

NASA TECHNICAL MEMORANDUM

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AERODYNAMIC ROLL CHARACTERISTICS OF A 0.00548 SCALE
146-INCH SOLID ROCKET BOOSTER REENTRY CONFIGURATION
(MSFC MODEL NUMBER 486) OVER A PORTION OF THE REENTRY
FLIGHT REGIME IN THE NASA MSFC 14-INCH TRISONIC
WIND TUNNEL

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(NASA-TM-78195) AERODYNAMIC ROLL
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SOLID ROCKET BOOSTER REENTRY CONFIGURATION
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*George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama*

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PLOTTED COEFFICIENTS SCHEDULE:

(A) C_l versus α

(B) C_l versus ϕ

NOMENCLATURE

<u>PLOT SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>	<u>UNITS</u>
b_{ref}	BREF	reference span (diameter of— the cylindrical section of the model)	in.
C_{lm}, C_l	CBL	rolling moment coefficient in the missile axis system, $M_{X_m} / q_{\infty} S_{ref} b_{ref}$	
M	MACH	Mach number	
M_{X_m}		rolling moment in the missile axis system, i.e., moment about the X_m -axis (a positive rolling moment tends to rotate the positive Y_m -axis toward the positive Z_m -axis)	in.-lb.
P_t		free stream total pressure	psi
P_{∞}		free stream static pressure	psi
q_{∞}	Q	free stream dynamic pressure	psi
RM		abbreviation for rolling moment	
RN	RN/L	Reynolds number per foot	
S_{ref}	SREF	reference area (cross sectional area of the cylindrical section of the model)	in. ²
T_t		tunnel total temperature	°F
α_T	ALPHA	angle of attack, angle between the X_m -axis and a vector in the direction of the air flow (For this test, $\beta = 0$ and $\alpha = \alpha_T$)	degrees
l_{ref}	LREF	reference length	

NOMENCLATURE (Continued)

<u>PLOT SYMBOL</u>	<u>MNEMONIC</u>	<u>DEFINITION</u>	<u>UNITS</u>
ϕ	PHI	roll angle; i.e., angle between the missile Y_m -axis and the body Y-axis (from a pilot's viewpoint in an air— plane, a positive roll angle is a clockwise rotation)	degrees
SRB		abbreviation for solid rocket booster	
C_A		total axial force coefficient in the body axis system—	
C_{A_m}	CA	total axial force coefficient in the — missile axis system, $F_{A_N}/q_\infty S_{ref}$ (nozzle balance)	
C_m		pitching moment coefficient in the body axis system	
C_{m_m}	CLMM	pitching moment coefficient in the missile axis system (nozzle balance), $M_{Y_m}/q_\infty S_{ref} l_{ref}$	
C_N		normal force coefficient in the body axis system	
C_{N_m}	CNM	normal force coefficient in the missile axis system, $F_{N_N}/q_\infty S_{ref}$ (nozzle balance)	
C_n		yawing moment coefficient in the body axis system	
C_{n_m}	CYNM	yawing moment coefficient in the missile axis system (nozzle balance), $M_{Z_m}/q_\infty S_{ref} l_{ref}$	
C_y		side force coefficient in the body axis system	
C_{y_m}	CYM	side force coefficient in the missile axis system, $F_{Y_N}/q_\infty S_{ref}$ (nozzle balance)	
<u>Subscripts</u>			
m		missile axis system	
ref		reference conditions	
t		total conditions	
∞		free stream conditions	

INTRODUCTION

This report describes a wind tunnel test program to obtain the aerodynamic roll characteristics of the 146-inch diameter solid rocket booster (SRB) reentry configuration over a portion of its reentry flight regime. The model is representative of the latest SRB configuration and has been tested in the NASA MSFC 14 x 14-inch Transonic Wind Tunnel and the AEDC-PWT 4T.

The SRB model tested was a 0.00548 scale model of the 146-inch diameter right hand solid rocket booster reentry configuration with all major protuberances. The SRB model was mounted nose aft onto a one-component roll balance to obtain rolling moment data. The model balance was supported by the MSFC double-knuckle sting to achieve the desired angle of attack range. The SRB reentry test configuration included a simulated heat shield around the engine nozzle.

The SRB was tested at Mach numbers of 1.46, 1.96, 2.75, and 3.48 at angles of attack from 150° to 190° . Roll angles varied from 0 to 337.5° at $22\frac{1}{2}^\circ$ increments.

MODEL DESCRIPTION AND SUPPORT HARDWARE

The model tested was a 0.00548 scale model of the 146-inch diameter Space Shuttle solid rocket booster with a truncated nozzle. The general model arrangement is shown in Figure 2. The SRB model was made of stainless steel and has been designated MSFC Model Number 486. The model was an assembly of three components: a nose section, a center body section, and a tail section. The nose section of the SRB model included the 18-degree conical nose and a portion of the cylindrical body of the SRB. The protuberances on the nose section were the data capsule and camera, the forward attach structure, and the forward section of the cable systems tunnel. The center body section of the SRB model was a long cylindrical tube and was pinned to the strain-gage balance. The only protuberance on the center body, a portion of the cable systems tunnel, was attached with machine screws. The model tail section was made up of the rear portion of the SRB cylindrical body, the nozzle skirt and the engine nozzle. The protuberances on the SRB tail section include: the aft attachment ring, the motor case ring stiffeners, aft separation motors, actuator supports, hold-down posts, and the rear portion of the cable systems tunnel. When the SRB model was nose mounted or side mounted, engine nozzle insert and heat shield were installed in the tail section. The SRB model components are shown in Figure 3.

The SRB model was mounted nose aft on a single component roll balance No. 247 which, in turn, was mounted to the MSFC double knuckle sting by using balance adapter 113A. This setup provided an angle of

MODEL DESCRIPTION AND SUPPORT HARDWARE (Concluded)

attack range of 150° to 190° . Changes in roll angle were achieved by rotating the entire SRB model about the balance after removing the four pins which attached the model body to the model/balance adapter. A series of holes around the model/balance adapter allowed roll angles of 0 to $337\frac{1}{2}^{\circ}$ in $22\frac{1}{2}^{\circ}$ increments to be achieved.

Table IV lists the combinations of support hardware and associated angle of attack ranges used during this test. The sting components are depicted in Figures 4 and 5. Model dimensional data are included as Table III.

TEST FACILITY DESCRIPTION

The Marshall Space Flight Center 14" x 14" Trisonic Wind Tunnel is an intermittent blow-down tunnel which operates by high pressure air flowing from storage to either vacuum or atmospheric conditions. A Mach number range from .2 to 5.85 is covered by utilizing two interchangeable test sections. The transonic section permits testing at Mach 0.20 through 2.50 and the supersonic section permits testing at Mach 2.74 through 5.85. Mach numbers between .2 and .9 are obtained by using a controllable diffuser. The range from .95 to 1.3 is achieved through the use of plenum suction and perforated walls. Mach numbers of 1.44, 1.93 and 2.50 are produced by interchangeable sets of fixed contour nozzle blocks. Above Mach 2.50 a set of fixed contour nozzle blocks are tilted and translated automatically to produce any desired Mach numbers in .25 increments.

Air is supplied to a 6000 cubic foot storage tank at approximately -40°F dew point and 500 psi. The compressor is a three-stage reciprocating unit driven by a 1500 hp motor.

The tunnel flow is established and controlled with a servo-actuated gate valve. The controlled air flows through the valve diffuser into the stilling chamber and heat exchanger where the air temperature can be controlled from ambient to approximately 180°F. The air then passes through the test section, which contains the nozzle blocks and test region.

Downstream of the test section is a hydraulically controlled pitch sector that provides a total angle of attack range of 20° ($\pm 10^\circ$). Sting offsets are available for obtaining various maximum angles of attack up to 90°.

TEST FACILITY DESCRIPTION (Continued)

The diffuser section has movable floor and ceiling panels which are the primary means of controlling the subsonic Mach numbers and permit more efficient running supersonically. The sector assembly at supersonic diffuser telescopes into the subsonic diffuser to allow easy access to the model and test section.

Tunnel flow is exhausted through an acoustically damped tower to atmosphere or into the vacuum field of 42,000 cubic feet. The vacuum tanks are evacuated by vacuum pumps driven by a total of 500 hp.

Data are recorded by a solid-state digital data acquisition system. The digital data are transferred to punched cards during the run to be reduced later by a computer to proper coefficient form.

TEST CONDITIONS

Mach numbers consisted of 1.46, 1.96, 2.74, and 3.48. The complete tunnel test conditions are presented in Table I. The angle of attack range consisted of 150° to 190° and roll angles varied from 0 to $337\frac{1}{2}^{\circ}$ in $22\frac{1}{2}^{\circ}$ increments. The test program is included as Table II.

Maximum model loads are presented in Table V. No base pressure measurements were made during this investigation.

DATA REDUCTION

The rolling moment was resolved in the missile axis system and presented in the form of a nondimensional coefficient as shown below:

$$CBL = \frac{M_{x_m}}{Q SREF BREF}, \text{ rolling moment coefficient}$$

The usual tunnel parameters P_∞ , P_t , T_t , q_∞ , RN , αT and ϕ were measured, computed and tabulated along with the data. Data were corrected for sting deflections and are tabulated in the Appendix. The only data coefficient required for input was the rolling moment coefficient, C_R .

Because the model was originally designed to be tested at angles of attack from 0 to 180°, it was reversed on the balance for alphas greater than 90 degrees; consequently, a sign change was required during data reduction for the rolling moment measured by the balance.

Model reference dimensions used for data reductions are presented below:

<u>Parameter</u>	<u>Symbol</u>	<u>Full Scale</u>	<u>0.00548 Scale</u>
Reference Area (based on body cross section)	SREF	116.26 ft. ²	0.503 in. ²
Reference Span (body diameter)	BREF	146 in.	0.800 in.

TABLE I.

[illegible]

TABLE II.

[illegible]

TABLE II. - Concluded

[illegible]

TABLE 111. MODEL DIMENSIONAL DATA

MODEL COMPONENT: SOLID ROCKET BOOSTER NOSE

GENERAL DESCRIPTION: A CONICAL SECTION WITH A SPHERICAL RADIUS NOSE

MODEL SCALE: 0.00548 SCALE

REFERENCE DRAWING(S): MSFC #80M42805 & 80M42806

<u>DIMENSIONS:</u>	<u>THEORETICAL</u>	
	<u>FULL-SCALE</u>	<u>MODEL-SCALE</u>
Spherical Nose Radius	13.27 in.	0.073 in
Conical Nose Section Half Angle	18 Degrees	18 Degrees
SRB Nose Length	195 in.	1.069 in.
Forward Cylindrical Body Diameter	146 in.	0.8 in.

TABLE III. - Continued

MODEL COMPONENT: SOLID ROCKET BOOSTER CYLINDRICAL BODY

GENERAL DESCRIPTION: THE CYLINDRICAL SECTION OF THE SRB BODY

MODEL SCALE: 0.00548 SCALE

REFERENCE DRAWING(S): MSFC #80M42802 & 80M42804

<u>DIMENSIONS:</u>	<u>THEORETICAL</u>	
	<u>FULL-SCALE</u>	<u>MODEL-SCALE</u>
Center Body Diameter	146 in.	0.8 in.
Center Body Length	1443.6 in.	7.910 in.

TABLE III. - Concluded

MODEL COMPONENT: SOLID ROCKET BOOSTER ENGINE SKIRT

GENERAL DESCRIPTION: A CONICAL FRUSTRUM FLARING OUT FROM THE SRB
BODY TO ENCLOSE THE ENGINE NOZZLE WITHOUT THE ENGINE EXTENSION

MODEL SCALE: 0.00548 SCALE

REFERENCE DRAWING(S): MSFC #80M51473

<u>DIMENSIONS:</u>	<u>THEORETICAL</u>	
	<u>FULL-SCALE</u>	<u>MODEL-SCALE</u>
Cylindrical Body Diameter	146 in.	0.8 in.
Engine Skirt Flare Angle	18°40'	18°40'
Engine Skirt Exit Diameter	208.20 in.	1.141 in.

TABLE IV.

STING COMBINATION AND ANGLE OF ATTACK NOMENCLATURE

ANGLE OF ATTACK DESIGNATOR	α (DEG) RANGE	STING ADAPTER		STING ADAPTER POSITION	STING NUMBER	BALANCE ADAPTER	
		ADAPTER NO.	HOLE NO.			ADAPTER NO.	HOLE NO.
I	150 to 170	1	51	7.50 in.	1	113A	3
J	170 to 190	1	53	7.50 in.	1	113A	1

TABLE V.

MAXIMUM MODEL LOADS

NORMAL FORCE	40 LBS.
SIDE FORCE	3 LBS.
AXIAL FORCE	20 LBS.
PITCHING MOMENT	50 IN-LBS.
YAWING MOMENT	2 IN-LBS.
ROLLING MOMENT	1 IN-LBS.

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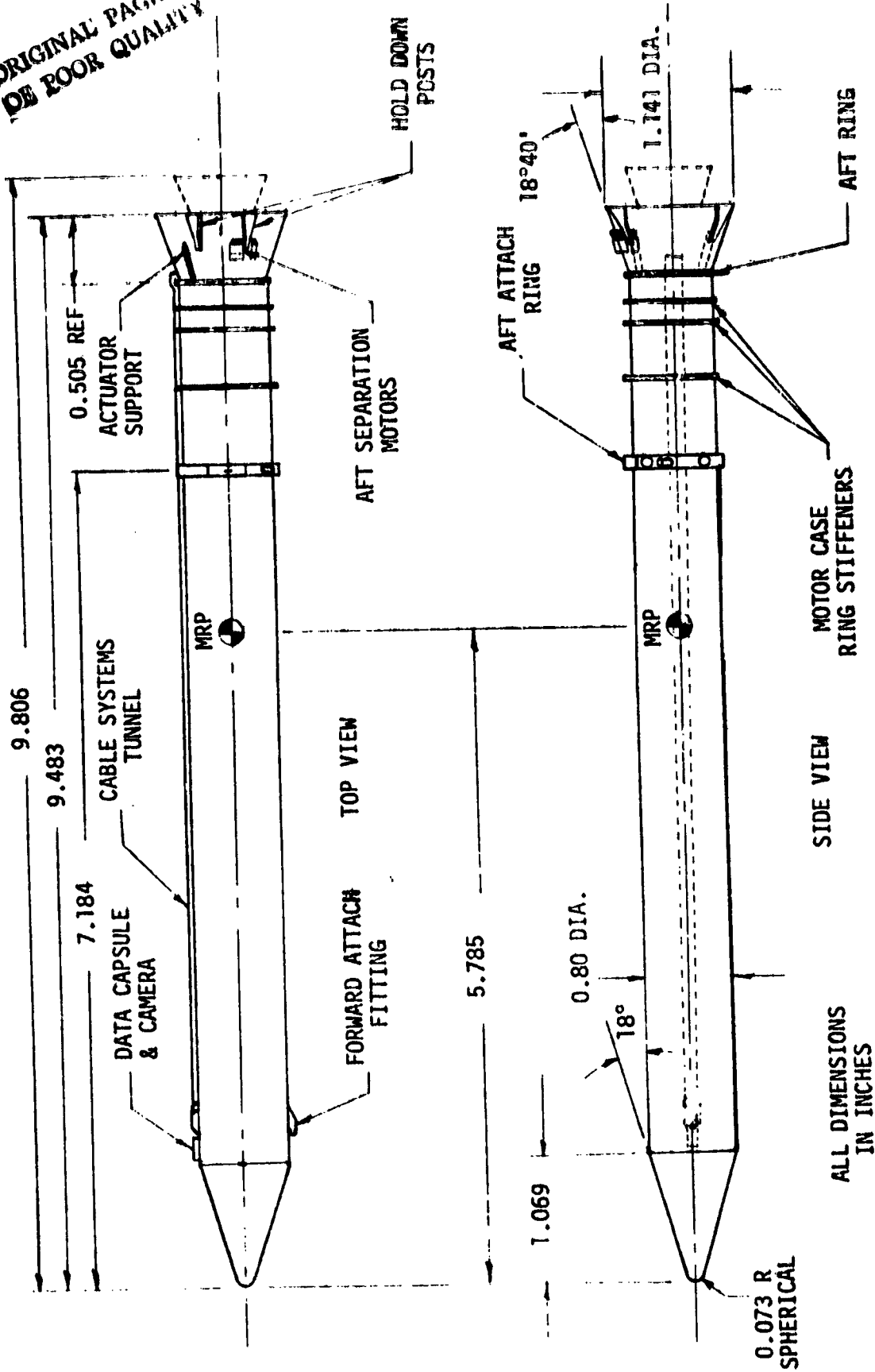


Figure 2. General model arrangement

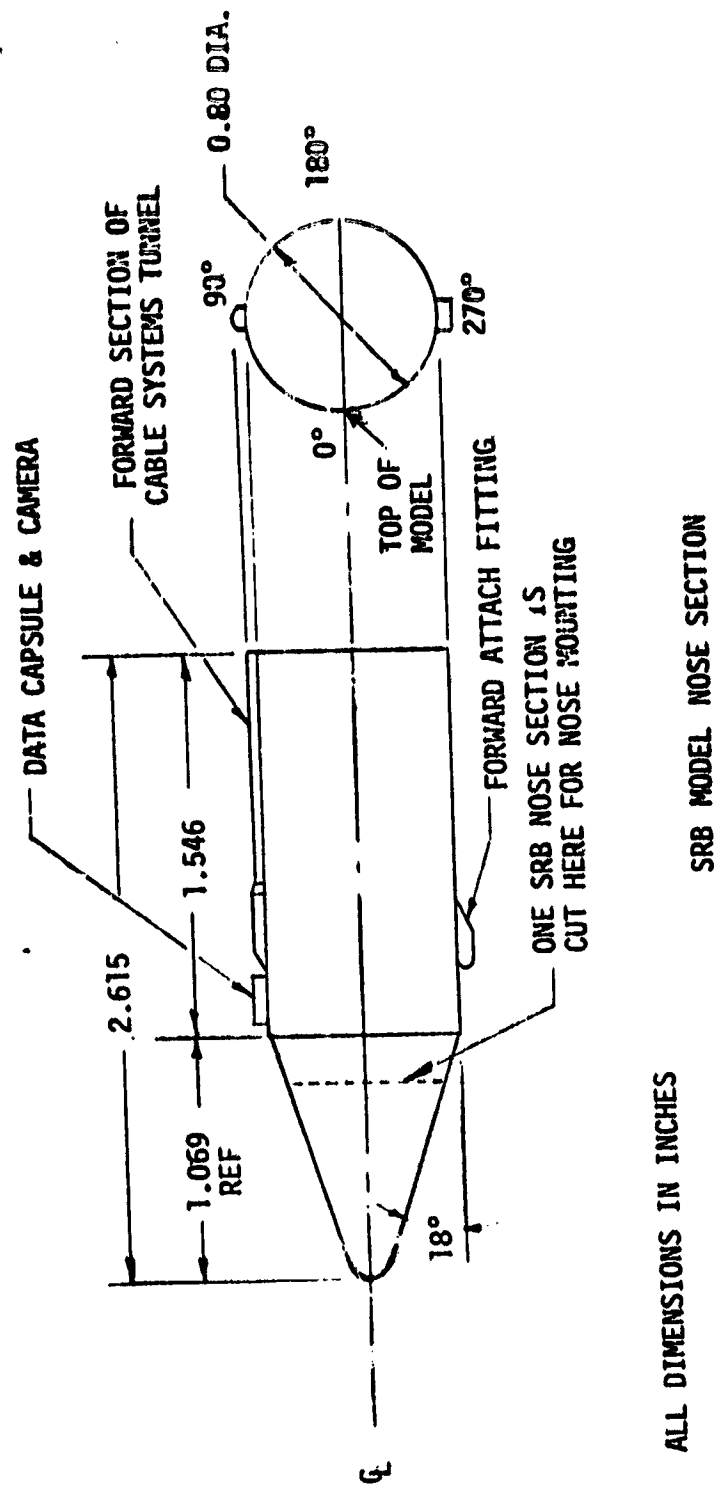
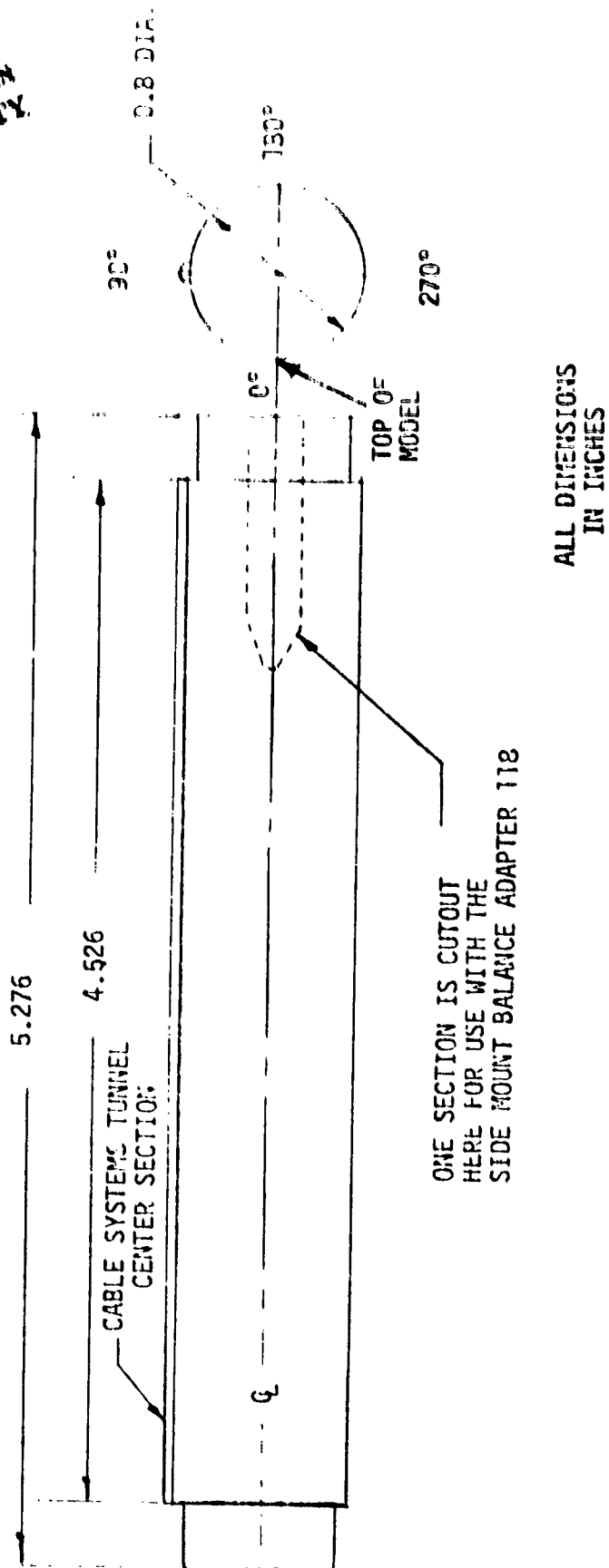


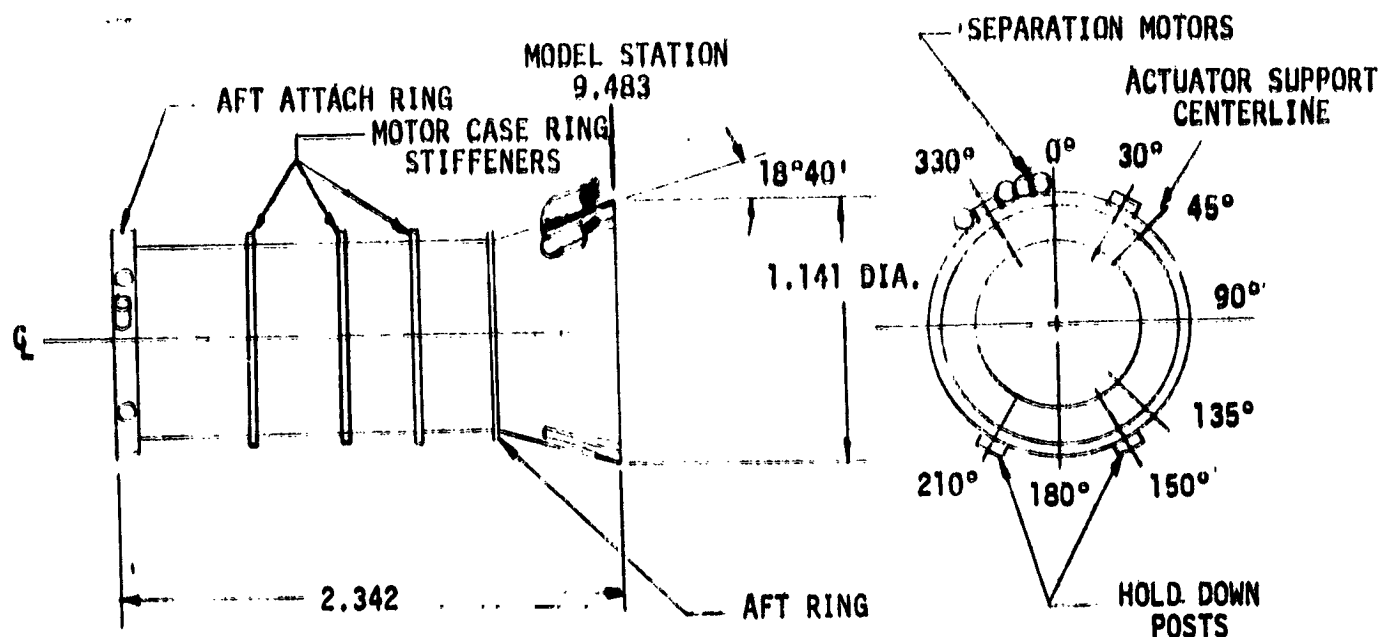
Figure 3. SRB model components

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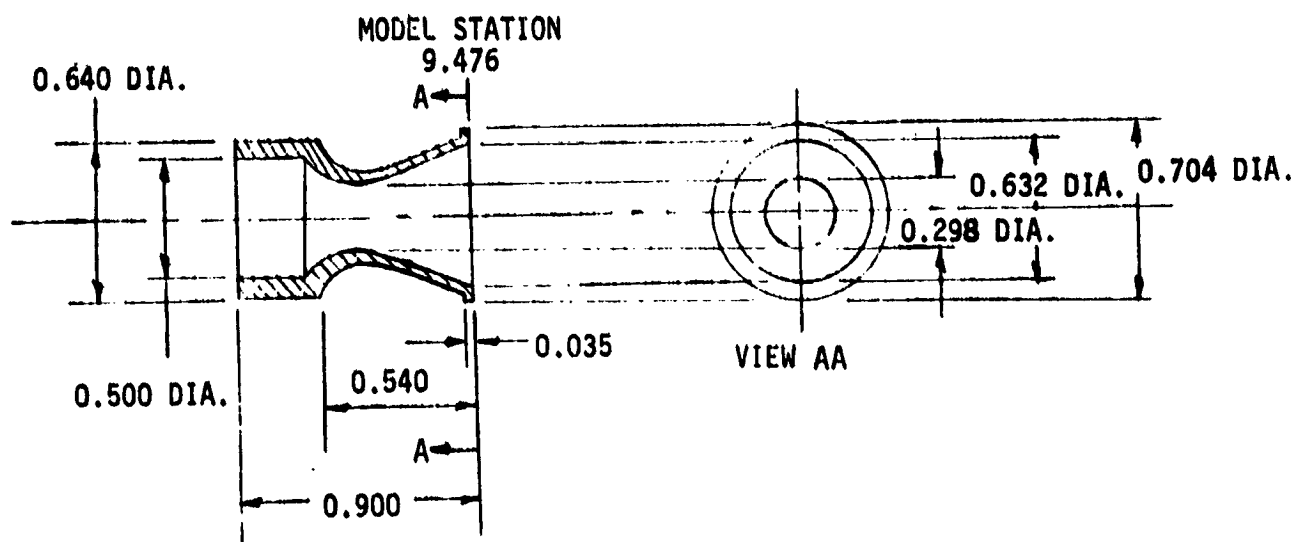
SRB MODEL CENTER BODY SECTIONS

Figure 3. (Continued)



SRB MODEL TAIL SECTION

ALL DIMENSIONS
IN INCHES



SRB MODEL ENGINE NOZZLE INSERT

Figure 3. (Concluded)

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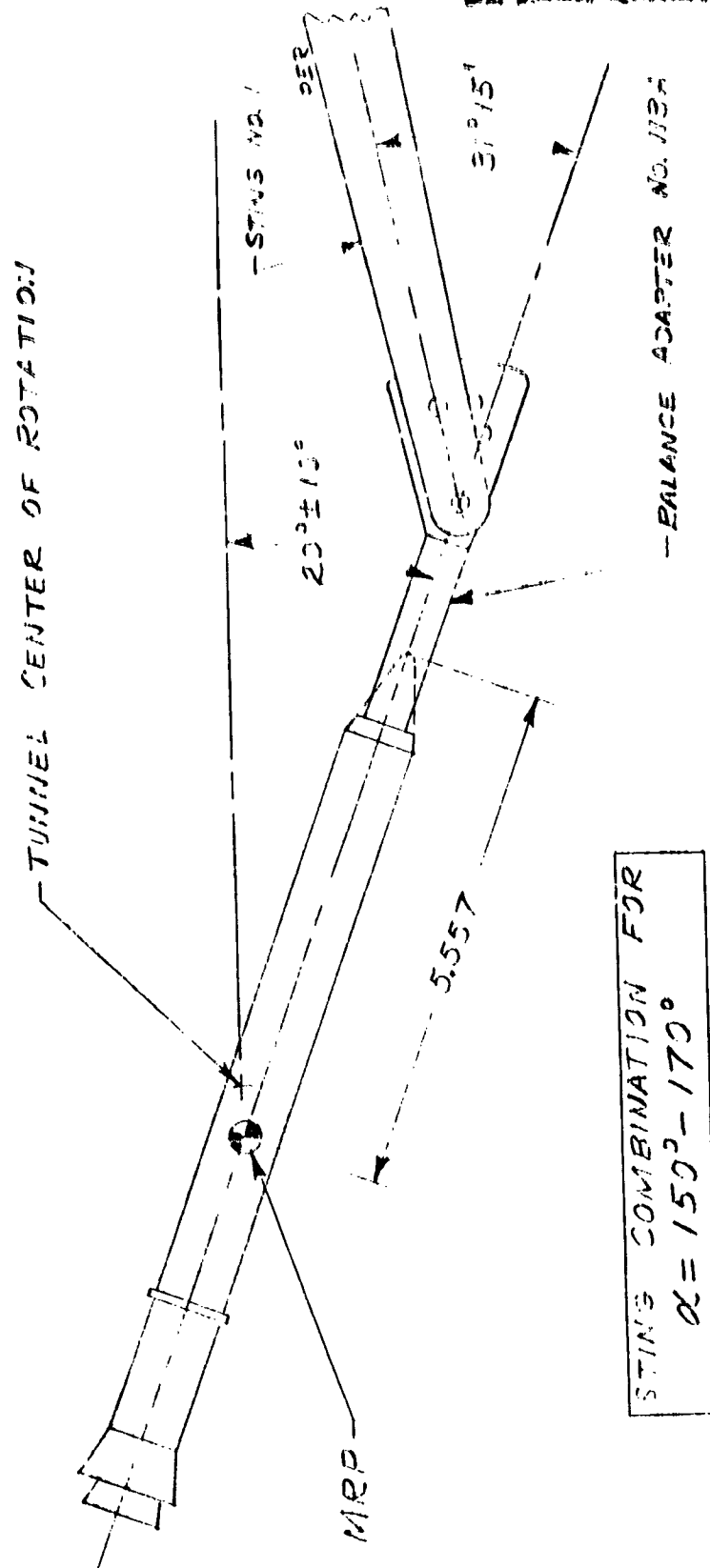
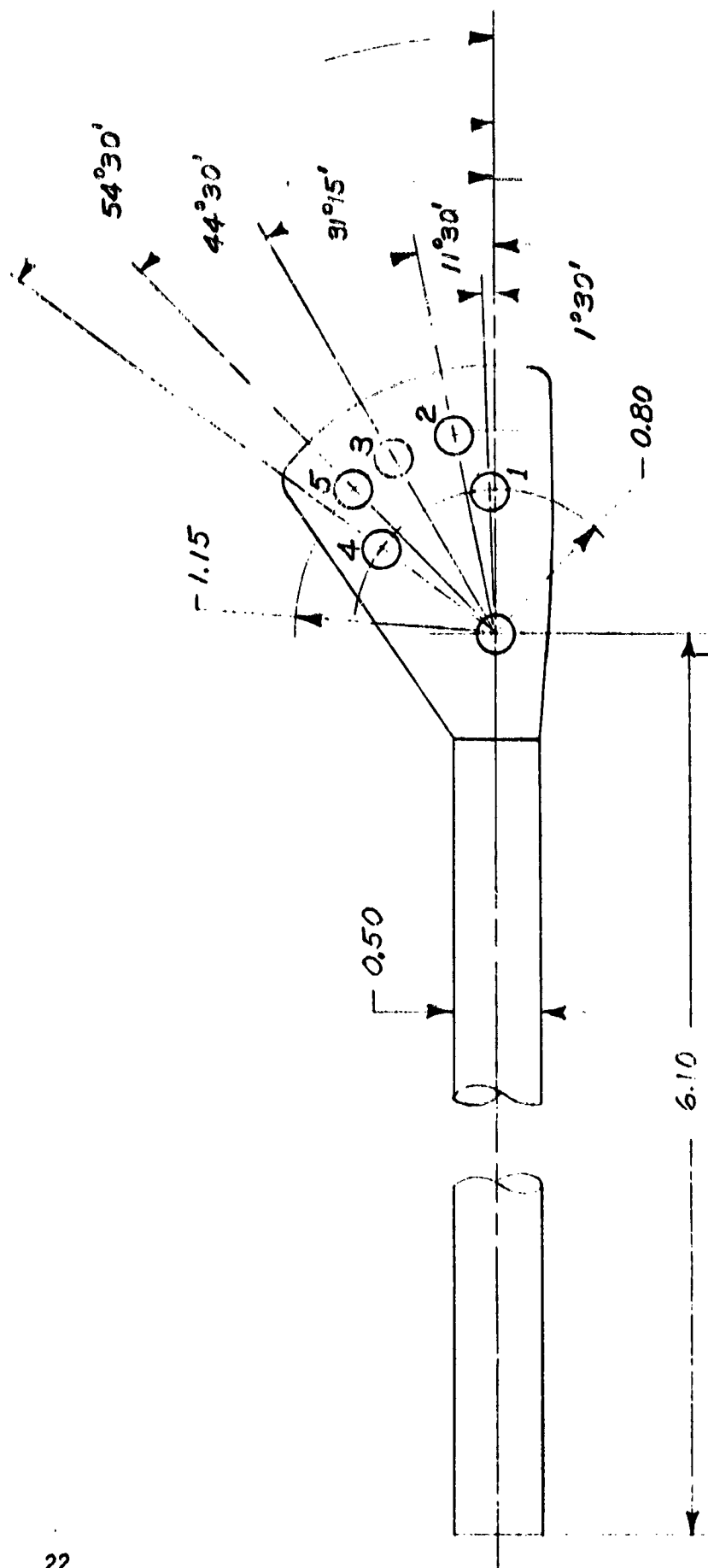


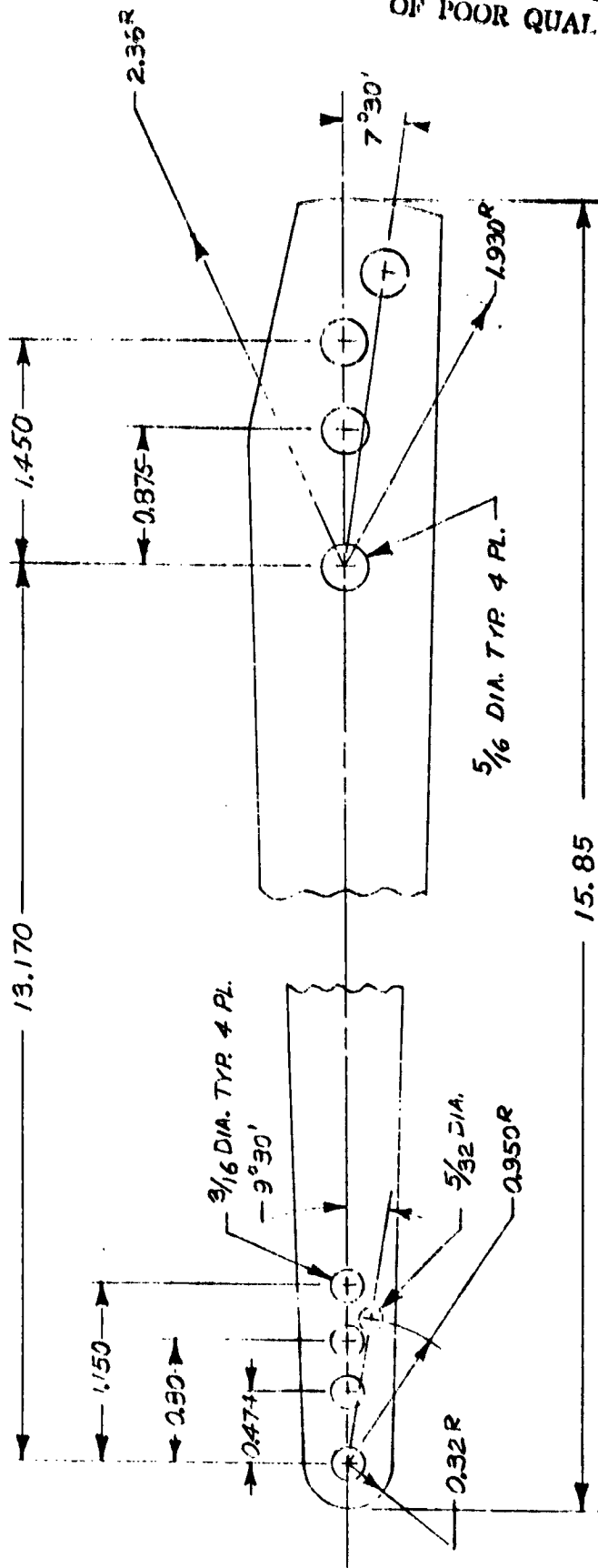
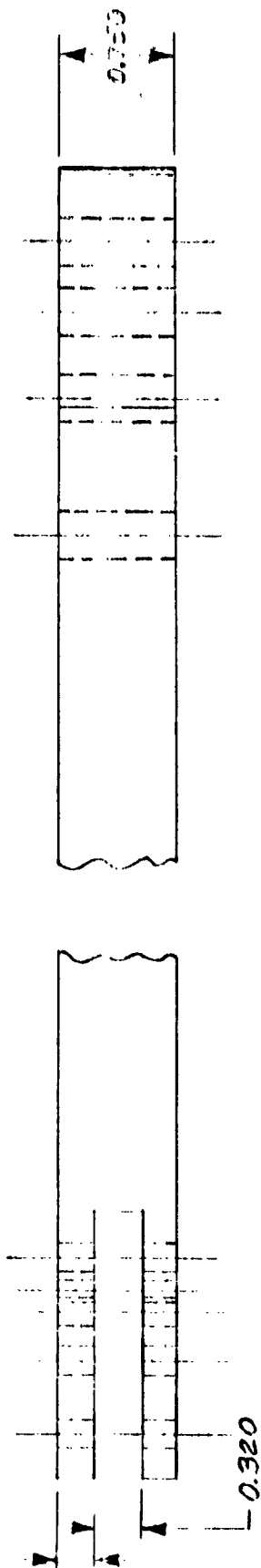
Figure 4. Layout of nose mounted sting



(a) Balance adapter No. 113A

Figure 5. Double knuckle sting details

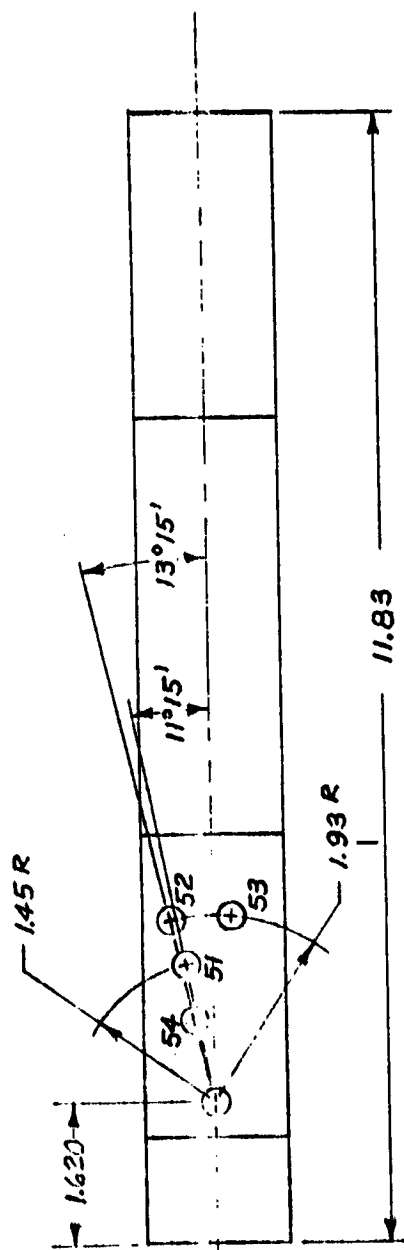
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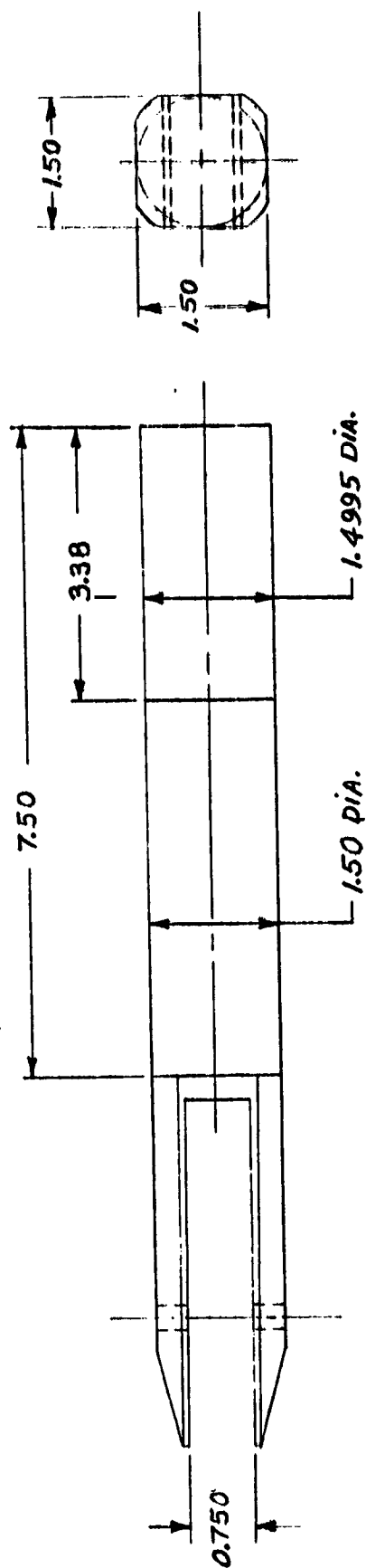
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(b) Sting No. 1

Figure 5. Continued



NOTE: ALL HOLES ARE $\frac{5}{16}$ DIA.



(c) Sting adapter No. 1

Figure 5. Concluded

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DATA FIGURES

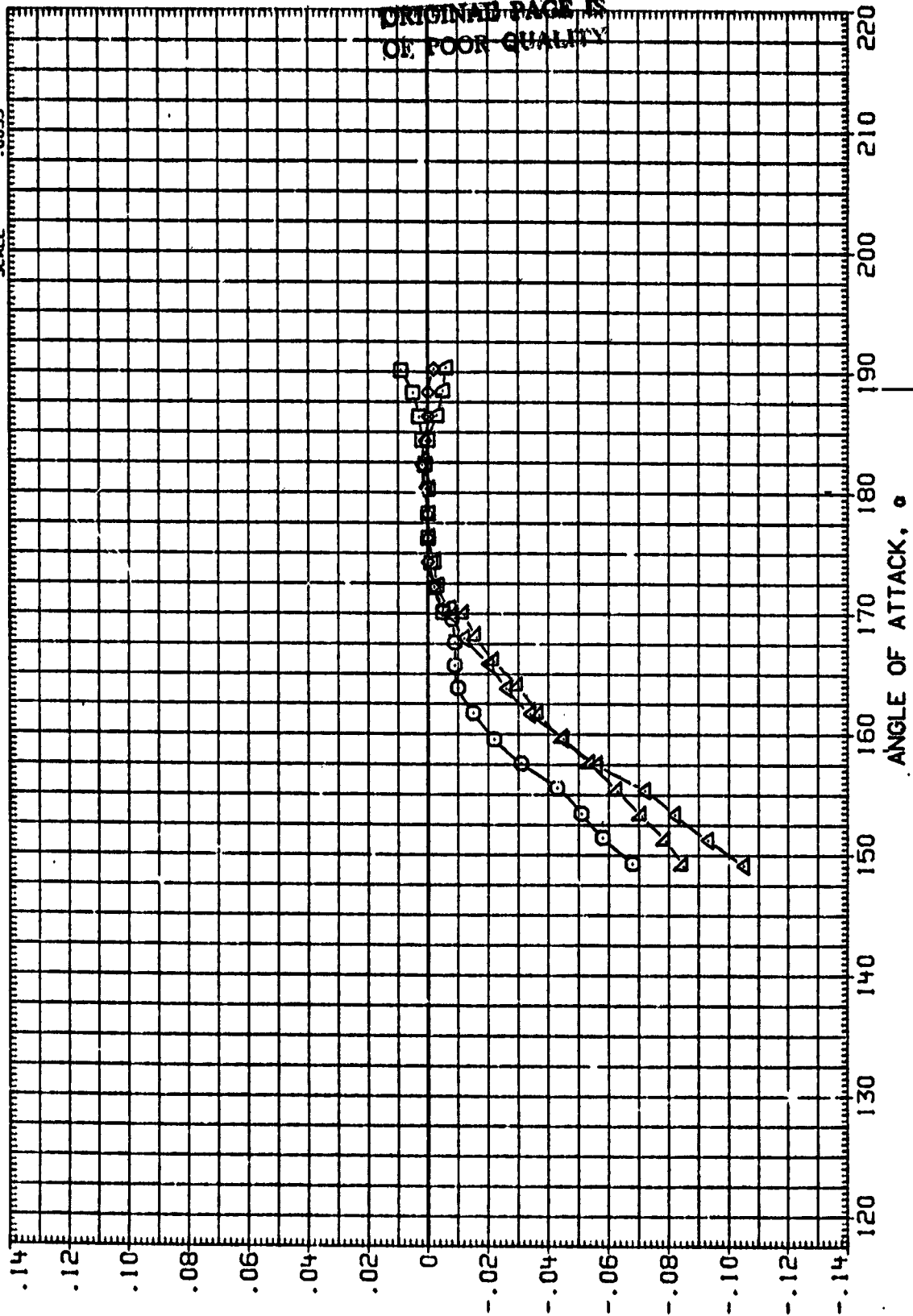
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 SCALE .0055

PHI
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 45.000
 45.000

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DATA SET SYMBOL
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 AIR003
 AIR004
 AIR005
 AIR006



SRB REENTRY ROLL CHARACTERISTICS

(A) MACH = 1.46

PAGE 1

DATA SET SYMBOL

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AIR006

CONFIGURATION

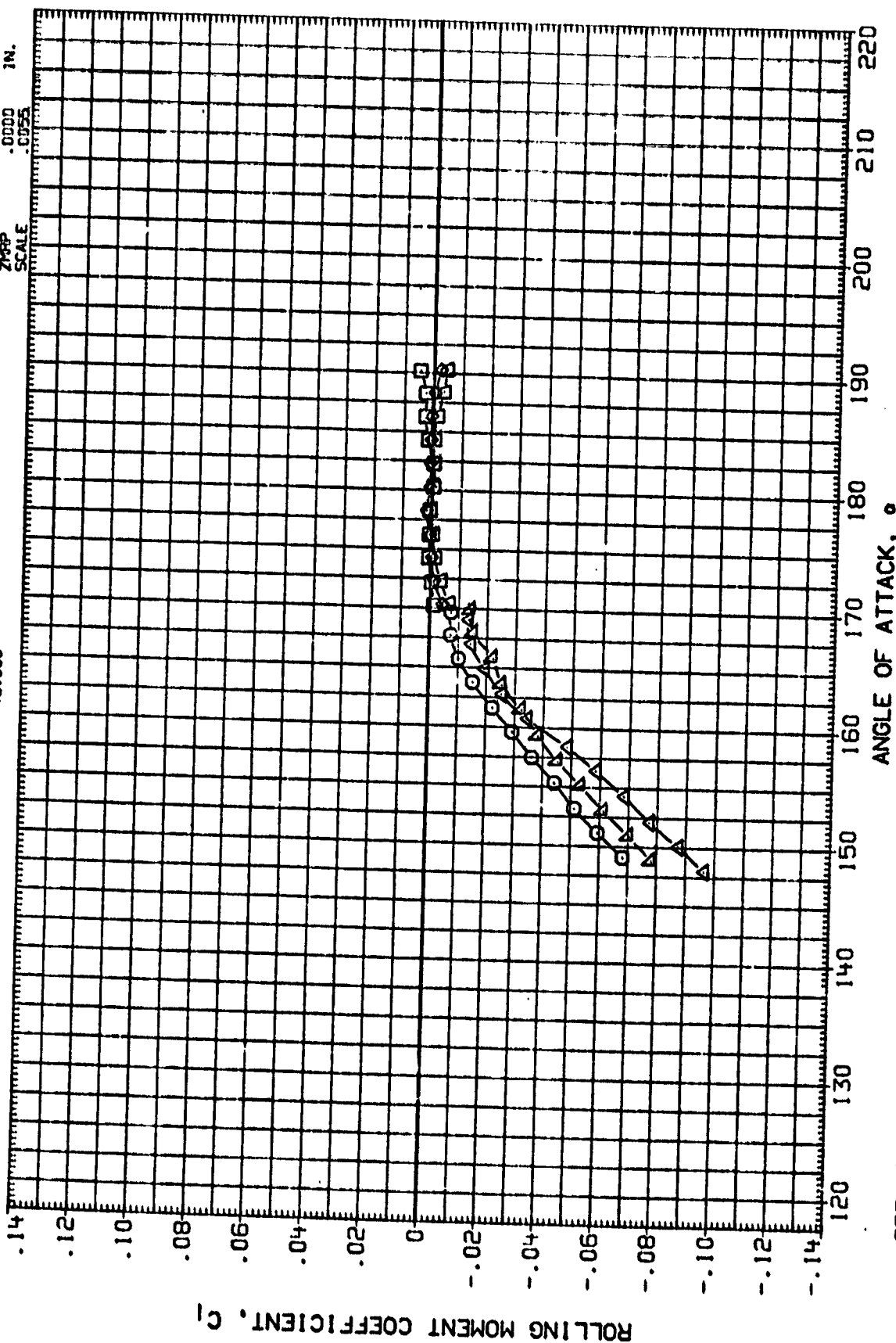
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SCALE .0055



SRB REENTRY ROLL CHARACTERISTICS

(B) MACH = 1.96

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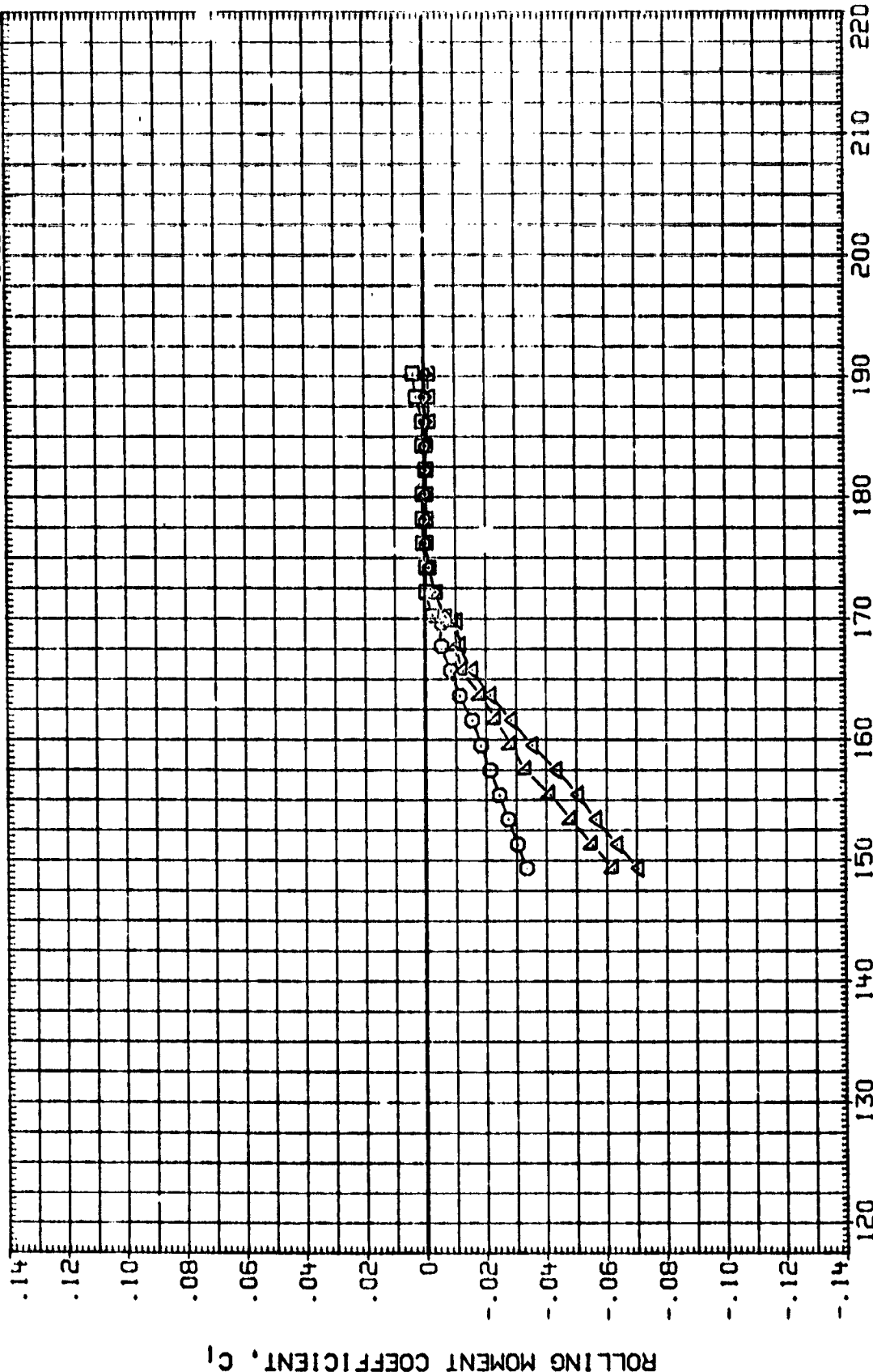

$$\frac{2}{3} \text{C)MACH} = 2.74$$

DATA SET SYMBOL
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AIR005
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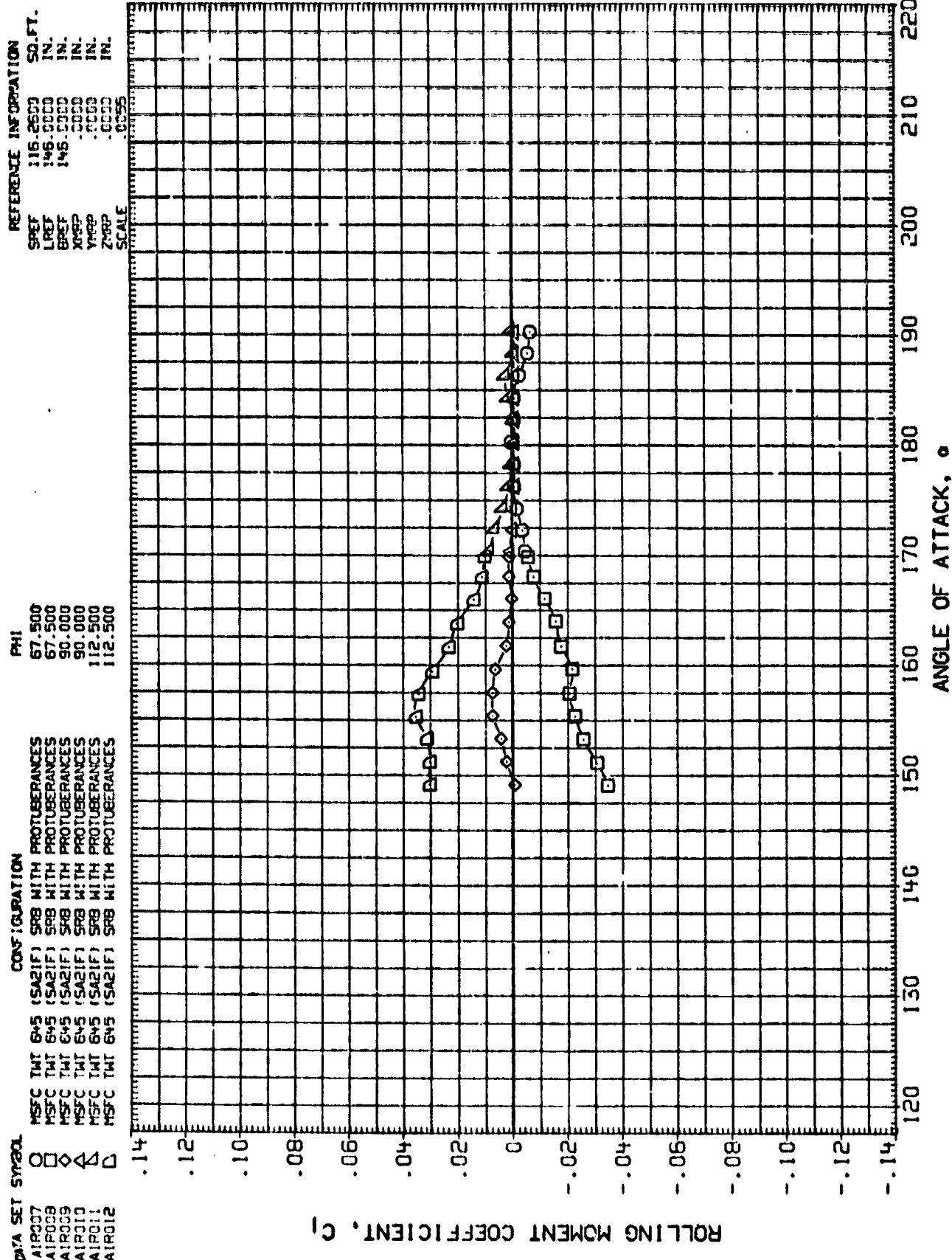
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SRB REENTRY ROLL CHARACTERISTICS

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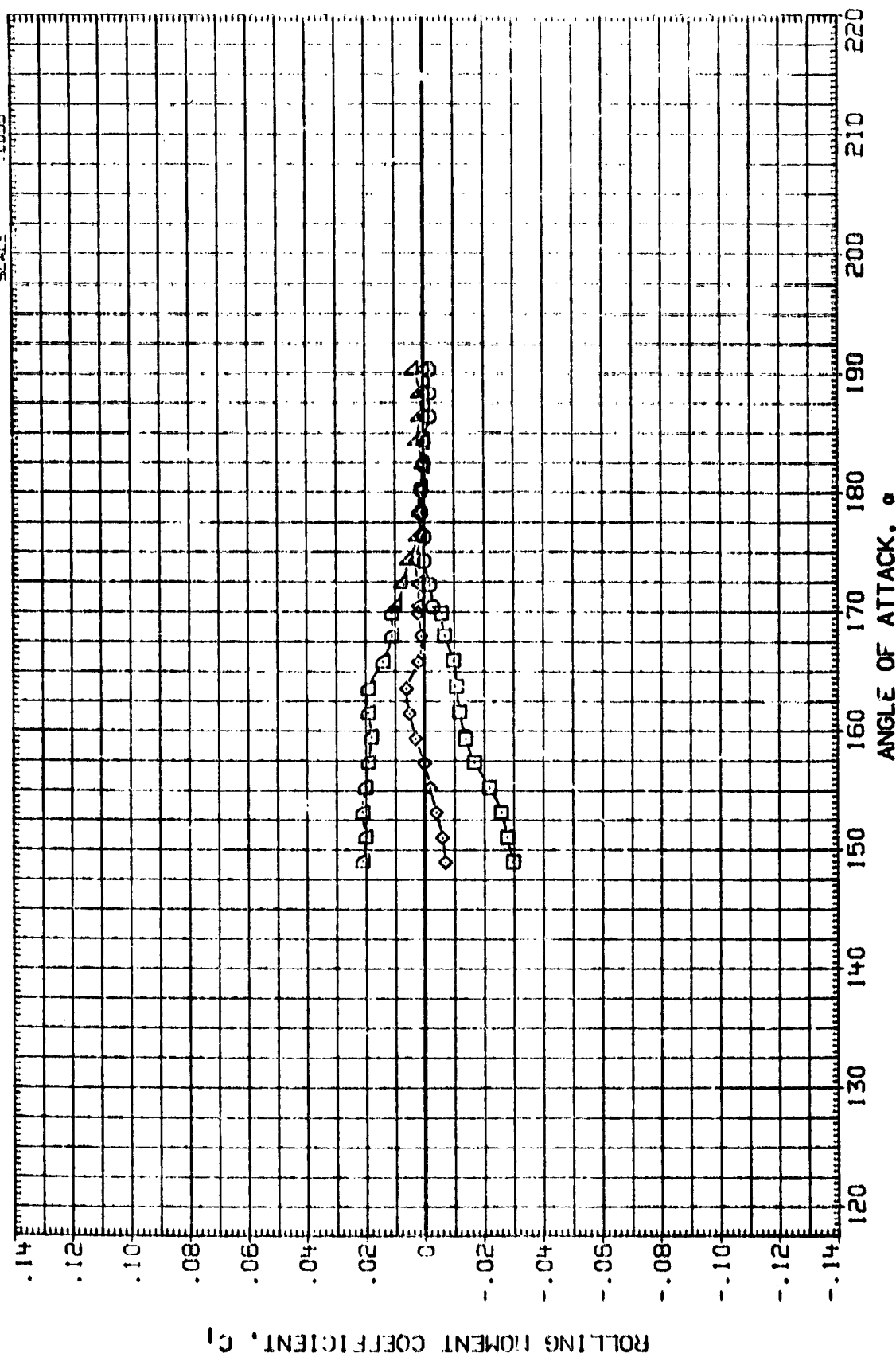


(A) MACH = 1.46

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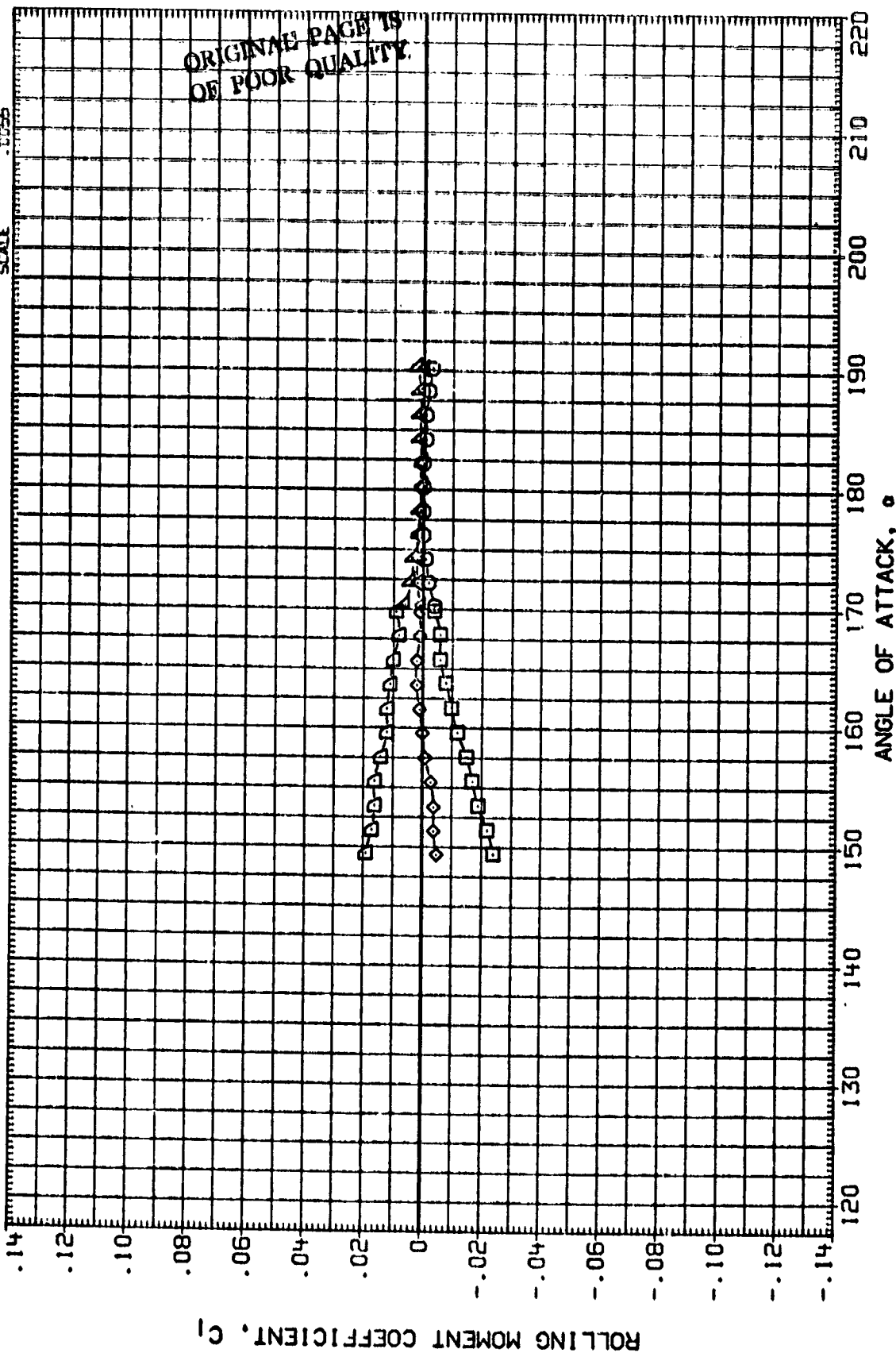
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(B) MACH = 1.96

DATA SET SYMBOL	CONFIGURATION	PHI	REFERENCE INFORMATION
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SRB REENTRY ROLL CHARACTERISTICS

(C)MACH = 2.74

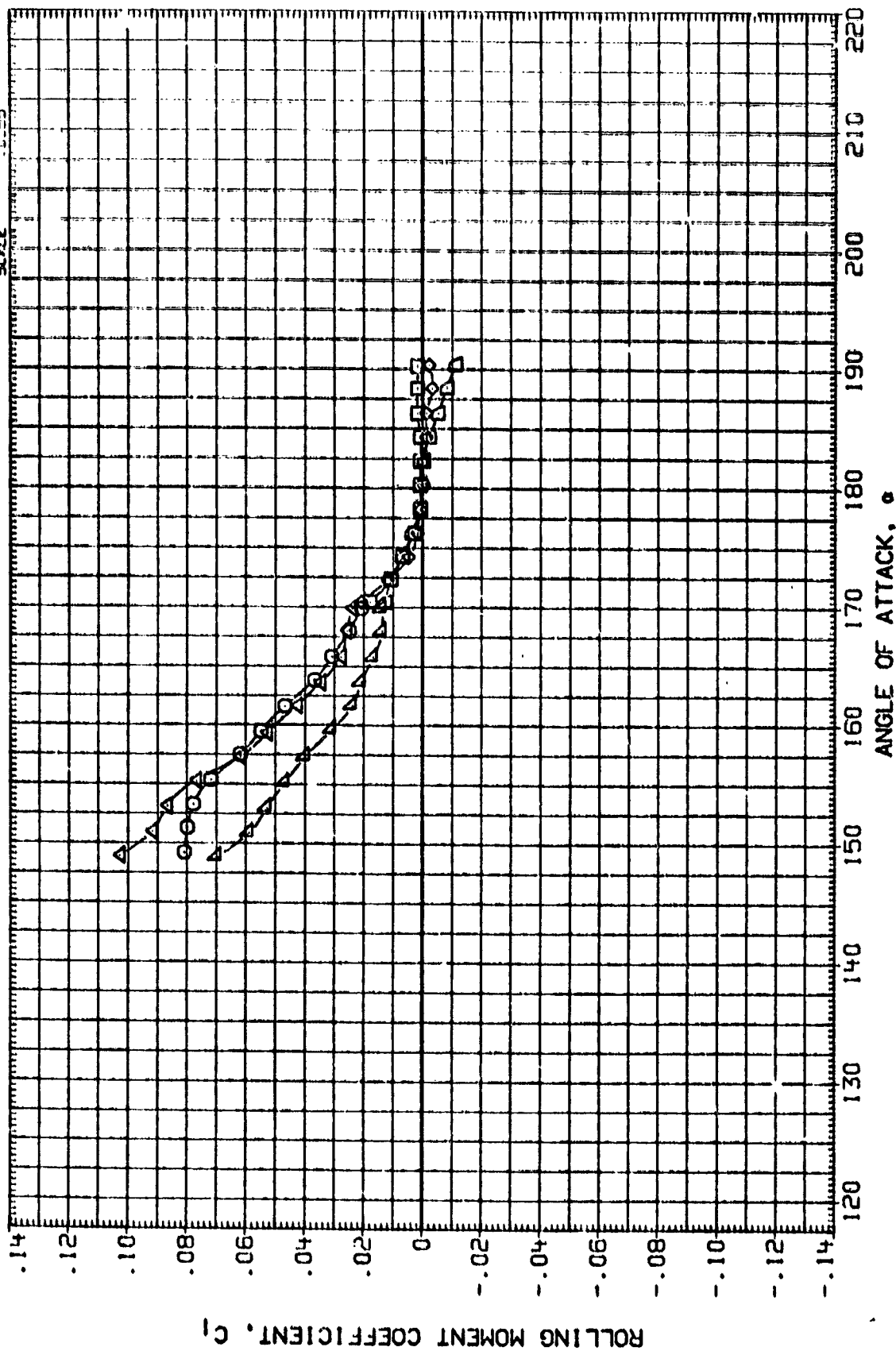
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XRF 146.1000 IN.
YRF 146.1000 IN.
ZRF 146.1000 IN.
SCALE 0.005

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135.000
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157.500
180.000
180.000

CONFIGURATION
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MSFC TWT 645 (S21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (S21F) SRB WITH PROTUBERANCES
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SRB REENTRY ROLL CHARACTERISTICS

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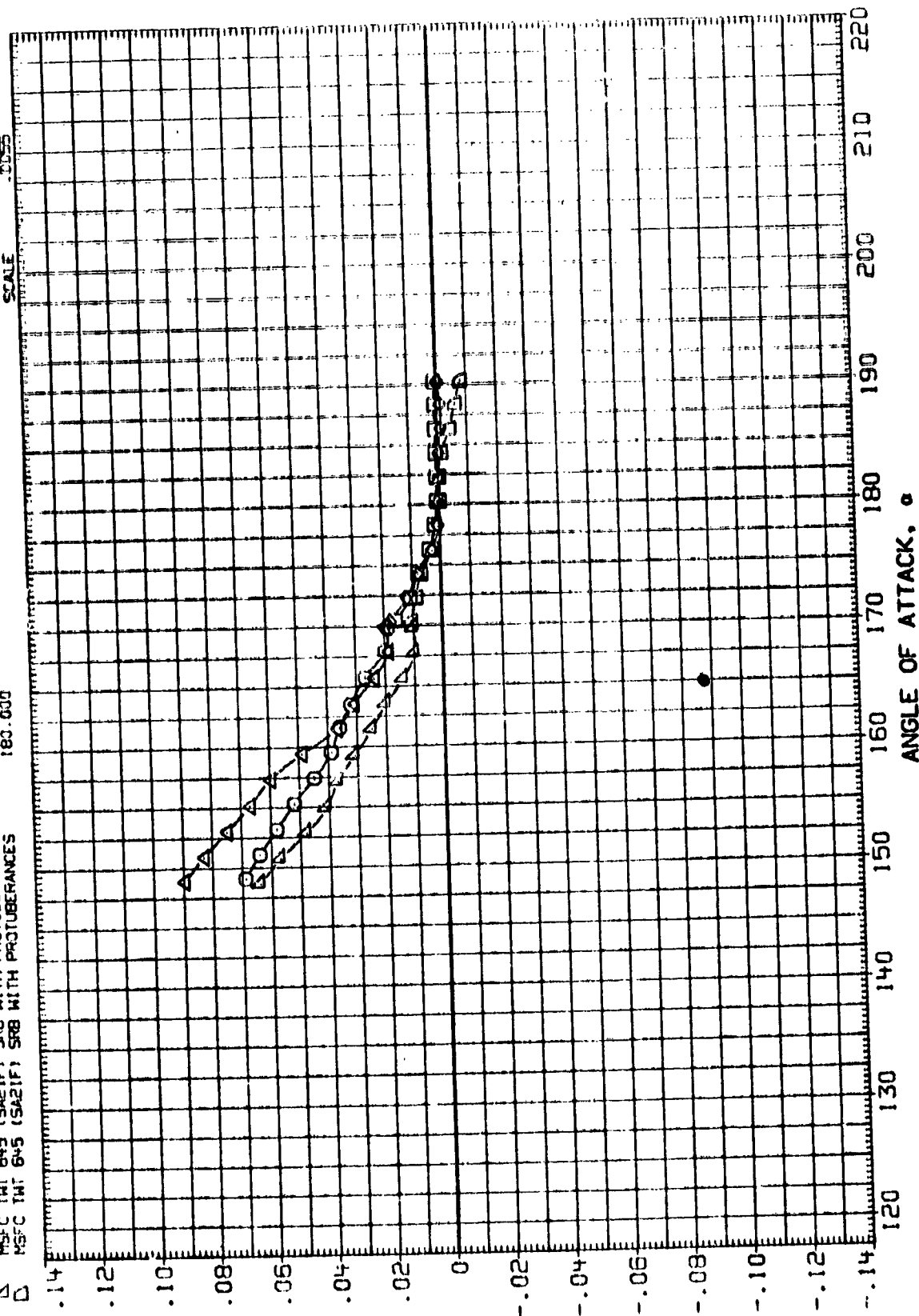
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 AIR018

CONFIGURATION
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 NSFC TAT 6N5 (SA21F) SRB WITH PROTUBERANCES

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REFERENCE INFORMATION
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 LREF 145.0000 IN.
 BREF 145.0000 IN.
 VREF 145.0000 IN.
 ZREF 145.0000 IN.
 SCALE 1.0000



SRB REENTRY ROLL CHARACTERISTICS

(B) MACH = 1.96

REFERENCE INFORMATION

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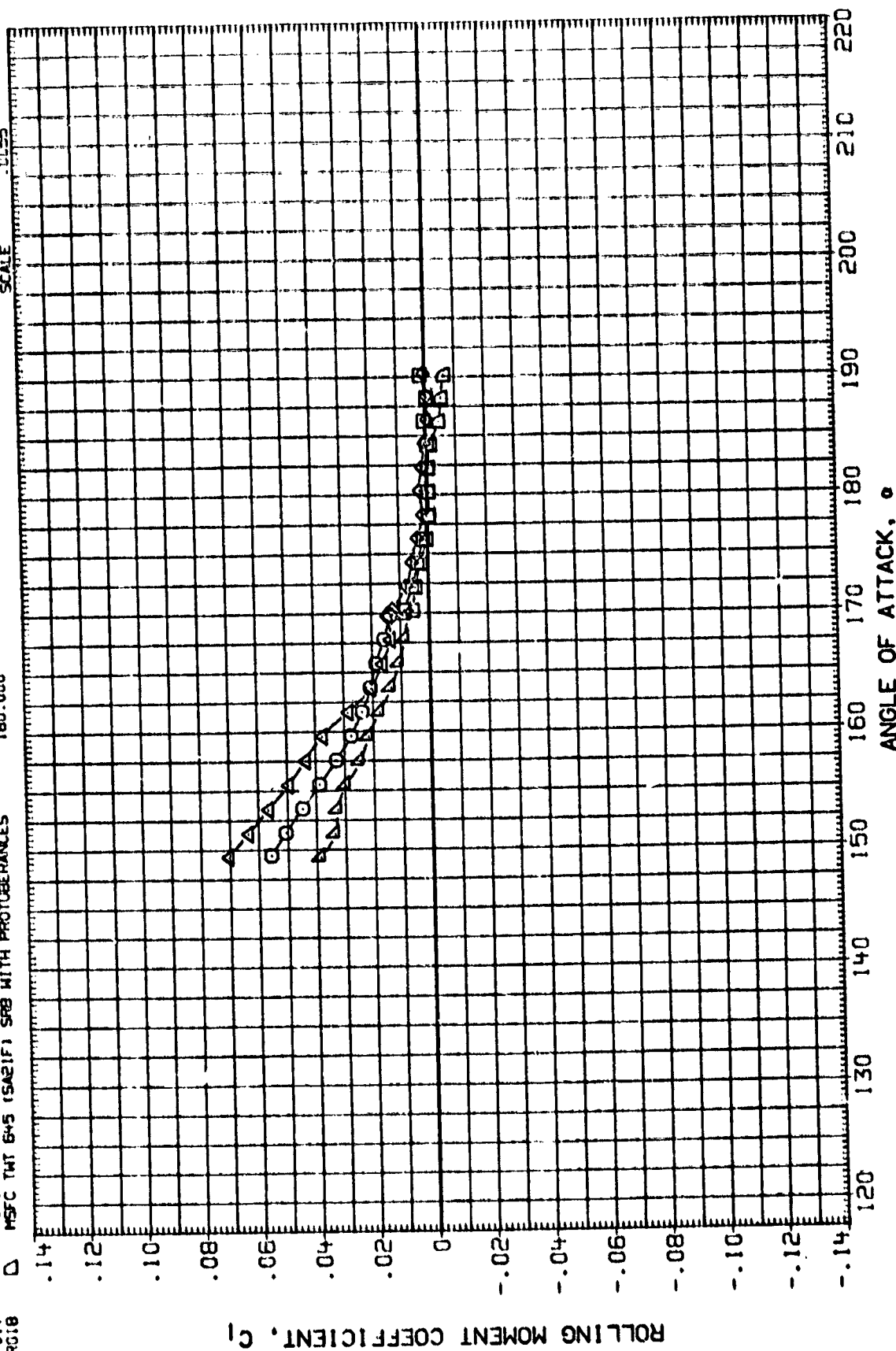
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CONFIGURATION

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MSFC TWT 645 (SA21F)	SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F)	SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F)	SRB WITH PROTUBERANCES

DATA SET SYMBOL

AIR013	□
AIR014	◇
AIR015	△
AIR016	▽
AIR017	◇
AIR018	◇



SRB REENTRY ROLL CHARACTERISTICS

(C) MACH = 2.75

34

7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24
25	26	27	28	29	30
31	32	33	34	35	36

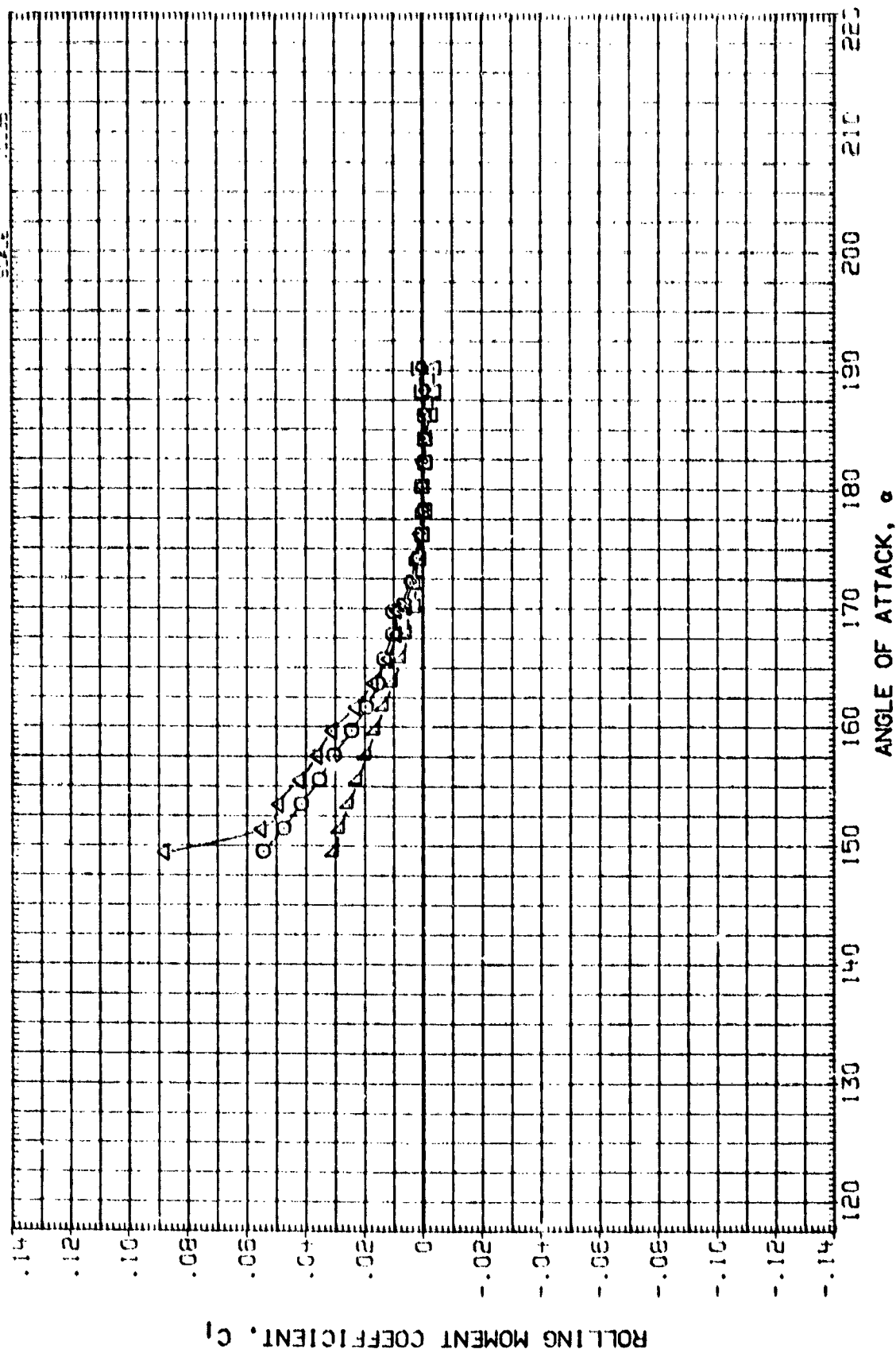
CONFIGURATION

[illegible]

156

135.000
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157.500
157.500
183.000
185.000

REFERENCES

[illegible]

ANGLE OF ATTACK, α

SRB REENTRY ROLL CHARACTERISTICS

(D) MACH = 3.48

PAGE 12

DATA SET SYMBOL
 AIR019
 AIR020
 AIR021
 AIR022
 AIR023
 AIR024

CONFIGURATION

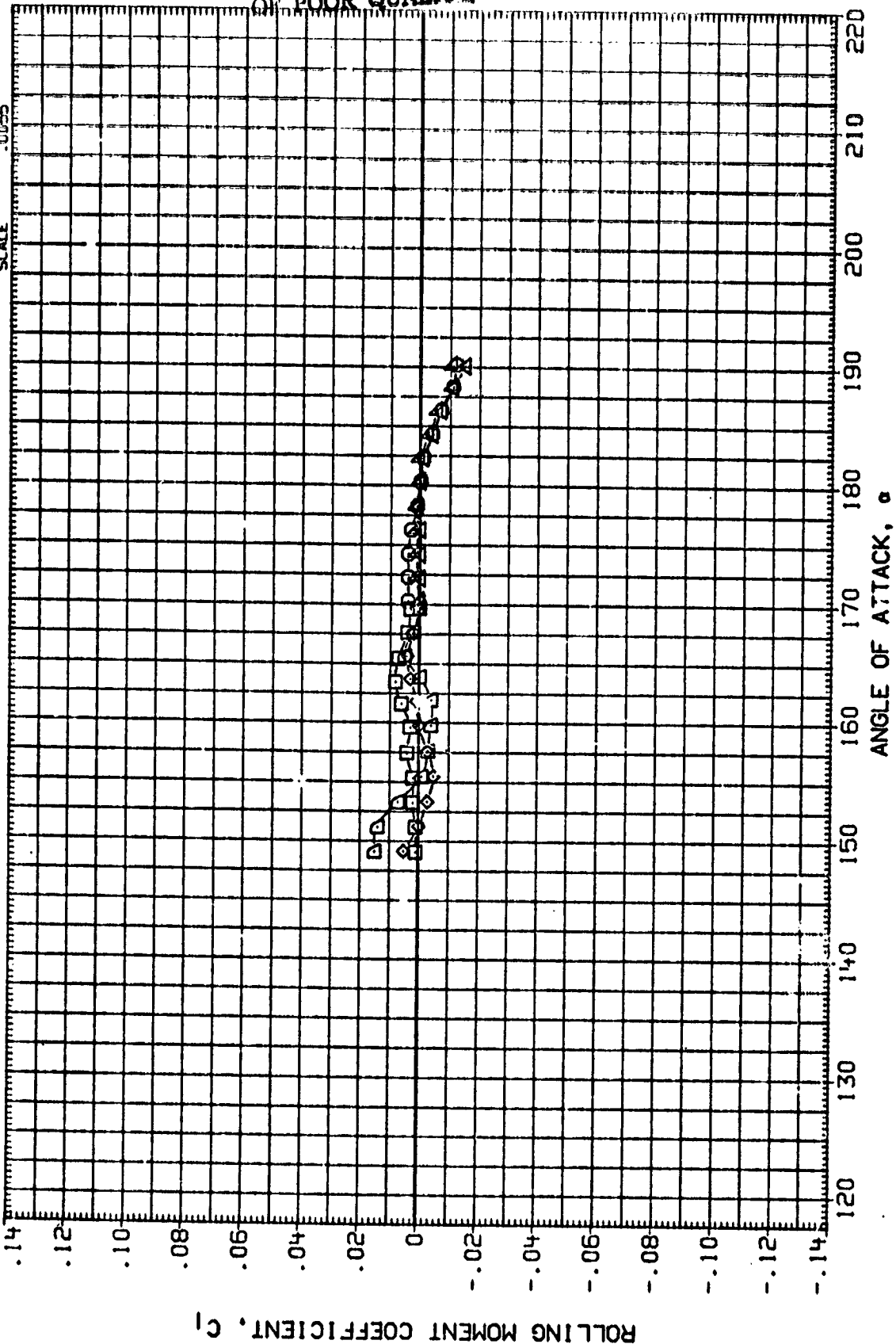
MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES
 MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES
 MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES
 MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES
 MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES

PHI

202.500
 202.500
 225.000
 225.000
 247.500

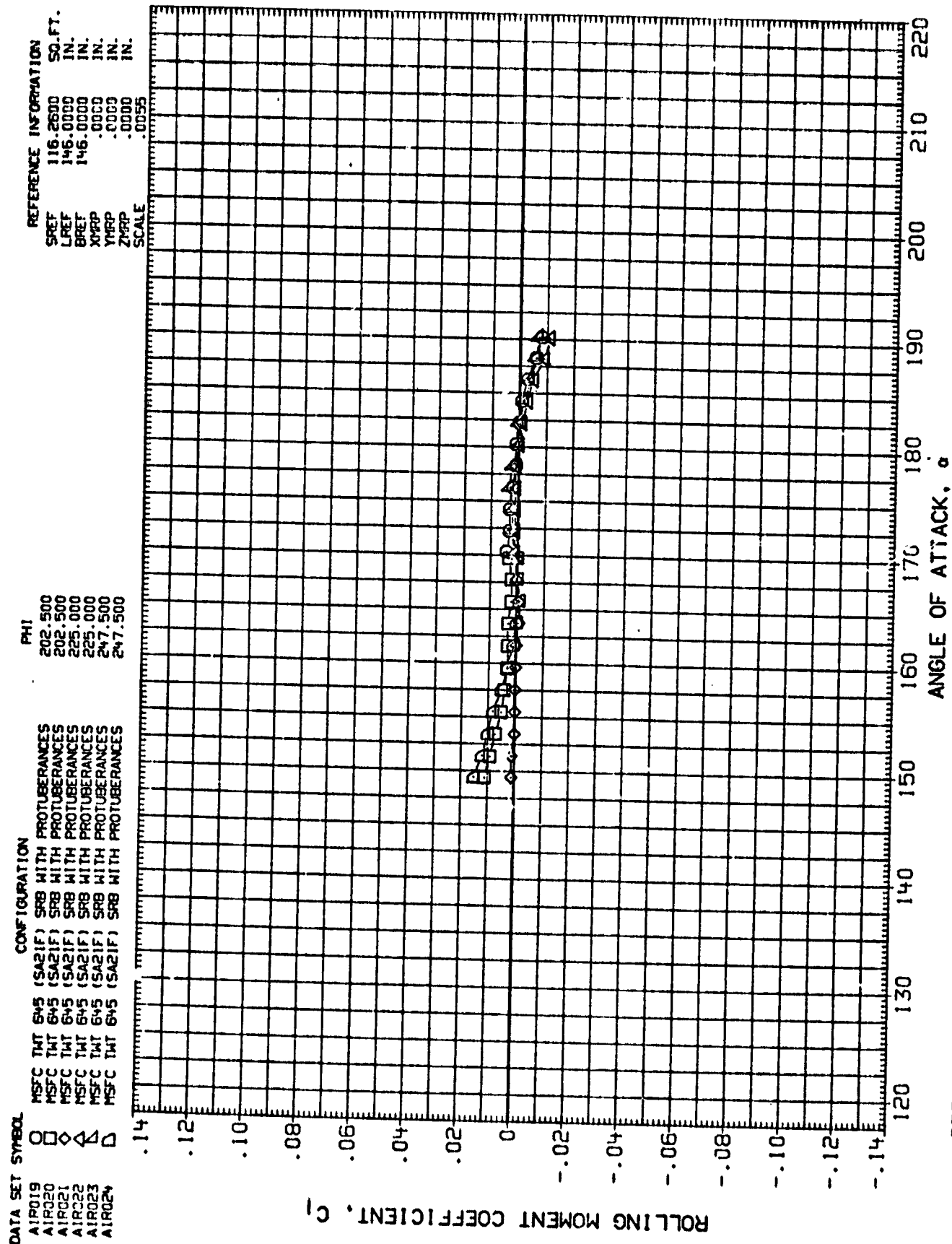
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 BREF 146.0000 IN.
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 SCALE .0035



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REFERENCE INFORMATION

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PHI

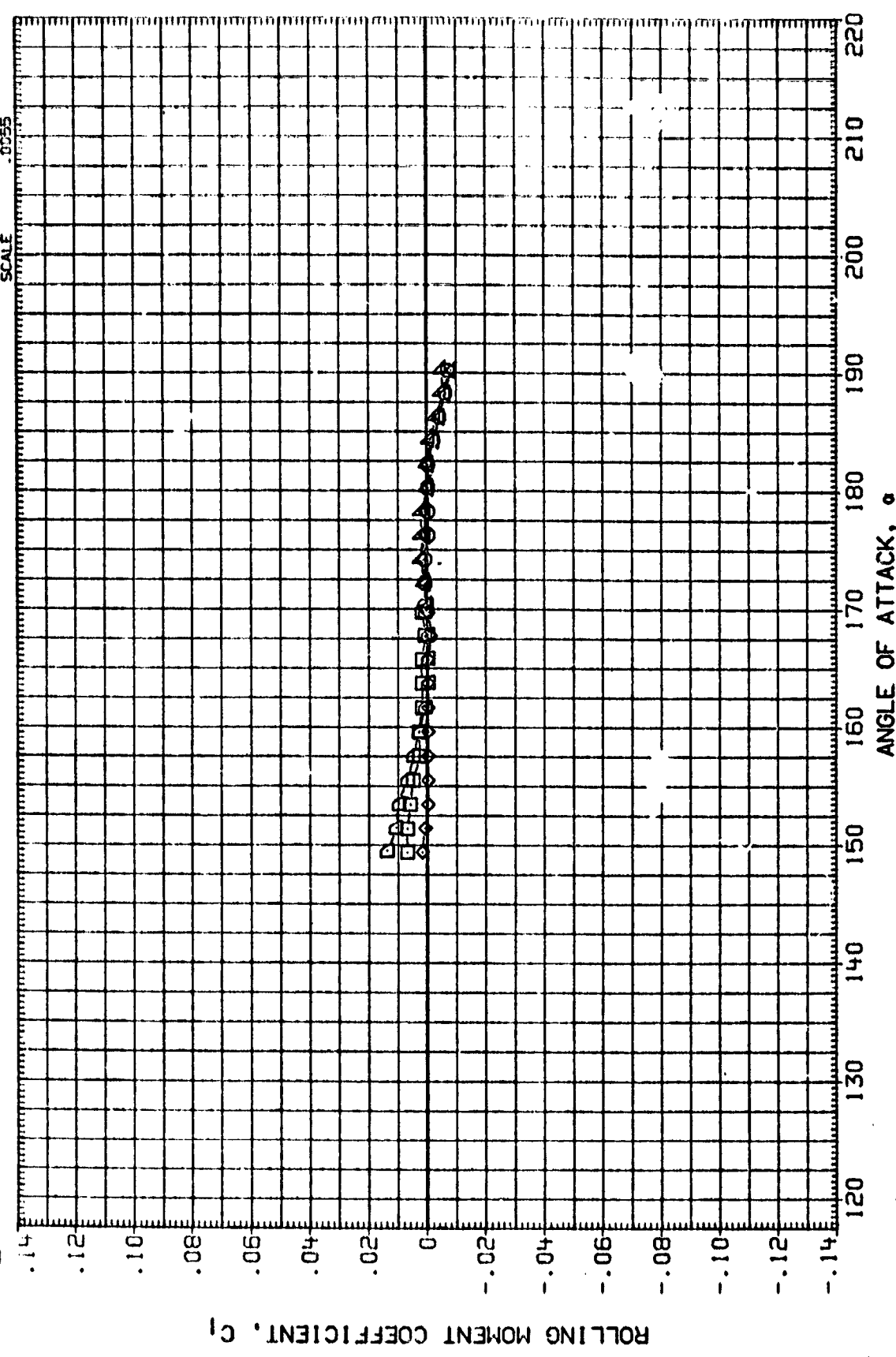
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202.500
225.000
225.000
247.500
247.500

CONFIGURATION

MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

DATA SET SYMBOL

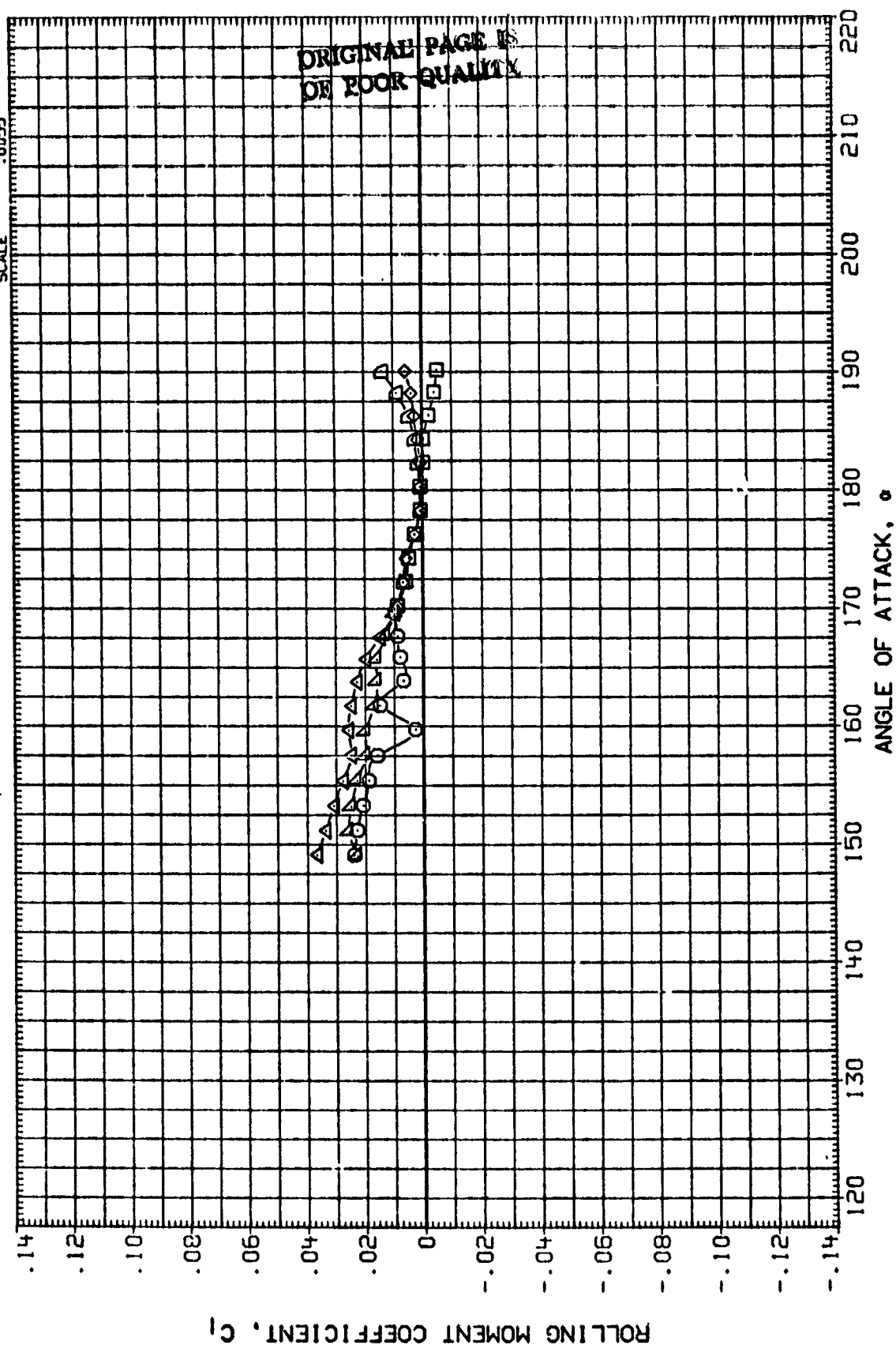
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A1R020	◇
A1R021	△
A1R022	▽
A1R023	□
A1R024	◇



SRB REENTRY ROLL CHARACTERISTICS

(D)MACH = 3.48

DATA SET SYMBOL	CONFIGURATION	PHI	REFERENCE INFORMATION
AIR025	MSFC TMT 6V5 (SA21F) SRB WITH PROTUBERANCES	270.000	SREF 116.2500 SO.FT.
AIR026	MSFC TMT 6V5 (SA21F) SRB WITH PROTUBERANCES	270.000	LREF 146.0000 IN.
AIR027	MSFC TMT 6V5 (SA21F) SRB WITH PROTUBERANCES	292.500	BREF 146.0000 IN.
AIR028	MSFC TMT 6V5 (SA21F) SRB WITH PROTUBERANCES	292.500	XMRP .0000 IN.
AIR029	MSFC TMT 6V5 (SA21F) SRB WITH PROTUBERANCES	315.000	YMRP .0000 IN.
AIR030	MSFC TMT 6V5 (SA21F) SRB WITH PROTUBERANCES	315.000	ZMRP .0000 IN.
			SCALE .0055



SRB REENTRY ROLL CHARACTERISTICS

(A) MACH = 1.46

PAGE 17

DATA SET SYMBOL

AIR025
AIR026
AIR027
AIR028
AIR029
AIR030

CONFIGURATION

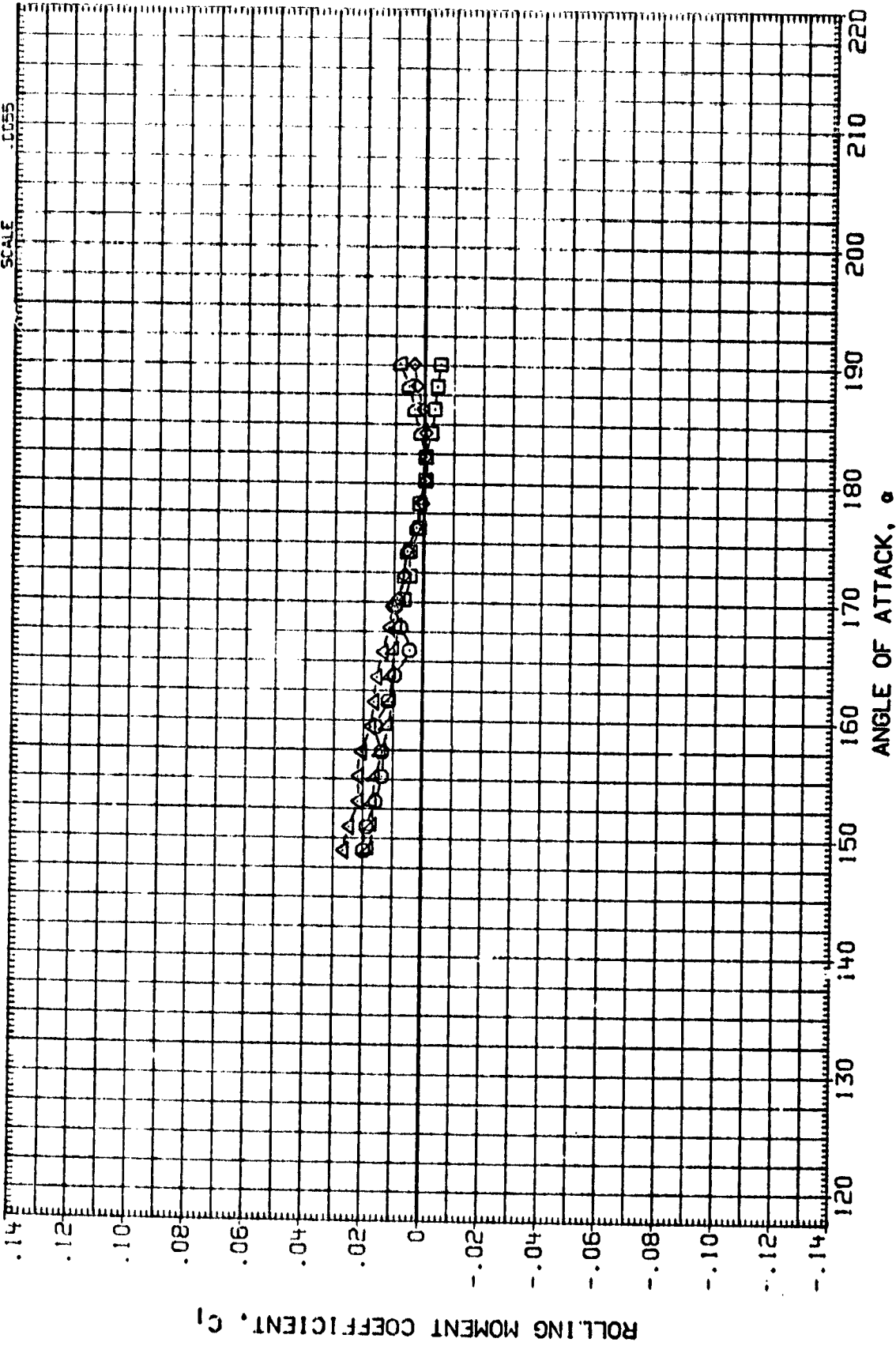
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MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

P.I.

270.000
270.000
292.500
292.500
315.000
315.000

REFERENCE INFORMATION

SREF 115.2600 SQ.FT.
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SREF 145.0000 IN.
XREF 145.0000 IN.
YREF 145.0000 IN.
ZREF 145.0000 IN.
SCALE 1.0000



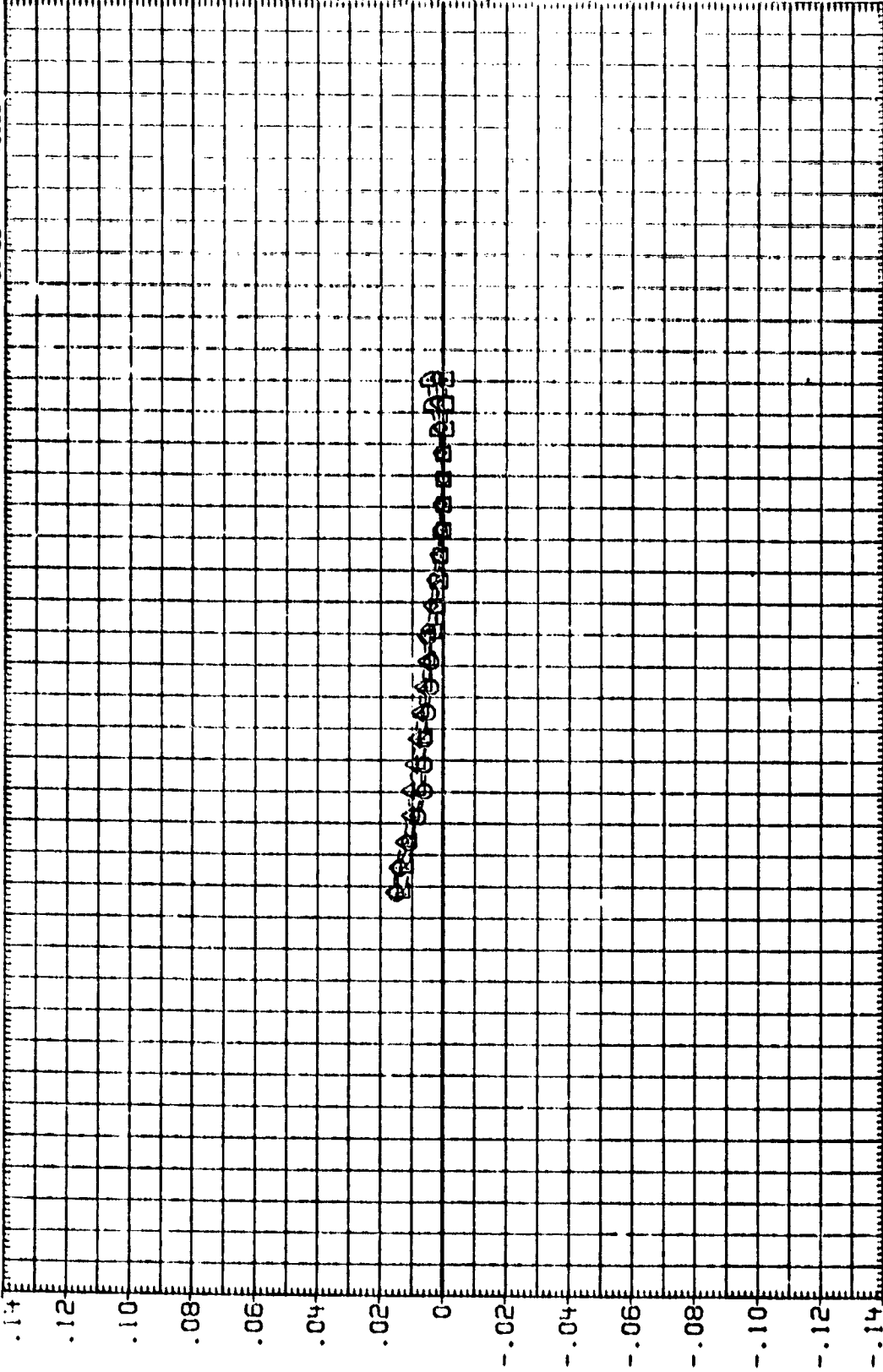
(B)MACH = 1.96

DATA SET 5780L
 AIR025
 AIR026
 AIR027
 AIR028
 AIR029
 AIR030

MSFC TWT 645 (SABIF) SRB WITH PROTUBERANCES
 MSFC TWT 645 (SABIF) SRB WITH PROTUBERANCES
 MSFC TWT 645 (SABIF) SRB WITH PROTUBERANCES
 MSFC TWT 645 (SABIF) SRB WITH PROTUBERANCES
 MSFC TWT 645 (SABIF) SRB WITH PROTUBERANCES

PHI
 270.000
 270.000
 292.500
 292.500
 315.000
 315.000

REFERENCE INFORMATION
 SREF 116.2500 SQ.FT.
 LREF 146.0000 IN.
 BREF 145.0000 IN.
 XREF 145.0000 IN.
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 ZREF 145.0000 IN.
 SCALE 1.0000



ANGLE OF ATTACK, α

SRB REENTRY ROLL CHARACTERISTICS

(D)MACH = 3.48

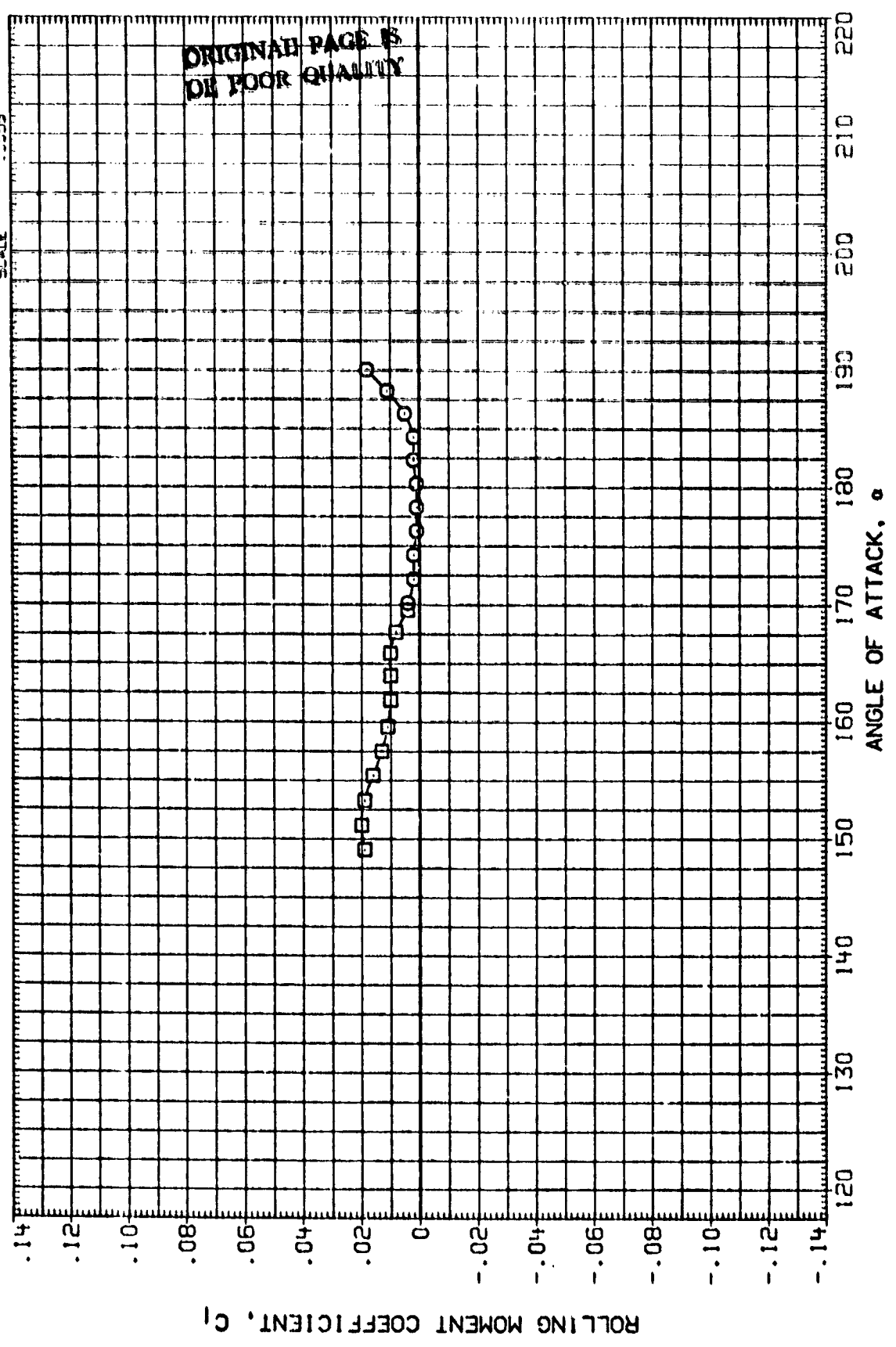
PAGE 20

REFERENCE INFORMATION
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 BREF 145.0000 IN.
 XREF 145.0000 IN.
 YREF 145.0000 IN.
 ZREF 145.0000 IN.
 SCALE .0005

PHI
 337.500
 337.500

CONFIGURATION
 MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES
 MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES

DATA SET SYMBOL
 AIR031
 AIR032



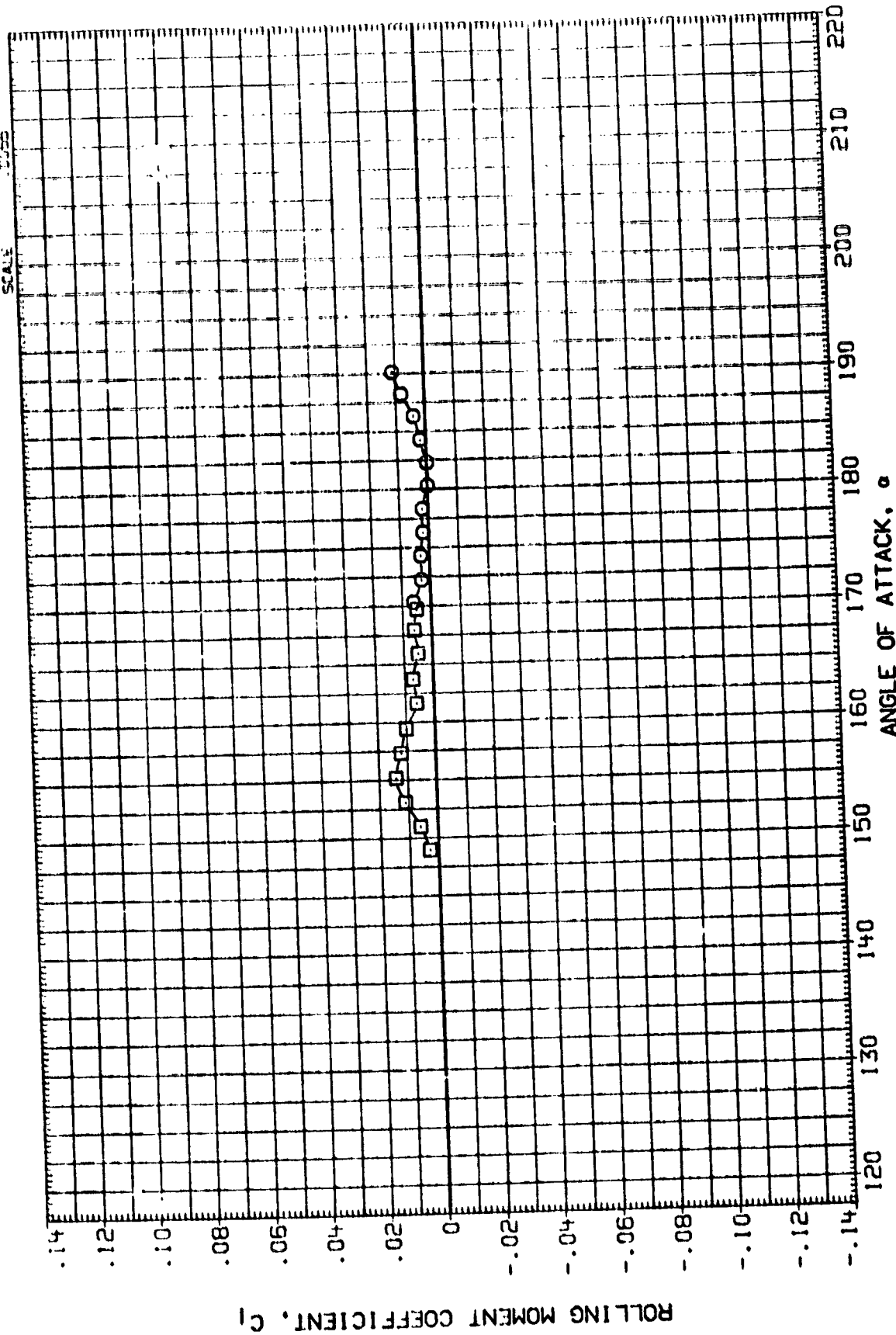
SRB REENTRY ROLL CHARACTERISTICS

DATA SET SYMBOL
AIR031
AIR032

MSFC INT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC INT 645 (SA21F) SRB WITH PROTUBERANCES

PHI
337.500
337.500

REFERENCE INFORMATION
SPF 116.2500 SQ.FT.
LREF 146.0000 IN.
BREF 146.0000 IN.
XREF 146.0000 IN.
YREF 146.0000 IN.
ZREF 146.0000 IN.
SCALE 1.0000



SRB REENTRY ROLL CHARACTERISTICS

(B) MACH = 1.96

DATA SET SYMBOL

AIR031
AIR032

CONFIGURATION

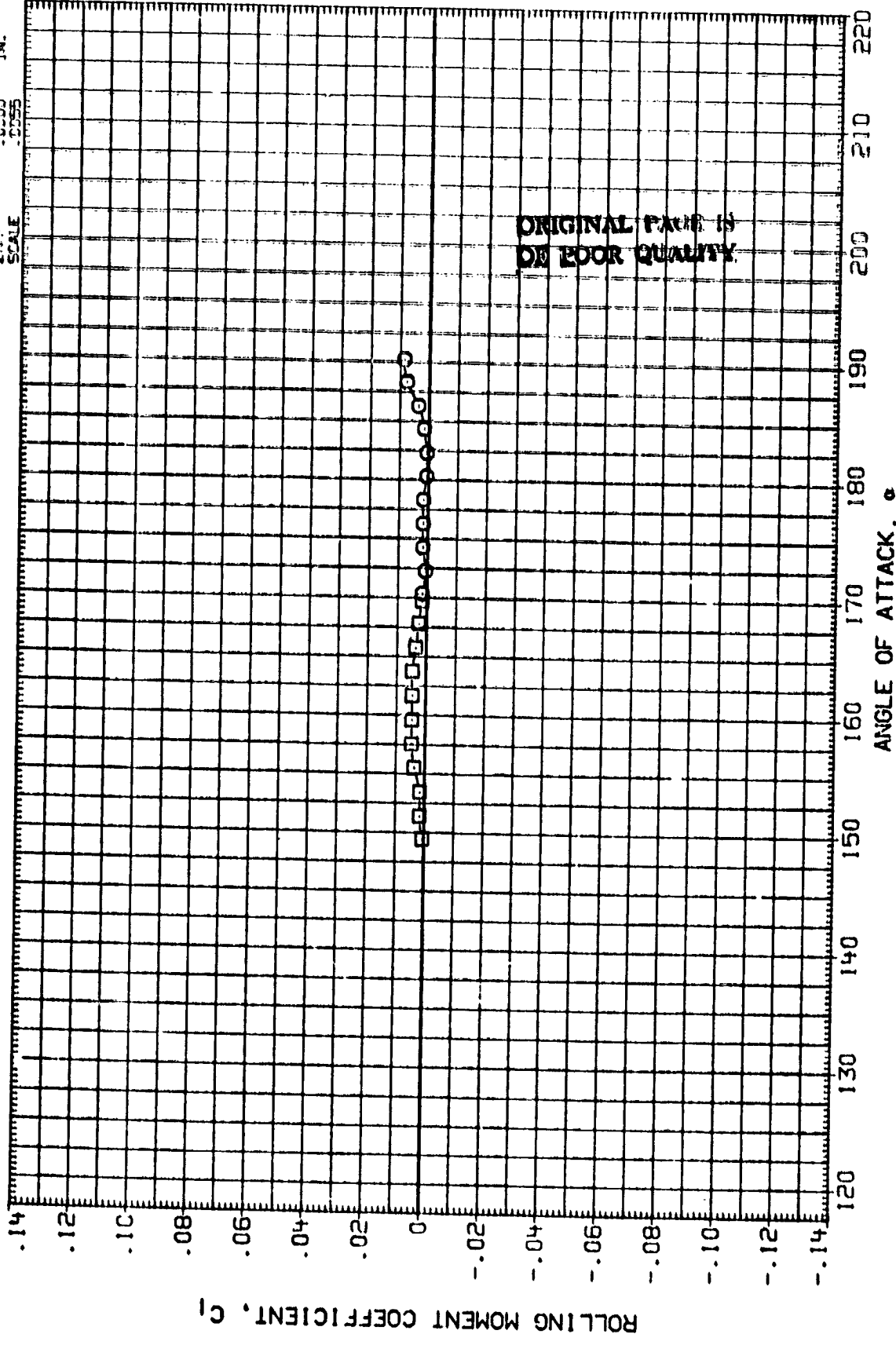
MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES
MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES

PHI

337.500
337.500

REFERENCE INFORMATION

SREF 116.2500 50. FT.
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XREF -5000 IN.
YREF -5000 IN.
ZREF -5000 IN.
SCALE .0055



SRB REENTRY ROLL CHARACTERISTICS

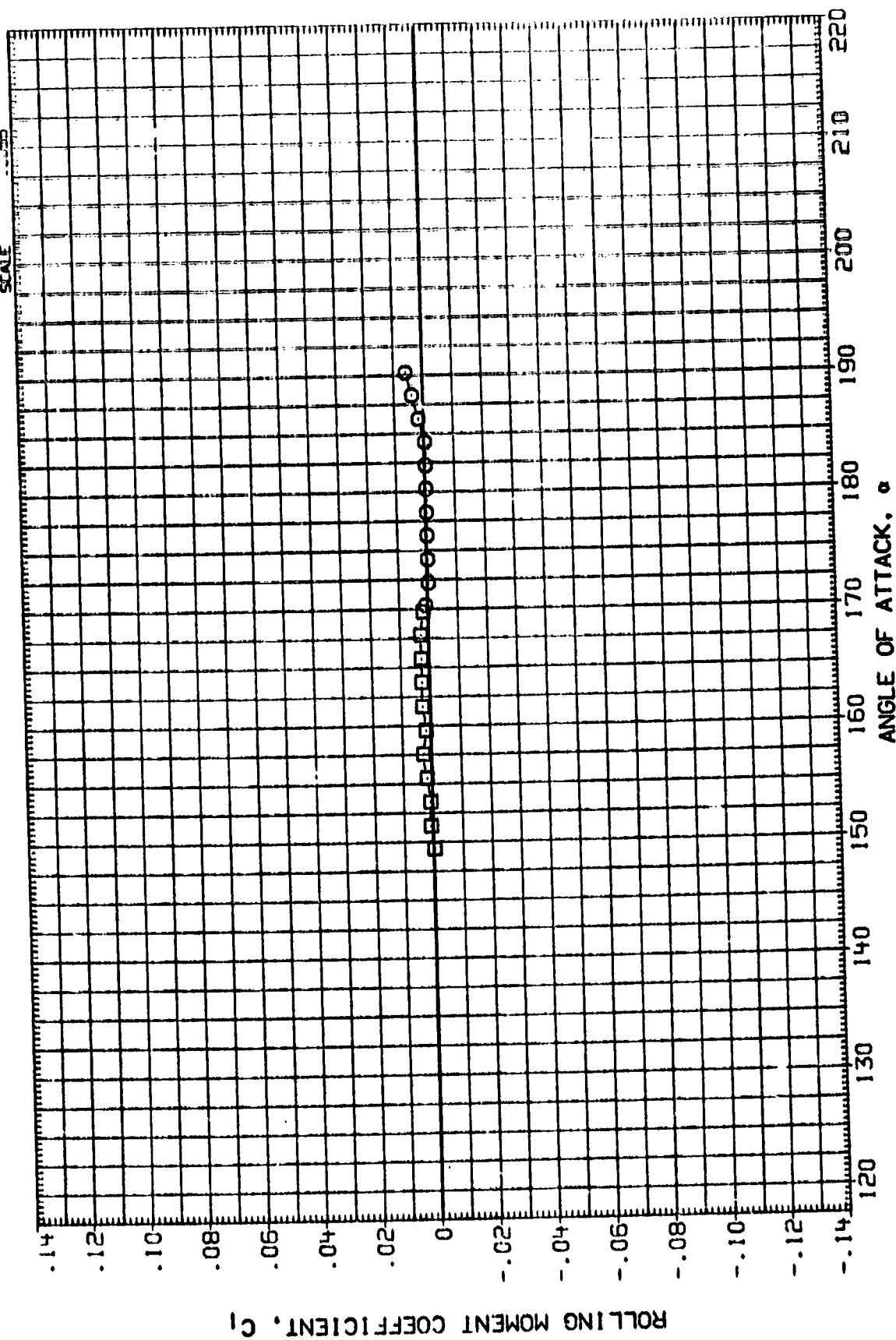
(C)MACH = 2.74

DATA SET	SYMBOL
AIR031	
AIR032	

CONFIGURATION	
MSFC TNT 6W5	SRB WITH PROTRUDANCES
MSFC TNT 6W5	SRB WITH PROTRUDANCES

PHI:
337.5
337.5

REFERENCE INFORMATION	
SPEF	115-2500
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6PEF	145
X0PP	1000
Y0PP	1000
Z0PP	1000
SCALE	1000



SRB REENTRY ROLL CHARACTERISTICS

(D) MACH = 3.48

PAGE **24**

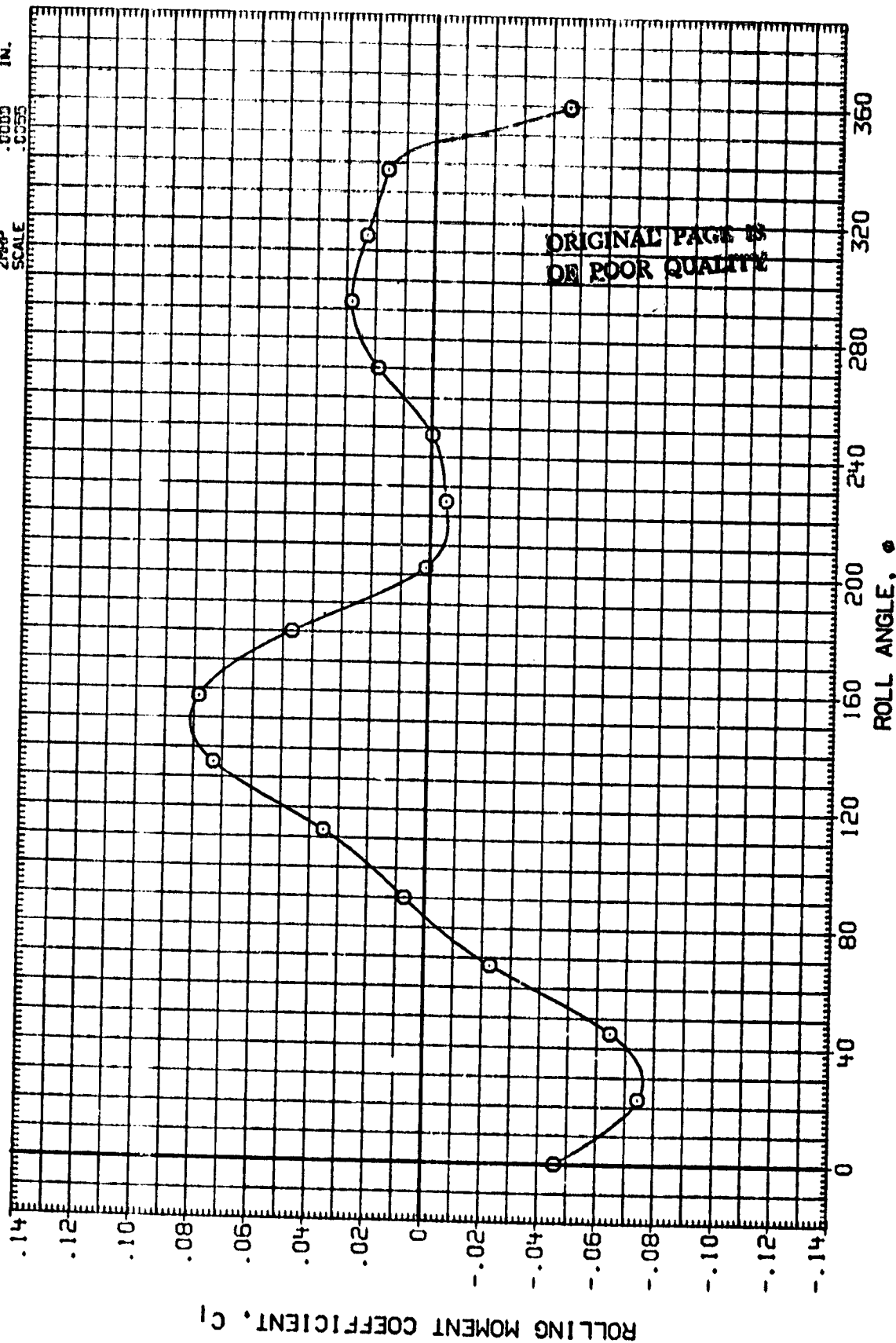
DATA SET SYMBOL
EIR101

CONFIGURATION

MSFC TWT 6+5 (SA21F) SRB WITH PROTUBERANCES

ALPHA
155.000

REFERENCE INFORMATION
SREF 116.2600 SQ.FT.
LREF 146.0000 IN.
BREF 146.0000 IN.
XMRP .0000 IN.
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ZMRP .0000 IN.
SCALE .0000



SRB REENTRY ROLL CHARACTERISTICS

(A) MACH = 1.46

REFERENCE INFORMATION

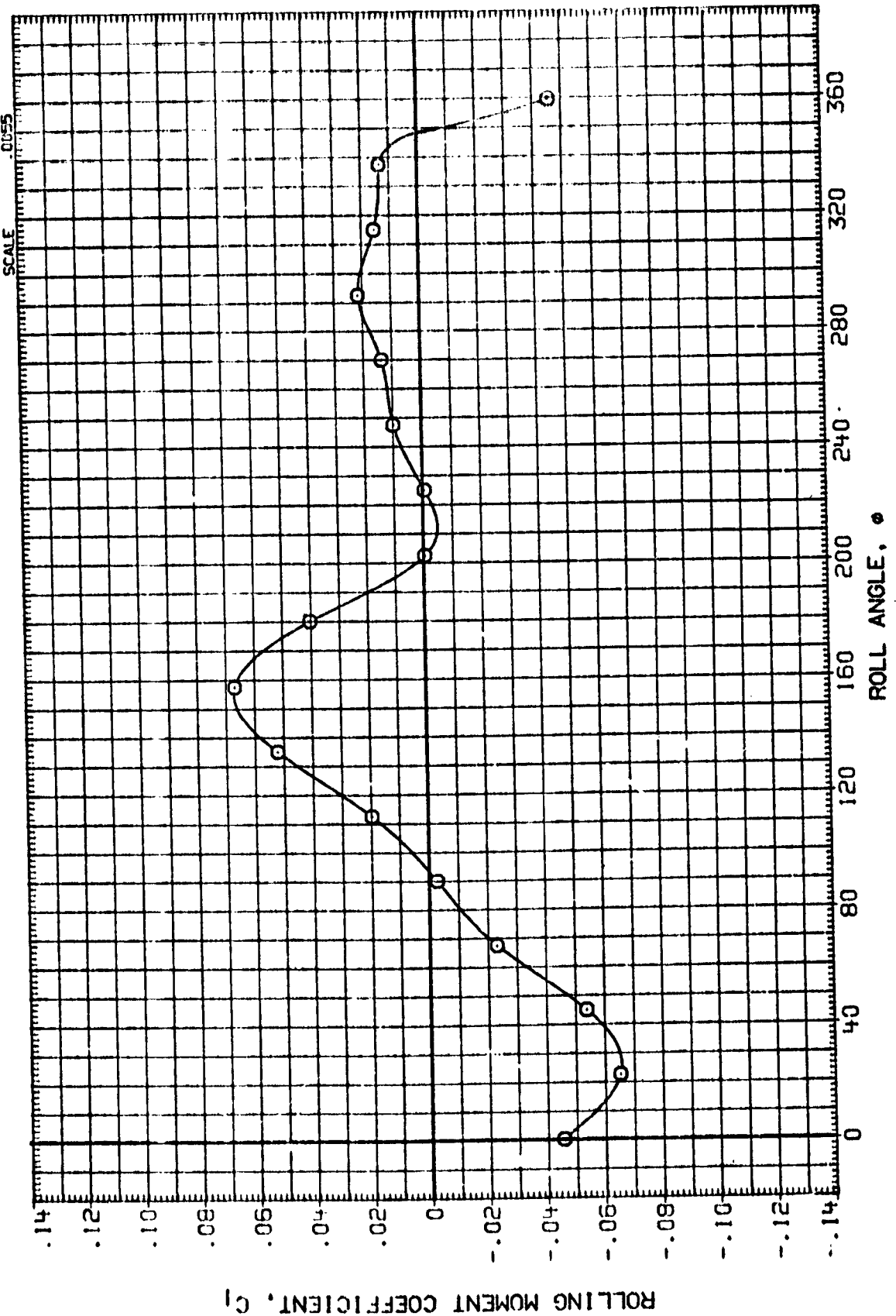
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YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0055	

ALP/A
155.000

CONFIGURATION
MSFC THT 6x5 (SA21F) SRB WITH PROTUBERANCES

DATA SET SYMBOL
EIR101

52



SRB REENTRY ROLL CHARACTERISTICS

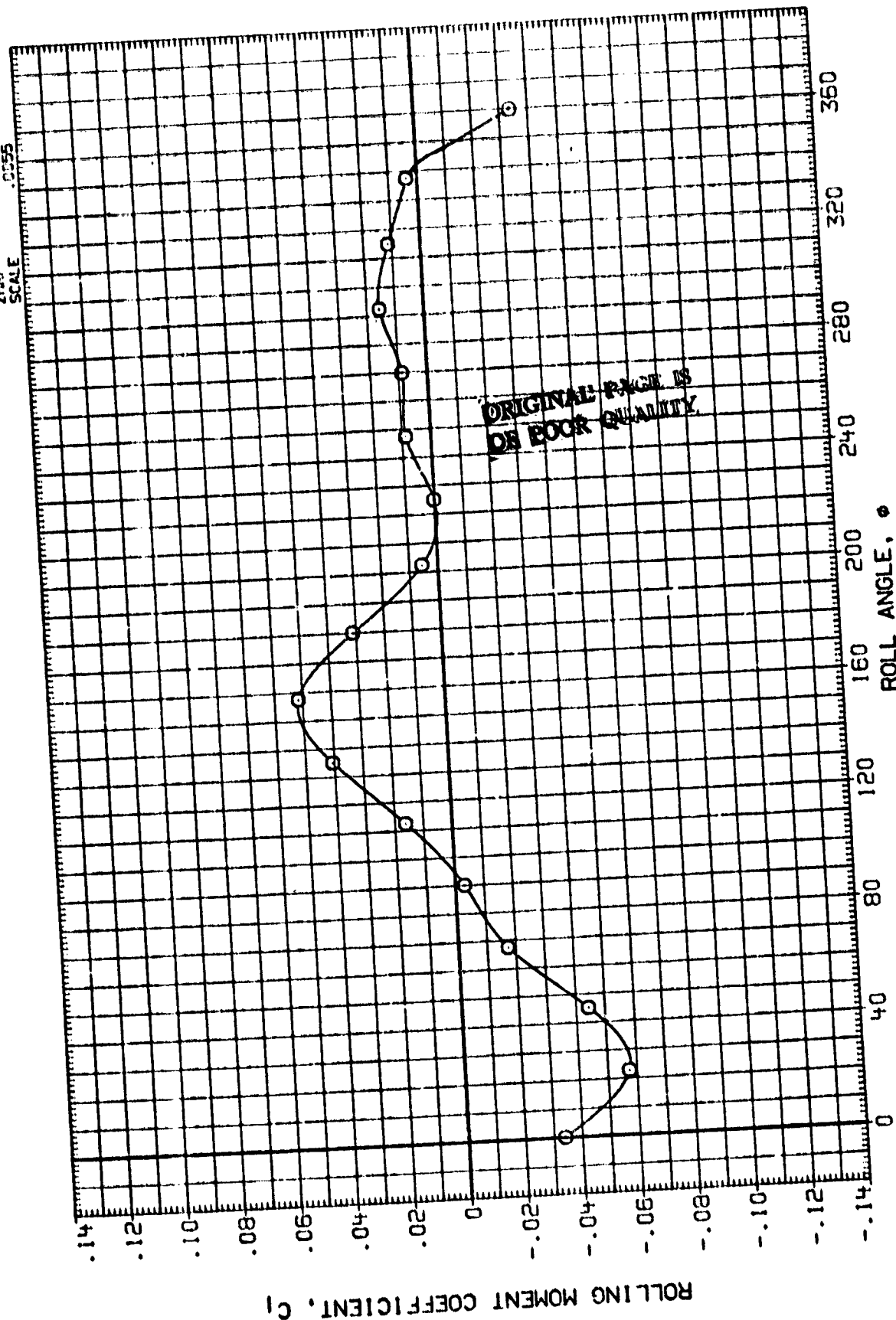
(B)MACH = 1.96

REFERENCE INFORMATION
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 BREF 146.0000 IN.
 XREF .0000 IN.
 YREF .0000 IN.
 ZREF .0000 IN.
 SCALE .0055

ALPHA
 155.000

CONFIGURATION
 MSFC TMT 6-5 (SA2IF) SRB WITH PROTUBERANCES

DATA SET SYMBOL
 EIR:01 O



SRB REENTRY ROLL CHARACTERISTICS

(C) MACH = 2.74

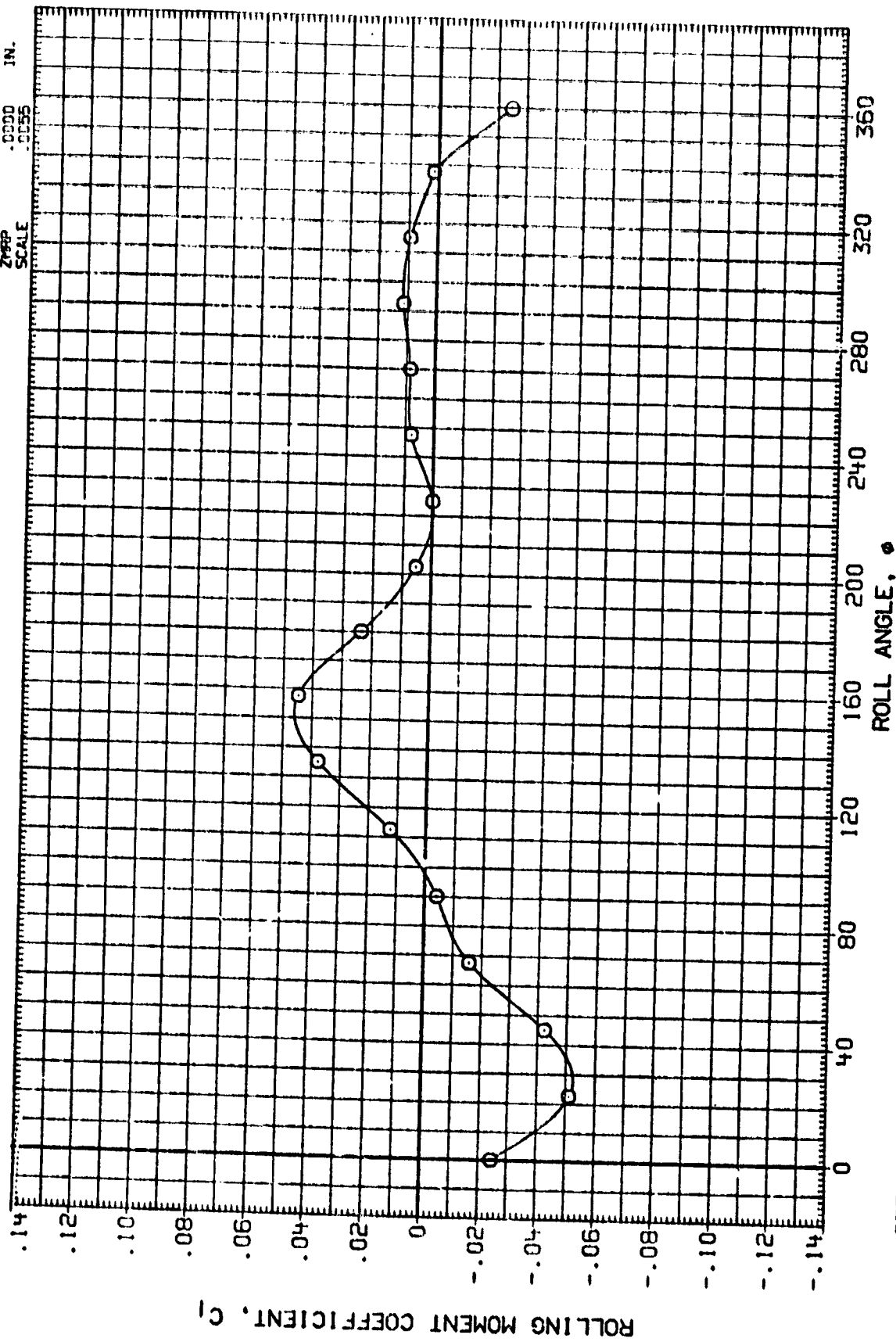
DATA SET SYMBOL
EIR101

CONFIGURATION

MSFC TWT 645 (S421F) SRB WITH PROTUBERANCES

ALPHA
155.000

REFERENCE INFORMATION
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LREF 146.0000 IN.
BREF 146.0000 IN.
XPRP .0000 IN.
YPRP .0000 IN.
ZPRP .0000 IN.
SCALE .0055



SRB REENTRY ROLL CHARACTERISTICS

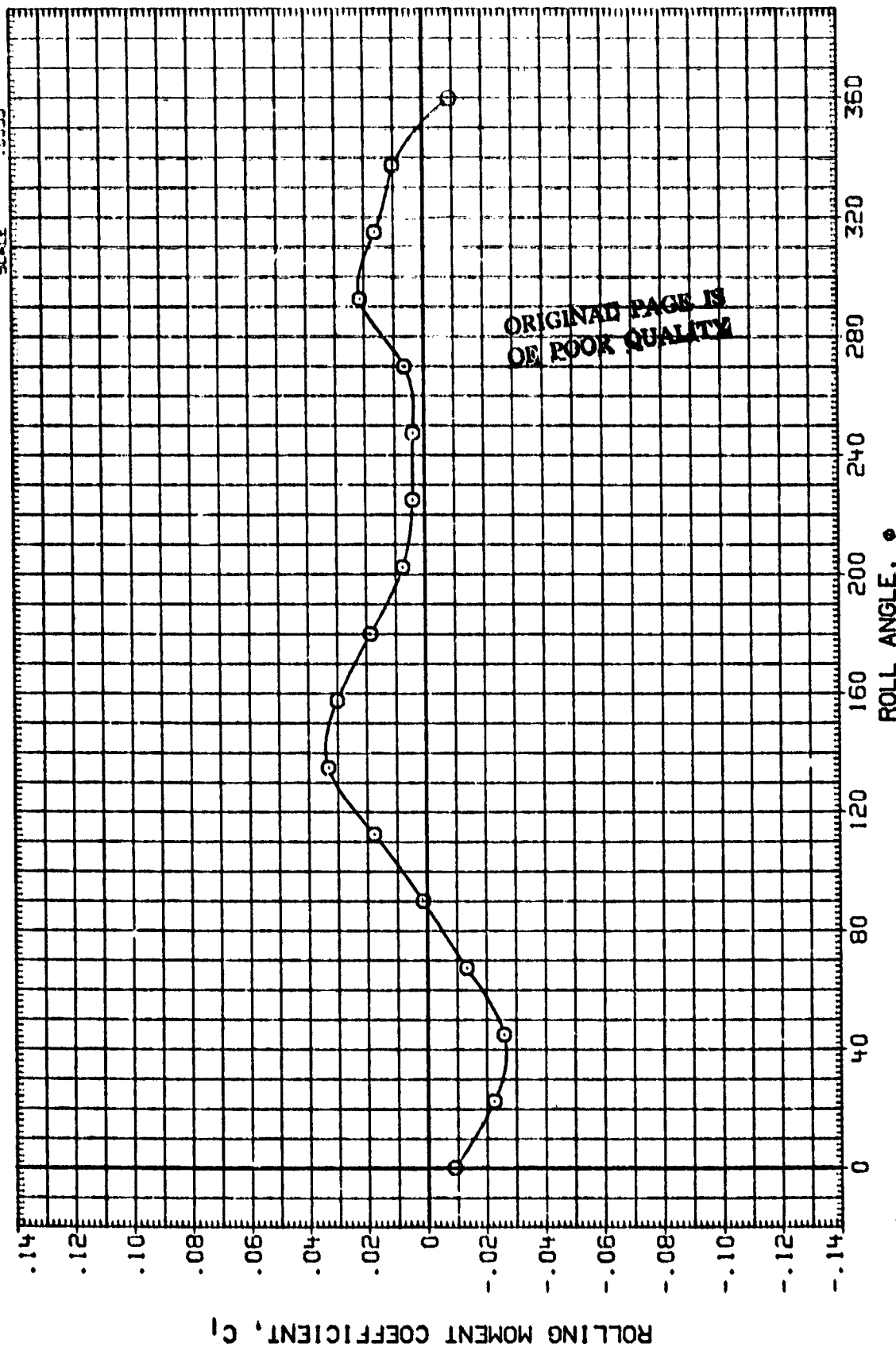
(D)MACH = 3.48

DATA 'ET SYMBOL
E1P201 O

CONFIGURATION
MSFC TMT 645 (S21F) SRB WITH PROTUBERANCES

ALPHA
165.000

REFERENCE INFORMATION
SREF 115.2600 SD.FT.
LREF 146.0000 IN.
BREF 146.0000 IN.
XREF 146.0000 IN.
YREF 146.0000 IN.
ZREF 146.0000 IN.
SCALE 1.0000



SRB REENTRY ROLL CHARACTERISTICS

(A) MACH = 1.46

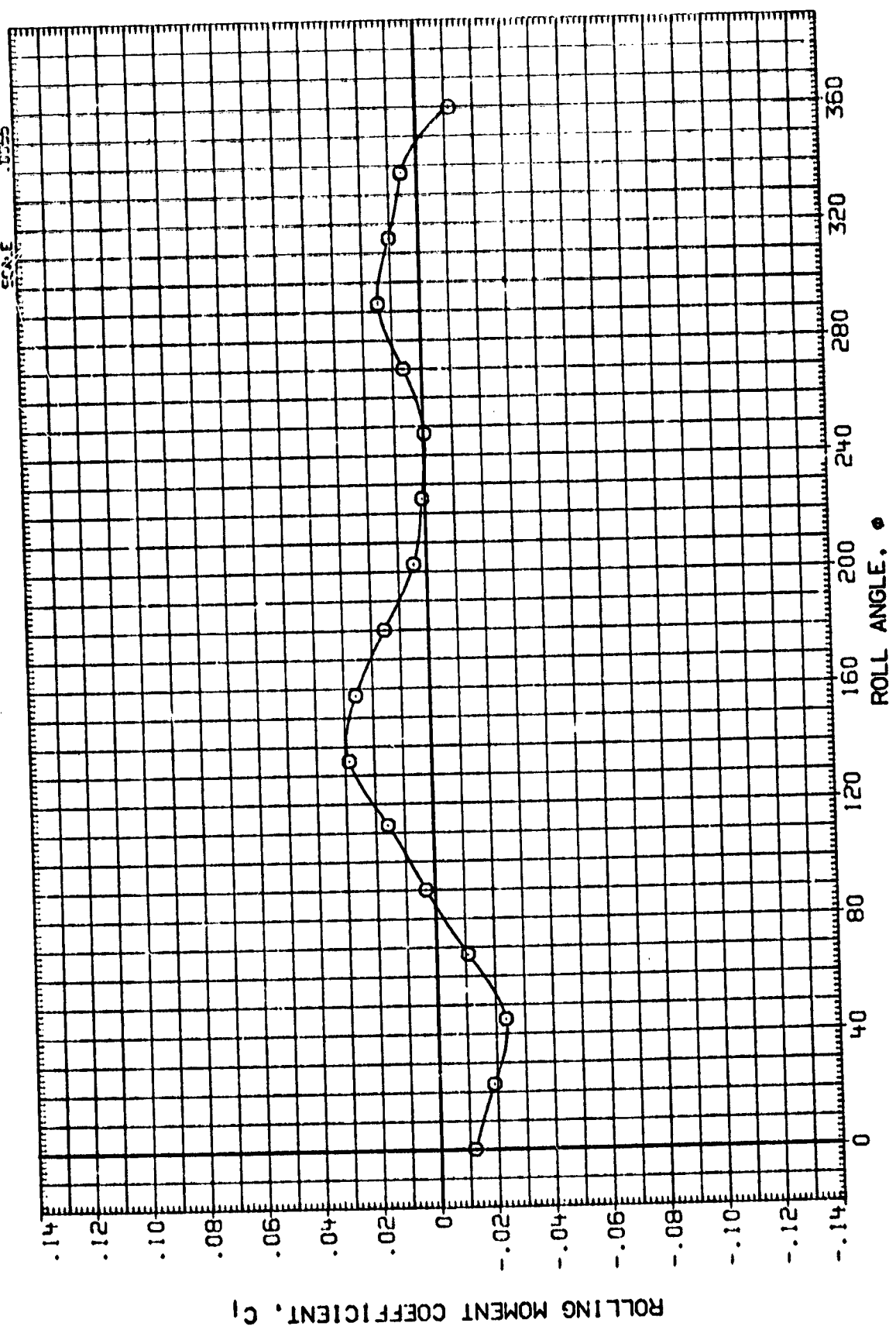
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 SCALE 0.255

ALPHA
 165.000

DATA SET SYMBOL
 E1R201

CONFIGURATION

MSFC TMT 6-5 (SA21F) SRB WITH PROTOBERANCES



SRB REENTRY ROLL CHARACTERISTICS

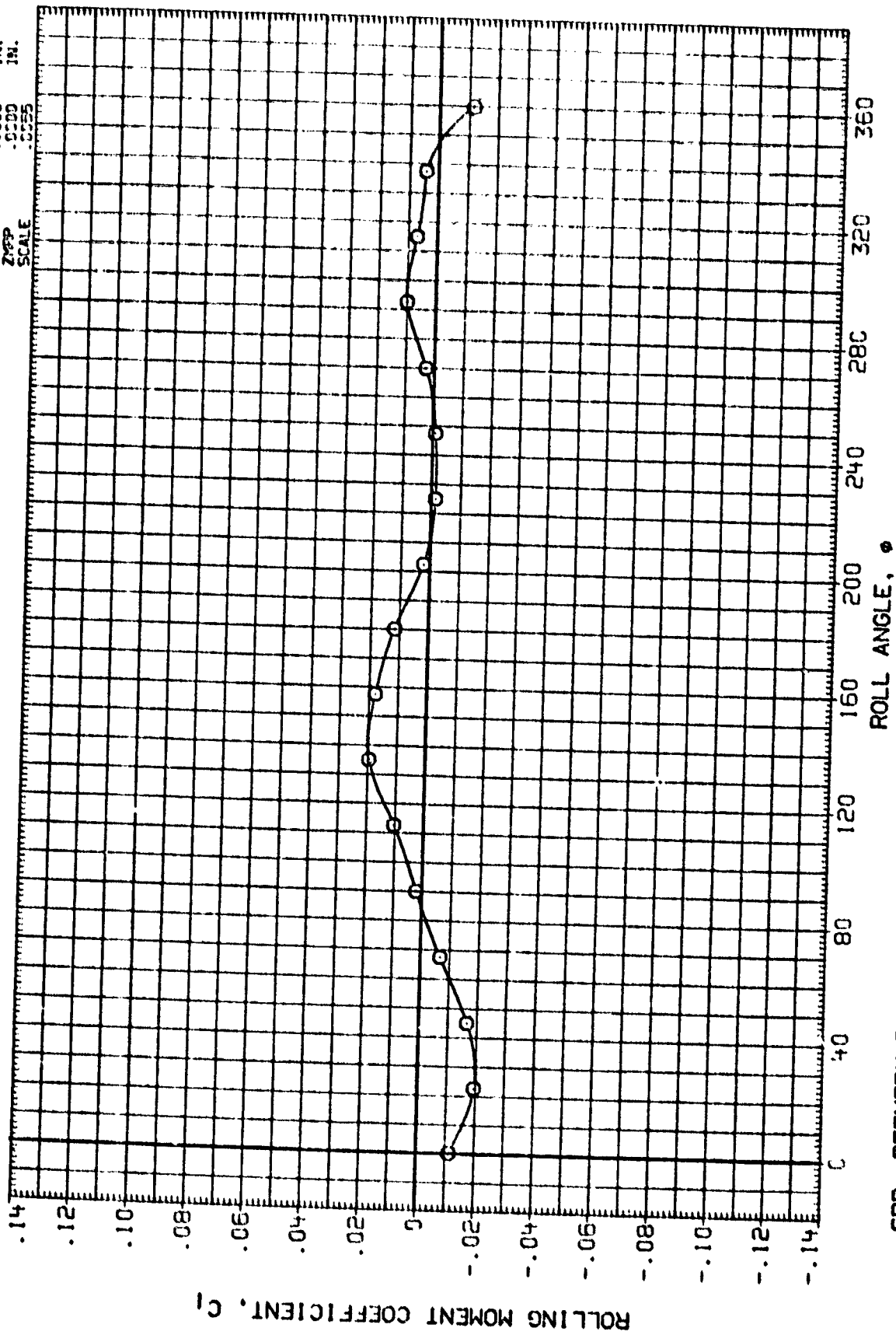
(B) MACH = 1.96

DATA SET SYMBOL
E1R201

CONFIGURATION
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

ALPHA
165.000

REFERENCE INFORMATION
SREF 116.2500 SQ.FT.
LREF 146.0000 IN.
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XREF .0000 IN.
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SRB REENTRY ROLL CHARACTERISTICS

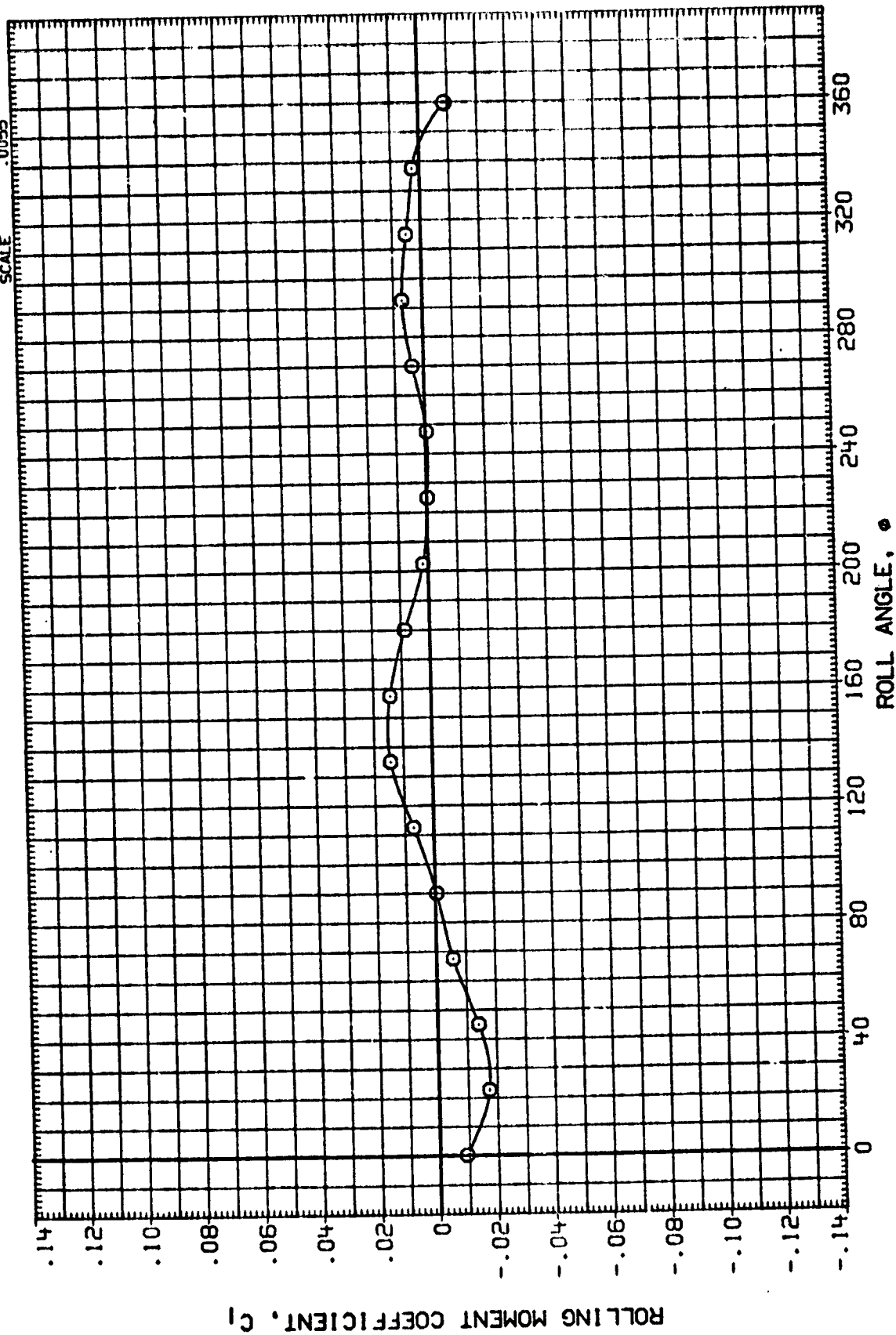
(C)MACH = 2.74

DATA SET SYMBOL
E1R201

MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

ALPHA
165.000

REFERENCE INFORMATION
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LREF 146.0000 IN.
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XMRP .0000 IN.
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SRB REENTRY ROLL CHARACTERISTICS

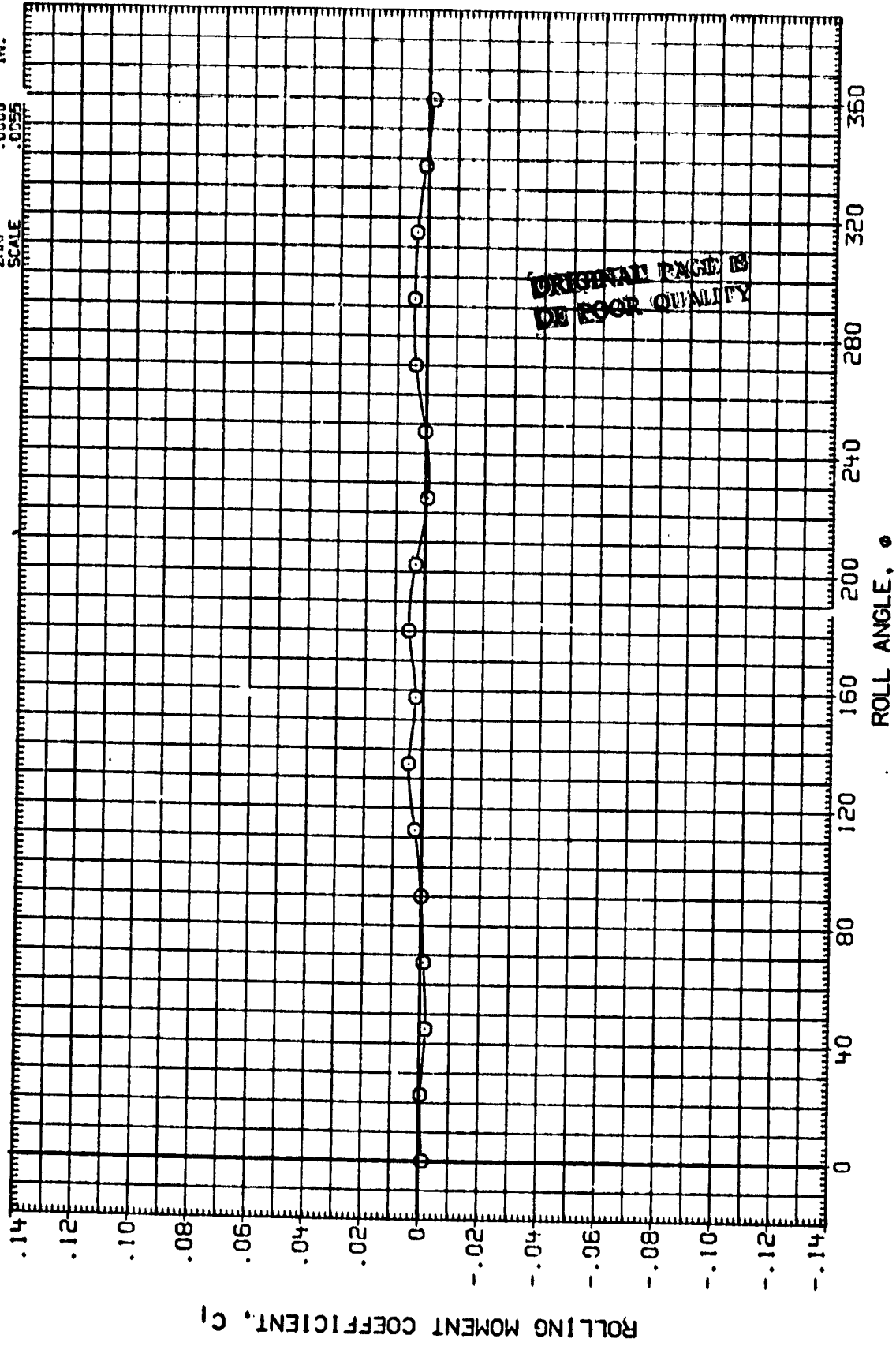
(D)MACH = 3.48

DATA SET SYMBOL
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CONFIGURATION
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

ALPHA
175.000

REFERENCE INFORMATION
SREF 116.2600 SQ.FT.
LREF 146.0000 IN.
BREF 146.0000 IN.
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SCALE .0055



SRB REENTRY ROLL CHARACTERISTICS

69 (A) MACH = 1.46

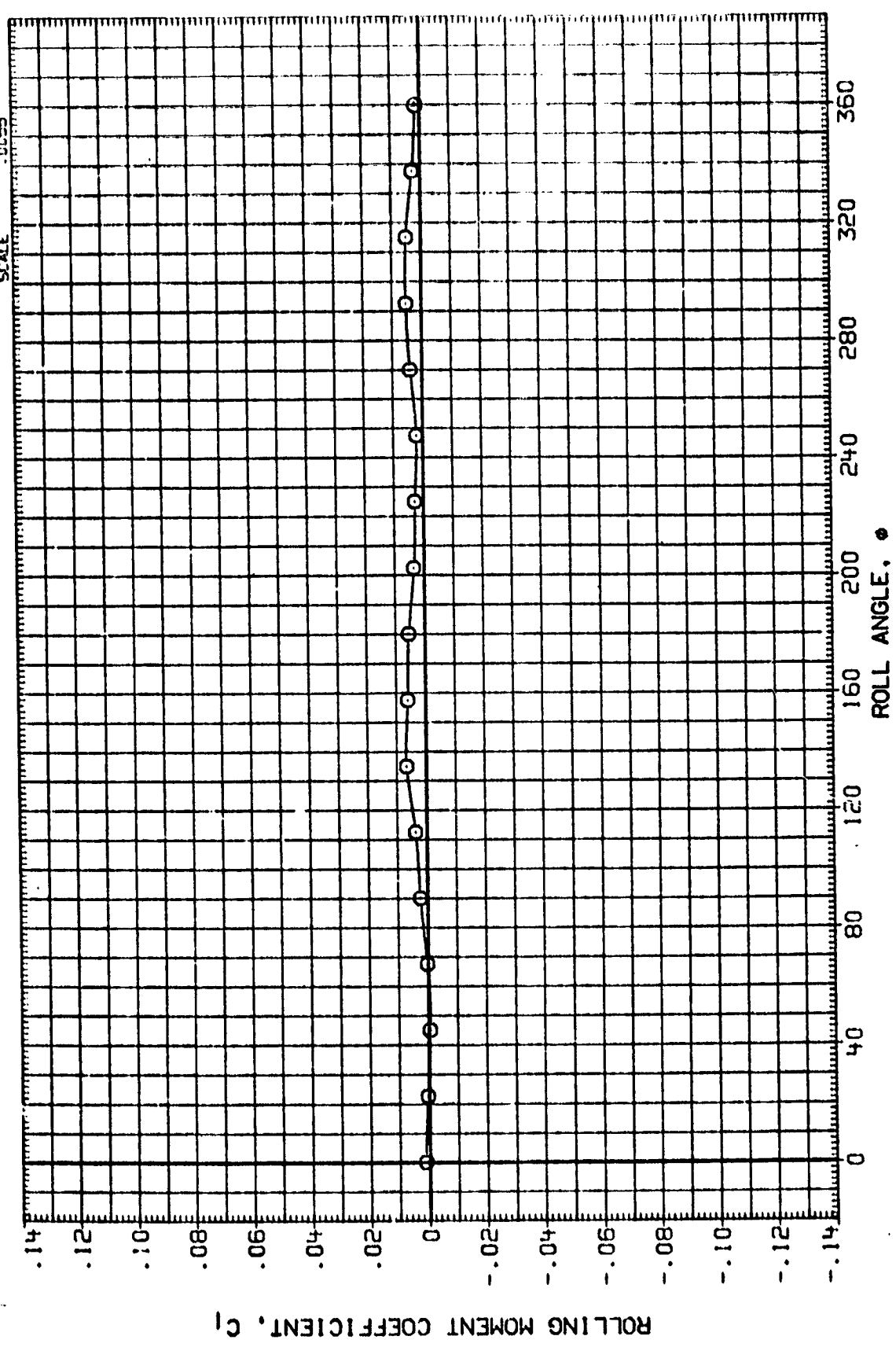
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ALPHA
 175.000

CONFIGURATION
 SRB WITH PROTUBERANCES

DATA SET SYMBOL
 EIR301

90



SRB REENTRY ROLL CHARACTERISTICS

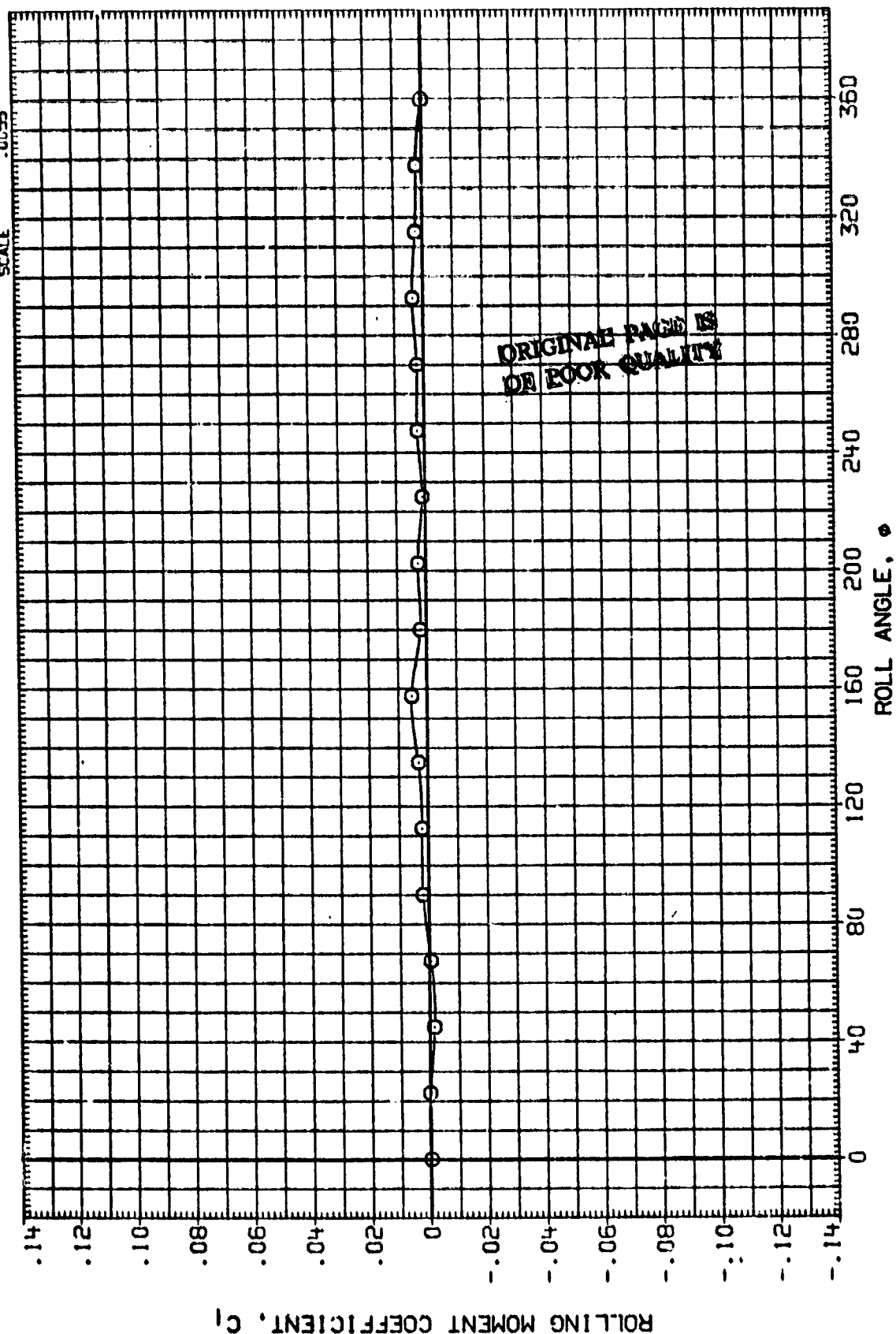
(B) MACH = 1.96

REFERENCE INFORMATION
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 BREF 146.0000 IN.
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 ZPRP -0000 IN.
 SCALE .0035

ALPHA
 175.000

CONFIGURATION
 SRB WITH PROTRUDANCES

DATA SET SYMBOL
 EIR301 O MSFC TMT 845 (SA2IF) SRB



SRB REENTRY ROLL CHARACTERISTICS

(C)MACH = 2.74

DATA SET SYMBOL CONFIGURATION ALPHA

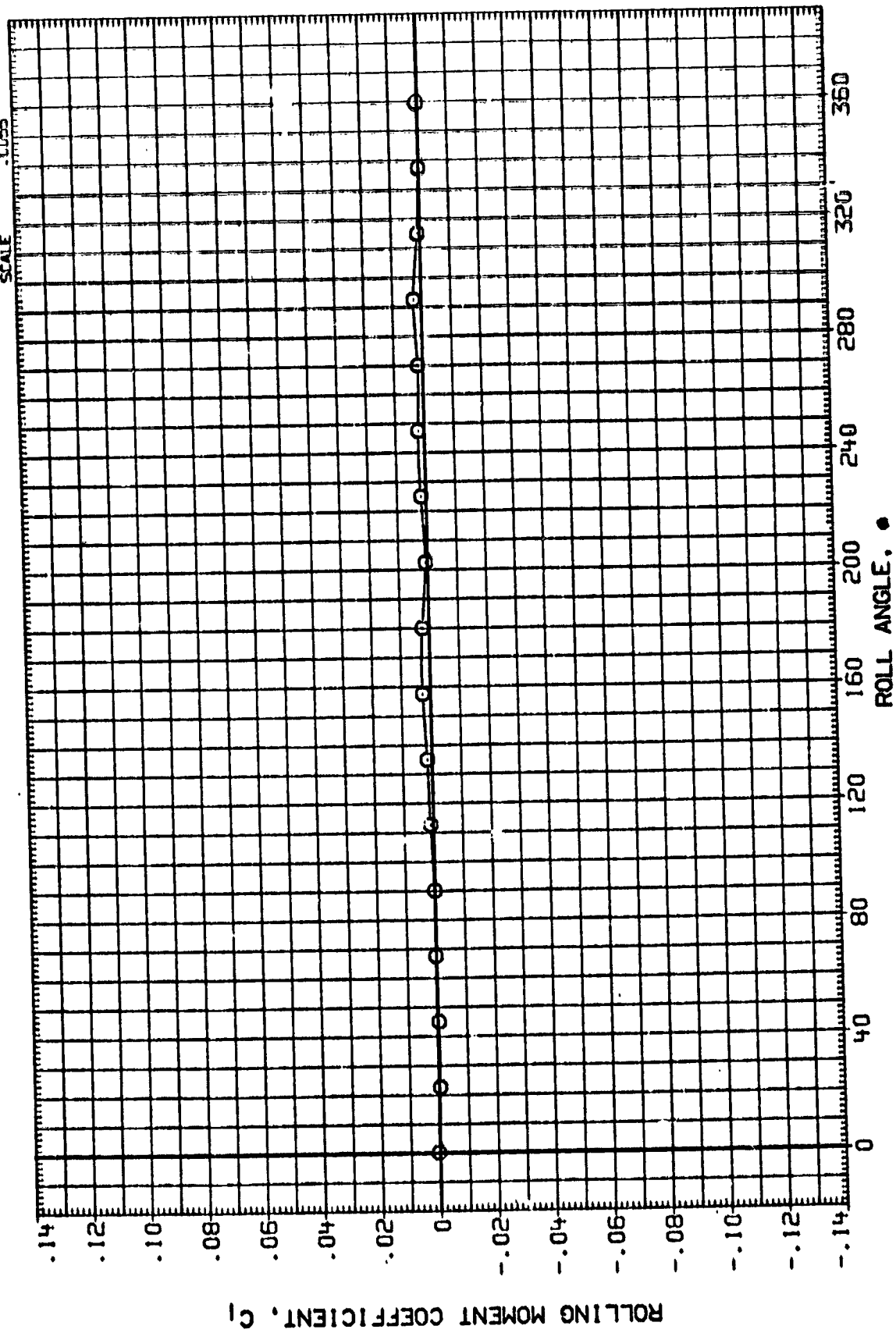
EIR301 O

MSC THT 645 (SA21F) SRB WITH PROTUBERANCES

175.000

REFERENCE INFORMATION

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BREF	145.0000	IN.
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ZREF	0.0000	IN.
SCALE	0.055	



SRB REENTRY ROLL CHARACTERISTICS

(D)MACH = 3.48

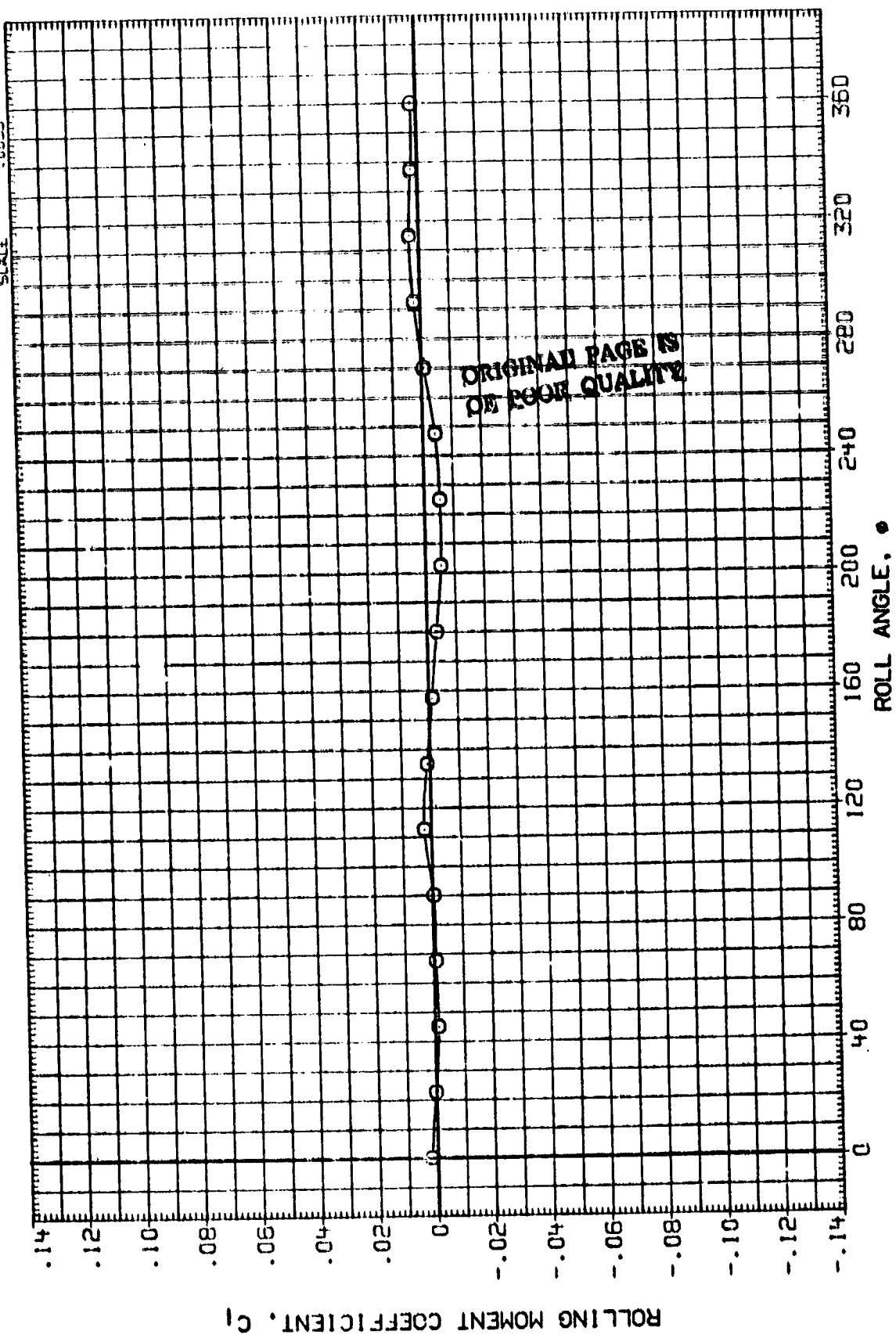
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YPET	0.0000	IN.
ZPET	0.0000	IN.
SCALE	0.055	

ALPHA
185.000

CONFIGURATION
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

DATA SET SYMBOL
E1R401 O



SRB REENTRY ROLL CHARACTERISTICS

(A) MACH = 1.46

64

DATA SET SYMBOL

EIR401

O

MSFC TMT 645 (SA21F) SRB WITH PROTUBERANCES

CONFIGURATION

ALPHA

185.000

REFERENCE INFORMATION

SREF

116.2500

SO.FT.

LREF

146.0000

IN.

BREF

146.0000

IN.

YREF

-0.0000

IN.

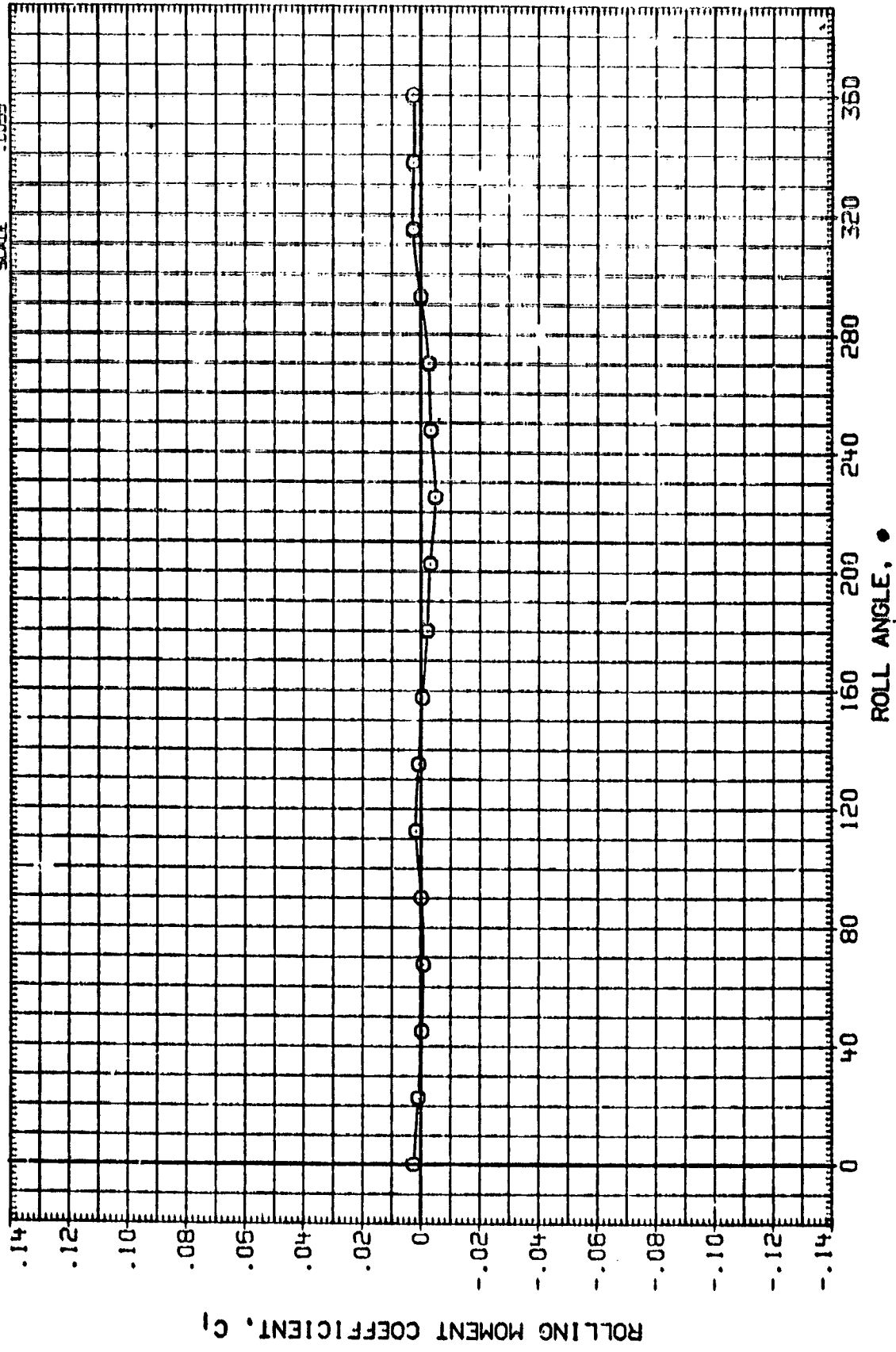
ZREF

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IN.

SCALE

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SRB REENTRY ROLL CHARACTERISTICS

(B)MACH = 1.96

REFERENCE INFORMATION

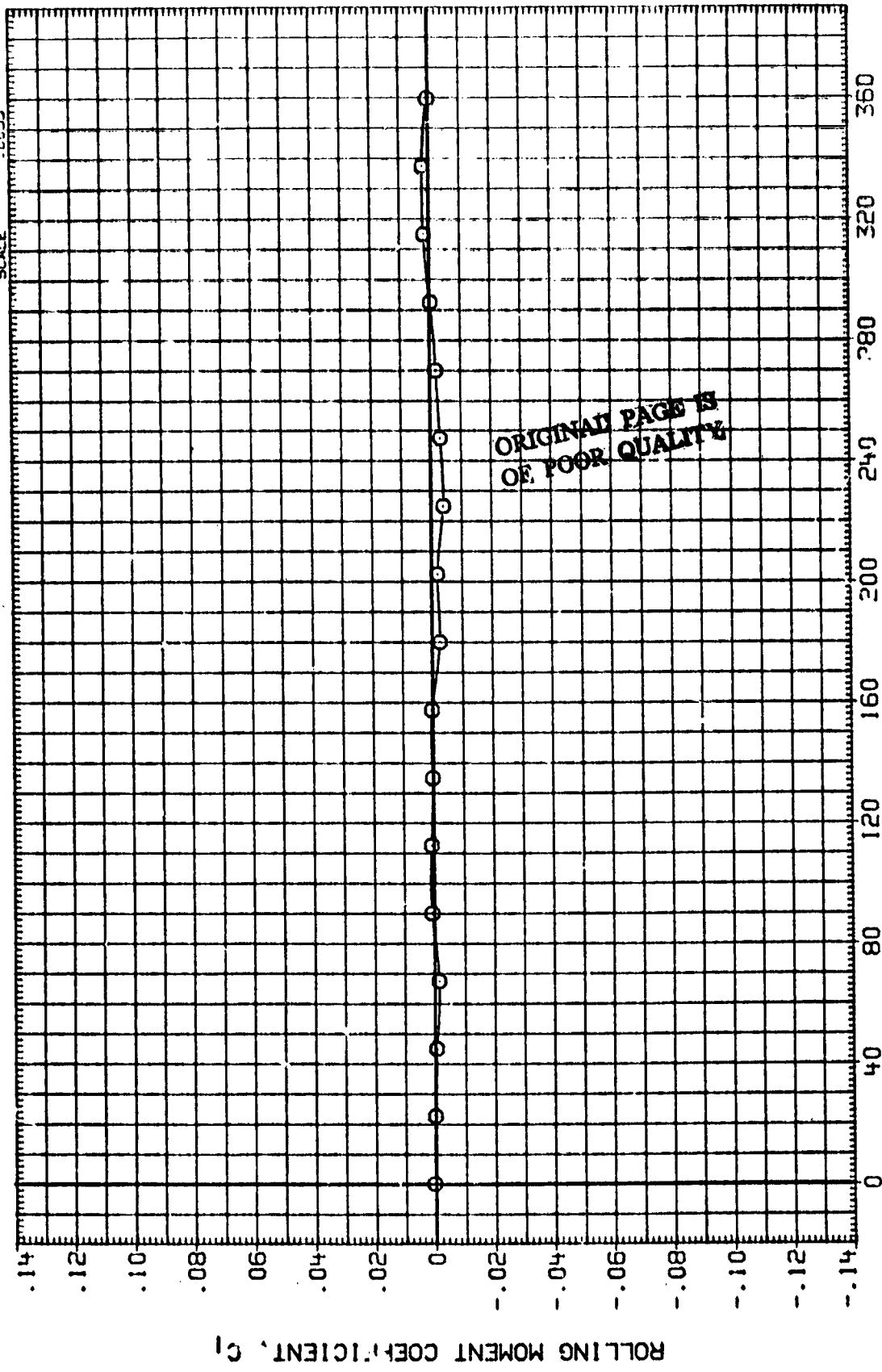
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YREF	.0000	IN.
ZREF	.0000	IN.

SCALE .0055

ALPHA
185.000

CONFIGURATION
SRB WITH PROTUBERANCES

DATA SET SYMBOL
EIR-01 O NSFC TWT 6W5 (SA2IF)



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SRB REENTRY ROLL CHARACTERISTICS

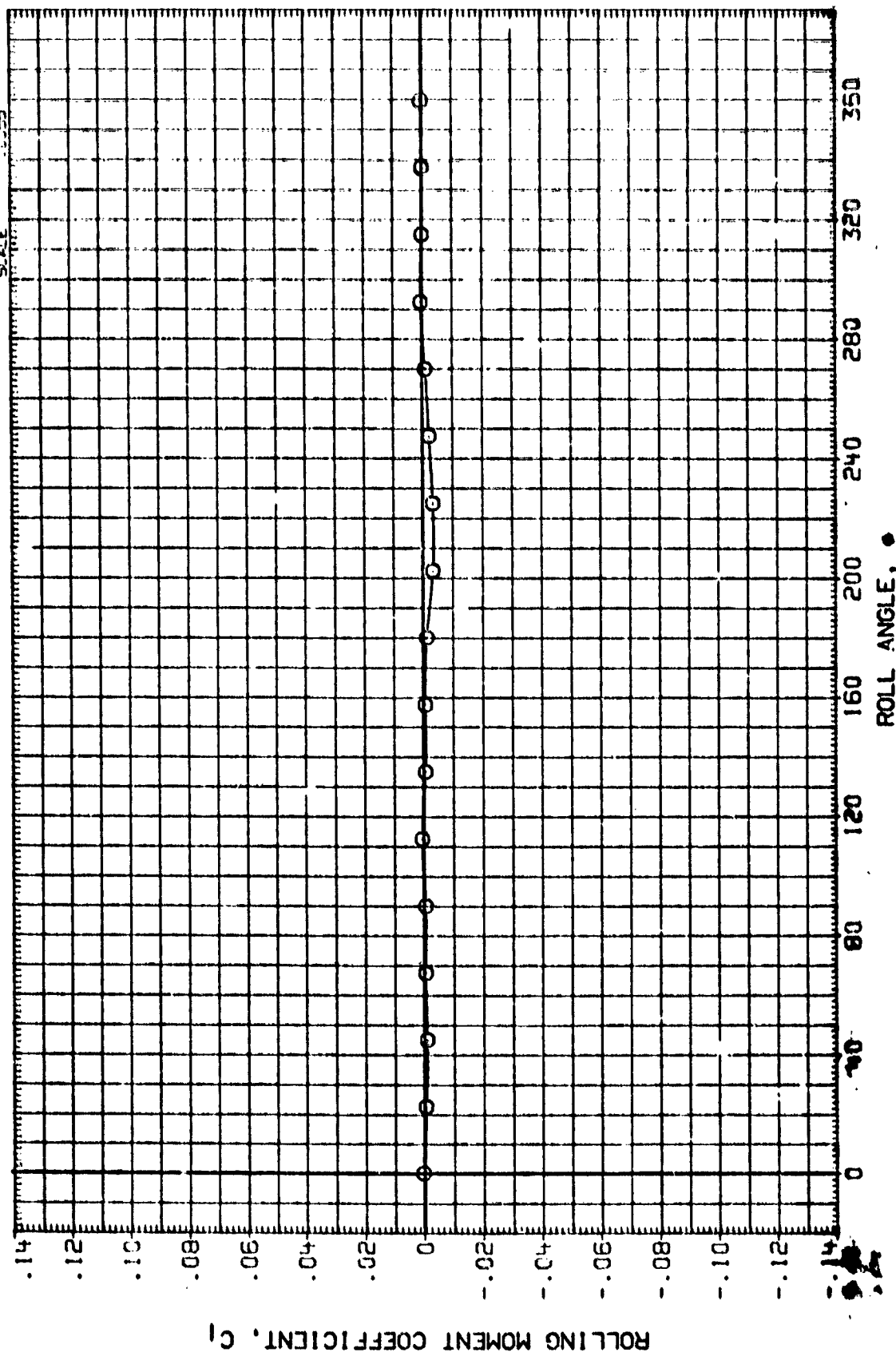
(C)MACH = 2.74

DATA SET SYMBOL
 EIR-01 O MSFC TMT 6N5 (SA2IF) SRB WITH PROTUBERANCES

ALPHA
 185.000

CONFIGURATION
 SRB WITH PROTUBERANCES

REFERENCE INFORMATION
 SPEC 116.2600 SQ.FT.
 LREF 145.0000 IN.
 BREF 145.0000 IN.
 YPRP 0.0000 IN.
 YMRP 0.0000 IN.
 ZPRP 0.0000 IN.
 SCALE 0.005



SRB REENTRY ROLL CHARACTERISTICS

(0)MACH = 3.48

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APPENDIX

TABULATED SOURCE DATA

TABLULATED SOURCE DATA. MSFC THT 645 (SA2IF)

MSFC THT 645 (SA2IF) SRB WITH PROTUBERANCES

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.

LREF = 146.0000 IN. YMRP = .0000 IN.

BREF = 146.0000 IN. ZMRP = .0000 IN.

SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = .000

RUN NO. 112/ 0 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	149.280	-.06800
1.459	151.430	-.05800
1.459	153.450	-.05100
1.459	155.550	-.04300
1.459	157.570	-.03100
1.459	159.570	-.02200
1.459	161.750	-.01500
1.459	163.860	-.01000
1.459	165.710	-.00900
1.459	167.610	-.00900
1.459	169.550	-.00800
	GRADIENT	.00000

RUN NO. 81/ 0 RN/L = 7.56 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	149.060	-.06800
1.959	151.140	-.05900
1.959	153.150	-.05100
1.959	155.290	-.04400
1.959	157.450	-.03600
1.959	159.560	-.02900
1.959	161.600	-.02200
1.959	163.730	-.01500
1.959	165.720	-.01000
1.959	167.720	-.00700
1.959	169.660	-.00700
	GRADIENT	.00000

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OF POOR QUALITY

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DATE 23 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SPB WITH PROTRUDANCES

PAGE 2

(RIPCD1) 1 23 FEB 77)

REFERENCE DATA

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LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = .000

RUN NO. 1/ 4 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	151.320	-.04200
2.740	153.330	-.03200
2.740	155.420	-.03300
2.740	157.500	-.02800
2.740	159.560	-.02400
2.740	161.570	-.02000
2.740	163.610	-.01400
2.740	165.660	-.01000
2.740	167.700	-.00700
2.740	169.670	-.00500
	GRADIENT	.00000

RUN NO. 2/ 1 RN/L = 7.13 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.320	-.03300
3.480	151.300	-.03000
3.480	153.380	-.02700
3.480	155.330	-.02400
3.480	157.460	-.02100
3.480	159.530	-.01800
3.480	161.580	-.01500
3.480	163.600	-.01100
3.480	165.670	-.00800
3.480	167.700	-.00500
3.480	169.660	-.00500
	GRADIENT	.00000

DATE 23 MAR 77

PAGE 3

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTRUDANCES

(R1R002) 1 23 FEB 77

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = .000

RUN NO. 111/ 0 RN/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	170.090	-.00500
1.459	172.150	-.00200
1.459	174.230	-.00150
1.459	175.260	.00000
1.459	178.260	.00000
1.459	180.290	.00000
1.459	182.310	.00100
1.459	184.330	.00200
1.459	185.280	.00300
1.459	188.240	.00500
1.459	190.100	.00900
1.459	GRADIENT	.00000

RUN NO. 82/ 0 RN/L = 7.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	170.200	-.00100
1.959	172.150	.00000
1.959	174.230	.00100
1.959	176.220	.00100
1.959	178.270	.00100
1.959	180.260	.00000
1.959	182.270	.00000
1.959	184.250	.00200
1.959	185.260	.00300
1.959	188.240	.00300
1.959	190.170	.00500
1.959	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC THT 645 (SA21F)
MSFC THT 645 (SA21F) SRB WITH PROTRUBANCES

PAGE 4
(R1R002) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = .000

RUN NO. 4/ 2 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.260	-.00300
2.740	172.370	.00100
2.740	174.200	.00300
2.740	176.220	.00000
2.740	178.210	.00000
2.740	180.240	.00000
2.740	182.230	.00000
2.740	184.210	.00000
2.740	186.190	.00200
2.740	188.230	.00300
2.740	190.180	.00300
	GRADIENT	.00000

RUN NO. 3/ 2 RN/L = 7.17 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.240	-.00200
3.480	172.190	.00000
3.480	174.220	.00000
3.480	176.210	.00100
3.480	178.220	.00100
3.480	180.220	.00100
3.480	182.250	.00000
3.480	184.240	.00100
3.480	186.220	.00100
3.480	188.260	.00300
3.480	190.220	.00400
	GRADIENT	.00000

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ABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

PAGE 5
(R1R003) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PAE ETRIC DATA

BETA = .000 PH1 = 22.500

RUN NO. 114/ 0 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.458	170.340	-.00500
1.458	172.270	-.00200
1.458	174.260	.00000
1.458	176.240	.00000
1.458	178.220	.00000
1.458	180.260	.00100
1.458	182.290	.00200
1.458	184.280	.00100
1.458	186.280	.00000
1.458	188.280	.00000
1.458	190.220	-.00200
1.458	GRADIENT	.00000

RUN NO. 79/ 0 RN/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.960	170.310	-.00400
1.960	172.260	-.00100
1.960	174.260	.00000
1.960	176.210	.00100
1.960	178.270	.00200
1.960	180.240	.00100
1.960	182.280	.00100
1.960	184.280	.00100
1.960	186.290	.00100
1.960	188.280	.00000
1.960	190.290	-.00200
1.960	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)

IRIR003) (23 FEB 77)

MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

REFERENCE DATA

SREF = 116.2600 50.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 22.500

RUN NO. 35/ 0 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.260	-.00600
2.740	172.210	-.00200
2.740	174.170	.00000
2.740	176.190	.00000
2.740	178.180	.00100
2.740	180.230	.00100
2.740	182.230	.00000
2.740	184.230	.00000
2.740	186.230	.00100
2.740	188.250	.00100
2.740	190.190	.00000
	GRADIENT	.00000

RUN NO. 35/ 0 RN/L = 7.13 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.180	-.00600
3.480	172.160	-.00300
3.480	174.170	-.00100
3.480	176.190	.00000
3.480	178.180	.00000
3.480	180.210	.00000
3.480	182.210	.00000
3.480	184.200	.00000
3.480	186.210	.00000
3.480	188.240	.00000
3.480	190.180	.00000
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (S21F)
MSFC TWT 645 (S21F) S99 WITH PROTUBERANCES

PAGE 7
(R:R004) 1 23 FEB 77

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

RUN NO. 113/ 0 RN/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	149.120	-1.0500
1.459	151.250	-.09300
1.453	153.350	-.08200
1.459	155.340	-.07200
1.459	157.470	-.05500
1.459	159.620	-.04500
1.459	161.570	-.03400
1.459	163.790	-.02600
1.459	165.820	-.02000
1.459	167.970	-.01200
1.459	169.850	-.00800
1.459	GRADIENT	.00000

RUN NO. 80/ 1 RN/L = 7.61 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.960	147.990	-.05600
1.960	150.060	-.09700
1.960	152.130	-.07700
1.960	154.280	-.06900
1.960	156.390	-.05900
1.960	158.410	-.04800
1.960	160.720	-.03400
1.960	162.760	-.02500
1.960	164.890	-.01900
1.960	166.990	-.01400
1.960	169.020	-.01300
1.960	GRADIENT	.00000

PARAMETRIC DATA

BETA = .000 PHI = 22.500

ORIGINAL PAGE IS
OF POOR QUALITY

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)
MSFC TWT 645 (SA2IF) SRB WITH PROTEBERANCES

PAGE 8
(R1R0024) (23 FEB 77)

PARAMETRIC DATA

BETA = .000 PHI = 72.500

REFERENCE DATA

SREF = 116.2500 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

RUN NO. 33/ 0 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
2.740	149.380	-.07800
2.740	151.340	-.07100
2.740	153.370	-.06400
2.740	155.420	-.05600
2.740	157.480	-.04900
2.740	159.510	-.04200
2.740	161.640	-.03100
2.740	163.670	-.02400
2.740	165.730	-.01700
2.740	167.770	-.01300
2.740	169.760	-.01200
	GRADIENT	.00000

RUN NO. 34/ 0 RN/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
3.480	149.340	-.07000
3.480	151.330	-.06300
3.480	153.380	-.05600
3.480	155.410	-.05000
3.480	157.470	-.04300
3.480	159.530	-.03500
3.480	161.590	-.02800
3.480	163.670	-.02100
3.480	165.730	-.01500
3.480	167.780	-.01100
3.480	169.750	-.01000
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)

MSFC TWT 645 (SA2IF) SPB WITH PHOTOGRAPHS

19.0000 1 23 FEB 77

REFERENCE DATA

SPEF = 116.2600 SQ.FT. XREF = .0000 IN.
 LREF = 146.0000 IN. YREF = .0000 IN.
 SPEF = 146.0000 IN. ZREF = .0000 IN.
 SCALE = .0055

PAPYMETRIC DATA

BETA = .000 PHJ = 45.000

RUN NO. 109/ 0 P/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CB
1.461	149.030	-0.000
1.461	151.160	-0.000
1.461	153.270	-0.000
1.461	155.370	-0.000
1.461	157.480	-0.000
1.461	159.590	-0.000
1.461	161.700	-0.000
1.461	163.810	-0.000
1.461	165.920	-0.000
1.461	168.030	-0.000
1.461	170.140	-0.000
1.461	172.250	-0.000
1.461	174.360	-0.000
1.461	176.470	-0.000
1.461	178.580	-0.000
1.461	180.690	-0.000
1.461	182.800	-0.000
1.461	184.910	-0.000
1.461	187.020	-0.000
1.461	189.130	-0.000
1.461	191.240	-0.000
1.461	193.350	-0.000
1.461	195.460	-0.000
1.461	197.570	-0.000
1.461	199.680	-0.000
1.461	201.790	-0.000
1.461	203.900	-0.000
1.461	206.010	-0.000
1.461	208.120	-0.000
1.461	210.230	-0.000
1.461	212.340	-0.000
1.461	214.450	-0.000
1.461	216.560	-0.000
1.461	218.670	-0.000
1.461	220.780	-0.000
1.461	222.890	-0.000
1.461	225.000	-0.000
1.461	227.110	-0.000
1.461	229.220	-0.000
1.461	231.330	-0.000
1.461	233.440	-0.000
1.461	235.550	-0.000
1.461	237.660	-0.000
1.461	239.770	-0.000
1.461	241.880	-0.000
1.461	243.990	-0.000
1.461	246.100	-0.000
1.461	248.210	-0.000
1.461	250.320	-0.000
1.461	252.430	-0.000
1.461	254.540	-0.000
1.461	256.650	-0.000
1.461	258.760	-0.000
1.461	260.870	-0.000
1.461	262.980	-0.000
1.461	265.090	-0.000
1.461	267.200	-0.000
1.461	269.310	-0.000
1.461	271.420	-0.000
1.461	273.530	-0.000
1.461	275.640	-0.000
1.461	277.750	-0.000
1.461	279.860	-0.000
1.461	281.970	-0.000
1.461	284.080	-0.000
1.461	286.190	-0.000
1.461	288.300	-0.000
1.461	290.410	-0.000
1.461	292.520	-0.000
1.461	294.630	-0.000
1.461	296.740	-0.000
1.461	298.850	-0.000
1.461	300.960	-0.000
1.461	303.070	-0.000
1.461	305.180	-0.000
1.461	307.290	-0.000
1.461	309.400	-0.000
1.461	311.510	-0.000
1.461	313.620	-0.000
1.461	315.730	-0.000
1.461	317.840	-0.000
1.461	319.950	-0.000
1.461	322.060	-0.000
1.461	324.170	-0.000
1.461	326.280	-0.000
1.461	328.390	-0.000
1.461	330.500	-0.000
1.461	332.610	-0.000
1.461	334.720	-0.000
1.461	336.830	-0.000
1.461	338.940	-0.000
1.461	341.050	-0.000
1.461	343.160	-0.000
1.461	345.270	-0.000
1.461	347.380	-0.000
1.461	349.490	-0.000
1.461	351.600	-0.000
1.461	353.710	-0.000
1.461	355.820	-0.000
1.461	357.930	-0.000
1.461	360.040	-0.000
1.461	362.150	-0.000
1.461	364.260	-0.000
1.461	366.370	-0.000
1.461	368.480	-0.000
1.461	370.590	-0.000
1.461	372.700	-0.000
1.461	374.810	-0.000
1.461	376.920	-0.000
1.461	379.030	-0.000
1.461	381.140	-0.000
1.461	383.250	-0.000
1.461	385.360	-0.000
1.461	387.470	-0.000
1.461	389.580	-0.000
1.461	391.690	-0.000
1.461	393.800	-0.000
1.461	395.910	-0.000
1.461	398.020	-0.000
1.461	400.130	-0.000
1.461	402.240	-0.000
1.461	404.350	-0.000
1.461	406.460	-0.000
1.461	408.570	-0.000
1.461	410.680	-0.000
1.461	412.790	-0.000
1.461	414.900	-0.000
1.461	417.010	-0.000
1.461	419.120	-0.000
1.461	421.230	-0.000
1.461	423.340	-0.000
1.461	425.450	-0.000
1.461	427.560	-0.000
1.461	429.670	-0.000
1.461	431.780	-0.000
1.461	433.890	-0.000
1.461	436.000	-0.000
1.461	438.110	-0.000
1.461	440.220	-0.000
1.461	442.330	-0.000
1.461	444.440	-0.000
1.461	446.550	-0.000
1.461	448.660	-0.000
1.461	450.770	-0.000
1.461	452.880	-0.000
1.461	454.990	-0.000
1.461	457.100	-0.000
1.461	459.210	-0.000
1.461	461.320	-0.000
1.461	463.430	-0.000
1.461	465.540	-0.000
1.461	467.650	-0.000
1.461	469.760	-0.000
1.461	471.870	-0.000
1.461	473.980	-0.000
1.461	476.090	-0.000
1.461	478.200	-0.000
1.461	480.310	-0.000
1.461	482.420	-0.000
1.461	484.530	-0.000
1.461	486.640	-0.000
1.461	488.750	-0.000
1.461	490.860	-0.000
1.461	492.970	-0.000
1.461	495.080	-0.000
1.461	497.190	-0.000
1.461	499.300	-0.000
1.461	501.410	-0.000
1.461	503.520	-0.000
1.461	505.630	-0.000
1.461	507.740	-0.000
1.461	509.850	-0.000
1.461	511.960	-0.000
1.461	514.070	-0.000
1.461	516.180	-0.000
1.461	518.290	-0.000
1.461	520.400	-0.000
1.461	522.510	-0.000
1.461	524.620	-0.000
1.461	526.730	-0.000
1.461	528.840	-0.000
1.461	530.950	-0.000
1.461	533.060	-0.000
1.461	535.170	-0.000
1.461	537.280	-0.000
1.461	539.390	-0.000
1.461	541.500	-0.000
1.461	543.610	-0.000
1.461	545.720	-0.000
1.461	547.830	-0.000
1.461	549.940	-0.000
1.461	552.050	-0.000
1.461	554.160	-0.000
1.461	556.270	-0.000
1.461	558.380	-0.000
1.461	560.490	-0.000
1.461	562.600	-0.000
1.461	564.710	-0.000
1.461	566.820	-0.000
1.461	568.930	-0.000
1.461	571.040	-0.000
1.461	573.150	-0.000
1.461	575.260	-0.000
1.461	577.370	-0.000
1.461	579.480	-0.000
1.461	581.590	-0.000
1.461	583.700	-0.000
1.461	585.810	-0.000
1.461	587.920	-0.000
1.461	590.030	-0.000
1.461	592.140	-0.000
1.461	594.250	-0.000
1.461	596.360	-0.000
1.461	598.470	-0.000
1.461	600.580	-0.000
1.461	602.690	-0.000
1.461	604.800	-0.000
1.461	606.910	-0.000
1.461	609.020	-0.000
1.461	611.130	-0.000
1.461	613.240	-0.000
1.461	615.350	-0.000
1.461	617.460	-0.000
1.461	619.570	-0.000
1.461	621.680	-0.000
1.461	623.790	-0.000
1.461	625.900	-0.000
1.461	628.010	-0.000
1.461	630.120	-0.000
1.461	632.230	-0.000
1.461	634.340	-0.000
1.461	636.450	-0.000
1.461	638.560	-0.000
1.461	640.670	-0.000
1.461	642.780	-0.000
1.461	644.890	-0.000
1.461	647.000	-0.000
1.461	649.110	-0.000
1.461	651.220	-0.000
1.461	653.330	-0.000
1.461	655.440	-0.000
1.461	657.550	-0.000
1.461	659.660	-0.000
1.461	661.770	-0.000
1.461	663.880	-0.000
1.461	665.990	-0.000
1.461	668.100	-0.000
1.461	670.210	-0.000
1.461	672.320	-0.000
1.461	674.430	-0.000
1.461	676.540	-0.000
1.461	678.650	-0.000
1.461	680.760	-0.000
1.461	682.870	-0.000
1.461	684.980	-0.000
1.461	687.090	-0.000
1.461	689.200	-0.000
1.461	691.310	-0.000
1.461	693.420	-0.000
1.461	695.530	-0.000
1.461	697.640	-0.000
1.461	699.750	-0.000
1.461	701.860	-0.000
1.461	703.970	-0.000
1.461	706.080	-0.000
1.461	708.190	-0.000
1.461	710.300	-0.000
1.461	712.410	-0.000
1.461	714.520	-0.000
1.461	716.630	-0.000
1.461	718.740	-0.000
1.461	720.850	-0.000
1.461	722.960	-0.000
1.461	725.070	-0.000
1.461	727.180	-0.000
1.461	729.290	-0.000
1.461	731.400	-0.000
1.461	733.510	-0.000
1.461	735.620	-0.000
1.461	737.730	-0.000
1.461	739.840	-0.000
1.461	741.950	-0.000
1.461	744.060	-0.000
1.461	746.170	-0.000
1.461	748.280	-0.000
1.461	750.390	-0.000
1.461	752.500	-0.000
1.461	754.610	-0.000
1.461	756.720	-0.000
1.461	758.830	-0.000
1.461	760.940	-0.000
1.461	763.050	-0.000
1.461	765.160	-0.000
1.461	767.270	-0.000
1.461	769.380	-0.000
1.461	771.490	-0.000
1.461	773.600	-0.000
1.461	775.710	-0.000
1.461	777.820	-0.000
1.461	779.930	-0.000
1.461	782.040	-0.000
1.461	784.150	-0.000
1.461	786.260	-0.000
1.461	788.370	-0.000
1.461	790.480	-0.000
1.461	792.590	-0.000
1.461	794.700	-0.000
1.461	796.810	-0.000
1.461	798.920	-0.000
1.461	801.030	-0.000
1.461	803.140	-0.000
1.461	805.250	-0.000
1.461	807.360	-0.000
1.461	809.470	-0.000
1.461	811.580	-0.000
1.461	813.690	-0.000
1.461	815.800	-0.000

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TABULATED SOURCE DATA. MSFC THT 645 (SA2IF)
 MSFC THT 645 (SA2IF) SR2 WITH PROTEUBANCES

(R12005) 1 23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = +5.000

RUN NO. 6/ 0 RV/L = 5.30 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
2.740	149.280	-.05500
2.740	151.260	-.05700
2.740	153.340	-.05100
2.740	155.390	-.04300
2.740	157.450	-.03500
2.740	159.530	-.02900
2.740	161.580	-.02400
2.740	163.610	-.02000
2.740	165.670	-.01500
2.740	167.750	-.01300
2.740	169.710	-.01000
	GRADIENT	.00000

RUN NO. 7/ 0 RV/L = 7.19 GRADIENT INTE. VAL = -5.00/ 5.00

MACH	ALPHA	CEL
3.480	149.250	-.06200
3.480	151.220	-.05500
3.480	153.300	-.04800
3.480	155.370	-.04100
3.480	157.430	-.03300
3.480	159.500	-.02800
3.480	161.560	-.02300
3.480	163.580	-.01800
3.480	165.650	-.01200
3.480	167.690	-.01000
3.480	169.660	-.00900
	GRADIENT	.00000

DATE 13 MAR 77

LABULATED SOURCE DATA. MSFC INT 645 (SA2IF)

MSFC INT 645 (SA2IF) SR3 WITH PROTRUSANCES

TRJEC036) 1 23 FEB 77)

REFERENCE DATA

SREF = 115.2600 SQ.FT. XREF = .0000 IN.
 LREF = 145.0000 IN. YREF = .0000 IN.
 BREF = 145.0000 IN. ZREF = .0000 IN.
 SCALE = .0055

PARAMETER-C DATA

BETA = .000 PHI = 45.000

RUN NO. 110/ 0 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.459	170.430	-0.0700
1.459	172.350	-0.0300
1.459	174.290	-0.0200
1.459	175.260	-0.0000
1.459	178.260	-0.0000
1.459	180.300	-0.0100
1.459	182.310	-0.0100
1.459	184.330	-0.0000
1.459	185.330	-0.0300
1.459	189.450	-0.0500
1.459	193.370	-0.0500
1.459	GRADIENT	.00000

RUN NO. 83/ 0 RN/L = 7.95 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.950	170.420	-0.0500
1.950	172.390	-0.0300
1.950	174.260	-0.0100
1.950	175.230	-0.0000
1.950	178.270	-0.0100
1.950	180.260	-0.0000
1.950	182.260	-0.0000
1.950	184.290	-0.0200
1.950	185.310	-0.0100
1.950	189.400	-0.0300
1.950	190.320	-0.0000
1.950	GRADIENT	.00000

ORIGINAL PAGE IS
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DATE 29 MAR 77

TABULATED SOURCE DATA, MSFC THT 645 (SA21F)
 MSFC THT 645 (SA21F); SRB WITH PROTUBERANCES

PAGE 12
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REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP =
 LREF = 146.0000 IN. YMRP =
 BREF = 146.0000 IN. ZMRP =
 SCALE = .0055

.0000 IN.
 .0000 IN.
 .0000 IN.

BETA = .000 PHI = 45.000

PARAMETRIC DATA

RUN NO. 5/ 0 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.240	-.00800
2.740	172.160	-.00400
2.740	174.180	-.00200
2.740	176.170	-.00100
2.740	178.180	.00000
2.740	180.220	.00000
2.740	182.230	.00000
2.740	184.230	.00000
2.740	186.240	-.00100
2.740	188.260	-.00300
2.740	190.200	-.00300
	GRADIENT	.00000

RUN NO. 6/ 2 RN/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.220	-.00600
3.480	172.170	-.00300
3.480	174.190	-.00100
3.480	176.200	.00000
3.480	178.190	.00000
3.480	180.220	.00000
3.480	182.220	.00000
3.480	184.240	.00000
3.480	186.230	-.00100
3.480	188.250	-.00100
3.480	190.190	-.00100
	GRADIENT	.00000

TABLED SOURCE DATA. NSFC TWT 645 (S421F)
NSFC TWT 645 (S421F) SRB WITH PROTOBERANCES

12.0007 23 FEB 77
PARAMETRIC DATA

REFERENCE DATA

SREF = 115.2600 SQ.FT. YREF = .0000 IN.
LREF = 145.0000 IN. YREF = .0000 IN.
BREF = 145.0000 IN. ZREF = .0000 IN.
SCALE = .0055

BETA = .000 PHI = 57.500

RUN NO. 115/ 0 PN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.450	170.350	-.00400
1.450	172.250	-.00300
1.450	174.250	-.00100
1.450	176.220	-.00000
1.450	178.230	-.00000
1.450	180.270	-.00100
1.450	182.280	-.00200
1.450	184.290	-.00300
1.450	186.310	-.00200
1.450	188.320	-.00500
1.450	190.250	-.00500
	GRADIENT	.00000

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OF POOR QUALITY

RUN NO. 78/ 0 PN/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.951	170.350	-.00300
1.951	172.240	-.00200
1.951	174.220	-.00300
1.951	176.220	-.00000
1.951	178.280	-.00100
1.951	180.240	-.00100
1.951	182.280	-.00000
1.951	184.290	-.00200
1.951	186.310	-.00200
1.951	188.340	-.00200
1.951	190.310	-.00200
	GRADIENT	.00000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC THT 645 (SA21F)
MSFC THT 645 (SA21F) SRB WITH PROTUBERANCES

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(RIPJ07) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

RUN NO. 37/ 0 RV/L = 5.23 GRADIENT INTERVAL = -5.00/ 5.00

BETA = .000 PHI = 67.500

PARAMETRIC DATA

MACH	ALPHA	CBL
2.740	170.220	-.00400
2.740	172.170	-.07200
2.740	174.180	-.00100
2.740	176.170	.00000
2.740	178.160	.00000
2.740	180.200	.00000
2.740	182.210	.00000
2.740	184.200	-.00100
2.740	186.240	-.00100
2.740	188.250	-.00200
2.740	190.190	-.00300
2.740	GRADIENT	.00000

RUN NO. 38/ 2 RV/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.260	-.00300
3.480	172.210	-.00100
3.480	174.210	.00000
3.480	176.210	.00000
3.480	178.230	.00000
3.480	180.240	.00000
3.480	182.250	.00000
3.480	184.290	.00000
3.480	186.250	.00000
3.480	188.280	-.00100
3.480	190.230	-.00200
3.480	GRADIENT	.00000

DATE 29 MAR 77

TABULATED SOURCE DATA, MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

PAGE 15
(R1P028) (23 FEB 77)

REFERENCE DATA

SPEF = 116.2600 SQ.FT. XMRP =
LREF = 146.0000 IN. YMRP =
BREF = 146.0000 IN. ZMRP =
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 67.500

RUN NO. 116/ 1 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.461	149.080	-.03400
1.461	151.140	-.03000
1.461	153.260	-.02500
1.461	155.390	-.02200
1.461	157.440	-.02000
1.461	159.670	-.01700
1.461	161.720	-.01500
1.461	163.980	-.01100
1.461	166.050	-.00700
1.461	168.050	-.00500
1.461	169.860	-.00000

GRADIENT

RUN NO. 77/ 0 RN/L = 7.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	148.960	-.03000
1.959	151.010	-.02800
1.959	153.120	-.02600
1.959	155.240	-.02200
1.959	157.340	-.01700
1.959	159.320	-.01400
1.959	161.570	-.01200
1.959	163.740	-.01100
1.959	165.920	-.01000
1.959	168.000	-.00700
1.959	169.860	-.00600

GRADIENT

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

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(IR16008) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0300 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 67.500

RUN NO. 40/ 0 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	149.420	-.02400
2.740	151.410	-.02200
2.740	153.460	-.01900
2.740	155.520	-.01700
2.740	157.550	-.01500
2.740	159.610	-.01200
2.740	161.680	-.01000
2.740	163.790	-.00800
2.740	165.750	-.00600
2.740	167.850	-.00500
2.740	169.820	-.00400
2.740	GRADIENT	.00000

RUN NO. 39/ 0 RN/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.420	-.02500
3.480	151.390	-.02100
3.480	153.450	-.01800
3.480	155.540	-.01500
3.480	157.550	-.01300
3.480	159.620	-.01100
3.480	161.670	-.00900
3.480	163.670	-.00600
3.480	165.780	-.00500
3.480	167.830	-.00400
3.480	169.800	-.00300
3.480	GRADIENT	.00000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TNT 645 (SA21F)
MSFC TNT 645 (SA21F) SRB WITH PROTRUDANCES

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REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PM1 = 90.000

RUN NO. 108/ 2 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.458	149.140	.00000
1.458	151.250	.00000
1.458	153.340	.00500
1.458	155.400	.00800
1.458	157.500	.00800
1.458	159.600	.00700
1.458	161.780	.00300
1.458	163.900	.00200
1.458	166.040	.00100
1.458	168.080	.00200
1.458	169.870	.00200
1.458	GRADIENT	.00000

RUN NO. 85/ 0 RN/L = 7.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.950	148.950	-.00700
1.950	150.990	-.00500
1.950	153.090	-.00400
1.950	155.180	-.00200
1.950	157.250	.00000
1.950	159.330	.00300
1.950	161.430	.00500
1.950	163.520	.00600
1.950	165.770	.00400
1.950	167.970	.00100
1.950	169.850	.00200
1.950	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)
MSFC TWT 645 (SA2IF) SRB WITH PROTRUSANCES

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REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

RUN NO. 9/ 0 RV/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00
BETA

MACH	ALPHA	CEB
2.740	149.330	-.00500
2.740	151.300	-.00400
2.740	153.330	-.00400
2.740	155.400	-.00300
2.740	157.440	-.00100
2.740	159.510	.00000
2.740	161.590	.00100
2.740	163.590	.00200
2.740	165.640	.00100
2.740	167.720	.00100
2.740	169.700	.00000
	GRADIENT	

RUN NO. 10/ 0 RV/L = 7.17 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEB
3.480	149.340	-.00500
3.480	151.310	-.00400
3.480	153.370	-.00400
3.480	155.410	-.00400
3.480	157.450	-.00200
3.480	159.520	-.00100
3.480	161.560	.00000
3.480	163.620	.00000
3.480	165.660	.00000
3.480	167.720	.00000
3.480	169.720	.00000
	GRADIENT	

PARAMETRIC DATA

.0000 F-11 = 90.000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

PAGE 19
(R1P210) 23 FEB 77

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 90.000

RUN NO. 107/ 1 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	170.340	.00200
1.459	172.290	.00100
1.459	174.240	.00100
1.459	176.230	.00000
1.459	178.230	.00000
1.459	180.250	.00000
1.459	182.240	.00000
1.459	184.250	.00000
1.459	186.250	.00000
1.459	188.270	.00000
1.459	190.230	.00000
	GRADIENT	.00000

RUN NO. 95/ 0 RN/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.960	170.410	.00200
1.960	172.290	.00200
1.960	174.280	.00300
1.960	176.250	.00100
1.960	178.270	.00200
1.960	180.270	.00100
1.960	182.250	.00000
1.960	184.250	.00000
1.960	186.270	.00000
1.960	188.320	.00000
1.960	190.310	.00000
	GRADIENT	.00000

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TABULATED SOURCE DATA. W5FC TWT 645 (SA21F)

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W5FC TWT 645 (SA21F) SPB WITH PROTUBERANCES

(R12010) (23 FEB 77)

REFERENCE DATA

SPEF = 116.2500 SQ.FT. XMRP = .0000 IN.
 LREF = 145.0000 IN. YMRP = .0000 IN.
 BREF = 145.0000 IN. ZMRP = .0000 IN.
 SCALE = .0035

RUN NO. 12/ 0

RN/L = 5.26

GRADIENT INTERVAL = -5.00/ 5.00

PARAMETRIC DATA

BETA = .000 PHI = 90.000

MACH	ALPHA	CBL
2.740	170.300	.00100
2.740	172.210	.00200
2.740	174.230	.00200
2.740	176.240	.00200
2.740	178.220	.00100
2.740	180.250	.00100
2.740	182.240	.00100
2.740	184.220	.00100
2.740	186.240	.00100
2.740	188.250	.00000
2.740	190.160	.00000
2.740	GRADIENT	.00000

RUN NO. 11/ 0

RN/L = 7.16

GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.230	.00000
3.480	172.160	.00000
3.480	174.190	.00000
3.480	176.180	.00000
3.480	178.190	.00000
3.480	180.210	.00000
3.480	182.210	.00000
3.480	184.220	.00000
3.480	186.220	.00000
3.480	188.220	.00000
3.480	190.160	.00000
3.480	GRADIENT	.00000

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UNCLASSIFIED SOURCE DATA. MSFC TWT 645 (SARIF)
MSFC TWT 645 (SARIF) SPB WITH PROTEUBANCES

PAGE 2:
10/20/77 123 FEB 77

REFERENCE DATA

SEF = 118.2500 CG.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

PETA = .000 PHJ = 112.500

RUN NO. 118/ 0 RV/L = 6.50 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
1.458	170.390	.00900
1.458	172.310	.00700
1.458	174.240	.00400
1.458	176.200	.00200
1.458	178.200	.00100
1.458	180.240	.00000
1.458	182.230	.00000
1.458	184.240	.00200
1.458	186.230	.00300
1.458	188.320	.00000
1.458	190.320	.00100
	GRADIENT	.00000

RUN NO. 75/ 0 RV/L = 7.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
1.959	170.390	.00900
1.959	172.270	.00700
1.959	174.240	.00500
1.959	176.200	.00300
1.959	178.270	.00100
1.959	180.220	.00000
1.959	182.250	.00000
1.959	184.260	.00200
1.959	186.270	.00100
1.959	188.290	.00100
1.959	190.260	.00300
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)

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MSFC TWT 645 (SA2IF) SFB WITH PROTRUBANCES

(R1R011) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LPEF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0005

PARAMETRIC DATA

BETA = .000 PHI = 112.500

RUN NO. 44/ 0 RV/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.320	.00000
2.740	172.240	.00000
2.740	174.270	.00300
2.740	176.270	.00100
2.740	178.250	.00100
2.740	180.270	.00000
2.740	182.270	.00000
2.740	184.260	.00100
2.740	186.300	.00100
2.740	188.280	.00100
2.740	190.240	.00200
	GRADIENT	.00000

RUN NO. 43/ 0 RV/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.270	.00400
3.480	172.220	.00300
3.480	174.230	.00100
3.480	176.250	.00100
3.480	178.230	.00000
3.480	180.250	.00000
3.480	182.270	.00000
3.480	184.260	.00100
3.480	186.270	.00100
3.480	188.260	.00100
3.480	190.220	.00300
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)

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MSFC TWT 645 (SA2IF) SPB WITH PROTRUDANCES

(R1P012) 1 23 FEB 77)

REFERENCE DATA

SREF = 116.2500 SQ.FT. XMRP = .0070 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHJ = 112.500

RUN NO. 117/ 0 RM/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	145.130	.03100
1.459	151.230	.03100
1.459	153.320	.03200
1.459	155.230	.03600
1.459	157.330	.03500
1.459	159.440	.03000
1.459	161.660	.02400
1.459	163.810	.02100
1.459	165.950	.01500
1.459	168.050	.01200
1.459	169.940	.01100
	GRADIENT	.00000

RUN NO. 76/ 0 RM/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.950	149.010	.02100
1.950	151.070	.02000
1.950	153.130	.02100
1.950	155.260	.02000
1.950	157.390	.01900
1.950	159.450	.01800
1.950	161.510	.01900
1.950	163.530	.01900
1.950	165.920	.01400
1.950	167.980	.01100
1.950	169.880	.01100
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (S2IF)

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MSFC TWT 645 (S2IF) SRB WITH PROTRUDANCES

(RIR012) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA | .000 PHI = 112.500

RUN NO. 41/ 0 RV/L = 5.22 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
2.740	149.430	.01900
2.740	151.400	.01700
2.740	153.480	.01600
2.740	155.530	.01600
2.740	157.550	.01400
2.740	159.610	.01200
2.740	161.640	.01200
2.740	163.690	.01100
2.740	165.740	.01000
2.740	167.800	.00800
2.740	169.800	.00900
	GRADIENT	.00000

RUN NO. 42/ 0 RV/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
3.480	149.420	.01900
3.480	151.410	.01600
3.480	153.450	.01400
3.480	155.500	.01200
3.480	157.560	.01200
3.480	159.620	.01000
3.480	161.670	.00900
3.480	163.690	.00800
3.480	165.750	.00700
3.480	167.780	.00600
3.480	169.770	.00600
	GRADIENT	.00000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TNT 645 (SA21F)
MSFC TNT 645 (SA21F) SRB WITH PROTUBERANCES

PAGE 25
(R1R013) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 145.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 135.000

RUN NO. 105/ 1 RN/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.460	149.170	.08100
1.460	151.270	.08000
1.460	153.230	.07800
1.460	155.360	.07200
1.460	157.490	.06200
1.460	159.440	.05500
1.460	161.560	.04700
1.460	163.800	.03700
1.460	165.800	.03100
1.460	167.990	.02500
1.460	169.870	.02100
	GRADIENT	.02000

RUN NO. 88/ 0 RN/L = 7.57 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	149.060	.06900
1.959	151.050	.06400
1.959	153.120	.05800
1.959	155.240	.05200
1.959	157.370	.04500
1.959	159.510	.03900
1.959	161.550	.03600
1.959	163.440	.03200
1.959	165.700	.02700
1.959	167.870	.02000
1.959	169.780	.01900
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF).
MSFC TWT 645 (SA2IF) SRB WITH PROTUBERANCES

PAGE 26
(R13013) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
SREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 135.000

RUN NO. 16/ 0 RV/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	149.460	.05600
2.740	151.420	.05100
2.740	153.470	.04500
2.740	155.500	.03900
2.740	157.540	.03300
2.740	159.640	.02800
2.740	161.650	.02400
2.740	163.660	.02100
2.740	165.700	.01900
2.740	167.770	.01600
2.740	169.770	.01400
	GRADIENT	.00000

RUN NO. 15/ 0 RV/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.470	.05500
3.480	151.440	.04800
3.480	153.500	.04200
3.480	155.540	.03600
3.480	157.590	.03100
3.480	159.650	.02500
3.480	161.680	.02000
3.480	163.680	.01600
3.480	165.750	.01400
3.480	167.810	.01100
3.480	169.760	.01100
	GRADIENT	.00000

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DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

(H1R0J4) (23 FEB 77)

PARAMETRIC DATA

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

BETA = .000 PHI = 135.000

RUN NO. 106/ 0 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	170.410	.01800
1.459	172.320	.01100
1.459	174.270	.00700
1.459	176.220	.00300
1.459	178.220	.00100
1.459	180.250	.00100
1.459	182.270	.00100
1.459	184.280	.00100
1.459	186.250	.00200
1.459	188.330	.00200
1.459	190.250	.00200
1.459	GRADIENT	.00000

RUN NO. 87/ 0 RN/L = 7.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	170.400	.01600
1.959	172.250	.01100
1.959	174.280	.00800
1.959	176.250	.00400
1.959	178.260	.00200
1.959	180.270	.00100
1.959	182.260	.00100
1.959	184.260	.00100
1.959	186.260	.00100
1.959	188.250	.00100
1.959	190.260	.00100
1.959	GRADIENT	.00000

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DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

PAGE 28
(R1R014) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 135.000

RUN NO. 13/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.240	.00900
2.740	172.170	.00600
2.740	174.200	.00430
2.740	176.200	.00200
2.740	178.190	.00000
2.740	180.210	.00000
2.740	182.210	.00000
2.740	184.190	.00000
2.740	186.210	.00100
2.740	188.210	.00000
2.740	190.120	.00200
	GRADIENT	.00000

RUN NO. 14/ 0 RN/L = 7.22 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.459	170.230	.00700
3.459	172.170	.00400
3.459	174.190	.00200
3.459	176.190	.00100
3.459	178.200	.00000
3.459	180.220	.00100
3.459	182.220	.00000
3.459	184.200	.00000
3.459	186.210	.00000
3.459	188.210	.00100
3.459	190.150	.00200
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

(RIPJ15) 23 FEB 77

PARAMETRIC DATA

REFERENCE DATA

STEF = 116.2500 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

BETA = .000 PHI = 157.520

RUN NO. 119/ 0 RN/L = 6.50 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	170.370	.02100
1.453	172.260	.01200
1.459	174.200	.00500
1.459	176.200	.00200
1.459	178.190	.00100
1.459	180.240	.00000
1.459	182.240	.00000
1.459	184.250	.00100
1.459	186.290	.00300
1.459	188.350	.00200
1.459	190.330	.00000
GRADIENT		

RUN NO. 74/ 0 RN/L = 7.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.951	170.340	.01800
1.951	172.270	.01200
1.951	174.230	.00800
1.951	176.190	.00300
1.951	178.240	.00100
1.951	180.210	.00000
1.951	182.230	.00000
1.951	184.220	.00000
1.951	186.290	.00100
1.951	188.330	.00100
1.951	190.190	.00000
GRADIENT		

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC T:T 645 (SA21F) SRB WITH PROTUBERANCES

PAGE 30
(R1R015) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 157.500

RUN NO. 45/ 0 RN/L = 5.23 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.330	.01300
2.740	172.260	.00800
2.740	174.270	.00600
2.740	176.280	.00400
2.740	178.270	.00200
2.740	180.310	.00300
2.740	182.290	.00200
2.740	184.320	.00100
2.740	186.330	.00000
2.740	188.330	.00000
2.740	190.250	.00100
2.740	GRADIENT	.00000

RUN NO. 46/ 0 RN/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.300	.00800
3.480	172.240	.00500
3.480	174.280	.00300
3.480	176.270	.00200
3.480	178.250	.00100
3.480	180.300	.00100
3.480	182.280	.00100
3.480	184.310	.00300
3.480	186.320	.00000
3.480	188.320	.00000
3.480	190.260	.00100
3.480	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SPB WITH PROTRUDANCES

PAGE 3
R:PCIS: 1 23 FEB 77

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0025

PARAMETRIC DATA

BETA = .000 PH = 157.500

RUN NO. 120/ 0 PN/L = 6.51 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
1.459	149.680	.10300
1.459	150.940	.09300
1.459	153.090	.08700
1.459	155.250	.07700
1.459	157.300	.06200
1.459	159.290	.05300
1.459	161.630	.04300
1.459	163.590	.03500
1.459	165.730	.02800
1.459	167.980	.02600
1.459	169.280	.02400
	GRADIENT	.00000

RUN NO. 73/ 1 PN/L = 7.62 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
1.959	149.350	.09300
1.959	150.890	.08300
1.959	153.000	.07500
1.959	155.130	.06700
1.959	157.270	.05900
1.959	159.400	.04900
1.959	161.460	.03700
1.959	163.590	.03100
1.959	165.810	.02400
1.959	167.810	.01900
1.959	169.850	.02000
	GRADIENT	.00000

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TABULATED SOURCE DATA, MSFC TWT 645 (SA21F)

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MSFC TWT 645 (SA21F) SRB WITH PROTRUDANCES

(IRIR016) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LPEF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0003 IN.
 SCALE = .0355

PARAMETRIC DATA

BETA = .000 PHJ = 157.500

RUN NO. 48/ 0 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00
 MACH 2.740 ALPHA 149.350 CBL .07100
 2.740 151.320 .06400
 2.740 153.370 .05700
 2.740 155.430 .05000
 2.740 157.500 .04400
 2.740 159.570 .03800
 2.740 161.610 .02900
 2.740 163.600 .02100
 2.740 165.650 .01700
 2.740 167.750 .01400
 2.740 169.760 .01500
 GRADIENT .00000

RUN NO. 47/ 0 RN/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00
 MACH 3.480 ALPHA 149.350 CBL .08900
 3.480 151.340 .05600
 3.480 153.400 .05000
 3.480 155.450 .04300
 3.480 157.510 .03700
 3.480 159.600 .03200
 3.480 161.640 .02400
 3.480 163.660 .01800
 3.480 165.710 .01300
 3.480 167.790 .01000
 3.480 169.780 .01000
 GRADIENT .00000

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(R1R017) 1 23 FEB 77

PARAMETRIC DATA
BETA = .000 PHI = 120.000

ISOLATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SPB WITH PRC UBERANCES

DI C 22 MAR 77

REFERENCE DATA

SPEF = 116.2500 SQ.FT.
LREF = 146.0000 IN.
BREF = 146.0000 IN.
SCALE = .0055
XMRP = .0600 IN.
YMRP = .0000 IN.
ZMRP = .0000 IN.

RUN NO. 104/ C RN/L = 6.52

GRADIENT INTERVAL = -5.00/ 5.00

ALPHA	CBL
148.810	.07200
150.850	.05920
152.970	.05300
155.080	.04700
157.300	.04000
159.590	.03100
161.630	.02400
163.640	.02100
165.730	.01700
167.910	.01400
169.860	.01100
GRADIENT	.00900

GRADIENT INTERVAL = -5.00/ 5.00

RN/L = 7.58

ALPHA	CBL
148.620	.06400
150.730	.05700
152.830	.04800
154.830	.04100
157.070	.03700
159.250	.03100
161.400	.02500
163.510	.02000
165.560	.01400
167.690	.01000
169.800	.01000
GRADIENT	.00900

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

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REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 160.000

RUN NO. 17/ 0 RN/L = 5.24 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	149.310	.03900
2.740	151.330	.03400
2.740	153.350	.03300
2.740	155.400	.03000
2.740	157.430	.02500
2.740	159.550	.02200
2.740	161.610	.01800
2.740	163.650	.01400
2.740	165.730	.01100
2.740	167.780	.00900
2.740	169.730	.00800
	GRADIENT	.00000

RUN NO. 18/ 0 RN/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.350	.03100
3.480	151.330	.02900
3.480	153.400	.02600
3.480	155.440	.02300
3.480	157.510	.02000
3.480	159.590	.01700
3.480	161.650	.01400
3.480	163.680	.01100
3.480	165.720	.00900
3.480	167.770	.00600
3.480	169.730	.00600
	GRADIENT	.00000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

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REFERENCE DATA

SPEF = 116.2500 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
RREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 160.000

RUN NO. 103/ 0 RN/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.03

MACH	ALPHA	CBL
1.450	170.330	.01100
1.460	172.330	.01100
1.460	174.290	.00790
1.460	176.250	.00400
1.460	178.250	.00100
1.460	180.250	.00100
1.460	182.280	.00000
1.460	184.300	-.00200
1.460	186.310	-.00500
1.460	188.450	-.00800
1.460	190.420	-.01100
	GRADIENT	-.00300

RUN NO. 90/ 0 RN/L = 7.58 GRADIENT INTERVAL = -5.00/ 5.03

MACH	ALPHA	CBL
1.959	170.330	.01100
1.959	172.290	.00900
1.959	174.280	.00700
1.959	176.250	.00500
1.959	178.280	.00200
1.959	180.260	.00000
1.959	182.260	-.00000
1.959	184.300	-.00100
1.959	186.310	-.00400
1.959	188.360	-.00600
1.959	190.310	-.00800
	GRADIENT	-.00000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTRUDANCES

PAGE 36
(R15018) 1 23 FEB 77)

REFERENCE DATA

SPEF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 145.0000 IN. YMRP = .0000 IN.
BREF = 145.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

BETA = .000 PHI = 180.000

PARAMETRIC DATA

RUN NO. 20/ 0 RV/L = 5.23 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.210	.00500
2.740	172.160	.00500
2.740	174.180	.00300
2.740	176.170	.00100
2.740	178.170	.00000
2.740	180.220	.00000
2.740	182.220	.00000
2.740	184.200	-.00100
2.740	185.200	-.00400
2.740	189.210	-.00500
2.740	190.150	-.00600
	GRADIENT	.00000

RUN NO. 19/ 0 RV/L = 7.13 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.200	.00400
3.490	172.160	.00300
3.480	174.180	.00300
3.480	176.190	.00100
3.480	178.190	.00100
3.480	180.230	.00100
3.480	182.230	.00000
3.490	184.220	.00000
3.480	186.220	-.00200
3.480	188.230	-.00300
3.480	190.190	-.00300
	GRADIENT	.00000

DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TNT 645 (SA2IF)
MSFC TNT 645 (SA2IF) SPB WITH PROTRUDANCES

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(RIP019) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 202.500

RUN NO. 122/ 0 RN/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.460	170.240	.00400
1.460	172.270	.00400
1.460	174.240	.00400
1.460	176.250	.00300
1.460	178.240	.00100
1.460	180.230	.00000
1.460	182.230	-.00100
1.460	184.230	-.00400
1.460	186.280	-.00700
1.460	188.280	-.01100
1.460	190.160	-.01200
	GRADIENT	.00000

RUN NO. 71/ 0 RN/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.959	170.220	.00400
1.959	172.260	.00400
1.959	174.230	.00400
1.959	176.280	.00200
1.959	178.300	.00100
1.959	180.270	.00000
1.959	182.280	-.00000
1.959	184.280	-.00200
1.959	186.290	-.00500
1.959	188.240	-.00900
1.959	190.200	-.01100
	GRADIENT	.00000

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DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)
MSFC TWT 645 (SA2IF) SRG WITH PROTECTORANCES

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(R1F019) 1 23 FEB 77

REFERENCE DATA

SREF = 115.2600 SQ.FT. XMRP = .0000 IN.
LREF = 145.0000 IN. YMRP = .0000 IN.
BREF = 145.0000 IN. ZMRP = .0000 IN.
SCALE = .0033

PARAMETRIC DATA

BETA = .000 PHI = 202.500

RUN NO. 52/ 0 PN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.290	.03400
2.740	172.230	.03300
2.740	174.250	.00300
2.740	176.260	.00200
2.740	178.250	.00100
2.740	180.260	.00100
2.740	182.260	.00000
2.740	184.260	-.00100
2.740	186.250	-.00300
2.740	188.260	-.00600
2.740	190.200	-.00600
	GRADIENT	.00000

RUN NO. 51/ 0 PN/L = 7.13 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.230	.00100
3.480	172.180	.00100
3.480	174.190	.00100
3.480	176.210	.00000
3.480	178.220	.00000
3.480	180.250	.00000
3.480	182.230	.00000
3.480	184.260	.00200
3.480	186.220	.00400
3.480	188.250	.00600
3.480	190.200	.00700
	GRADIENT	.00000

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTUBERANCES

(RIR020) (23 FEB 77)

PARAMETRIC DATA

BETA = .000 PHI = 202.500

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

RUN NO. 121/ 0 RN/L = 6.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.460	149.050	.00100
1.460	151.150	.00100
1.460	153.230	.00200
1.460	155.320	.00200
1.460	157.430	.00400
1.460	159.600	.00300
1.460	161.600	.00500
1.460	163.470	.00800
1.460	165.430	.00700
1.460	167.590	.00400
1.460	169.600	.00300
	GRADIENT	.00000

RUN NO. 72/ 0 RN/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.959	149.910	.01000
1.959	150.940	.00700
1.959	153.100	.00300
1.959	155.200	.00000
1.959	157.300	.00100
1.959	159.370	.00300
1.959	161.490	.00400
1.959	163.650	.00400
1.959	165.820	.00500
1.959	167.970	.00400
1.959	169.660	.00300
	GRADIENT	.00000

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TABLED SOURCE DATA. MSFC TWT 645 (SA2IF)

DATE 23 MAR 77

(RIP020) 23 FEB 77

MSFC TWT 645 (SA2IF) SRB WITH PROTUBERANCES

PARAMETRIC DATA

REFERENCE DATA

BETA = .003 PHI = 202.500

SPEF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 145.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

RUN NO. 49/ 0 RN/L = 5.23 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
2.740	149.350	.01100
2.740	151.340	.00900
2.740	153.400	.00700
2.740	155.430	.00500
2.740	157.490	.00400
2.740	159.530	.00300
2.740	161.600	.00300
2.740	163.670	.00300
2.740	165.680	.00200
2.740	167.730	.00200
2.740	169.720	.00300
	GRADIENT	.00000

RUN NO. 50/ 0 RN/L = 7.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
3.480	149.360	.00700
3.480	151.370	.00700
3.480	153.410	.00600
3.480	155.460	.00500
3.480	157.520	.00300
3.480	159.560	.00300
3.480	161.620	.00200
3.480	163.710	.00200
3.480	165.710	.00200
3.480	167.760	.00100
3.480	169.730	.00200
	GRADIENT	.00000

DATE 29 MAR 77

REFERENCE DATA
 SREF = 117.2500 SQ.FT. XMRP =
 LREF = 133.0000 IN. YMRP =
 BREF = 145.0000 IN. ZMRP =
 SCALE = .0055

TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
 MSFC TWT 645 (SA21F) SP3 WITH PROTRUDANCES

PAGE 41
 (R1R21) 1 23 FEB 77
 PARAMETRIC DATA
 BETA = .000 PHI = 225.000

RUN NO. 101/ C RV/L = 6.52

GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.450	143.130	.00000
1.460	151.220	.00000
1.460	153.340	.00000
1.460	153.460	.00000
1.460	157.540	.00000
1.460	159.740	.00000
1.460	161.750	.00000
1.460	163.710	.00000
1.460	163.640	.00000
1.460	167.580	.00000
1.460	169.530	.00000
1.460	GRADIENT	.00000

RUN NO. 92/ C RV/L = 7.58

GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.950	148.920	.00000
1.950	150.940	.00000
1.950	153.030	.00000
1.950	155.160	.00000
1.950	157.310	.00000
1.950	159.440	.00000
1.950	161.520	.00000
1.950	163.720	.00000
1.950	165.670	.00000
1.950	167.620	.00000
1.950	169.600	.00000
1.950	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)

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MSFC TWT 645 (SA21F) SPB WITH PROTOBERANCES

IRIR321) (23 FEB 77)

REFERENCE DATA

SREF = 116.2500 SQ.FT. XREF = .0000 IN.
 LREF = 146.0000 IN. YREF = .0000 IN.
 BREF = 145.0000 IN. ZREF = .0000 IN.
 SCALE = .0005

PARAMETRIC DATA

BETA = .000 PHI = 253.000

RUN NO. 23/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	149.410	.00100
2.740	151.390	.00100
2.740	153.410	.00200
2.740	155.450	.00300
2.740	157.520	.00500
2.740	159.600	.00800
2.740	161.660	.00100
2.740	163.720	-.00100
2.740	165.720	-.00100
2.740	167.720	.00300
2.740	169.690	.00300
	GRADIENT	.00000

RUN NO. 23/ 0 RN/L = 7.19 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.400	.00200
3.480	151.400	.00100
3.480	153.410	.00000
3.480	155.470	.00300
3.480	157.530	.00000
3.480	159.600	.00800
3.480	161.650	.00000
3.480	163.700	.00000
3.480	165.730	.00000
3.480	167.730	-.00100
3.480	169.720	.00000
	GRADIENT	.00000

TABLED SOURCE DATA. MSFC THT 645 (SA2IF)
 MSFC THT 645 (SA2IF) SRB WITH PROTUBERANCES

REFERENCE DATA

SCF = 115.2000 SQ.F.
 LRF = 146.0000 IN.
 SCF = 146.0000 IN.
 LRF = 146.0000 IN.
 SCALE = .0055

RUN NO. 102/ 1 RNYL = 6.53

MACH	ALPHA	CP
1.459	170.150	.00200
1.459	172.150	.00300
1.459	174.170	.00000
1.459	176.230	.00300
1.459	178.220	.00100
1.459	180.280	.00000
1.459	182.260	-.00100
1.459	184.270	-.00400
1.459	186.250	-.00700
1.459	188.220	-.01100
1.459	190.050	-.01500
1.459	GRADIENT	.00000

GRADIENT INTERVAL = -5.00/ 5.00

RUN NO. 91/ 0 RNYL = 7.58

MACH	ALPHA	CB
1.960	173.180	.00200
1.960	175.150	.00100
1.960	177.230	.00300
1.960	179.250	.00200
1.960	181.270	.00000
1.960	183.250	.00100
1.960	185.260	.00400
1.960	187.300	-.00800
1.960	189.290	-.01200
1.960	191.140	-.01400
1.960	GRADIENT	.00000

GRADIENT INTERVAL = -5.00/ 5.00

DATE 29 MAR 77
 TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)
 MSFC TWT 645 (SA2IF) SRB WITH PROTUBERANCES

PAGE 44
 (RIR022) (23 FEB 77)

REFERENCE DATA

SREF = 116.266 SQ.FT. XMRP = 0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 225.000

RUN NO. 21/ 1 RN/L = 5.27 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	.70.200	.00100
2.740	.72.180	.00100
2.740	.74.170	.00100
2.740	.76.190	.00100
2.740	.78.210	.0100
2.740	.80.200	.00000
2.740	.82.230	.00100
2.740	.84.230	.00300
2.740	.86.220	.00500
2.740	.88.200	.00900
2.740	.90.140	.01100
2.740	GRADIENT	.00000

RUN NO. 22/ 0 RN/L = 7.18 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	.170.230	.00000
3.480	.172.170	.00100
3.480	.174.180	.00200
3.480	.176.210	.00100
3.480	.178.200	.00100
3.480	.180.210	.00000
3.480	.182.240	.00000
3.480	.184.250	.00200
3.480	.186.220	.00400
3.480	.188.220	.00600
3.480	.190.190	.00800
3.480	GRADIENT	.00000

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TABULATED SOURCE DATA, MSFC TWT 645 (S21F)
MSFC TWT 645 (S21F) SFB WITH PROTUBERANCES

PAGE 45
(R1R023) 23 FEB 77

REFERENCE DATA

SPEC = 116.2600 SQ.FT. XMRP =
LREF = 146.0000 IN. YMRP =
BREF = 146.0000 IN. ZMRP =
SCALE = .0055

PAPAMETRIC DATA

BETA = .000 PHI = 247.500

RUN NO. 123/ 0 RM/L = 6.51 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.460	170.220	.00000
1.460	172.230	.00100
1.460	174.230	.00100
1.460	175.220	.00100
1.460	178.230	.00100
1.460	180.280	.00000
1.460	182.270	.00300
1.460	184.270	-.00300
1.460	186.260	-.00500
1.460	188.290	-.01100
1.460	190.070	-.01100
	GRADIENT	.00000

RUN NO. 70/ 0 RM/L = 7.61 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	172.100	.00300
1.959	172.190	.00100
1.959	174.260	.00200
1.959	176.260	.00200
1.959	178.230	.00200
1.959	180.270	.00300
1.959	182.260	.00000
1.959	184.300	-.00200
1.959	186.280	-.00500
1.959	188.240	-.01000
1.959	190.130	-.01000
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TNT 645 (SA21F)

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MSFC TNT 645 (SA21F) SRB WITH PRC TUBERANCES

(R1R023) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = .247.500

RUN NO. 53/ 0 RN/L = 5.26 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	170.240	.00100
2.740	172.200	.00200
2.740	174.200	.00300
2.740	176.220	.00300
2.740	178.220	.00200
2.740	180.240	.00000
2.740	182.240	.00000
2.740	184.270	.00200
2.740	186.220	.00400
2.740	188.240	.00600
2.740	190.180	.00700
	GRADIENT	.00000

RUN NO. 54/ 0 RN/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	170.250	.00000
3.480	172.200	.00100
3.480	174.190	.00200
3.480	176.220	.00200
3.480	178.220	.00200
3.480	180.240	.00000
3.480	182.260	.00000
3.480	184.280	.00100
3.480	186.240	.00300
3.480	188.300	.00500
3.480	190.220	.00500
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TNT 645 (SA2IF)
MSFC TNT 645 (SA2IF) SRB WITH PROTRUDANCES

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(RIP024) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 247.500

RUN NO. 124/ 0 RV/L = 5.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.460	149.100	.01500
1.460	151.190	.01400
1.460	153.310	.00700
1.460	155.480	-.00100
1.460	157.610	-.00300
1.460	159.780	-.00400
1.460	161.910	-.00400
1.460	163.890	.00000
1.460	165.660	.00500
1.460	167.670	.00200
1.460	169.670	.00000
	GRADIENT	.00000

RUN NO. 69/ 0 RV/L = 7.64 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.538	148.920	.01900
1.958	150.950	.01600
1.958	153.100	.01300
1.958	155.200	.01000
1.958	157.300	.00500
1.958	159.450	.00200
1.958	161.620	.00000
1.958	163.790	-.00100
1.958	165.820	.00100
1.958	167.680	.00300
1.958	169.650	.00300
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)

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(R1R024) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 247.500

RUN NO. 56/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	149.420	.01500
2.740	151.400	.01200
2.740	153.460	.01000
2.740	155.520	.00800
2.740	157.550	.00500
2.740	159.620	.00300
2.740	161.740	.00100
2.740	163.790	.00000
2.740	165.790	-.00100
2.740	167.830	.00000
2.740	169.760	.00000
2.740	GRADIENT	.00000

RUN NO. 55/ 2 RN/L = 7.17 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.500	.01400
3.480	151.460	.01100
3.480	153.500	.01000
3.480	155.560	.00700
3.480	157.570	.00500
3.480	159.630	.00300
3.480	161.700	.00100
3.480	163.770	.00000
3.480	165.810	.00000
3.480	167.810	.00000
3.480	169.800	.00000
3.480	GRADIENT	.00000

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TABULATED SOURCE DATA, MSFC THT 645 (SA2IF)
MSFC THT 645 (SA2IF) SRB WITH PROTRUDERANCLS

PAGE 49
(R1P025) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0355

PARAMETRIC DATA

BETA = .000 P41 = 270.000

RUN NO. 100/ 1 RV/L = 6.51 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CB
1.459	149.090	.02400
1.459	151.200	.02300
1.459	153.300	.02100
1.459	155.410	.01900
1.459	157.520	.01600
1.459	159.710	.00300
1.459	161.780	.01500
1.459	163.890	.00700
1.459	165.870	.02800
1.459	167.660	.00900
1.459	169.590	.01900
	GRADIENT	.00000

RUN NO. 93/ 0 RV/L = 7.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CB
1.960	148.910	.02300
1.960	150.940	.01900
1.960	153.020	.01600
1.960	155.210	.01400
1.960	157.320	.01400
1.960	159.450	.01500
1.960	161.500	.01200
1.960	163.770	.01000
1.960	165.930	.04500
1.960	167.850	.00800
1.960	169.620	.01000
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC THT 645 (SA21F)

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MSFC THT 645 (SA21F) SRB WITH PROTRUDANCES

(RIPO25) 1 23 FEB 77

REFERENCE DATA

SREF = 116.2600 SQ.FT.
 LREF = 146.0000 IN.
 BREF = 146.0000 IN.
 SCALE = .0055

XMRP =
 YMRP =
 ZMRP =

.0000 IN.
 .0000 IN.
 .0000 IN.

PARAMETRIC DATA

BETA = .000 PHI = 270.000

RUN NO. 25/ 1 RN/L = 5.26 GRADIENT INTERVAL = -5.00/ 5.00
 MACH ALPHA CBL
 2.740 149.420 .01500
 2.740 151.420 .01400
 2.740 153.420 .01200
 2.740 155.420 .00800
 2.740 157.550 .00900
 2.740 159.640 .00800
 2.740 161.620 .00700
 2.740 163.750 .00400
 2.740 165.770 .00300
 2.740 167.790 .00500
 2.740 169.740 .00500
 GRADIENT .00000

RUN NO. 26/ 0 RN/L = 7.17 GRADIENT INTERVAL = -5.00/ 5.00
 MACH ALPHA CBL
 3.480 149.410 .01500
 3.480 151.400 .01400
 3.480 153.400 .01100
 3.480 155.470 .00300
 3.480 157.530 .00500
 3.480 159.610 .00500
 3.480 161.670 .00500
 3.480 163.730 .00500
 3.480 165.760 .00400
 3.480 167.780 .00400
 3.480 169.740 .00500
 GRADIENT .00000

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TABULATED SOURCE DATA, MSFC TWT 645 (SA2IF)
MSFC TWT 645 (SA2IF) SRB WITH PROTEGEANCES

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(RIPDS) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PAPAVEIRIC DATA

BETA = .000 PMJ - 270.000

RUN NO. 99/ 0 RM/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.459	170.240	.00920
1.459	172.230	.00600
1.459	174.290	.00500
1.459	176.230	.00300
1.459	178.310	.00100
1.459	180.310	.00100
1.459	182.320	.00000
1.459	184.310	.00000
1.459	186.300	.00200
1.459	188.290	.00470
1.459	190.160	.00500
	GRADIENT	.00000

RUN NO. 94/ 0 RM/L = 7.60 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.959	170.190	.00700
1.959	172.180	.00500
1.959	174.270	.00500
1.959	176.230	.00200
1.959	178.270	.00000
1.959	180.250	.00000
1.959	182.240	.00200
1.959	184.260	.00200
1.959	186.260	.00300
1.959	188.210	.00400
1.959	190.090	.00500
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)

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(IRIP025) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PMJ = 270.000

RUN NO. 28/ 0 RN/L = 5.26 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
2.740	170.240	.00300
2.740	172.190	.00300
2.740	174.170	.00300
2.740	176.190	.00100
2.740	178.230	.00000
2.740	180.190	.00000
2.740	182.210	.00000
2.740	184.220	.00100
2.740	186.170	.00200
2.740	188.170	.00200
2.740	190.110	.00300
2.740	GRADIENT	.00000

RUN NO. 27/ 0 RN/L = 7.18 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
3.480	170.210	.00200
3.480	172.180	.00200
3.480	174.150	.00200
3.480	176.170	.00100
3.480	178.170	.00000
3.480	180.170	.00000
3.480	182.200	.00000
3.480	184.200	.00000
3.480	186.170	.00100
3.480	188.170	.00100
3.480	190.130	.00100
3.480	GRADIENT	.00000

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TABULATED SOURCE DATA, MSFC TWT 645 (SA21F)

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(R1R027) (23 FEB 77)

MSFC TWT 645 (SA21F) SRB WITH PROTRUDANCES

REFERENCE DATA

SREF = 116.2600 SO.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 292.500

RUN NO. 126/ 0 RN/L = 6.54 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEI
1.460	170.120	.00900
1.460	172.230	.00700
1.460	174.250	.00600
1.460	176.240	.00300
1.460	178.230	.00100
1.460	180.260	.00100
1.460	182.280	.00100
1.460	184.260	.00200
1.460	186.230	.00300
1.460	188.170	.00400
1.460	190.050	.00600
	GRADIENT	.00000

RUN NO. 57/ 0 RN/L = 7.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEI
1.959	170.230	.00900
1.959	172.240	.00700
1.959	174.320	.00600
1.959	176.280	.00300
1.959	178.300	.00100
1.959	180.260	.00000
1.959	182.270	.00000
1.959	184.260	.00000
1.959	186.280	.00100
1.959	188.230	.00300
1.959	190.100	.00400
	GRADIENT	.00000

TABLED SOURCE DATA. MSFC TNT 645 (SA21F)
MSFC TNT 645 (SA21F) SPB WITH PROTEGEANCES

18:0027) 23 FEB 77)

PARAMETRIC DATA

REFERENCE DATA

REFERENCE DATA			
33.5	116.250	30. FT.	0.000 IN.
33.5	115.000	IN.	0.000 IN.
33.5	115.000	IN.	0.000 IN.
33.5	115.000	IN.	0.000 IN.

- 6 -

PH 000 Y138

5.00/ 5.00
 GRADIENT INTERVAL = -5.00/
 5.25 P/L = 5.25
 5.00/ 5.00

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[illegible]

7 15 GRADIENT INTERVAL = -5.00/ 5.00

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[illegible]

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TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)

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MSFC TWT 645 (SA2IF) SPB WITH PROTUBERANCES

(R1R028) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XOPP = .0000 IN.
 LREF = 146.0000 IN. YOPP = .0000 IN.
 BREF = 146.0000 IN. ZOPP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 292.500

RUN NO. 125/ 1 RV/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.460	149.100	.03700
1.460	151.170	.03400
1.460	152.260	.03100
1.460	153.370	.02800
1.460	154.550	.02500
1.460	155.650	.02200
1.460	156.700	.02000
1.460	157.760	.01800
1.460	158.690	.01600
1.460	159.550	.01400
1.460	160.600	.01200
1.460	GRADIENT	.00000

RUN NO. 68/ 0 RV/L = 7.61 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	148.900	.02700
1.959	150.930	.02500
1.959	153.090	.02200
1.959	155.200	.02000
1.959	157.320	.01800
1.959	159.460	.01600
1.959	161.510	.01400
1.959	163.620	.01200
1.959	165.780	.01000
1.959	167.830	.00800
1.959	169.620	.00600
1.959	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TH1 6W5 (SA21F)
MSFC TH1 6W5 (SA21F) SRB WITH PROTUBERANCES

PAGE 56
(IRIR028) (23 FEB 77)

REFERENCE DATA

SPEF = 116.2600 SQ.FT. XPRP = .0000 IN.
LREF = 146.0000 IN. YPRP = .0000 IN.
BREF = 146.0000 IN. ZPRP = .0000 IN.
SCALE = .0053

FAPAMETRIC DATA

BETA = .000 PHI = 292.500

RUN NO. 57/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
2.740	149.470	.02100
2.740	151.460	.01800
2.740	153.490	.01700
2.740	155.560	.01500
2.740	157.600	.01500
2.740	159.660	.01400
2.740	161.700	.01300
2.740	163.750	.01100
2.740	165.790	.01000
2.740	167.840	.01000
2.740	169.723	.00900
	GRADIENT	.00000

RUN NO. 58/ 0 RN/L = 7.16 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
3.480	149.510	.01600
3.480	151.460	.01500
3.480	153.510	.01300
3.480	155.570	.01100
3.480	157.570	.01100
3.480	159.650	.01000
3.480	161.690	.00900
3.480	163.740	.00800
3.480	165.760	.00700
3.480	167.820	.00600
3.480	169.790	.00600
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TWT 645 (SA21F)
MSFC TWT 645 (SA21F) SRB WITH PROTRUBERANCES

PAGE 57

(R1R029) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .006 PHI = 315.000

RUN NO. 97/ 0 RN/L = 6.54 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.459	149.030	.02300
1.459	151.080	.02600
1.459	153.200	.02500
1.459	155.400	.02300
1.459	157.500	.02000
1.459	159.510	.02000
1.459	161.690	.01700
1.459	163.790	.01600
1.459	165.680	.01600
1.459	167.600	.01300
1.459	169.572	.01000
	GRADIENT	.00900

RUN NO. 96/ 0 RN/L = 7.57 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.959	148.900	.01800
1.959	150.900	.01700
1.959	152.960	.01700
1.959	155.120	.01600
1.959	157.280	.01400
1.959	159.460	.01200
1.959	161.530	.01100
1.959	163.720	.01100
1.959	165.850	.01000
1.959	167.820	.00900
1.959	169.580	.00900
	GRADIENT	.00900

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DATE 29 MAR 77

TABULATED SOURCE DATA. MSFC TWT 645 (SA2IF)
MSFC TWT 645 (SA2IF) SRB WITH PROT. SERANCES

(IRIR029) (23 FEB 77)

PARAMETRIC DATA

REFERENCE DATA

SREF = 116.2600 SO.FT. XMRP = .0000 IN.
LREF = 145.0000 IN. YMRP = .0000 IN.
BREF = 145.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

BETA = .000 PHI = 315.000

RUN NO. 32/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEB
2.740	149.400	.01400
2.740	151.390	.01200
2.740	153.400	.01100
2.740	155.470	.01100
2.740	157.520	.00900
2.740	159.600	.00900
2.740	161.660	.00500
2.740	163.720	.00700
2.740	165.740	.00700
2.740	167.810	.00500
2.740	169.770	.00500
	GRADIENT	.00000

RUN NO. 31/ 0 RN/L = 7.16 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEB
3.480	149.400	.01200
3.480	151.380	.01100
3.480	153.400	.01000
3.480	155.470	.00300
3.480	157.530	.00700
3.480	159.590	.00700
3.480	161.630	.00500
3.480	163.690	.00500
3.480	165.740	.00400
3.480	167.780	.00400
3.480	169.770	.00000
	GRADIENT	.00000

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TABULATED SOURCE DATA, MSFC TWT 645 (SA2IF)
MSFC TWT 645 (SA2IF) SRB WITH PROTUBERANCES

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(RIR030) (23 FEB 77)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA 1 .000 PHI = 315.000

RUN NO. 98/ 0 RN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.459	170.230	.00900
1.459	172.230	.00700
1.459	174.260	.00500
1.459	176.260	.00300
1.459	178.230	.00100
1.459	180.260	.00100
1.459	182.280	.00200
1.459	184.310	.00300
1.459	186.250	.00500
1.459	188.230	.00900
1.459	190.050	.01400
	GRADIENT	.00000

RUN NO. 95/ 0 RN/L = 7.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
1.958	170.220	.00900
1.958	172.190	.00700
1.958	174.240	.00500
1.958	176.230	.00300
1.958	178.270	.00200
1.958	180.250	.00000
1.958	182.250	.00000
1.958	184.250	.00200
1.958	186.250	.00400
1.958	188.230	.00600
1.958	190.150	.00900
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TN. 645 (SA21F)
 MSFC THT 645 (SA21F) SRB WITH PROTUBERANCES

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 (IRIR030) (23 FEB 77)

REFERENCE DATA

SREF = 115.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 145.0000 IN. YMRP = .0000 IN.
 BREF = 145.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PH = 315.000

RUN NO. 29/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
2.740	170.290	.00600
2.740	172.220	.00400
2.740	174.130	.00300
2.740	175.220	.00200
2.740	178.210	.00200
2.740	180.240	.00100
2.740	182.240	.00100
2.740	184.230	.00200
2.740	186.200	.00300
2.740	188.200	.00500
2.740	190.130	.00700
	GRADIENT	.00000

RUN NO. 30/ 0 RN/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEL
3.480	170.240	.00300
3.480	172.220	.00200
3.480	174.160	.00100
3.480	175.180	.00100
3.480	178.190	.00100
3.480	180.200	.00000
3.480	182.210	.00000
3.480	184.220	.00000
3.480	186.190	.00200
3.480	188.180	.00400
3.480	190.140	.00500
	GRADIENT	.00000

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TABULATED SOURCE DATA. MSFC TNT 645 (SA21F)
MSFC TNT 645 (SA21F) SRB WITH PROTUBERANCES

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(R1RD31) (23 FEB 77)

REFERENCE DATA

SREF = 113.2600 SQ.FT. XMRP = .0000 IN.
LREF = 146.0000 IN. YMRP = .0000 IN.
BREF = 146.0000 IN. ZMRP = .0000 IN.
SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 337.500

RUN NO. 127/ 0 FN/L = 6.53 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.460	170.050	.00400
1.460	172.120	.00200
1.460	174.200	.00200
1.460	176.230	.00100
1.460	178.230	.00100
1.460	180.250	.00100
1.460	182.280	.00200
1.460	184.260	.00200
1.460	186.260	.00500
1.460	188.210	.01100
1.460	190.050	.01800
	GRADIENT	.00000

RUN NO. 66/ 0 FN/L = 7.61 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CBL
1.957	170.270	.00600
1.957	172.180	.00300
1.957	174.270	.00300
1.957	176.270	.00200
1.957	178.290	.00200
1.957	180.270	.00000
1.957	182.270	.00000
1.957	184.270	.00200
1.957	186.270	.00400
1.957	188.200	.00800
1.957	190.100	.01100
	GRADIENT	.00000

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DATE 29 MAR 77
 TABULATED SOURCE DATA. MSFC TWT 6W5 (SA21F)
 MSFC TWT 6W5 (SA21F) SRB WITH PROTUBERANCES
 (R1R031) (23 FEB 77)
 PAGE 62
 REFERENCE DATA
 SREF = 116.260) SQ.FT. XMRP = .0000 IN.
 LREF = 146.0070 IN. YMRP = .0000 IN.
 BREF = 146.0077 IN. ZMRP = .0000 IN.
 SCALE = .0055
 PARAMETRIC DATA
 BETA = .000 PHI = 337.500

RUN NO. 61/ 0 RN/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00
 MACH 2.740
 ALPHA 170.290
 CBL .00200
 2.740 172.210 .00100
 2.740 174.440 .00200
 2.740 176.270 .00200
 2.740 178.270 .00200
 2.740 180.270 .00100
 2.740 182.270 .00100
 2.740 184.300 .00200
 2.740 186.260 .00400
 2.740 188.270 .00800
 2.740 190.230 .00900
 GRADIENT .00030
 RUN NO. 62/ 0 RN/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00
 MACH 3.480
 ALPHA 170.270
 CBL .00100
 3.480 172.180 .00000
 3.480 174.200 .00000
 3.480 176.230 .00000
 3.480 178.220 .00000
 3.480 180.230 .00000
 3.480 182.230 .00000
 3.480 184.270 .00000
 3.480 186.230 .00200
 3.480 188.250 .00400
 3.480 190.220 .00500
 GRADIENT .00000

DATE 29 MAR 77

TRANSLATED SOURCE DATA, MSFC TWT 645 (5A21F)

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MSFC TWT 645 (5A21F) SPB WITH PROJECTIONS

(R1R032) (23 FEB 77)

REFERENCE DATA

SREF = 115.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PH: • 337.500

RUN NO. 128/ 0 RM/L = 6.54 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEB
1.460	149.060	.01900
1.450	151.120	.02500
1.460	153.250	.01960
1.460	155.400	.01500
1.450	157.490	.01300
1.460	159.580	.01100
1.460	161.830	.01000
1.460	163.940	.01000
1.460	165.840	.01000
1.460	167.650	.00800
1.460	169.540	.00400
	GRADIENT	.00000

RUN NO. 65/ 1 RM/L = 7.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CEB
1.957	148.910	.00300
1.957	150.940	.00500
1.957	152.640	.01100
1.957	154.160	.01400
1.957	157.300	.01200
1.957	159.400	.01000
1.957	161.590	.00500
1.957	163.650	.00700
1.957	165.880	.00500
1.957	167.900	.00600
1.957	169.670	.00500
	GRADIENT	.00000

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TABULATED SOURCE DATA. MTC TMT 645 (SA21F)

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MSFC TMT 645 (SA21F) SR8 WITH PROTRUDANCES

(RIP032) (23 FEB 77)

REFERENCE DATA

SPEF = 116.2600 SQ.FT. XMRP = .0000 IN.
 LREF = 146.0000 IN. YMRP = .0000 IN.
 BREF = 146.0000 IN. ZMRP = .0000 IN.
 SCALE = .0055

PARAMETRIC DATA

BETA = .000 PHI = 337.500

RUN NO. 64/ 0 RV/L = 5.25 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CE
2.740	149.280	.00100
2.740	151.370	.00200
2.740	153.420	.00200
2.740	155.460	.00400
2.740	157.520	.00500
2.740	159.580	.00500
2.740	161.650	.00500
2.740	163.720	.00500
2.740	165.750	.00400
2.740	167.800	.00300
2.740	169.710	.00200
	GRADIENT	.00000

RUN NO. 63/ 0 RV/L = 7.15 GRADIENT INTERVAL = -5.00/ 5.00

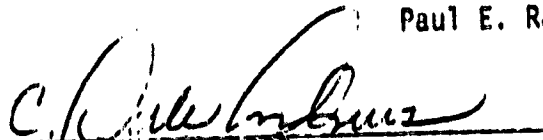
MACH	ALPHA	CE
3.480	149.390	.00000
3.480	151.370	.00100
3.480	153.400	.00100
3.480	155.460	.00200
3.480	157.530	.00300
3.480	159.570	.00200
3.480	161.620	.00300
3.480	163.700	.00300
3.480	165.720	.00300
3.480	167.770	.00200
3.480	169.740	.00000
	GRADIENT	.00000

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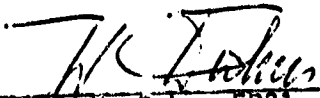
Aerodynamic Roll Characteristics of A 0.00548 Scale 146-Inch Solid Rocket Booster Reentry Configuration (MSFC Model Number 486) Over A Portion of the Reentry Flight Regime in the NASA/MSFC 14-Inch Transonic Wind Tunnel (SA21F).

By

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