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National Aeronautics and
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Lyndon B. Johnson Space Center
Houston, Texas 77058

DMS-DR-2346
NASA CR-151,385

VOLUME 1 OF 3

RESULTS OF SRB SEPARATION TESTS

USING THE 0.010-SCALE SSV MODEL 75-OTS IN

THE AEDC VKF TUNNEL A

(IA142)

SPACE SHUTTLE AEROTHERMODYNAMIC DATA REPORT

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(IA142)

by

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Prepared under NASA Contract Number NAS9-13247

by

Data Management Services
Chrysler Corporation Michoud Defense-Space Division
New Orleans, La. 70189

for

Engineering Analysis Division
Johnson Space Center
National Aeronautics and Space Administration
Houston, Texas

WIND TUNNEL TEST SPECIFICS:

Test Number: AEDC VKF V41A-K1A
NASA Series Number: IA142
Model Number: 75-OTS
Test Dates: August 11 through August 18, 1976
Occupancy Hours: 63.6

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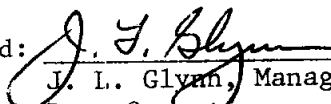
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ABSTRACT

An experimental investigation (test IA142) was conducted in the AEDC/VKF Tunnel A from August 11 through August 18, 1976. The objective was to obtain proximity force and moment data for the orbiter/external tank and SRBs with booster separation motor (BSM) plume effects. Six-component force and moment data were obtained on the orbiter/ET and four-component force and moment data were obtained on each SRB. BSM plumes were simulated with high pressure air exhausting through specially designed nozzles.

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NOMENCLATURE

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
AEDC		Arnold Engineering Development Center
b_{ref}	BREF	reference span, in.
BSM		booster separation motor
C_A	CA	axial force coefficient
C_l	CBL	body axis rolling moment coefficient
C_m	CLM	pitching moment coefficient
C_{m_j}	CLMJ	BSM thrust pitching moment coefficient
C_{m_T}	CLMT	pitching moment coefficient due to both BSM thrust and aerodynamic effects
C_n	CYN	body axis yawing moment coefficient
C_{n_j}	CYNJ	BSM thrust body axis yawing moment coefficient
C_{n_T}	CYNT	body axis yawing moment coefficient due to both BSM thrust and aerodynamic effects
C_N	CN	normal force coefficient
C_{N_j}	CNJ	BSM thrust normal force coefficient
C_{N_T}	CNT	normal force coefficient due to both BSM thrust and aerodynamic effects
C_{PB1}, C_{PB2}	CPB1, CPB2	base pressure coefficients
C_{P_c}	CPC	balance cavity pressure coefficient
C_{ref}	CREF	reference chord, in.
C_Y	CY	side force coefficient
C_{Y_j}	CYJ	BSM thrust side force coefficient
C_{Y_T}	CYT	side force coefficient due to both BSM thrust and aerodynamic effects

NOMENCLATURE (Continued)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
CTS		captive trajectory system
ET		external tank
l_{ref}	LREF	reference length, in.
M_{∞}	MACH	freestream Mach number
MRP		moment reference point
P_{B1}, P_{B2}	PB1, PB2	model base pressures, psia
P_c	PC	model cavity pressures, psia
P_o	PO	tunnel stilling chamber pressure, psia
P_{∞}	P	freestream static pressure, psia
q_{∞}	Q(P _{PSF}), Q(P _{PSI})	freestream dynamic pressure, psfa, psia
Re/ft	RE/L	unit Reynolds number, per foot
S_{ref}	SREF	reference area, ft. ²
SRB		solid rocket booster
SSV		Space Shuttle Vehicle
T_o	TO	tunnel stilling chamber temperature, °R
T_{∞}	T	freestream static temperature, °R
VKF		von Karman Facility
$X_{MRP_o/ET}$	XMRP	longitudinal location of mated orbiter and ET MRP, in. X_T
$X_{MRP_{SRB}}$	XMRP	longitudinal location of SRB MRP, in. X_S
X_o	XO	orbiter longitudinal station, in.
X_S, X_B	XS	SRB longitudinal station, in.

NOMENCLATURE (Continued)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
X_T	XT	ET longitudinal station, in.
$Y_{MRP_{O/ET}}$	YMRP	lateral location of mated orbiter and ET MRP, in. Y_T
$Y_{MRP_{SRB}}$	YMRP	lateral location of SRB MRP, in. Y_S
Y_O	YO	orbiter lateral station, in.
Y_S	YS	SRB lateral station, in.
Y_T	YT	ET lateral station, in.
$Z_{MRP_{O/ET}}$	ZMRP	vertical location of mated orbiter and ET MRP, in. Z_T
$Z_{MRP_{SRB}}$	ZMRP	vertical location of SRB MRP, in. Z_S
Z_O	ZO	orbiter vertical station, in.
Z_S	ZS	SRB vertical station, in.
Z_T	ZT	ET vertical station, in.
$\alpha_{O/ET, O/T}$	ALPHA	mated orbiter and ET angle of attack, deg.
α_{SRB}	ALPHAB, ALPHAR	left, right SRB angle of attack, deg.
$\beta_{O/ET, O/T}$	BETA	mated orbiter and ET angle of sideslip, deg.
β_{SRB}	BETAB, BETAR	left, right SRB angle of sideslip, deg.
δ_a	AILLON	aileron deflection angle, deg.
δ_{BF}	BDFLAP	body flap deflection angle, deg.
δ_e	ELEVON	elevon deflection angle, deg.
Δ_X	X	longitudinal displacement of SRB nose parallel to the X_T axis, from its mated position with the orbiter and ET, positive downstream, in.

NOMENCLATURE (Continued)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>					
ΔY	Y, YR, YL	lateral displacement of right, right, left SRB nose parallel to the Y_T axis, from its mated position with the orbiter and ET, positive to port, in.					
ΔZ	Z	vertical displacement of SRB nose parallel to the Z_T axis, from its mated position with the orbiter and ET, positive down, in.					
$\Delta\alpha$	DALFA	incremental pitch angle between O/ET and SRB, degrees; $\Delta\alpha = \alpha_{SRB} - \alpha_{O/ET}$					
$\Delta\beta$	DBETA	incremental sideslip angle between O/ET and SRB, degrees; $\Delta\beta = \beta_{SRB} - \beta_{O/ET}$ (left SRB) $\Delta\beta = \beta_{O/ET} - \beta_{SRB}$ (right SRB)					
Δp	DEL P	pressure differential between throat tap and supply line on venturi used to measure mass flow to simulated separation engines; psia					
p_j	JET PC	chamber pressure of simulated BSM jets, psia					
-	LTFW, LTAFT	left SRB balance forward or aft gage temperature, $^{\circ}F$					
\dot{m}	<table border="0"> <tr> <td rowspan="2" style="font-size: 3em; vertical-align: middle;">{</td> <td>MDOT</td> <td>total mass flow measured by venturi, lb.-mass/sec.</td> </tr> <tr> <td>MTR, MTL</td> <td>total mass flow supplied to separation engines in right and left boosters, lb.-mass/sec.</td> </tr> </table>	{	MDOT	total mass flow measured by venturi, lb.-mass/sec.	MTR, MTL	total mass flow supplied to separation engines in right and left boosters, lb.-mass/sec.	
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	MTR, MTL	total mass flow supplied to separation engines in right and left boosters, lb.-mass/sec.					
p_a	PA	pressure in supply line to venturi, psia					
p_c	<table border="0"> <tr> <td rowspan="2" style="font-size: 3em; vertical-align: middle;">{</td> <td>PCHAR, PCHFR</td> <td>chamber pressures for right SRB aft or forward engines, psia</td> </tr> <tr> <td>PCHAL, PCHFL</td> <td>chamber pressures for left SRB aft or forward engines, psia</td> </tr> </table>	{	PCHAR, PCHFR	chamber pressures for right SRB aft or forward engines, psia	PCHAL, PCHFL	chamber pressures for left SRB aft or forward engines, psia	
{	PCHAR, PCHFR		chamber pressures for right SRB aft or forward engines, psia				
	PCHAL, PCHFL	chamber pressures for left SRB aft or forward engines, psia					

NOMENCLATURE (Concluded)

<u>SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>
ϕ	PHI, PHIL, PHIR	left, left, right SRB model roll angles, degrees
p_s	PSR, PSL	pressure in supply lines to separation engines on right or left booster, psia
-	RTFW, RTAFT	right SRB balance forward or aft gage temperature, °F
T_a	TA	temperature of air supplied to venturi, °R
ORB		orbiter
F_N		normal force (in Z direction), lbs.
F_Y		side force (lateral direction), lbs.
M_Y		pitching moment about Y axis, lbs.
M_Z		yawing moment about Z axis, lbs.

INTRODUCTION

The space shuttle solid rocket boosters (SRBs) have small separation motors (BSMs) in the extreme forward and aft sections which fire during separation of the SRBs from the O/ET. This action assures a positive separation sequence. A series of three wind tunnel tests was conducted in the AEDC/VKF Tunnel A on a 0.010-scale model of the space shuttle configuration during SRB separation, with BSM plumes simulated with air jets, to obtain proximity force and moment data for the orbiter, external tank, and SRBs. This report presents results from the second test, conducted from August 11 through August 18, 1976. Results from the first test (IA40) are given in reference 8 while reference 9 presents the third test (IA143) results.

Data were obtained at a Mach number of 4.5 and a Reynolds number of (1.68×10^6) . Test variables included orbiter/ET angles of attack and sideslip, SRB angles of attack and sideslip relative to the orbiter/ET; vertical, longitudinal, and lateral displacement of the SRBs from the simulated position; SRB roll angle; BSM plenum pressure; and Reynolds number.

Two base pressure measurements and one cavity pressure were obtained in addition to the basic force measurement. Model (75-OTS) was used for these tests.

Chrysler Data Management Services adjusted the original data while this data report was being prepared for publication. Data for coefficients C_Y , C_N , and C_ℓ in certain groups of runs were adjusted to correct a balance zero shift which occurred during the test. Details of the adjustment are in the Remarks section.

CONFIGURATIONS INVESTIGATED

The model was a 0.010 scale representation of the space shuttle launch vehicle, designated 75-OTS. A model 72-0 wing was used for simplicity because it was not instrumented as was the 75-0 wing but was otherwise identical to the 75-0 wing. The wing represented a 140 A/B configuration. The orbiter fuselage represented a 140C modified configuration. The external tank model was built to VC78-000002 lines with an isentropic nose spike. SRB models were built to VC77-000002 lines to represent a modified vehicle 5 configuration. Figure 2a shows the mated configuration. Figure 2b shows the orbiter configuration. Figures 2c through f show the external tank configuration and its protuberances. Orbiter to tank attach hardware and feedlines are shown in Figures 2g through i. The SRB is shown in Figure 2j. The models were fabricated from stainless steel and aluminum.

The mated orbiter and external tank were mounted on the VKF Tunnel A captive trajectory system in an upright position. The AEDC VY109478 bent sting was attached to the captive trajectory system strut and entered the model through the orbiter base where it attached to the AEDC 0.85-inch diameter 4.00-Y-36-049 internal strain gage balance. The orbiter and tank were rigidly attached to the orbiter. The SRB's were mounted on the tunnel primary support system using the Rockwell W-1137A model support assembly and W-1138A twin sting assembly. Forces and moments on each SRB were measured by AEDC 4-component flow-through balances (4.00-Y-34-069 in the left SRB and 4.00-Y-34-065 in the right SRB). Figure 2k shows

CONFIGURATIONS INVESTIGATED (Continued)

a sketch of the model installation. Figure 3 presents photographs of the installed models.

Booster separation motors (BSM) consisted of two four-nozzle clusters located at the forward and aft end of each SRB as shown on Figure 2j. Each nozzle was supplied with high pressure air through a common plenum for each cluster. The plenums were designed to provide simultaneous firing of the forward and aft nozzles with identical plenum pressures. Nozzle internal contours were designed to provide model plumes simulating full scale plumes. External contours were made to maintain similitude with full scale contours.

All three balances were calibrated by AEDC prior to the test. In-tunnel check loadings were performed after installation to insure total measurement system integrity. All transducers or thermocouples used to measure base, cavity, sting, model plenum pressures and mass flow were calibrated prior to the test.

Prior to the test, after the models were installed in the test chamber, sting pressure was calibrated as a function of forward and aft plenum pressures for each SRB model. A calibration of balance forces and moments and mass flow as functions of sting pressure was then performed for each SRB model. These calibrations yielded thrust tares for each balance component and the average thrust for each BSM nozzle. Operating pressures for the test were then defined using these thrust calibrations.

CONFIGURATIONS INVESTIGATED (Continued)

The orbiter model was designated as ORB, where:

$$\text{ORB} = \text{B}_{62} \text{C}_{12} \text{E}_{44} \text{F}_{10} \text{M}_{16} \text{R}_5 \text{N}_{89} \text{N}_{103} \text{V}_8 \text{W}_{116}$$

The individual orbiter components were defined as follows:

<u>Component</u>	<u>Definition</u>	<u>Reference Drawing</u>
B ₆₂	Body	VL70-000140C -202C, -205A, -200B, -203A
C ₁₂	Canopy	VL70-000140C -202B, -204
E ₄₄	Elevon	SAS/AERO/73-344
F ₁₀	Body Flap	VL70-000140C, VL70-355114
M ₁₆	OMS Pod	VL70-008401, VL70-008410
N ₈₉	OMS Nozzles	SS-A01279
N ₁₀₃	MPS Nozzles	SS-A01687
R ₅	Rudder	VL70-000146B, VL70-000095
V ₈	Vertical Tail	VL70-000140C, VL70-000146B
W ₁₁₆	Wing	VL70-000140A/B, VL70-000200

The external tank was designated as ET, where:

$$\text{ET} = \text{T}_{35} \text{AT}_{28} \text{AT}_{130} \text{AT}_{131} \text{FL}_{10} \text{FL}_{11} \text{FR}_{10} \text{FR}_{14} \text{FR}_{15} \text{FR}_{16} \text{FR}_{17} \\ \text{FR}_{18} \text{FR}_{19} \text{PT}_{23} \text{PT}_{25} \text{PT}_{26} \text{PT}_{29} \text{PT}_{33} \text{PT}_{39}$$

<u>Component</u>	<u>Description</u>
AT ₂₈	Aft O/ET attach structure per VL78-000063, VL78-000062B.
AT ₁₃₀	Forward O/ET attach structure, per ICD-2-00001, Rev. B.
AT ₁₃₁	Aft O/ET attach structure cross-member, per ICD-2-00001, Rev. B.

CONFIGURATIONS INVESTIGATED (Continued)

<u>Component</u>	<u>Description</u>
FL ₁₀	LH ₂ feedline per VL78-000063, VL78-000062B, VC78-0000 2.
FL ₁₁	LO ₂ feedline per VL78-000063, VL78-000062B, VC78-0000 2.
FR ₁₀	Fairing, per VL78-000063, VL78-000062B, Martin-Mariet a 82600207000, VC78-000002
FR ₁₄	ET nose cable fairing.
FR ₁₅	ET nose fairing for PT ₃₉
FR ₁₆	LO ₂ feedline (FL ₁₁) fairing.
FR ₁₇	LO ₂ antigeysers-line (PT ₂₃) fairing.
FR ₁₈	Aft electrical-conduit (PT ₂₅) fairing.
FR ₁₉	LH ₂ pressure line (PT ₃₃) fairing.
PT ₂₃	LO ₂ recirculation line per VL78-000063, VL78-000062B, Martin-Marietta 82600207000, VC78-000002
PT ₂₅	Aft electrical line, per VL78-000063, VL78-000062B, Martin-Marietta 82600207000, VC78-000002
PT ₂₆	LO ₂ pressure line, per VL78-000063, VL78-000062B, Martin-Marietta 82600207000
PT ₂₉	Electrical conduit, per ICD-2-00001, Revision B.
PT ₃₃	LH ₂ pressure line per ICD-2-00001, Revision B.
PT ₃₉	ET nose probe, per ICD-2-00001, Revision B.
T ₃₅	Modified Vehicle 5 external tank per VC78-000002

The solid rocket booster was designated as:

SRB = S₂₄ N₁₀₁ N₁₀₂ N₁₀₆ PS₂₀ PS₂₆ PS₂₇ PS₂₈ PS₂₉ PS₃₁ PS₃₂
 PS₃₃ PS₃₄ PS₃₅

CONFIGURATIONS INVESTIGATED (Concluded)

where:

<u>Component</u>	<u>Description</u>
N ₁₀₁	Forward booster separation motor nozzle block. Reference: ICD-2-00001, Revision B (Model Drawing (SS-A01690)).
N ₁₀₂	Aft booster separation motor nozzle block. Reference: ICD-2-00001, Revision B (Model Drawing (SS-A01690)).
N ₁₀₆	SRB nozzle, per VL77-000066, VC77-000002D.
PS ₂₀	Electrical cable tunnel, per ICD-2-00001. Revision B.
PS ₂₆	SRB aft attach ring, per ICD-2-00001, Revision B.
PS ₂₇	SRM nozzle actuator struts, per ICD-2-00001, Revision B.
PS ₂₈	Aft booster separation motor fairing, per ICD-2-00001, Revision B.
PS ₂₉	Tiedown struts (4) per ICD-2-00001, Revision B.
PS ₃₁	Command antenna (2) per ICD-2-00001, Revision B.
PS ₃₂	Data capsule and camera, per ICD-2-00001, Revision B.
PS ₃₃	Intermediate structural rings (3), per ICD-2-00001, Revision B.
PS ₃₄	Aft cable housing, per ICD-2-00001, Revision B.
PS ₃₅	Aft structural ring, per ICD-2-00001, Revision B.
S ₂₄	Modified Vehicle 5 Solid Rocket Booster body.

TEST FACILITY DESCRIPTION

Arnold Engineering Development Center (AEDC) is an Air Force facility located in Tullahoma, Tennessee. The tunnel used, Tunnel A, is in the von Karman facility. Engineering and other technical operations in this tunnel are conducted by contractor personnel of ARO, Inc.

Tunnel A is a 40 x 40-in., continuous, closed circuit, variable density, supersonic wind tunnel with a Mach number range of 1.5 to 6.0.

The tunnel is served by the main compressor system which provides a wide range of mass flows and stagnation pressures up to a maximum of 200 psia.

The model may be injected into the tunnel for a test run and then retracted for model cooling or model changes without interrupting the tunnel flow.

DATA REDUCTION

Standard AEDC methods for computing tunnel parameters, balance force and moments, and model attitudes were used. Six-component force and moment data were recorded and reduced for the orbiter/external tank balance. Base and cavity pressure coefficients were computed but corrections were not applied to the balance data. Four-component force and moment data were recorded and reduced for each SRB balance. Thrust tares were removed from these data and coefficients were calculated for each SRB both with and without BSM thrust. Base and cavity pressures were not measured. Attitude and position of all three model components were corrected for sting/balance deflections.

The following reference dimensions were used:

<u>Symbol</u>	<u>Description</u>	<u>Model Scale</u>	<u>Full Scale</u>
$\lambda_{ref}, C_{ref}, b_{ref}$	reference length, chord, span, in.	12.903	1290.3
S_{ref}	reference area, ft. ²	0.269	2690.0
$X_{MRP_{O/ET}}$	orbiter/ET longitudinal location of MRP, in. X_T	10.97	1097.0
$X_{MRP_{SRB}}$	SRB longitudinal location of MRP, in. X_S	12.585	1258.5
$Y_{MRP_{O/ET}}$	orbiter/ET lateral location of MRP, in. Y_T	0.0	0.0
$Y_{MRP_{SRB}}$	SRB lateral location of MRP, in. Y_S	0.0	0.0
$Z_{MRP_{O/ET}}$	orbiter/ET vertical location of MRP, in. Z_T	4.50	450.0
$Z_{MRP_{SRB}}$	SRB vertical location of MRP, in. Z_S	4.00	400.0

REMARKS

Several changes were made to the test hardware and the tunnel installation from the initial entry (test IA40).

- (1) A clutch-face yaw adapter replaced the yaw pin/plate used with the W-1115-S-3 housing. The clutch-face was fabricated by AEDC and provided for 5-degree yaw increments.
- (2) A longer docking spike was fabricated by AEDC to facilitate docking measurements for $\Delta\alpha = -8^\circ$ test conditions.
- (3) As a means of decreasing blockage, a new sting arrangement was investigated for mounting the O/ET to the CTS. This change moved the O/ET up in the wind tunnel relative to the CTS so that the separation rig could be raised toward the centerline of the wind tunnel.
- (4) Marotta valves were installed in the high pressure air supply lines to each SRB. These valves provided the capability of running jet-on for either one or both SRBs.

The following test anomalies were observed during test IA142:

- (1) Tunnel Blockage. Blockage was encountered at $\alpha_{O/T} = 15$, $\beta_{O/T} = 15$ at $\Delta\alpha$'s of 0 and -4 degrees when both left and right BSM jets were on. This problem was avoided by obtaining jet-on data at these α , β conditions for only one BSM operating at any time.

No other blockage conditions were encountered, even at the same combinations of $\alpha_{O/T}$ and $\beta_{O/T}$ where blockage occurred

REMARKS (Continued)

during IA40. It is believed that this is due to the change in model installation which permitted the SRBs to be located closer to the center of the wind tunnel.

- (2) Mass Flow System. Marotta valves were installed in the mass flow system to provide for on/off operation of the BSM jets. Unexpected large flow restrictions through these valves made it necessary to install a second set of Marotta valves in parallel with the first. Even with two valves for each SRB, a pressure level of 1500 psi could not be obtained in the SRB stings. Therefore, 1500 psi data were obtained with the Marotta valves removed from the system.
- (3) Thrust calibrations: Repeat thrust calibrations during the 4th shift of the test did not agree with previous calibrations. During the 5th shift, a ruptured filter was located in the high pressure air system and was replaced. Following the 5th shift, the SRB models were removed from the stings and disassembled. Large concentrations of fine dirt particles were removed from the air system. A few broken pieces of O-ring were also removed from in between the model balance adapter and the outer shell. After this, thrust calibrations again repeated those obtained prior to the test. The effect of the disagreement between thrust calibrations on coefficient accuracy will be assessed during post-test data analysis.

REMARKS (Concluded)

- (4) A balance zero shift occurred in two increments, about 100 counts for groups 475-619 and 130 counts for groups 620-1108. Chrysler Data Management Services was notified of the shift in October 1977 (ref. 10). Accordingly, an adjustment to the orbiter/external tank aerodynamic coefficients was made by subtracting the following increments from the original data:

	C_Y	C_n	C_l
Groups 475-619	0.020	-0.003	0.004
Groups 620-1108	0.032	-0.005	0.007

Adjusted data are published in this report.

REFERENCES

1. NA-73-435, "Structural Analysis of the 0.010-Scale #32-OTS SSV Model, Appendix E," dated May 17, 1976.
2. SAS/AERO/74-588, "Test Requirements for the Booster Separation Test IA40," dated August 14, 1974.
3. SAS/AERO/76-164, "Booster Separation Motor Model Design for Test IA40A," dated March 26, 1976.
4. SAS/WTO/74-186, Addendum #5, "Model Design Information for the 0.010-Scale SSV Model 32-OTS, Task 23 (Test IA40), AEDC Tunnel A," dated November 24, 1975.
5. SAS/WTO/74-186, Addendum #6, "Calibration Requirements for Model 75-OTS SRB Model High Pressure Air System for Test IA40A," dated April 22, 1976.
6. SAS/WTO/74-186, Addendum #7, "Additional Model Design Requirements for SRB Model 72-OTS/75-OTS Test IA40A at AEDC, Tunnel A," dated April 29, 1976.
7. SD76-SH-0126, "Pretest Information for SRB Separation Tests IA40 and IA142 Using the 0.010-Scale SSV Model 75-OTS in the AEDC VKF Tunnel A," dated May 28, 1976.
8. DMS-DR-2293, "Results of SRB Separation Tests Using the 0.010-Scale SSV Model 75-OTS in the AEDC VKF Tunnel A (IA40)."
9. DMS-DR-2354, "Results of SRB Separation Tests Using the 0.010-Scale SSV Model 75-OTS in the AEDC VKF Tunnel A (IA143)."
10. Letter from T. Best, proj. eng., Aero. Proj. Branch, ARO, Inc., AEDC, Arnold AFS, Tenn., to J. E. Vaughn, Chrysler Corp. (Huntsville Electronics), Huntsville, Ala., dated Oct. 4, 1977

TABLE I.

TEST : IA142		DATE :	
TEST CONDITIONS			
MACH NUMBER	REYNOLDS NUMBER ($Re \times 10^{-6}$) per foot	DYNAMIC PRESSURE (psfa)	STAGNATION TEMPERATURE (degrees Fahrenheit)
4.5	1.68	166	160
BALANCE UTILIZED: <u>Orbiter/Tank - AEDC 0.85-inch diameter 4.00-Y-36 049</u> <u>SRB - 0.625-inch diameter flow through balance</u>			
	<u>ORBITER/TANK</u> CAPACITY:	<u>SRB</u> CAPACITY	COEFFICIENT TOLERANCE
Normal Force	200 lb	125 lb	---
Axial Force	50 lb	--	---
Side Force	200 lb	125 lb	---
Pitching Moment	310 in-lb	451 in-lb	---
Rolling Moment	100 in-lb	--	---
Yawing Moment	310 in-lb	451 in-lb	---
COMMENTS:			

TABLE II.

SRB JETS OFF

1 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_0	β_0	α_B	β_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VT001	ORB/ET/2SRB's	0	0	0	0	0	0	0	L	0	371	373				
02									M		372	374				
03									N		377	400				
04									P		398	401				
05									Q		399	402				
06					-4		-4		N		407	410				
07									N		432	437				
08									P		408	411				
09									P		-	438				
10									Q		409	412				
11									Q		436	439				
12					-8		-8		R				450	453		
13									R					472		
14									S				451	454		
15									S					473		
16									T				452	455		
17									T					474		

TEST RUN NUMBERS

22

$L = 400, 300, 250, 200, 175, 150, 125, 100, 75, 50, 25, 0, -50, -100, -200$
 $M = -100, -50, 0, 25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 400$
 $N = 400, 300, 250, 200, 175, 150, 125, 100, 75, 50$
 $P = 25, 0, -50, -100, -200, -100, -50, 0, 50$
 $Q = 75, 100, 125, 150, 175, 200, 250, 300, 400$

$R = 400, 300, 250, 200, 175, 150, 125, 100$
 $S = 75, 50, 25, 0, 25, 50, 75, 100$
 $T = 125, 150, 175, 200, 250, 300, 400$

α OR β
SCHEDULES

Coefficient schedule on P. 120.

TABLE II. (Continued)

SRB JETS OFF

2 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z VERTICAL SEPARATION DIST.					
		α	β	d_p	β_p	d_d	$d\beta$	Y	X	P_c	0	50	75	100	150	200
-VTO18	ORB/ET/2SRB's	0	0	0	4	0	4	200	U	0	475	476		477		478
19					2		2	100			479	480		481		482
20					2		2	150			483	484		485		486
21					0		0	0			487	488		489		490
22					0		0	50			491	492		493		494
23					0		0	100			495	496		497		498
24					-2		-2	0			499	500		501		502
25					-2		-2	50			503	504		505		506
26					-2		-2	100			507	508		509		510
27					-4	4	-4	4	200		620	621		622		623
28					2		2	100			624	625		626		627
29					2		2	150			628	629		630		631
30					0		0	0			632	633		634		635
31					0		0	50			636	637		638		639
32					0		0	100			640	641		642		643
33					-2		-2	0			644	645		646		647
34					-2		-2	50			648	649		650		651
35					-2		-2	100			652	653		654		655

TEST RUN NUMBERS

23

α OR β
SCHEDULES

TABLE II. (Continued)

SRE JETS OFF

3 JFY

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76					
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.						
		α	β	d_s	β_s	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200	
-VTO36	ORB/ET/2SRB's	C	D	-8	4	-8	4	200	A	0				753	754	755	
37					2		2	100						756	757	758	
38					2		2	150						759	760	761	
39					0		0	0						762	763	764	
40					0		0	50						765	766	767	
41					0		0	100						768	769	770	
42					-2		-2	0						771	772	773	
43					-2		-2	50						774	775	776	
44			↓	↓	-2		↓	-2	100					777	778	779	
45				10	0	14	0	4	200			2067	2013		2014	2015	
46						12		2	100			2068	2016		2017	2018	
47						12		2	150			2069	2019		2020	2021	
48						10		0	0			2070	2022		2023	2024	
49						10		0	50			2071	2025		2026	2027	
50						10		0	100			2072	2028		2029	2030	
51						8		-2	0			2073	2031		2032	2033	
52						8		-2	50			2074	2034		2035	2036	
53			↓	↓	↓	8		↓	-2	100	↓	↓	2075	2037		2038	2039

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

SRB JETS OFF

4 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_0	β_0	α_B	β_B	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
VT054	ORB/ET/2SRB's	0	10	-4	14	-4	4	200	A	0	2076			2077		2078
55					12		2	100			2079			2080		2081
56					12		2	150			2082			2083		2084
57					10		0	0			2085			2086		2087
58					10		0	50			2088			2089		2090
59					10		0	100			2091			2092		2093
60					8		-2	0			2094			2095		2096
61					8		-2	50			2097			2098		2099
62					8		-2	100			2100			2101		2102
63					-8	14	-8	4	200					2130	2131	2132
64						12		2	100					2133	2134	2135
65						12		2	150					2136	2137	2138
66						10		0	0					2139	2140	2141
67						10		0	50					2142	2143	2144
68						10		0	100					2145	2146	2147
69						8		-2	0					2148	2149	2150
70						8		-2	50					2151	2152	2153
71						8		-2	100					2154	2155	2156

A - 100 200 300 400 500 600 700 800 900 1000

α OR β
SCHEDULES

25

TABLE II. (Continued)

SRB JETS OFF

5 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB'S		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_0	β_0	d_B	β_B	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
-VT072	ORB/ET/2SRB'S	10	0	10	4	0	4	200	A	0	2184			2185		2186
73					2		2	100			2187			2188		2189
74					2		2	150			2190			2191		2192
75					0		0	0			2193			2194		2195
76					0		0	50			2196			2197		2198
77					0		0	100			2199			2200		2201
78					-2		-2	0			2202			2203		2204
79					-2		-2	50			2205			2206		2207
80					-2		-2	100			2208			2209		2210
81				6	4	-4	4	200			2238			2239		2240
82					2		2	100			2241			2242		2243
83					2		2	150			2244			2245		2246
84					0		0	0			2247			2248		2249
85					0		0	50			2250			2251		2252
86					0		0	100			2253			2254		2255
87					-2		-2	0			2257			2258		2259
88					-2		-2	50			2260			2261		2262
89					-2		-2	100			2263			2264		2265

TEST RUN NUMBERS

26

A= 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

SRB JETS OFF

6 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α	β	α_B	β_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VTO90	ORB/ET/2SRB's	10	10	10	14	0	4	200	A	0	891	892		893		894
91					12		2	100			895	896		897		898
92					12		2	150			899	900		901		902
93					10		0	0			903	904		905		906
94					10		0	50			907	908		909		910
95					10		0	100			911	912		913		914
96					8		-2	0			915	916		917		918
97					8		-2	50			919	920		921		922
98					8		-2	100			923	924		925		926
99					6	14	-4	4	200		1035	1036		1037		1038
100					12		2	100			1039	1040		1041		1042
101					12		2	150			1045	1046		1047		1048
102					10		0	0			1049	1050		1051		1052
102					10		0	50			1053	1054		1055		1056
104					10		0	100			1057	1058		1059		1060
105					8		-2	0			1061	1062		1063		1064
106					8		-2	50			1065	1066		1067		1068
107					8		-2	100			1069	1070		1071		1072

27

α OR β
SCHEDULES

TABLE II. (Continued)

SRB JETS OFF

7 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY									DATE: 9/14/76					
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α	β	d_B	β_B	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
-VT108	ORB/ET/2SRB's	10	10	2	14	-8	4	200	A	0				1850	1851	1852
109					12		2	100						1853	1854	1855
110					12		2	150						1856	1857	1858
111					10		0	0						1859	1860	1861
112					10		0	50						1862	1863	1864
113					10		0	100						1865	1866	1867
114					8		-2	0						1868	1869	1870
115					8		-2	50						1871	1872	1873
116		↓		↓	8	↓	-2	100						1874	1875	1876
117		-10		-10	14	0	4	200			1150	1151	1152		1153	
118					12		2	100			1154	1155	1156		1157	
119					12		2	150			1158	1159	1160		1161	
120					10		0	0			1162	1163	1164		1165	
121					10		0	50			1166	1167	1168		1169	
122					10		0	100			1170	1171	1172		1173	
123					8		-2	0			1174	1175	1176		1177	
124					8		-2	50			1178	1179	1180		1181	
125		↓	↓	↓	8	↓	-2	100	↓	↓	1182	1183	1184		1185	

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

SRB JETS OFF

8 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	C/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α_a	β_a	α_b	β_b	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
VT126	ORB/ET/2SRB's	-10	10	-14	14	-4	4	200	A	0		1904		1905		1906
127					12		2	100				1907		1908		1909
128					12		2	150				1910		1911		1912
129					10		0	0				1913		1914		1915
130					10		0	50				1916		1917		1918
131					10		0	100				1919		1920		1921
132					8		-2	0				1922		1923		1924
133					8		-2	50				1925		1926		1927
134					8		-2	100				1928		1929		1930
135					-18	14	-8	4	200				1959	1960		1961
136					12			2	100				1962	1963		1964
137					12			2	150				1965	1966		1967
138					10			0	0				1968	1969		1970
139					10			0	50				1971	1972		1973
140					10			0	100				1974	1975	1976	
141					8			-2	0				1977	1978	1979	
142					8			-2	50				1980	1981	1982	
143					8			-2	100				1983	1984	1985	

TEST RUN NUMBERS

A- 400 200 100 50 0 -150 -200

α OR β
SCHEDULES

29

TABLE II. (Continued)

SRB JETS OFF

9 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α	β	d_a	P_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
-VT144	ORB/ET/2SRB's	15	15	15	19	0	4	200	A	0	1366	1367		1368		1369
145					17		2	100			1370	1371		1372		1373
146					17		2	150			1374	1375		1376		1377
147					15		0	0			1378	1379		1380		1381
148					15		0	50			1382	1383		1384		1385
149					15		0	100			1386	1387		1388		1389
150					13		-2	0			1390	1391		1392		1393
151					13		-2	50			1394	1395		1396		1397
152					13		-2	100			1398	1399		1400		1401
153					11		-4	4	200		1476	1477		1478		1479
154					17		2	100			1480	1481		1482		1483
155					17		2	150			1484	1485		1486		1487
156					15		0	0			1531	1532		1533		1534
157					15		0	50			1492	1493		1494		1495
158					15		0	100			1496	1497		1498		1499
159					13		-2	0			1500	1501		1502		1503
160					13		-2	50			1504	1505		1506		1507
161					13		-2	100			1508	1509		1510		1511

TEST RUN NUMBERS

30

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

SRB JETS OFF

10 JEV

TEST: IA142

DATA SET/RUN NUMBER COLLATION SUMMARY

DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB:		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α	β	α_B	β_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VT 162	ORB/ET/2SRB's	15	15	7	19	-8	4	200	A	0				1625	1626	1627
163					17		2	100						1628	1629	1630
164					17		2	150						1631	1632	1633
165					15		0	0						1652	1653	1654
166					15		0	50						1655	1656	1657
167					15		0	100						1658	1659	1660
168					13		-2	0						1643	1644	1645
169					13		-2	50						1646	1647	1648
170		Y		Y	13	Y	-2	100						1649	1650	1651
171		-15		-15	19	0	4	200			1730	1731	1732		1733	
172					17		2	100			1734	1735	1736		1737	
173					17		2	150			1738	1739	1740		1741	
174					15		0	0			1742	1743	1744		1745	
175					15		0	50			1746	1747	1748		1749	
176					15		0	100			1750	1751	1752		1753	
177					13		-2	0			1754	1755	1756		1757	
178					13		-2	50			1758	1759	1760		1761	
179		Y	Y	Y	13	Y	-2	100	Y	Y	1762	1763	1764		1765	

TEST RUN NUMBERS

A = 400 200 100 50 0 -50 -100 -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

11 JEV

TEST: IA 142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB %		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_c	β_c	α_B	β_B	Δd	ΔB	Y	X	P_c	0	50	75	100	150	200
VT501	ORB/ET/2SRB's	0	0	0	0	0	0	0	L	1225	375	377				
502									M		376	378				
503									N		385	388				
504									P		386	380				
505									Q		387	390				
506				-4		-4			N		413	416				
507									N		440	443				
508									P		414	417				
509									P		441	444				
510									Q		415	418				
511									Q		442	445				
512				-8		-8			R				459	456		
513									R				-	469		
514									S				-	457		
515									S				-	470		
516									T				460	458		
517									T				-	471		

TEST RUN NUMBERS

32

L = 400, 300, 250, 200, 175, 150, 125, 100, 75, 50, 25, 0, -50, -100, -200
M = -100, -50, 0, 25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 400
N = 400, 300, 250, 200, 175, 150, 125, 100, 75, 50
P = 25, 0, -50, -100, -200, -100, -50, 0, 50
Q = 75, 100, 125, 150, 175, 200, 250, 300, 400

R = 400, 300, 250, 200, 175, 150, 125, 100
S = 75, 50, 25, 0, 25, 50, 75, 100
T = 125, 150, 175, 200, 250, 300, 400

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

12 JEV

TEST: IA 142		DATA SET/RUN NUMBER COLLATION SUMMARY									DATE: 9/14/76					
DATA SET IDENTIFIER	CONFIGURATION	O/T SRB's				SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_c	β_c	α_B	β_B	$\Delta \alpha$	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
	ORB/ET/2SRB's															
VT 518		0	0	0	4	0	4	200	U	642	511	512		513		514
519										1225	547	548		549		550
520										1500	583	584		585		586
521					2		2	100		642	515	516		517		518
522										1225	551	552		553		554
523										1500	587	588		589		590
524								150		642	519	520		521		522
525										1225	555	556		557		558
526										1500	591	592		593		594
527					0		0	0		642	523	524		525		526
528										1225	559	560		561		562
529										1500	595*	597		598		599
530							0	50	U	642	527	528		529		530

TEST RUN NUMBERS

33

$\Delta = 400, 200, 100, 0$
 $U = 400, 100, 0$

α OR β
 SCHEDULES

TABLE II. (Continued)

RTH RE TESTS ON

13 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76					
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.						
		α_0	β_0	d_0	β_0	αd	$\alpha \beta$	Y	X	P_c	0	50	75	100	150	200	
VT531	ORB/ET/2SRB's	0	0	0	0	0	0	50	U	1225	563	564		565		566	
532								50	A	1500	600	601		602		603	
533								100	U	642	531	532		533		534	
534									U	1225	567	568		569		570	
535									A	1500	604	605		606		607	
536					-2			-2	0	A	642	535	536		537		538
537										1225	571	572		573		574	
538										1500	608	609		610		611	
539								50		642	539	540		541		542	
540										1225	575	576		577		578	
541										1500	612	613		614		615	
542								100		642	543	544		545		546	
543										1225	579	580		581		582	
544										1500	616	617		618		619	

TEST RUN NUMBERS

34

A = 400, 200, 100, 50, 0, -150, -200
 U = 400, 100, 0

α OR β
 SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

14 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.						
		α	β	α_R	β_R	Δd	ΔB	Y	X	P_c	0	50	75	100	150	200	
	ORB/ET/2SRB's																
VT-545		0	0	-4	4	-4	4	200	U	642	656	657		658		659	
546										1225	692	693		694		695	
547										1500	728	729		730		731	
548					2		2	100		642	660	661		662		663	
549										1225	696	697		698		699	
550										1500	732	733		734		735	
551								150		642	664	665		666		667	
552										1225	700	701		702		703	
553										1500	736	737		738		739	
554					0		0	0		642	668	669		670		671	
555										1225	704	705		706		707	
556										A, U*	740*	741		742		743	
557								0	50	U	642	672	673		674		675

TEST RUN NUMBERS

35

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

15 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α	β	d_a	β_a	d_{α}	d_{β}	γ	X	P_c	0	50	75	100	150	200
VT 558	ORB/ET/2SRB's	0	0	-4	0	-4	0	50	U	1225	708	709	710		711	
559								50	A	1500	744	745	746		747	
560								100	A	642	676	677	678		679	
561									A	1225	712	713	714		715	
562									A	1500	877	878	879		880	
563					-2	-2	0		A	642	680	681	682		683	
564									A	1225	716	717	718		719	
565									A	1500	865	866	867		868	
566								50	A	642	684	685	686		687	
567									A	1225	720	721	722		723	
568									A	1500	869	870	871		872	
569								100	A	642	688	689	690		691	
570									A	1225	724	725	726		727	
571									A	1500	873	874	875		876	

TEST RUN NUMBERS

36

A= 400, 200, 100, 50, 0, -150, -200
 U= 400, 100, 0

α OR β
 SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

16 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS				Z. VERTICAL SEPARATION DIST.						
		α_a	β_a	α_b	β_b	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
	ORB/ET/2SRB's															
VT 572		0	0	-8	4	-8	4	200	A	642				780	781	782
573										1225				810	811	812
574					↓		↓	↓		1500				837	838	839
575					2		2	100		642				786	787	788
576										1225				813	814	815
577									↓	1500				840	841	842
578								150		642				789	790	791
579										1225				816	817	818
580					↓		↓	↓		1500				843	844	845
581					0		0	0		642				792	793	794
582										1225				819	820	821
583									↓	1500				847	848	849
584		↓	↓	↓	↓	↓	↓	50	↓	642				795	796	797

TEST RUN NUMBERS

37

α OR β
SCHEDULES

TABLE II. (Continued)

8074 ORB JET: DN

17 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z. VERTICAL SEPARATION DIST.					
		α_a	β_a	α_b	β_b	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
VT585	ORB/ET/2SRB's	0	0	-8	0	-8	0	50	A	1225				822	823	824
586								50		1500				850	851	852
587								100		642				798	799	800
588										1225				825	826	827
589										1500				853	854	855
590					-2		-2	0		642				801	802	803
591										1225				828	829	830
592										1500				856	857	858
593								50		642				804	805	806
594										1225				831	832	833
595										1500				859	860	861
596								100		642				807	808	809
597										1225				834	835	836
598										1500				862	863	864

TEST RUN NUMBERS

38

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

18 JFY

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY									DATE: 9/14/76					
DATA SET IDENTIFIER	CONFIGURATION	C/T SRB:				SEPARATION PARAMETERS					Z VERTICAL SEPARATION DIST.					
		α_c	β_c	α_B	β_B	α_d	α_B	Y	X	P_c	0	50	75	100	150	200
VT 599	ORB/ET/2SRB:	0	10	-8	14	-8	4	200	A	1225				2157	2158	2159
600					12		2	100						2160	2161	2162
601					12		2	150						2163	2164	2165
602					10		0	0						2166	2167	2168
603					10		0	50						2169	2170	2171
604					10		0	100						2172	2173	2174
605					8		-2	0						2175	2176	2177
606					8		-2	50						2178	2179	2180
607		↓	↓	↓	8		-2	100						2181	2182	2183
608		10	0	6	4	-4	4	200			2293			2294		2295
609					2		2	100			2269			2270		2271
610					2		2	150			2272			2273		2274
611					0		0	0			2275			2276		2277
612					0		0	50			2278			2279		2280
613					0		0	100			2281			2282		2283
614					-2		-2	0			2284			2285		2286
615					-2		-2	50			2287			2288		2289
616		↓	↓	↓	-2		-2	100			2290			2291		2292

TEST RUN NUMBERS

39

A: 400 200 100 50 0 -50 200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

19 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	Q/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION Dist.					
		α_c	β_c	α_B	β_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VT 617	CRB/ET/2SRB's	10	0	10	4	0	4	200	A	1225	2211			2212		2213
618					2		2	100			2214			2215		2216
619					2		2	150			2217			2218		2219
620					0		0	0			2220			2221		2222
621					0		0	50			2223			2224		2225
622					0		0	100			2226			2227		2228
623					-2		-2	0			2229			2230		2231
624					-2		-2	50			2232			2233		2234
625					-2		-2	100			2235			2236		2237
626		10	10	2	14	-8	4	200						1877	1878	1879
627					12		2	100						1880	1881	1882
628					12		2	150						1883	1884	1885
629					10		0	0						1886	1887	1888
630					10		0	50						1889	1890	1891
631					10		0	100						1892	1893	1894
632					8		-2	0						1895	1896	1897
633					8		-2	50						1898	1899	1900
634					8		-2	100						1901	1902	1903

TEST RUN NUMBERS

40

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

20 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α	β	d_{α}	β_{β}	d_{α}	d_{β}	Y	X	P_c	0	50	75	100	150	200
	ORB/ET/2SRB's															
-VT635		10	10	10	14	0	4	200	A	642	927	928		929		930
636										1225	963	964		965		966
637					↓					1500	999	1000		1001		1002
638					12		2	100		642	931	932		933		934
639										1225	967	968		969		970
640										1500	1003	1004		1005		1006
641								150		642	935	936		937		938
642										1225	971	972		973		974
643					↓					1500	1007	1008		1009		1010
644					10		0	0		642	939	940		941		942
645										1225	975	976		977		978
646										1500	1011	1012		1013		1014
647		↓	↓	↓	↓	↓	↓	50	↓	642	943	944		945		946

TEST RUN NUMBERS

41

A- 400 200 100 50 0 -100 -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS DN

21 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z. VERTICAL SEPARATION DIST.					
		α_0	β_0	α_P	β_P	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VT 648	ORB/ET/2SRB's	10	10	10	10	0	0	50	A	1225	979	980		981		982
649								50		1500	1015	1016		1017		1018
650								100		642	947	948		949		950
651										1225	983	984		985		986
652										1500	1019	1020		1021		1022
653					8		-2	0		642	951	952		953		954
654										1225	987	988		989		990
655										1500	1023	1024		1025		1026
656								50		642	955	956		957		958
657										1225	991	992		993		994
658										1500	1027	1028		1029		1030
659								100		642	959	960		961		962
660										1225	995	996		997		998
661										1500	1031	1032		1033		1034

TEST RUN NUMBERS

42

A= 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ϕN

22 JEV

TEST: IA 142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION Dist.					
		α	β	α	β	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
	ORB/ET/2SRB's															
VT 662		10	10	6	14	-4	4	200	A	642	1073	1074		1075		1076
663					14		4	200		1500	1110	1111		1112		1113
664					12		2	100		642	1077	1078		1079		1080
665								100		1500	1118	1119		1120		1121
666								150		642	1081	1082		1083		1084
667								150		1500	1122	1123		1124		1125
668					10		0	0		642	1085	1086		1087		1088
669								0		1500	1126	1127		1128		1129
670								50		642	1089	1090		1091		1092
671								50		1500	1130	1131		1132		1133
672								100		642	1093	1094		1095		1096
673								100		1500	1134	1135		1136		1137

TEST RUN NUMBERS

43

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

23 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_a	β_a	α_B	β_B	Δd	$\Delta \theta$	Y	X	P_c	0	50	75	100	150	200
	ORB/ET/2SRB's															
VT 674		10	10	6	8	-4	-2	0	A	642	1097	1098		1099		1100
675								0		1500	1138	1139		1140		1141
676								50		642	1101	1102		1103		1104
677								50		1500	1142	1143		1144		1145
678								100		642	1105	1106		1107		1108
679		↓	↓	↓	↓	↓	↓	100		1500	1146	1147		1148		1149
680		-10	10	-10	14	0	4	200		642	1186	1187		1188		1189
681					14		4	200		1500	1222	1223		1224		1225
682					12		2	100		642	1190	1191		1192		1193
683								100		1500	1226	1227		1228		1229
684								150		642	1194	1195		1196		1197
685		↓	↓	↓	↓	↓	↓	150	↓	1500	1230	1231		1232		1233

44

TEST RUN NUMBERS

A= 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

24 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z. VERTICAL SEPARATION DIST.					
		α_0	β_0	d_0	β_0	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
VT 686	ORB/ET/2SRB's	10	10	6	14	-4	4	200	A	1225		1767			1768	1769
687					12		2	100				1770			1771	1772
688					12		2	150				1773			1774	1775
689					10		0	0				1776			1777	1778
690					10		0	50				1779			1780	1781
691					10		0	100				1782			1783	1784
692					8		-2	0				1785			1786	1787
693					8		-2	50				1788			1789	1790
694					8		-2	100				1791			1792	1793
695					14		0	4	200			1258	1259		1260	1261
696					12			2	100			1278	1279		1280	1281
697					12			2	150			1282	1283		1284	1285
698					10			0	0			1286	1287		1288	1289
699					10			0	50			1290	1291		1292	1293
700					10			0	100			1294	1295		1296	1297
701					8			-2	0			1298	1299		1300	1301
702					8			-2	50			1302	1303		1304	1305
703					8			-2	100			1306	1307		1308	1309

TEST RUN NUMBERS

45

A= 400 200 100 50 0 -150 -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

25 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	E/T SRB:				SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_0	β_0	d_R	β_R	Δd	ΔB	Y	X	P_0	0	50	75	100	150	200
	ORG/ET/2SRB's															
VT 704		-10	10	-10	10	0	0	0	A	642	1198	1199		1200		1201
705								0		1500	1234	1235		1236		1237
706								50		642	1202	1203		1204		1205
707								50		1500	1238	1239		1240		1241
708								100		642	1206	1207		1208		1209
709								100		1500	1242	1243		1244		1245
710					8	-2	0			642	1210	1211		1212		1213
711								0		1500	1246	1247		1248		1249
712								50		642	1214	1215		1216		1217
713								50		1500	1250	1251		1252		1253
714								100		642	1218	1219		1220		1221
715								100		1500	1254	1255		1256		1257

TEST RUN NUMBERS

46

A: 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

BOTH SRB JETS ON

26 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	Q/T		SRB's		SEPARATION PARAMETERS					Z. VERTICAL SEPARATION DIST.					
		α_a	β_a	α_b	β_b	$\Delta\alpha$	$\Delta\beta$	Y	X	Pc	0	50	75	100	150	200
VT 716	ORB/ET/2SRB's	-10	10	-14	14	-4	4	200	A	1225		1931		1932		1933
717					12		2	100				1934		1935		1936
718					12		2	150				1937		1938		1939
719					10		0	0				1940		1941		1942
720					10		0	50				1943		1944		1945
721					10		0	100				1946		1947		1948
722					8		-2	0				1949		1950		1951
723					8		-2	50				1953		1954		1955
724					8		-2	100				1956		1957		1958
725					-18	14	-8	4	200					1986	1987	1988
726					12			2	100					1989	1990	1991
727					12			2	150					1992	1993	1994
728					10			0	0					1995	1996	1997
729					10			0	50					1998	1999	2000
730					10			0	100					2001	2002	2003
731					8			-2	0					2004	2005	2006
732					8			-2	50					2007	2008	2009
733					8			-2	100					2010	2011	2012

47

TEST RUN NUMBERS

α OR β
SCHEDULES

TABLE II. (Continued)

LEFT SRB JETS ON

27 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z. VERTICAL SEPARATION DIST.					
		α	β	α	β	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
-VTLO1	ORB/ET/2SRB's	0	0	0	0	0	0	0	N	1225	391	394				
L02									P		392	395				
L03				↓		↓			Q		393	396				
L04				-4		-4			N		419	421				
L05									N		431	428				
L06									P		-	422				
L07									P		426	429				
L08									Q		420	423				
L09				↓		↓			Q		427	430				
L10				-8		-8			R					461		
L11									R					467		
L12									S					462		
L13									T					463		
L14		↓	↓	↓	↓	↓	↓	↓	T	↓				468		

48

TEST RUN NUMBERS

N = 400, 300, 250, 200, 175, 150, 125, 100, 75, 50
 P = 25, 0, -50, -100, -200, -100, -50, 0, 50
 Q = 75, 100, 125, 150, 175, 200, 250, 300, 400

R = 400, 300, 250, 200, 175, 150, 125, 100
 S = 75, 50, 25, 0, 25, 50, 75, 100
 T = 125, 150, 175, 200, 250, 300, 400

α OR β
 SCHEDULES

TABLE II. (Continued)

LEFT SRB JET ON

28 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY									DATE: 9/14/76					
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α_a	β_a	α_b	β_b	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
VT L15	ORB/ET/2SRB's	10	10	6	14	-4	4	200	A	1225	1794			1795		1796
L16					12		2	100				1820		1821		1822
L17					12		2	150			1799			1800		1801
L18					10		0	0				1802		1803		1804
L19					10		0	50				1805		1806		1807
L20					10		0	100				1808		1809		1810
L21					8		-2	0				1811		1812		1813
L22					8		-2	50				1814		1815		1816
L23					8		-2	100				1817		1818		1819
L24		-10	10	-10	14	0	4	200			1262	1263		1264		1265
L25					12		2	100			1274	1275		1276		1277
L26					12		2	150			1310	1311		1312		1313
L27					10		0	0			1314	1315		1316		1317
L28					10		0	50			1318	1319		1320		1321
L29					10		0	100			1322	1323		1324		1325
L30					8		-2	0			1326	1327		1328		1329
L31					8		-2	50			1330	1331		1332		1333
L32					8		-2	100			1334	1335		1336		1337

TEST RUN NUMBERS

49

α OR β
SCHEDULES

TABLE II. (Continued)

LEFT SRB JET ON

29 JEV

TEST: IA142		DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: 9/14/76				
DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α	β	d_a	β_a	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
-VTL 33	ORB/ET/2SRB's	15	15	15	19	0	4	200	A	1225	1404	1405		1406		1407
L 34					17		2	100			1408	1409		1410		1411
L 35					17		2	150			1412	1413		1414		1415
L 36					15		0	0			1416	1417		1418		1419
L 37					15		0	50			1420	1421		1422		1423
L 38					15		0	100			1424	1425		1426		1427
L 39					13		-2	0			1428	1429		1430		1431
L 40					13		-2	50			1432	1433		1434		1435
L 41				↓	13		↓	-2	100		1436	1437		1438		1439
L 42					11	19	-4	4	200		1516	1517		1518		1519
L 43					17			2	100		1520	1521		1522		1523
L 44					17			2	150		1524	1525		1526		1527
L 45					15			0	0			1528		1529		1530
L 46					15			0	50			1535		1536		1537
L 47					15			0	100			1538		1539		1540
L 48					13			-2	0			1541		1542		1543
L 49					13			-2	50			1544		1545		1546
L 50		↓	↓	↓	13		↓	-2	100	↓	↓	1550	1547	1548		1549

50

TEST RUN NUMBERS

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

LEFT SRB JET ON 30 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T SRB:				SEPARATION PARAMETERS					Z VERTICAL SEPARATION DIST.					
		α_a	β_a	α_b	β_b	Δx	Δy	Y	X	P_c	0	50	75	100	150	200
VTL51	ORG/ET/2SRB:	15	15	7	19	-8	4	200	A	1225				1661	1662	1663
L52					17		2	100						1664	1665	1666
L53					17		2	150						1667	1668	1669
L54					15		0	0						1694	1695	1696
L55					15		0	50						1697	1698	1699
L56					15		0	100						1700	1701	1702
L57					13		-2	0						1685	1686	1687
L58					13		-2	50						1688	1689	1690
L59					13		-2	100						1691	1692	1693

TEST RUN NUMBERS

51

A= 400 200 100 50 0 -150 -200

α OR β
SCHEDULES

TABLE II. (Continued)

RIGHT SRB JET ON

31 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α	β	d_0	β_0	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
-VTR01	ORB/ET/2SRB's	0	10	0	14	0	4	200	A	1225	2040			2041		2042
R02					12		2	100			2043			2044		2045
R03					12		2	150			2046			2047		2048
R04					10		0	0			2049			2050		2051
R05					10		0	50			2052			2053		2054
R06					10		0	100			2055			2056		2057
R07					8		-2	0			2058			2059		2060
R08					8		-2	50			2061			2062		2063
R09				↓	8		↓	-2	100		2064			2065		2066
R10					-4	14	-4	4	200		2103			2104		2105
R11					12			2	100		2106			2107		2108
R12					12			2	150		2109			2110		2111
R13					10			0	0		2112			2113		2114
R14					10			0	50		2115			2116		2117
R15					10			0	100		2118			2119		2120
R16					8			-2	0		2121			2122		2123
R17					8			-2	50		2124			2125		2126
R18				↓	8		↓	-2	100	↓	2127			2128		2129

TEST RUN NUMBERS

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

52

TABLE II. (Continued)

RIGHT SRB JET ON

32 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	C/T		SRB'S		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α_c	β_c	α_B	β_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VTR19	ORB/ET/2SRB'S	10	10	6	14	-4	4	200	A	1225		1823		1824		1825
R20					12		2	100				1826		1827		1828
R21					12		2	150				1829		1830		1831
R22					10		0	0				1832		1833		1834
R23					10		0	50				1835		1836		1837
R24					10		0	100				1838		1839		1840
R25					8		-2	0				1841		1842		1843
R26					8		-2	50				1844		1845		1846
R27		↓	↓	↓	8	↓	2	100				1847		1848		1849
R28		-10	10	-10	14	0	4	200			1266	1267		1268		1269
R29					12		2	100			1270	1271		1272		1273
R30					12		2	150			1338	1339		1340		1341
R31					10		0	20			1342	1343		1344		1365
R32					10		0	50			1345	1346		1347		1348
R33					10		0	100			1349	1350		1351		1352
R34					8		-2	0			1353	1354		1355		1356
R35					8		-2	50			1357	1358		1359		1360
R36		↓	↓	↓	8	↓	-2	100	↓	↓	1361	1362		1363		1364

TEST RUN NUMBERS

A = 400, 200, 100, 50, 0 - 150 - 200

α OR β
SCHEDULES

53

TABLE II. (Continued)

RIGHT SRB JET ON

23 JEV

TEST: IA 142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					VERTICAL SEPARATION DIST.					
		α_a	β_a	α_B	β_B	$\Delta\alpha$	$\Delta\beta$	Y	X	P_c	0	50	75	100	150	200
VTR37	ORB/ET/2SRB's	15	15	15	19	0	4	200	A	1225	1440	1441		1442		1443
R38					17		2	100			1444	1445		1446		1447
R39					17		2	150			1448	1449		1450		1451
R40					15		0	20			1472	1473		1474		1475
R41					15		0	50			1452	1453		1454		1455
R42					15		0	100			1456	1457		1458		1459
R43					13		-2	0			1460	1461		1462		1463
R44					13		-2	50			1464	1465		1466		1467
R45		↓	↓	↓	13		↓	-2	100		1468	1469		1470		1471
R46		15	15	11	19	-4	4	200			1551	1552		1553		1554
R47					17		2	100			1555	1556		1557		1558
R48					17		2	150			1559	1560		1561		1562
R49					15		0	0			1587	1588		1589		1590
R50					15		0	50			1593	1594		1595		1596
R51					15		0	100			1597	1598		1599		1600
R52					13		-2	0			1575	1576		1577		1578
R53					13		-2	50			1579	1580		1581		1582
R54		↓	↓	↓	13		↓	-2	100		↓	↓		↓		↓

TEST RUN NUMBERS

54

A = 400, 200, 100, 50, 0, -150, -200

α OR β
SCHEDULES

TABLE II. (Continued)

RIGHT SRB JET ON

34 JEV

TEST: IA142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	O/T		SRB's		SEPARATION PARAMETERS					Z, VERTICAL SEPARATION DIST.					
		α_a	β_a	α_b	β_b	Δd	$\Delta \beta$	Y	X	P_c	0	50	75	100	150	200
-VTR55	ORB/ET/2SRB's	15	15	7	19	-8	4	200	A	1225				1703	1704	1705
R56					17		2	100						1706	1707	1708
R57					17		2	150						1709	1710	1711
R58					15		0	0						1712	1713	1714
R59					15		0	50						1715	1716	1717
R60					15		0	100						1718	1719	1720
R61					13		-2	0						1721	1722	1723
R62					13		-2	50						1724	1725	1726
R63		↓	↓	↓	13		↓	-2	100	↓	↓			1727	1728	1729

TEST RUN NUMBERS

A = 400, 200, 100, 50, 0, -150, -200

α OR β SCHEDULES

55

TABLE II. (Concluded)

ISOLATED ϕ/ET

35 JEV

TEST: IA 142 DATA SET/RUN NUMBER COLLATION SUMMARY DATE: 9/14/76

DATA SET IDENTIFIER	CONFIGURATION	SCHED.		PARAMETERS/VALUES						NO. OF RUNS	MACH NUMBERS			
		α	β	S_p	S_{RF}	S_{SB}								
$\phi VTIO1$	ORB/ET	A	0	0	0	0						4.5		
I02		A	0									446		
I03		C	0									752		
I04		A	0									447		
I05		B	0									882		
I06		C	0									883		
I07		A	5									884		
I08		C	5									448		
I09		B	5									449		
I10		C	5									885		
I11		B	10									886		
I12		C	10									887		
I13		B	15									888		
I14		C	15									889		
I15		O	C									890		
												1109		

TEST RUN NUMBERS

56

α OR β
SCHEDULES

A = 0, -5, -10, -10, -5, 0
B = 0, -5, -10, -15, -10, -5, 0

C = 5, 10, 15, 10, 5, 0

TABLE III. MODEL DIMENSIONAL DATA

MODEL COMPONENT: ATTACH STRUCTURE - AT₂₈

GENERAL DESCRIPTION: Rear orbiter to ET attach structure (left-hand and right-hand) (two members)

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B

DIMENSIONS:	MEMBER		FULL SCALE	MODEL SCALE
	#1	X _O	1317.00	13.17
		Y _O	- 96.50 (LH)	- 0.96
			96.50 (RH)	0.96
		Z _O	267.50	2.67
		X _T	2058.0	20.58
		Y _T	- 96.50 (LH)	- 0.96
			96.50 (RH)	0.96
		Z _T	515.50	5.15
	#2	X _O	1317.0	13.17
		Y _O	- 96.50 (LH)	- 0.96
			96.50 (RH)	0.96
		Z _O	267.50	2.67
		X _T	1872.0	18.72
		Y _T	- 125.68 (LH)	- 1.25
			125.68 (RH)	1.25
		Z _T	504.5	5.04
Diameter, In.	#1		11.5	0.115
	#2		15.5	0.155

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: ATTACH STRUCTURE - AT₁₃₀
 GENERAL DESCRIPTION: Forward orbiter/ET attach structure (2 members structure).

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01692

DIMENSIONS:	MEMBER		FULL SCALE	MODEL SCALE
Orbiter attach point	#1	X _O	388.9	3.889
		Y _O	0 (LH)	0
			0 (RH)	0
		Z _O	283.8	2.838
		X _T	1129.9	11.299
		Y _T	0 (LH)	0
			0 (RH)	0
		Z _T	620.3	6.203
		Tank attach point		X _T
Y _T	42.75 (LH)			.4275
	42.75 (RH)			.4275
Z _T	227.5			2.275
X _O	1129.9			11.299
Y _O	42.75 (LH)			.4275
	42.75 (RH)			.4275
Z _O	564.0			5.640

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: ATTACH STRUCTURE - AT₁₃₁

GENERAL DESCRIPTION: Aft Orbiter/ET attach structure

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01692

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Upper attach point:	X _O		13.17
	Y _O		.87
	Z _O		2.67
	X _T		20.58
	Y _T		.87
	Z _T		6.04
ET attach point:	X _T		20.58
	Y _T		.14
	Z _T		1.72
	X _O		13.17
	Y _O		.14
	Z _O		2.36

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: BODY - B₆₂

GENERAL DESCRIPTION: Configuration 140 C orbiter fuselage, MCR 200-R₄.
 Similar to 140 A/B fuselage except aft body revised and improved mid-body-wing-boot fairing, X₀ = 940 to X₀ = 1040.

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-000140C, -000202C, -000205A, -000200B, -000203A.

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length (IML: Fwd. Sta. X ₀ = 238), In.	1290.3	12.903
Length (OML: Fwd. Sta. X ₀ = 235), In.	1293.3	12.933
Max Width (@ X ₀ = 1528.3), In.	264.0	2.640
Max Depth (@ X ₀ = 1464), In.	250.0	2.500
Fineness Ratio	4.899	4.899
Area - Ft ²		
Max. Cross-Sectional	340.885	.03409

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: CANOPY - C₁₂

GENERAL DESCRIPTION: Configuration 140 C orbiter canopy, vehicle cabin
No. 31 updated to MCR 200-R₄. Used with fuselage B₆₂.

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-000140C -000202B, -000204

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length ($X_o = 434.643-578$), In.	143.357	1.43
Max Width (@ $X_o = 513.127$), In.	152.412	1.52
Max Depth ($Z_o = 501$ to 449.39), In.	51.61	0.51

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: ELEVON - E₄₄

GENERAL DESCRIPTION: 6.0 in F.S. gaps machined into E₂₆ elevon. Flapper doors, centerbody pieces, and tipseals are not simulated. (Data are for one of two sides).

MODEL SCALE: 0.010

DRAWING NUMBER:

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Area, Ft ²	210.00	0.021
Span (equivalent), In.	349.2	3.492
Inb'd equivalent chord, In.	118.0	1.180
Outb'd equivalent chord, In.	55.19	0.552
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	0.2096	0.2096
At Outb'd equiv. chord	0.4004	0.4004
Sweep Back Angles, degrees		
Leading Edge	0.00	0.00
Trailing Edge	- 10.056	- 10.056
Hingeline	0.00	0.00
Area Moment (Product of Area & \bar{c}), Ft ³	1587.25	0.00159
Mean Aerodynamic Chord, In.	90.7	0.907

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: BODY FLAP - F_{10}

GENERAL DESCRIPTION: Configuration 140 C body flap. Hingeline located at $X_0 = 1532$, $Z_0 = 238$.

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-000140C, VL70-355114

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length ($X_0 = 1525.5$ to $X_0 = 1613$), In.	87.50	0.87
Max Width (@ L.E., $X_0 = 1525.5$), In.	256.00	2.56
Max Depth ($X_0 = 1532$), In.	19.798	0.19
Fineness Ratio		
Area - Ft ²		
Max. Cross-Sectional (@H.L.)	35.196	.0052
Planform	135.00	.0150
Wetted		
Base ($X_0 = 1613$)	4.89	

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: FEEDLINE - FL₁₀

GENERAL DESCRIPTION: LH₂ feedline on upper left-hand side of T₃₅

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Leading edge at:	X _T	2071.5	20.715
	Y _T	- 70.0	- 0.700
	Z _T	573.934	5.739
Trailing edge at:	X _T	2081.8	20.818
	Y _T	- 70.0	- 0.700
	Z _T	584.059	5.841
Line diameter (17.0 I.D.)		18.160	0.182

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: FEEDLINE - FL₁₁

GENERAL DESCRIPTION: LO₂ feedline on upper right-hand side of T₃₅.

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SC. E</u>
Leading edge at:	X _T	1000.667	10.00
	Y _T	70.00	0.70
	Z _T	150.519	1.50
Trailing edge at:	X _T	2071.5	20.71
	Y _T	70.00	0.70
	Z _T	573.934	5.73
Line diameter (17.0 I.D.)		18.16	0.18

Centerline of line located radially at $\phi = 113^{\circ}4'$

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: FAIRING - FR₁₀

GENERAL DESCRIPTION: Umbilical door fairing between aft ET/Orbiter attach structure.

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B, Martin-Marietta 82600207000

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Leading edge at	X _T	2052.0	20.520
Length		193.0	1.930
Width		15.00	0.150

TABLE III. MODEL DIMENSIONAL DATA (Continued)

<u>Component</u>	<u>Definition</u>						
FR ₁₄	External Tank nose cable fairing per model dwg. SS-A01668-5 located at:						
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>X_T = 3.490 → 3.710</td> <td>X_T = 349.00 → 371.00</td> </tr> <tr> <td>φ = 31°31'</td> <td>φ = 31°31'</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	X _T = 3.490 → 3.710	X _T = 349.00 → 371.00	φ = 31°31'	φ = 31°31'
<u>Model Scale</u>	<u>Full Scale</u>						
X _T = 3.490 → 3.710	X _T = 349.00 → 371.00						
φ = 31°31'	φ = 31°31'						
FR ₁₅	External Tank nose probe fairing per model dwg. SS-A01668-5 located at:						
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>X_T = 3.413 → 3.710</td> <td>X_T = 341.30 → 371.00</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	X _T = 3.413 → 3.710	X _T = 341.30 → 371.00		
<u>Model Scale</u>	<u>Full Scale</u>						
X _T = 3.413 → 3.710	X _T = 341.30 → 371.00						
FR ₁₆	External Tank IO ₂ feedline (F11) fairing per model dwg. SS-A01668-3 located at:						
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>X_T = 9.820 → 10.420</td> <td>X_T = 982.00 → 1042.0</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	X _T = 9.820 → 10.420	X _T = 982.00 → 1042.0		
<u>Model Scale</u>	<u>Full Scale</u>						
X _T = 9.820 → 10.420	X _T = 982.00 → 1042.0						

TABLE III. MODEL DIMENSIONAL DATA (Continued)

<u>Component</u>	<u>Definition</u>	
FR ₁₇	External Tank LO ₂ antigeyser line (PT ₂₃) fairing per model dwg. SS-A01668-3. Located at:	
	<u>Model Scale</u>	<u>Full Scale</u>
	X _T = 9.860 → 10.460 ϕ = 33°45'	X _T = 986.00 → 1046.00 ϕ = 33°45'
FR ₁₈	External Tank aft electrical conduit (PT ₂₅) fairing per model dwg. SS-A01668-3. Located at:	
	<u>Model Scale</u>	<u>Full Scale</u>
	X _T = 10.670 → 10.820 ϕ = 37°30'	X _T = 1067.00 → 1082.00 ϕ = 37°30'
FR ₁₉	External Tank LH ₂ pressure line (PT ₃₃) fairing per model dwg. SS-A01668-9. Located at:	
	<u>Model Scale</u>	<u>Full Scale</u>
	X _T = 10.600 → 11.269 ϕ = 30°0'	X _T = 1060.00 → 1126.90 ϕ = 30°0'

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: OMS POD - M₁₆

GENERAL DESCRIPTION: Configuration 140 C orbiter OMS pod - Short p d.

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-008401, VL70-008410

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length (OMS Fwd. Sta. X ₀ = 1310.5), In.	258.50	2.58
Max Width (@ X ₀ = 1511), In.	136.8	1.36
Max Depth (@ X ₀ = 1511), In.	74.70	0.74
Fineness Ratio	2.484	2.48
Area - Ft ²		
Max. Cross-Sectional	58.864	0.00 39

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: NOZZLES - N₈₉

GENERAL DESCRIPTION: OMS nozzle in stowed position which is outboard

8 deg. and down 7 deg. from null position. Use with M₁₆.

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01279

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length - In.		
Gimbal Point to Exit Plane	56.0	0.560
Diameter - In.		
Exit (O.D.)	50.0	0.50
Gimbal Point (Station) - In.		
X ₀	1518.00	15.180
Y ₀	88.00	0.880
Z ₀	492.0	4.920
Null Position - Deg.		
Pitch	15°49'	15°49'
Yaw	6°30'	6°30'

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: SRB FWD. SEPARATION NOZZLE BLOCK - N₁₀₁
 GENERAL DESCRIPTION: Fwd. separation nozzles for Vehicle 5 Configuration solid rocket booster.

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01690

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Diameter - In.		
Exit	12.14	.121
Throat	7.00	.07
Inlet	7.00	.070
Lip Angle	13°	13°
Area - Ft ²		
Exit	.8038	.000 8038
Throat	.2673	.000 2673
Design exit Mach No.	2.64	2.64
No of nozzles	4 (in two blocks)	

Centerline of the two fwd. nozzles @ X_s 2.854

Centerline of the two aft nozzles @ X_s 3.081

Nozzles canted 20 degrees forward, away from O/ET

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: SRB AFT SEPARATION NOZZLE BLOCK - N₁₀₂

GENERAL DESCRIPTION: Aft separation nozzles for Vehicle 5 Configuration solid rocket booster.

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01690

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Diameter	12.14	.1214
Exit	7.00	.0700
Throat	7.00	.0700
Inlet	13°	13°
Lip Angle		
Area - Ft ²		
Exit	.8038	.00008038
Throat	.2673	.00002673
Design Exit Mach No.	2.64	2.64
No. of nozzles	4 (In two blocks)	

Centerline of the four (4) nozzles @ X_s 18.90 - nozzle mounted on SRB aft shut, canted 20° aft, away from O/ET

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: MPS NOZZLES - N₁₀₃

GENERAL DESCRIPTION: Non-flow-through MPS nozzle dummy nozzle - size external dim. as N₈₇

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01687

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
MACH NO.		
Length - In.		
Gimbal Point to Exit Plane	--	--
Throat to Exit Plane		
Diameter - In.		
Exit	--	--
Throat		
Inlet		
Area - Ft ²		
Exit	--	--
Throat		
Gimbal Point (Station) - In.		
Upper Nozzles		
X	1445.00	14.450
Y	0.0	0.0
Z	443.00	4.430
Lower Nozzles		
X	1468.17	14.682
Y	±53.0	0.530
Z	342.64	3.426
Null Position - Deg.		
Upper Nozzle		
Pitch	16°	16°
Yaw	0°	0°
Lower Nozzle		
Pitch	10°	10°
Yaw	0	0

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: SOLID ROCKET BOOSTER NOZZLES - N₁₀₆
 GENERAL DESCRIPTION: SRB nozzle to lines used with S₂₂

MODEL SCALE: 0.010

DRAWING NUMBER: VC77-000002D

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Diameter, E _{ex} - In. (I.D.) (exit)	145.64	1.456
Diameter, E _{ex} - In. (O.D.) (exit)	147.64	1.476
Diameter, DT - In. (throat)	--	--
Diameter, D _{in} - In. (inlet)	--	--
Area - Ft ²	115.688	0.0116
Gimbal Center Coordinates:		
Left Nozzle		
X _B - cold	1863.458	18.635
X _B - hot	1875.358	18.754
Y _O	- 250.50	- 2.505
Z _T	400.0	4.000
Right Nozzle		
X _B - cold	1863.458	1.863
X _B - hot	1875.358	1.875
Y _O	250.50	2.505
Z _T	400.0	4.000
Null Position - Deg.		
Left Nozzle		
Pitch	±8	±8
Yaw		
Right Nozzle		
Pitch	±8	±8
Yaw		

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: SRB PROTUBERANCE - PS₂₀

GENERAL DESCRIPTION: Electrical tunnel on SRB side, 30° taper L. 1. circular cross-section with mounting flange. Tunnel discontinued from X_B 15.022 to X_B 15.199.

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01667 and SS-A01690

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length, In.	1384.7	13.847
Tunnel, Depth	4.30	.043
Max Width	16.90	.169
Max Depth @ L.E.	7.30	.073
Radius	8.30	.083
Taper @ L.E.	30°	30°
Radius @ L.E.	11.40	.114

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: SRB PROTUBERANCE - PS₂₆
 GENERAL DESCRIPTION: SRB aft attach point stiffener ring, trimmed and enclosed from PS₁₄, extends for 292.7 deg. around 146 in SRB

MODEL SCALE: 0.010

DRAWING NUMBER: VC77-000002F, ICD-2-000001 Rev. A, see Dwg.

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length, In.	17.70	0.177
Max Width varies zero to 16.20"		
Location ϕ XB	1511.1	15.111

TABLE III. MODEL DIMENSIONAL DATA (Continued)

<u>Component</u>	<u>Definition</u>				
PS ₂₇	SRB Nozzle Actuator Struts, protuberance on SRB nozzle skirt, defined by ICD-2-00001, Rev. B				
PS ₂₈	Solid Rocket Booster separation rocket motor fairings per model dwg. SS-A01667-38. Located on SRB skirt aft of rear structural ring at $\phi = 0 \rightarrow 36^\circ$ RH $324 \rightarrow 360^\circ$ LH				
PS ₂₉	Solid Rocket Booster tiedown struts located on SRB skirt per model dwg. SS-A01667-30 located at:				
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>$X_B = 18.603 \rightarrow 19.306$ $\phi = 30^\circ, 150^\circ, 210^\circ, 330^\circ$</td> <td>$X_B = 1860.30 \rightarrow 1900.60$ $\phi = 30^\circ, 150^\circ, 210^\circ, 330^\circ$</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	$X_B = 18.603 \rightarrow 19.306$ $\phi = 30^\circ, 150^\circ, 210^\circ, 330^\circ$	$X_B = 1860.30 \rightarrow 1900.60$ $\phi = 30^\circ, 150^\circ, 210^\circ, 330^\circ$
<u>Model Scale</u>	<u>Full Scale</u>				
$X_B = 18.603 \rightarrow 19.306$ $\phi = 30^\circ, 150^\circ, 210^\circ, 330^\circ$	$X_B = 1860.30 \rightarrow 1900.60$ $\phi = 30^\circ, 150^\circ, 210^\circ, 330^\circ$				
PS ₃₁	Solid Rocket Booster command antenna per model dwg. SS-A01667-28, located at:				
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>$X_B = 4.026 \rightarrow 4.526$ $\phi = 0^\circ \text{ \& } 180^\circ$</td> <td>$X_B = 402.60 \rightarrow 452.60$ $\phi = 0^\circ \text{ \& } 180^\circ$</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	$X_B = 4.026 \rightarrow 4.526$ $\phi = 0^\circ \text{ \& } 180^\circ$	$X_B = 402.60 \rightarrow 452.60$ $\phi = 0^\circ \text{ \& } 180^\circ$
<u>Model Scale</u>	<u>Full Scale</u>				
$X_B = 4.026 \rightarrow 4.526$ $\phi = 0^\circ \text{ \& } 180^\circ$	$X_B = 402.60 \rightarrow 452.60$ $\phi = 0^\circ \text{ \& } 180^\circ$				
PS ₃₂	Solid Rocket Booster data capsule and camera per model dwg. SS-A01667-26, located at:				
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>$X_B = 4.017 \rightarrow 4.402$ $\phi = 90^\circ$ RH $= 270^\circ$ LH</td> <td>$X_B = 401.70 \rightarrow 440.0$ $\phi = 90^\circ$ RH $= 270^\circ$ LH</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	$X_B = 4.017 \rightarrow 4.402$ $\phi = 90^\circ$ RH $= 270^\circ$ LH	$X_B = 401.70 \rightarrow 440.0$ $\phi = 90^\circ$ RH $= 270^\circ$ LH
<u>Model Scale</u>	<u>Full Scale</u>				
$X_B = 4.017 \rightarrow 4.402$ $\phi = 90^\circ$ RH $= 270^\circ$ LH	$X_B = 401.70 \rightarrow 440.0$ $\phi = 90^\circ$ RH $= 270^\circ$ LH				
PS ₃₃	Solid Rocket Booster 3 intermediate structural rings per model dwg. SS-A01667-8, located at:				
	<table border="0"> <thead> <tr> <th><u>Model Scale</u></th> <th><u>Full Scale</u></th> </tr> </thead> <tbody> <tr> <td>$X = 16.559$ $= 17.319$ $= 17.760$</td> <td>$X = 1655.90$ $= 1731.90$ $= 1776.00$</td> </tr> </tbody> </table>	<u>Model Scale</u>	<u>Full Scale</u>	$X = 16.559$ $= 17.319$ $= 17.760$	$X = 1655.90$ $= 1731.90$ $= 1776.00$
<u>Model Scale</u>	<u>Full Scale</u>				
$X = 16.559$ $= 17.319$ $= 17.760$	$X = 1655.90$ $= 1731.90$ $= 1776.00$				

TABLE III. MODEL DIMENSIONAL DATA (Continued)

Component

PS
34

Solid Rocket Booster aft cable housing per
model drawing SS-A01667-12, located at:

Model Scale

$X_B = 4.726 \rightarrow 18.554$
 $\phi = 90^\circ \text{ RH}$
 $= 180^\circ \text{ LH}$

Full Scale

$X_B = 472.60 \rightarrow 1855.40$
 $\phi = 90^\circ \text{ RH}$
 $= 180^\circ \text{ LH}$

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: SRB PROTUBERANCE - PS₃₅

GENERAL DESCRIPTION: Ring stiffener located at the point where the skirt flares. The stiffener is on I-beam.

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01690

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Height, In.	7.9	.079
Length, In.	3.0	.030
Location ζ $X_B =$	1837.4	18.374

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: LO₂ RECIRCULATION LINE - PT₂₃
 GENERAL DESCRIPTION: LO₂ recirculation line on right-hand upper side
 of T₃₅

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B, Martin-Marietta 82600207000

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Leading edge at:	X _T	1040.667	10.407
	Y _T	94.169	0.942
	Z _T	540.934	5.409
Trailing edge at:	X _T	2062.920	20.629
	Y _T	70.0	0.700
	Z _T	573.934	5.739
Line diameter		4.0	0.040

Centerline of line located radially at $\phi = 33^{\circ}45'$
 (Right of TDC looking forward)

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: EXTERNAL TANK PROTUBERANCES - PT₂₅

GENERAL DESCRIPTION: Right-hand electrical conduit line on T₃₅ with LH₂ pressure sensors line and LO₂ vent valve actuator line.

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B, Martin-Marietta 826002('000

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Leading edge at:	X _T	371.0	
	Y _T		
	Z _T		
Trailing edge at:	X _T	847.8	
	Y _T		
	Z _T	2.0 x 6.0	0.2 x .06
Line diameter			

Centerline of line located radially at $\phi = 31^{\circ} 31'$

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: LO₂ PRESSURE LINE - PT₂₆

GENERAL DESCRIPTION: LO₂ pressure line on the T₃₅

MODEL SCALE: 0.010

DRAWING NUMBER: VL78-000063, VL78-000062B, Martin-Marietta 82600207000

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Leading edge at:	X _T	360.733	3.607
	Y _T	15.145	.1515
	Z _T	407.718	4.077
Trailing edge at:	X _T	2083.5	20.835
	Y _T	63.25	0.633
	Z _T	609.0	6.090
Line diameter		2.0	0.020

Centerline of line located radially at $\phi = 27^\circ$

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: ELECTRICAL LINE - PT₂₉

GENERAL DESCRIPTION: Left-hand electrical conduit line on T₃₅

MODEL SCALE: 0.010

DRAWING NUMBER:

DIMENSIONS:		<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Leading edge at:	X _T	371.0	3.710
	Y _T		
	Z _T		
Trailing edge at:	X _T	847.8	8.478
	Y _T		
	Z _T		

Line diameter

Centerline of line located radially at $\phi = 31^{\circ}31'$

TABLE III. MODEL DIMENSIONAL DATA (Continued)

<u>Component</u>	<u>Definition</u>	
PT ₃₃	External Tank LH ₂ pressure line per model dwg. SS-A01668-9. Located at:	
	<u>Model Scale</u>	<u>Full Scale</u>
	X _T = 10.600 → 20.580	X _T = 1060.00 → 2058.00
	ϕ = 330°0'	ϕ = 330°0'
PT ₃₉	External Tank nose probe per model dwg. SS-A01668-5. Located at:	
	<u>Model Scale</u>	<u>Full Scale</u>
	X _T = 3.225 → 3.413	X _T = 332.5 → 341.3
	Max. Dia. = .069 in.	Max. Dia. = 6.90 in.

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: RUDDER - R₅

GENERAL DESCRIPTION: Configuration 140C orbiter rudder (identical to configuration 140A/B rudder)

MODEL SCALE: 0.010

DRAWING NUMBER: VL70-000146B, -000095

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Area, Ft ²	100.15	0.010 12
Span (equivalent), In.	201.00	2.010
Inb'd equivalent chord, In.	91.585	0.916
Outb'd equivalent chord, In.	50.833	0.508
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	0.400	0.400
At Outb'd equiv. chord	0.400	0.400
Sweep Back Angles, degrees		
Leading Edge	34.83	34.83
Trailing Edge	26.25	26.25
Hingeline	34.83	34.83
Area Moment (Product of Area and \bar{c}), Ft ³	610.92	0.000 10
Mean Aerodynamic Chord, In.	73.2	0.732

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: BOOSTER SOLID ROCKET MOTOR - S₂₄
 GENERAL DESCRIPTION: Booster Solid Rocket - modified Vehicle 5

MODEL SCALE: 0.010

DRAWING NUMBER: SS-A01690

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length (Includes Nozzle) - In.	1789.6	17.896
Max. Width (Tank Dia.) - In.	150.0	1.500
Max. Depth (Aft Shroud) - In.	208.0	2.08
Fineness Ratio	11.931	11.931
Area - Ft ²		
Max. Cross-Sectional	236.0	.02360
Planform		
Wetted		
Base		
WP of BSRM Centerline (Z _T) - In.	400.00	4.00
FS of BSRM Nose (X _T) - In.	200.00	2.00

TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: EXTERNAL TANK - T₃₅

GENERAL DESCRIPTION: External oxygen-hydrogen tank per Rockwell dr wings
SS-A01692 and SS-A01689, ICD 2-00001 Rev. B

MODEL SCALE: 0.010

DRAWING NUMBER: VC78-00002

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
Length - In.	1852.5	18.525
Max Width (Dia.) - In.	333	3.33
Fineness Ratio L/D	5.5631	5.563
Area - Ft ²		
Max Cross-Sectional	604.81	6.048
W.P. of Tank Centerline (X _T) in.	400.0	4.0

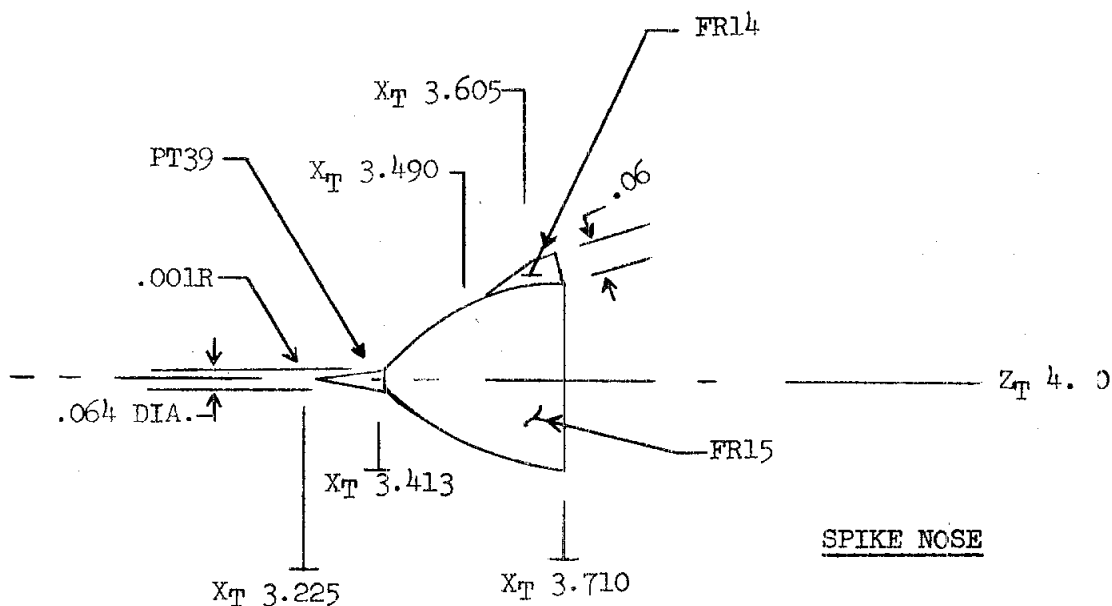


TABLE III. MODEL DIMENSIONAL DATA (Continued)

MODEL COMPONENT: VERTICAL - V8

GENERAL DESCRIPTION: Configuration 140C orbiter vertical tail (identical to configuration 140A/B vertical tail).

MODEL SCALE: 0.010

DRAWING NUMBER: V70-000140C, -000146B

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
TOTAL DATA		
Area (Theo.), ft ² Planform	413.253	0.0413
Span (Theo.), in.	315.720	3.157
Aspect Ratio	1.675	1.675
Rate of Taper	0.507	0.507
Taper Ratio	0.404	0.404
Sweep Back Angles, degrees		
Leading Edge	45.000	45.000
Trailing Edge	26.2	26.2
0.25 Element Line	41.130	41.130
Chords:		
Root (Theo.) WP	268.500	2.685
Tip (Theo.) WP	108.470	1.085
MAC	199.808	1.998
Fus. Sta. of .25 MAC	1463.50	14.635
W.P. of .25 MAC	635.522	6.355
B.L. of .25 MAC	0.000	0.000
Airfoil Section		
Leading Wedge Angle, deg.	10.000	10.000
Trailing Wedge Angle, deg.	14.920	14.920
Leading Edge Radius	2.00	.020
Void Area	13.17	0.00131
Blanketed Area	0.00	0.000

TABLE III. MODEL DIMENSIONAL DATA (Concluded)

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SC</u>	<u>LE</u>
<u>TOTAL DATA</u>			
Area (Theo.), ft ²			
Planform	2690.00	0.2	90
Span (Theo.), in.	936.68	9.3	7
Aspect Ratio	2.265	2.2	5
Rate of Taper	1.177	1.1	7
Taper Ratio	0.200	0.2	0
Dihedral Angle, degrees	3.500	3.5	0
Incidence Angle, degrees	0.500	0.5	0
Aerodynamic Twist, degrees	+ 3.000	+ 3.0	0
Sweep Back Angles, degrees			
Leading Edge	45.000	45.0	0
Trailing Edge	- 10.056	- 10.0	6
0.25 Element Line	35.209	35.2	9
Chords:			
Root (Theo.) B.P.O.O.	689.24	6.8	2
Tip, (Theo.) B.P.	137.85	1.3	9
MAC	474.81	4.7	8
Fus. Sta. of .25 MAC	1136.83	11.3	8
W.P. of .25 MAC	290.58	2.9	6
B.L. of .25 MAC	182.13	1.8	3
<u>EXPOSED DATA</u>			
Area (Theo.), ft ²	1751.50	0.1	52
Span, (Theo.), in. BP108	720.68	7.2	7
Aspect Ratio	2.059	2.0	9
Taper Ratio	0.245	0.2	5
Chords			
Root BP108	562.09	5.6	1
Tip 1.00 b/2	137.85	1.3	9
MAC	392.83	3.9	8
Fus. Sta. of .25 MAC	1185.98	11.8	0
W.P. of .25 MAC	395.40	3.9	4
B.L. of .25 MAC	251.77	2.5	8
Airfoil Section (Rockwell Mod NASA) XXXX-64			
Root b/2 =	0.113	0.1	3
Tip b/2 =	0.120	0.1	0
Data for (1) of (2) Sides			
Leading Edge Cuff			
Planform Area, ft ²	113.18	0.0	13
Leading Edge Intersects Fus M.L. @ Sta	500.00	5.0	0
Leading Edge Intersects Wing @ Sta	1024.00	10.2	0

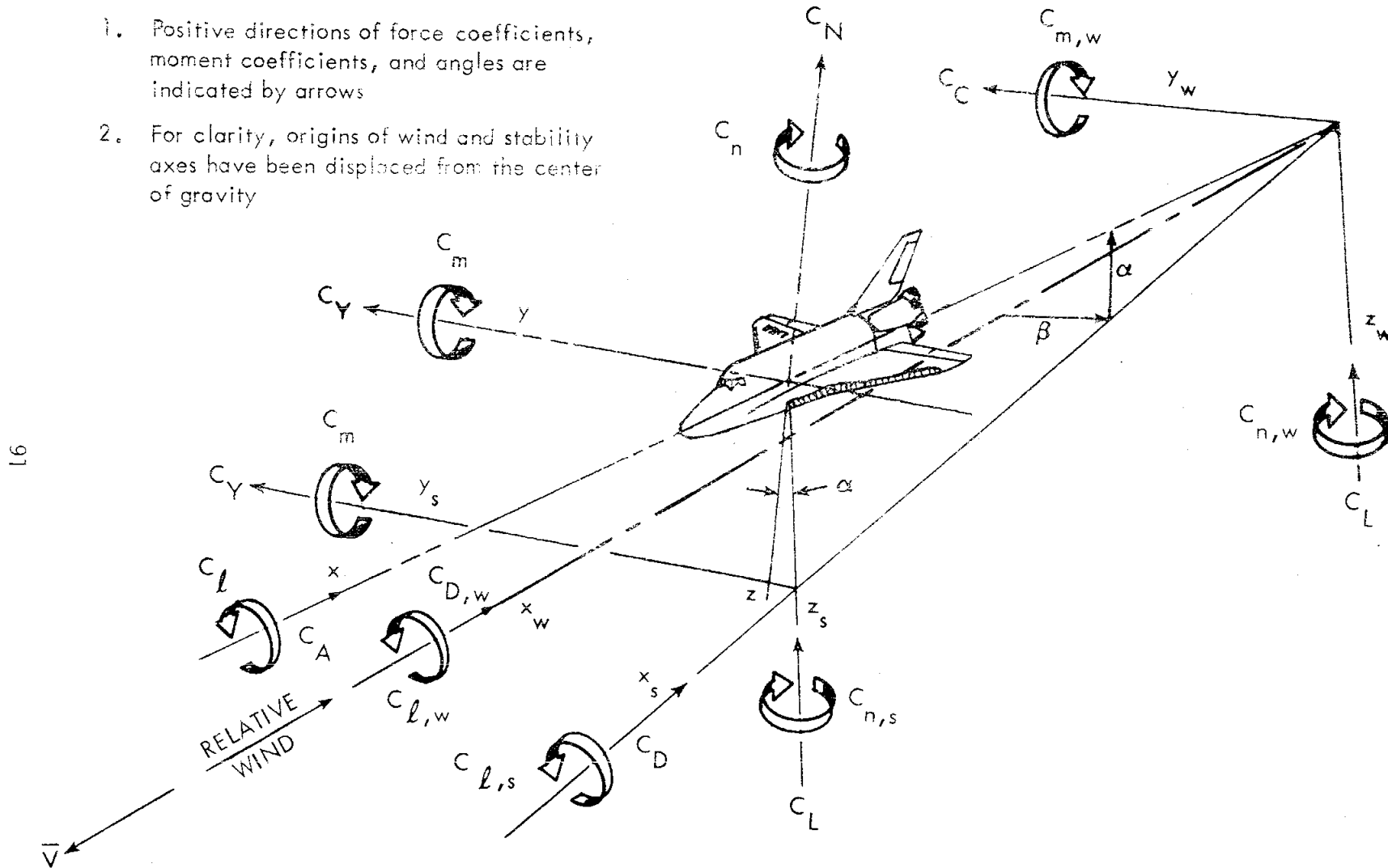
TABLE IV. SUMMARY OF FLOW SIMULATION PARAMETERS FOR THE BSM

A. FREE STREAM CONDITIONS	FREE FLIGHT	WIND TUNNEL
Dynamic Pressures, Q (PSF)	55.0	165.6
Mach Number, M	4.46	4.5
Altitude, h (ft)	142,830	---
Reynolds Number, Re	* 6.95×10^6	1.62×10^6
B. BSM FLOW CHARACTERISTICS	PROTOTYPE	MODEL
Chamber Pressure, P_c (psia)	1800	1134
Chamber Temperature, T_c (°R)	5435	530
Average Specific Heat Ratio, γ	1.22	1.4
Nozzle Expansion Ratio, ϵ	5.826	3.00
Nozzle Lip Angle, θ_{lip} (deg.)	8	13
Nozzle Exit Area, A_e (in ²)	44.94	0.01157
Exit Mach Number, M_e	2.94	2.64
Exit Pressure, P_e (psia)	44.50	53.4
Mass Flow Rate/Jet, \dot{m} (lbm/sec)	86	0.1009
Momentum/jet, $\dot{m} V_e$ (lb _f)	20,000	6.03
Thrust/Jet, T (lb _f)	22,000	6.647
C. JET-TO-FREE STREAM PARAMETERS	FLIGHT	TUNNEL
Thrust Ratio, $TH/(q_{Sref})$	400	401.4
Momentum Ratio, $\dot{m} V_e/q_{Sref}$	364	364
Mass Flow Ratio, $\dot{m}/(P_\infty V_\infty S_{ref})$	120	224
Pressure Ratio, P_e/P_∞	1704.3	658.4
Momentum Flux Ratio. q_{jet}/q_∞ (250 inches F.S. downstream of nozzle exit plane)	0.1803	0.1805
Plume cross-sectional Area at 250 in., A_{Plume} (in ²)	145,220	14.522

* Reynolds number based on orbiter body length ($L_{ORB} = 107.5$ ft. Full Scale)

Notes:

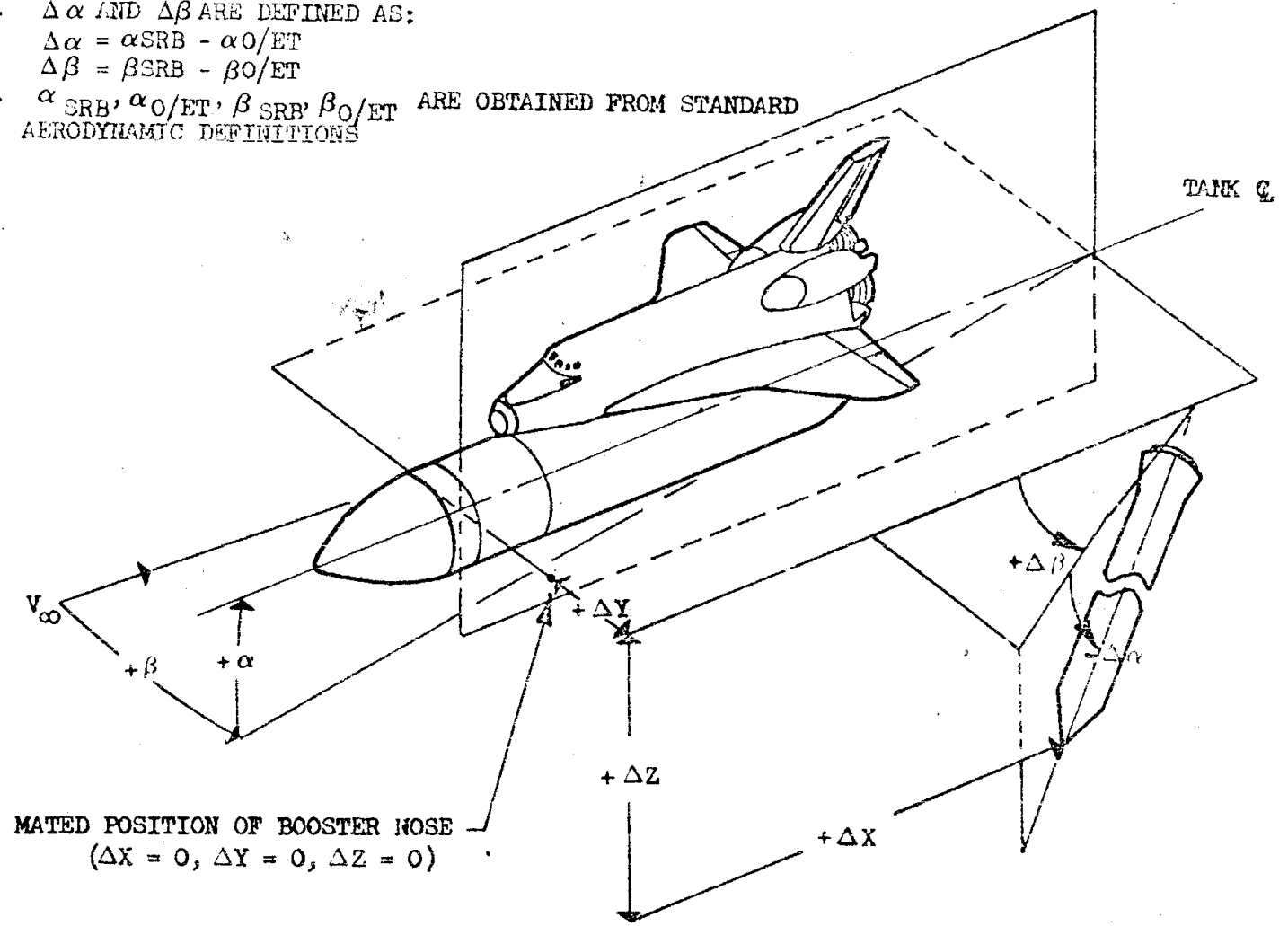
1. Positive directions of force coefficients, moment coefficients, and angles are indicated by arrows
2. For clarity, origins of wind and stability axes have been displaced from the center of gravity



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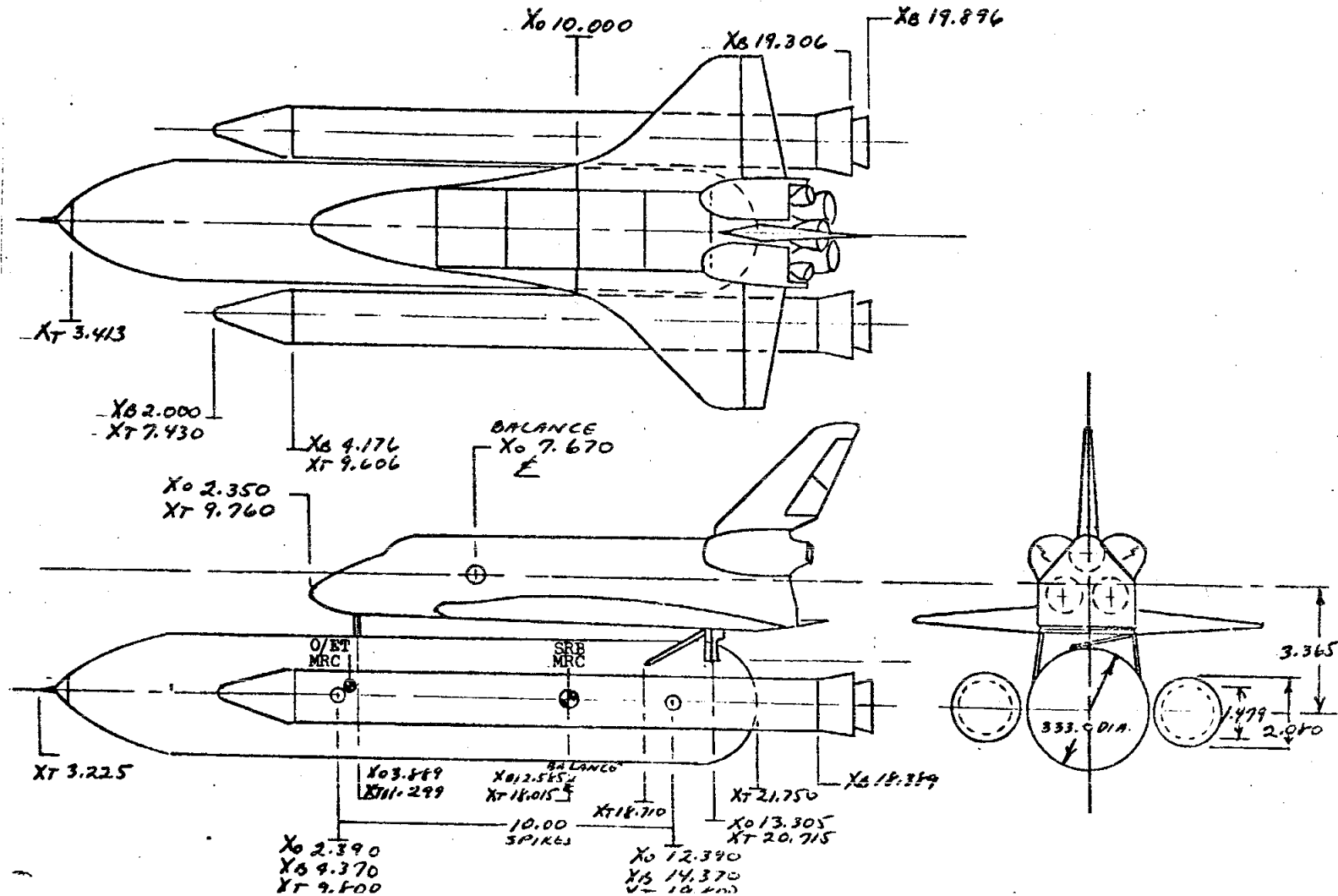
a. General
Figure 1. Axis Systems

- NOTES: 1. ΔX , ΔY , AND ΔZ ARE DISPLACEMENTS OF THE SRB NOSE FROM THE MATED SRB NOSE POSITION.
2. ΔX IS MEASURED POSITIVE AFT; ΔY IS MEASURED POSITIVE OUTBOARD FOR LEFT SRB, POSITIVE INBOARD FOR RIGHT SRB; ΔZ IS MEASURED POSITIVE AWAY FROM THE ORBITER.
3. $\Delta\alpha$ AND $\Delta\beta$ ARE DEFINED AS:
 $\Delta\alpha = \alpha_{SRB} - \alpha_{O/ET}$
 $\Delta\beta = \beta_{SRB} - \beta_{O/ET}$
4. α_{SRB} , $\alpha_{O/ET}$, β_{SRB} , $\beta_{O/ET}$ ARE OBTAINED FROM STANDARD AERODYNAMIC DEFINITIONS

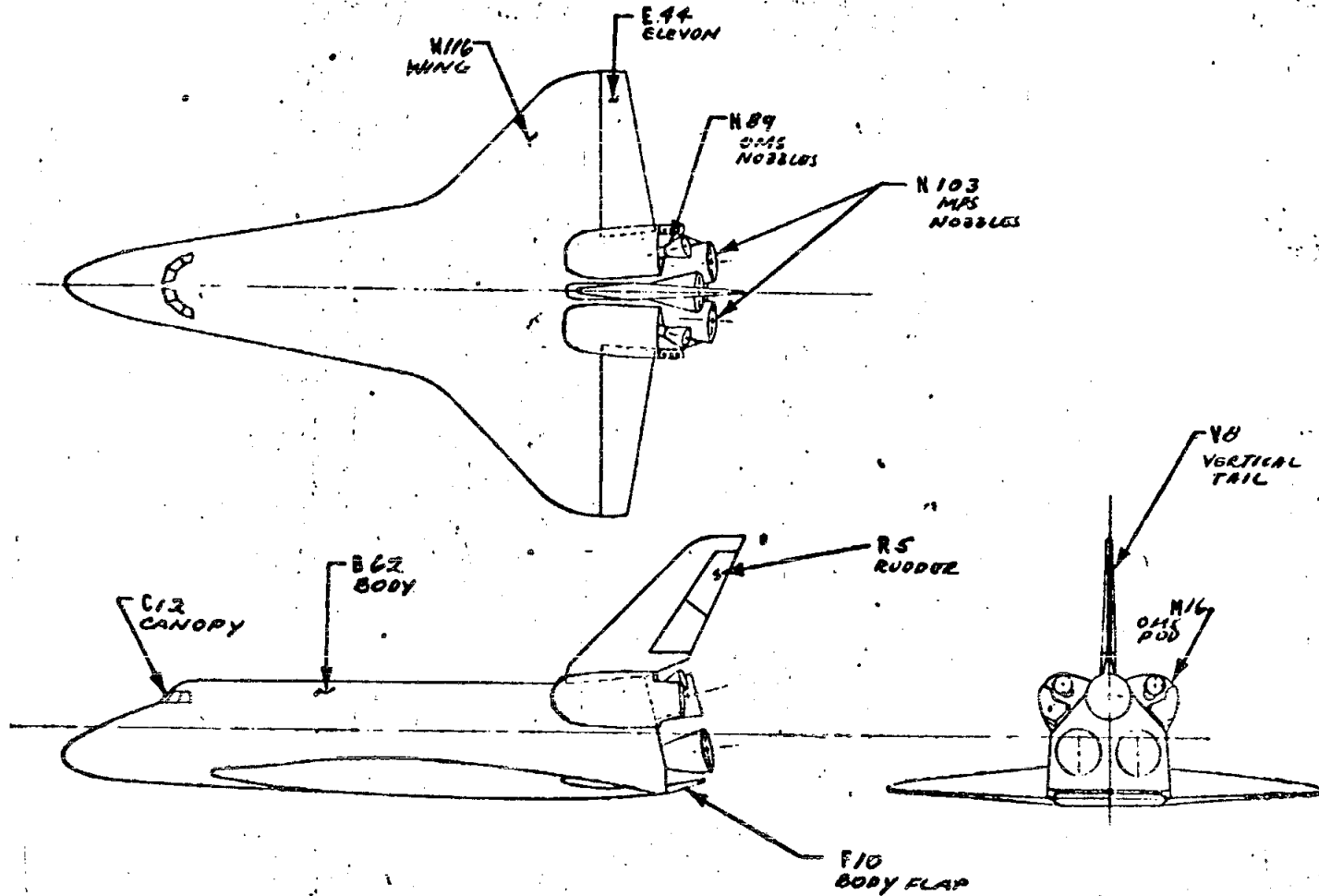


MATED POSITION OF BOOSTER NOSE
 $(\Delta X = 0, \Delta Y = 0, \Delta Z = 0)$

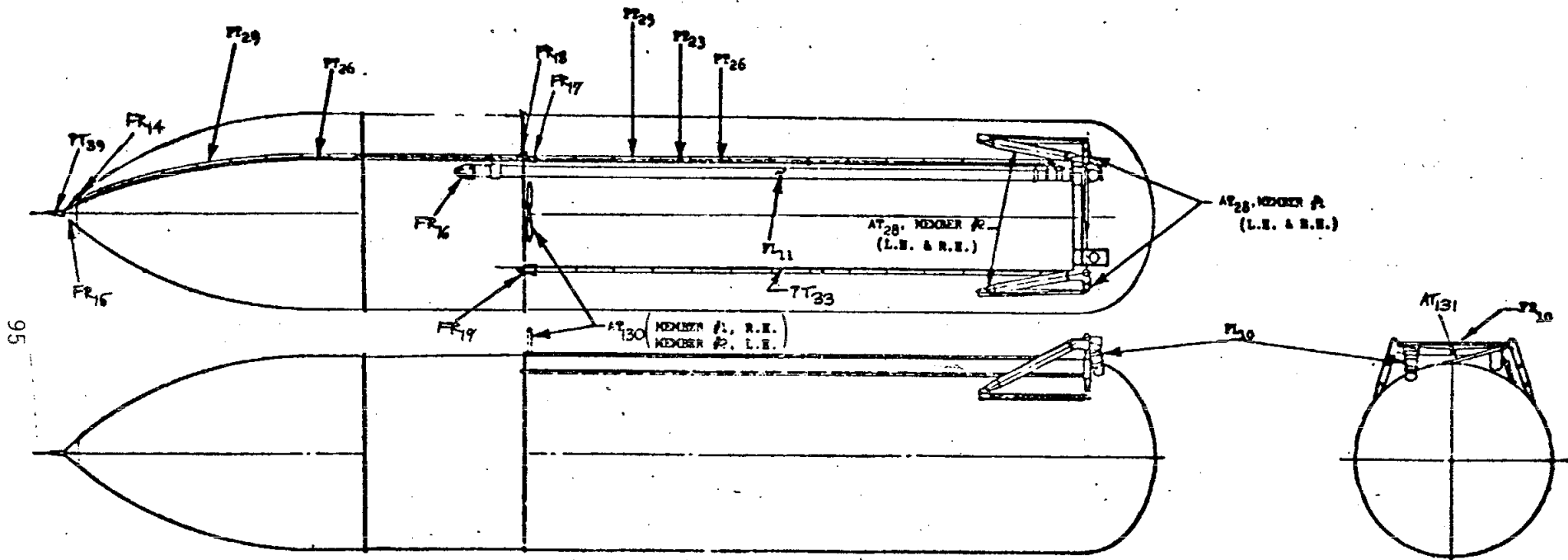
b. Booster Separation from Orbiter/External Tank
 Figure 1. Concluded.



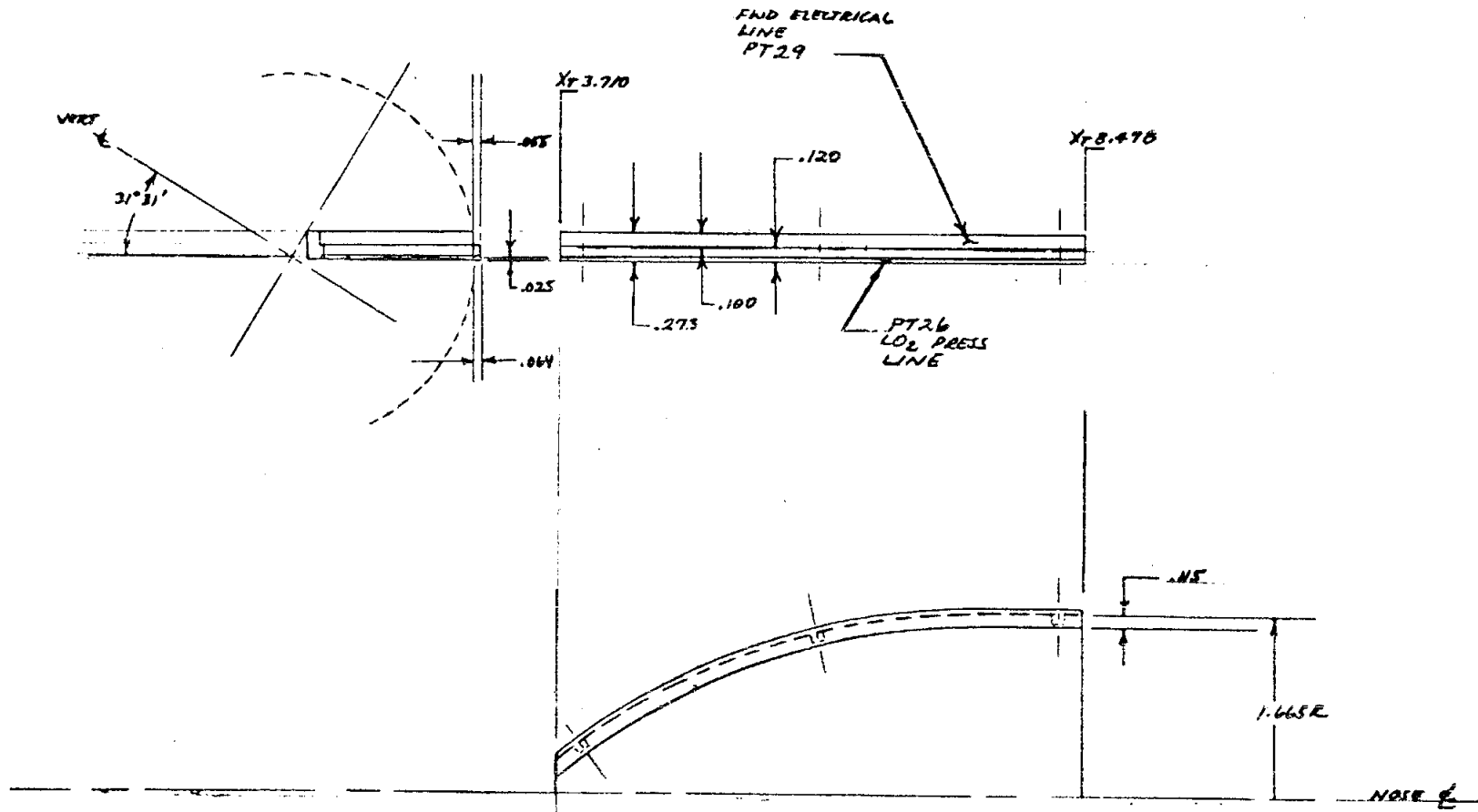
a. Integrated Vehicle Model 75-OTS Configuration
Figure 2. Model sketches.



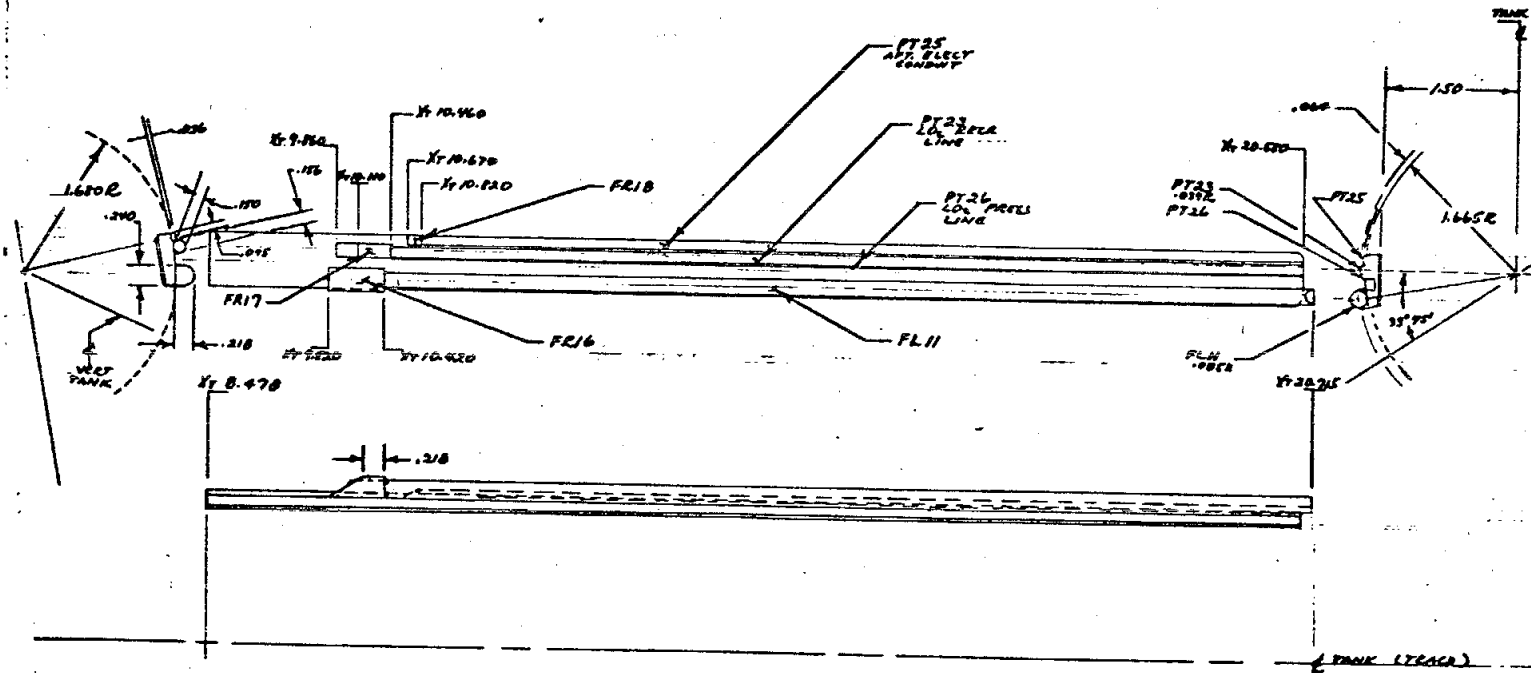
b. Orbiter Nomenclature
Figure 2. Continued.



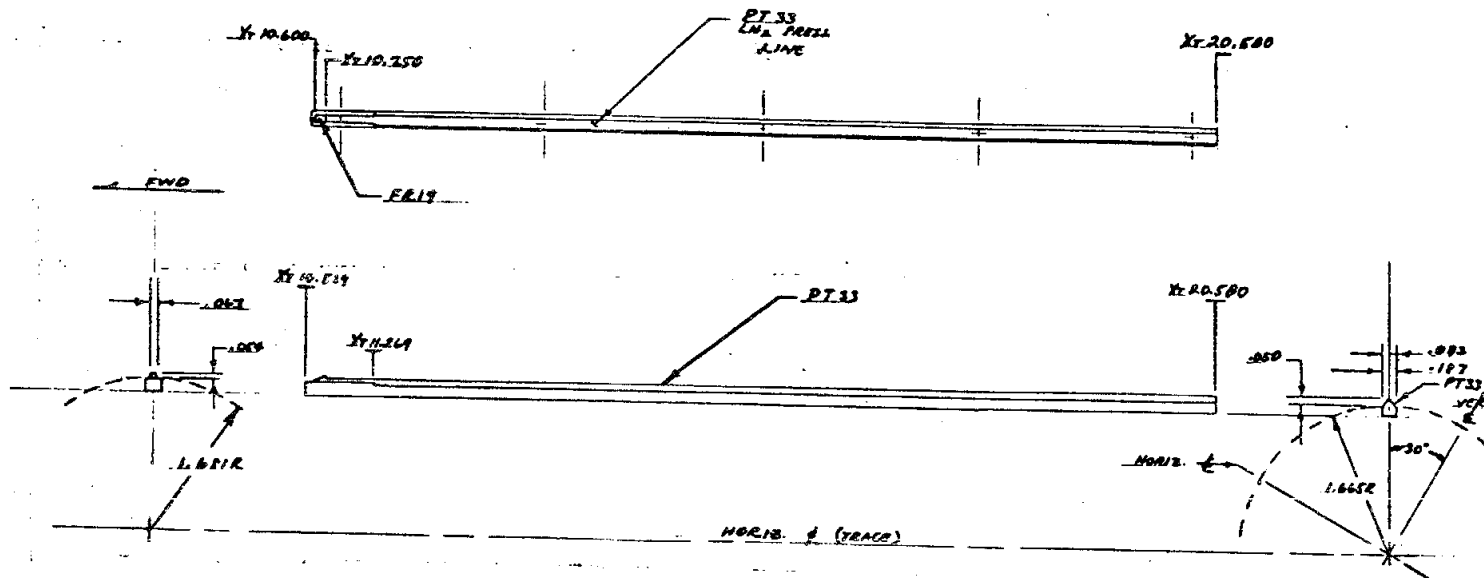
c. External Tank (T₃₅) Protrusions
 Figure 2. Continued.



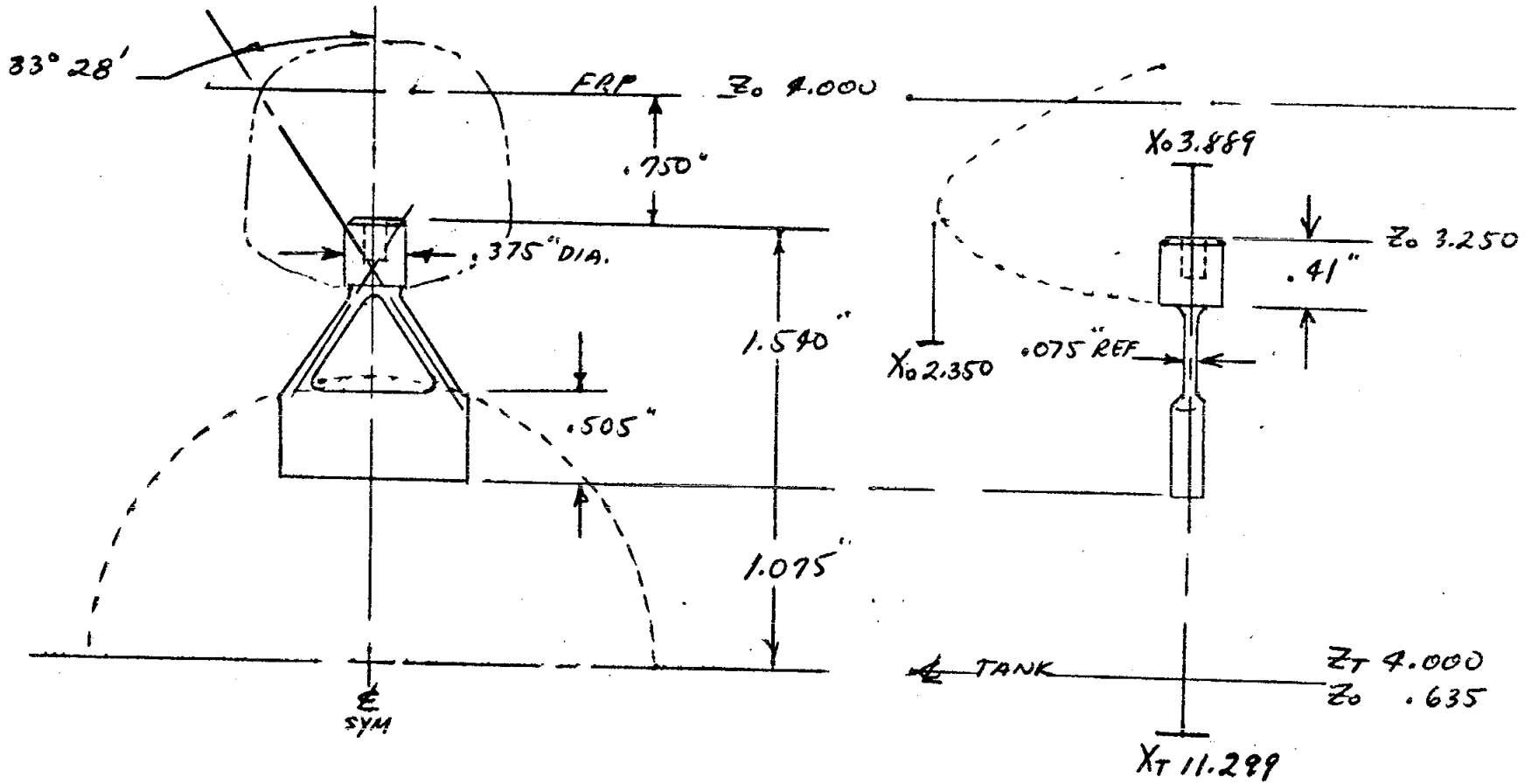
d. Forward Electrical Conduit (PT₂₉) and LO₂ Pressure Line (PT₂₆)
Figure 2. Continued.



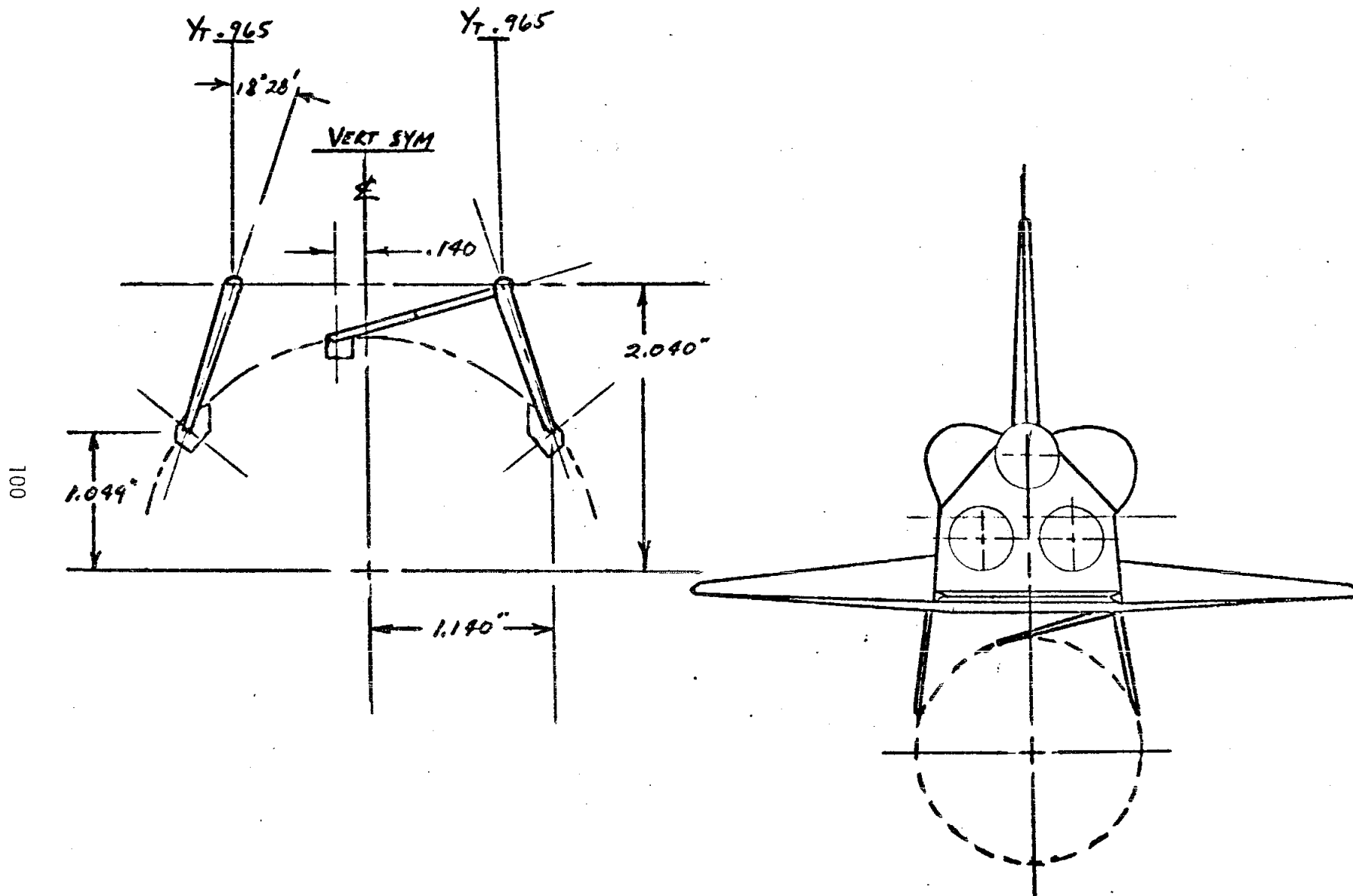
e. External Tank Hardware and Protrusions
Figure 2. Continued.



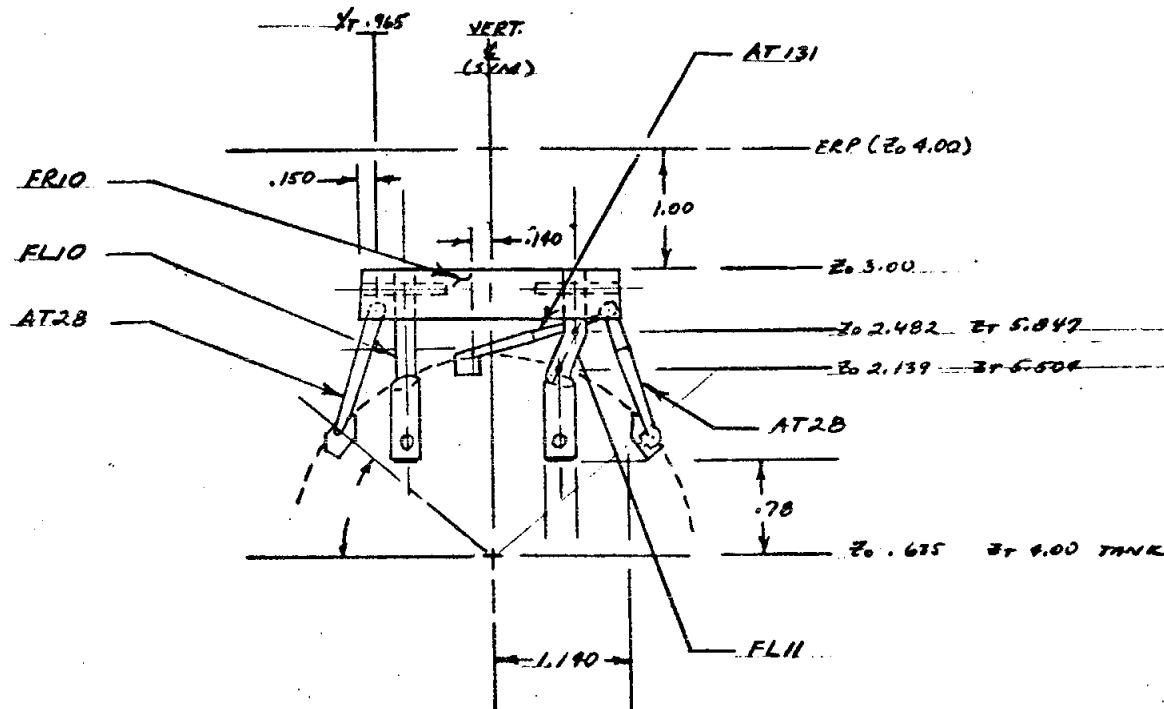
f. Left LH₂ Pressure Line - PT₃₃ and FR₁₉
Figure 2. Continued.



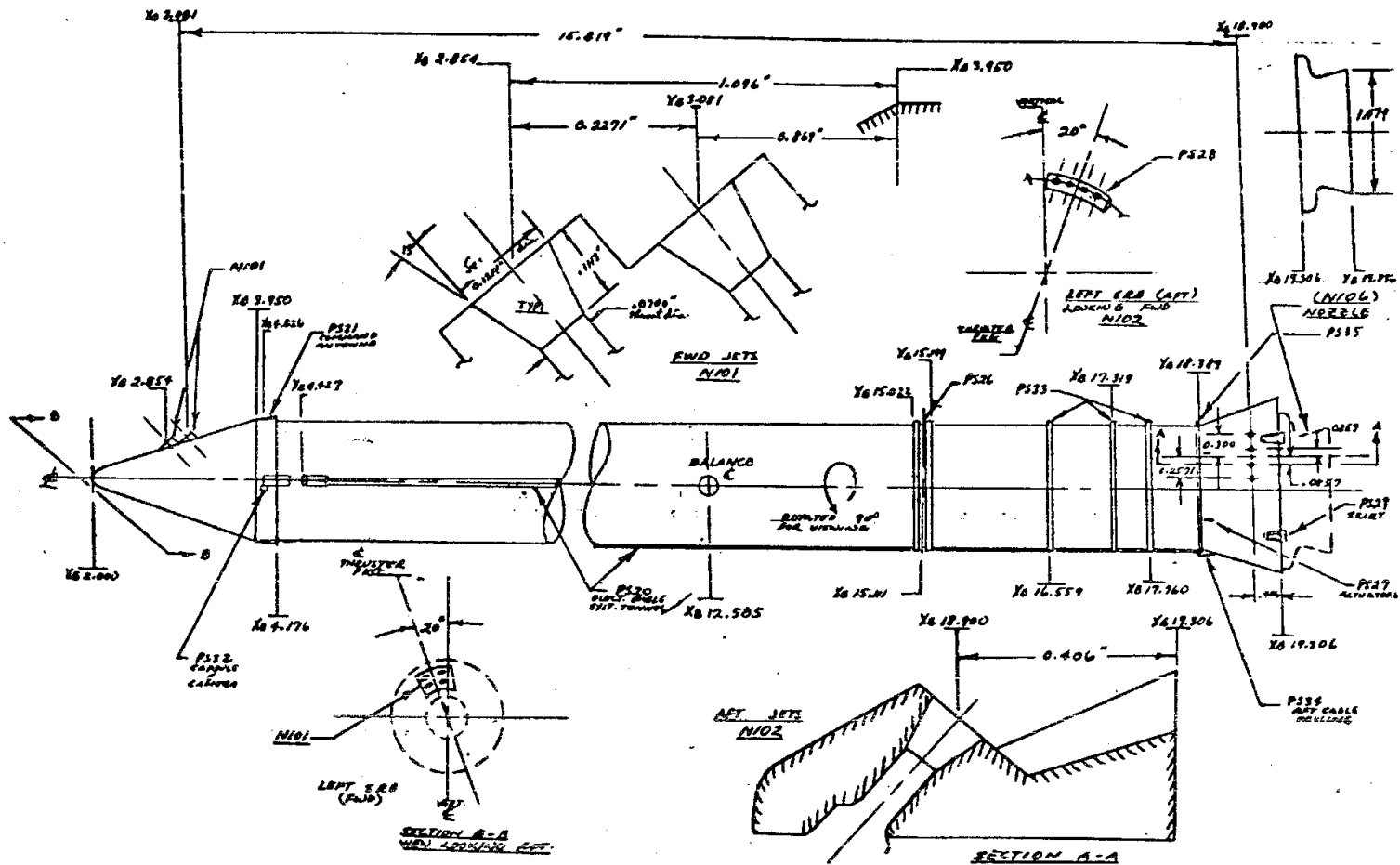
g. Orbiter/Tank Forward Support (AT₁₃₀)
Figure 2. Continued.



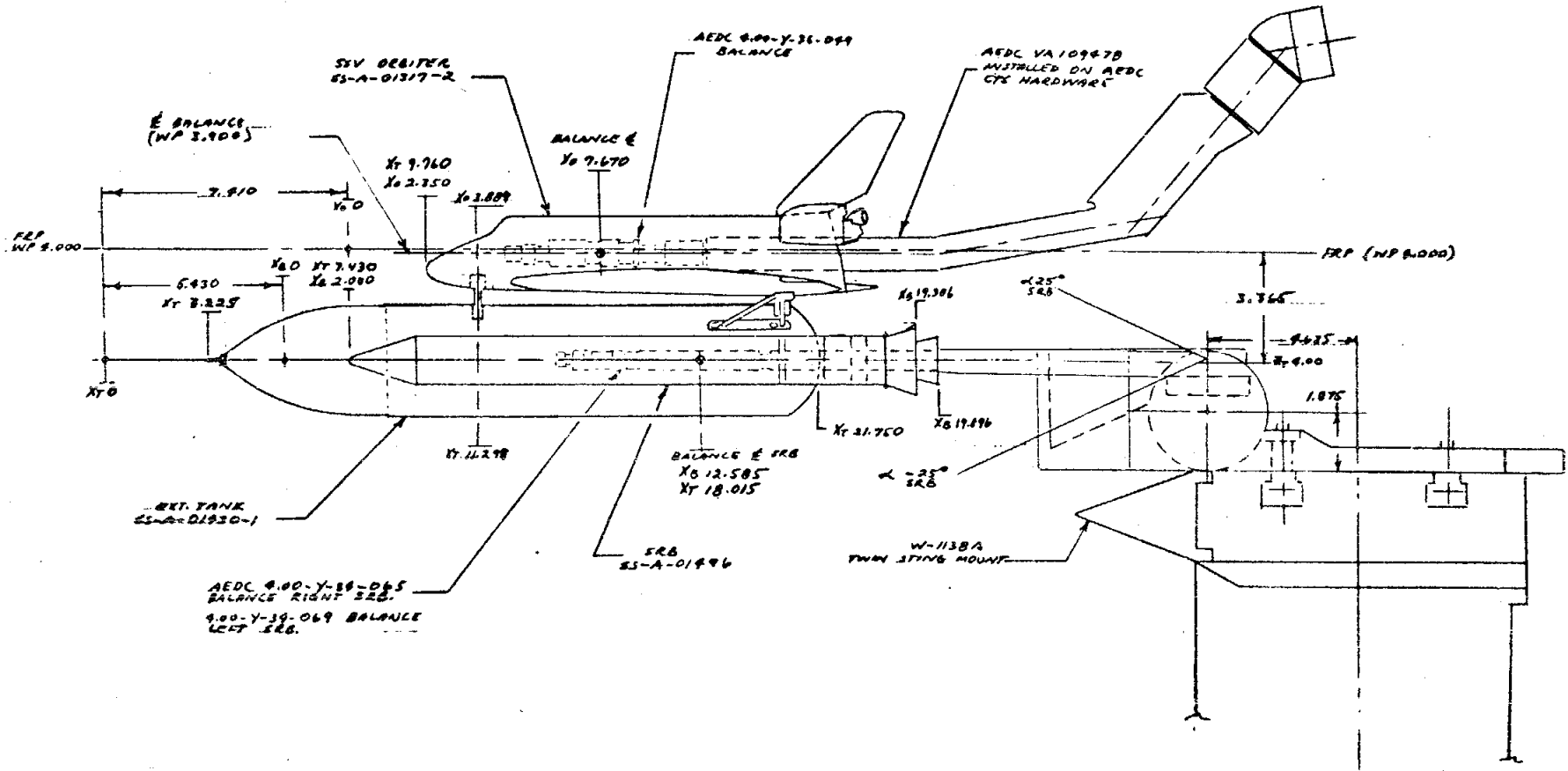
h. Aft Attachment of External Tank to Orbiter (AT₂₈ and AT₁₃₁)
 Figure 2. Continued.



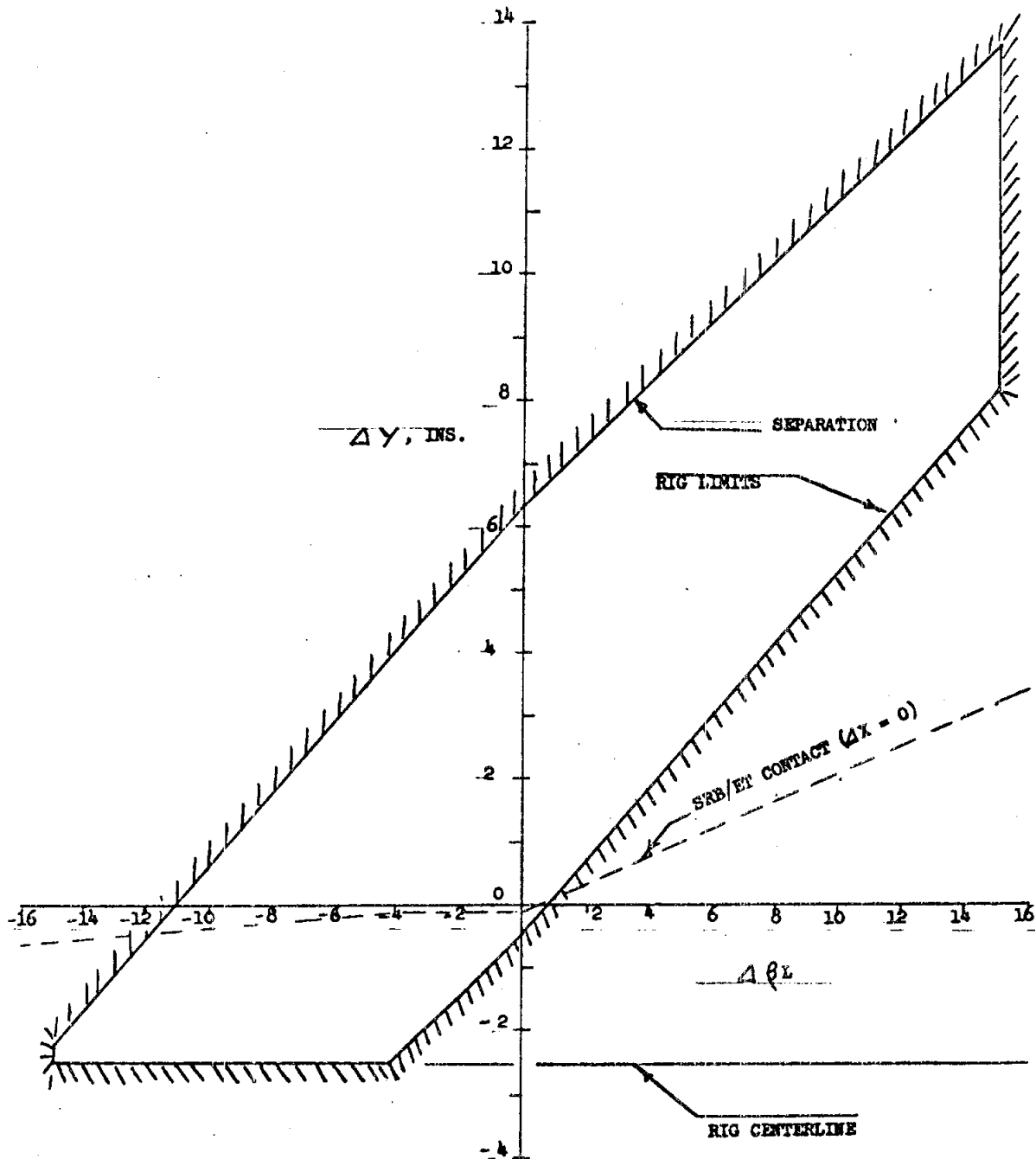
1. LH and LO₂ Feedline and Aft Orbiter/Tank Attach Structure (FL₁₀, FL₁₁) and (AT₂₈, AT₁₃₁)
Figure 2. Continued.



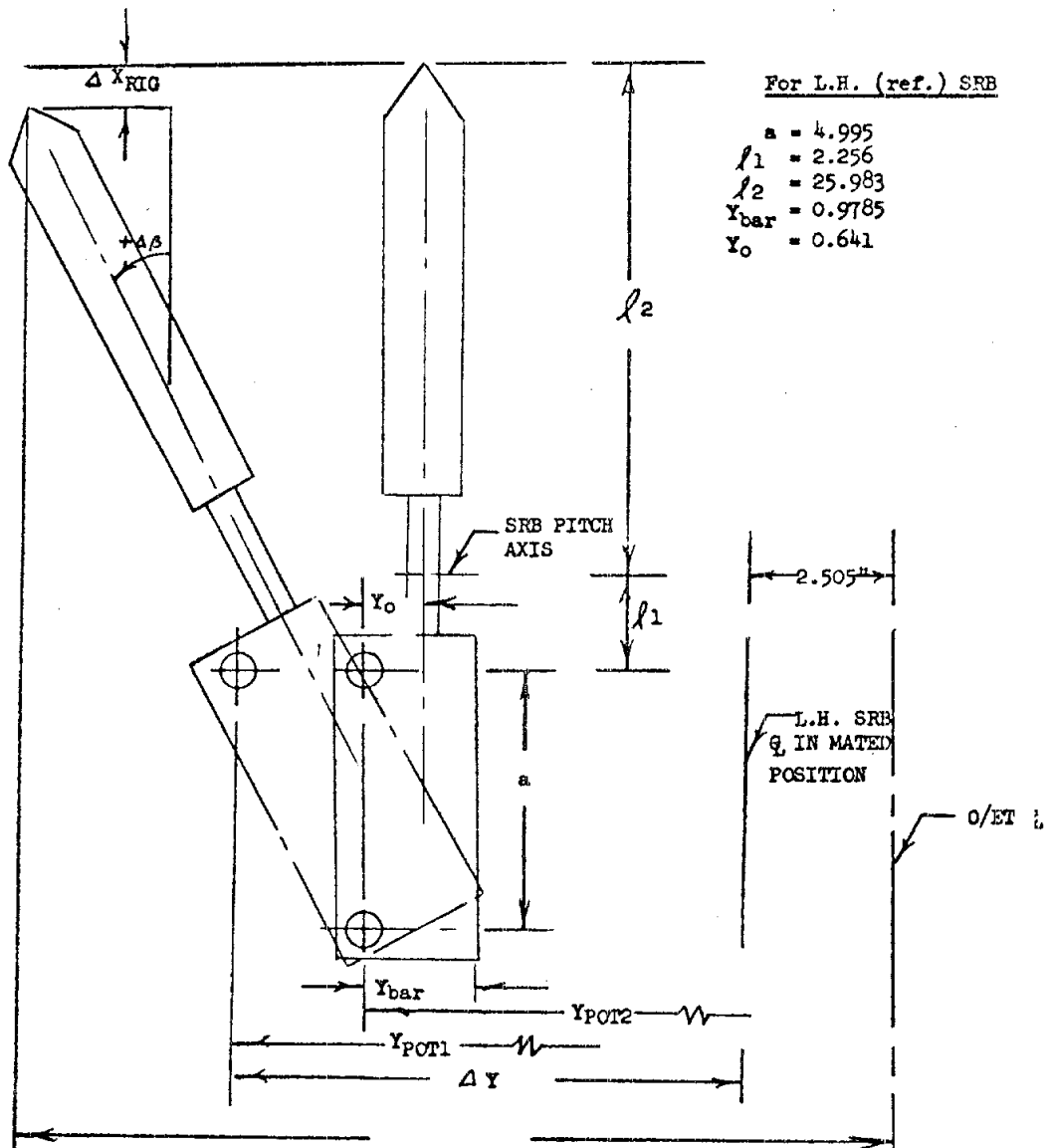
j. BSRM 0.010 Scale 75 OTS Test IA142
Figure 2. Continued.



k. IA142 Installation
 Figure 2. Continued.



1. W-1138A Separation Rig Envelope in Yaw Plane
Figure 2. Continued.



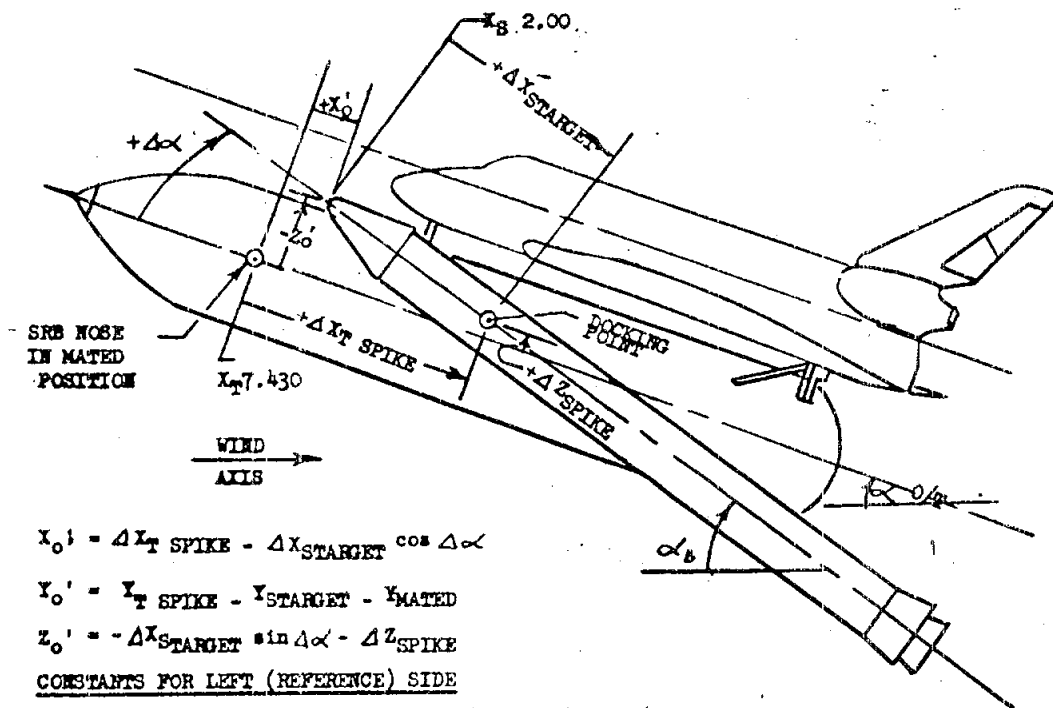
$$\Delta X_{RIG} = \left[(l_1 + l_2 \cos \alpha_0) (1 - \cos \Delta \beta) - Y_0 \sin \Delta \beta \right] (1 / \cos \alpha_{O/T})$$

$$\Delta Y = Y_{ref} + Y_{POT1} + Y_{bar} / \cos \Delta \beta - Y_0 \cos \Delta \beta + (l_1 + l_2 \cos \alpha_0) \sin \Delta \beta$$

Determine Y_{ref} for each installation as follows: with $\Delta \beta = 0$, ΔY set at a known position, and the O/ET centered between LH and RH SRB's, read Y_{POT1} and calculate Y_{ref} .

$$\Delta \beta = \tan^{-1} \left(\frac{Y_{POT1} - Y_{POT2}}{a} \right)$$

m. Separation Rig Geometry and Equations
Figure 2. Continued.



$$X_o' = \Delta X_{T \text{ SPIKE}} - \Delta X_{\text{TARGET}} \cos \Delta \alpha$$

$$Y_o' = Y_{T \text{ SPIKE}} - Y_{\text{TARGET}} - Y_{\text{MATED}}$$

$$Z_o' = -\Delta X_{\text{TARGET}} \sin \Delta \alpha - \Delta Z_{\text{SPIKE}}$$

CONSTANTS FOR LEFT (REFERENCE) SIDE

$$Y_{\text{MATED}} = 2.505$$

ET (SHORT SPIKE)

$$Y_{\text{TARGET}} = -0.7295$$

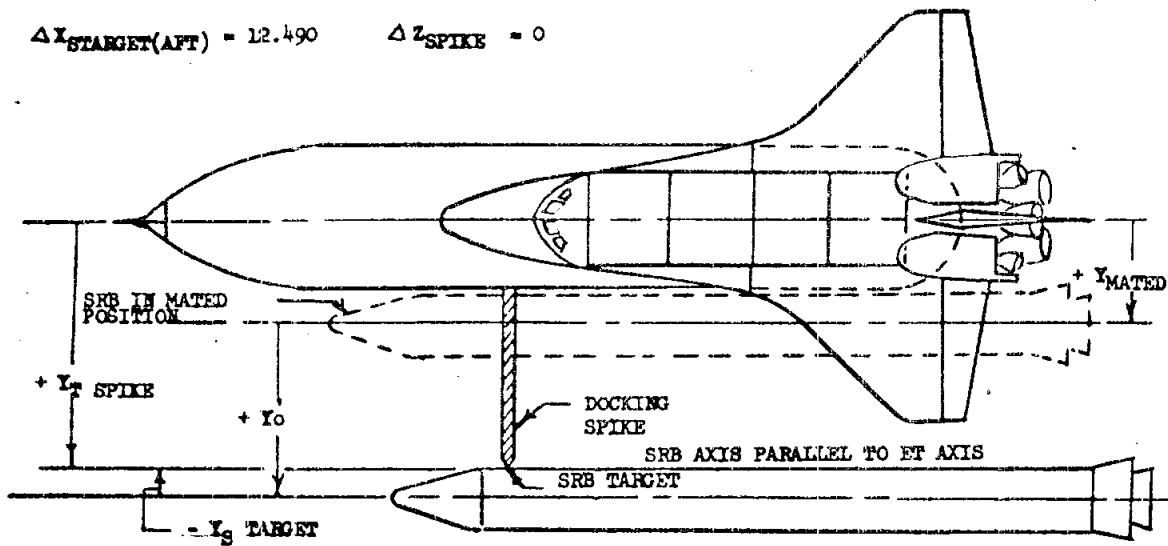
$$\Delta X_{T \text{ SPIKE}} = 2.279$$

$$\Delta X_{\text{TARGET(FWD)}} = 2.510$$

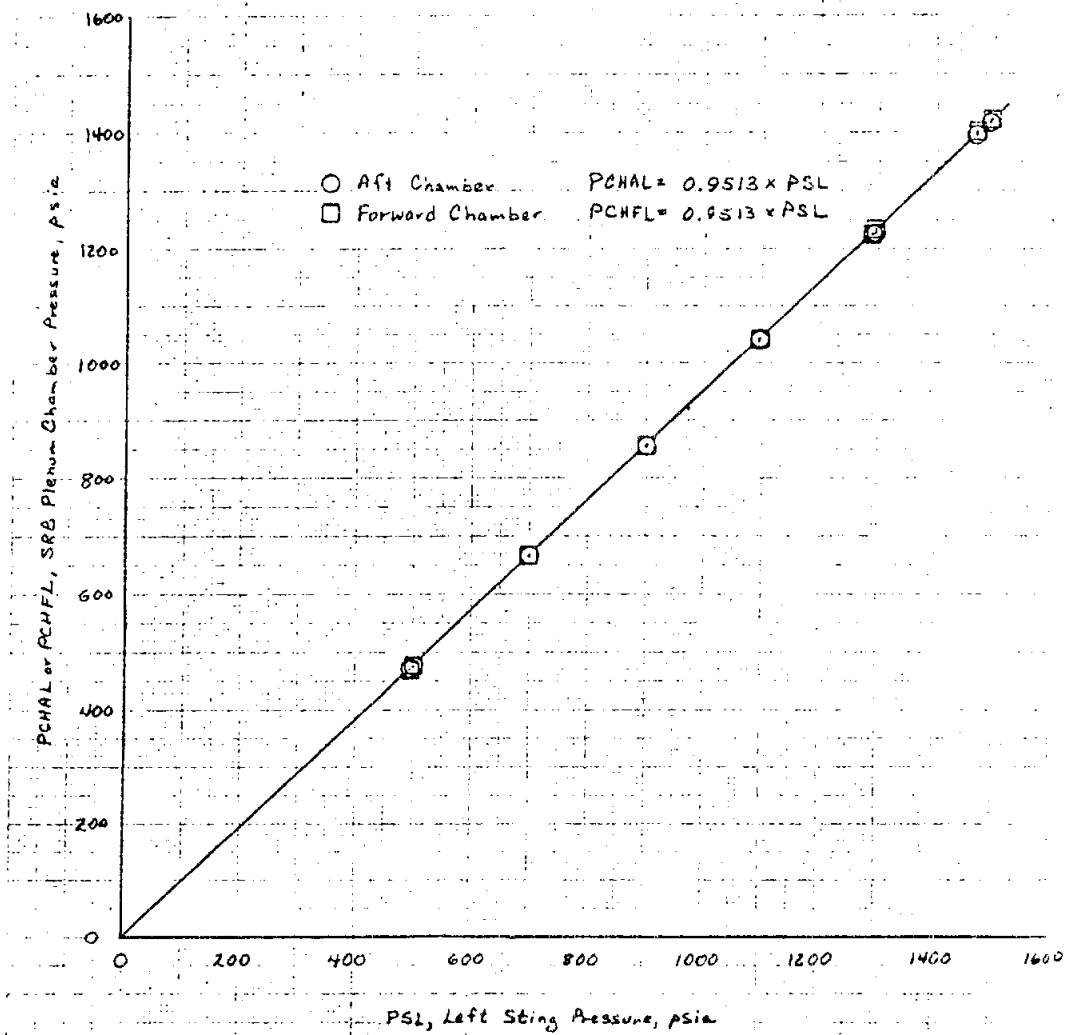
$$Y_{T \text{ SPIKE}} = 3.879$$

$$\Delta X_{\text{TARGET(AFT)}} = 12.490$$

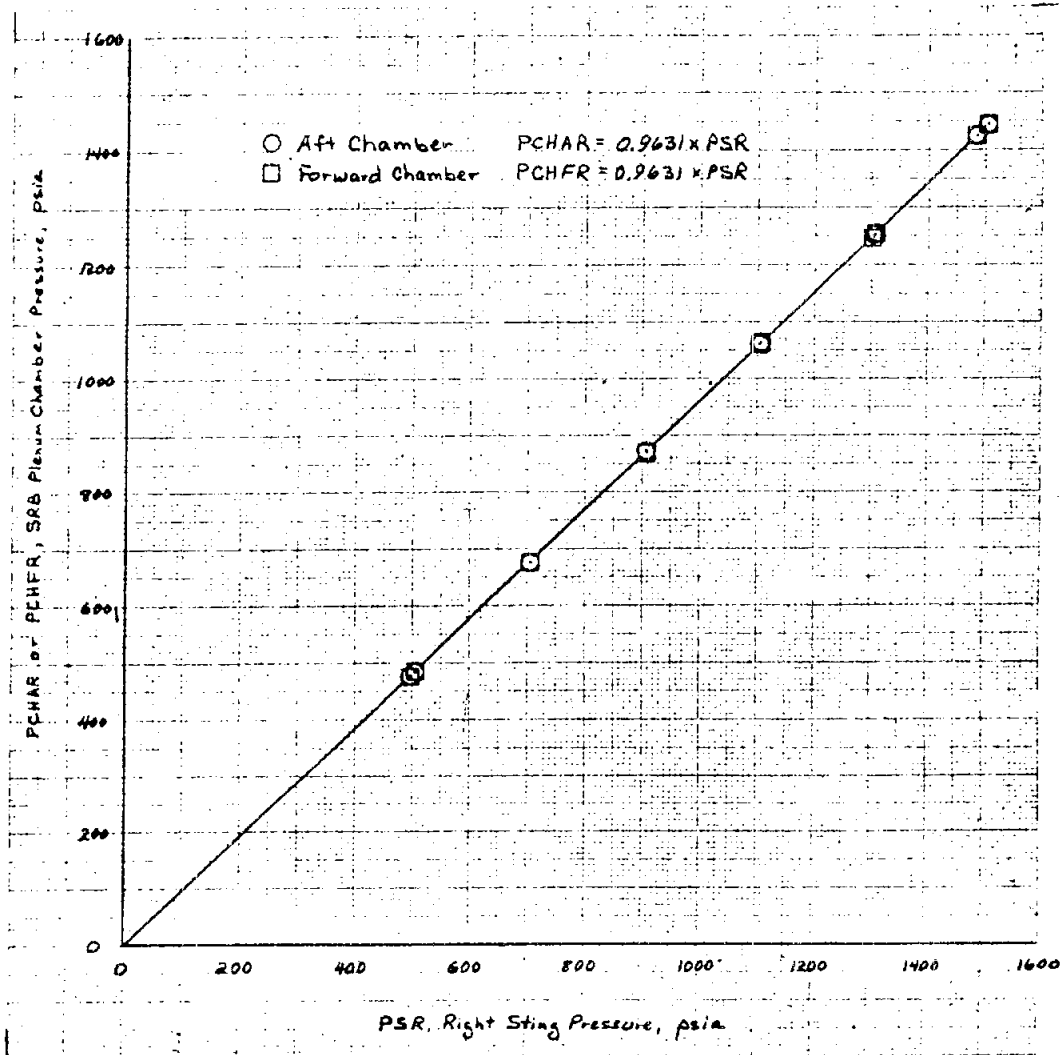
$$\Delta Z_{\text{SPIKE}} = 0$$



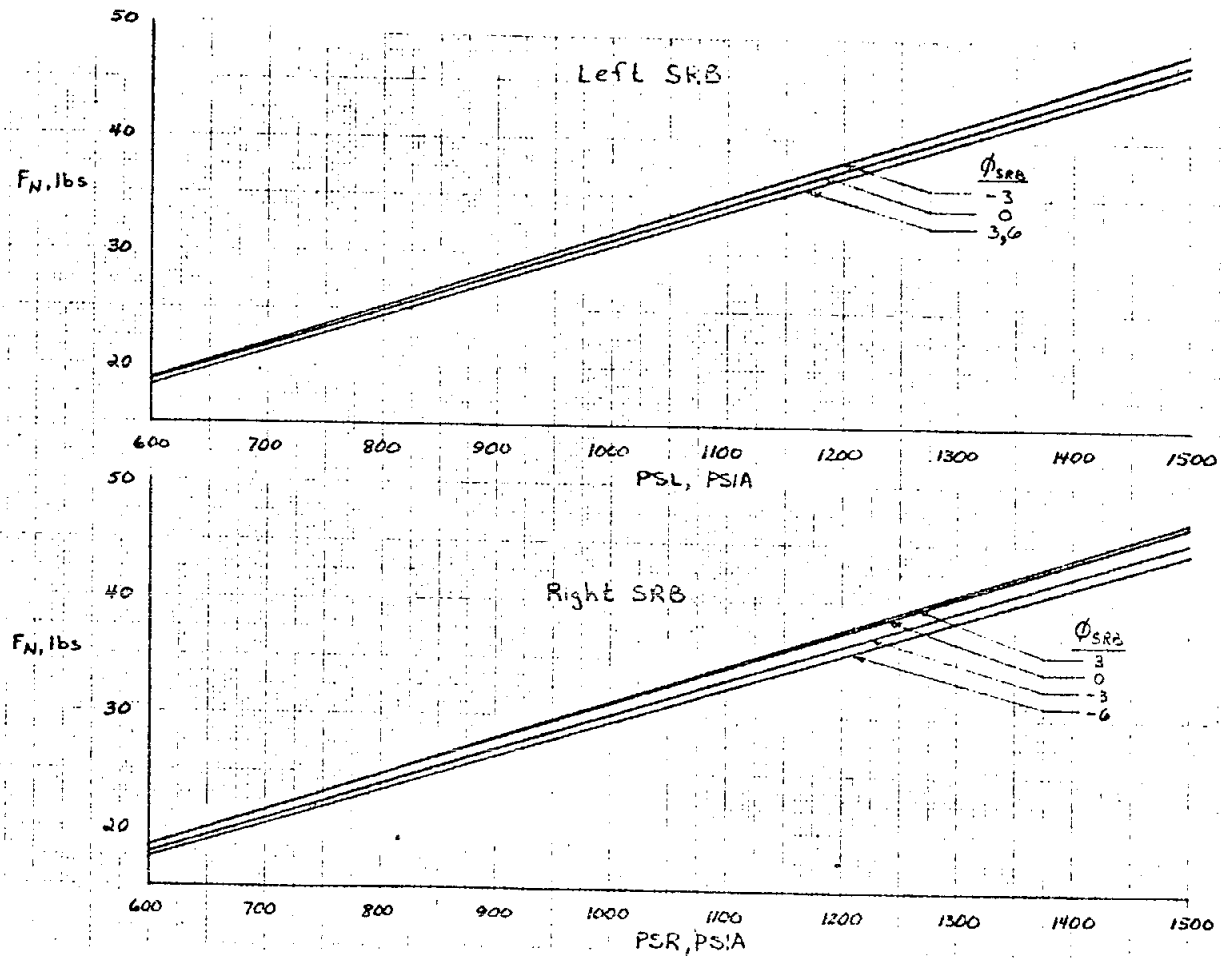
n. CTS Docking Equations
Figure 2. Continued.



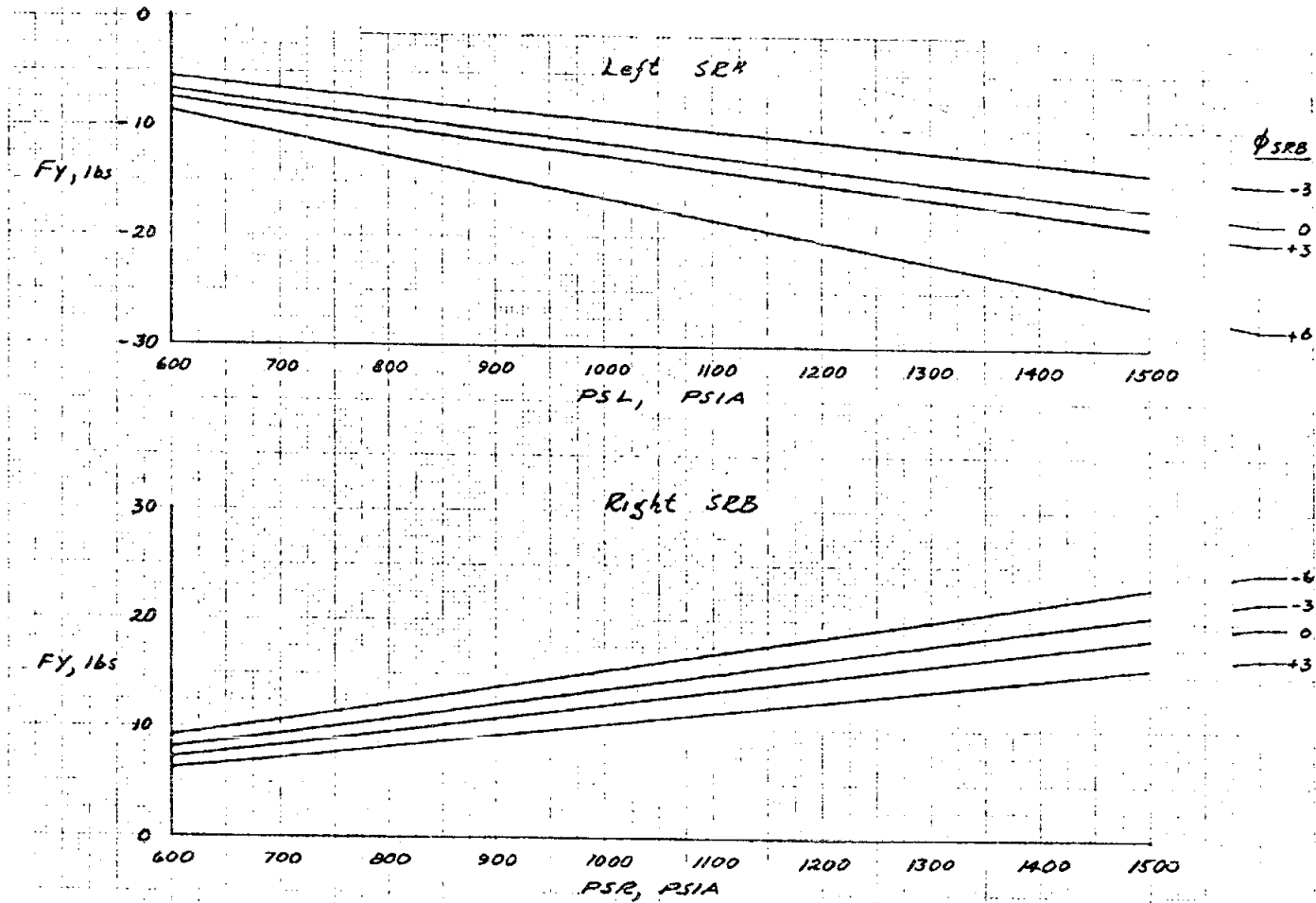
o. Sting/Plenum Chamber Pressure Calibration Left SRB
 Figure 2. Continued.



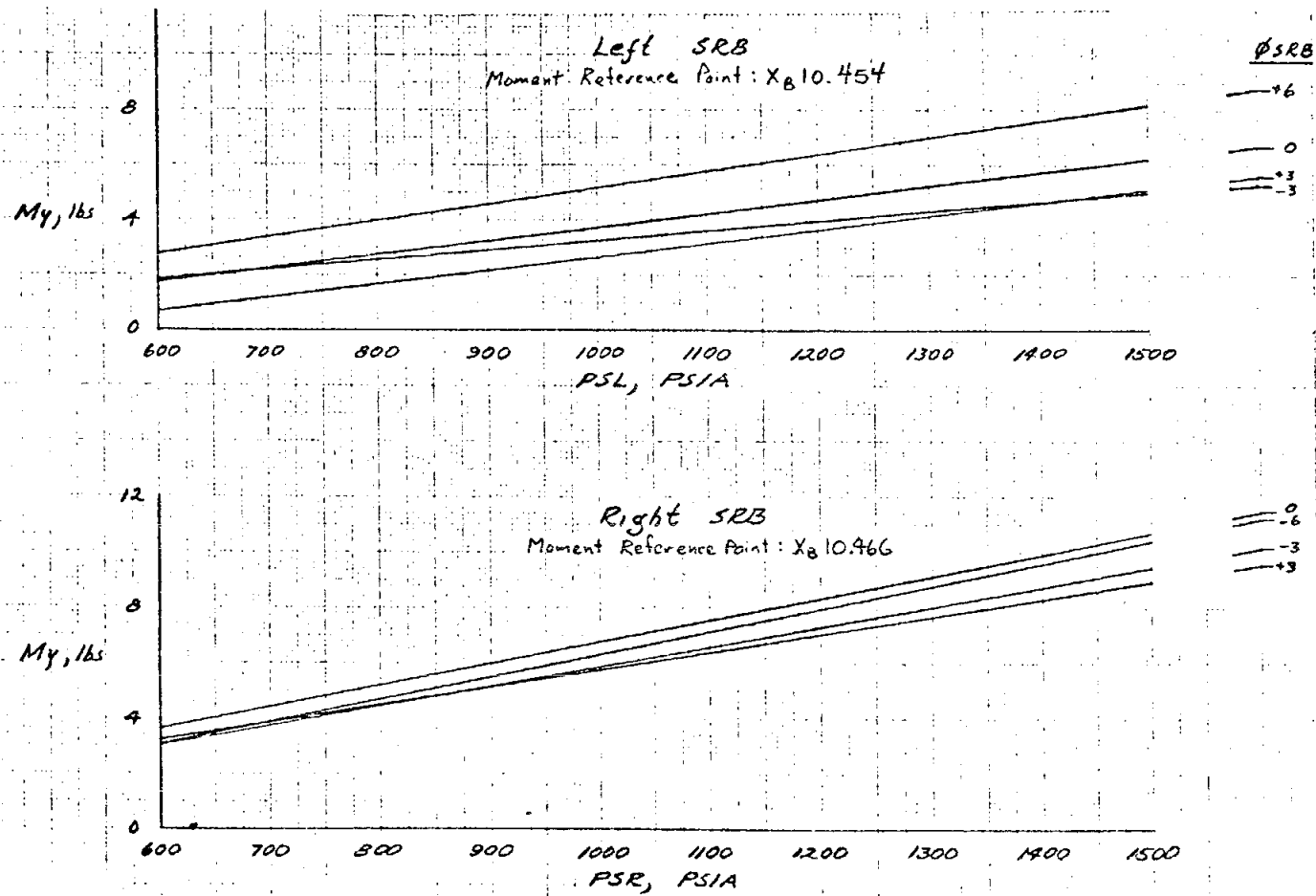
p. Sting/Plenum Chamber Pressure Calibration Right SRB
 Figure 2. Continued.



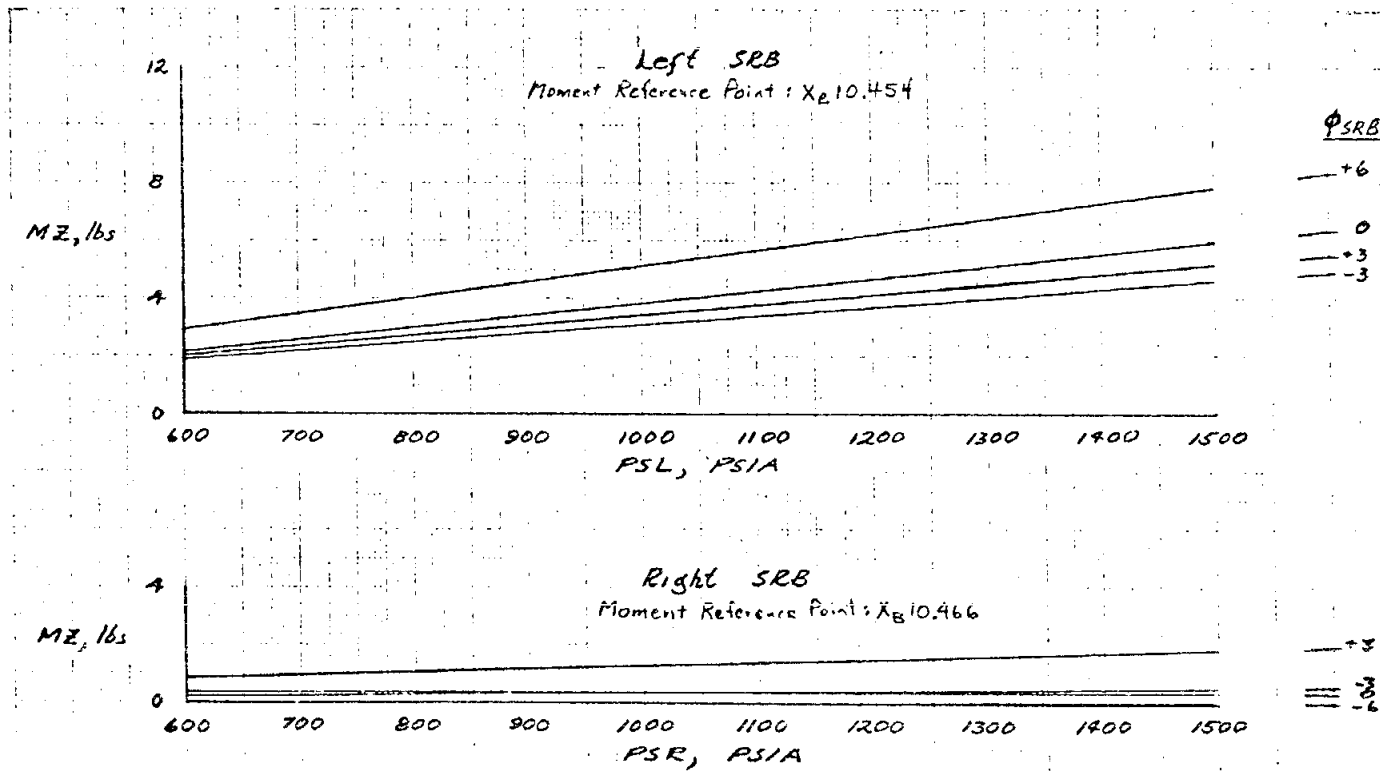
q. SRB Thrust Tare Normal Force Calibrations for Left and Right SRB
Figure 2. Continued.



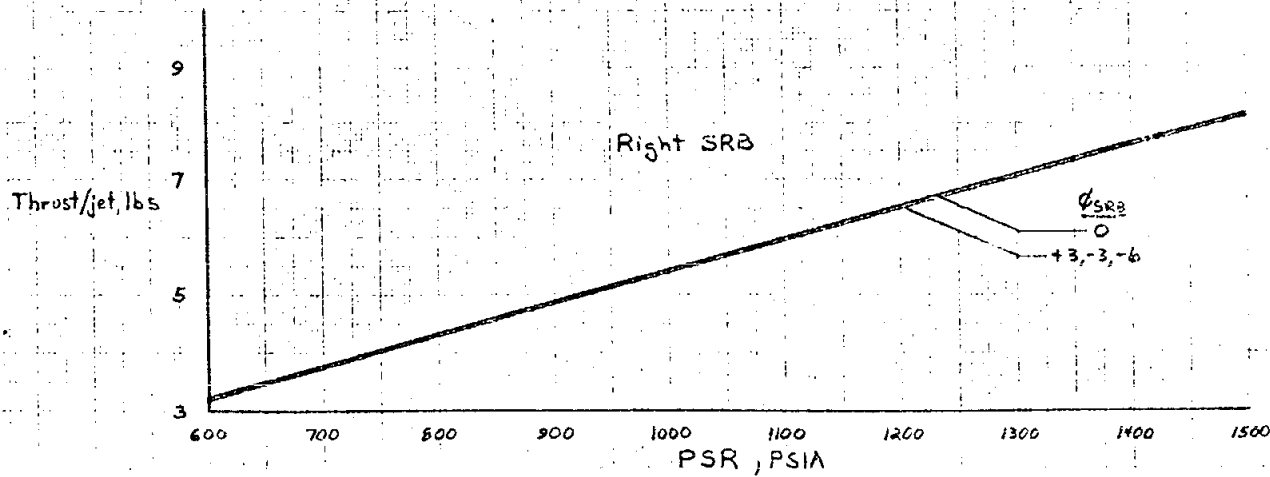
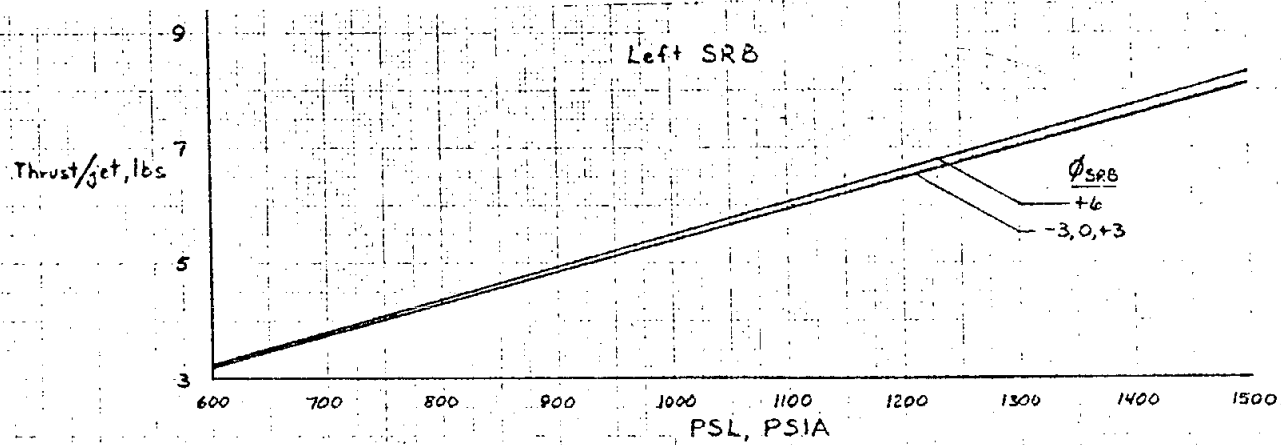
r. SRB Thrust Tare Side Force Calibrations for Left and Right SRB
Figure 2. Continued.



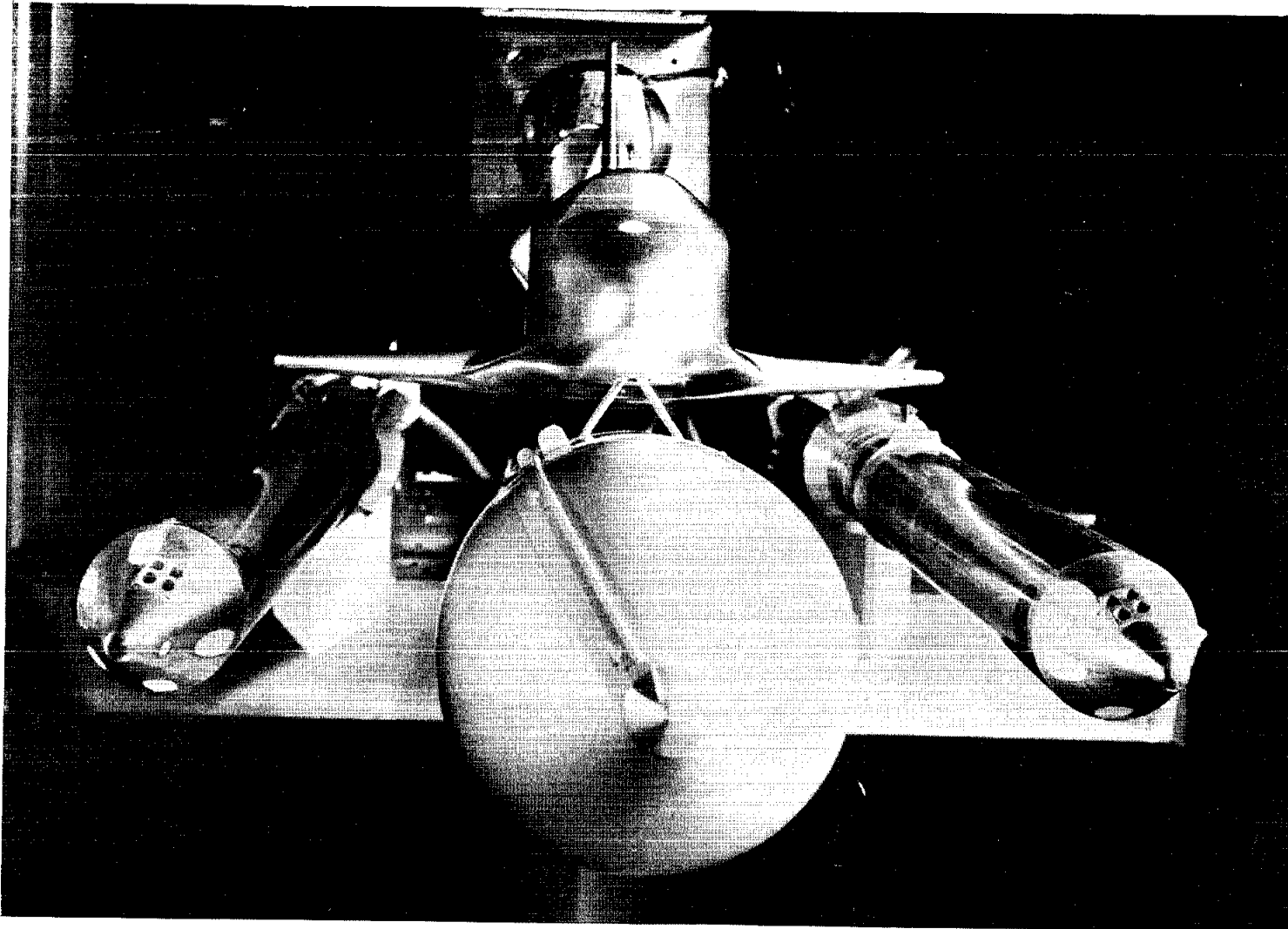
s. SRB Thrust Tare Pitching Moment Calibrations for Left and Right SRB
Figure 2. Continued.



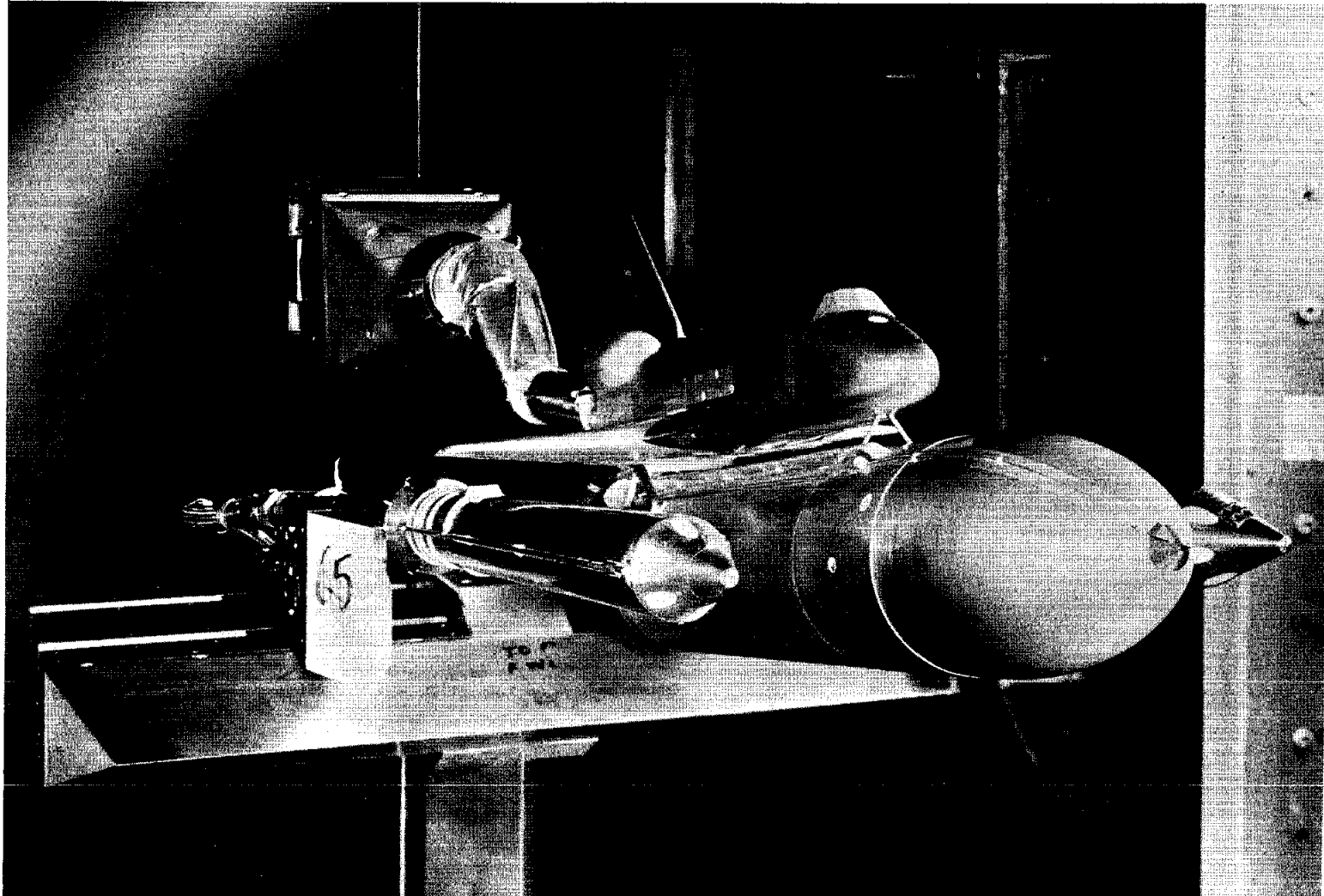
t. SRB Thrust Tare Yawing Moment Calibrations for Left and Right SRB
Figure 2. Continued.



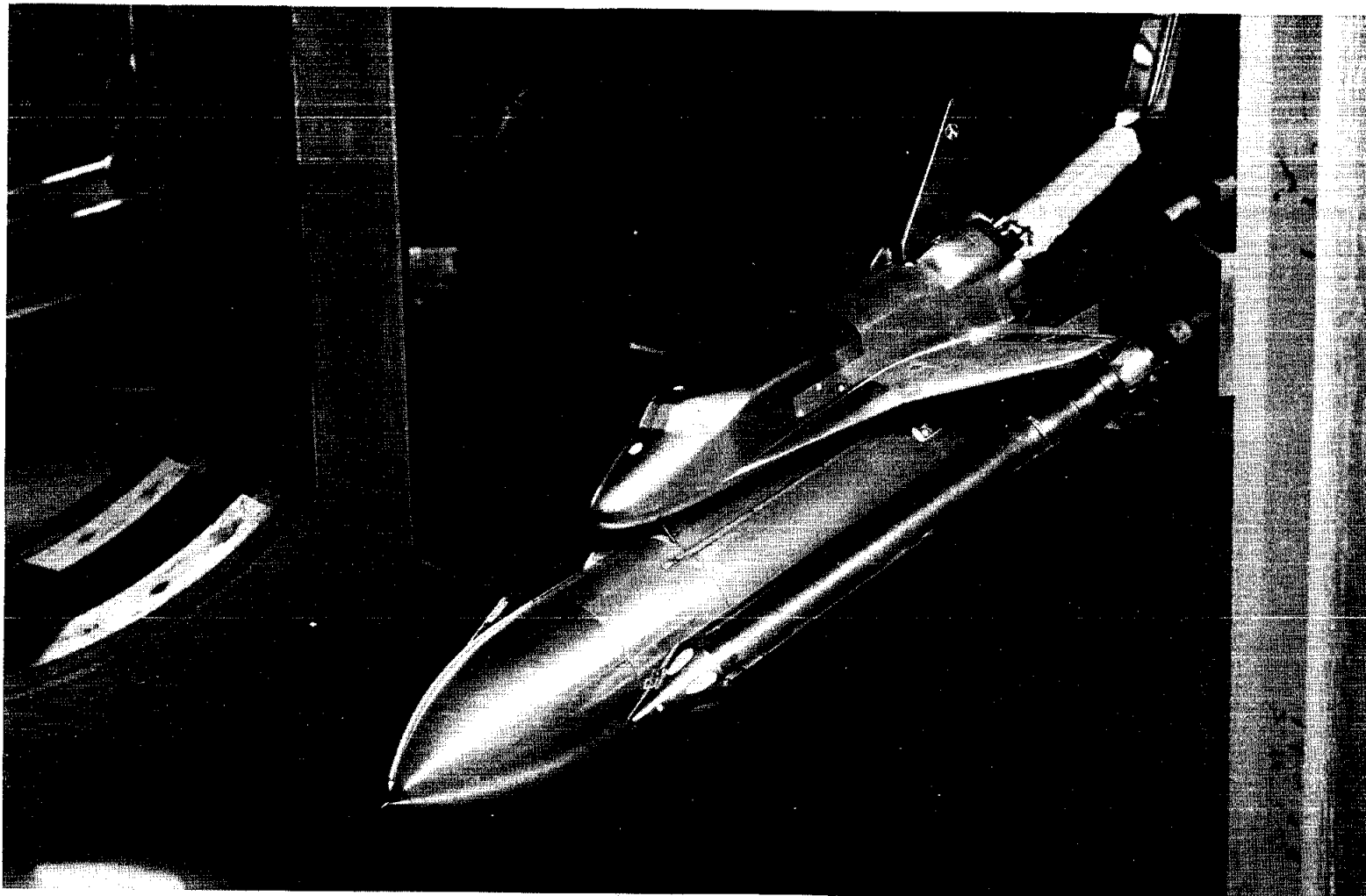
u. Thrust/Jet vs. Sting Pressure for Left and Right SRB
Figure 2. Concluded.



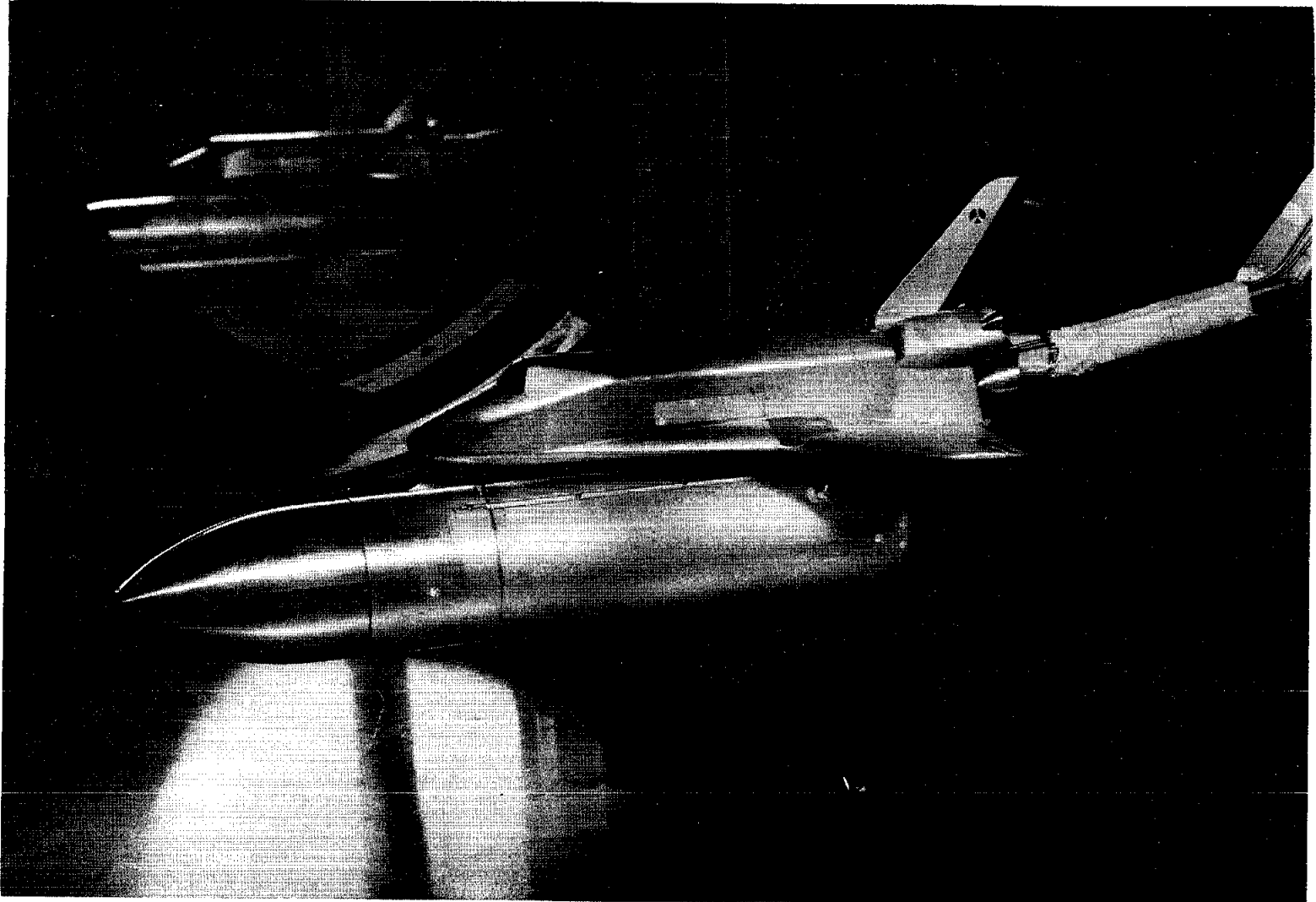
a. Front View of Model on CTS Rig
Figure 3. Model photographs.



b. Front Three-quarter View of Model CTS Rig
Figure 3. Continued.



c. Top Three-quarter View of Model Installed in Tunnel
Figure 3. Continued.



d. Model with SRB's Removed
Figure 3. Concluded.

APPENDIX

TABULATED SOURCE DATA

COEFFICIENT SCHEDULE

<u>DATA SET</u> <u>I.D.</u>	<u>1st INDEP.</u> <u>VARIABLE</u>	<u>2nd INDEP.</u> <u>VARIABLE</u>	<u>DEPENDENT VARIABLES</u>
OVT101 - 15	MACH	ALPHA	CN, CLM, CA, CY, CYN, CBL, BETA
OVT001 - 179 } OVT501 - 733 } OVTL01 - L59 } OVTR01 - R63 }	Z	X	CN, CLM, CA, CY, CYN, CBL, ALPHA, BETA, DALFA, DBETA
LVT001 - 179 } LVT501 - 733 } LVTL01 - L59 }	Z	X	Y, CN, CLM, CY, CYN, ALPHAB, BETAB, ALPHA, BETA
LVT501 - 733 }	Z	X	CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAB, BETAB
LVTL01 - L59 }	Z	X	Y, CN, CLM, CY, CYN, ALPHAB, BETAB, ALPHA, BETA
RVTR01 - R63	Z	X	Y, CN, CLM, CY, CYN, ALPHAB, BETAB, ALPHA, BETA
RVT001 - 179 } RVT501 - 733 } RVTL01 - L59 } RVTR01 - R63 }	Z	X	Y, CN, CLM, CY, CYN, ALPHAR, BETAR, ALPHA, BETA
RVT501 - 733 }	Z	X	CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAR, BETAR
RVTL01 - L59 }	Z	X	Y, CN, CLM, CY, CYN, ALPHAR, BETAR, ALPHA, BETA
RVTR01 - R63	Z	X	CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAR, BETAR
PVT001 - 179 } PVT501 - 733 } PVTL01 - L59 } RVTR01 - R63 }	Z	X	Y, PHI, PC/P, PB1/P, PB2/P
PVT501 - 733 }	Z	X	Y, PHI, PC/P, PB1/P, PB2/P, MDOT, PA, DELP, TA, PHIL
PVTL01 - L59 }	Z	X	Y, PHI, PC/P, PB1/P, PB2/P, MDOT, PA, DELP, TA, PHIL
RVTR01 - R63	Z	X	Y, PHI, PC/P, PB1/P, PB2/P, MDOT, PA, DELP, TA, PHIL
TVT501 - 733 } TVTLO1 - L59 } TVTR01 - R63 }	Z	X	Y, MTR, MTL, PSR, PSL, PCHAR, PCHFR, PCHAL, PCHFL, PHIR
TVTLO1 - L59 }	Z	X	YL, YR, MTL, PSL, PCHAL, PCHFL, LTFW, LTAFT, PHIR
TVTR01 - R63	Z	X	YR, YL, MTR, PSR, PCHAR, PCHFR, RTFW, RTAFT, PHIR
SVT001 - 179 } SVT501 - 733 } SVTL01 - L59 } SVTR01 - R63 }	Z	X	YL, YR, MACH, P, Q(Psi), T
SVT501 - 733 }	Z	X	YL, YR, MACH, P, Q(Psi), T, LTFW, LTAFT, RTFW, RTAFT
SVTL01 - L59 }	Z	X	YL, YR, MACH, P, Q(Psi), T, LTFW, LTAFT, RTFW, RTAFT
SVTR01 - R63	Z	X	YL, YR, MACH, P, Q(Psi), T, LTFW, LTAFT, RTFW, RTAFT

INDEX TO DATA TABULATIONS

<u>DESCRIPTION</u>	<u>DATA SET I. D.</u>	<u>P. GES</u>
Isolated O/ET Aerodynamic Data	OVTI01 - 15	1 - 8 (Vol. 1)
O/ET Aerodynamic Data		
All SRB Separation Jets Off	OVT001 - 179	8 - 165
All SRB Separation Jets On	OVT501 - 733	166 - 374
Left SRB Separation Jets On	OVTLO1 - L59	375 - 425
Right SRB Separation Jets On	OVTR01 - R63	425 - 479
Left SRB Aerodynamic Data		
All SRB Separation Jets Off	LVT001 - 179	479 - 636
All SRB Separation Jets On	LVT501 - 733	637 - 845
Left SRB Separation Jets On	LVTLO1 - L59	846 - 896
Right SRB Separation Jets On	LVTR01 - R63	896 - 950
Right SRB Aerodynamic Data		
All SRB Separation Jets Off	RVT001 - 179	951 - 1107 (Vol. 2)
All SRB Separation Jets On	RVT501 - 733	1108 - 1316
Left SRB Separation Jets On	RVTLO1 - L59	1317 - 1367
Right SRB Separation Jets On	RVTR01 - R63	1367 - 1421
O/ET Base Pressures		
All SRB Separation Jets Off	PVT001 - 179	1421 - 1578
All SRB Separation Jets On	PVT501 - 733	1579 - 1787
Left SRB Separation Jets On	PVTLO1 - L59	1788 - 1838
Right SRB Separation Jets On	PVTR01 - R63	1838 - 1892
SRB Thruster Pressure Data		
All SRB Separation Jets On	TVT501 - 733	1893 - 2101 (Vol. 3)
Left SRB Separation Jets On	TVTLO1 - L59	2102 - 2152
Right SRB Separation Jets On	TVTR01 - R63 *	2152 - 2206
Tunnel Operational Parameters		
All SRB Separation Jets Off	SVT001 - 179	2206 - 2363
All SRB Separation Jets On	SVT501 - 733 *	2364 - 2572
Left SRB Separation Jets On	SVTLO1 - L59 *	2573 - 2623
Right SRB Separation Jets On	SVTR01 - R63 *	2623 - 2677

* RTFW data are unavailable to DMS; lack of data is noted by asterisk in these data sets.

DATE 25 JUL 77

IA142, AEDC V41A-K1A, TABULATED SOURCE DATA

PAGE 1

IA142, ISOLATED O/ET

(OVT101) (02 FEB 77)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = 1097.0000 IN. XT
 LREF = 1290.3000 INCHES YMRP = .0000 IN. YT
 BREF = 1290.3000 INCHES ZMRP = 450.0000 IN. ZT
 SCALE = .0100

PARAMETRIC DATA

BETA = .000 ELEVON = .000
 BDFLAP = .000 SPDBRK = .000

RUN NO. 446/ 0 RN/L = 1.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CLM	CA	CY	CYN	CBL	BETA
4.500	-.077	-.06281	.03136	.18957	-.00529	.00351	-.00140	.00343
4.500	-5.067	-.18980	.06652	.21579	-.00710	.00417	-.00129	.01339
4.500	-10.067	-.30750	.09270	.24086	-.00229	.00211	-.00086	.00153
4.500	-10.000	-.30923	.09306	.24148	-.00393	.00251	-.00103	.00544
4.500	-4.923	-.18541	.06523	.21472	-.00426	.00323	-.00103	.00376
4.500	.058	-.06085	.03085	.18934	-.00393	.00274	-.00108	.00760
	GRADIENT	.02501	-.00690	-.00510	.00007	-.00010	-.00001	.00077

IA142, ISOLATED O/ET

(OVT102) (02 FEB 77)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = 1097.0000 IN. XT
 LREF = 1290.3000 INCHES YMRP = .0000 IN. YT
 BREF = 1290.3000 INCHES ZMRP = 450.0000 IN. ZT
 SCALE = .0100

PARAMETRIC DATA

BETA = .000 ELEVON = .000
 BDFLAP = .000 SPDBRK = .000

RUN NO. 752/ 0 RN/L = 1.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CLM	CA	CY	CYN	CBL	BETA
4.500	-.086	-.06700	.03182	.18922	.02739	-.00400	.00584	-.00822
4.500	-5.071	-.19249	.06749	.21609	.02661	-.00378	.00607	.01674
4.500	-10.084	-.31468	.09391	.24193	.02948	-.00479	.00616	.01669
4.500	-10.002	-.31232	.09351	.24173	.02837	-.00475	.00606	.01617
4.500	-4.934	-.19056	.06668	.21547	.02659	-.00381	.00598	.01545
4.500	.061	-.06249	.03089	.18851	.02757	-.00430	.00586	.01371
	GRADIENT	.02564	-.00716	-.00540	.00020	-.00010	-.00002	-.00035

IA142, ISOLATED O/ET

(OVT103) (02 FEB 77)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = 1097.0000 IN. XT
 LREF = 1290.3000 INCHES YMRP = .0000 IN. YT
 BREF = 1290.3000 INCHES ZMRP = 450.0000 IN. ZT
 SCALE = .0100

PARAMETRIC DATA

BETA = .000 ELEVON = .000
 BDFLAP = .000 SPDBRK = .000

RUN NO. 447/ 0 RN/L = 1.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CLM	CA	CY	CYN	CBL	BETA
4.500	4.978	.04810	.00705	.17570	-.00226	.00189	-.00079	.00267
4.500	10.056	.16966	-.02557	.16569	-.00341	.00177	-.00088	.00649
4.500	15.064	.28848	-.05438	.15374	-.00593	.00246	-.00040	.00403
4.500	9.920	.16784	-.02518	.16513	-.00367	.00177	-.00061	.00662
4.500	4.932	.04713	.00737	.17503	-.00314	.00203	-.00088	.00534
4.500	-.073	-.06443	.03166	.18958	-.00397	.00278	-.00101	.00423
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000	.00000

IA142, ISOLATED O/ET

(OVT104) (02 FEB 77)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = 1097.0000 IN. XT
 LREF = 1290.3000 INCHES YMRP = .0000 IN. YT
 BREF = 1290.3000 INCHES ZMRP = 450.0000 IN. ZT
 SCALE = .0100

PARAMETRIC DATA

BETA = .000 ELEVON = .000
 BDFLAP = .000 SPDBRK = .000

RUN NO. 882/ 0 RN/L = 1.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CLM*	CA	CY	CYN	CBL	BETA
4.500	-.080	-.06179	.02991	.18831	.03446	-.00562	.00706	-.01287
4.500	-5.075	-.19298	.06593	.21472	.03363	-.00527	.00734	.01903
4.500	-10.074	-.31505	.09305	.24096	.03430	-.00568	.00710	.01467
4.500	-10.002	-.31140	.09223	.23990	.03240	-.00537	.00699	.01922
4.500	-4.925	-.18675	.06415	.21344	.03059	-.00458	.00708	.01690
4.500	.061	-.05757	.02883	.18697	.03159	-.00500	.00678	.01814
	GRADIENT	.02591	-.00708	-.00531	.00020	-.00008	-.00006	.00025

DATE 25 JUL 77

IA142, AEDC V41A-K1A, TABULATED SOURCE DATA

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IA142, O/ET W/SRBS SEPARATING, RIGHT SRB JET ON

(OVTR63) (02 FEB 77)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = 1097.0000 IN. XT
 LREF = 1290.3000 INCHES YMRP = .0000 IN. YT
 BREF = 1290.3000 INCHES ZMRP = 450.0000 IN. ZT
 SCALE = .0100

PARAMETRIC DATA

ALPHA = 15.000 BETA = 15.000
 ALPHAB = 7.000 BETAB = 13.000
 Y = 100.000 JET PC = 1225.000
 MACH = 4.500

RUN NO. 1729/ 0 RN/L = 1.51 GRADIENT INTERVAL = -5.00/ 5.00

Z	X	CN	CLM	CA	CY	CYN	CBL	ALPHA	BETA	DALFA	DBETA
200.680	-4.028	.29206	-.06084	.15760	-.37862	.00568	-.02418	15.00100	15.03200	-8.05390	-1.98270
200.770	95.888	.34172	-.05456	.16702	-.44779	-.03182	-.01861	15.01900	15.03600	-8.07370	-1.97160
201.010	195.910	.35897	-.04701	.15827	-.48846	-.03871	-.01409	15.02900	15.07300	-8.08710	-2.01960
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000	.00000

IA142, SRBS SEPARATING FROM O/ET, SRB JETS OFF

(LVT001) (26 APR 77)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = 1258.5000 IN. XB
 LREF = 1290.3000 INCHES YMRP = .0000 IN. YB
 BREF = 1290.3000 INCHES ZMRP = .0000 IN. ZB
 SCALE = .0100

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 ALPHAB = .000 BETAB = .000
 Y = .000 JET PC = .000
 MACH = 4.500

RUN NO. 371/ 0 RN/L = 1.52 GRADIENT INTERVAL = -5.00/ 5.00

Z	X	Y	CN	CLM	CY	CYN	ALPHAB	BETAB	ALPHA	BETA
-1.904	400.060	-.01445	-.01549	-.00396	.00267	-.00464	-.11040	.00712	-.08433	-.00134
-.486	300.130	-.21230	-.01450	-.00269	.00370	-.00495	-.10665	.00388	-.00397	.00732
-.445	249.970	-.20647	-.01439	-.00210	.00391	-.00514	-.10513	.00420	-.00499	-.00184
-.414	200.030	-.29943	-.01493	-.00151	.00476	-.00507	-.10402	.00174	-.00394	-.00211
-.385	175.100	-.22388	-.01494	-.00120	.00516	-.00539	-.10324	.00390	-.00357	-.00263
-.398	150.160	-.10044	-.01514	-.00084	.00494	-.00552	-.10248	.00606	-.01220	-.00336
-.330	125.030	.07850	-.01539	-.00050	.00507	-.00563	-.10181	.00951	-.00276	-.00182
-.506	100.090	-.10285	-.01585	-.00012	.00485	-.00568	-.10116	.00653	-.01122	-.00471
-.323	74.994	-.06442	-.01609	.00023	.00421	-.00580	-.10043	.00732	-.00599	-.00047
-.371	49.944	-.22721	-.01615	.00050	.00379	-.00606	-.09980	.00504	-.00370	-.00161
-.418	25.066	.08623	-.01600	.00059	.00327	-.00630	-.09947	.01097	-.00606	-.00275
-.271	-.002	.24777	-.01655	.00090	.00208	-.00709	-.09903	.01559	-.00410	-.00289
-.349	-50.050	.31370	-.01708	.00122	-.00017	-.01000	-.09951	.02171	-.00437	.00499
-.463	-100.140	.68659	-.01836	.00200	-.00550	-.01396	-.09732	.03616	-.01031	-.00316
-.315	-200.050	1.71820	-.01849	.00471	-.02196	-.02206	-.09047	.07150	-.00424	-.00131

DATE 25 JUL 77

IA142, AEDC V41A-K1A, TABULATED SOURCE DATA

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IA142, O/ET W/SRBS SEPARATING, BOTH SRB JETS ON

(LVT664) (20 JUL 77)

REFERENCE DATA

PARAMETRIC DATA

SREF = 2690.0000 SQ.FT. XMRP = 1258.5000 IN. XB
LREF = 1290.3000 INCHES YMRP = .0000 IN. YB
BREF = 1290.3000 INCHES ZMRP = .0000 IN. ZB
SCALE = .0100

ALPHA = 10.000 BETA = 10.000
ALPHAB = 6.000 BETAB = 12.000
Y = 100.000 JET PC = 642.000
MACH = 4.500

RUN NO. 1078/ 0 RN/L = 1.52 GRADIENT INTERVAL = -5.00/ 5.00

Table with 12 columns: Z, X, CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAB, BETAB. Values range from -0.00445 to 5.48280.

RUN NO. 1079/ 0 RN/L = 1.52 GRADIENT INTERVAL = -5.00/ 5.00

Table with 12 columns: Z, X, CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAB, BETAB. Values range from -0.00465 to 5.49000.

RUN NO. 1080/ 0 RN/L = 1.52 GRADIENT INTERVAL = -5.00/ 5.00

Table with 12 columns: Z, X, CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAB, BETAB. Values range from -0.00205 to 5.49250.

IA142, O/ET W/SRBS SEPARATING, BOTH SRB JETS ON

(LVT665) (20 JUL 77)

REFERENCE DATA

PARAMETRIC DATA

SREF = 2690.0000 SQ.FT. XMRP = 1258.5000 IN. XB
LREF = 1290.3000 INCHES YMRP = .0000 IN. YB
BREF = 1290.3000 INCHES ZMRP = .0000 IN. ZB
SCALE = .0100

ALPHA = 10.000 BETA = 10.000
ALPHAB = 6.000 BETAB = 12.000
Y = 100.000 JET PC = 1500.000
MACH = 4.500

RUN NO. 1118/ 0 RN/L = 1.55 GRADIENT INTERVAL = -5.00/ 5.00

Table with 12 columns: Z, X, CN, CNT, CLM, CLMT, CY, CYT, CYN, CYNT, ALPHAB, BETAB. Values range from -1.215 to 4.87410.

