

—SPACE SHUTTLE—

**AERODYNAMIC STATIC STABILITY
CHARACTERISTICS OF THE MSFC
33-FOOT PUMP FED BOOSTER AT
HIGH ANGLES OF ATTACK**

by

Thomas Hamilton, NSI

N72-22899

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STABILITY CHARACTERISTICS OF THE MSFC
33-FOOT PUMP FED BOOSTER AT HIGH ANGLES OF
ATTACK SADSAC/Space Shuttle T. Hamilton
(Chrysler Corp.) Mar. 1972 81 p CSCL 22B G3/31

**MSFC 14x14-INCH
TRISONIC WIND TUNNEL**

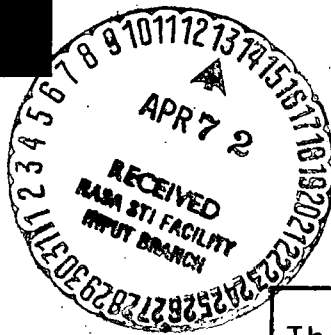
**Marshall Space Flight
Center**

N A S A

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION  **CHRYSLER
CORPORATION**



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CR-120,051
March, 1972

SADSAC/SPACE SHUTTLE
WIND TUNNEL TEST DATA REPORT

CONFIGURATION: 0.00340 Scale MSFC 33-Foot Pump Fed Booster
TEST PURPOSE: To Determine the Aerodynamic Static Stability Characteristics
of the MSFC 33-Foot Pump Fed Booster at High Angles of Attack

TEST FACILITY: NASA-MSFC 14 x 14 Inch Trisonic Wind Tunnel
TESTING AGENCY: Northrop Services, Inc., Huntsville, Alabama
TEST NO. & DATE: MSFC TWT 529; 10 February 1972
FACILITY COORDINATOR: Jim Weaver, NASA/MSFC
PROJECT ENGINEER(S): Thomas Hamilton, NSI

DATA MANAGEMENT SERVICES

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FOR (N. D. Kemp, Supervisor
Aero Thermo Data Group

CONTRACT NAS 8-4016

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AERODYNAMIC STATIC STABILITY CHARACTERISTICS OF THE
MSFC 33-FOOT PUMP FED BOOSTER AT HIGH ANGLES OF ATTACK

By: Thomas Hamilton

ABSTRACT

Experimental aerodynamic investigations were conducted in the NASA/MSFC 14 x 14 Inch Trisonic Wind Tunnel during early February 1972 on a 0.00340 scale model of the MSFC 33-foot diameter space shuttle pump fed booster configuration. The basic configuration tested was a 40° cone/cylinder designated the MSFC 33-foot pump fed booster. Six component aerodynamic force and moment data were recorded over a Mach number range from 0.6 to 5.0, angles-of-attack from 50° to 90° at 0° sideslip and over a sideslip range from -10° to $+10^\circ$ at 60° and 80° angles-of-attack. Primary configuration variables were fin area and body cutout size.

NOMENCLATURE
General

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
a		speed of sound; m/sec, ft/sec
C _p	CP	pressure coefficient; $(p_1 - p_\infty)/q$
M	MACH	Mach number; V/a
p		pressure; N/m ² , psf
q	Q(NSM) Q(PSF)	dynamic pressure; $1/2\rho V^2$, N/m ² , psf
RN/L	RN/L	unit Reynolds number; per m, per ft
V		velocity; m/sec, ft/sec
α	ALPHA	angle of attack, degrees
β	BETA	angle of sideslip, degrees
ψ	PSI	angle of yaw, degrees
ϕ	PHI	angle of roll, degrees
ρ		mass density; kg/m ³ , slugs/ft ³
<u>Reference & C.G. Definitions</u>		
A _b		base area; m ² , ft ²
b	BREF	wing span or reference span; m, ft
c.g.		center of gravity
$\frac{l}{c}$ _{REF}	LREF	reference length or wing mean aerodynamic chord; m, ft
S	SREF	wing area or reference area; m ² , ft ²
	MRP	moment reference point
	XMRP	moment reference point on X axis
	YMRP	moment reference point on Y axis
	ZMRP	moment reference point on Z axis
<u>SUBSCRIPTS</u>		
b		base
l		local
s		static conditions
t		total conditions
∞		free stream

NOMENCLATURE (Continued)

Body-Axis System

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
C_N	CN	normal-force coefficient; $\frac{\text{normal force}}{qS}$
C_A	CA	axial-force coefficient; $\frac{\text{axial force}}{qS}$
C_Y	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
C_{A_b}	CAB	base-force coefficient; $\frac{\text{base force}}{qS}$ $-A_b(p_b - p_\infty)/qS$
C_{A_f}	CAF	forebody axial force coefficient, $C_A - C_{A_b}$
C_m	CLM	pitching-moment coefficient; $\frac{\text{pitching moment}}{qS l_{REF}}$
C_n	CYN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qS b}$
C_l	CBL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qS b}$

Stability-Axis System

C_L	CL	lift coefficient; $\frac{\text{lift}}{qS}$
C_D	CD	drag coefficient; $\frac{\text{drag}}{qS}$
C_{D_b}	CDB	base-drag coefficient; $\frac{\text{base drag}}{qS}$
C_{D_f}	CDF	forebody drag coefficient; $C_D - C_{D_b}$
C_Y	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
C_m	CLM	pitching-moment coefficient; $\frac{\text{pitching moment}}{qS l_{REF}}$
C_n	CLN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qS b}$
C_l	CSL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qS b}$
L/D	L/D	lift-to-drag ratio; C_L/C_D

ADDITIONS TO SADSAC NOMENCLATURE
FOR
TEST MSFC TWT 529

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
Γ		Fin dihedral angle, degrees. See Figure 6.
LOC		Fin location on booster. See Figure 2.

CONFIGURATION DESCRIPTION

The basic pump fed booster configuration was a 40° cone/cylinder with a flat at the end of the cylinder on the bottom. The configuration is designated the MSFC 33-foot pump fed booster. Component configuration symbols and descriptions are listed as follows:

<u>SYMBOL</u>	<u>CONFIGURATION</u>
N_{1B_6}	MSFC 33-foot pump fed booster body with a 40° conical nose and a 33-foot diameter full scale cylindrical body.
N_{1B_7}	MSFC 33-foot pump fed booster body with a 40° conical nose and a 33-foot diameter full scale cylindrical body.
F_2	Two 508 sq. ft. full scale fins located at the end of and in the mid position on the cylindrical body. Fin incidence was zero degrees.
F_3	Two 339 sq. ft. full scale fins mounted like F_2 .

Model dimensional information for these components is given in the model component description sheets.

TEST FACILITY DESCRIPTION

The MSFC 14 x 14 Inch Trisonic Wind Tunnel is an intermittent blowdown tunnel which operates by high pressure air flowing from storage to either vacuum or atmospheric conditions. A Mach number range from 0.2 to 5.85 is covered by utilizing two interchangeable test sections. The transonic section permits testing at Mach 0.20 to 2.50, and the supersonic section permits testing at Mach 2.75 to 5.85. Mach numbers between 0.2 and 0.9 are obtained by using a controllable diffuser. The range from 0.95 to 1.3 is achieved through the use of plenum suction and perforated walls. Mach numbers of 1.46, 1.96 and 2.48 are produced by interchangeable sets of fixed contour nozzle blocks. Above Mach 2.48 a set of fixed contour nozzle blocks are tilted and translated automatically to produce any desired Mach number in 0.25 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° (+10°). Sting offsets and extensions are available for obtaining various maximum angles of attack up to 90°.

DATA REDUCTION

Six component force and moment data were recorded using an internal strain gage balance. Aerodynamic coefficients were calculated for the body and stability axis reference systems. Data reduction included an axial force static tare. No base or cavity pressures were recorded. The model reference dimensions utilized in reducing the data are listed below:

$$S_{\text{ref}} = \text{Booster Body (N}_1\text{B}_6 \text{ or N}_1\text{B}_7)$$

$$\text{Cylinder cross section area} = 1.423 \text{ sq. in.}$$

$$l_{\text{ref}} = b_{\text{ref}} = \text{Booster Body (N}_1\text{B}_6 \text{ or N}_1\text{B}_7)$$

$$\text{Length (from nose to aft end of cylinder)} = 5.443 \text{ in.}$$

The moment reference center (MRC) is on a line coincident with the body longitudinal centerline 60 per cent of the body length aft of the nose.

$$\text{MRC} = 60\% l_{\text{ref}} = 3.266 \text{ in.}$$

The moment reference center location is shown in Figure 2.

TABLE I.
TEST CONDITIONS

[illegible]

BALANCE UTILIZED: MSFC No. 201 Balance

CAPACITY:

NF	120 lb
SF	20 lb
AF	30 lb
PM	60 in-lb
YM	20 in-lb
RM	25 in-lb

ACCURACY :

.....

**COEFFICIENT
TOLERANCE:**

COMMENTS :

TEST MSC TWT SK9 TABLE II. DATA SET COLLATION SHEET

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.			PARAMETERS/VALUES	NO. OF RUNS	NACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE)															
		a	B	7			0.6	0.9	1.2	1.46	2.74	4.96										
R63001	N, B ₆	C	0	—	—		45	44	43	40	70	71										
002	↓	0	0	↓	↓		46	47	48	42	73	72										
003	N, B ₆ F ₃	0	0	30	2					41												
004	N, B ₇	C	0	—	—		13	14	15	34	12	11										
005	↓	0	0	—	—		18	17	16	33	9	10										
006	↓	80	E	—	—					35												
007	↓	80	E	—	—					36												
008	N, B ₇ F ₃	C	0	30	2		23	21	22	31	41	1										
009	↓	0	0	—	—		19	20		32	3	2										
010	↓	60	E	—	—		24	25	26	30	5	6										
011	↓	80	E	—	—		28	27		29	8	7										
012	N, B ₇ F ₃	C	0	—	—		50	51	52	39	69	68										
013	↓	0	0	—	—		53	54	55	40	66	67										
014	↓	60	E	—	—		59	60	61	38	63	63										
015	↓	80	E	—	—		58	57	56	37	65	64										

COEFFICIENTS:

a or B SCHEDULES

C: $\alpha = 50^\circ$ TO 70° $\Delta\alpha = 2^\circ$ $\epsilon; \beta = -10^\circ$ TO 10° $\Delta\beta = 2^\circ$
D: $\alpha = 70^\circ$ TO 90° $\Delta\alpha = 2^\circ$

IDPVAR(1) IDPVAR(2) IDPVAR(3)

TABLE III.
DIMENSIONAL DATA

MODEL COMPONENT: BODY - N₃B₆

GENERAL DESCRIPTION: MSFC Pump Fed Booster Body with Short Cutout on
Bottom of Aft End.

DRAWING NUMBER: _____

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length , ft	<u>133.4</u>	<u>0.453</u>
Max. Width, in.	<u>395.9</u>	<u>1.346</u>
Max. Depth , in.	<u>395.9</u>	<u>1.346</u>
Fineness Ratio	<u>4.044</u>	<u>4.044</u>
Area , ft ²		
Max. Cross-Sectional	<u>854.8</u>	<u>1.423</u>
Planform	<u> </u>	<u> </u>
Wetted	<u> </u>	<u> </u>
Base	<u>854.8</u>	<u>1.423</u>
Body Diameter, In.	<u>395.6</u>	<u>1.346</u>
Base Diameter, in.	<u>395.6</u>	<u>1.346</u>
Conical Nose Angle, degrees	<u>40.0</u>	<u>40.0</u>
Cutout Angle, degrees	<u>15.0</u>	<u>15.0</u>
Cutout Length, in.	<u> </u>	<u> </u>
Cutout Height, in.	<u> </u>	<u> </u>

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N₁B₇GENERAL DESCRIPTION: MSFC Pump Fed Booster Body with Long Cutout on Bottom
of Aft EndDRAWING NUMBER: _____DIMENSIONS:FULL-SCALEMODEL SCALE

Length, ft.	<u>133.4</u>	<u>0.453</u>
Max. Width, inches	<u>395.9</u>	<u>1.346</u>
Max. Depth, inches	<u>395.9</u>	<u>1.346</u>
Fineness Ratio	<u>4.044</u>	<u>4.044</u>
Area, ft ²		
Max. Cross-Sectional	<u>854.8</u>	<u>1.423</u>
Planform	<u> </u>	<u> </u>
Wetted	<u> </u>	<u> </u>
Base	<u>854.8</u>	<u>1.423</u>
Body Diameter, inches	<u>395.6</u>	<u>1.346</u>
Base Diameter, inches	<u>395.6</u>	<u>1.346</u>
Conical Nose Angle, degrees	<u>40.0</u>	<u>40.0</u>
Cutout Angle, degrees	<u>15.0</u>	<u>15.0</u>
Cutout Length, inches	<u> </u>	<u> </u>
Cutout Height, inches	<u> </u>	<u> </u>

TABLE III. (CONTINUED)

MODEL COMPONENT: Fin - F₂GENERAL DESCRIPTION: Fins for MSFC Pump Fed Booster, Dihedral = 30°DRAWING NUMBER: _____DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	<u>508.7</u>	<u>0.0059</u>
Span (equivalent)	<u>310.3</u>	<u>1.055</u>
Inb'd equivalent chord	<u>354.1</u>	<u>1.204</u>
Outb'd equivalent chord	<u>117.9</u>	<u>0.401</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u> </u>	<u> </u>
At Outb'd equiv. chord	<u> </u>	<u> </u>
Sweep Back Angles, degrees		
Leading Edge	<u>45°</u>	<u>45°</u>
Tailing Edge	<u>13.45°</u>	<u>13.45°</u>
Hingeline	<u> </u>	<u> </u>
Area Moment (Normal to hinge line)	<u> </u>	<u> </u>

TABLE III. (CONTINUED)

MODEL COMPONENT: Fin - F3

GENERAL DESCRIPTION: Fins for MSFC Pump Fed Bosoter, Dihedral = 30°

DRAWING NUMBER: _____

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	<u>339.1</u>	<u>0.00392</u>
Span (equivalent)	<u>206.8</u>	<u>0.703</u>
Inb'd equivalent chord	<u>354.1</u>	<u>1.204</u>
Outb'd equivalent chord	<u>117.9</u>	<u>0.401</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u> </u>	<u> </u>
At Outb'd equiv. chord	<u> </u>	<u> </u>
Sweep Back Angles, degrees		
Leading Edge	<u>50.0</u>	<u>50.0</u>
Tailing Edge	<u>2.88</u>	<u>2.88</u>
Hingeline	<u> </u>	<u> </u>
Area Moment (normal to hinge line)	<u> </u>	<u> </u>

TABLE IV.
INDEX OF MODEL FIGURES

<u>Figure</u>	<u>Description</u>	<u>Page Number</u>
1	Axis System	17
2	MSFC Pump Fed Booster	18
3	Nose N_1	19
4	Body B_6 , B_7	20
5	Balance Block	21
6	Fin	22

TABLE V. INDEX OF DATA FIGURES

TITLE	PLOTTED COEFFICIENTS SCHEDULE	CONDITIONS VARYING	PAGES
Effect of Configuration on Longitudinal Characteristics	A	Configuration	1-54
Effect of Configuration on Directional Characteristics	B	Configuration, Alpha	55-78

PLOTTED COEFFICIENTS SCHEDULE:

(A) C_{LM}, C_N, C_A, C_L, C_D, L/D vs. ALPHA;

C_N, C_L vs. C_{LM}; C_L vs. C_D

(B) C_Y, C_{BL}, C_{YN} vs. BETA;

C_Y vs. C_{YN}

MODEL FIGURES

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

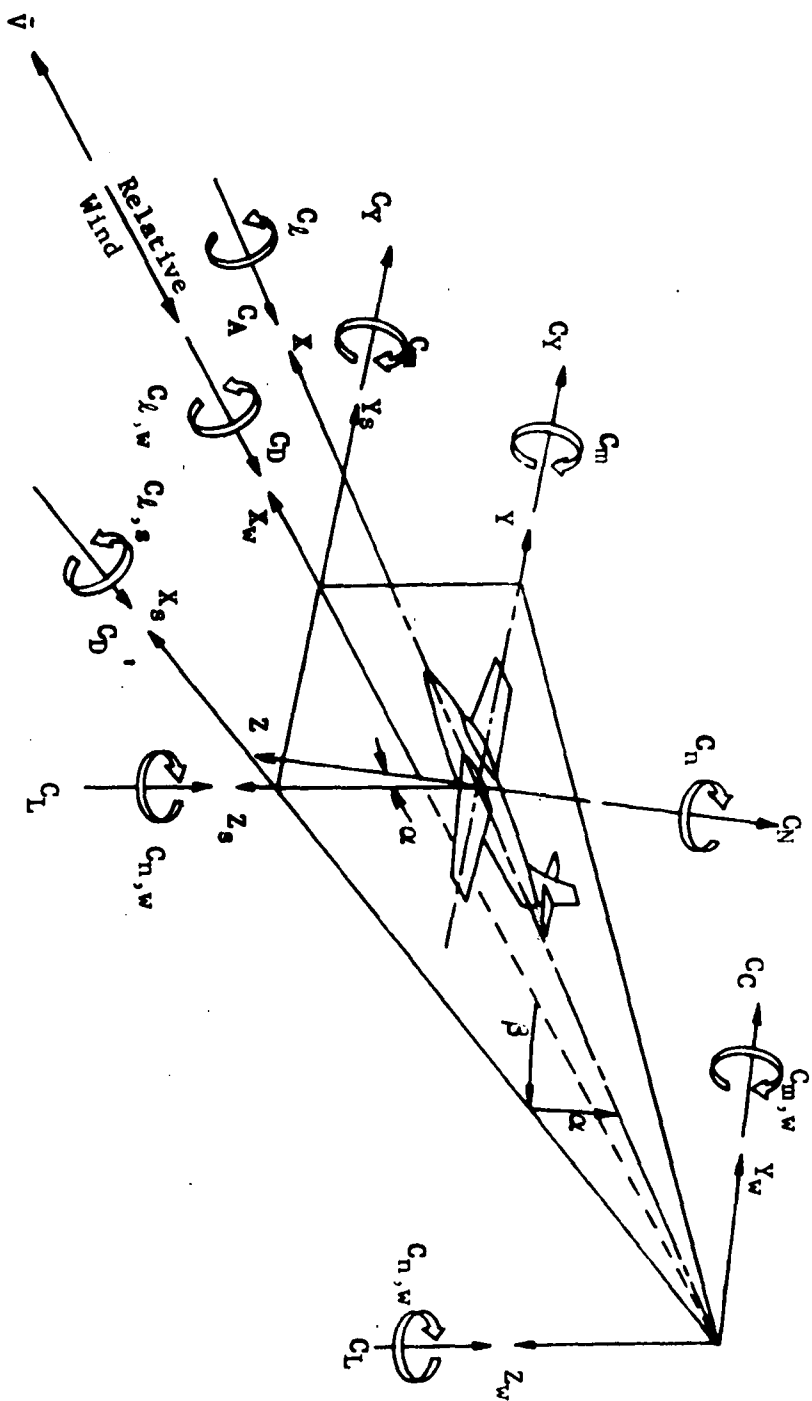


Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

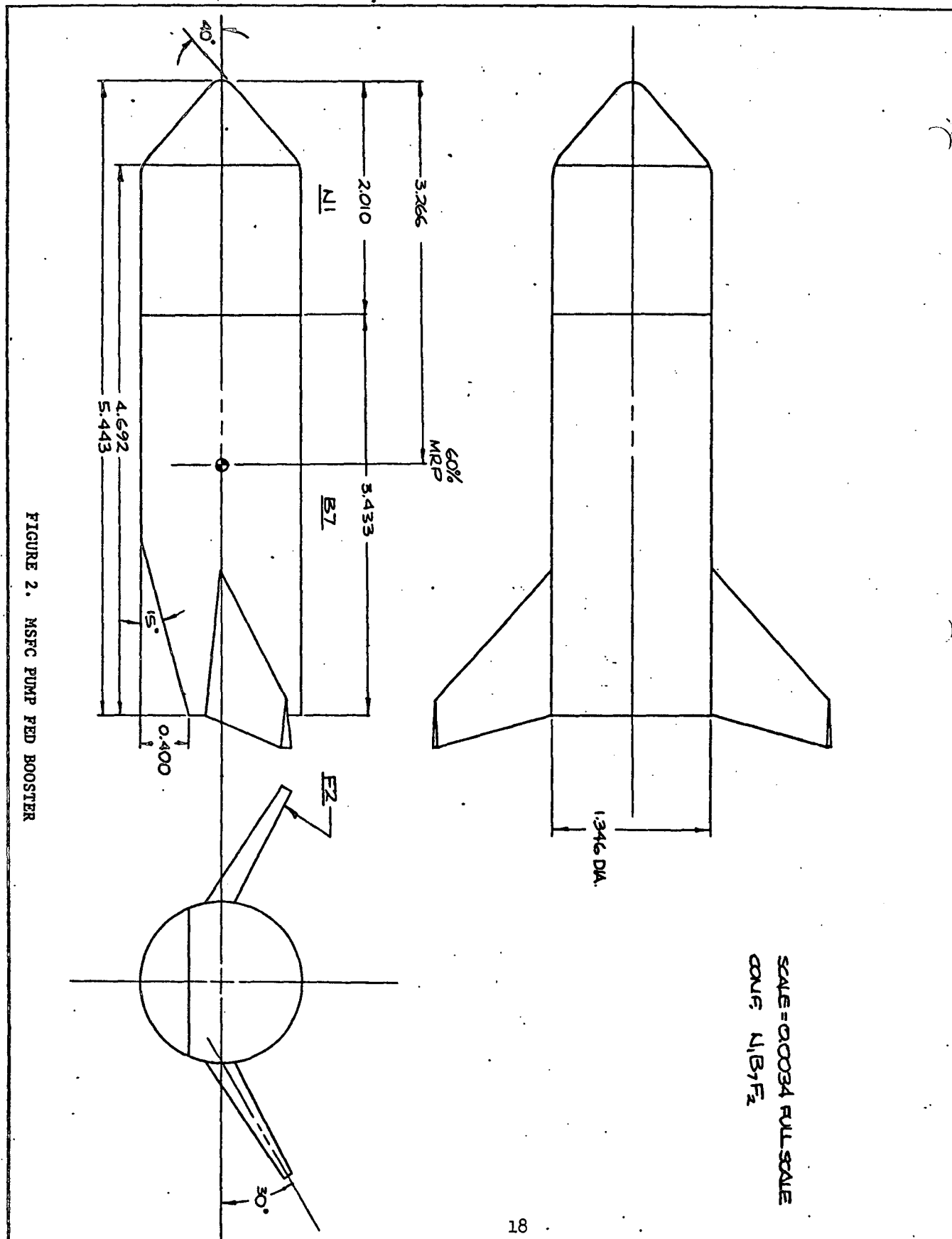
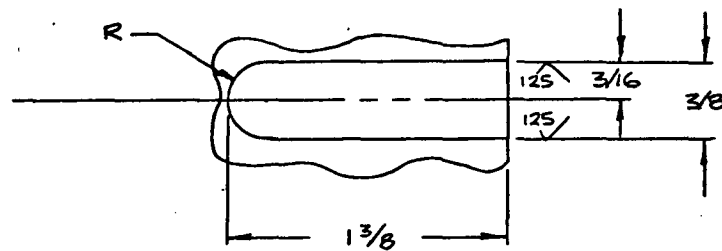
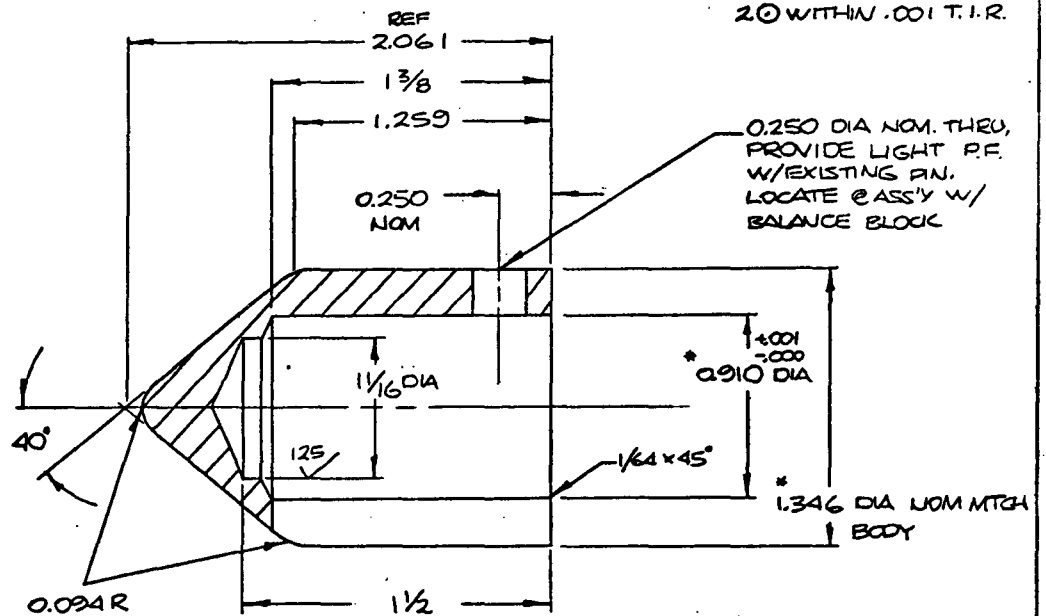


FIGURE 2. MSFC PUMP FEED BOOSTER

NOTES:

1. $\sqrt[32]{}$ EXCEPT AS SHOWN
2. ϕ WITHIN .001 T.I.R.



NOSE N_1

ALAL OR CRES TYPE OPT.

$\pm \frac{1}{16} \pm .005 \pm 0.5^\circ$

FIGURE 3. NOSE N_1

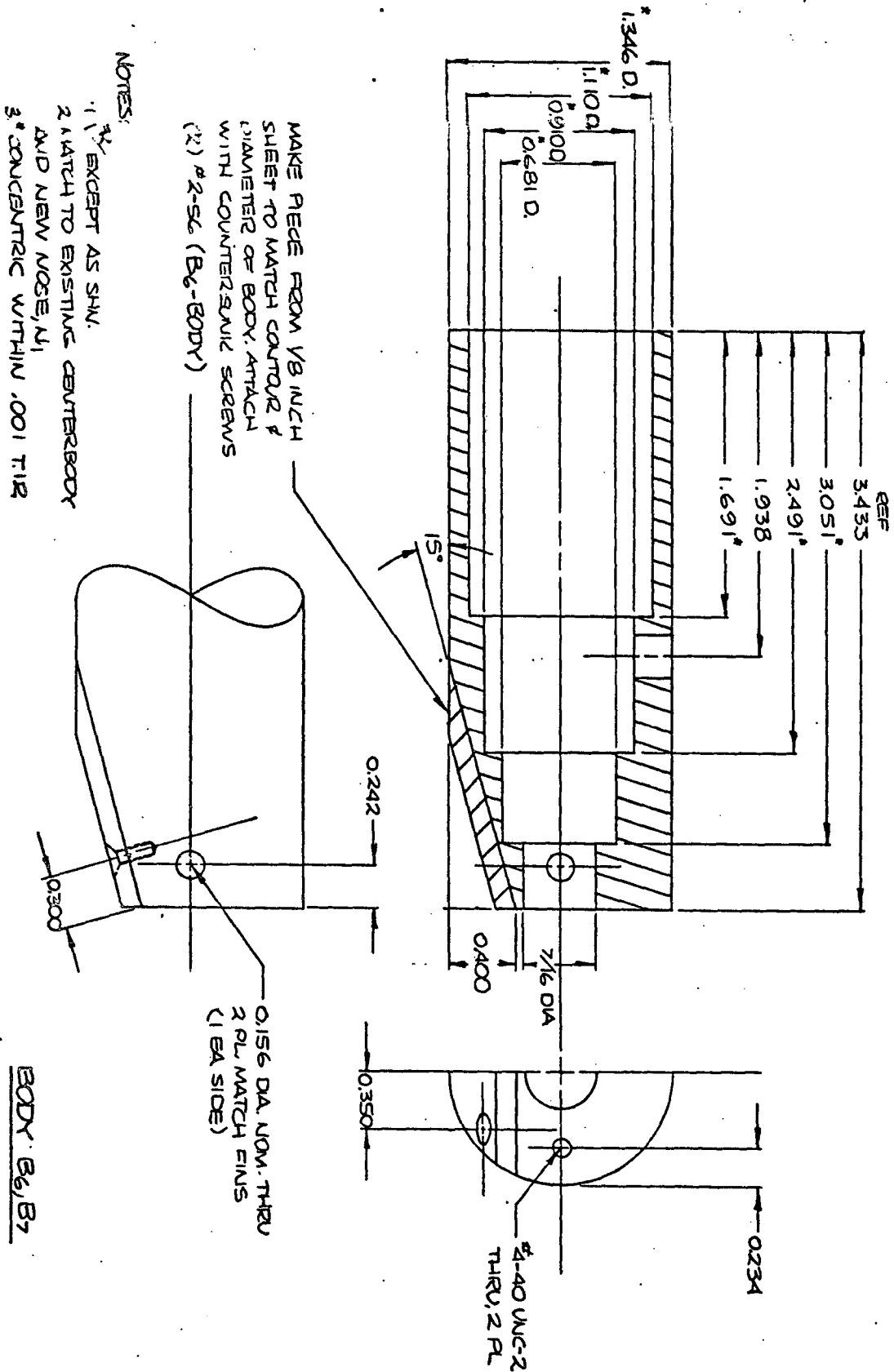
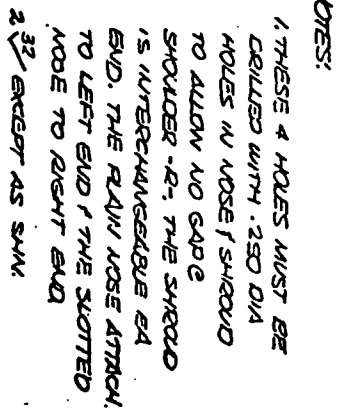


FIGURE 4. BODY B6, B7



Notes:

1. THESE 4 HOLES MUST BE
DRILLED WITH .250 DIA
HOLES IN NOSE / SHOULD
TO ALLOW NO GAP @
SHOULDER - R. THE SHOULDER
IS INTERCHANGEABLE EA
END. THE PLAIN NOSE ATTACH.
TO LEFT END / THE SCOTTED
NOSE TO RIGHT END

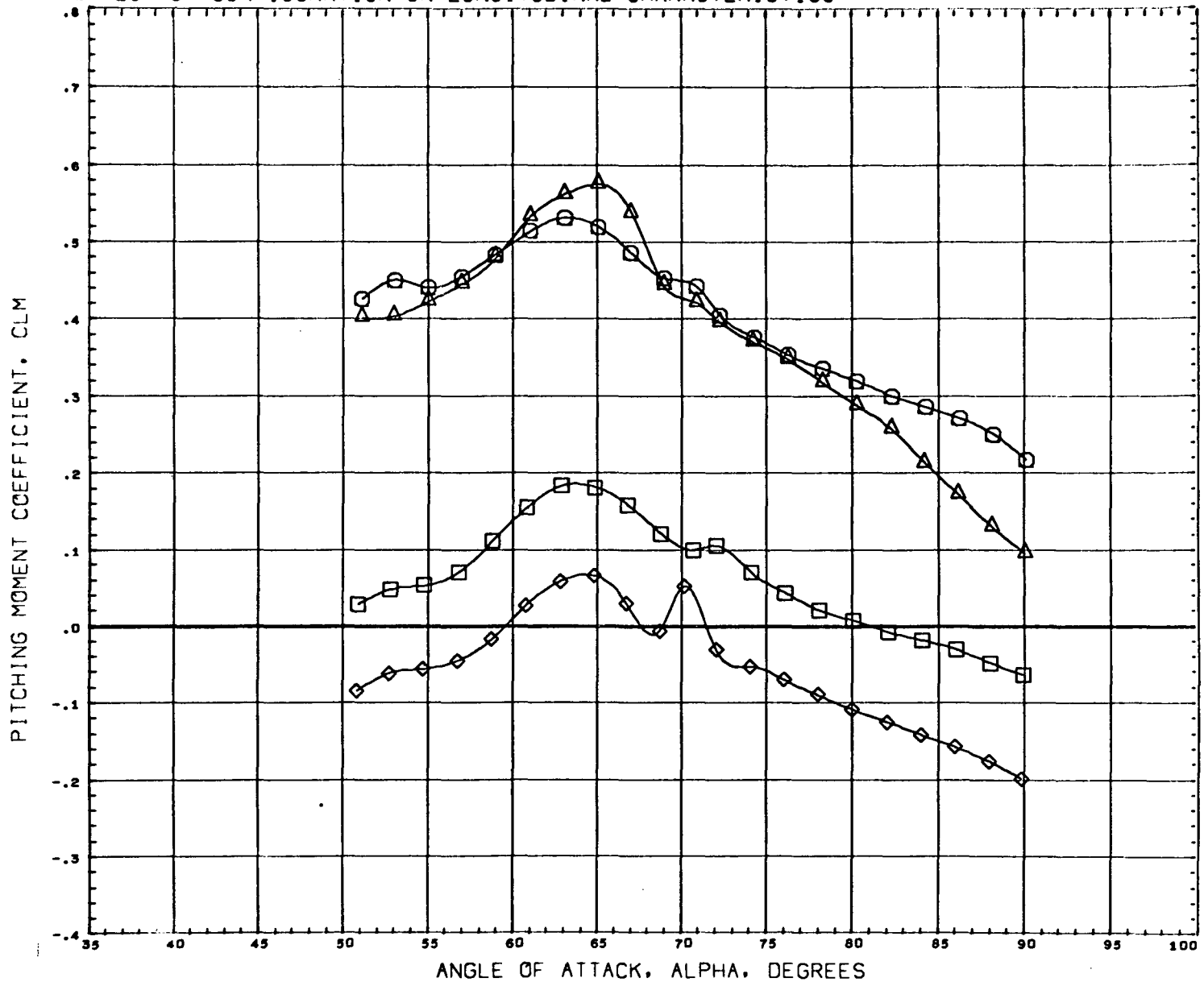
FIGURE 5. BALANCE BLOCK

BILLMAZE BLOCK (1)

P L O T T E D D A T A

Tabulations of the plotted data and corresponding
source data are available from SADSAC Operations.

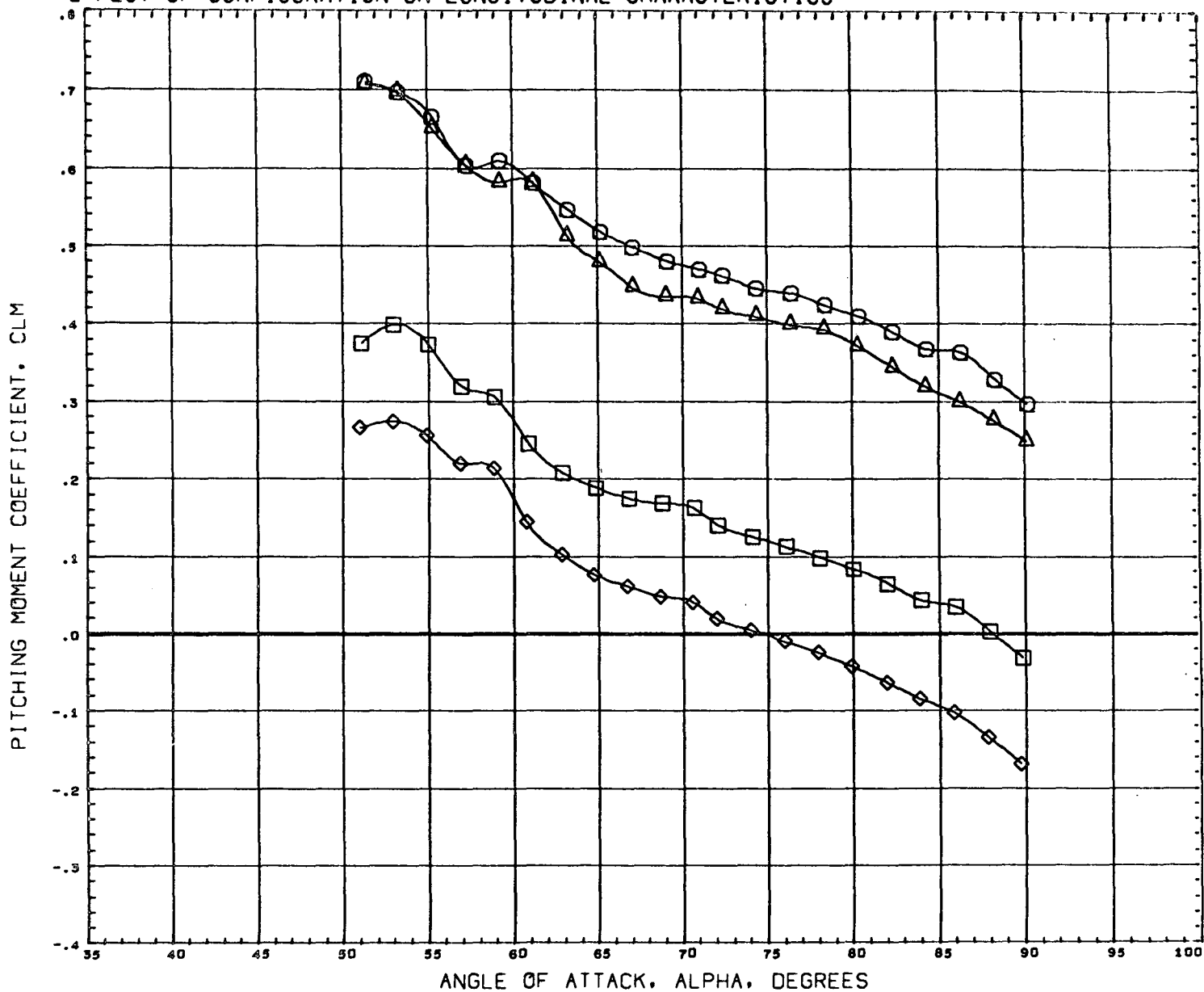
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.596

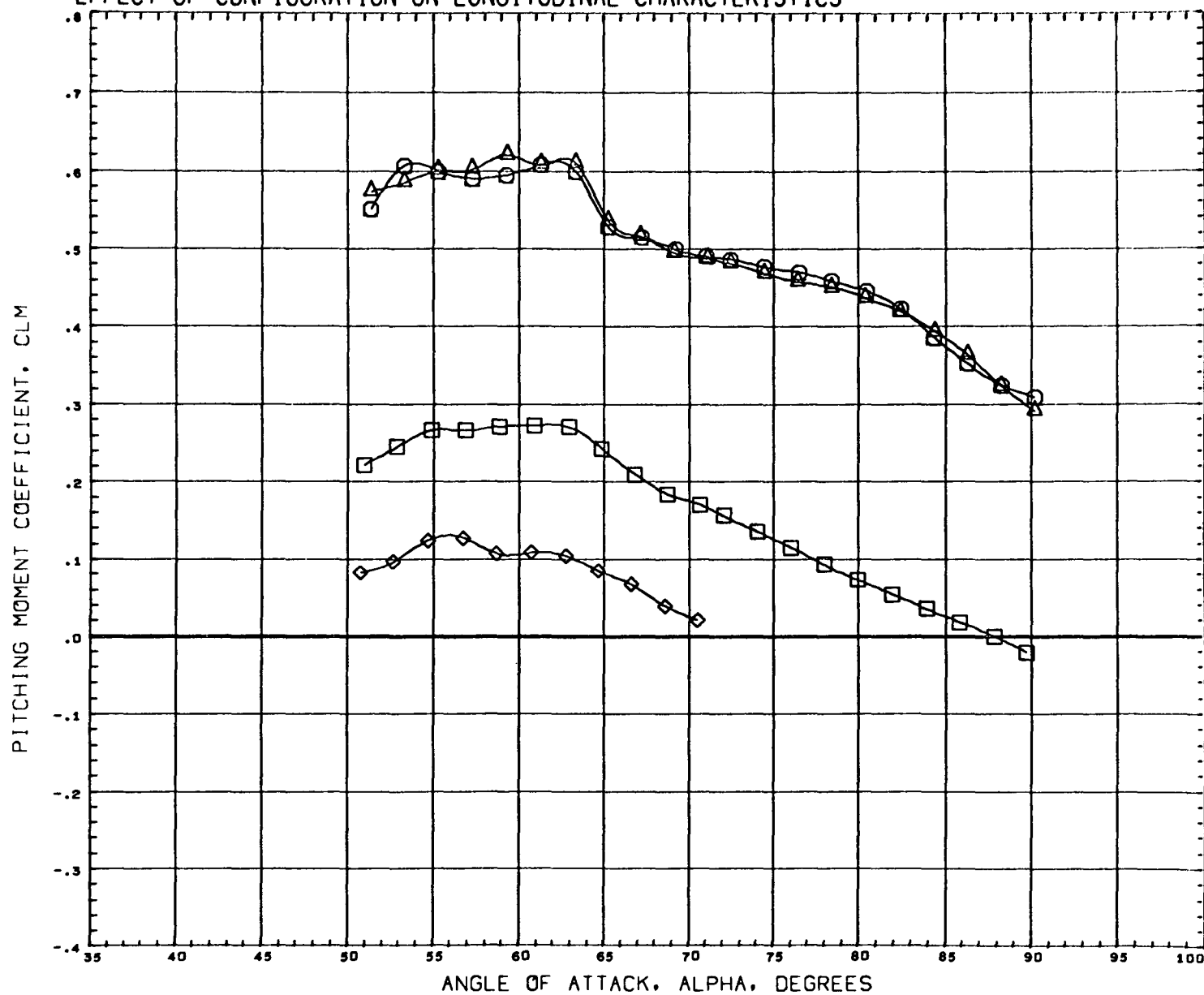
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



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(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.897

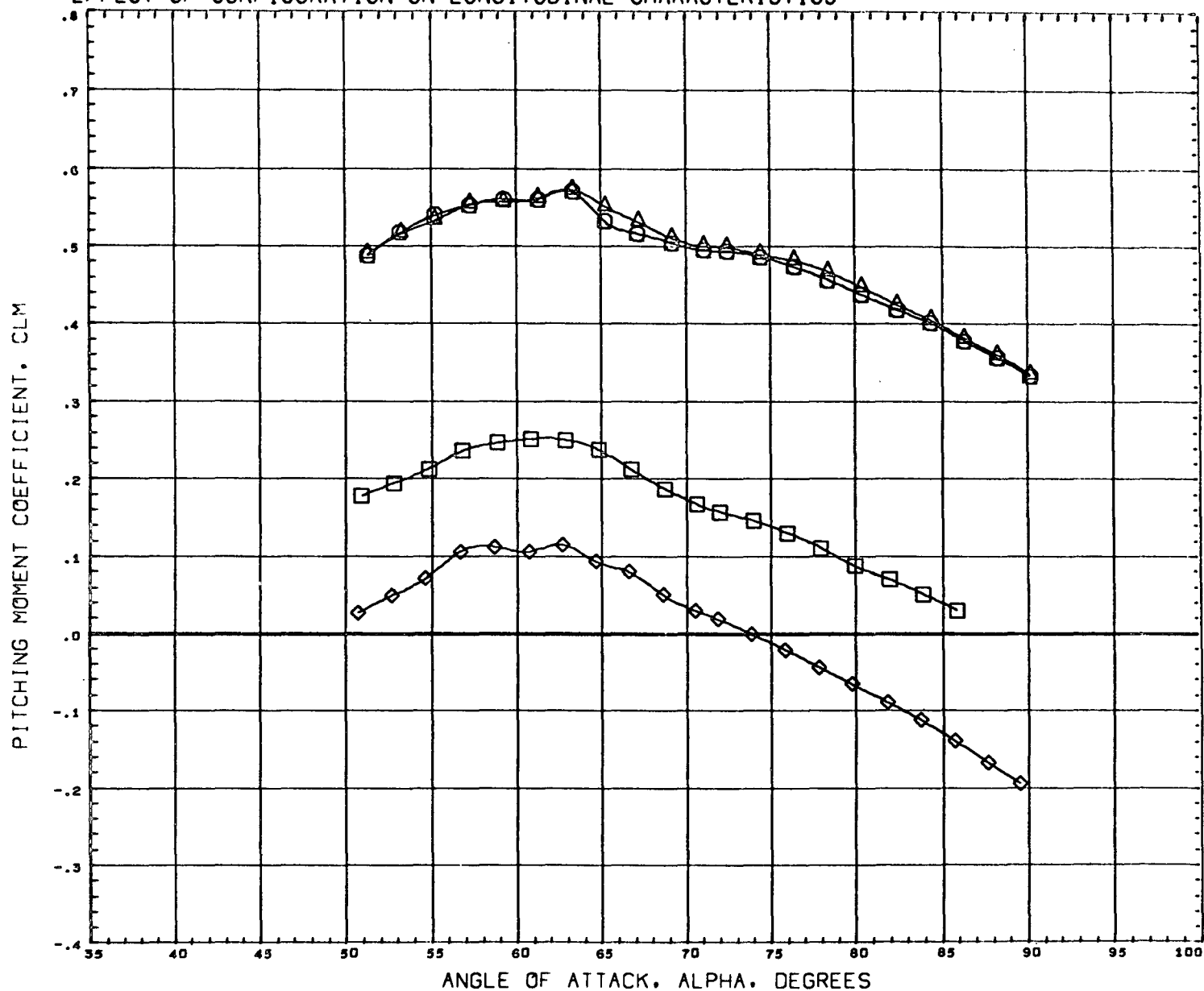
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION	
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF	1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF	5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF	5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP	3.2660 IN.
			YMRP	0.0000 IN.
			ZMRP	0.0000 IN.
			SCALE	0.0034

MACH 1.199

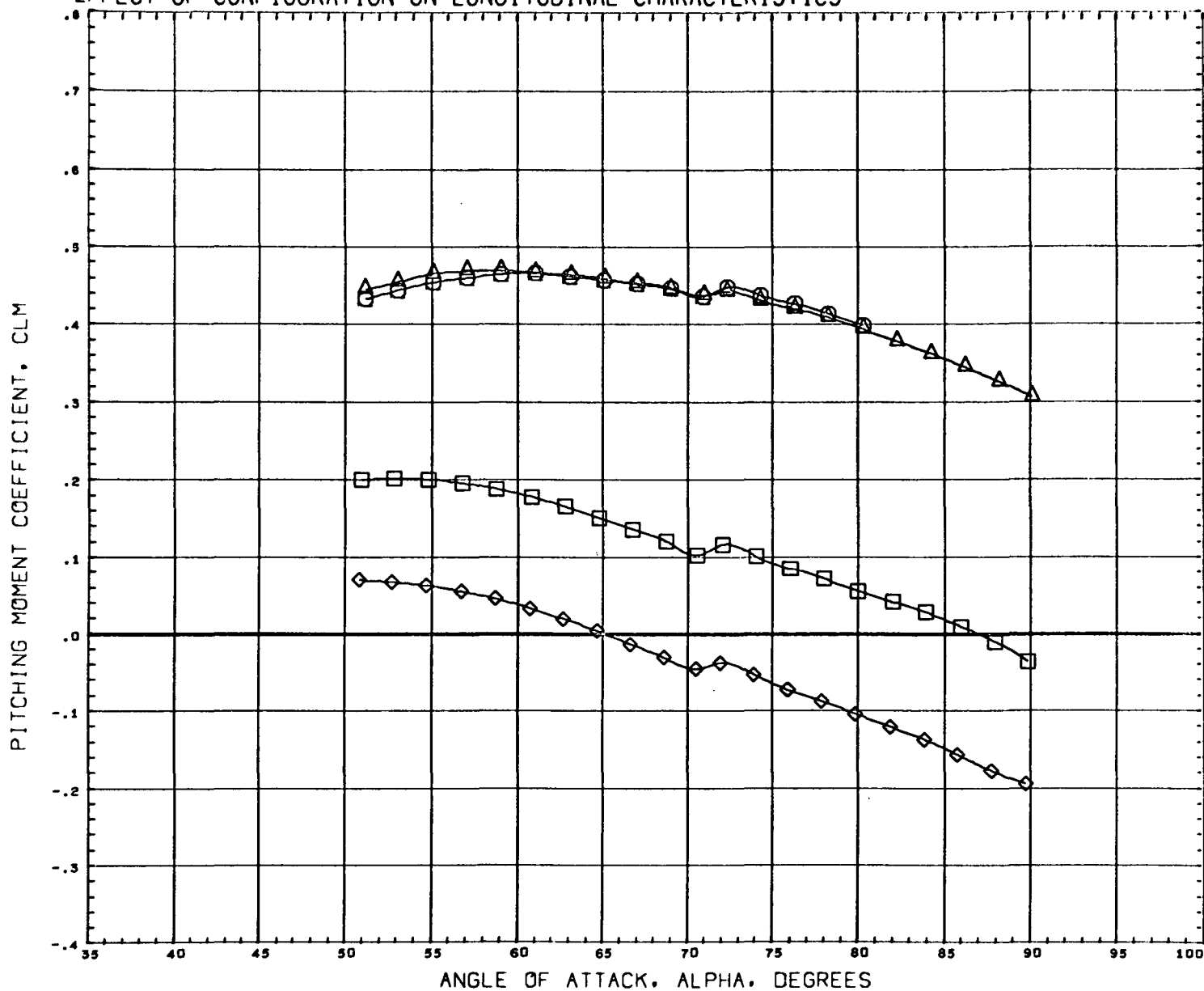
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.456

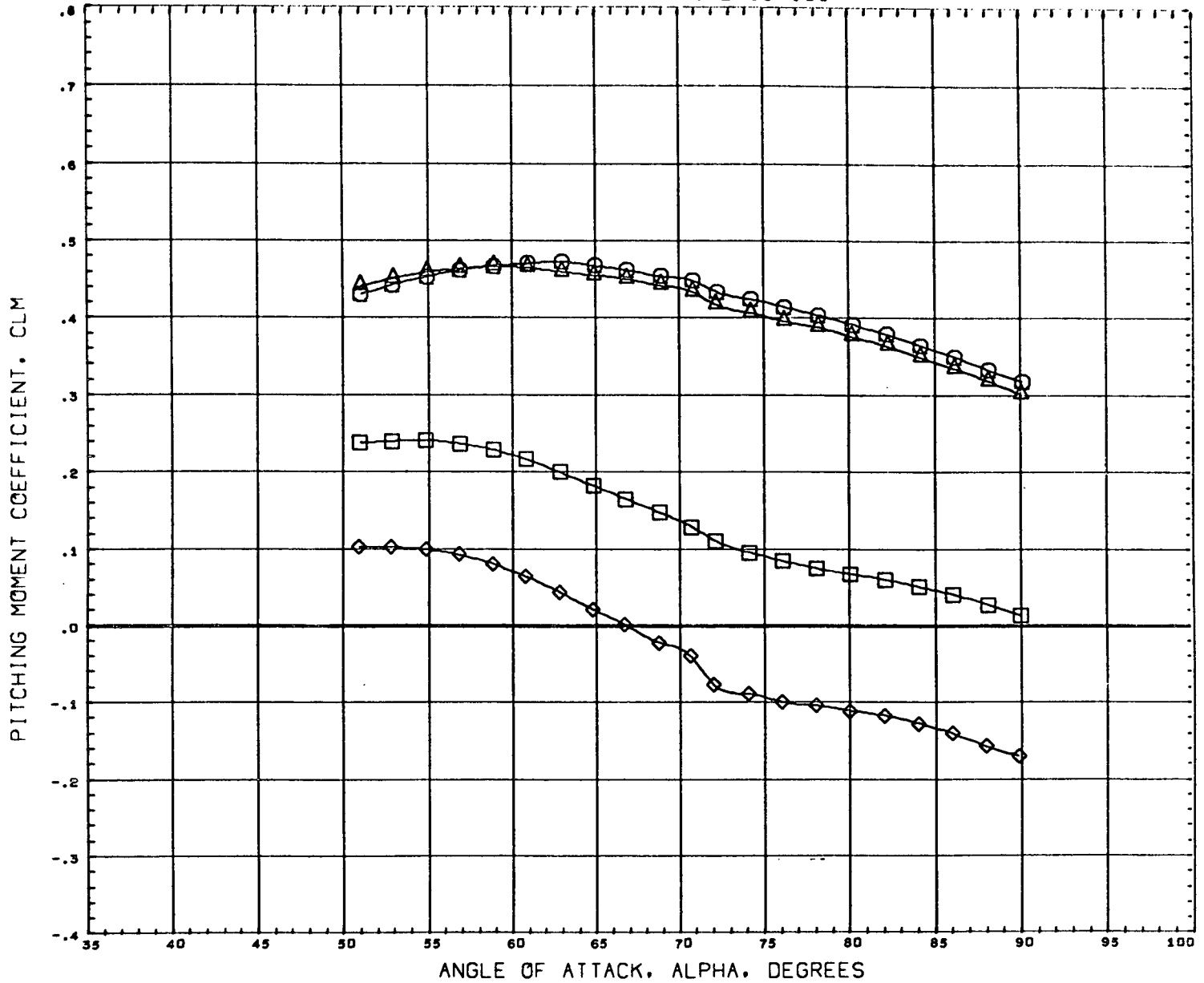
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 2.740

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(C63001)	MSFC TWT 529	33 FOOT BOOSTER	N1B6
(C63004)	MSFC TWT 529	33 FOOT BOOSTER	N1B7
(C63008)	MSFC TWT 529	33 FOOT BOOSTER	N1B7F2
(C63012)	MSFC TWT 529	33 FOOT BOOSTER	N1B7F3

BETA

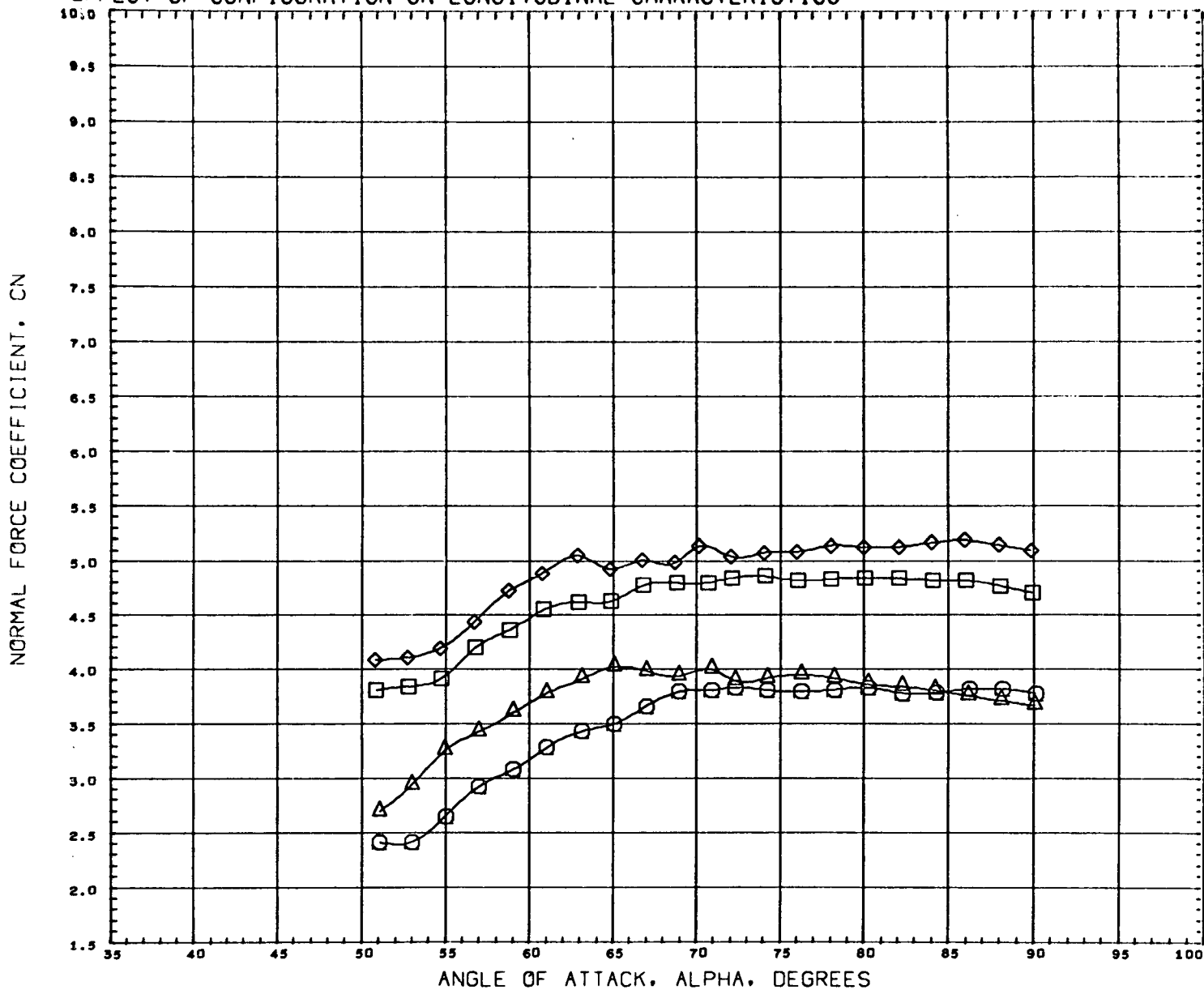
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0.000
0.000
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REFERENCE INFORMATION

SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.959

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



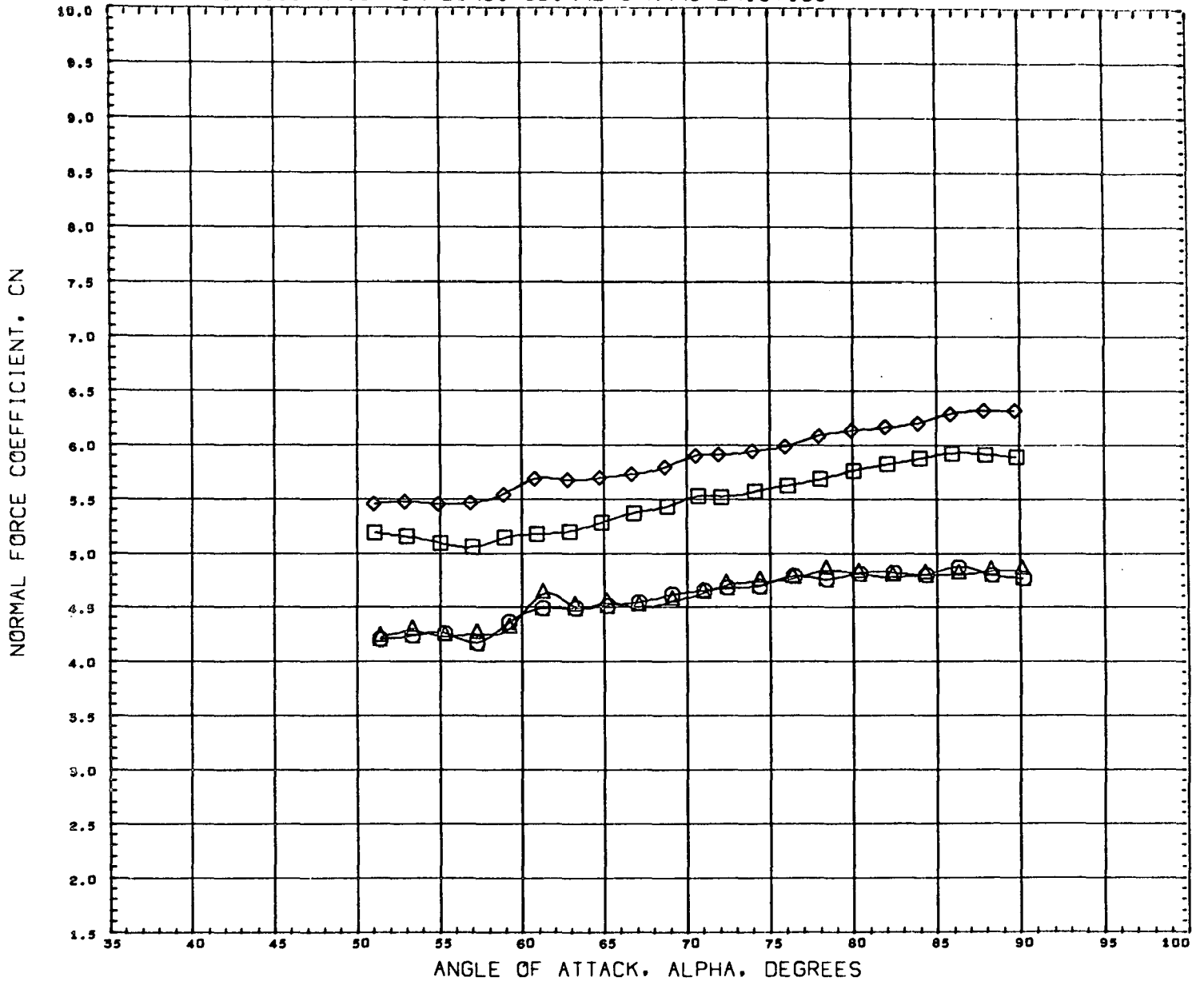
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	MSFC TWT 529 33 FOOT BOOSTER

BETA
0.000
0.000
0.000
0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 0.596

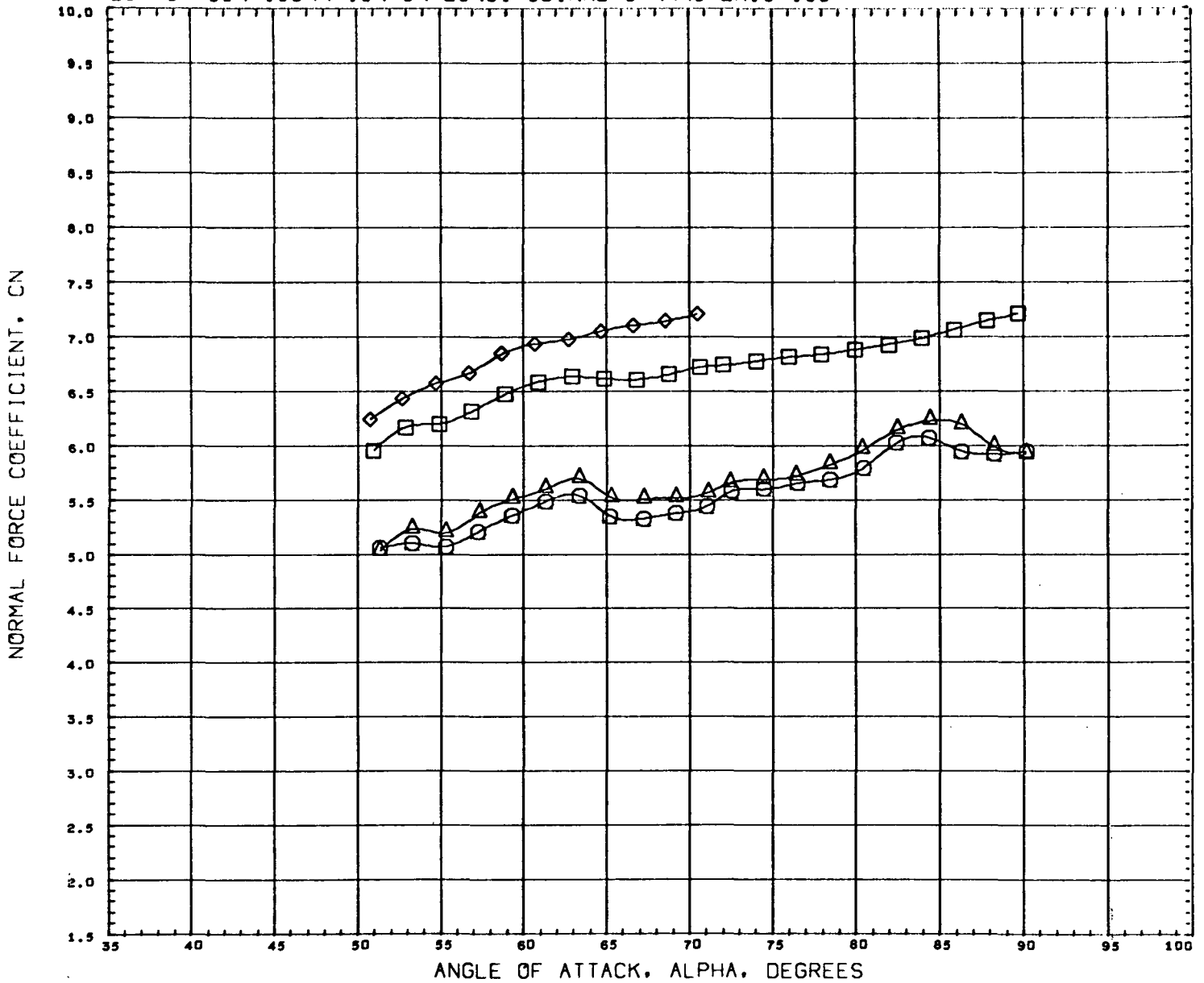
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.897

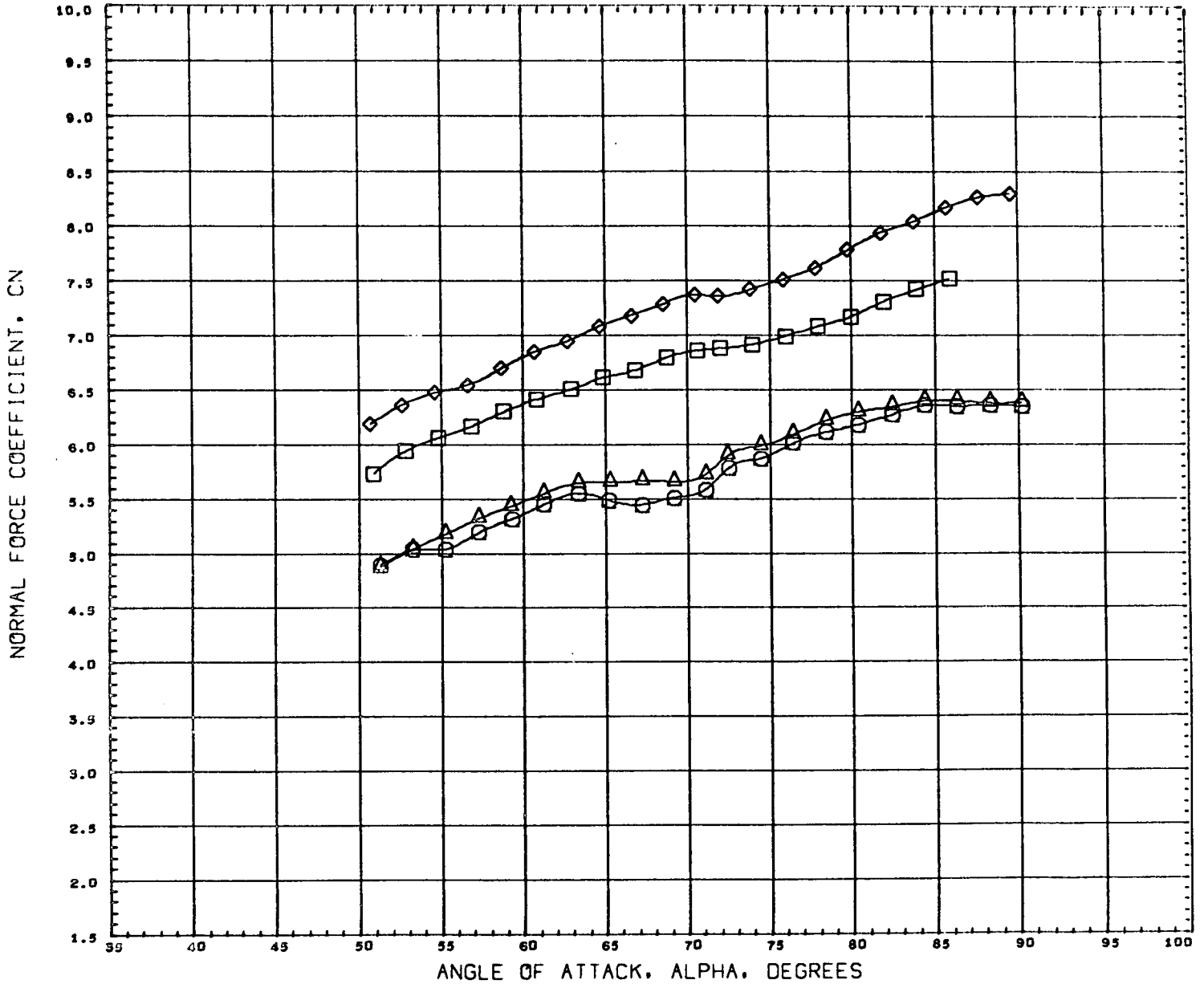
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.199

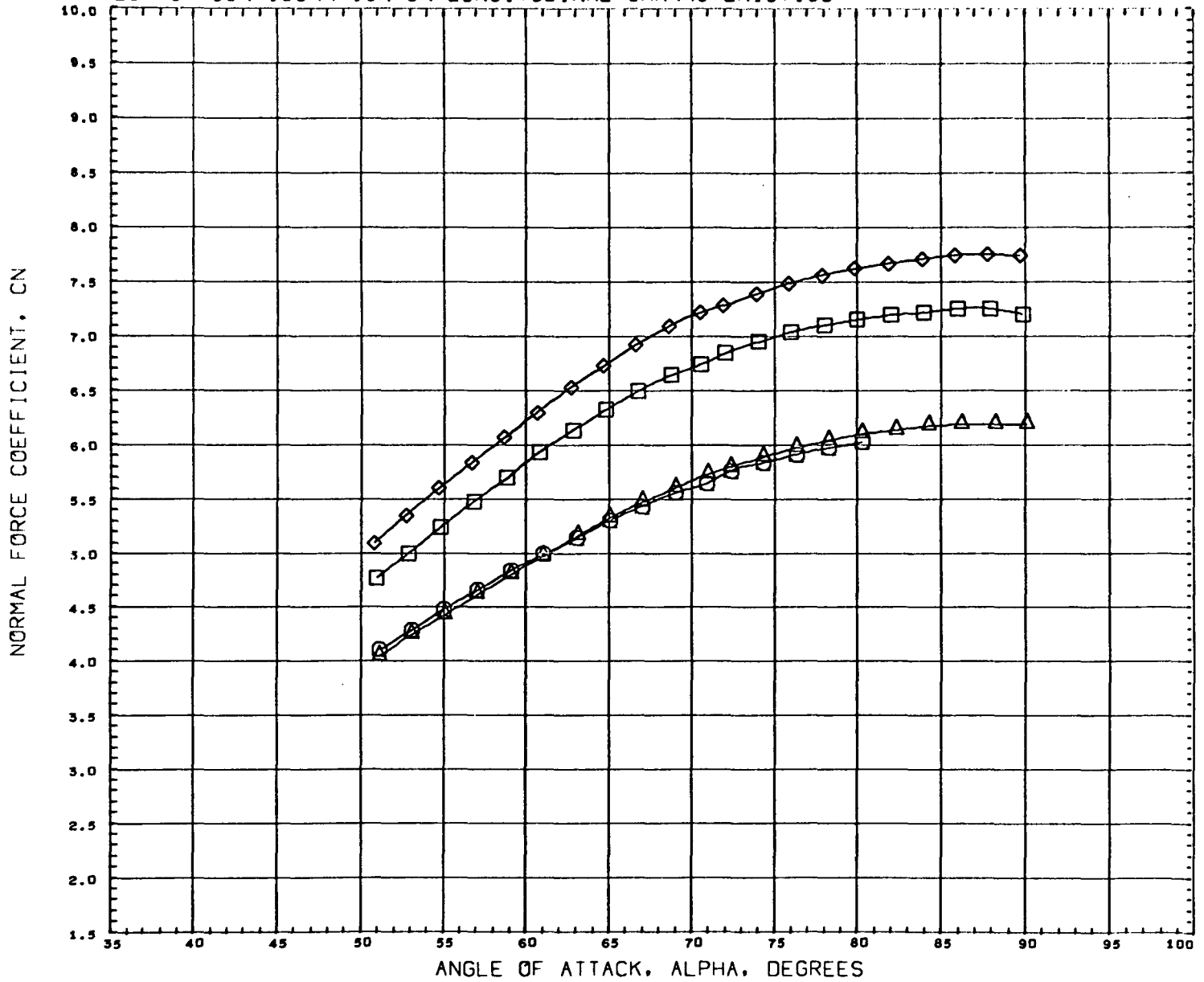
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION	
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF	1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF	5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF	5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP	3.2660 IN.
			YMRP	0.0000 IN.
			ZMRP	0.0000 IN.
			SCALE	0.0034

MACH 1.456

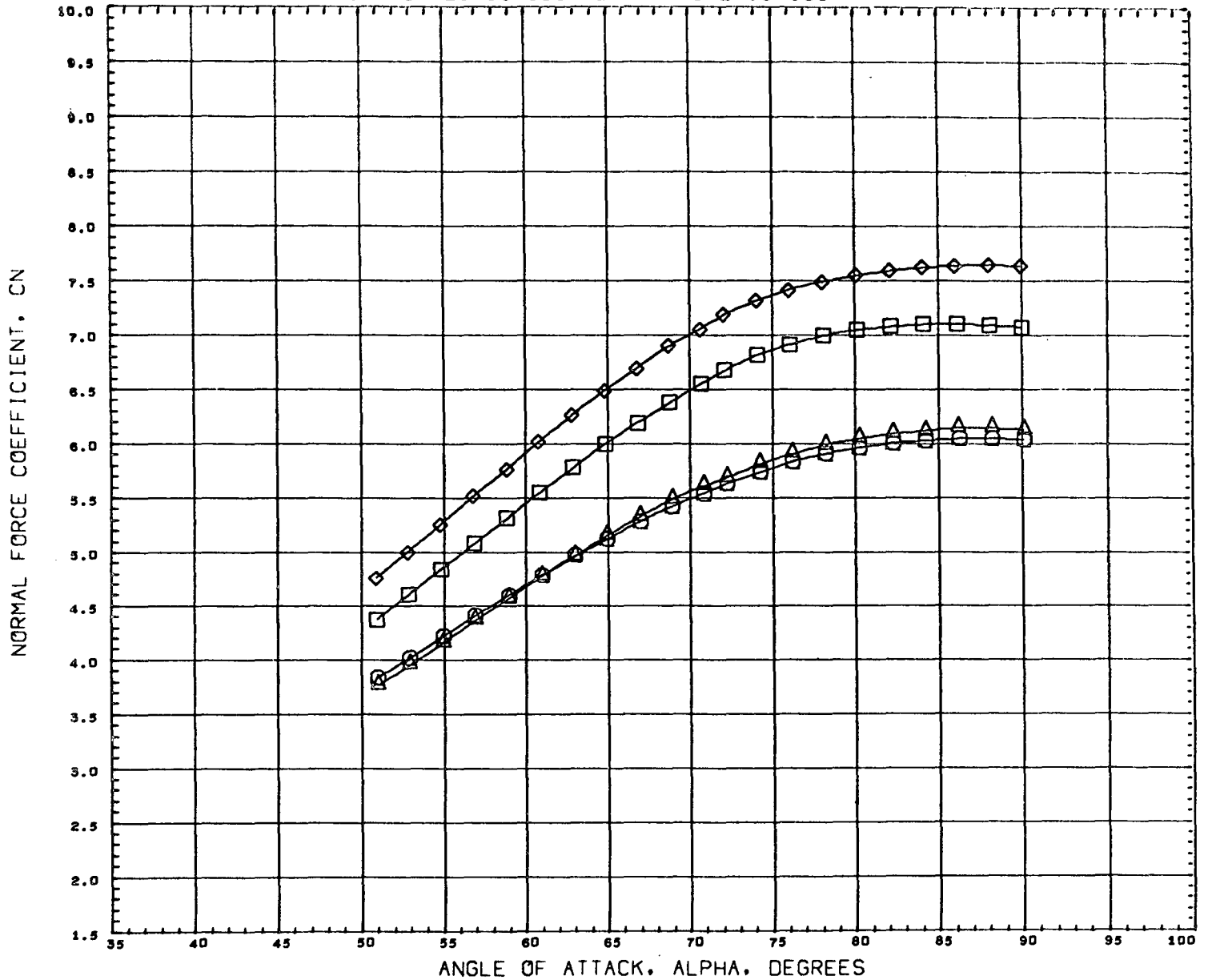
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 2.740

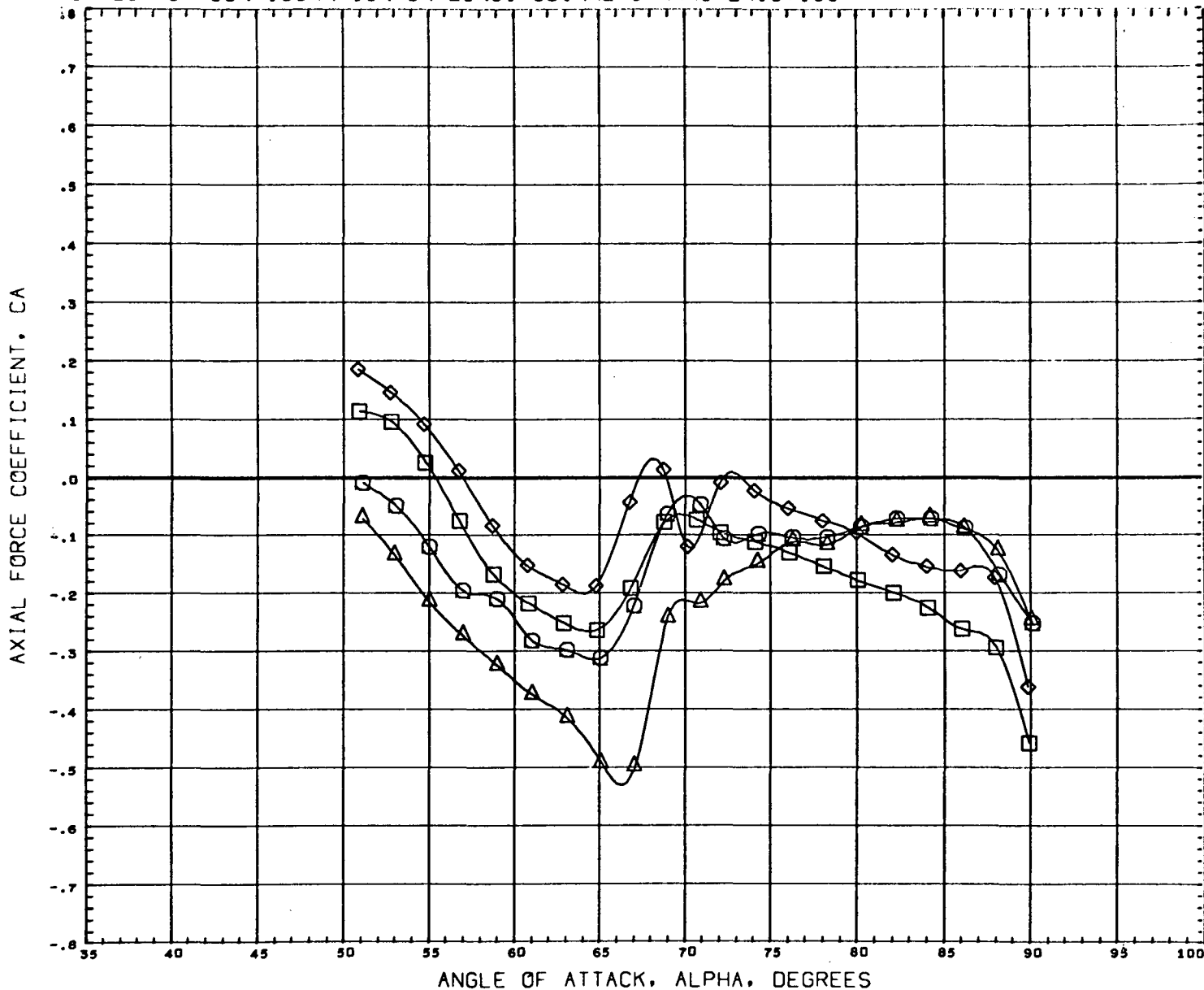
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 4.959

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



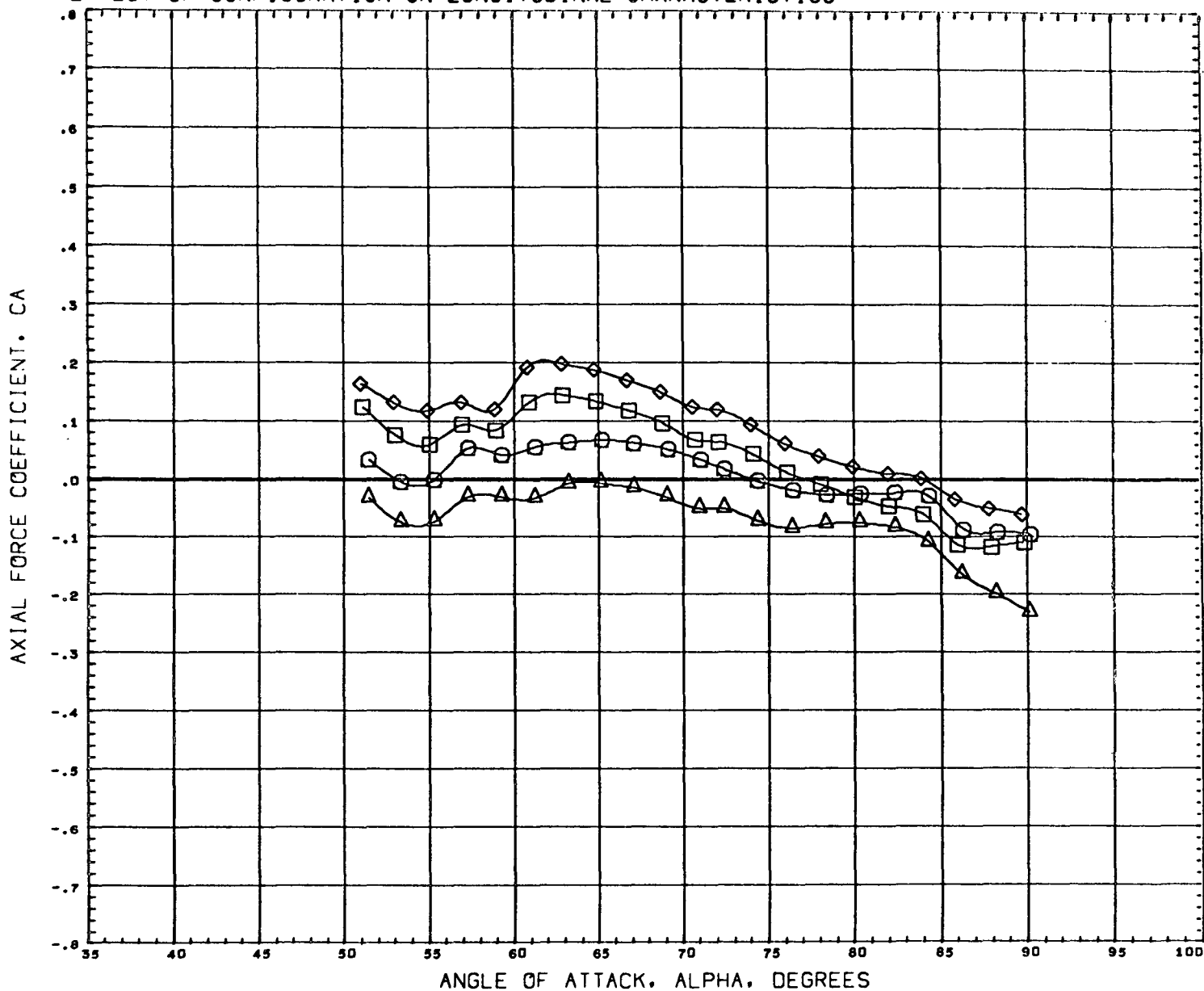
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3

BETA
0.000
0.000
0.000
0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 0.596

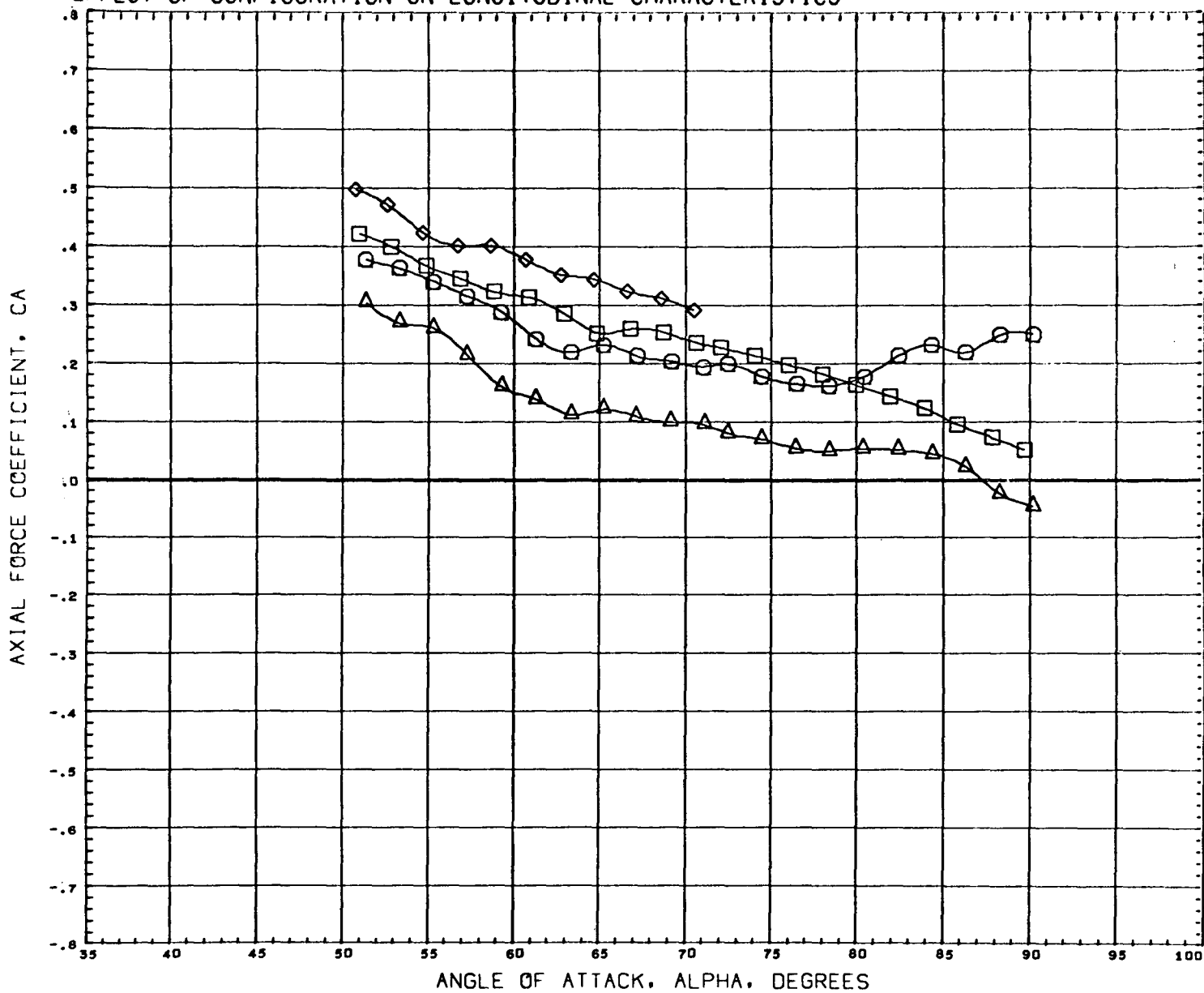
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.897

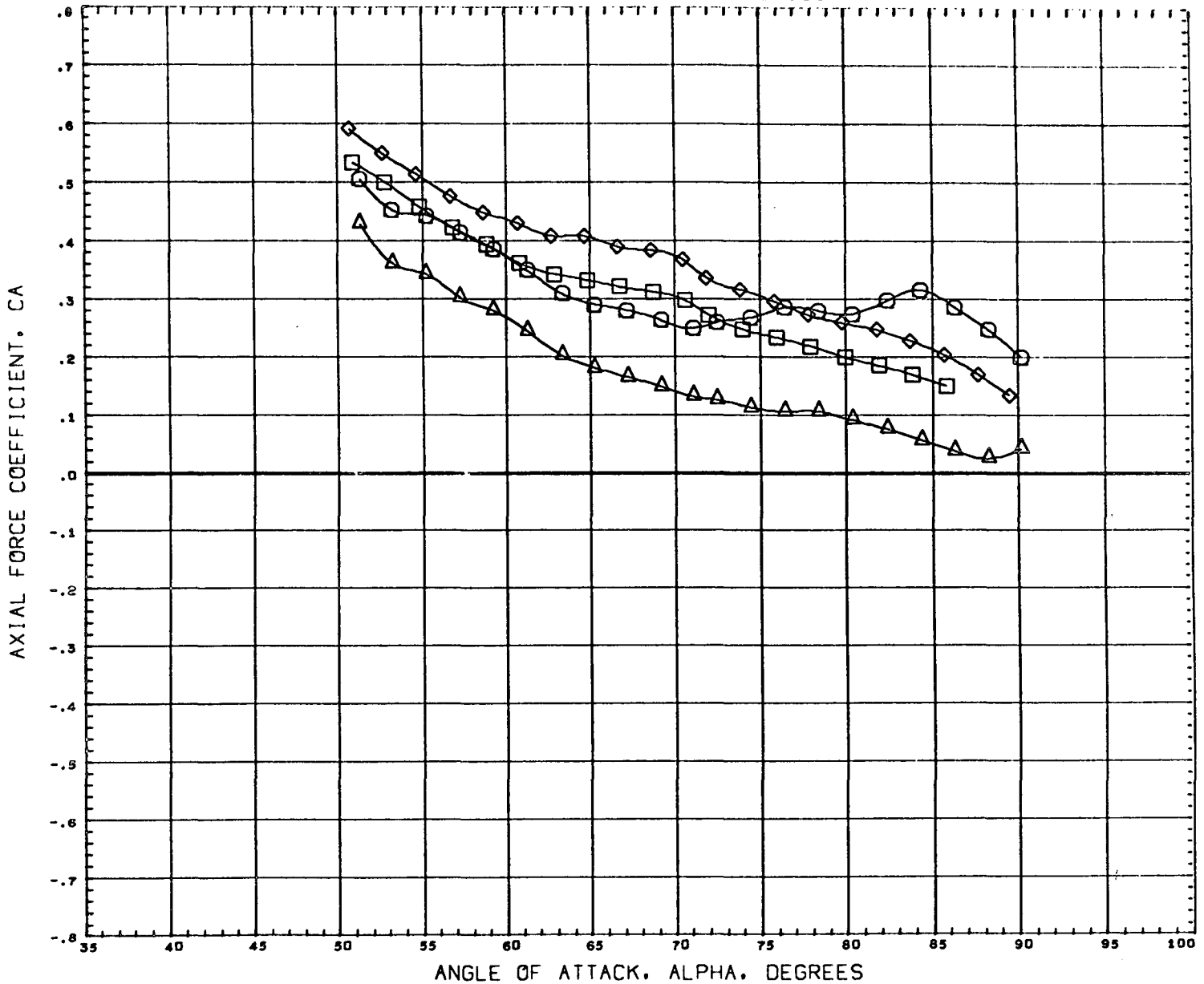
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.199

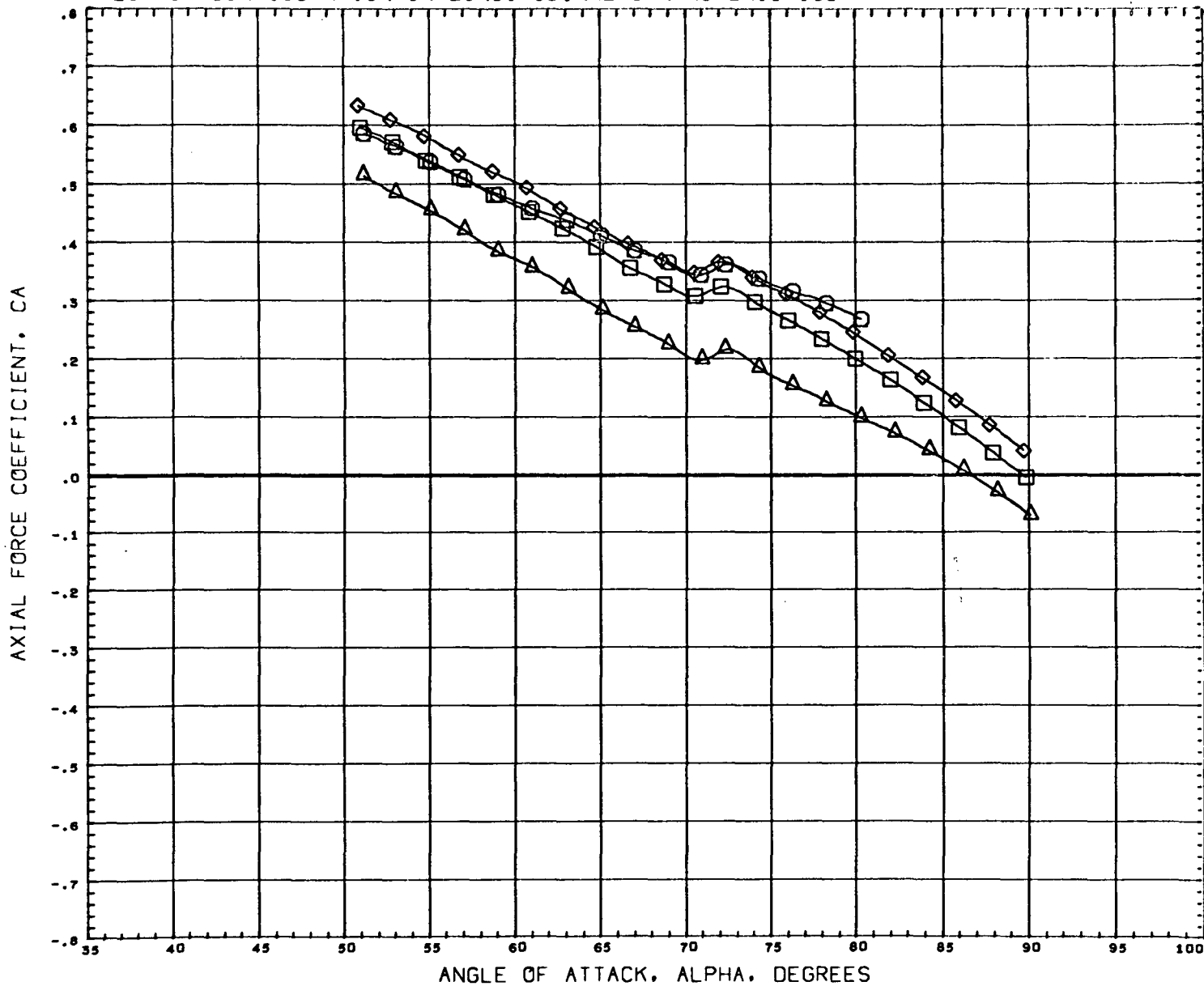
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.456

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



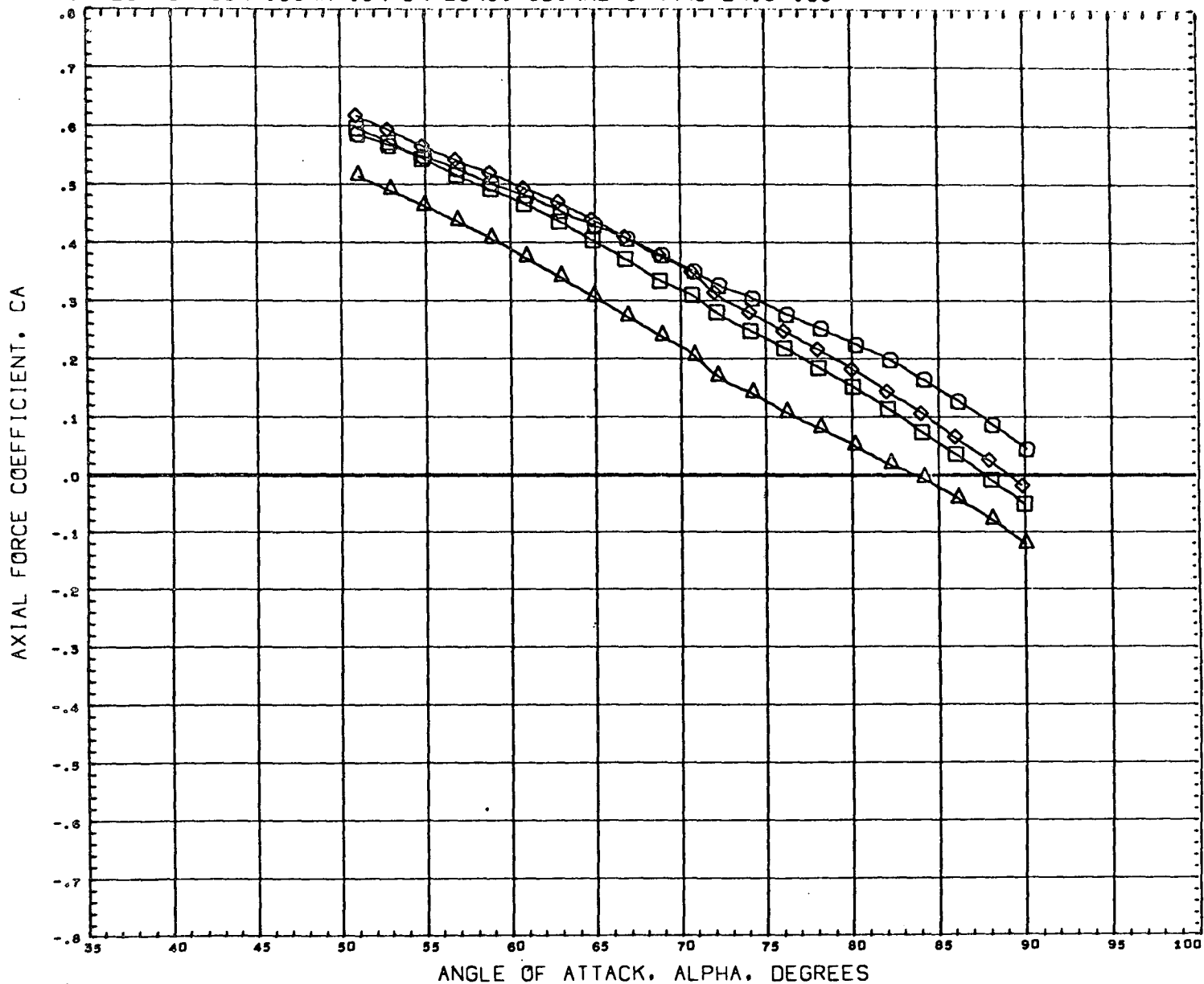
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	MSFC TWT 529 33 FOOT BOOSTER

	BETA
N1B6	0.000
N1B7	0.000
N1B7F2	0.000
N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 2.740

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

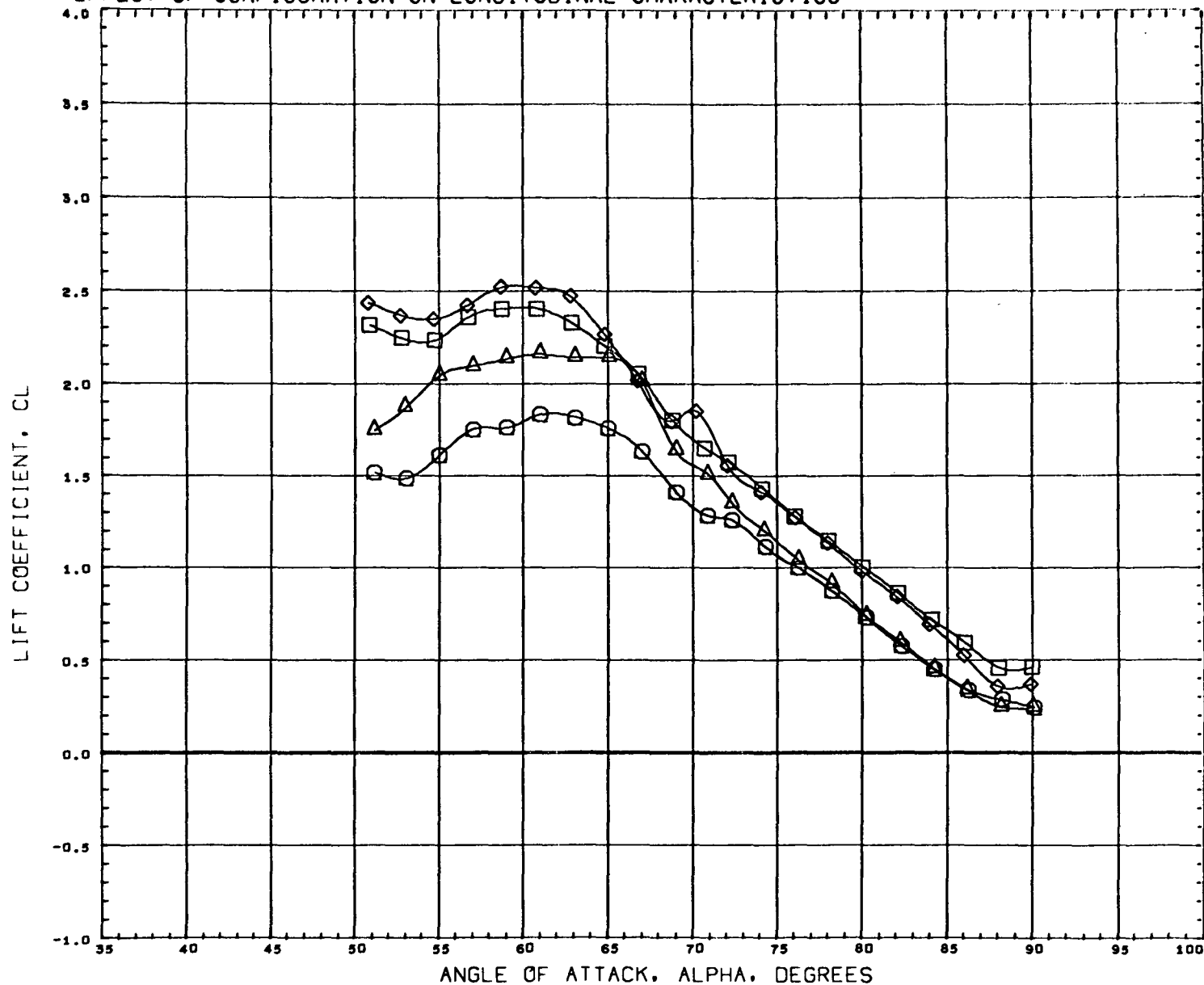


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

MACH 4.959

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

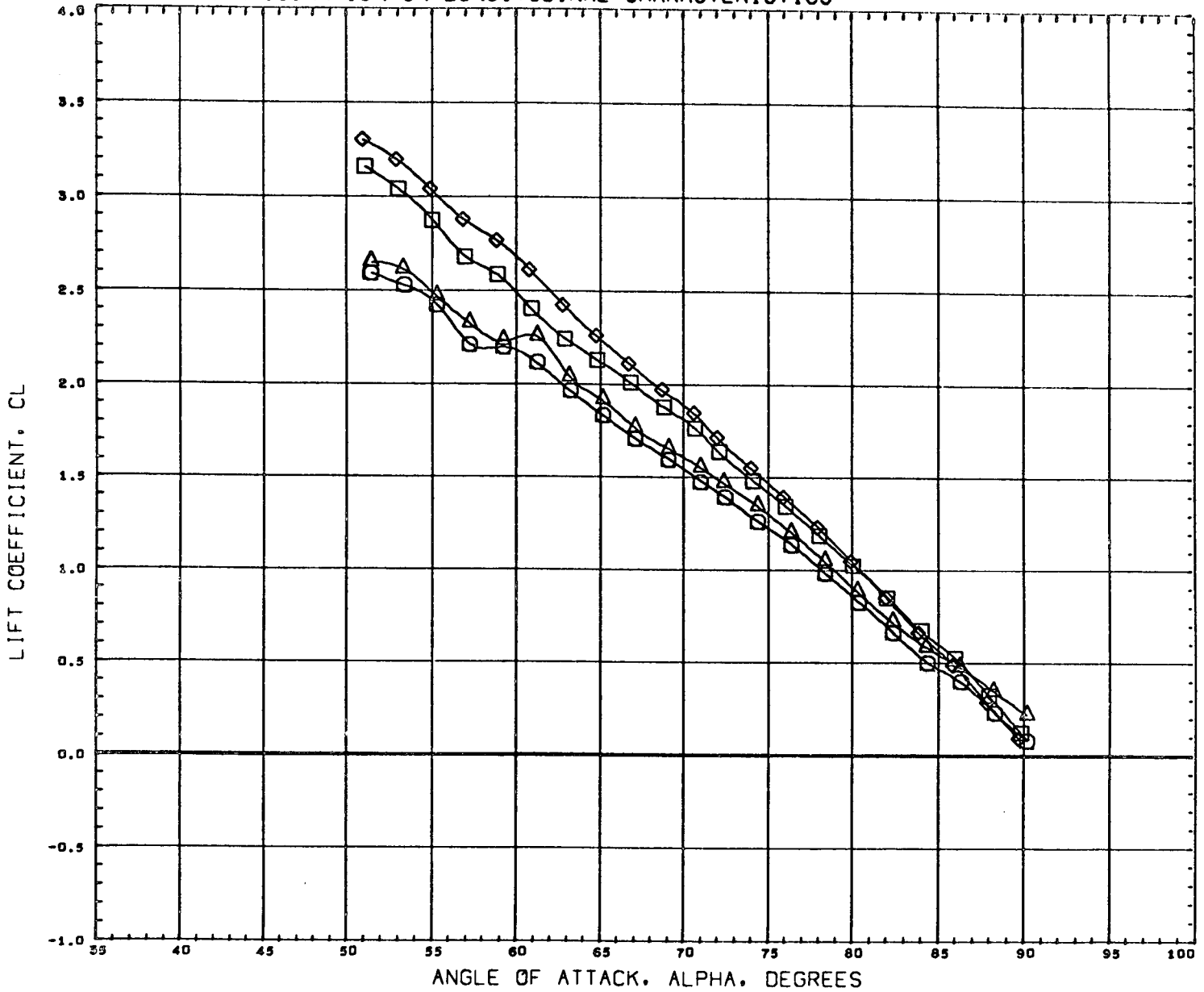
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.596

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



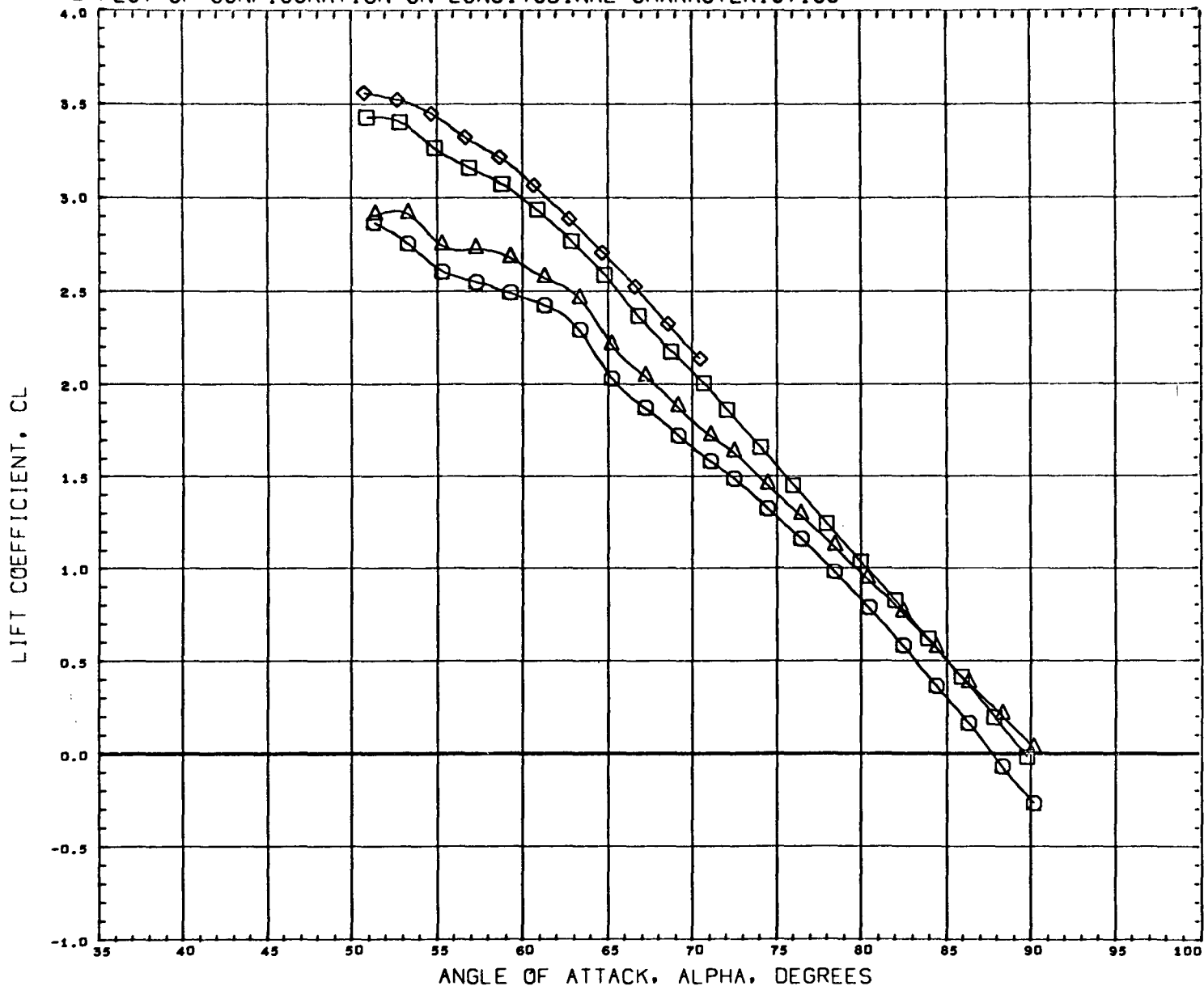
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	○	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	◇	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	□	MSFC TWT 529 33 FOOT BOOSTER

BETA
N1B6 0.000
N1B7 0.000
N1B7F2 0.000
N1B7F3 0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	5.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 0.897

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

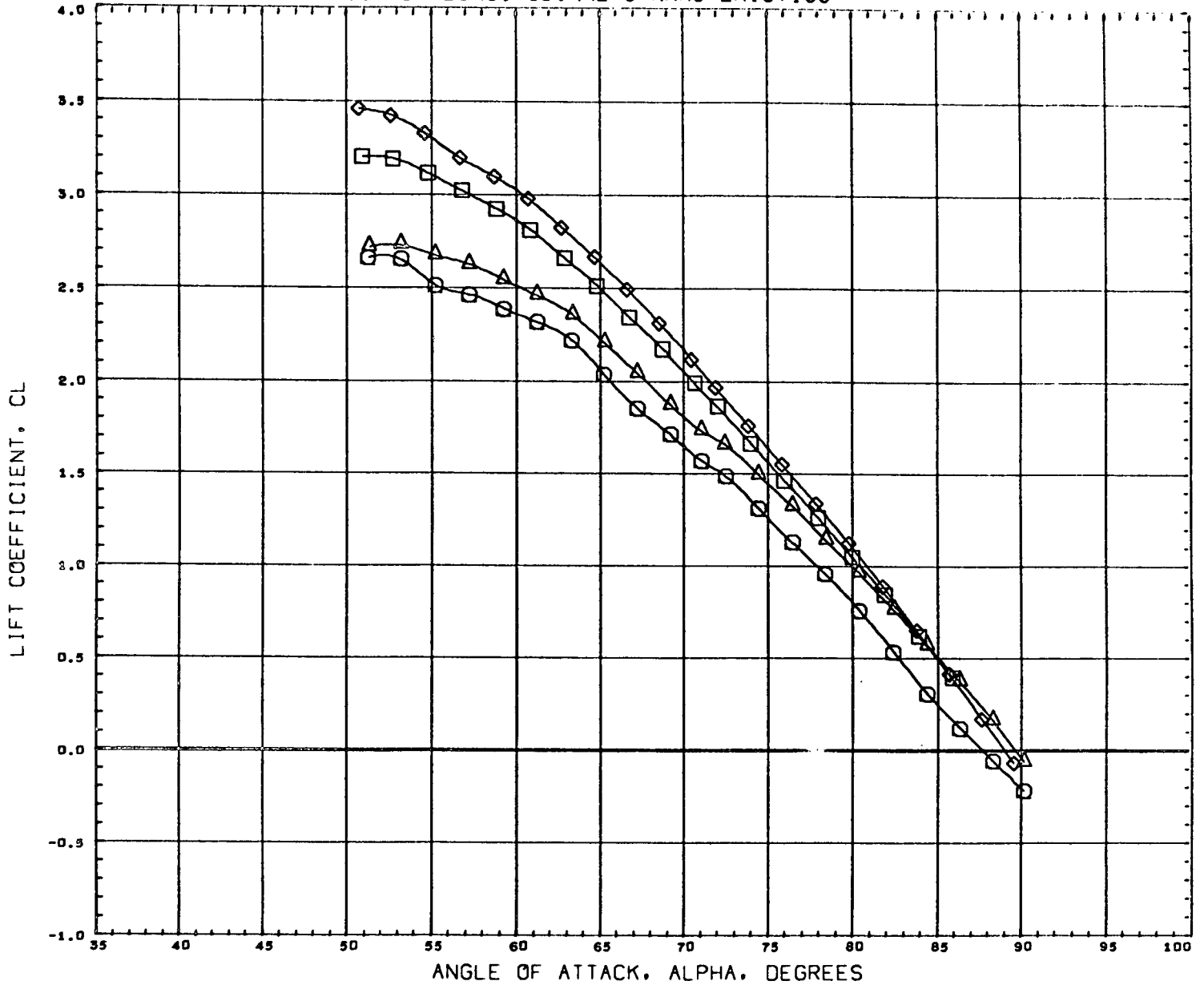


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	◇	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	□	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	○	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

MACH 1.199

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

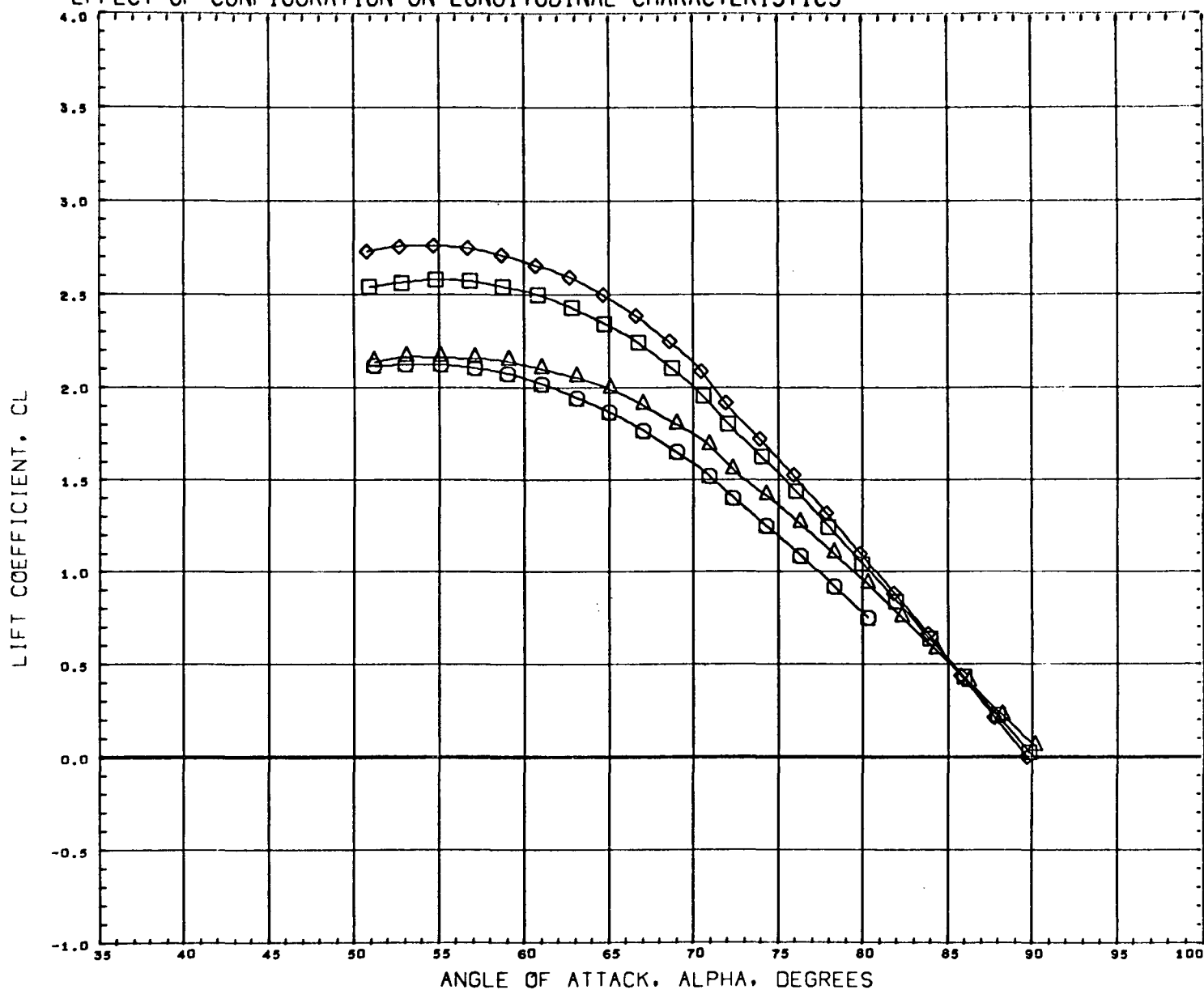
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.456

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

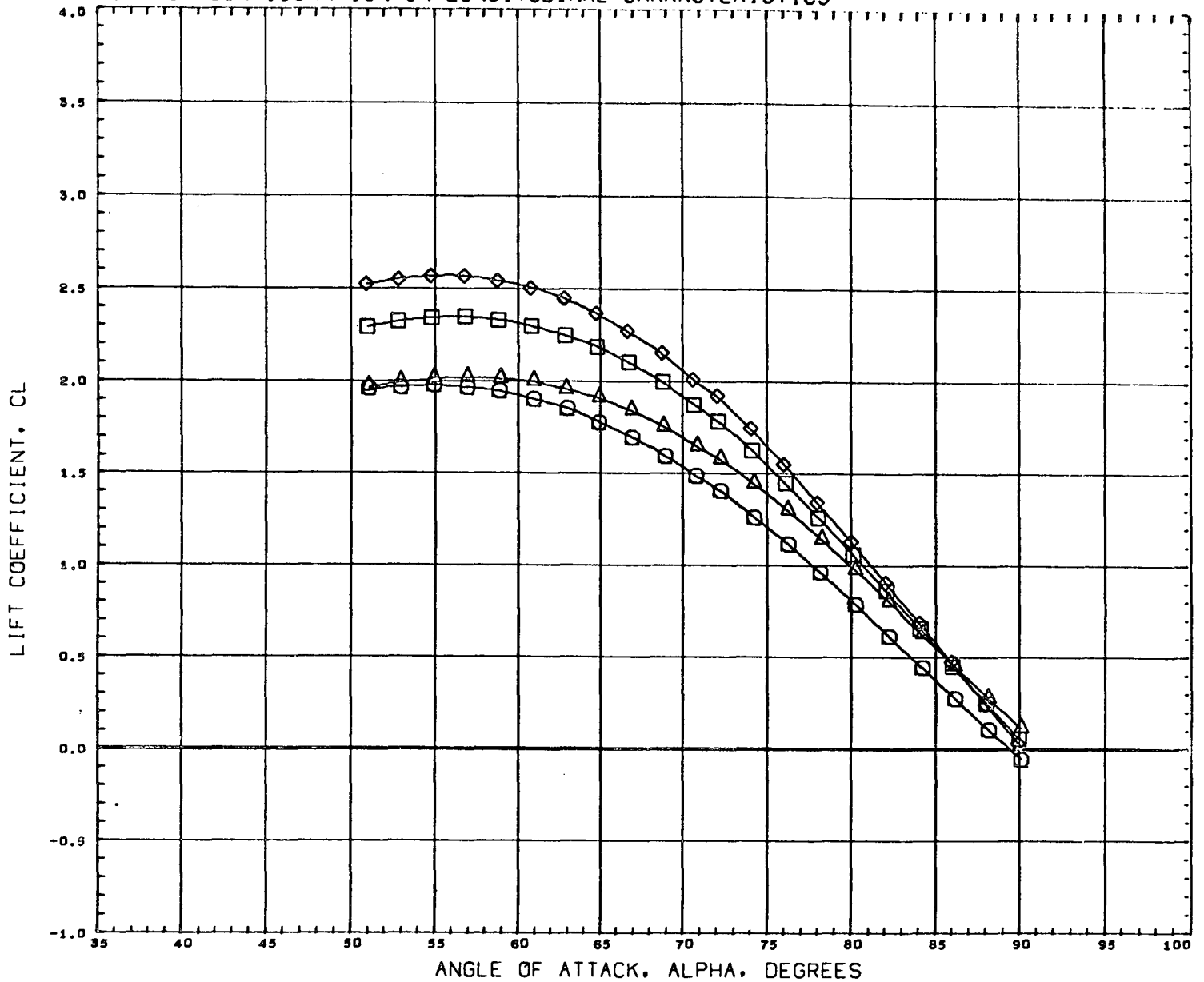


DATA SET	SYMBOL	CONFIGURATION	DESCRIPTION	BETA
(C63001)	○	MSFC TWT 529	33 FOOT BOOSTER	0.000
(C63004)	△	MSFC TWT 529	33 FOOT BOOSTER	0.000
(C63008)	◇	MSFC TWT 529	33 FOOT BOOSTER	0.000
(C63012)	□	MSFC TWT 529	33 FOOT BOOSTER	0.000

MACH 2.740

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

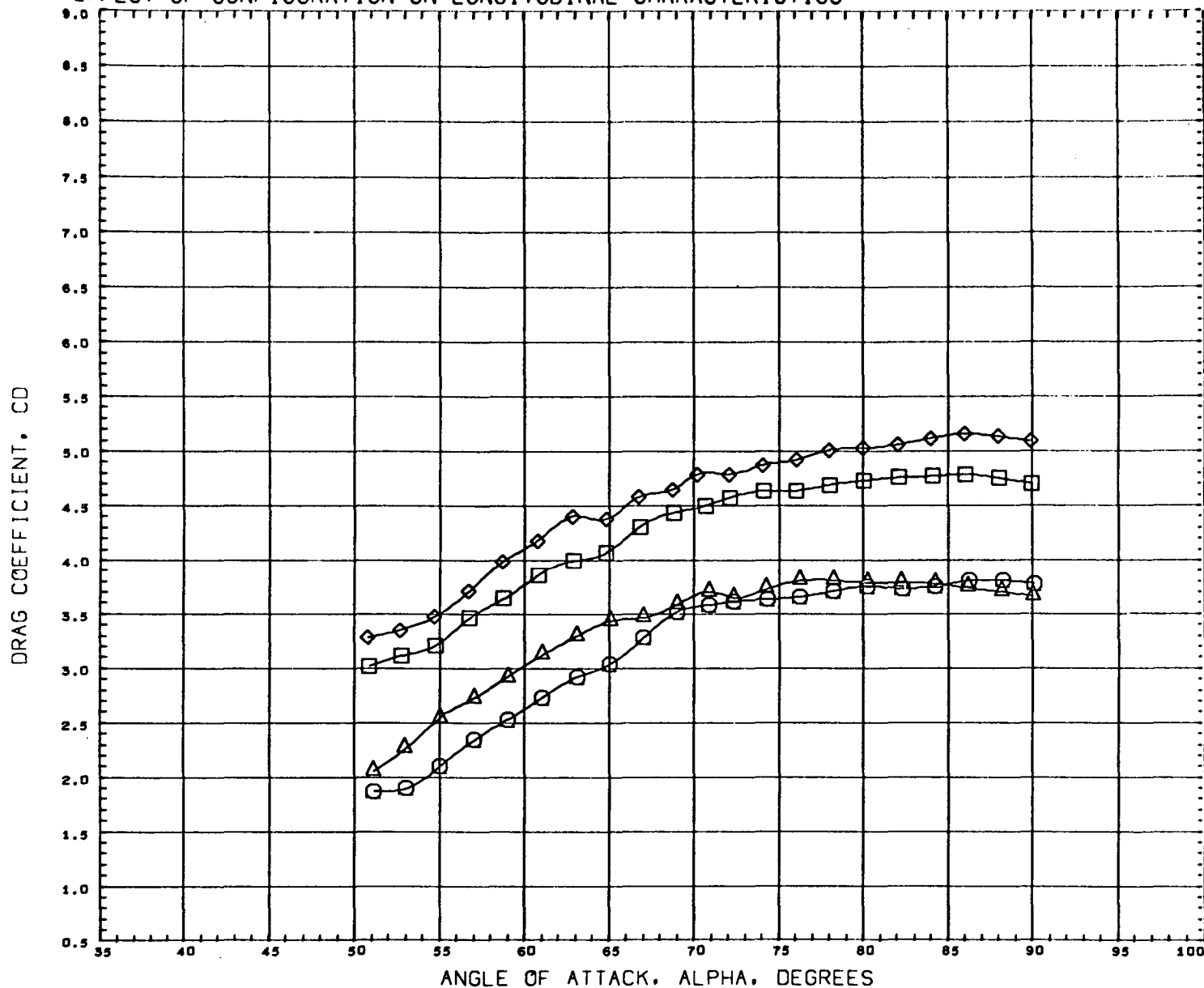


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.959

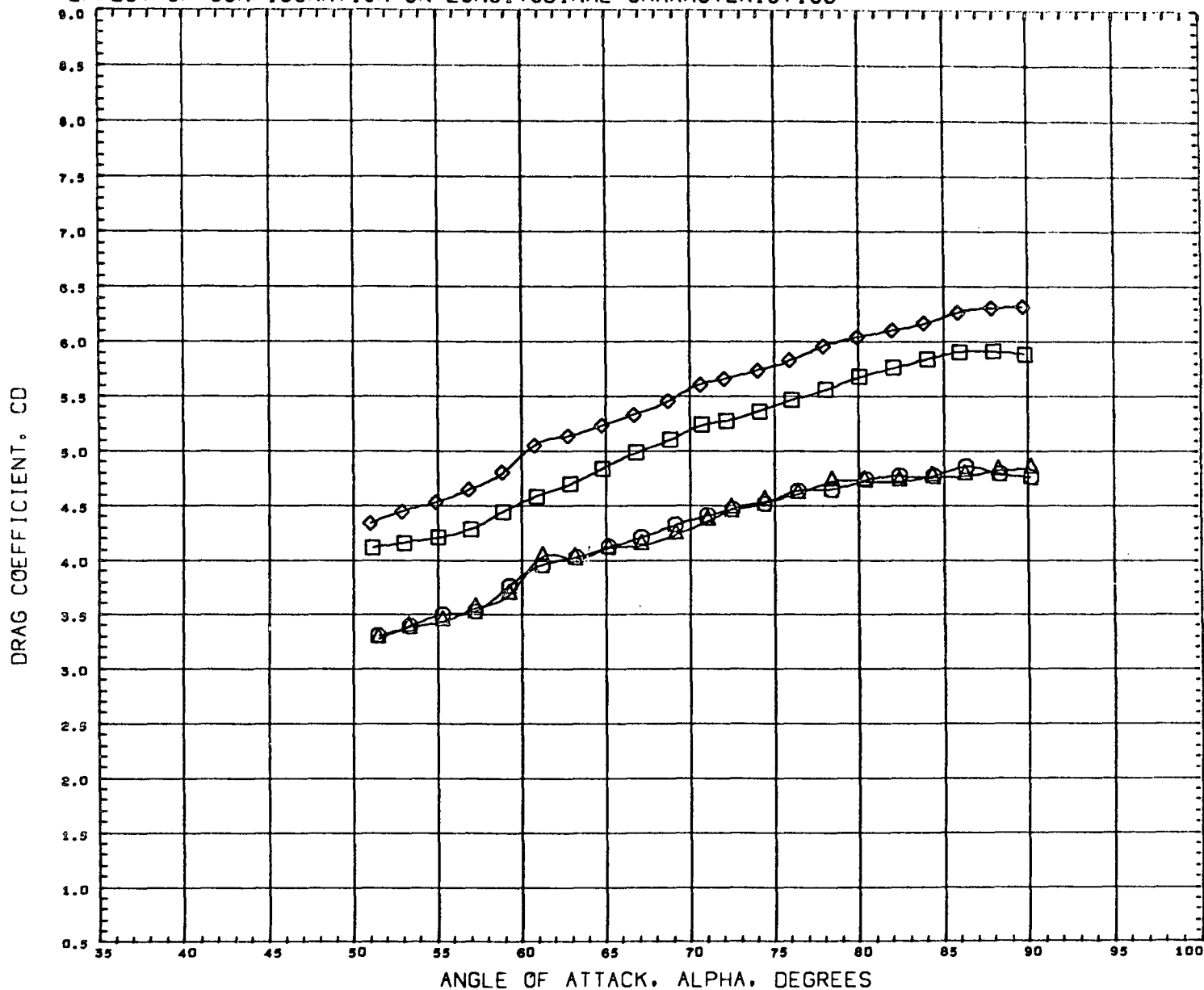
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.596

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

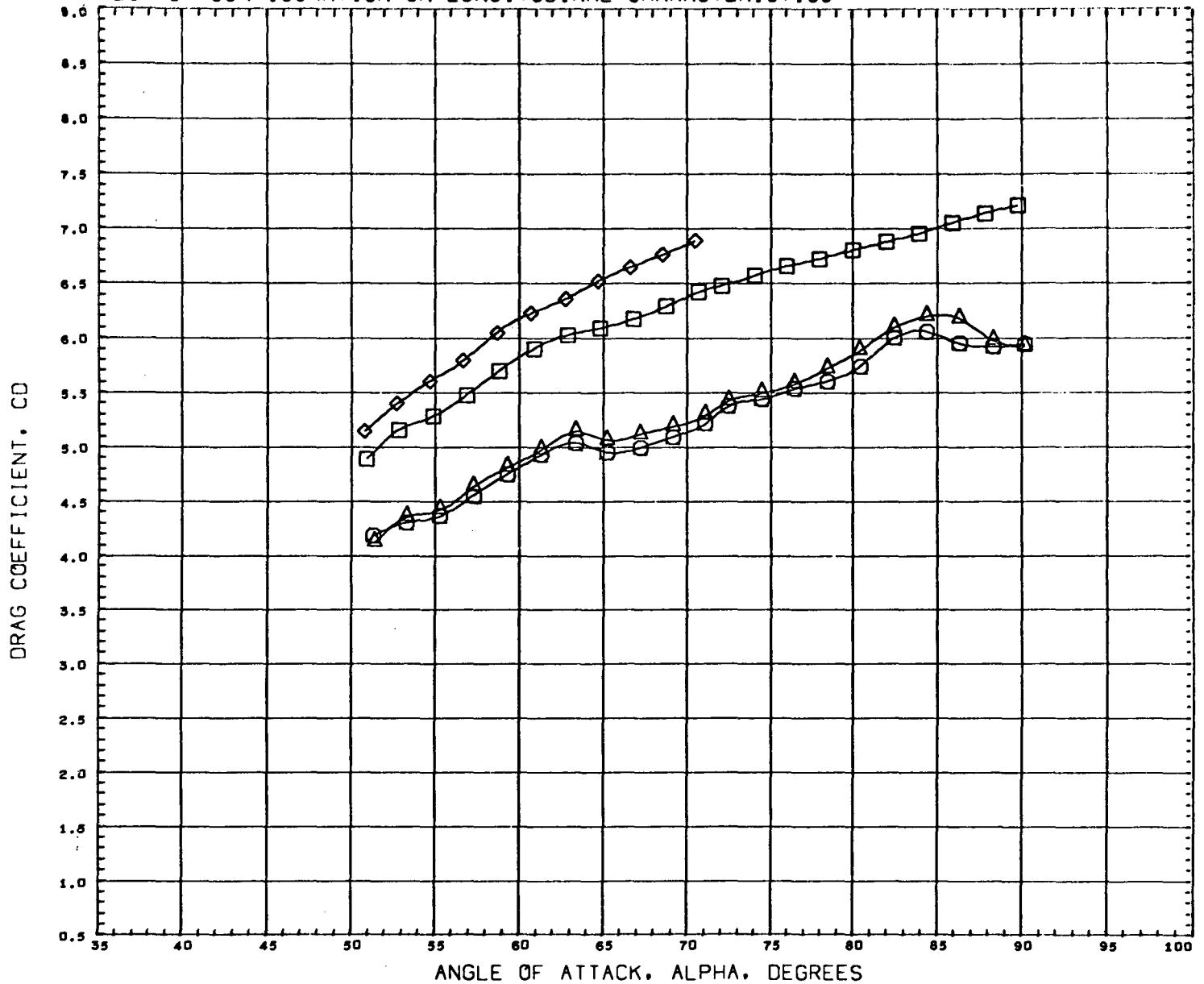


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

MACH 0.897

REFERENCE INFORMATION	
SREF	1.4230 SQ. IN.
LREF	5.4330 IN.
BREF	5.4330 IN.
XMRP	3.2660 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

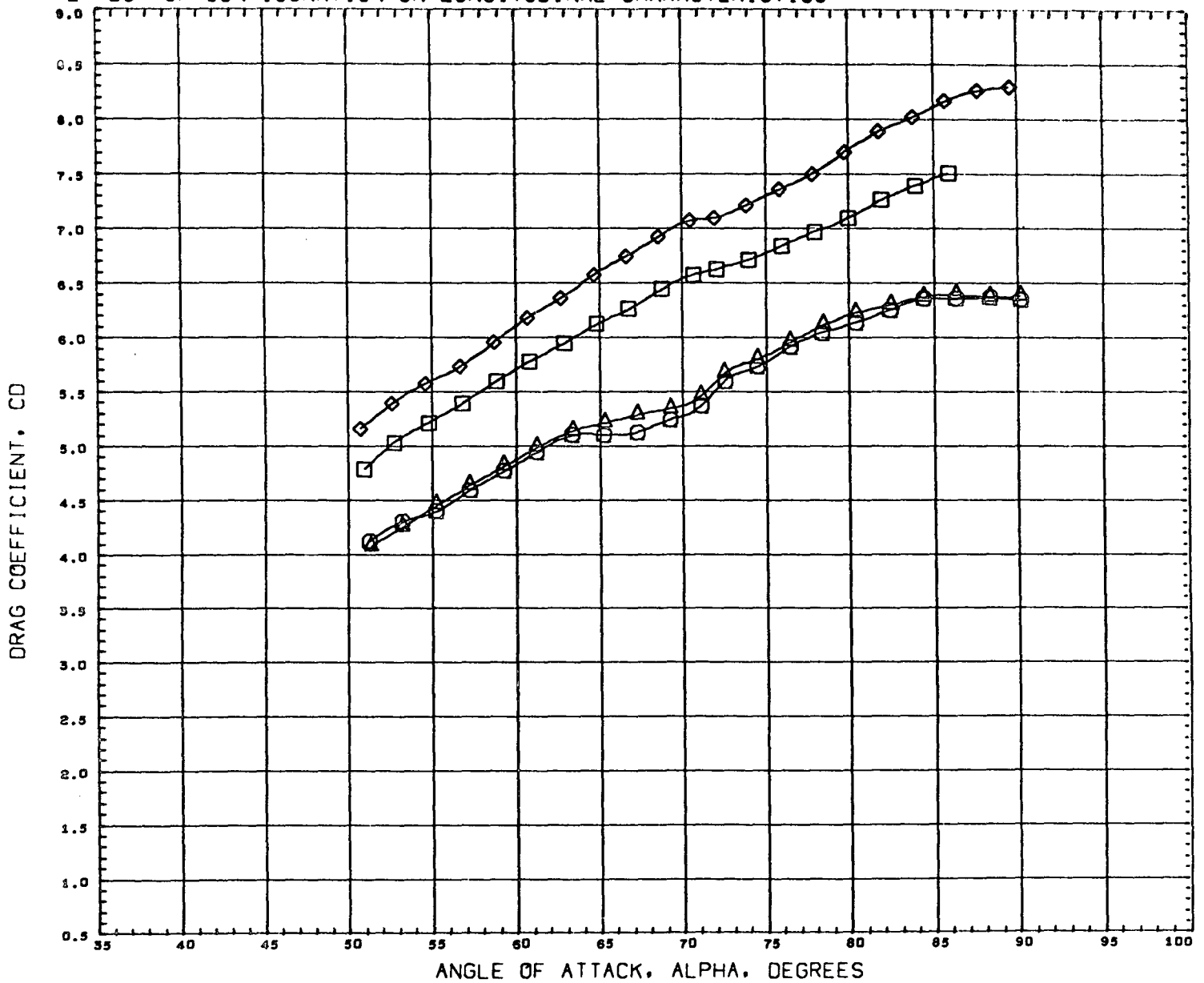
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRF 3.2660 IN.
			YMRF 0.0000 IN.
			ZMRF 0.0000 IN.
			SCALE 0.0034

MACH 1.199

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

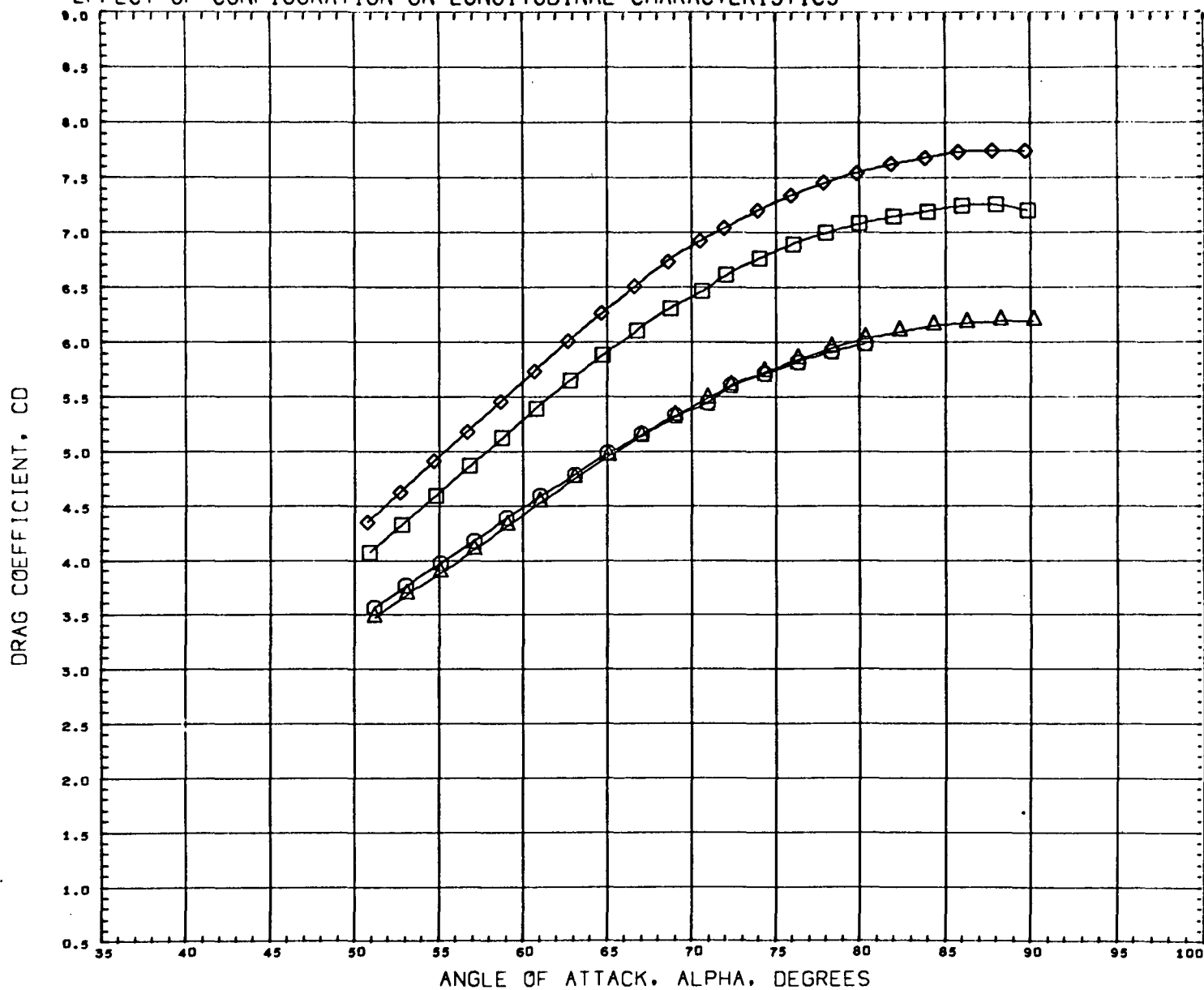


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	○	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	◇	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	□	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.456

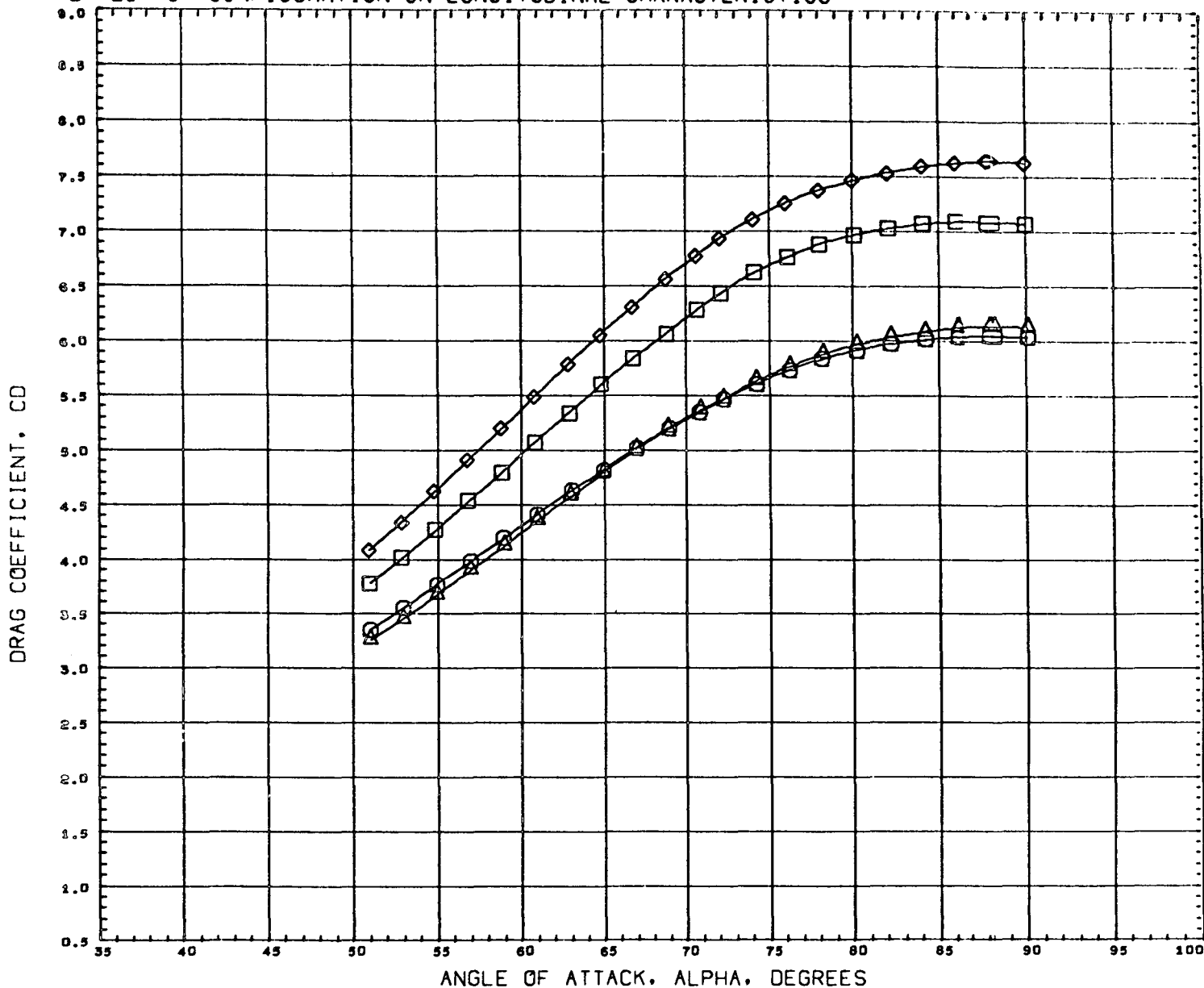
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 2.740

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



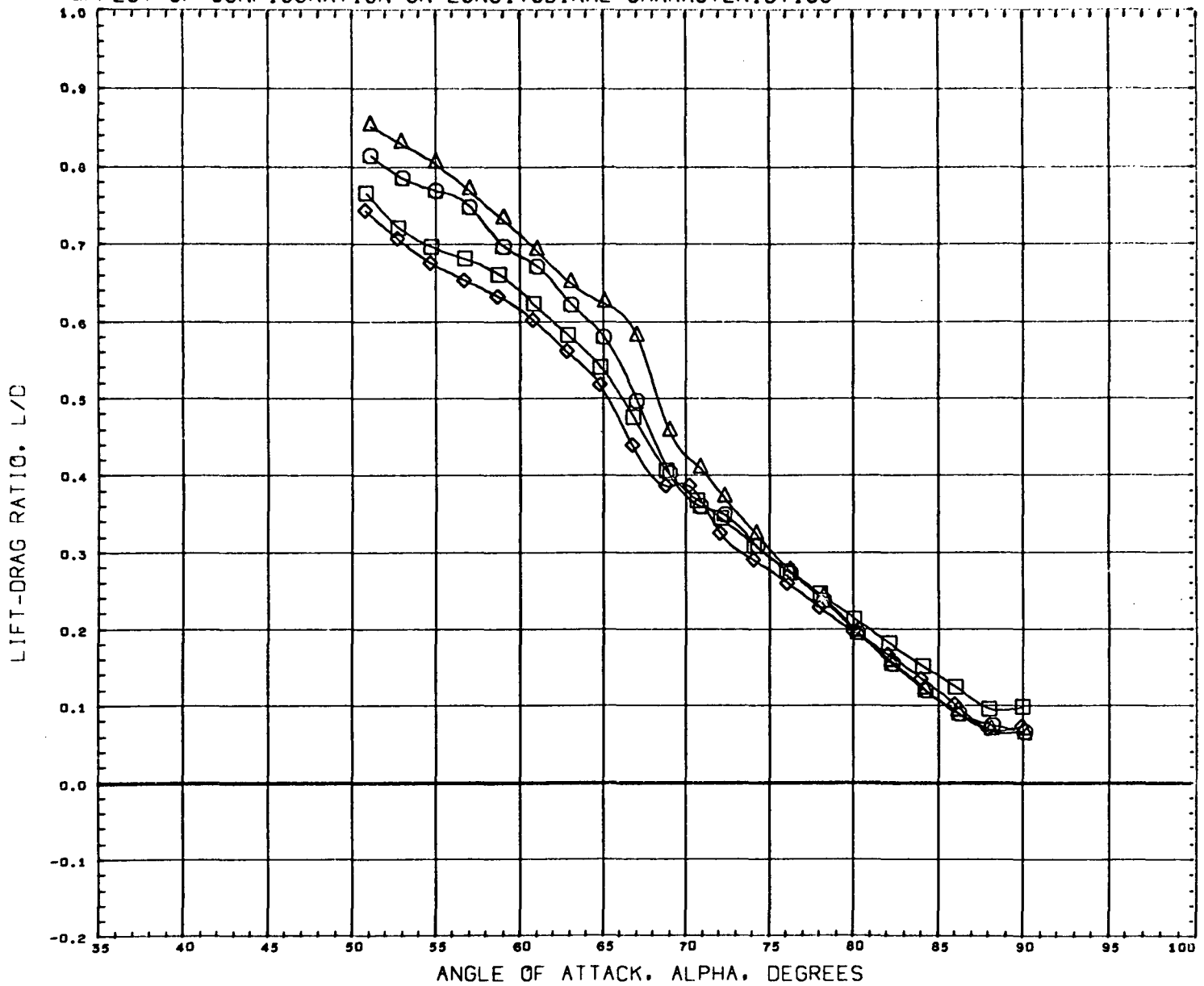
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	MSFC TWT 529 33 FOOT BOOSTER

BETA
0.000
0.000
0.000
0.000

REFERENCE INFORMATION	
SREF	1.4230 SQ. IN.
LREF	5.4330 IN.
BREF	5.4330 IN.
XNRF	3.2660 IN.
YNRF	0.0000 IN.
ZNRF	0.0000 IN.
SCALE	0.0034

MACH 4.959

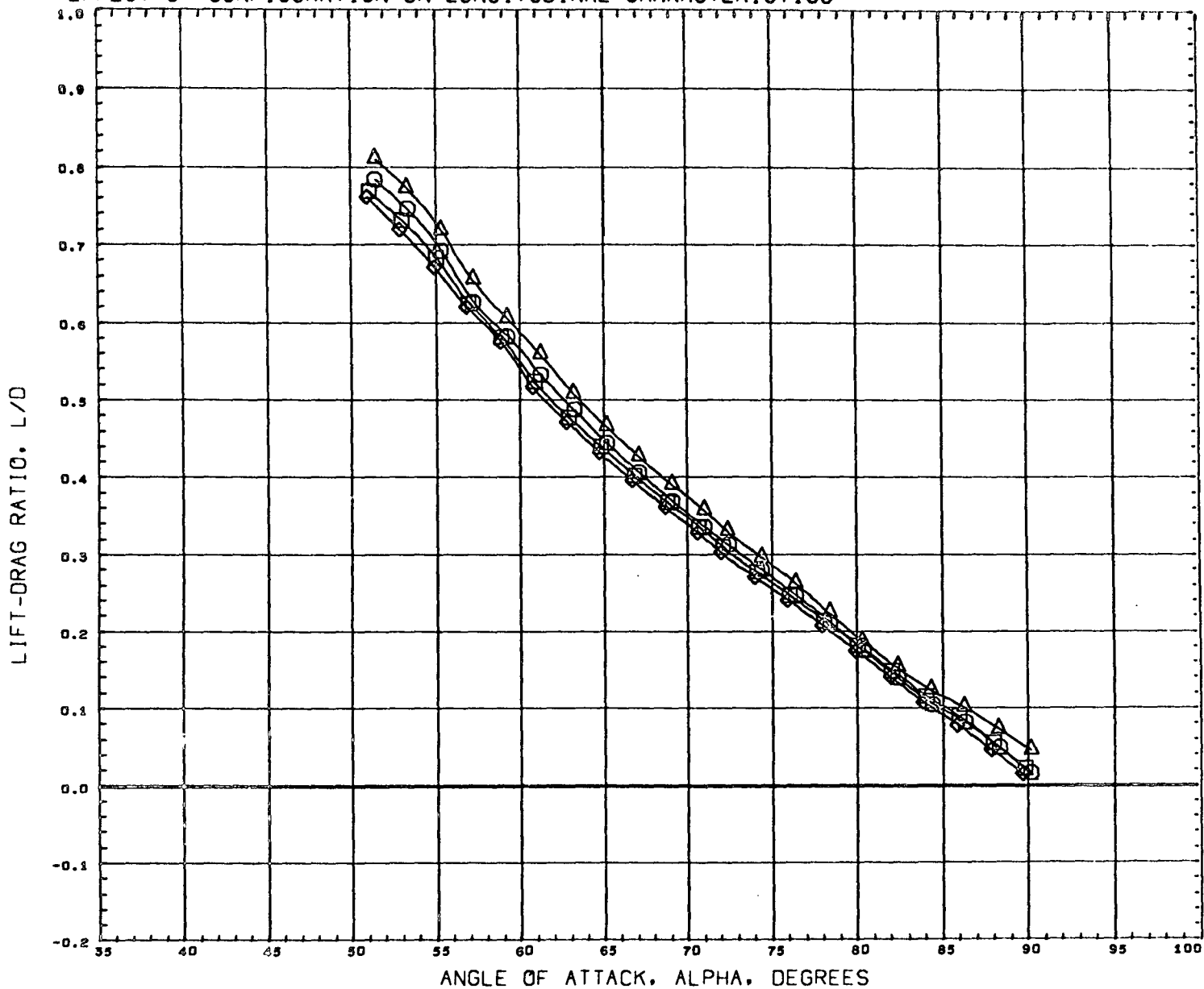
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.596

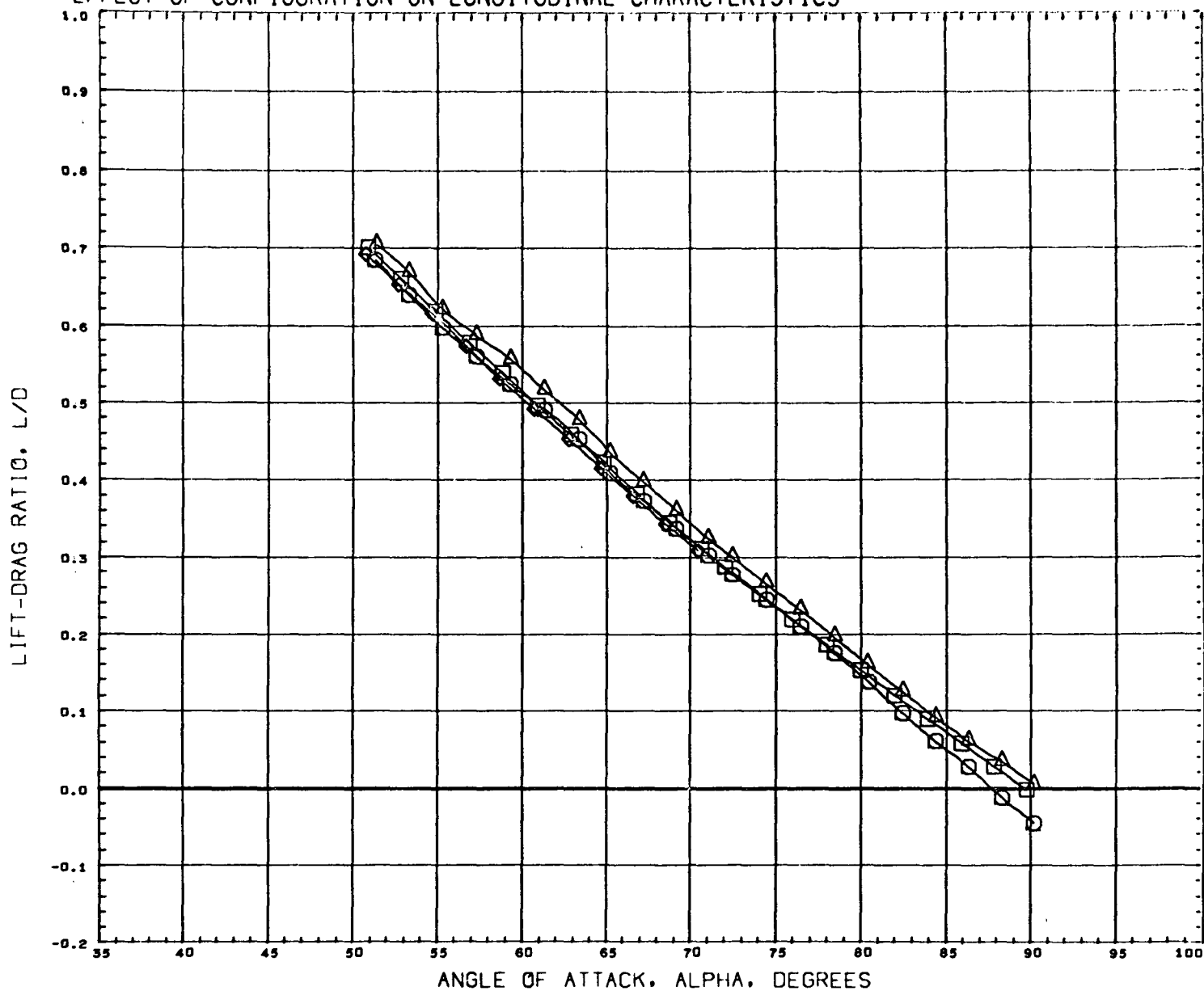
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.897

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



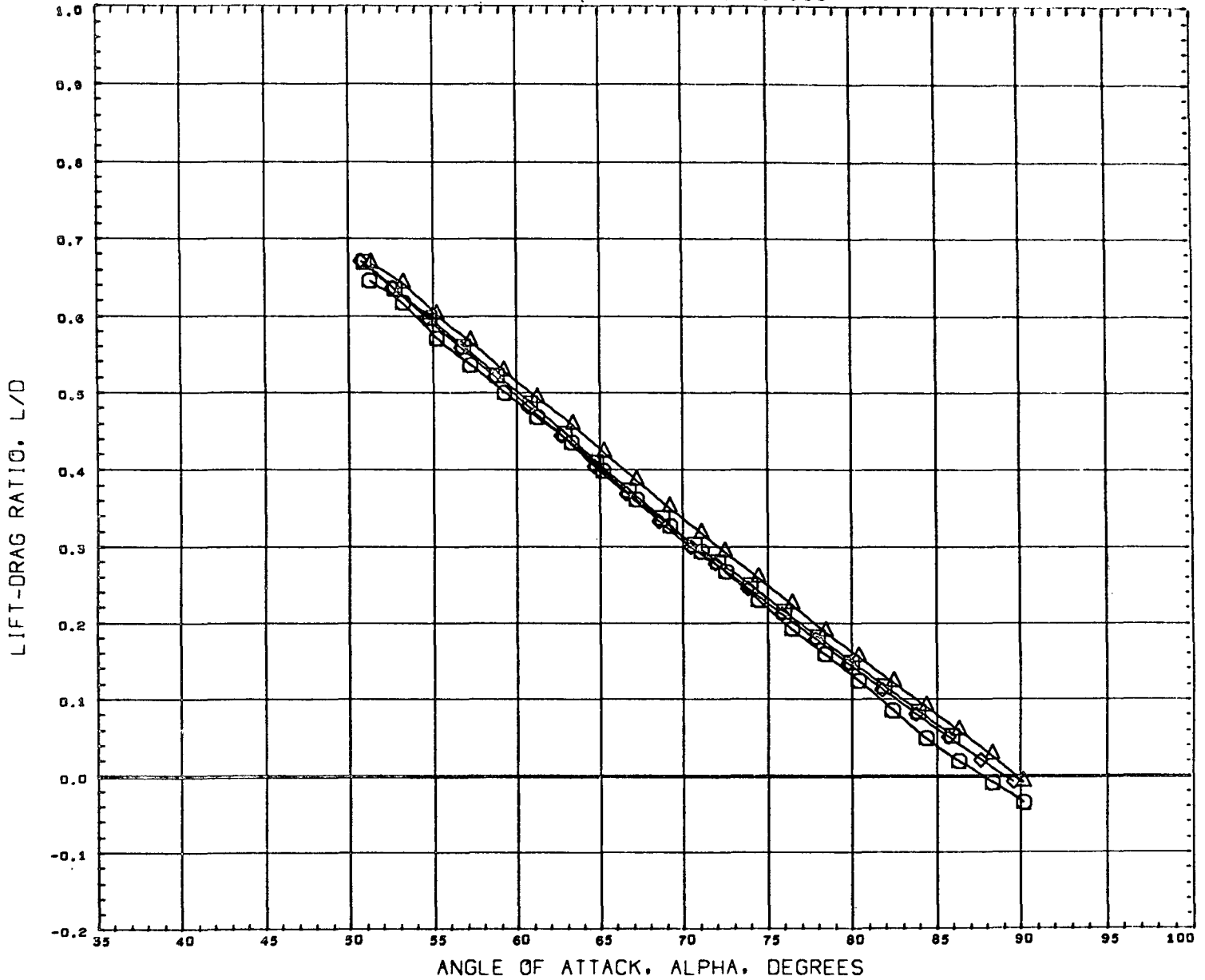
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	MSFC TWT 529 33 FOOT BOOSTER

BETA
N1B6 0.000
N1B7 0.000
N1B7F2 0.000
N1B7F3 0.000

REFERENCE INFORMATION	
SREF	1.4230 SQ. IN.
LREF	5.4330 IN.
BREF	5.4330 IN.
XMRP	3.2660 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 1.199

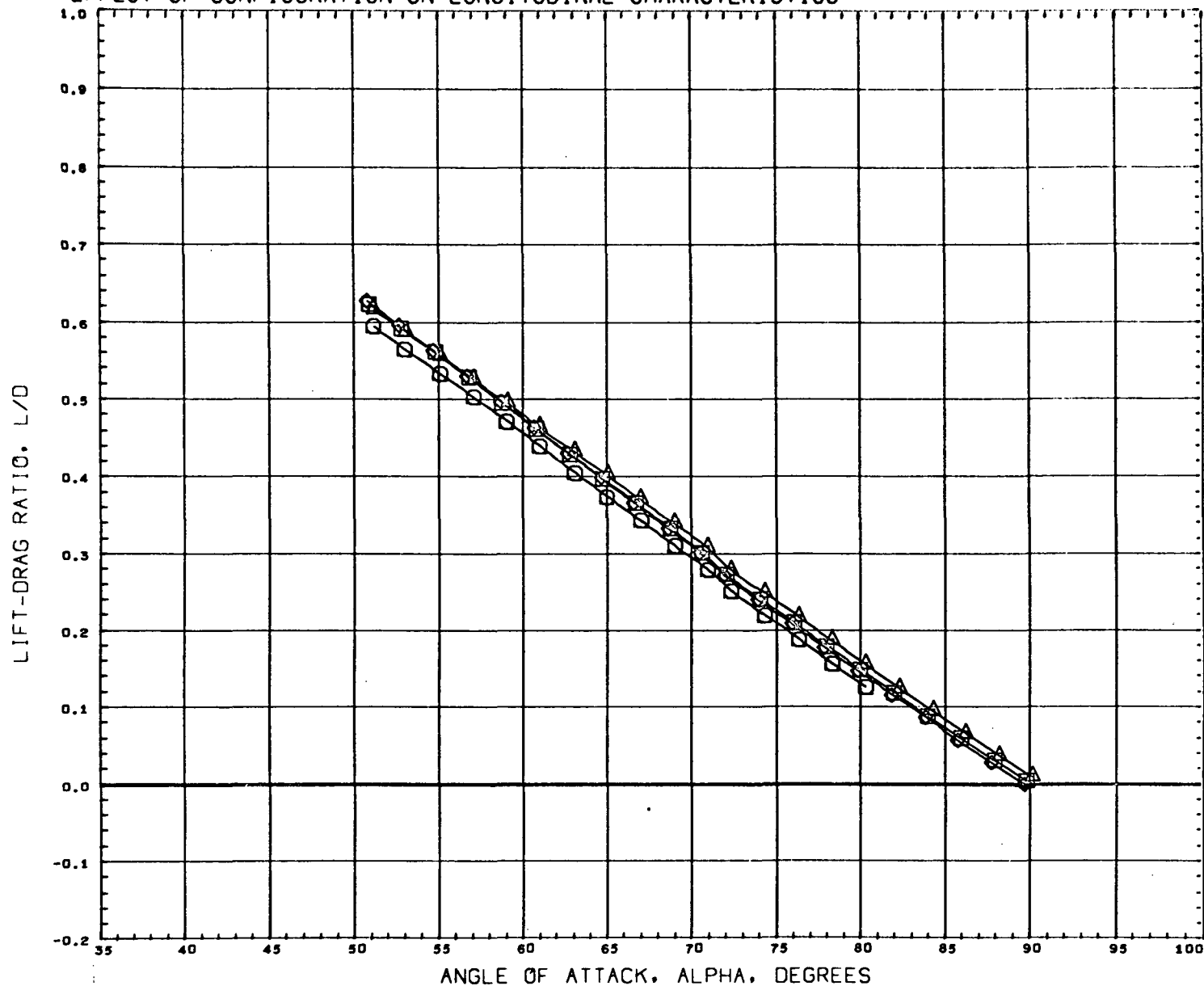
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRF 3.2660 IN.
			YMRF 0.0000 IN.
			ZMRF 0.0000 IN.
			SCALE 0.0034

MACH 1.456

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



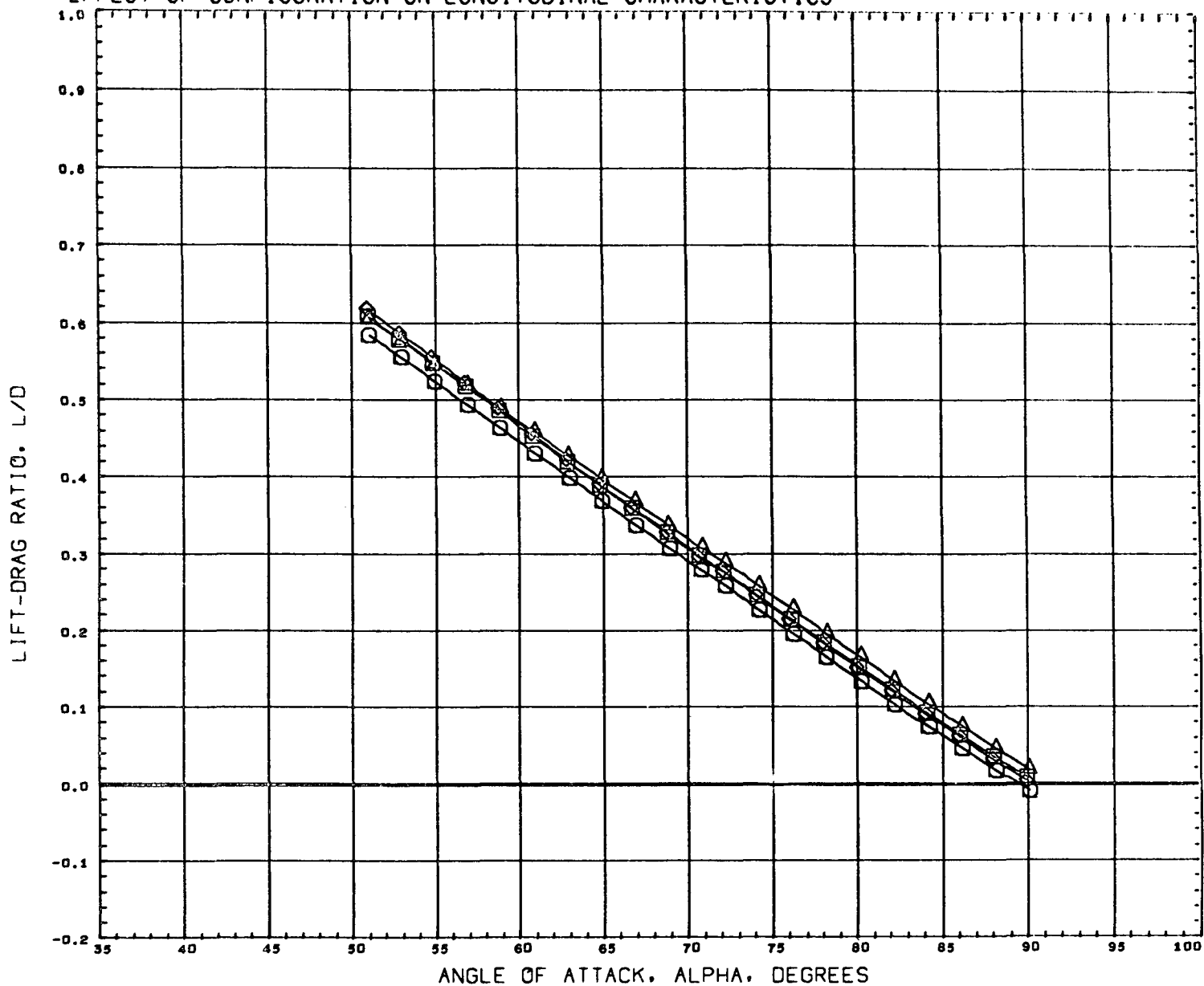
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	○	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	◇	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	□	MSFC TWT 529 33 FOOT BOOSTER

BETA	
N1B6	0.000
N1B7	0.000
N1B7F2	0.000
N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	sq. in.
LREF	5.4330	in.
BREF	5.4330	in.
XMRP	3.2660	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 2.740

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(C63001)	○	MSFC TWT 529	33 FOOT BOOSTER	N1B6
(C63004)	△	MSFC TWT 529	33 FOOT BOOSTER	N1B7
(C63008)	◇	MSFC TWT 529	33 FOOT BOOSTER	N1B7F2
(C63012)	□	MSFC TWT 529	33 FOOT BOOSTER	N1B7F3

BETA

0.000
0.000
0.000
0.000

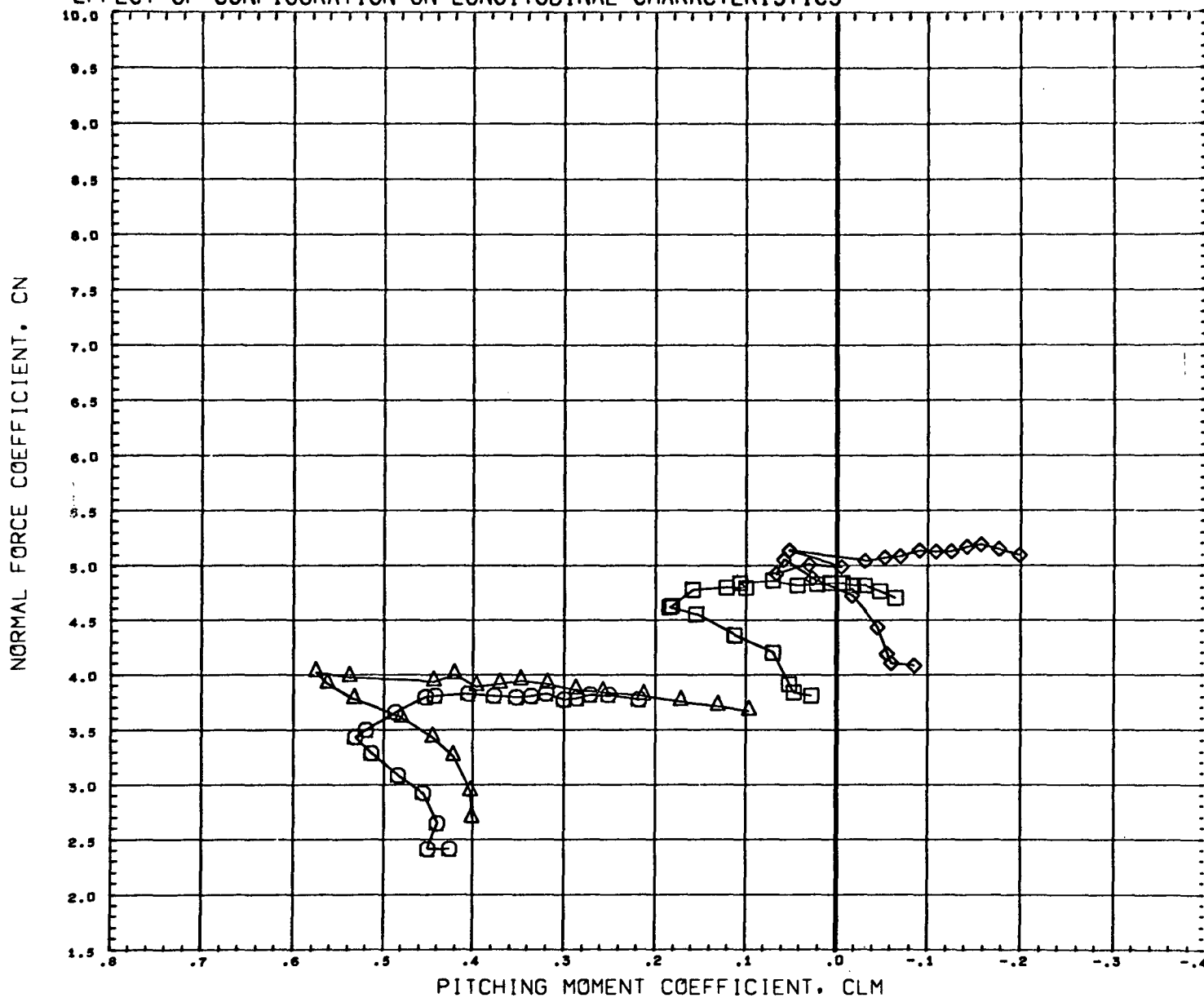
REFERENCE INFORMATION

SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH

4.959

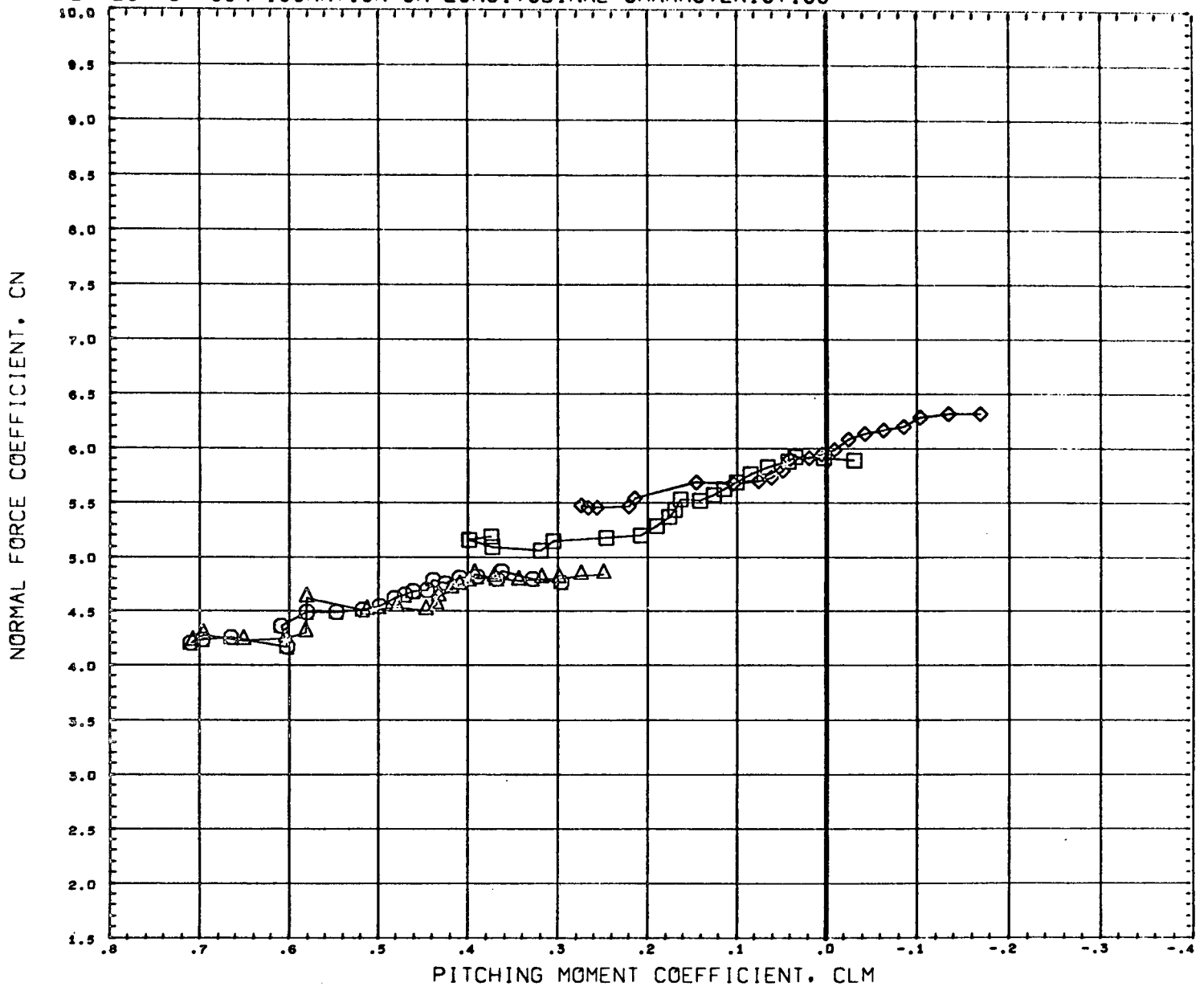
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.596

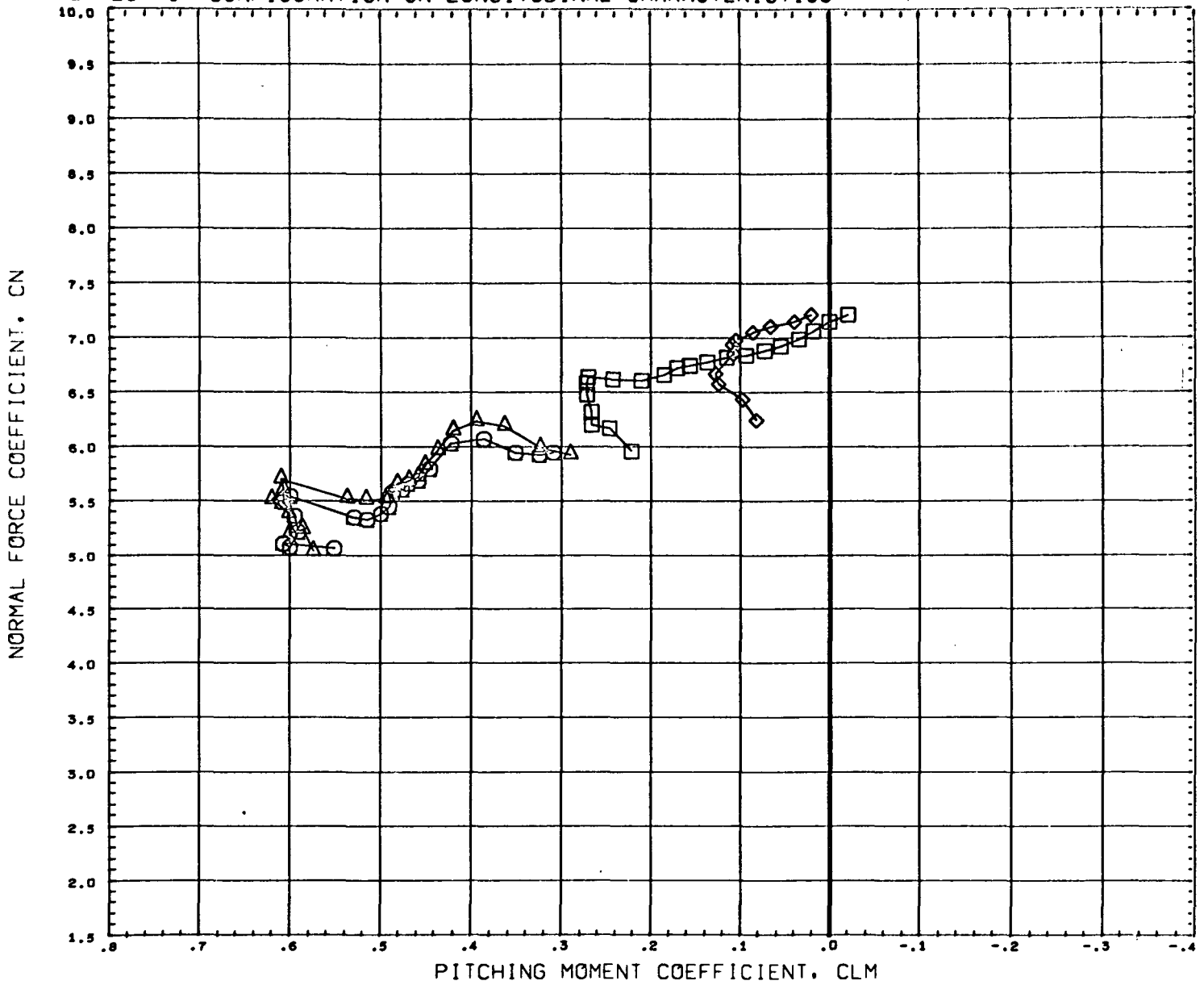
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRF 3.2660 IN.
			YMRF 0.0000 IN.
			ZMRF 0.0000 IN.
			SCALE 0.0034

MACH 0.897

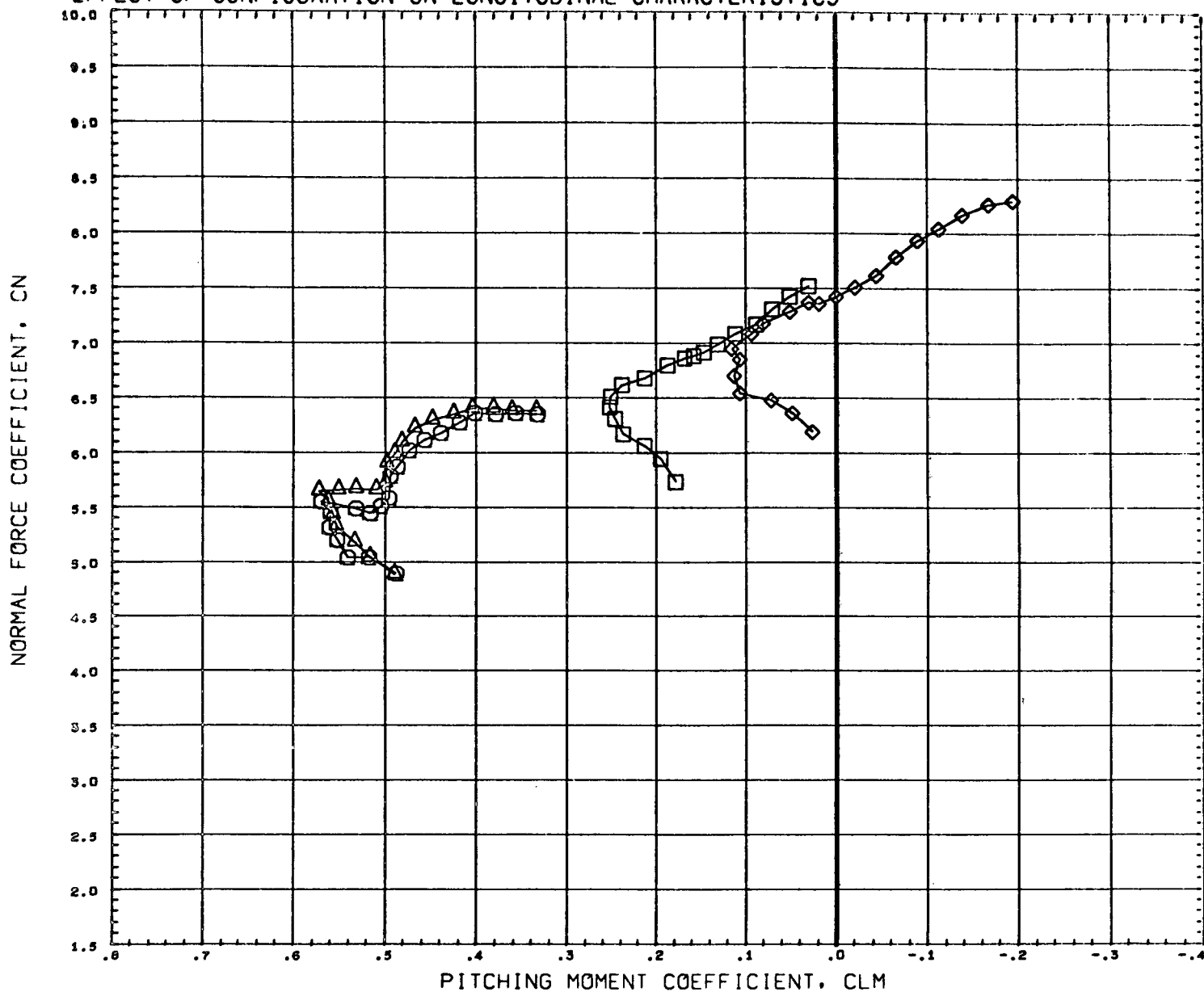
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.199

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

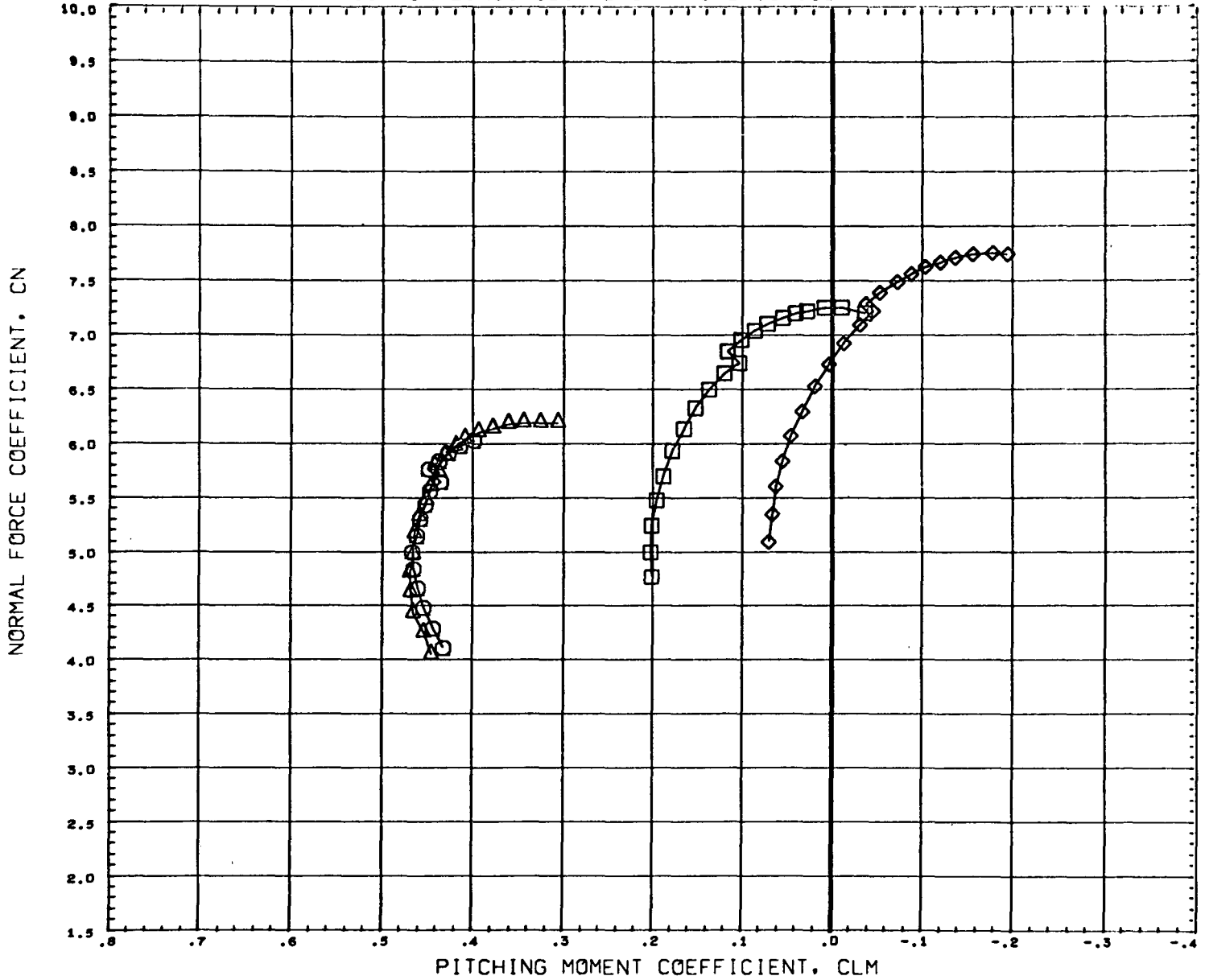


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.456

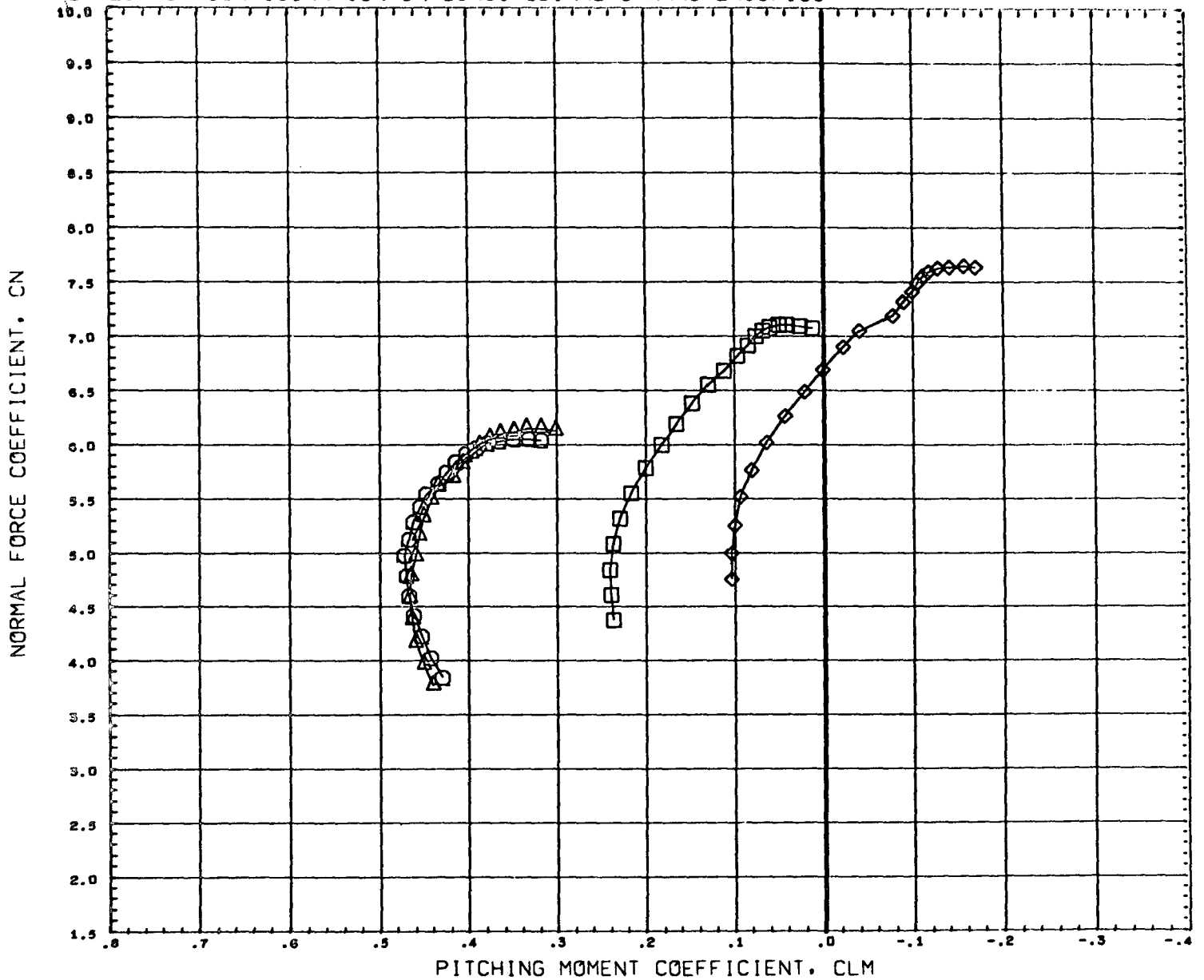
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 2.740

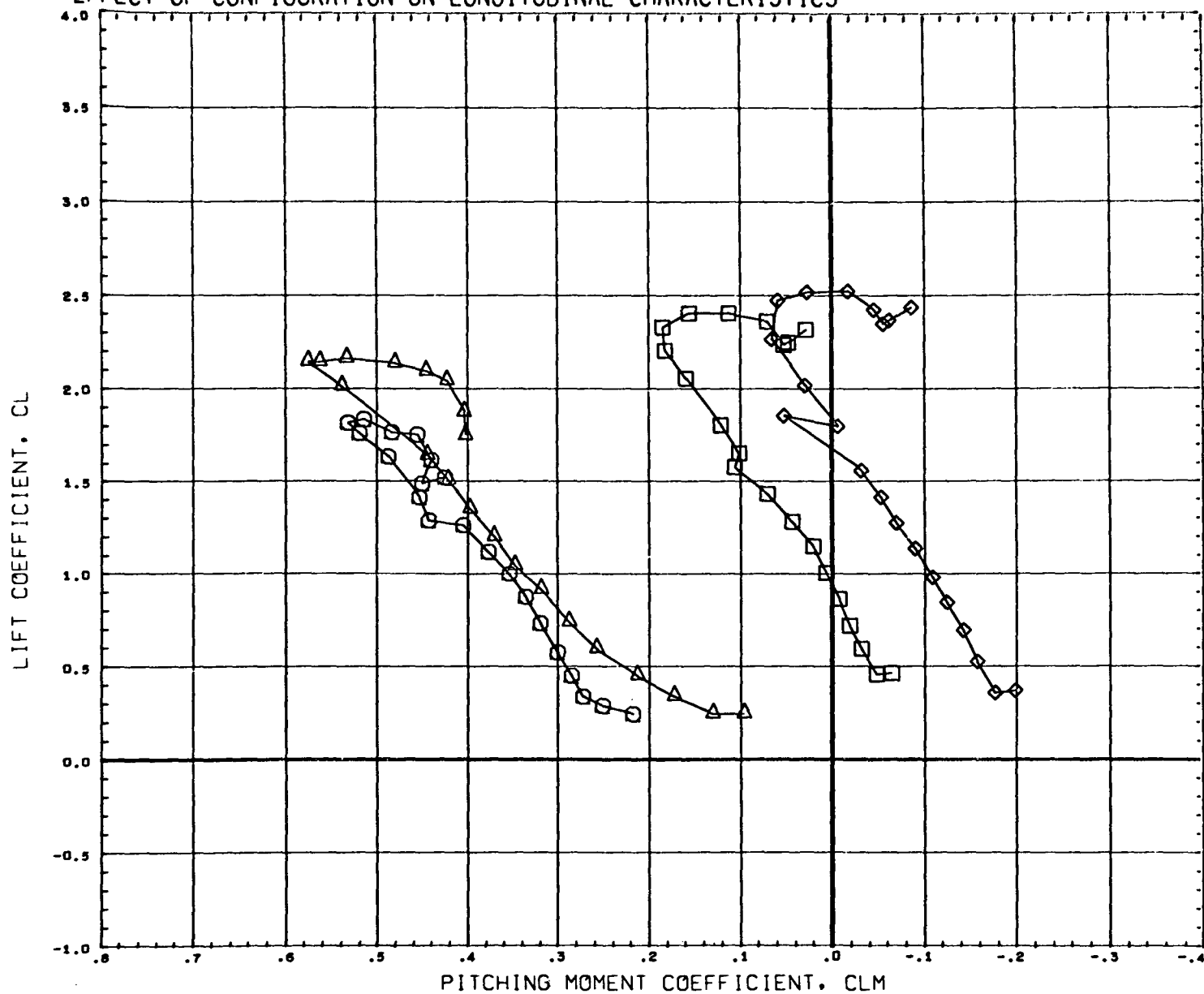
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRF 3.2660 IN.
			YMRF 0.0000 IN.
			ZMRF 0.0000 IN.
			SCALE 0.0034

MACH 4.959

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

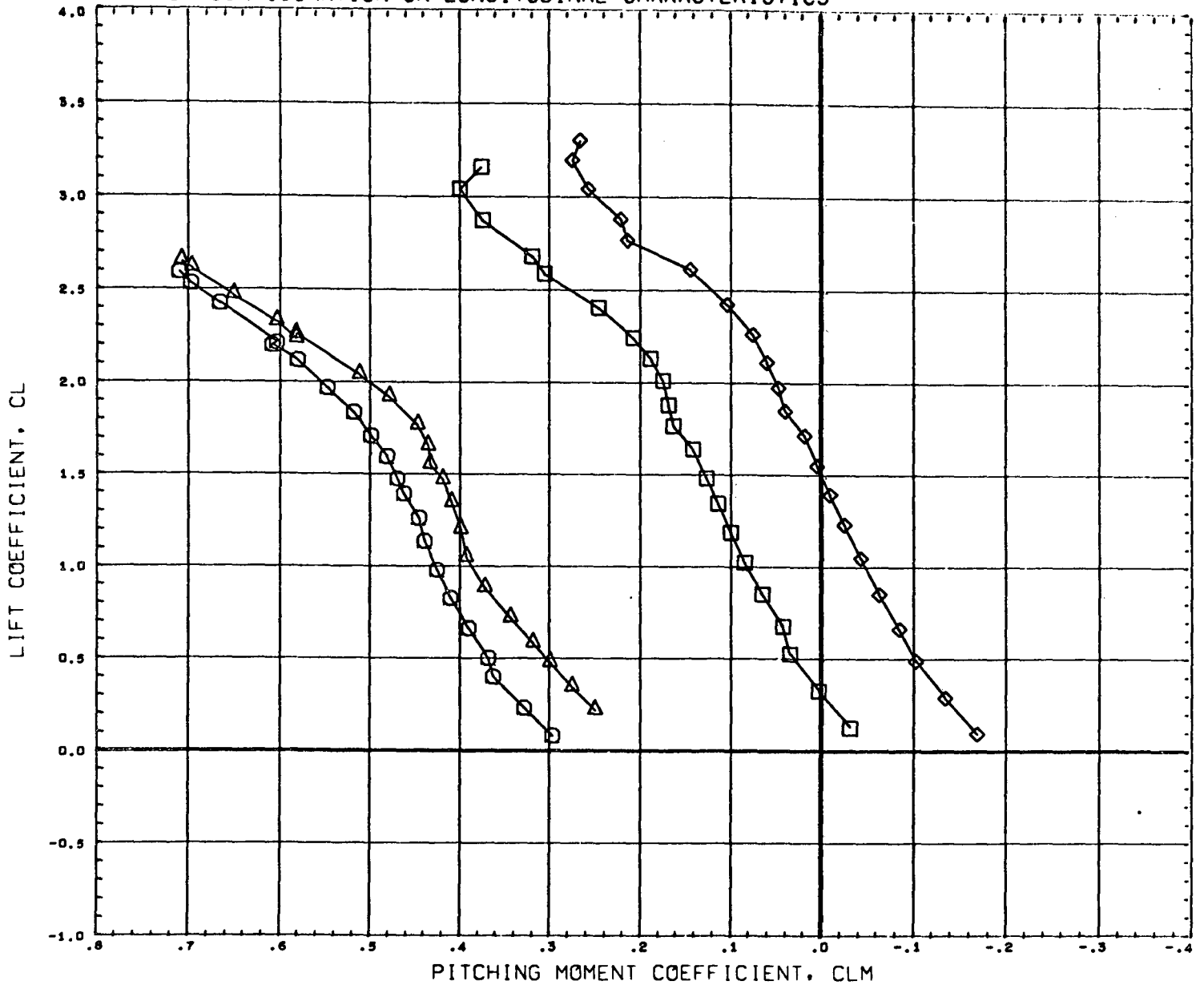


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	○	MSFC TWT 529 33 FOOT BOOSTER N186	0.000
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER N187	0.000
(C63008)	◇	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000
(C63012)	□	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000

MACH 0.596

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

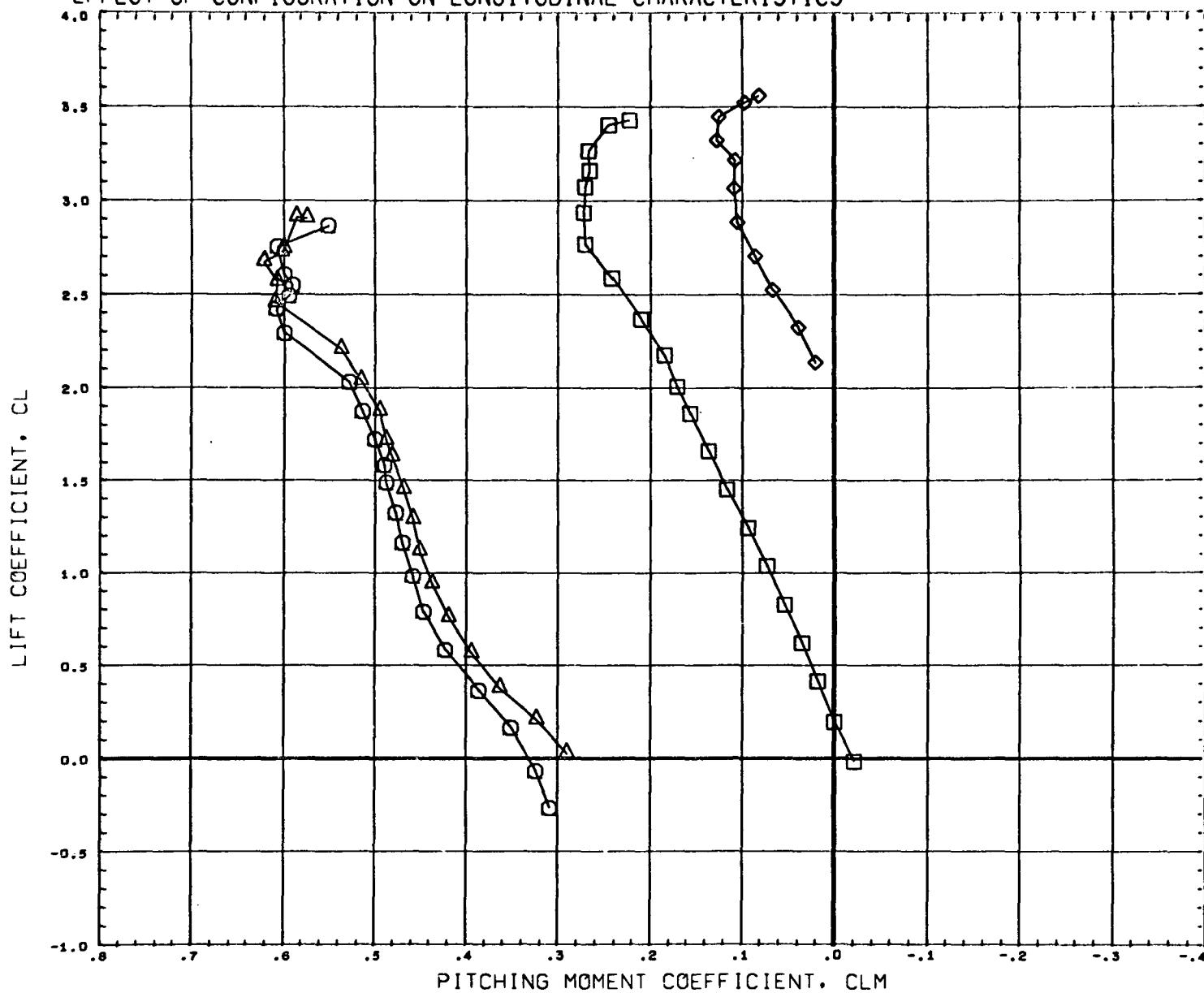
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 0.897

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

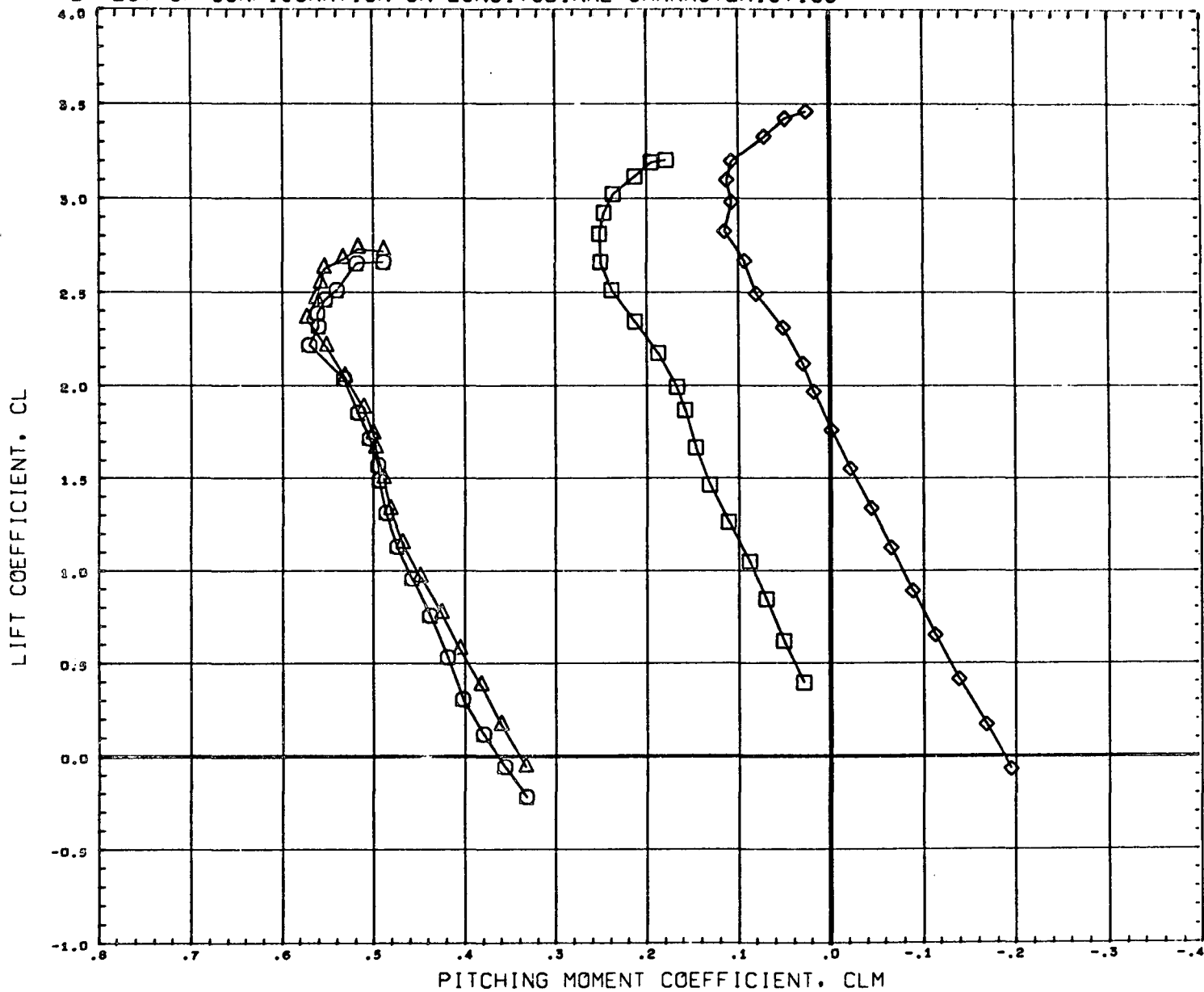


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.199

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS

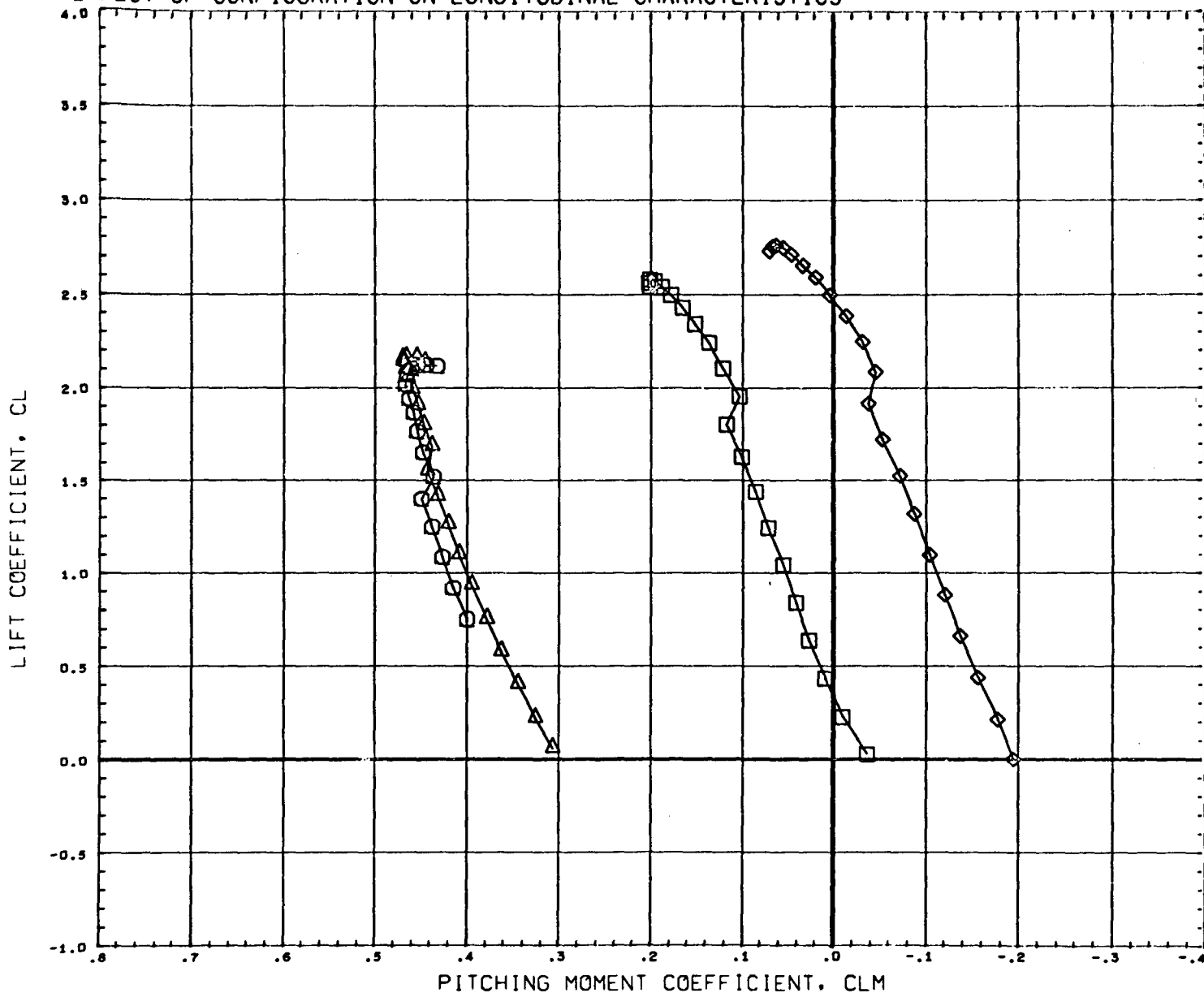


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	sq. in.
LREF	5.4330	in.
BREF	5.4330	in.
XMRP	3.2660	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 1.456

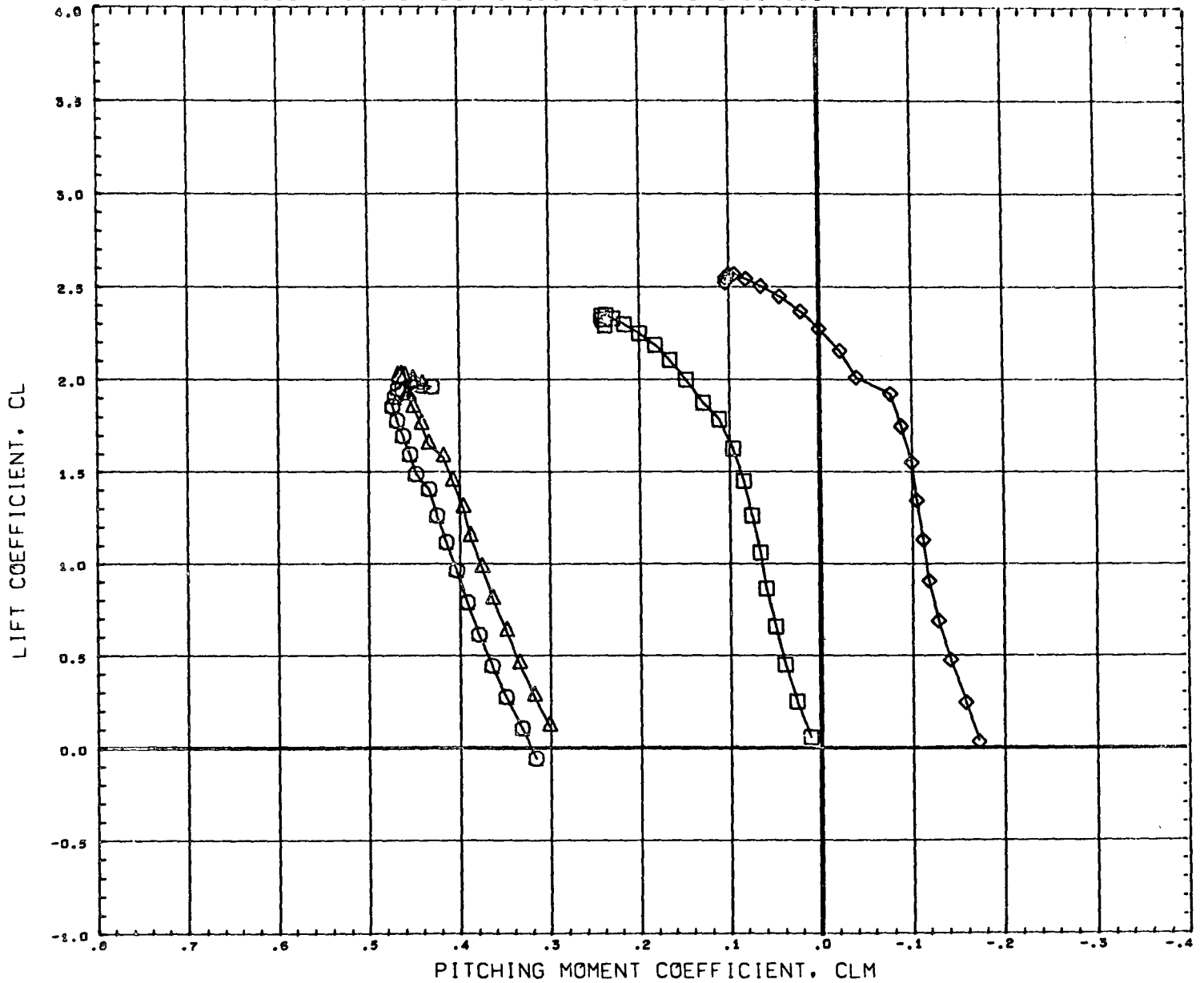
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 2.740

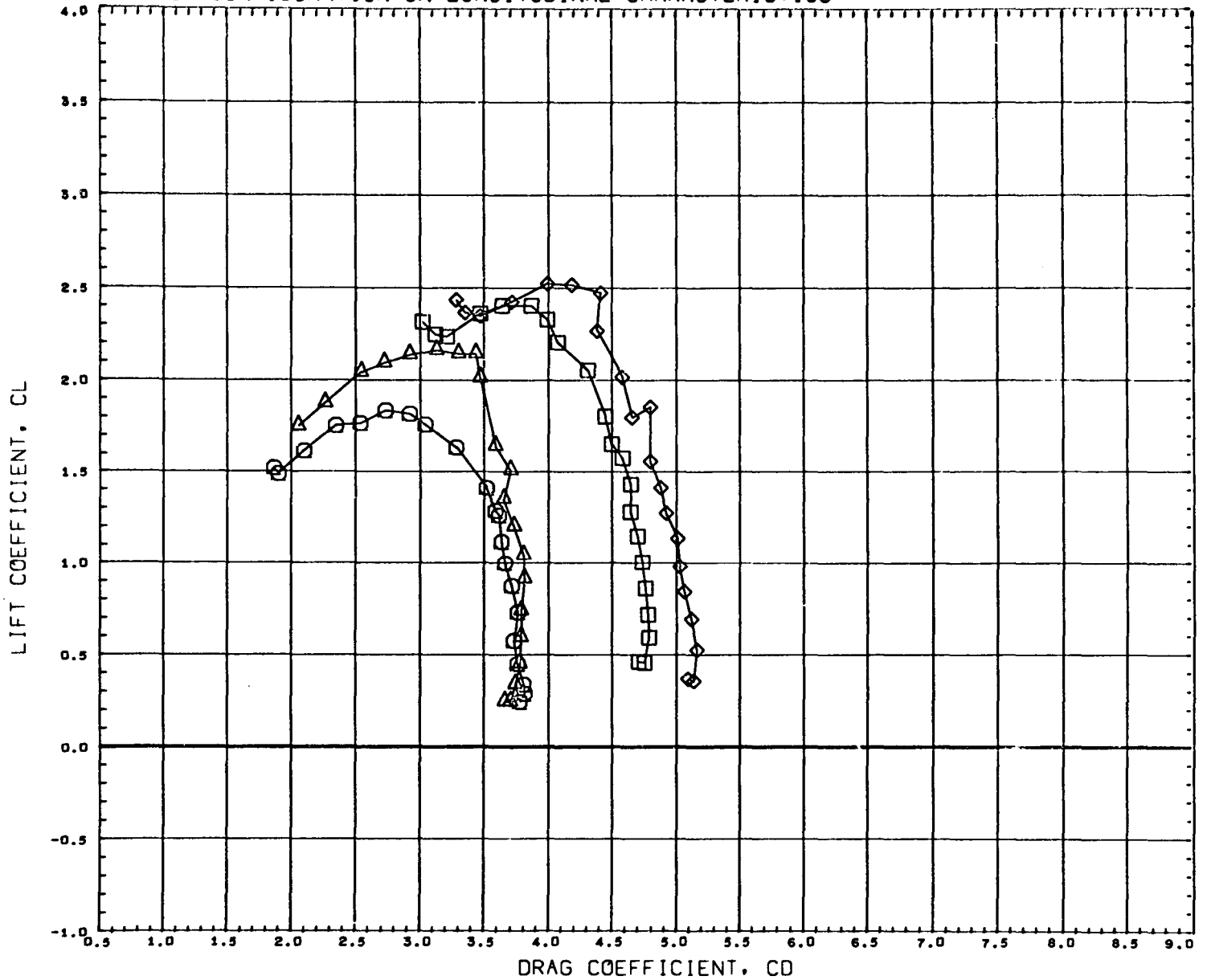
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 4.959

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



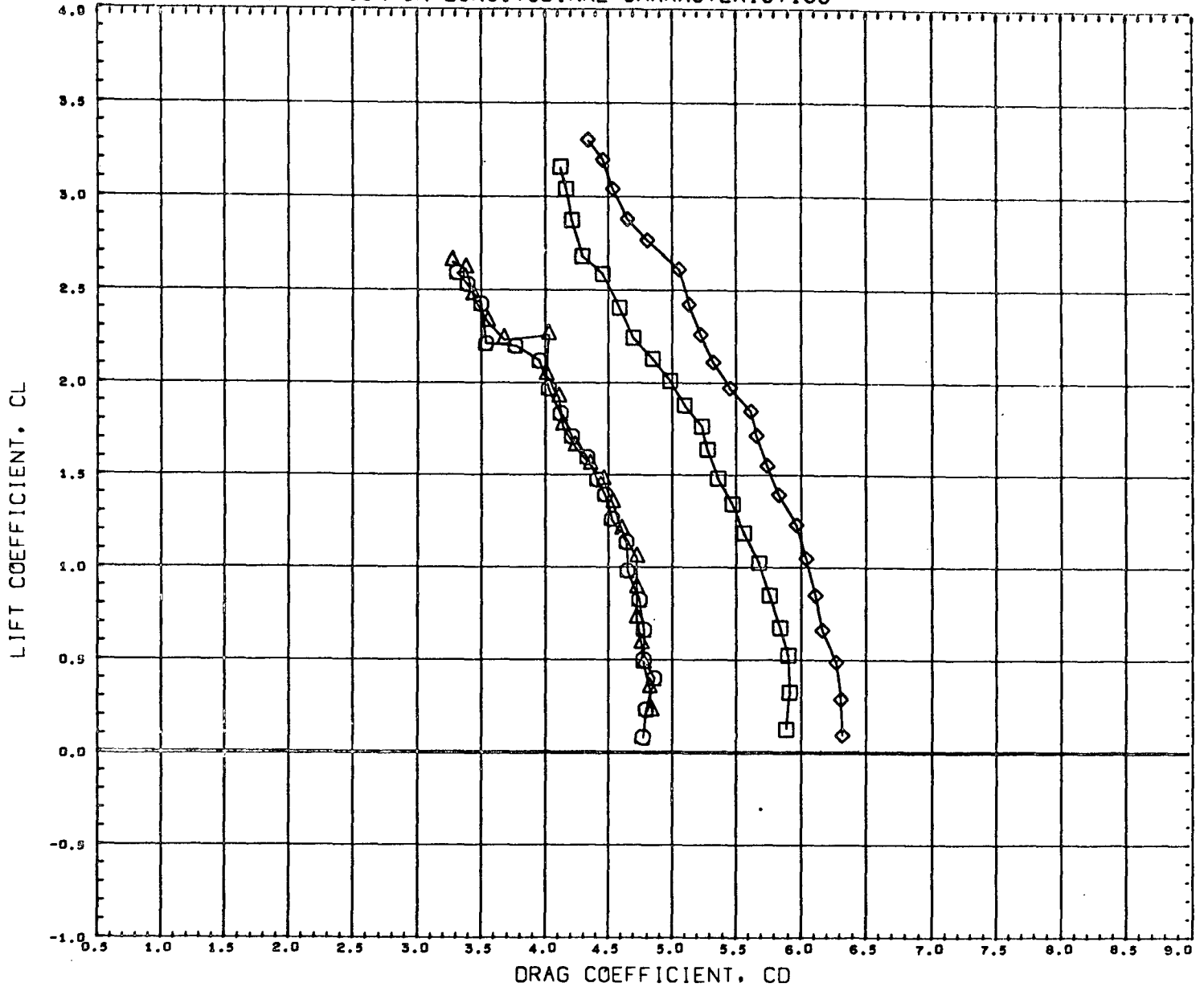
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	○	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	◇	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	□	MSFC TWT 529 33 FOOT BOOSTER

	BETA
N1B6	0.000
N1B7	0.000
N1B7F2	0.000
N1B7F3	0.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 0.596

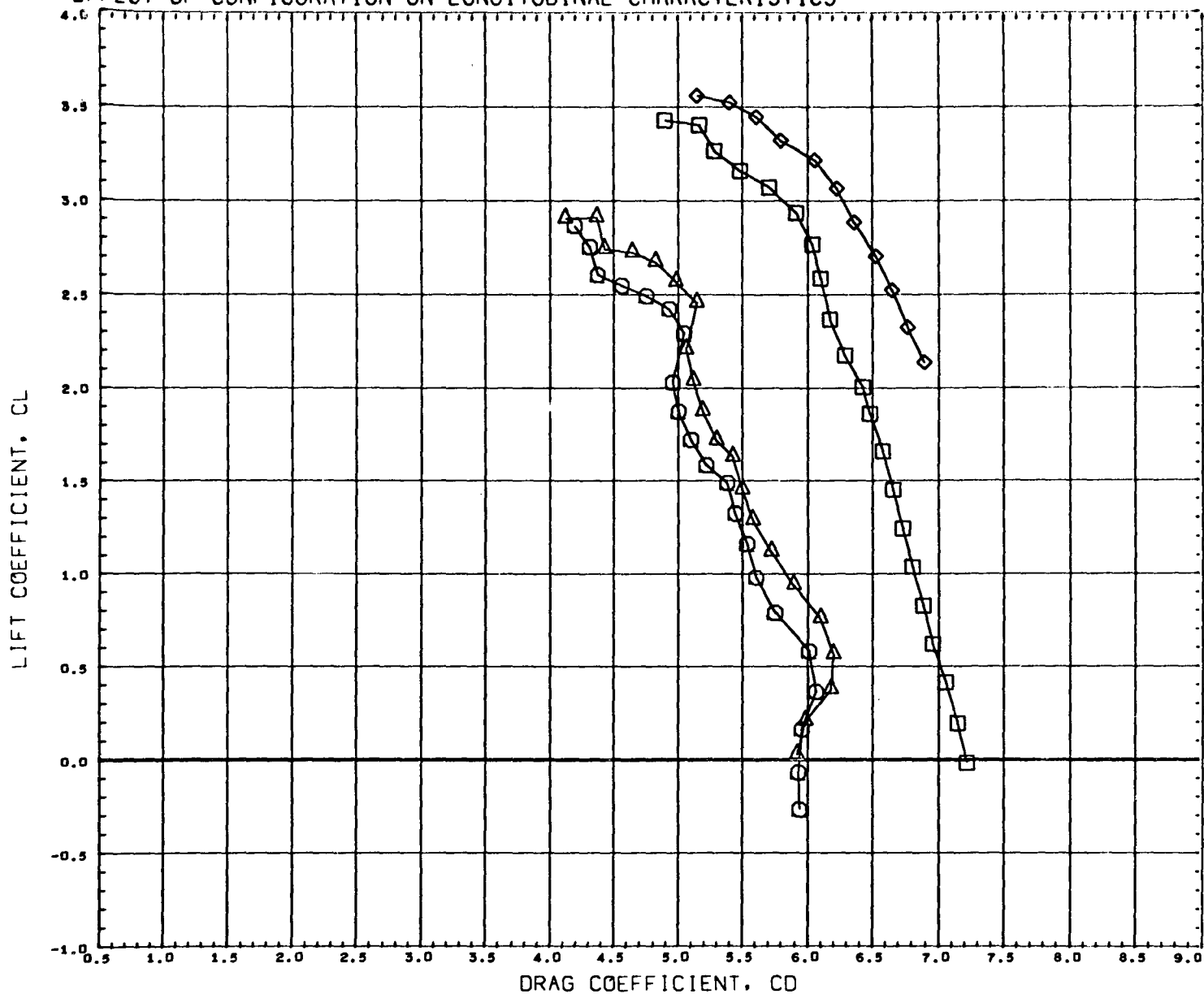
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	○	MSFC TWT 529 33 FOOT BOOSTER	0.000	SREF 1.4230 SQ. IN.
(C63004)	△	MSFC TWT 529 33 FOOT BOOSTER	0.000	LREF 5.4330 IN.
(C63008)	◇	MSFC TWT 529 33 FOOT BOOSTER	0.000	BREF 5.4330 IN.
(C63012)	□	MSFC TWT 529 33 FOOT BOOSTER	0.000	XMRP 3.2660 IN.
				YMRP 0.0000 IN.
				ZMRP 0.0000 IN.
				SCALE 0.0034

MACH 0.897

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



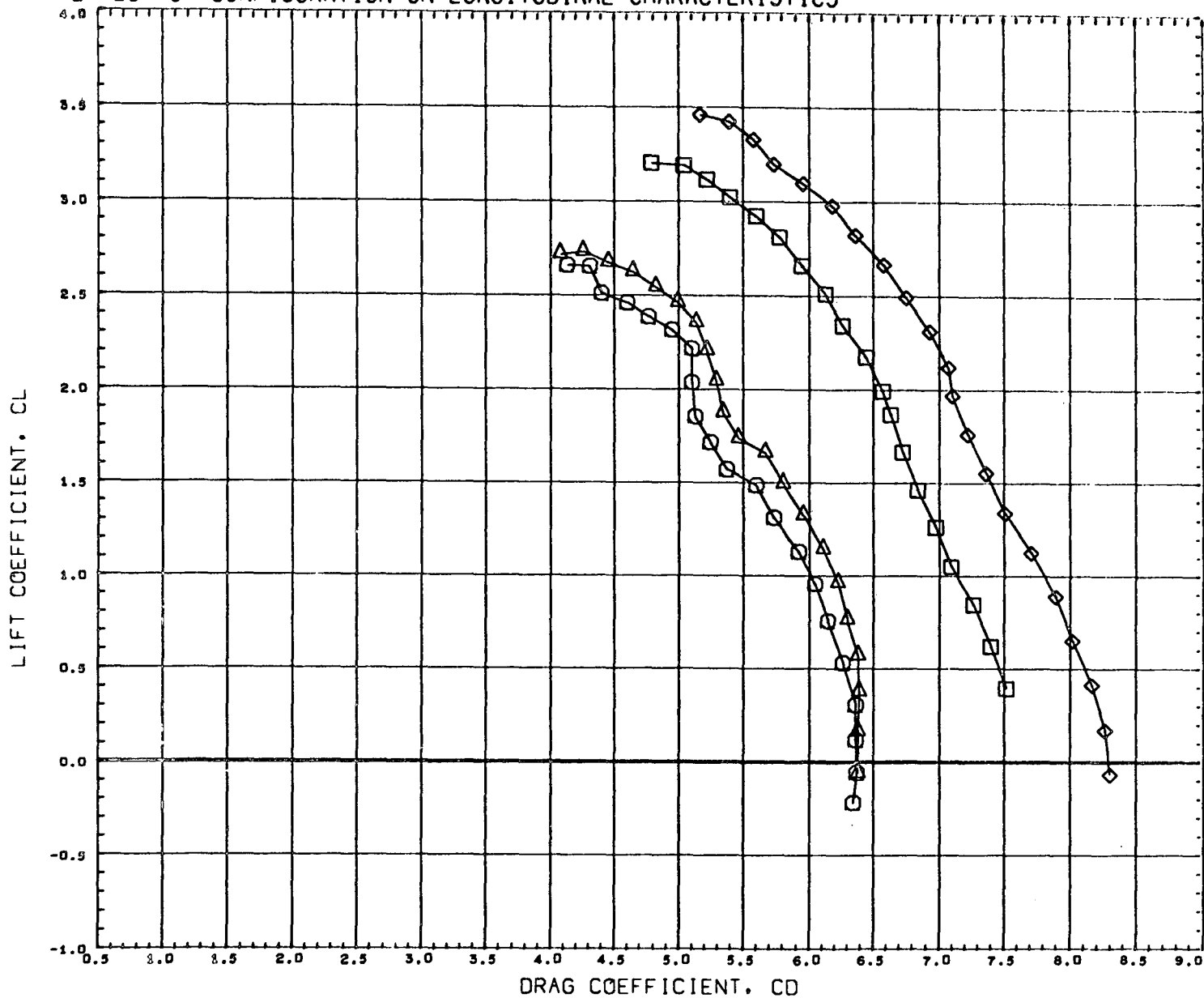
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	MSFC TWT 529 33 FOOT BOOSTER

BETA
0.000
0.000
0.000
0.000

REFERENCE INFORMATION	
SREF	1.4230 SQ. IN.
LREF	5.4330 IN.
BREF	5.4330 IN.
XMRP	3.2660 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 1.199

EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



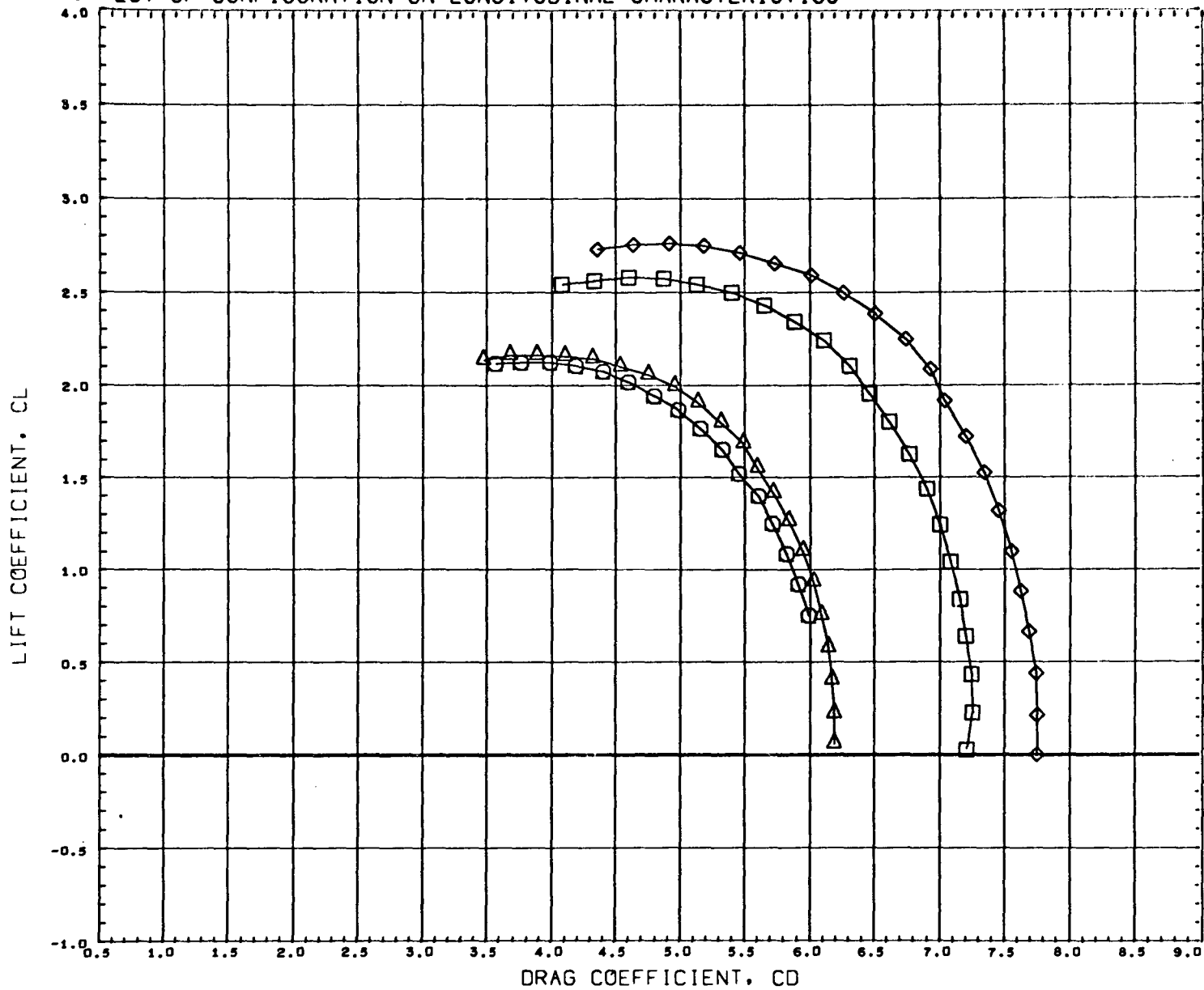
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER
(C63004)	MSFC TWT 529 33 FOOT BOOSTER
(C63008)	MSFC TWT 529 33 FOOT BOOSTER
(C63012)	MSFC TWT 529 33 FOOT BOOSTER

BETA
N1B6 0.000
N1B7 0.000
N1B7F2 0.000
N1B7F3 0.000

REFERENCE INFORMATION
SREF 1.4230 SQ. IN.
LREF 5.4330 IN.
BREF 5.4330 IN.
XMRP 3.2660 IN.
YMRP 0.0000 IN.
ZMRP 0.0000 IN.
SCALE 0.0034

MACH 1.456

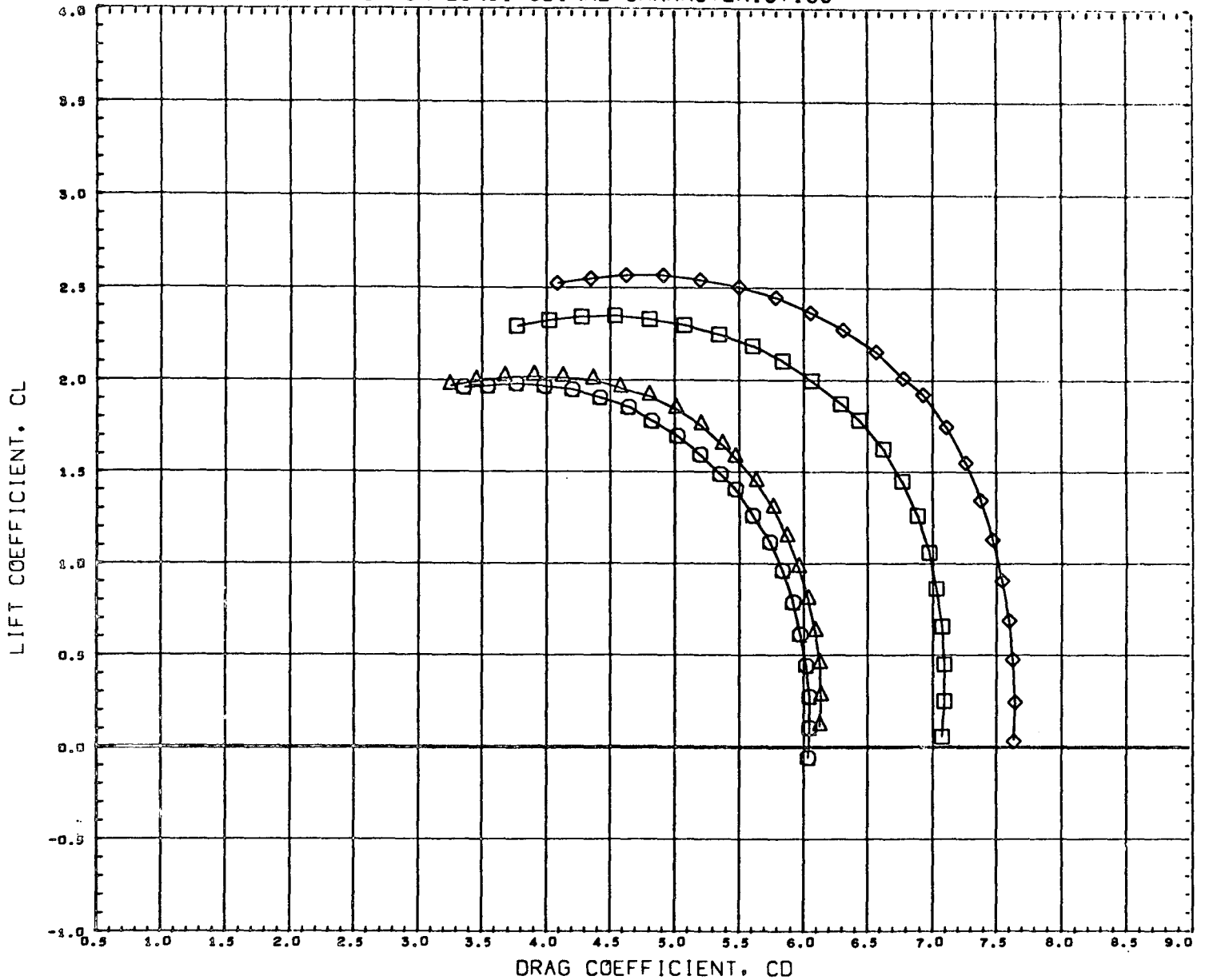
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N186	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N187	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N187F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N187F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 2.740

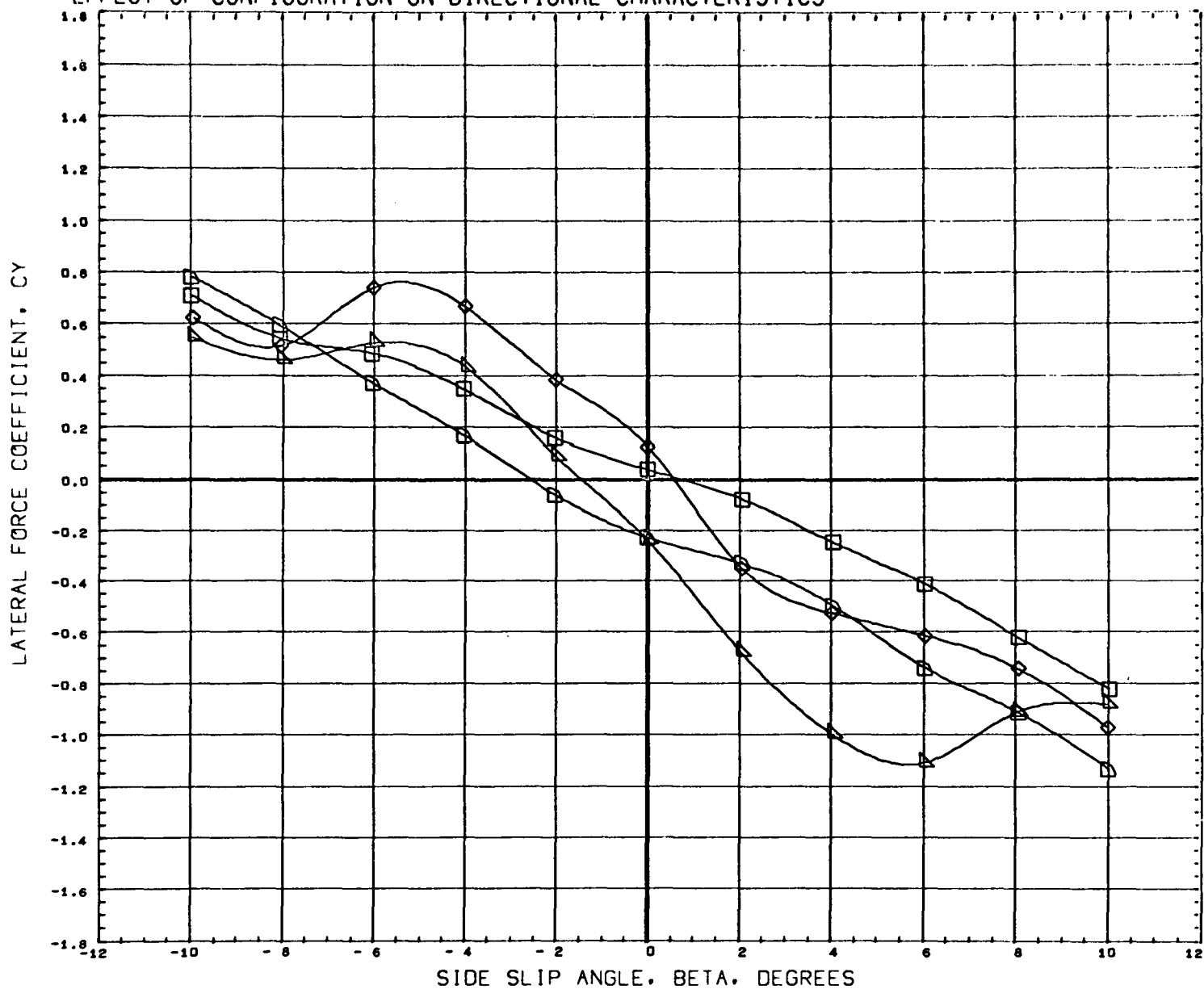
EFFECT OF CONFIGURATION ON LONGITUDINAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	REFERENCE INFORMATION
(C63001)	MSFC TWT 529 33 FOOT BOOSTER N1B6	0.000	SREF 1.4230 SQ. IN.
(C63004)	MSFC TWT 529 33 FOOT BOOSTER N1B7	0.000	LREF 5.4330 IN.
(C63008)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	0.000	BREF 5.4330 IN.
(C63012)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	0.000	XMRP 3.2660 IN.
			YMRP 0.0000 IN.
			ZMRP 0.0000 IN.
			SCALE 0.0034

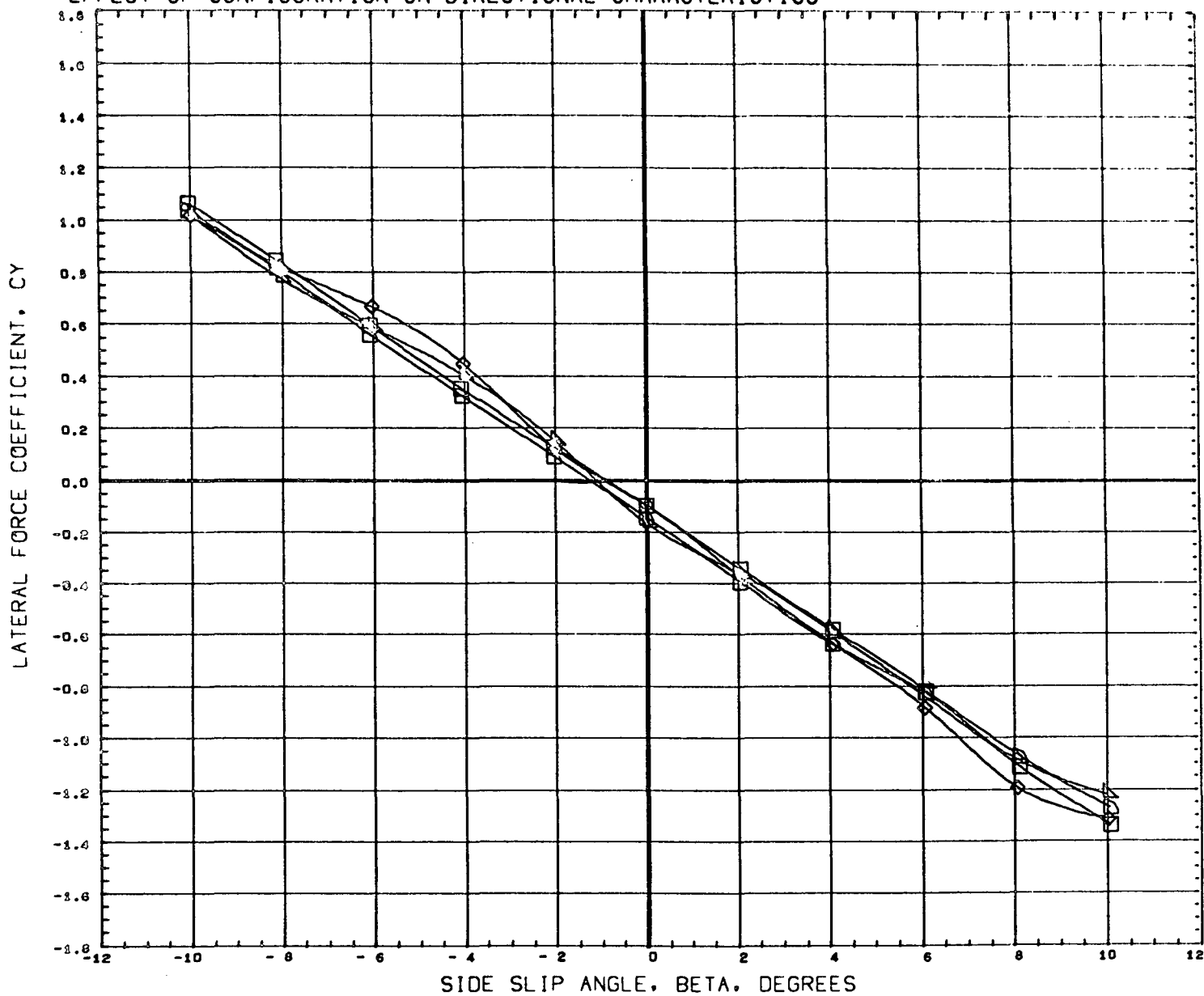
MACH 4.959

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



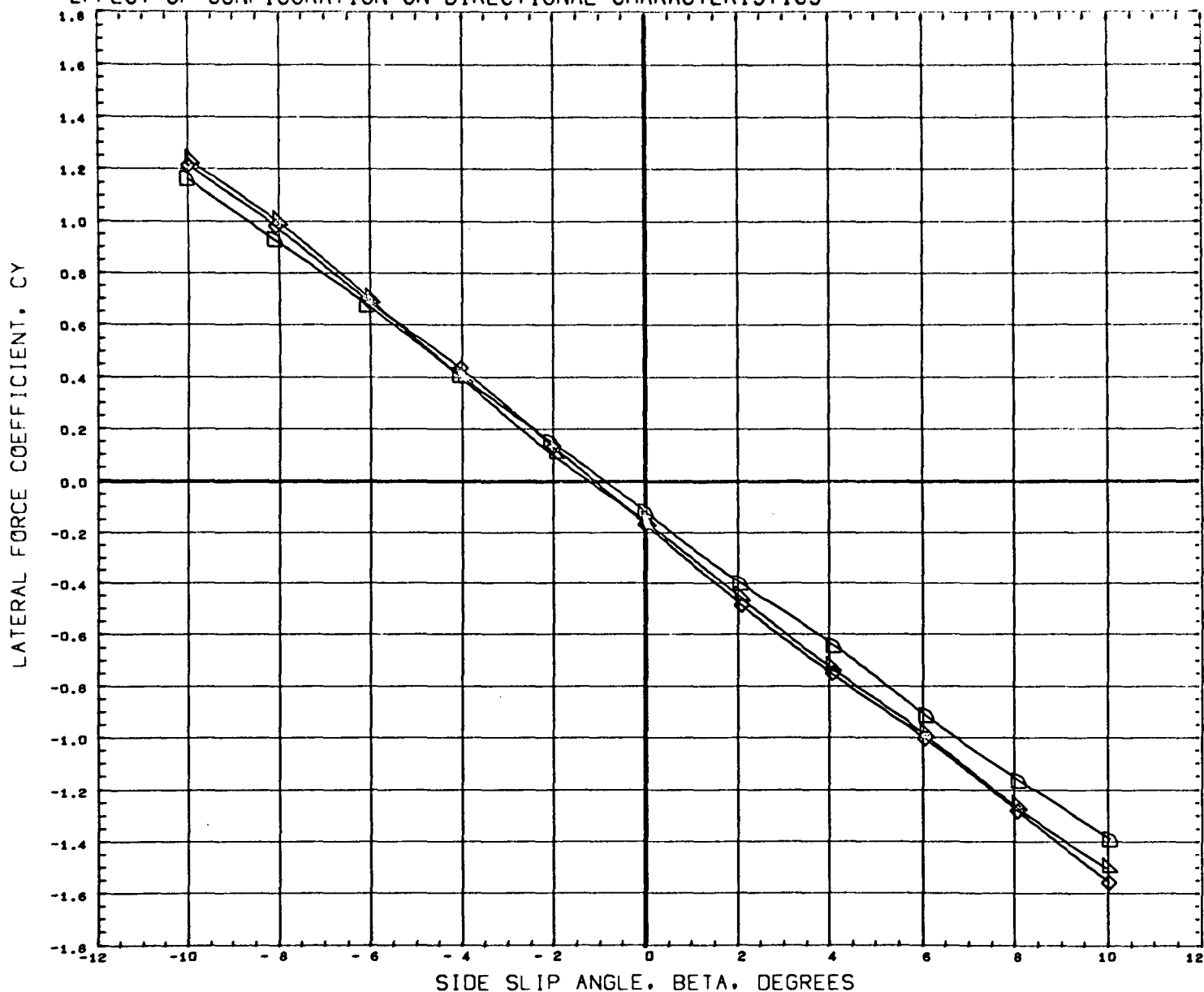
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION	
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF	1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF	5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF	5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP	3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP	0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP	0.0000 IN.
MACH 0.596			SCALE	0.0034

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
			SCALE 0.0034
MACH	0.904		

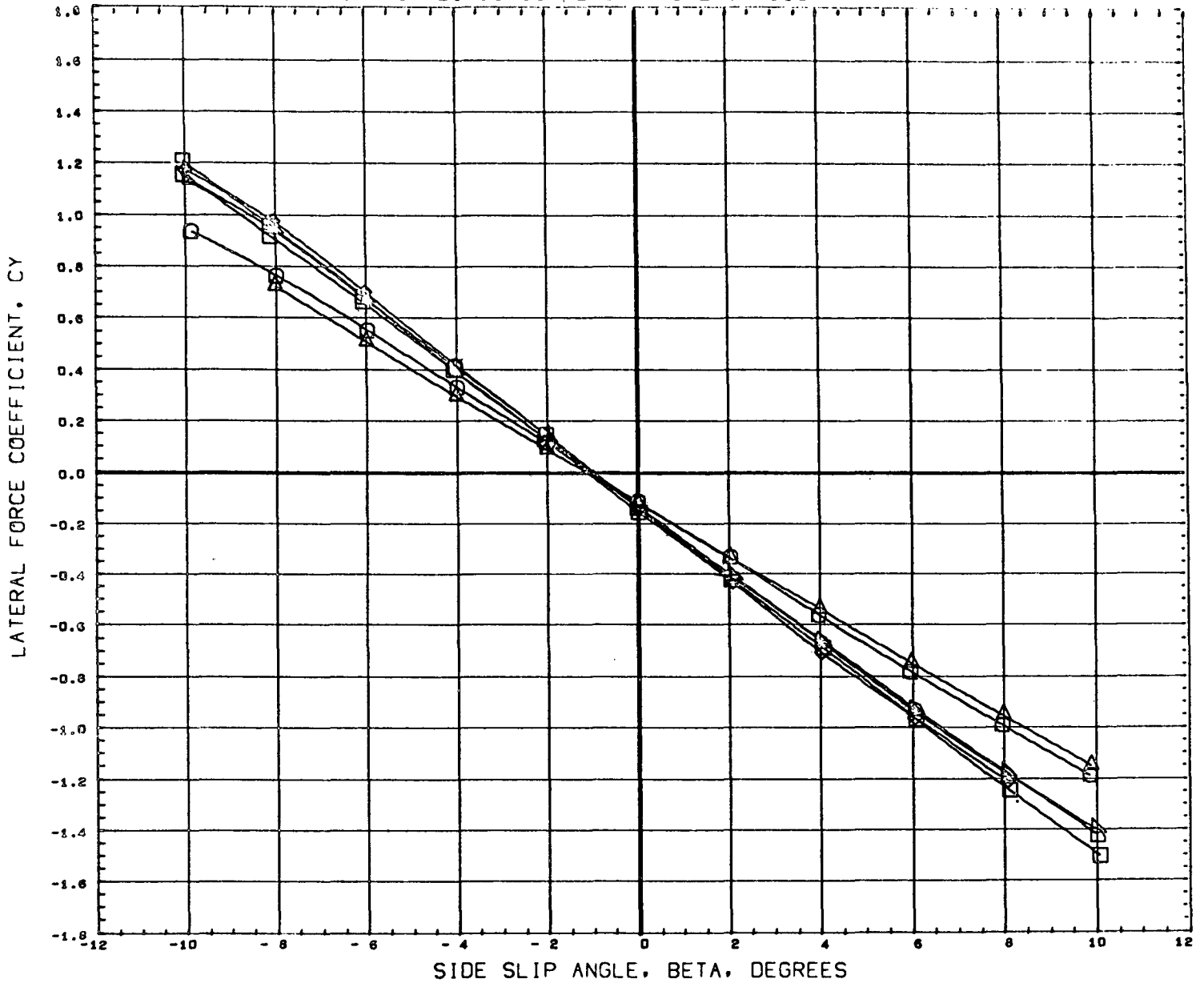
EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
			SCALE 0.0034

MACH 1.204

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS

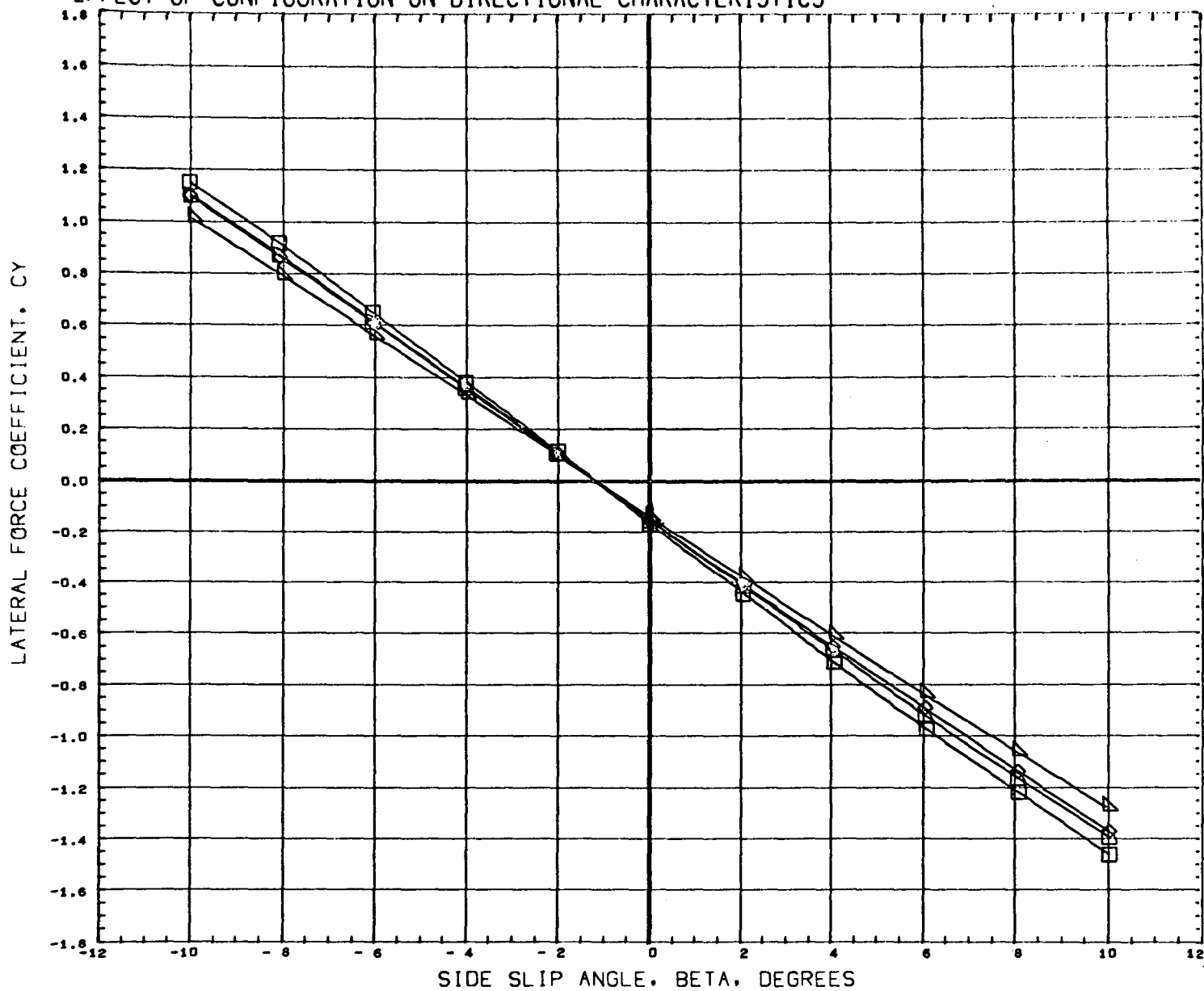


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(A63006)	MSFC TWT 529 33 FOOT BOOSTER N1B7	60.000
(A63007)	MSFC TWT 529 33 FOOT BOOSTER N1B7	80.000
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000

MACH 1.466

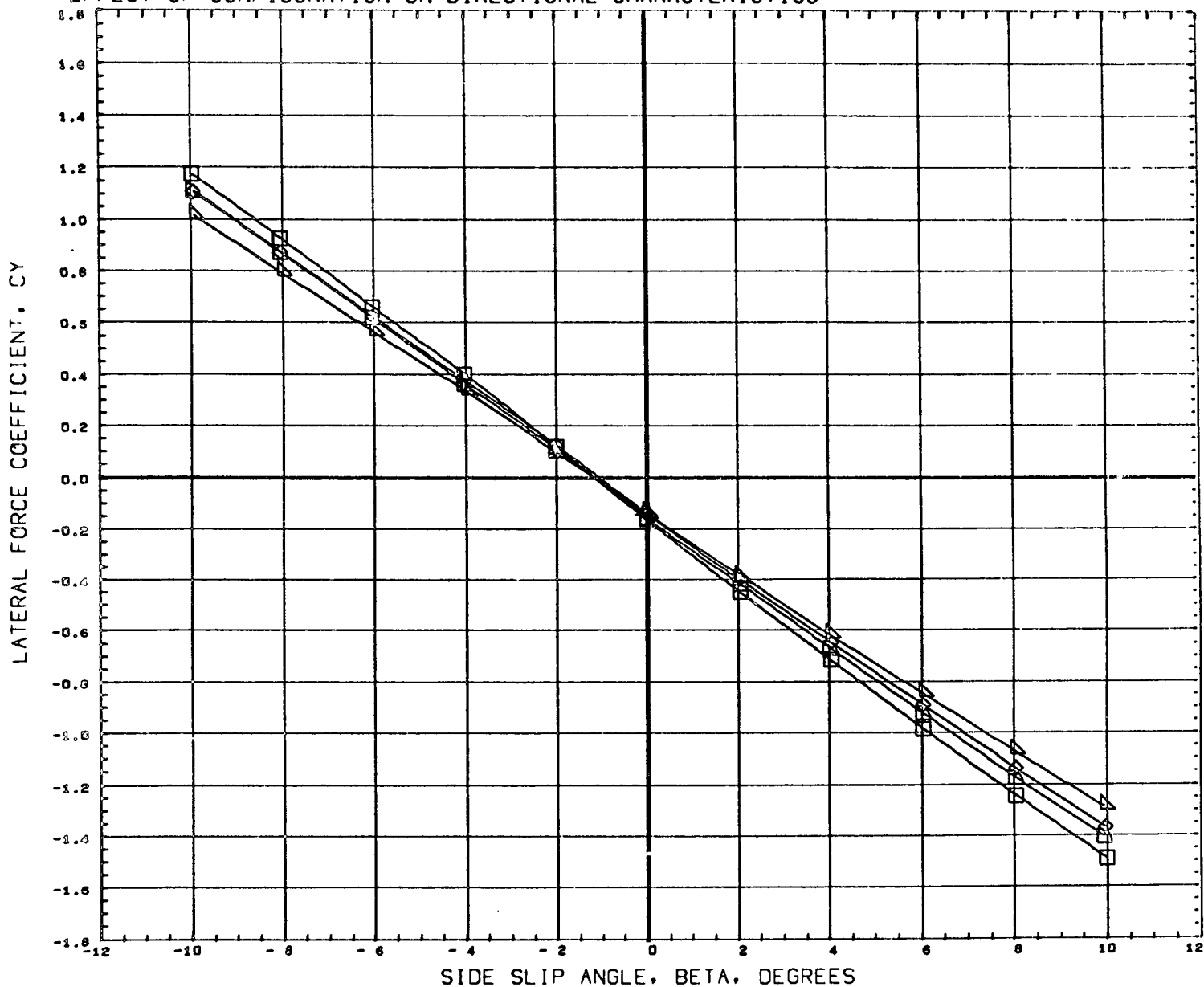
REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



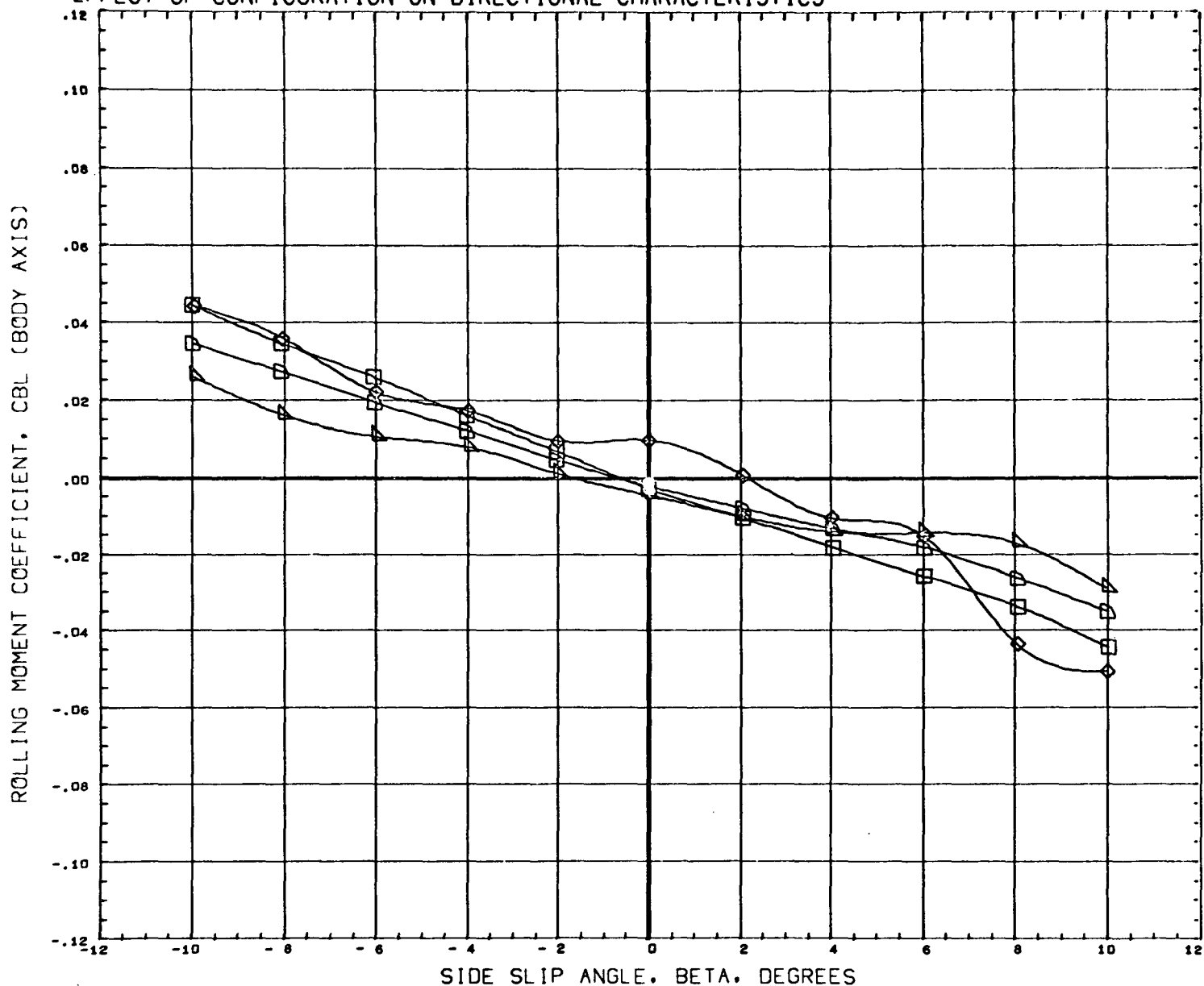
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRF 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRF 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRF 0.0000 IN.
MACH	2.740		SCALE 0.0034

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



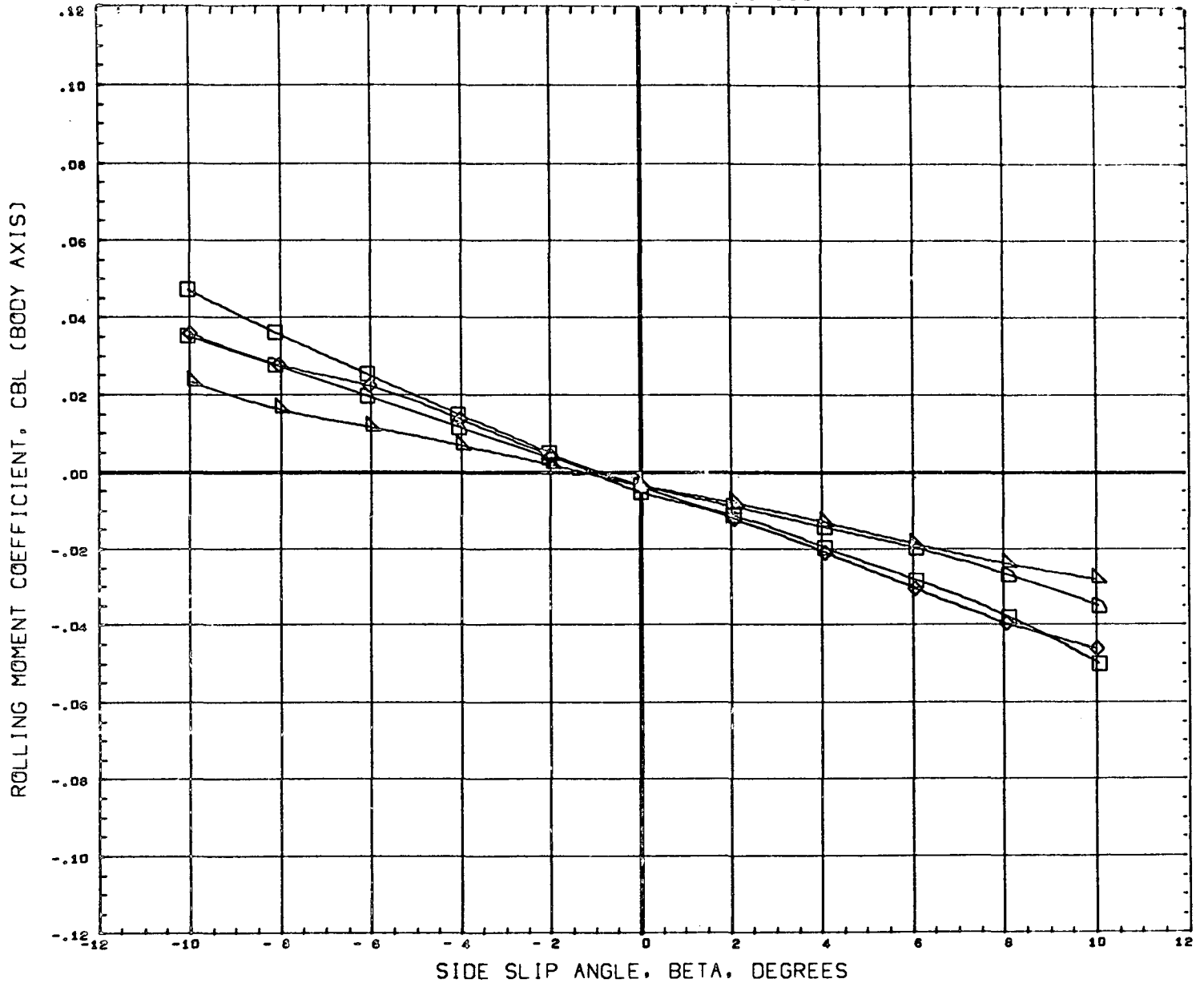
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
			SCALE 0.0034
MACH	4.959		

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



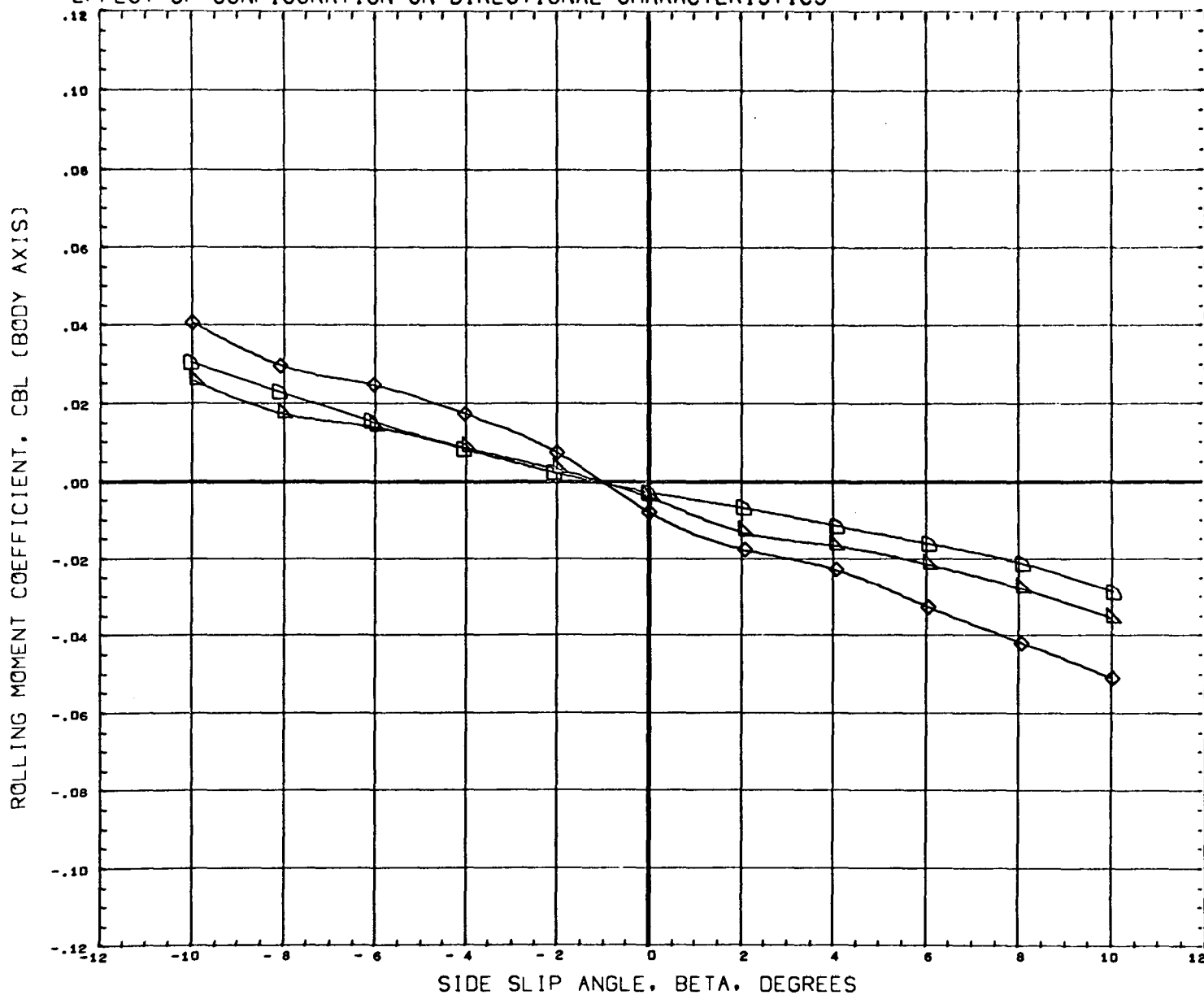
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION	
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF	1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF	5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N187F2	60.000	BREF	5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N187F2	80.000	XMRP	3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N187F3	60.000	YMRP	0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N187F3	80.000	ZMRP	0.0000 IN.
MACH	0.596		SCALE	0.0034

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
MACH	0.904		SCALE 0.0034

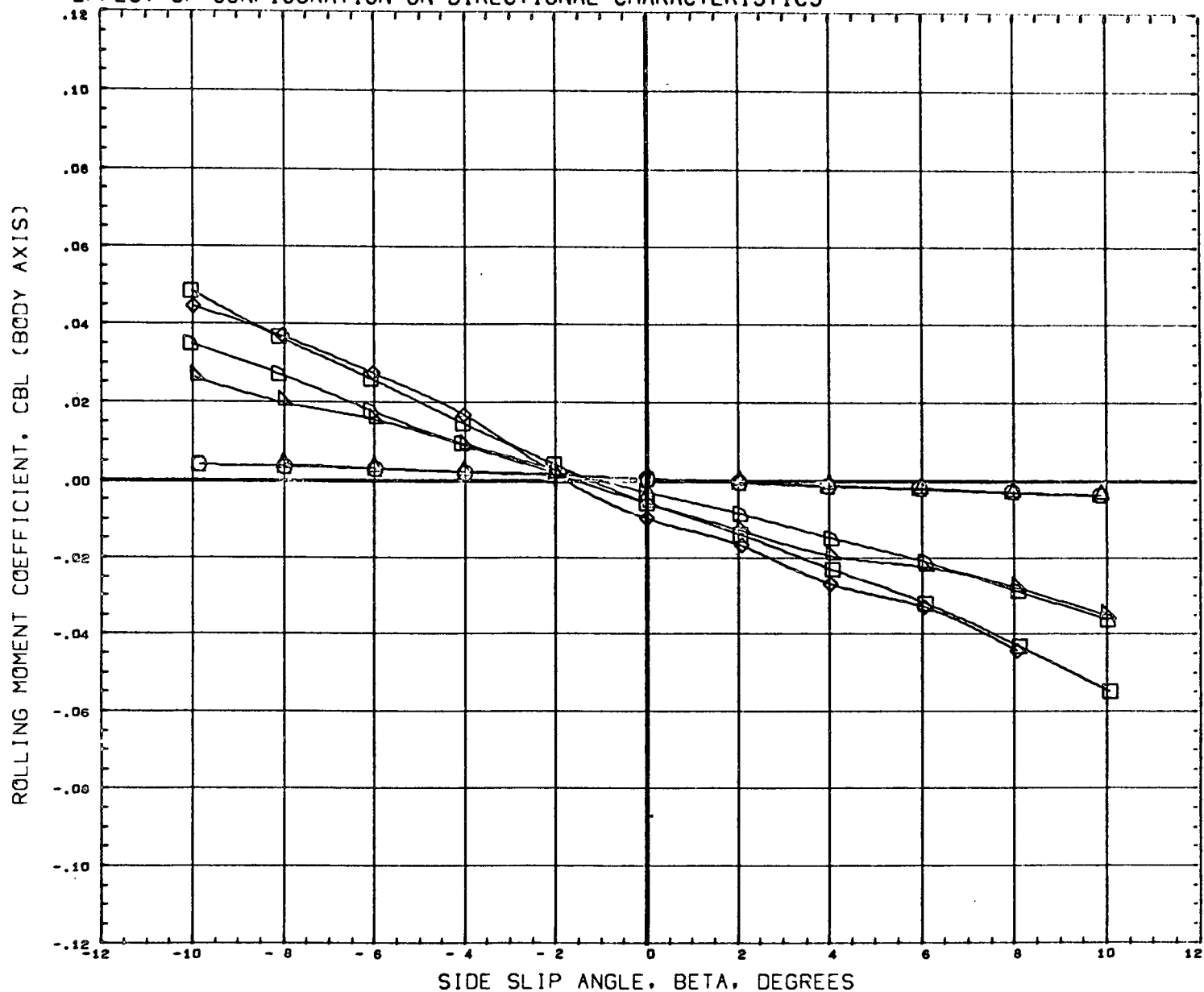
EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION	
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF	1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF	5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF	5.4330 IN.
(A63011)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	XMRP	3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP	0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP	0.0000 IN.
			SCALE	0.0034

MACH 1.204

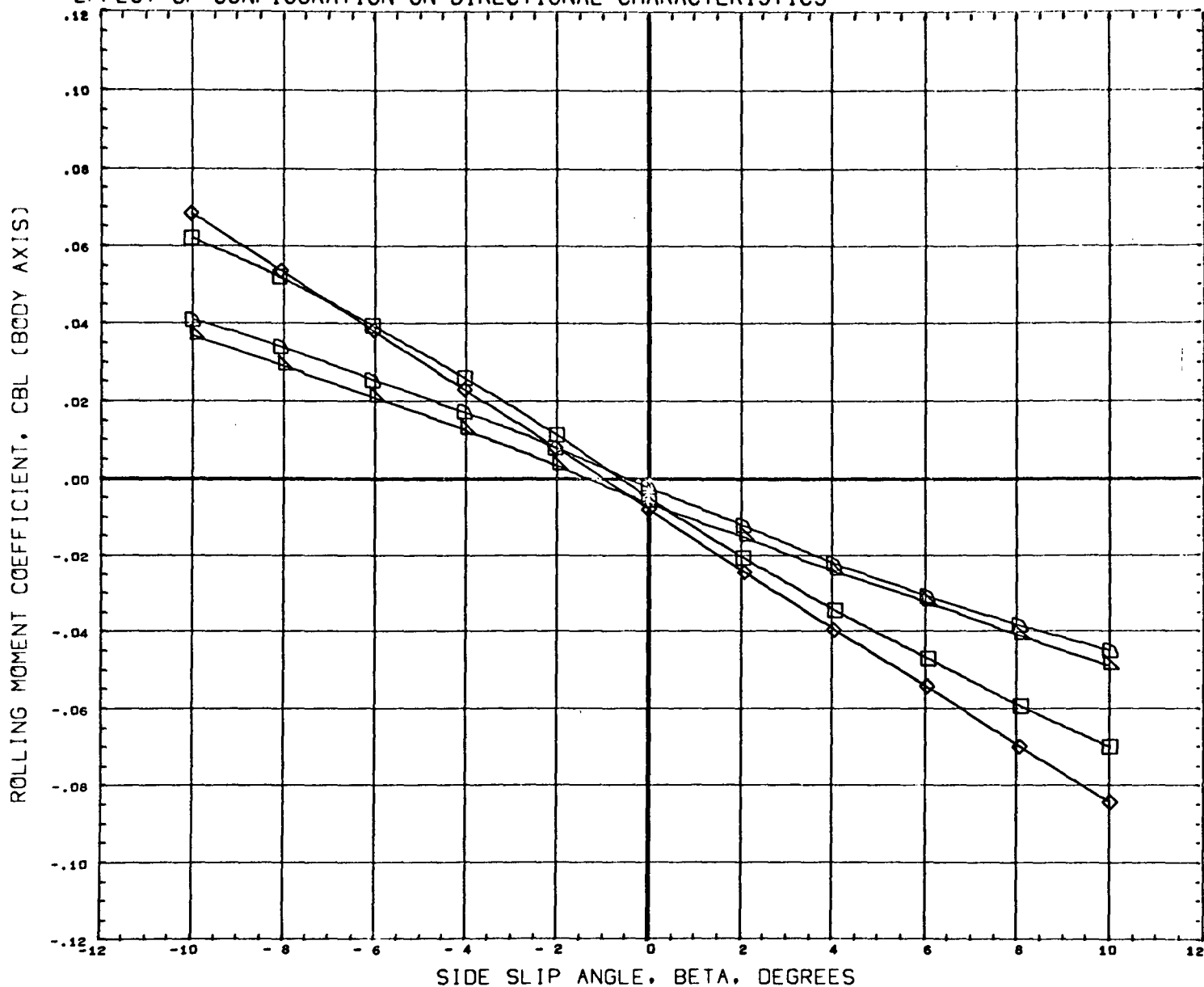
EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	MSFC TWT 529 33 FOOT BOOSTER N1B7	60.000	SREF 1.4230 SQ. IN.
(A63007)	MSFC TWT 529 33 FOOT BOOSTER N1B7	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRF 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRF 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRF 0.0000 IN.
			SCALE 0.0034

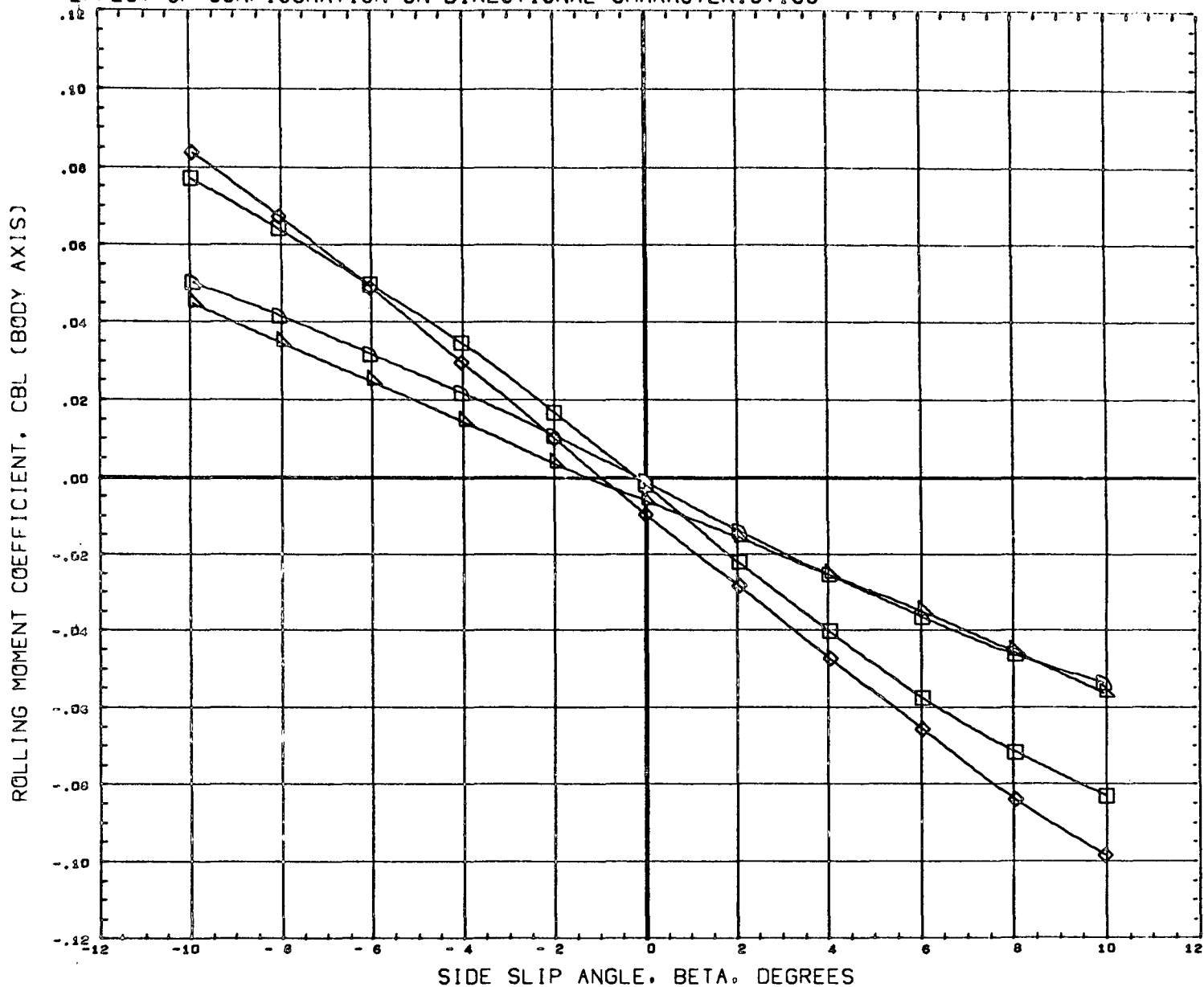
MACH 1.466

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N187F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N187F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N187F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N187F3	80.000	ZMRP 0.0000 IN.
MACH	2.740		SCALE 0.0034

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N187F2
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N187F2
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N187F3
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N187F3

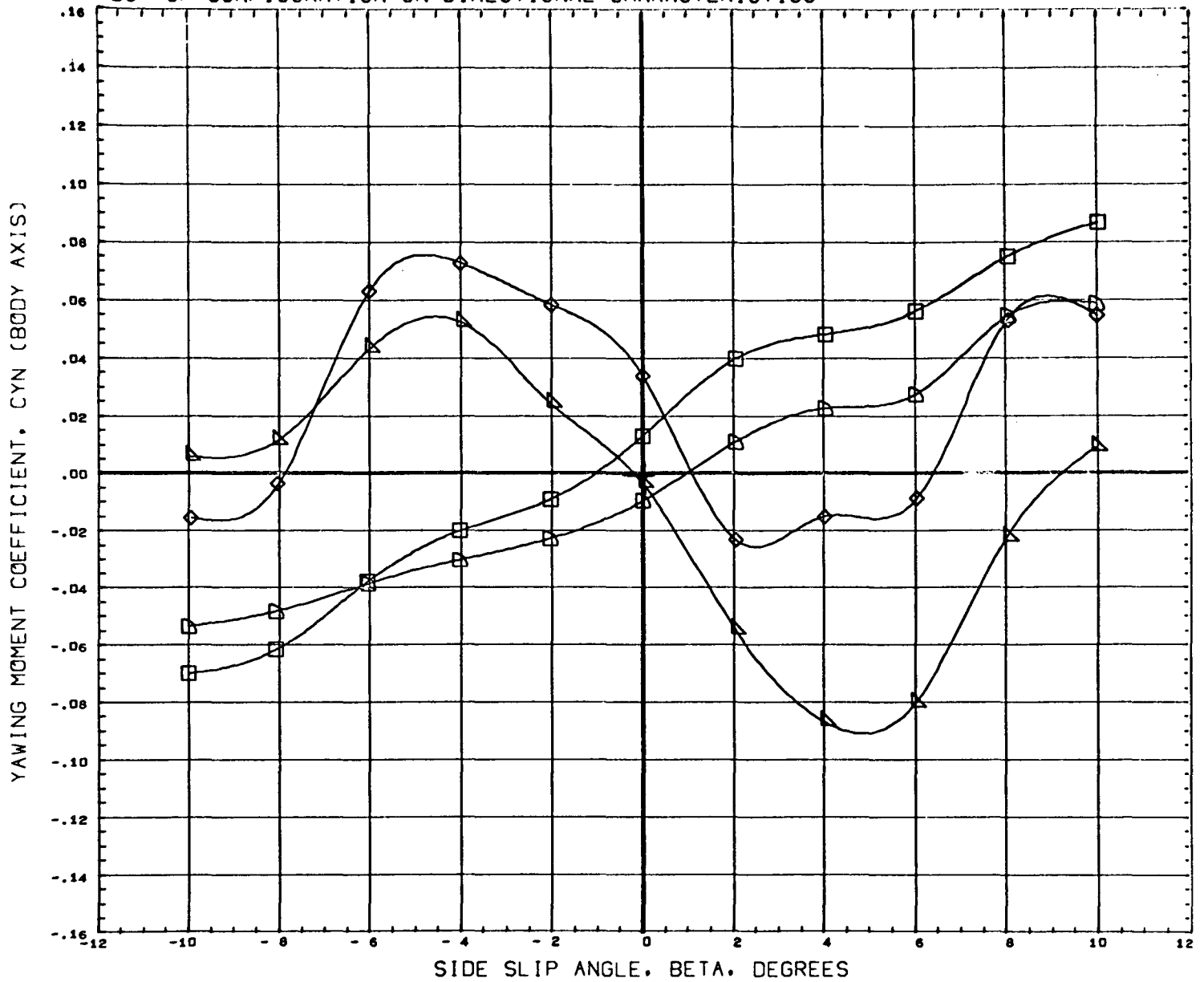
MACH 4.959

ALPHA
60.000
80.000
60.000
80.000
60.000
80.000

REFERENCE INFORMATION

SREF	1.4230	sq. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



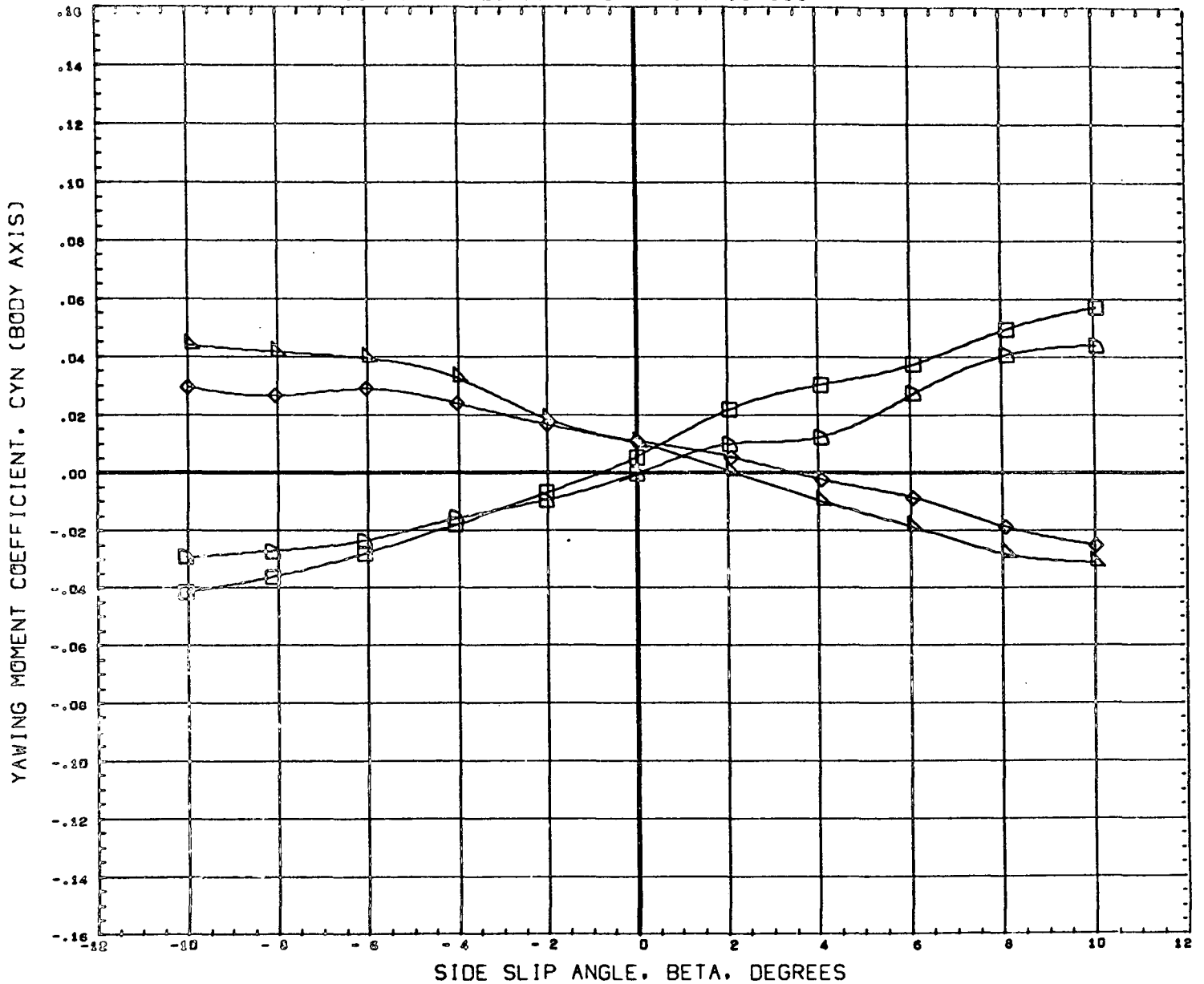
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3

ALPHA
60.000
80.000
60.000
80.000
60.000
80.000

REFERENCE INFORMATION		
SREF	1.4230	Sq. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 0.596

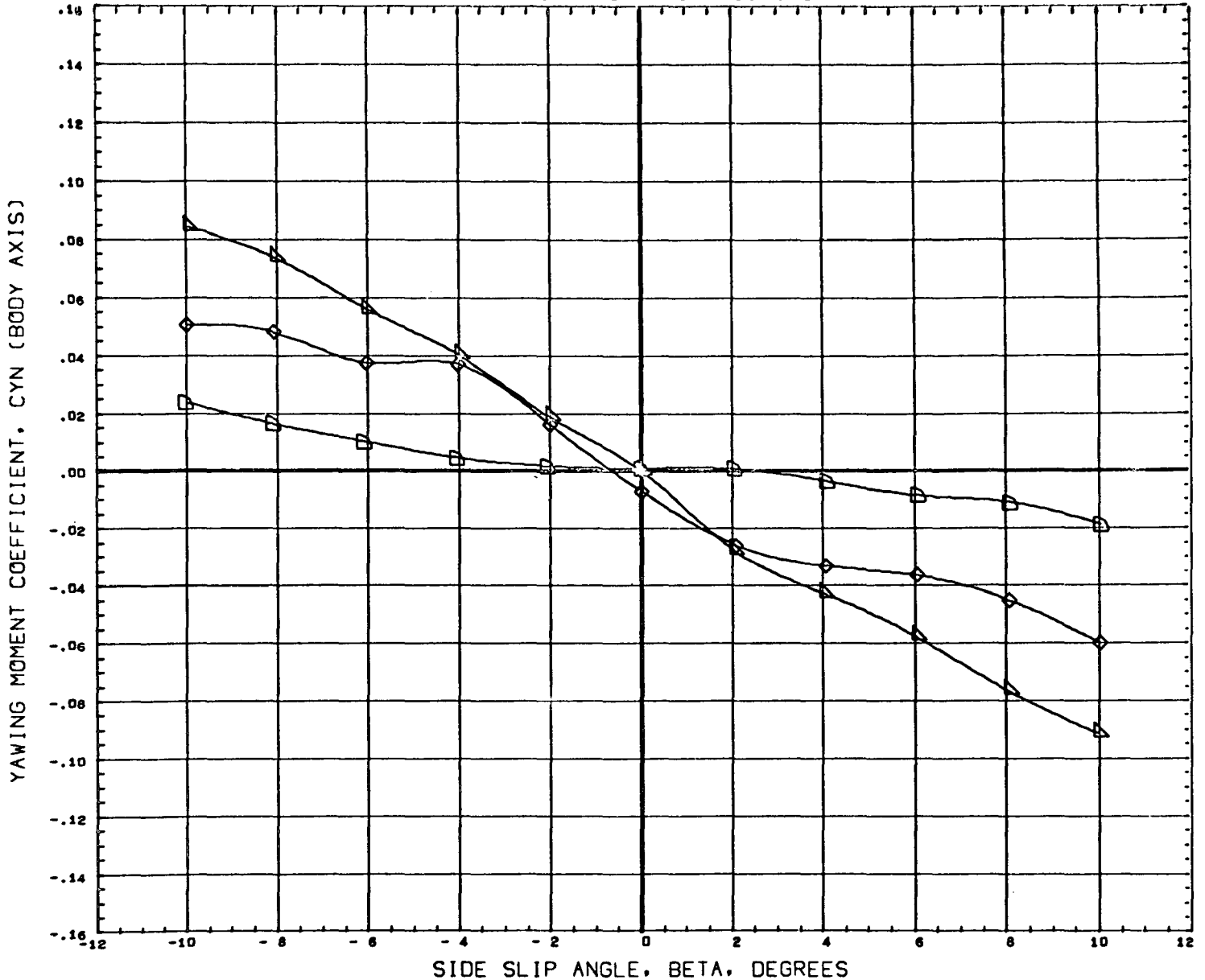
EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION	
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF	1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF	5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N187F2	60.000	BREF	5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N187F2	80.000	XMRP	3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N187F3	60.000	YMRP	0.0000 IN.
(A63019)	MSFC TWT 529 33 FOOT BOOSTER N187F3	80.000	ZMRP	0.0000 IN.
			SCALE	0.0034

MACH 0.904

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2
(A63011)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3

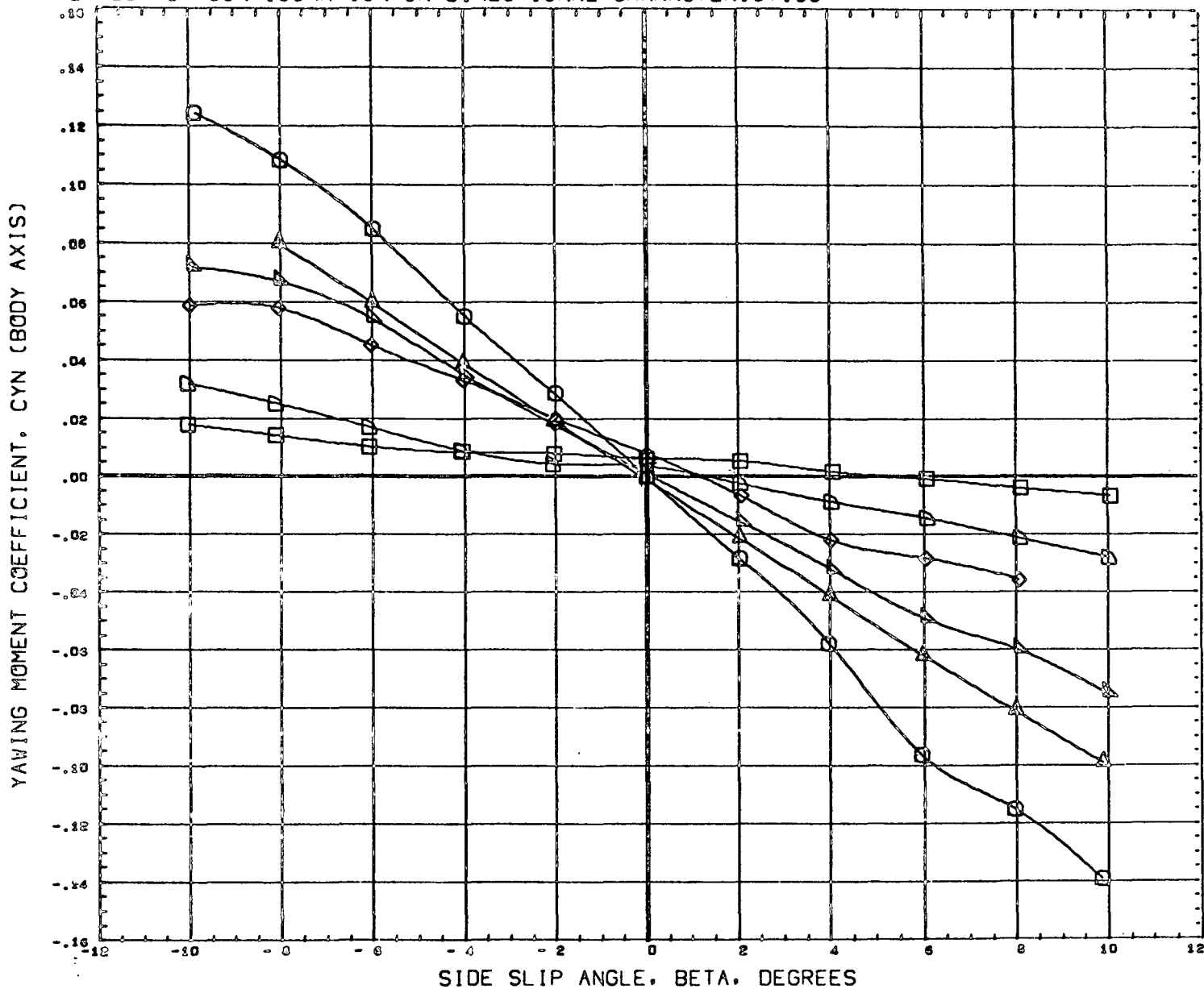
MACH 1.204

ALPHA
60.000
80.000
60.000
80.000
60.000
80.000

REFERENCE INFORMATION

SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



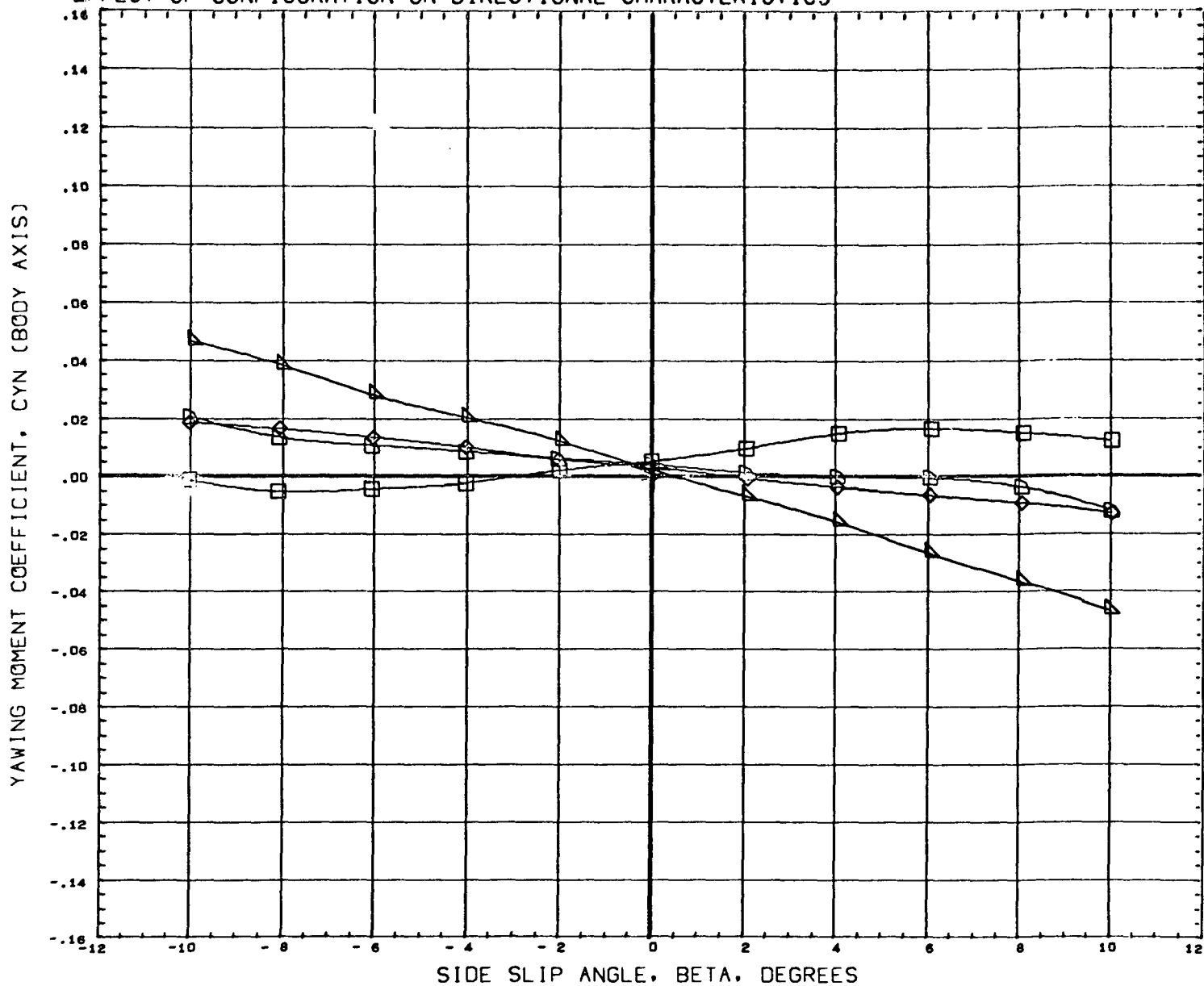
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A63026)	MSFC TWT 529 33 FOOT BOOSTER
(A63007)	MSFC TWT 529 33 FOOT BOOSTER
(A63010)	MSFC TWT 529 33 FOOT BOOSTER
(A63011)	MSFC TWT 529 33 FOOT BOOSTER
(A63014)	MSFC TWT 529 33 FOOT BOOSTER
(A63015)	MSFC TWT 529 33 FOOT BOOSTER

ALPHA
N1B7 60.000
N1B7 80.000
N1B7F2 60.000
N1B7F2 80.000
N1B7F3 60.000
N1B7F3 80.000

REFERENCE INFORMATION		
SREF	1.4230	SQ. IN.
LREF	5.4330	IN.
BREF	5.4330	IN.
XMRP	3.2660	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.466

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(A63006) DATA NOT AVAILABLE FOR ALL CONDITIONS
 (A63007) DATA NOT AVAILABLE FOR ALL CONDITIONS
 (A63010) MSFC TWT 529 33 FOOT BOOSTER N1B7F2
 (A63011) MSFC TWT 529 33 FOOT BOOSTER N1B7F2
 (A63014) MSFC TWT 529 33 FOOT BOOSTER N1B7F3
 (A63015) MSFC TWT 529 33 FOOT BOOSTER N1B7F3

ALPHA

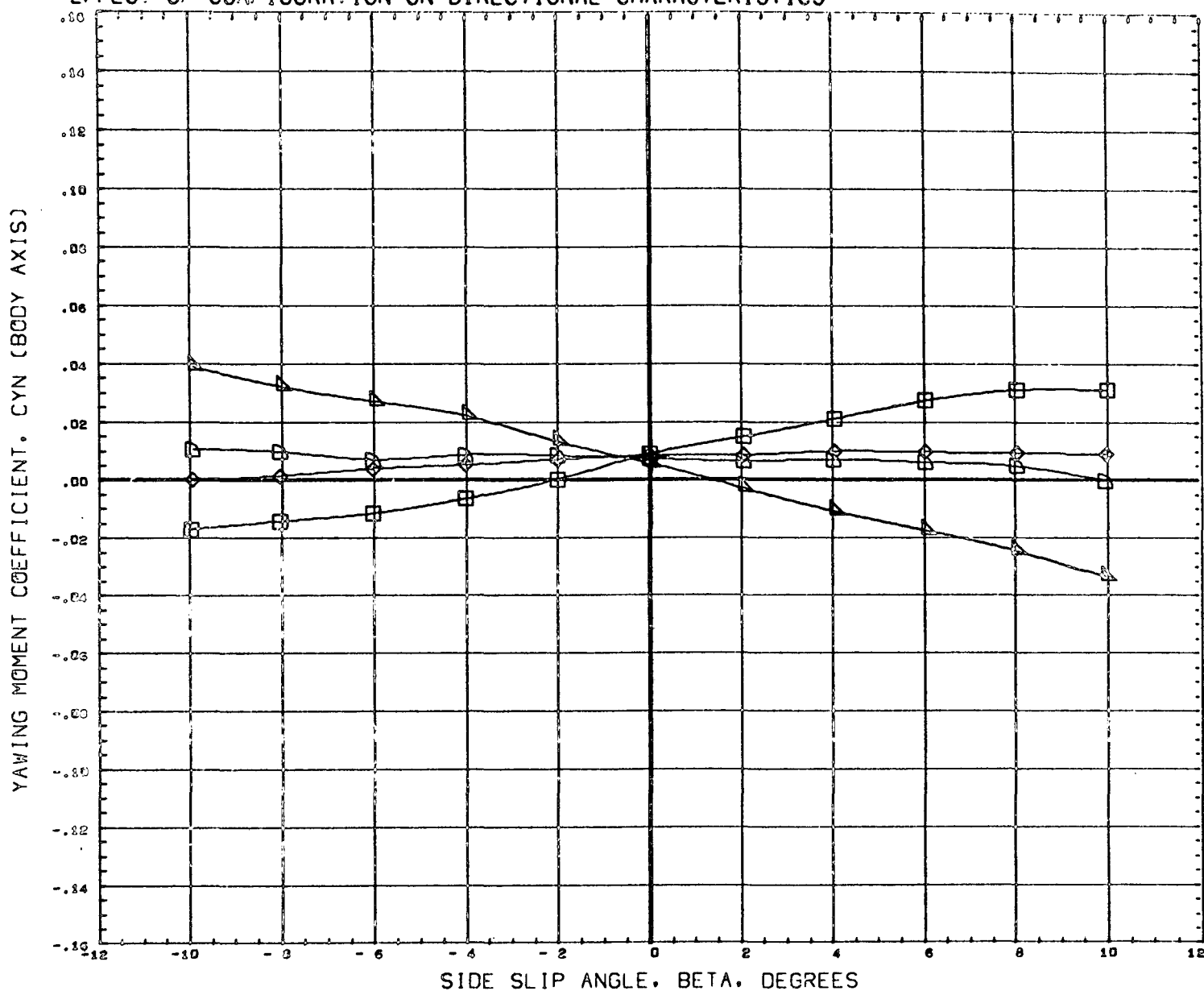
60.000
 80.000
 60.000
 80.000
 60.000
 80.000

REFERENCE INFORMATION

SREF 1.4230 SQ. IN.
 LREF 5.4330 IN.
 BREF 5.4330 IN.
 XMRP 3.2660 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 2.740

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



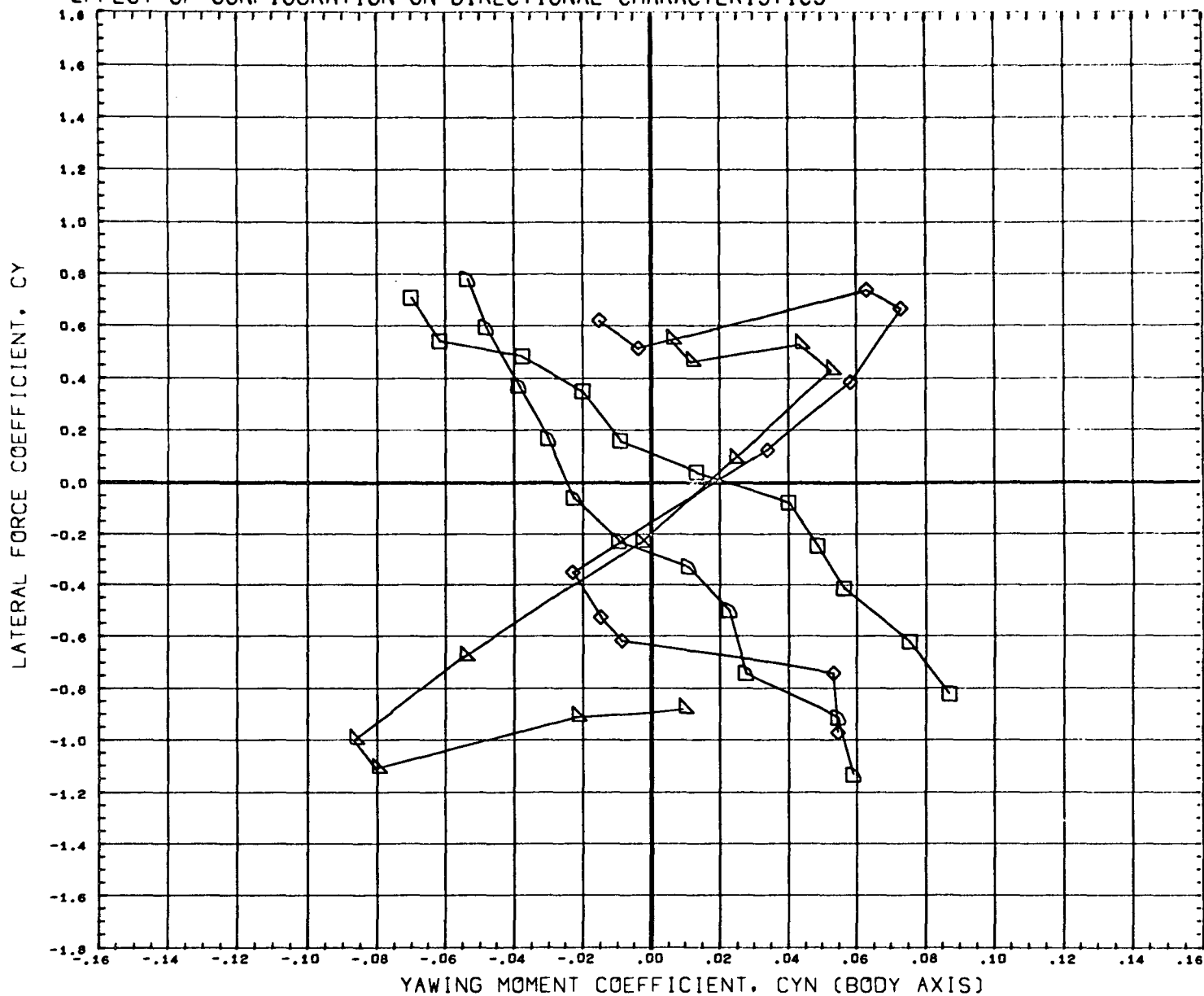
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3

MACH 4.959

ALPHA
60.000
80.000
60.000
80.000
60.000
80.000

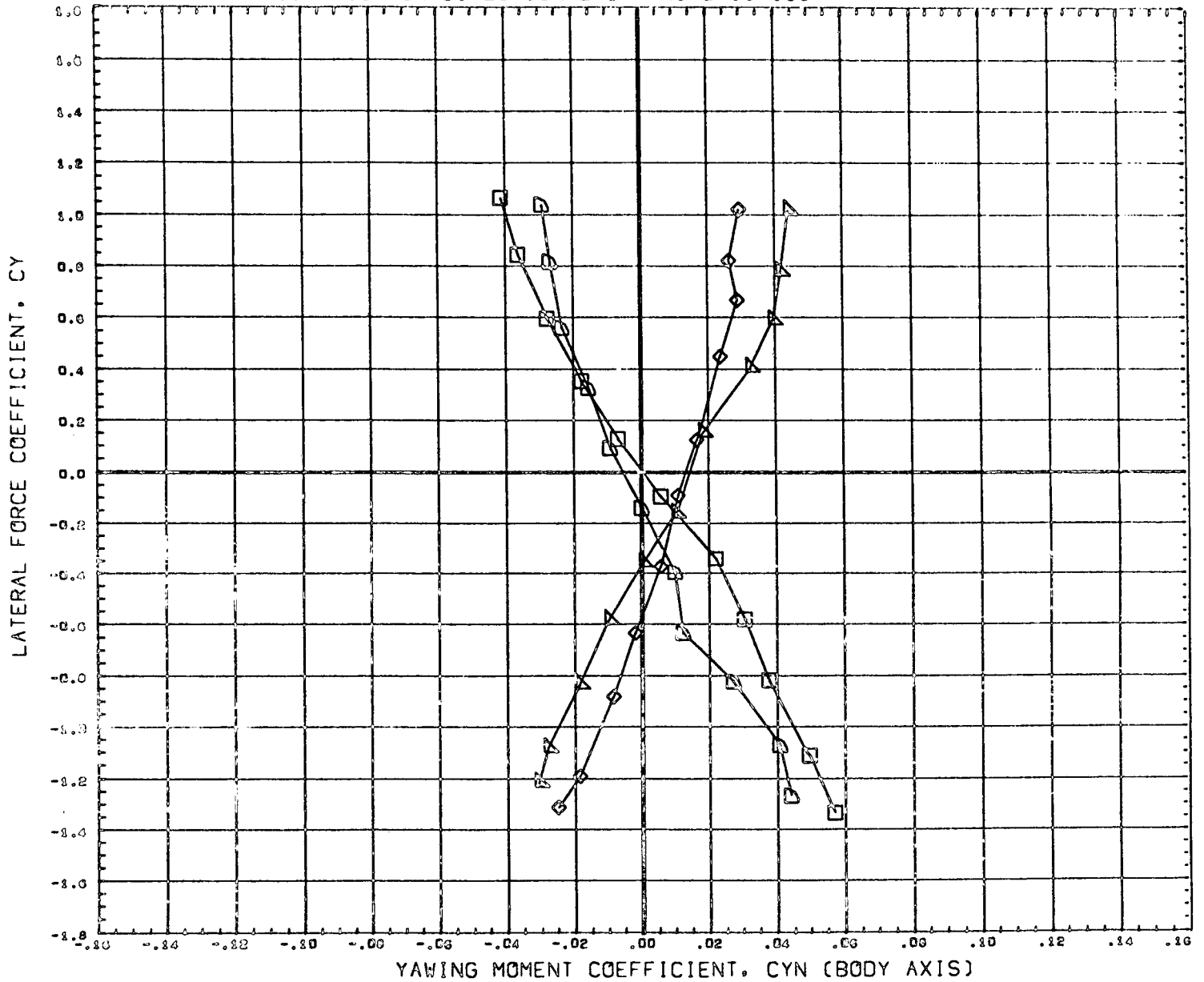
REFERENCE INFORMATION
SREF 1.4230 SQ. IN.
LREF 5.4330 IN.
BREF 5.4330 IN.
XMRP 3.2660 IN.
YMRP 0.0000 IN.
ZMRP 0.0000 IN.
SCALE 0.0034

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
			SCALE 0.0034
MACH	0.596		

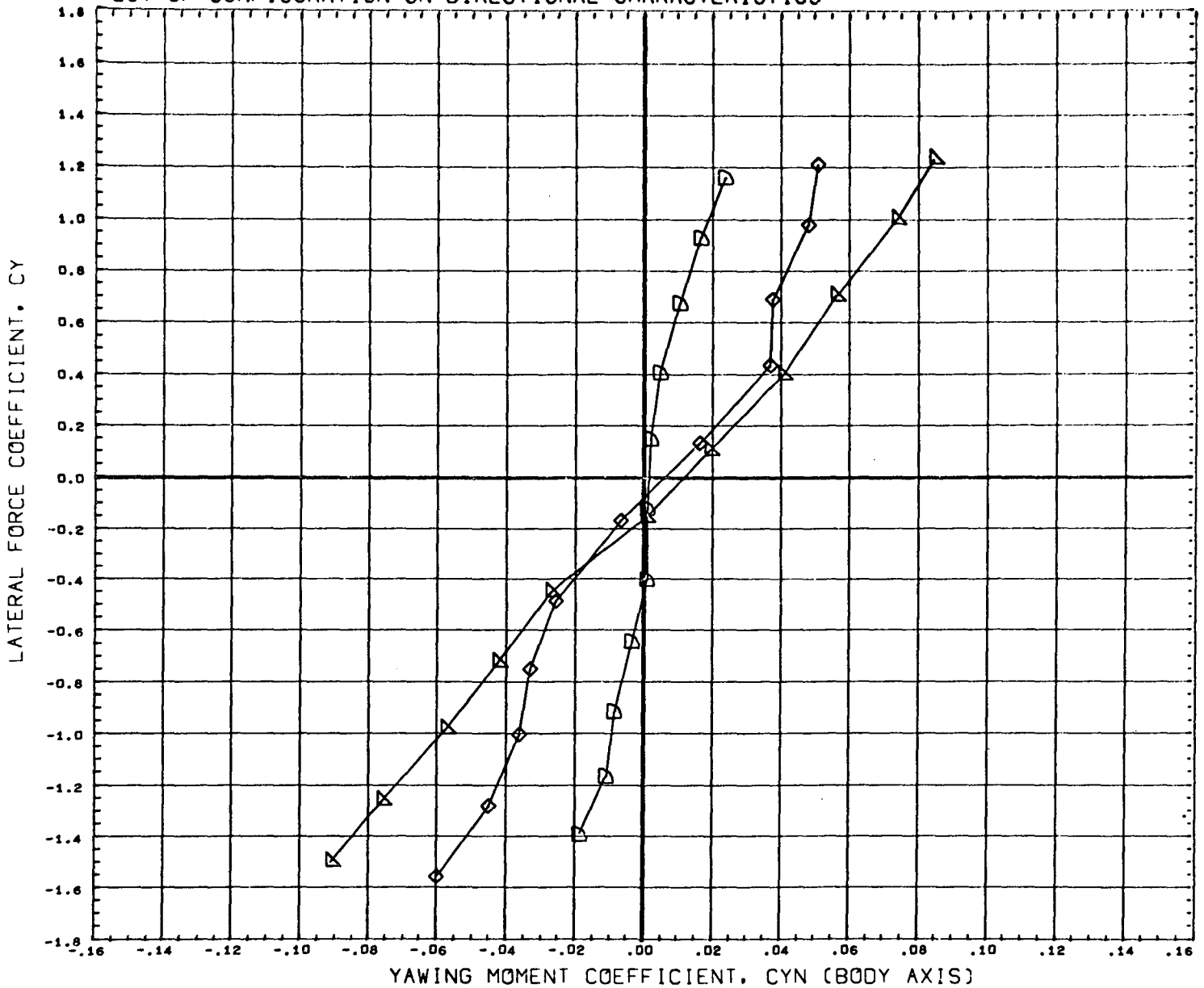
EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION	
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF	1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF	5.4330 IN.
(A63010)	HSFC TWT 929 33 FOOT BOOSTER N1B7F2	60.000	BREF	9.4330 IN.
(A63011)	HSFC TWT 929 33 FOOT BOOSTER N1B7F2	80.000	XMRF	3.2660 IN.
(A63014)	HSFC TWT 929 33 FOOT BOOSTER N1B7F3	60.000	YMRF	0.0000 IN.
(A63015)	HSFC TWT 929 33 FOOT BOOSTER N1B7F3	80.000	ZMRF	0.0000 IN.
			SCALE	0.0034

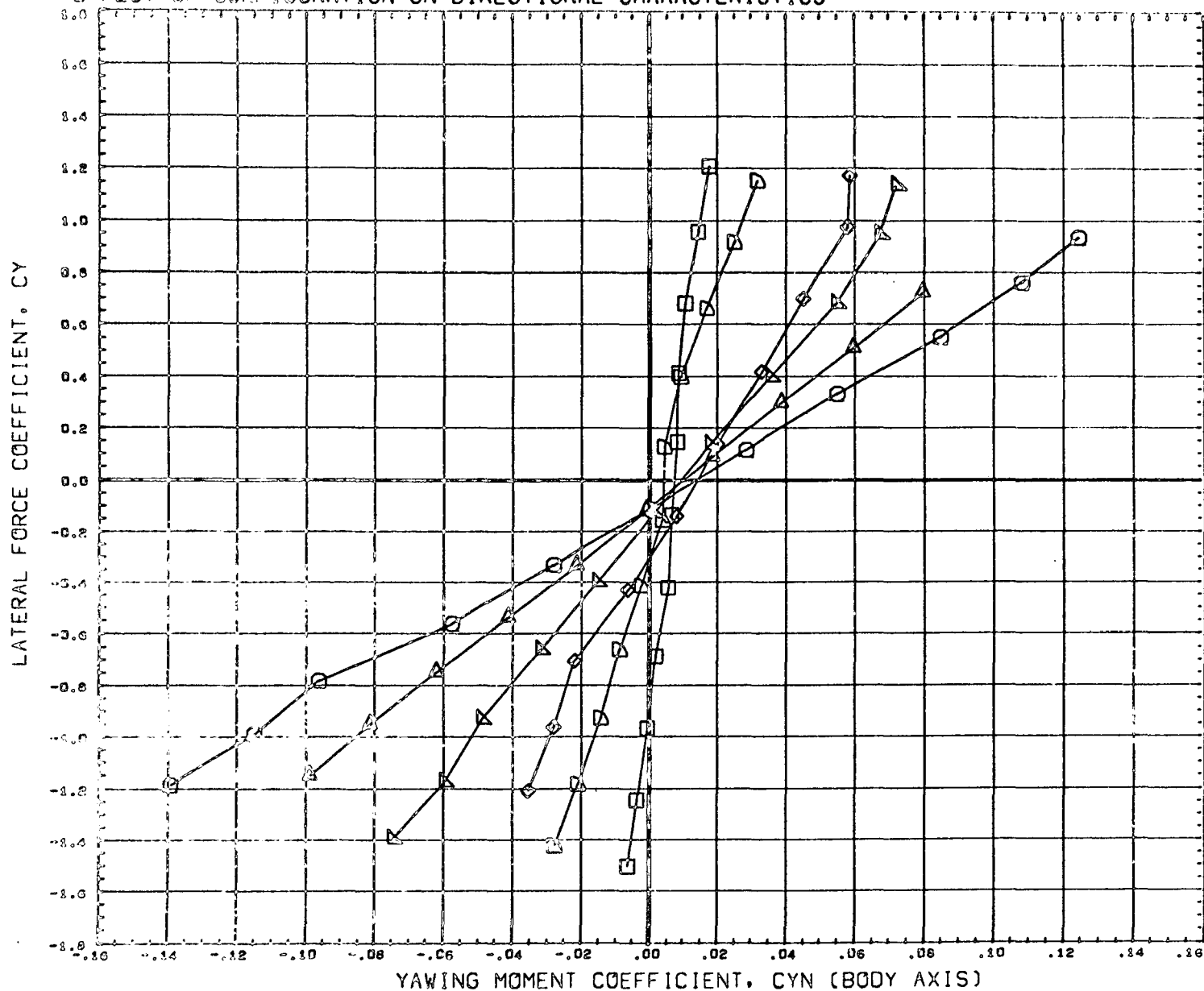
MACH 6.064

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



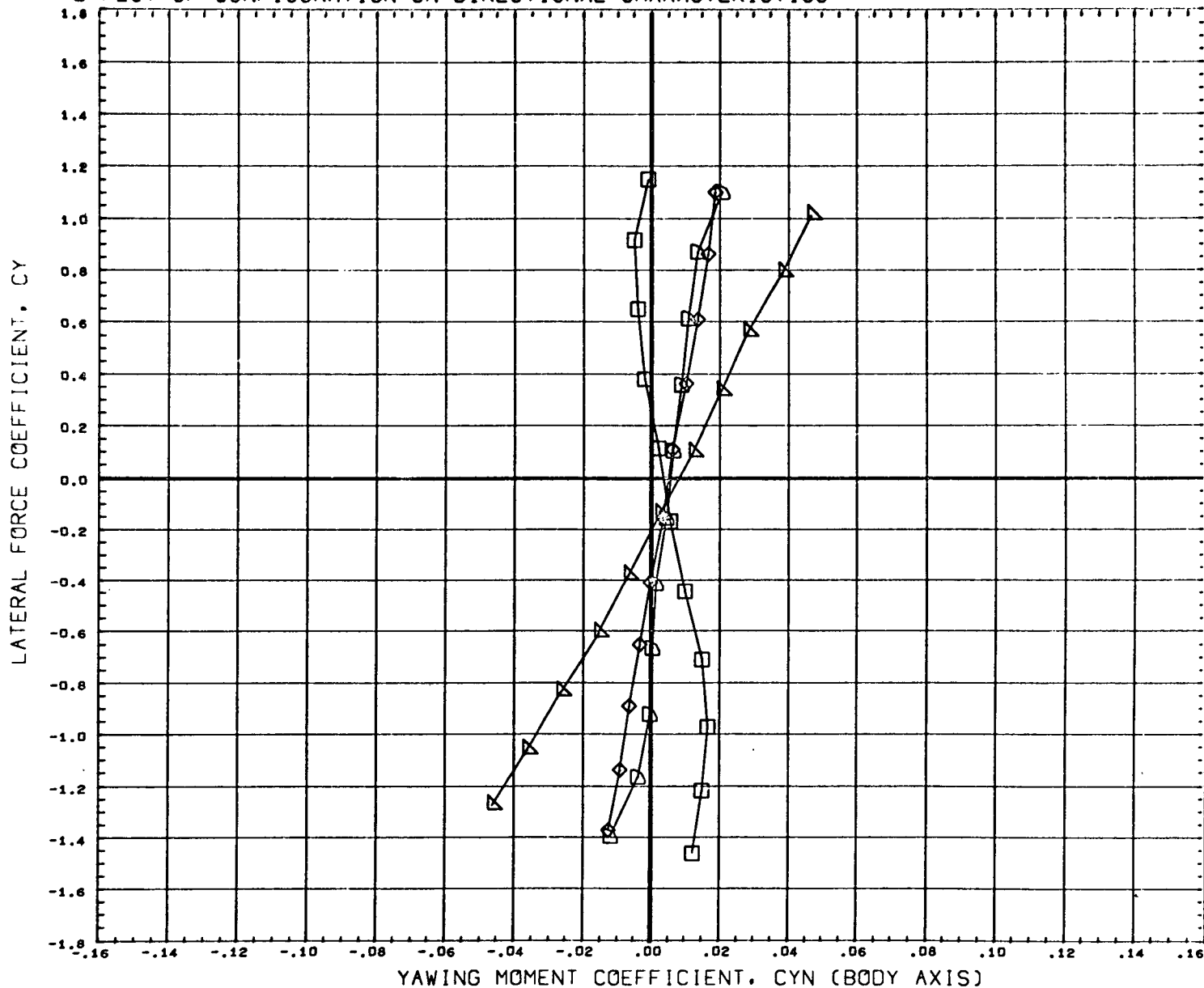
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
			SCALE 0.0034
MACH	1.204		

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



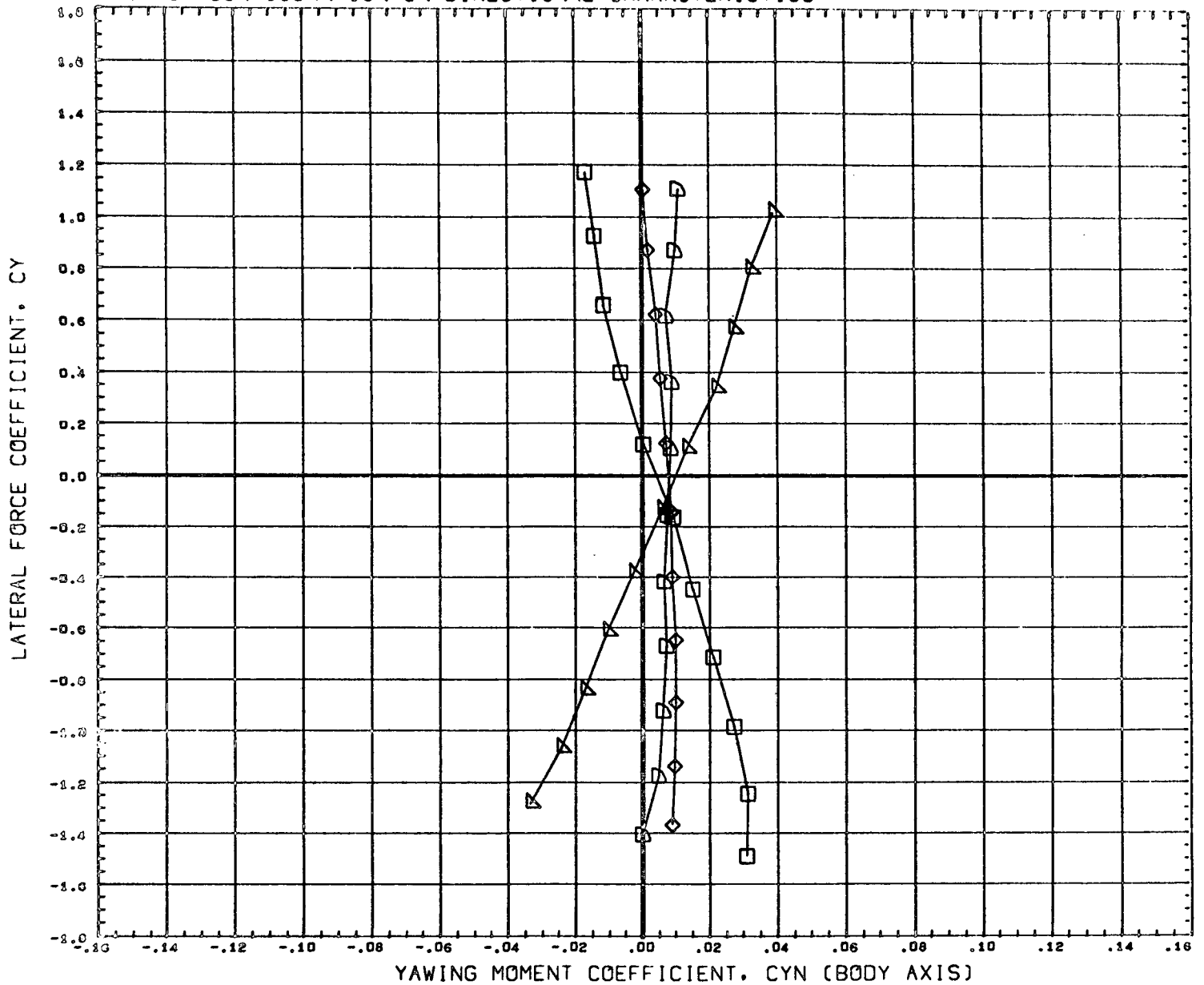
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	○	HSFC TWT 529 33 FOOT BOOSTER N187	60.000	SREF 1.4230 SQ. IN.
(A63007)	◇	HSFC TWT 529 33 FOOT BOOSTER N187	80.000	LREF 5.4330 IN.
(A63010)	△	HSFC TWT 529 33 FOOT BOOSTER N187F2	60.000	BREF 5.4330 IN.
(A63011)	□	HSFC TWT 529 33 FOOT BOOSTER N187F2	80.000	XMRP 3.2660 IN.
(A63014)	▽	HSFC TWT 529 33 FOOT BOOSTER N187F3	60.000	YMRP 0.0000 IN.
(A63015)	■	HSFC TWT 529 33 FOOT BOOSTER N187F3	80.000	ZMRP 0.0000 IN.
				SCALE 0.0034
MACH 1.466				

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 SQ. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0000 IN.
MACH	2.740		SCALE 0.0034

EFFECT OF CONFIGURATION ON DIRECTIONAL CHARACTERISTICS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	REFERENCE INFORMATION
(A63006)	DATA NOT AVAILABLE FOR ALL CONDITIONS	60.000	SREF 1.4230 58. IN.
(A63007)	DATA NOT AVAILABLE FOR ALL CONDITIONS	80.000	LREF 5.4330 IN.
(A63010)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	60.000	BREF 5.4330 IN.
(A63011)	MSFC TWT 529 33 FOOT BOOSTER N1B7F2	80.000	XMRP 3.2660 IN.
(A63014)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	60.000	YMRP 0.0000 IN.
(A63015)	MSFC TWT 529 33 FOOT BOOSTER N1B7F3	80.000	ZMRP 0.0700 IN.
			SCALE 0.0034
MACH	4.959		