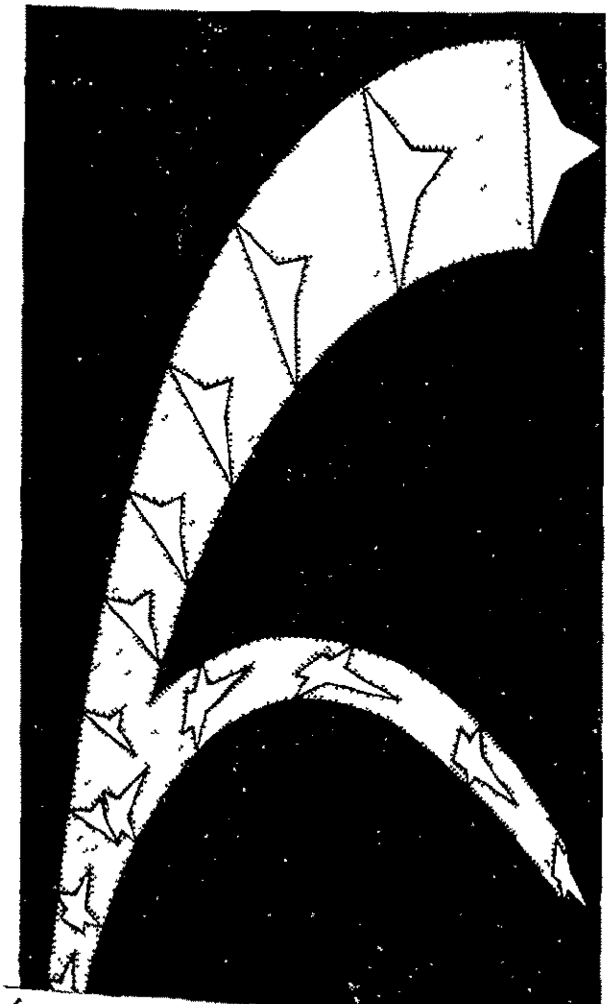
DMS-DR-1163
SEPTEMBER 1971



—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

NASA Series Number: S-0609

DMS-DR-1163
SEPTEMBER, 1971

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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CONTRACT NAS 8-4016 AMENDMENT 153 DRL 184 - 58

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ABSTRACT

Experimental aerodynamic wind tunnel tests were conducted during May, 1971 on a 1/200 scale model Grumman ROS-NB1 space shuttle model in the GAC 15 inch Supersonic Wind Tunnel at Farmingdale, New York. The basic narrow body ROS-NB1 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-NB1 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-NB1 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:

B_1 - basic ROS-NB1 fuselage

W_1 - basic delta wing for ROS-NB1

V_1 - single vertical tail

U_1 - 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 GFST 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 α	SCHD β	CONTROL DEFLECTION δ_{eL}	δ_{eR}	δ_R		NO. of RUNS	MACH NUMBERS 1.75	2.02	2.48
RCS002	$B_1W_1V_1$	0	B	0	0	0		3	43	2	31
RCS003	$B_1W_1V_1$	A	0	0	0	0		3	40	3	24
RCS004	$B_1W_1^{-20,-20}V_1$	A	0	-20	-20	0		3	41	4	25
RCS005	$B_1W_1^{-40,-40}V_1$	A	0	-40	-40	0		3	42	5	26
RCS007	$B_1W_1V_1^{10}$	A	0	0	0	10		2		7	28
RCS008	$B_1W_1^{-40,-20}V_1$	A	0	-40	-20	0		1		8	
RCS009	$B_1W_1V_1U_1$	0	B	0	0	0		1		9	
RCS010	B_1W_1	0	B	0	0	—		3	44	10	33
RCS012	$B_1W_1V_1^{\pm 30}$	0	B	0	0	±30		3	45	12	32
RCS014	$B_1W_1V_1$	A	42	0	0	0		1		14	
RCS015	$B_1W_1V_1$	A	26	0	0	0		1		15	
RCS016	B_1	A	0	—	—	—		1		16	
RCS017	B_1W_1	10	B	0	0	—		1		17	
RCS018	$B_1W_1V_1$	5	B	0	0	0		1		18	
RCS019	$B_1W_1V_1$	10	B	0	0	0		1		19	
RCS020	$B_1W_1V_1^{\pm 30}$	10	B	0	0	±30		1		20	
RCS021	$B_1W_1V_1U_1$	10	B	0	0	0		1		21	
RCS022	$B_1W_1V_1$	15	B	0	0	0		1		22	
RCS027	$B_1W_1^{-40,-40}V^{\pm 30}$	A	0	-40	-40	±30		1			27
RCS034	B_1W_1	A	34	0	0	—		2	49		34

1 7 13 19 25 31 37 43 49 55 61 67 75 76

CL	CD	CY	CLM	CSL	CLl							

COEFFICIENTS → IDPVAR(1) IDPVAR(2) NDV

α or β SCHEDULES
α A = -5 to 25°
β B = -5° to 10°

TEST GFST 022 DATA SET COLLATION SHEET

☐ PRETEST

☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD α	SCHD β	CONTROL DEFLECTION δ_e	δ_{BF}	δ_R		NO of RUNS	MACH NUMBERS 1.75	2.02	2.48									
RCS035	$B_1W_1V_1$	A	3.4	0	0	0		2	48		35									
RCS036	$B_1W_1V_1^{\pm 30}$	A	3.4	0	0	±30		2	47		36									
RCS037	$B_1W_1V_1^{\pm 30}$	A	0	0	0	±30		2	46		37									
RCS038	B_1W_1	A	0	0	0	–		2	50		38									
RCSXX1	B_1W_1	0	C	0	0	–		2	49/50		34/38									
RCSXX2	B_1W_1	5	C	0	0	–		2	49/50		34/38									
RCSXX3	B_1W_1	10	C	0	0	–		2	49/50		34/38									
RCSXX4	$B_1W_1V_1$	0	C	0	0	0		3	40/48	3/14/15	24/35									
RCSXX5	$B_1W_1V_1$	5	C	0	0	0		3	40/48	3/14/15	24/35									
RCSXX6	$B_1W_1V_1$	10	C	0	0	0		3	40/48	3/14/15	24/35									
RCSXX7	$B_1W_1V_1^{\pm 30}$	0	C	0	0	±30		2	46/47		36/37									
RCSXX8	$B_1W_1V_1^{\pm 30}$	5	C	0	0	±30		2	46/47		36/37									
RCSXX9	$B_1W_1V_1^{\pm 30}$	10	C	0	0	±30		2	46/47		36/37									

1 7 13 19 25 31 37 43 49 55 61 67 75 76

CL CD CY CLM CSL CLN

COEFFICIENTS → IDPVAR(1) IDPVAR(2) NDV

α or β SCHEDULES

α A = −5° to 25°

β B = −5° to 10°

β C = 0°, 3.4° (For M = 2.02 in RCSXX4, RCSXX5, RCSXX6, βC = 0°, 2.6°, 4.2°)

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 ($x\ 10^6$/ft):	3.0 to 65
Stagnation Pressure (psia):	25 to 500
Dynamic Pressure (psf):	1550 to 6700
Stagnation Temperature (^{o}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 CONDITIONS

TEST GFST - 022

MACH NUMBER	REYNOLDS NUMBER per unit length	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)
1.75	12.7×10^6	16.07	30°
2.02	9.9×10^6	12.29	30°
2.48	12.4×10^6	13.36	30°

BALANCE UTILIZED: TASK .75 MK XLIII "A"

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	200 lbs.	± .486	.0020
SF	100 lbs.	± .789	.0032
AF	80 lbs.	± .075	.0004
PM	300 in.-lbs.	± .357	.0002
YM	125 in.-lbs.	± .924	.0007
RM	80 in.-lbs.	± .207	.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)

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

F I G U R E S

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.

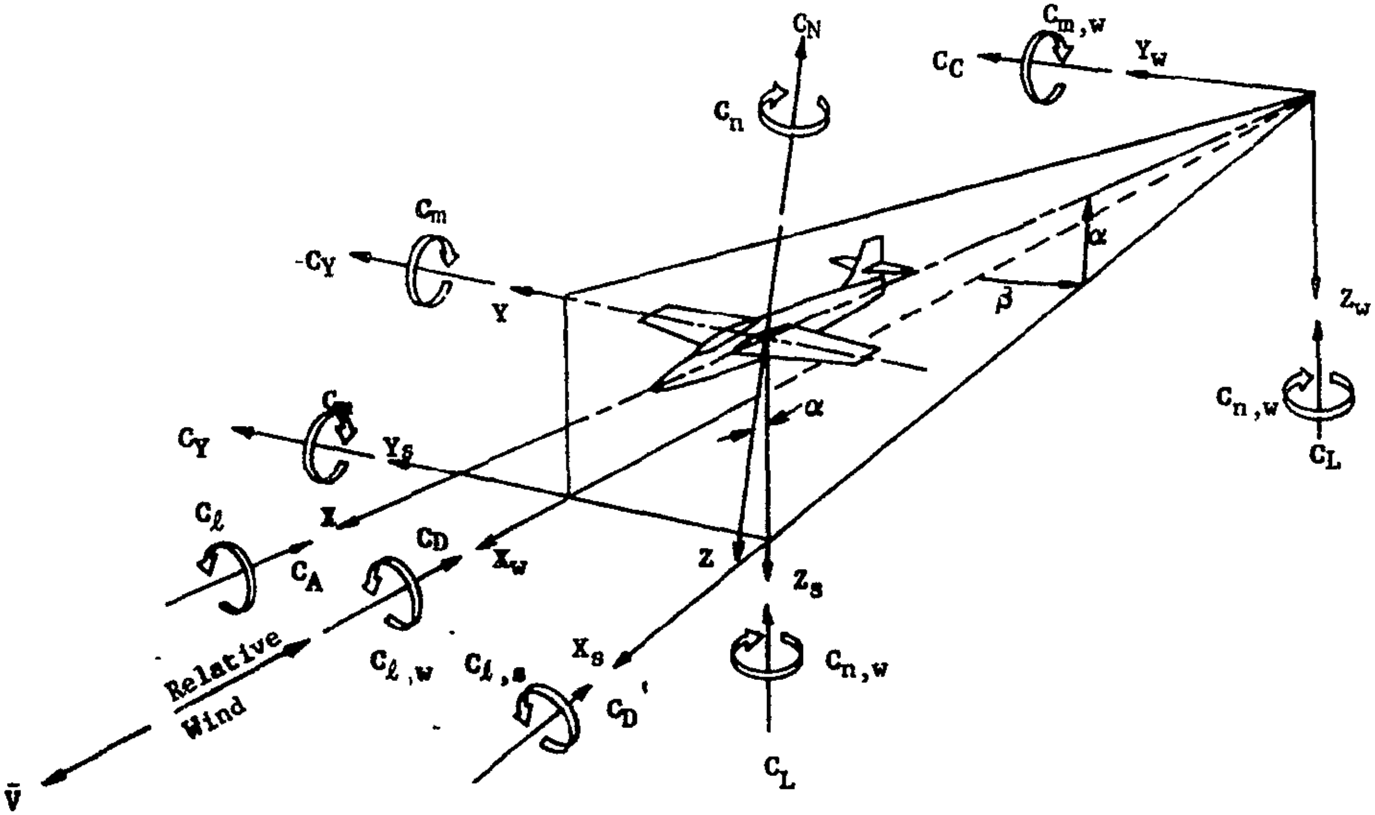


Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

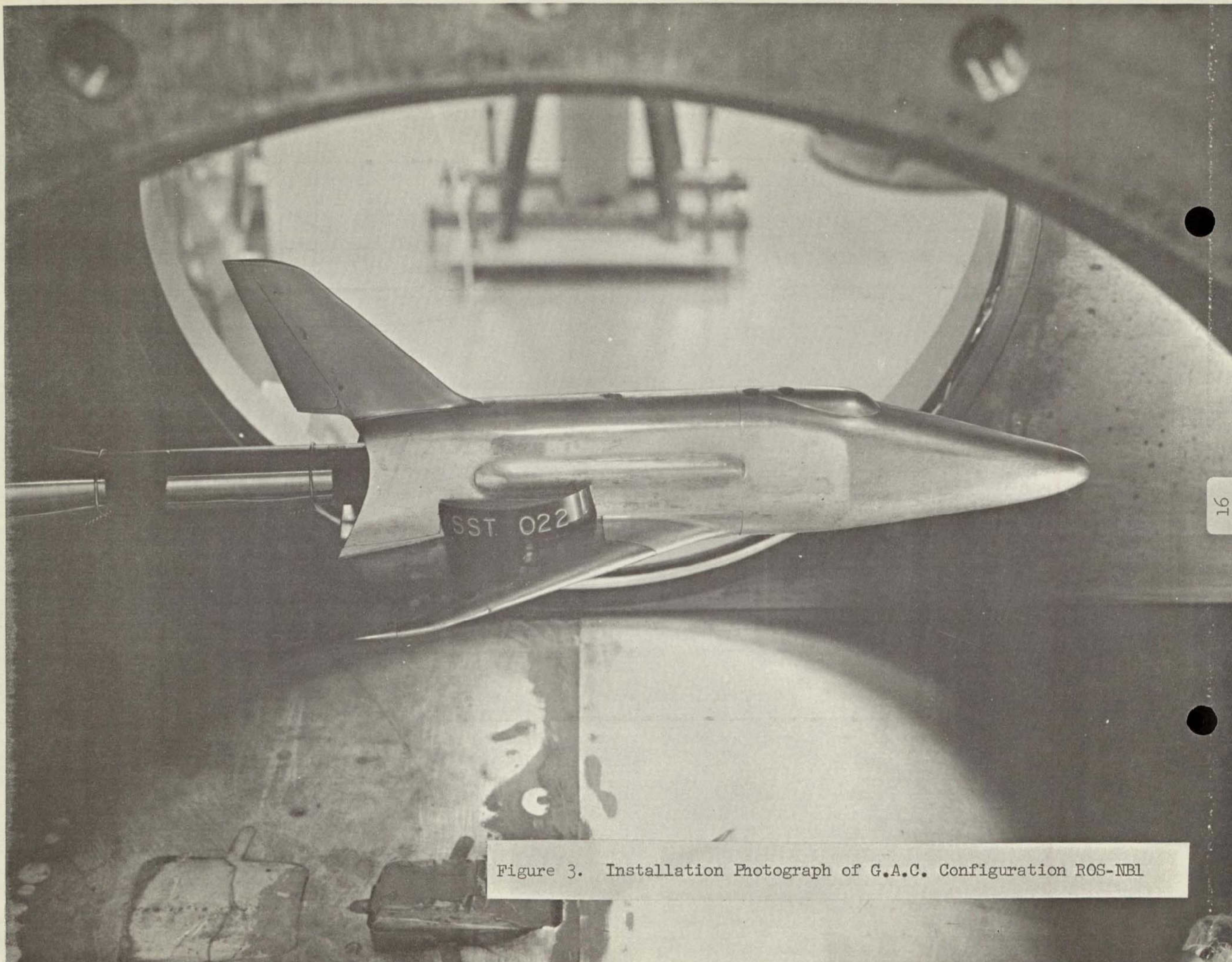


Figure 3. Installation Photograph of G.A.C. Configuration ROS-NB1

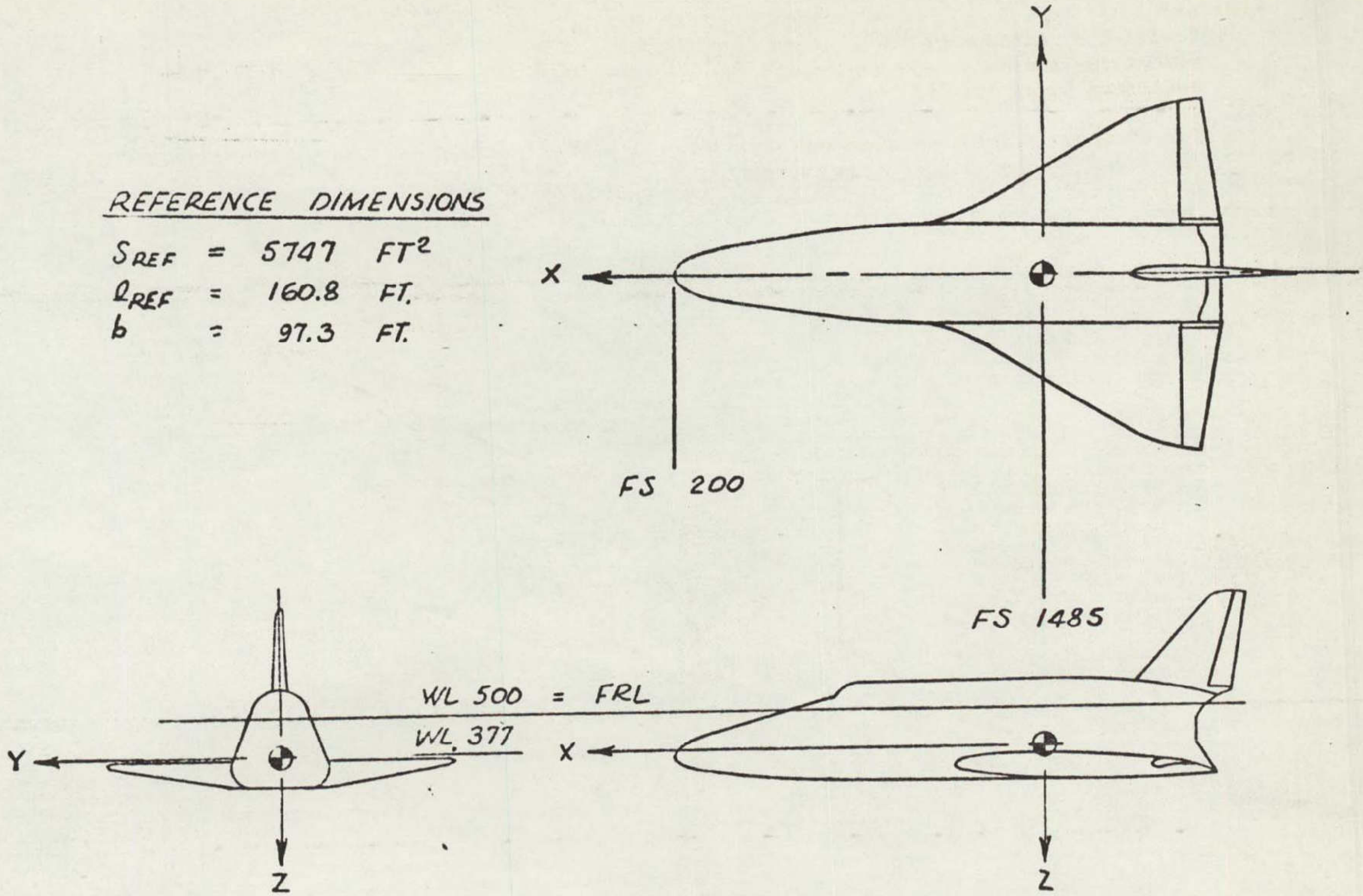


FIGURE 2. CONFIGURATION ROS-NB1, THREE-VIEW

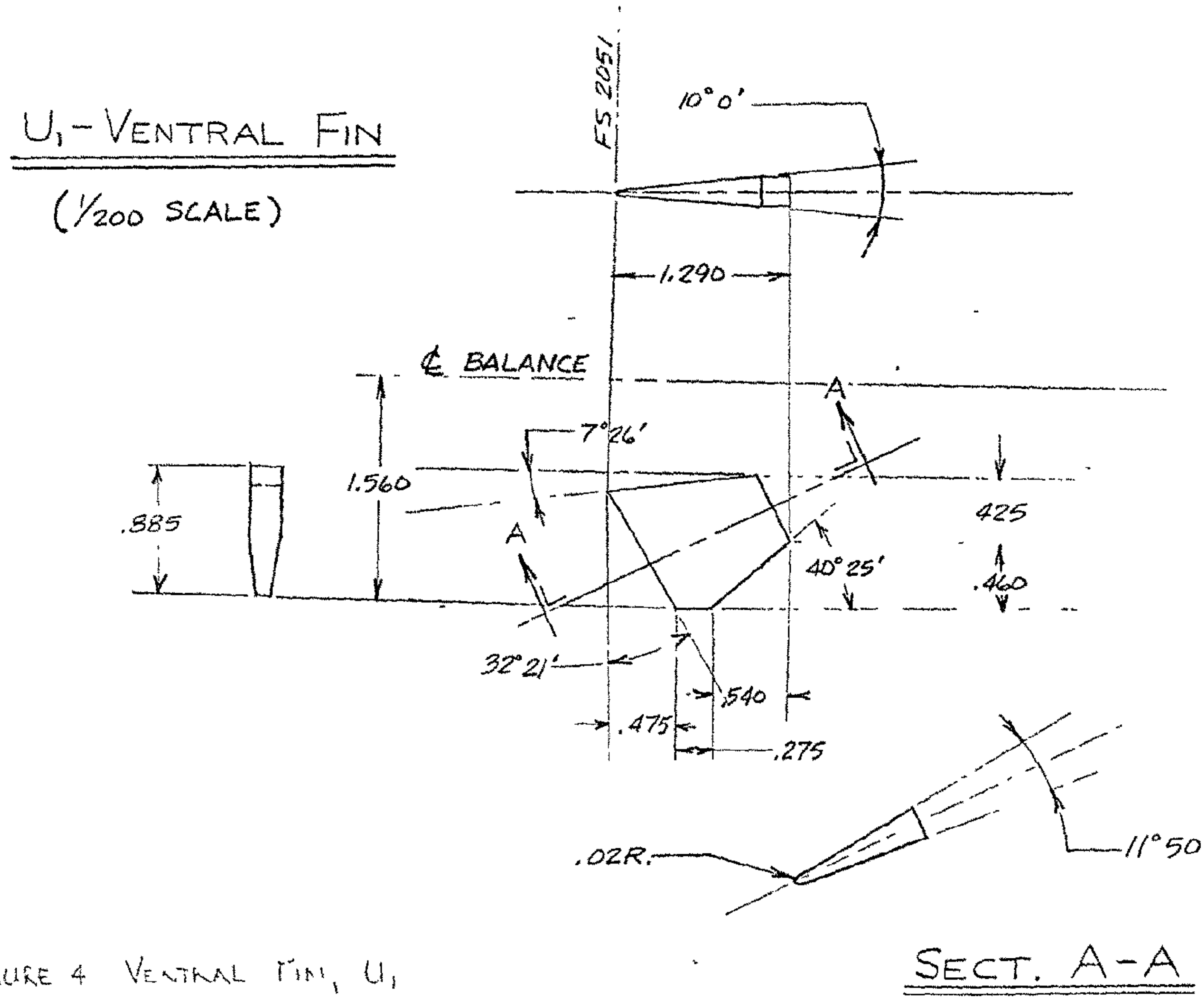


FIGURE 4 VENTRAL FIN, U1

MODEL COMPONENT DESCRIPTION SHEETS

MODEL COMPONENT: BODY - B_1

GENERAL DESCRIPTION: BASIC ROS-NB1 BODY

DRAWING NUMBER:

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

MODEL COMPONENT: WING - W_1

GENERAL DESCRIPTION: BASIC ROS-NB 1 WING

DRAWING NUMBER: 518 MOD 902

DIMENSIONS:

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

MODEL COMPONENT: Elevon (For the W_1 Wing)

GENERAL DESCRIPTION: Moveable Control Surface Associated With the W_1 Wing

DRAWING NUMBER: 518 MOD 902

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

MODEL COMPONENT: ℄ VERTICAL TAIL - V_1

GENERAL DESCRIPTION: BASIC ROS-NB 1 VERTICAL TAIL

DRAWING NUMBER: 518 MOD 902

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

MODEL COMPONENT: Rudder (for the V_1 vertical tail)

GENERAL DESCRIPTION: Moveable Control Surface Associated With the V_1 Vertical Tail

DRAWING NUMBER: 518 MOD 902

DIMENSIONS:

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

NOMENCLATURE

(General)

SYMBOL	SADSAC SYMBOL	DEFINITION
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; K_g/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

SYMBOL	SADSAC SYMBOL	DEFINITION
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

SYMBOL	DEFINITION
F	force; F, lbs
M	moment; M, in-lb

Subscript	Definition
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

SYMBOL	SADSAC SYMBOL	DEFINITION
		Body Axis System
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; $\left[-1\right] \left[(p_b - p_\infty)/q\right] (A_b/S)$
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; $M_X/qS\ b_{ref}$
		Common to Both Axis Systems
C_m	CLM	pitching moment coefficient; $M_Y/qS\ \ell_{ref}$
C_y	CY	side force coefficient; F_Y/qS
		Stability Axis System
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}

Surface Definitions

SYMBOL	SADSAC SYMBOL	DEFINITION
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
	SPOILR	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

SURFACE SUBSCRIPTS	DEFINITION
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

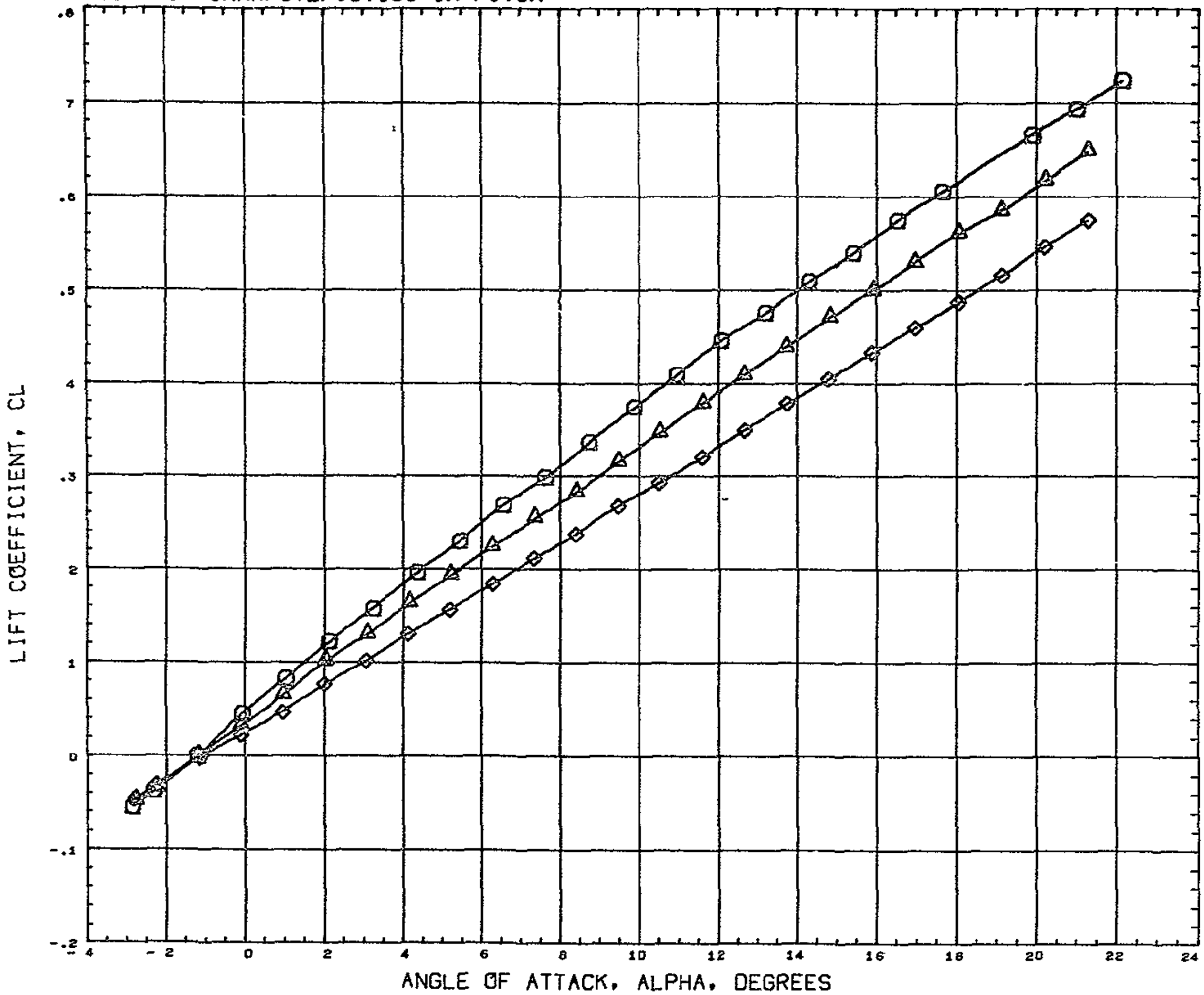
If copies of this listing are desired, please contact the above or the cognizant SADSAC personnel who, for this data, is:

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				

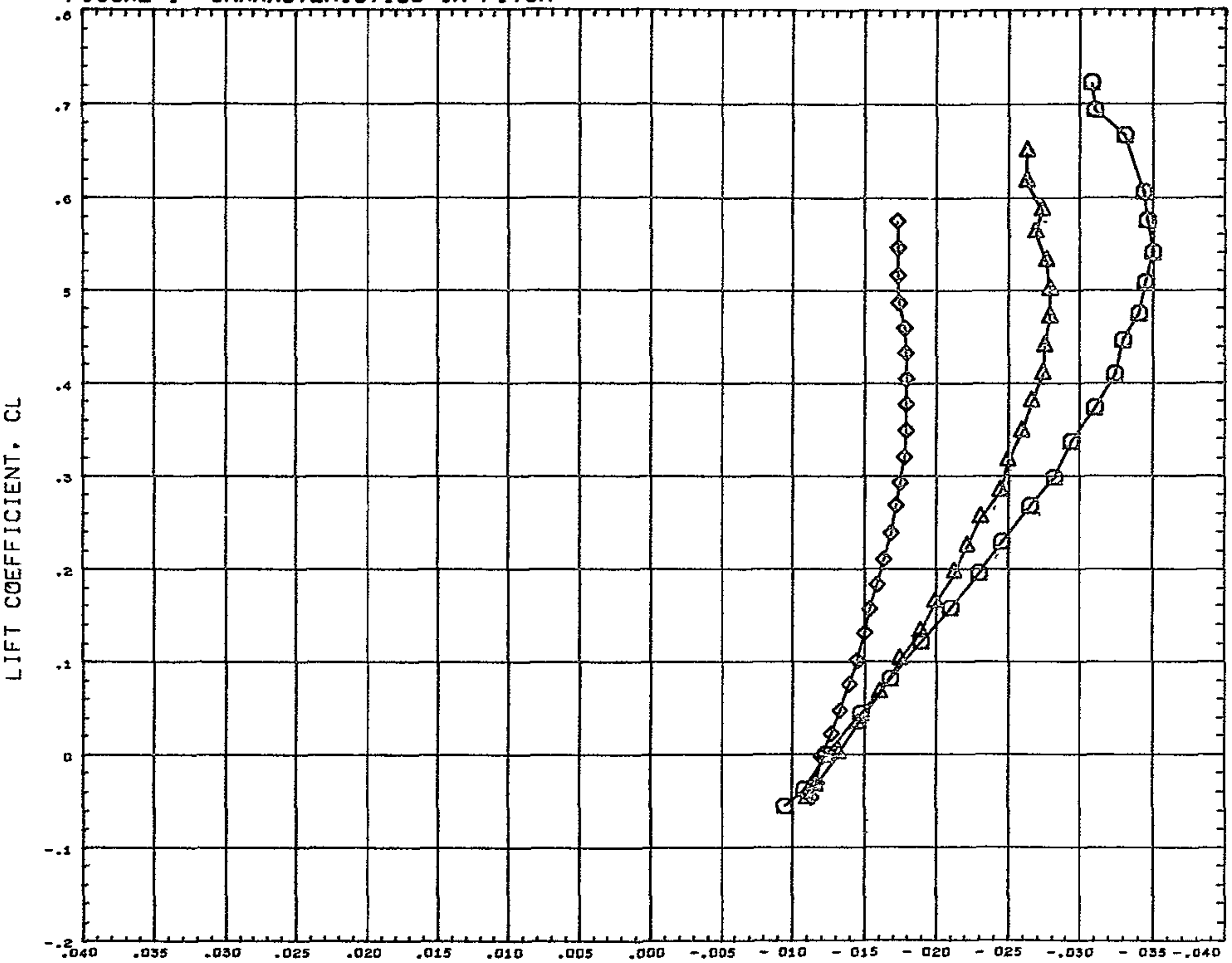
REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8360	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

REFERENCE FILE

GFST 022 CONF. ROS-NB1 B1W1V1

FIGURE 1 CHARACTERISTICS IN PITCH

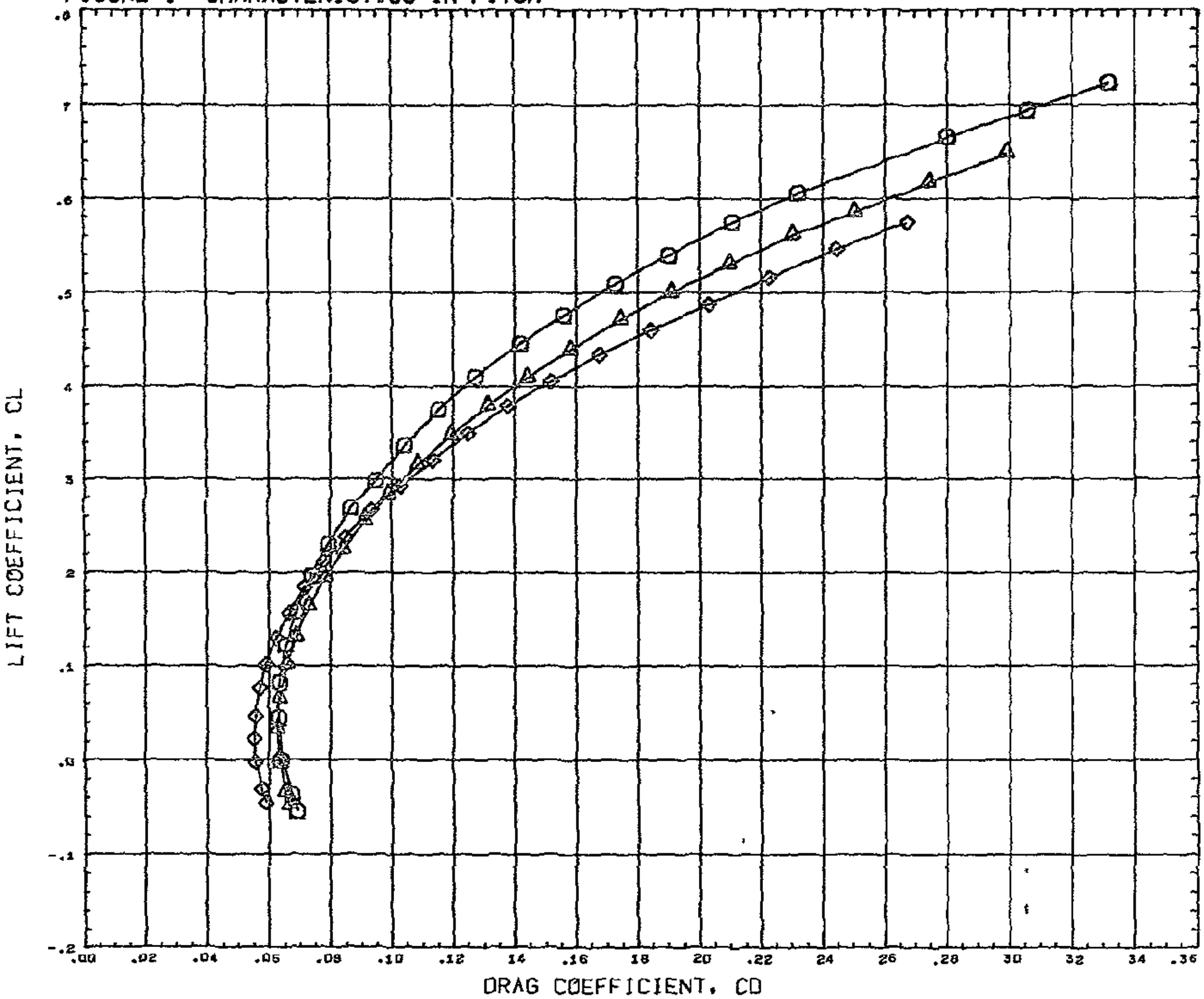


SYMBOL	MACH	PARAMETRIC VALUES			
○	1.750	BETA	0 000	LELEVN	0.000
△	2 020	RELEVN	0 000	RUDDER	0 000
◇	2.480				

REFERENCE FILE

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	

FIGURE 1 CHARACTERISTICS IN PITCH



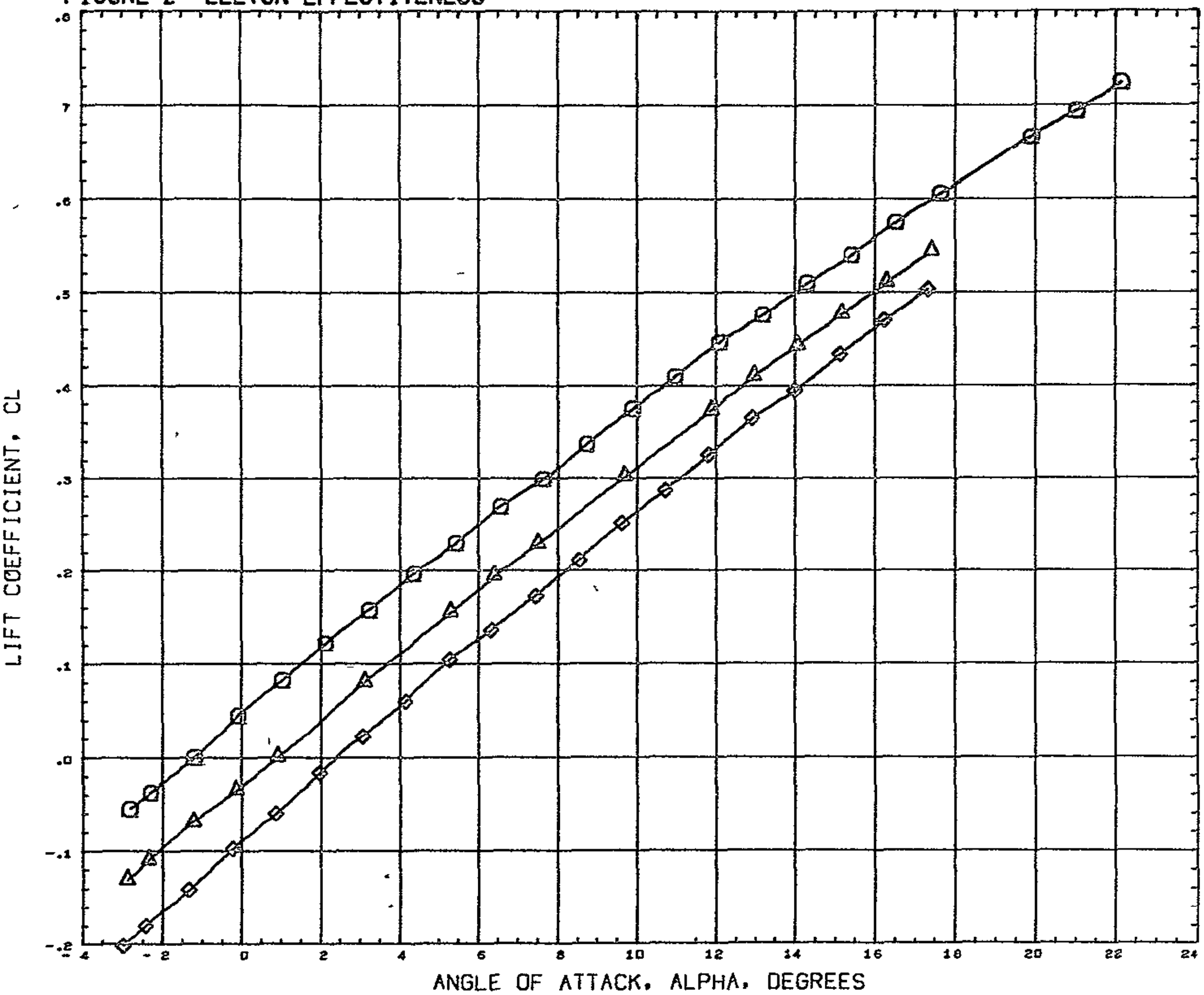
SYMBOL	MACH	PARAMETRIC VALUES			
○	1 750	BETA	0 000	LELEVN	0.000
△	2 020	RELEVN	0.000	RUDDER	0.000
◇	2 480				

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8380	IN
XMRP	1485.0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

REFERENCE FILE

FIGURE 2 ELEVON EFFECTIVENESS

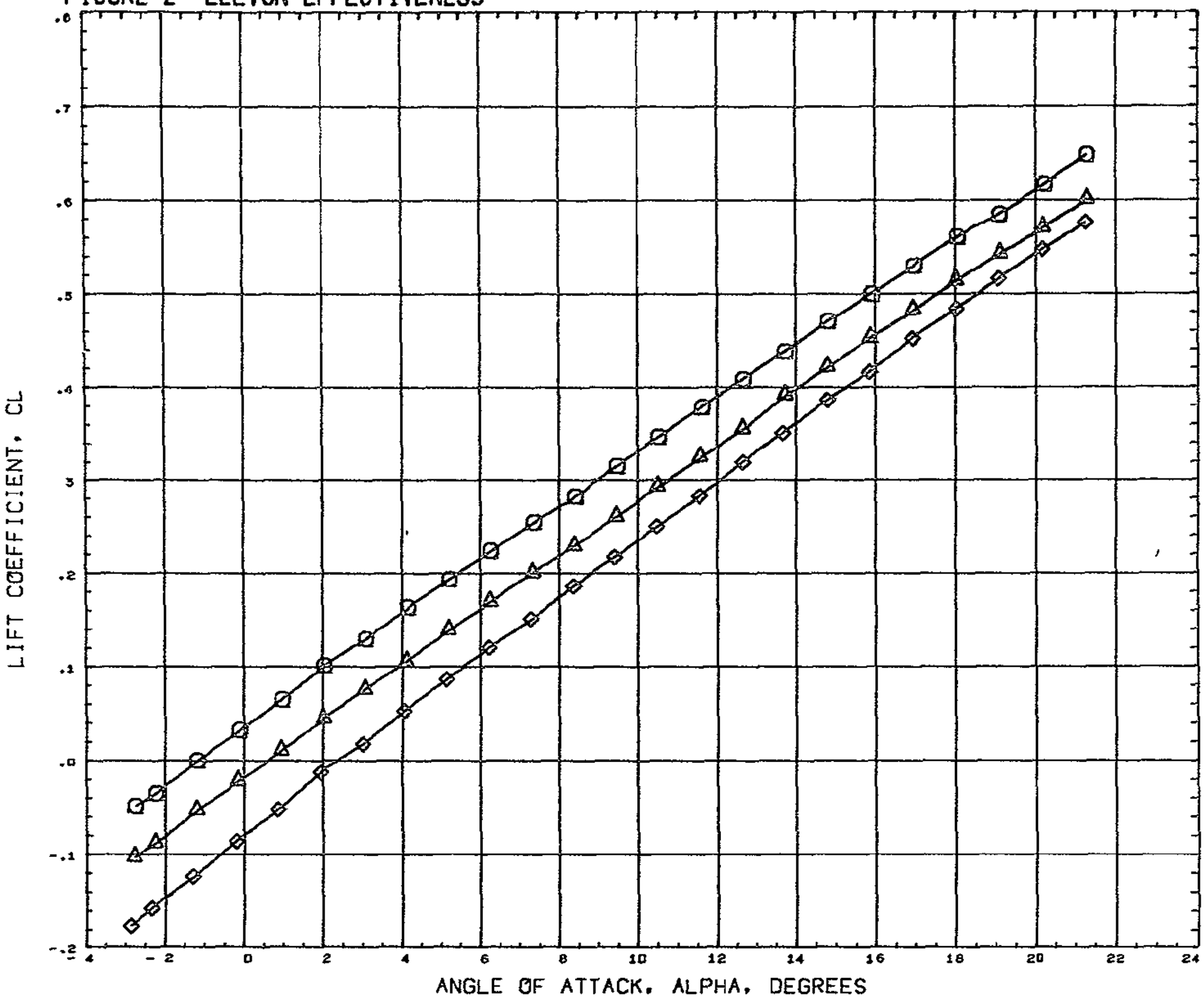


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000
(RCS004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0 000	-20.000	-20 000	0.000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40 000	-40 000	0 000

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8380	IN
XMRP	1465 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

MACH 1.750

FIGURE 2 ELEVON EFFECTIVENESS



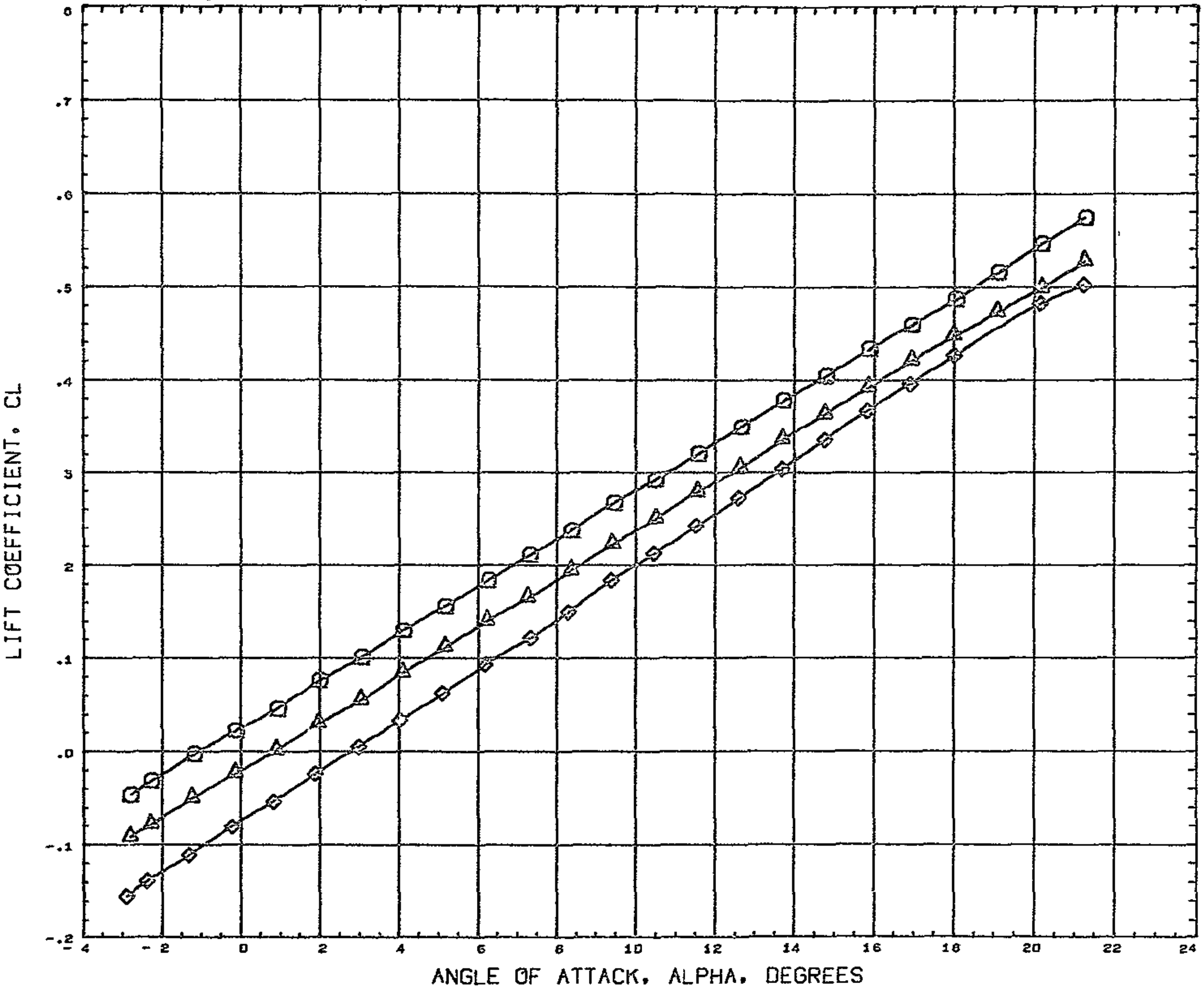
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS004)	△	GFST 022 CONF. ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0.000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0.000	-40 000	-40 000	0 000

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 2 ELEVON EFFECTIVENESS



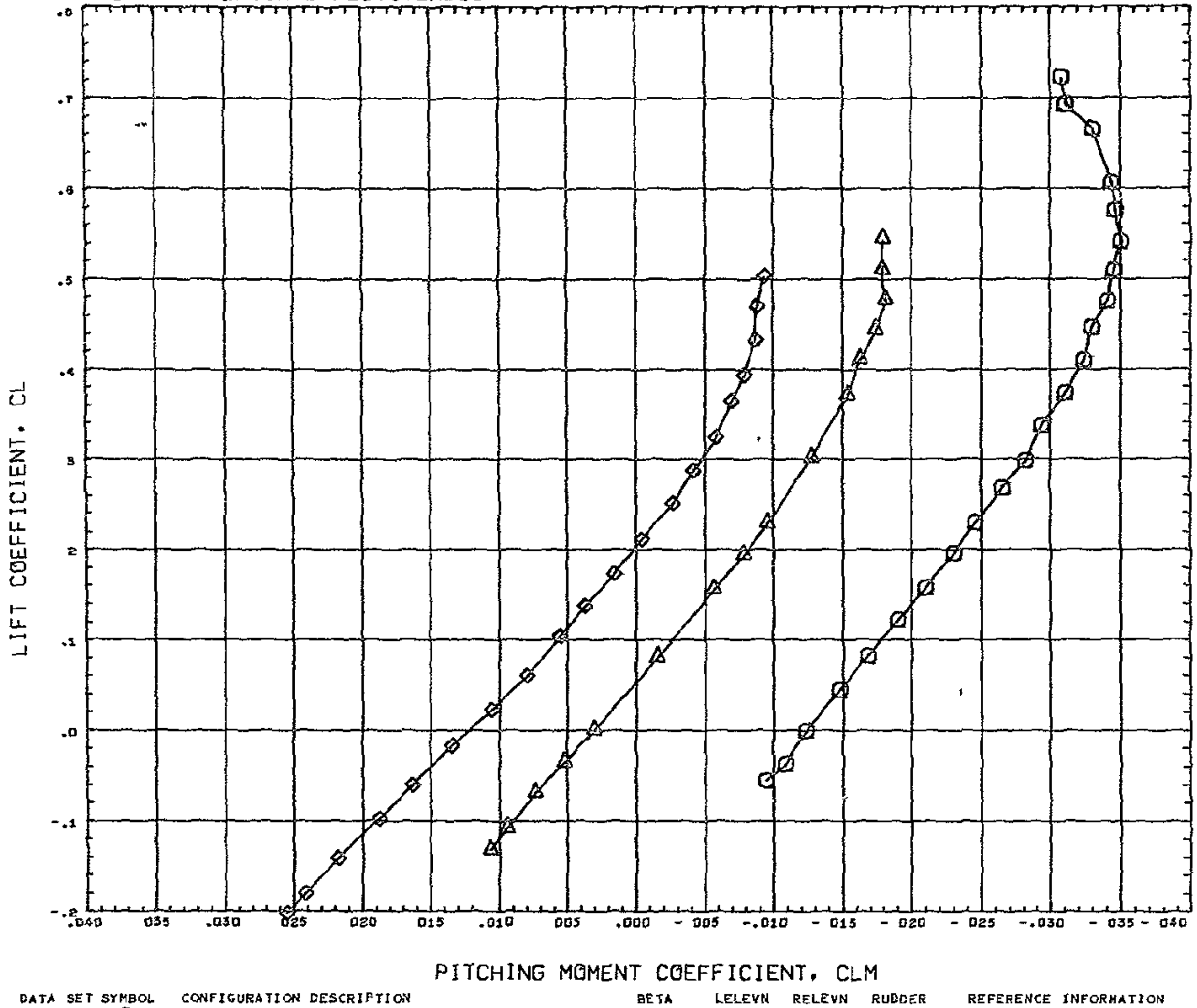
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDEF
(RCS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20,V1	0 000	-20 000	-20 000	0 000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0.000	-40 000	-40 000	0 000

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 2.480

FIGURE 2 ELEVON EFFECTIVENESS



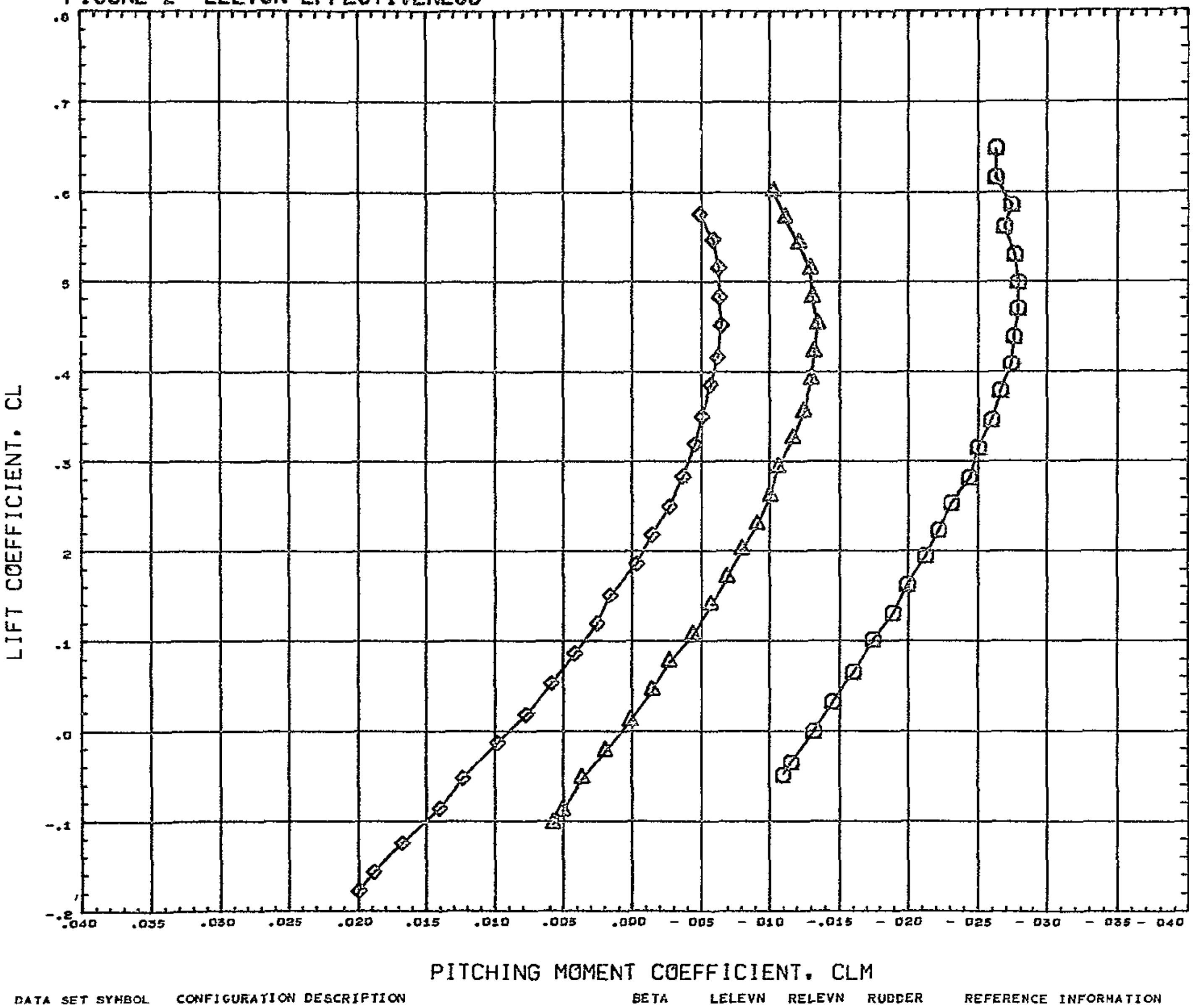
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RC5003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RC5004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0 000
(RC5005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40 000	-40 000	0 000

MACH 1 750

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	

FIGURE 2 ELEVON EFFECTIVENESS

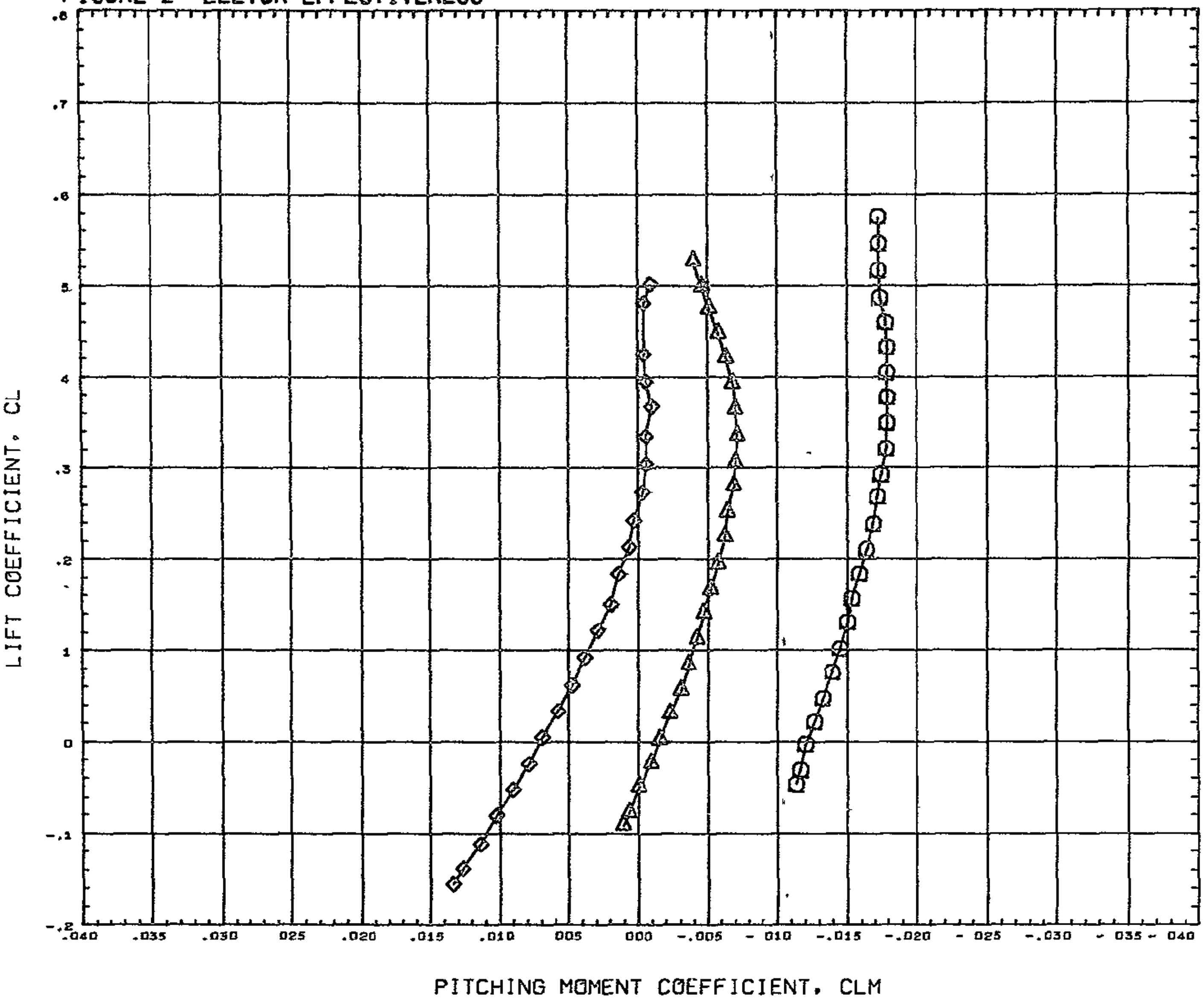


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0 000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40 000	-40 000	0 000

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 2 ELEVON EFFECTIVENESS



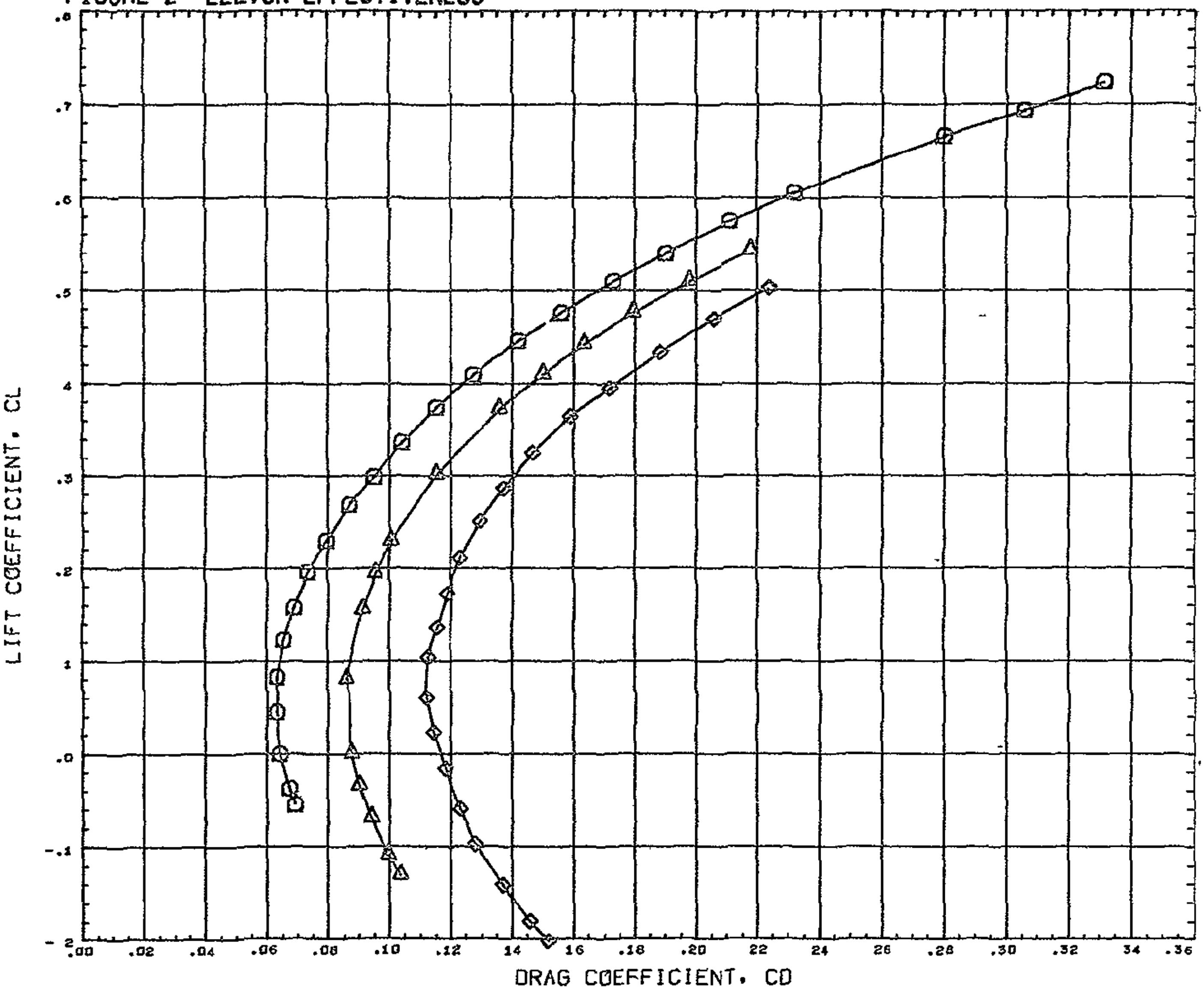
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000
(RCS004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0 000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40.000	-40 000	0.000

MACH 2 480

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	

FIGURE 2 ELEVON EFFECTIVENESS



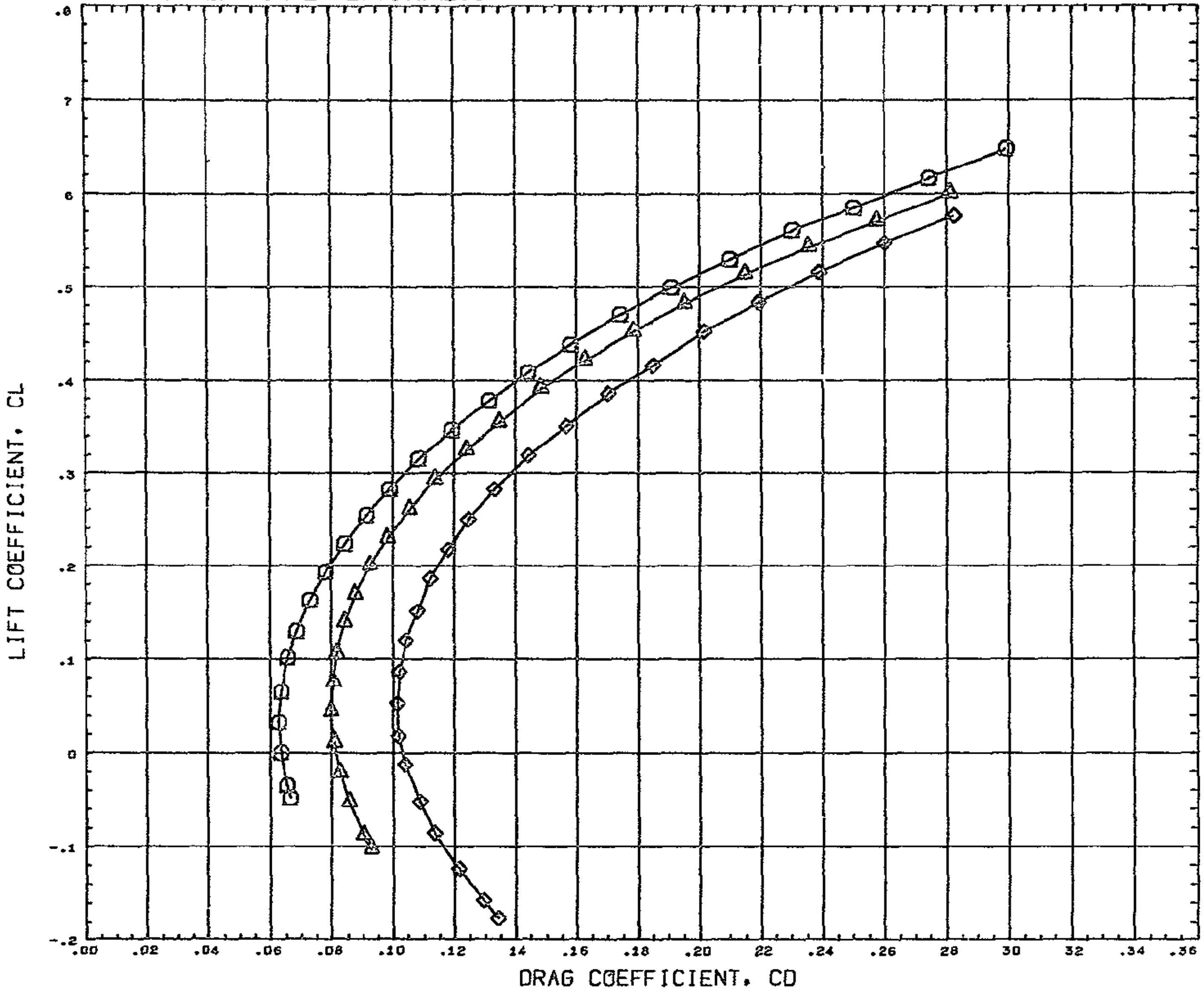
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0 000	0 000	0.000
(RCS004)	△	GFST 022 CONF. ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0 000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40.000	-40 000	0 000

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8360	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

MACH 1 750

FIGURE 2 ELEVON EFFECTIVENESS

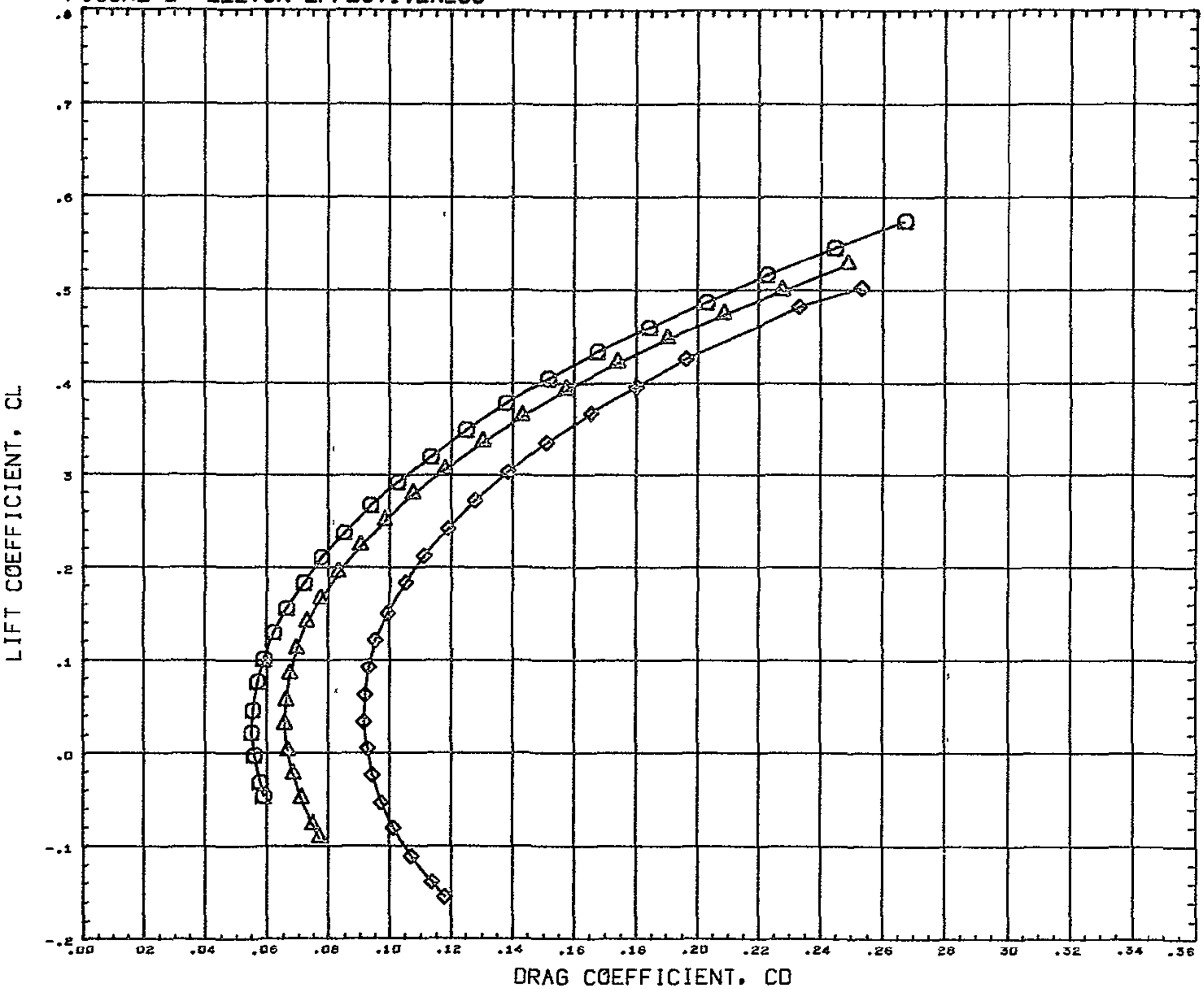


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0 000	-20 000	-20 000	0 000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40 000	-40 000	0 000

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 2 ELEVON EFFECTIVENESS



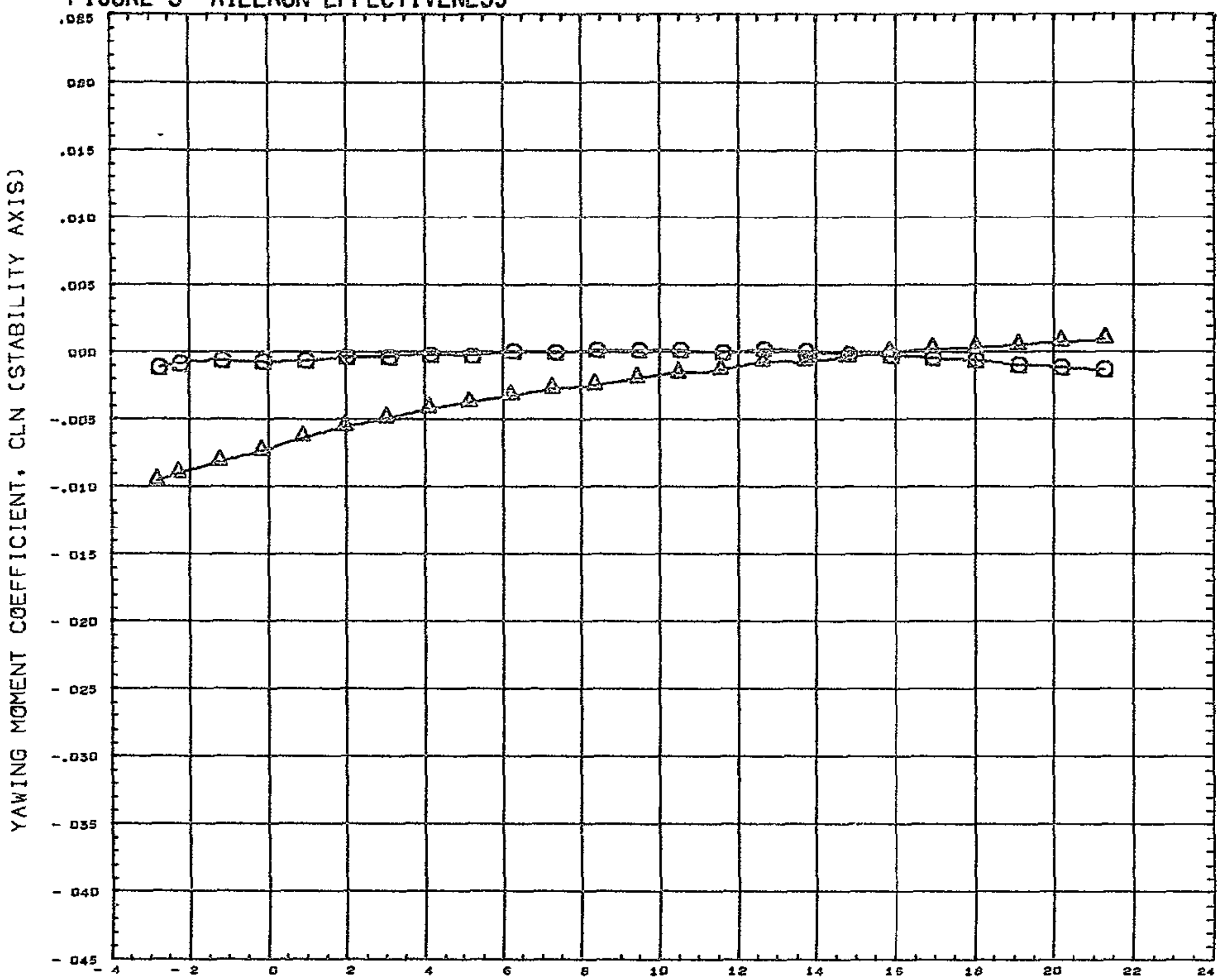
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0.000	0 000	0 000
(RCS004)	△	GFST 022 CONF ROS-NB1 B1W1(-20,-20)V1	0.000	-20 000	-20 000	0 000
(RCS005)	◇	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	0 000	-40 000	-40 000	0 000

REFERENCE INFORMATION

SPEF	20 6890	SQ IN
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 3 AILERON EFFECTIVENESS

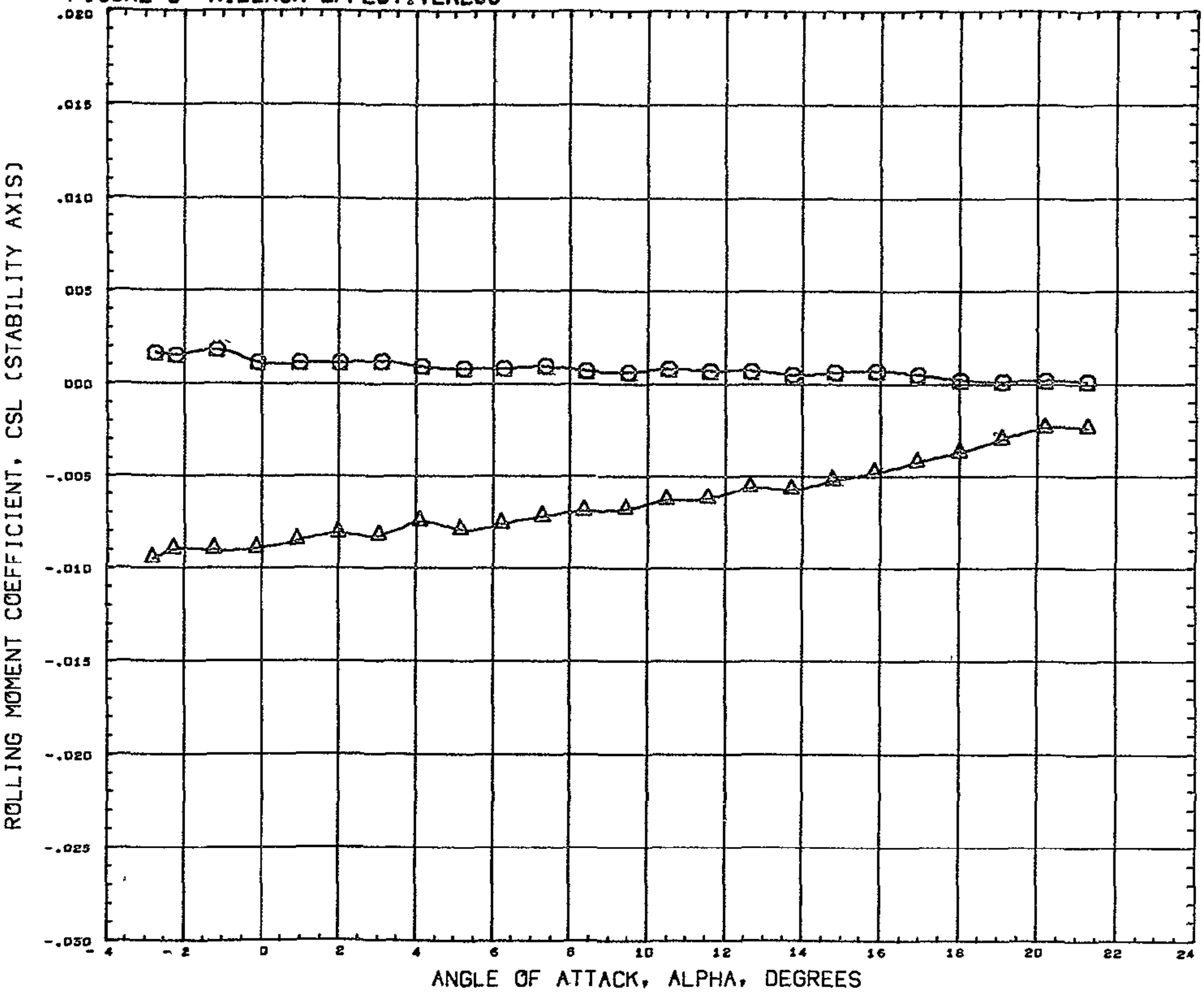


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000
(RCS008)	△	GFST 022 CONF ROS-NB1 B1W1(-40,-20)V1	0.000	-40.000	-20.000	0.000

REFERENCE INFORMATION		
SREF	20.6890	SQ IN
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 3 AILERON EFFECTIVENESS

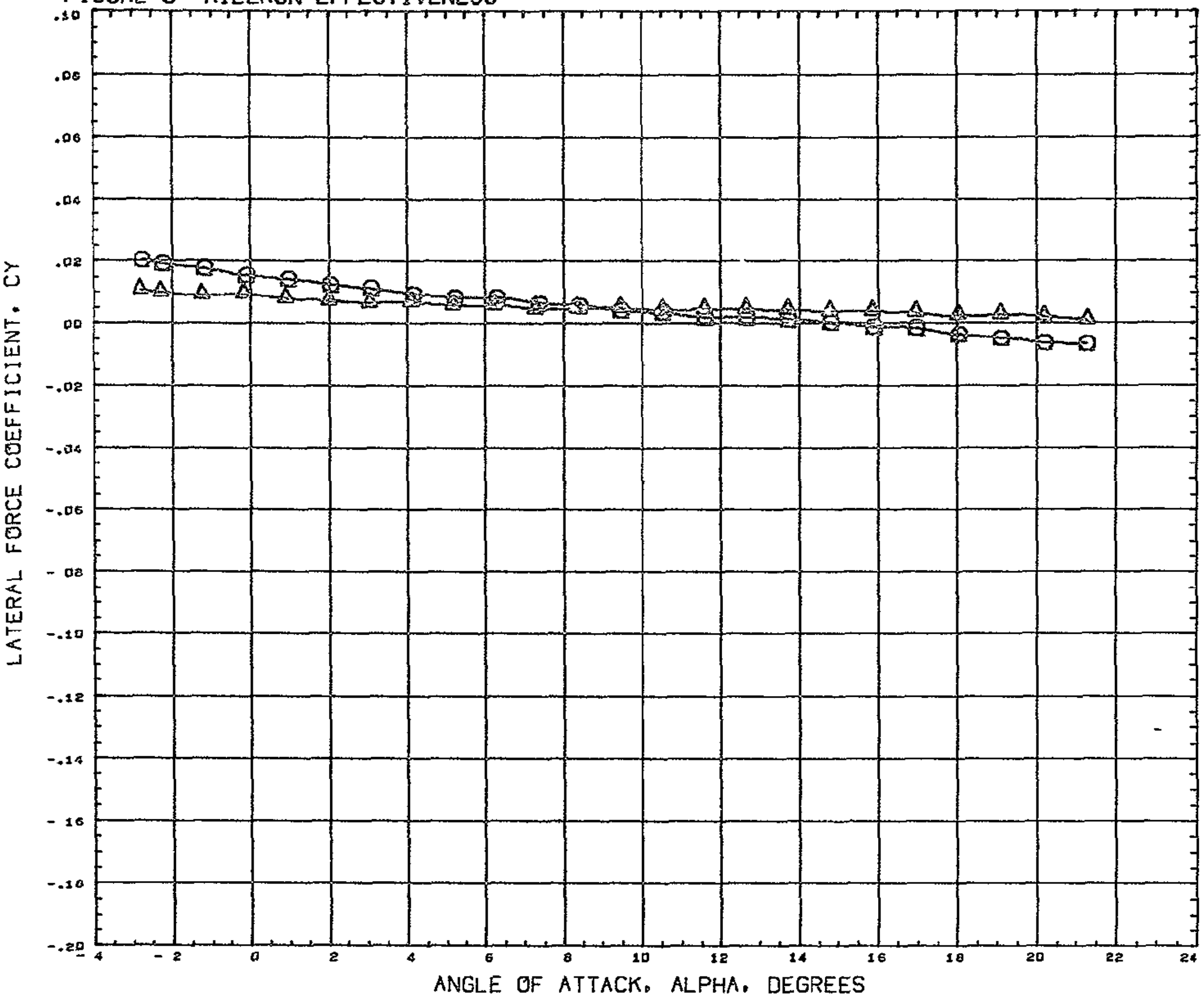


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS008)	△	GFST 022 CONF ROS-NB1 B1W1(-40,-20)V1	0.000	-40 000	-20 000	0 000

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 3 AILERON EFFECTIVENESS



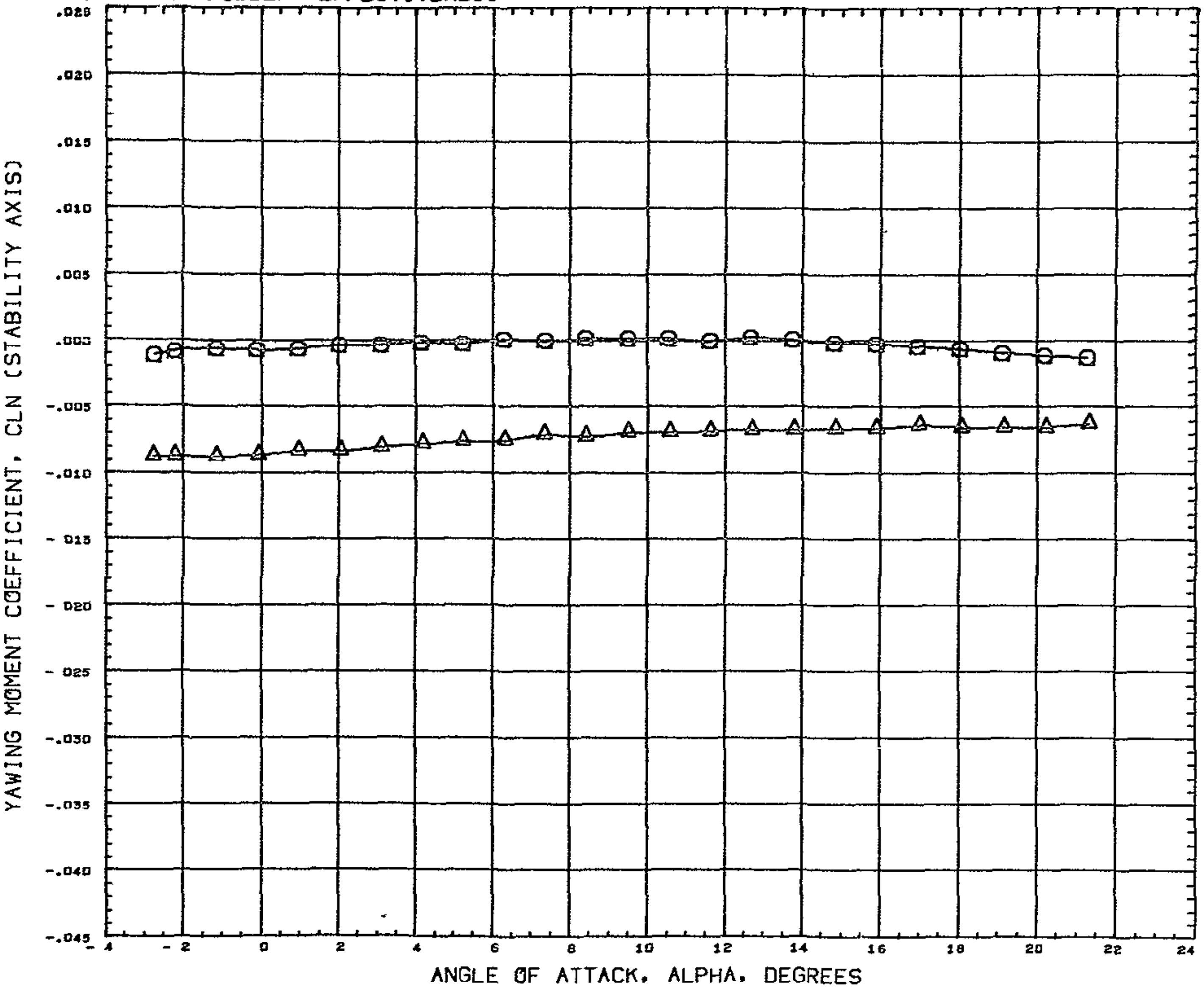
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS008)	△	GFST 022 CONF ROS-NB1 B1W1(-40,-20)V1	0 000	-40 000	-20 000	0 000

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 4 RUDDER EFFECTIVENESS



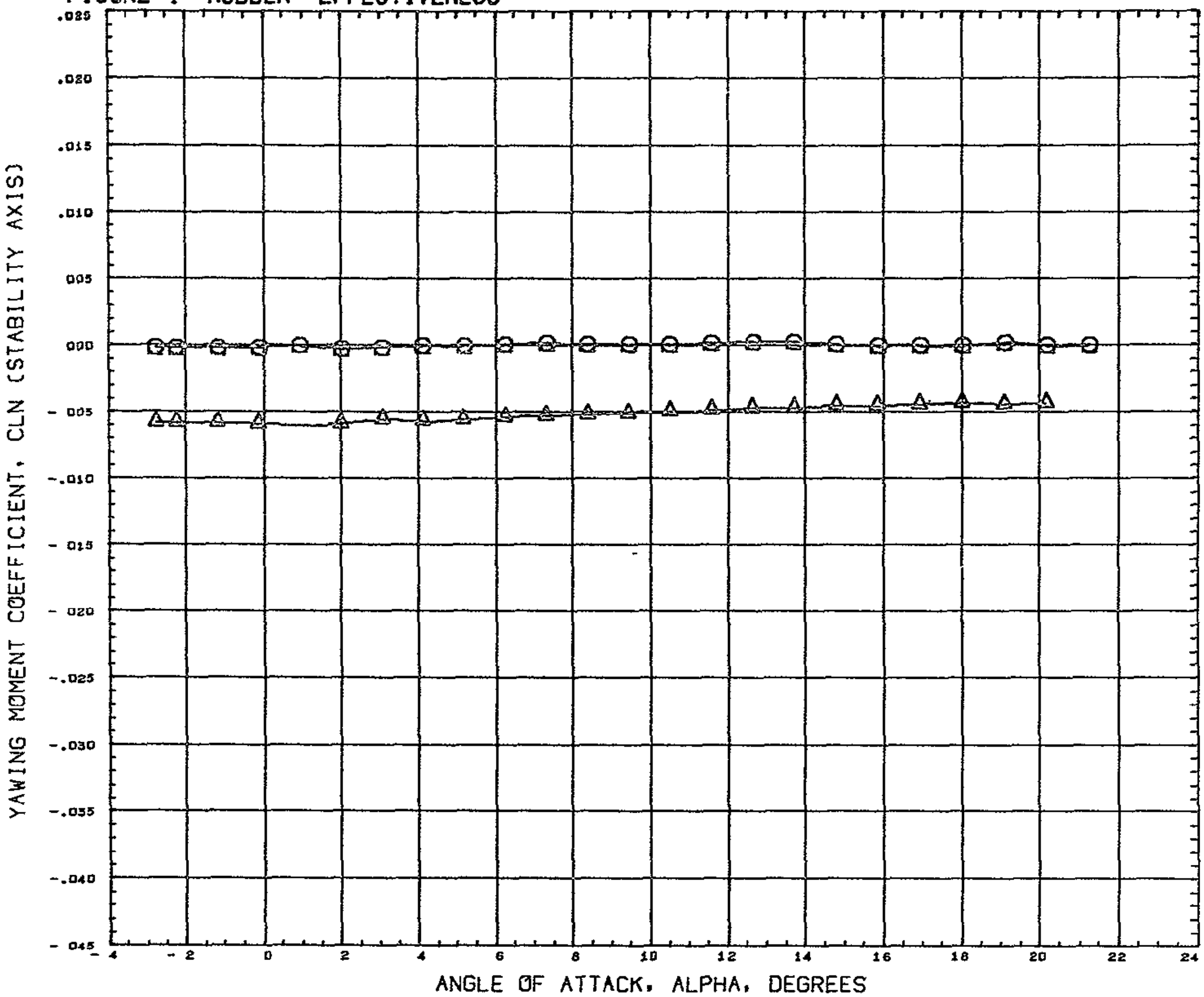
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(BCS003)	O	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000
(RCS007)	Δ	GFST 022 CONF. ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000

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 4 RUDDER EFFECTIVENESS



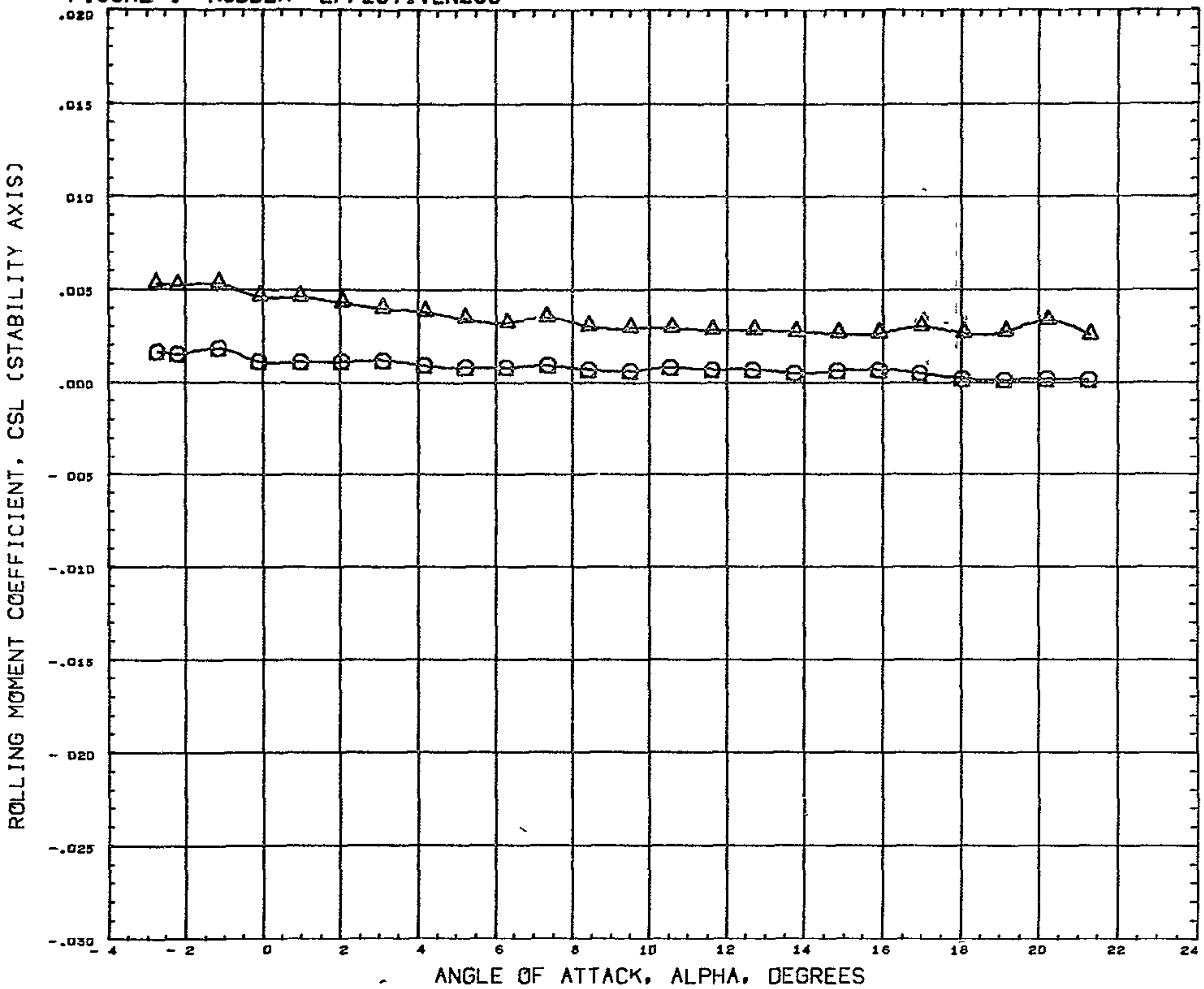
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(BCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000
(RCS007)	△	GFST 022 CONF ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000

REFERENCE INFORMATION

SREF	20 6890	SQ IN
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

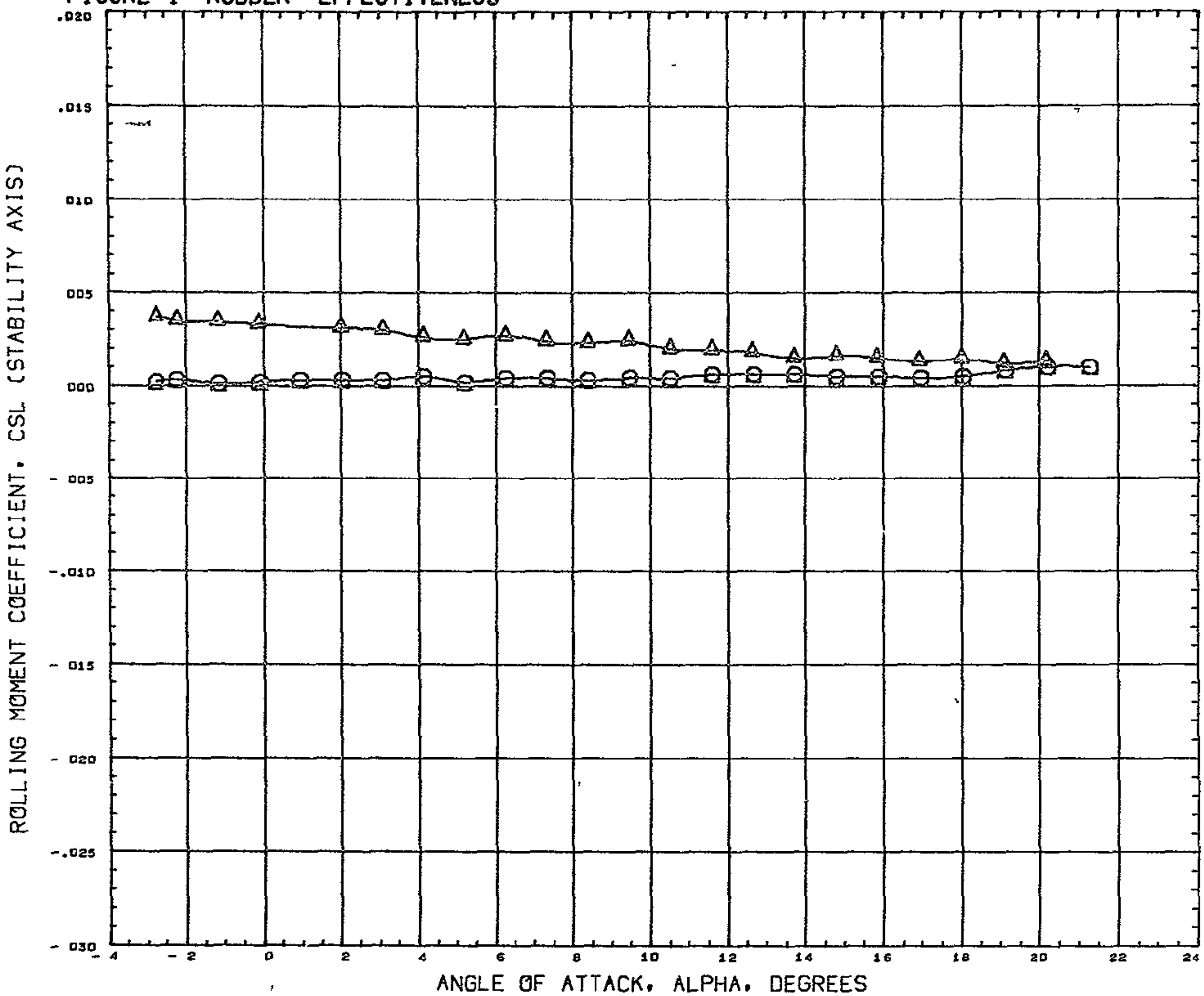


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(BCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS007)	△	GFST 022 CONF ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000

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 4 RUDDER EFFECTIVENESS

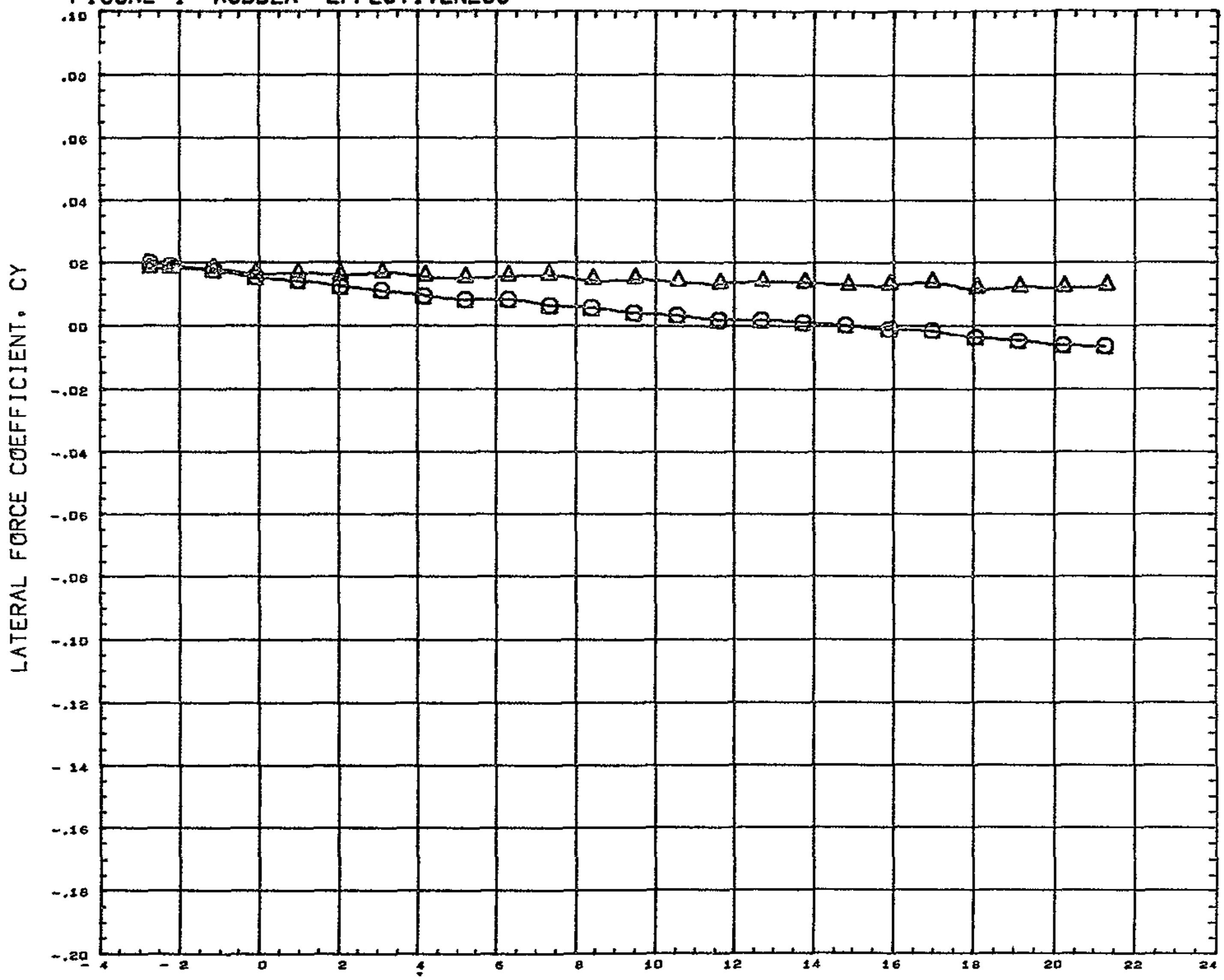


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(BCS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000
(RCS007)	△	GFST 022 CONF. ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
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 4 RUDDER EFFECTIVENESS



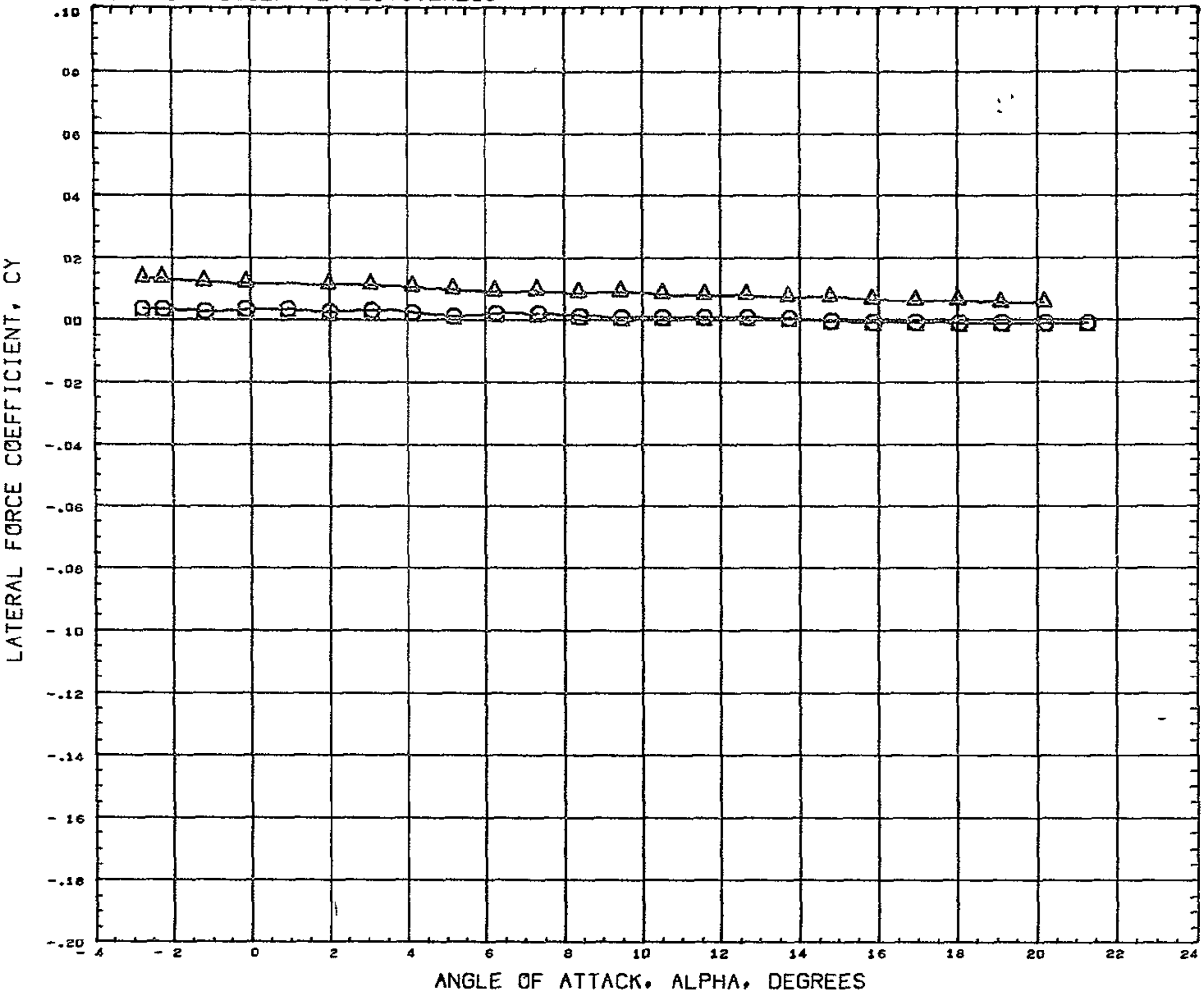
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(BCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0 000	0.000	0 000
(RCS007)	△	GFST 022 CONF. ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000

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 4 RUDDER EFFECTIVENESS



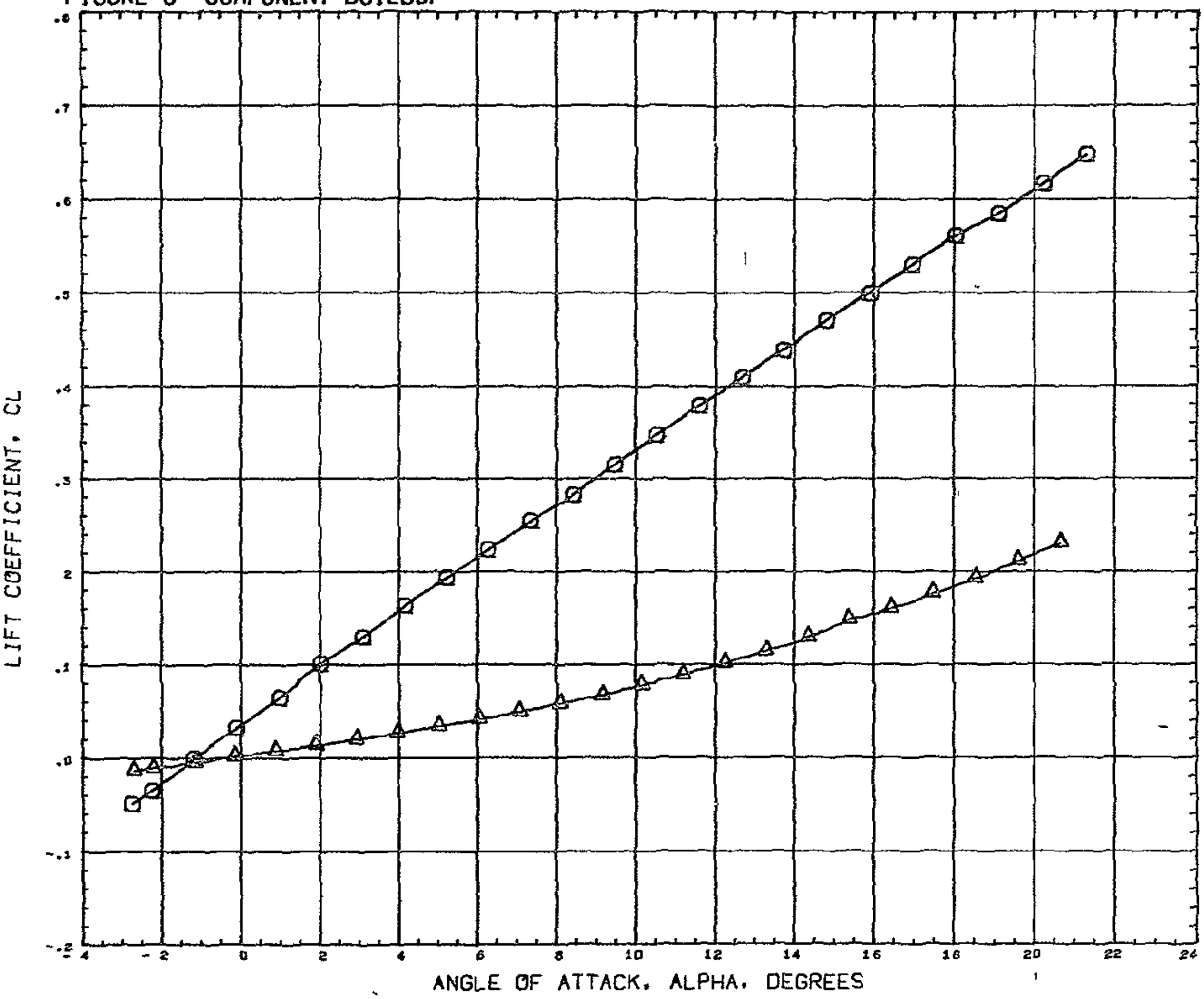
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(BCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS007)	△	GFST 022 CONF ROS-NB1 B1W1V1(10)	0 000	0 000	0 000	10 000

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 6360	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377.0004	IN
SCALE	0 0050	

MACH 2 480

FIGURE 5 COMPONENT BUILDUP



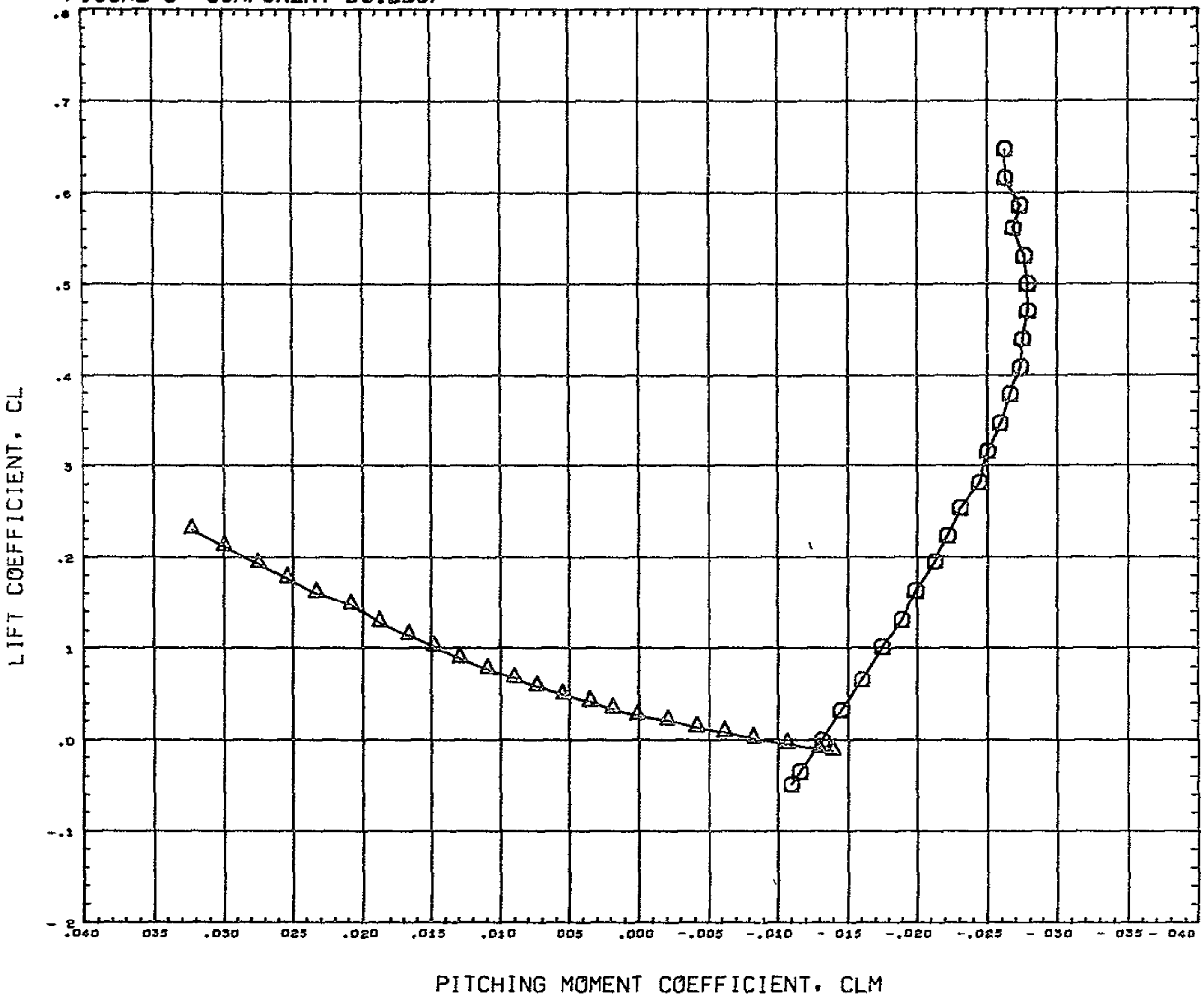
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS016)	△	GFST 022 CONF. ROS-NB1 B1	0 000			

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

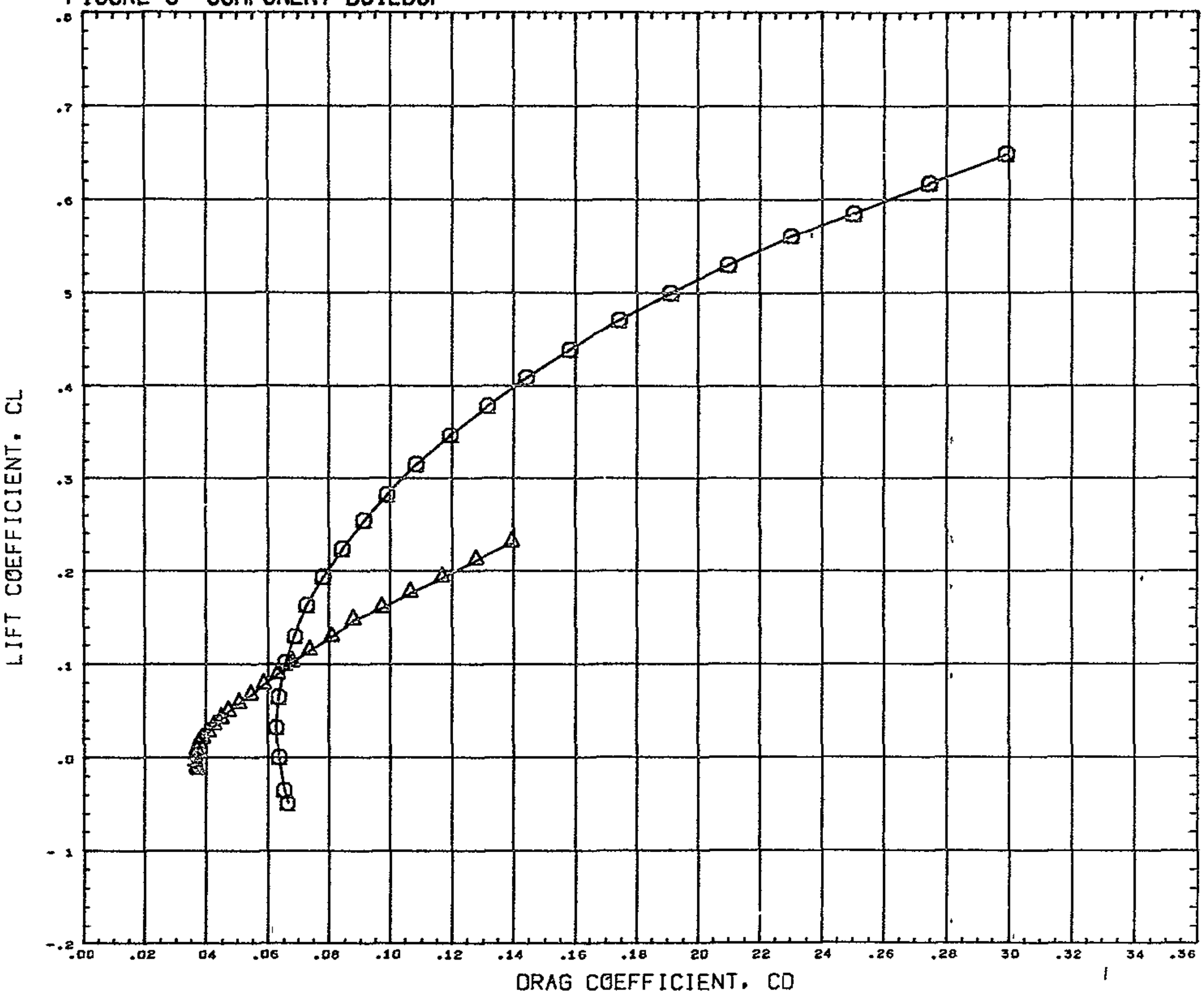


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	O	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS016)	Δ	GFST 022 CONF ROS-NB1 B1	0 000			

MACH 2 020

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	

FIGURE 5 COMPONENT BUILDUP



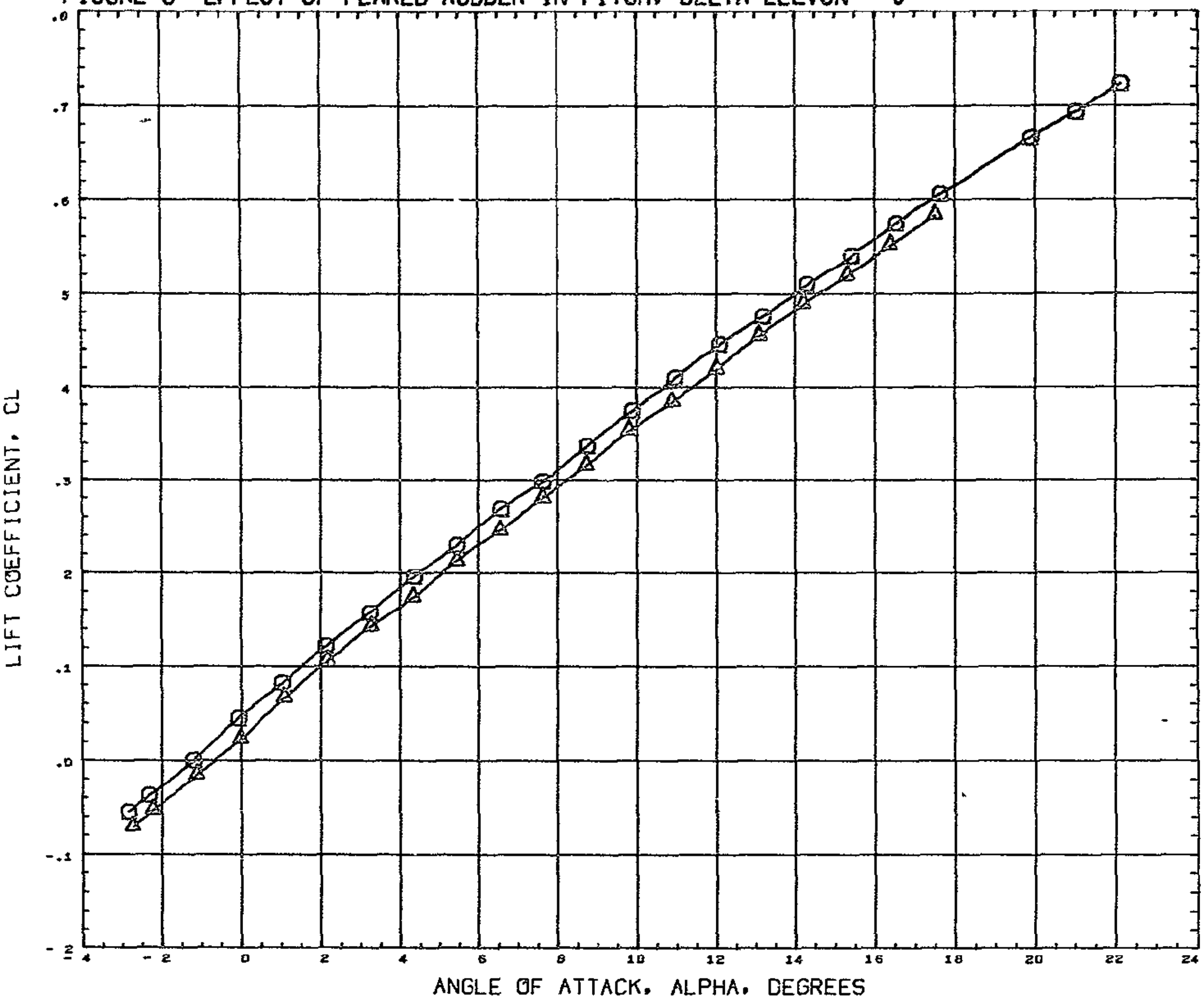
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS016)	△	GFST 022 CONF ROS-NB1 B1	0 000			

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

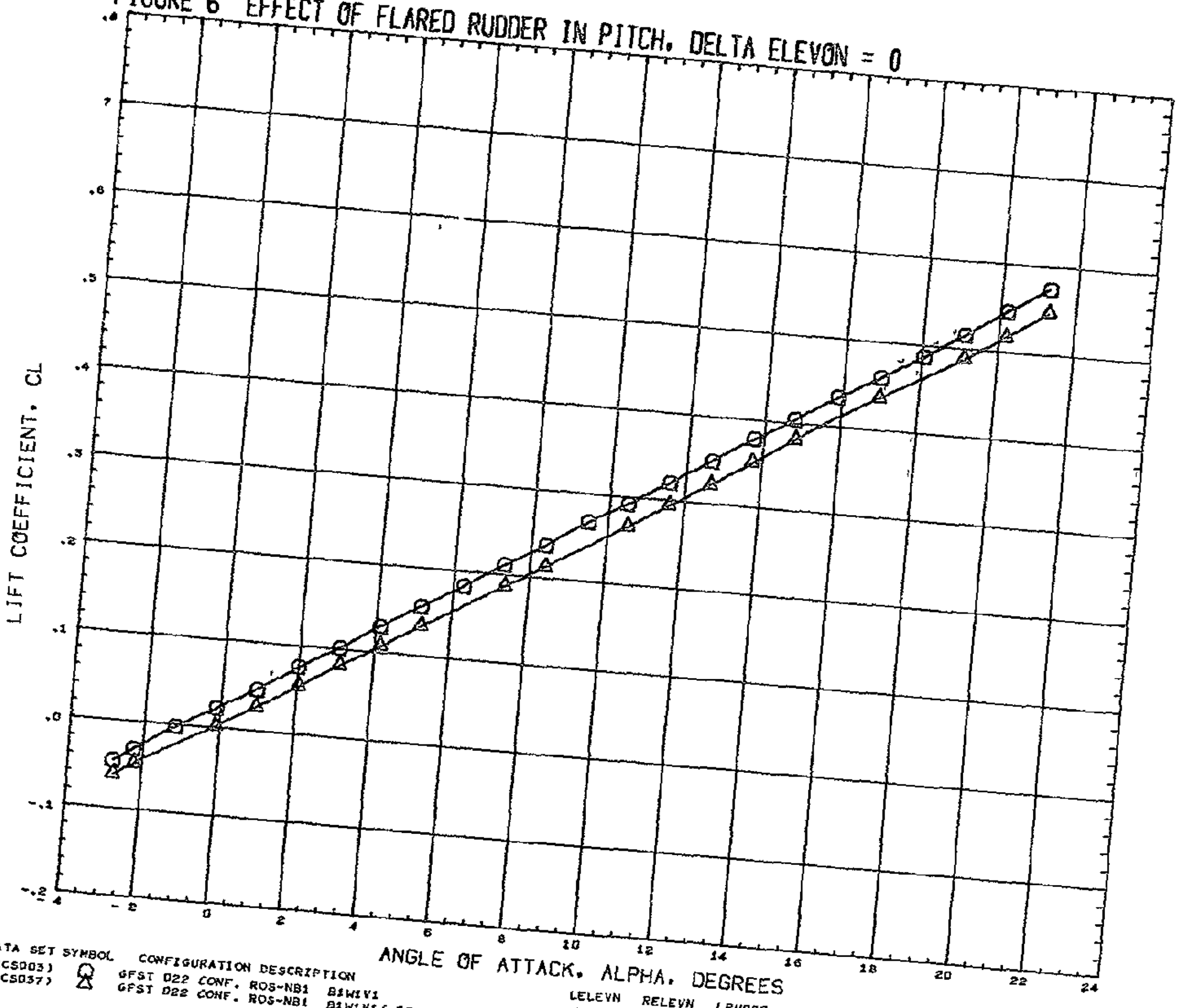


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000		
(RCS037)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0.000	0 000	-30 000	30.000

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 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)

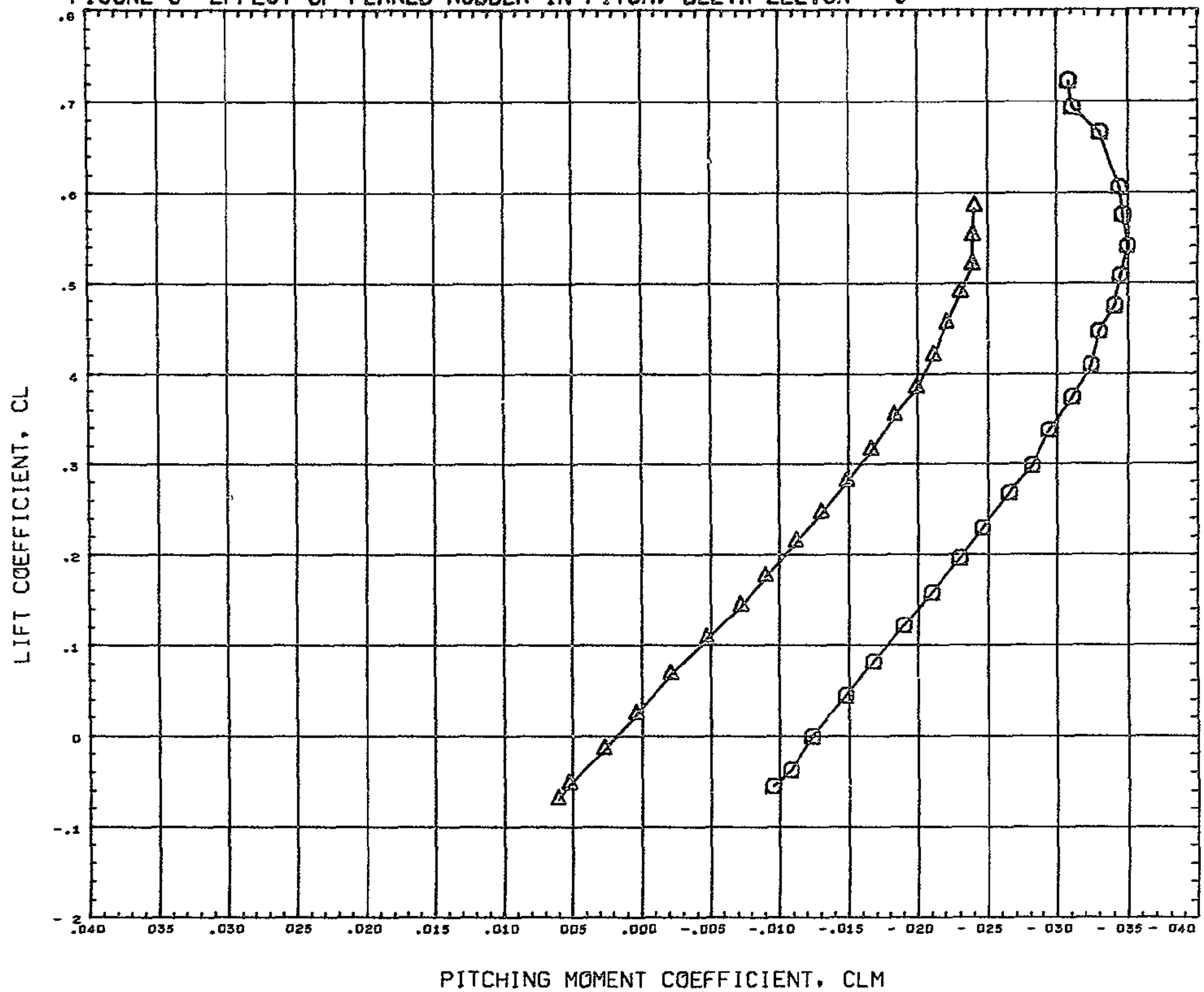
LELEVN	RELEVN	LRUDDR	RRUDDR
0.000	0.000		
0 000	0 000	-30 000	30 000

MACH 2.480

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	

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

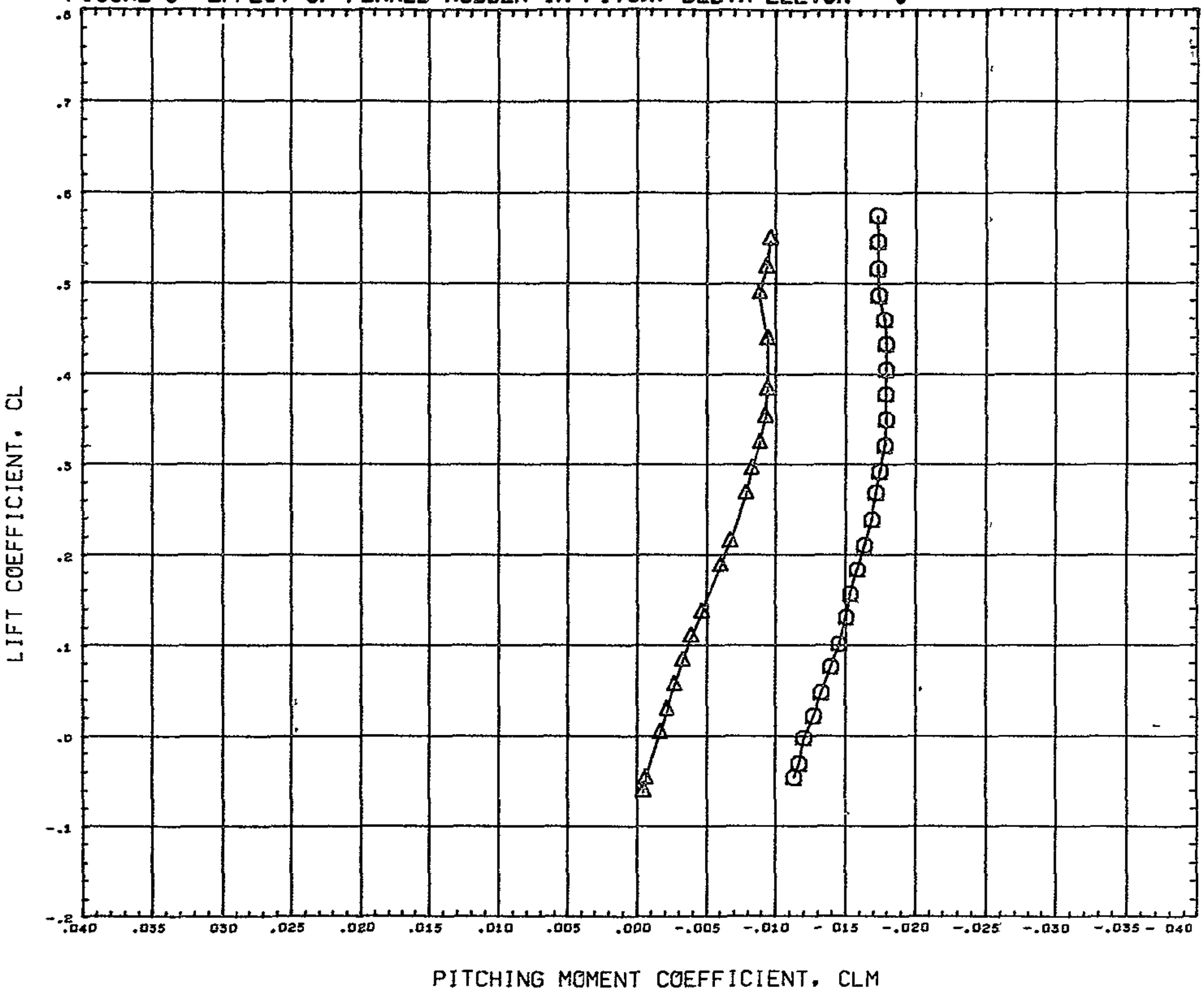


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000		
(RCS037)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	0 000	-30 000	30 000

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 1 750

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

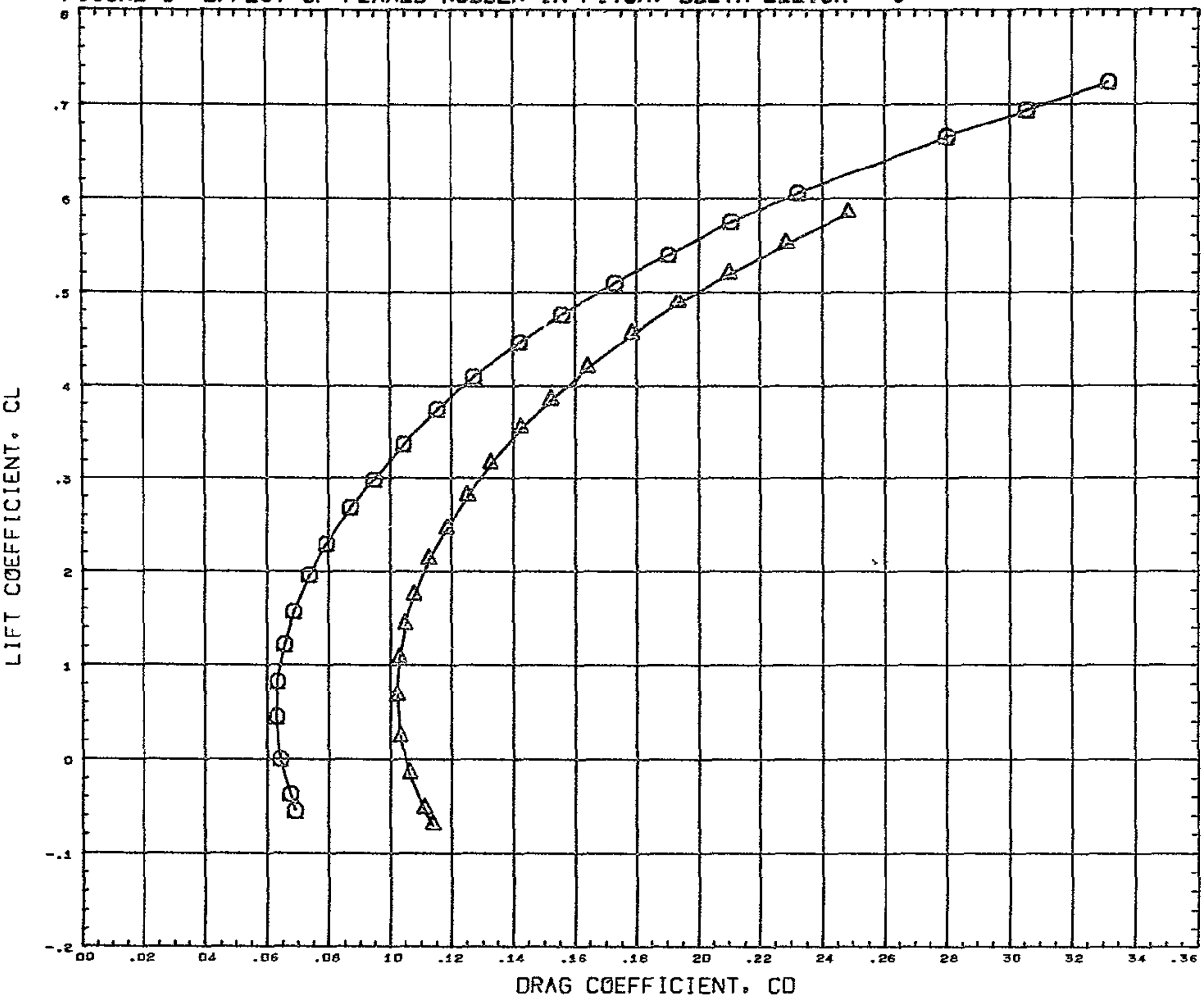


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(CCS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0.000		
(RCS037)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	0 000	-30 000	30 000

MACH 2.480

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	

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

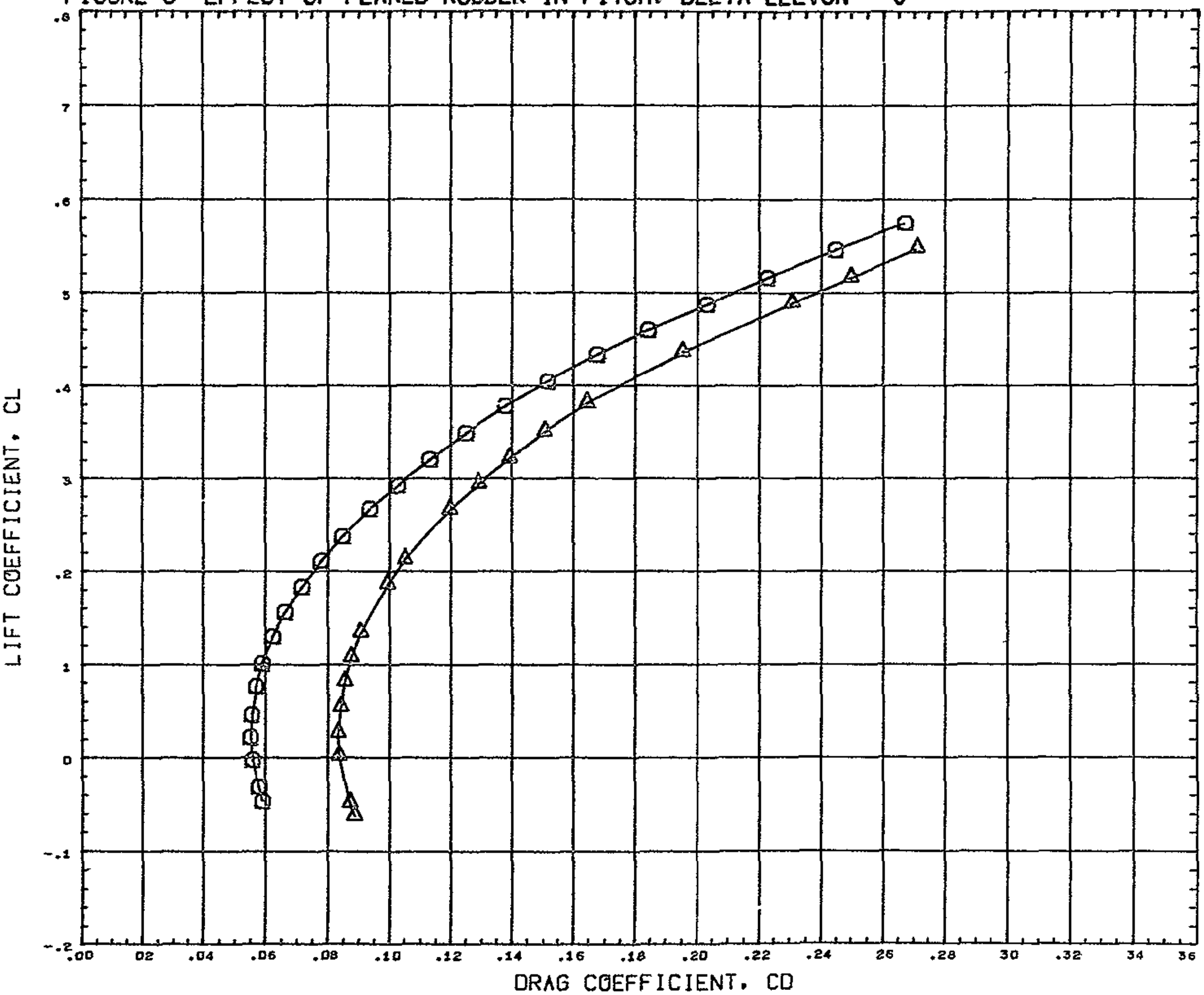


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(CCSD03)	O	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0 000		
(RCSD37)	Δ	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0.000	0 000	-30 000	30 000

MACH 1.750

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

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

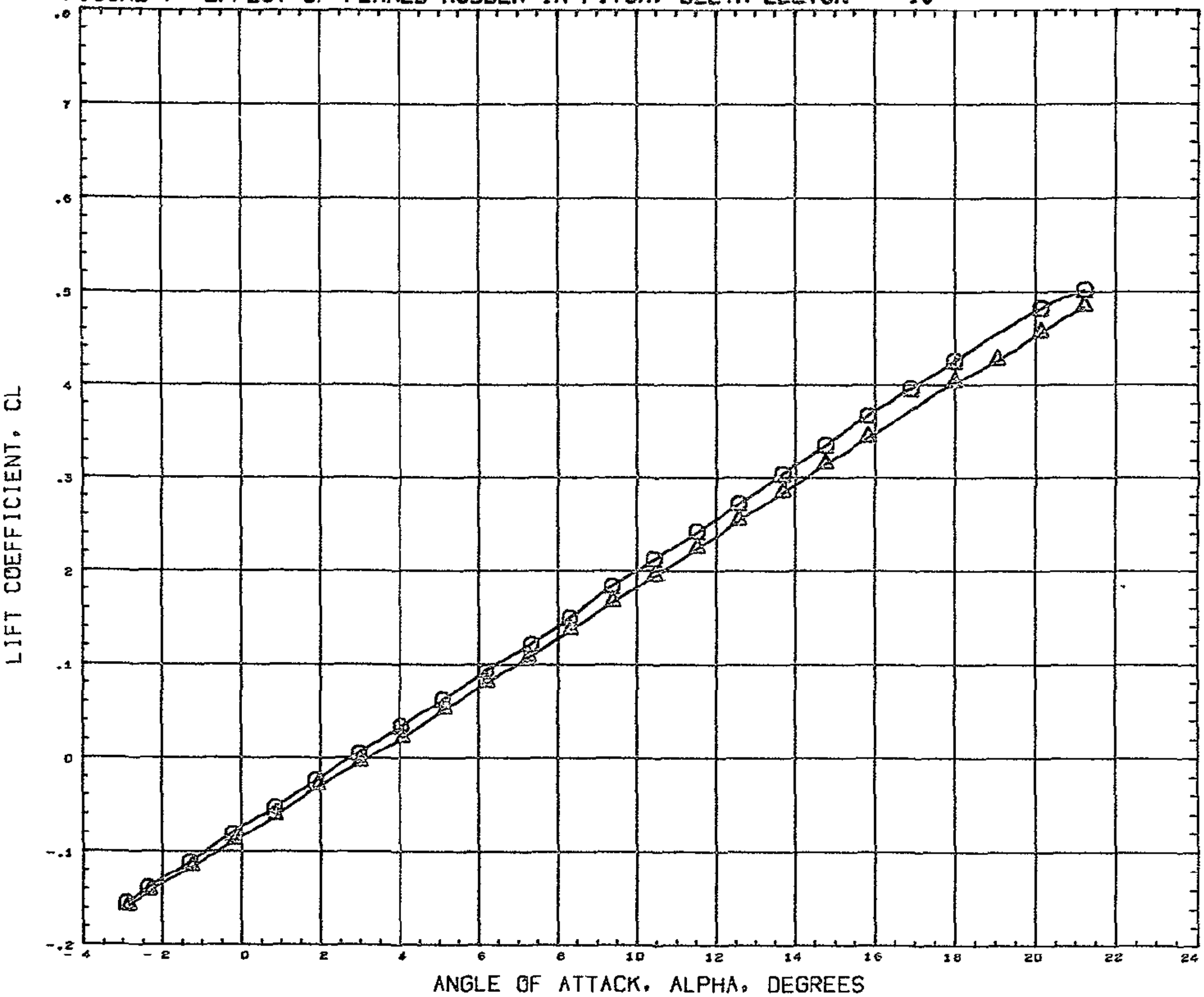


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000		
(RCS037)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	0 000	-30 000	30 000

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



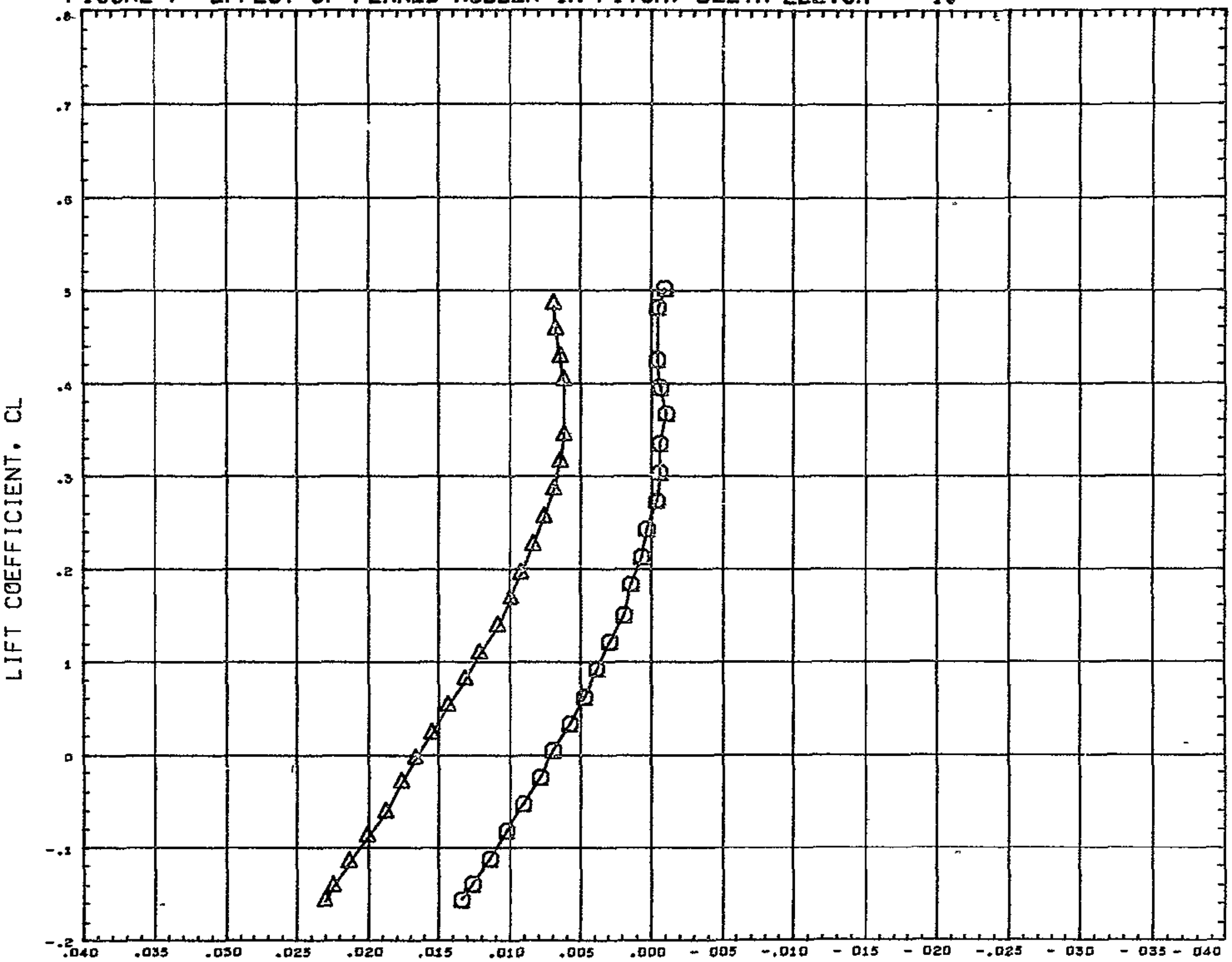
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(ACS005)	○	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	-40 000	-40.000		
(RCS027)	△	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1(-30,30)	-40 000	-40 000	-30 000	30 000

MACH 2 480

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	

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



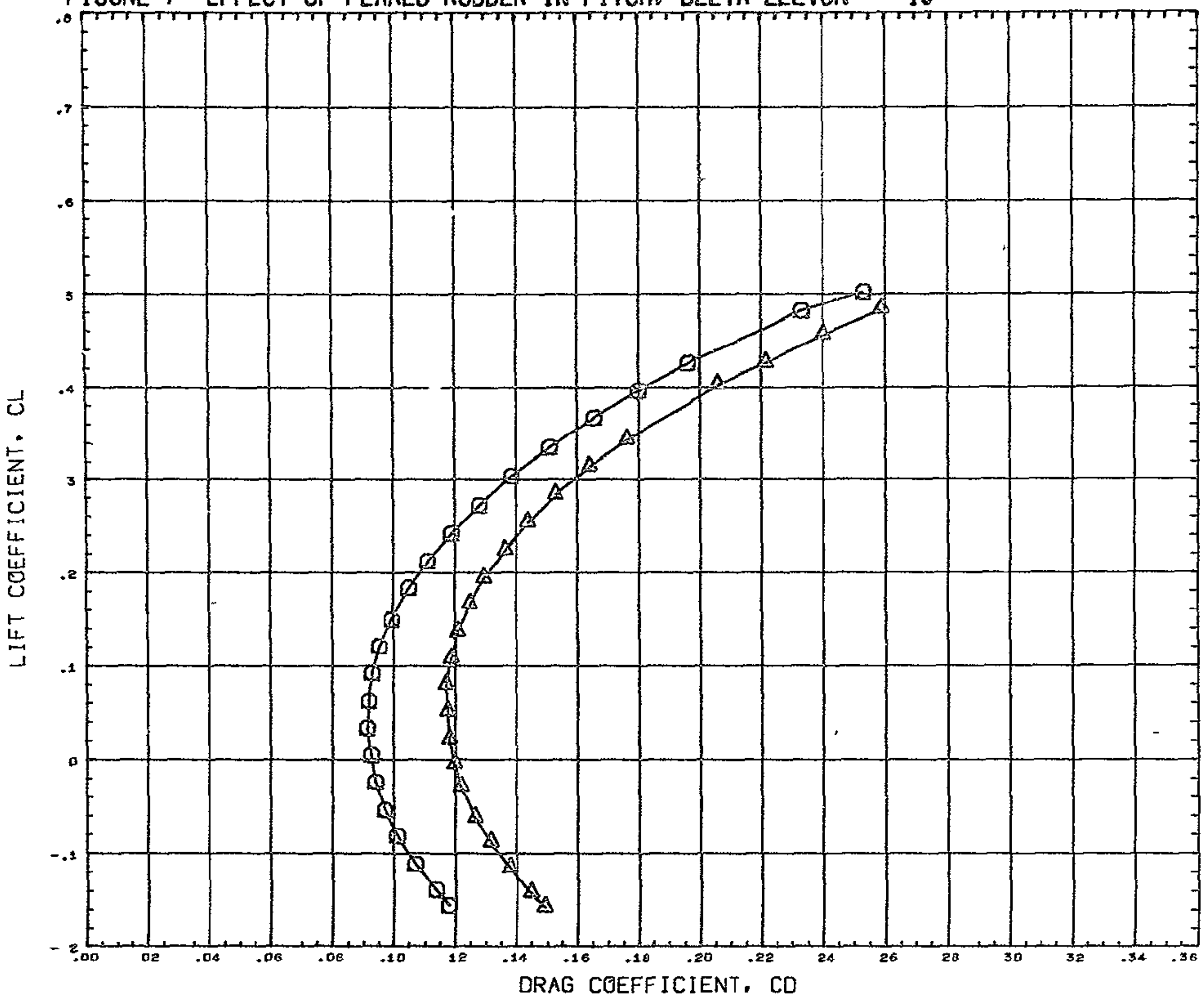
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(ACS005)	○	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	-40 000	-40 000		
(RCS027)	△	GFST 022 CONF. ROS-NB1 B1W1(-40,-40)V1(-30,30)	-40 000	-40.000	-30.000	30 000

MACH 2 480

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	

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

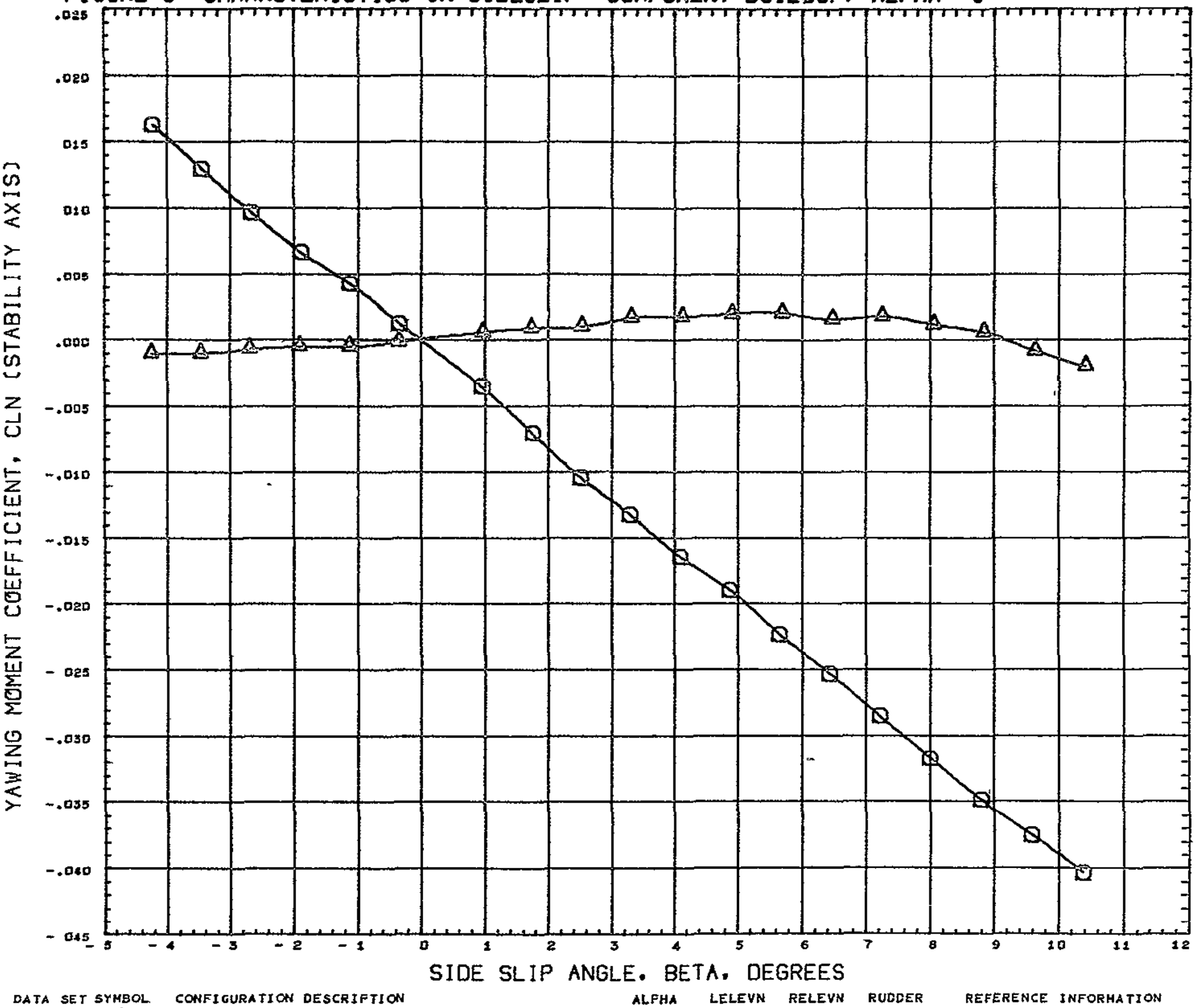


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	LELEVN	RELEVN	LRUDDR	RRUDDR
(ACS005)	O	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1	-40.000	-40 000		
(RCS027)	Δ	GFST 022 CONF ROS-NB1 B1W1(-40,-40)V1(-30,30)	-40 000	-40 000	-30 000	30 000

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 8 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP, ALPHA= 0

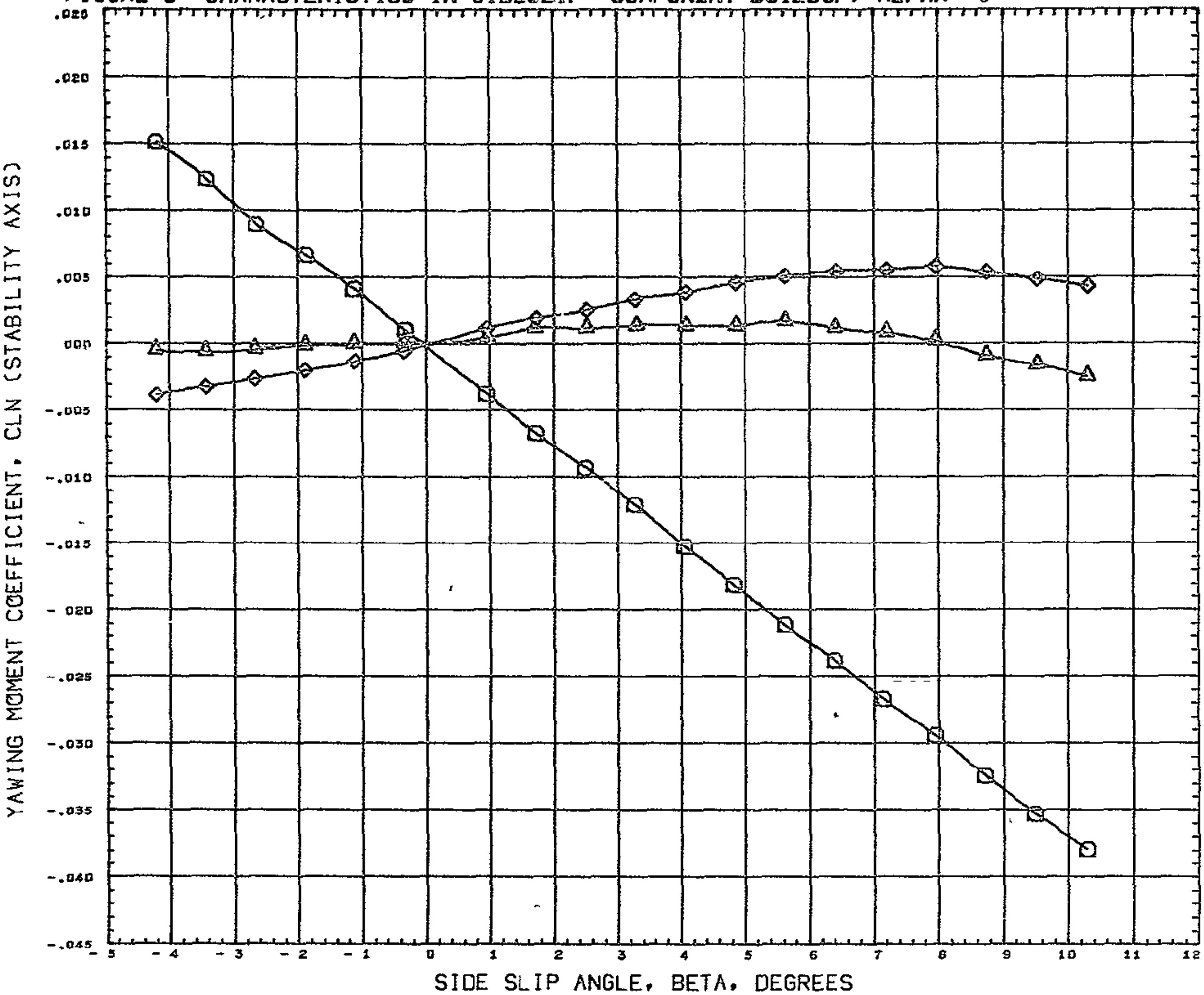


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS002)	△	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0 000
(RCS009)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0 000	0 000	0 000	0 000

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 1.750

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

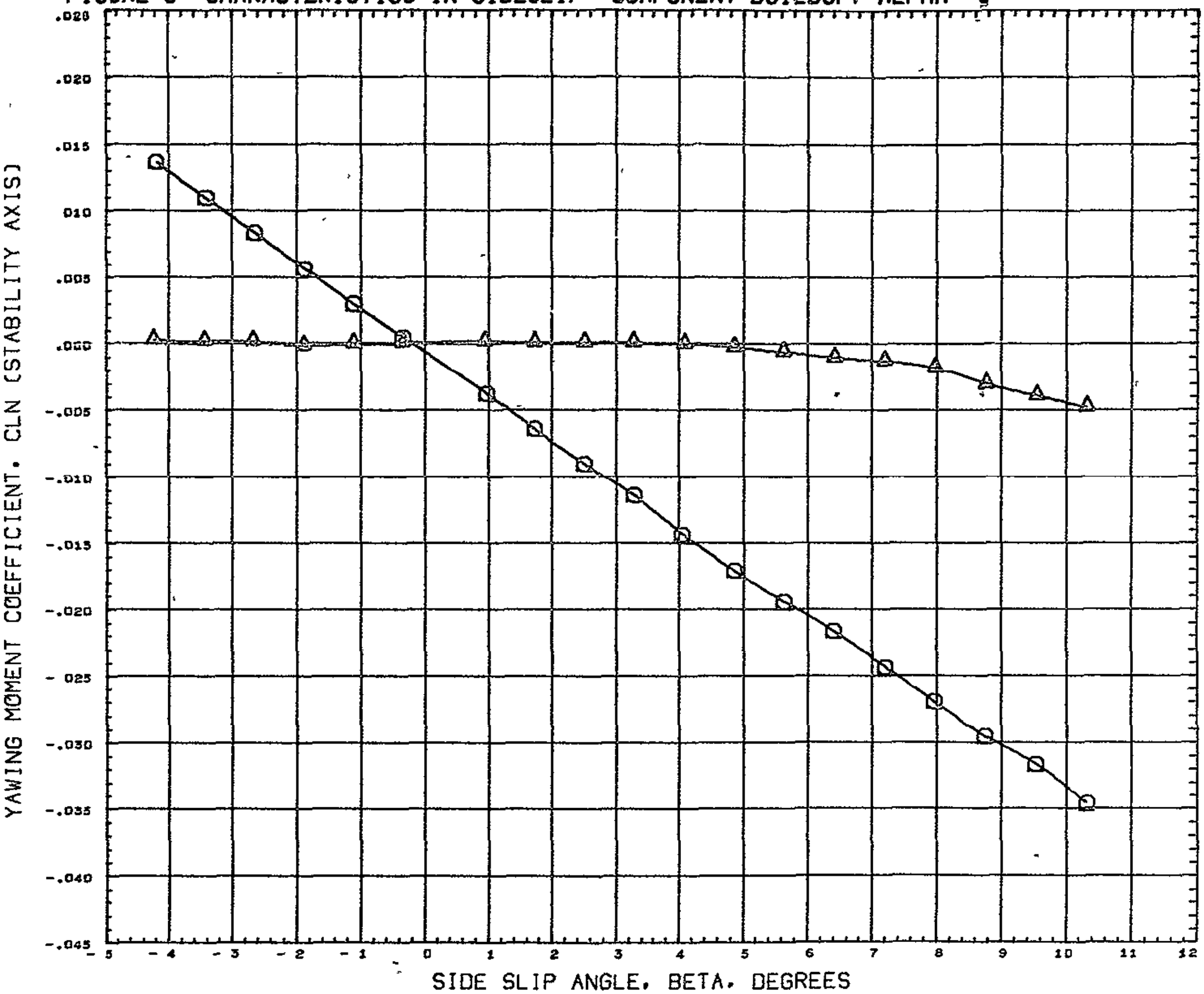


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF. ROS-NB1 B1W1	0 000	0.000	0 000	
(RCS002)	△	GFST 022 CONF. ROS-NB1 B1W1V1	0.000	0 000	0 000	0 000
(RCS009)	◇	GFST 022 CONF ROS-NB1 B1W1V1U1	0.000	0 000	0 000	0 000

MACH 2.020

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	

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

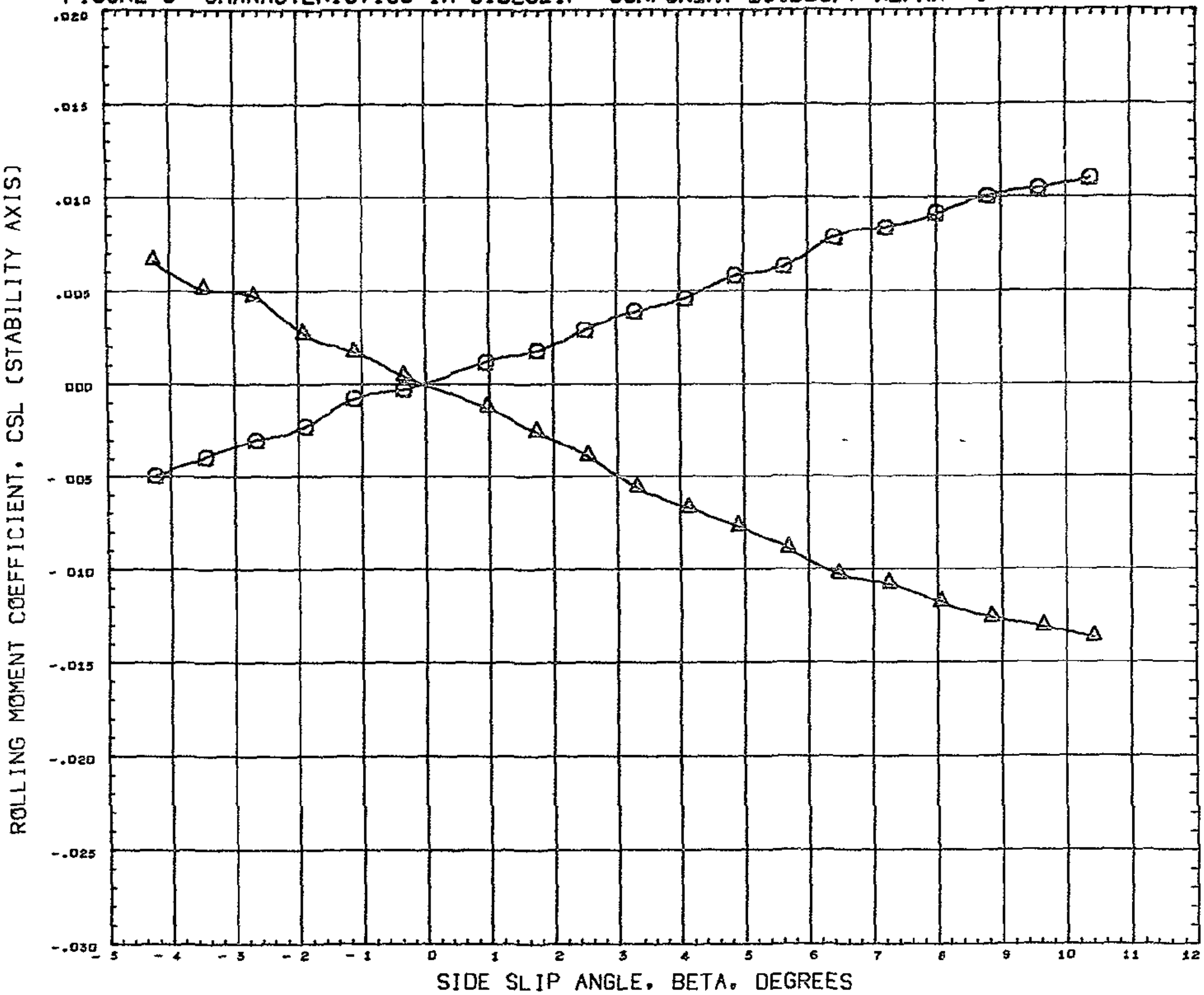


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF. ROS-NB1 B1W1	0 000	0.000	0 000	
(RCS002)	△	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0.000	0 000	0 000
(RCS009)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0 000	0.000	0 000	0 000

MACH 2 480

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	

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



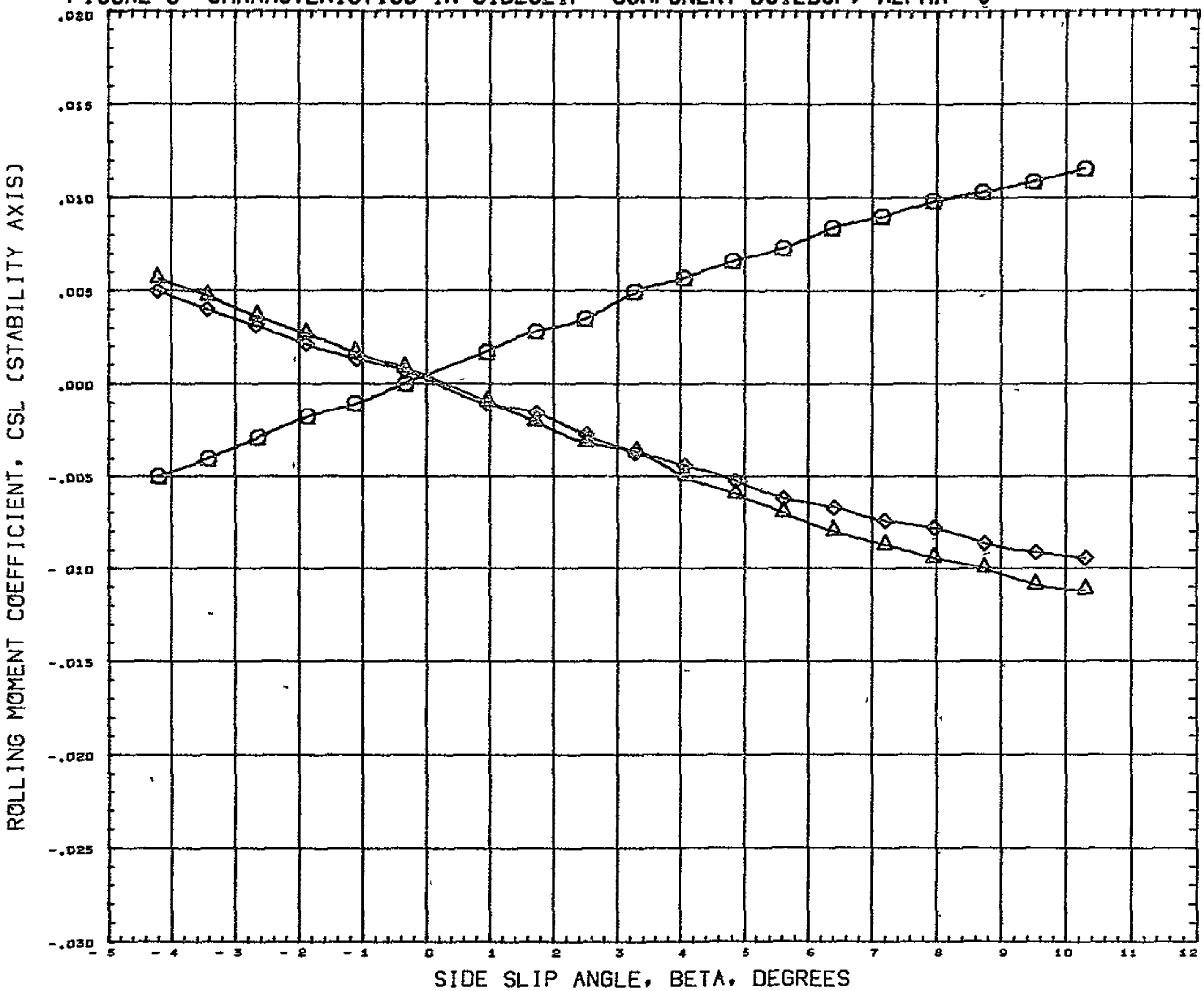
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCSD10)	○	GFST D22 CONF. ROS-NB1 B1W1	0 000	0 000	0 000	
(RCSD02)	△	GFST D22 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCSD09)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0 000	0.000	0.000	0 000

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 1 750

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

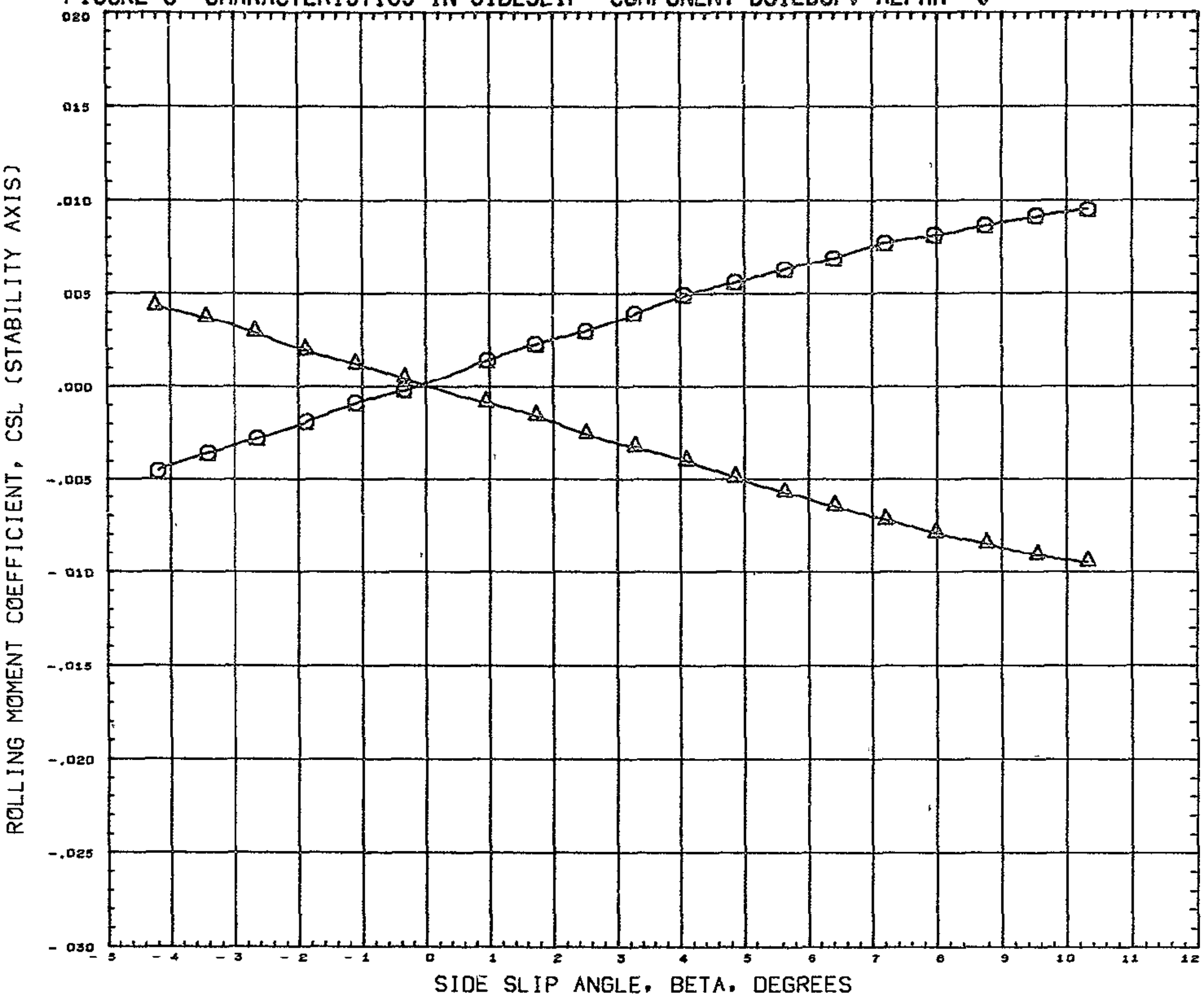


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF. ROS-NB1 B1W1	0.000	0 000	0 000	
(RCS002)	△	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS009)	◇	GFST 022 CONF. ROS-NB1 B1W1V1U1	0 000	0.000	0 000	0 000

MACH 2.020

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	

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

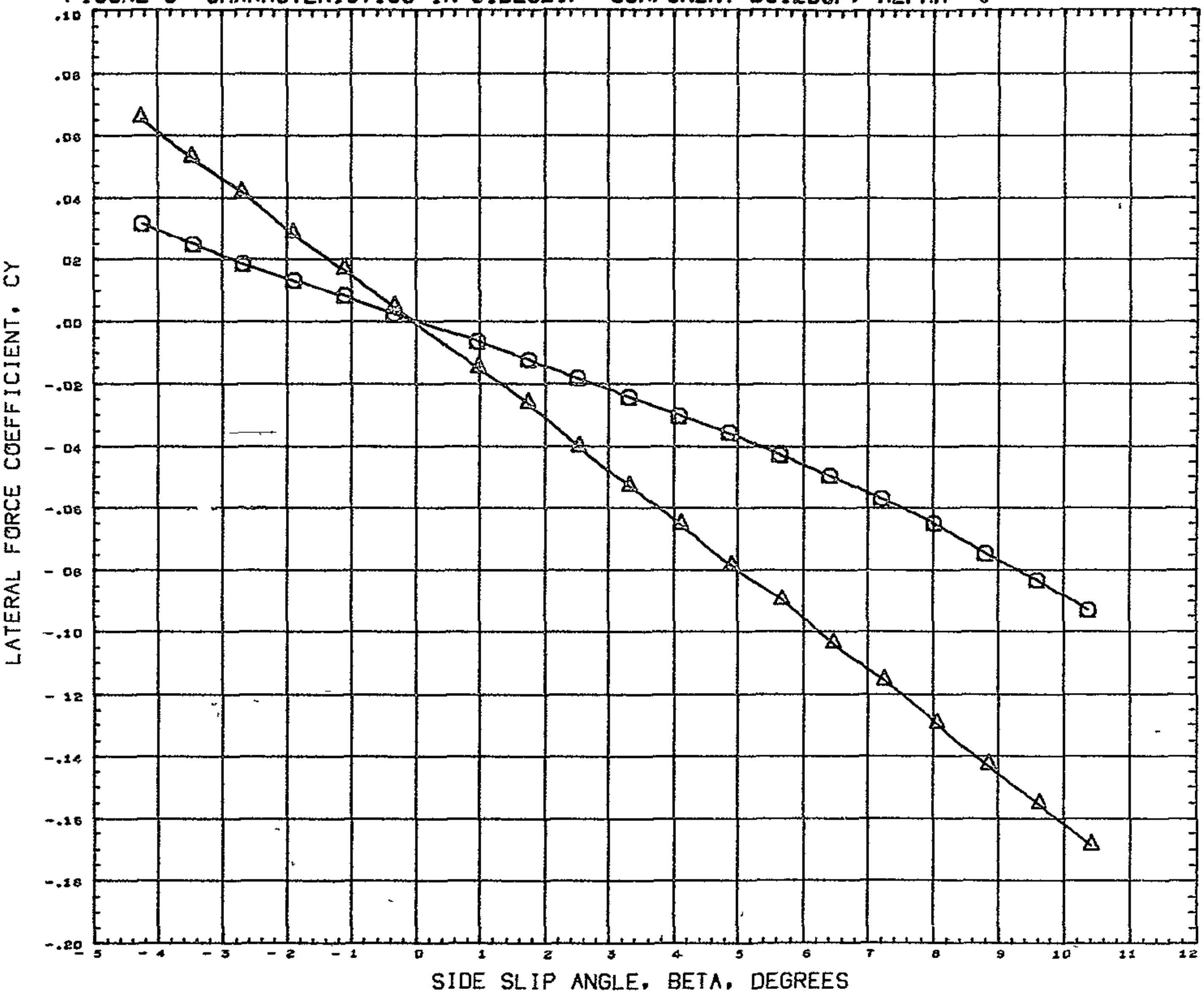


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF. ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS002)	△	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS009)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.000	0 000	0.000	0 000

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 2 480

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

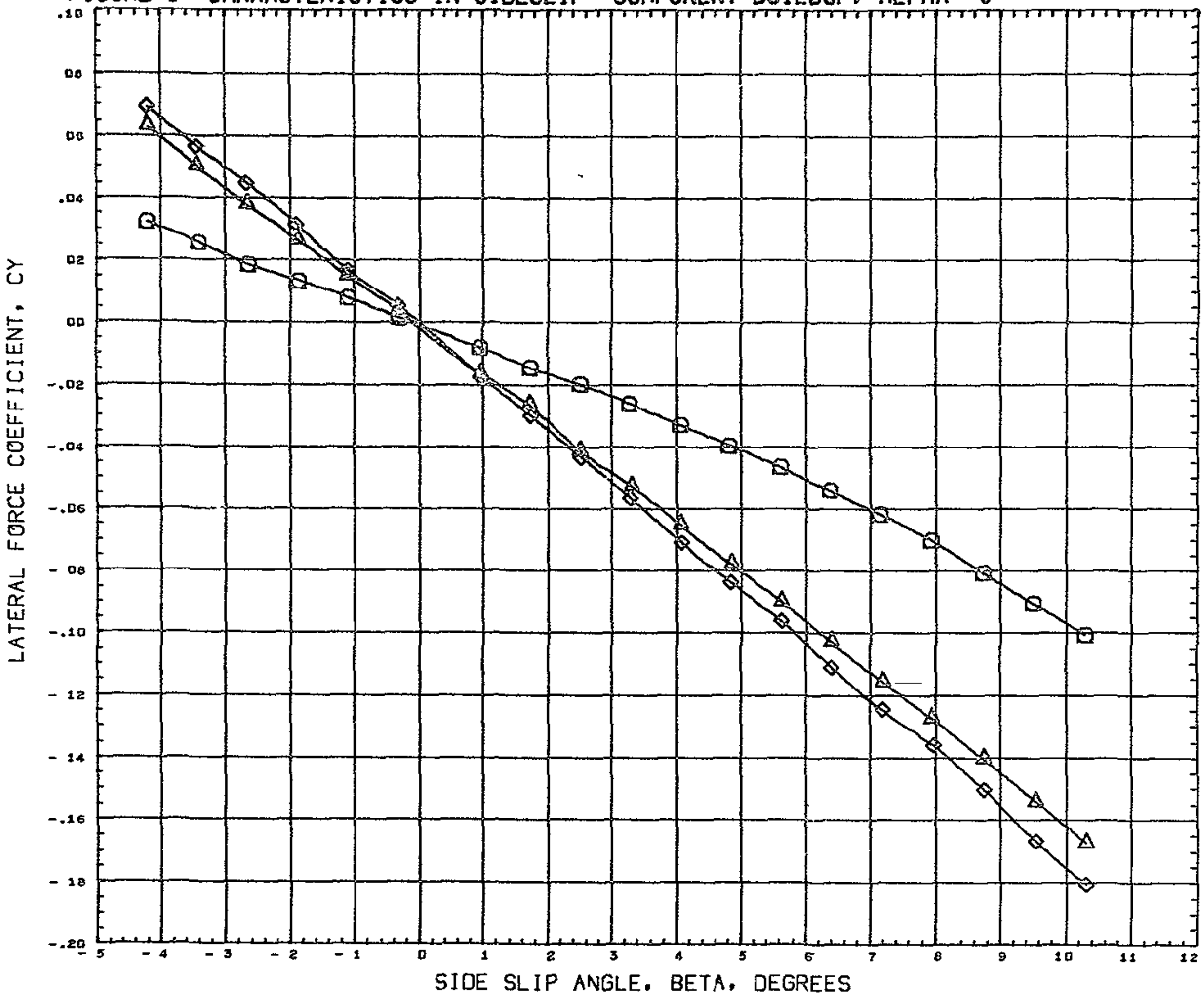


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF. ROS-NB1 B1W1	0.000	0.000	0.000	
(RCS002)	△	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS009)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0 000	0 000	0 000	0 000

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 1.750

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

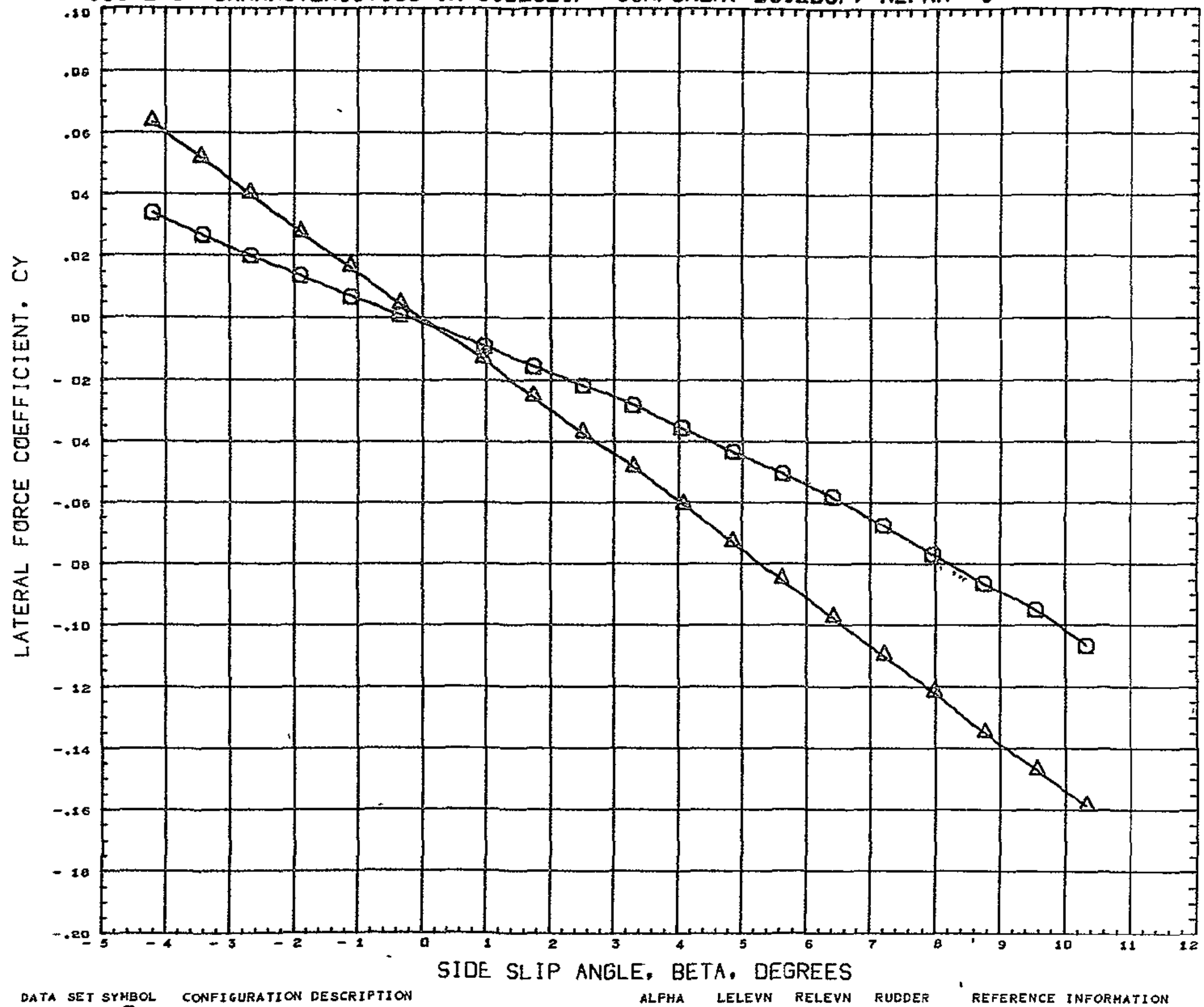


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF. ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS002)	△	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS009)	◇	GFST 022 CONF ROS-NB1 B1W1V1U1	0 000	0 000	0 000	0 000

MACH 2 020

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

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

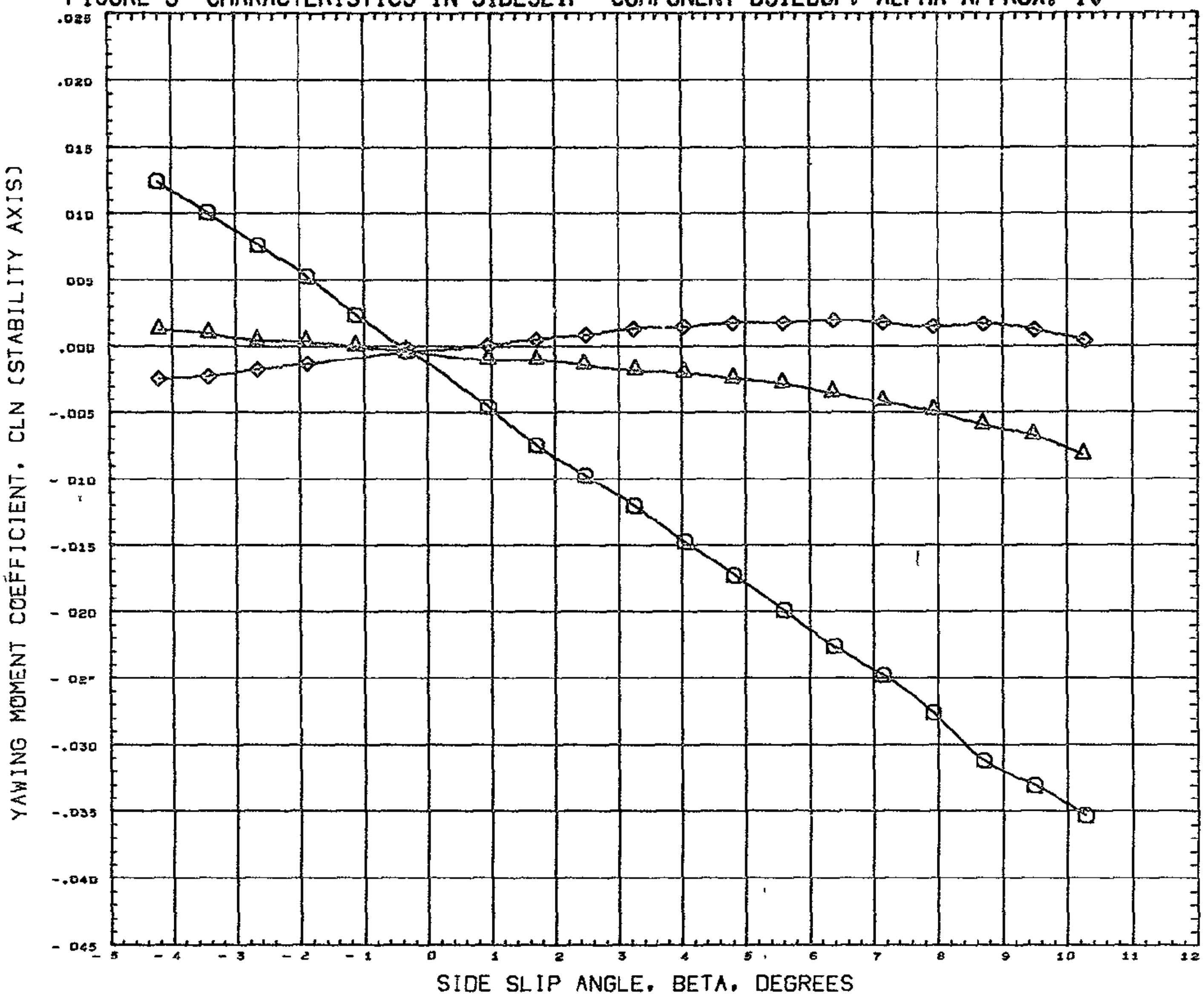


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS010)	○	GFST 022 CONF ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS002)	△	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0.000	0 000
(RCS009)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0 000	0 000	0 000	0.000

MACH 2 480

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	

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

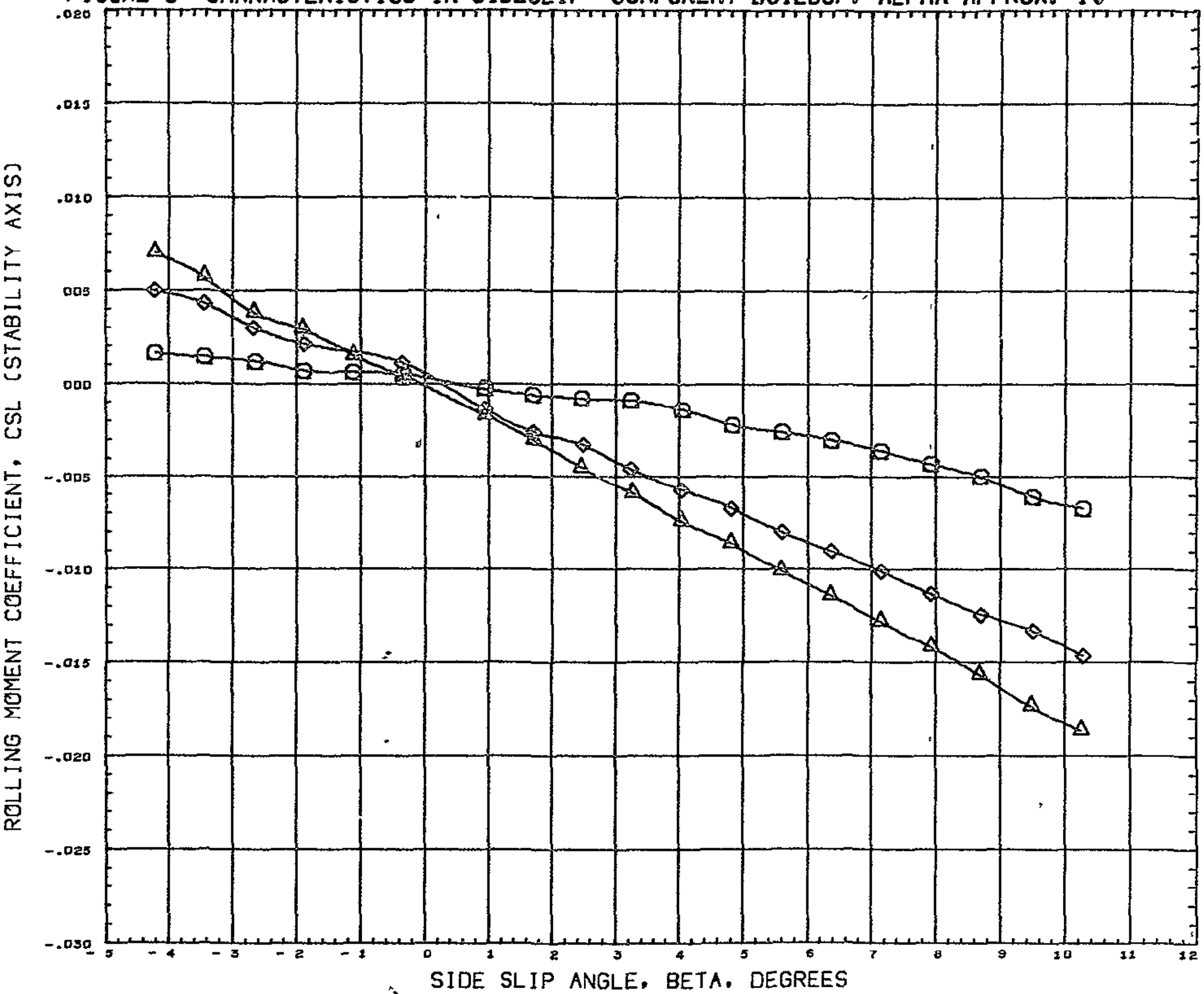


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS017)	○	GFST 022 CONF ROS-NB1 B1W1	10 000	0 000	0 000	
(RCS019)	△	GFST 022 CONF POS-NB1 B1W1V1	10.000	0.000	0 000	0 000
(RCS021)	◇	GFST 022 CONF ROS-NB1 B1W1V1U1	10 000	0 000	0 000	0 000

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6460	IN
BREF	5 8360	IN
XMRF	1485 0040	IN
YMRF	0 0000	IN
ZMRF	377 0004	IN
SCALE	0 0050	

MACH 2 020

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

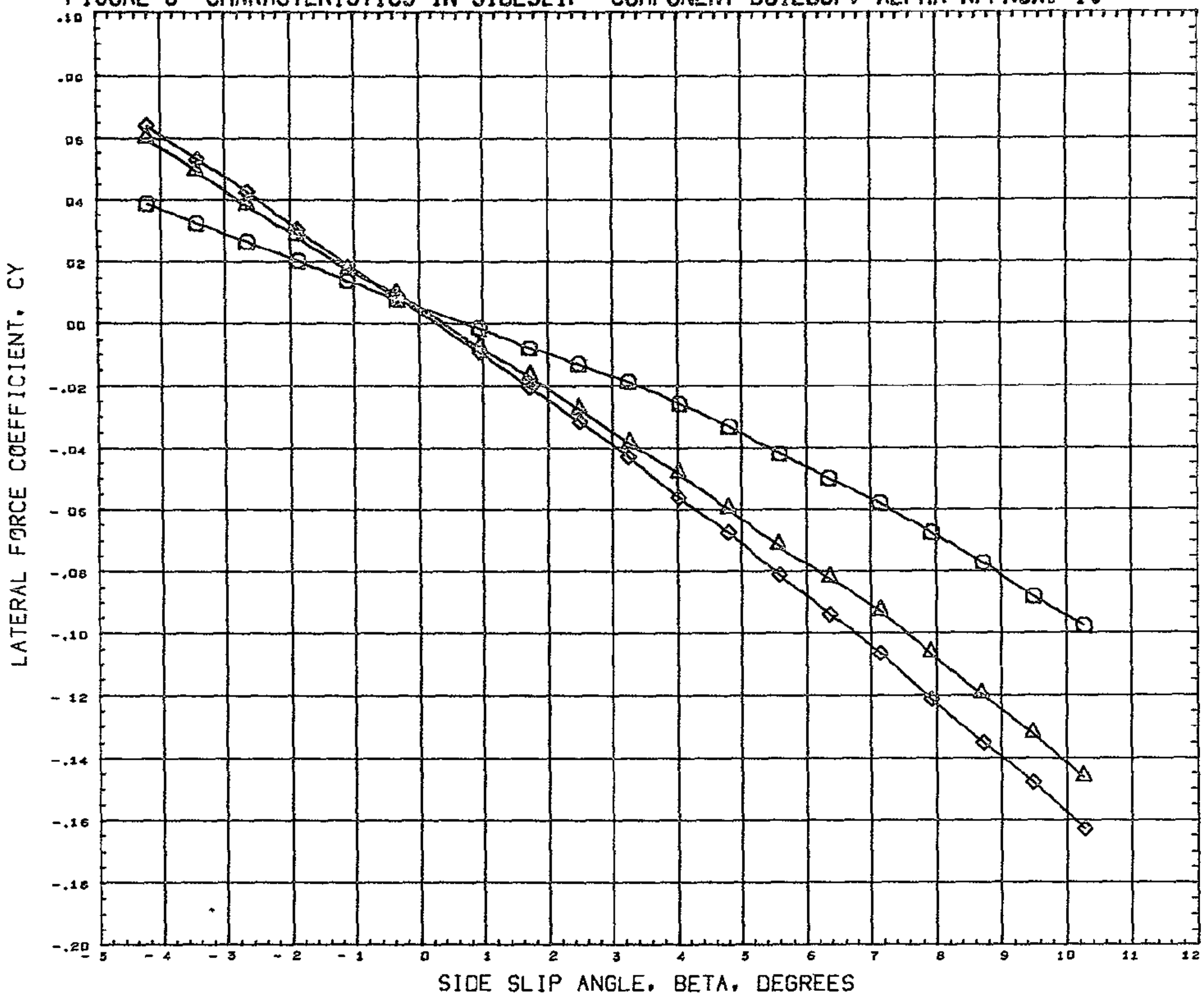


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCS017)	○	GFST 022 CONF. ROS-NB1 B1W1	10.000	0 000	0 000	
(RCS019)	△	GFST 022 CONF. ROS-NB1 B1W1V1	10 000	0 000	0 000	0 000
(RCS021)	◇	GFST 022 CONF ROS-NB1 B1W1V1U1	10 000	0 000	0 000	0 000

MACH 2 020

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	

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

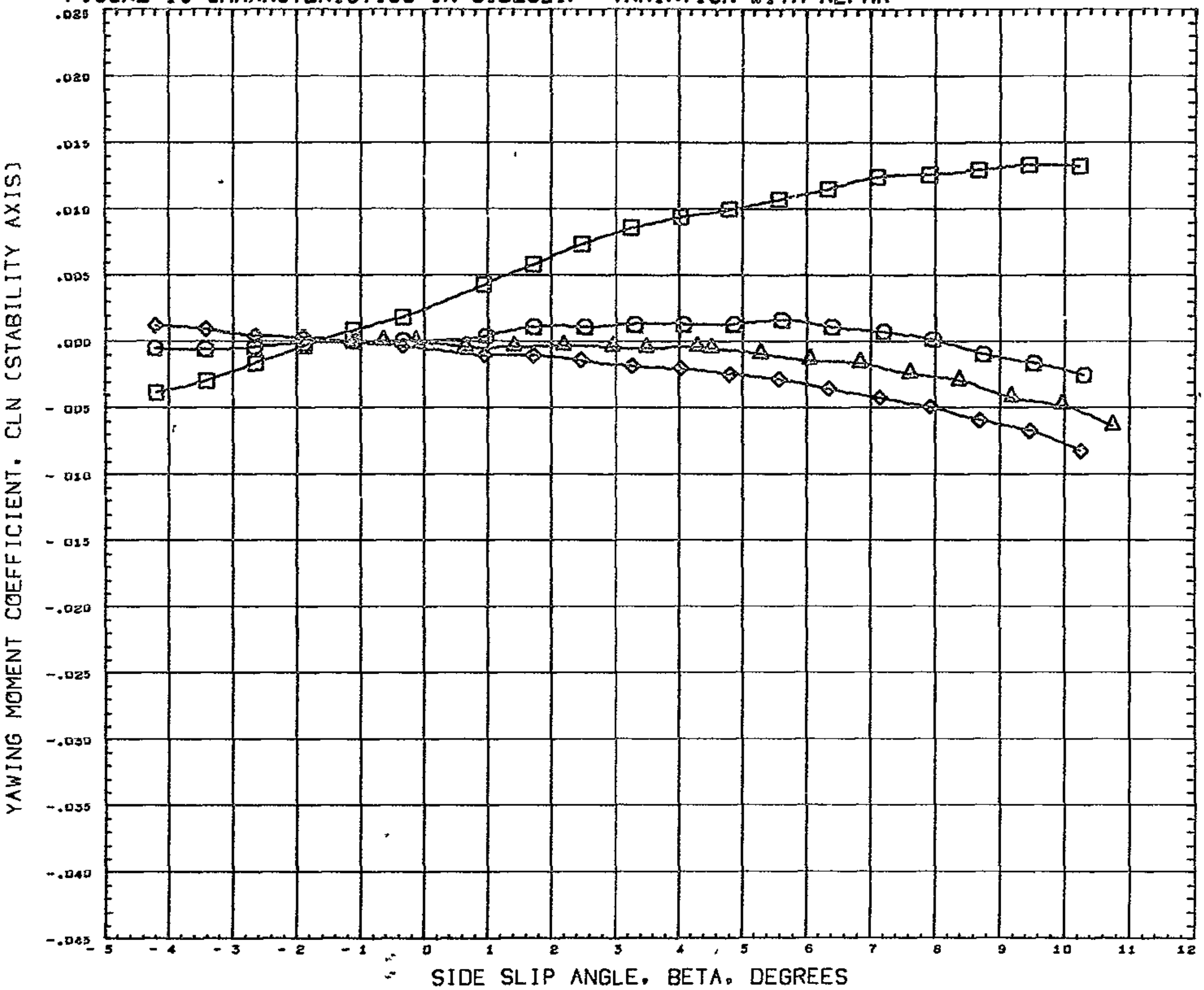


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(RCSD17)	○	GFST 022 CONF ROS-NB1 B1W1	10 000	0 000	0 000	
(RCSD19)	△	GFST 022 CONF. ROS-NB1 B1W1V1	10.000	0 000	0 000	0.000
(RCS021)	◇	GFST 022 CONF ROS-NB1 B1W1V1U1	10 000	0 000	0 000	0 000

MACH 2 020

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	

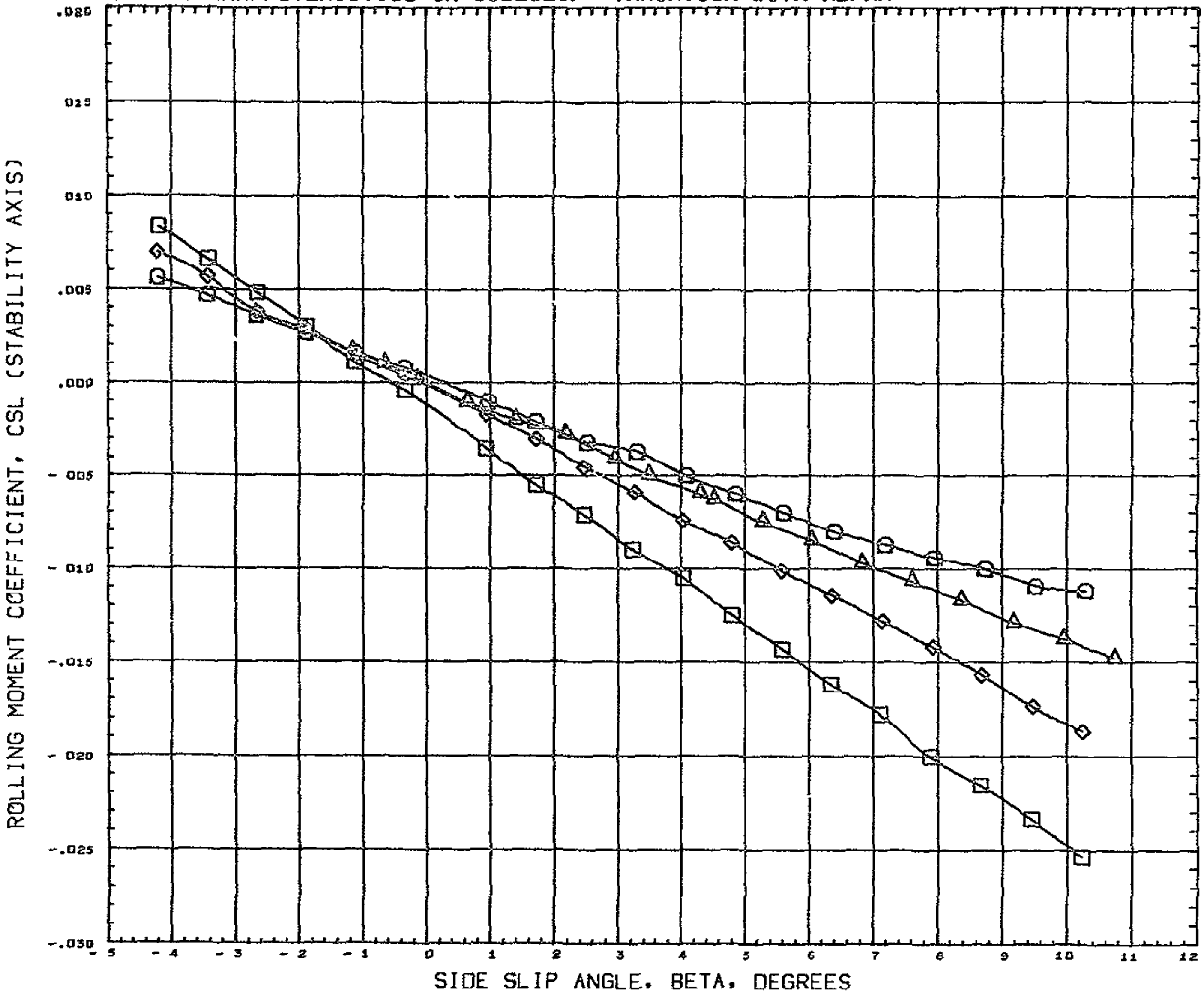
FIGURE 10 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



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 ROS-NB1 B1W1V1(-30,30)	10.000	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

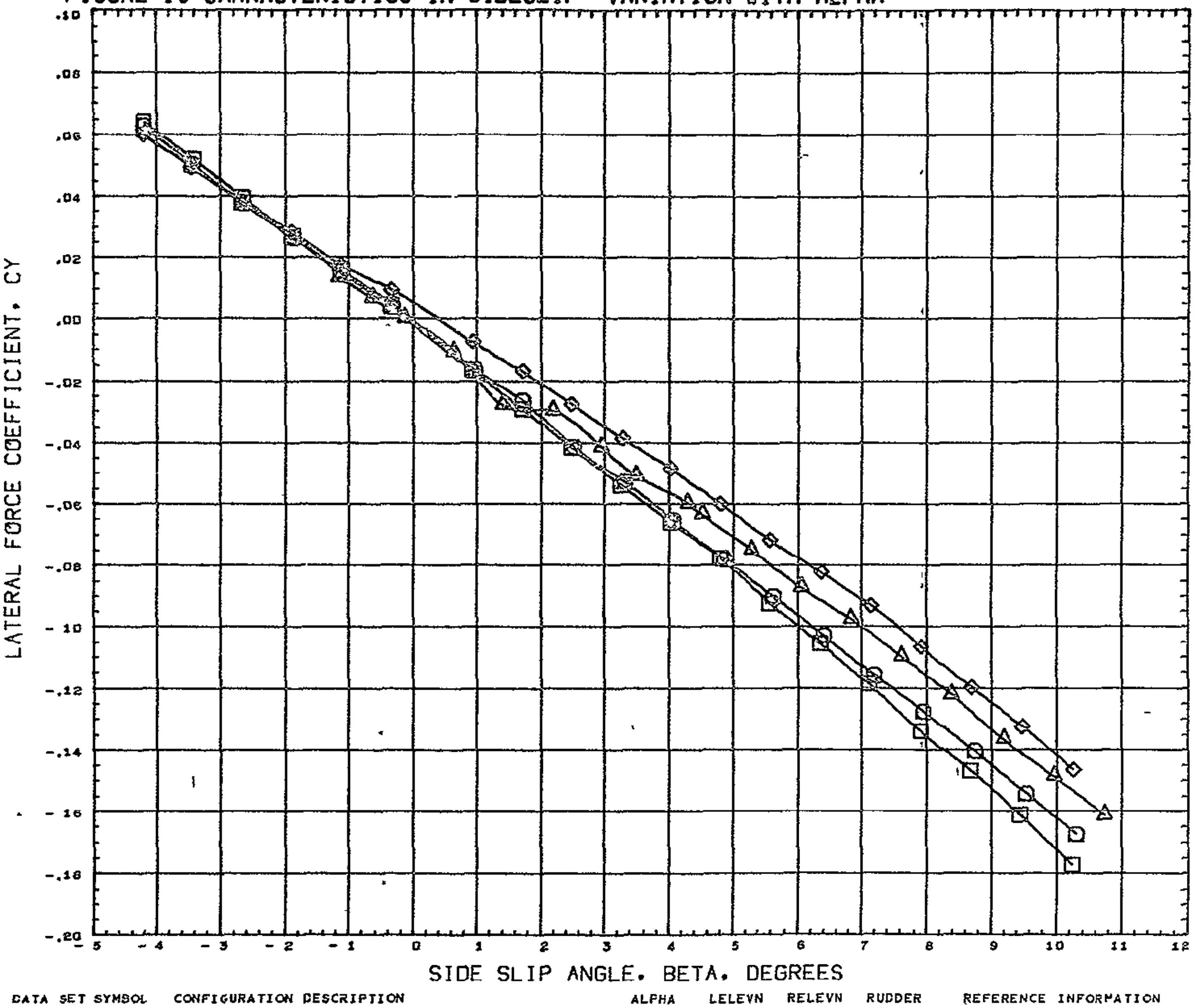


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LELEVN	RELEVN	RUDDER
(ACS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000	0.000	0.000	0.000
(RCS018)	△	GFST 022 CONF. ROS-NB1 B1W1V1	5.000	0.000	0.000	0.000
(RCS019)	◇	GFST 022 CONF ROS-NB1 B1W1V1	10.000	0.000	0.000	0.000
(RCS020)	□	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	10.000	0.000	0.000	

MACH 2.020

REFERENCE INFORMATION		
SREF	20.6890	SQ IN
LREF	9.6480	IN
BREF	5.0360	IN
XMRP	1485.0040	IN
YMRP	0.0000	IN
ZMRP	377.0004	IN
SCALE	0.0050	

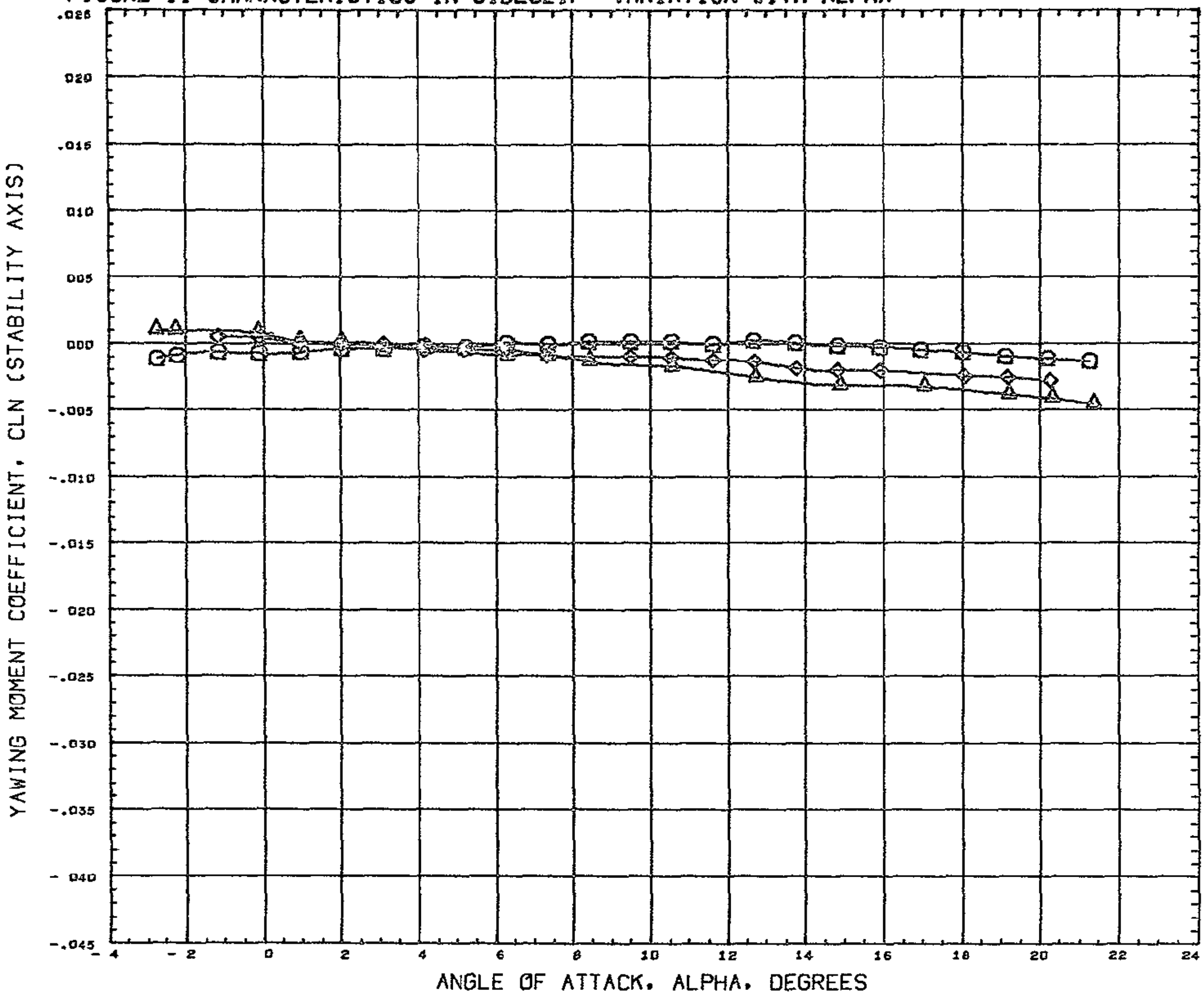
FIGURE 10 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



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 ROS-NB1 B1W1V1(-30,30)	10 000	0 000	0 000		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

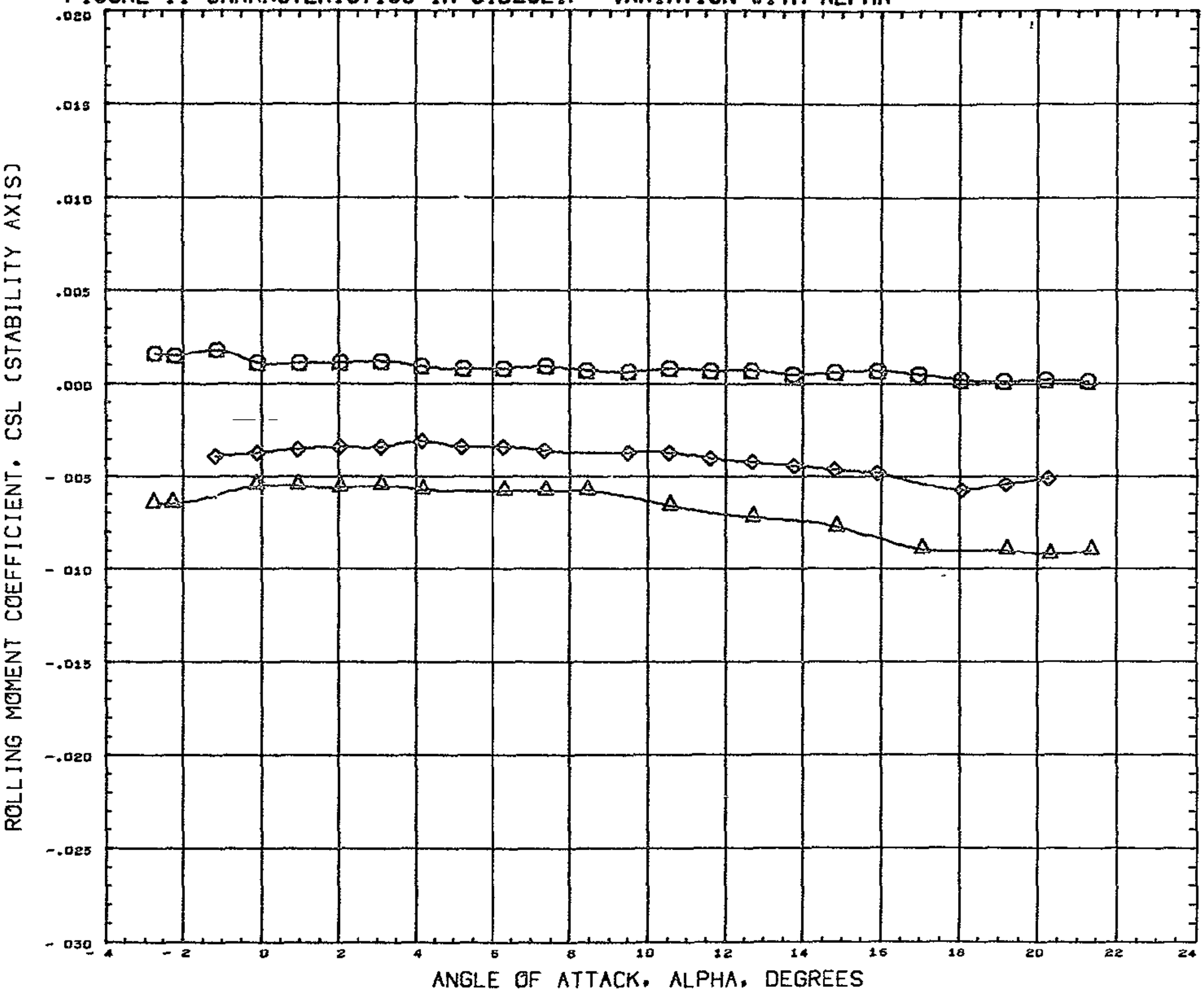


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS014)	△	GFST 022 CONF ROS-NB1 B1W1V1	4 200	0 000	0 000	0 000
(RCS015)	◇	GFST 022 CONF ROS-NB1 B1W1V1	2 600	0 000	0 000	0 000

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8360	IN
XMRF	1485 0040	IN
YMRF	0 0000	IN
ZMRF	377 0004	IN
SCALE	0 0050	

MACH 2 020

FIGURE 11 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA

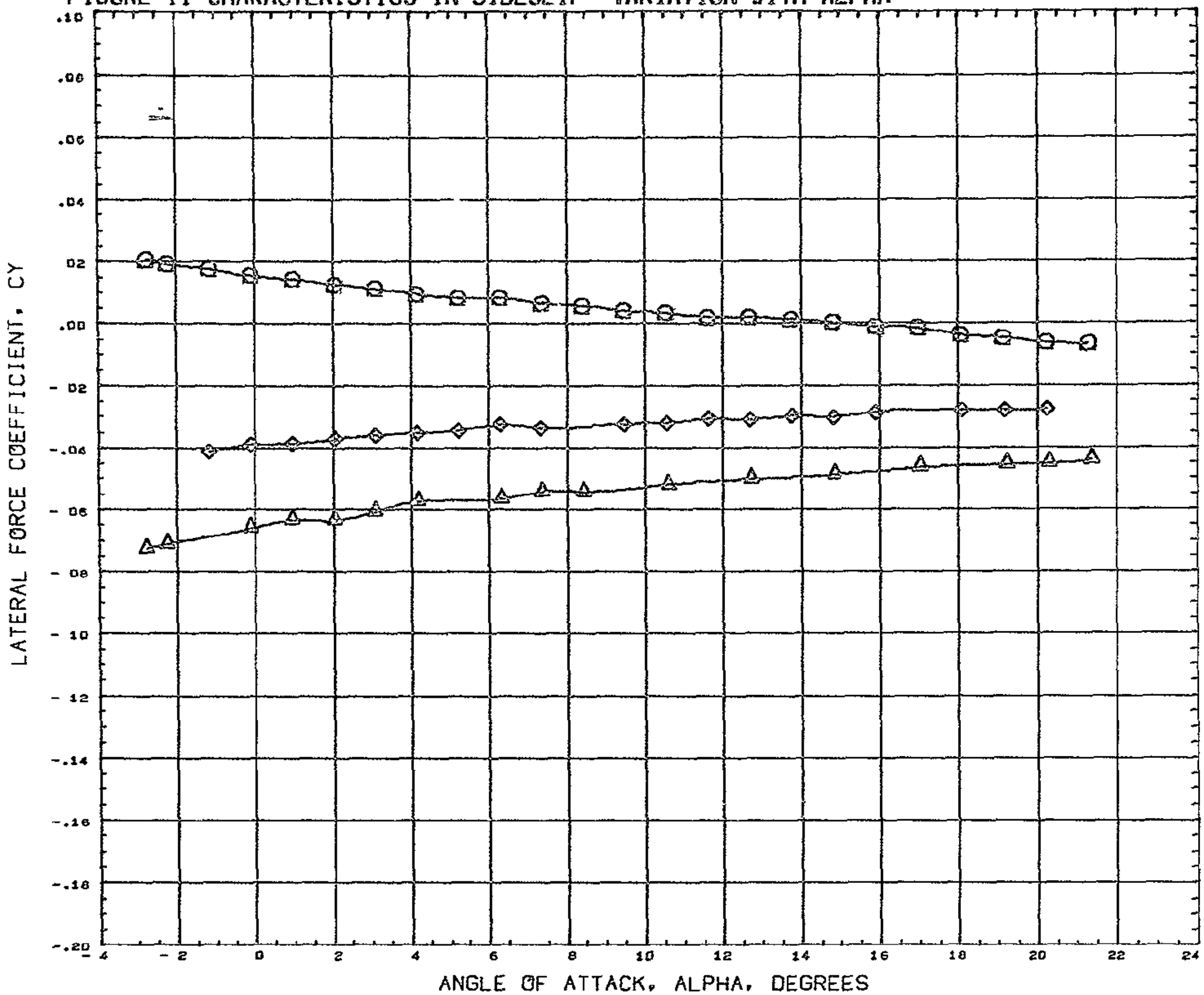


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS014)	△	GFST 022 CONF ROS-NB1 B1W1V1	4 200	0 000	0 000	0 000
(RCS015)	◇	GFST 022 CONF. ROS-NB1 B1W1V1	2 600	0 000	0 000	0 000

MACH 2 020

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

FIGURE 11 CHARACTERISTICS IN SIDESLIP- VARIATION WITH ALPHA



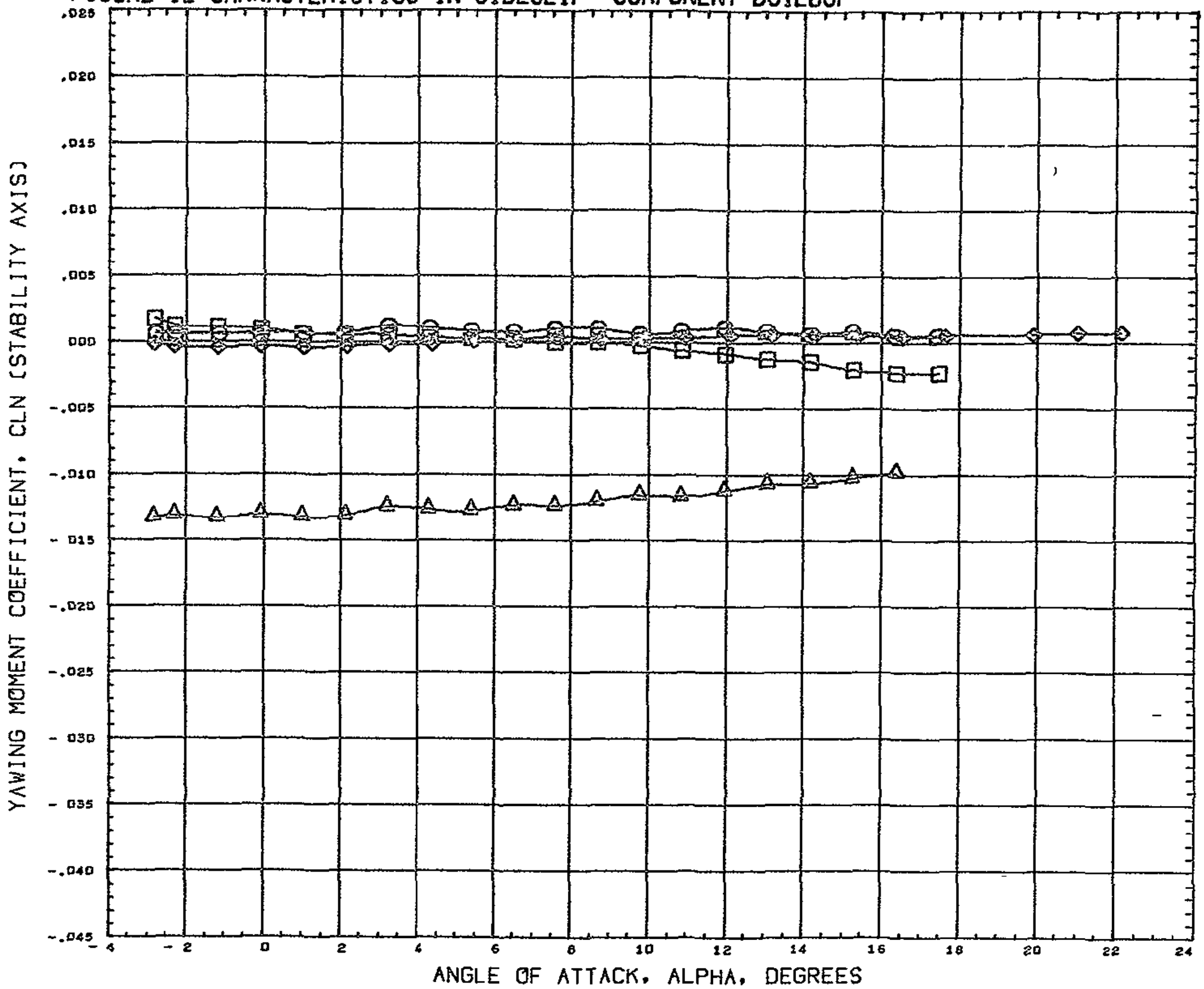
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(ACS003)	○	GFST 022 CONF ROS-N01 B1W1V1	0 000	0.000	0 000	0.000
(RCS014)	△	GFST 022 CONF. ROS-N01 B1W1V1	4 200	0 000	0 000	0 000
(RCS015)	◇	GFST 022 CONF ROS-N01 B1W1V1	2 600	0 000	0 000	0 000

MACH 2 020

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	

FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



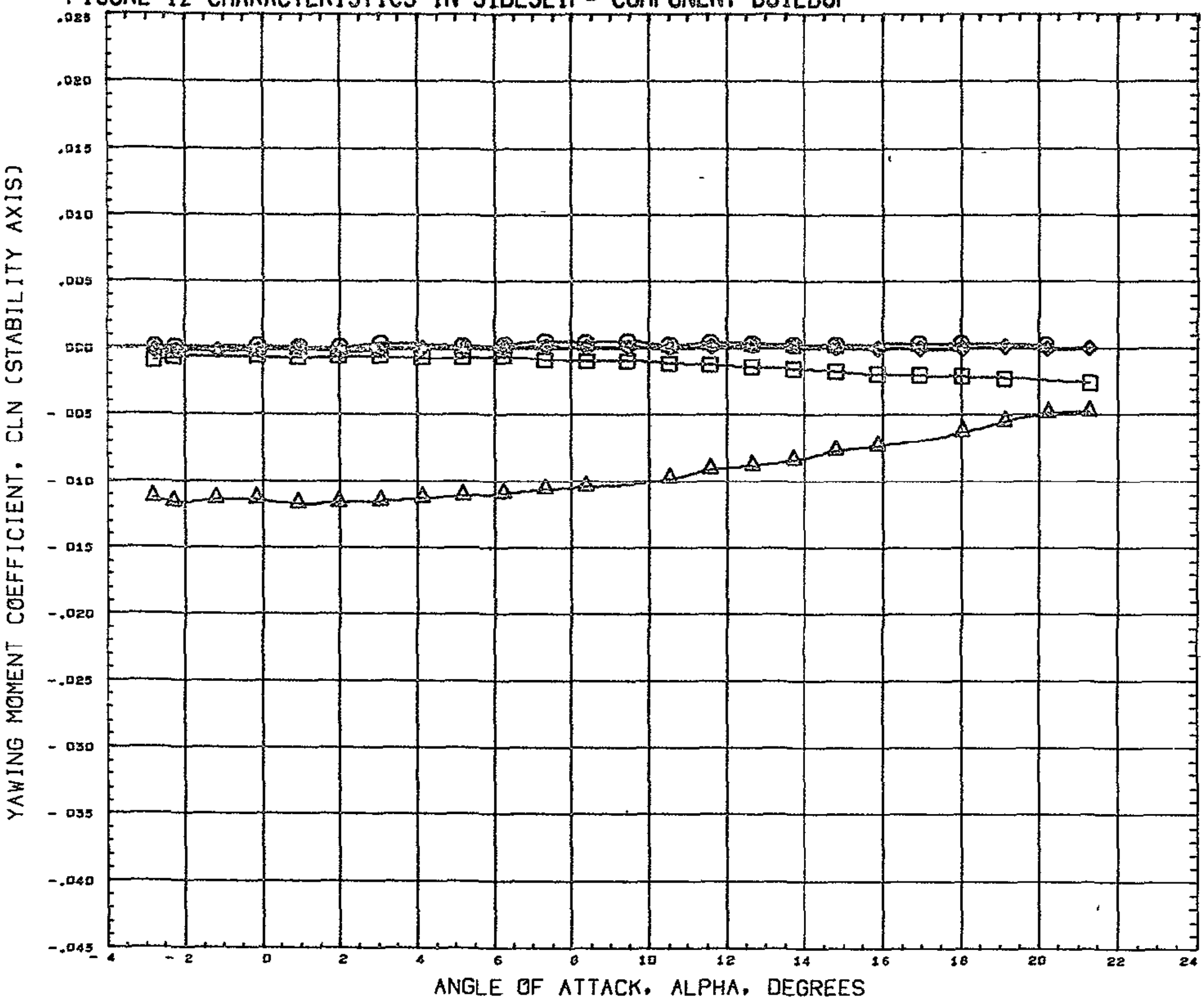
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS038)	○	GFST 022 CONF ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS034)	△	GFST 022 CONF ROS-NB1 B1W1	3 400	0 000	0 000	
(CCS003)	◇	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS035)	□	GFST 022 CONF ROS-NB1 B1W1V1	3 400	0.000	0 000	0 000

MACH 1 750

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6460	IN
BREF	5 8380	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP

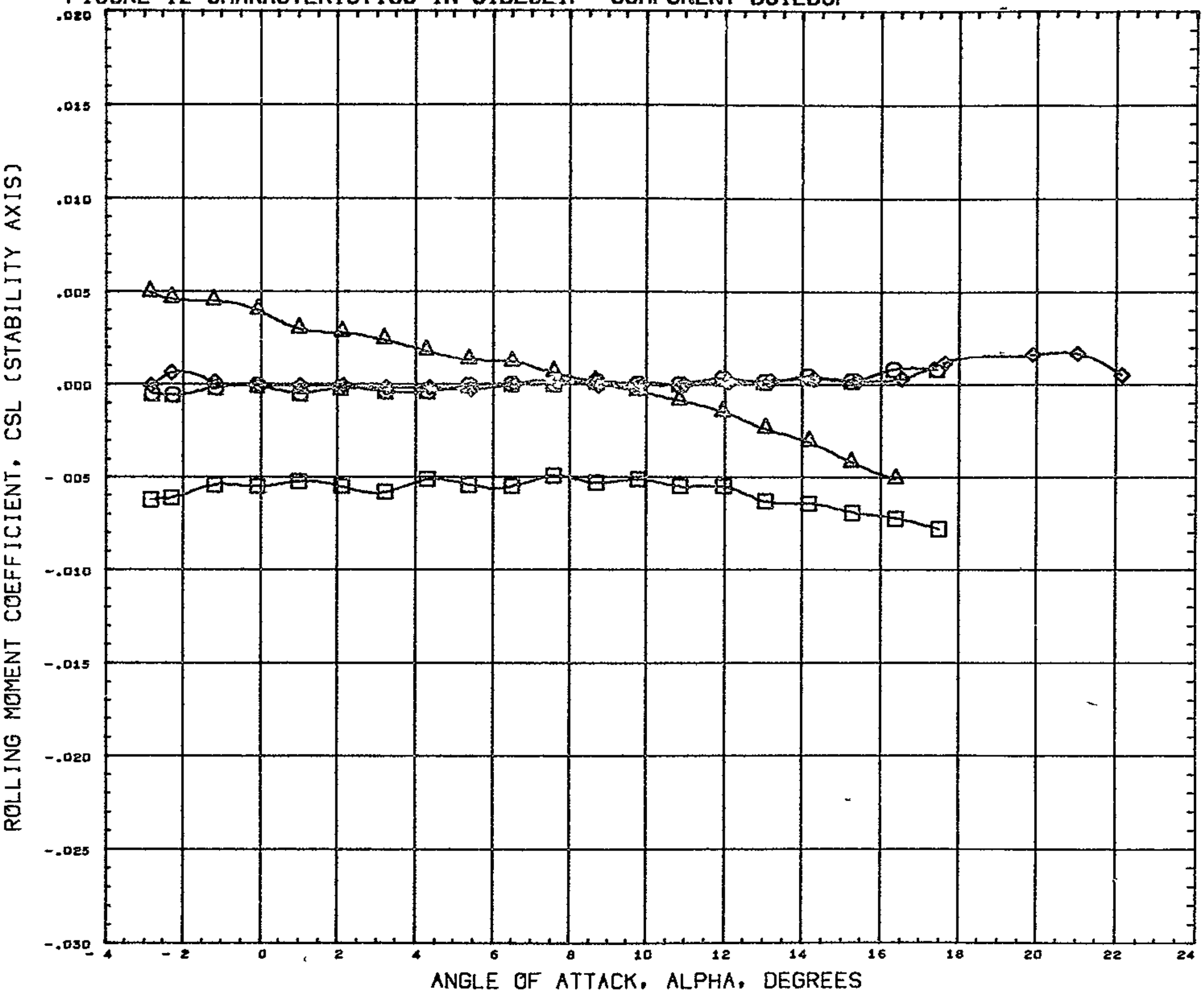


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS038)	○	GFST 022 CONF. ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS034)	△	GFST 022 CONF ROS-NB1 B1W1	3 400	0 000	0 000	
(CCS003)	◇	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS035)	□	GFST 022 CONF ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000

MACH 2 480

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	

FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



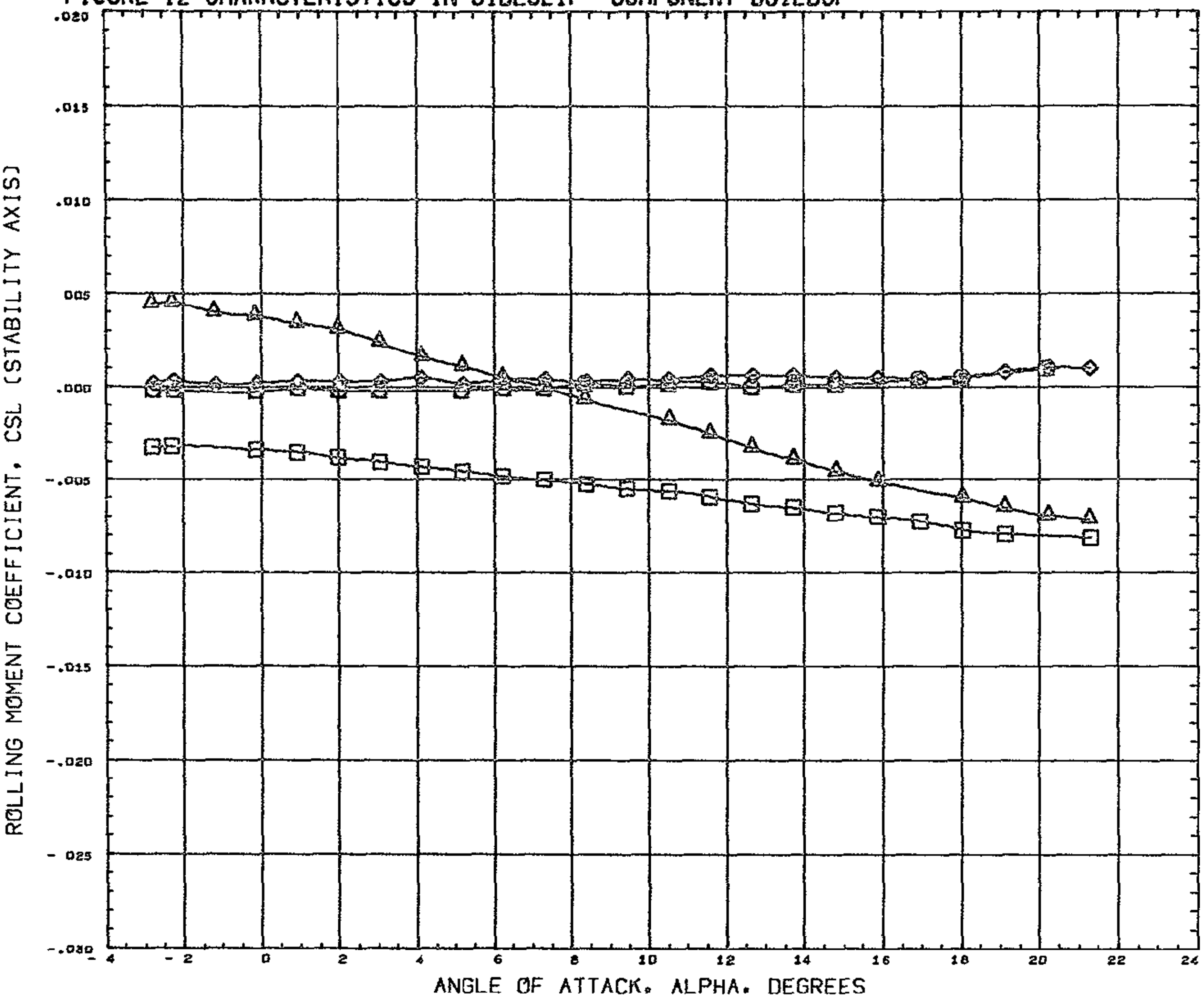
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS038)	○	GFST 022 CONF ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS034)	△	GFST 022 CONF. ROS-NB1 B1W1	3.400	0 000	0 000	
(CCS003)	◇	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0.000	0.000	0.000
(RCS035)	□	GFST 022 CONF. ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000

MACH 1 750

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8380	IN
XMRP	1405 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP

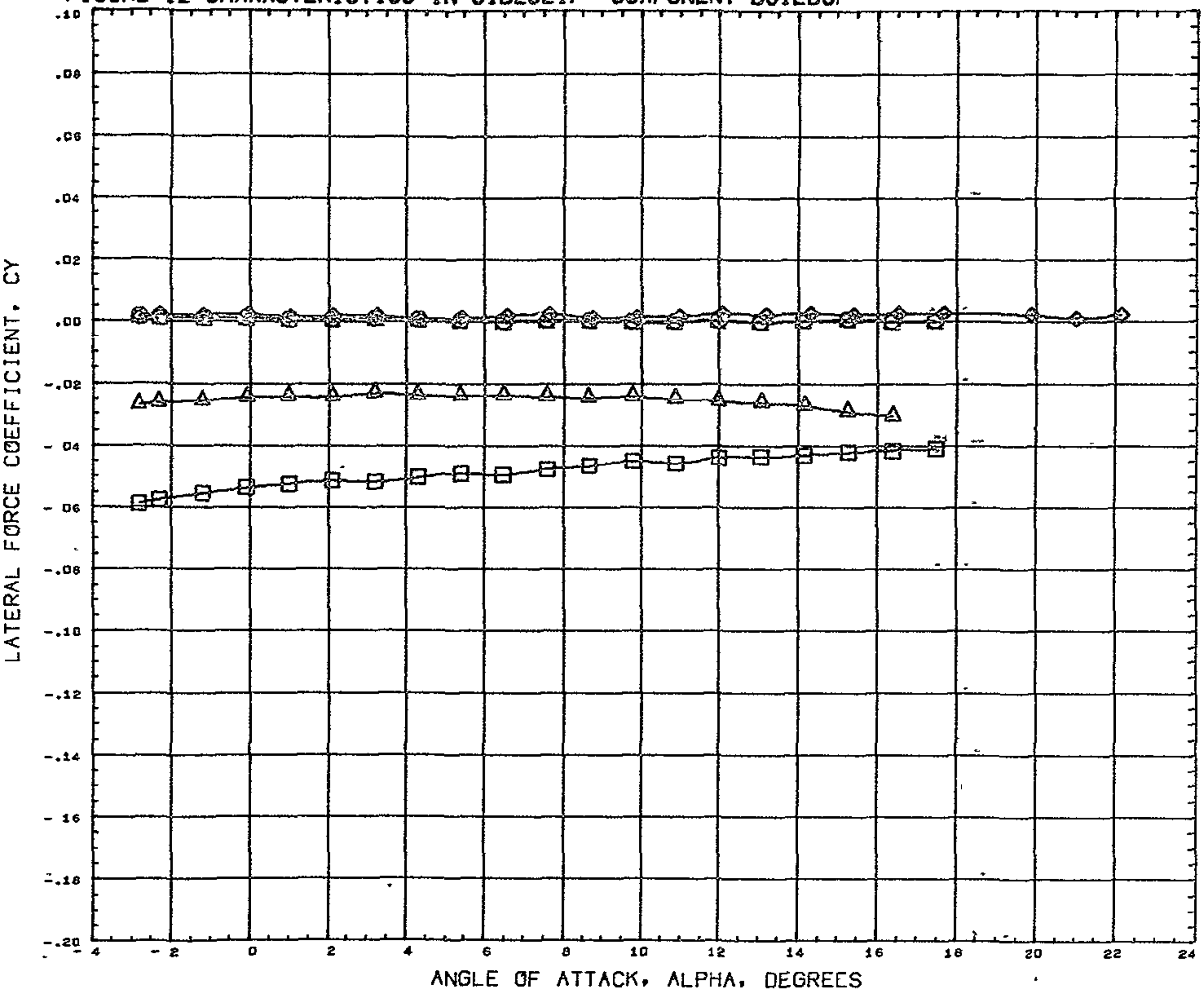


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS038)	○	GFST 022 CONF ROS-NB1 B1W1	0 000	0.000	0 000	
(RCS034)	△	GFST 022 CONF ROS-NB1 B1W1	3.400	0.000	0 000	
(CCS003)	◇	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0.000	0 000	0 000
(RCS035)	□	GFST 022 CONF. ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000

MACH 2 480

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	

FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP



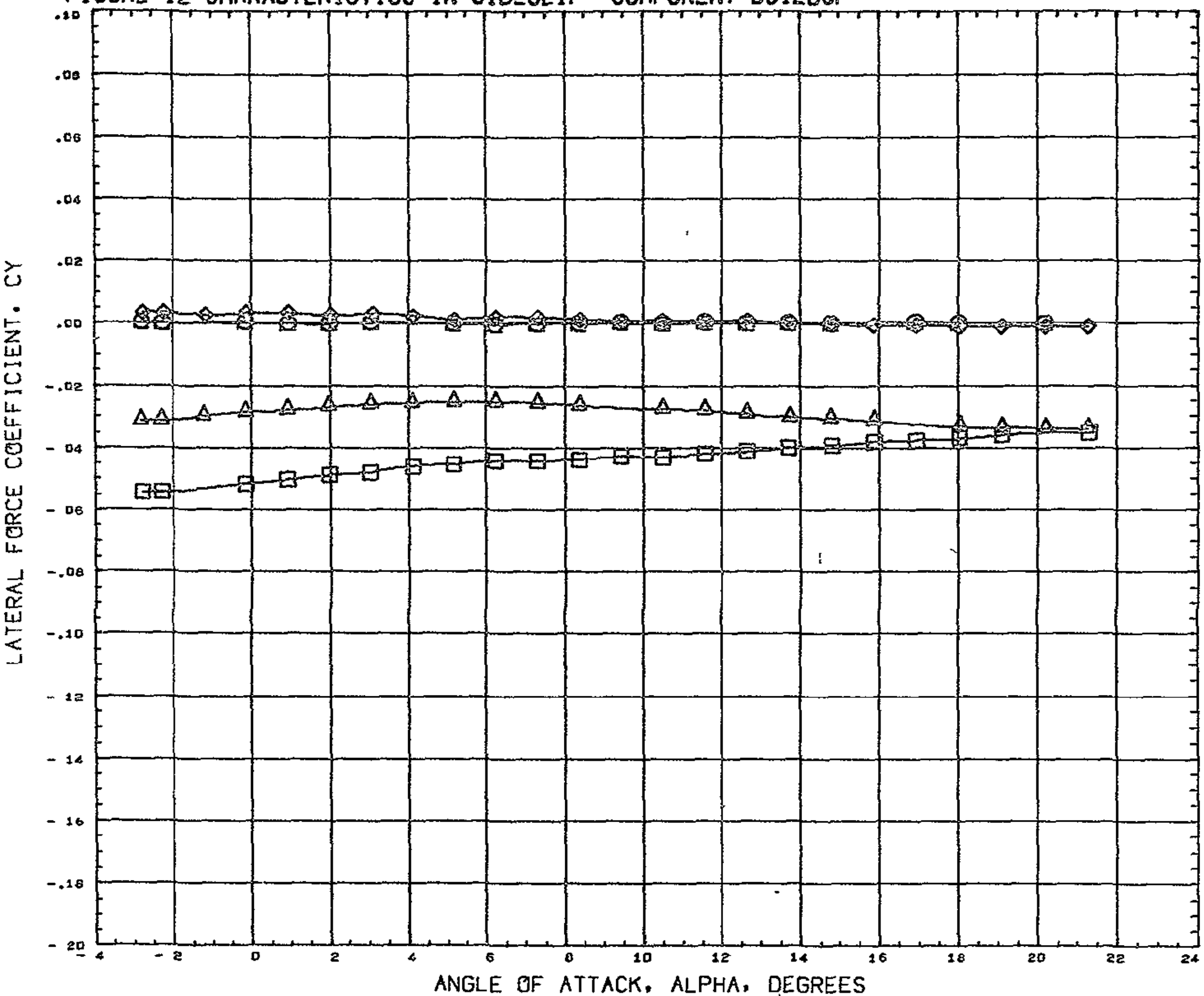
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCSD38)	○	GFST 022 CONF. ROS-NB1 B1W1	0 000	0.000	0 000	
(RCSD34)	△	GFST 022 CONF ROS-NB1 B1W1	3 400	0 000	0 000	
(CCS003)	◇	GFST 022 CONF ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCSD35)	□	GFST 022 CONF ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000

MACH 1.750

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8360	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

FIGURE 12 CHARACTERISTICS IN SIDESLIP- COMPONENT BUILDUP

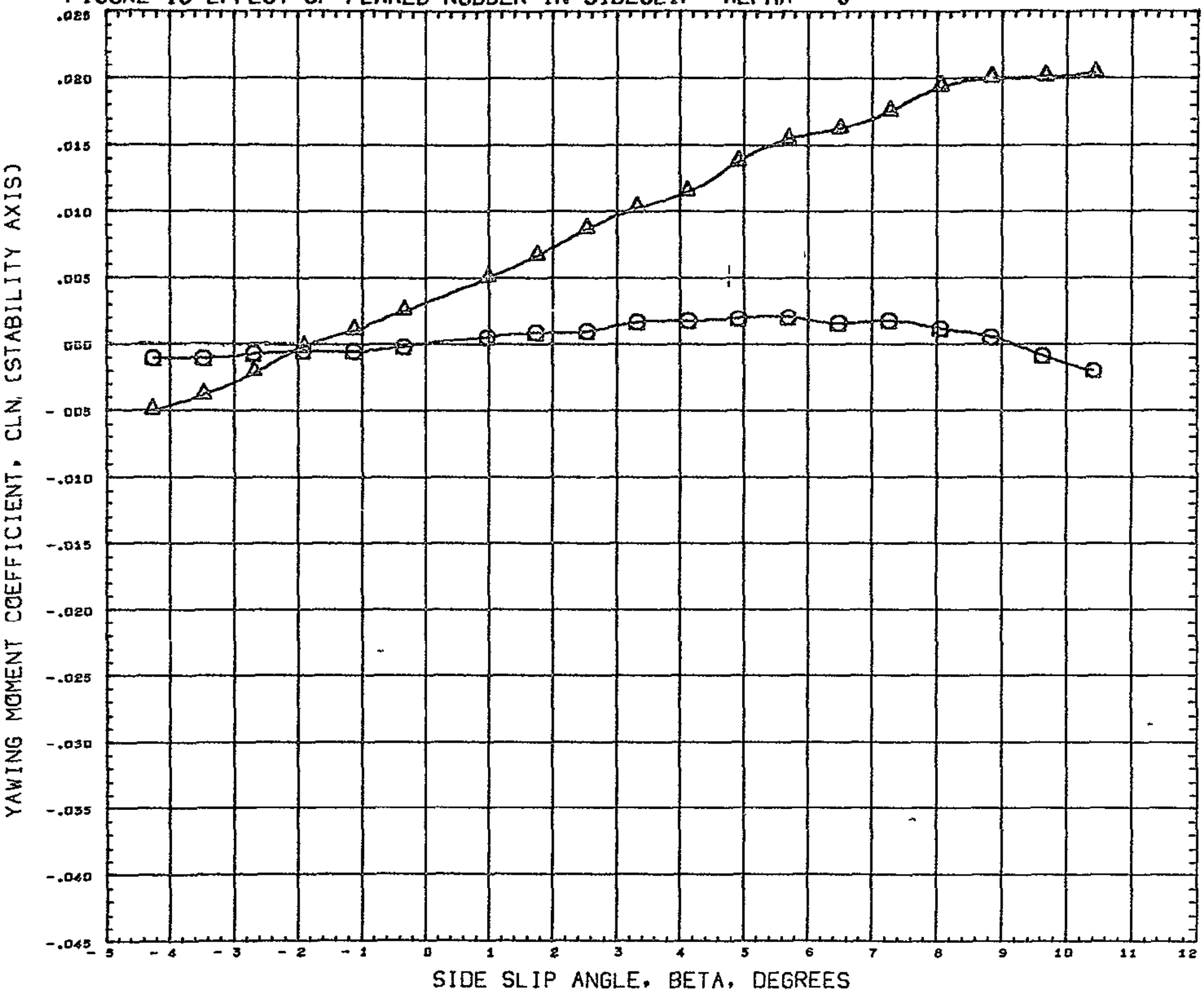


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LELEVN	RELEVN	RUDDER
(RCS038)	○	GFST 022 CONF ROS-NB1 B1W1	0 000	0 000	0 000	
(RCS034)	△	GFST 022 CONF ROS-NB1 B1W1	3.400	0.000	0 000	
(CCS003)	◇	GFST 022 CONF. ROS-NB1 B1W1V1	0 000	0 000	0 000	0 000
(RCS035)	□	GFST 022 CONF. ROS-NB1 B1W1V1	3 400	0 000	0 000	0 000

MACH 2 480

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8380	IN
XMRP	1465 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

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



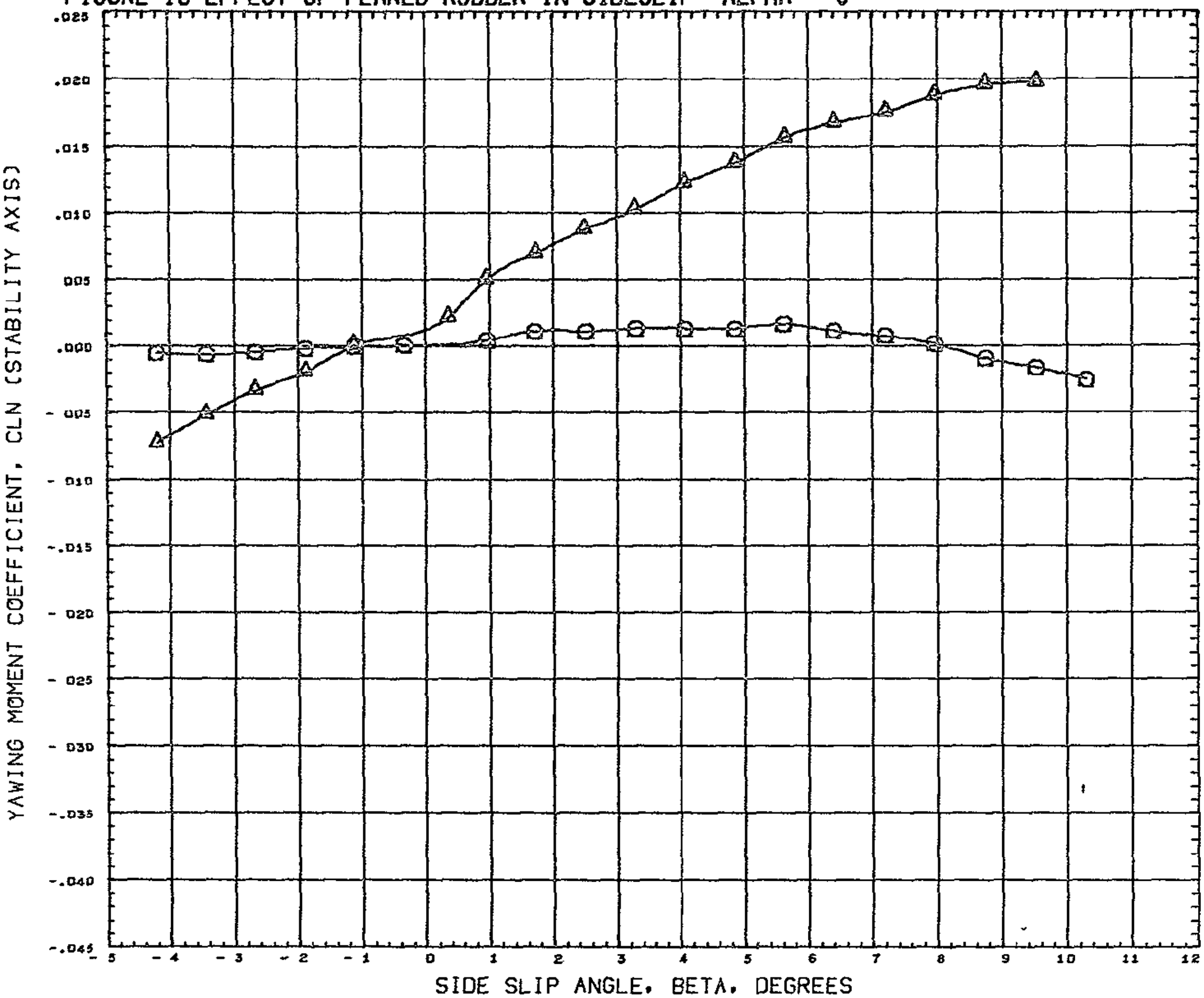
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	△	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	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



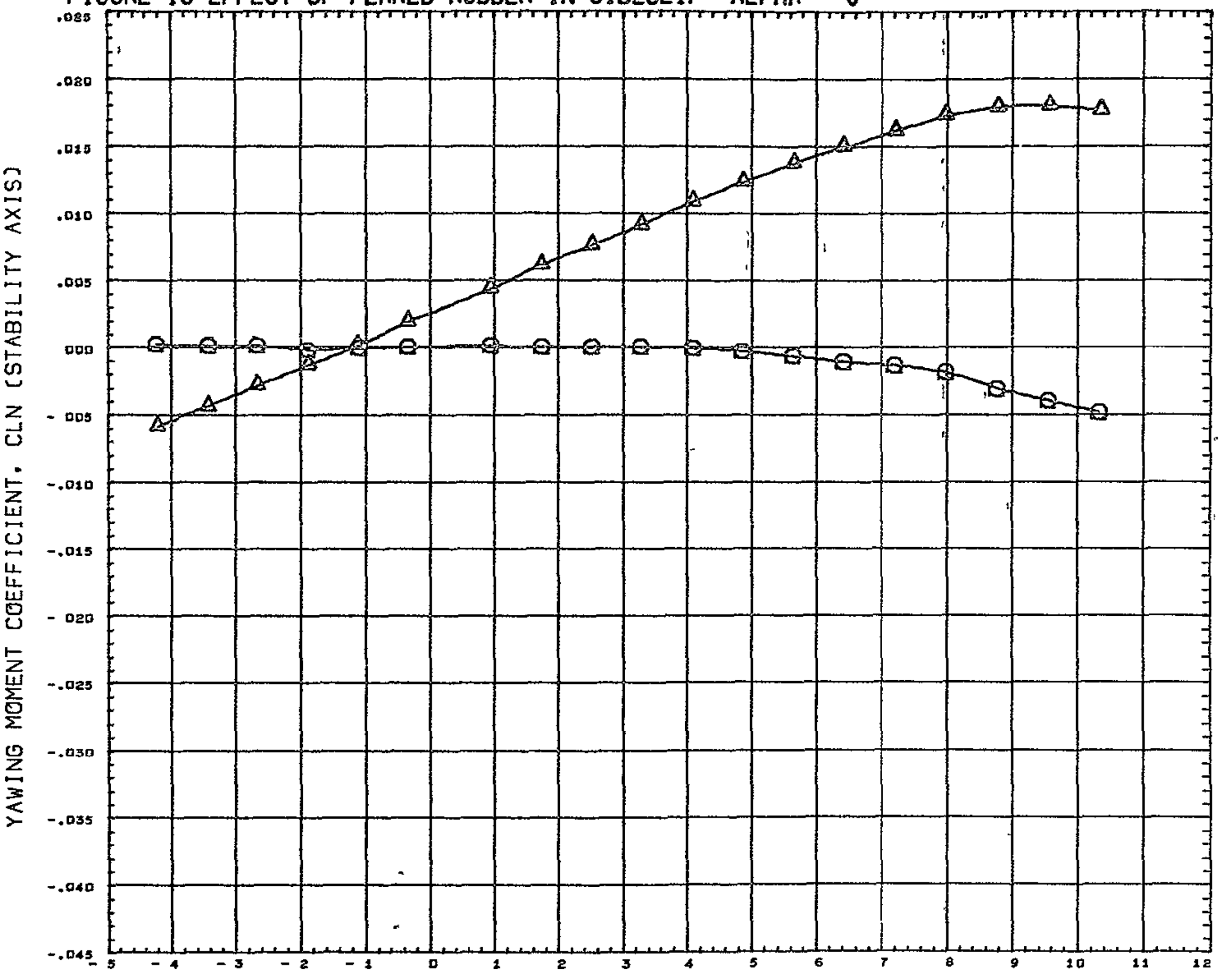
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

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 2 020

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

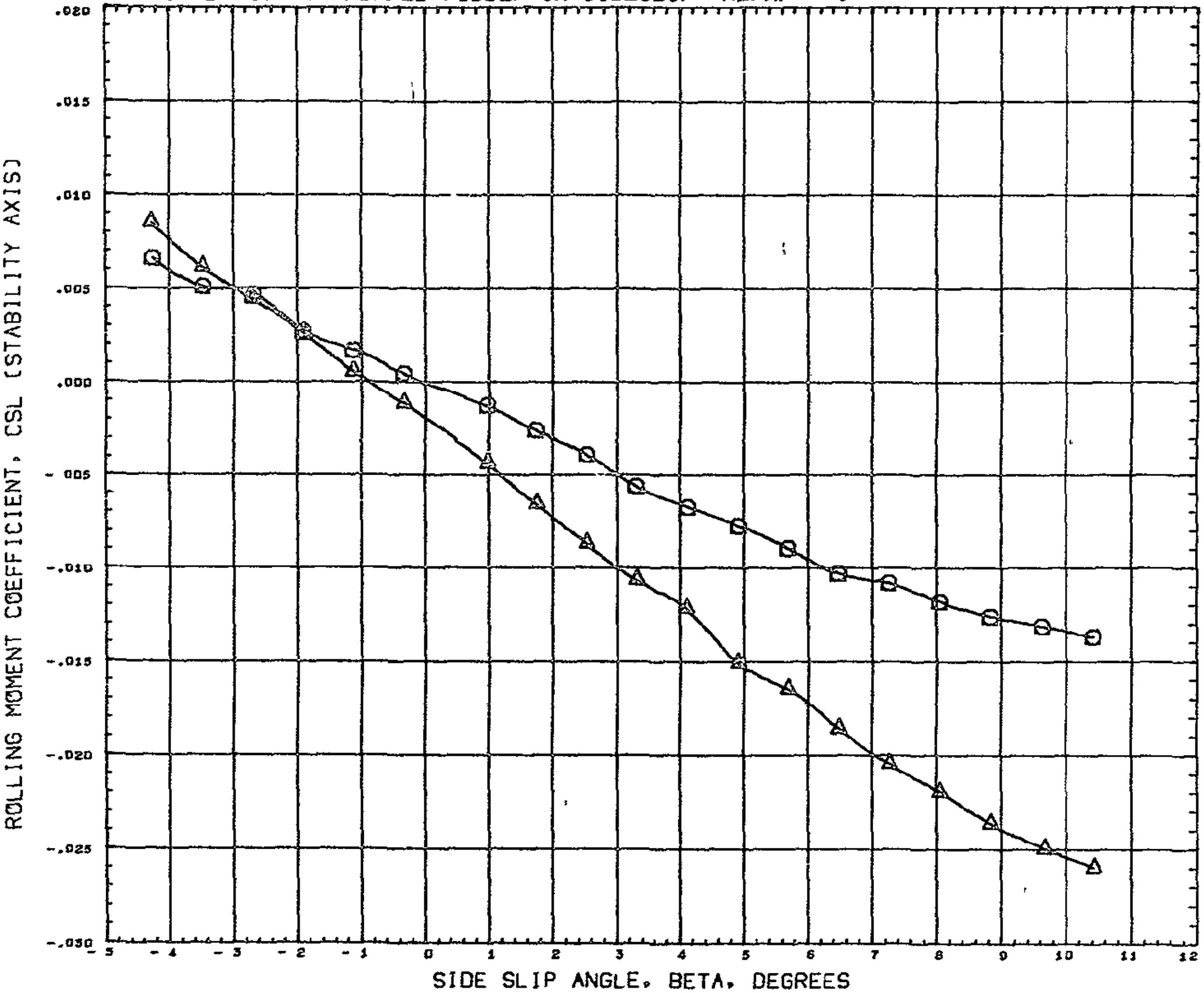


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	O	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	Δ	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

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 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0



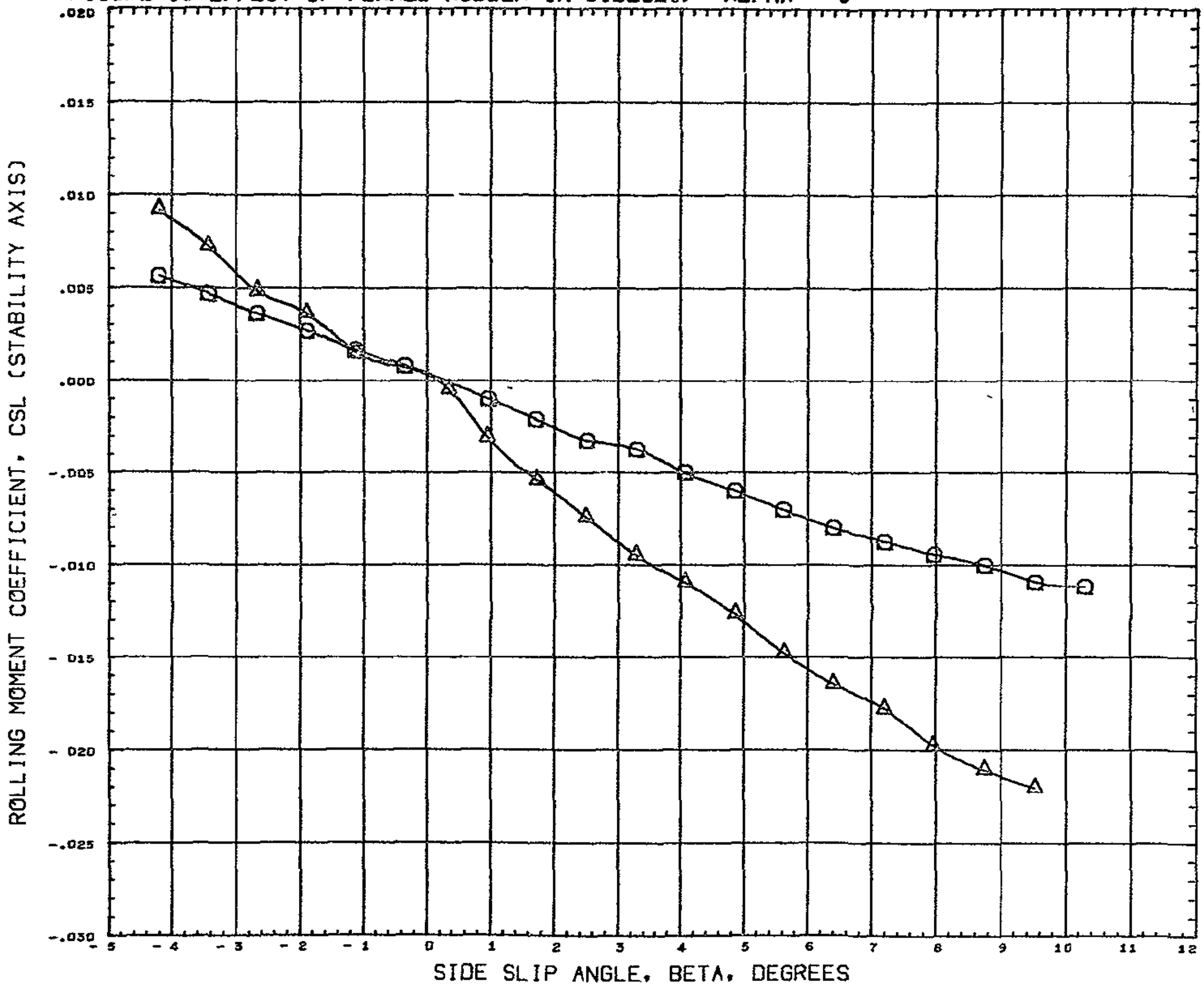
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

MACH 1 750

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	

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



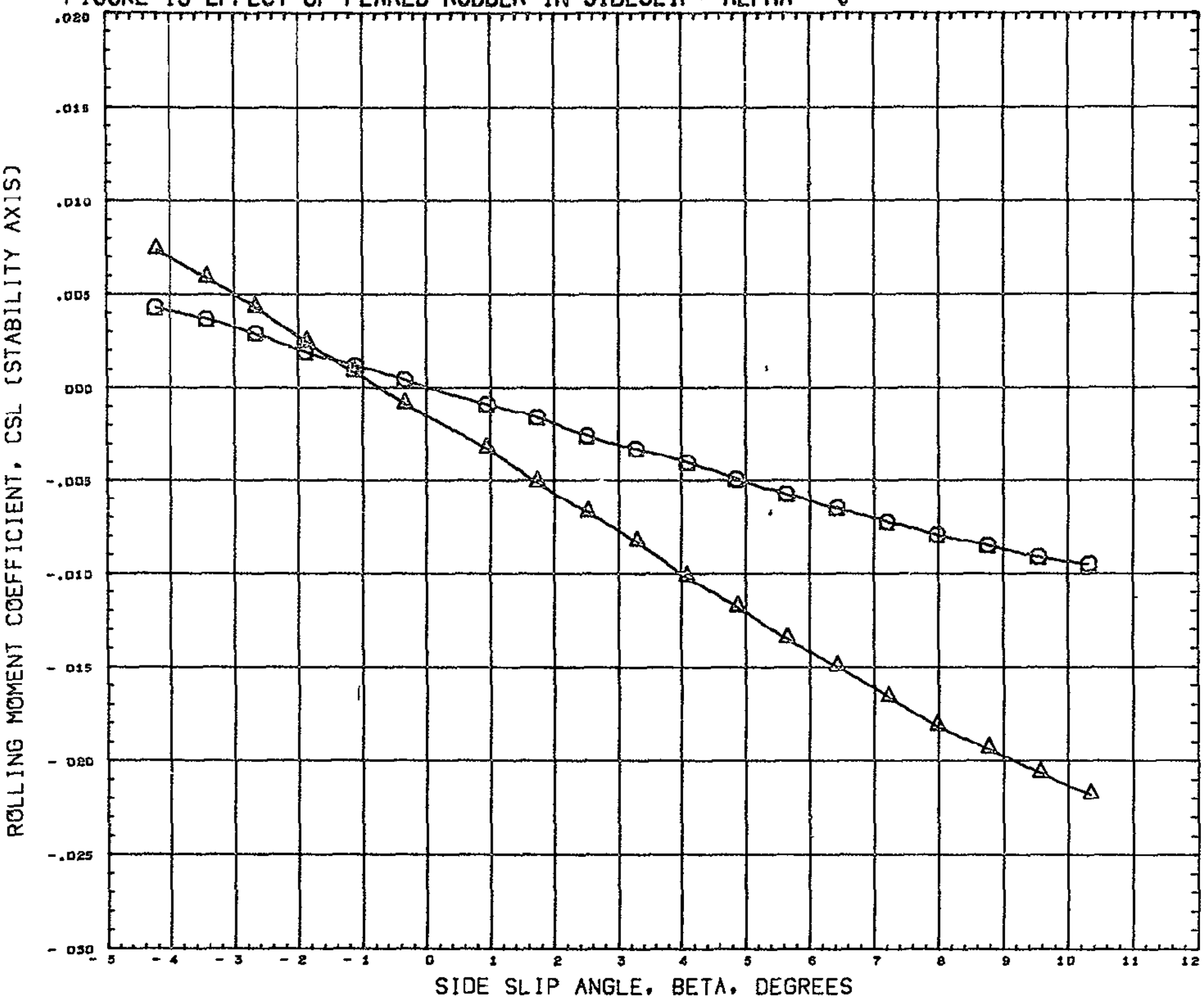
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

MACH 2 020

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	

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

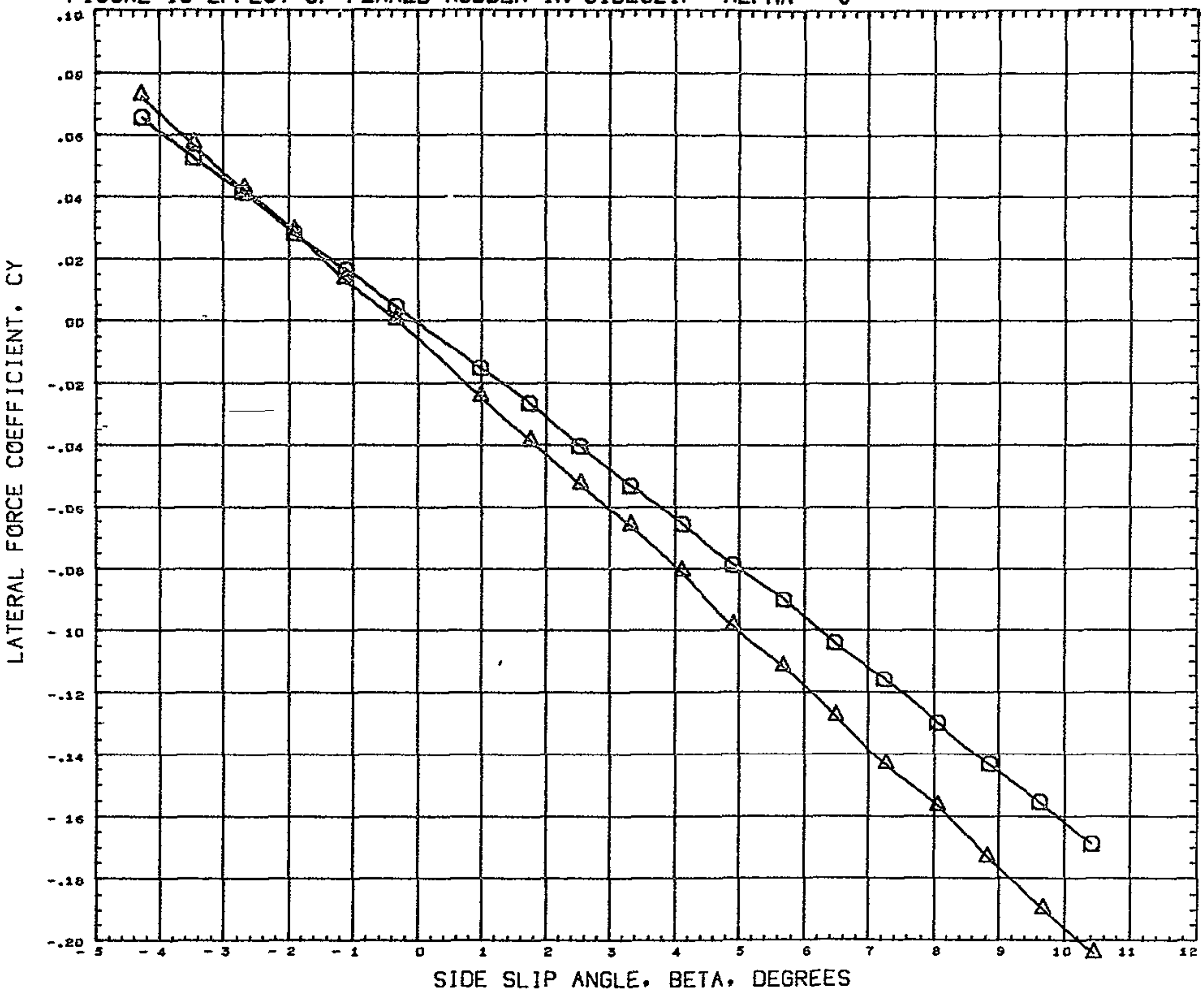


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30.000		

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 13 EFFECT OF FLARED RUDDER IN SIDESLIP- ALPHA = 0



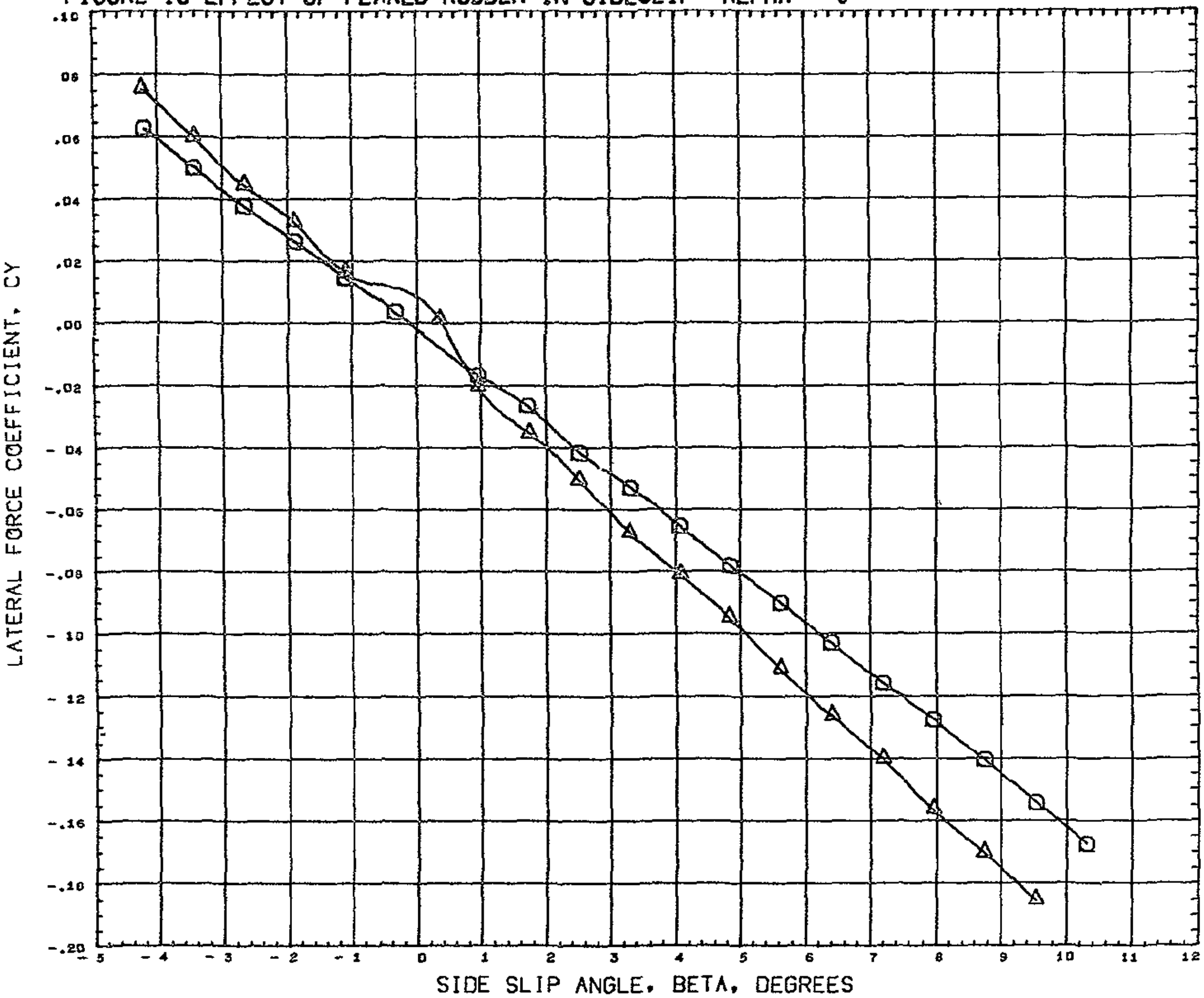
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30.000		

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 8380	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



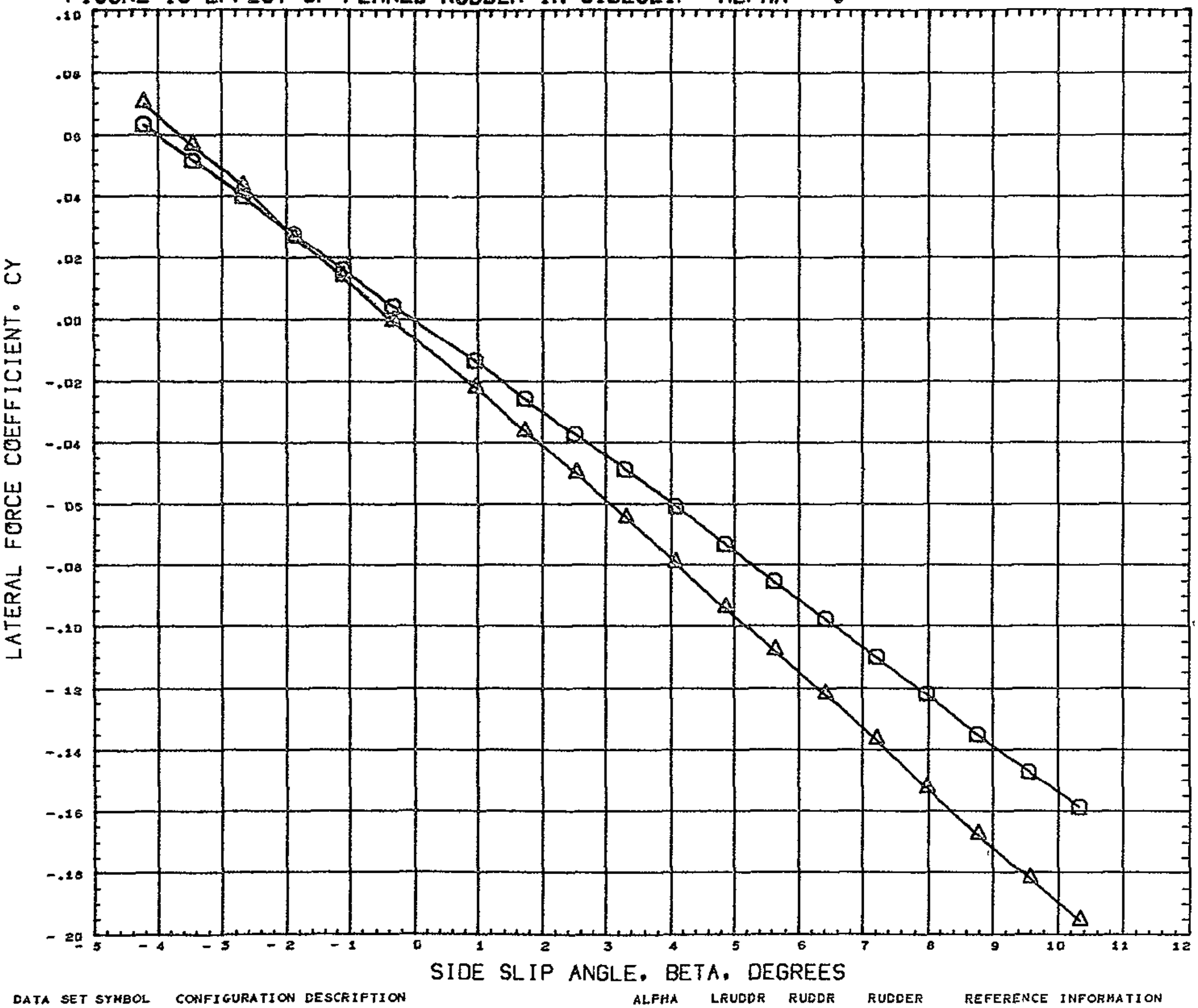
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

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 2 020

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



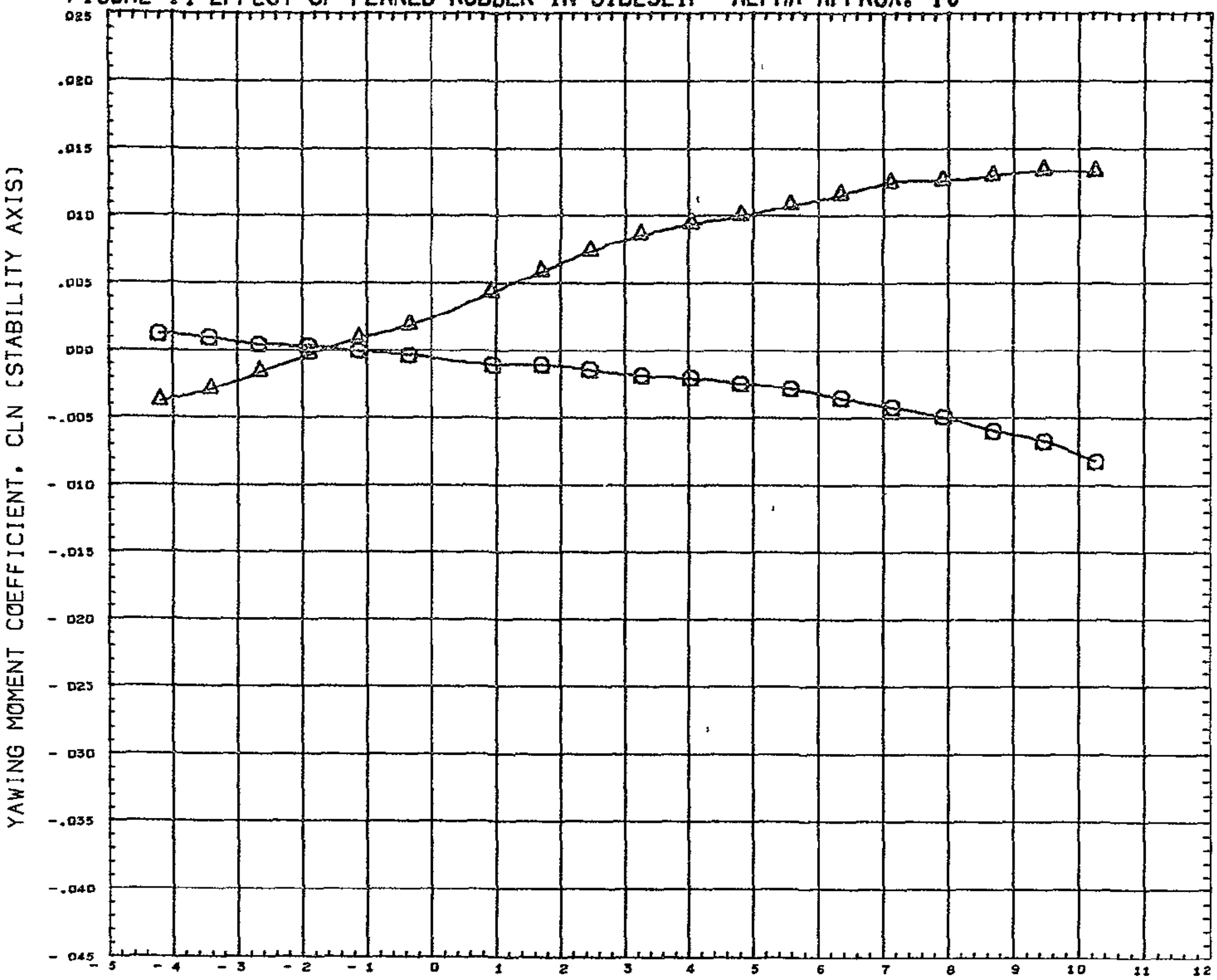
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS002)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0 000
(RCS012)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		

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



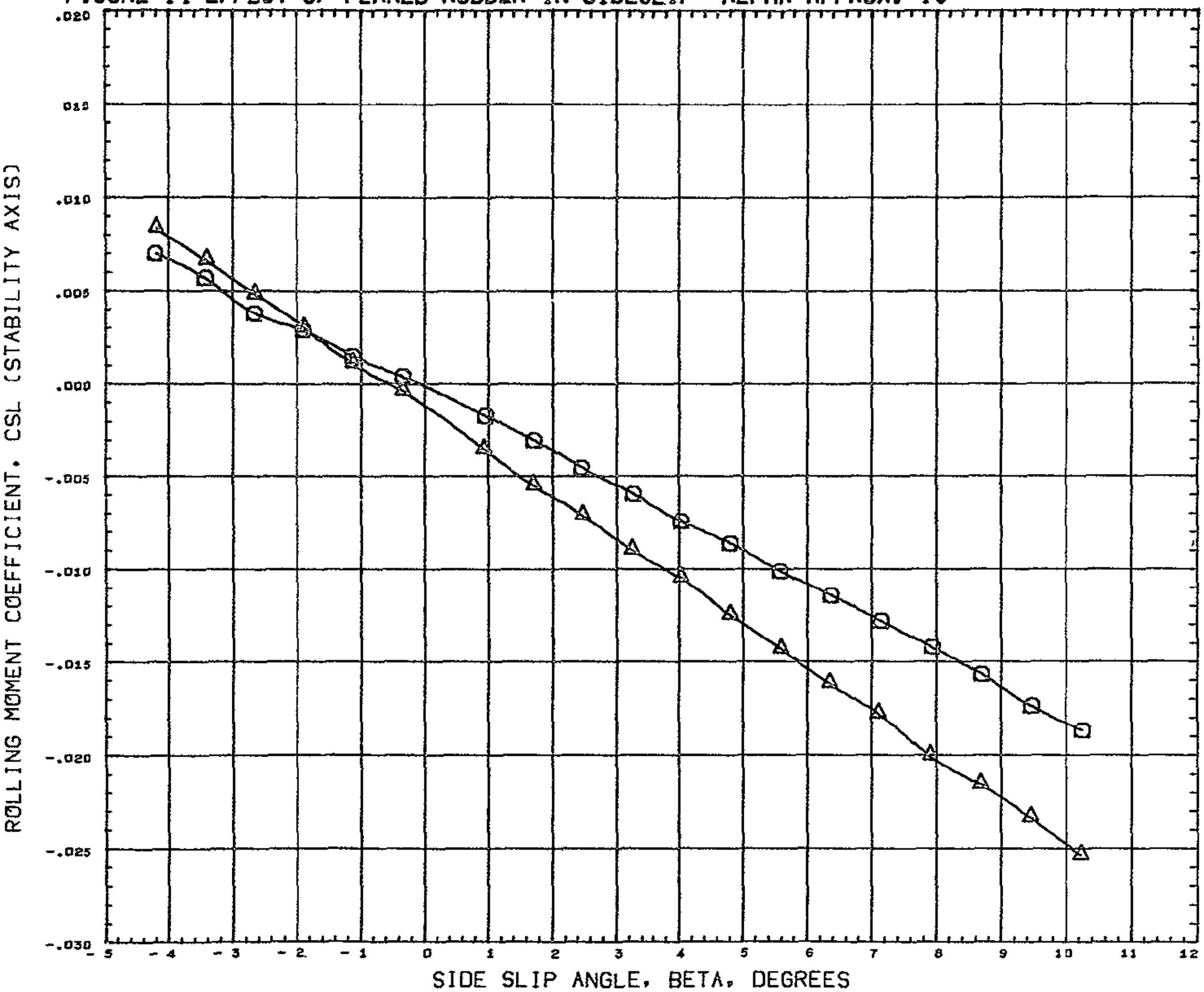
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS019)	○	GFST 022 CONF. ROS-NB1 B1W1V1	10 000			0 000
(RCS020)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	10 000	-30 000		

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 2 020

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



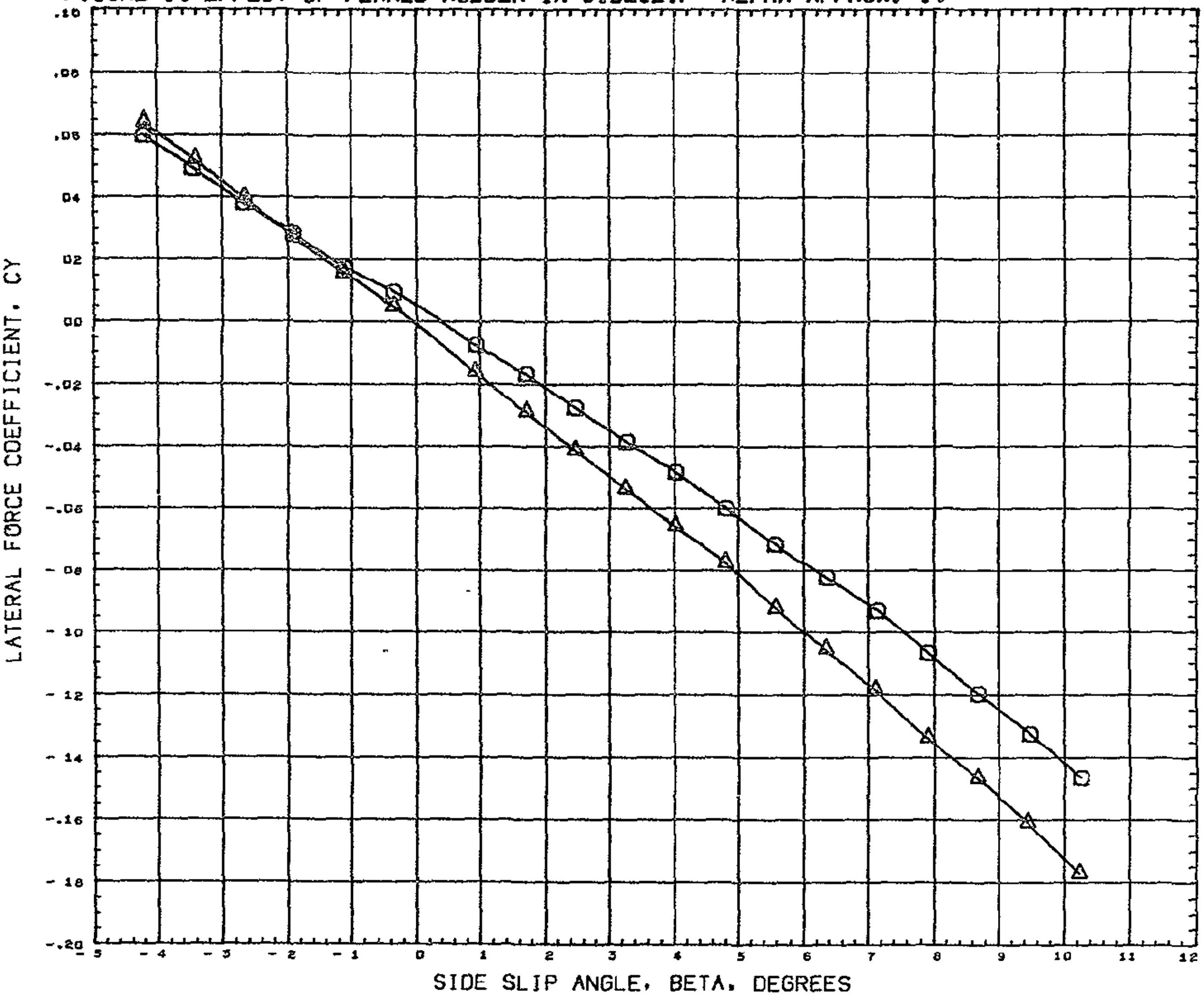
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS019)	O	GFST 022 CONF. ROS-NB1 B1W1V1	10 000			0 000
(RCS020)	Δ	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	10 000	-30 000		

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 2 020

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



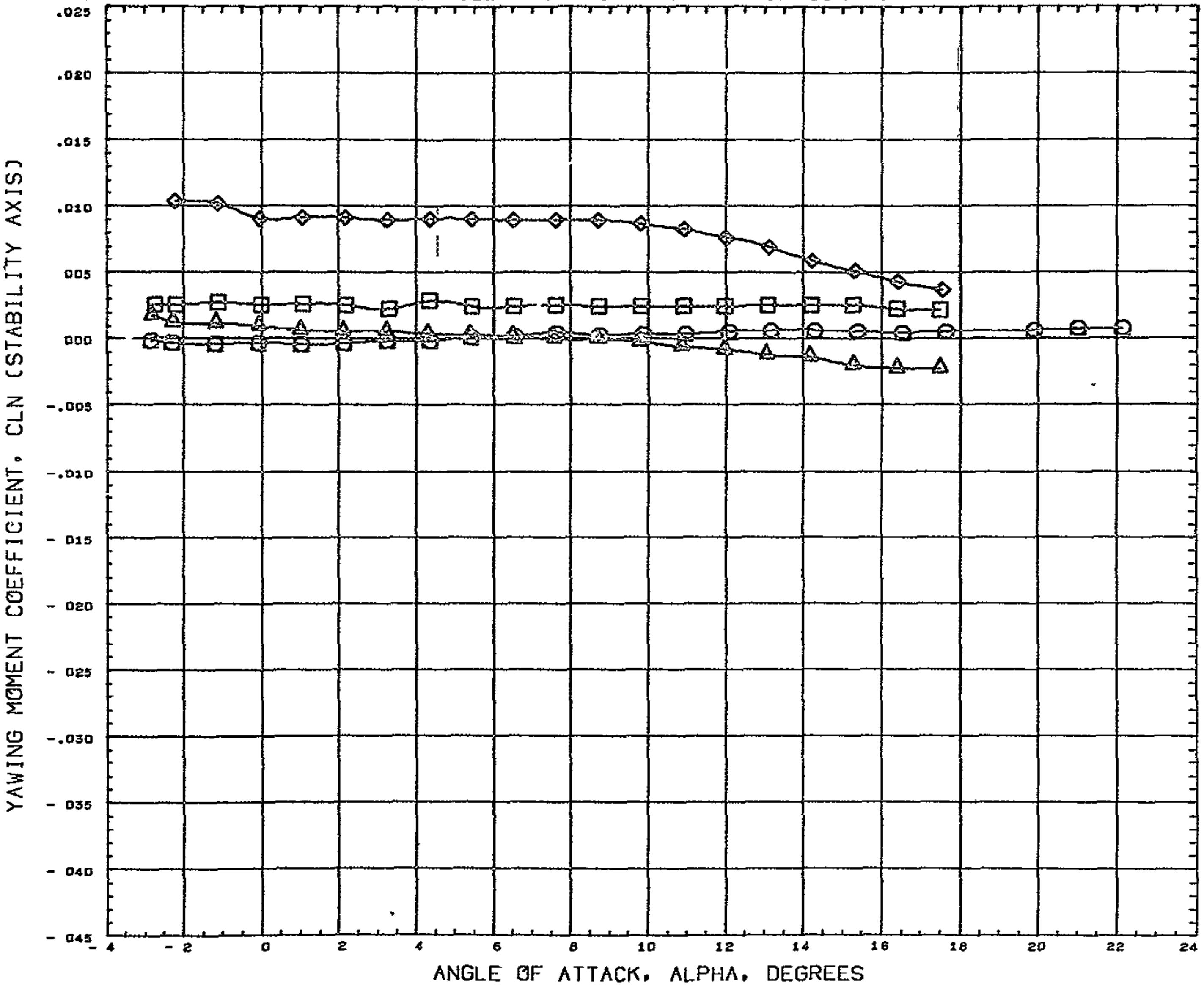
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS019)	○	GFST 022 CONF. ROS-NB1 B1W1V1	10.000			0.000
(RCS020)	△	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	10.000	-30.000		

REFERENCE INFORMATION

SREF	20.6890	SQ IN
LREF	9.6400	IN
BREF	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

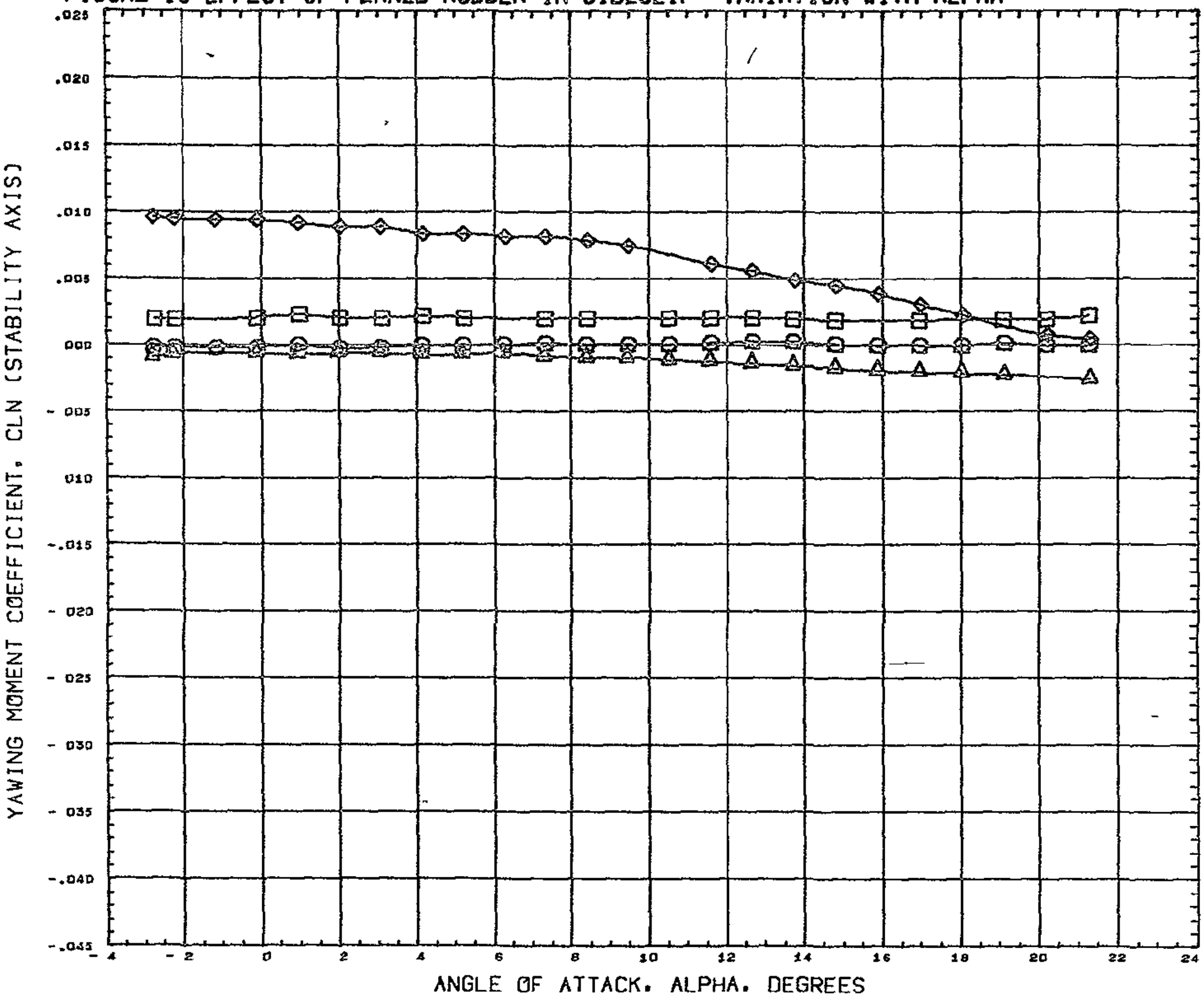


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER
(CCS003)	○	GFST 022 CONF. ROS-NB1 B1W1V1	0 000			0 000
(RCS035)	△	GFST 022 CONF. ROS-NB1 B1W1V1	3 400			0 000
(RCS036)	◇	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	3 400	-30 000	30 000	
(RCS037)	□	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000	30 000	

MACH 1 750

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	

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



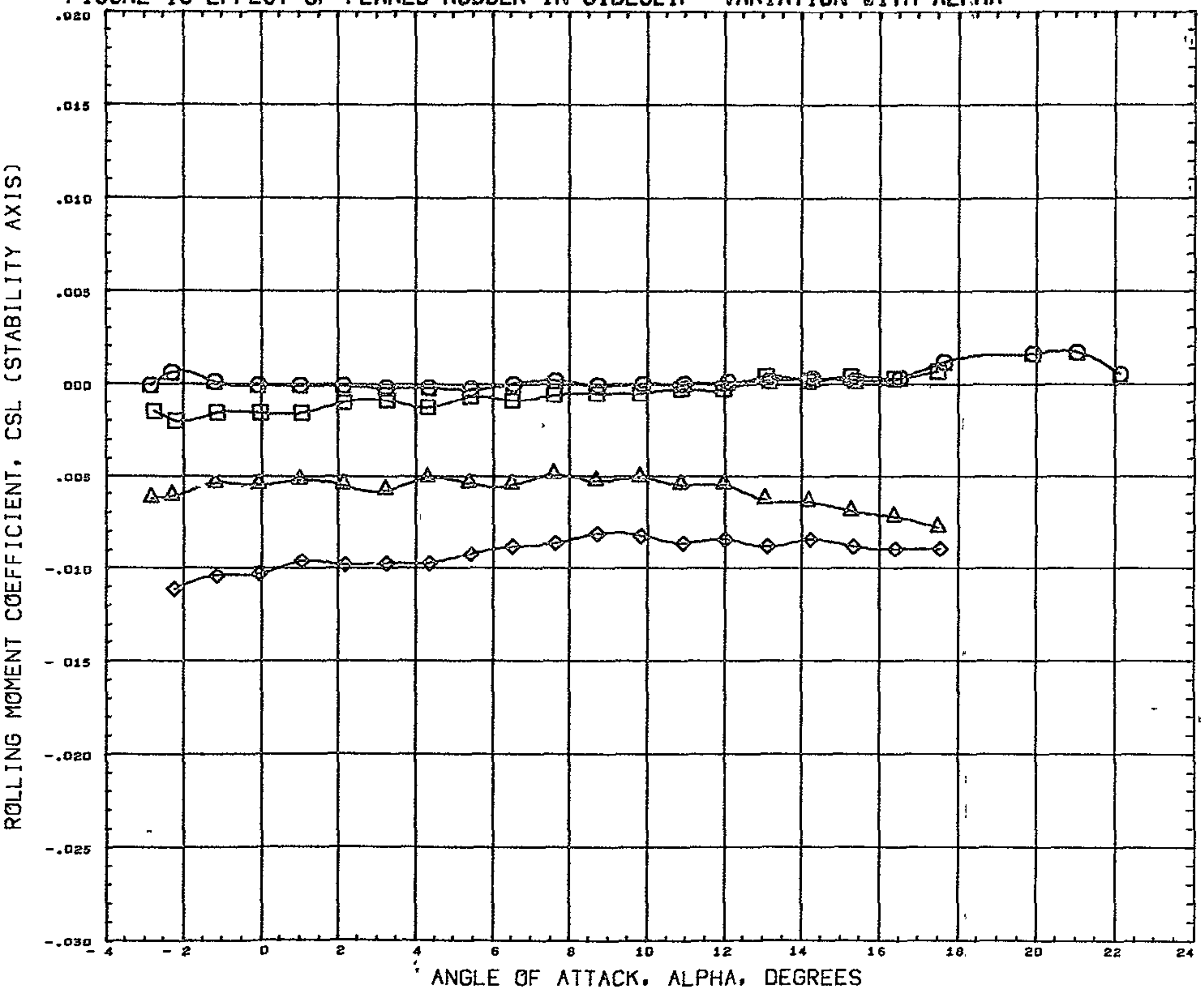
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0.000
(RCS035)	△	GFST 022 CONF ROS-NB1 B1W1V1	3 400			0 000
(RCS036)	◇	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	3.400	-30 000	30 000	
(RCS037)	□	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30.000	30 000	

MACH 2 460

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	

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

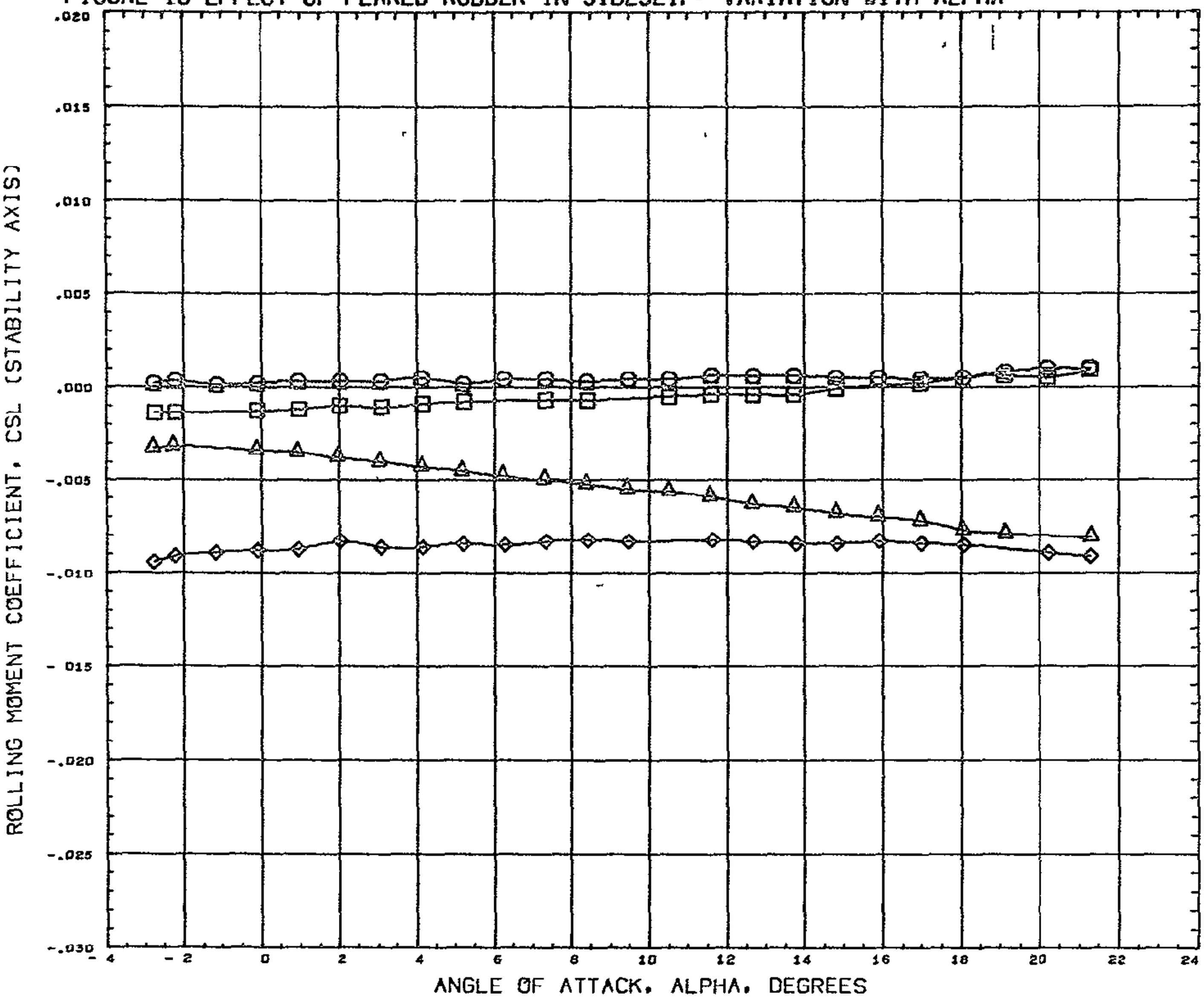


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0 000
(RCS035)	△	GFST 022 CONF ROS-NB1 B1W1V1	3.400			0 000
(RCS036)	◇	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	3 400	-30 000	30 000	
(RCS037)	□	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	0 000	-30 000	30 000	

MACH 1 750

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

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

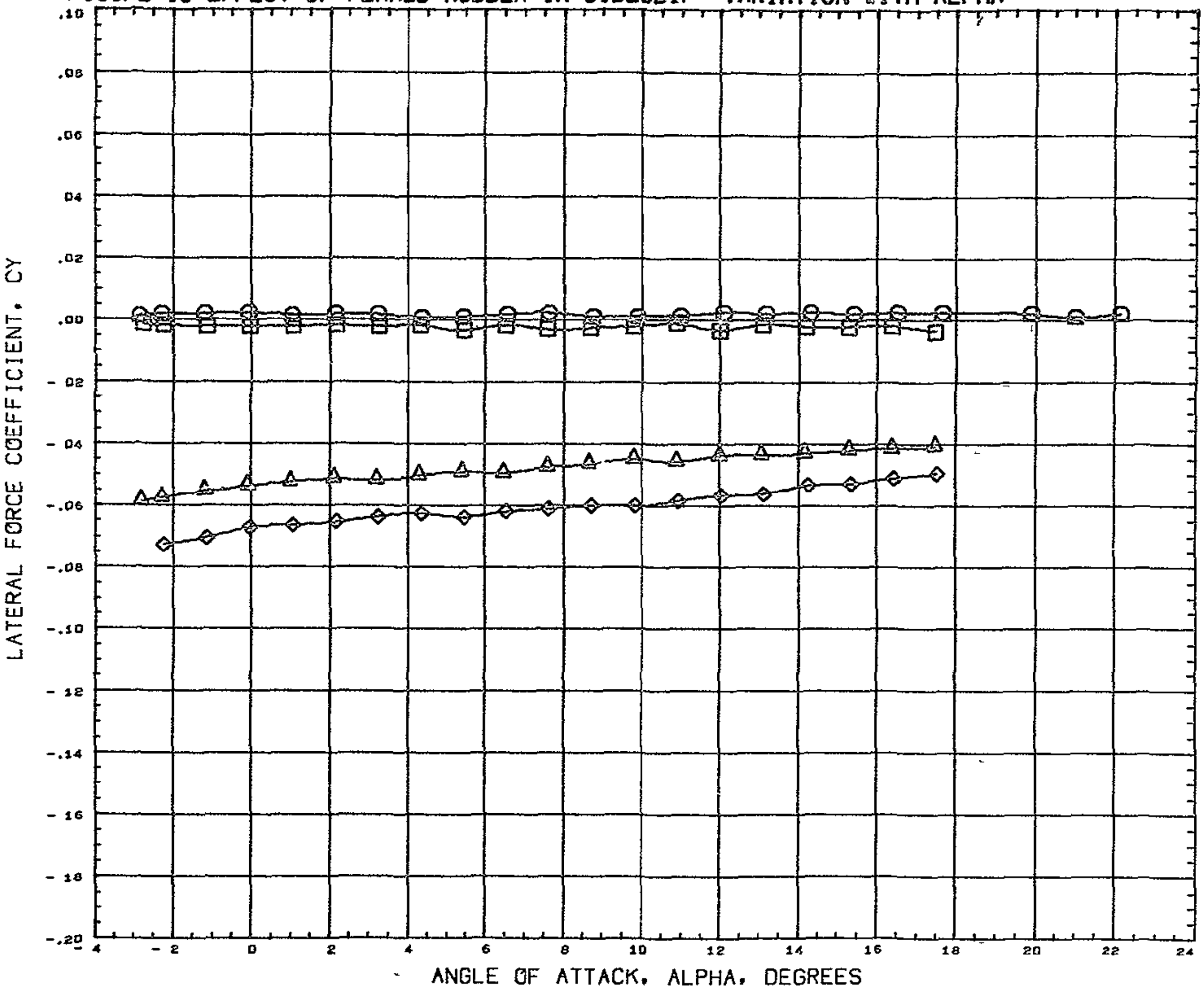


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS035)	△	GFST 022 CONF ROS-NB1 B1W1V1	3 400			0 000
(RCS036)	◇	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	3 400	-30 000	30 000	
(RCS037)	□	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	0 000	-30 000	30.000	

MACH 2 480

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	

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

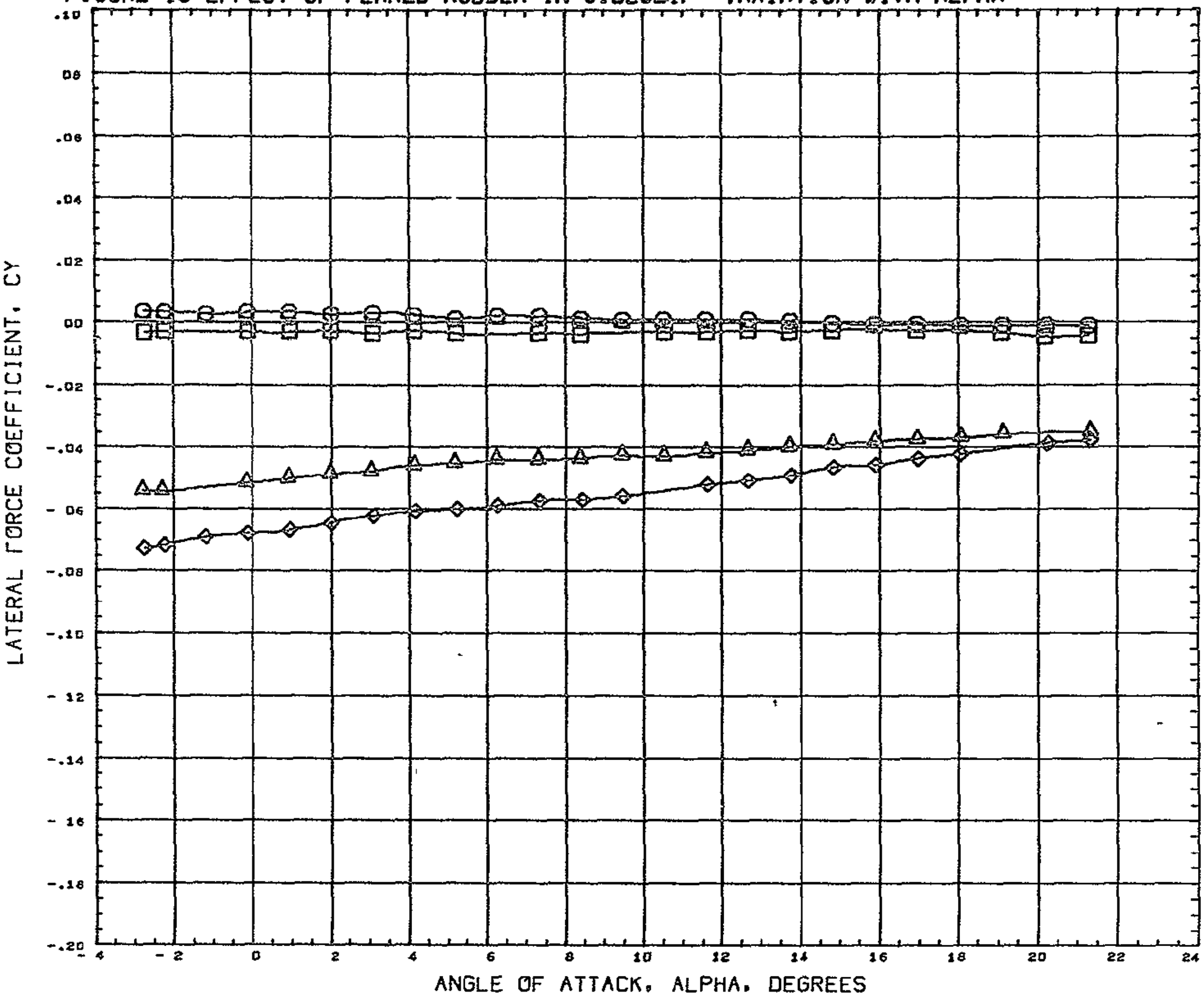


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCS035)	△	GFST 022 CONF ROS-NB1 B1W1V1	3 400			0 000
(RCS036)	◇	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	3 400	-30 000	30 000	
(RCS037)	□	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0.000	-30 000	30 000	

MACH 1 750

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5.8360	IN
XMRP	.485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

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

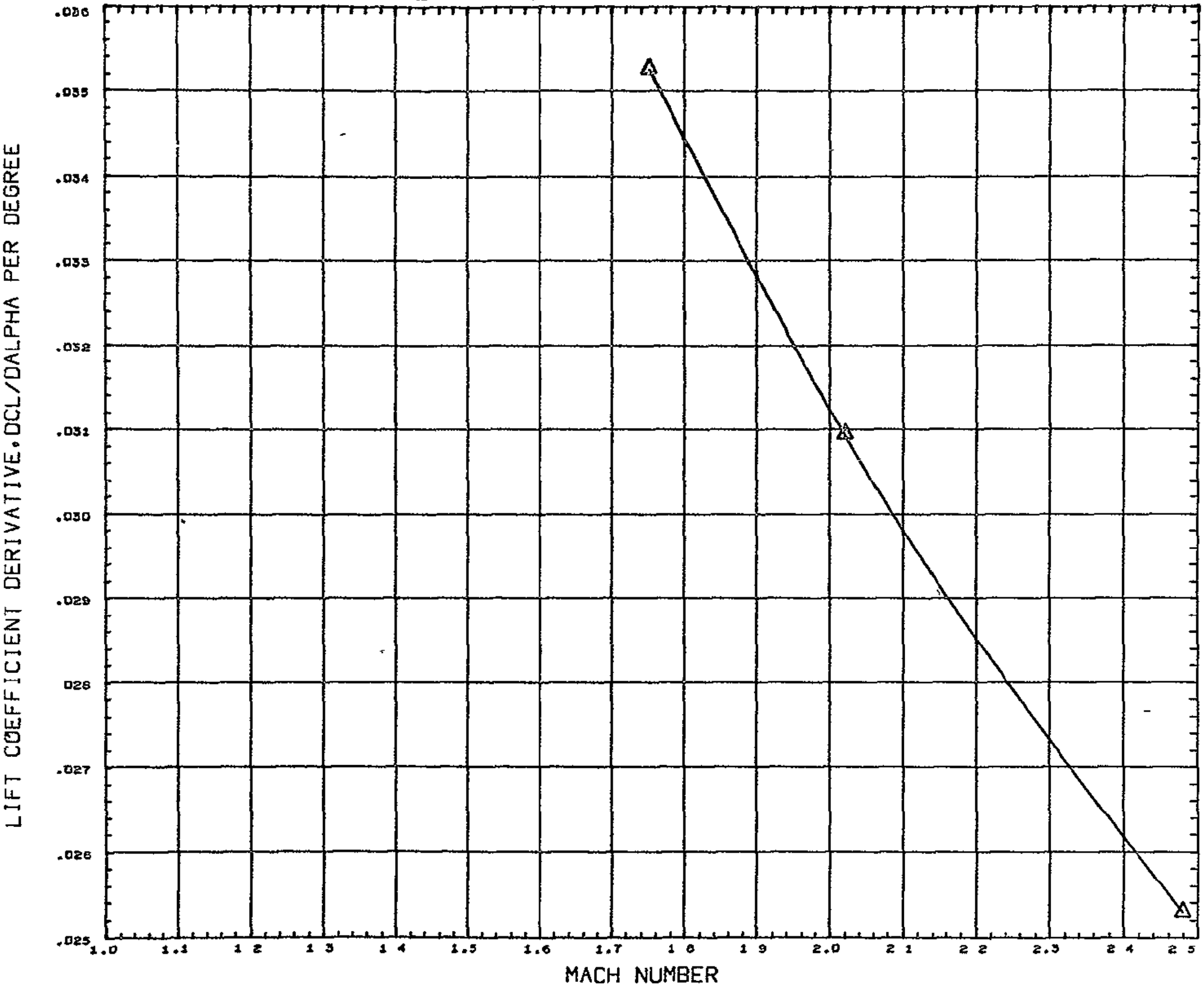


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	LRUDDR	RRUDDR	RUDDER
(CCS003)	○	GFST 022 CONF ROS-NB1 B1W1V1	0.000			0 000
(RCS035)	△	GFST 022 CONF ROS-NB1 B1W1V1	3.400			0.000
(RCS036)	◇	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	3 400	-30 000	30.000	
(RCS037)	□	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	0 000	-30 000	30 000	

REFERENCE INFORMATION		
SREF	20 6890	SQ IN.
LREF	9 6480	IN
BREF	5 8380	IN
XMRF	1485 0040	IN
YMRF	0 0000	IN
ZMRF	377.0004	IN
SCALE	0 0050	

MACH 2.460

FIGURE 16 DERIVED PARAMETERS- BASIC CONFIGURATION IN PITCH



PARAMETRIC VALUES

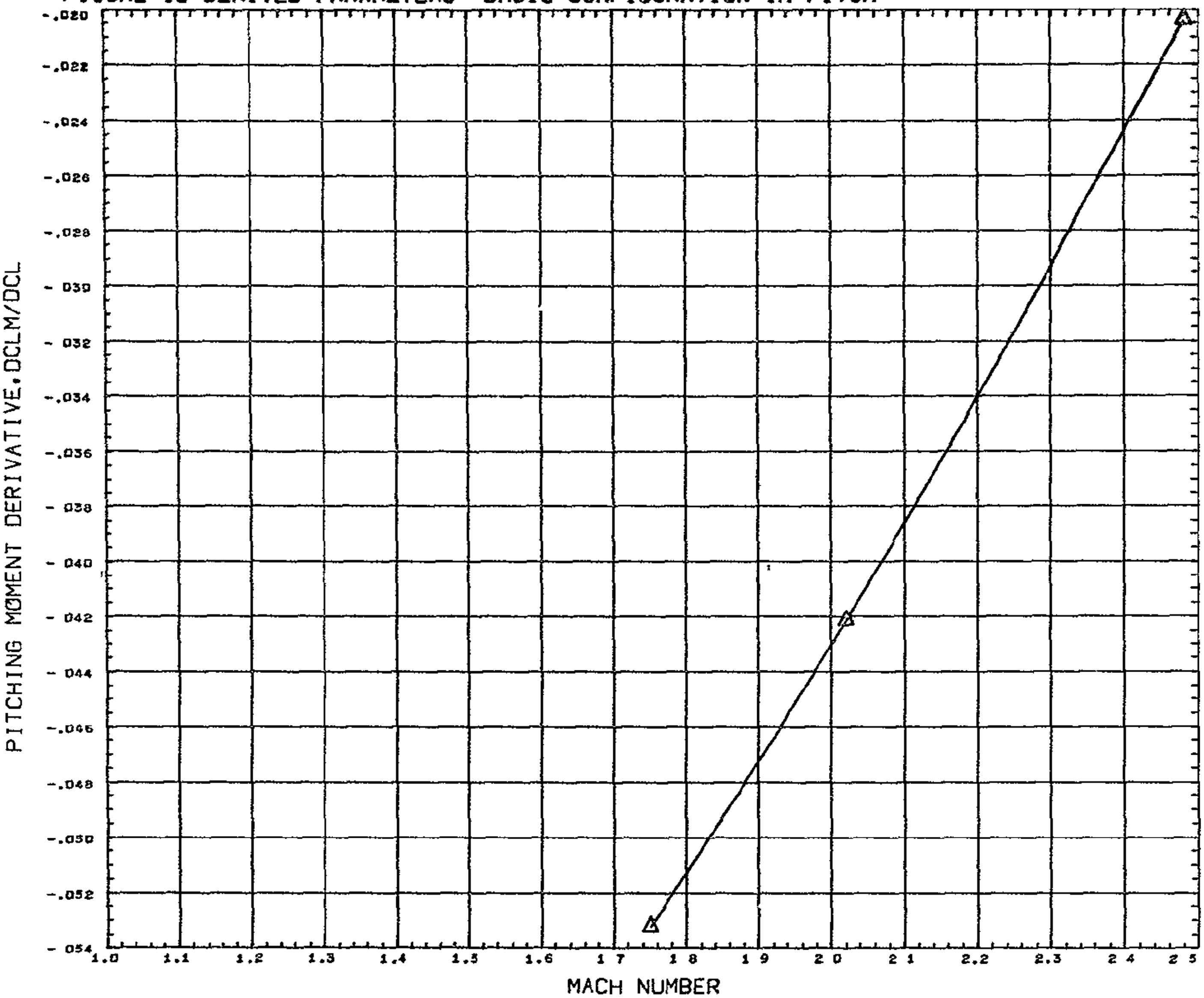
BETA	0.000	IELEVN	0.000
RELEVN	0.000	RUDDER	0.000

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

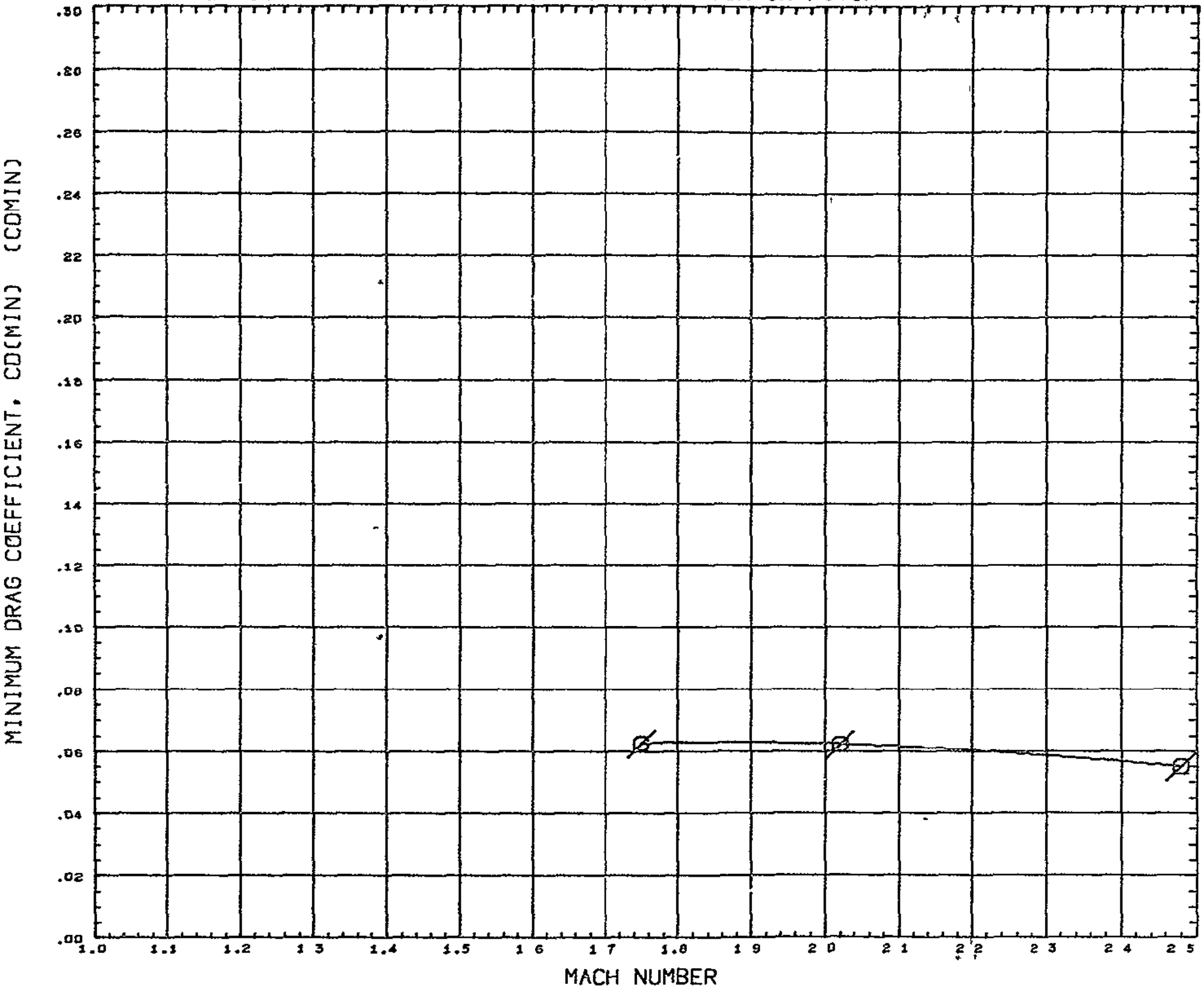
BETA	0.000	LELEVN	0.000
RELEVN	0.000	RUDDER	0.000

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

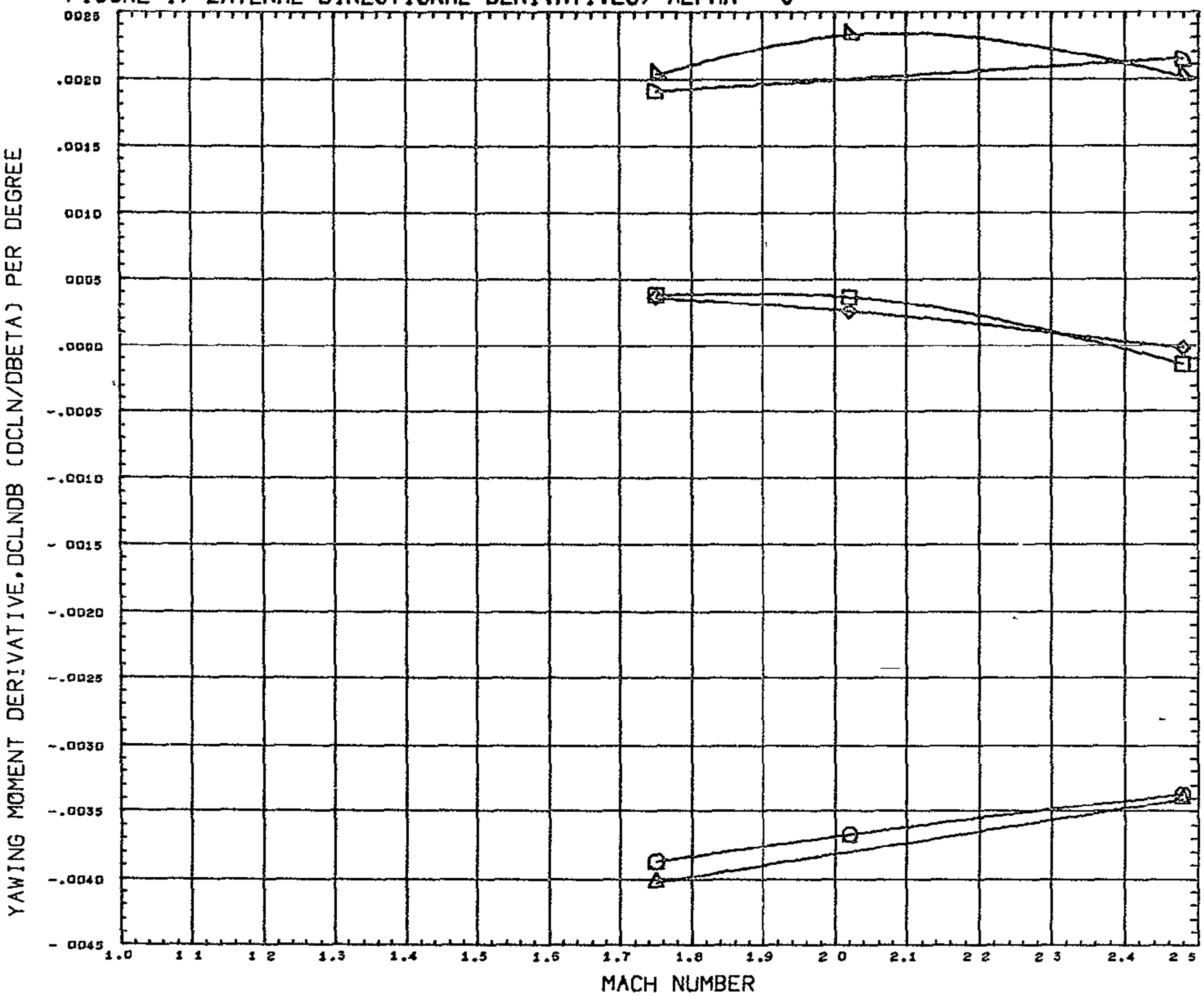
BETA	0.000	LELEVN	0 000
RELEVN	0 000	RUDDER	0 000

DATA HIST CODE F

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	

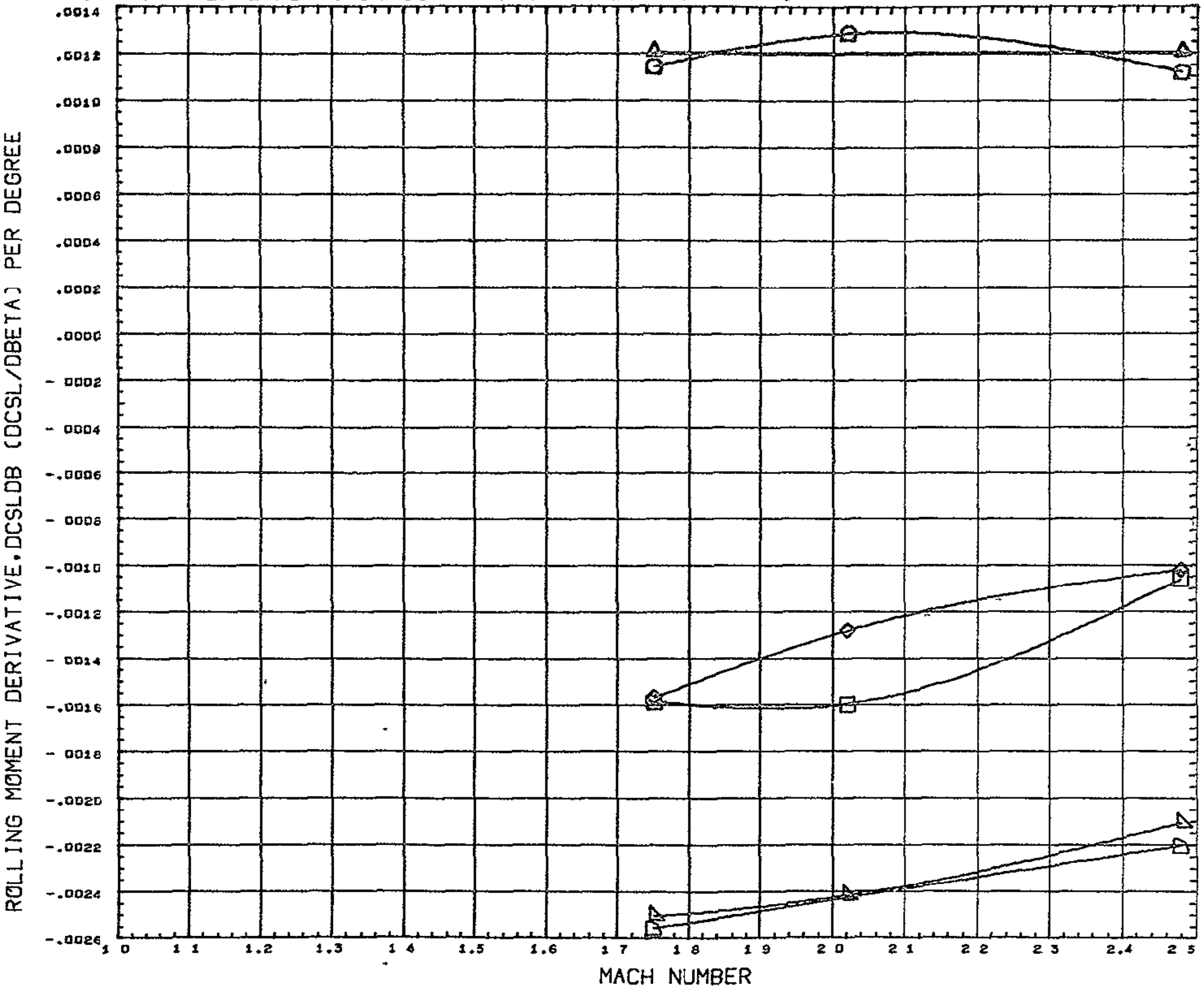
FIGURE 17 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA = 0



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS010)	○	GFST 022 CONF ROS-NB1 B1W1	0 000			
(RCSXX1)	△	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 0)	0 000			
(RCS002)	◇	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCSXX4)	□	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 0)	0 000			0 000
(RCS012)	◺	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		
(RCSXX7)	◹	GFST 022 CONF. DATA B1W1V1(-30,30) (ALPHA IS 0)	0 000	-30 000		

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

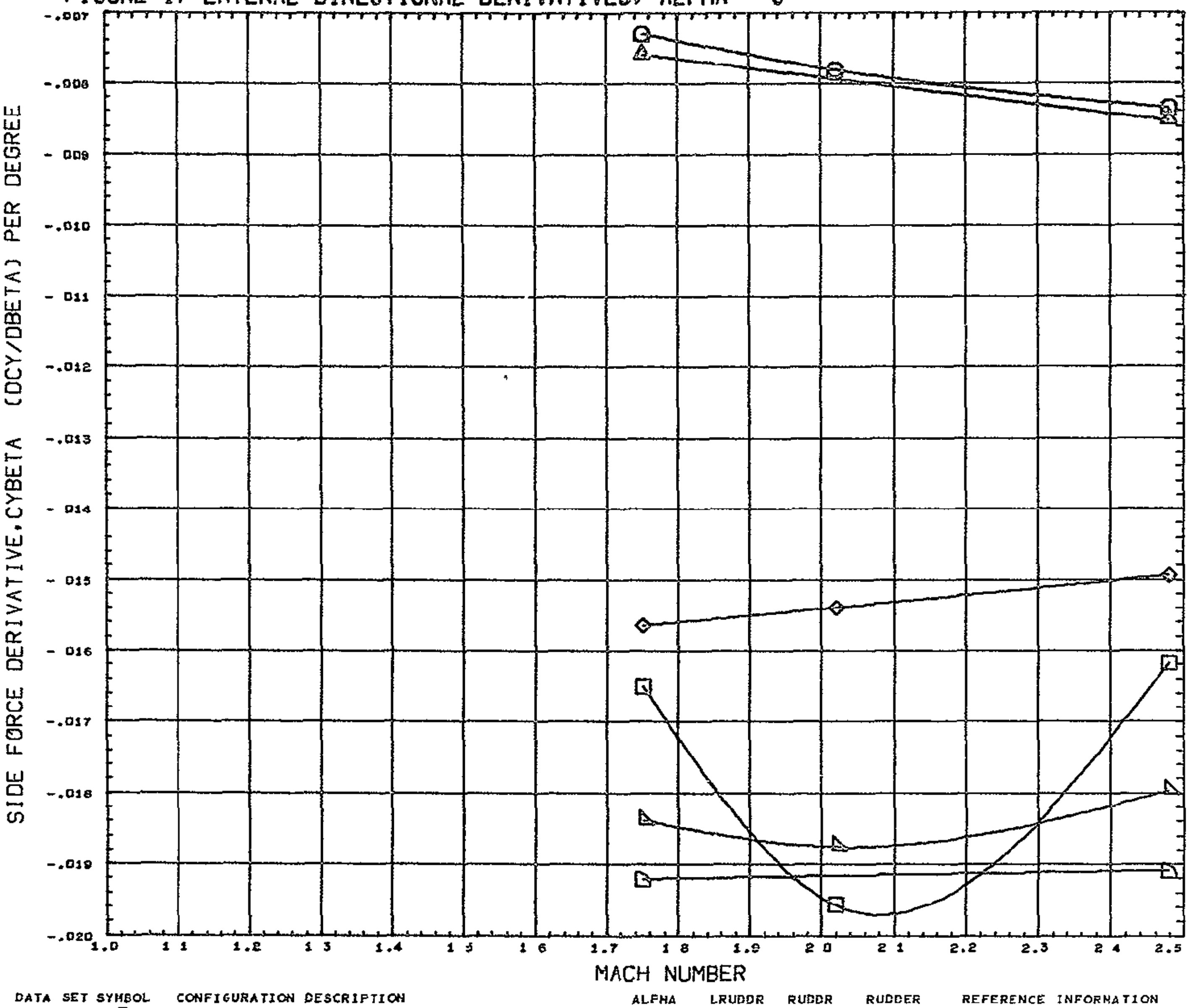
FIGURE 17 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA = 0



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALFHA	LRUDDR	RUDDR	RUDDER
(RCS010)	○	GFST 022 CONF ROS-NB1 B1W1	0.000			
(RCSXX1)	△	GFST 022 COMPOSITE DATASET B1W1 (ALFHA IS 0)	0 000			
(RCS002)	◇	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0.000
(RCSXX4)	□	GFST 022 COMPOSITE DATASET B1W1V1 (ALFHA IS 0)	0 000			0 000
(RCS012)	◺	GFST 022 CONF. ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		
(RCSXX7)	D	GFST 022 COMP DATA B1W1V1(-30,30, (ALFHA IS 0)	0.000	-30 000		

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6460	IN
BREF	5 8380	IN
XHRP	1485 0040	IN
YHRP	0 0000	IN
ZHRP	377 0004	IN
SCALE	0 0050	

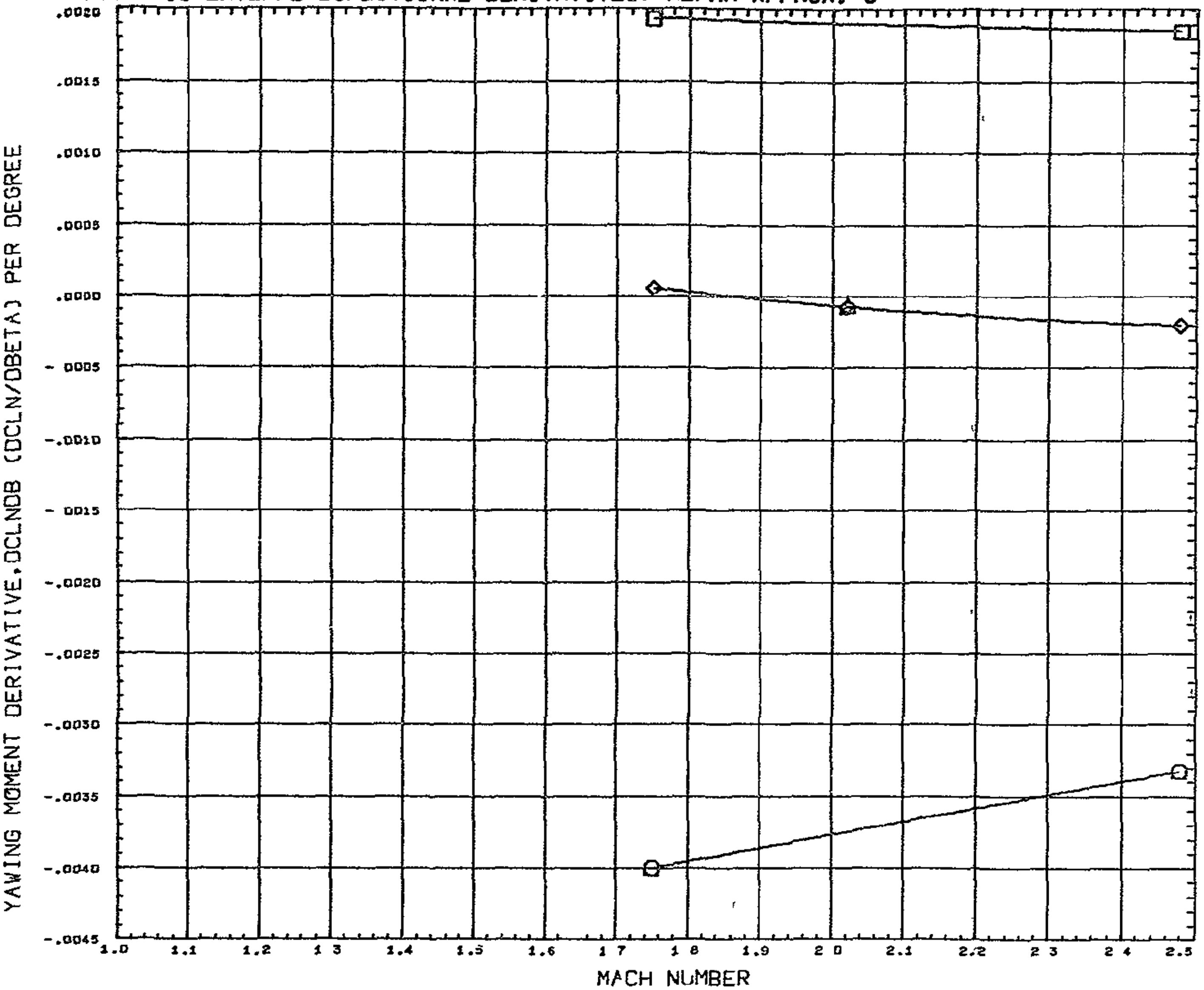
FIGURE 17 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA = 0



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS010)	○	GFST 022 CONF ROS-NB1 B1W1	0 000			
(RCSXX1)	△	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 0)	0 000			
(RCS002)	◇	GFST 022 CONF ROS-NB1 B1W1V1	0 000			0 000
(RCSXX4)	□	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 0)	0 000			0 000
(RCS012)		GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	0 000	-30 000		
(RCSXX7)		GFST 022 CONF DATA B1W1V1(-30,30 (ALPHA IS 0)	0 000	-30 000		

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

FIGURE 18 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 5

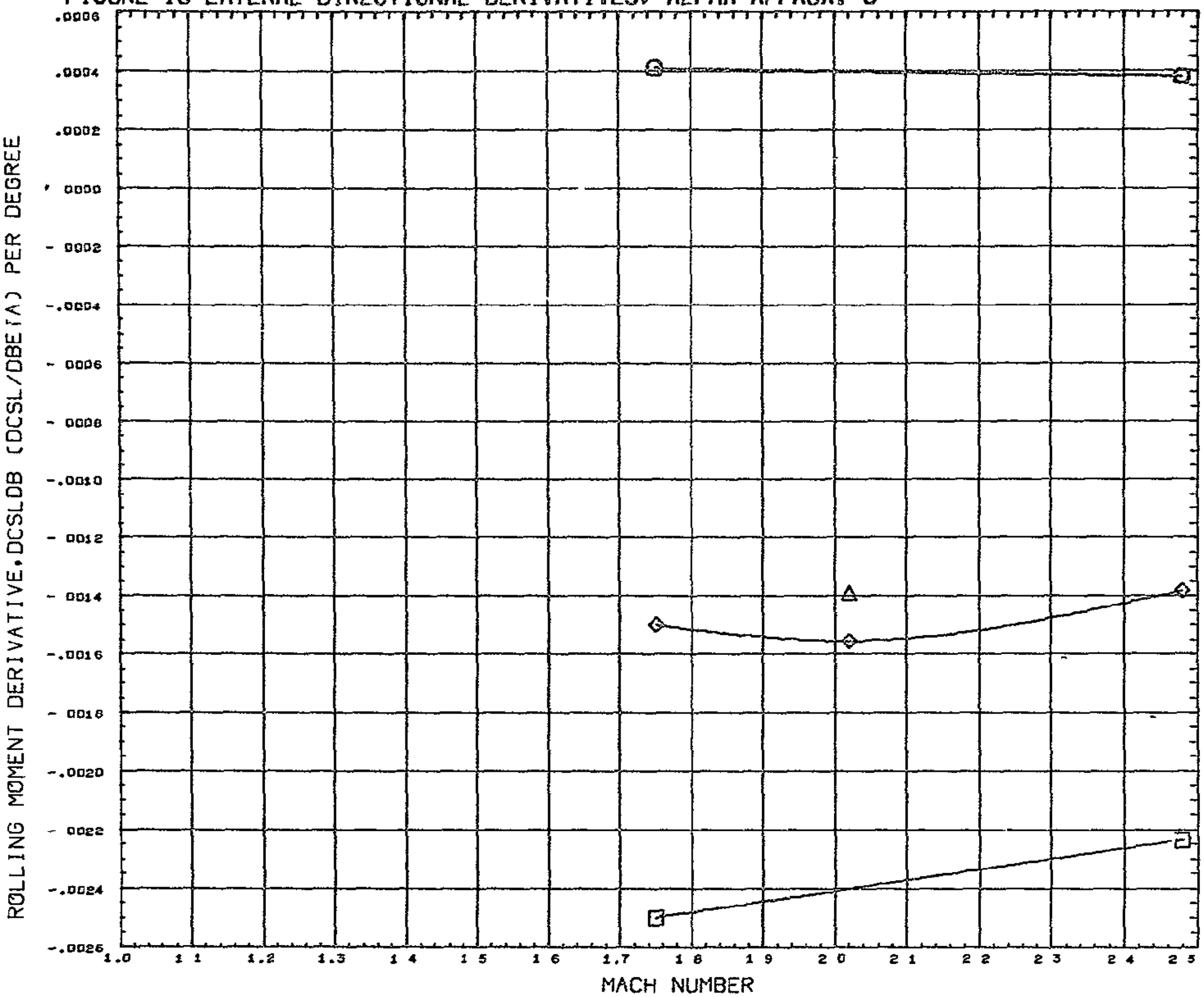


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCSXX2)	○	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 5)	5 000			
(RCS018)	△	GFST 022 CONF ROS-NB1 B1W1V1	5.000			0 000
(RCSXX5)	◇	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 5)	5 000			0 000
(RCSXX6)	□	GFST 022 COMP DATA B1W1V1(-30,30) (ALPHA IS 5)	5 000	-30 000		

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6400	IN
BREF	5 8380	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377.0004	IN
SCALE	0 0050	

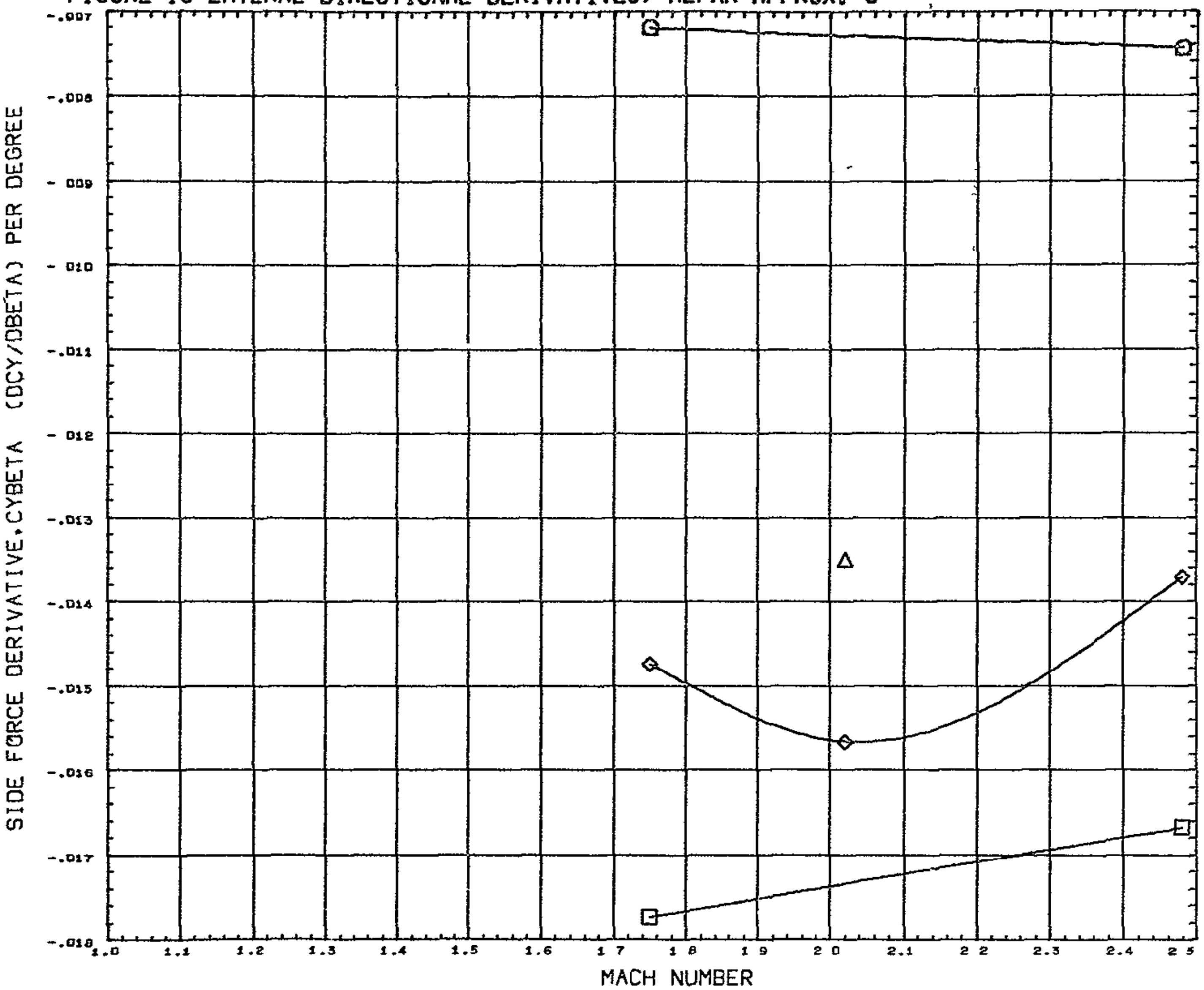
FIGURE 18 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 5



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCSXX2)	○	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 5)	5.000			
(RCS018)	△	GFST 022 CONF. ROS-NB1 B1W1V1	5.000			0.000
(RCSXX5)	◇	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 5)	5.000			0.000
(RCSXX8)	□	GFST 022 COMP. DATA B1W1V1(-30,30) (ALPHA IS 5)	5.000	-30.000		

REFERENCE INFORMATION		
SREF	20.6890	SQ IN
LREF	9.6460	IN
BREF	5.8360	IN
XMRP	1485.0040	IN
YMRP	0.0000	IN
ZMRP	377.0004	IN
SCALE	0.0050	

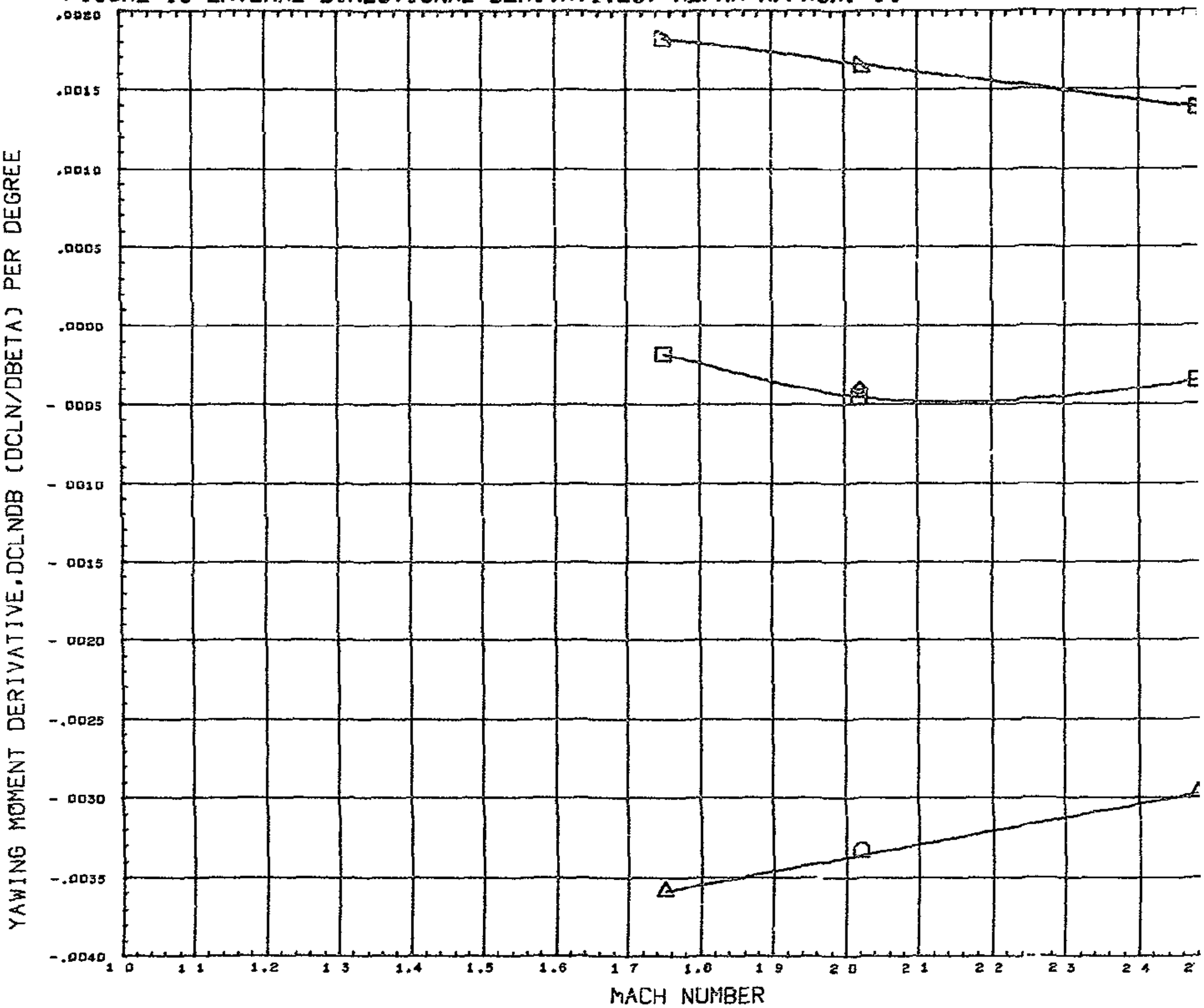
FIGURE 18 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 5



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCSXX2)	○	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 5)	5.000			
(RCS018)	△	GFST 022 CONF ROS-NB1 B1W1V1	5.000			0.000
(RCSXX5)	◇	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 5)	5.000			0.000
(RCSXX6)	□	GFST 022 COMP. DATA B1W1V1(-30,30) (ALPHA IS 5)	5.000	-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	

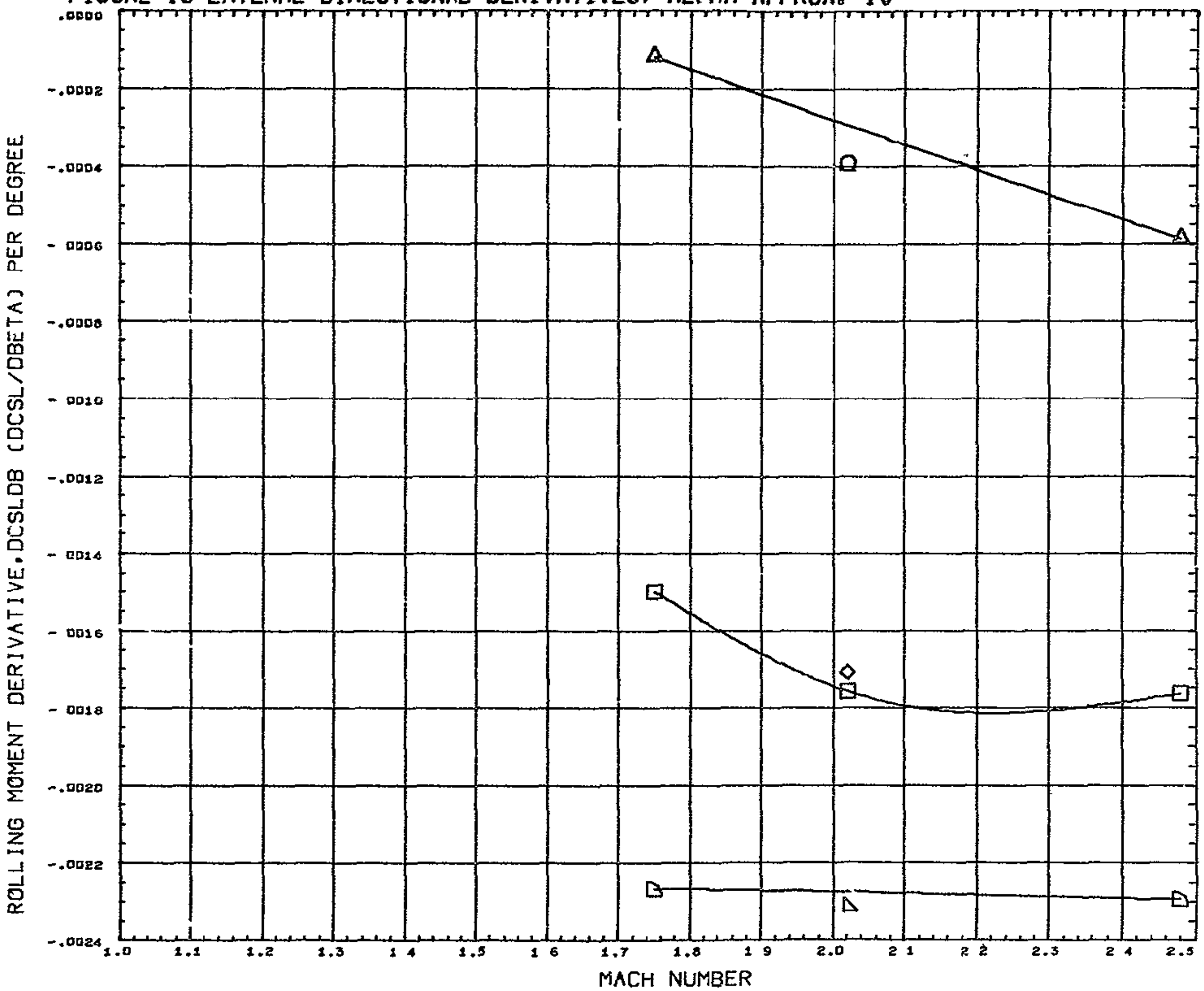
FIGURE 19 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 10



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER	REFERENCE INFORMATION		
(RCS017)	○	GFST 022 CONF. ROS-NB1 B1W1	10.000				SREF	20 6890	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	XMRP	1485 0040	IN
(RCS020)	◺	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	10 000	-30.000			YMRP	0 0000	IN
(RCSXX9)	D	GFST 022 CONF. DATA B1W1V1(-30,30) (ALPHA IS 10)	10 000	-30 000			ZMRP	377 0004	IN
							SCALE	0 0050	

3 9

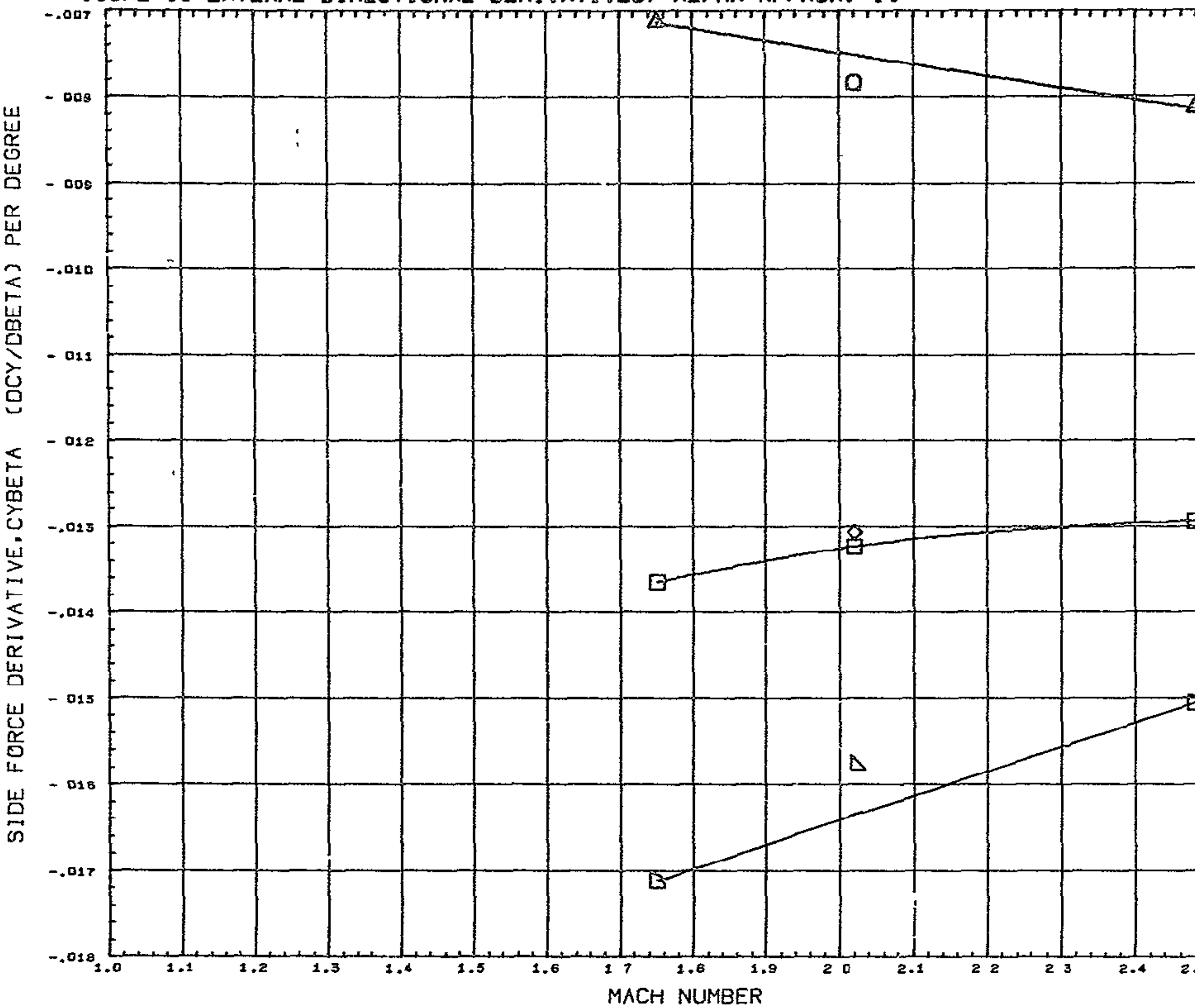
FIGURE 19 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 10



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS017)	○	GFST 022 CONF ROS-NB1 B1W1	10.000			
(RCSXX3)	△	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 10)	10.000			
(RCS019)	◇	GFST 022 CONF. ROS-NB1 B1W1V1	10 000			0 000
(RCSXX6)	□	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 10)	10 000			0 000
(RCS020)	◺	GFST 022 CONF ROS-NB1 B1W1V1(-30,30)	10.000	-30 000		
(RCSXX9)	◻	GFST 022 COMP. DATA B1W1V1(-30,30) (ALPHA IS 10)	10 000	-30.000		

REFERENCE INFORMATION		
SREF	20 6890	SQ IN
LREF	9 6490	IN
BREF	5 8380	IN.
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	

FIGURE 19 LATERAL-DIRECTIONAL DERIVATIVES, ALPHA APPROX. 10



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	LRUDDR	RUDDR	RUDDER
(RCS017)	○	GFST 022 CONF. ROS-NB1 B1W1	10 000			
(RCSXX3)	△	GFST 022 COMPOSITE DATASET B1W1 (ALPHA IS 10)	10 000			
(RCS019)	◇	GFST 022 CONF ROS-NB1 B1W1V1	10 000			0 000
(RCSXX6)	□	GFST 022 COMPOSITE DATASET B1W1V1 (ALPHA IS 10)	10 000			0 000
(RCS020)	◺	GFST 022 CONF ROS-NB. B1W1V1(-30,30)	10 000	-30 000		
(RCSXX9)	D	GFST 022 CONF DATA 31W1V1(-30,30) (ALPHA IS 10)	10 000	-30 000		

REFERENCE INFORMATION

SREF	20 6890	SQ IN
LREF	9 6480	IN
BREF	5 9380	IN
XMRP	1485 0040	IN
YMRP	0 0000	IN
ZMRP	377 0004	IN
SCALE	0 0050	