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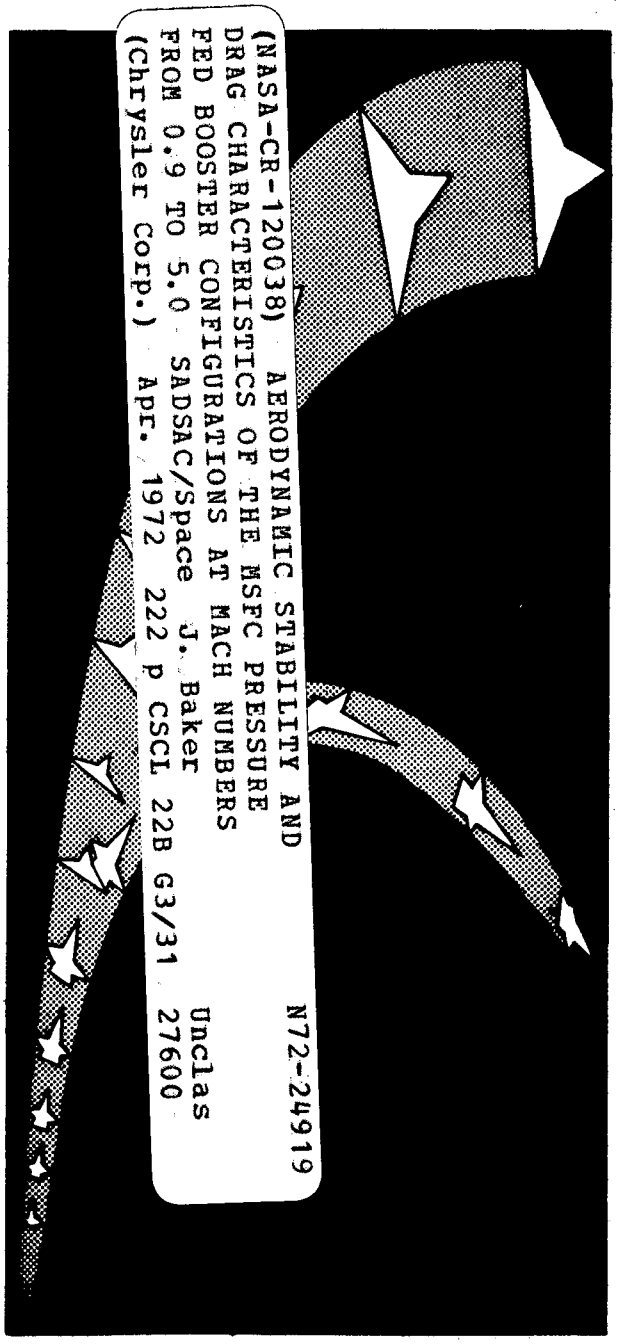
APRIL 1972



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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

NASA

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

RECEIVED
MAY 1972
NASA STI FACILITY
INPUT BRANCH

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION CHRYSLER CORPORATION

This document should be referenced as NASA CR-120,038

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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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CONTRACT NAS 8-4016 AMENDMENT 158 DRL 297-84a

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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

SYMBOL	SADSAC SYMBOL	DEFINITION
a		speed of sound; m/sec, ft/sec
C_p	CP	pressure coefficient; $(p_l - p_\infty)/q$
M	MACH	Mach number; V/a
p		pressure; N/m^2, psf
q	Q(NSM) Q(PSF)	dynamic pressure; $1/2\rho V^2$, N/m^2, psf
RN/L	RN/L	unit Reynolds number; per m, per ft
V		velocity; m/sec, ft/sec
α	ALPHA	angle of attack, degrees
β	BETA	angle of sideslip, degrees
ψ	PSI	angle of yaw, degrees
ϕ	PHI	angle of roll, degrees
ρ		mass density; kg/m^3, $slugs/ft^3$
		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
ℓ_{REF} $\bar{c}$	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

SYMBOL	SADSAC SYMBOL	DEFINITION
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; $\frac{\text{pitching moment}}{qS\ell_{REF}}$
C_n	CYN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qSb}$
C_ℓ	CBL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qSb}$
		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; $\frac{\text{pitching moment}}{qS\ell_{REF}}$
C_n	CLN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qSb}$
C_ℓ	CSL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qSb}$
L/D	L/D	lift-to-drag ratio; C_L/C_D

ADDITIONS TO SADSAC NOMENCLATURE
FOR
MSFC TWT TEST NO. 521

SYMBOL	SADSAC SYMBOL	DEFINITION
Γ	DIHDRL	Fin dihedral angle, measured from horizontal.

CONFIGURATIONS INVESTIGATED

SYMBOL	DESCRIPTIONS
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° (±10°). Sting offsets and extensions are available for obtaining various maximum angles of attack up to 90°.

DATA REDUCTION

Six component force and moment data were recorded using an internal strain gage balance. Aerodynamic coefficients were calculated for the body and stability axis reference systems. Data reduction included an axial force static tare 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 MSFC TWT 521

MACH NUMBER	REYNOLDS NUMBER per unit length	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)
0.9	6.9×10^6/ft.	8.05	94
1.2	6.7×10^6/ft.	9.14	98
1.46	7.5×10^6/ft.	10.77	96
1.96	7.1×10^6/ft.	10.20	98
2.74	5.2×10^6/ft.	6.39	99
3.48	7.1×10^6/ft.	6.87	100
4.96	5.8×10^6/ft.	3.24	97

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.		

COMMENTS:

TABLE II.

TEST MSFC TWT 521 DATA SET COLLATION SHEET

☐ PRETEST

☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES Γ				NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) 0.6	0.8	0.7	1.0	1.1	1.2	1.46	1.96	2.74	3.48	4.96	
R55 001	N_1E_1	0	C	–				3			073/0			074/0	090/0					
002		30	C	–				6			062/0			061/0		066/0	003/0	003/0	001/0	
003		51	C	–				6			065/0			064/0		065/0	004/0	005/0	006/0	
004	$N_1B_1F_2$	B	0	30				4								068/0	016/0	017/0	018/0	
005		30	C					4								061/0	022/0	023/0	024/0	
006		51	C					4								068/0	021/0	020/0	019/0	
007	$N_1B_1F_6$	D	0					3			077/0			075/0	088/0					
008		B	0					4								070/0	015/0	014/0	013/0	
009		0	C					3			076/0			075/0	089/0					
010		30	C					4								007/0	010/0	011/0	012/0	
011		51	C					4								011/0	007/0	008/0	007/0	
R55 012	N_1B_3	D	0	–				1											099/0	
013		A	0	–				7			120/0			121/0	116/0	115/0	110/0	109/0	108/0	
014		B	0	–				6			054/0			052/0		046/0	033/0	034/0	031/0	
015		E	0	–				4								100/0	102/0	106/0	107/0	
016		0	C	–				3			084/0			083/0	085/0					
017		30	C	–				6			054/0			049/0		043/0	027/0	026/0	025/0	
018		51	C	–				6			051/0			054/0		041/0	029/0	029/0	030/0	
019	$N_1B_3F_{12}$	D	0	30				3			077/0			079/0	084/0					

1	7	13	19	25	31	37	43	49	55	61	67	75 76
CLM	CN	CY	CBL	CYN	CA	CAB	CAF	CAC	XCP			10

COEFFICIENTS: → IDPVAR(1) | IDPVAR(2) | NDV

α or β SCHEDULES

C: β = −10° To 10° Δβ = 2° A: α = 20° To 40° Δα = 2°

B: α = 40° To 60° Δα = 2° E: α = 60° To 80° Δα = 2°

D: α = −10° To 10° Δα = 2°

NASA-MSFC-MAF

TABLE II. (CONTINUED)

TEST MSFC TWT 521 DATA SET COLLATION SHEET

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES Γ				NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) 0.6	0.8	0.9	1.0	1.1	1.2	1.46	1.96	2.74	3.48	4.96	
R55 020	$N_1B_3F_{12}$	A	0	30				7			117/0			118/0	117/0	114/0	113/0	112/0	111/0	
021		B	0					4								045/0	034/0	035/0	036/0	
022		E	0					4								101/0	104/0	103/0	102/0	
023		0	C					3			081/0			082/0	08[illegible]/0					
024		30	C					6			059/0			060/0		043/0	040/0	041/0	042/0	
025		51	C					4								044/0	039/0	038/0	037/0	
R55 026	N_2B_2	E	0	—				4								091/0	095/0	097/0	096/0	
027	$N_2B_2F_7$	E	0	30				4								092/0	093/0	094/0	095/0	
R55 028	N_2B_4	A	0	—				4								125/0	132/0	131/0	130/0	
029		B	0	—				4								126/0	[illegible]	[illegible]	[illegible]	
030		E	0	—				4								137/0	[illegible]	[illegible]	[illegible]	
031	N_2B_5	A	0	—				1											133/0	
032		B	0	—				1											134/0	
033		E	0	—				2										140/0	135/0	

1	7	13	19	25	31	37	43	49	55	61	67	75 76
CLM	CN	CY	CBL	CYN	CA	CAB	CAF	CAC	XCP			10

COEFFICIENTS: → IDPVAR(1) | IDPVAR(2) | NDV

α or β SCHEDULES

A: α = 20° TO 40° Δα = 2° C: β = −10° TO 10° Δα = 2°

B: α = 40° TO 60° Δα = 2°

E: α = 60° TO 80° Δα = 2°

NASA-MSFC-MAF

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:

	FULL-SCALE	MODEL SCALE
Length	178.8 ft.	7.223 in.
Max. Width	38.6 ft.	1.558 in.
Max. Depth	38.6 ft.	1.558 in.
Fineness Ratio		
Area		
Cross-Sectional	572 ft^2	0.933 in^2
Planform		
Wetted		
Base	1168 ft^2	1.906 in^2
Body Diameter	27 ft.	1.091 in.
Base Diameter	38.6 ft.	1.558 in.
Base Flare Angle, Degrees	13.05	13.05
Conical Nose Angle, Degrees	40	40

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N1B3

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

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:

	FULL-SCALE	MODEL SCALE
Length	145 ft.	5.859 in.
Max. Width	41 ft.	1.658 in.
Max. Depth	41 ft.	1.658 in.
Fineness Ratio		
Area		
Max. Cross-Sectional	1320 ft^2	2.159 in^2
Planform		
Wetted		
Base	1320 ft^2	2,159 in^2
Body Diameter	41 ft.	1.658 in.
Conical Nose Angle, Degrees	35	35

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N2B4

GENERAL DESCRIPTION: MSFC Pressure Fed Booster Body with 35° Conical Nose, Cylindrical Body and 7° Aft Flare

DRAWING NUMBER: _____

DIMENSIONS:

	FULL-SCALE	MODEL SCALE
Length	152.3 ft.	7,659 in.
Max. Width		
Max. Depth		
Fineness Ratio		
Area		
Cross-Sectional	854 ft.^{2}	2.159 in.^{2}
Planform		
Wetted		
Base		
Body Diameter	33 ft.	1.658 in.
Base Diameter	41.8 ft.	2.102 in.
Base Flare Angle, Degrees	7°	7°
Conical Nose Angle	35	35

TABLE III. (CONTINUED)

MODEL COMPONENT: BODY - N2B5

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

DRAWING NUMBER: _____

DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length	152.3 ft.	7.659 in.
Max. Width		
Max. Depth		
Fineness Ratio		
Area		
Cross-Sectional	854 ft.^{2}	2.159 in.^{2}
Planform		
Wetted		
Base		
Body Diameter	33 ft.	1.658 in.
Base Diameter	33 ft.	1.658 in.
Conical Nose Angle, Degrees	35	35

TABLE III. (CONTINUED)

MODEL COMPONENT: FINS - F2

GENERAL DESCRIPTION: Fins for MSFC Pressure Fed Booster

DRAWING NUMBER:

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

TABLE III. (CONTINUED)

MODEL COMPONENT: FINS - F6

GENERAL DESCRIPTION: Fins for MSFC Pressure Fed Booster

DRAWING NUMBER: _____

DIMENSIONS:	FULL-SCALE	MODEL SCALE
Area	600 ft.^{2}	0.979 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	40.75	40.75
Tailing Edge	0.0	0.0
Hingeline		
Area Moment (Normal to hinge line)		

TABLE III. (CONTINUED)

MODEL COMPONENT: FINS - F7

GENERAL DESCRIPTION: Fins for MSFC Pressure Fed Booster Body N2B2

DRAWING NUMBER:

DIMENSIONS:

	FULL-SCALE	MODEL SCALE
Area	672 ft^2	1.100 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	40.75	40.75
Tailing Edge	0.0	0.0
Hingeline		
Area Moment (Normal to hinge line)		

TABLE III. (CONCLUDED)

MODEL COMPONENT: Fins - F12

GENERAL DESCRIPTION: Fins for MSFC Pressure Fed Booster Body N1B3

DRAWING NUMBER:

DIMENSIONS:	FULL-SCALE	MODEL SCALE
Area	1200 ft.^{2}	1.961 in.^{2}
Span (equivalent)		
Inb'd equivalent chord		
Outb'd equivalent chord	24.1 ft.	0.975 in.
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord		
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge	31°20'	31°20'
Tailing Edge	0.0	0.0
Hingeline		
Area Moment (Normal to hinge line)		

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14	Photograph of Configuration N2B4	38

TABLE V. INDEX OF DATA FIGURES

TITLE	PLOTTED COEFFICIENTS SCHEDULE	CONDITIONS VARYING	PAGES
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 COEFFICIENTS SCHEDULE	CONDITIONS VARYING	PAGES
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, CLM, CA, CL, CD, L/D, CAB vs. ALPHA

CN, CL vs. CLM

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.

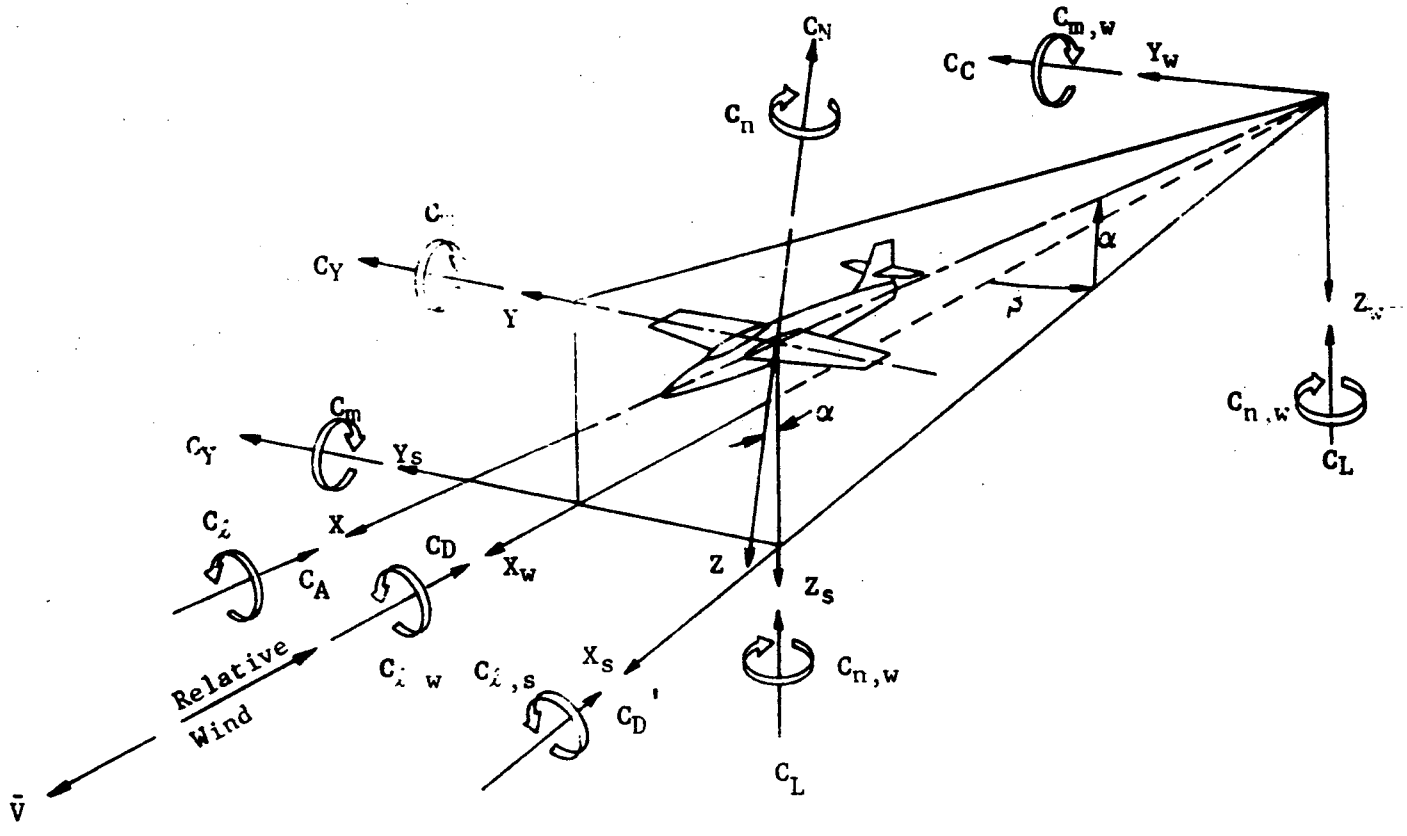


Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

NASA-MSFC

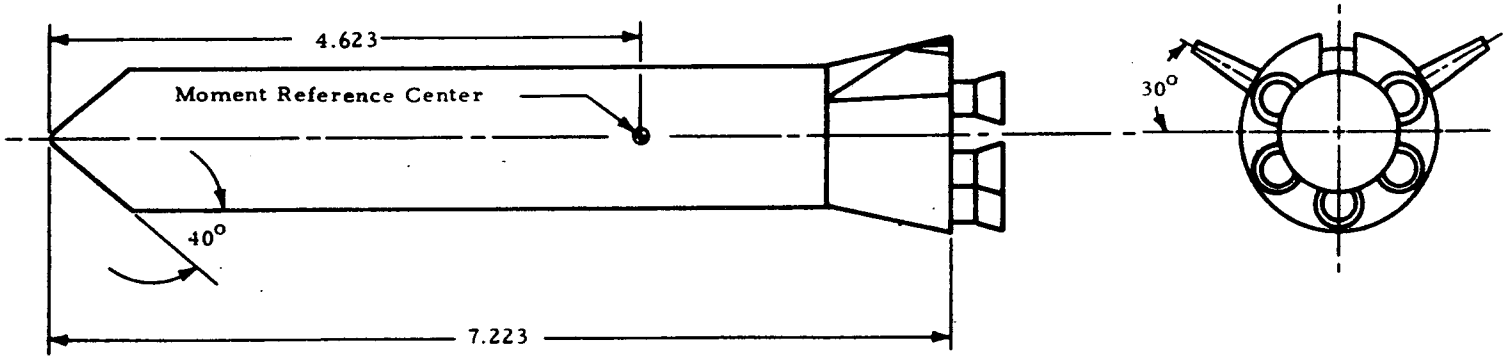


Fig. 2. MSFC Pressure Fed Booster N1B1F2 Moment Reference Center Location

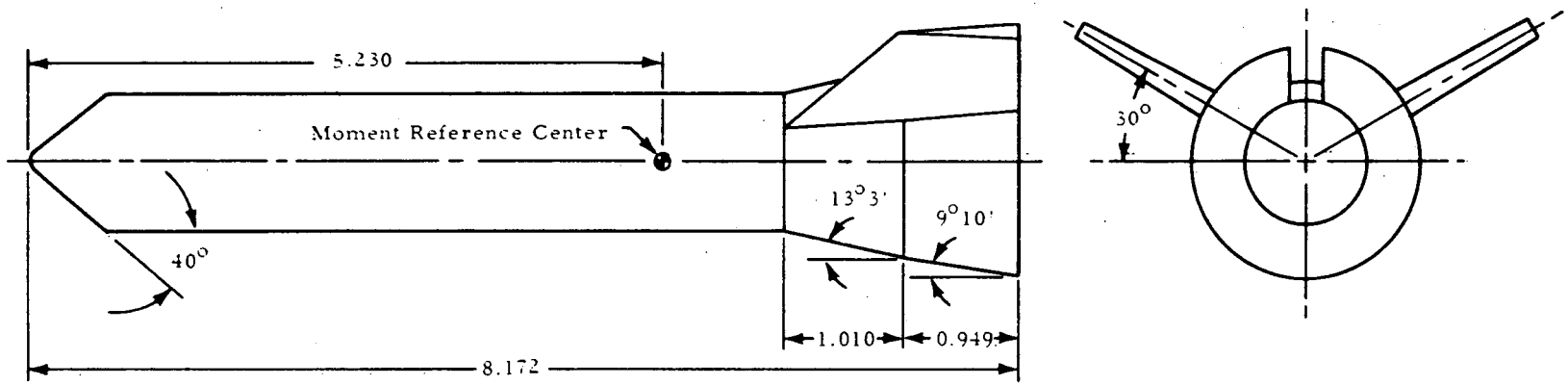


Fig. 3 - MSFC Pressure Fed Booster N1B3F12 Moment Reference Center Location

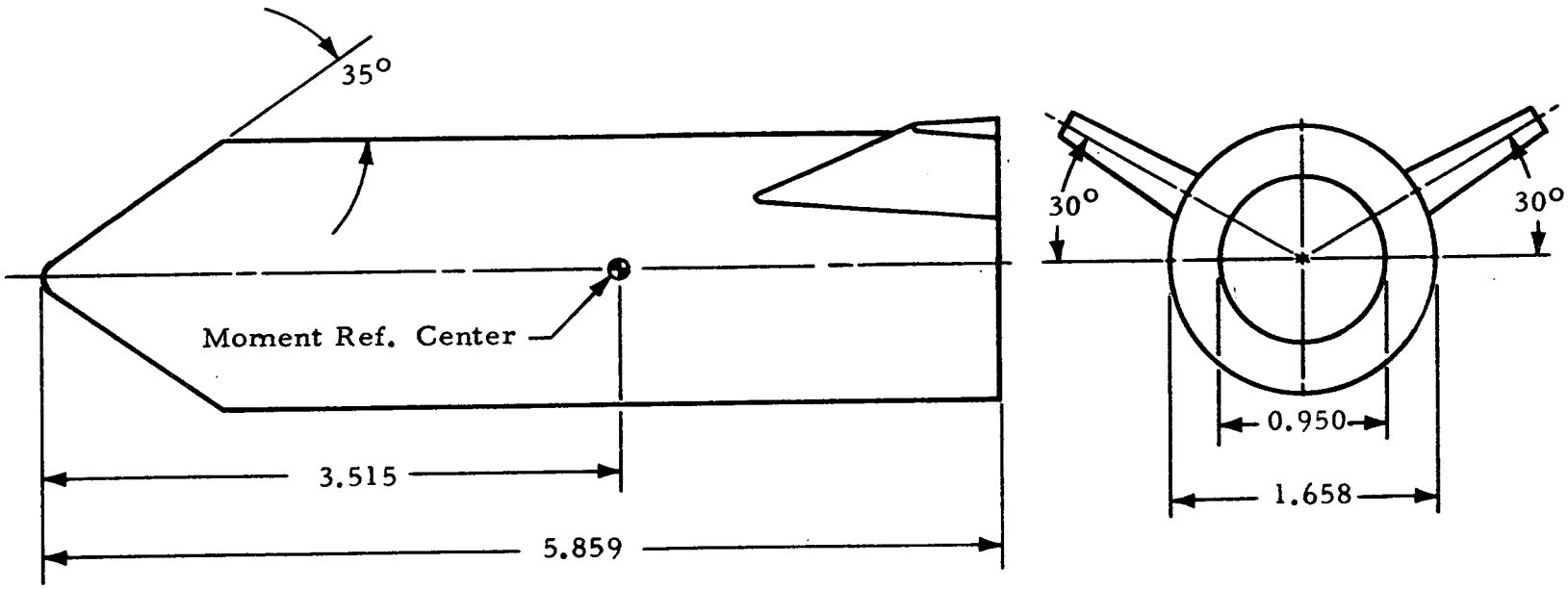


Fig. 4 - MSFC Pressure Fed Booster N2B2F7 Moment Reference Center Location

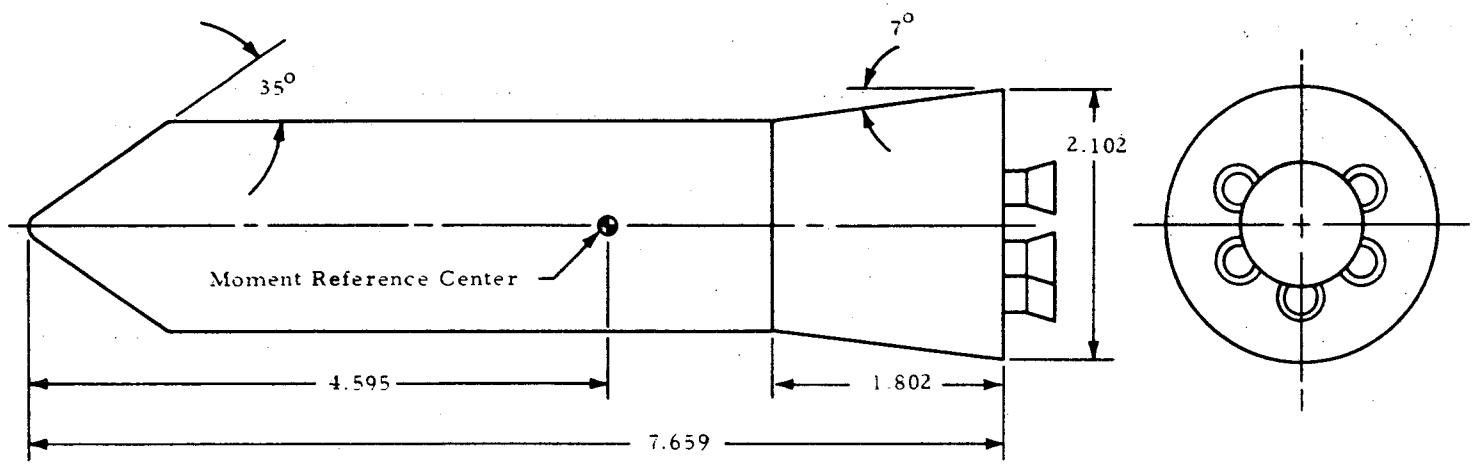


Fig. 5 - MSFC Pressure Fed Booster N2B4 Moment Reference Center Location

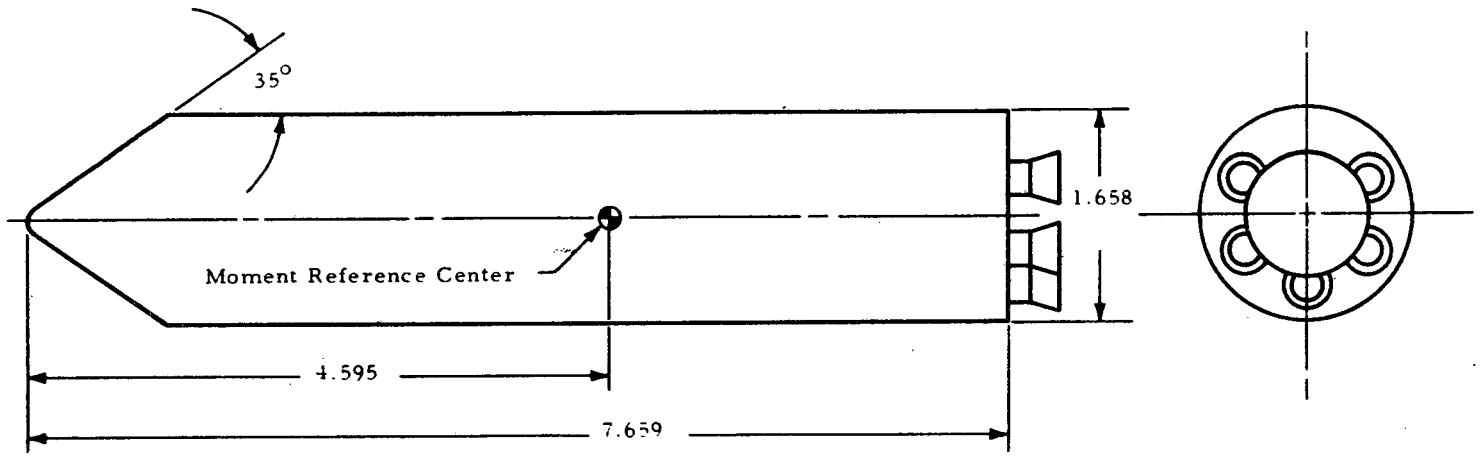


Fig. 6 - MSFC Pressure Fed Booster N2B5 Moment Reference Center Location

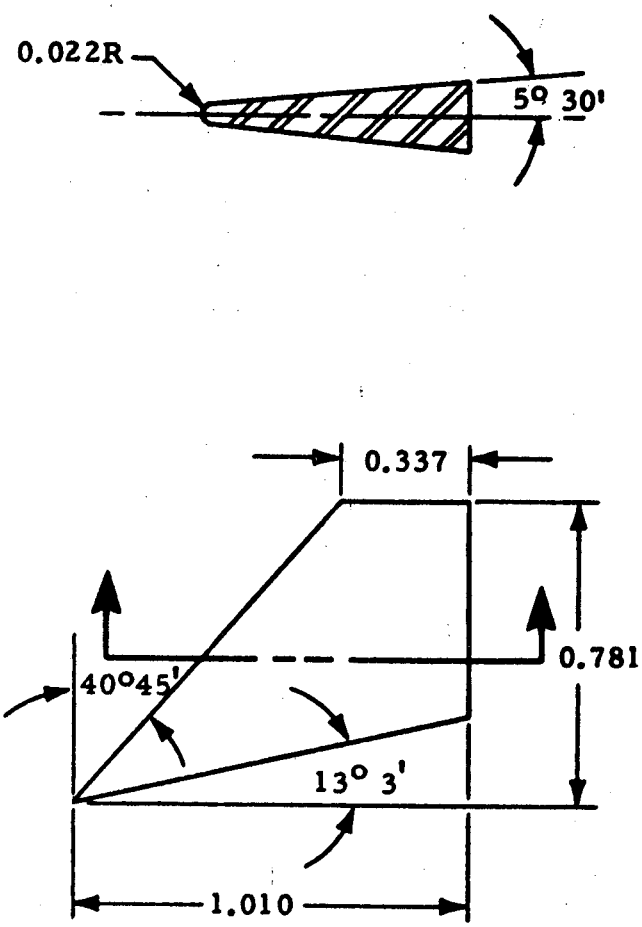


FIGURE 7. FINS F2

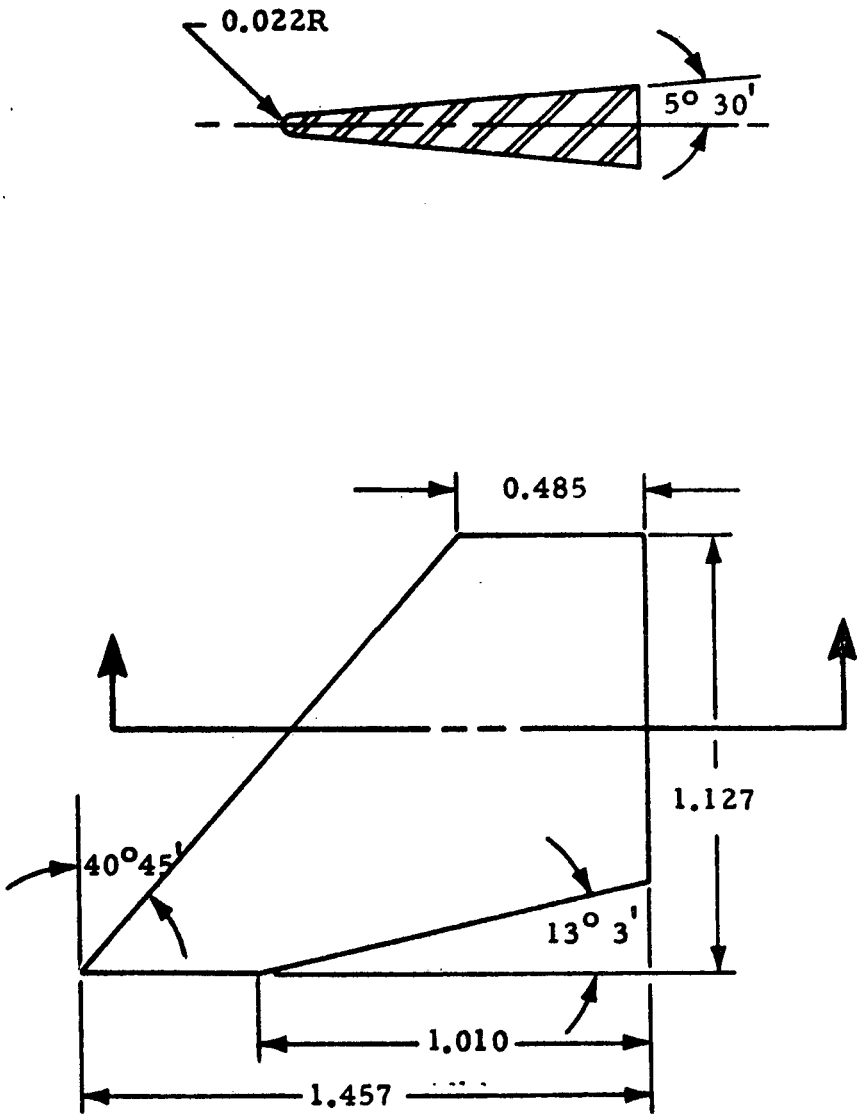


FIGURE 8. FINS F6

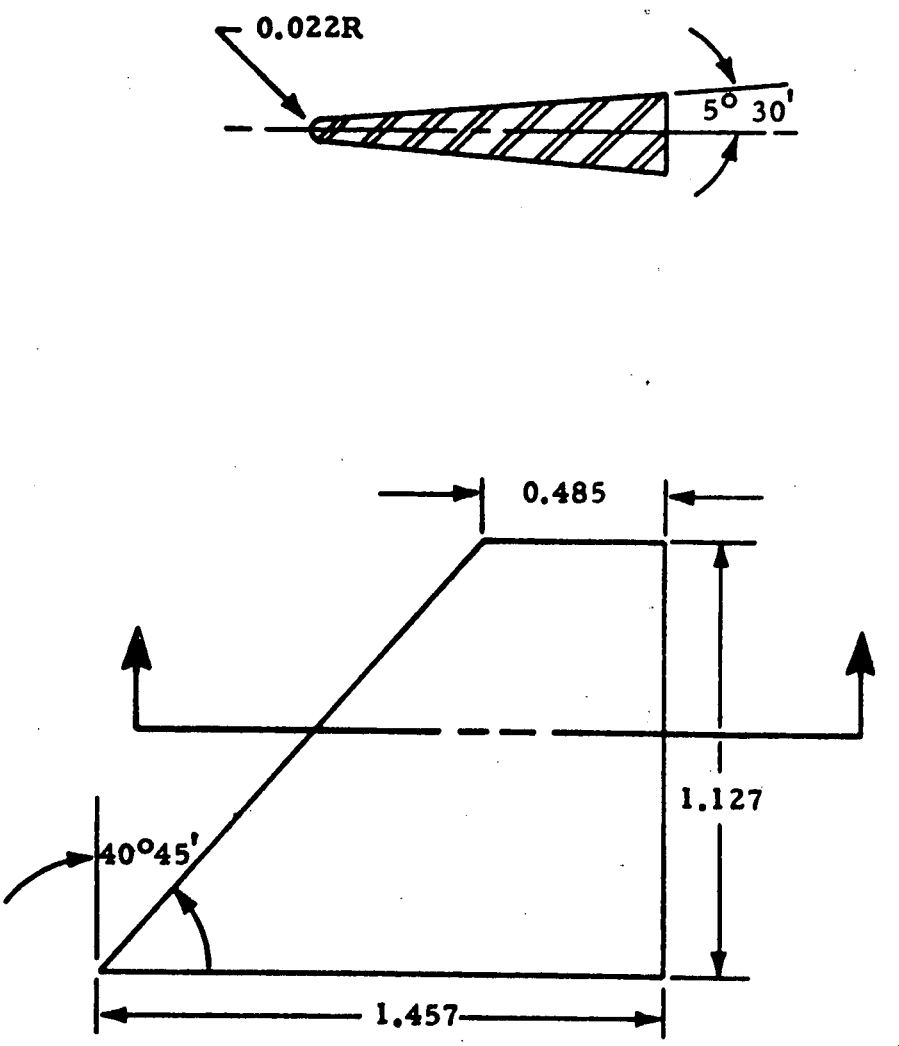


FIGURE 9. FINS F7

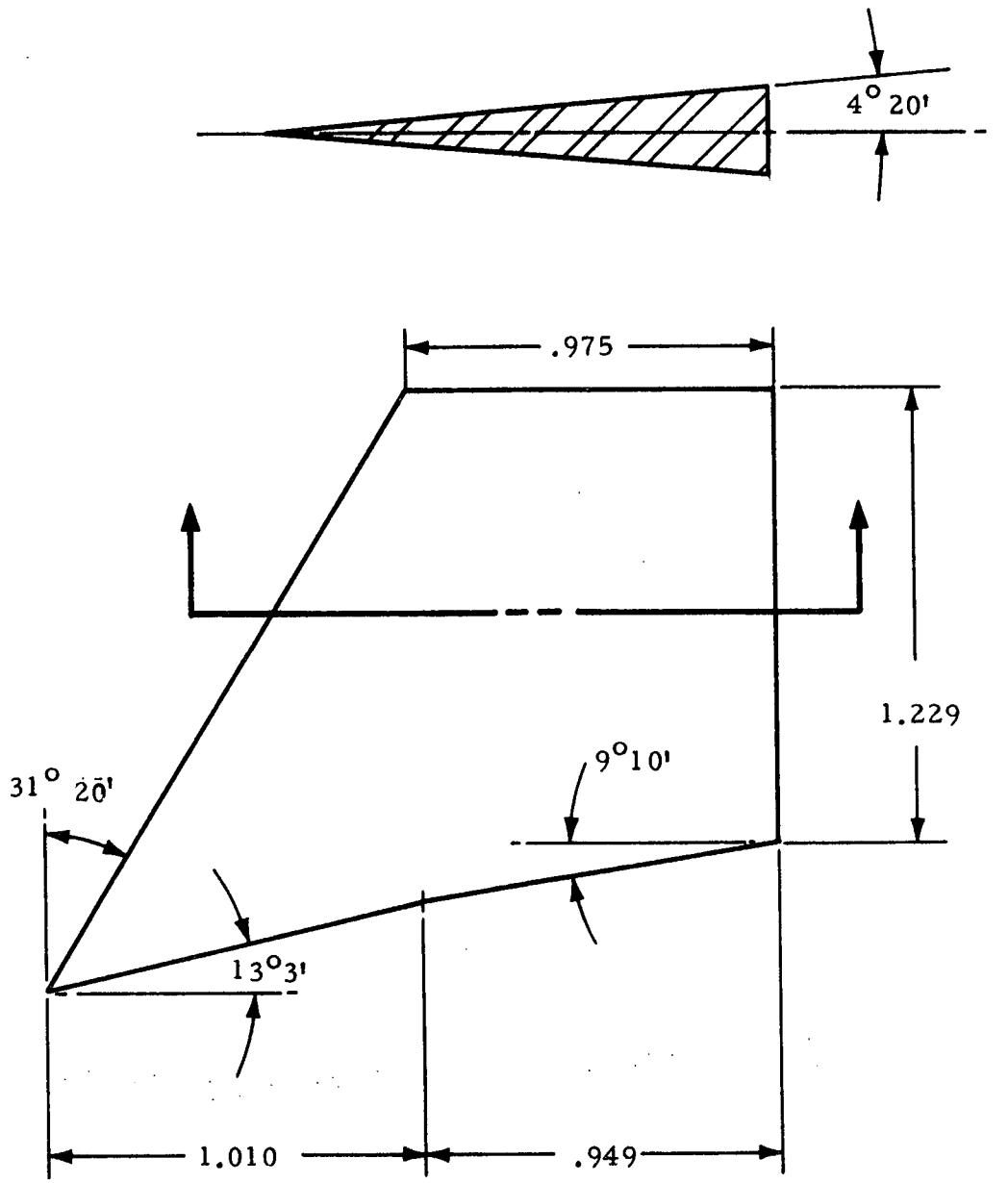


Fig. 10- Fins F12

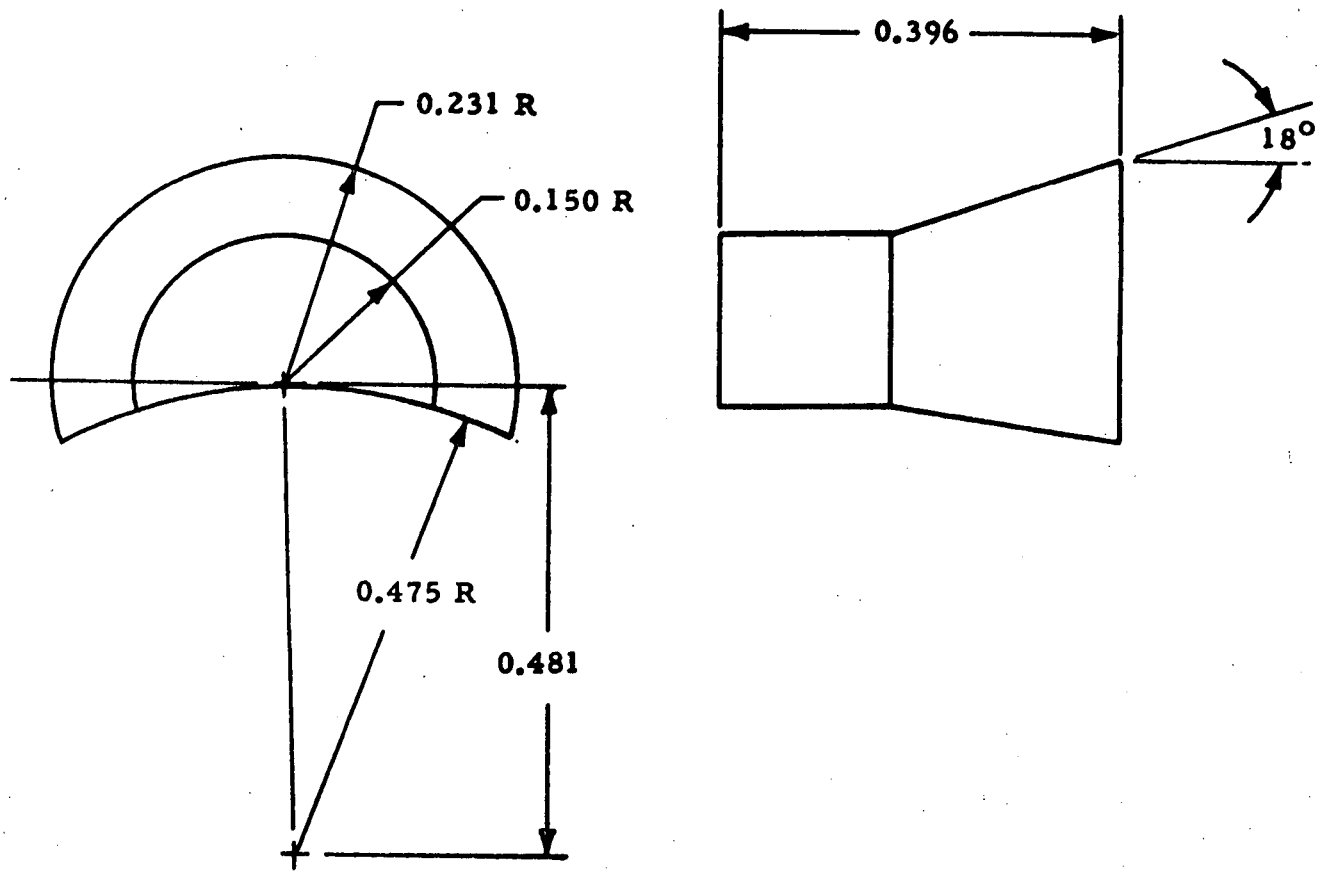
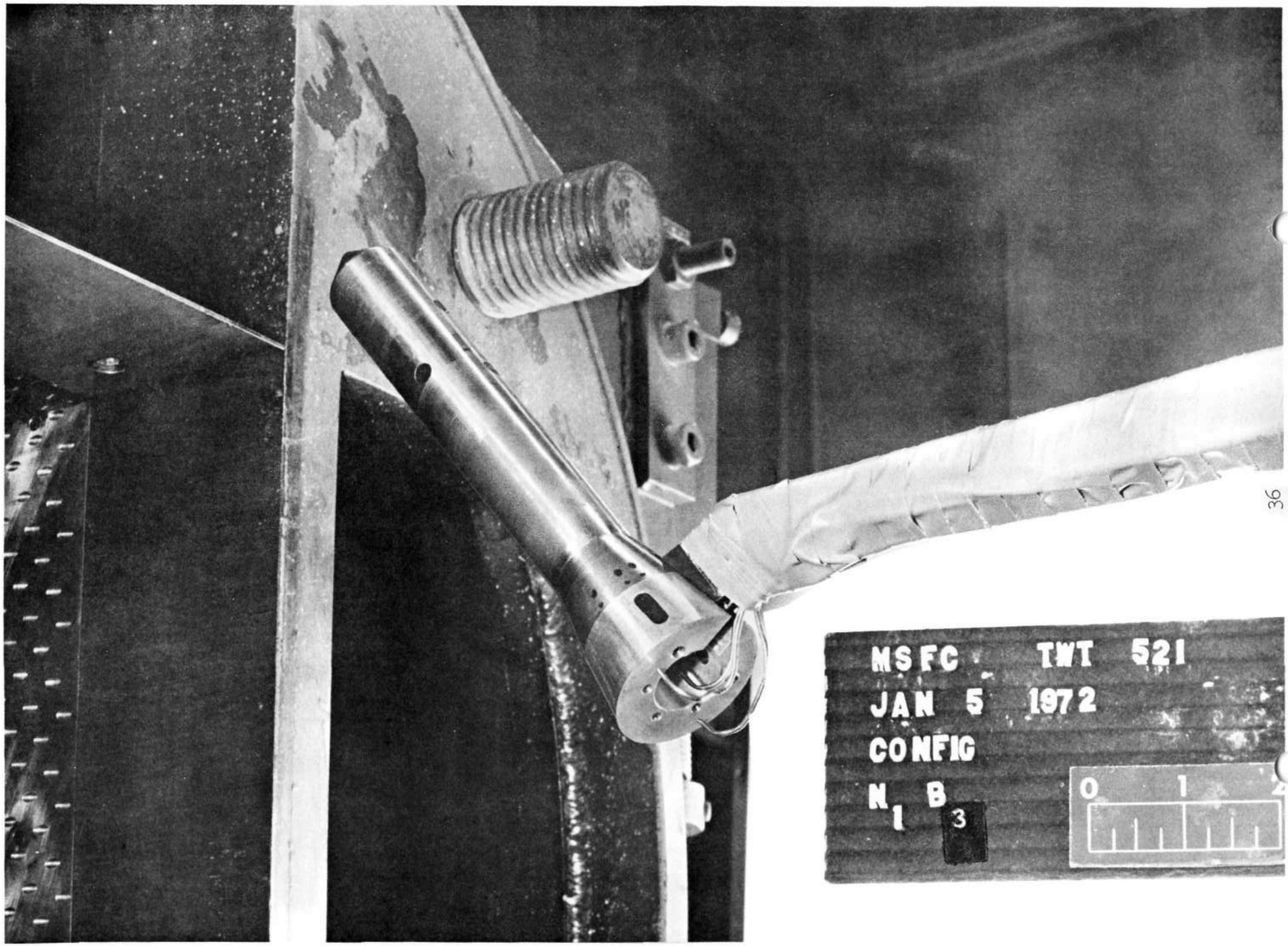


Fig. 11. Rocket Engines for N1B1, N2B4 and N2B5



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S&E-Aero-AE

FIGURE 12. CONFIGURATION N1B3

01-05-72

01-4-72

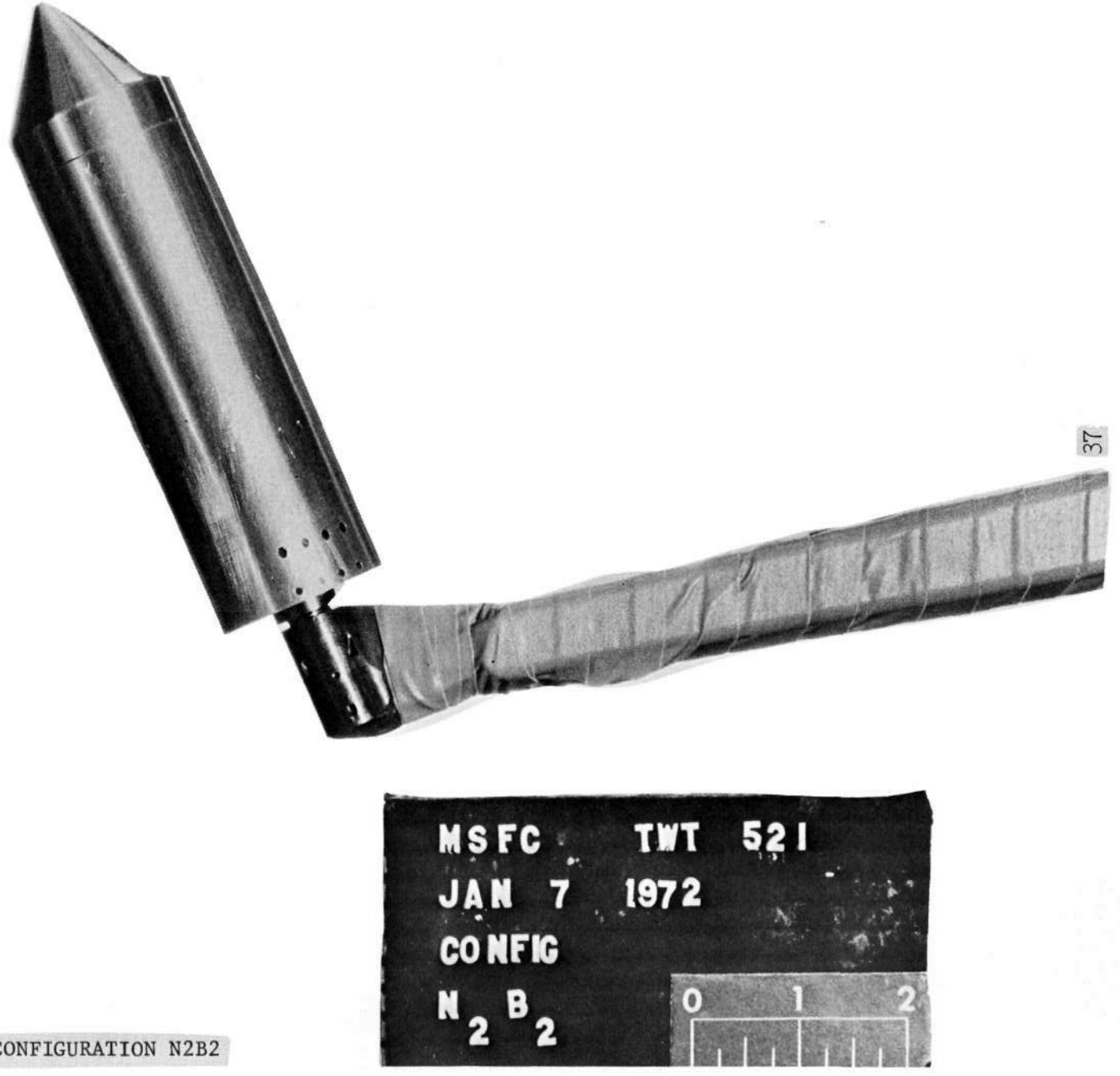

FIGURE 13. CONFIGURATION N2B2

NASA-MSFC
S&E-Aero-AE

01-07-72

03-1-72

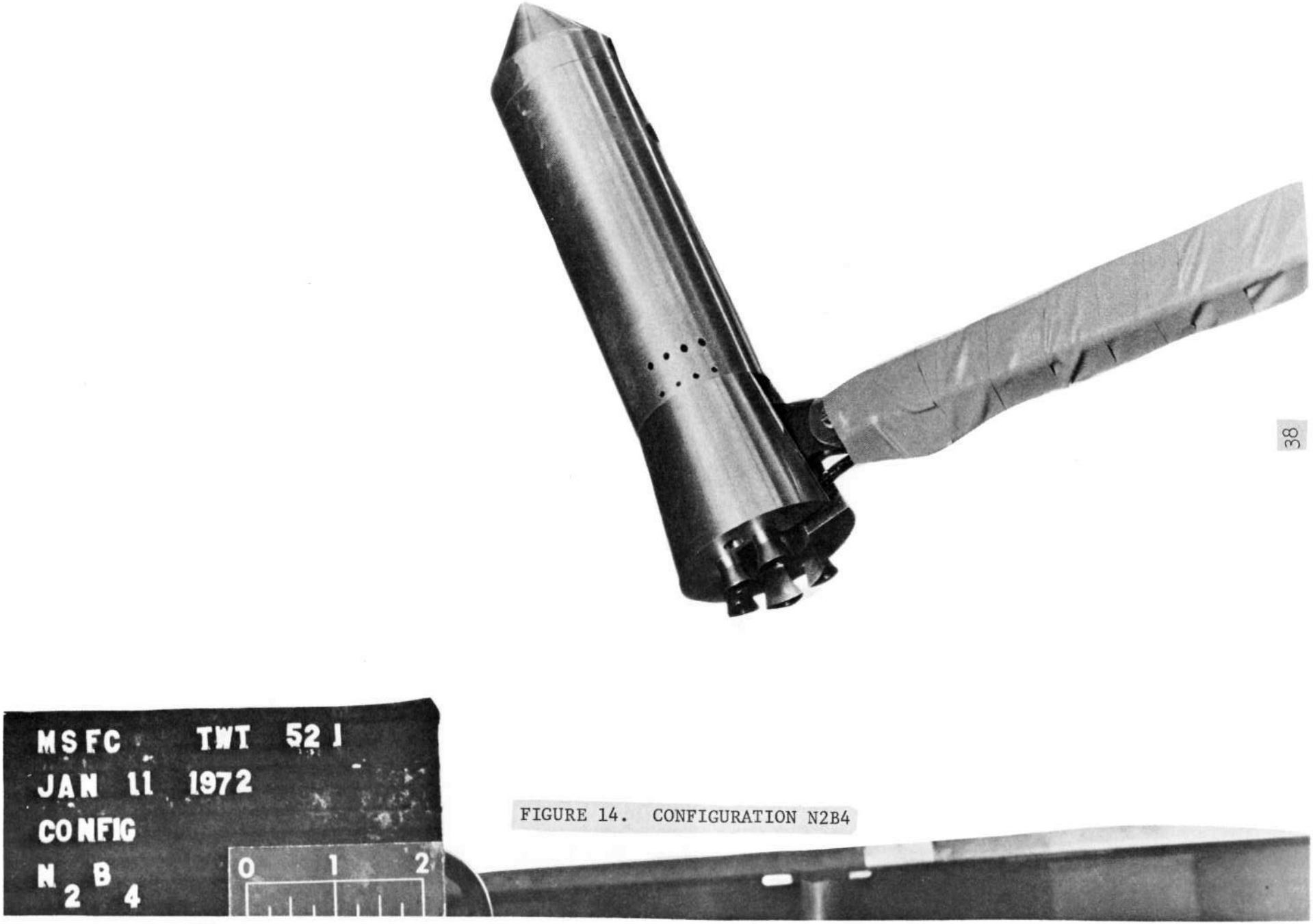

FIGURE 14. CONFIGURATION N2B4

NASA-MSFC
S&E-Aero-AE

01-11-72

04-1-72

PLOTTED DATA

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

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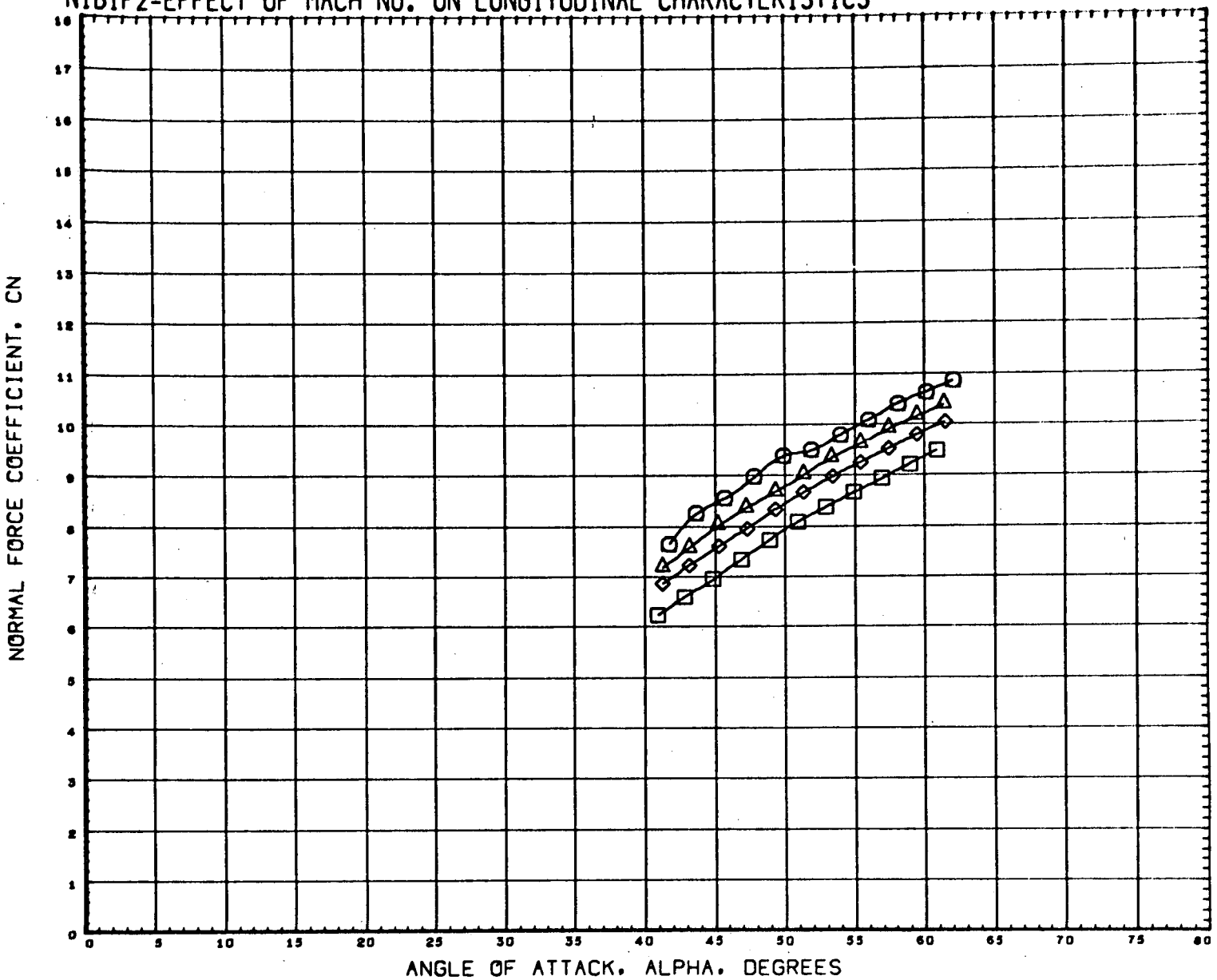

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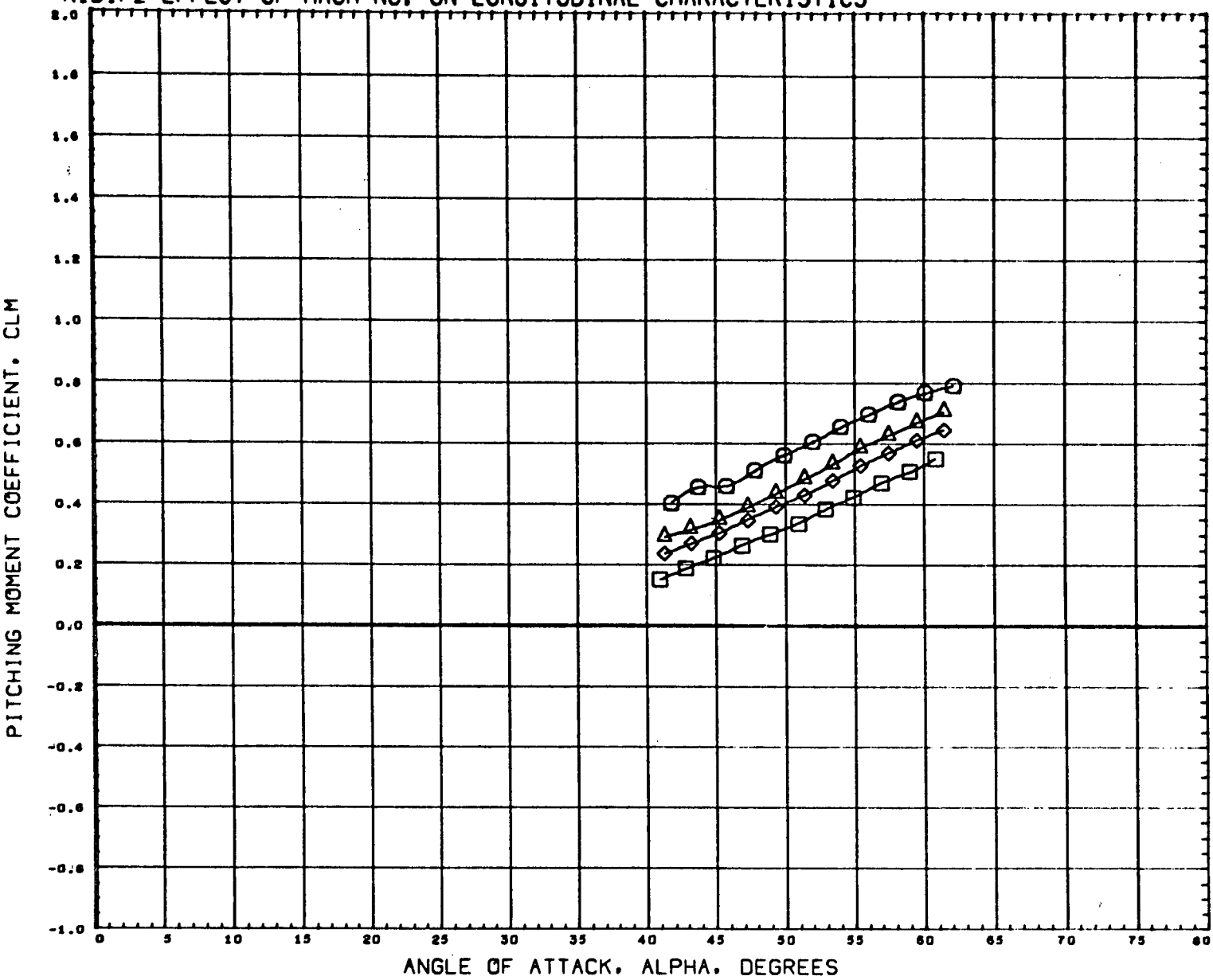

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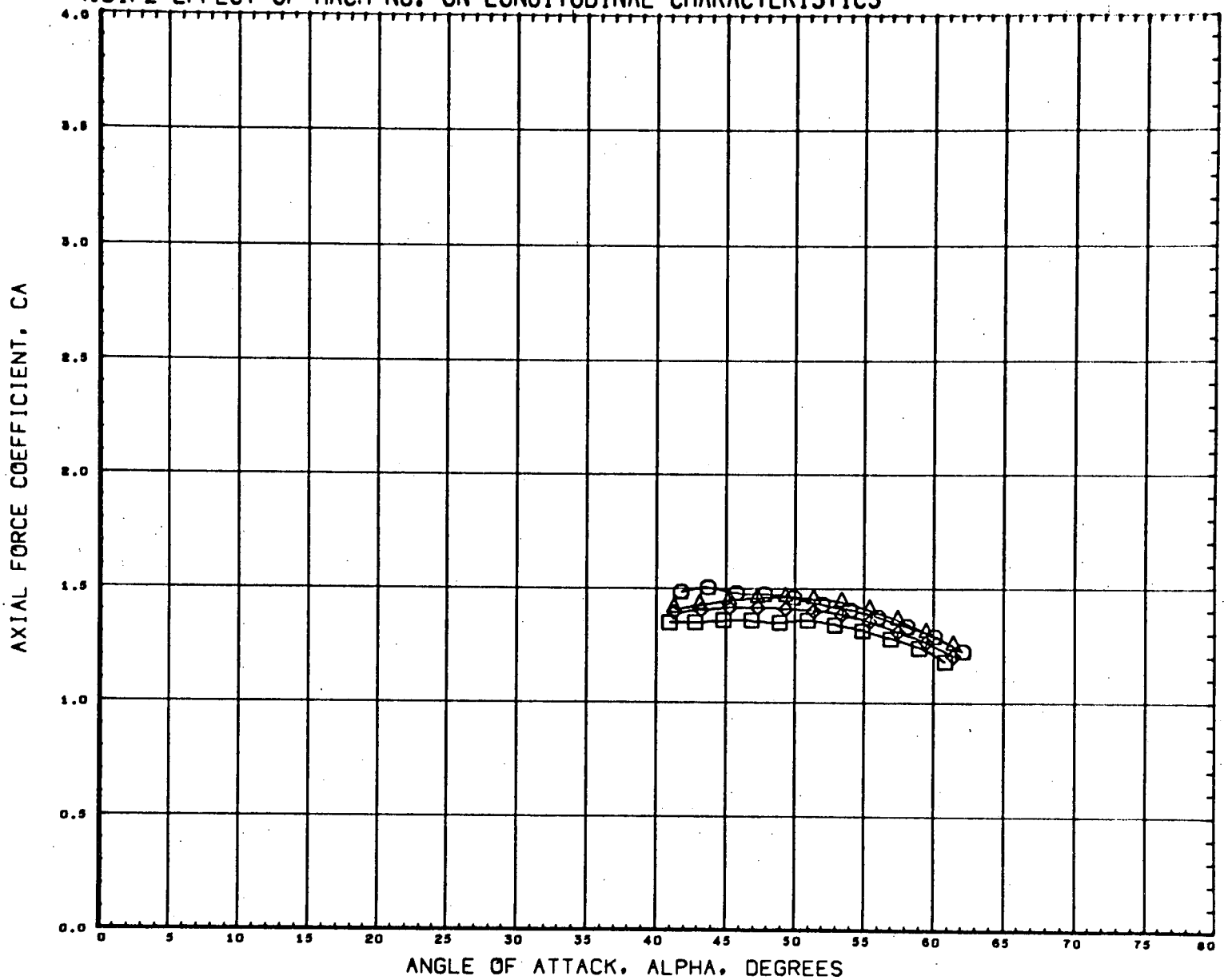

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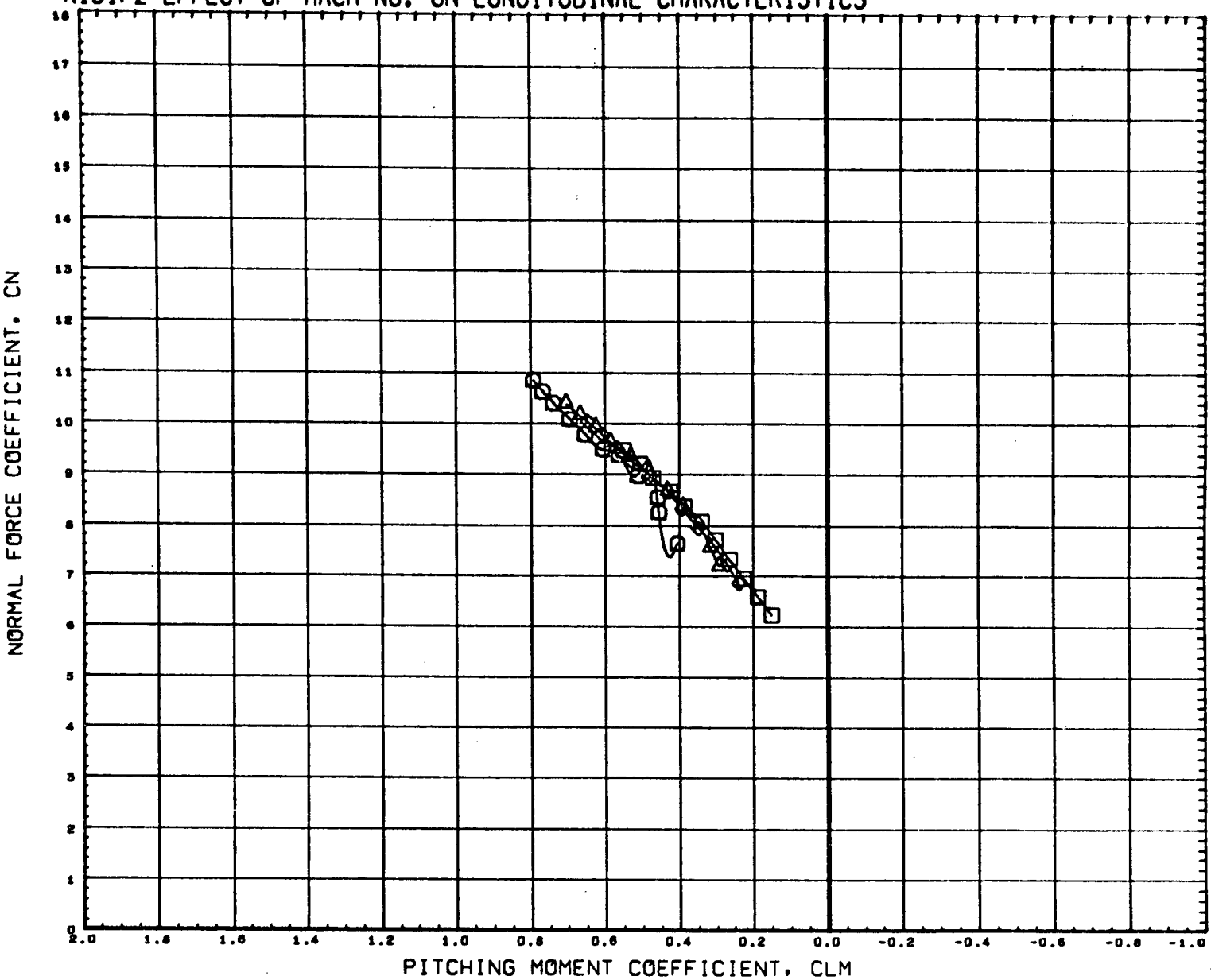

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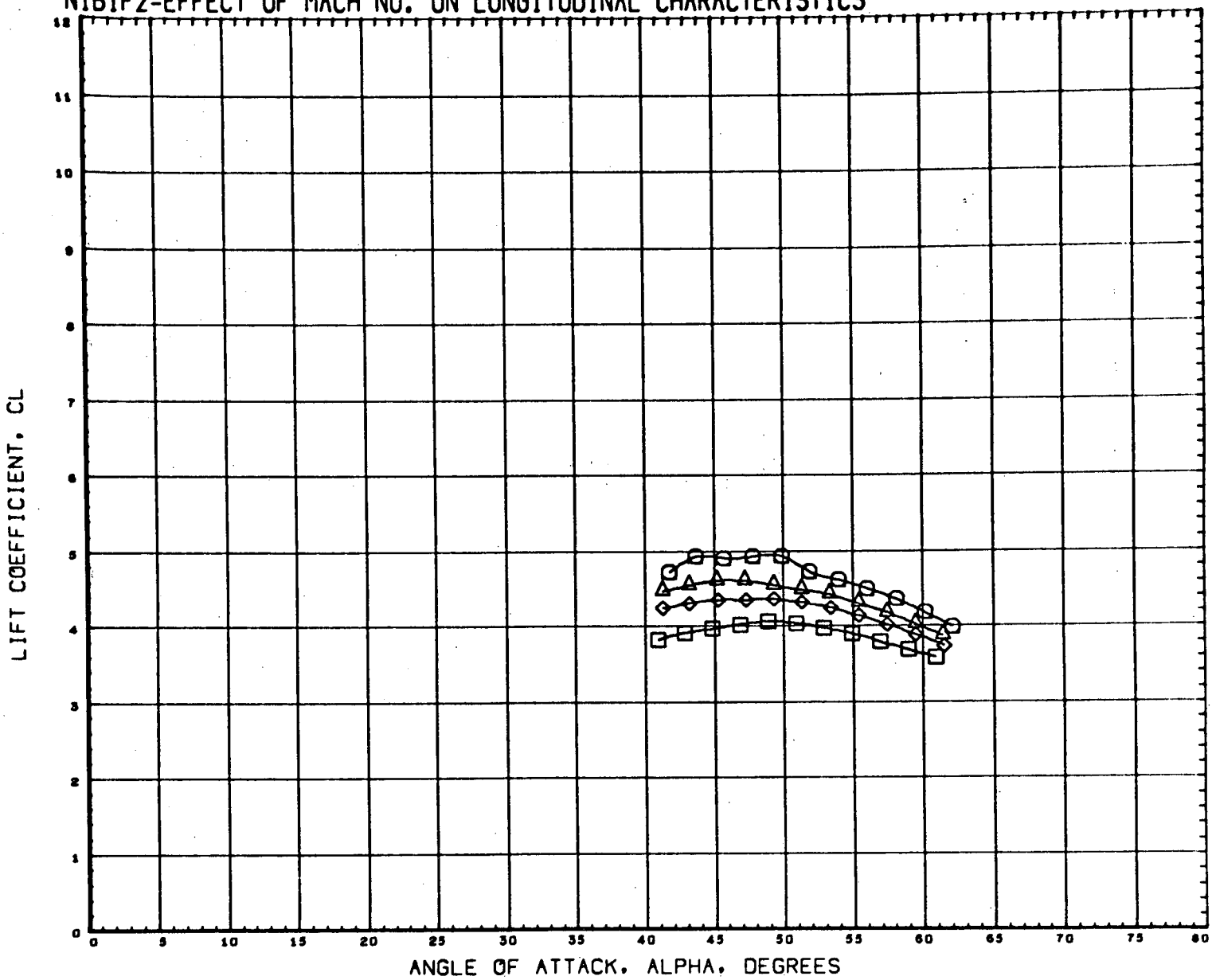

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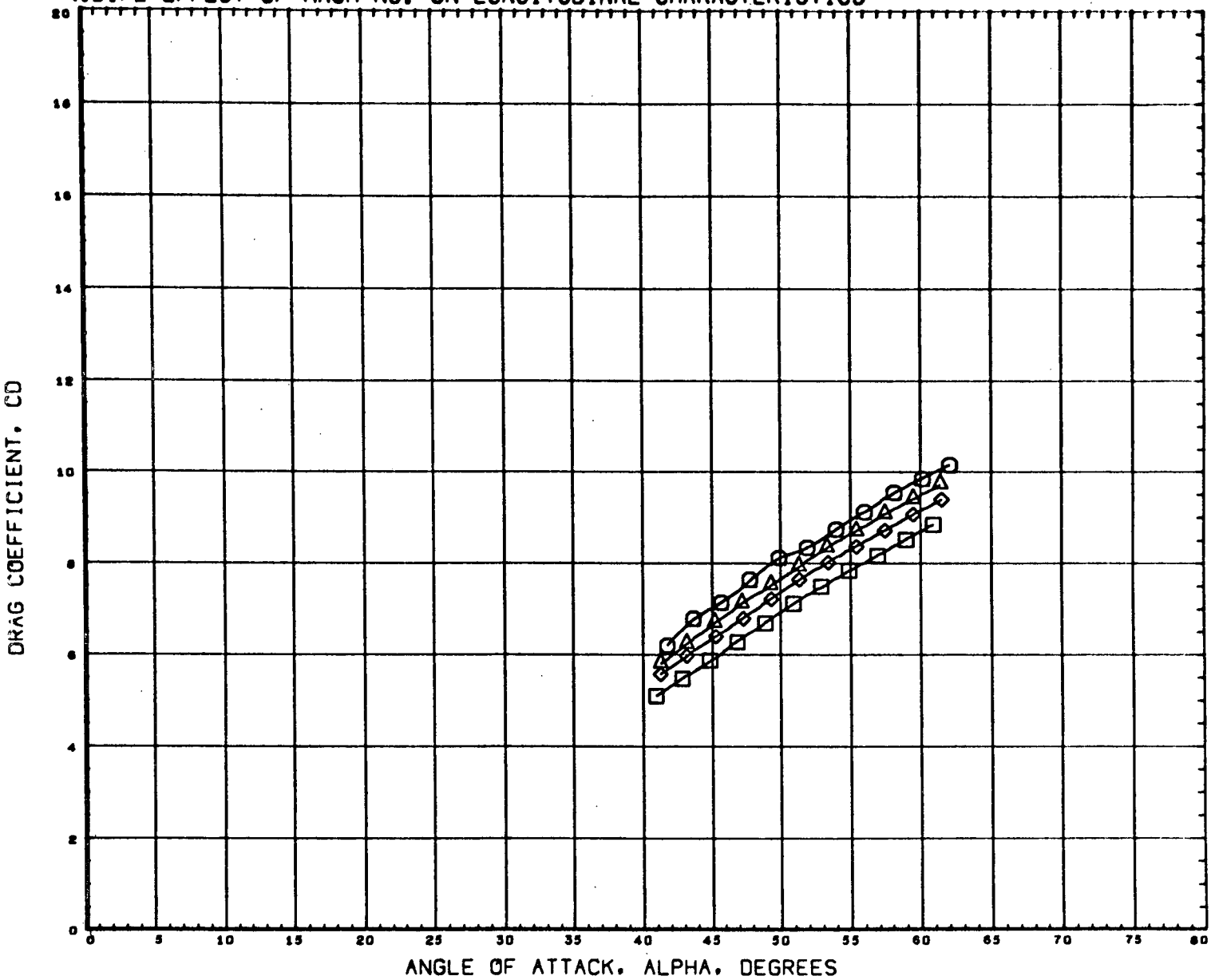

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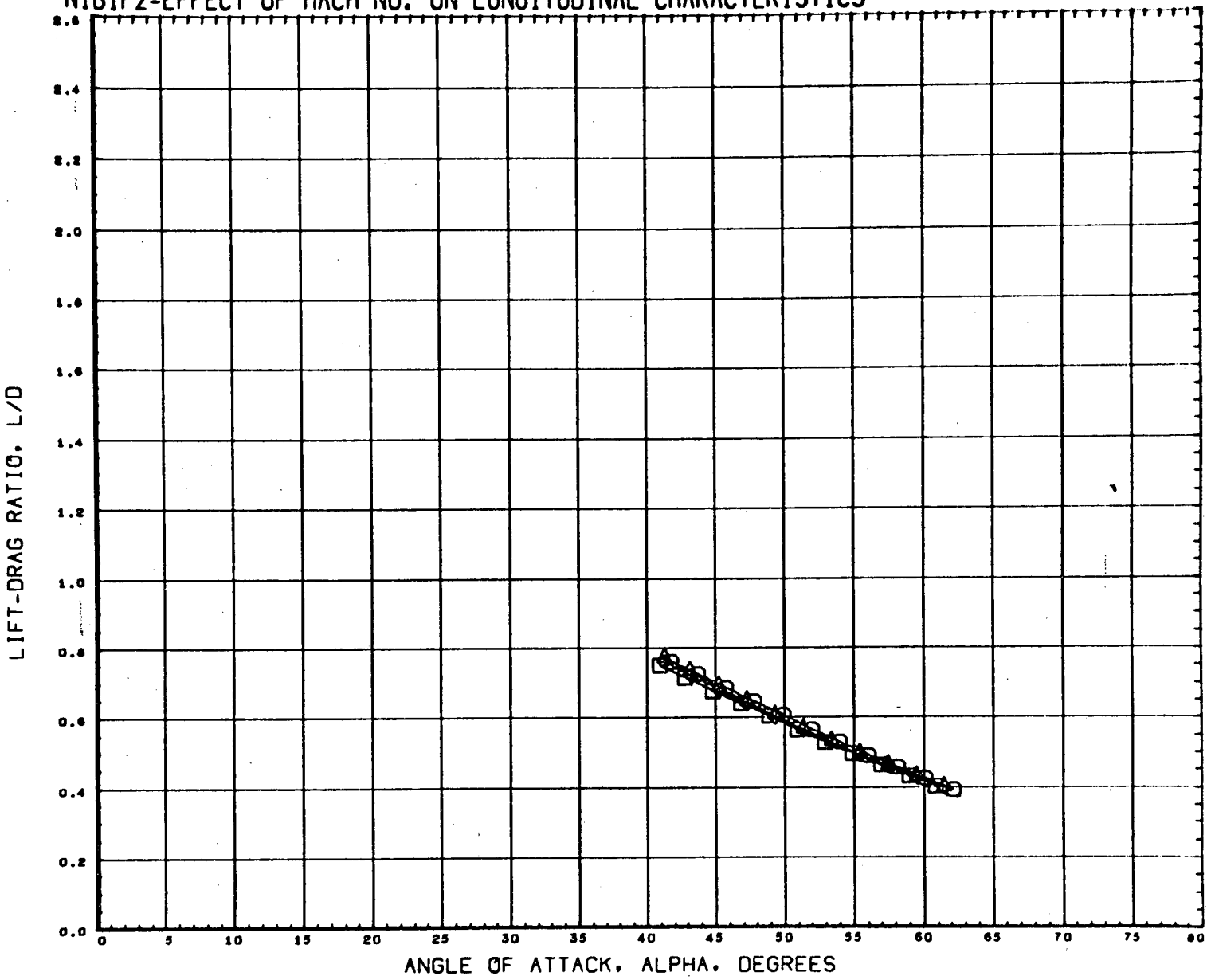

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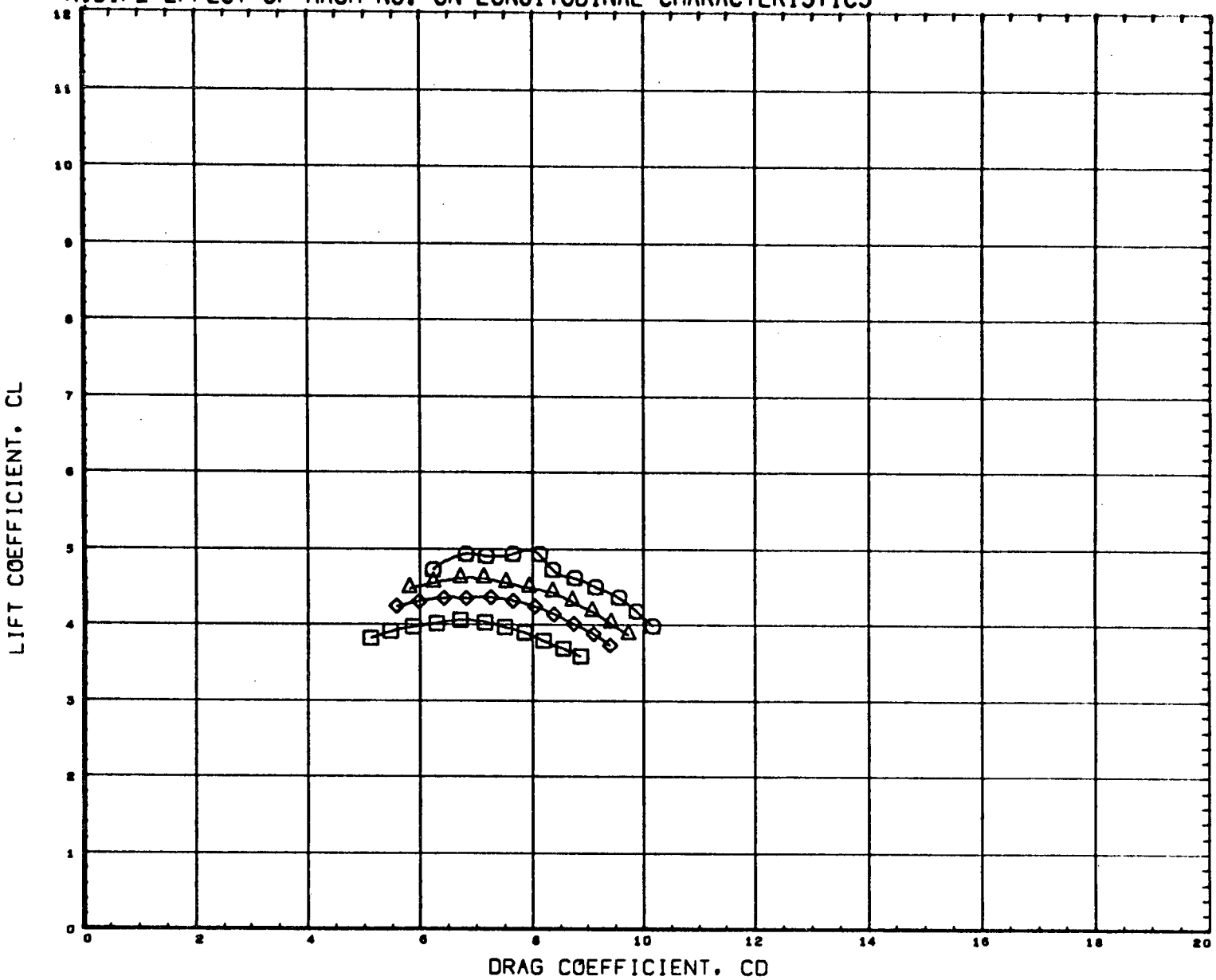

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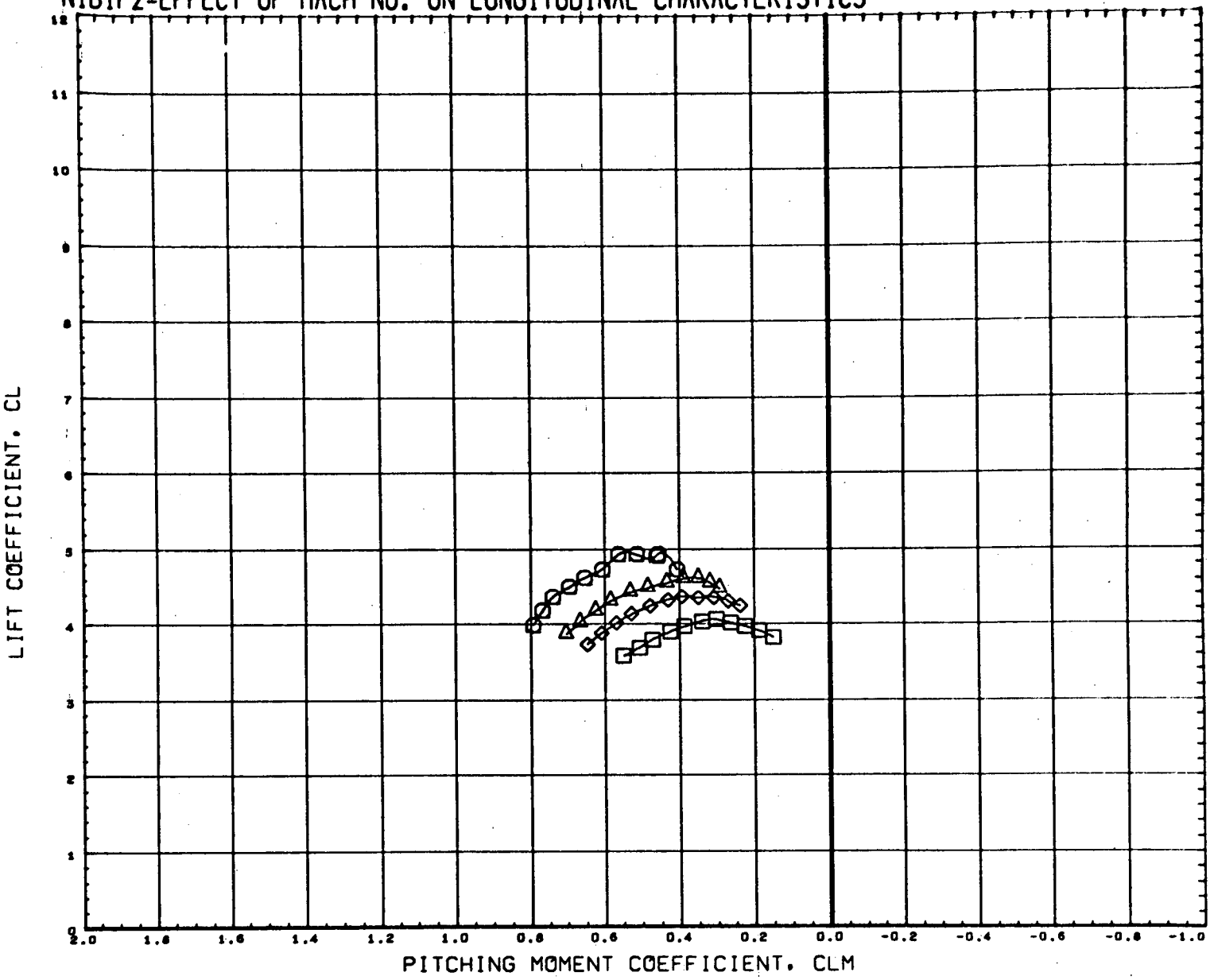

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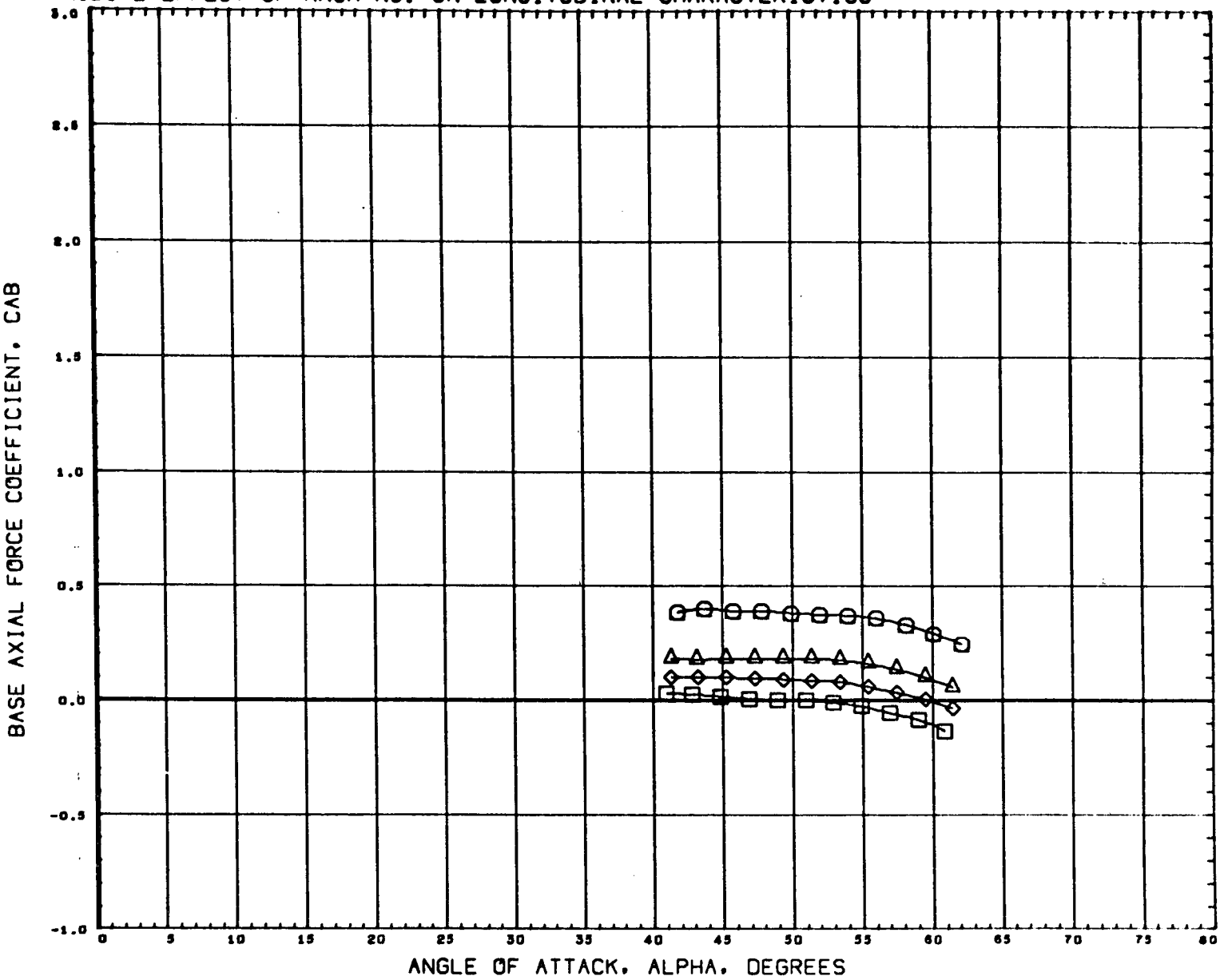

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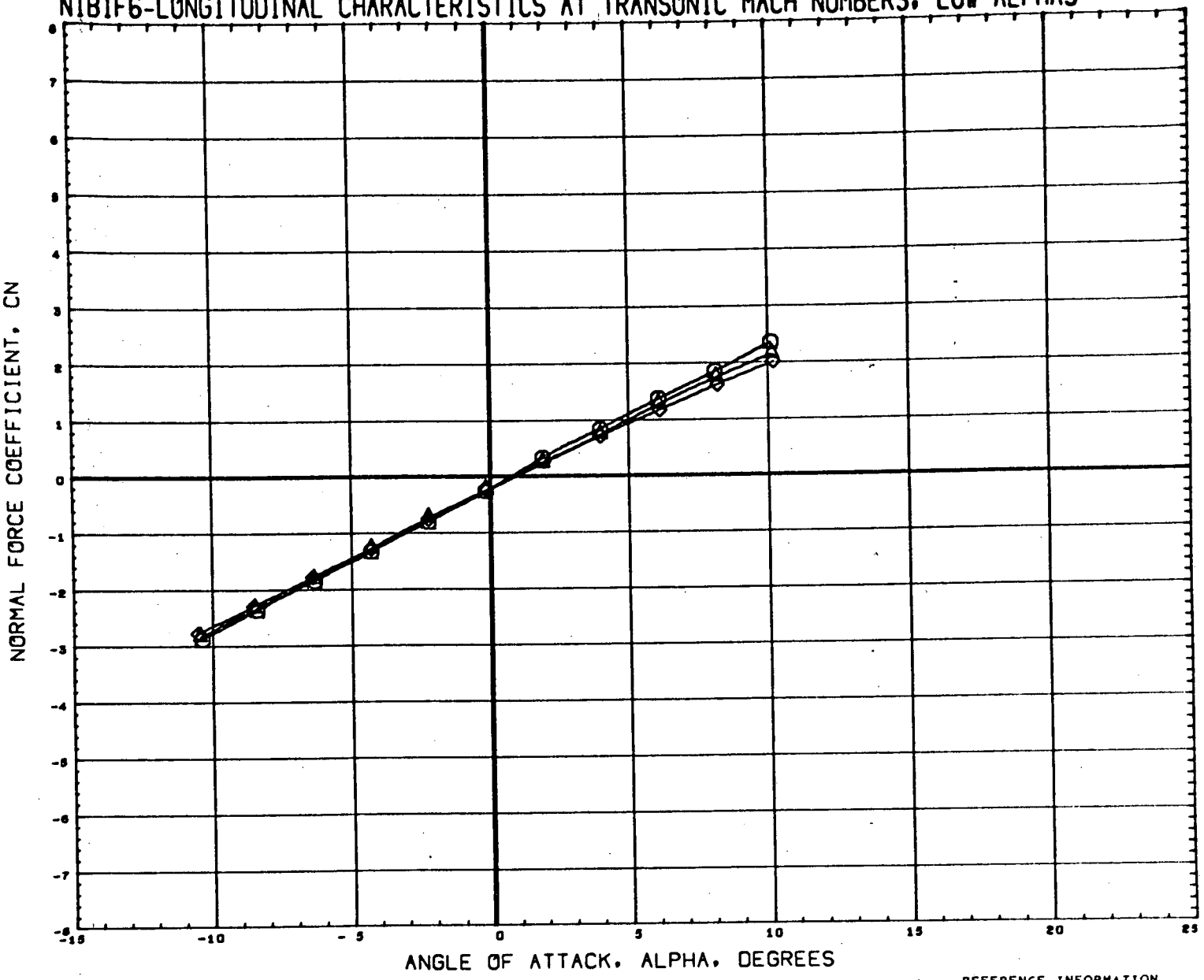

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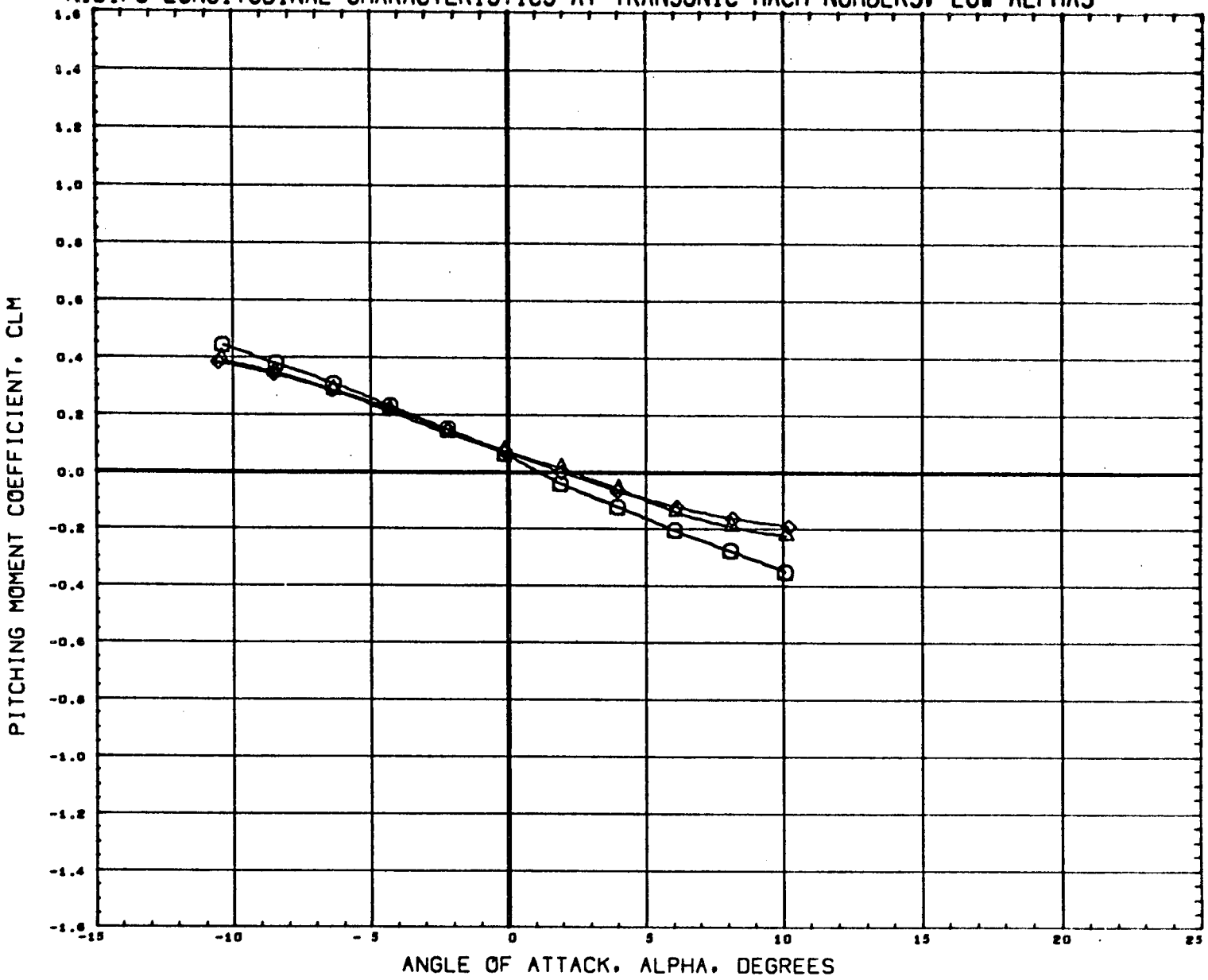

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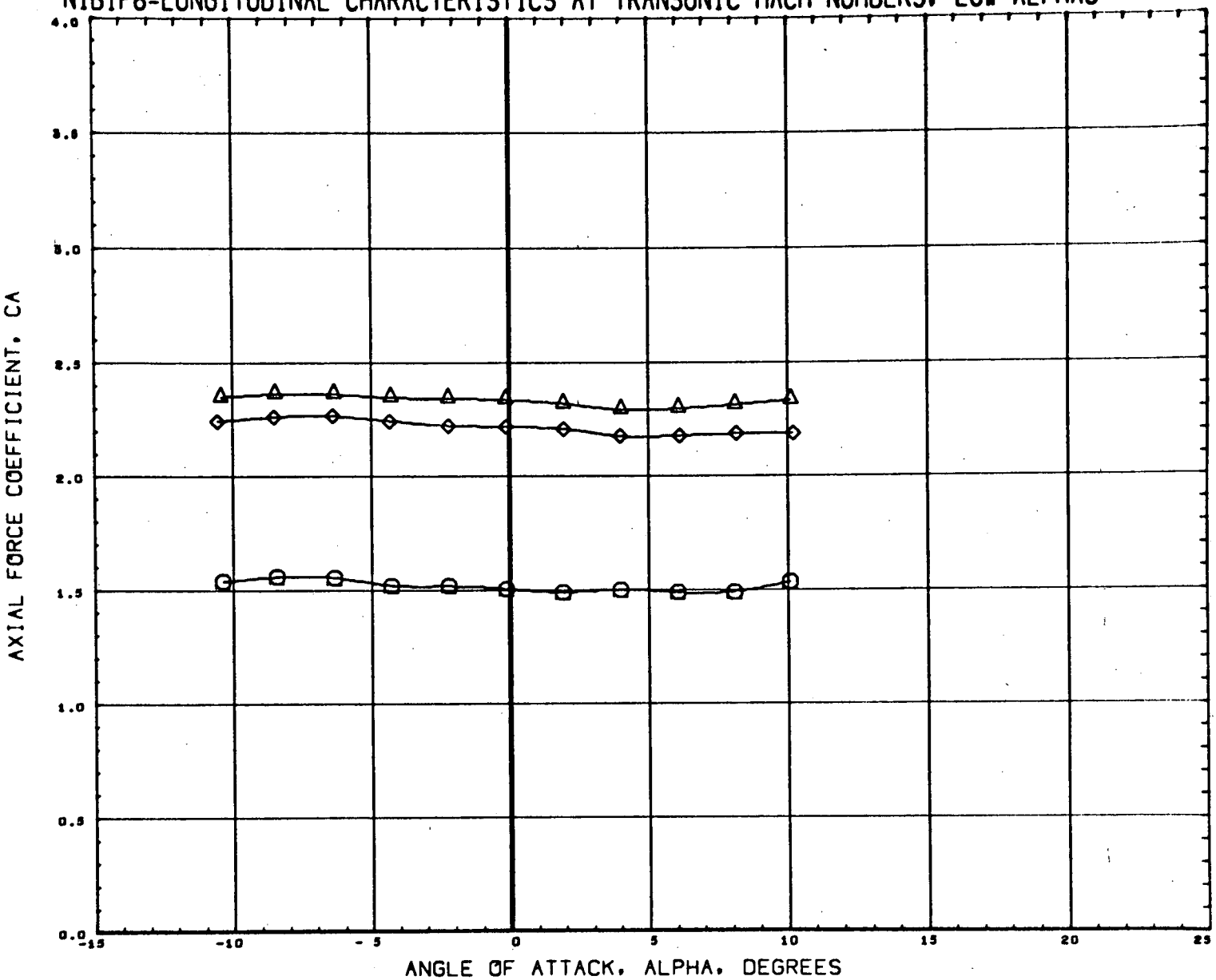

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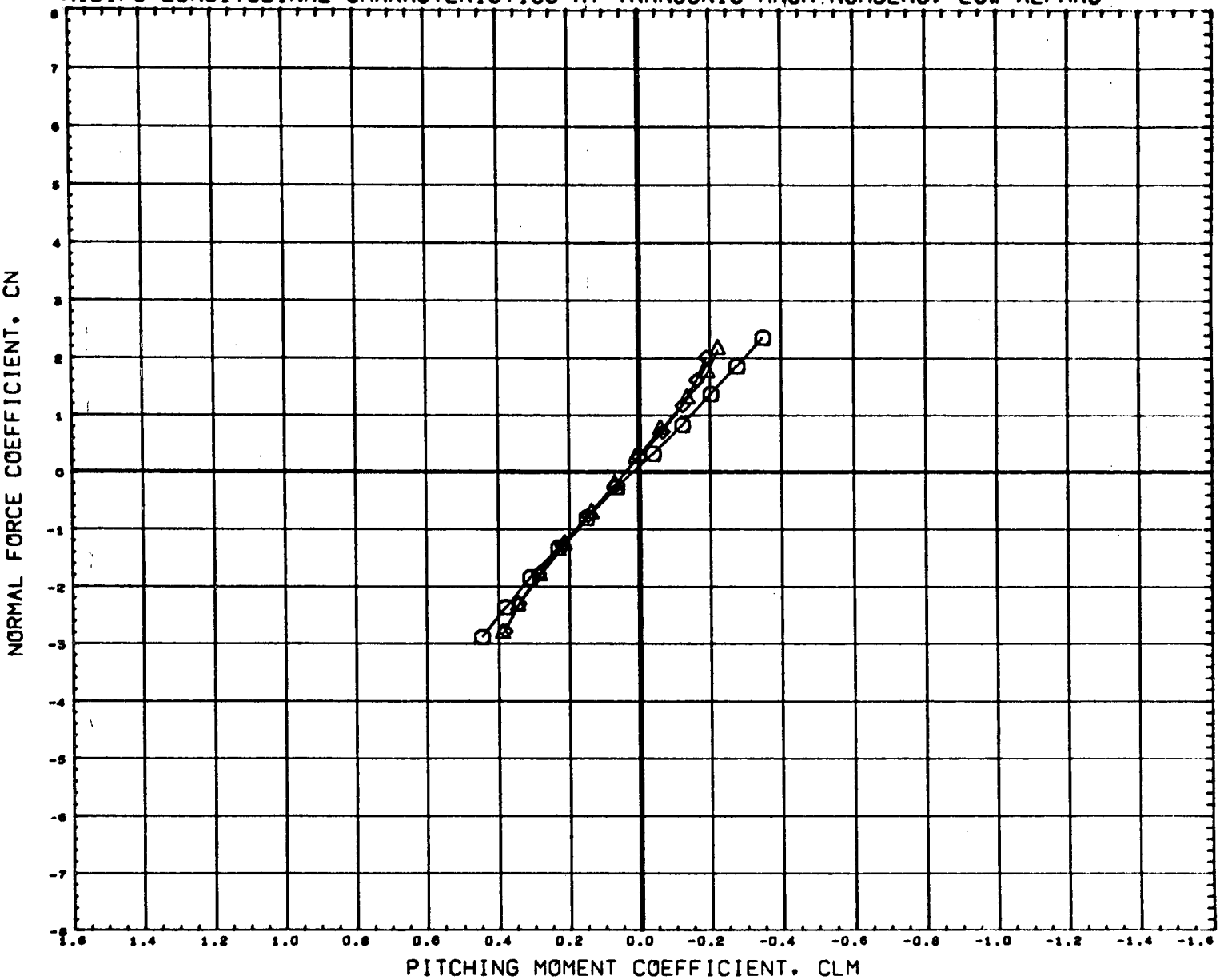

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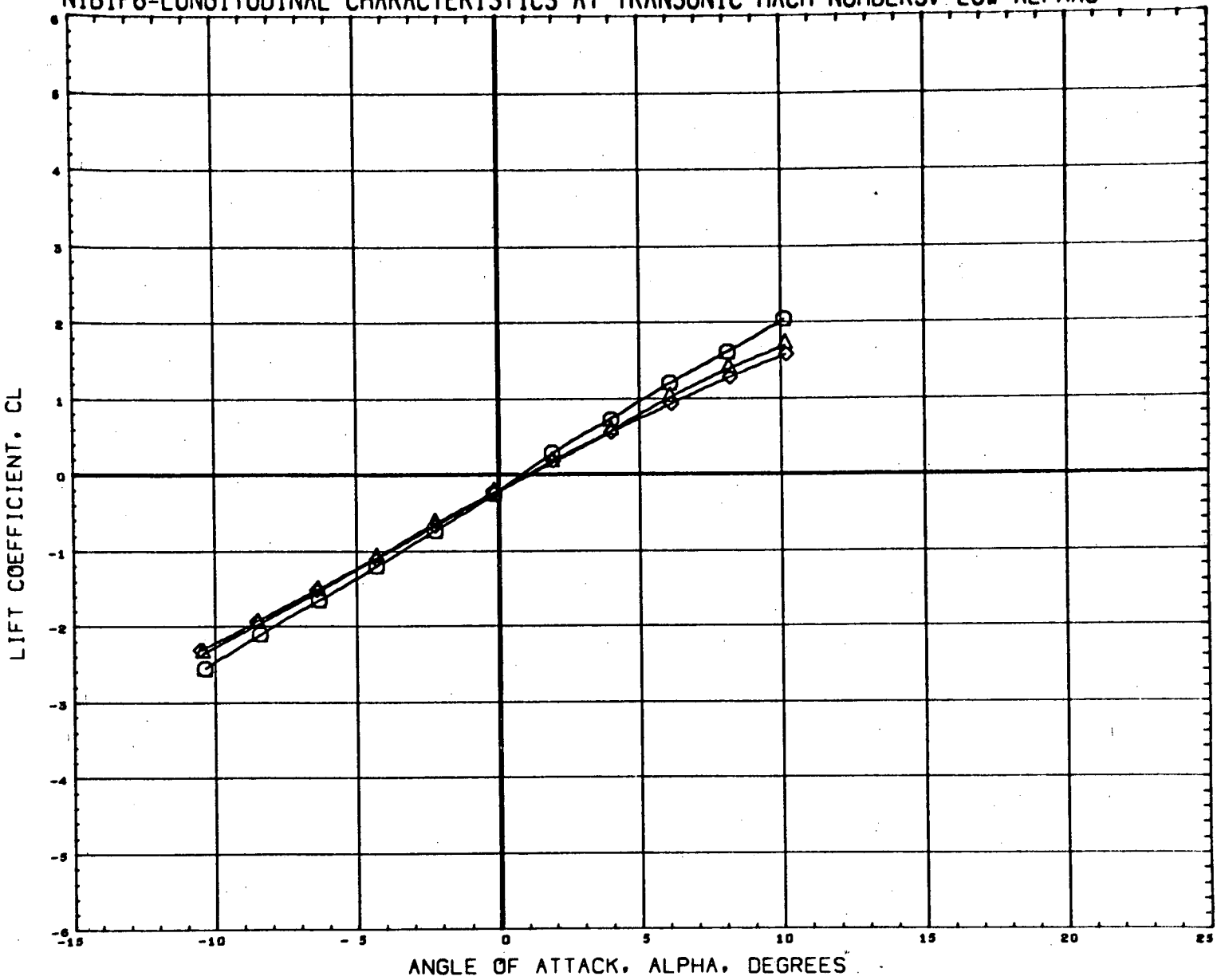

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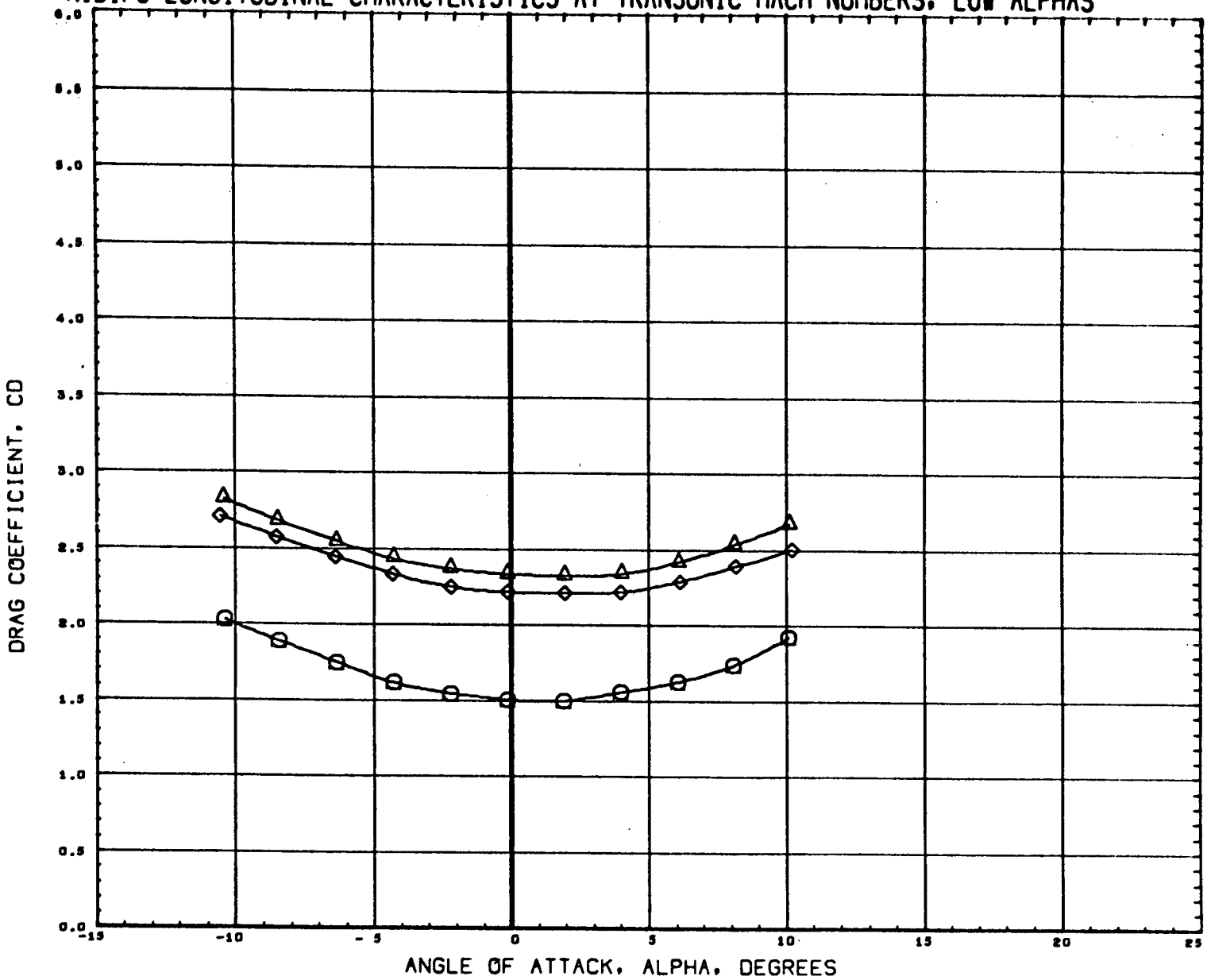

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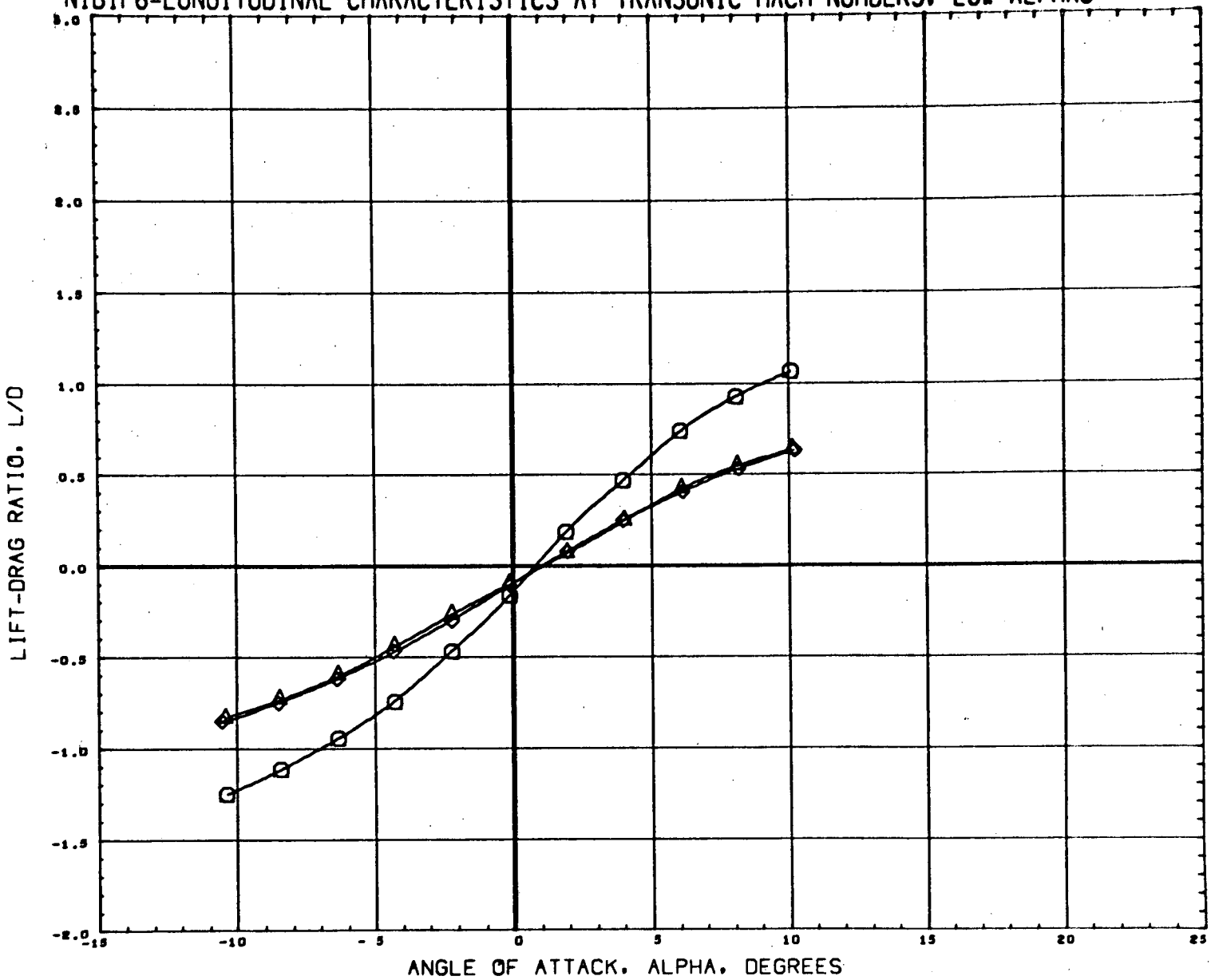
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *E

N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



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

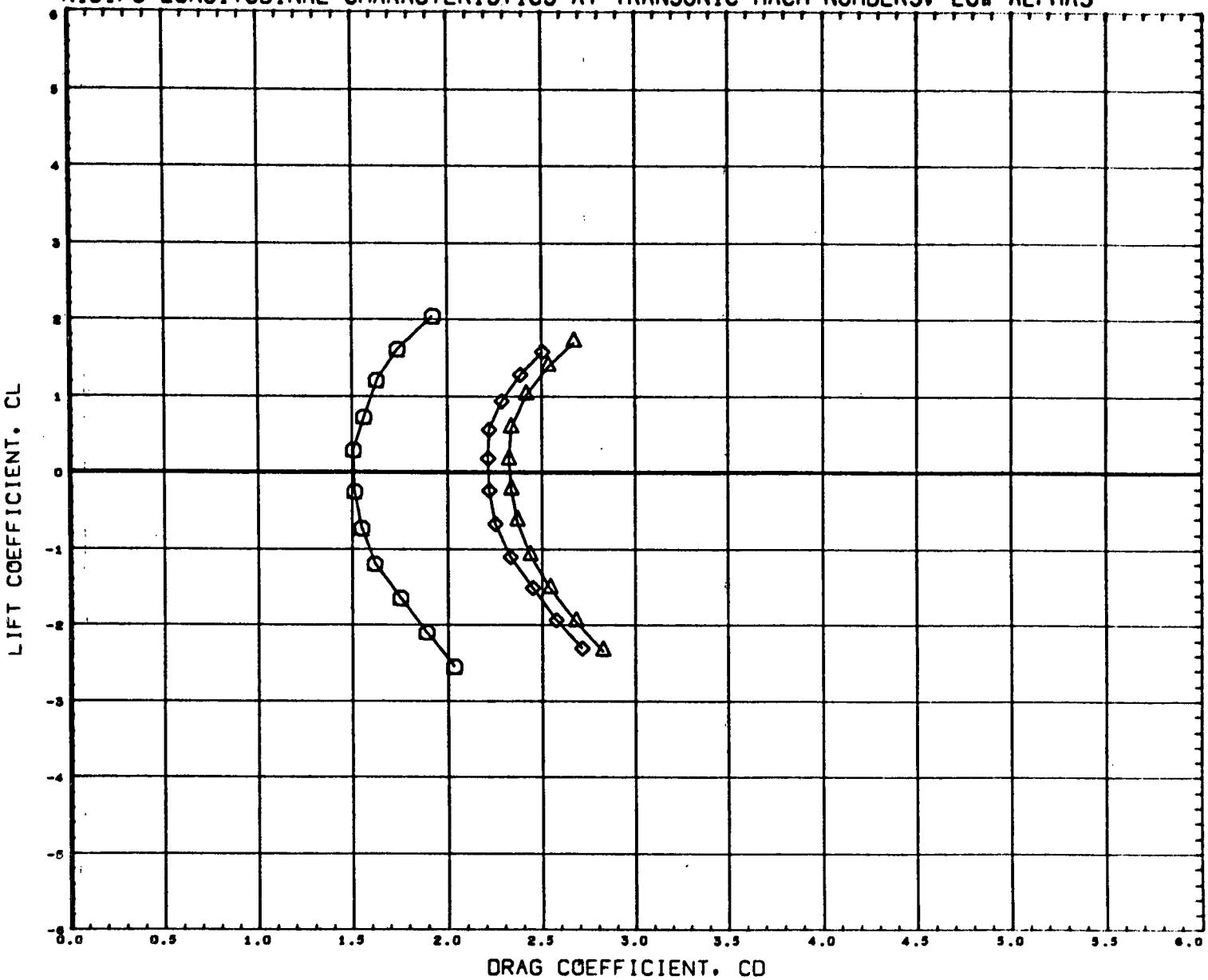
DATA HIST. CODE *E

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	

C.2

N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



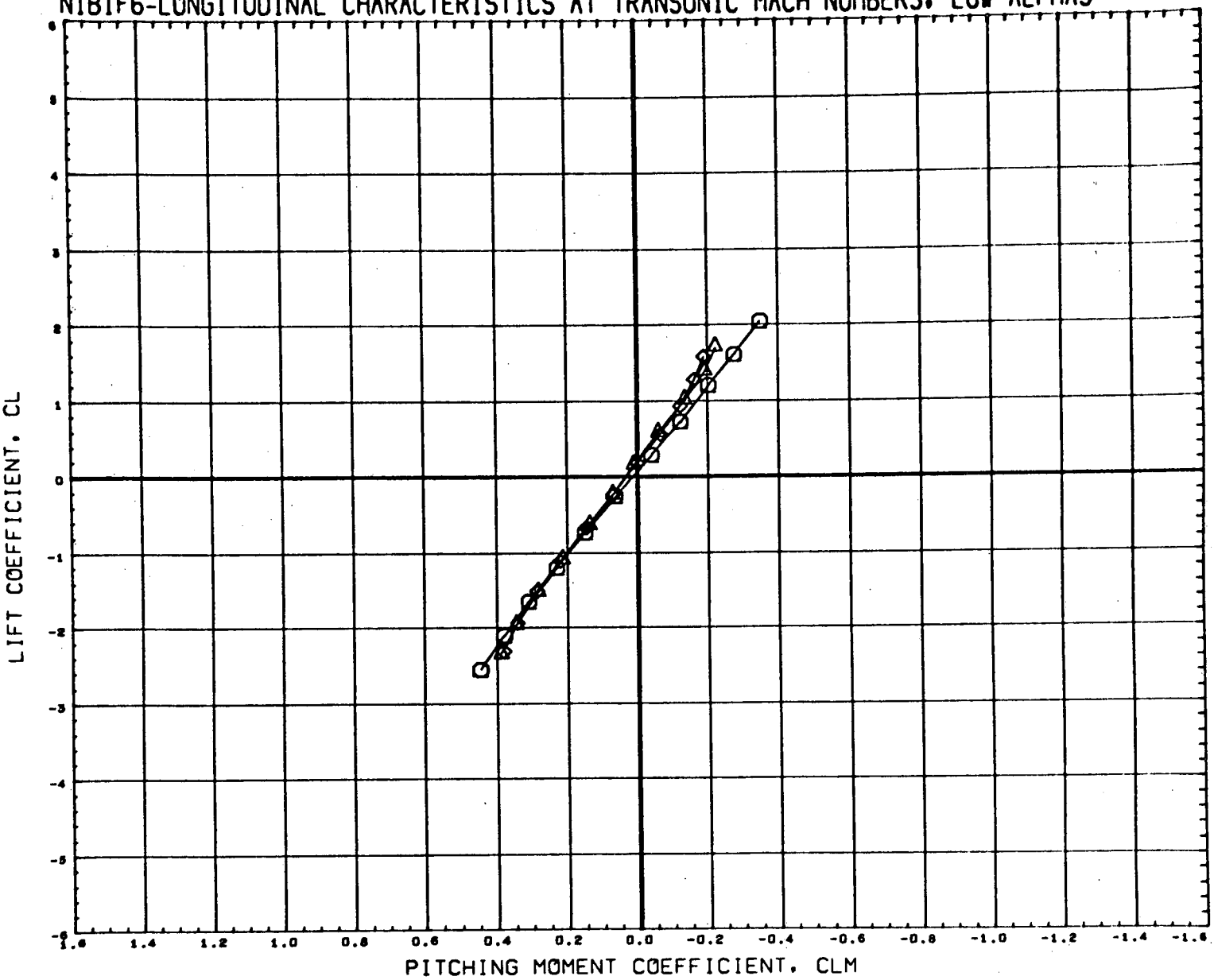
SYMBOL	MACH	PARAMETRIC VALUES			
○	0.899	BETA	0.000	DIHDRL	30.000
△	1.199				
◇	1.462				

DATA HIST. CODE *E

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	

N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS. LOW ALPHAS



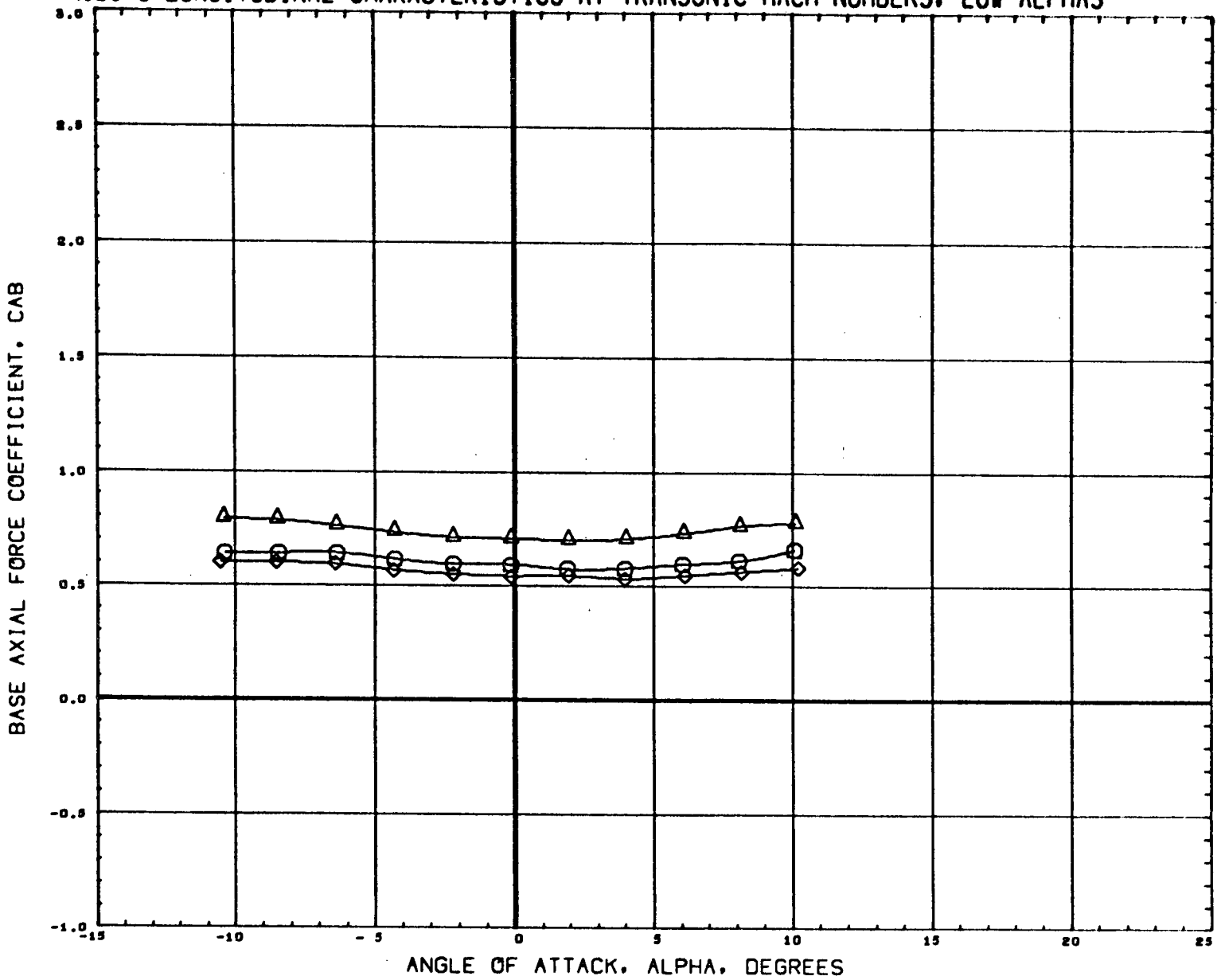
SYMBOL	MACH		PARAMETRIC VALUES		
○	0.899	BETA	0.000	DIHDRL	30.000
△	1.199				
◇	1.462				

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

N1B1F6-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



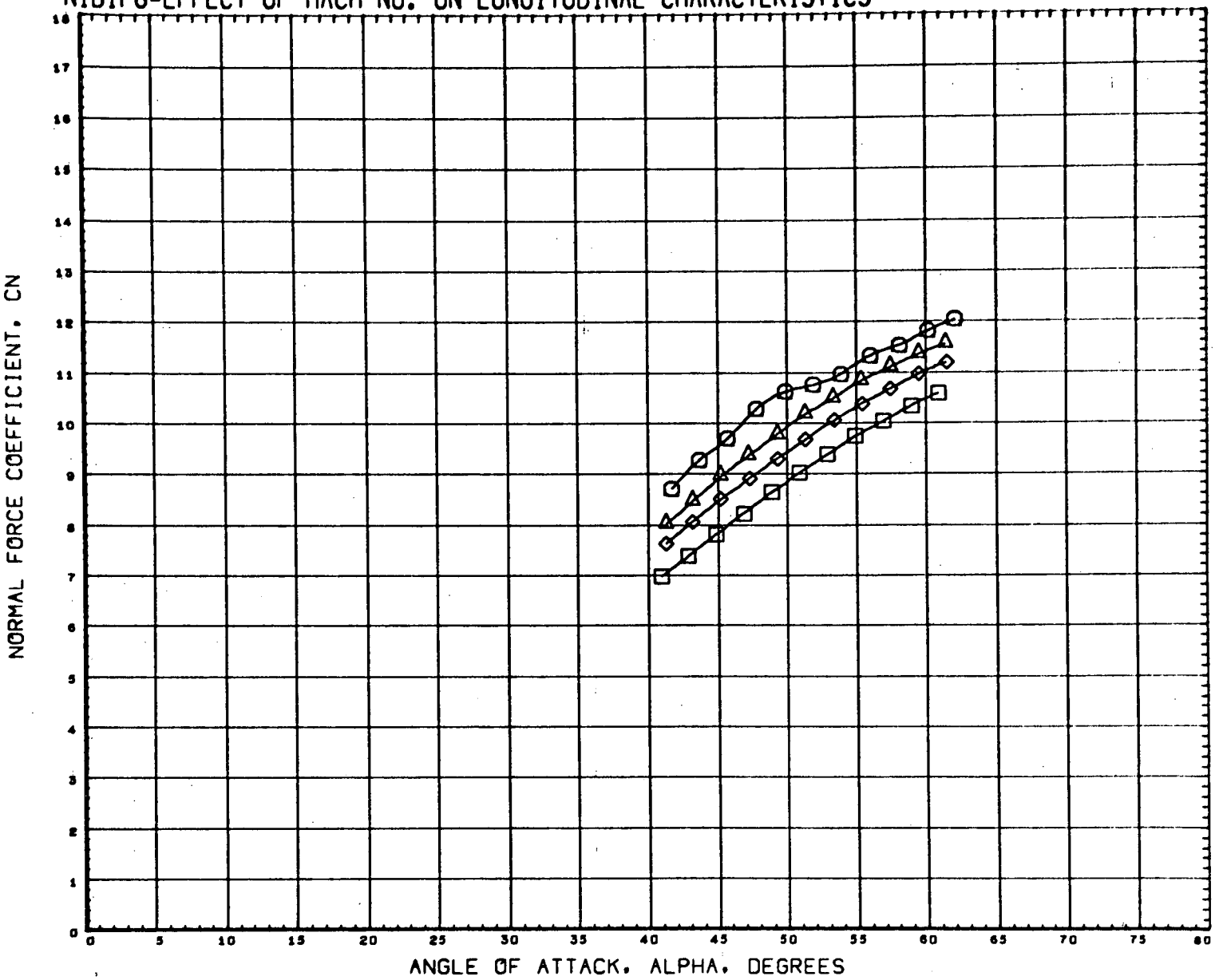
SYMBOL	MACH	PARAMETRIC VALUES			
○	0.899	BETA	0.000	DIHDRL	30.000
△	1.199				
◇	1.462				

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

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



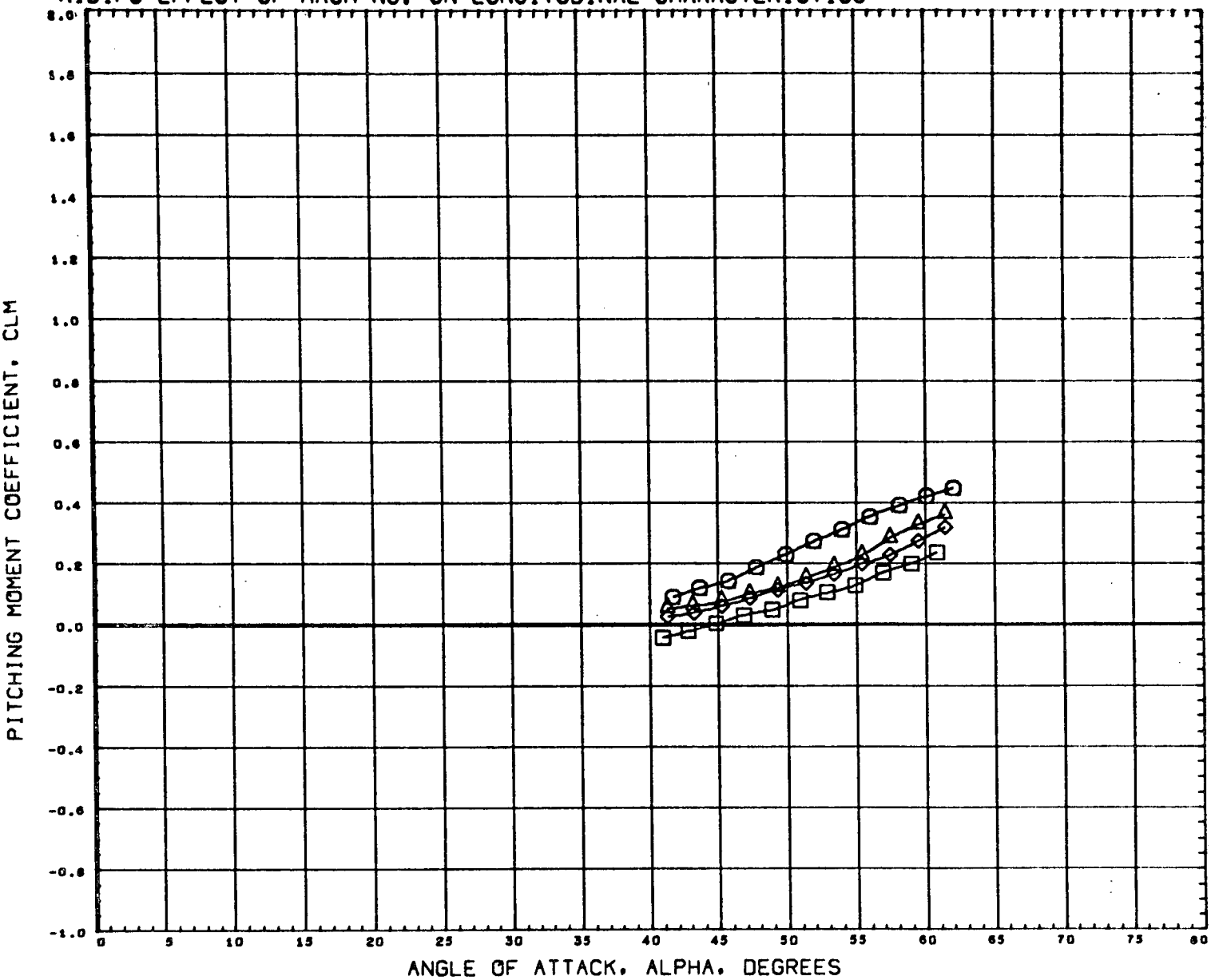
SYMBOL	MACH	PARAMETRIC VALUES			
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.480				
□	4.959				

DATA MIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



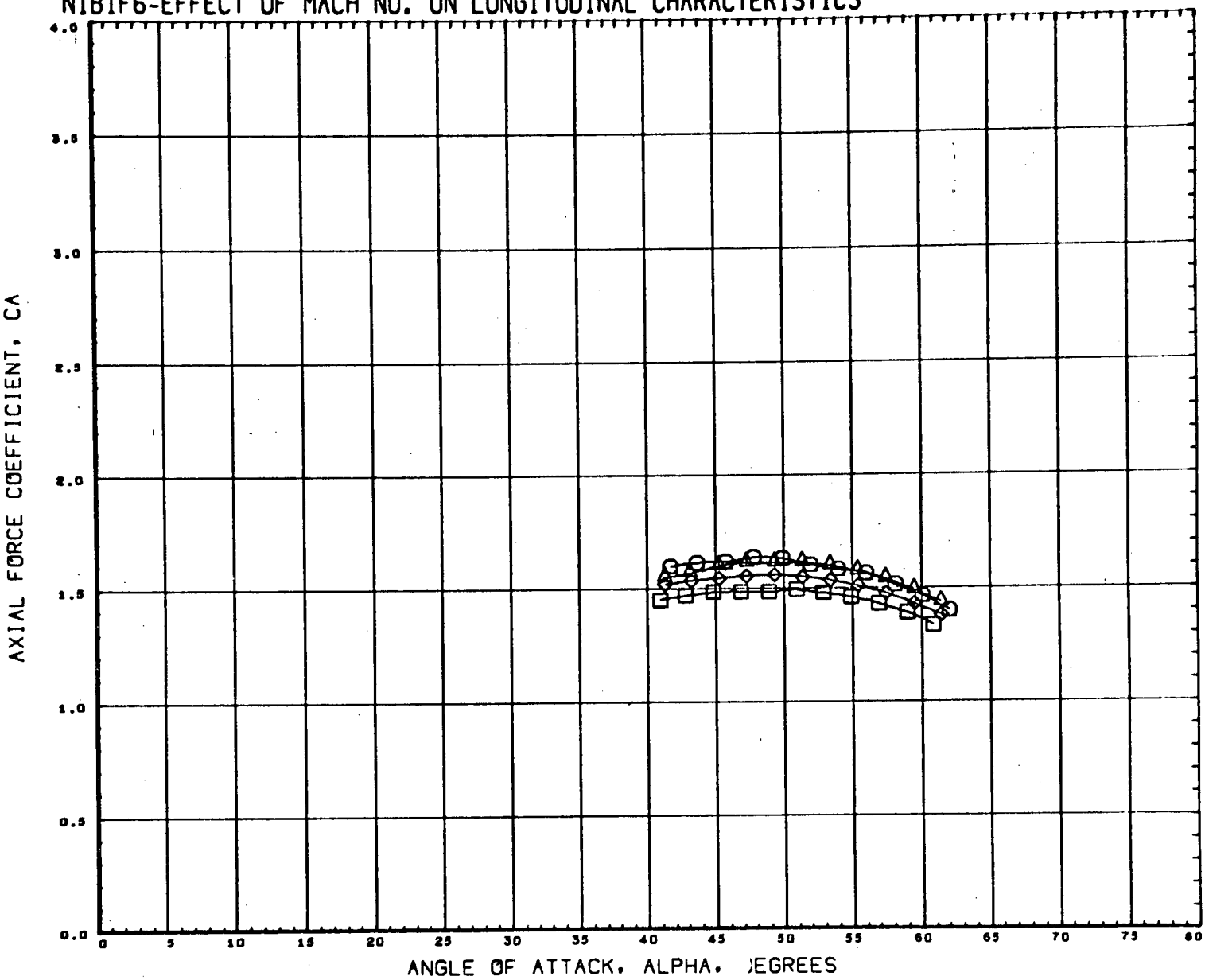
SYMBOL	MACH	PARAMETRIC VALUES			
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.460				
□	4.959				

DATA HIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



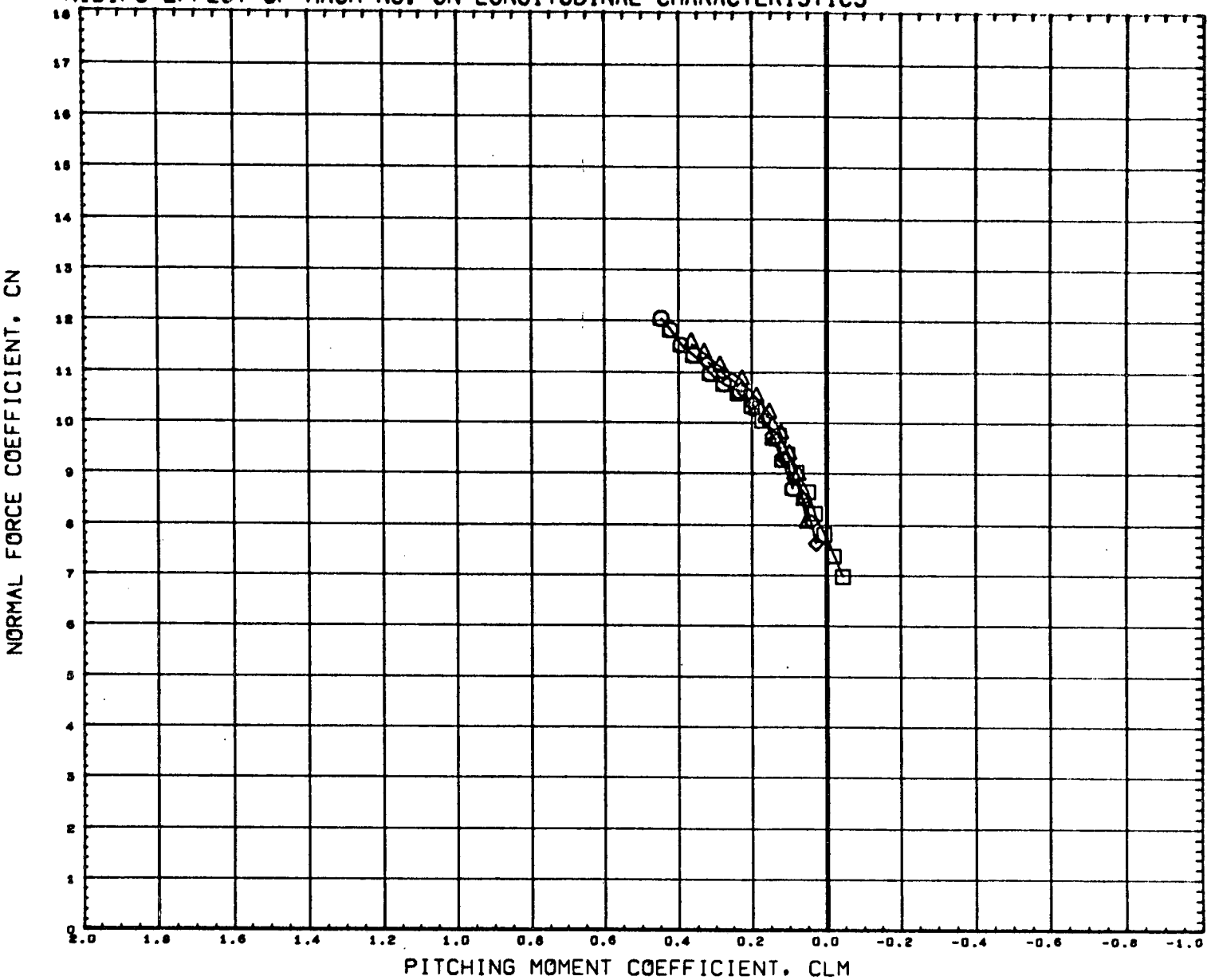
SYMBOL	MACH	PARAMETRIC VALUES			
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.480				
□	4.959				

DATA HIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



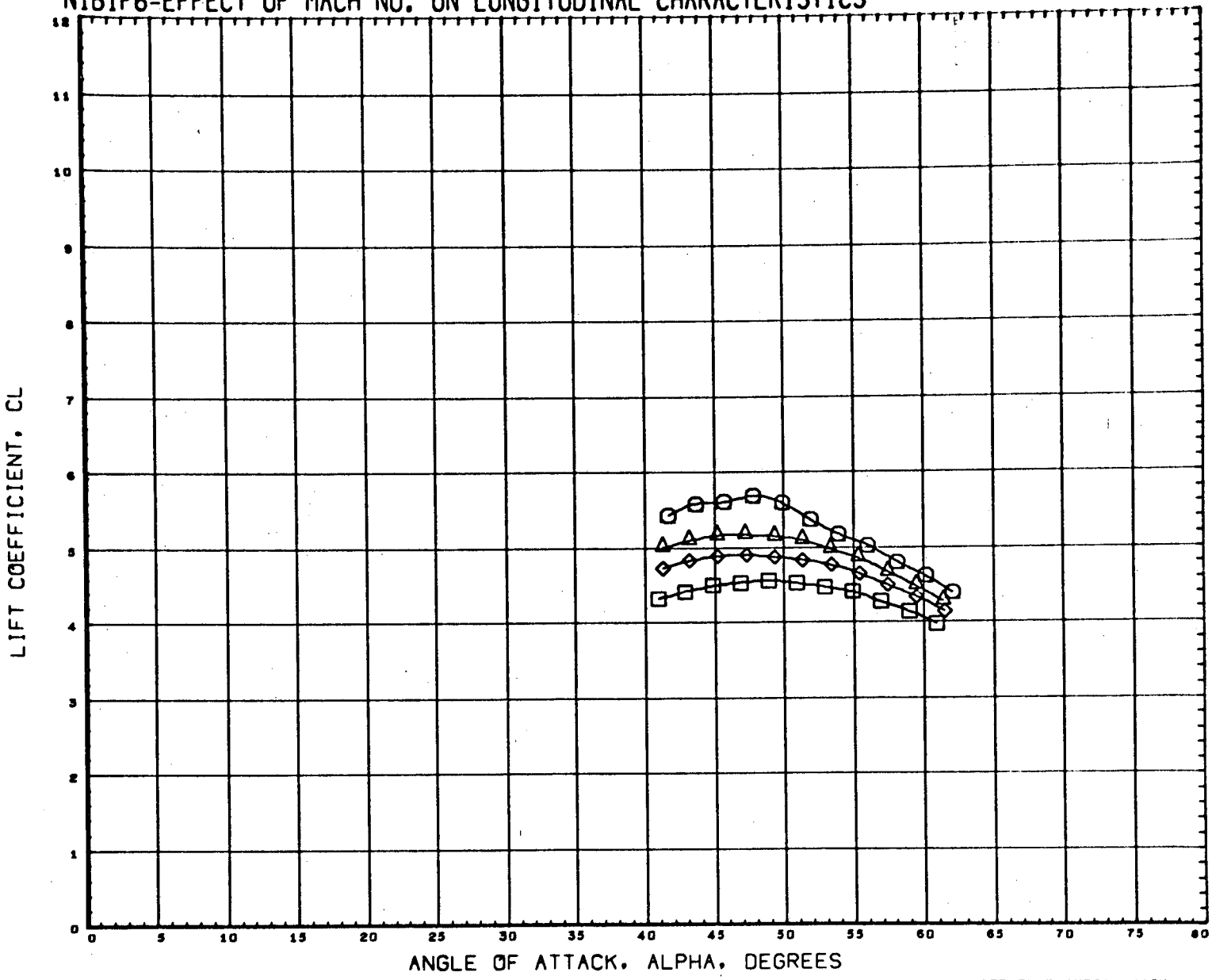
SYMBOL	MACH		PARAMETRIC VALUES		
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.480				
□	4.959				

DATA HIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



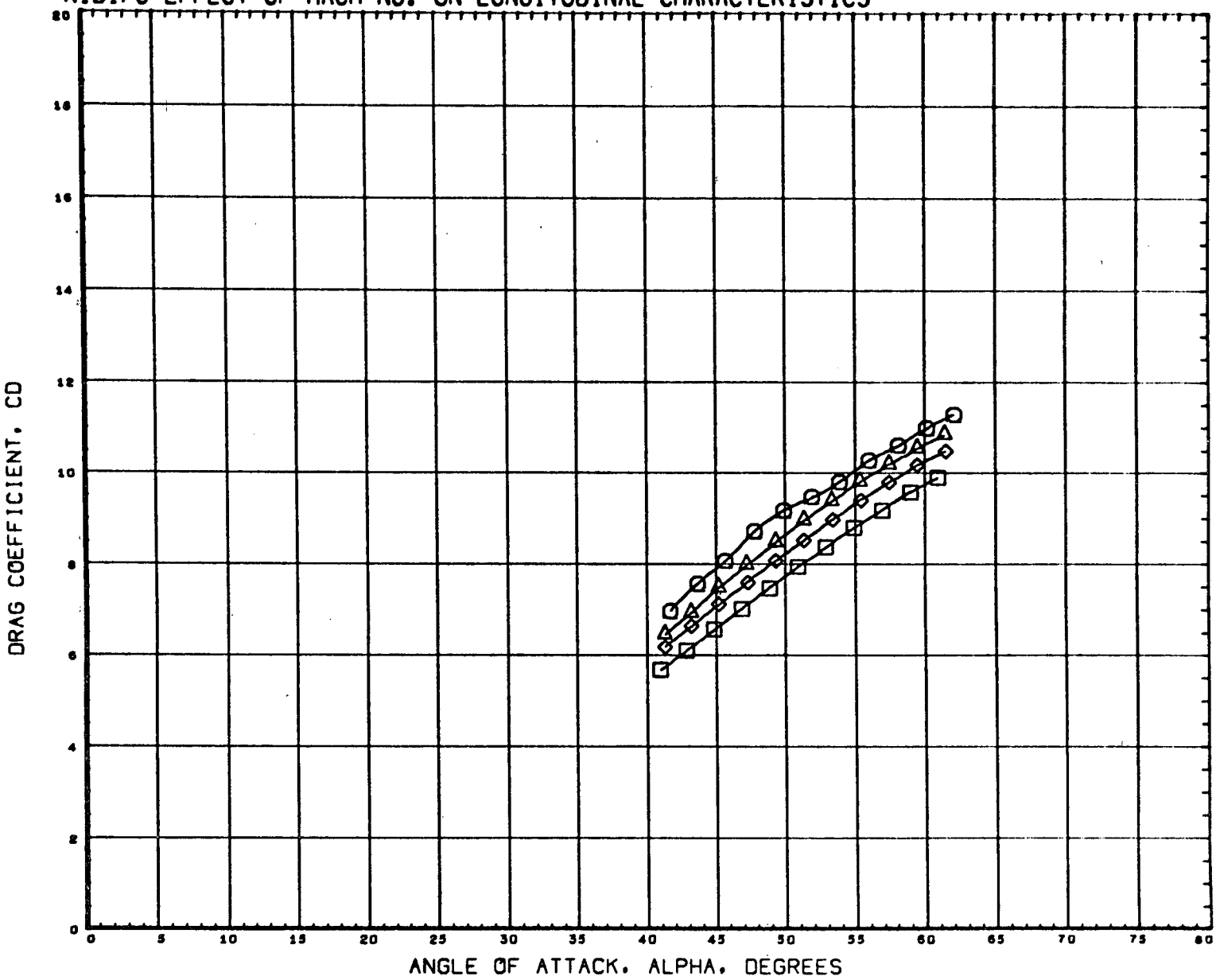
SYMBOL	MACH	PARAMETRIC VALUES			
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.460				
□	4.959				

DATA HIST. CODE #E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH
○	1.963
△	2.740
◇	3.480
□	4.959

PARAMETRIC VALUES

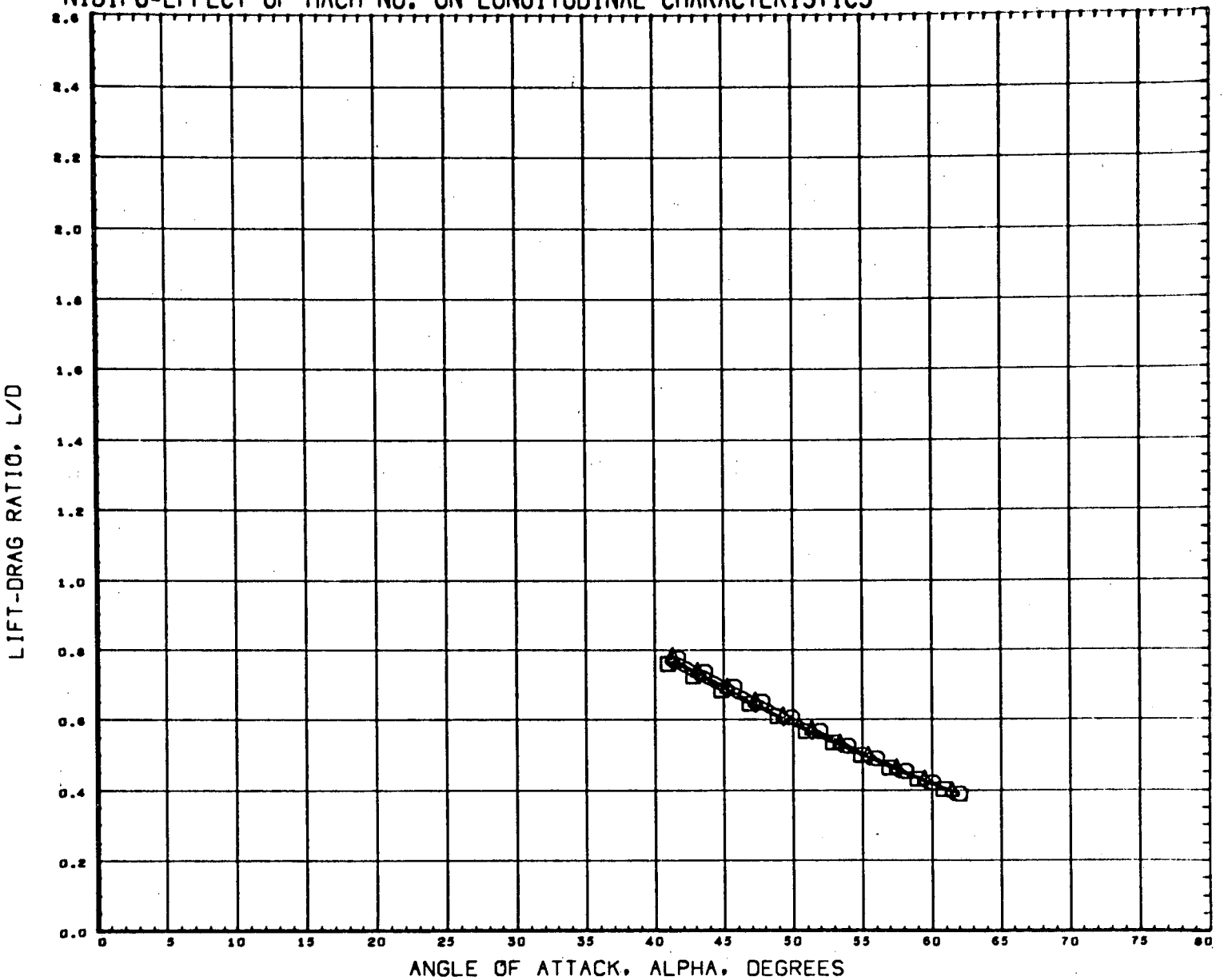
BETA 0.000 DIHDRL 30.000

DATA HIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



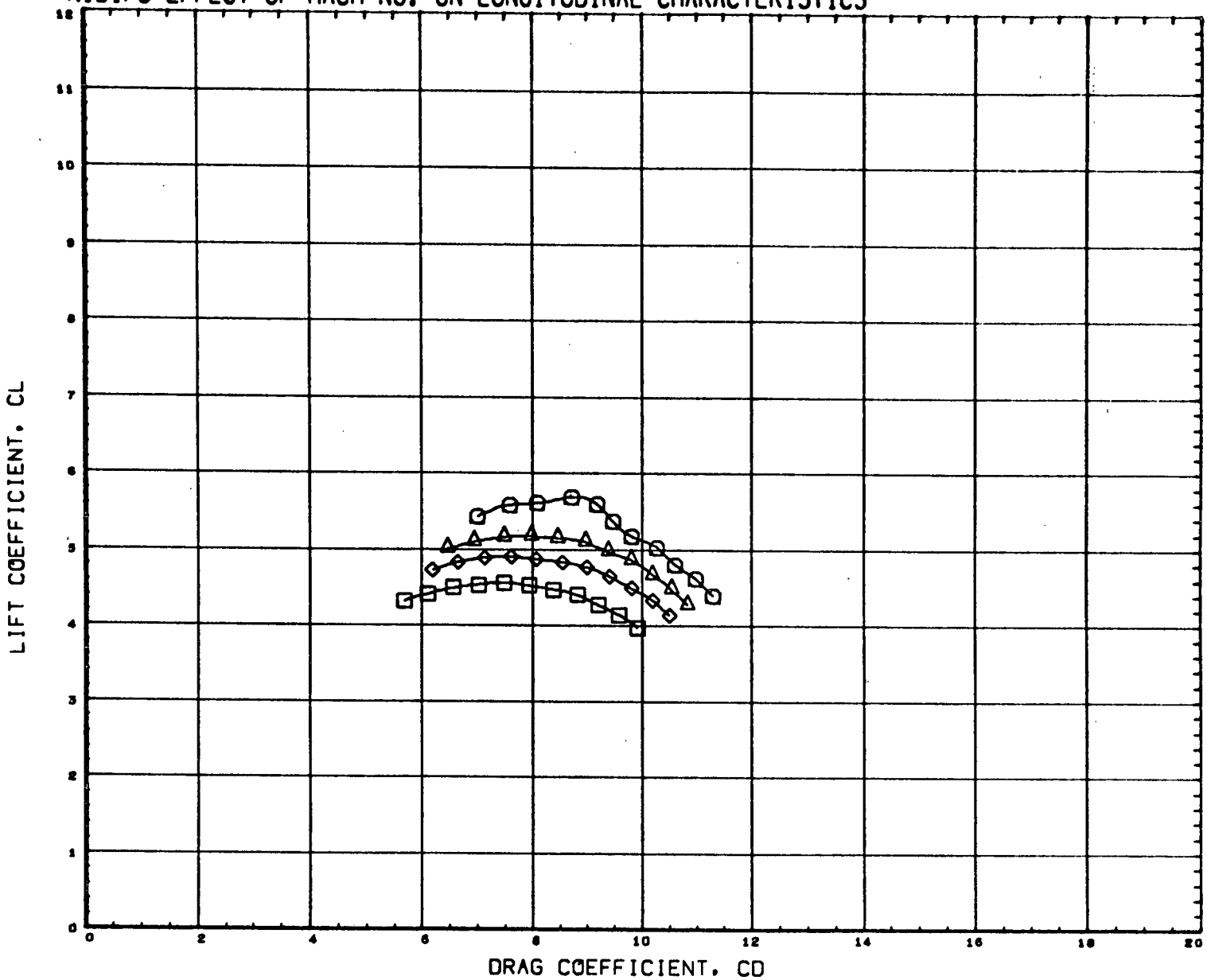
SYMBOL	MACH		PARAMETRIC VALUES		
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.480				
□	4.959				

DATA HIST. CODE #E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH
○	1.963
△	2.740
◇	3.480
□	4.959

PARAMETRIC VALUES

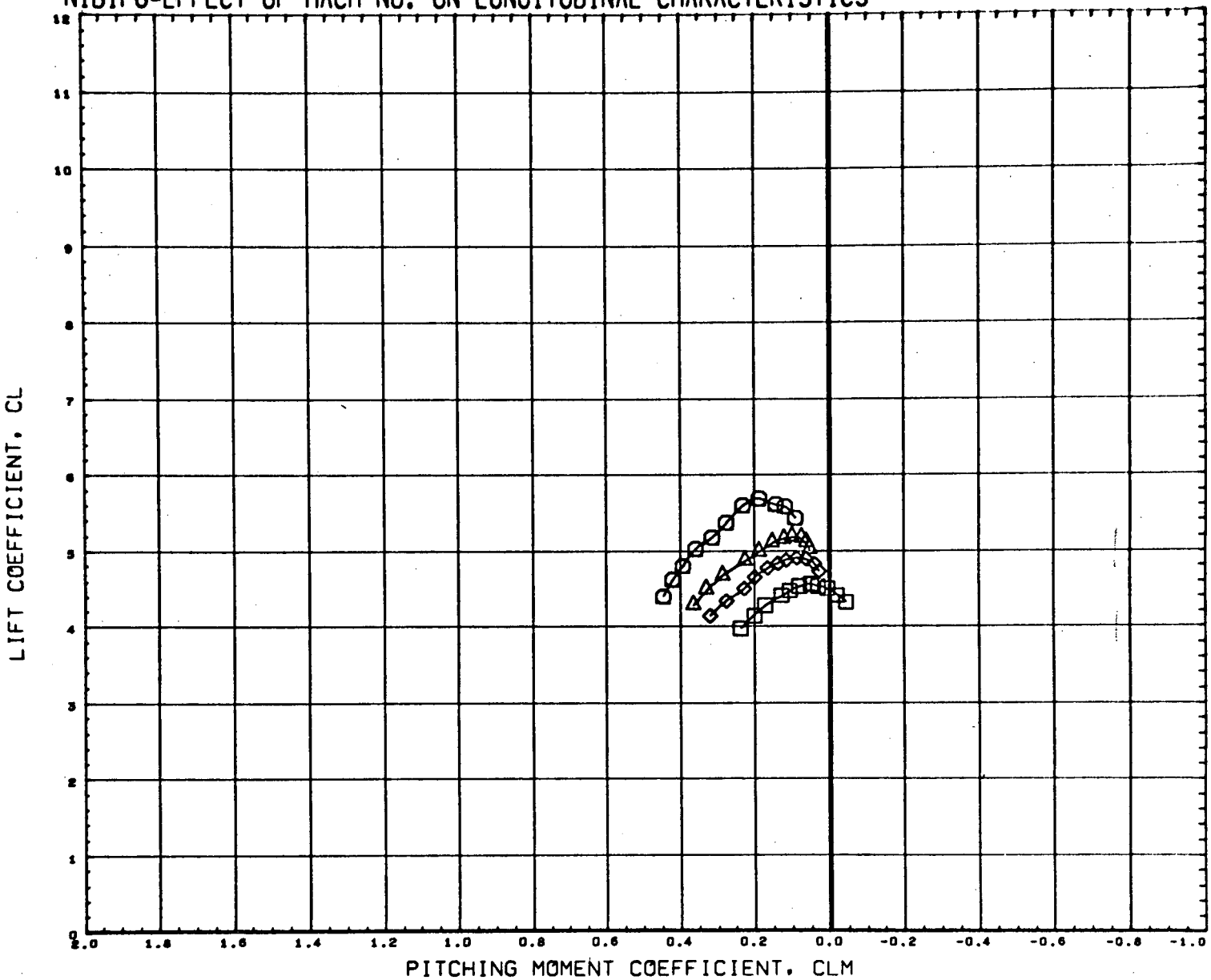
BETA 0.000 DIHDRL 30.000

DATA HIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



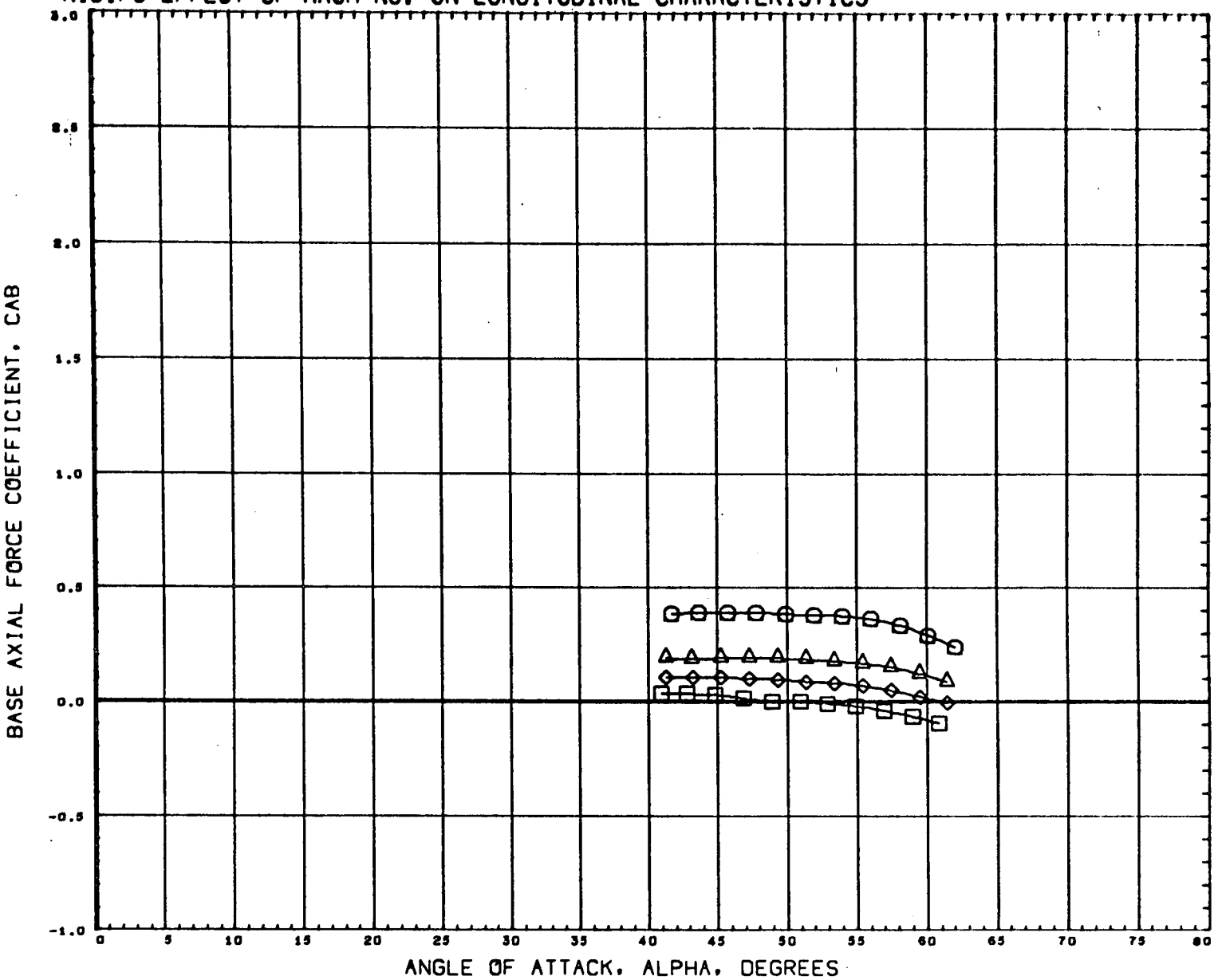
SYMBOL	MACH		PARAMETRIC VALUES		
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.460				
□	4.959				

DATA HIST. CODE *E

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	

N1B1F6-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

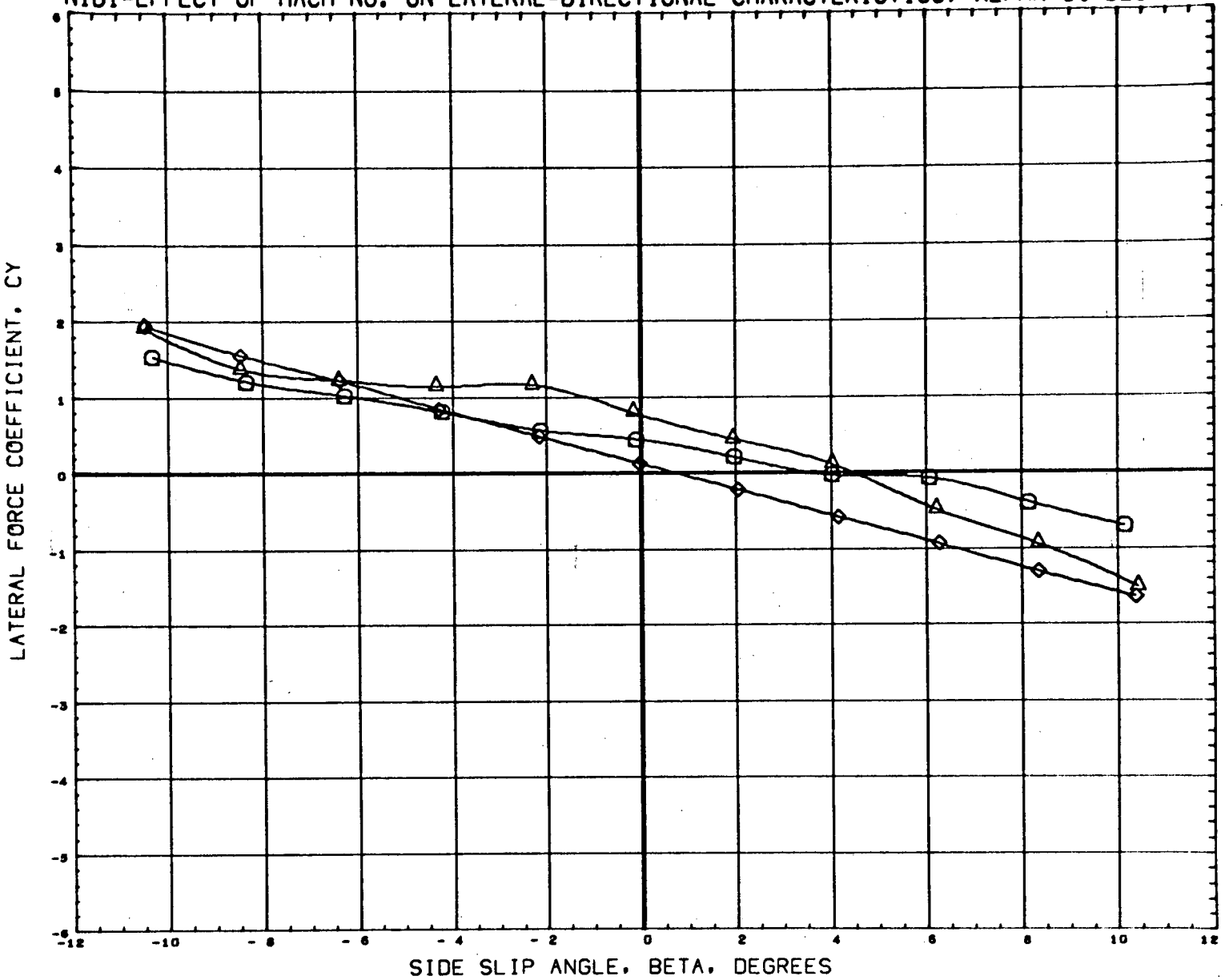


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.963	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.480				
□	4.859				

DATA HIST. CODE *E

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	

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



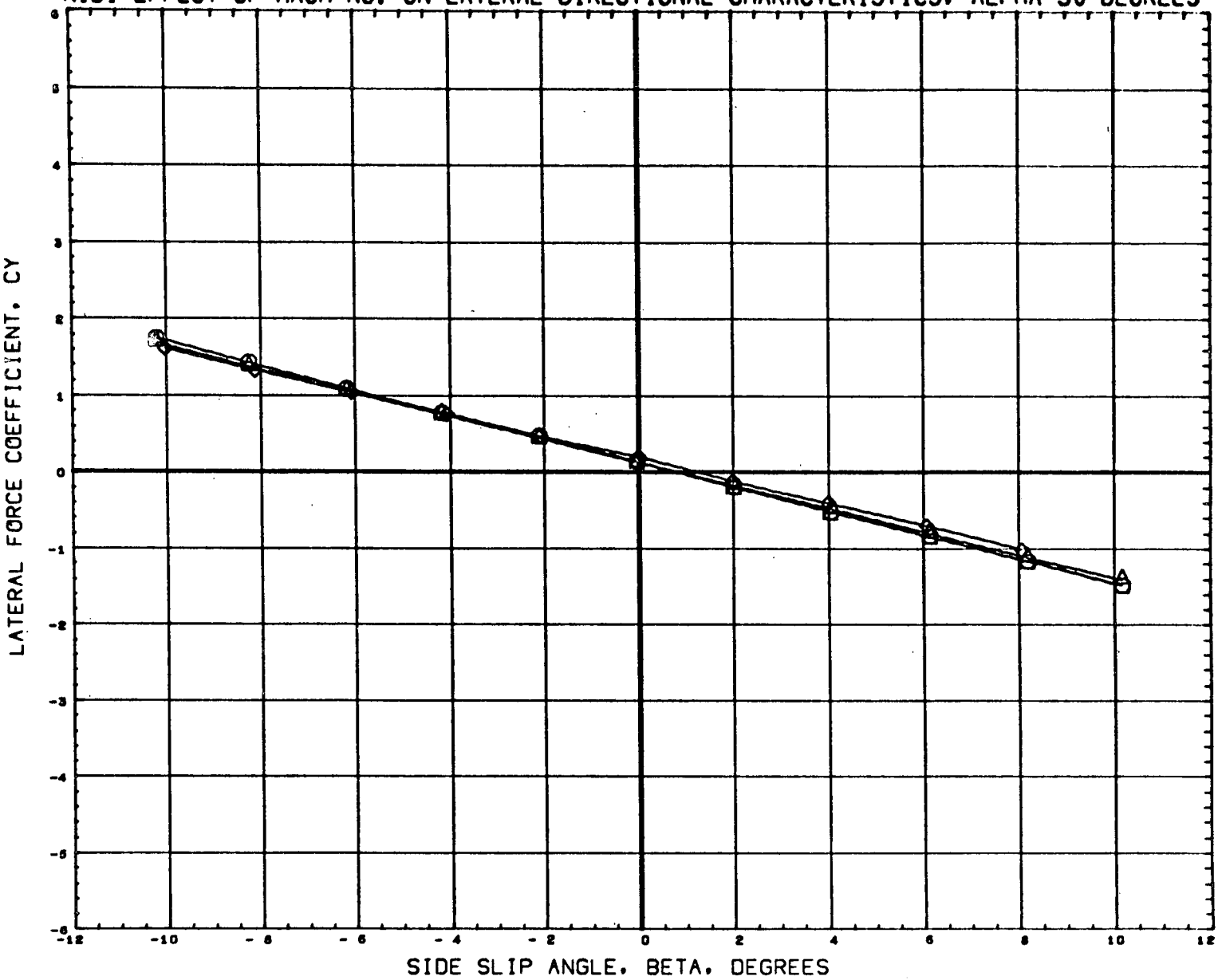
SYMBOL	MACH	PARAMETRIC VALUES	
○	0.897	ALPHA	30.000
△	1.194		
◇	1.961		

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

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



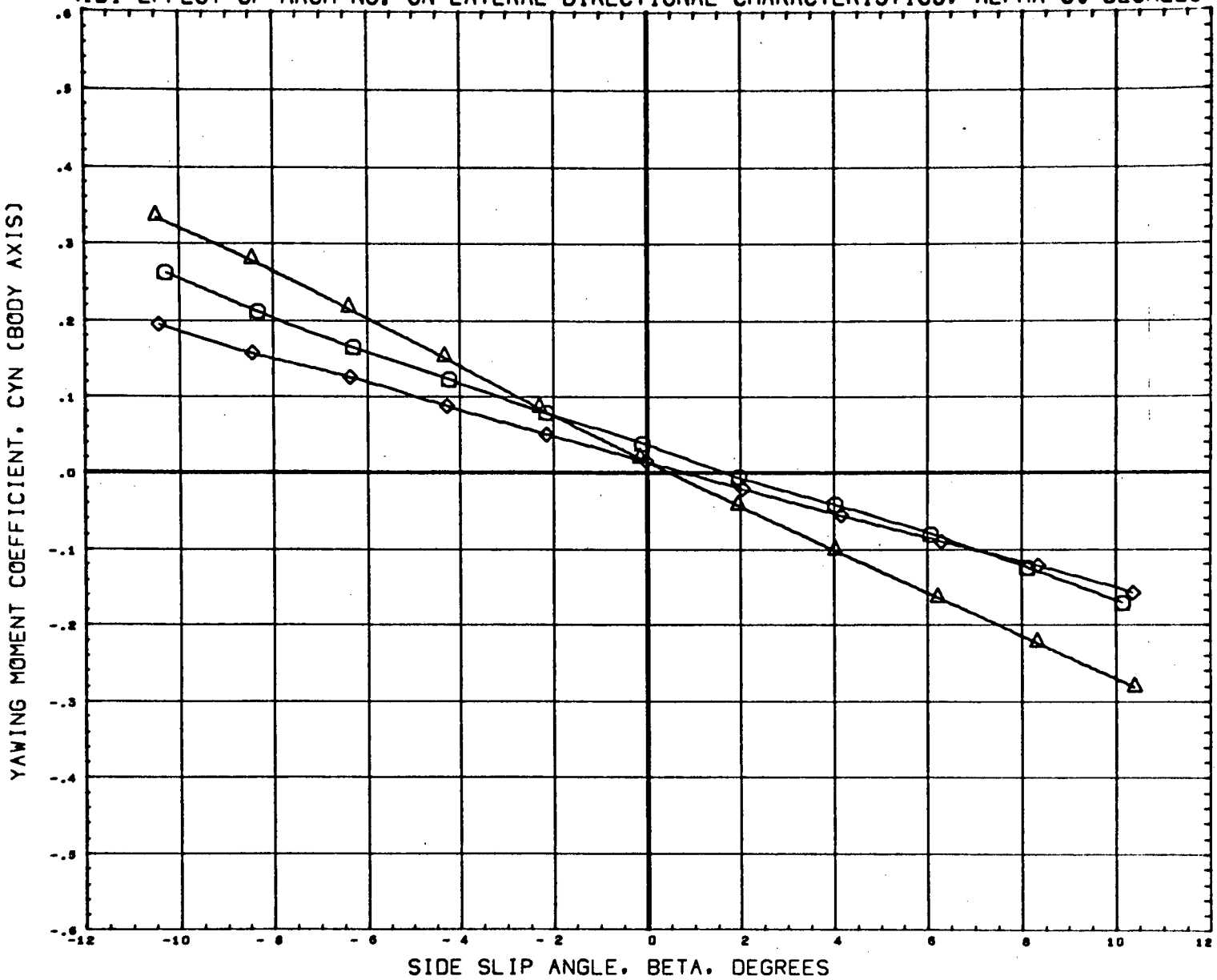
SYMBOL	MACH	PARAMETRIC VALUES	
○	2.740	ALPHA	30.000
△	3.460		
◇	4.959		

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

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



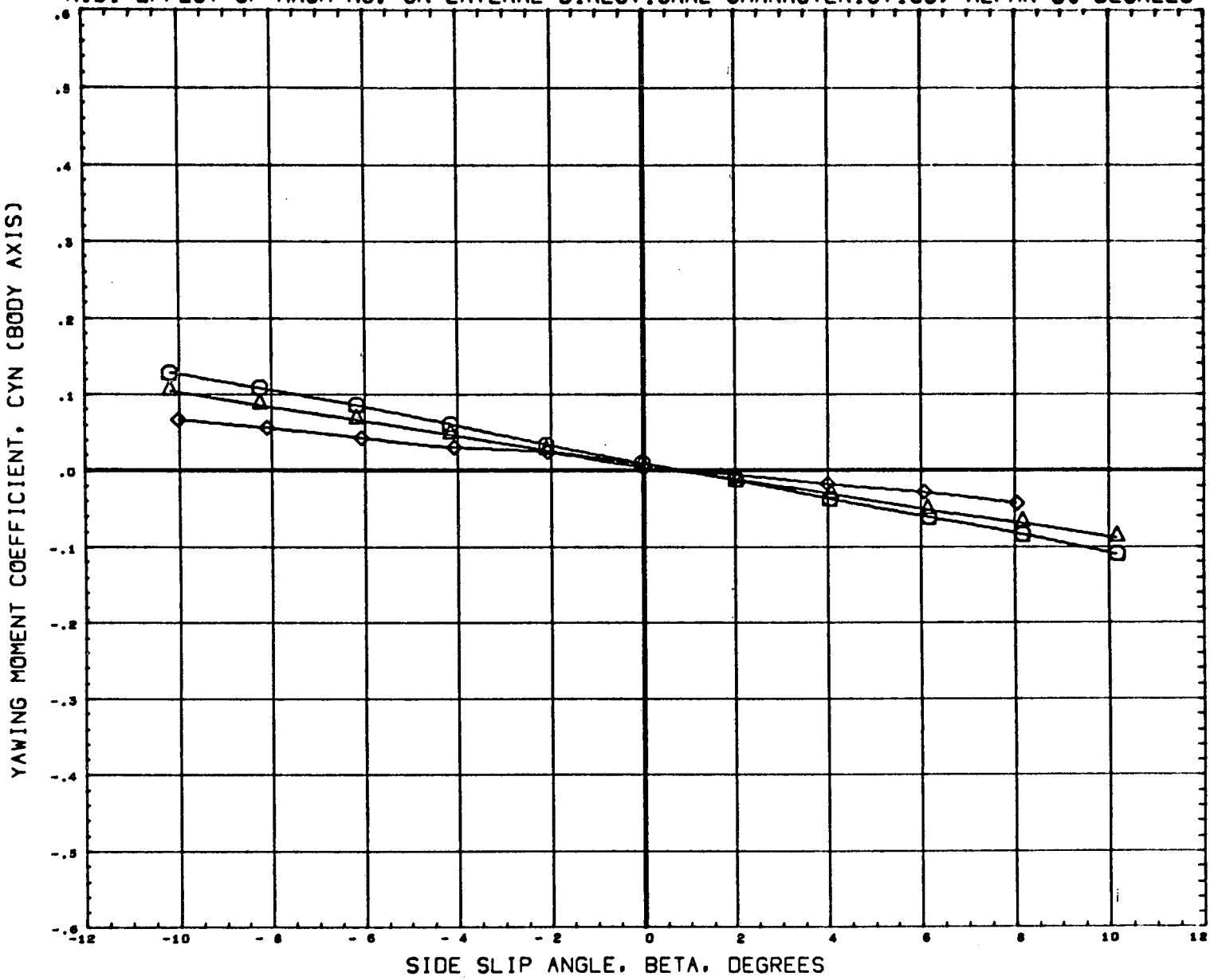
SYMBOL	MACH		PARAMETRIC VALUES
○	0.897	ALPHA	30.000
△	1.194		
◇	1.961		

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

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



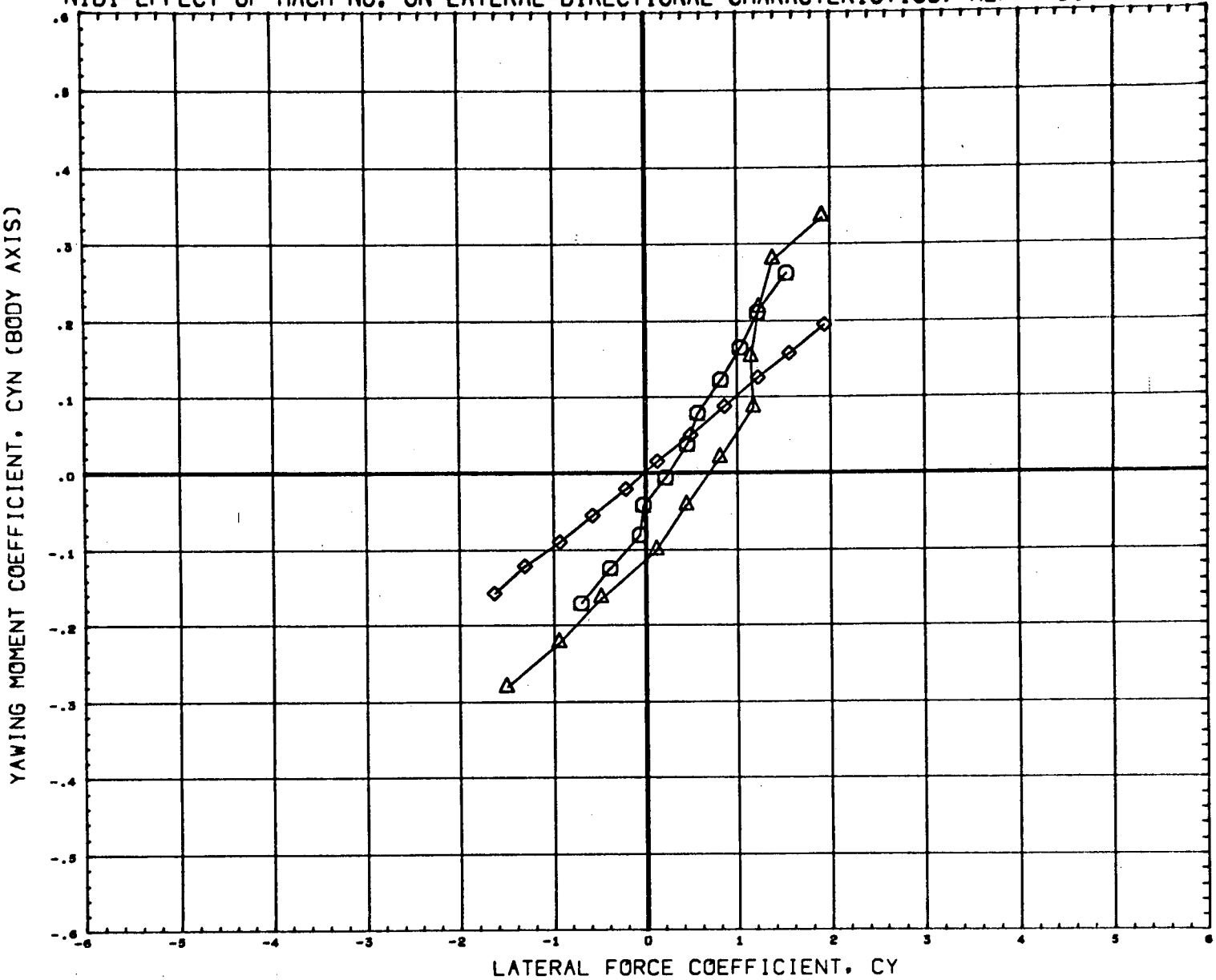
SYMBOL	MACH	PARAMETRIC VALUES	
○	2.740	ALPHA	30.000
△	3.480		
◇	4.959		

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	

REFERENCE FILE

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



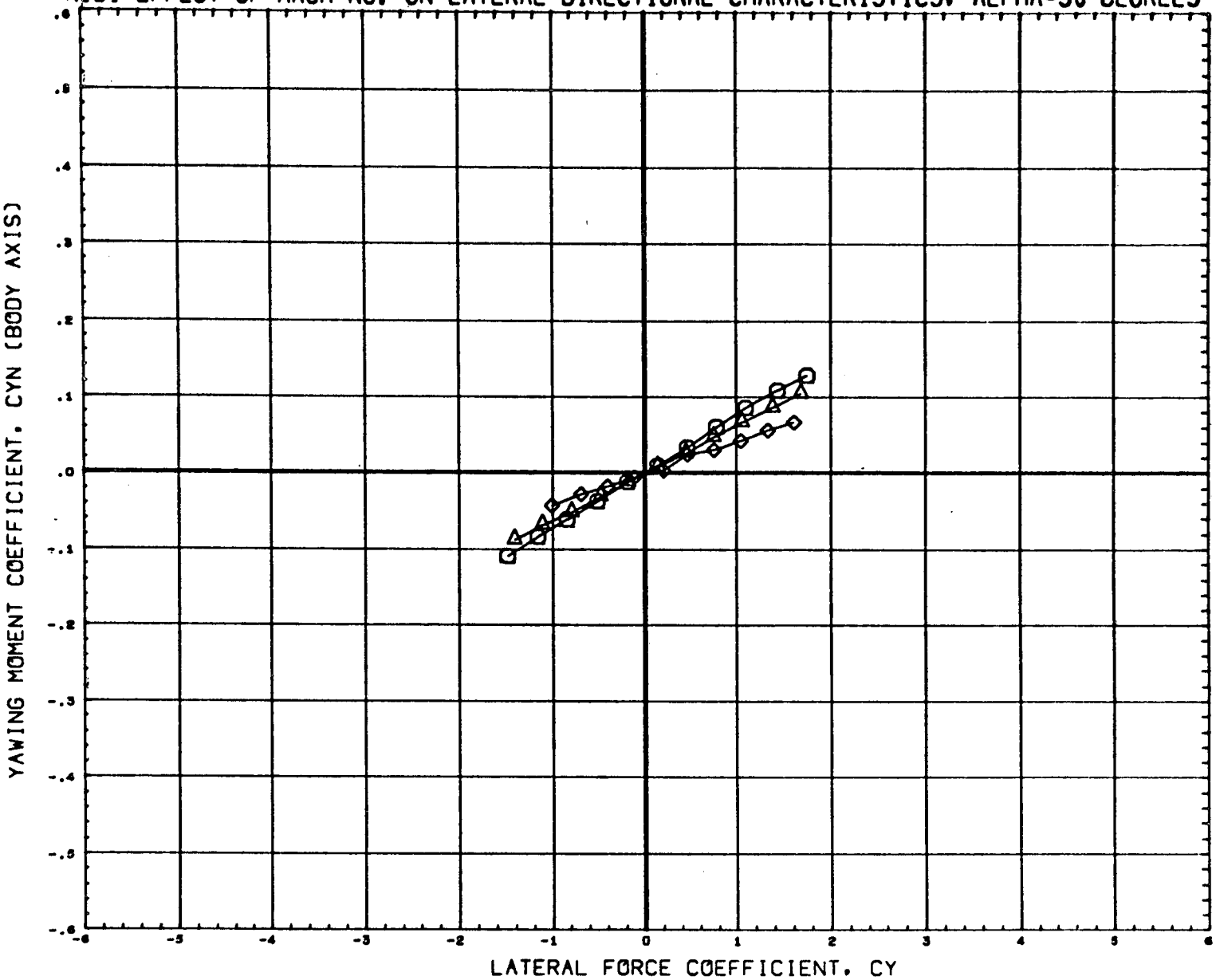
SYMBOL	MACH		PARAMETRIC VALUES
○	0.897	ALPHA	30.000
△	1.194		
◇	1.961		

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

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



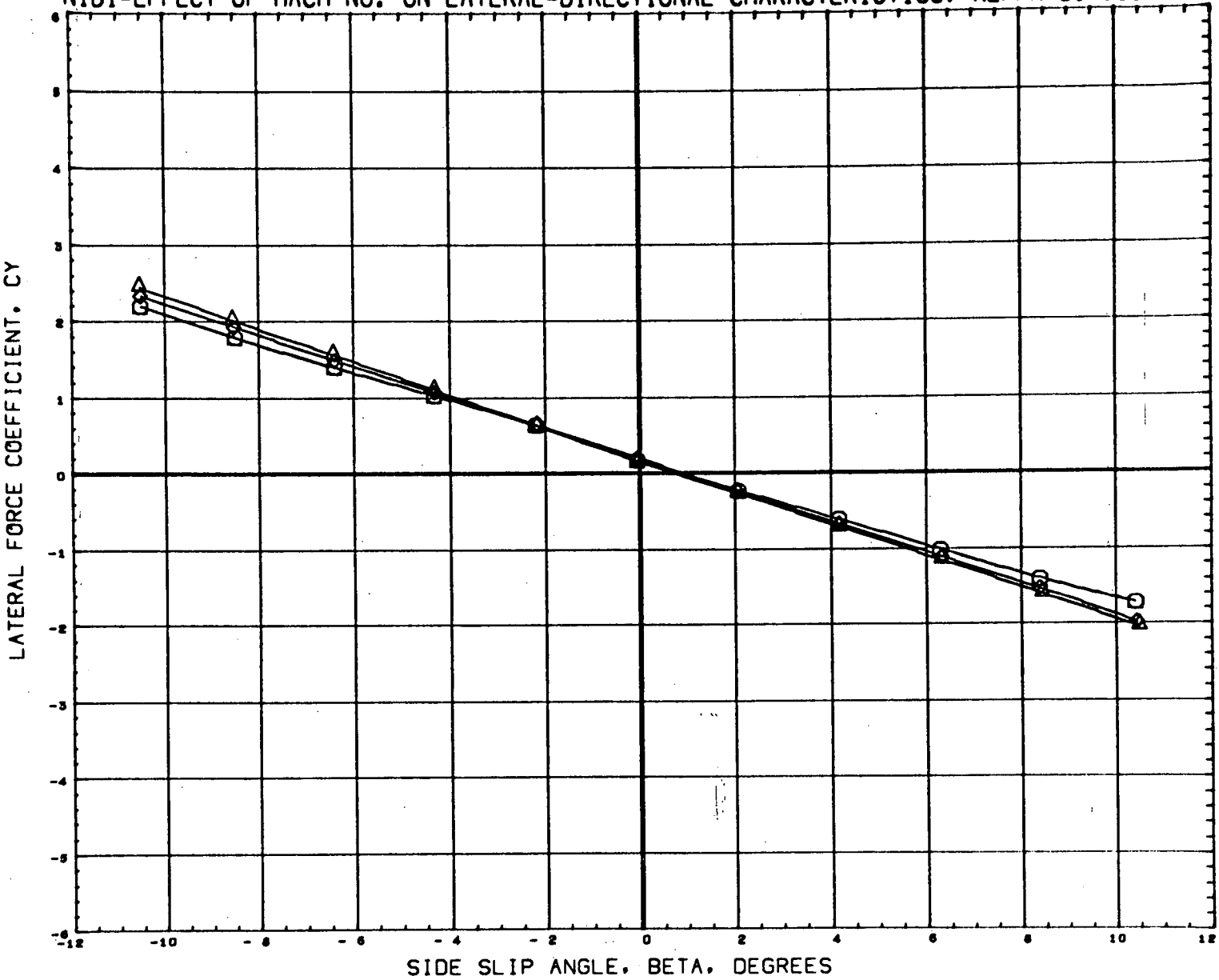
SYMBOL	MACH		PARAMETRIC VALUES
○	2.740	ALPHA	30.000
△	3.480		
◇	4.959		

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	

REFERENCE FILE

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



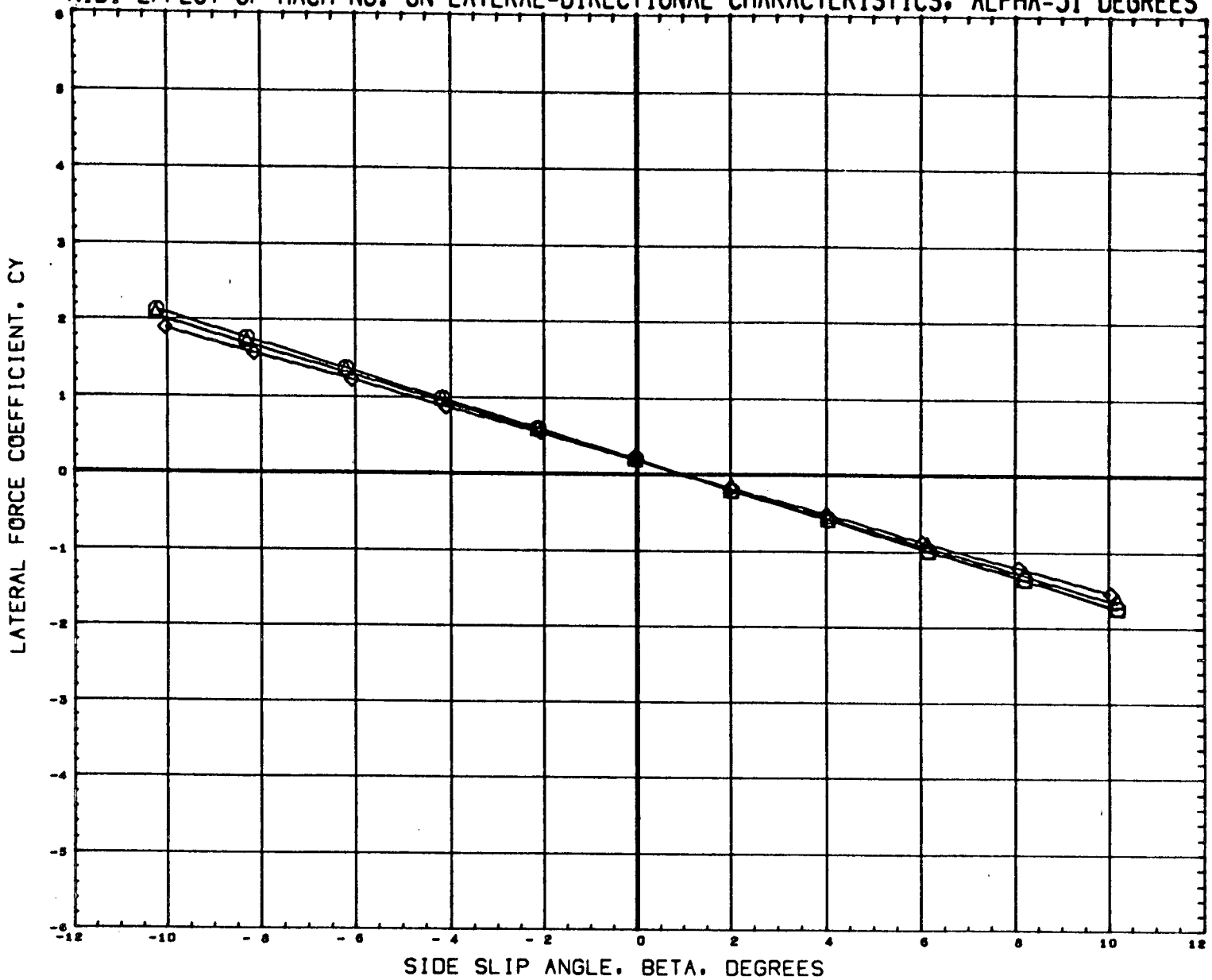
SYMBOL	MACH	PARAMETRIC VALUES	
○	0.903	ALPHA	51.000
△	1.195		
◇	1.943		

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

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



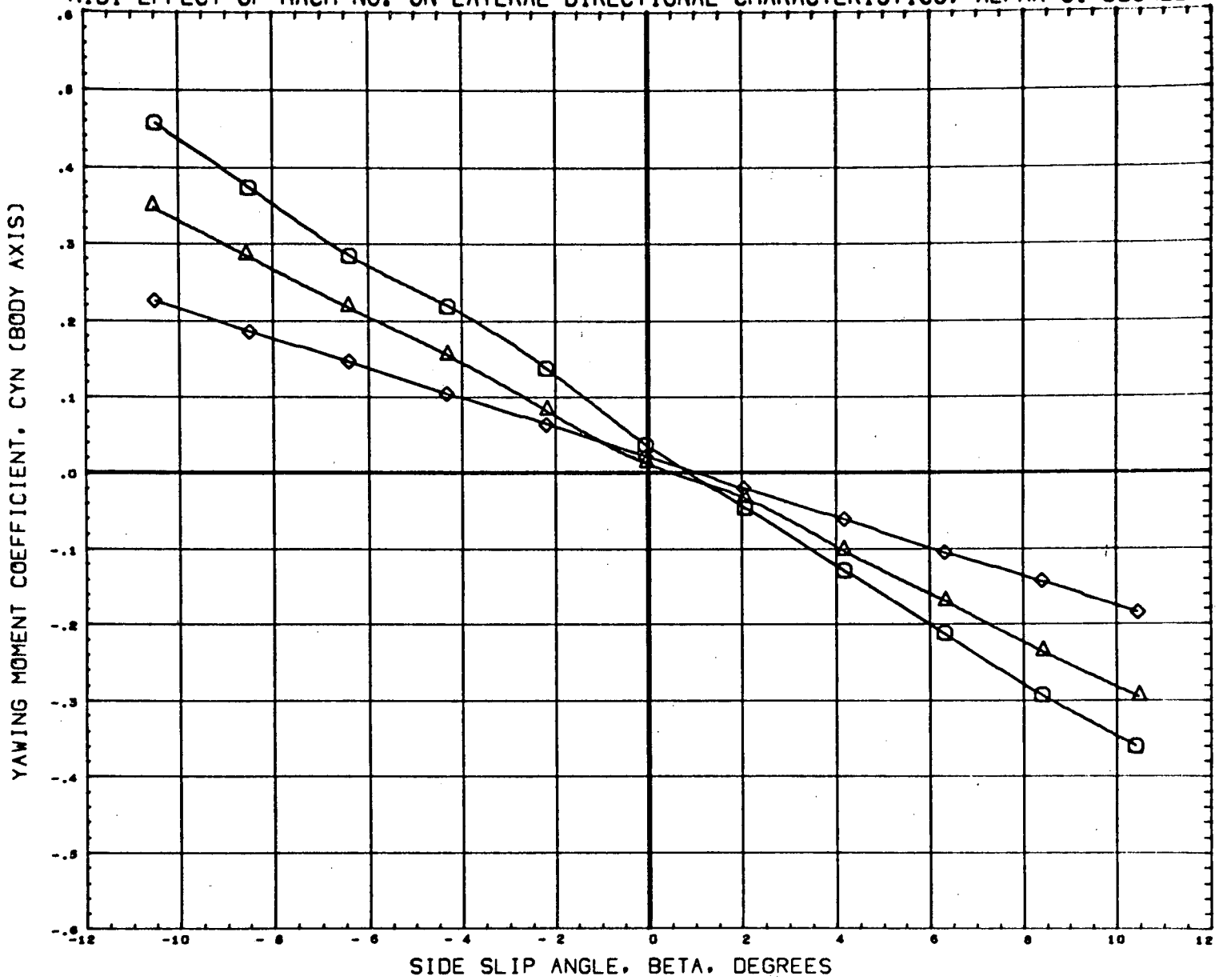
SYMBOL	MACH		PARAMETRIC VALUES
○	2.740	ALPHA	51.000
△	3.460		
◇	4.959		

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

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



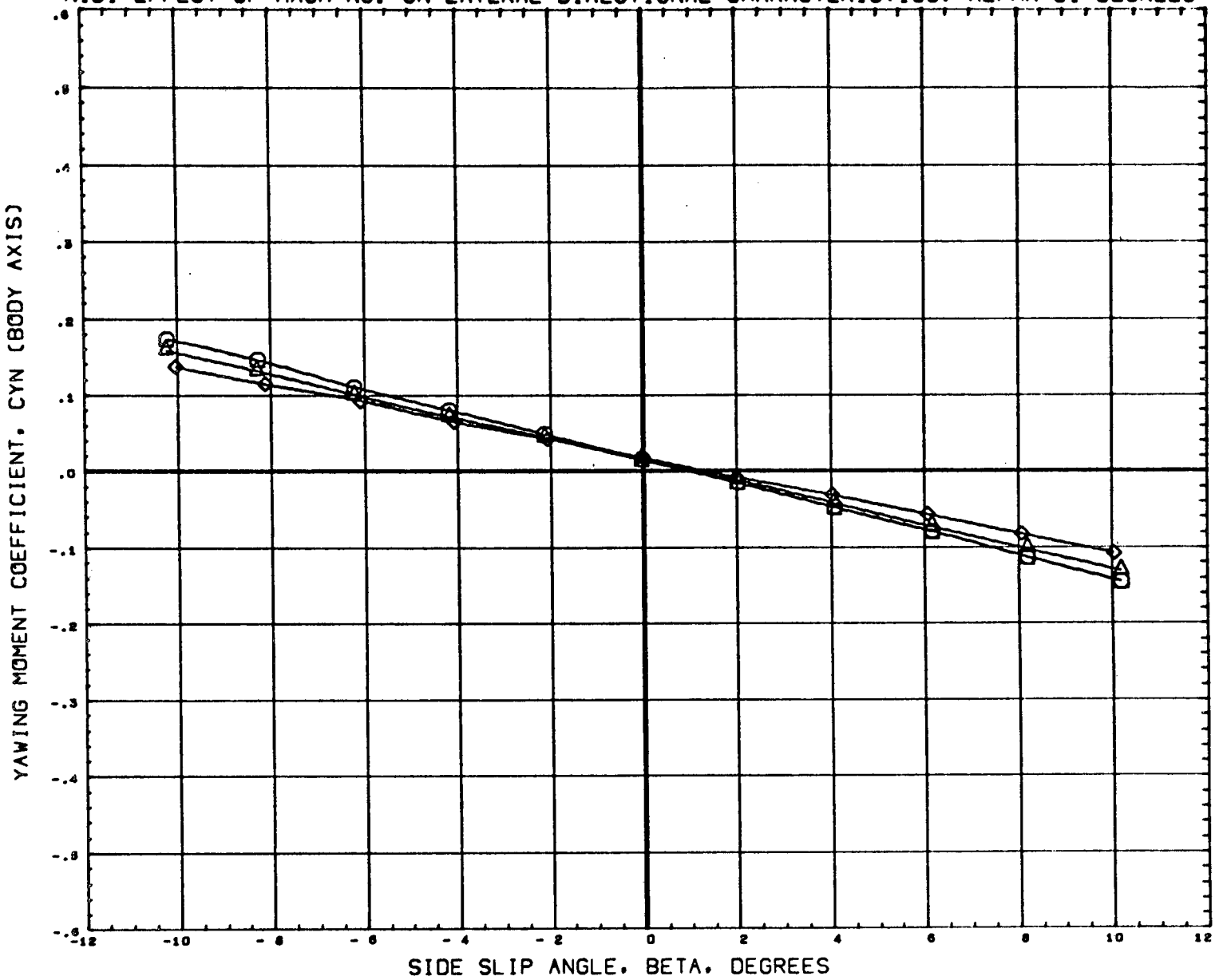
SYMBOL	MACH		PARAMETRIC VALUES
○	0.903	ALPHA	51.000
△	1.195		
◇	1.943		

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

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



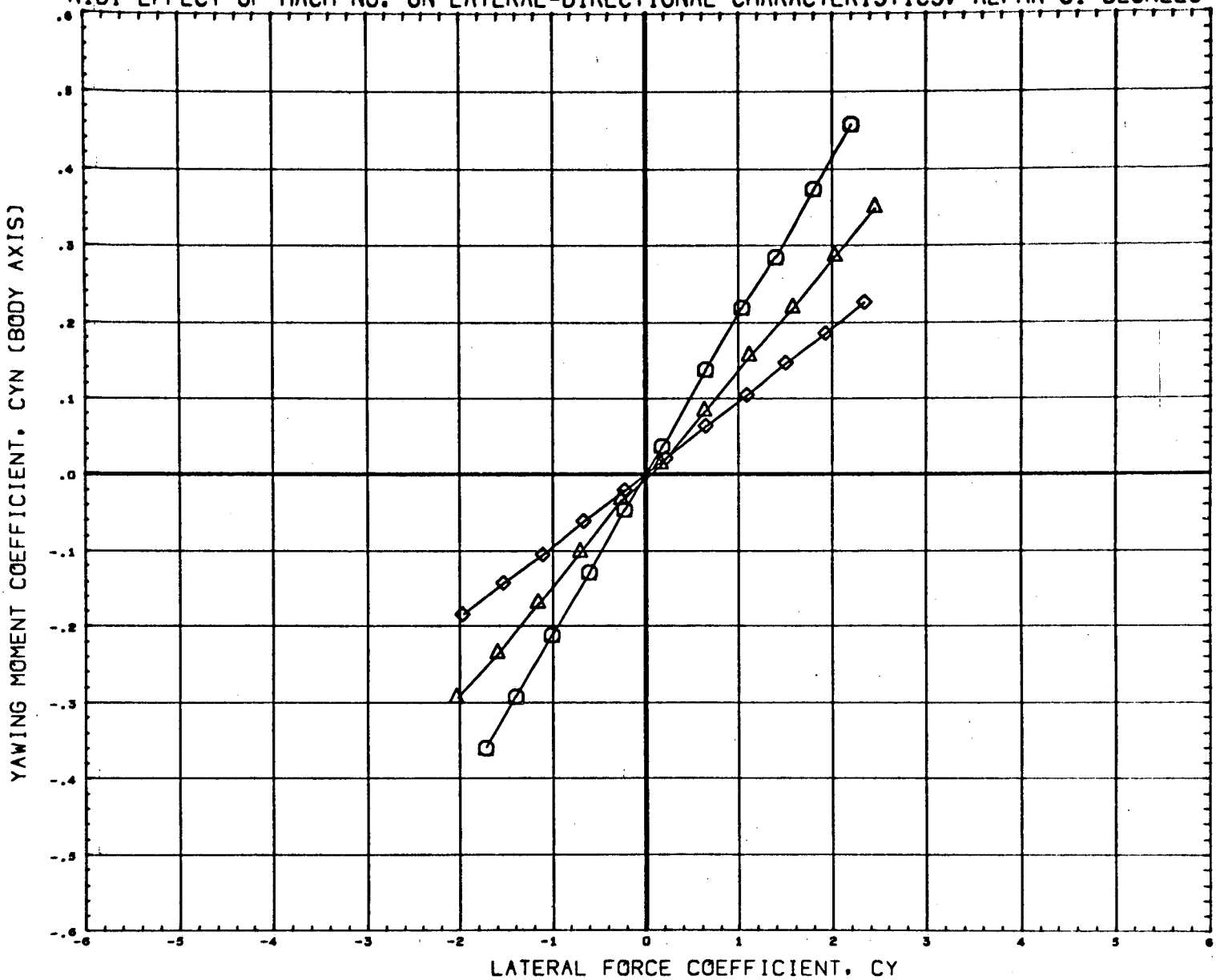
SYMBOL	MACH		PARAMETRIC VALUES
○	2.740	ALPHA	51.000
△	3.460		
◇	4.959		

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

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



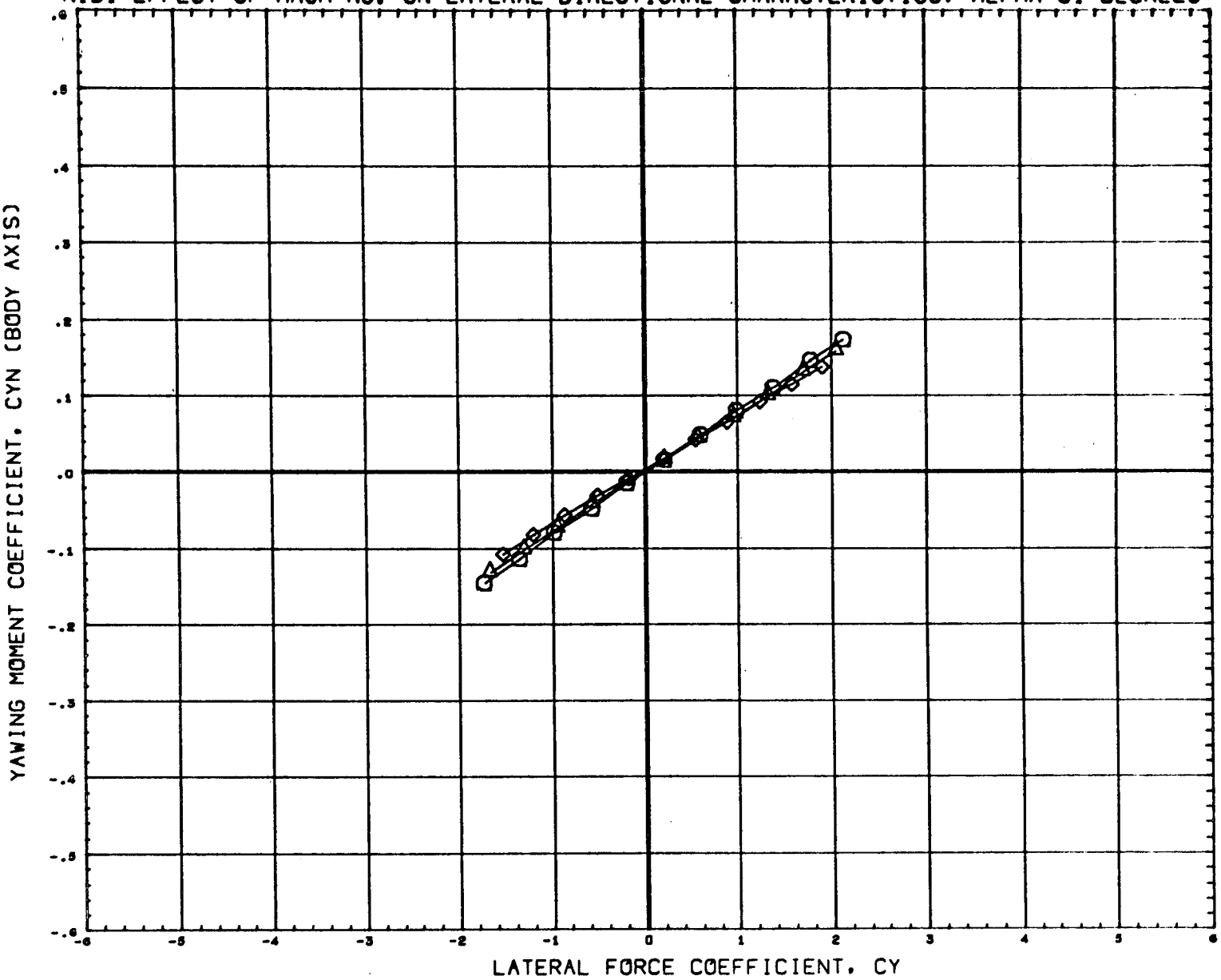
SYMBOL	MACH		PARAMETRIC VALUES
○	0.903	ALPHA	51.000
△	1.195		
◇	1.943		

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

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



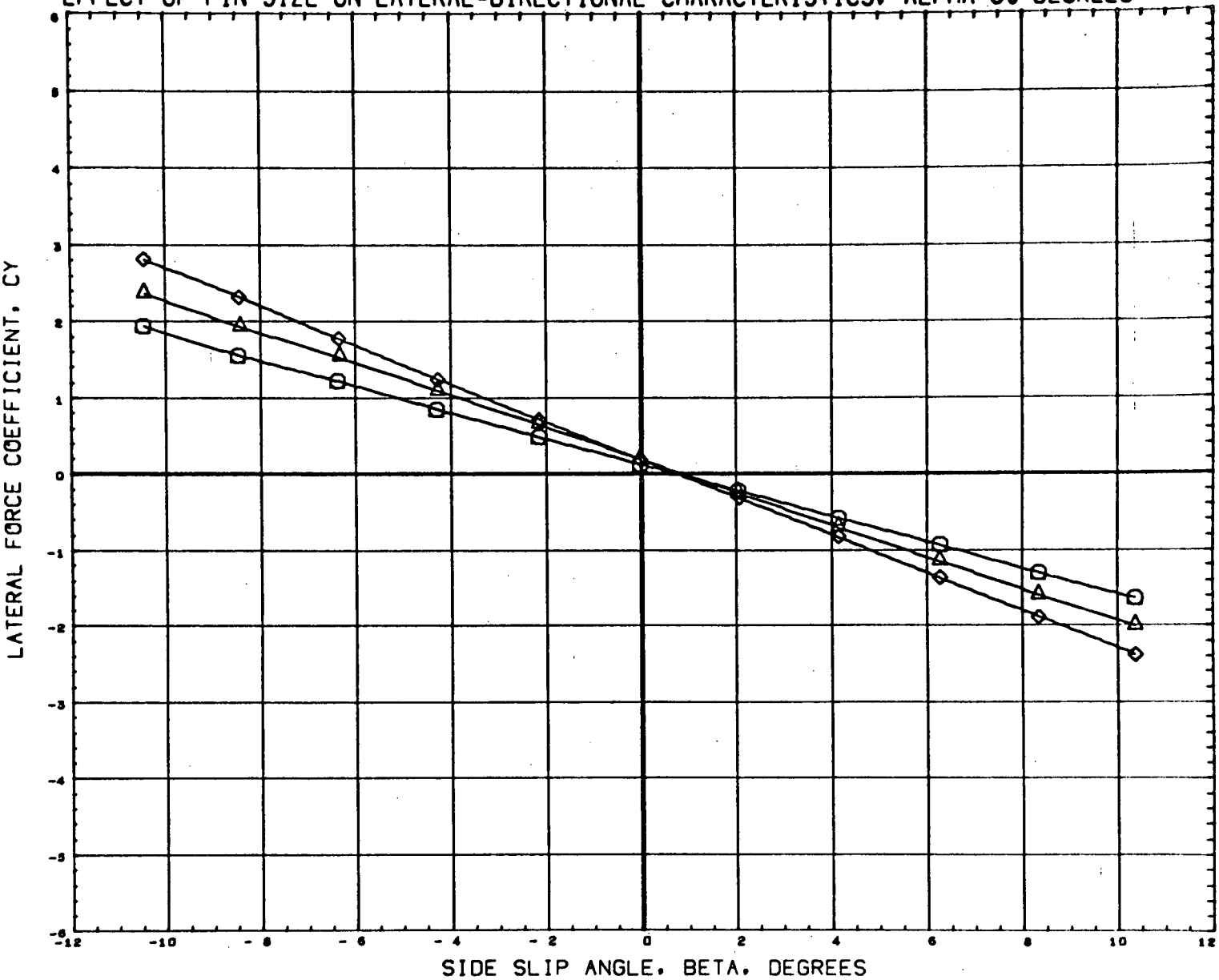
SYMBOL	MACH		PARAMETRIC VALUES
○	2.740	ALPHA	51.000
△	3.480		
◇	4.959		

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

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



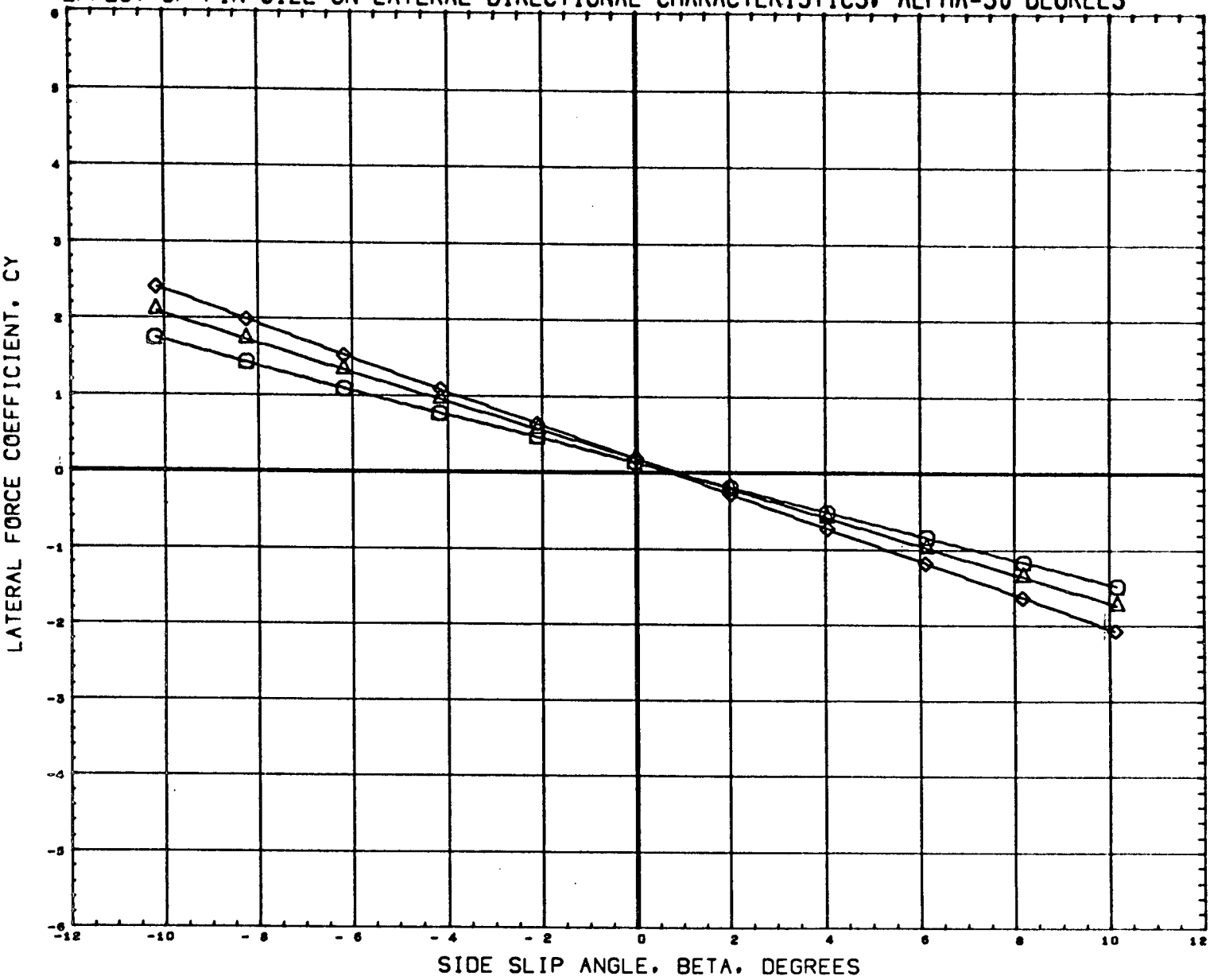
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



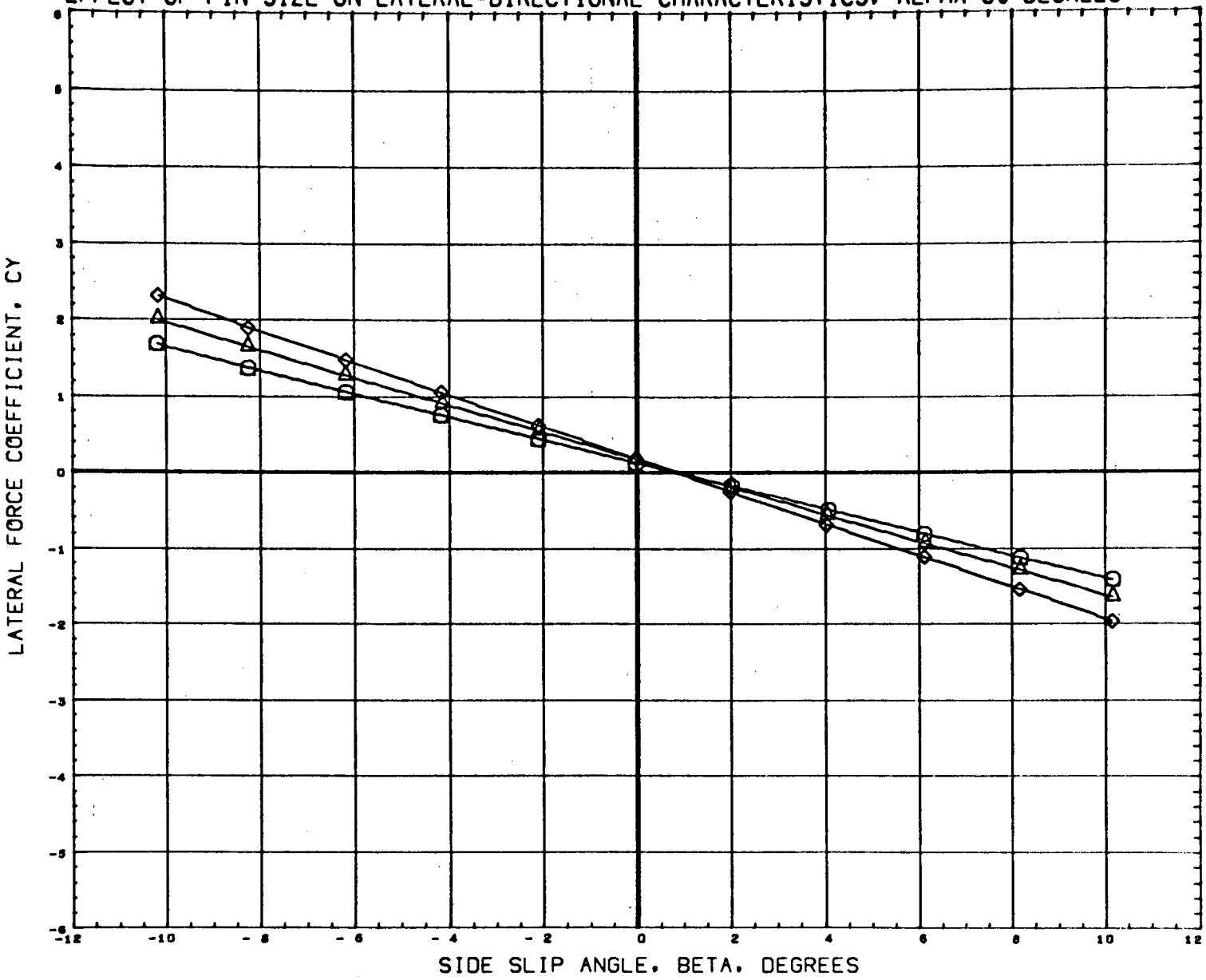
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



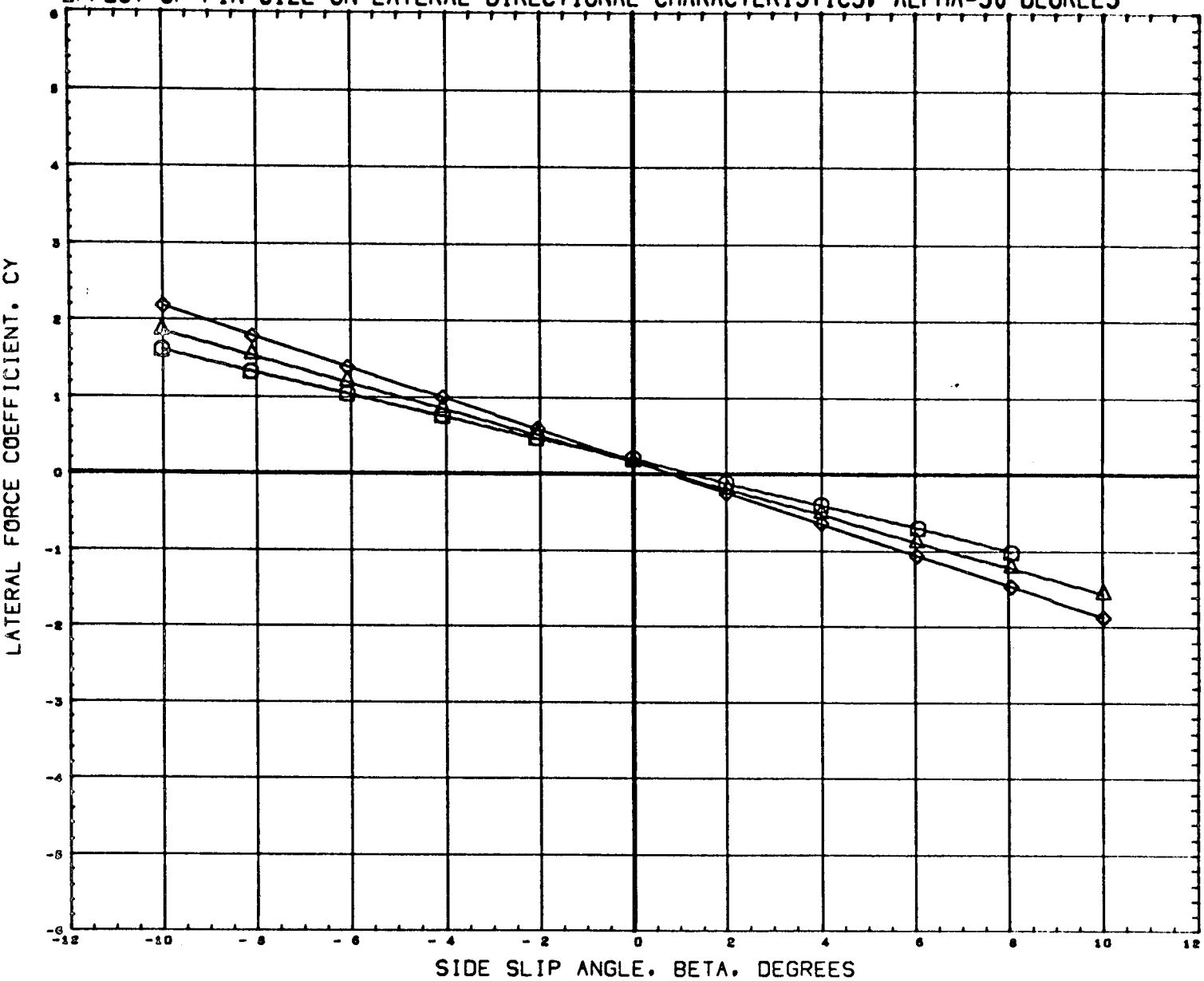
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



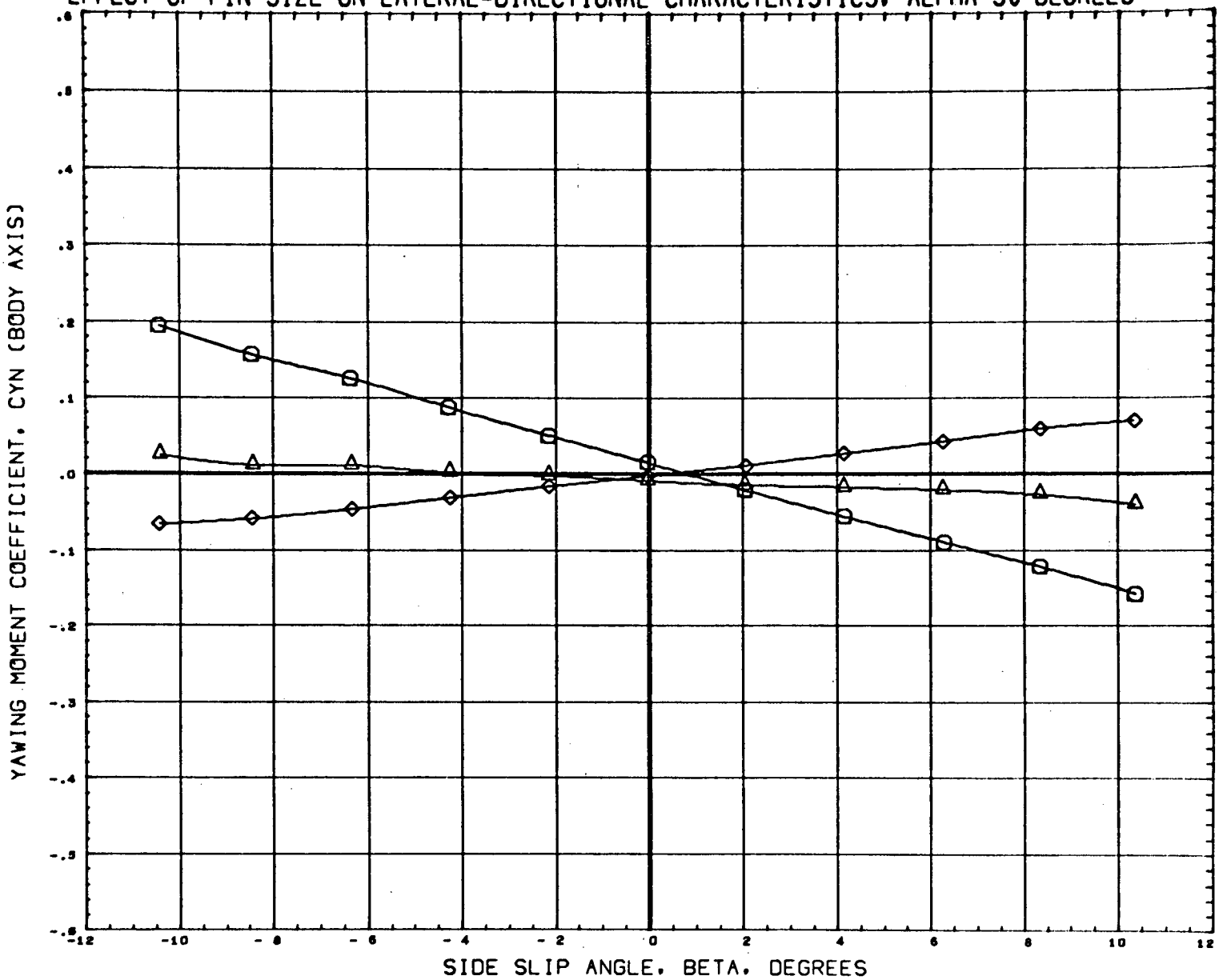
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



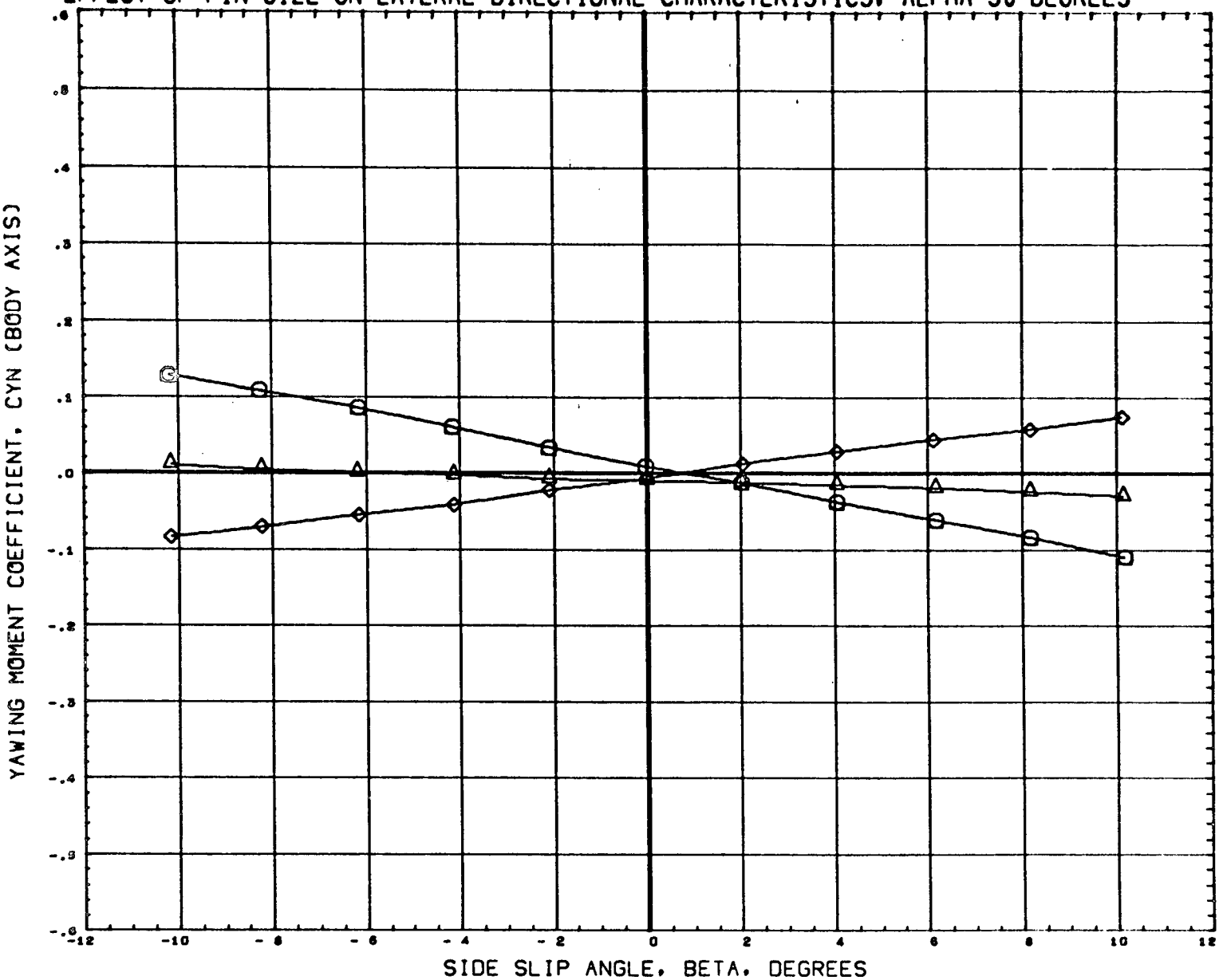
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



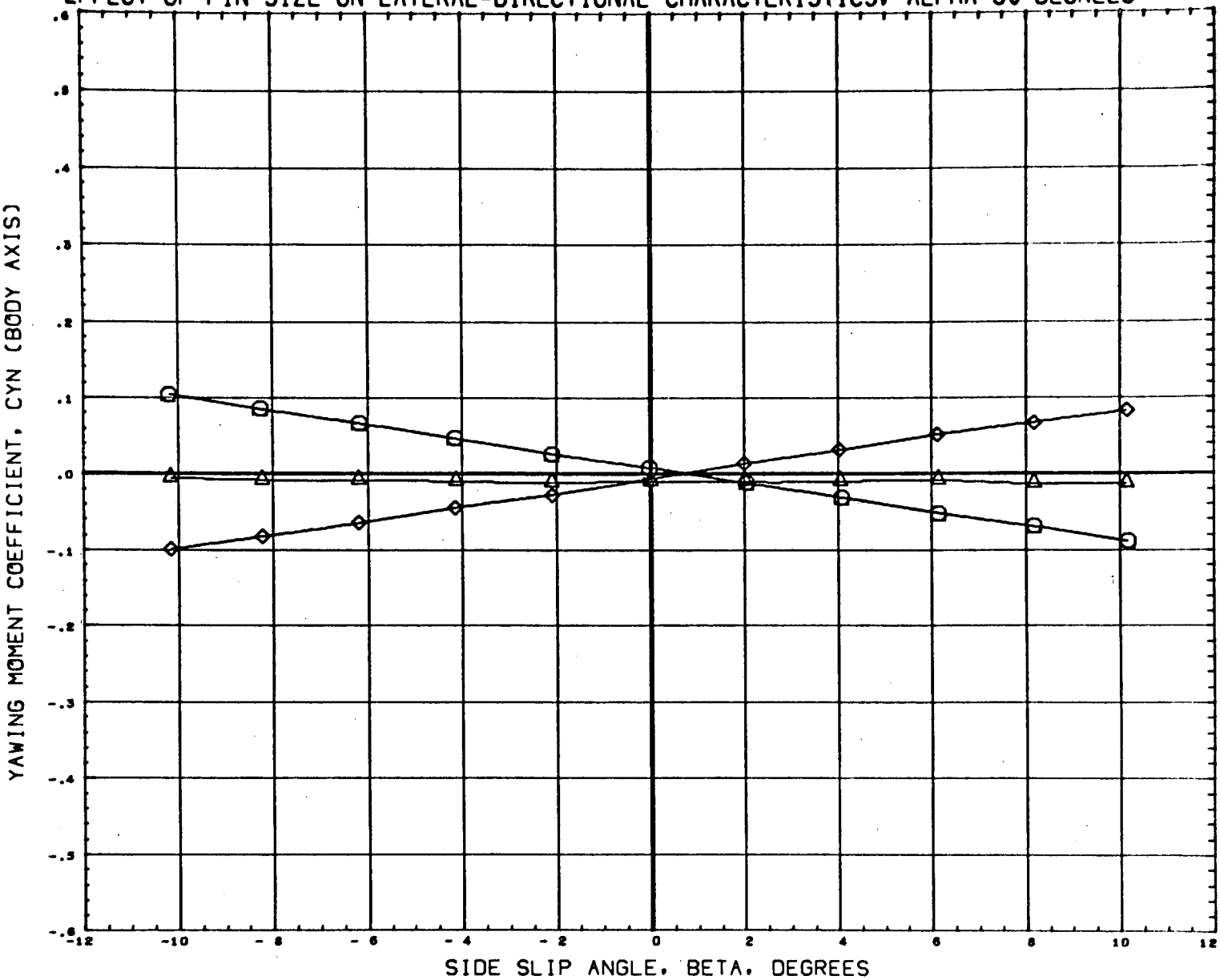
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



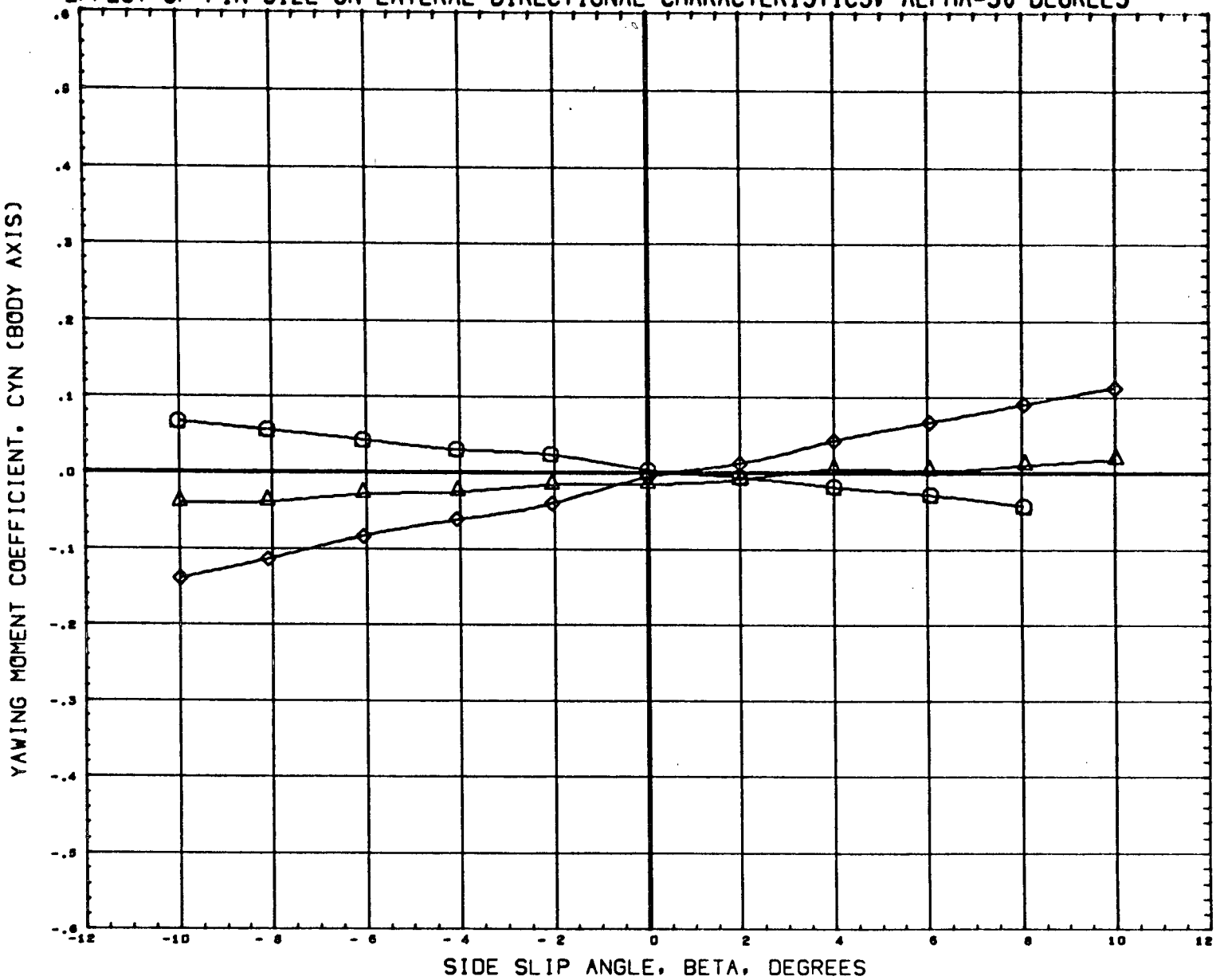
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



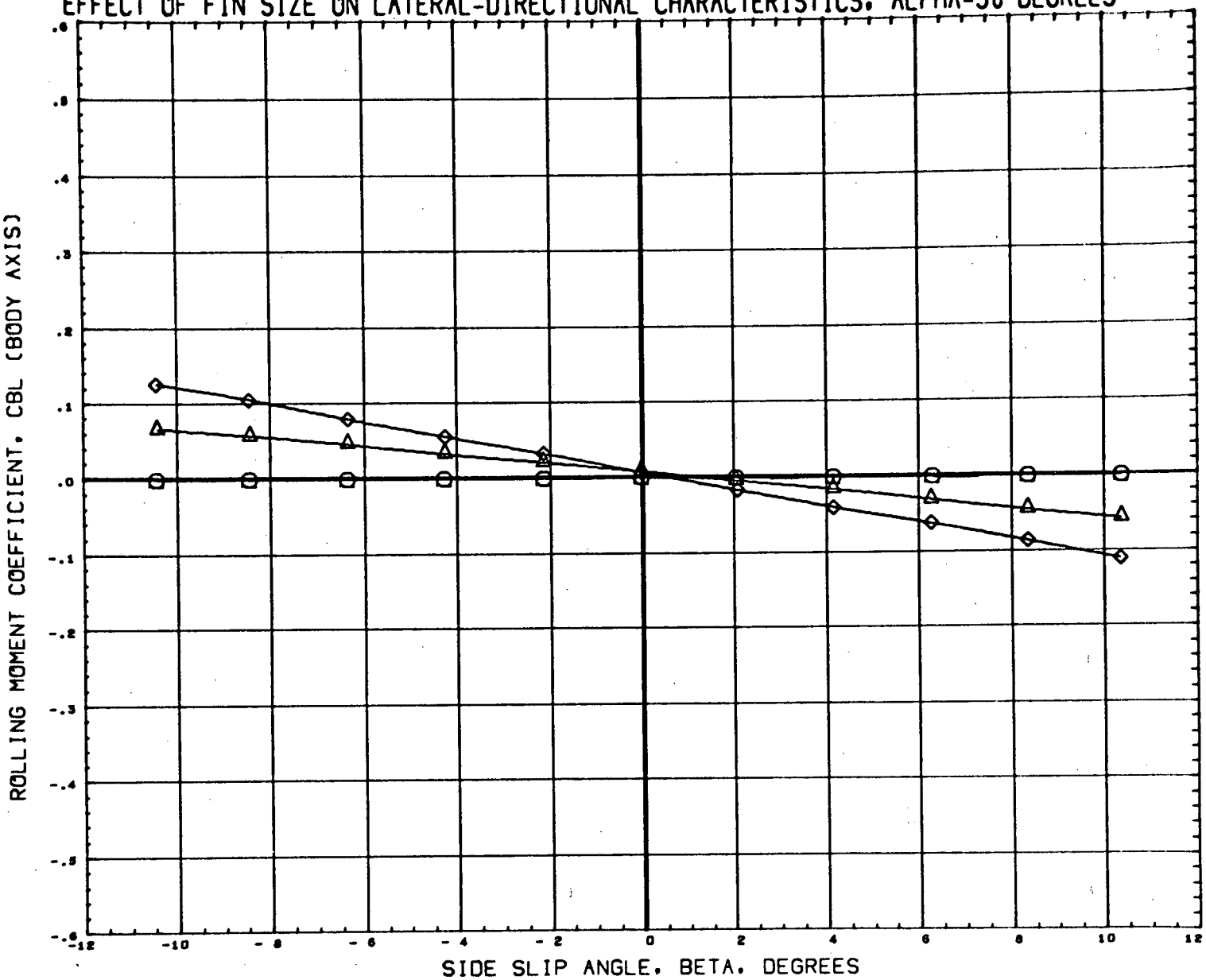
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



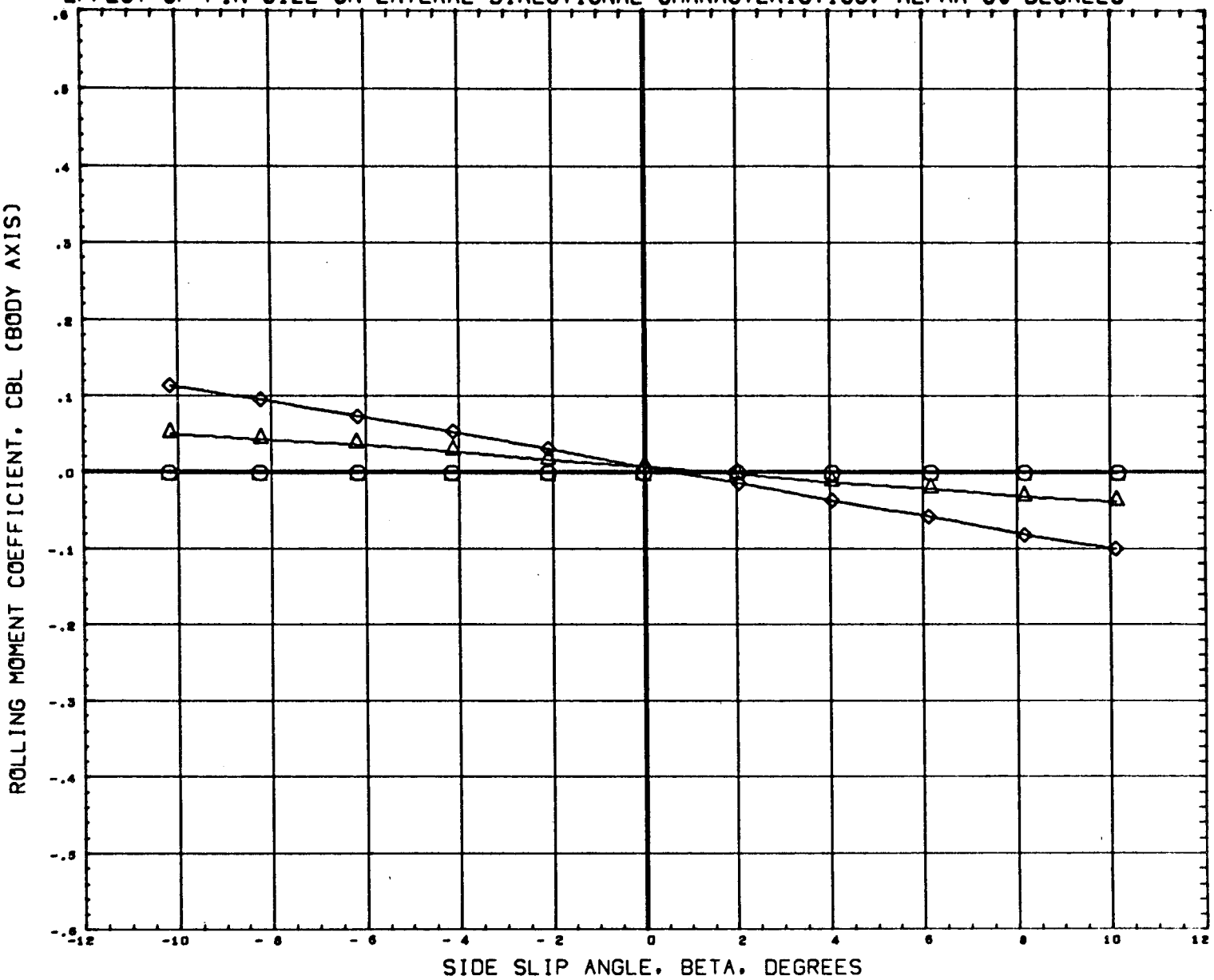
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



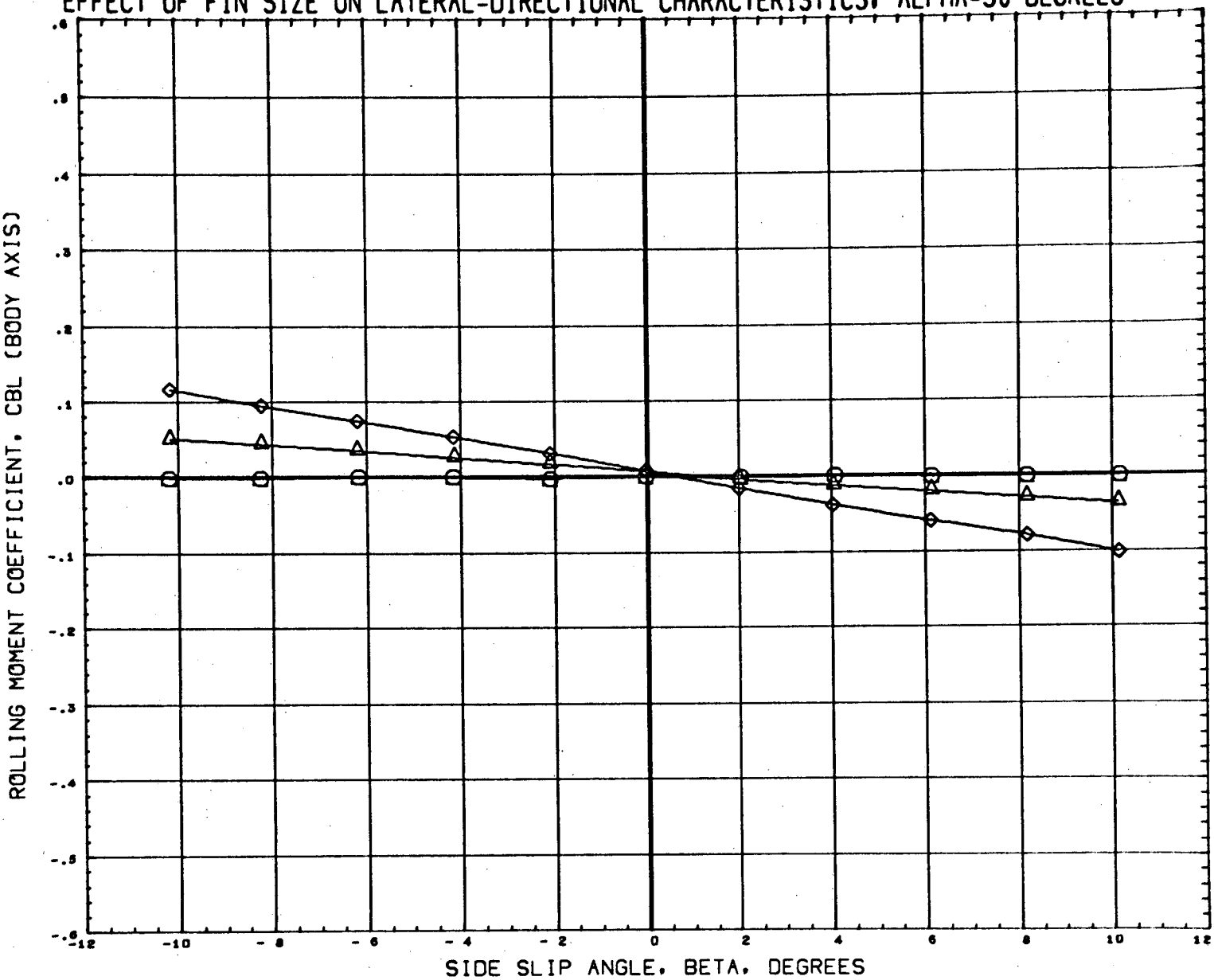
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



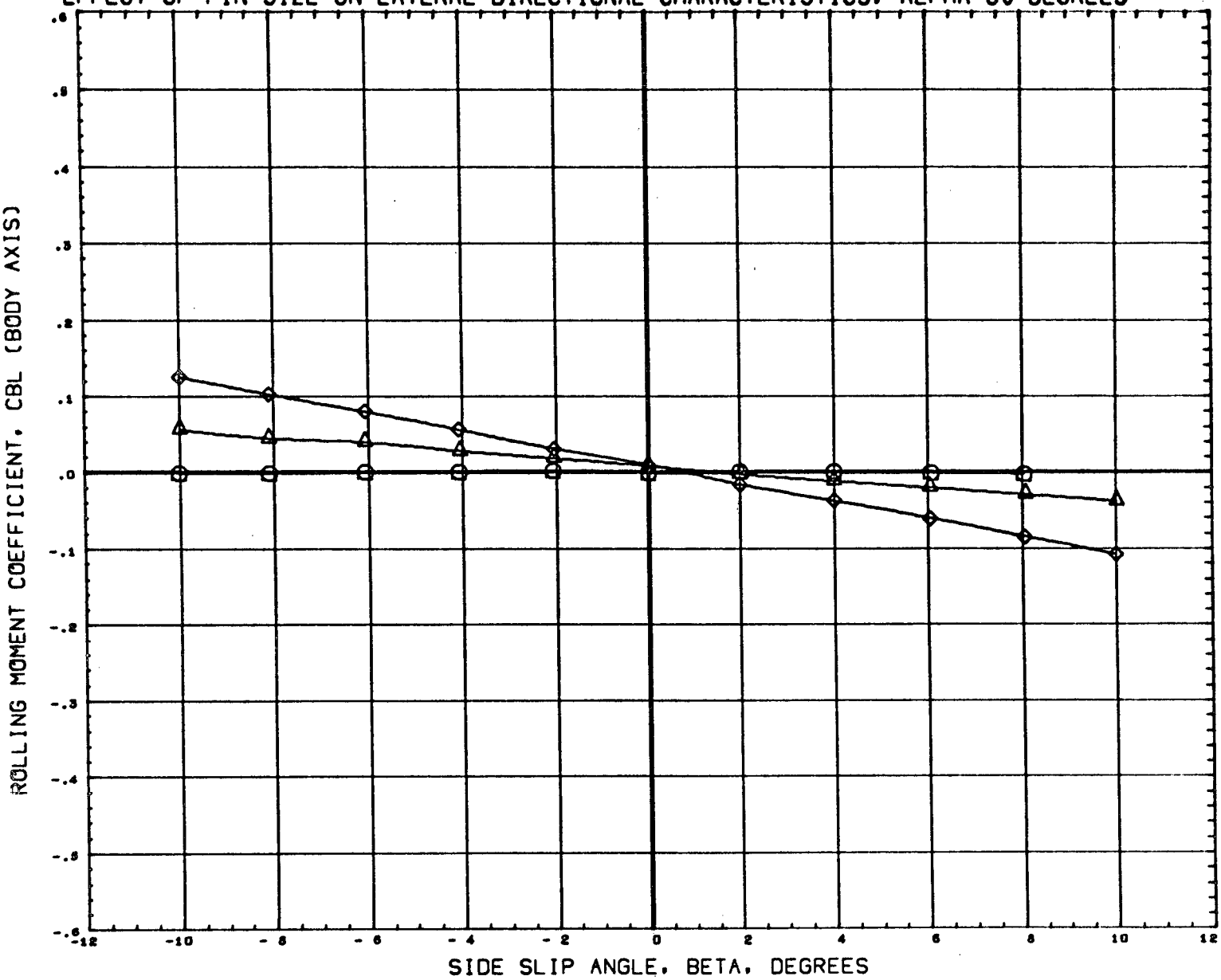
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



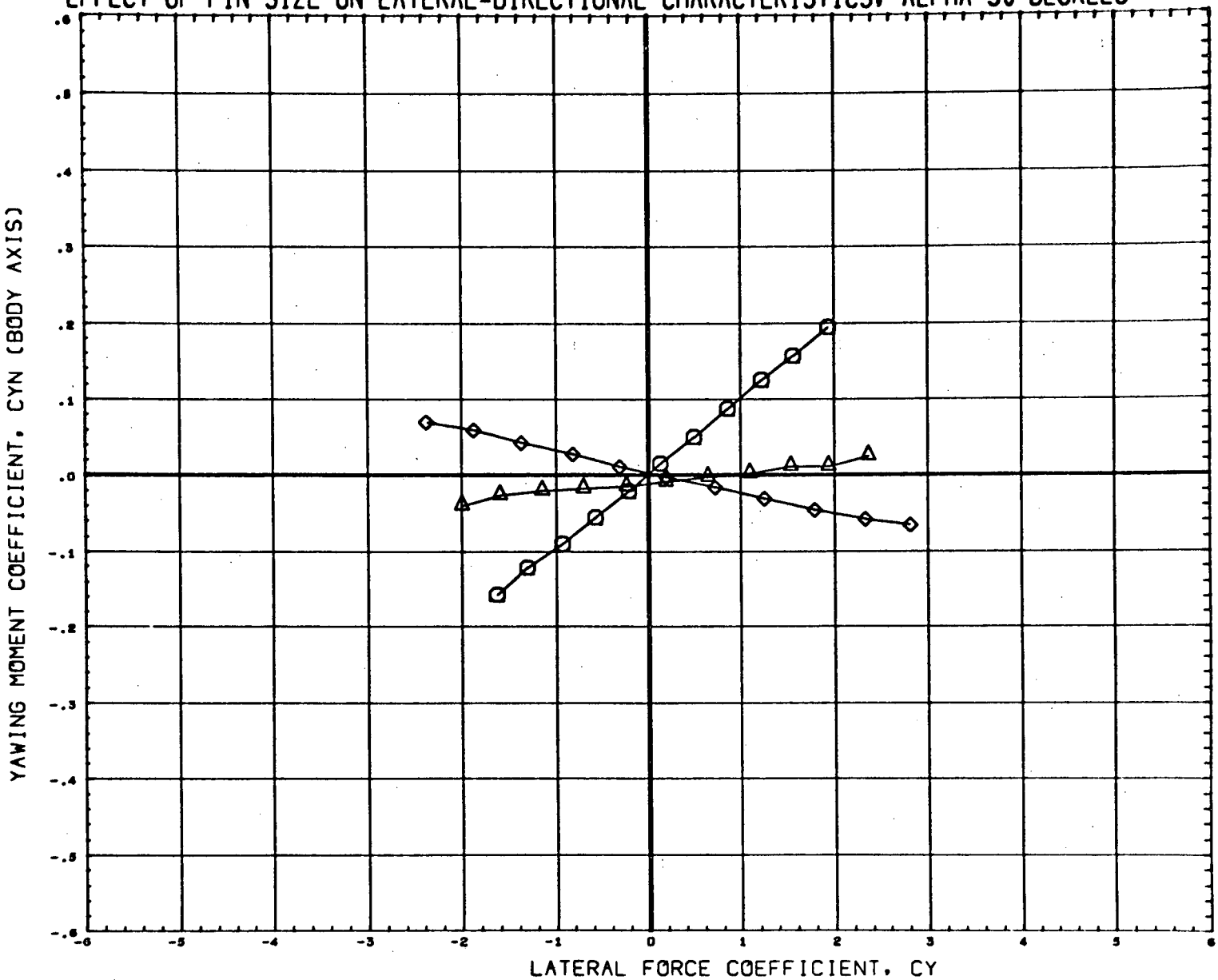
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

REFERENCE INFORMATION

SREF	0.9330	SQ. IN
LREF	7.2230	IN.
BREF	7.2230	IN.
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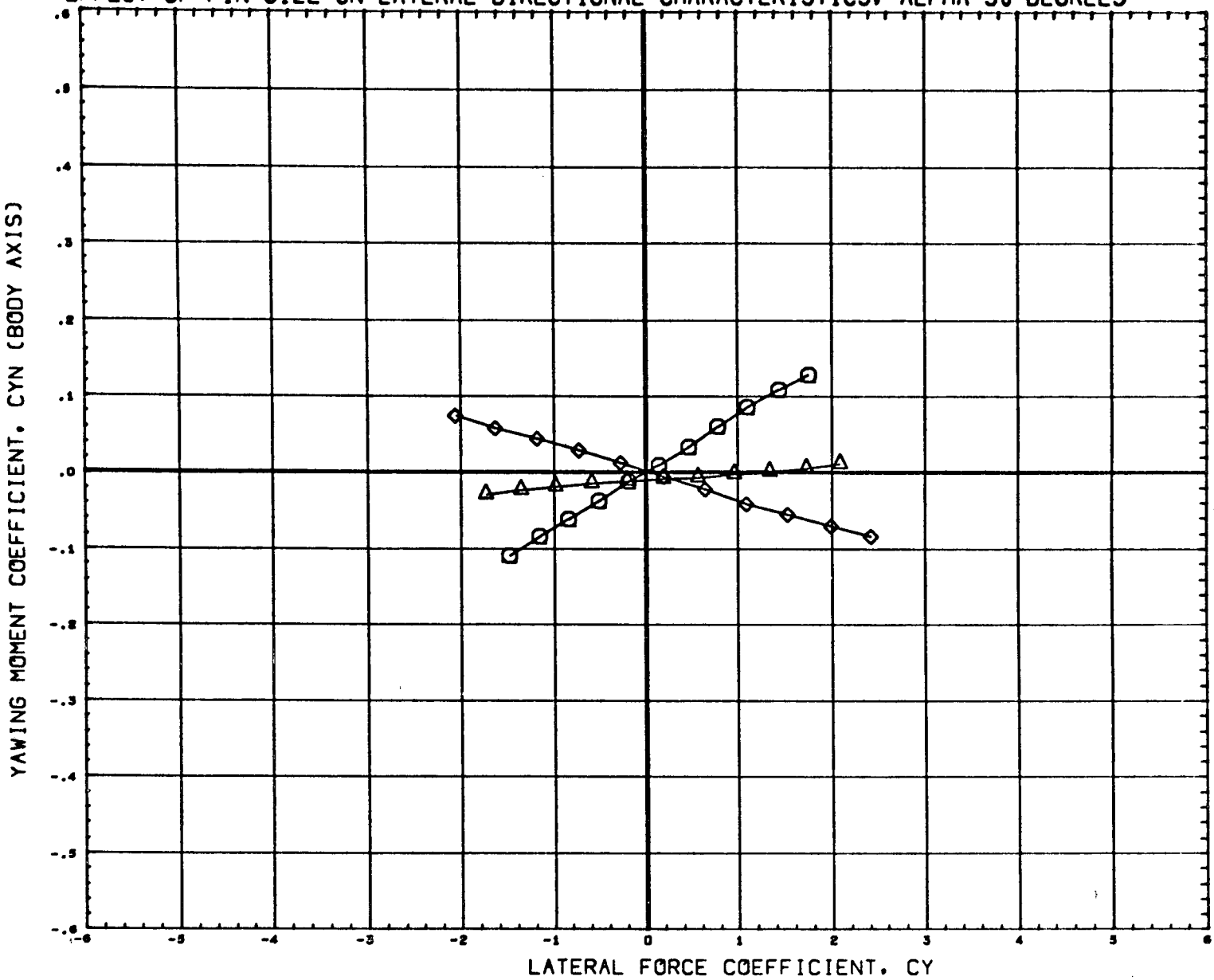
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

MACH 1.96

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



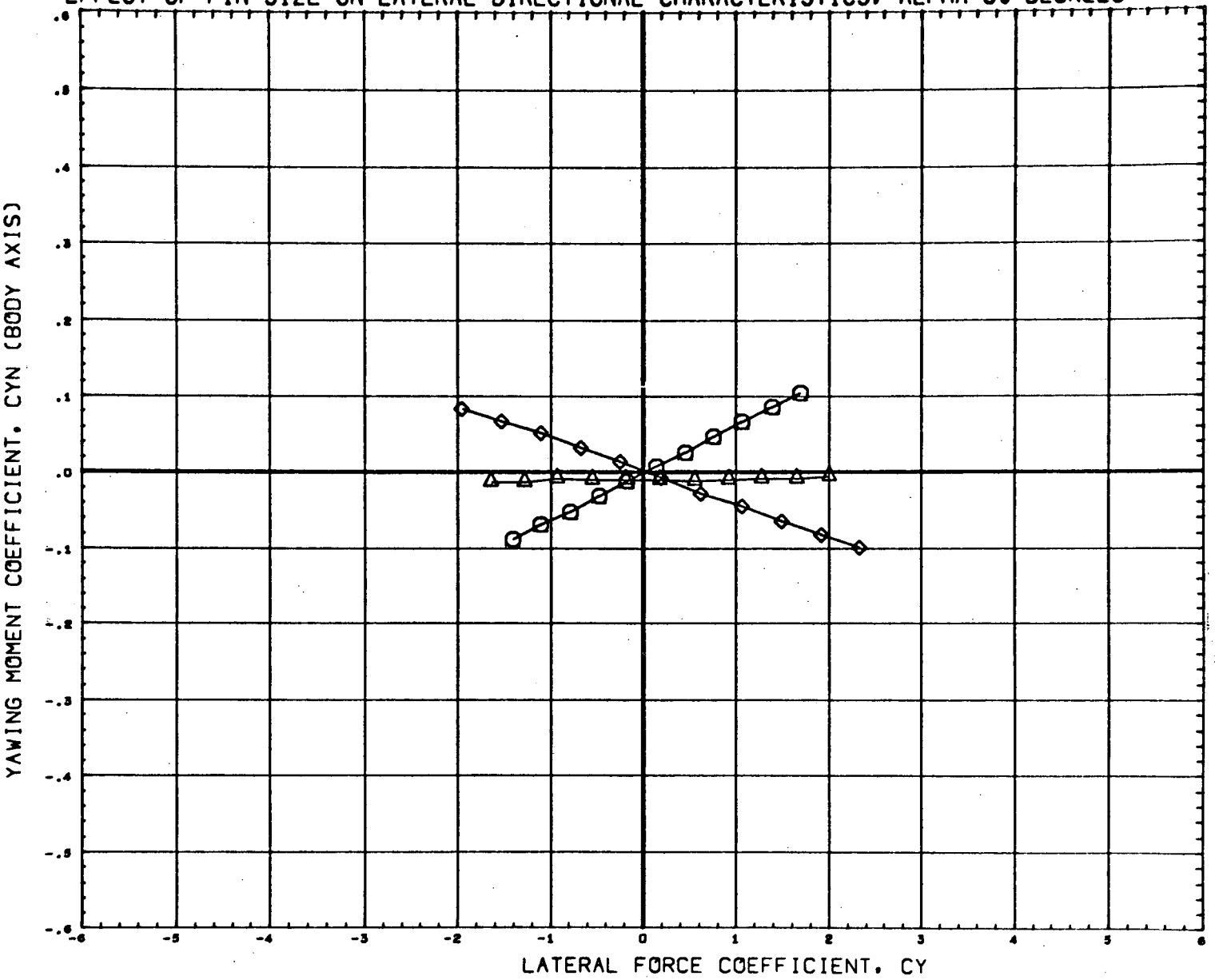
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



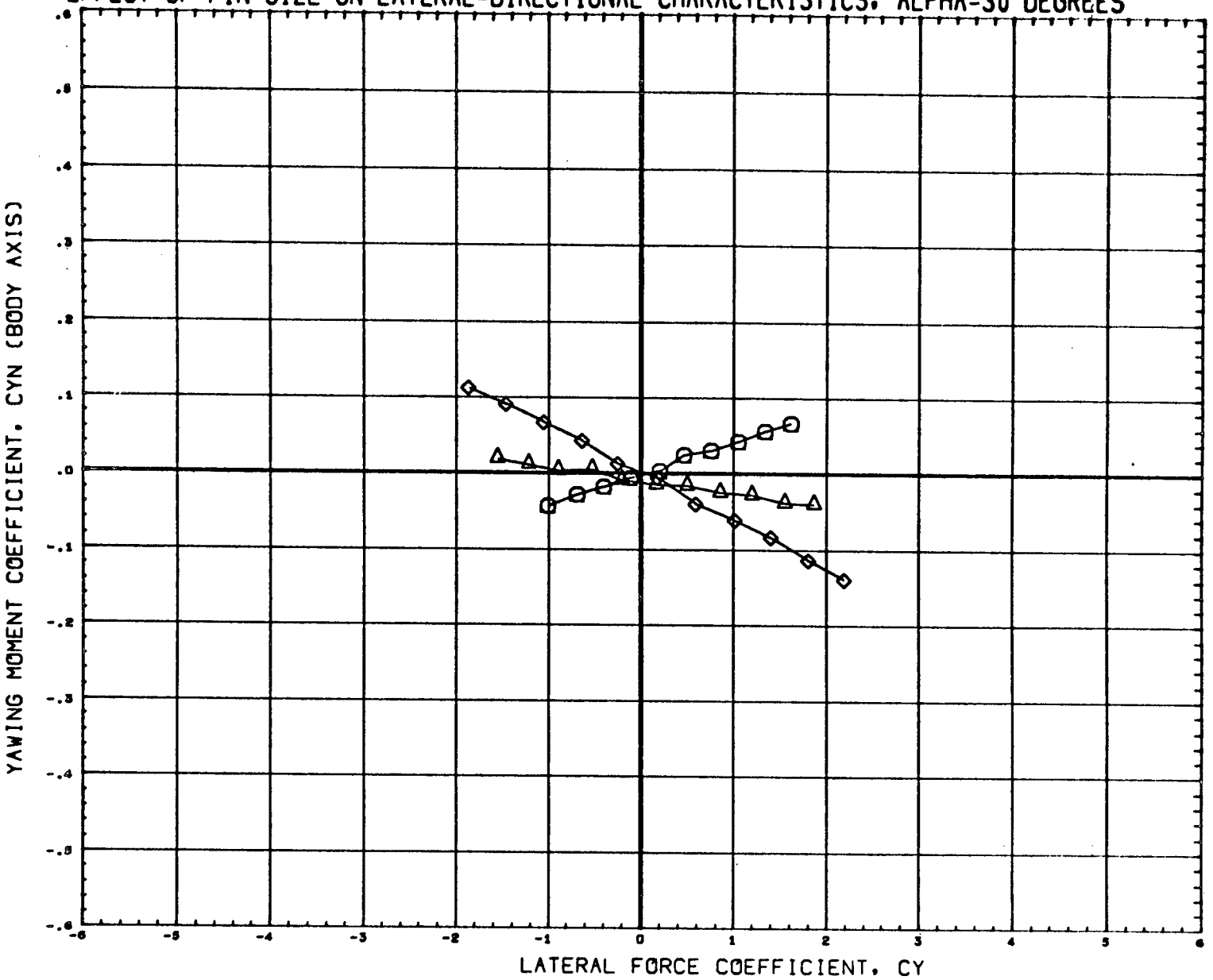
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



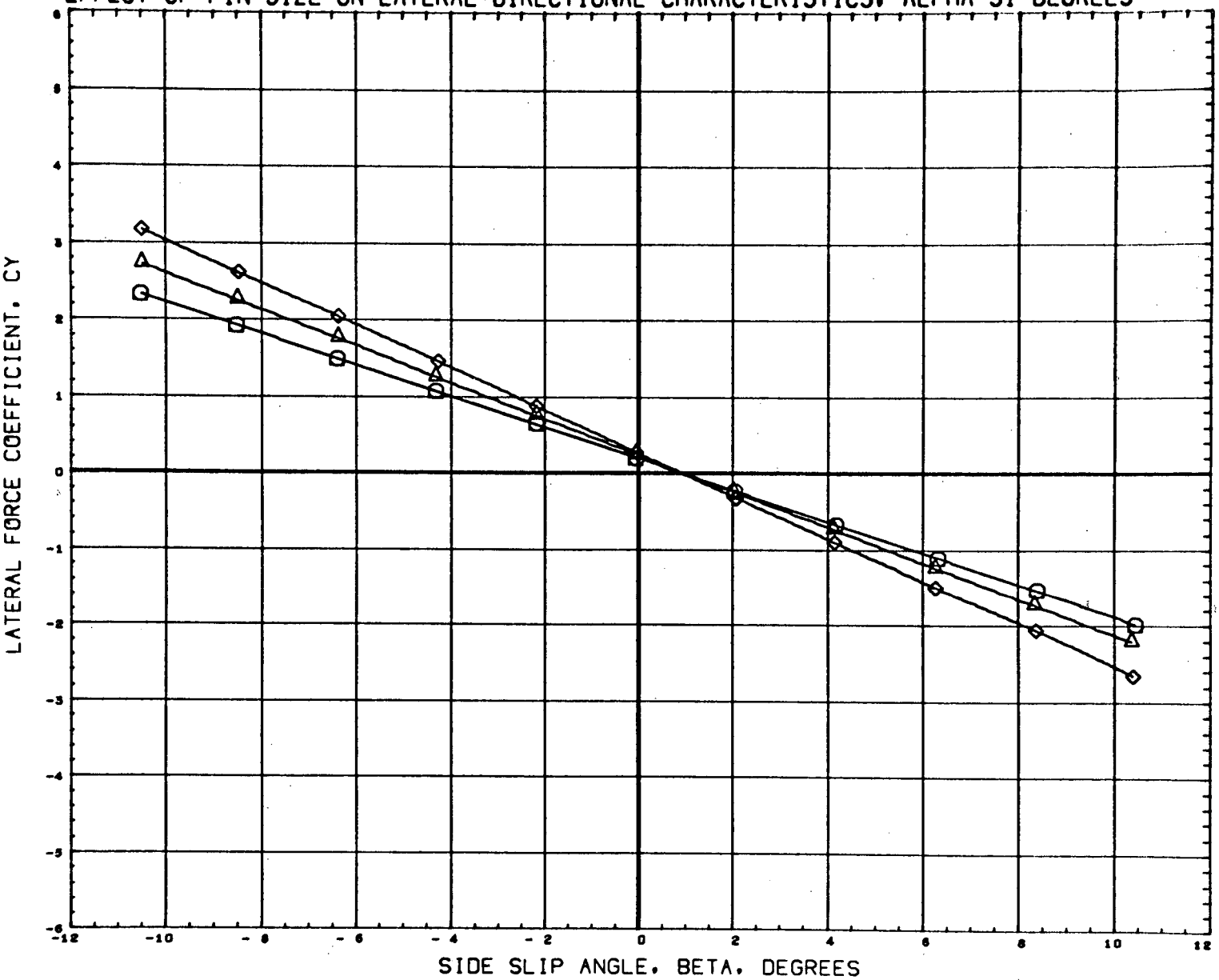
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55002)	○	MSFC TWT 521	BOOSTER	N1B1	30.000	
(A55005)	△	MSFC TWT 521	BOOSTER	N1B1F2	30.000	30.000
(A55010)	◇	MSFC TWT 521	BOOSTER	N1B1F6	30.000	30.000

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

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



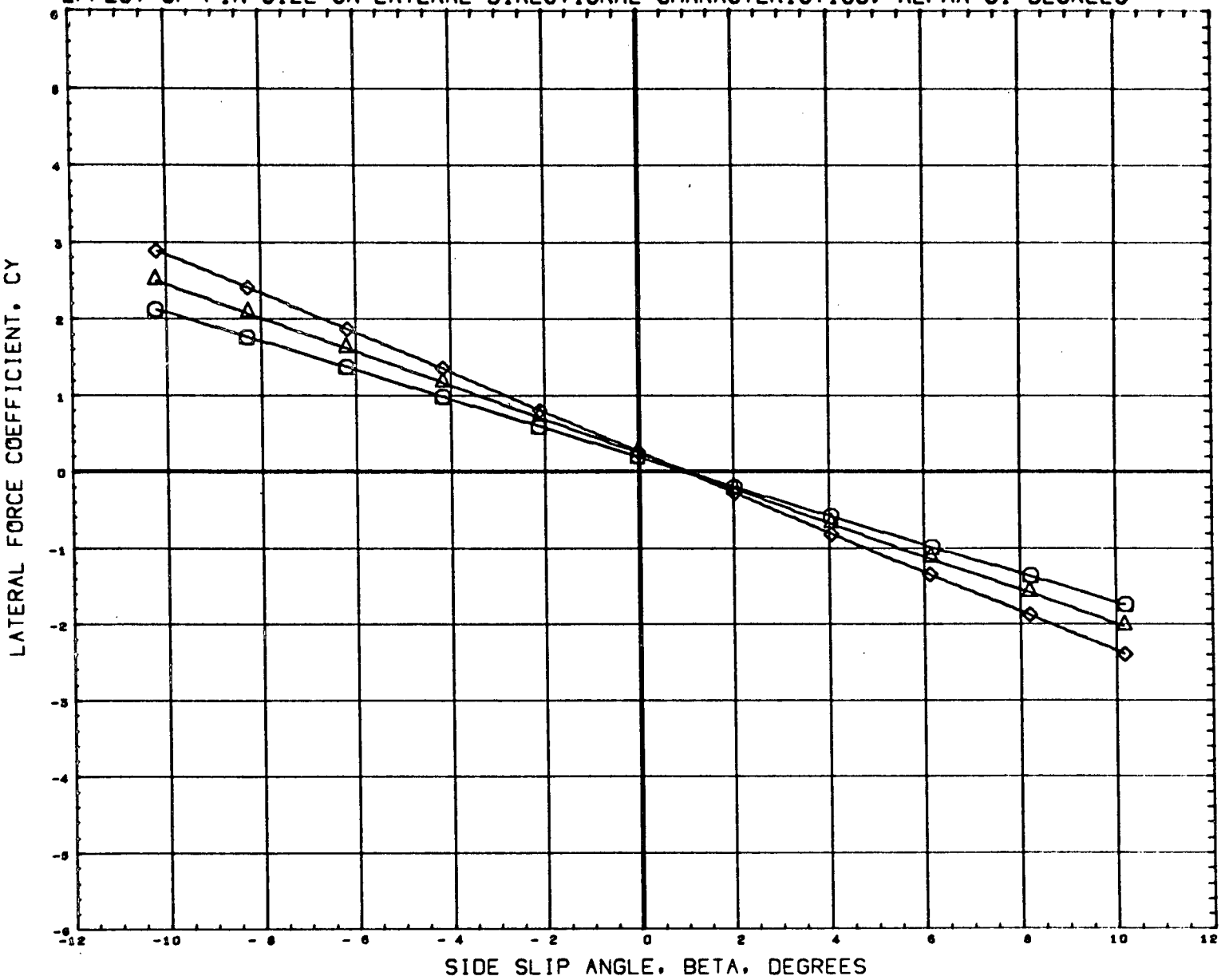
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



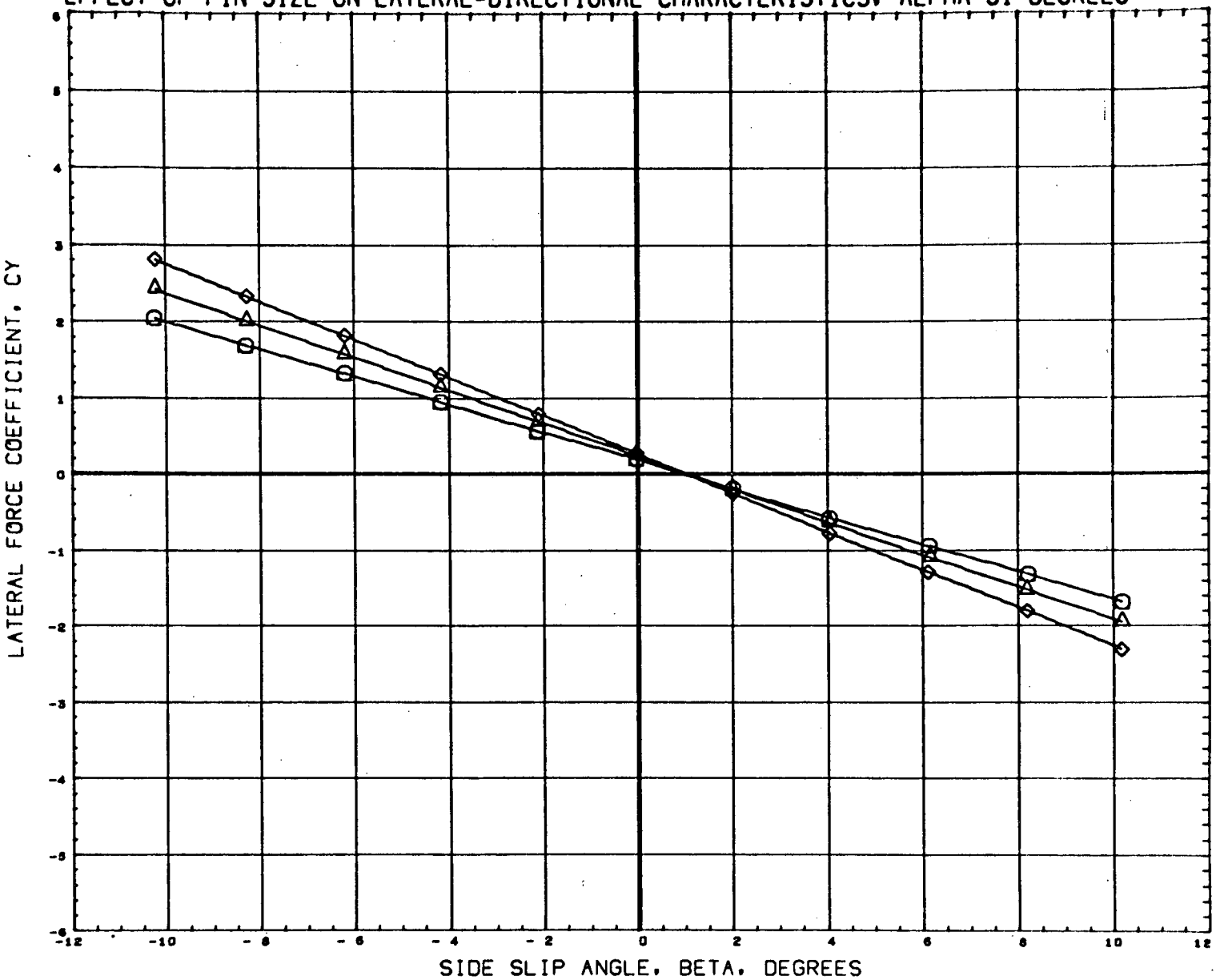
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



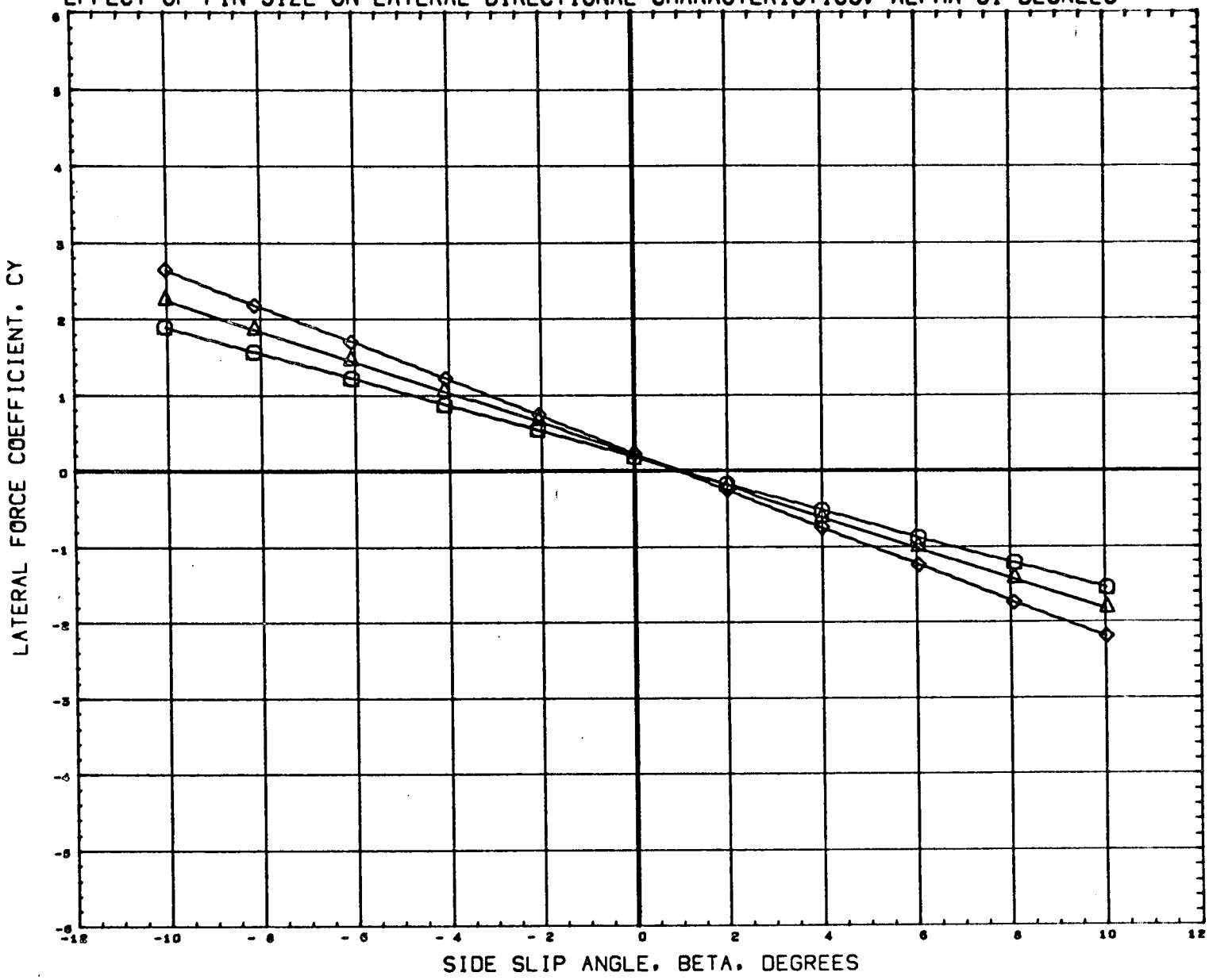
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



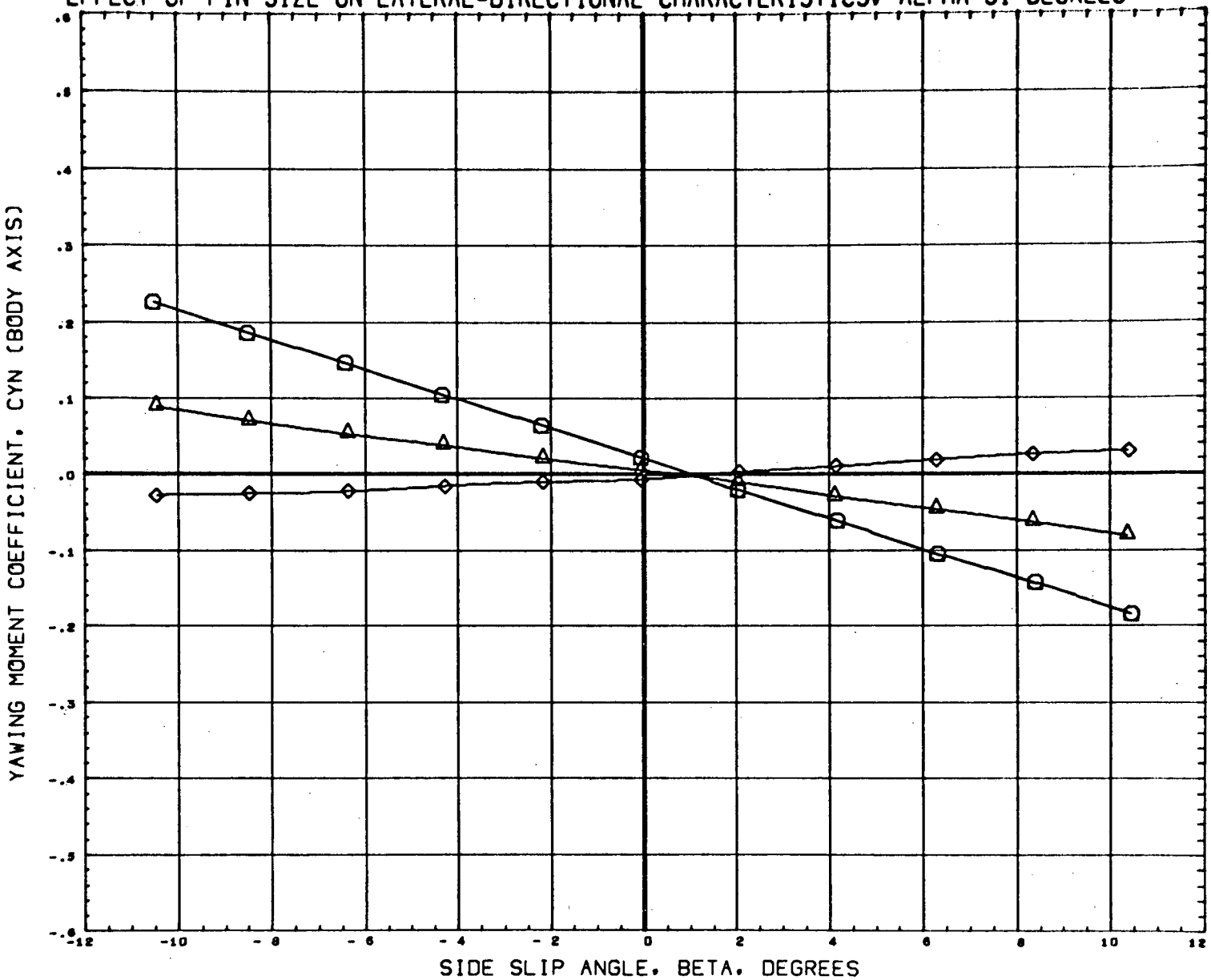
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



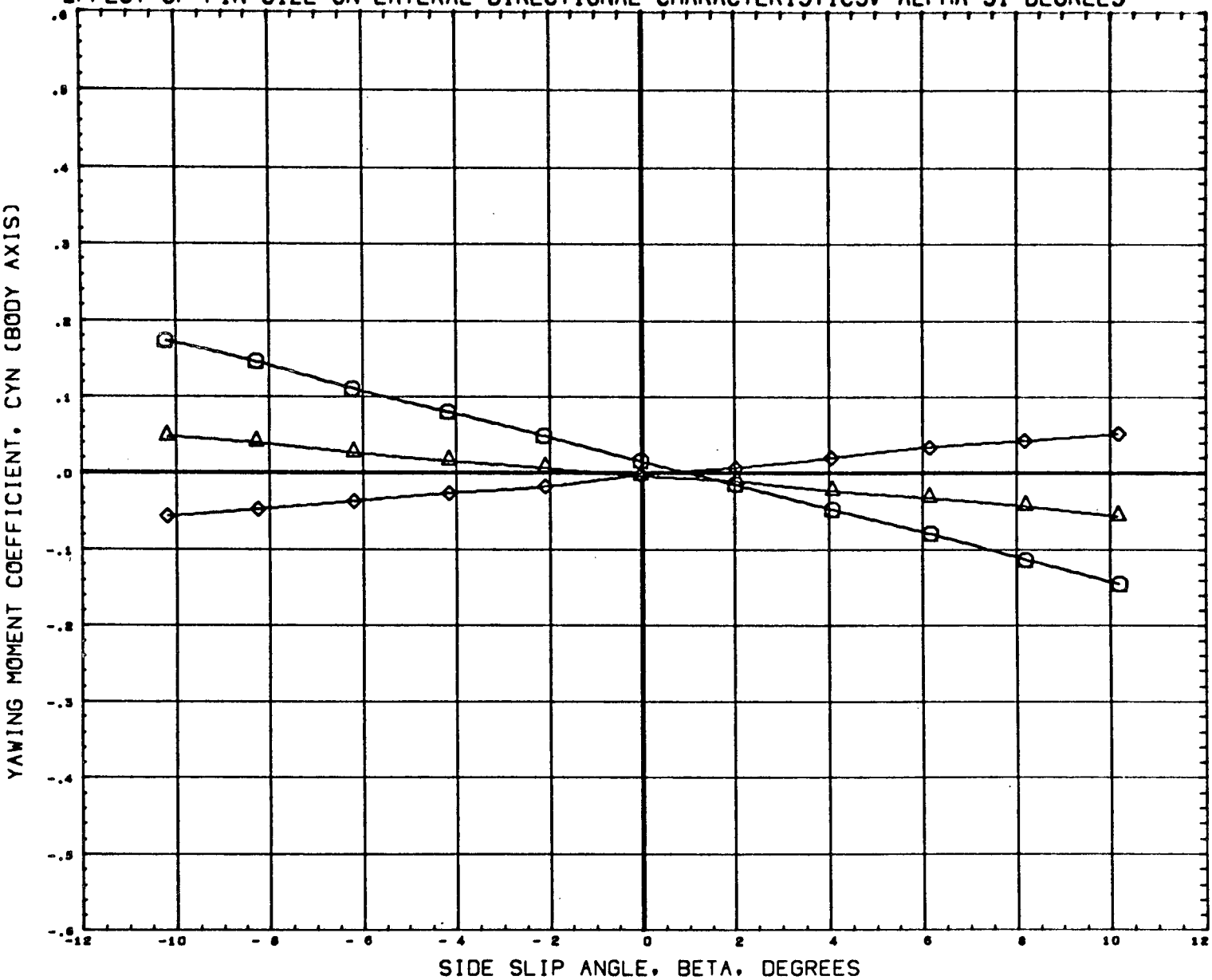
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



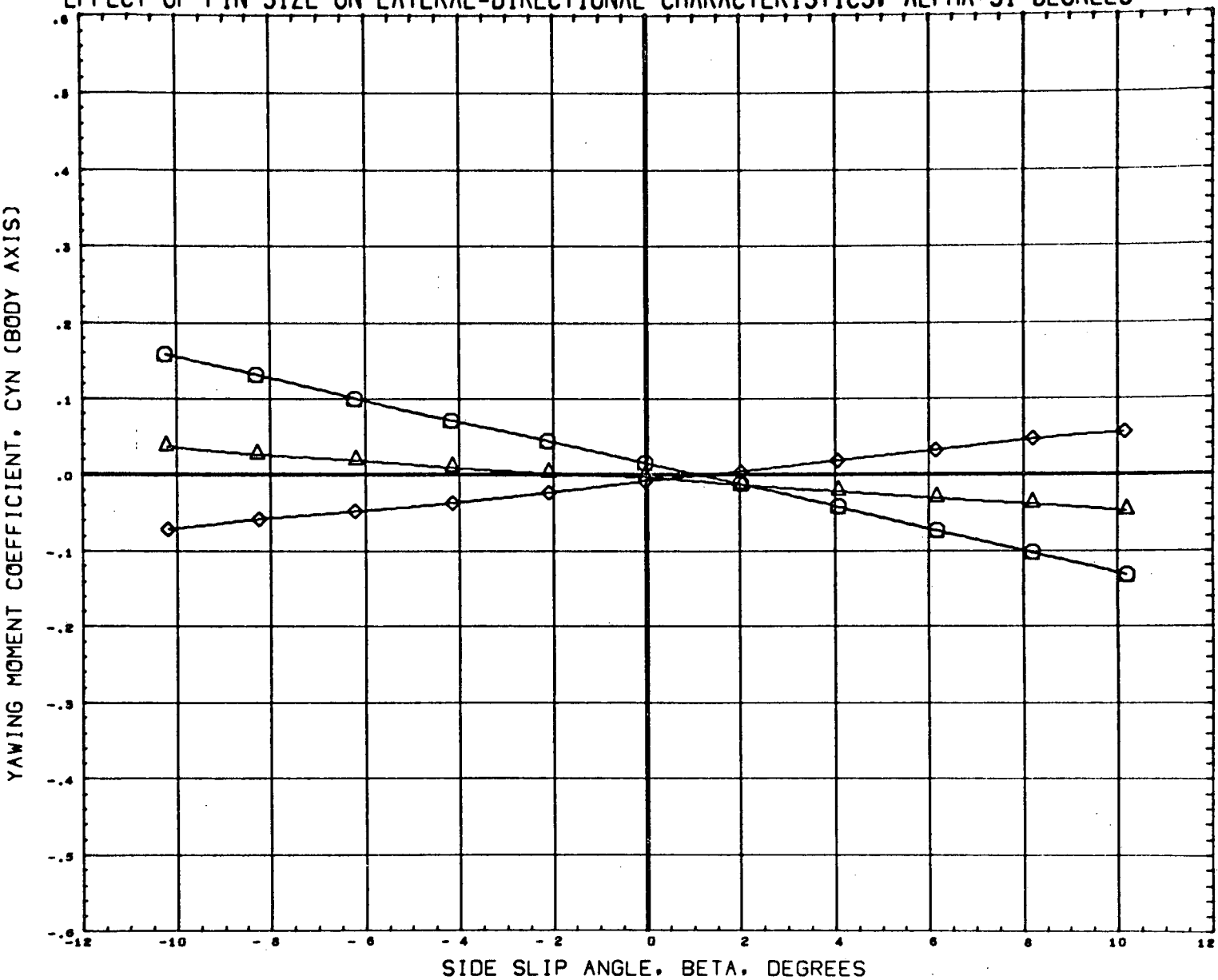
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



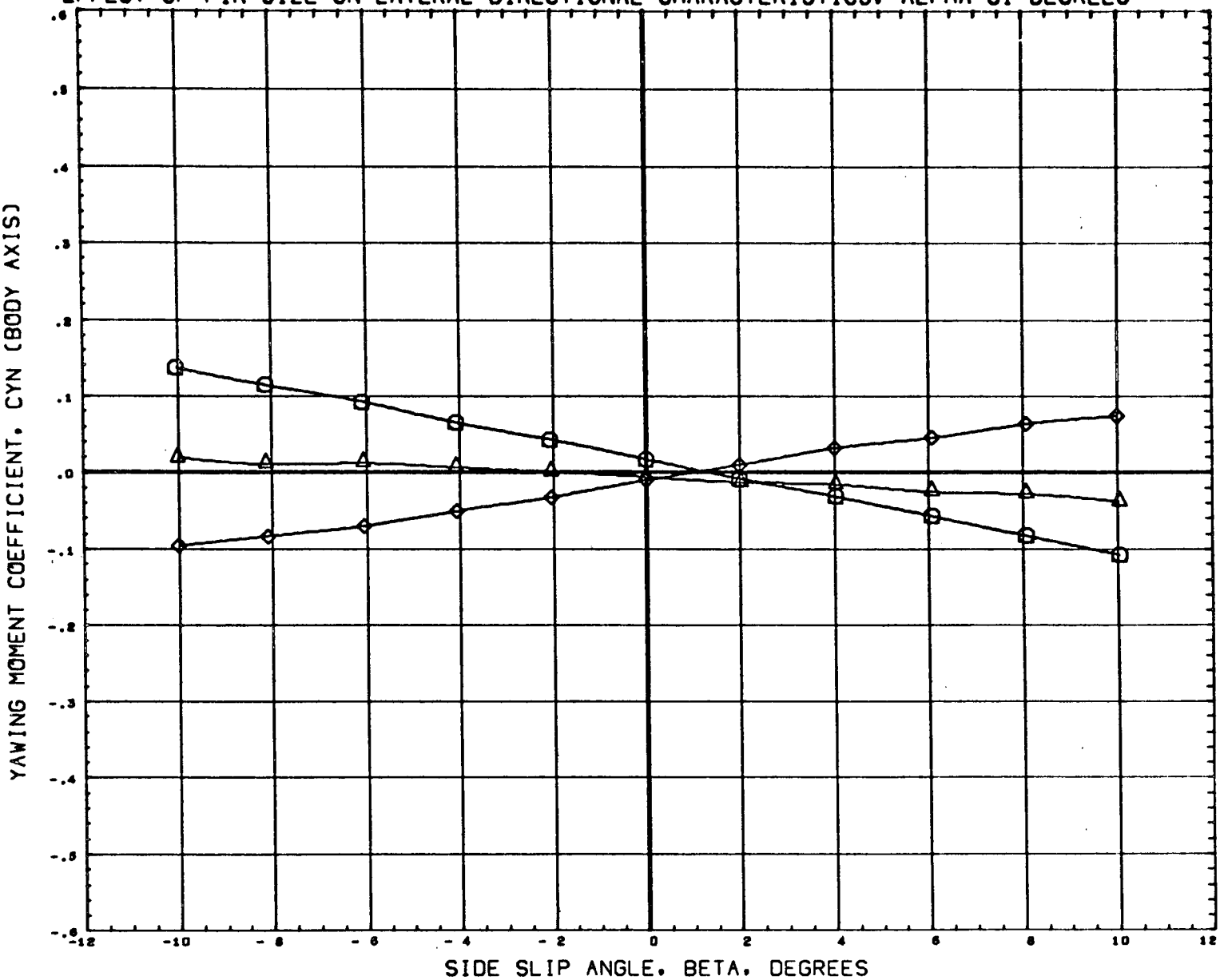
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



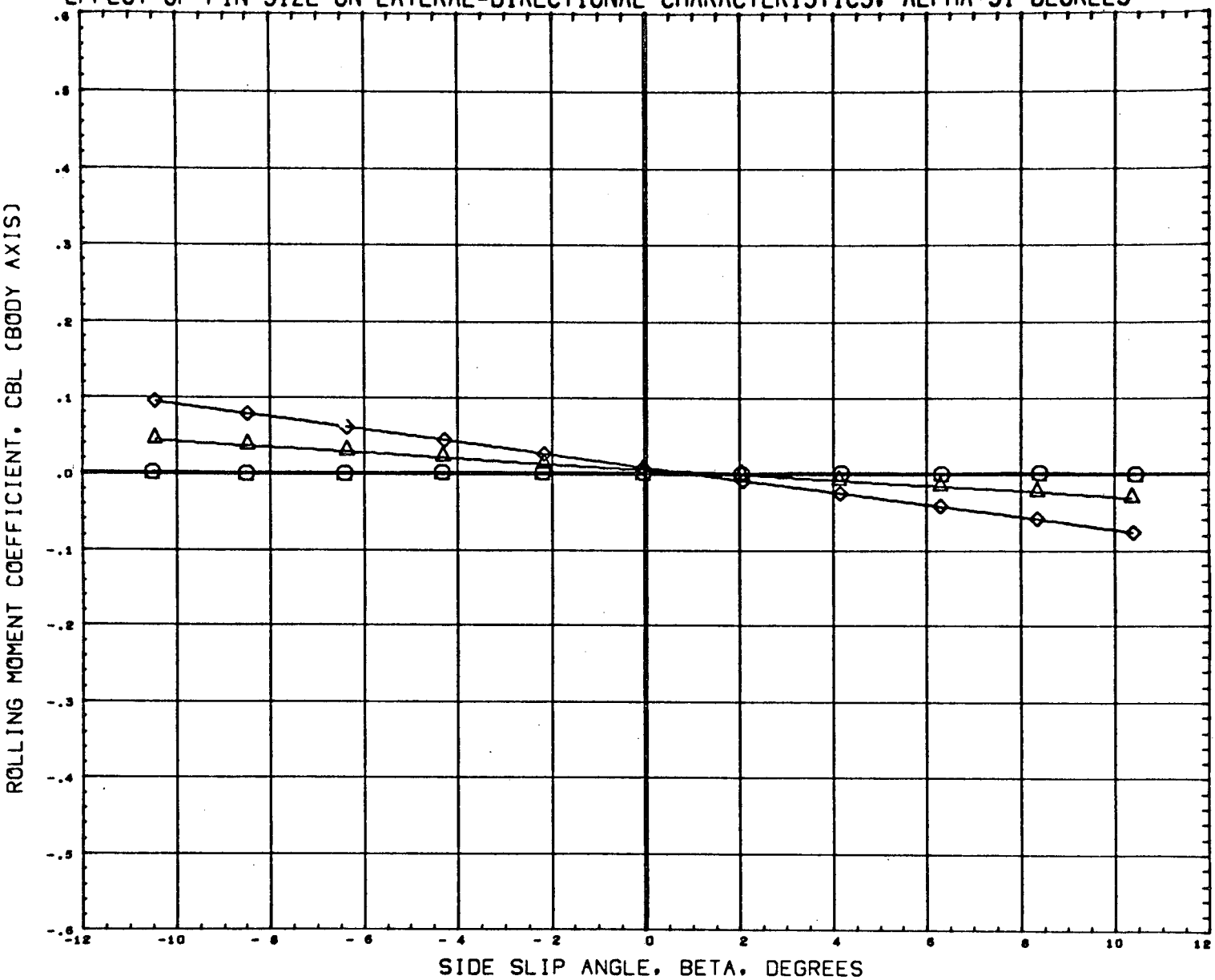
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



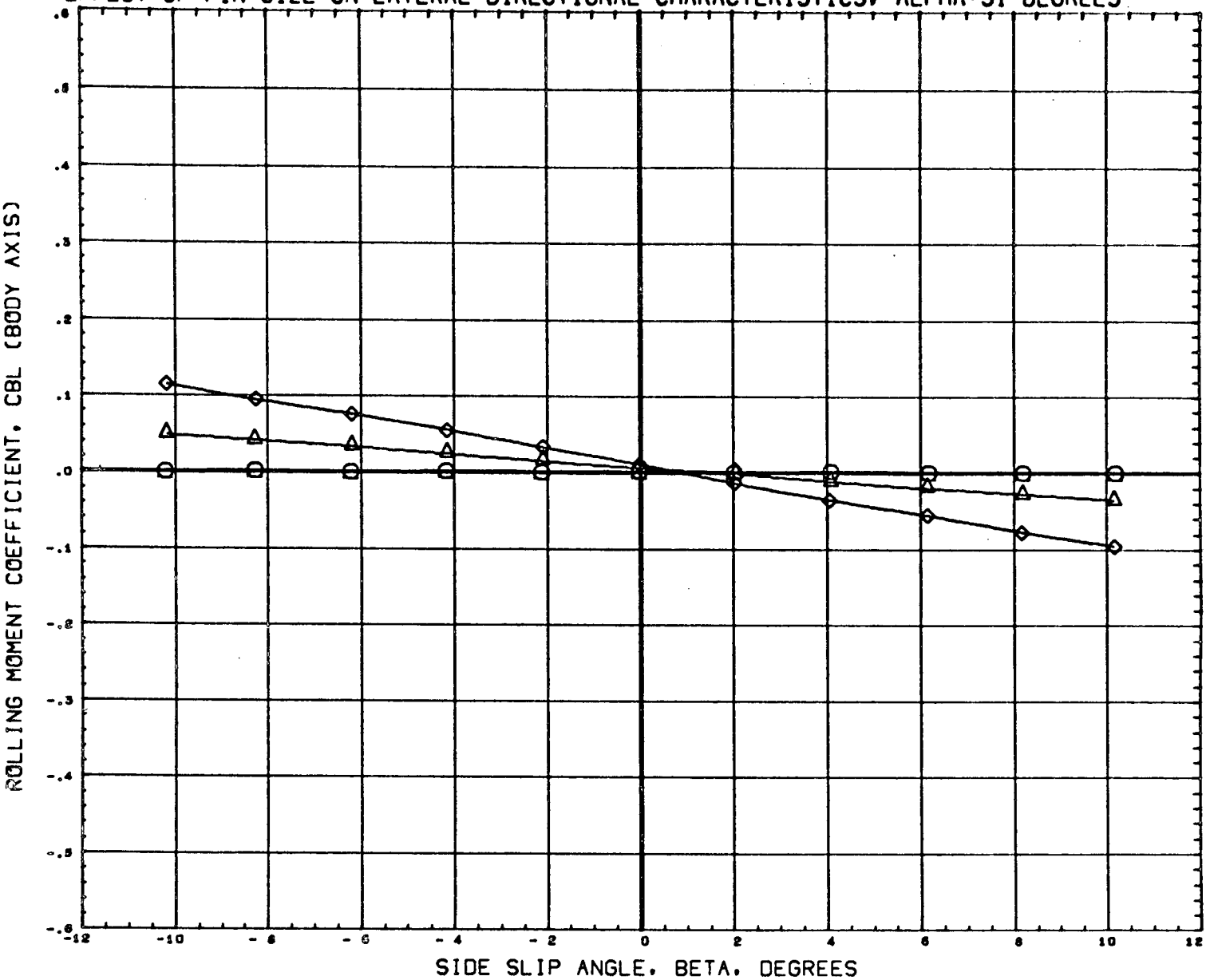
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



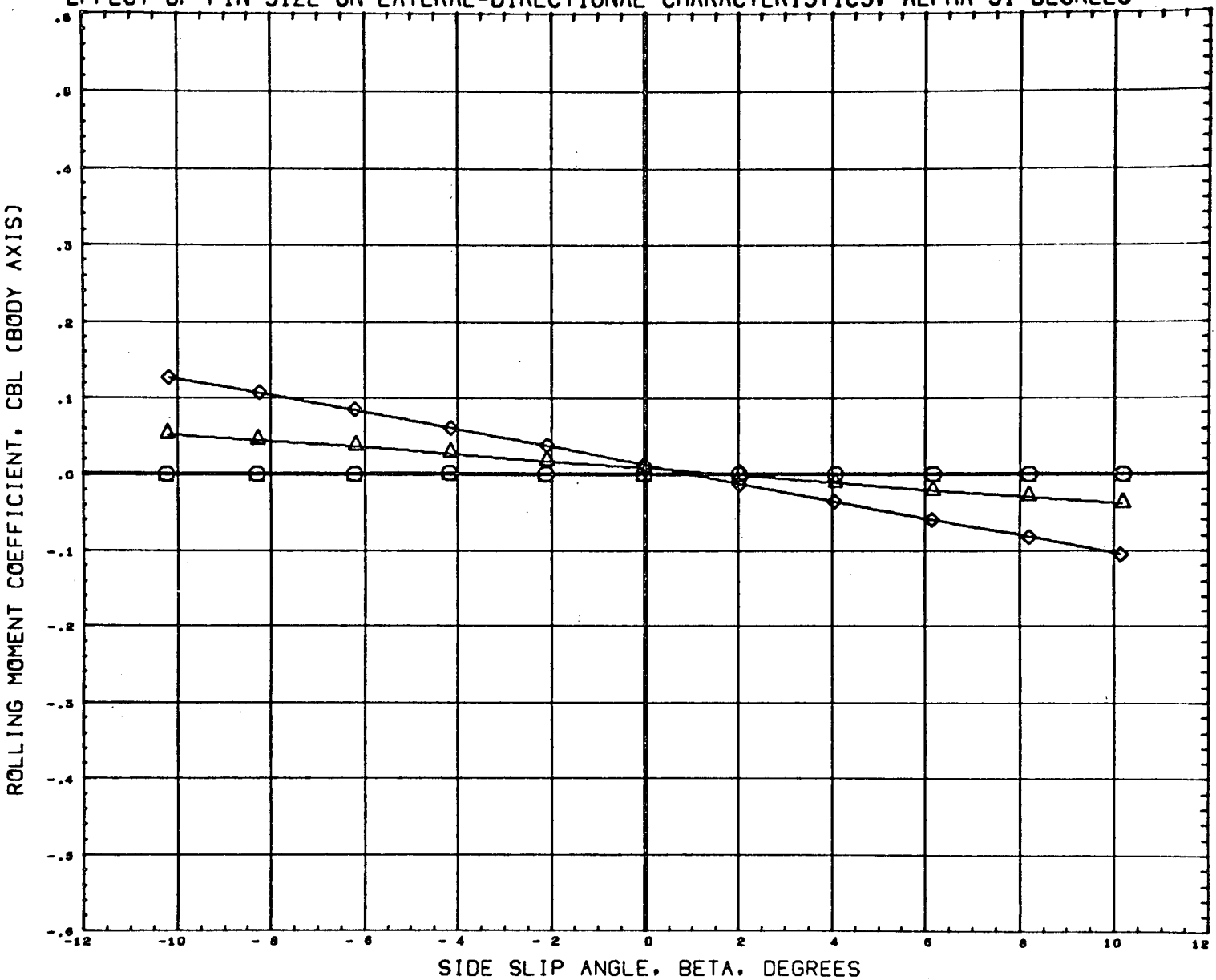
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



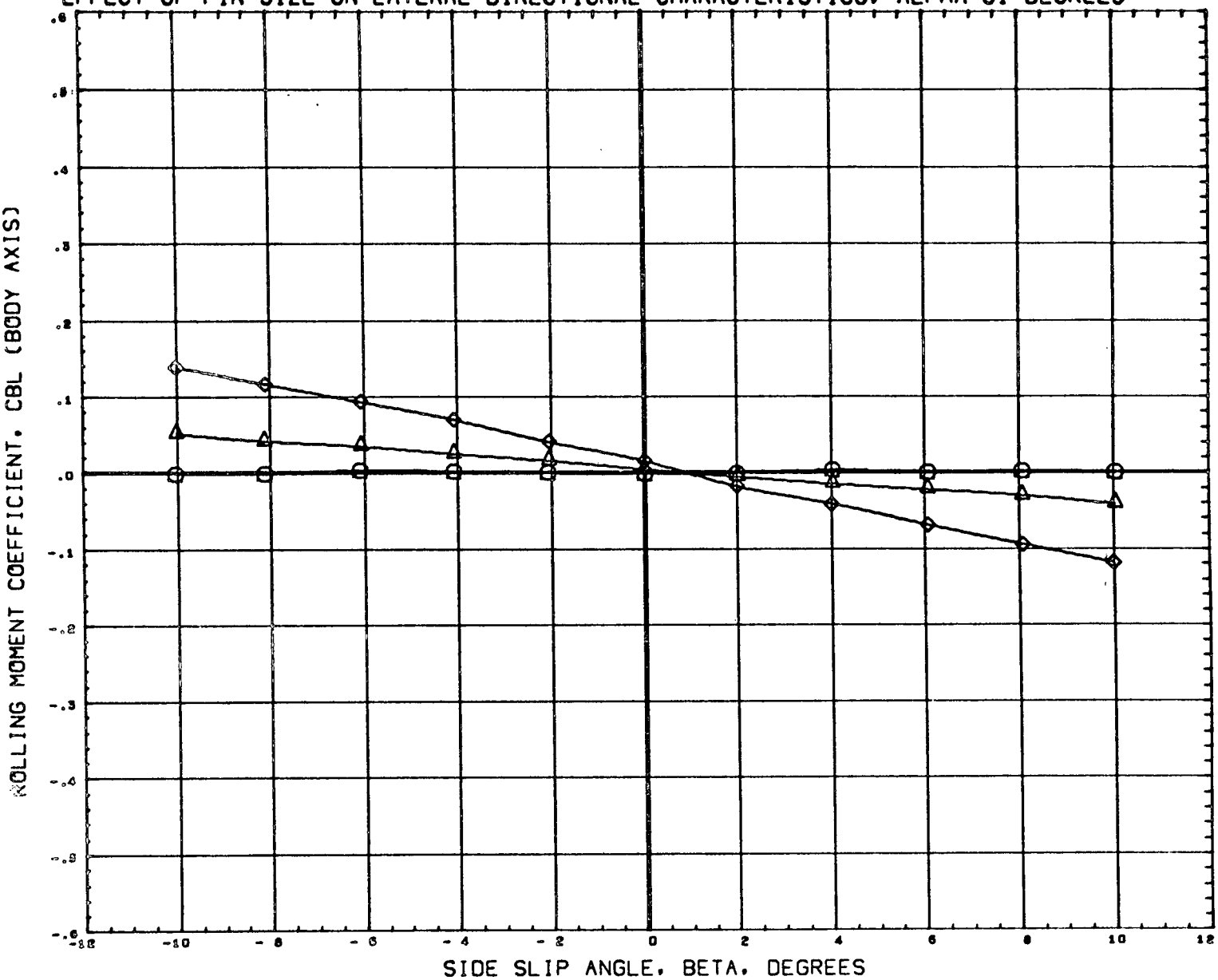
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



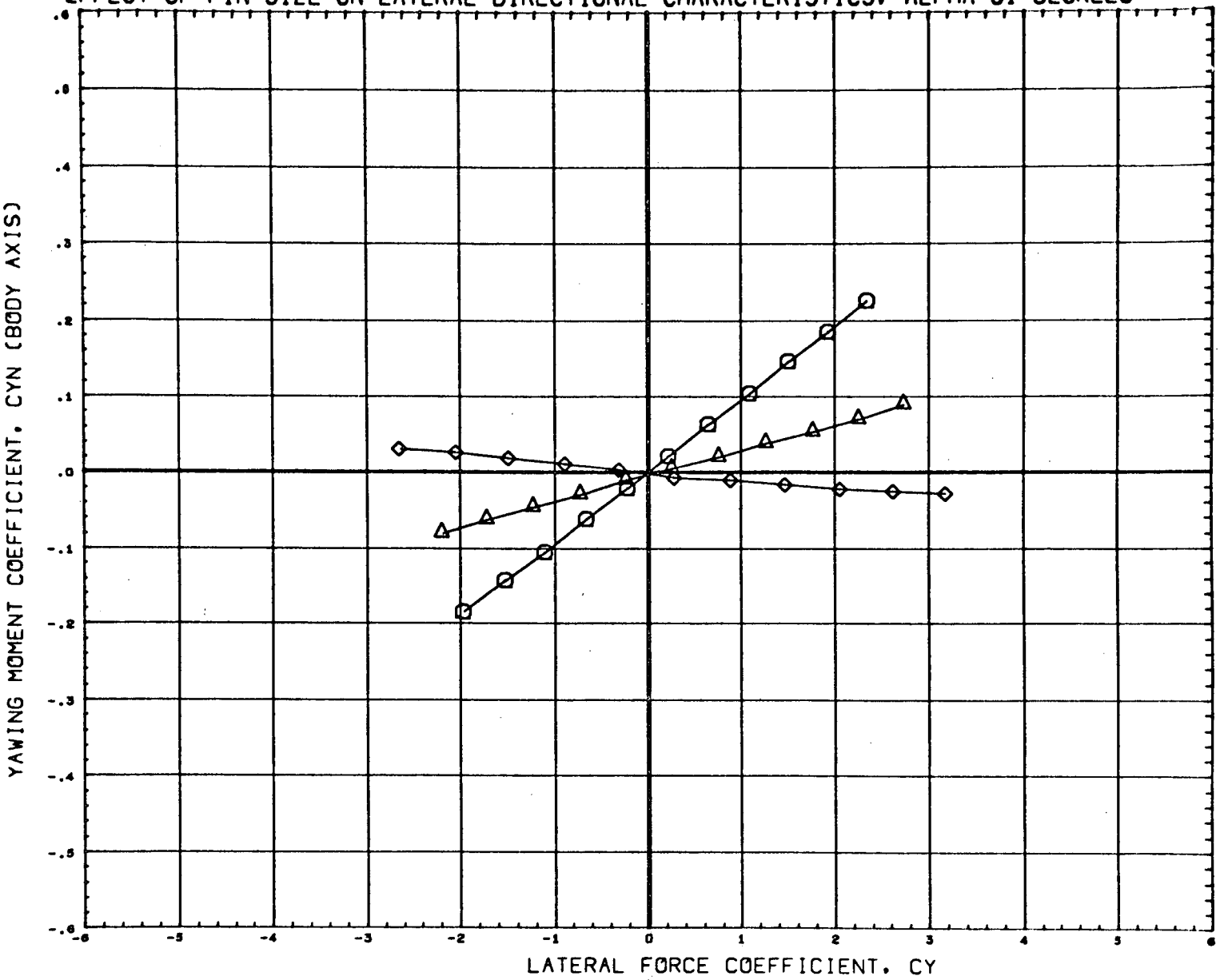
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A95006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A95011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



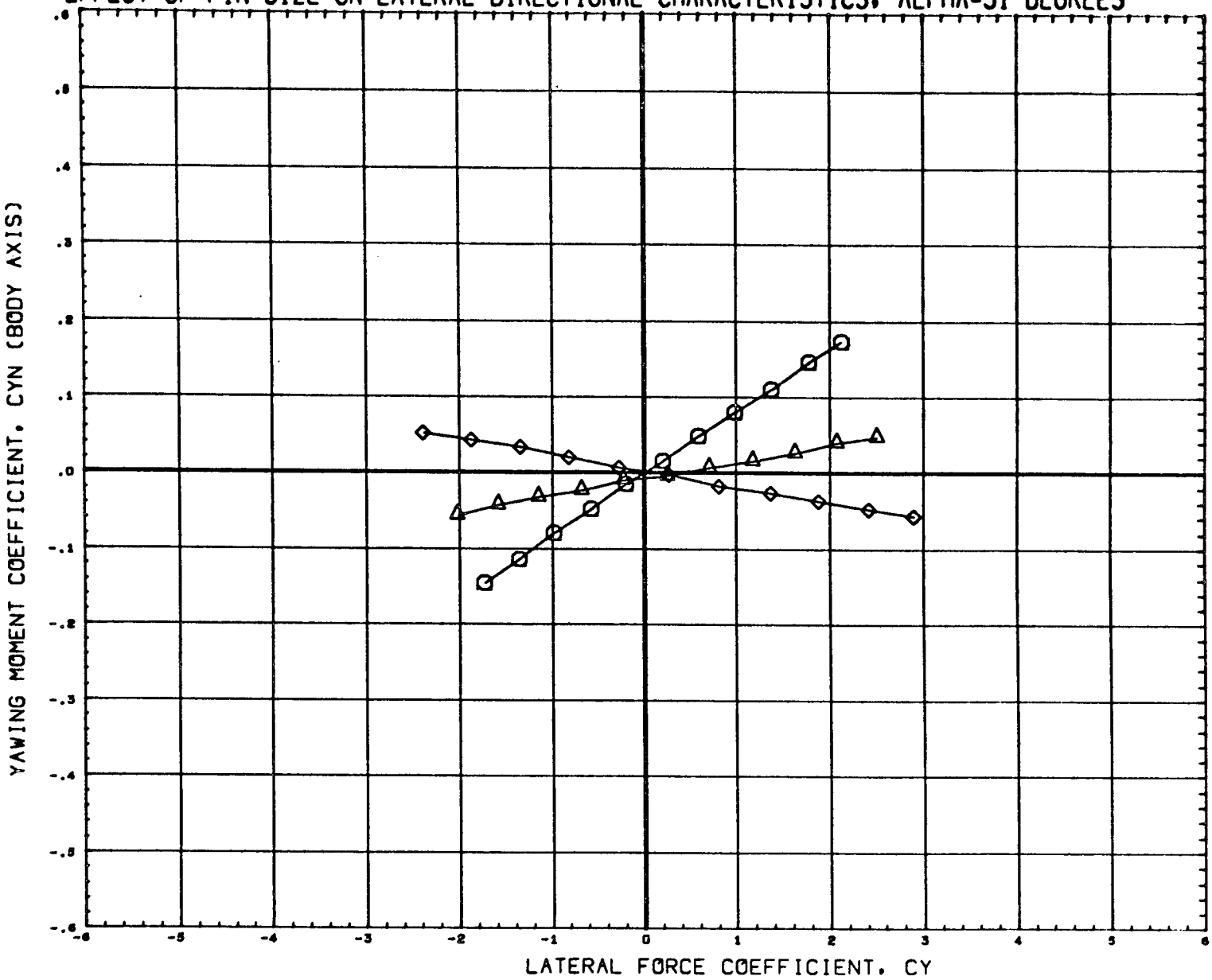
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



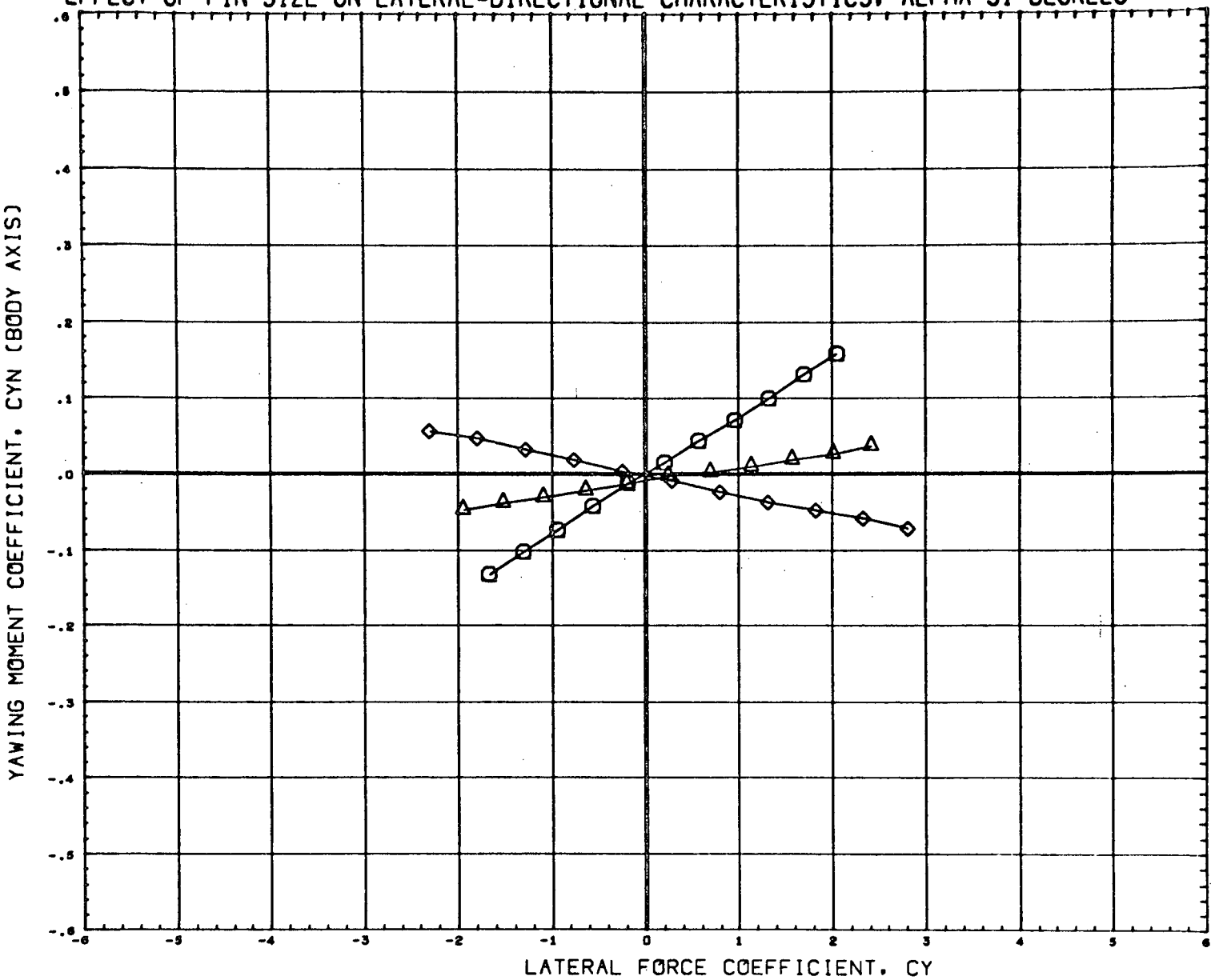
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



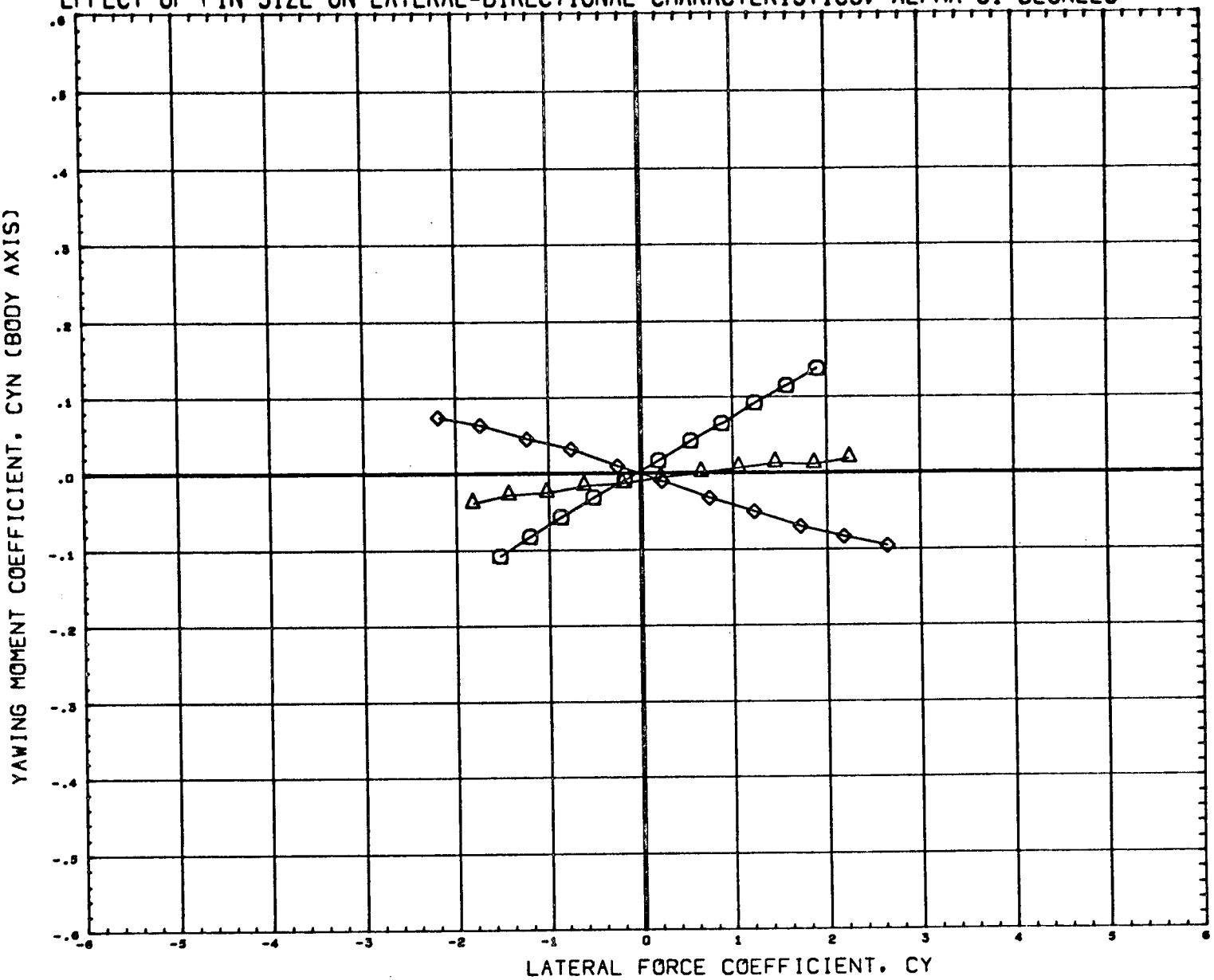
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



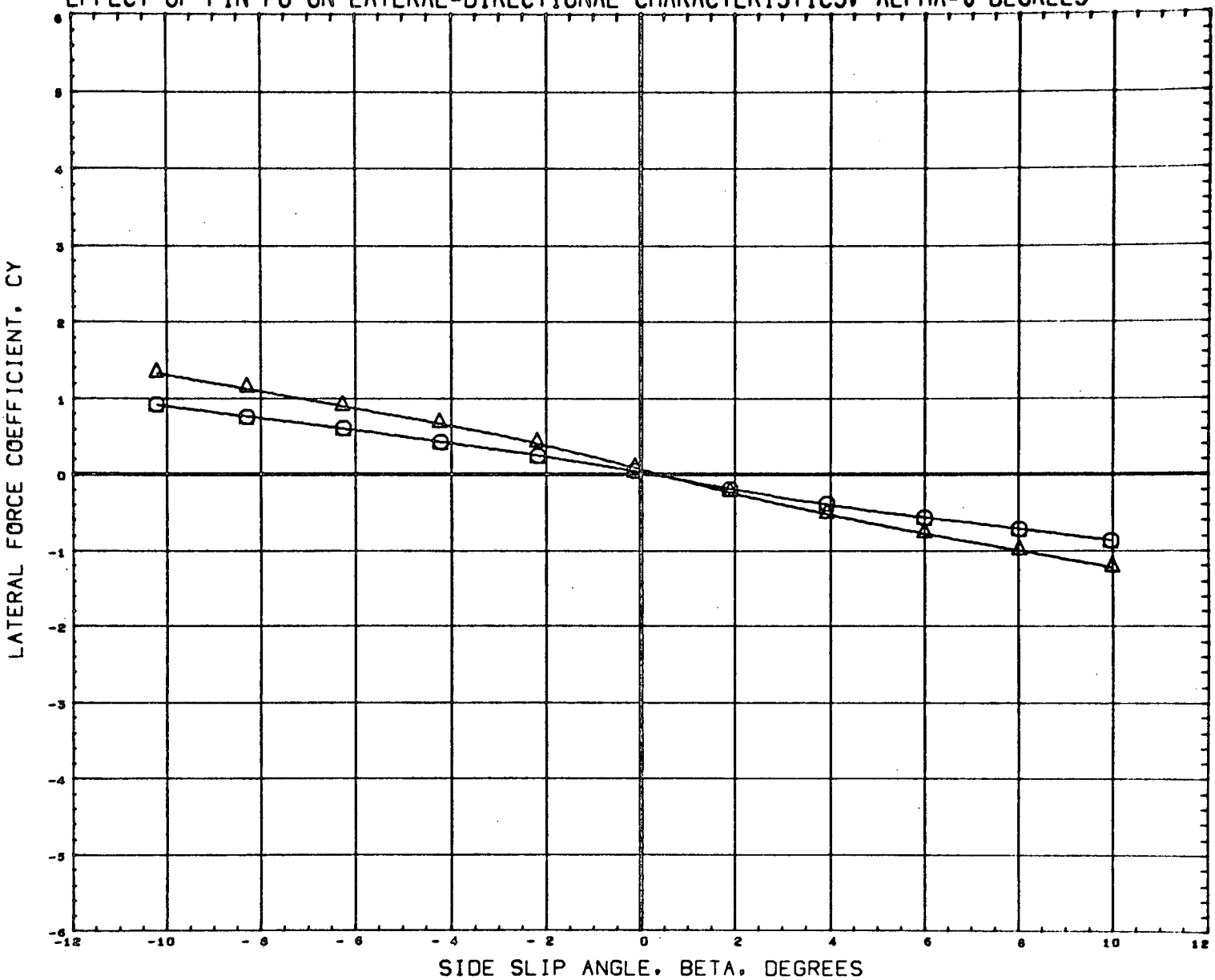
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(F55003)	○	MSFC TWT 521	BOOSTER	N1B1	51.000	
(A55006)	△	MSFC TWT 521	BOOSTER	N1B1F2	51.000	30.000
(A55011)	◇	MSFC TWT 521	BOOSTER	N1B1F6	51.000	30.000

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

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



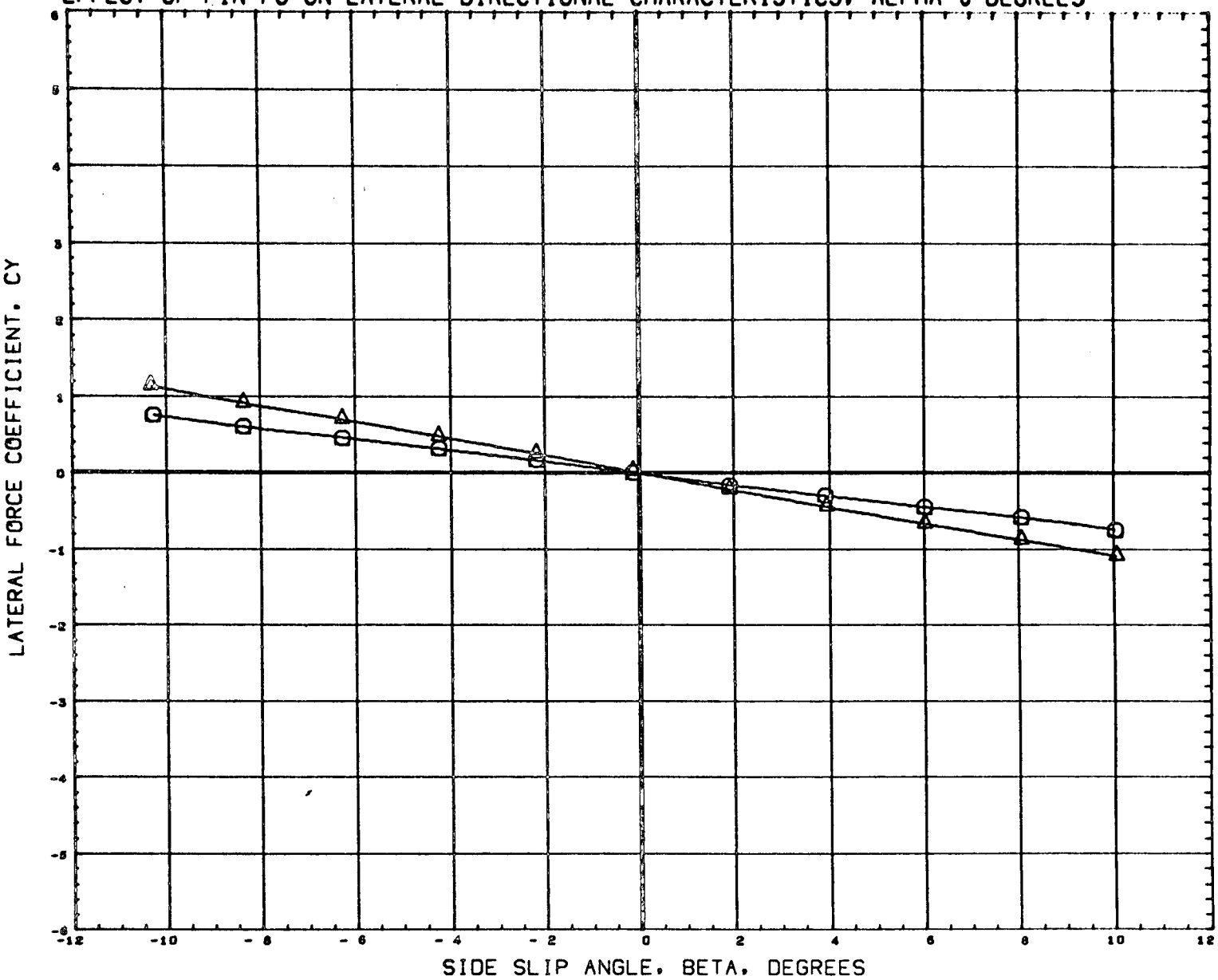
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 .90

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



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

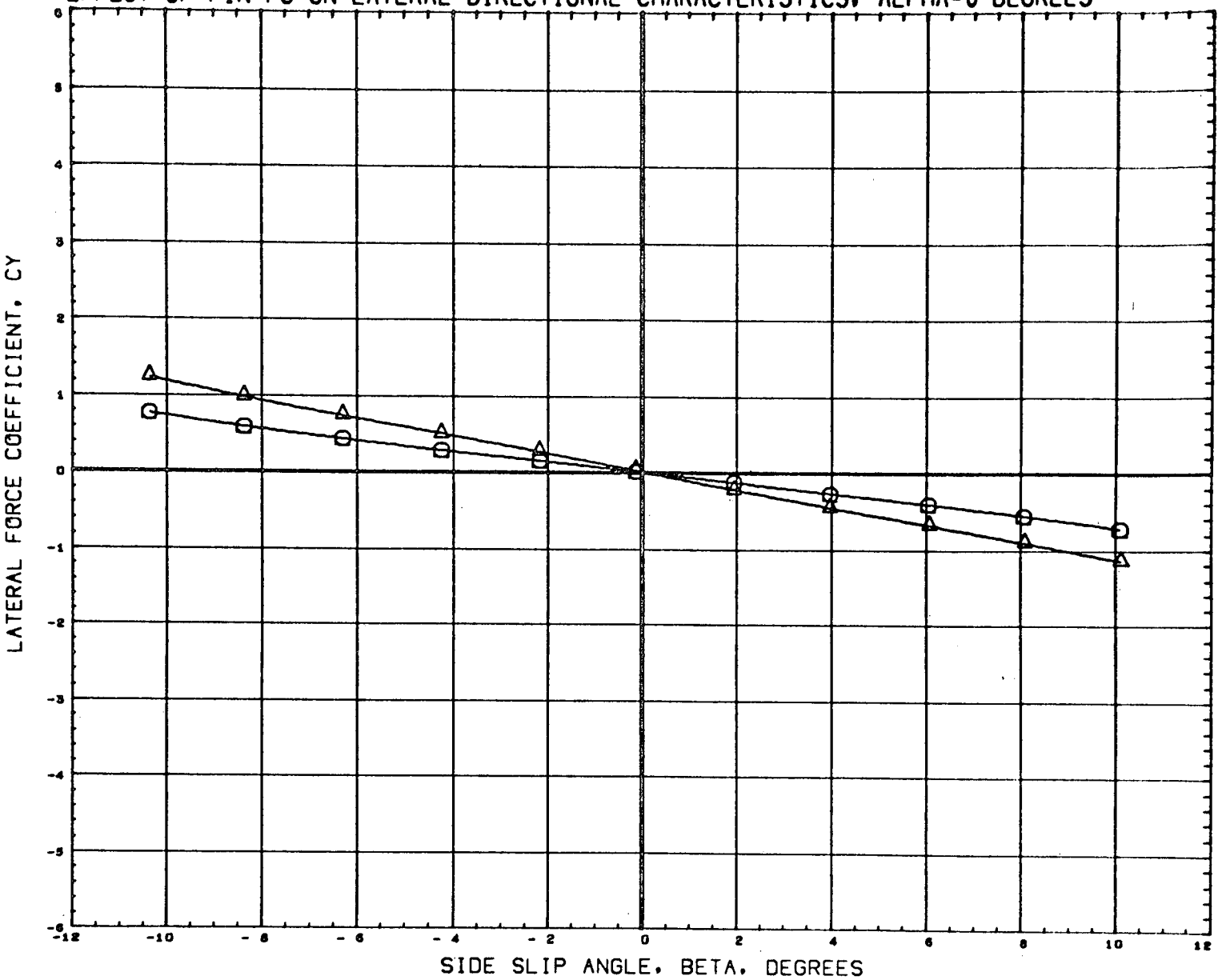
REFERENCE INFORMATION

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 1.20

C.3

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



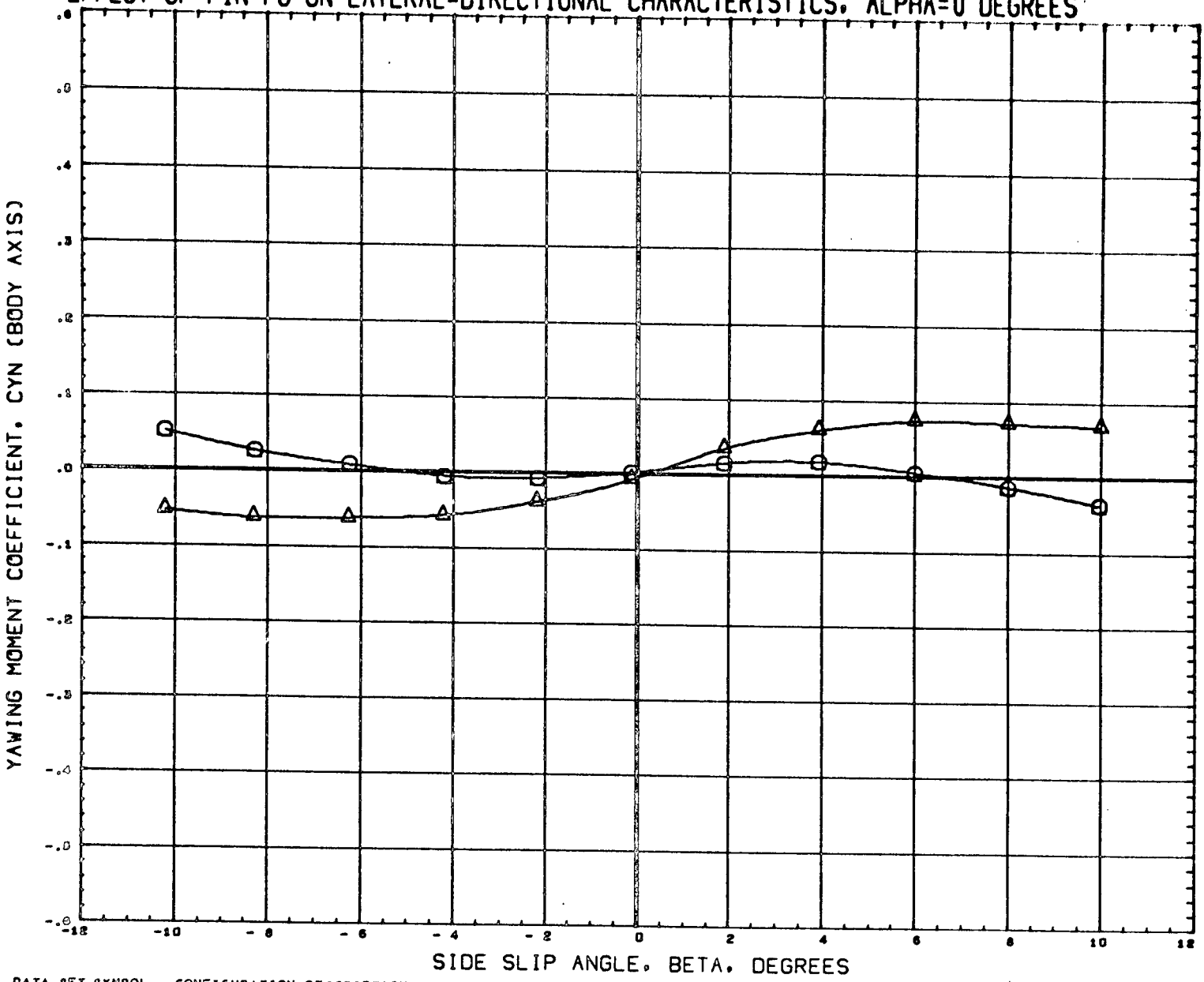
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 1.46

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



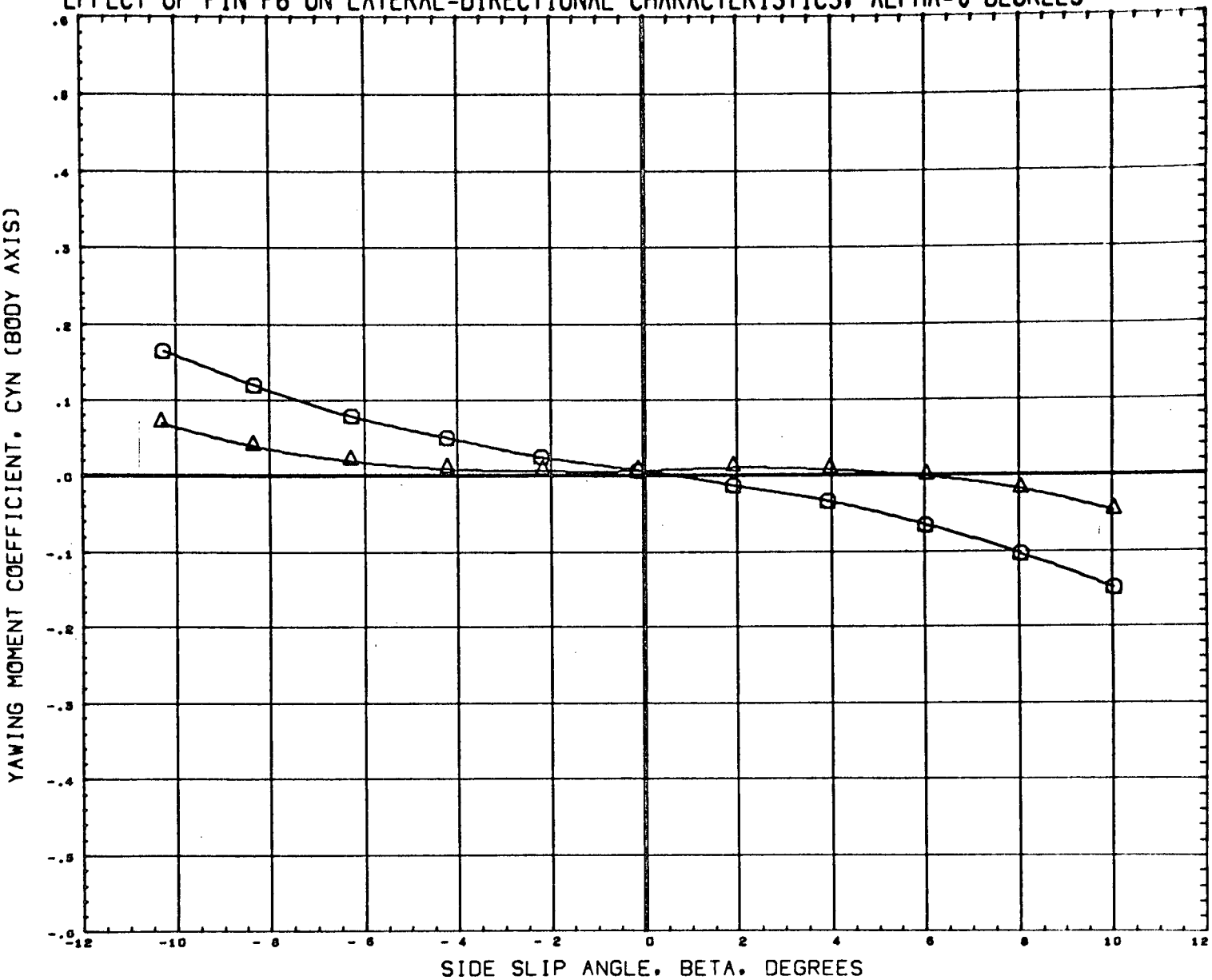
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1FG	0.000	30.000

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 .90

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



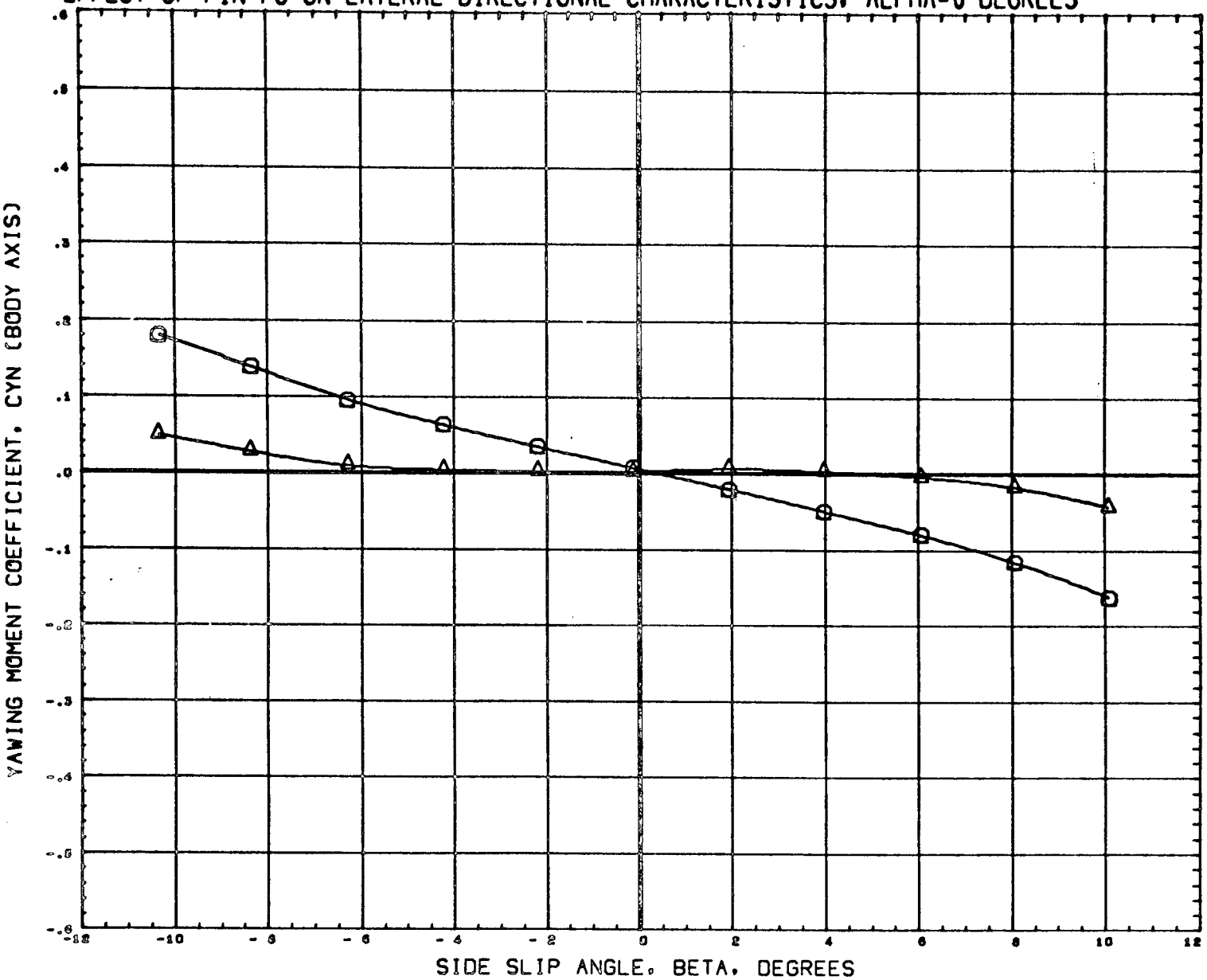
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 1.20

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



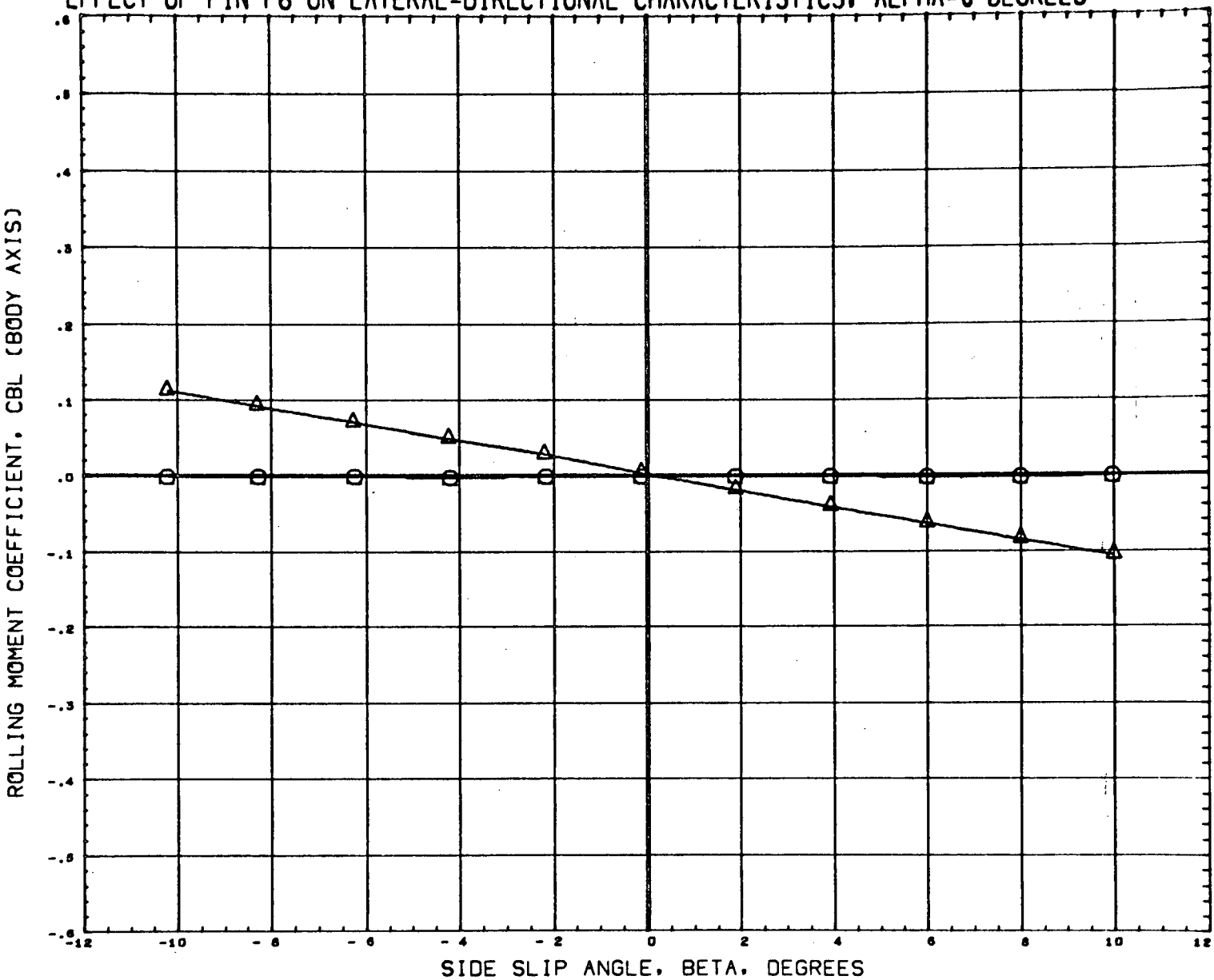
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 921	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 921	BOOSTER	N1B1F6	0.000	30.000

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 1.46

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



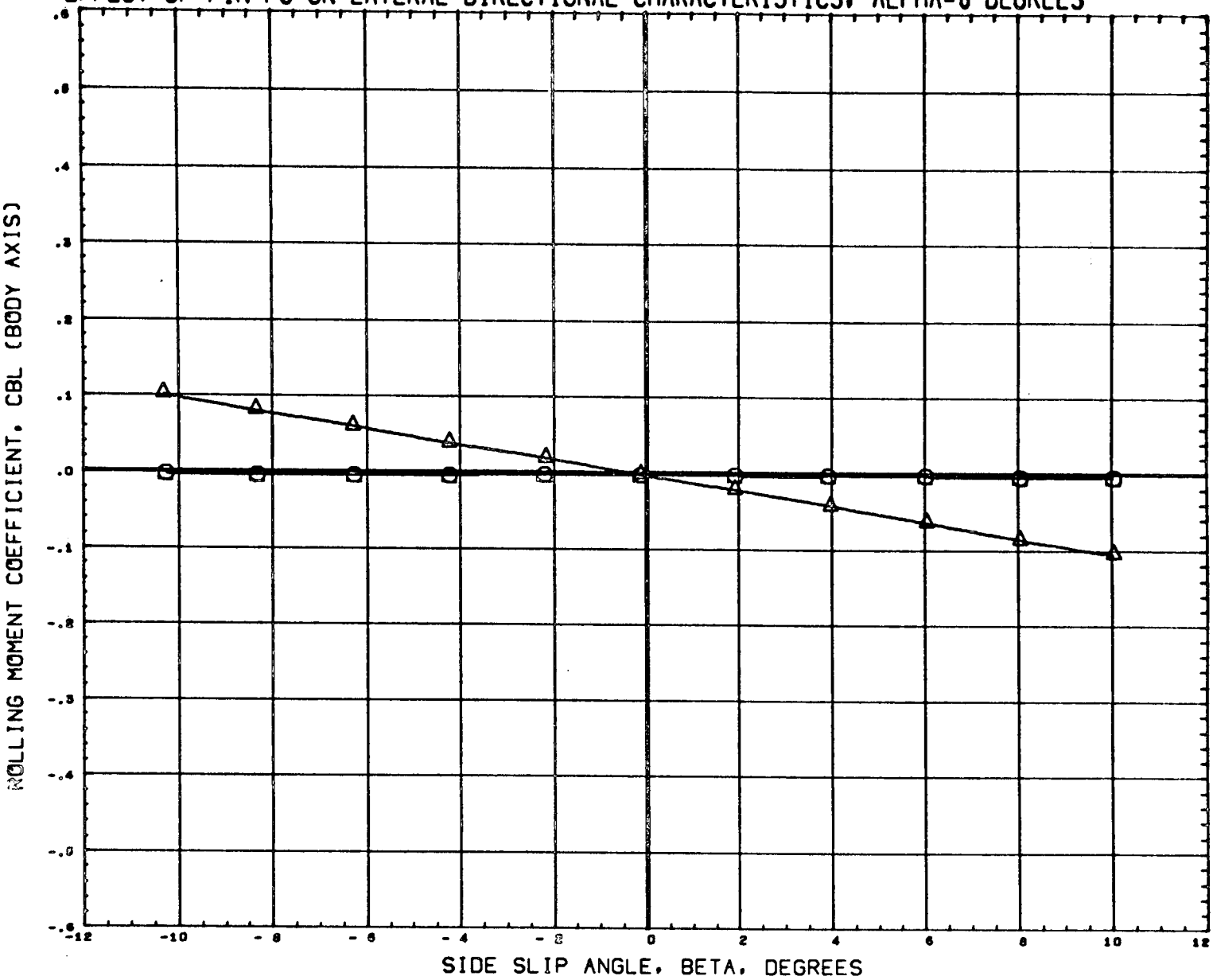
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 .90

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



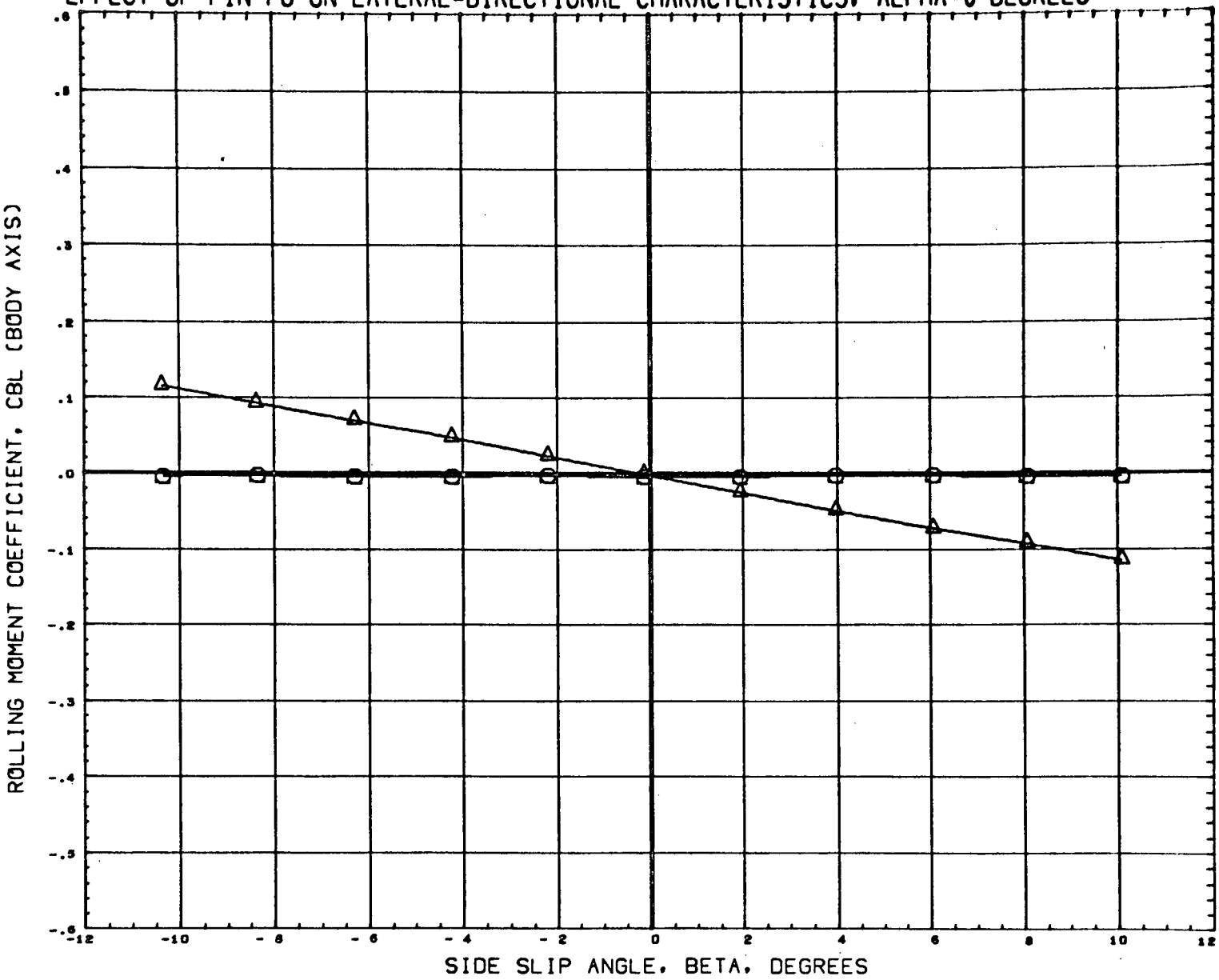
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 1.20

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



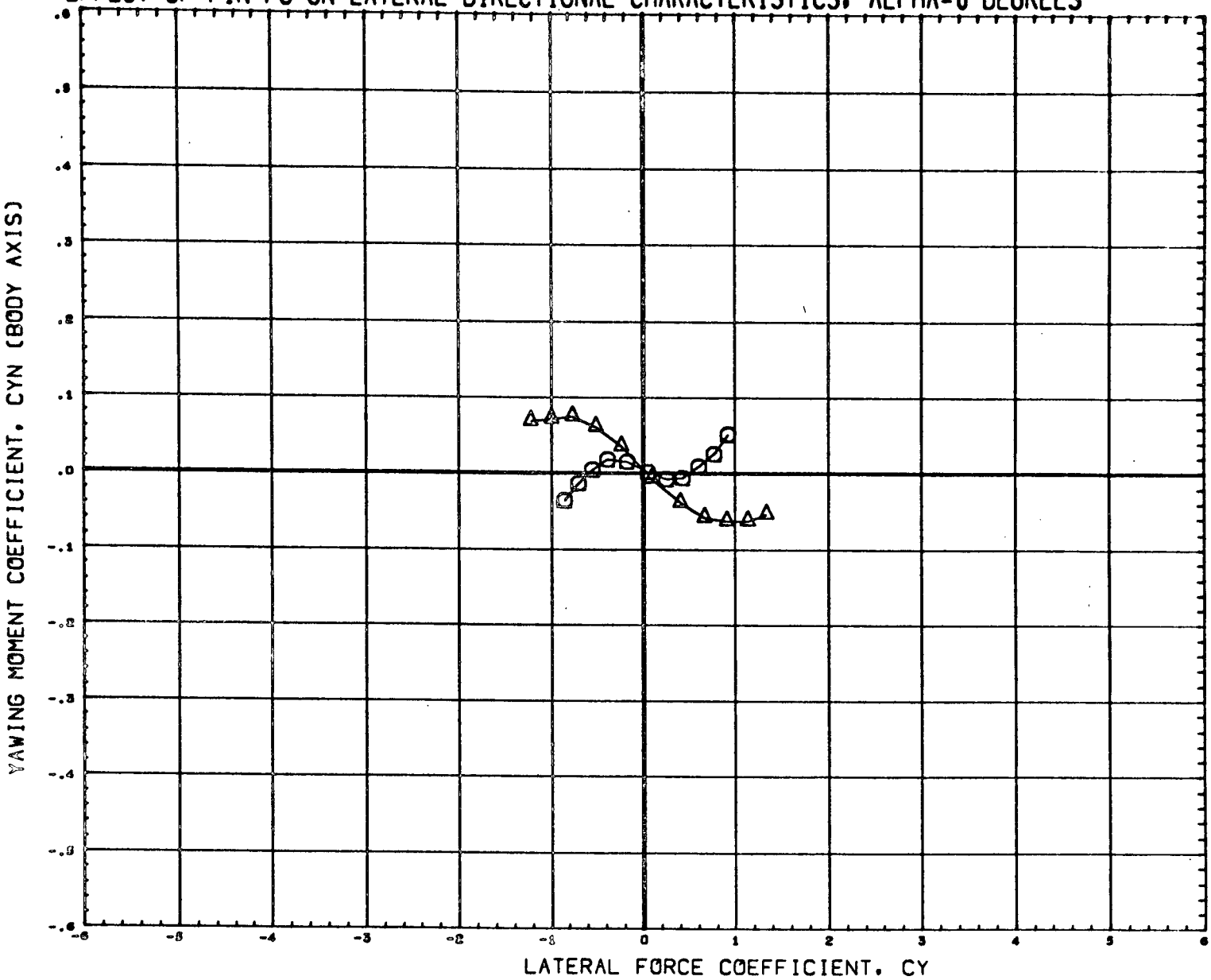
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 1.46

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



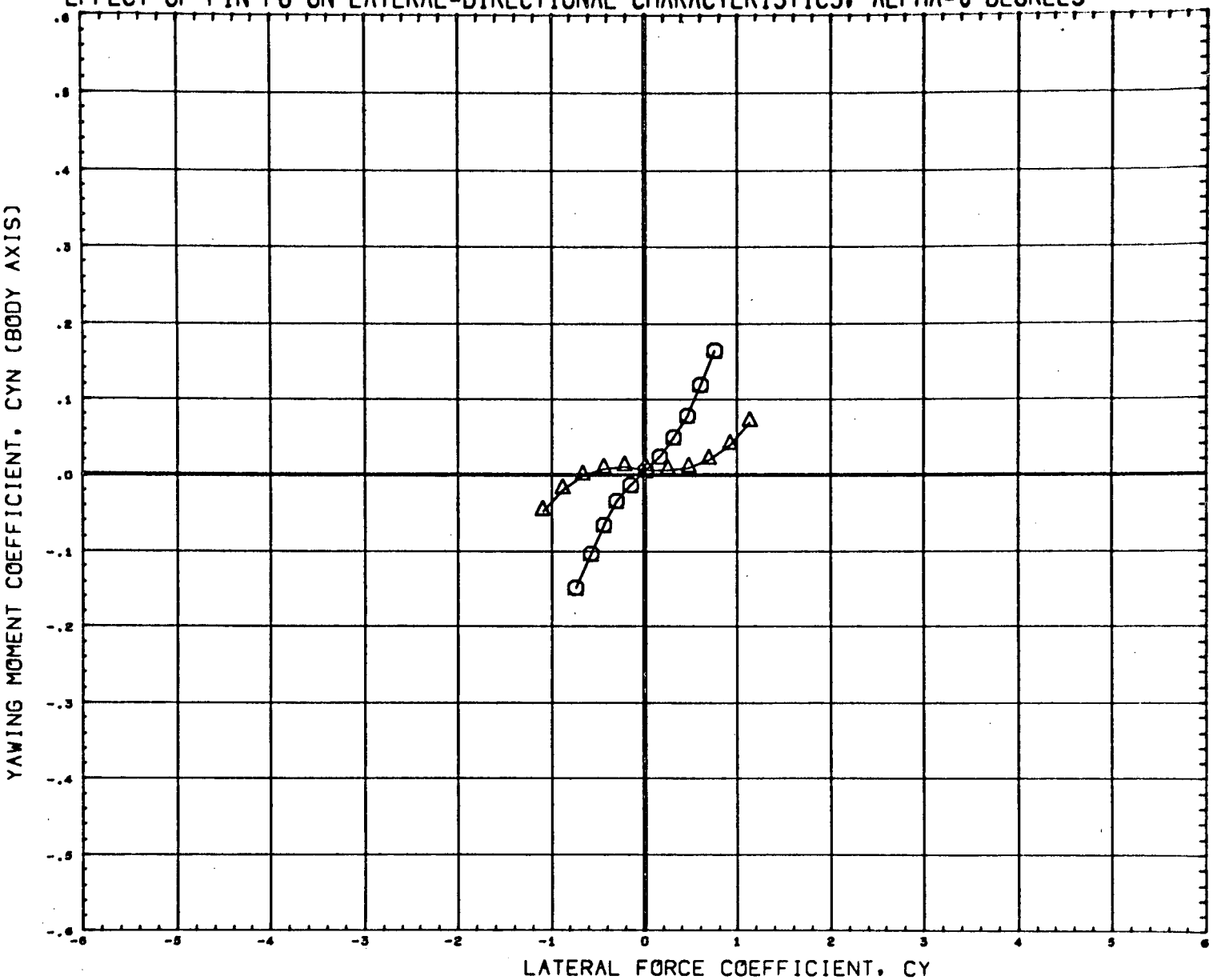
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N181	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N181F6	0.000	30.000

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 .90

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



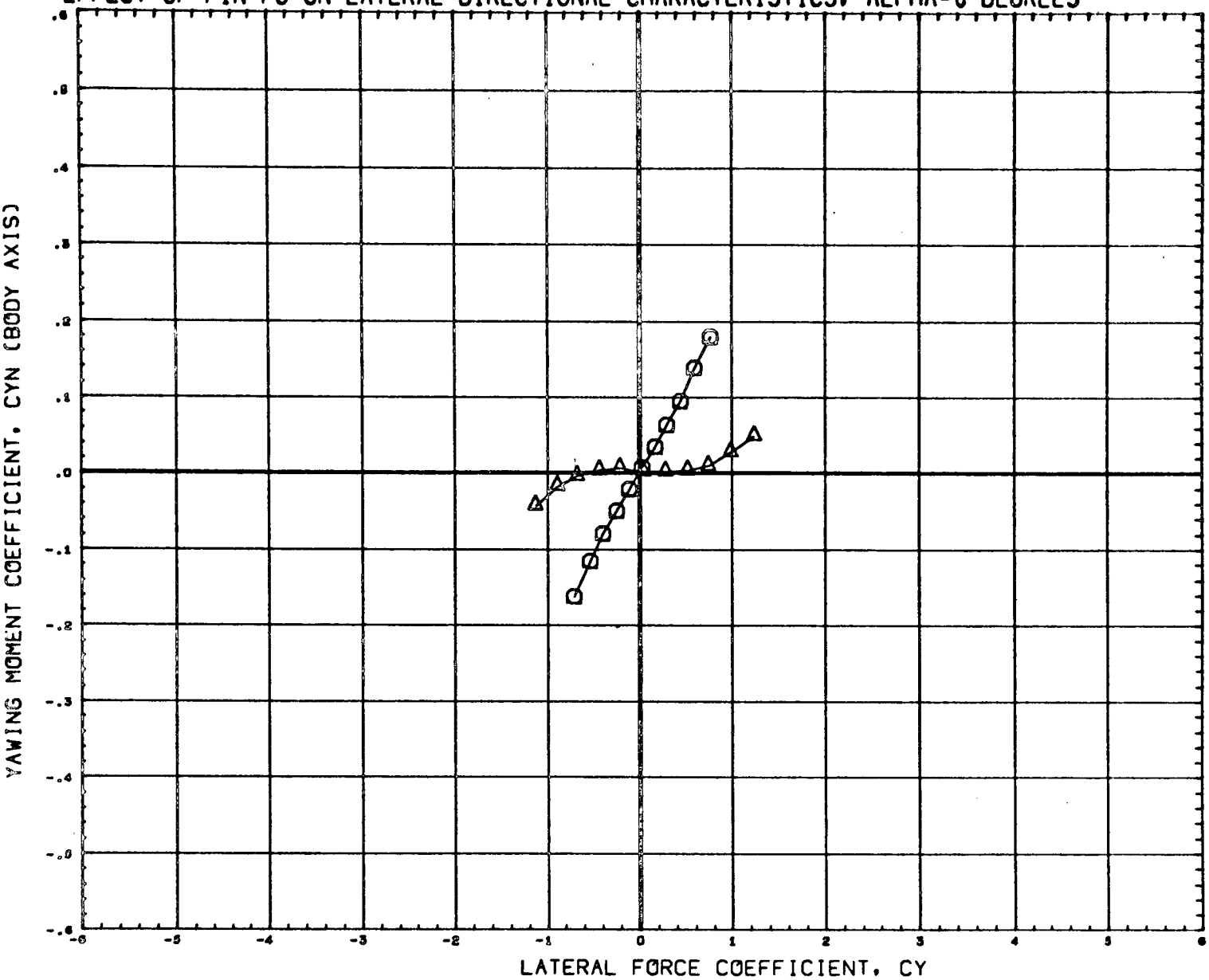
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 1.20

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



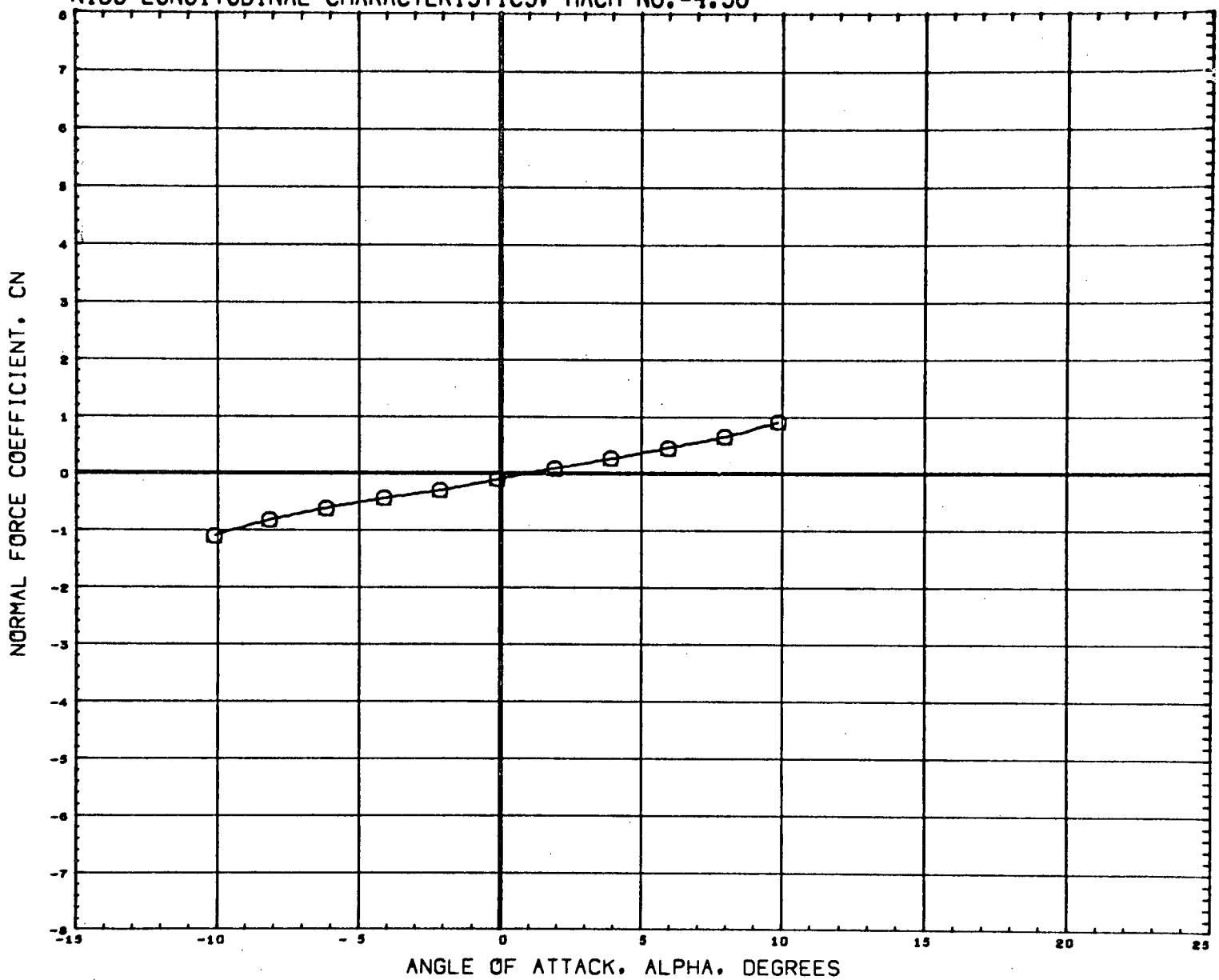
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55001)	○	MSFC TWT 521	BOOSTER	N1B1	0.000	
(A55009)	△	MSFC TWT 521	BOOSTER	N1B1F6	0.000	30.000

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 1.46

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL	MACH		PARAMETRIC VALUES
O	4.959	BETA	0.000

REFERENCE INFORMATION

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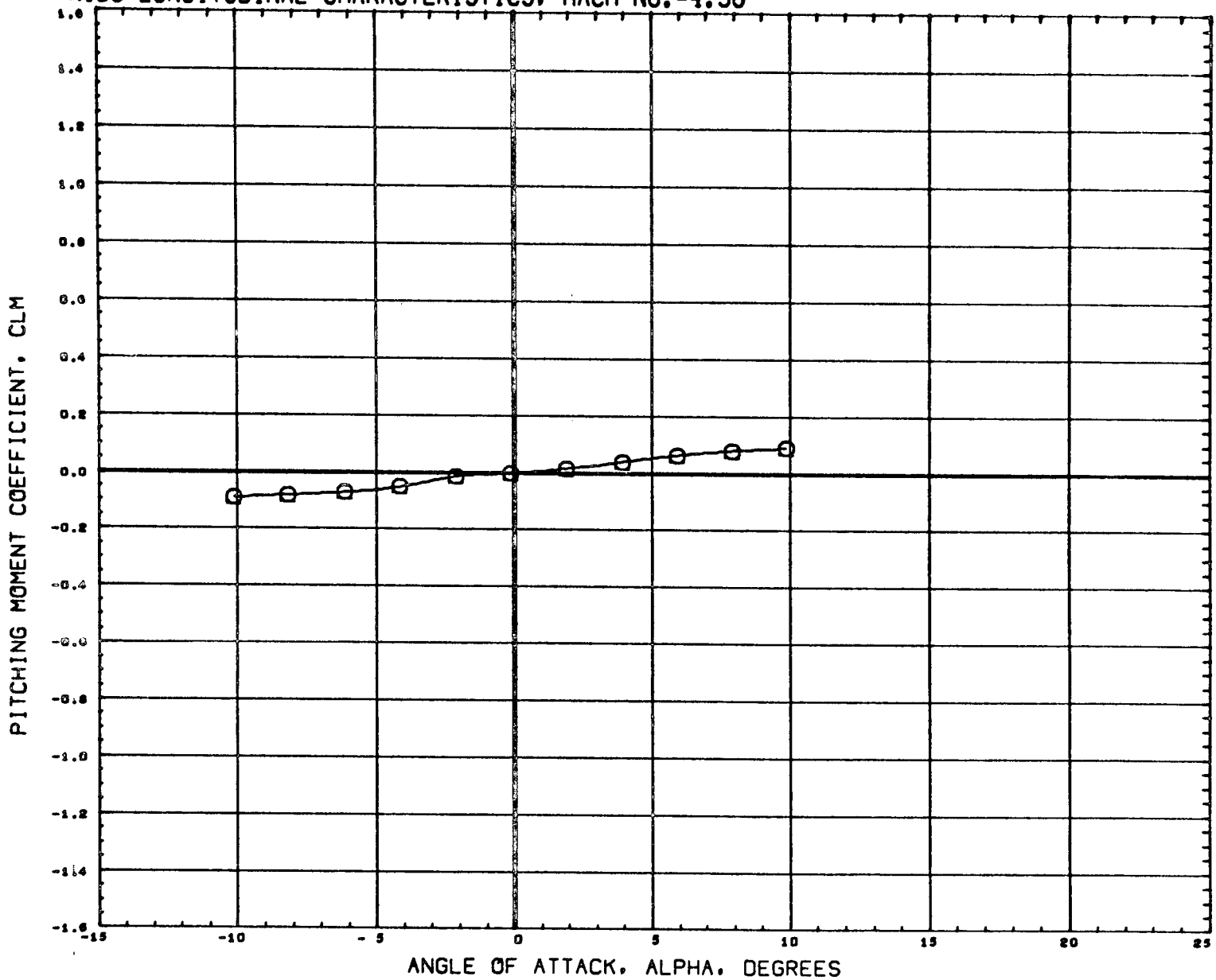
SCALE	0.0034	

DATA HIST. CODE *E

N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL	MACH		PARAMETRIC VALUES
O	4.959	BETA	0.000

REFERENCE INFORMATION

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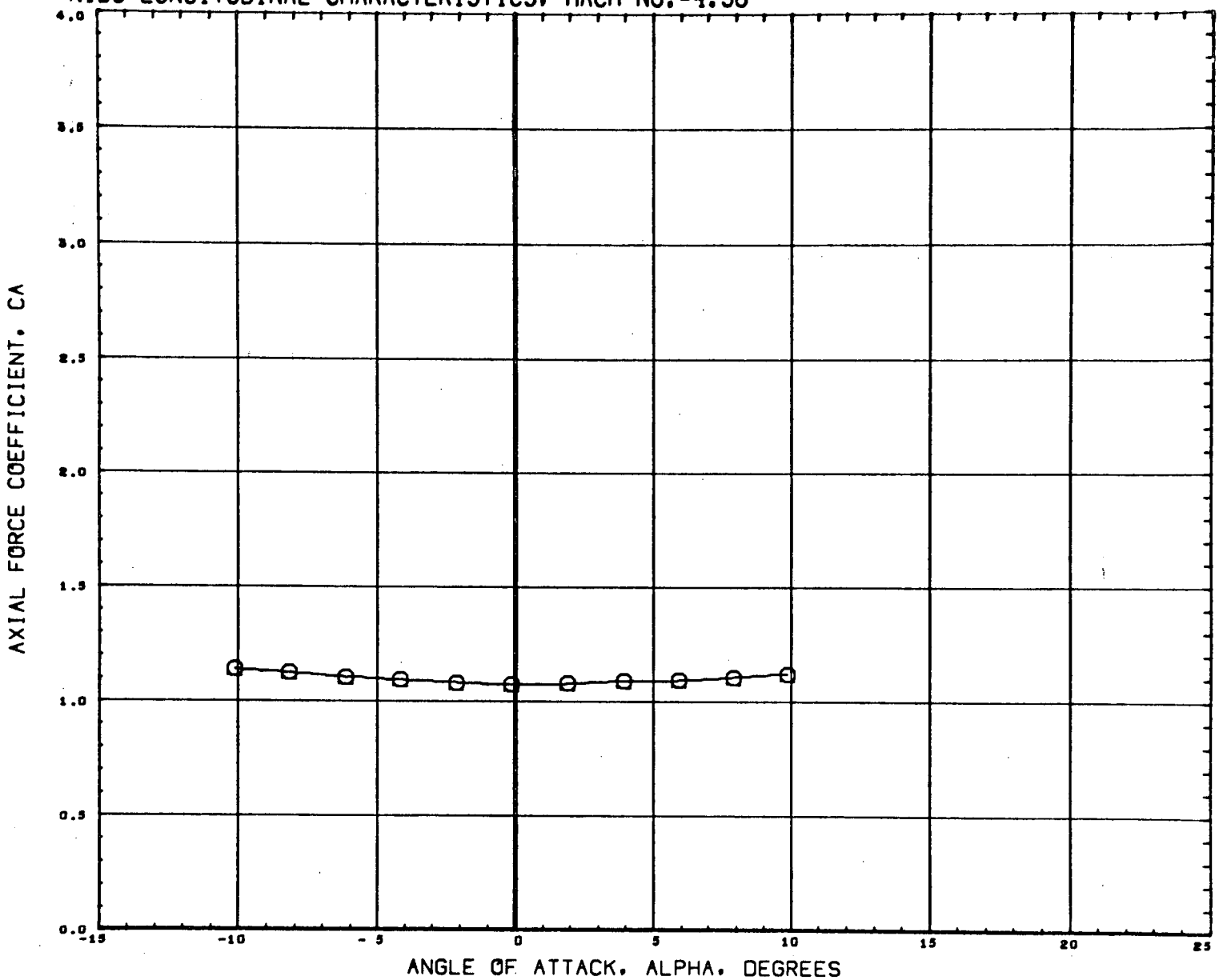
N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



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O	4.959	BETA	0.000

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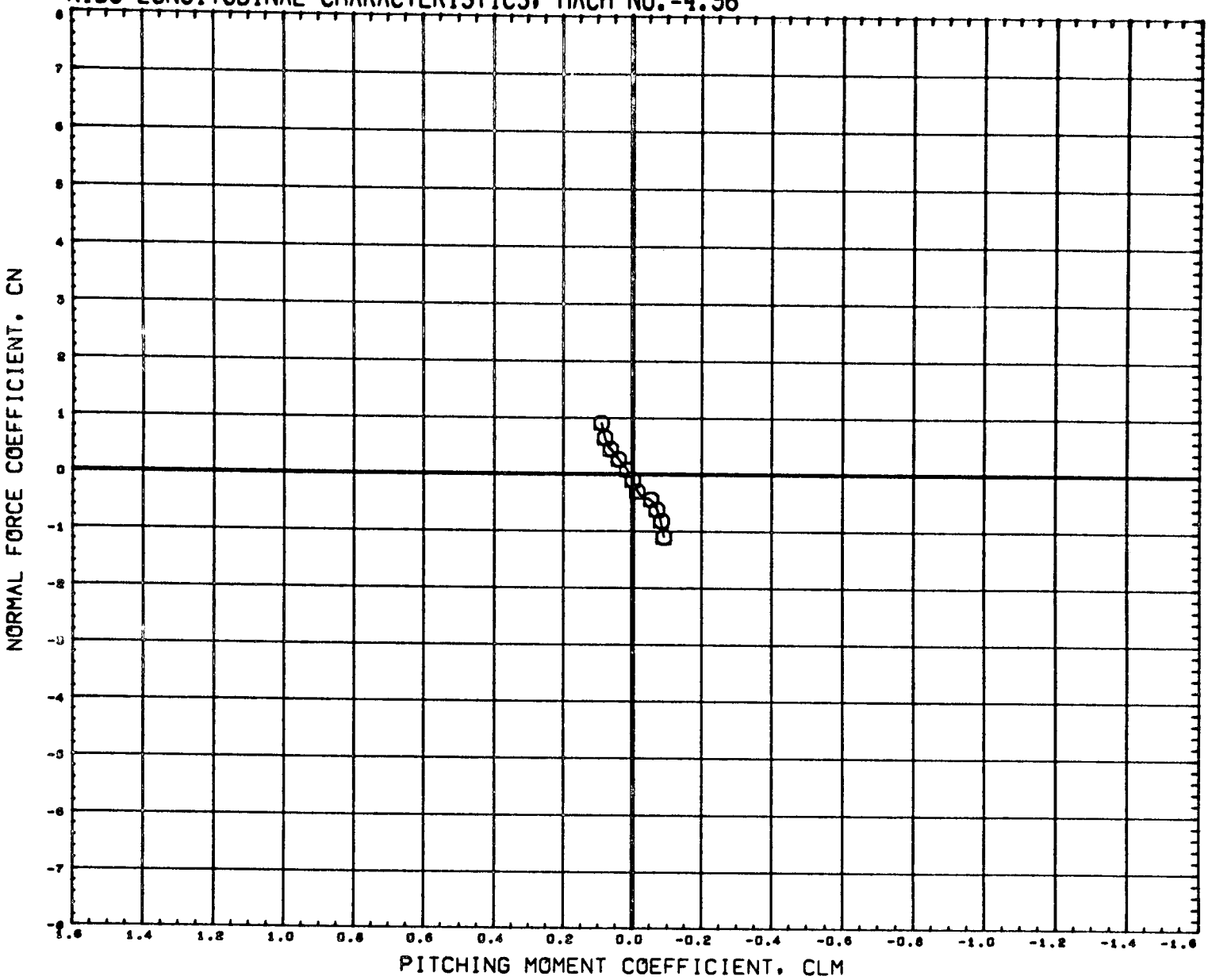
N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



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O	4.959	BETA	0.000

REFERENCE INFORMATION

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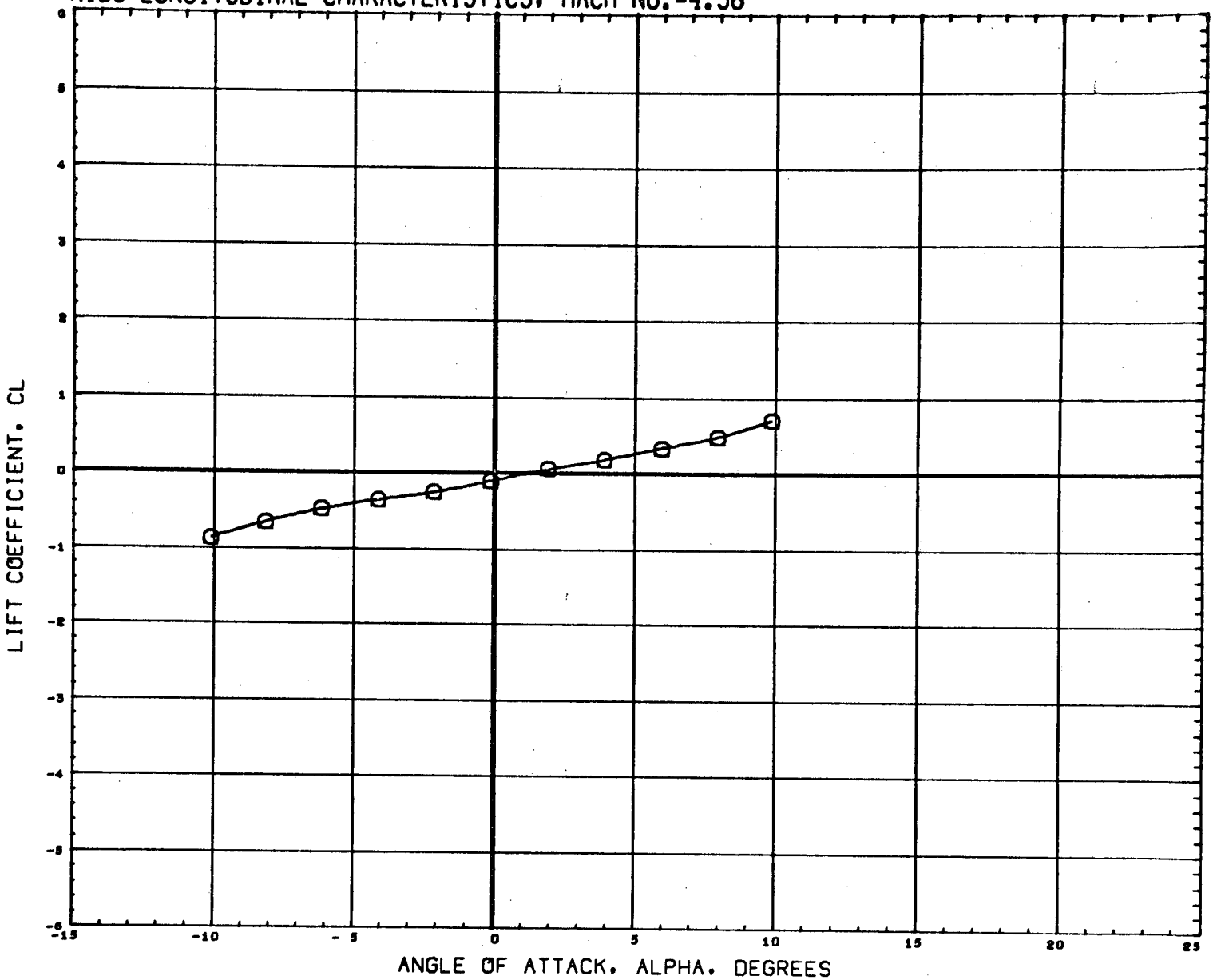
N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



SYMBOL MACH PARAMETRIC VALUES

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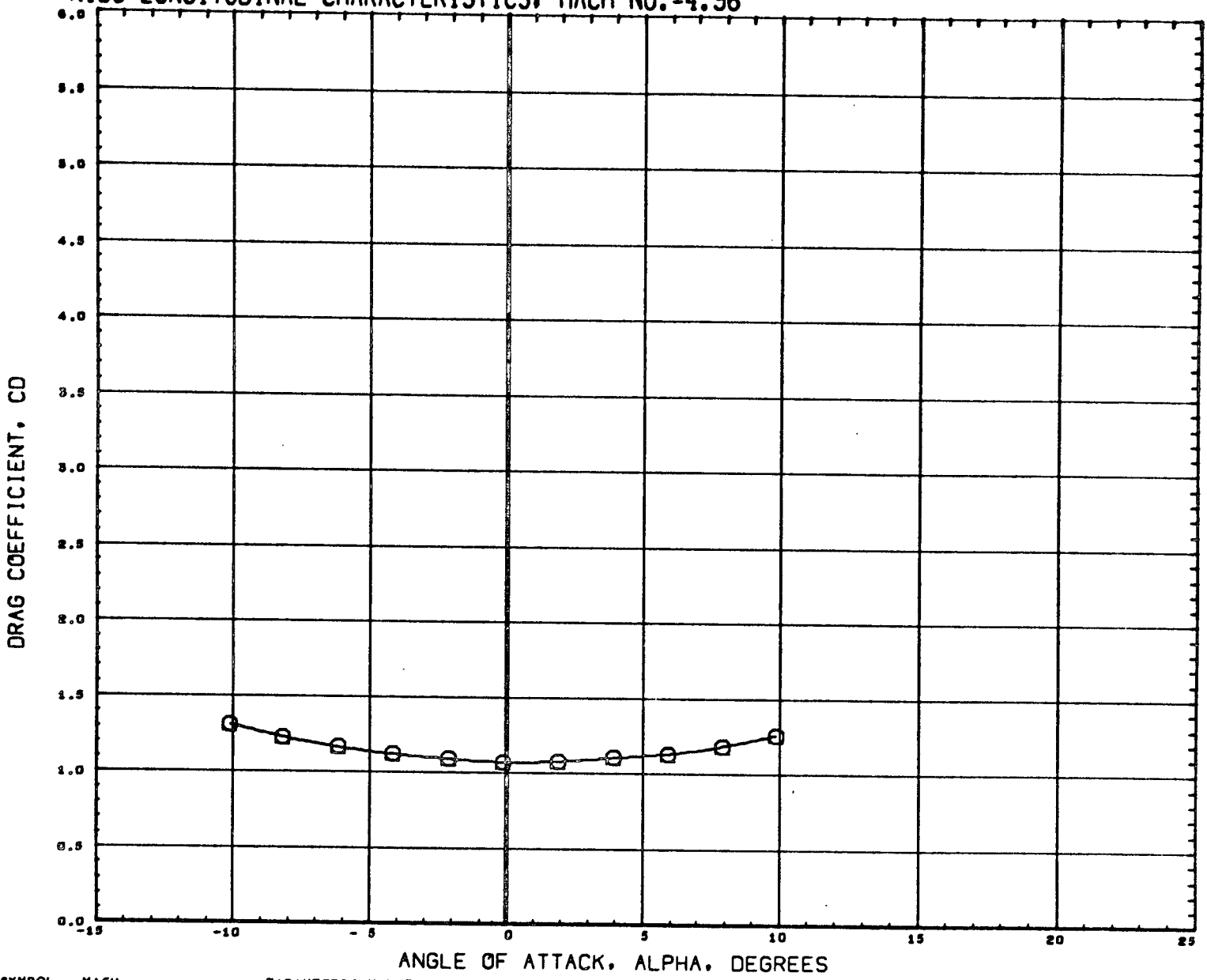

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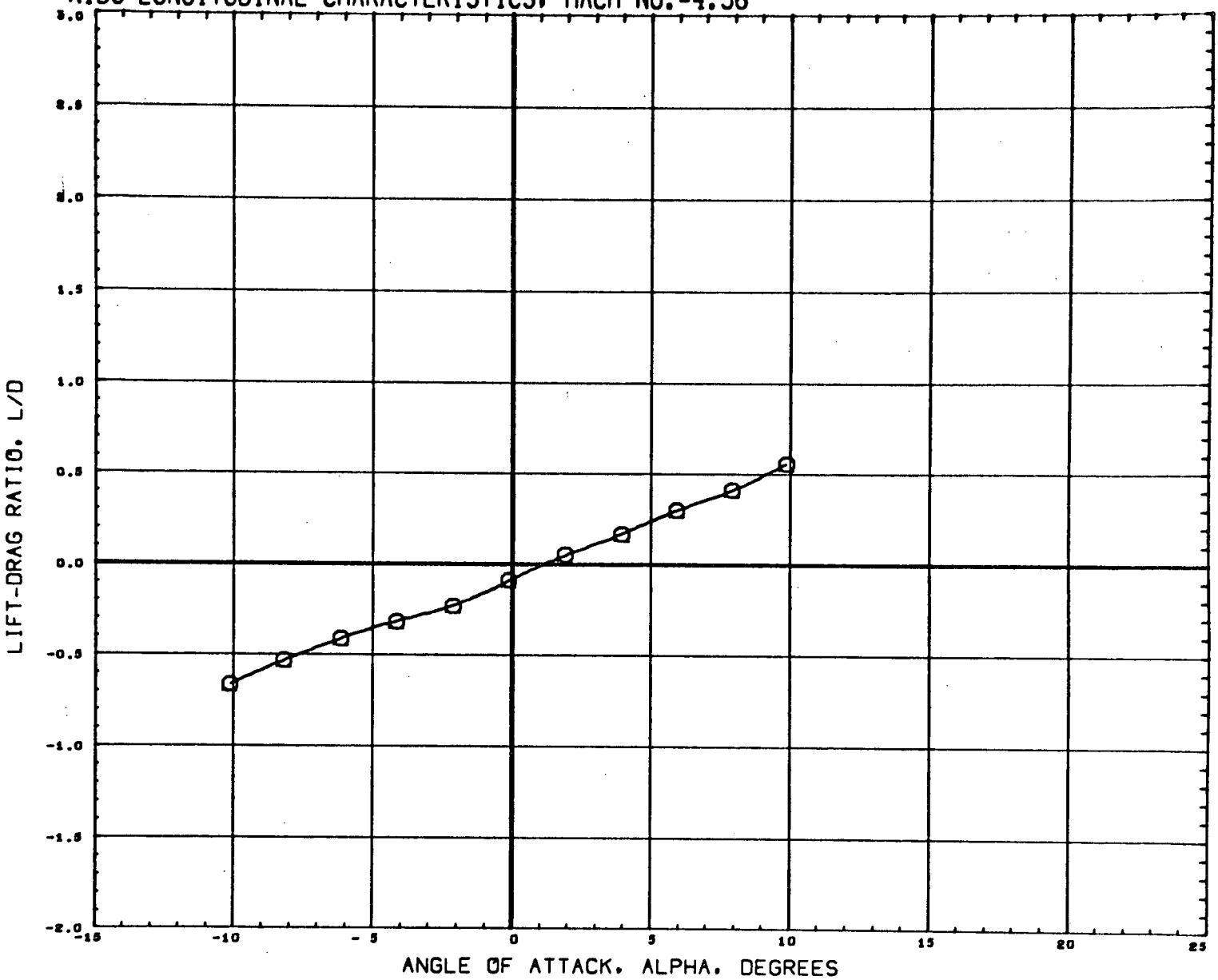
N1B3-LONGITUDINAL CHARACTERISTICS, MACH NO.=4.96



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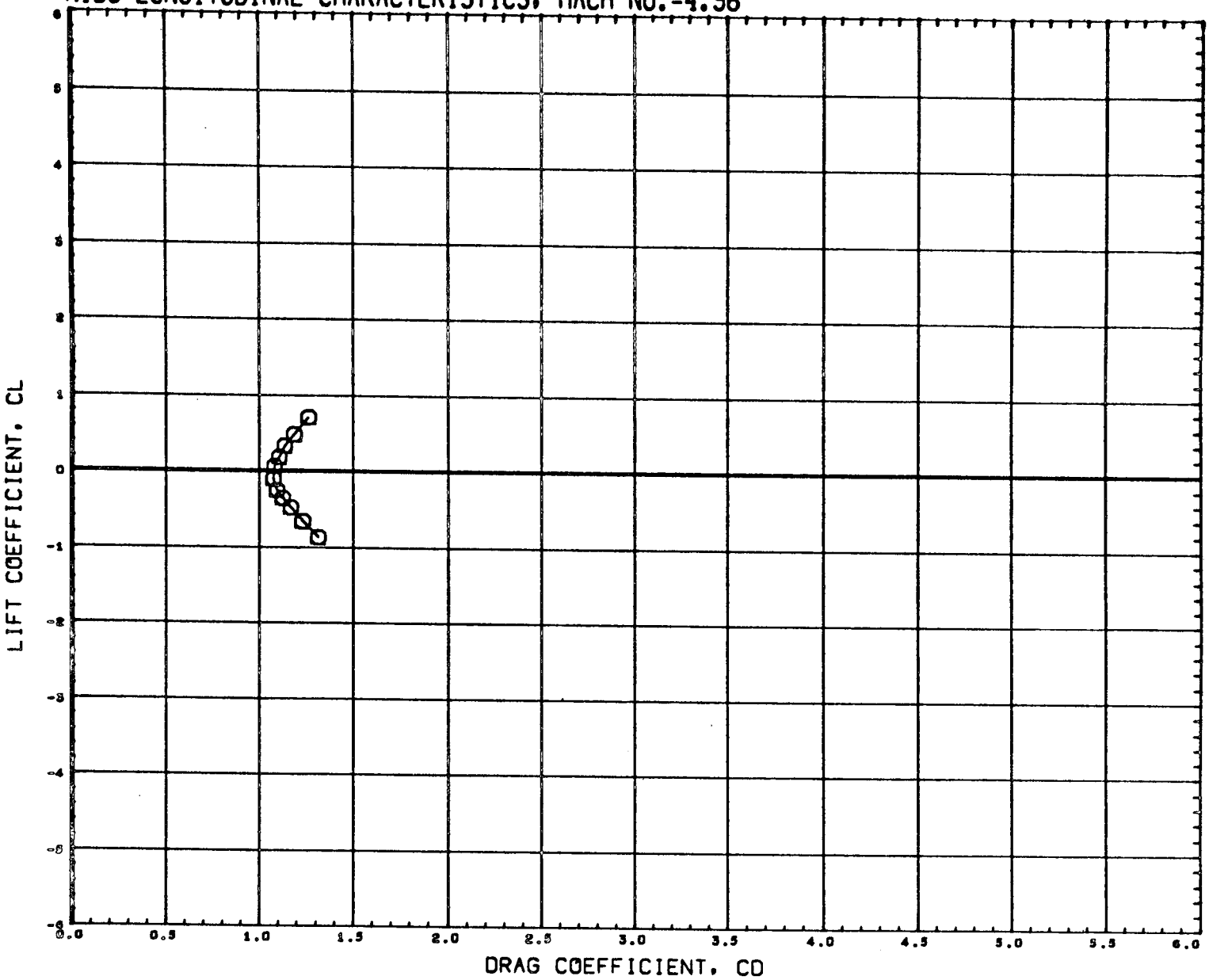

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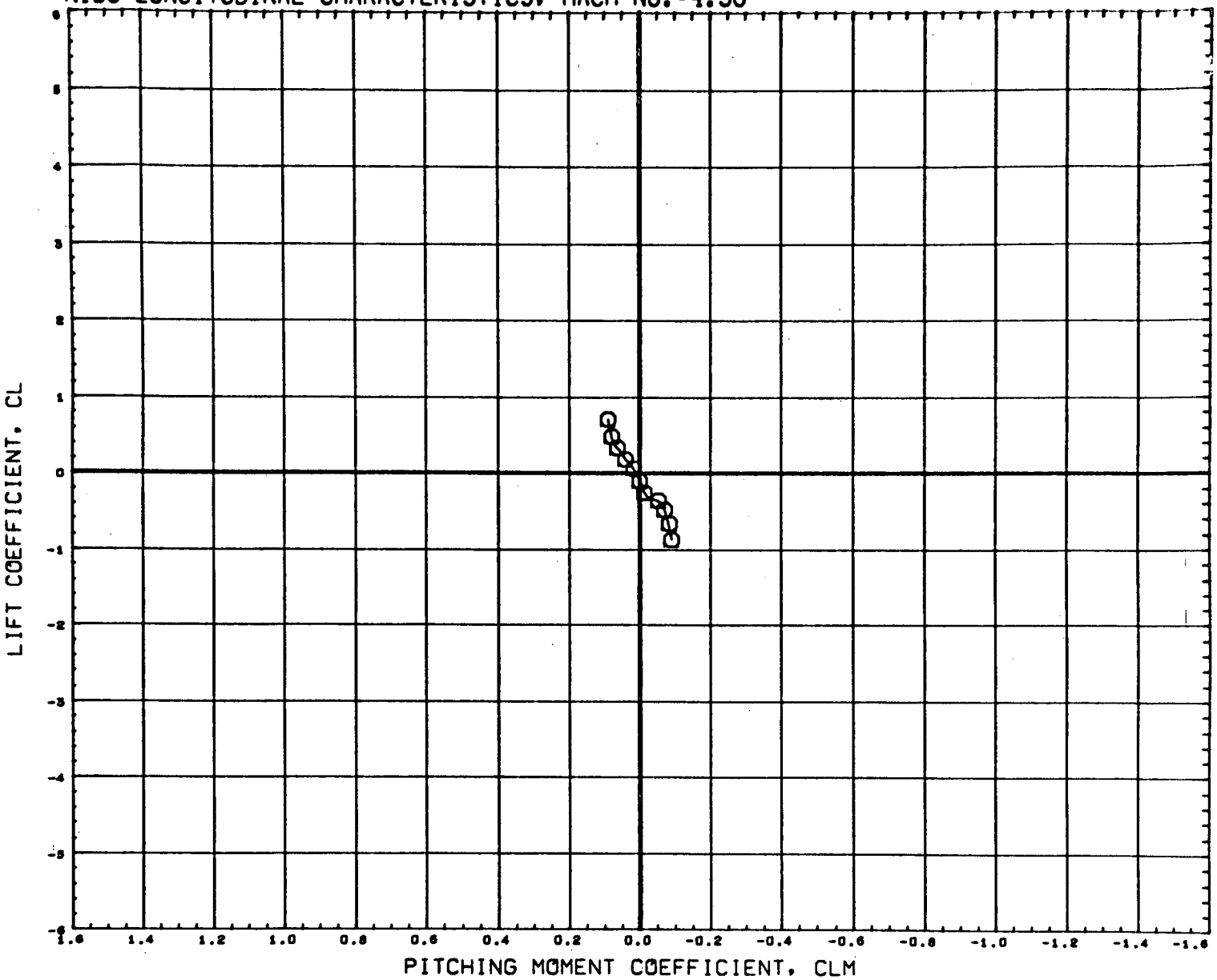

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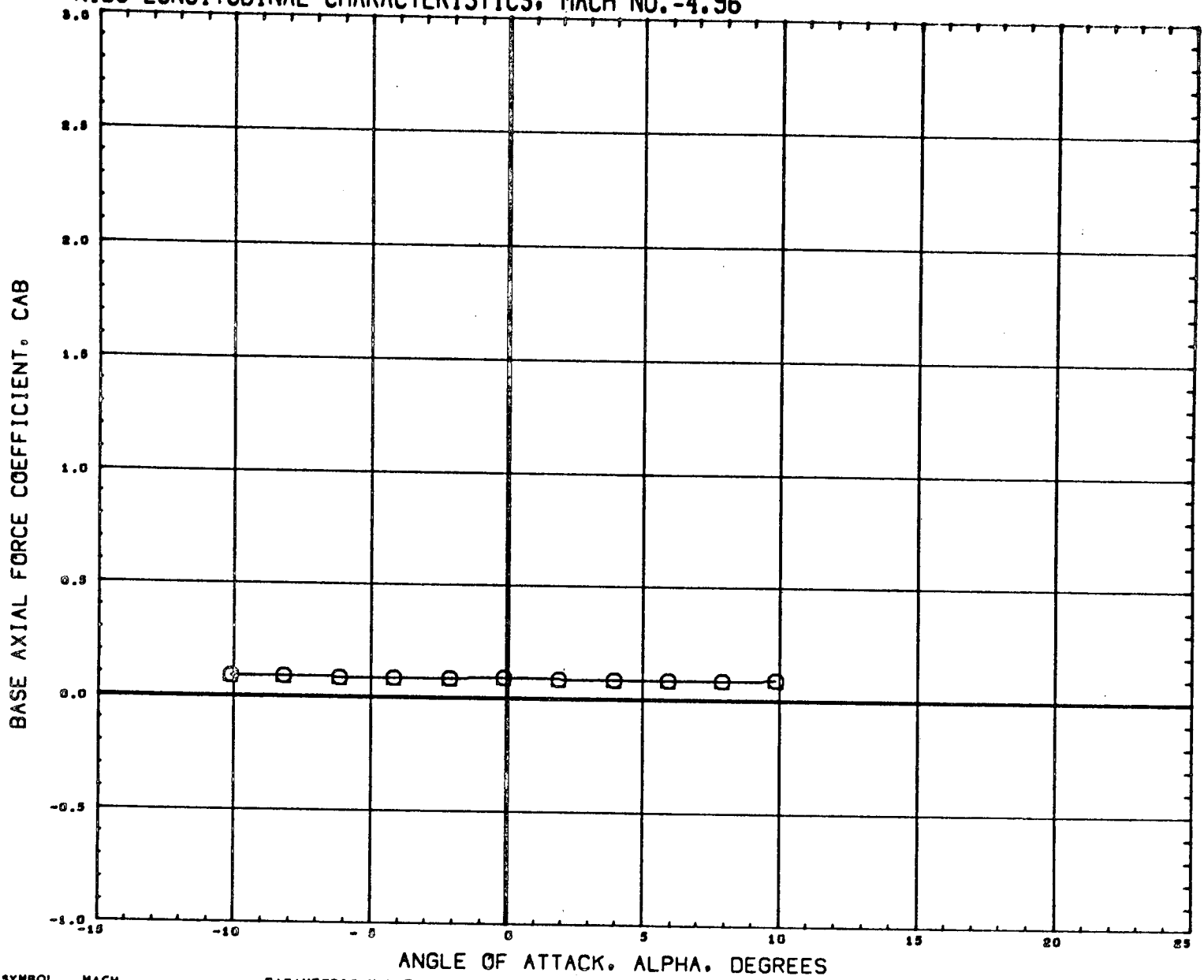

SYMBOL	MACH		PARAMETRIC VALUES
O	4.959	BETA	0.000

REFERENCE INFORMATION

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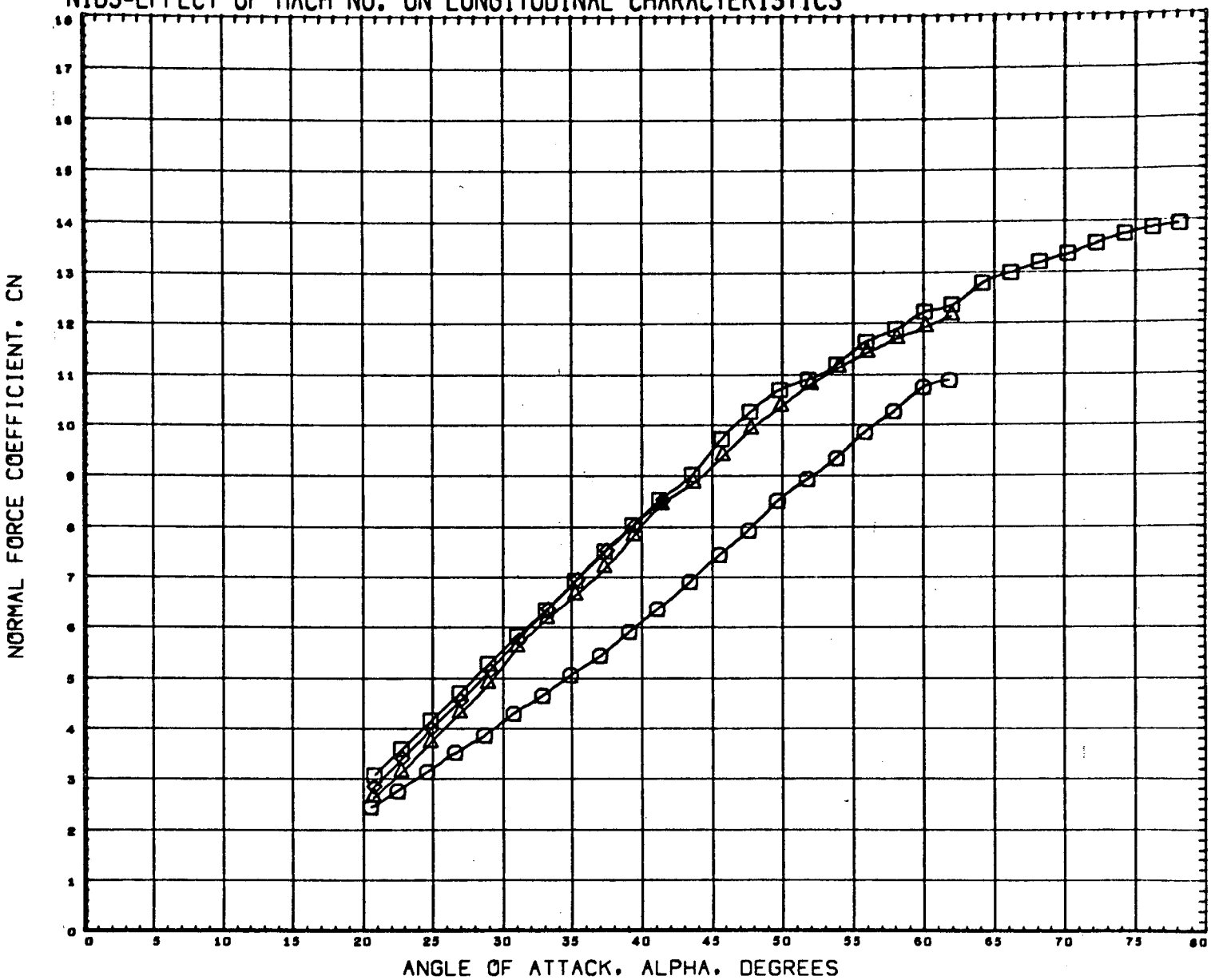
DATA HIST. CODE #E

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES	
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△	1.197		
◇	1.461		
□	1.964		

DATA HIST. CODE *G*E

REFERENCE INFORMATION

SREF	0.9330	SQ. IN
LREF	8.1720	IN.
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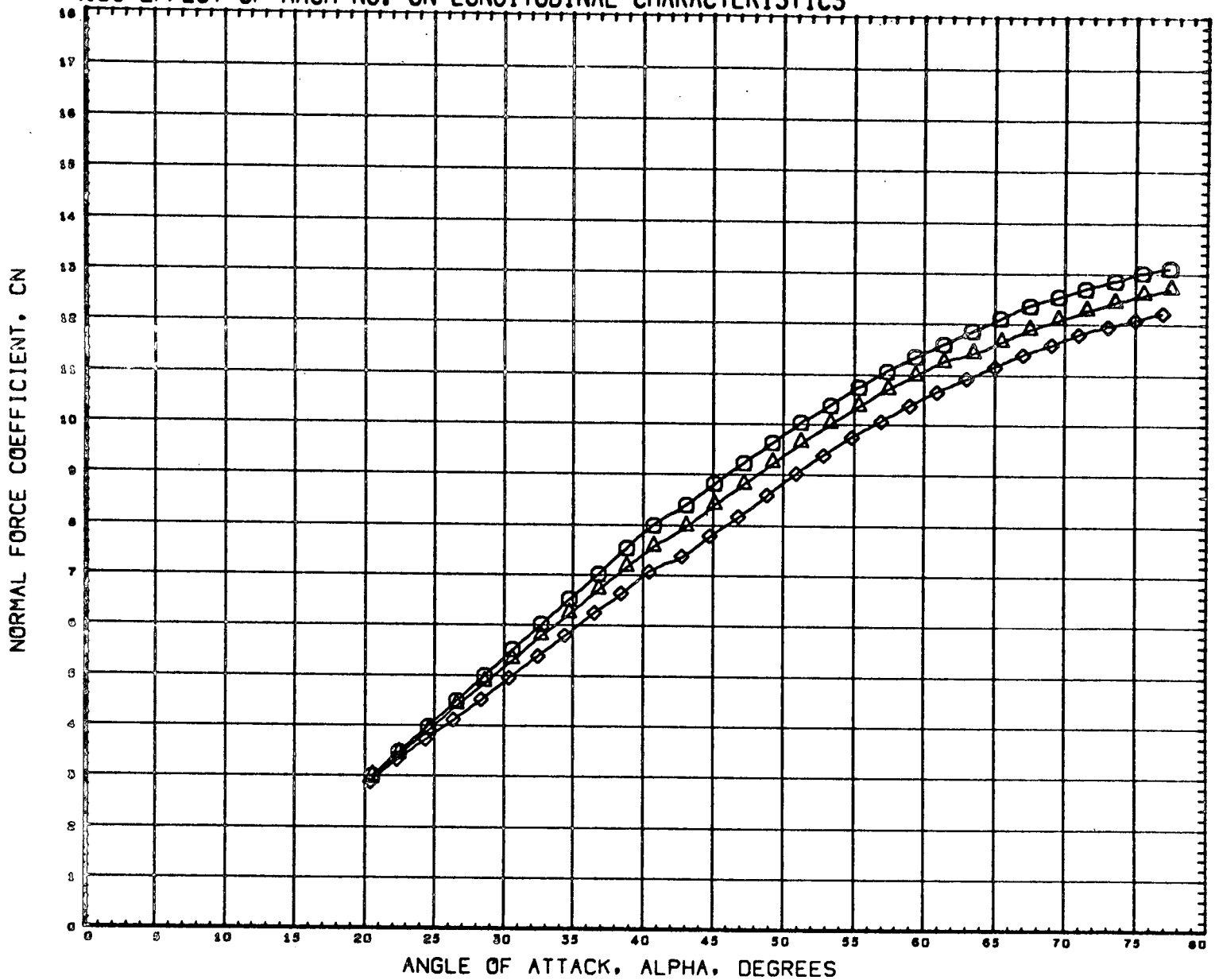
SCALE	0.0034	

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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

REFERENCE INFORMATION

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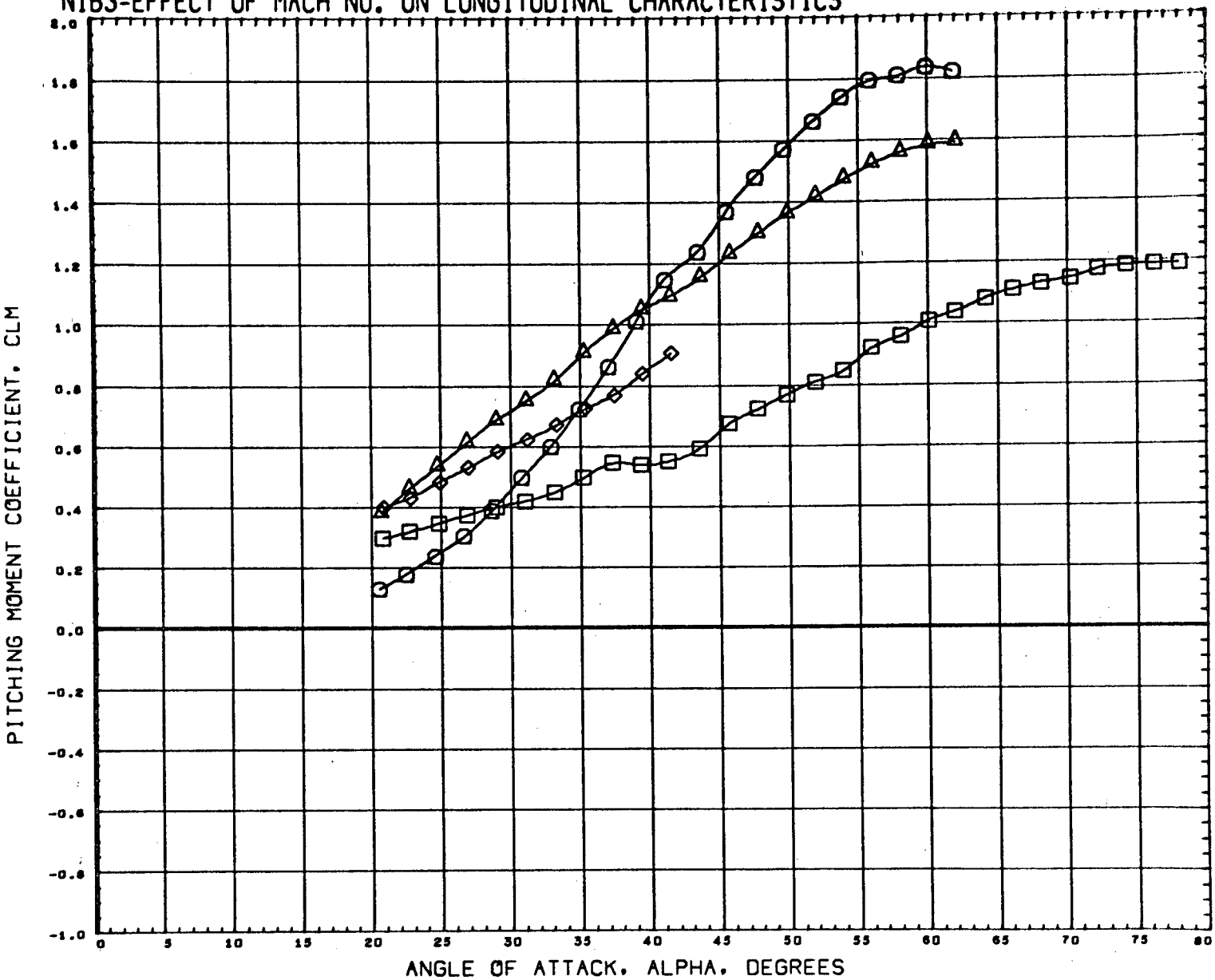

SYMBOL	MACH		PARAMETRIC VALUES
○	0.899	BETA	0.000
△	1.197		
◇	1.461		
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DATA HIST. CODE *G*E

REFERENCE INFORMATION

SREF	0.9330	SQ. IN
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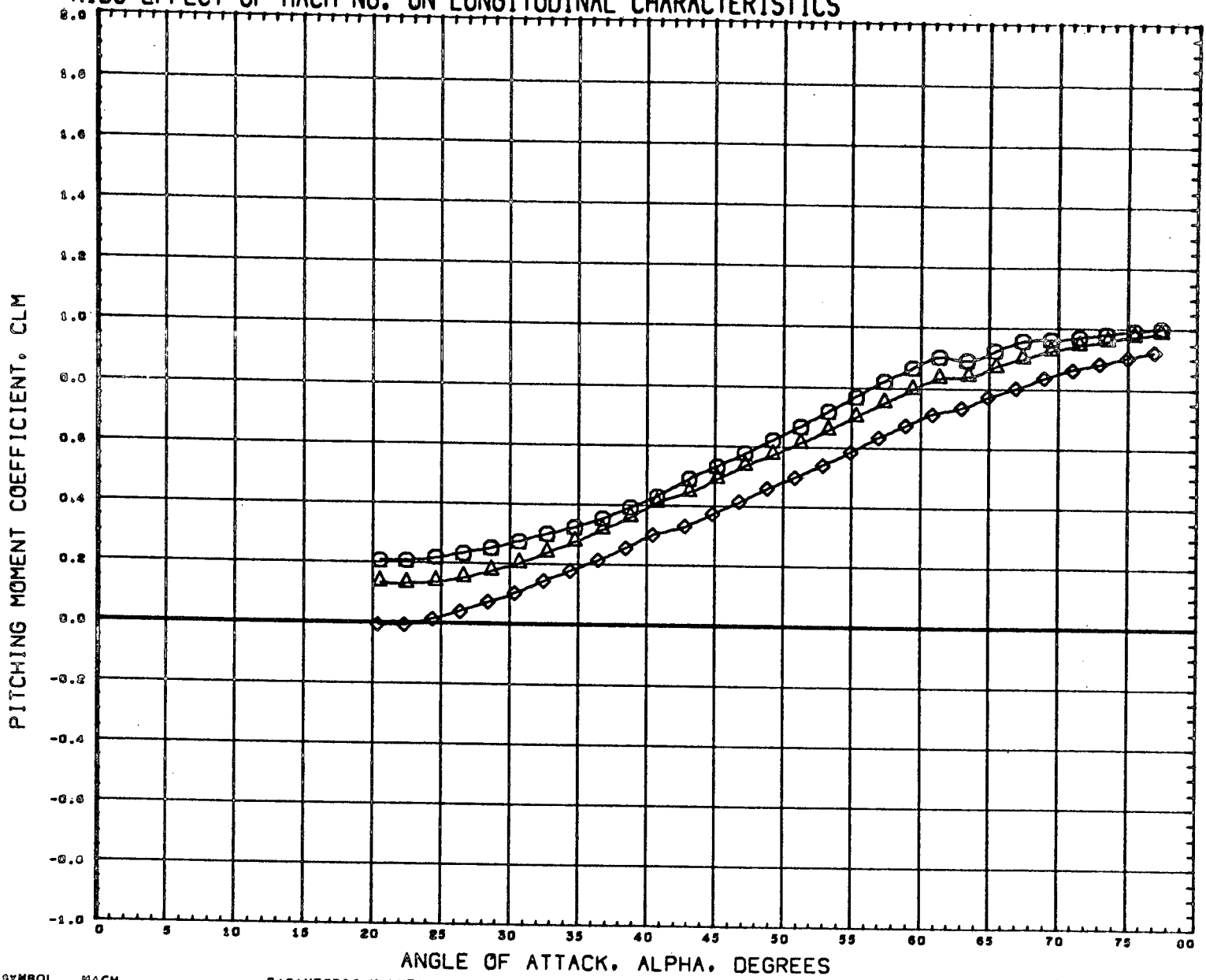
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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

REFERENCE INFORMATION

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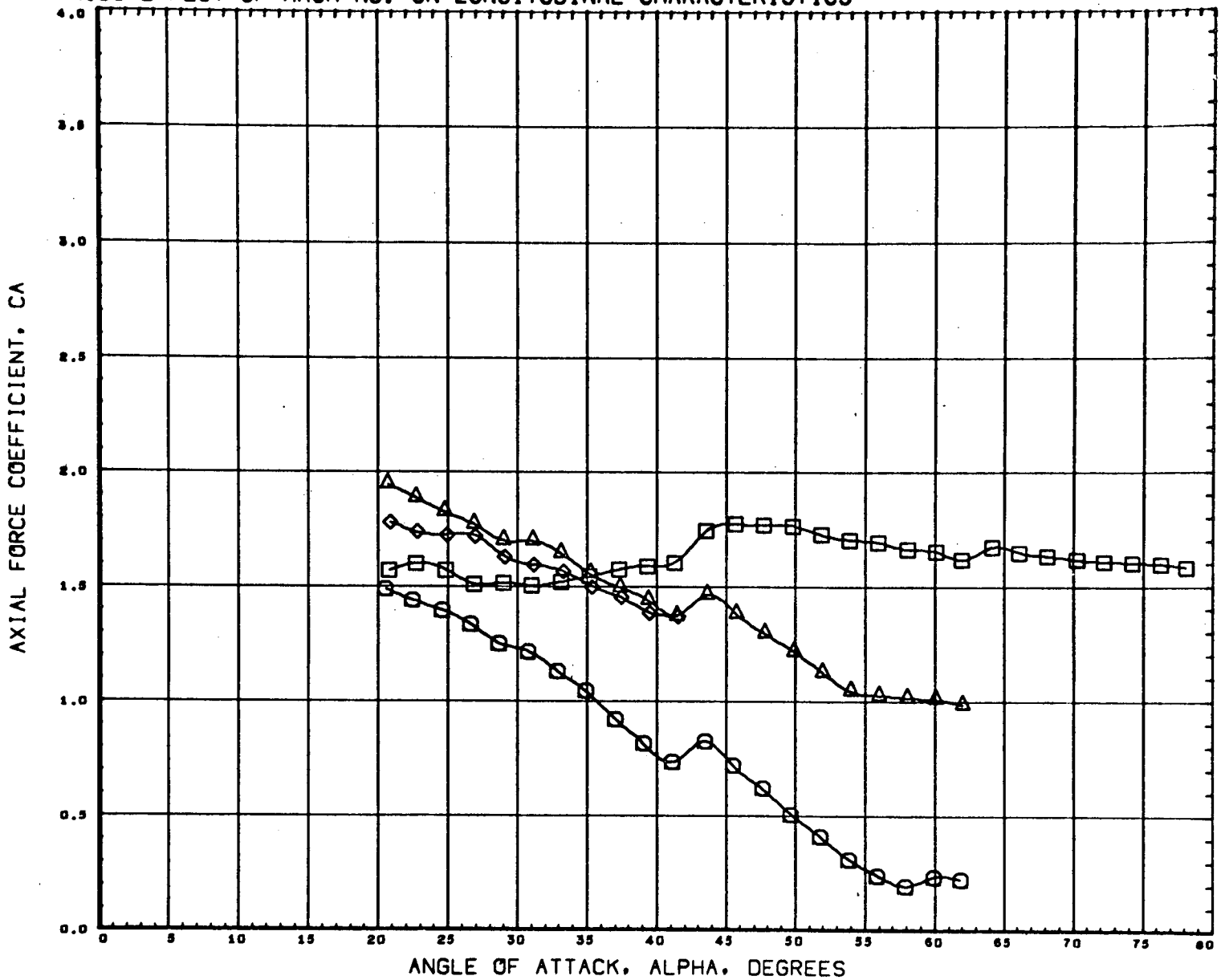
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES	
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△	1.197		
◇	1.461		
□	1.964		

DATA HIST. CODE *G*E

REFERENCE INFORMATION

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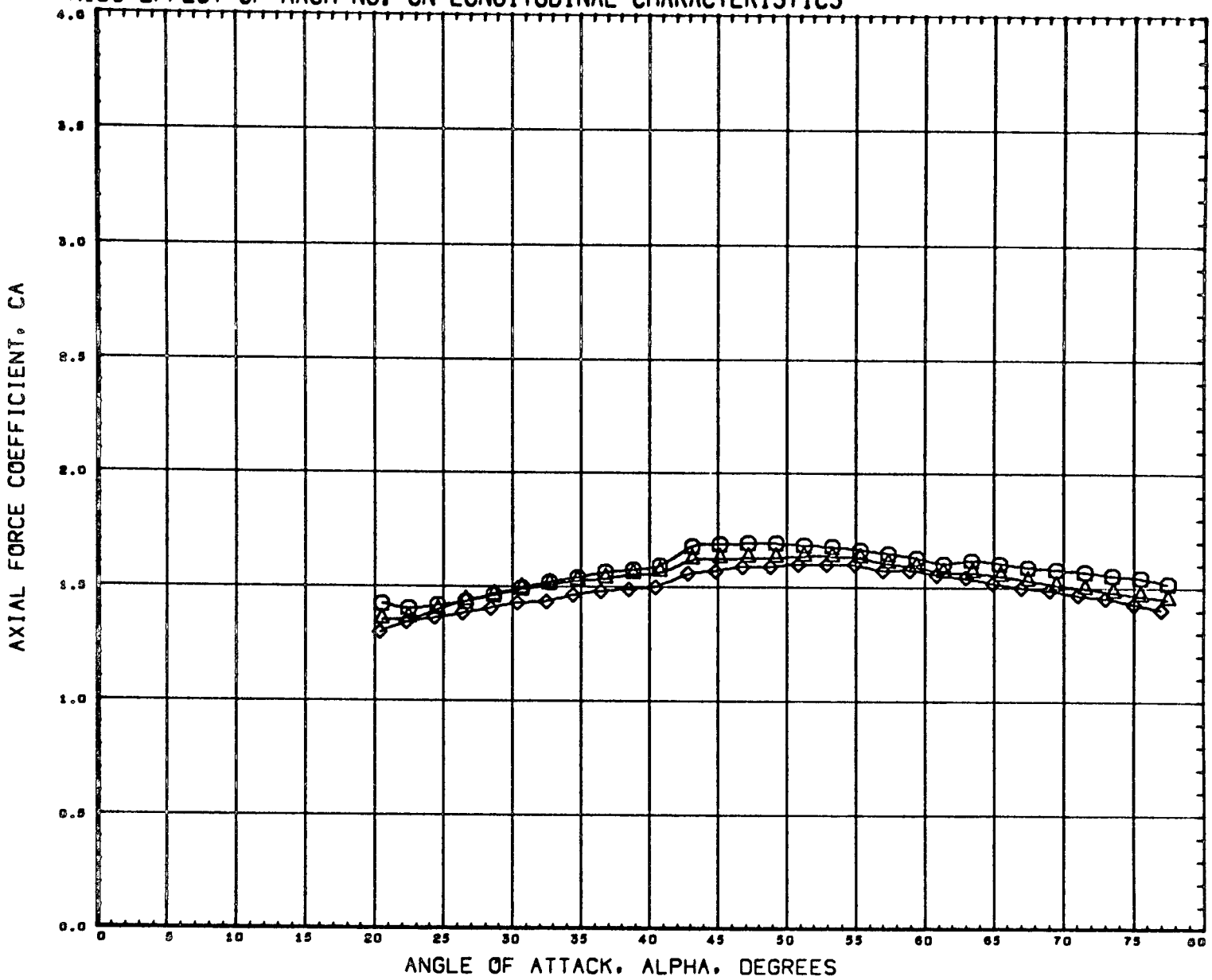
SCALE	0.0034	

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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○	2.740	BETA	0.000
△	3.480		
◇	4.959		

REFERENCE INFORMATION

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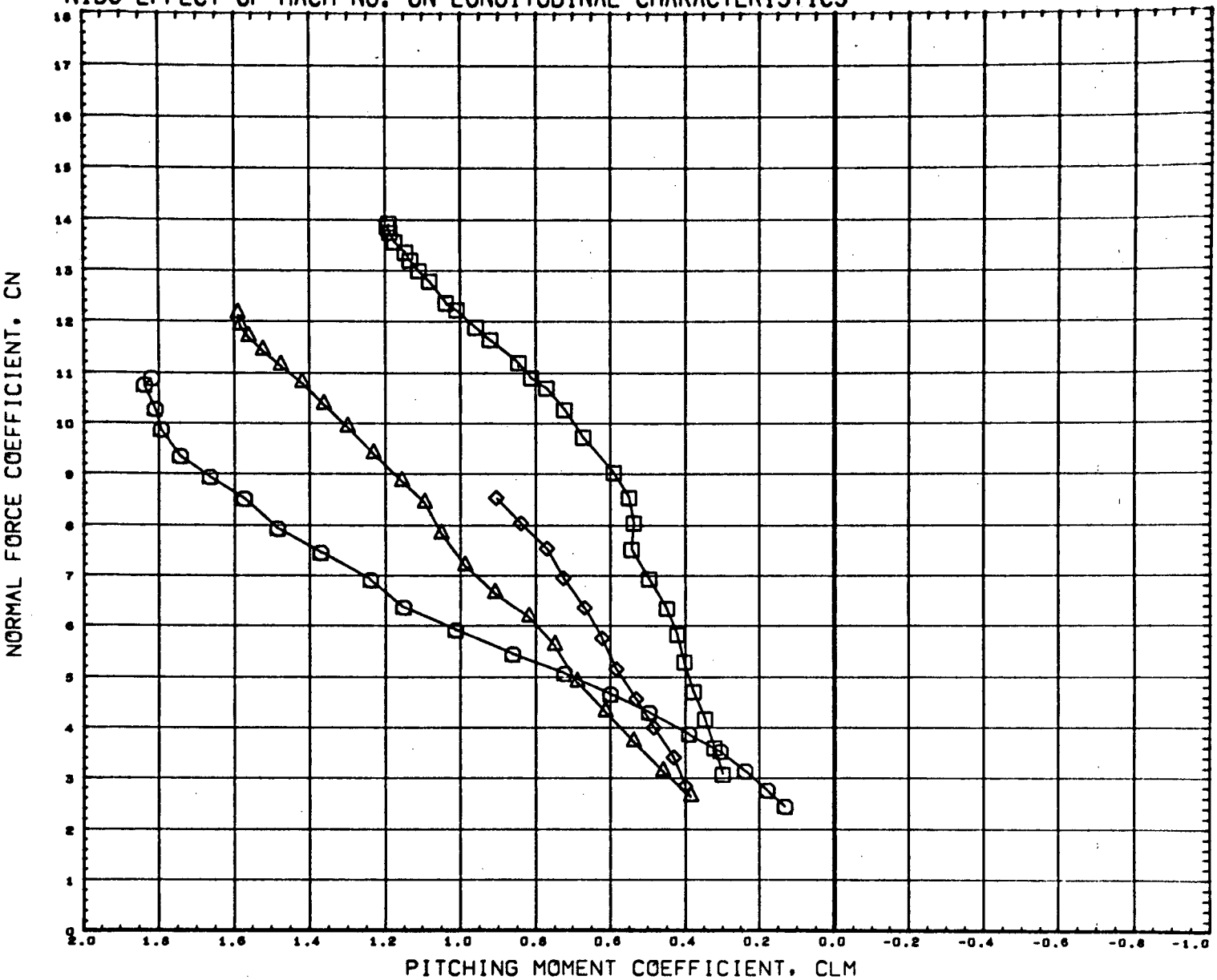
DATA HIST. CODE *G*E

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES	
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□	1.964		

DATA HIST. CODE *G*E

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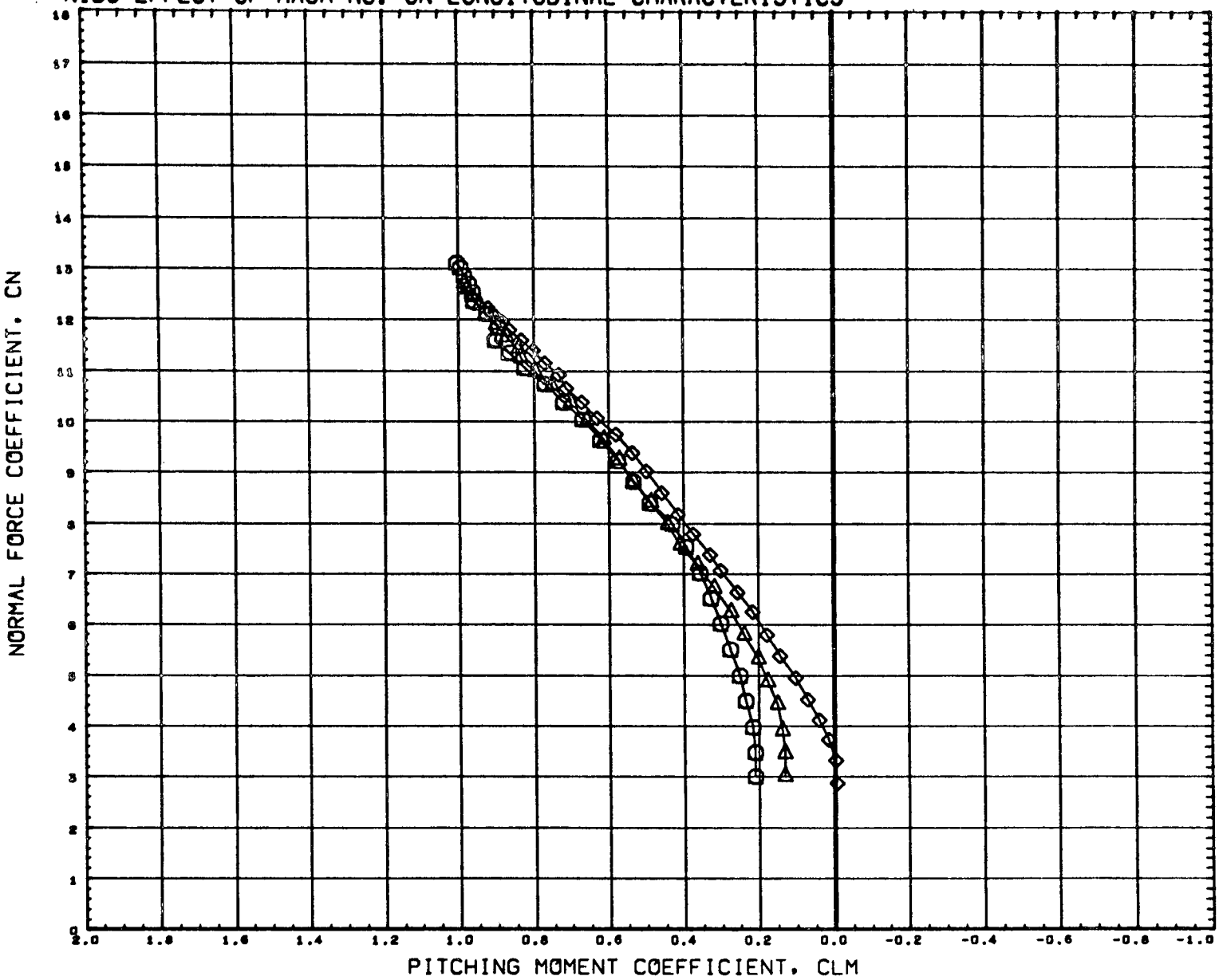
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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◇	4.959		

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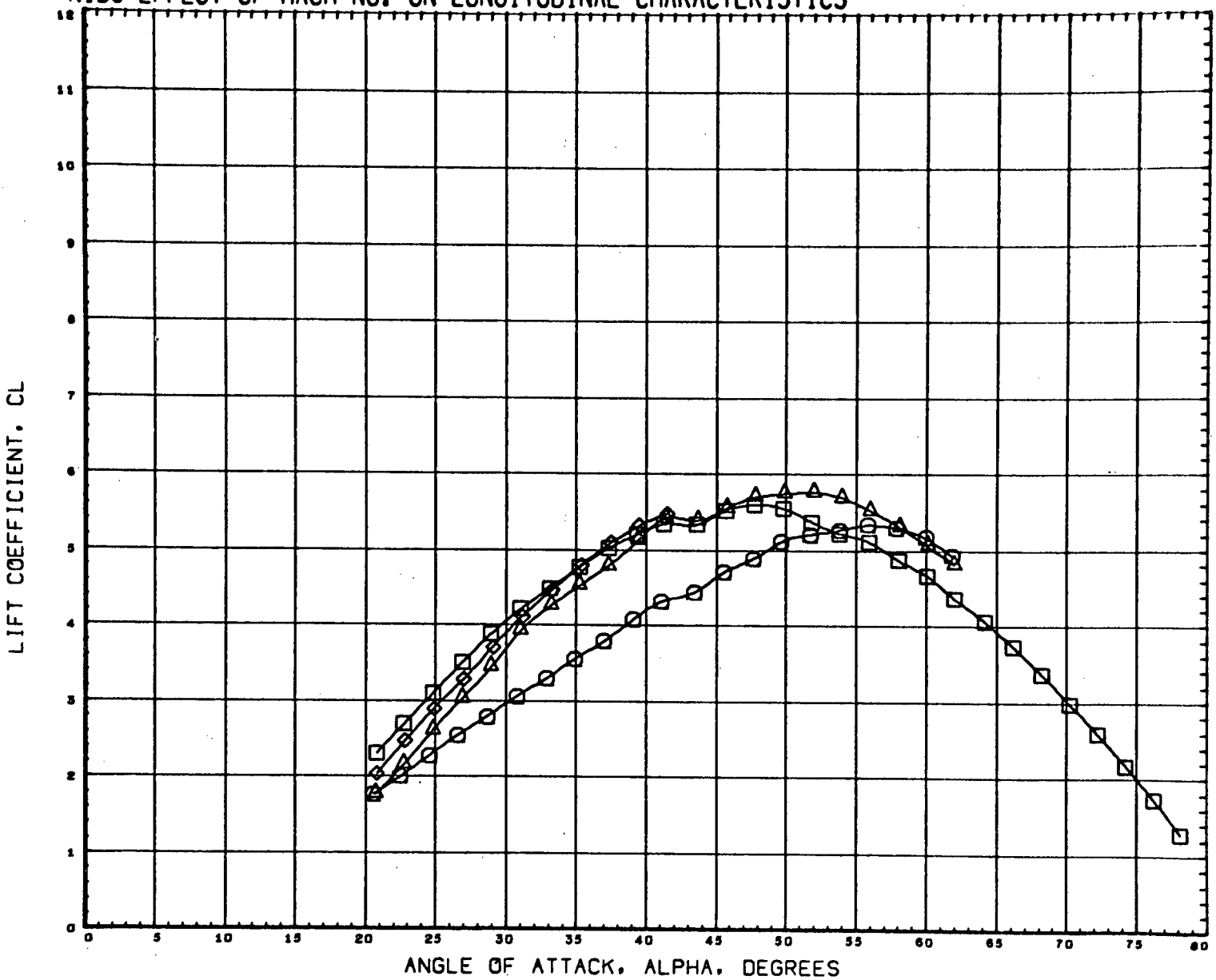

SYMBOL	MACH		PARAMETRIC VALUES
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DATA HIST. CODE *G*E

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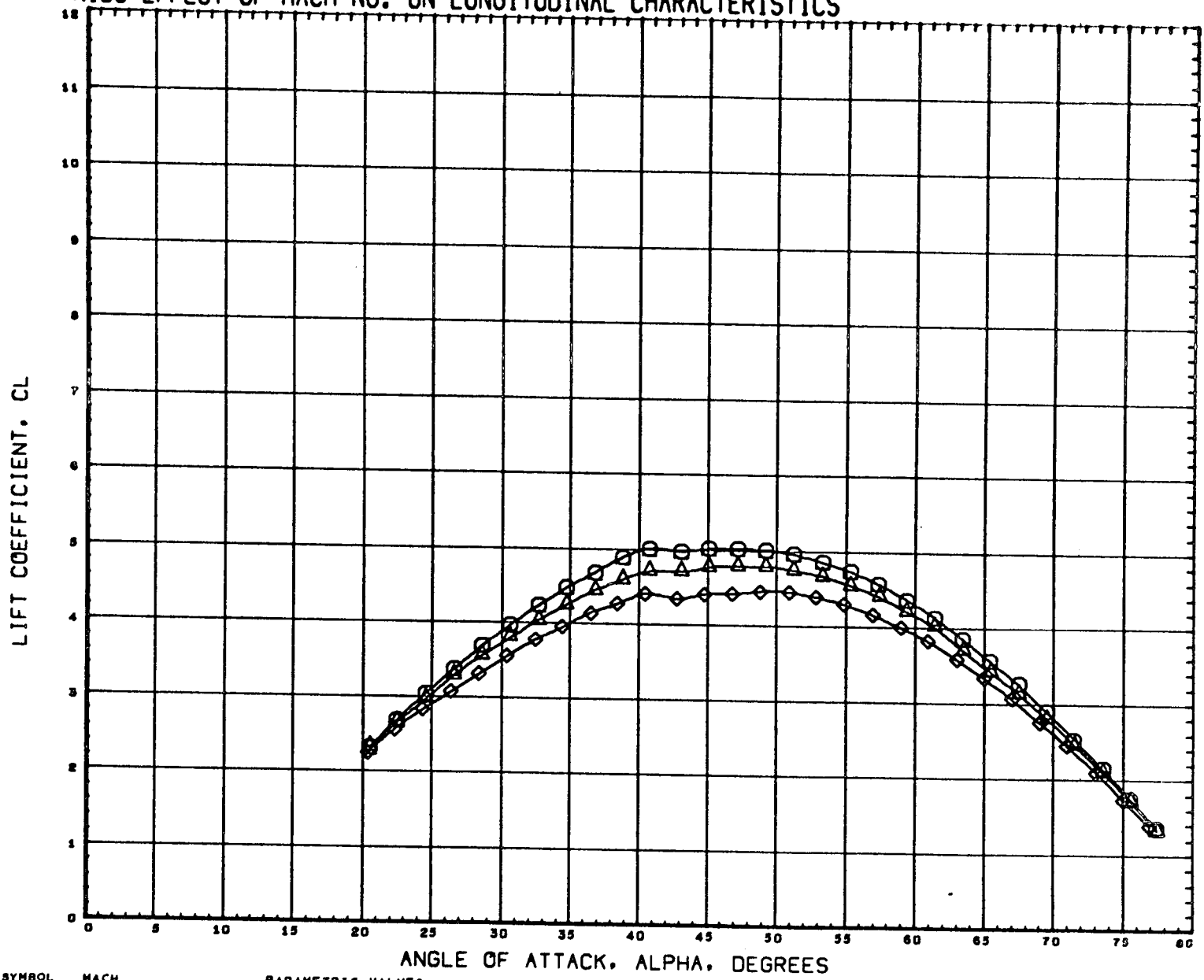
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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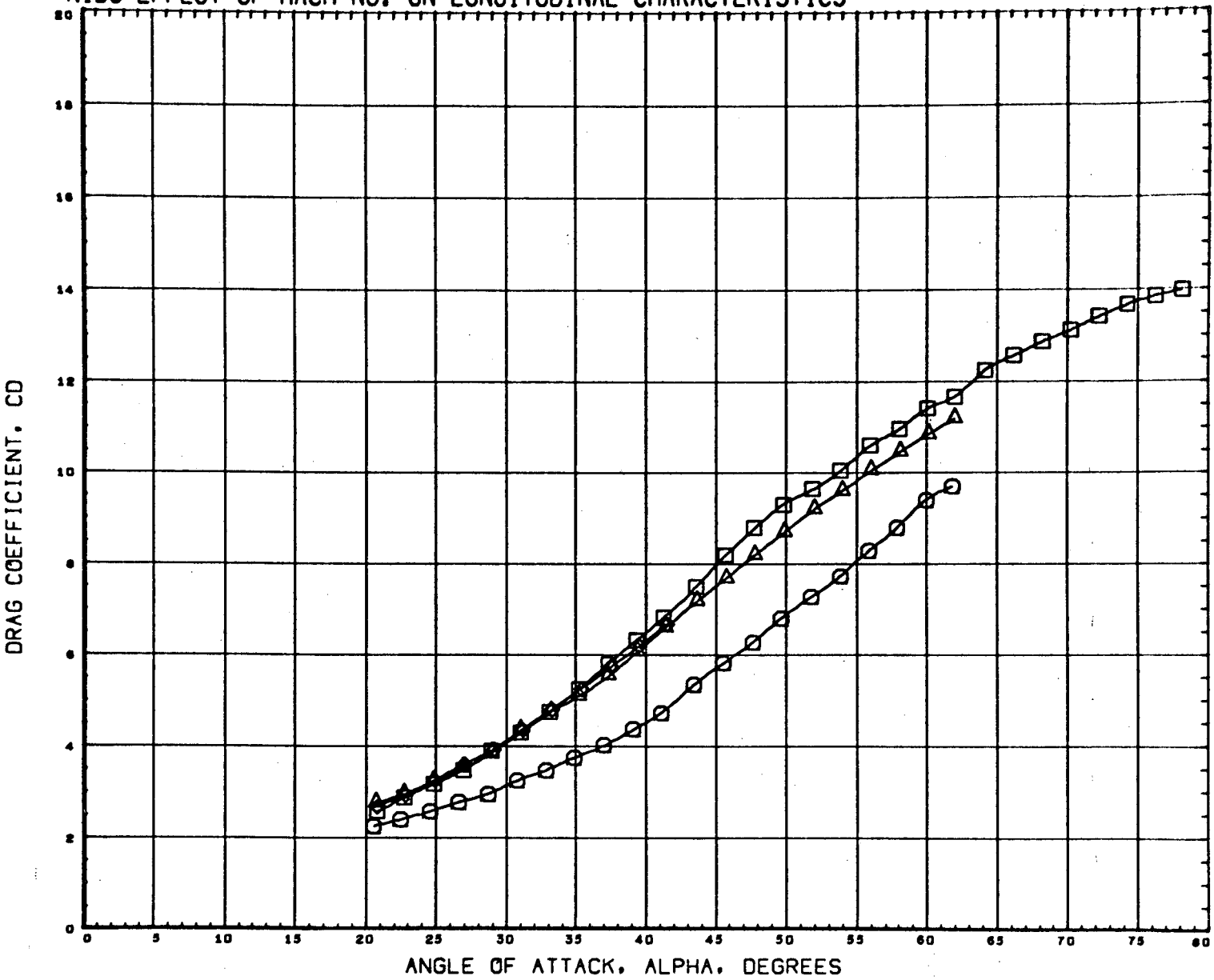

SYMBOL	MACH		PARAMETRIC VALUES
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DATA HIST. CODE *G*E

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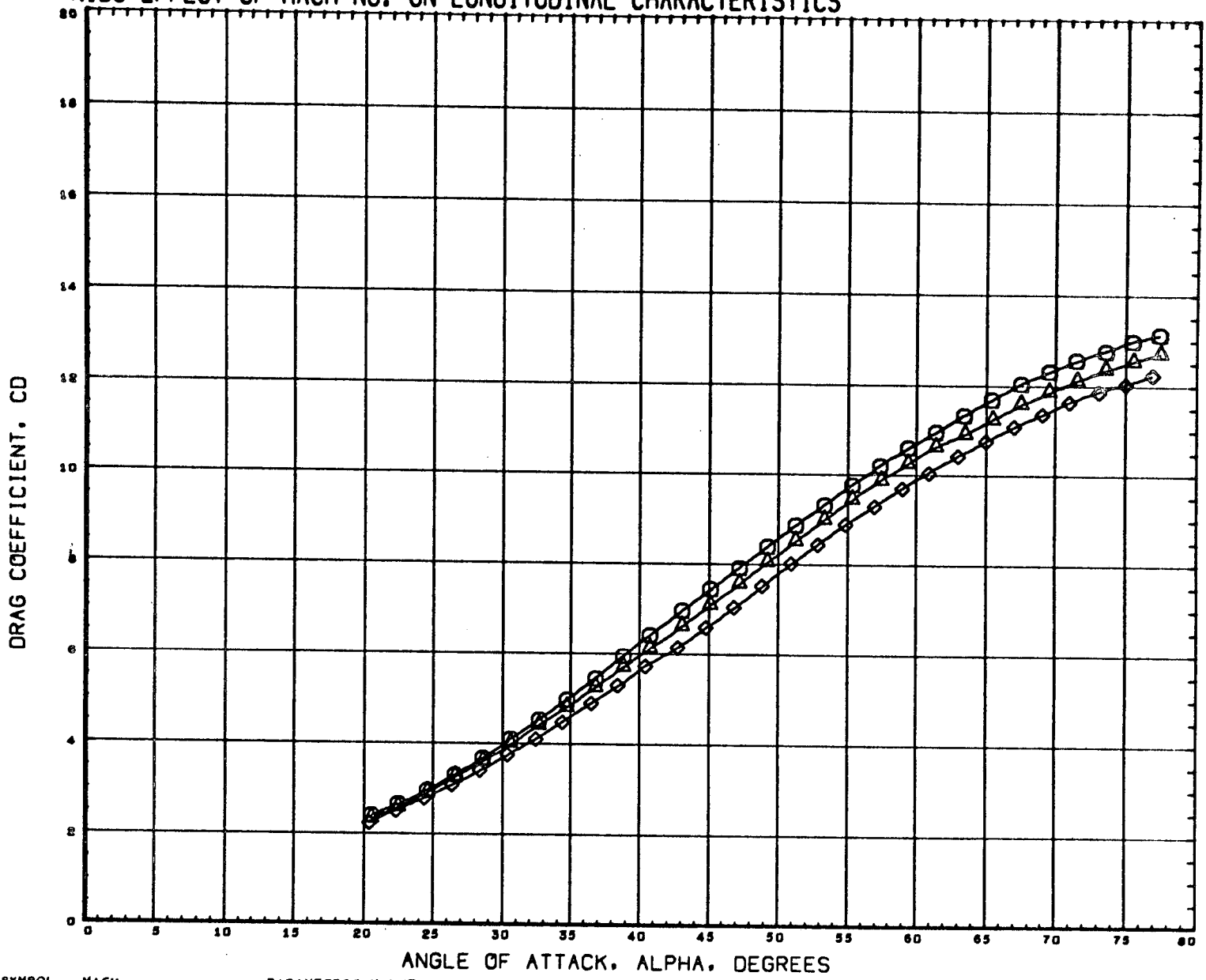
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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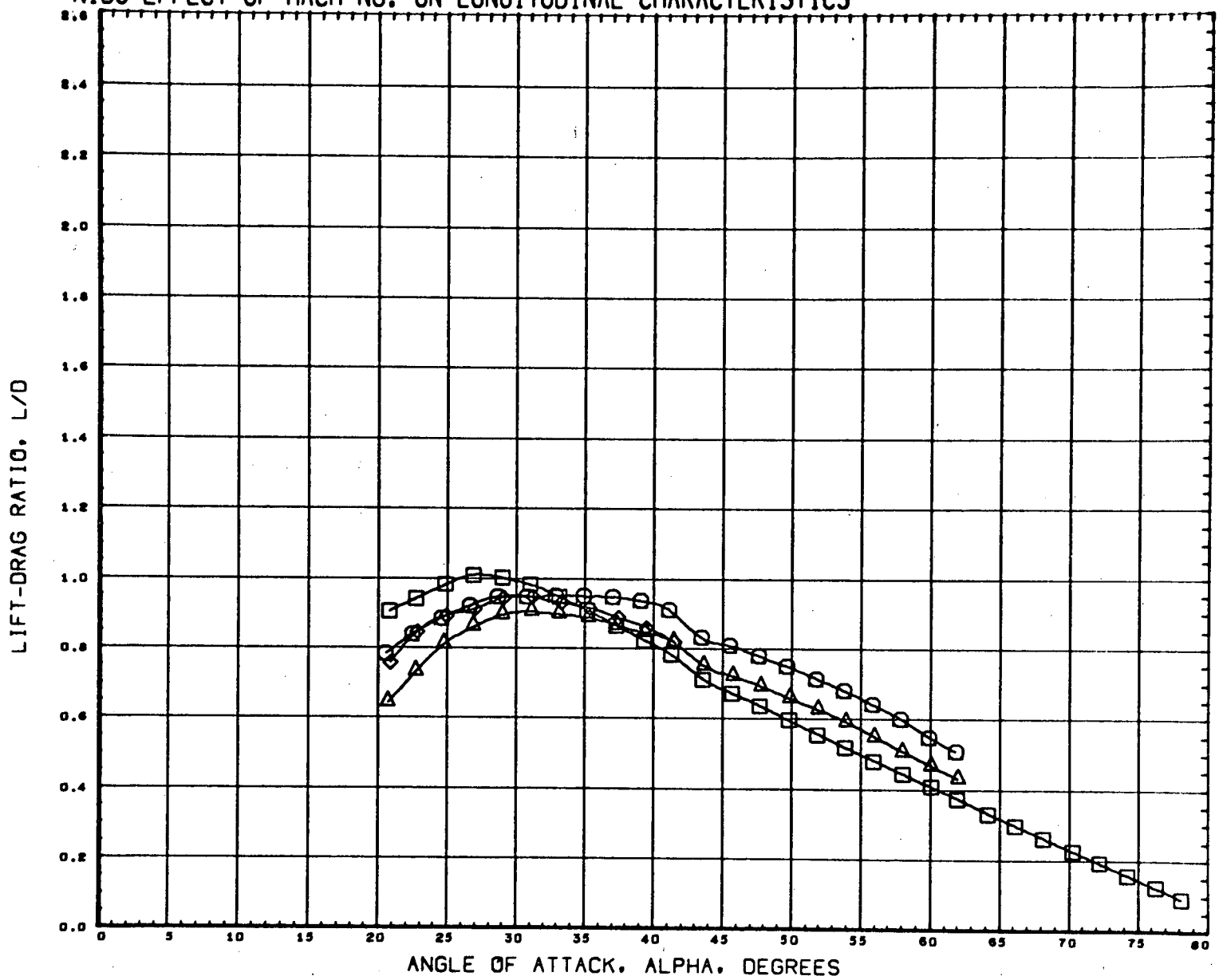

SYMBOL	MACH		PARAMETRIC VALUES
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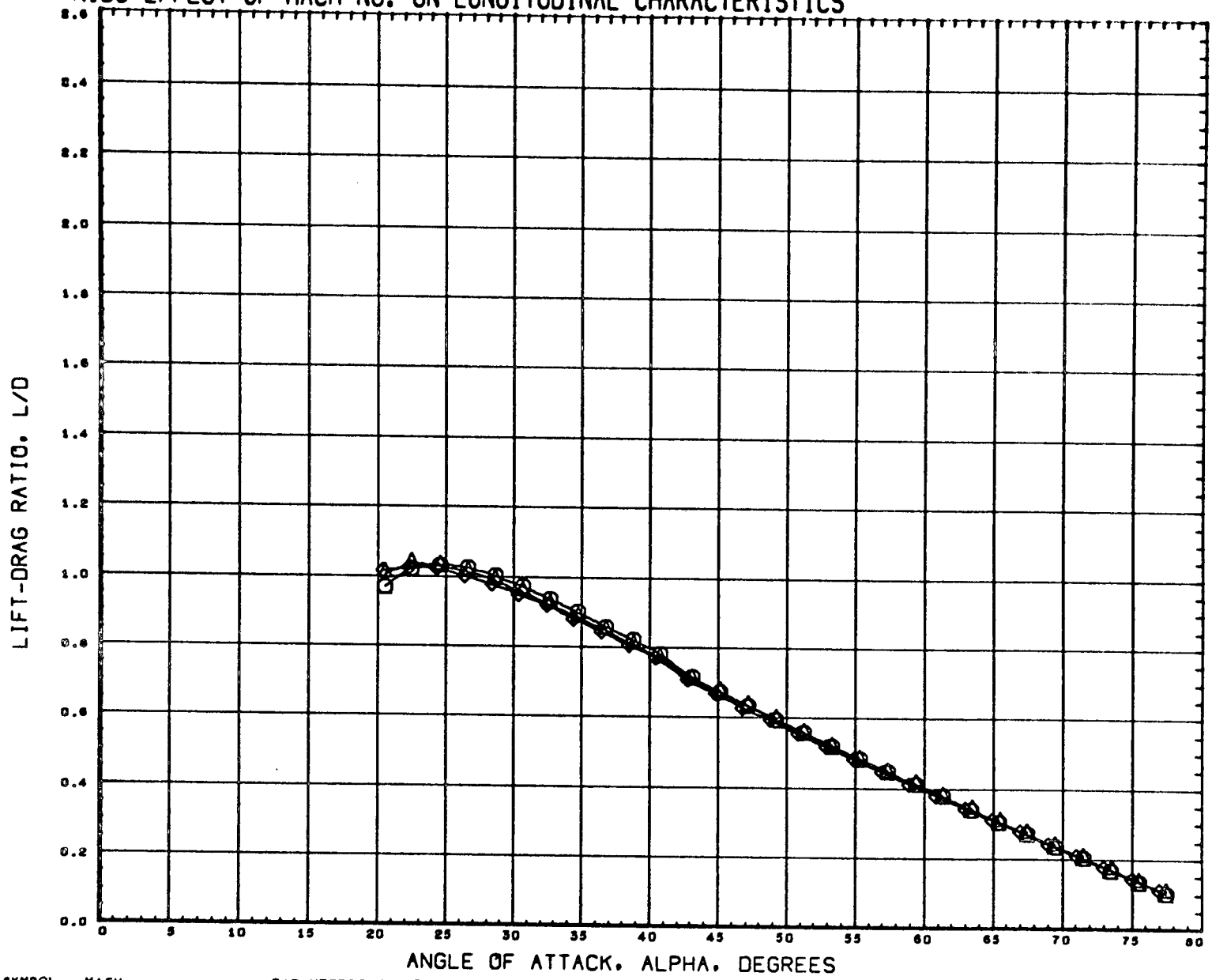
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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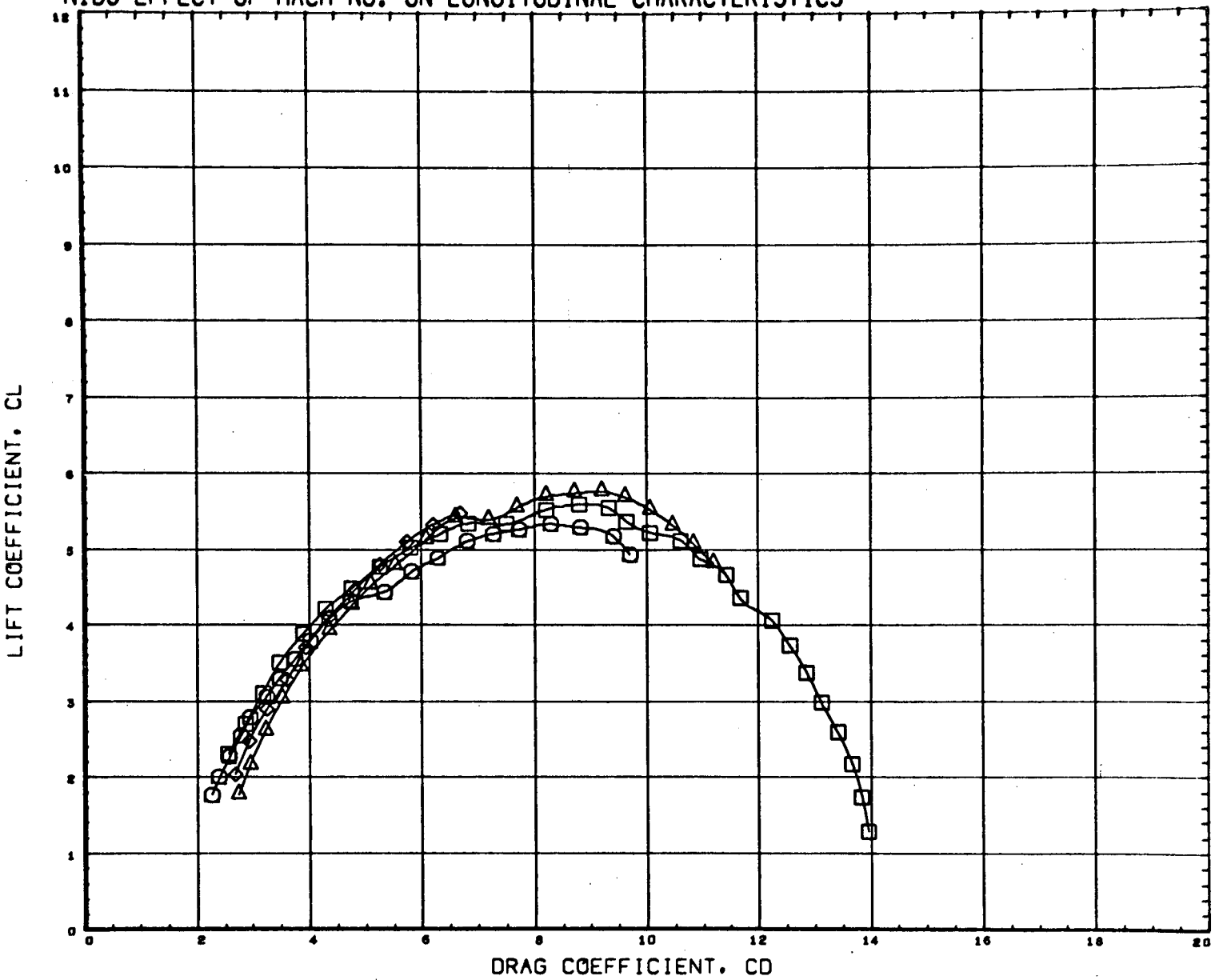
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES	
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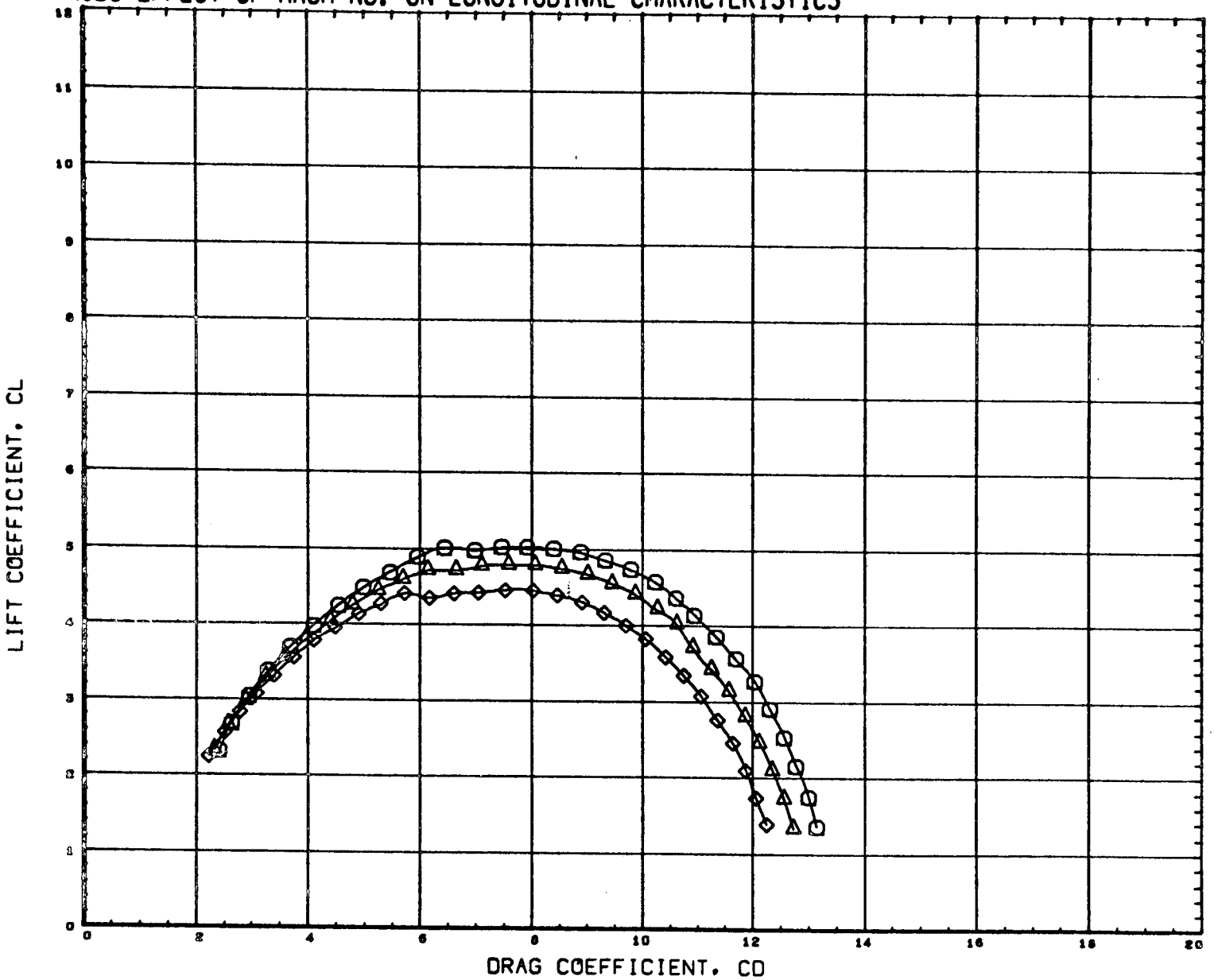
N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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△	3.460		
◇	4.959		

REFERENCE INFORMATION

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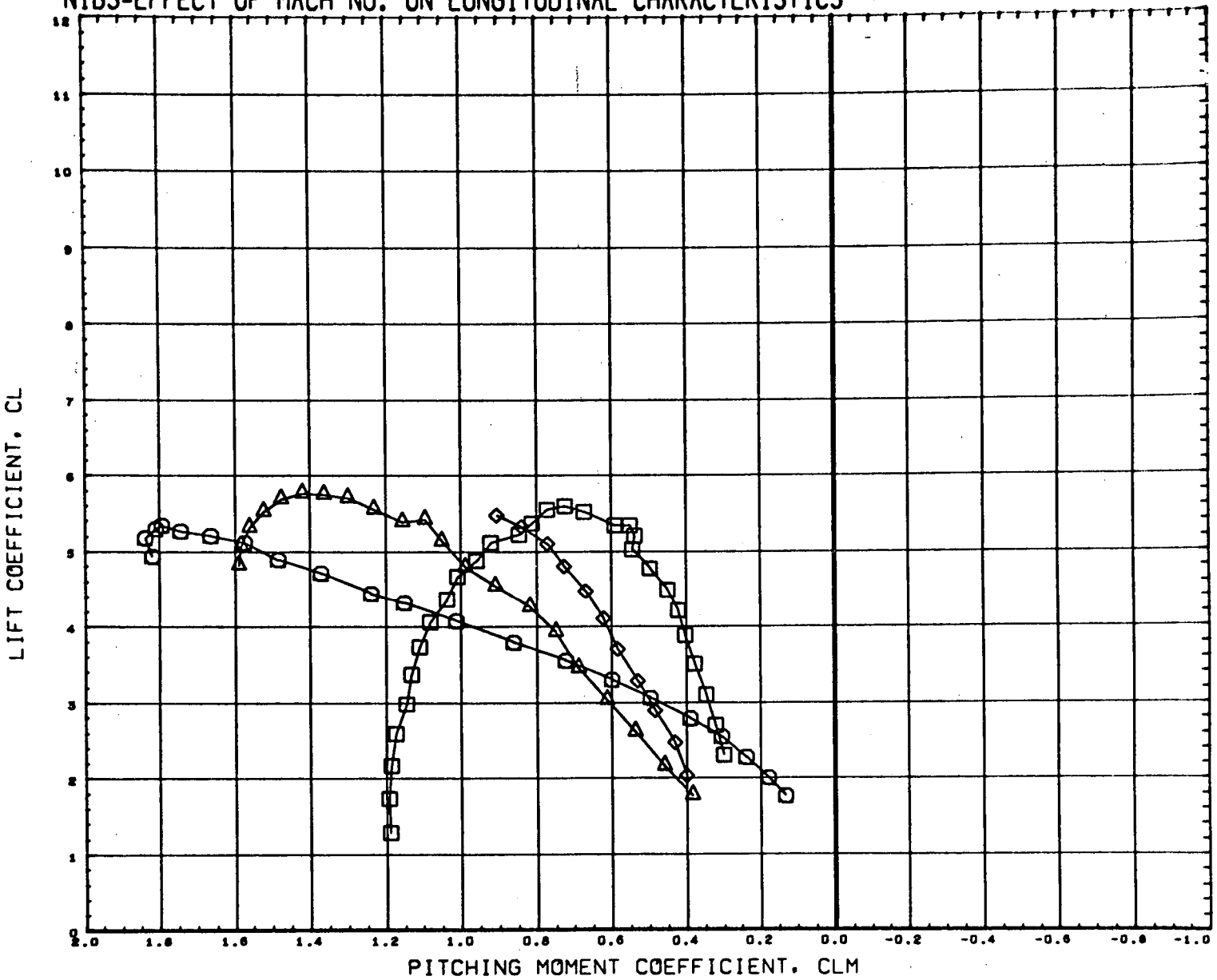
SCALE	0.0034	

DATA HIST. CODE *G*E

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES	
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□	1.964		

DATA HIST. CODE *G*E

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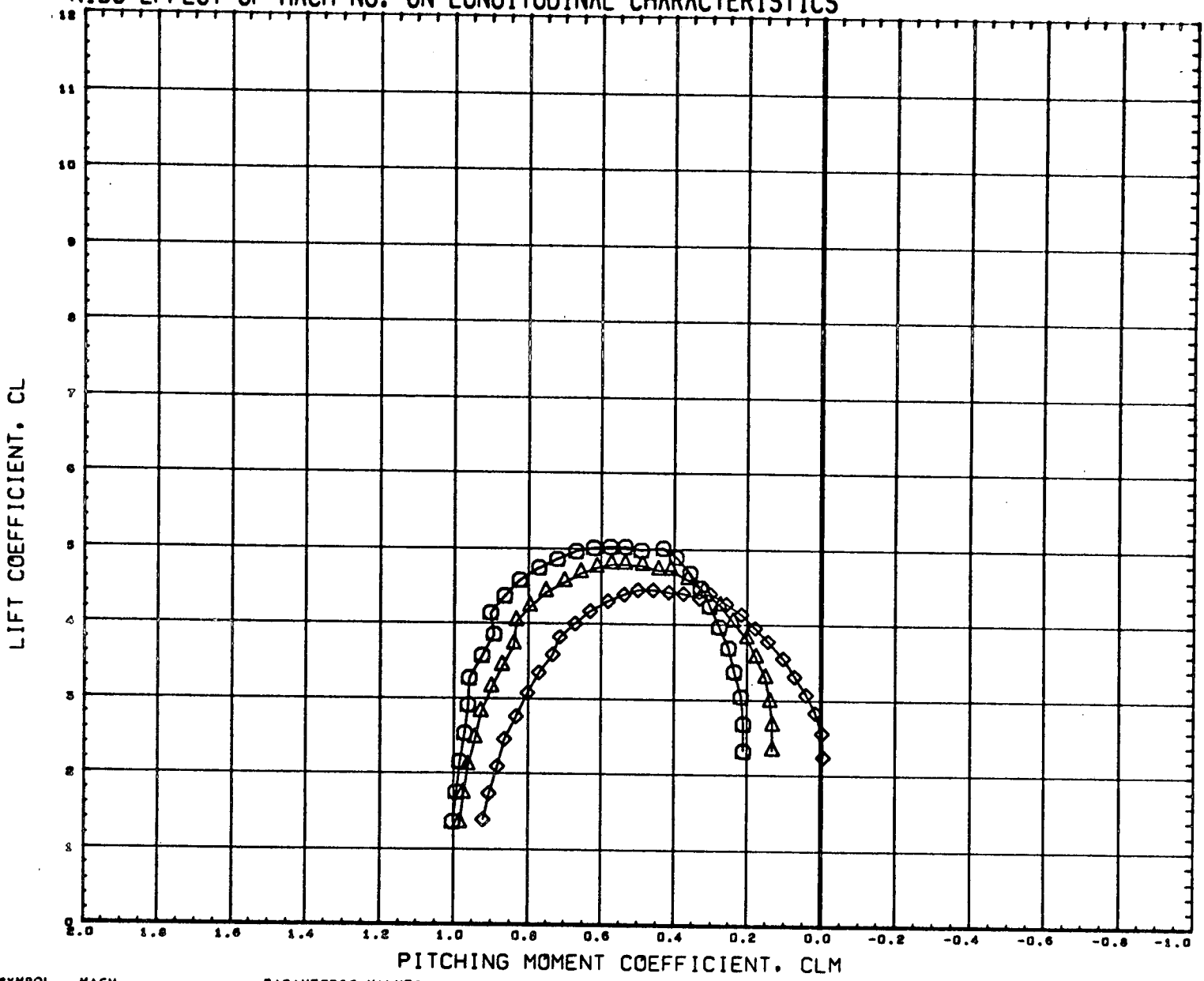
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

N1B3-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



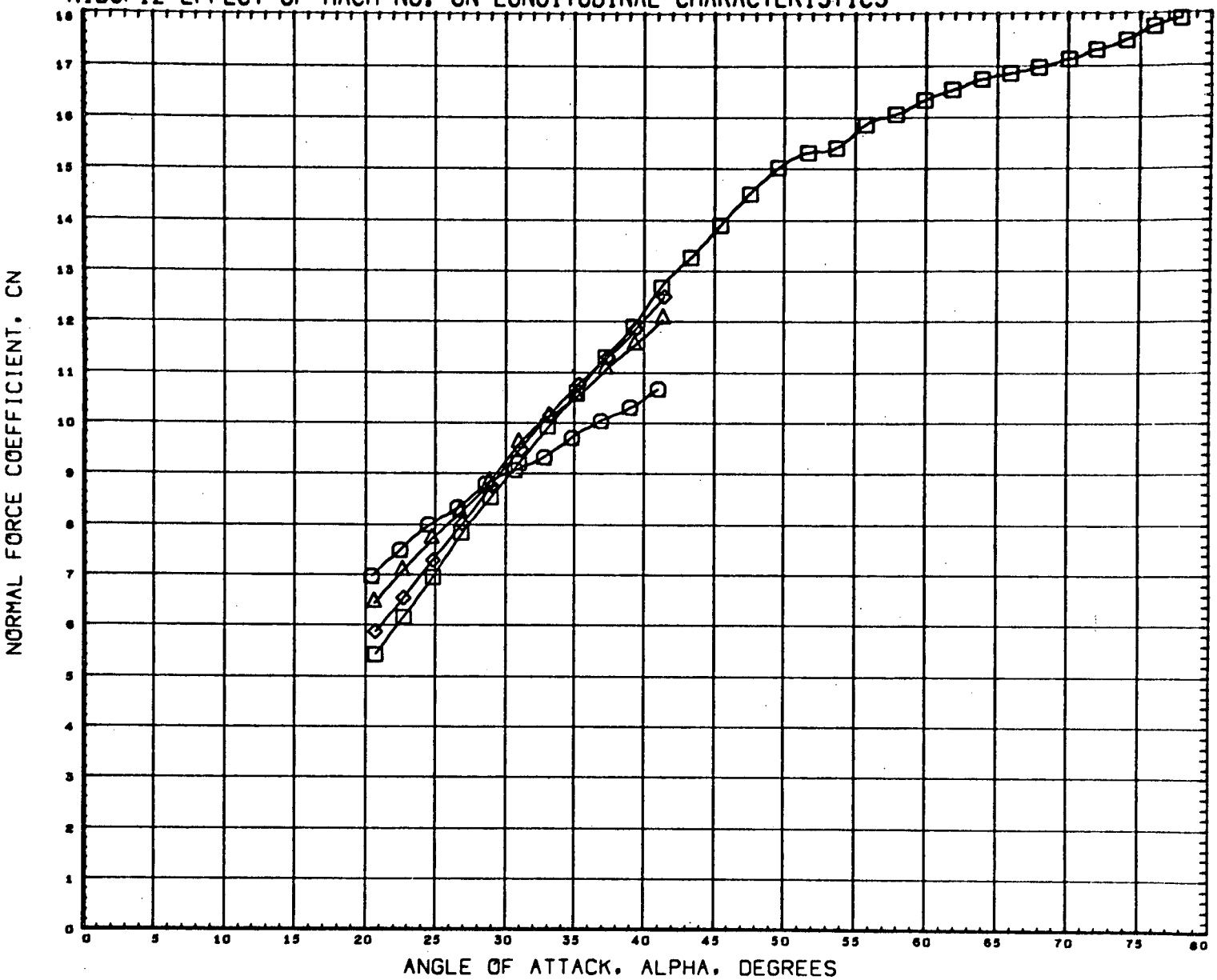
SYMBOL	MACH		PARAMETRIC VALUES
○	2.740	BETA	0.000
△	3.460		
◇	4.959		

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

DATA HIST. CODE *G*E

REFERENCE INFORMATION

SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
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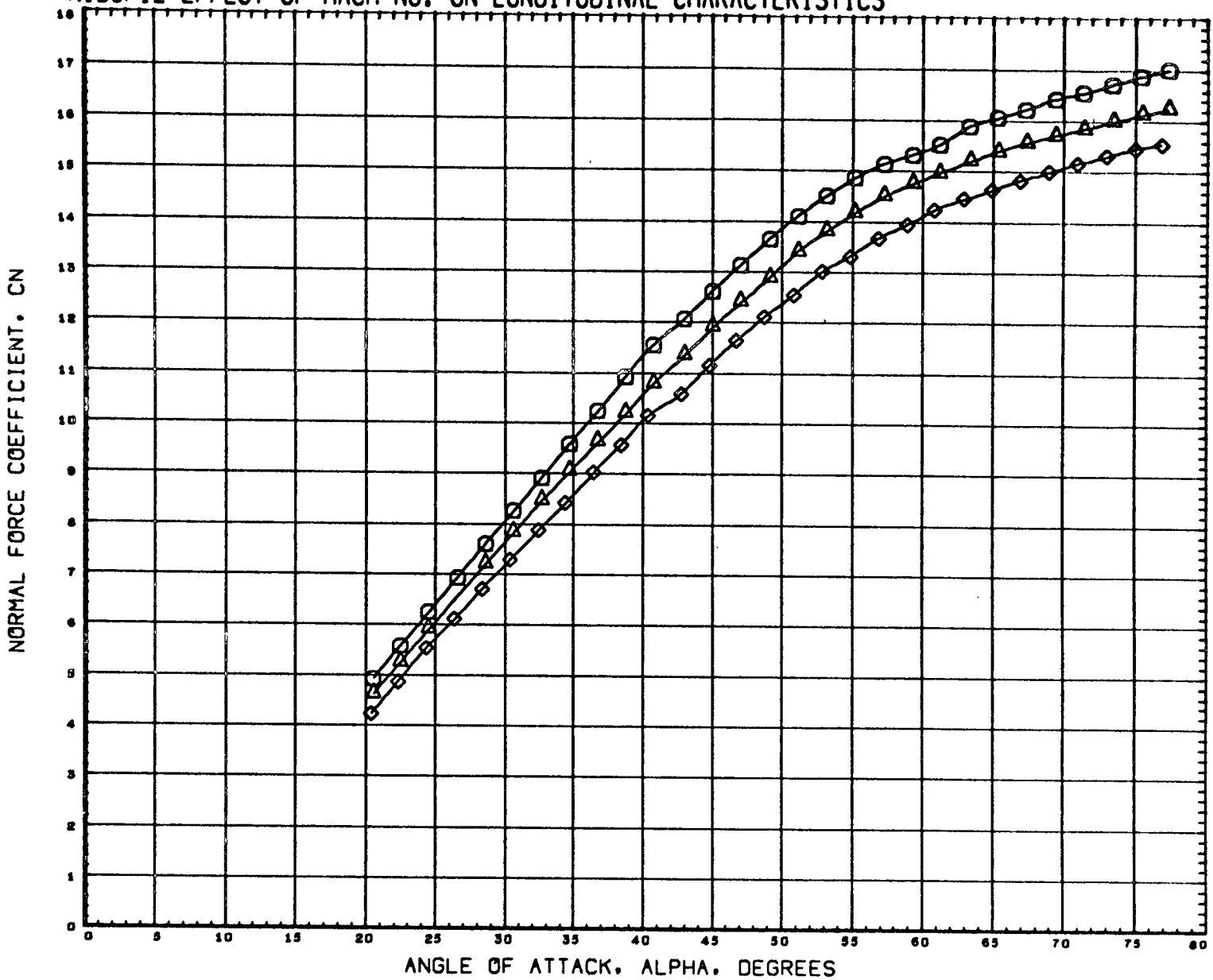
SCALE	0.0034	

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES		
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△	3.480				
◇	4.959				

REFERENCE INFORMATION

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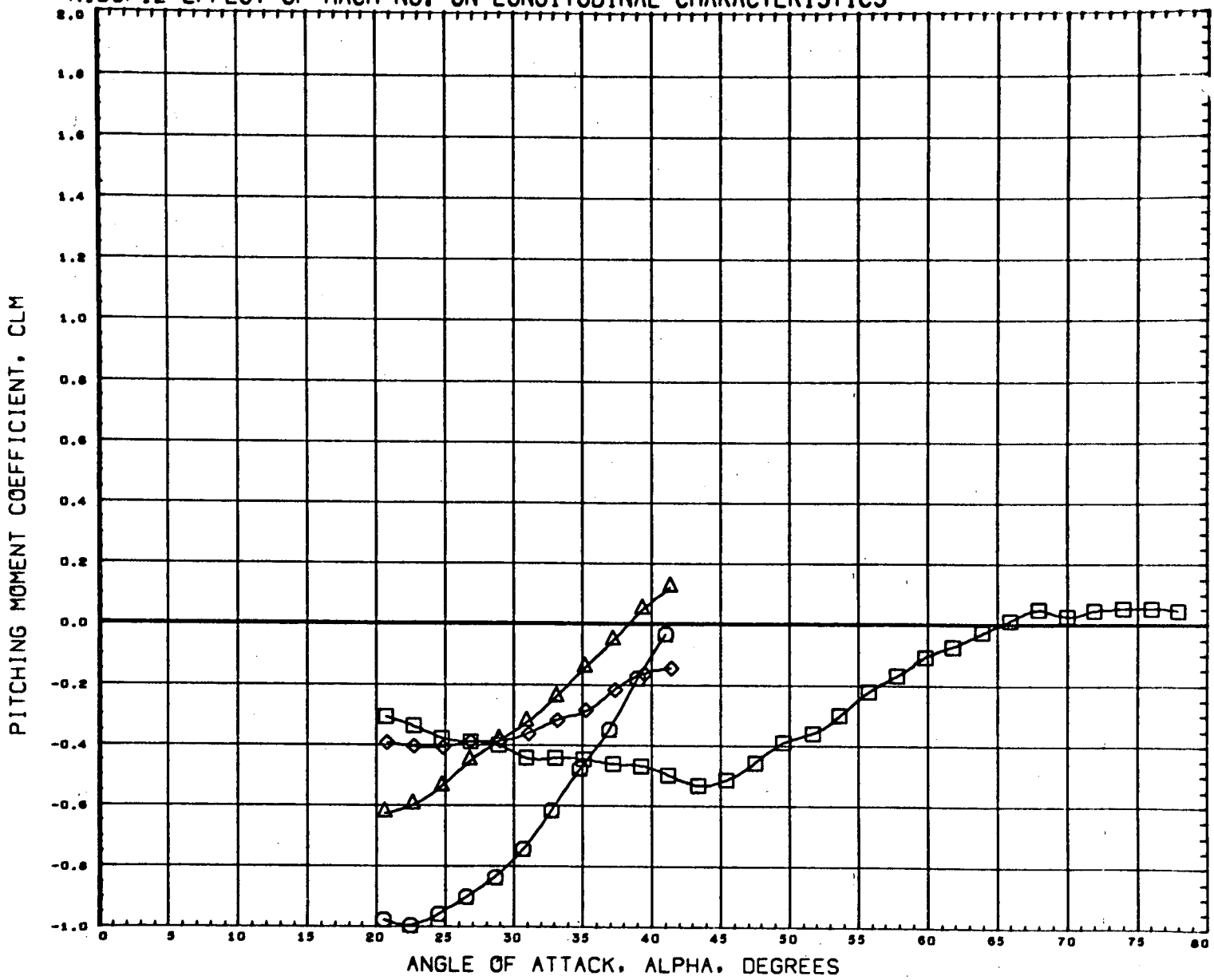
DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES		
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△	1.198				
◇	1.460				
□	1.957				

DATA HIST. CODE *G*E

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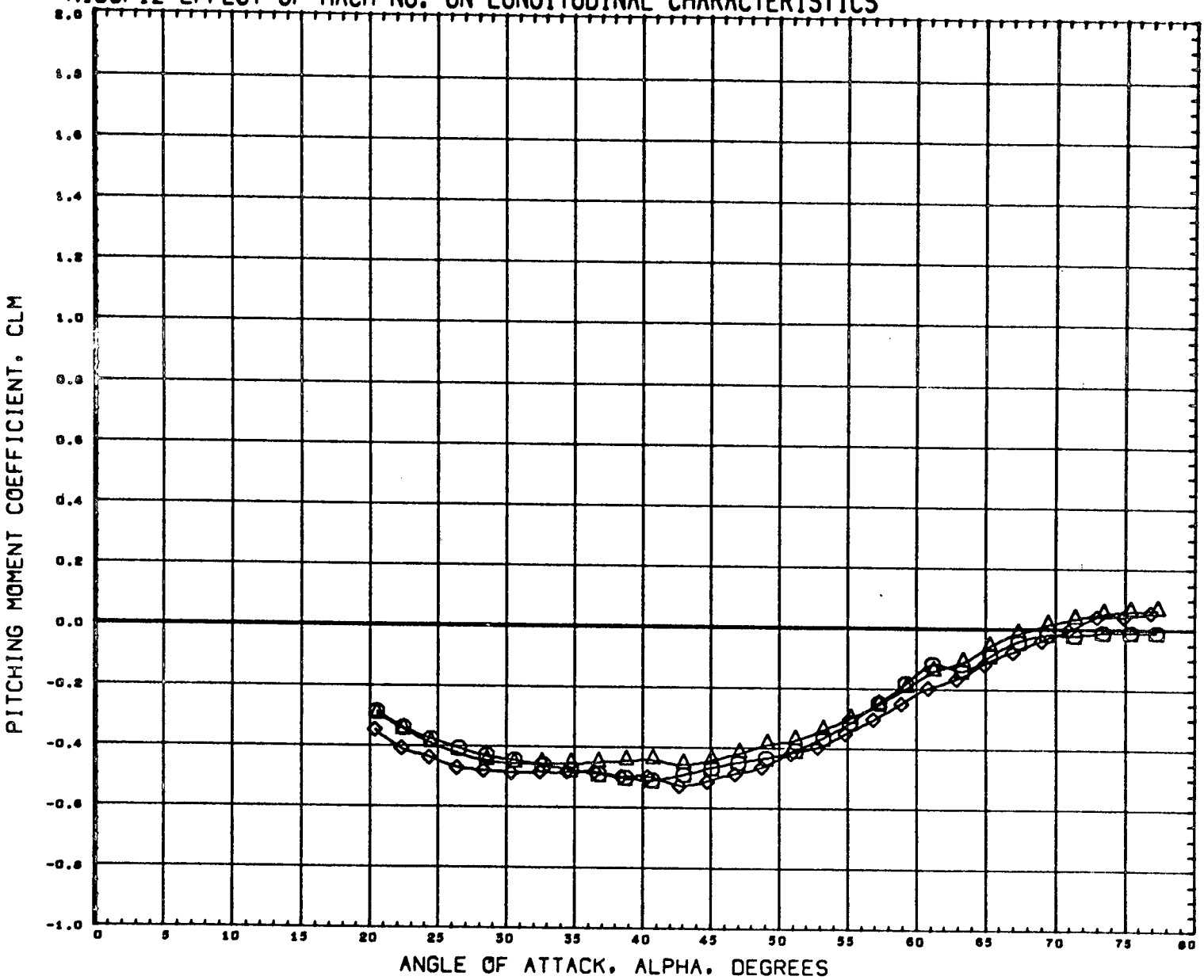

SYMBOL	MACH
○	2.740
△	3.480
◇	4.959

PARAMETRIC VALUES

BETA 0.000 DIHDRL 30.000

REFERENCE INFORMATION

SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
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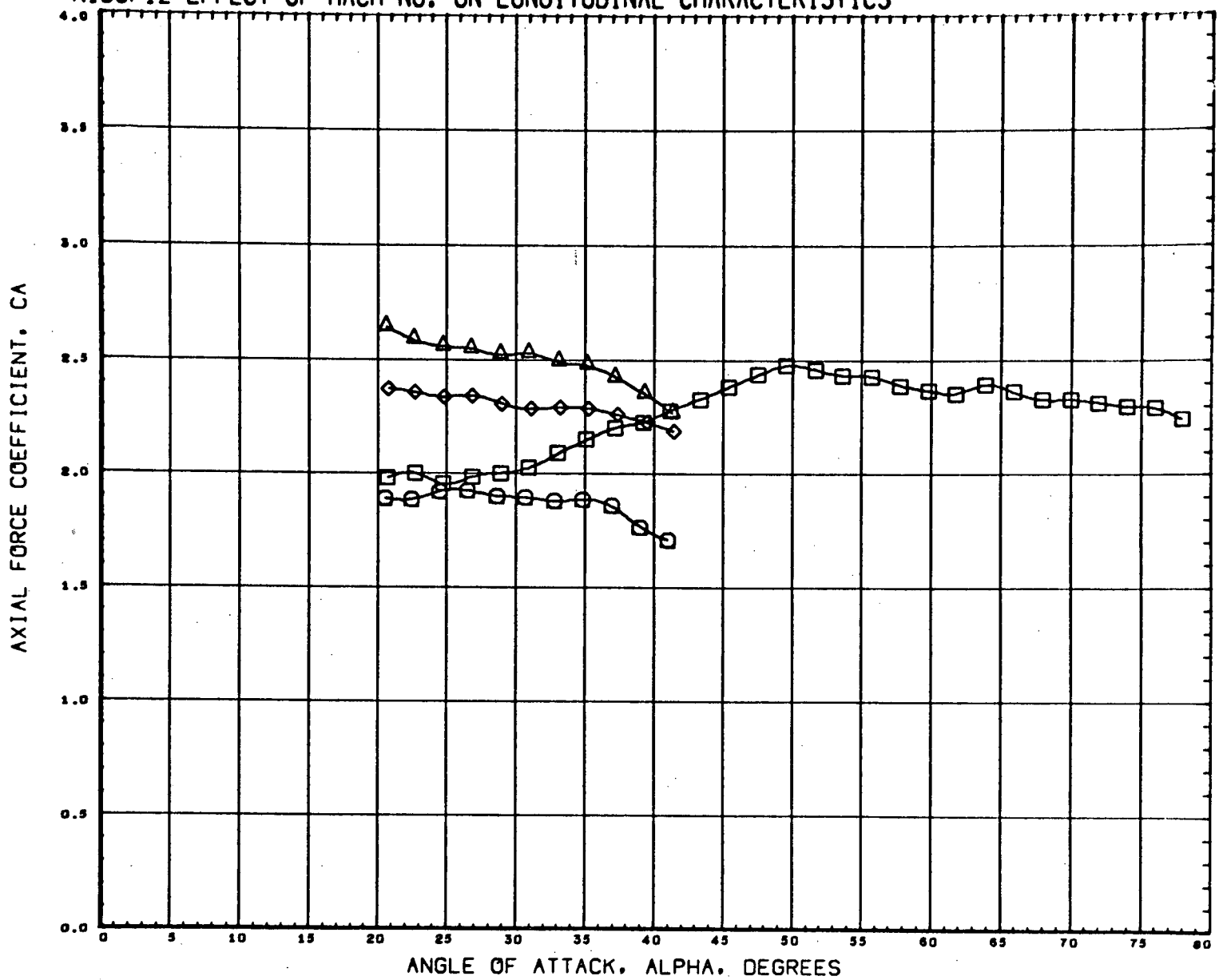
DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			
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DATA HIST. CODE #G#E

REFERENCE INFORMATION

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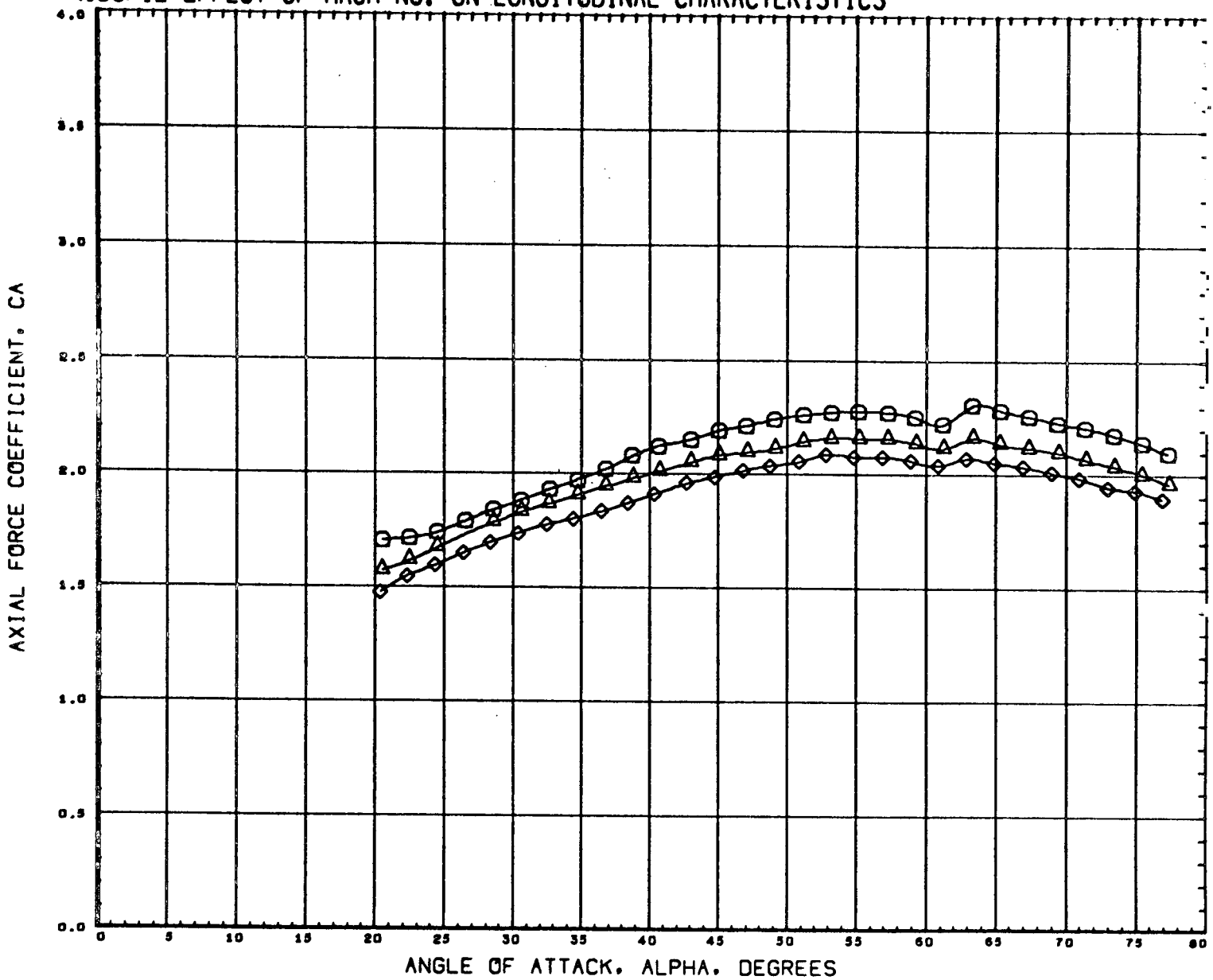

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YMRP	0.0000	IN.
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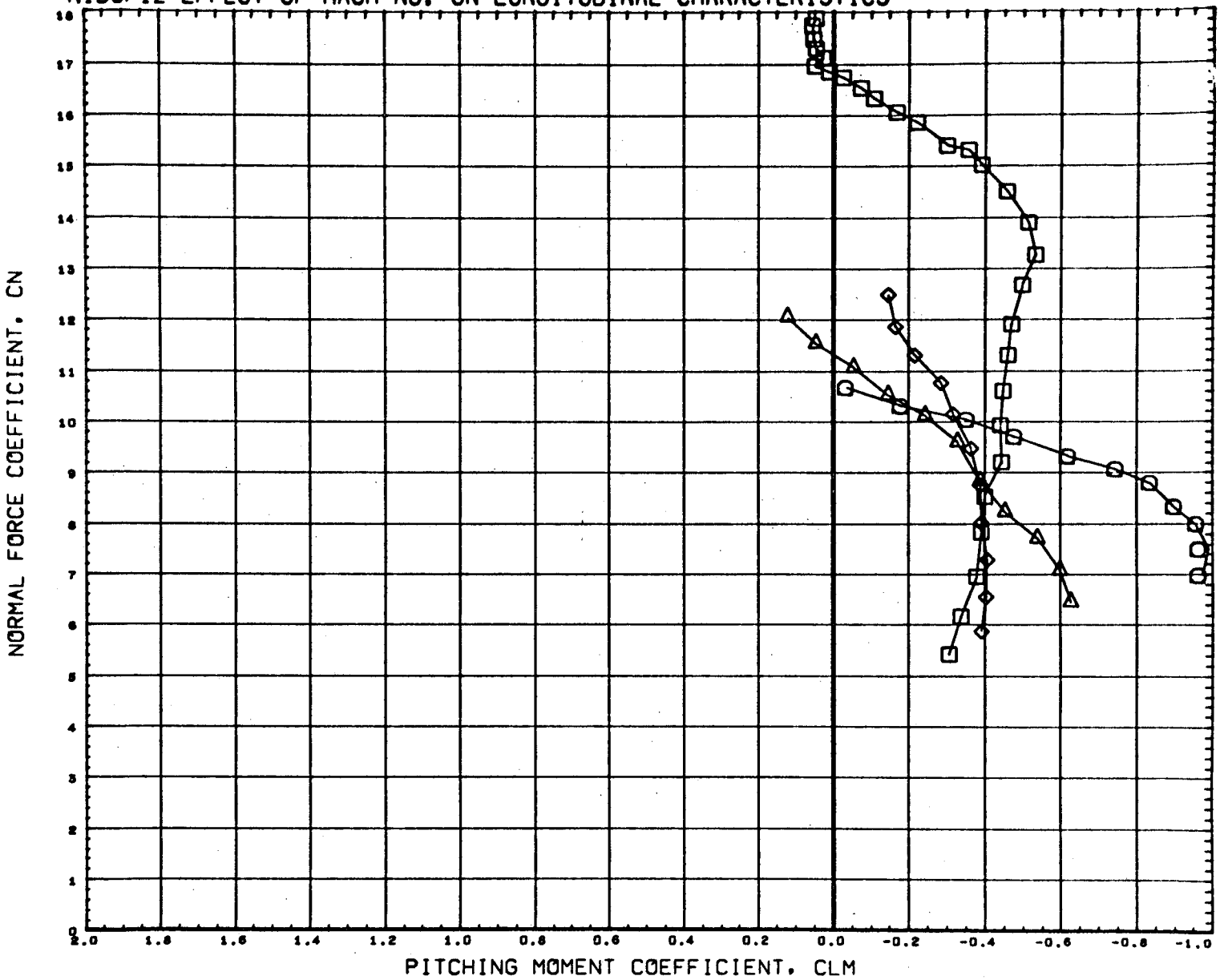
DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			
○	0.898	BETA	0.000	DIHDRL	30.000
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DATA HIST. CODE *G*E

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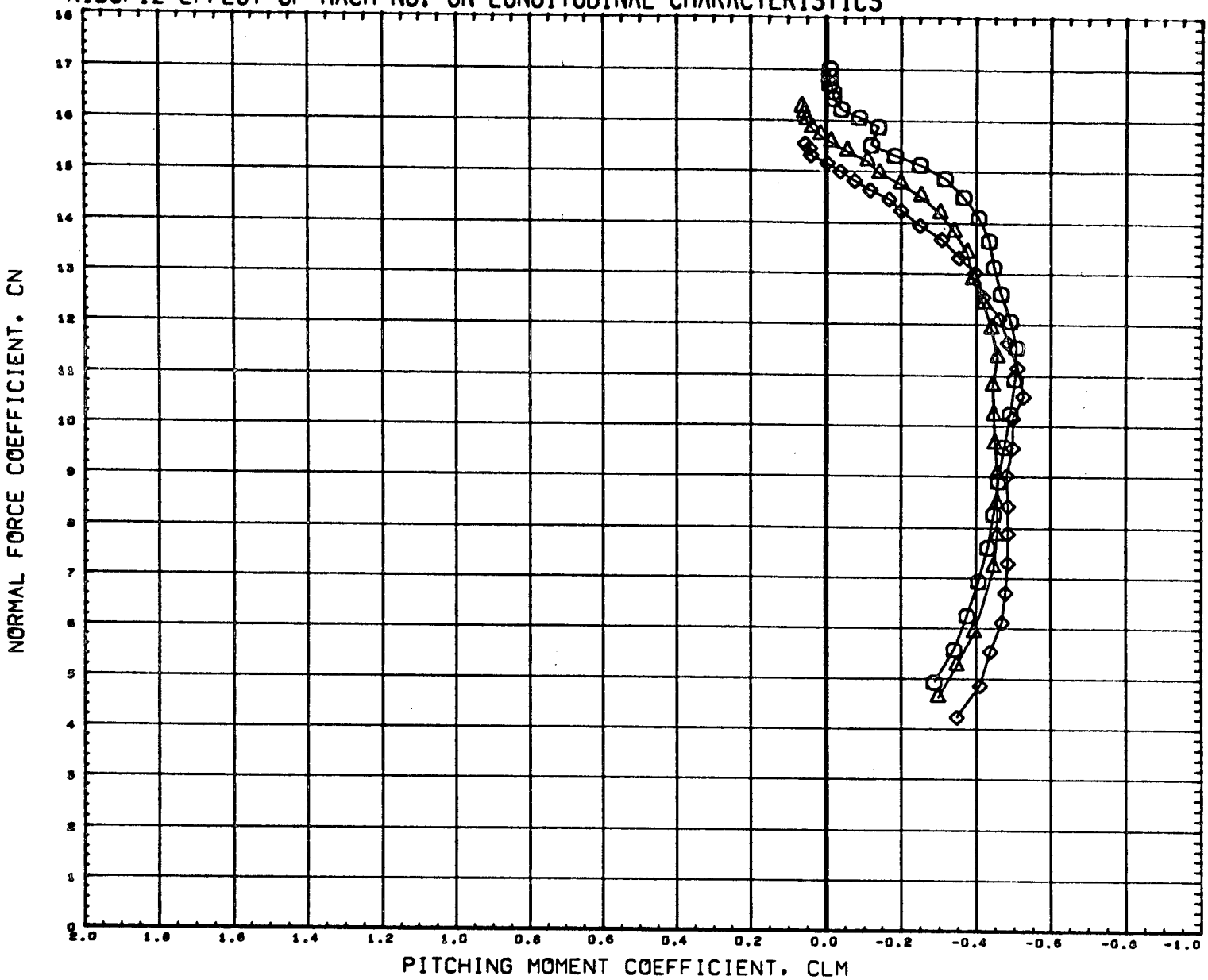

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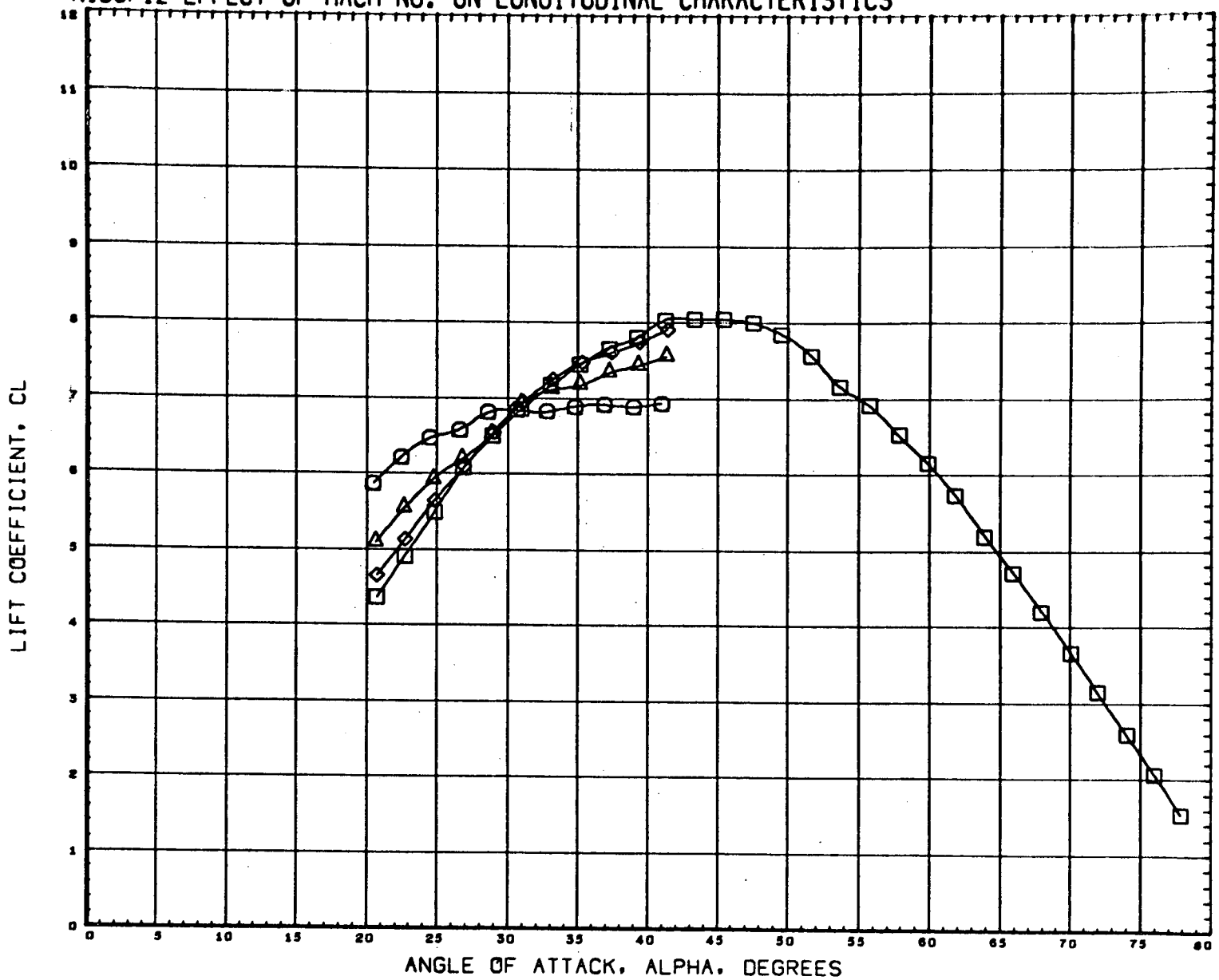

SYMBOL	MACH	PARAMETRIC VALUES			
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◇	1.460				
□	1.957				

DATA HIST. CODE *G*E

REFERENCE INFORMATION

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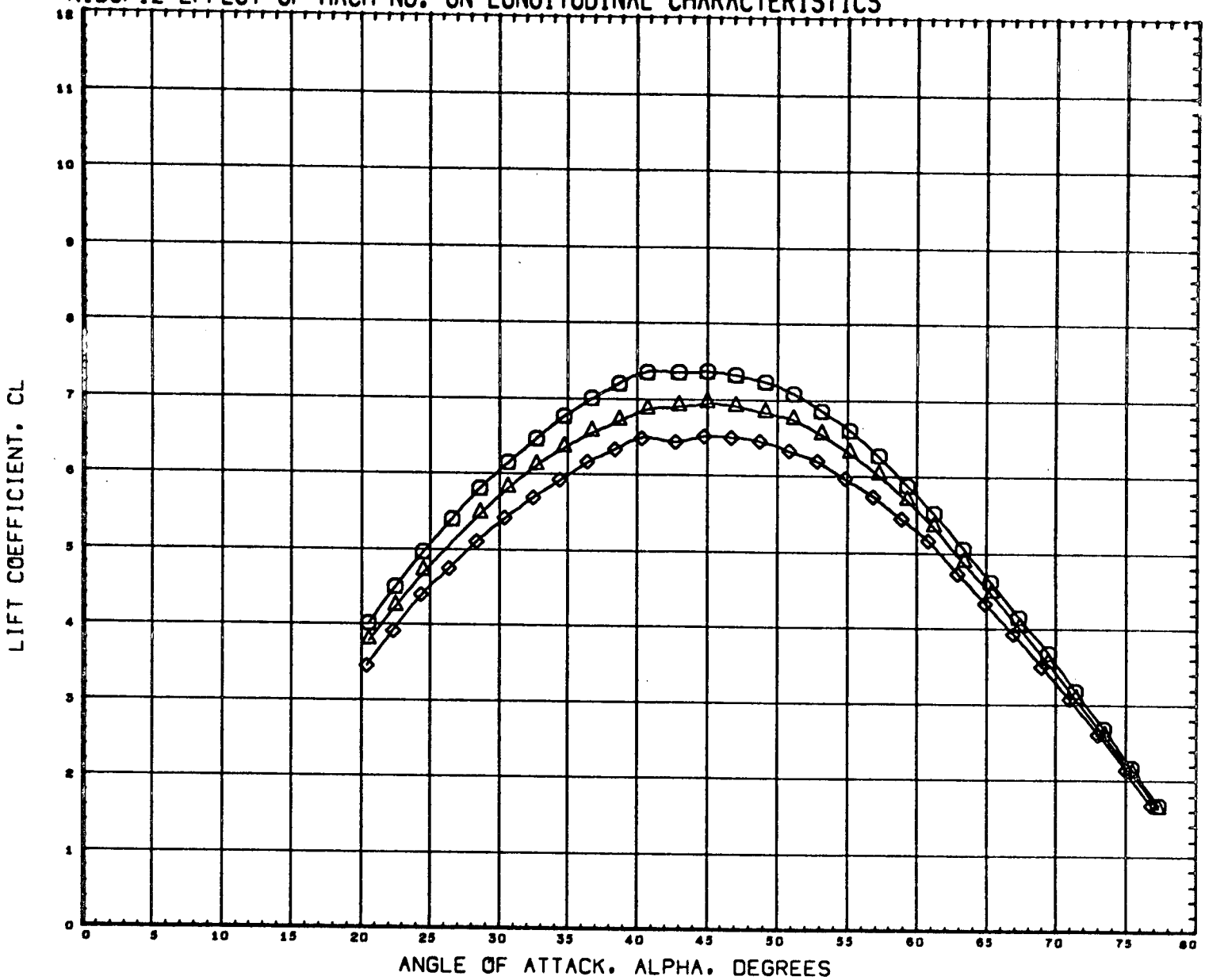

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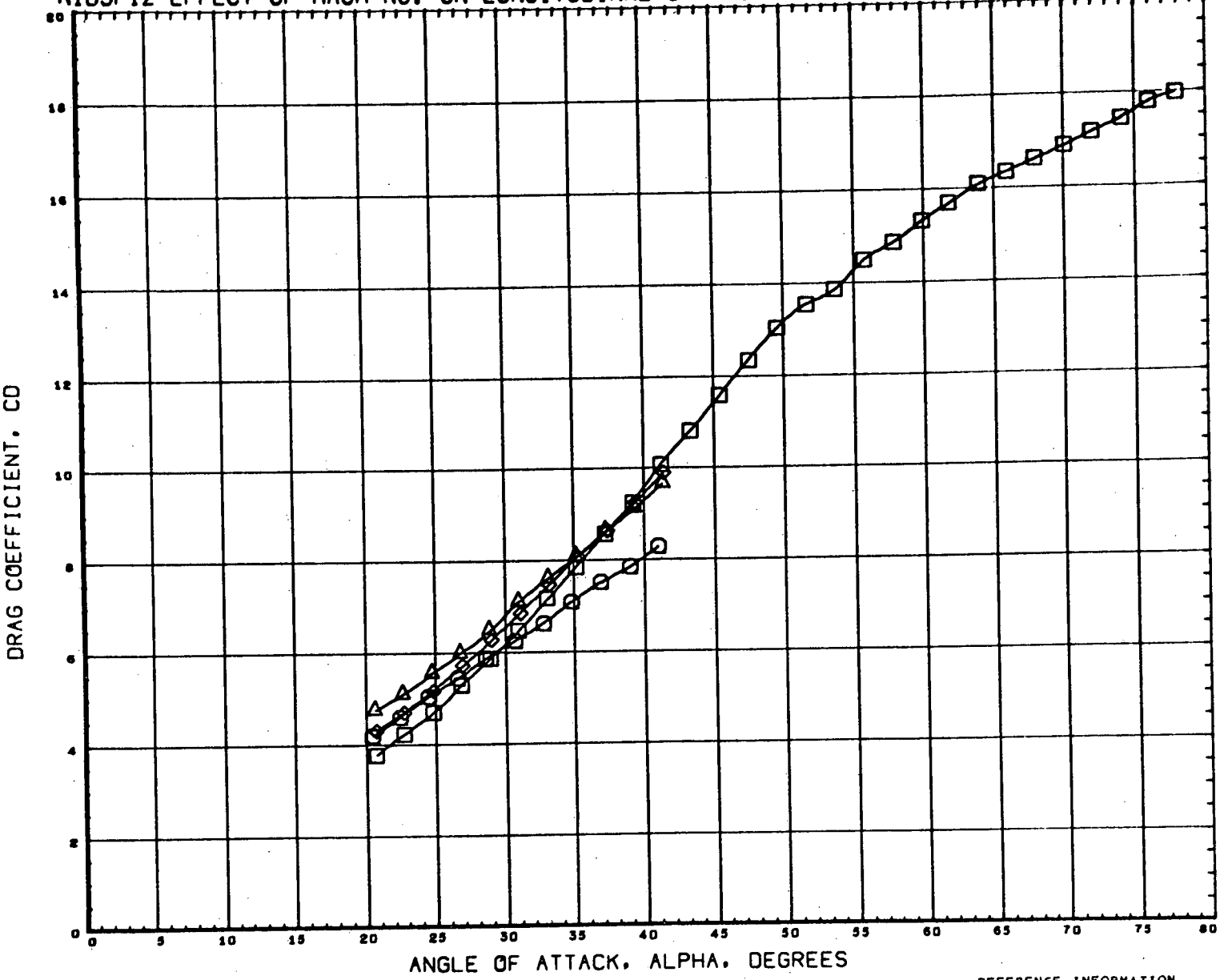

SYMBOL	MACH
○	0.898
△	1.198
◇	1.460
□	1.957

PARAMETRIC VALUES

BETA 0.000 DIHDRL 30.000

REFERENCE INFORMATION

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LREF	8.1720	IN.
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DATA HIST. CODE *G*E

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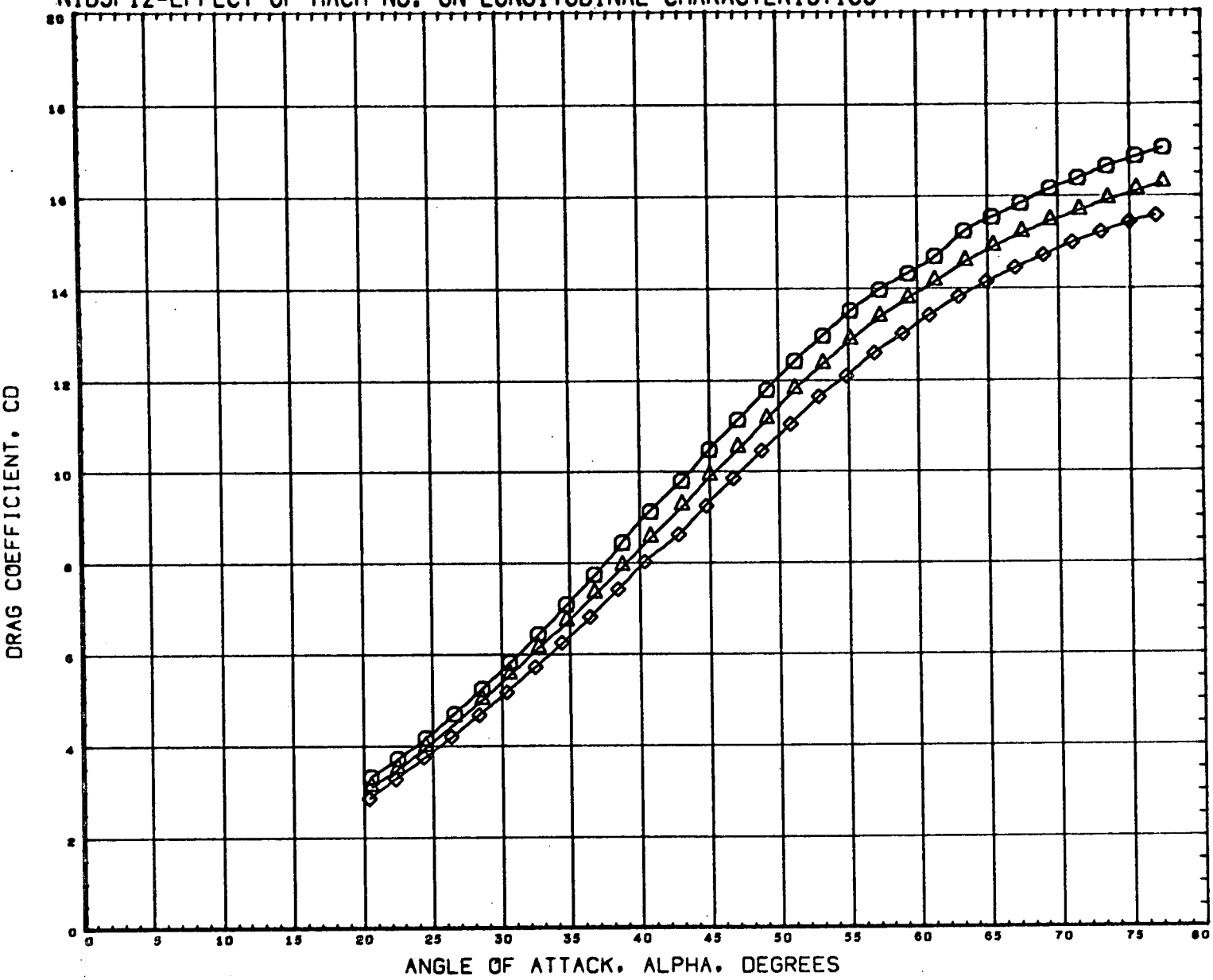

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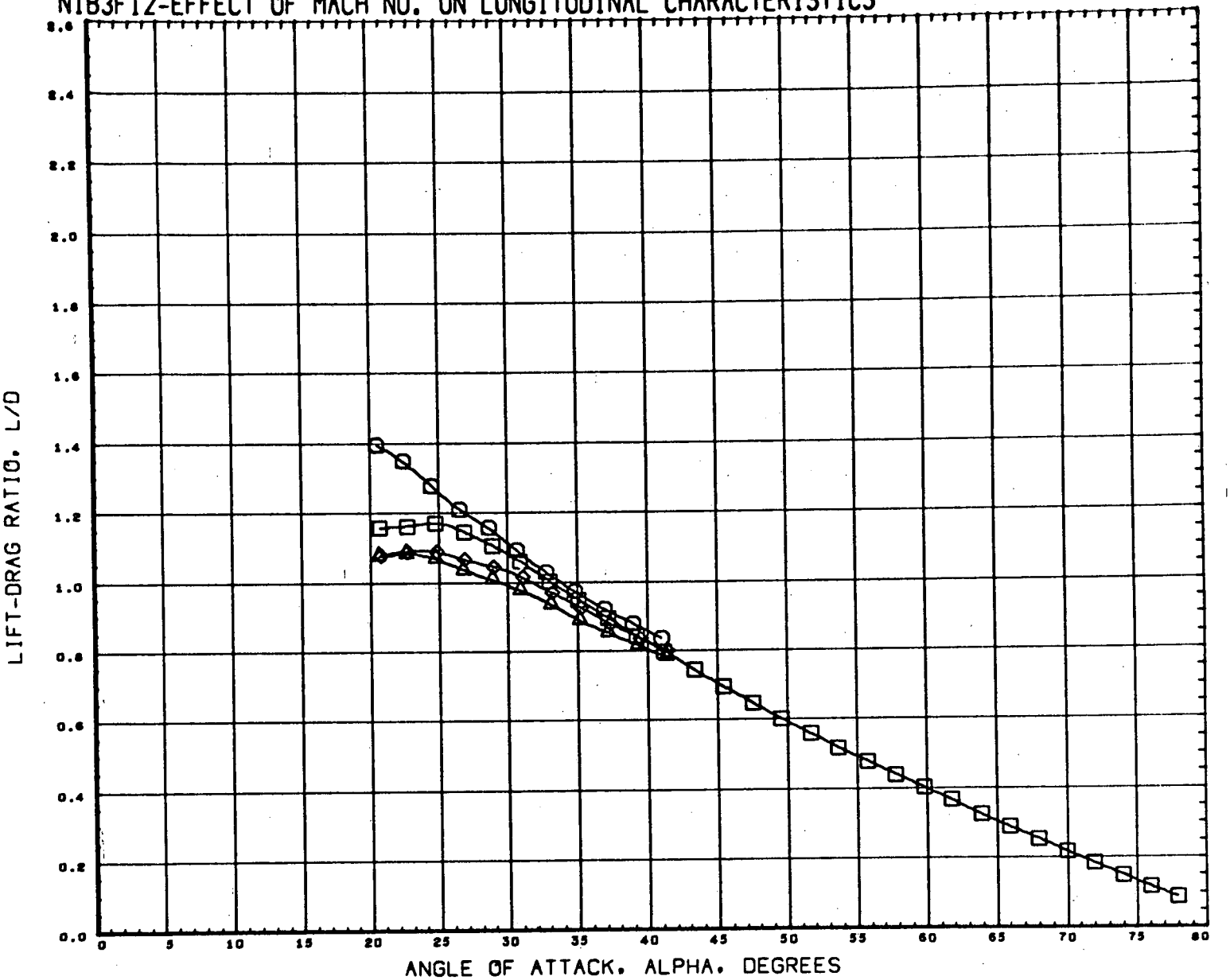

SYMBOL	MACH
○	0.898
△	1.198
◇	1.460
□	1.957

PARAMETRIC VALUES

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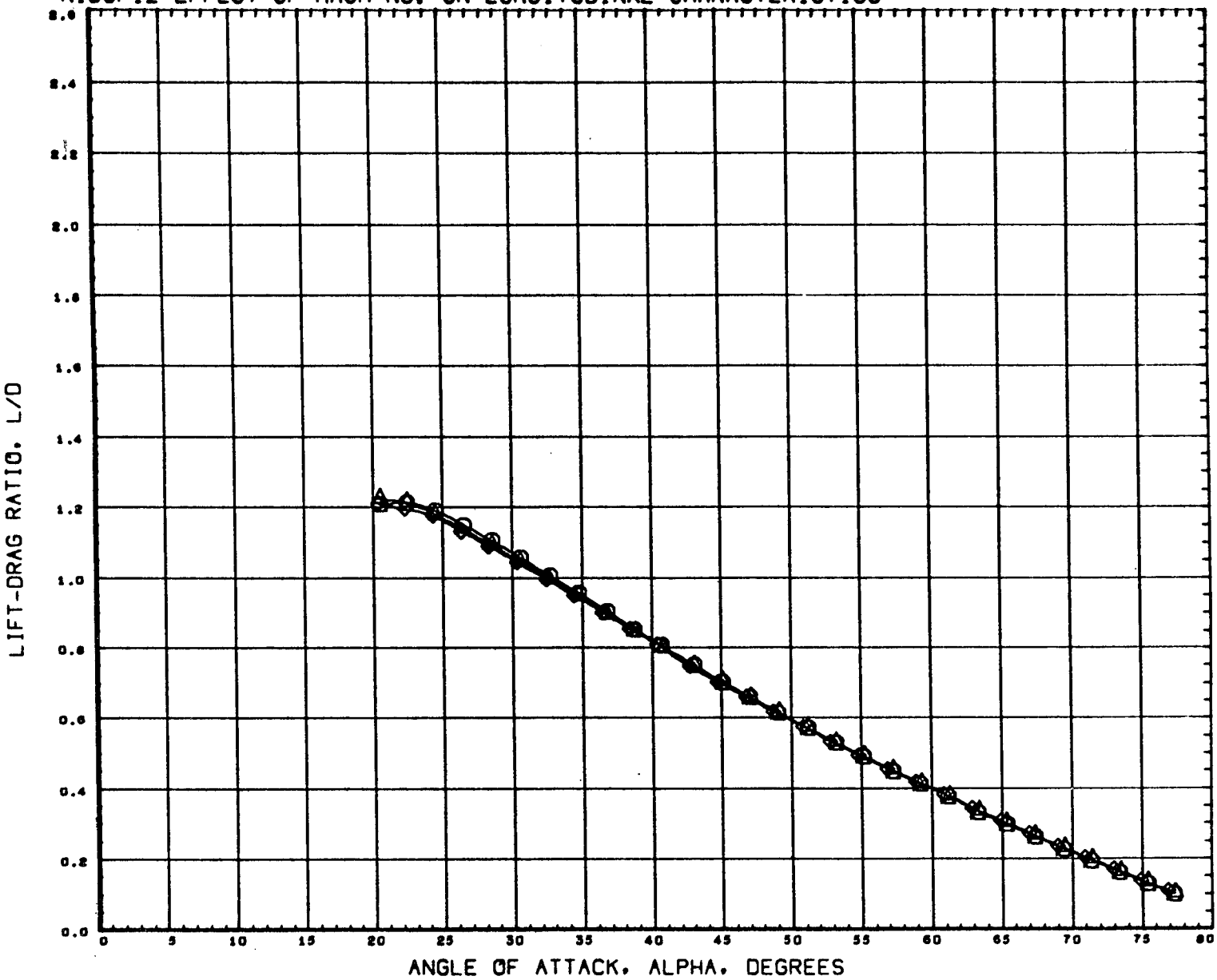
DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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△	3.480				
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REFERENCE INFORMATION

SREF	0.9330	SQ. IN
LREF	8.1720	IN.
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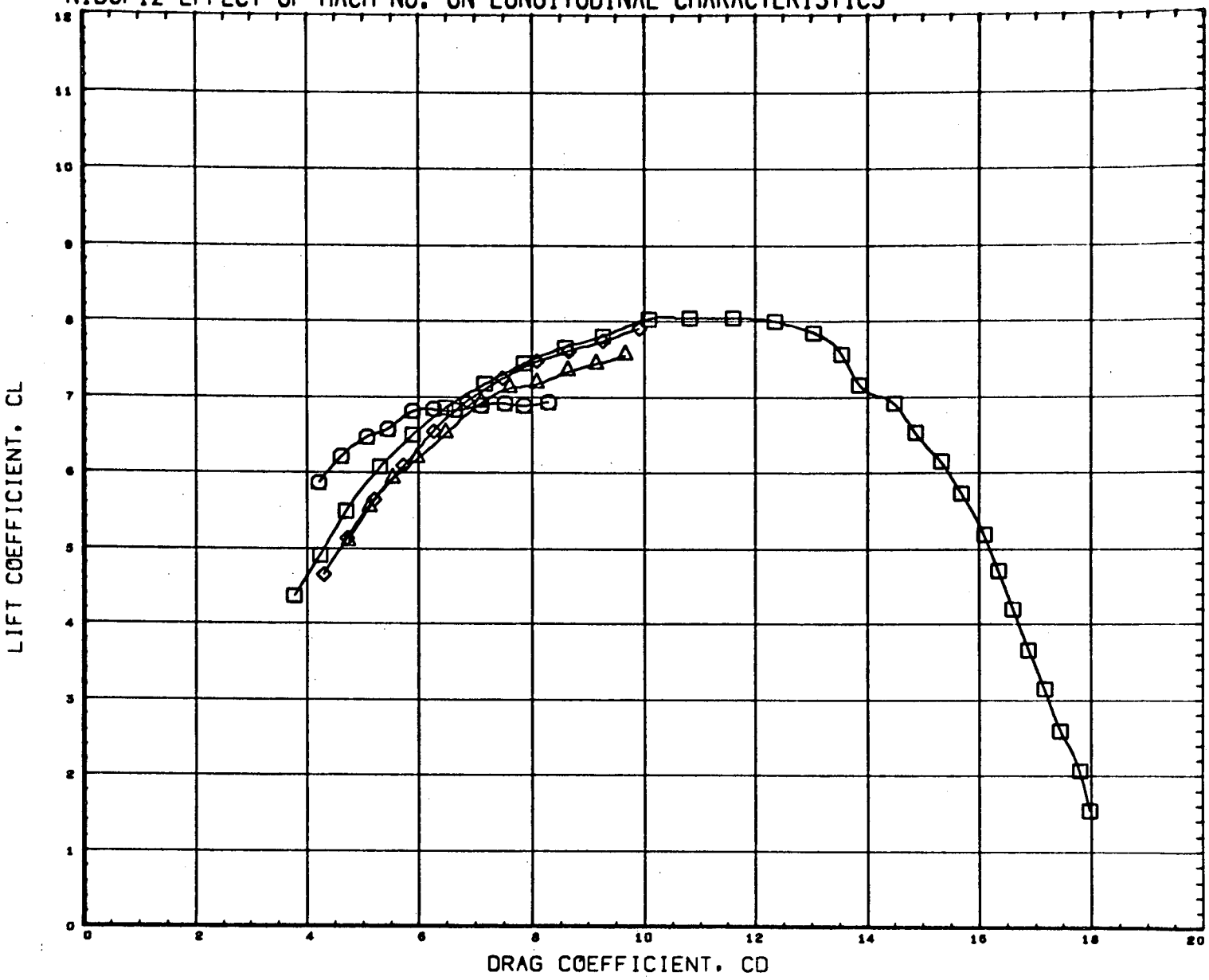
DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES		
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□	1.957				

DATA HIST. CODE *G*E

REFERENCE INFORMATION

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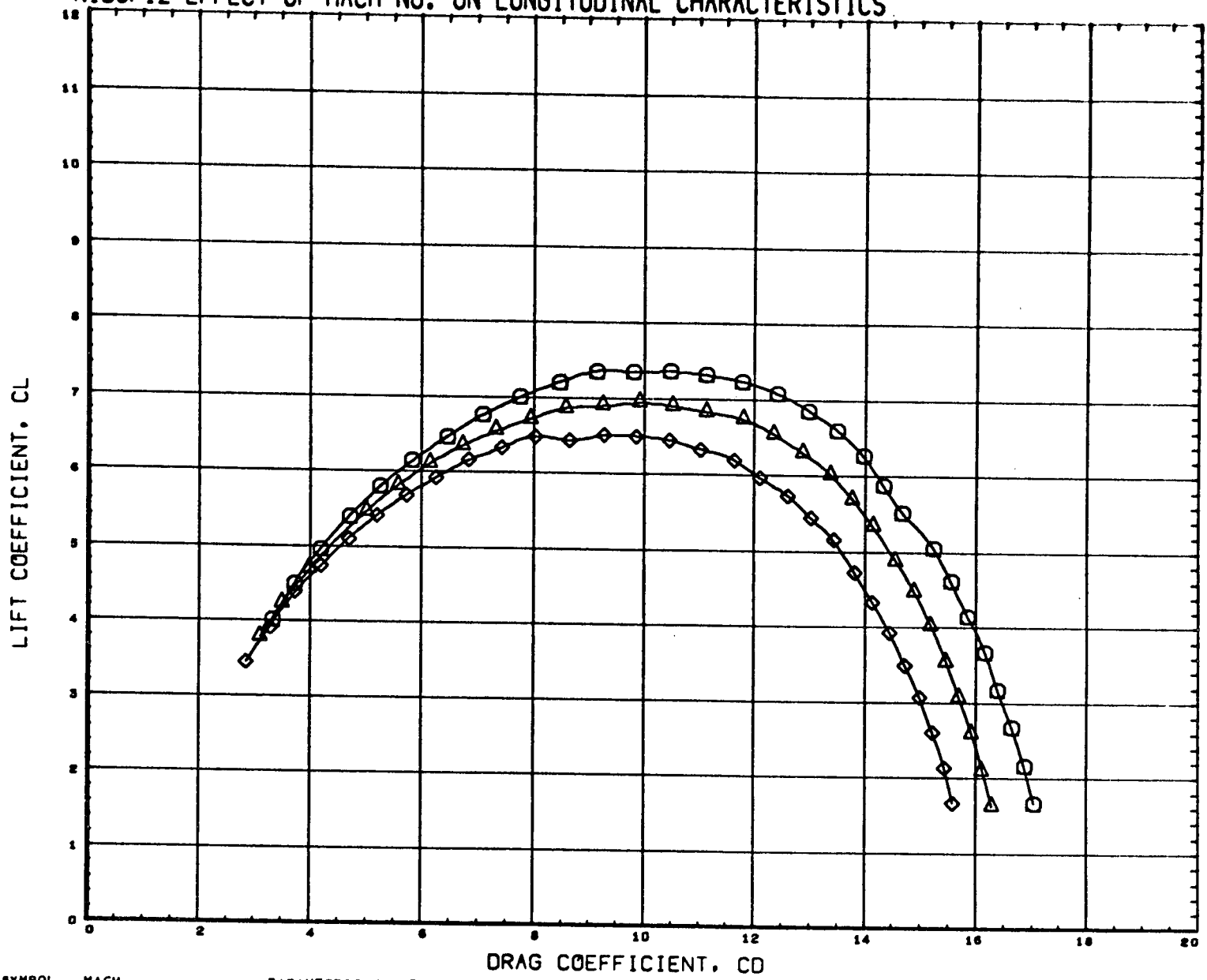
N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH
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△	3.480
◇	4.959

PARAMETRIC VALUES

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REFERENCE INFORMATION

SREF	0.9330	SQ. IN
LREF	8.1720	IN.
BREF	8.1720	IN.
XMRP	5.2300	IN.
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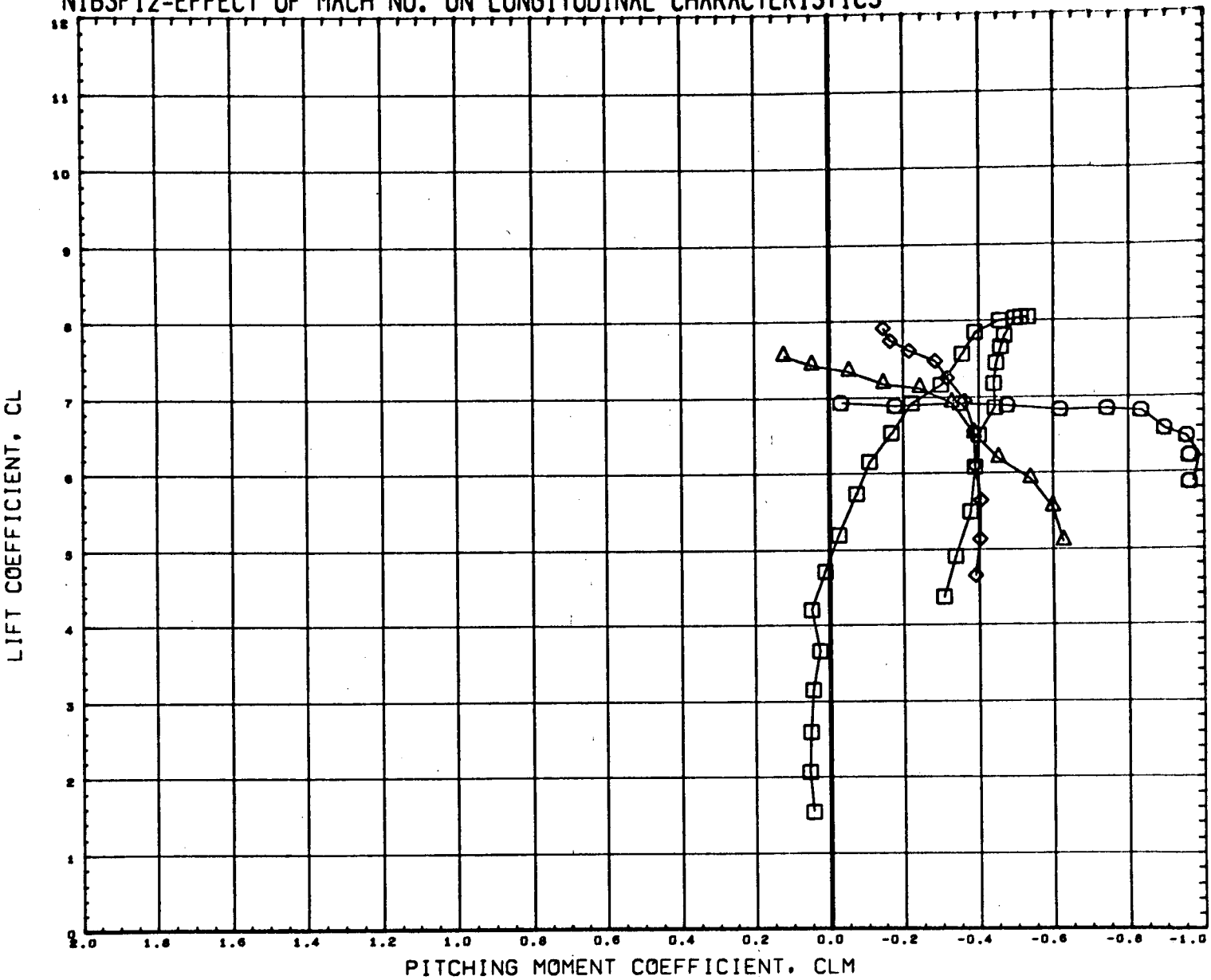
DATA HIST. CODE *G*E

N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			
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◇	1.460				
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DATA HIST. CODE *G*E

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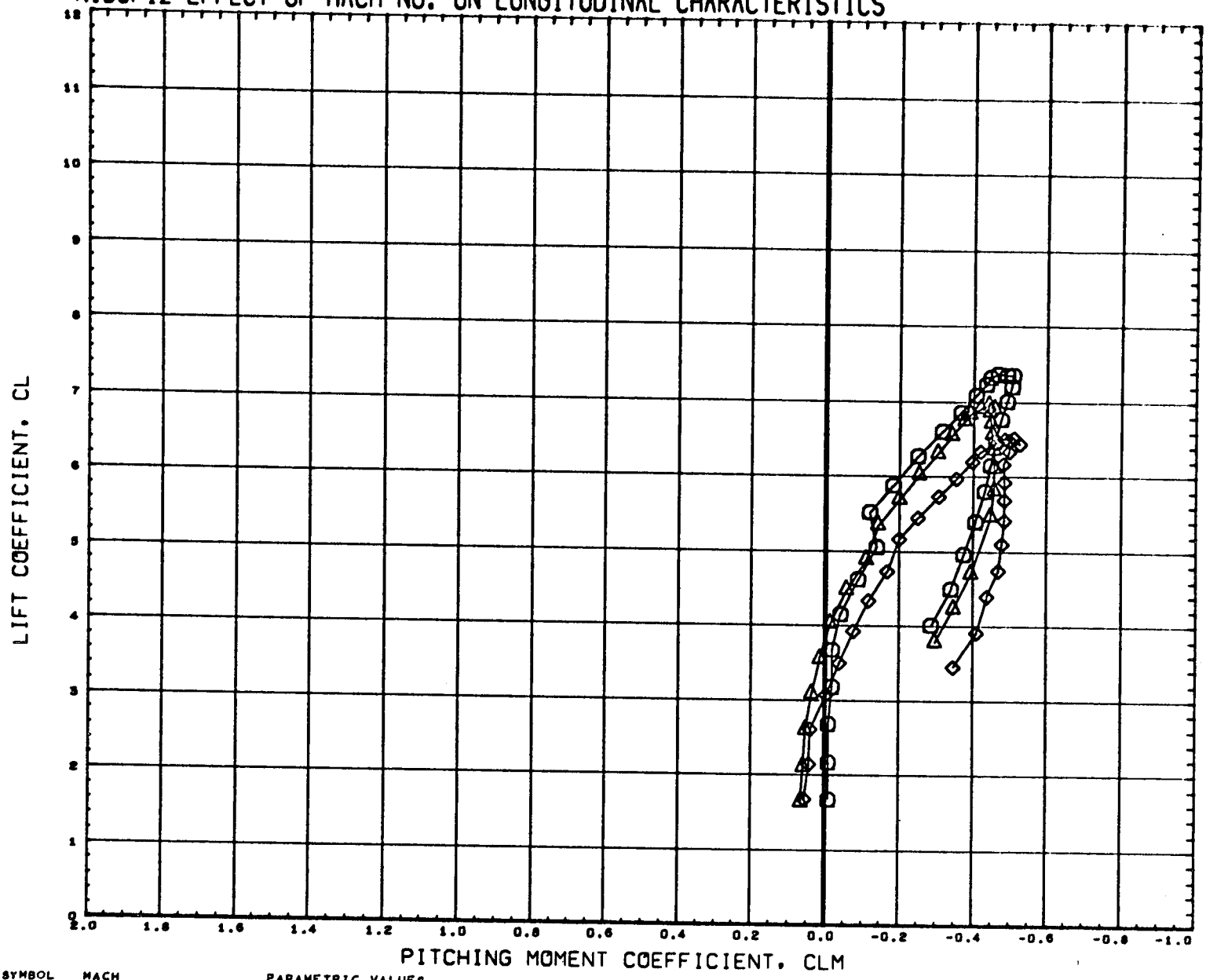
N1B3F12-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES		
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REFERENCE INFORMATION

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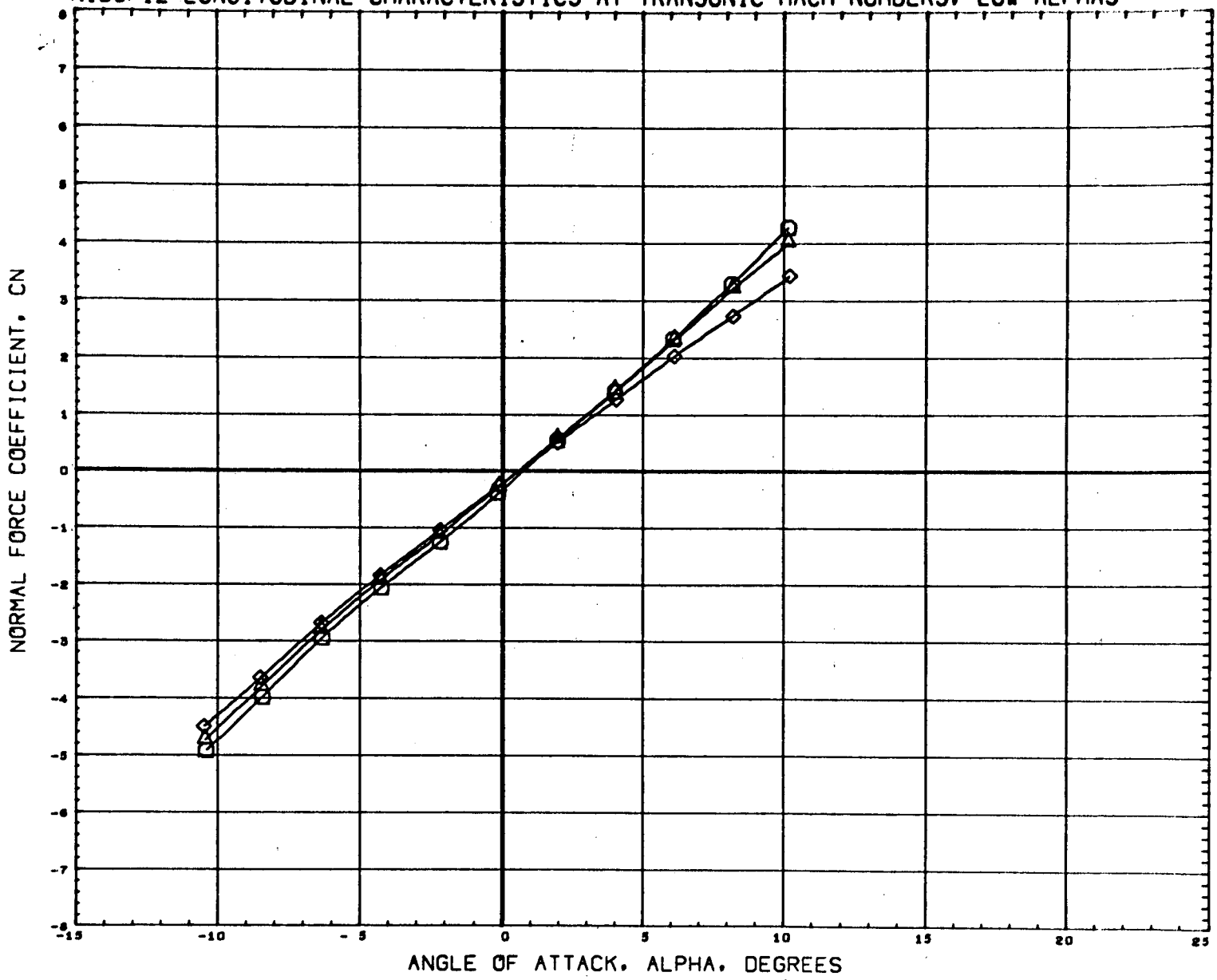
XMRP	5.2300	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

DATA HIST. CODE *G*E

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH	PARAMETRIC VALUES			
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◇	1.465				

REFERENCE INFORMATION

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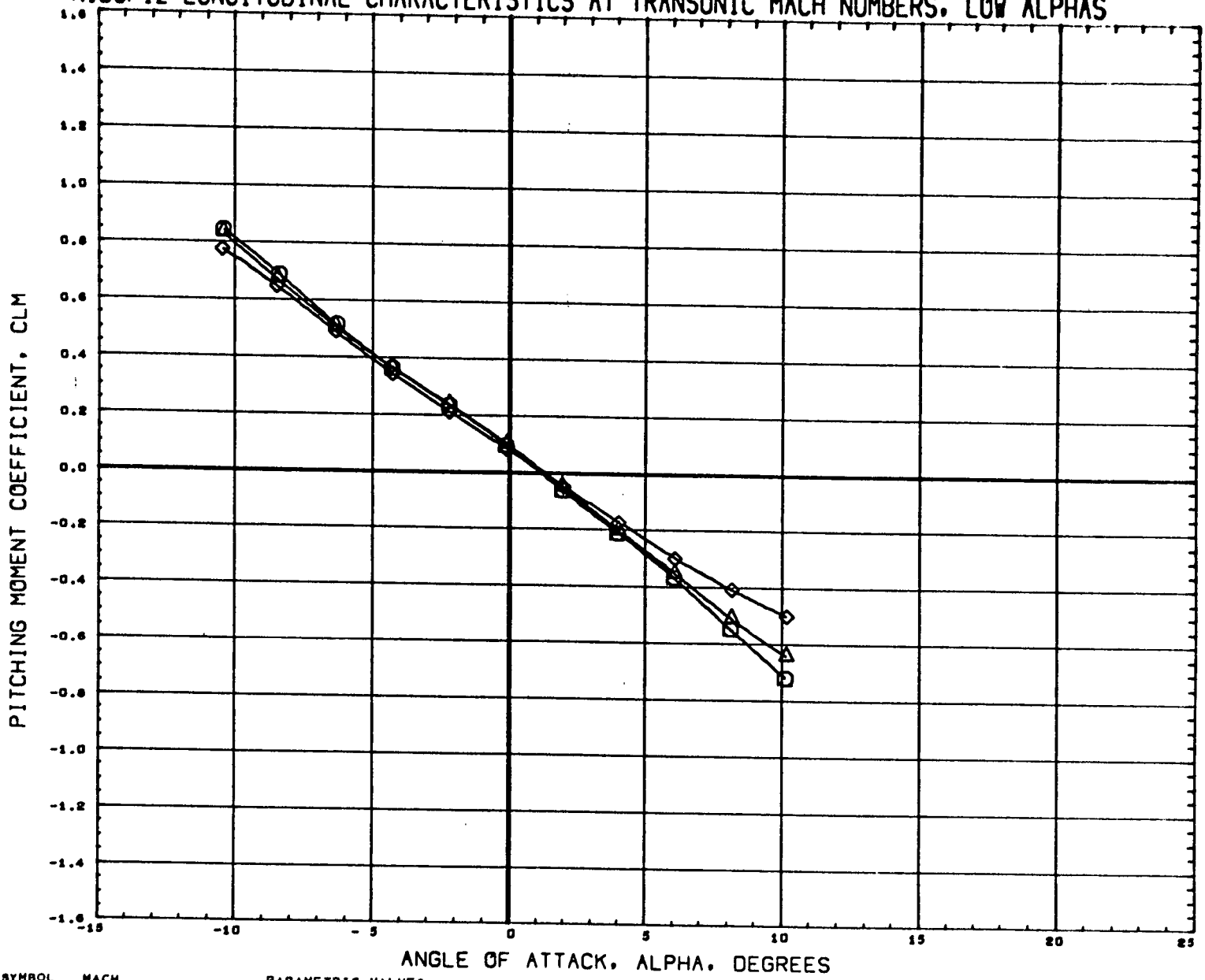
DATA HIST. CODE *E

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH
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△	1.199
◇	1.465

PARAMETRIC VALUES

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REFERENCE INFORMATION

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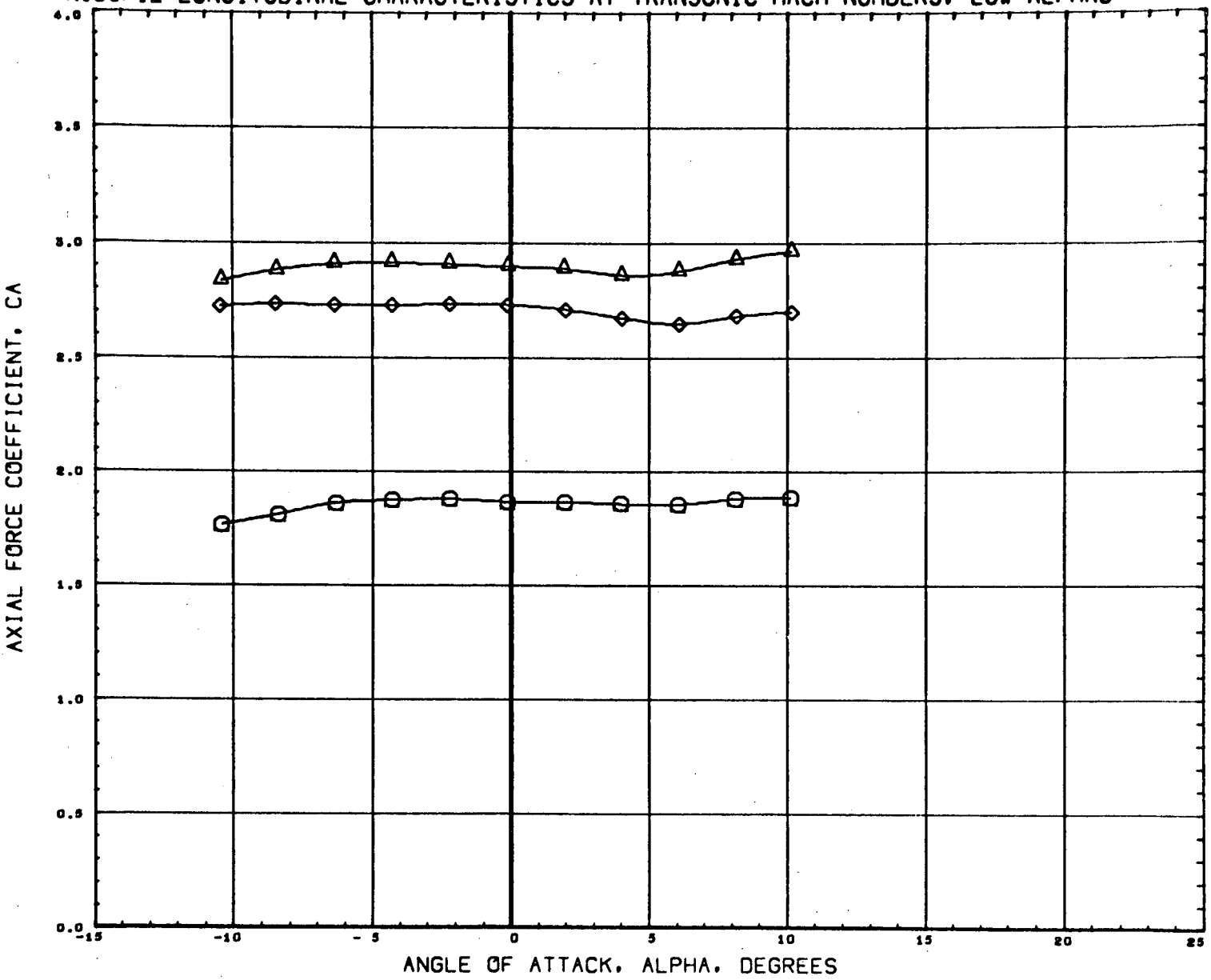
N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



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REFERENCE INFORMATION

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YMRP	0.0000	IN.
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SCALE	0.0034	

DATA HIST. CODE *E

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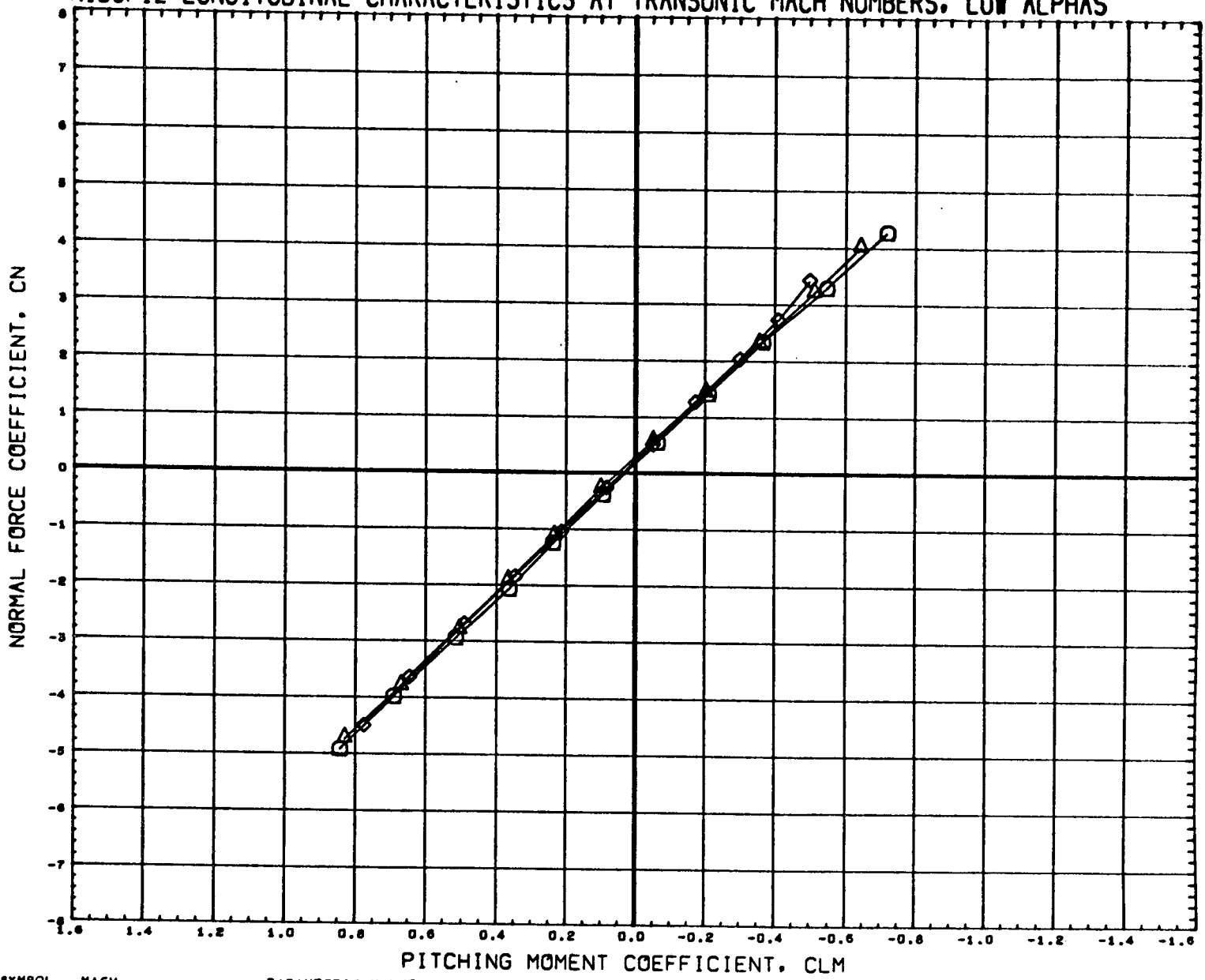
N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH
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△	1.199
◇	1.465

PARAMETRIC VALUES

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REFERENCE INFORMATION

SREF	0.9330	SQ. IN
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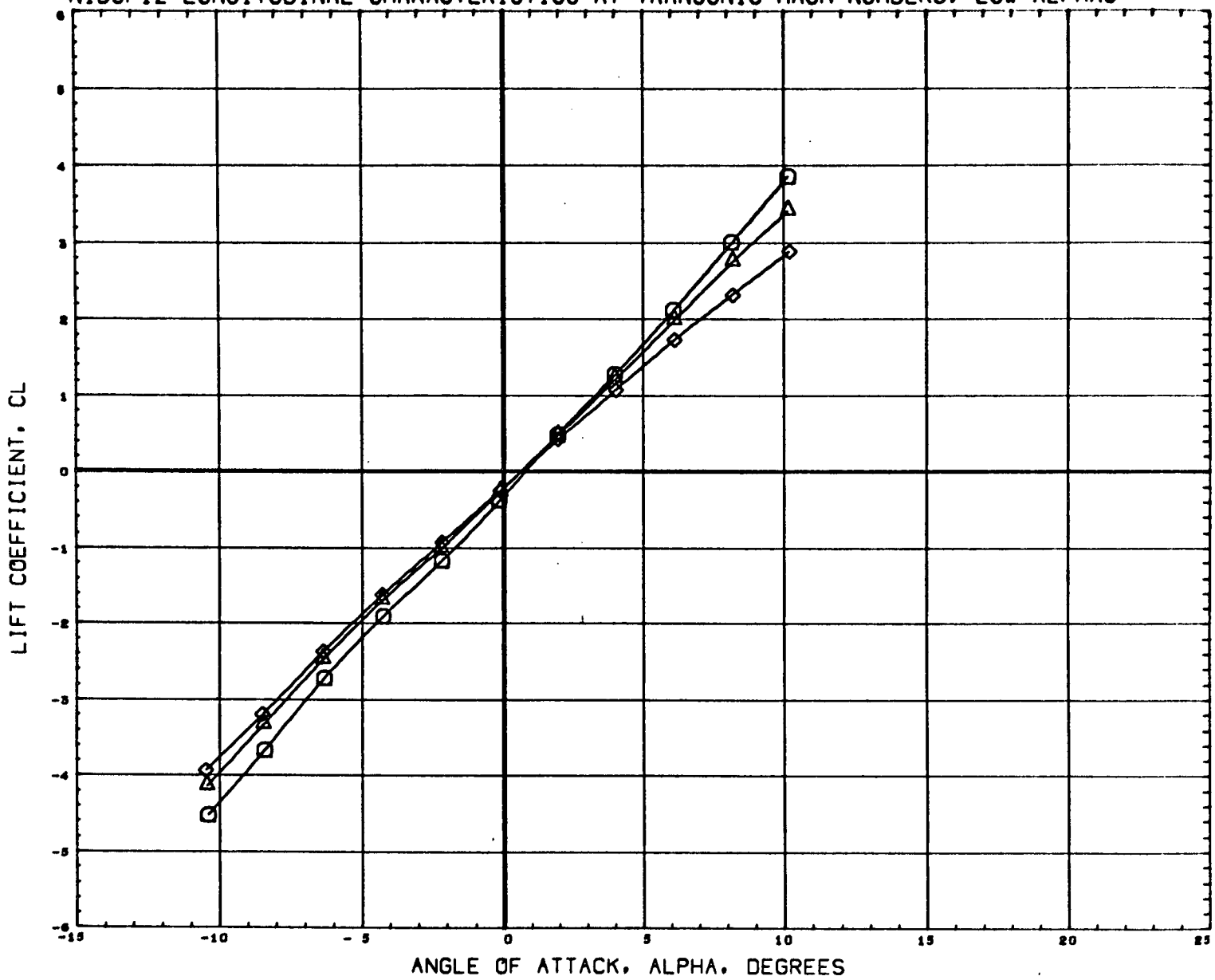
N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH		PARAMETRIC VALUES		
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REFERENCE INFORMATION

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LREF	8.1720	IN.
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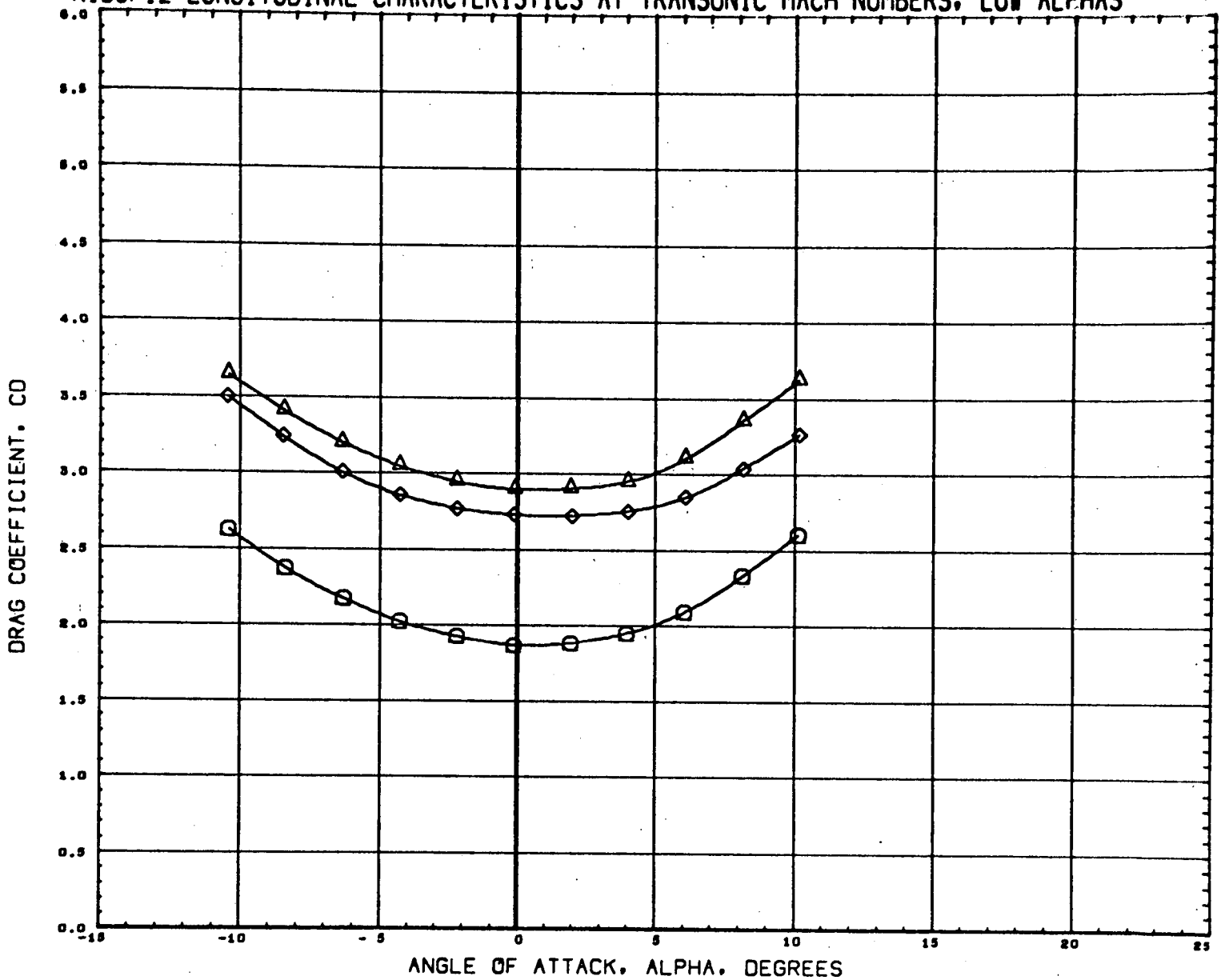
N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH		PARAMETRIC VALUES		
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REFERENCE INFORMATION

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YMRP	0.0000	IN.
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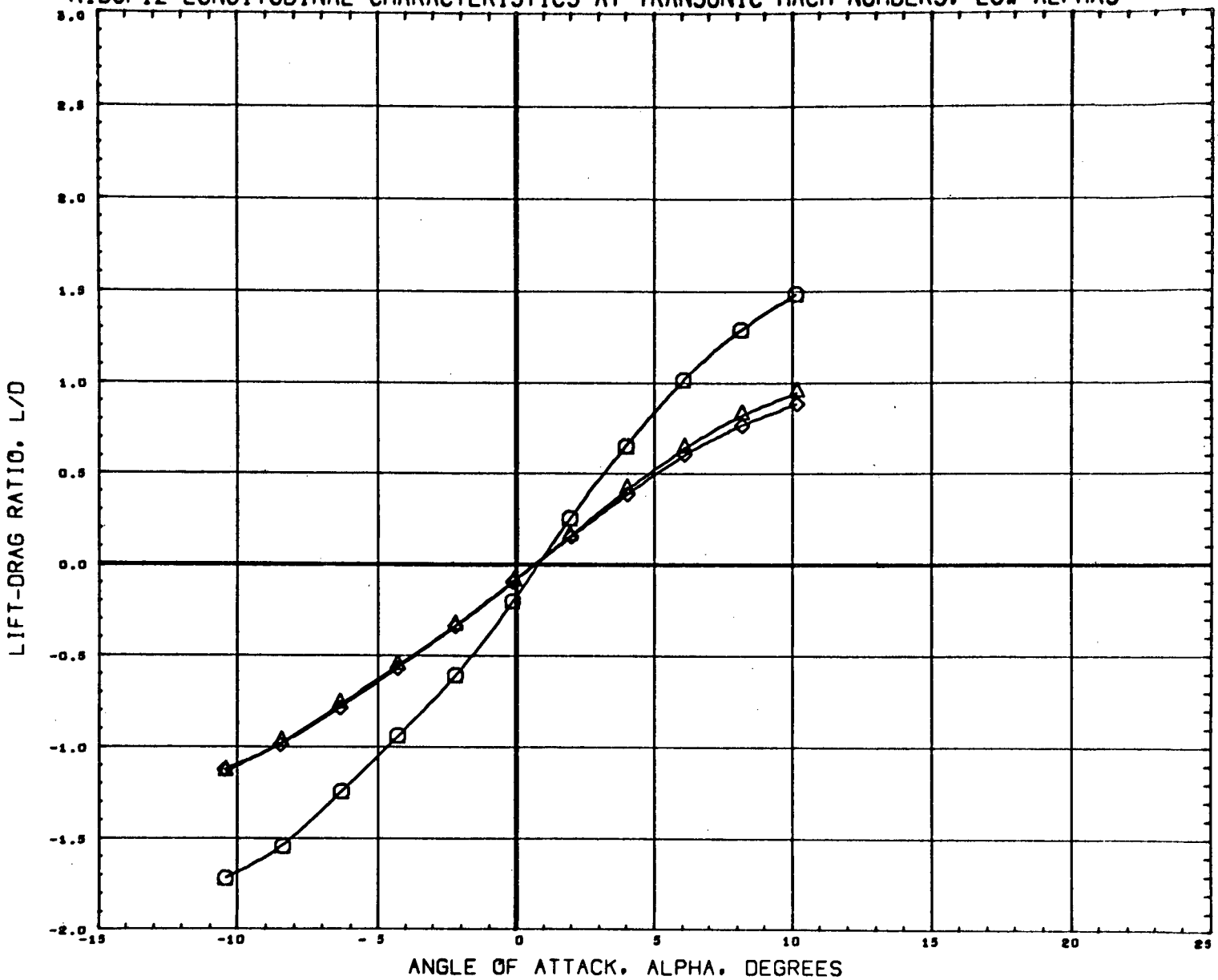
DATA HIST. CODE *E

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH		PARAMETRIC VALUES		
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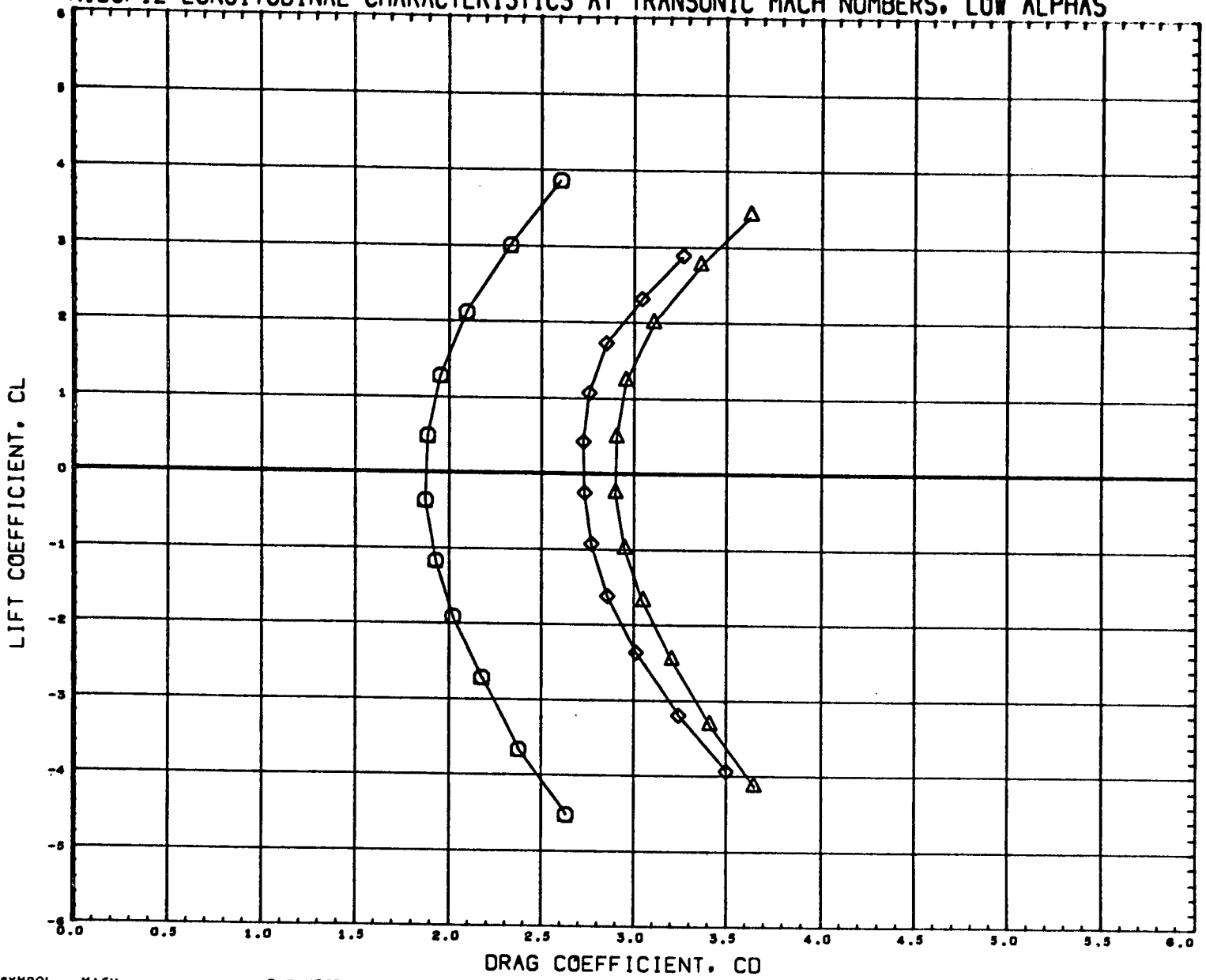
REFERENCE INFORMATION

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

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



SYMBOL	MACH
○	0.897
△	1.199
◇	1.465

PARAMETRIC VALUES

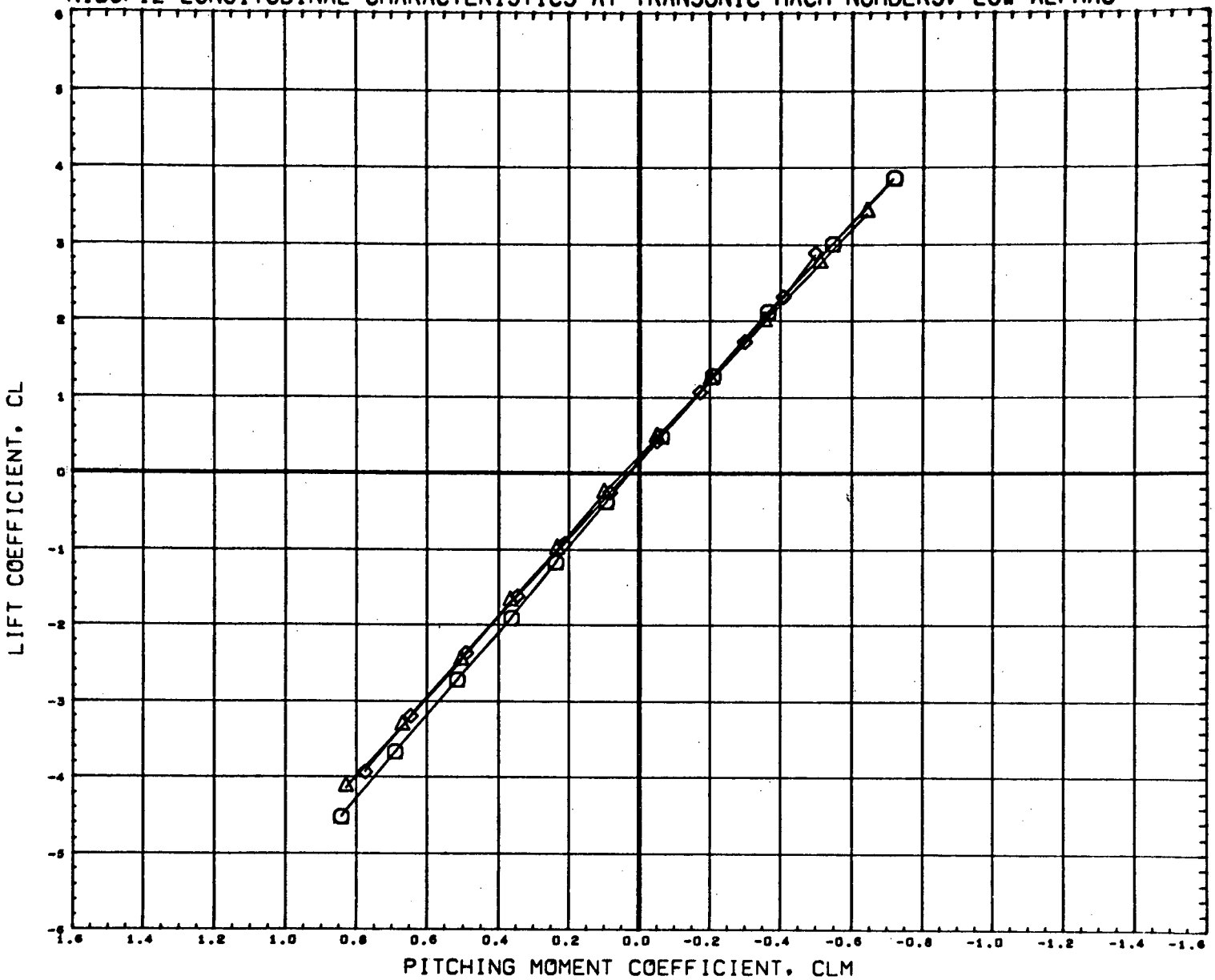
BETA 0.000 DIHDRL 30.000

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	

DATA HIST. CODE *E

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS, LOW ALPHAS



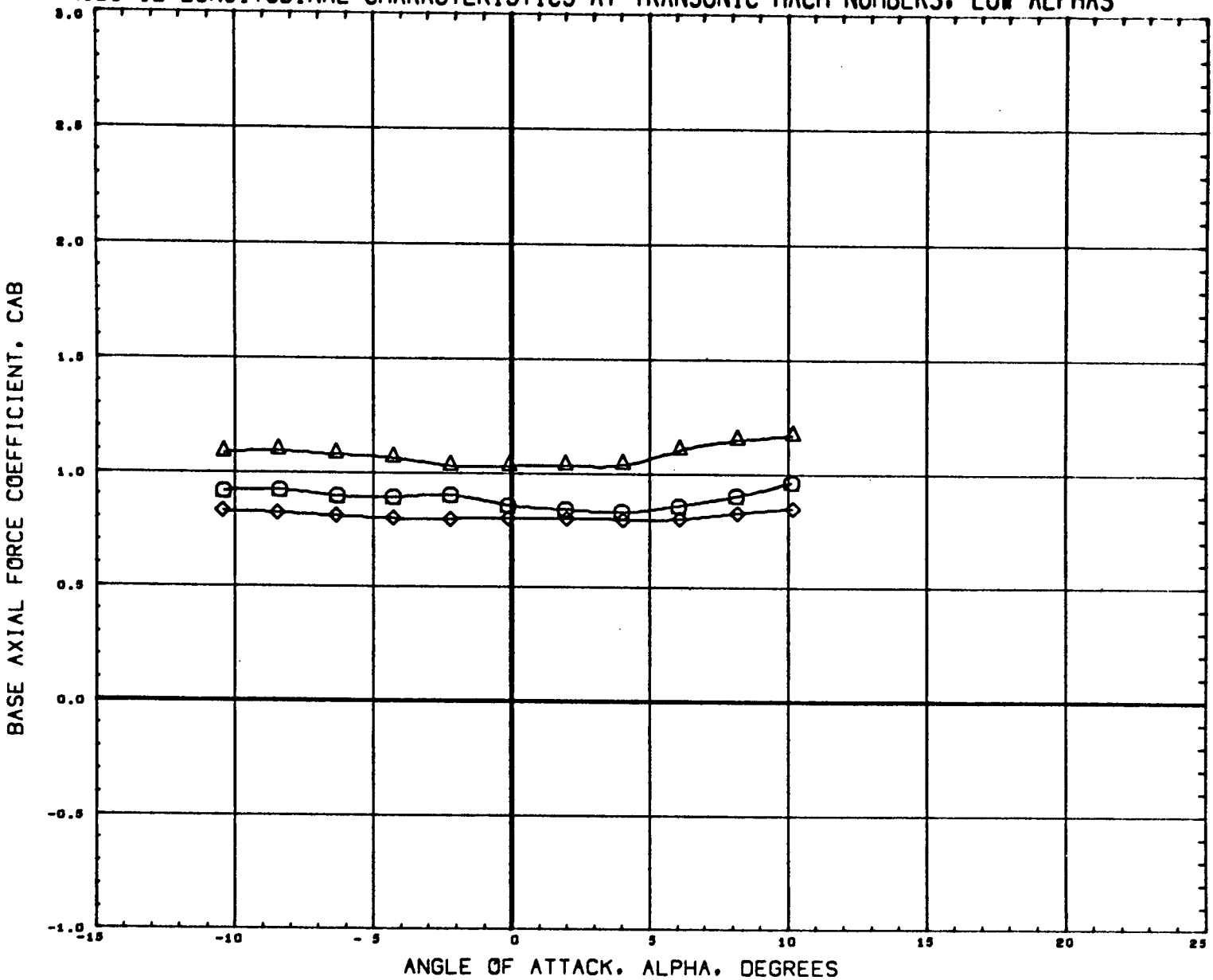
SYMBOL	MACH	PARAMETRIC VALUES			
○	0.897	BETA	0.000	DIHDRL	30.000
△	1.199				
◇	1.465				

DATA HIST. CODE *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	

N1B3F12-LONGITUDINAL CHARACTERISTICS AT TRANSONIC MACH NUMBERS. LOW ALPHAS



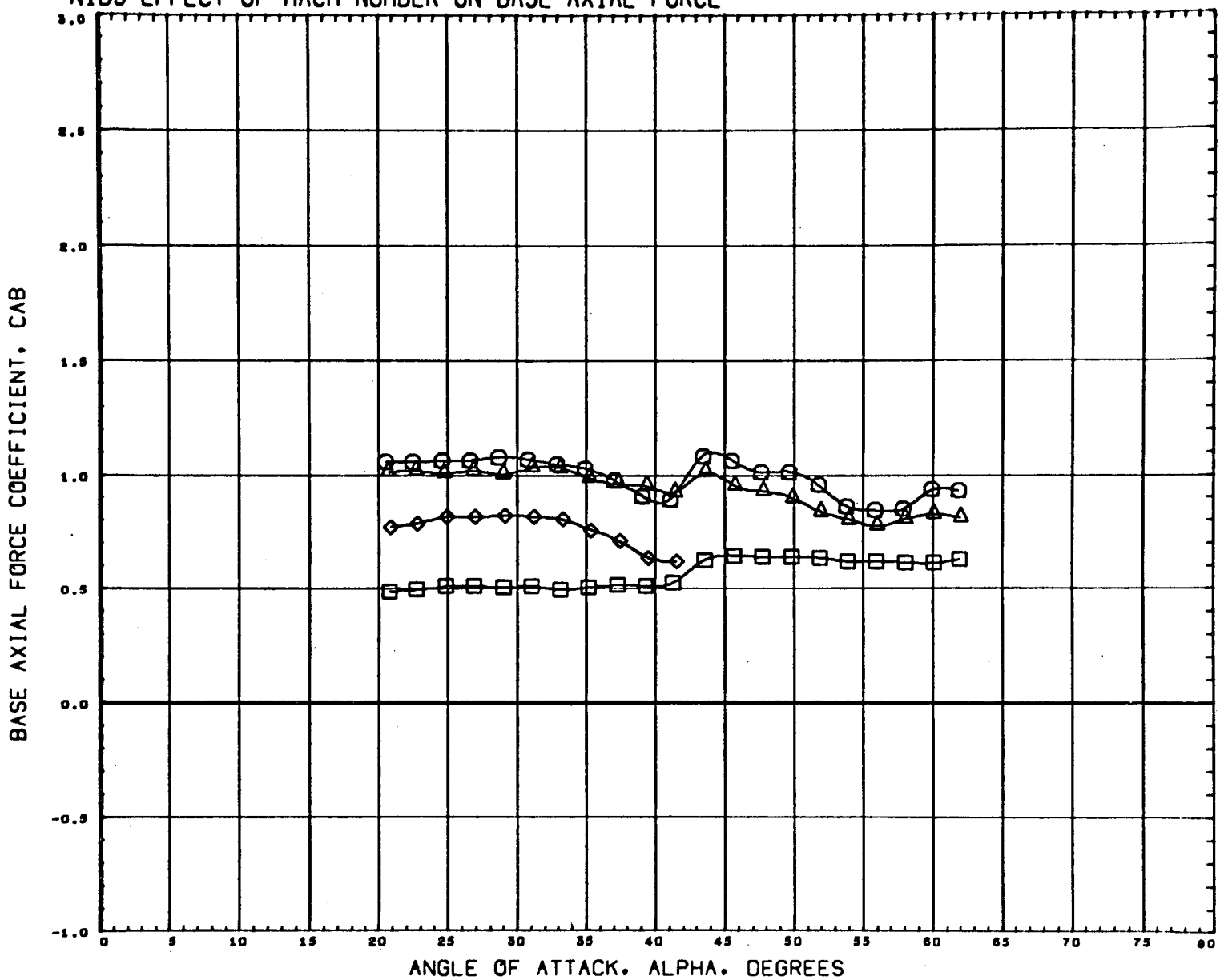
SYMBOL	MACH	PARAMETRIC VALUES			
○	0.897	BETA	0.000	DIHDRL	30.000
△	1.199				
◇	1.465				

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 *E

N1B3-EFFECT OF MACH NUMBER ON BASE AXIAL FORCE



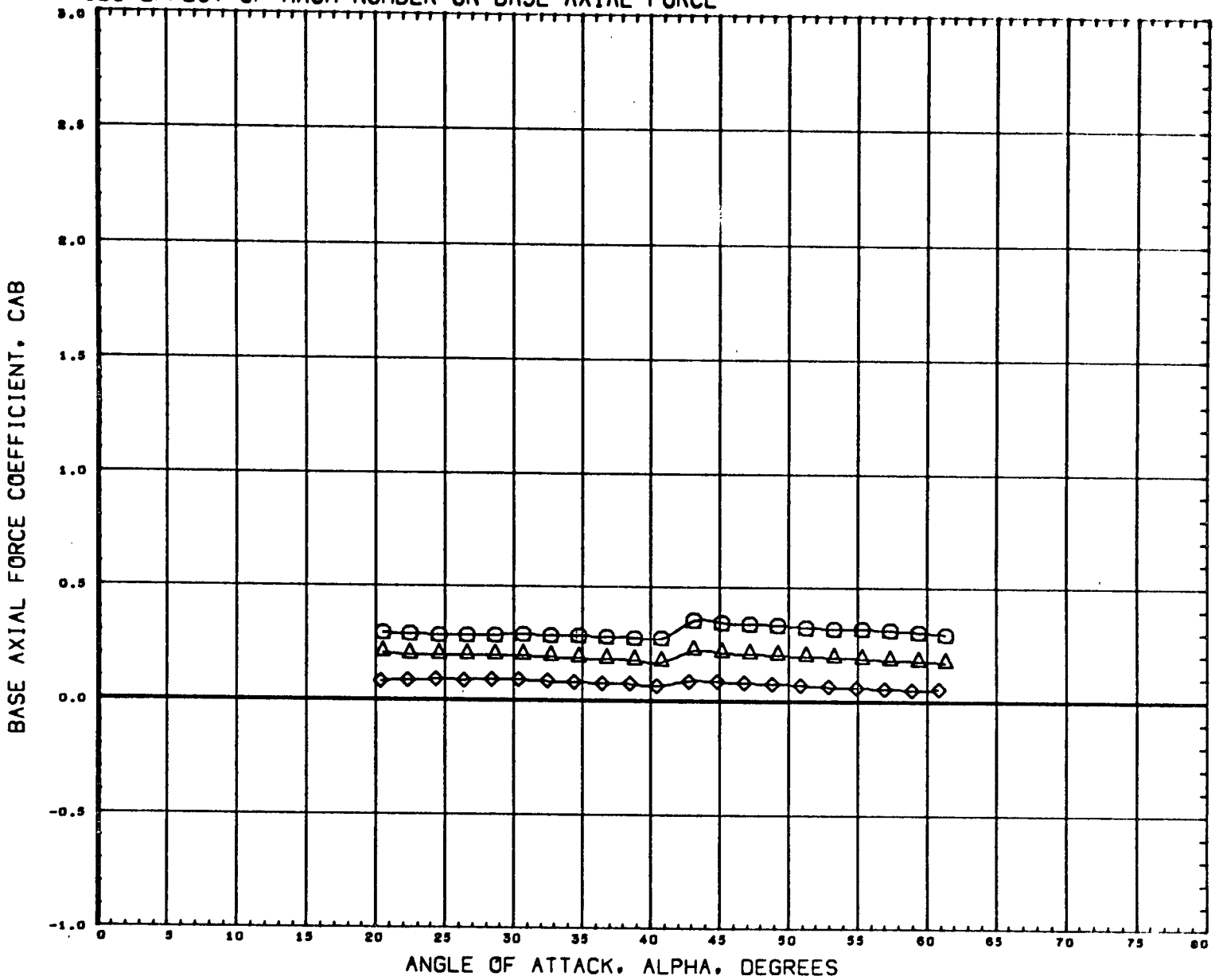
SYMBOL	MACH	PARAMETRIC VALUES	
○	0.899	BETA	0.000
△	1.197		
◇	1.461		
□	1.964		

DATA HIST. CODE *G

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	

N1B3-EFFECT OF MACH NUMBER ON BASE AXIAL FORCE



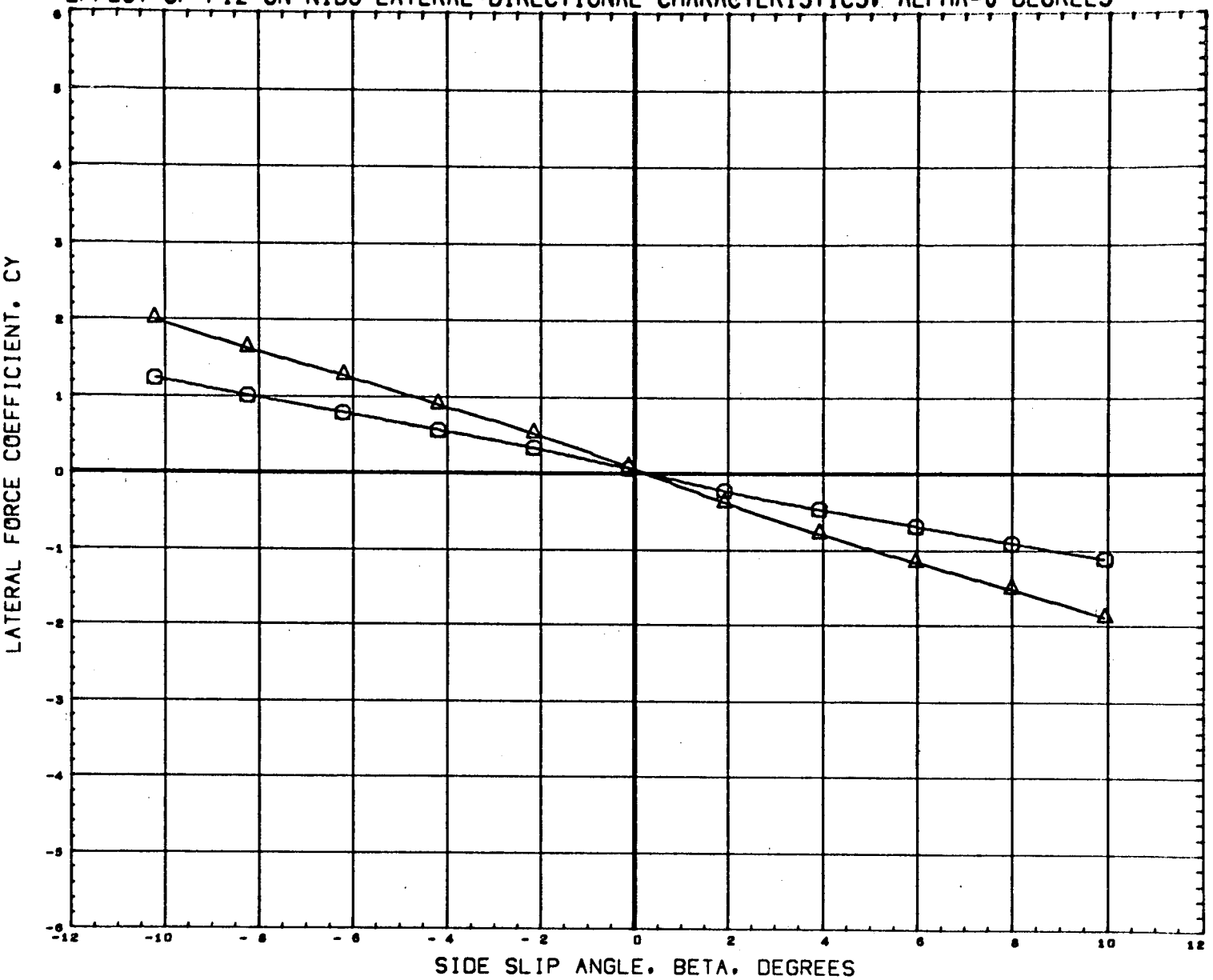
SYMBOL	MACH		PARAMETRIC VALUES
○	2.740	BETA	0.000
△	3.480		
◇	4.959		

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

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



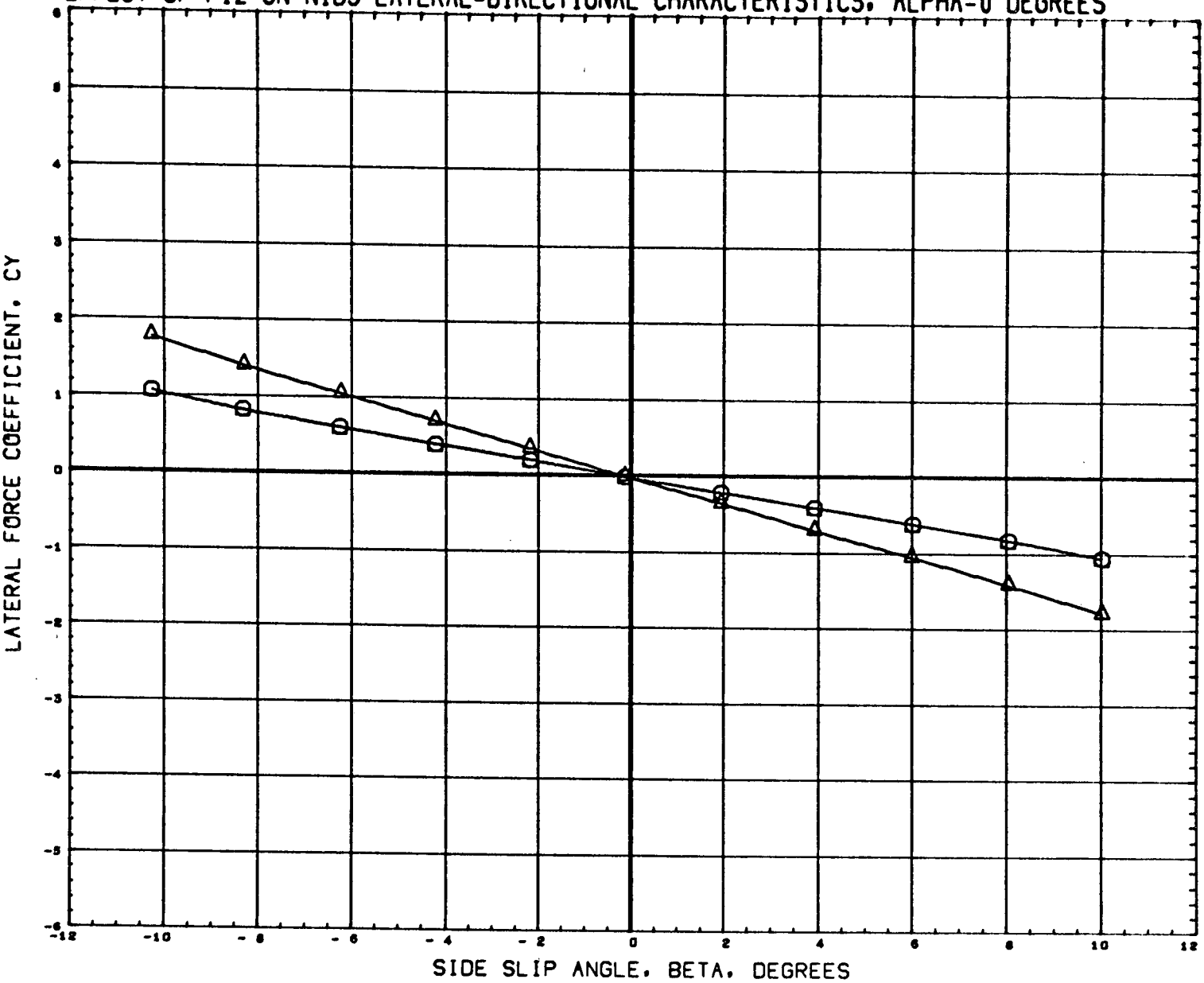
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



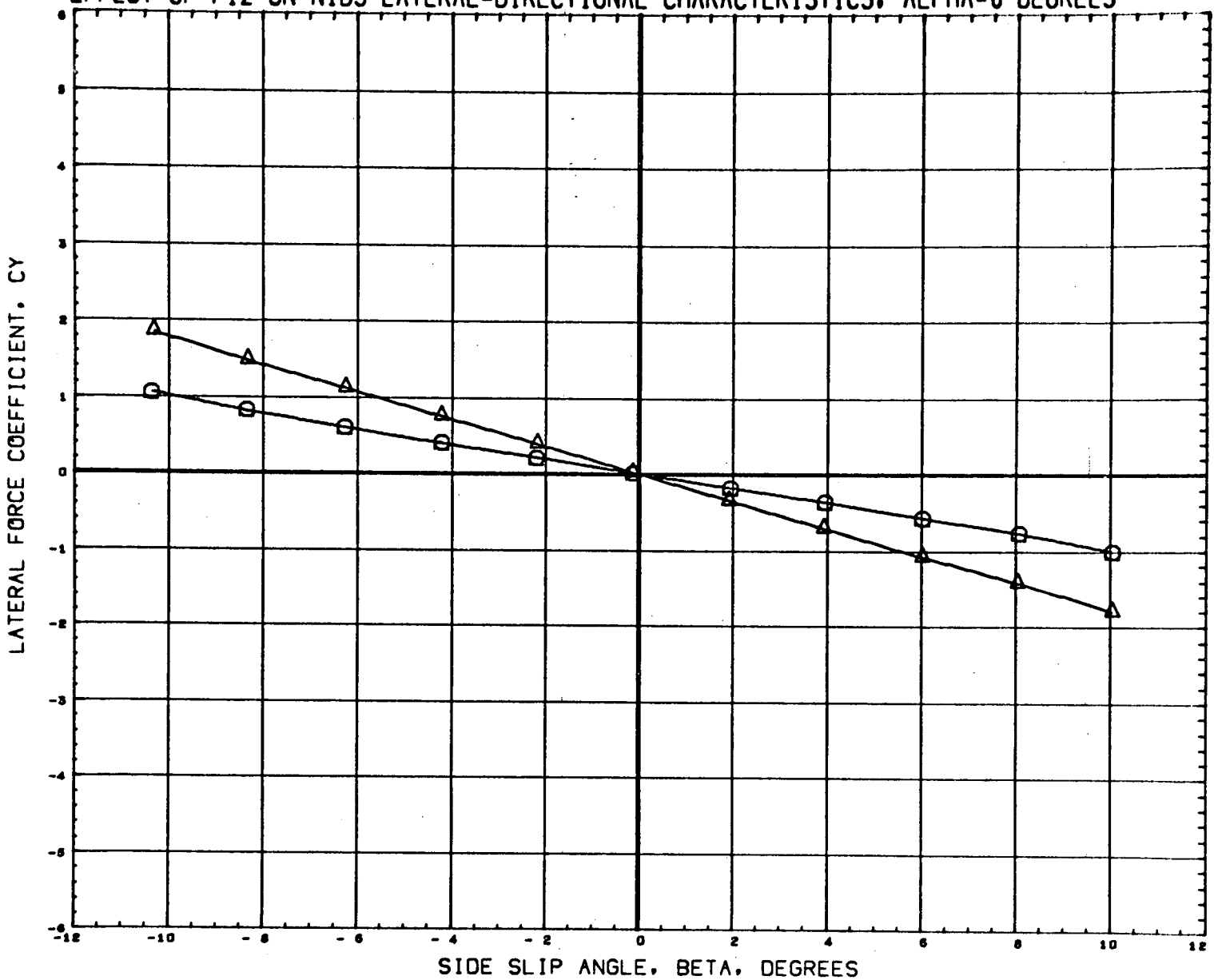
DATA SET SYMBOL		CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



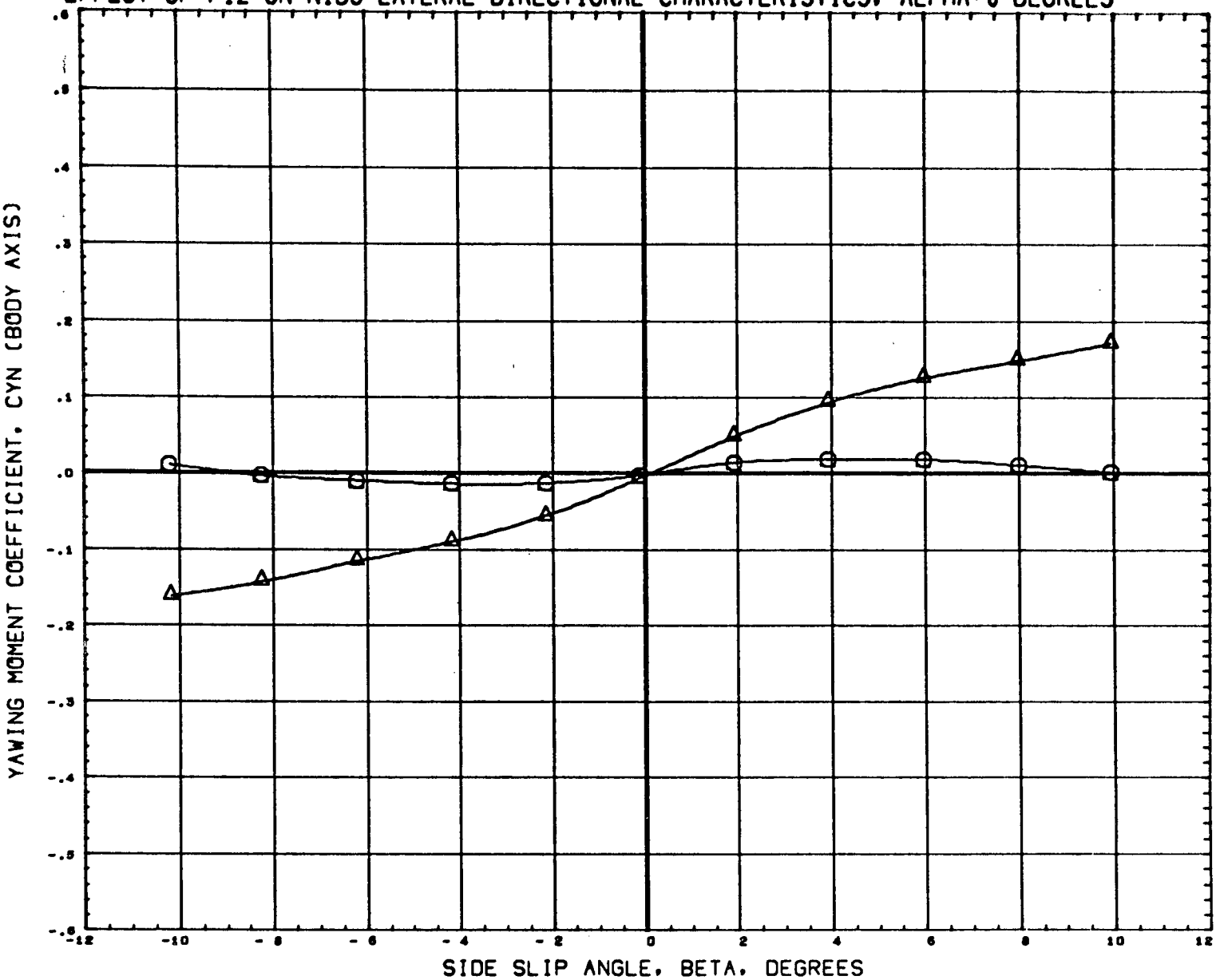
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



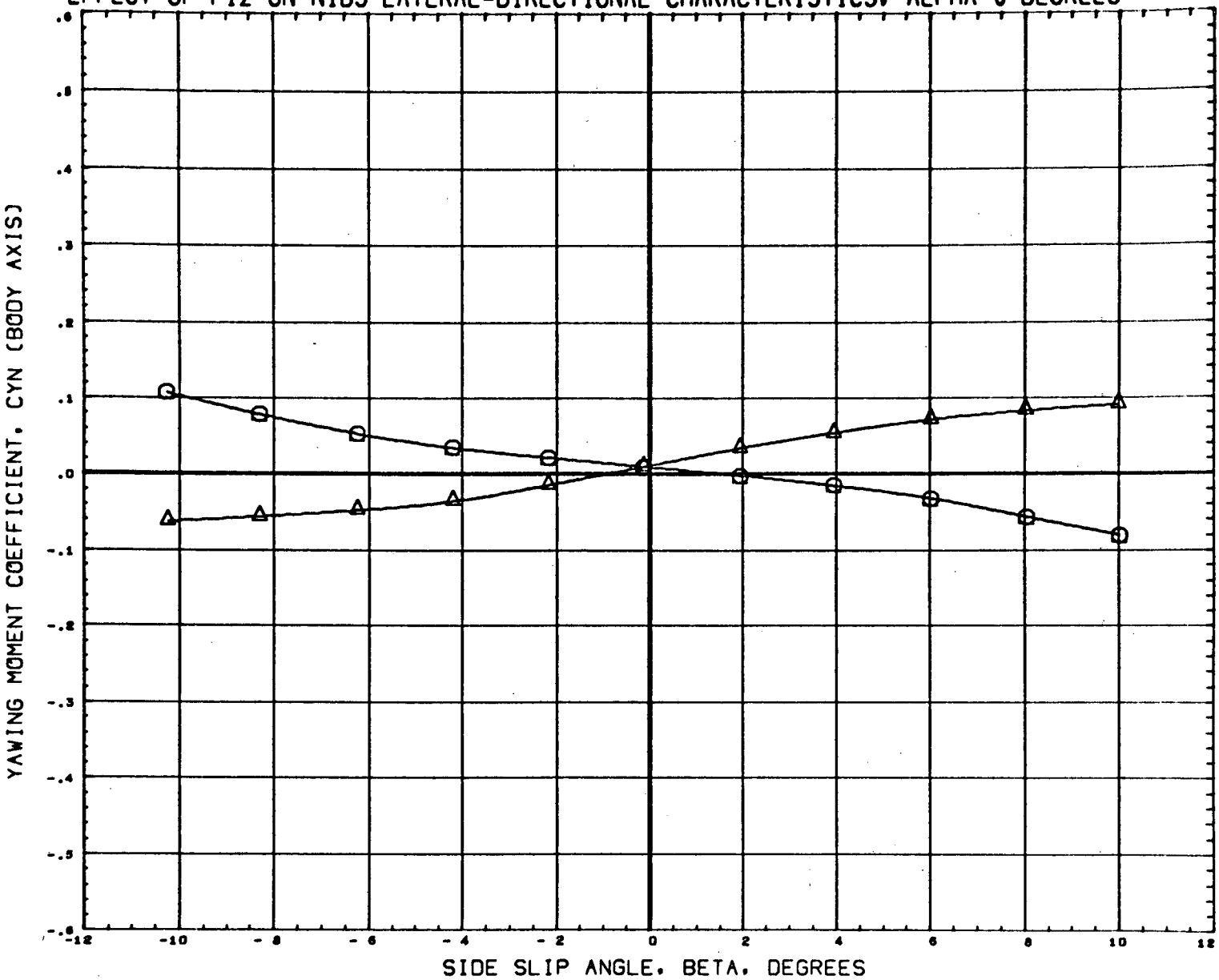
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



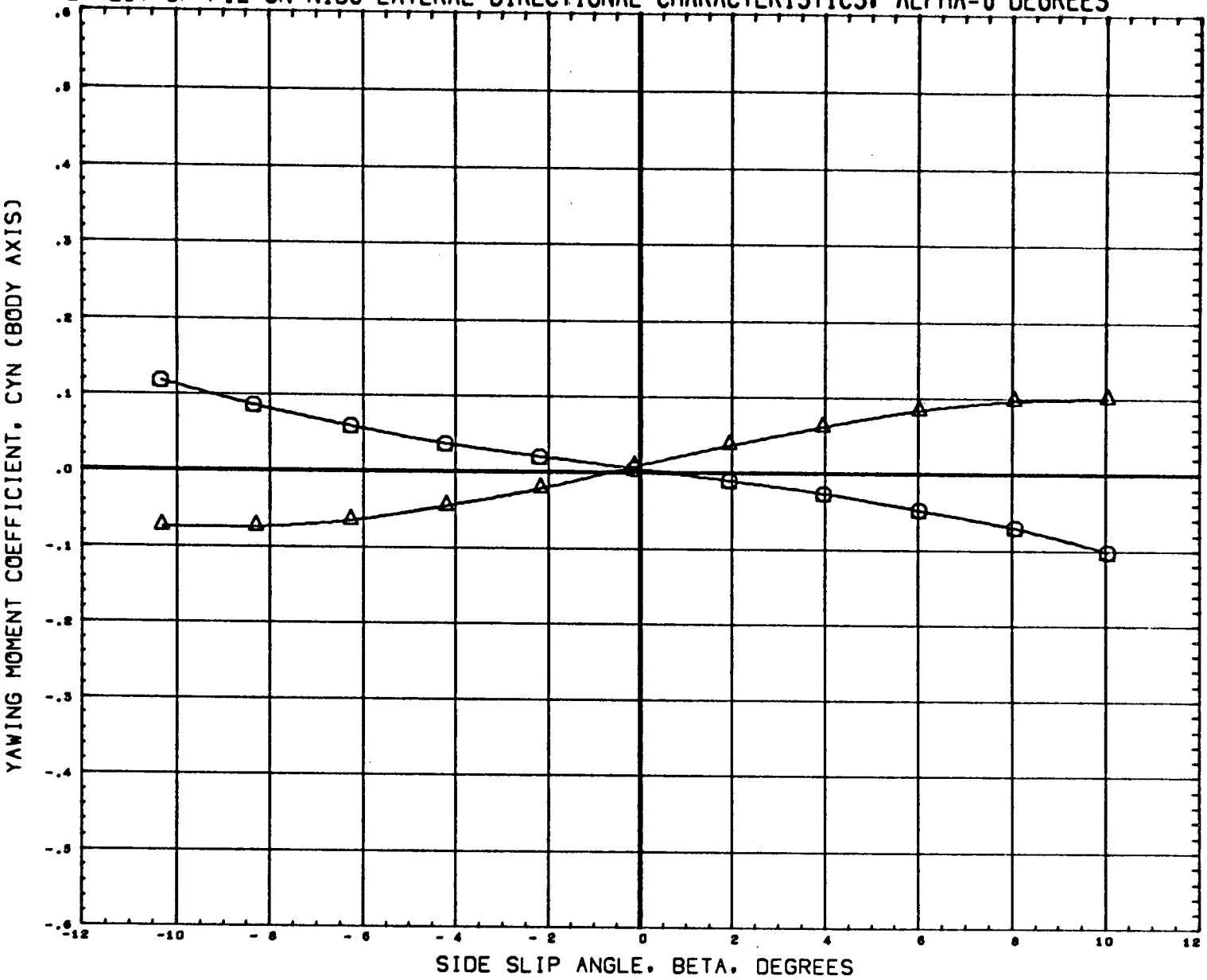
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



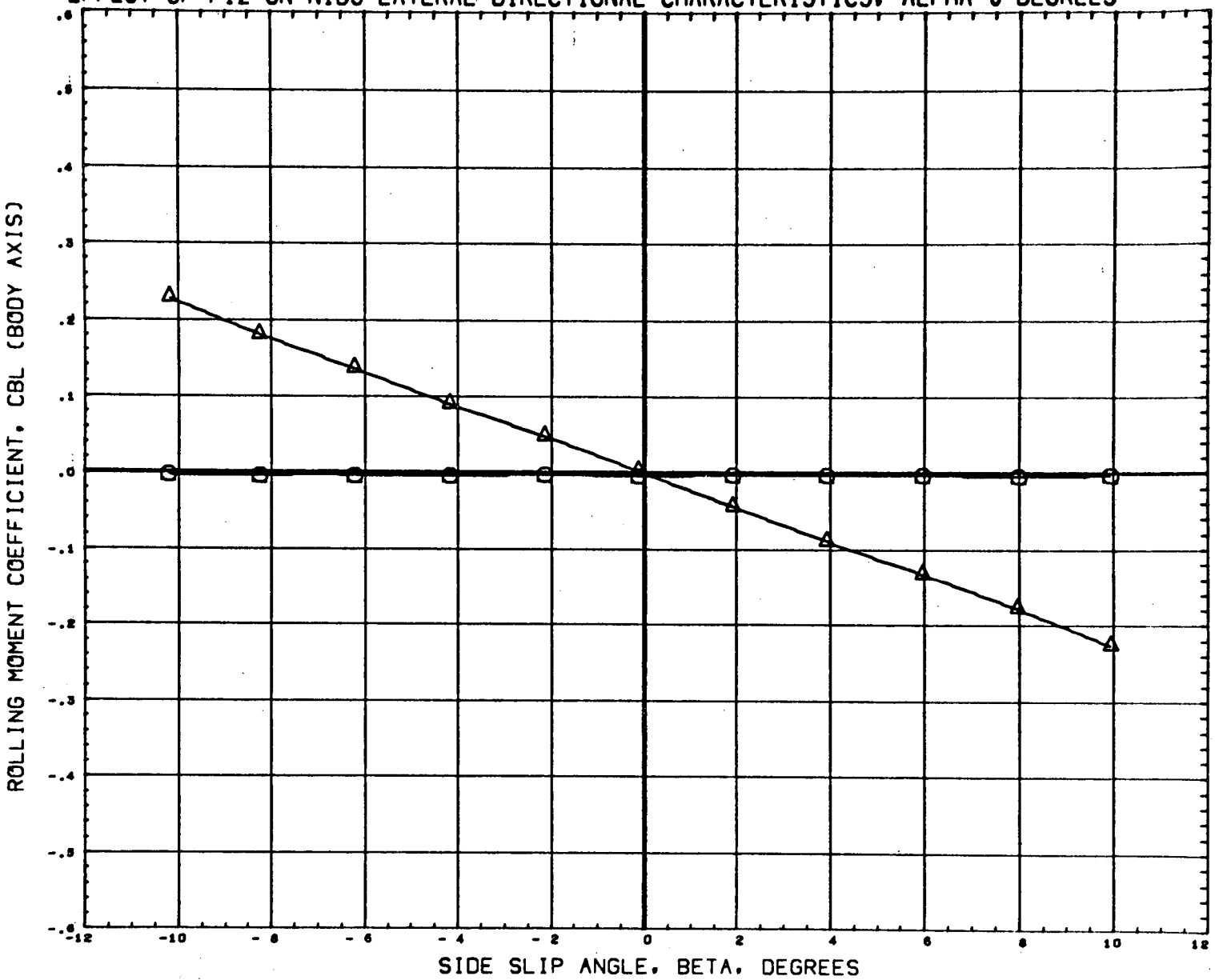
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



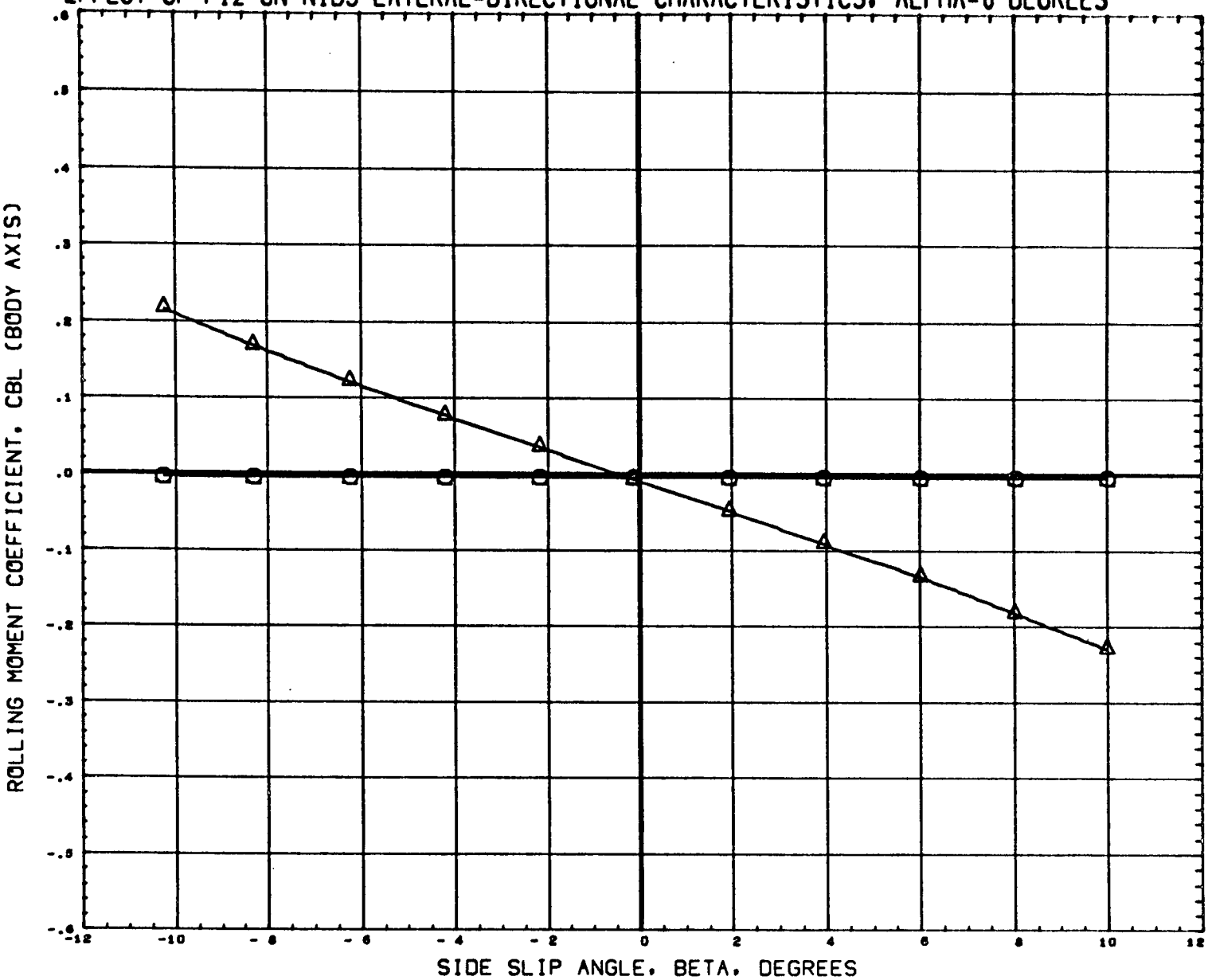
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



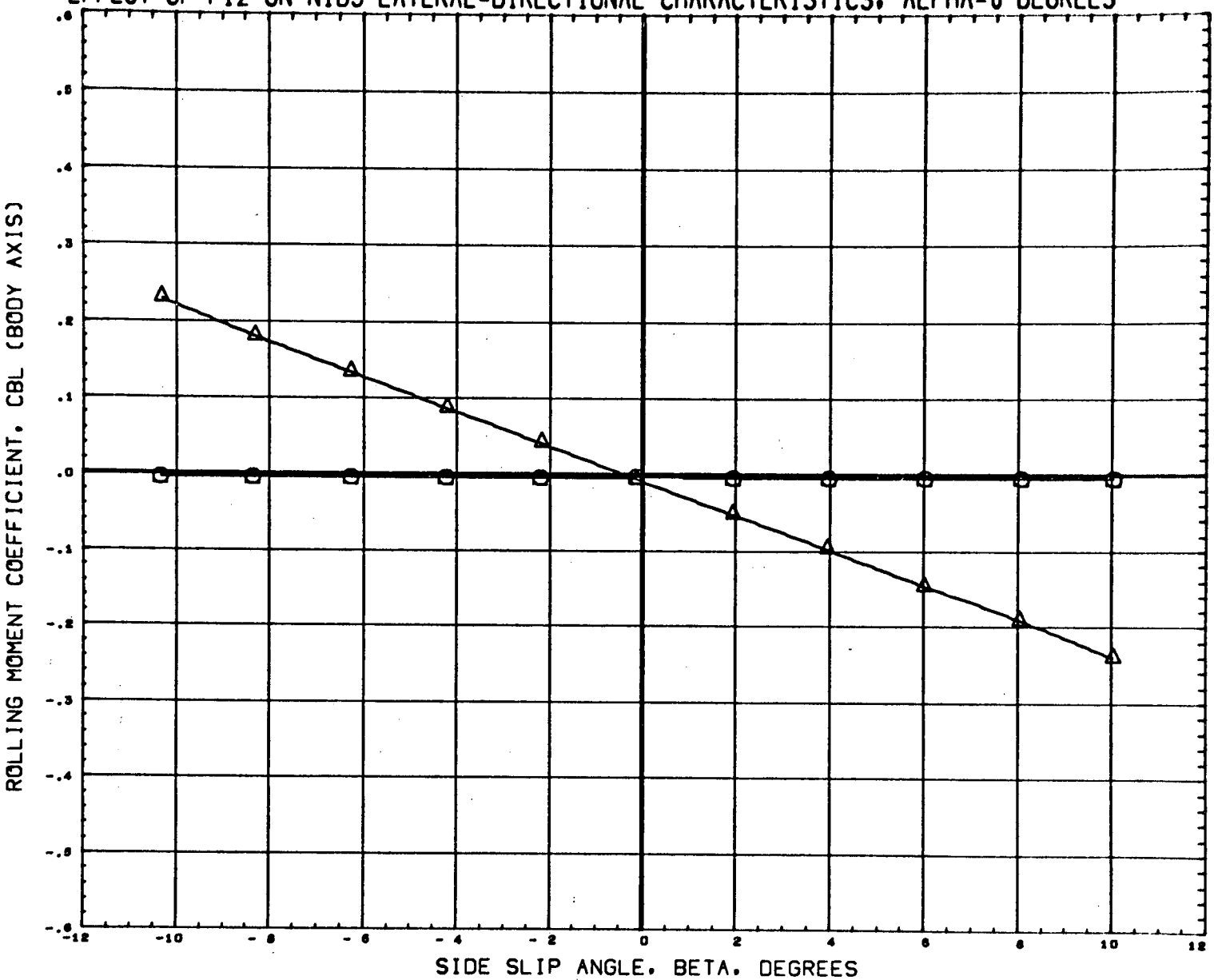
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



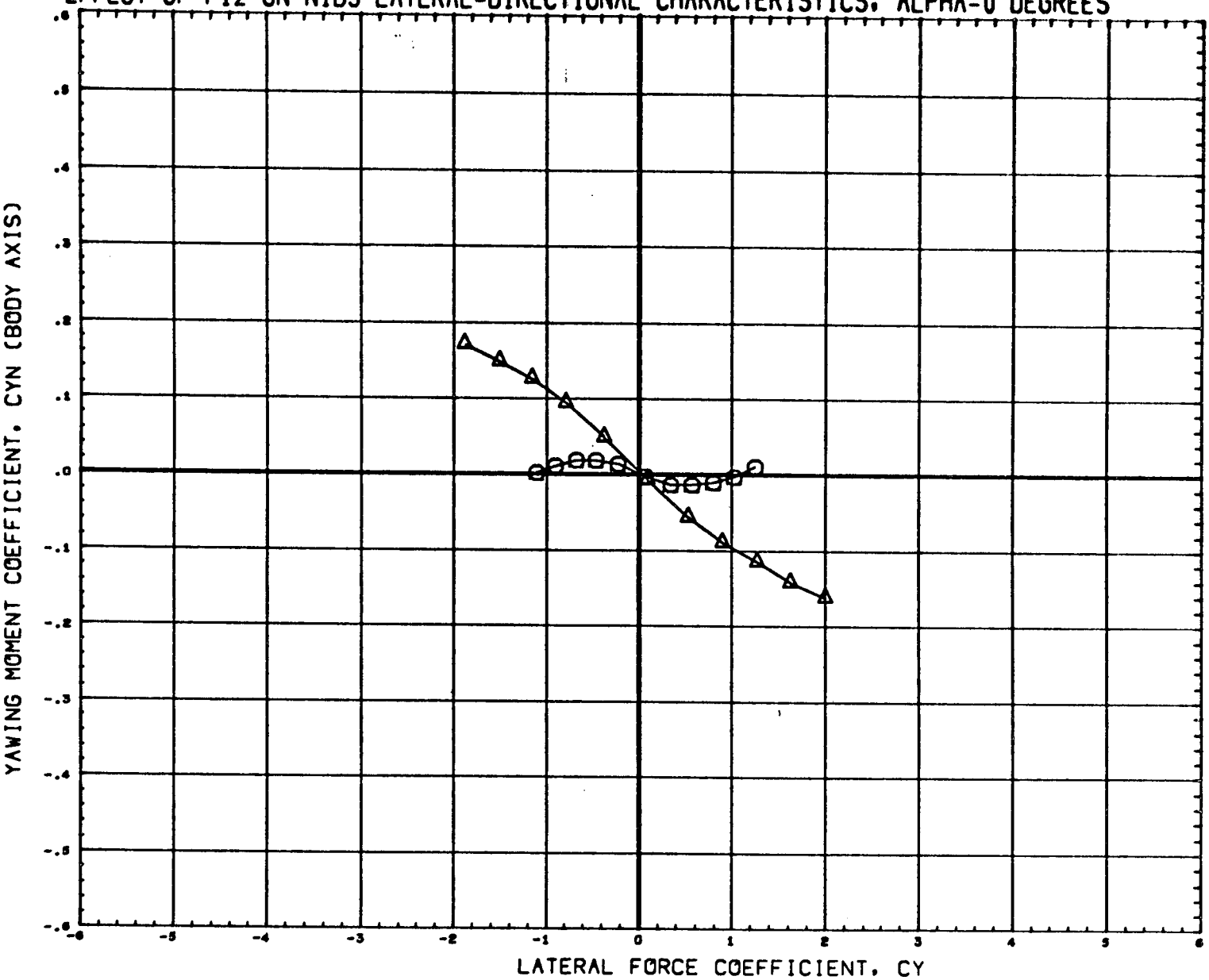
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



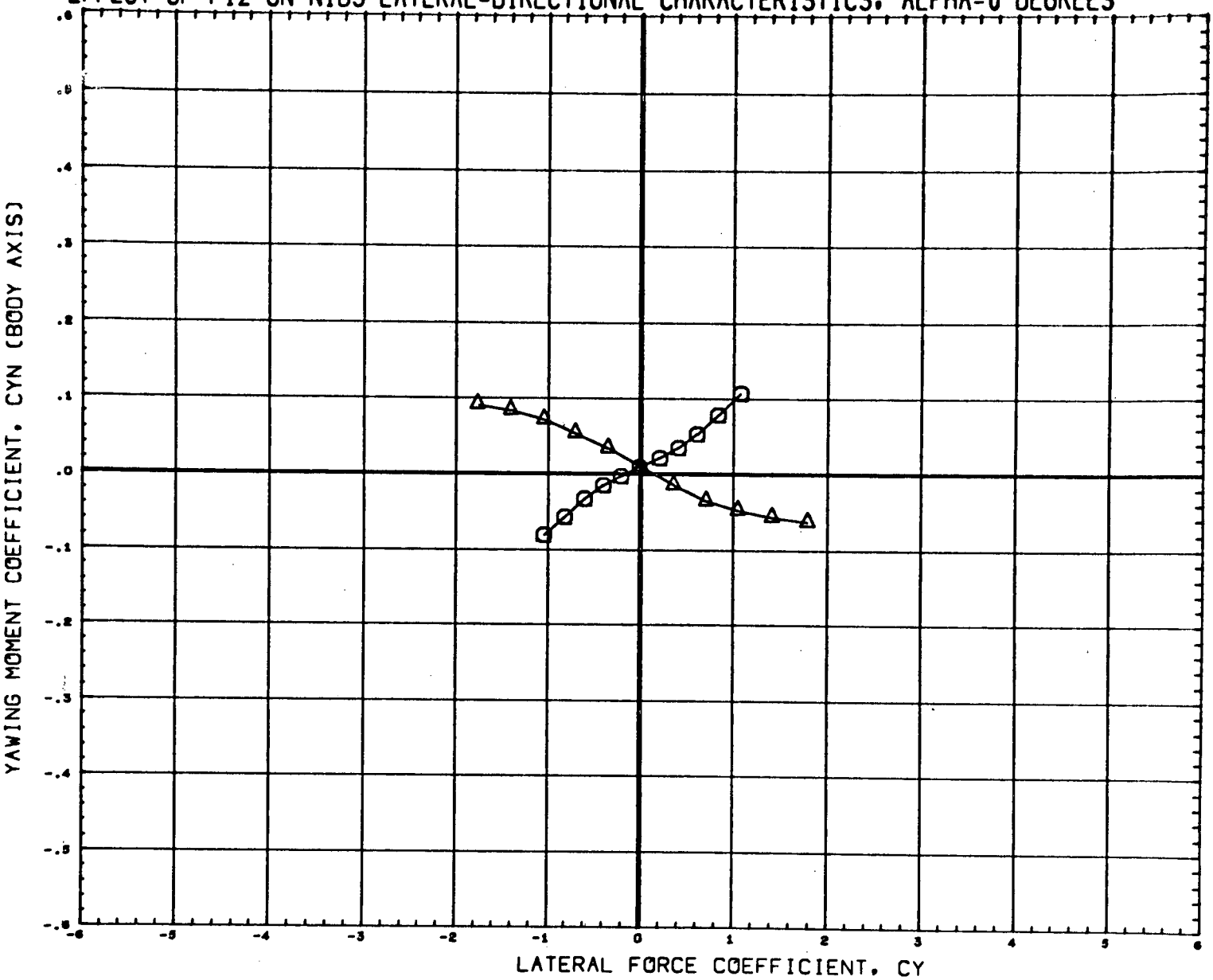
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



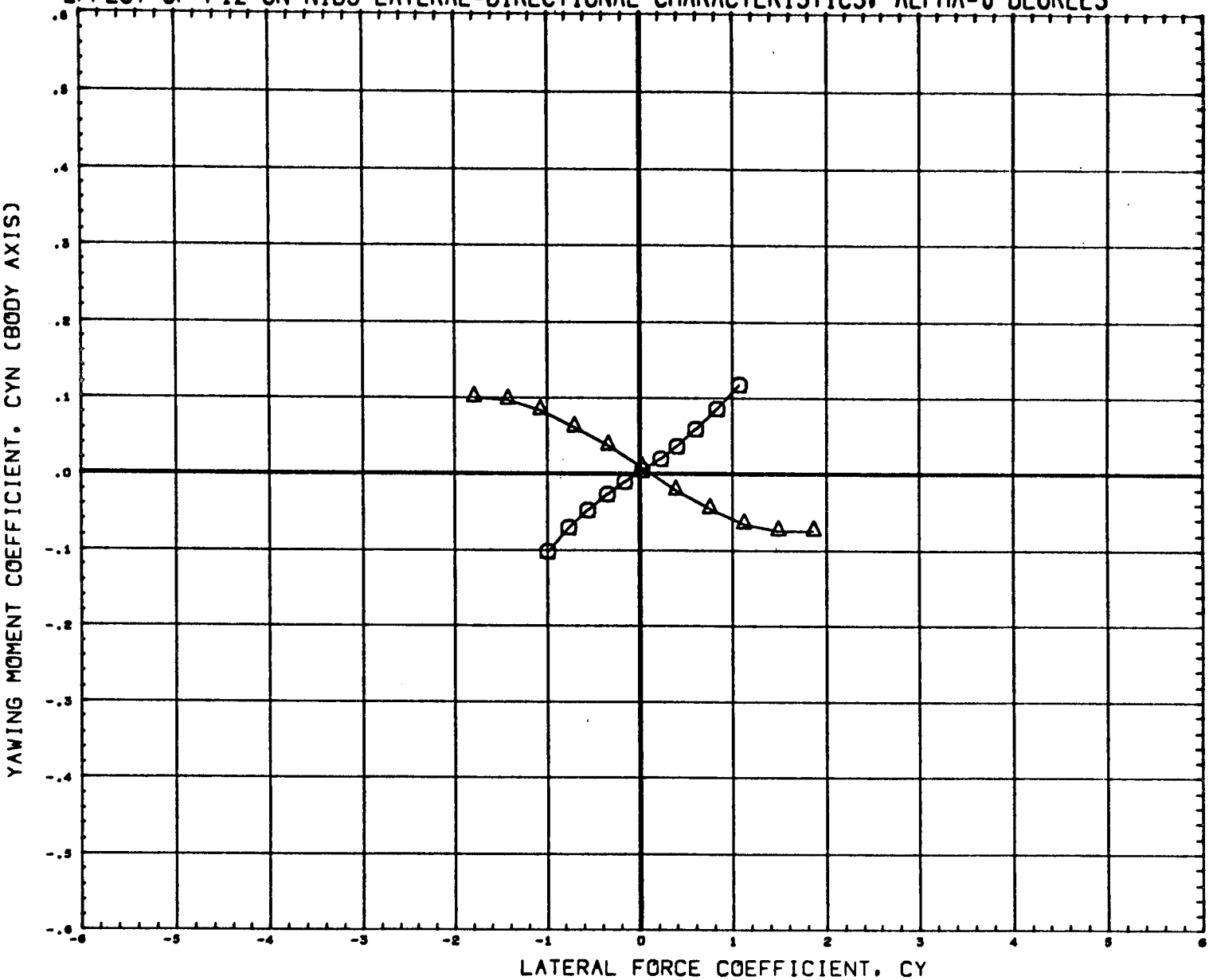
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



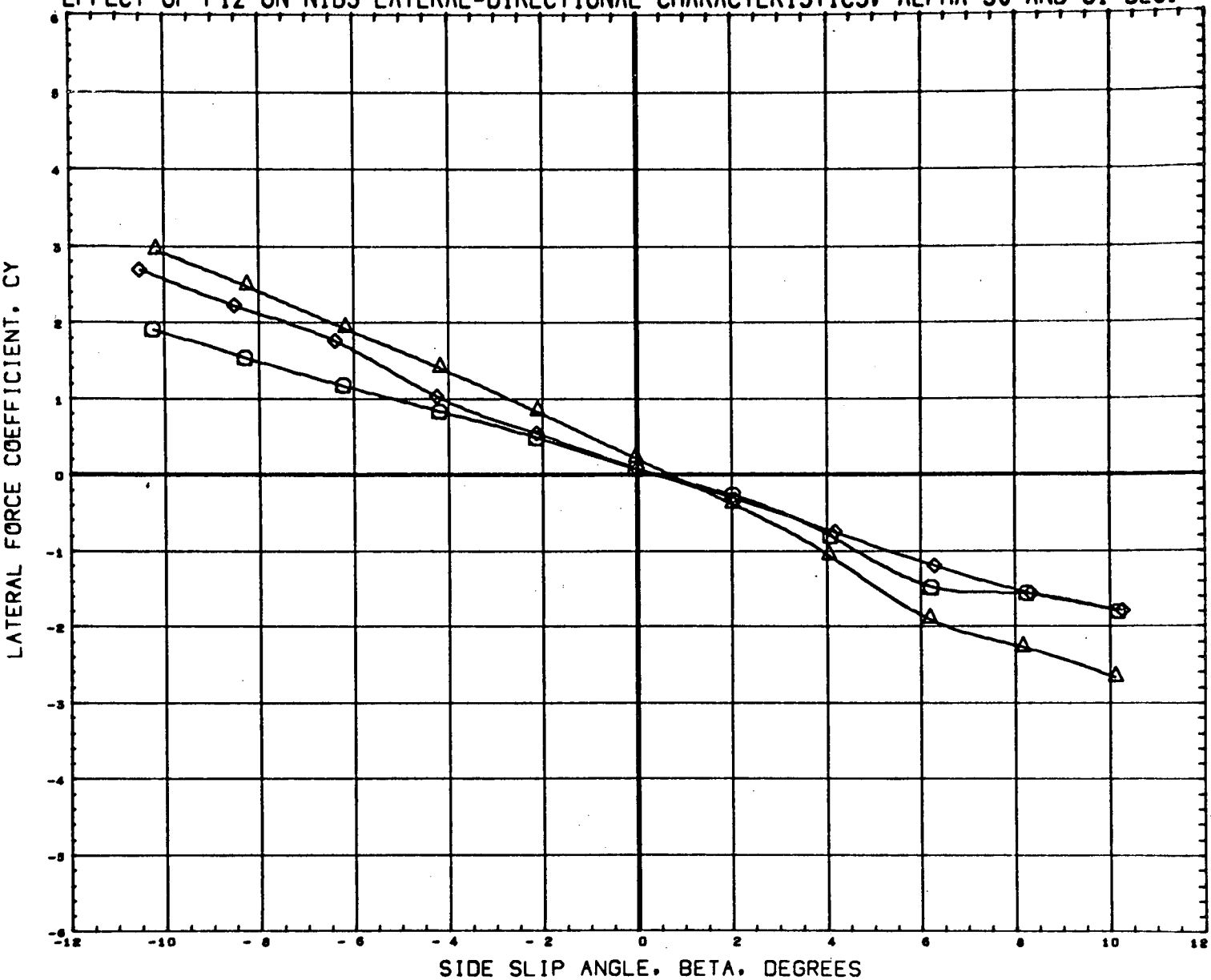
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55016)	○	MSFC TWT 521	BOOSTER	N1B3	0.000	
(A55023)	△	MSFC TWT 521	BOOSTER	N1B3F12	0.000	30.000

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

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



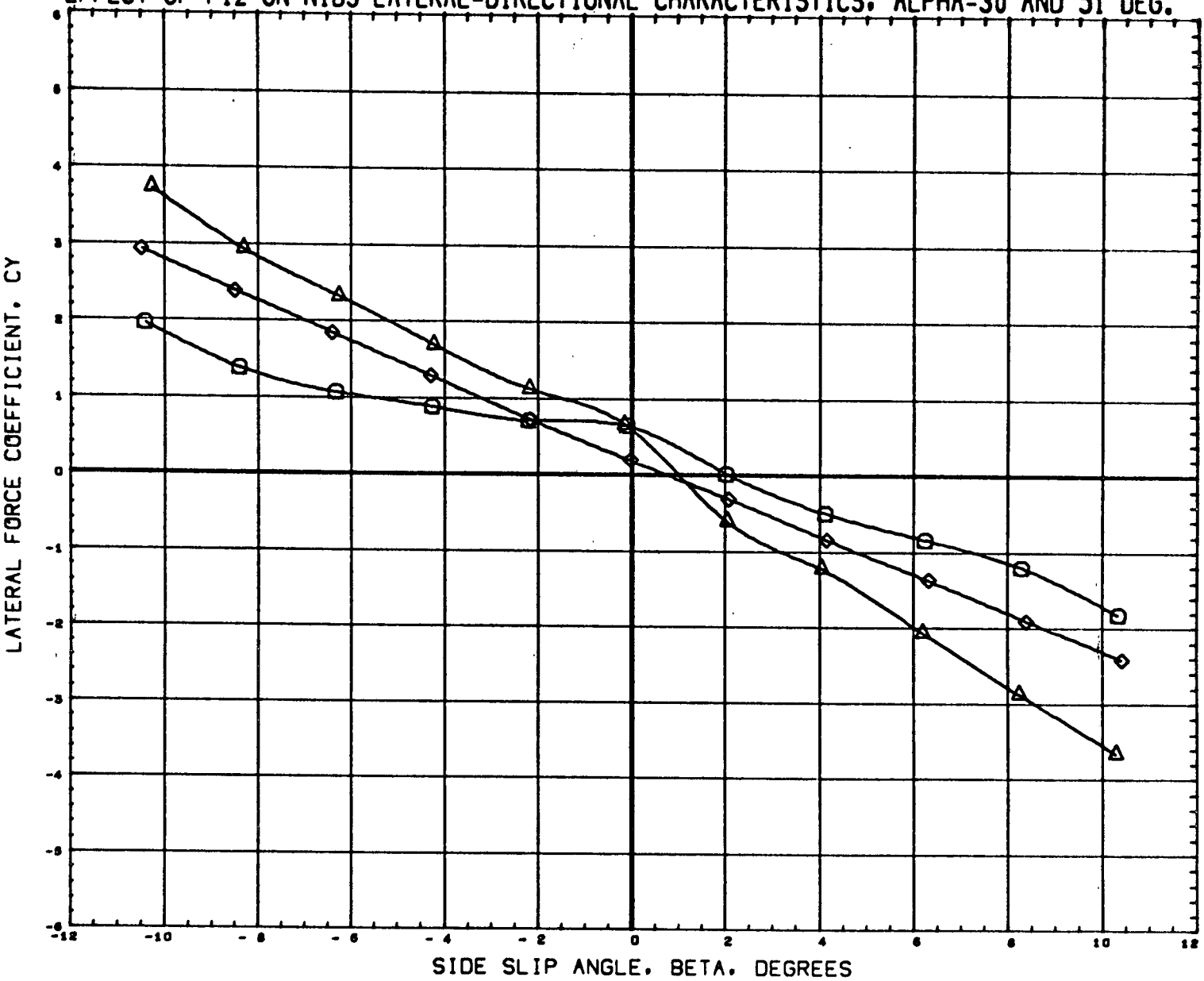
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521 BOOSTER N1B3	30.000	
(A55024)	△	MSFC TWT 521 BOOSTER N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521 BOOSTER N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	51.000	30.000

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

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



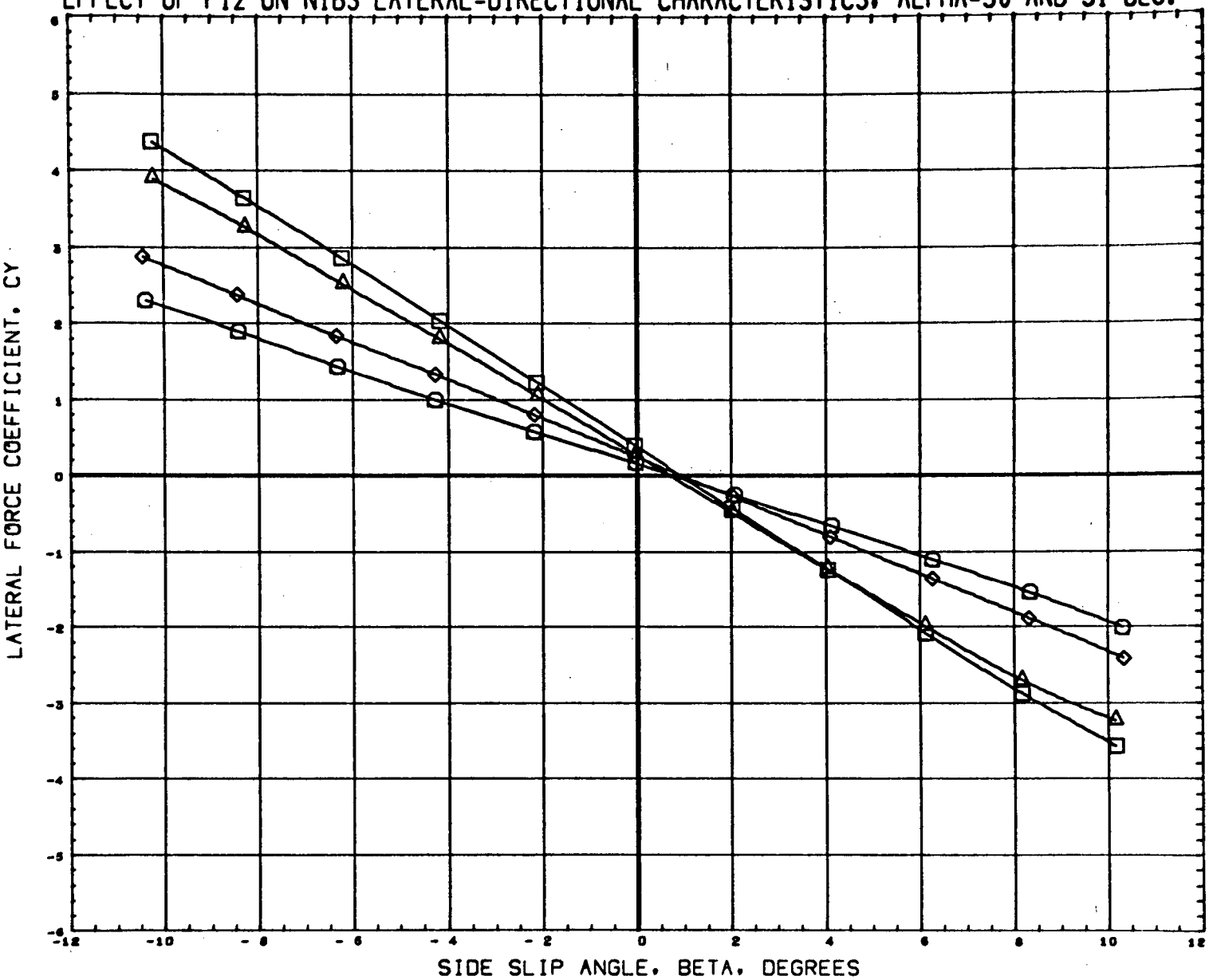
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS			51.000	30.000

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

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



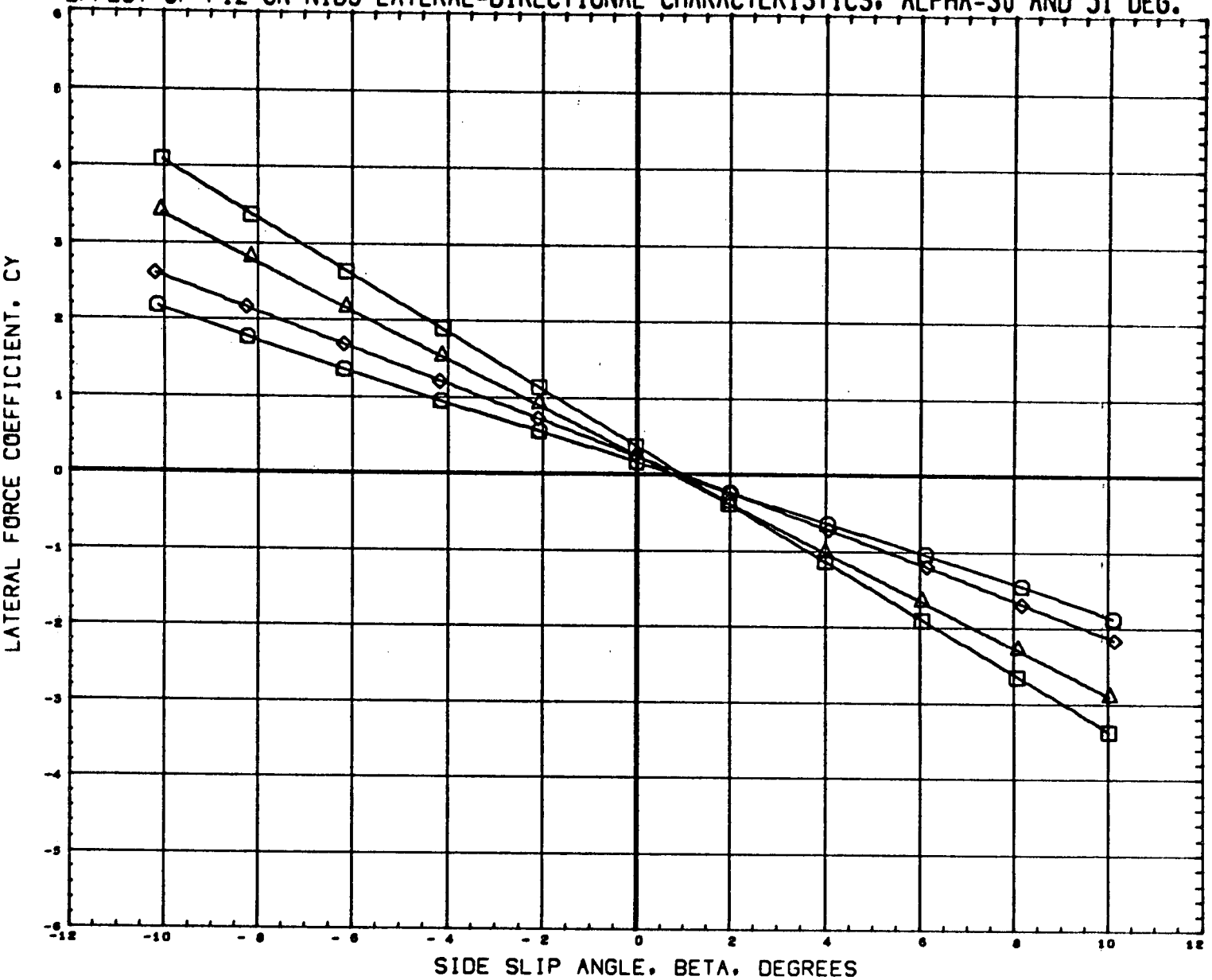
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



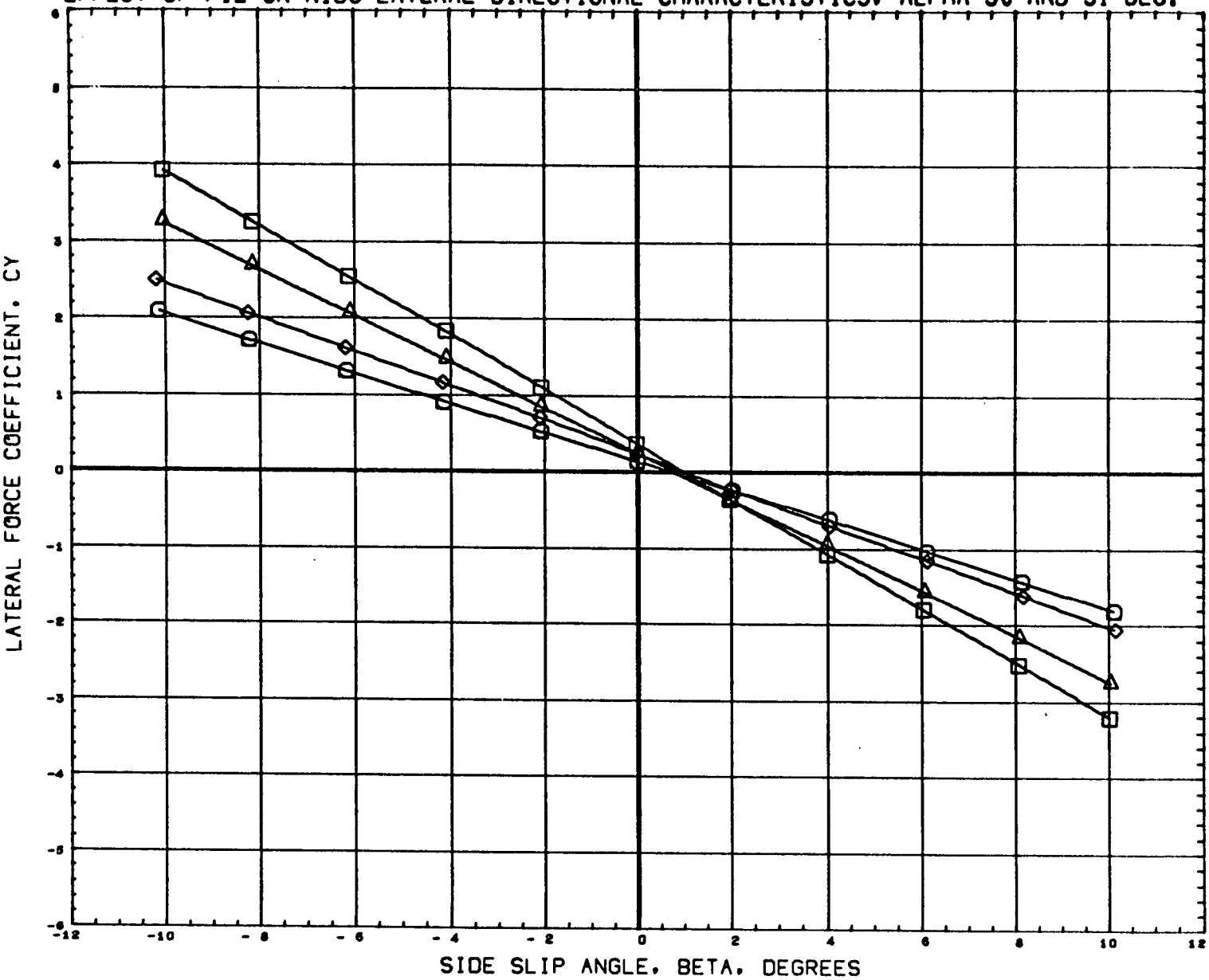
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



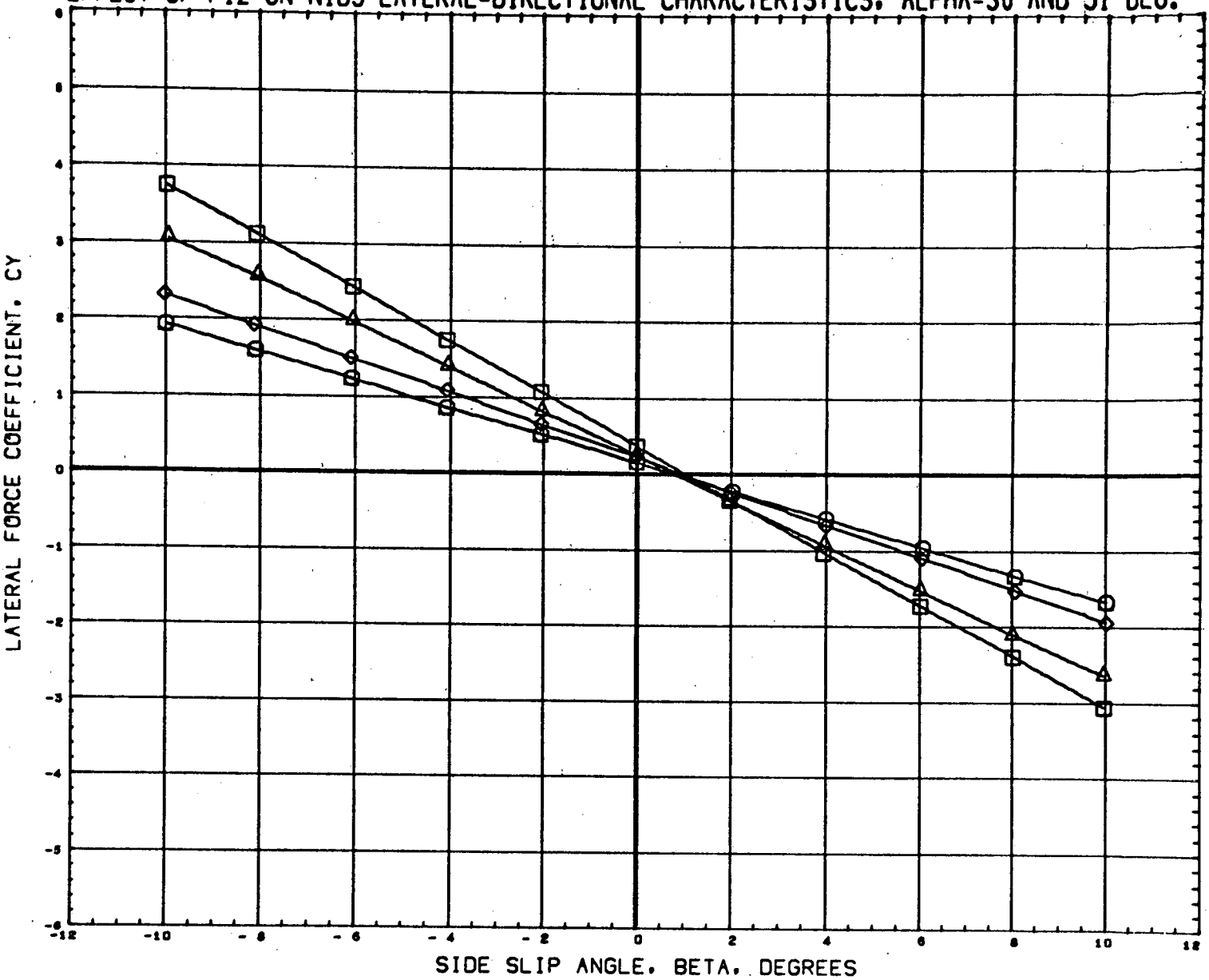
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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.



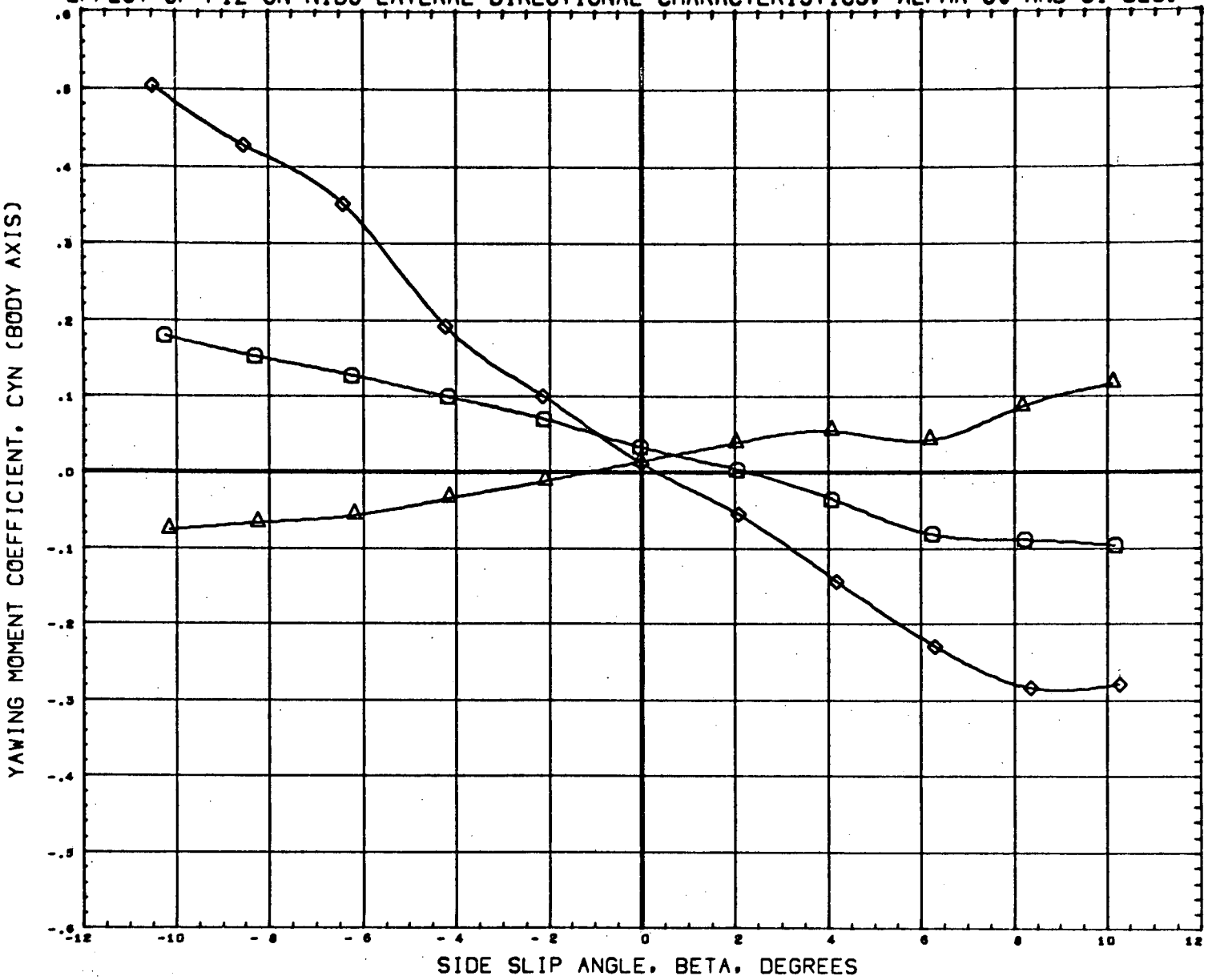
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



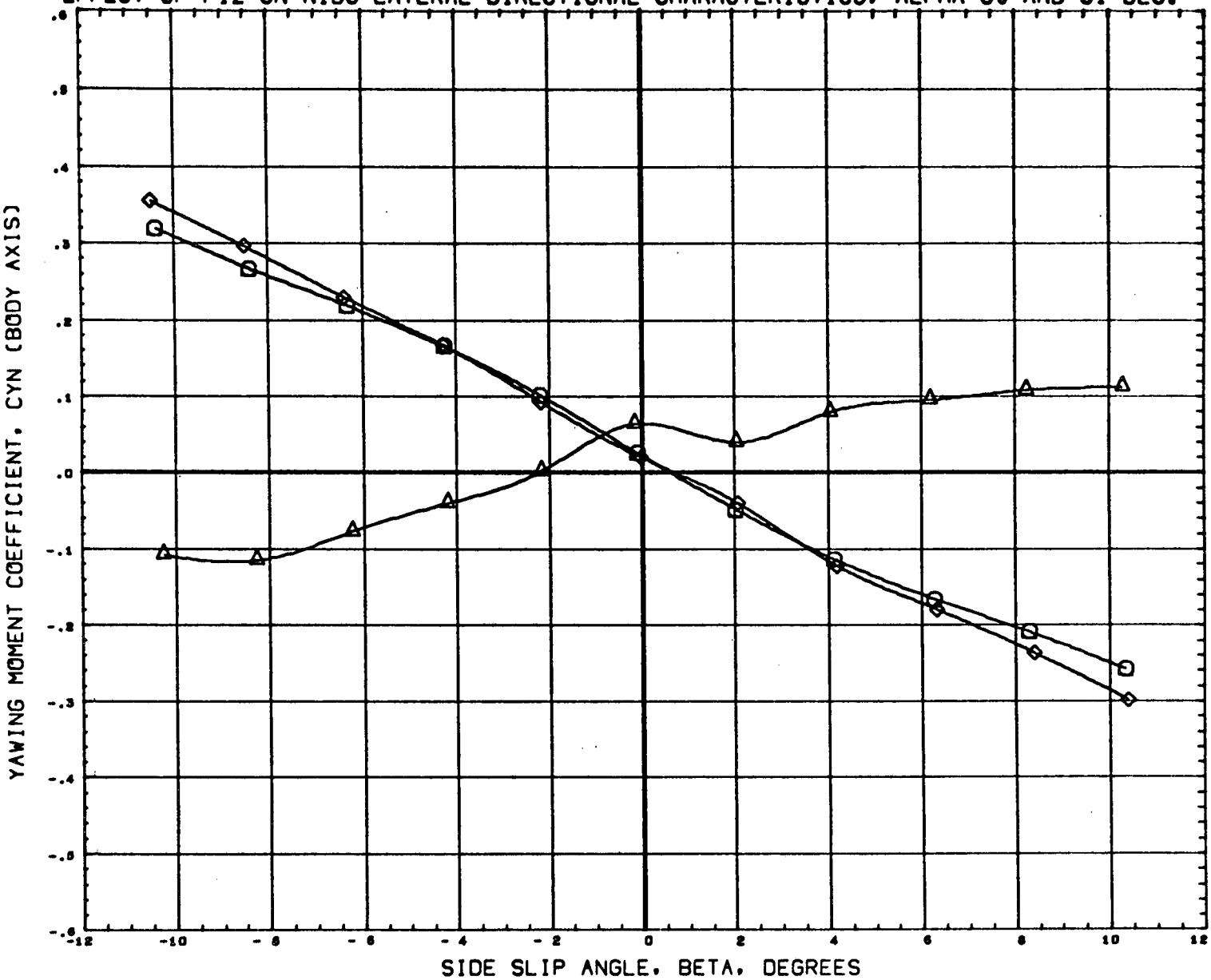
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS			51.000	30.000

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

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

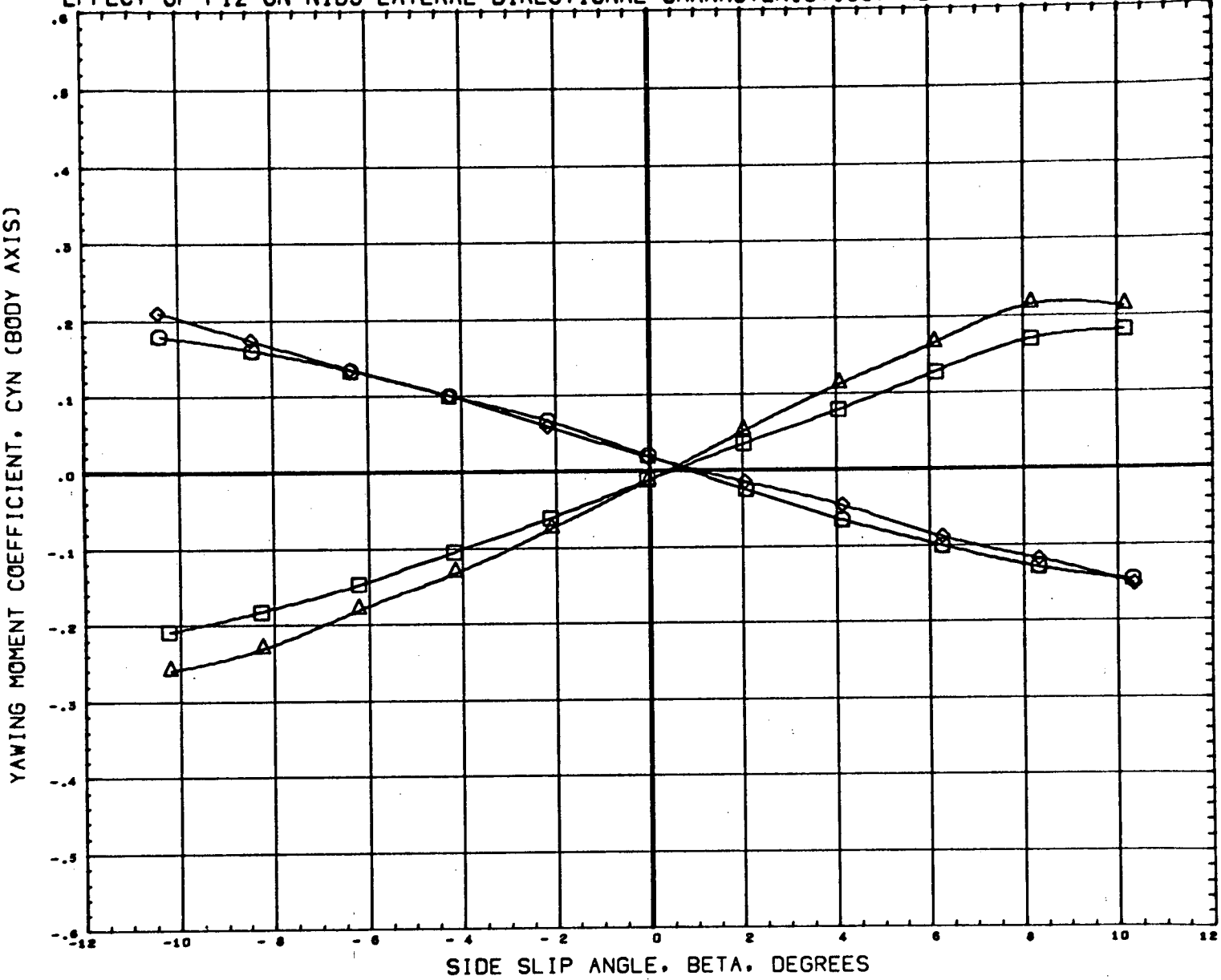


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS			51.000	30.000

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 1.20

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



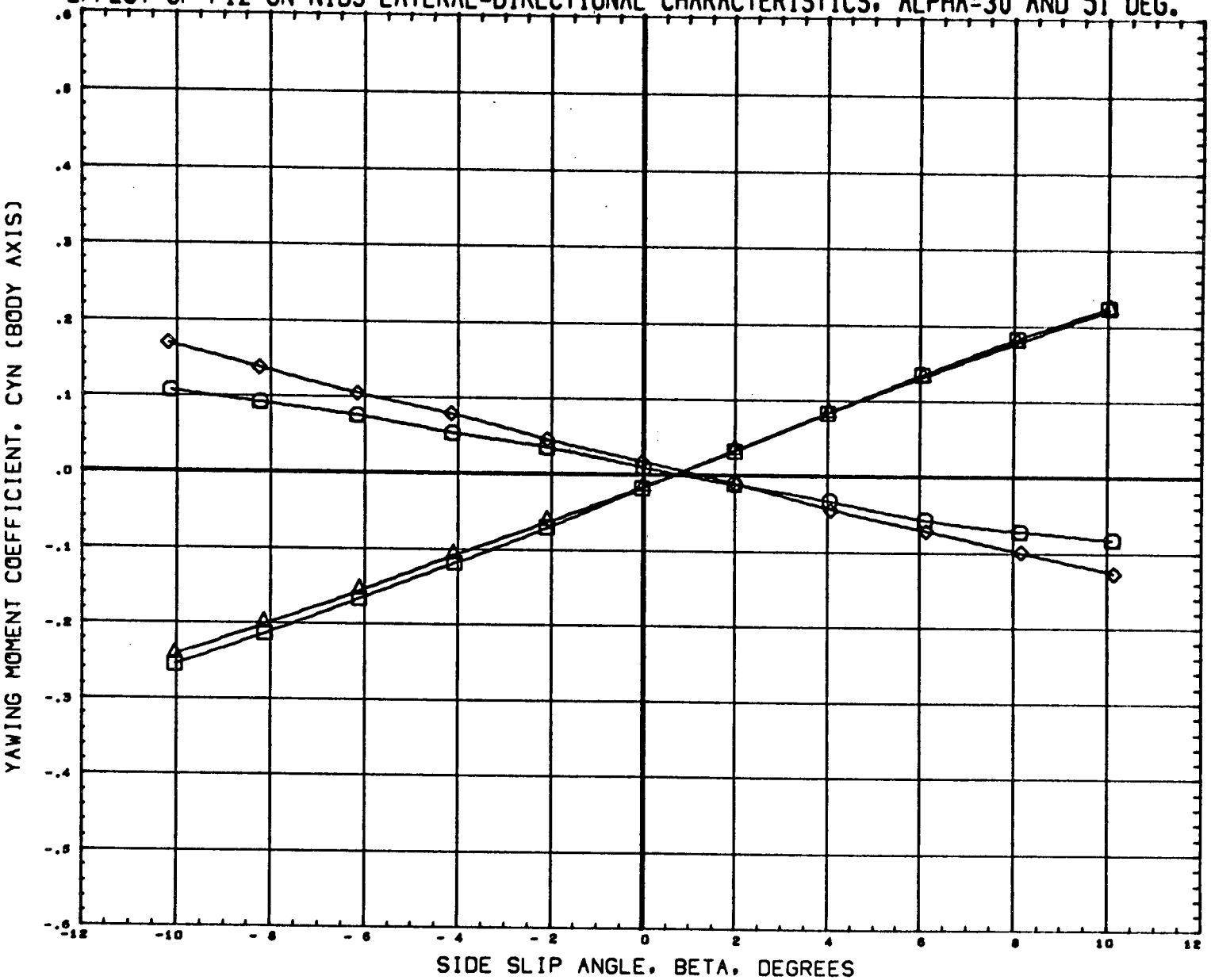
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



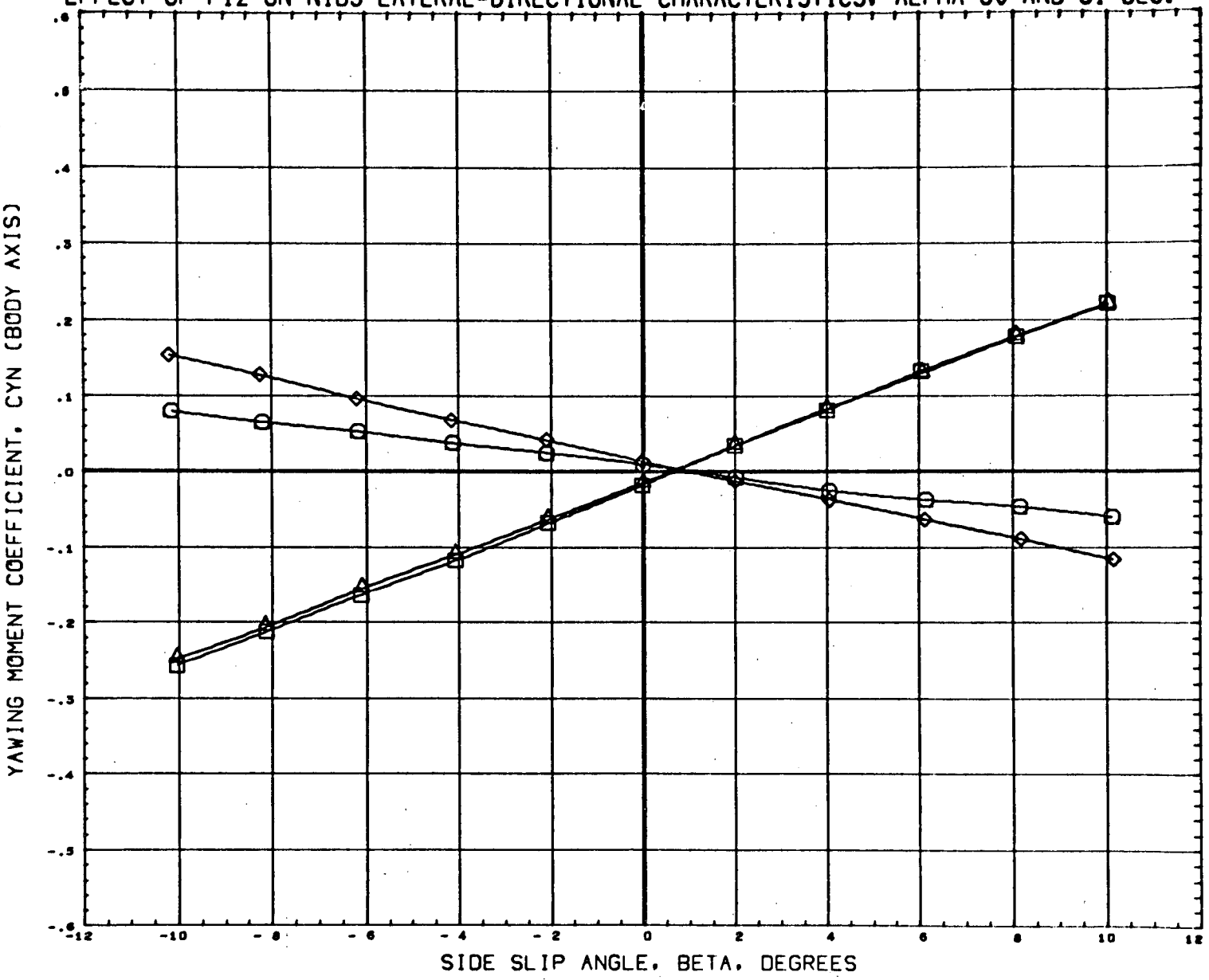
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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 2.74

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



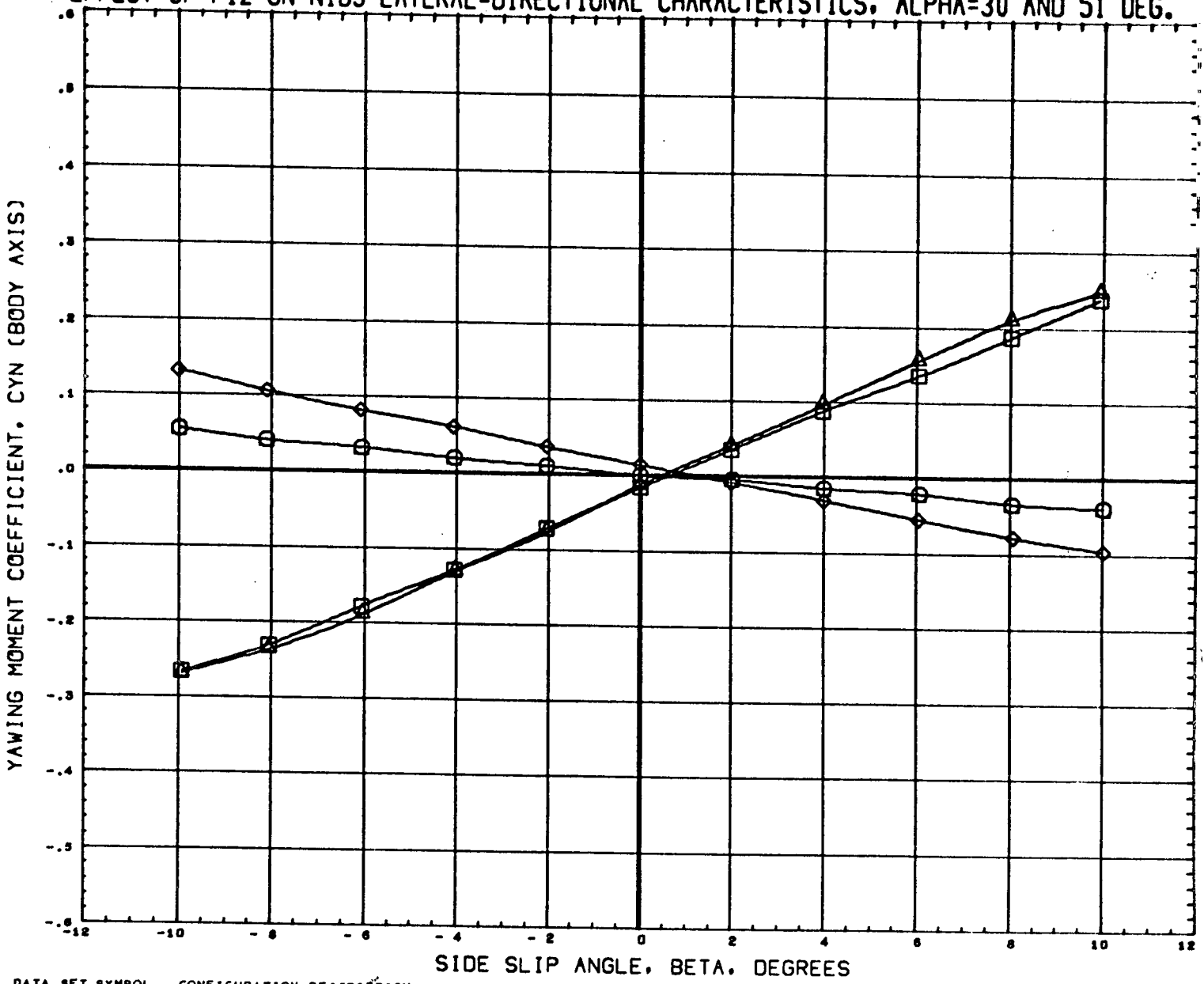
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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.



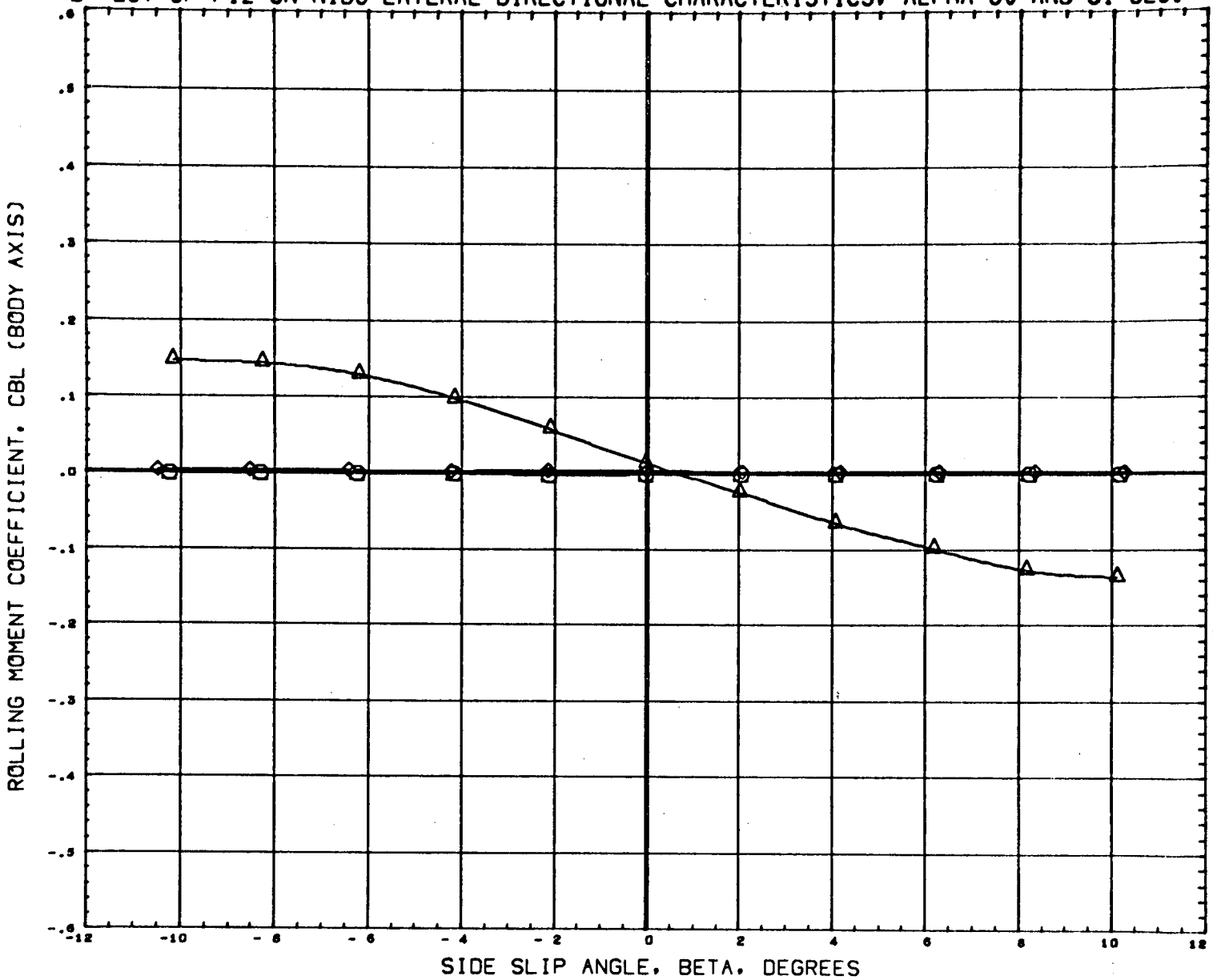
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



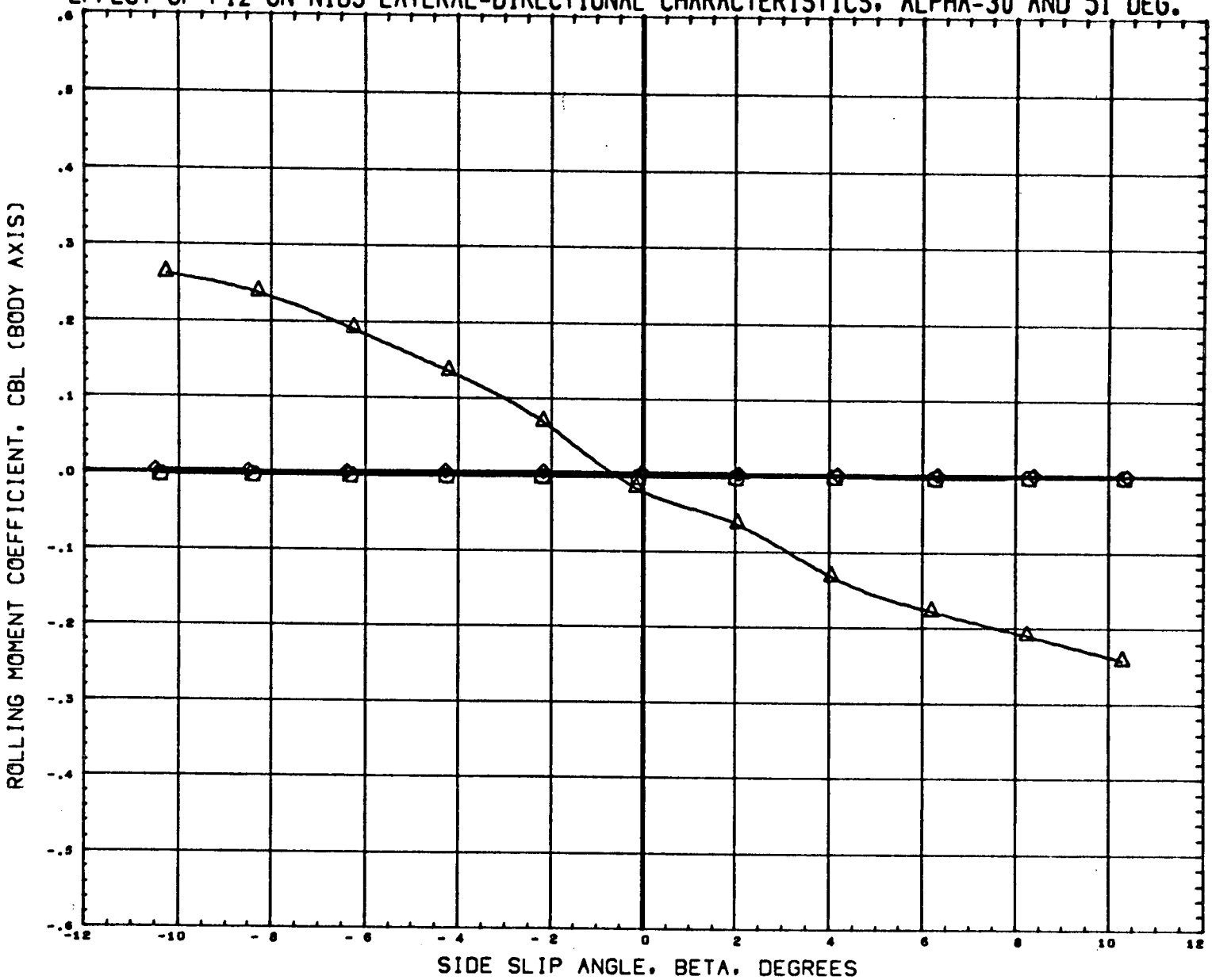
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS			51.000	30.000

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

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



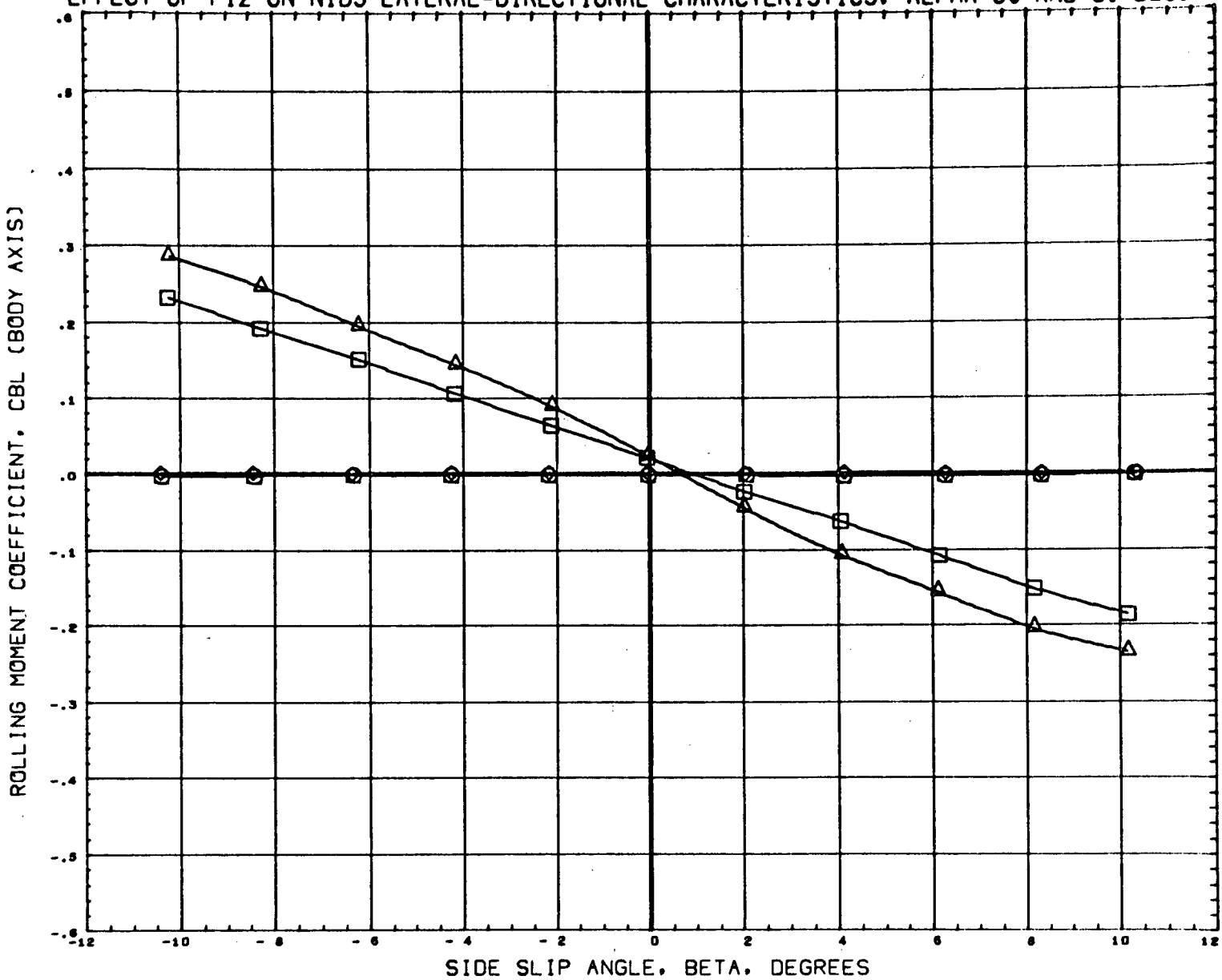
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS			51.000	30.000

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

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



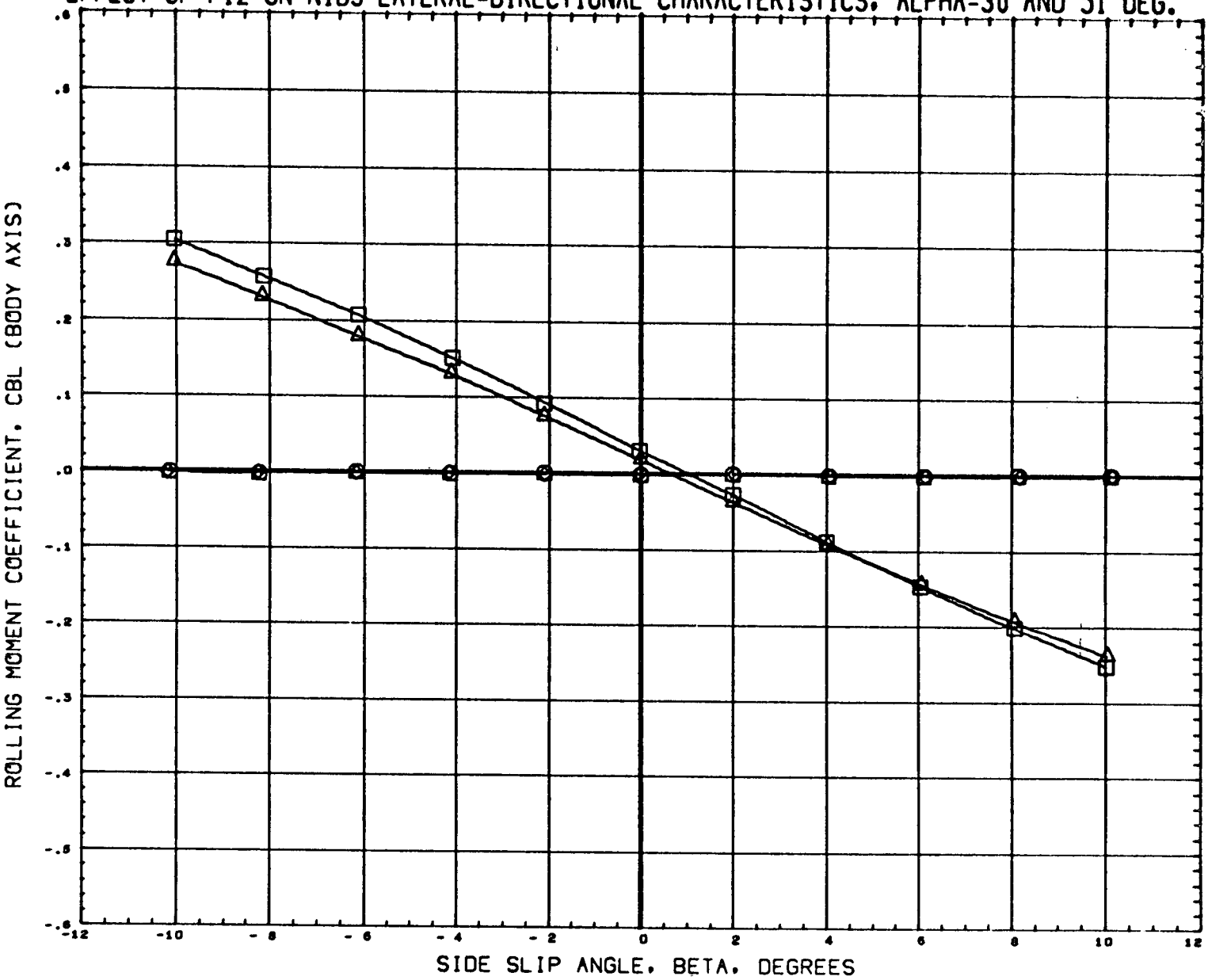
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



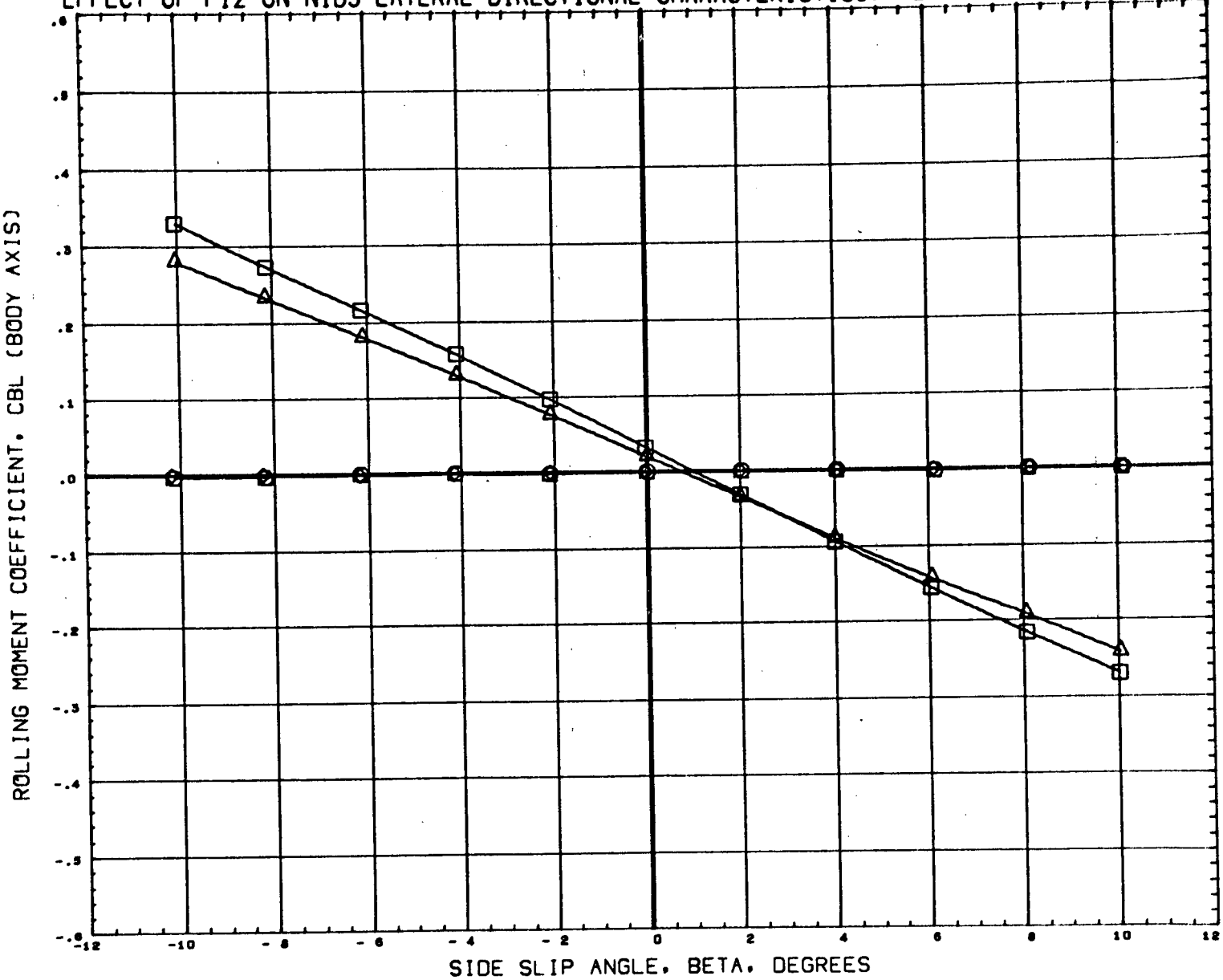
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



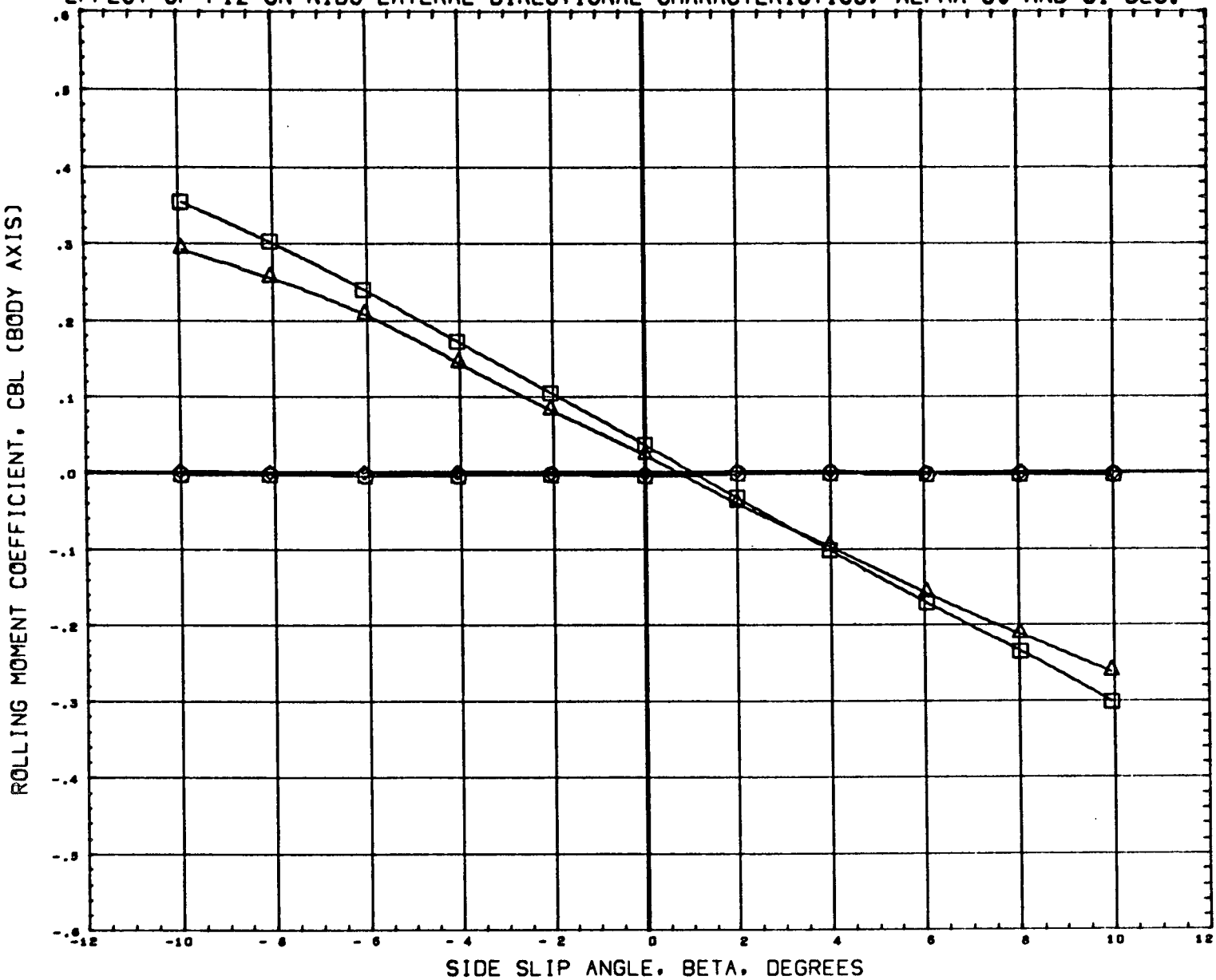
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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.



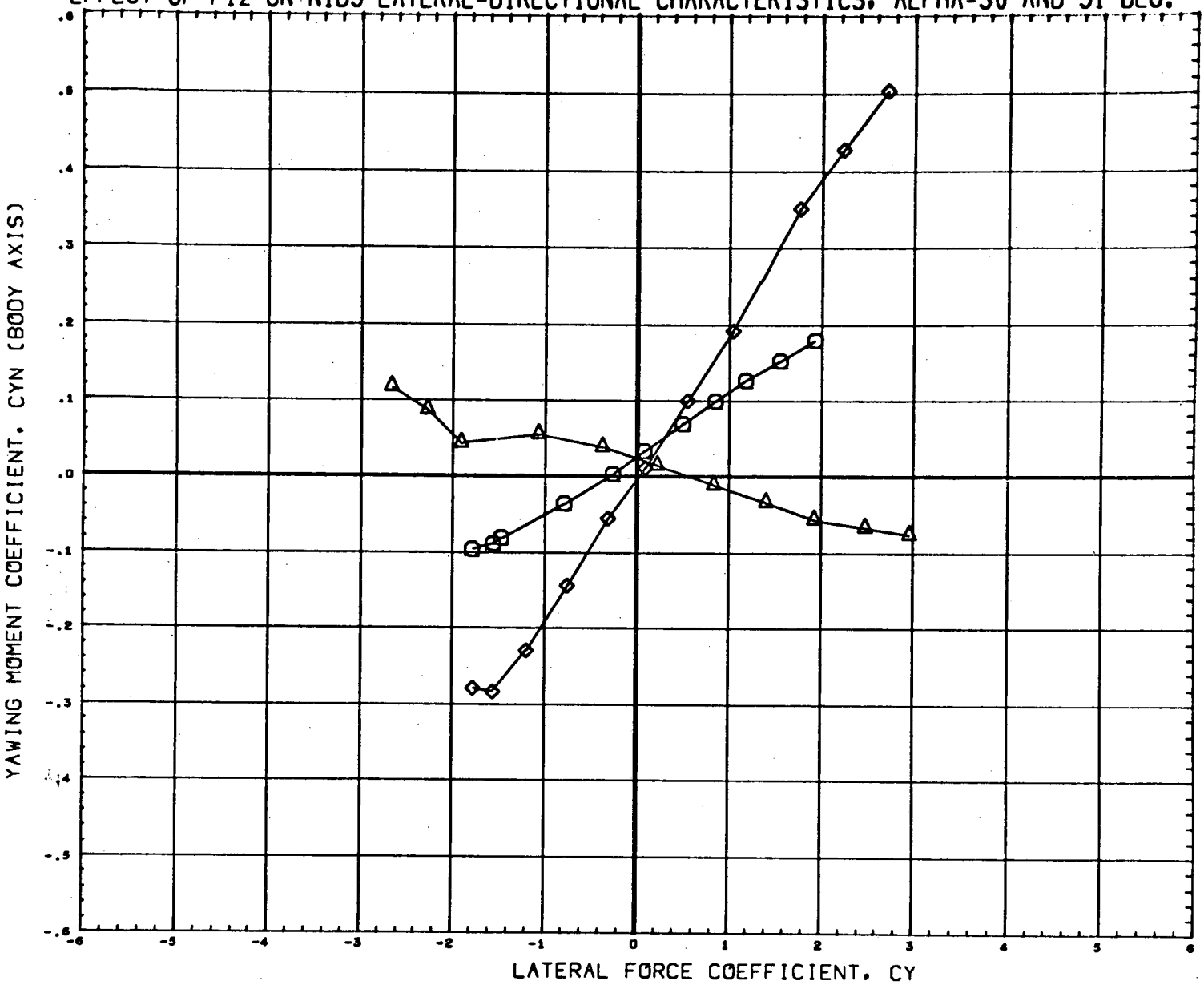
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



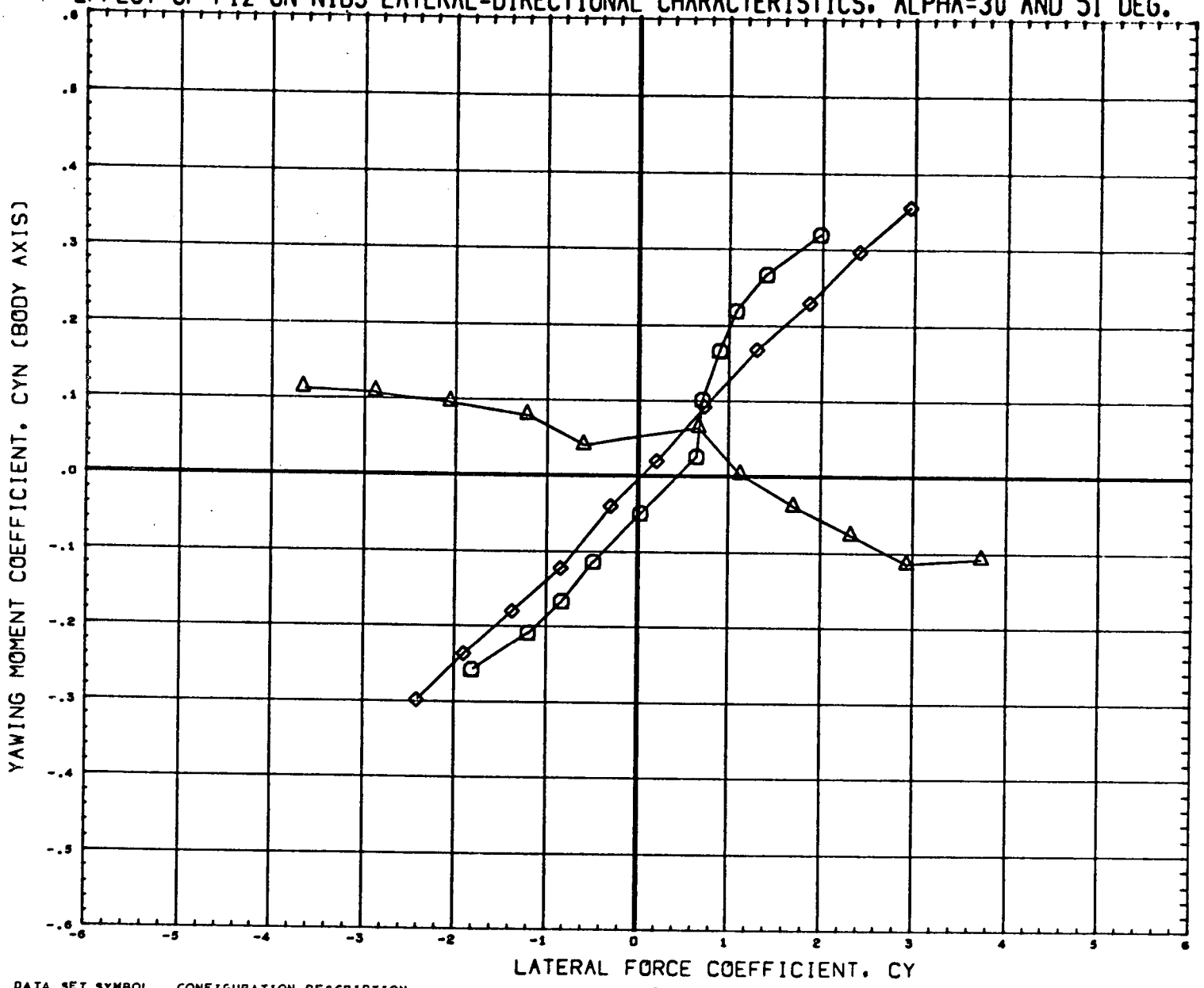
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS			51.000	30.000

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

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		

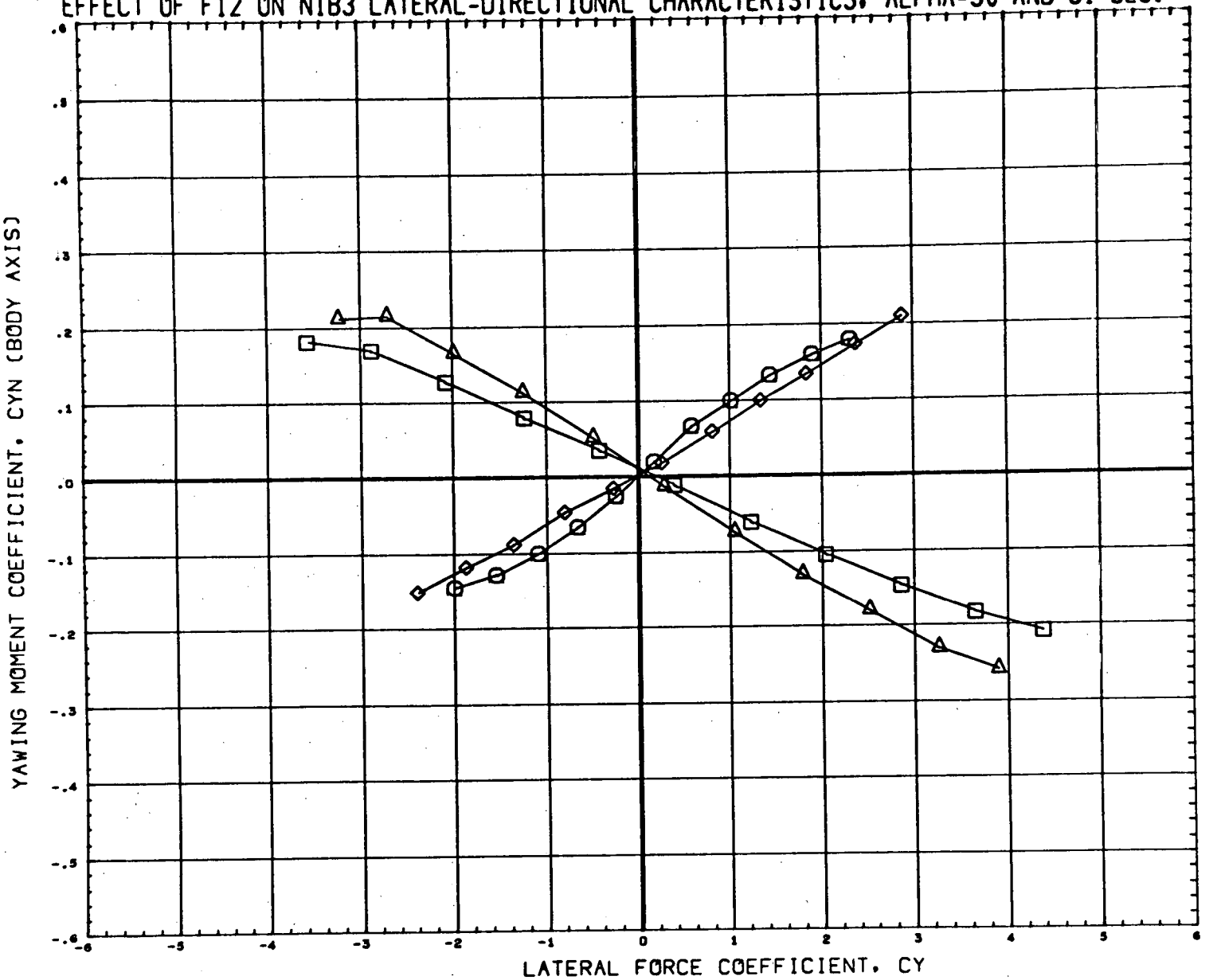
ALPHA	DIHDRL
30.000	
30.000	30.000
51.000	
51.000	30.000

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

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



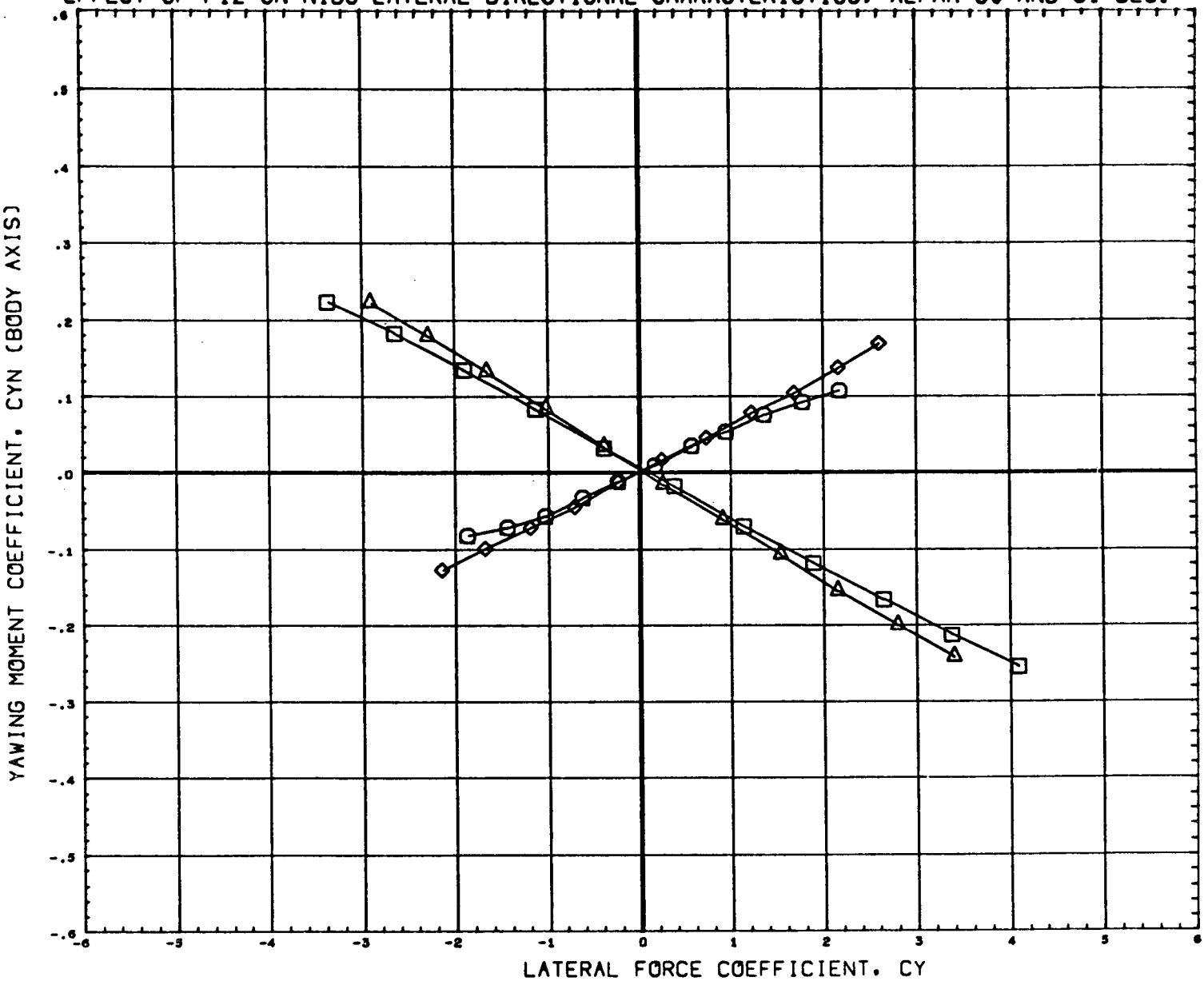
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



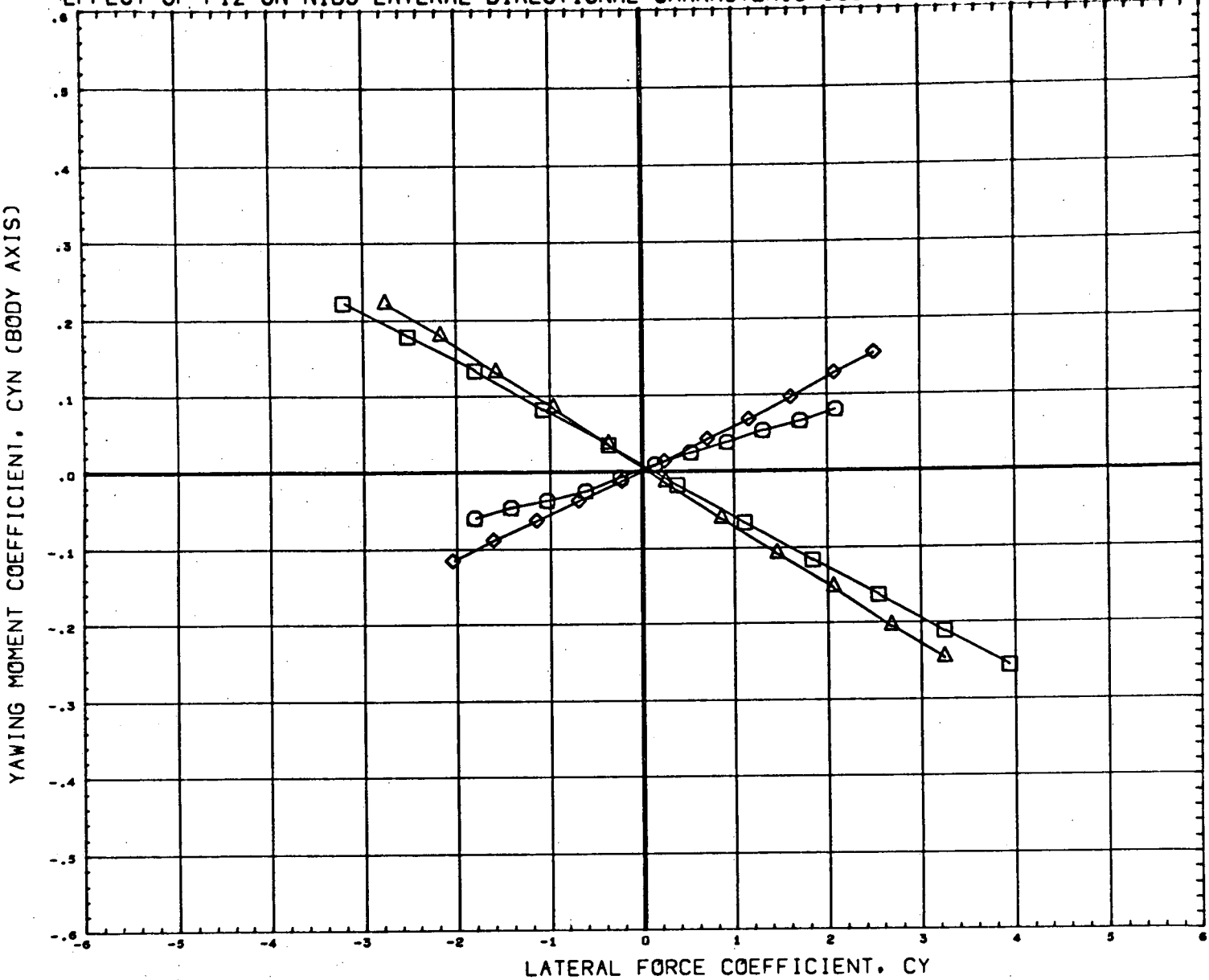
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

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



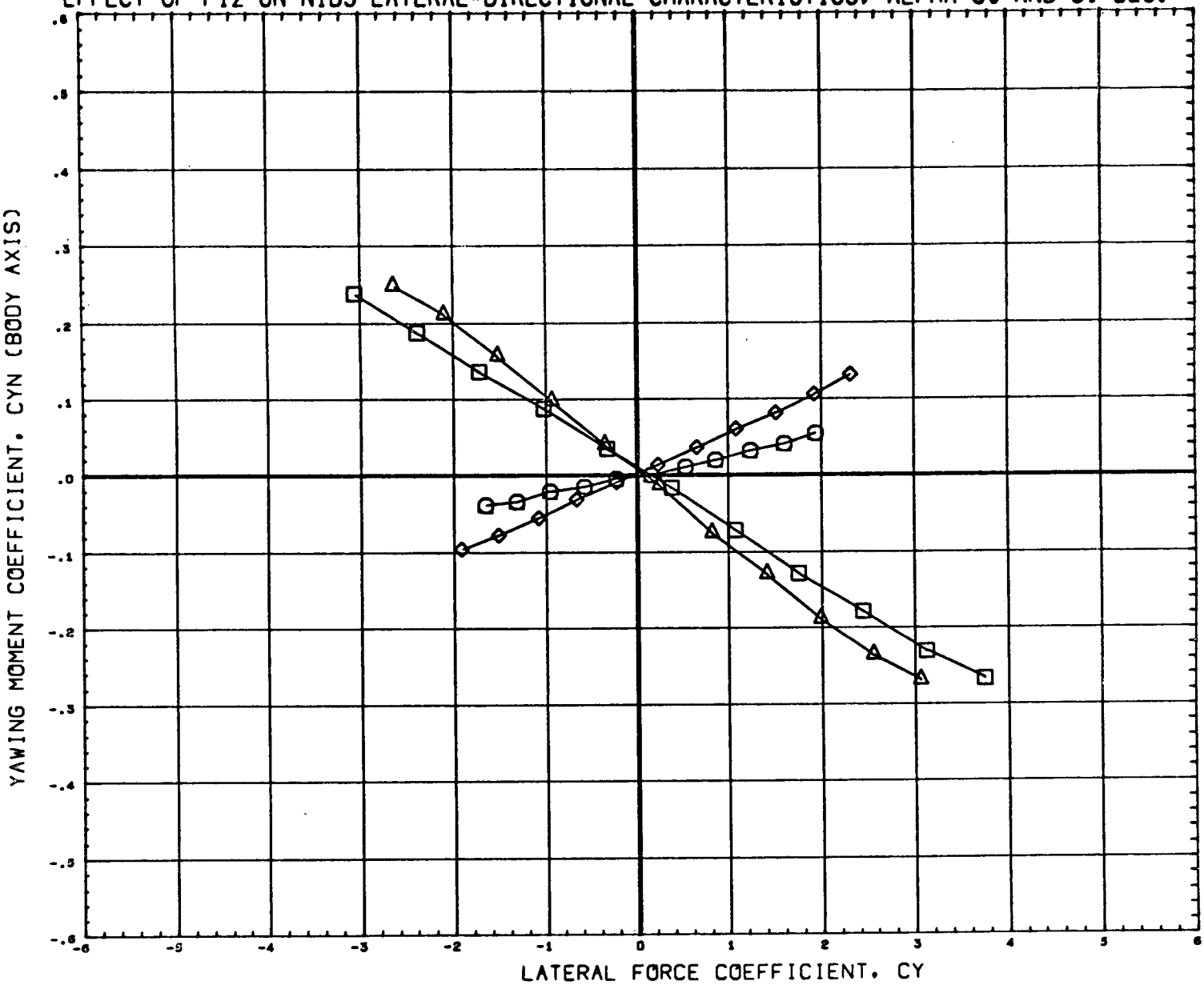
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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.



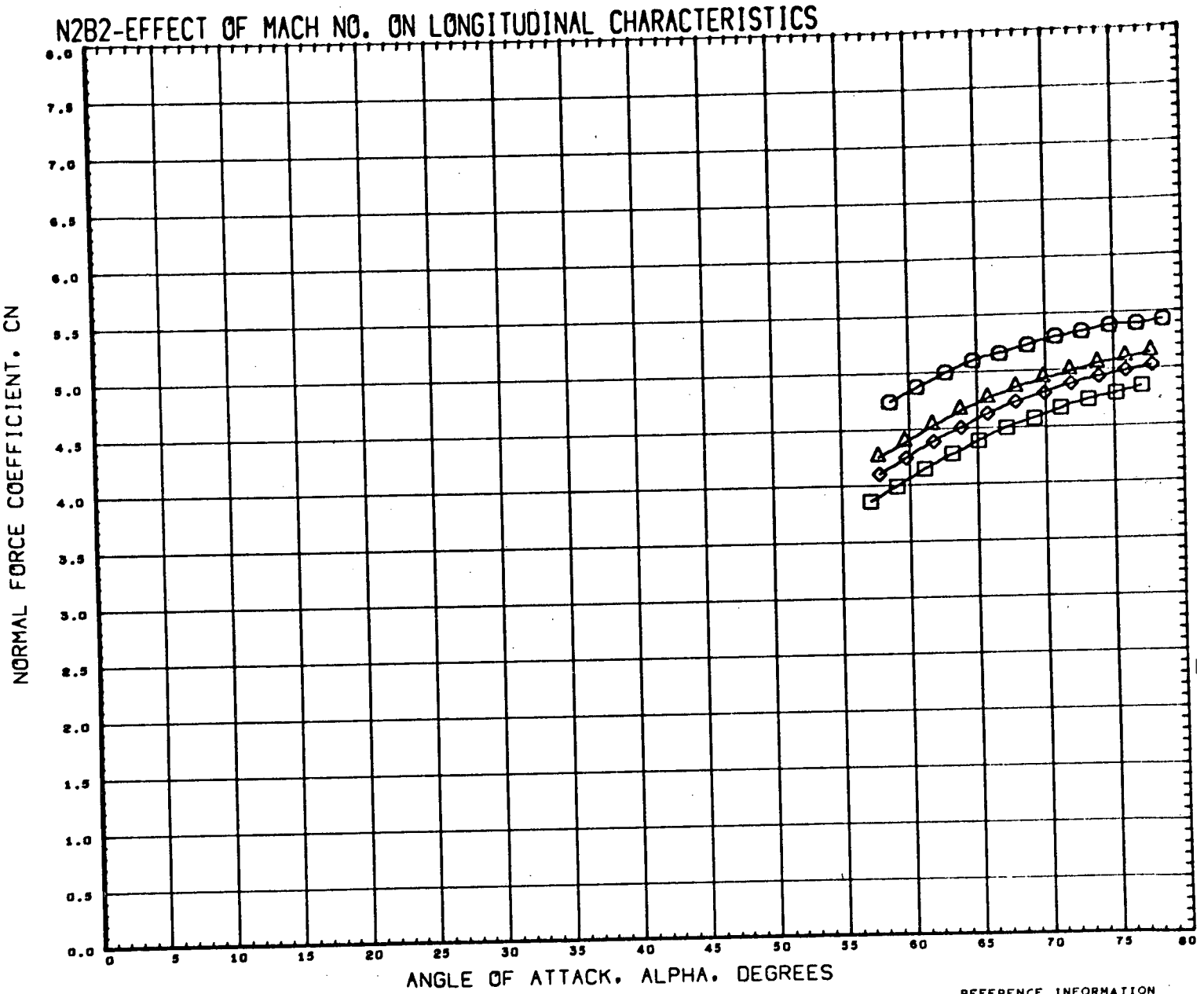
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION			ALPHA	DIHDRL
(A55017)	○	MSFC TWT 521	BOOSTER	N1B3	30.000	
(A55024)	△	MSFC TWT 521	BOOSTER	N1B3F12	30.000	30.000
(A55018)	◇	MSFC TWT 521	BOOSTER	N1B3	51.000	
(A55025)	□	MSFC TWT 521	BOOSTER	N1B3F12	51.000	30.000

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

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



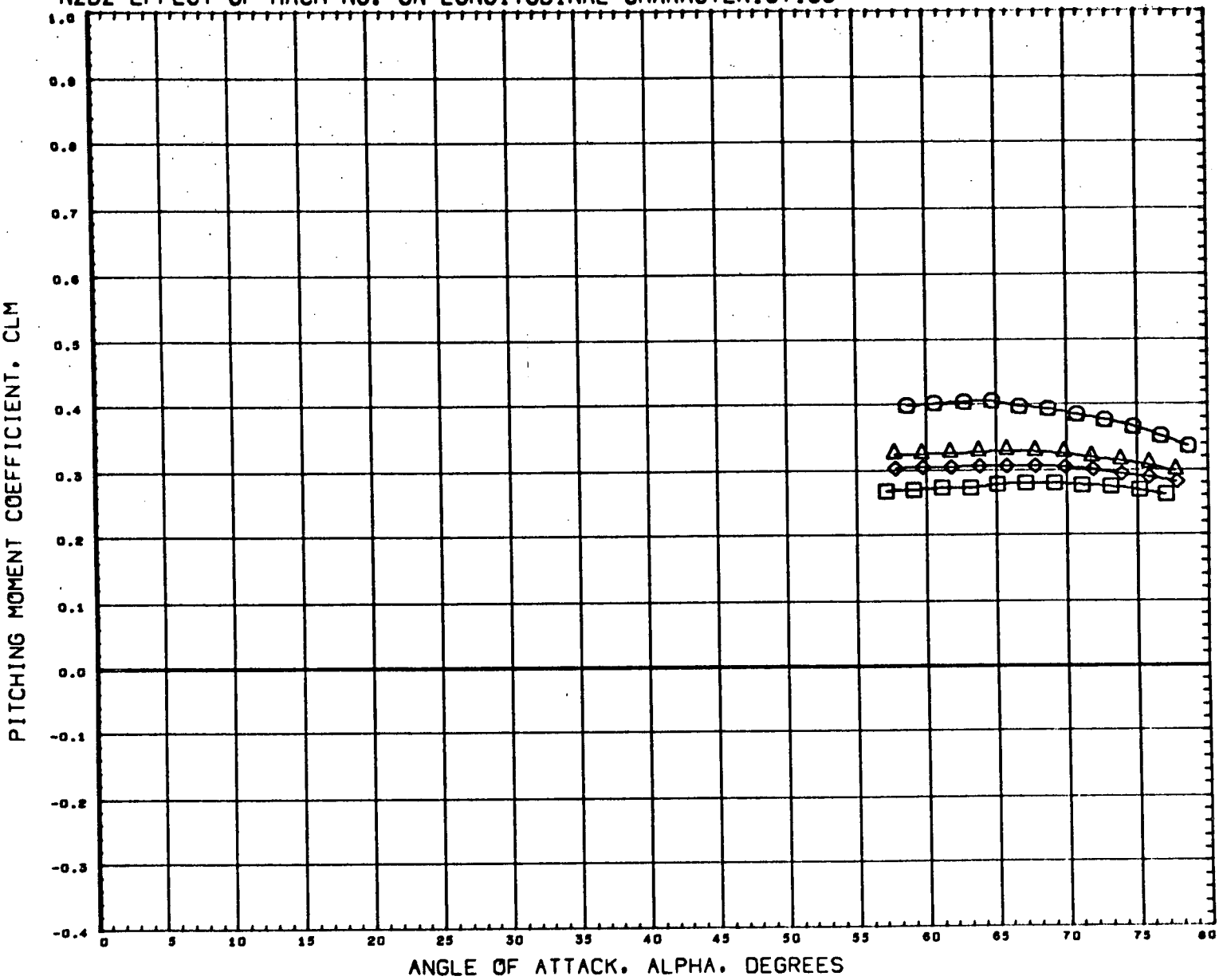
SYMBOL	MACH		PARAMETRIC VALUES
○	1.961	BETA	0.000
△	2.740		
◇	3.480		
□	4.959		

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 S*E

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



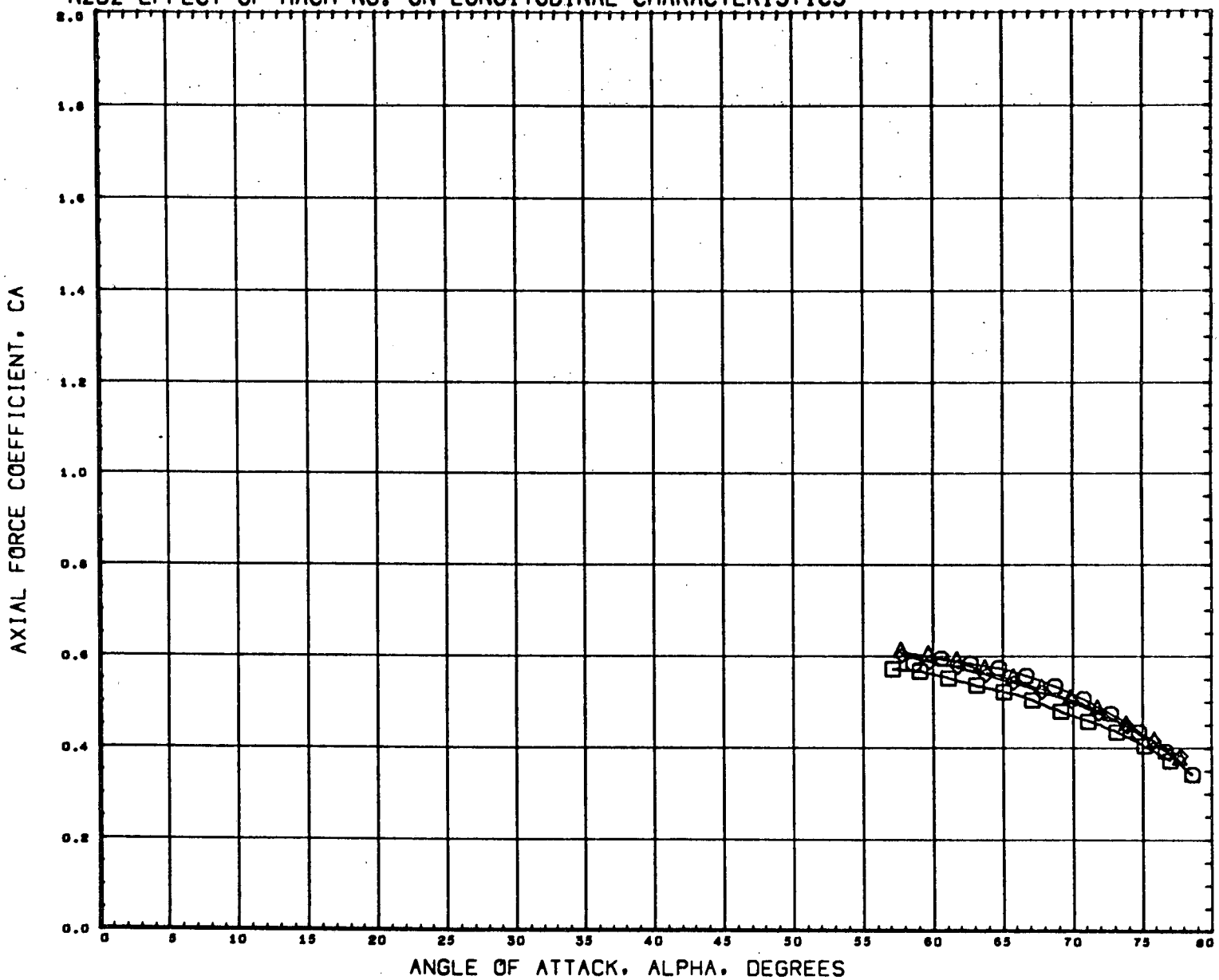
SYMBOL	MACH		PARAMETRIC VALUES
○	1.961	BETA	0.000
△	2.740		
◇	3.460		
□	4.959		

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	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



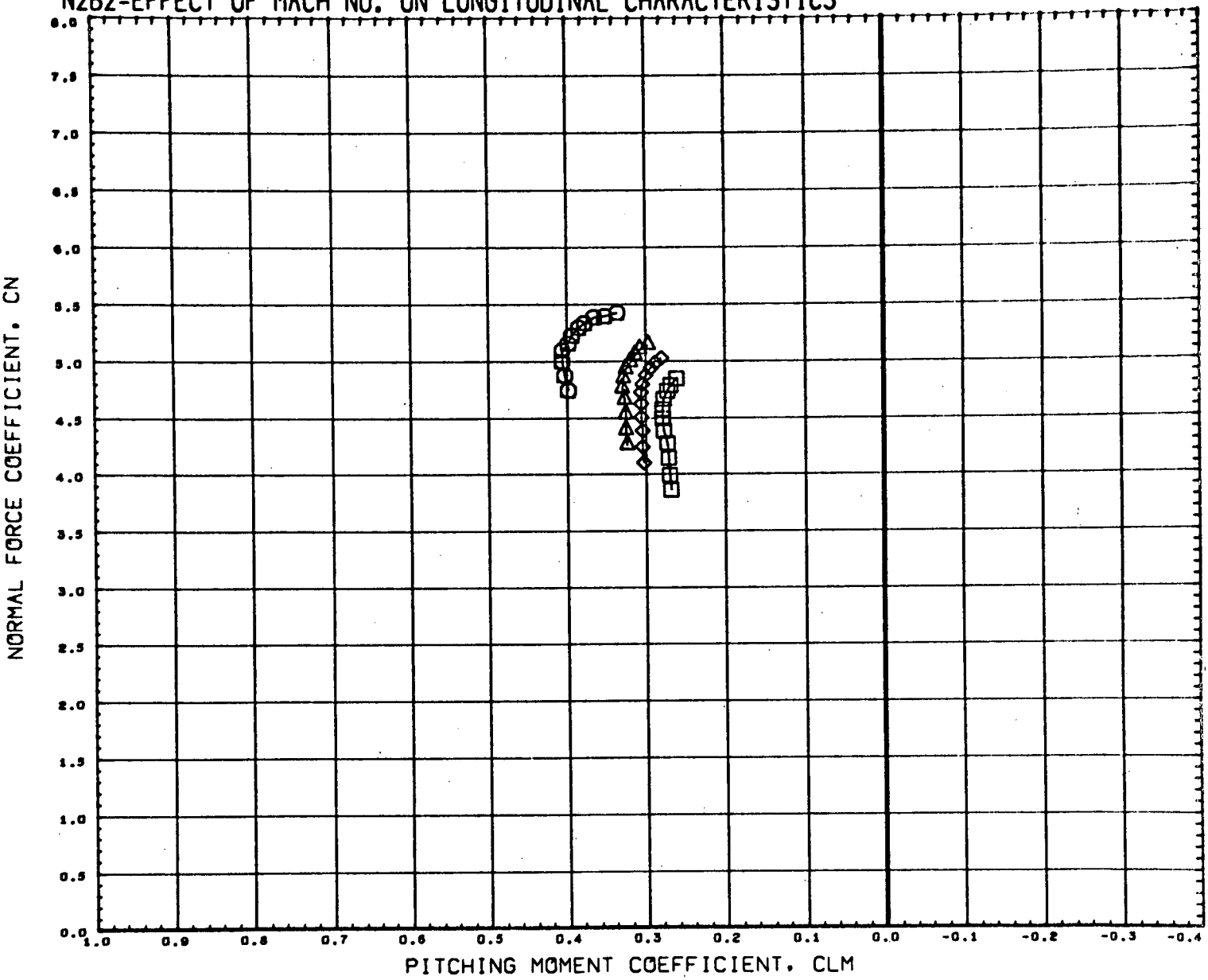
SYMBOL	MACH	PARAMETRIC VALUES	
○	1.961	BETA	0.000
△	2.740		
◇	3.480		
□	4.959		

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	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



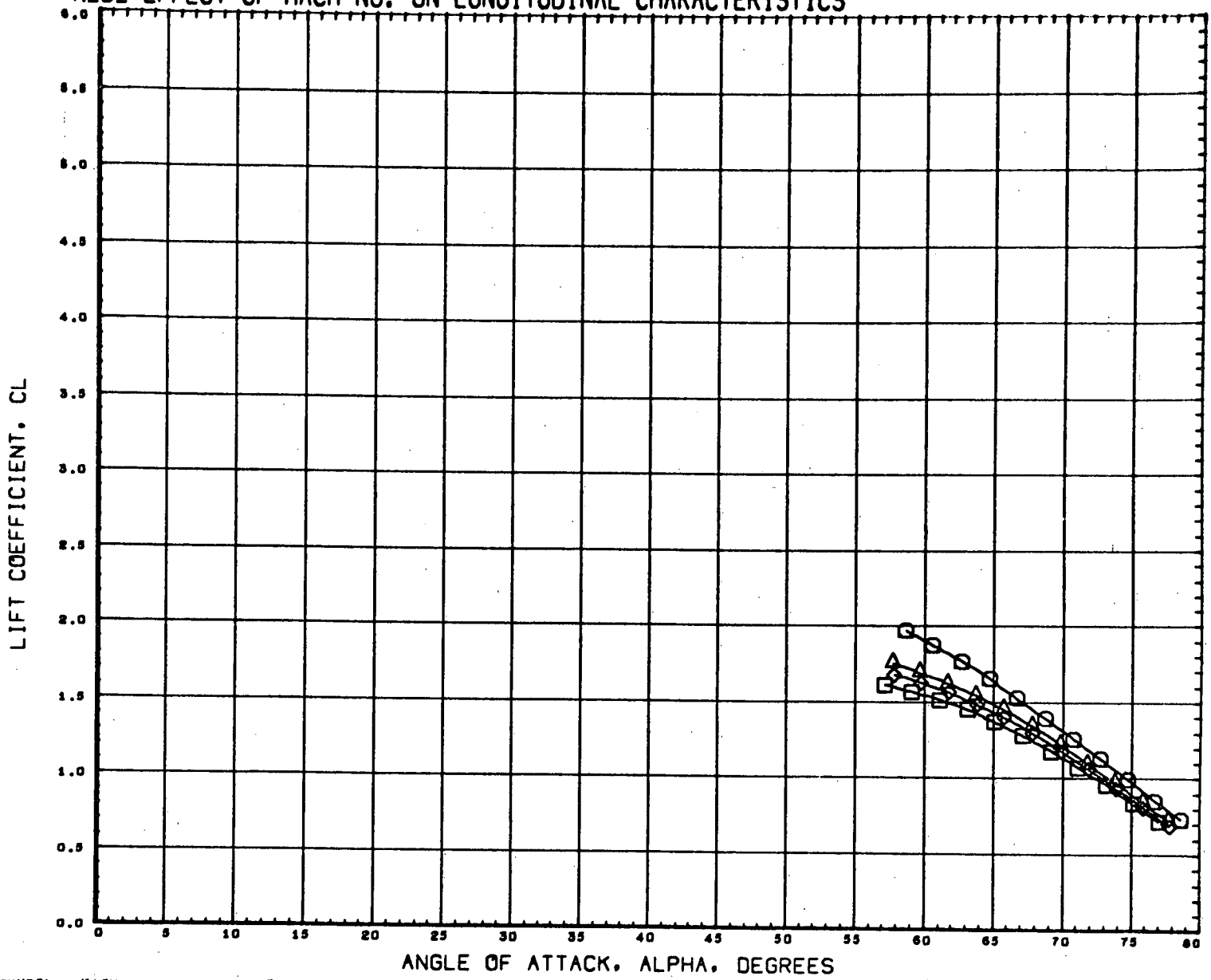
SYMBOL	MACH	PARAMETRIC VALUES	
○	1.961	BETA	0.000
△	2.740		
◇	3.480		
□	4.959		

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	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



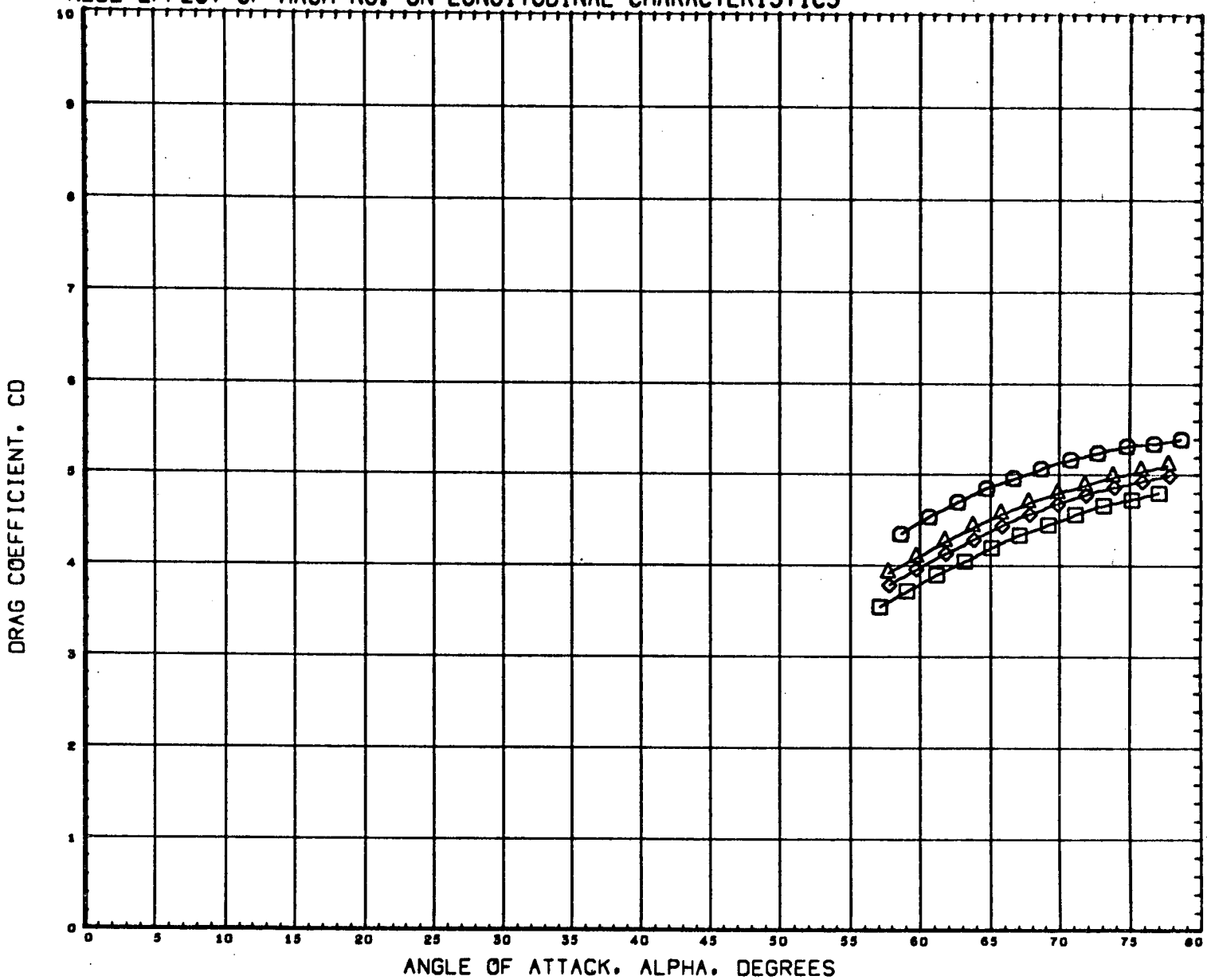
SYMBOL	MACH		PARAMETRIC VALUES
○	1.961	BETA	0.000
△	2.740		
◇	3.460		
□	4.959		

DATA HIST. CODE S*E

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
LREF	5.8590	IN.
BREF	5.8590	IN.
XMRP	3.3150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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△	2.740		
◇	3.480		
□	4.959		

DATA HIST. CODE S*E

REFERENCE INFORMATION

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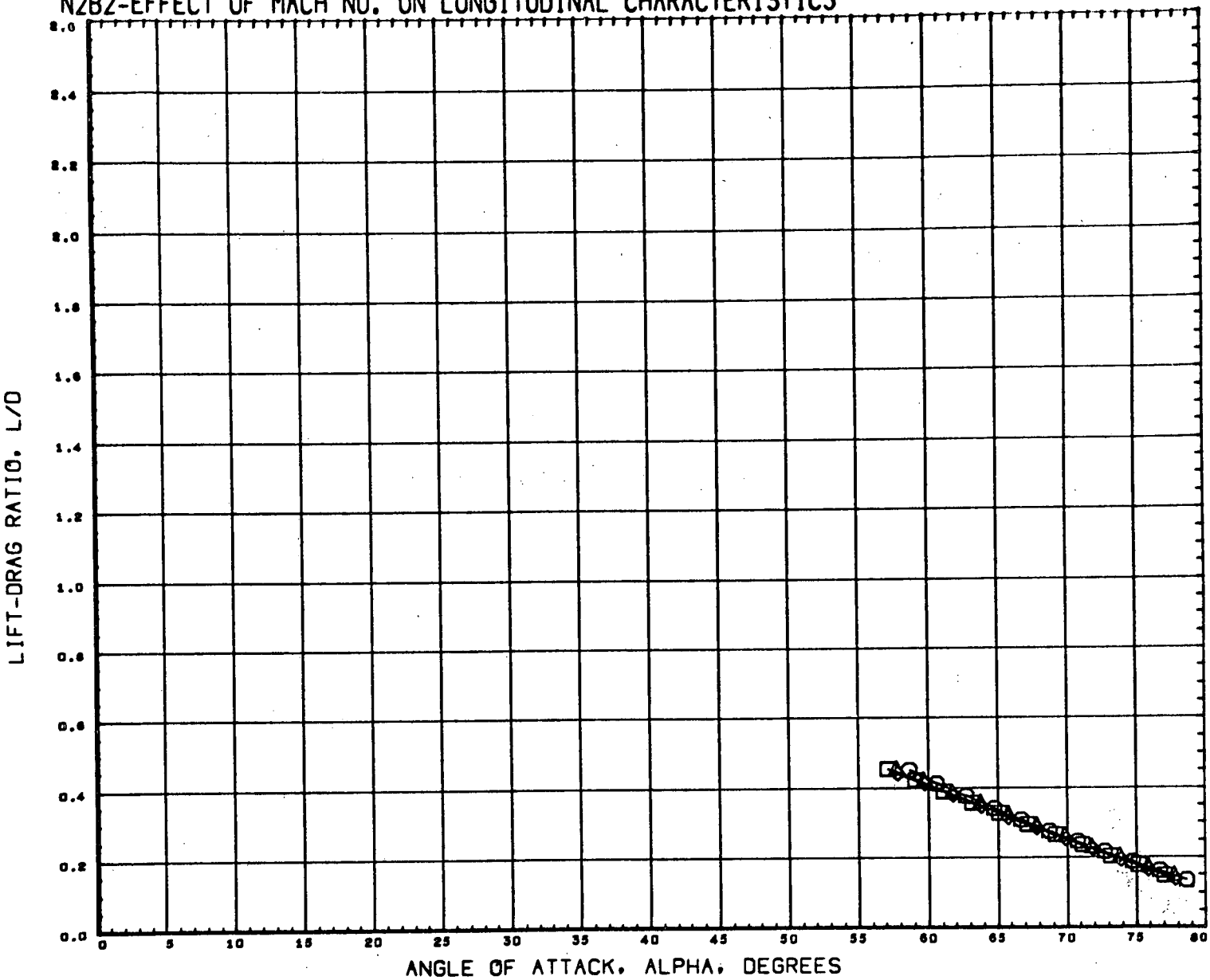
ZMRP	0.0000	IN.
SCALE	0.0034	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
○	1.961	BETA	0.000
△	2.740		
◇	3.460		
□	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.
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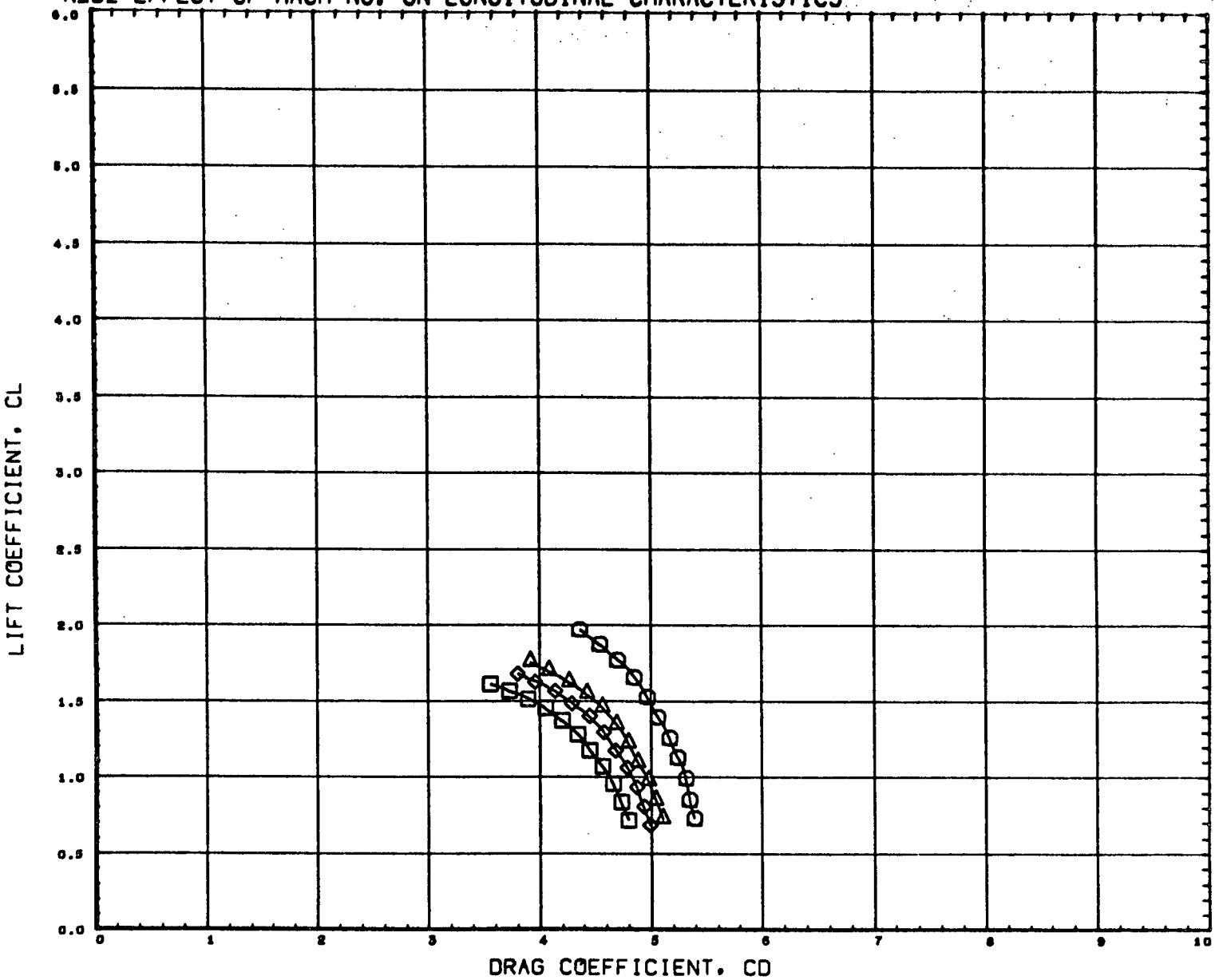
SCALE	0.0034	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
○	1.961	BETA	0.000
△	2.740		
◇	3.460		
□	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.
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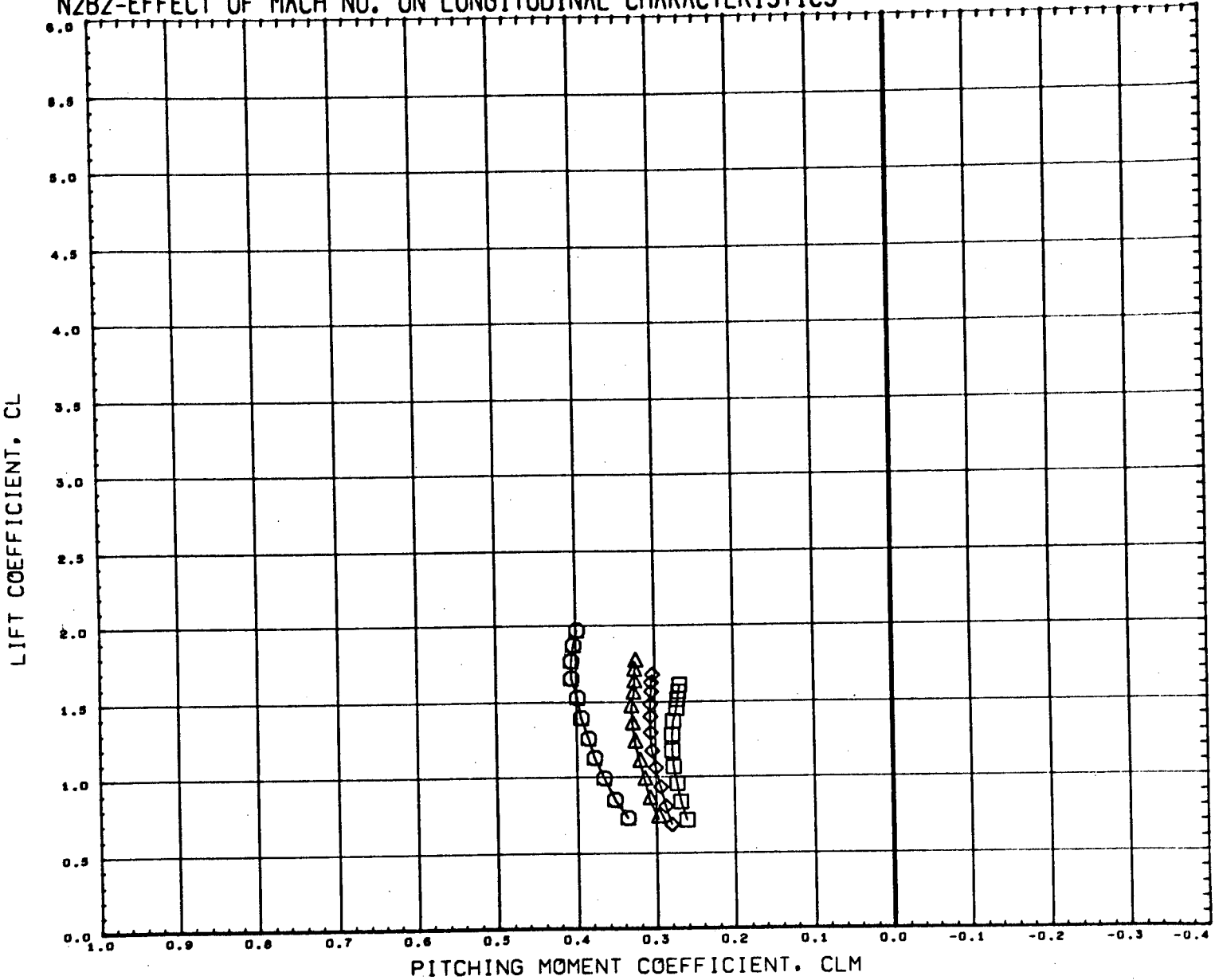
SCALE	0.0034	

N2B2-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



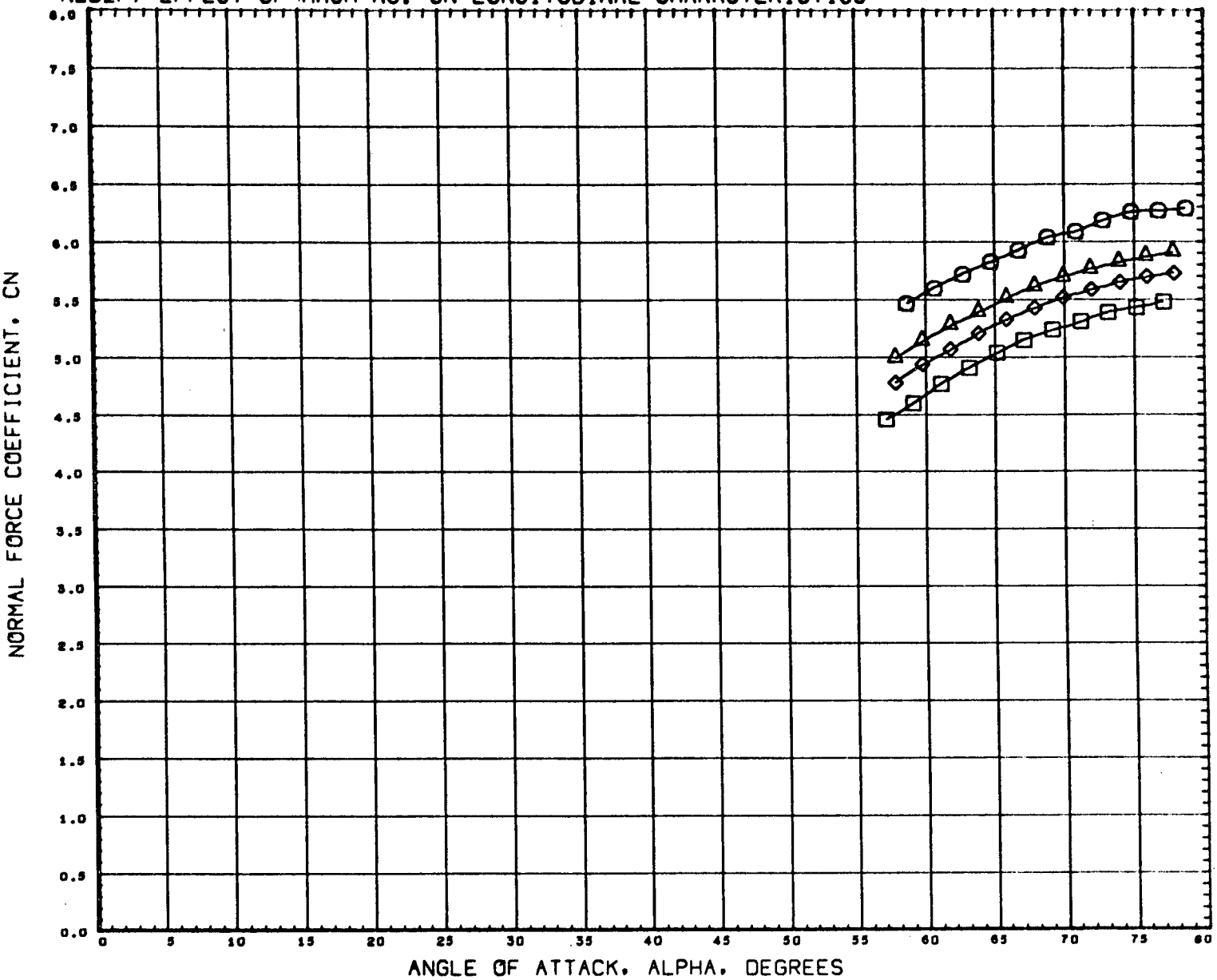
SYMBOL	MACH	PARAMETRIC VALUES	
○	1.961	BETA	0.000
△	2.740		
◇	3.480		
□	4.959		

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	

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			
○	1.975	BETA	0.000	DIHDRL	30.000
△	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	

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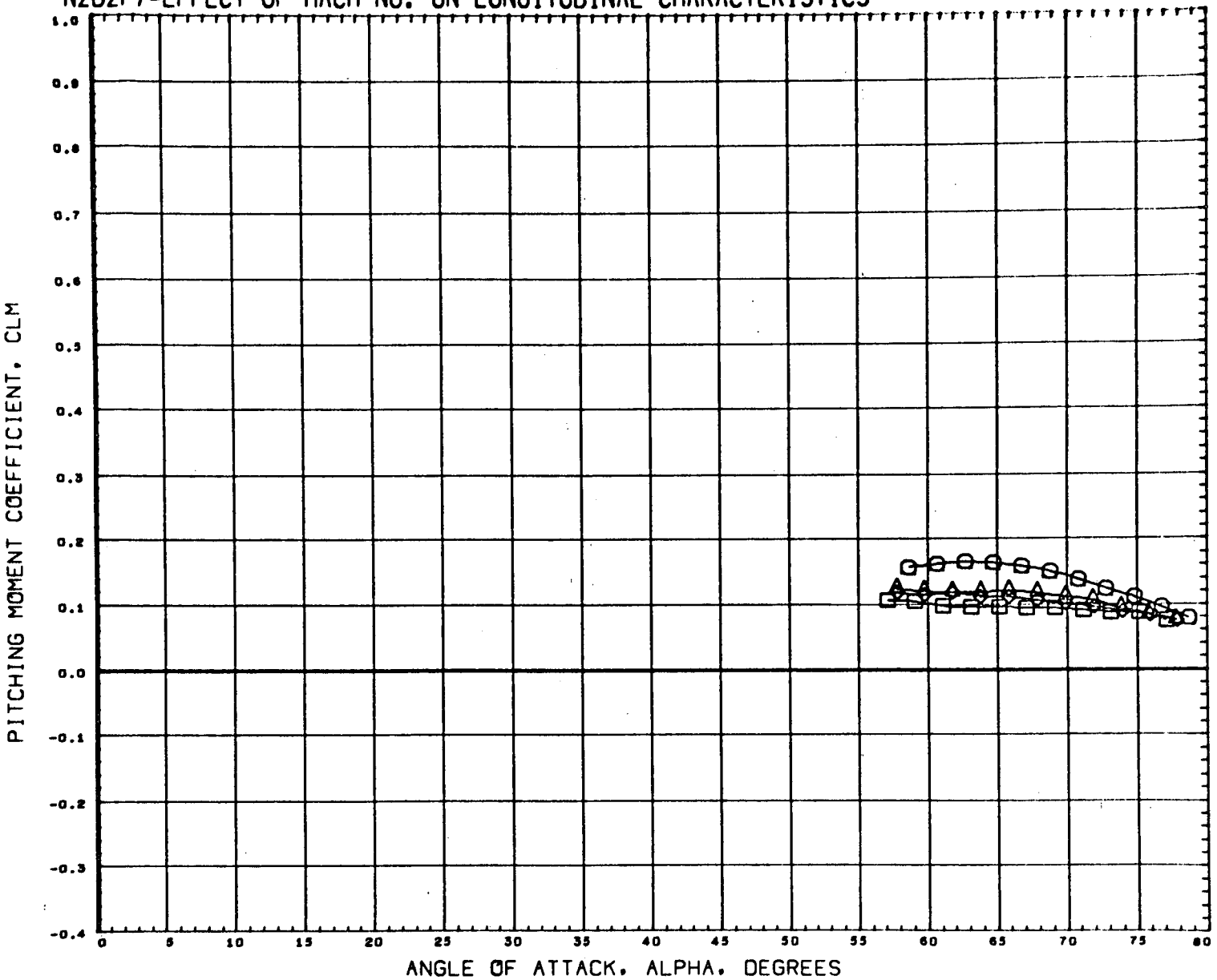

SYMBOL	MACH	PARAMETRIC VALUES			
○	1.975	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.480				
□	4.959				

DATA HIST. CODE S*E

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
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XMRP	3.5150	IN.
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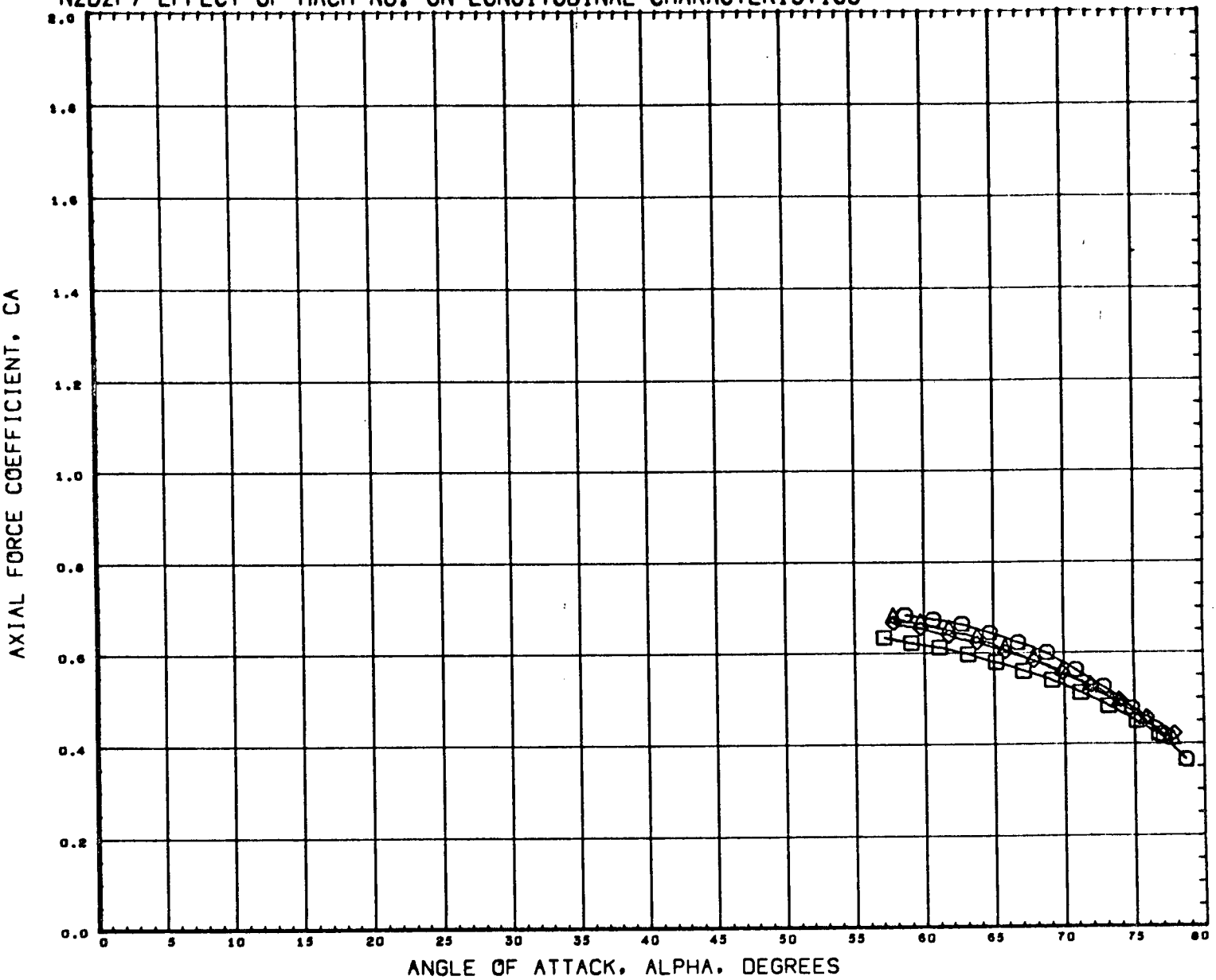
ZMRP	0.0000	IN.
SCALE	0.0034	

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			
○	1.975	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.460				
□	4.959				

DATA HIST. CODE S*E

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
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ZMRP	0.0000	IN.
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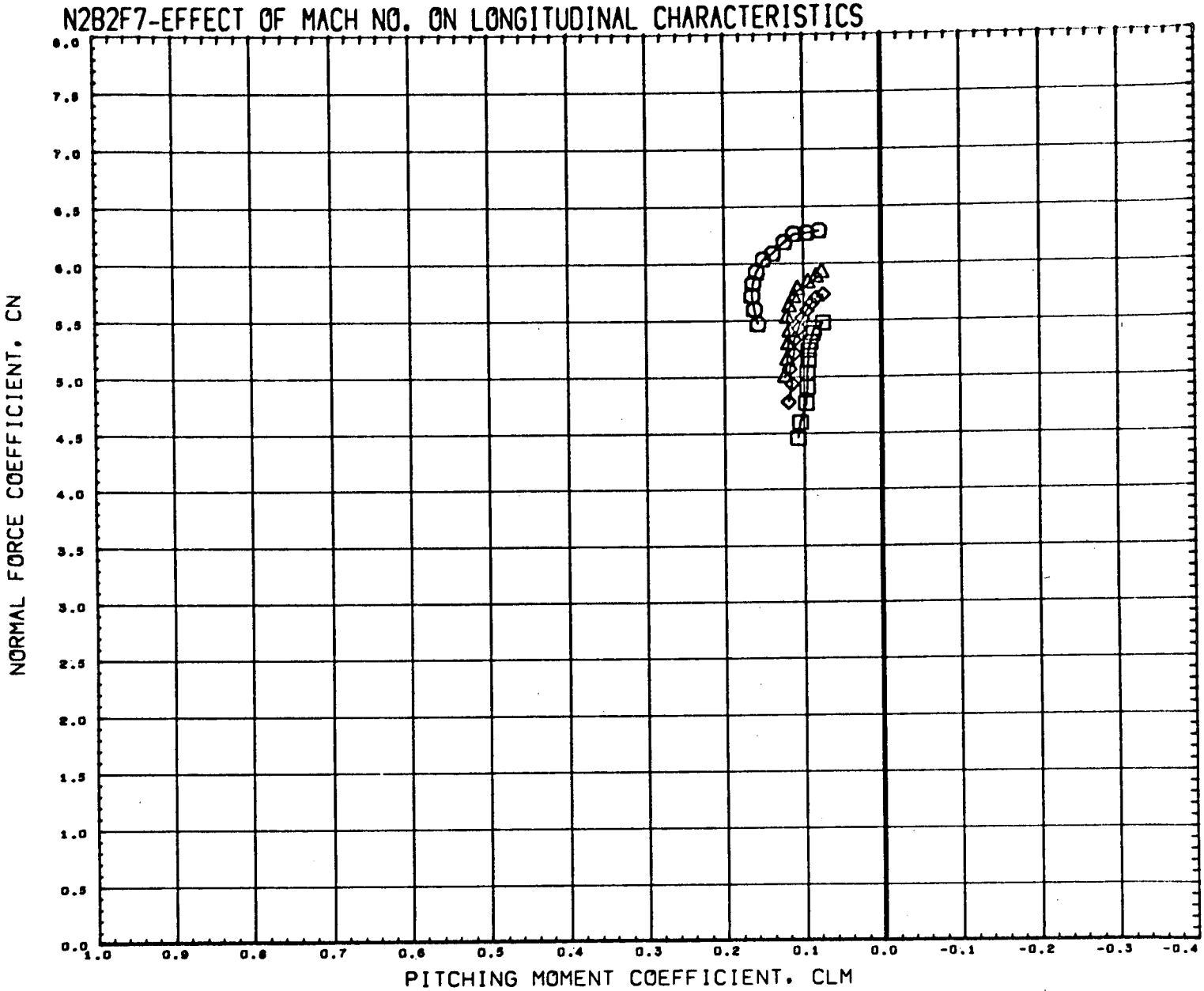
N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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

DATA HIST. CODE S*E

REFERENCE INFORMATION

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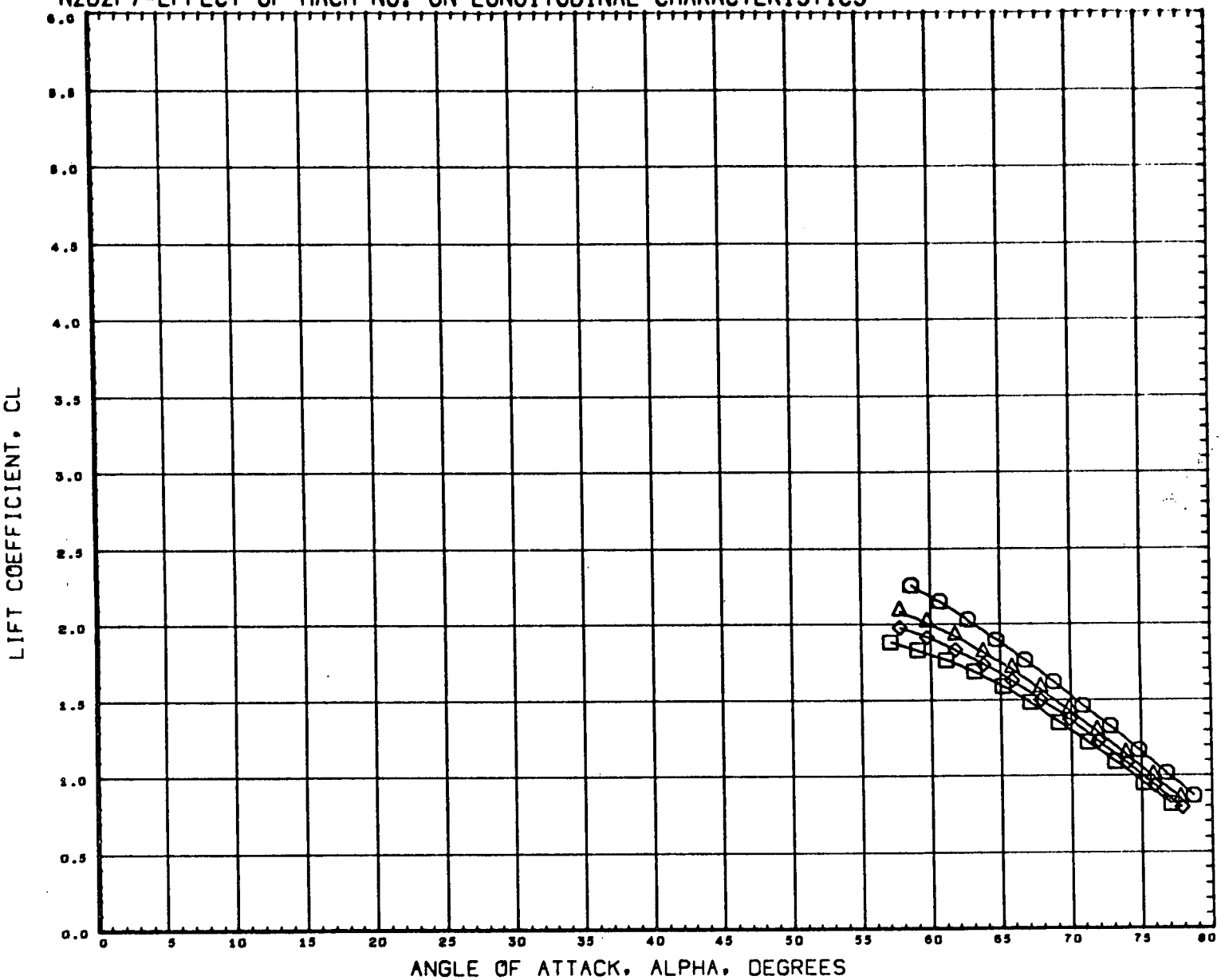
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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

DATA HIST. CODE S*E

REFERENCE INFORMATION

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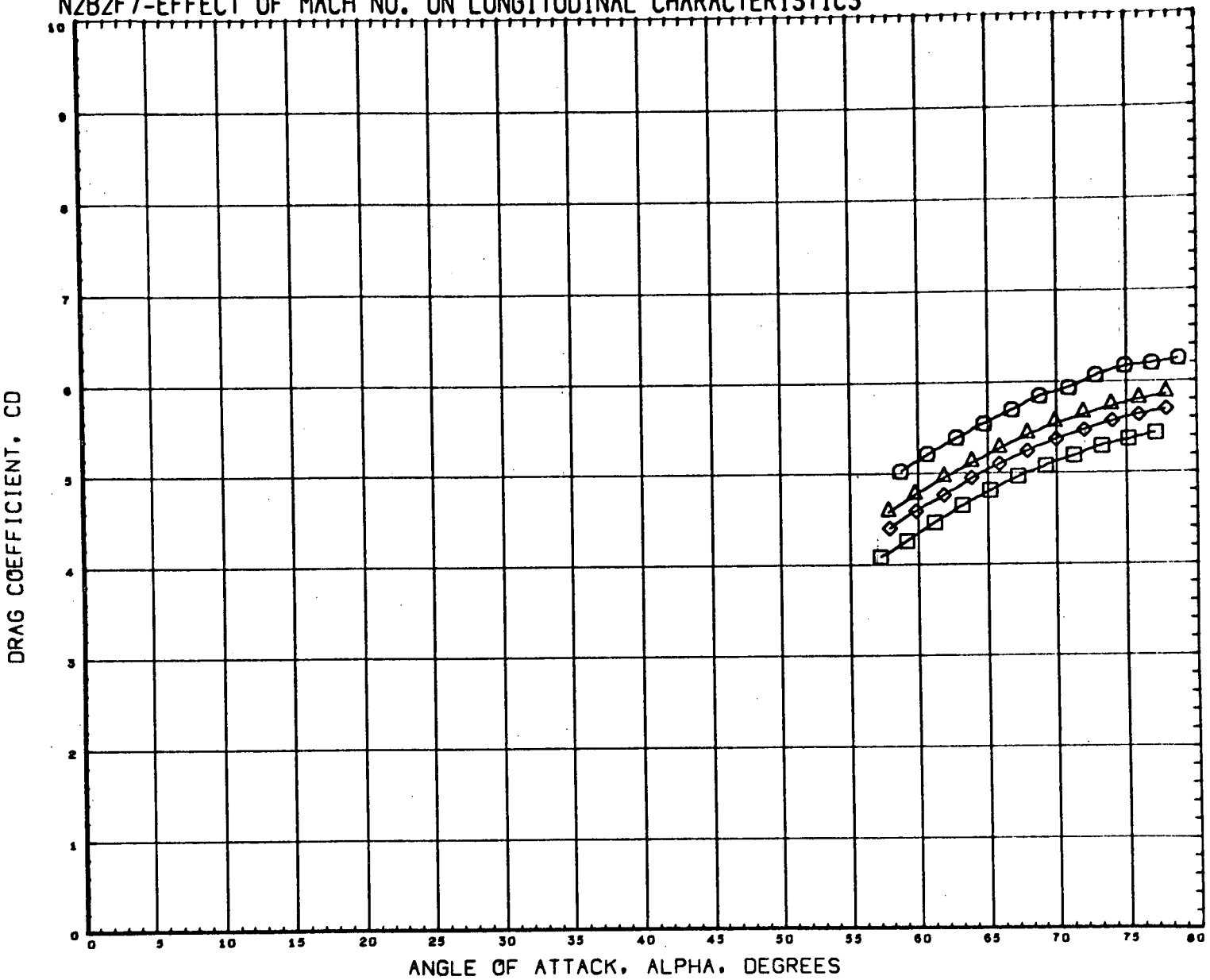
BREF	5.8590	IN.
XMRP	3.5150	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0034	

C.5

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES		
○	1.975	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.460				
□	4.959				

DATA HIST. CODE S*E

REFERENCE INFORMATION

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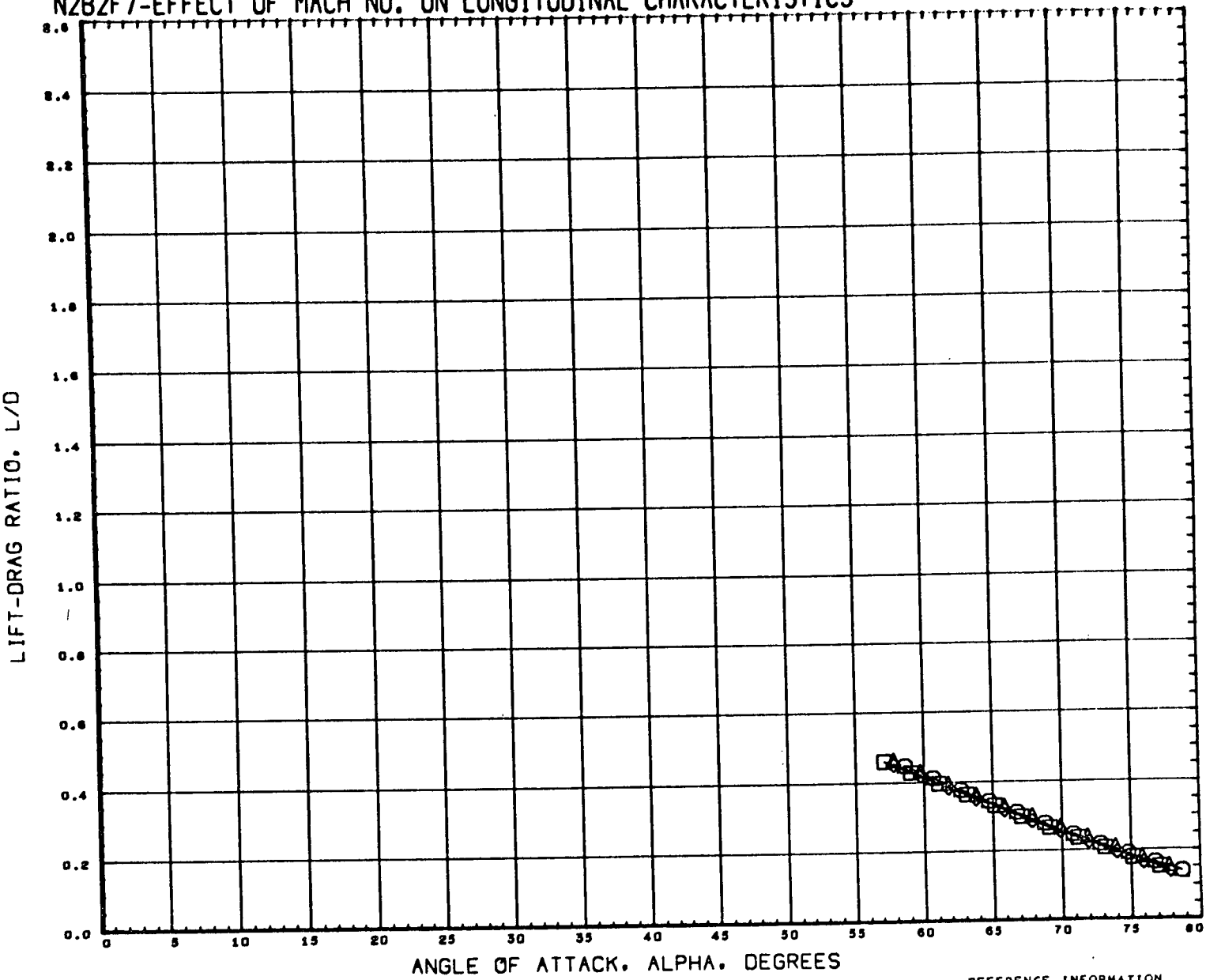
ZMRP	0.0000	IN.
SCALE	0.0034	

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



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

REFERENCE INFORMATION

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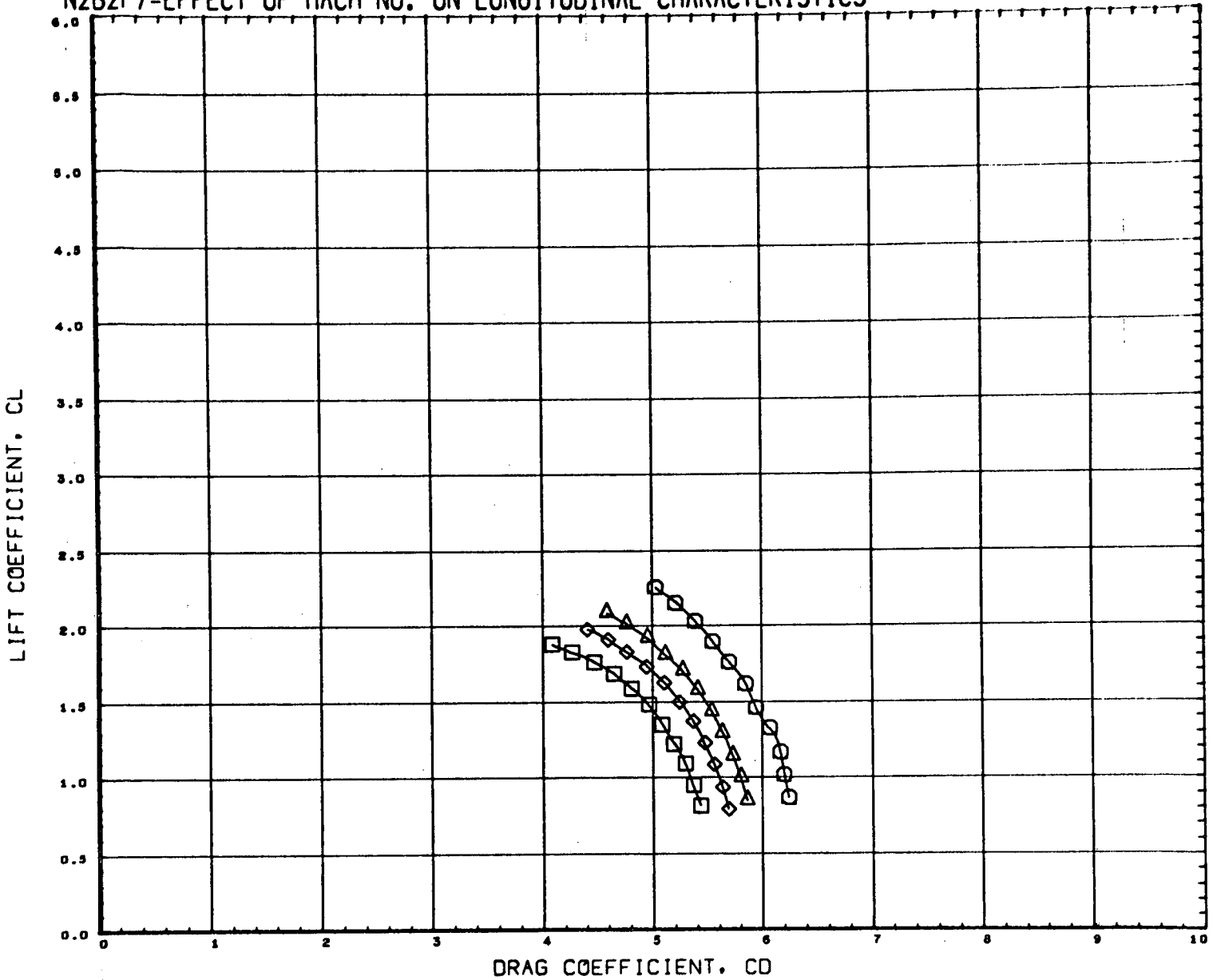
SCALE	0.0034	

DATA HIST. CODE S*E

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES			
○	1.975	BETA	0.000	DIHDRL	30.000
△	2.740				
◇	3.460				
□	4.959				

DATA HIST. CODE S*E

REFERENCE INFORMATION

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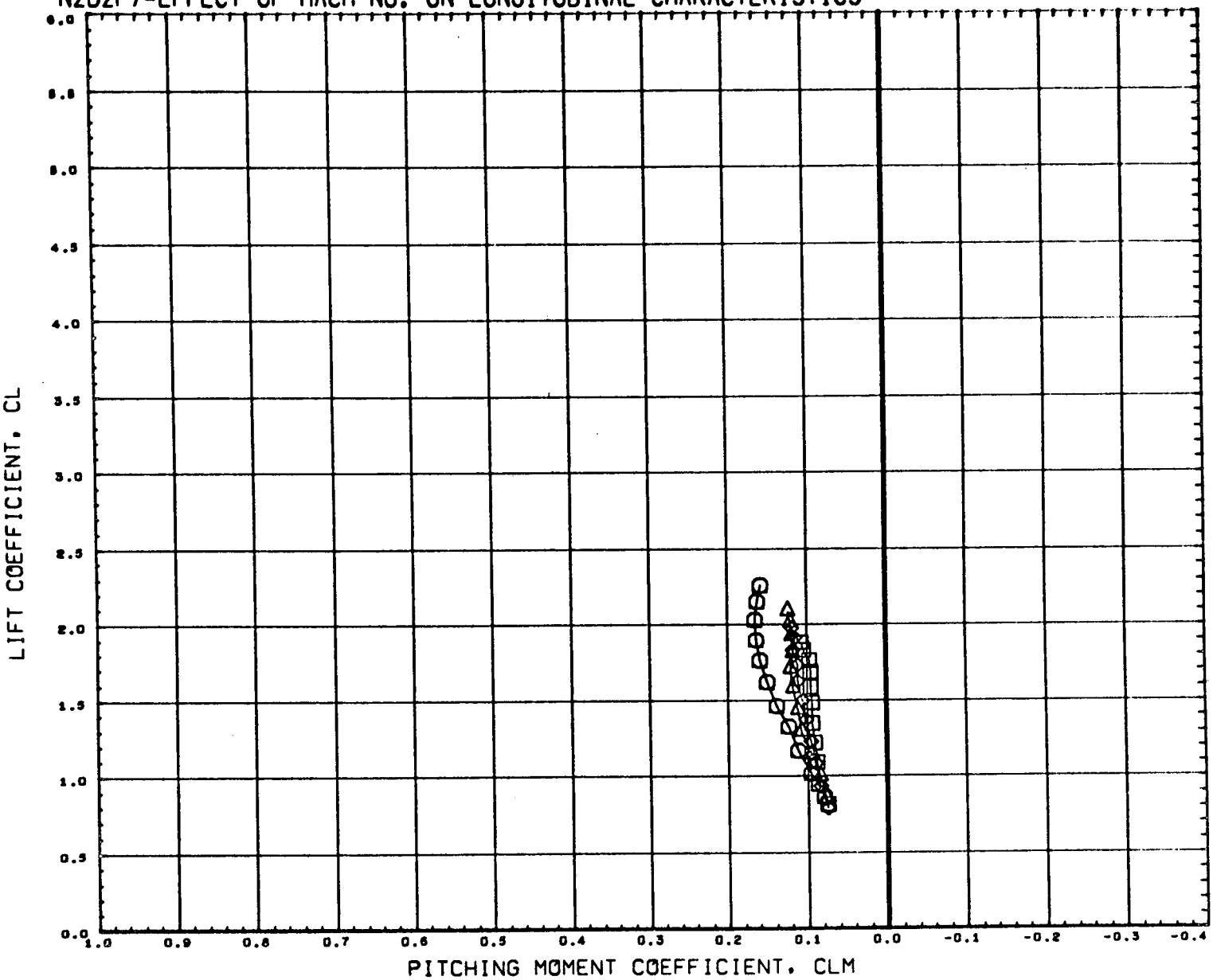
ZMRP	0.0000	IN.
SCALE	0.0034	

N2B2F7-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH
○	1.975
△	2.740
◇	3.460
□	4.959

PARAMETRIC VALUES

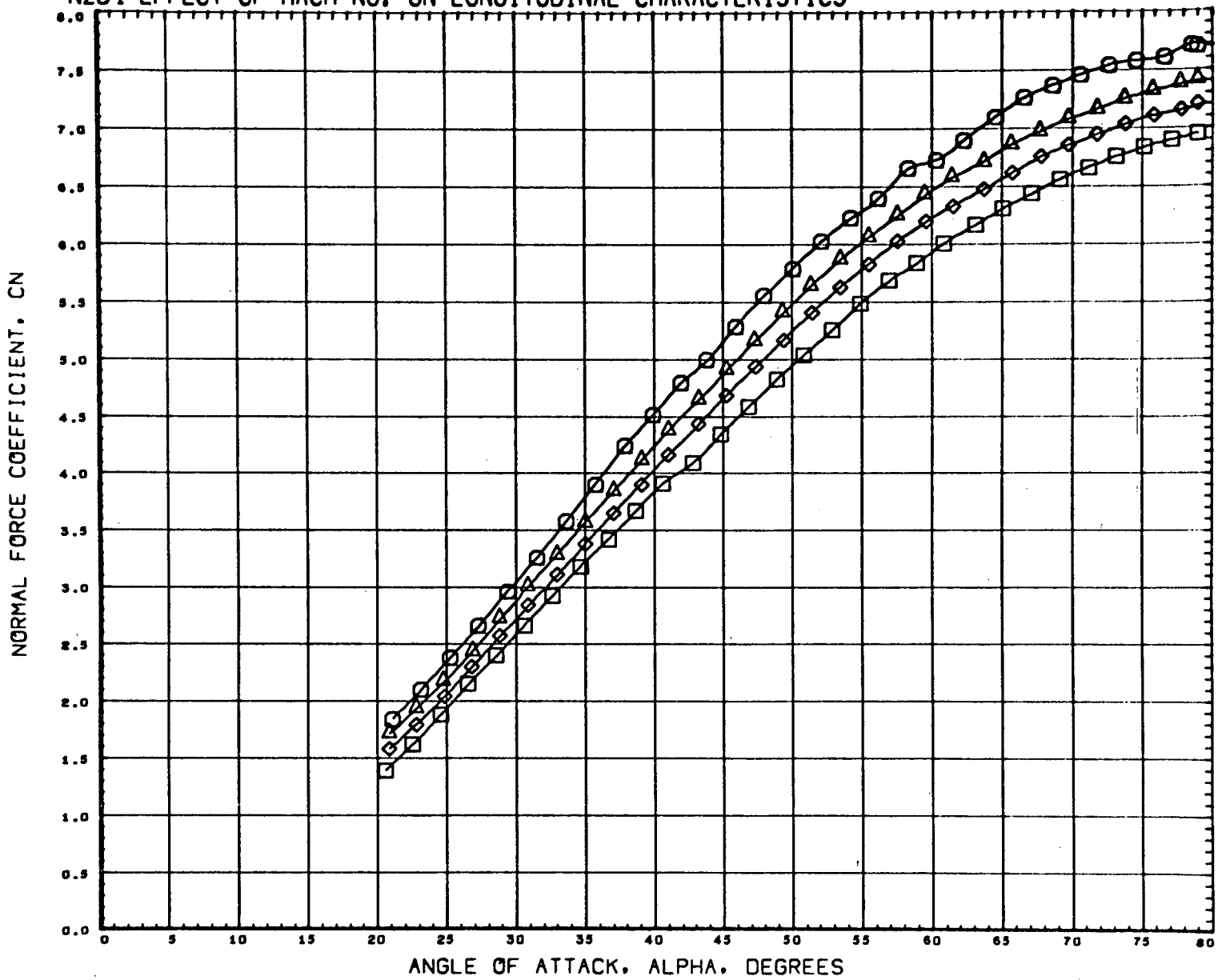
BETA 0.000 DIHDRL 30.000

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

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
○	1.955	BETA	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.
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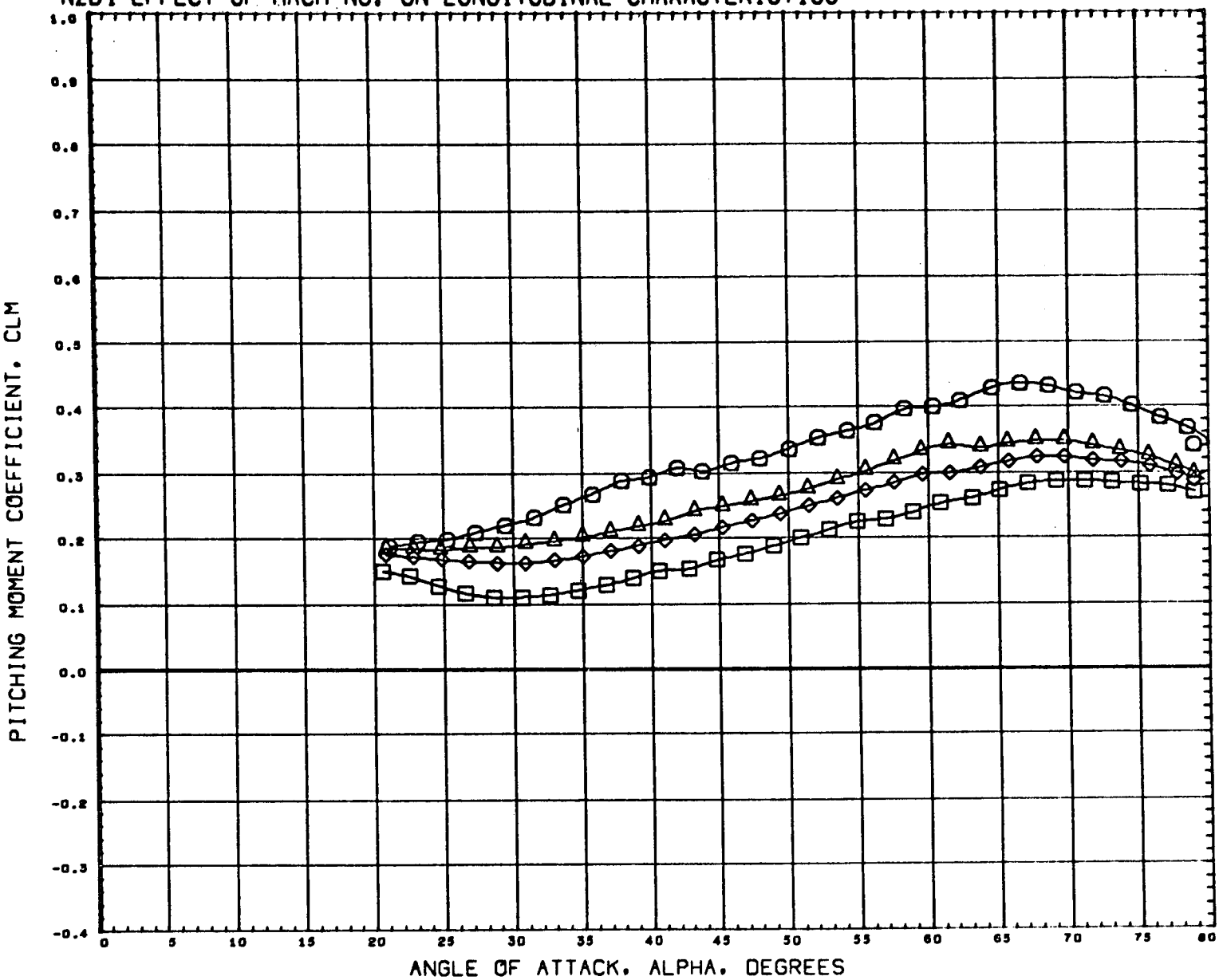
ZMRP	0.0000	IN.
SCALE	0.0042	

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



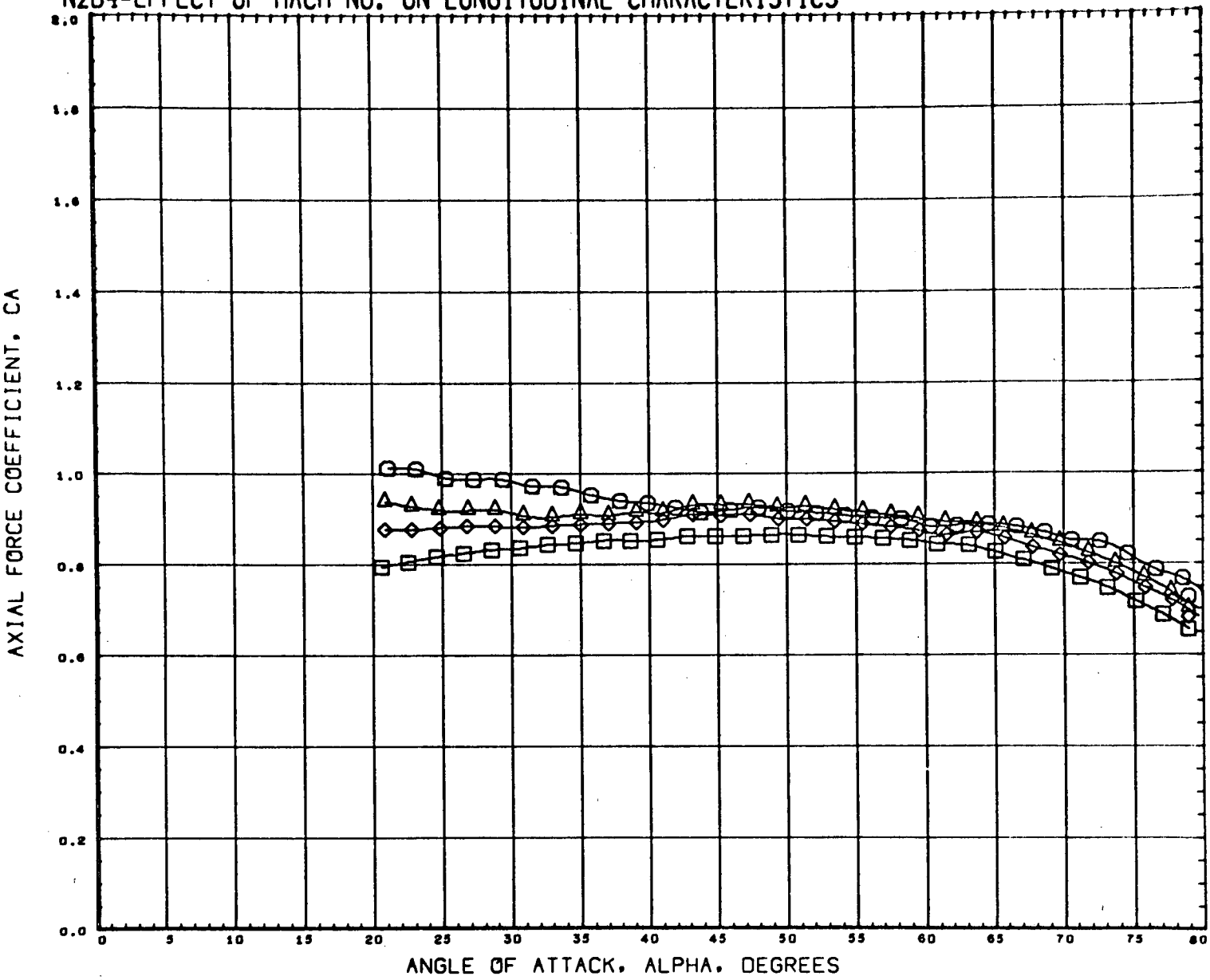
SYMBOL	MACH		PARAMETRIC VALUES
○	1.955	BETA	0.000
△	2.740		
◇	3.480		
□	4.959		

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

DATA HIST. CODE S*G*E

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
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BREF	7.6590	IN.
XMRP	4.5950	IN.
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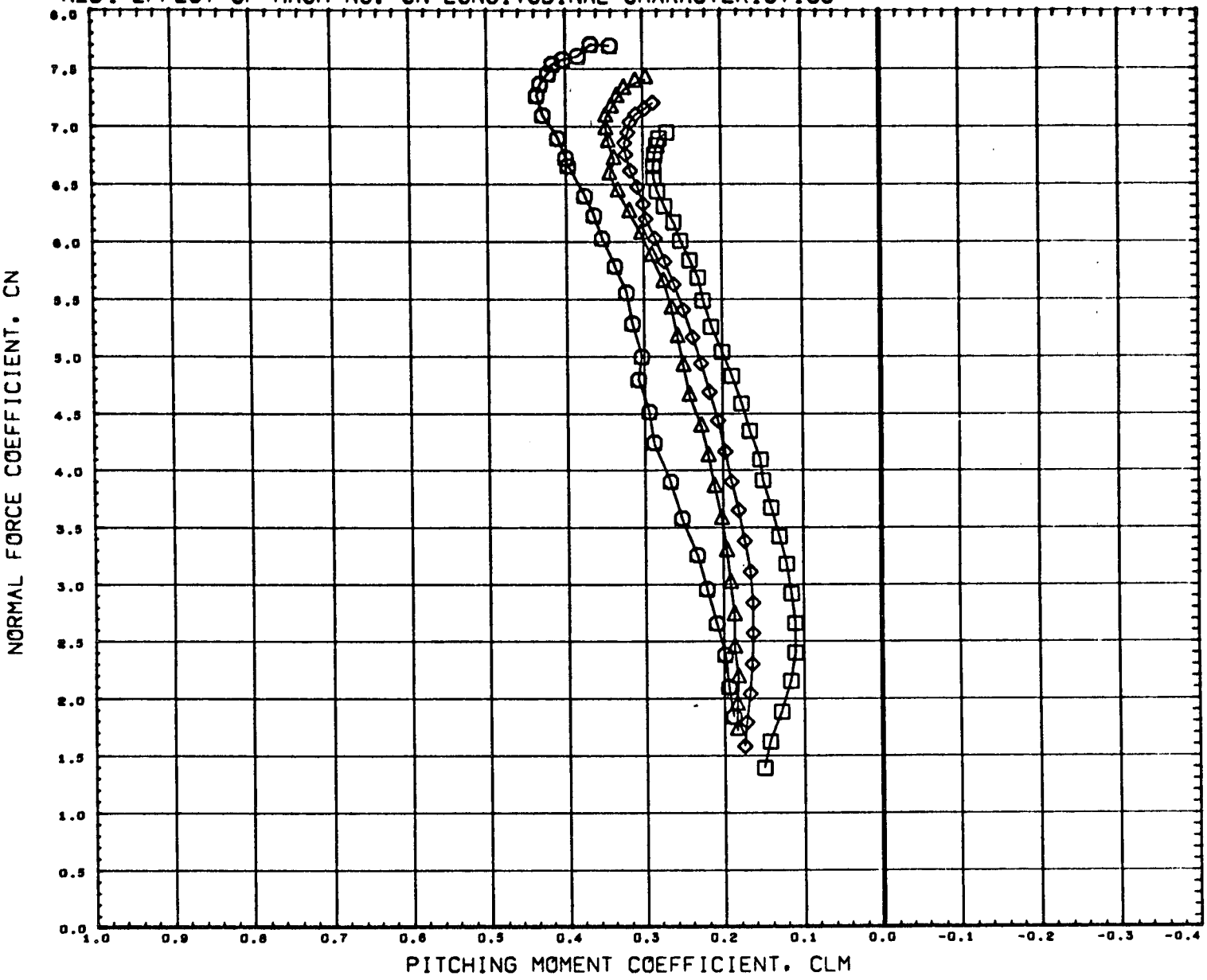
ZMRP	0.0000	IN.
SCALE	0.0042	

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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△	2.740		
◇	3.480		
□	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.
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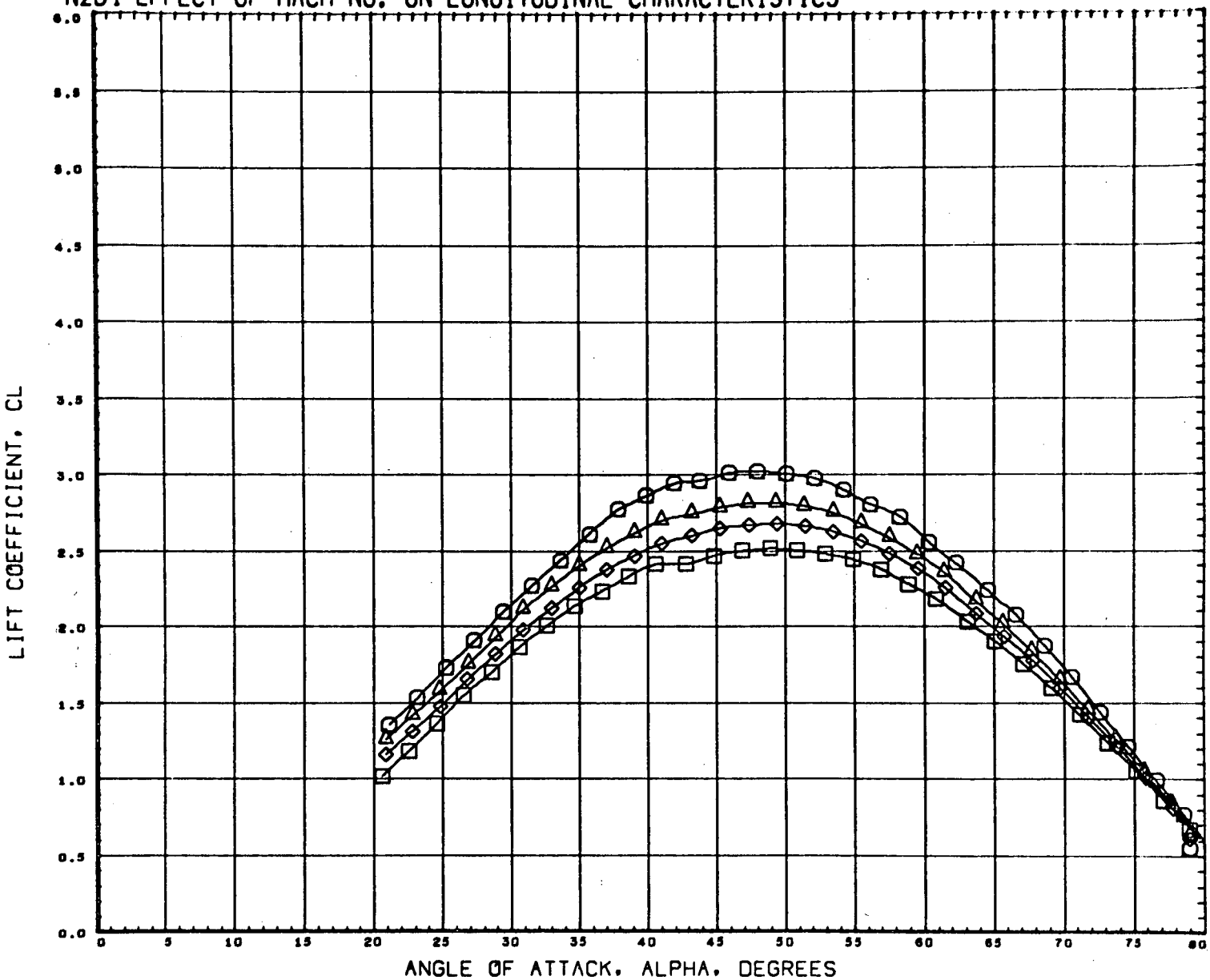
SCALE	0.0042	

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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◇	3.480		
□	4.959		

DATA HIST. CODE S*G*E

REFERENCE INFORMATION

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ZMRP	0.0000	IN.
SCALE	0.0042	

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS

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

REFERENCE INFORMATION

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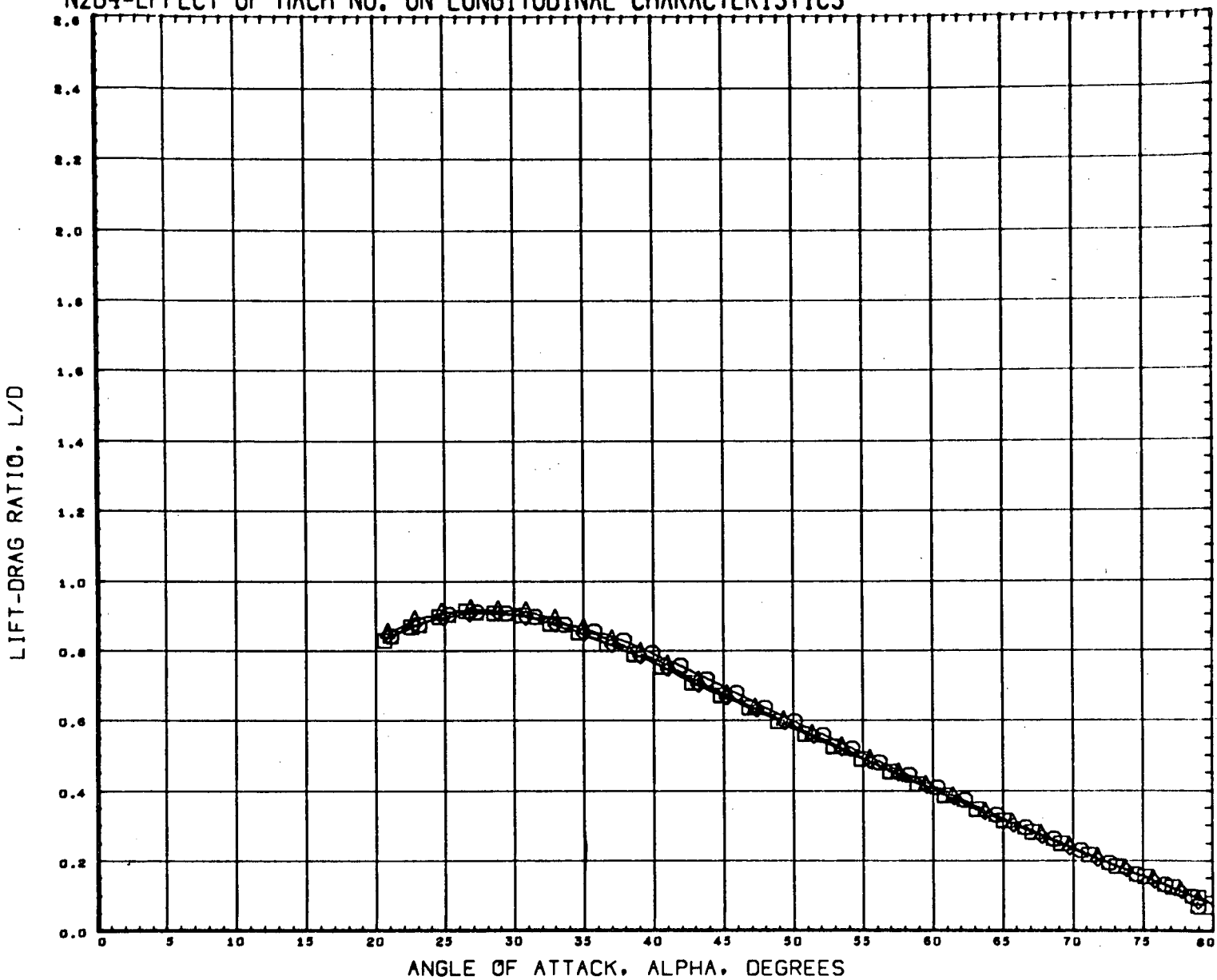
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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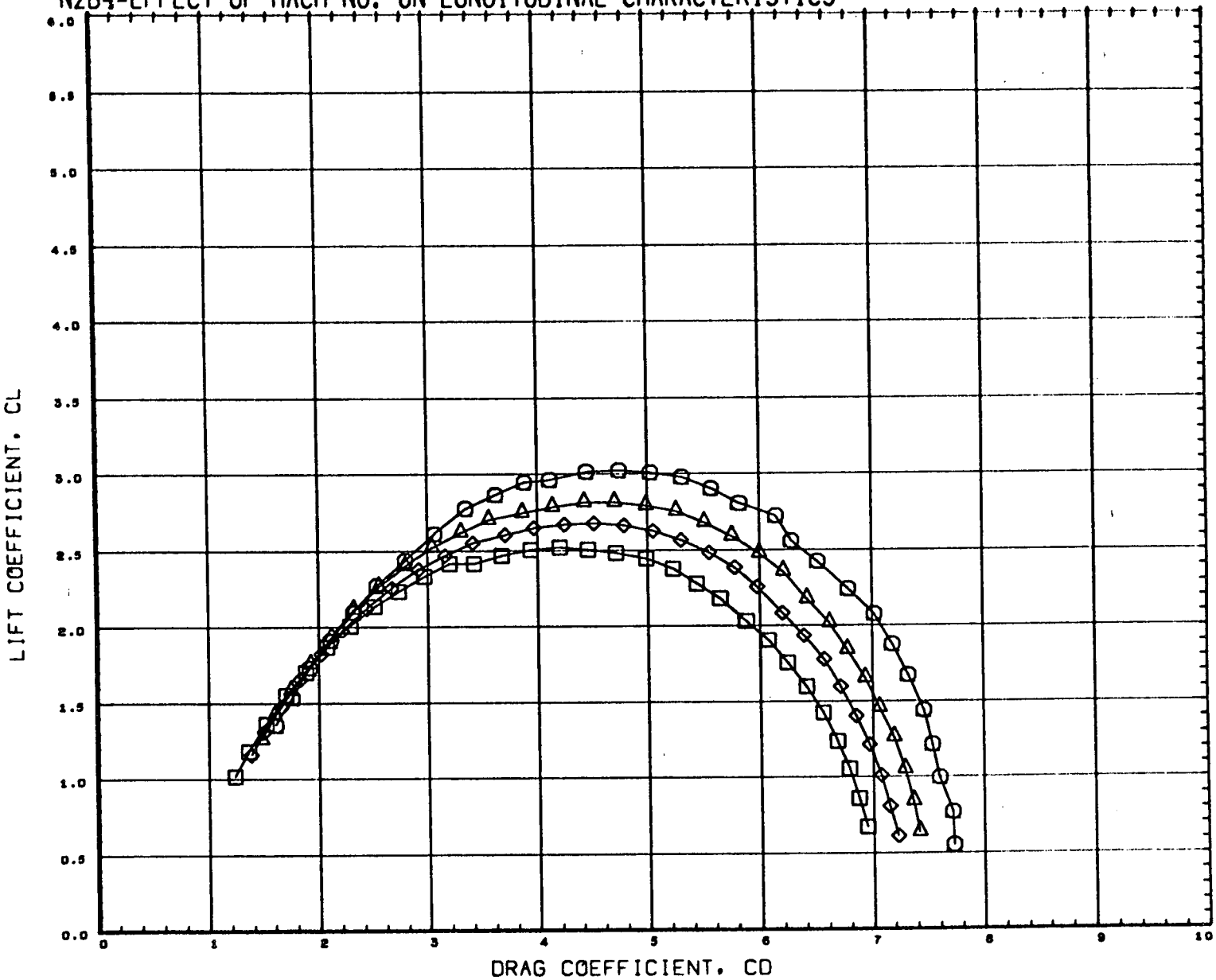
△	2.740		
◇	3.480		
□	4.959		

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	

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH	PARAMETRIC VALUES	
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△	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.
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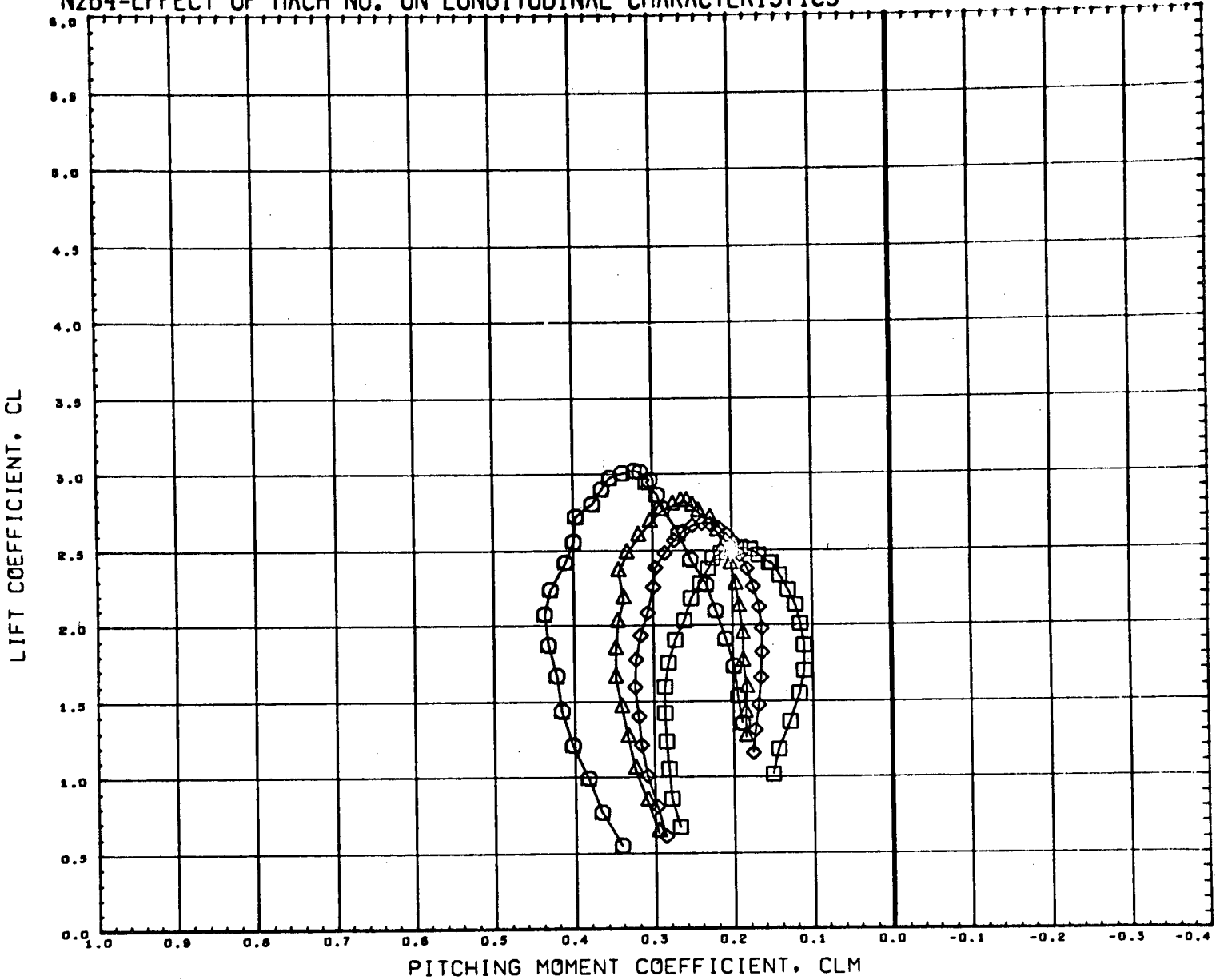
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B4-EFFECT OF MACH NO. ON LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
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◇	3.480		
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REFERENCE INFORMATION

SREF	2.1590	SQ. IN
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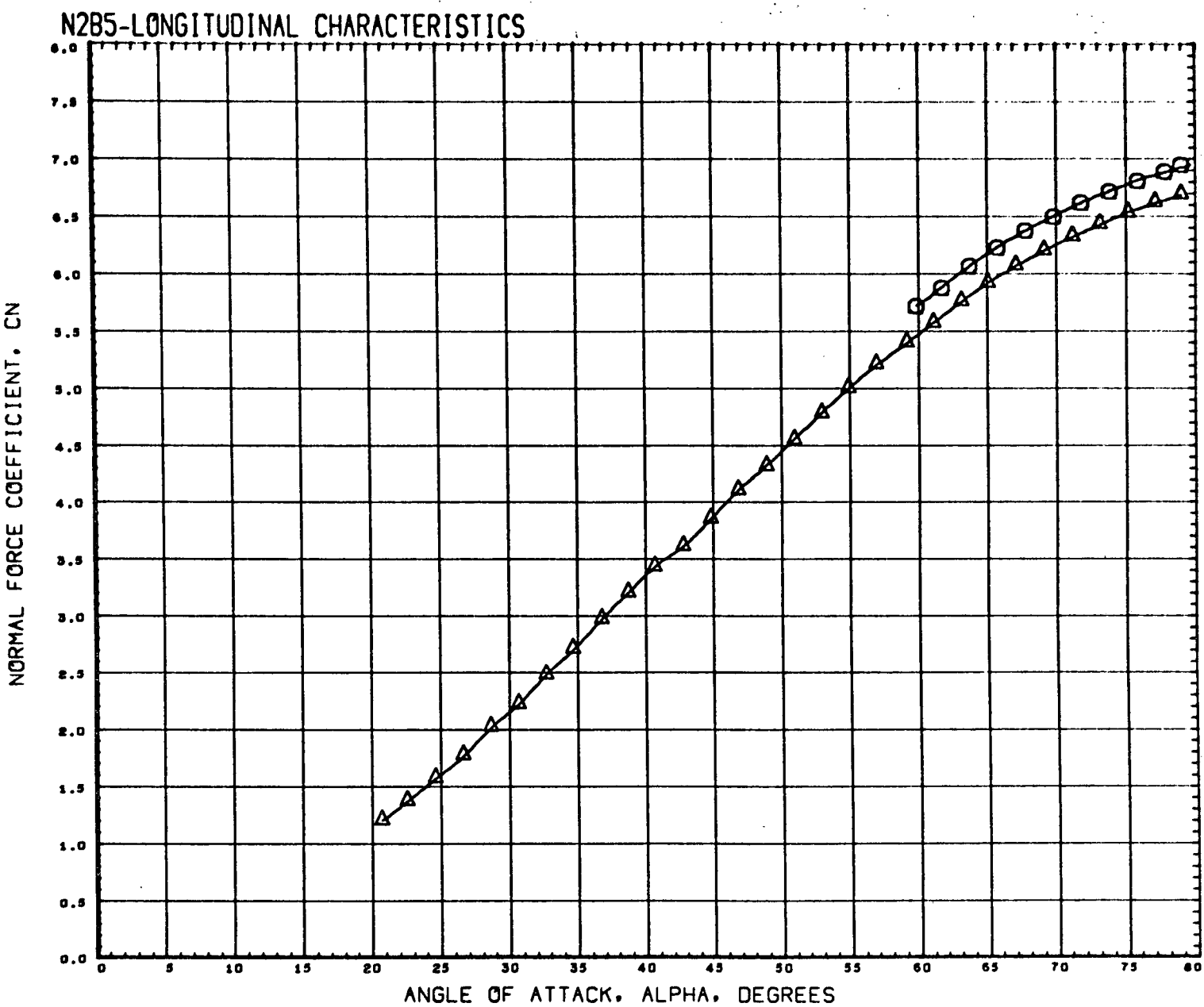
DATA HIST. CODE S*G*E



SYMBOL	MACH		PARAMETRIC VALUES
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△	4.959		

REFERENCE INFORMATION

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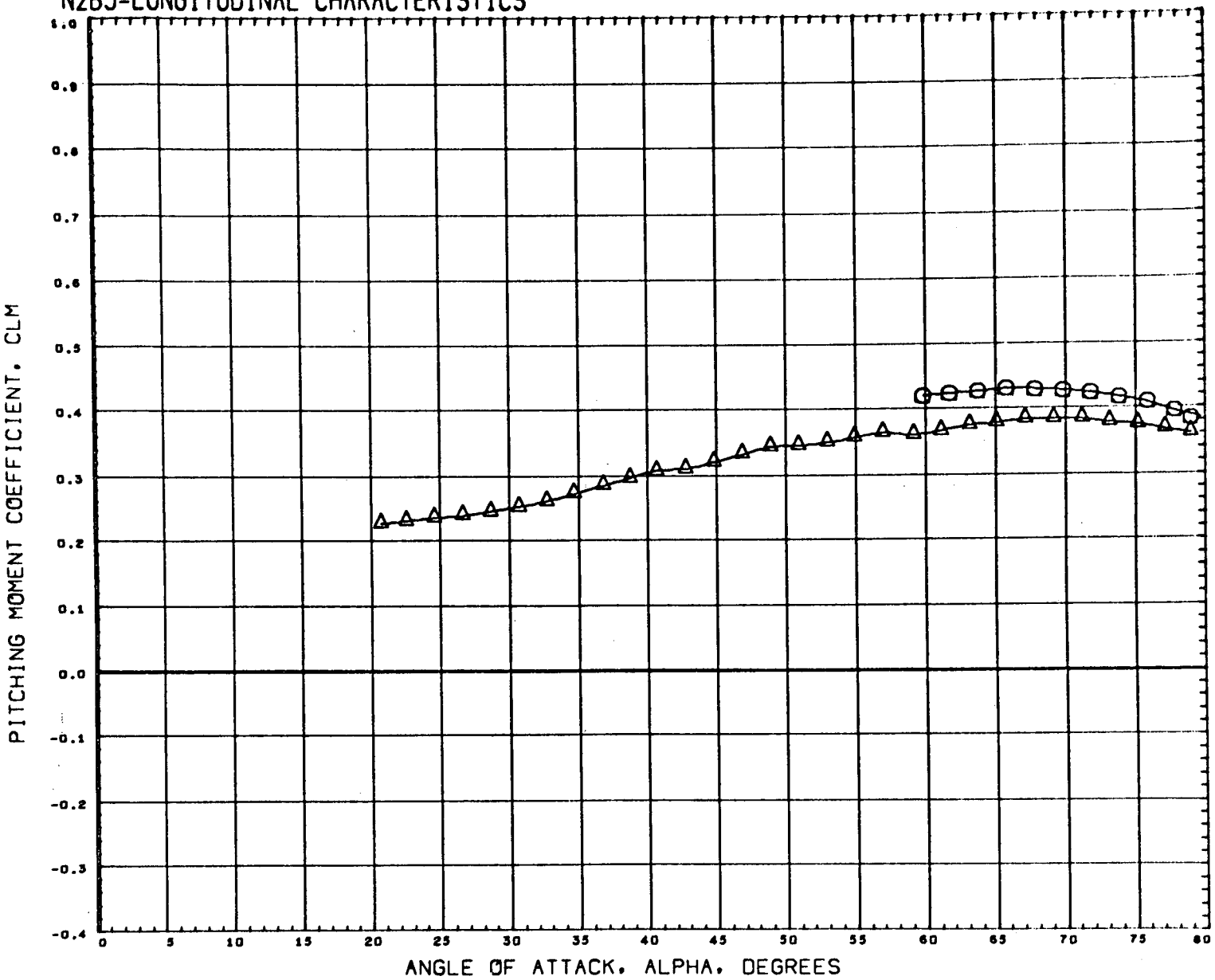
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
○	3.480	BETA	0.000
△	4.959		

REFERENCE INFORMATION

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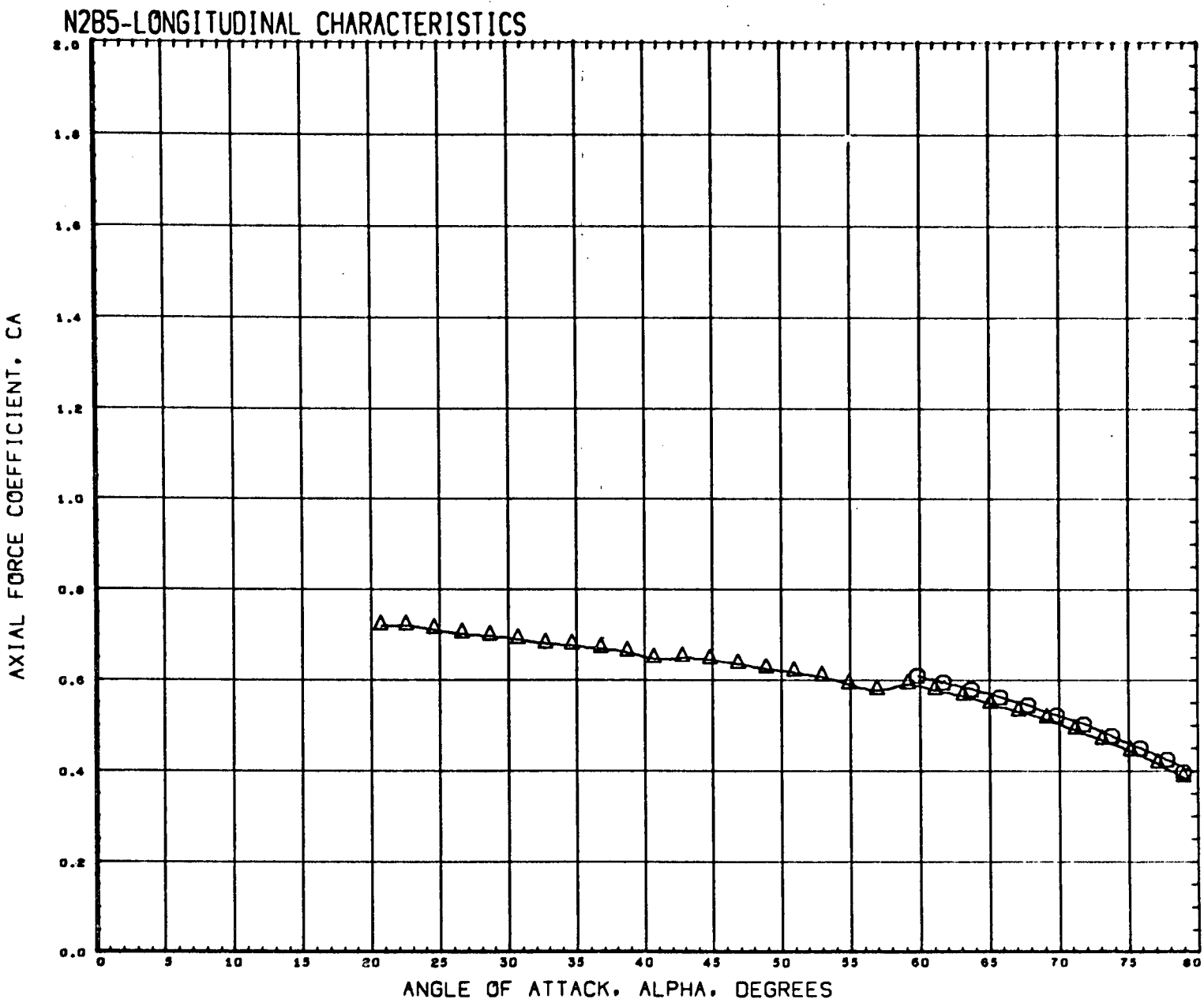
BREF	7.6590	IN.
XMRP	4.5950	IN.
YMRP	0.0000	IN.
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E



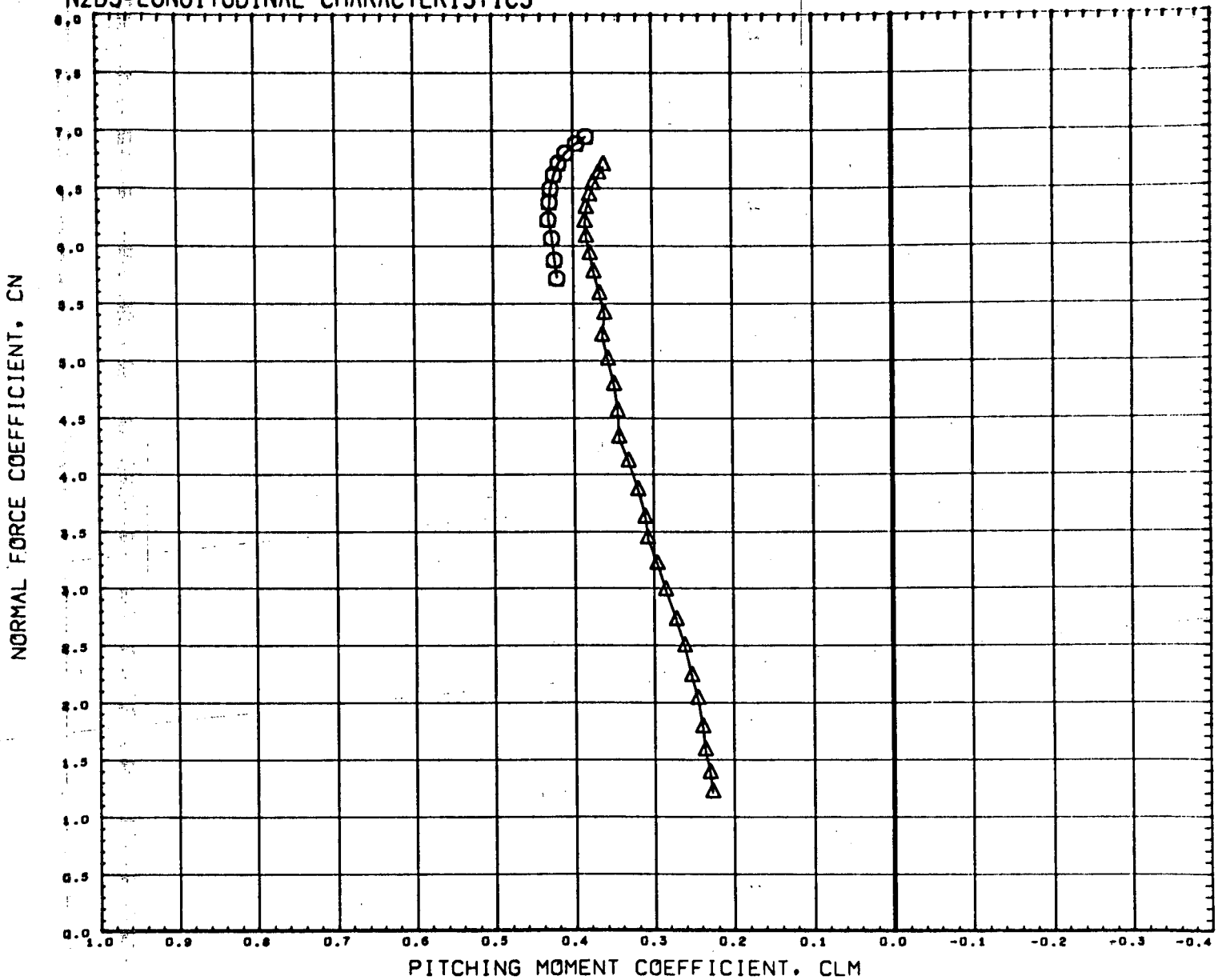
SYMBOL	MACH		PARAMETRIC VALUES
○	3.480	BETA	0.000
△	4.959		

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

N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
O	3.480	BETA	0.000
Δ	4.959		

REFERENCE INFORMATION

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BREF	7.6590	IN.
XMRP	4.5950	IN.
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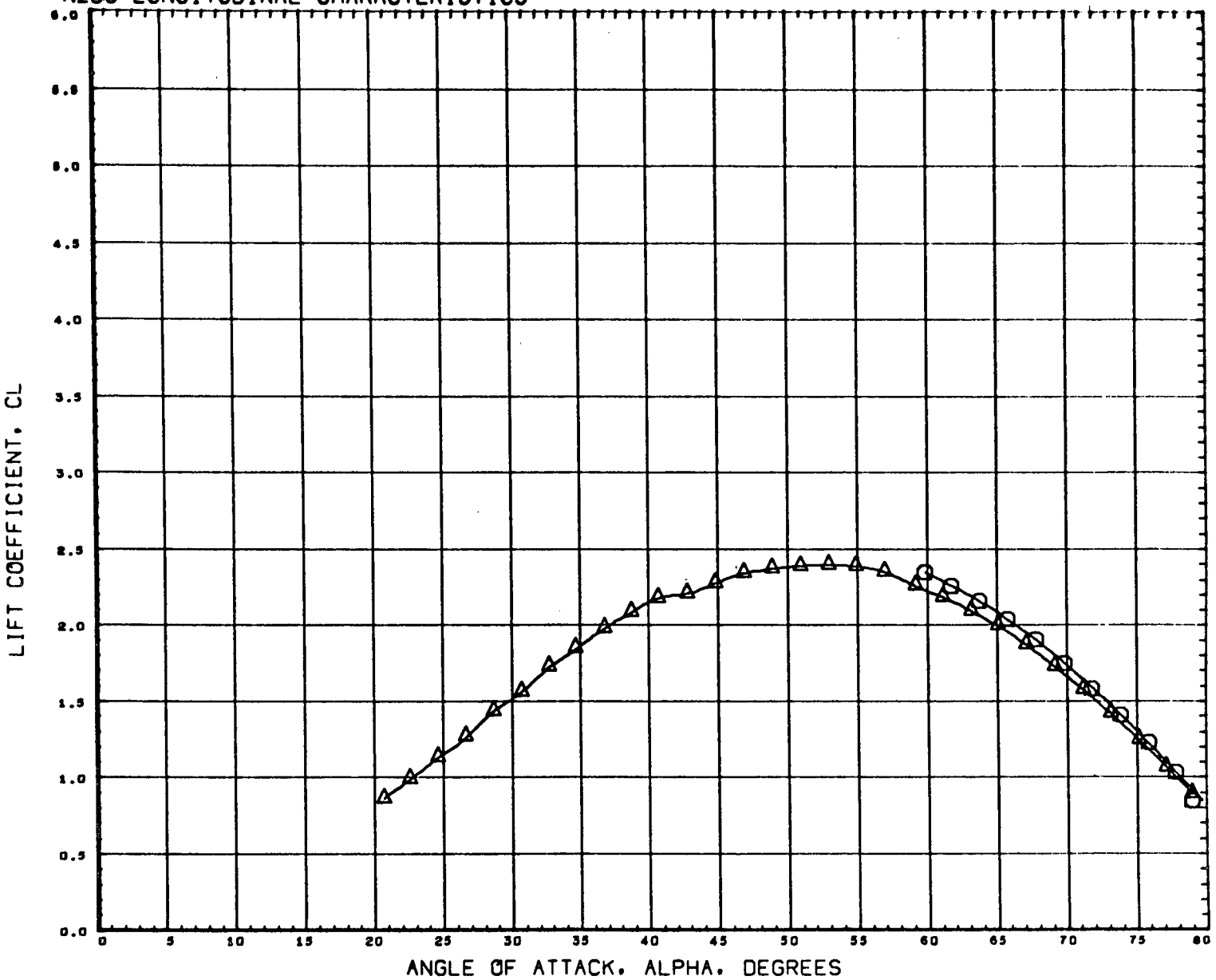
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
○	3.480	BETA	0.000
△	4.959		

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
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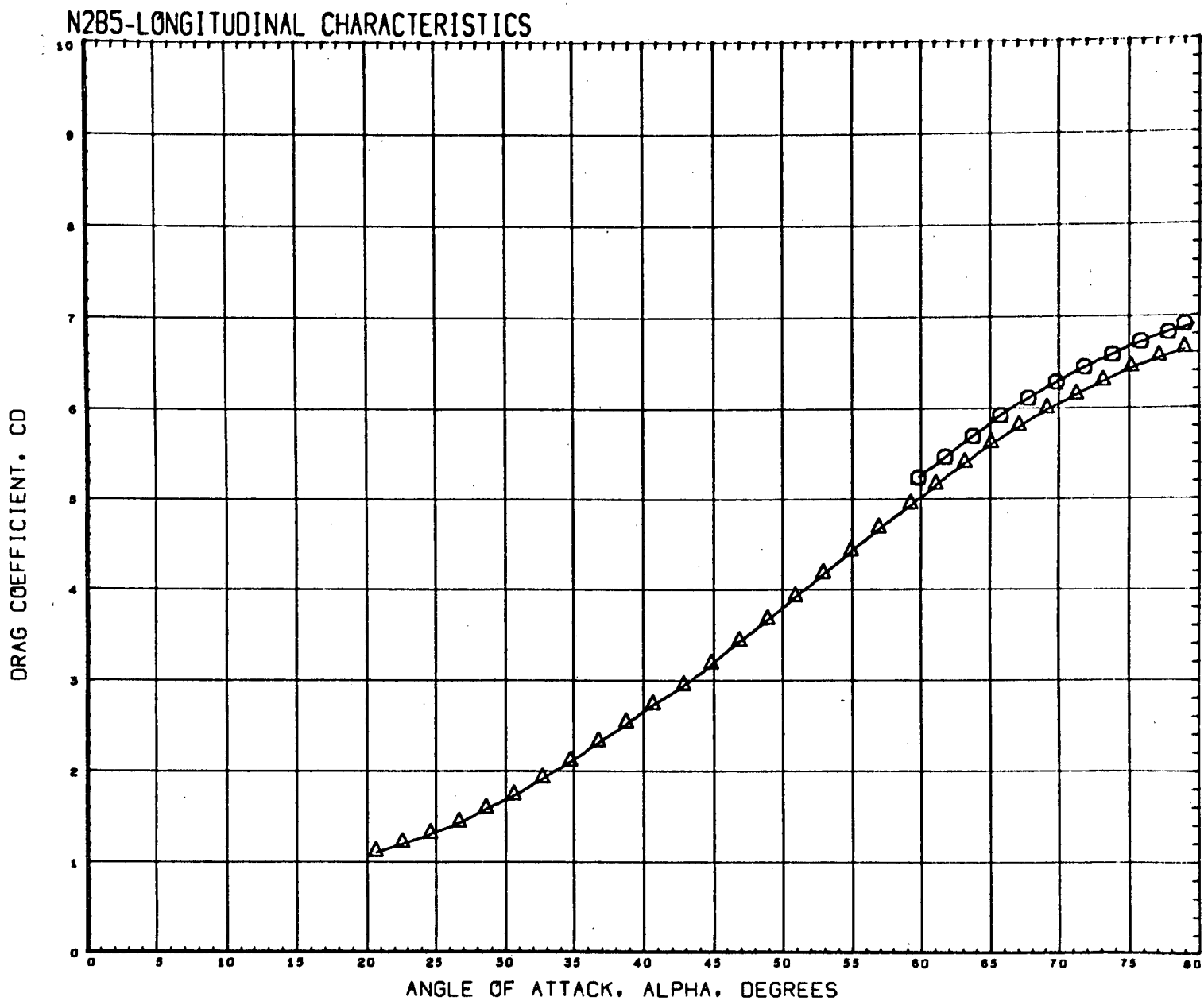
SCALE	0.0042	

DATA HIST. CODE S*G*E



SYMBOL	MACH		PARAMETRIC VALUES
○	3.480	BETA	0.000
△	4.959		

REFERENCE INFORMATION

SREF	2.1590	SQ. IN
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XMRP	4.5950	IN.
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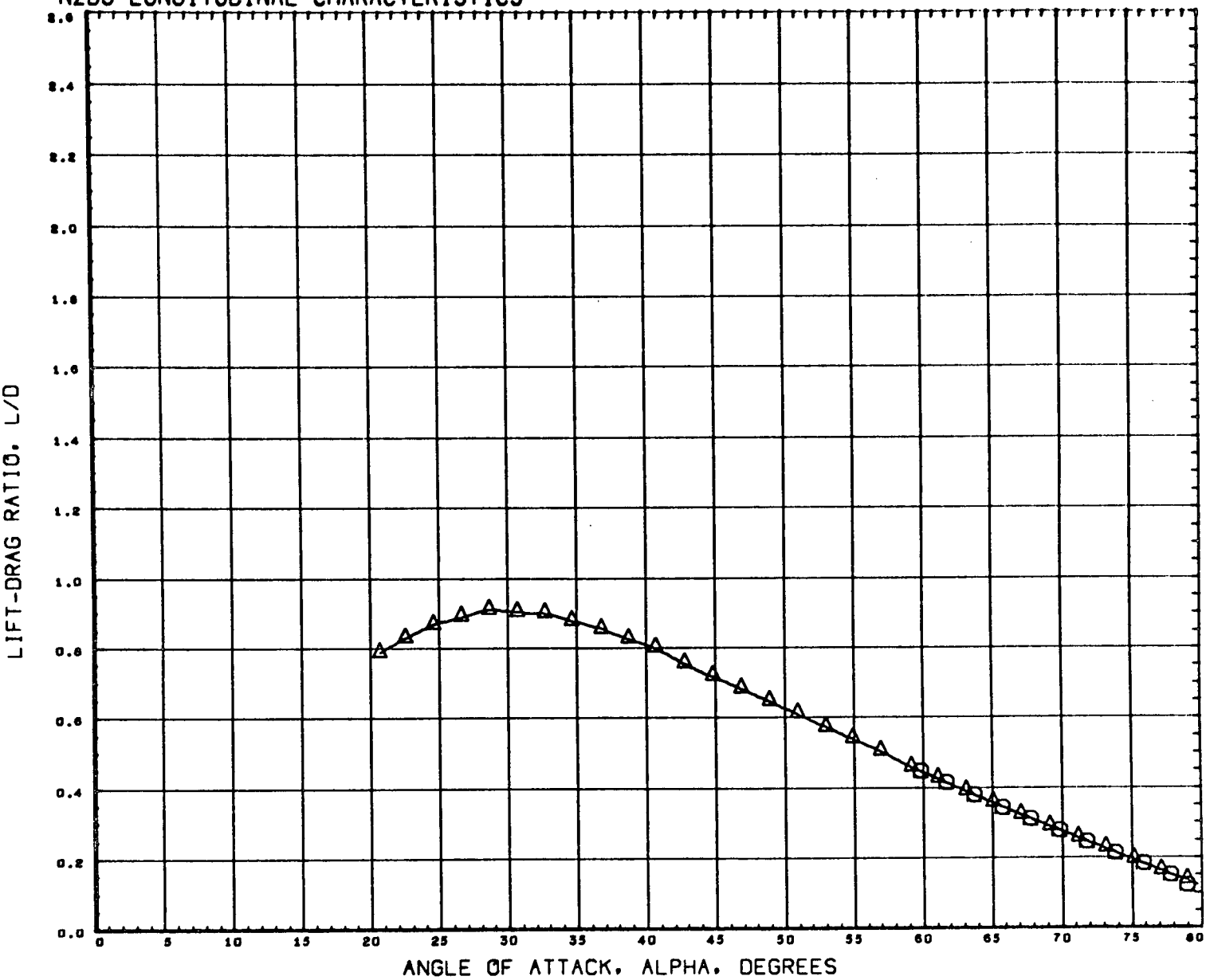
ZMRP	0.0000	IN.
SCALE	0.0042	

DATA HIST. CODE S*G*E

N2B5-LONGITUDINAL CHARACTERISTICS



SYMBOL	MACH		PARAMETRIC VALUES
○	3.480	BETA	0.000
△	4.959		

REFERENCE INFORMATION

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YMRP	0.0000	IN.
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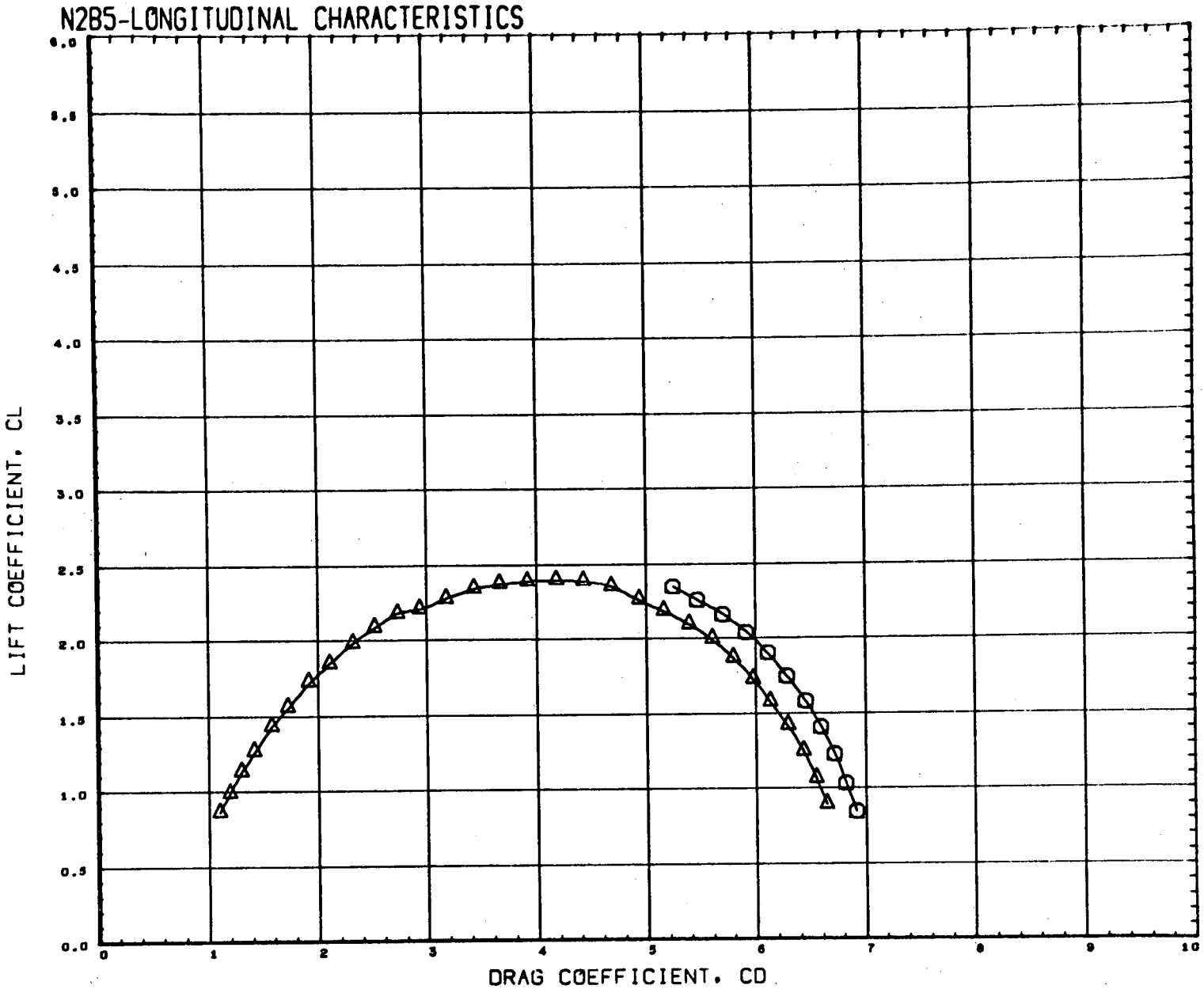
SCALE	0.0042	

DATA HIST. CODE S*G*E



SYMBOL	MACH	PARAMETRIC VALUES	
○	3.480	BETA	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

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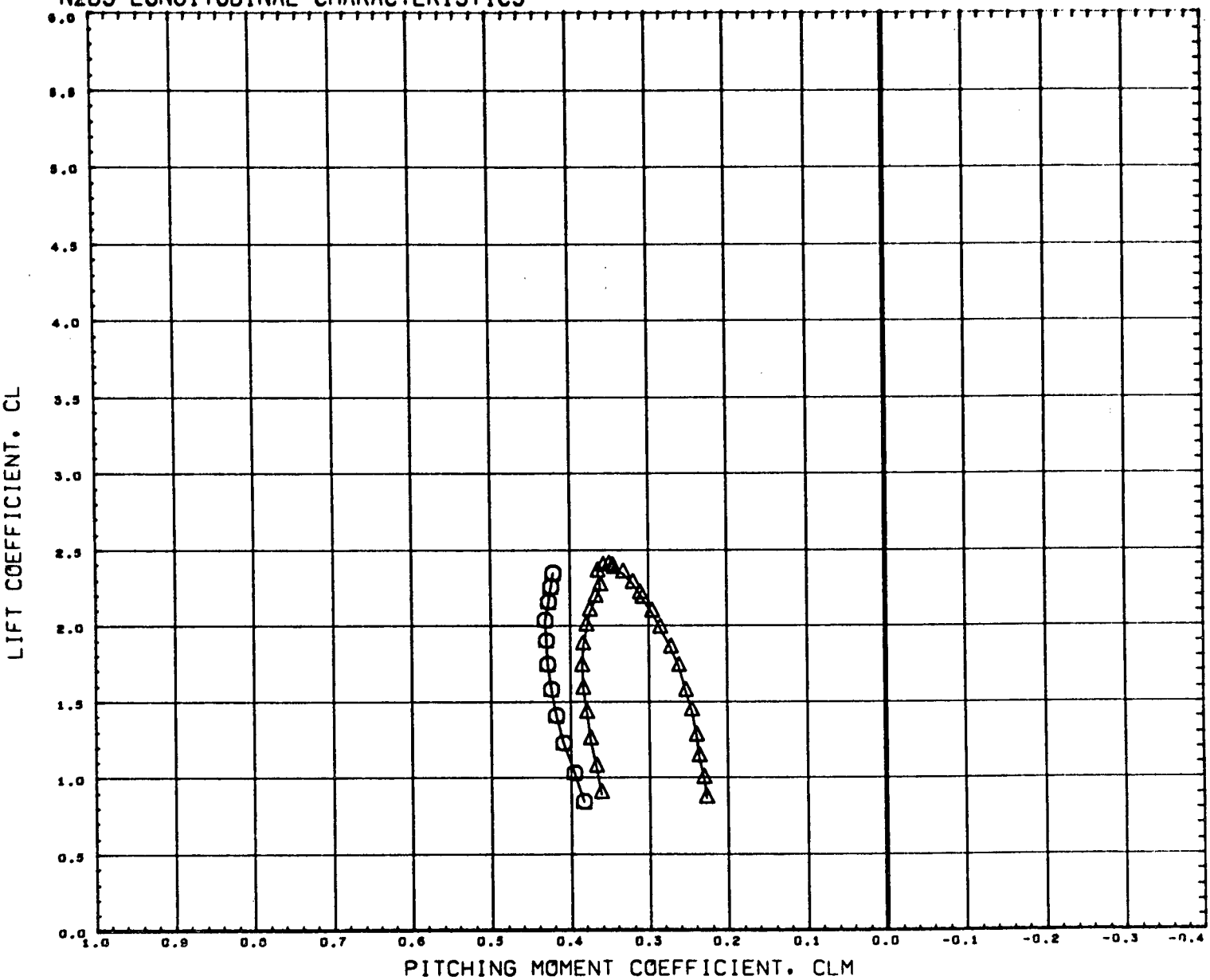
N2B5-LONGITUDINAL CHARACTERISTICS



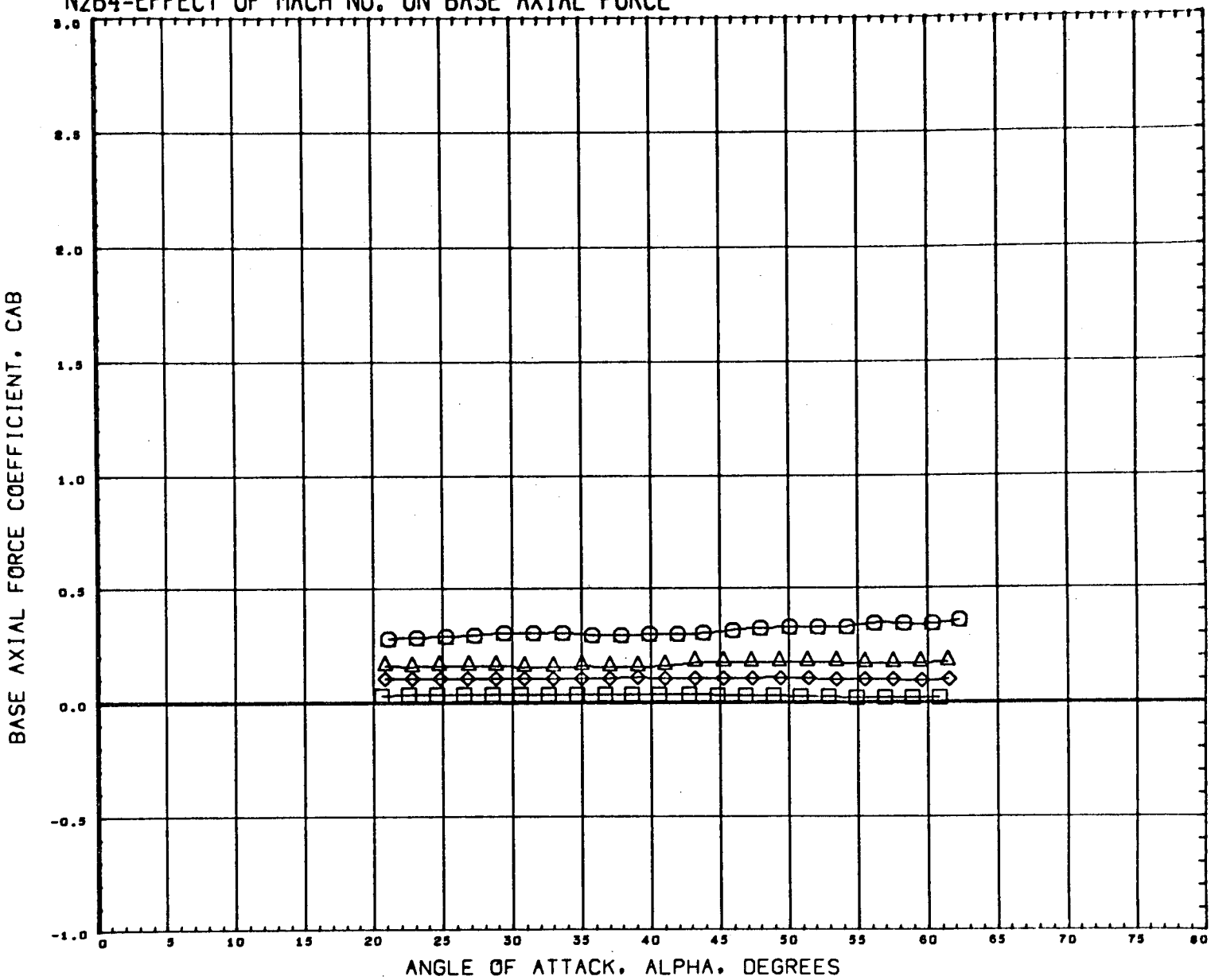
SYMBOL	MACH		PARAMETRIC VALUES
○	3.480	BETA	0.000
△	4.959		

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

N2B4-EFFECT OF MACH NO. ON BASE AXIAL FORCE



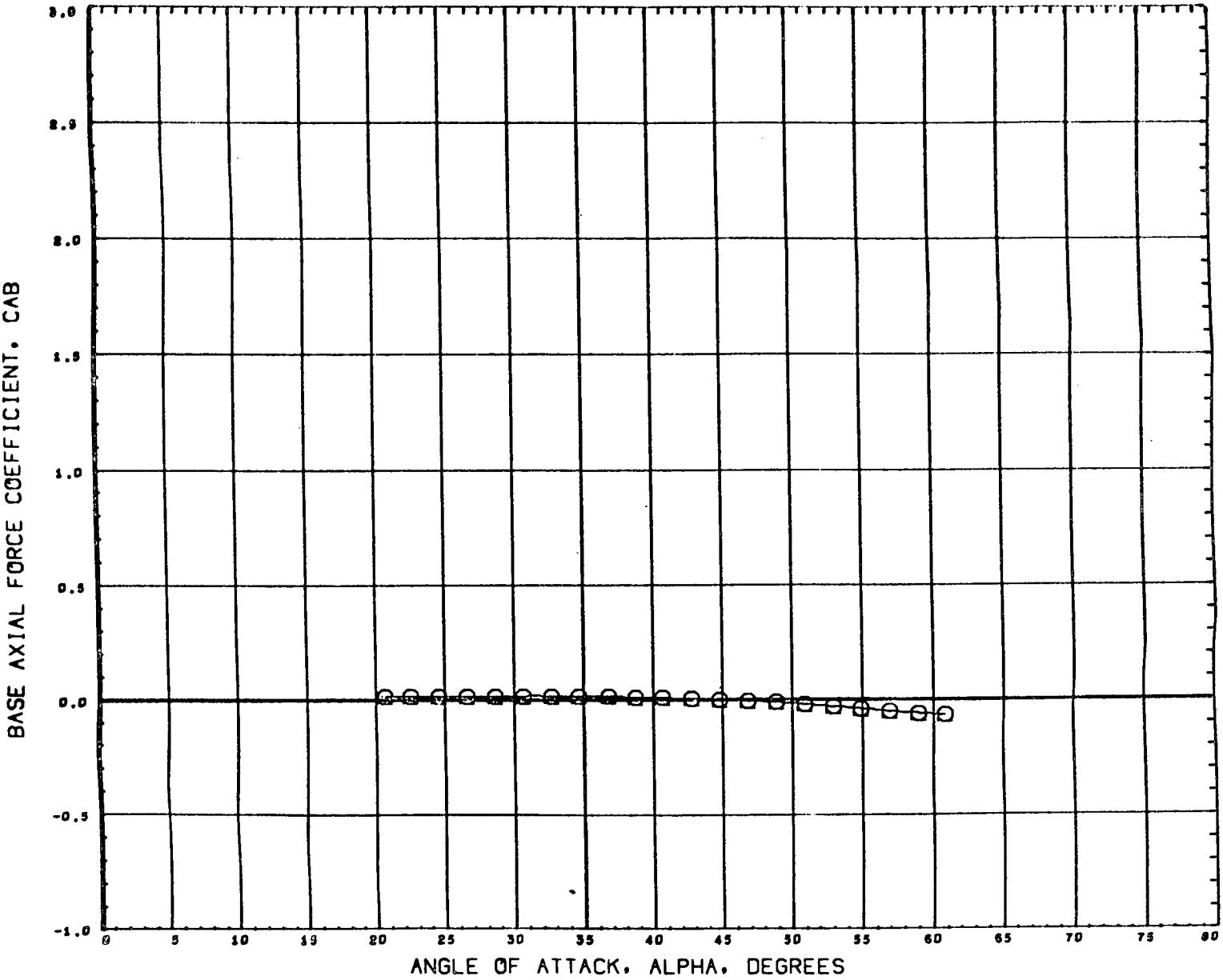
SYMBOL	MACH		PARAMETRIC VALUES
○	1.955	BETA	0.000
△	2.740		
◇	3.480		
□	4.959		

DATA HIST. CODE S*G

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	

N2B5- BASE AXIAL FORCE, MACH NO. =4.96



SYMBOL	MACH		PARAMETRIC VALUES
O	4.959	BETA	0.000

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