

—SPACE SHUTTLE—

**BASIC SUPERSONIC FORCE DATA
FOR GRUMMAN DELTA WING ORBITER
CONFIGURATION ROS-NB1**

by

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**GRUMMAN FARMINGDALE
15-INCH SUPERSONIC TUNNEL**

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION  **CHRYSLER
CORPORATION**



2 mix



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SADSAC/SPACE SHUTTLE
WIND TUNNEL TEST DATA REPORT

CONFIGURATION: Grumman Configuration ROS-NB1; 1/200 Scale Model

TEST PURPOSE: Determine Basic Supersonic Force Data For a Delta Wing
Orbiter Configuration

TEST FACILITY: Grumman Farmingdale 15" Supersonic Tunnel

TESTING AGENCY: Grumman Aerospace Corporation

TEST NO. & DATE: GFST-022 5/17/71 to 5/25/71

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ABSTRACT

Experimental aerodynamic wind tunnel tests were conducted during May, 1971 on a 1/200 scale model Grumman ROS-NBL space shuttle model in the GAC 15 inch Supersonic Wind Tunnel at Farmingdale, New York. The basic narrow body ROS-NBL configuration was tested over an angle of attack range from -3° to 22° at sideslip angles of 0° , 2.6° , 3.4° and 4.2° and over a sideslip angle range from -5° to 10° at set pitch angles of 0° , 5° , 10° and 15° . Test Mach numbers were 1.75, 2.02 and 2.48. Configuration variables included model buildup, symmetric and asymmetric elevon deflection, rudder deflections and an auxiliary ventral fin.

All testing was conducted without transition.

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SUMMARY

A 1/200 scale model of the Grumman ROS-NBI space shuttle was tested in the GAC 15 inch Supersonic Wind Tunnel in Farmingdale, New York. Tests at Mach numbers of 1.75, 2.02 and 2.48 were conducted. Model angle of attack was varied from -3° to 22° at sideslip angles of 0° , 2.6° , 3.4° and 4.2° . Sideslip angle was varied from -5° to 10° at set pitch angles of attack of 0° , 5° , 10° and 15° . Data were taken during a sweep at approximately every 1.0° .

The basic narrow body ROS-NBI configuration was tested. Test configurations included a model build-up: body alone, body-wing, and body-wing-tail. Symmetric and asymmetric elevon deflections were tested to determine longitudinal control effectiveness. The effect of the rudder and an auxiliary ventral fin was also determined.

All testing was conducted without transition.

Datasets RCSXX1 to RCSXX9 are composite datasets formed from data selected from various other datasets. They were created only to facilitate the plotting of the derivative plots and do not represent actual runs.

SUMMARY OF SADSAC NOMENCLATURE - AERODYNAMIC FORCE AND MOMENT COEFFICIENTS

COEFFICIENT	COEFFICIENT NAME	SADSAC NOMENCLATURE		
		BODY AXIS	STABILITY AXIS	WIND AXIS
C _A	Total Axial Force	CA	-	-
C _{AB}	Base Axial Force	CAB	--	-
C _{AF}	Forebody Axial Force	CAF	-	-
C _D	Total Drag Force	-	CD	CDTOTL
C _{DB}	Base Drag Force	-	CDB	CDBASE
C _{DF}	Forebody Drag Force	-	CDF	CDFORE
C _L	Lift Force	-	CL	CL
C _N	Normal Force	CN	-	-
C _Y	Side Force	CY	CY	CC
C _l	Rolling Moment	CBL	CSL	CWL
C _m	Pitching Moment	CLM	CLM	CPM
C _n	Yawing Moment	CYN	CLN	CLN
L/D	Lift-To-Drag Force Ratio	-	L/D	CL/CD
L/D	Lift-To-Forebody Drag Force Ratio	-	L/DF	CL/CDF
N/A	Normal-To-Axial Force Ratio	N/A	-	-
N/A	Normal-To-Forebody Axial Force Ratio	CN/CAF	-	-

CONFIGURATIONS INVESTIGATED

The following 1/200 scale model components were tested:

B₁ - basic ROS-NBL fuselage

W₁ - basic delta wing for ROS-NBL

V₁ - single vertical tail

U₁ - ventral fin

Pertinent dimensional information for each of these components is given in the Model Component Description Forms which follow the figures. The Dataset Collation Sheets which follow immediately contain a summary of the test run schedule and complete configurations tested.

TEST GFAST 022 DATA SET COLLATION SHEET
BASIC SUPERSONIC FORCE DATA ON THE GRUMMAN ROS-NB1
SPACE SHUTTLE ORBITER CONFIGURATION

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD		CONTROL DEFLECTION				NO. of RUNS	MACH NUMBERS									
		α	β	δ_{CL}	δ_{CL}	δ_R			1.75	2.02	2.48							
RCS002	B, W, V,	0	B	0	0	0		3	43	2	31							
RCS003	B, W, V,	A	0	0	0	0		3	40	3	24							
RCS004	B, W, $-20, -20$ V,	A	0	-20	-20	0		3	41	4	25							
RCS005	B, W, $-40, -40$ V,	A	0	-40	-40	0		3	42	5	26							
RCS007	B, W, V, 10	A	0	0	0	10		2		7	28							
RCS008	B, W, $-40, -20$ V,	A	0	-40	-20	0		1		8								
RCS009	B, W, V, U,	0	B	0	0	0		1		9								
RCS010	B, W,	0	B	0	0	-		3	44	10	33							
RCS012	B, W, V, ± 30	0	B	0	0	± 30		3	45	12	32							
RCS014	B, W, V,	A	42	0	0	0		1		14								
RCS015	B, W, V,	A	26	0	0	0		1		15								
RCS016	B,	A	0	-	-	-		1		16								
RCS017	B, W,	10	B	0	0	-		1		17								
RCS018	B, W, V,	5	B	0	0	0		1		18								
RCS019	B, W, V,	10	B	0	0	0		1		19								
RCS020	B, W, V, ± 30	10	B	0	0	± 30		1		20								
RCS021	B, W, V, U,	10	B	0	0	0		1		21								
RCS022	B, W, V,	15	B	0	0	0		1		22								
RCS027	B, W, $-40, -40$ V ± 30	A	0	-10	-40	± 30		1			27							
RCS034	B, W,	A	33	0	0	-		2	49		34							

1	7	13	19	25	31	37	43	49	55	61	67	75	76
CL	ICD	ICY	ICLM	ICSL	CLI								

COEFFICIENTS.

→ IDPVAR(1) IDPVAR(2) NDV

α or β
SCHEDULES

$\alpha A = -5^\circ$ to 25°
 $\beta B = -5^\circ$ to 10°

TEST GFST 022 DATA SET COLLATION SHEET

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD		CONTROL DEFLECTION			NO of RUNS	MACH NUMBERS									
		α	β	δ_a	$\delta_{a'}$	δ_B		1.75	2.02	2.48							
RCS 035	B, V _i , V _i	A	3+	0	0	0	2	48		35							
RCS 036	B, W, V _i ⁺³⁰	A	3+	0	0	±30	2	47		36							
RCS 037	B, W, V _i ^{±30}	A	0	0	0	±30	2	46		37							
RCS 038	B, W _i	A	0	0	0	-	2	50		38							
RCSXX1	B, W _i	0	C	0	0	-	2	49 50		34 38							
RCSXX2	B, W _i	5	C	0	0	-	2	49 50		34 38							
RCSXX3	B, W _i	10	C	0	0	-	2	49 50		34 38							
RCSXX4	B, W, V _i	0	C	0	0	0	3	40 48	3/14/15	24 35							
RCSXX5	B, W, V _i	5	C	0	0	0	3	40 48	3/14/15	24 35							
RCSXX6	B, W, V _i	10	C	0	0	0	3	40 48	3/14/15	24 35							
RCSXX7	B, W, V _i ^{±30}	0	C	0	0	±30	2	46 47		36 37							
RCSXX8	B, W, V _i ^{±30}	5	C	0	0	±30	2	46 47		36 37							
RCSXX9	B, W, V _i ^{±30}	10	C	0	0	±30	2	46 47		36 37							

1 7 11 19 25 31 37 43 49 55 61 67 75 76

CL 12D 12Y 12L14 12SL 12LN

COEFFICIENTS.

α or β

SCHEDULES

$$\alpha A = -5^\circ \pm 25^\circ$$

$$\beta B = -5^\circ \pm 10^\circ$$

$$\beta C = 0^\circ, 3.4^\circ \text{ (FOR } M=2.02 \text{ IN RCSXX4, RCSXX5, RCSXX6, } \beta C = 0^\circ, 2.6^\circ, 4.2^\circ)$$

→ IDPVAR(1) IDPVAR(2) NDV

TEST FACILITY DESCRIPTION

GRUMMAN 15-INCH SUPERSONIC WIND TUNNEL

DESCRIPTION: This is an intermittent blowdown to atmosphere facility with a 15-inch by 15-inch test section. The tunnel makes use of fixed nozzle blocks covering a Mach number range of 1.5 to 4.0. An alumina type air dryer is used to dry the air to a dewpoint of 0-10 degrees Fahrenheit at 3000 psi.

PERFORMANCE PARAMETERS:

Mach Range:	1.5, 1.75, 2.0, 3.0, 3.5, 4.0
Reynolds Number ($\times 10^6/\text{ft}$):	3.0 to 65
Stagnation Pressure (psia):	25 to 500
Dynamic Pressure (psf):	1550 to 6700
Stagnation Temperature ($^{\circ}\text{R}$):	460
Run Time (sec):	40 to 180

TESTING CAPABILITIES: This tunnel has a sector, which provides an angle of attack range of ± 15 degrees, and a four and a six-component internal strain gage force balance for measuring static aerodynamic forces. A pogo stick type of support raises from the floor to restrain sting mounted models during starting and stopping transients. Schlieren and shadowgraph are utilized for flow visualization. This facility is equipped with a computer controlled data acquisition system.

TEST GFST - 022[illegible]

BALANCE UTILIZED: TASK .75 MK XLIII "A"

CAPACITY:

NF 200 lbs.
SF 100 lbs.
AF 80 lbs.
PM 300 in.-lbs.
YM 125 in.-lbs.
RM 80 in.-lbs.

ACCURACY:

十一	486
十二	789
十三	075
十四	357
十五	924
十六	207

COEFFICIENT
TOLERANCE:

.0020
 .0032
 .0004
 .0002
 .0007
 .0002

COMMENTS:

DATA REDUCTION

The 0.75 inch TASK MK XLIII six component strain gage balance was used to measure orbiter forces and moments. All final data were presented along and about the stability axis passing through a nominal center of gravity located at F.S. 1485, W.L. 377, and B.L. 0. Data were converted to standard NASA coefficients using the following constants:

Reference area: $S_{ref} = 20.689$ sq. in.

Reference length: $l_{ref} = 9.648$ in.

Reference span: $b_{ref} = 5.838$ in.

No adjustment to the final data was made to account for the base and cavity pressure contributions.

SUMMARY DATA PLOT INDEX

TITLE	PLOTTED COEFFICIENTS SCHEDULE	CONDITIONS VARYING	PAGES
Figure 1 Characteristics in Pitch	(A)	Mach	1-3
Figure 2 Elevon Effectiveness	(A)	Elevon Deflection	4-12
Figure 3 Aileron Effectiveness	(B)	Elevon Deflection	13-15
Figure 4 Rudder Effectiveness	(B)	Rudder Deflection	16-21
Figure 5 Component Buildup	(A)	Configuration	22-24
Figure 6 Effect of Flared Rudder in Pitch, Delta Elevon = 0	(A)	Rudder	25-30
Figure 7 Effect of Flared Rudder in Pitch, Delta Elevon = -40	(A)	Rudder	31-33
Figure 8 Characteristics in Sideslip - Component Buildup, Alpha = 0	(C)	Configuration	34-42
Figure 9 Characteristics in Sideslip - Component Buildup, Alpha Approx. 10	(C)	Configuration	43-45
Figure 10 Characteristics in Sideslip - Variation with Alpha	(C)	Alpha	46-48
Figure 11 Characteristics in Sideslip - Variation with Alpha	(B)	Beta	49-51
Figure 12 Characteristics in Sideslip - Component Buildup	(B)	Beta	52-57
Figure 13 Effect of Flared Rudder in Sideslip - Alpha = 0	(C)	Rudder	58-66

SUMMARY DATA PLOT INDEX
(CONTINUED)

TITLE	PLOTTED COEFFICIENTS : SCHEDULE	CONDITIONS VARYING	PAGES
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Figure 15 Effect of Flared Rudder in Sideslip - Variation with Alpha	(B)	Rudder	70-75
Figure 16 Derived Parameters - Basic Configuration in Pitch	(D)		76-78
Figure 17 Lateral-Directional Derivatives, Alpha = 0	(E)	Configuration	79-81
Figure 18 Lateral-Directional Derivatives, Alpha Approx. 5	(E)	Configuration	82-84
Figure 19 Lateral-Directional Derivatives, Alpha Approx. 10	(E)	Configuration	85-87

PLOTTED COEFFICIENTS SCHEDULE:

- (A) CL vs. α , CL vs. CLM, CL vs. CD
- (B) CLN, CSL, CY vs. α
- (C) CLN, CSL, CY vs. β
- (D) DCL/DALPHA, DCLM/DCL, CD(MIN) vs. Mach
- (E) DCLNDB, DCSLDB, CYBETA vs. Mach

FIGURES

Notes:

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

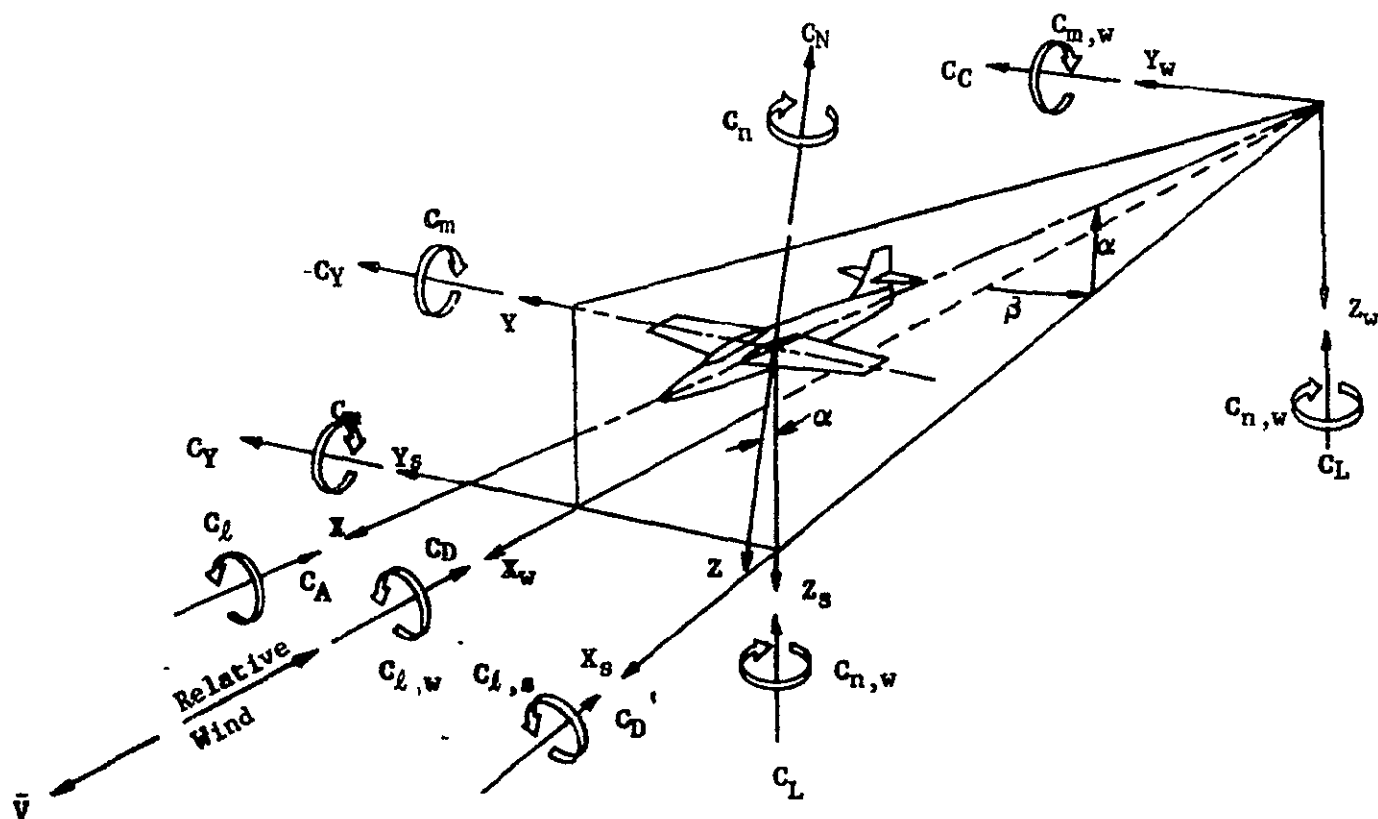


Figure 1. Axis systems, showing direction and sense of force, and moment coefficients, angle of attack, and sideslip angle

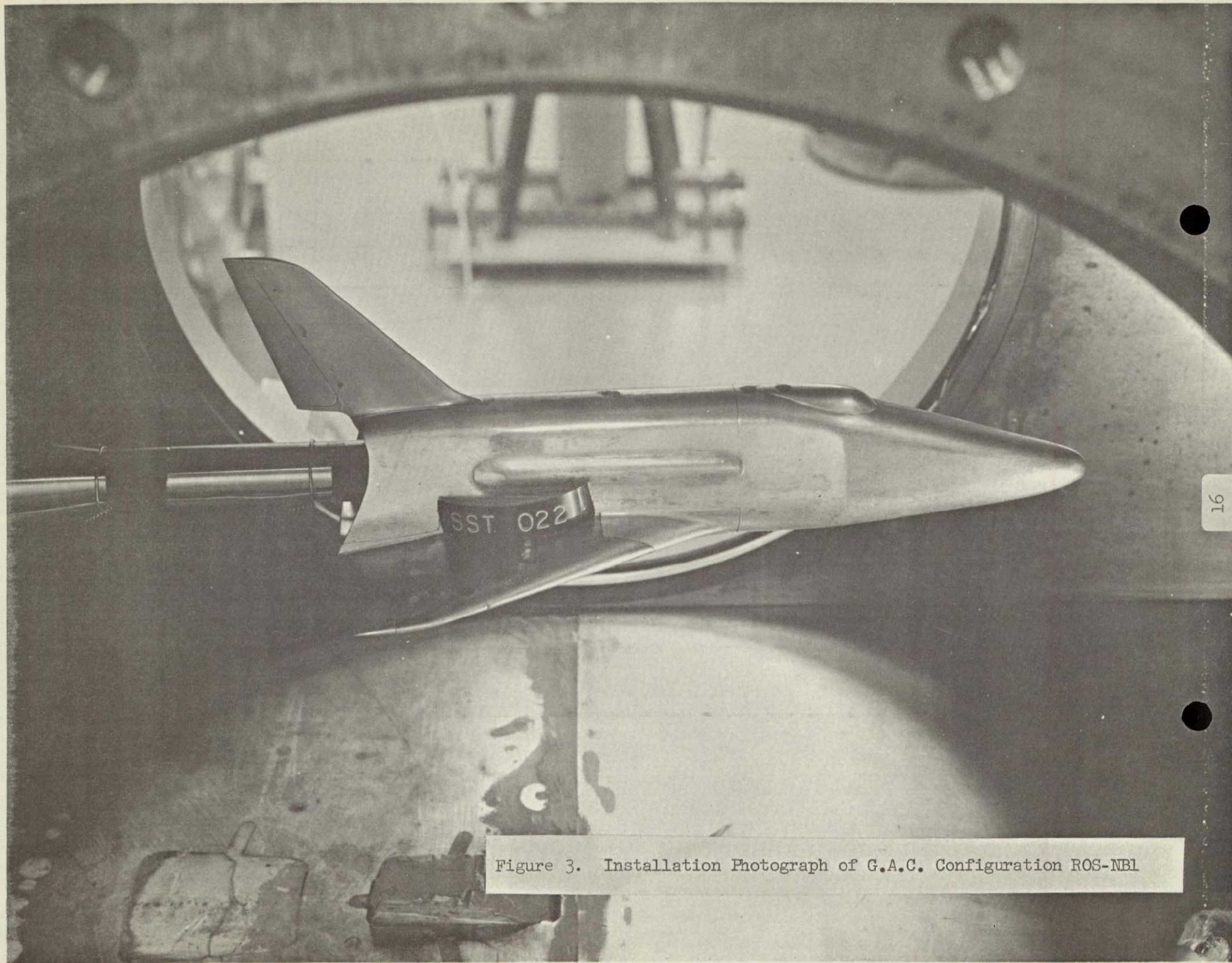


Figure 3. Installation Photograph of G.A.C. Configuration ROS-NB1

REFERENCE DIMENSIONS

$$S_{REF} = 5747 \text{ FT}^2$$

$$Q_{REF} = 160.8 \text{ FT.}$$

$$b = 97.3 \text{ FT.}$$

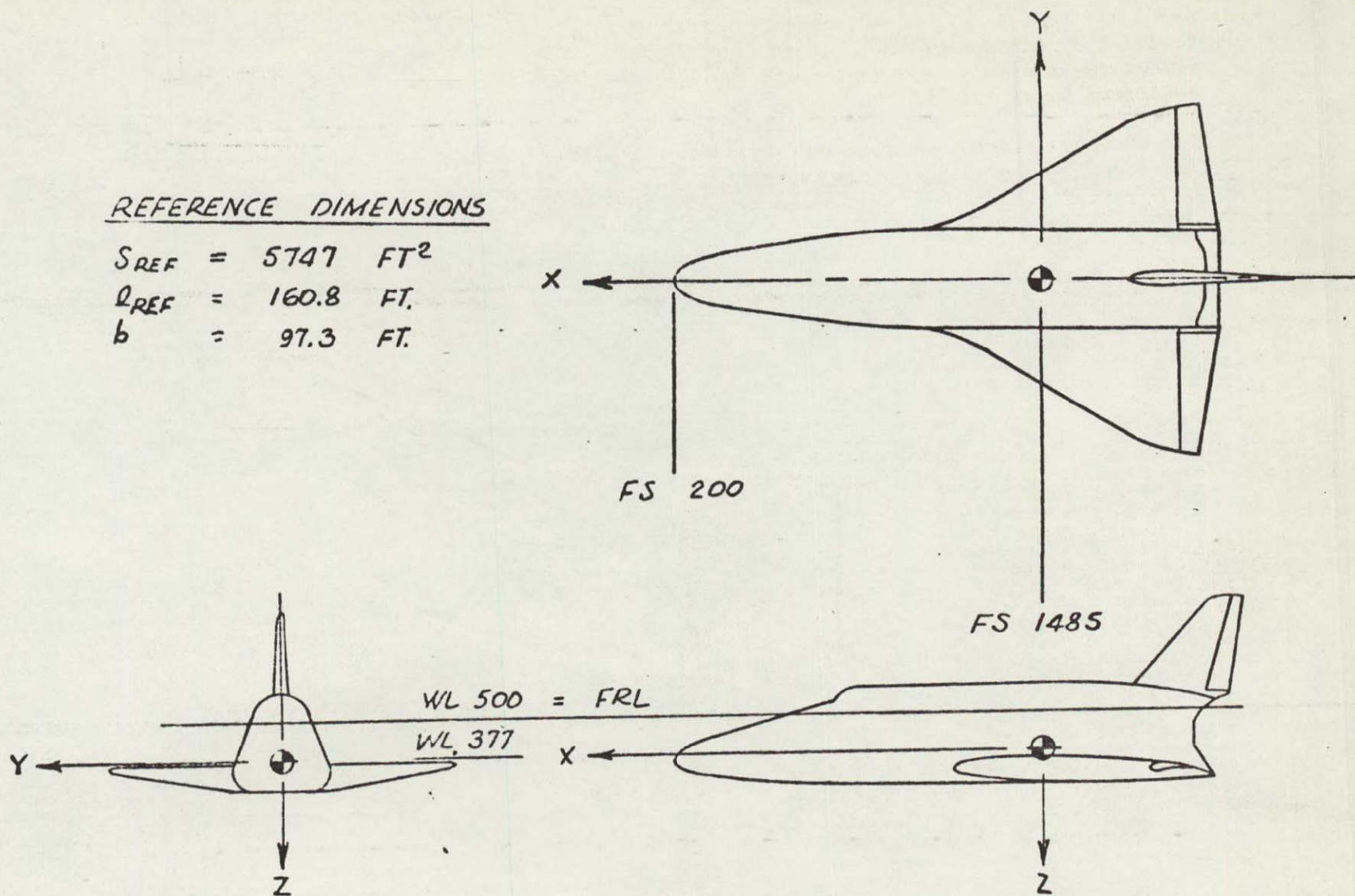


FIGURE 2. CONFIGURATION ROS-NBI, THREE-VIEW

U₁ - VENTRAL FIN

(1/200 SCALE)

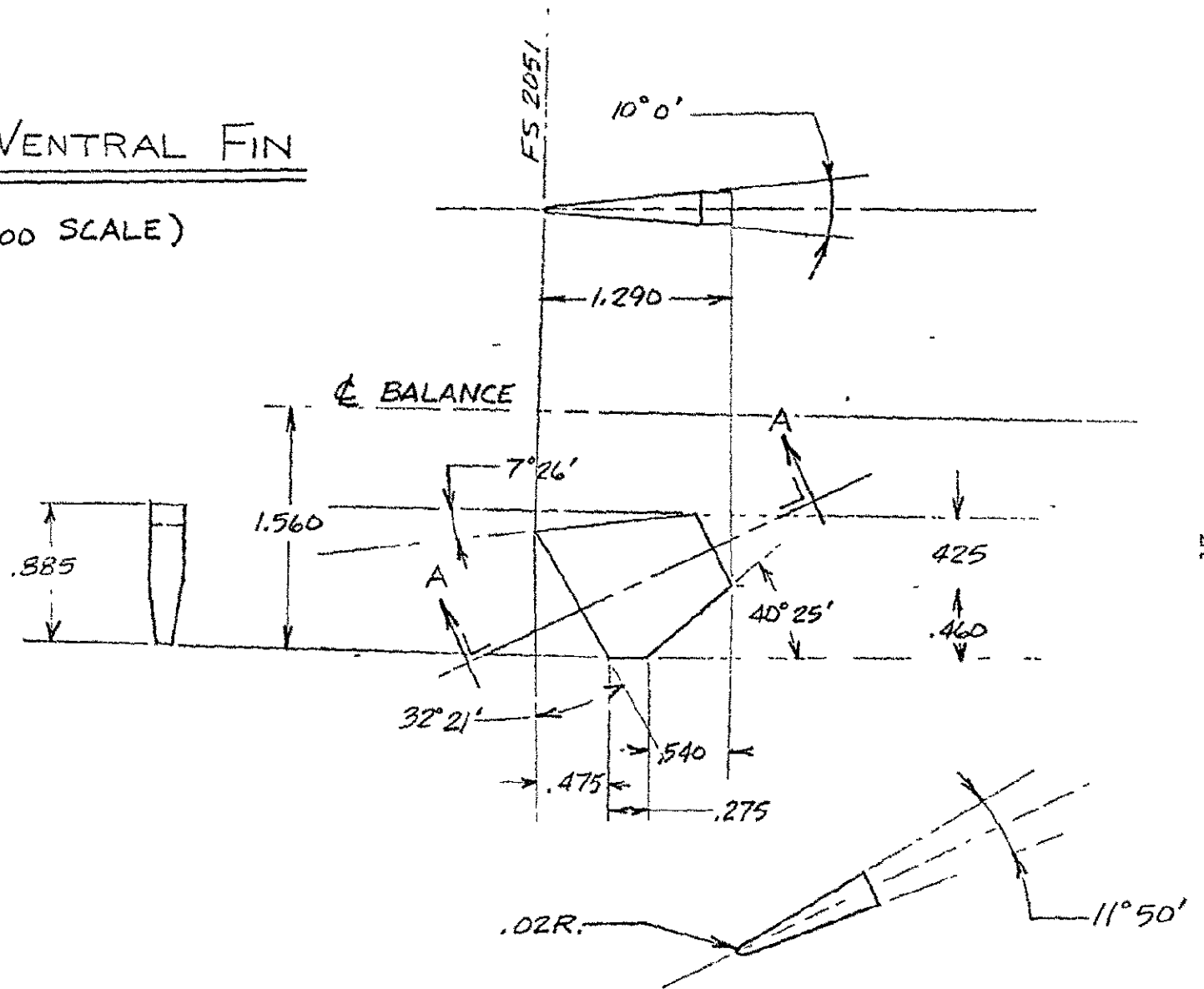


FIGURE 4 VENTRAL FIN, U,

SECT. A-A

MODEL COMPONENT DESCRIPTION SHEETS

MODEL COMPONENT: BODY - B₁

GENERAL DESCRIPTION: BASIC ROS-NB1 BODY

DRAWING NUMBER: _____

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u> (FT. or FT ²)	<u>MODEL SCALE</u> (IN. OR IN. ²)
Length	<u>160.8</u>	<u>9.648</u>
Max. Width	<u>28.0</u>	<u>1.680</u>
Max. Depth	<u>28.7</u>	<u>1.722</u>
Fineness Ratio	<u>5.61</u>	<u>5.61</u>
Area		
Max. Cross-Sectional	<u>616</u>	<u>2.218</u>
Planform	<u>3990</u>	<u>14.364</u>
Wetted	<u>12,610</u>	<u>45.396</u>
Base	<u>590</u>	<u>2.124</u>

MODEL COMPONENT: WING - W₁

GENERAL DESCRIPTION: BASIC ROS-NB 1 WING

DRAWING NUMBER: 518 MOD 902

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u> (FT. OR FT. ²)	<u>MODEL SCALE</u>
<u>TOTAL DATA</u>		
Area		
Planform	<u>5747</u>	<u>20.7 in.²</u>
Wetted	<u>7780</u>	<u>28 in.²</u>
Span (equivalent)	<u>97.3</u>	<u>5.84 in.</u>
Aspect Ratio	<u>1.65</u>	<u>1.65</u>
Rate of Taper	<u>1.87</u>	<u>1.87</u>
Taper Ratio	<u>.129</u>	<u>.129</u>
Diehedral Angle, degrees	<u>5°</u>	<u>5°</u>
Incidence Angle, degrees	<u>+ 2° @body - 3° @tip</u>	<u>- 3° @ tip</u>
Aerodynamic Twist, degrees		
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	<u>60°</u>	<u>60°</u>
Trailing Edge	<u>- 8.4°</u>	<u>- 8.4°</u>
0.25 Element Line	<u>42.9°</u>	<u>42.9°</u>
Chords:		
Root (Wing Sta. 0.0)	<u>104.6</u>	<u>6.276 in.</u>
Tip, (equivalent)	<u>13.5</u>	<u>0.81 in.</u>
MAC	<u>59.0</u>	<u>3.54 in.</u>
Fus. Sta. of .25 MAC	<u>1580</u>	<u>1580</u>
W.P. of .25 MAC	<u>302.6</u>	<u>302.6</u>
B.L. of .25 MAC	<u>290</u>	<u>290</u>
Airfoil Section		
Root	<u>18% max.camber 10% thickness</u>	
Tip	<u>3% max.camber 10% thickness</u>	
<u>EXPOSED DATA</u>		
Area	<u>3217</u>	<u>11.58 in.²</u>
Span, (equivalent)	<u>69.3</u>	<u>4.16 in.</u>
Aspect Ratio	<u>1.5</u>	<u>1.5</u>
Taper Ratio	<u>.172</u>	<u>.172</u>
Chords		
Root	<u>78.25</u>	<u>4.7 in.</u>
Tip	<u>13.5</u>	<u>0.81 in.</u>
MAC	<u>46.4</u>	<u>2.78 in.</u>
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		
B.L. of .25 MAC		

MODEL COMPONENT: Elevon (For the W₁ Wing)

GENERAL DESCRIPTION: Moveable Control Surface Associated With the W₁ Wing

DRAWING NUMBER: 518 MOD 902

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u> (ft. or ft. ²)	^{1/200} <u>MODEL SCALE</u> (in. or in. ²)
Area	<u>364</u>	<u>1.310</u>
Span (equivalent)	<u>35.5</u>	<u>2.130</u>
^{Root} Inb'd equivalent chord	<u>12.75</u>	<u>.765</u>
Outb'd equivalent chord	<u>7.75</u>	<u>.465</u>
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	<u> </u>	<u> </u>
At Outb'd equiv. chord	<u> </u>	<u> </u>
Sweep Back Angles, degrees		
Leading Edge	<u>0°</u>	<u>0°</u>
Tailing Edge	<u>-8.4°</u>	<u>-8.4°</u>
Hingeline	<u> </u>	<u> </u>
Area Moment (Normal to hinge line)	<u> </u>	<u> </u>

MODEL COMPONENT: E VERTICAL TAIL - V₁

GENERAL DESCRIPTION: BASIC ROS-NB 1 VERTICAL TAIL

DRAWING NUMBER: 518 MOD 902

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u> (FT. OR FT. ²)	<u>MODEL SCALE</u> (IN. OR IN. ²)
Area	<u>805</u>	<u>2.898</u>
Span (equivalent)	<u>33.3</u>	<u>1.998</u>
Inb'd equivalent chord	<u>34.6</u>	<u>2.076</u>
Outb'd equivalent chord	<u>13.75</u>	<u>.825</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u>.3</u>	<u>.3</u>
At Outb'd equiv. chord	<u>.3</u>	<u>.3</u>
Sweep Back Angles, degrees		
Leading Edge	<u>45°</u>	<u>45°</u>
Tailing Edge	<u>19.7°</u>	<u>19.7°</u>
Hingeline	<u>28.7°</u>	<u>28.7°</u>
Area Moment (Normal to hinge line)	<u>945</u>	<u>.204</u>
AIRFOIL SECTION	<u>64A010</u>	<u>64A010</u>

MODEL COMPONENT: Rudder (for the V₁ vertical tail)

GENERAL DESCRIPTION: Moveable Control Surface Associated With the V₁
Vertical Tail

DRAWING NUMBER: 518 MOD 902

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u> <u>(ft. or ft²)</u>	<u>1/200</u> <u>MODEL SCALE</u> <u>(in. or in.²)</u>
Area	<u>240</u>	<u>.864</u>
Span (equivalent) ROOT	<u>33.3</u>	<u>1.998</u>
Inb'd equivalent chord	<u>10.4</u>	<u>.624</u>
Outb'd equivalent chord RUDDER	<u>4.02</u>	<u>.241</u>
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	<u>.3</u>	<u>.3</u>
At Outb'd equiv. chord	<u>.3</u>	<u>.3</u>
Sweep Back Angles, degrees		
Leading Edge	<u>29.5°</u>	<u>29.5°</u>
Tailing Edge	<u>19.7°</u>	<u>19.7°</u>
Hingeline	<u></u>	<u></u>
Area Moment (Normal to hinge line)	<u></u>	<u></u>

NOMENCLATURE

(General)

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
α	ALPHA	angle of attack, angle between the projection of the wind X_w -axis on the body X, Z -plane and the body X -axis; degrees
β	BETA	sideslip angle, angle between the wind X_w -axis and the projection of this axis on the body X - Z -plane; degrees
ψ	PSI	yaw angle, angle of rotation about the body Z -axis, positive when the positive X -axis is rotated toward the positive Y -axis; degrees
ϕ	PHI	roll angle, angle of rotation about the body X -axis, positive when the positive Y -axis is rotated toward the positive Z -axis; degrees
ρ		air density; Kg/m^3 , slugs/ft ³
a		speed of sound; m/sec, ft/sec
V		speed of vehicle relative to surrounding atmosphere; m/sec, ft/sec
q	$Q(PSI)$ $Q(Psf)$	dynamic pressure; $1/2\rho V^2$, psi, psf
M	MACH	Mach number; V/a
RN/L	RN/L	Reynolds number per unit length; million/ft
p		static pressure; psi
P		total pressure; psi
C_p	CP	pressure coefficient; $(p-p_\infty)/q$

NOMENCLATURE (Continued)

Reference & C. G. Definitions

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
S		wing area; m^2 , ft^2
S	SREF	reference area; m^2 , ft^2
$\bar{c}$		wing mean aerodynamic chord or reference chord; m, ft, in (see l_{ref} or LREF)
l_{ref}	LREF	reference length; m, ft, in.; (see $\bar{c}$)
b_{ref}	BREF	wing span or reference span; m, ft, in
A_b		base area; m^2 , ft^2 , in^2
c. g.		center of gravity
MRP	MRP	abbreviation for moment reference point
	XMRP	abbreviation for moment reference point on X-axis
	YMRP	abbreviation for moment reference point on Y-axis
	ZMRP	abbreviation for moment reference point on Z-axis

NOMENCLATURE (Continued)

Axis System General

<u>SYMBOL</u>	<u>DEFINITION</u>
F	force; F, lbs
M	moment; M, in-lb

<u>Subscript</u>	<u>Definition</u>
N	normal force
A	axial force
L	lift force
D	drag force
Y	force or moment about the Y axis
Z	moment about the Z axis
X	moment about the X axis
s	stability axis system
w	wind axis system
ref	reference conditions
∞	free stream conditions
t	total conditions
b	base

NOMENCLATURE (Continued)
Body & Stability Axis System

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
<u>Body Axis System</u>		
C_N	CN	normal force coefficient; F_N/qS
C_A	CA	axial force coefficient; F_A/qS
C_{A_b}	CAB	base axial force coefficient; $\begin{bmatrix} -1 \\ \end{bmatrix} \begin{bmatrix} (p_b - p_\infty)/q \end{bmatrix} (A_b/S)$
C_{A_f}	CAF	forebody axial force coefficient; $C_A - C_{A_b}$
C_n	CYN	yawing moment coefficient; $M_Z/qS b_{ref}$
C_ℓ	CBL	rolling moment coefficient; $M_X/qS b_{ref}$
<u>Common to Both Axis Systems</u>		
C_m	CIM	pitching moment coefficient; $M_Y/qS \ell_{ref}$
C_y	CY	side force coefficient; F_Y/qS
<u>Stability Axis System</u>		
C_L	CL	lift force coefficient; F_L/qS
C_D	CD	drag force coefficient; F_D/qS
C_{D_b}	CDB	base drag coefficient
C_{D_f}	CDF	forebody drag coefficient; $C_D - C_{D_b}$
C_n	CLN	yawing moment coefficient; $M_{Z,s}/qS b_{ref}$
C_ℓ	CSL	rolling moment coefficient; $M_{X,s}/qS b_{ref}$
L/D	L/D	lift-to-drag ratio; C_L/C_D
L/D_f	L/DF	lift to forebody drag ratio; C_L/C_{D_f}

NOMENCLATURE (Continued)

Surface Definitions

<u>SYMBOL</u>	<u>SADSAC SYMBOL</u>	<u>DEFINITION</u>
i_t	HORIZT	horizontal tail incidence; positive when trailing edge down; degrees
δ		symmetrical surface deflection angle; degrees; positive deflections are:
	AILRON	aileron - total aileron deflection; (left aileron - right aileron)/2
	CANARD	canard - trailing edge down
	ELEVON	elevon - trailing edge down
	ELEVTR	elevator - trailing edge down
	FLAP	flap - trailing edge down
	RUDDER	rudder - trailing edge to the left
	SPOILER	spoiler - trailing edge down
	TAB	tab - trailing edge down with respect to control surface
δ		antisymmetrical surface deflection angle, degrees; positive trailing edge down:
	AIL-L	left aileron - trailing edge down
	AIL-R	right aileron - trailing edge down
	ELVN-L	left elevon - trailing edge down
	ELVN-R	right elevon - trailing edge down
	SPLR-L	left spoiler - trailing edge down
	SPLR-R	right spoiler - trailing edge down

<u>SURFACE SUBSCRIPTS</u>	<u>DEFINITION</u>
a	aileron
b	base
c	canard
e	elevator or elevon
f	flap
r	rudder or ruddervator
s	spoiler
t	tail

TABULATED DATA LISTING

A tabulated data listing, consisting of all aero data sets, both original and those created in arriving at the plotted material to be presented subsequently, is available as an addendum to this report. The tabular listing is made up in two sections:

- (a) a brief summary list of all data sets containing the identifier, the descriptor, and the resident dependent variables.
- (b) a full list of all data sets containing all resident or selected aerodynamic coefficients of the data sets as well as the above mentioned information.

The listing is currently sent on limited distribution to the following organizations:

NASA AMES	Mr. V. Stevens
NASA MSC	Mr. Ray Nelson
GAC	Mr. M. Quan

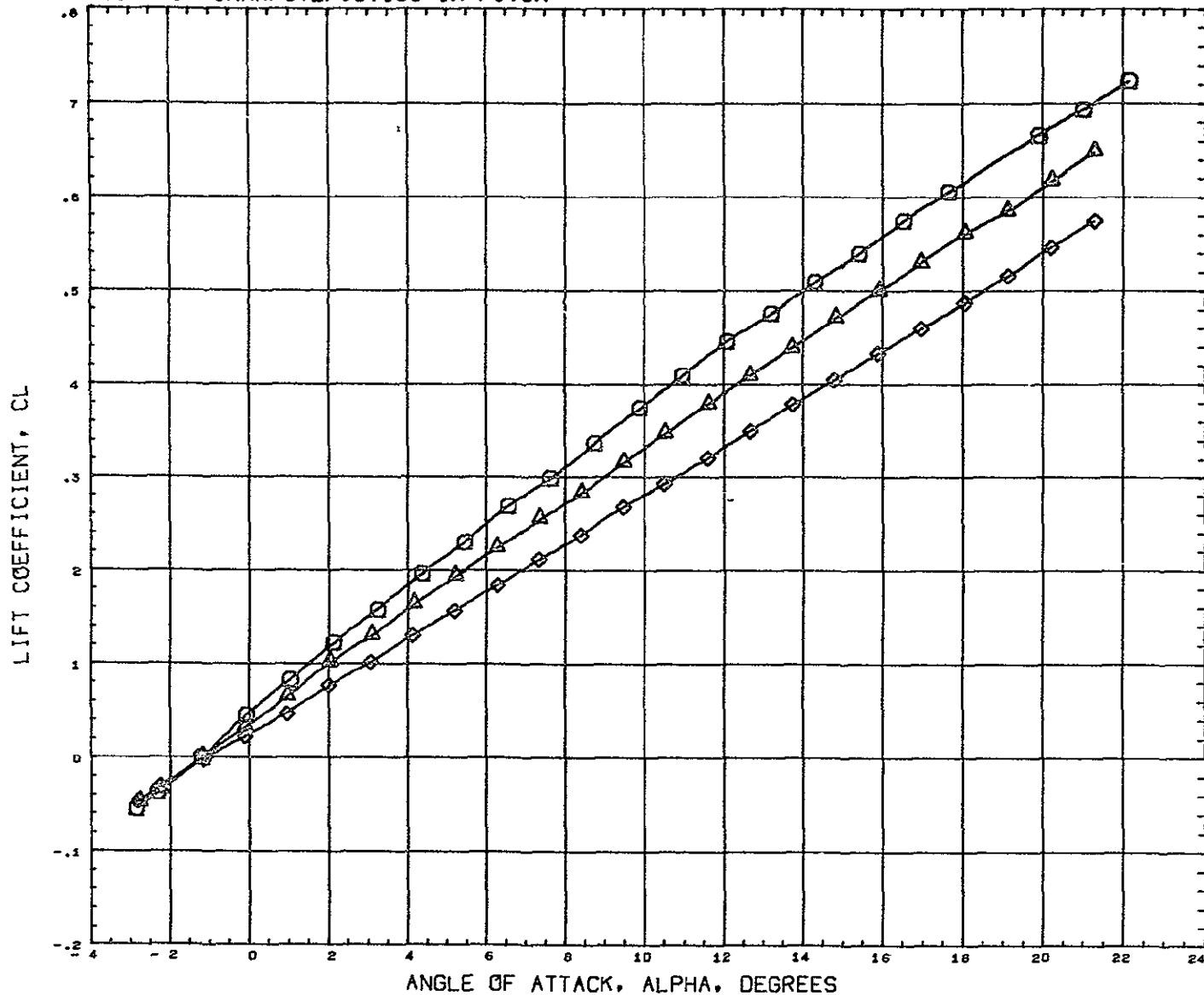
If copies of this listing are desired, please contact the above or the cognizant SADSAC personnel who, for this data, is:

Miss Betty J. Fricken
Department 2780
Chrysler Corporation Space Division
New Orleans, La. 70129

(504) 255-2304

PLOTTED DATA

FIGURE 1 CHARACTERISTICS IN PITCH



SYMBOL	MACH	PARAMETRIC VALUES			
○	1.750	BETA	0.000	LELEVN	0.000
△	2.020	RELEVN	0.000	RUDDER	0.000
◇	2.480				

REFERENCE INFORMATION		
SREF	20.6890	SQ IN
LREF	9.6460	IN
BREF	5.8360	IN
XHRP	1485.0040	IN
YHRP	0.0000	IN
ZHRP	377.0004	IN
SCALE	0.0050	

REFERENCE FILE

GFST 022 CONF. RGS-NB1 B1W1V1

(RCS003) 11 SEP 71 PAGE 1

REFERENCE FILE

1

SYMBOL
◇
△
○

MACH
1.750
2.020
2.460

BETA
0.000
0.000
0.000

PARAMETRIC VALUES
LELEVN 0.000
RUDDER 0.000

0.000
0.000

SREF 20.6690
LREF 9.6480
DRSF 5.6380
XMRP 14.050040
YMRP 0.0000
ZMRP 3.770004

SCALE
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IN
IN
IN
IN
IN
IN
IN

REFERENCE INFORMATION

PITCHING MOMENT COEFFICIENT, CLM

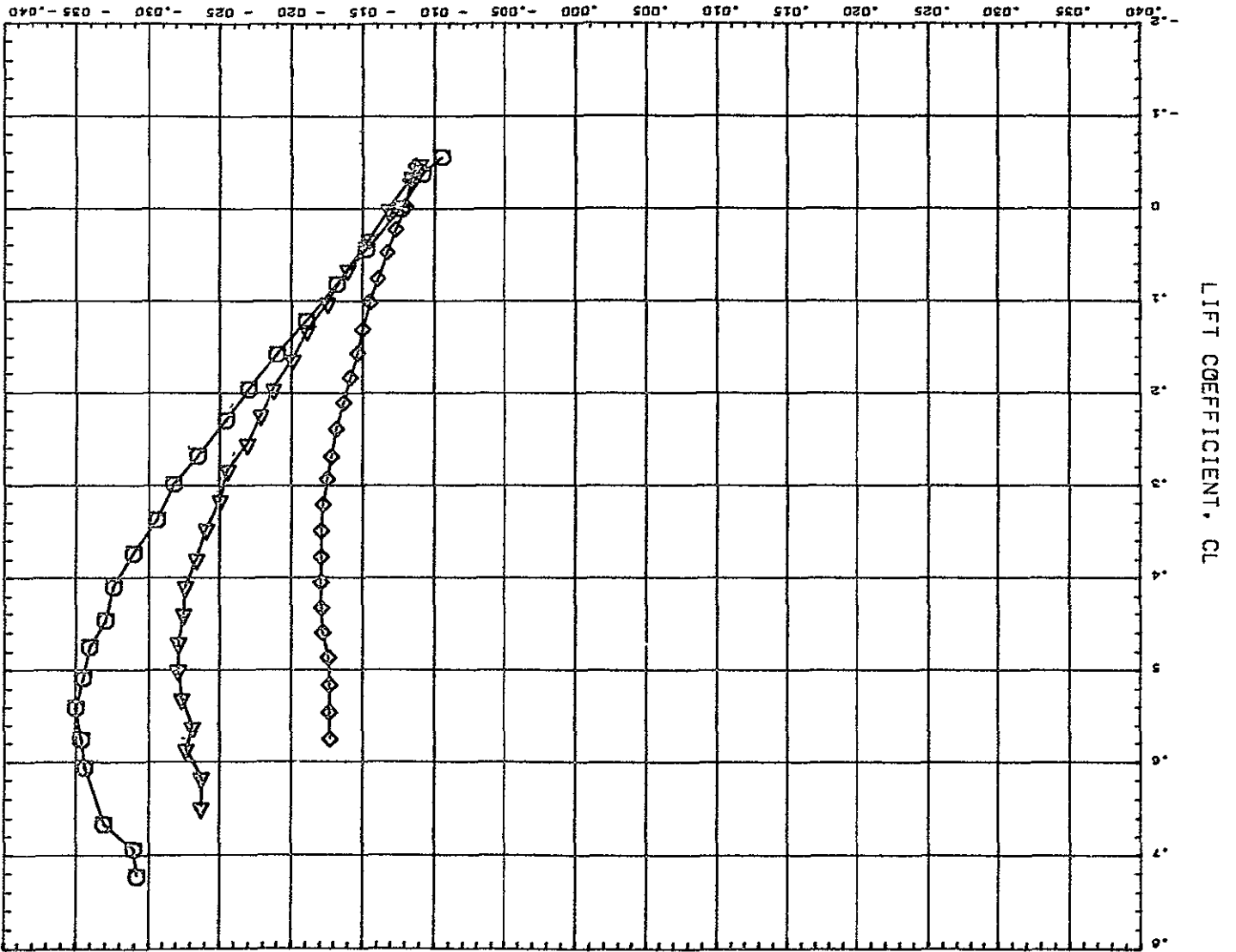
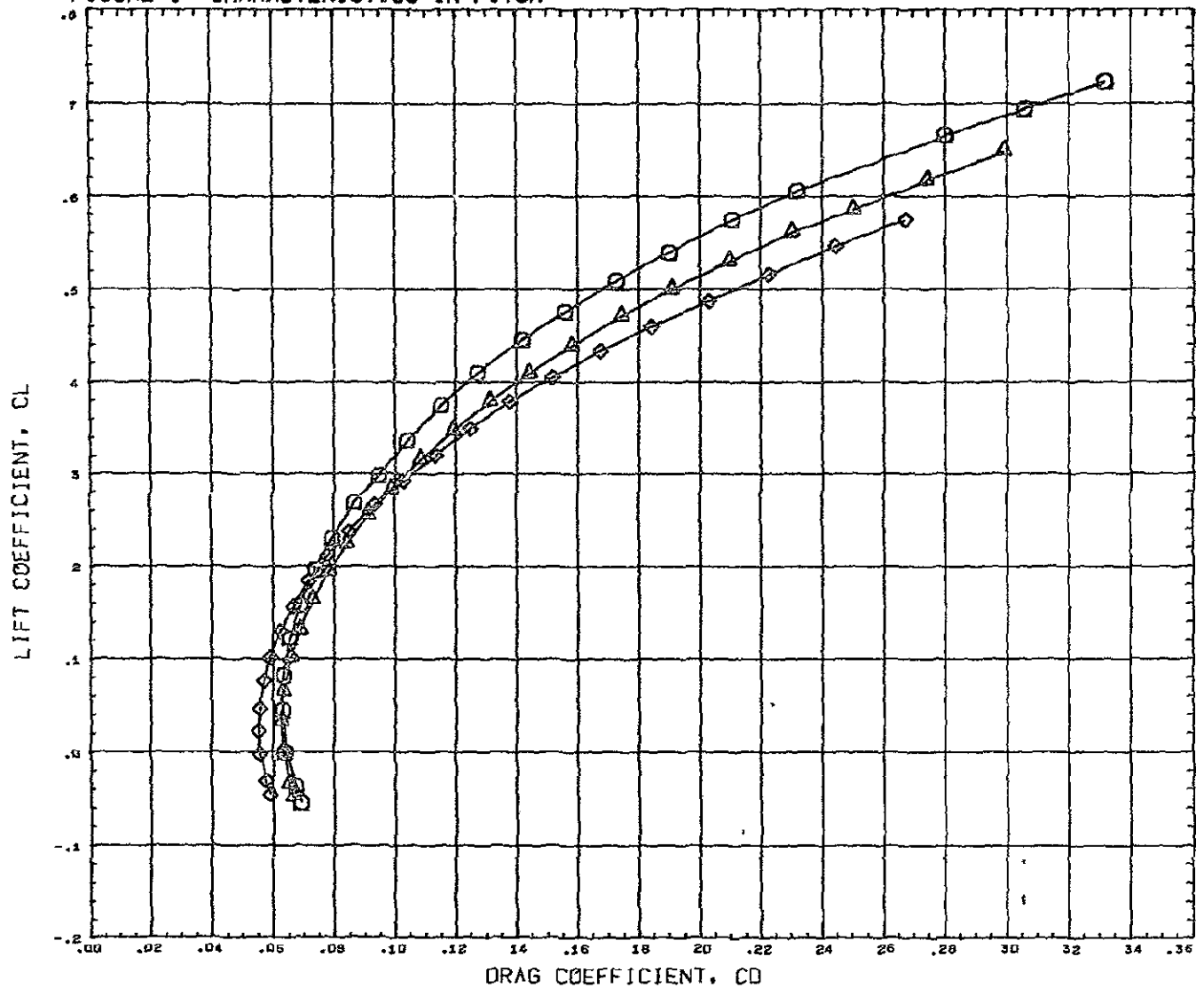


FIGURE 1 CHARACTERISTICS IN PITCH

FIGURE 1 CHARACTERISTICS IN PITCH



SYMBOL	MACH	PARAMETRIC VALUES			
○	1.750	BETA	0.000	LELEVN	0.000
△	2.020	RELEVN	0.000	RUDDER	0.000
◇	2.430				

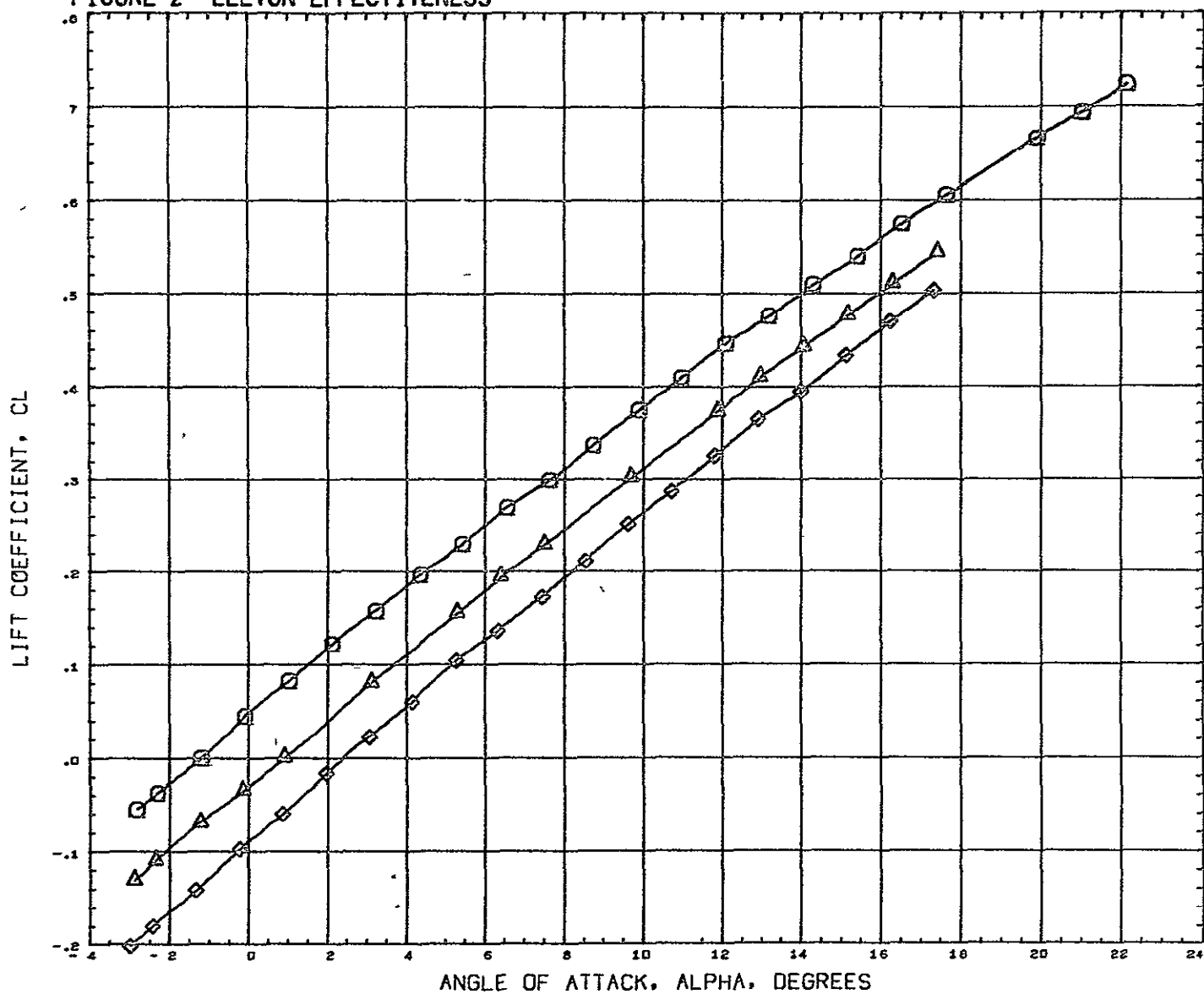
REFERENCE INFORMATION		
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LREF	9.6480	IN
BREF	5.8380	IN
XMRP	1485.0040	IN
YMRP	0.0000	IN
ZMRP	377.0004	IN
SCALE	0.0050	

REFERENCE FILE

GFST 022 CONF. R0S-NB1 B1W1V1

(RCS003) 11 SEP 71 PAGE 3

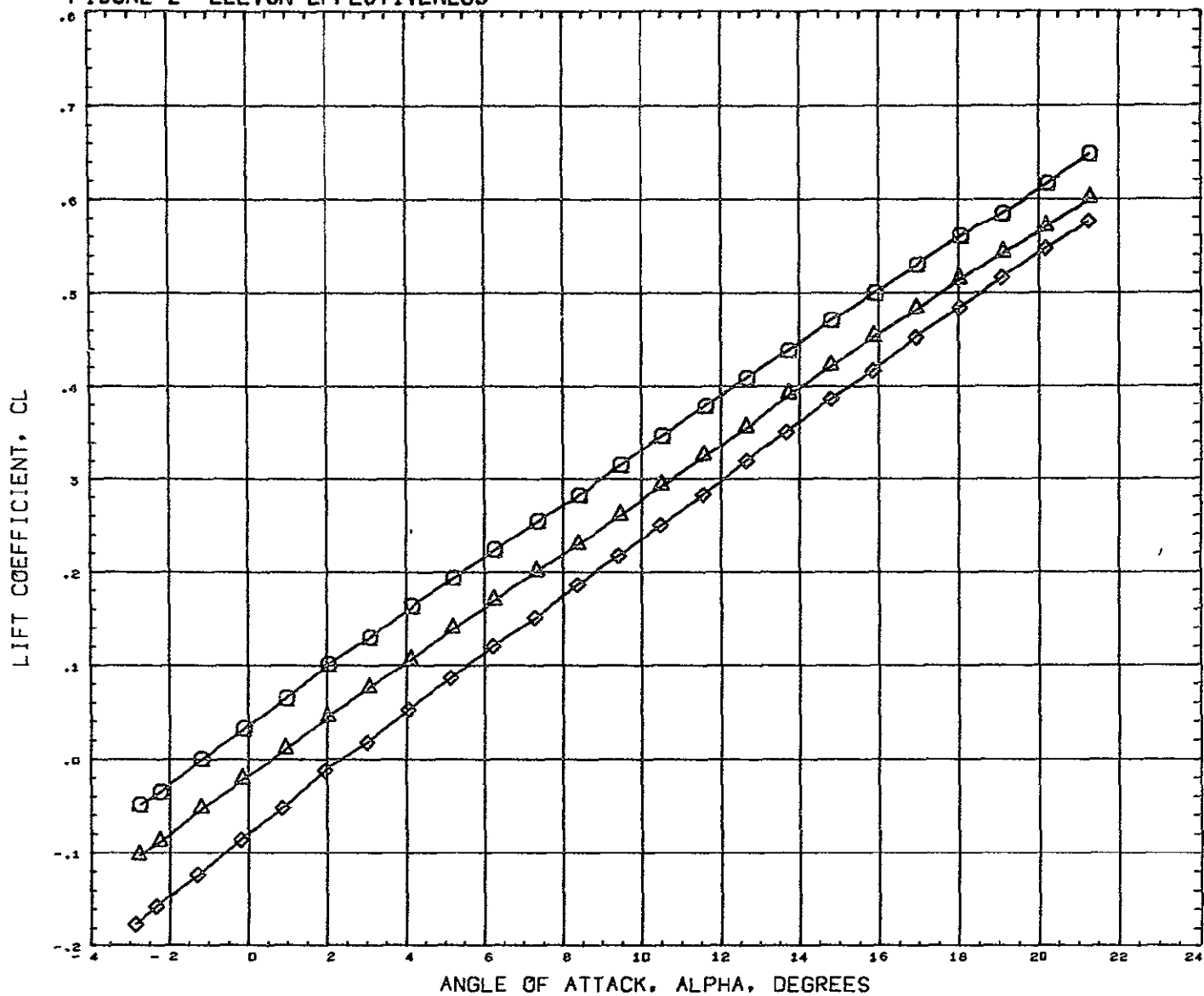
FIGURE 2 ELEVON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS003)	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20 6890	sq IN
(RCS004)	GFST 022 CONF. ROS-NB1 B1W1(-20,-20)V1	0.000	-20.000	-20.000	0.000	LREF	9 6480	IN
(RCS005)	GFST 022 CONF. ROS-NB1 B1W1(-40,-40)V1	0.000	-40.000	-40.000	0.000	BREF	5 8380	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 1.750

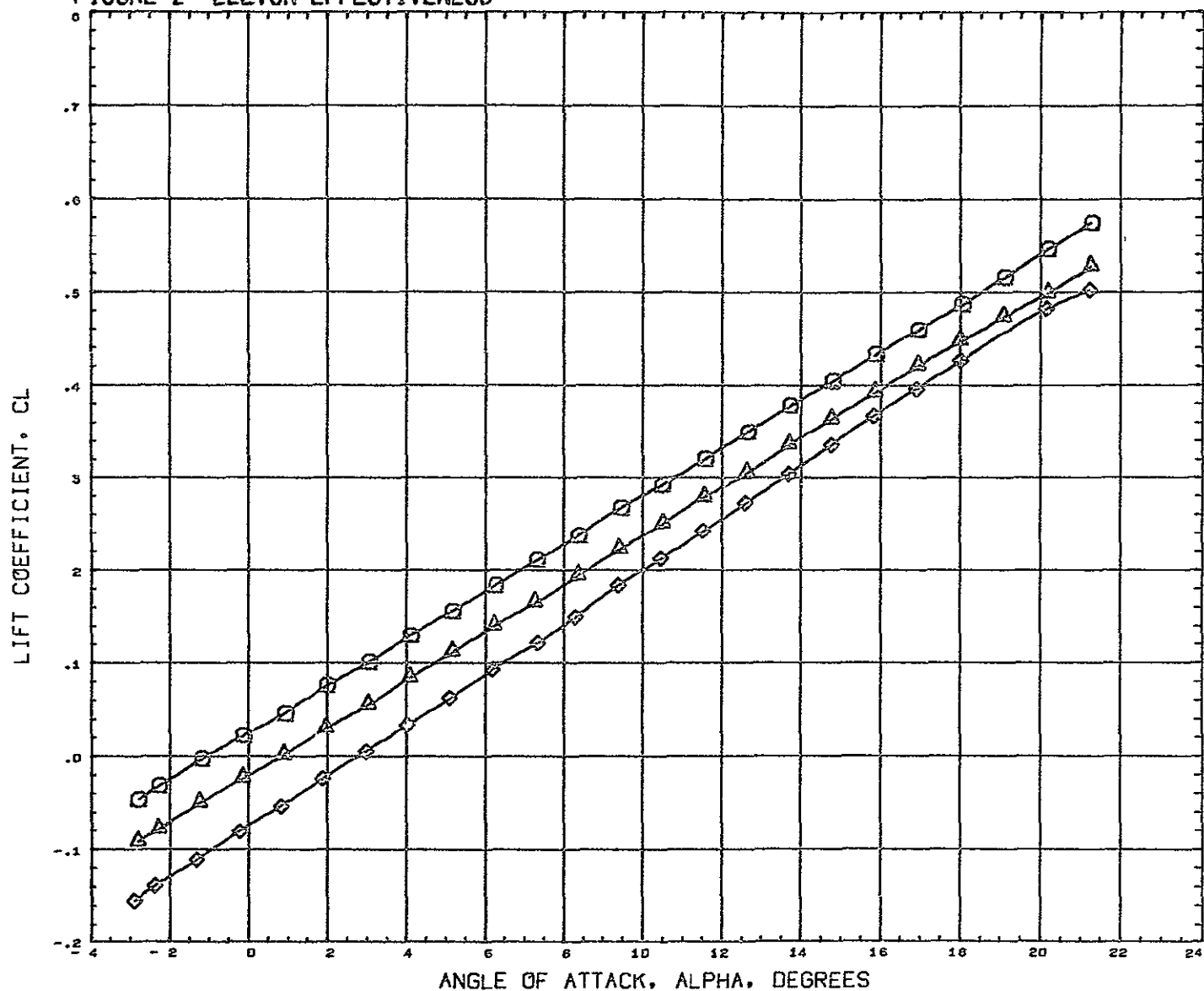
FIGURE 2 ELEVON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION	
(RCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20 6890 SQ IN
(RCS004)	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0.000	-20.000	-20.000	0.000	LREF	9 6480 IN
(RCS005)	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0.000	-40.000	-40.000	0.000	BREF	5 8380 IN
						XMRP	1485 0040 IN
						YMRP	0 0000 IN
						ZMRP	377 0004 IN
						SCALE	0 0050

MACH 2.020

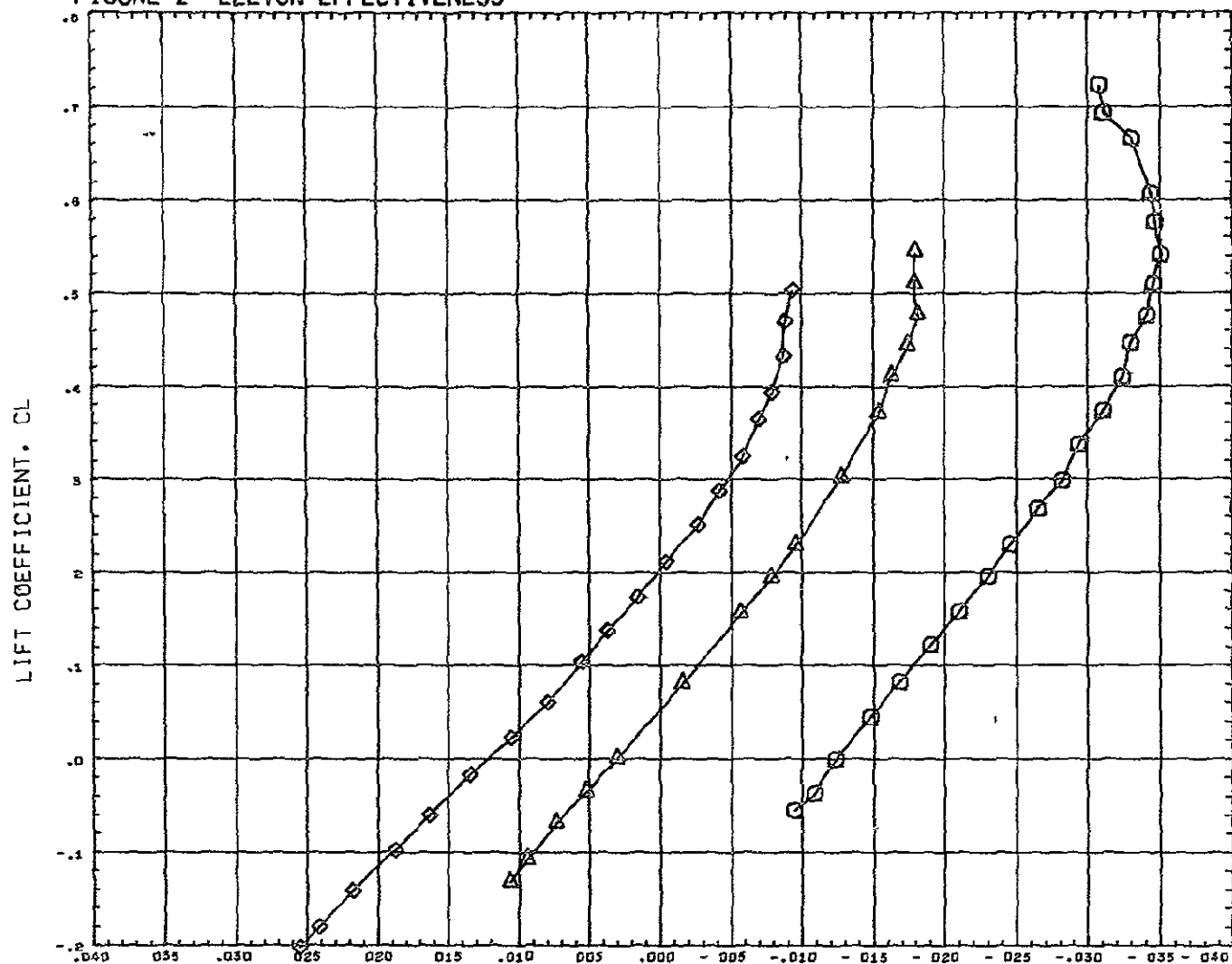
FIGURE 2 ELEVON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDEF	REFERENCE INFORMATION		
(RCS003)	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20.6890	50 IN
(RCS004)	GFST 022 CONF. ROS-NB1 B1W1(-20,-20)V1	0.000	-20.000	-20.000	0.000	LREF	9.6480	IN
(RCS005)	GFST 022 CONF. ROS-NB1 B1W1(-40,-40)V1	0.000	-40.000	-40.000	0.000	BREF	5.8380	IN
						XMRP	1485.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

MACH 2.480

FIGURE 2 ELEVON EFFECTIVENESS

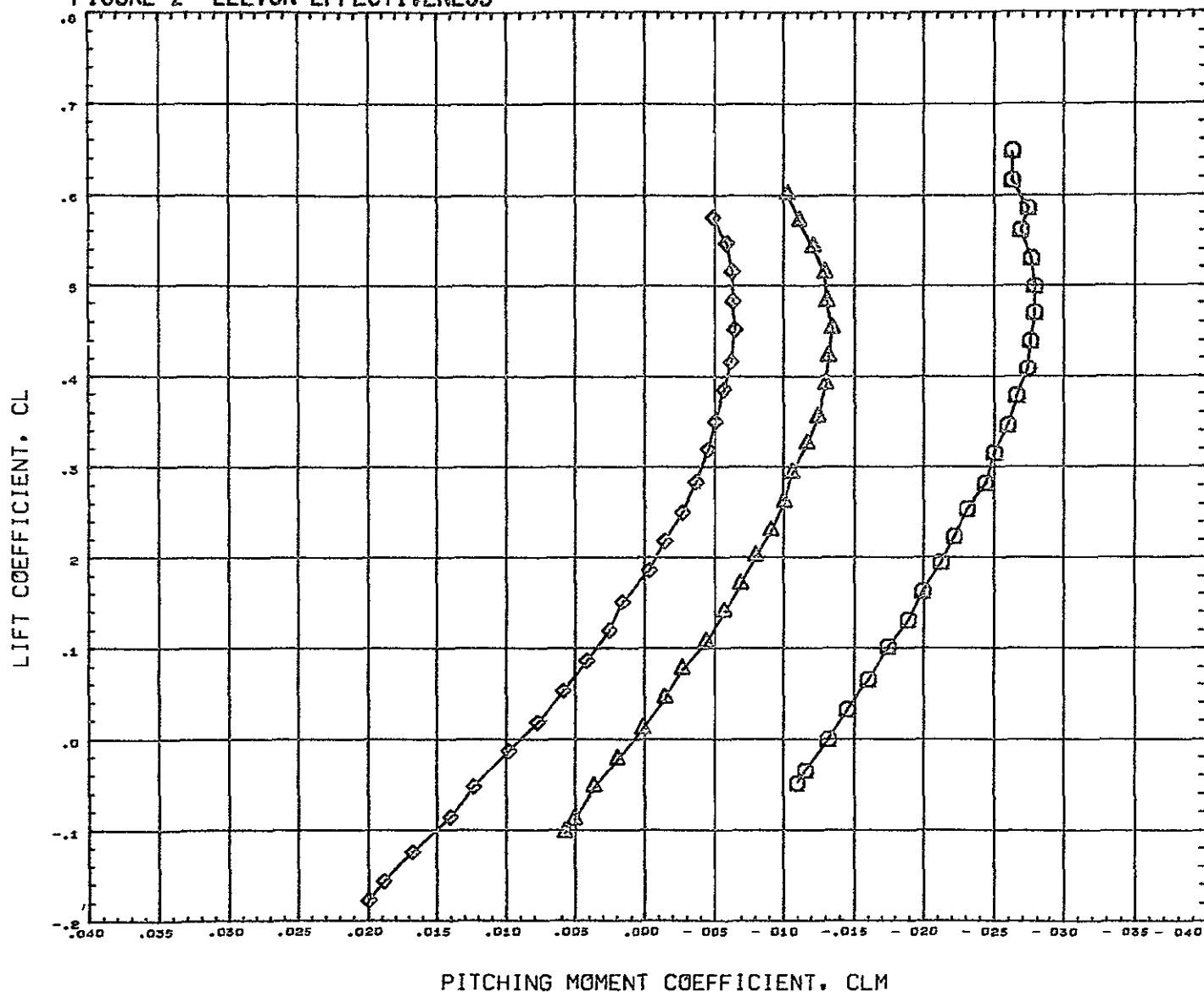


PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RC5003)	GFST 022 CONF ROS-NB1 B1W1 V1	0 000	0 000	0 000	0 000	SREF	20 6890	52 IN
(RC5004)	GFST 022 CONF ROS-NB1 B1W1 (-20, -20) V1	0 000	-20 000	-20 000	0 000	LRFP	9 6480	IN
(RC5005)	GFST 022 CONF ROS-NB1 B1W1 (-40, -40) V1	0 000	-40 000	-40 000	0 000	BRFP	5 8380	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

NACH 1 750

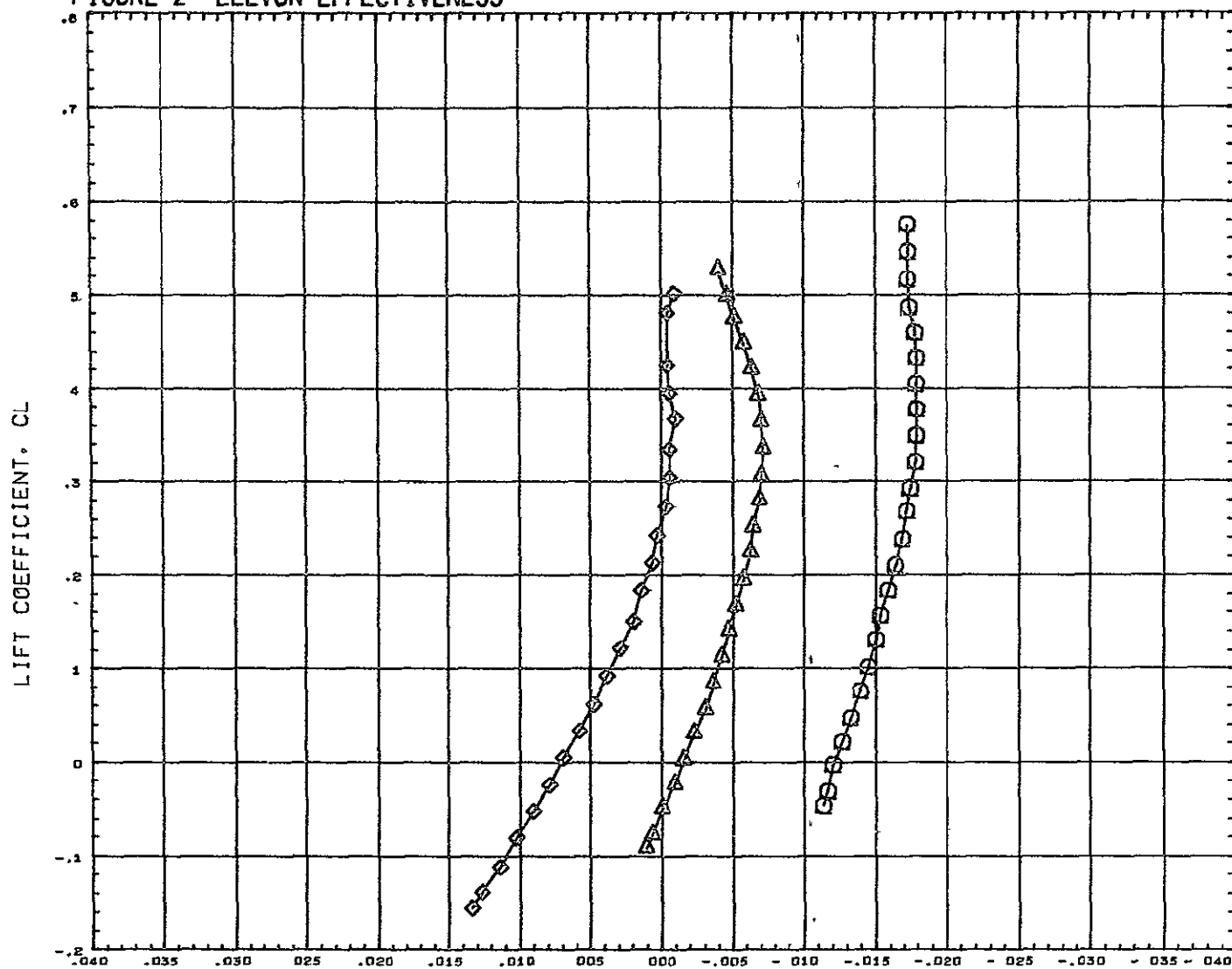
FIGURE 2 ELEVON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	SREF	20 6890	59 IN.
(RCS004)	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0 000	LREF	9 6480	IN
(RCS005)	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40 000	-40 000	0 000	BREF	5 8360	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 2.020

FIGURE 2 ELEVON EFFECTIVENESS

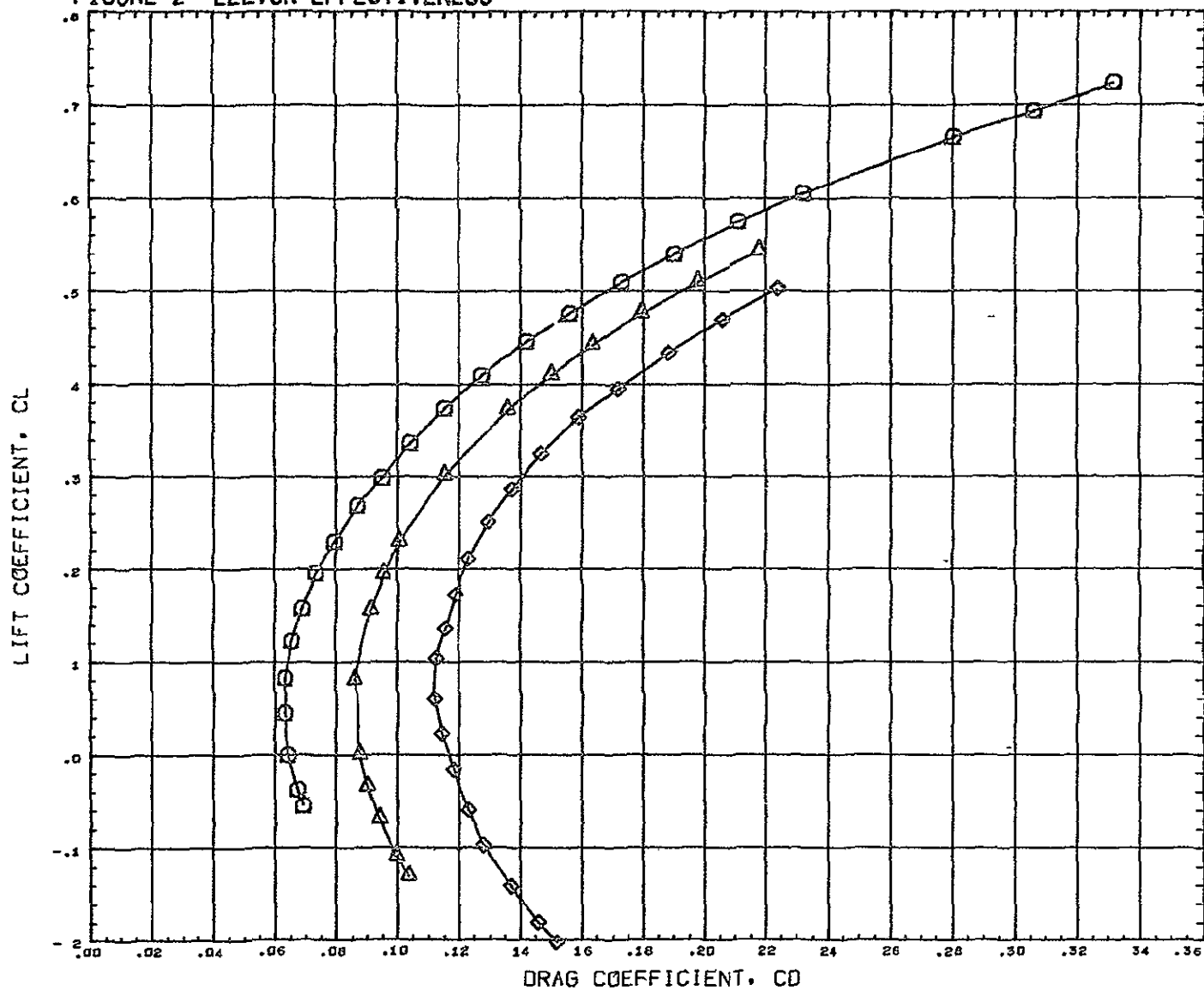


PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS003)	6FST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20.6090	30 IN
(RCS004)	6FST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0.000	-20.000	-20.000	0.000	LREF	9.6480	IN
(RCS005)	6FST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0.000	-40.000	-40.000	0.000	BREF	5.8380	IN
						XMRP	1465.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

MACH 2.480

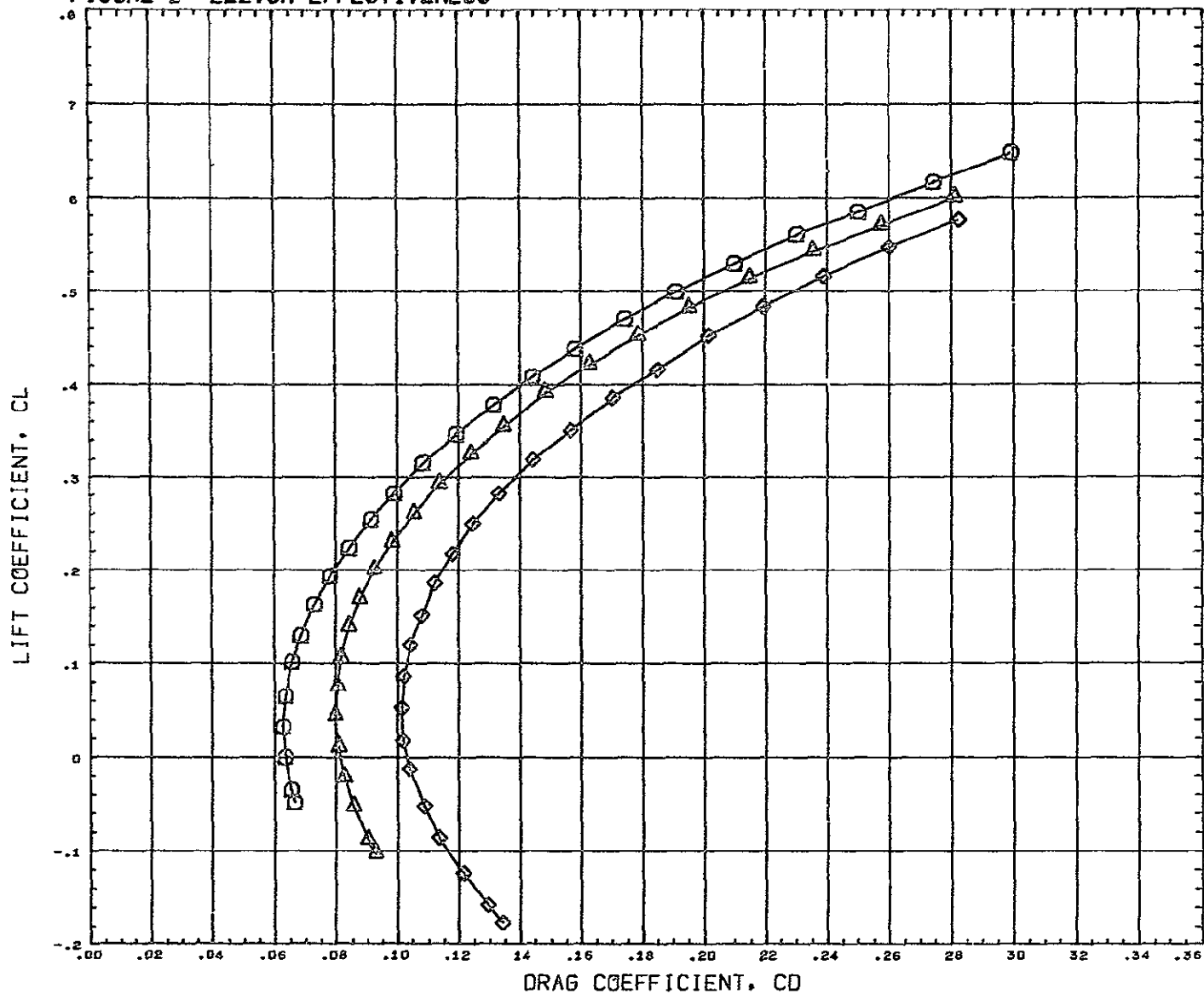
FIGURE 2 ELEVON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20.6890	SQ IN
(RCS004)	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0.000	-20.000	-20.000	0.000	LREF	9.6480	IN
(RCS005)	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0.000	-40.000	-40.000	0.000	BREF	5.8360	IN
						XMRP	1485.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0020	

MACH 1.750

FIGURE 2 ELEVON EFFECTIVENESS

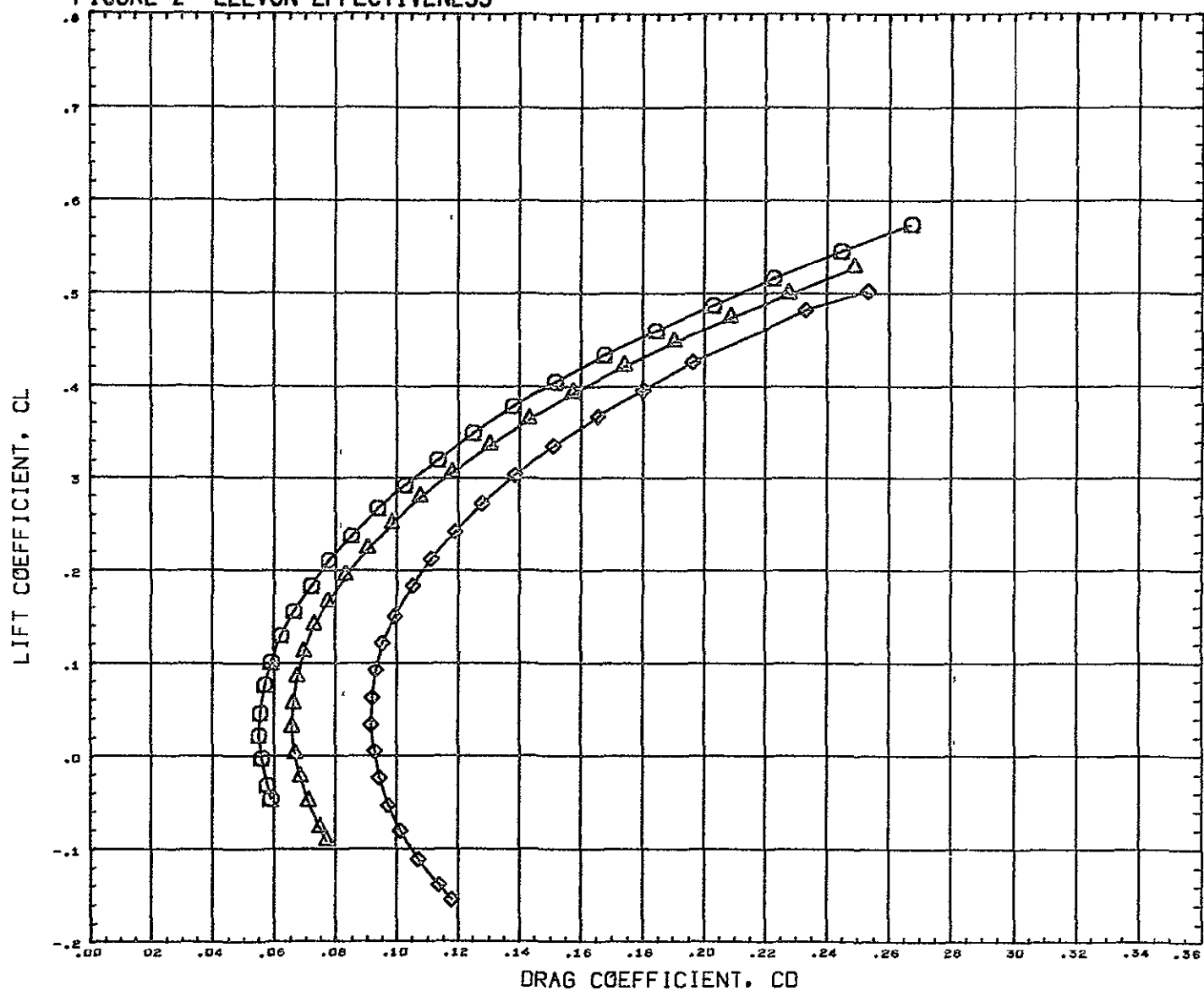


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS003)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS004)	GFST 022 CONF ROS-NB1 B1W1 (-20,-20) V1
(RCS005)	GFST 022 CONF ROS-NB1 B1W1 (-40,-40) V1

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0 000	0 000	0 000	0 000	SREF 20 6890 SQ IN.
0 000	-20 000	-20 000	0 000	LREF 9 6480 IN
0 000	-40 000	-40 000	0 000	BREF 5 8380 IN
				XMRP 1485.0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

FIGURE 2 ELEVON EFFECTIVENESS

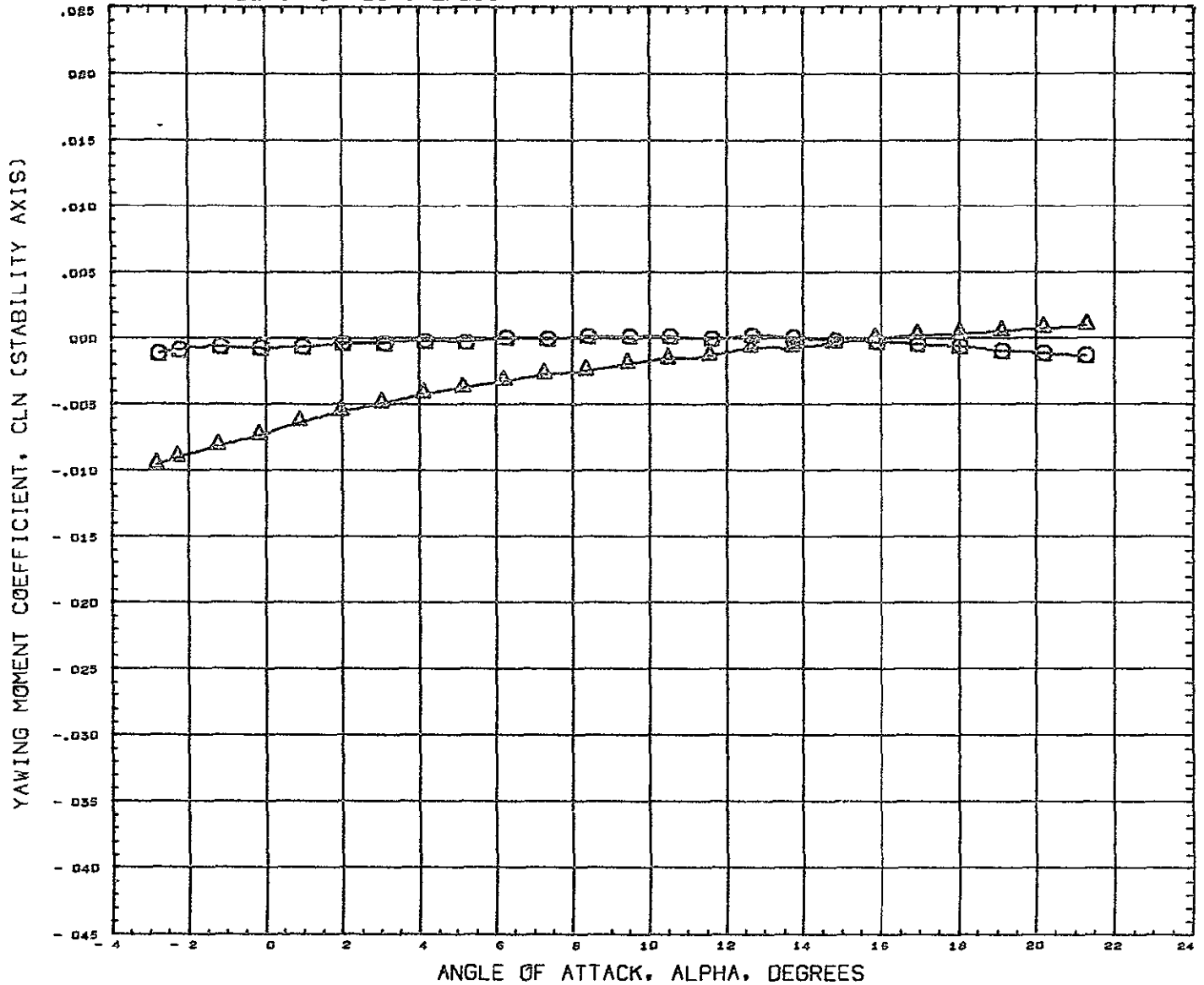


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS003)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS004)	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1
(RCS005)	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0.000	0.000	0.000	0.000	SPEF 20 6890 SQ IN
0.000	-20.000	-20.000	0.000	LREF 9 6480 IN
0.000	-40.000	-40.000	0.000	BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377.0004 IN
				SCALE 0 0050

MACH 2.480

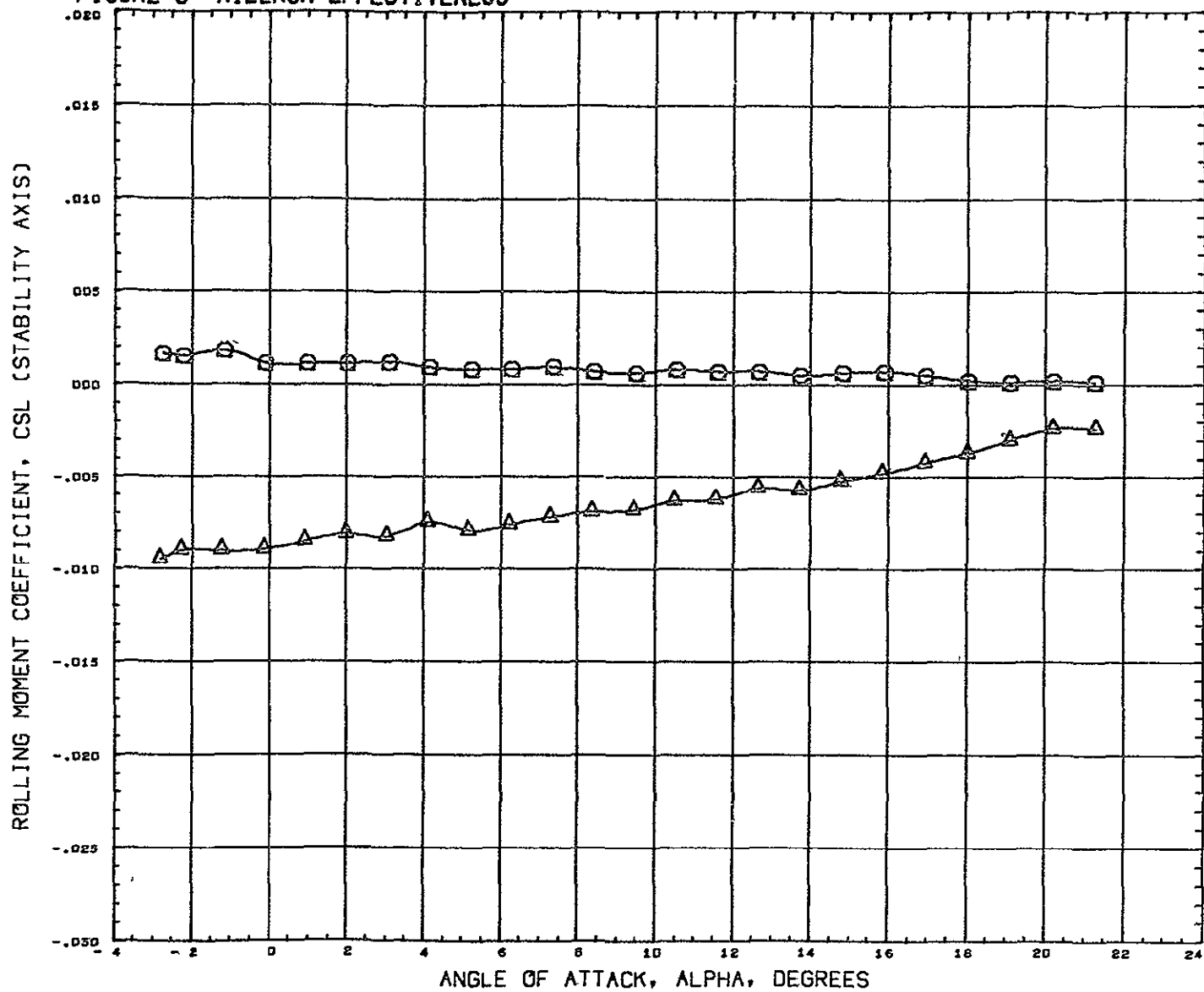
FIGURE 3 AILERON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(ACS003)	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0.000	0 000	0 000	SREF	20 6690	50 IN
(RCS008)	GFST 022 CONF ROS-NB1 B1W1 (-40,-20) V1	0 000	-40.000	-20 000	0 000	LREF	9 6480	IN
						BREF	5 8360	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMPP	377 0004	IN
						SCALE	0 0050	

MACH 2.020

FIGURE 3 AILERON EFFECTIVENESS

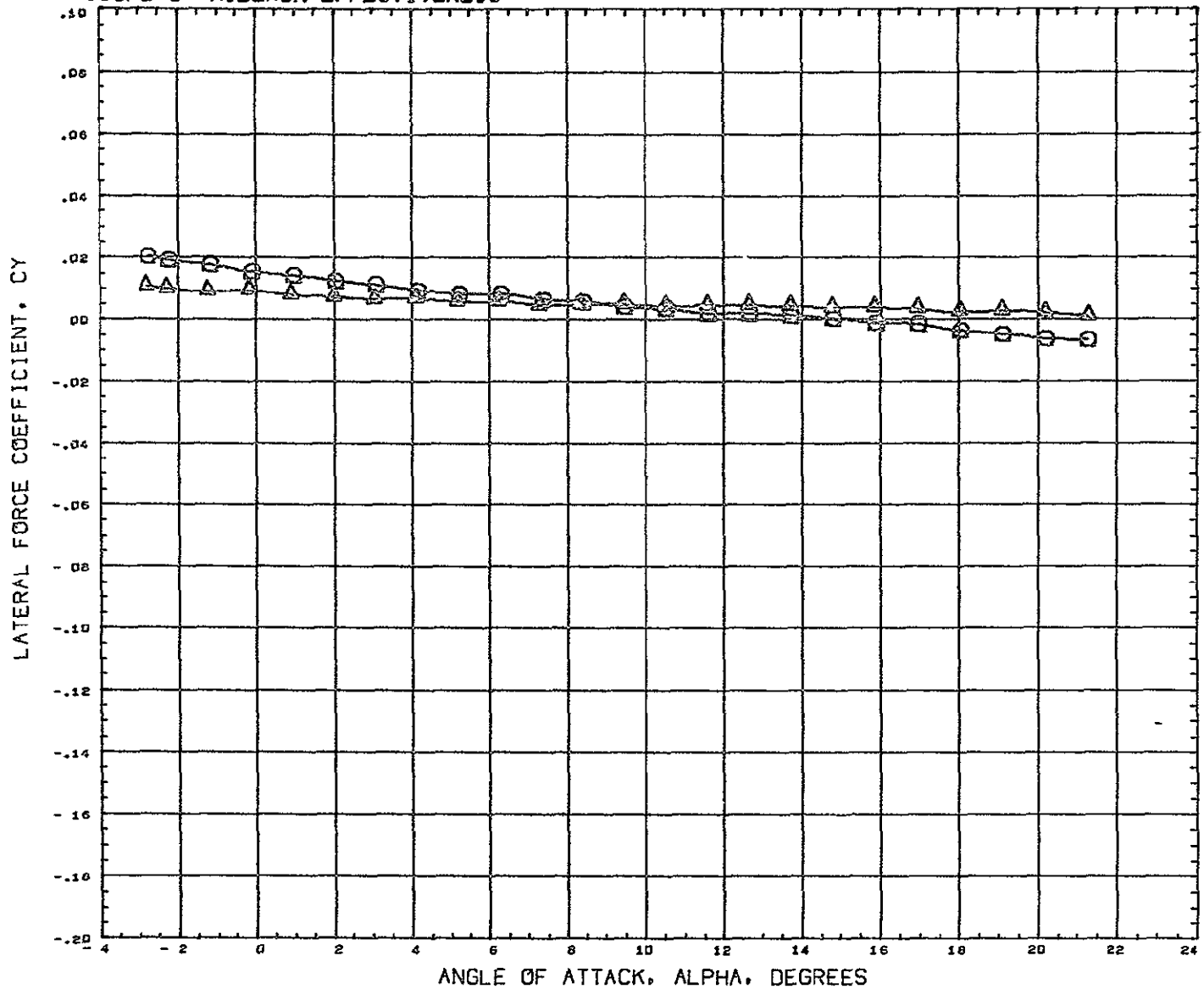


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(ACSD03)	Q GFST 022 CONF ROS-NB1 B1W1V1
(RCS008)	A GFST 022 CONF ROS-NB1 B1W1 (-40,-20) V1

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0.000	0.000	0.000	0.000	SREF 20.6890 SQ IN
0.000	-40.000	-20.000	0.000	LREF 9.6480 IN
				BREF 5.8380 IN
				XMRRP 1485.0040 IN
				YMRRP 0.0000 IN
				ZMRRP 377.0004 IN
				SCALE 0.0050

MACH 2.020

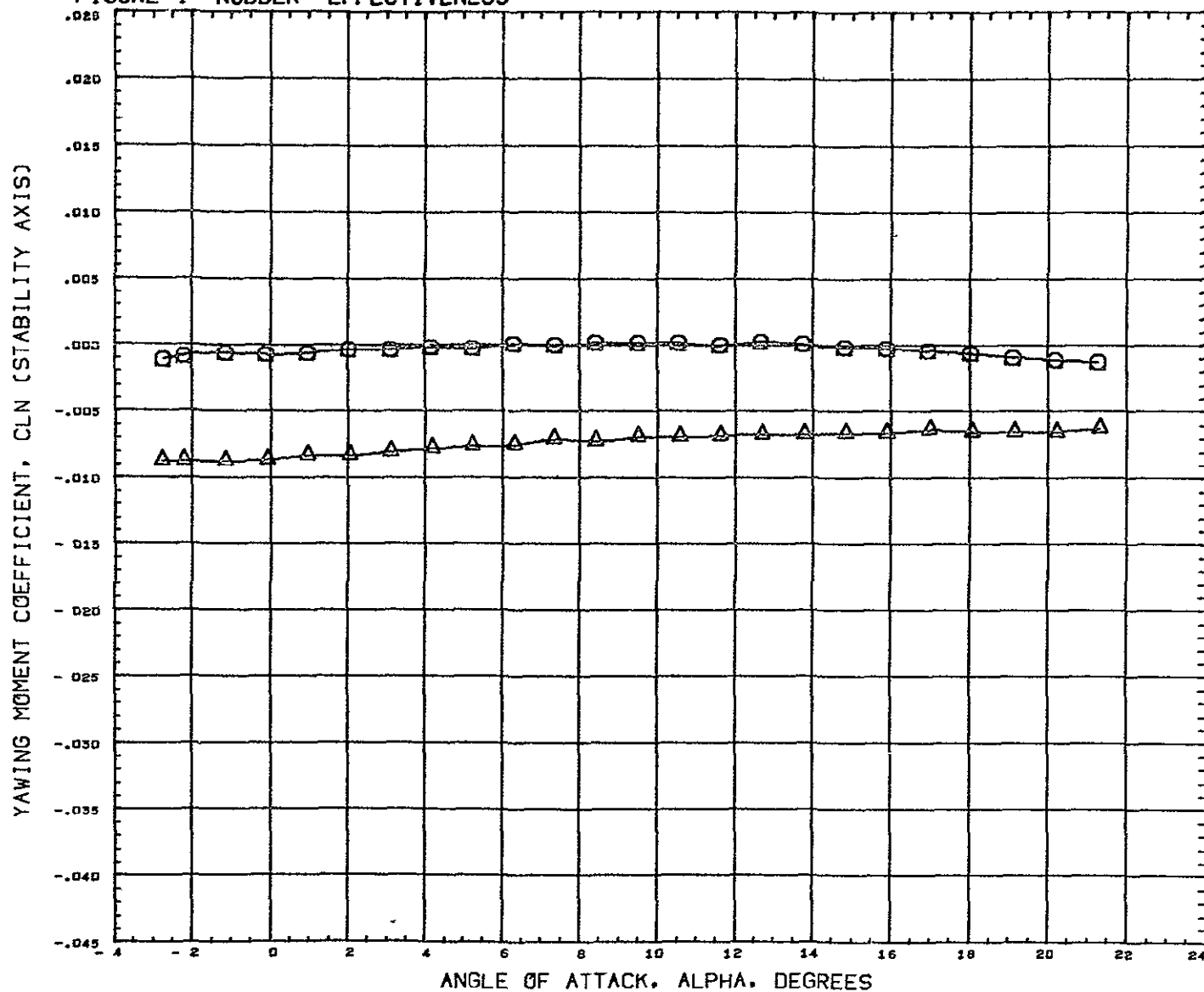
FIGURE 3 AILERON EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(ACSD03)	GFST 022 CONF. ROS-NB1 81W1V1	0 000	0 000	0 000	0 000	SREF	20 6890	S4 IN
(RCS008)	GFST 022 CONF ROS-NB1 81W1 (-40,-20)V1	0 000	-40 000	-20 000	0 000	LREF	9 6480	IN
						BREF	5 8380	IN
						XMRP	1465 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 2 020

FIGURE 4 RUDDER EFFECTIVENESS

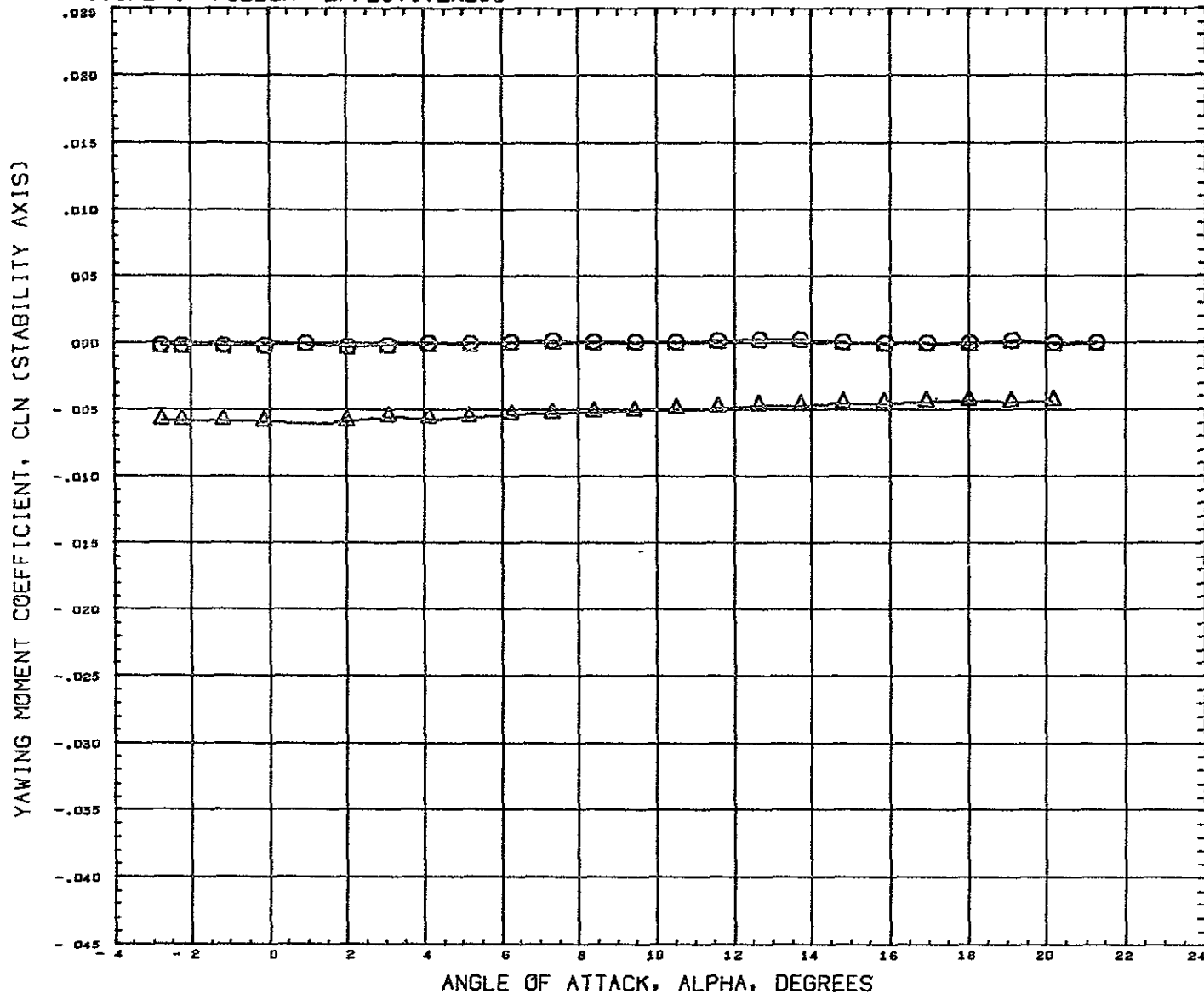


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (BCS003) $\square$ GFST 022 CONF. ROS-NB1 B1W1V1
 (RCS007) $\triangle$ GFST 022 CONF. ROS-NB1 B1W1V1 (10)

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0.000	0 000	0 000	0 000	SREF 20 6890 SQ IN
0 000	0 000	0 000	10 000	LREF 9 6480 IN
				BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0.0050

MACH 2.020

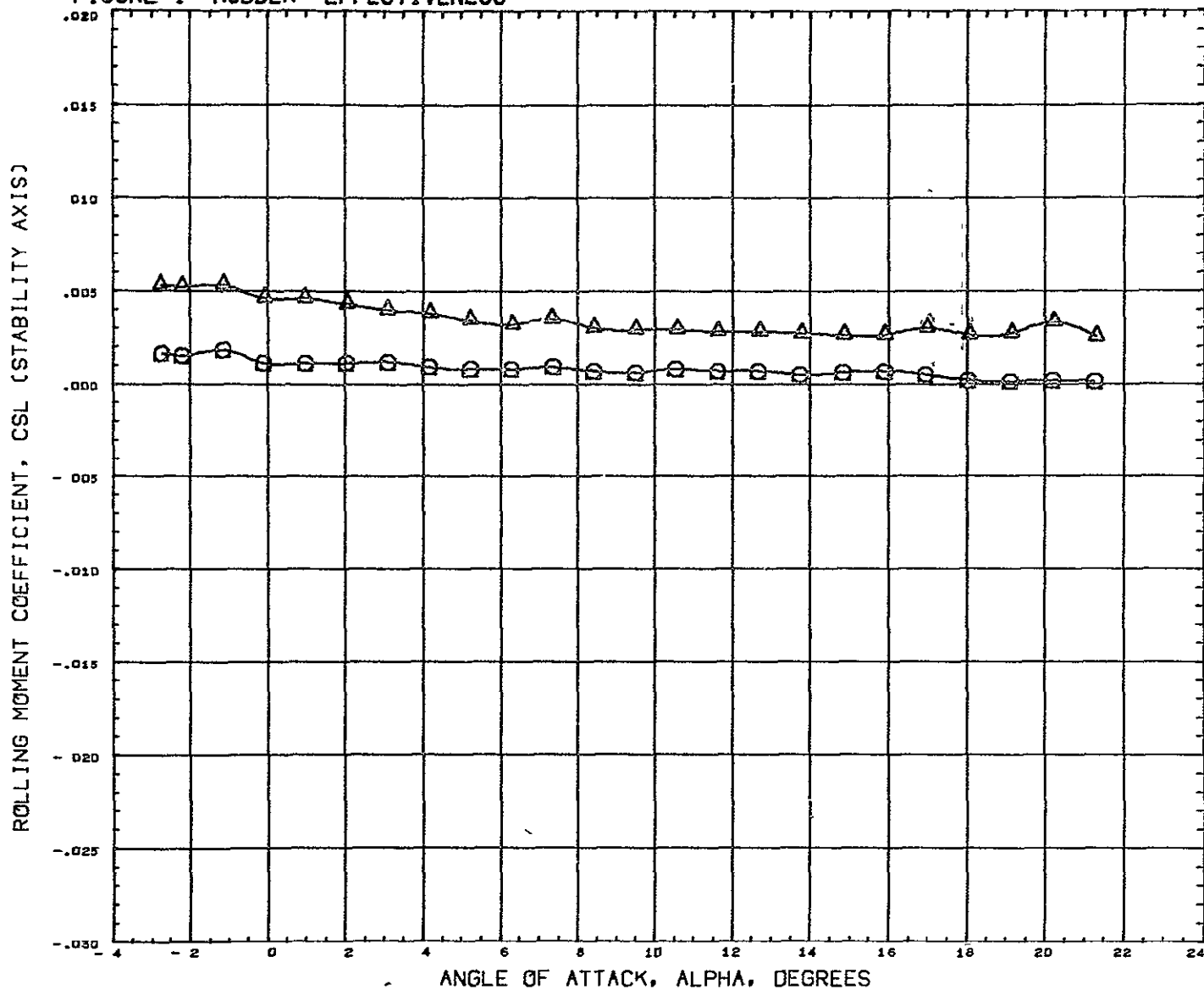
FIGURE 4 RUDDER EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(BCS003)	Q GFST 022 CONF ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000	SREF	20 6890	Sq IN
(RCS007)	A GFST 022 CONF ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000	LREF	9 6480	IN
						BREF	5 8380	IN
						XMRF	1485 0040	IN
						YMRF	0 0000	IN
						ZMRF	377 0004	IN
						SCALE	0 0050	

MACH 2.480

FIGURE 4 RUDDER EFFECTIVENESS

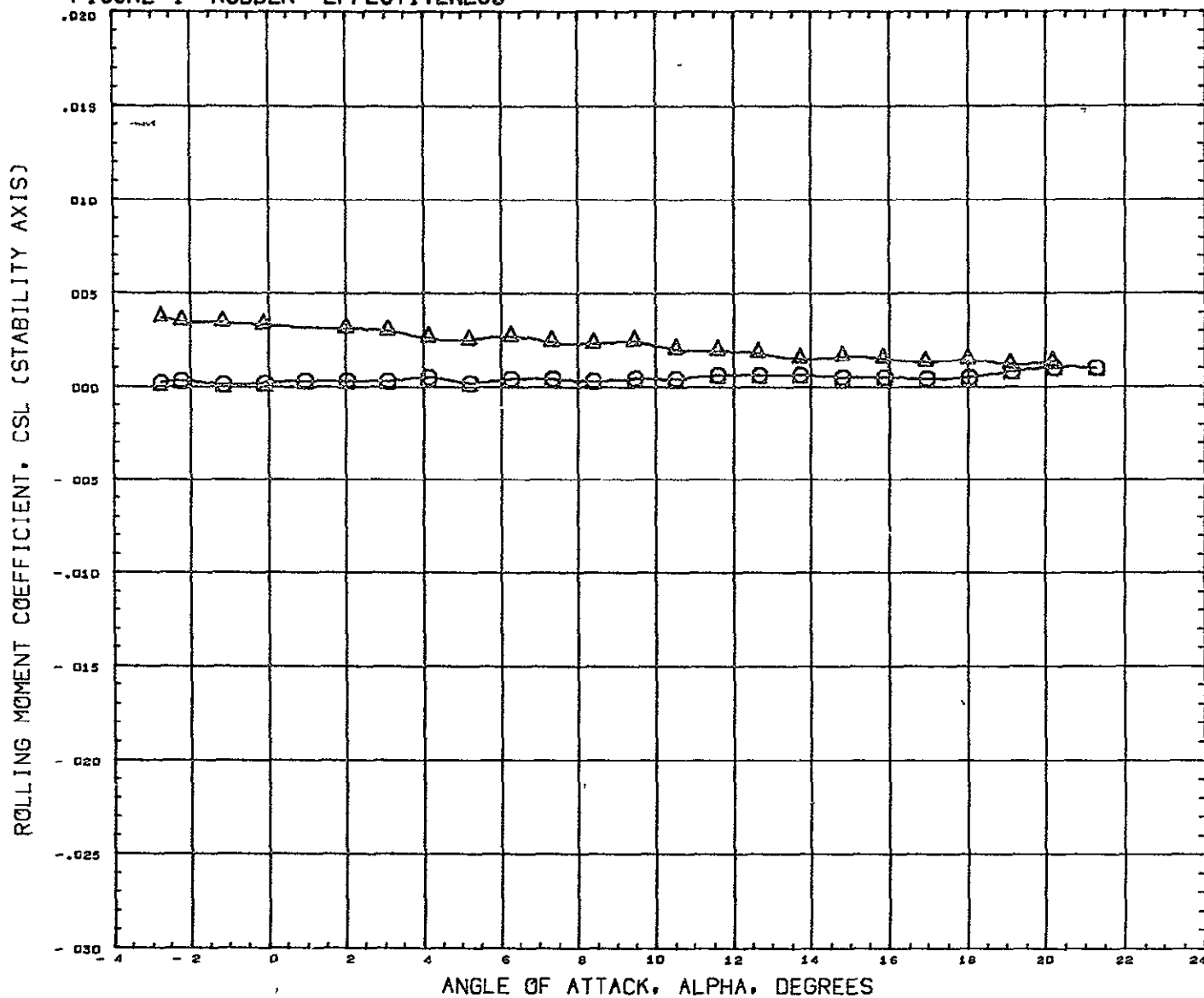


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(BCSD03) 	GFST 022 CONF ROS-NB1 B1W1V1
(RCS007) 	GFST 022 CONF ROS-NB1 B1W1V1(10)

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0 000	0 000	0 000	0 000	SREF 20 6890 SQ IN
0 000	0 000	0 000	10 000	LREF 9 6480 IN
				BREF 5 8360 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2.020

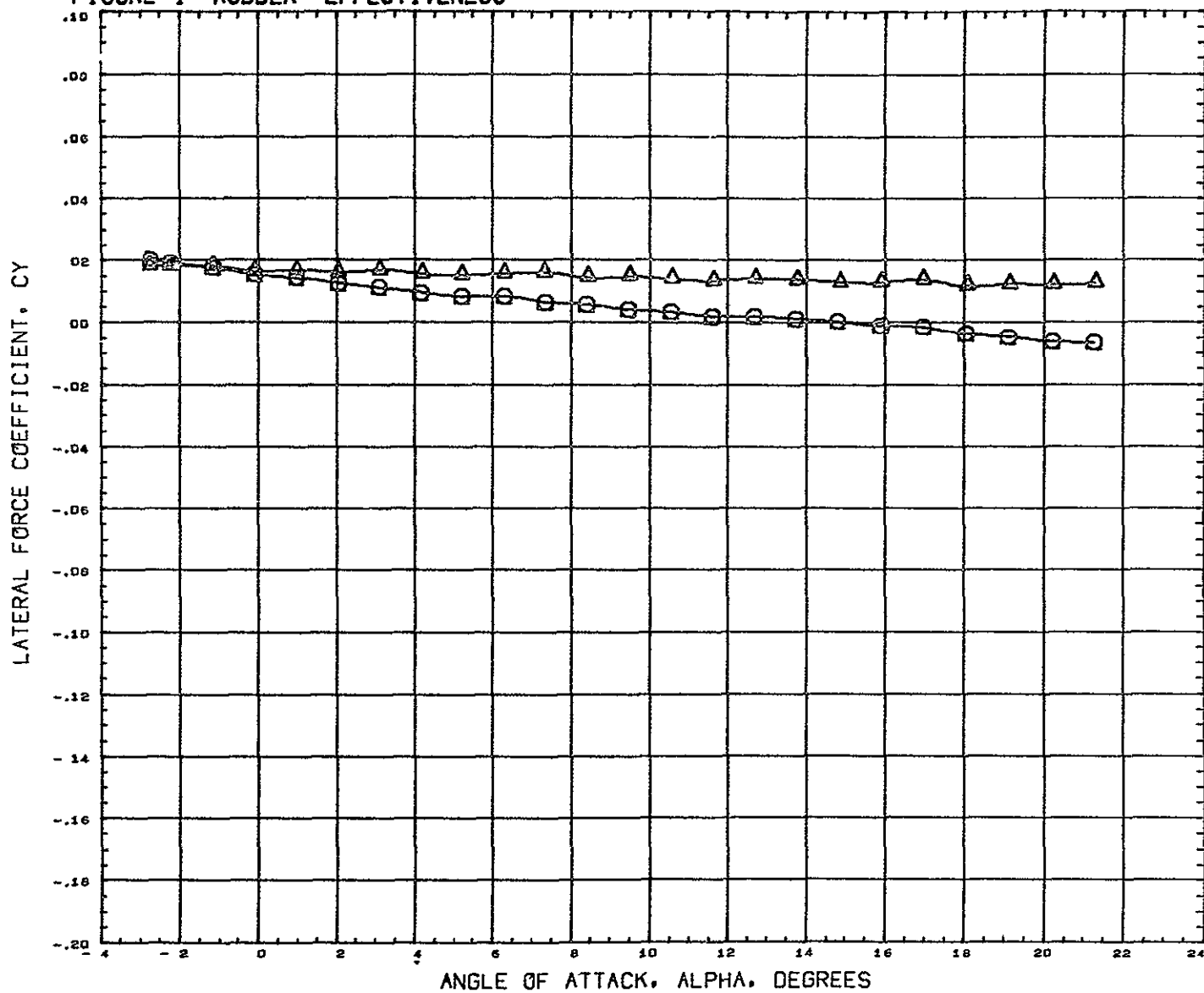
FIGURE 4 RUDDER EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(BC5003)	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20.5690	SQ IN
(RC5007)	GFST 022 CONF. ROS-NB1 B1W1V1 (10)	0.000	0.000	0.000	10.000	LREF	9.6460	IN
						BREF	5.8360	IN
						XHRP	1485.0040	IN
						YHRP	0.0000	IN
						ZHRP	377.0004	IN
						SCALE	0.0050	

MACH 2.480

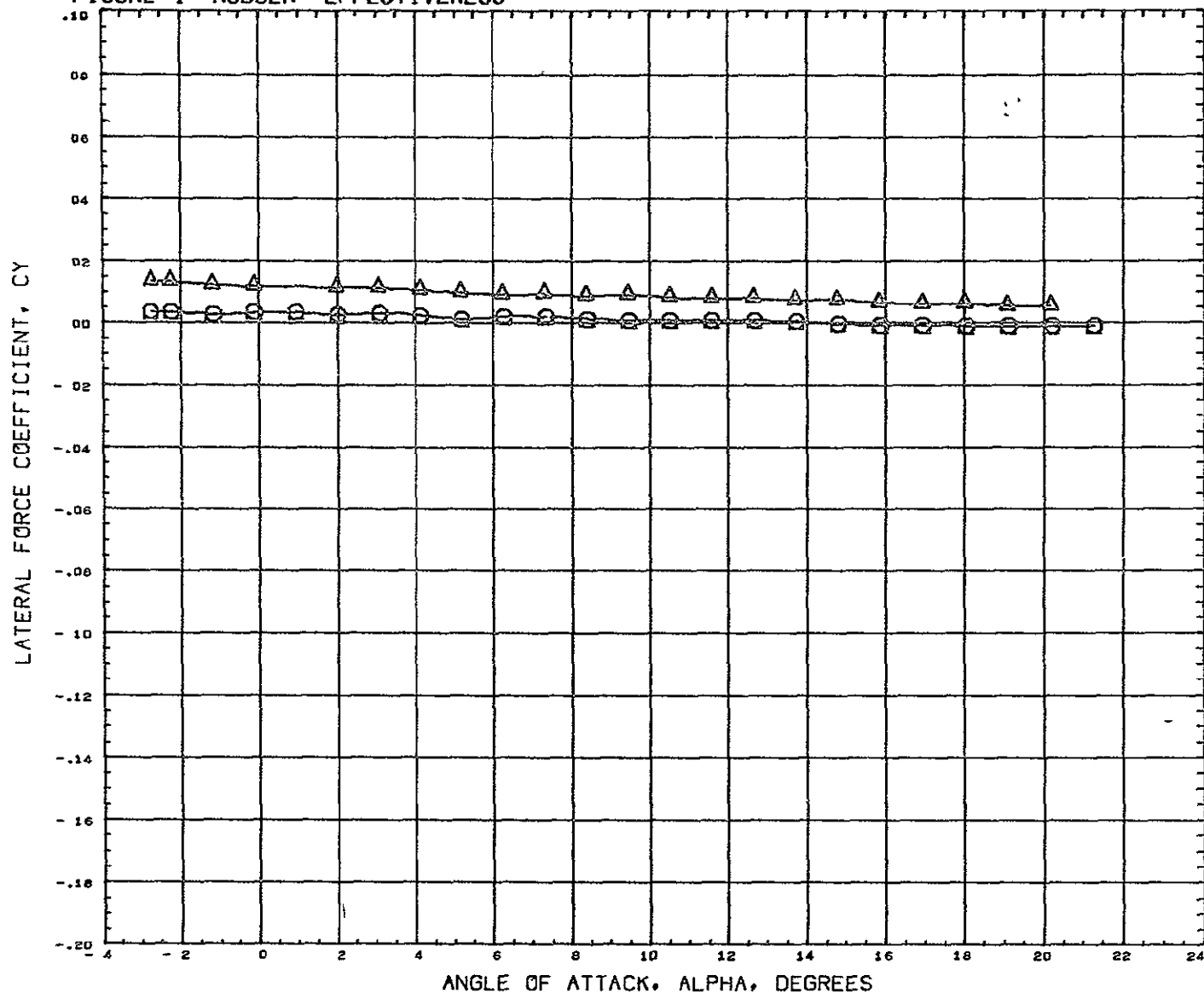
FIGURE 4 RUDDER EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(BCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF	20.6890	SQ IN
(RCS007)	GFST 022 CONF ROS-NB1 B1W1V1 (10)	0.000	0.000	0.000	10.000	LREF	9.6480	IN
						BREF	5.8380	IN
						XMRP	1485.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

MACH 2.020

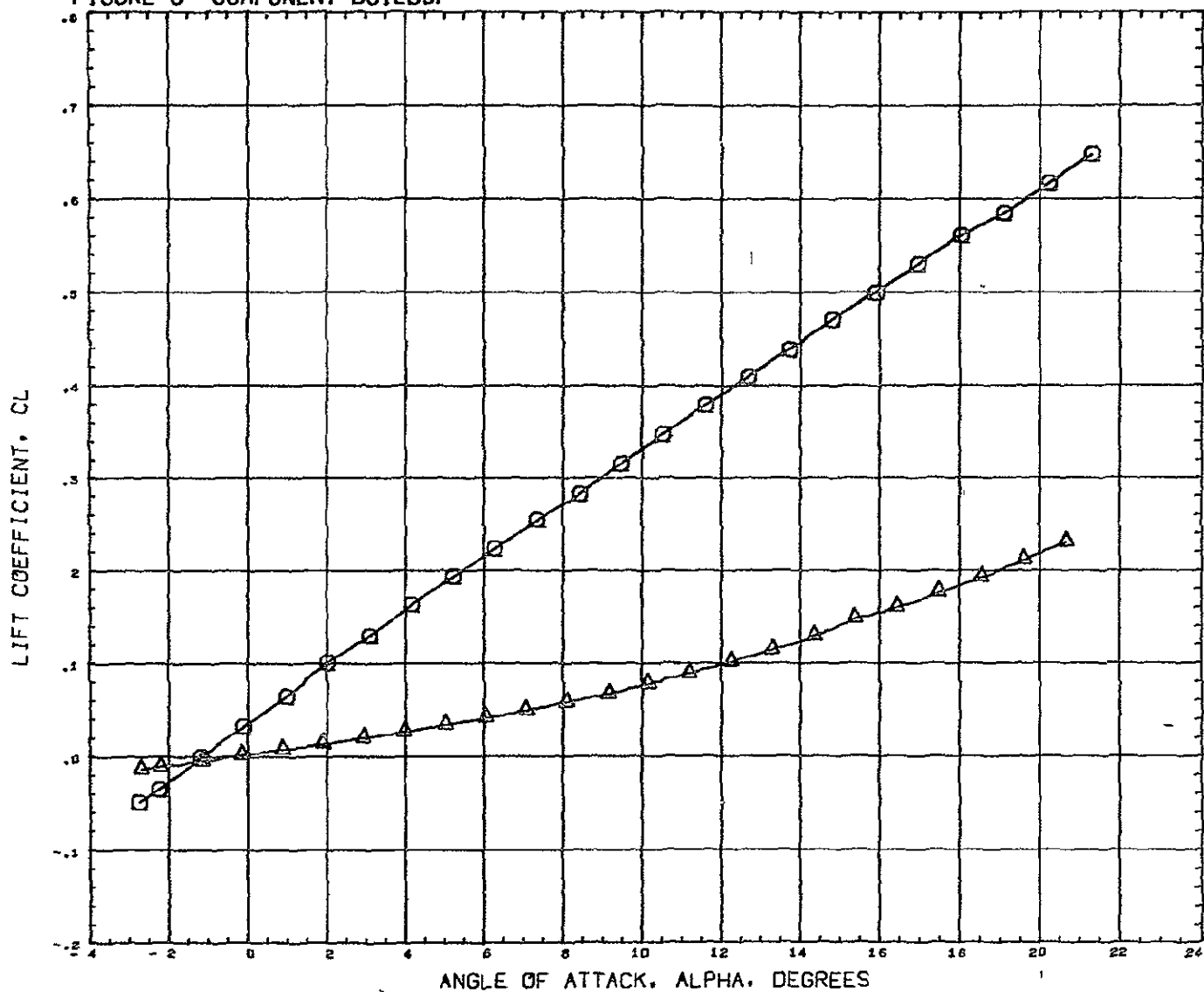
FIGURE 4 RUDDER EFFECTIVENESS



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(BCS003)	GFST D22 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	SREF	20 6890	SQ IN
(RCS007)	GFST D22 CONF ROS-NB1 B1W1V1 (10)	0 000	0 000	0 000	10 000	LREF	9 6480	IN
						BREF	5 6380	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377.0004	IN
						SCALE	0 0050	

MACH 2 480

FIGURE 5 COMPONENT BUILDUP



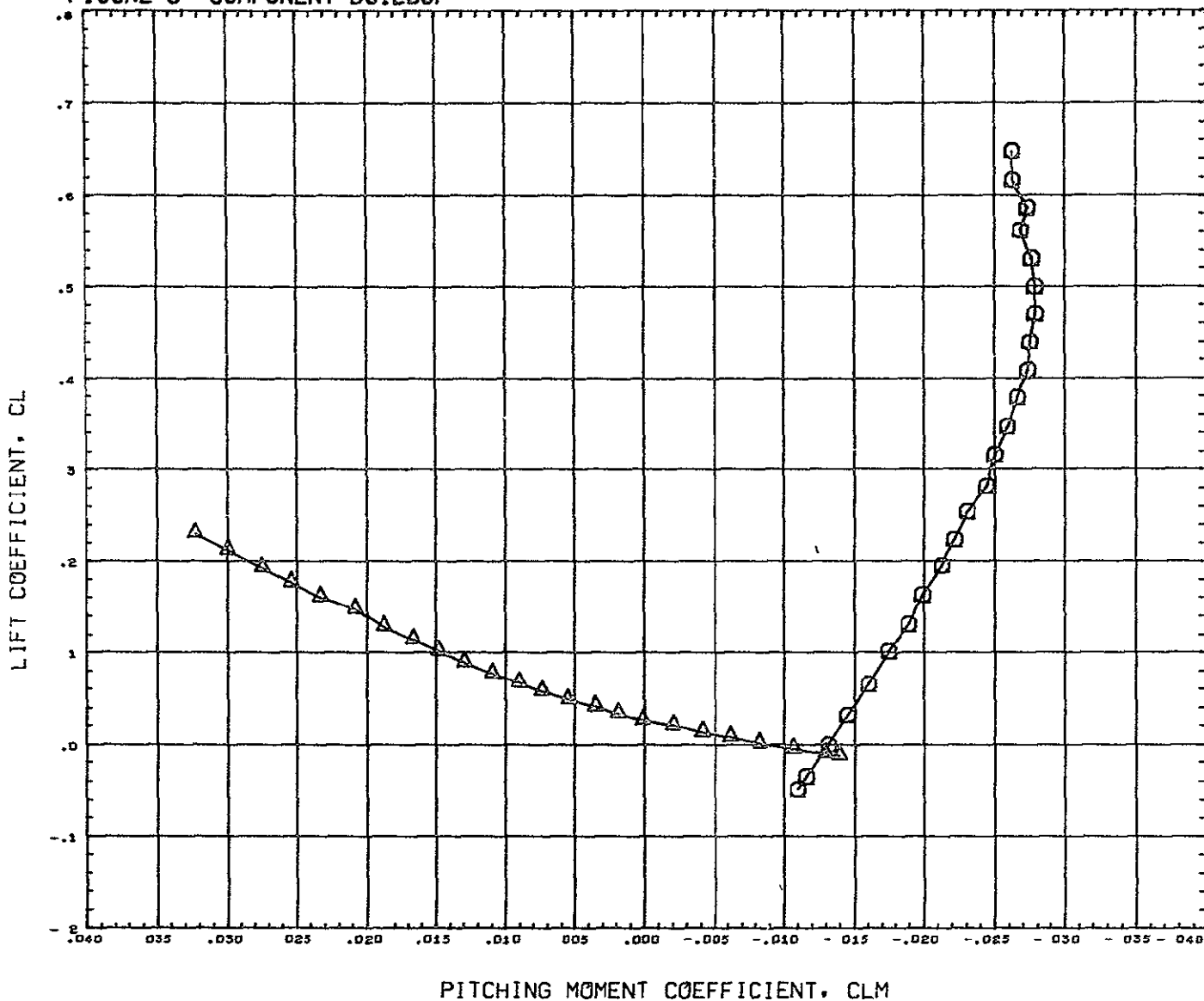
DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (ACSD03) $\square$ GFST D22 CONF ROS-NB1 B1W1v1
 (RCS016) $\triangle$ GFST D22 CONF ROS-NB1 B1

BETA LELEVN RELEVN RUDDER
 0 000 0 000 0 000 0 000
 0 000

REFERENCE INFORMATION
 SREF 20 6890 SQ IN
 LREF 9 6480 IN
 BREF 5 8380 IN
 XMRP 1485 0040 IN
 YMRP 0 0000 IN
 ZMRP 377 0004 IN
 SCALE 0 0050

MACH 2.020

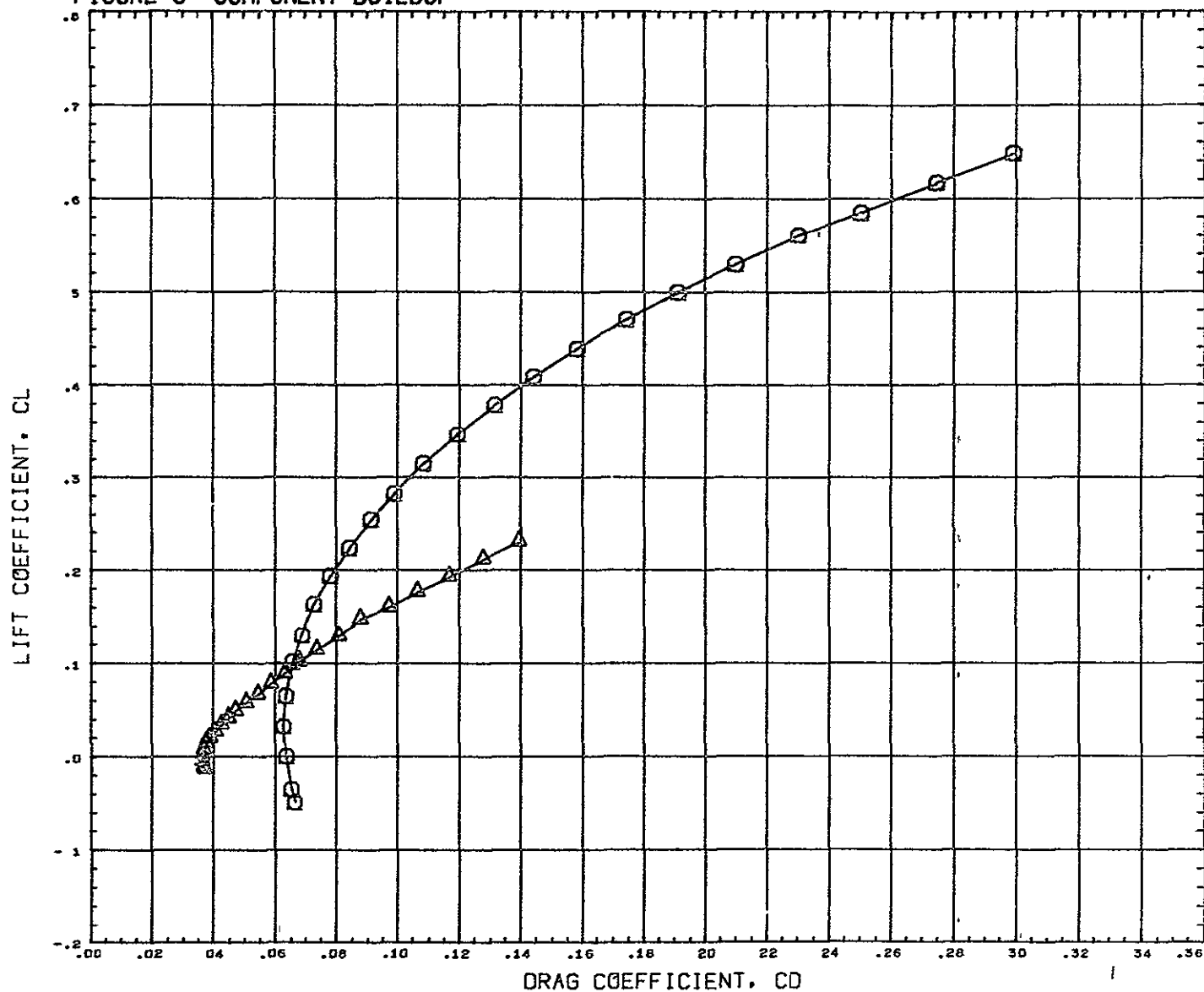
FIGURE 5 COMPONENT BUILDUP



DATA SET SYMBOL		CONFIGURATION DESCRIPTION		BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(ACS003)	Q	GFST 022 CONF.	ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	SREF	20 6890	50 IN
(RCS016)	A	GFST 022 CONF	ROS-NB1 B1	0 000				LREF	9 6480	IN
								BREF	5 6380	IN
								XMRP	1485 0040	IN
								YMRP	0 0000	IN
								ZMRP	377 0004	IN
								SCALE	0 0050	

MACH 2 020

FIGURE 5 COMPONENT BUILDUP

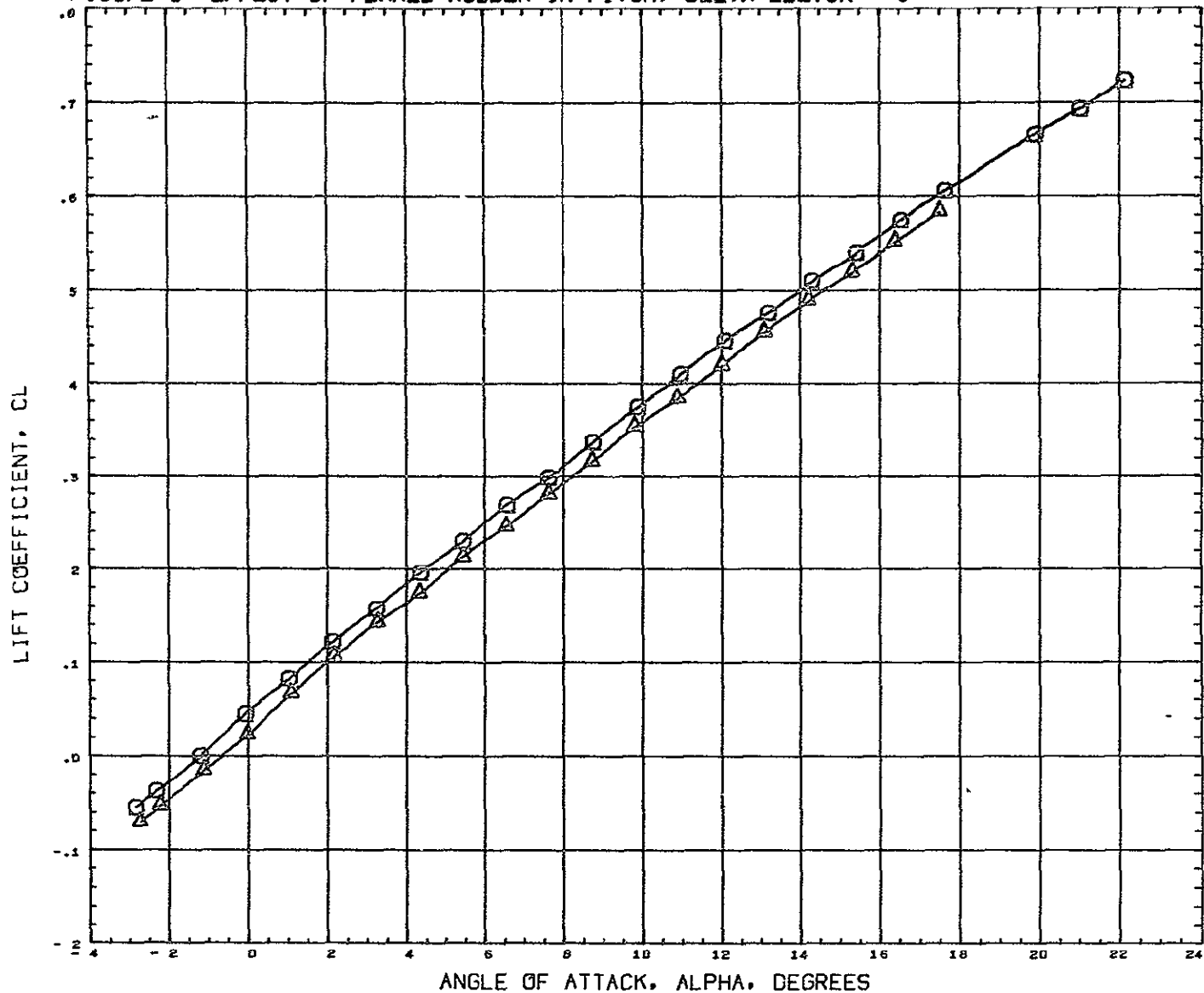


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(ACSD03)	GFST 022 CONF ROS-ND1 B1W1V1
(RCS016)	GFST 022 CONF ROS-NB1 B1

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0 000	0 000	0 000	0 000	SREF 20 6890 SQ.IN
0 000				LREF 9 6480 IN
				BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

FIGURE 6 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = 0

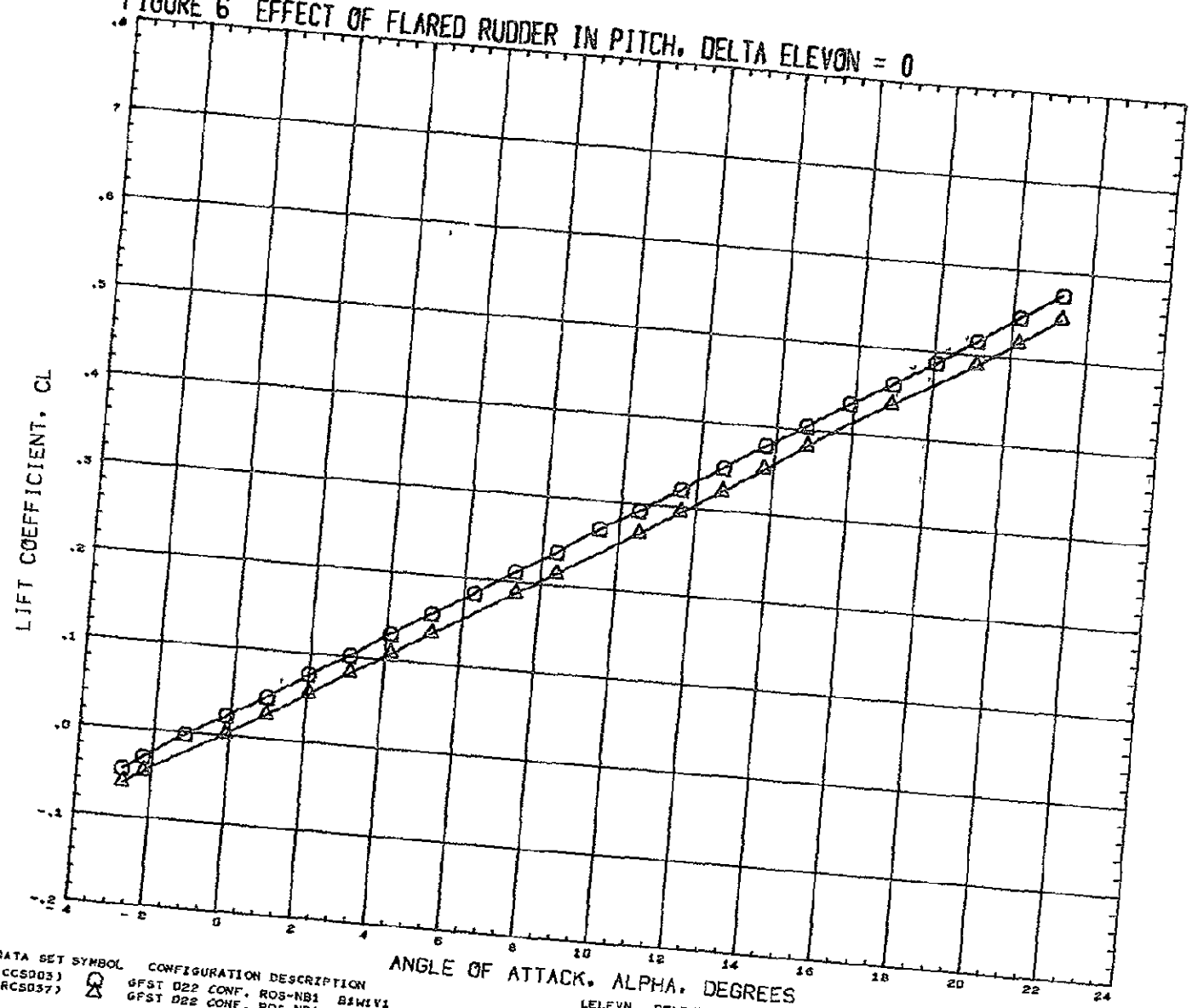


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR	REFERENCE INFORMATION		
(CCSD03)	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000			SREF	20.6890	50 IN
(RCS037)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0.000	0.000	-30.000	30.000	LREF	9.6480	IN
						BREF	5.8380	IN
						XMRP	1485.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

MACH 1.750

2

FIGURE 6 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = 0



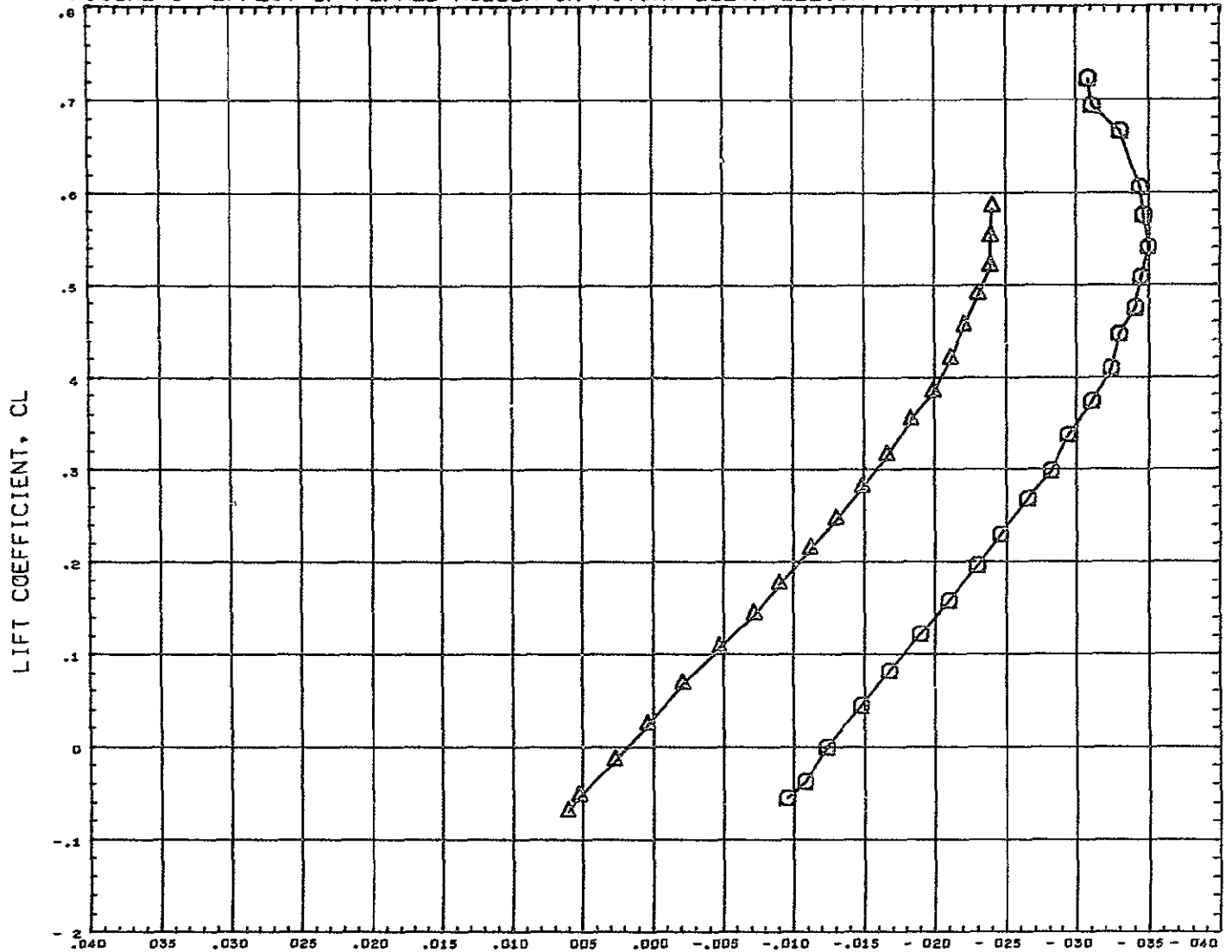
DATA SET SYMBOL (CCS003) (RCS037) CONFIGURATION DESCRIPTION GFST D22 CONF. ROS-NB1 B1W1V1 GFST D22 CONF. ROS-NB1 B1W1V1 (-30,30)

MACH 2.400

LELEVN 0.000 0.000 0.000 RELEVN 0.000 0.000 0.000 LRUDDR -30.000 30.000 BRUDDR

REFERENCE INFORMATION
 SREF 20.6000 SQ IN
 LREF 3.6400 IN
 BREF 3.8380 IN
 XHRP 1485.0040 IN
 YHRP 0.0000 IN
 ZHRP 377.0004 IN
 SCALE 0.0050

FIGURE 6 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = 0

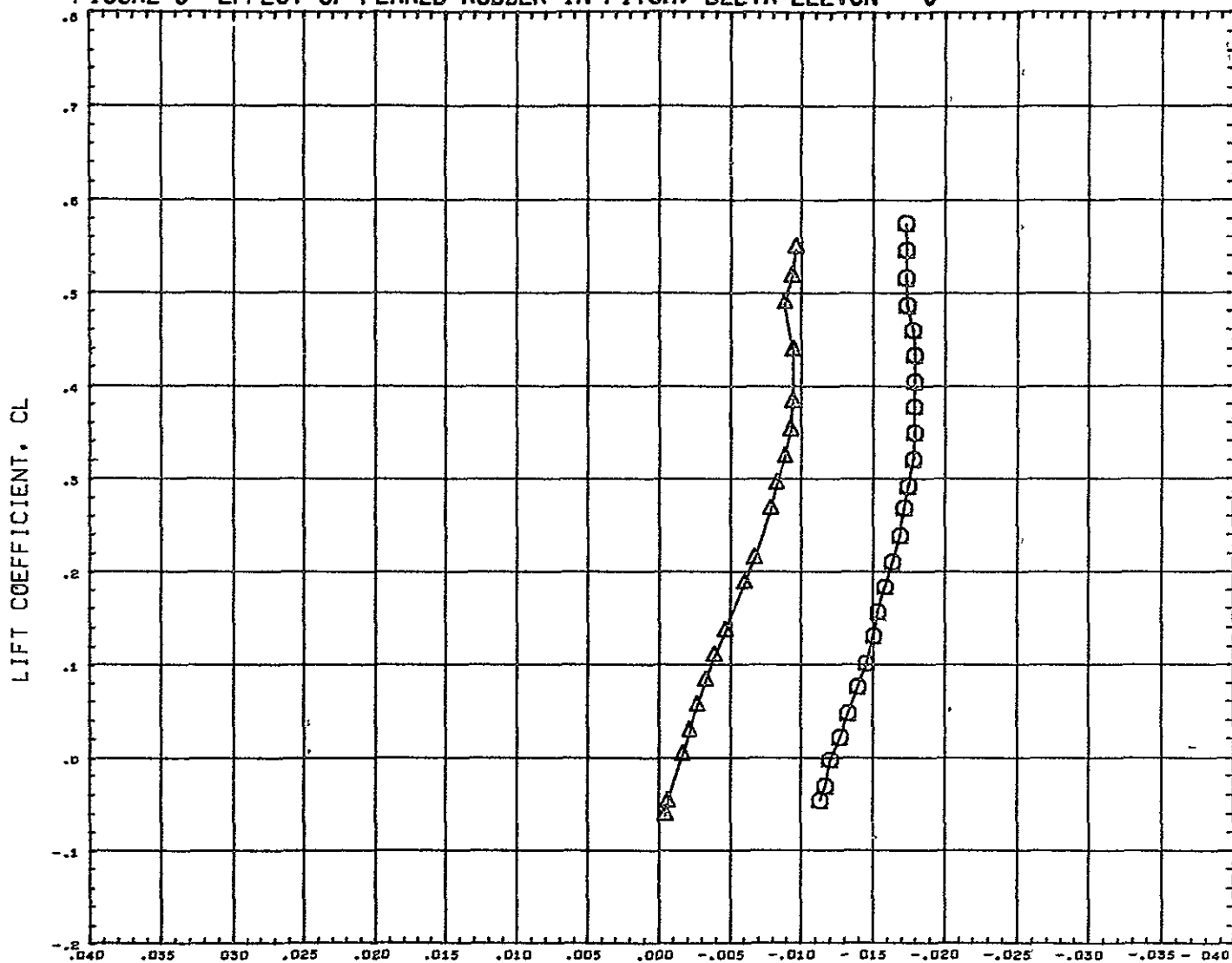


PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR	REFERENCE INFORMATION		
(CCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000			SREF	20 6890	SQ IN
(RCS037)	GFST 022 CCHF ROS-NB1 B1W1V1 (-30,30)	0 000	0 000	-30 000	30 000	LREF	9 6480	IN
						BREF	5 8380	IN
						XMRF	1485 0040	IN
						YMRF	0 0000	IN
						ZMRF	377 0004	IN
						SCALE	0 0050	

MACH 1 750

FIGURE 6 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = 0



PITCHING MOMENT COEFFICIENT, CLM

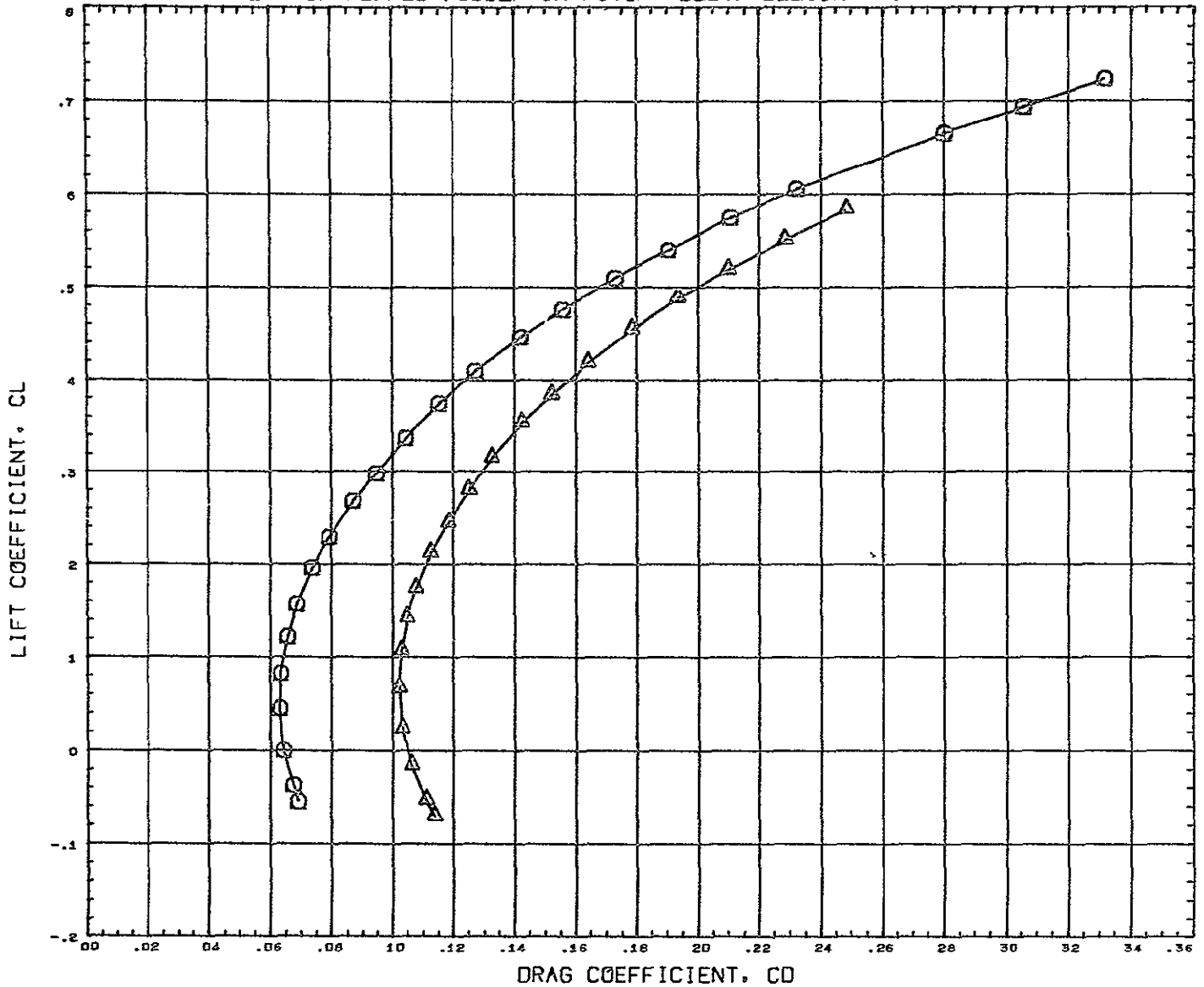
DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (CCS003) Q GFST 022 CONF ROS-NB1 BiW1V1
 (RCS037) A GFST 022 CONF ROS-NB1 BiW1V1 (-30,30)

LELEVN RELEVN LRUDDR RRUDDR
 0 000 0 000
 0 000 0 000 -30 000 30 000

REFERENCE INFORMATION
 SREF 20 6890 SQ IN
 LREF 9 6480 IN.
 BREF 5 8380 IN
 XMRP 1485 0040 IN
 YMRP 0 0000 IN
 ZMRP 377 0004 IN
 SCALE 0 0050

MACH 2.480

FIGURE 6 EFFECT OF FLARED RUDDER IN PITCH. DELTA ELEVON = 0

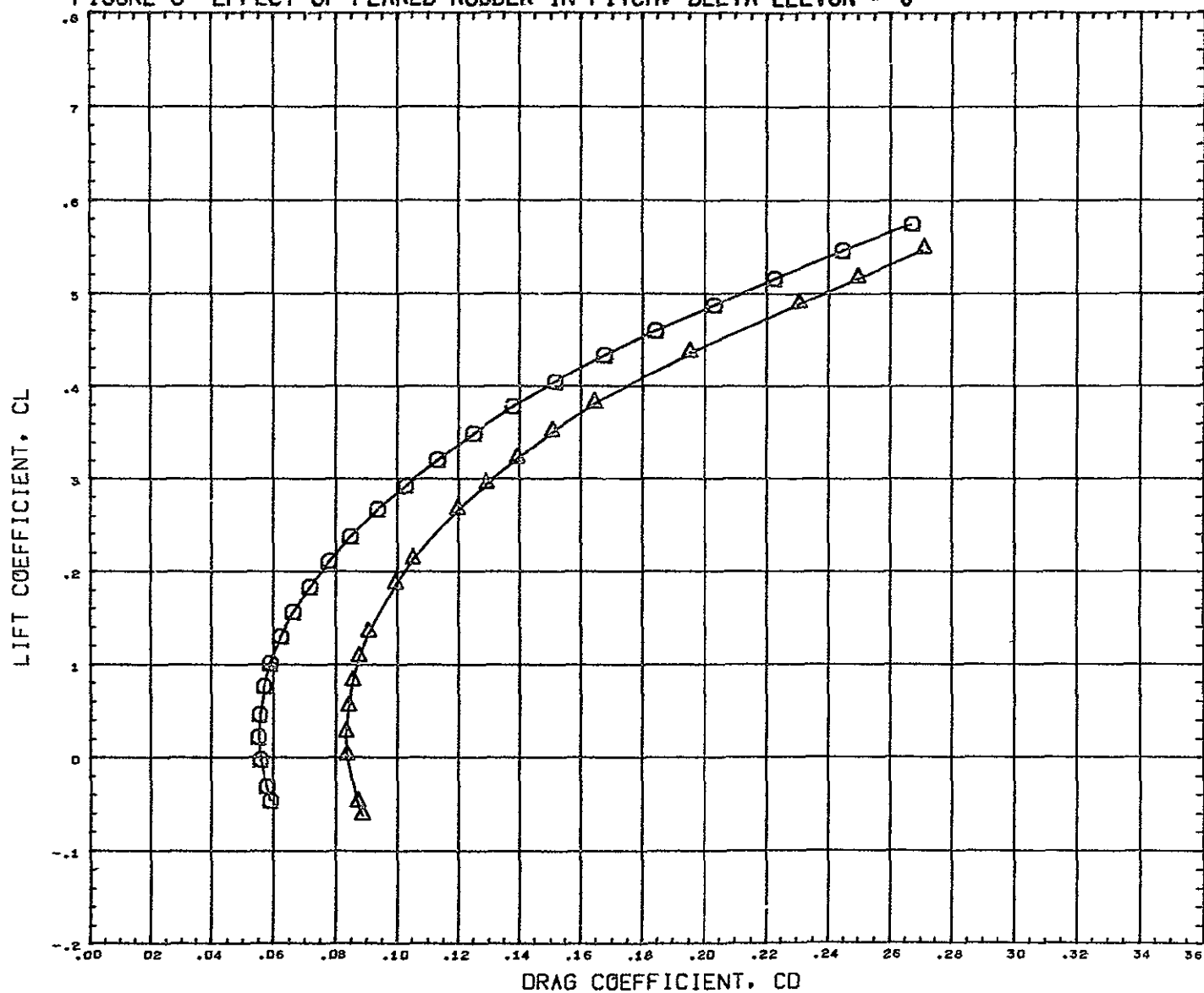


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (CCSD03) GFST 022 CONF ROS-NB1 B1W1V1
 (RCSE37) GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

LELEVN	RELEVN	LRUDDR	RRUDDR	REFERENCE INFORMATION
0.000	0.000	0.000	0.000	SREF 20 6890 SQ IN
0.000	0.000	-30.000	30.000	LREF 9 6480 IN
				BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 1.750

FIGURE 6 EFFECT OF FLARED RUDDER IN PITCH. DELTA ELEVON = 0

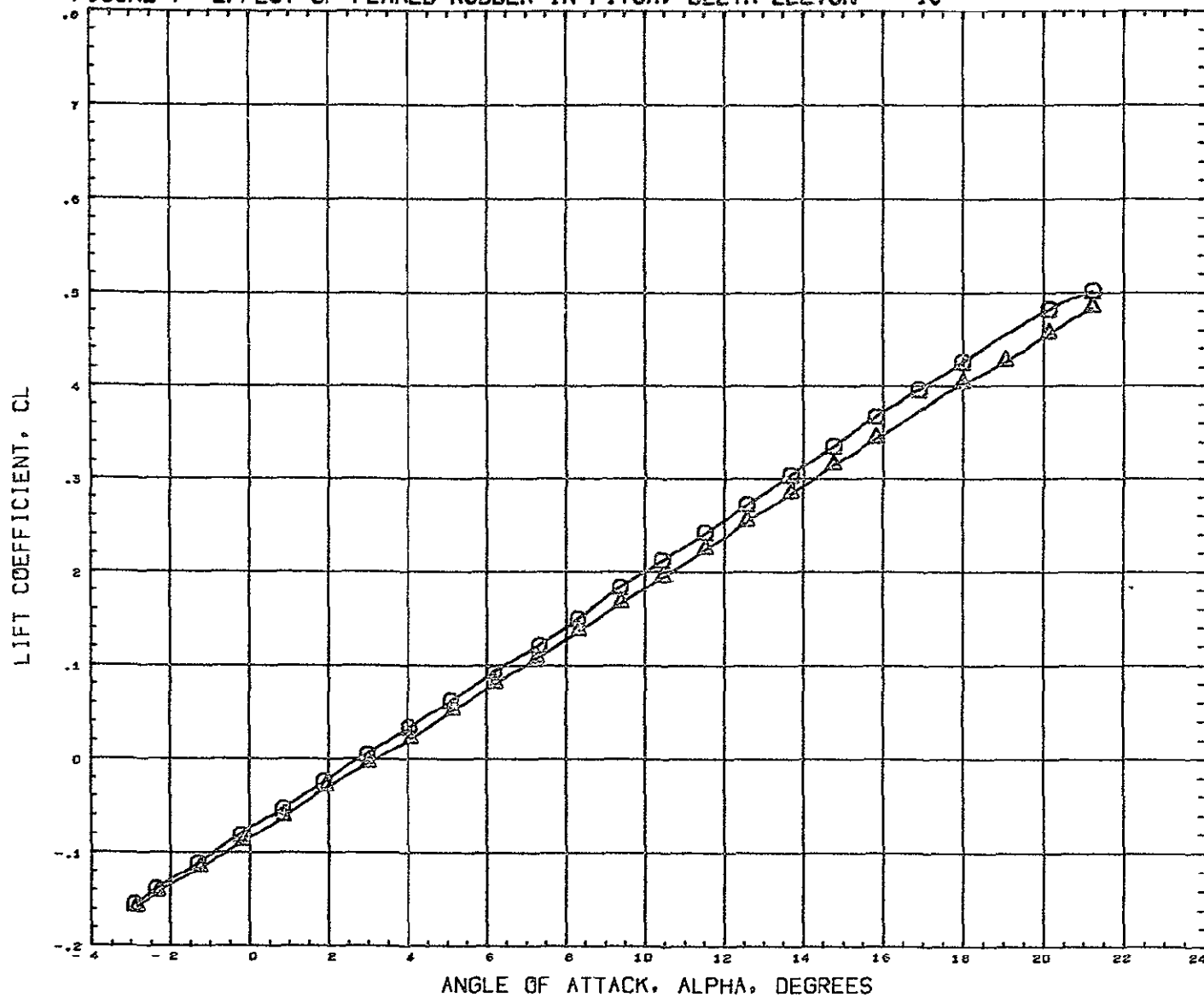


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(CCS003)	GFST D22 CONF ROS-NB1 B1W1V1
(RCS037)	GFST D22 CONF ROS-NB1 B1W1V1 (-30,30)

LELVN	RELVN	LRUDDR	RRUDDR	REFERENCE INFORMATION
0 000	0 000			SREF 20 6890 50 IN
0 000	0 000	-30 000	30 000	LREF 9 6480 IN
				BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 480

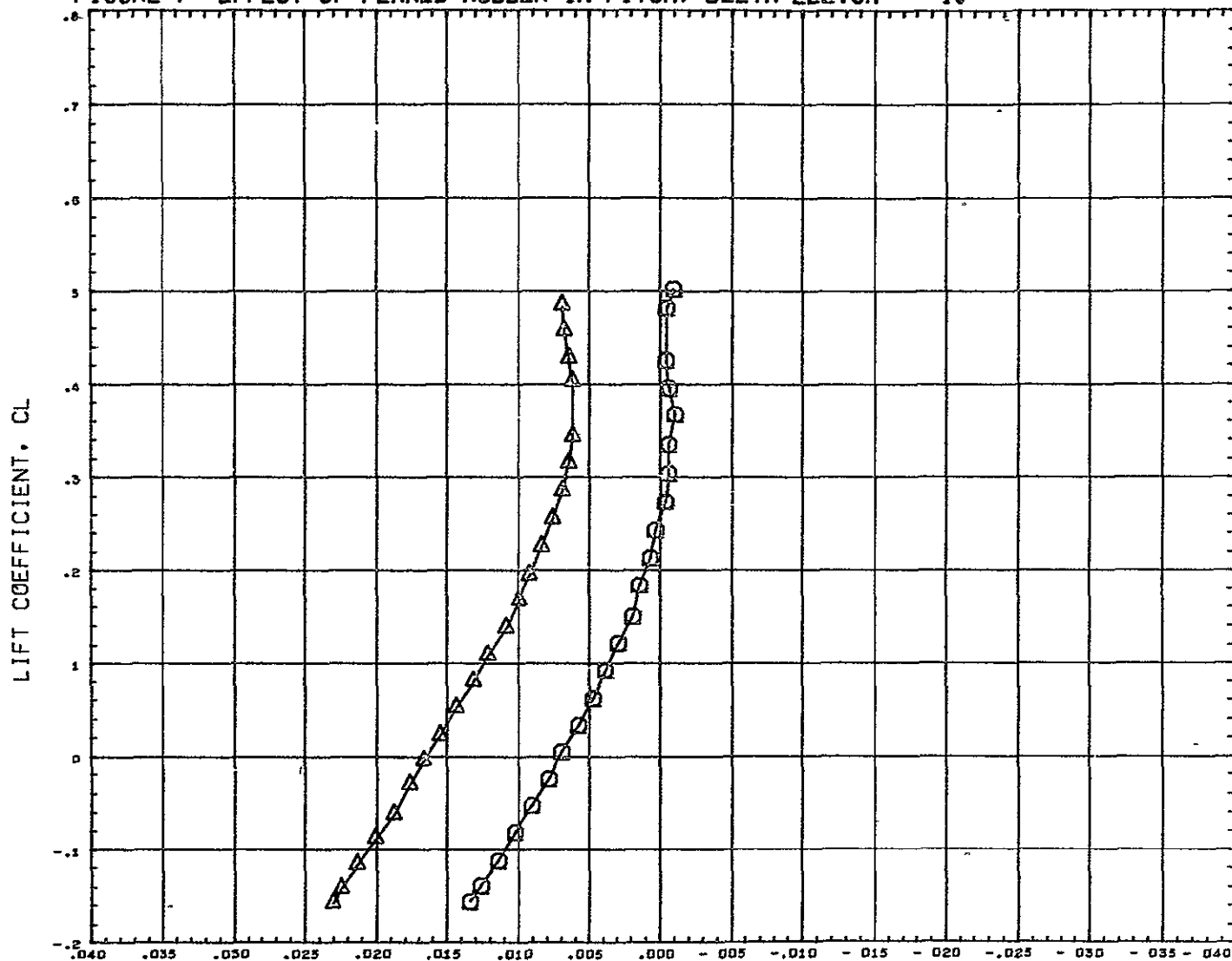
FIGURE 7 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = -40



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR	REFERENCE INFORMATION	
(ACSD05)	GFAST 022 CONF ROS-NB1 B1W1 (-40,-40) V1	-40 000	-40.000			SREF	20 6890 SQ IN
(RCS027)	GFAST 022 CONF ROS-NB1 B1W1 (-40,-40) V1 (-30,30)	-40 000	-40 000	-30 000	30 000	LREF	9 6480 IN
						BREF	5 8380 IN
						XMRP	1485 0040 IN
						YMRP	0 0000 IN
						ZMRP	377 0004 IN
						SCALE	0 0050

MACH 2.480

FIGURE 7 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = -40

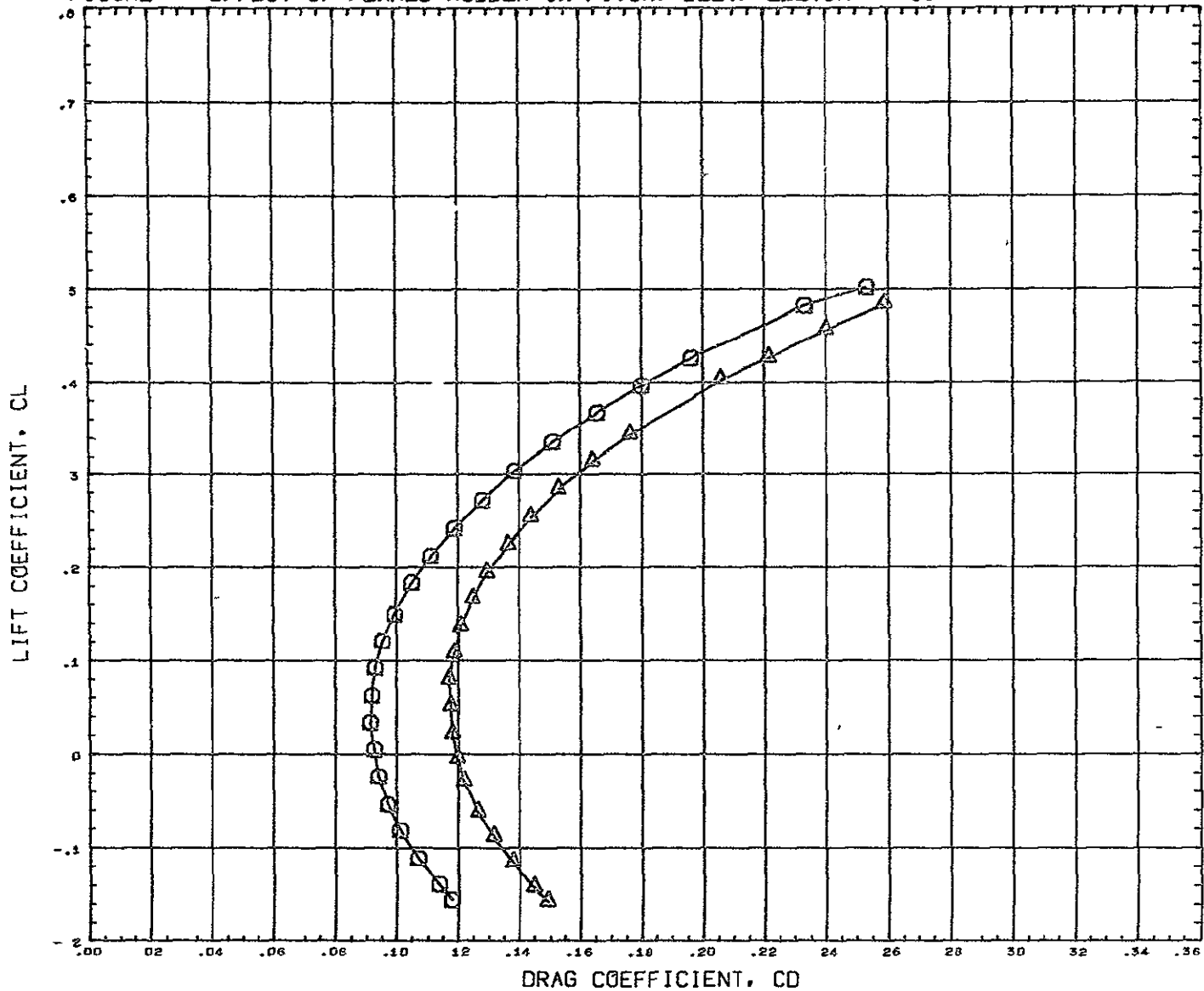


PITCHING MOMENT COEFFICIENT, CLM

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR	REFERENCE INFORMATION		
(ACSD05)	GFST 022 CONF ROS-NB1 B1W1 (-40,-40) V1	-40.000	-40.000			SREF	20.6890	50 IN
(RCS027)	GFST 022 CONF ROS-NB1 B1W1 (-40,-40) V1 (-30,30)	-40.000	-40.000	-30.000	30.000	LREF	9.6480	IN
						BREF	5.8380	IN
						XMRF	1485.0040	IN
						YMRF	0.0000	IN
						ZMRF	377.0004	IN
						SCALE	0.0050	

MACH 2.480

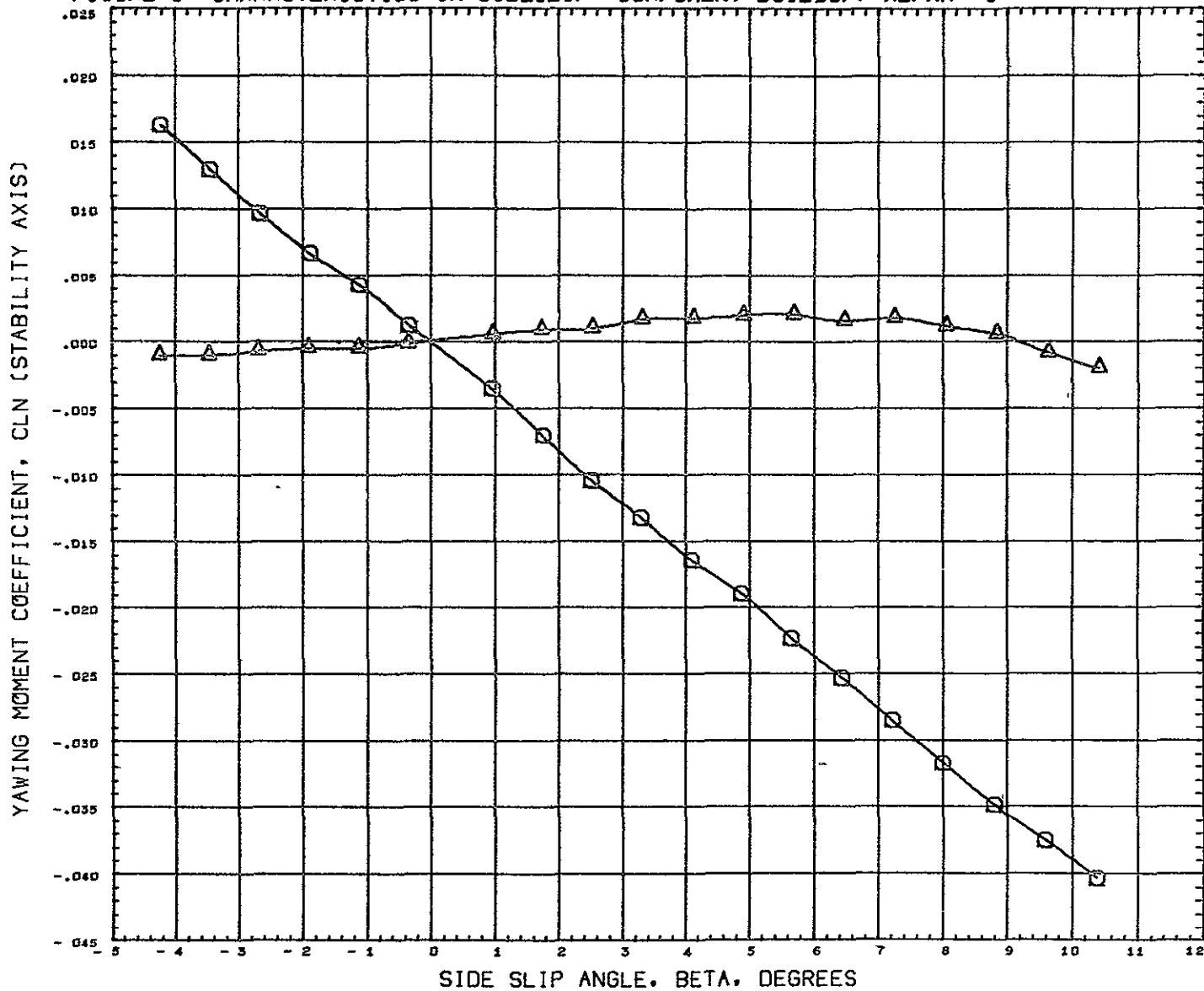
FIGURE 7 EFFECT OF FLARED RUDDER IN PITCH, DELTA ELEVON = -40



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR	REFERENCE INFORMATION		
(ACSD05)	Q 6FST 022 CONF ROS-NB1 B1W1 (-40,-40) V1	-40.000	-40.000			SREF	20 6090	50 IN
(RCS027)	Δ 6FST 022 CONF ROS-NB1 B1W1 (-40,-40) V1 (-30,30)	-40.000	-40.000	-30.000	30.000	LREF	9 6480	IN
						BREF	5 8380	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 2.480

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

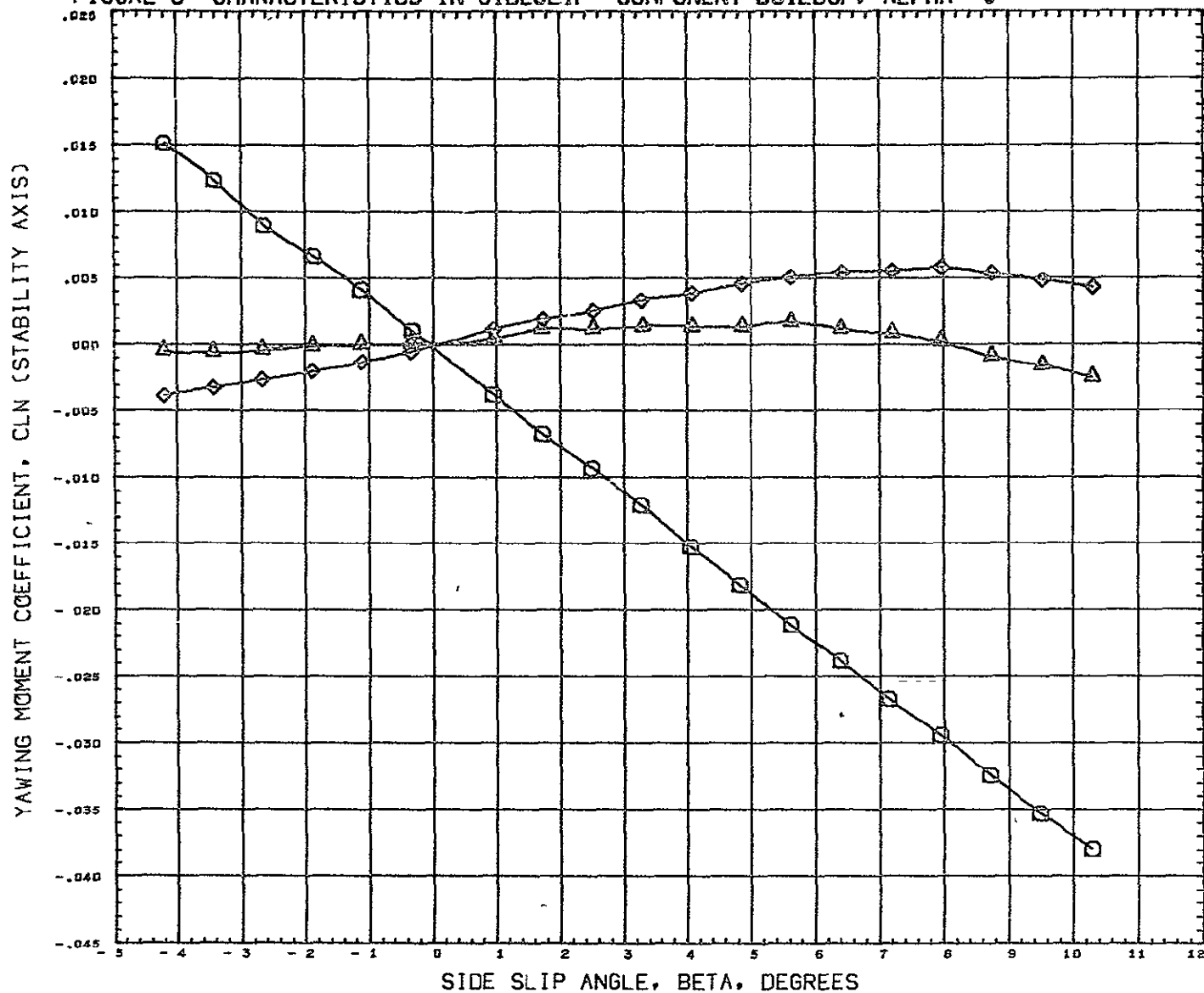


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCS010) $\square$ GFST 022 CONF ROS-NB1 B1W1
 (RCS002) $\triangle$ GFST 022 CONF ROS-NB1 B1W1V1
 (RCS009) $\diamond$ DATA NOT AVAILABLE FOR ALL CONDITIONS

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
0.000	0.000	0.000		SREF	20 6890	SQ IN
0.000	0.000	0.000	0.000	LREF	9 6480	IN
0.000	0.000	0.000	0.000	BREF	5 8380	IN
				XHRP	1465 0040	IN
				YHRP	0 0000	IN
				ZHRP	377 0004	IN
				SCALE	0 0050	

MACH 1.750

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0



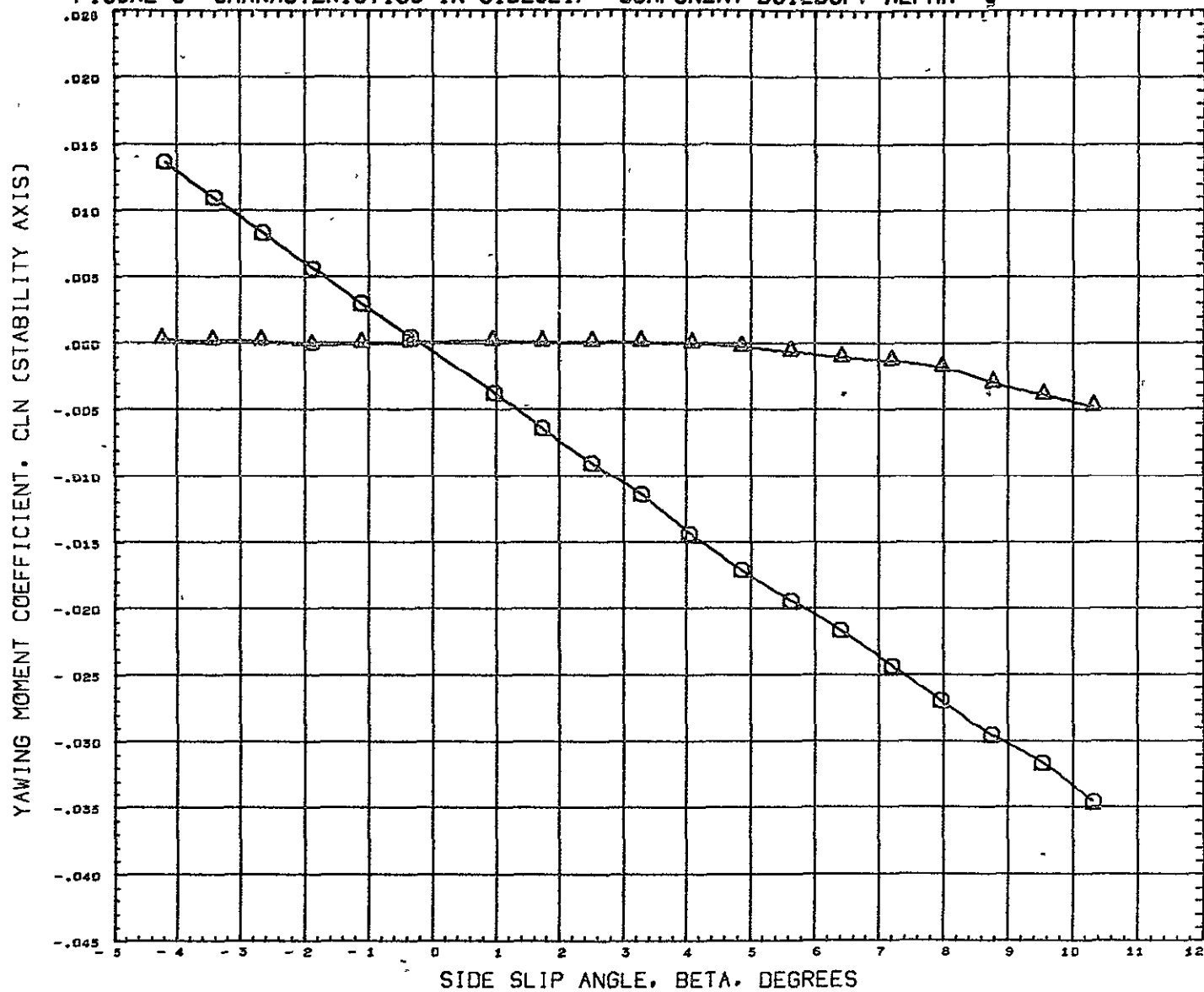
DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCS010) GFST 022 CONF. ROS-NB1 B1W1
 (RCS002) GFST 022 CONF. ROS-NB1 B1W1V1
 (RCS009) GFST 022 CONF. ROS-NB1 B1W1V1U1

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
0.000	0.000	0.000	0.000	SREF	20 6890	SQ IN
0.000	0.000	0.000	0.000	LREF	9 6480	IN
0.000	0.000	0.000	0.000	BREF	5 8380	IN
				XMRP	1485 0040	IN
				YMRP	0 0000	IN
				ZMRP	377 0004	IN
				SCALE	0 0050	

MACH 2.020

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

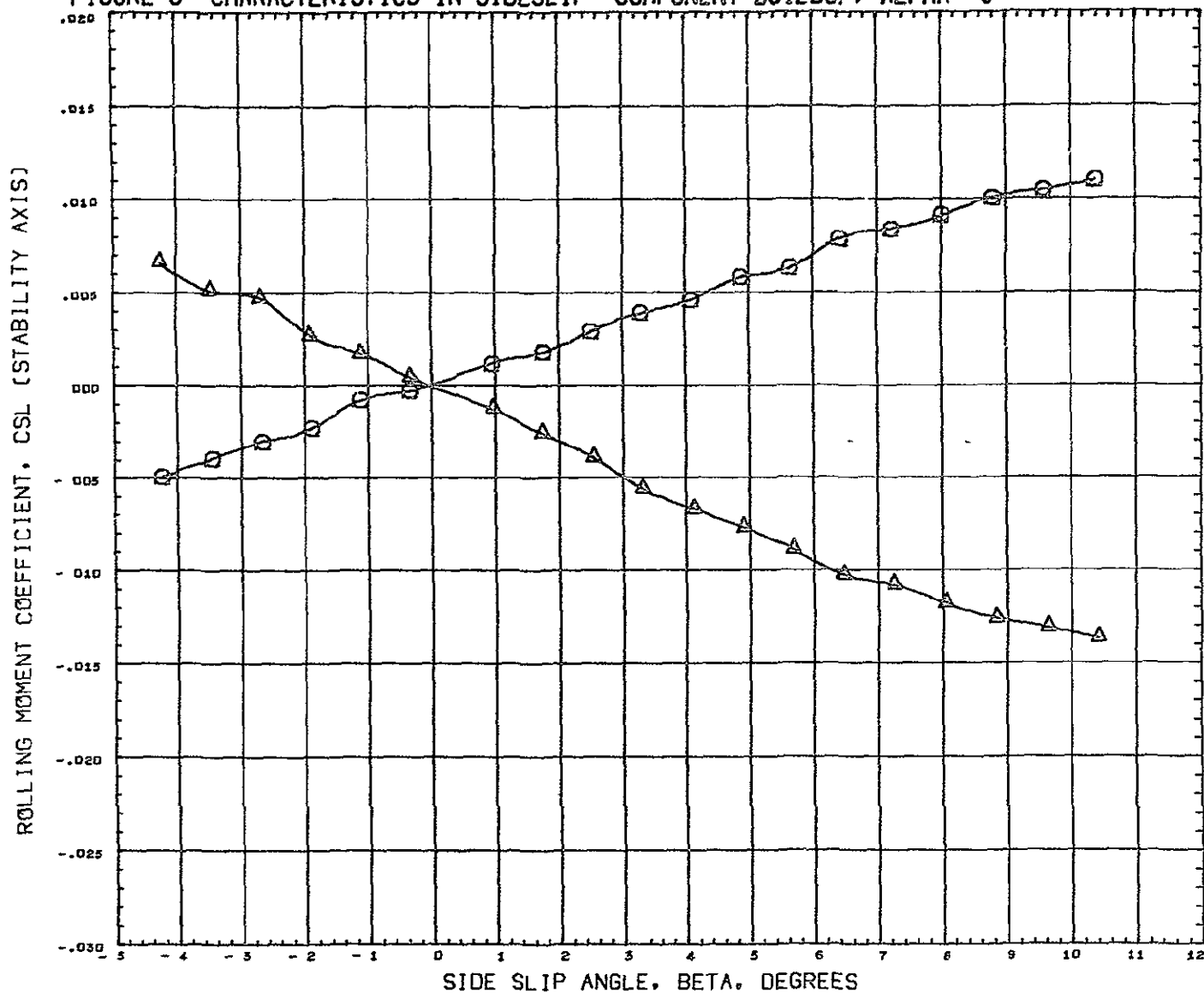


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCSD010) GFST 022 CONF. ROS-NB1 B1W1
 (RCSD002) GFST 022 CONF. ROS-NB1 B1W1V1
 (RCSD009) DATA NOT AVAILABLE FOR ALL CONDITIONS

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0 000	0.000	0 000		SREF 20 6690 S4 IN
0 000	0.000	0 000	0 000	LREF 9 6480 IN
0 000	0.000	0 000	0 000	BREF 5 0380 IN
				XNRP 1485 0040 IN
				YNRP 0 0000 IN
				ZNRP 377 0004 IN
				SCALE 0 0050

MACH 2.480

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

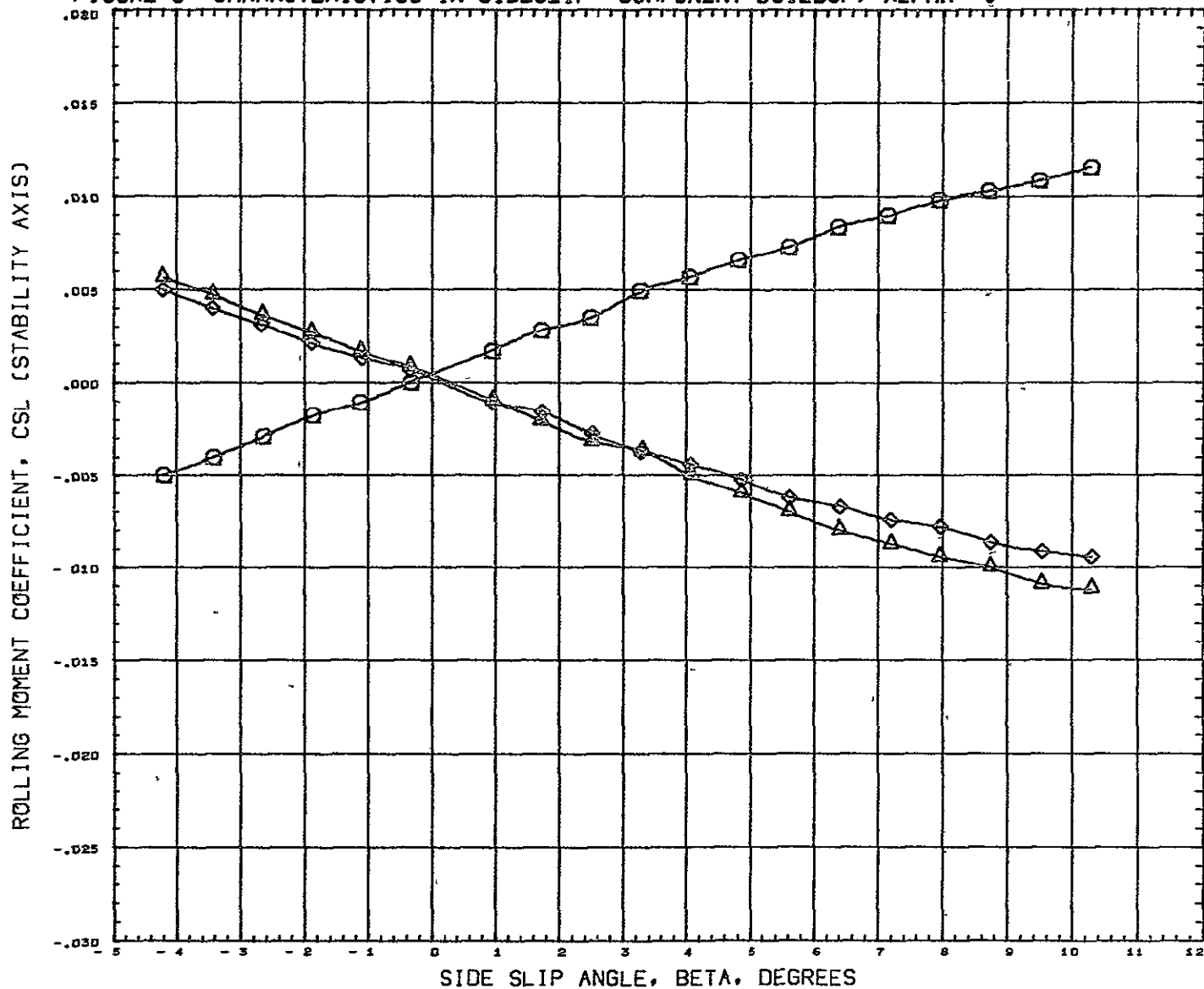


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCS010) ○ GFST D22 CONF ROS-NB1 B1W1
 (RCS002) △ GFST D22 CONF ROS-NB1 B1W1V1
 (RCS009) ◇ DATA NOT AVAILABLE FOR ALL CONDITIONS

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
0.000	0.000	0.000	0.000	SREF	20 6890	SQ IN
0.000	0.000	0.000	0.000	LREF	9 6480	IN
0.000	0.000	0.000	0.000	BREF	5 8380	IN
				XHRP	1485 0020	IN
				YHRP	0 0000	IN
				ZHRP	377 0004	IN
				SCALE	0.0050	

MACH 1.750

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0



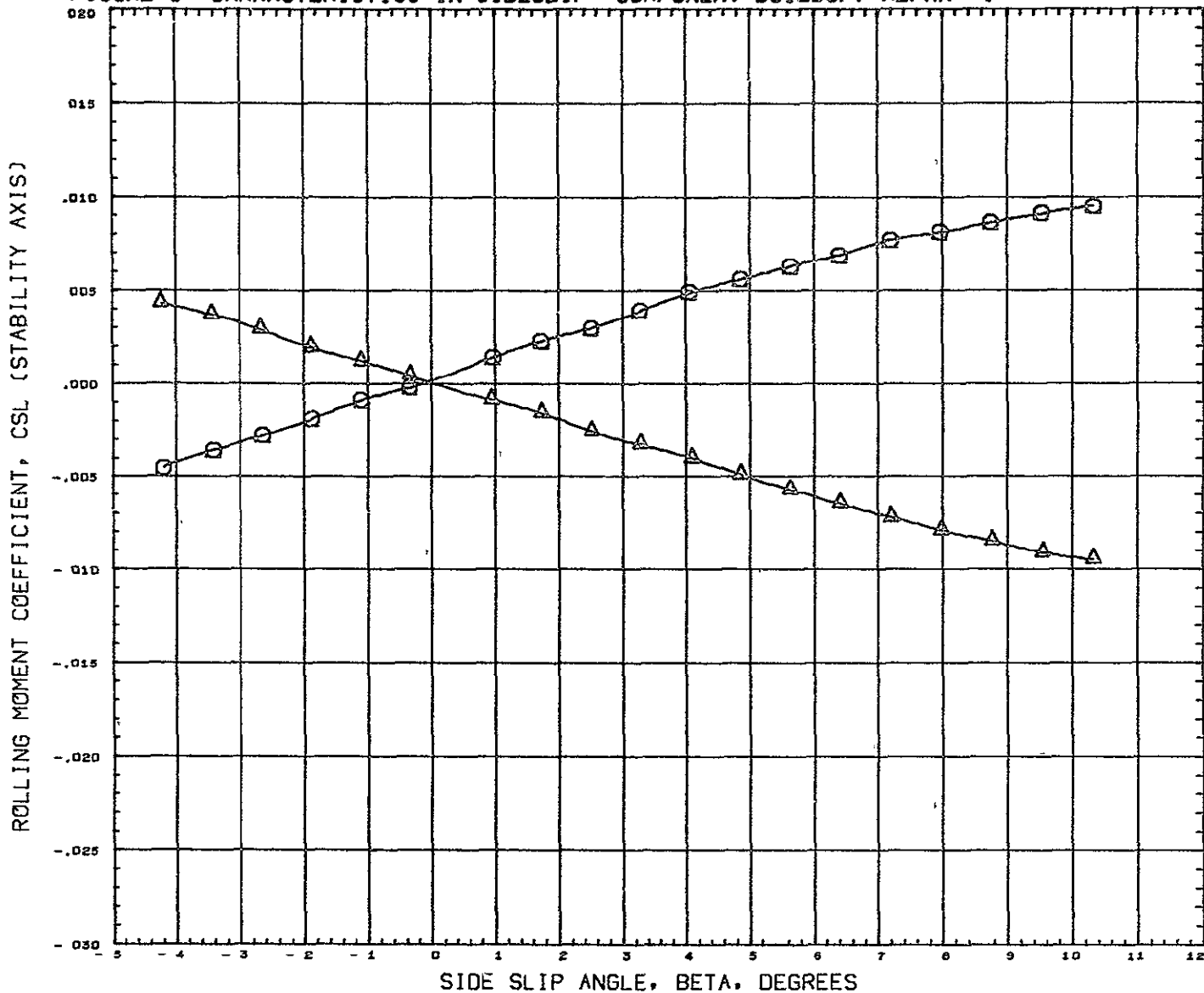
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS010)	GFST 022 CONF. ROS-NB1 B1W1
(RCS002)	GFST 022 CONF. ROS-NB1 B1W1V1
(RCS009)	GFST 022 CONF. ROS-NB1 B1W1V1U1

ALPHA	LELEVN	RELEVN	RUDDER
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	20.6890	SQ IN
LREF	9.6480	IN
BREF	5.8380	IN
XMRP	1485.0040	IN.
YMRP	0.0000	IN
ZMRP	377.0004	IN
SCALE	0.0050	

MACH 2.020

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

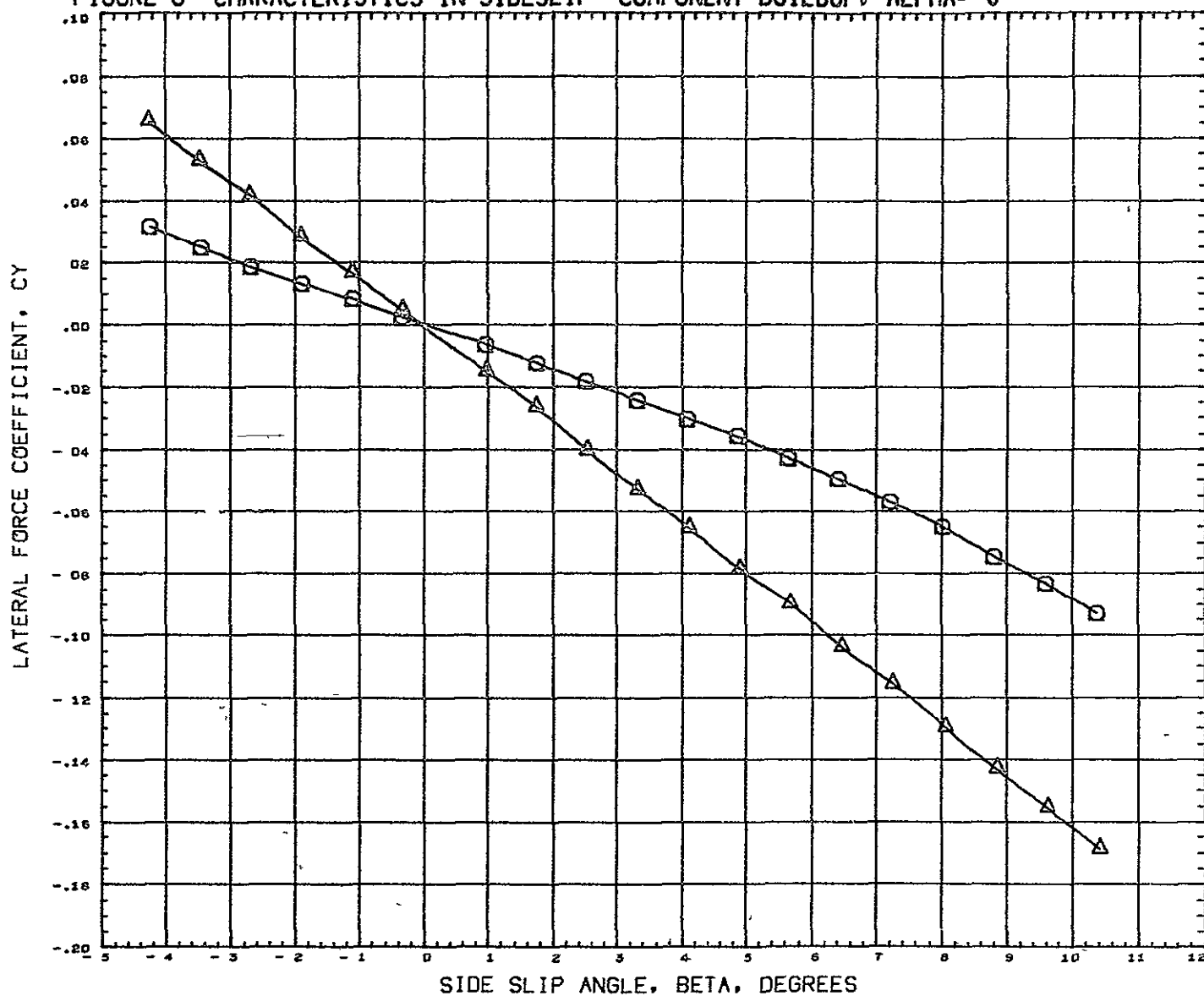


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS010)	GFST 022 CONF. ROS-NB1 B1W1
(RCS002)	GFST 022 CONF. ROS-NB1 B1W1V1
(RCS009)	DATA NOT AVAILABLE FOR ALL CONDITIONS

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0.000	0.000	0.000		SREF 20 6890' SQ IN
0.000	0.000	0.000	0.000	LREF 9 6480 IN
0.000	0.000	0.000	0.000	BREF 5 8380 IN
				XMRP 1495 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0.0050

MACH 2.480

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

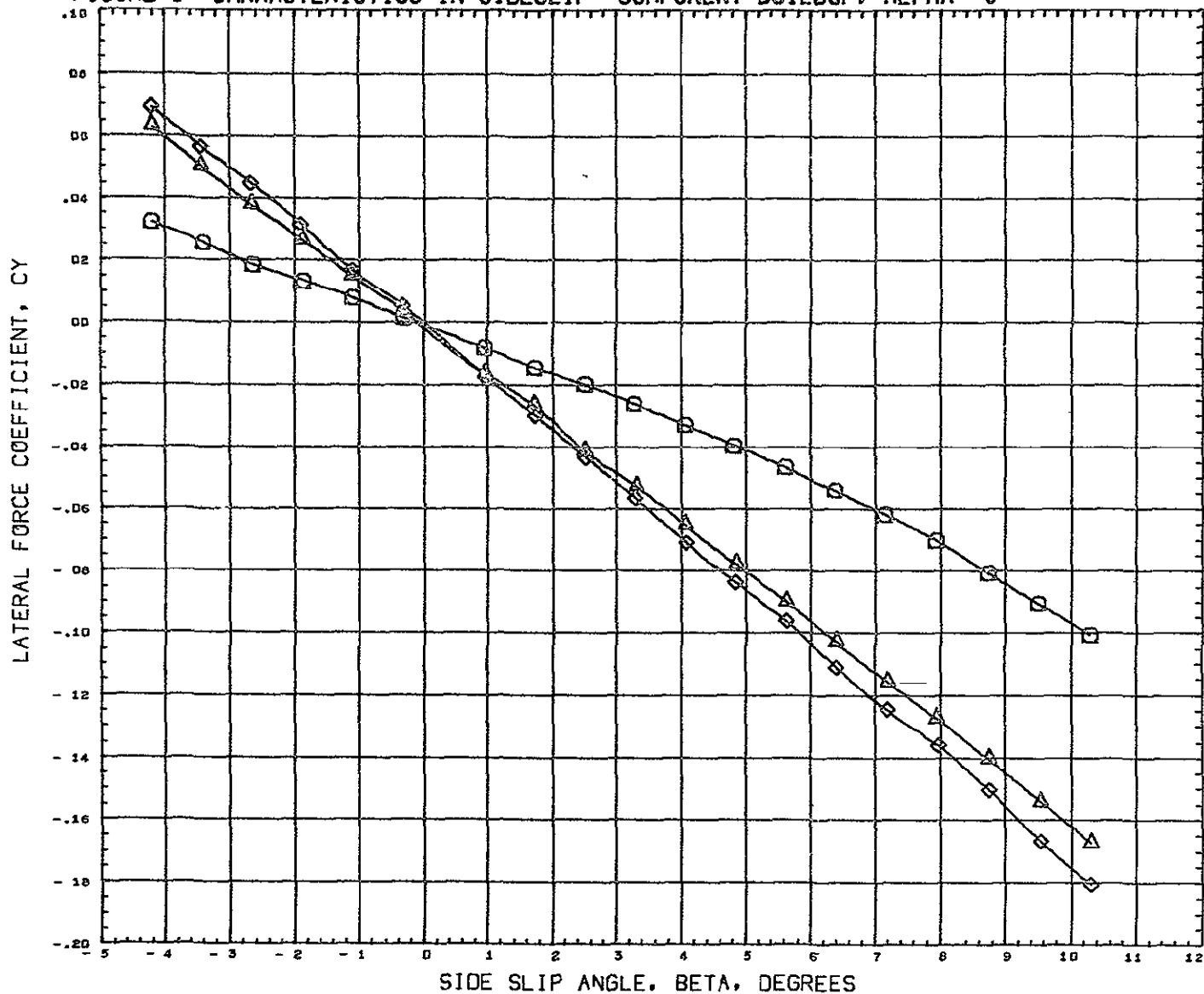


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RCS010) GFST 022 CONF. ROS-NB1 B1W1
 (RCS002) GFST 022 CONF. ROS-NB1 B1W1V1
 (RCS009) DATA NOT AVAILABLE FOR ALL CONDITIONS

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0.000	0.000	0.000		SREF 20 6890 SQ IN
0.000	0.000	0.000	0.000	LREF 9 6480 IN
0.000	0.000	0.000	0.000	BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 1.750

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

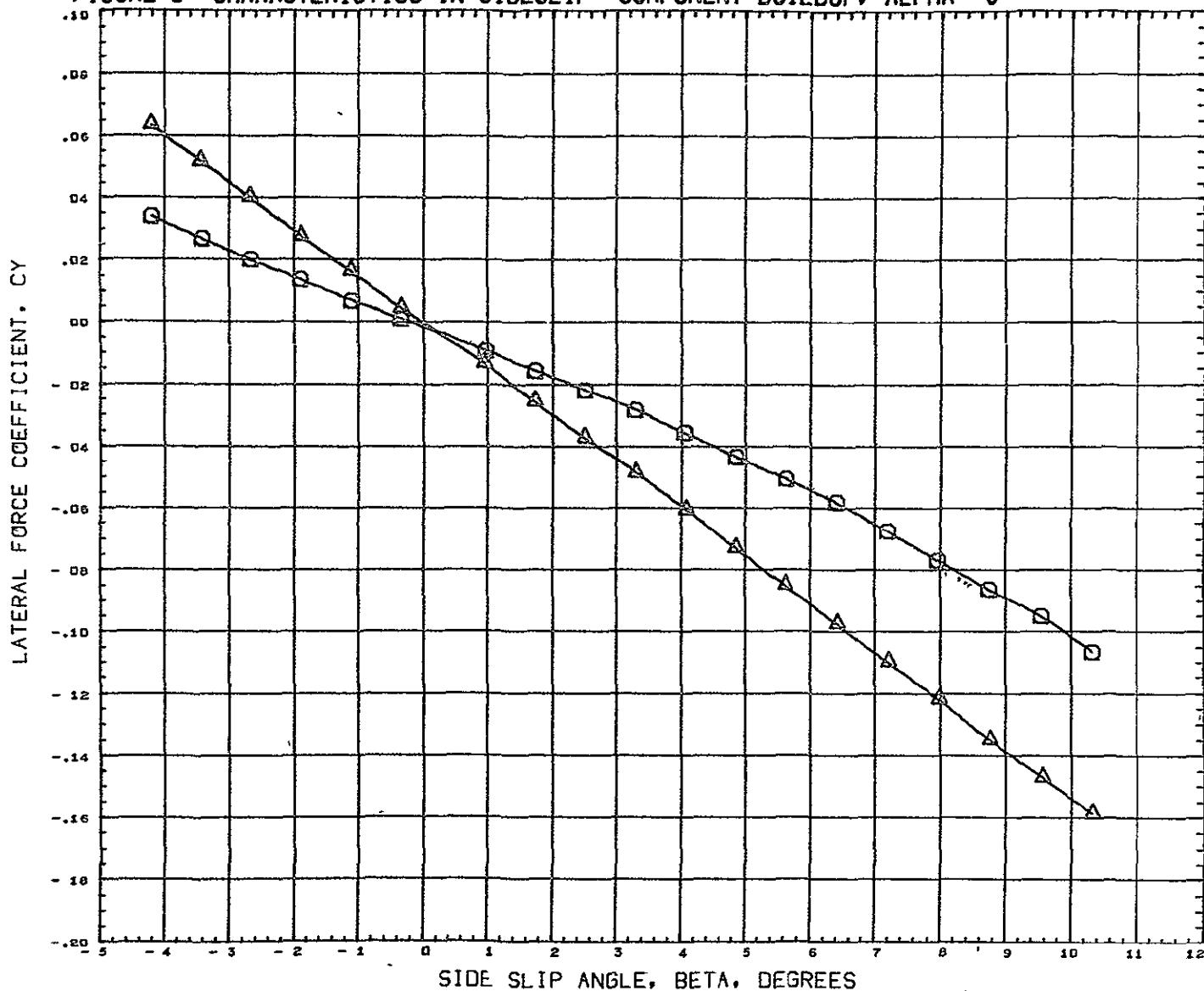


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(RCS010)	○	GFST 022 CONF ROS-NB1 B1W1
(RCS002)	△	GFST 022 CONF ROS-NB1 B1W1V1
(RCS009)	◇	GFST 022 CONF ROS-NB1 B1W1V1U1

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0 000	0 000	0 000		SREF 20 6890 SQ IN
0 000	0 000	0 000	0 000	LREF 9 6480 IN
0 000	0 000	0 000	0 000	BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

FIGURE 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

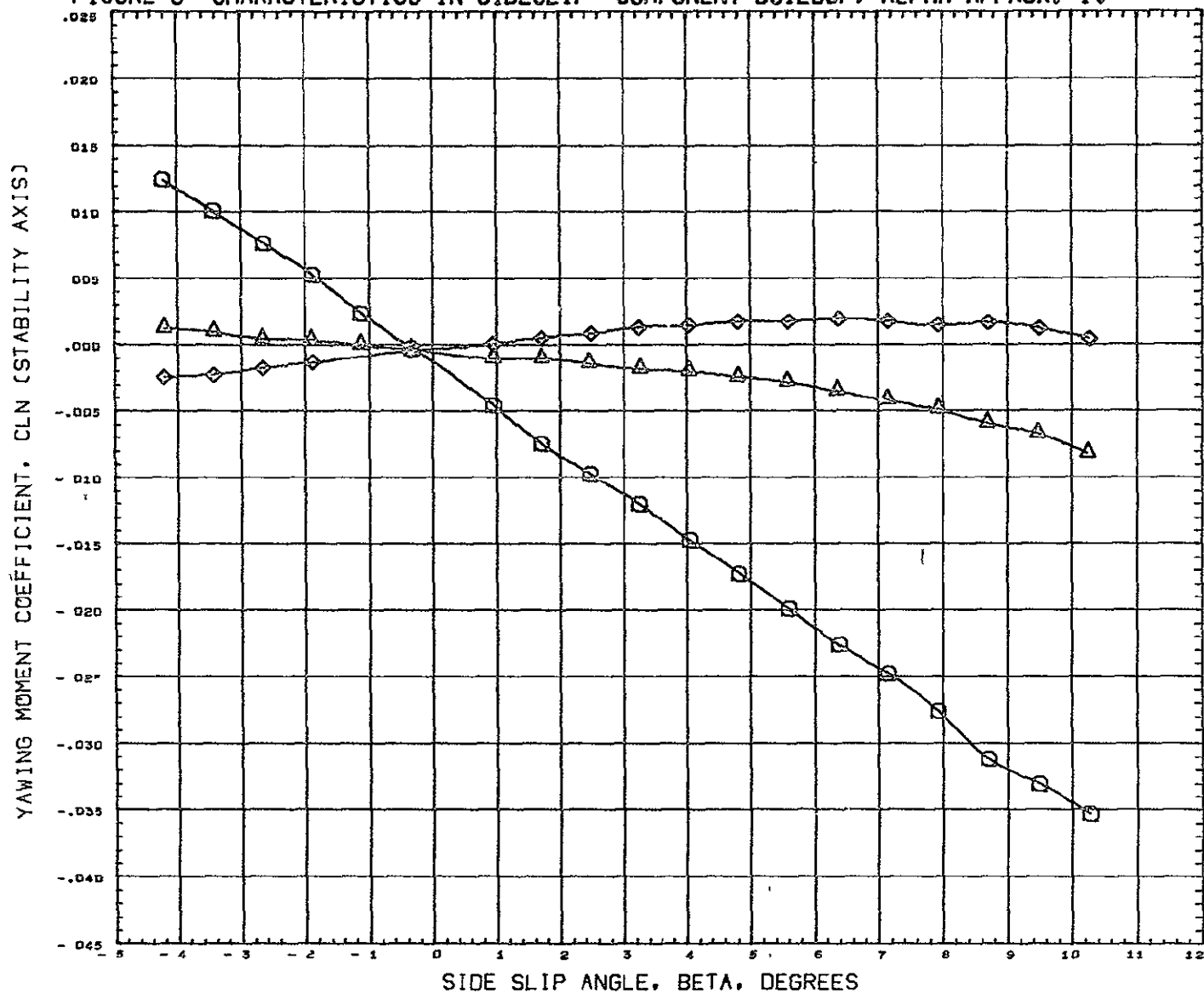


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(RCS010) ○ GFST 022 CONF ROS-NB1 B1W1
(RCS002) △ GFST 022 CONF ROS-NB1 B1W1V1
(RCS009) ◇ DATA NOT AVAILABLE FOR ALL CONDITIONS

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION	
0.000	0.000	0.000		SREF	20.6890 Sq IN
0.000	0.000	0.000	0.000	LREF	9.6480 IN
0.000	0.000	0.000	0.000	BREF	5.8380 IN
				XHRP	1485.0040 IN
				YHRP	0.0000 IN
				ZHRP	377.0004 IN
				SCALE	0.0050

MACH 2.480

FIGURE 9 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA APPROX. 10

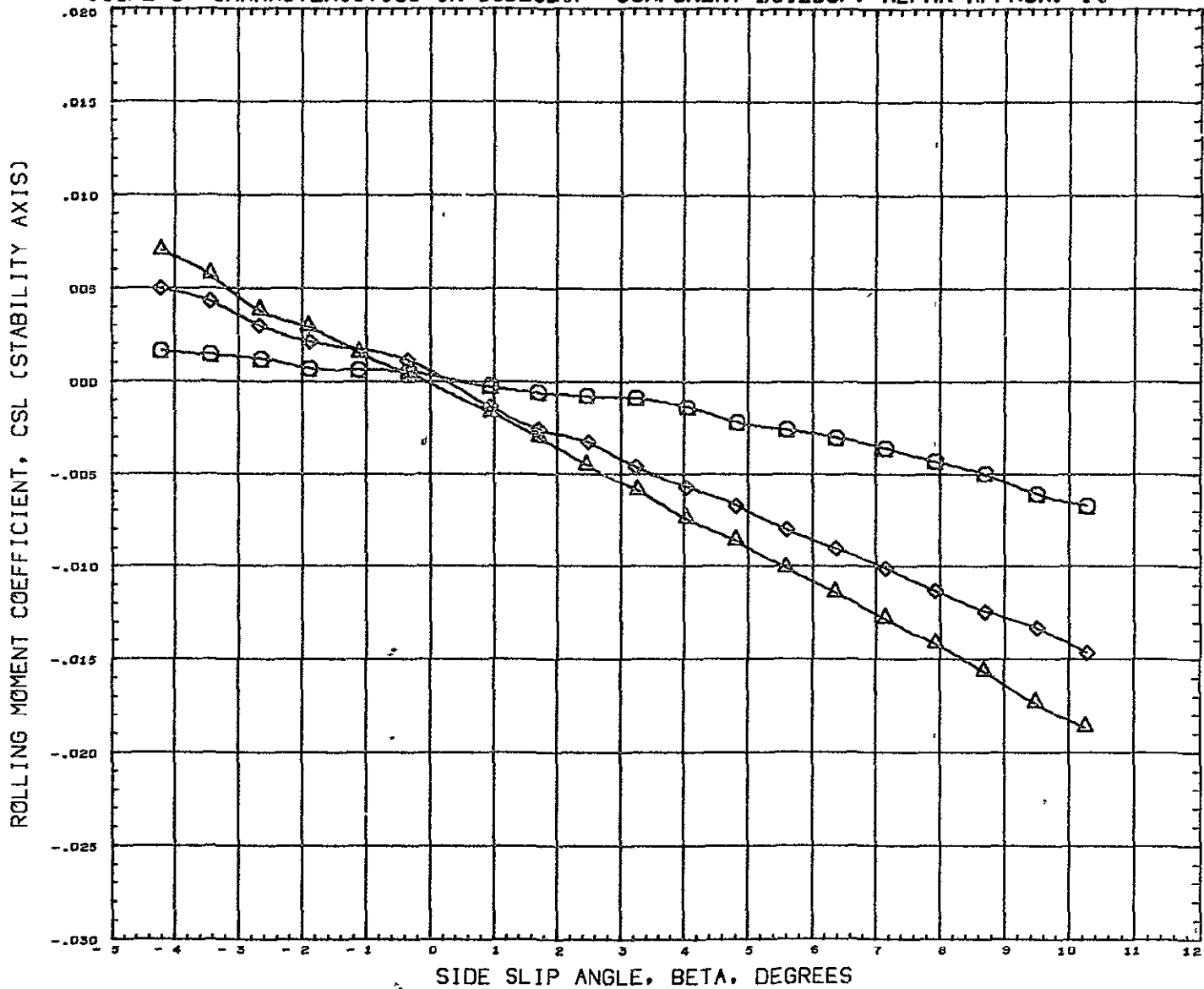


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS017)	GFST 022 CONF ROS-NB1 B1W1
(RCS019)	GFST 022 CONF POS-NB1 B1W1V1
(RCS021)	GFST 022 CONF ROS-NB1 B1W1V1U1

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
10.000	0.000	0.000	0.000	SREF 20 6850 SQ IN
10.000	0.000	0.000	0.000	LREF 9 6460 IN
10.000	0.000	0.000	0.000	BREF 5 8360 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2.020

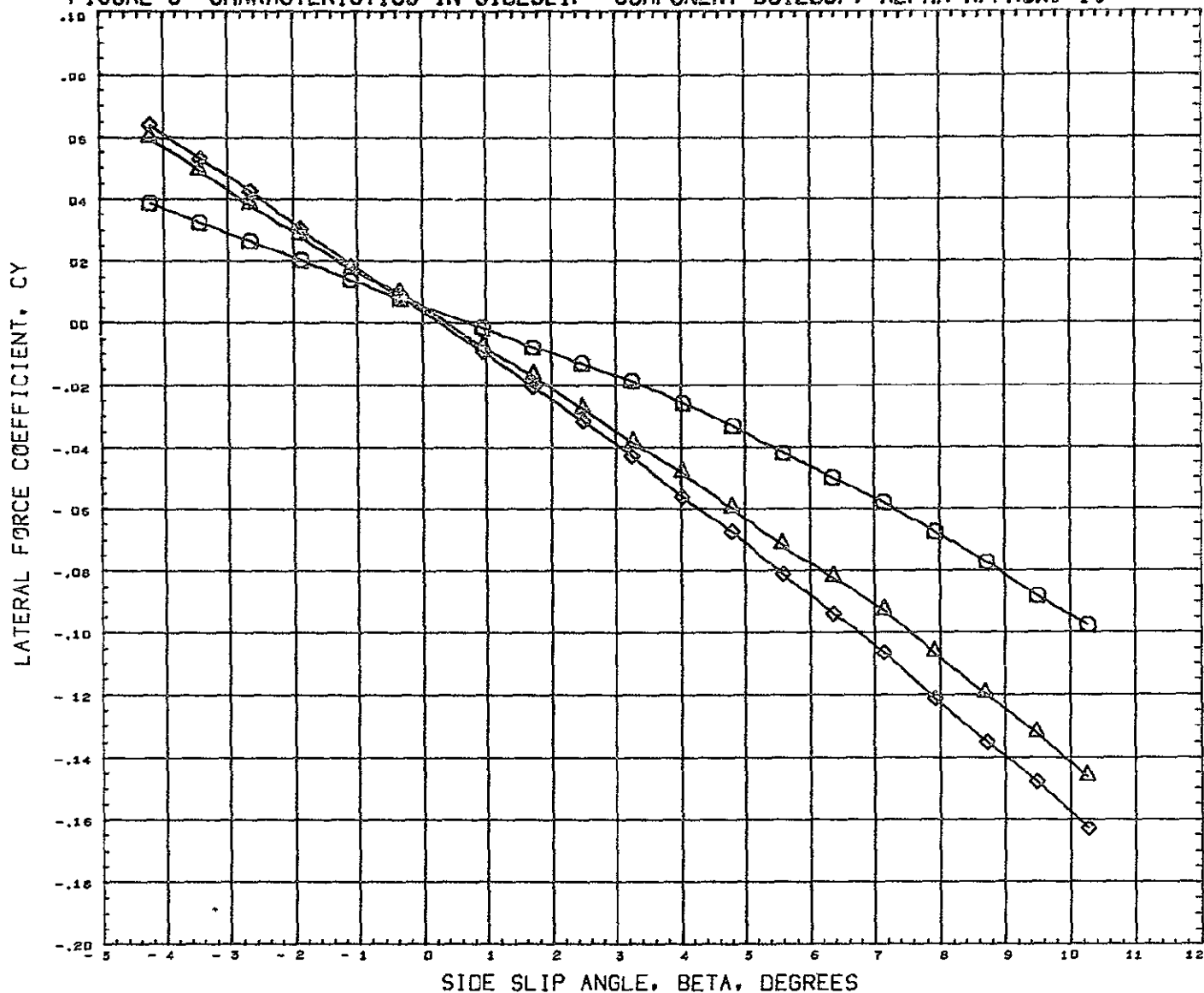
FIGURE 9 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA APPROX. 10



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
(RCS017)	GFST 022 CONF. ROS-NB1 B1W1	10.000	0.000	0.000	0.000	SREF 20 6890 SQ IN
(RCS019)	GFST 022 CONF. ROS-NB1 B1W1V1	10.000	0.000	0.000	0.000	LREF 9 6480 IN
(RCS021)	GFST 022 CONF. ROS-NB1 B1W1V1U1	10.000	0.000	0.000	0.000	BREF 5 8380 IN
						XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377 0004 IN
						SCALE 0 0050

HACH 2 020

FIGURE 9 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA APPROX. 10

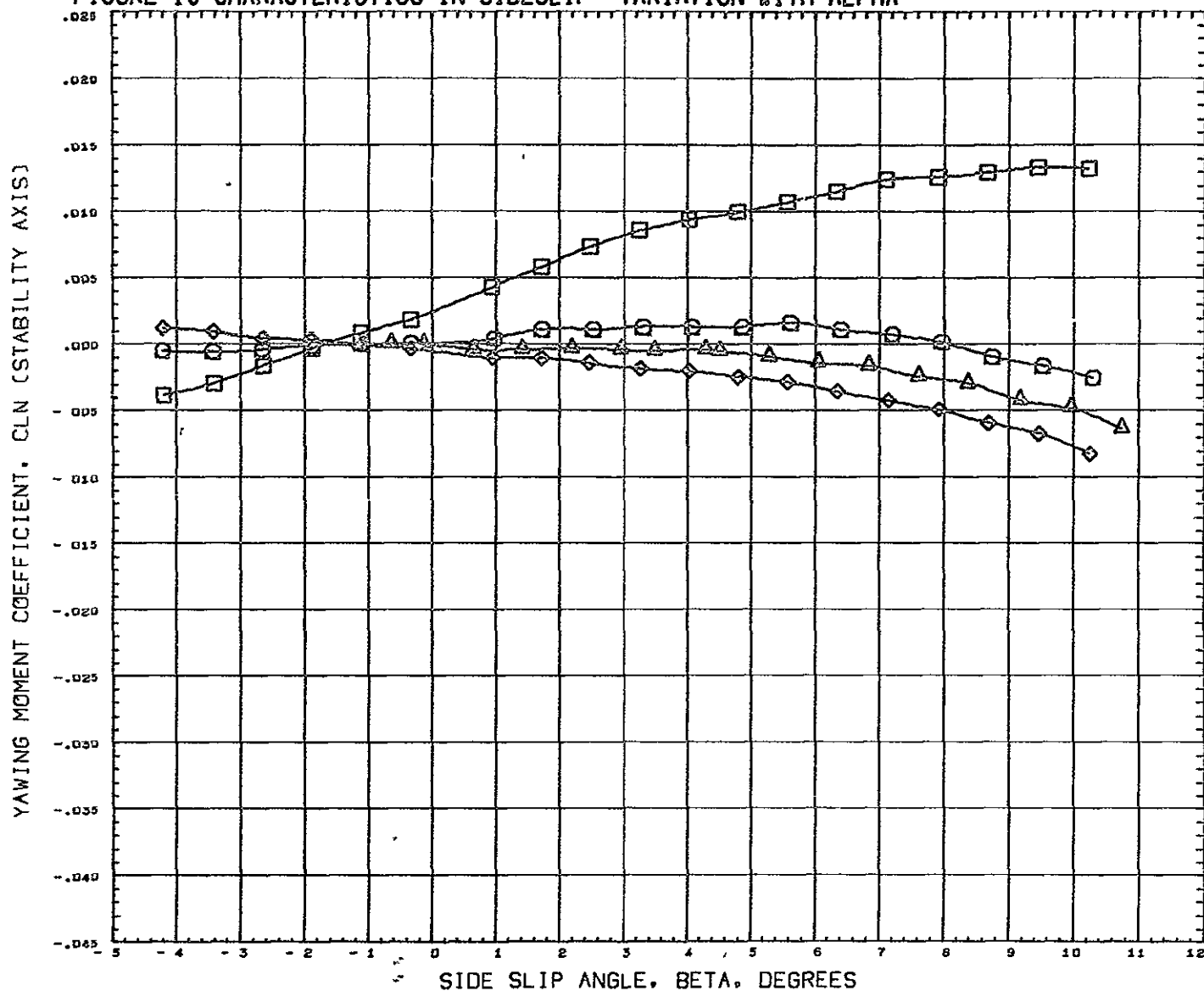


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS017)	GFST 022 CONF ROS-NB1 B1W1
(RCS019)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS021)	GFST 022 CONF ROS-NB1 B1W1V1U1

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
10.000	0.000	0.000		SREF 20 6890 SQ IN
10.000	0.000	0.000	0.000	LREF 9 6480 IN
10.000	0.000	0.000	0.000	BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

HACH 2 020

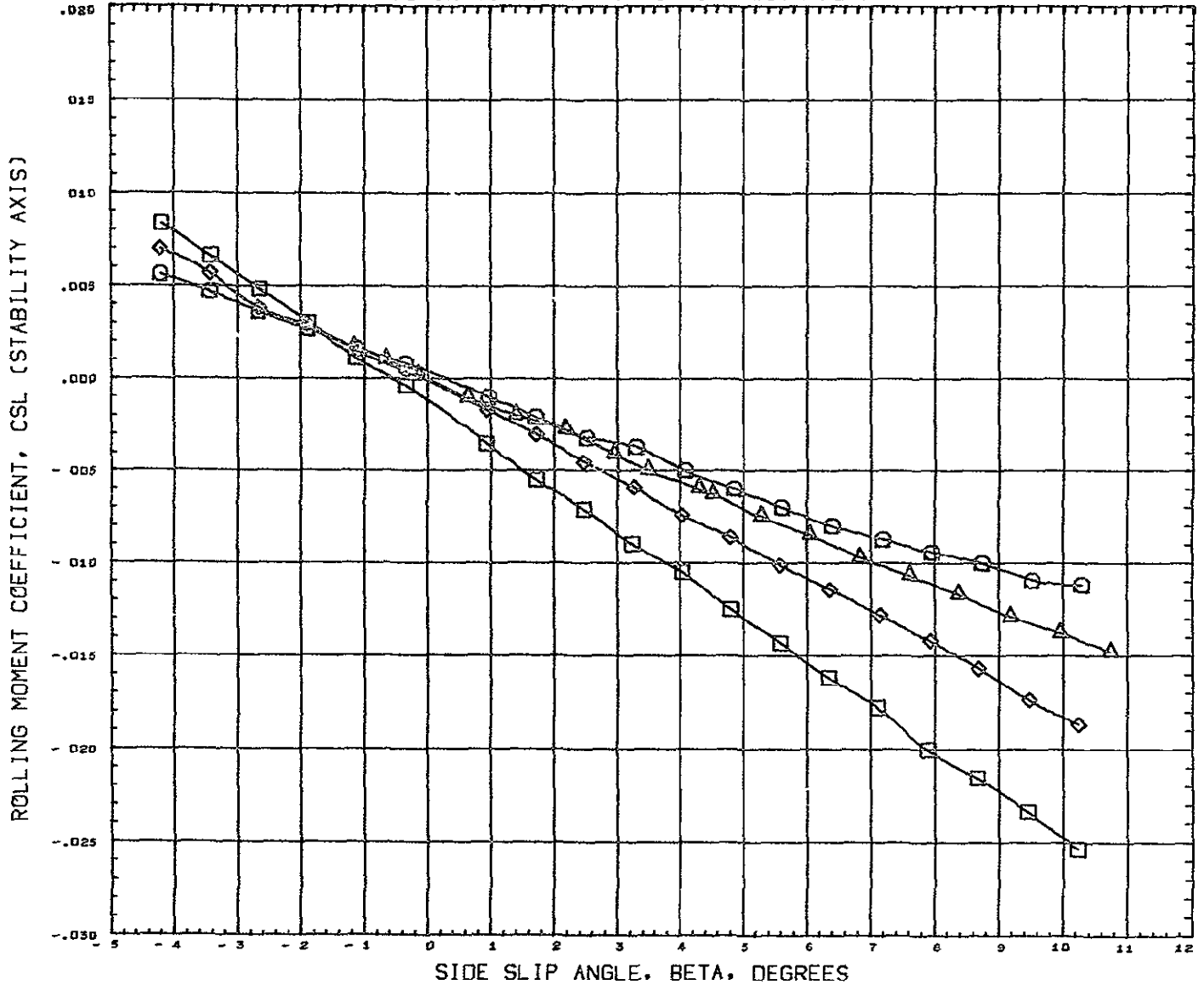
FIGURE 10 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
(ACS002)	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	SREF 20 6890 SQ.IN
(RCS018)	GFST 022 CONF. ROS-NB1 B1W1V1	5.000	0.000	0.000	0.000	LREF 9 6480 IN
(RCS019)	GFST 022 CONF. ROS-NB1 B1W1V1	10.000	0.000	0.000	0.000	BREF 5 8380 IN
(RCS020)	GFST 022 CONF. RCS-NB1 B1W1V1 (-30,30)	10.000	0.000	0.000	0.000	XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377 0004 IN
						SCALE 0 0050

MACH 2.020

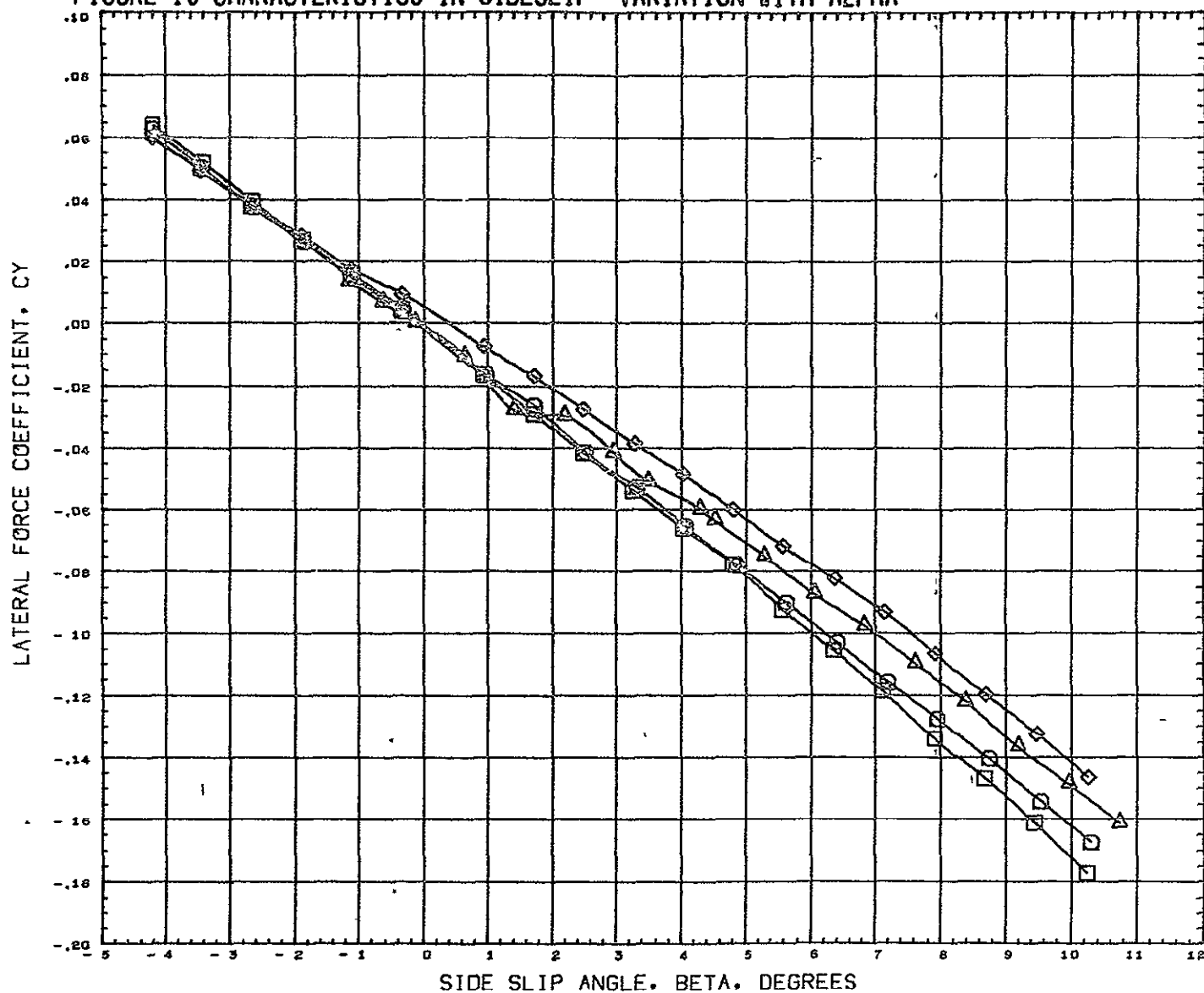
FIGURE 10 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(ACSP02)	GFST 022 CONF ROS-NB1 S1W1V1	0.000	0.000	0.000	0.000	SREF	20.6890	\$Q IN
(RCS018)	GFST 022 CONF ROS-NB1 S1W1V1	5.000	0.000	0.000	0.000	LREF	9.6480	IN
(RCS019)	GFST 022 CONF ROS-NB1 S1W1V1	10.000	0.000	0.000	0.000	BREF	5.0360	IN
(RCS020)	GFST 022 CONF ROS-NB1 S1W1V1 (-30,30)	10.000	0.000	0.000	0.000	XMRP	1485.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

MACH 2.020

FIGURE 10 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA

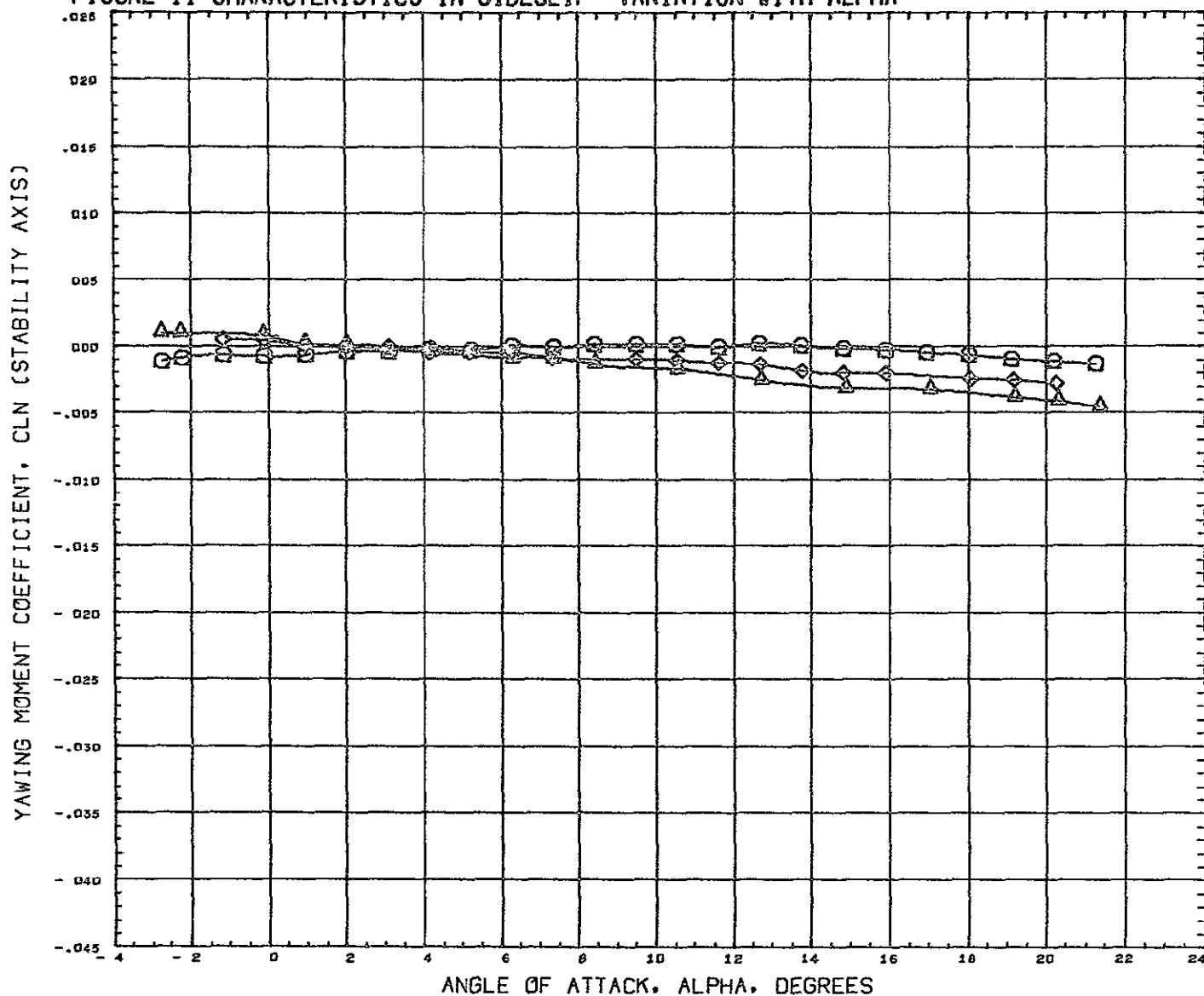


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(ACSD02)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS018)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS019)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS020)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0.000	0 000	0 000	0 000	SREF 20 6890 SQ IN
5.000	0 000	0 000	0 000	LREF 9 6480 IN
10.000	0 000	0 000	0 000	BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2.020

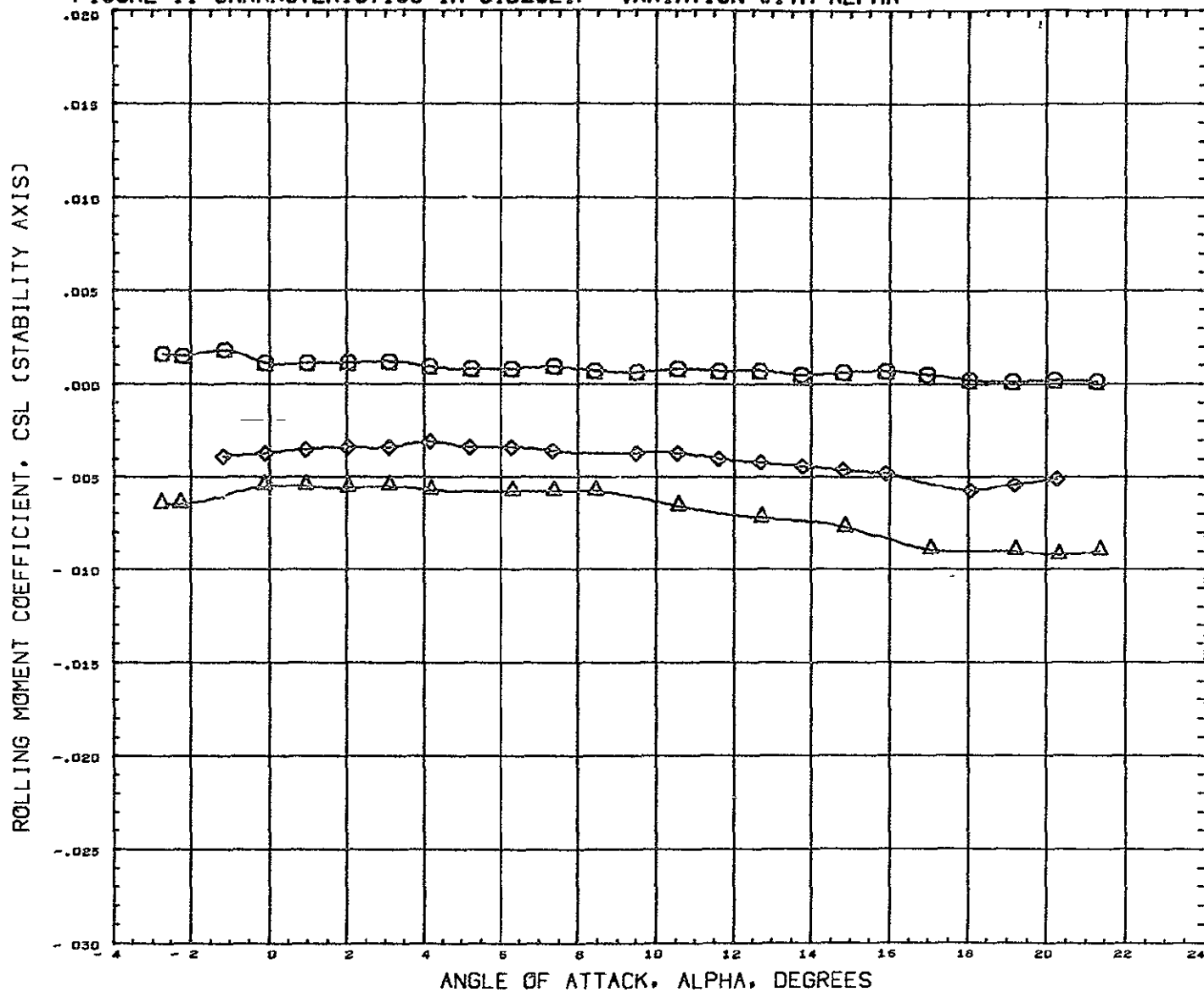
FIGURE 11 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELVN	RELVN	RUDDER	REFERENCE INFORMATION		
(ACSD03)	6FST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	SREF	20 6890	SQ IN
(RCSD14)	6FST 022 CONF ROS-NB1 B1W1V1	4 200	0 000	0 000	0 000	LREF	9 6480	IN
(RCSD15)	6FST 022 CONF ROS-NB1 B1W1V1	2 600	0 000	0 000	0 000	BREF	5 8380	IN
						XNRF	1485 0040	IN
						Y4RP	0 0000	IN
						ZMPP	377 0004	IN
						SCALE	0 0050	

NACH 2 020

FIGURE 11 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA

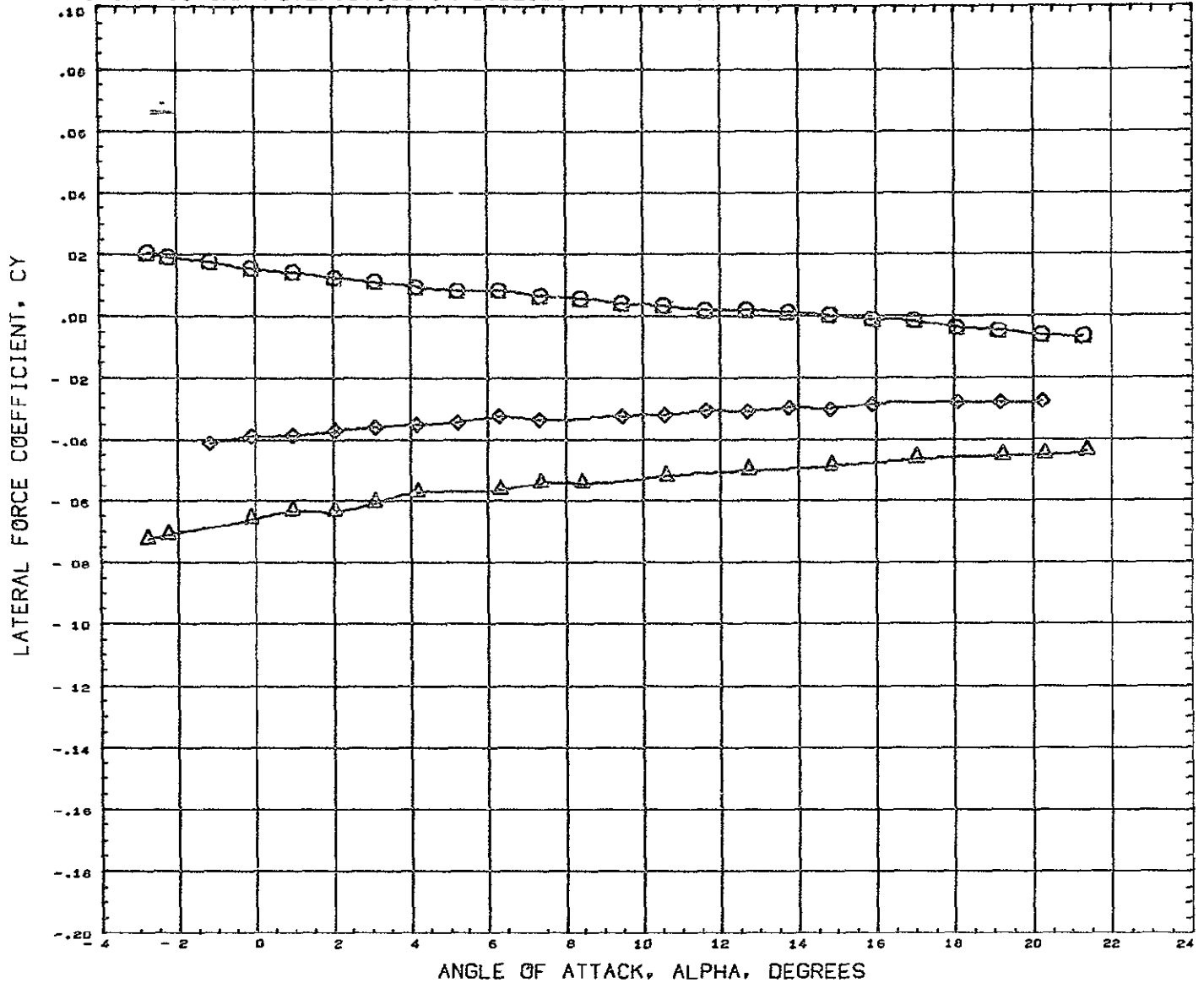


DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (ACSD03) 6FST 022 CONF ROS-NB1 B1W1V1
 (RCSD14) 6FST 022 CONF ROS-NB1 B1W1V1
 (RCSD15) 6FST 022 CONF. ROS-NB1 B1W1V1

BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION
0 000	0 000	0 000	0 000	SREF 20 6890 SQ IN
4 200	0 000	0 000	0 000	LREF 9 6480 IN
2 600	0 000	0 000	0 000	BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

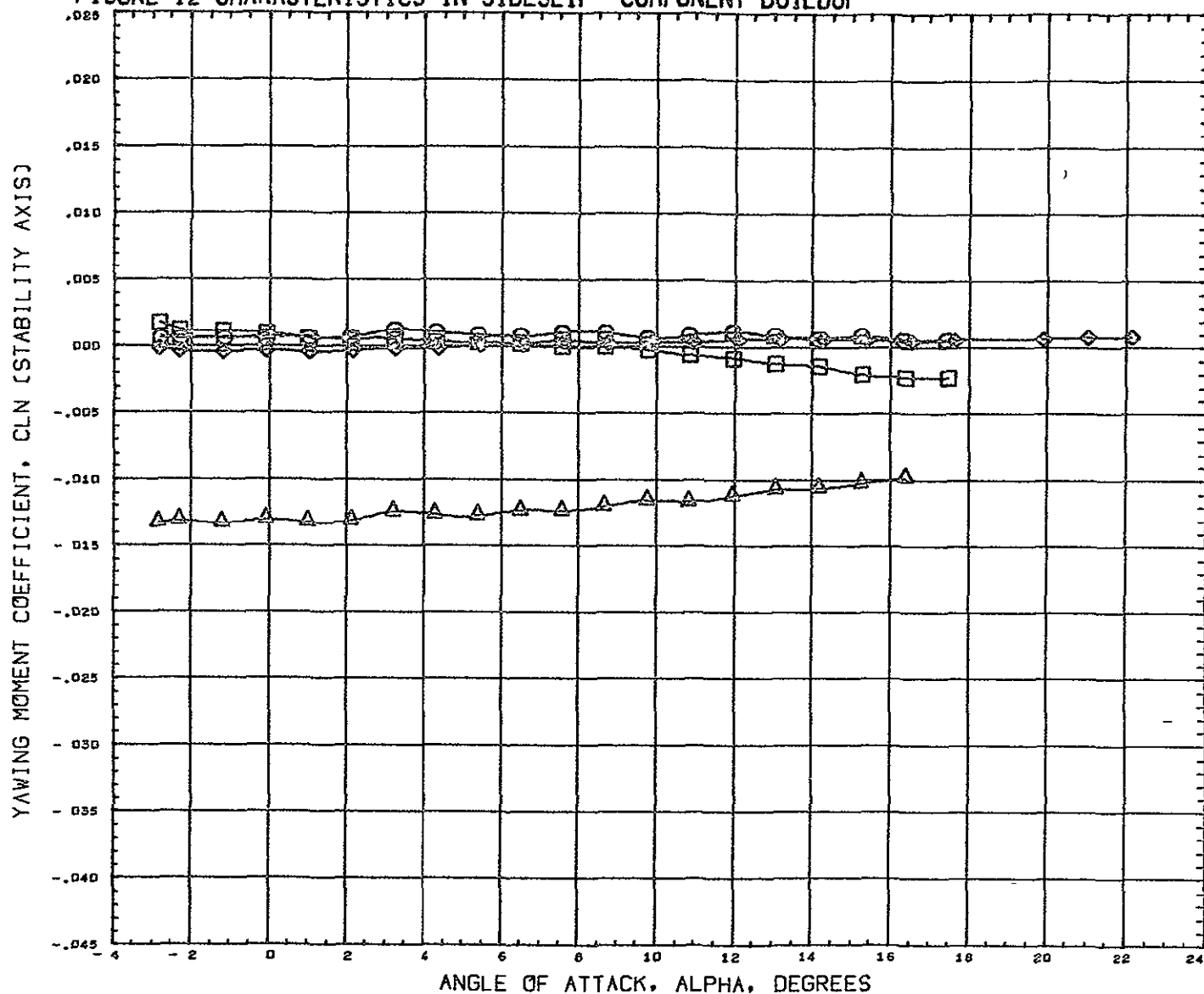
FIGURE 11 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(ACSD03)	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	SREF	20 8890	SQ IN
(RCS014)	GFST 022 CONF ROS-NB1 B1W1V1	4 200	0 000	0 000	0 000	LREF	9 6480	IN
(RCS015)	GFST 022 CONF ROS-NB1 B1W1V1	2 600	0 000	0 000	0 000	BREF	5 8380	IN
						XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 2 020

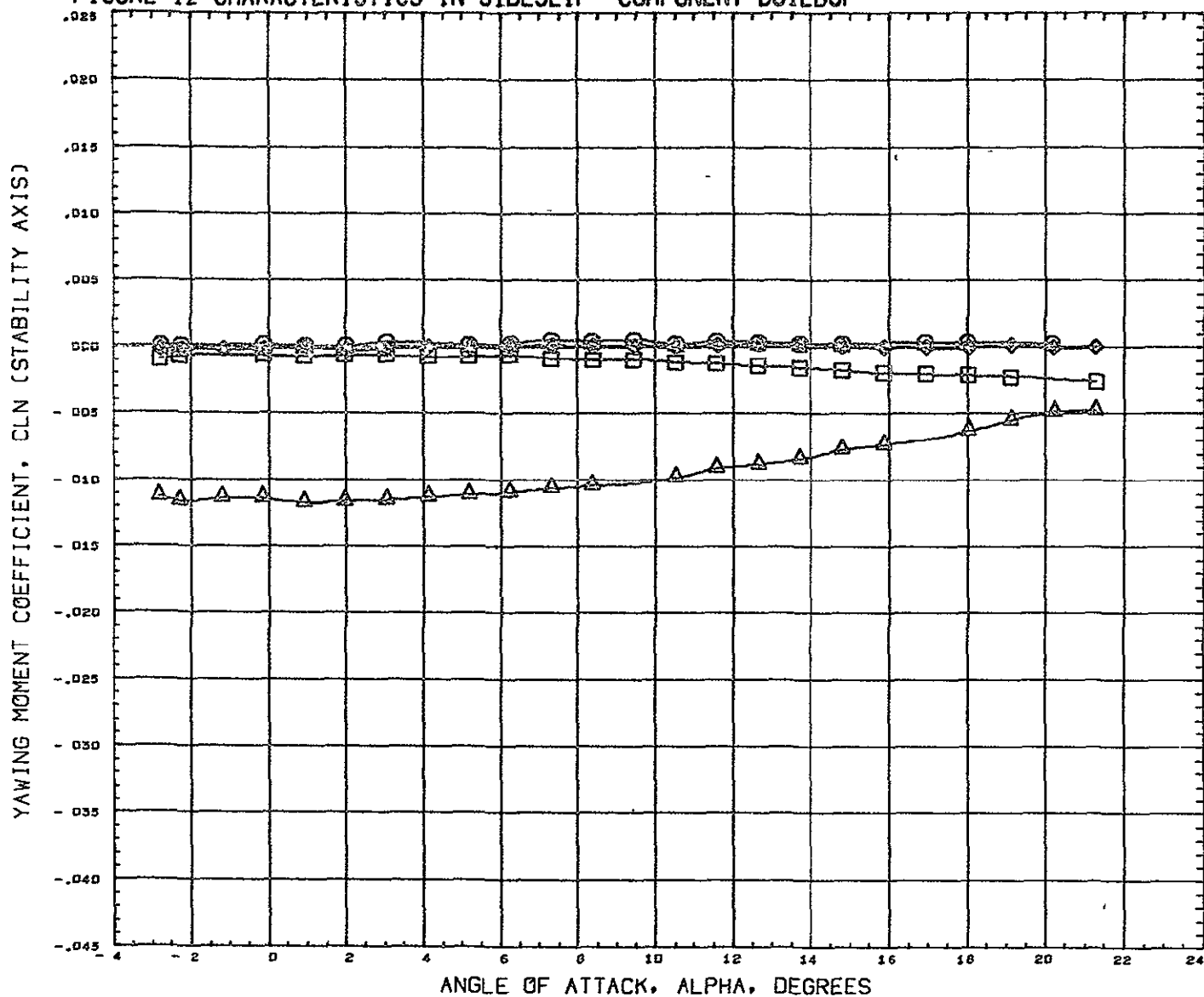
FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS036)	GFST D22 CONF ROS-NB1 B1W1	0 000	0 000	0 000		SREF	20 6890	SQ IN
(RCS034)	GFST D22 CONF ROS-NB1 B1W1	3 400	0 000	0 000		LREF	9 6480	IN
(CCS003)	GFST D22 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	BREF	5 8380	IN
(RCS035)	GFST D22 CONF ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000	XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 1 750

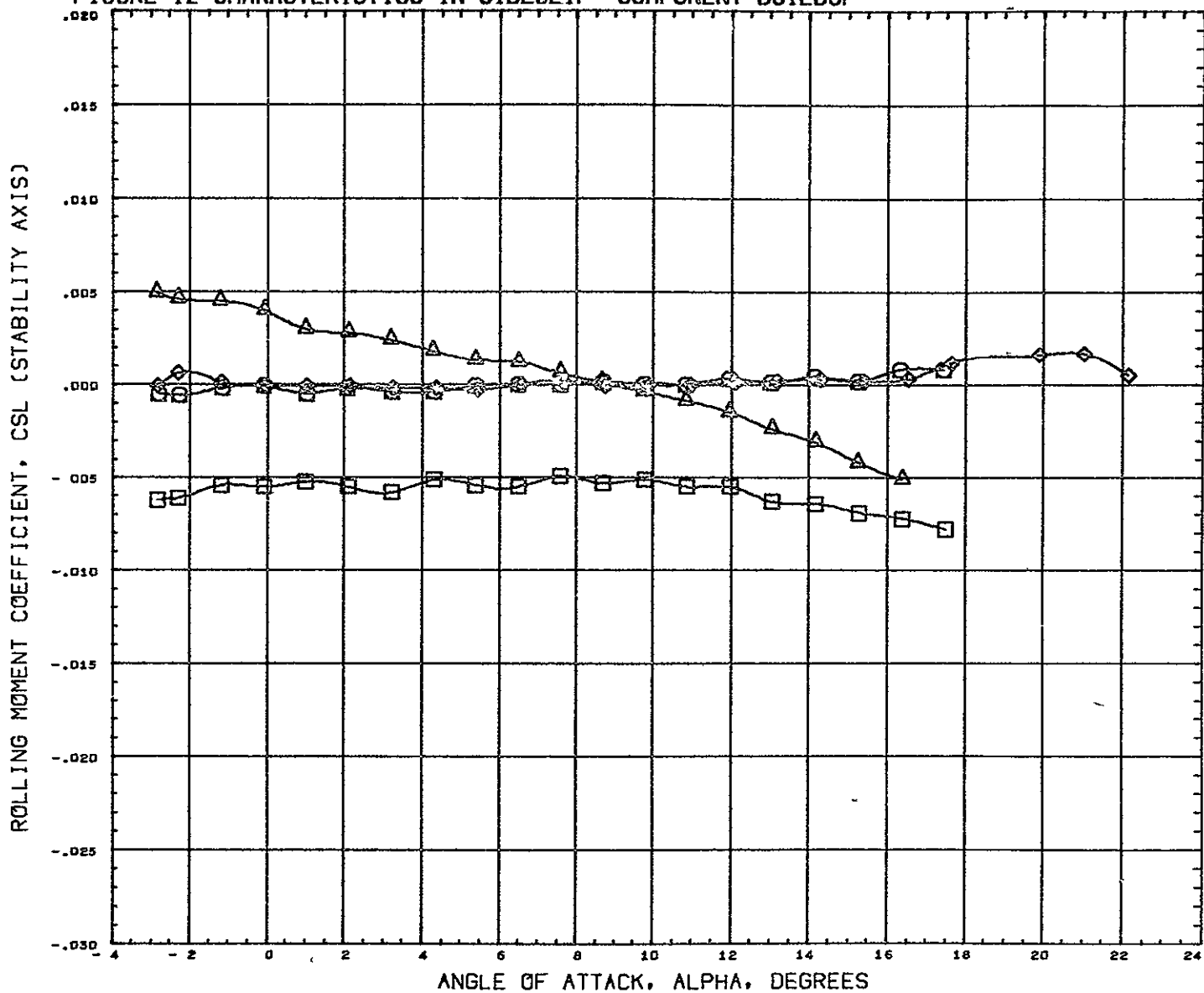
FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS038)	GFST 022 CONF. ROS-NB1 B1W1	0 000	0 000	0 000		SREF	20 6890	SQ IN
(RCS034)	GFST 022 CONF. ROS-NB1 B1W1	3 400	0 000	0 000		LREF	9 6480	IN
(RCS003)	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	BREF	5 8380	IN
(RCS035)	GFST 022 CONF. ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000	XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 2 480

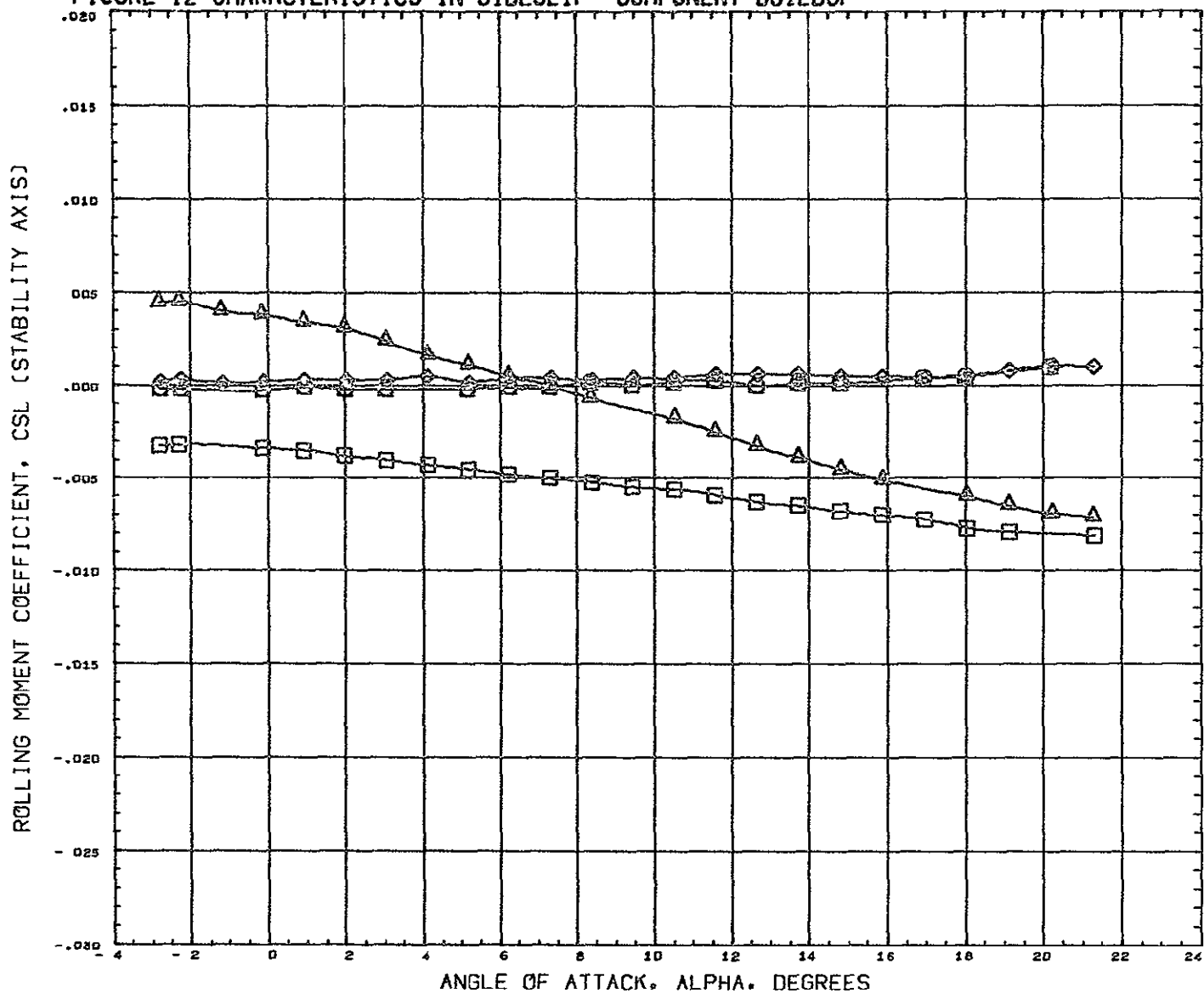
FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS038)	GFST 022 CONF. ROS-NB1 B1W1	0.000	0.000	0.000		SREF	20.6890	50 IN
(RCS034)	GFST 022 CONF. ROS-NB1 B1W1	3.400	0.000	0.000		LREF	9.6480	IN
(CCS003)	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	BREF	5.8380	IN
(RCS035)	GFST 022 CONF. ROS-NB1 B1W1V1	3.400	0.000	0.000	0.000	XMRP	1405.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

HACH 1 750

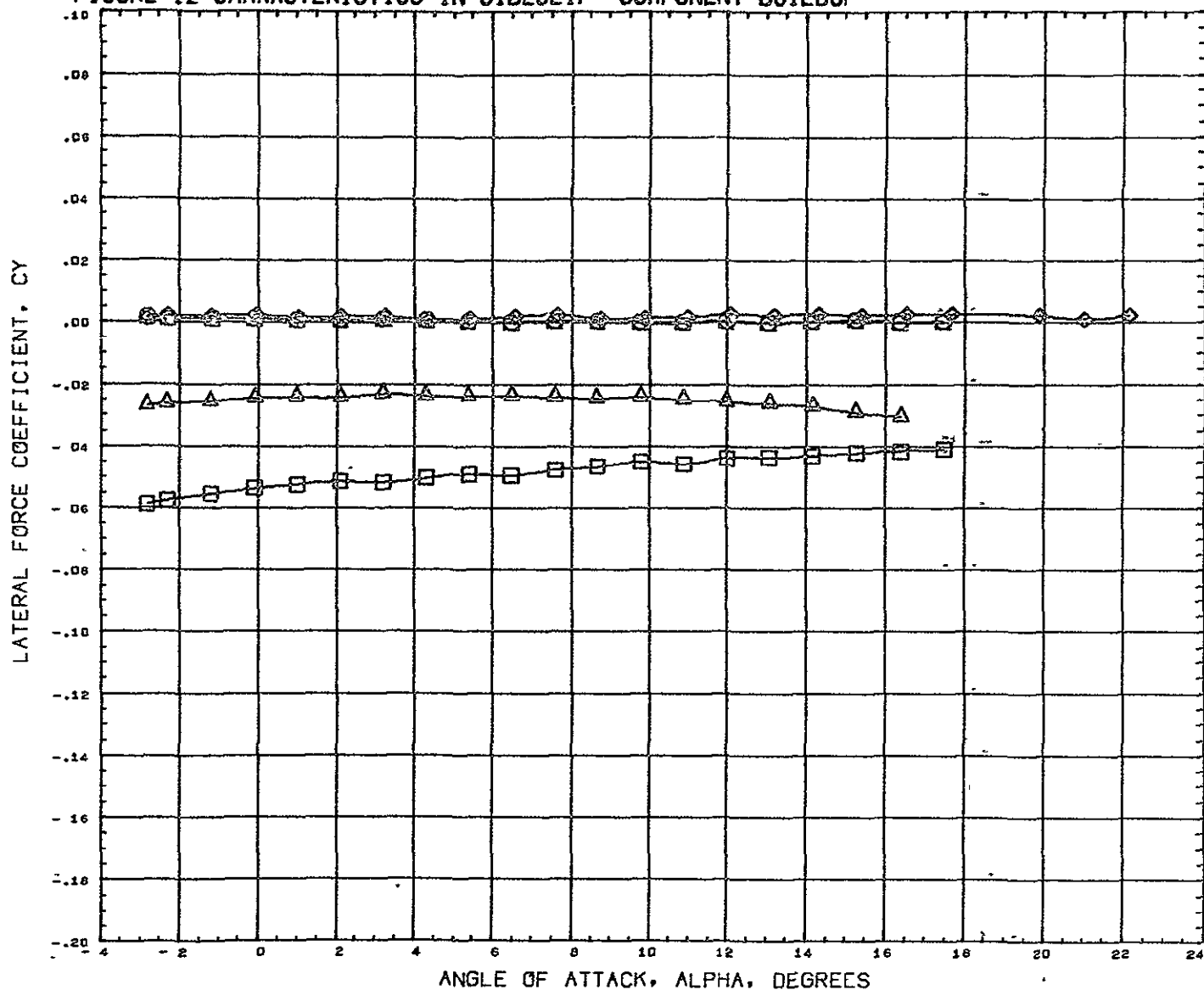
FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS038)	△	GFST 022 CONF ROS-NB1 B1W1	0 000	0 000	0 000		SREF	20 6890	SQ IN
(RCS034)	◇	GFST 022 CONF ROS-NB1 B1W1	3 400	0 000	0 000		LREF	9 6480	IN
(RCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	BREF	5 8380	IN
(RCS035)	□	GFST 022 CONF ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000	XHRP	1485 0040	IN
							YHRP	0 0000	IN
							ZHRP	377 0004	IN
							SCALE	0 0050	

MACH 2 480

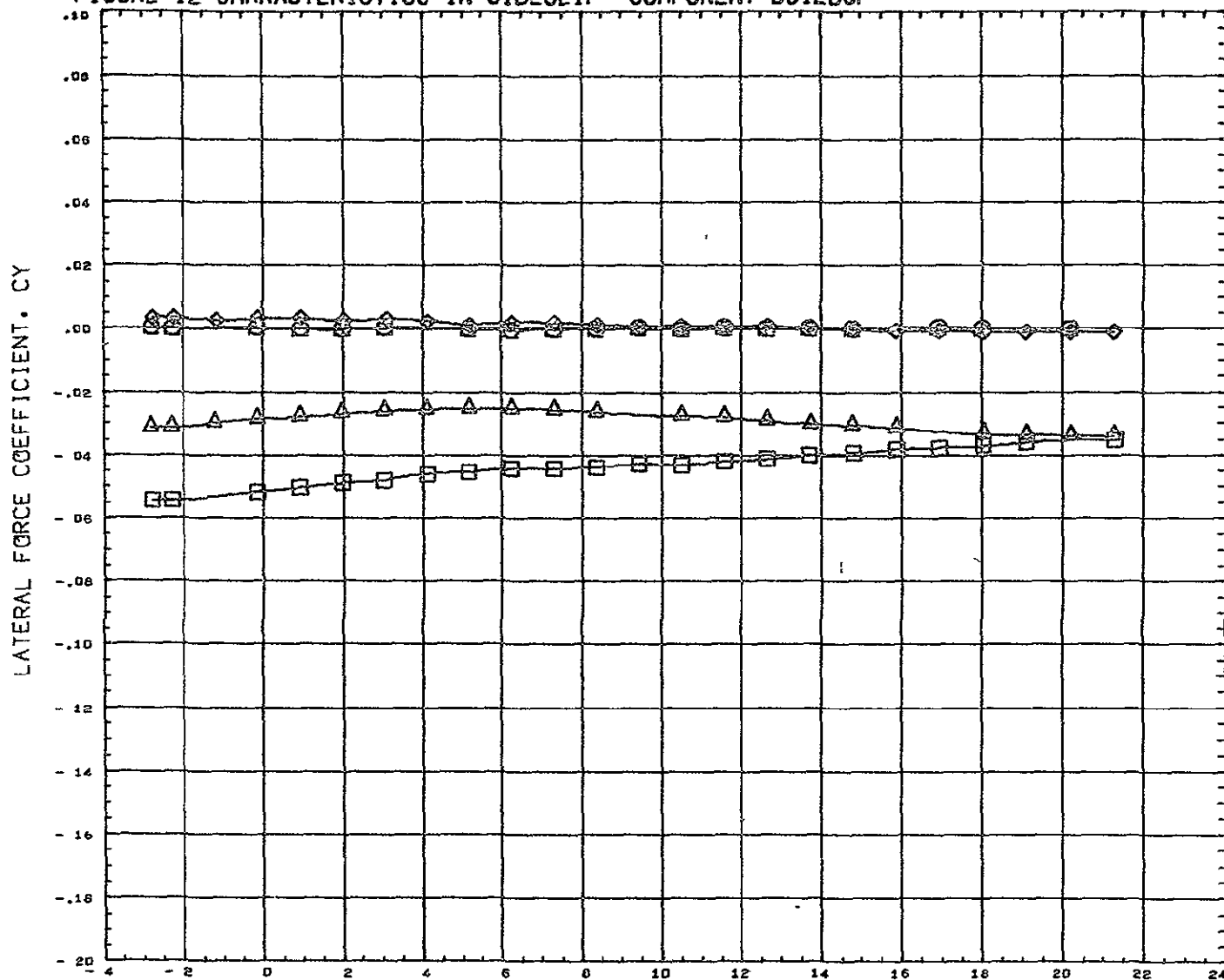
FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION		
(RCS038)	GFST 022 CONF. ROS-NB1 B1W1	0 000	0 000	0 000		SREF	20 6890	SQ IN
(RCS034)	GFST 022 CONF ROS-NB1 B1W1	3 400	0 000	0 000		LREF	9 6480	IN
(CCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000	BREF	5 8380	IN
(RCS035)	GFST 022 CONF ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000	XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 1.750

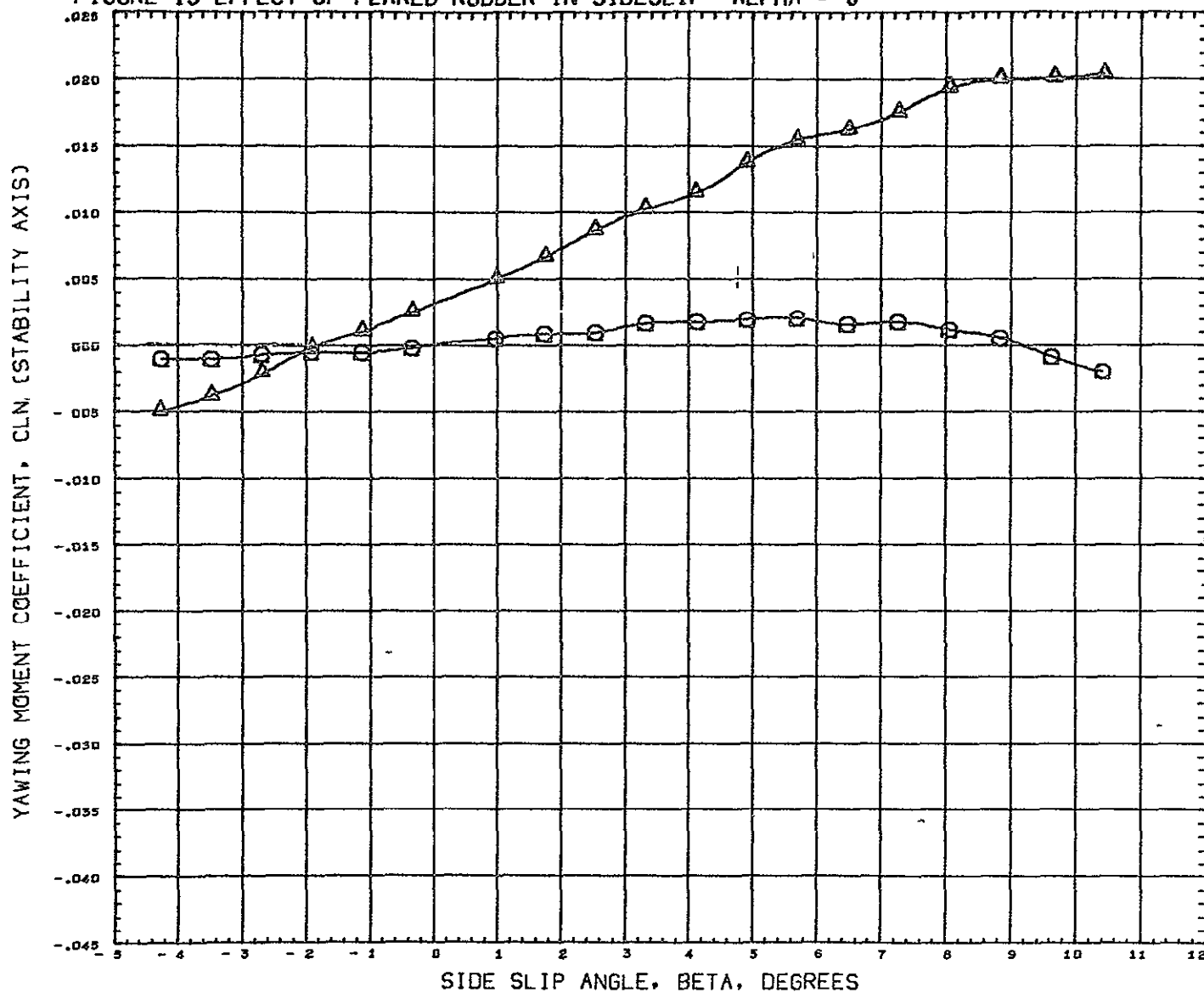
FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER	REFERENCE INFORMATION	
(RCS038)	GFST 022 CONF ROS-NB1 B1W1	0.000	0.000	0.000		SREF	20.6890 SQ IN
(RCS034)	GFST 022 CONF ROS-NB1 B1W1	3.400	0.000	0.000		LREF	9.6480 IN
(CCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000	BREF	5.8380 IN
(RCS035)	GFST 022 CONF ROS-NB1 B1W1V1	3.400	0.000	0.000	0.000	XHRP	1485.0040 IN
						YHRP	0.0000 IN
						ZMRP	377.0004 IN
						SCALE	0.0050

MACH 2.480

FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0

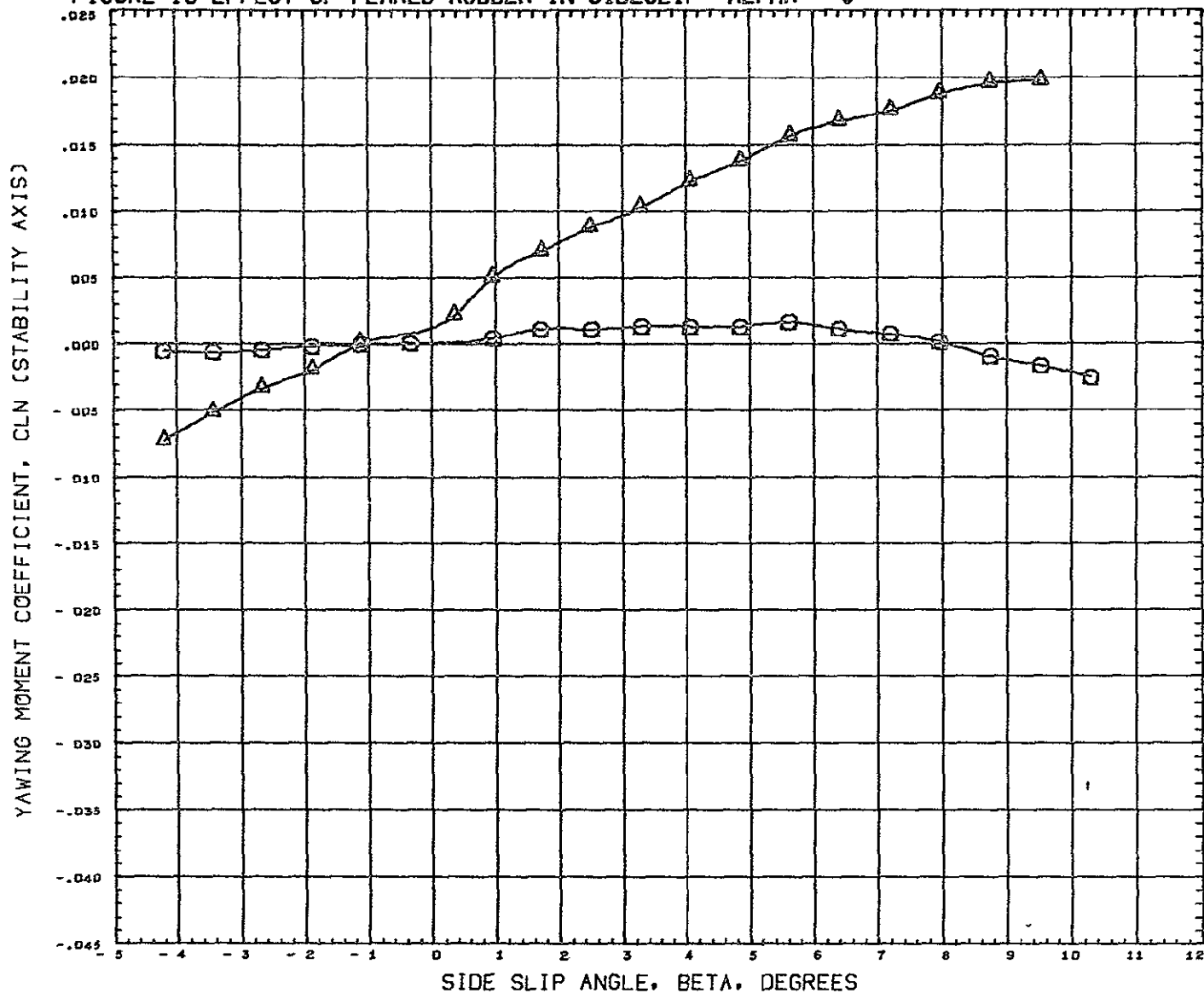


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS002) ○	GFST 022 CONF ROS-NB1 B1W1V1
(RCS012) △	GFST 022 CONF. ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDR	REFERENCE INFORMATION
0 000			0 000	SREF 20 6890 SQ IN
0 000	-30 000			LREF 9 6460 IN
				BREF 5 8360 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 1 750

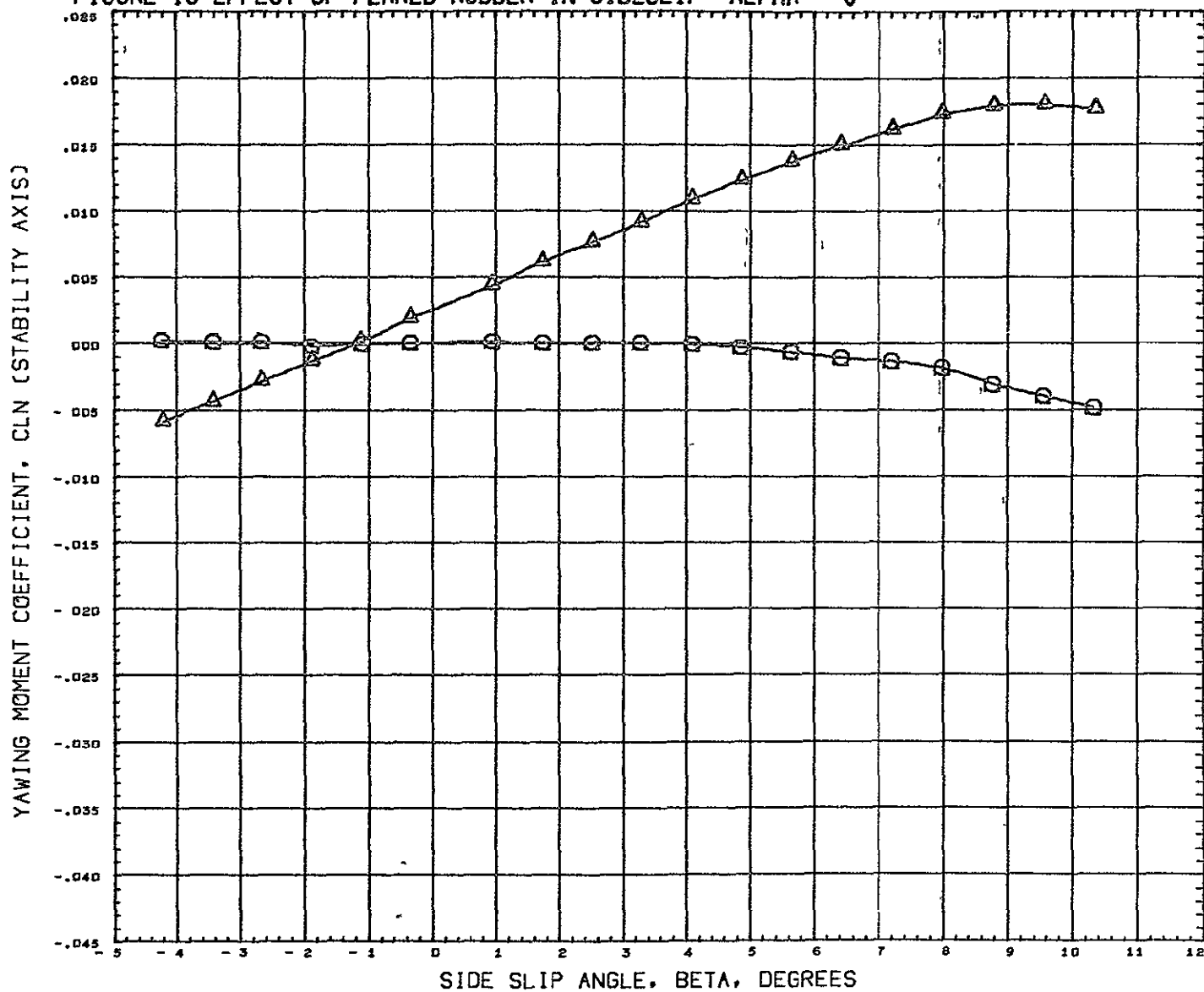
FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	L RUDDER	RUDDER	RUDDER	REFERENCE INFORMATION
(RCS002)	6FST 022 CONF. ROS-NB1 B1W1V1	0 000			0 000	SREF 20 6890 SQ IN
(RCS012)	6FST 022 CONF. ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000			LREF 9 6480 IN
						BREF 5 8380 IN
						XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377 0004 IN
						SCALE 0 0050

MACH 2 020

FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0

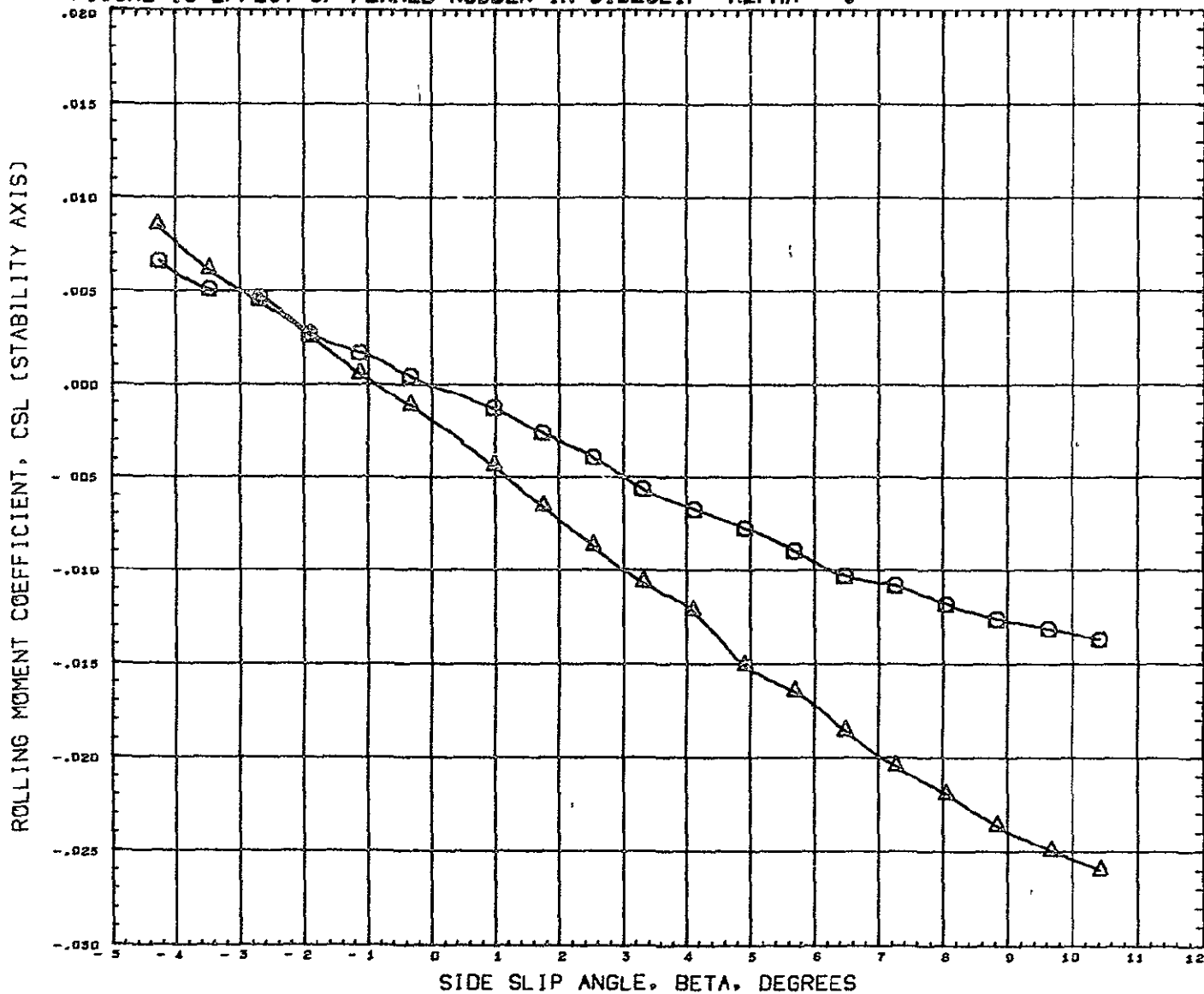


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS002)	GFST 022 CONF ROS-NB1 B1W1V1
(RCS012)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
0 000			0 000	SREF 20 6890 SQ IN
0 000	-30 000			LREF 9 6480 IN
				BREF 5 8360 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 480

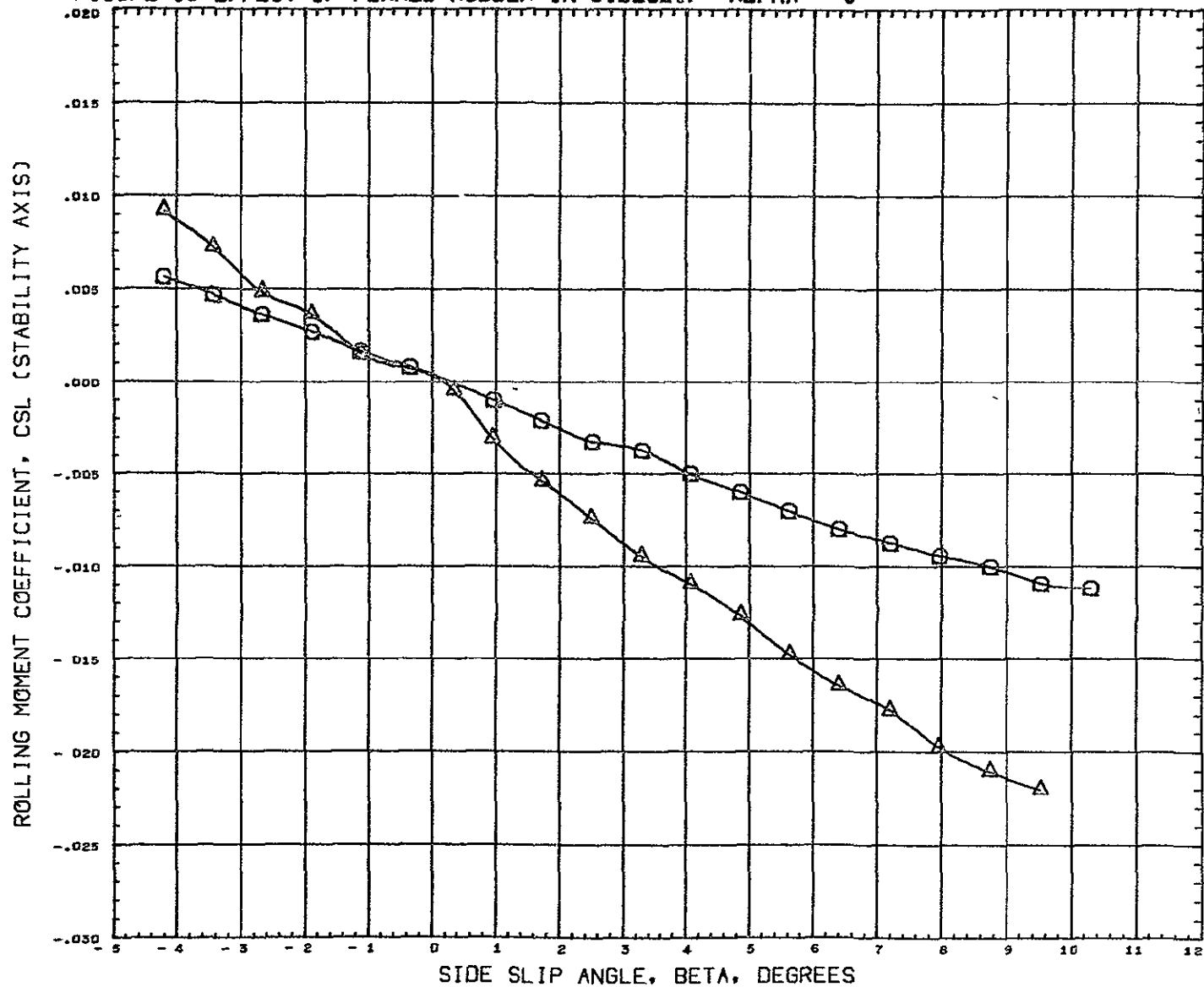
FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
(RCS002)	GFST 022 CONF. ROS-NB1 B1W1V1	0 000			0 000	SREF 20 6890 SQ IN.
(RCS012)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000			LREF 9 6480 IN
						BREF 5 8380 IN
						XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377 0004 IN
						SCALE 0 0050

MACH 1 750

FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0

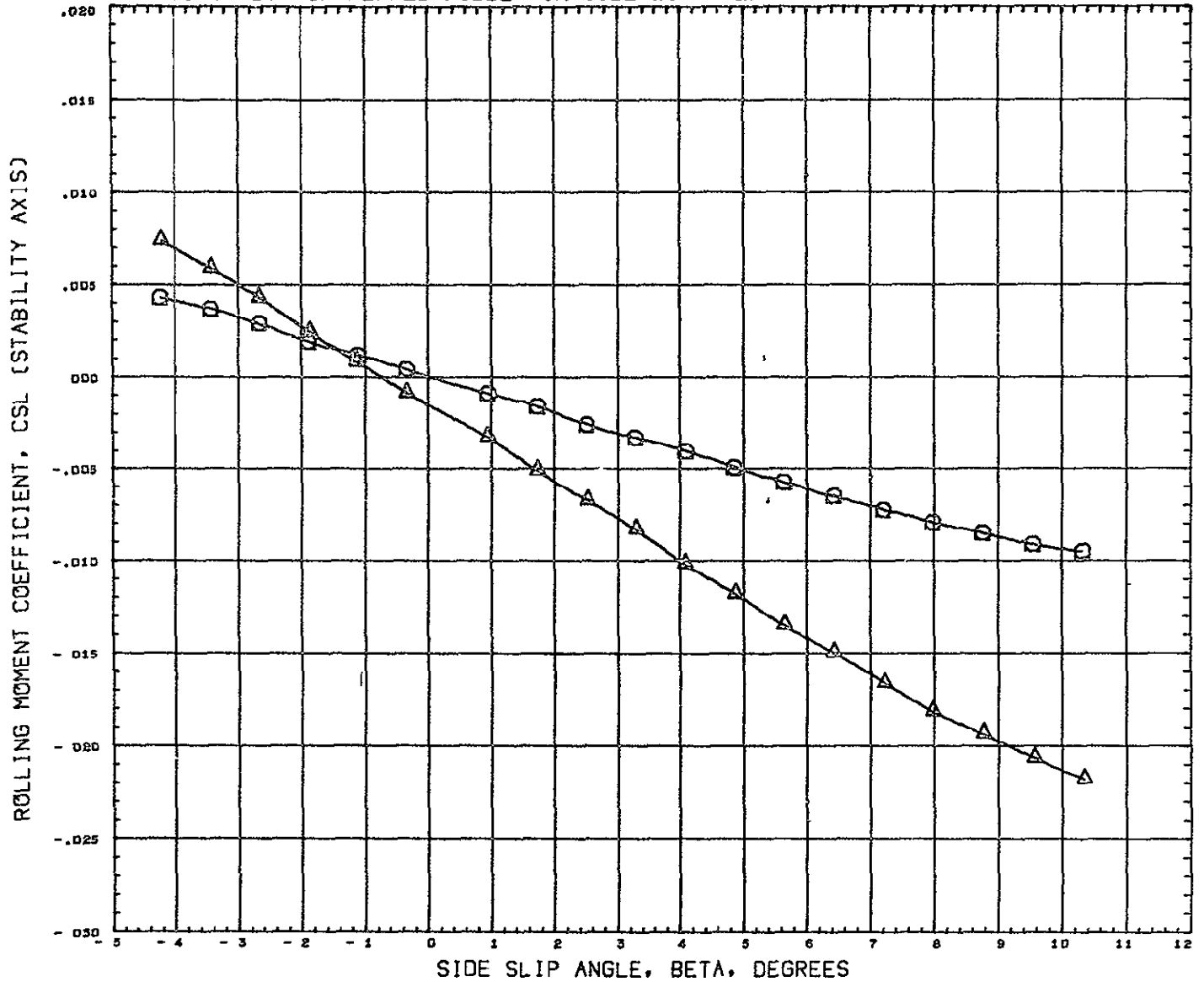


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS002) ○	GFST 022 CONF ROS-NB1 B1W1V1
(RCS012) △	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
0.000			0 000	SREF 20 5890 SQ IN
0 000	-30 000			LREF 9 5480 IN
				BREF 5 3380 IN
				XMRP 1485.0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0

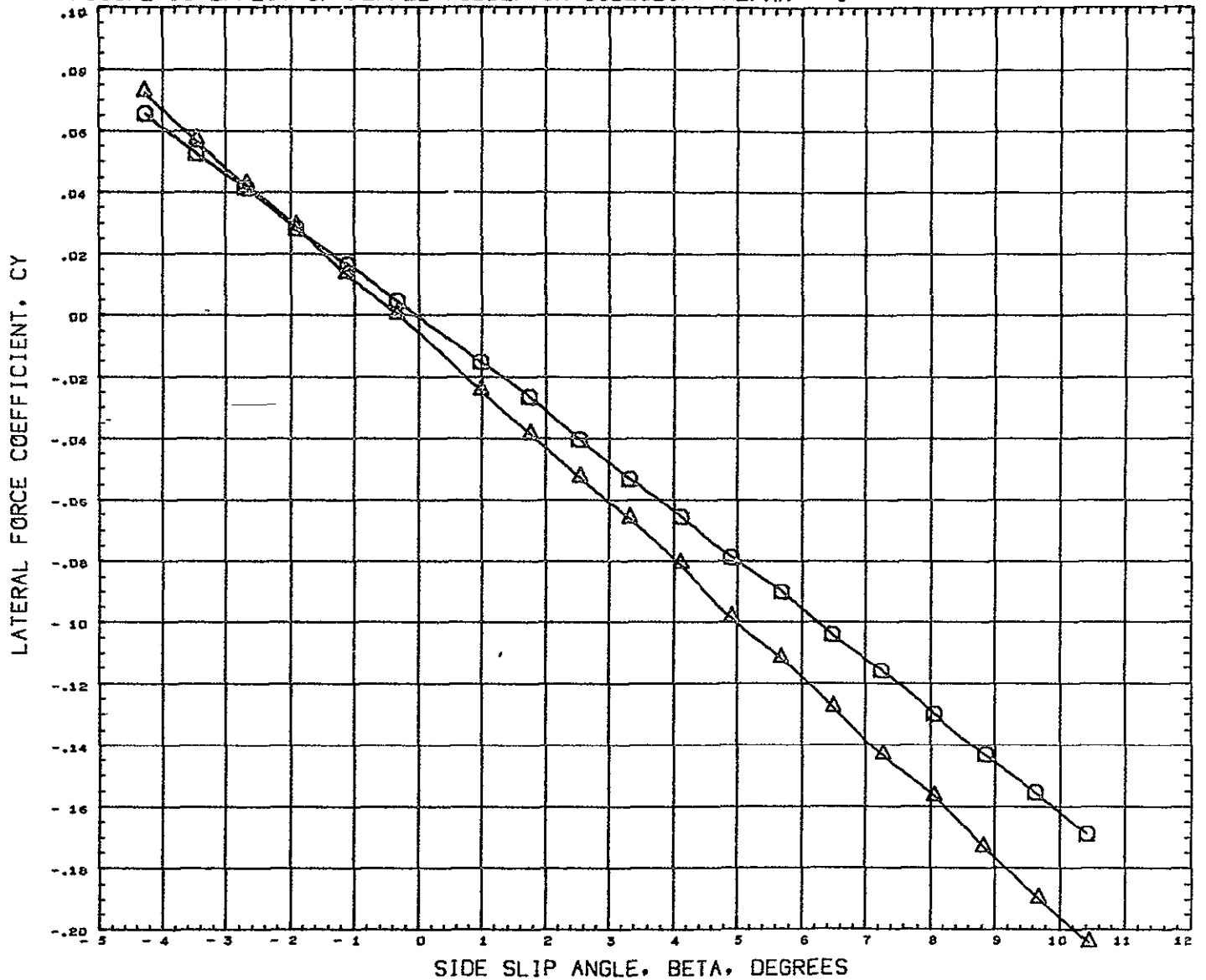


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RC8002)	GFST 022 CONF ROS-NB1 B1W1V1
(RC8012)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
0 000			0 000	SREF 20 6890 SQ IN
0 000	-30.000			LREF 9 6480 IN
				BREF 5 8390 IN
				XHRP 1485 0040 IN
				YHRP 0 0000 IN
				ZHRP 377 0004 IN
				SCALE 0 0050

MACH 2 480

FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0

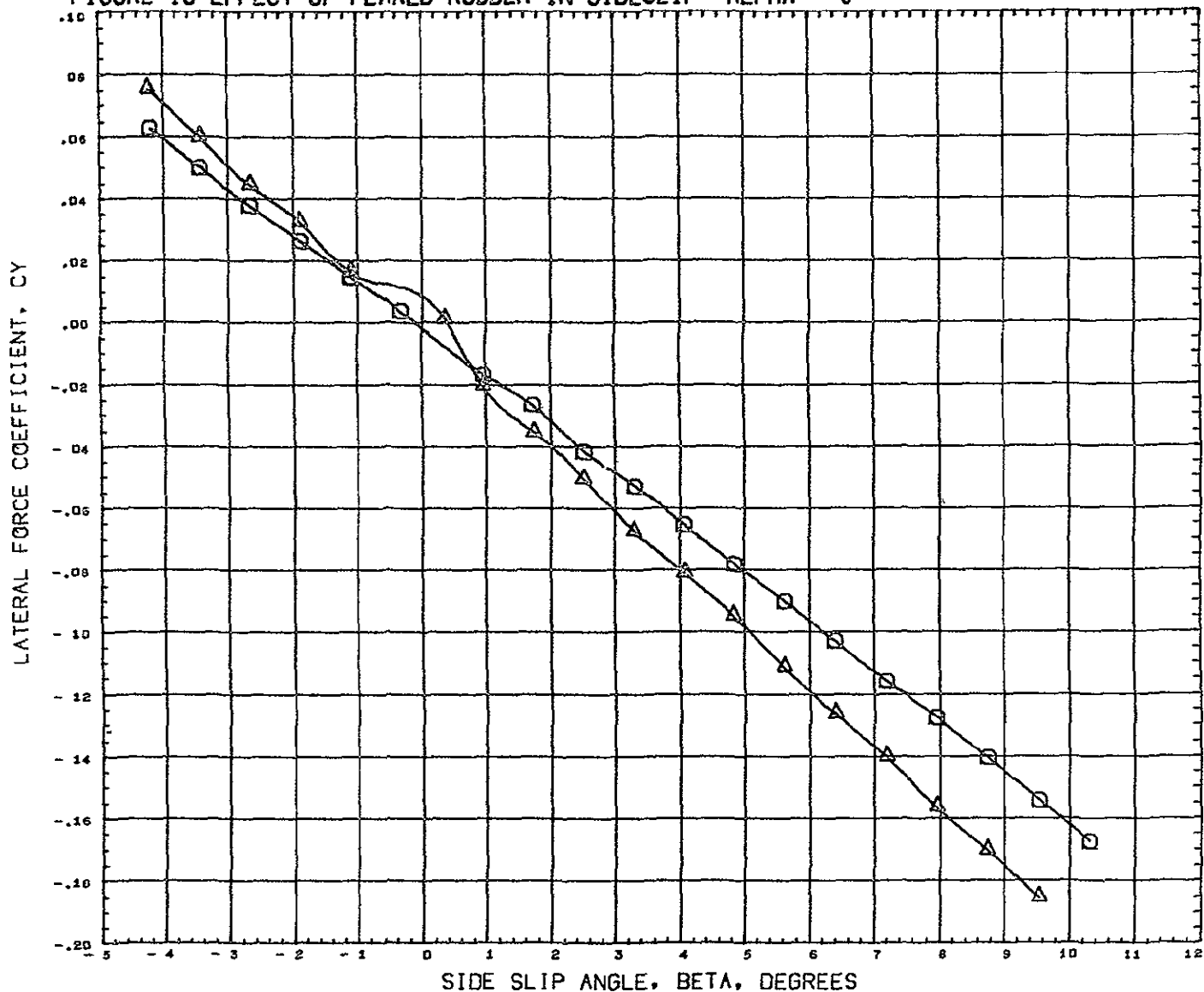


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(RCS002) GFST 022 CONF ROS-NB1 B1W1V1
(RCS012) GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
0 000			0 000	SREF 20 6890 SQ IN
0 000	-30.000			LREF 9 6480 IN
				BREF 5 8360 IN
				XHRP 1485 0040 IN
				YHRP 0 0000 IN
				ZHRP 377 0004 IN
				SCALE 0 0050

MACH 1 750

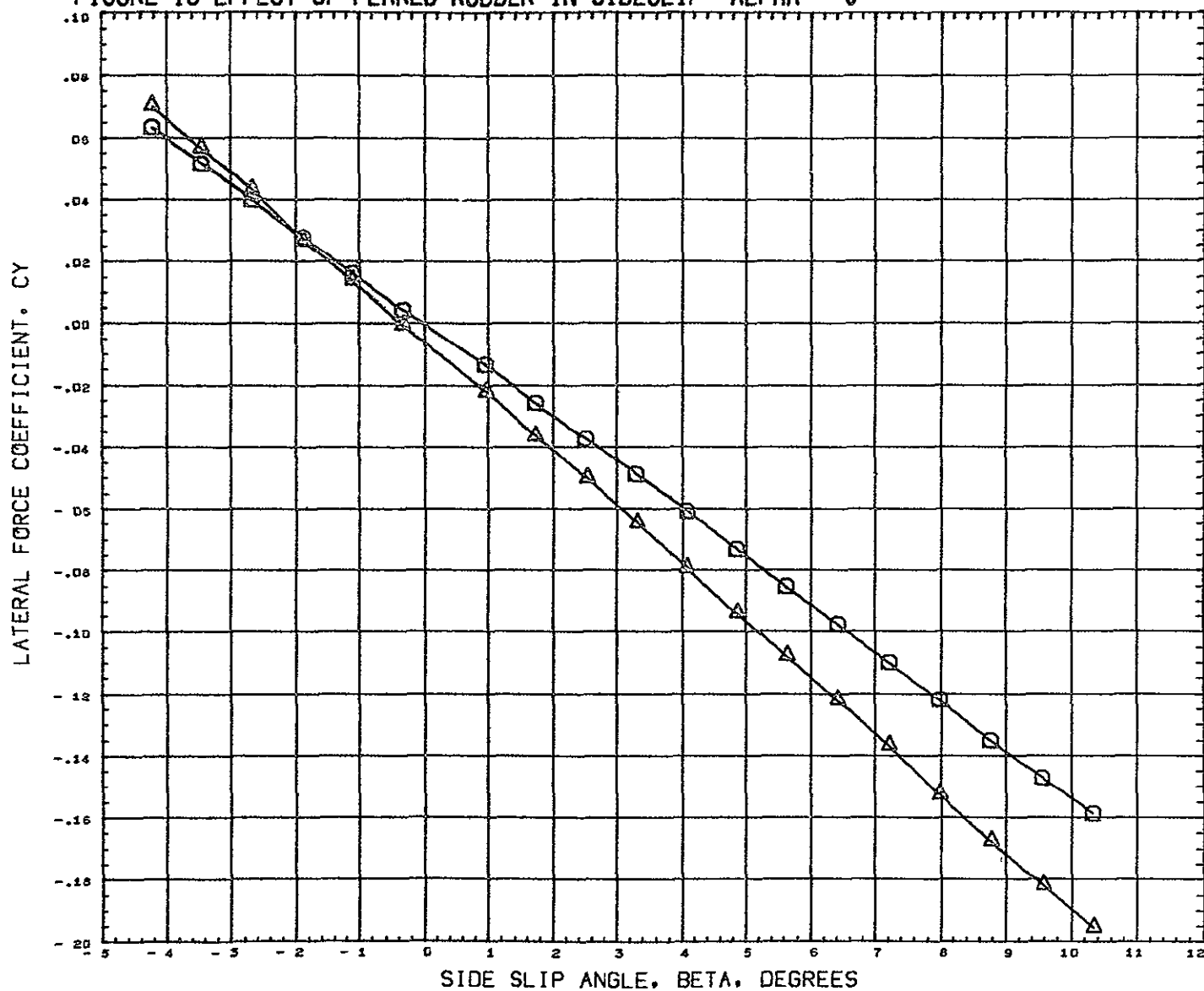
FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
(RCS002)	GFST Q22 CONF ROS-NB1 B1W1V1	0 000			0 000	SREF 20 6890 SQ IN
(RCS012)	GFST Q22 CONF ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000			LREF 9 6480 IN
						BREF 5 0380 IN
						XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377 0004 IN
						SCALE 0 0050

MACH 2 020

FIGURE 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0



DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS002) $\square$	6FST 022 CONF ROS-NB1 B1W1V1
(RCS012) $\triangle$	6FST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR
0.000		
0.000	-30.000	

RUDDER

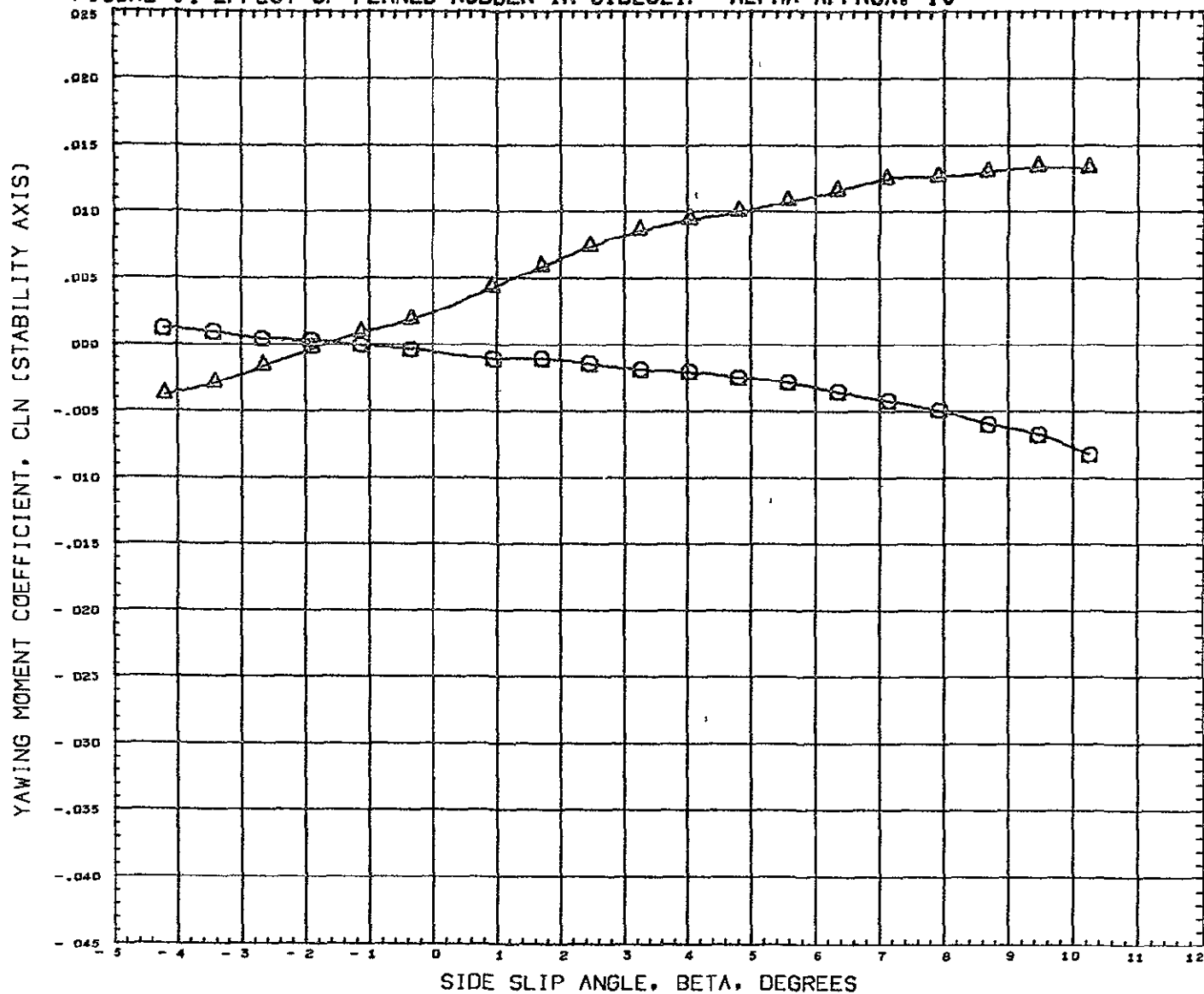
0.000

REFERENCE INFORMATION		
SREF	20.6890	SQ IN
LREF	9.6480	IN
BREF	5.8380	IN
XMRP	1485.0040	IN
YMRP	0.0000	IN
ZMRP	377.0004	IN
SCALE	0.0050	

MACH

2.480

FIGURE 14 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA APPROX. 10

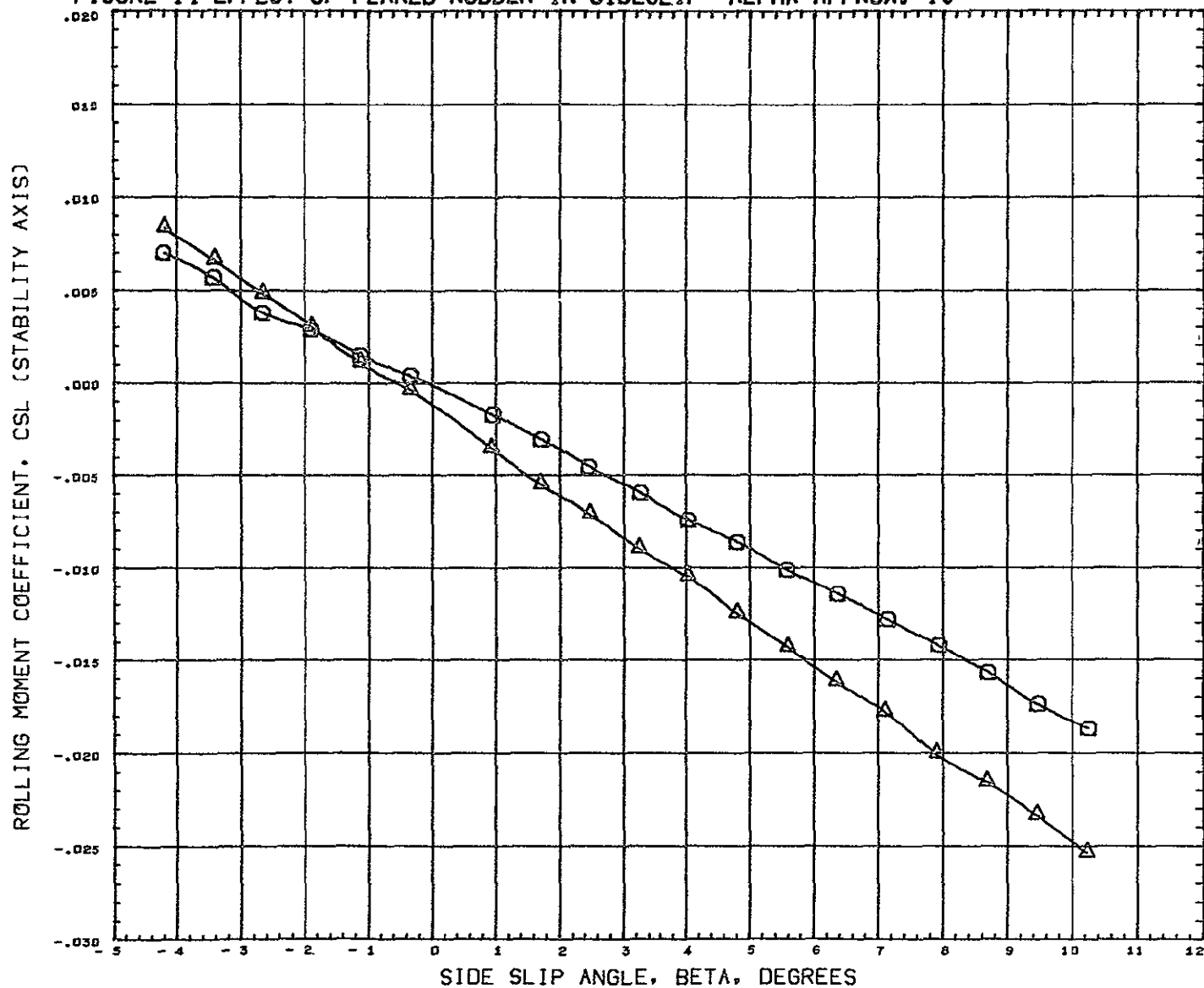


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS019)	GFST 022 CONF. ROS-NB1 B1W1V1
(RCS020)	GFST 022 CONF. ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
10 000			0 000	SREF 20 6890 SQ IN
10 000	-30 000			LREF 9.6480 IN
				BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

FIGURE 14 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA APPROX. 10

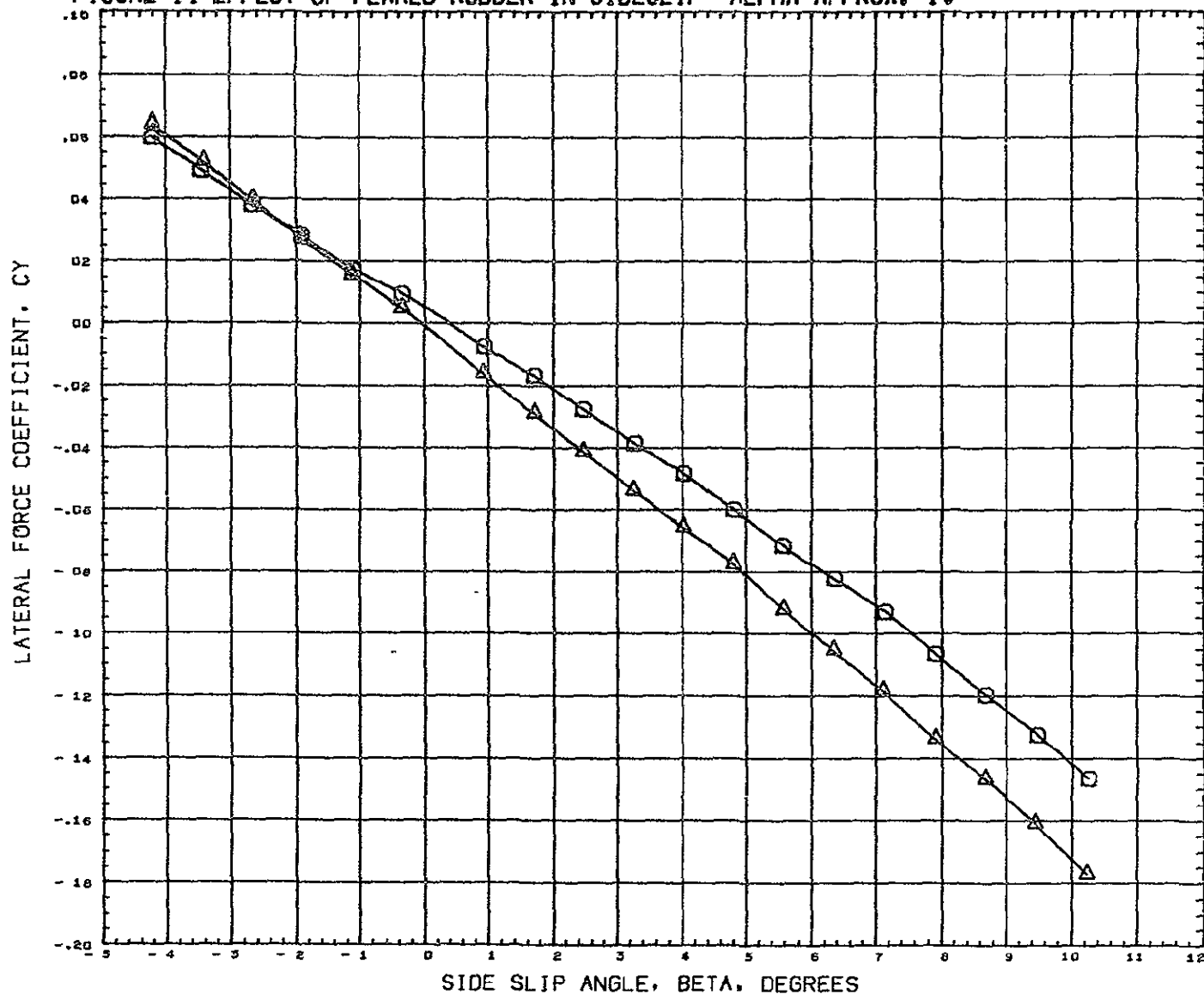


DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(RCS019) ○	GFST 022 CONF. ROS-NB1 B1W1V1
(RCS020) △	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
10 000			0 000	SREF 20 6890 SQ IN
10 000	-30 000			LREF 9 6480 IN
				BREF 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0 0050

MACH 2 020

FIGURE 14 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA APPROX. 10

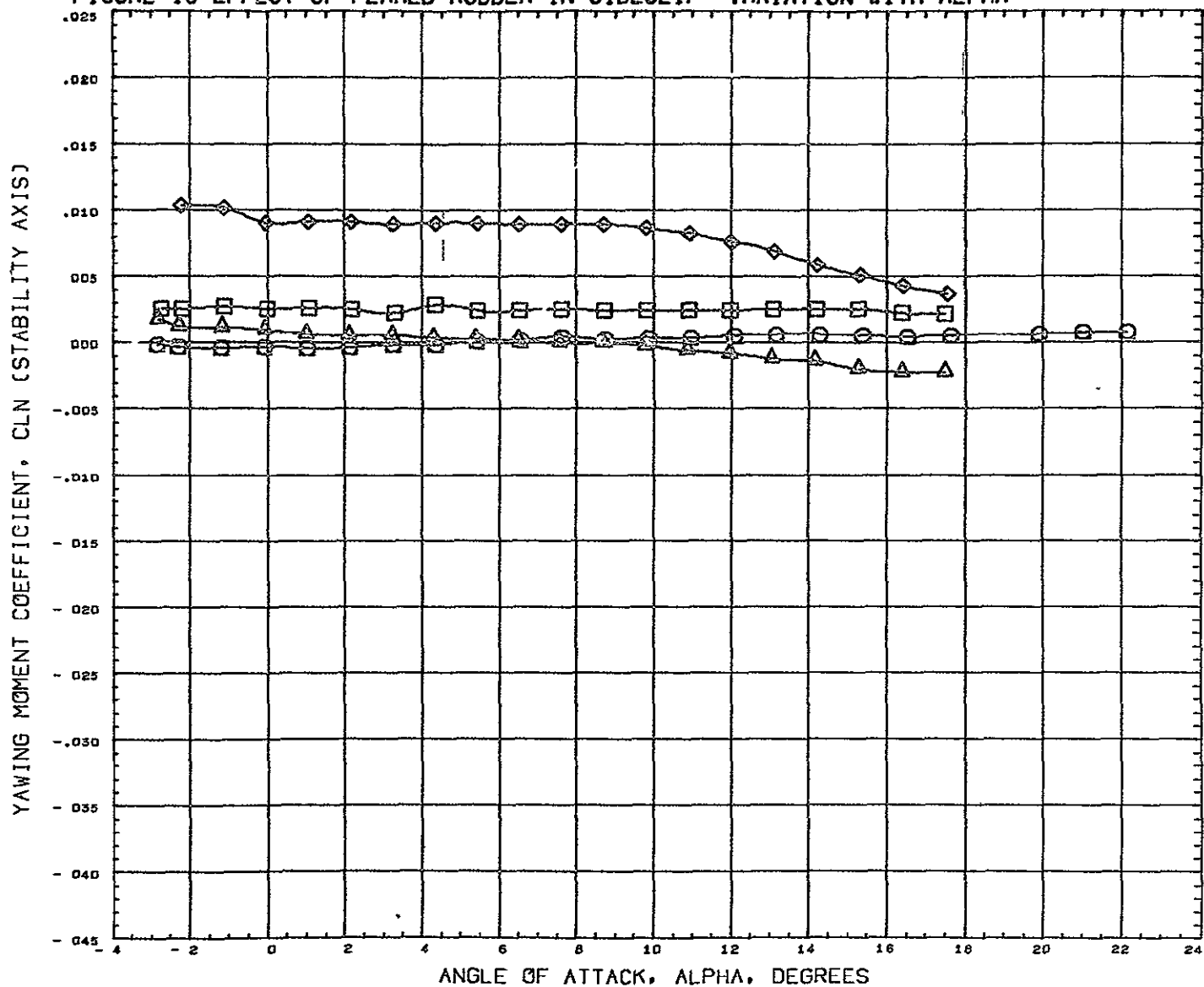


DATA SET SYMBOL CONFIGURATION DESCRIPTION
(RCS019) GFST 022 CONF. ROS-NB1 B1W1V1
(RCS020) GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)

- ALPHA	LRUDDR	RUDDR	RUDDR	REFERENCE INFORMATION
10 000			0 000	SREF 20 6890 SQ IN
10 000	-30 000			LRFP 9 6490 IN
				BRFP 5 8380 IN
				XMRP 1485 0040 IN
				YMRP 0 0000 IN
				ZMRP 377 0004 IN
				SCALE 0.0050

MACH 2 020

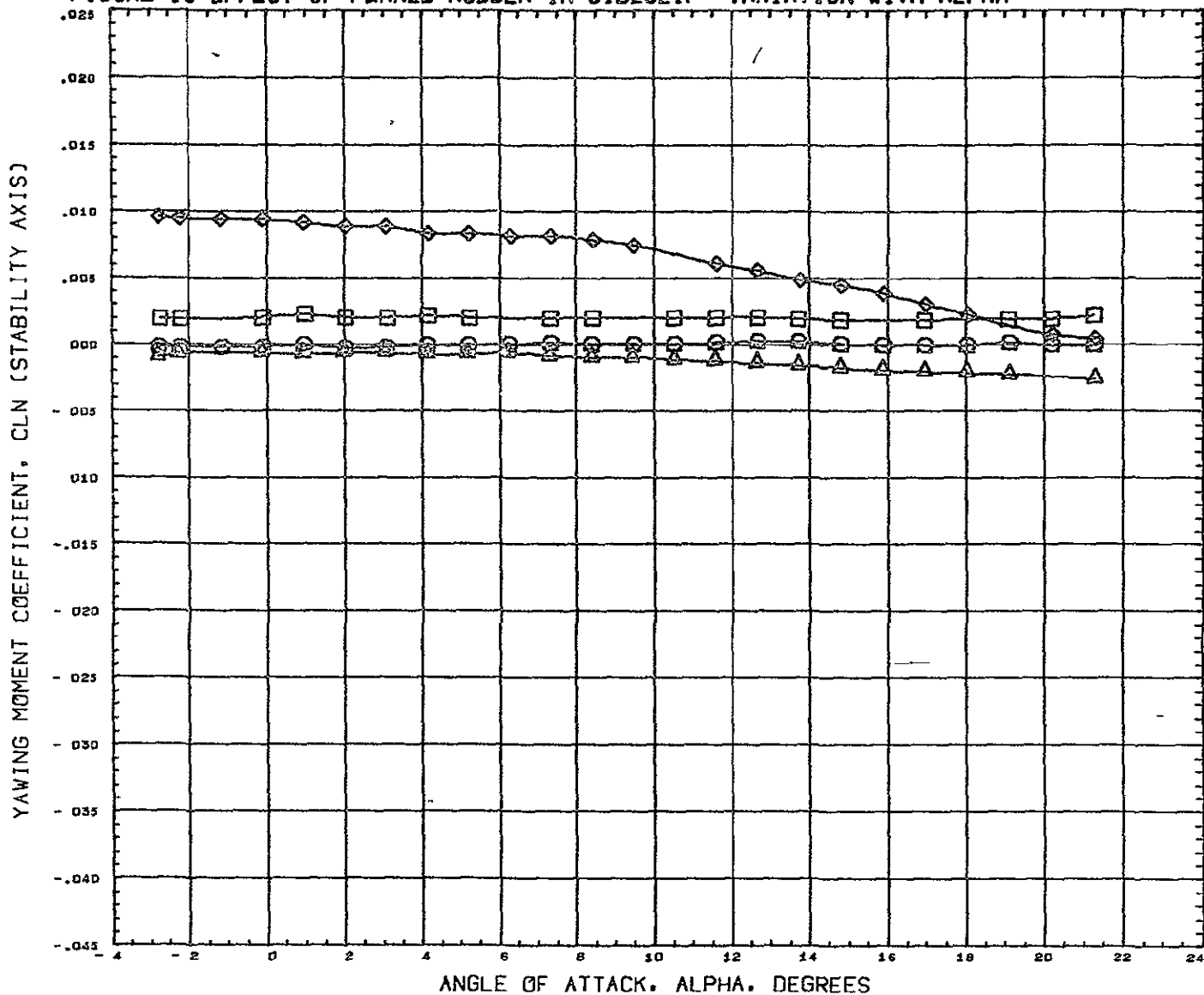
FIGURE 15 EFFECT OF FLARED RUDDER IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER	REFERENCE INFORMATION		
(CCS003)	GFST 022 CONF. ROS-NB1 B1W1V1	0 000			0 000	SREF	20 6890	SQ IN
(RCS035)	GFST 022 CONF. ROS-NB1 B1W1V1	3 400			0 000	LREF	9 6460	IN
(RCS036)	GFST 022 CONF. ROS-NB1 D1W1V1 (-30,30)	3 400	-30 000	30 000		BREF	5 8360	IN
(RCS037)	GFST 022 CONF. ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000	30 000		XMRF	1485 0040	IN
						YMRF	0 0000	IN
						ZMRF	377 0004	IN
						SCALE	0 0050	

MACH 1 750

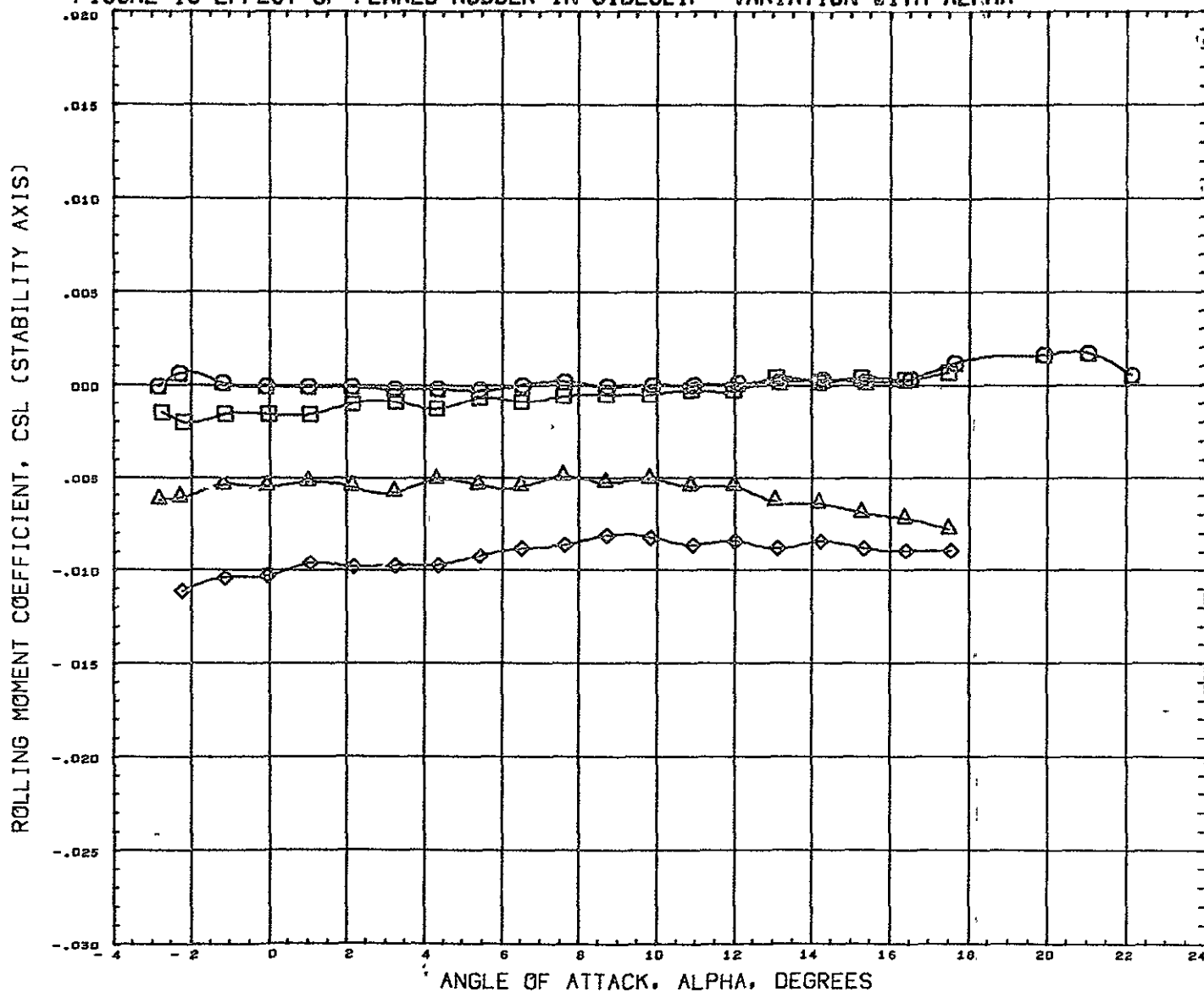
FIGURE 15 EFFECT OF FLARED RUDDER IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER	REFERENCE INFORMATION		
(CCS003)	GFS1 022 CONF ROS-NB1 B1W1V1	0.000			0.000	SREF	20.6890	sq IN
(RCS035)	GFS1 022 CONF ROS-NB1 B1W1V1	3.400			0.000	LREF	9.6480	IN
(RCS036)	GFS1 022 CONF ROS-NB1 B1W1V1(-30,30)	3.400	-30.000	30.000		BREF	5.6360	IN
(RCS037)	GFS1 022 CONF ROS-NB1 B1W1V1(-30,30)	0.000	-30.000	30.000		XMRP	1485.0040	IN
						YMRP	0.0000	IN
						ZMRP	377.0004	IN
						SCALE	0.0050	

MACH 2.480

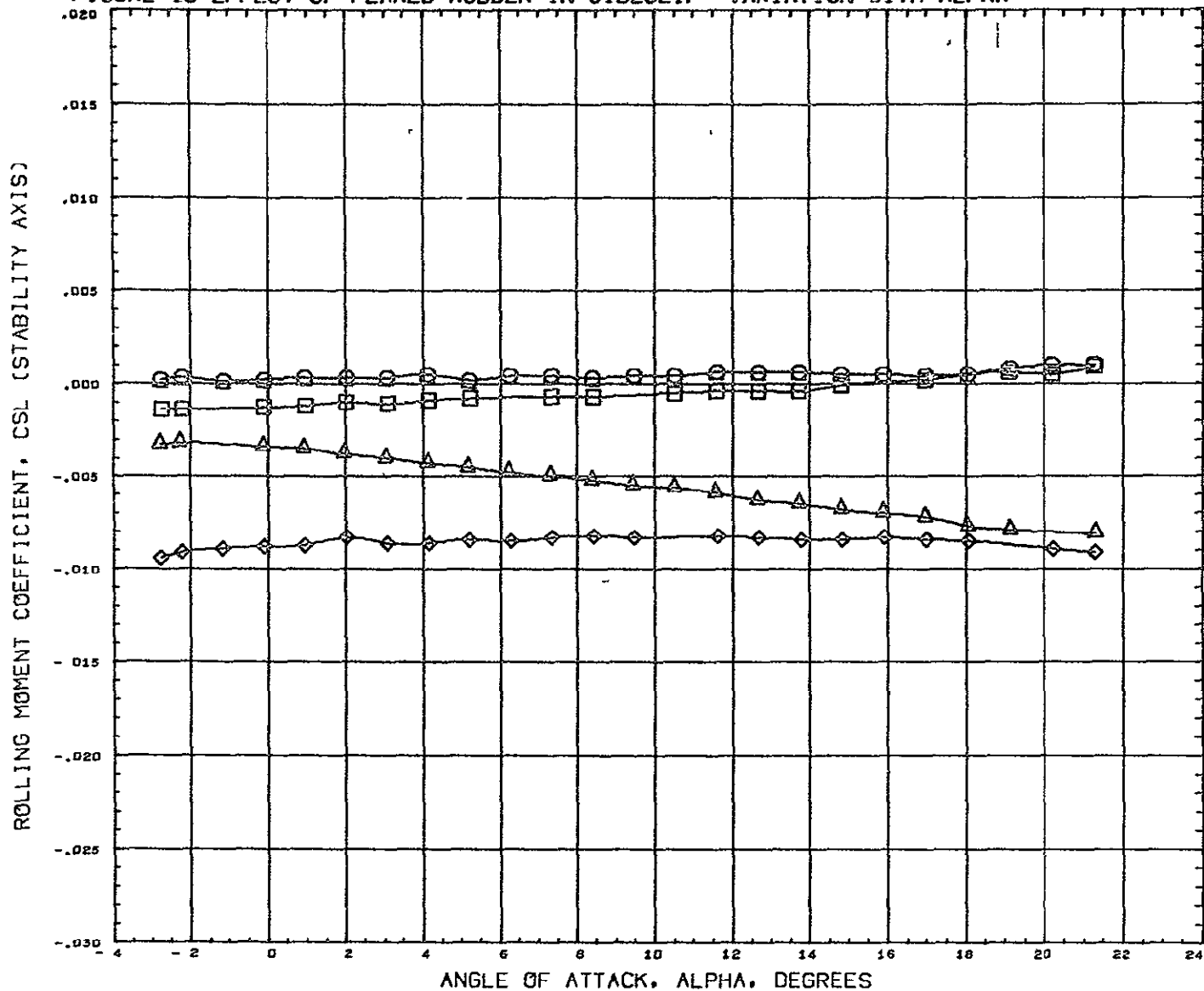
FIGURE 15 EFFECT OF FLARED RUDDER IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER	REFERENCE INFORMATION		
(CC3003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0 000	SREF	20 0000	50 IN
(RC3035)	GFST 022 CONF ROS-NB1 B1W1V1	3.400			0 000	LREF	9 6480	IN
(RC3036)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	3.400	-30 000	30 000		BREF	5 8360	IN
(RC3037)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000	30 000		XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN
						SCALE	0 0050	

MACH 1.750

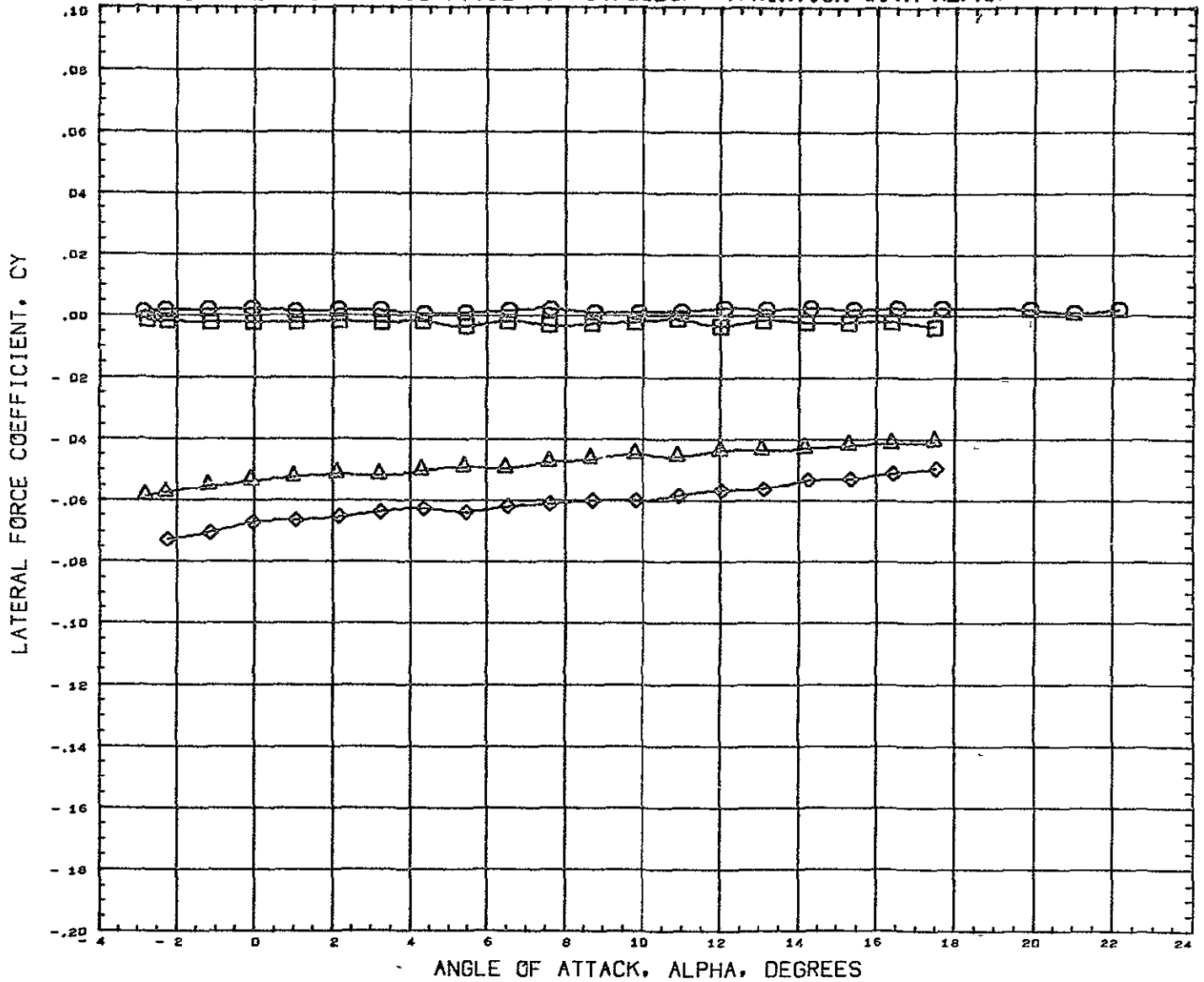
FIGURE 15 EFFECT OF FLARED RUDDER IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER	REFERENCE INFORMATION		
(CCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000	SREF	20 6890	SQ IN
(RCS035)	GFST 022 CONF ROS-NB1 B1W1V1	3 400			0 000	LREF	9 6480	IN
(RCS036)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	3 400	-30 000	30 000		BREF	5 8380	IN
(RCS037)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000	30 000		XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377 0004	IN.
						SCALE	0 0050	

MACH 2 480

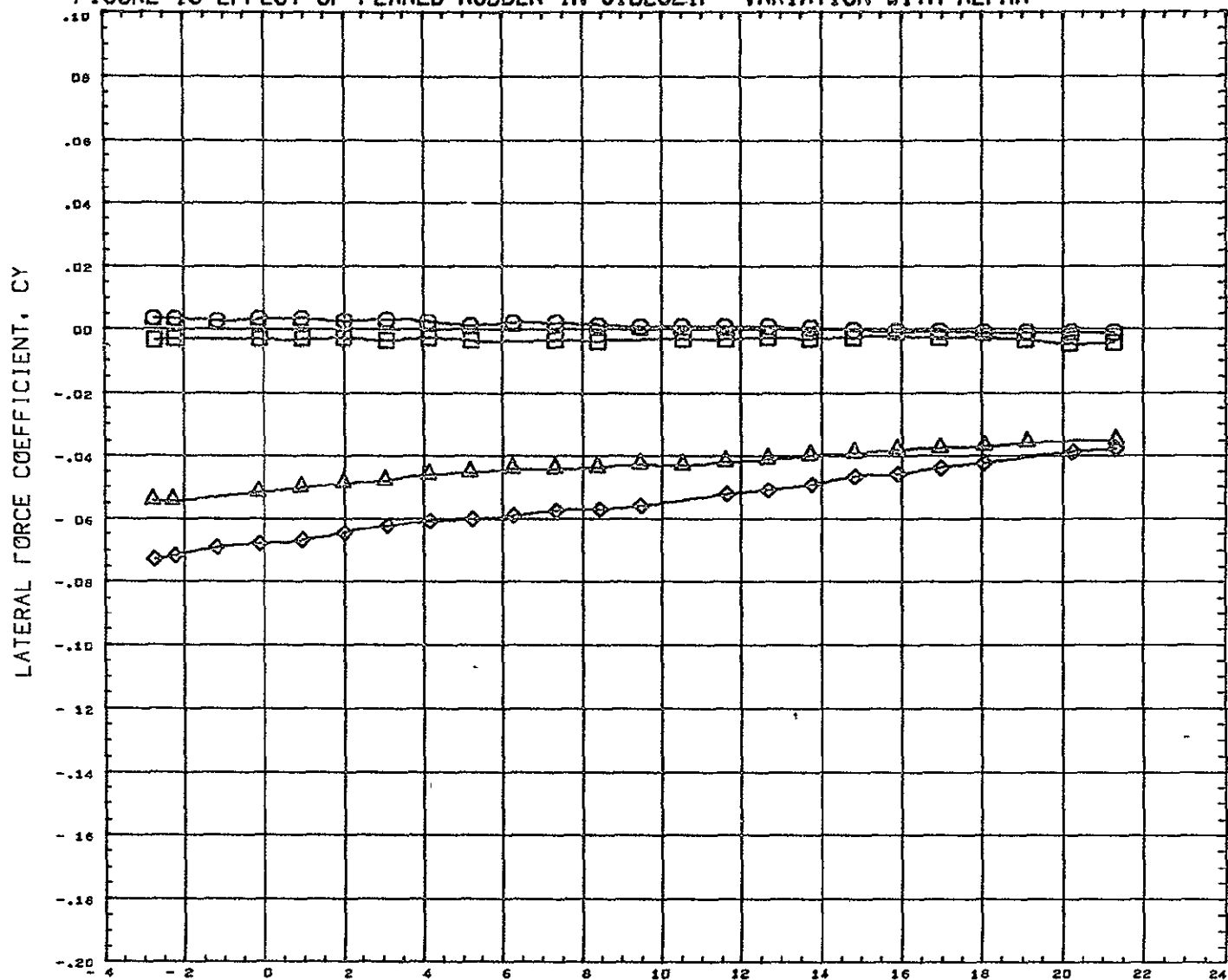
FIGURE 15 EFFECT OF FLARED RUDDER IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER	REFERENCE INFORMATION		
(CCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0.000	SREF	20.6890	50 IN
(RCS035)	GFST 022 CONF ROS-NB1 B1W1V1	3.400			0.000	LREF	9.6480	IN
(RCS036)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	3.400	-30.000	30.000		BREF	5.8360	IN
(RCS037)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0.000	-30.000	30.000		XHRP	4.4850	IN
						YHRP	0.0000	IN
						ZHRP	3.7700	IN
						SCALE	0.0050	

NACH 1 750

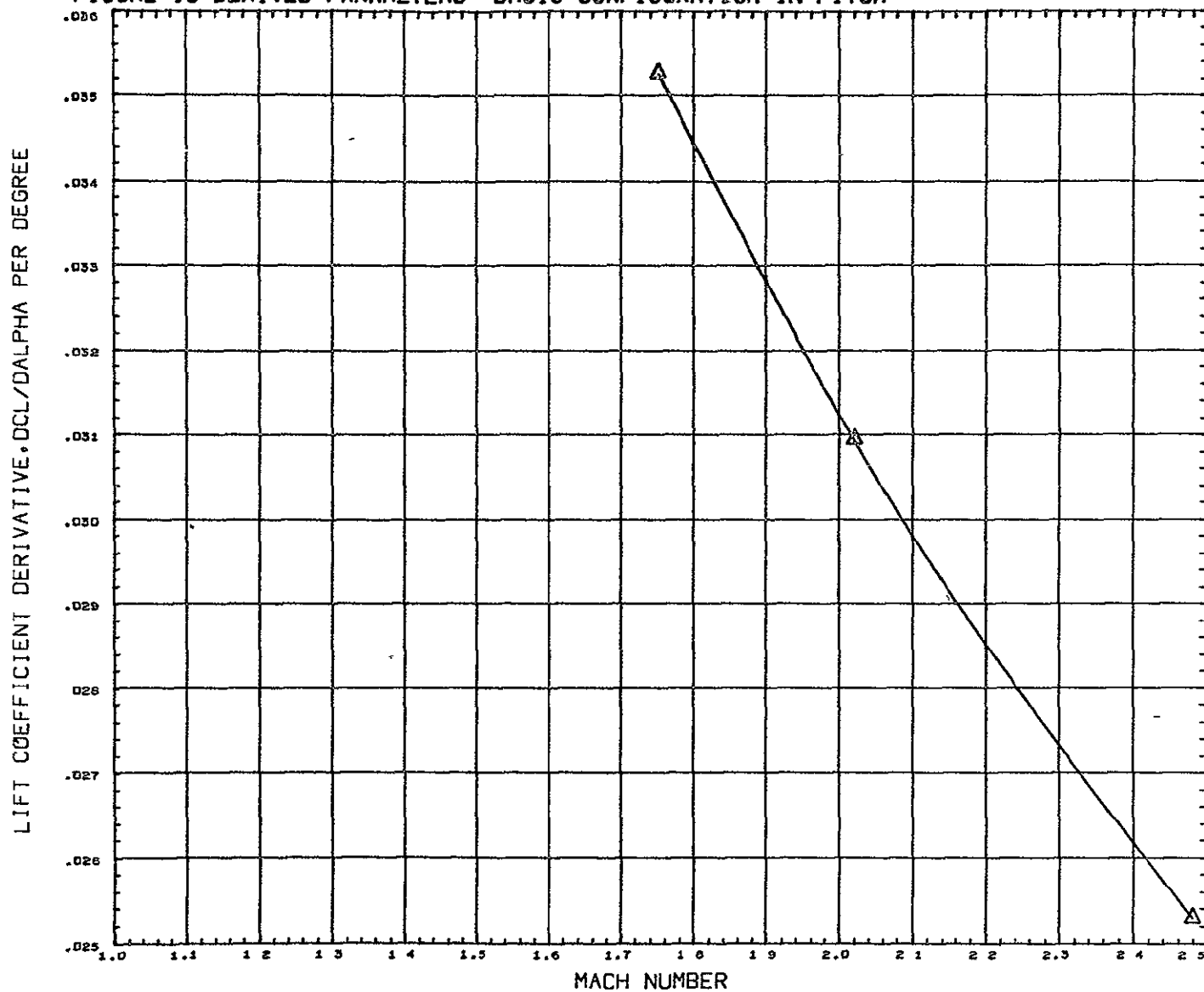
FIGURE 15 EFFECT OF FLARED RUDDER IN SIDESLIP- VARIATION WITH ALPHA



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	KRUDDR	RUDDR	REFERENCE INFORMATION		
(CCS003)	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0.000	SREF	20 6890	SQ IN.
(RCS035)	GFST 022 CONF ROS-NB1 B1W1V1	3.400			0.000	LREF	9 6480	IN
(RCS036)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	3.400	-30.000	30.000		BREF	5 8380	IN
(RCS037)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0.000	-30.000	30.000		XMRP	1485 0040	IN
						YMRP	0 0000	IN
						ZMRP	377.0004	IN
						SCALE	0 0050	

MACH 2.480

FIGURE 16 DERIVED PARAMETERS- BASIC CONFIGURATION IN PITCH

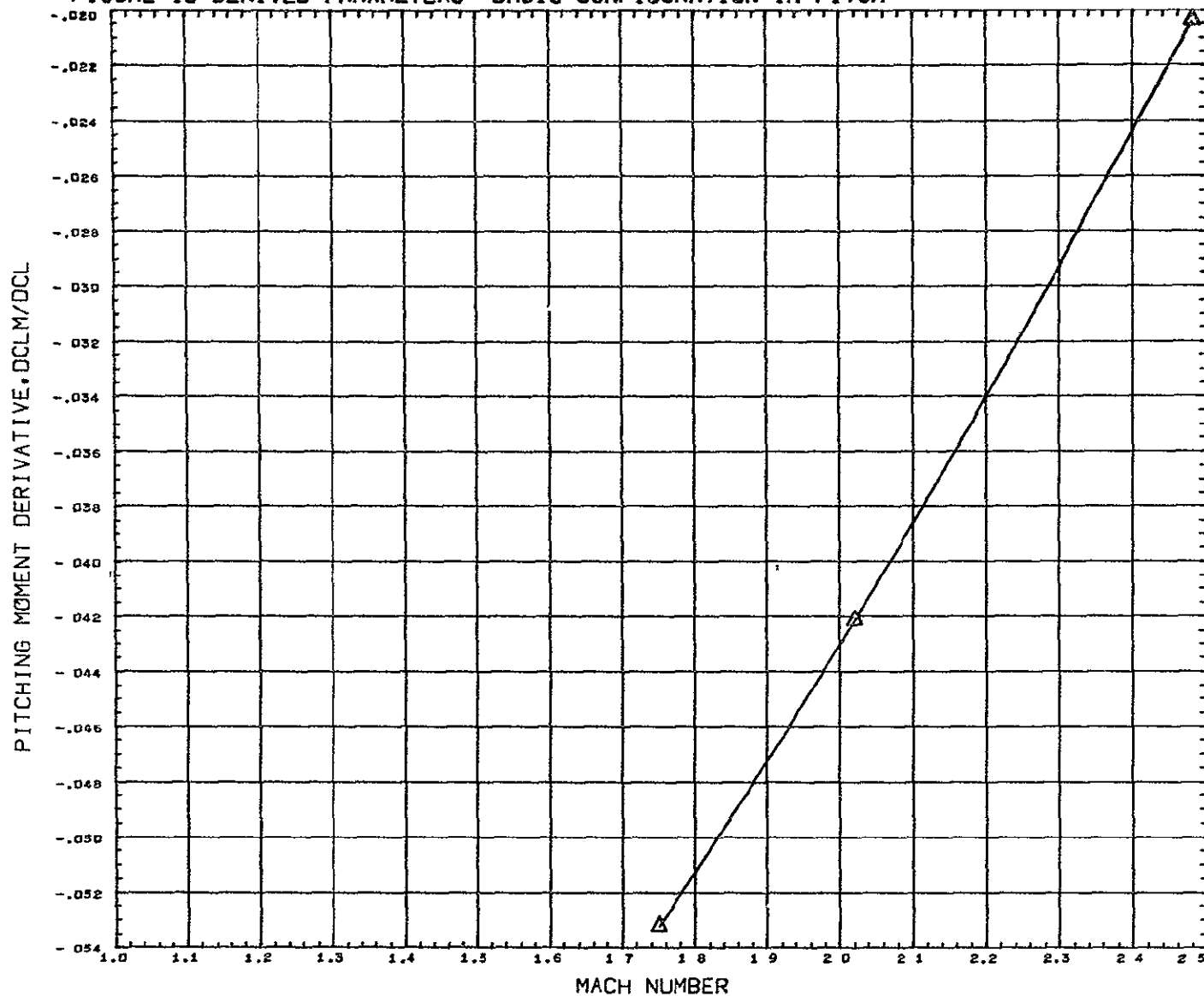


PARAMETRIC VALUES
 BETA 0.000 IELEVN 0.000
 RELEVN 0.000 RUDDER 0.000

REFERENCE INFORMATION
 SREF 20.6890 SQ IN
 LREF 9.6480 IN
 BREF 5.8380 IN
 XMRP 1485.0040 IN
 YMRP 0.0000 IN
 ZMRP 377.0004 IN
 SCALE 0.0050

REFERENCE FILE

FIGURE 16 DERIVED PARAMETERS- BASIC CONFIGURATION IN PITCH

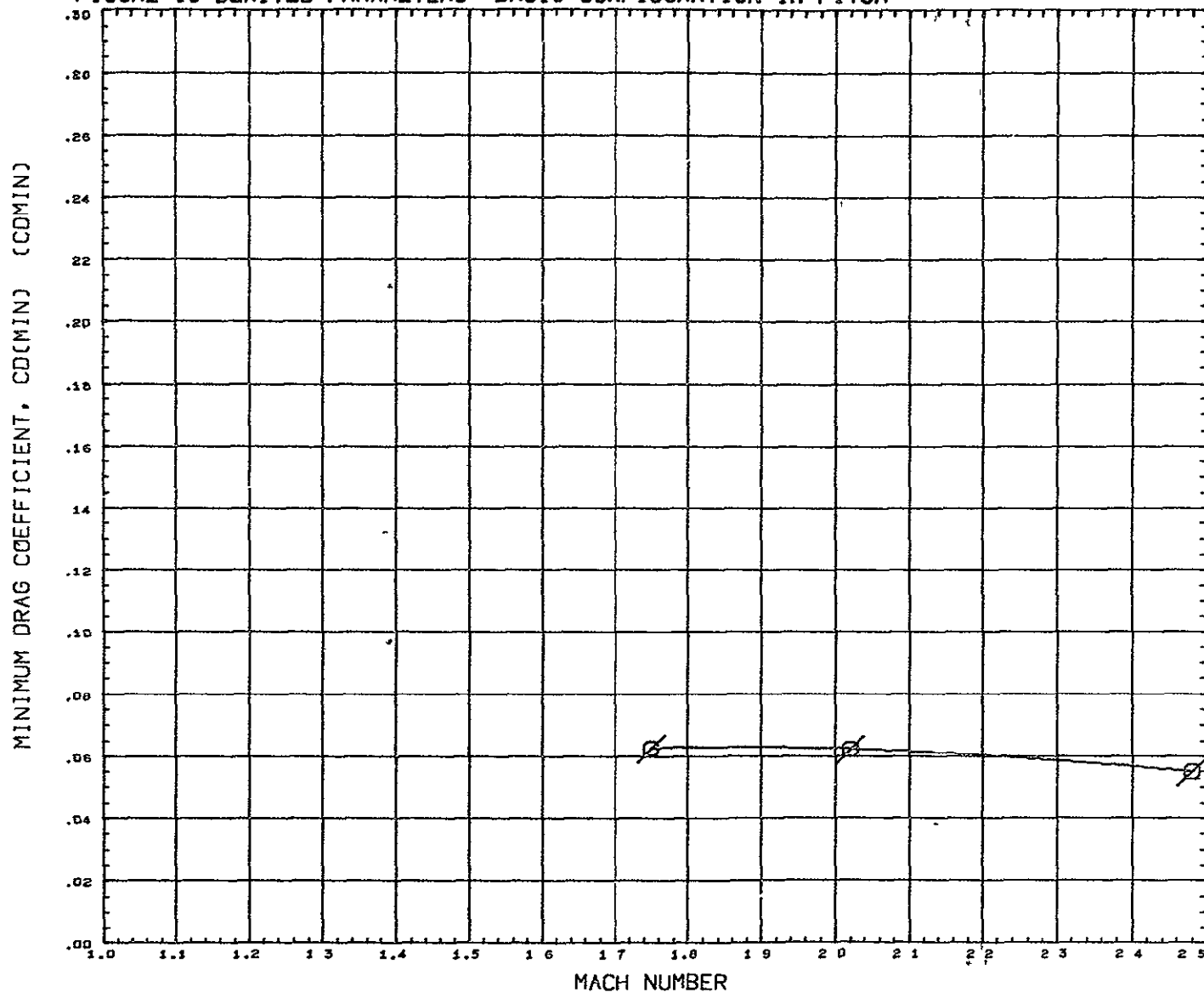


PARAMETRIC VALUES
 BETA 0 000 LELEVN 0.000
 RELEVN 0 000 RUDDER 0 000

REFERENCE INFORMATION
 SREF 20 6890 SQ IN.
 LREF 9 6480 IN
 BREF 5 8380 IN
 XMRP 1485 0040 IN
 YMRP 0 0000 IN
 ZMRP 377 0004 IN
 SCALE 0 0050

DATA HIST CODE L

FIGURE 16 DERIVED PARAMETERS- BASIC CONFIGURATION IN PITCH

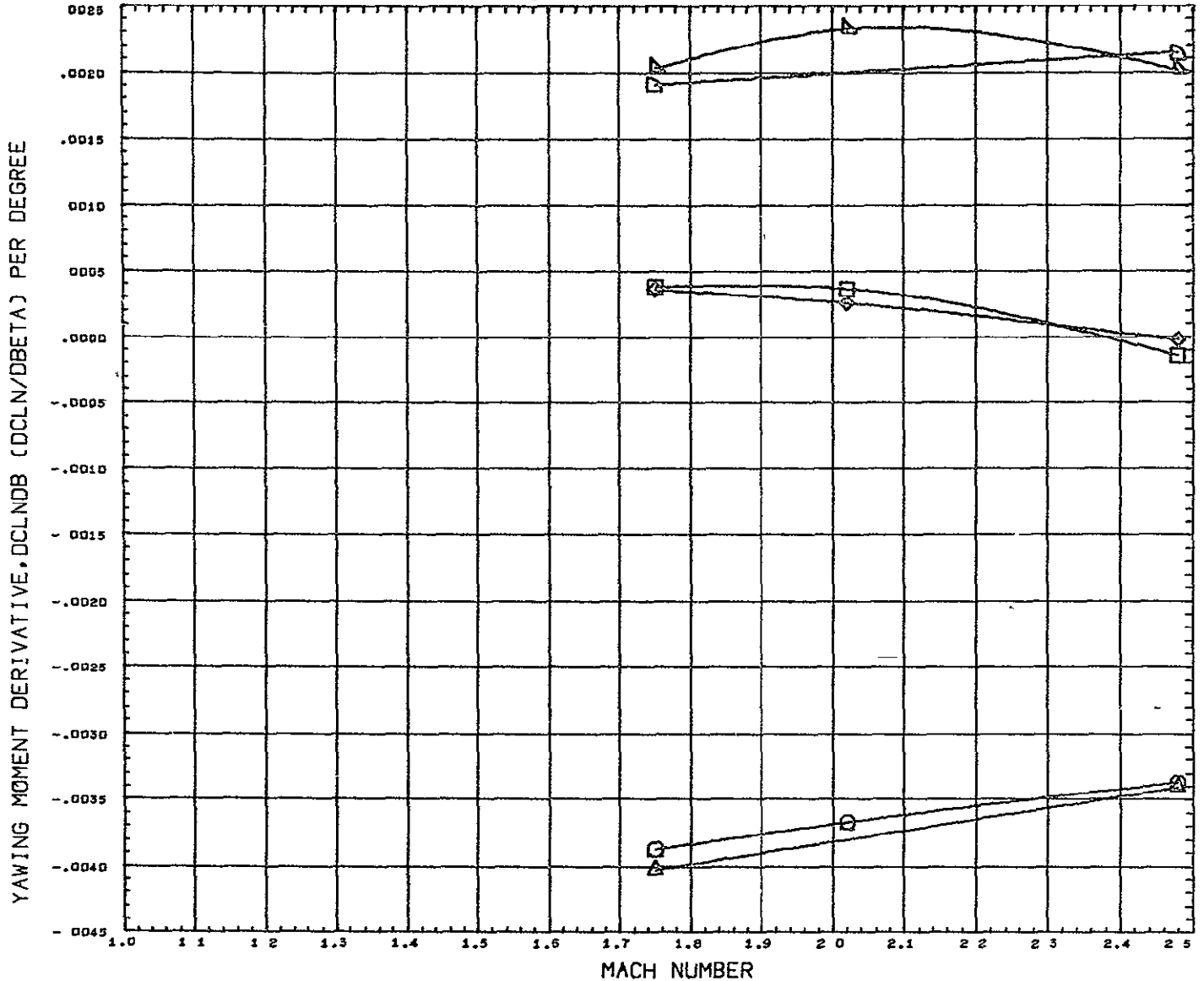


PARAMETRIC VALUES
 BETA 0.000 LELEVN 0 000
 RELEVN 0 000 RUDDER 0 000

REFERENCE INFORMATION
 SREF 20.6890 SQ IN
 LREF 9 6480 IN
 DREF 5 8300 IN
 XMRP 1485 0040 IN
 YMRP 0 0000 IN
 ZMRP 377 0004 IN
 SCALE 0 0050

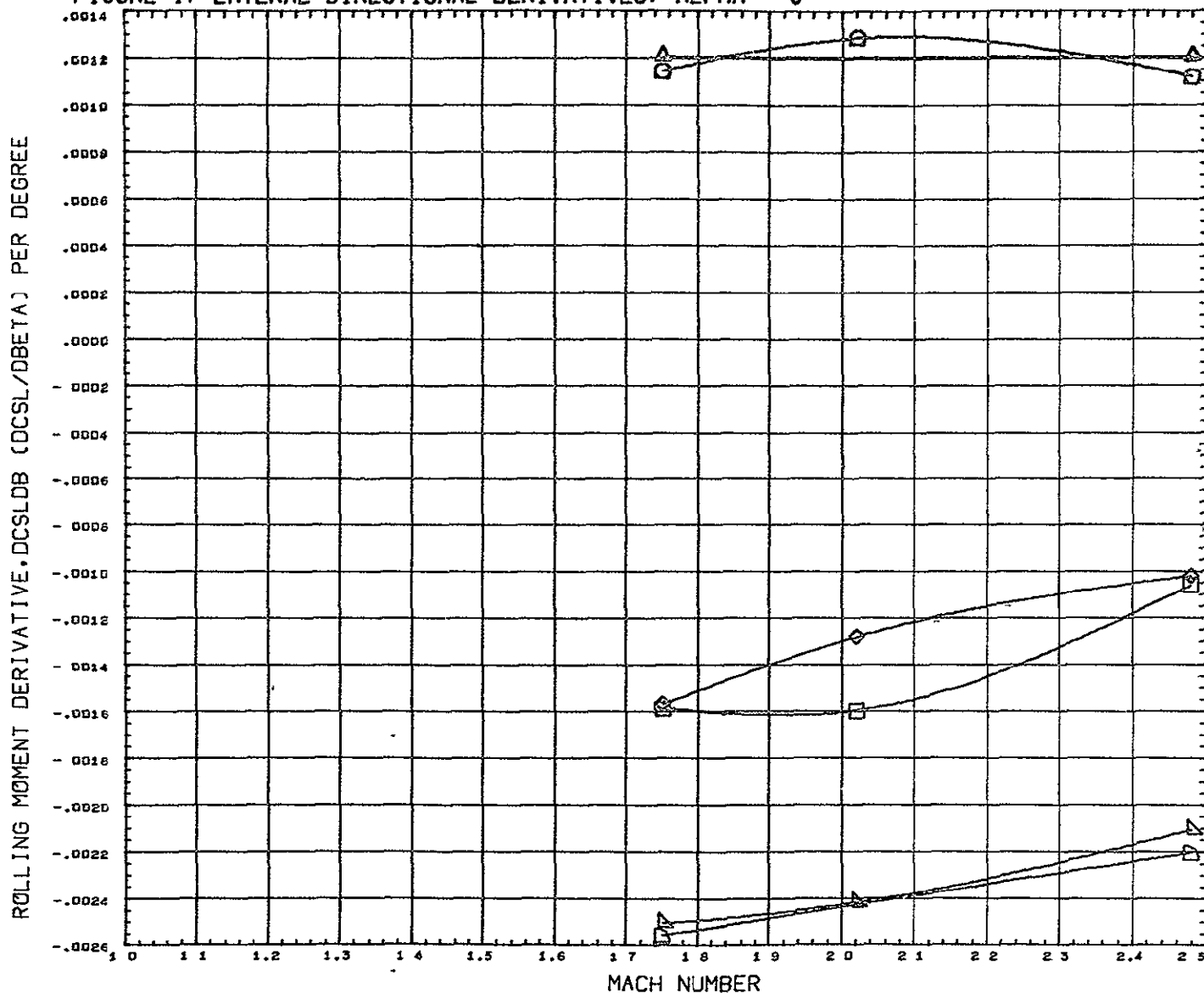
DATA HIST CODE F

FIGURE 17 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA = 0



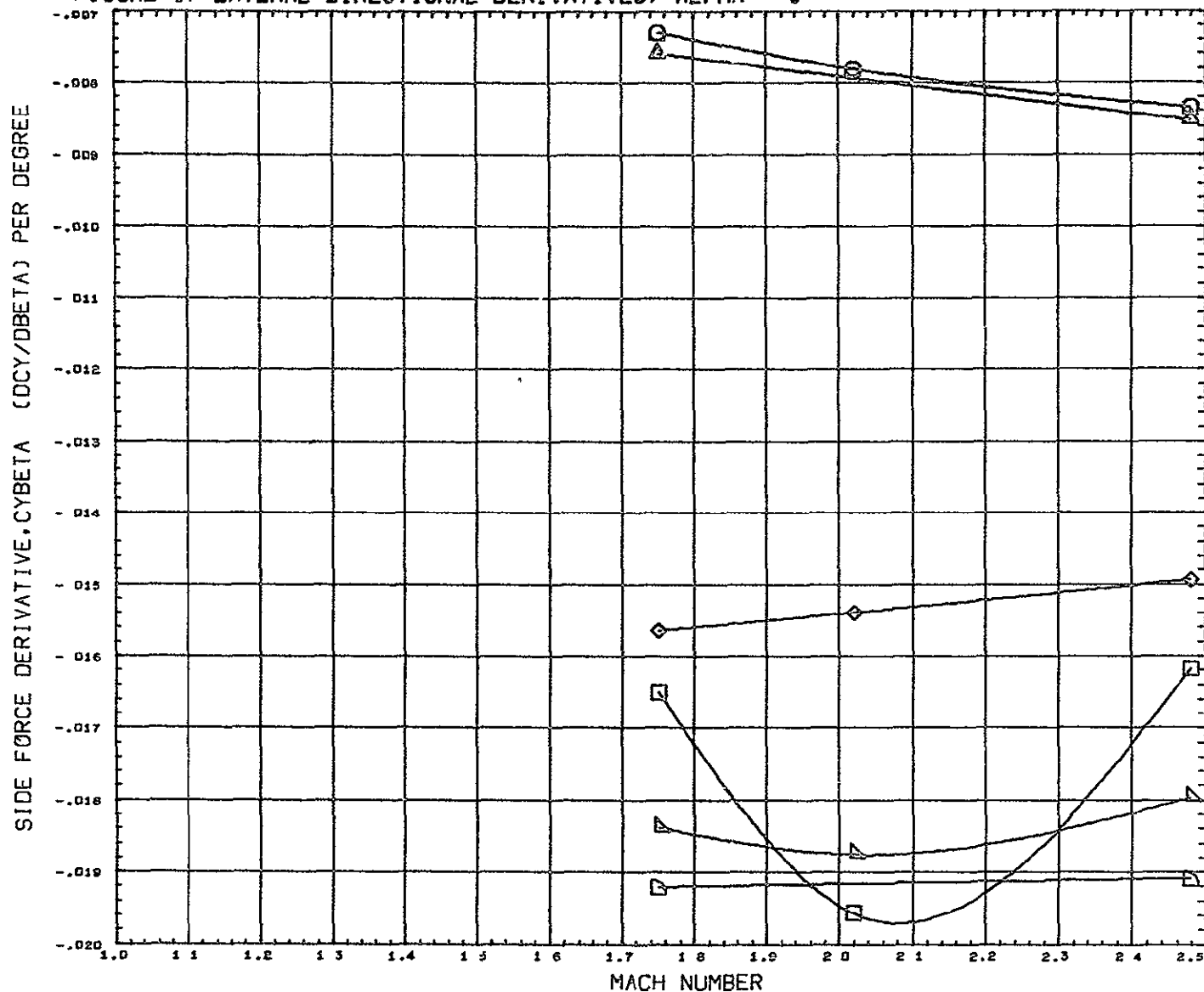
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDR	REFERENCE INFORMATION
(RCS010)	GFST 022 CONF ROS-NB1 B1W1	0 000				SREF 20 6890 SQ IN
(RCSXX1)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 0)	0 000				LREF 5 6480 IN
(RCS002)	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000	BREF 5 8360 IN
(RCSXX4)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 0)	0 000			0 000	XMRP 1485 0040 IN
(RCS012)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000			YMRP 0 0000 IN
(RCSXX7)	GFST 022 COMP. DATA B1W1V1 (-30,30) (ALPHA IS 0)	0 000	-30 000			ZMRP 377 0004 IN
						SCALE 0 0050

FIGURE 17 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA = 0



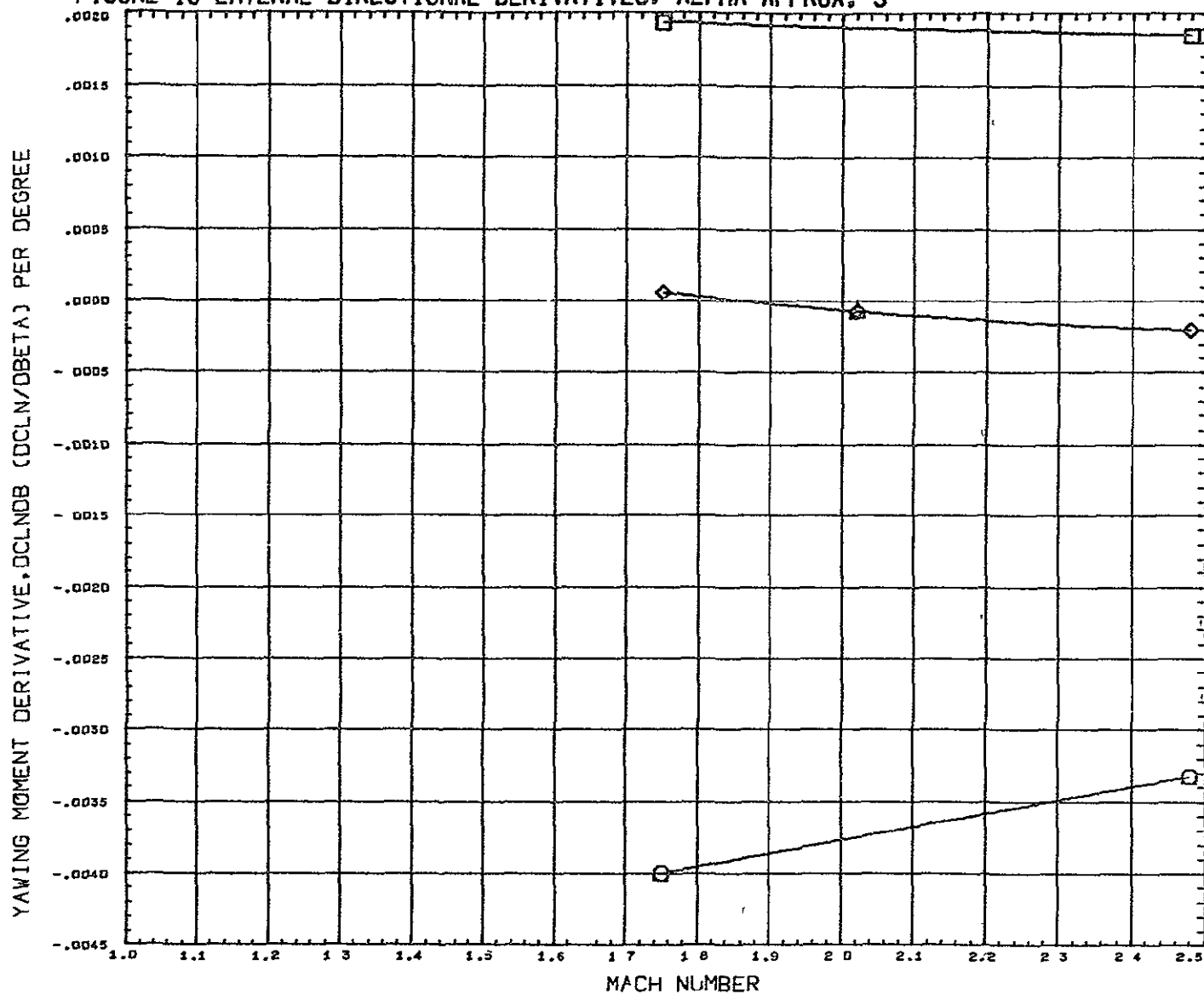
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
(RCS010)	GFST 022 CONF ROS-NB1 B1W1	0.000				SREF 20 6890 SQ IN
(RCSXX1)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 0)	0 000				LREF 9 6480 IN
(RCS002)	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0.000	BREF 5 8380 IN
(RCSXX4)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 0)	0 000			0 000	XHRP 1485 0040 IN
(RCS012)	GFST 022 CONF. ROS-NB1 B1W1V1 (-30,30)	0 000	-30 000			YHRP 0 0000 IN
(RCSXX7)	GFST 022 COMP DATA B1W1V1 (-30,30, (ALPHA IS 0)	0.000	-30 000			ZHRP 377 0004 IN
						SCALE 0 0050

FIGURE 17 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA = 0



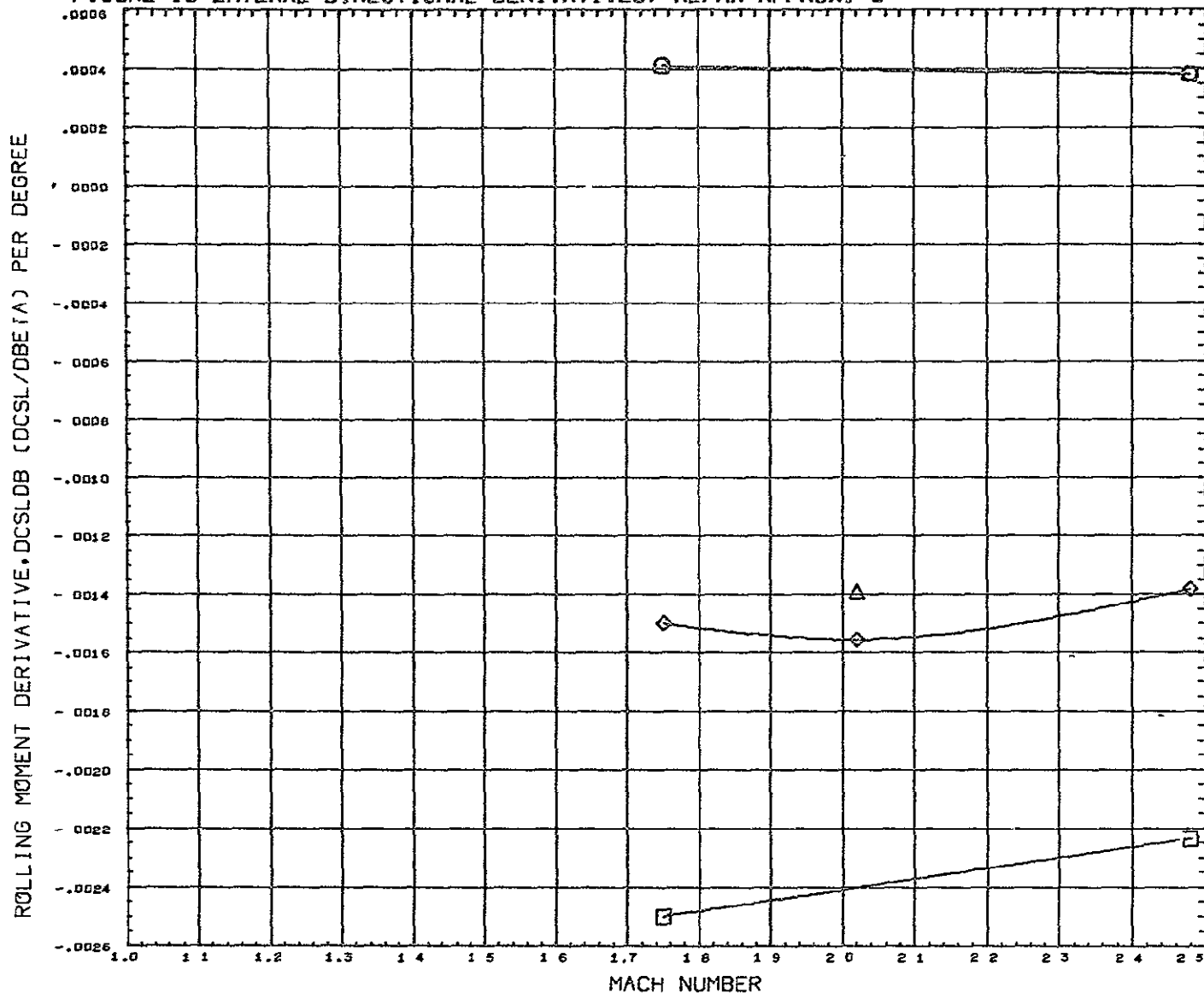
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION	
(RCS010)	GFST 022 CONF ROS-NB1 B1W1	0 000				SREF	20 8890 SQ IN
(RCSXX1)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 0)	0 000				LREF	9 6480 IN
(RCS002)	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000	BREF	5 8380 IN
(RCSXX4)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 0)	0 000			0 000	XMRP	1485 0040 IN
(RCS012)	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000			YMRP	0 0000 IN
(RCSXX7)	GFST 022 CONF DATA B1W1V1(-30,30 (ALPHA IS 0)	0 000	-30 000			ZMRP	377 0004 IN
						SCALE	0 0050

FIGURE 18 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 5



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
(RCSXX2)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 5)	5.000				SREF 20 6890 SQ IN
(RCS016)	GFST 022 CONF ROS-NB1 B1W1V1	5.000			0.000	LREF 9 6400 IN
(RCSXX5)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 5)	5.000			0.000	BREF 5 8380 IN
(RCSXX6)	GFST 022 COMP DATA B1W1V1(-30,30) (ALPHA IS 5)	5.000	-30.000			XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377.0004 IN
						SCALE 0.0050

FIGURE 18 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 5



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION
(RCSXX2)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 5)	5 000				SREF 20 6090 50 IN
(RCS018)	GFST 022 CONF. ROS-NB1 B1W1V1	5 000			0 000	LREF 9 6480 IN
(RCSXX5)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 5)	5 000			0 000	BREF 5 8380 IN
(RCSXX8)	GFST 022 COMP. DATA B1W1V1 (-30,30) (ALPHA IS 5)	5 000	-30 000			XMRP 1485 0040 IN
						YMRP 0 0000 IN
						ZMRP 377 0004 IN
						SCALE 0 0050

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RCSXX2) GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 5)

(RCS046) GFST 022 CONF ROS-NB1 B1W1V1

(RCSXX5) GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 5)

(RCSXX6) GFST 022 COMP. DATA B1W1V1(-30,30) (ALPHA IS 5)

ALPHA LRUDR RUDDR RUDDER

5.000 5.000 5.000 5.000 -30.000

5.000 5.000 5.000 5.000 0.000

0.000 0.000 0.000 0.000 0.000

20.6890 9.6480 5.8380 1485.0040 0.0000 377.0004 0.0050

SCALE

REFERENCE INFORMATION

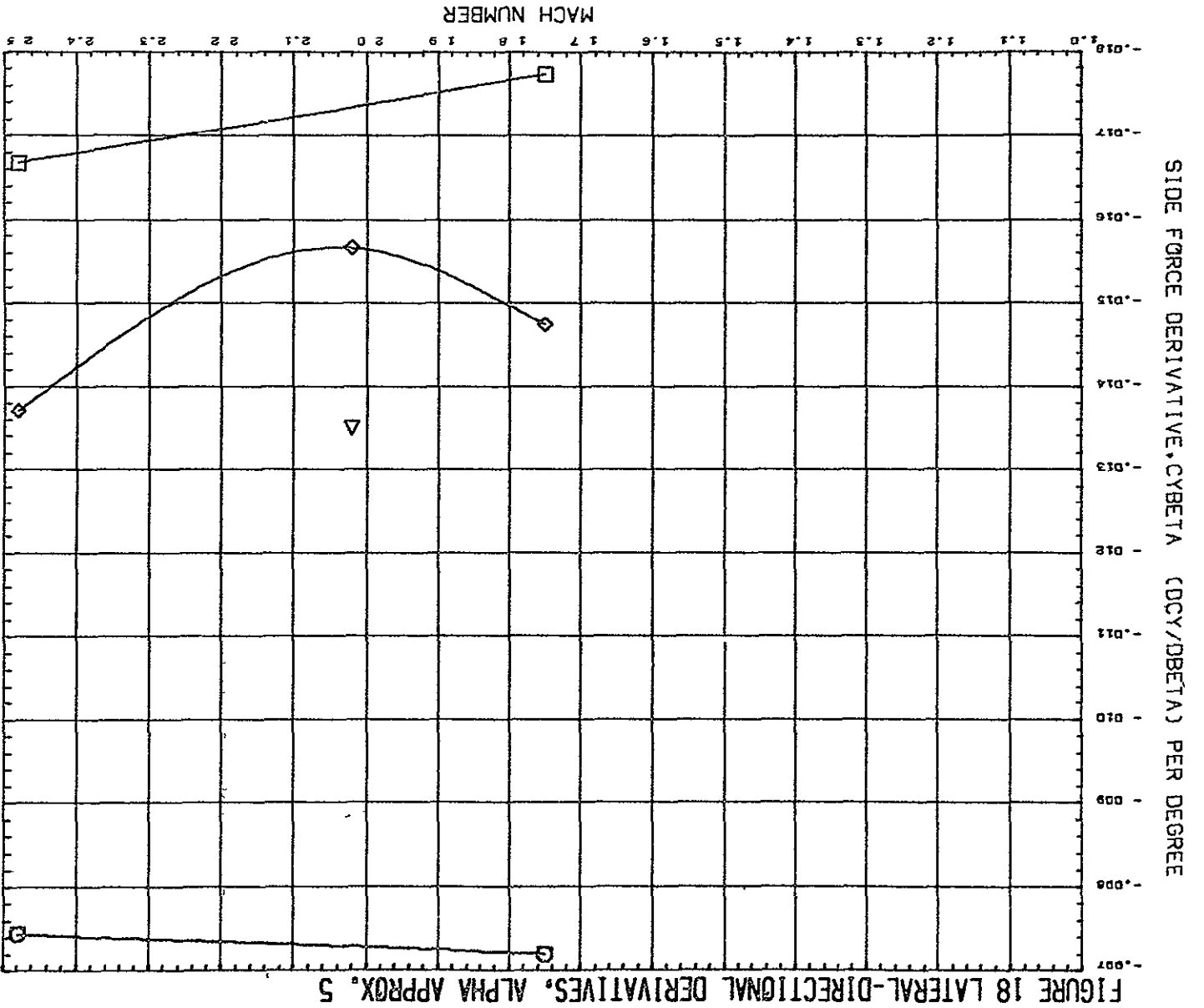
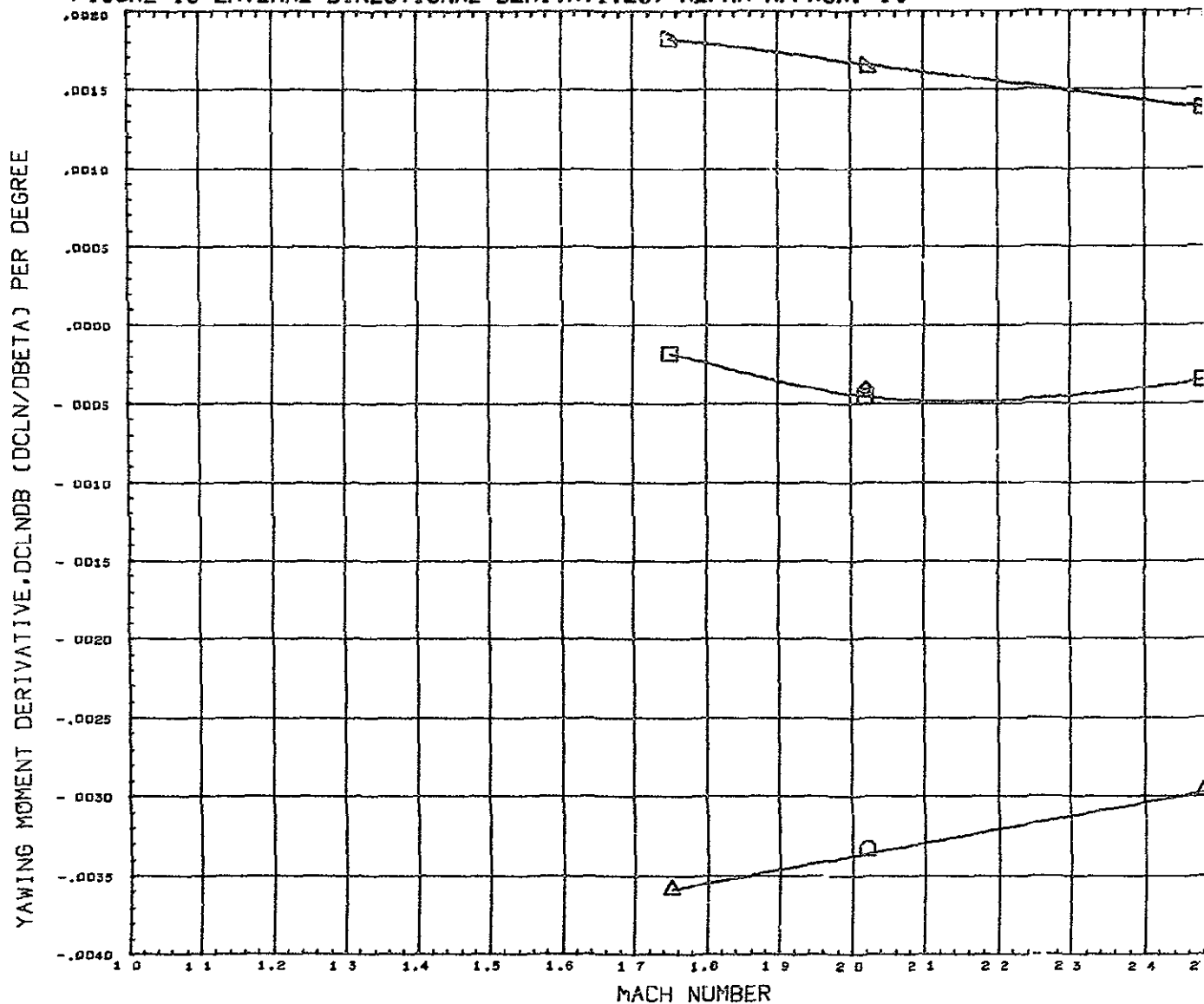
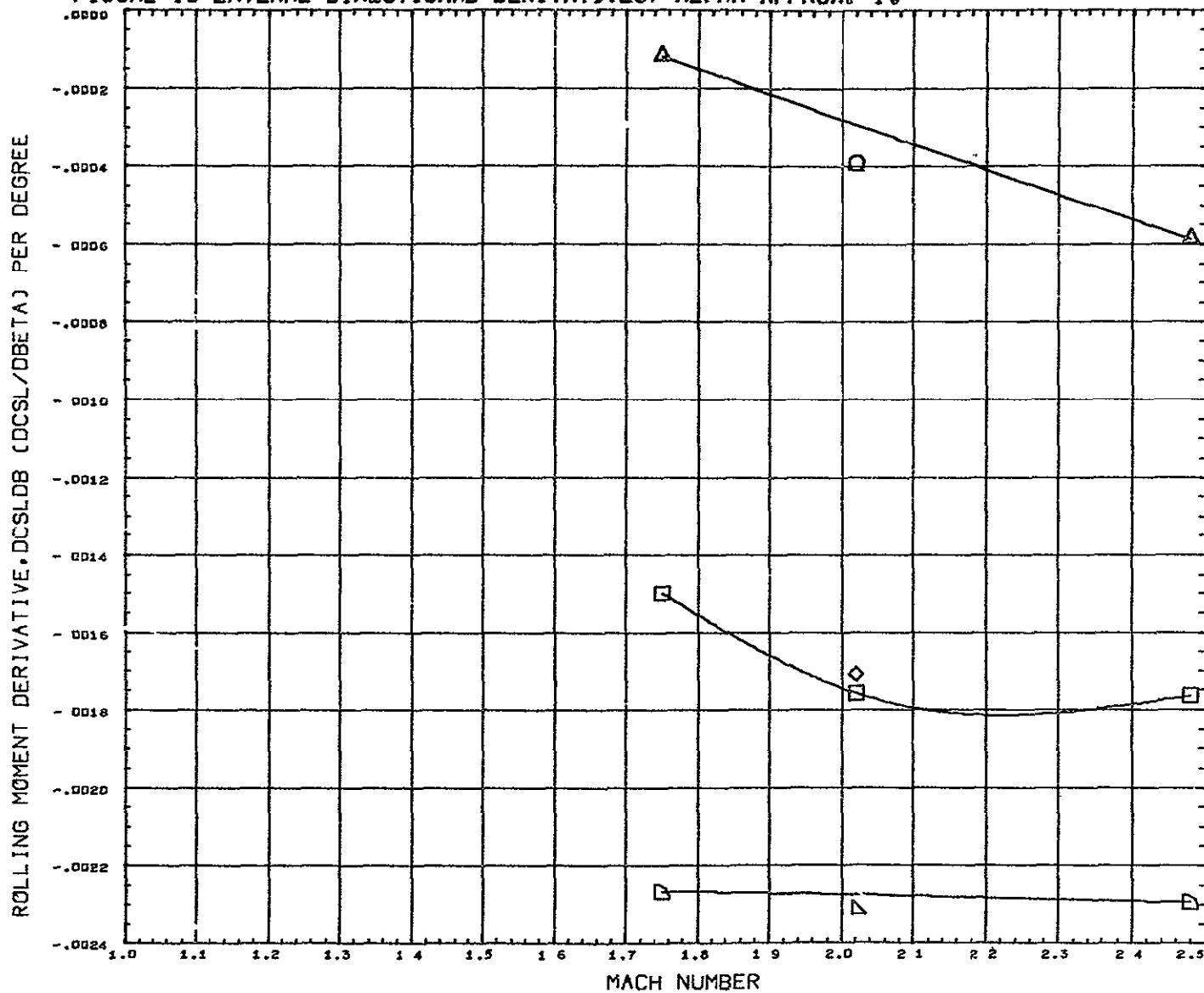


FIGURE 19 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 10



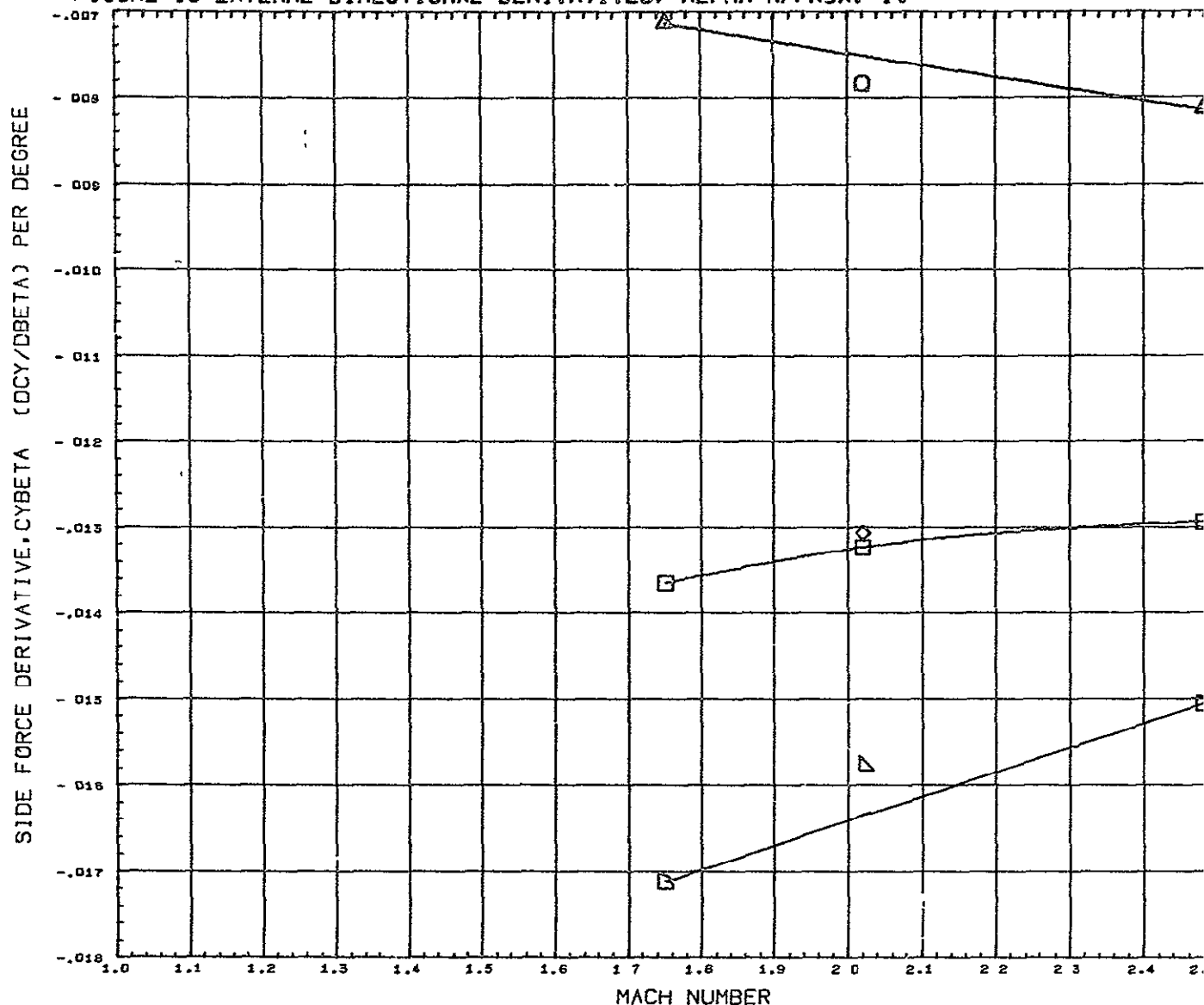
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDR	REFERENCE INFORMATION
(RCS017)	GFST 022 CONF. ROS-NB1 B1W1	10.000				\$REF 20 6990 SQ IN
(RCSXX3)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 10)	10.000				LREF 9 6480 IN
(RCS019)	GFST 022 CONF. ROS-NB1 B1W1V1	10.000			0.000	BREF 5 8380 IN
(RCSXX6)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 10)	10.000			0.000	XMRF 1485 0040 IN
(RCS020)	GFST 022 CONF. ROS-NB1 B1W1V1 (-30,30)	10.000	-30.000			YMRF 0 0000 IN
(RCSXX9)	GFST 022 CONF. DATA B1W1V1 (-30,30) (ALPHA IS 10)	10.000	-30.000			ZMRF 377 0004 IN
						SCALE 0 0050

FIGURE 19 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 10



REF SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDR	REFERENCE INFORMATION
(RCS017)	GFST 022 CONF ROS-NB1 B1W1	10.000				SREF 20 6890 SQ IN
(RCSXX3)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 10)	10.000				LREF 9 6490 IN
(RCS019)	GFST 022 CONF ROS-NB1 B1W1V1	10.000			0.000	BREF 5 8380 IN
(RCSXX6)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 10)	10.000			0.000	XHRP 1485 0040 IN
(RCS020)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	10.000	-30.000			YHRP 0 0000 IN
(RCSXX9)	GFST 022 COMP. DATA B1W1V1 (-30,30) (ALPHA IS 10)	10.000	-30.000			ZHRP 377 0004 IN
						SCALE 0 0050

FIGURE 19 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 10



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION		
(RCS017)	GFST 022 CONF. ROS-NB1 B1W1	10 000				SREF	20 6890	50 IN
(RCSXX3)	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 10)	10 000				LREF	9 6480	IN
(RCS019)	GFST 022 CONF ROS-NB1 B1W1V1	10 000			0 000	BREF	5 8380	IN
(RCSXX6)	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 10)	10 000			0 000	XHRF	1405 0040	IN
(RCS020)	GFST 022 CONF ROS-NB1 B1W1V1 (-30,30)	10 000	-30 000			YHRF	0 0000	IN
(RCSXX9)	GFST 022 CONF DATA B1W1V1 (-30,30) (ALPHA IS 10)	10 000	-30 000			ZHRF	377 0004	IN
						SCALE	0 0050	