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—SPACE SHUTTLE—

**AERODYNAMIC STABILITY AND
DRAG CHARACTERISTICS OF THE
MSFC PRESSURE FED BOOSTER
CONFIGURATIONS AT MACH
NUMBERS FROM 0.9 TO 5.0**

by

John Baker, LMSC/HREC

**MSFC 14-INCH TRISONIC
WIND TUNNEL**

**Marshall Space
Flight Center**

N A S A

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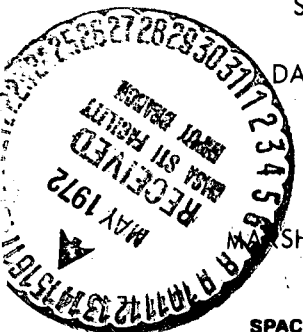
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AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION



**CHRYSLER
CORPORATION**



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SADSAC/SPACE SHUTTLE
WIND TUNNEL TEST DATA REPORT

CONFIGURATION: 0.003366 AND 0.00419 SCALE MSFC PRESSURE FED BOOSTER CONFIGURATIONS

TEST PURPOSE: DETERMINE AERODYNAMIC CHARACTERISTICS OF THE PRESSURE FED BOOSTER CONFIGURATIONS.

TEST FACILITY: NASA/MSFC 14-INCH TRISONIC WIND TUNNEL

TESTING AGENCY: LOCKHEED MISSILES AND SPACE COMPANY - HUNTSVILLE

TEST NO. & DATE: MSFC 521; January 1972

FACILITY COORDINATOR: Jim Weaver - NASA/MSFC

PROJECT ENGINEER(S): John Baker - LMSC/HREC

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AERODYNAMIC STABILITY AND DRAG CHARACTERISTICS OF THE
MSFC PRESSURE FED BOOSTER CONFIGURATIONS AT
MACH NUMBERS FROM 0.9 TO 5.0

By John Baker

A B S T R A C T

Experimental aerodynamic investigations were conducted in the NASA/MSFC 14 x 14 Inch Trisonic Wind Tunnel during January 1972 on 0.003366 and 0.00419 scale models of the MSFC space shuttle pressure fed booster configurations. The configurations tested were a 40° cone/cylinder/ 13° flare with and without fins, a 40° cone/cylinder/ 13° flare/ 9° flare with and without fins, a 35° cone/cylinder with and without fins, a 35° cone/cylinder/ 7° flare and a 35° cone/cylinder with straight extension. Six component aerodynamic force and moment data were recorded over a Mach number range of 0.9 to 5.0. Model angle of attack range was -10° to $+10^\circ$ and $+20^\circ$ to 80° at 0° sideslip. Model sideslip range was -10° to $+10^\circ$ at nominal angles of attack of 0° , 30° and 51° .

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
Re/L	Re/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

Reference & C.G. Definitions

A_b		base area; m^2 , ft^2
b	BREF	wing span or reference span; m, ft
c.g.		center of gravity
$\frac{l_{REF}}{c}$	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

SUBSCRIPTS

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; $\frac{\text{pitching moment}}{qS_{REF}}$
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; $\frac{\text{pitching moment}}{qS_{REF}}$
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
MSFC TWT TEST NO. 521

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
Γ	DIHDRL	Fin dihedral angle, measured from horizontal.

CONFIGURATIONS INVESTIGATED

<u>SYMBOL</u>	<u>DESCRIPTIONS</u>
N_1B_1	MSFC pressure fed booster body with 40° conical nose, 27 ft. diameter full scale cylindrical body and 13° aft flare. Full scale length is 178.8 ft. Five rocket engines located on the base.
F_2	Two 250 sq. ft. full scale fins located on the flare of N_1B_1 .
F_6	Two 600 sq. ft. full scale fins located on the flare of N_1B_1 .
N_1B_3	MSFC pressure fed booster body with 40° conical nose, 27 ft. diameter full scale cylindrical body, and a 13° flare followed by a 9° flare. Full scale length is 202.3 ft.
F_{12}	Two 1200 sq. ft. fins located on the flare of N_1B_3 .
N_2B_2	MSFC pressure fed booster body with 35° conical nose and 41 ft. diameter full scale cylindrical body. Full scale length is 145 ft.
F_7	Two 672 sq. ft. full scale fins located on the aft end of N_2B_2 .
N_2B_4	MSFC pressure fed booster body with 35° conical nose, 33 ft. diameter full scale cylindrical body and 7° aft flare. Full scale length is 152.3 ft. Five rocket engines located on the base.
N_2B_5	MSFC pressure fed booster body with 35° conical nose and 33 ft. full scale cylindrical body. Full scale length is 152.3 ft. Five rocket engines located on the base.

TEST FACILITY DESCRIPTION

The Marshall Space Flight Center 14" x 14" 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 .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 number 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 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 correction to the balance recorded data. Base and cavity pressures were measured for model angle of attack schedules below 60° to determine base axial force and a sting cavity axial force correction. The model reference dimensions utilized in reducing the data are listed below for the basic booster configurations along with the model scale.

Configuration	Reference Area in ²	Reference Length l_{ref} and b_{ref} in.	Model Scale
N1B1	0.933	7.223	0.003366
N1B3	0.933	8.172	0.003366
N2B2	2.159	5.859	0.003366
N2B4	2.159	7.659	0.00419
N2B5	2.159	7.659	0.00419

The moment reference center (MRC) is on a line coincident with the body longitudinal centerline. The distance of the MRC aft of the body nose is given below for each of the basic booster configurations.

Configuration	MRC Location – Percent Body Length Aft of Nose	MRC Location – Distance Aft of Nose – in.
N1B1	64	4.623
N1B3	64	5.230
N2B2	60	3.515
N2B4	60	4.595
N2B5	60	4.595

Two base pressures and one cavity pressure were recorded and used to determine base axial force C_{A_B} and a cavity correction to total axial force C_{A_T} .

$$C_{A_B} = -\frac{C_{P_1} A_{B_1}}{S_{ref}} - \frac{C_{P_2} A_{B_2}}{S_{ref}} - \left(\frac{C_{P_1} + C_{P_2}}{2} \right) \frac{A_C}{S_{ref}}$$

$$C_{A_T} = C_{A_{bal}} + \left[C_{P_C} - \left(\frac{C_{P_1} + C_{P_2}}{2} \right) \right] \frac{A_C}{S_{ref}}$$

Base and cavity areas for the basic booster configurations are listed below.

Configuration	A_{B_1} (in ²)	A_{B_2} (in ²)	A_C (in ²)
N1B1	0.5466	0.6525	0.3673
N1B3	0.9162	1.0702	0.3673
N2B2	0.7250*	0.7250*	0.4069*
N2B4	1.1657	1.3817	0.5396
N2B5	0.5923	0.7250	0.5396

* Base pressures were not measured for N2B2 because the angle of attack schedule for all runs was above 60°.

The base areas listed were used for all configurations fins on and fins off. Base pressure 1 was located on the upper half of the body base and base pressure 2 was located on the lower half of the body base.

TABLE I.

TEST	CONDITIONS
TEST	<u>MSFC TWT 521</u>

[illegible]

BALANCE UTILIZED: MSFC No. 232 Balance

CAPACITY:

ACCURACY:

**COEFFICIENT
TOLERANCE:**

NF 300 lbs.
SF 143 lbs.
AF 50 lbs.
PM 400 in-lbs.
YM 192 in-lbs.
RM 100 in-lbs.

[illegible]

COMMENTS :

TABLE II.
TEST MSFC TWT 521 DATA SET COLLATION SHEET

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES		NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLES)											
		a	B	F				0.6	0.8	0.7	1.0	1.1	1.2	1.45	1.96	2.74	3.48	4.96
K55 001	N/E ₁	0	C	-		3			0.7%			0.7%	0.9%					
002		30	C	-		6			0.62%			0.61%		0.66%	0.03%	0.03%	0.1%	
003		31	C	-		6			0.63%			0.64%		0.65%	0.04%	0.05%	0.06%	
004	N ₁ B ₁ F ₂	30	C	30		4								0.63%	0.16%	0.17%	0.18%	
005		30	C			4								0.61%	0.02%	0.23%	0.24%	
006		31	C			4								0.68%	0.21%	0.24%	0.19%	
007	N ₁ B ₁ F ₂	D	0			3			0.71%			0.75%	0.83%					
008		B	0			4								0.79%	0.15%	0.14%	0.13%	
009		0	C			3			0.76%			0.75%	0.83%					
010		30	C			4								0.71%	0.10%	0.11%	0.12%	
011		31	C			4								0.71%	0.10%	0.08%	0.07%	
K55 012	N ₁ B ₃	D	0	-		1											0.99%	
013		A	0	-		7			1.2%			1.21%	1.16%	1.15%	1.10%	1.07%	1.08%	
014		B	0	-		6			0.54%			0.53%		0.45%	0.23%	0.34%	0.31%	
015		E	0	-		4								1.0%	1.71%	1.54%	1.47%	
016		0	C	-		3			0.84%			0.83%	0.85%					
017		30	C	-		6			0.51%			0.49%		0.43%	0.27%	0.24%	0.25%	
018		31	C	-		6			0.51%			0.54%		0.41%	0.29%	0.29%	0.31%	
019	N ₁ B ₃ F ₂	D	0	30		3			0.71%			0.79%	0.81%					

COEFFICIENTS:
C: $\beta = -10^\circ$ to 10° $\Delta\beta = 2^\circ$ A: $\alpha = 20^\circ$ to 40° $\Delta\alpha = 2^\circ$
B: $\alpha = 40^\circ$ to 60° $\Delta\alpha = 2^\circ$ E: $\alpha = 60^\circ$ to 80° $\Delta\alpha = 2^\circ$
D: $\alpha = -10^\circ$ to 10° $\Delta\alpha = 2^\circ$

TABLE II. (CONTINUED)

TEST MSFC TWI 521 DATA SET COLLATION SHEET

01

☐ PRETEST☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD.		PARAMETERS/VALUES		NO. OF RUNS	MCH NUMBERS (ON ALTERNATE INDEPENDENT VARIABLE)													
		A	B	T			0.6	0.8	0.9	1.0	1.1	1.2	1.36	1.46	2.07	3.43	4.82			
K55 020	N1B3F12	A	0	30		7			117%			116%	117%	114%	113%	112%	111%			
021		B	0			4								044%	034%	037%	036%			
022		E	0			4								101%	107%	103%	102%			
023		O	C			3			081%			083%	051%							
024		3d	C			6			051%			069%		043%	041%	041%	042%			
025		51	C			4								044%	031%	028%	031%			
K55 026	N2B2	E	0	-		4								091%	015%	097%	096%			
027	N2B2F7	E	0	30		4								097%	092%	094%	075%			
K55 028	N2B4	A	0	-		4								125%	133%	131%	130%			
029		B	0	-		4								126%	130%	123%	123%			
030		E	0	-		4								131%	130%	131%	133%			
031	N2B5	A	0	-		1														
032		B	0	-		1											134%			
033		E	0	-		2										140%	135%			

1 7 13 19 25 31 37 43 49 55 61 67 7575

CLM EN ICY ICL ICYN CA CAB CAE CAC XCP

COEFFICIENTS:

A: $\alpha = 20^\circ$ to 40° $\Delta\alpha = 2^\circ$ C: $\beta = -10^\circ$ to 10° $\Delta\beta = 2^\circ$

a or b

R: $\alpha = 40^\circ$ to 60° $\Delta\alpha = 2^\circ$

SCHEDULES

E: $\alpha = 60^\circ$ to 80° $\Delta\alpha = 2^\circ$

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TABLE III.
DIMENSIONAL DATA

MODEL COMPONENT: BODY - N1B1

GENERAL DESCRIPTION: MSFC Pressure-Fed Booster Body with 40 degree conical nose, cylindrical body, and 13 degree aft flare.

DRAWING NUMBER: _____

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>178.8 ft.</u>	<u>7.223 in.</u>
Max. Width	<u>38.6 ft.</u>	<u>1.558 in.</u>
Max. Depth	<u>38.6 ft.</u>	<u>1.558 in.</u>
Fineness Ratio	_____	_____
Area		
Cross-Sectional	<u>572 ft²</u>	<u>0.933 in²</u>
Planform	_____	_____
Wetted	_____	_____
Base	<u>1168 ft²</u>	<u>1.906 in²</u>
Body Diameter	<u>27 ft.</u>	<u>1.091 in.</u>
Base Diameter	<u>38.6 ft.</u>	<u>1.558 in.</u>
Base Flare Angle, Degrees	<u>13.05</u>	<u>13.05</u>
Conical Nose Angle, Degrees	<u>40</u>	<u>40</u>

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N1B3GENERAL DESCRIPTION: MSFC Pressure Fed Booster Body with 40°Conical Nose, Cylindrical Body, and 13°3' Flare Followed by a 9°10' Flare.DRAWING NUMBER: _____DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>202.3 ft.</u>	<u>8.172 in.</u>
Max. Width	_____	_____
Max. Depth	_____	_____
Fineness Ratio	_____	_____
Area		
Cross-Sectional	<u>572 ft.²</u>	<u>0.933 in.²</u>
Planform	_____	_____
Wetted	_____	_____
Base	_____	_____
Body Diameter	<u>27 ft.</u>	<u>1.091 in.</u>
Base Diameter	<u>46.3 ft.</u>	<u>1.869 in.</u>
Base Flare Angle, Degrees	<u>13°3'/9°10'</u>	<u>13°3'/9°10'</u>
Conical Nose Angle, Degrees	<u>40</u>	<u>40</u>

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N2B2

GENERAL DESCRIPTION: MSFC Pressure-Fed Booster body
with 35 degree conical nose and cylindrical body.

DRAWING NUMBER: _____

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>145 ft.</u>	<u>5.859 in.</u>
Max. Width	<u>41 ft.</u>	<u>1.658 in.</u>
Max. Depth	<u>41 ft.</u>	<u>1.658 in.</u>
Fineness Ratio	_____	_____
Area		
Max. Cross-Sectional	<u>1320 ft²</u>	<u>2.159 in²</u>
Planform	_____	_____
Wetted	_____	_____
Base	<u>1320 ft²</u>	<u>2.159 in²</u>
Body Diameter	<u>41 ft.</u>	<u>1.658 in.</u>
Conical Nose Angle, Degrees	<u>35</u>	<u>35</u>

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N2B4GENERAL DESCRIPTION: MSFC Pressure Fed Booster Body with 35°Conical Nose, Cylindrical Body and 7° Aft FlareDRAWING NUMBER: _____DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>152.3 ft.</u>	<u>7.659 in.</u>
Max. Width	_____	_____
Max. Depth	_____	_____
Fineness Ratio	_____	_____
Area		
Cross-Sectional	<u>854 ft.²</u>	<u>2.159 in.²</u>
Planform	_____	_____
Wetted	_____	_____
Base	_____	_____
Body Diameter	<u>33 ft.</u>	<u>1.658 in.</u>
Base Diameter	<u>41.8 ft.</u>	<u>2.102 in.</u>
Base Flare Angle, Degrees	<u>7°</u>	<u>7°</u>
Conical Nose Angle	<u>35</u>	<u>35</u>

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N2B5

GENERAL DESCRIPTION: MSFC Pressure Fed Booster Body with 35° Conical
Nose and Cylindrical body

DRAWING NUMBER: _____

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length	<u>152.3 ft.</u>	<u>7.659 in.</u>
Max. Width	_____	_____
Max. Depth	_____	_____
Fineness Ratio	_____	_____
Area		
Cross-Sectional	<u>854 ft.²</u>	<u>2.159 in.²</u>
Planform	_____	_____
Wetted	_____	_____
Base	_____	_____
Body Diameter	<u>33 ft.</u>	<u>1.658 in.</u>
Base Diameter	<u>33 ft.</u>	<u>1.658 in.</u>
Conical Nose Angle, Degrees	<u>35</u>	<u>35</u>

TABLE III. (CONTINUED)

MODEL COMPONENT: FINS - F2GENERAL DESCRIPTION: Fins for MSFC Pressure Fed BoosterDRAWING NUMBER: _____DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	<u>250 ft.²</u>	<u>0.408 in.²</u>
Span (equivalent)	_____	_____
Inb'd equivalent chord	_____	_____
Outb'd equivalent chord	<u>8.34 ft.</u>	<u>0.337 in.</u>
Ratio movable surface chord/ total surface chord	_____	_____
At Inb'd equiv. chord	_____	_____
At Outb'd equiv. chord	_____	_____
Sweep Back Angles, degrees		
Leading Edge	<u>40.75</u>	<u>40.75</u>
Tailing Edge	<u>0.0</u>	<u>0.0</u>
Hingeline	_____	_____
Area Moment (Normal to hinge line)	_____	_____

TABLE III. (CONTINUED)

MODEL COMPONENT FINS - F6GENERAL DESCRIPTION: Fins for MSFC Pressure Fed BoosterDRAWING NUMBER: _____DIMENSIONS:FULL-SCALEMODEL SCALE

Area

600 ft.²0.979 in.²

Span (equivalent)

Inb'd equivalent chord

Outb'd equivalent chord

12.0 ft.0.485 in.Ratio movable surface chord/
total surface chord

At Inb'd equiv. chord

At Outb'd equiv. chord

Sweep Back Angles, degrees

Leading Edge

40.7540.75

Tailing Edge

0.00.0

Hingeline

Area Moment (Normal to hinge line)

TABLE III. (CONTINUED)

MODEL COMPONENT: FINS - F7GENERAL DESCRIPTION: Fins for MSFC Pressure Fed BoosterBody N2B2DRAWING NUMBER:DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	<u>672 ft²</u>	<u>1.100 in²</u>
Span (equivalent)	<u></u>	<u></u>
Inb'd equivalent chord	<u></u>	<u></u>
Outb'd equivalent chord	<u>12.0 ft.</u>	<u>0.485 in.</u>
Ratio movable surface chord/ total surface chord	<u></u>	<u></u>
At Inb'd equiv. chord	<u></u>	<u></u>
At Outb'd equiv. chord	<u></u>	<u></u>
Sweep Back Angles, degrees	<u></u>	<u></u>
Leading Edge	<u>40.75</u>	<u>40.75</u>
Tailing Edge	<u>0.0</u>	<u>0.0</u>
Hingeline	<u></u>	<u></u>
Area Moment (Normal to hinge line)	<u></u>	<u></u>

TABLE III. (CONCLUDED)

MODEL COMPONENT: Fins - F12GENERAL DESCRIPTION: Fins for MSFC Pressure Fed Booster Body N1B3DRAWING NUMBER: _____DIMENSIONS:FULL-SCALEMODEL SCALE

Area	<u>1200 ft.²</u>	<u>1.961 in.²</u>
Span (equivalent)	_____	_____
Inb'd equivalent chord	_____	_____
Outb'd equivalent chord	<u>24.1 ft.</u>	<u>0.975 in.</u>
Ratio movable surface chord/ total surface chord	_____	_____
At Inb'd equiv. chord	_____	_____
At Outb'd equiv. chord	_____	_____
Sweep Back Angles, degrees		
Leading Edge	<u>31° 20'</u>	<u>31° 20'</u>
Tailing Edge	<u>0.0</u>	<u>0.0</u>
Hingeline	_____	_____
Area Moment (Normal to hinge line)	_____	_____

TABLE IV
INDEX OF MODEL FIGURES

Figure		Page Number
1	Axis System	25
2	MSFC Pressure Fed Booster N1B1F2 Moment Reference Center Location	26
3	MSFC Pressure Fed Booster N1B3F12 Moment Reference Center Location	27
4	MSFC Pressure Fed Booster N2B2F7 Moment Reference Center Location	28
5	MSFC Pressure Fed Booster N2B4 Moment Reference Center Location	29
6	MSFC Pressure Fed Booster N2B5 Moment Reference Center Location	30
7	Fins F2	31
8	Fins F6	32
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10	Fins F12	34
11	Rocket Engines for N1B1, N2B4, and N2B5	35
12	Photograph of Configuration N1B3	36
13	Photograph of Configuration N2B2	37
14	Photograph of Configuration N2B4	38

TABLE V. INDEX OF DATA FIGURES

TITLE	PLOTTED		CONDITIONS VARYING	PAGES
	COEFFICIENTS	SCHEDULE		
N1B1F2 - Effect of Mach Number on Longitudinal Characteristics	A		MACH	1-10
N1B1F6 - Longitudinal Characteristics at Transonic Mach Numbers, Low Alphas	A		MACH	11-20
N1B1F6 - Effect of Mach Number on Longitudinal Characteristics	A		MACH	21-30
N1B1 - Effect of Mach Number on Lateral-Directional Characteristics, ALPHA = 30 Degrees	E		MACH	31-36
N1B1 - Effect of Mach Number on Lateral - Directional Characteristics, ALPHA = 51 Degrees	E		MACH	37-42
Effect of Fin Size on Lateral-Directional Characteristics, ALPHA = 30 Degrees	D		Configuration, MACH	43-58
Effect of Fin Size on Lateral-Directional Characteristics, ALPHA = 51 Degrees	D		Configuration, MACH	59-74
Effect of Fin F6 on Lateral-Directional Characteristics, ALPHA = 0 Degrees	D		Configuration, MACH	75-86
N1B3 - Longitudinal Characteristics, Mach Number = 4.96	A		MACH	87-96
N1B3 - Effect of Mach Number on Longitudinal Characteristics	B		MACH	97-114
N1B3F12 - Effect of Mach Number on Longitudinal Characteristics	B		MACH	115-132

TABLE V. INDEX OF DATA FIGURES
(Continued)

TITLE	PLOTTED		PAGES
	COEFFICIENTS SCHEDULE	CONDITIONS VARYING	
N1B3F12 - Longitudinal Characteristics at Transonic Mach Numbers, Low Alphas	A	MACH	133-142
N1B3 - Effect of Mach Number on Base Axial Force	C	MACH	143-144
Effect of F12 on N1B3 Lateral-Directional Characteristics, ALPHA = 0 Degrees	D	Configuration, MACH	145-156
Effect of F12 on N1B3 Lateral-Directional Characteristics, ALPHA = 30 and 51 Degrees	D	Configuration MACH	157-180
N2B2 - Effect of Mach Number on Longitudinal Characteristics	B	MACH	181-189
N2B2F7 - Effect of Mach Number on Longitudinal Characteristics	B	MACH	190-198
N2B4 - Effect of Mach Number on Longitudinal Characteristics	B	MACH	199-207
N2B5 - Longitudinal Characteristics	B	MACH	208-216
N2B4 - Effect of Mach Number on Base Axial Force	C	MACH	217
N2B5 - Base Axial Force, Mach Number = 4.96	C	MACH	218

TABLE V. INDEX OF DATA FIGURES
(CONCLUDED)

PLOTTED COEFFICIENTS SCHEDULE:

- (A) CN, CIM, CA, CL, CD, L/D, CAB vs. ALPHA
CN, CL vs. CIM
CL vs. CD
- (B) All plots of Schedule (A) except CAB vs. ALPHA
- (C) CAB vs. ALPHA
- (D) CY, CYN, CBL vs. BETA
CYN vs. CY
- (E) All plots of Schedule (D) except CBL vs. BETA

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.

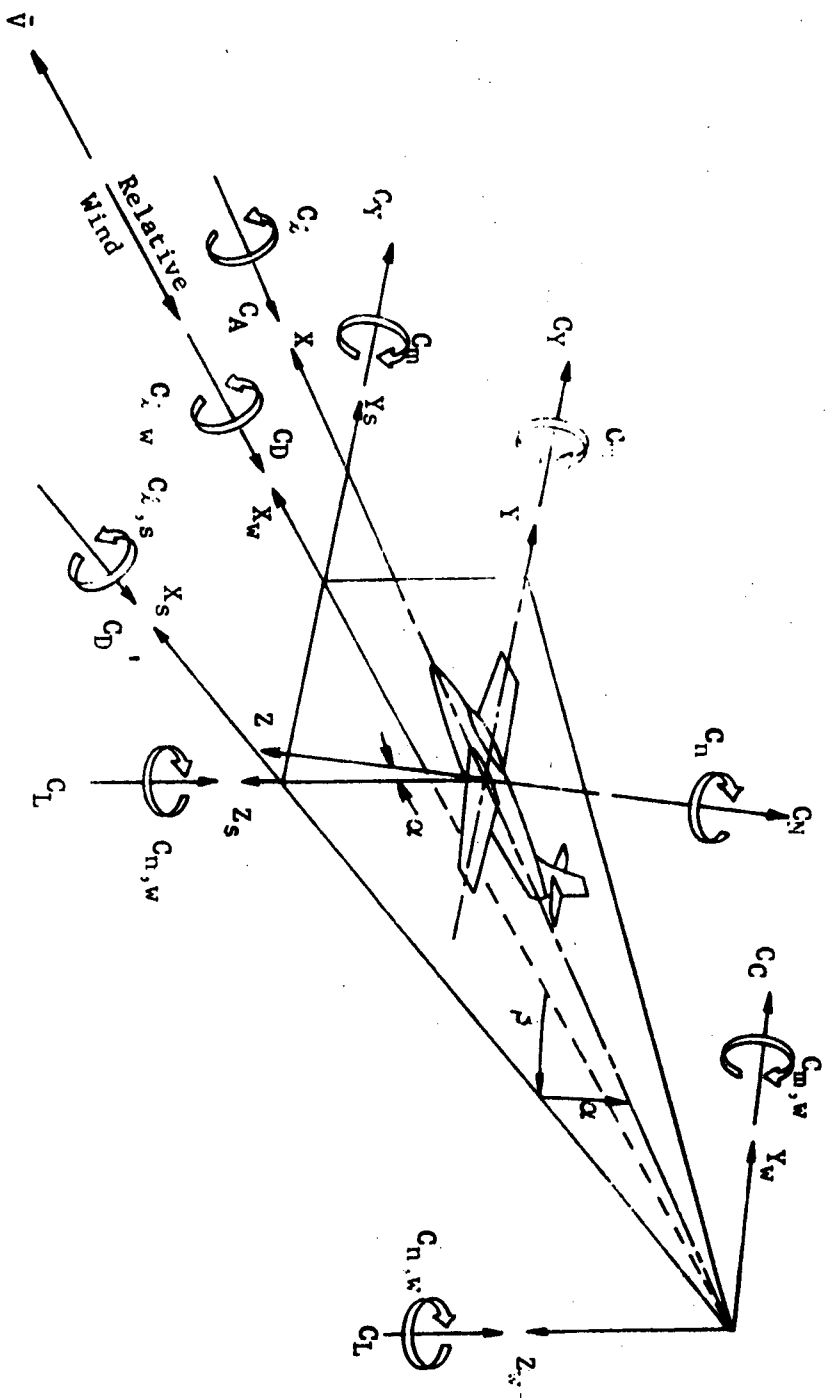


Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

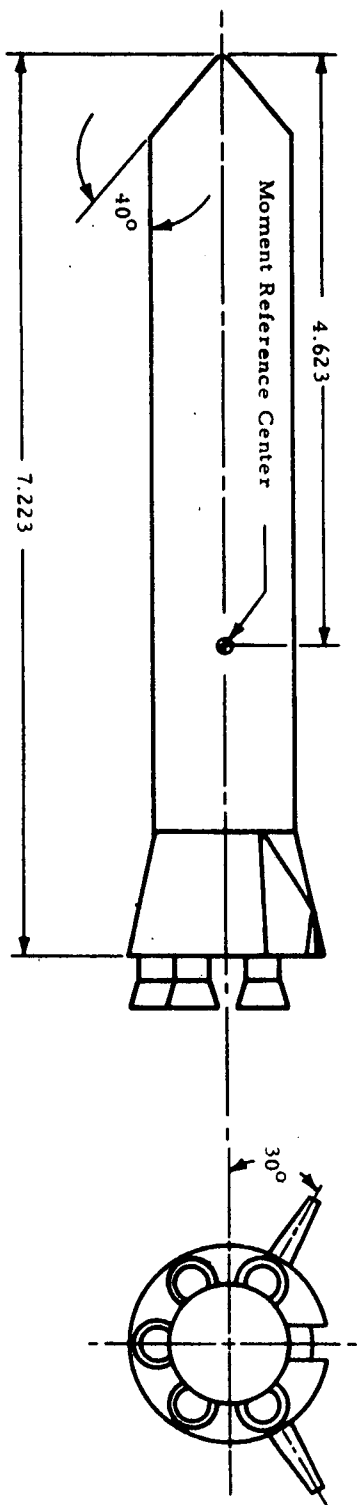


Fig. 2. MSFC Pressure Fed Booster NIBIF2 Moment Reference Center Location

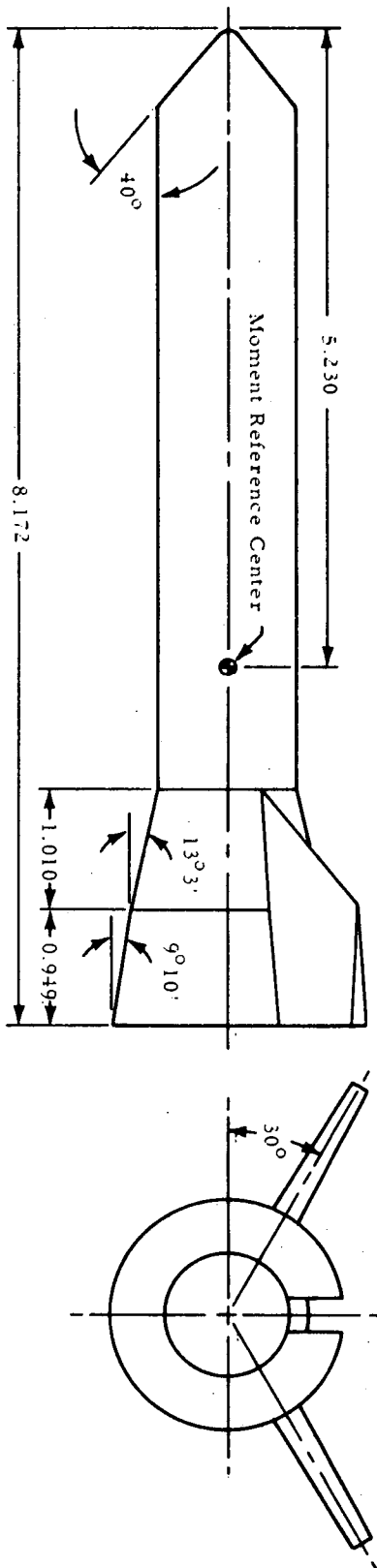


Fig. 3 - MSFC Pressure Fed Booster N1B3F12 Moment Reference Center Location

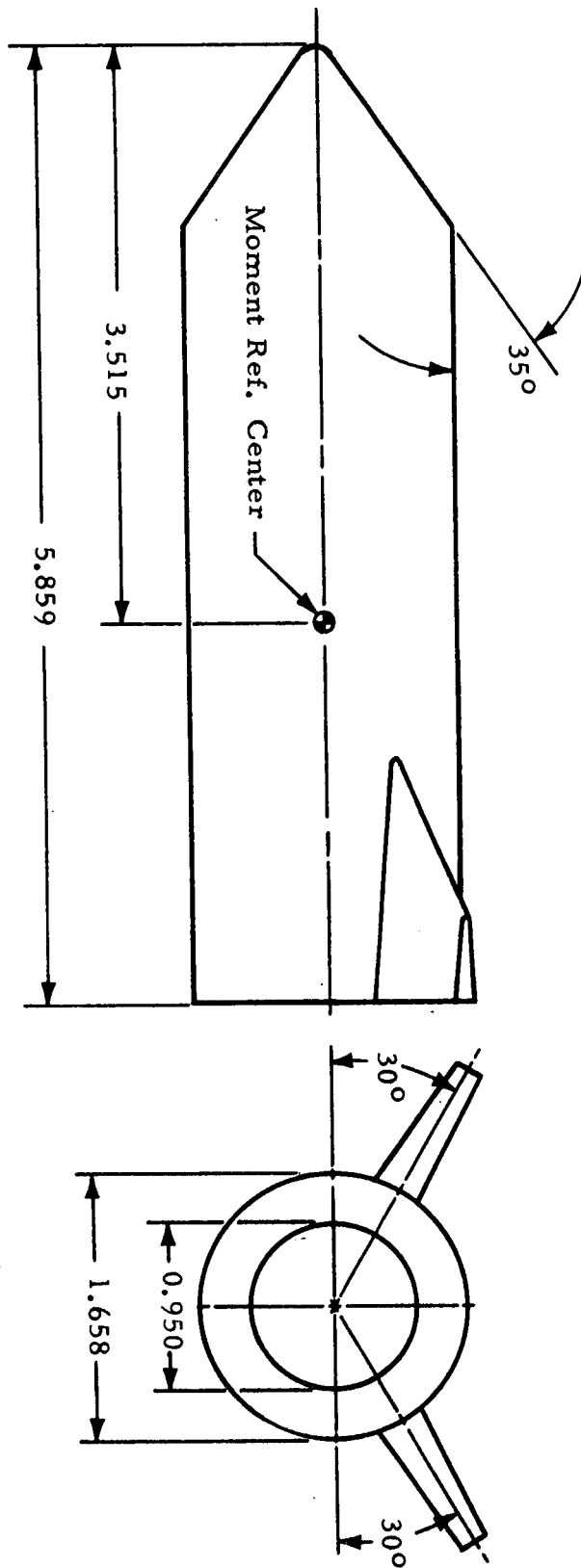


Fig. 4 - MSFC Pressure Fed Booster N2B2F7 Moment Reference Center Location

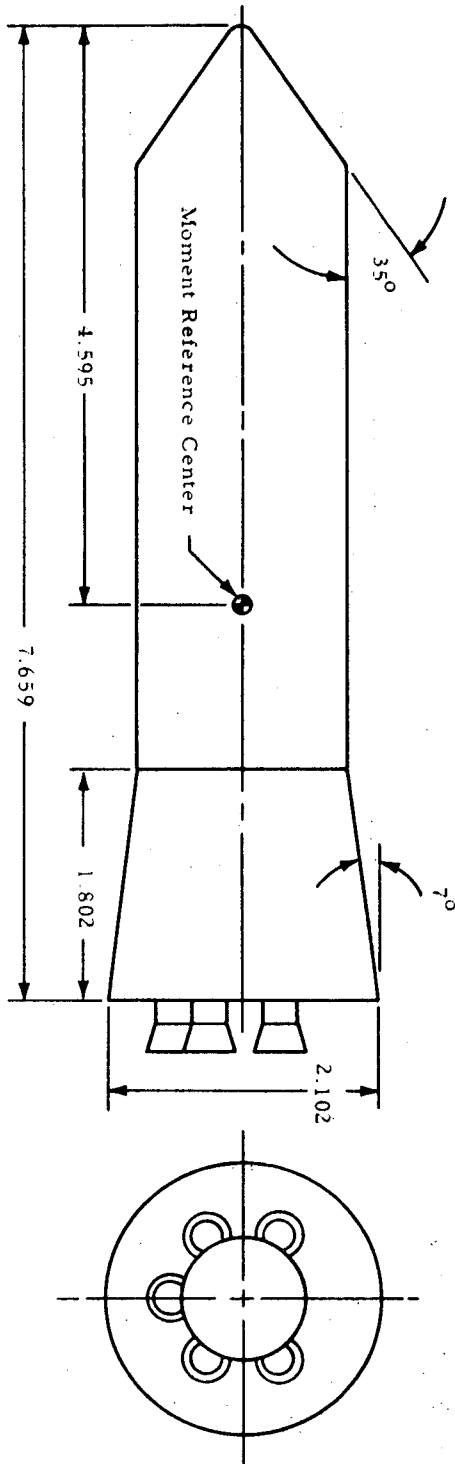


Fig. 5 - MSFC Pressure Fed Booster N2B4 Moment Reference
Center Location

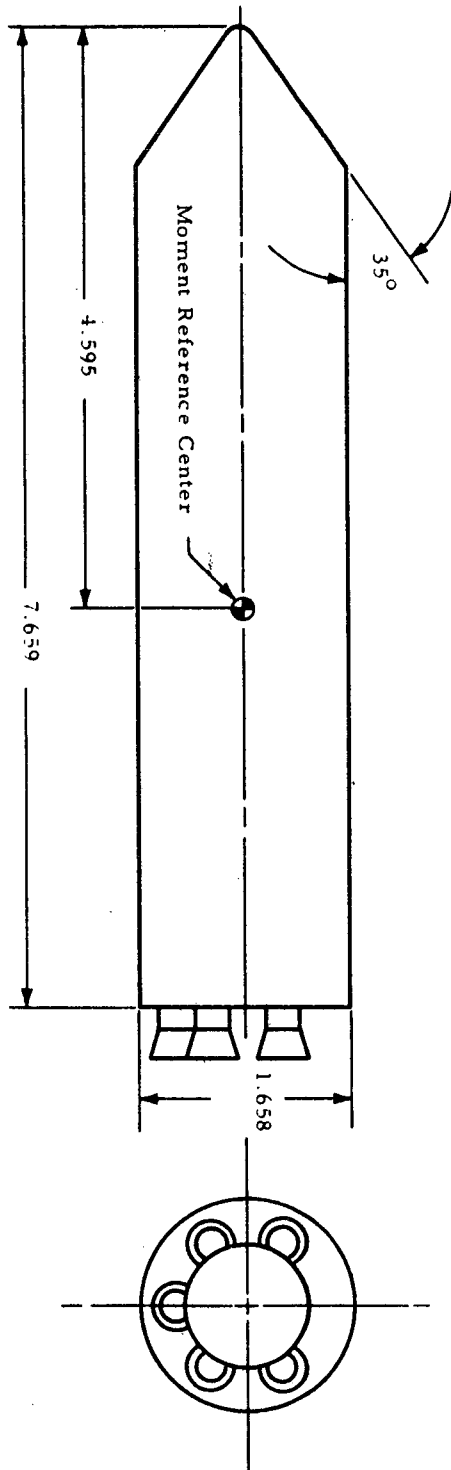


Fig. 6 - MSFC Pressure Fed Booster N2B5 Moment Reference
Center Location

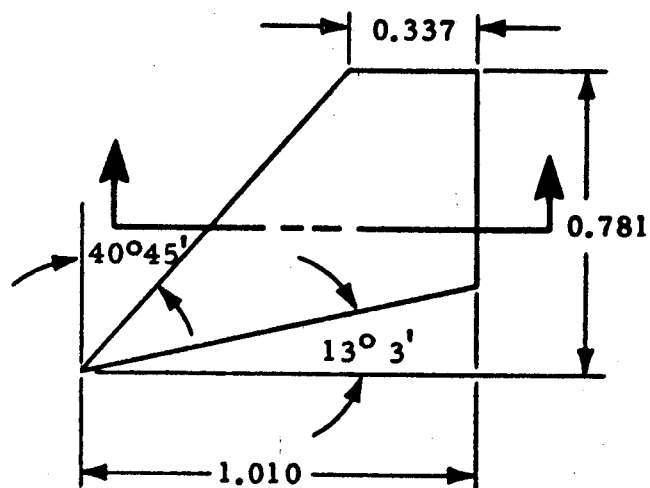
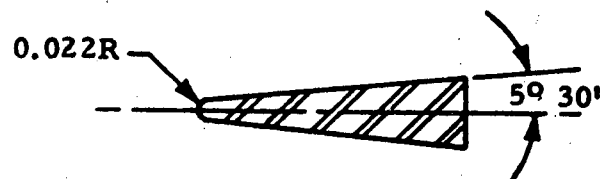


FIGURE 7. FINS F2

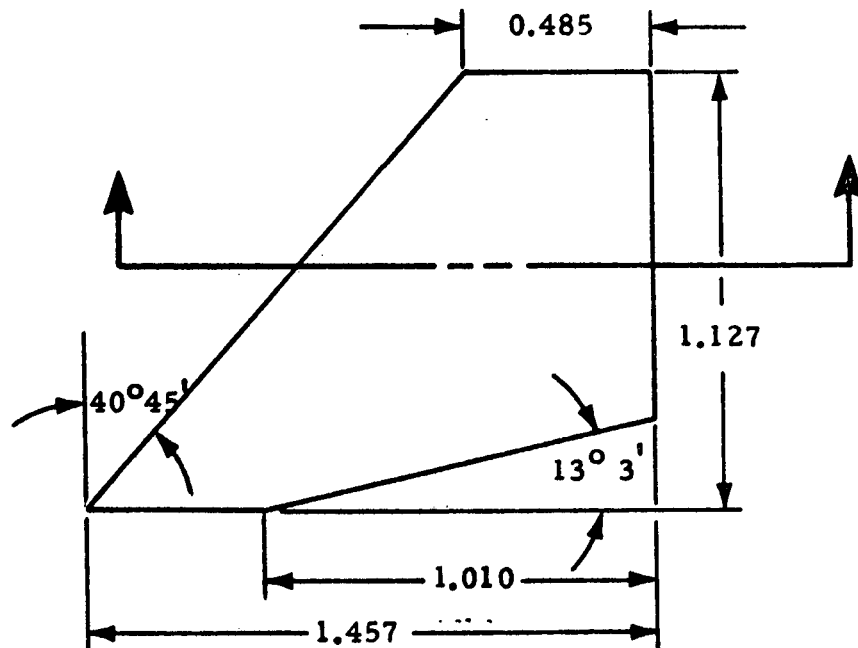
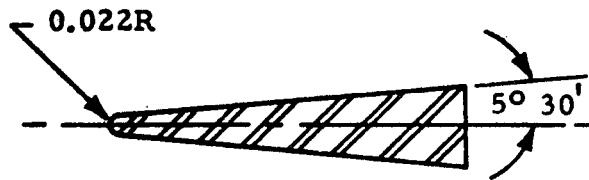


FIGURE 8. FINS F6

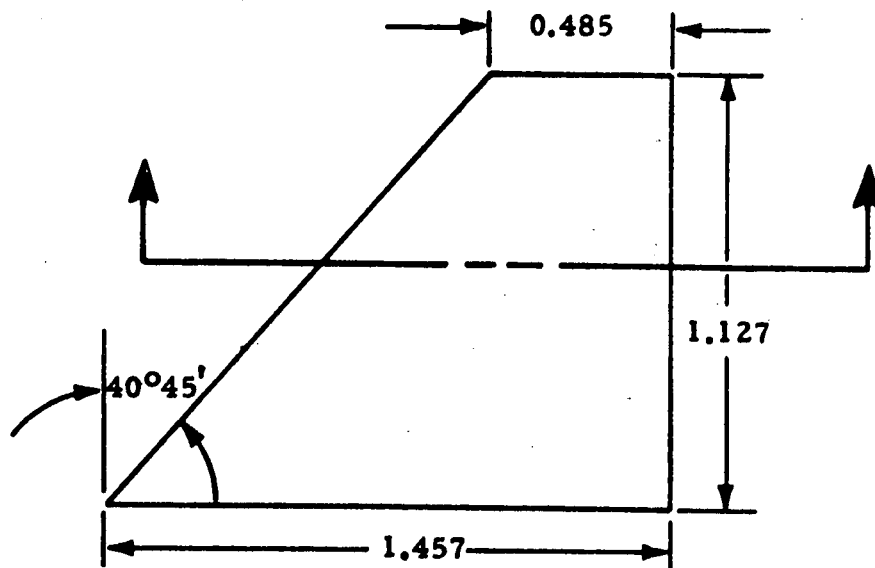
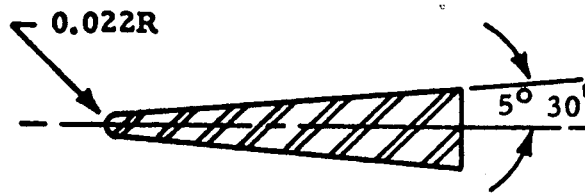


FIGURE 9. FINS F7

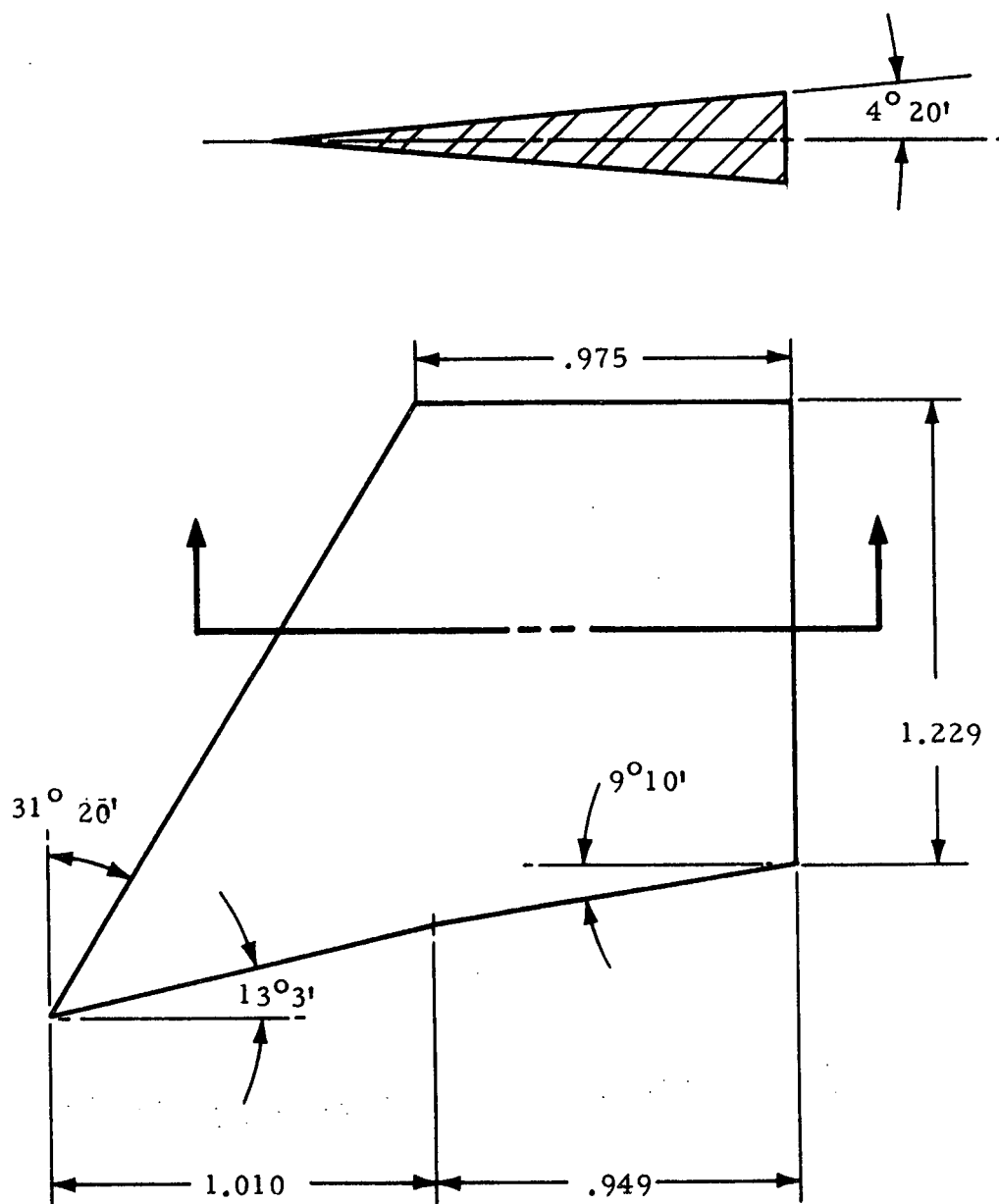


Fig. 10- Fins F12

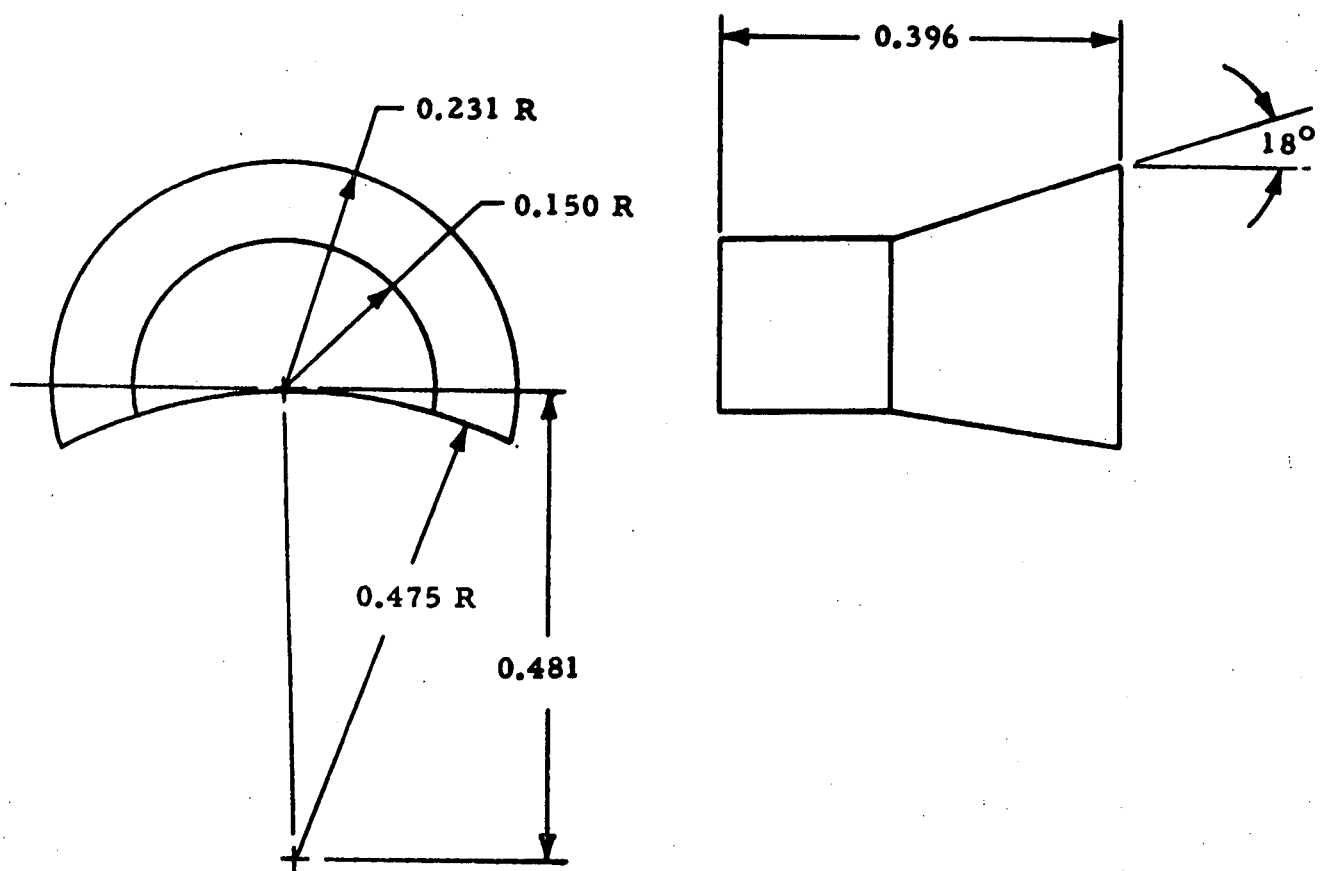


Fig. 11. Rocket Engines for N1B1, N2B4 and N2B5

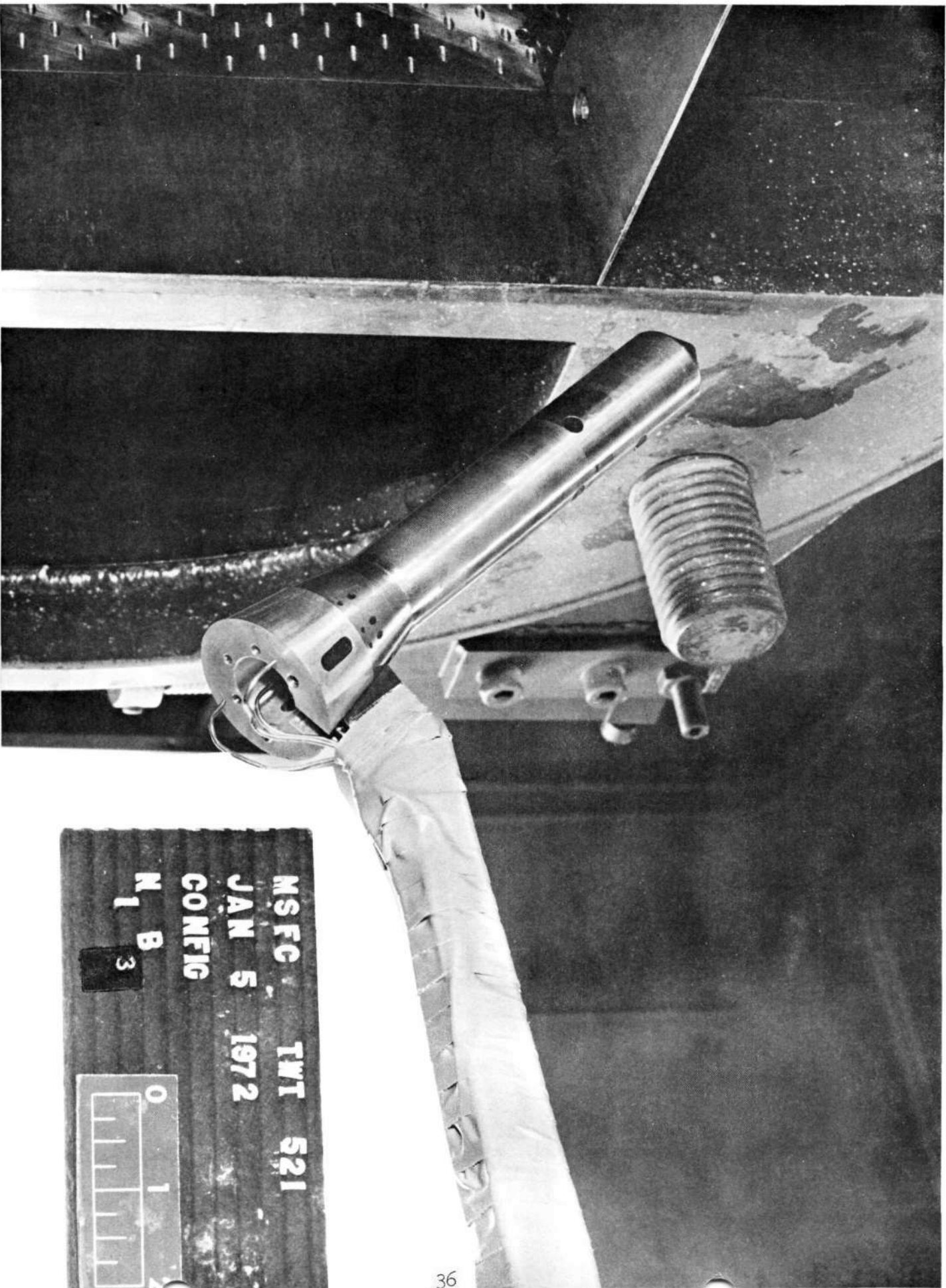


FIGURE 12. CONFIGURATION N1B3

NASA-MSFC
S&E-Aero-AE

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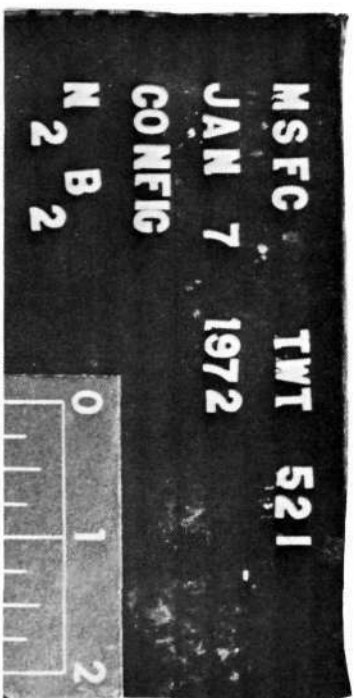


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FIGURE 13. CONFIGURATION N2B2

NASA-MSFC
S&E-Aero-AE

01-07-72



03-1-72



FIGURE 14. CONFIGURATION N2B4

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CONFIG
N 2 B 4



NASA-MSFC
S&E-Aero-AE

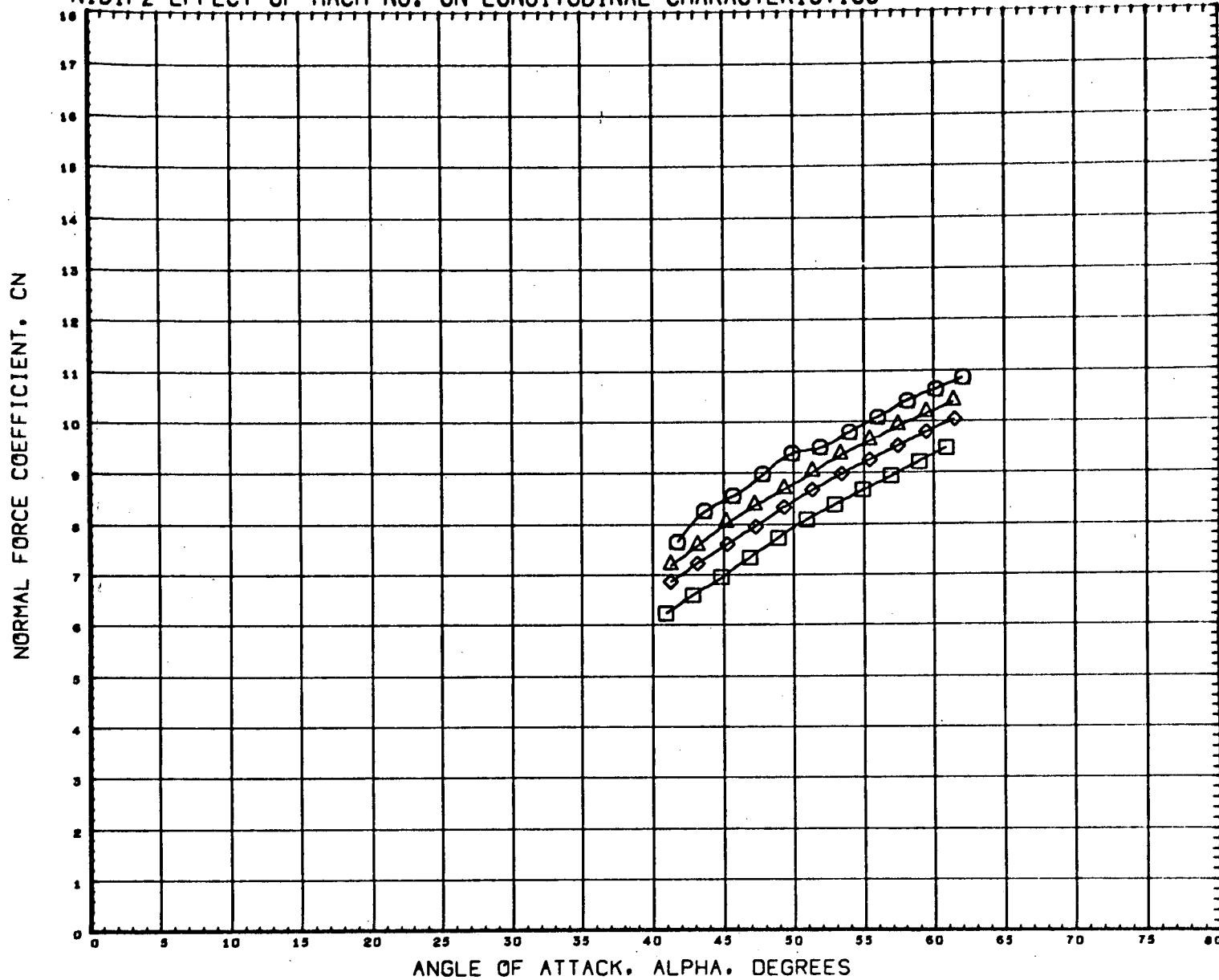
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P L O T T E D D A T A

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

N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES		
○	1.963	BETA	0.000	DIHRL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
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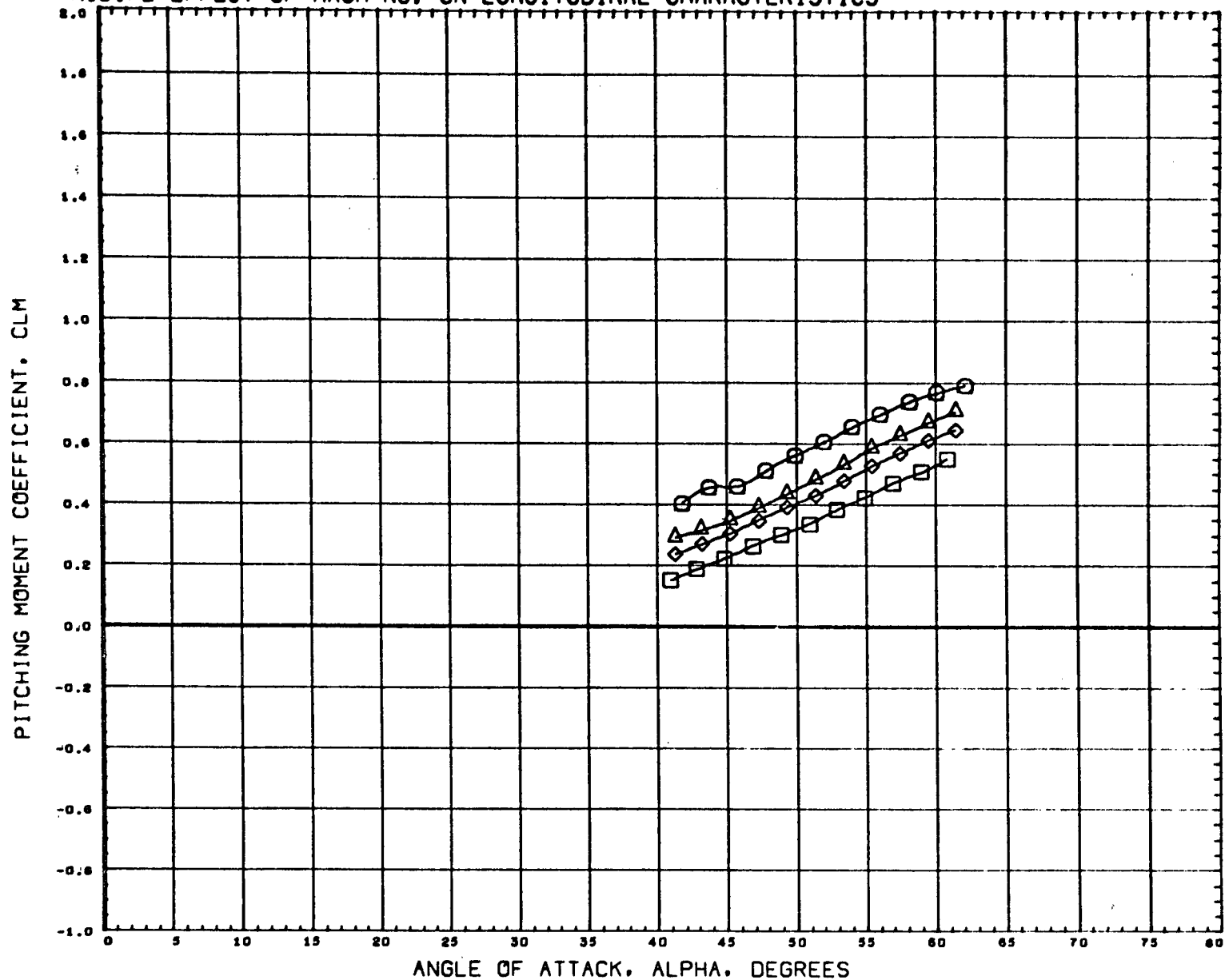
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N1B1F2

(E55004) 02 FEB 72

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N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES		
○	1.963	BETA	0.000	D1HDRL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
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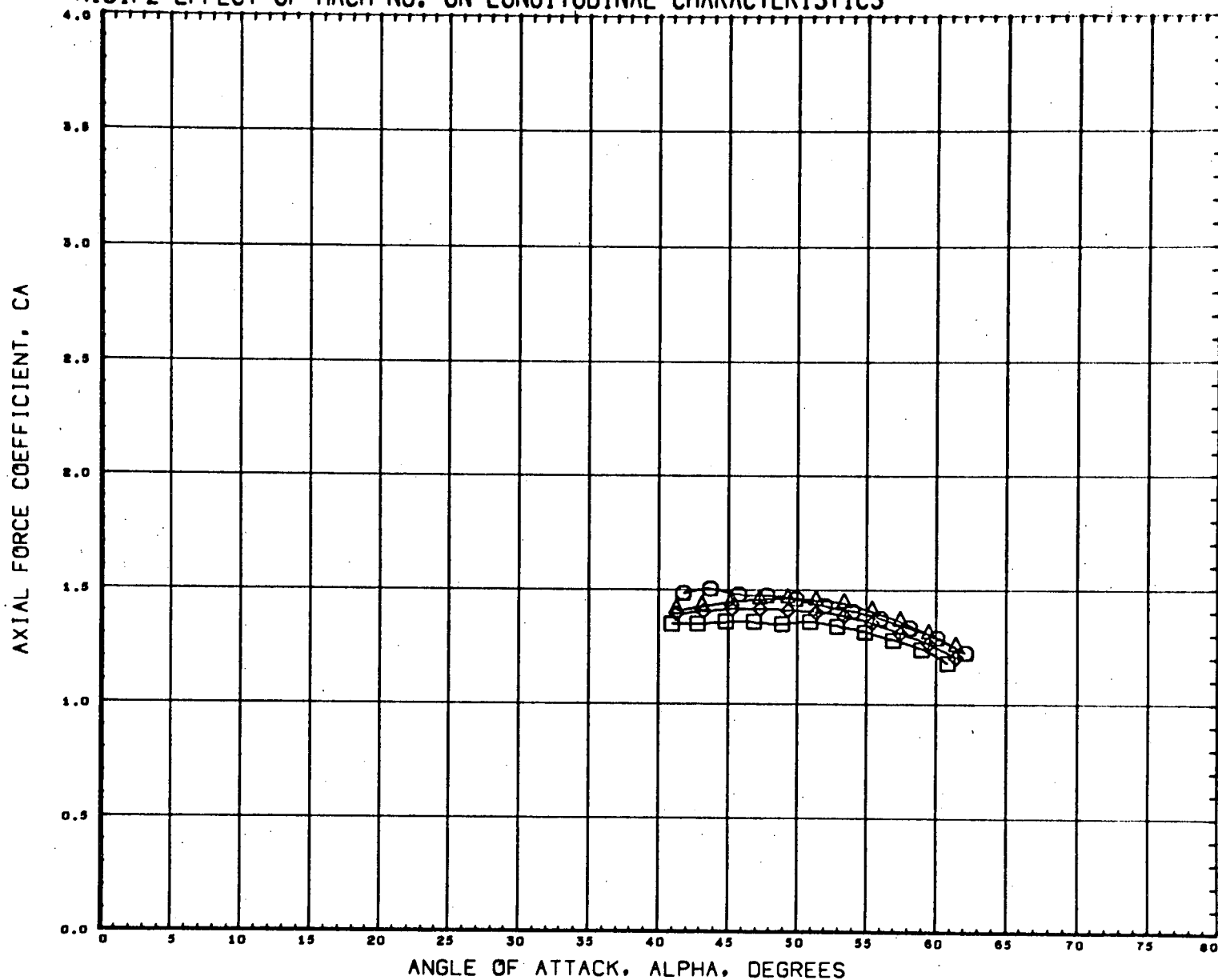
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N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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△	2.740			
◇	3.480			
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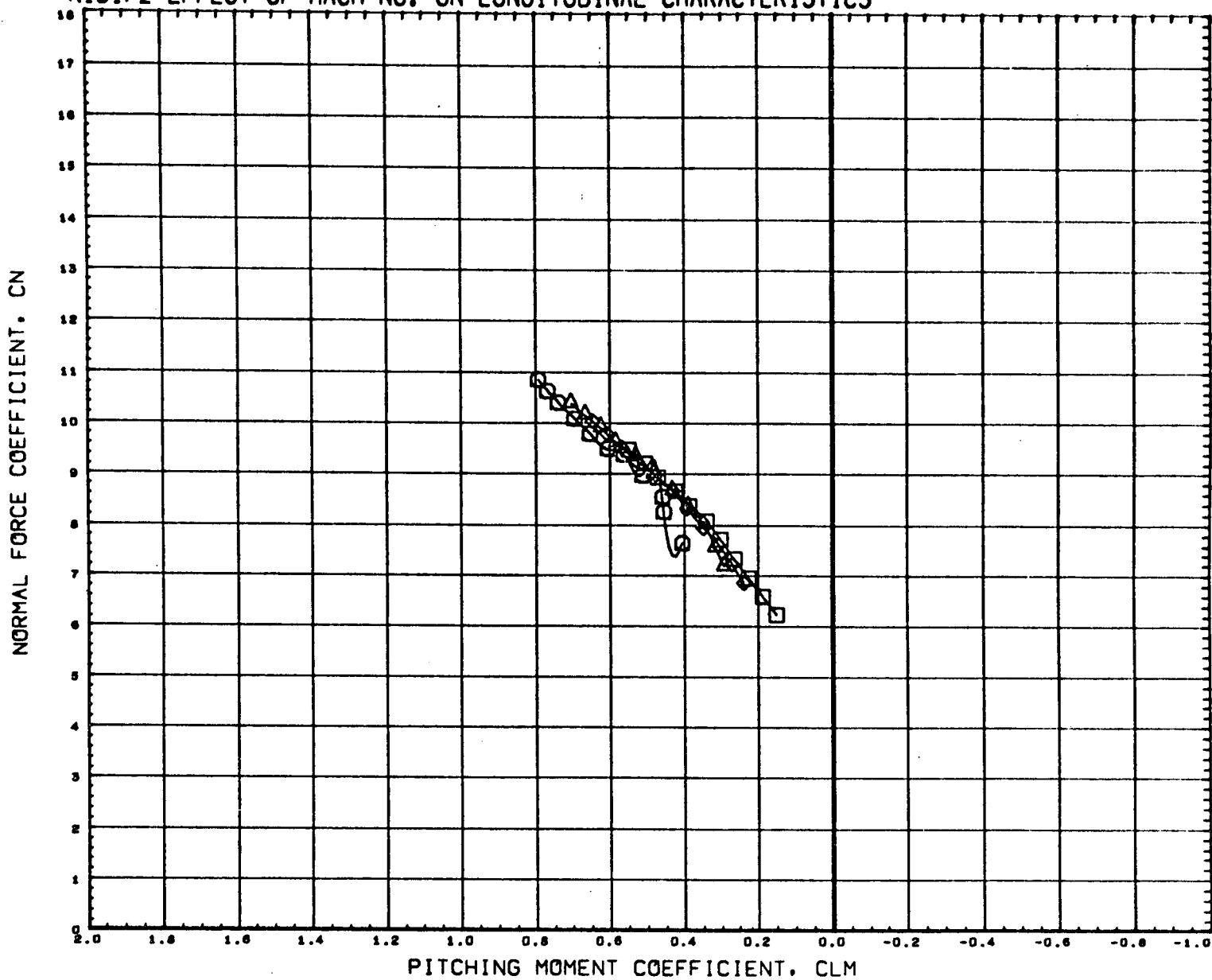
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N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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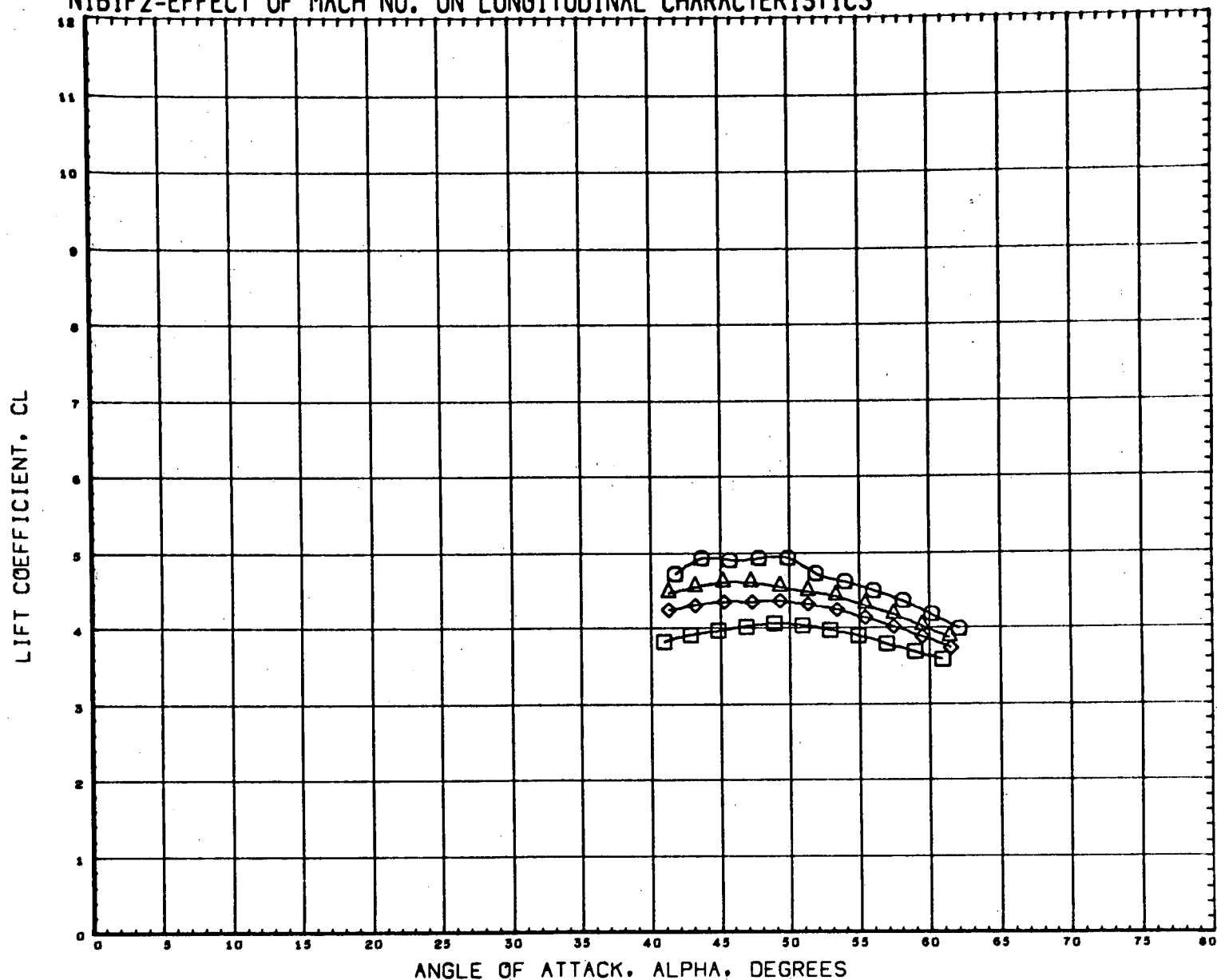
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N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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◇	3.480			
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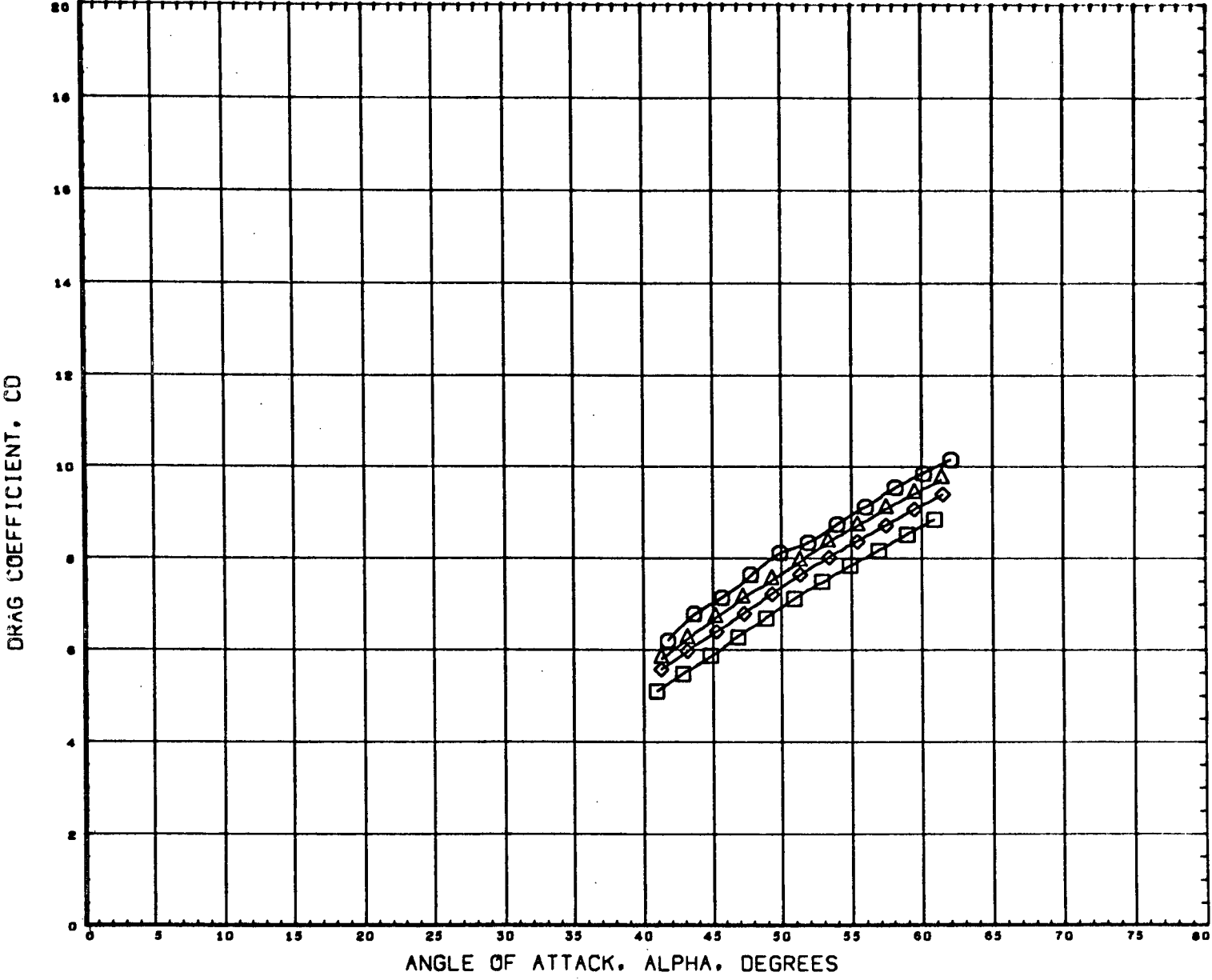
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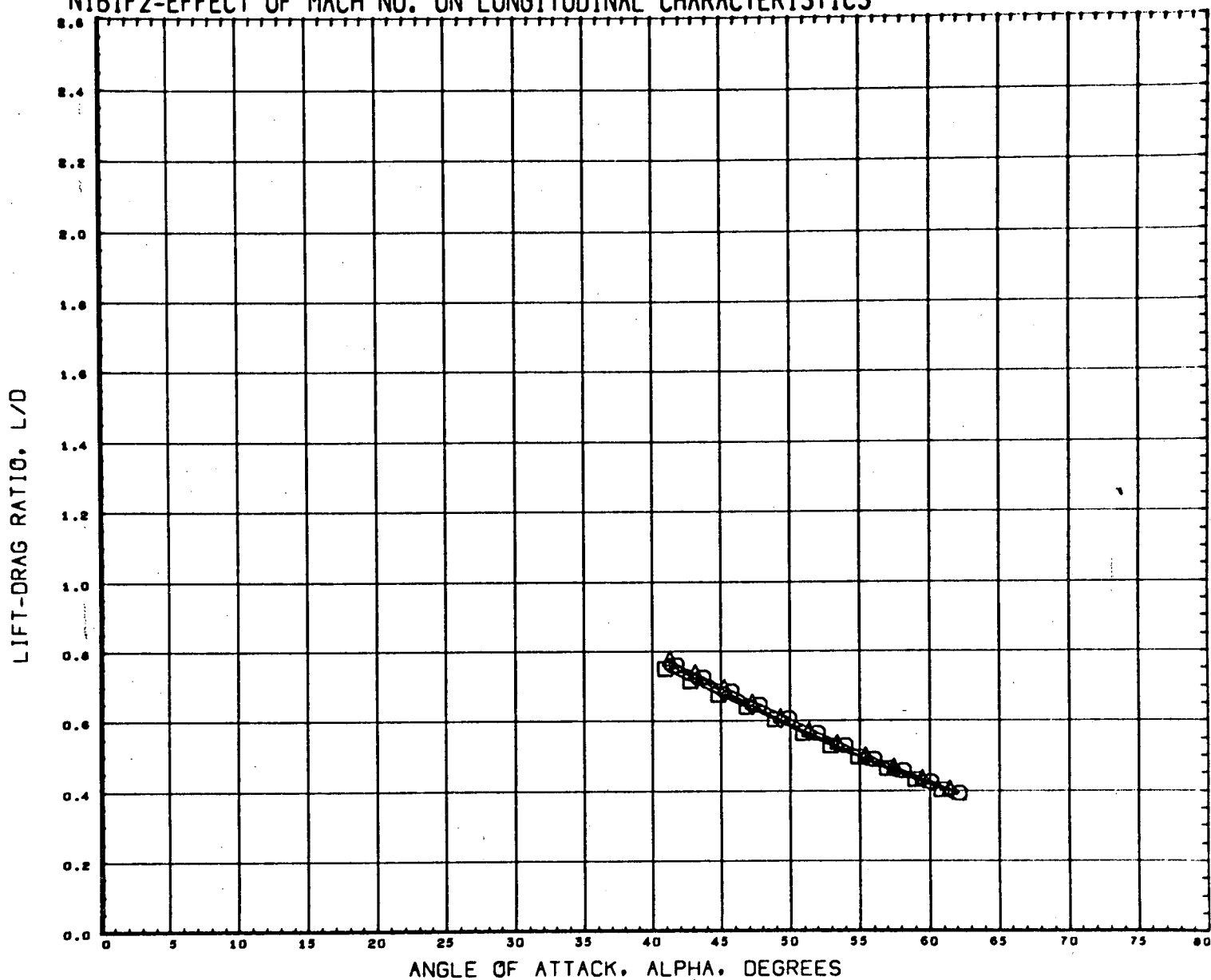
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◇	3.480				
□	4.959				

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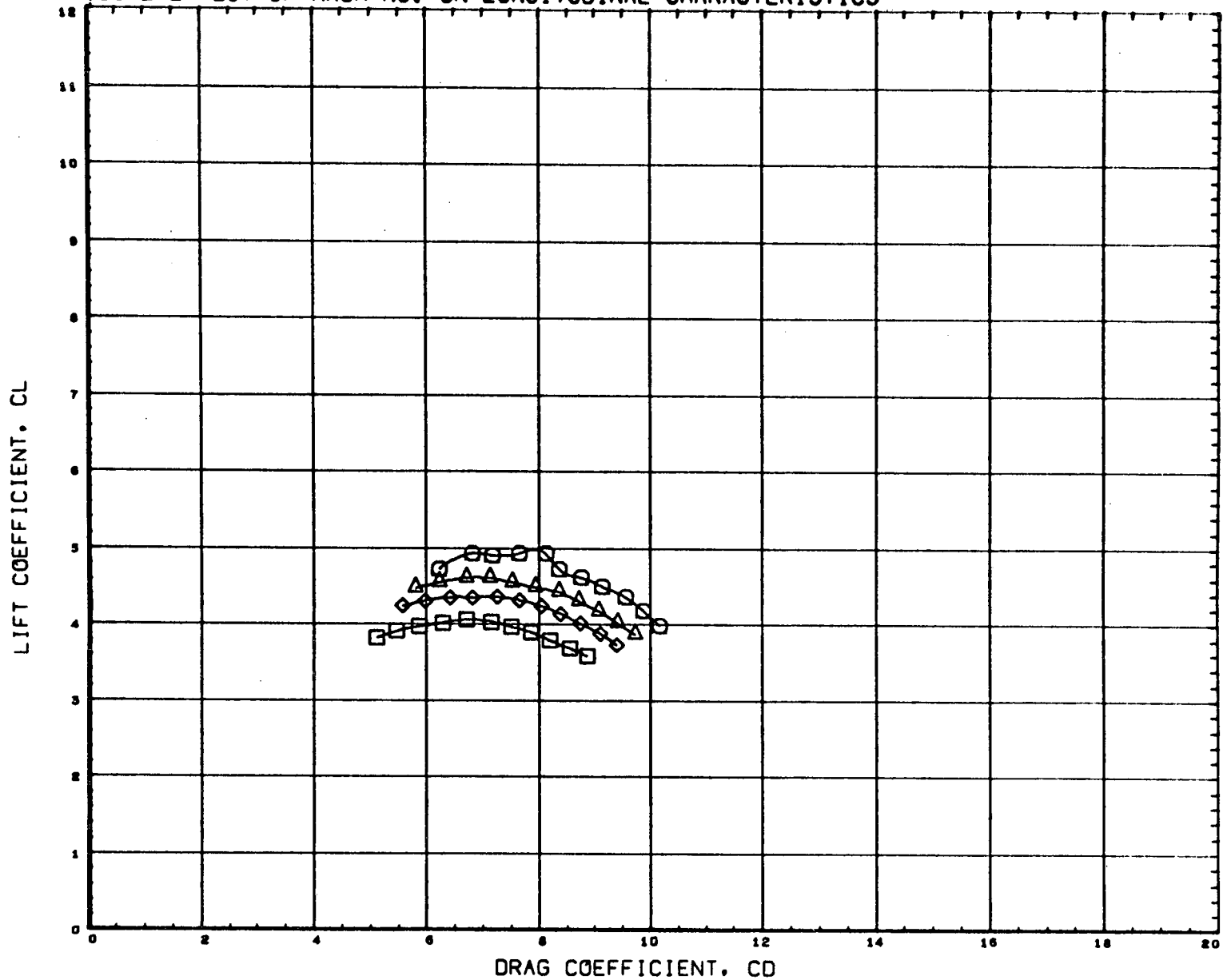
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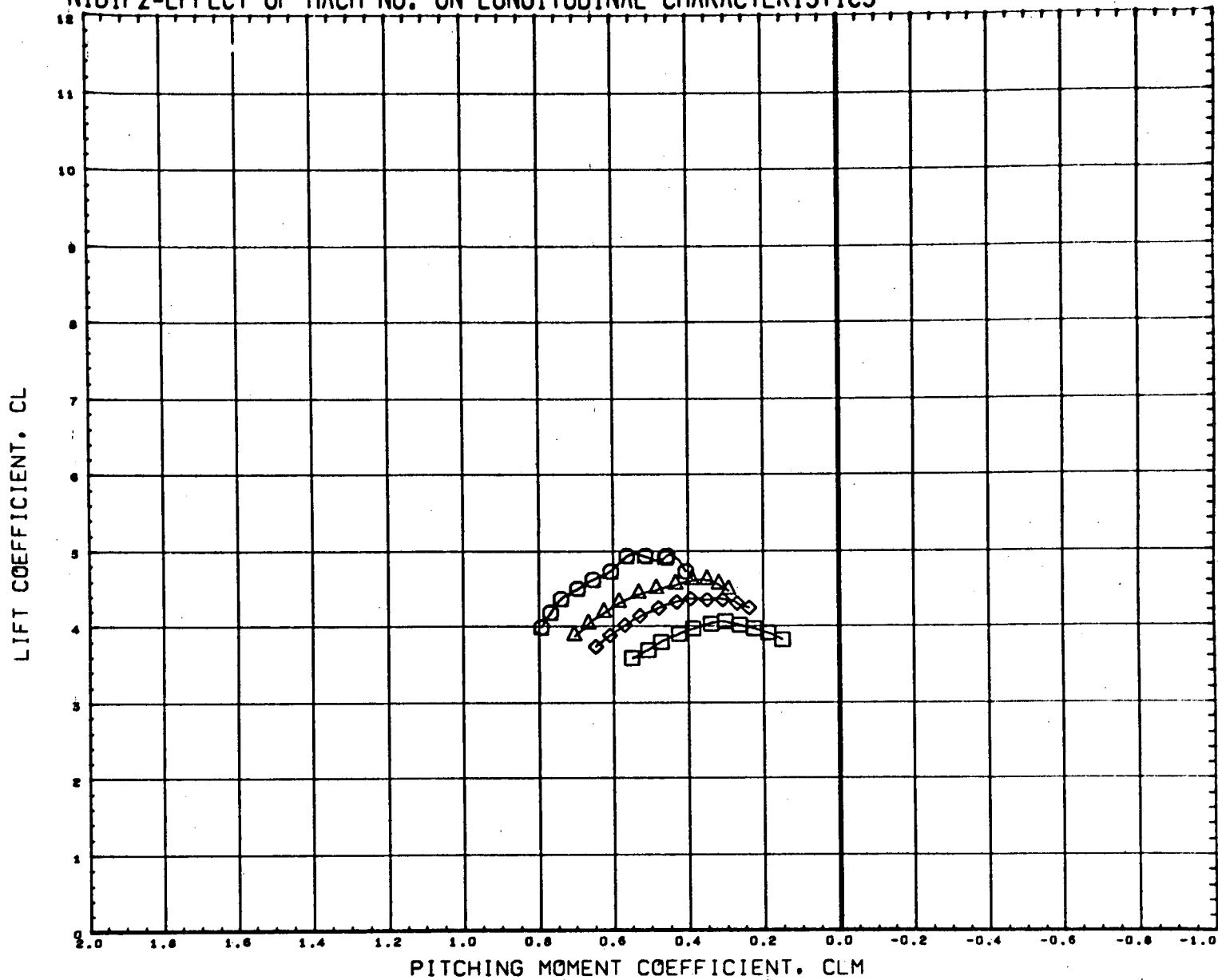


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◇	3.480			
□	4.959			

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DATA HIST. CODE *E

N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DIHDL	30.000
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△	2.740				
◇	3.480				
□	4.959				

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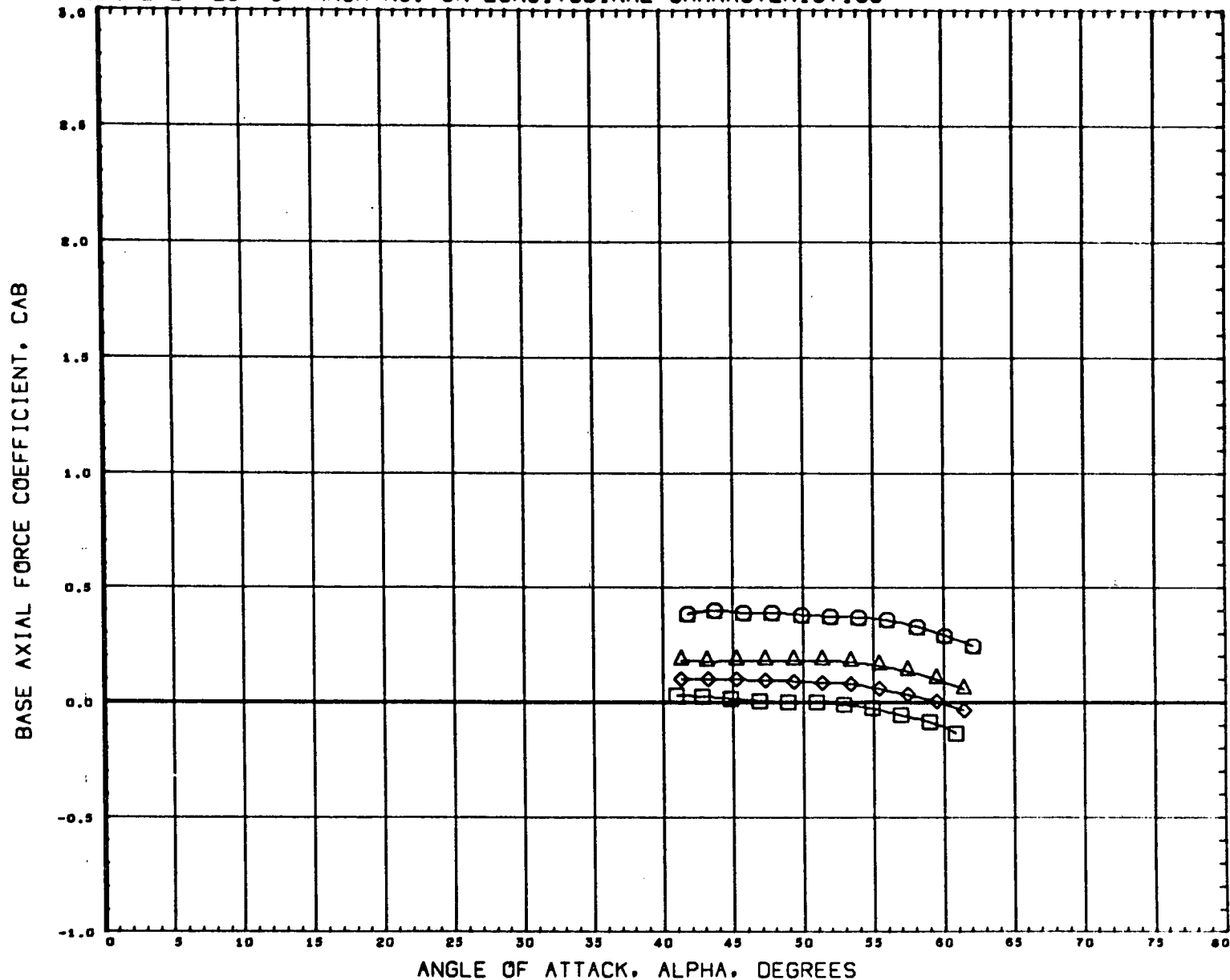
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N1B1F2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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□	4.959			

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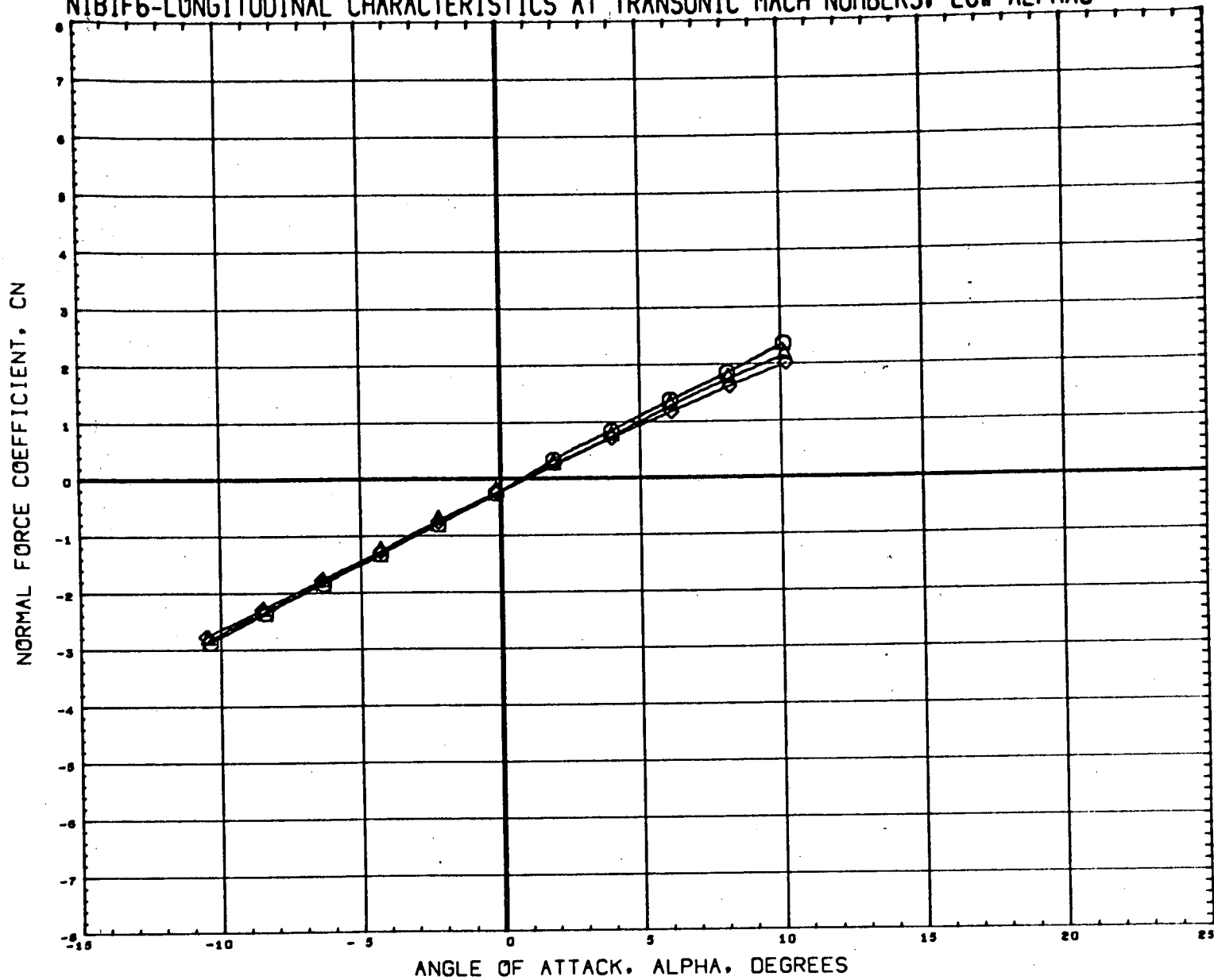
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N1B1F2

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
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△	1.199			
□	1.462			

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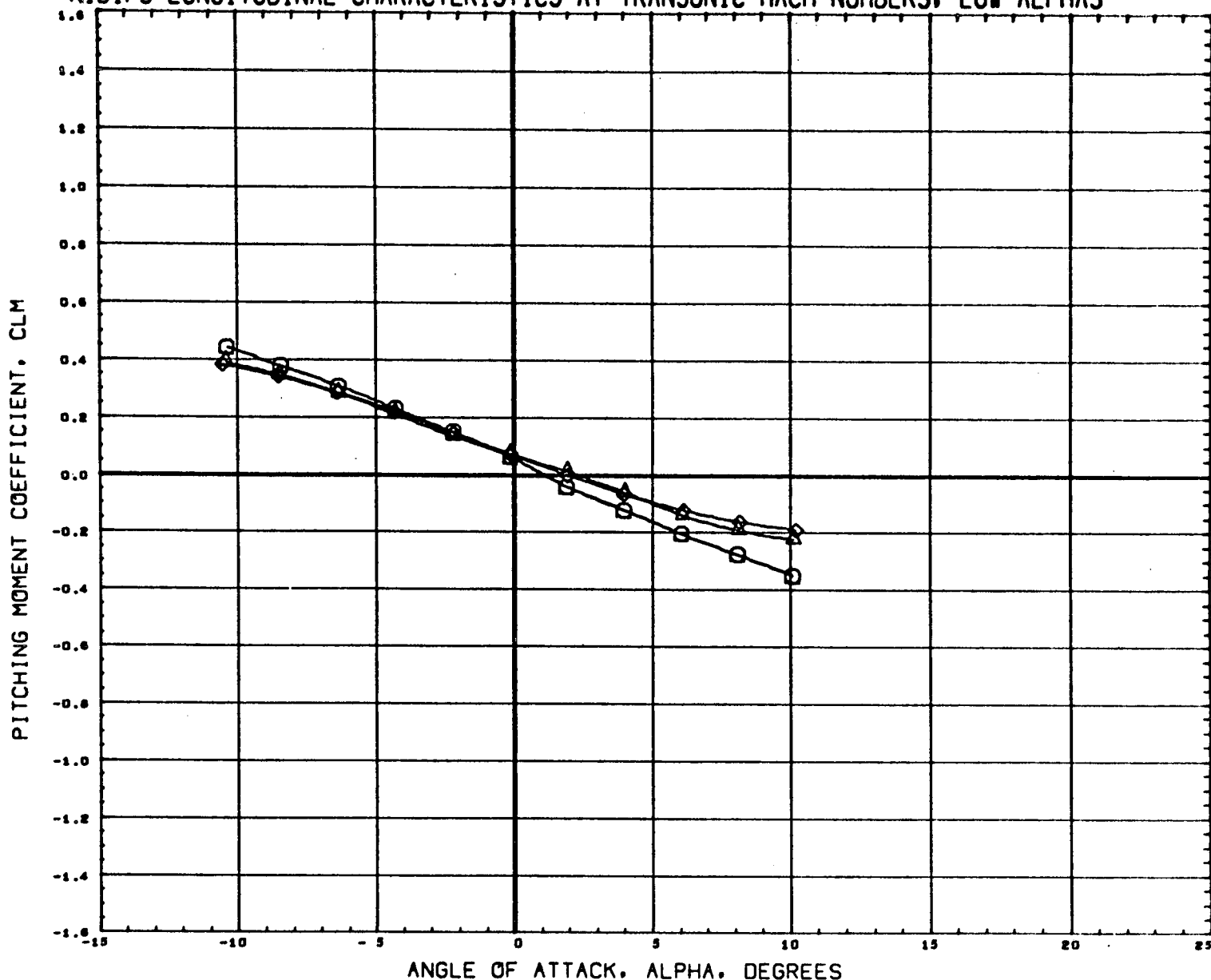
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N1B1F6

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



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△	1.199			
◇	1.462			

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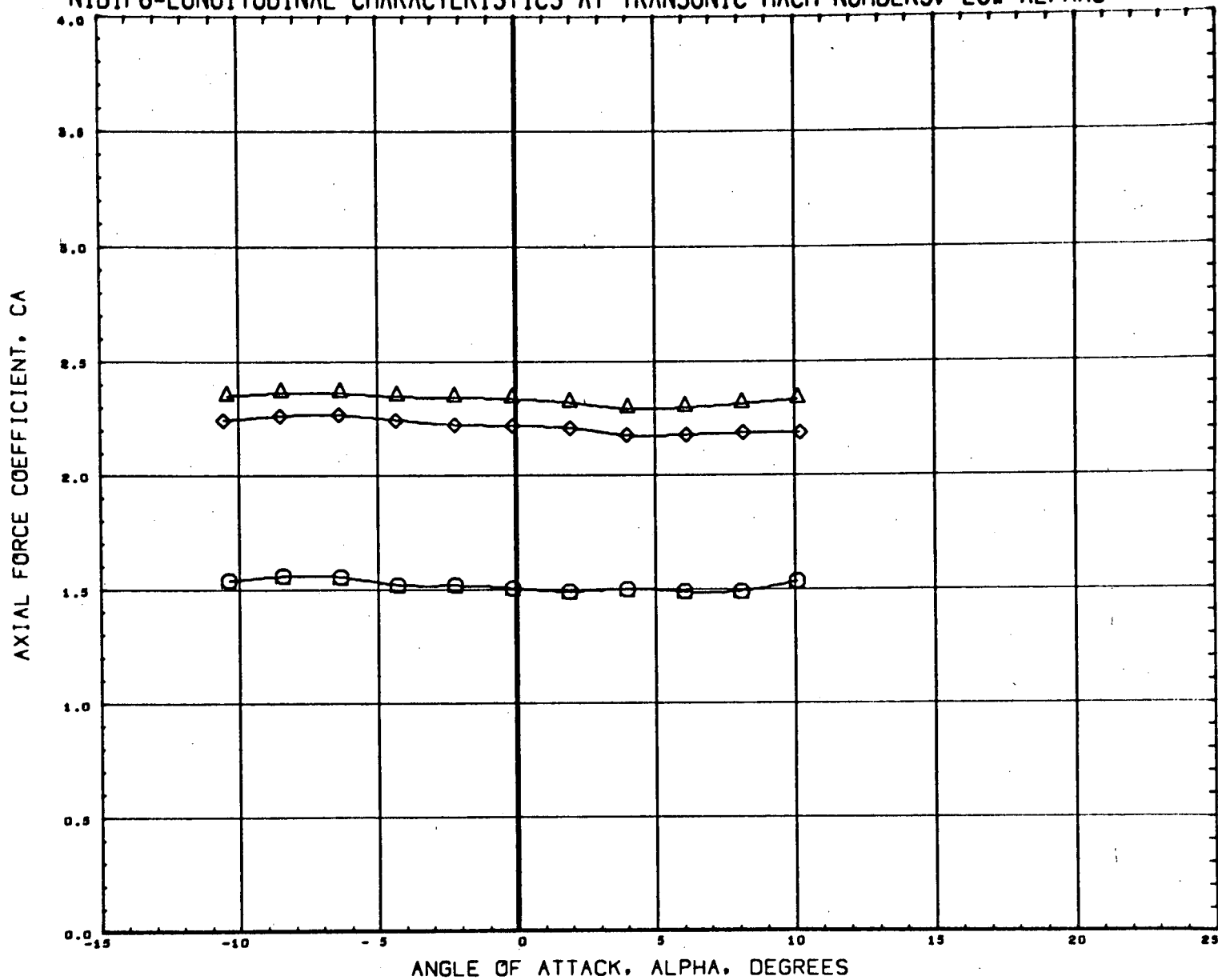
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(E55007) 02 FEB 72

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
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◇	1.199			
□	1.462			

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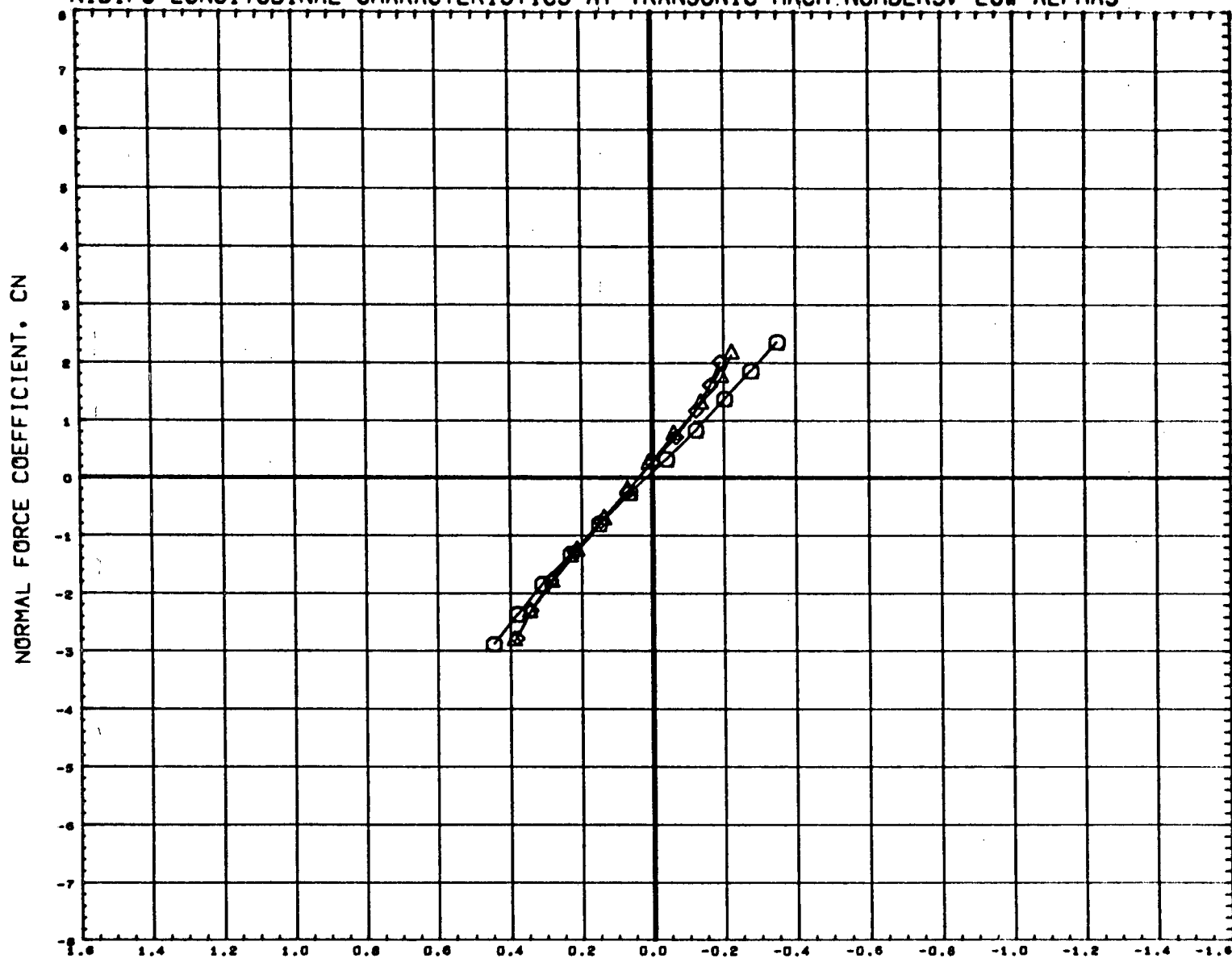
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N1B1F6

(E55007) 02 FEB 72

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
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△	1.199				
◇	1.462				

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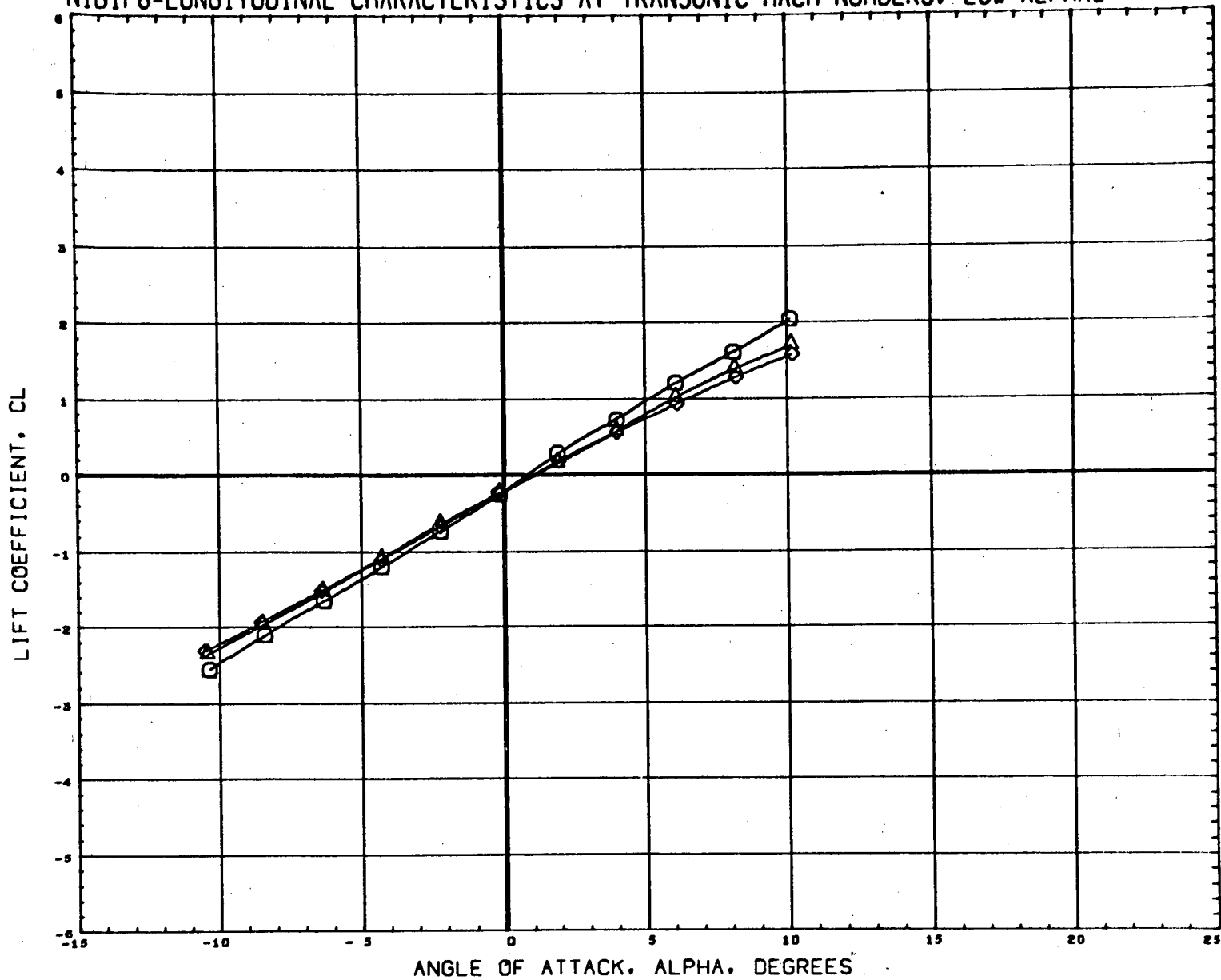
MSFC TWT 521 BOOSTER

N1B1F6

(E55007) 02 FEB 72

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.899	0.000	DINDRL	30.000
△	1.199			
◇	1.462			

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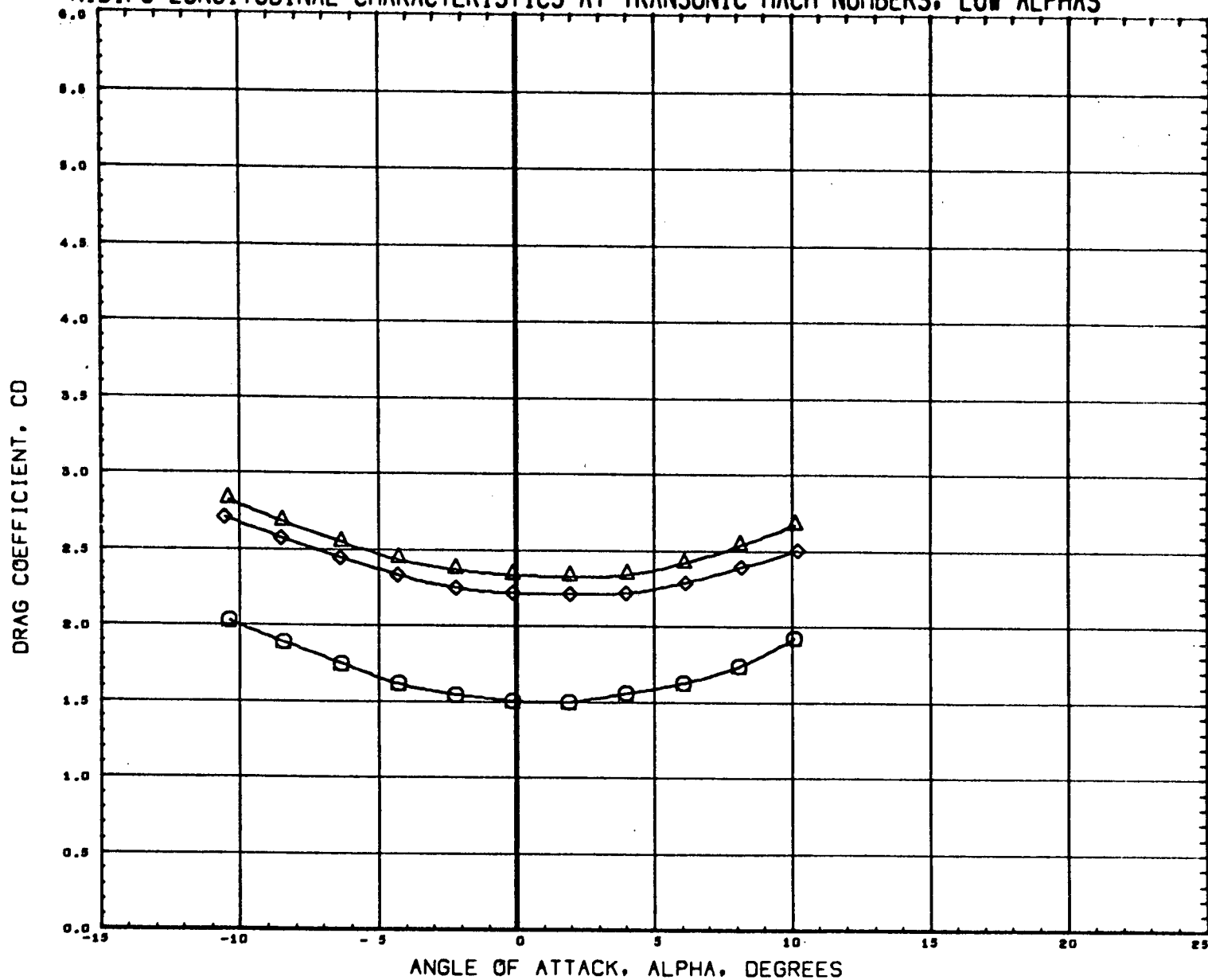
MSFC TWT 521 BOOSTER

N1B1F6

(E55007) 02 FEB 72

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DIHDR	30.000
○	0.899				
△	1.199				
◇	1.462				

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DATA HIST. CODE *E

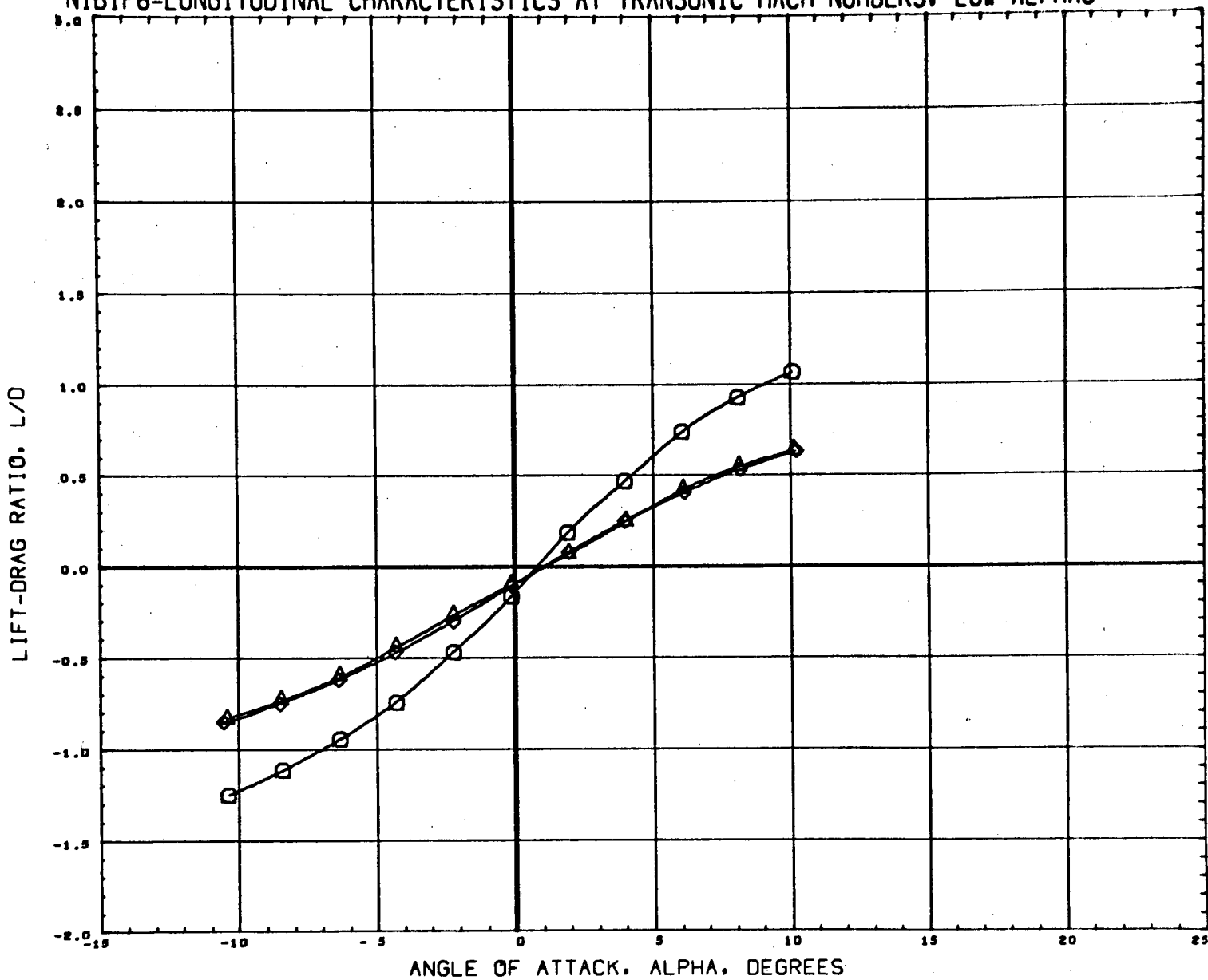
MSFC TWT 521 BOOSTER

N1B1F6

(E55007) 02 FEB 72

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	0.899		0.000	DIHRL	30.000
△	1.199				
◇	1.462				

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE #E

MSFC TWT 521 BOOSTER

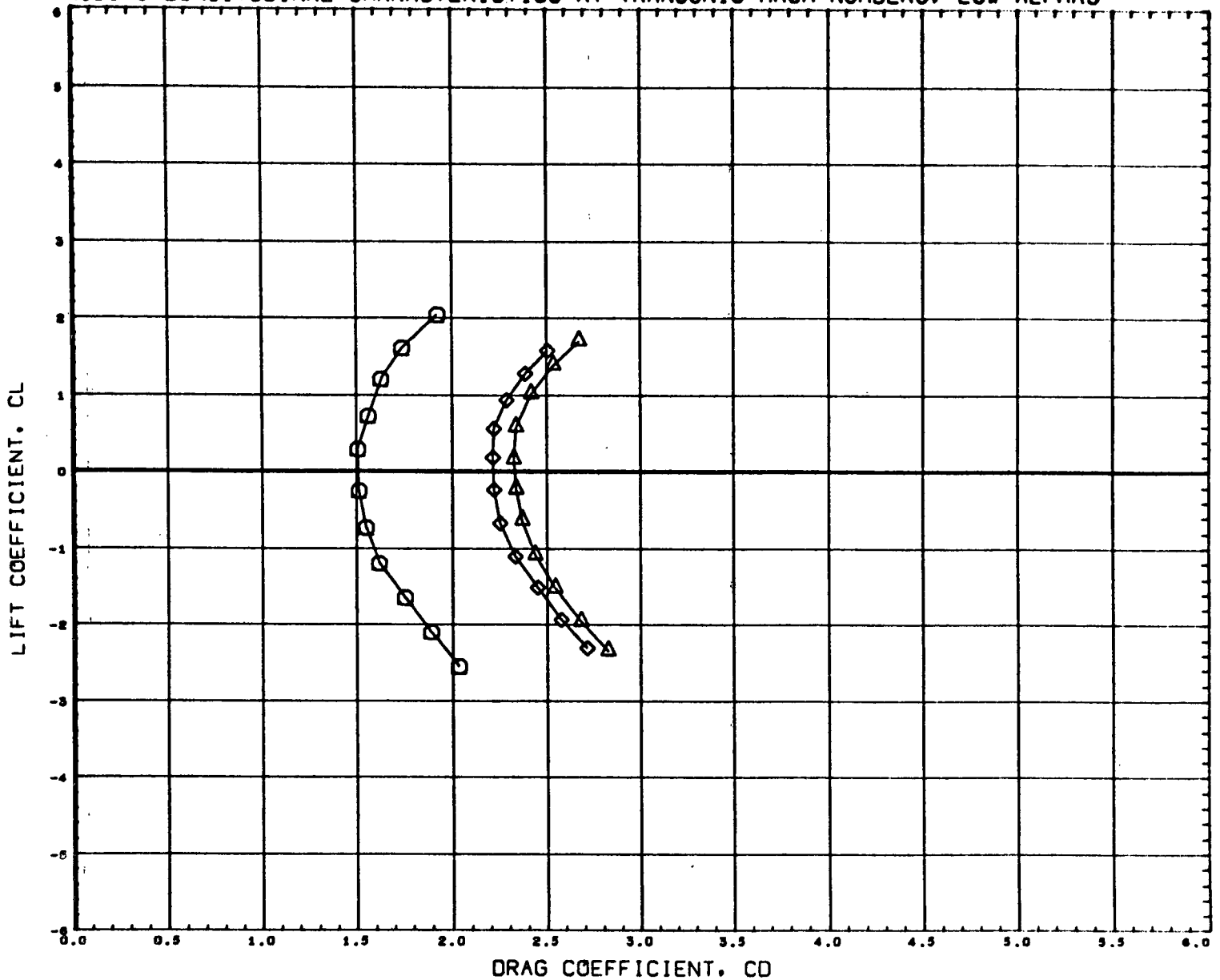
N1B1F6

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C.2

N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.899		0.000	30.000
△	1.199			
◇	1.462			

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRF	4.6230	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B1F6

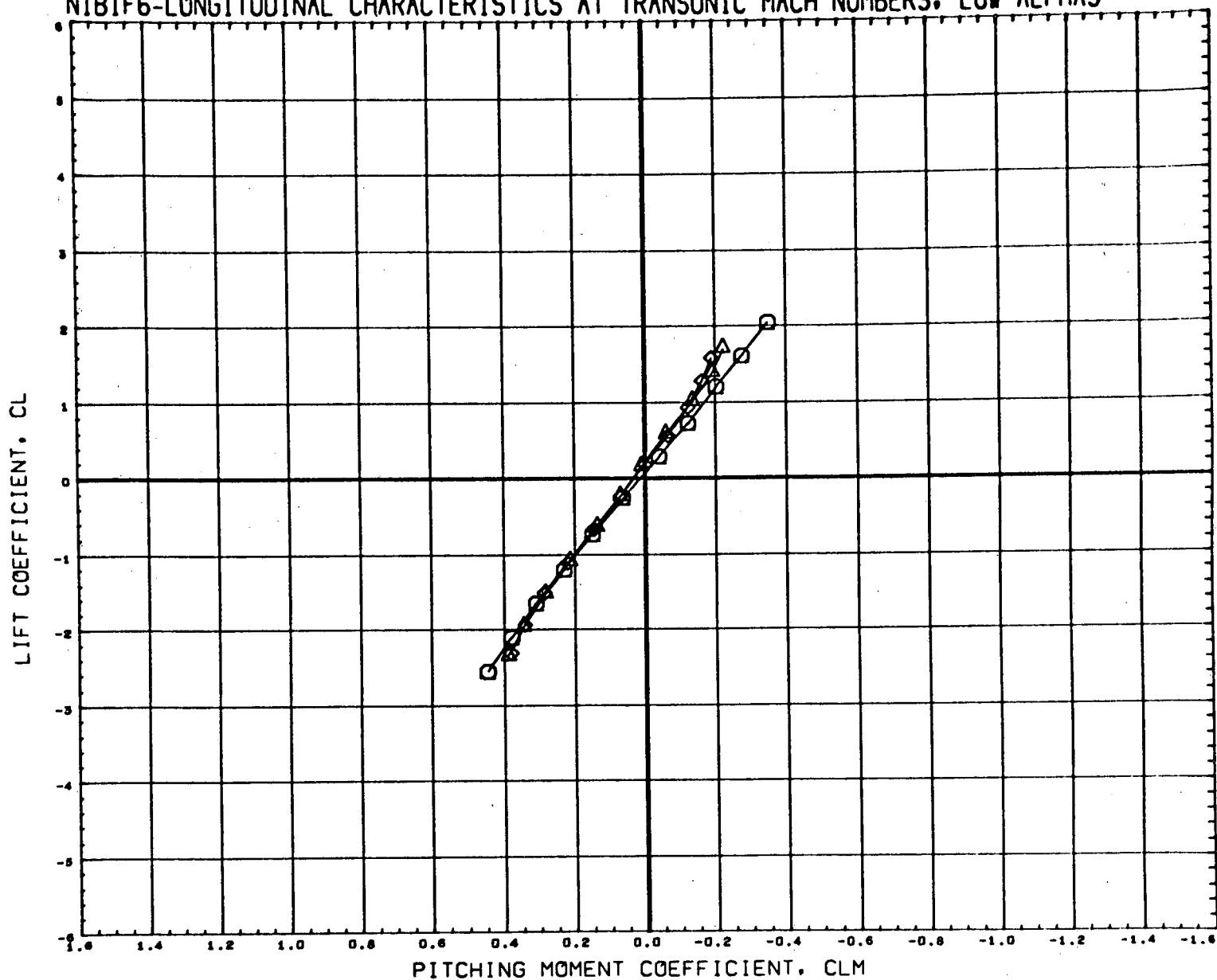
(E55007)

02 FEB 72

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	0.899		0.000	DIHRL	30.000
△	1.199				
◇	1.462				

REFERENCE INFORMATION		
SREF	0.9330	50. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

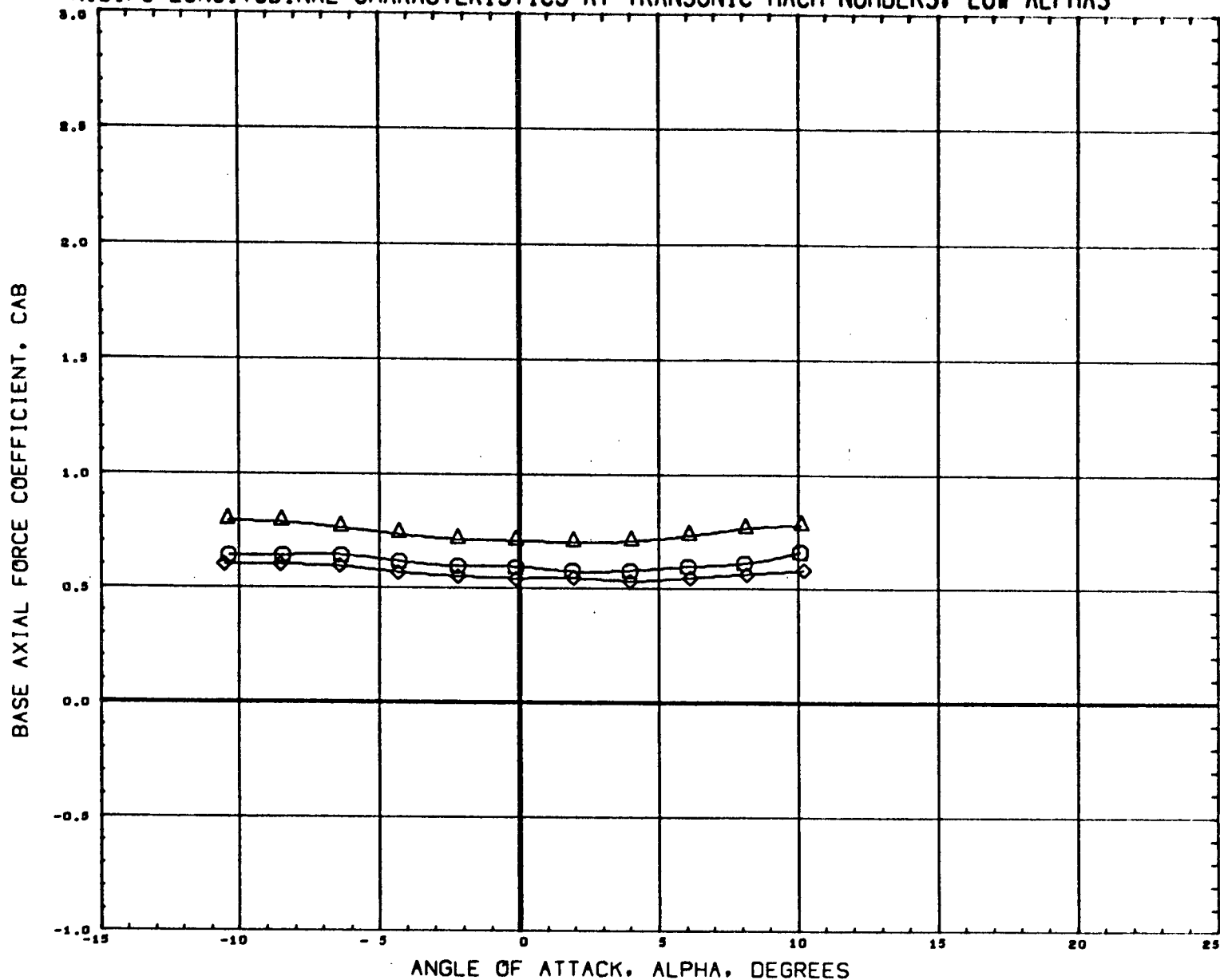
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DINHRL	30.000
△	0.899				
○	1.199				
◇	1.462				

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

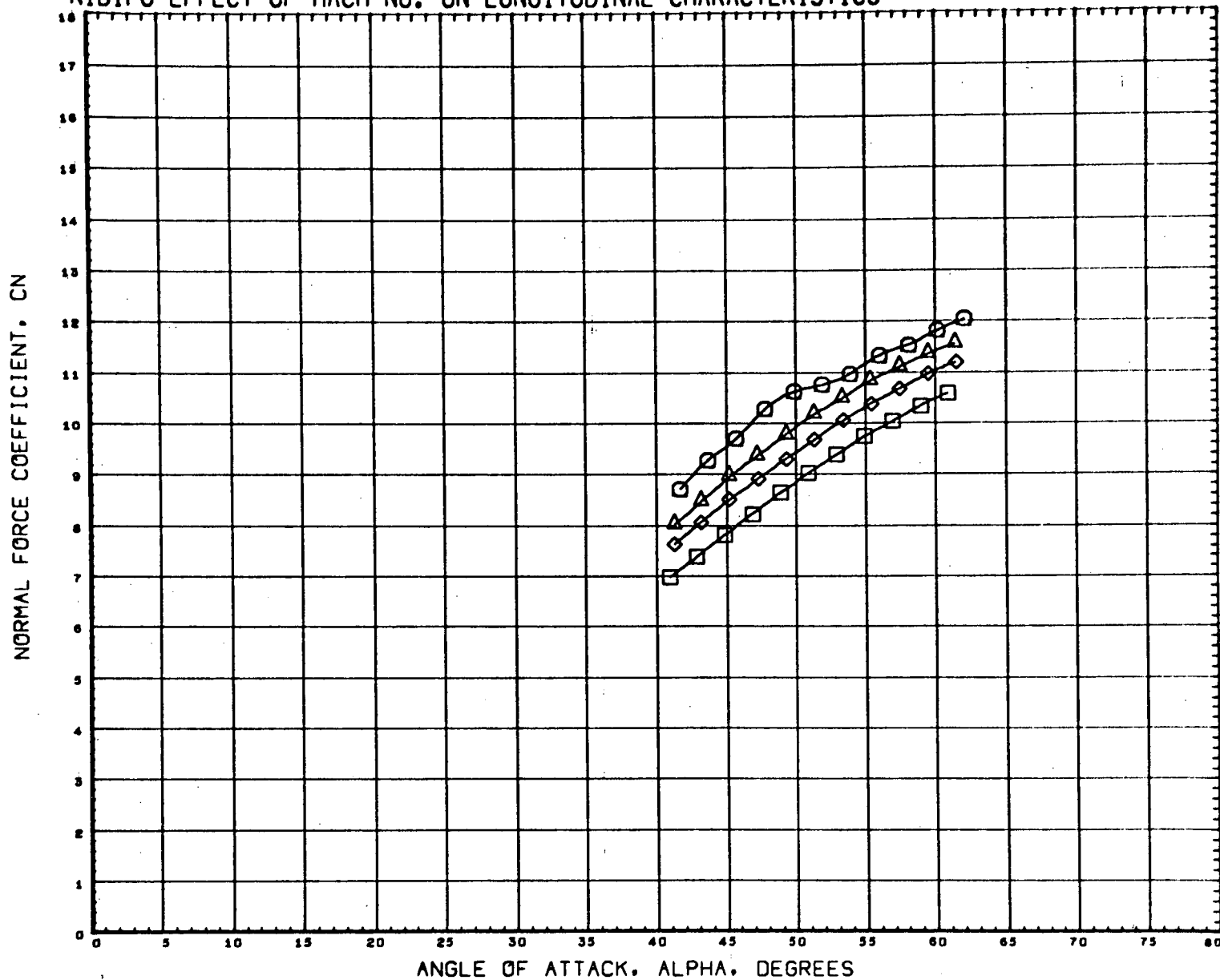
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			REFERENCE INFORMATION		
○	1.963	BETA	0.000	DIHDL	30.000	SREF	0.9330 SQ. IN
△	2.740					LREF	7.2230 IN.
◇	3.480					BREF	7.2230 IN.
□	4.959					XMRP	4.6230 IN.
						YMRP	0.0000 IN.
						ZMRP	0.0000 IN.
						SCALE	0.0034

DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

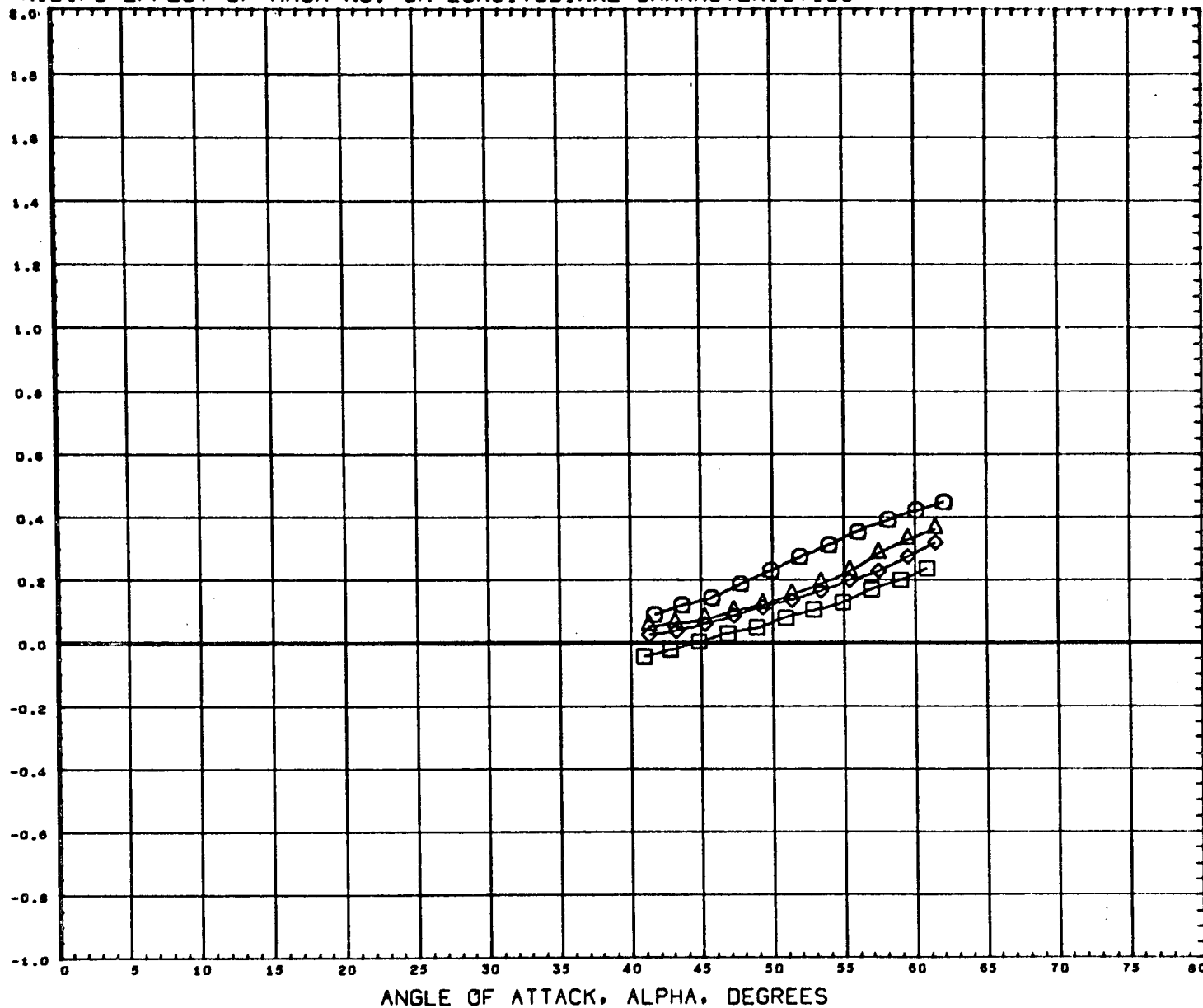
N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

PITCHING MOMENT COEFFICIENT, CLM



SYMBOL	MACH	PARAMETRIC VALUES		
○	1.963	BETA	0.000	DIMDRL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	0.9330	30. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

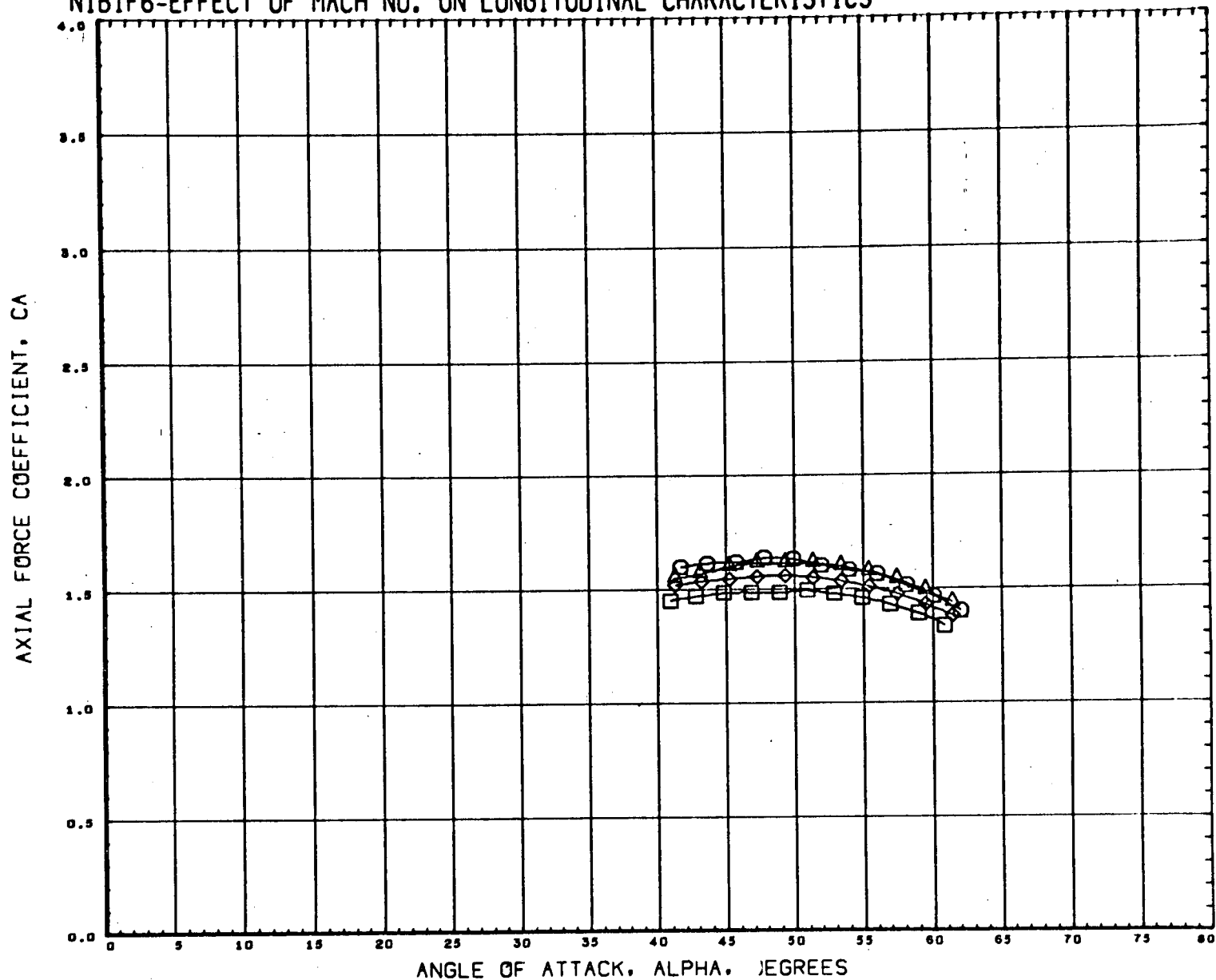
N1B1F6

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22

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	1.963		0.000	DIHDL	30.000
◇	2.740				
△	3.480				
□	4.959				

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

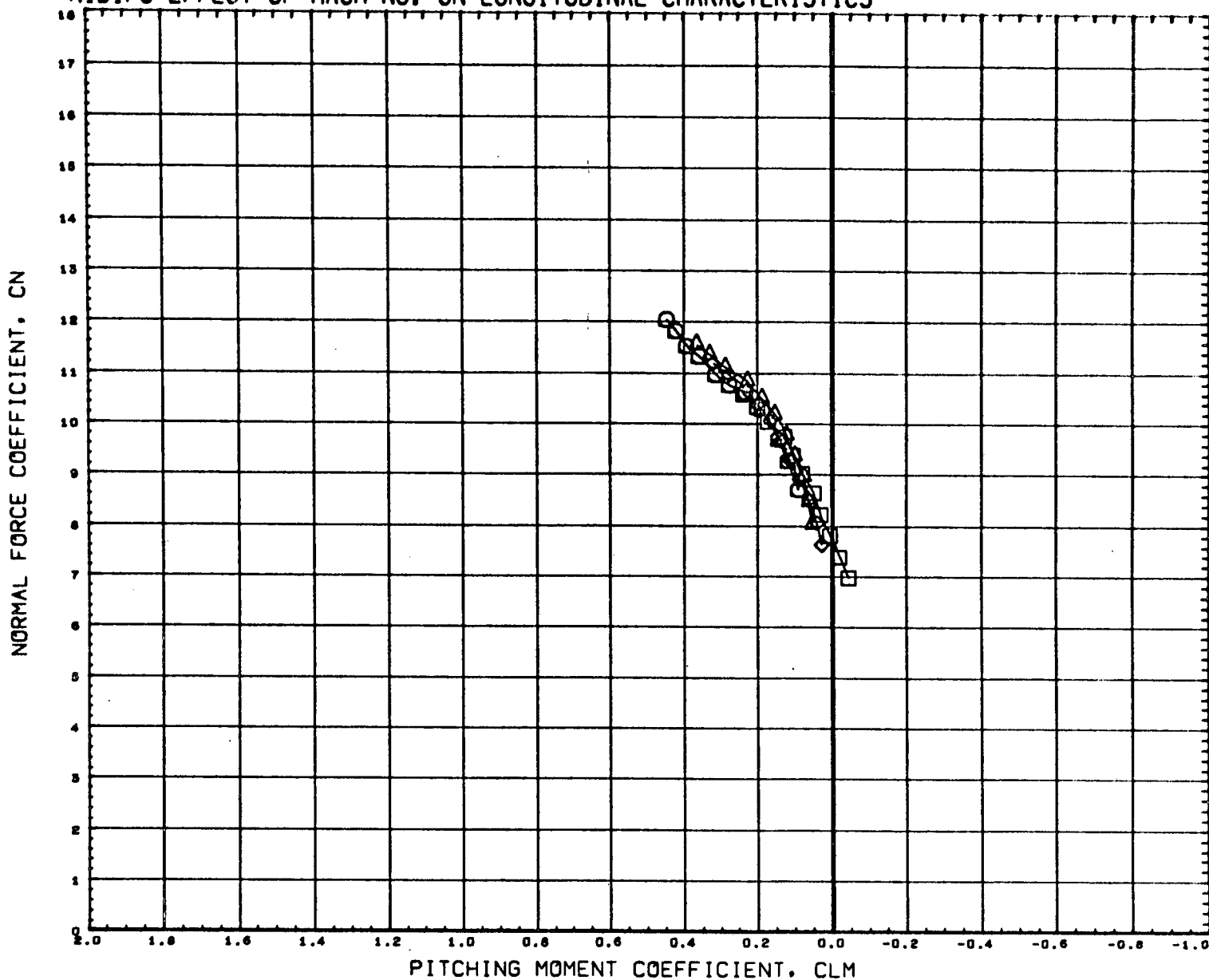
MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.963		0.000	30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	7.2230	in.
BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE *E

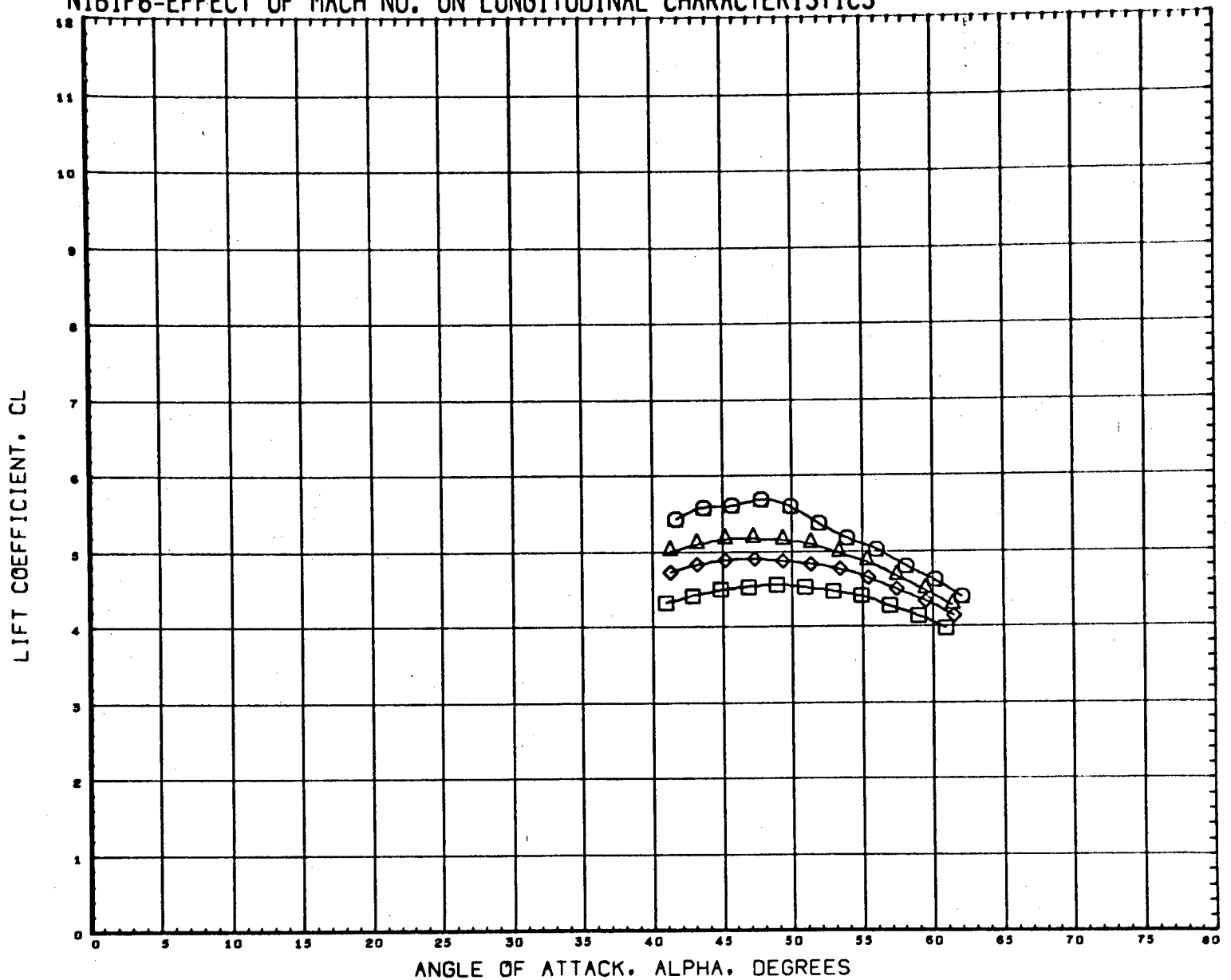
MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.963	0.000	DIHDL	30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	0.9330	50. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

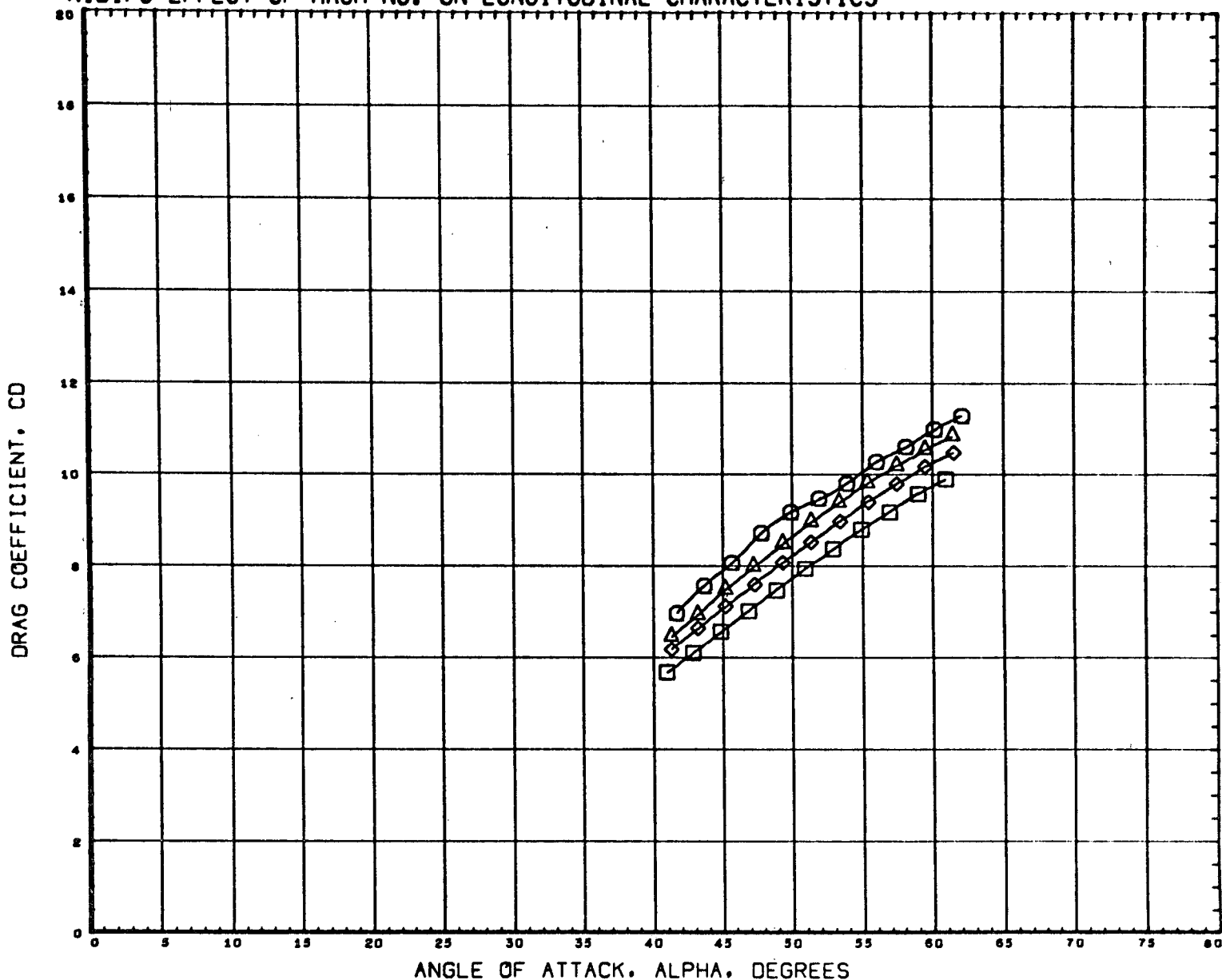
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.963	0.000	DINDRL	30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
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BREF	7.2230	in.
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YMHP	0.0000	in.
ZMHP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE #E

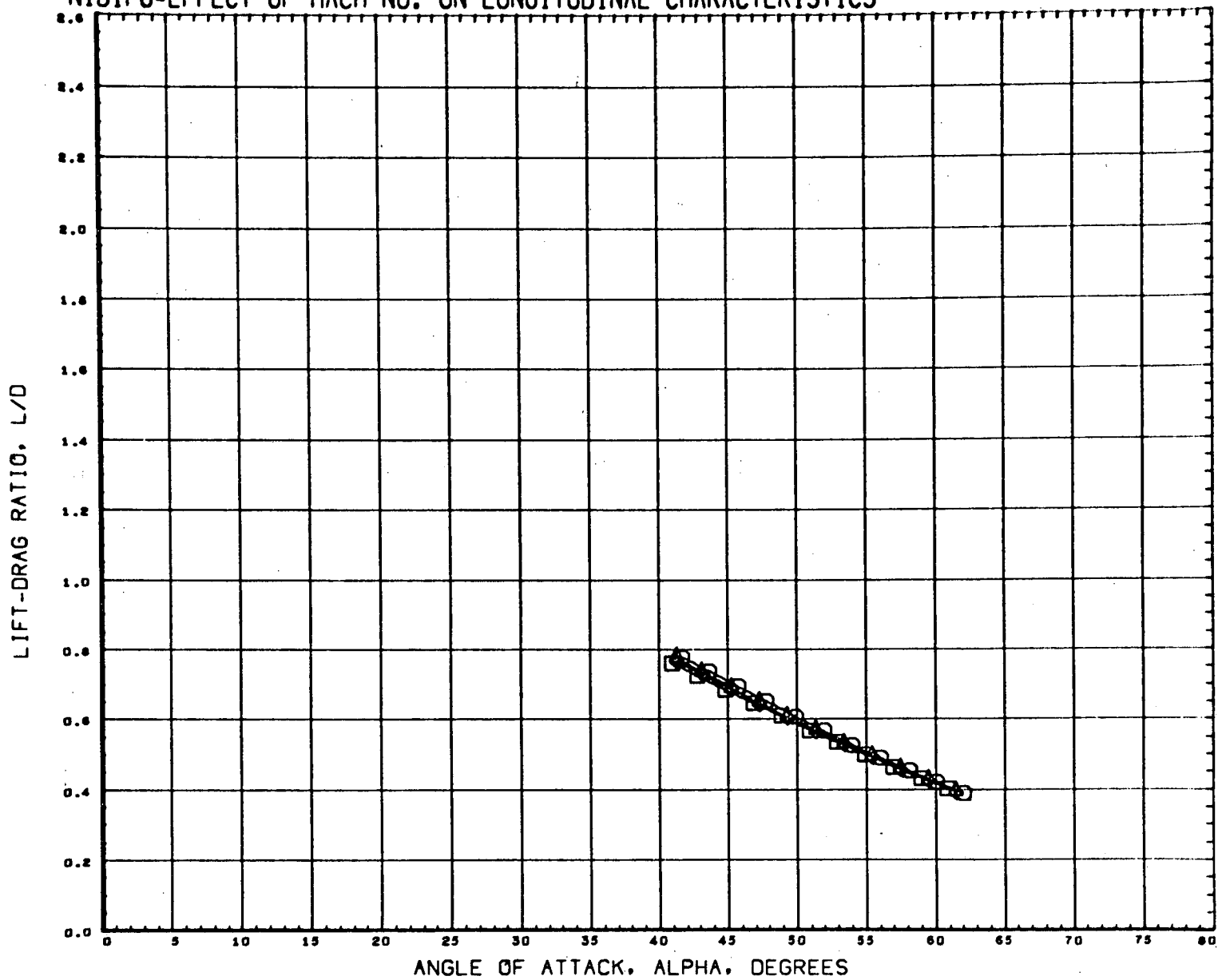
MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

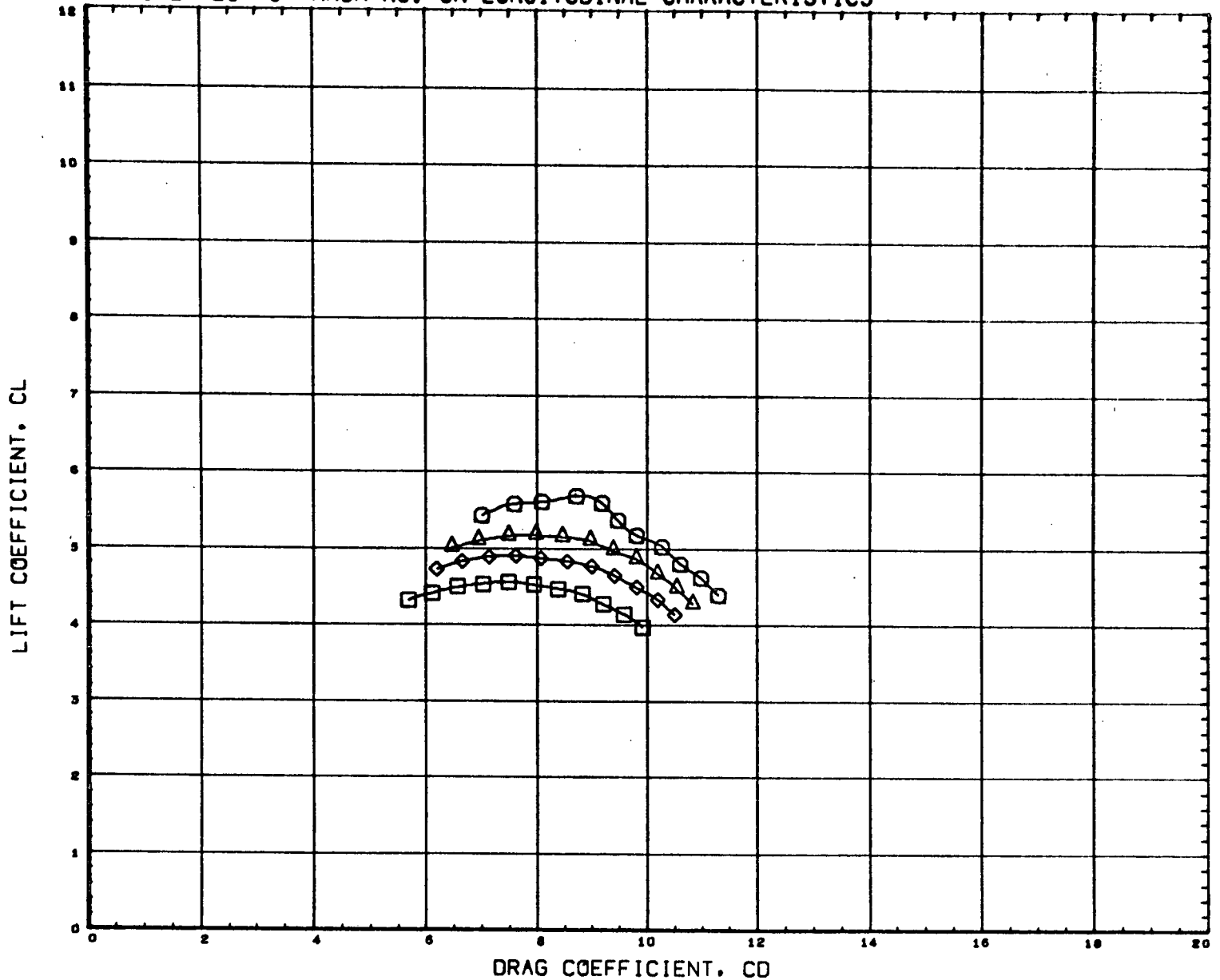


SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.963		0.000	DIMORL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	0.9330	30. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE #E

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.963		0.000	DIHDL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	7.2230	in.
BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

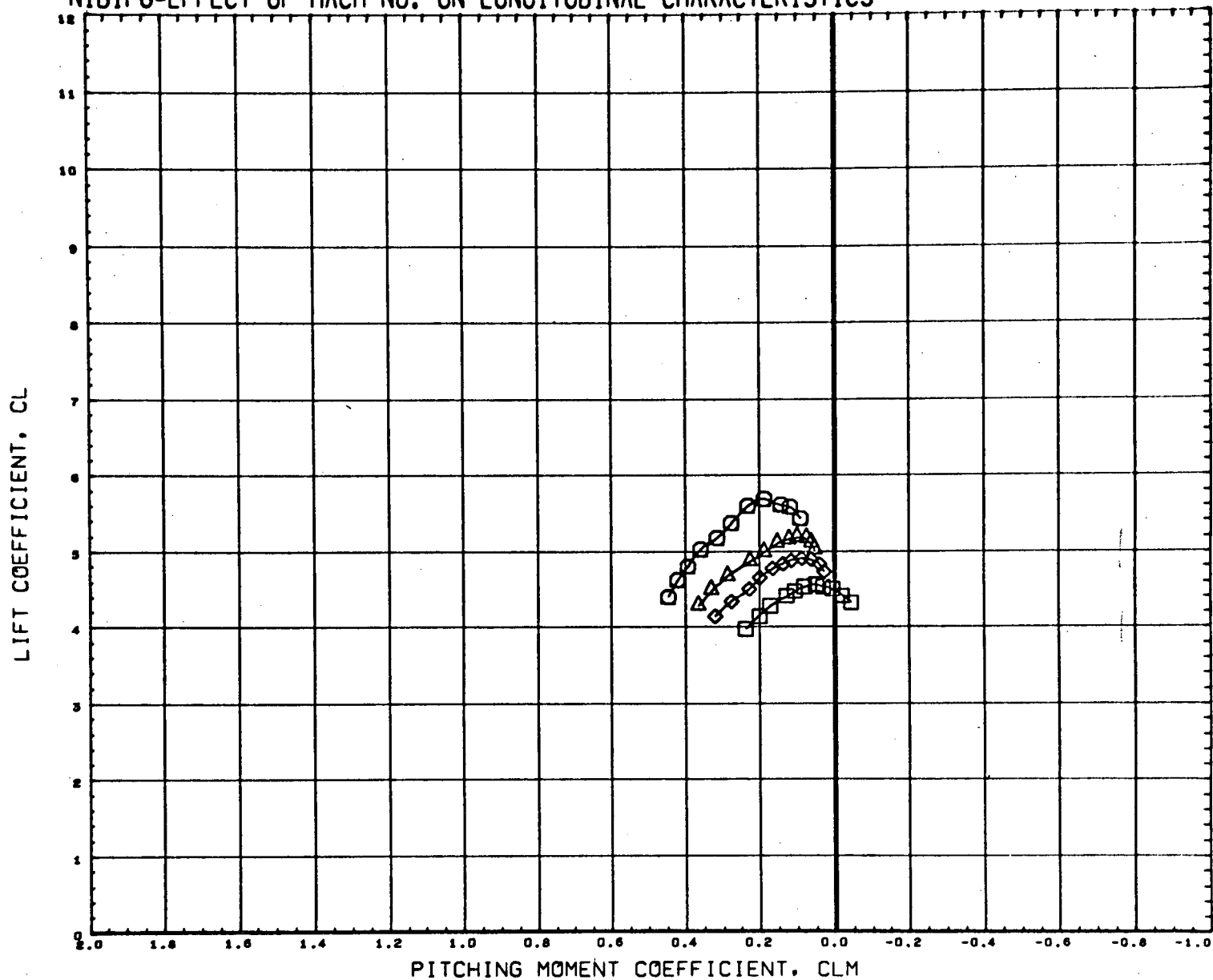
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MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	1.963		0.000	DIHDL	30.000
△	2.740				
◇	3.480				
□	4.959				

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

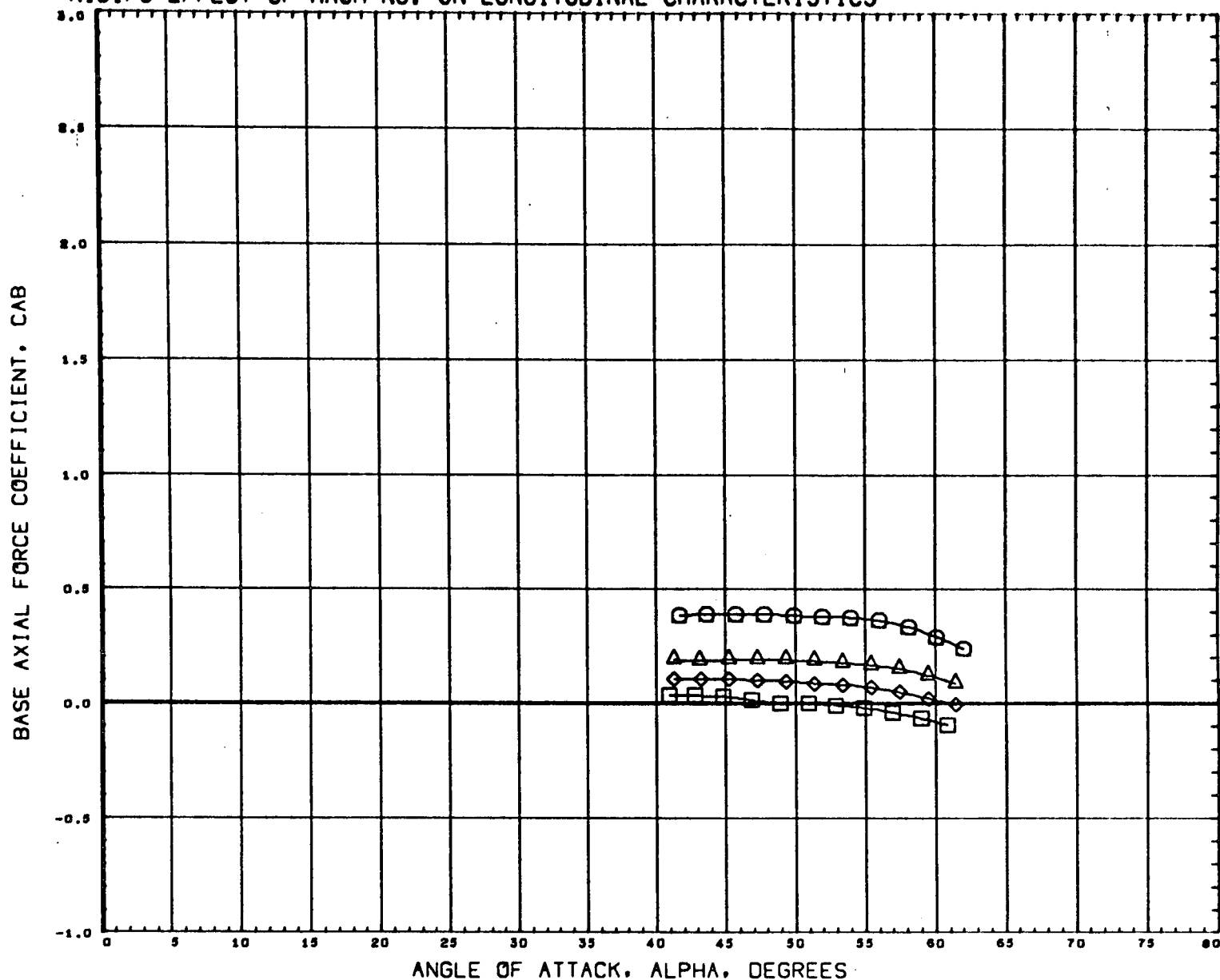
MSFC TWT 521 BOOSTER

N1B1F6

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N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.963	0.000	DINDRL	30.000
△	2.740			
◇	3.480			
□	4.859			

REFERENCE INFORMATION		
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LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

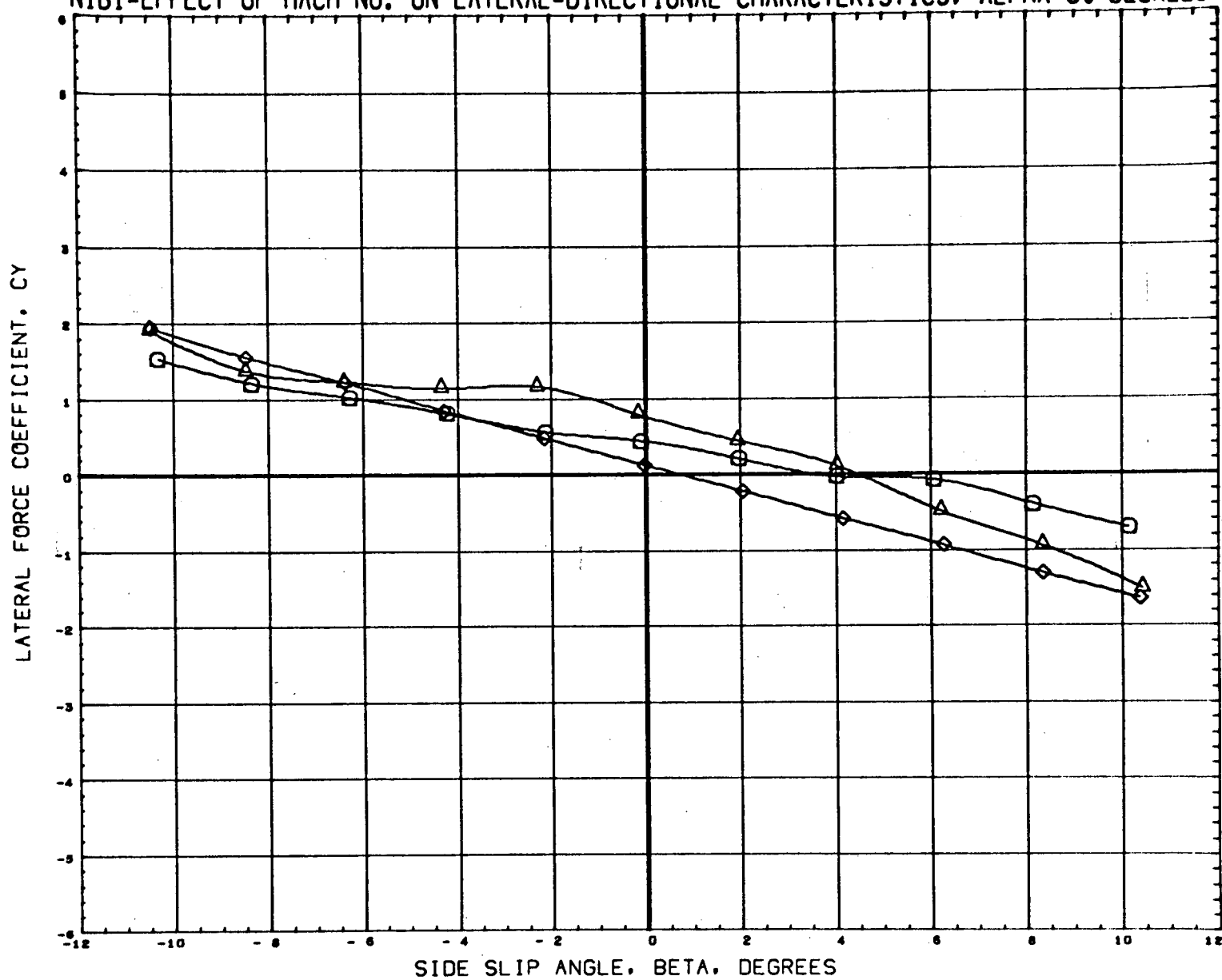
MSFC TWT 521 BOOSTER

N1B1F6

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	0.897	30.000	
△	1.194		
◇	1.981		

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

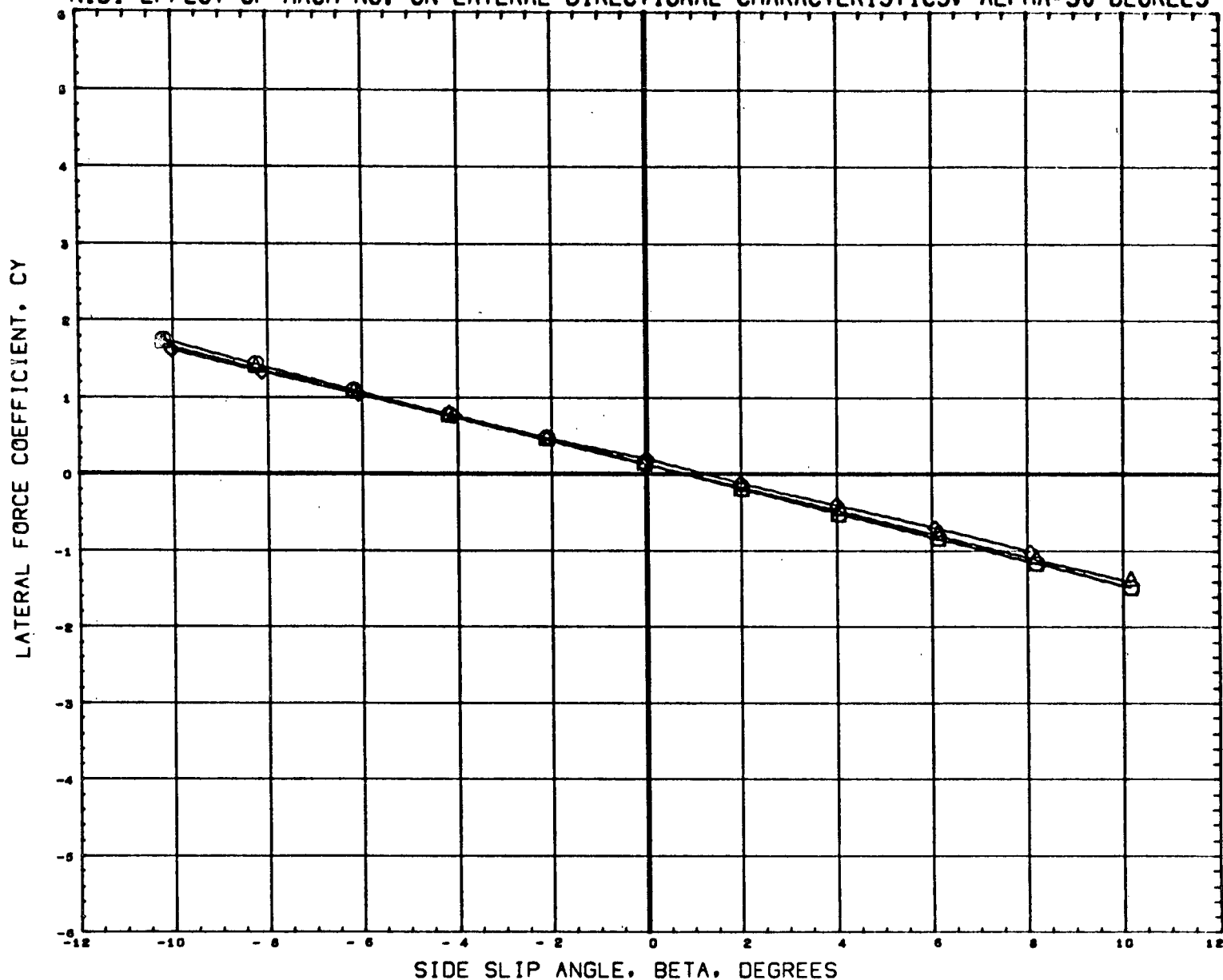
REFERENCE FILE

MSFC TWT 521 BOOSTER

N1B1

(A55002) 27 JAN 72 PAGE 31

N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	2.740	30.000	
△	3.460		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
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YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

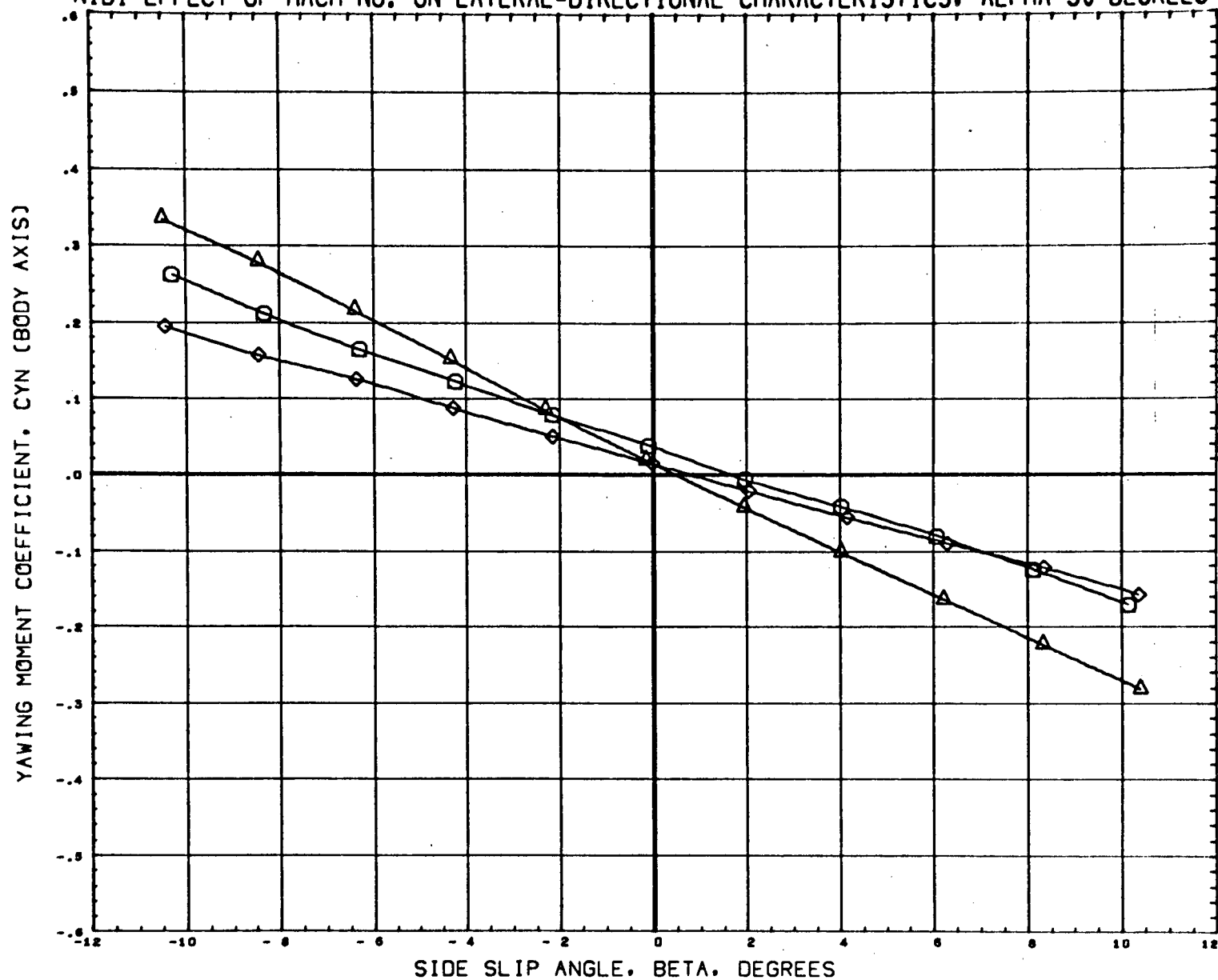
MSFC TWT 521 BOOSTER

N1B1

(A55002) 27 JAN 72

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
△	0.897	30.000	
○	1.194		
◇	1.981		

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	7.2230	in.
BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

REFERENCE FILE

MSFC TWT 521 BOOSTER

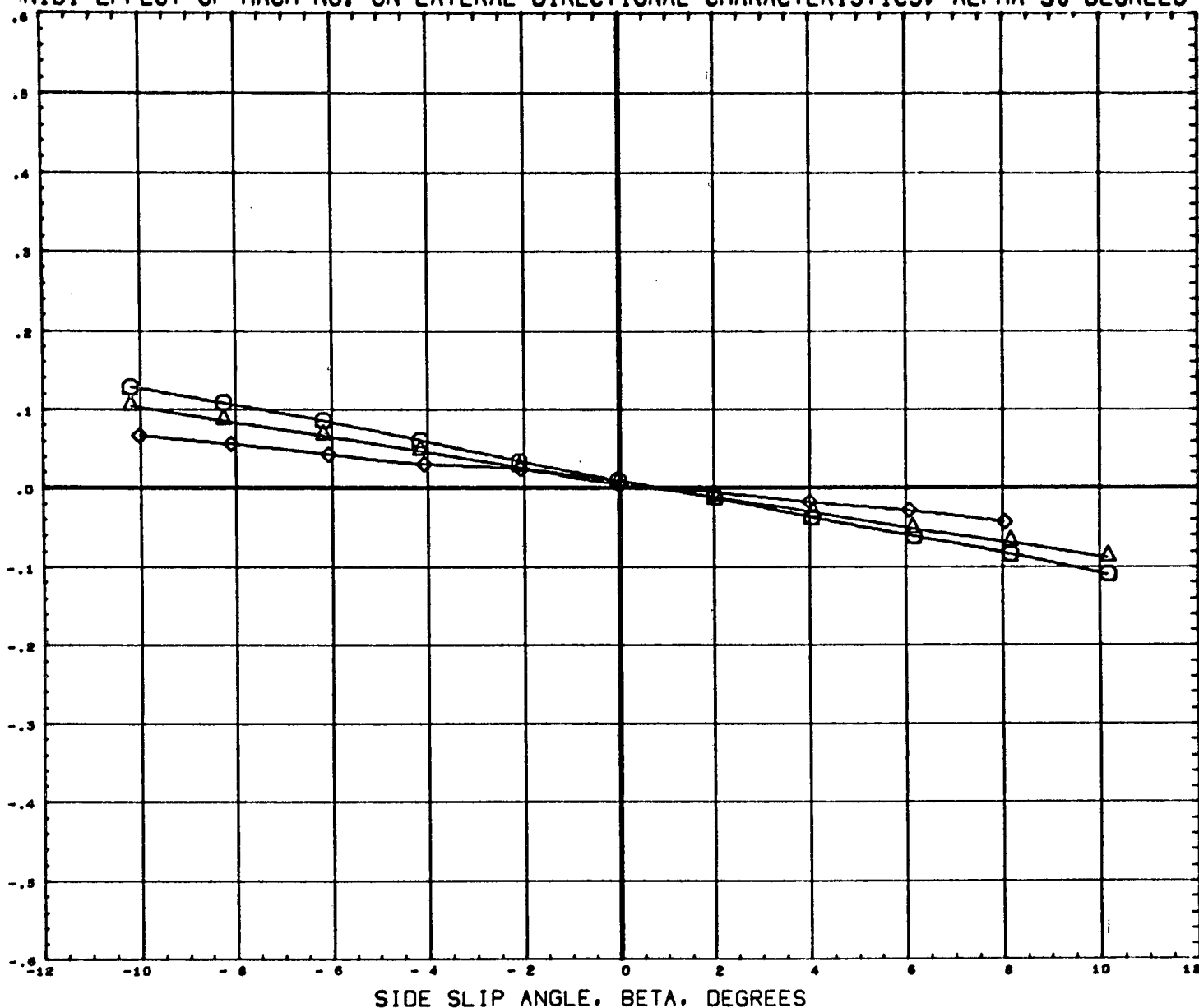
N1B1

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	2.740	30.000	
◇	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

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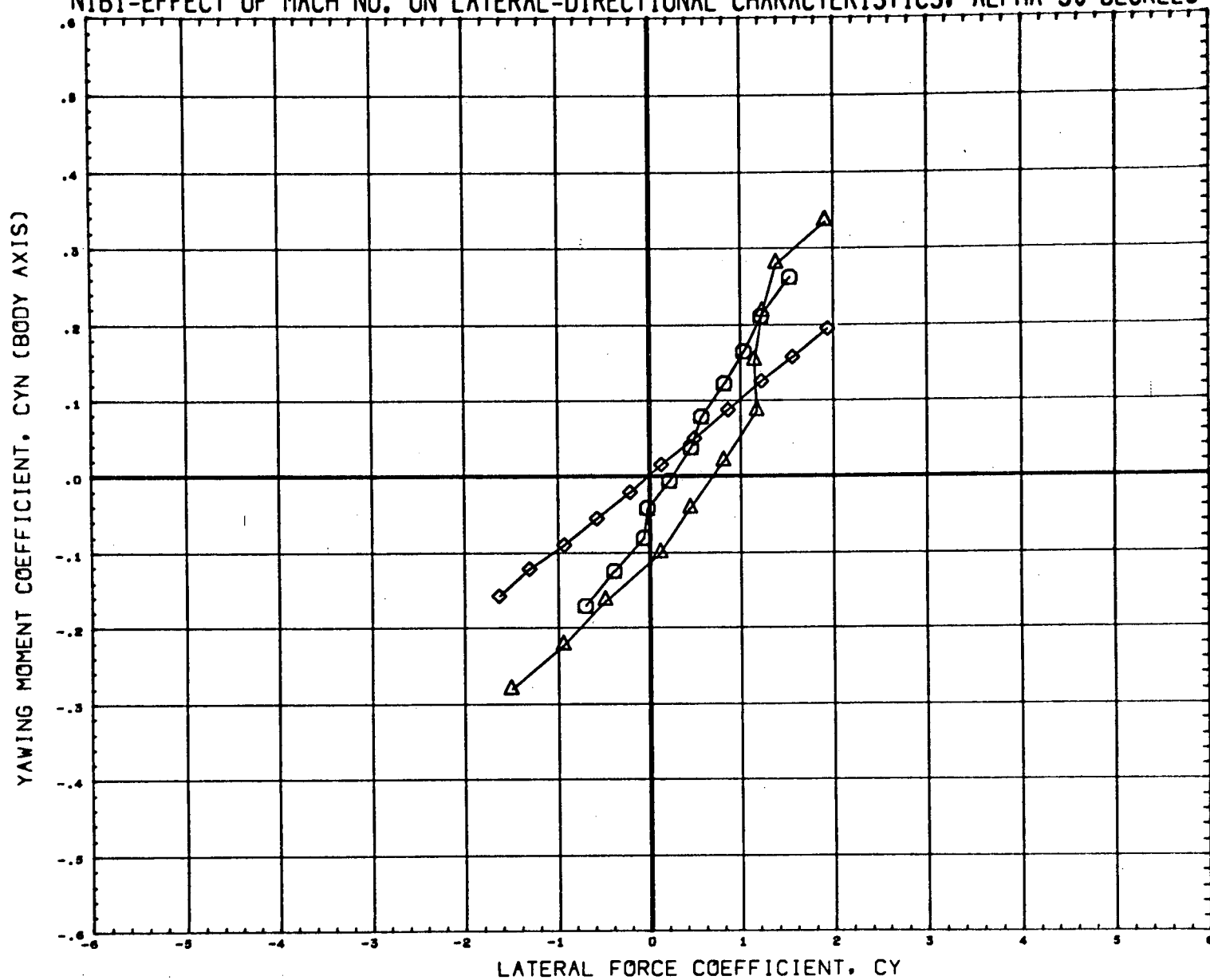
MSFC TWT 521 BOOSTER

N1B1

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	0.897	30.000	
□	1.194		
△	1.961		

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRF	4.6230	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

MSFC TWT 521 BOOSTER

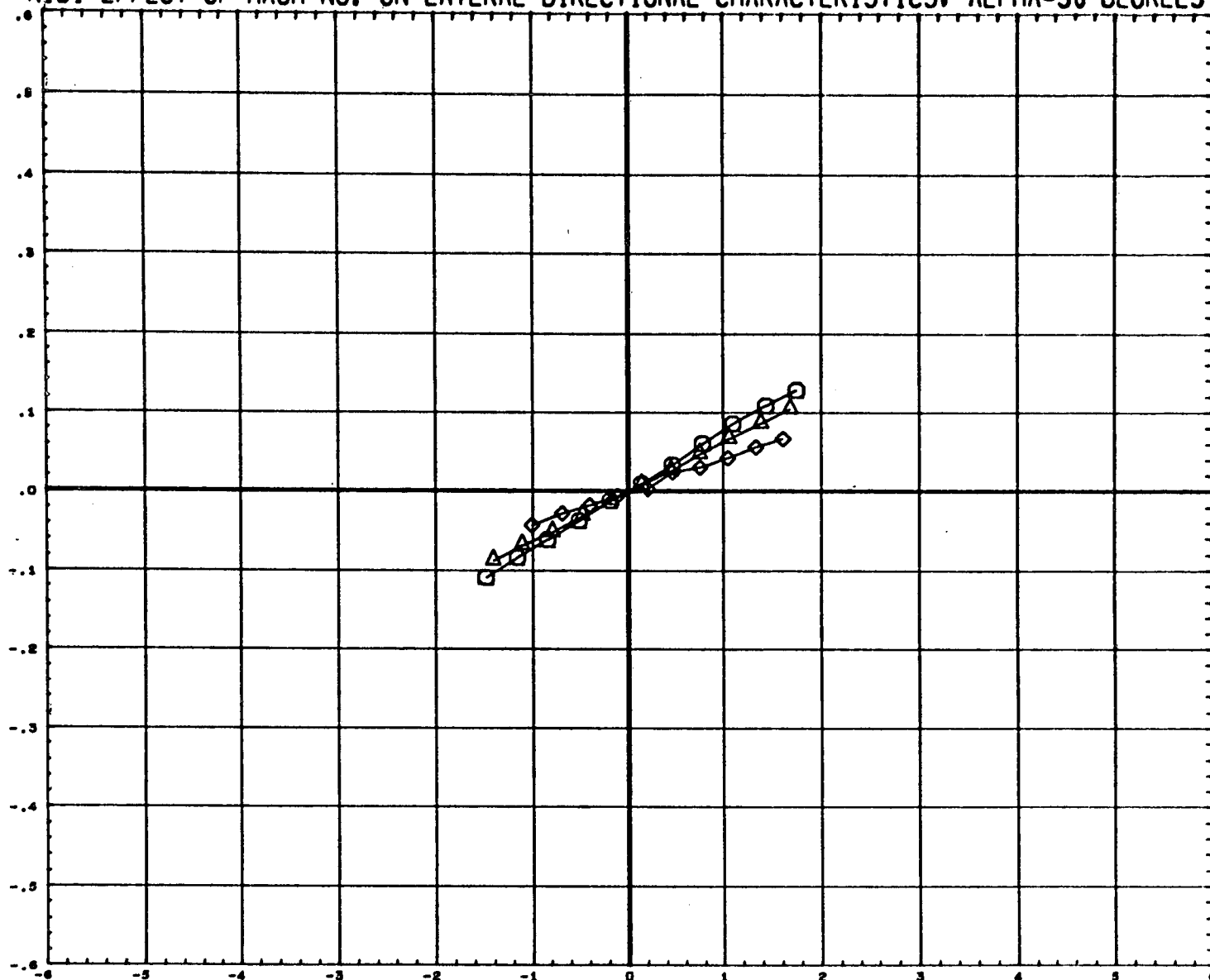
N1B1

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



LATERAL FORCE COEFFICIENT, CY

SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	2.740	30.000	
△	3.480	30.000	
◇	4.959	30.000	

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

MSFC TWT 521 BOOSTER

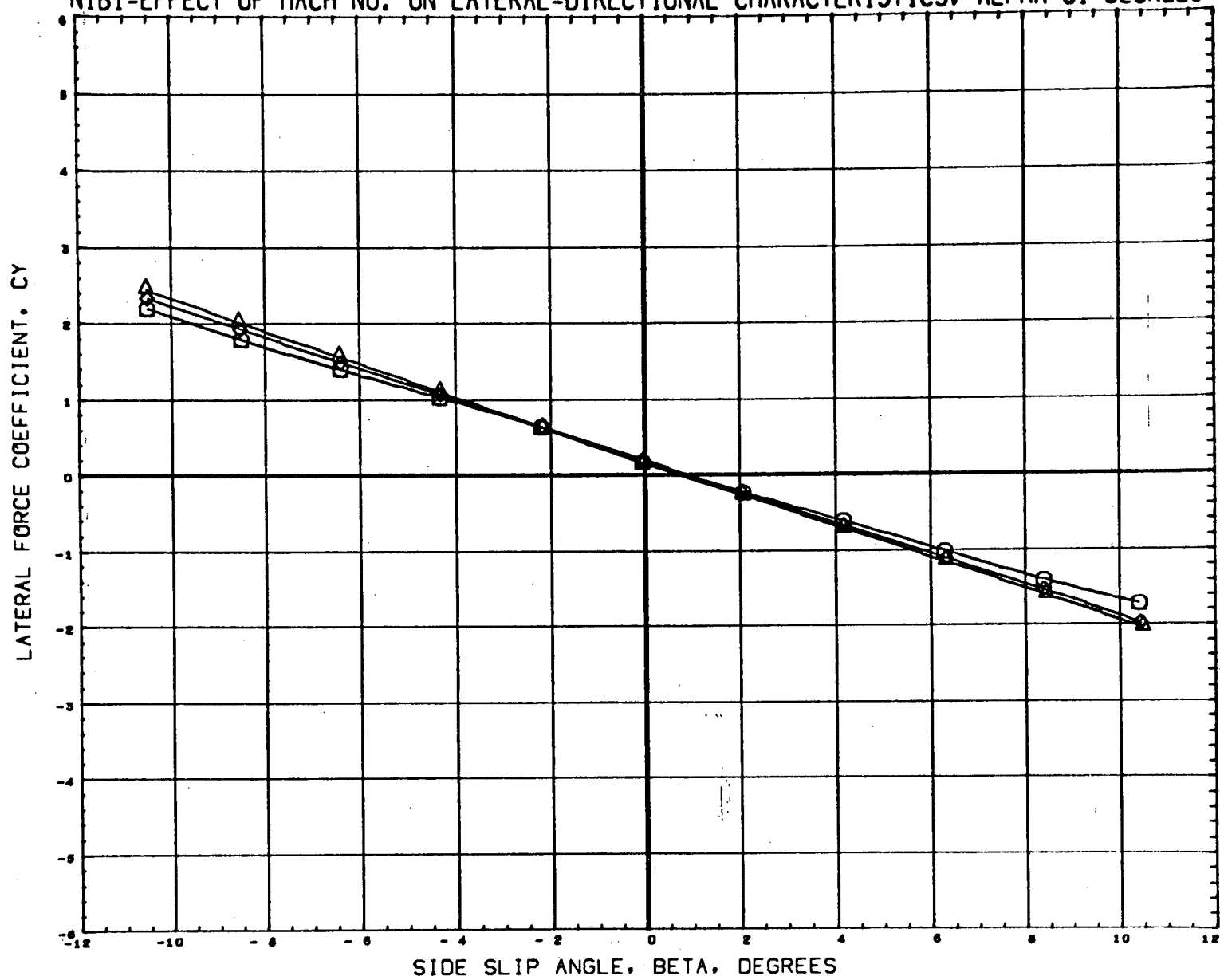
N1B1

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
△	0.903	51.000	
□	1.195		
◇	1.943		

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

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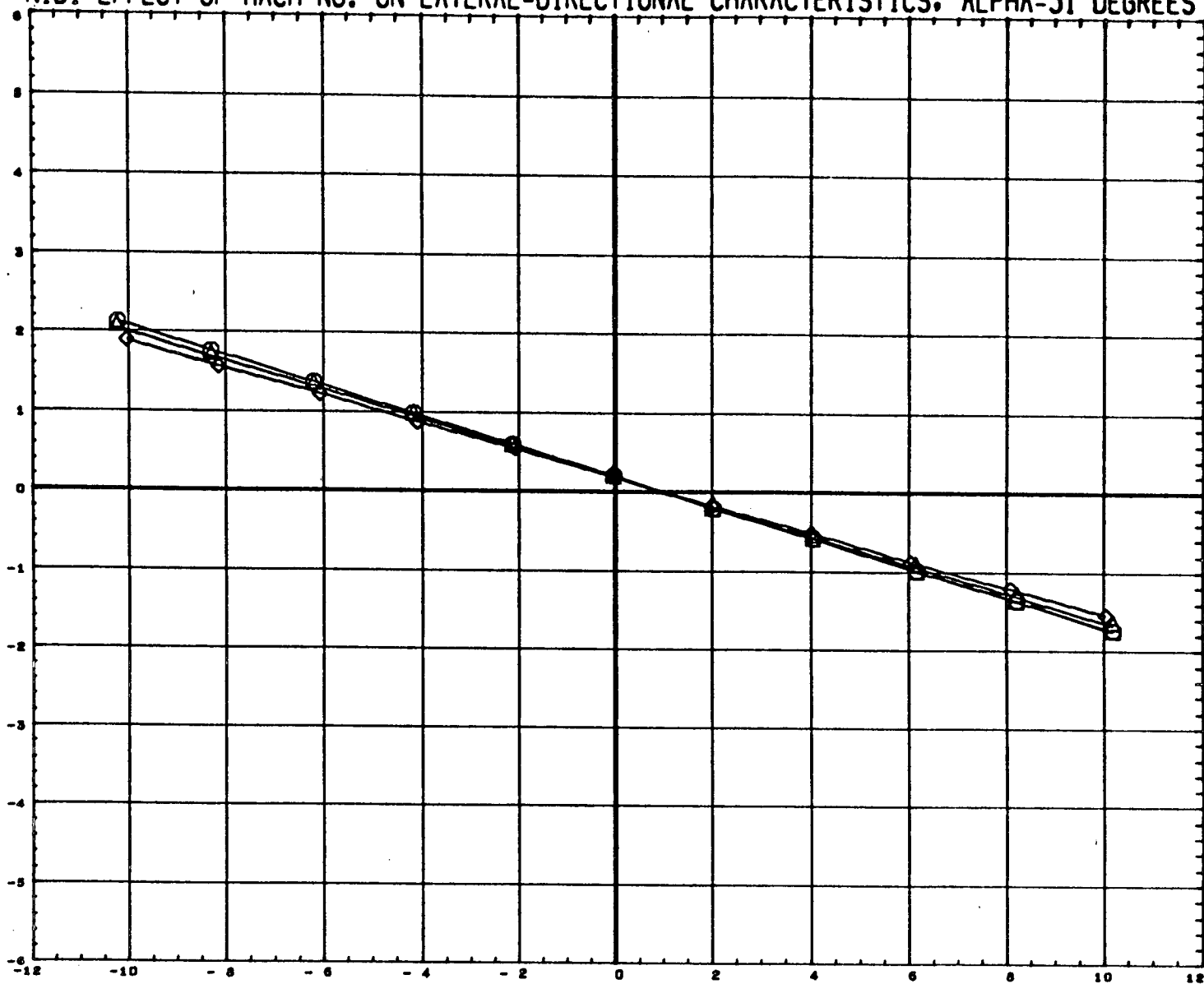
N1B1

(A55003) 27 JAN 72

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

LATERAL FORCE COEFFICIENT, CY



SIDE SLIP ANGLE, BETA, DEGREES

SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	2.740	51.000	
△	3.460		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	90. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

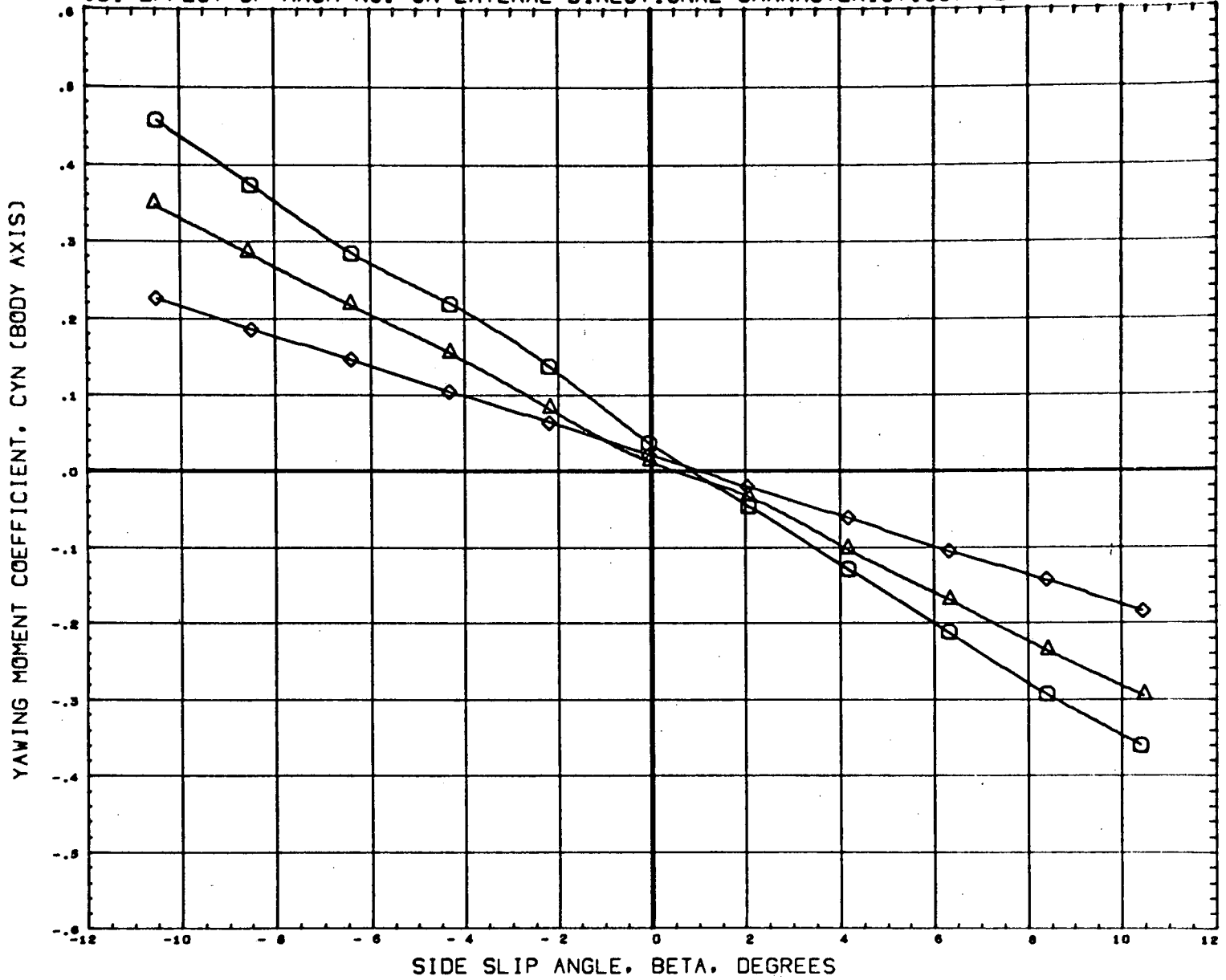
MSFC TWT 521 BOOSTER

N1B1

(A55003) 27 JAN 72

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	0.903	51.000	
△	1.195		
◇	1.943		

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN.
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

MSFC TWT 521 BOOSTER

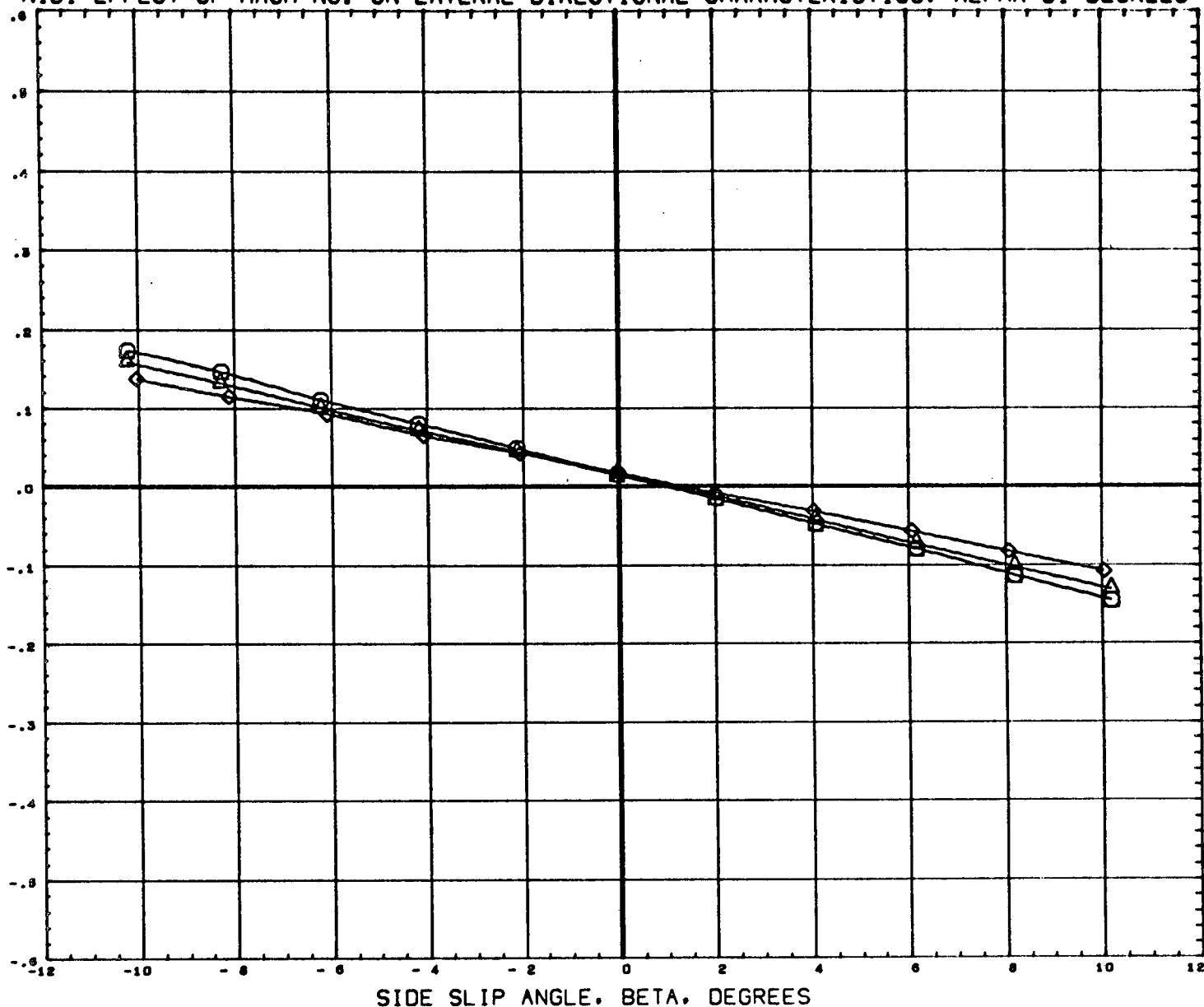
N1B1

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	2.740	51.000	
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

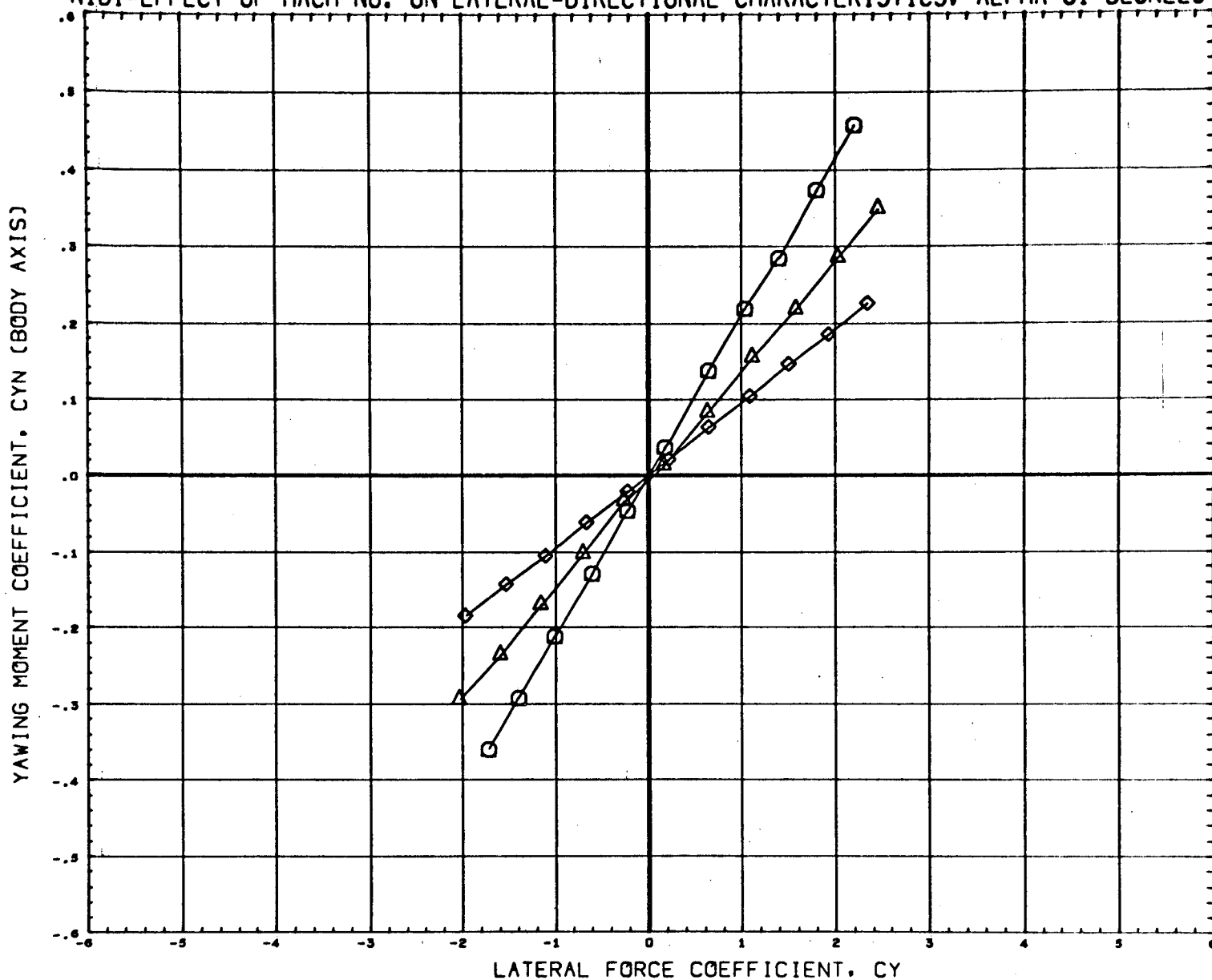
MSFC TWT 521 BOOSTER

N1B1

(A55003) 27 JAN 72

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	0.903	51.000	
△	1.195		
◇	1.943		

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

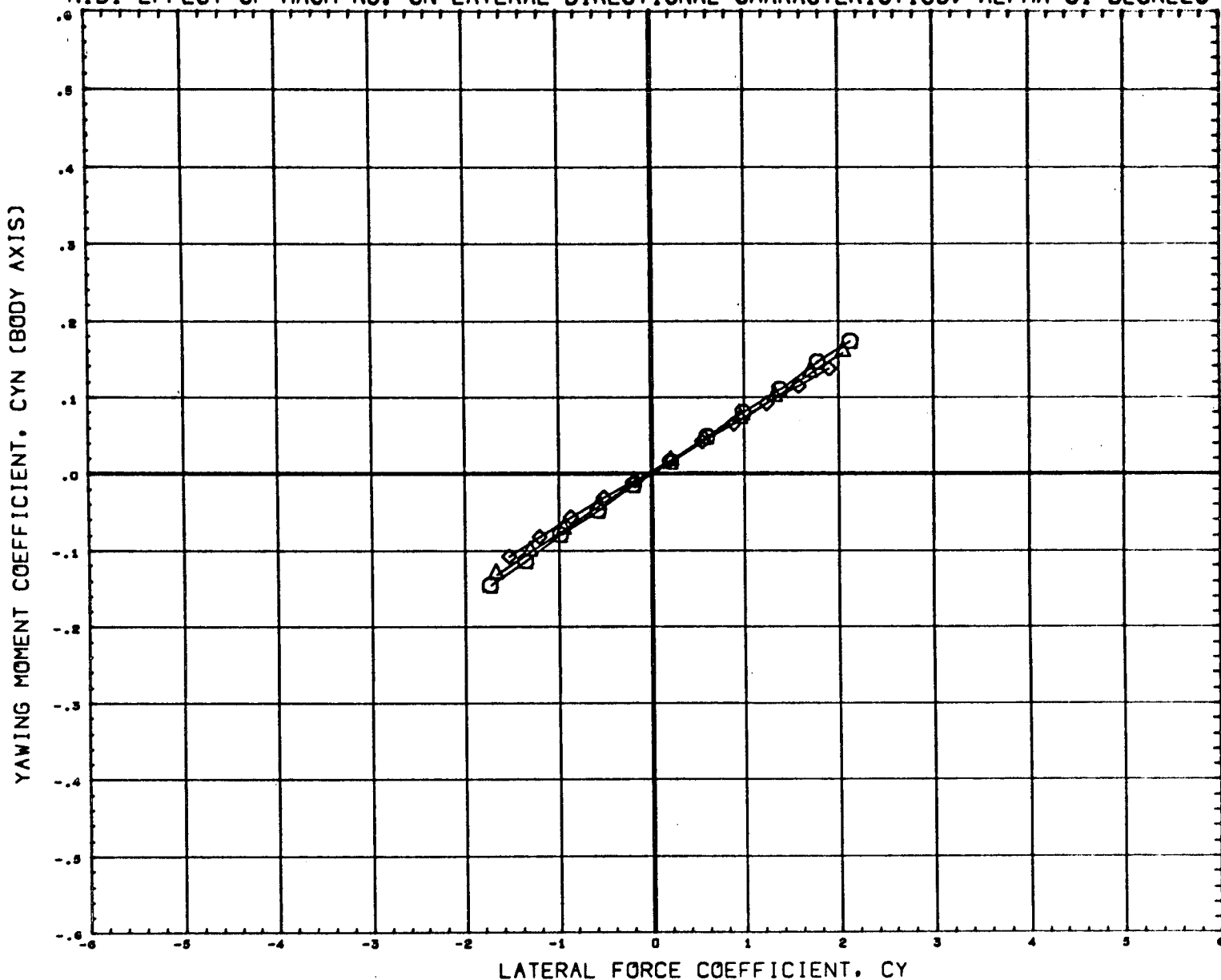
MSFC TWT 521 BOOSTER

N1B1

(A55003) 27 JAN 72

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N1B1-EFFECT OF MACH NO. ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



SYMBOL	MACH	ALPHA	PARAMETRIC VALUES
○	2.740	51.000	
◇	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

REFERENCE FILE

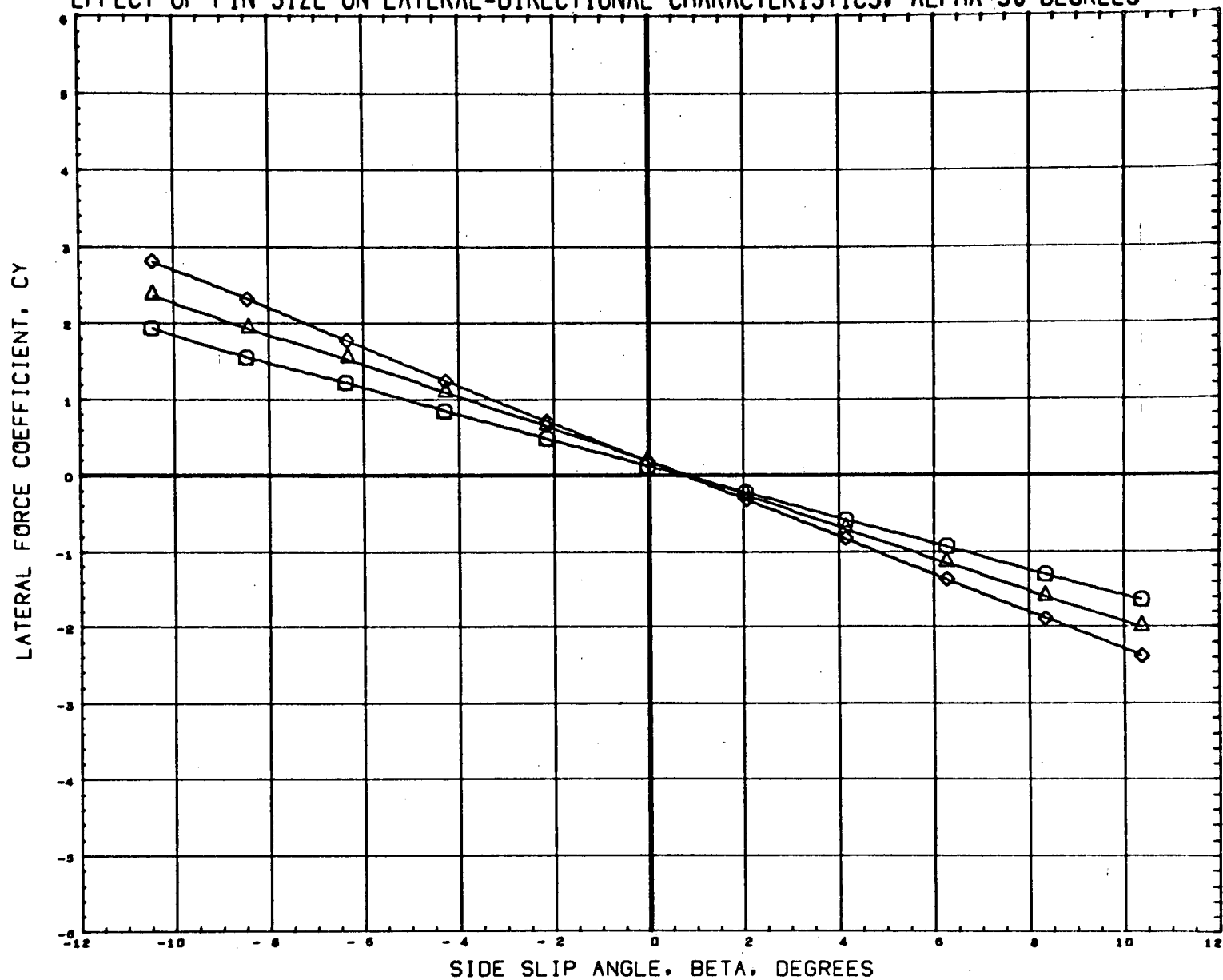
MSFC TWT 521 BOOSTER

N1B1

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER N1B1
(A55005)	MSFC TWT 521 BOOSTER N1B1F2
(A55010)	MSFC TWT 521 BOOSTER N1B1F6

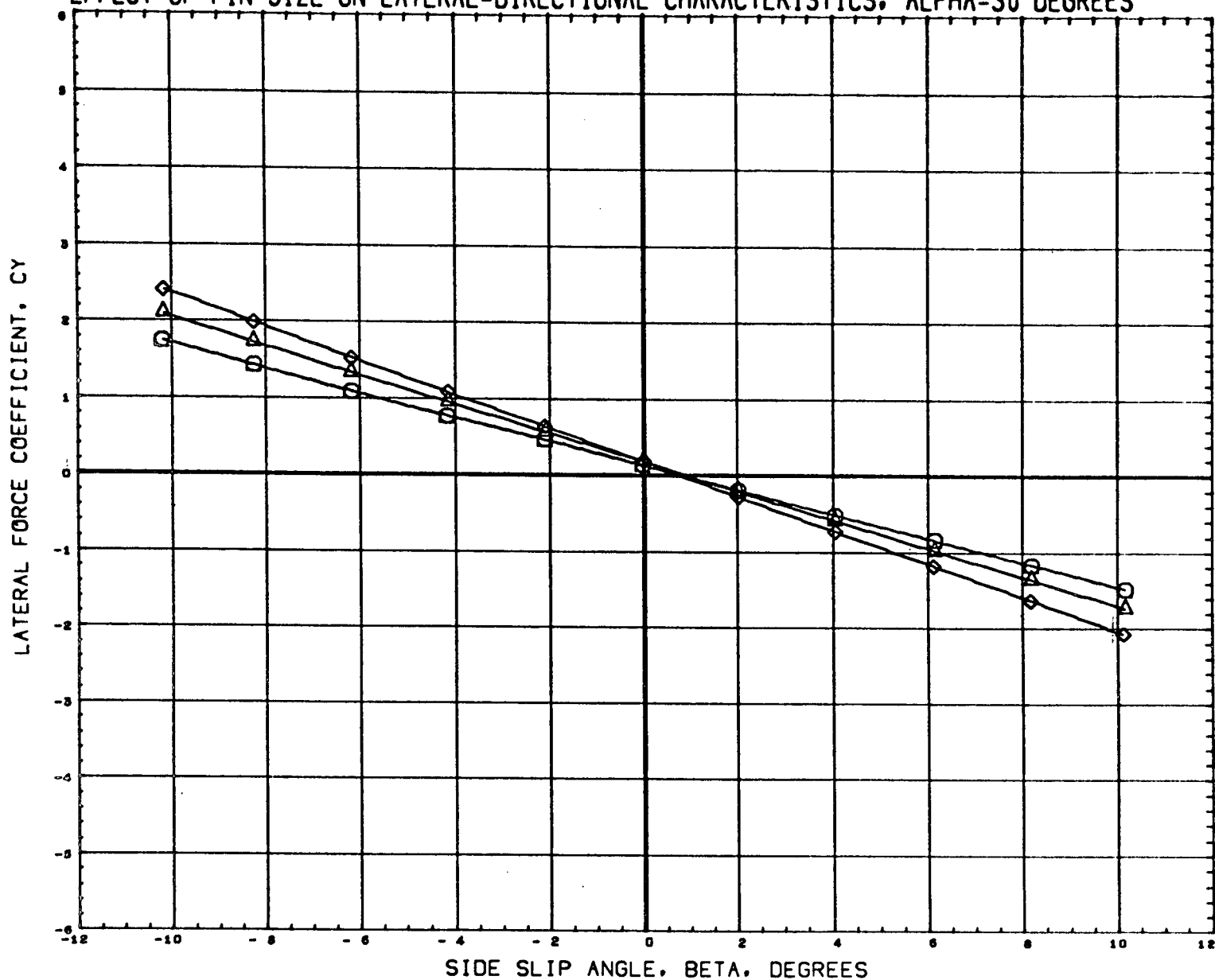
ALPHA	DIHDL
30.000	30.000
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	90. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(P35002) ○	MSFC TWT 521 BOOSTER
(A55005) △	MSFC TWT 521 BOOSTER
(A55010) ◇	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

ALPHA	D1HDRL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	30. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

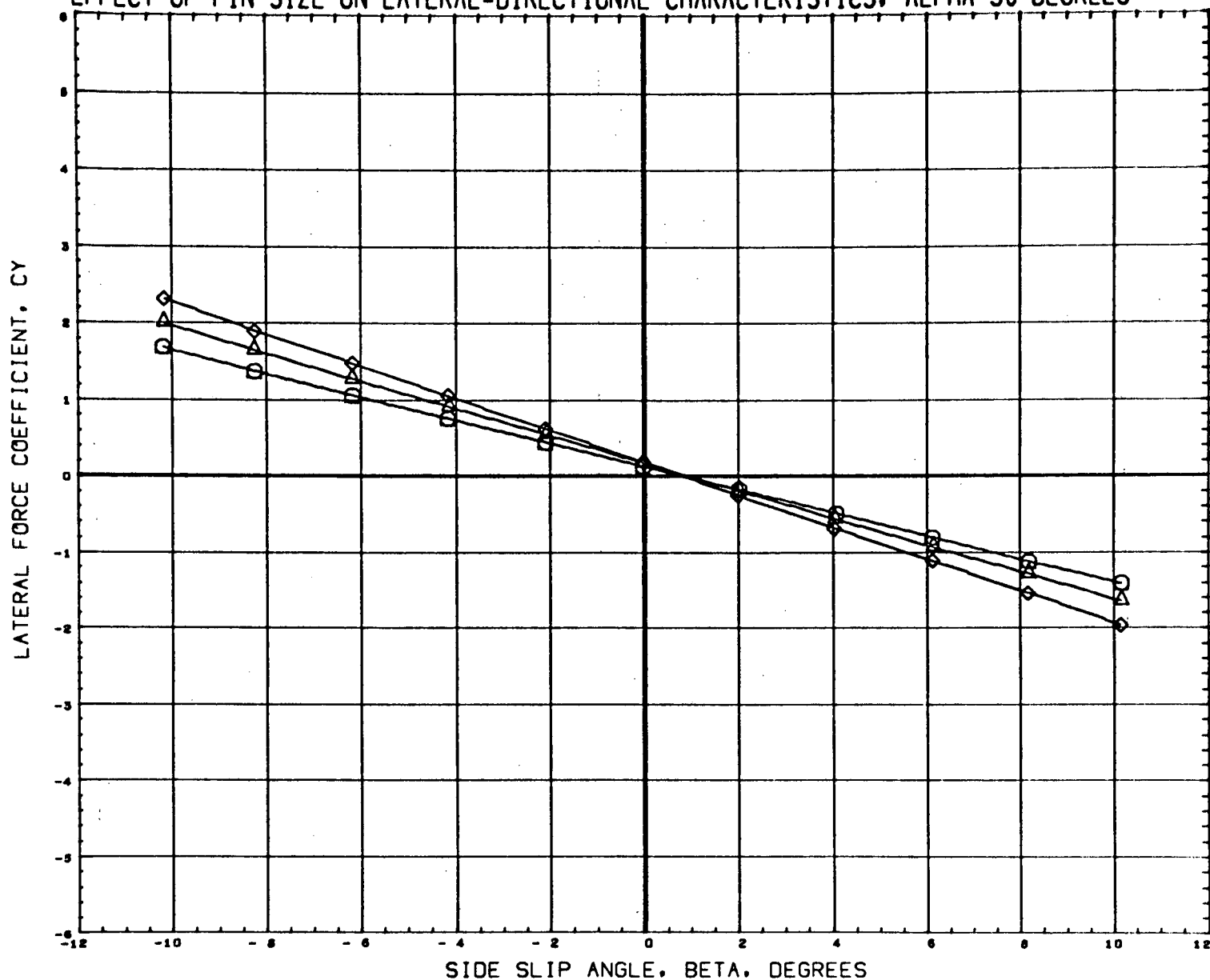
MACH

2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

	ALPHA	DIHORI
N1B1	30.000	
N1B1F2	30.000	30.000
N1B1F6	30.000	30.000

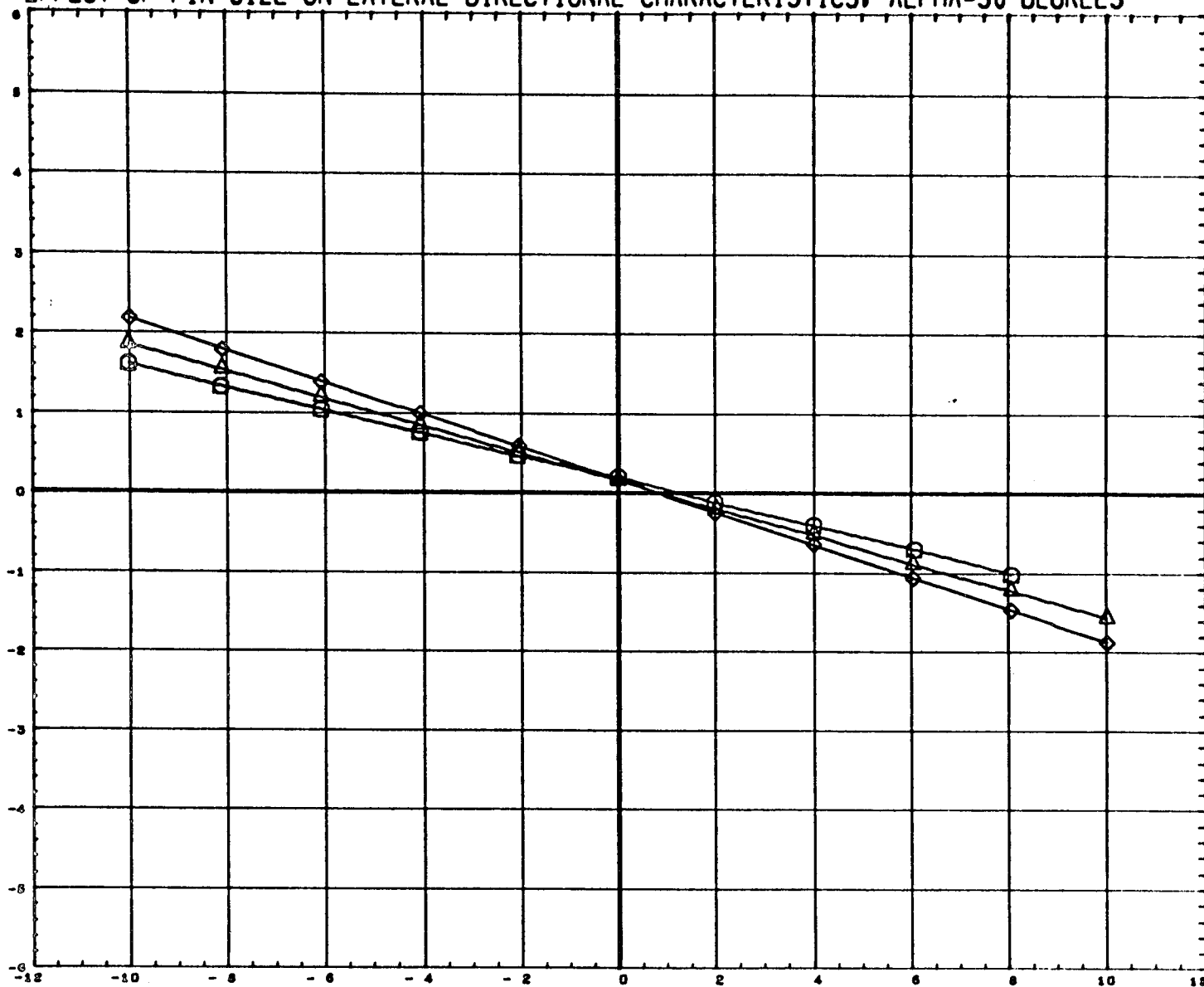
REFERENCE INFORMATION		
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LREF	7.2230	in.
BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

LATERAL FORCE COEFFICIENT, CY



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

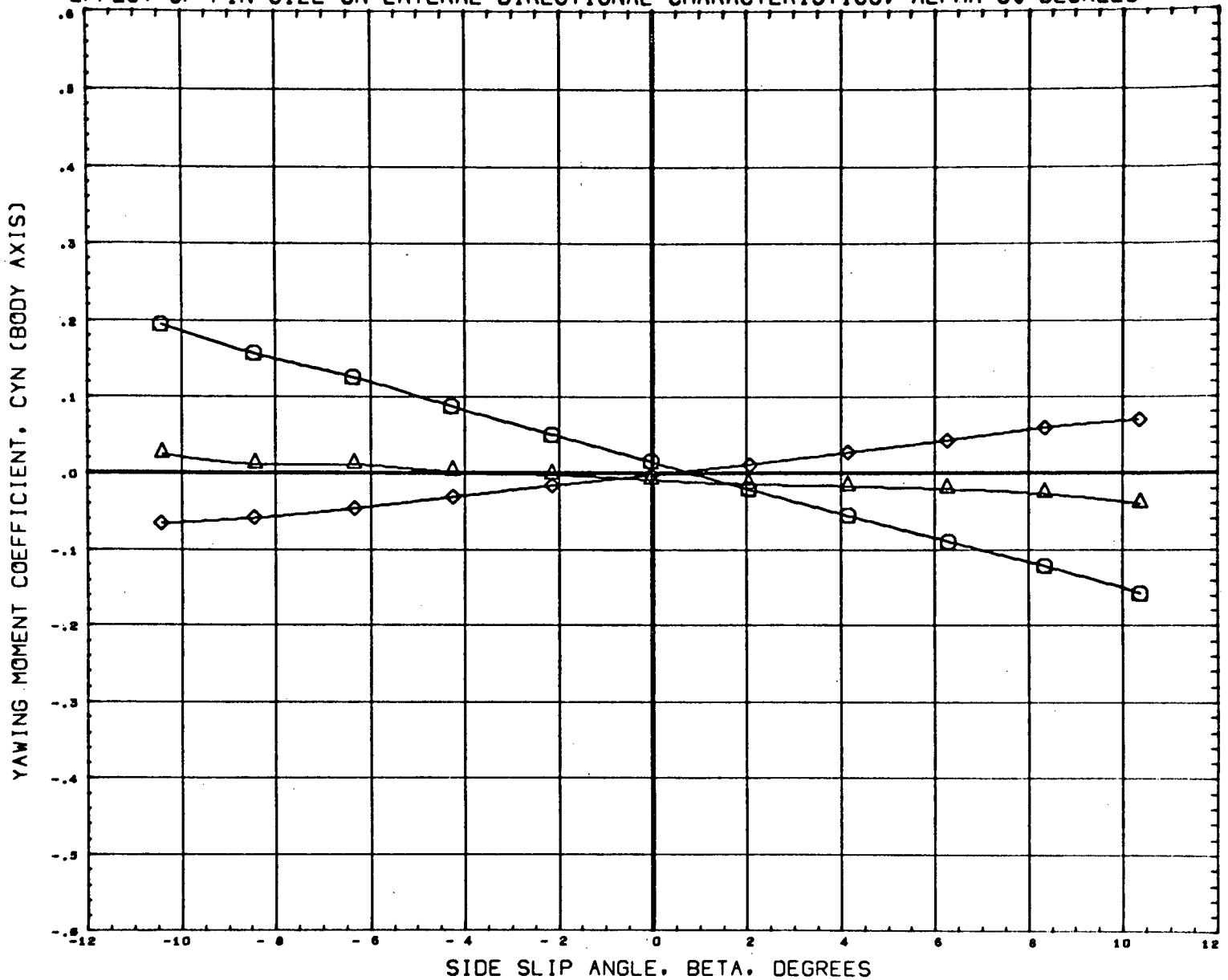
ALPHA	DIMDRL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
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LREF	7.2230	in.
BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

ALPHA	DIHDL
30.000	30.000
30.000	30.000
30.000	30.000

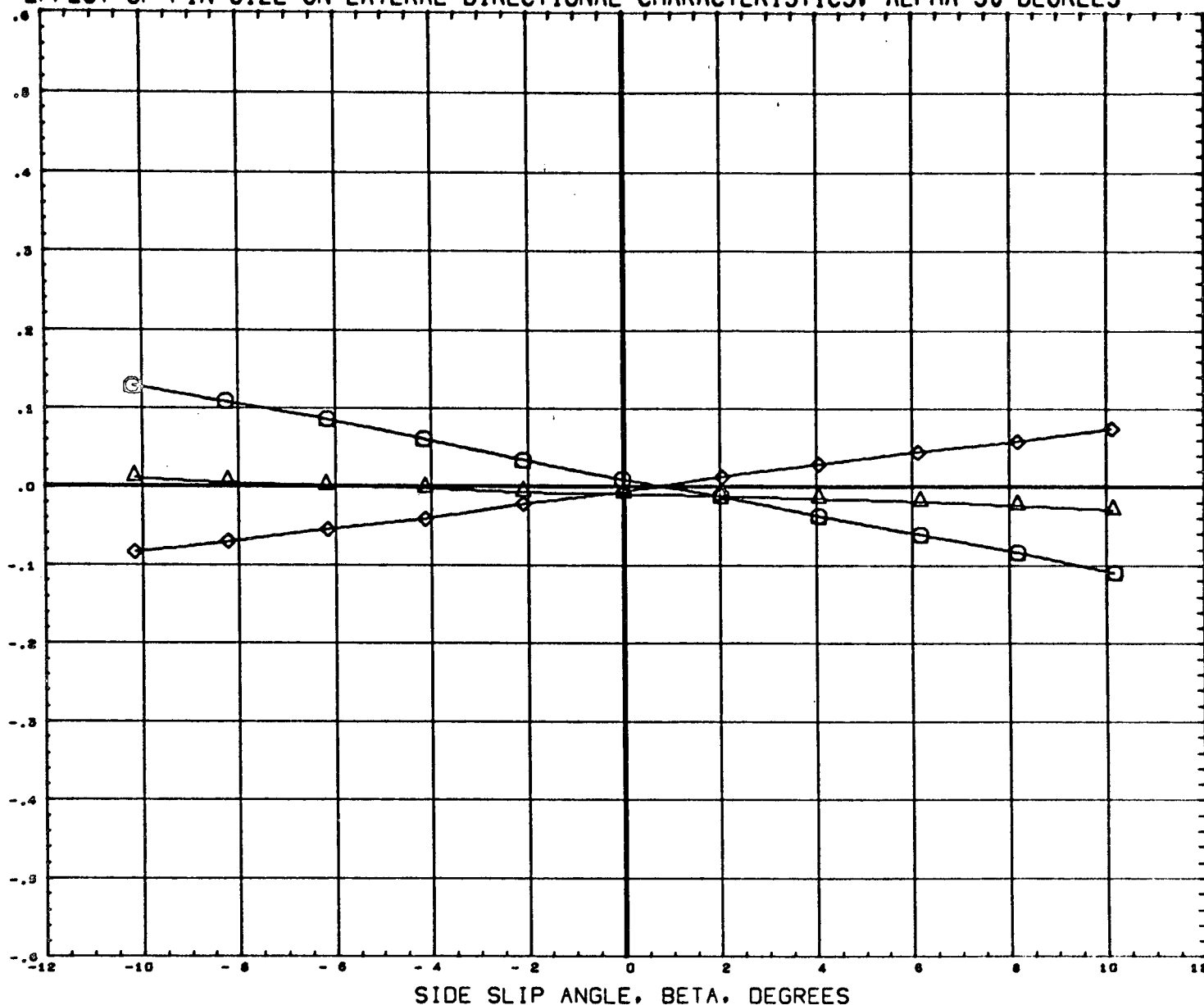
REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER N1B1
(A55005)	MSFC TWT 521 BOOSTER N1B1F2
(A55010)	MSFC TWT 521 BOOSTER N1B1F6

ALPHA	DIHDL
30.000	
30.000	30.000
30.000	30.000

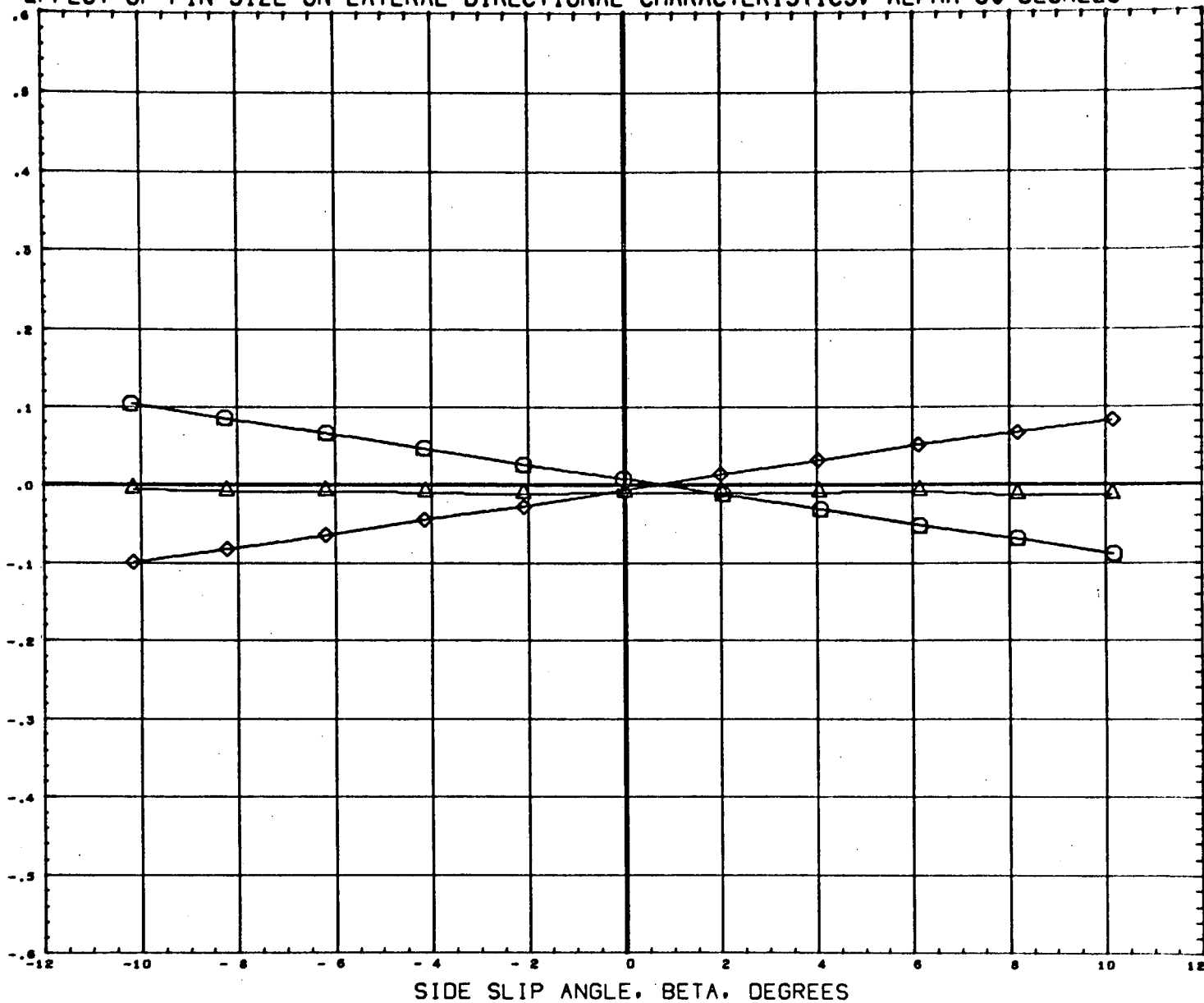
REFERENCE INFORMATION	
SREF	0.9330 SQ. IN
LREF	7.2230 IN.
BREF	7.2230 IN.
XMRP	4.6230 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(P55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

ALPHA	DIHRL
30.000	30.000
30.000	30.000
30.000	30.000

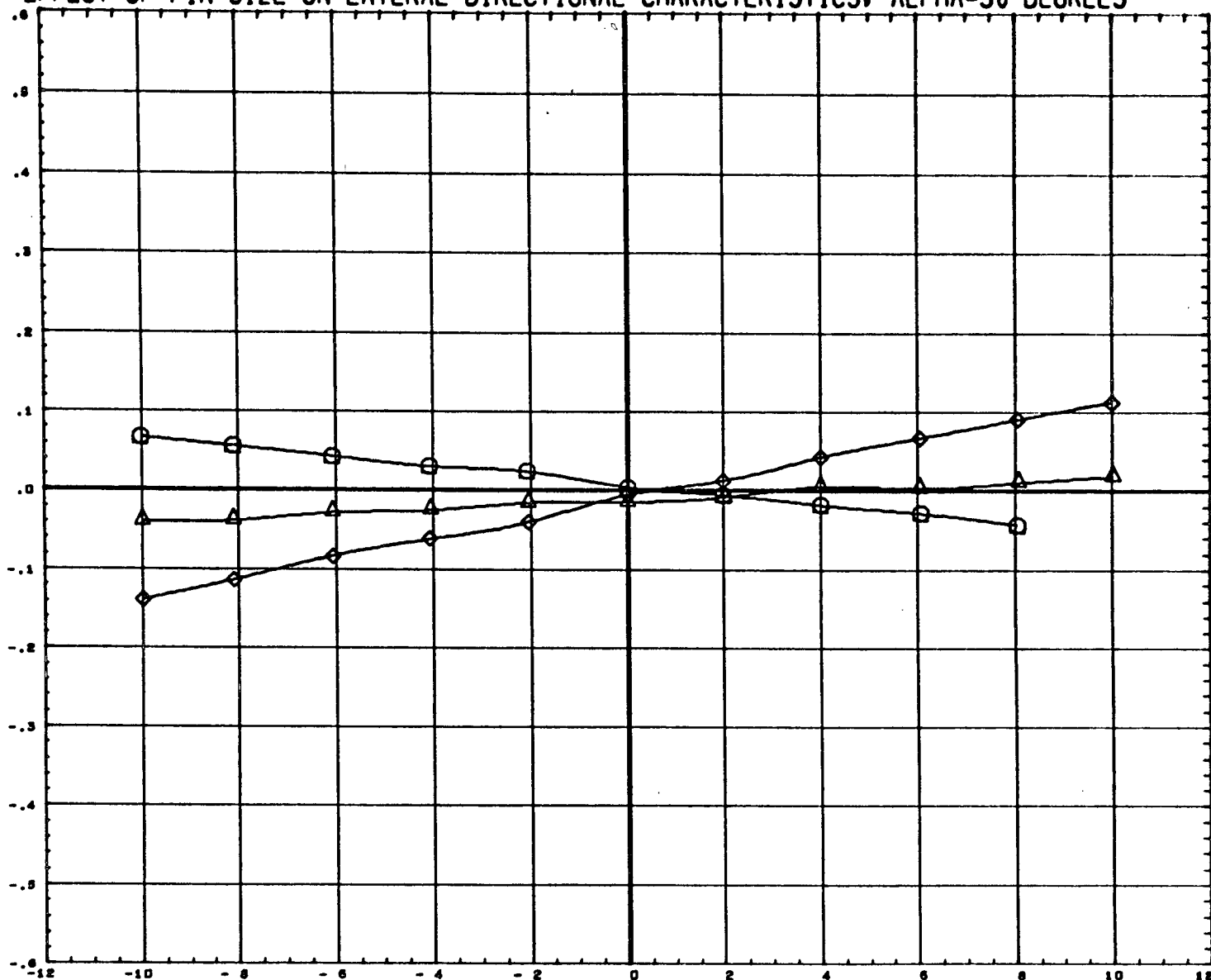
REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER N1B1
(A55003)	MSFC TWT 521 BOOSTER N1B1F2
(A55010)	MSFC TWT 521 BOOSTER N1B1F6

ALPHA	DIHDL
30.000	
30.000	30.000
30.000	30.000

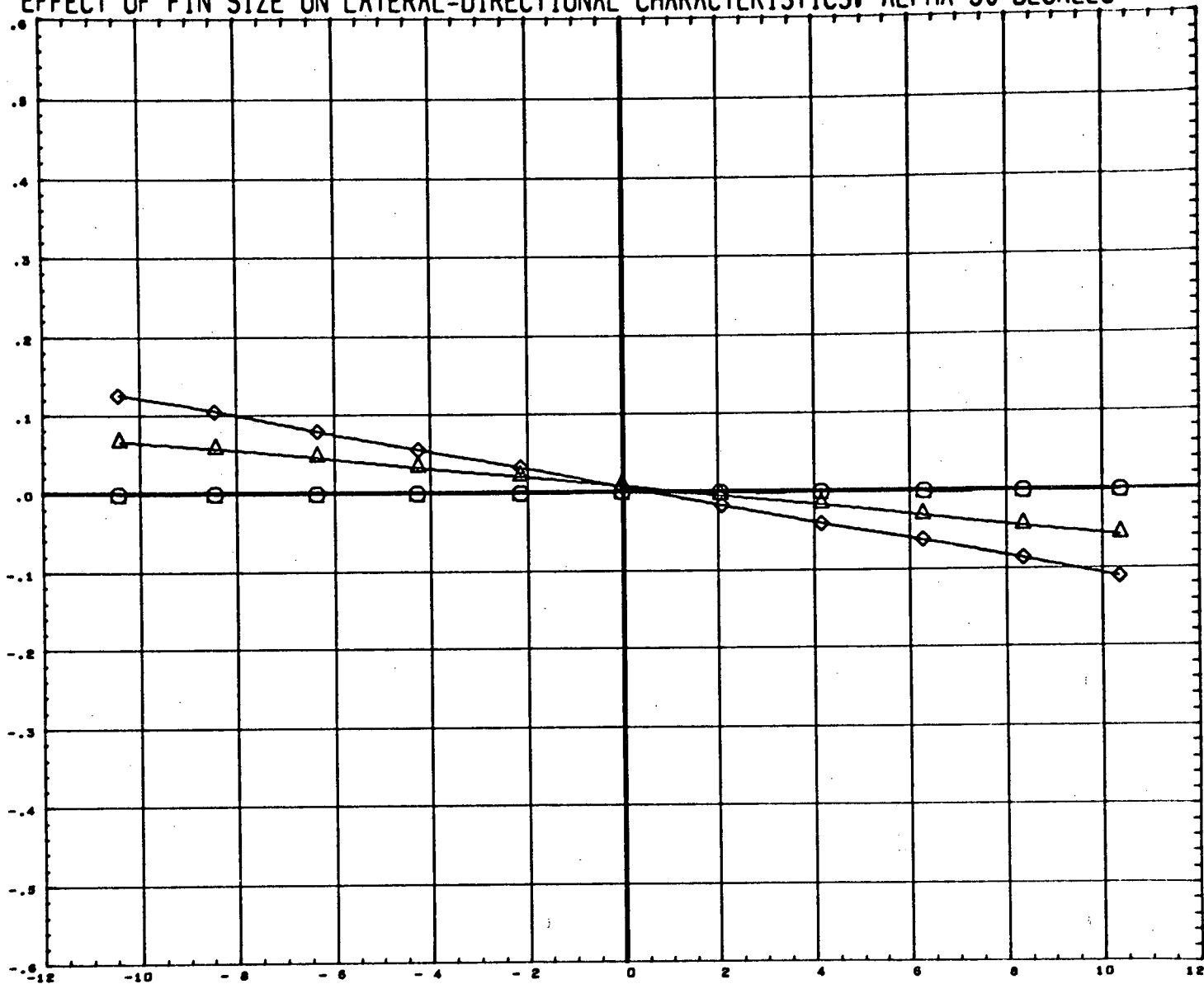
REFERENCE INFORMATION		
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LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	
(F55002)	MSFC TWT 521 BOOSTER	N1B1
(A55005)	MSFC TWT 521 BOOSTER	N1B1F2
(A55010)	MSFC TWT 521 BOOSTER	N1B1F6

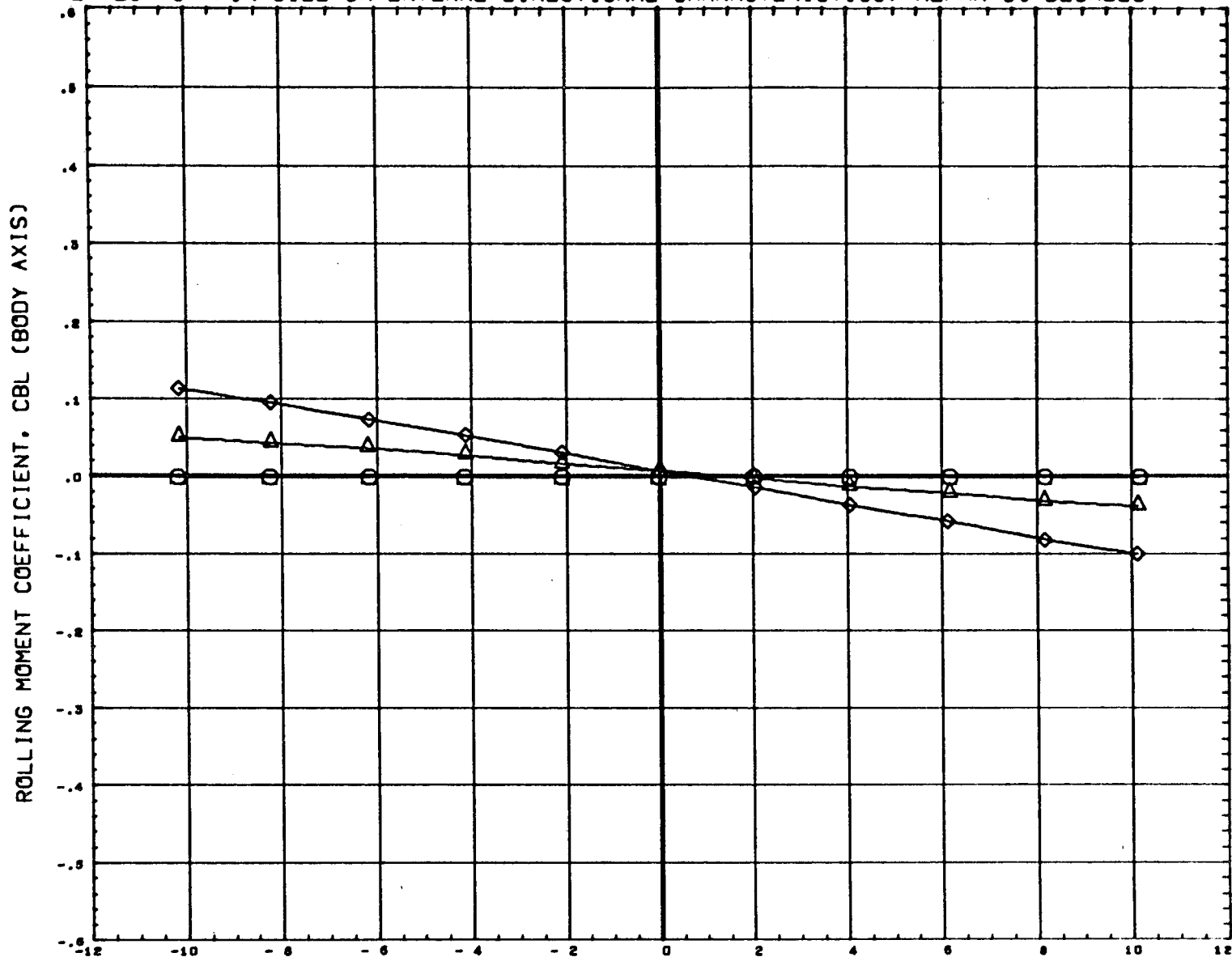
ALPHA	DIHDL
30.000	30.000
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(P55002) □	MSFC TWT 521 BOOSTER
(A55005) △	MSFC TWT 521 BOOSTER
(A55010) ◇	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

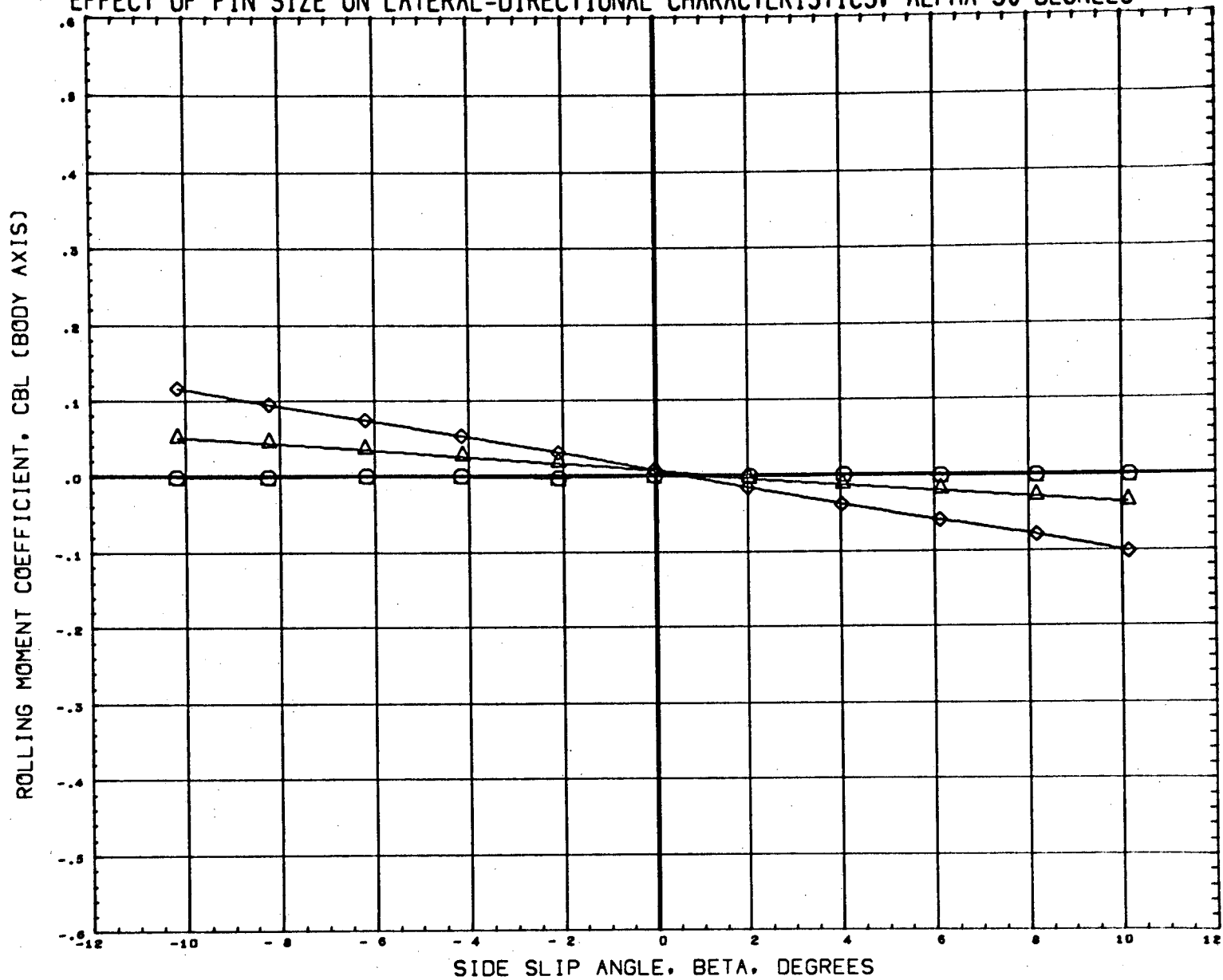
ALPHA	DIMDRL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

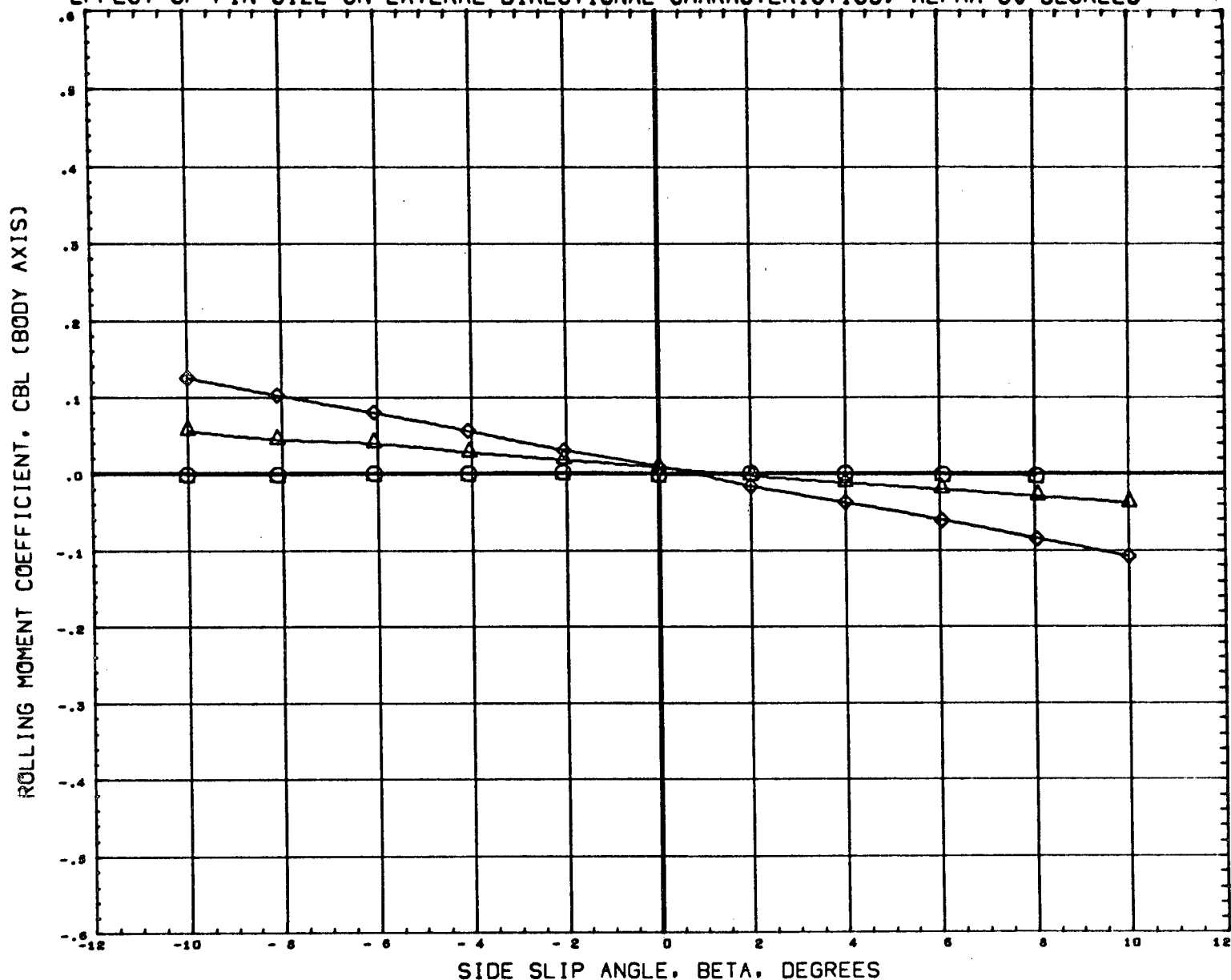
ALPHA	DIHRL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

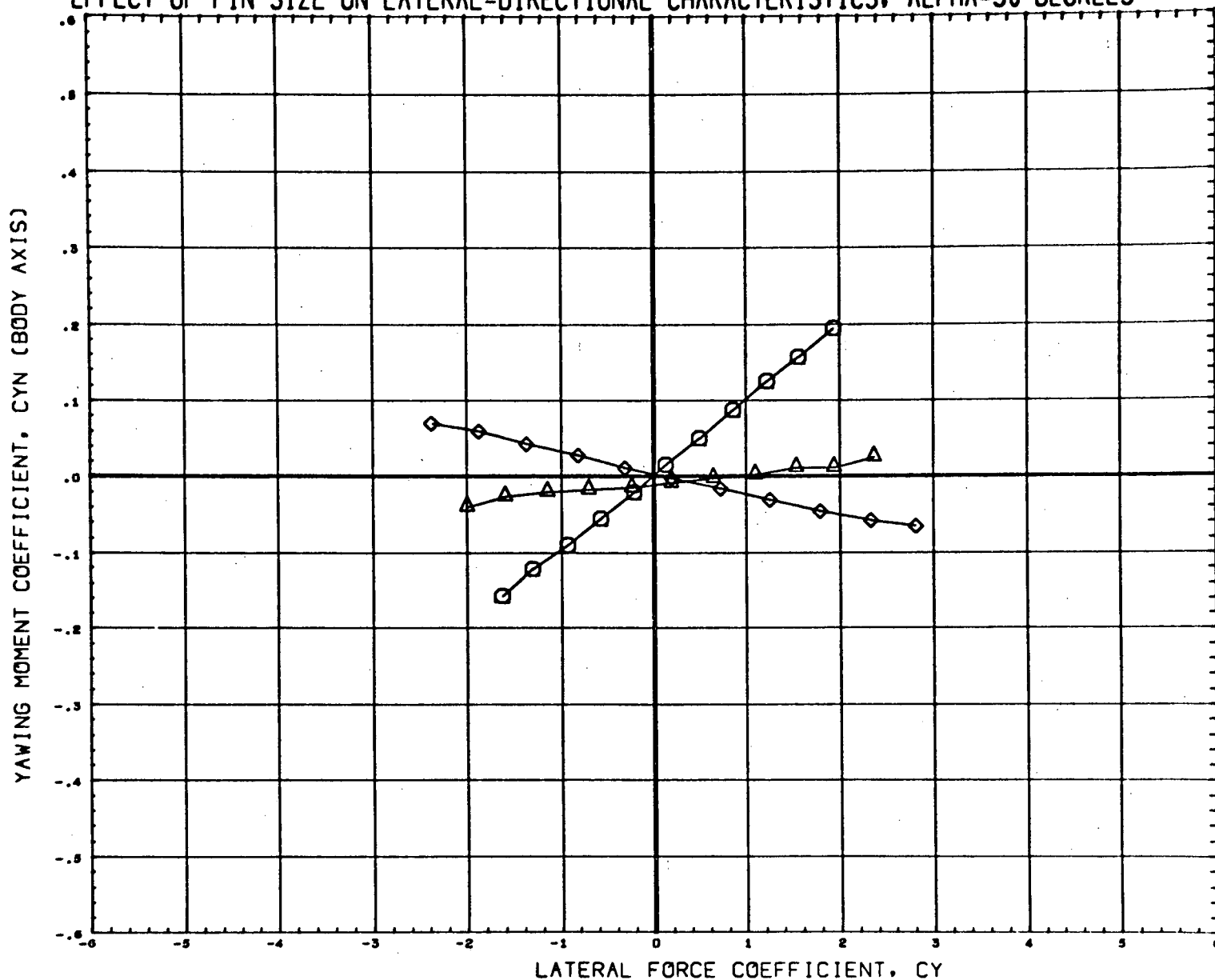
ALPHA	DINHRL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	99. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
YMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

CONFIGURATION DESCRIPTION
N1B1
N1B1F2
N1B1F6

ALPHA	DIHDL
30.000	30.000
30.000	30.000
30.000	30.000

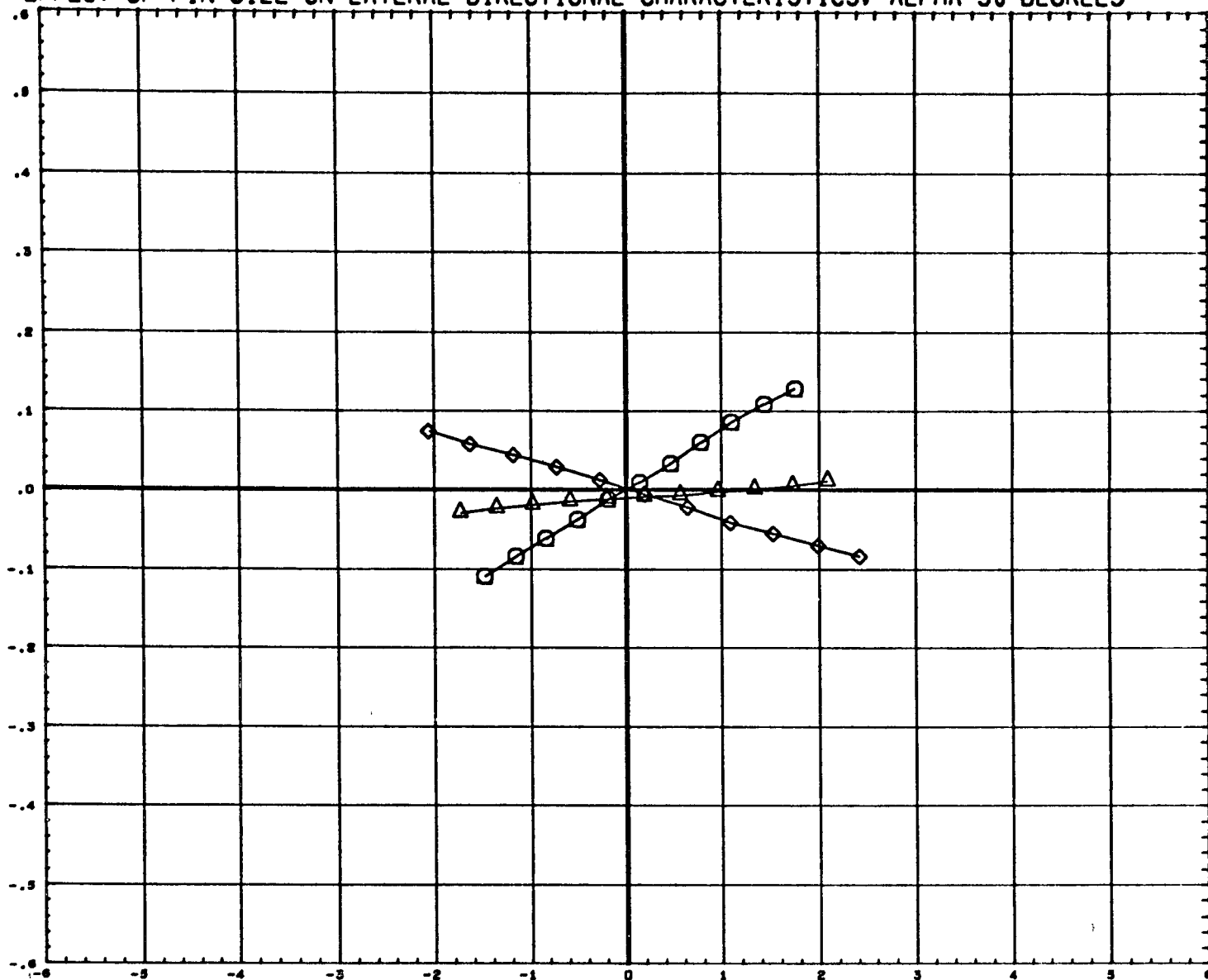
REFERENCE INFORMATION	
SREF	0.9330 SQ. IN
LREF	7.2230 IN.
BREF	7.2230 IN.
XMRP	4.6230 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 1.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



LATERAL FORCE COEFFICIENT, CY

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

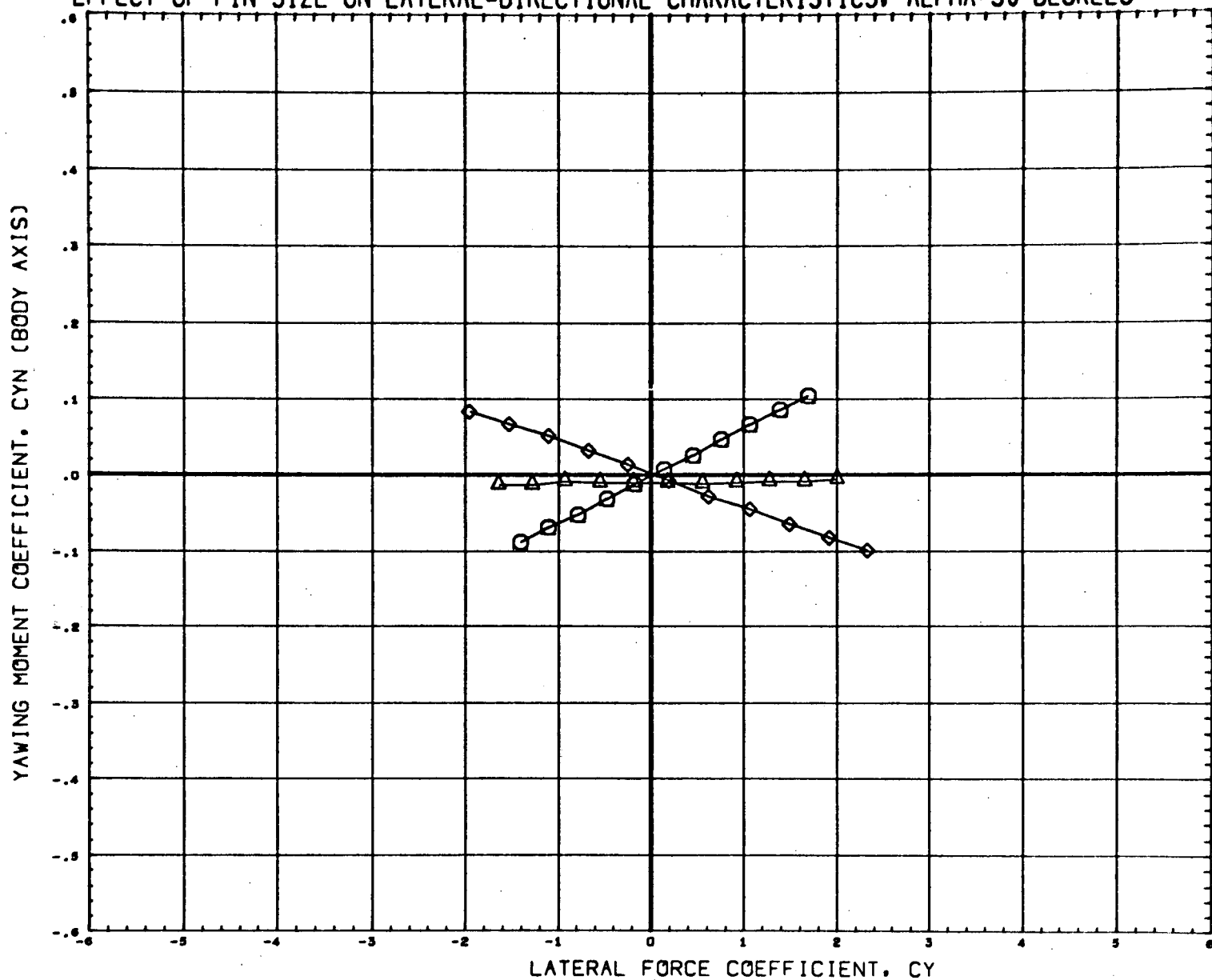
ALPHA	DIHDL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=30 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55003)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

ALPHA	DIHDL
30.000	
30.000	30.000
30.000	30.000

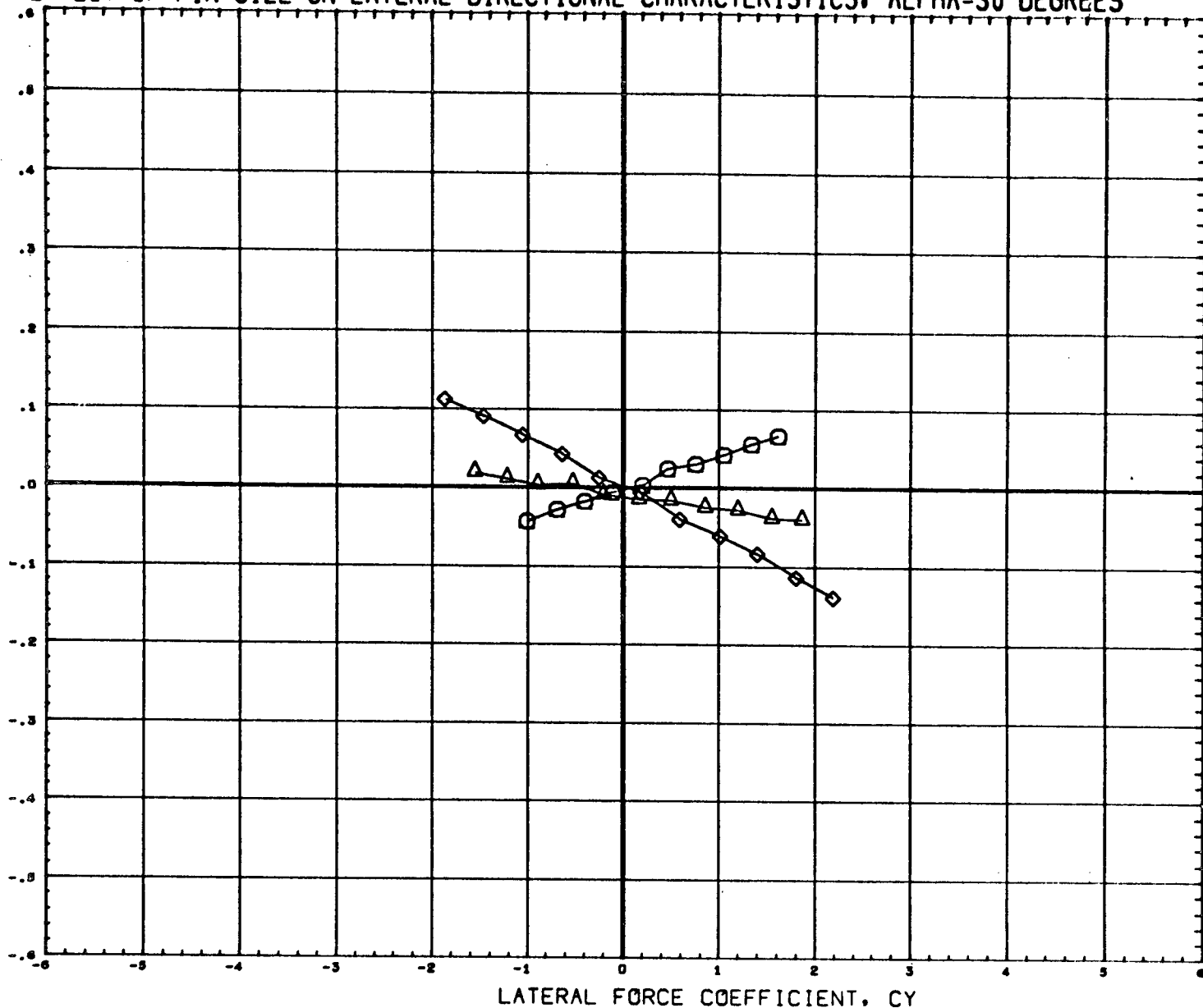
REFERENCE INFORMATION		
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LREF	7.2230	IN.
BREF	7.2230	IN.
XMRF	4.6230	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



LATERAL FORCE COEFFICIENT, CY

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55002)	MSFC TWT 521 BOOSTER
(A55005)	MSFC TWT 521 BOOSTER
(A55010)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

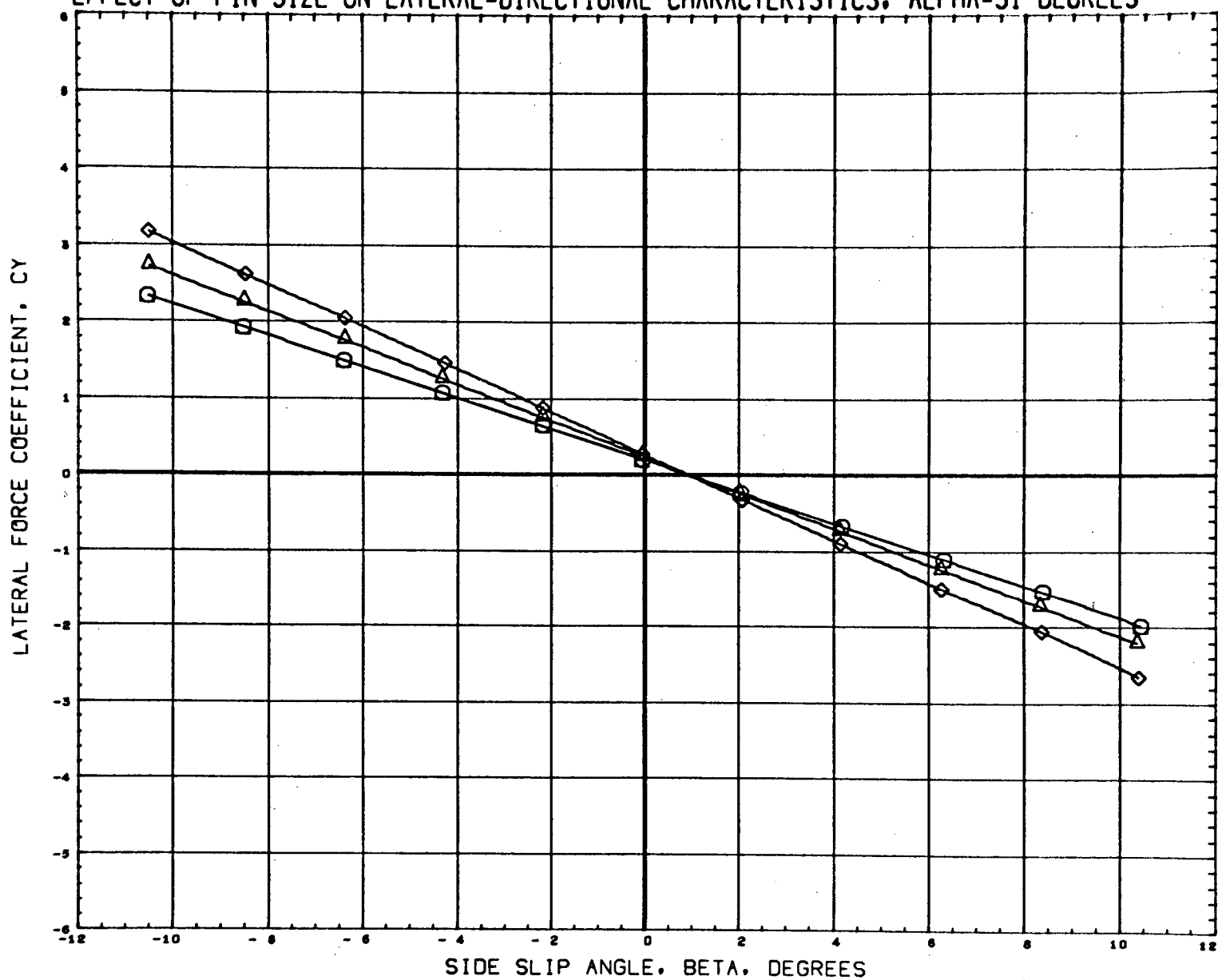
ALPHA	DIHDL
30.000	
30.000	30.000
30.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003) ○	MSFC TWT 521 BOOSTER
(A55006) △	MSFC TWT 521 BOOSTER
(A55011) ◇	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

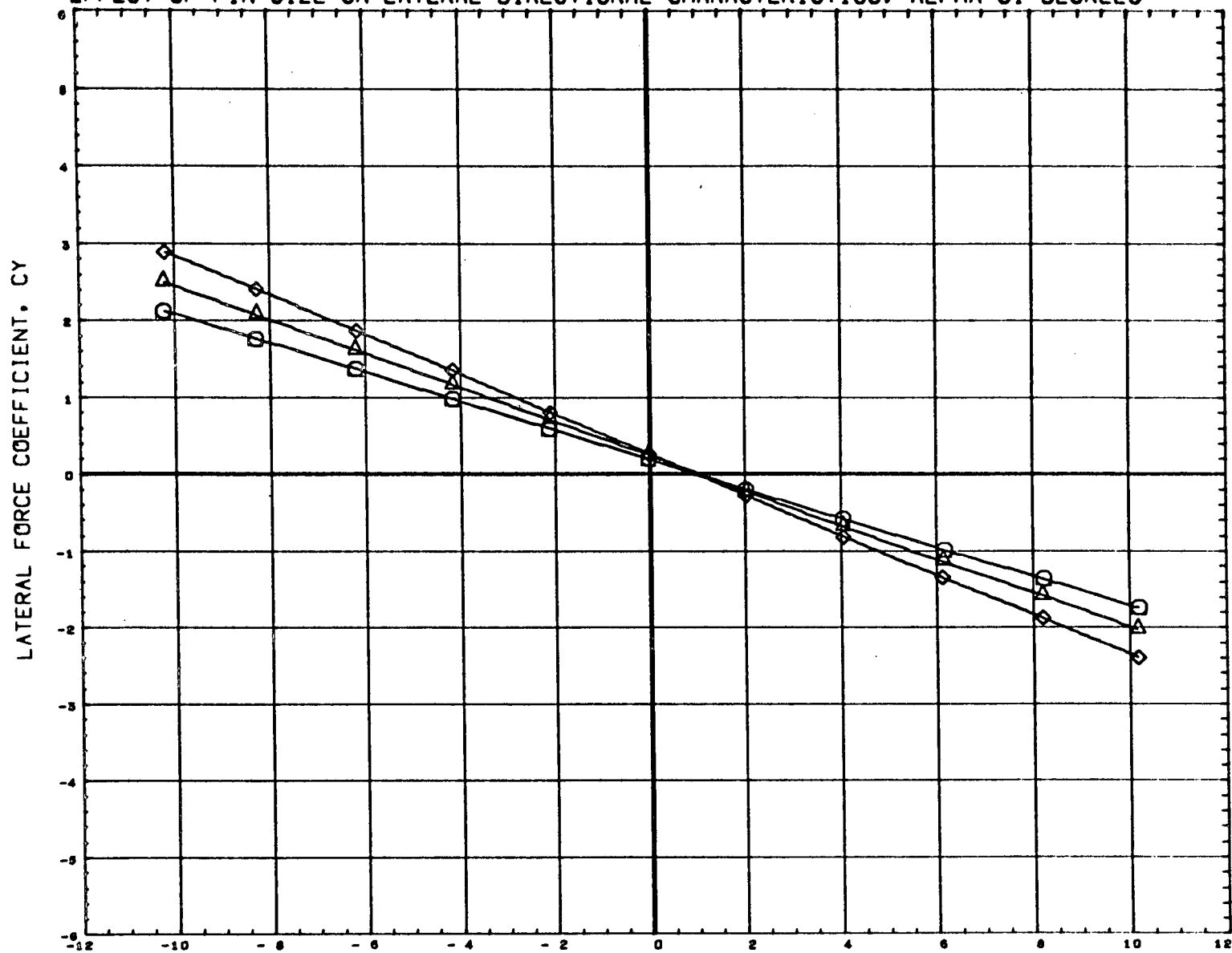
ALPHA	DIHDL
51.000	
51.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.94

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003) ○	MSFC TWT 521 BOOSTER
(A55006) △	MSFC TWT 521 BOOSTER
(A55011) ◇	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

ALPHA	DIHDL
51.000	
51.000	30.000
51.000	30.000

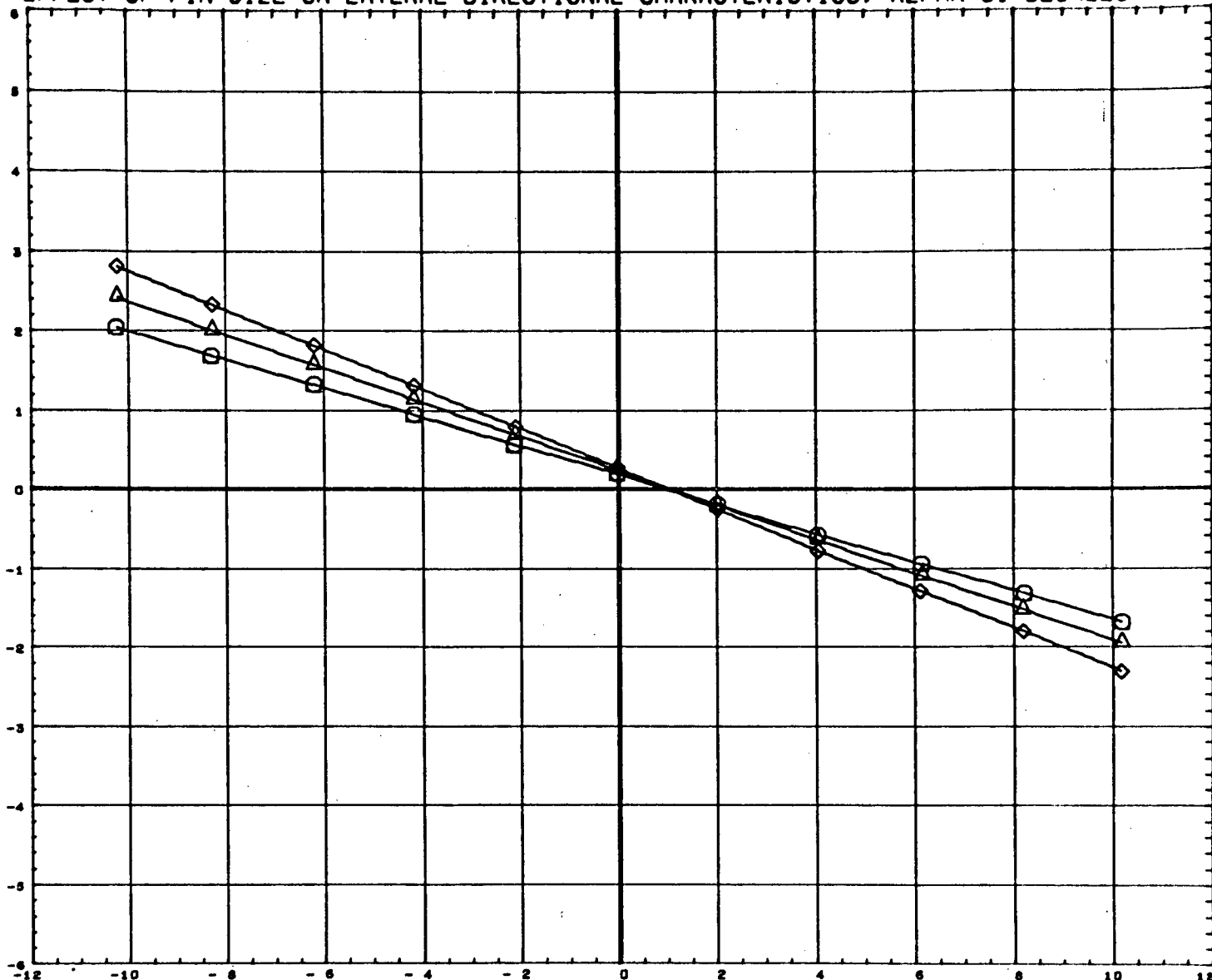
REFERENCE INFORMATION		
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LREF	7.2230	in.
BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

LATERAL FORCE COEFFICIENT, CY



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

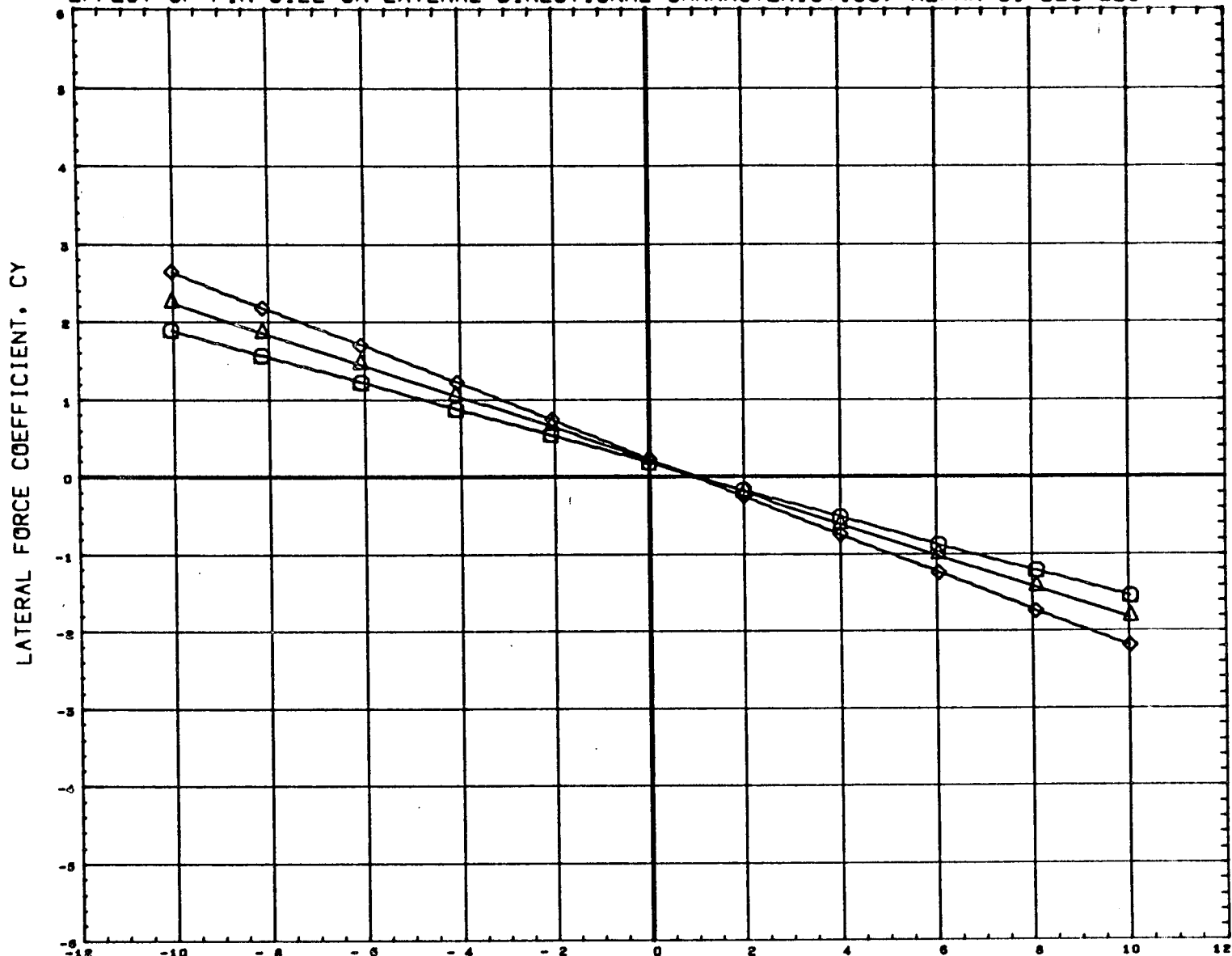
ALPHA	DIMDRL
51.000	
51.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

ALPHA	DIHDL
51.000	
51.000	30.000
51.000	30.000

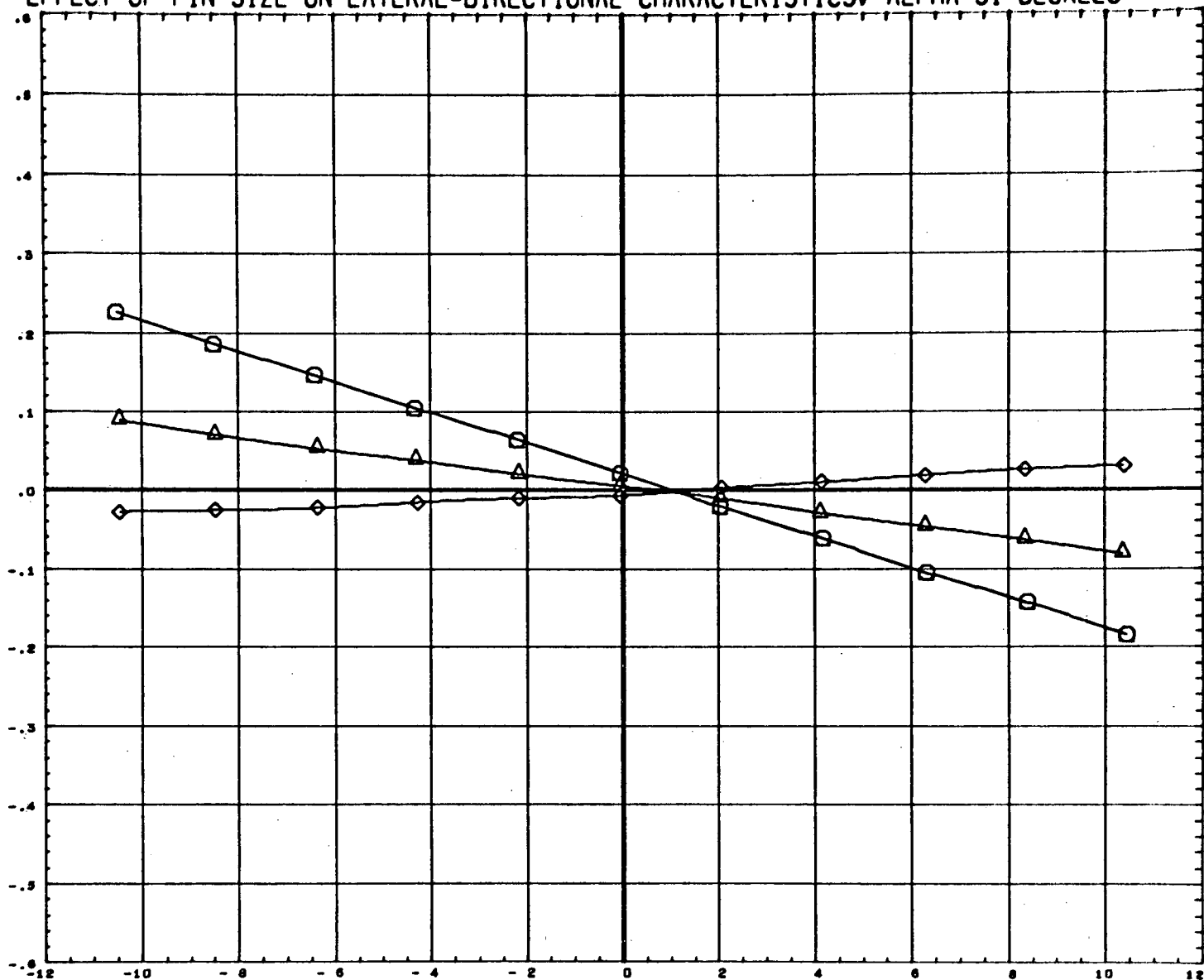
REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

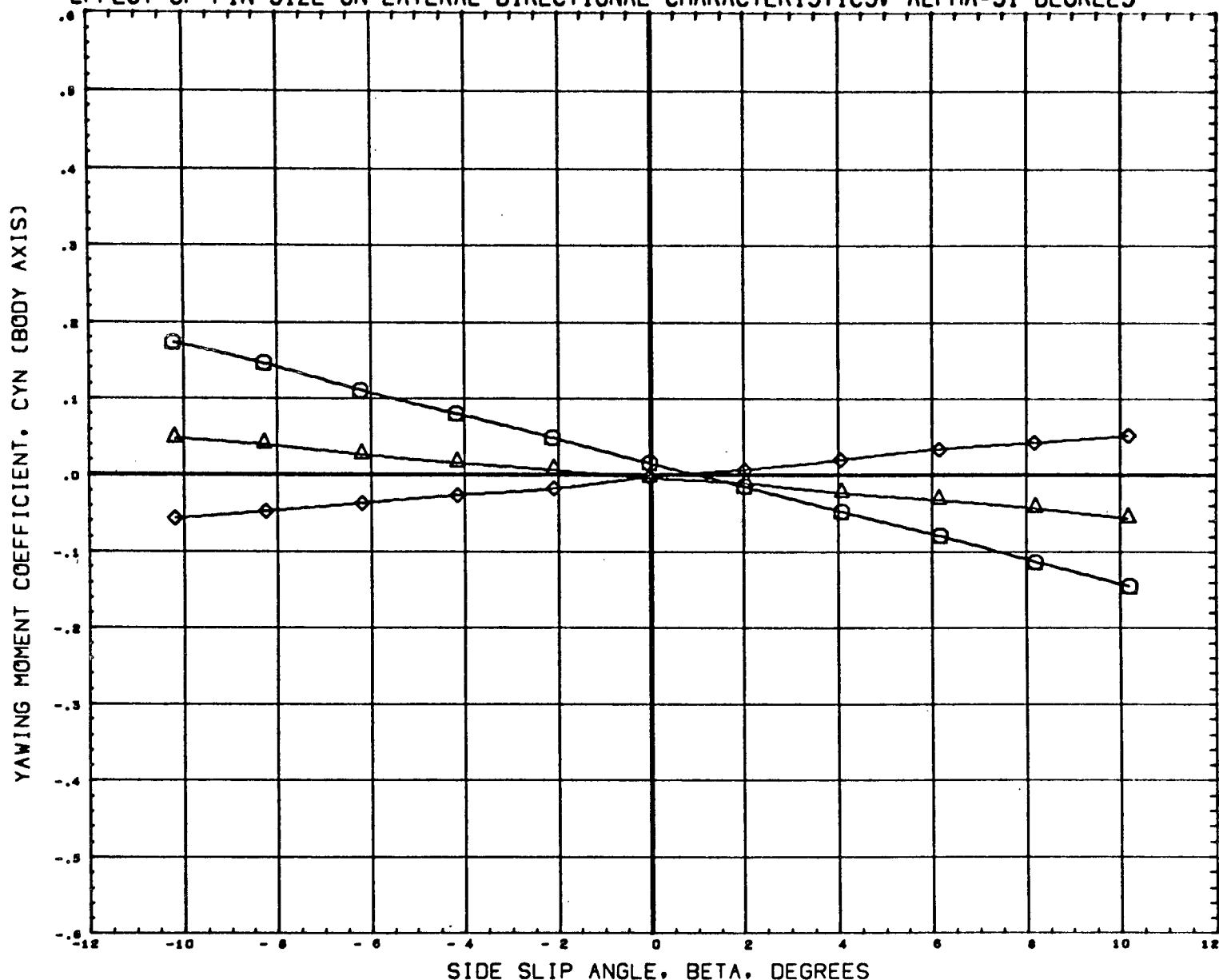
ALPHA	DIHDL
51.000	
51.000	30.000
51.000	30.000

REFERENCE INFORMATION	
SREF	0.9330 sq. in
LREF	7.2230 in.
BREF	7.2230 in.
XMRP	4.6230 in.
YMRP	0.0000 in.
ZMRP	0.0000 in.
SCALE	0.0034

MACH 1.94

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER N1B1
(A55006)	MSFC TWT 521 BOOSTER N1B1F2
(A55011)	MSFC TWT 521 BOOSTER N1B1F6

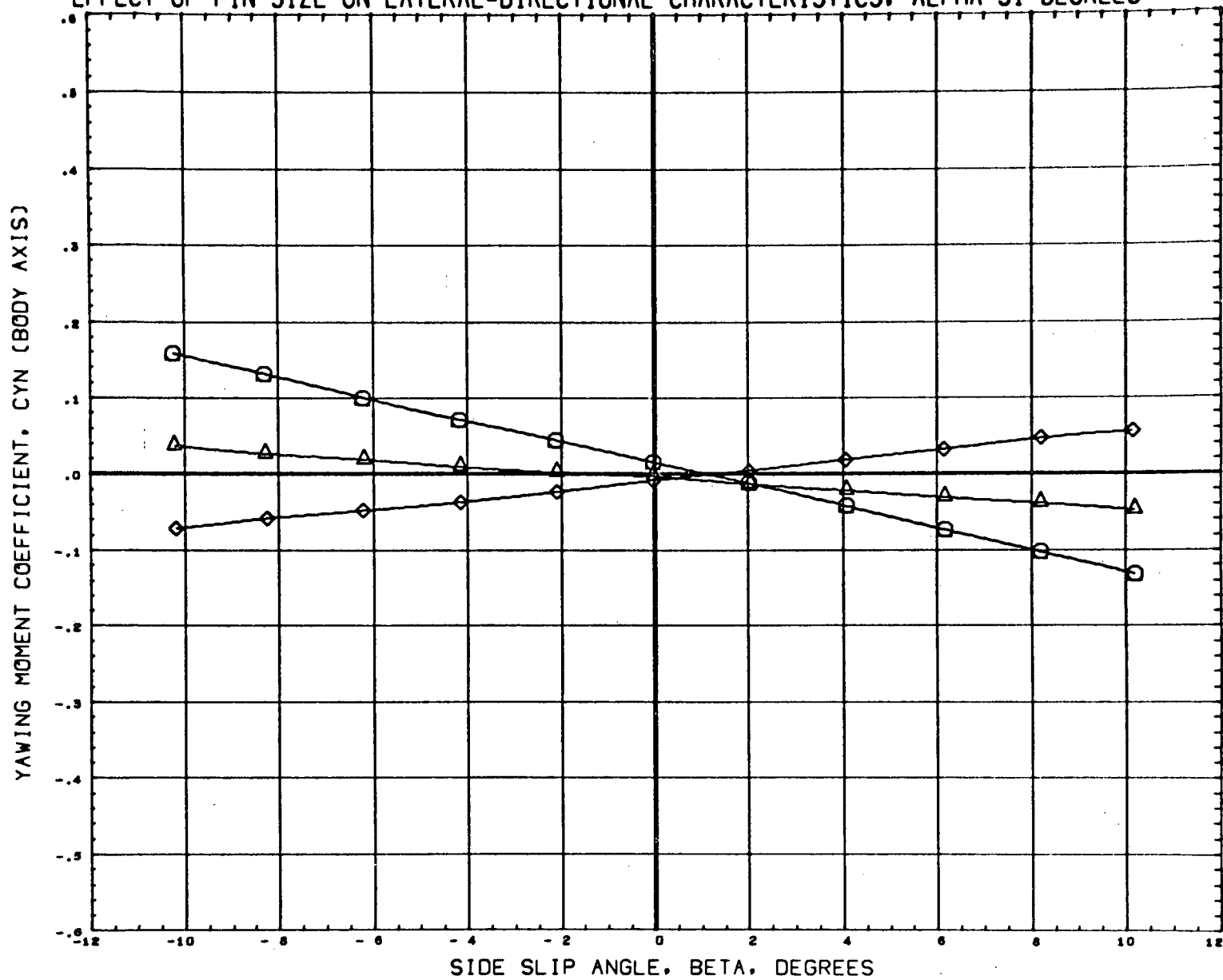
ALPHA	DIHRL
51.000	
51.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

ALPHA	DIMDRL
51.000	30.000
51.000	30.000
51.000	30.000

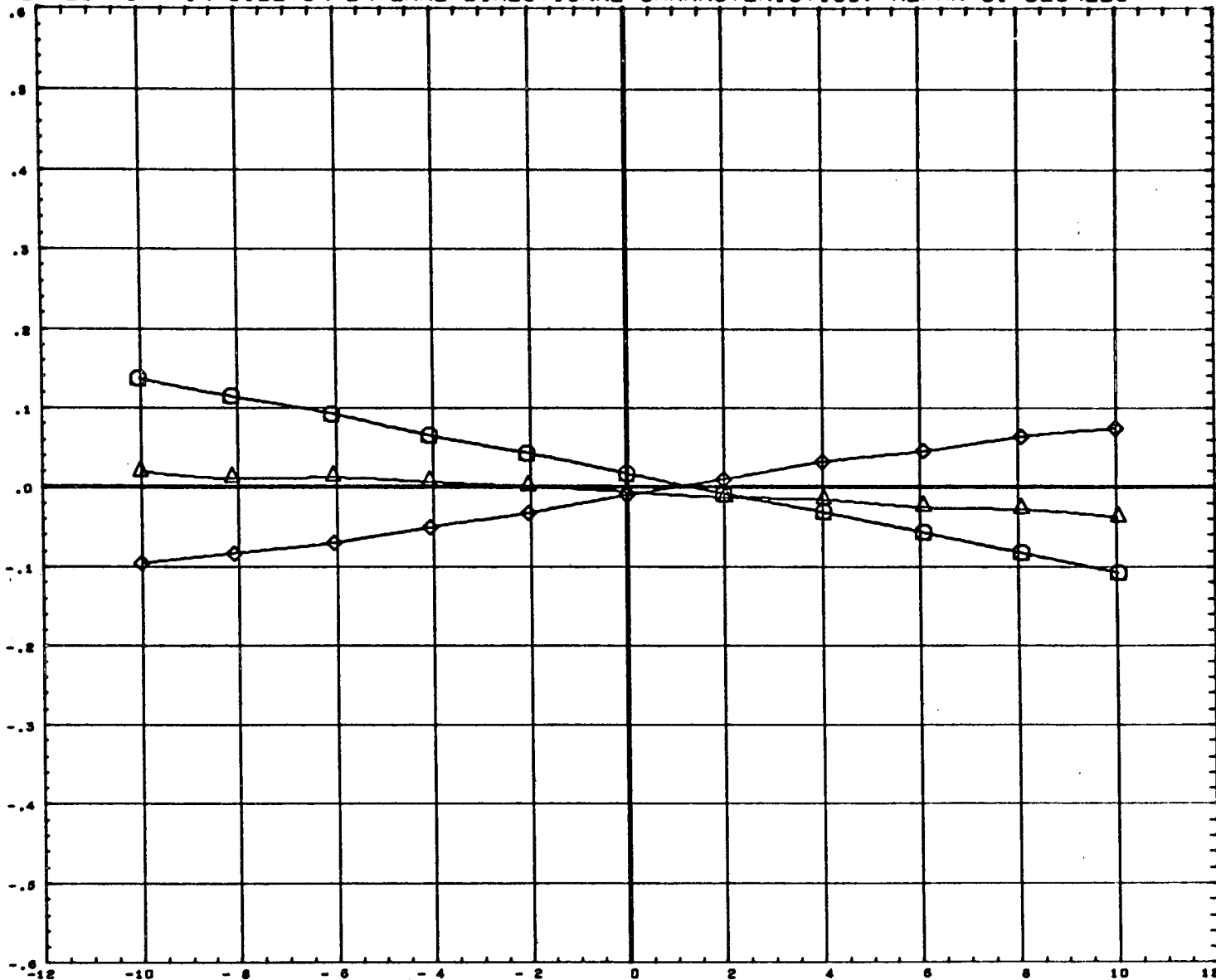
REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003) $\square$	MSFC TWT 521 BOOSTER
(A55006) $\triangle$	MSFC TWT 521 BOOSTER
(A55011) $\diamond$	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

ALPHA	DIHDL
51.000	
51.000	30.000
51.000	30.000

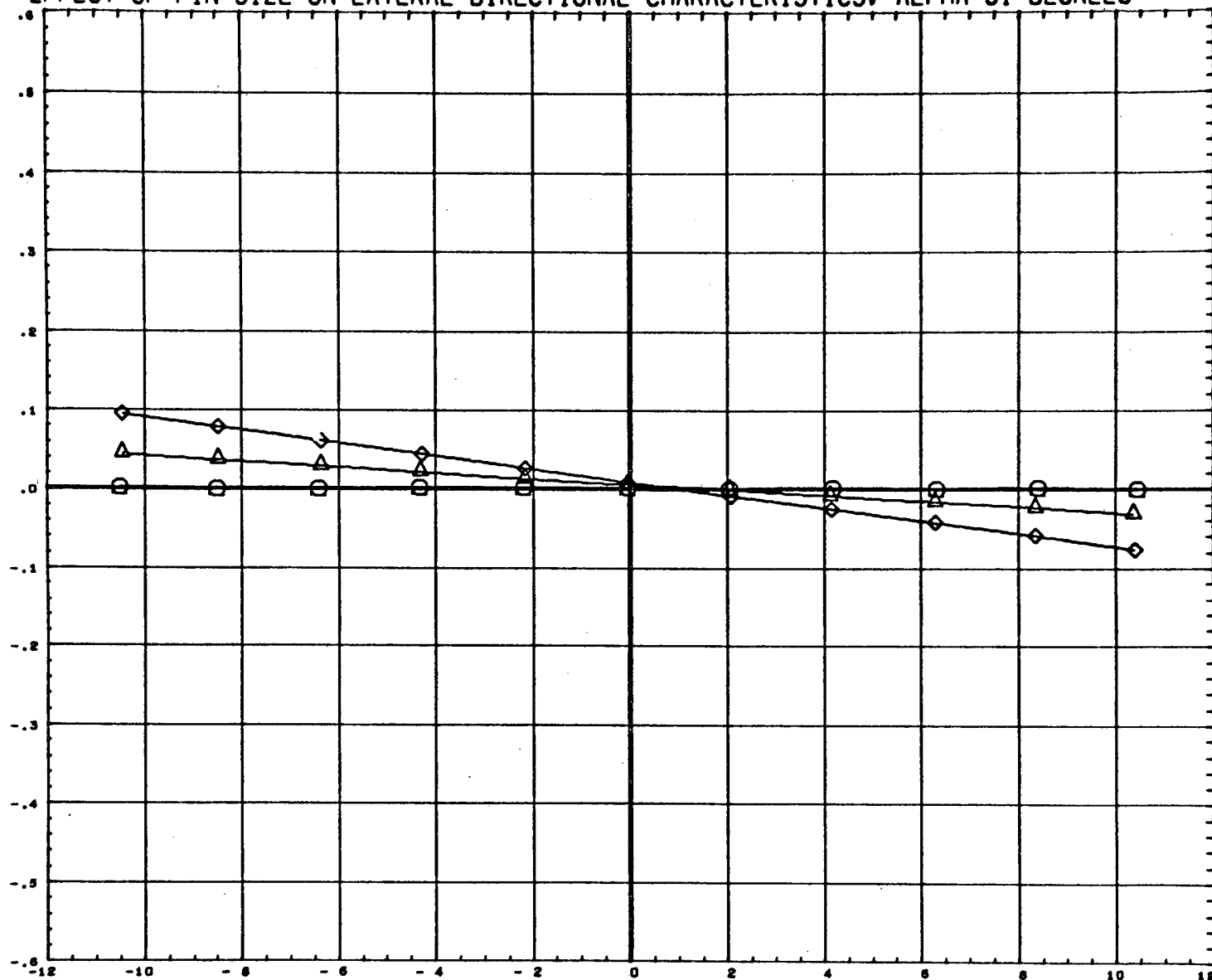
REFERENCE INFORMATION		
SREF	0.9330	99. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

ALPHA	DIHRL
51.000	
51.000	30.000
51.000	30.000

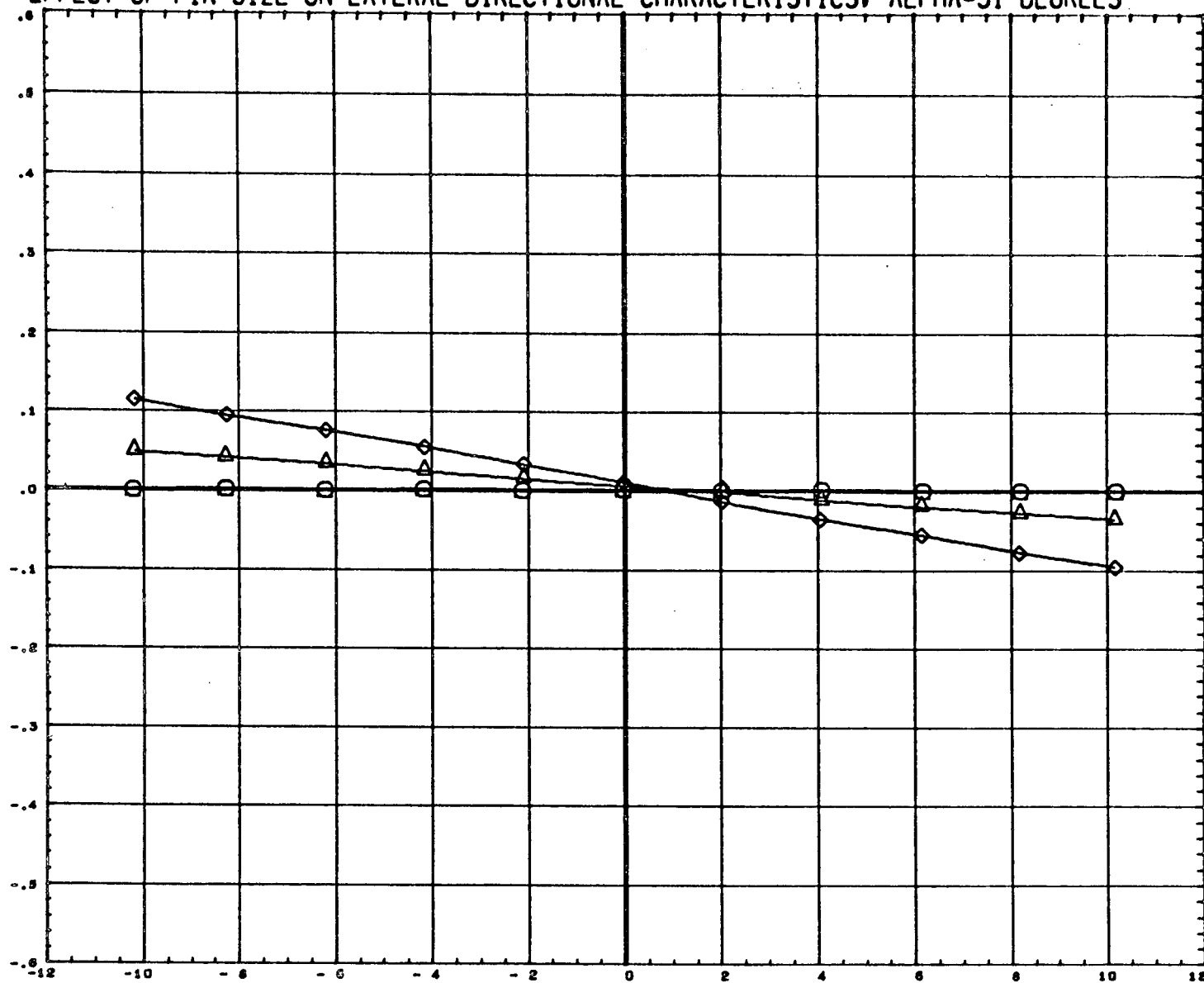
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BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.94

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(P55003) ○	MSFC TWT 521 BOOSTER
(A55006) △	MSFC TWT 521 BOOSTER
(A55011) ◇	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

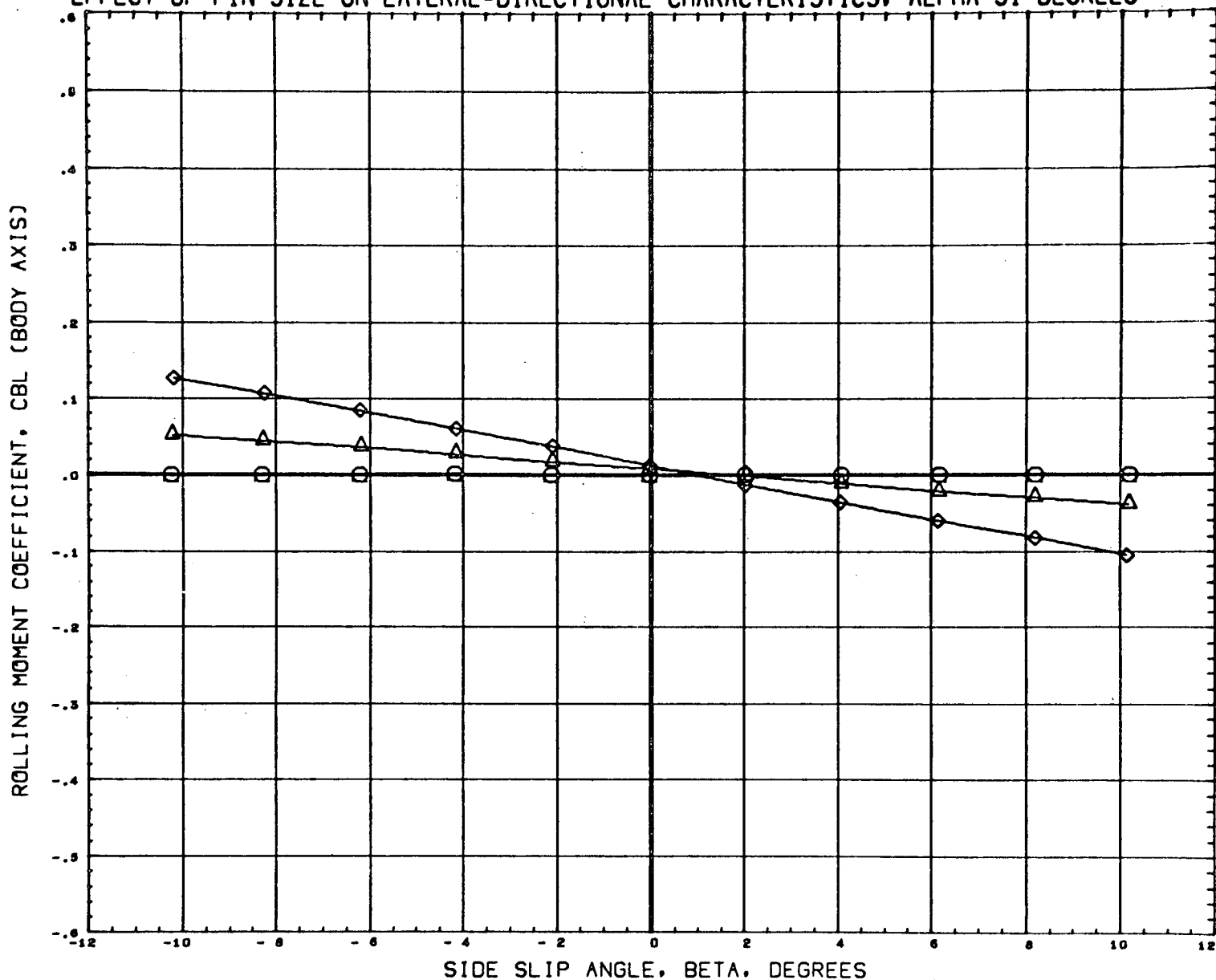
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51.000	30.000
51.000	30.000

REFERENCE INFORMATION		
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BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 2.74

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003) ○	MSFC TWT 521 BOOSTER N1B1
(A55006) △	MSFC TWT 521 BOOSTER N1B1F2
(A55011) ◇	MSFC TWT 521 BOOSTER N1B1F6

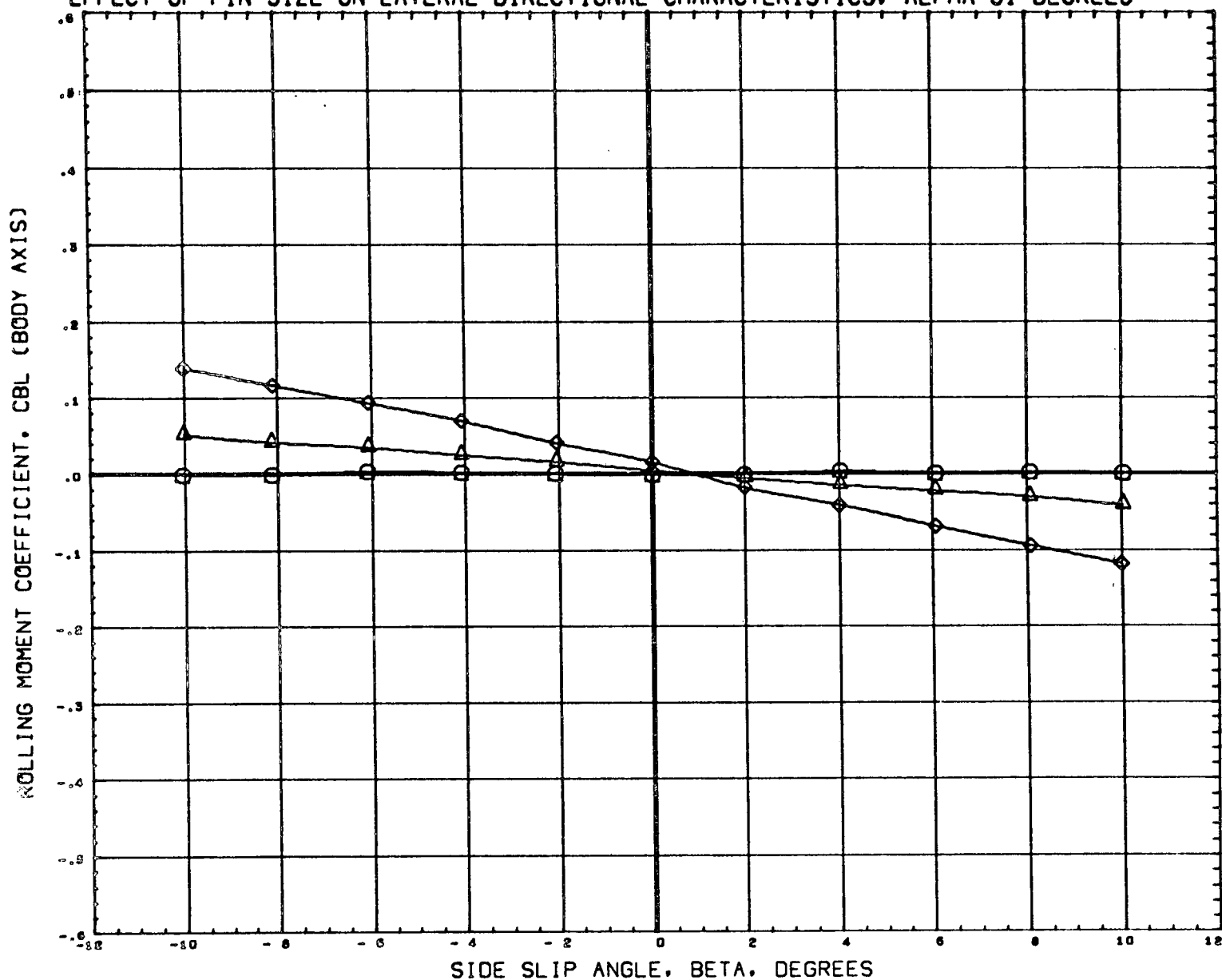
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51.000	30.000

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BREF	7.2230	in.
XMRP	4.6230	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

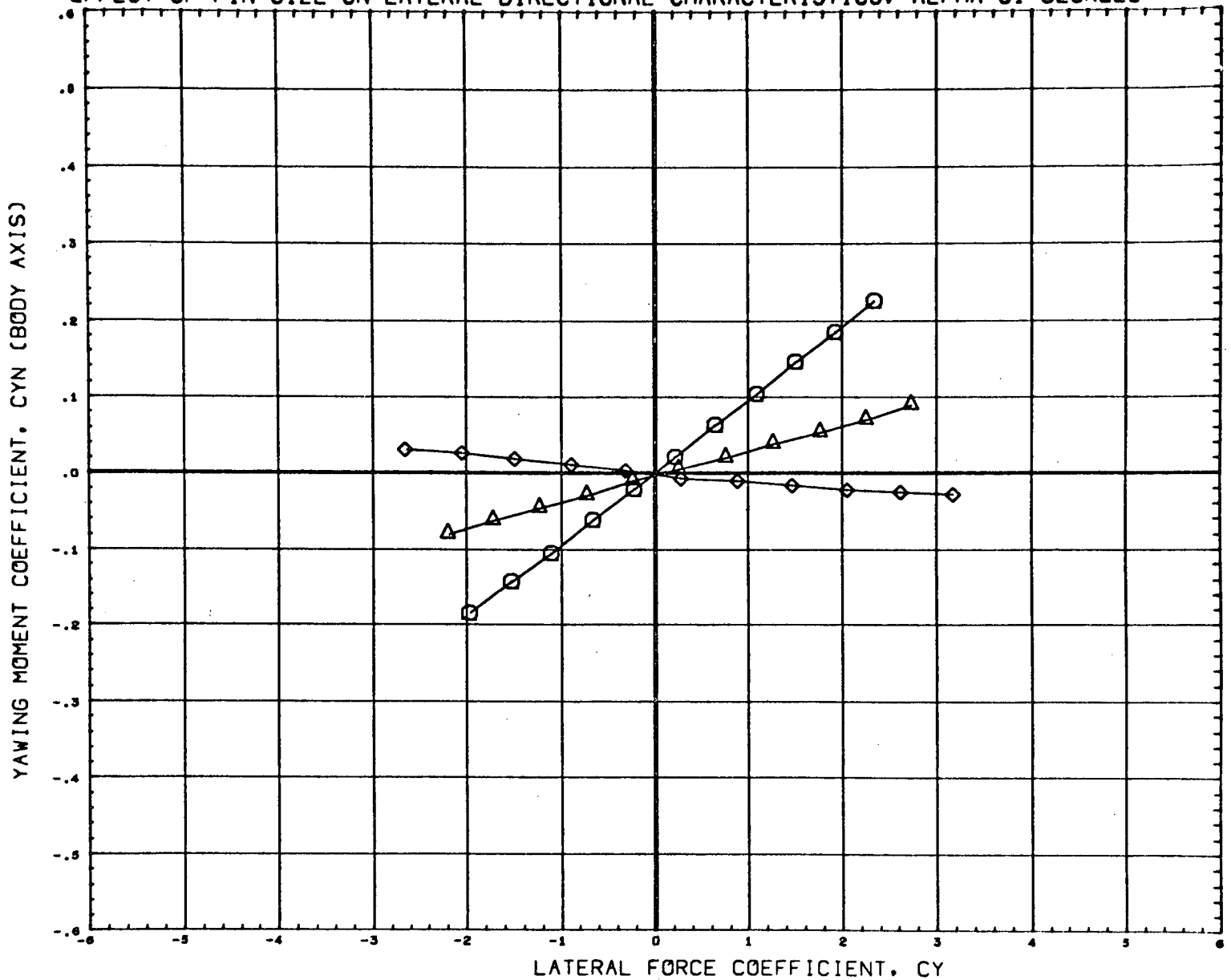
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BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION		
(F55003)	MSFC TWT 521	BOOSTER	N1B1
(A55006)	MSFC TWT 521	BOOSTER	N1B1F2
(A55011)	MSFC TWT 521	BOOSTER	N1B1F6

ALPHA	DIHRL
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51.000	30.000
51.000	30.000

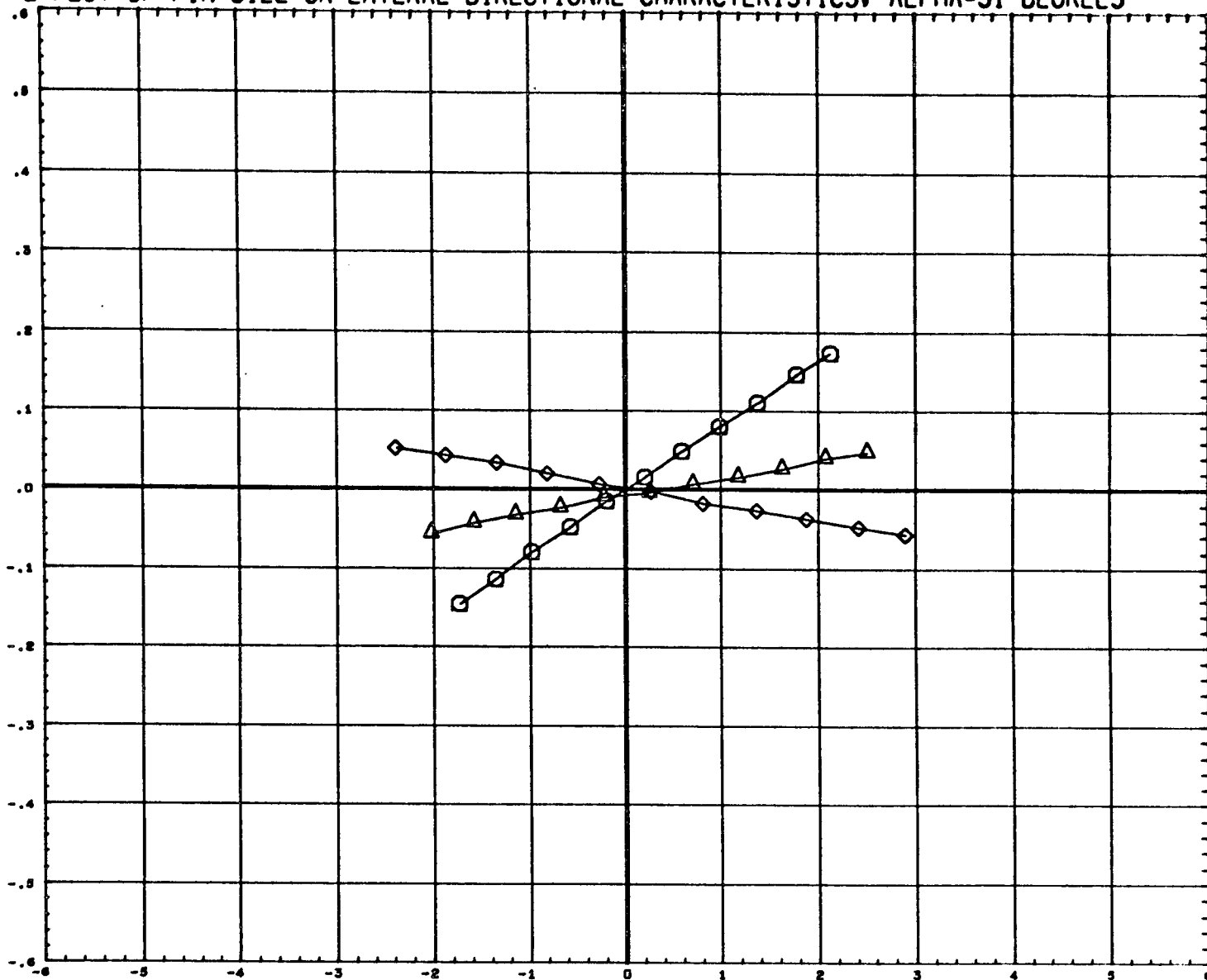
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BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.94

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



LATERAL FORCE COEFFICIENT, CY

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	NSFC TWT 521 BOOSTER N1B1
(A55006)	NSFC TWT 521 BOOSTER N1B1F2
(A55011)	NSFC TWT 521 BOOSTER N1B1F6

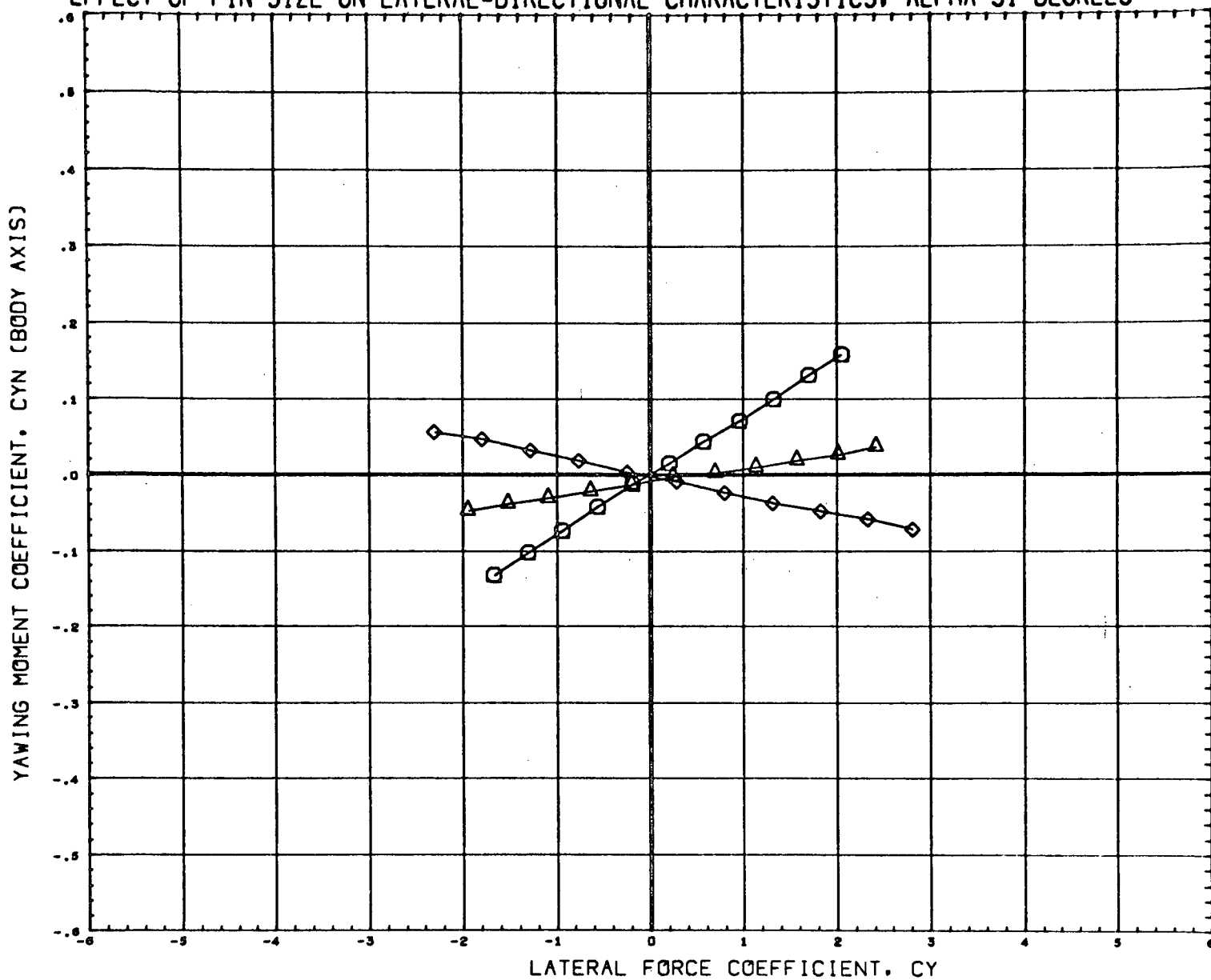
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51.000	30.000
51.000	30.000

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BREF	7.2230	IN.
XMRP	4.6230	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 2.74

PAGE 72

EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

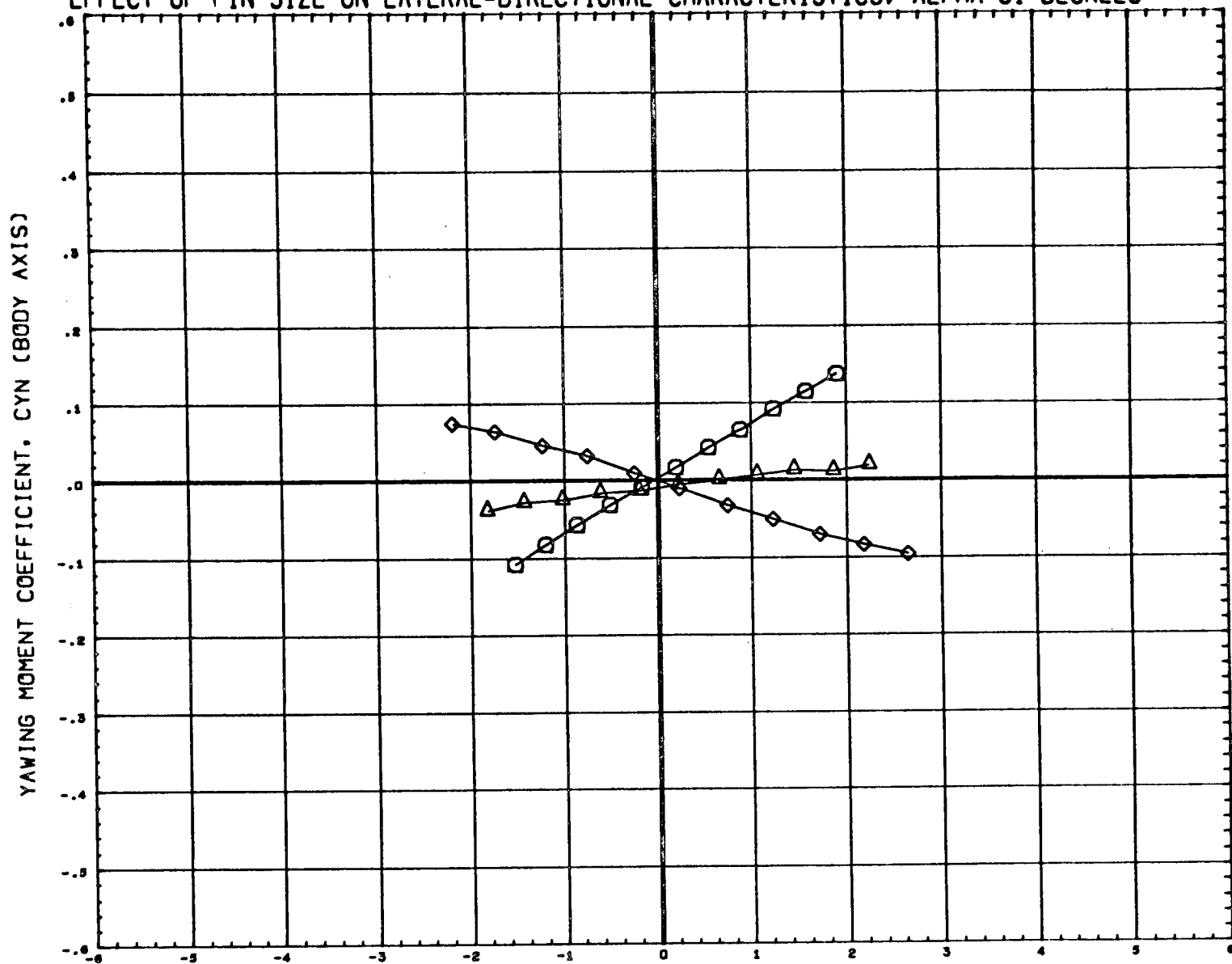
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BREF	7.2230 IN.
XMRP	4.6230 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 3.48

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EFFECT OF FIN SIZE ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=51 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(F55003)	MSFC TWT 521 BOOSTER
(A55006)	MSFC TWT 521 BOOSTER
(A55011)	MSFC TWT 521 BOOSTER

N1B1
N1B1F2
N1B1F6

ALPHA	DIHDL
51.000	
51.000	30.000
51.000	30.000

REFERENCE INFORMATION	
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LREF	7.2230 IN.
BREF	7.2230 IN.
XMRP	4.6230 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

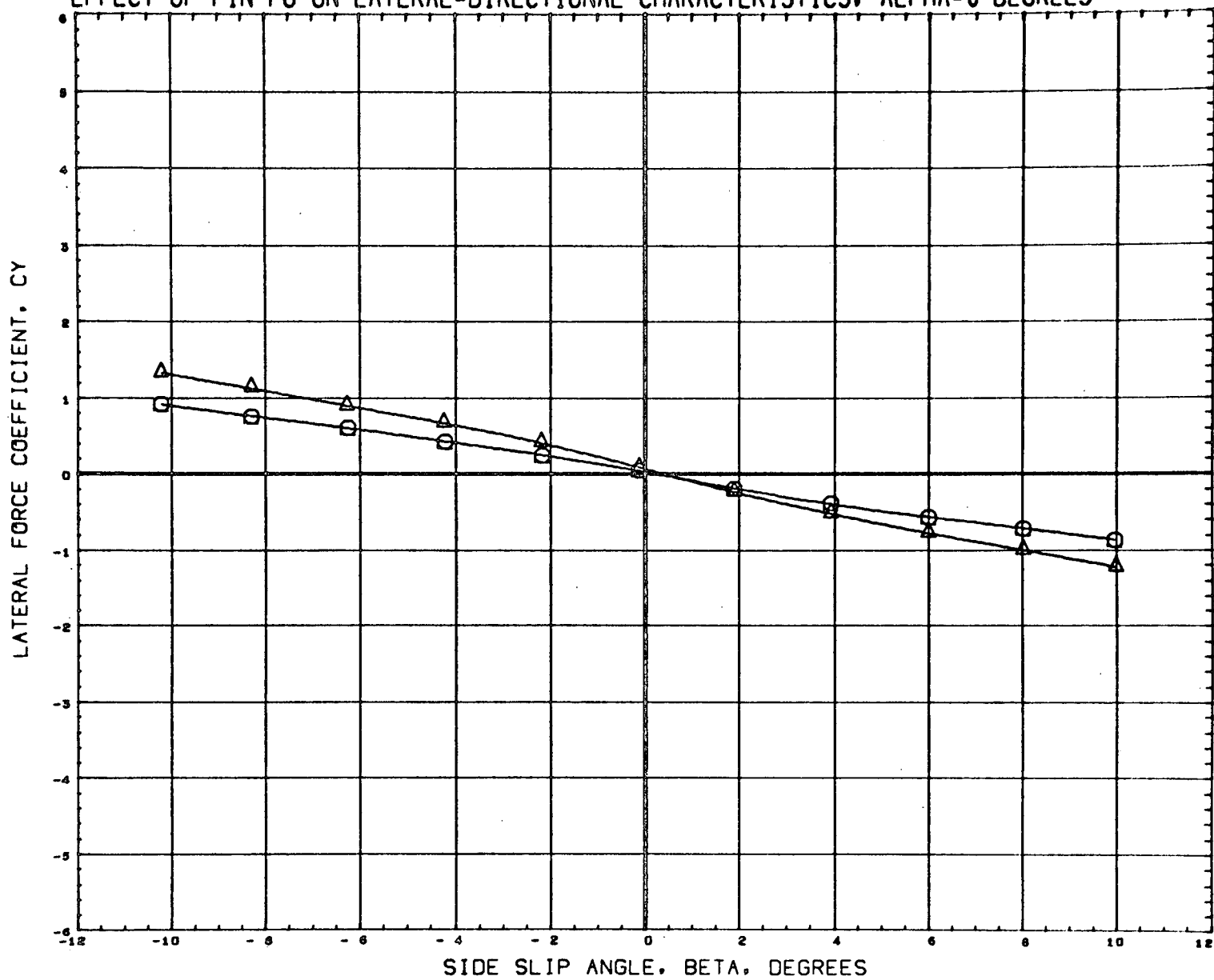
MACH

4.96

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74

EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55001) MSFC TWT 521 BOOSTER
 (A55009) MSFC TWT 521 BOOSTER

N1B1
 N1B1F6

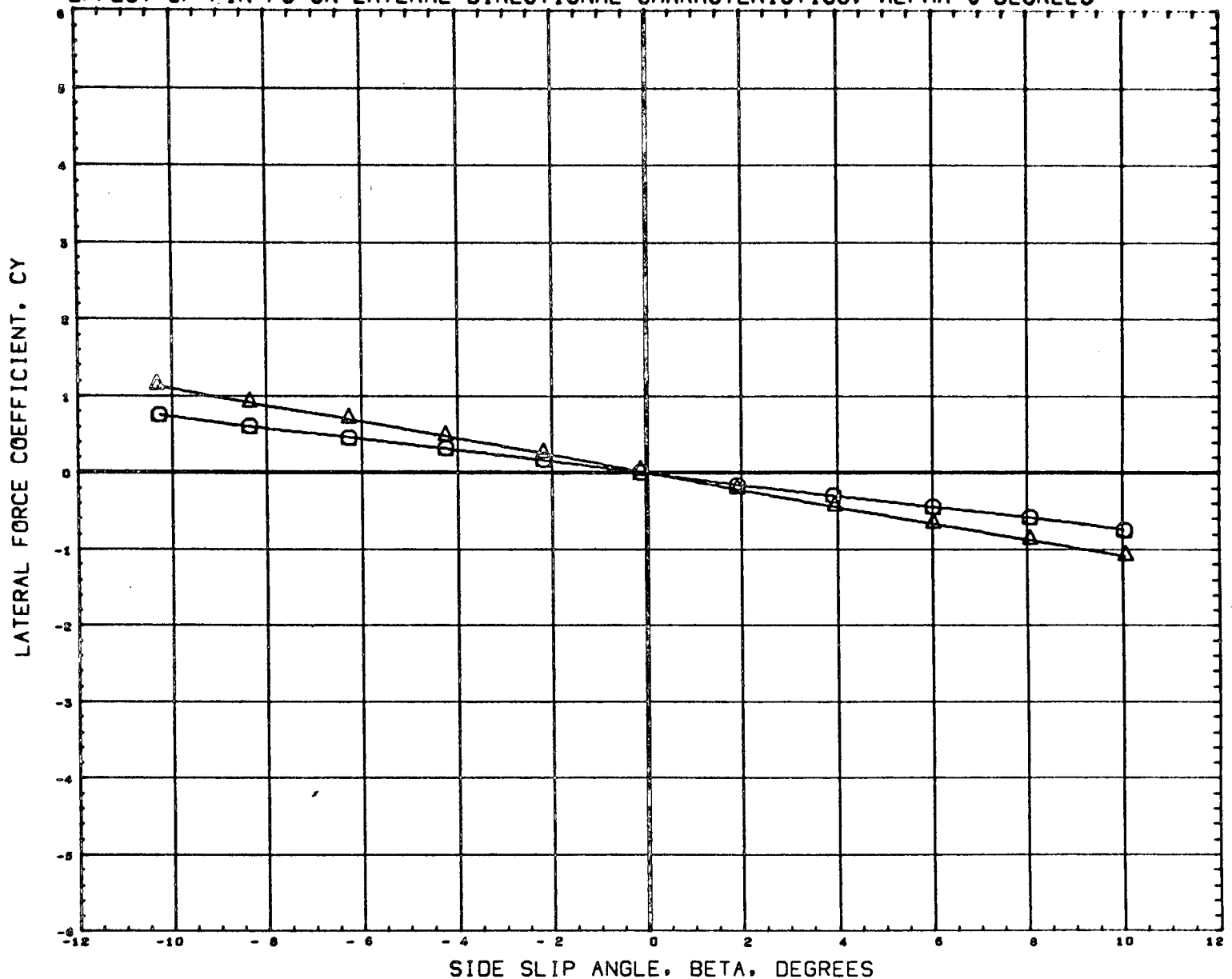
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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH .90

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55008) $\bigcirc$ MSFC TWT 521 BOOSTER N1B1
 (A55009) $\triangle$ MSFC TWT 521 BOOSTER N1B1F6

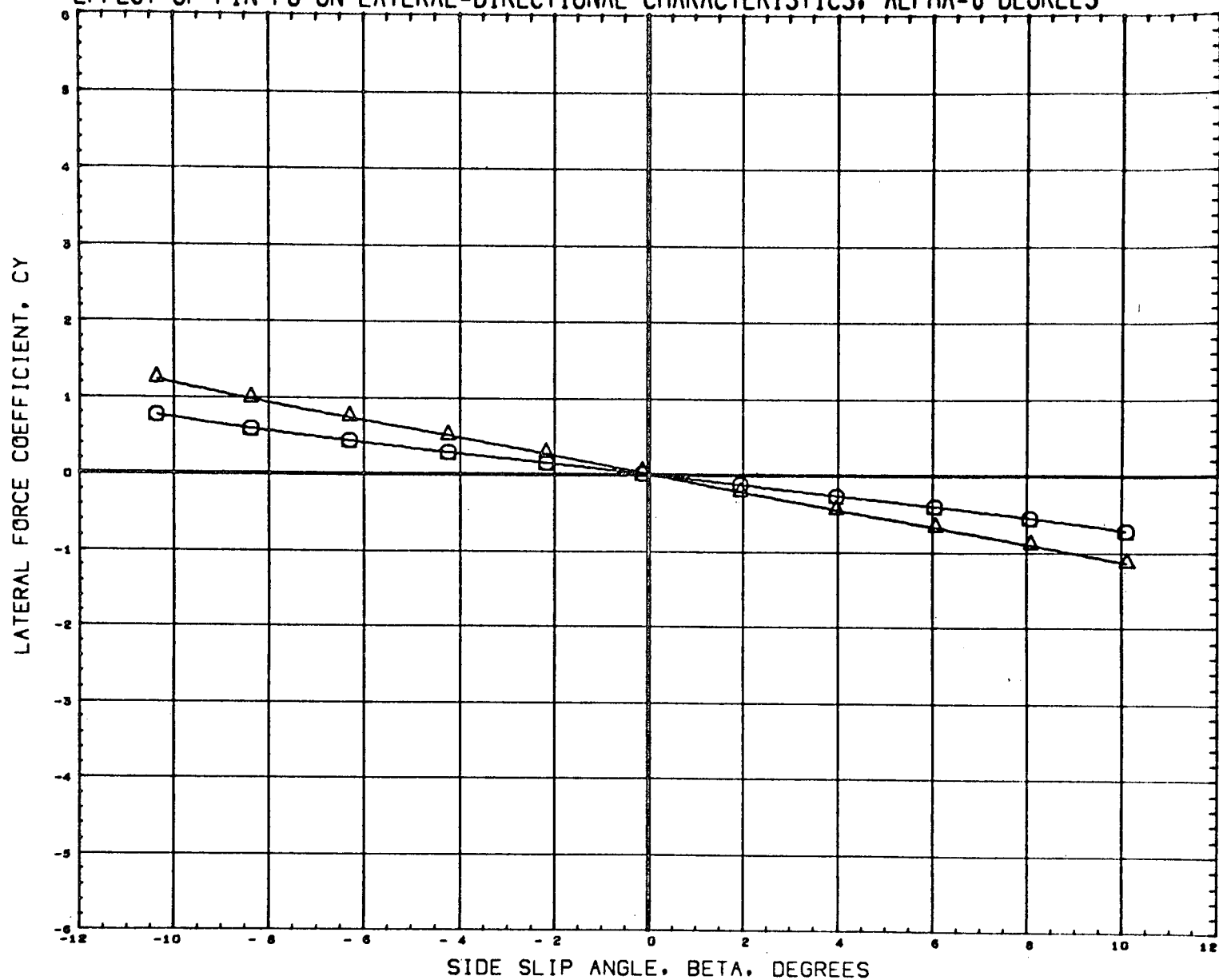
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 YMRP 0.0000 in.
 ZMRP 0.0000 in.
 SCALE 0.0034

MACH 1.20

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55001) MSFC TWT 521 BOOSTER
 (A55009) MSFC TWT 521 BOOSTER

N1B1
 N1B1F6

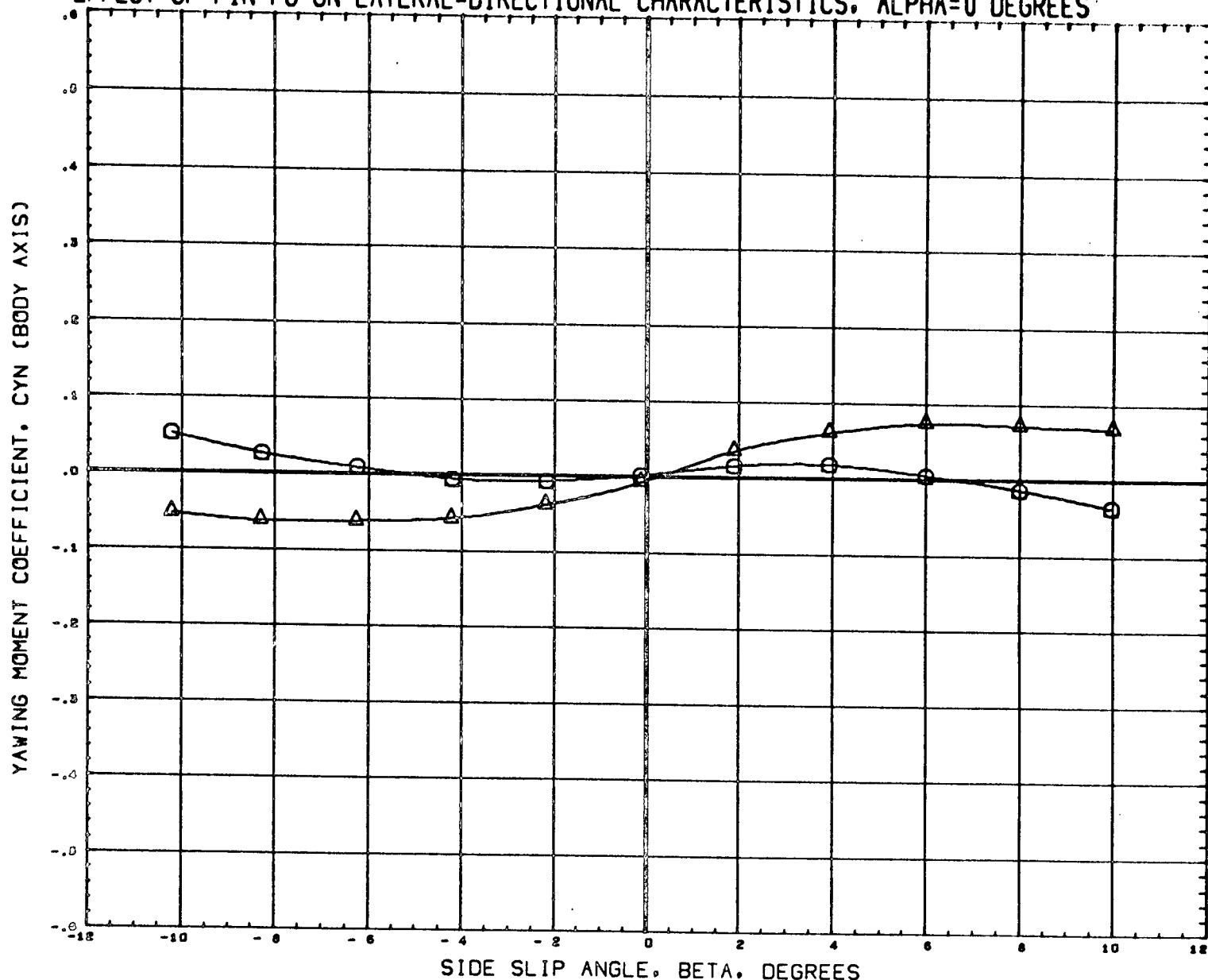
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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.46

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A35001) MSFC TWT 521 BOOSTER
 (A35009) MSFC TWT 521 BOOSTER

N1B1
 N1B1F6

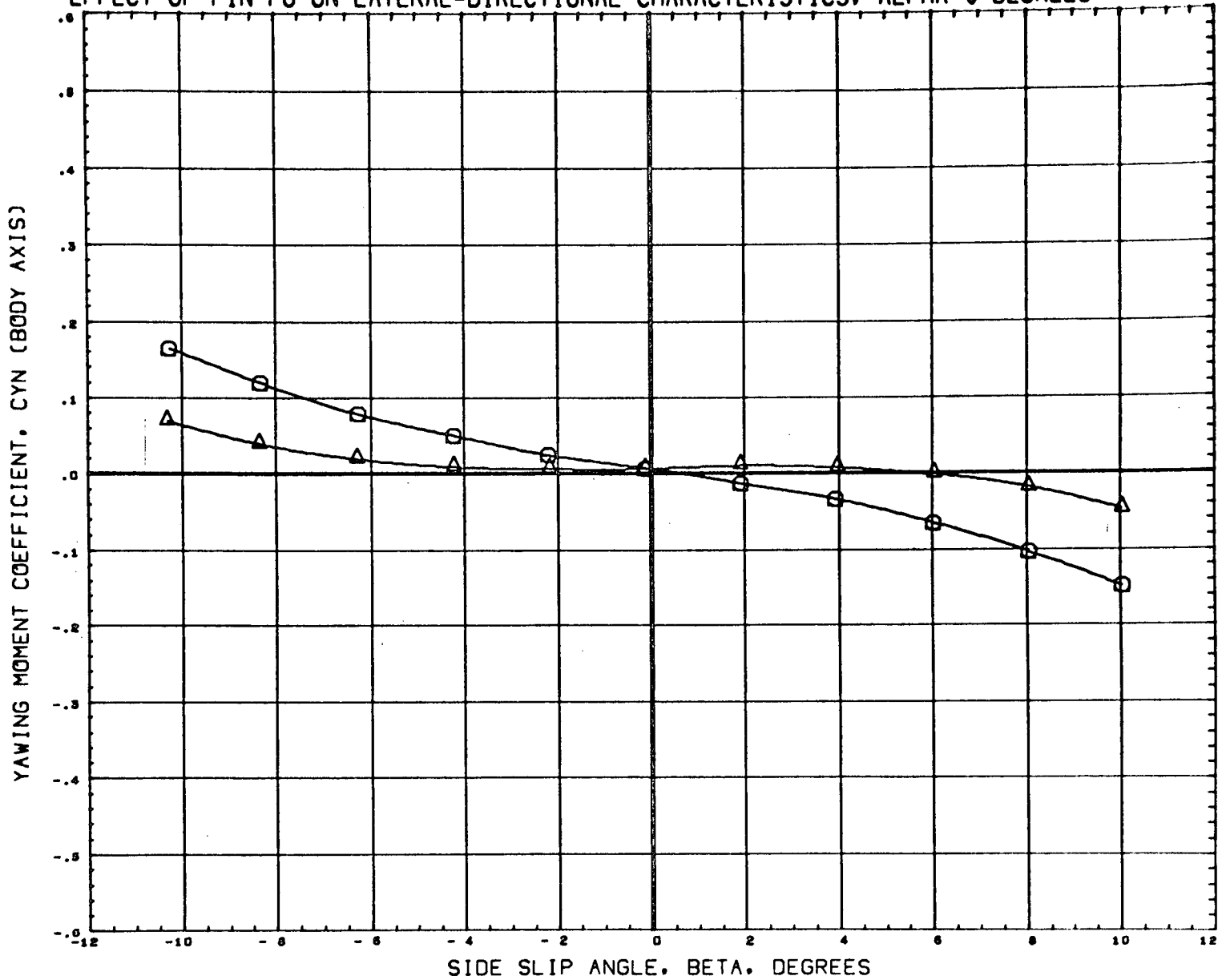
ALPHA DIHDL
 0.000
 0.000 30.000

REFERENCE INFORMATION
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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH .90

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55001) M3FC TWT 521 BOOSTER N1B1
 (A55009) M3FC TWT 521 BOOSTER N1B1F6

ALPHA DIHDL
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 0.000 30.000

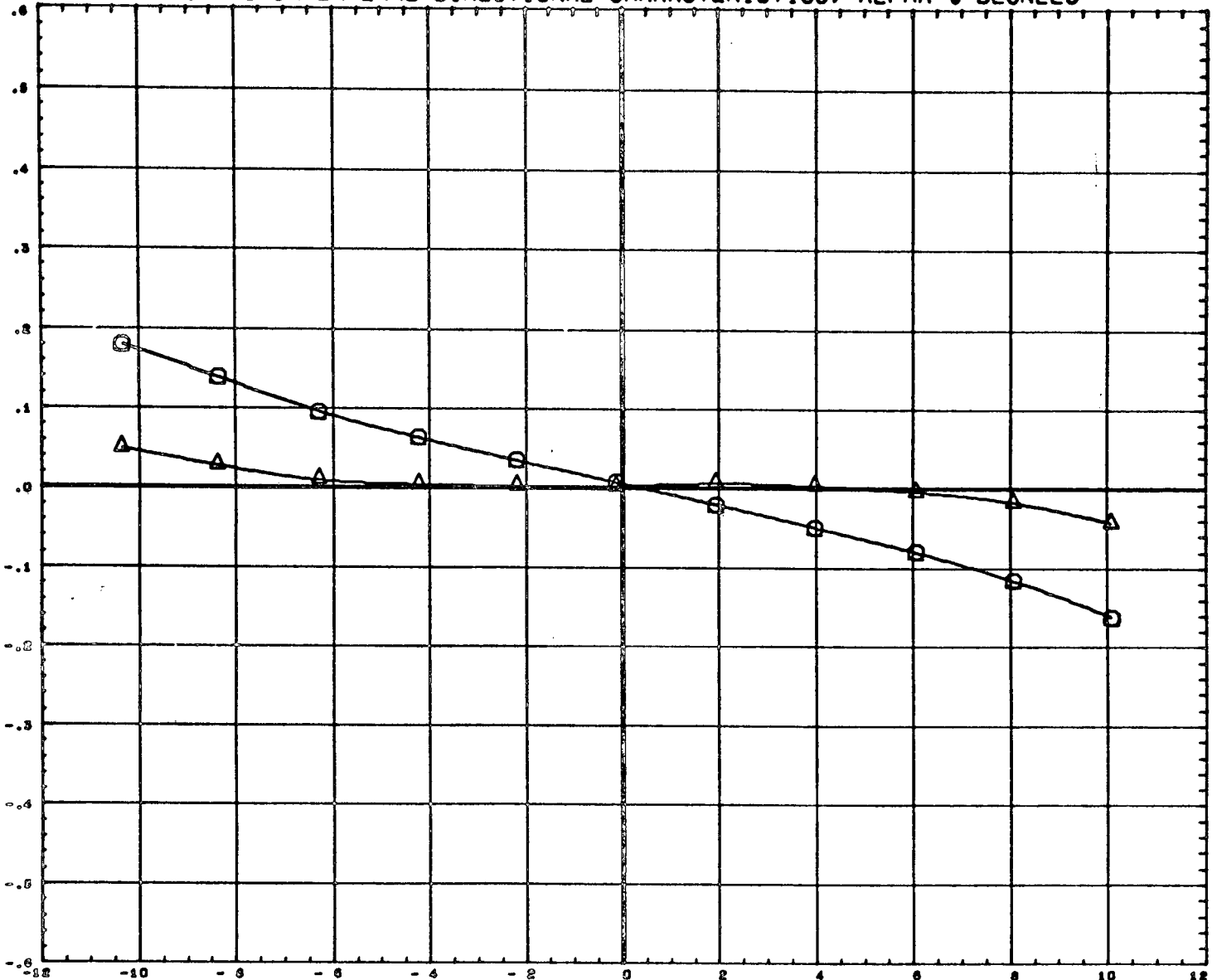
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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.20

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



SIDE SLIP ANGLE, BETA, DEGREES

DATA SET SYMBOL CONFIGURATION DESCRIPTION
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 N1B1F6

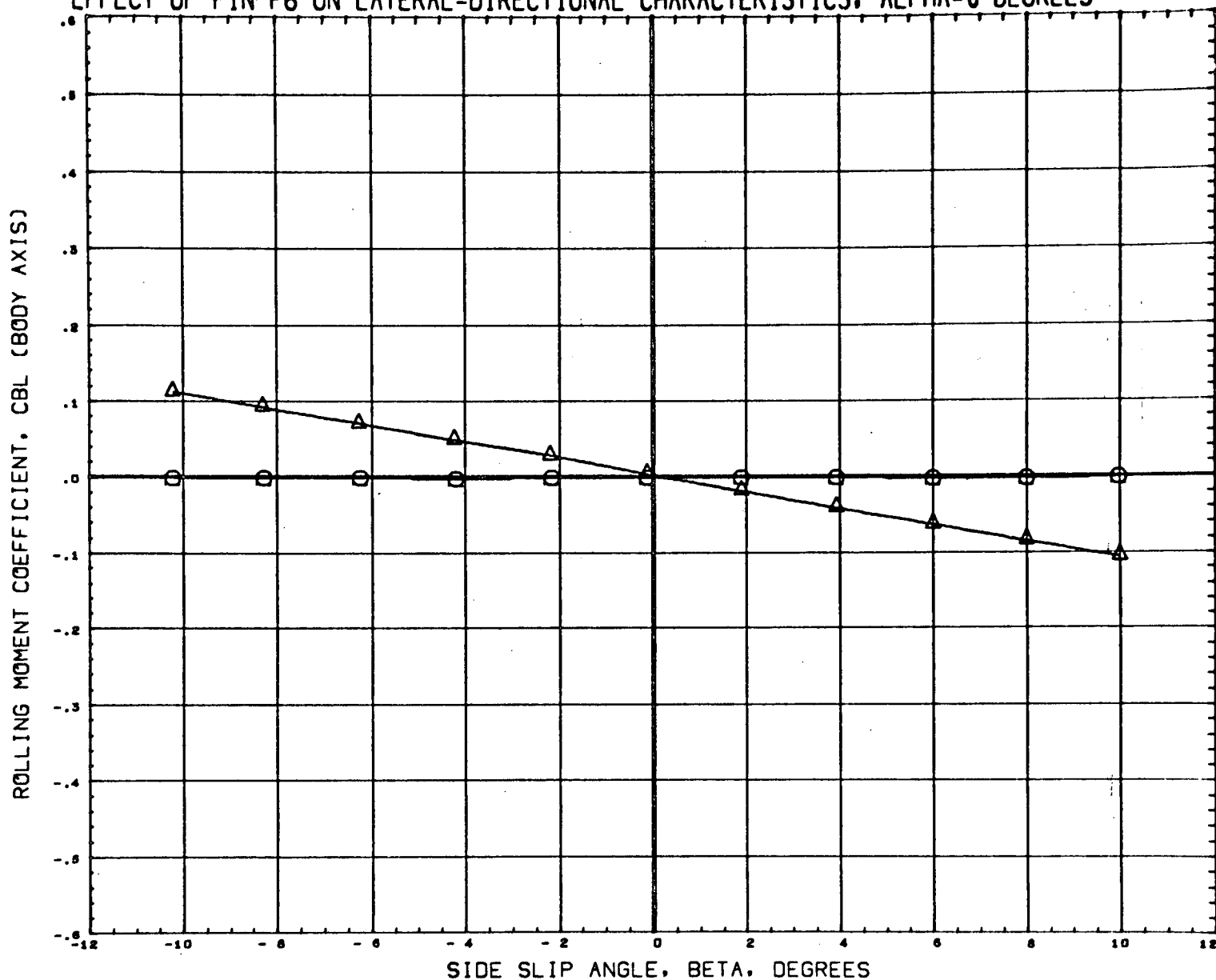
ALPHA DIHDL
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 0.000 30.000

REFERENCE INFORMATION
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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.46

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



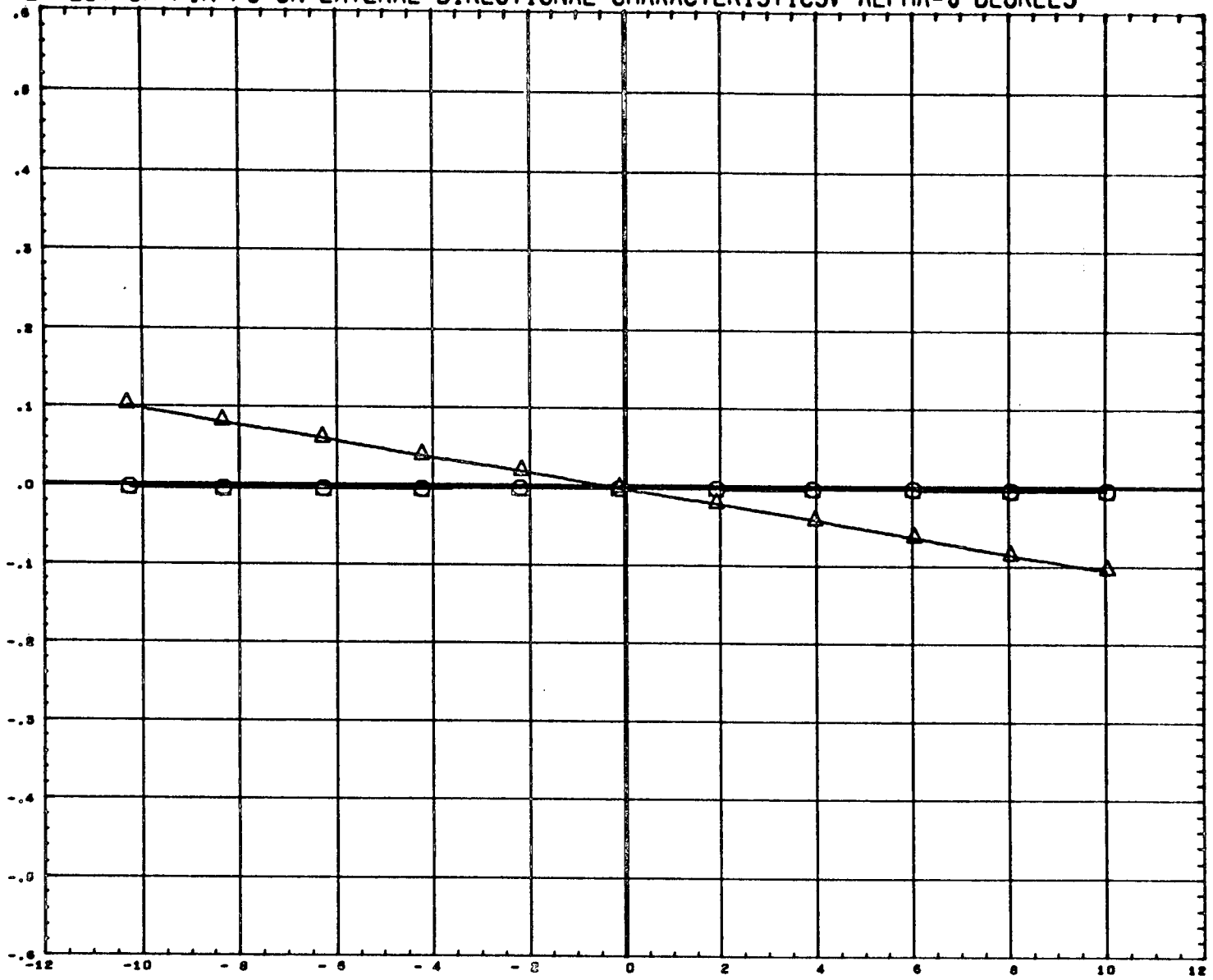
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 0.000 30.000

REFERENCE INFORMATION
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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES

ROLLING MOMENT COEFFICIENT, CBL (BODY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION
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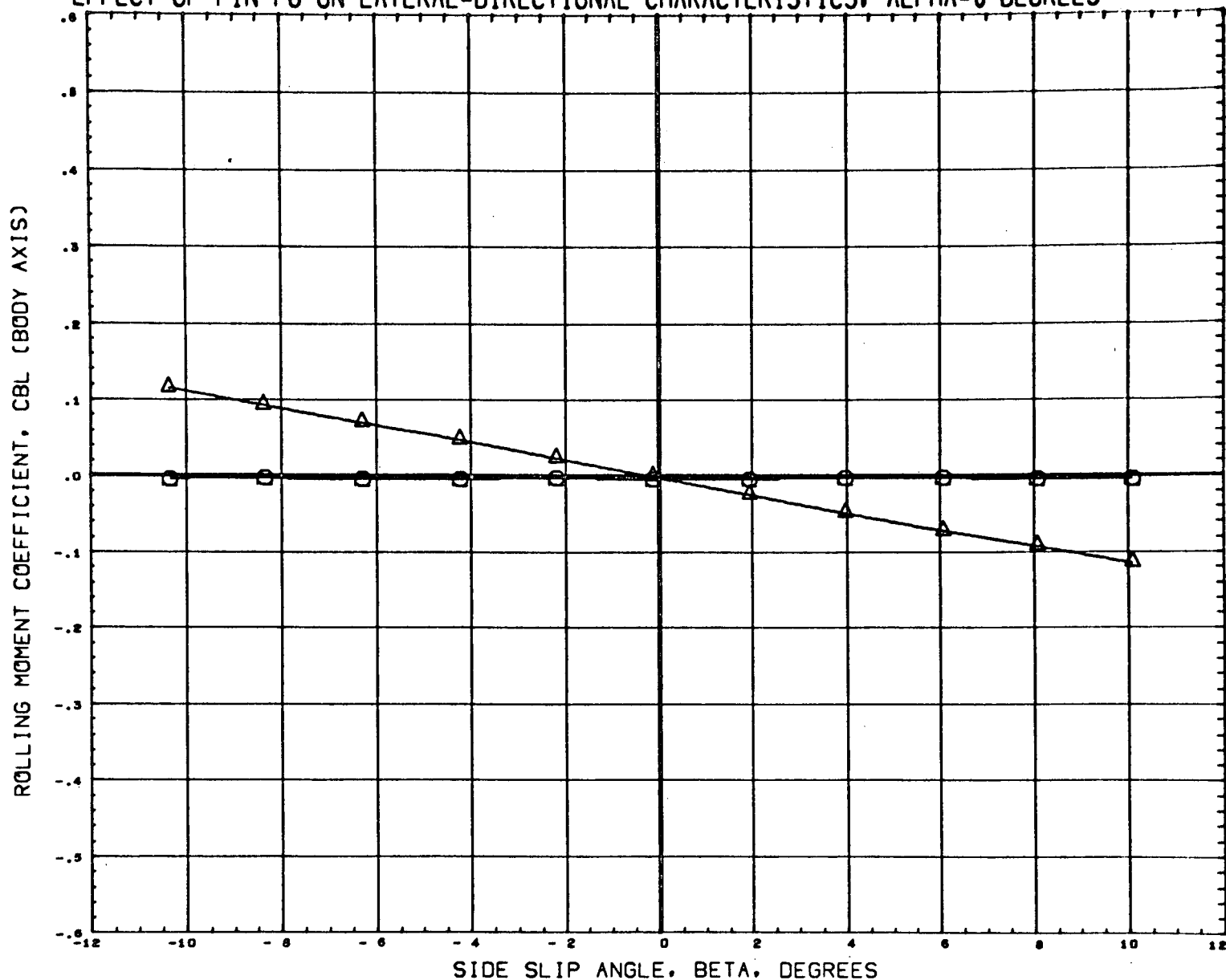
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 0.000 30.000

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 BREF 7.2230 IN.
 XMRP 4.6230 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.20

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55001) 	MSFC TWT 521 BOOSTER
(A55009) 	MSFC TWT 521 BOOSTER

N1B1
N1B1F6

ALPHA	DIHDL
0.000	0.000
0.000	30.000

REFERENCE INFORMATION		
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BREF	7.2230	in.
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YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH

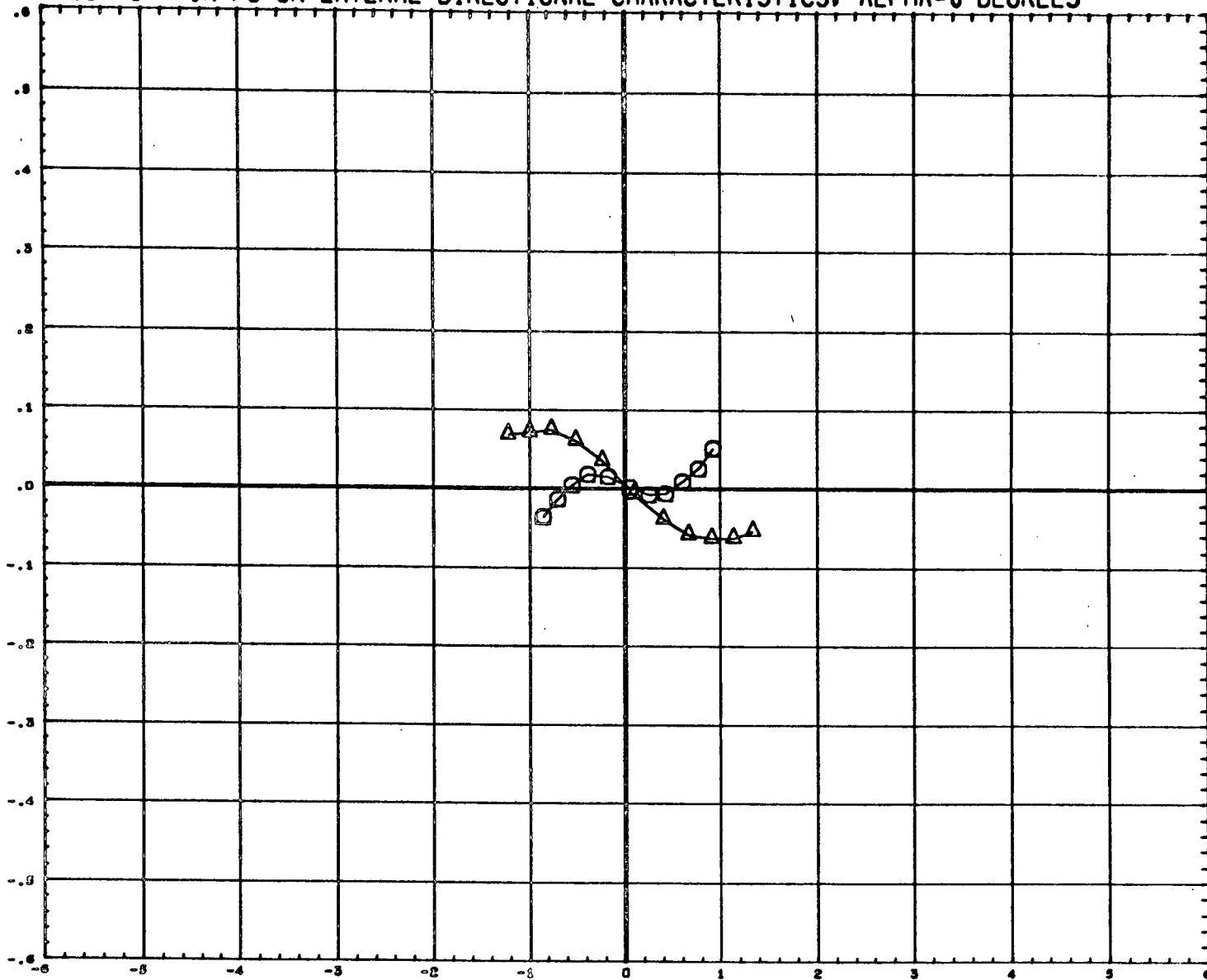
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PAGE

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



LATERAL FORCE COEFFICIENT, CY

DATA SET SYMBOL CONFIGURATION DESCRIPTION

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(A55009) MSFC TWT 521 BOOSTER N1B1F6

ALPHA DIHRL

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0.000 30.000

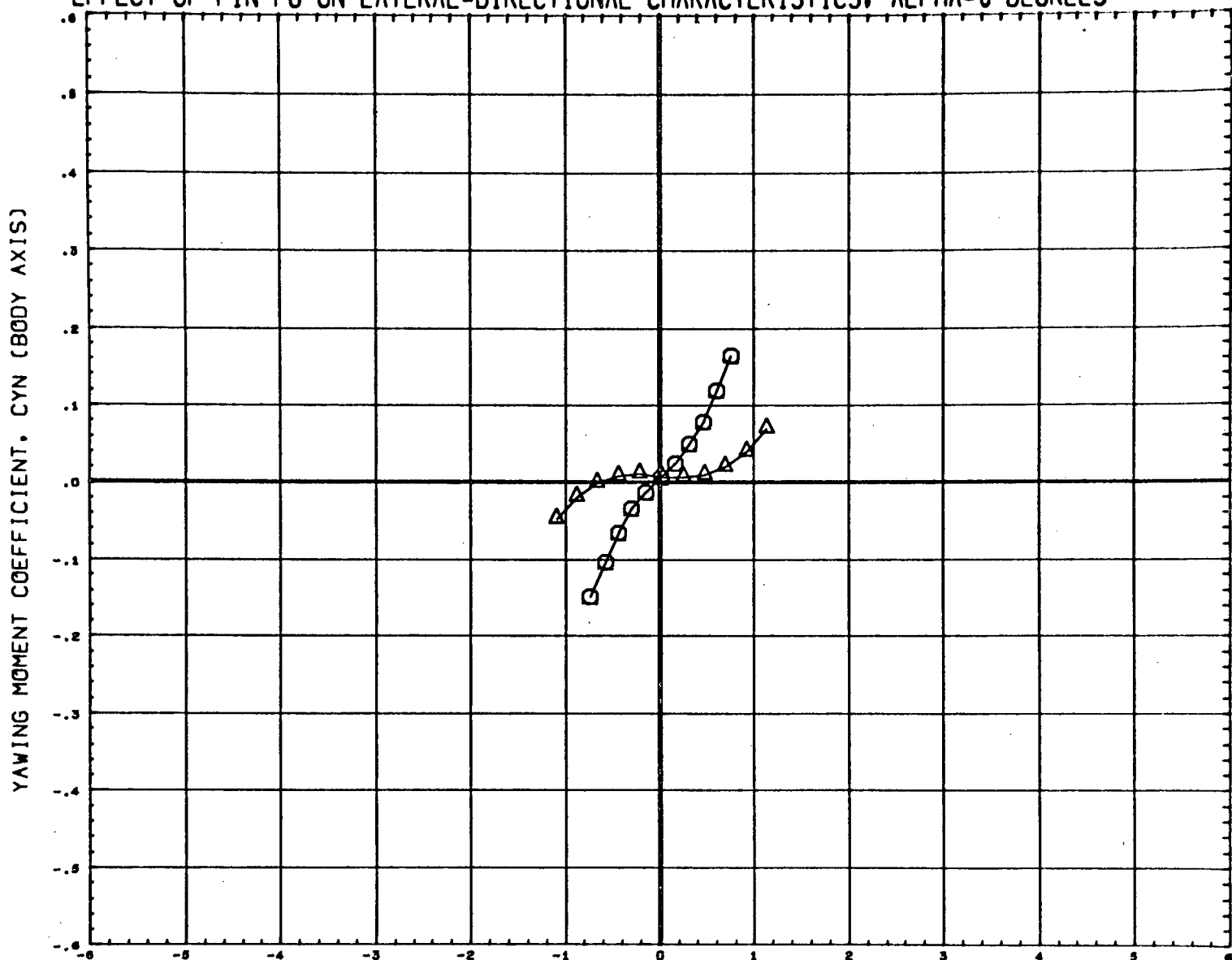
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XMRP 4.6230 IN.
YMRP 0.0000 IN.
ZMRP 0.0000 IN.
SCALE 0.0034

MACH .90

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



LATERAL FORCE COEFFICIENT, C_Y

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55001) $\bigcirc$ MSFC TWT 521 BOOSTER
 (A55009) $\triangle$ MSFC TWT 521 BOOSTER

N1B1
 N1B1F6

ALPHA DIHDL
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 0.000 30.000

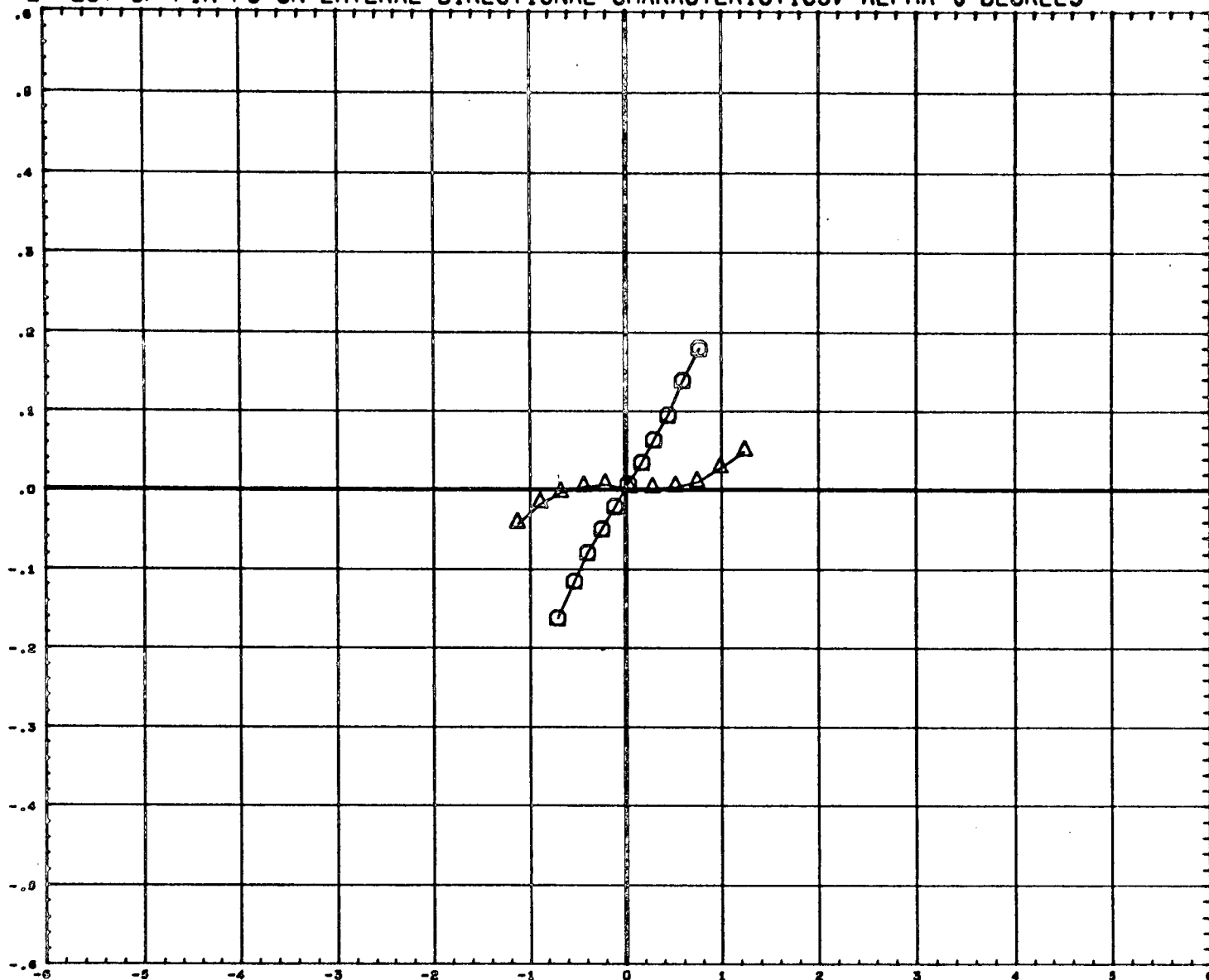
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 YMRP 0.0000 in.
 ZMRP 0.0000 in.
 SCALE 0.0034

MACH 1.20

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EFFECT OF FIN F6 ON LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(A55001) NSFC TWT 921 BOOSTER N1B1
(A55009) NSFC TWT 921 BOOSTER N1B1F6

ALPHA DIMDL

0.000
0.000 30.000

REFERENCE INFORMATION

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YMRP 0.0000 in.
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SCALE 0.0034

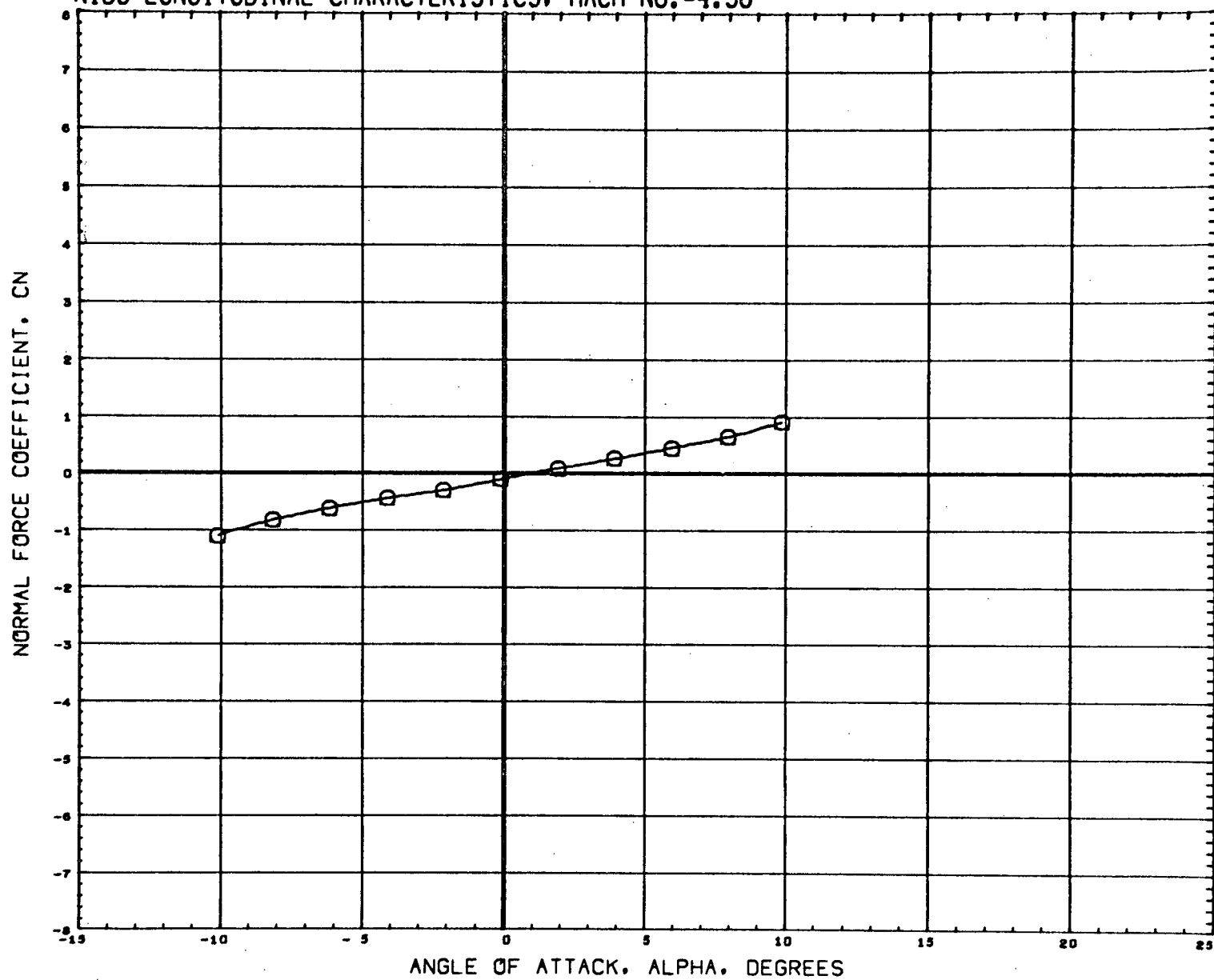
MACH

1.46

PAGE

86

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL $\bigcirc$ MACH 4.959 BETA 0.000 PARAMETRIC VALUES

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
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 BREF 8.1720 IN.
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 SCALE 0.0034

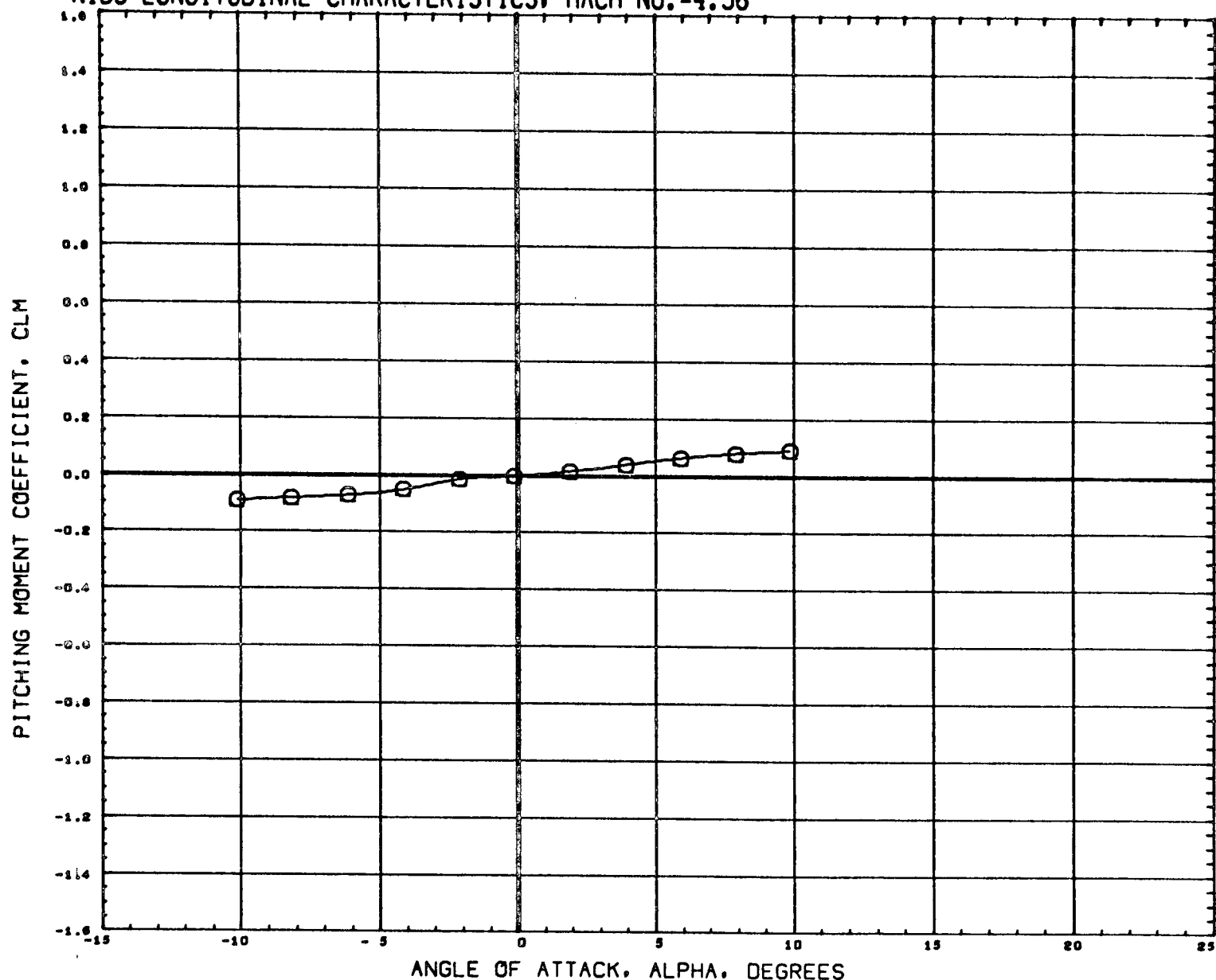
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MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 87

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL $\square$ MACH 4.959 BETA 0.000 PARAMETRIC VALUES

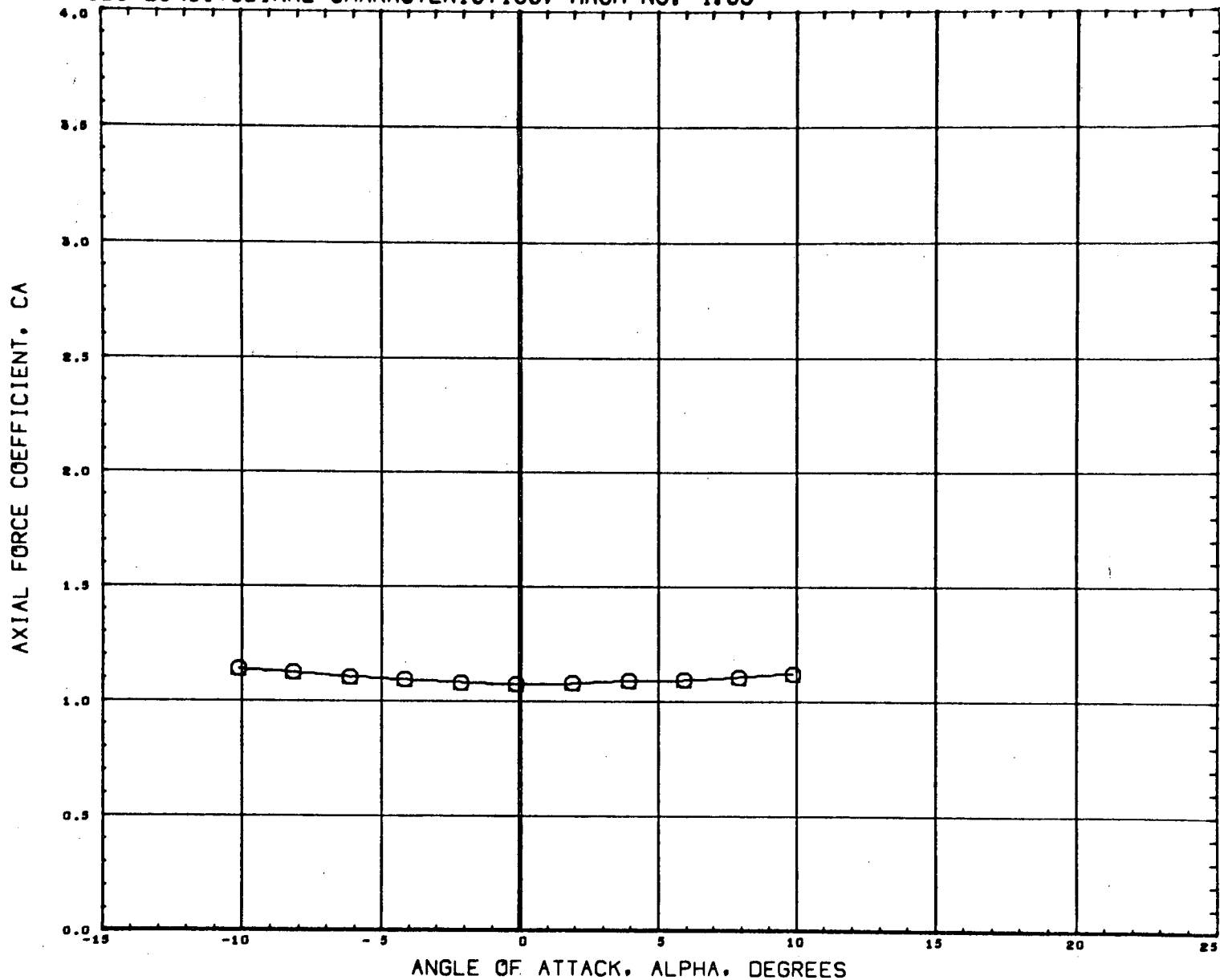
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 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

DATA HIST. CODE *E

MSFC TWT 521 BOOSTER N1B3

(E55012) 02 FEB 72 PAGE 88

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL $\square$ MACH 4.959 BETA 0.000 PARAMETRIC VALUES

REFERENCE INFORMATION
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 ZMRP 0.0000 in.
 SCALE 0.0034

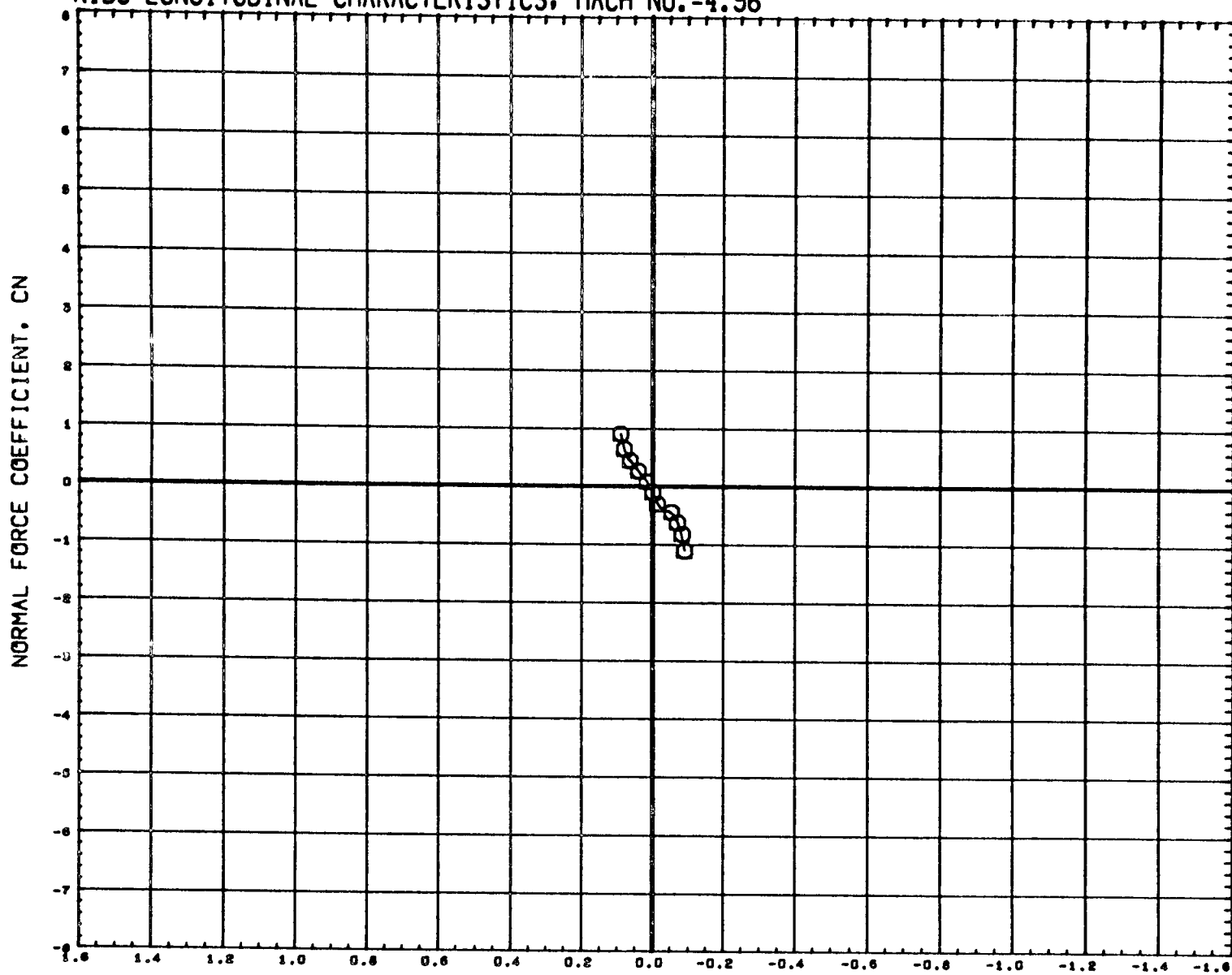
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MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 89

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL ☐ MACH 4.959 BETA 0.000
 PARAMETRIC VALUES

REFERENCE INFORMATION
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 BREF 0.1720 IN.
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 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

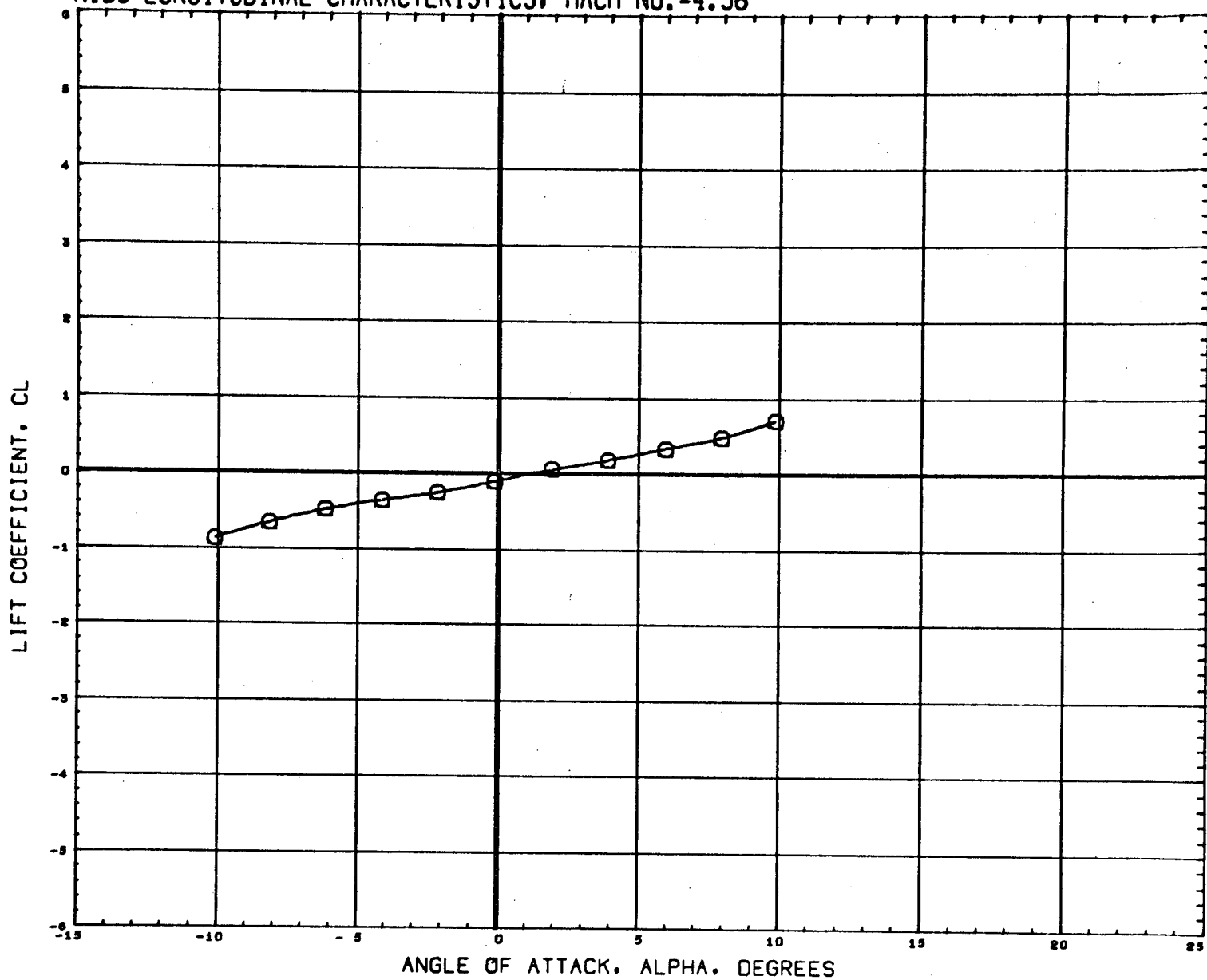
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 90

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL: MACH 4.959 BETA 0.000
 O

PARAMETRIC VALUES

REFERENCE INFORMATION

SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
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YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

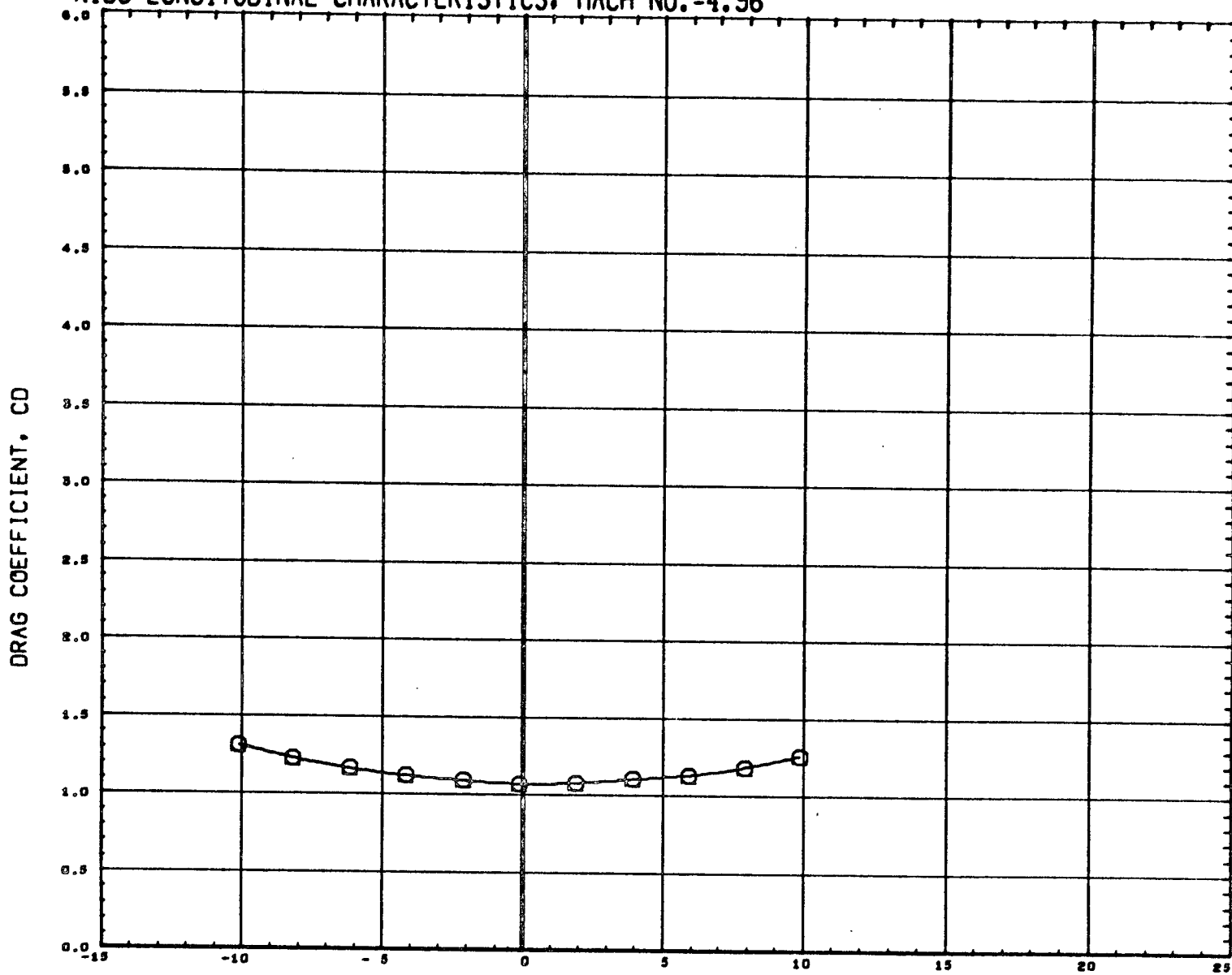
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MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 91

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL $\square$ MACH 4.959 BETA 0.000
PARAMETRIC VALUES

REFERENCE INFORMATION
SREF 0.9330 SQ. IN
LREF 0.1720 IN.
BREF 0.1720 IN.
XMRP 5.2300 IN.
YMRP 0.0000 IN.
ZMRP 0.0000 IN.
SCALE 0.0034

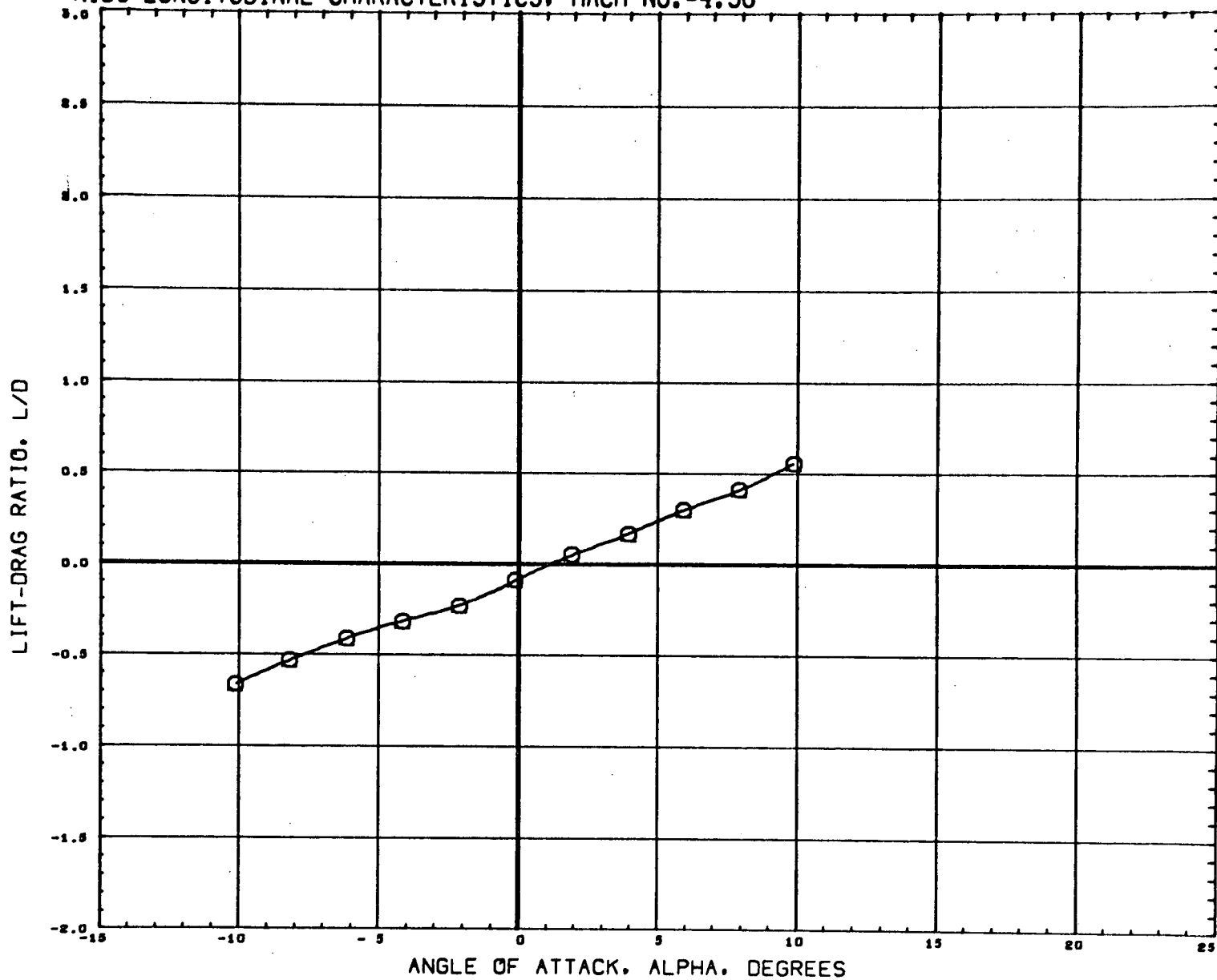
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MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 92

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL $\square$ MACH 4.959 BETA 0.000 PARAMETRIC VALUES

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
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 BREF 0.1720 IN.
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 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

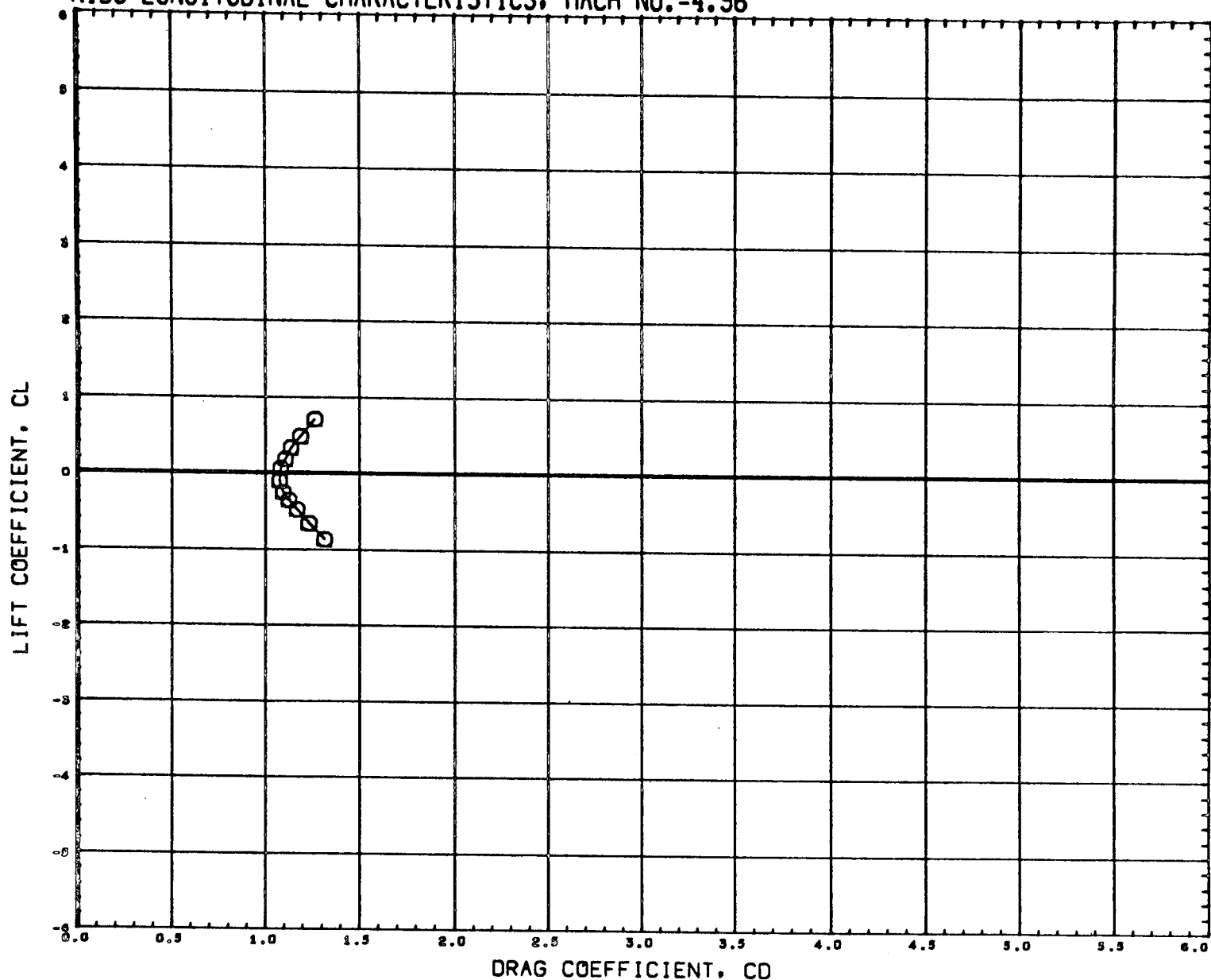
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MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 93

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL MACH BETA PARAMETRIC VALUES
 O 4.959 0.000

REFERENCE INFORMATION
 SREF 0.9330 99. IN
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 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

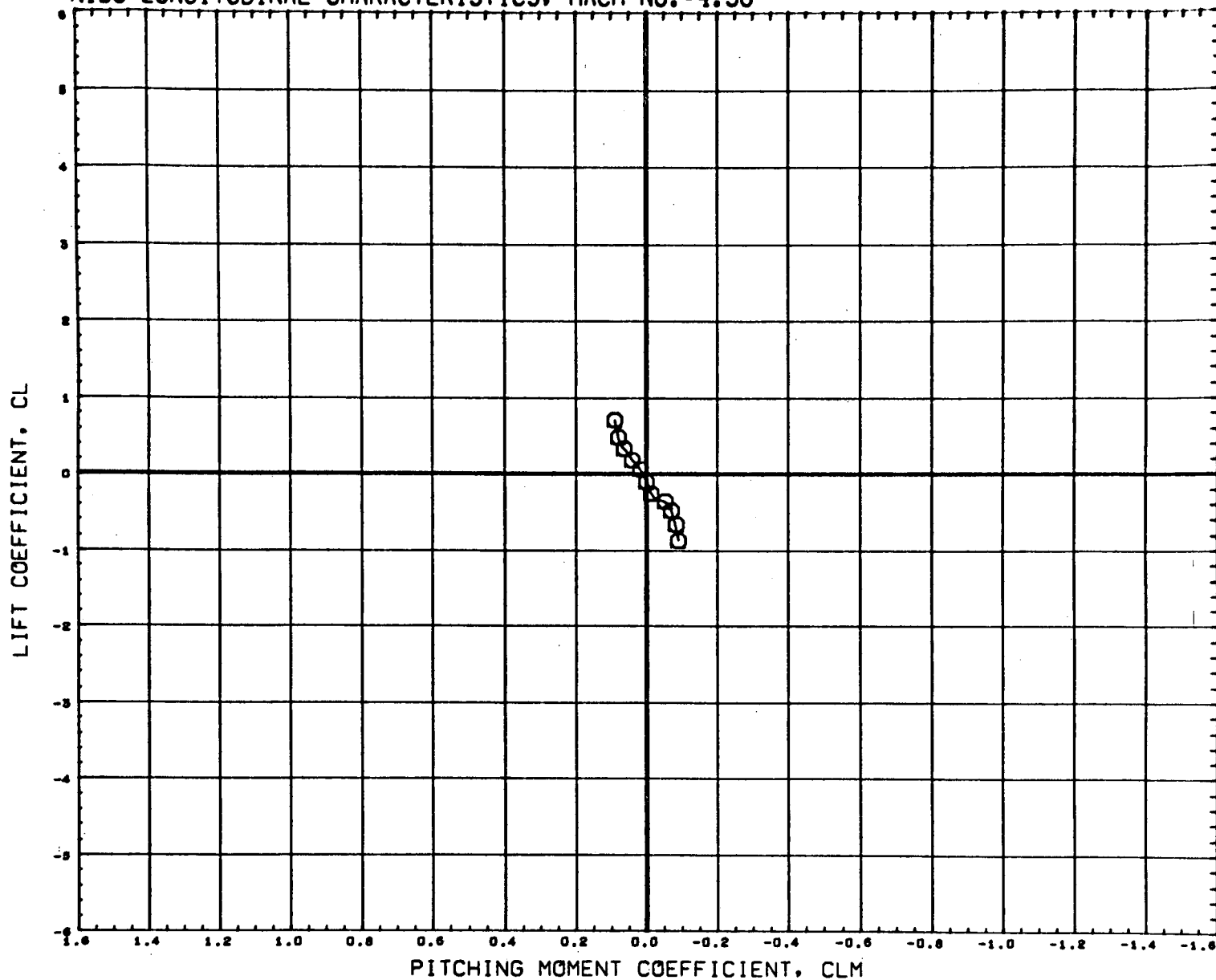
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MSFC TWT 521 BOOSTER

N1B3

(E55012) 02 FEB 72 PAGE 94

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL MACH BETA PARAMETRIC VALUES
 O 4.959 0.000

REFERENCE INFORMATION
 SREF 0.9330 90. IN.
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

DATA HIST. CODE *E

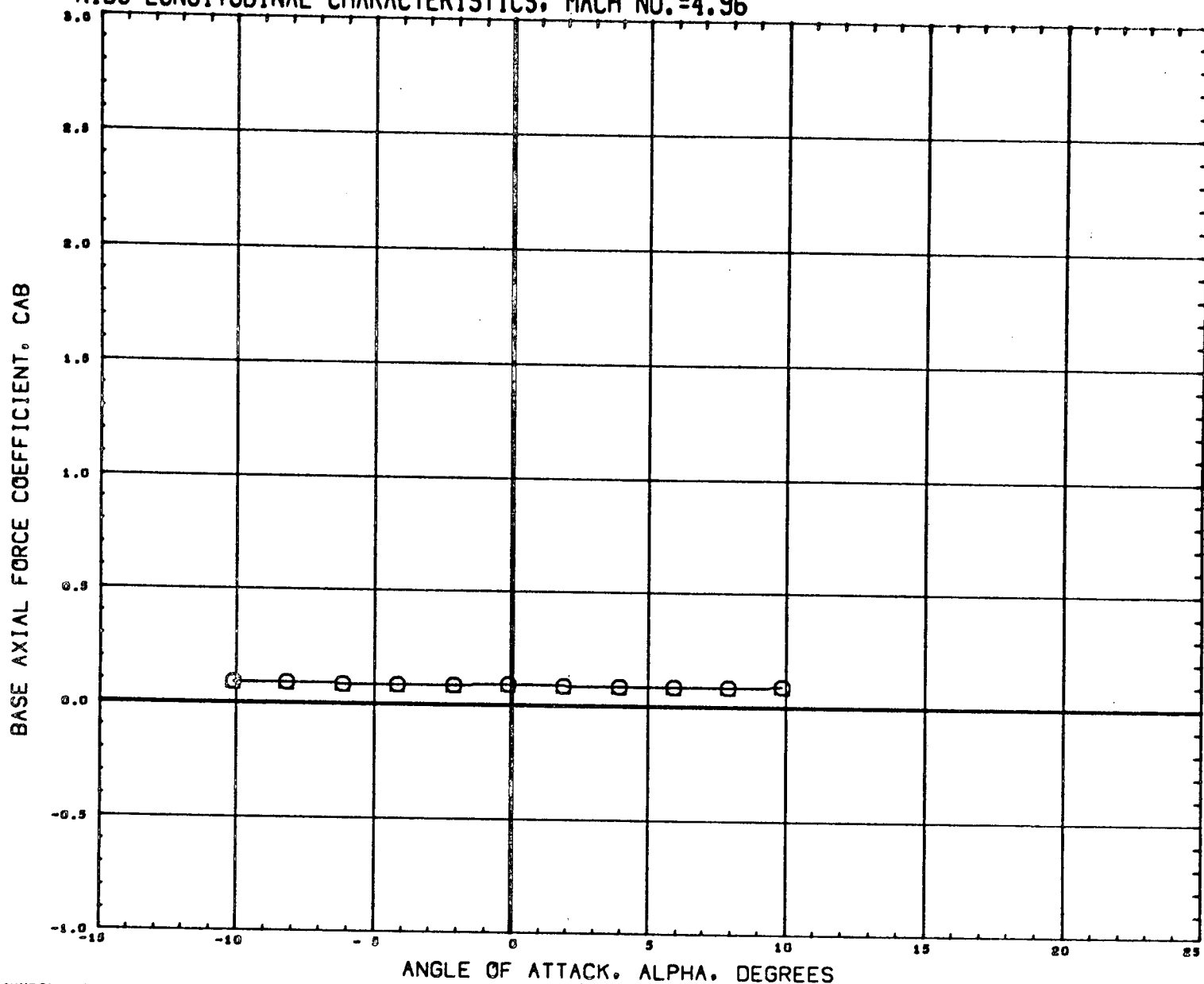
MSFC TWT 521 BOOSTER

N1B3

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N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL $\bigcirc$ MACH 4.959 BETA 0.000 PARAMETRIC VALUES

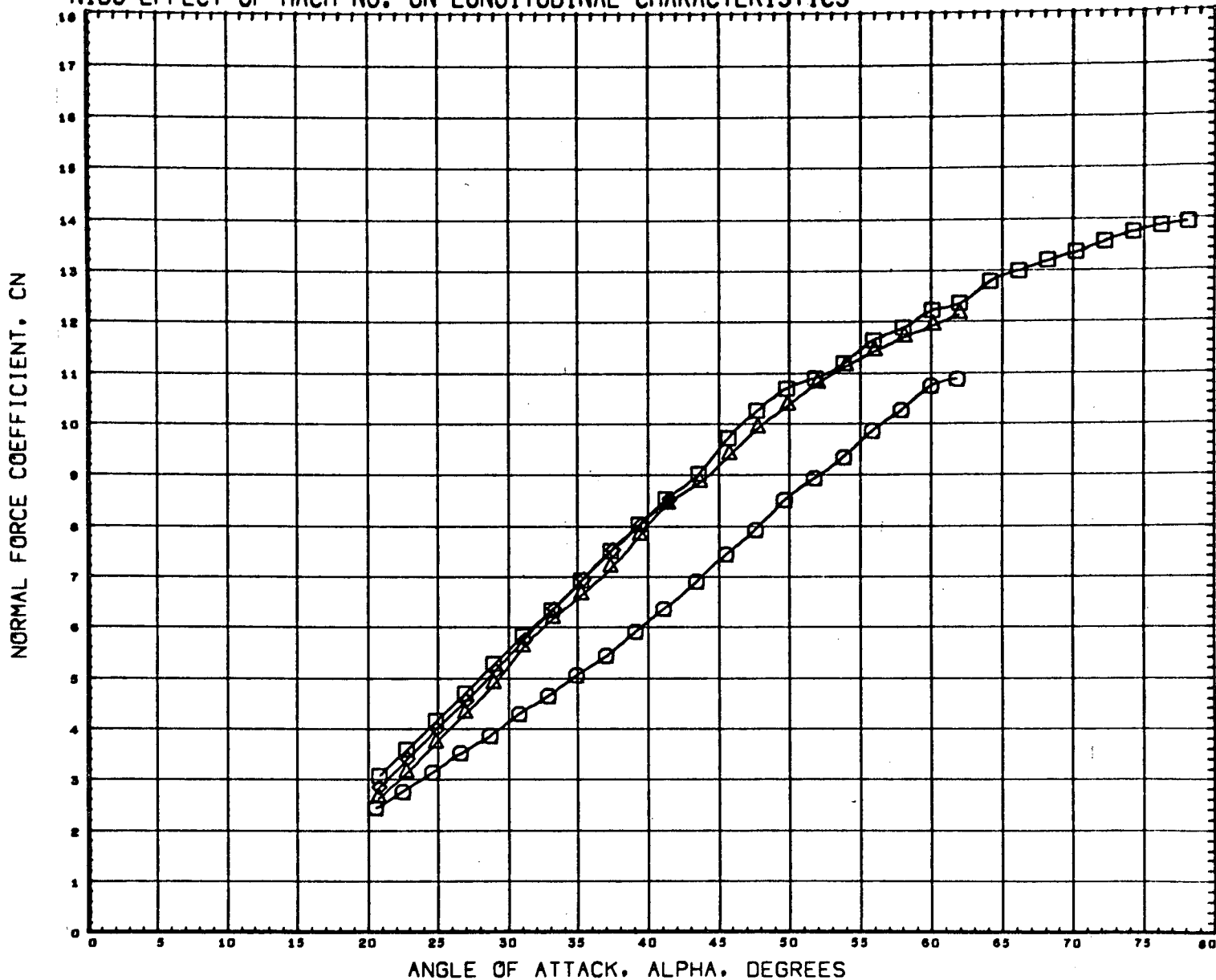
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 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

DATA HIST. CODE #E

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

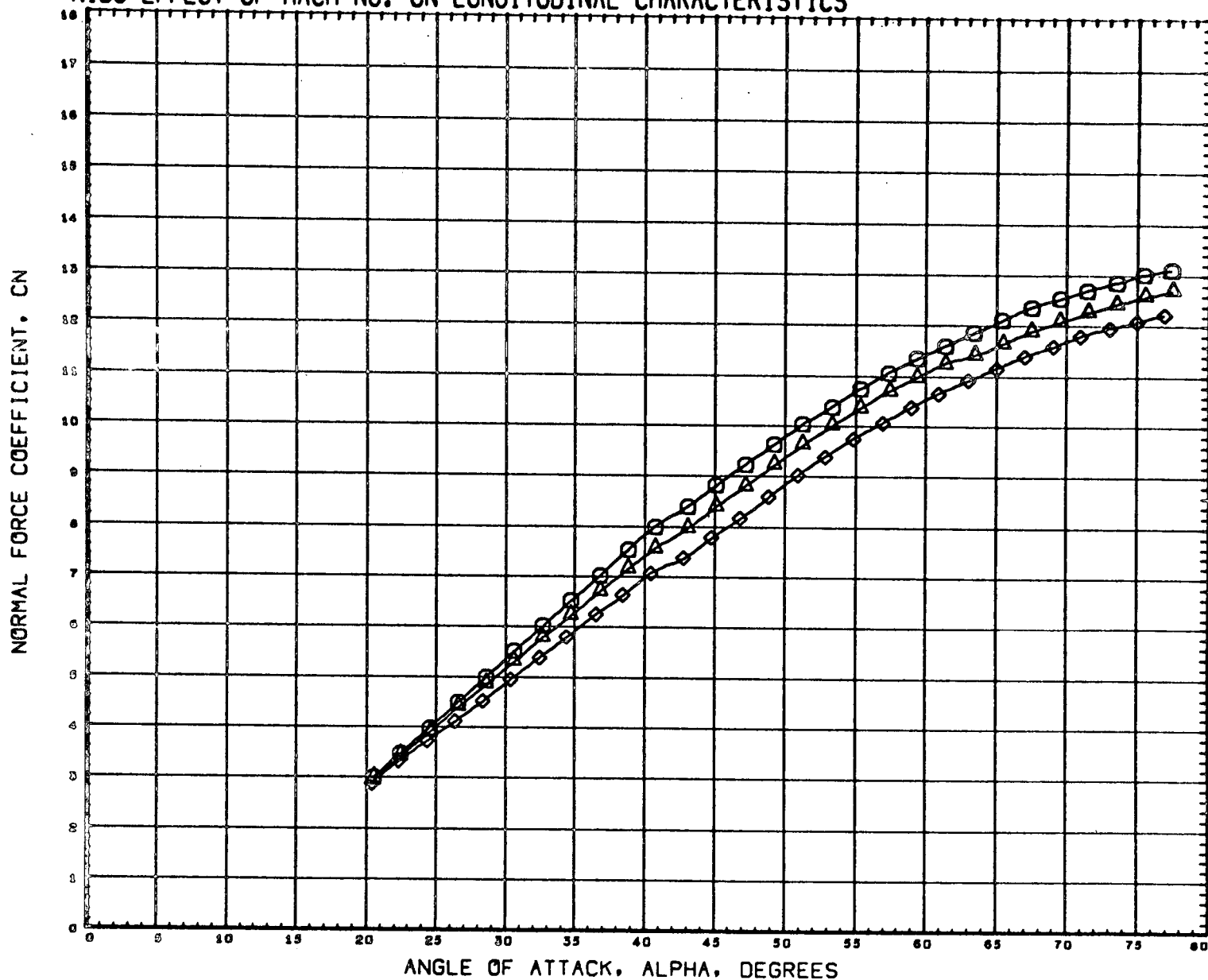


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.899		0.000
△	1.197		
◇	1.461		
□	1.964		

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	9.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE *G+E

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
YMRP	3.2300	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

MSFC TWT 521

BOOSTER

N1B3

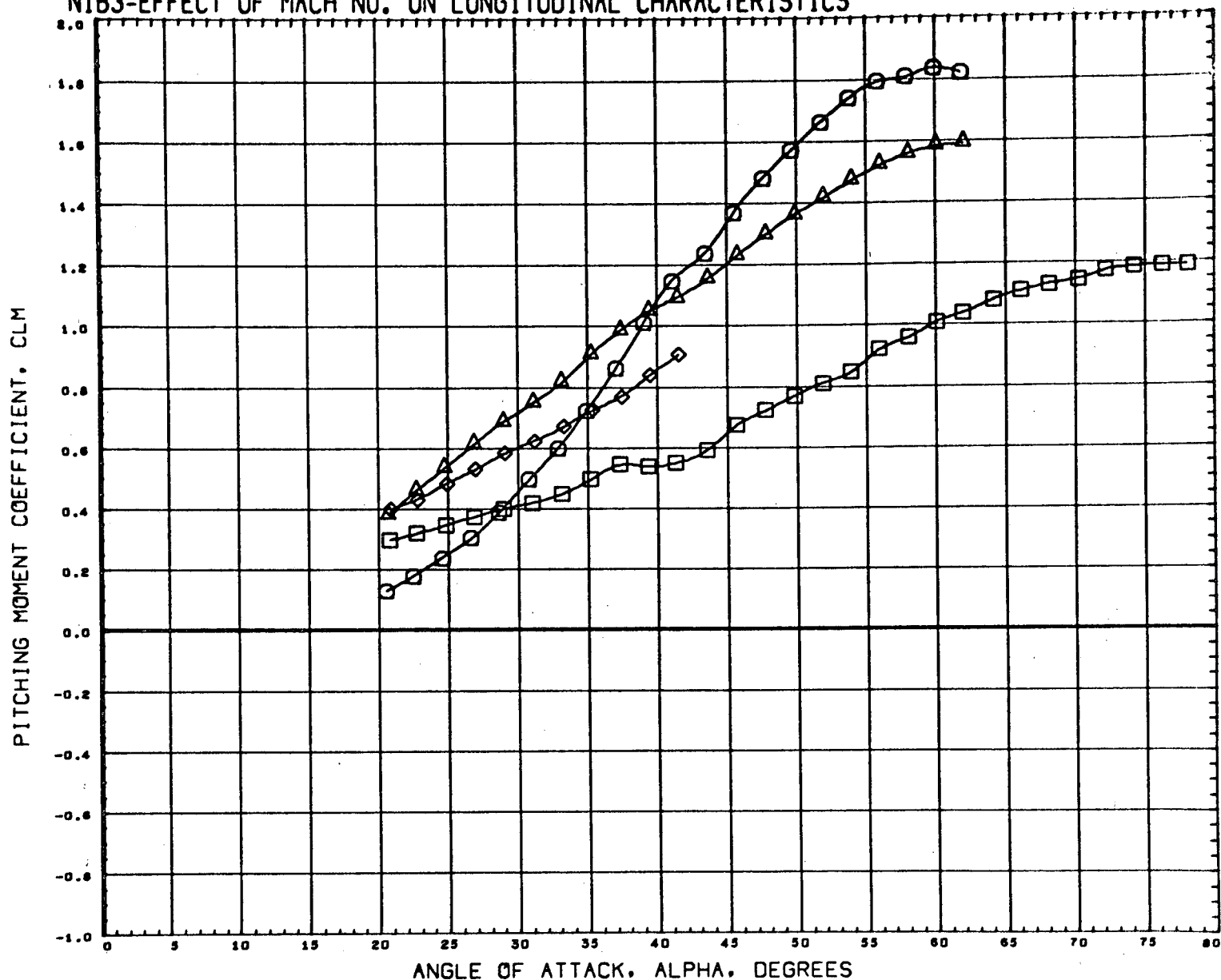
(E5501S)

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL MACH
 ○ 0.899
 △ 1.197
 ◇ 1.461
 □ 1.964

BETA 0.000
 PARAMETRIC VALUES

REFERENCE INFORMATION

SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMHP	5.2300	IN.
YMHP	0.0000	IN.
ZMHP	0.0000	IN.
SCALE	0.0034	

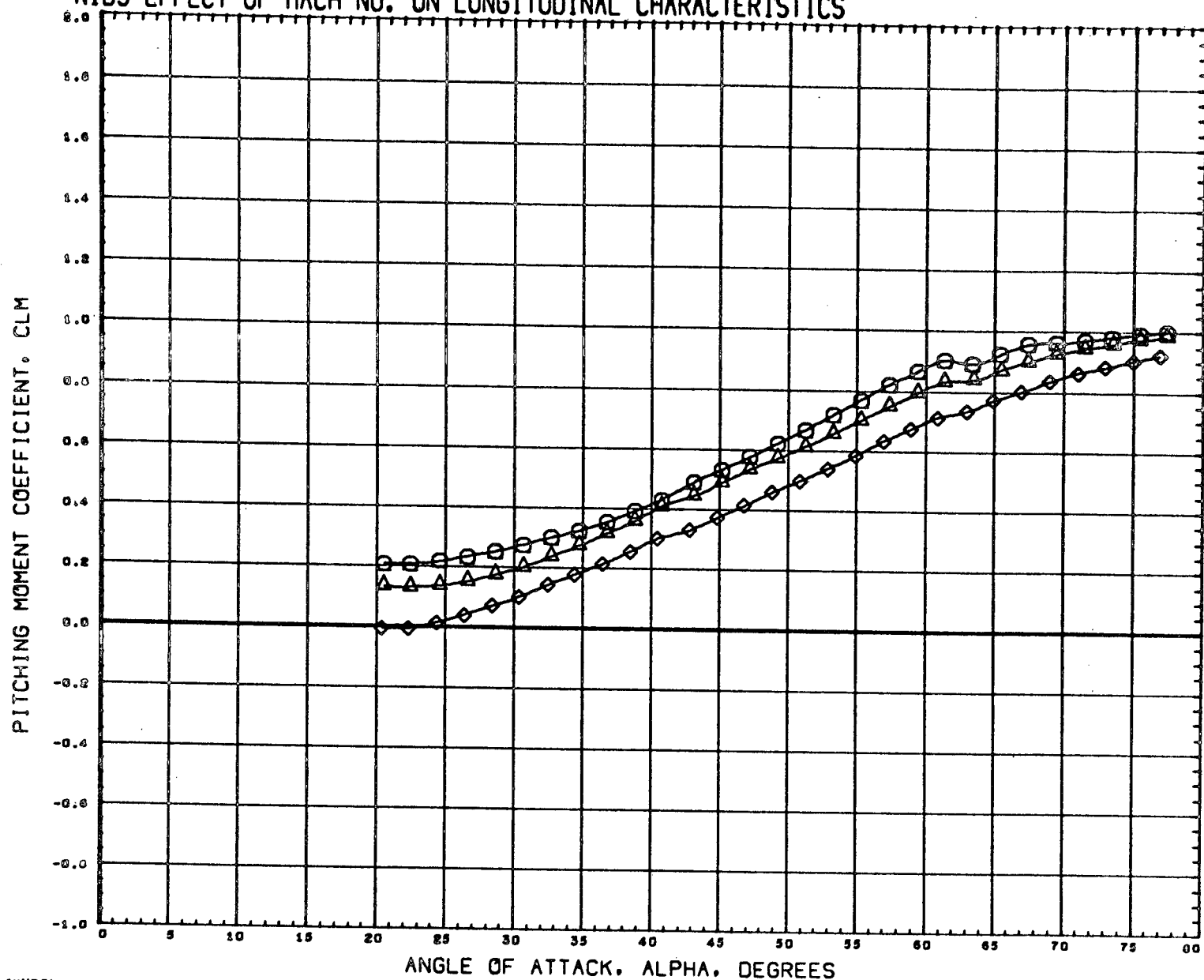
DATA HIST. CODE *64E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	DETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.939		

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

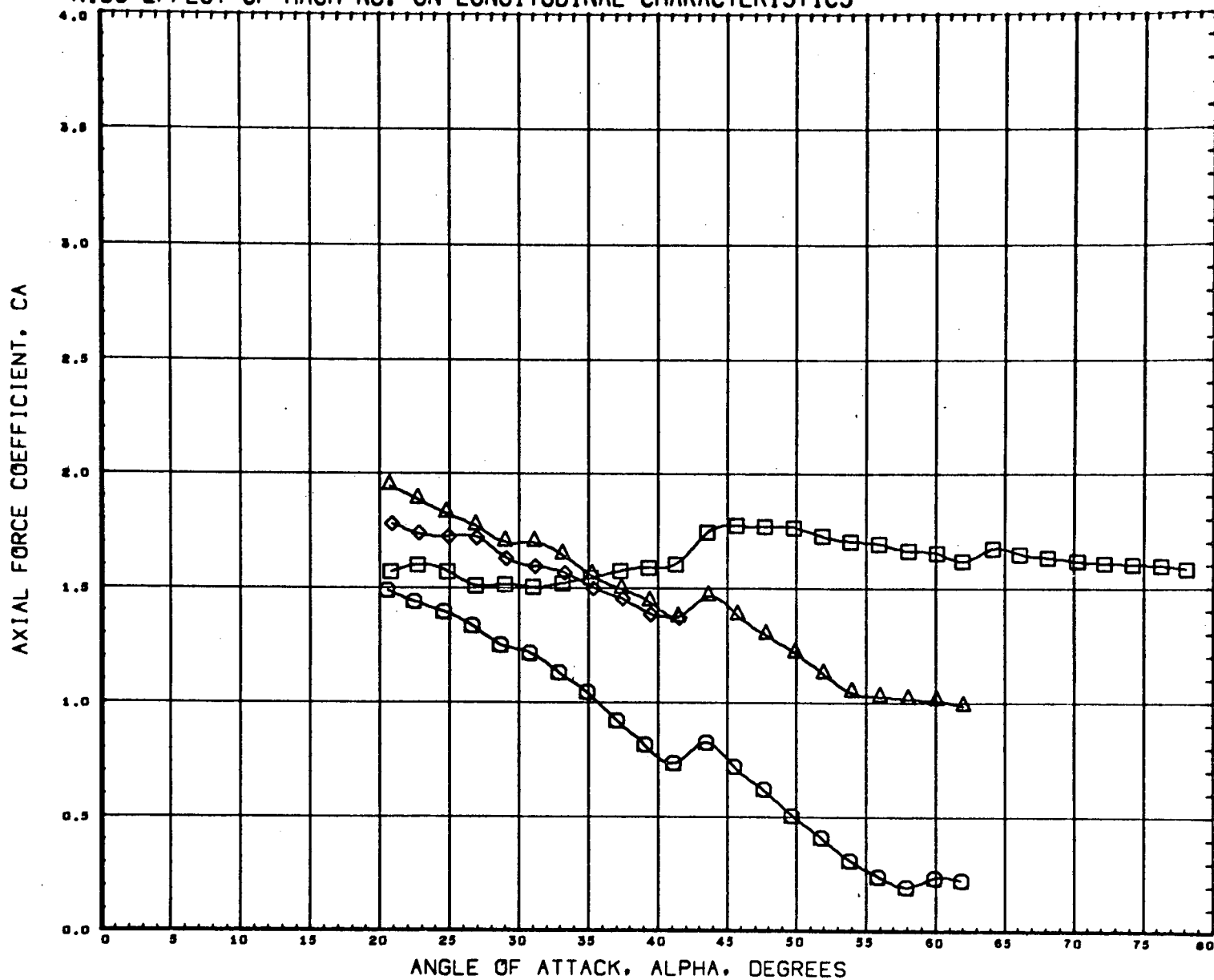
DATA HIST. CODE *G*E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.899		0.000
△	1.197		
◇	1.461		
□	1.964		

REFERENCE INFORMATION		
SREF	0.9330	50. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

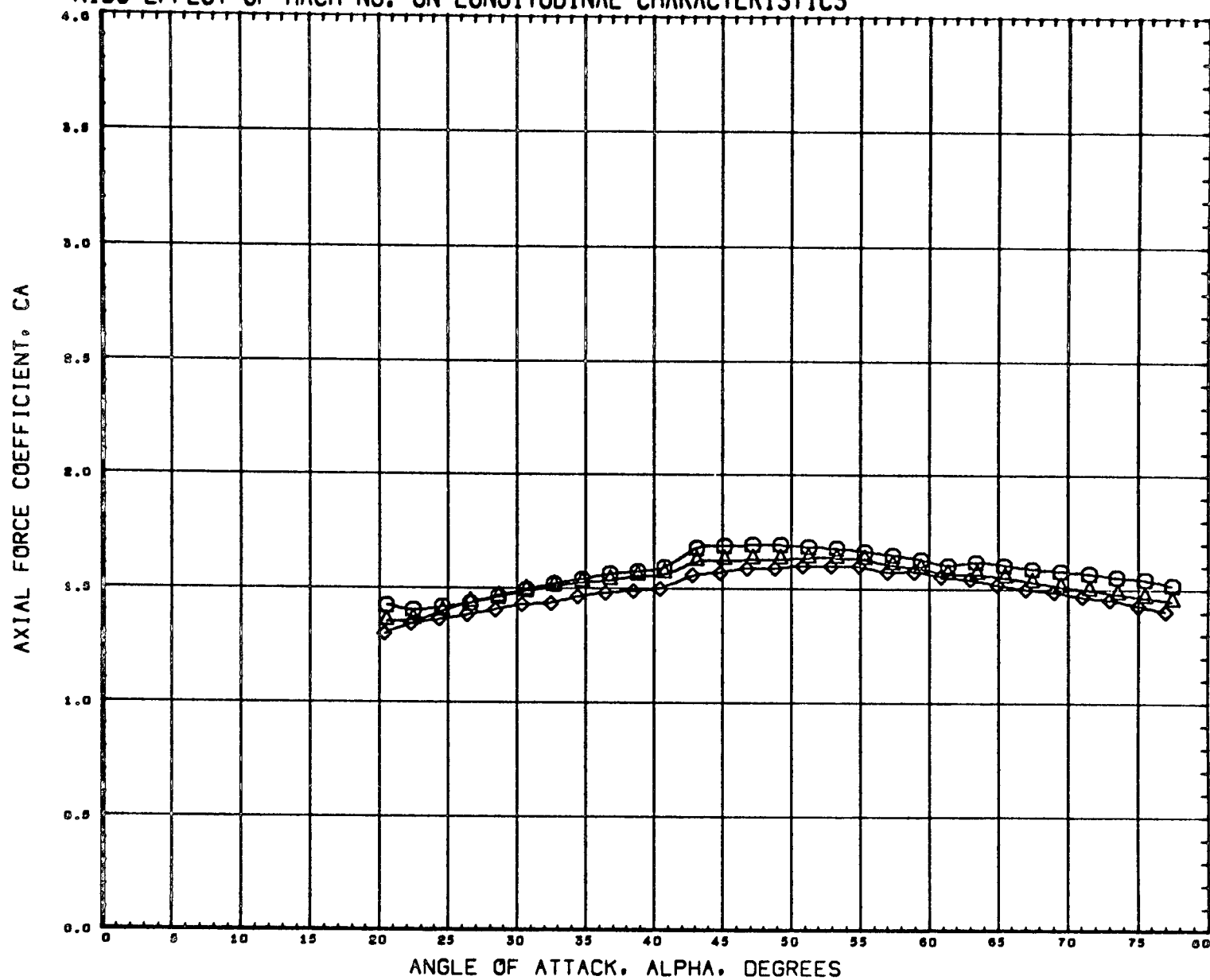
DATA HIST. CODE *G*E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.950		

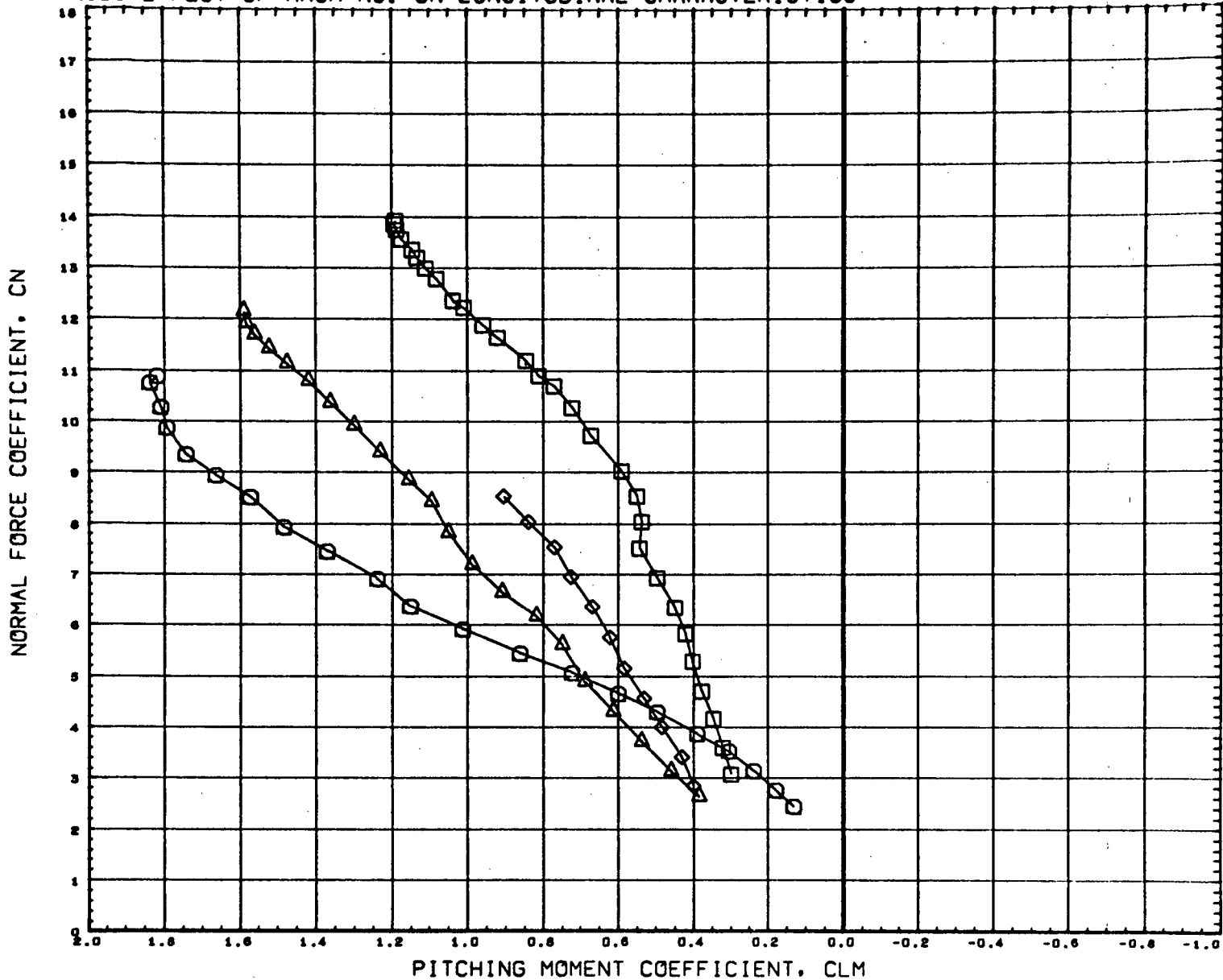
REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	0.1720	IN.
BREF	0.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

MSFC TWT 521 BOOSTER N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.899		0.000
△	1.197		
◇	1.461		
□	1.964		

REFERENCE INFORMATION		
SREF	0.9330	50. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRF	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

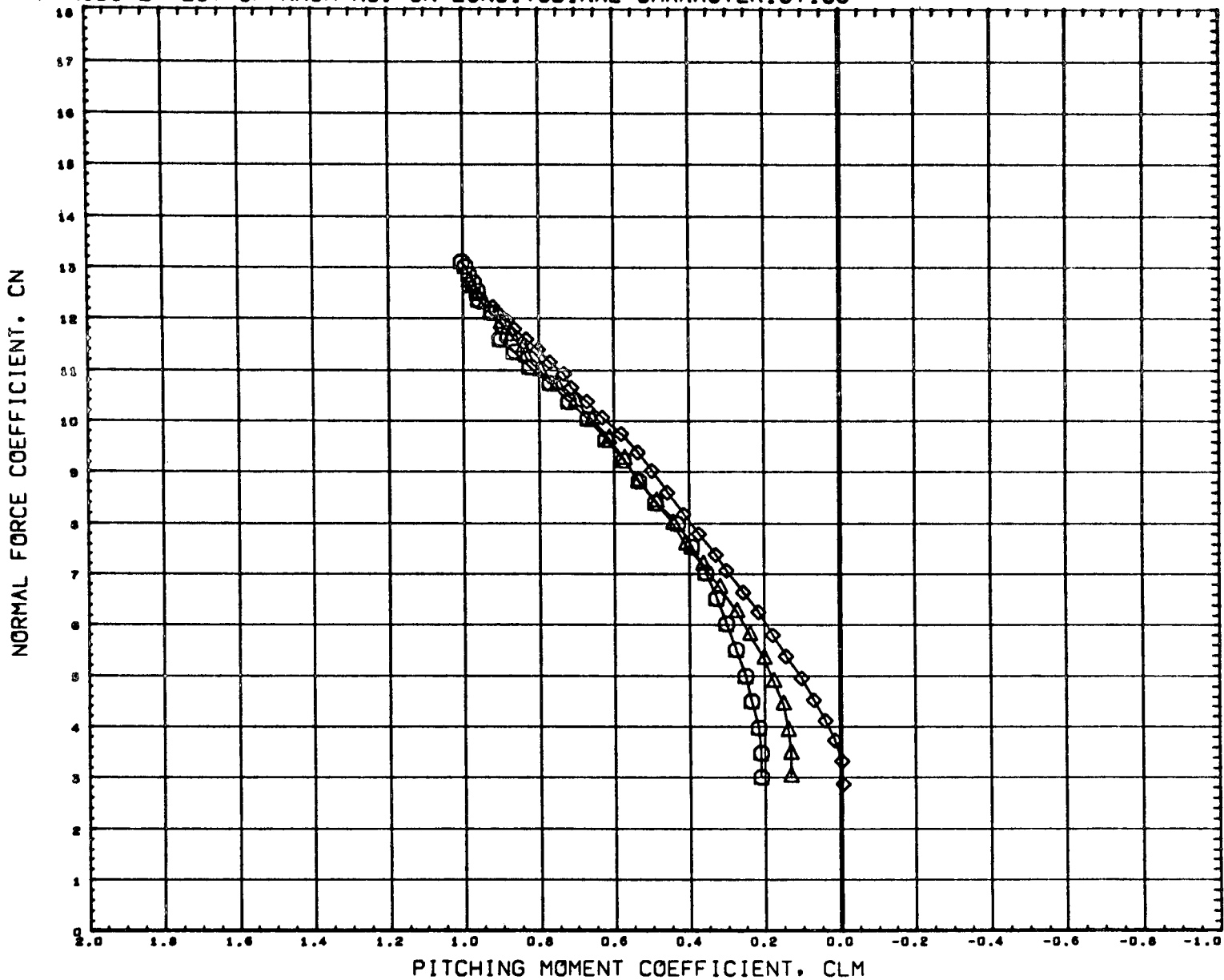
DATA HIST. CODE *G*E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	90. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

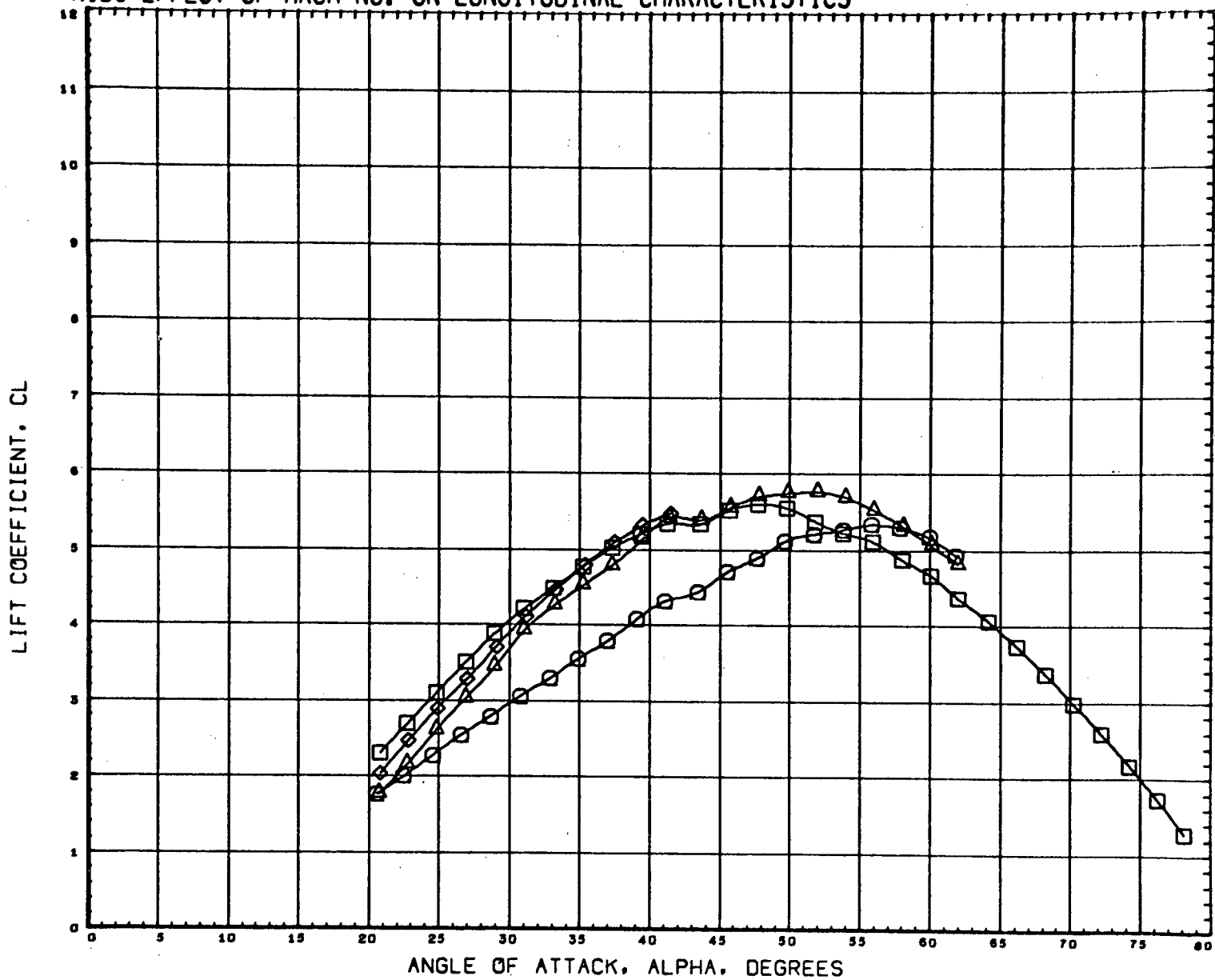
MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES
 ○ 0.899 0.000 0.000
 △ 1.197
 ◇ 1.461
 □ 1.964

DATA HIST. CODE *G*E

REFERENCE INFORMATION

SREF	0.9330	39. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

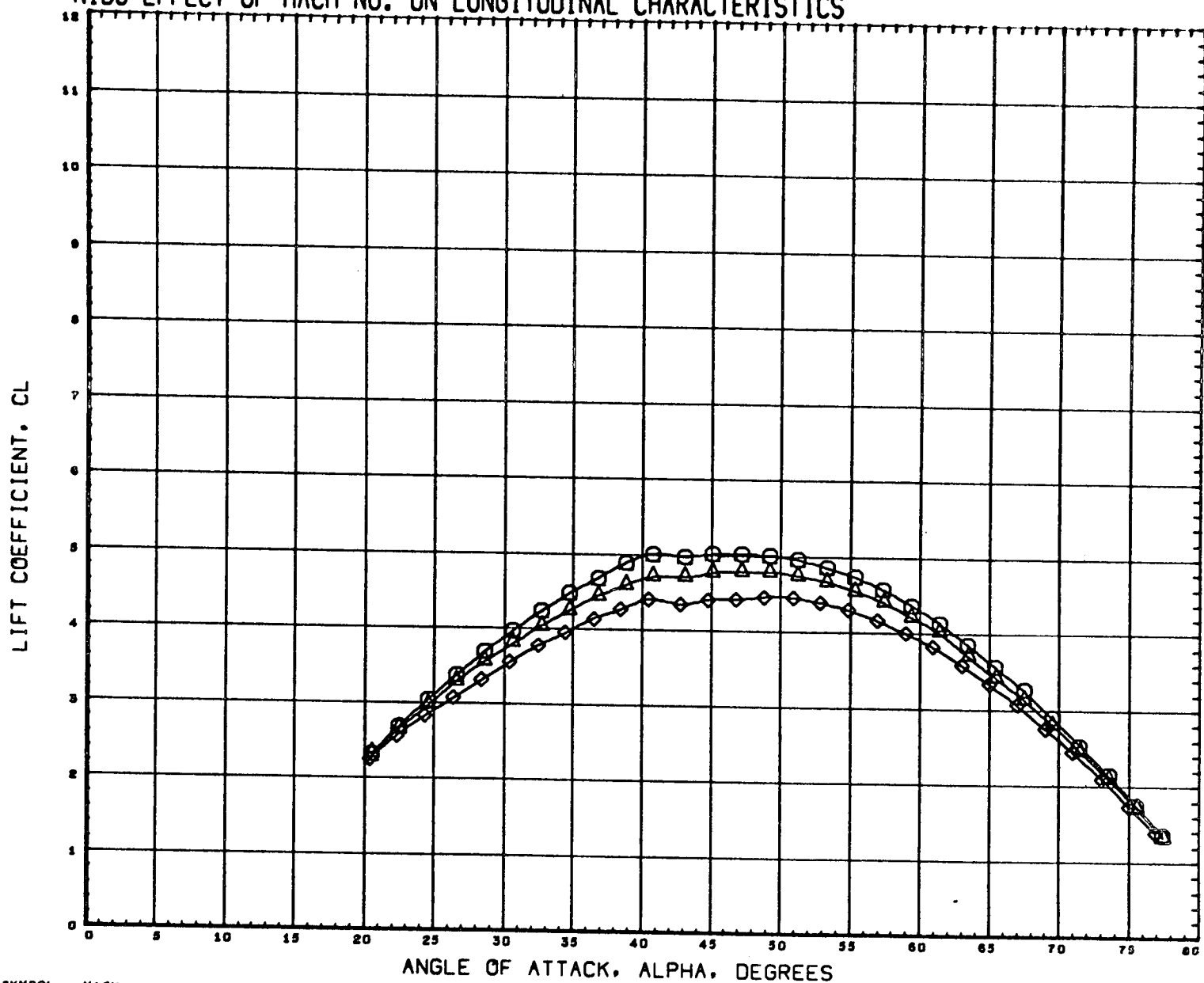
MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES
 ○ 2.740 0.000
 △ 3.480
 ◇ 4.950

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
 LREF 0.1720 IN.
 BREF 0.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

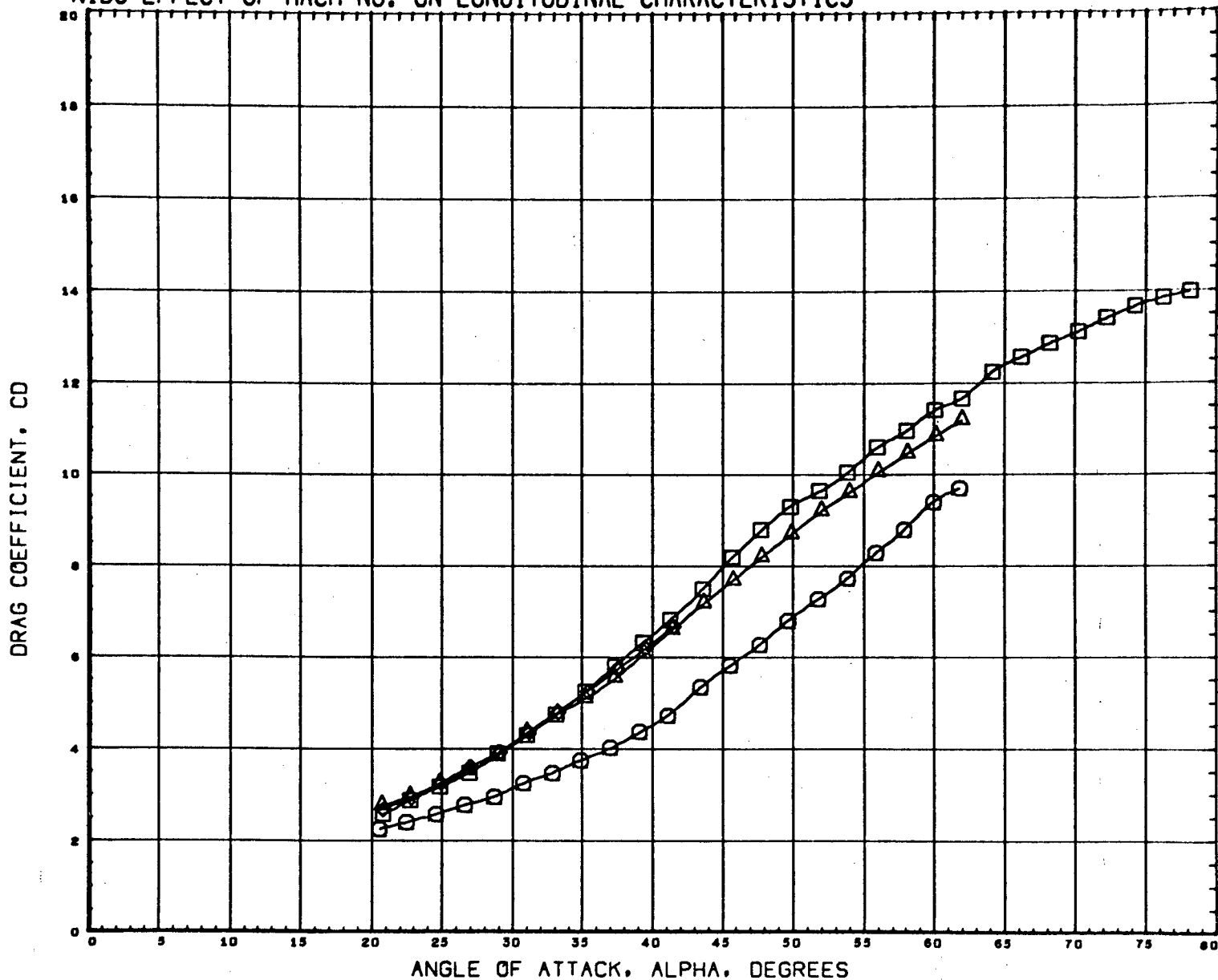
DATA HIST. CODE *G+E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES

○ 0.899 0.000 0.000

△ 1.197 0.000 0.000

◇ 1.461 0.000 0.000

□ 1.964 0.000 0.000

DATA HIST. CODE *G*E

REFERENCE INFORMATION

SREF 0.9330 39. IN

LREF 8.1720 IN.

BREF 8.1720 IN.

XMRP 5.2300 IN.

YMRP 0.0000 IN.

ZMRP 0.0000 IN.

SCALE 0.0034

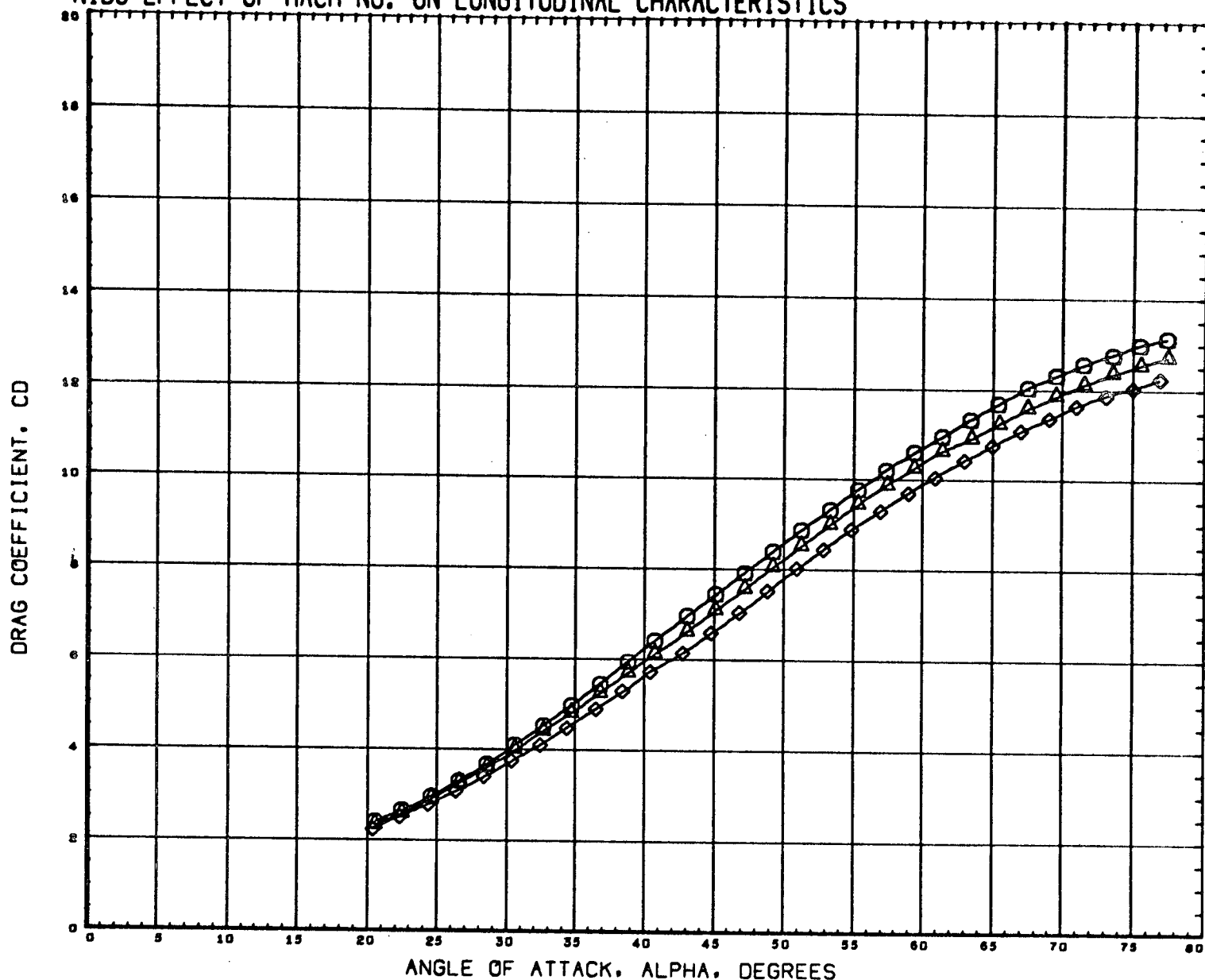
MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

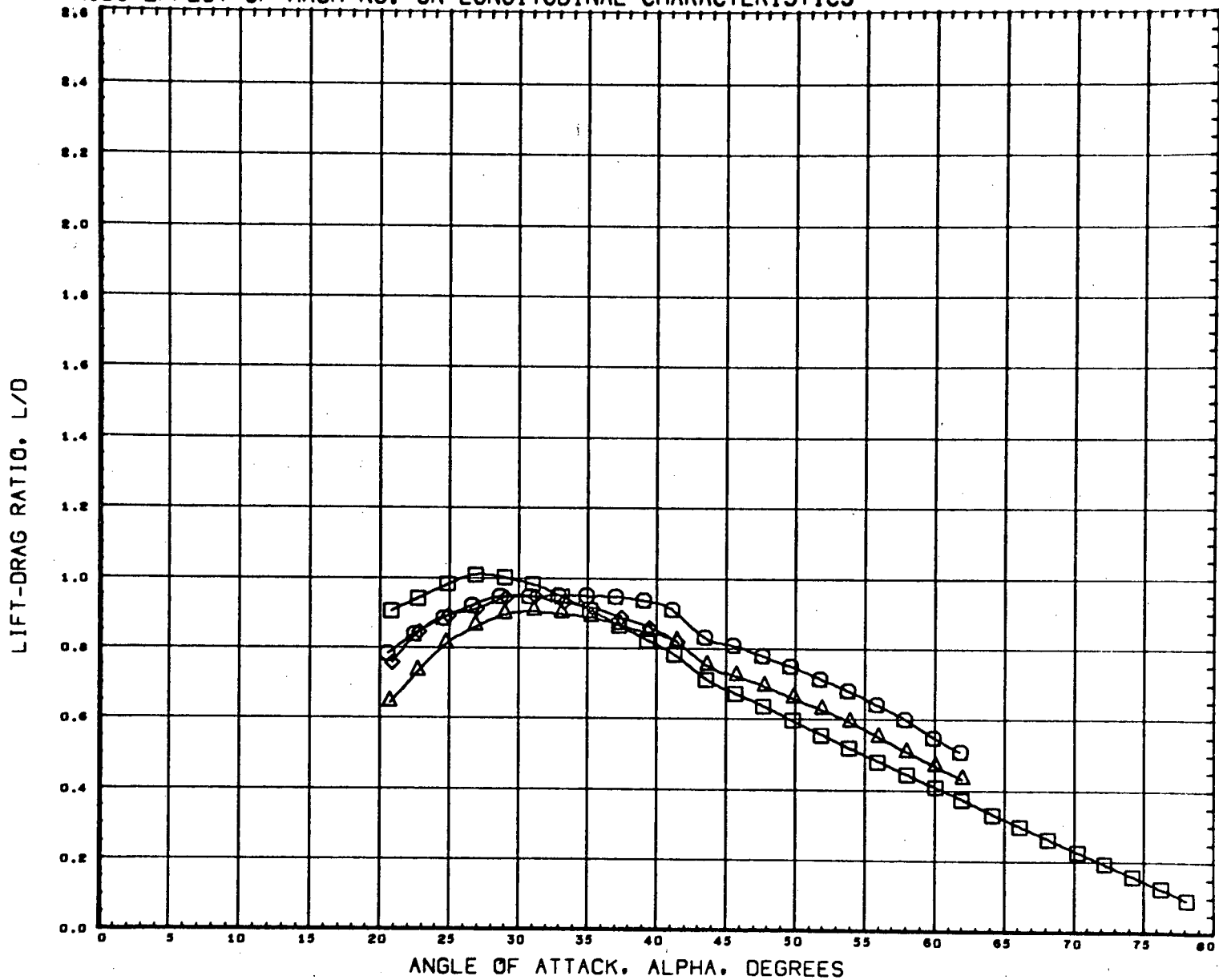


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.699		0.000
◇	1.197		
△	1.461		
□	1.964		

DATA HIST. CODE *G*E

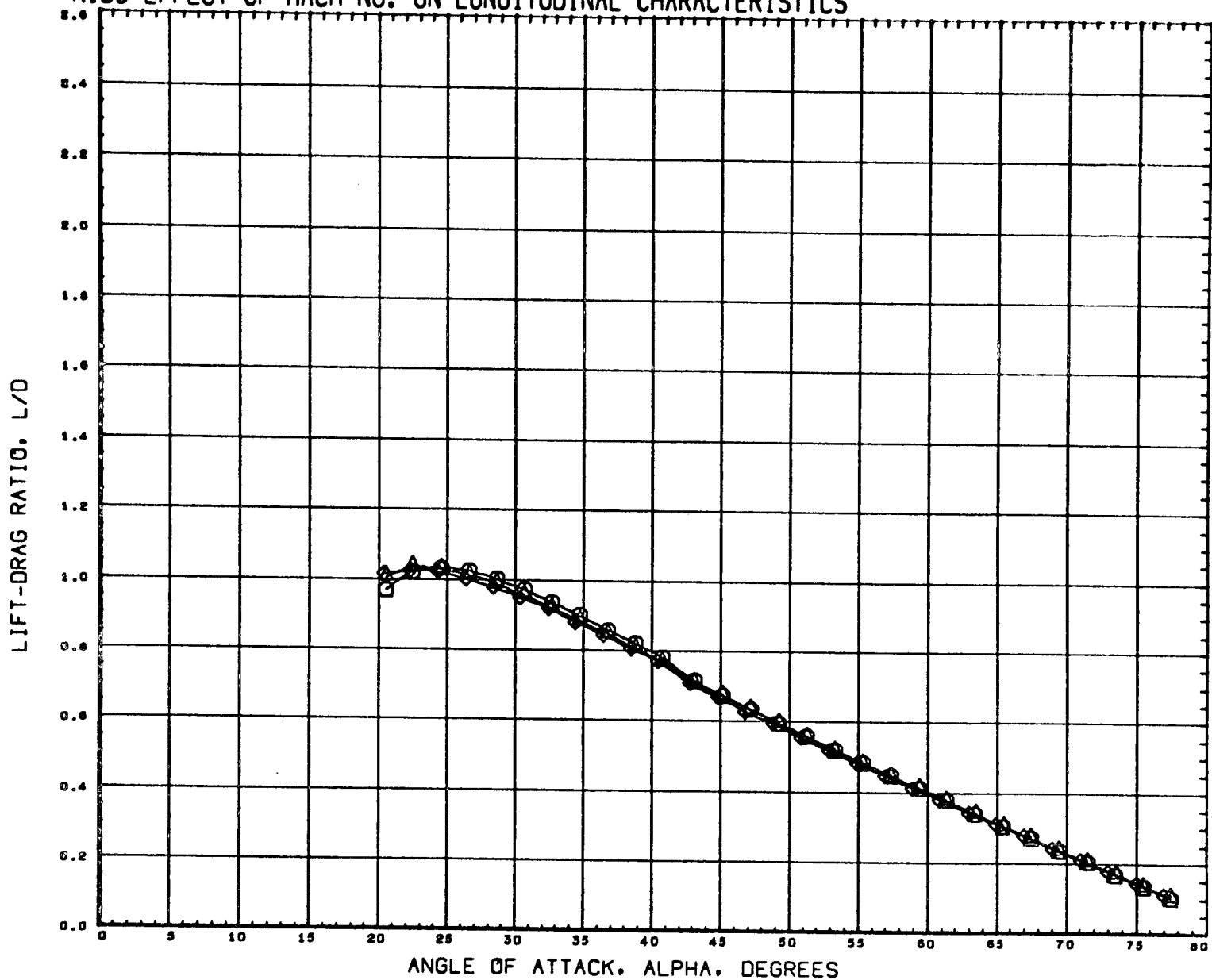
REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMHP	5.2300	IN.
YMHP	0.0000	IN.
ZMHP	0.0000	IN.
SCALE	0.0034	

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

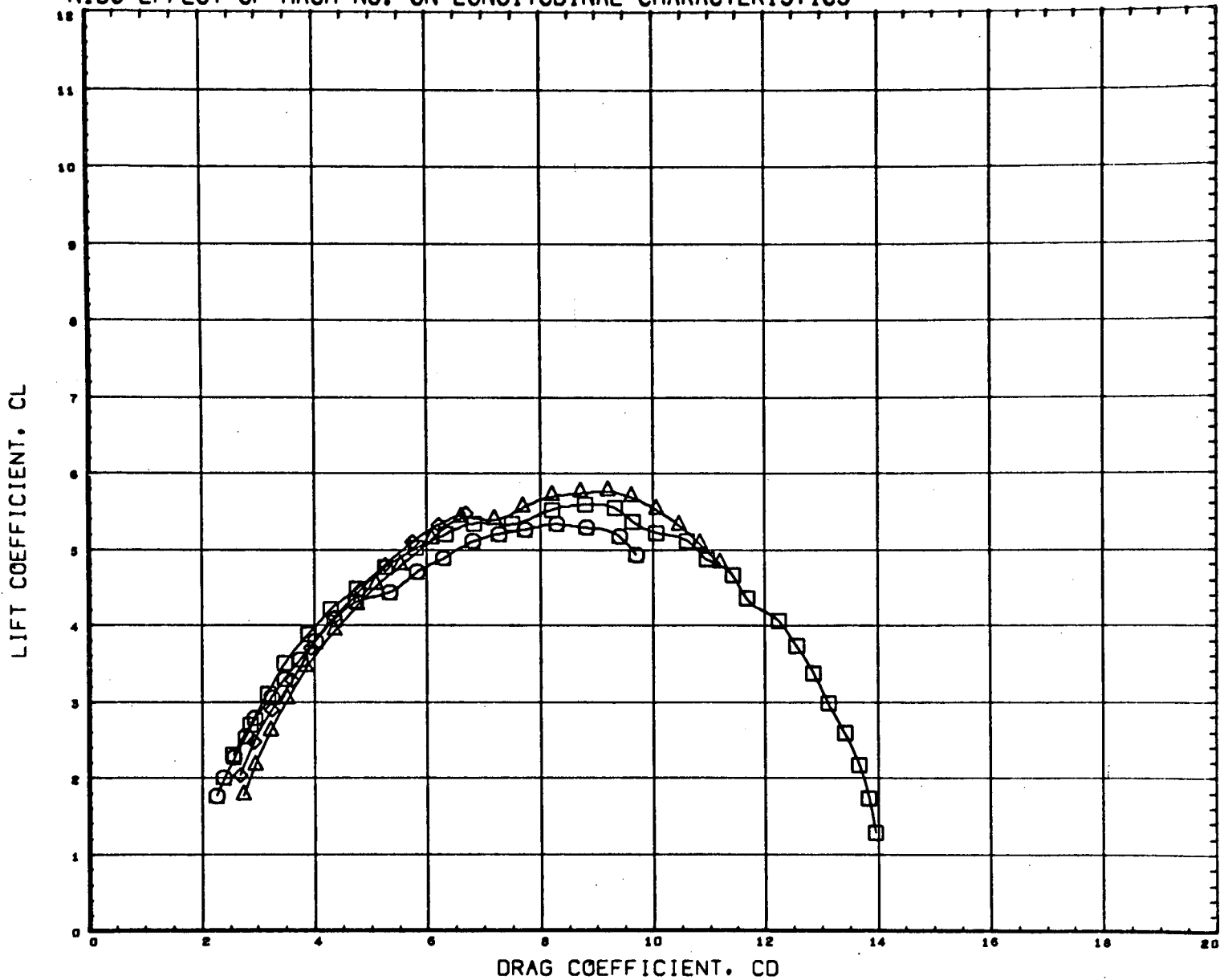


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMHP	5.2300	IN.
YMHP	0.0000	IN.
ZMHP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.899		0.000
△	1.197		
□	1.461		
◇	1.964		

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	6.1720	in.
BREF	6.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE *G+E

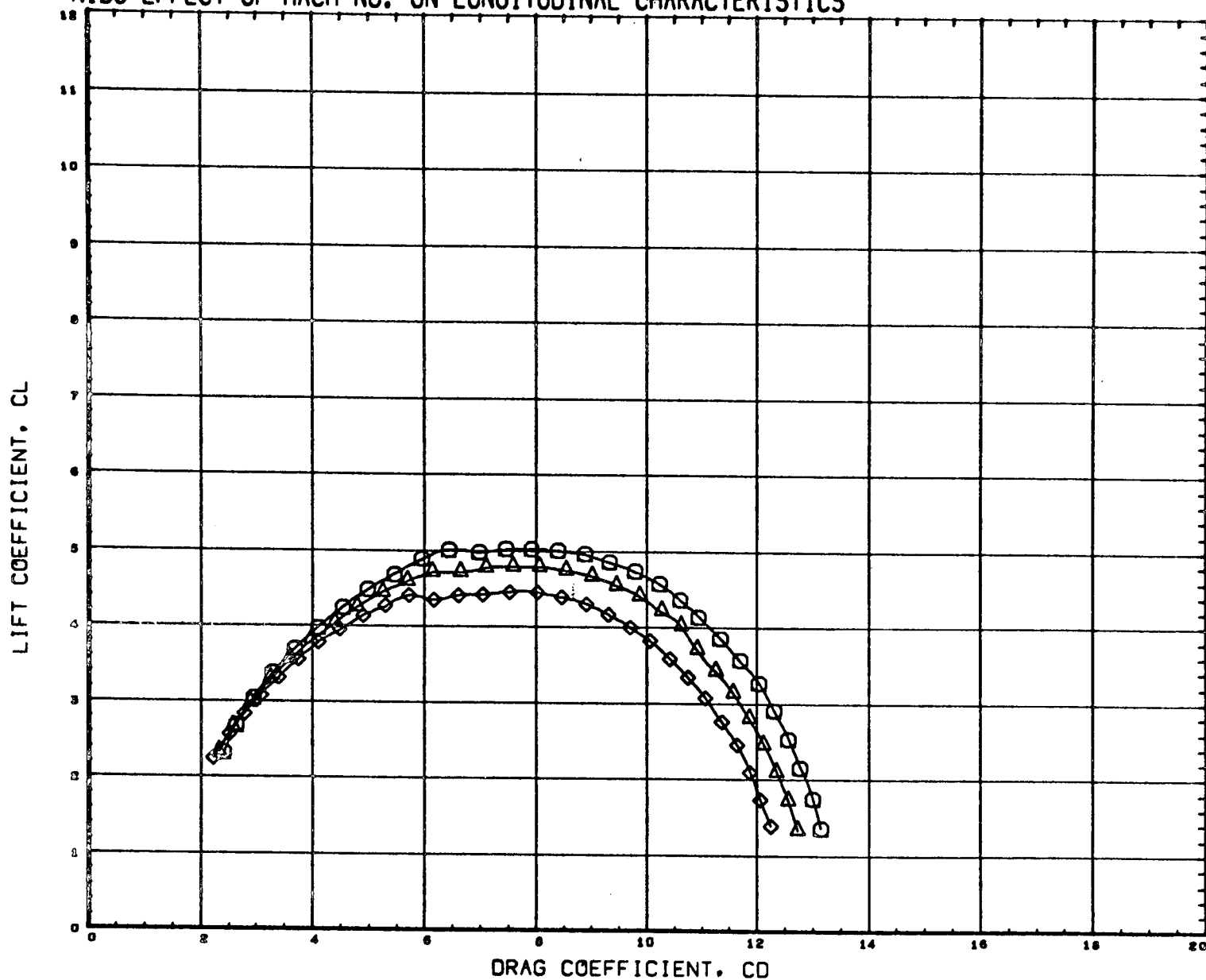
MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.400		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

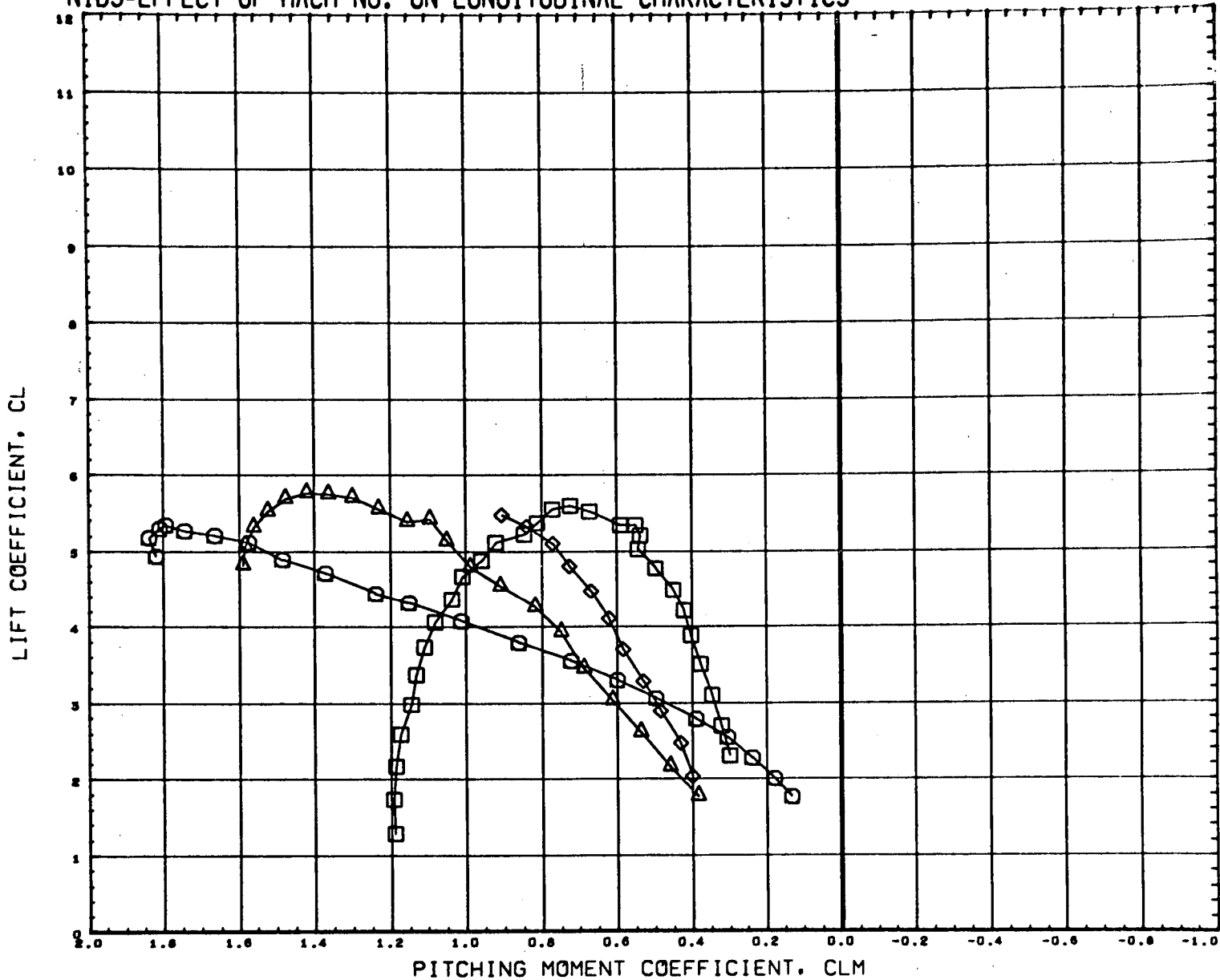
DATA HIST. CODE *6*E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	REFERENCE INFORMATION		
○	0.899		0.000	SREF	0.9330	30. IN
△	1.197			LREF	8.1720	IN.
◇	1.461			BREF	8.1720	IN.
□	1.964			XMRP	5.2300	IN.
				YMRP	0.0000	IN.
				ZMRP	0.0000	IN.
				SCALE	0.0034	

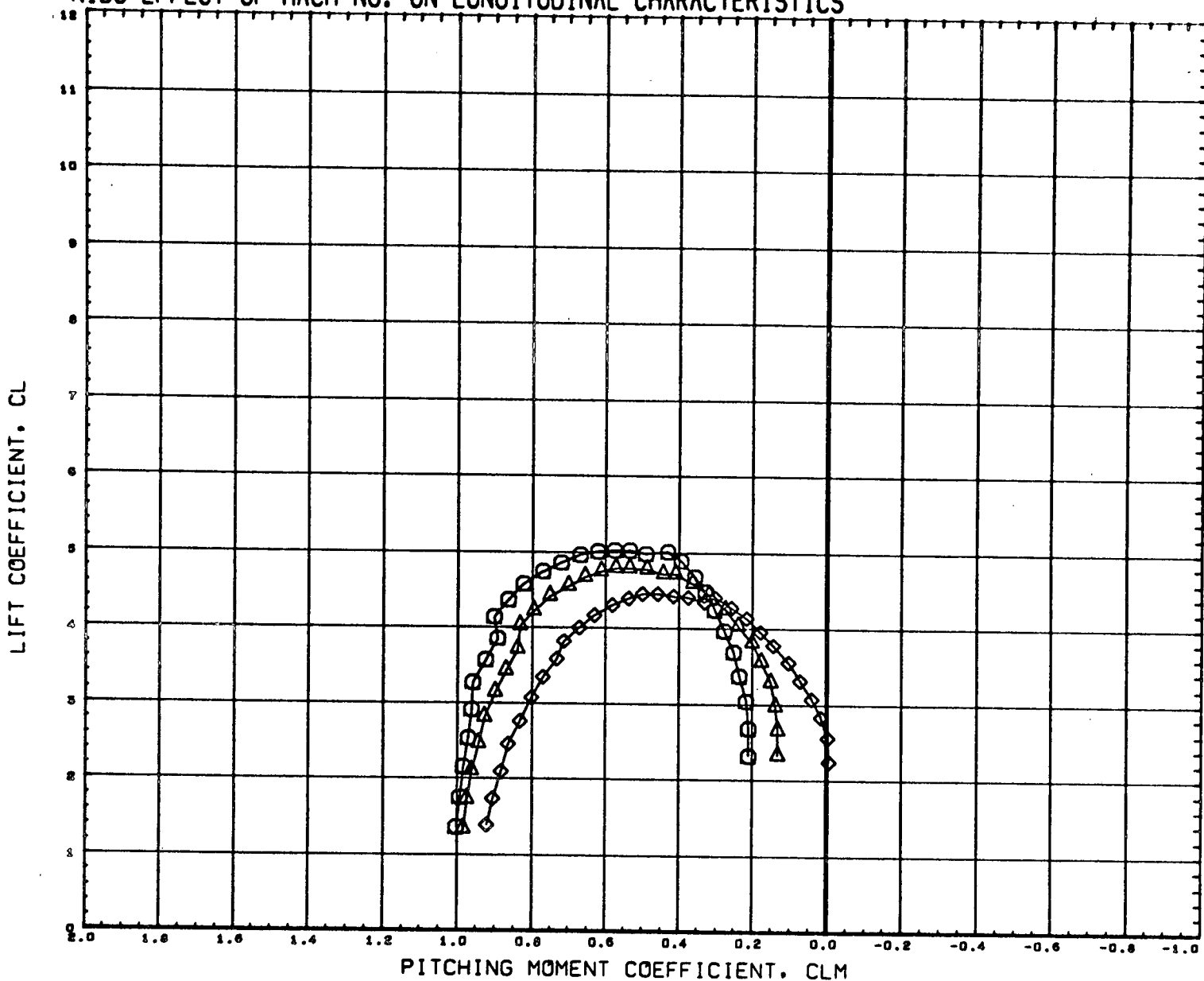
DATA HIST. CODE *G*E

MSFC TWT 521 BOOSTER

N1B3

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N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	59. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

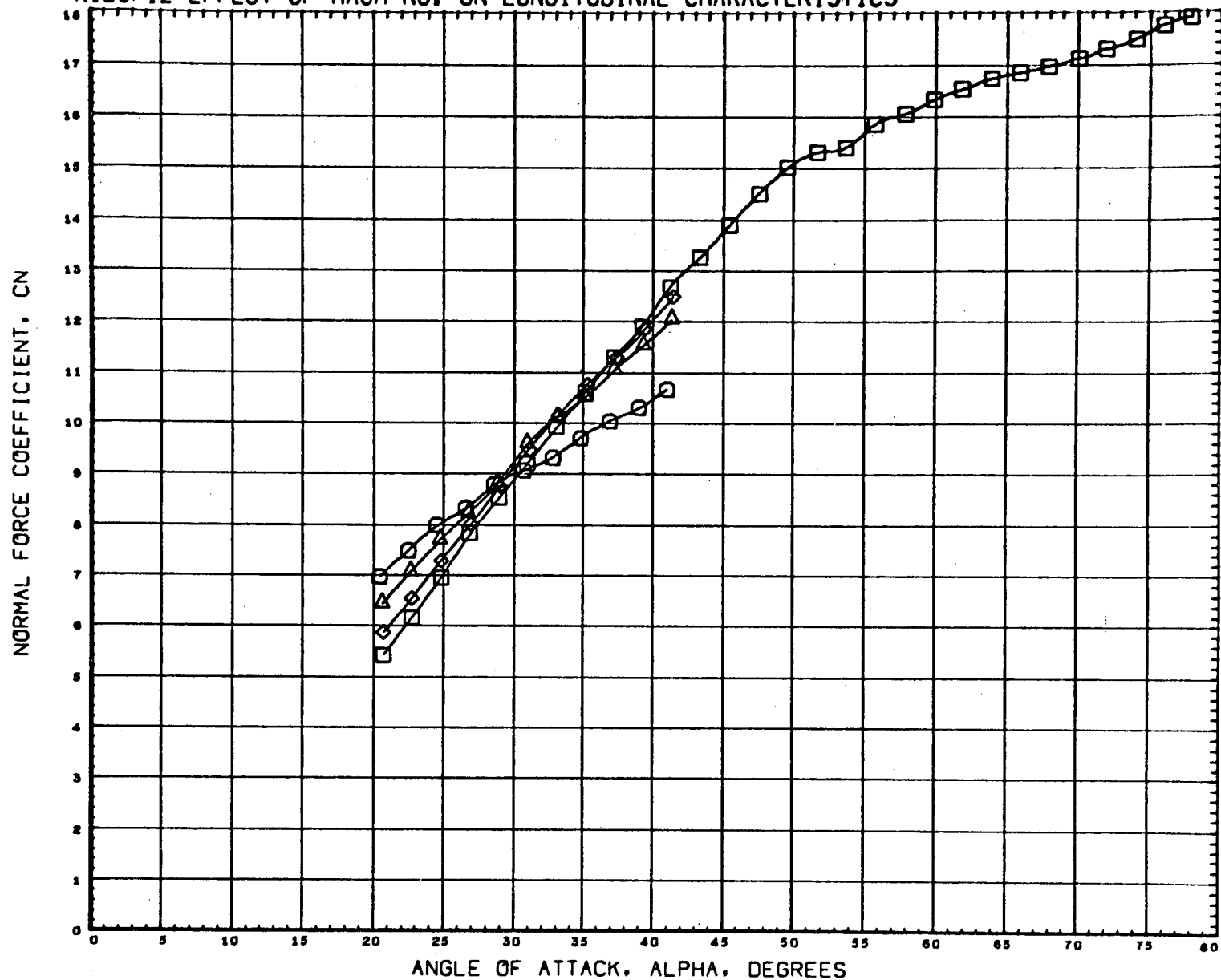
MSFC TWT 521 BOOSTER

N1B3

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.898		0.000	DIHDL 30.000
△	1.198			
◇	1.460			
□	1.957			

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

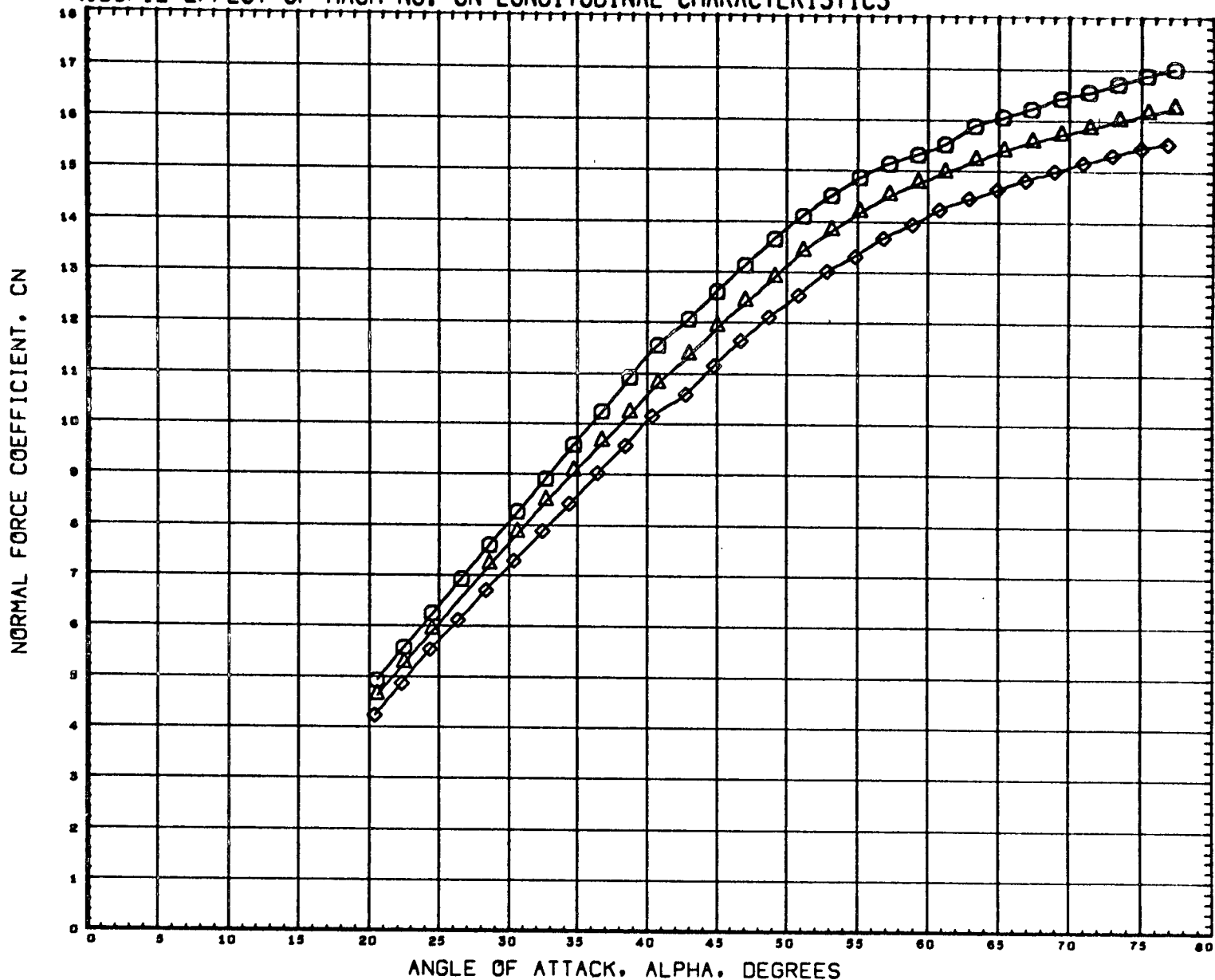
MSFC TWT 521 BOOSTER

N1B3F12

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

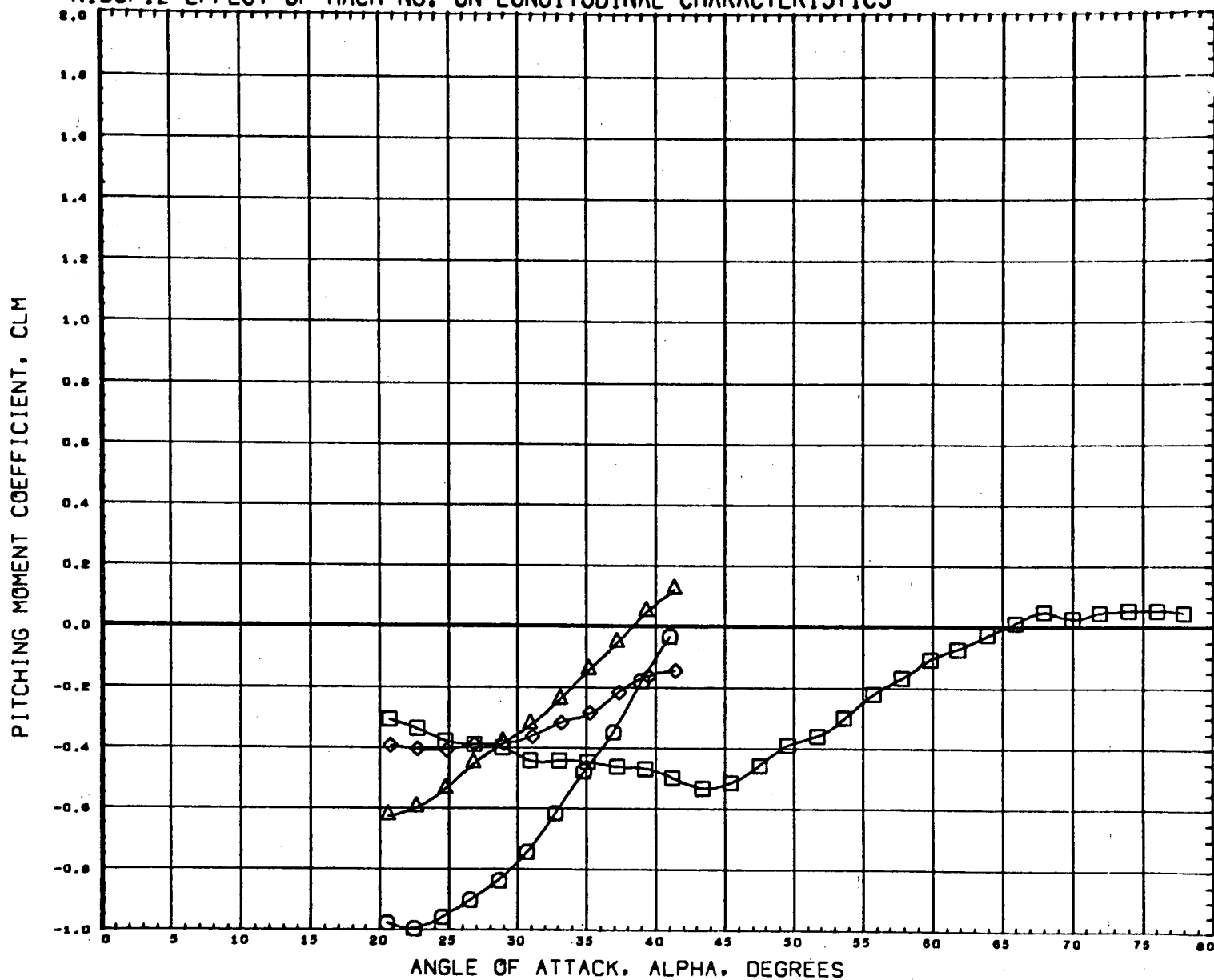


SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	2.740	0.000	DIHRL	30.000
△	3.480			
◇	4.959			

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.898	0.000	D1HDRL 30.000
△	1.198		
◇	1.460		
□	1.957		

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

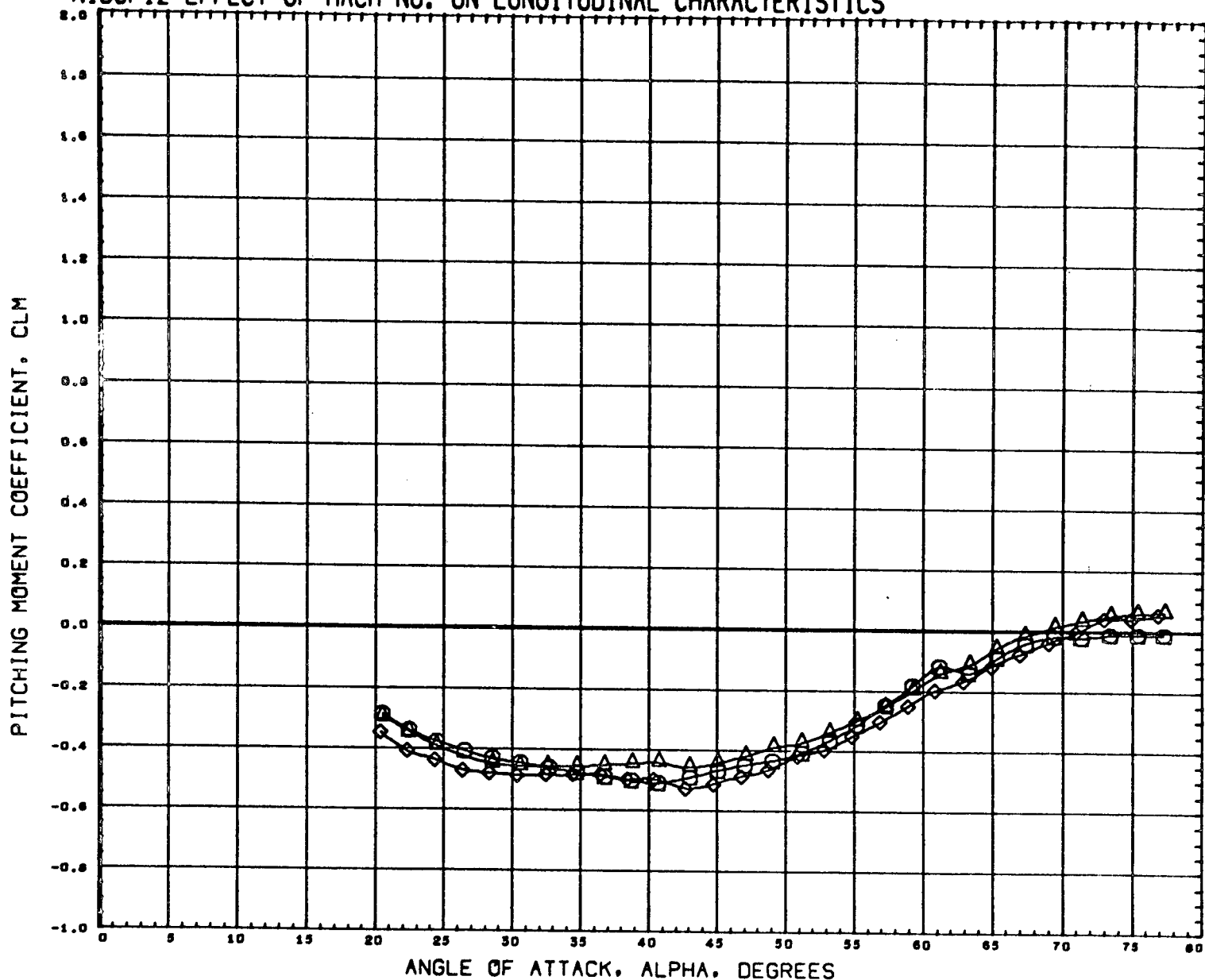
MSFC TWT 521 BOOSTER

N1B3F12

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

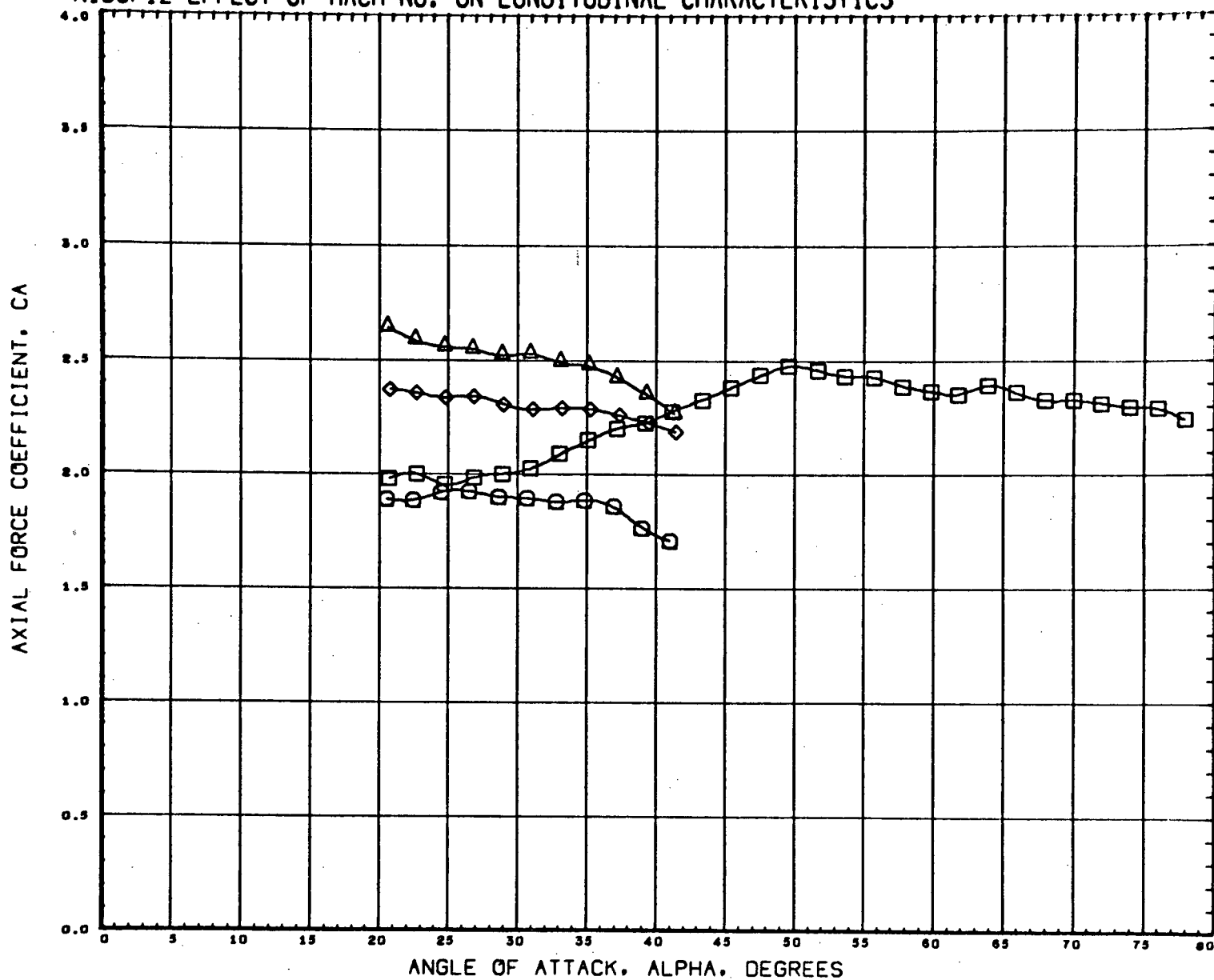


SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	2.740		0.000	DIHDL 30.000
△	3.480			
◇	4.959			

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL MACH
 ○ 0.898
 △ 1.198
 ◇ 1.460
 □ 1.957

PARAMETRIC VALUES
 BETA 0.000
 DIHRL 30.000

REFERENCE INFORMATION

SREF	0.9330	sq. in
LREF	6.1720	in.
BREF	6.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

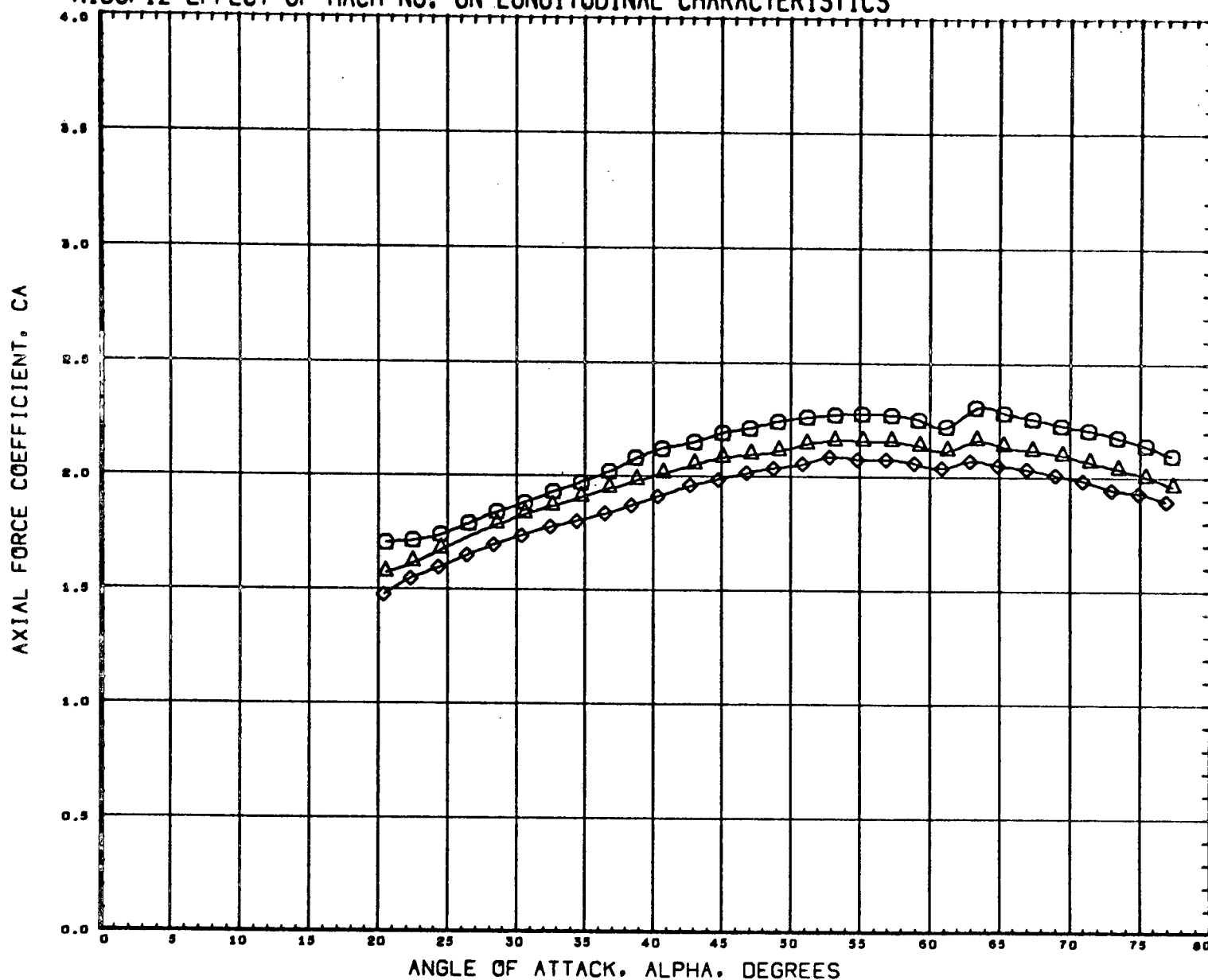
DATA HIST. CODE *G#E

MSFC TWT 521 BOOSTER

N1B3F12

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N183F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740	0.000	DIMDRL 30.000
△	3.460		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	6.1720	IN.
QREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *66E

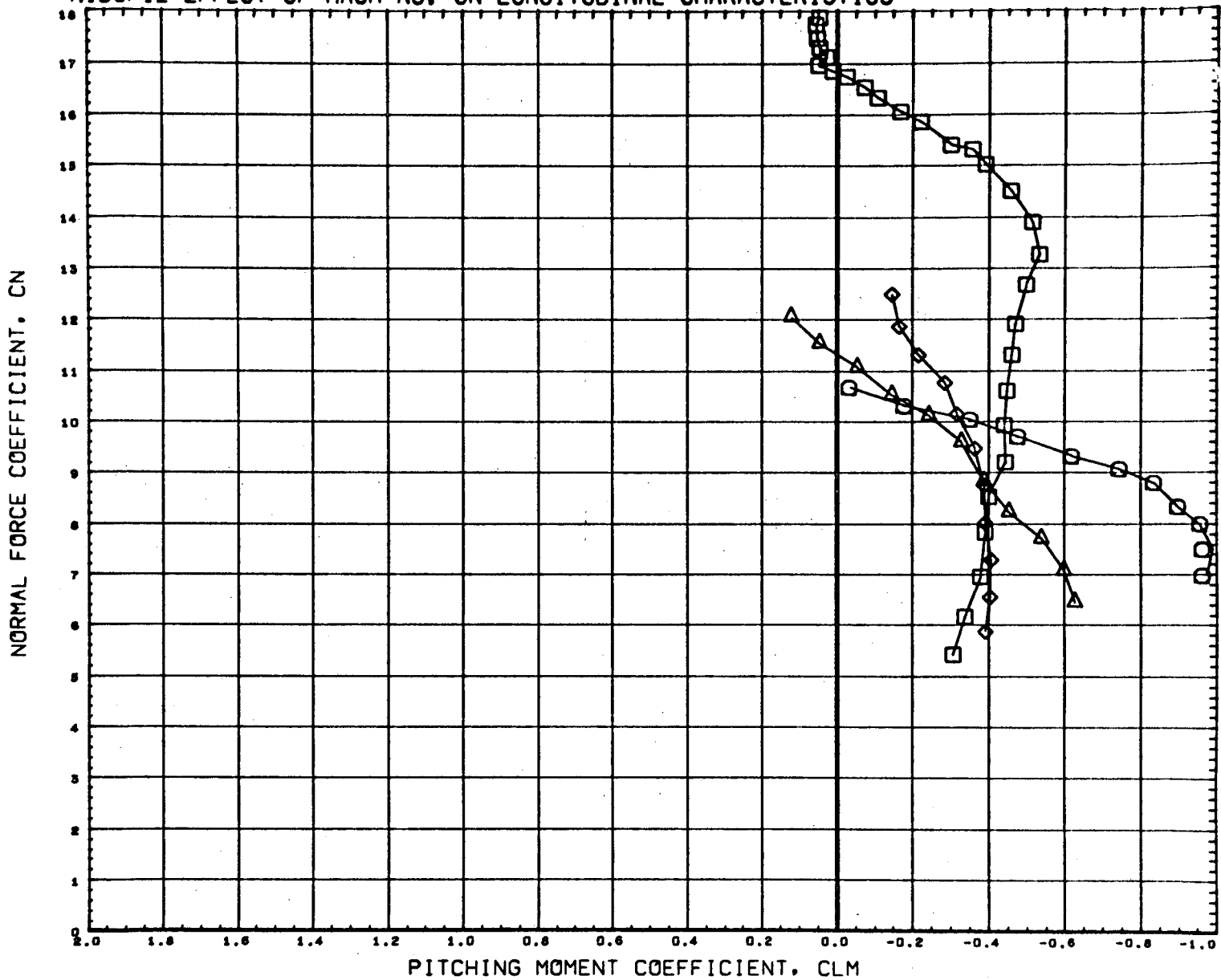
MSFC TWT 521 BOOSTER

N183F12

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.898		0.000	30.000
△	1.196			
◇	1.460			
□	1.937			

REFERENCE INFORMATION		
SREF	0.9330	sq. in.
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

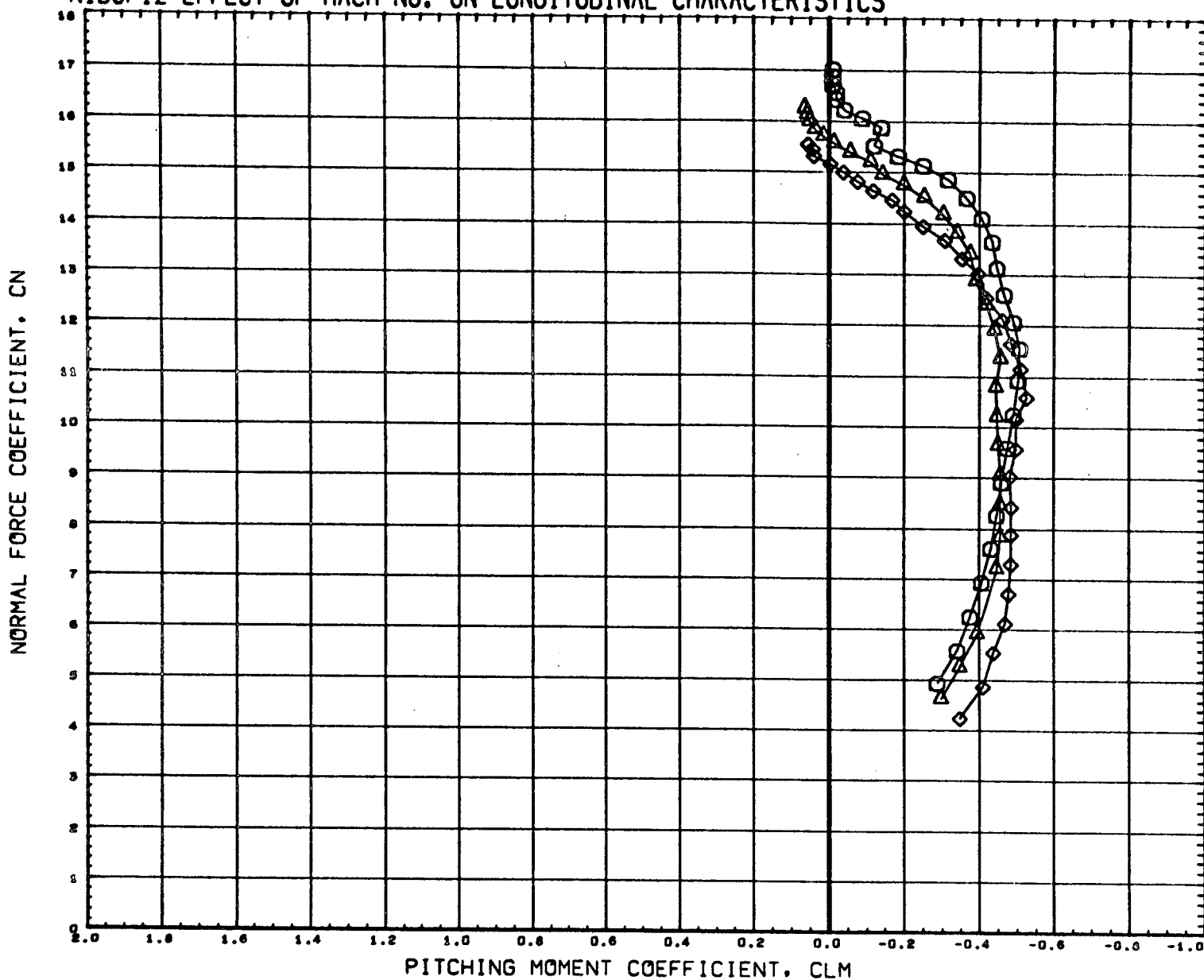
DATA HIST. CODE *G*E

MSFC TWT 521 BOOSTER

N1B3F12

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	2.740		0.000	DIHDL	30.000
△	3.480				
◇	4.959				

REFERENCE INFORMATION		
SREF	0.9330	50. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G+E

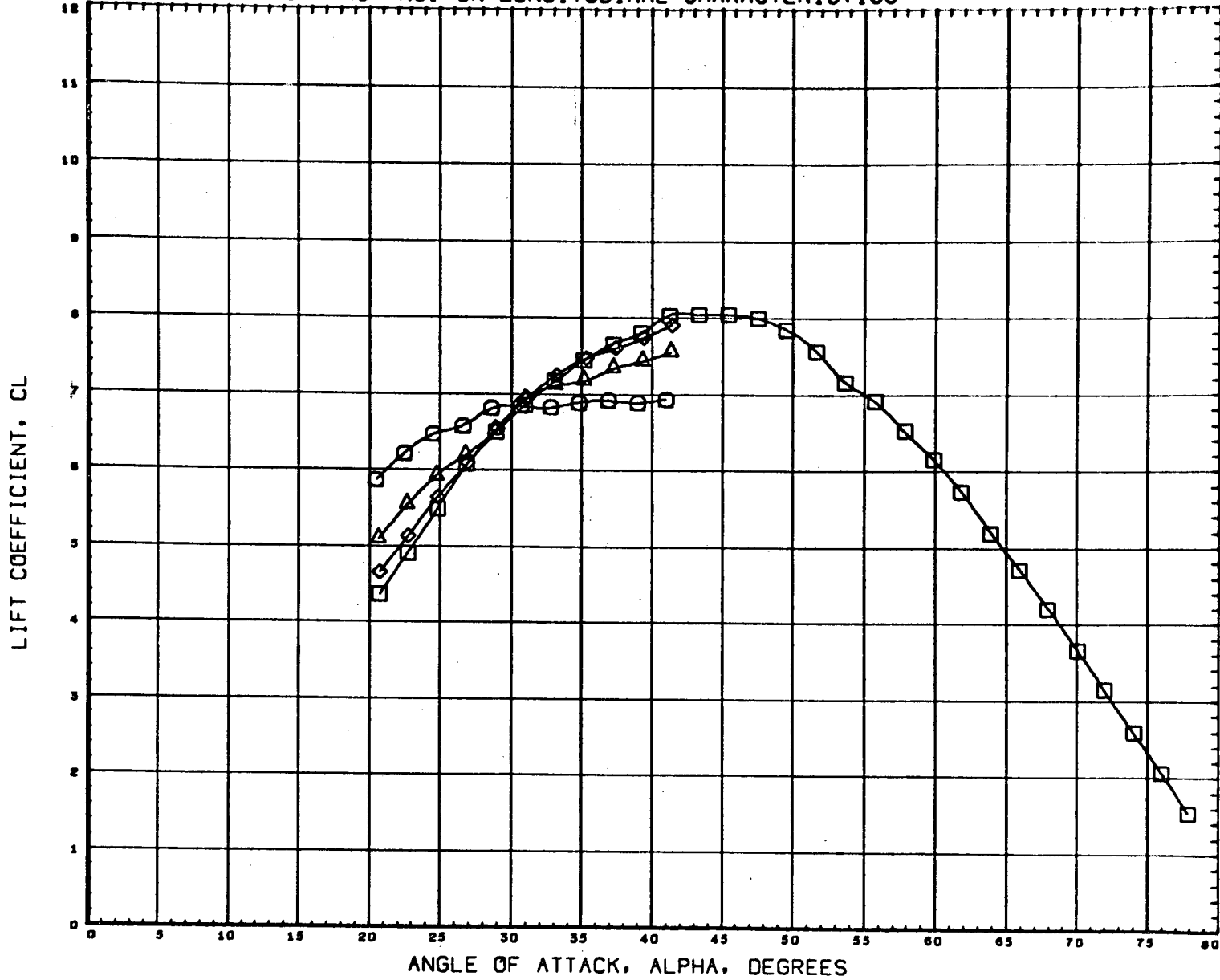
MSFC TWT 521 BOOSTER

N1B3F12

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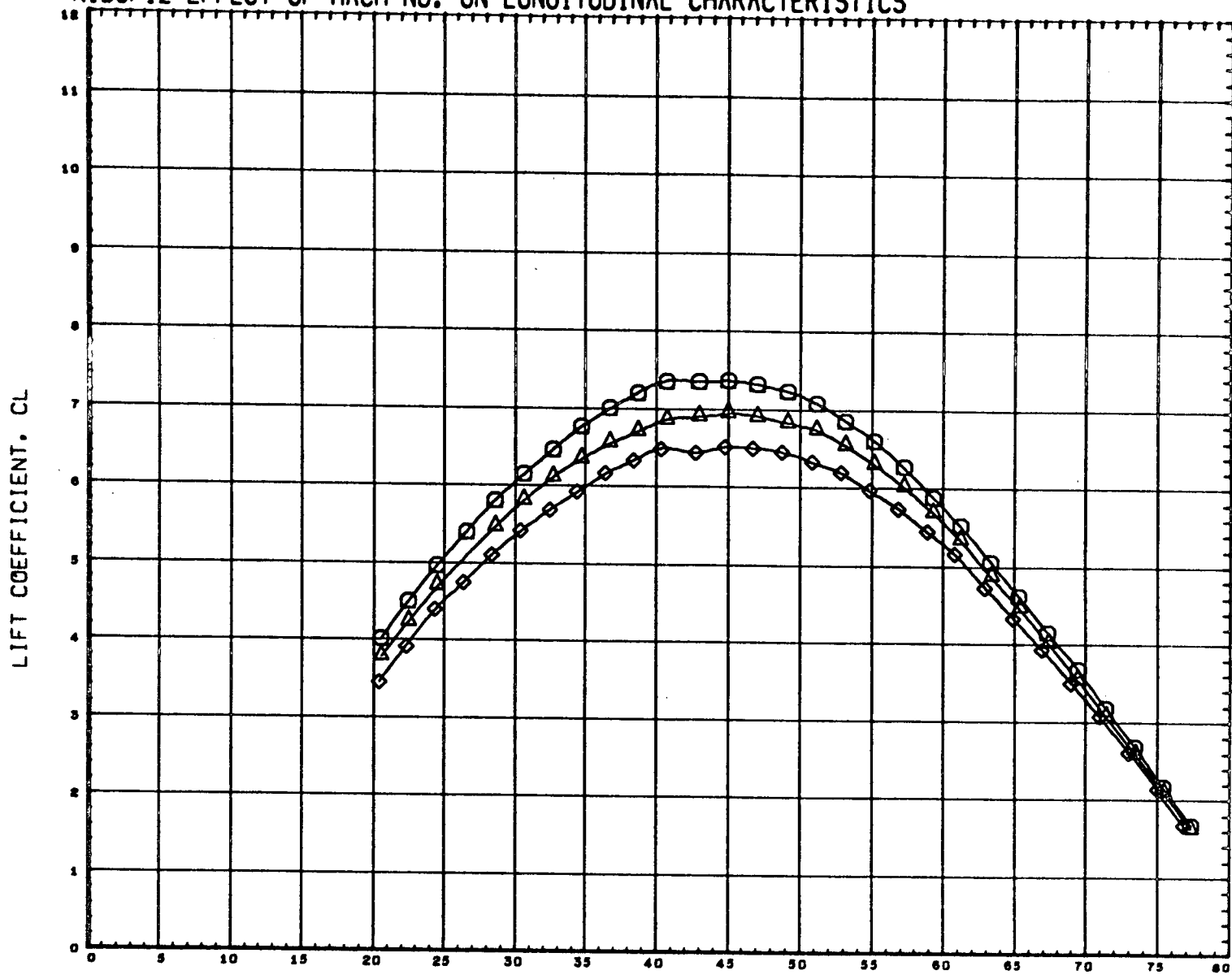
N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	PARAMETRIC VALUES				REFERENCE INFORMATION		
	MACH	BETA	DIMDRL		SREF		
○	0.898		0.000	30.000	LREF	0.9330	30. IN
△	1.198				BREF	0.1720	IN.
◇	1.480				XMRP	8.1720	IN.
□	1.957				YMRP	5.2300	IN.
					ZMRP	0.0000	IN.
					SCALE	0.0034	IN.

DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL
○
△
◇

MACH
2.740
3.480
4.959

BETA

PARAMETRIC VALUES
0.000 DINDRL 30.000

DATA HIST. CODE *G*E

REFERENCE INFORMATION

SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

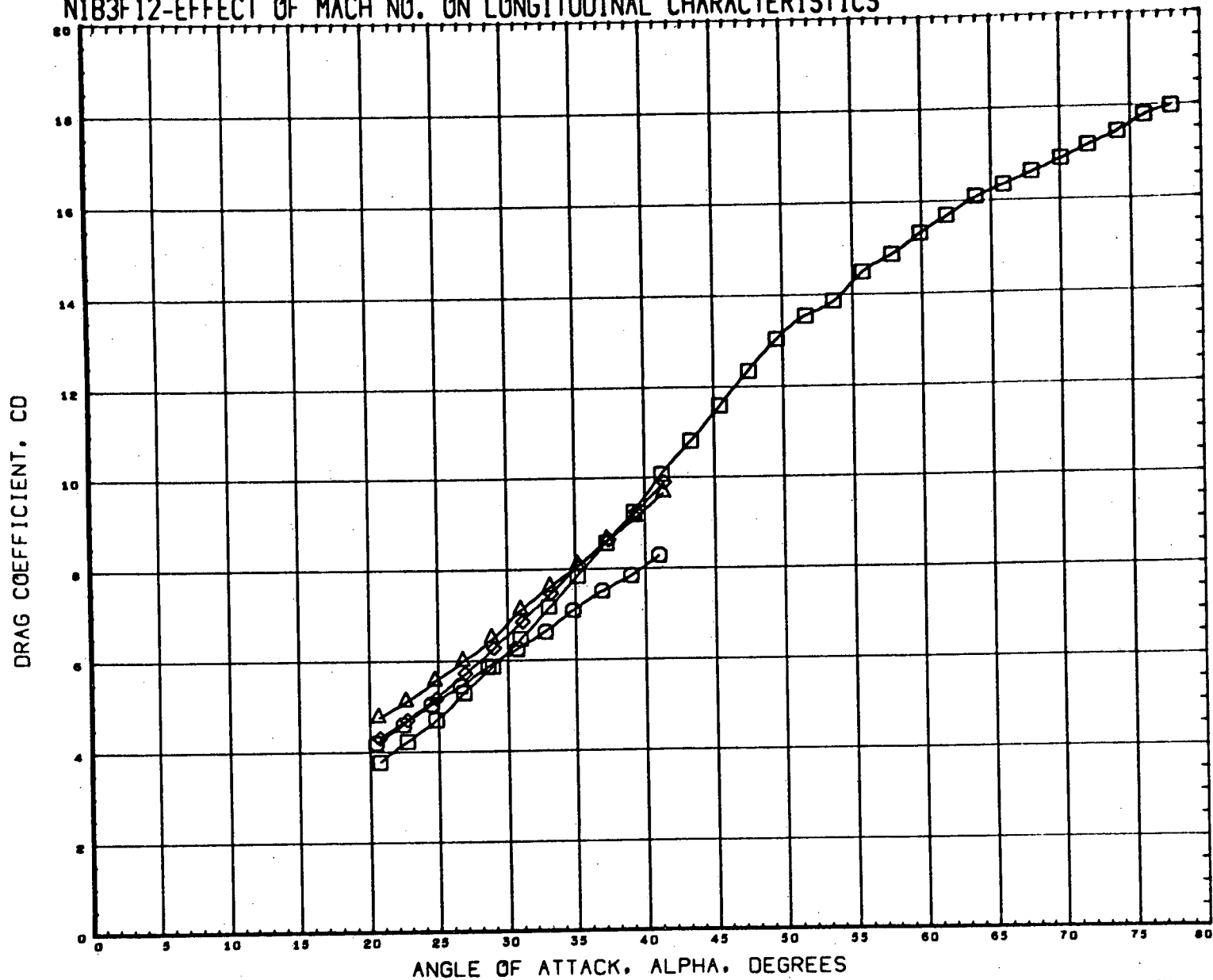
MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DIHRL
○	0.898		0.000	30.000
△	1.198			
◇	1.460			
□	1.937			

REFERENCE INFORMATION

SREF	0.9330	30. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

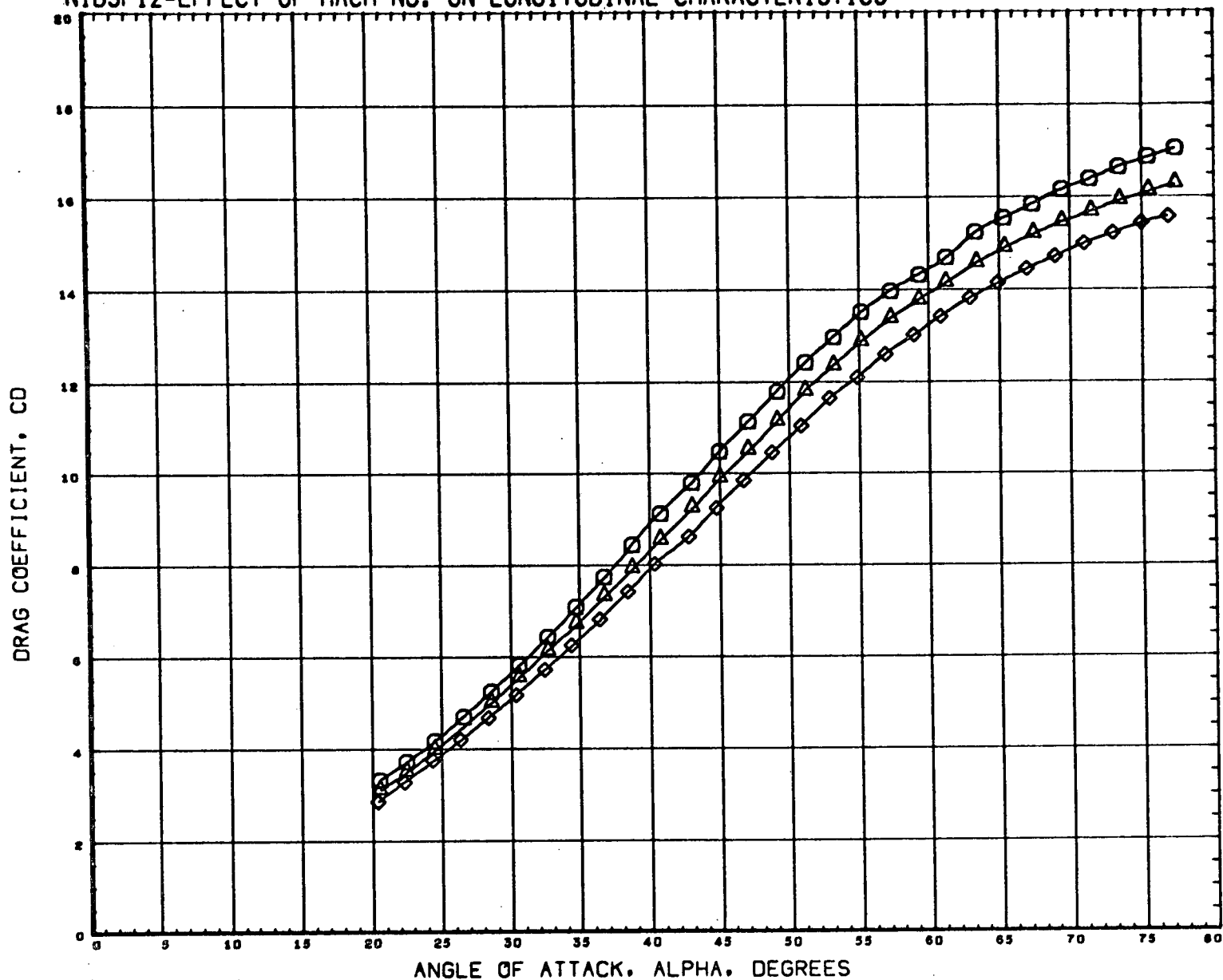
DATA HIST. CODE *G*E

MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72 PAGE 125

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DIHDL	30.000
○	2.740		0.000		
△	3.480				
◇	4.959				

REFERENCE INFORMATION		
SREF	0.9330	sq. in.
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE *G*E

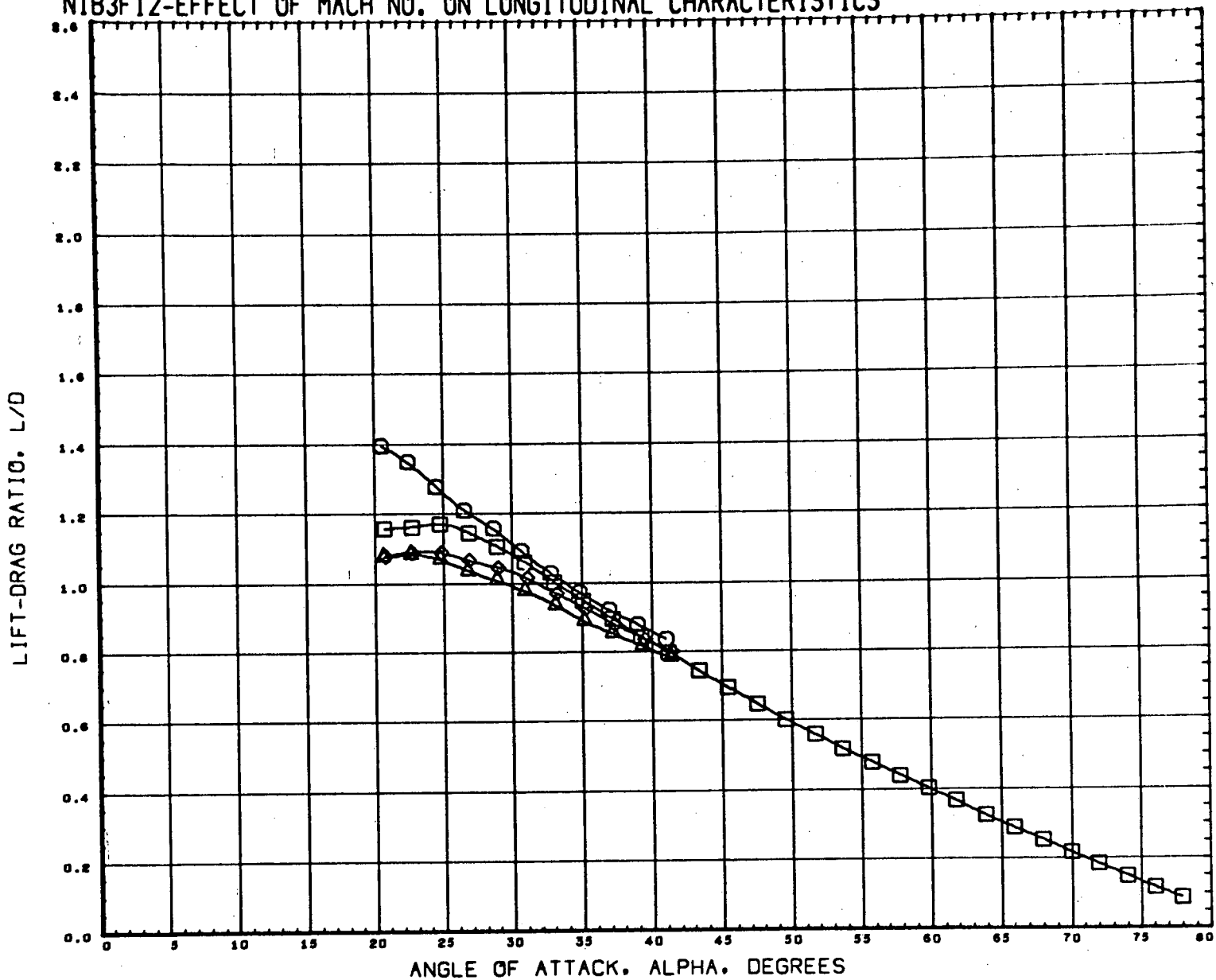
MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72

PAGE 126

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
$\circ$	0.898		0.000	DIHRL 30.000
$\triangle$	1.198			
$\diamond$	1.480			
$\square$	1.957			

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

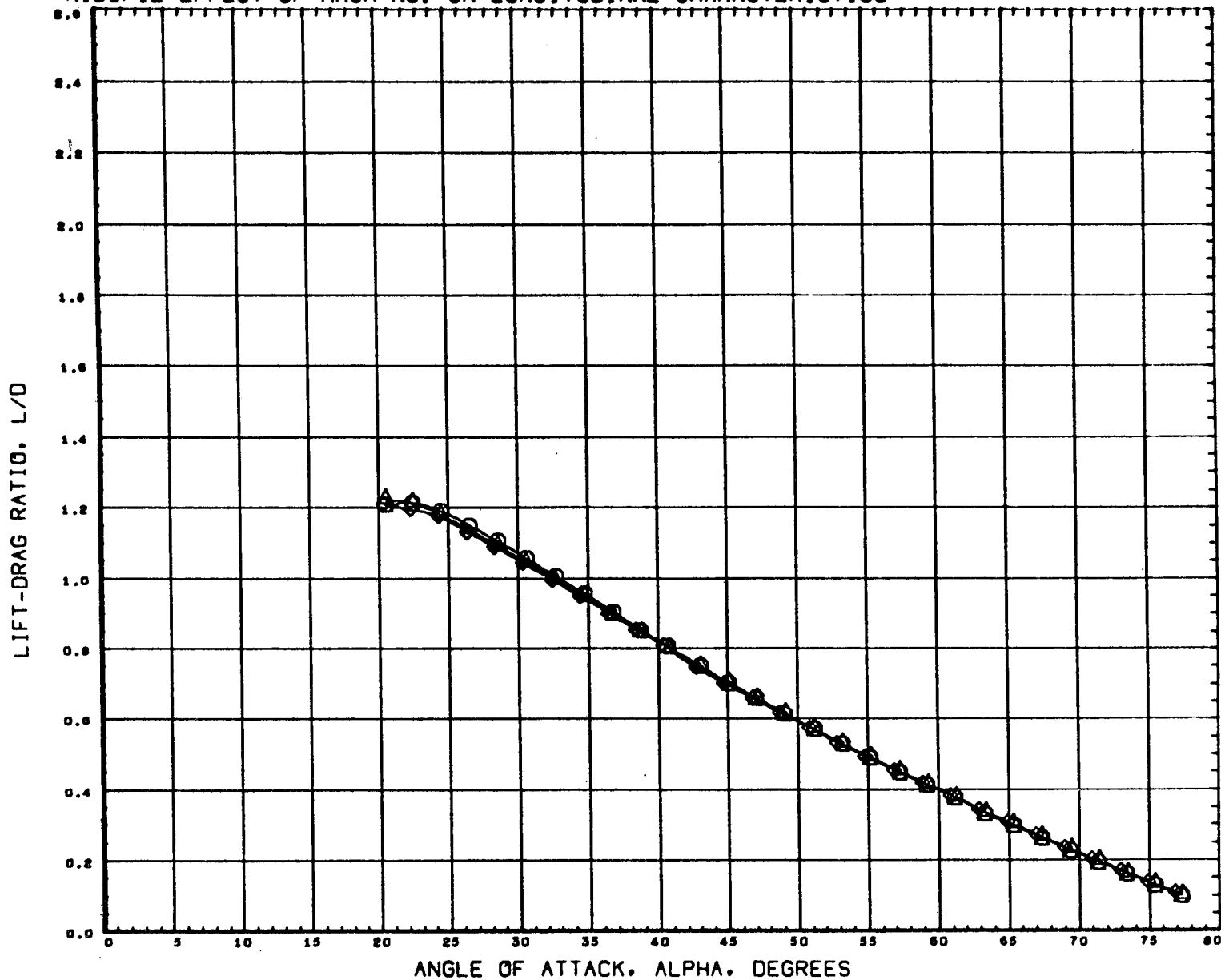
MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72

PAGE 127

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	2.740		0.000	DIMORL 30.000
△	3.480			
◇	4.959			

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

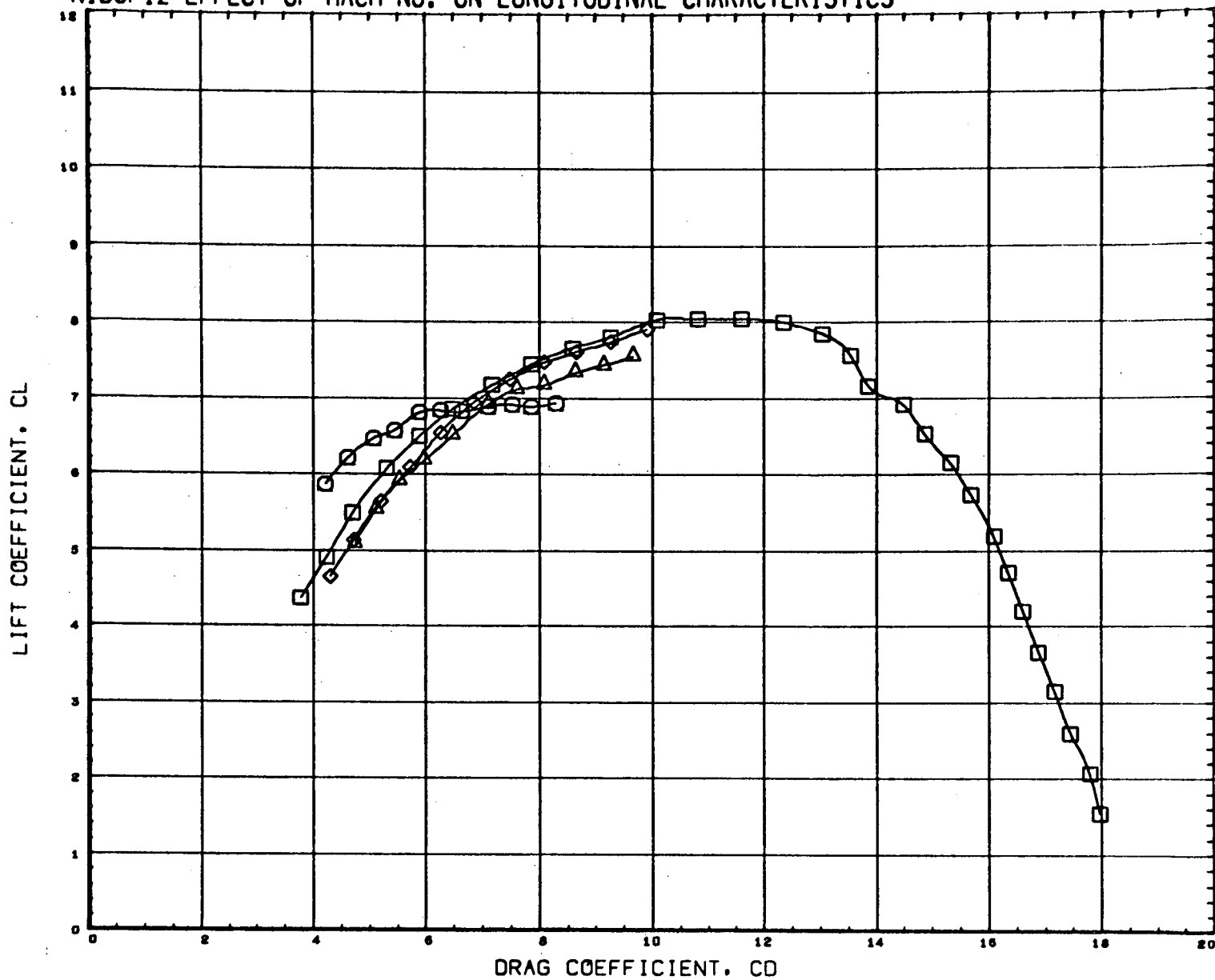
MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			REFERENCE INFORMATION			
□	0.898	BETA	0.000	DIHDL	30.000	SREF	0.9330	sq. IN
△	1.198					LREF	8.1720	IN.
◇	1.460					BREF	8.1720	IN.
□	1.957					XMRP	5.2300	IN.
						YMRP	0.0000	IN.
						ZMRP	0.0000	IN.
						SCALE	0.0034	
		DATA HIST. CODE	*G*E					

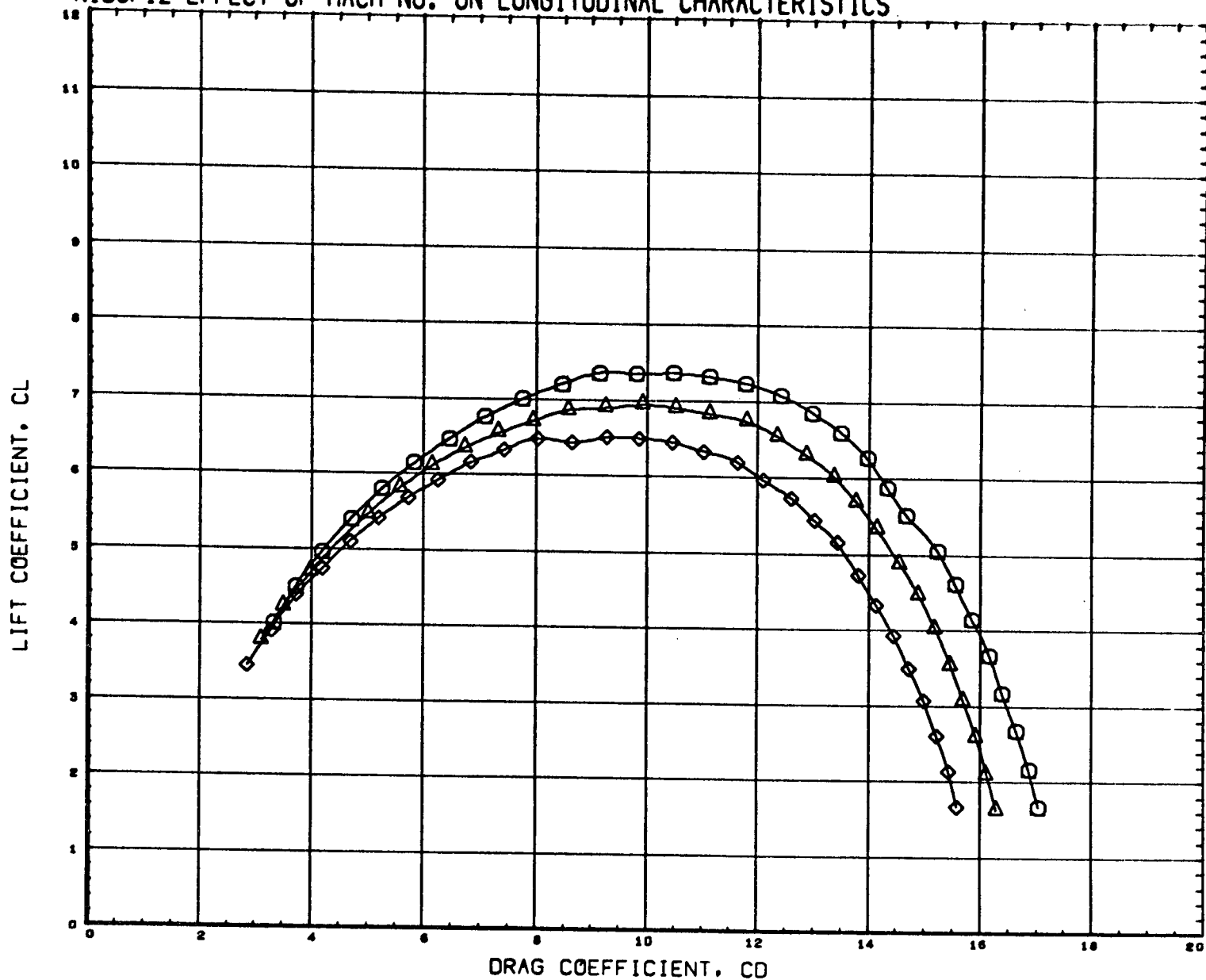
DATA HIST. CODE *G+E

MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72 PAGE 129

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

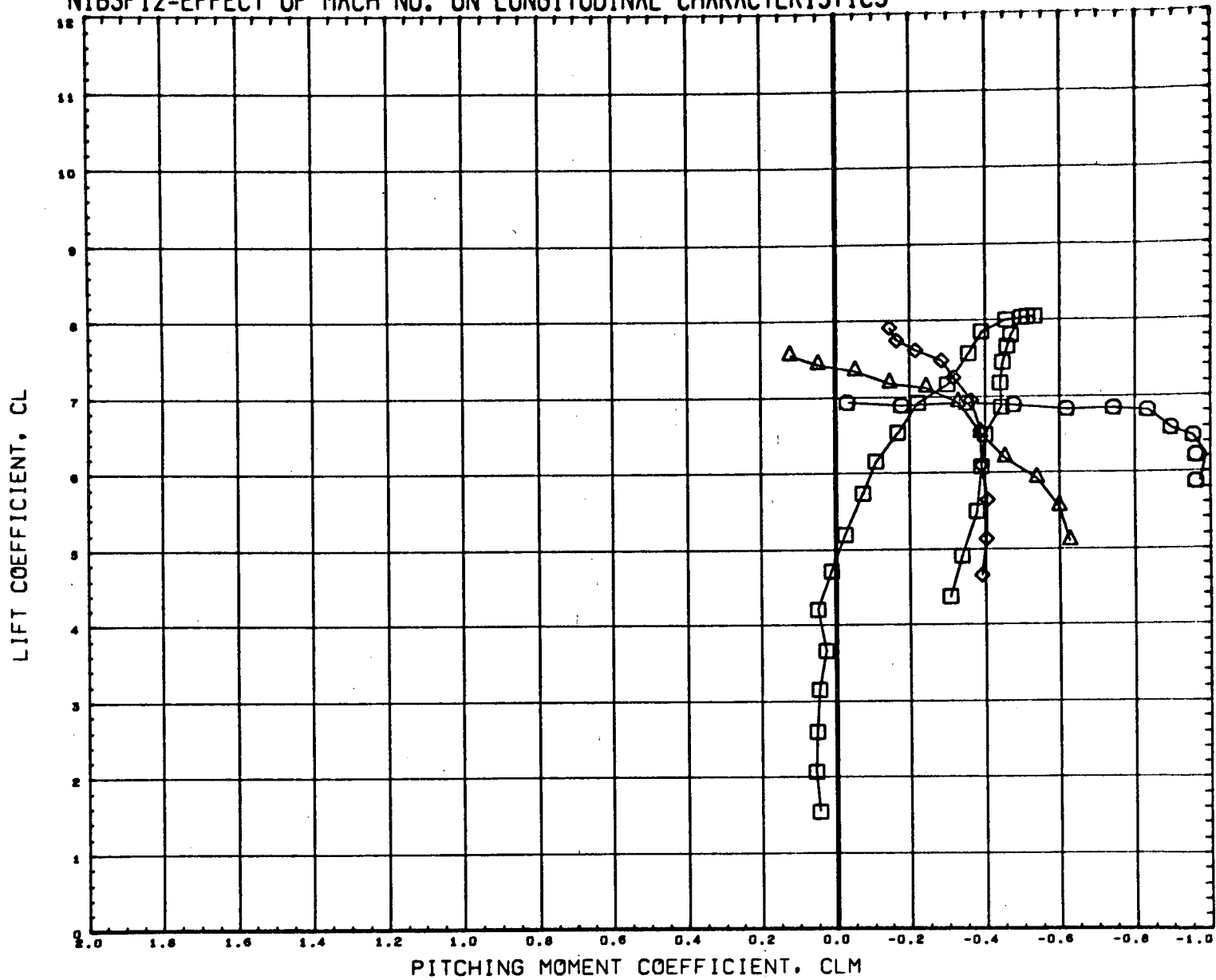


SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	2.740		0.000	DIHDL 30.000
△	3.480			
◇	4.959			

REFERENCE INFORMATION		
SREF	0.9330	30. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	9.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G#E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.898		0.000	30.000
△	1.198			
◇	1.460			
□	1.957			

REFERENCE INFORMATION		
SREF	0.9330	30. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

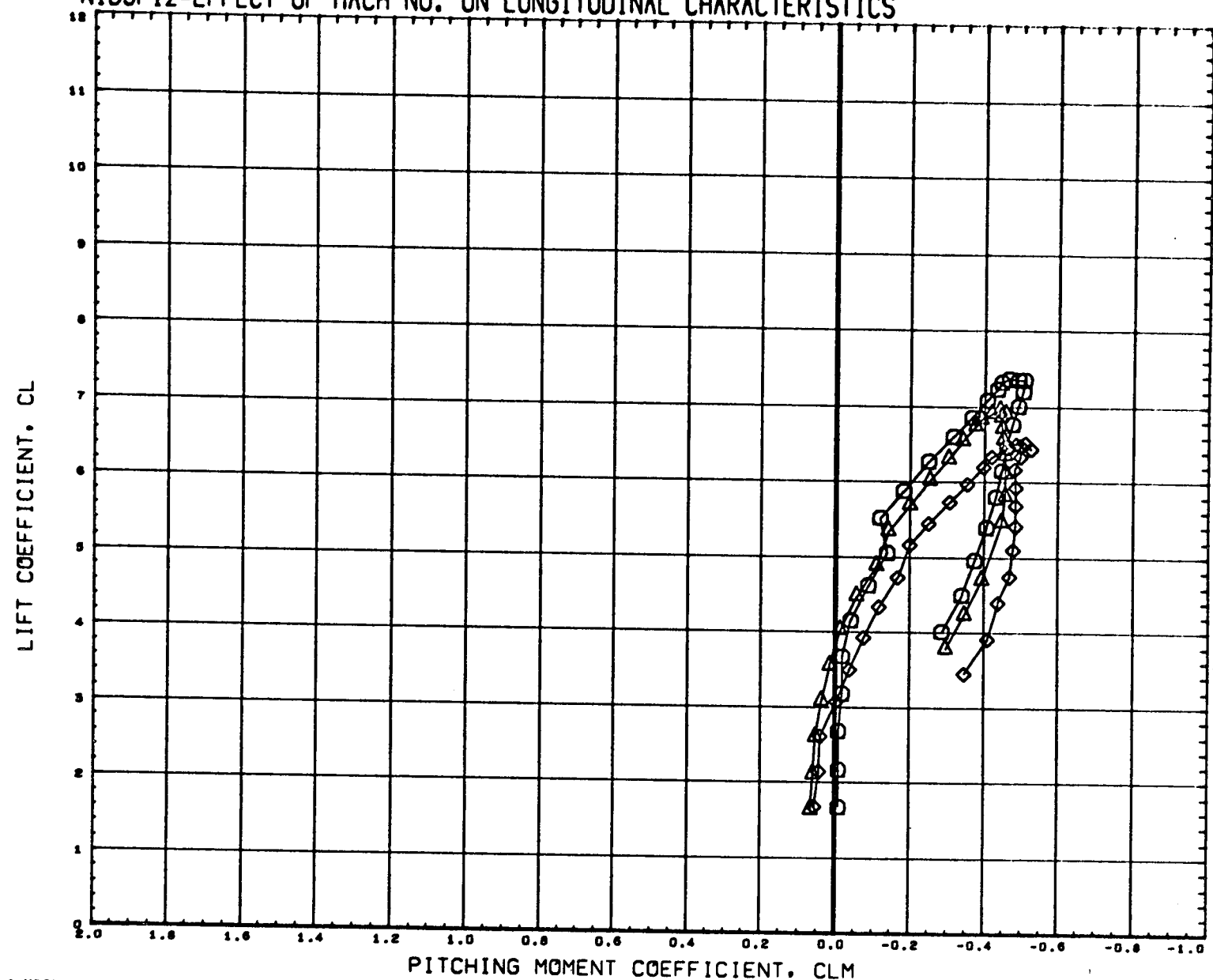
MSFC TWT 521 BOOSTER

N1B3F12

(E5502S) 02 FEB 72

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N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	2.740		0.000	DIHRL 30.000
△	3.480			
◇	4.959			

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

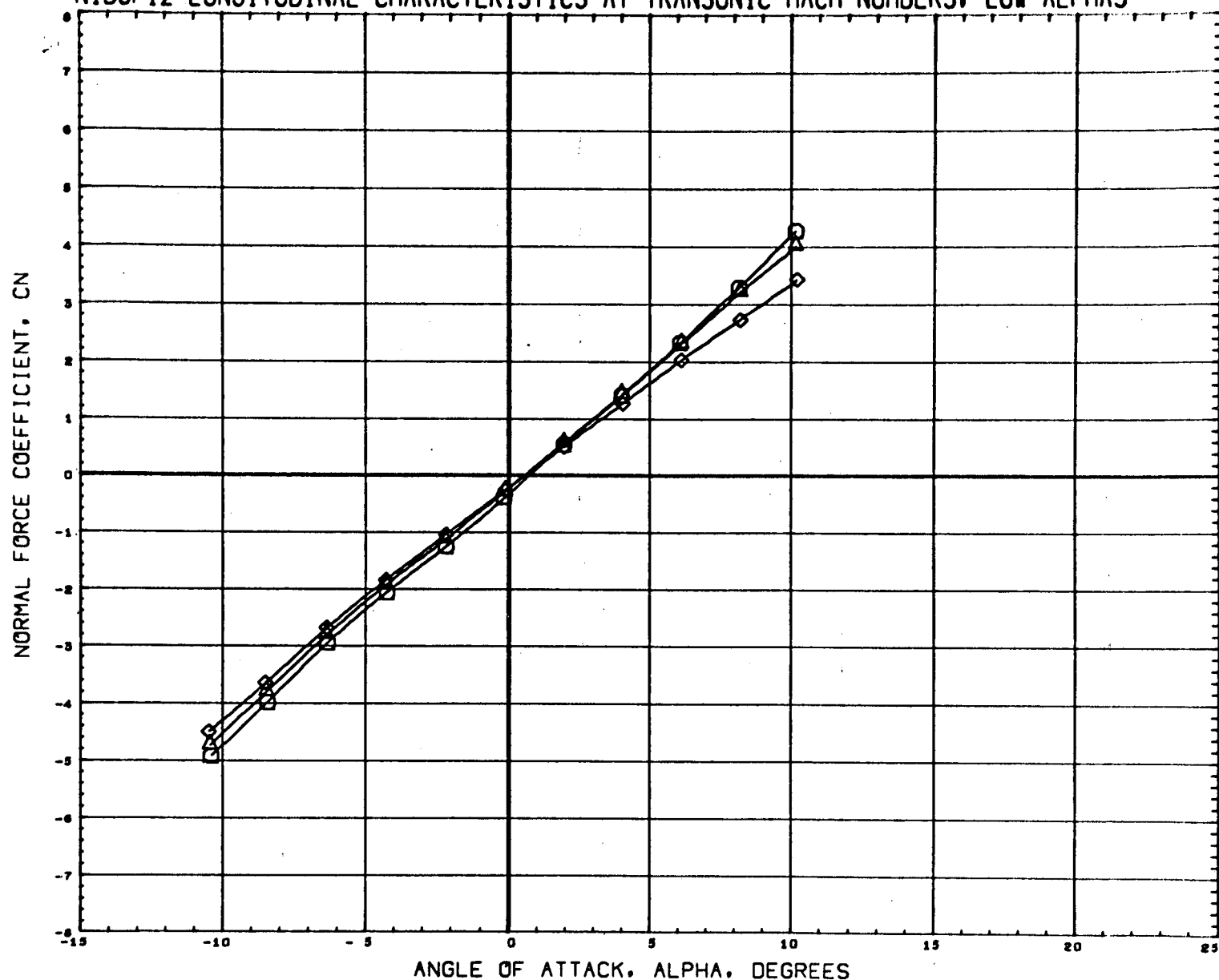
MSFC TWT S21 BOOSTER

N1B3F12

(E5502S) 02 FEB 72

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DIMDRL	30.000
○	0.897				
△	1.199				
◇	1.465				

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

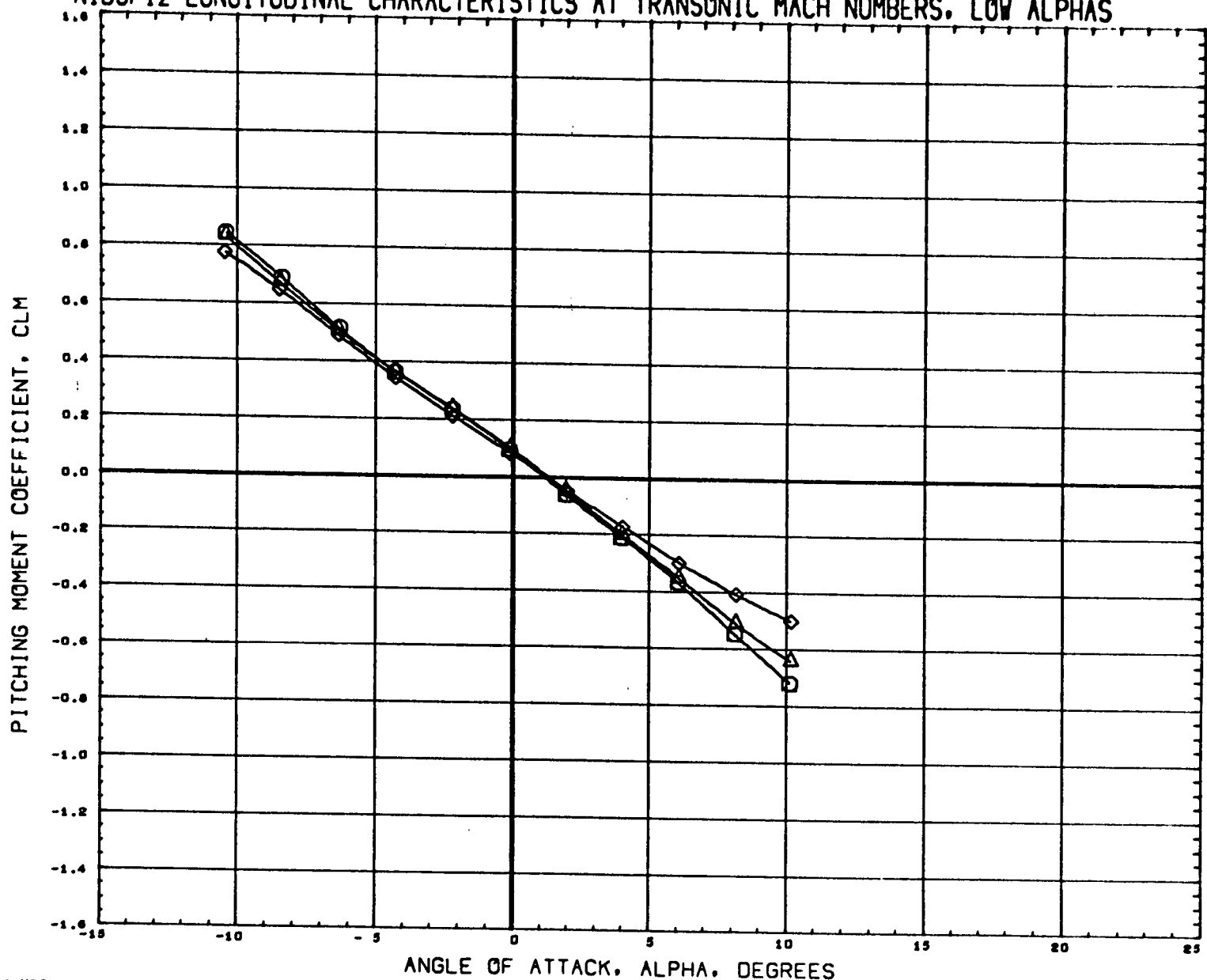
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B3F12

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.897	0.000	DINDRL	30.000
△	1.199			
◇	1.465			

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

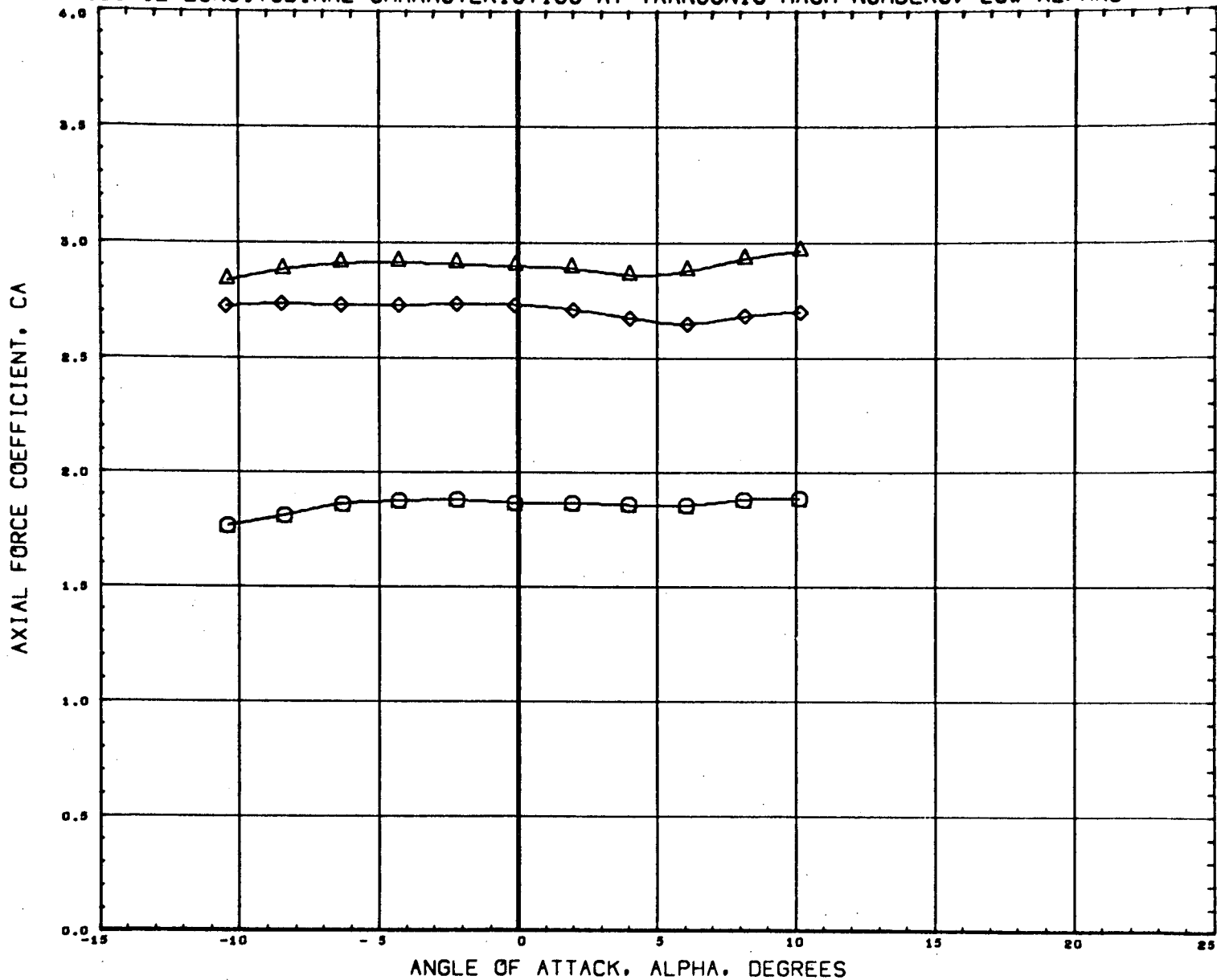
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B3F12

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.897		0.000	DIHDL 30.000
△	1.199			
◇	1.465			

REFERENCE INFORMATION		
SREF	0.9350	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

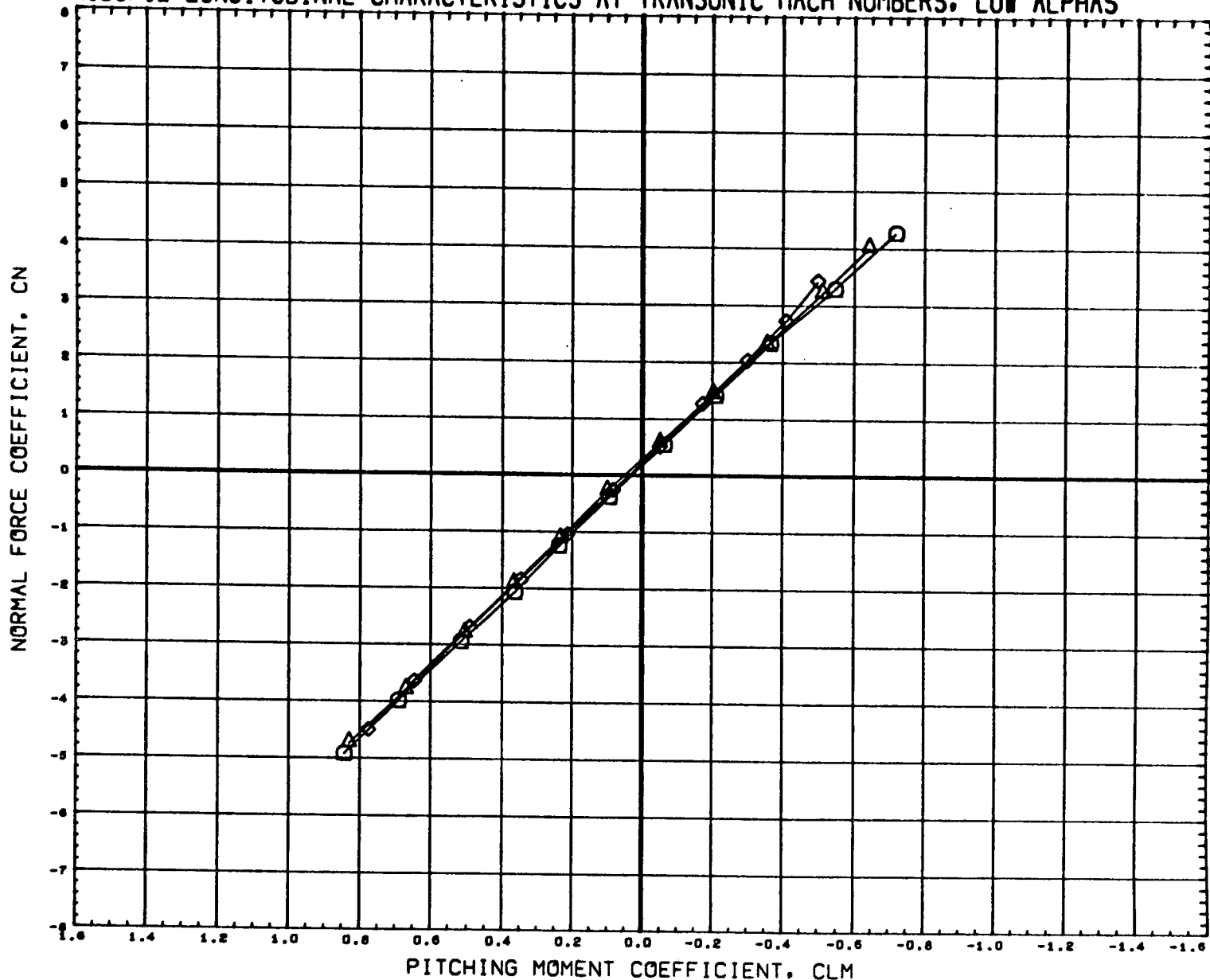
N1B3F12

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C.4

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.897		0.000	DINDRL 30.000
△	1.199			
◇	1.465			

REFERENCE INFORMATION		
SREF	0.9330	90. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

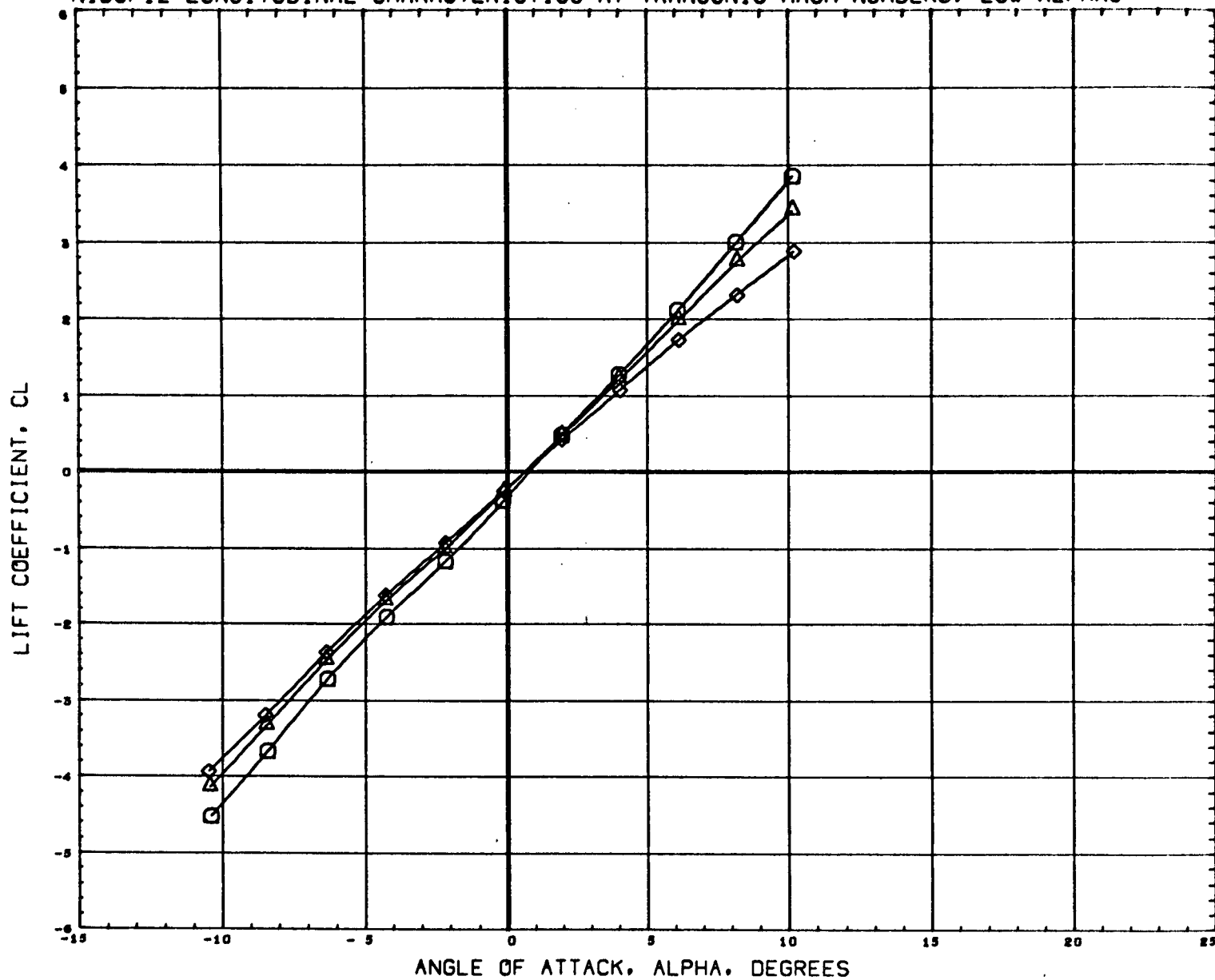
MSFC TWT 521 BOOSTER

N1B3F12

(E55019) 02 FEB 72

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.897		0.000	DIHDL 30.000
△	1.199			
◇	1.469			

REFERENCE INFORMATION		
SREF	0.9330	90. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

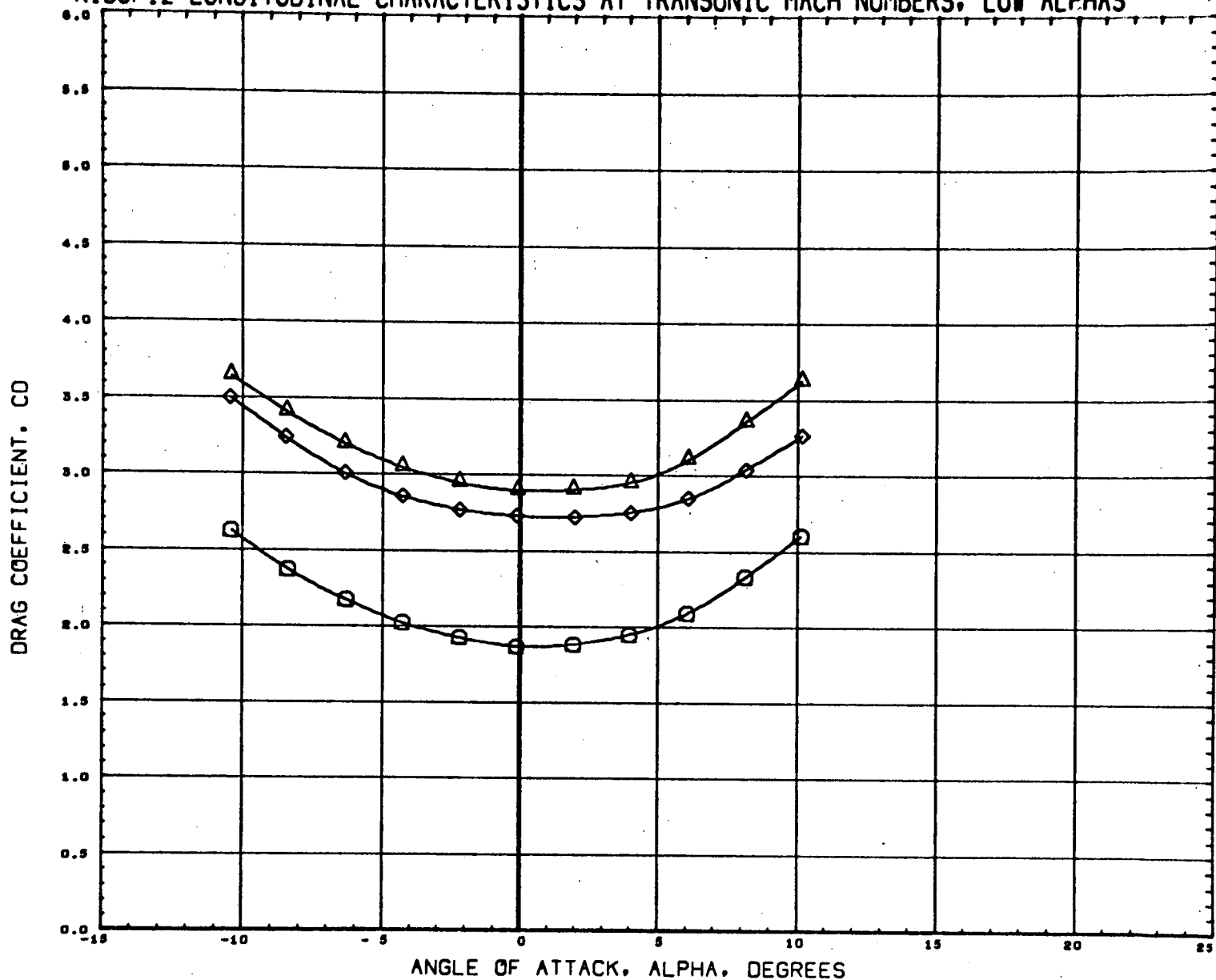
MSFC TWT 521 BOOSTER

N1B3F12

(E55019) 02 FEB 72

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS

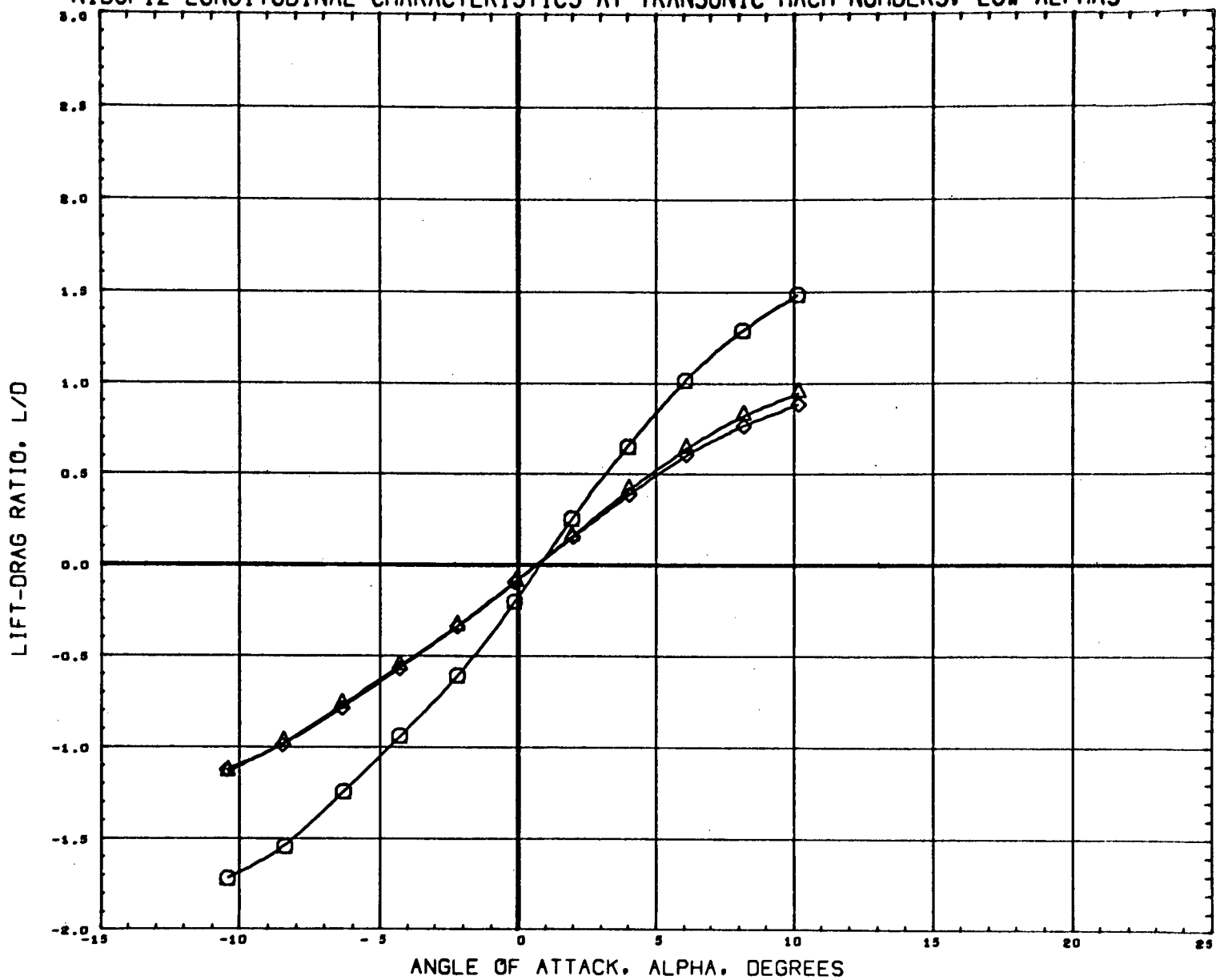


SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	0.897	0.000	DIHDL	30.000
△	1.199			
◇	1.465			

REFERENCE INFORMATION		
SREF	0.0330	sq. in
LREF	0.1720	in.
BREF	0.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE *E

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.897	0.000	DIHDL 30.000
△	1.199		
◇	1.465		

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	6.1720	in.
BREF	6.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

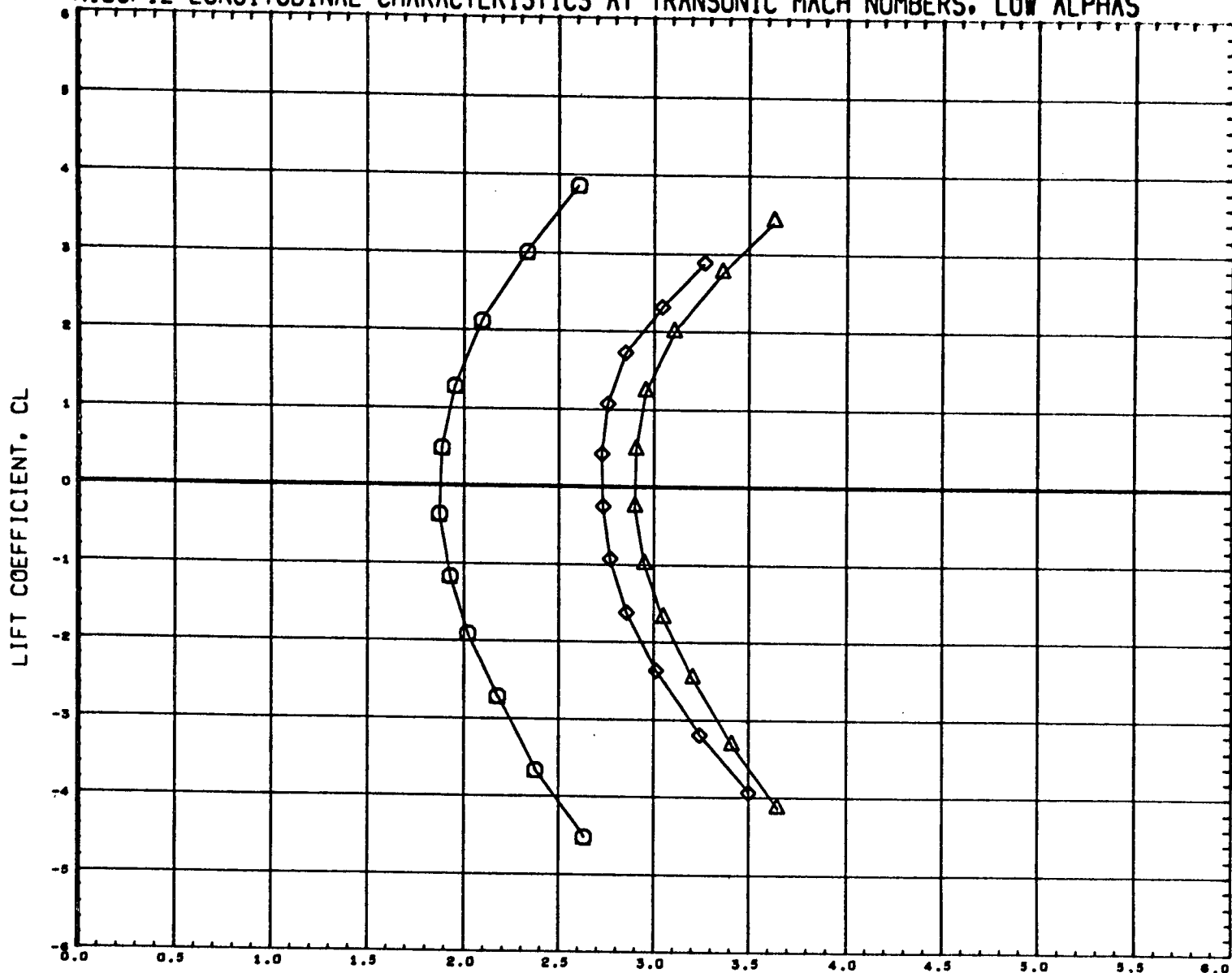
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B3F12

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS. LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	0.897		0.000 DIHDRL 30.000
△	1.199		
◇	1.465		

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

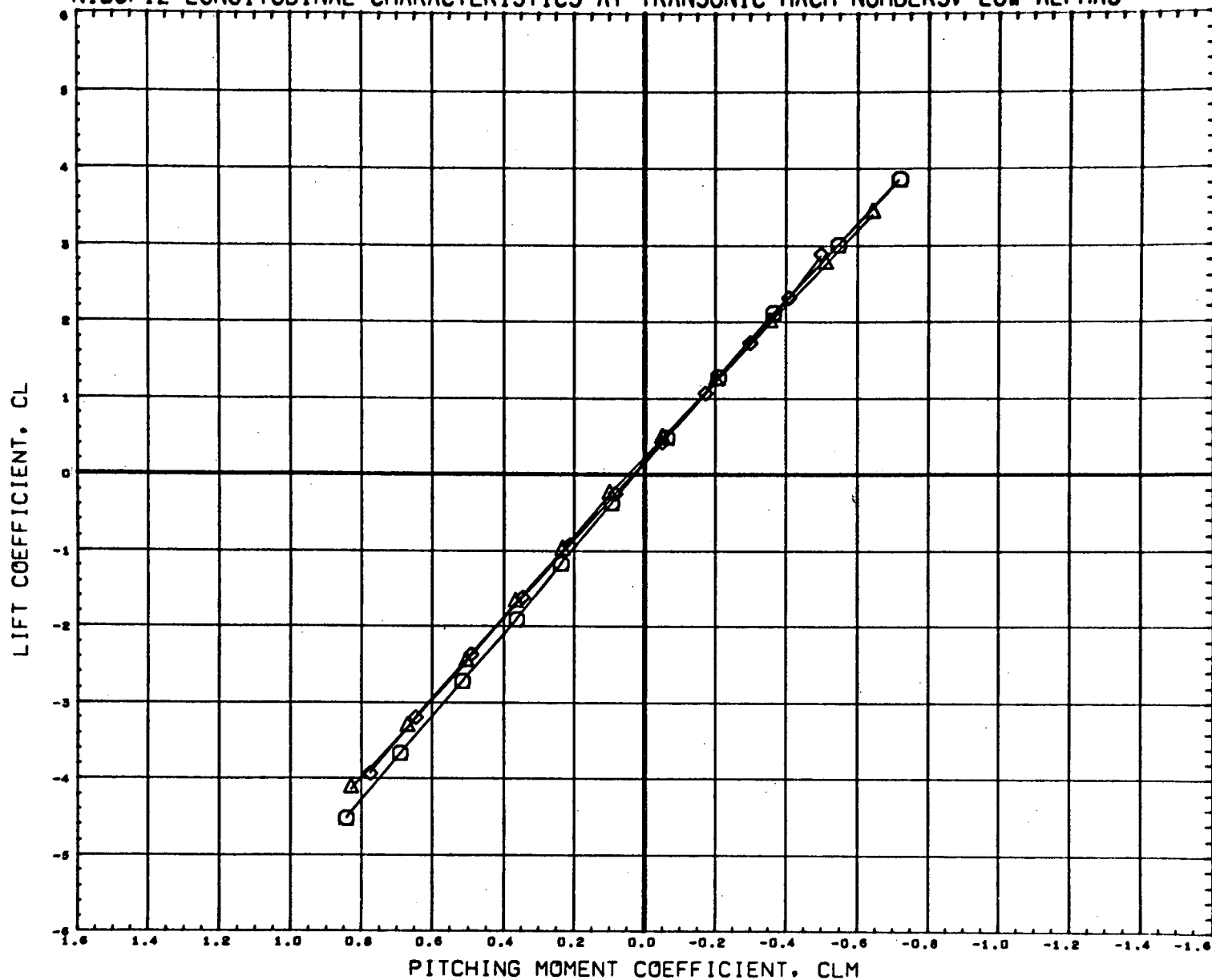
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B3F12

(E55019) 02 FEB 72 PAGE 140

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	30.000
○	0.897		0.000	DIHORI
△	1.199			
◇	1.465			

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

DATA HIST. CODE *E

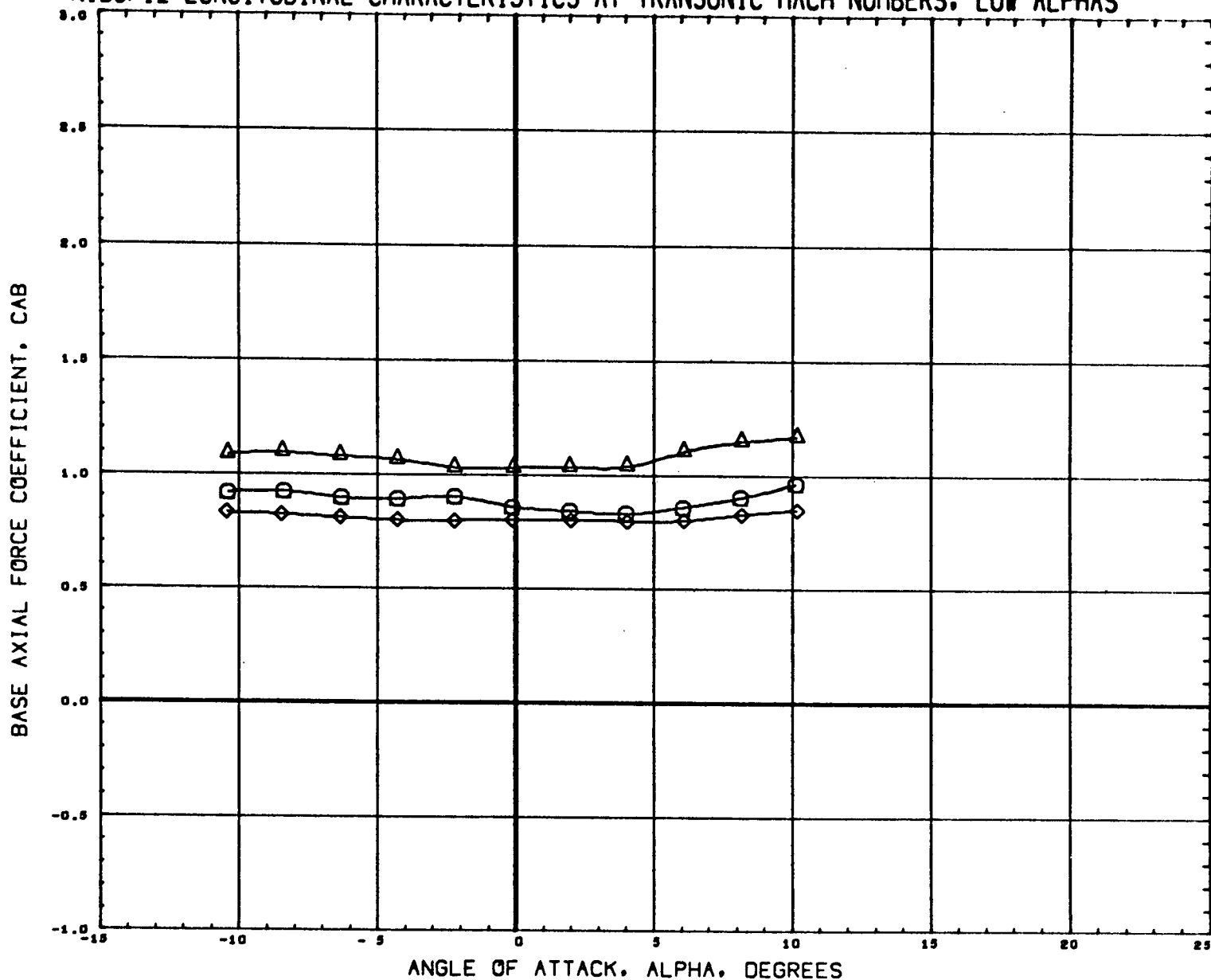
MSFC TWT 521 BOOSTER

N1B3F12

(E55019) 02 FEB 72

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N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	DIHDL	30.000
△	0.897				
□	1.199				
◇	1.465				

REFERENCE INFORMATION		
SREF	0.9330	30. IN
LREF	0.1720	IN.
BREF	0.1720	IN.
YMRP	5.2300	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	IN.

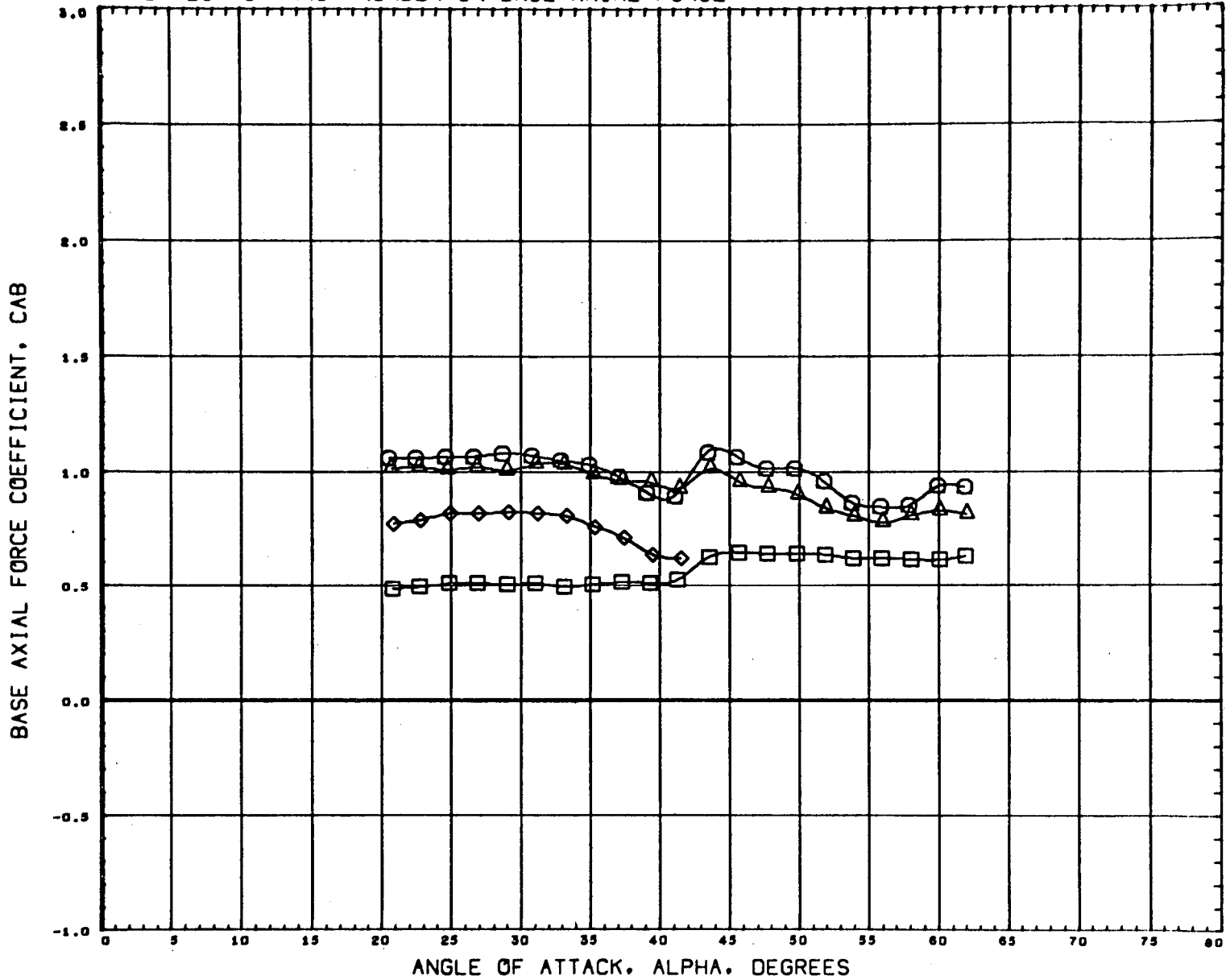
DATA HIST. CODE *E

MSFC TWT 521 BOOSTER

N1B3F12

(E55019) 02 FEB 72 PAGE 142

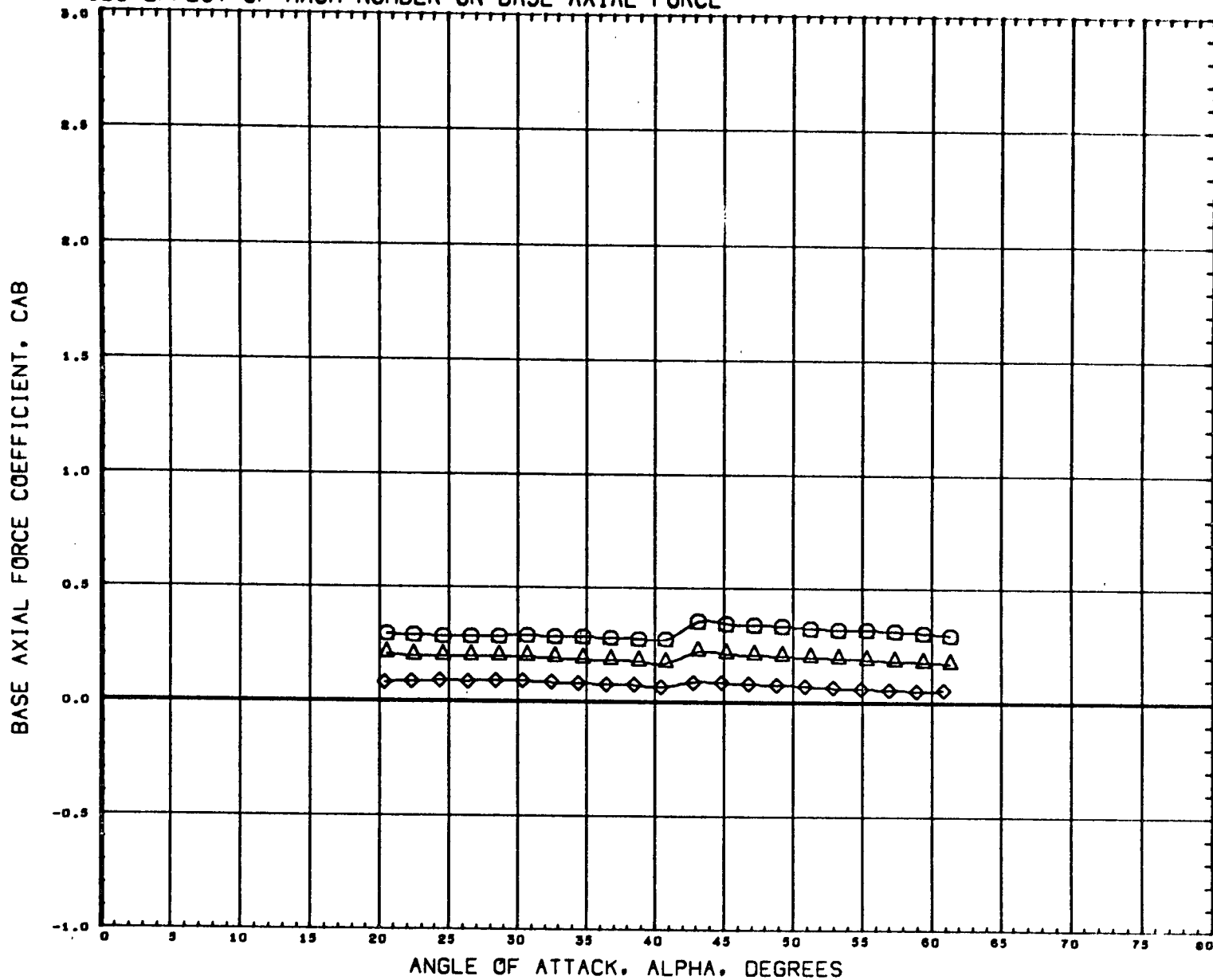
N1B3-EFFECT OF MACH NUMBER ON BASE AXIAL FORCE



SYMBOL	MACH	BETA	PARAMETRIC VALUES	REFERENCE INFORMATION		
○	0.899		0.000	SREF	0.9330	Sq. IN.
△	1.197			LREF	8.1720	IN.
◇	1.461			BREF	8.1720	IN.
□	1.964			XMRP	9.2300	IN.
				YMRP	0.0000	IN.
				ZMRP	0.0000	IN.
				SCALE	0.0034	

DATA HIST. CODE *6

N1B3-EFFECT OF MACH NUMBER ON BASE AXIAL FORCE

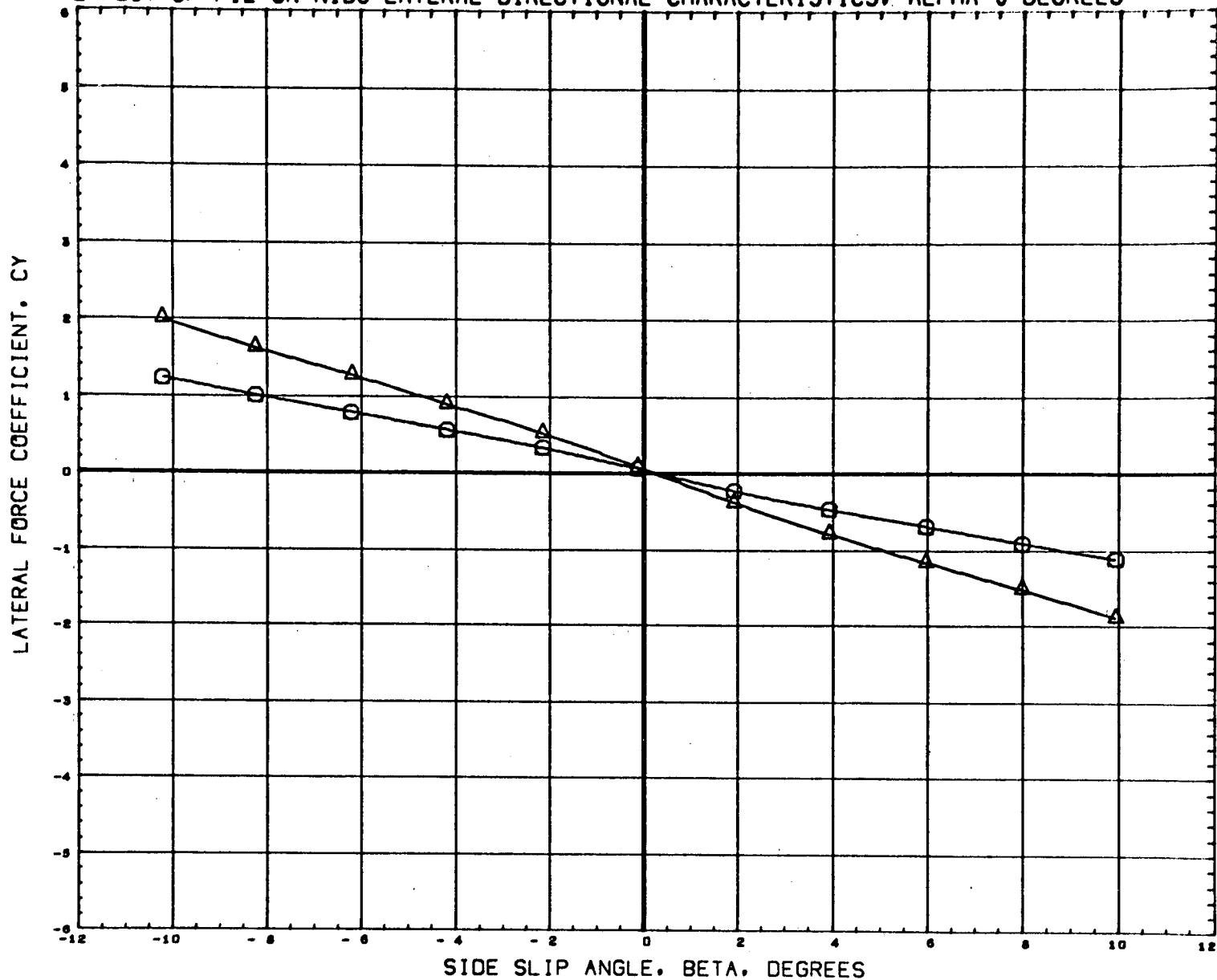


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	2.740		0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRF	5.2300	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G

EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55016) MSFC TWT 521 BOOSTER
 (A55023) MSFC TWT 521 BOOSTER

N1B3
 N1B3F12

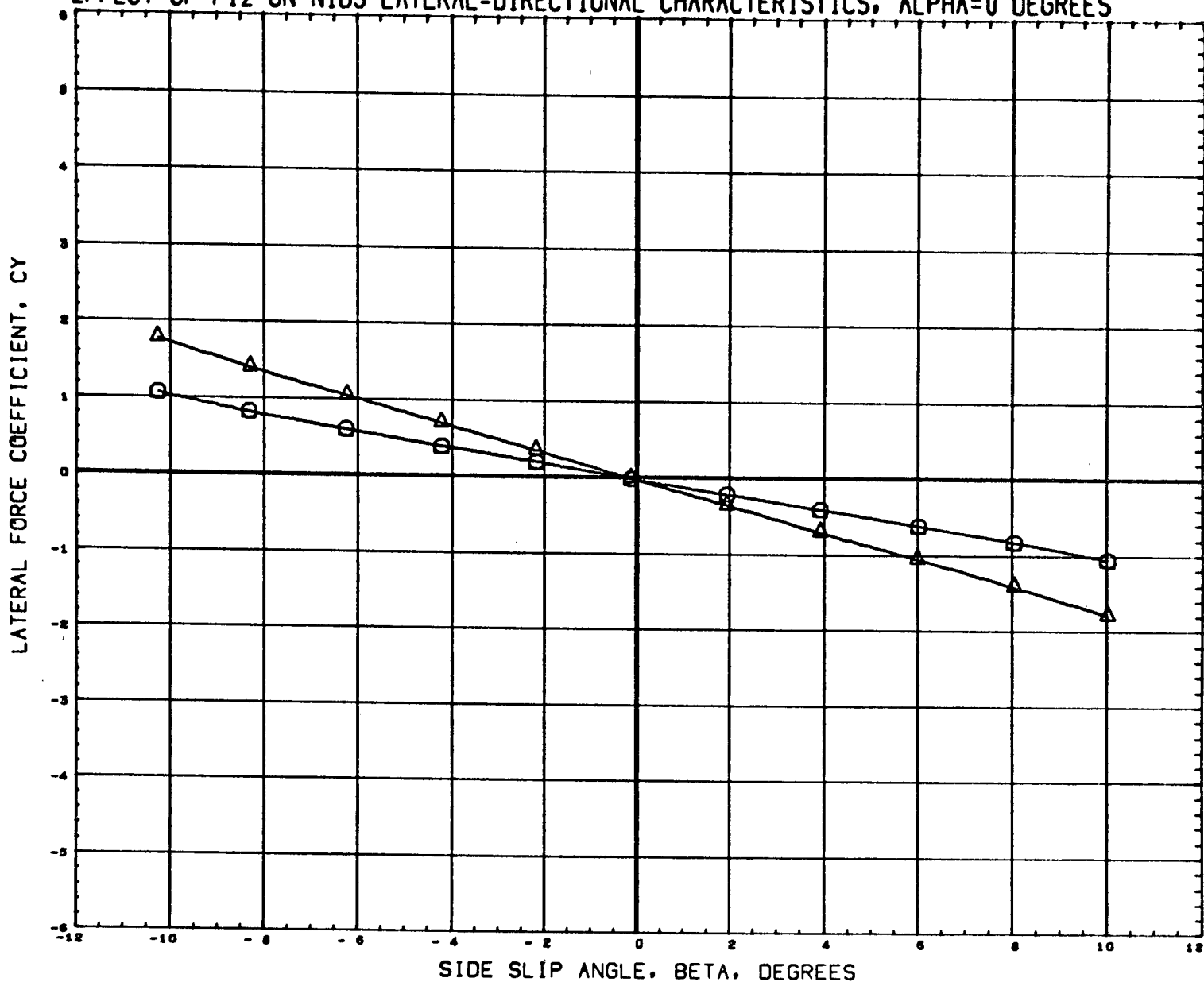
ALPHA DIHDL
 0.000
 0.000 30.000

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH .90

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55016) MSFC TWT 521 BOOSTER
 (A55023) MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

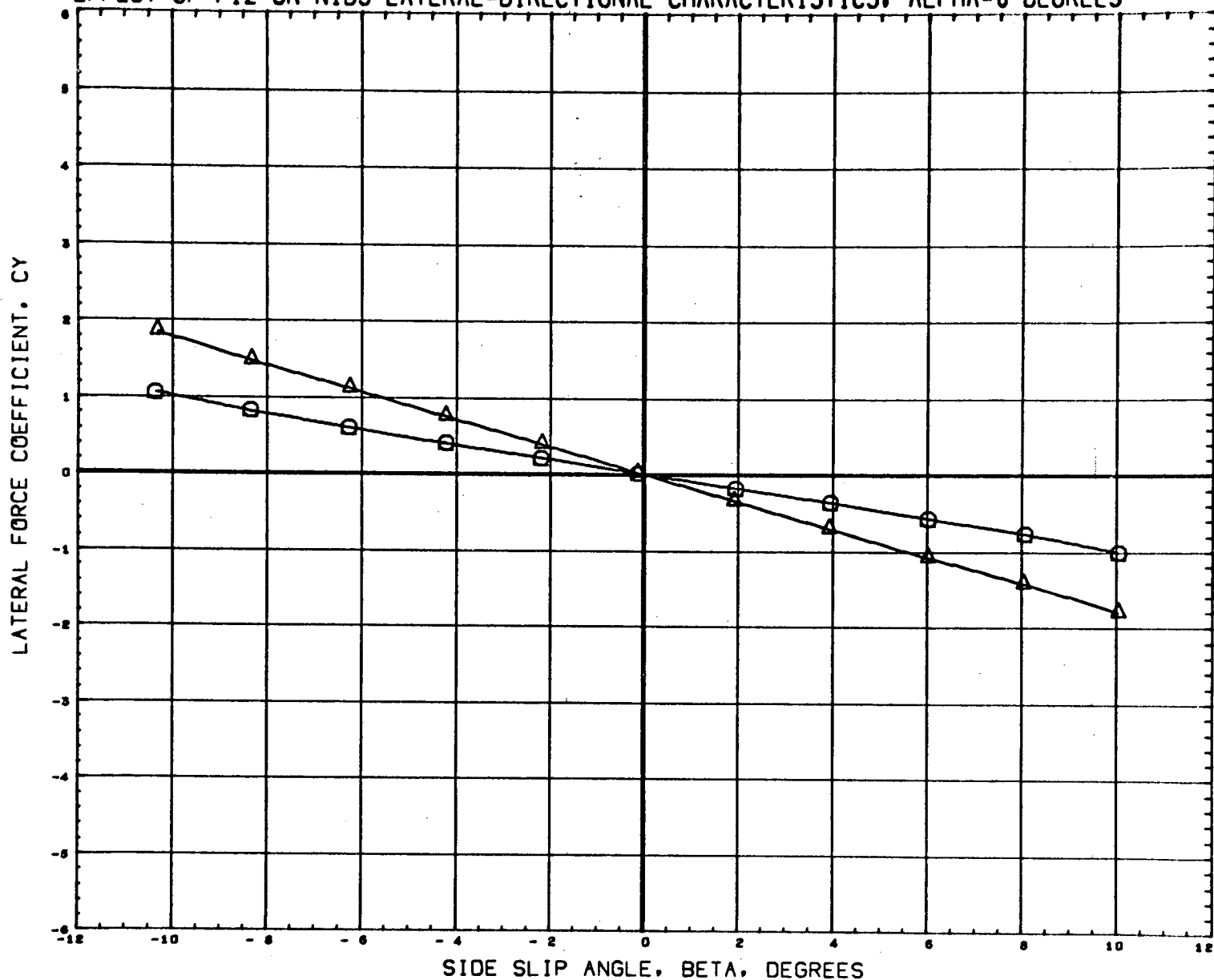
ALPHA DIHRL
 0.000
 0.000 30.000

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A95016) $\bigcirc$ MSFC TWT 521 BOOSTER N1B3
 (A95023) $\triangle$ MSFC TWT 521 BOOSTER N1B3F12

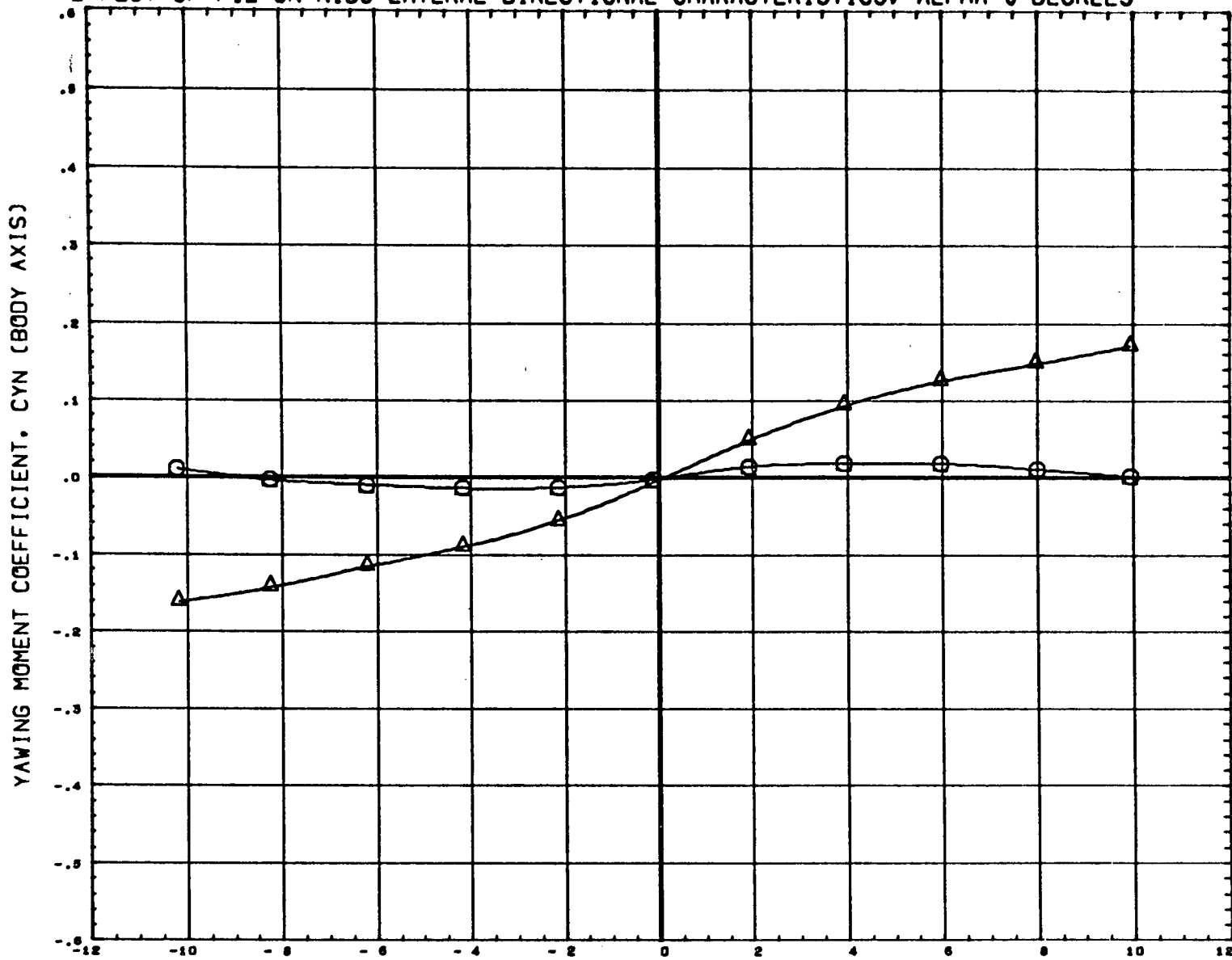
ALPHA DIHDL
 0.000
 0.000 30.000

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.46

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55016) MSFC TWT 521 BOOSTER N1B3
 (A55023) MSFC TWT 521 BOOSTER N1B3F12

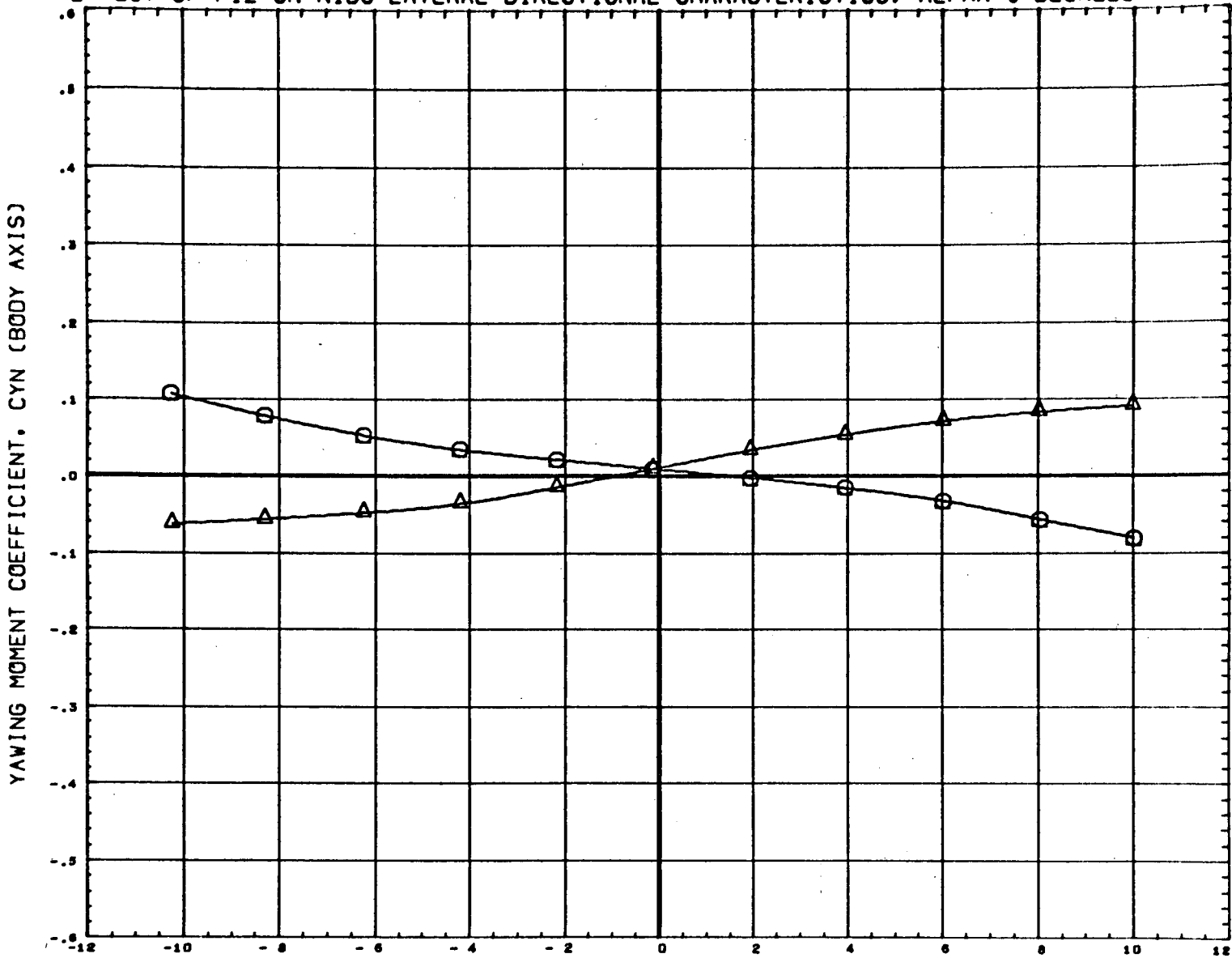
ALPHA DIHRL
 0.000
 0.000 30.000

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN.
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH .90

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55016) $\bigcirc$ MSFC TWT 521 BOOSTER
 (A55023) $\triangle$ MSFC TWT 521 BOOSTER

N1B3
 N1B3F12

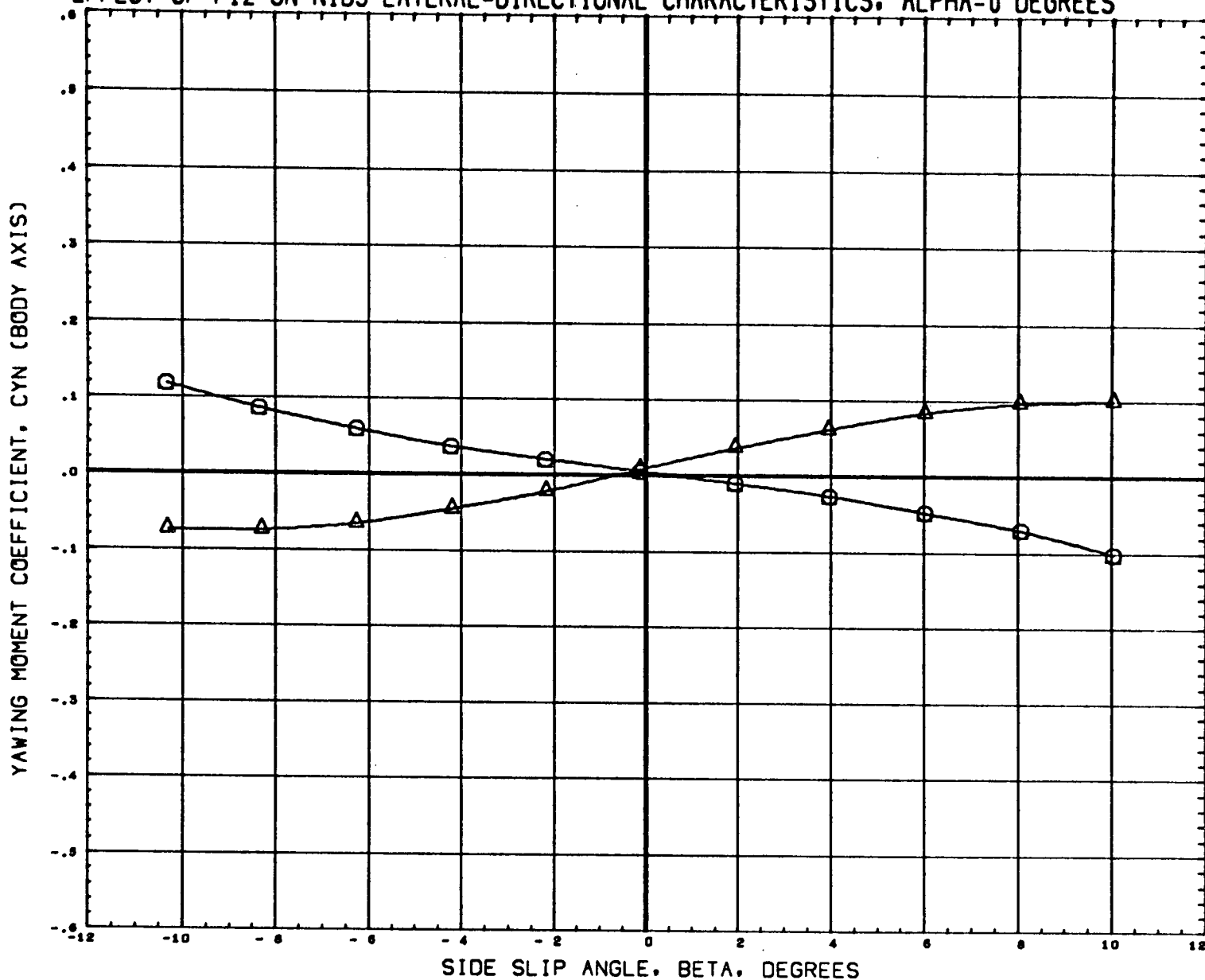
ALPHA DIHDL
 0.000
 0.000 30.000

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55016)  MSFC TWT 521 BOOSTER
 (A55023)  MSFC TWT 521 BOOSTER

N1B3
 N1B3F12

ALPHA DIHDL
 0.000
 0.000 30.000

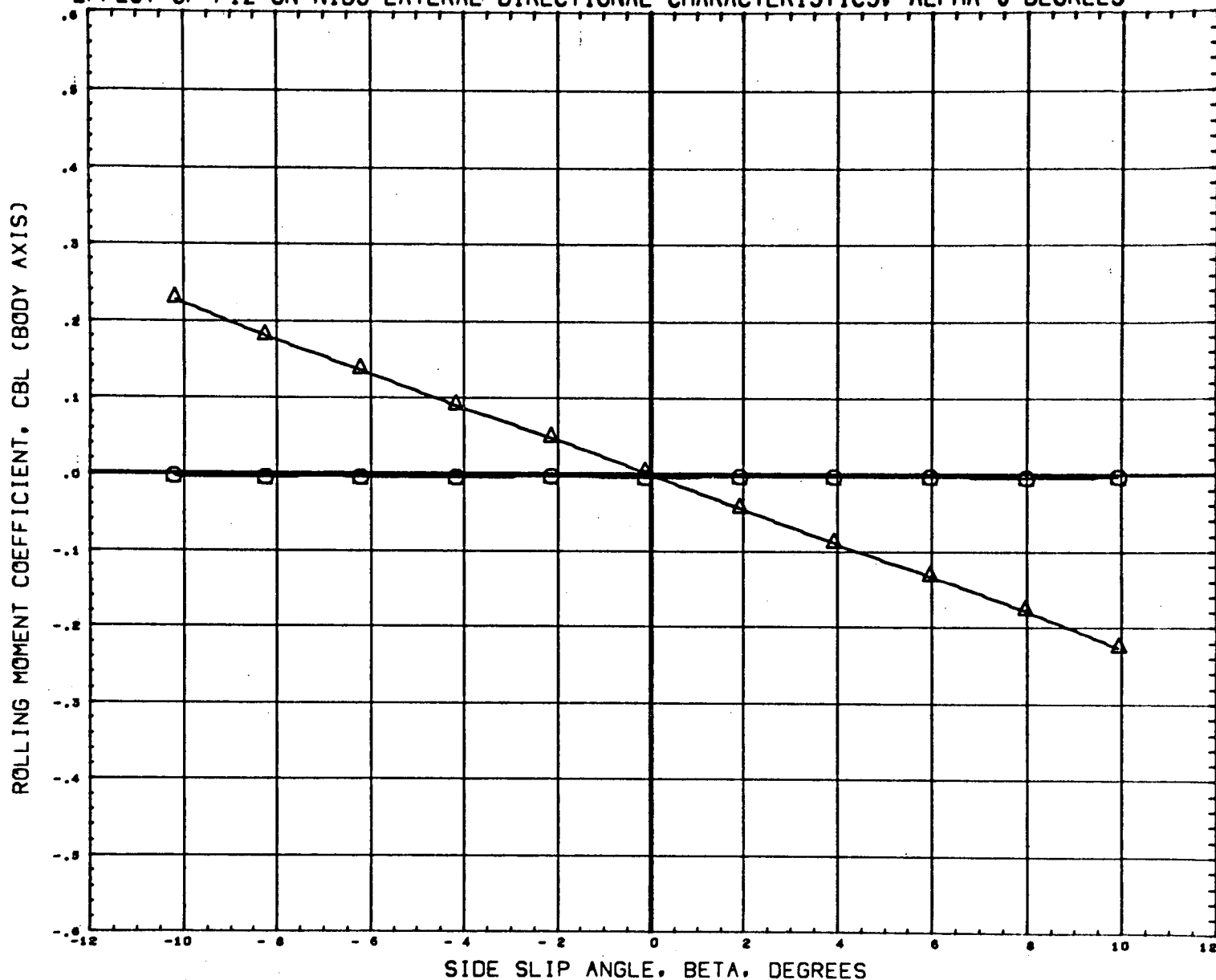
REFERENCE INFORMATION
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 LREF 6.1720 IN.
 BREF 6.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH

1.46

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55016)	MSFC TWT 521 BOOSTER
(A55023)	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

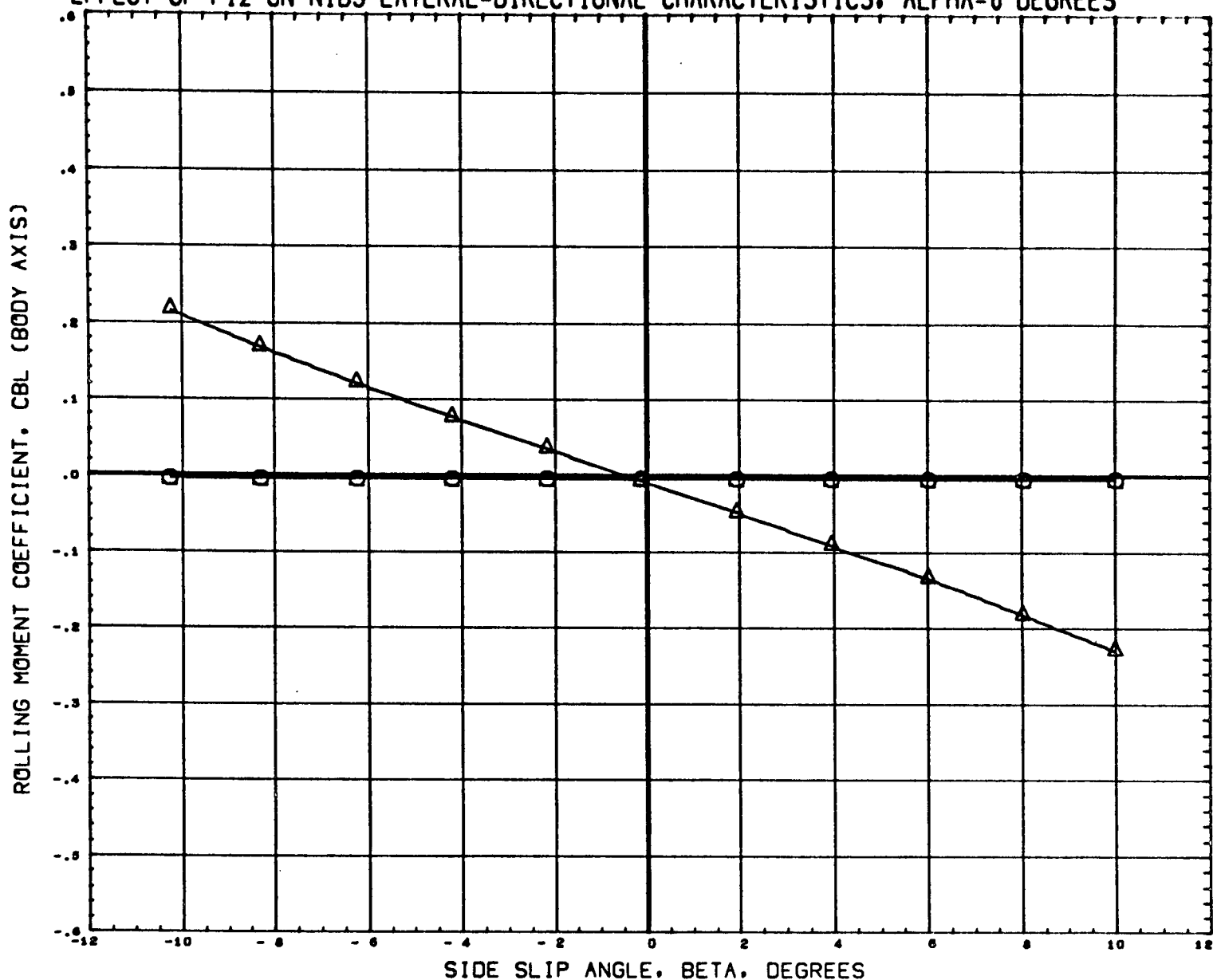
ALPHA	D1HDRL
0.000	0.000
0.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH .90

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=0 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55016) 	MSFC TWT 521 BOOSTER
(A55023) 	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

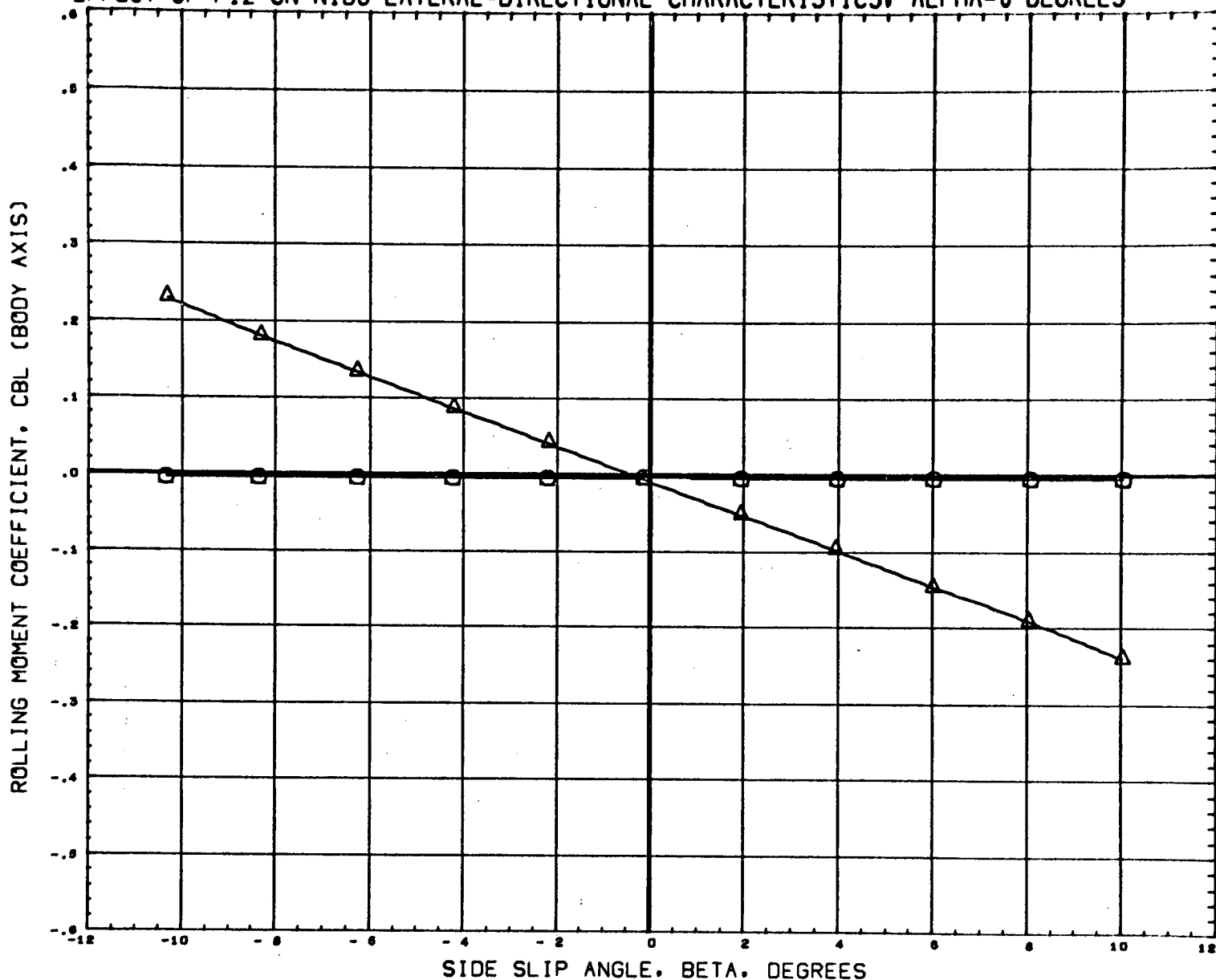
ALPHA	DIMDRL
0.000	0.000
0.000	30.000

REFERENCE INFORMATION	
SREF	0.9330 sq. in.
LREF	8.1720 in.
BREF	8.1720 in.
XMRP	5.2300 in.
YMRP	0.0000 in.
ZMRP	0.0000 in.
SCALE	0.0034

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55016) 	MSFC TWT 521 BOOSTER
(A55023) 	MSFC TWT 521 BOOSTER

N1B3
N1B3F12

ALPHA	DIHDL
0.000	
0.000	30.000

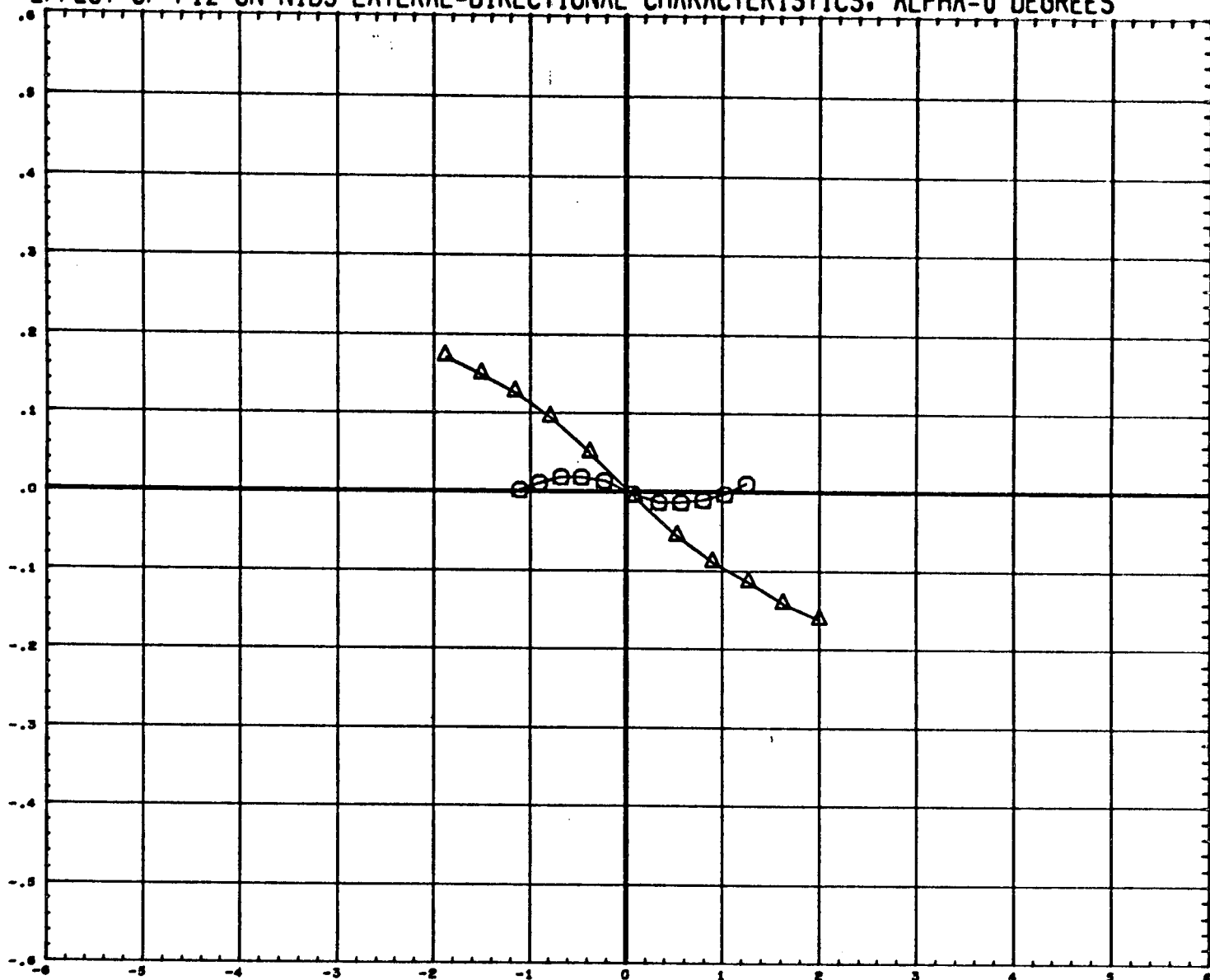
REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.46

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



LATERAL FORCE COEFFICIENT, CY

DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55016)	MSFC TWT 521 BOOSTER
(A55023)	MSFC TWT 521 BOOSTER

N1B3
N1B3F12

ALPHA	DIHDL
0.000	
0.000	30.000

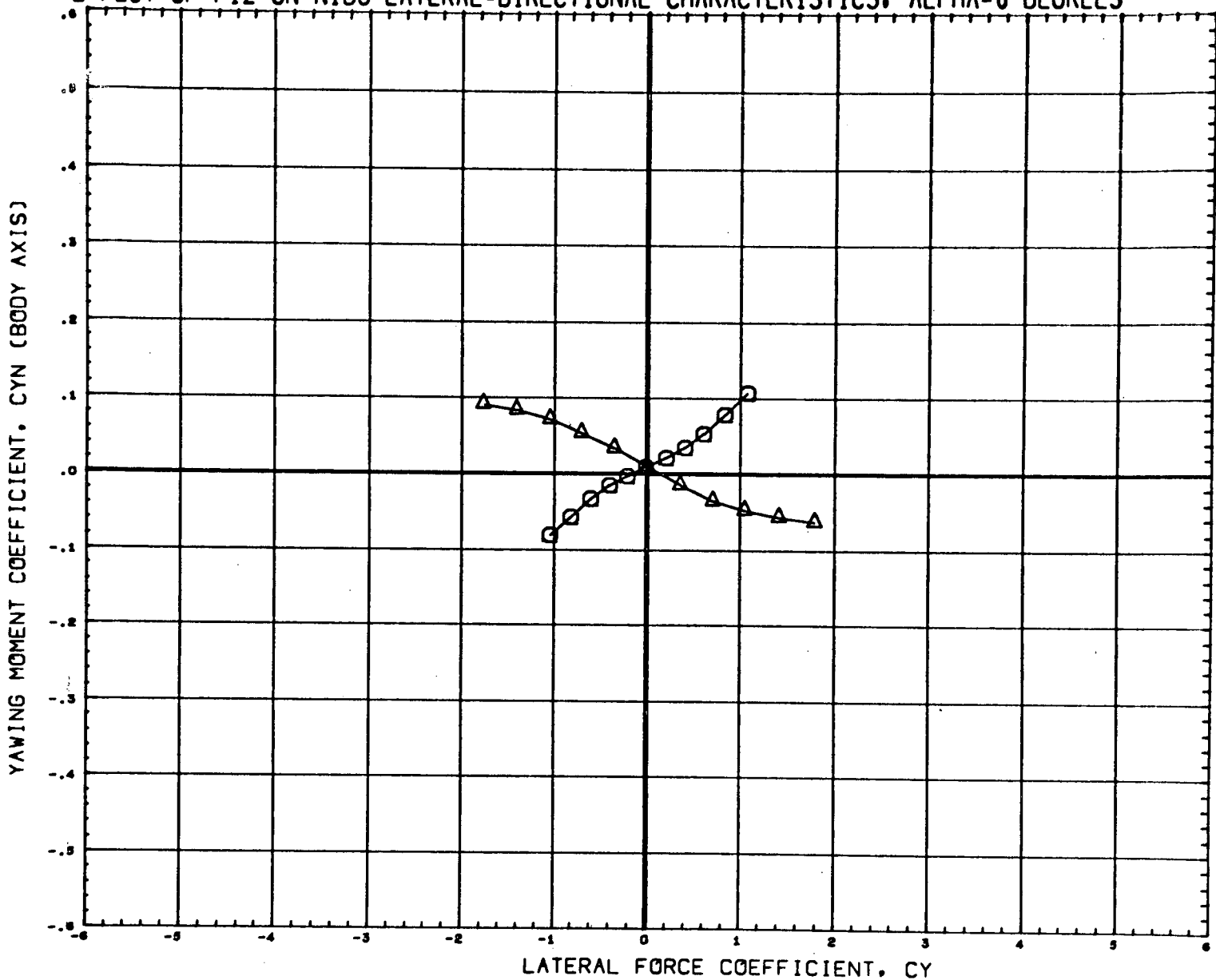
REFERENCE INFORMATION		
SREF	0.9330	50. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH

.90

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A55016) MSFC TWT 521 BOOSTER N1B3
 (A55023) MSFC TWT 521 BOOSTER N1B3F12

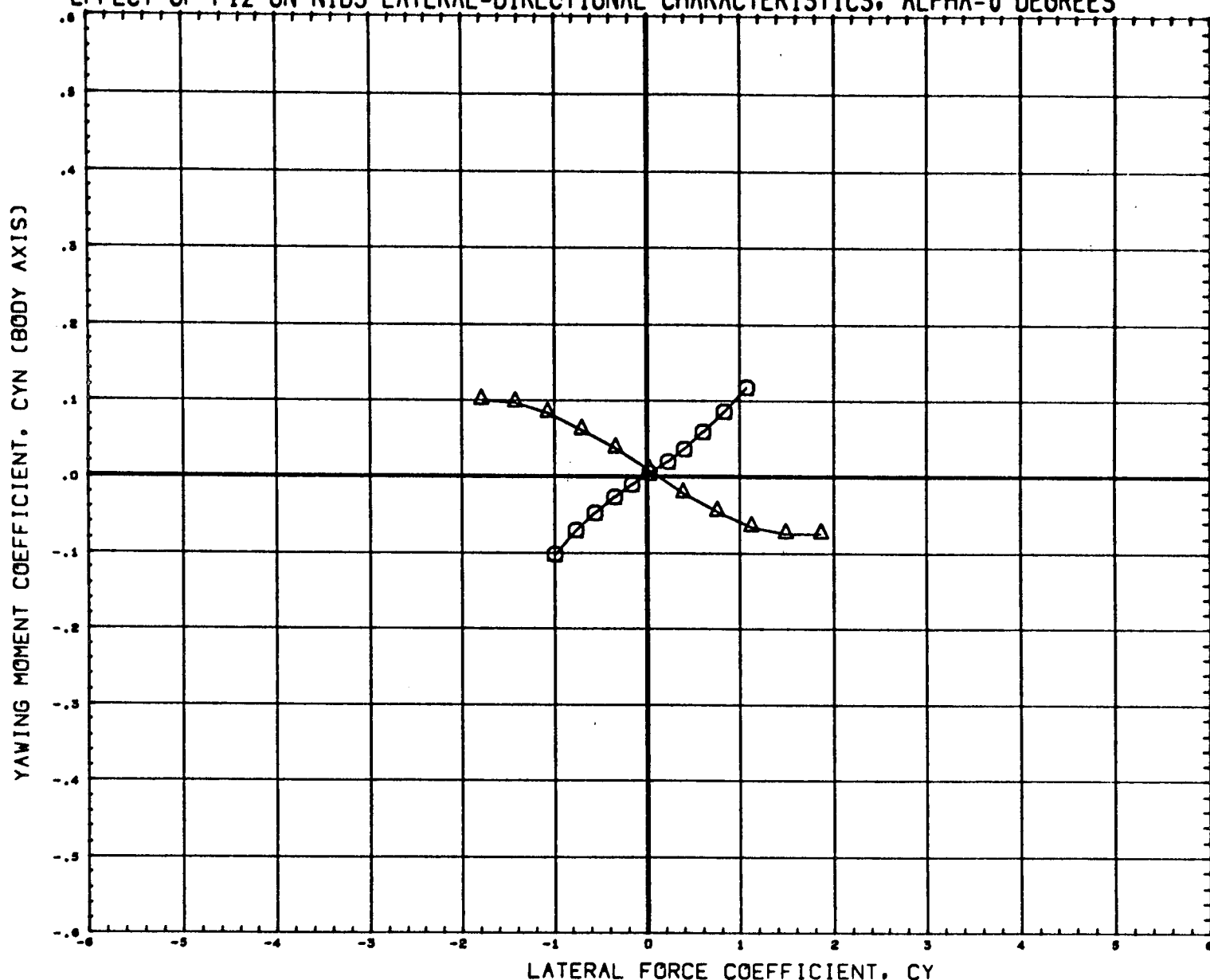
ALPHA DINDRL
 0.000
 0.000 30.000

REFERENCE INFORMATION
 SREF 0.9330 SQ. IN
 LREF 8.1720 IN.
 BREF 8.1720 IN.
 XMRP 5.2300 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=0 DEGREES



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(A55016) MSFC TWT 521 BOOSTER N1B3
(A55023) MSFC TWT 521 BOOSTER N1B3F12

ALPHA DIHRL

0.000 30.000
0.000 30.000

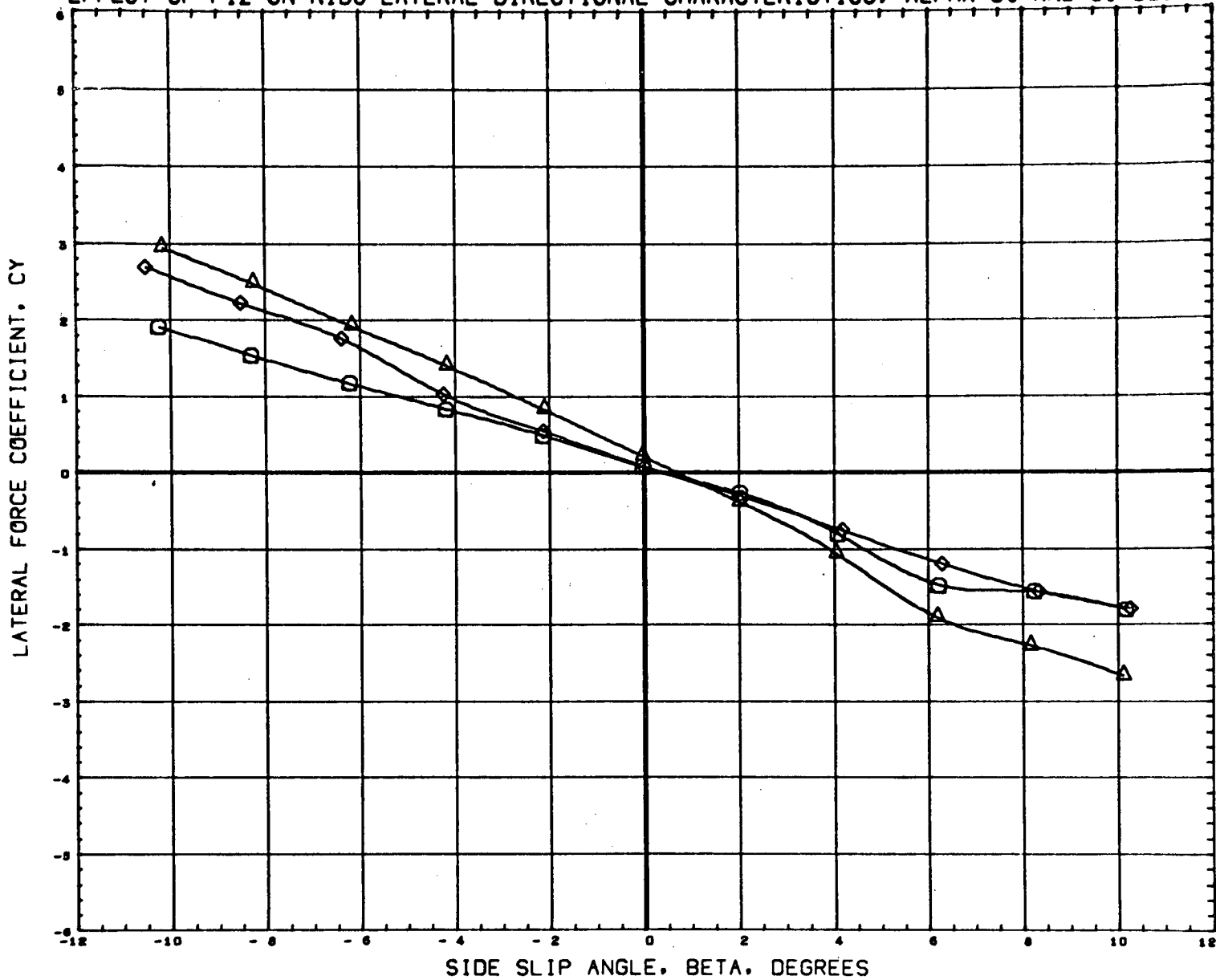
REFERENCE INFORMATION

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LREF 8.1720 IN.
BREF 8.1720 IN.
XMRP 5.2300 IN.
YMRP 0.0000 IN.
ZMRP 0.0000 IN.
SCALE 0.0034

MACH 1.46

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

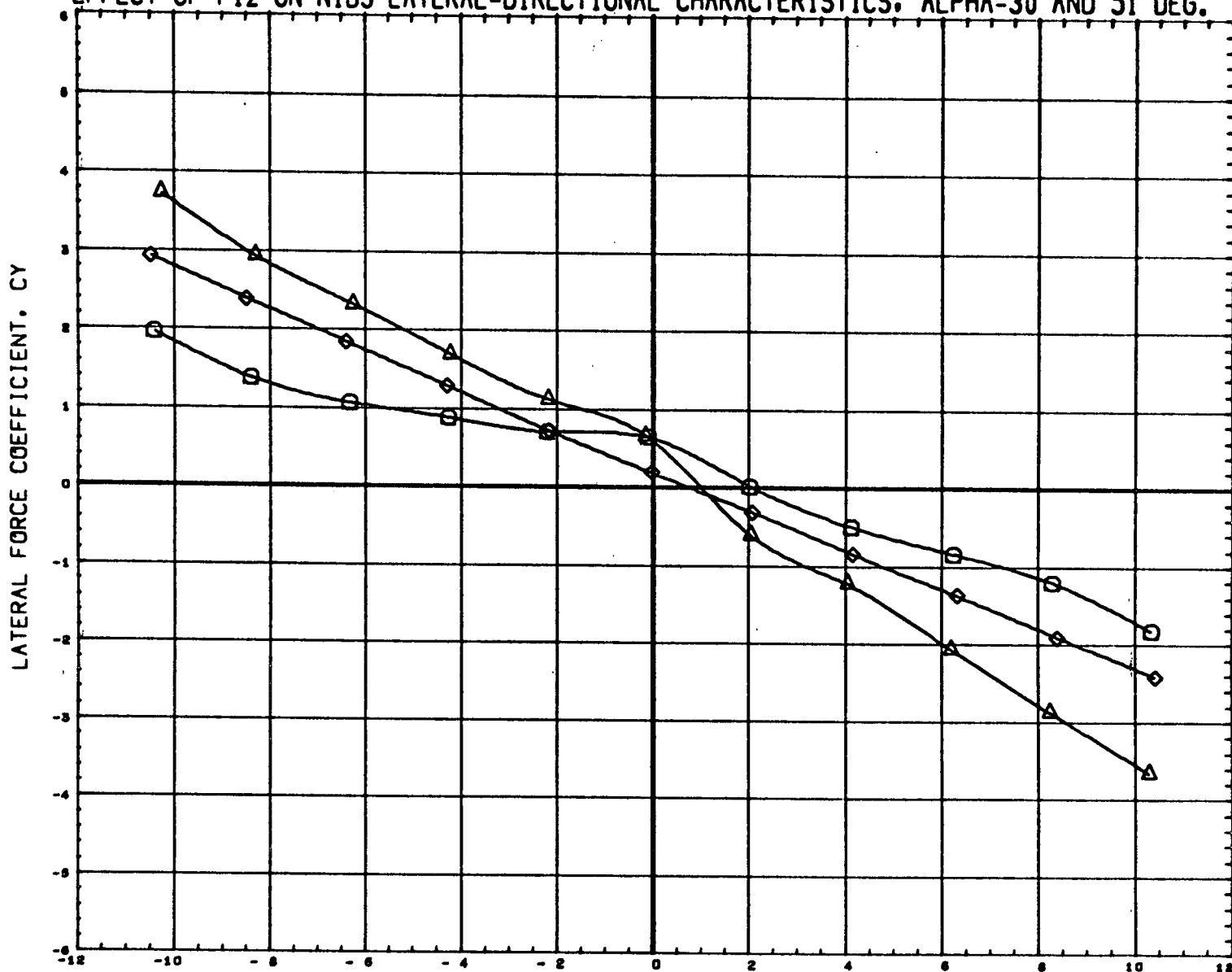
ALPHA	DIHDL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH .90

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EFFECT OF F12 ON N183 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N183
(A55024)	MSFC TWT 521 BOOSTER N183F12
(A55018)	MSFC TWT 521 BOOSTER N183
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

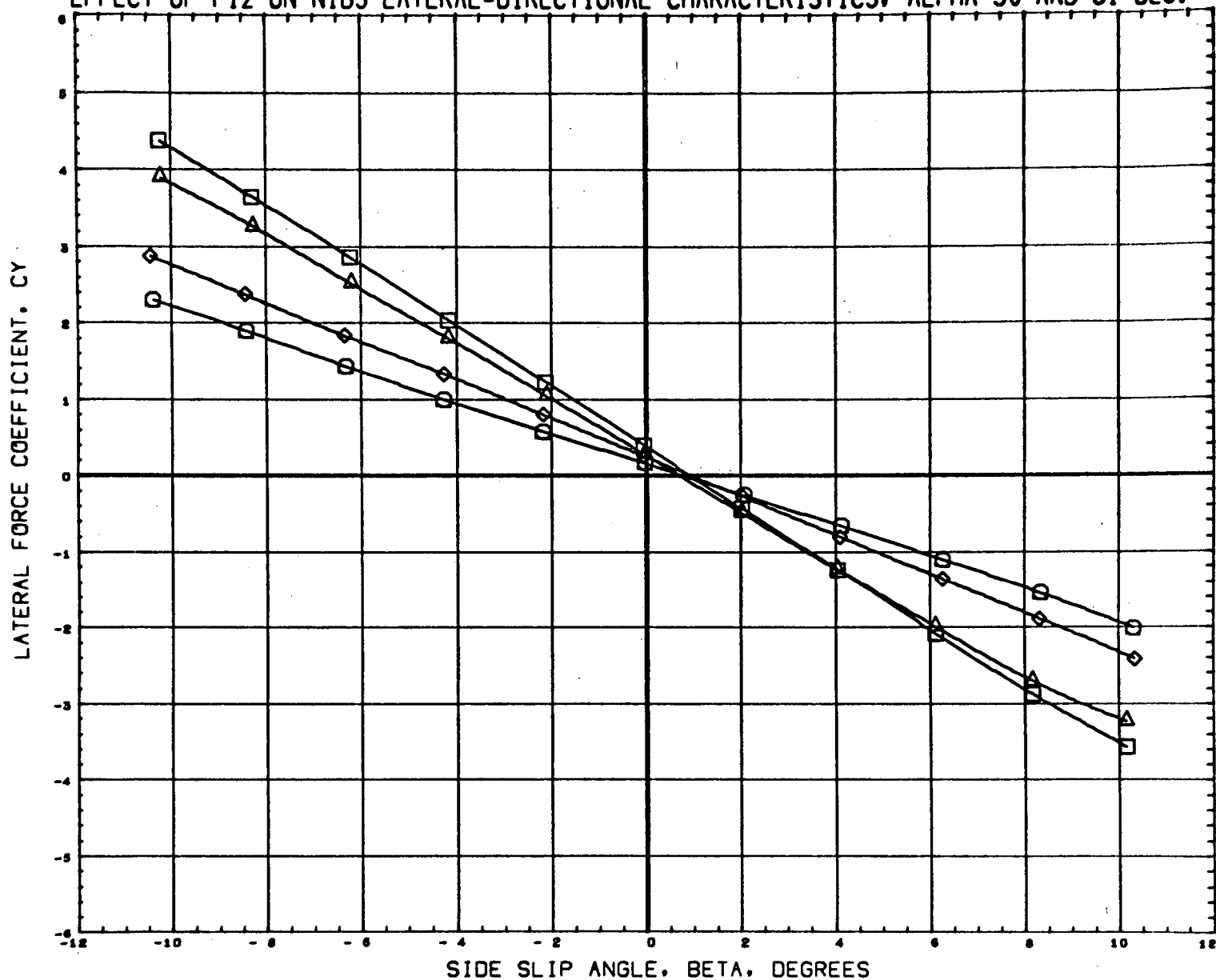
ALPHA	DIHDL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	○	MSFC TWT 521 BOOSTER N1B3
(A55024)	△	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	◇	MSFC TWT 521 BOOSTER N1B3
(A55025)	□	MSFC TWT 521 BOOSTER N1B3F12

SIDE SLIP ANGLE, BETA, DEGREES

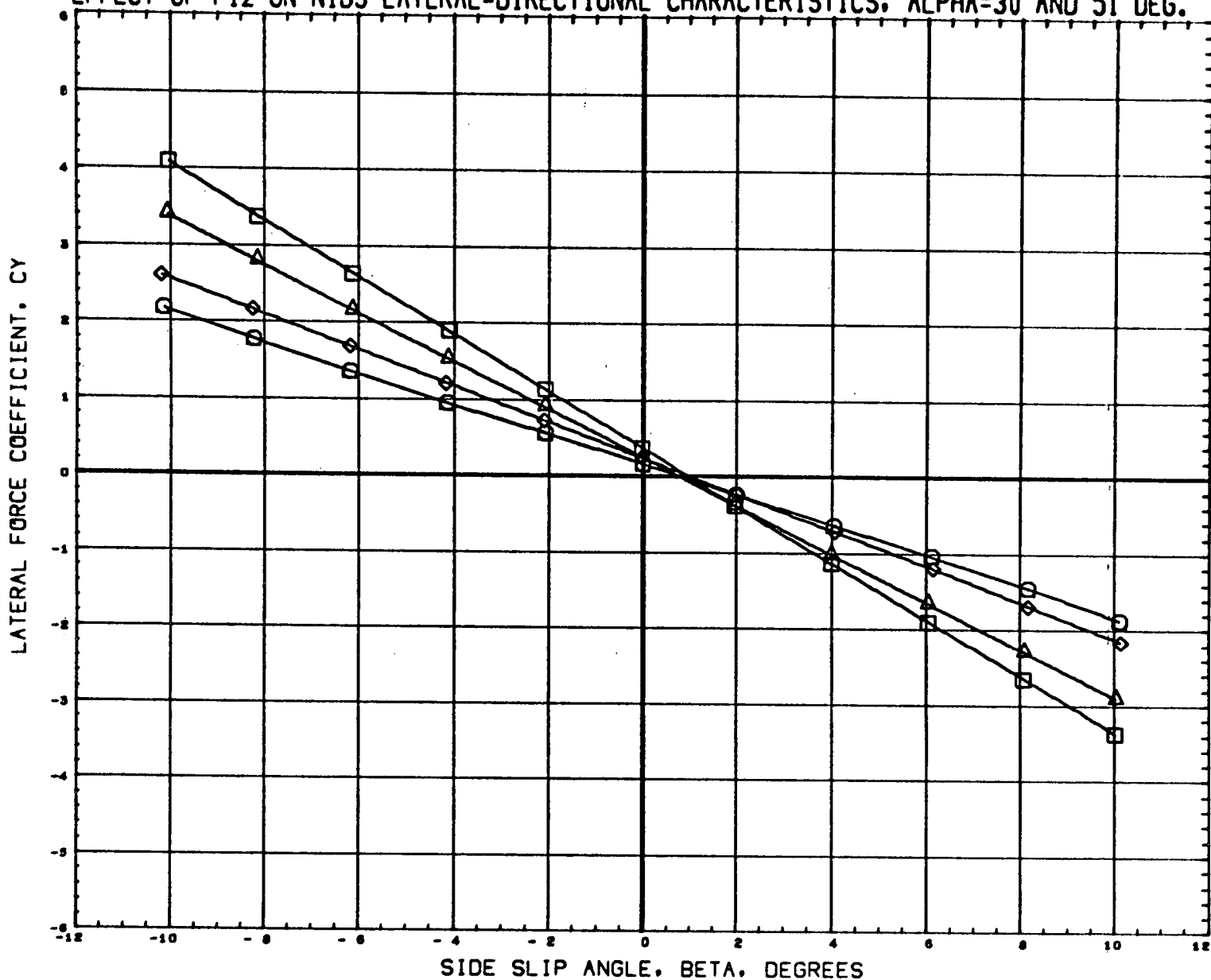
ALPHA	DIMDRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 1.95

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	MSFC TWT 521 BOOSTER N1B3F12

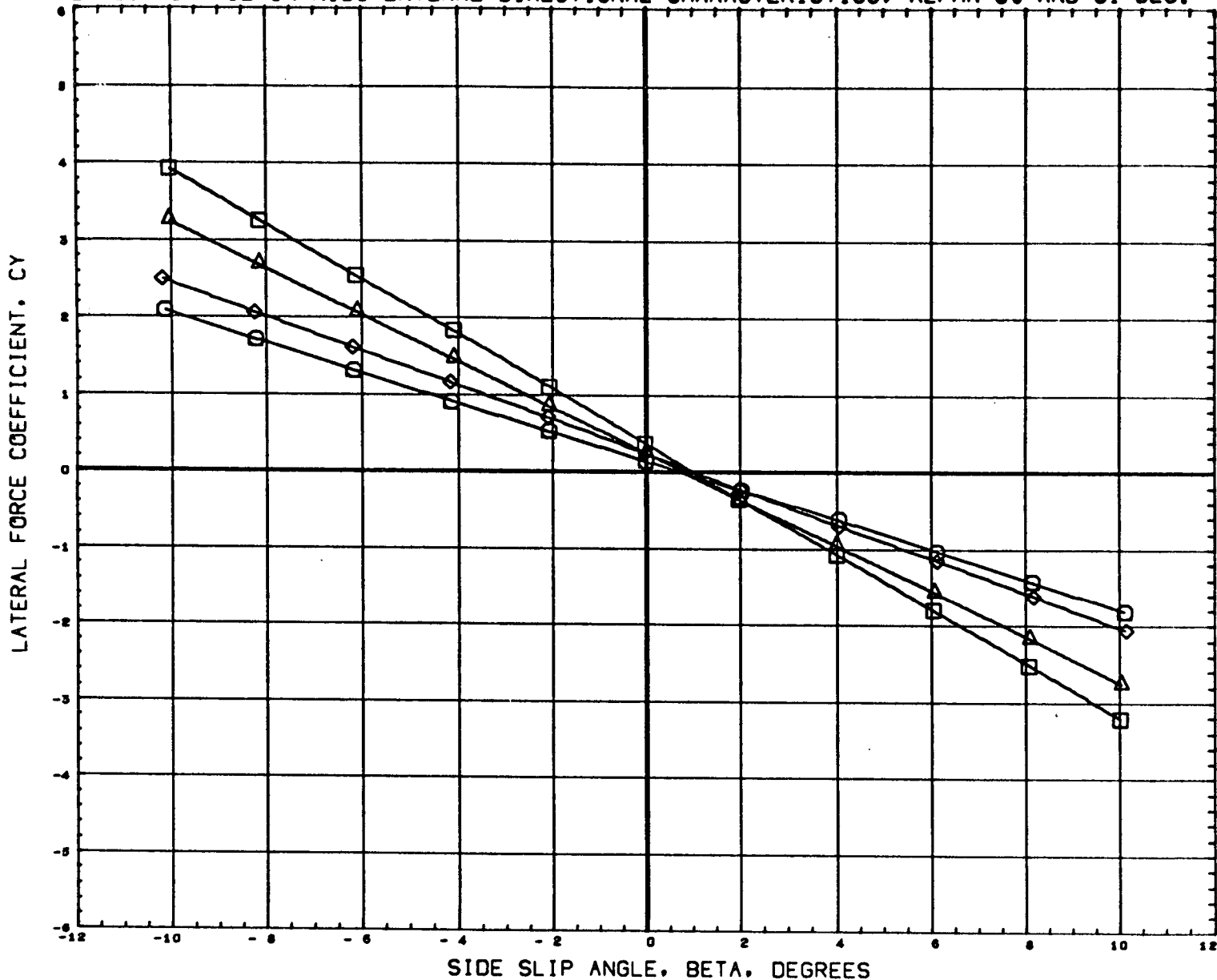
ALPHA	DIHDL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRF	5.2300	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

MACH 2.74

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



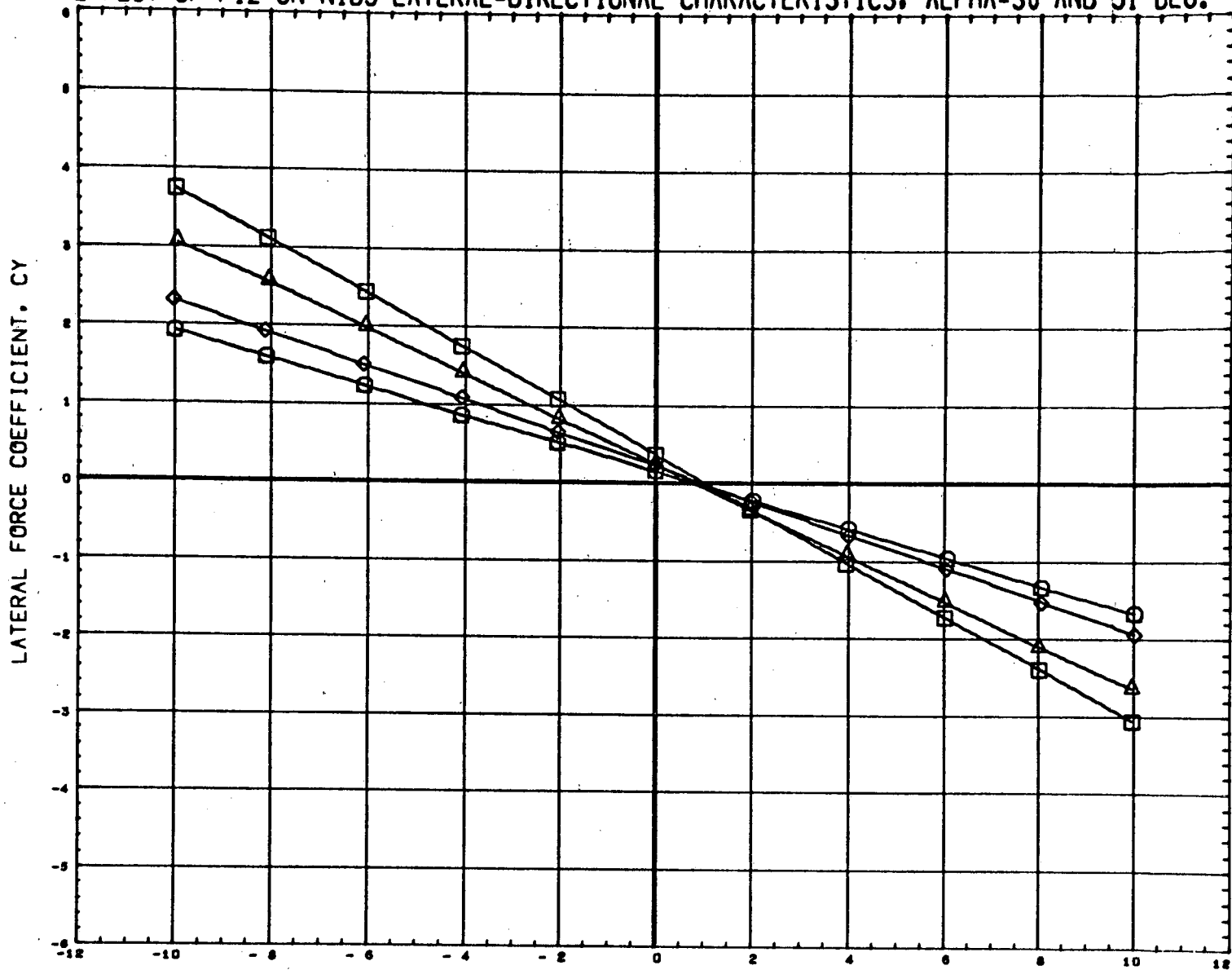
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	MSFC TWT 521 BOOSTER N1B3F12

ALPHA	DIHDL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	NSFC TWT 521 BOOSTER
(A55024)	NSFC TWT 521 BOOSTER
(A55018)	NSFC TWT 521 BOOSTER
(A55025)	NSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

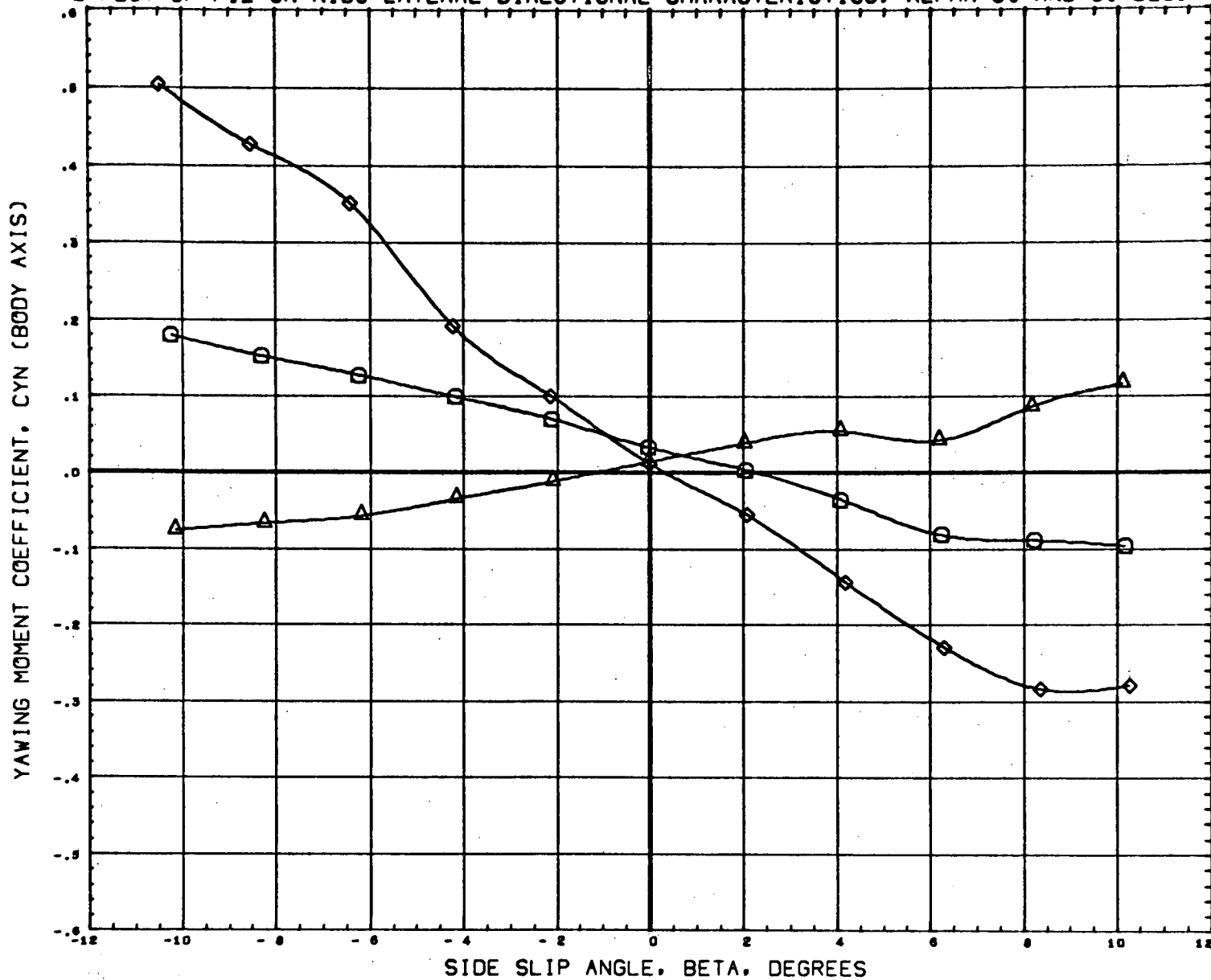
ALPHA	DINHRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

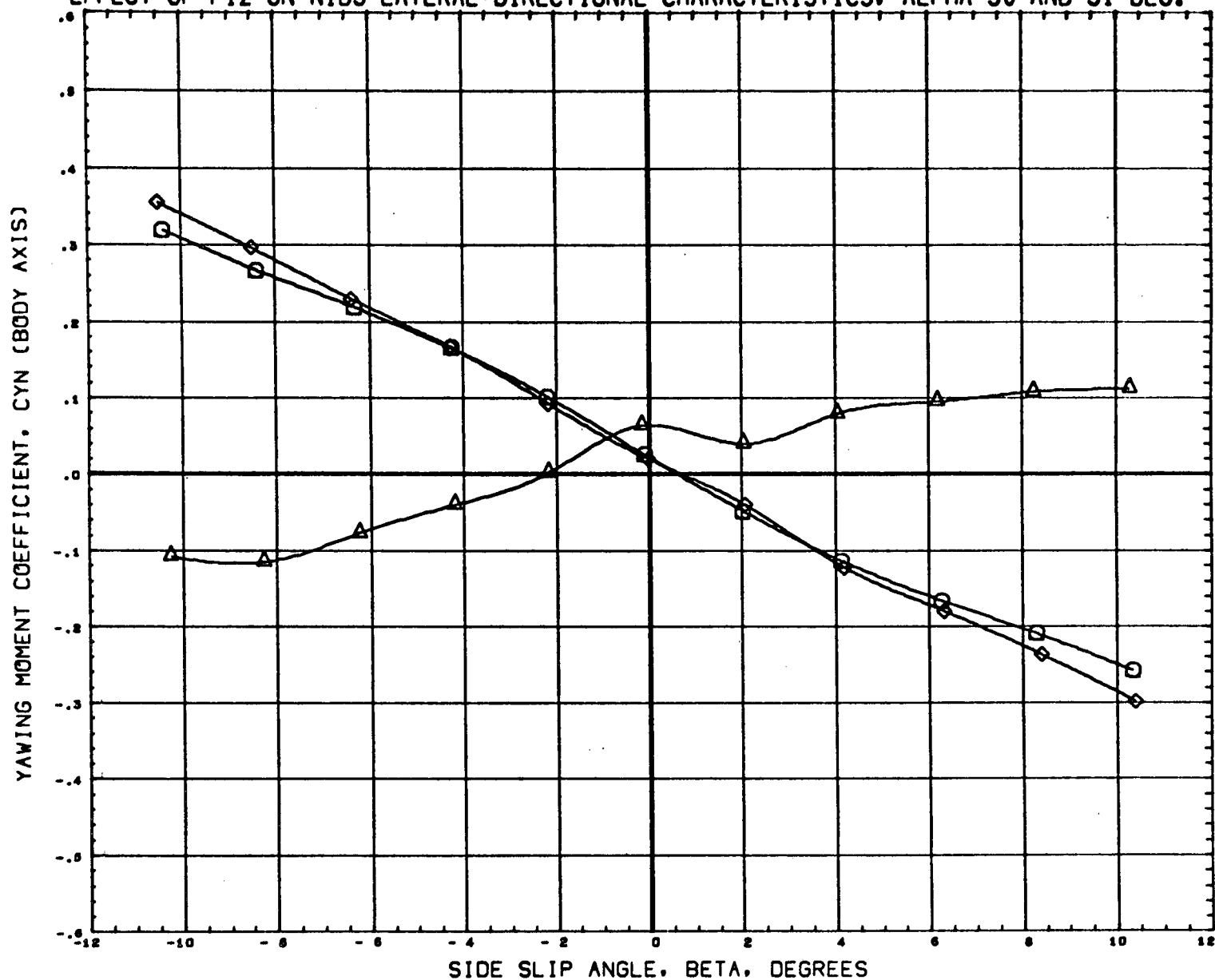
ALPHA	DIHRL
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51.000	30.000

REFERENCE INFORMATION	
SREF	0.9330 sq. in
LREF	8.1720 in.
BREF	8.1720 in.
XMRP	5.2300 in.
YMRP	0.0000 in.
ZMRP	0.0000 in.
SCALE	0.0034

MACH .90

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EFFECT OF F12 ON N183 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N183
(A55024)	MSFC TWT 521 BOOSTER N183F12
(A55018)	MSFC TWT 521 BOOSTER N183
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

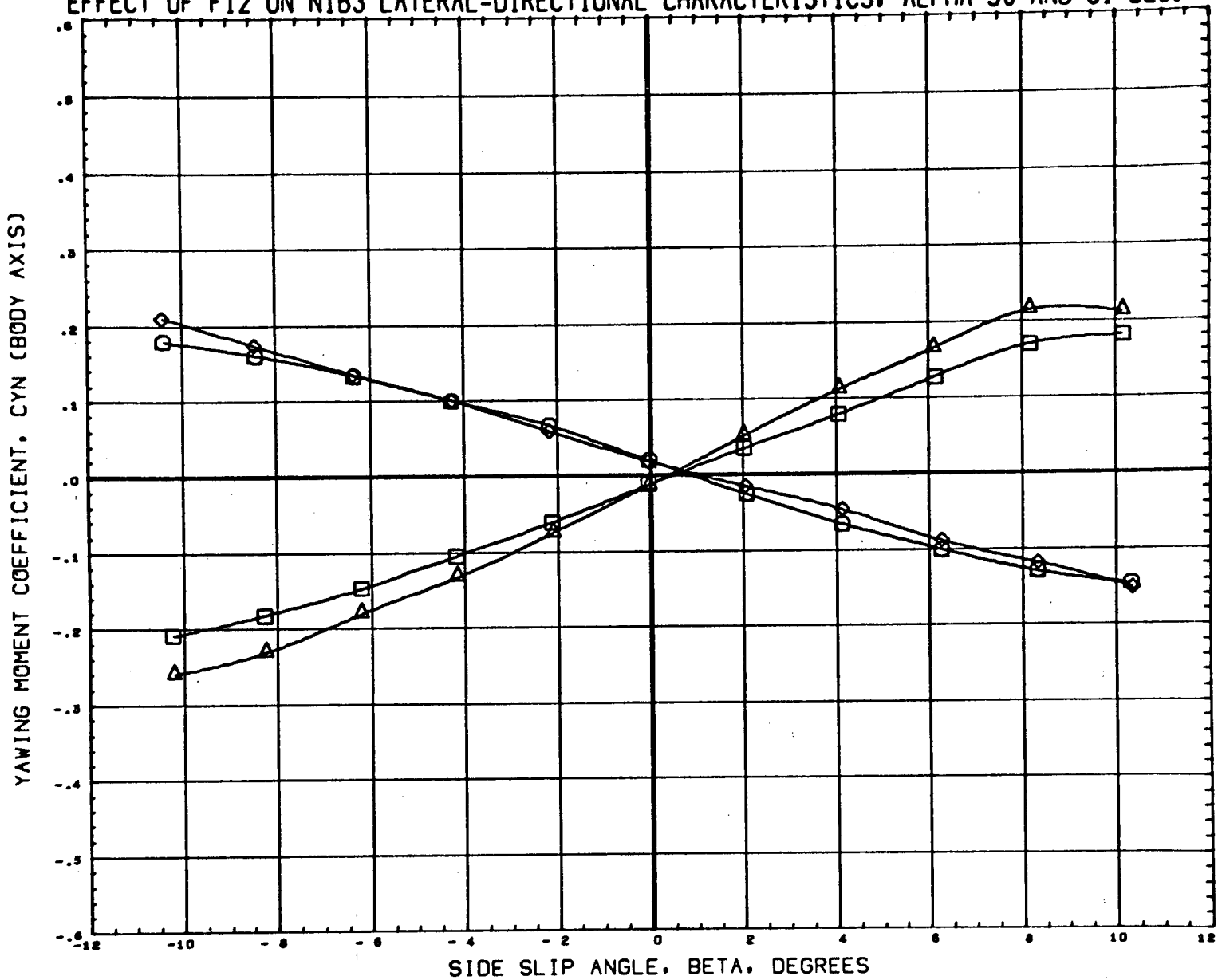
ALPHA	DIMDRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION	
SREF	0.9330 SQ. IN
LREF	8.1720 IN.
BREF	8.1720 IN.
XMRP	5.2300 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER
(A55024)	MSFC TWT 521 BOOSTER
(A55018)	MSFC TWT 521 BOOSTER
(A55025)	MSFC TWT 521 BOOSTER

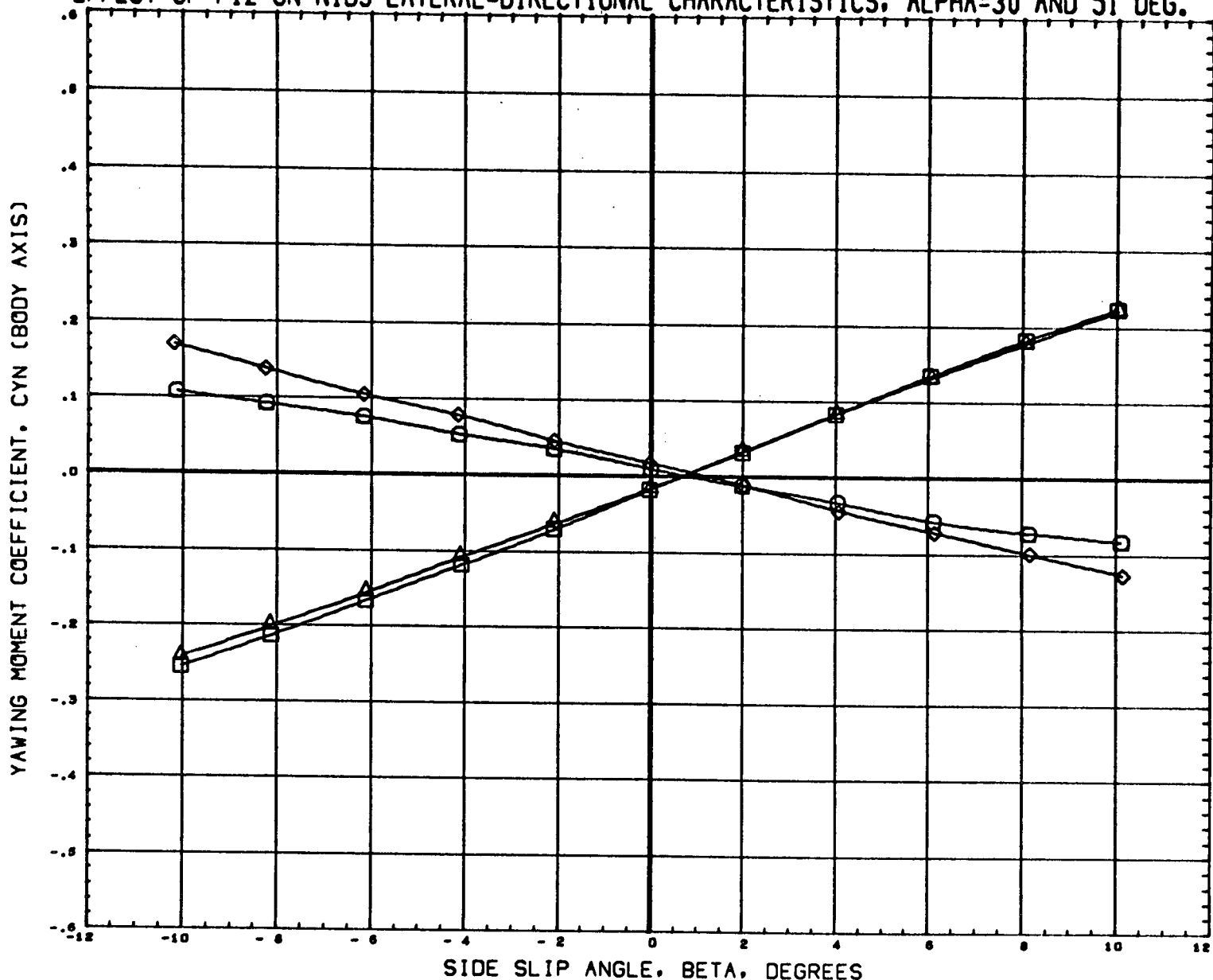
ALPHA	DIHDL
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30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XHRP	5.2300	IN.
YHRP	0.0000	IN.
ZHRP	0.0000	IN.
SCALE	0.0034	

MACH 1.95

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	N1B3
(A55024)	N1B3F12
(A55018)	N1B3
(A55025)	N1B3F12

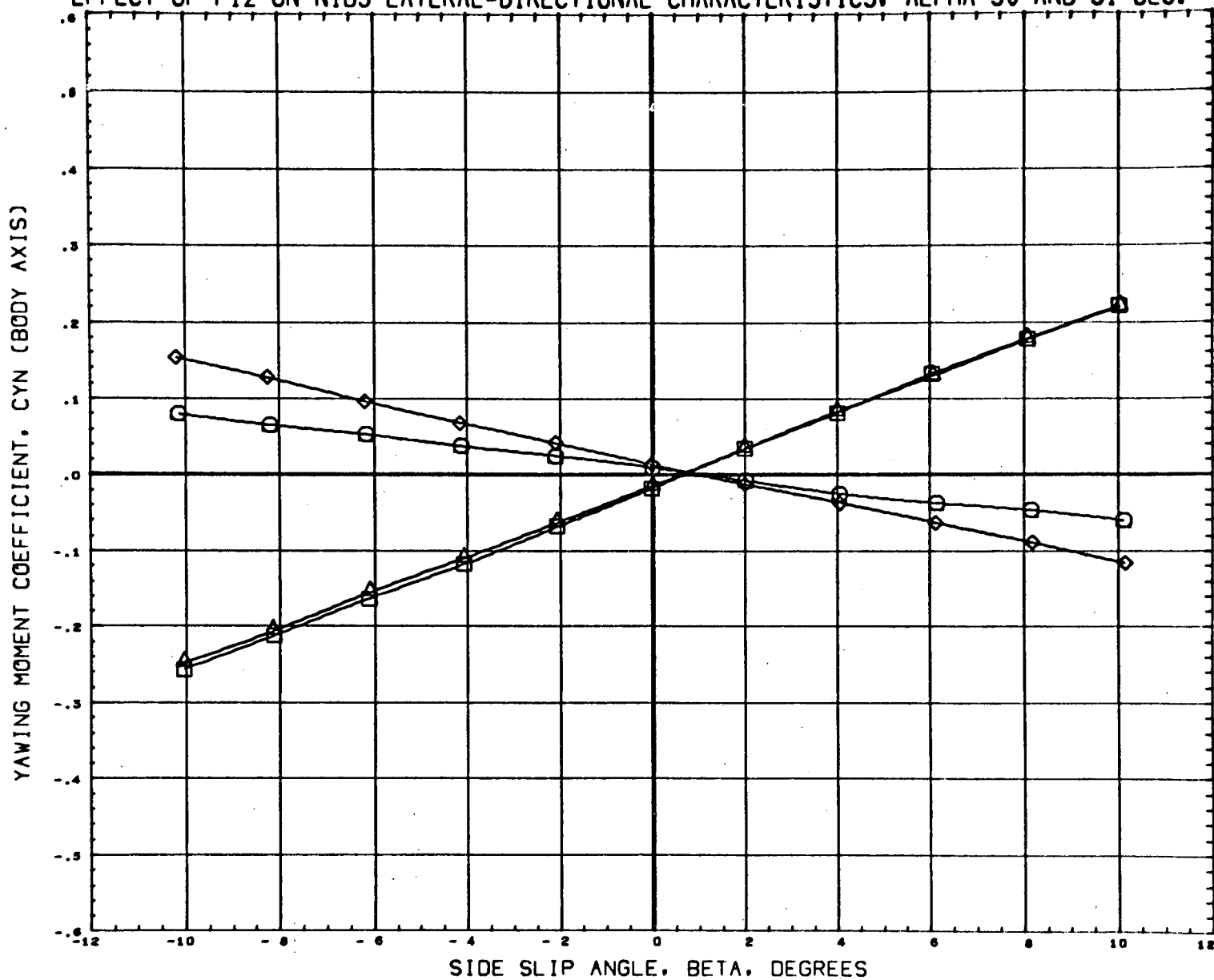
ALPHA	DINHRL
30.000	30.000
51.000	30.000

REFERENCE INFORMATION	
SREF	0.9330 sq. IN
LREF	8.1720 IN.
BREF	8.1720 IN.
XMRP	5.2300 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 2.74

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	MSFC TWT 521 BOOSTER N1B3F12

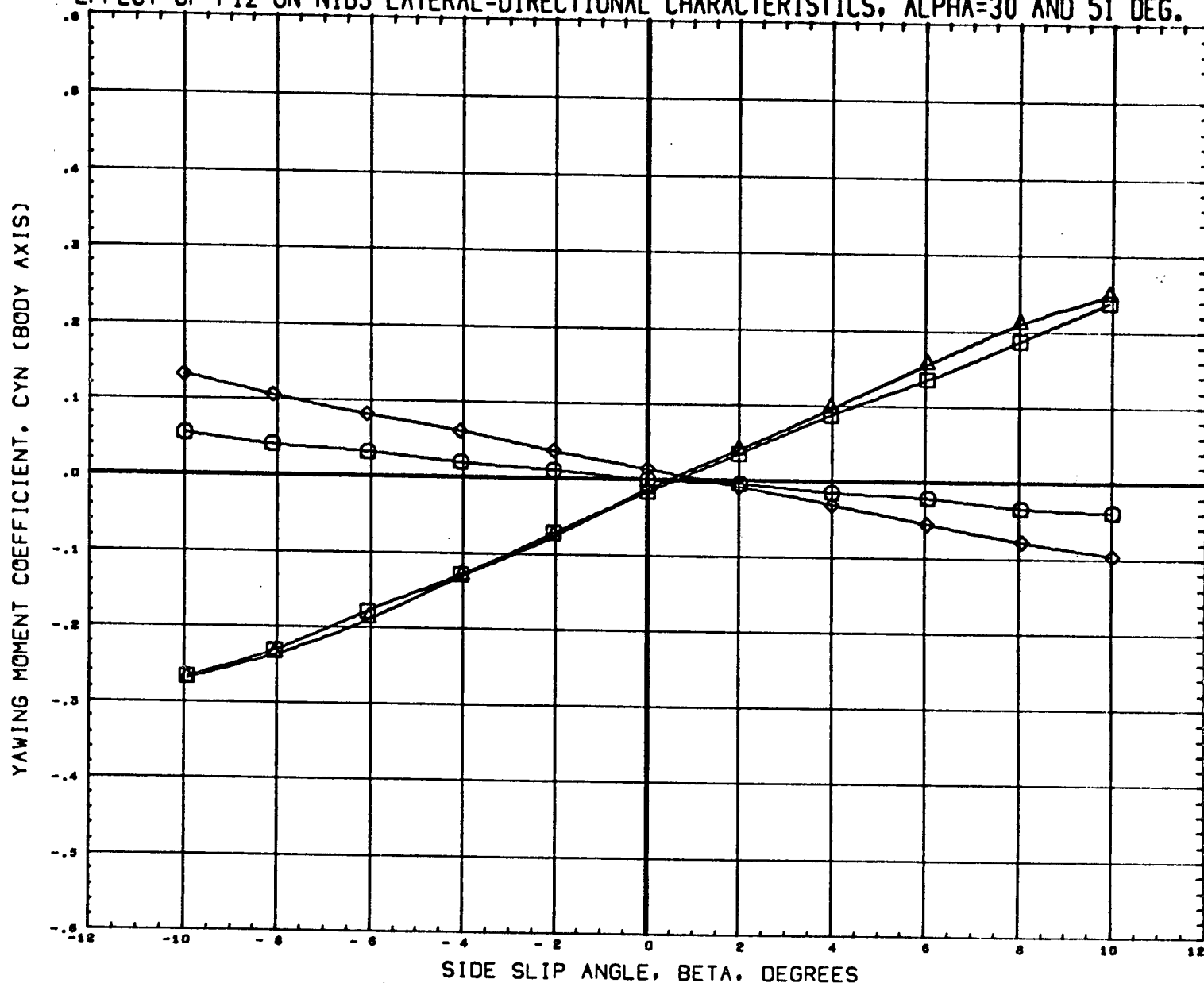
ALPHA	DIMDRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER
(A55024)	MSFC TWT 521 BOOSTER
(A55018)	MSFC TWT 521 BOOSTER
(A55025)	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

ALPHA	DINDRL
30.000	30.000
30.000	30.000
51.000	30.000
51.000	30.000

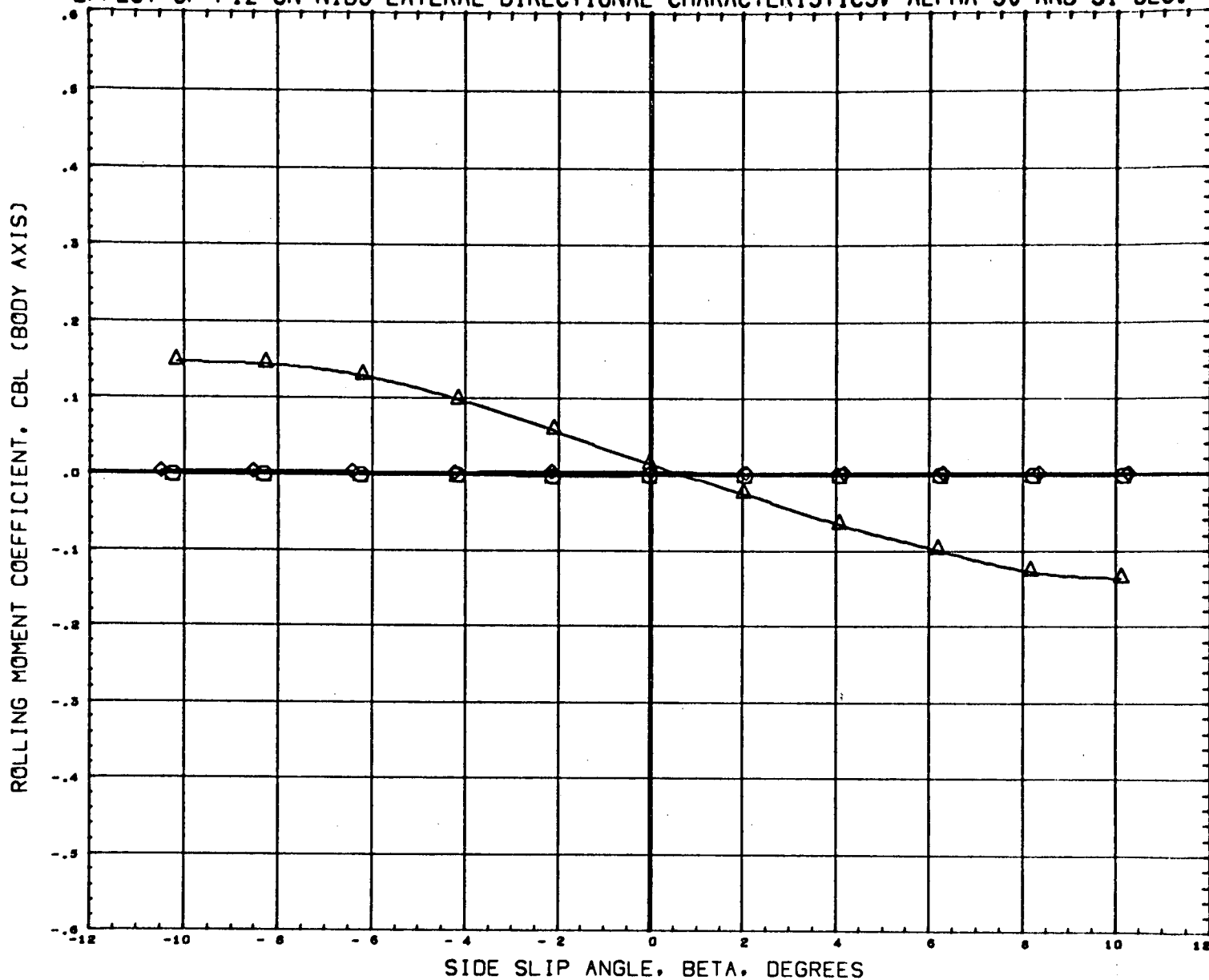
REFERENCE INFORMATION		
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LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH

4.96

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(A55017)	MSFC TWT 521 BOOSTER	N1B3
(A55024)	MSFC TWT 521 BOOSTER	N1B3F12
(A55018)	MSFC TWT 521 BOOSTER	N1B3
(A55023)	DATA NOT AVAILABLE FOR ALL CONDITIONS	

ALPHA DIHDL

30.000	
30.000	30.000
51.000	
51.000	30.000

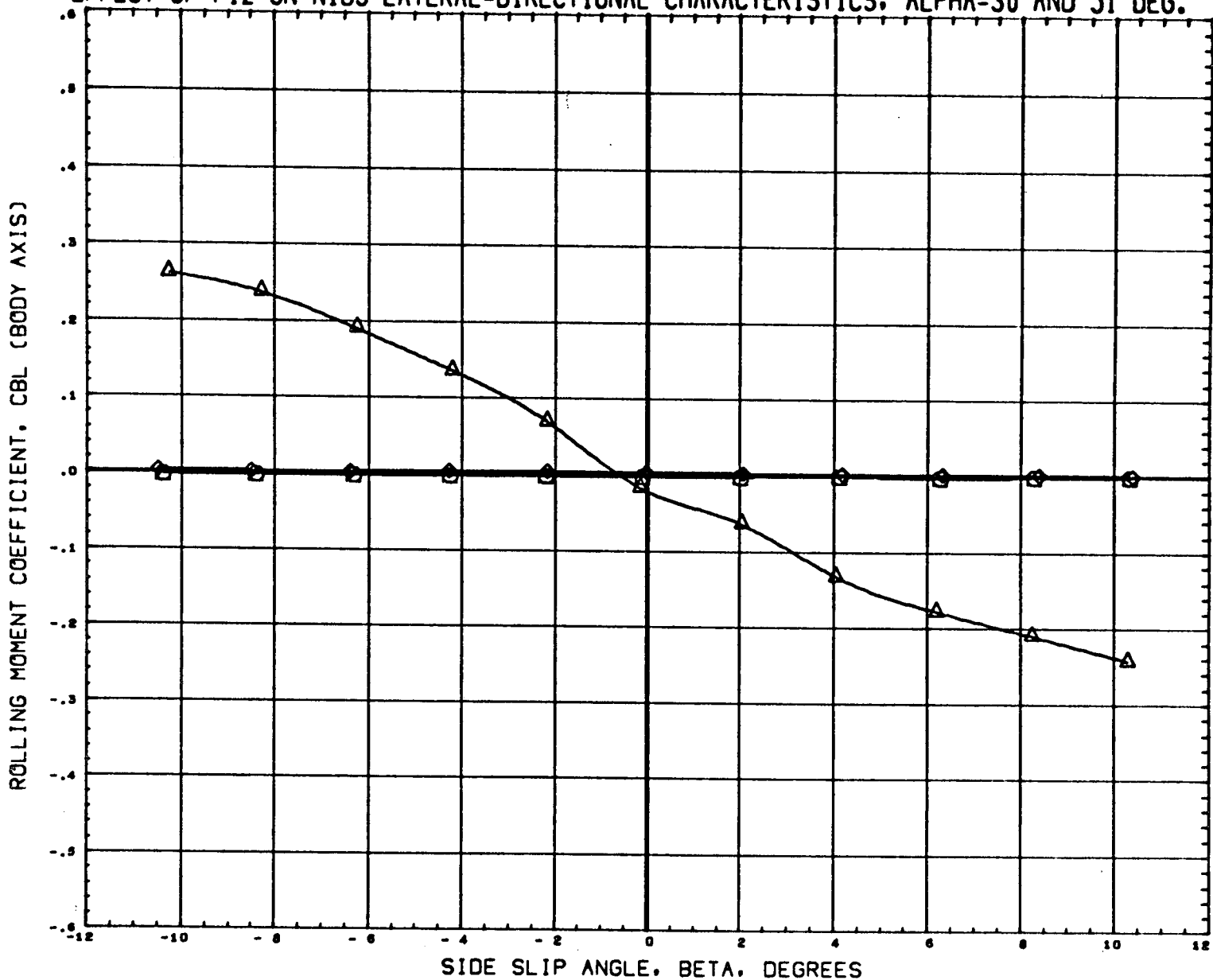
REFERENCE INFORMATION

SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH .90

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

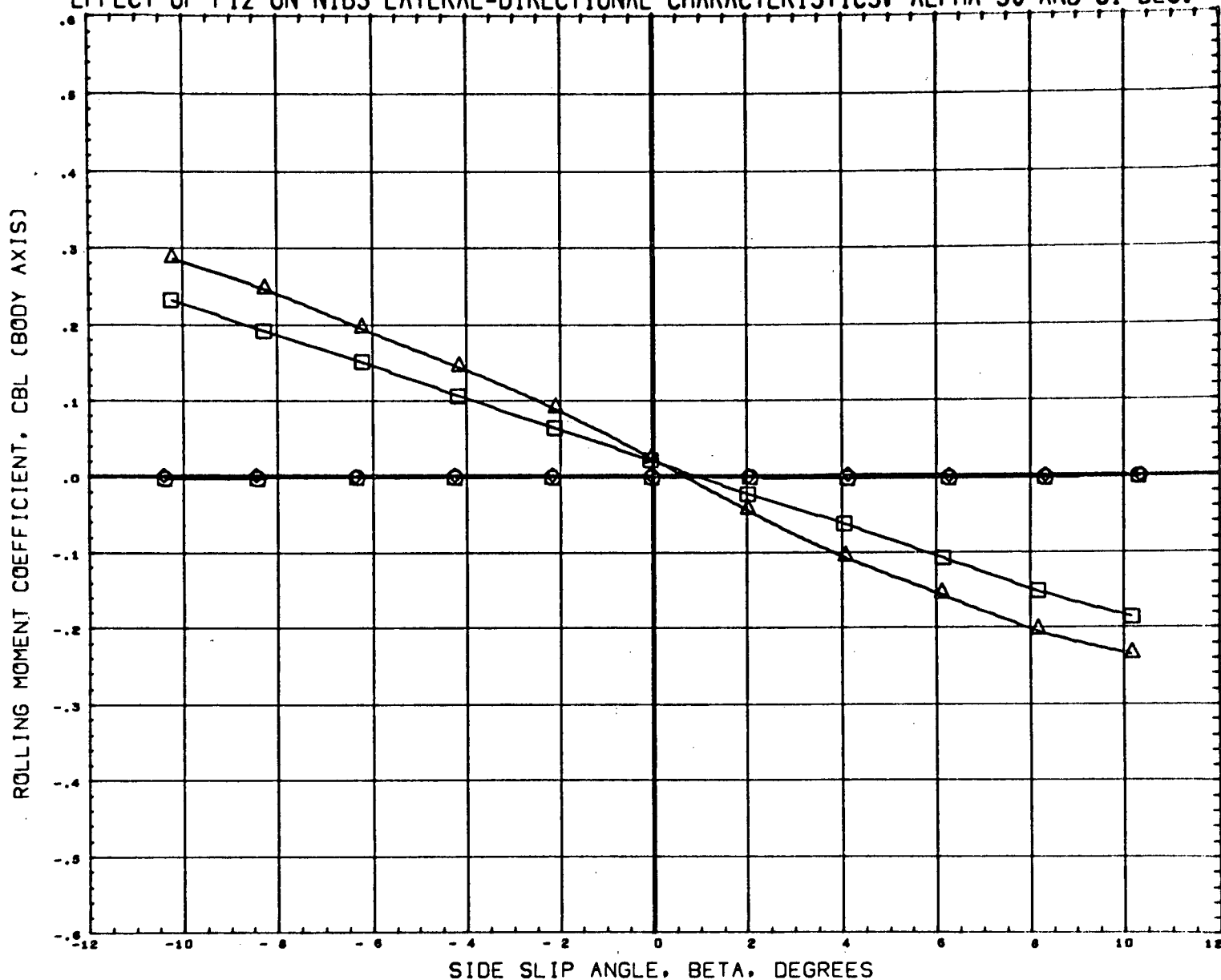
ALPHA	DIHRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	MSFC TWT 521 BOOSTER N1B3F12

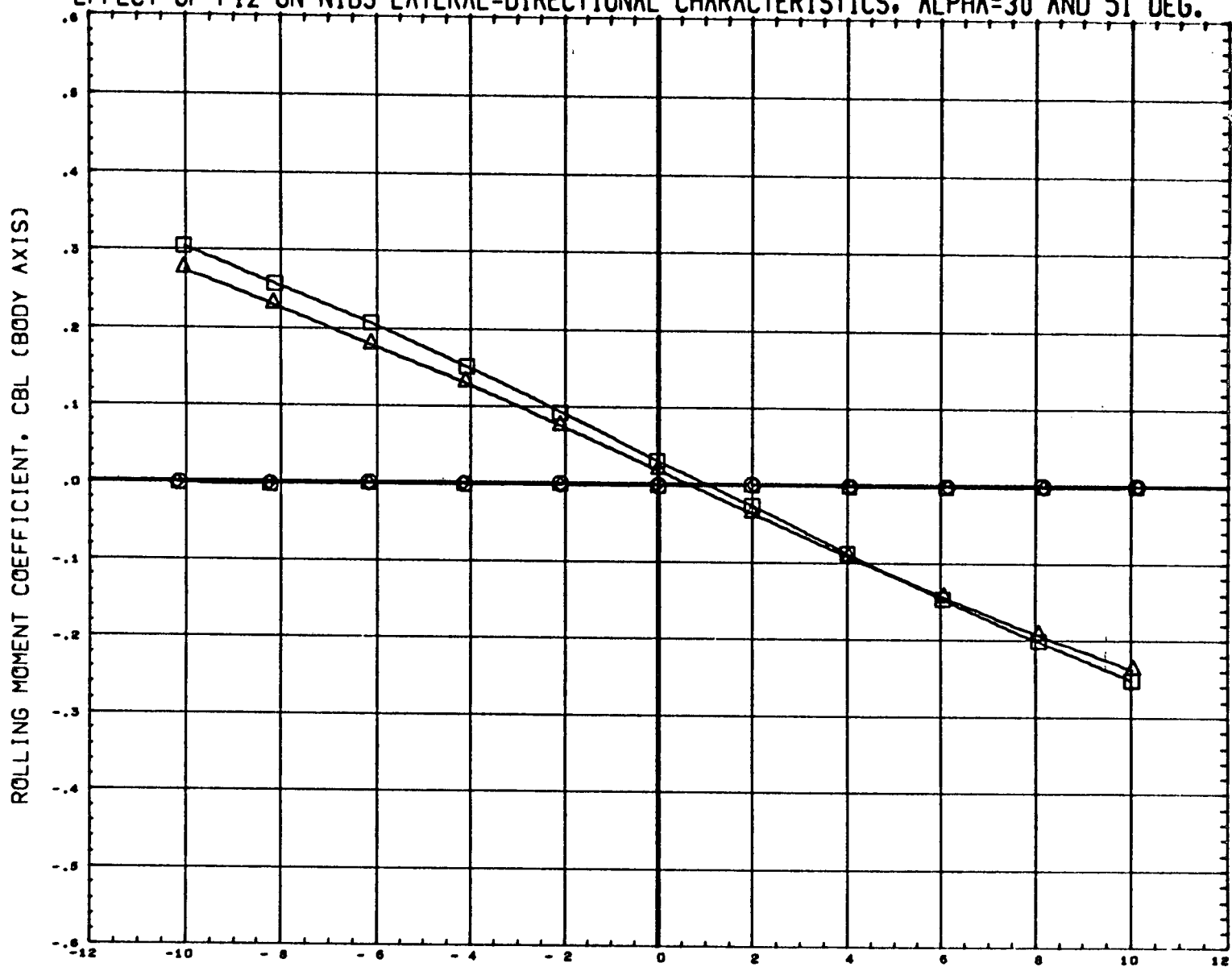
ALPHA	DIHDL
30.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	6.1720	IN.
BREF	6.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.95

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	○	MSFC TWT 521 BOOSTER
(A55024)	△	MSFC TWT 521 BOOSTER
(A55018)	◇	MSFC TWT 521 BOOSTER
(A55025)	□	MSFC TWT 521 BOOSTER

SIDE SLIP ANGLE, BETA, DEGREES

ALPHA	DIHRL
30.000	30.000
30.000	30.000
51.000	30.000
51.000	30.000

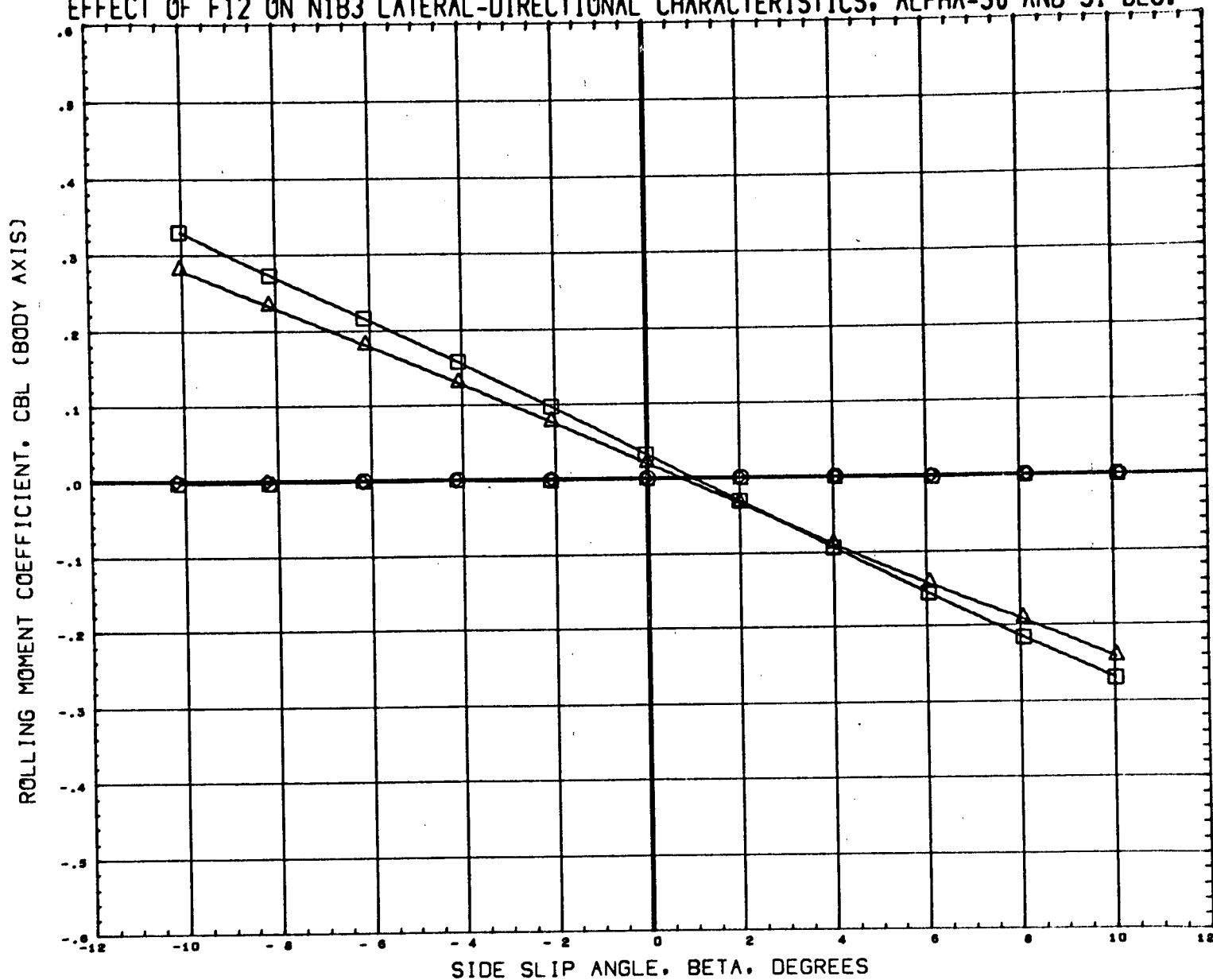
REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH

2.74

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER
(A55024)	MSFC TWT 521 BOOSTER
(A55018)	MSFC TWT 521 BOOSTER
(A55025)	MSFC TWT 521 BOOSTER

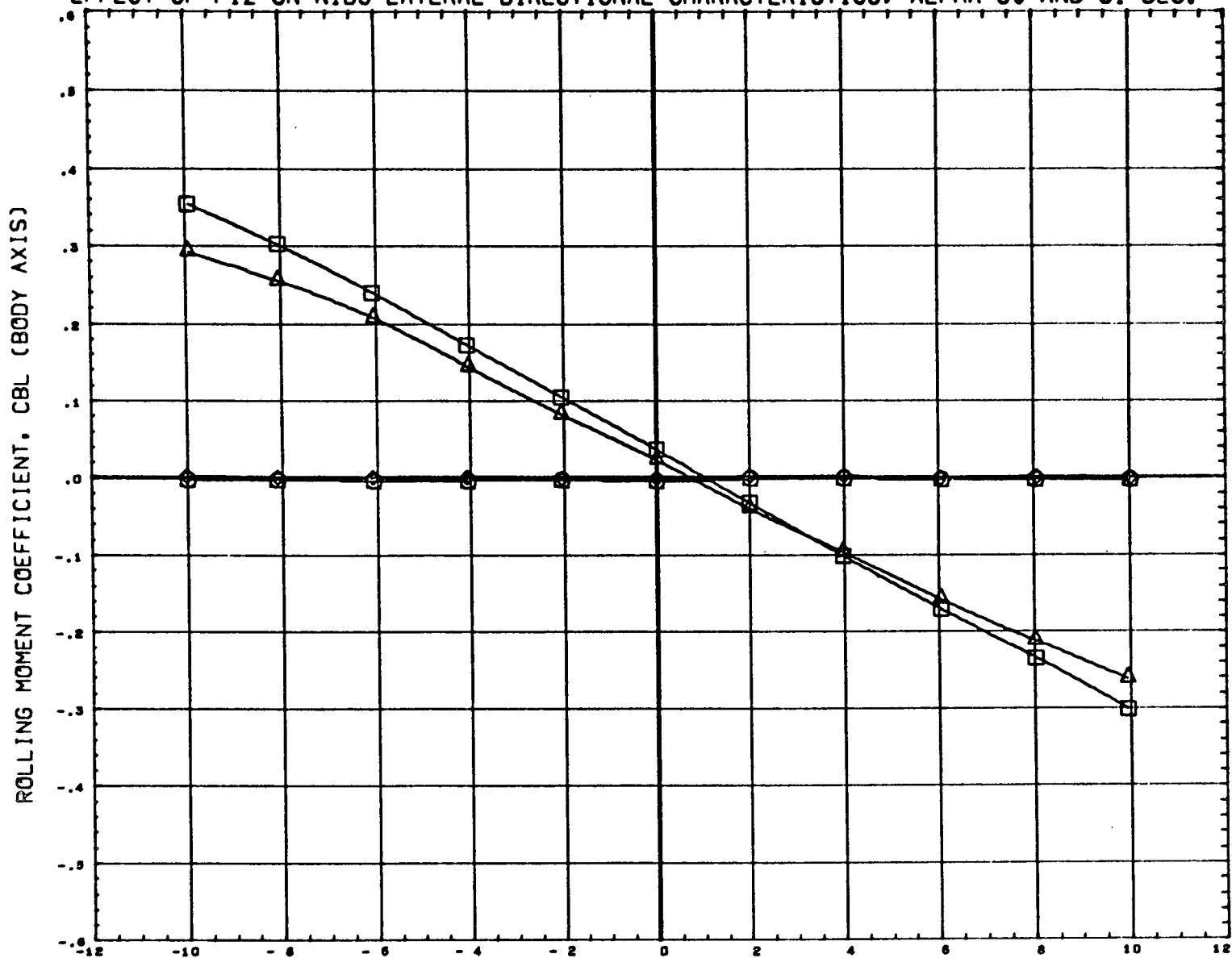
ALPHA	D1HDRL
30.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 3.48

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A99017)	MSFC TWT 521 BOOSTER N1B3
(A99024)	MSFC TWT 521 BOOSTER N1B3F12
(A99018)	MSFC TWT 521 BOOSTER N1B3
(A99025)	MSFC TWT 521 BOOSTER N1B3F12

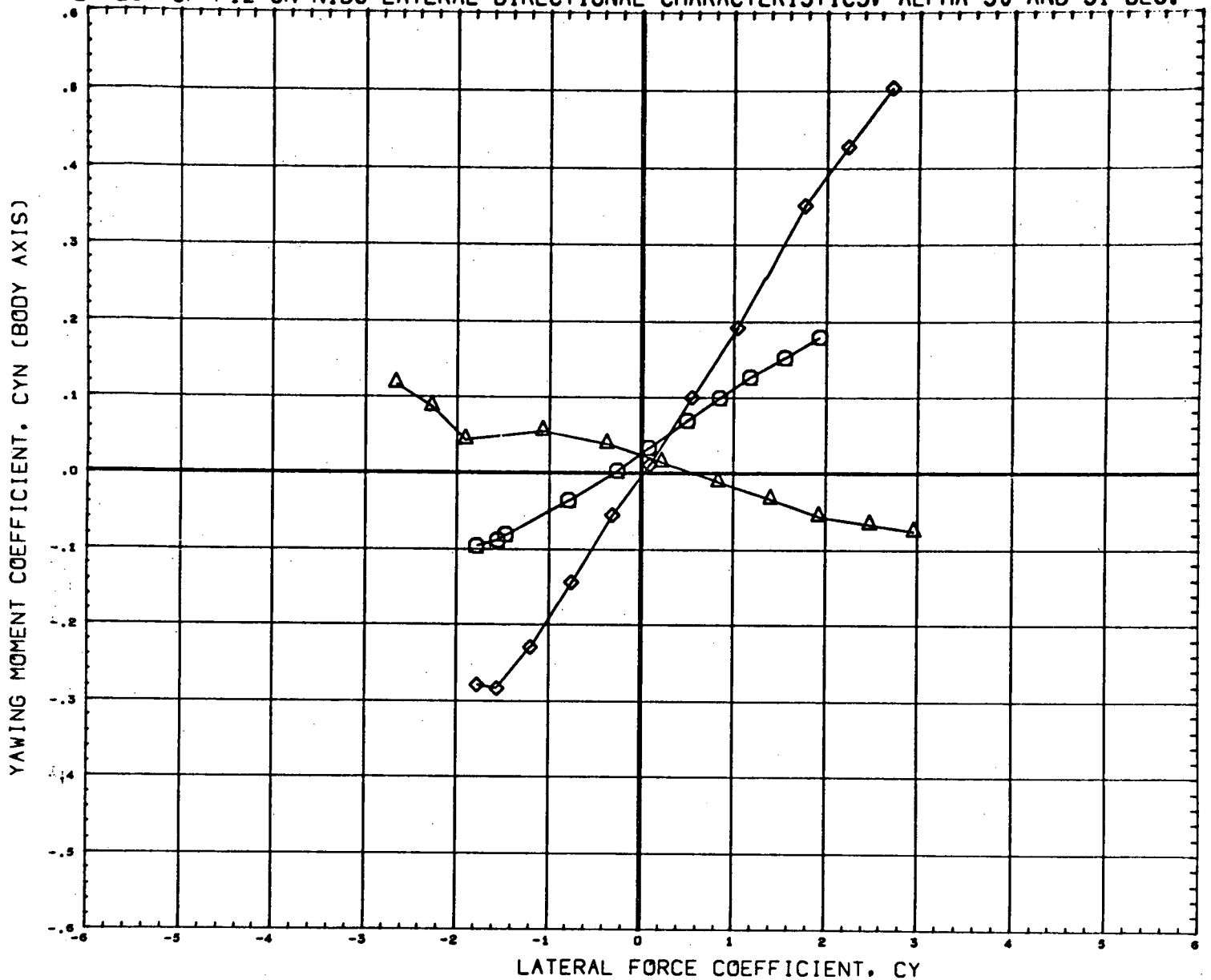
ALPHA	DINHRL
30.000	30.000
30.000	30.000
51.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

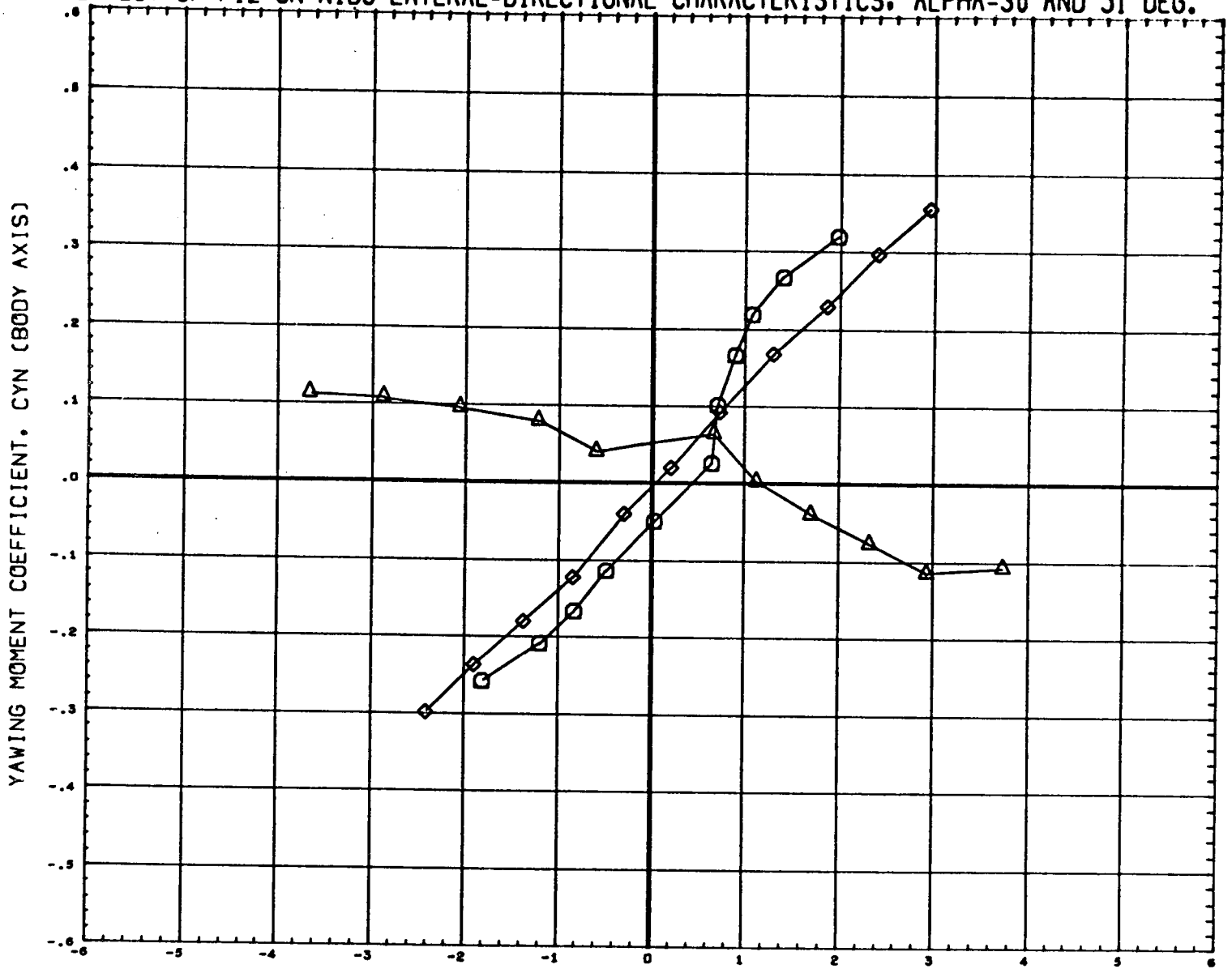
ALPHA	D1HDRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH .90

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS. ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER N1B3
(A55024)	MSFC TWT 521 BOOSTER N1B3F12
(A55018)	MSFC TWT 521 BOOSTER N1B3
(A55025)	DATA NOT AVAILABLE FOR ALL CONDITIONS

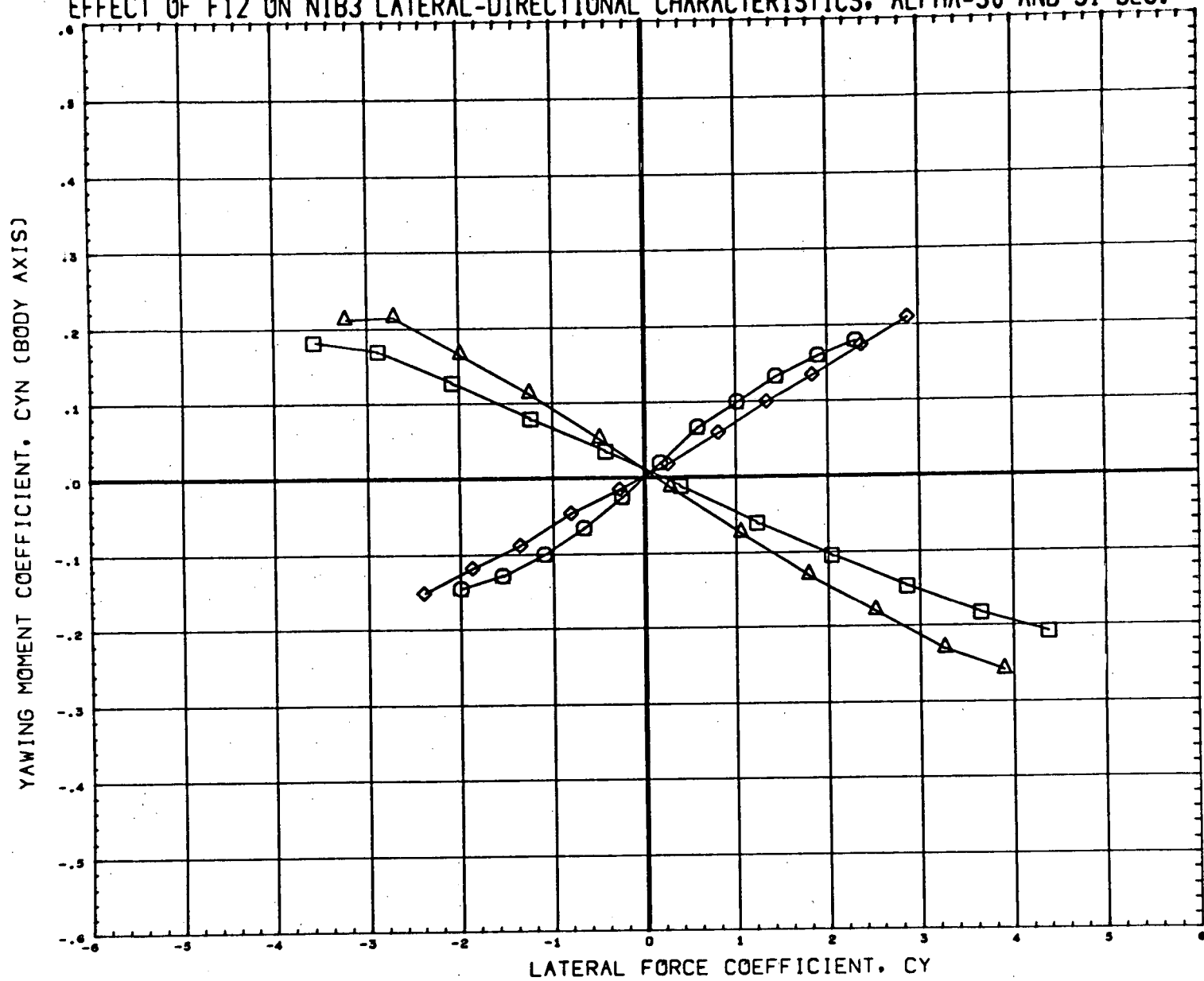
ALPHA	DIMORL
30.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XNRP	5.2300	IN.
YNRP	0.0000	IN.
ZNRP	0.0000	IN.
SCALE	0.0034	

MACH 1.20

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER
(A55024)	MSFC TWT 521 BOOSTER
(A55018)	MSFC TWT 521 BOOSTER
(A55025)	MSFC TWT 521 BOOSTER

CONFIGURATION
N1B3
N1B3F12
N1B3
N1B3F12

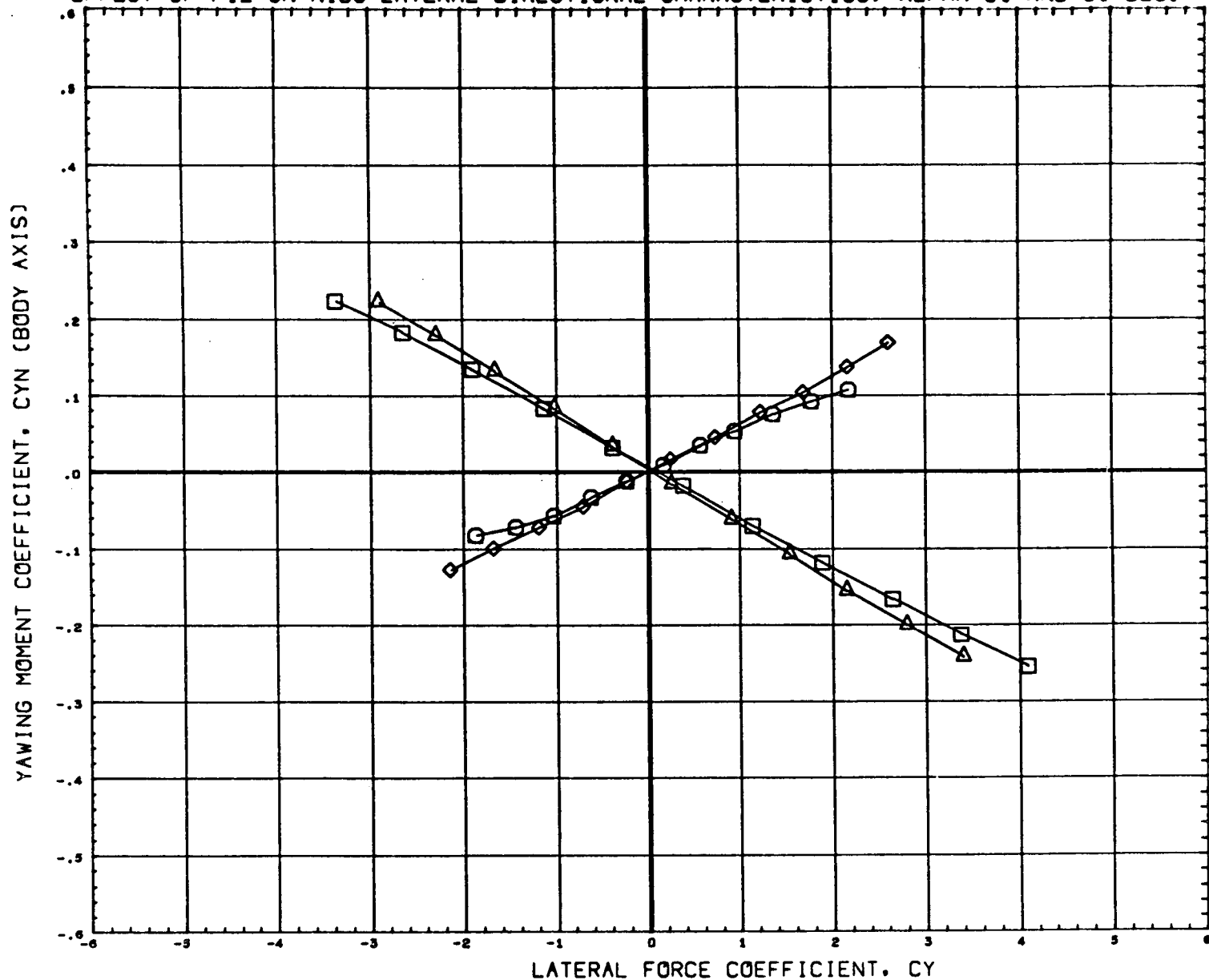
ALPHA	DIHEDRAL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION	
SREF	0.9330 sq. IN
LREF	8.1720 IN.
BREF	8.1720 IN.
XMRP	5.2300 IN.
YMRP	0.0000 IN.
ZMRP	0.0000 IN.
SCALE	0.0034

MACH 1.95

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	Circle	MSFC TWT 521 BOOSTER
(A55024)	Triangle	MSFC TWT 521 BOOSTER
(A55018)	Diamond	MSFC TWT 521 BOOSTER
(A55025)	Square	MSFC TWT 521 BOOSTER

Configuration
N1B3
N1B3F12
N1B3
N1B3F12

ALPHA	DIHEDRAL
30.000	30.000
30.000	30.000
51.000	30.000
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	Sq. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRF	5.2300	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

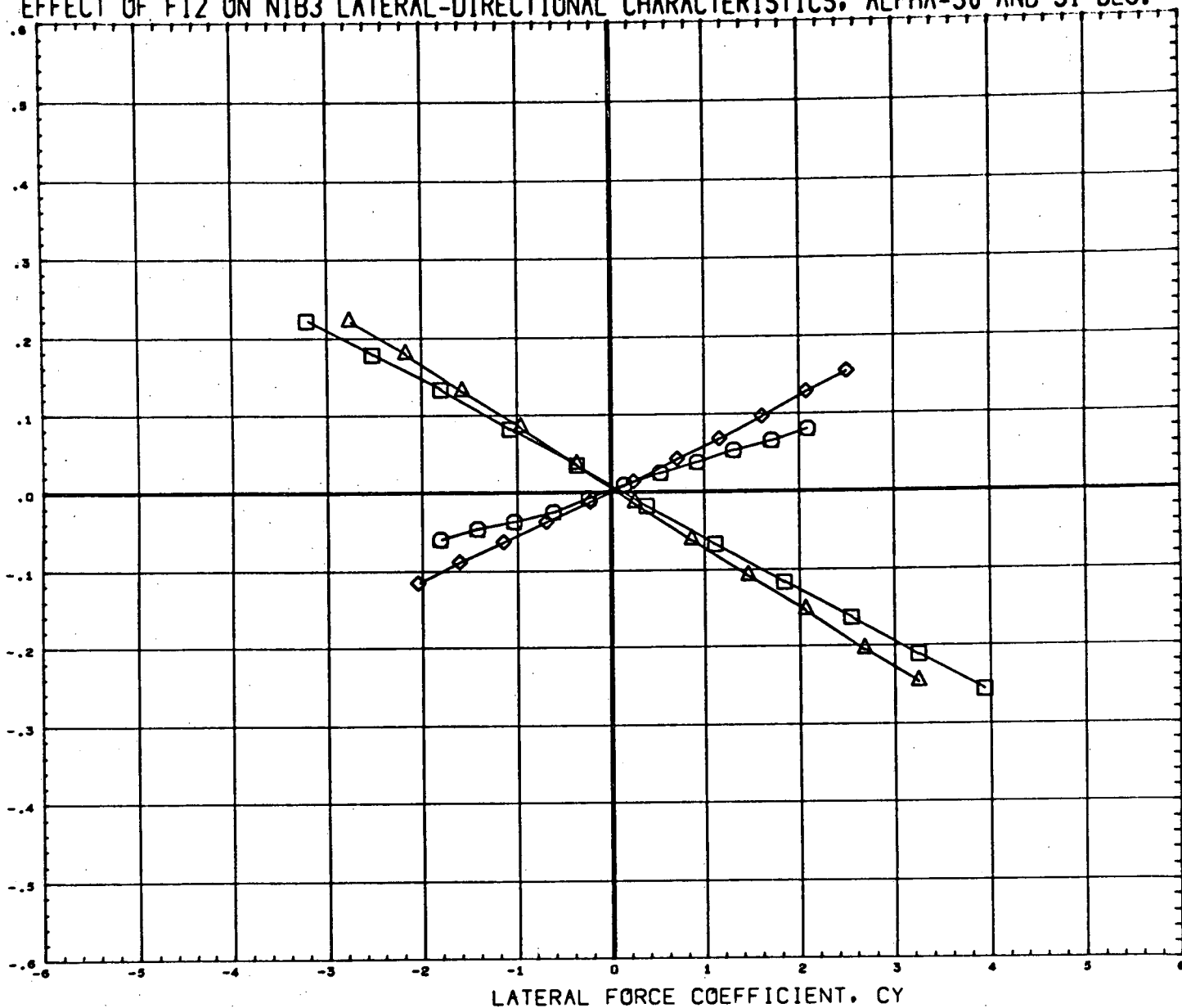
MACH

2.74

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.

YAWING MOMENT COEFFICIENT, CYN (BODY AXIS)



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER
(A55024)	MSFC TWT 521 BOOSTER
(A55018)	MSFC TWT 521 BOOSTER
(A55025)	MSFC TWT 521 BOOSTER

N1B3
N1B3F12
N1B3
N1B3F12

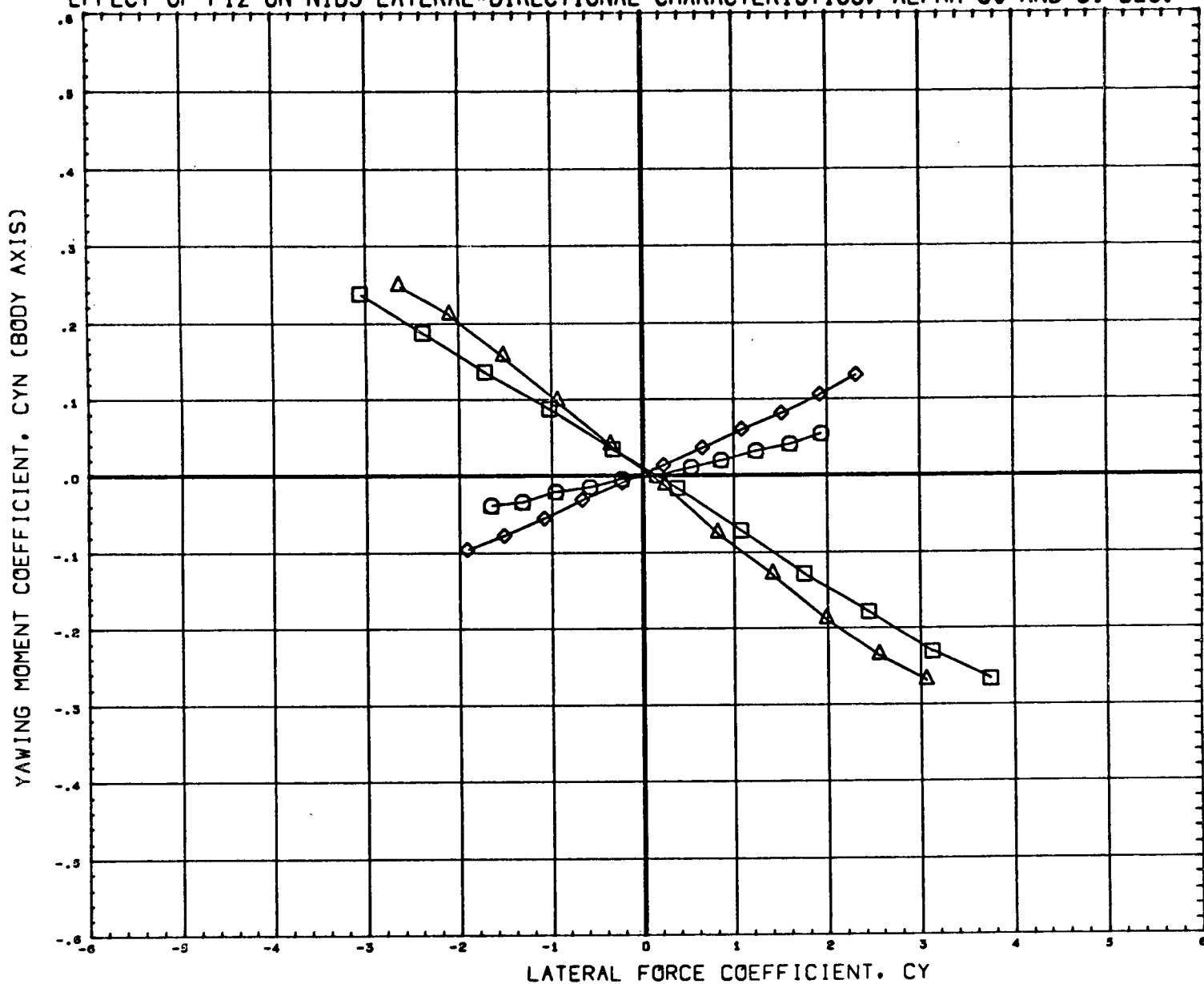
ALPHA	DHDL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	sq. in
LREF	8.1720	in.
BREF	8.1720	in.
XMRP	5.2300	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MACH 3.48

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EFFECT OF F12 ON N1B3 LATERAL-DIRECTIONAL CHARACTERISTICS, ALPHA=30 AND 51 DEG.



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(A55017)	MSFC TWT 521 BOOSTER
(A55024)	MSFC TWT 521 BOOSTER
(A55018)	MSFC TWT 521 BOOSTER
(A55025)	MSFC TWT 521 BOOSTER

N1B3
N1B3F12
N1B3
N1B3F12

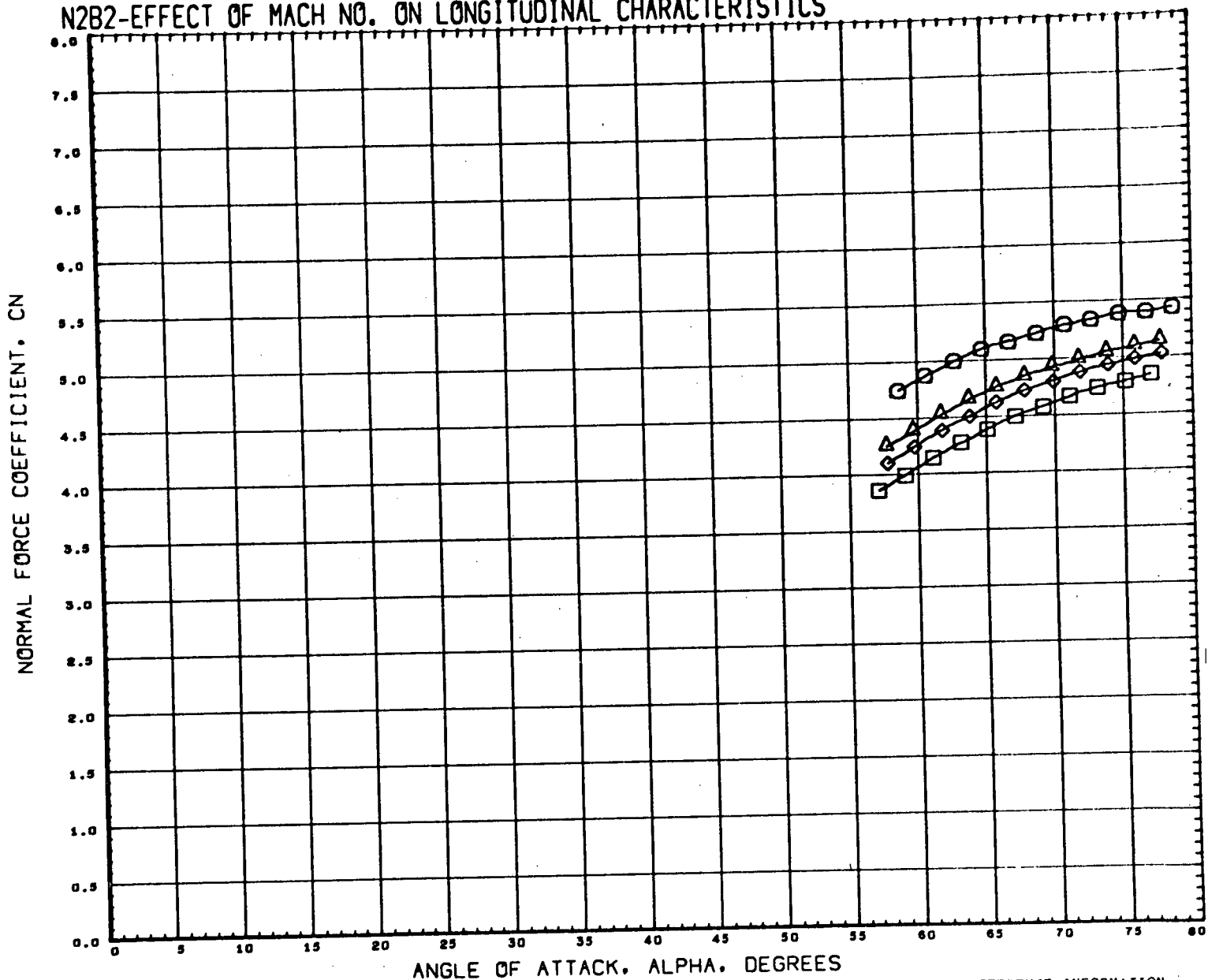
ALPHA	D1HDRL
30.000	
30.000	30.000
51.000	
51.000	30.000

REFERENCE INFORMATION		
SREF	0.9330	90. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 4.96

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N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.961		0.000
△	2.740		
◇	3.460		
□	4.959		

DATA HIST. CODE S*E

REFERENCE INFORMATION

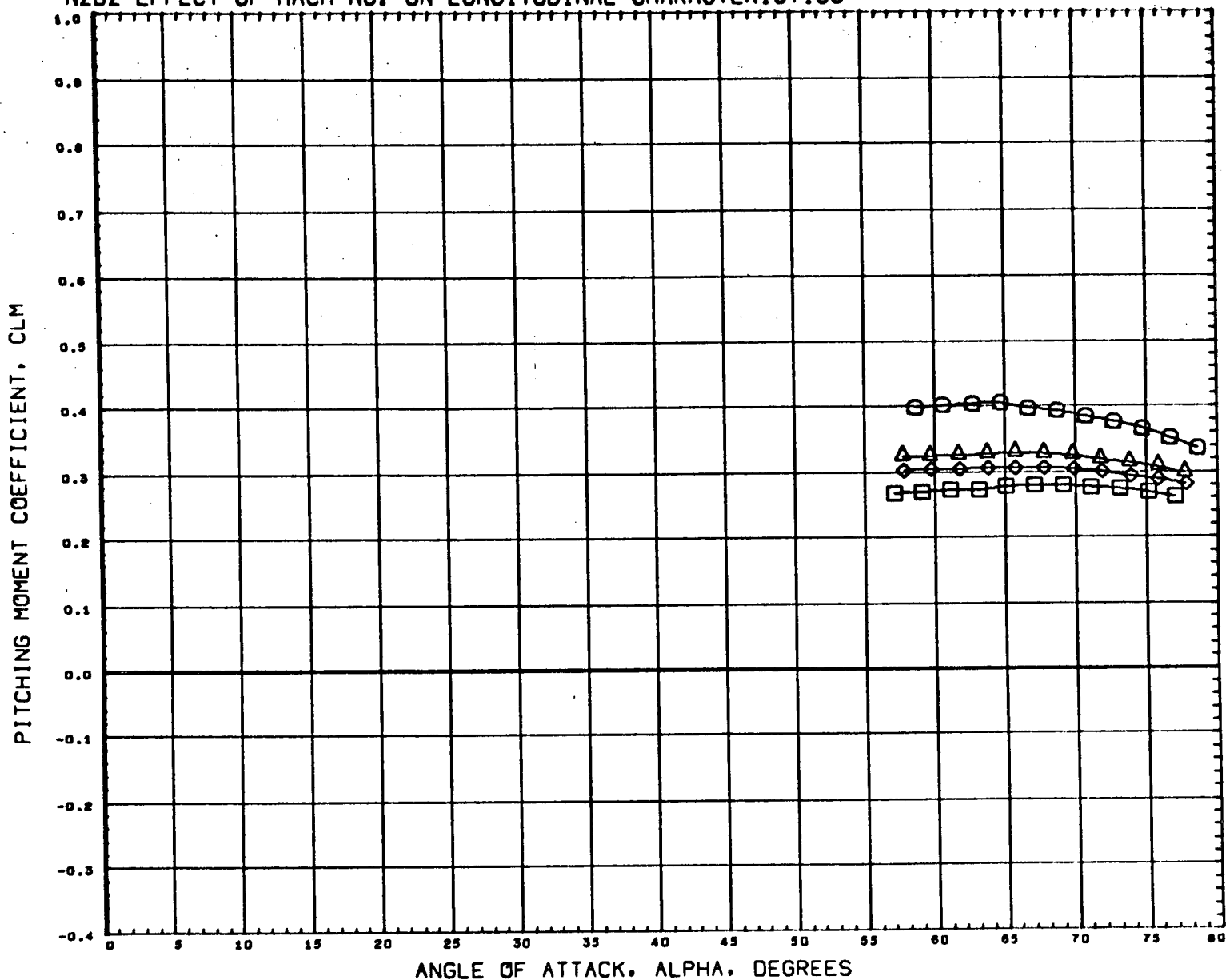
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LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MSFC TWT 521 BOOSTER

N2B2

(E55026) 02 FEB 72 PAGE 181

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.961		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE 94E

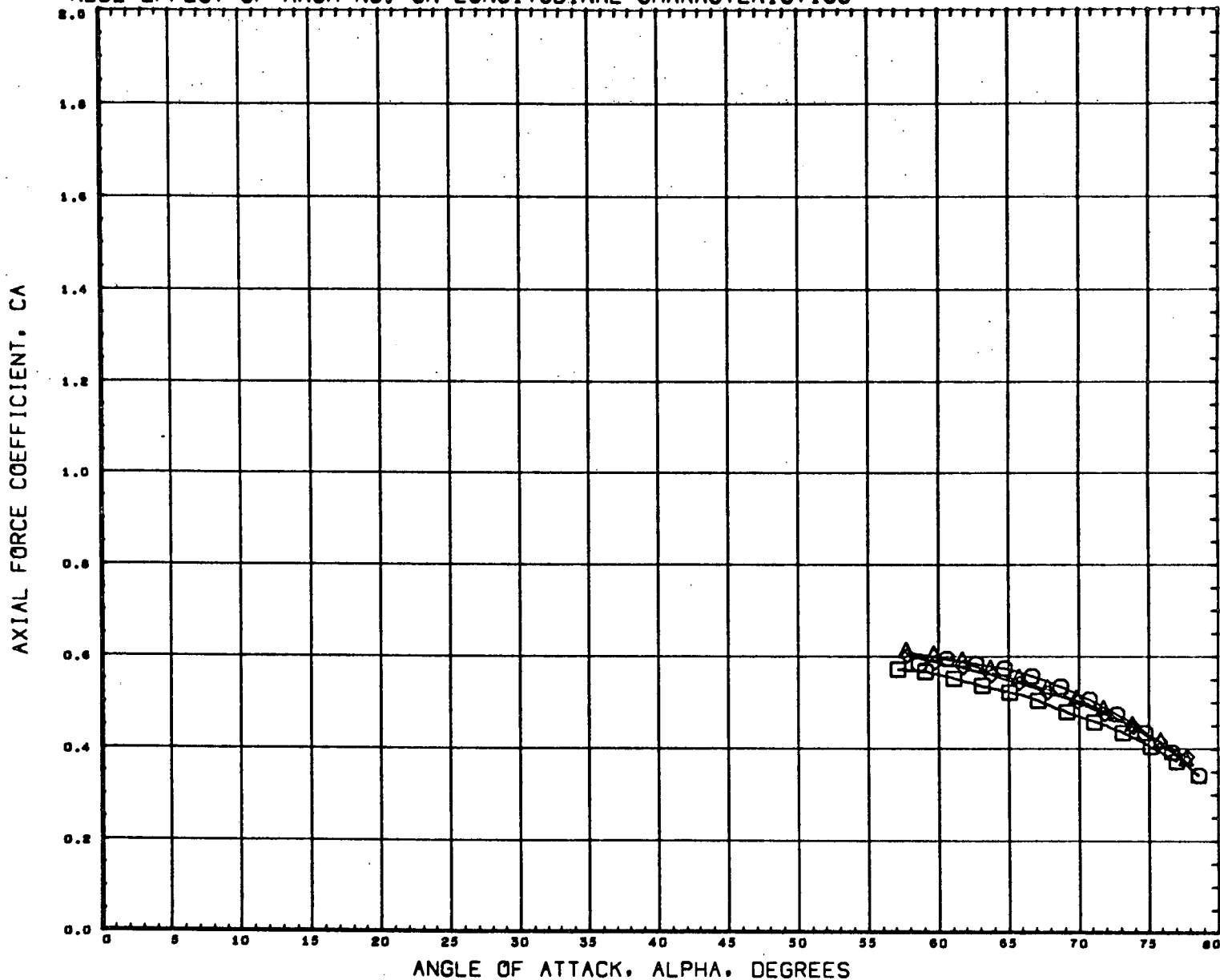
MSFC TWT 521 BOOSTER

N2B2

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N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
△	1.961		0.000
□	2.740		
◇	3.480		
○	4.959		

REFERENCE INFORMATION		
SREF	2.1590	90. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

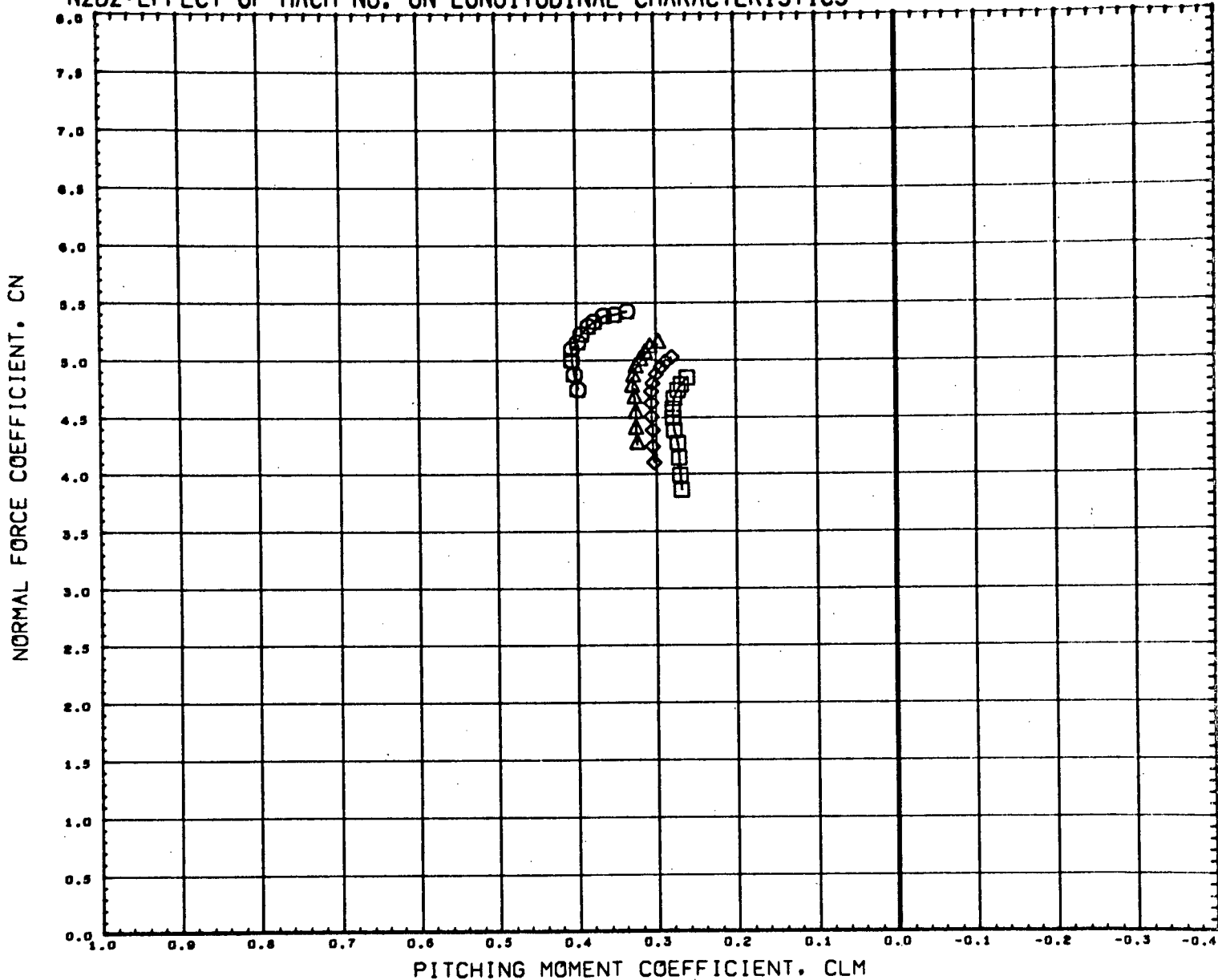
DATA HIST. CODE 8*E

MSFC TWT 521 BOOSTER

N2B2

(E55026) 02 FEB 72 PAGE 183

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.961		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	90. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRF	3.5150	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE S*E

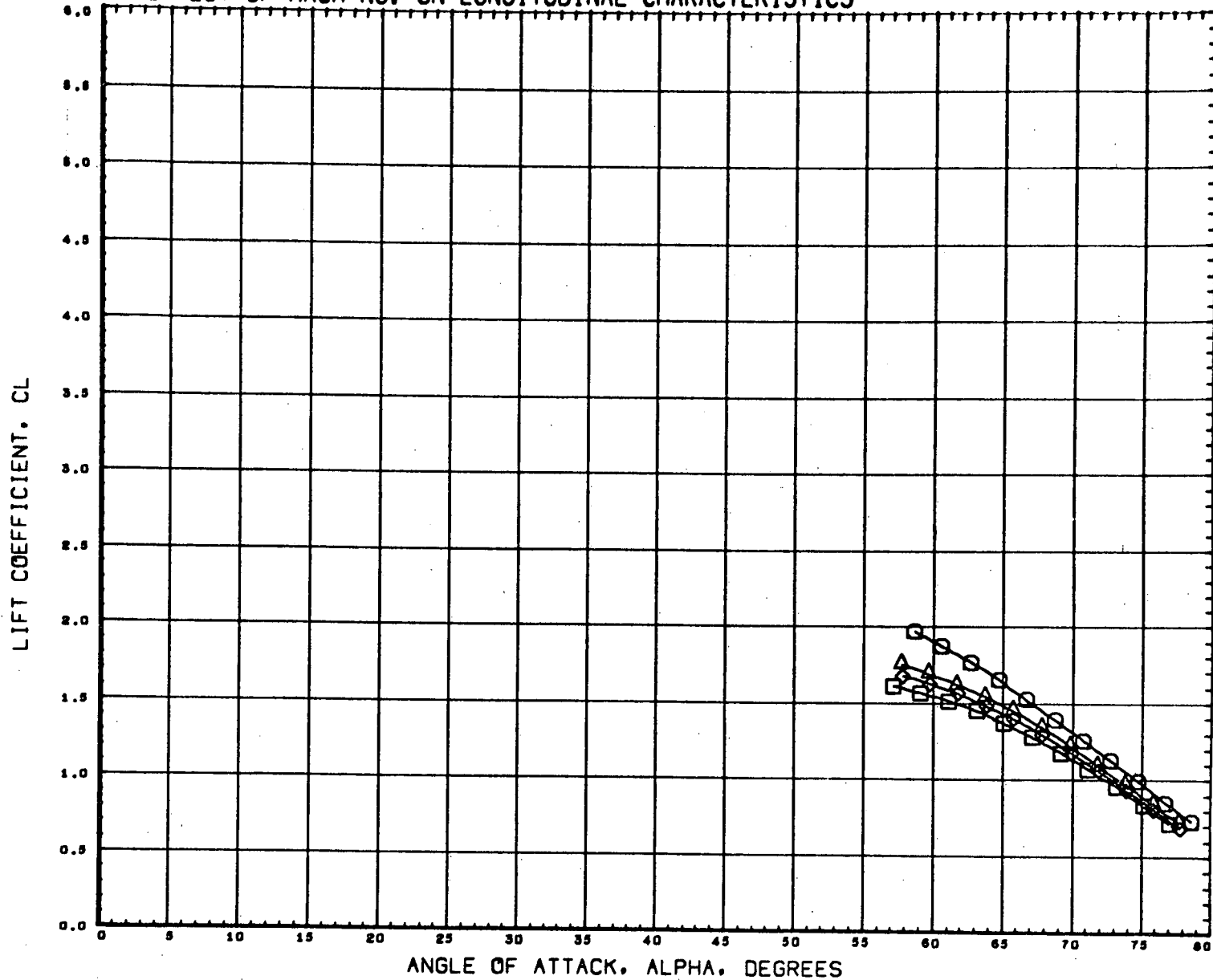
MSFC TWT 521 BOOSTER

N2B2

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N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES
 ○ 1.961
 △ 2.740
 ◇ 3.480
 □ 4.959

DATA HIST. CODE S#E

REFERENCE INFORMATION
 SREF 2.1590 SQ. IN
 LREF 5.6590 IN.
 BREF 5.6590 IN.
 XMRP 3.3150 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0034

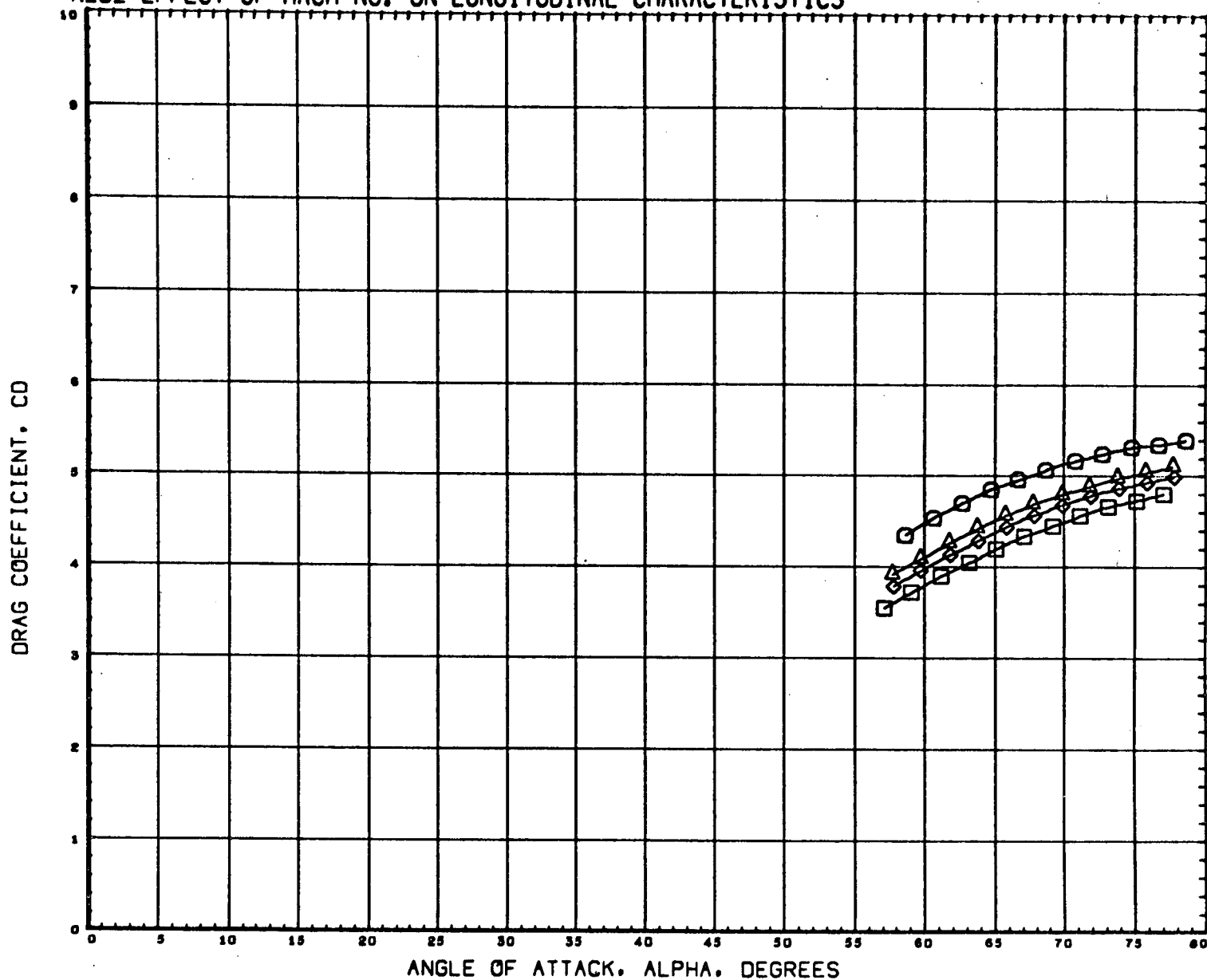
MSFC TWT 521 BOOSTER

N2B2

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N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.961		0.000
△	2.740		
◇	3.480		
□	4.959		

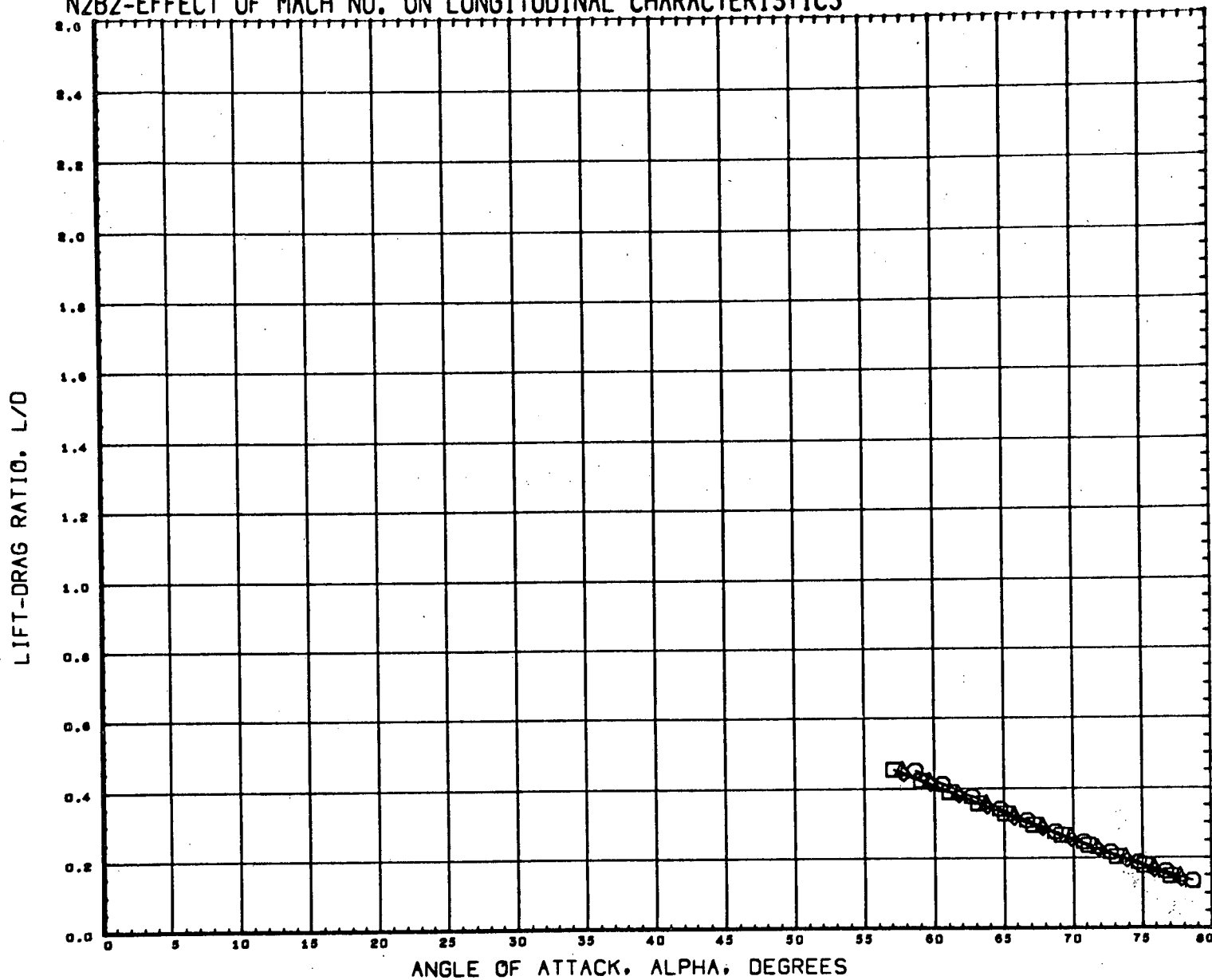
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LREF	5.0590	IN.
BREF	5.0590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE S+E

MSFC TWT 521 BOOSTER N2B2

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N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.961		0.000
△	2.740		
◇	3.480		
□	4.959		

DATA HIST. CODE S+E

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

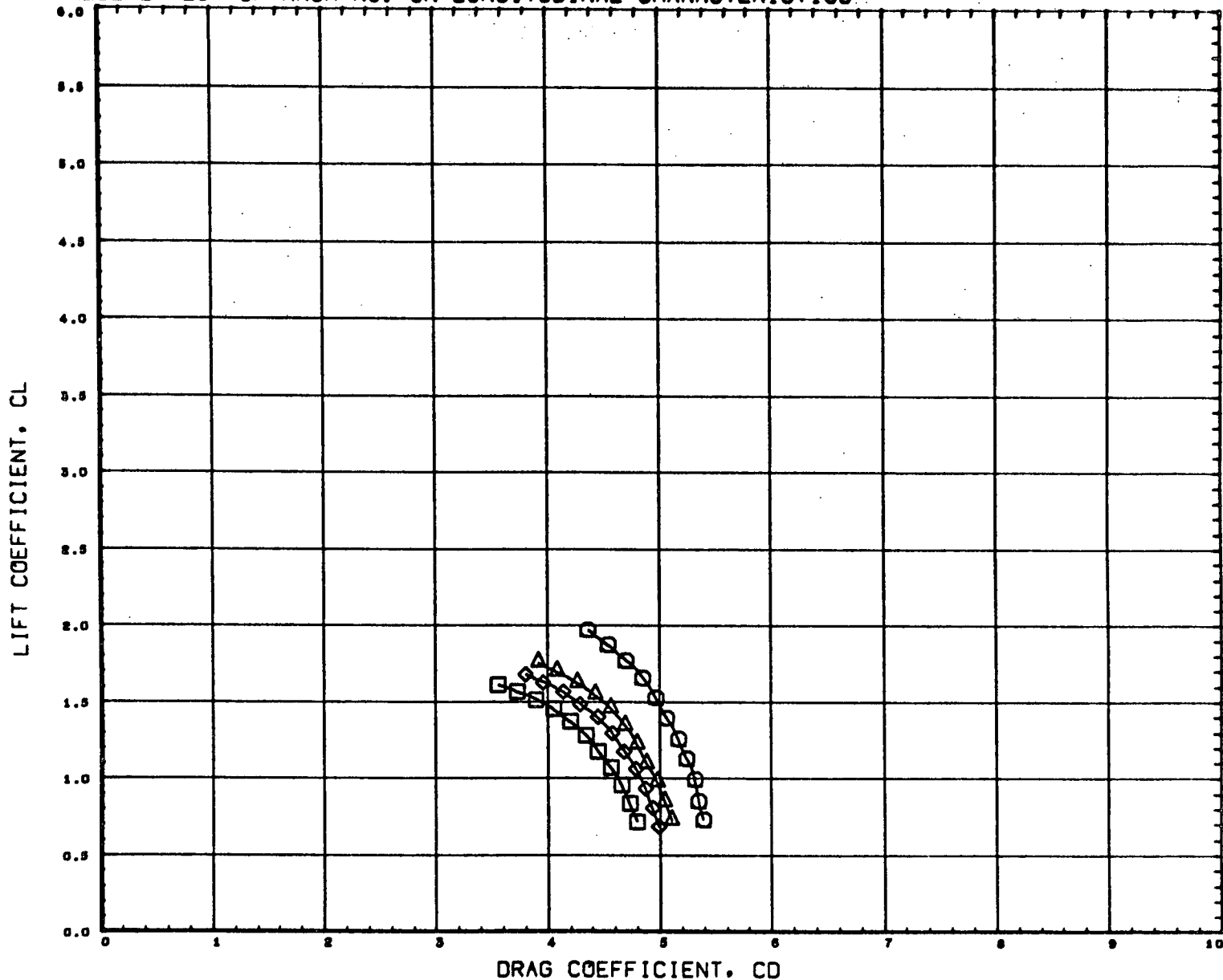
MSFC TWT 521 BOOSTER

N2B2

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N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
□	1.961		0.000
◇	2.740		
△	3.480		
○	4.959		

DATA HIST. CODE S#E

REFERENCE INFORMATION		
SREF	2.1590	sq. in
LREF	5.0590	in.
BREF	5.0590	in.
XMRP	3.5150	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

MSFC TWT 521

BOOSTER

N2B2

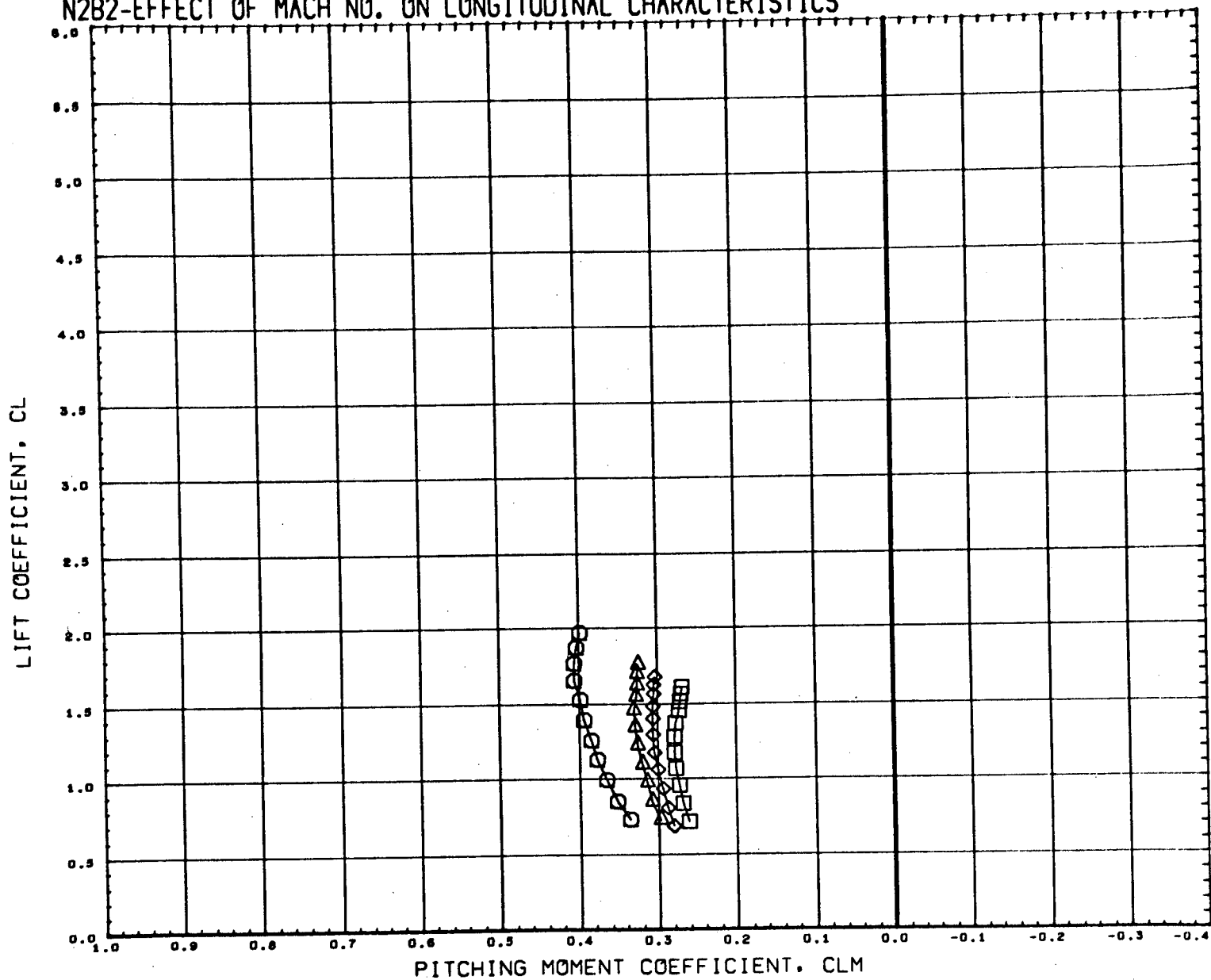
(E55026)

02 FEB 72

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188

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.961	0.000	
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

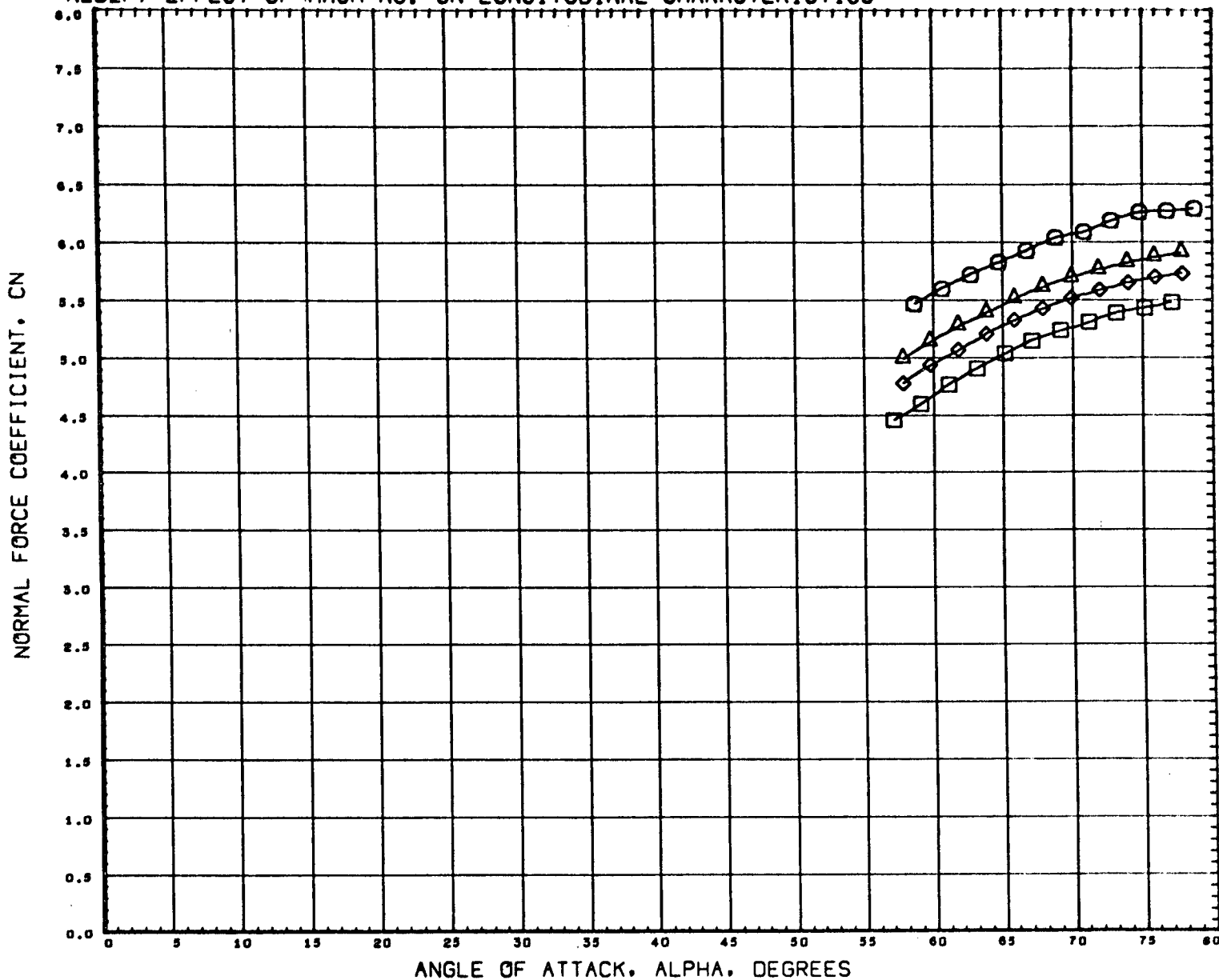
DATA HIST. CODE SWE

MSFC TWT 521 BOOSTER

N2B2

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N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

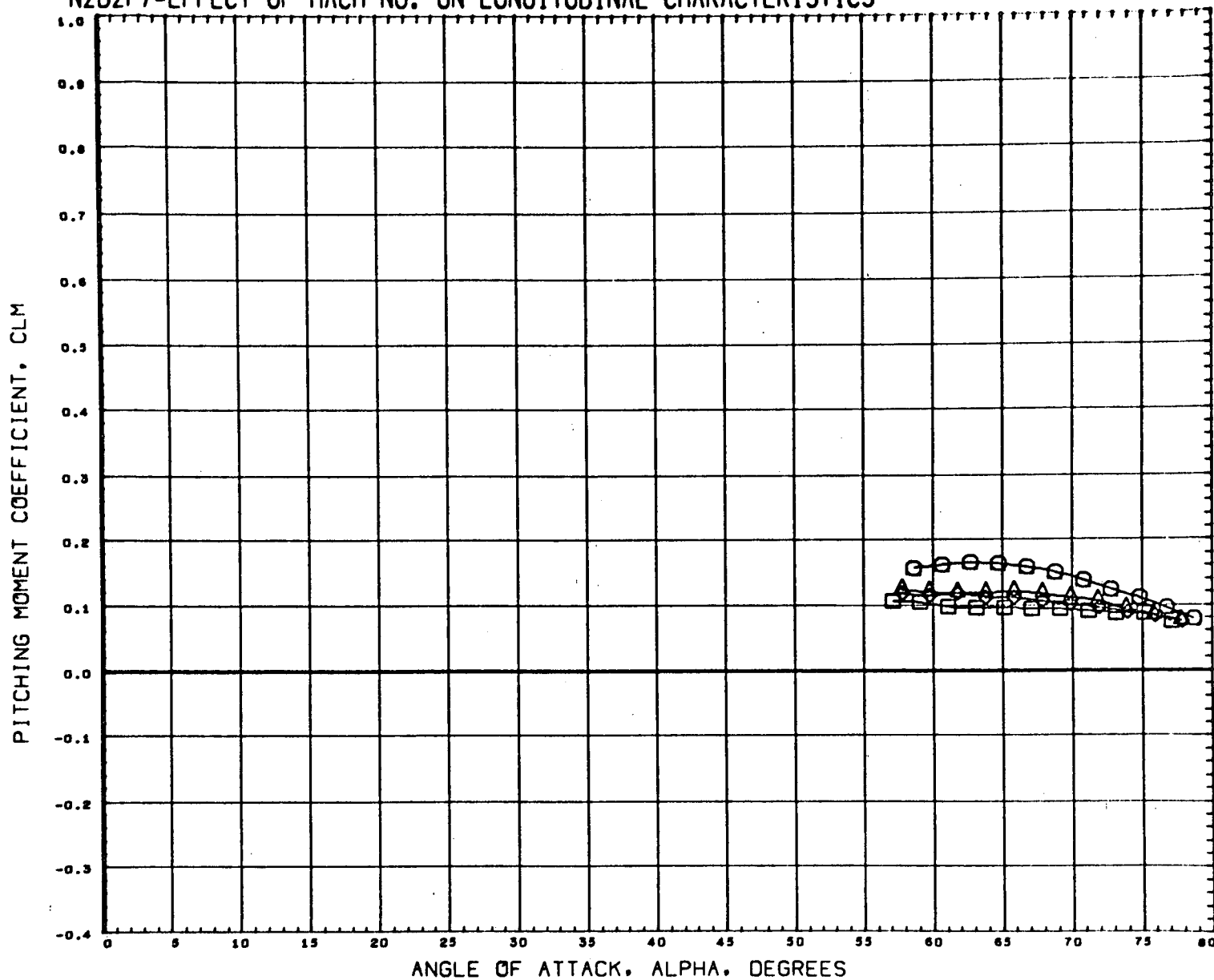


SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.975		0.000	30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE 3#E

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.975	0.000	DIHDL	30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	2.1590	50. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE S*E

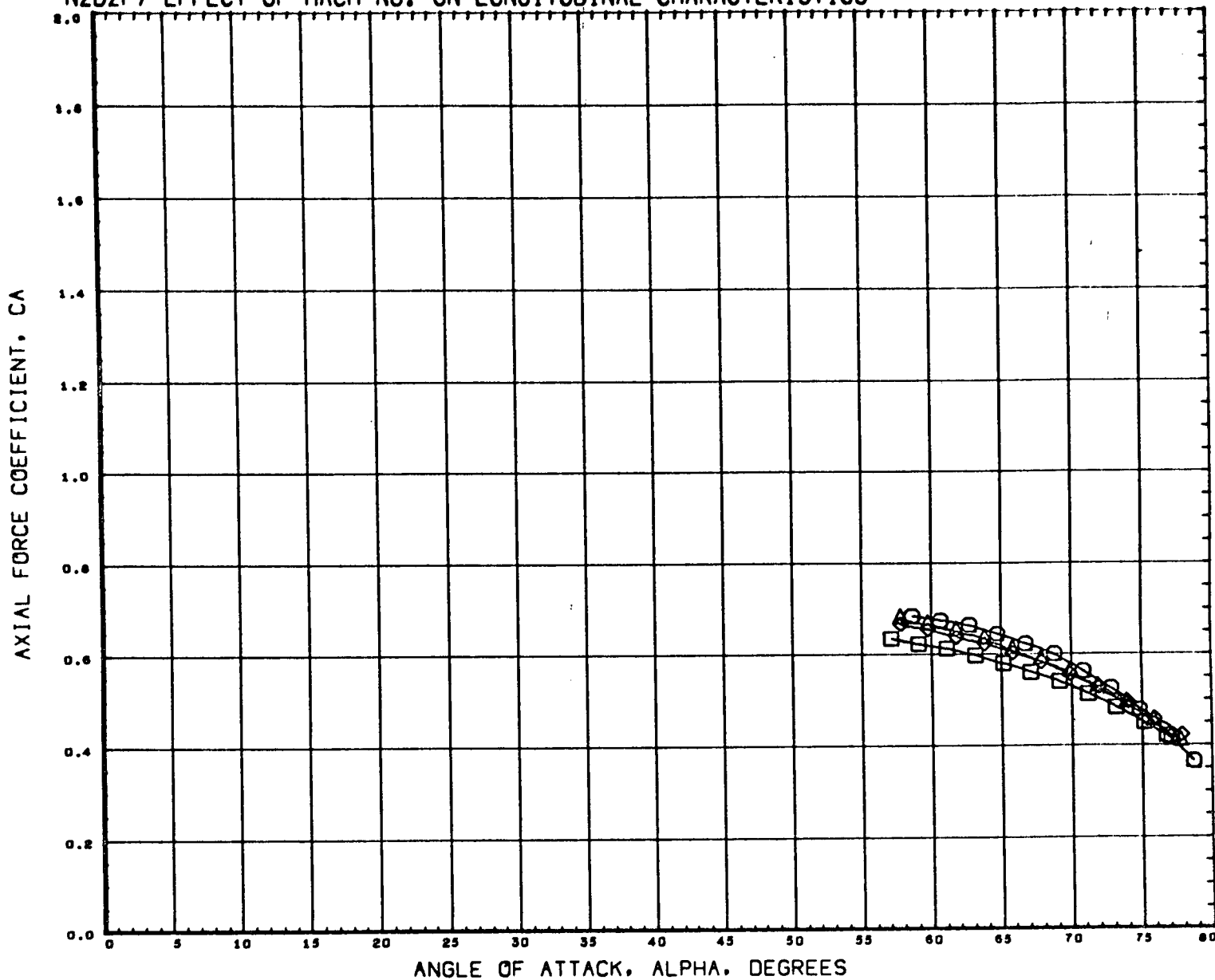
MSFC TWT 521 BOOSTER

N2B2F7

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N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.975		0.000	DIHDL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	2.1590	sq. in
LREF	5.6590	in.
BREF	5.6590	in.
XMRP	3.5150	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0034	

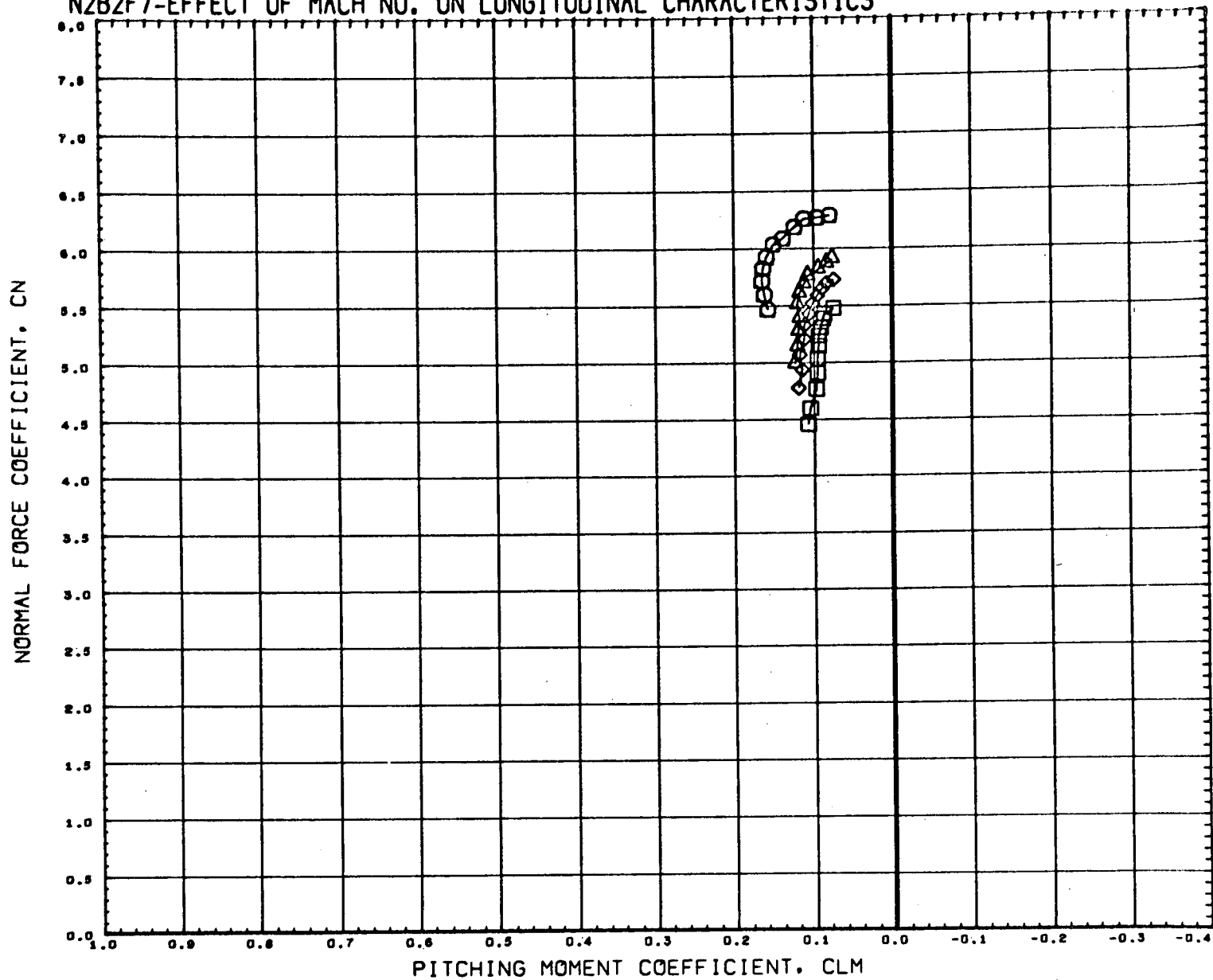
DATA HIST. CODE S*E

MSFC TWT 521 BOOSTER

N2B2F7

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N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	1.975		0.000	DINHRL	30.000
△	2.740				
◇	3.480				
□	4.959				

REFERENCE INFORMATION		
SREF	2.1590	90. IN
LREF	5.6590	IN.
BREF	5.6590	IN.
XMRF	3.5150	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0034	

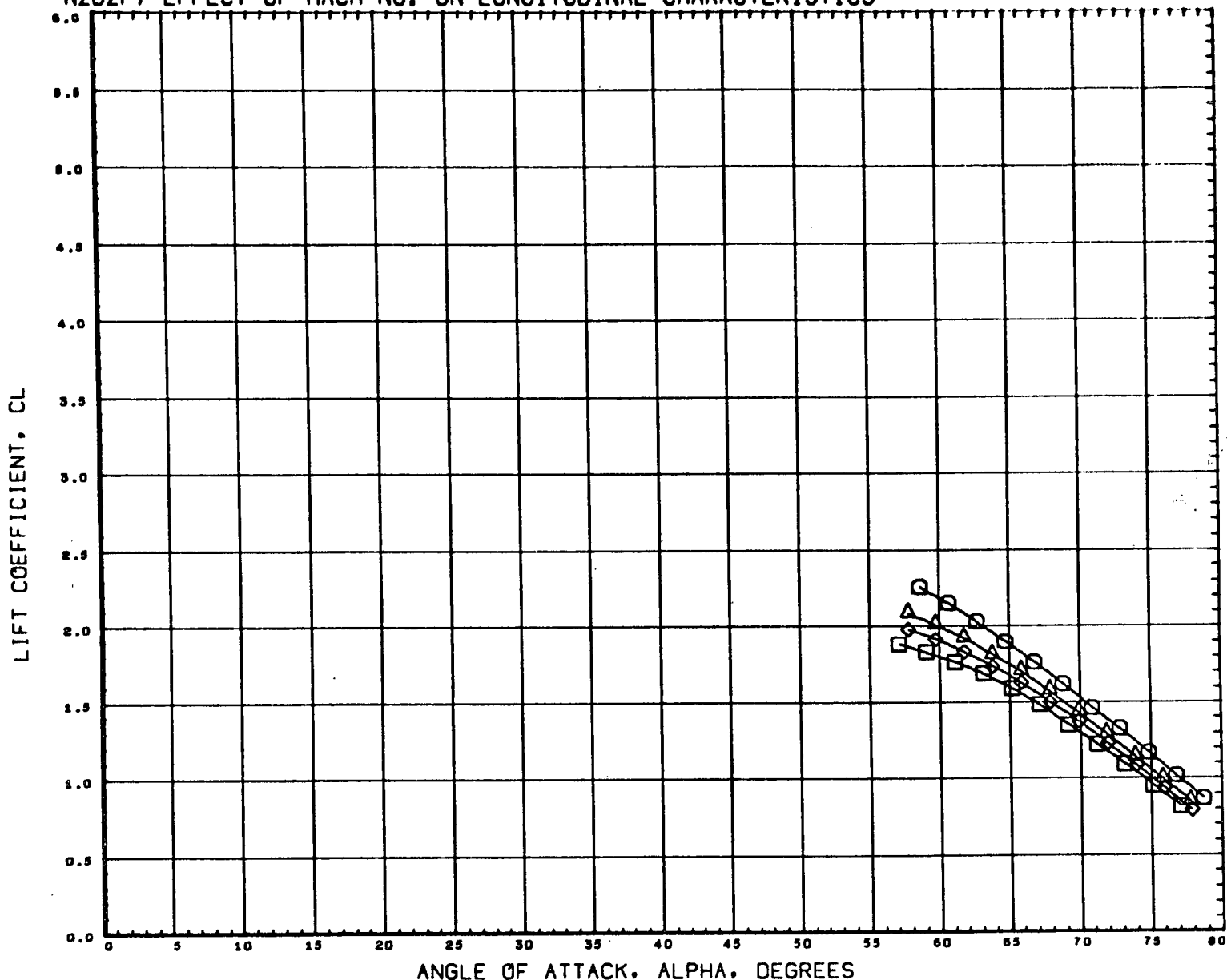
DATA HIST. CODE S*E

MSFC TWT 521 BOOSTER

N2B2F7

(E55027) 02 FEB 72 PAGE 193

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	1.975		0.000	DIHDL	30.000
△	2.740				
◇	3.480				
□	4.939				

DATA HIST. CODE S*E

REFERENCE INFORMATION		
SREF	2.1590	Sq. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MSFC TWT 521 BOOSTER

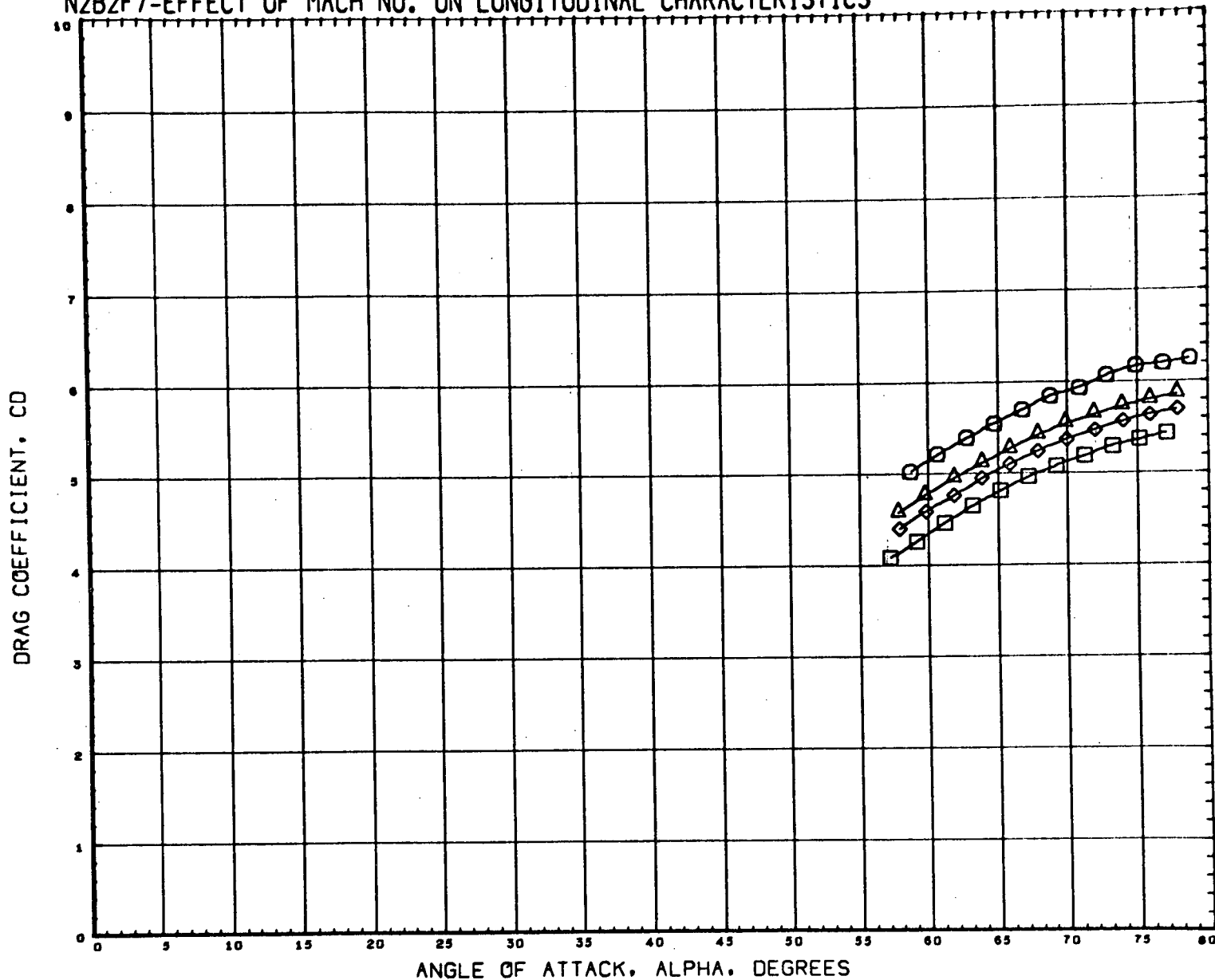
N2B2F7

(E55027) 02 FEB 72

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0.5

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES		
○	1.975	BETA	0.000	D1HDRL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	2.1590	sq. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

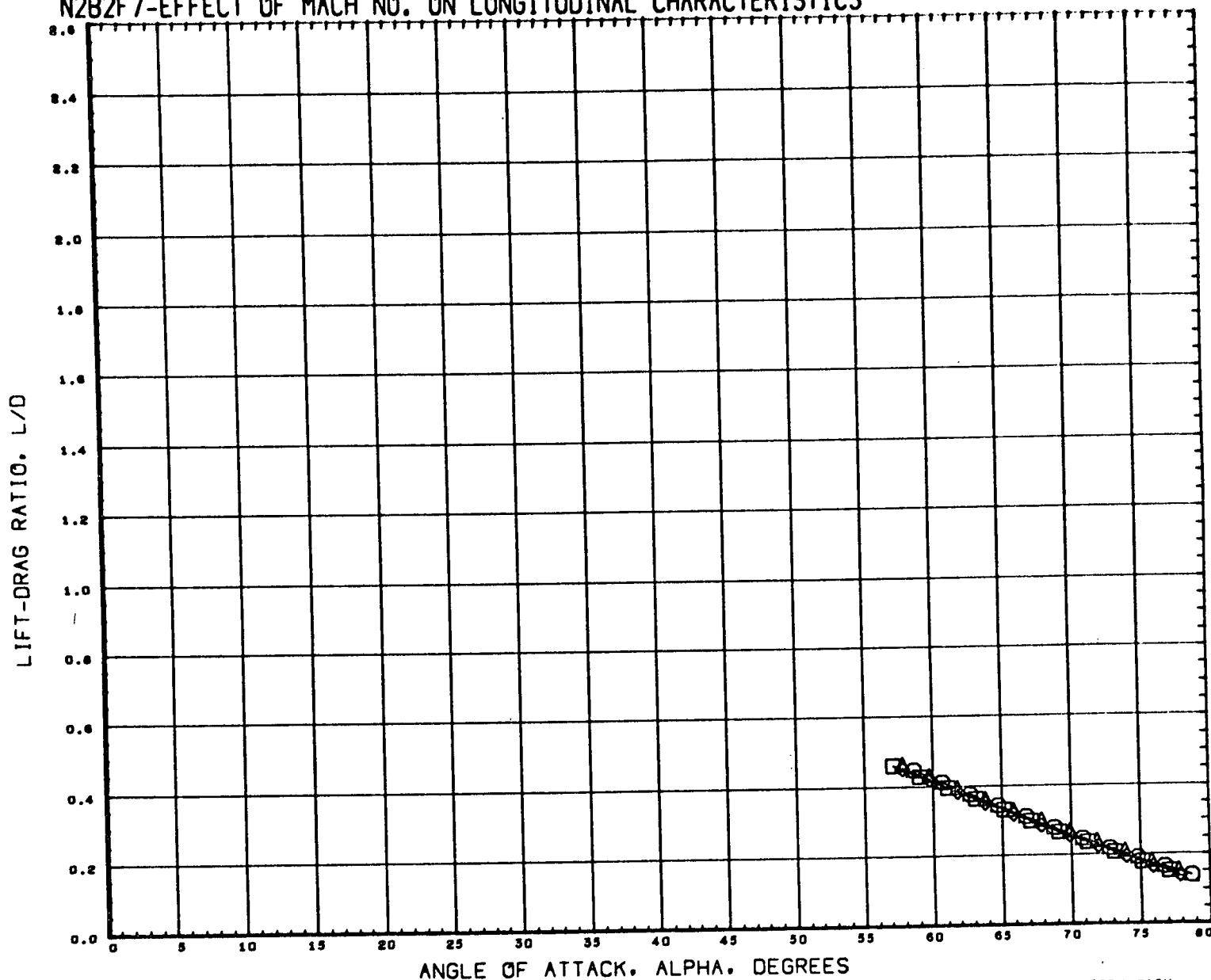
DATA HIST. CODE S*E

MSFC TWT 521 BOOSTER

N2B2F7

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N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.975		0.000	DIHDL 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	2.1590	50. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

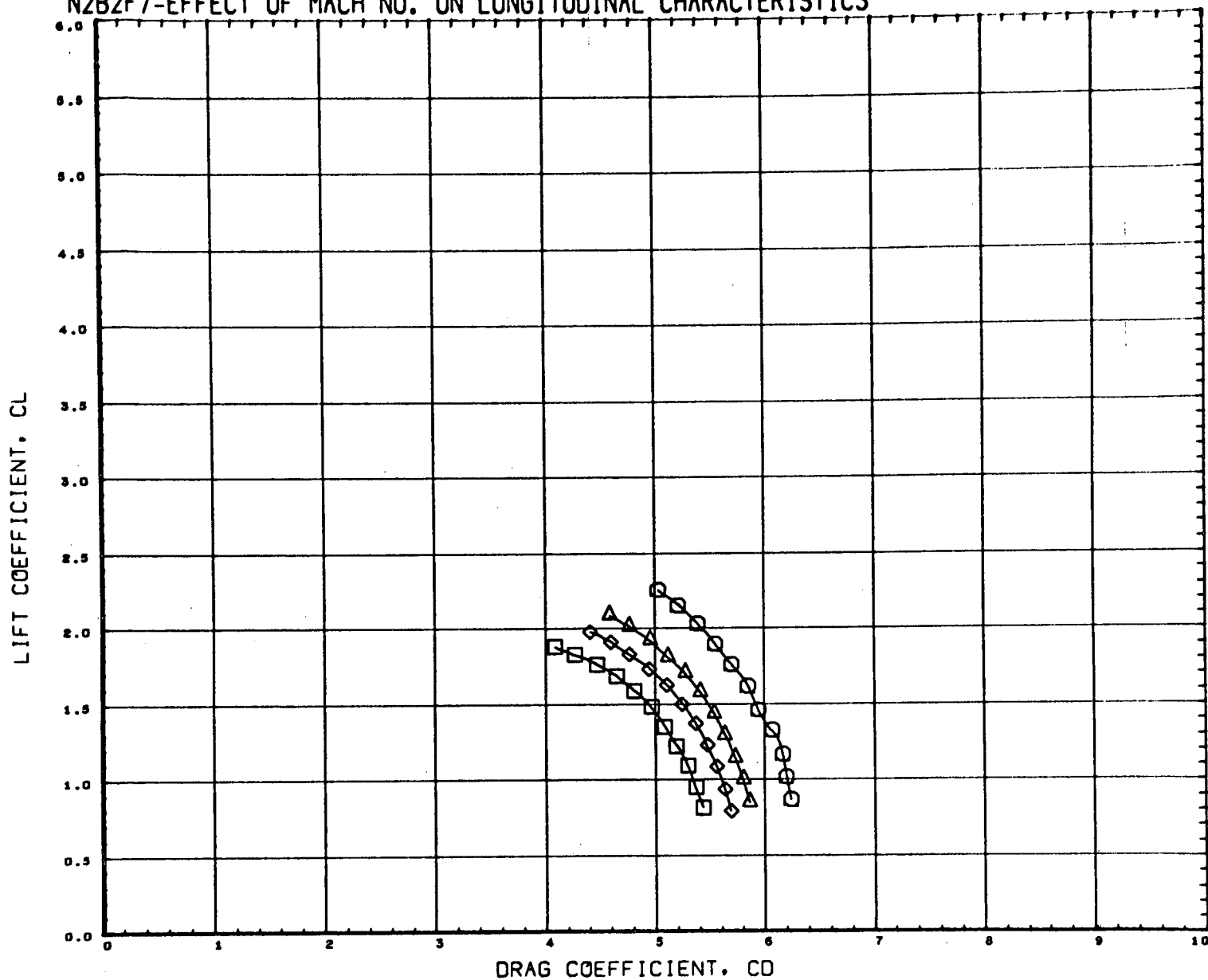
DATA HIST. CODE 3WE

MSFC TWT 521 BOOSTER

N2B2F7

(E55027) 02 FEB 72 PAGE 196

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	
○	1.975		0.000	DIHORI 30.000
△	2.740			
◇	3.480			
□	4.959			

REFERENCE INFORMATION		
SREF	2.1590	50. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

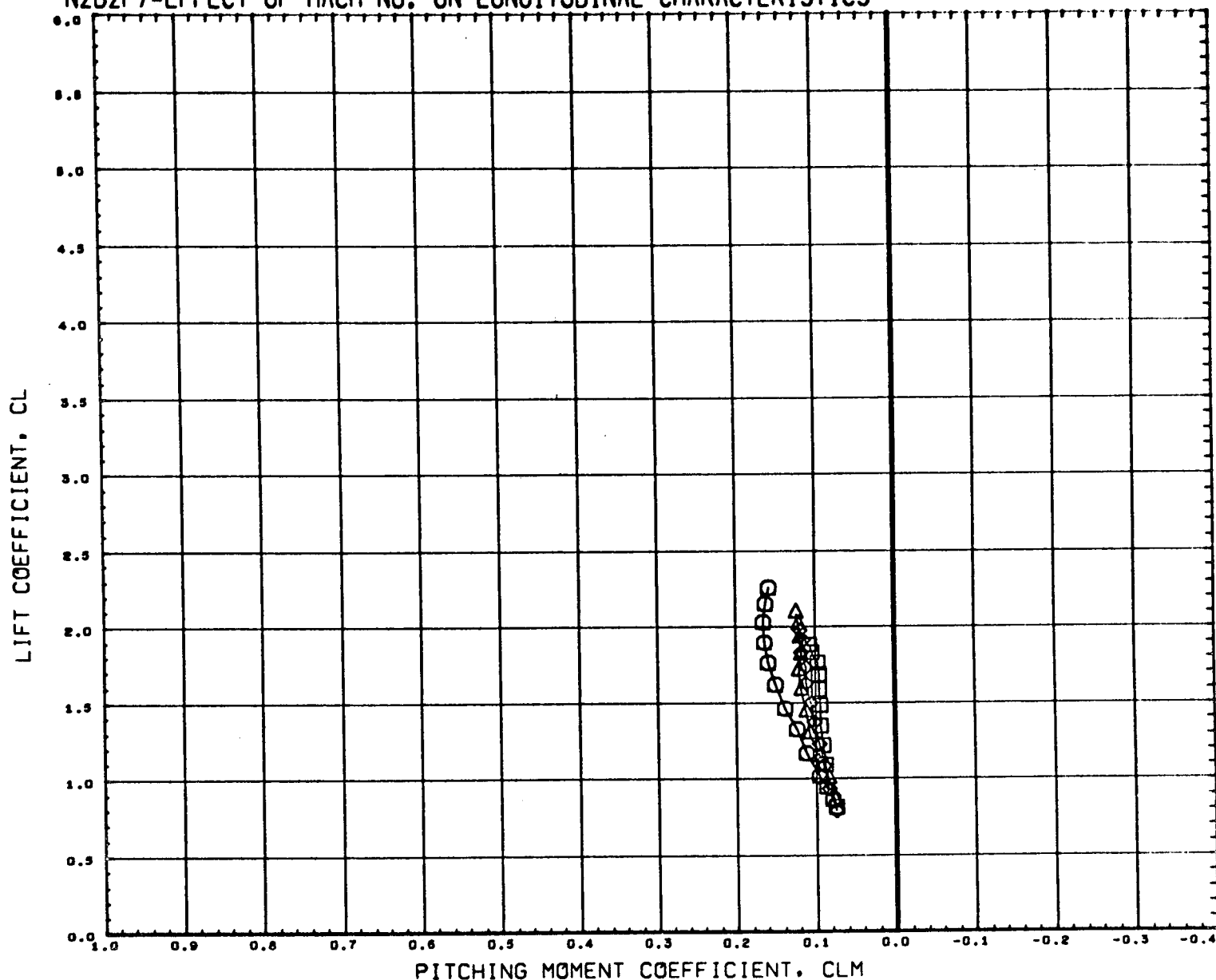
DATA HIST. CODE 3+E

MSFC TWT 521 BOOSTER

N2B2F7

(E55027) 02 FEB 72 PAGE 197

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES		
○	1.975		0.000	DIHDL	30.000
△	2.740				
◇	3.480				
□	4.959				

DATA HIST. CODE 3#E

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

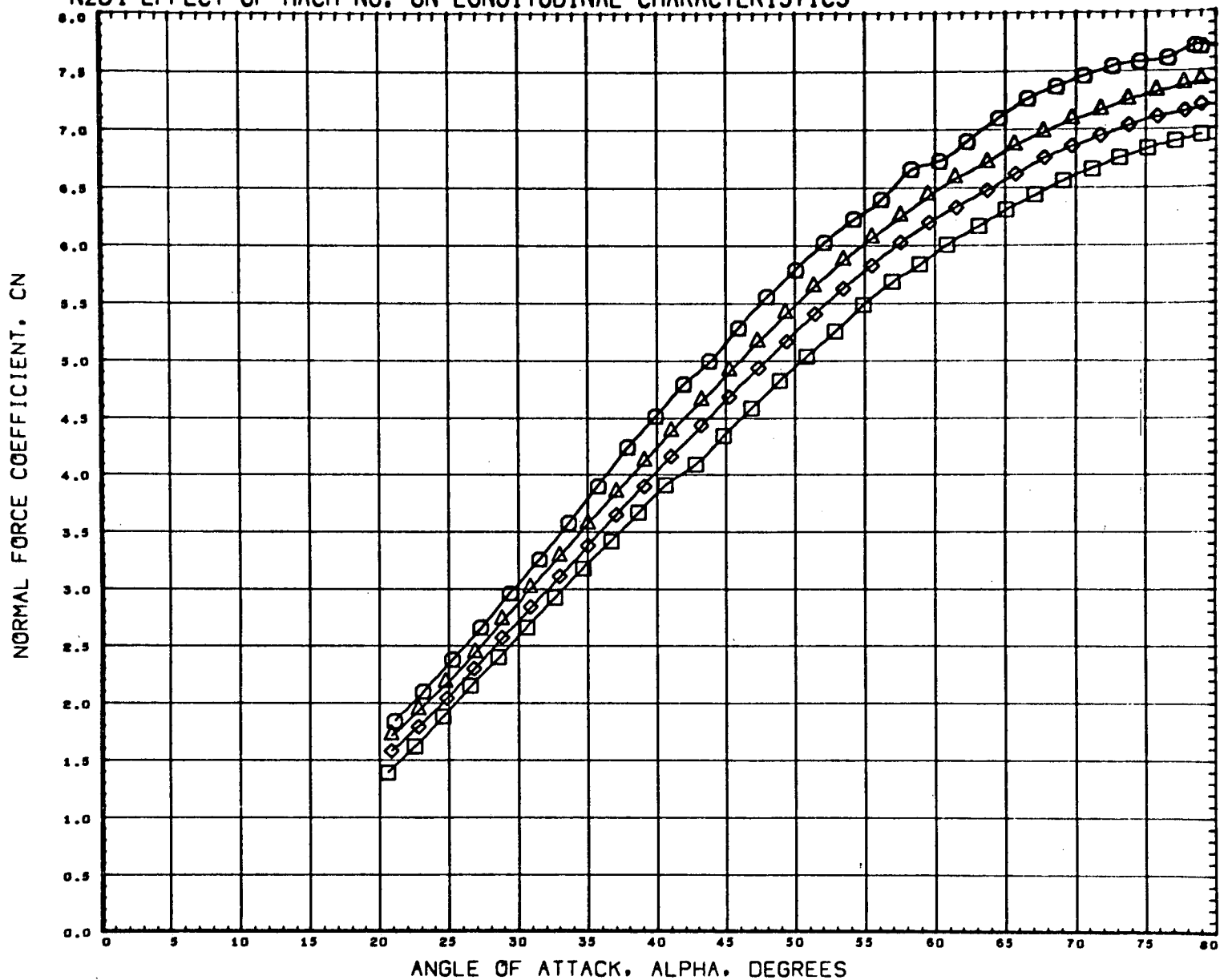
MSFC TWT 521 BOOSTER

N2B2F7

(E55027) 02 FEB 72

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N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.460		
□	4.959		

DATA HIST. CODE S*G*E

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

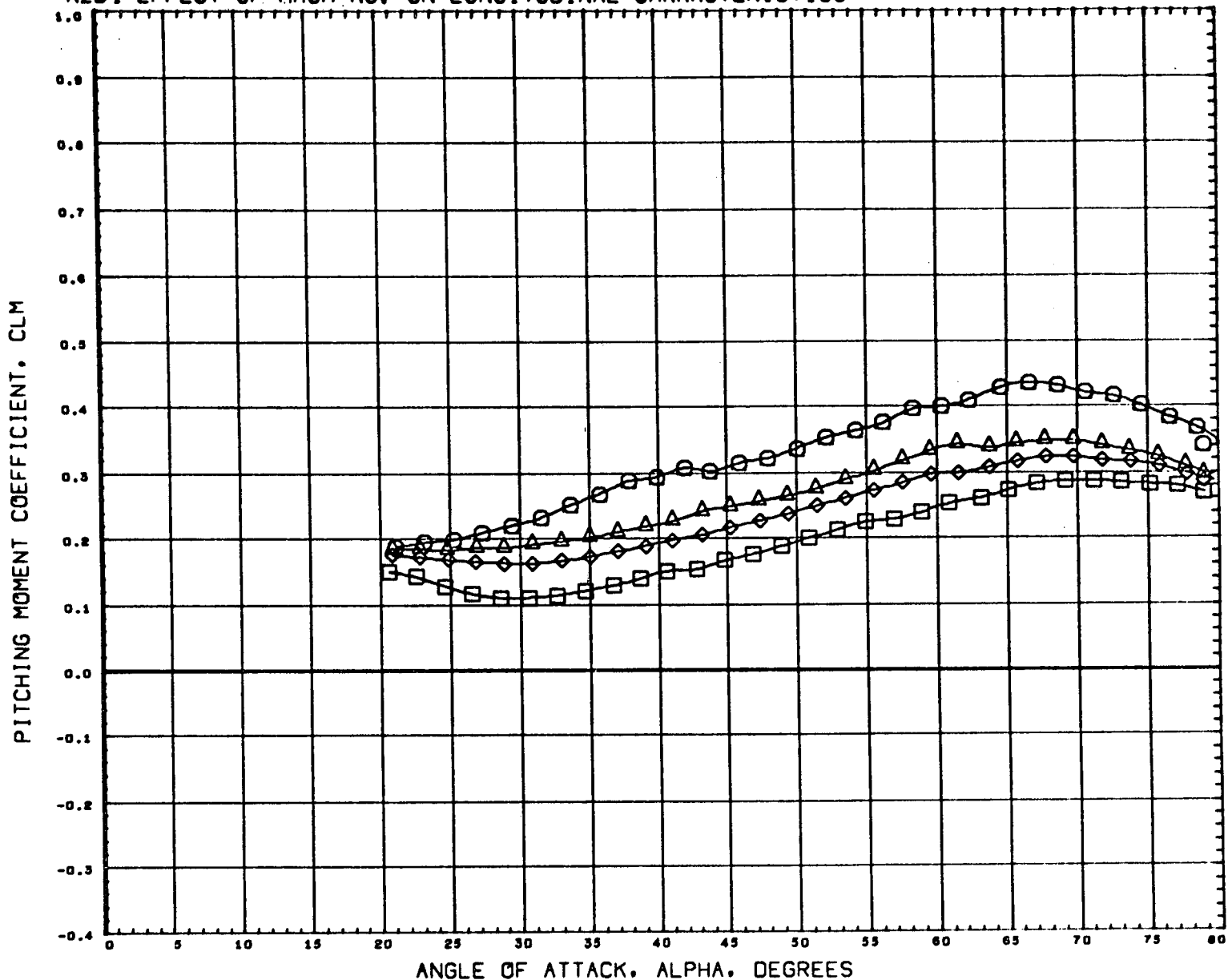
MSFC TWT 521 BOOSTER

N2B4

(E5504S) 02 FEB 72

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N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRF	4.5950	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0042	

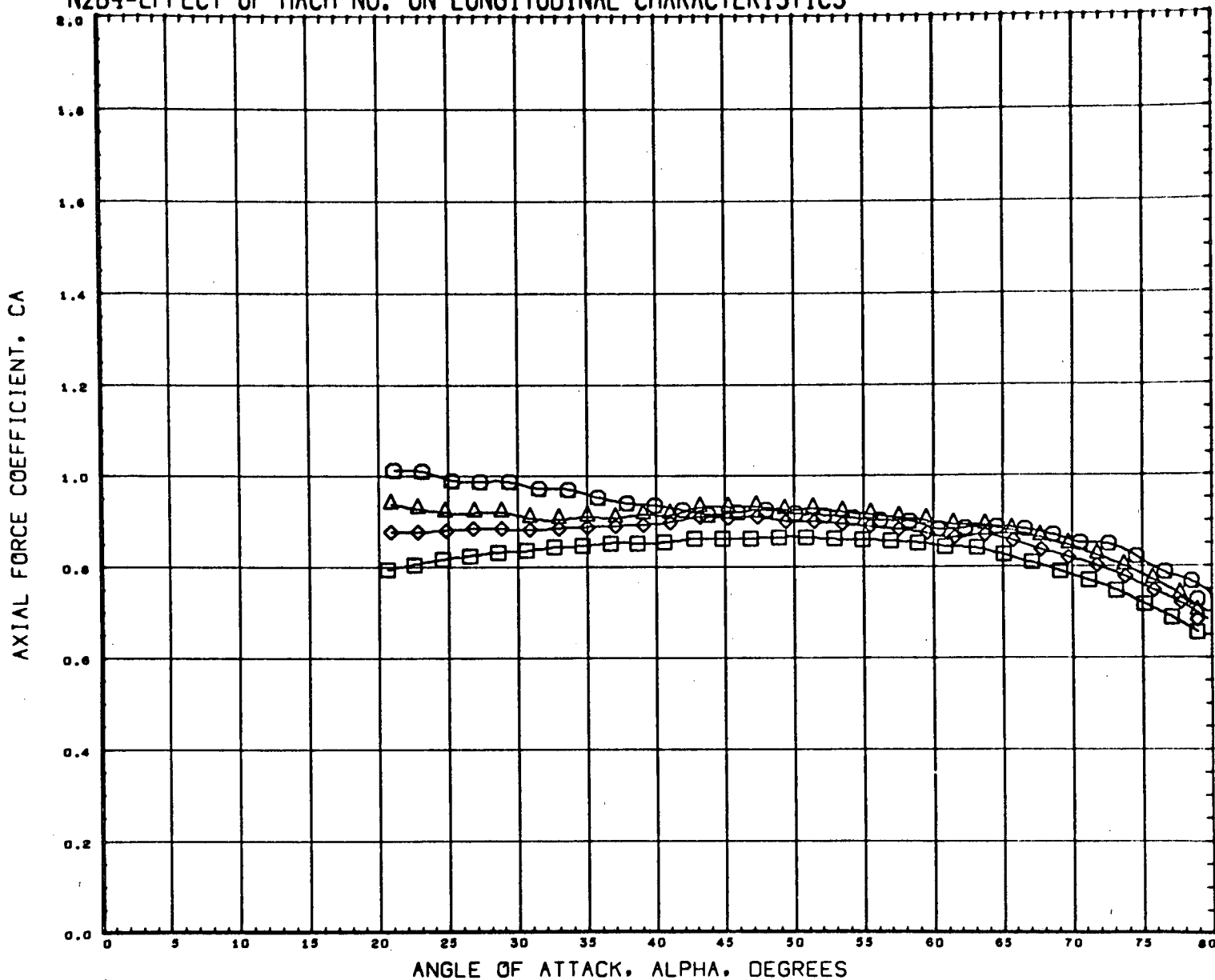
DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER

N2B4

(E5504S) 02 FEB 72 PAGE 200

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

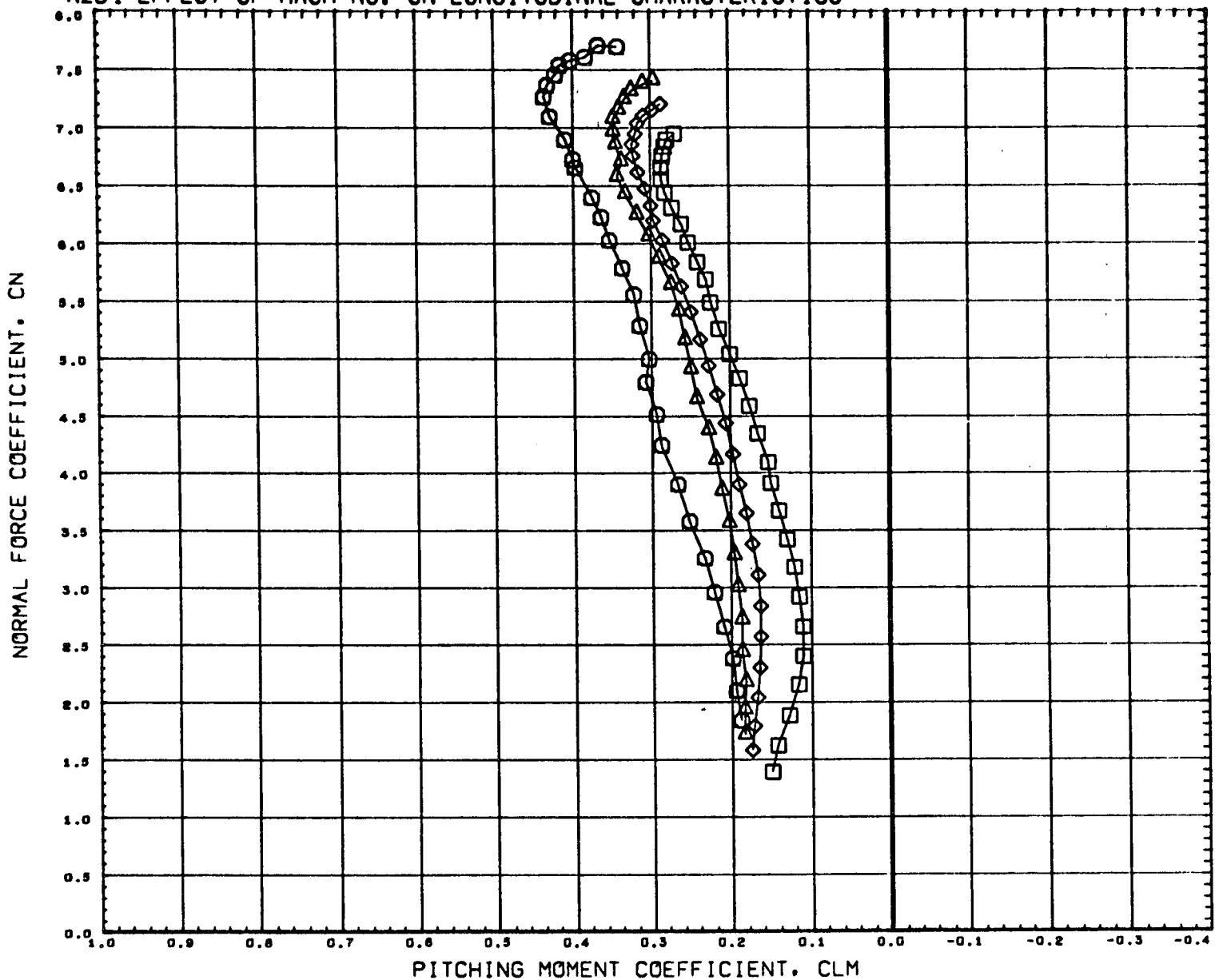


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

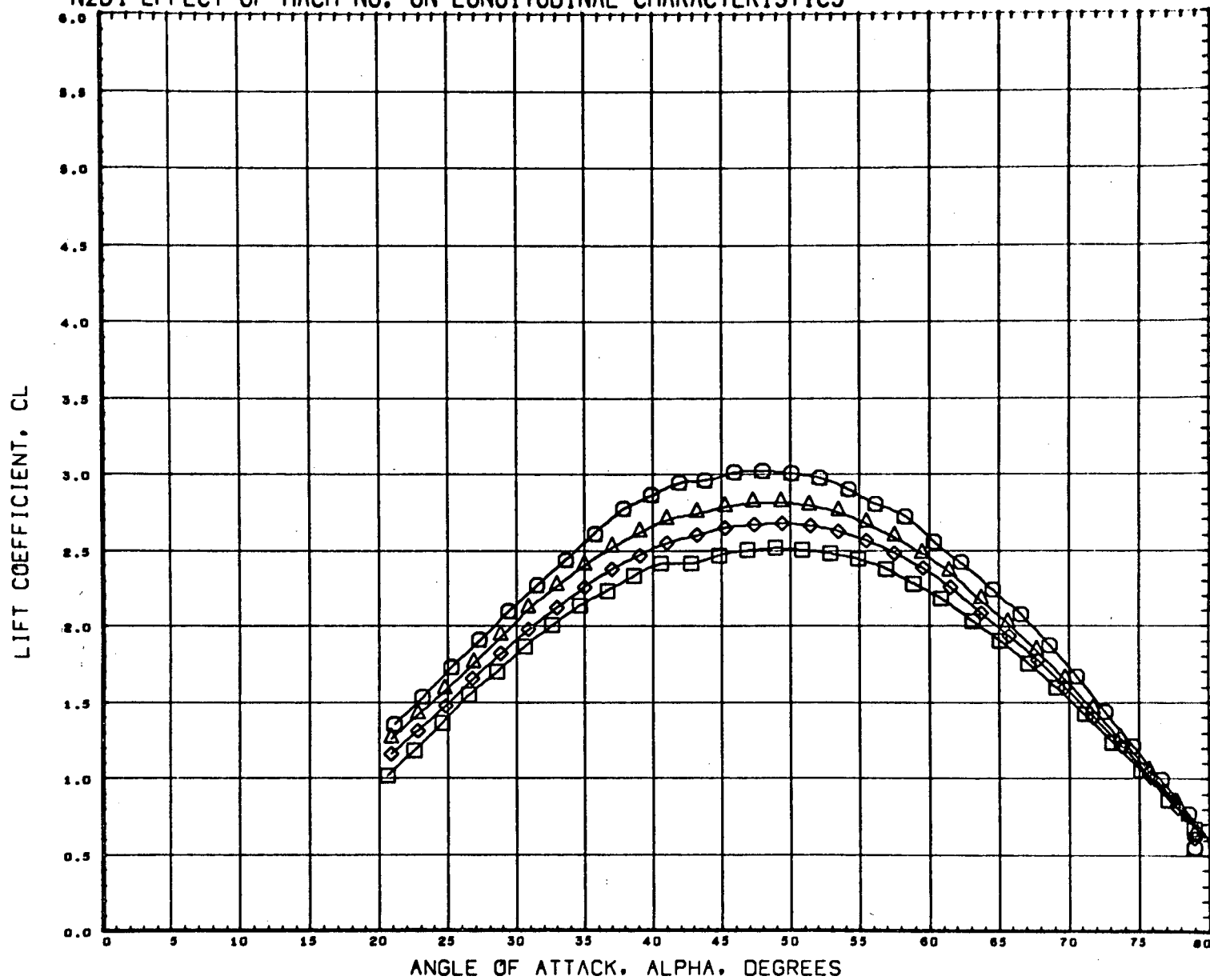
DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER

N2B4

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N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

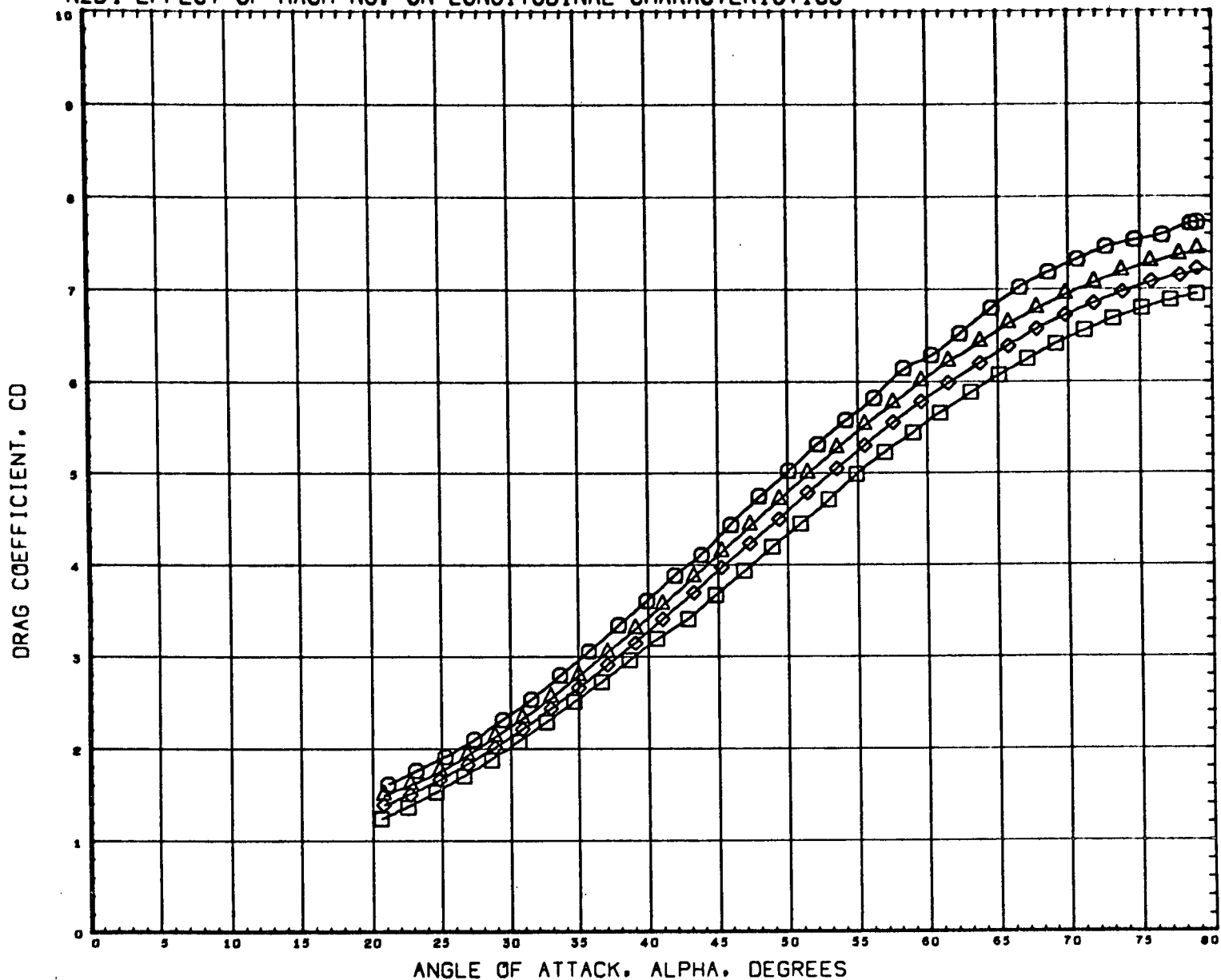
DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER

N2B4

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N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

DATA HIST. CODE S*G+E

REFERENCE INFORMATION		
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LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

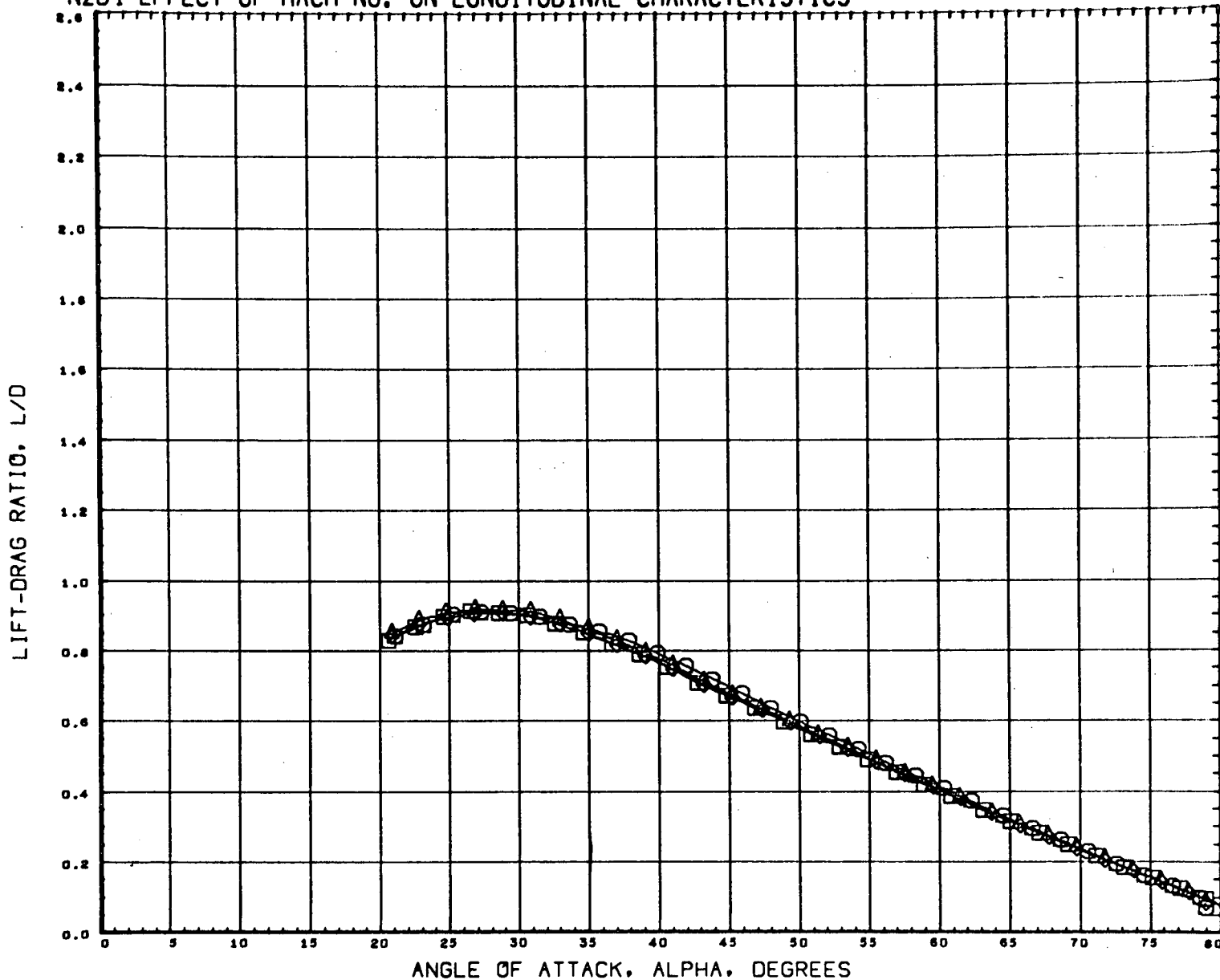
MSFC TWT 521 BOOSTER

N2B4

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N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

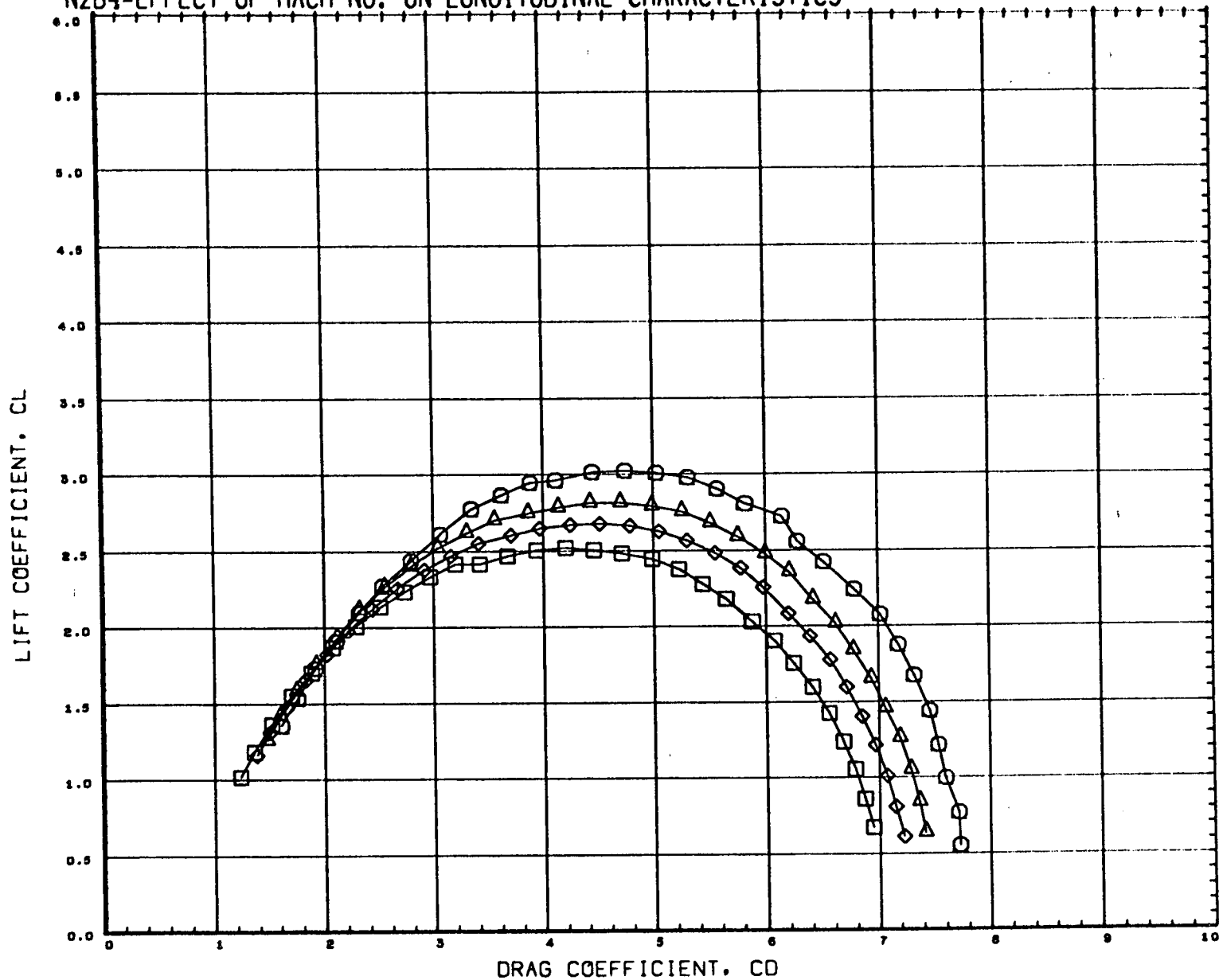


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	90. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	sq. in
LREF	7.6590	in.
BREF	7.6590	in.
XMRP	4.5950	in.
YMRP	0.0000	in.
ZMRP	0.0000	in.
SCALE	0.0042	

DATA HIST. CODE S*G*E

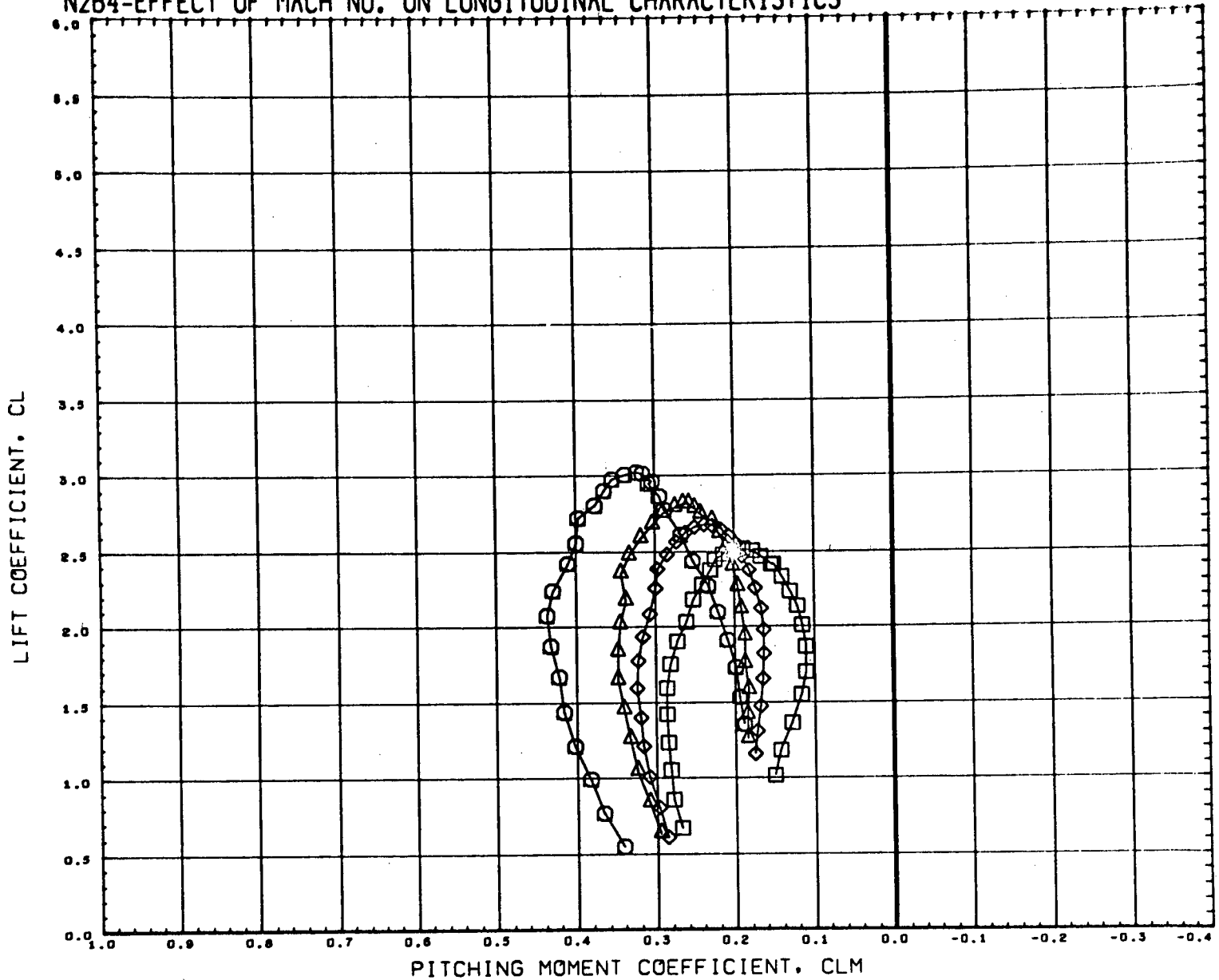
MSFC TWT 521 BOOSTER

N2B4

(E5504S) 02 FEB 72

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N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955	0.000	
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	SQ. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRF	4.5950	IN.
YMRF	0.0000	IN.
ZMRF	0.0000	IN.
SCALE	0.0042	

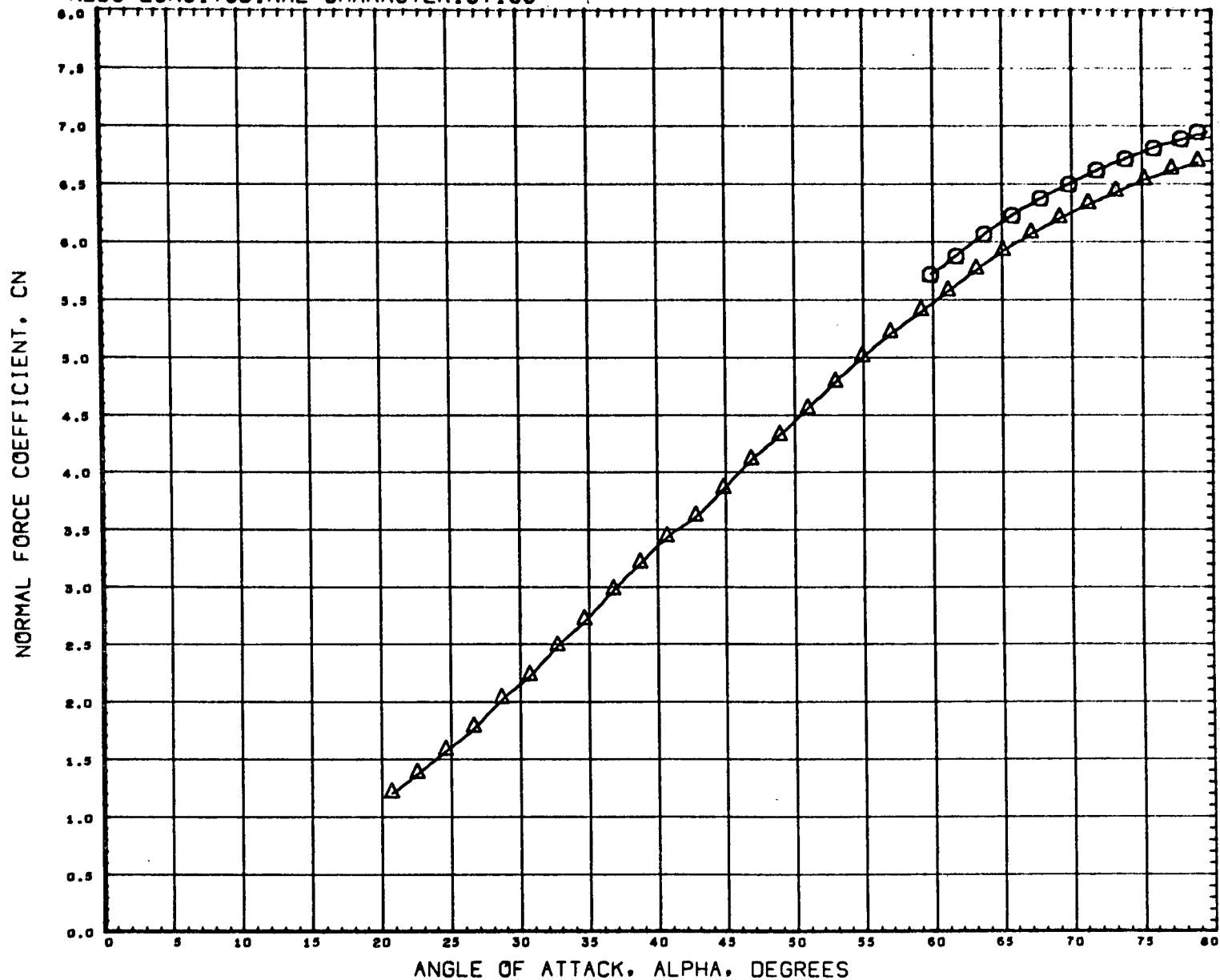
DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER

N2B4

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N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES
 O 3.480 0.000
 Δ 4.959

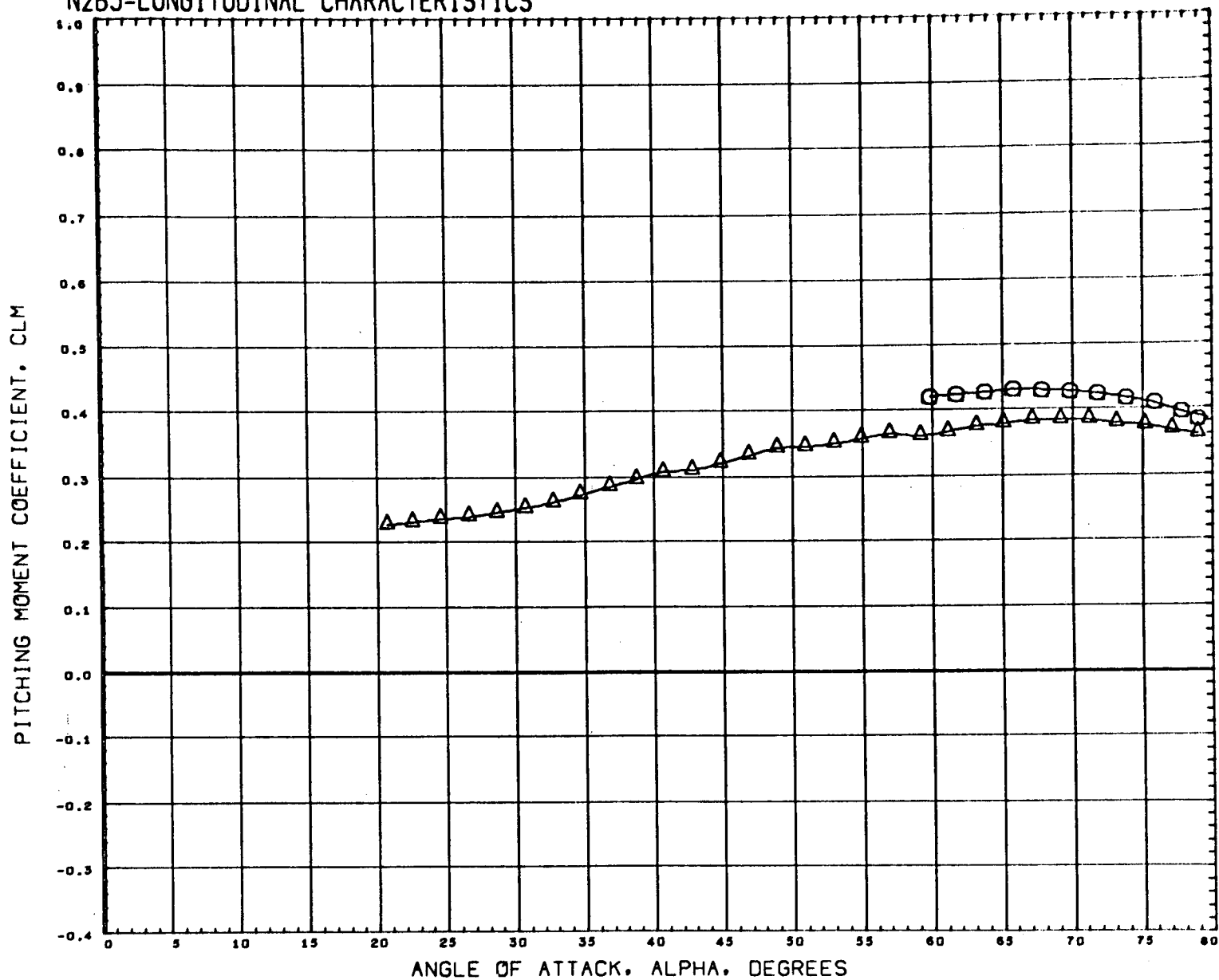
REFERENCE INFORMATION
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 BREF 7.6590 IN.
 XMRP 4.5950 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0042

DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER N2B5

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N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL Δ MACH 3.480 BETA 0.000

PARAMETRIC VALUES

REFERENCE INFORMATION

SREF	2.1590	Sq. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
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YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE 3*G+E

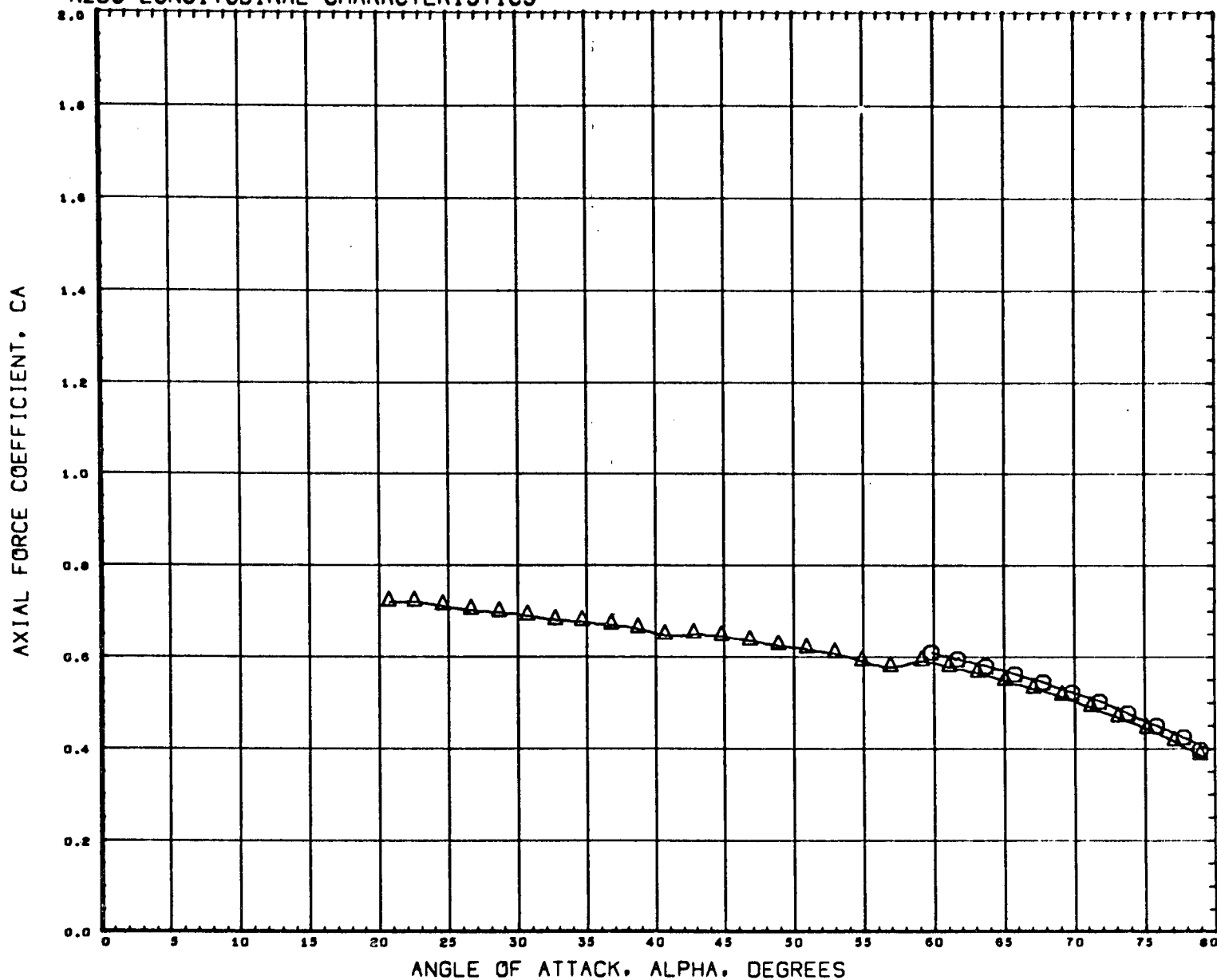
MSFC TWT 521 BOOSTER

N2B5

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N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES

○ 3.480 0.000

△ 4.939

REFERENCE INFORMATION

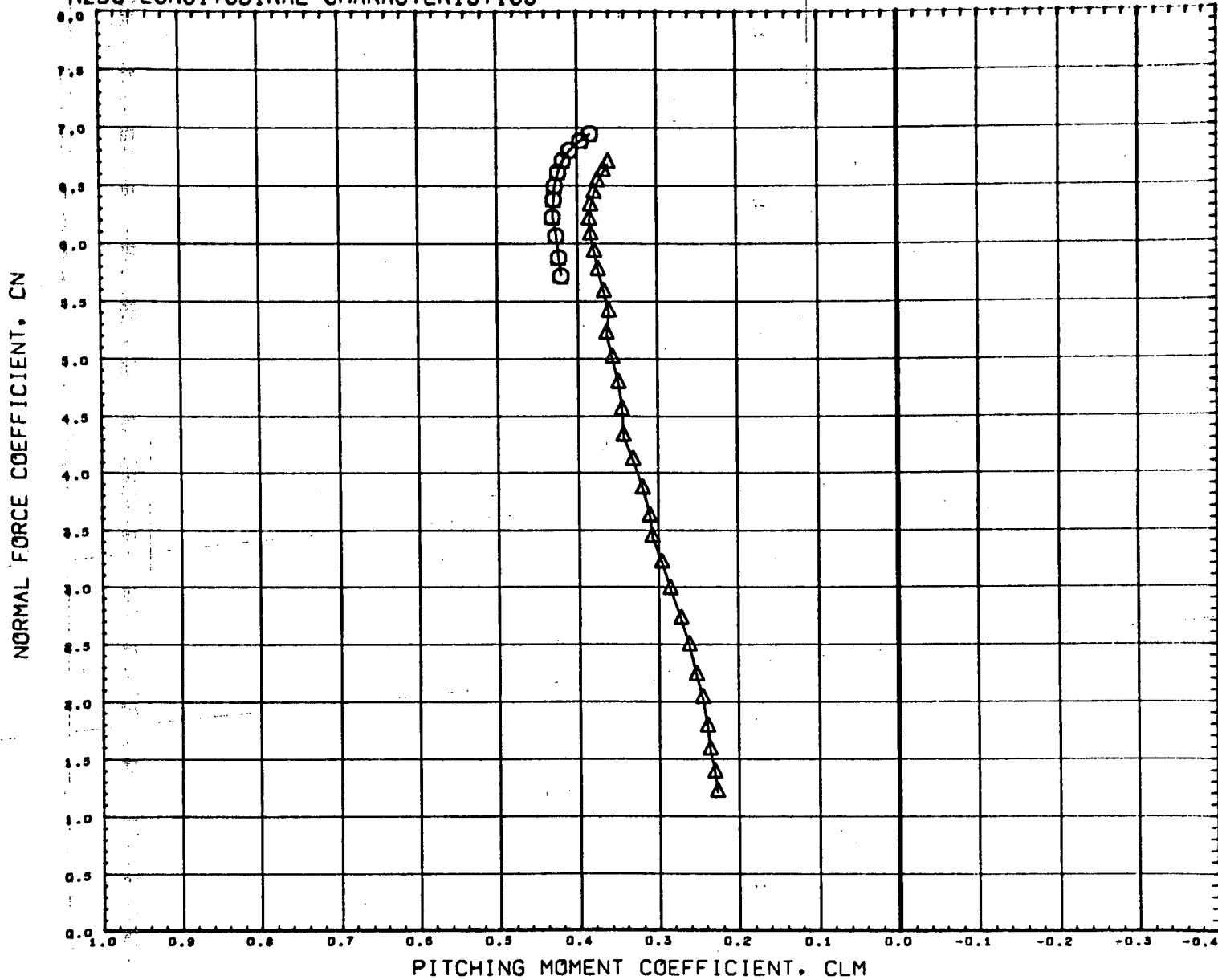
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BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER N2B5

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N2B5-LONGITUDINAL CHARACTERISTICS

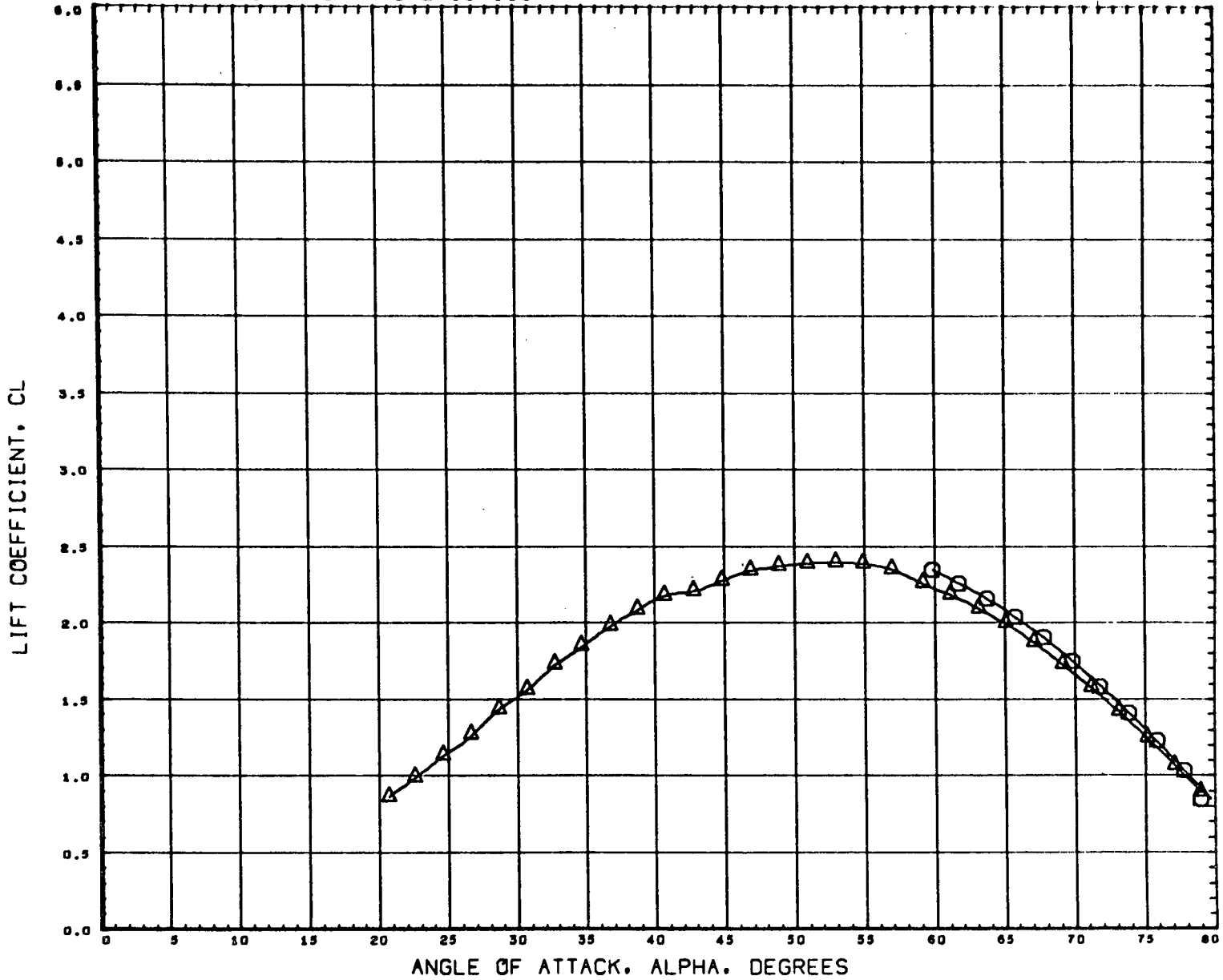


SYMBOL MACH BETA PARAMETRIC VALUES
 O 3.400 0.000
 Δ 4.999

REFERENCE INFORMATION
 SREF 2.1590 SQ. IN
 LREF 7.6590 IN.
 BREF 7.6590 IN.
 XMRP 4.5950 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0042

DATA HIST. CODE S*G+E

N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES
 O 3.480 0.000
 Δ 4.959

REFERENCE INFORMATION

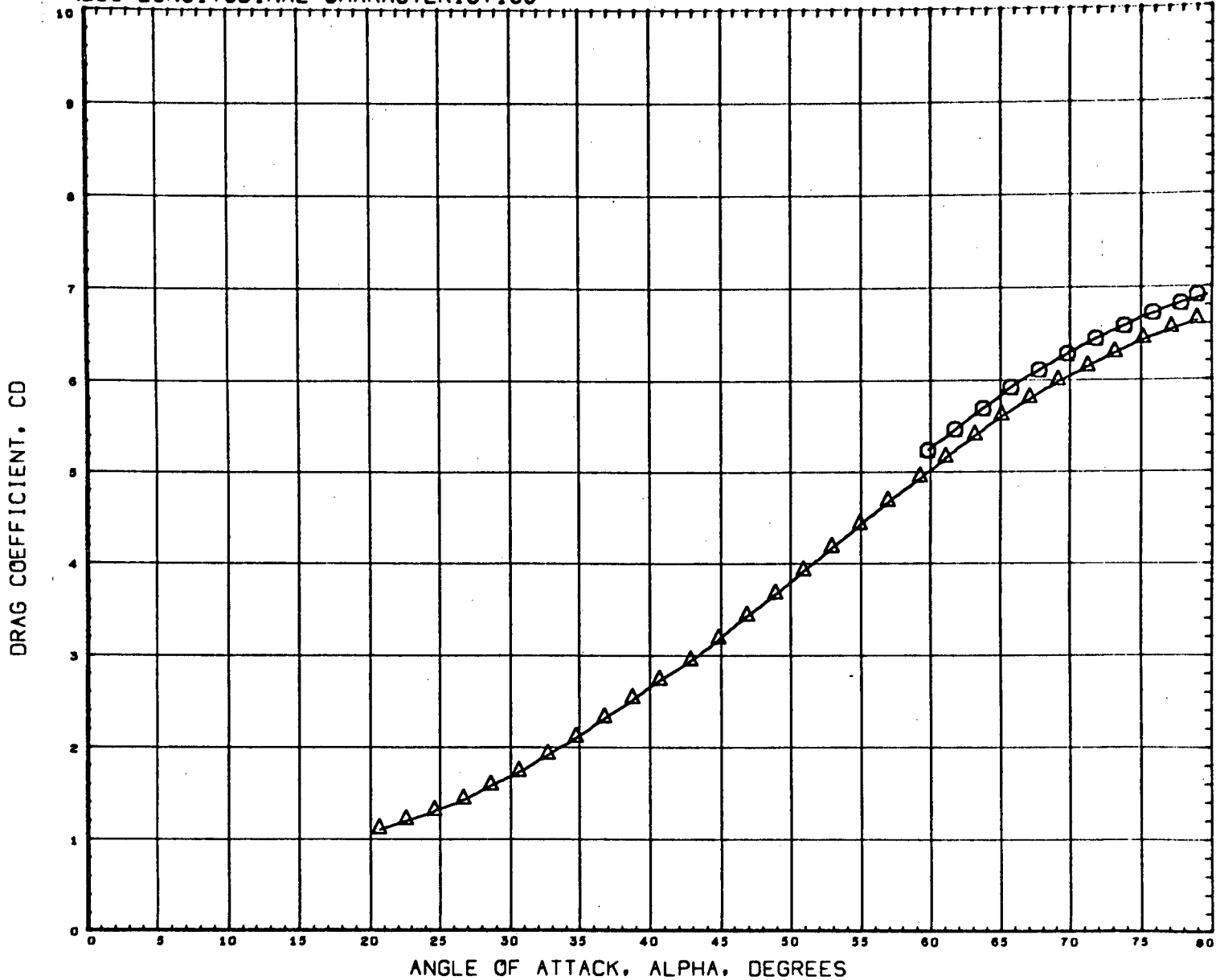
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BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER N2B5

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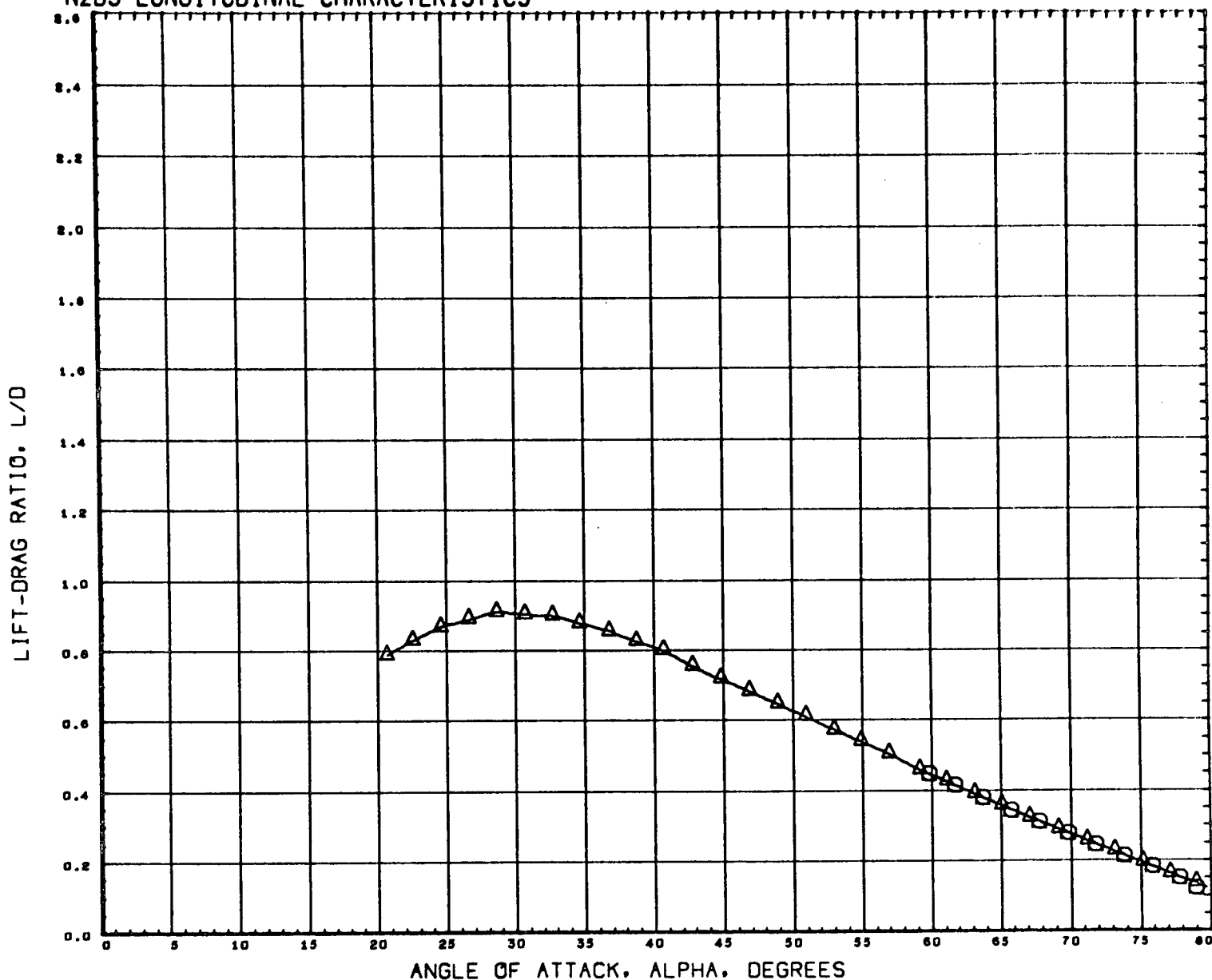
N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES	REFERENCE INFORMATION
○	3.480		0.000	SREF 2.1590 30. IN
△	4.950			LREF 7.6590 IN.
				BREF 7.6590 IN.
				XMRP 4.5950 IN.
				YMRP 0.0000 IN.
				ZMRP 0.0000 IN.
				SCALE 0.0042

DATA HIST. CODE S*G*E

N2B5-LONGITUDINAL CHARACTERISTICS

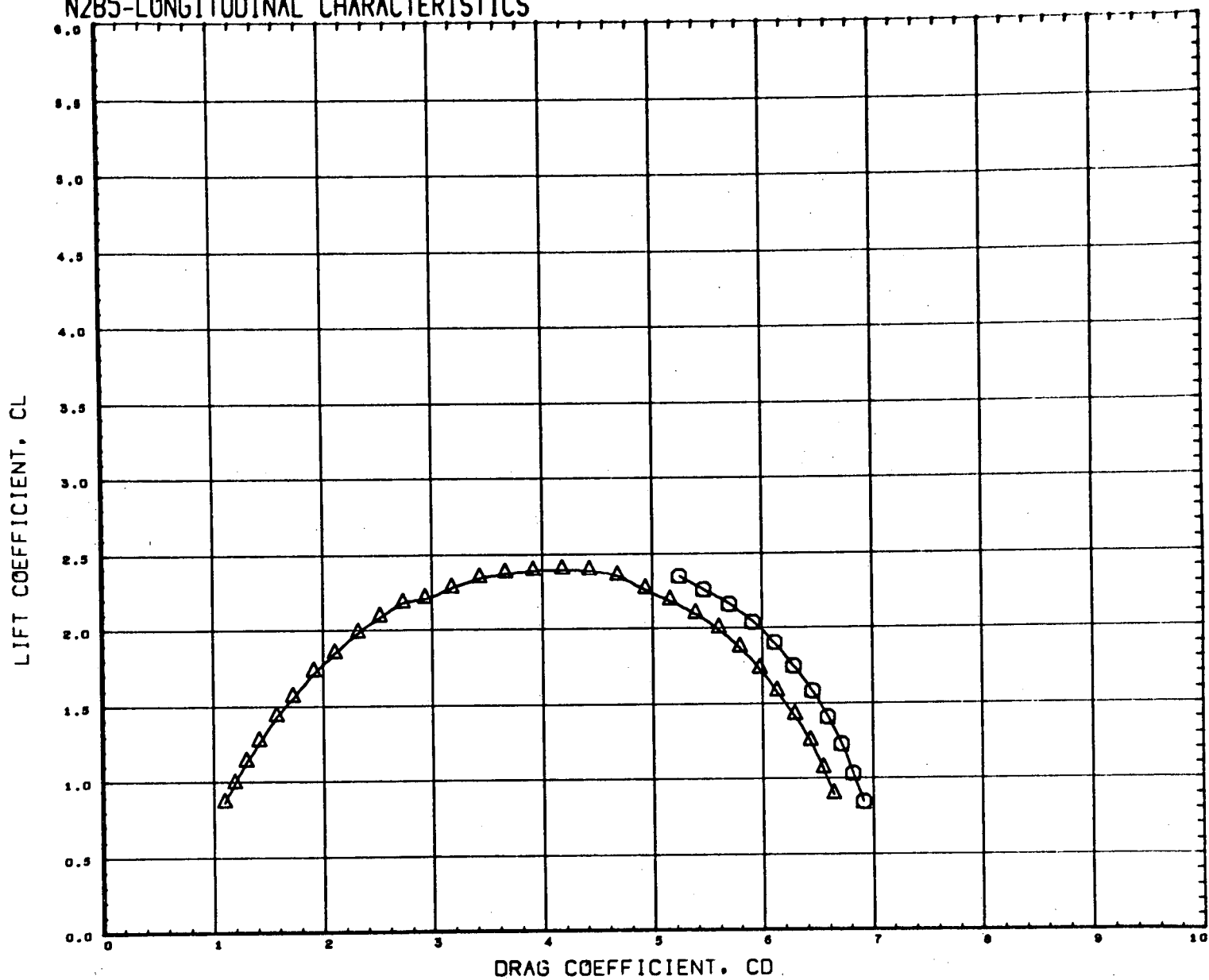


SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	3.480		0.000
△	4.959		

REFERENCE INFORMATION		
SREF	2.1590	90. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	3.460		0.000
△	4.959		

REFERENCE INFORMATION		
SREF	2.1590	Sq. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XHRP	4.5950	IN.
YHRP	0.0000	IN.
ZHRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

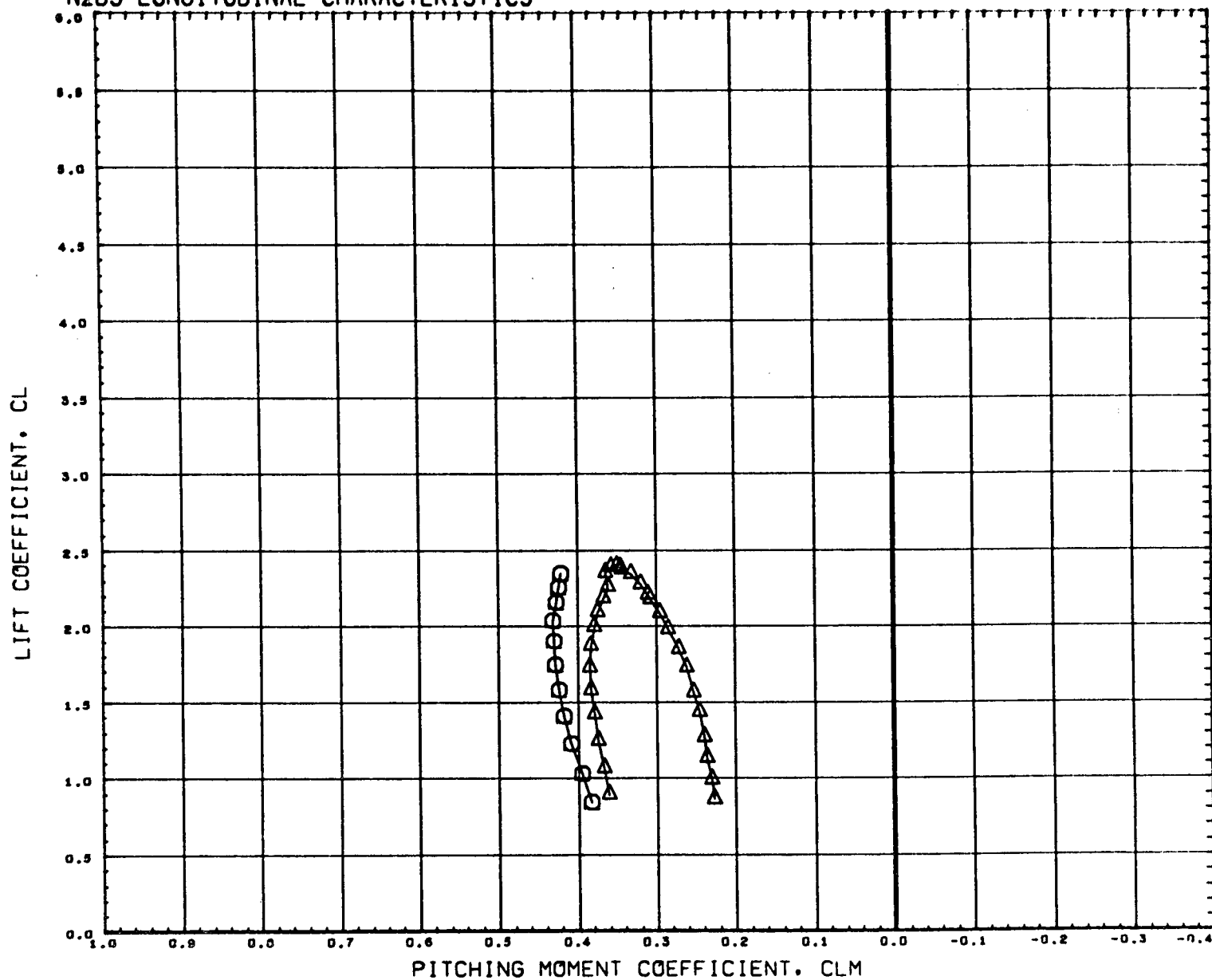
MSFC TWT 521 BOOSTER

N2B5

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N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL MACH BETA PARAMETRIC VALUES
 ○ 3.480 0.000
 △ 4.959

REFERENCE INFORMATION
 SREF 2.1590 SQ. IN
 LREF 7.6590 IN.
 BREF 7.6590 IN.
 XMRP 4.5950 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0042

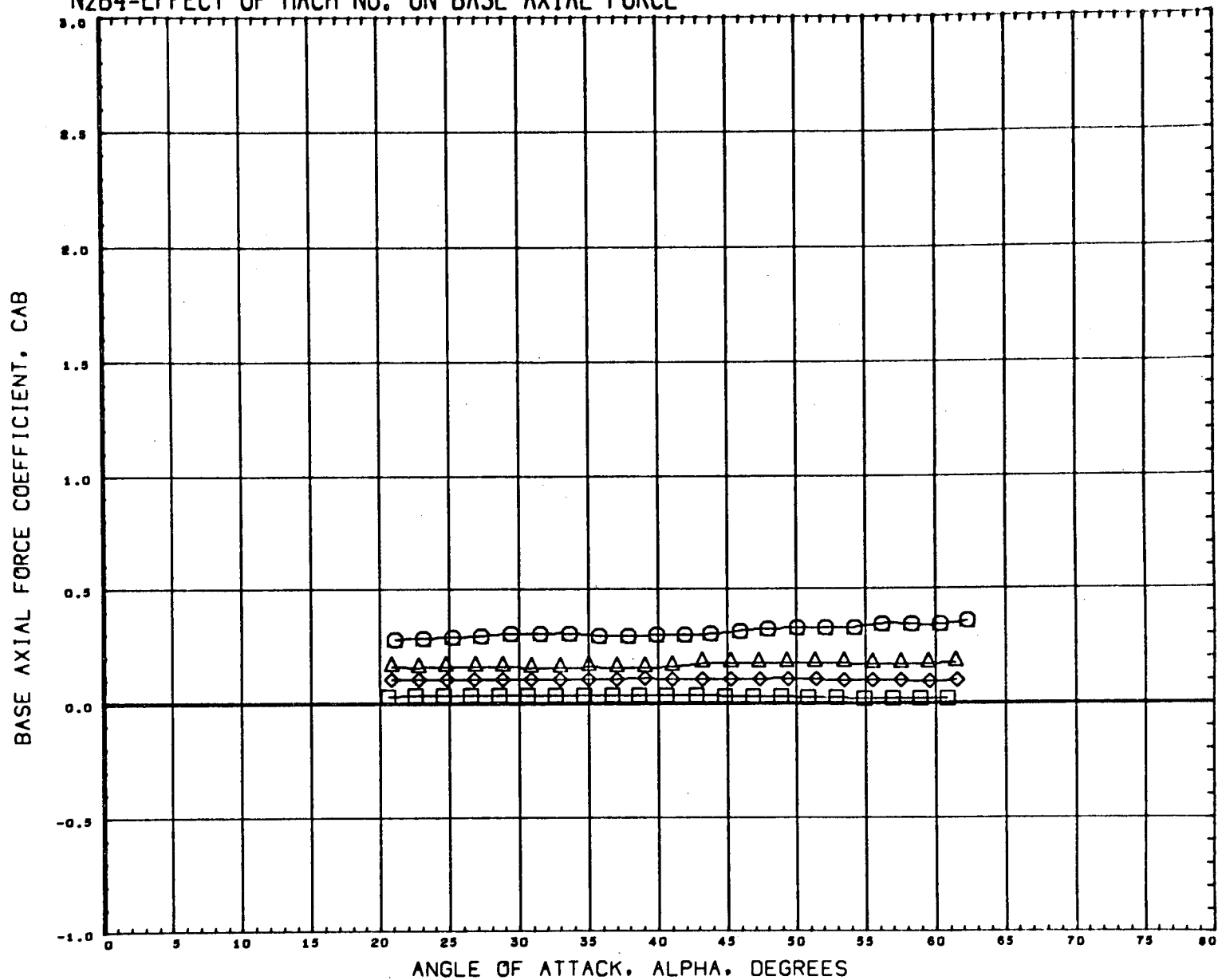
DATA HIST. CODE S*G*E

MSFC TWT 521 BOOSTER

N2B5

(E5505S) 02 FEB 72 PAGE 216

N2B4-EFFECT OF MACH NO. ON BASE AXIAL FORCE



SYMBOL	MACH	BETA	PARAMETRIC VALUES
○	1.955		0.000
△	2.740		
◇	3.480		
□	4.959		

REFERENCE INFORMATION		
SREF	2.1590	98. IN
LREF	7.6590	IN.
BREF	7.6590	IN.
XMRF	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

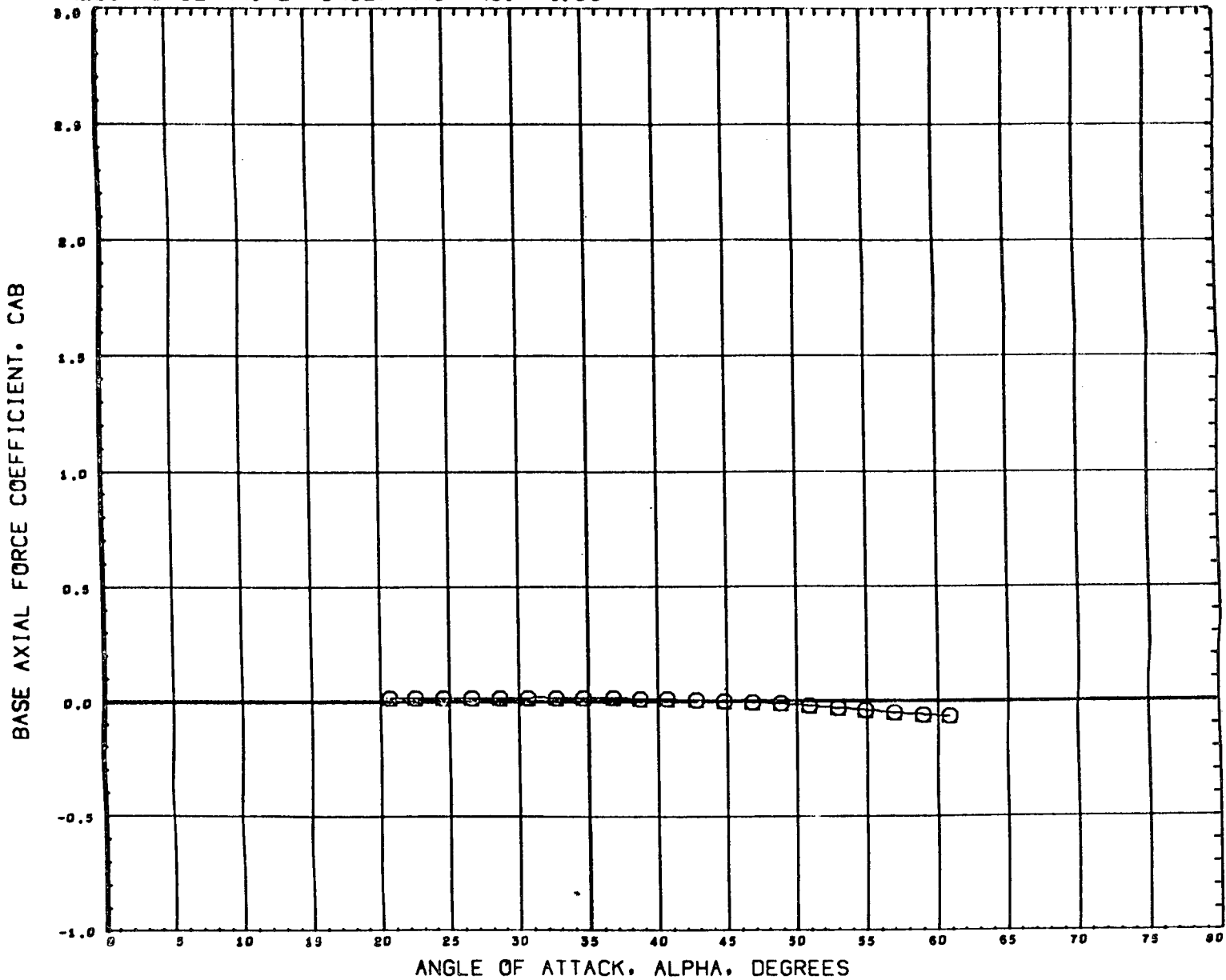
DATA HIST. CODE S*G

MSFC TWT 521 BOOSTER

N2B4

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N2B5- BASE AXIAL FORCE, MACH NO. =4.96



SYMBOL MACH PARAMETRIC VALUES
 O 4.959 BETA 0.000

REFERENCE INFORMATION
 SREF 2.1590 30. IN
 LREF 7.6590 IN.
 BREF 7.6590 IN.
 XMRP 4.5950 IN.
 YMRP 0.0000 IN.
 ZMRP 0.0000 IN.
 SCALE 0.0042

DATA HIST. CODE S*G

MSFC TWT 521 BOOSTER

N2B5

(A5507S) 02 FEB 72

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