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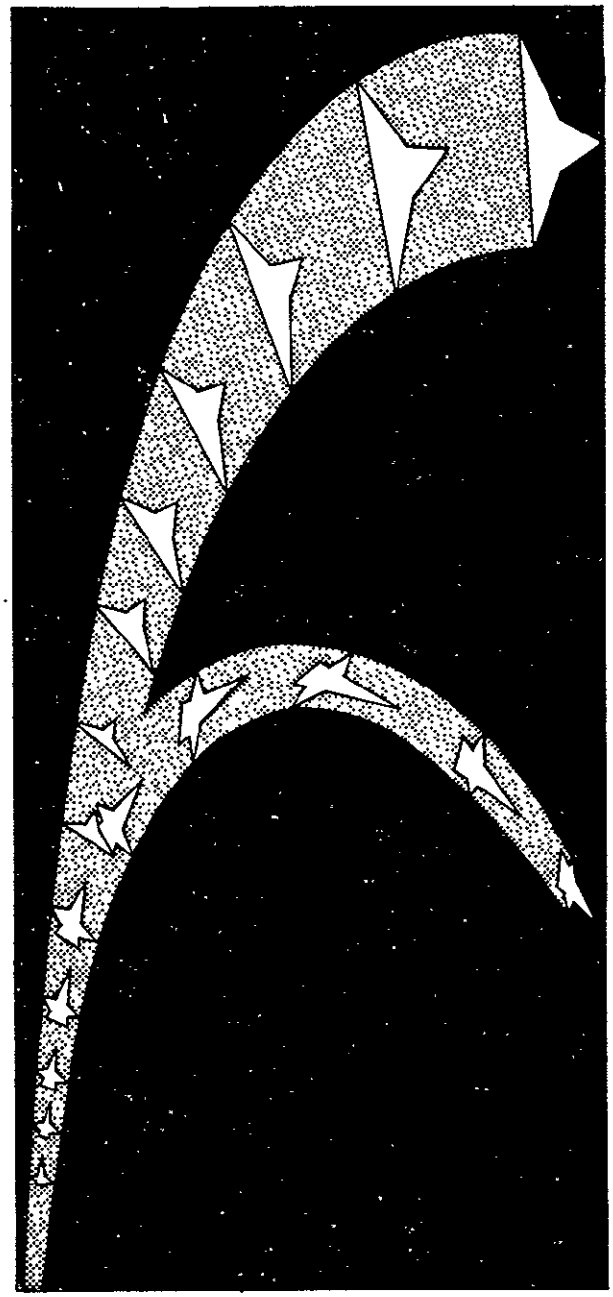

SPACE SHUTTLE

STATIC AERODYNAMIC AND CONTROL INVESTIGATION OF AN EXPENDABLE SECOND STAGE WITH PAYLOAD ALONE AND WITH DELTA WING BOOSTER (B-15B-1)

BY

E. C. ALLEN - NR
F. W. EDER - GD/C

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NASA STI FACILITY
INPUT BRANCH

MSFC

14-INCH TRISONIC WIND TUNNEL

MARSHALL
SPACE FLIGHT CENTER

NASA

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
AMENDMENT 149
DRL 184-58
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION CHRYSLER CORPORATION

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SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION: Expendable Second Stage Alone and with G/D Delta Wing Booster (B-15B-1); .0031 Scale Model

TEST PURPOSE: Static Stability and Control

TEST FACILITY: MSFC 14-Inch Trisonic Wind Tunnel

TESTING AGENCY: North American Rockwell

TEST NO. & DATE: MSFC - TWT 489; 4-15-71 thru 5-5-71

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ABSTRACT

Results of experimental aerodynamic investigations in the MSFC 14 x 14 inch Trisonic Wind Tunnel on 0.0031 scale models of the NR Expendable Second Stage (ESS) Modified S-II vehicles are presented. Three different versions of the ESS were tested both alone and mounted "piggyback" on the GD/C space shuttle booster (B-15B-1). Six component force and moment data were recorded at Mach numbers from 0.6 to 4.96 over an angle of attack range from -10° to 16° at zero degrees sideslip and over a sideslip range from -10 to 10 at 0° and -6° angles of attack. Reynolds number varied over the Mach number range from 4.4 to 8.9×10^{6} per foot. Various booster control surface deflections were tested.

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TABLE I. SADSAC NOMENCLATURE OF AERODYNAMIC 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	-	-

SUMMARY

Plotted six component aerodynamic force and moment coefficients are presented for 0.0031 scale model wind tunnel tests on NR Expendable Second Stage (ESS) Modified S-II vehicles in the NASA-MSFC 14 inch Trisonic Wind Tunnel. Three versions of the ESS were tested both alone and mounted "piggyback" on the GD/C space shuttle booster in a launch configuration (see Figures 2 through 5). Primary configuration variation was booster control surface deflection. Aerodynamic coefficient data are given in both the body and stability axis system over a Mach number range from 0.6 to 4.96. Angle of attack was varied from -10° to 16° at zero degrees sideslip while sideslip data were taken over a range from -10° to 10° at 0° and -6° angle of attack.

CONFIGURATIONS INVESTIGATED

The following components were tested in various combinations during this test as shown on the dataset collation sheets. Pertinent dimensional data for these components are given in the section entitled Model Component Description Sheets.

Symbol	Description
U	Basic ESS and MDAC Space Station vehicle configuration. Total vehicle 2320 inches long, 396 inches in diameter with a 50° included nose cone.
U_2	The ESS plus Nuclear Payload (NR RNS W/D Engines) configuration. Total vehicle 3050 inches long, 396 inches in diameter with a 25° and 50° included nose cone.
U_3	The ESS plus Space Tug configuration. Total vehicle 2200 inches long, 396 inches in diameter ESS and 180 inches in diameter space Tug with a 50° included nose cone.
B_{19}	Basic body for Booster B-15 B-1 includes eight (8) peripheral rocket engines and fairings.
W_{14}	Basic delta wing with an upswept T.E., a -4 degree twist and a 3 degree dihedral.
V_7	Basic vertical tail for the B-15 B-1 booster.
C_4	Basic canard for B-15 B-1 booster.

TEST MSFC-TWT 489 DATA SET COLLATION SHEET

☐ PRETEST

☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES ELEVON L	ELEVON R	δ_a	δ_r	NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) 0.6	0.9	1.0	1.2	1.96	2.99	4.96
R3101A	U	A	0	–	–	–	–			585	584	583	562	577	576
01B	U	-6	B	–	–	–	–		592	593	594	595	567	569	568
02A	U2	A	0	–	–	–	–			580	581	582	563	579	578
02B	U2	-6	B	–	–	–	–			598	597	596	566	571	570
03A	U3	A	0	–	–	–	–			586	587	588	564	575	574
03B	U3	-6	B	–	–	–	–			591	590	589	565	573	572
04C	$B_{19}W_{14}C_4AV_7+U$	C	0	0	0	0	0		500	501	502	503	521	524	525
05C				10/-10	0	10	0		507	506	505	504	522	528	529
06C				10/-20	-5	15	0					508		530	
07C				10/-40	-15	25	0					509		531	
08C				0	0	0	10					510		526	
09C				10/-10	0	10	0					511		527	
04B		-6	B	0	0	0	0			554	553	552	551	542	543
05B				10/-10	0	10	0					557		546	
06B				10/-20	-5	15	0					558		547	
07B				10/-40	-15	25	0					559		548	
08B				0	0	0	10					555		544	
09B				10/-10	0	10	0					556		545	
10B		0		0	0	0	0			514	513	512	523	535	536
11B		0		10/-10	0	10	0					515		534	

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

CLM CN CY CBL CYN CAF CAB CPBI CPC CL

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

α or β SCHEDULES

A) -4, -2, 0, 2, 4, 6, 8, 10, 12, 14, 16

B) -10 -8 -6 -4 -2 0 2 4 6 8 10

δ_e · elevon deflection

δ_a · aileron deflection

7

TEST MSFC-TWT 489 DATA SET COLLATION SHEET

☐ PRETEST
☒ POSTTEST

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES ELEVON L|R	δ_a	δ_3	δ_R	NO. of RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) 0.6	0.9	1.0	1.2	1.96	2.99	4.96
R3112B	$B_{19}W_{14}\overline{C}_4AV_7 + U$	0	B	10/-20	-5	15	0					516		533	
13B	↓ + U	↓	↓	10/-40	-15	25	0					517		532	
14B	↓ + U	↓		0	0	0	10					518		537	
15B	↓ + U_2	-6		0	0	0	0					560		550	
16B	↓ + U_2	6		0	0	0	0					—		540	
17C	↓ + U_2	C	↓	0	0	0	0					519		538	
18C	$B_{19}W_{14}C_4AV_7 + U_3$	C	0	0	0	0	0					520		539	
19B	↓ + U_3	-6	B	0	0	0	0					561		549	
20B	↓ + U_3	6	B	0	0	0	0					—		541	

8

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

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

α or β SCHEDULES

B) -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10

C) -10, -8, -6, -4, -2, 0, 2, 4, 6, 8, 10

NASA-MSFC-MAF

TEST FACILITY

The Marshall Space Flight Center 14" x 14" Trisonic Wind Tunnel is an intermittent blowdown tunnel which operates by high pressure air flowing from storage to either vacuum or atmospheric conditions. A Mach number range from .2 to 5.85 is covered by utilizing two interchangeable test sections. The transonic section permits testing at Mach 0.20 through 2.50, and the supersonic section permits testing at Mach 2.74 through 5.85. Mach numbers between .2 and .9 are obtained by using a controllable diffuser. The range from .95 to 1.3 is achieved through the use of plenum suction and perforated walls. Mach numbers of 1.44, 1.93 and 2.50 are produced by interchangeable sets of fixed contour nozzle blocks. Above Mach 2.50 a set of fixed contour nozzle blocks are tilted and translated automatically to produce any desired Mach number in .25 increments.

Air is supplied to a 6000 cubic foot storage tank at approximately -40°F dew point and 500 psi. The compressor is a three-stage receiprocating unit driven by a 1500 hp motor.

The tunnel flow is established and controlled with a servo actuated gate valve. The controlled air flows through the valve diffuser into the stilling chamber and heat exchanger where the air temperature can be controlled from ambient to approximately 180°F. The air then passes through the test section which contains the nozzle blocks and test region.

Downstream of the test section is a hydraulically controlled pitch sector that provides a total angle of attack range of 20° ($\pm 10^{\circ}$). Sting offsets are available for obtaining various maximum angles of attack up to 25°.

TEST CONDITIONS
TEST TWT-489

MACH NUMBER	REYNOLDS NUMBER per unit length	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)
0.6	6.5×10^6	5.58	97
0.9	6.9×10^6	7.96	95
1.0	6.7×10^6	8.33	98
1.2	6.6×10^6	8.98	97
1.96	8.9×10^6	12.80	96
2.99	4.4×10^6	4.95	98
4.96	6.1×10^6	3.40	99

BALANCE UTILIZED: TWT Model 200 and 201 Moment Balances

CAPACITY	200	201	ACCURACY:	COEFFICIENT TOLERANCE:
NF	175 lbs	60 lbs		0.3%
SF	150 lbs	20 lbs		0.3%
AF	100 lbs	30 lbs		0.3%
PM	185 in. lbs	60 in. lbs		0.3%
YM	160 in. lbs	20 in. lbs		0.3%
RM	50 in. lbs	25 in. lbs		0.3%

COMMENTS:

No satisfactory method is known for determining the absolute accuracy of the final data coefficients.

DATA REDUCTION

FOR SADSAC

The six component aerodynamic force and moment data were reduced to coefficient form in the body axis system using reference values given in Table II. Moments are about the booster nose as shown in Figure 13 for all configurations. The ESS alone moment data are about this same point even though it is physically off the model. Static pressure was measured on the vehicle base and in the balance cavity area. Figure 14 shows the base pressure orifice locations fo the ESS and Figure 15 shows the booster tap locations for the launch configuration. During launch testing pressures were measured on the booster base only. Axial force was corrected for these pressure effects by the following equations:

$$CA_F = C_A - (C_{A_b} + C_{A_c})$$

where

$$C_{A_b} = - \left[(C_{P_{B_1}})(A_{b_1}) + (CP_{B_2})(A_{b_2})\right] \frac{1}{S_{REF}}$$

and

$$C_{p_B} = (p_b - p_\infty)/q_\infty$$

$$C_{A_c} = - \left[(p_c - p_\infty)/q_\infty\right] \; Ac/S_{REF}$$

BY SADSAC

Center of pressure location was determined as a percent of body length by one of the following equations:

$$X_{cp} = \left[X_{c.g.} - (CLM/CN)\,\bar{c}\right] 1/\ell$$

or

$$X_{cp} = \left[X_{c.g.} - (CYN/CY)\,b_{ref}\right] 1/\ell$$

where X_{cg} = fus. sta. of c.g.

$\bar{c}$ = wing mean aerodynamic chord

b_{ref} = reference wing span

ℓ = body length

REFERENCE DIMENSIONS -

(MODEL SCALE)

Configuration & Test No.	S_{ref} Area $in.^2$	M. A. C. ($\bar{c}$) in.	SPAN (b) in.	BODY LENGTH in.	BASE AREA $in.^2$	CAVITY AREA $in.^2$	C. G., in. (Y = O)	
							X	Z
ESS + MDAC Space Station (U)	15.656	3.095	6.099	7.192	0.731	0.454	1.717 (From U Nose)	-1.332
ESS & Nuclear Payload (U2)	15.656	3.095	6.099	9.455	0.731	0.454	3.980 (From U2 Nose)	-1.332
ESS & Space Tug (U3)	15.656	3.095	6.099	6.820	0.743	0.442	1.345 (From U3 Nose)	-1.332
ESS Launch (U or U2 or U3)+B	15.656	3.095	6.099	9.734 (B Nose to Wing T. E.)	A_{b1} = 0.418 A_{b2} = 0.634	0.785	0.0 (B Nose)	0.0

TABLE II

SUMMARY DATA PLOT INDEX

PLOT TITLE	PLOTTED COEFFICIENT SCHEDULE	CONDITIONS VARYING	MACH NUMBER	NOMINAL SCHEDULE (DEGREES)	NOMINAL SCHEDULE (DEGREES)	PAGES
Longitudinal Characteristics - Booster With 3 Payload Configuration Comparisons	A	Configuration	1.2 & 2.99	-11 - 11	0	1-12
Elevon Effectiveness in Pitch, Beta = 0, B + U Configuration	A	Elevon Deflection	0.6-4.96	-11 - 11	0	13-54
Rudder and Elevon Effectiveness in Pitch, Beta = 0, B + U Configuration	A	Rudder and Elevon Deflection	0.6-4.96	-11 - 11	0	55-96
Elevon Effectiveness in Yaw, Alpha = 0, B + U Configuration	C	Elevon Deflection	1.2 - 3.0	-11 - 11	0	97-110
Elevon Effectiveness in Yaw, Alpha = -6, B + U Configuration	C	Elevon Deflection	1.2 - 3.0	-6	-11 - 11	111-124
Rudder and Elevon Effectiveness in Yaw, Alpha = -6, B + U Configuration	C	Rudder and Elevon Deflection	1.2 - 3.0	-6	-11 - 11	125-138
Booster With 3 Payload Configuration Comparisons in Sideslip	C	Configuration	1.2 - 3.0	-6	-11 - 11	139-152
Longitudinal Characteristics - ESS + Payload	B	Configuration	.9 - 3.0	-4 - 16	0	153-170
ESS + Payload in Sideslip - Alpha = -6	D	Configuration	.9-4.96	-6	-11 - 11	171-194
ESS + Payload in Sideslip for Alpha = 0 and -6 Degrees	C	Angle of Attack	1.2 - 3.0	0 & -6	-11 - 11	195-208

SUMMARY DATA PLOT INDEX
(Continued)

PLOTTED COEFFICIENT SCHEDULE

A			B			C			D		
CN	vs.	α	CN	vs.	α	CN	vs.	β	CY	vs.	β
CAF	vs.	α	CAF	vs.	α	CAF	vs.	β	CYN	vs.	β
CIM	vs.	α	CIM	vs.	α	CIM	vs.	β	CBL	vs.	β
CY	vs.	α				CY	vs.	β	XCPY/L	vs.	β
CYN	vs.	α				CYN	vs.	β			
CBL	vs.	α				CBL	vs.	β			
						XCPY/L	vs.	β			

FIGURES

Notes:

1. Positive directions of force coefficients moment coefficients, and angles are indicated by arrows.

2. For clarity, origins of wind and stability axes have been displaced from the center of gravity.

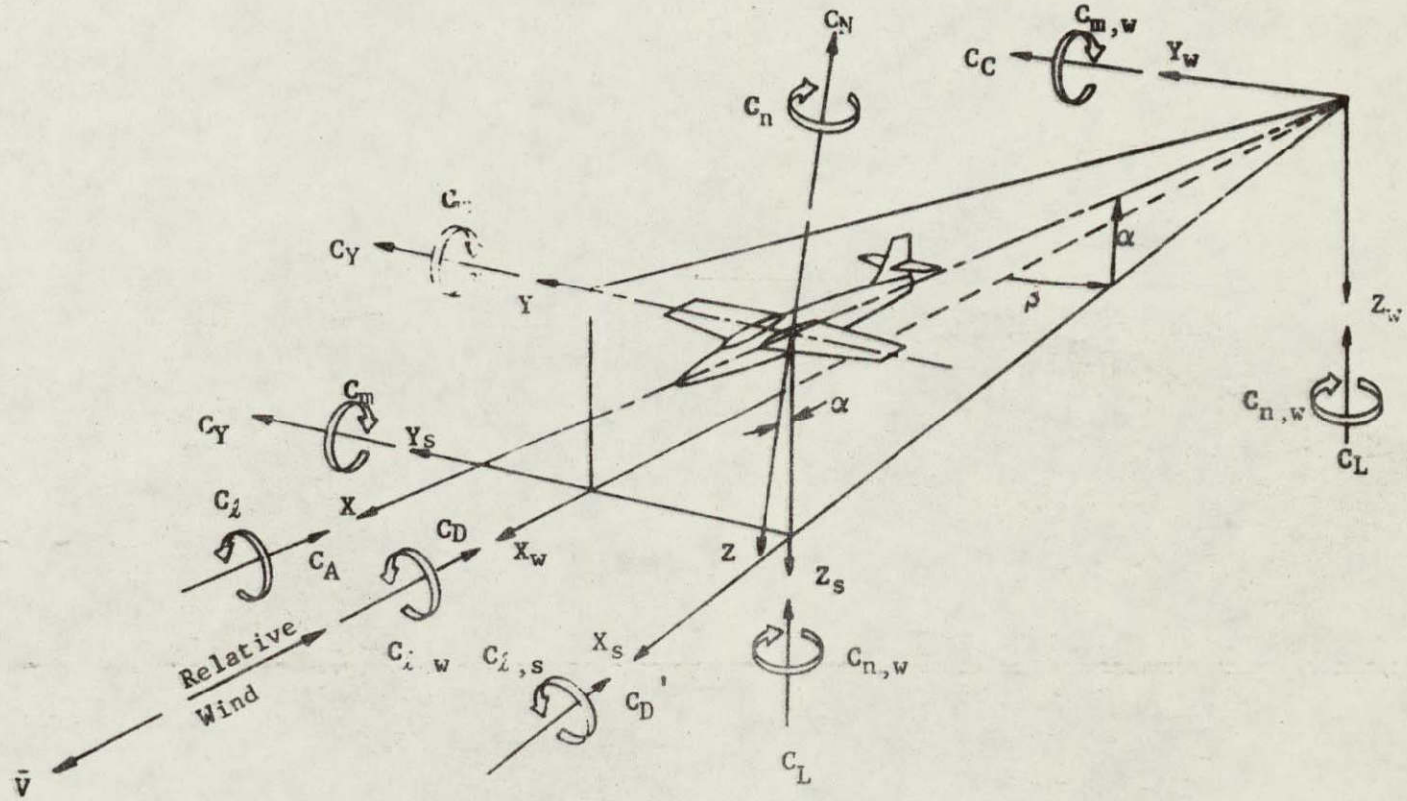


Figure 1. Axis systems, showing direction and sense of force and moment coefficients, angle of attack, and sideslip angle

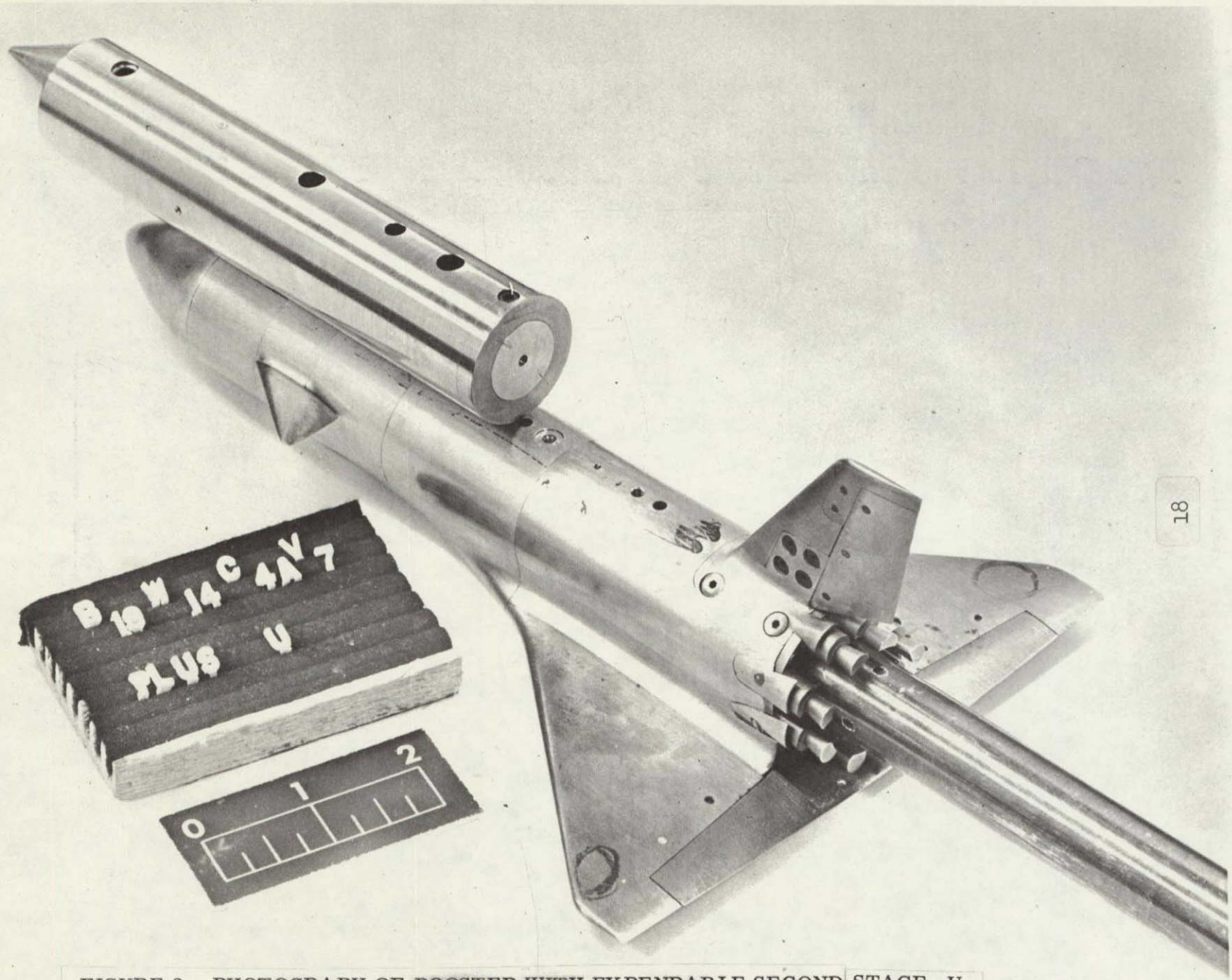


FIGURE 2. PHOTOGRAPH OF BOOSTER WITH EXPENDABLE SECOND STAGE, U.

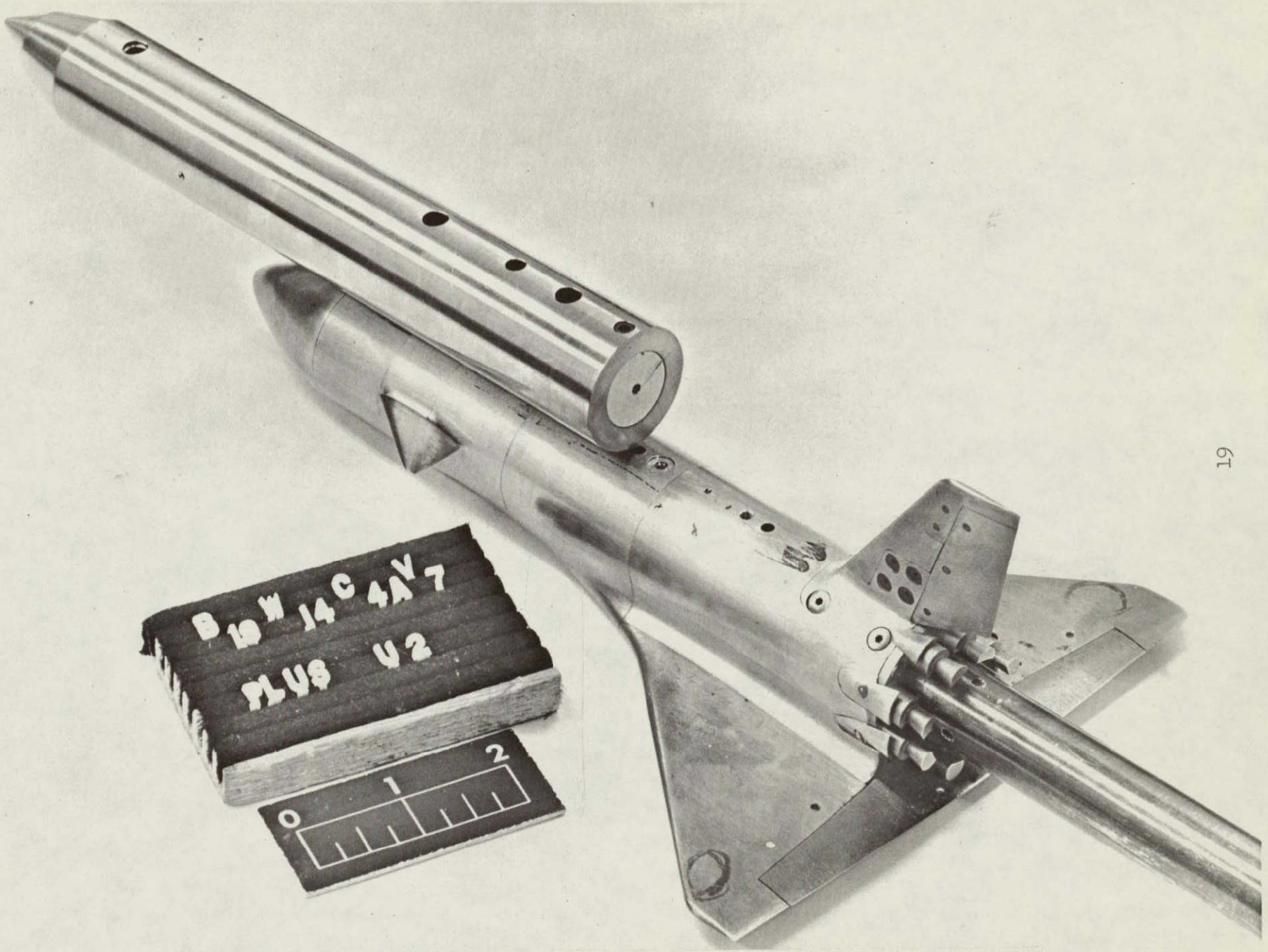


FIGURE 3. PHOTOGRAPH OF BOOSTER WITH EXPENDABLE SECOND STAGE, U_2.

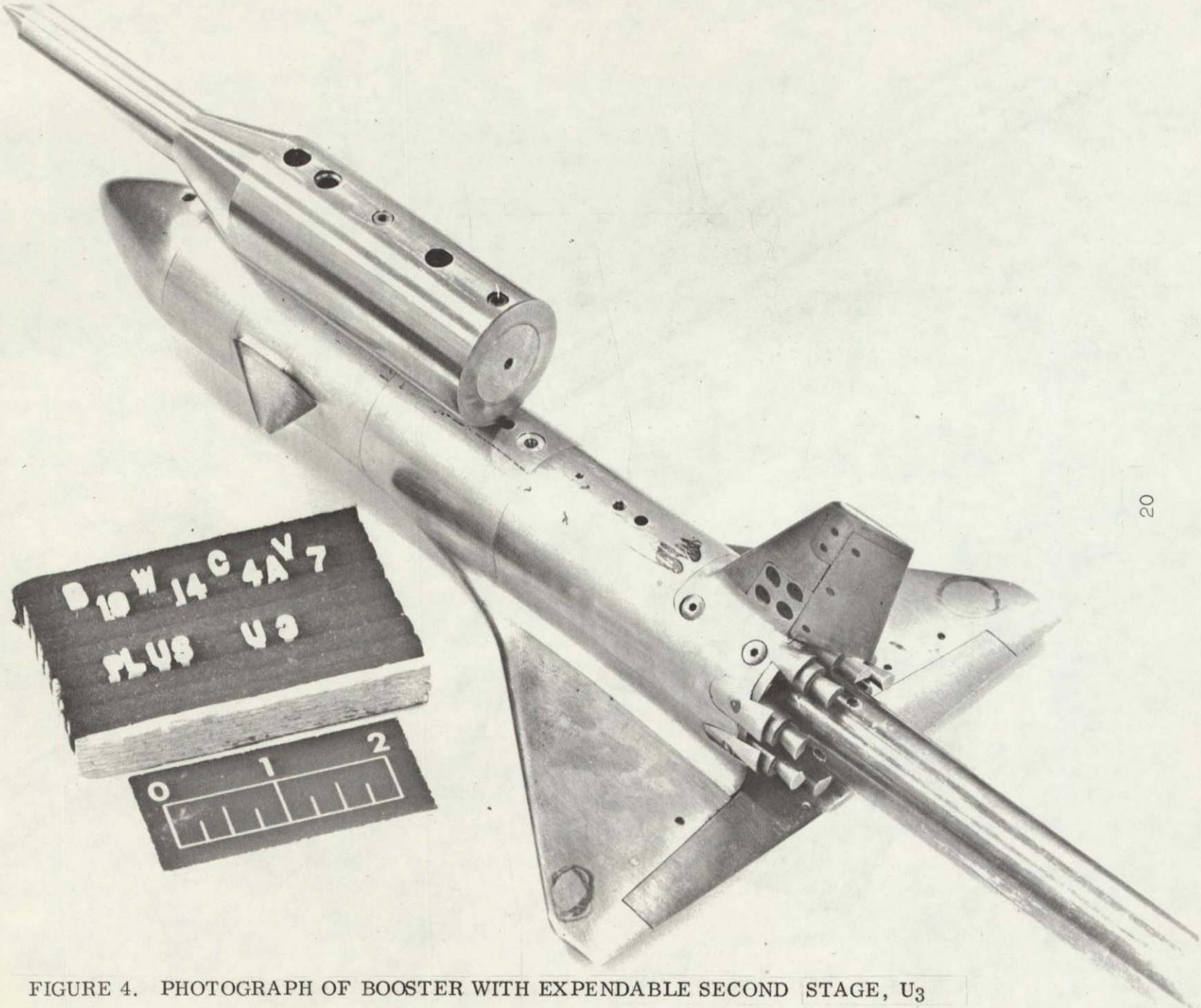


FIGURE 4. PHOTOGRAPH OF BOOSTER WITH EXPENDABLE SECOND STAGE, U_3

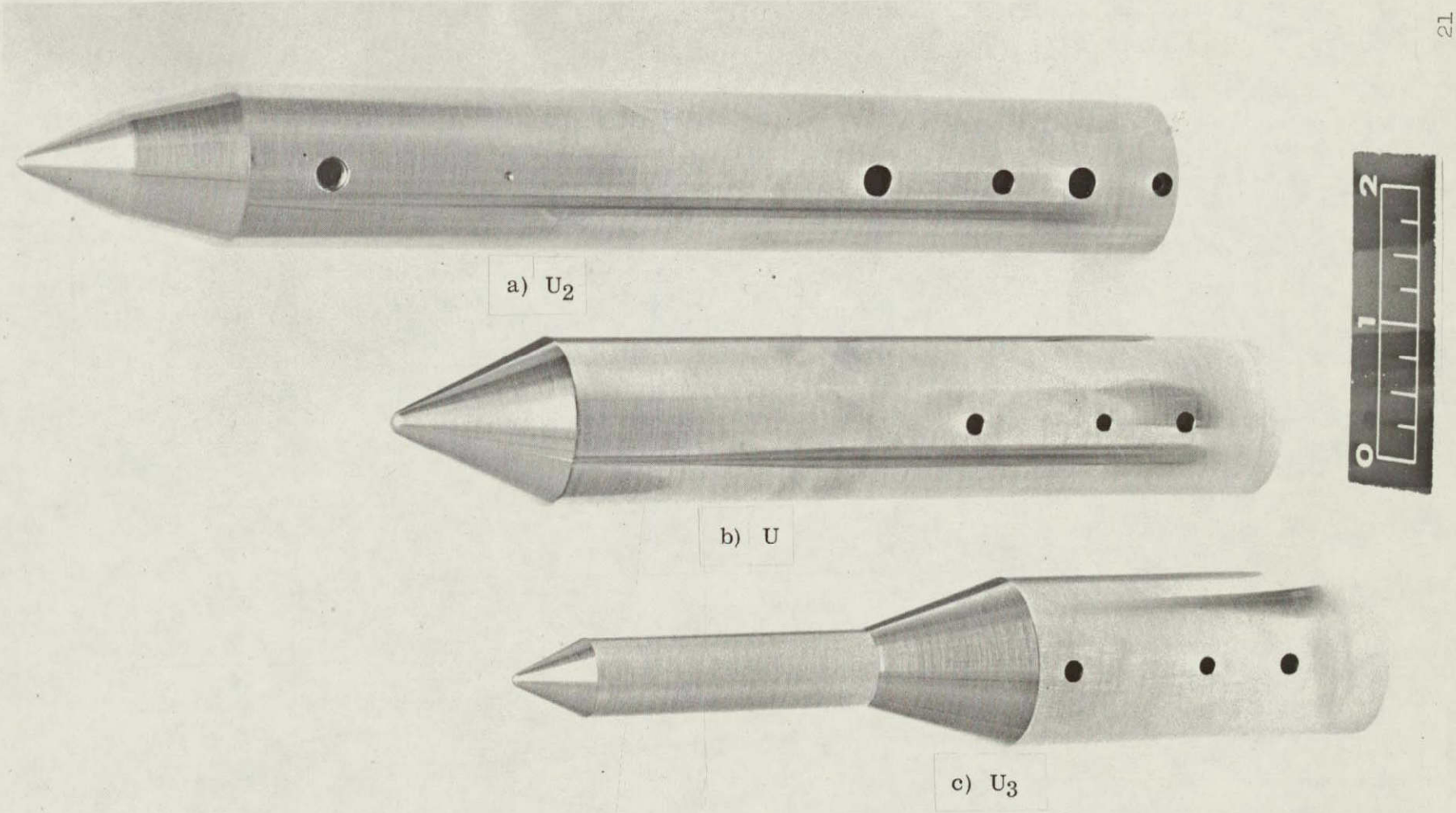


FIGURE 5. PHOTOGRAPH OF EXPENDABLE SECOND STAGES TESTED

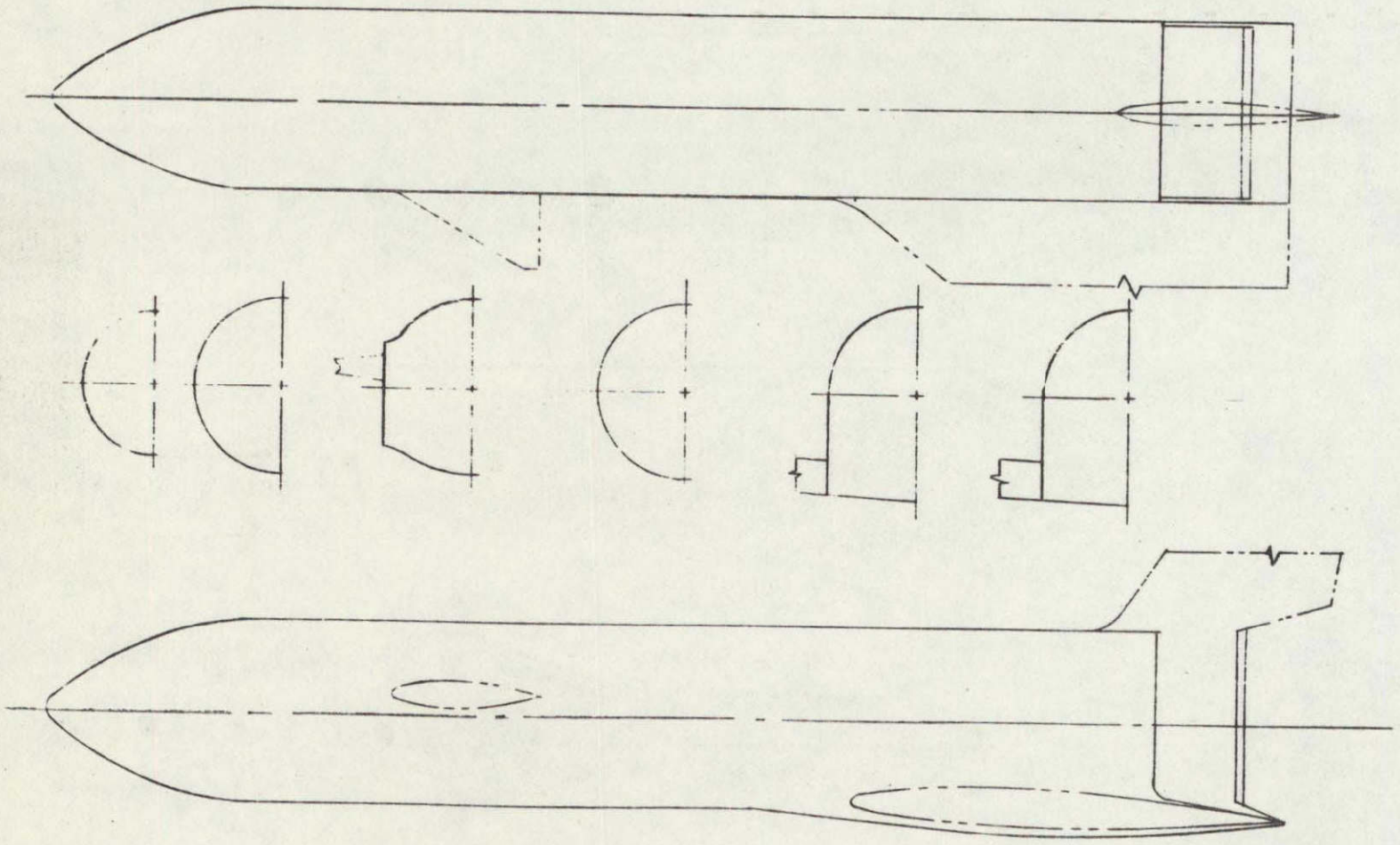


FIGURE 6. BODY B_{19} - BOOSTER B-15 B-1 CONFIGURATION

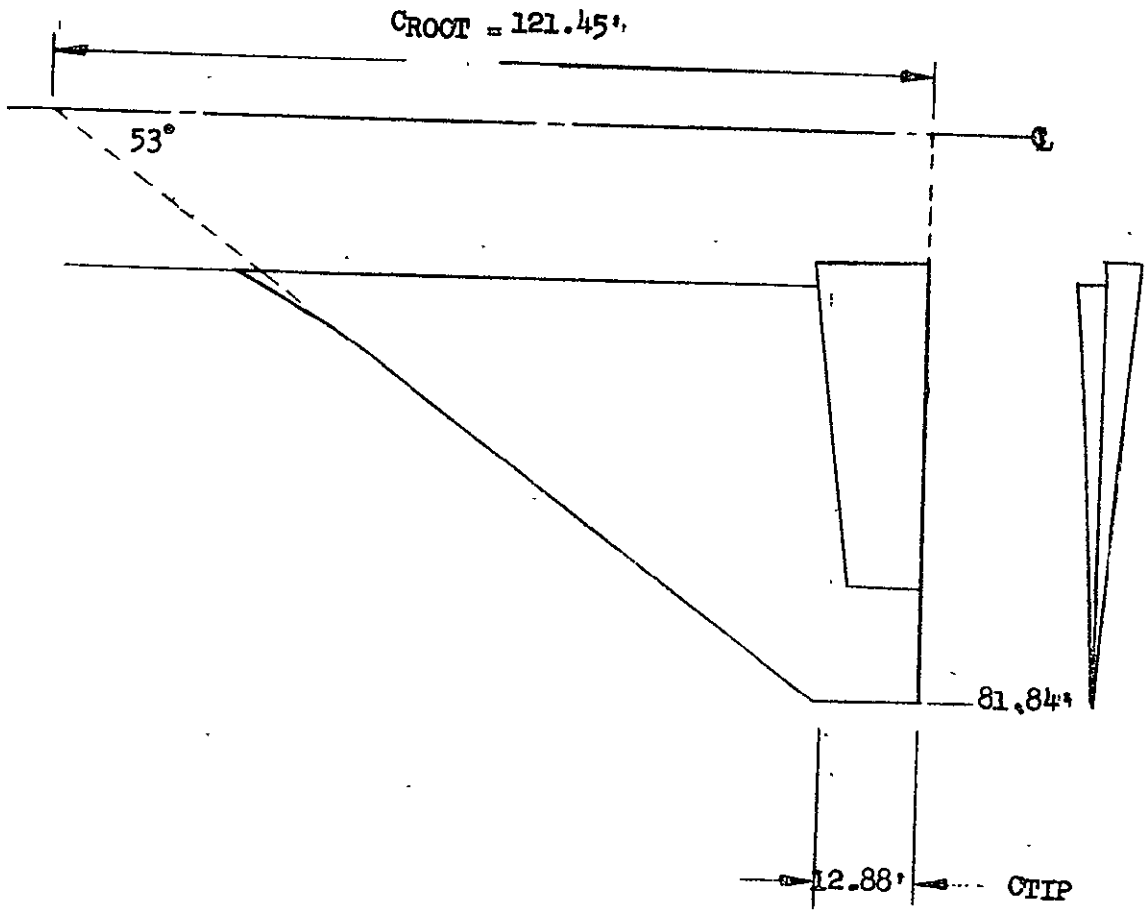


FIGURE 7. WING W14 - BOOSTER CONFIGURATION

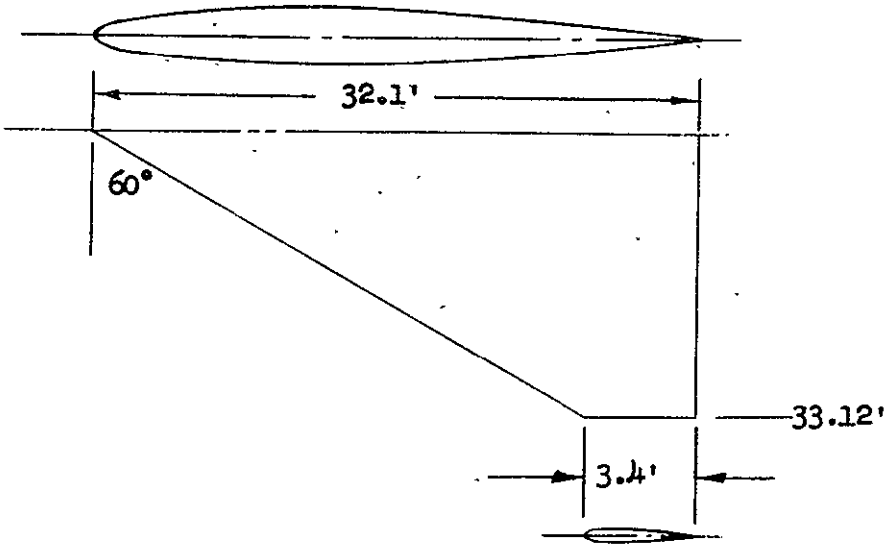


FIGURE 8. CANARD - C_4

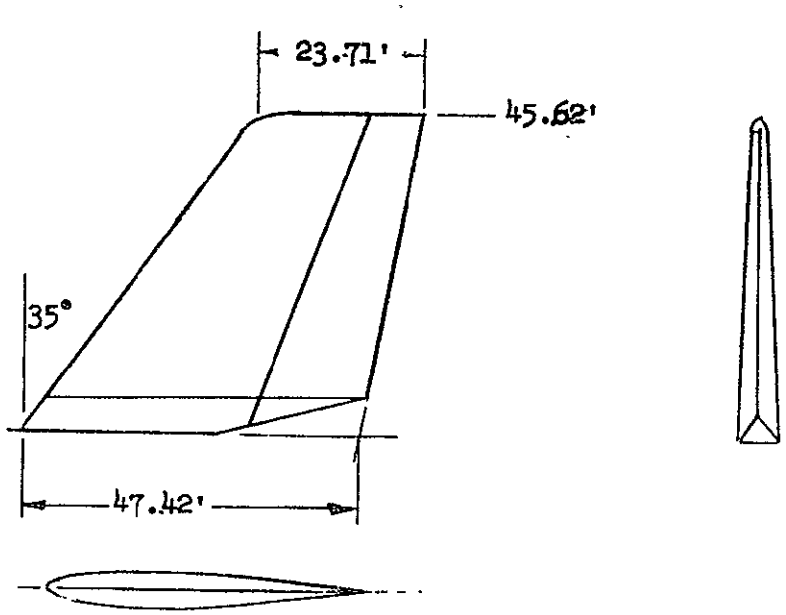


FIGURE 9. VERTICAL TAIL - V_7

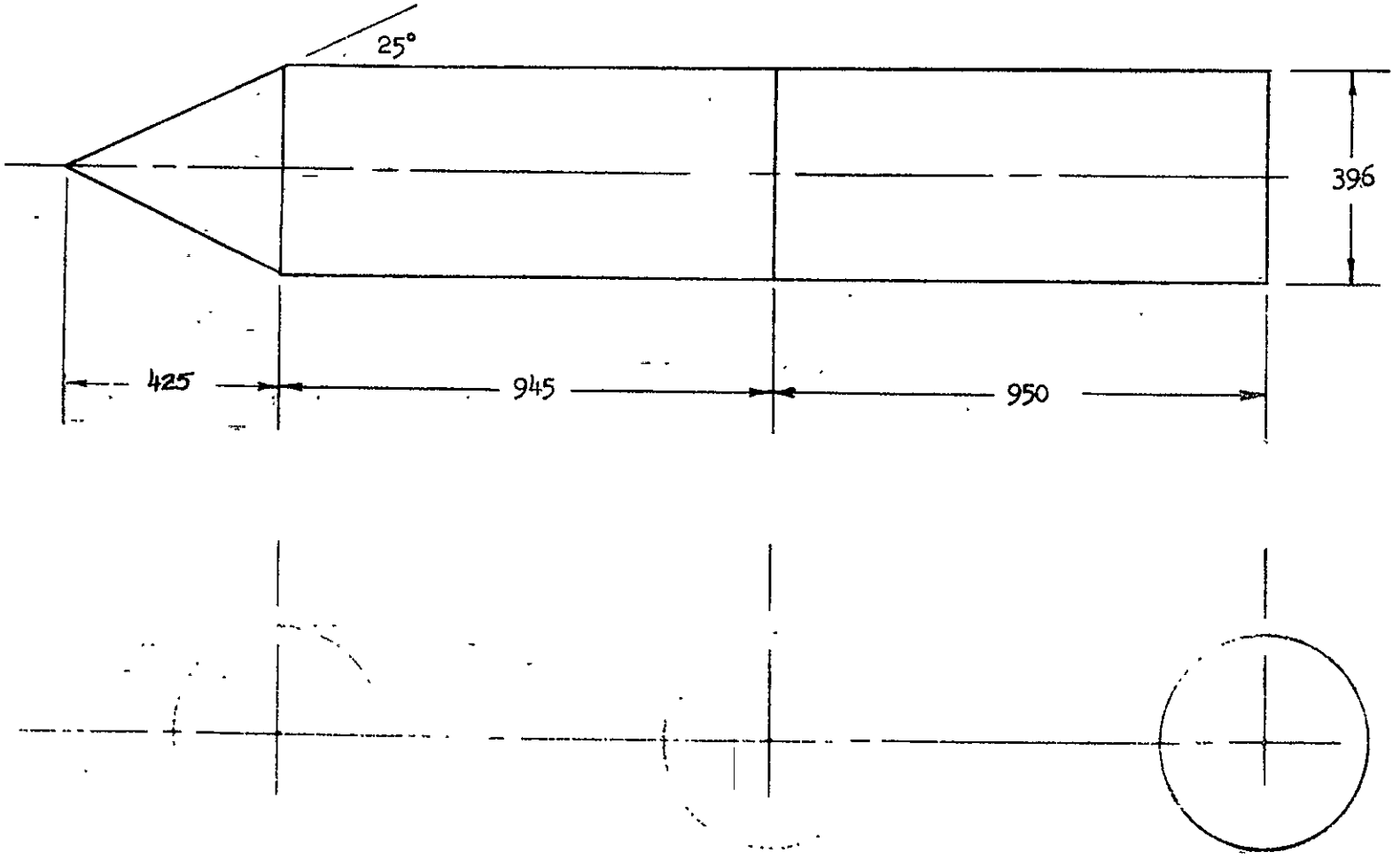


FIGURE 10.ESS VEHICLE - U

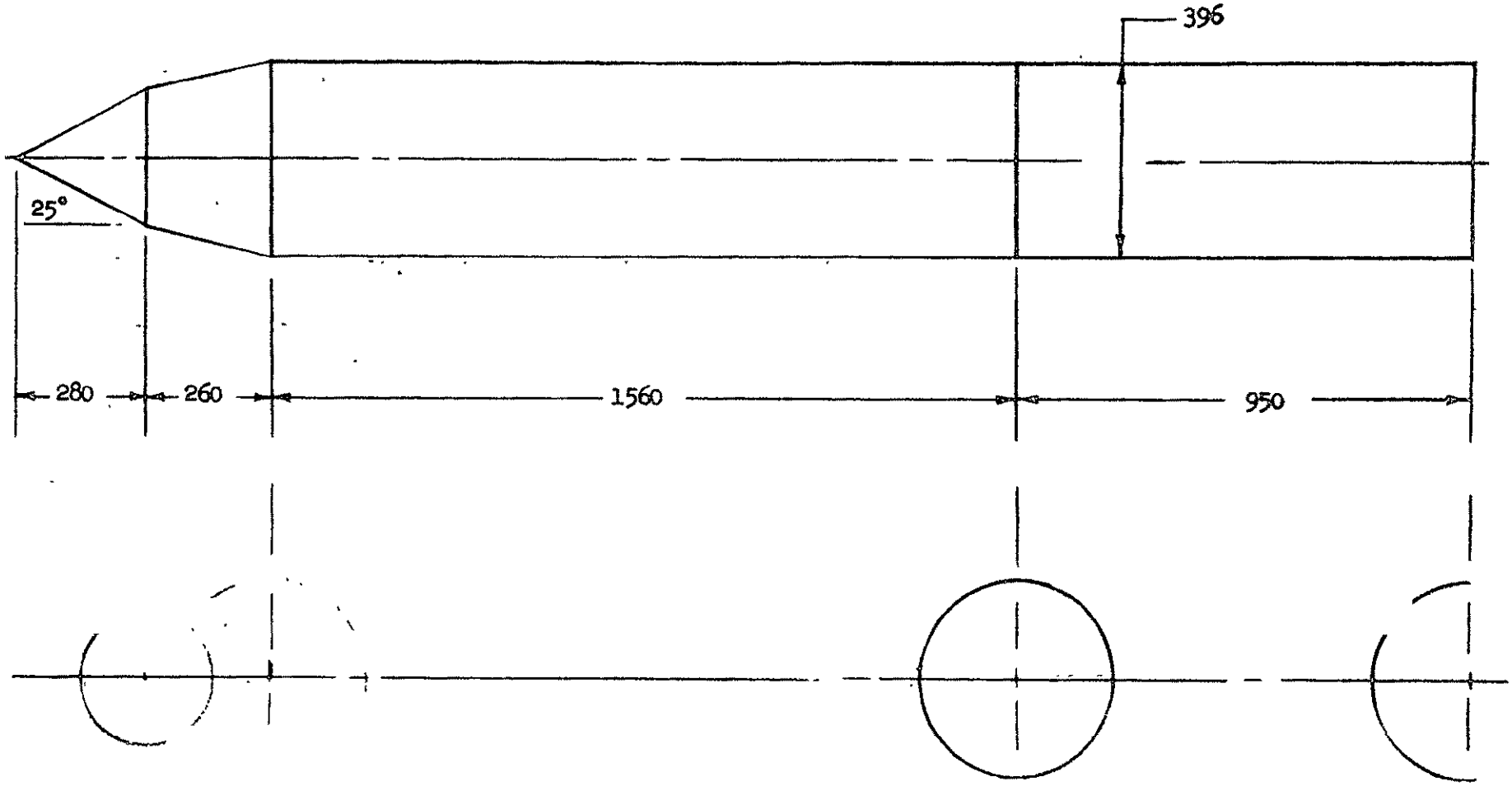


FIGURE 11. ESS VEHICLE - U_2

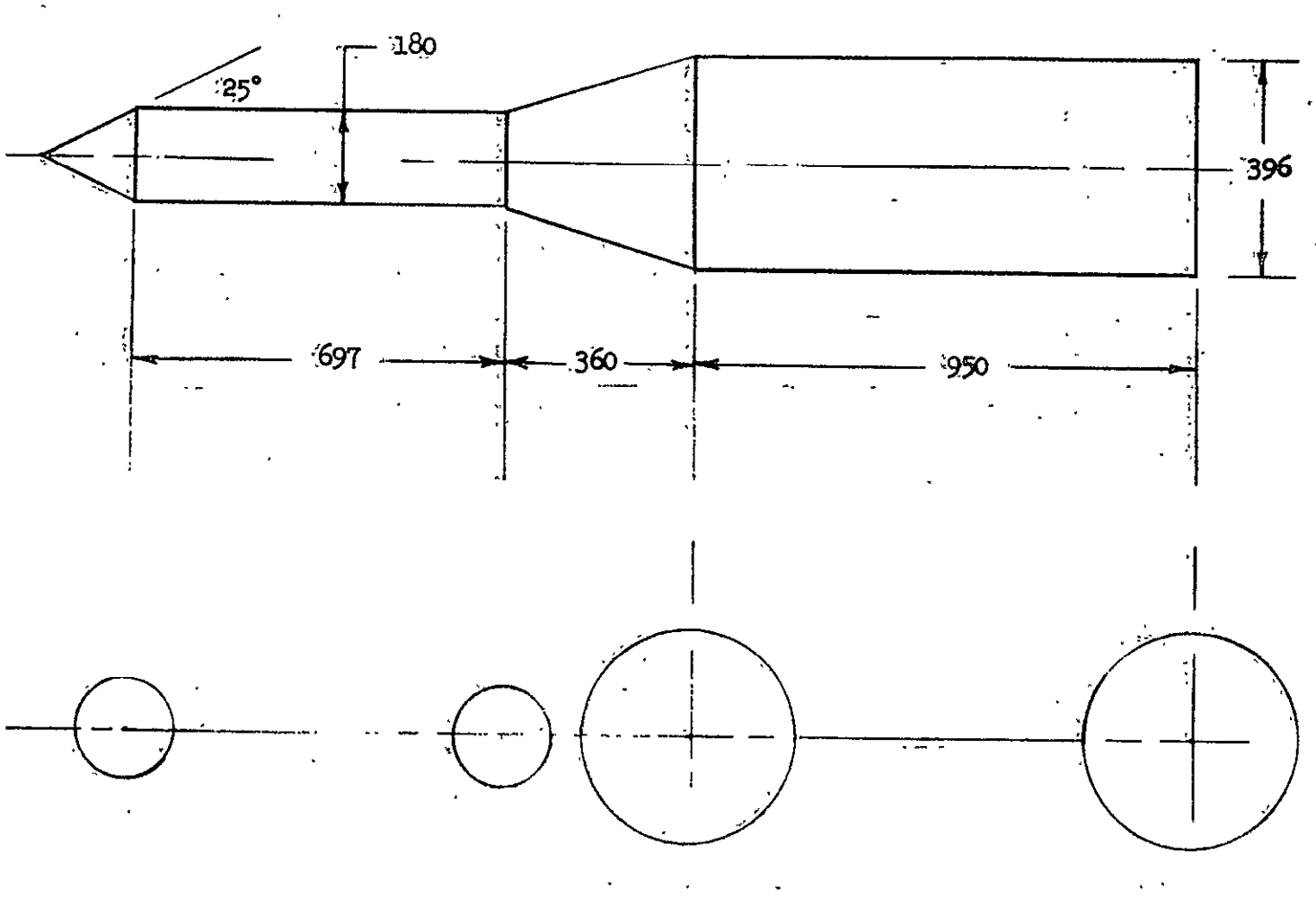
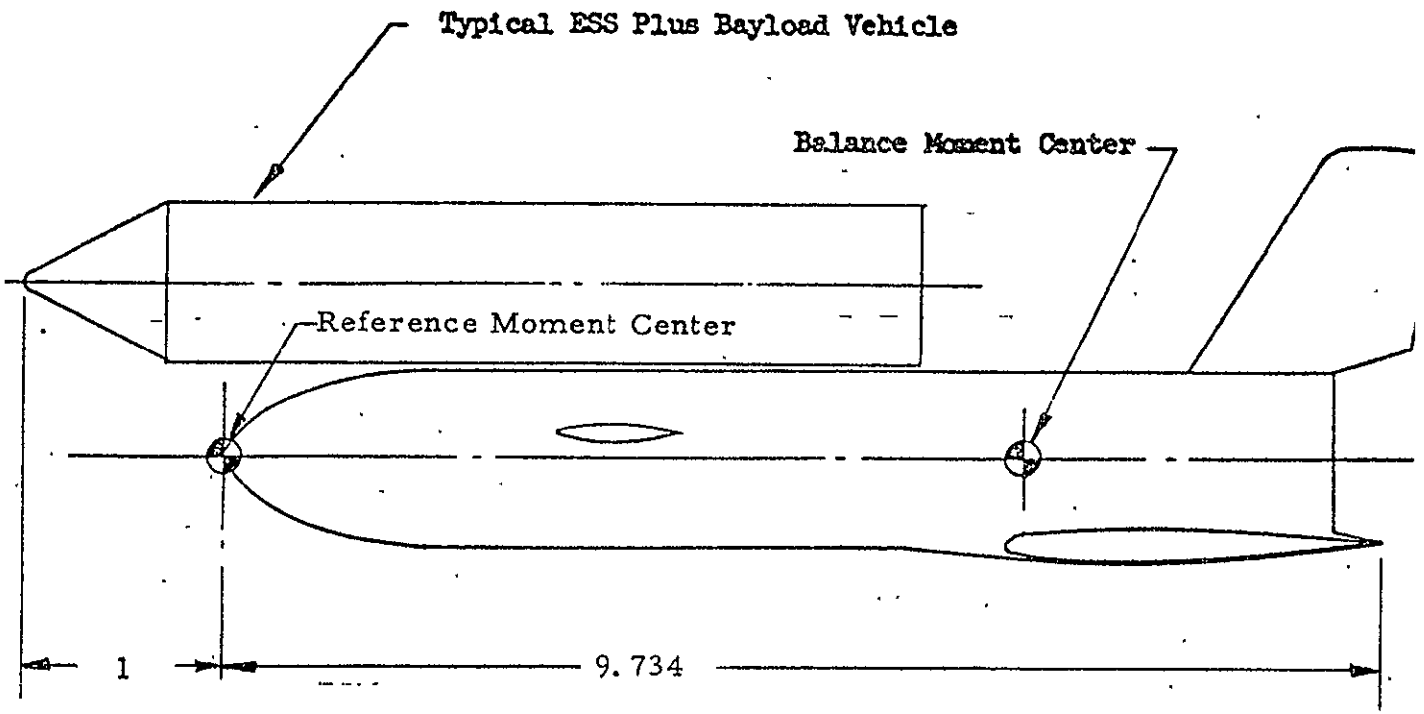
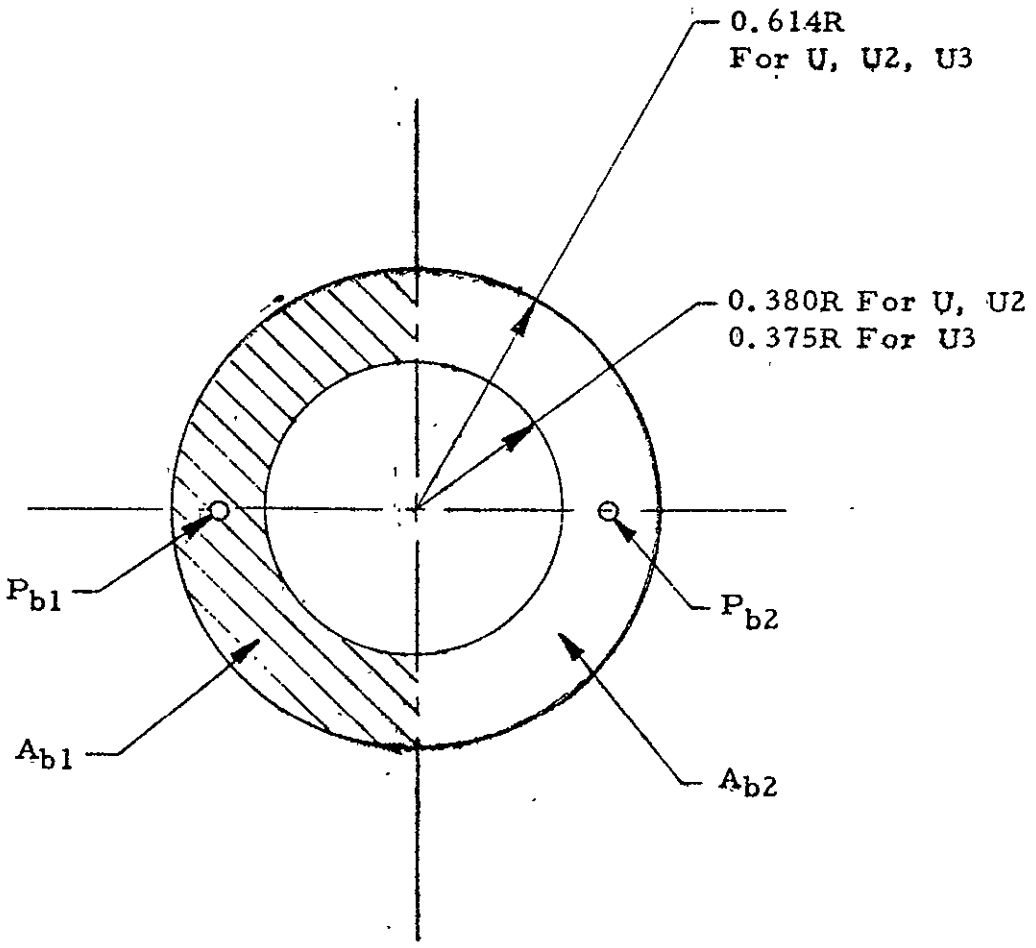


FIGURE 12. ESS VEHICLE - U_3



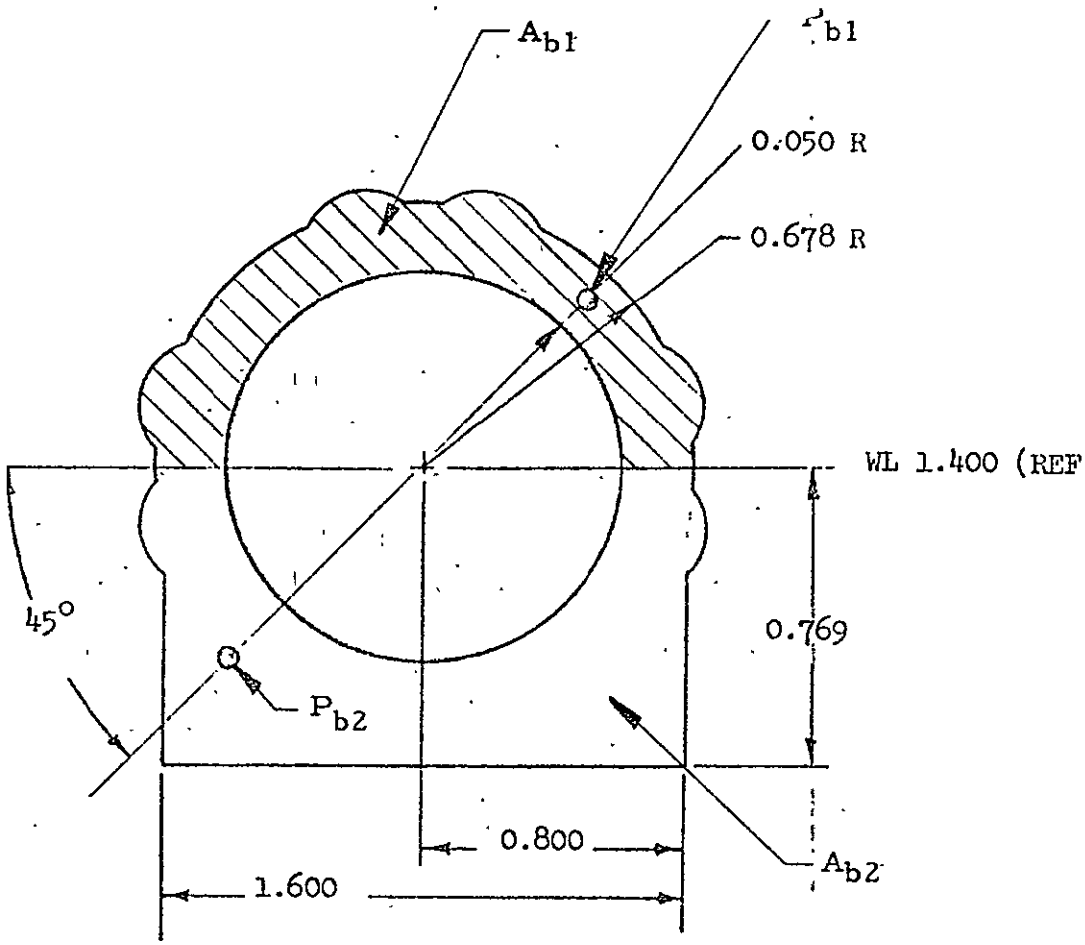
1 for U = 1.717
U2 = 3.980
U3 = 1.355

FIGURE 13. MOMENT REFERENCE CENTER LOCATION



Note: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 14 . Location of Base Pressure Taps for ESS Alone.



View Looking Forward

NOTE: Location of pressure taps may vary slightly as installation will be made during test setup.

Figure 15 . Location of Base Pressure Taps for Launch Configurations.

MODEL COMPONENT DESCRIPTION SHEETS

MODEL COMPONENT: BODY - B_{19}

GENERAL DESCRIPTION: Body for B-15B Delta Wing Configuration, with circular cross section at nose, fairing to flat bottom at wing. Flats on sides to close up at canard root forward of hinge line. Fairings over rocket engines.

DRAWING NUMBER: WT-70-105222

DIMENSIONS:	FULL-SCALE	MODEL SCALE AS BUILT
Length (nose to wing T. E.)		9734
Max. Width		1.356
Max. Depth		1.587
Fineness Ratio		6.13
Area		
Max. Cross-Sectional		2.252
Planform		12.501
Wetted		
Base		1.840

MODEL COMPONENT: Wing W_{14}

GENERAL DESCRIPTION: W_{10} modified to unswept trailing edge and with twist outboard of B. L. 340 linearly increasing to -4 degrees at tip and with leading edge faired into fuselage(W_{10} is the basic B-15B wing)

DRAWING NUMBER: WF-7-105222

DIMENSIONS:	FULL-SCALE	MODEL SCALE AS BUILT
TOTAL DATA		
Area		
Planform		15.656
Wetted		
Span (equivalent)		6.099
Aspect Ratio		2.37
Rate of Taper		
Taper Ratio		0.1192
Dihedral Angle, degrees		3 at T. E.
Incidence Angle, degrees at root		2
Aerodynamic Twist, degrees		-4
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge		53
Trailing Edge		0
0.25 Element Line		44.85
Chords:		
Root (Wing Sta. 0.0)		4.587
Tip, (equivalent)		0.547
MAC		3.095
Fus. Sta. of .25 MAC		10.913*
W.P. of .25 MAC		0.766
B.L. of .25 MAC		1.126
Airfoil Section		
Root	NACA -0010-64 (mod)	
Tip	NACA -0010-64 (mod)	
EXPOSED DATA		
Area		10.03
Span, (equivalent)		4.743
Aspect Ratio		2.24
Taper Ratio		0.1465
Chords		
Root		3.684
Tip		0.547
MAC		2.504
Fus. Sta. of .25 MAC		11.356*
W.P. of .25 MAC		0.776
B.L. of .25 MAC		1.572

*Fuselage stations are relative to an origin 3.500 inches ahead of the nose c

MODEL COMPONENT: Canard C_4

GENERAL DESCRIPTION: Basic canard for B-15B Delta Wing Configuration

DRAWING NUMBER: WT-70-105224

DIMENSIONS:	FULL-SCALE	MODEL SCALE AS BUILT
Area (exposed)		0.706
Span (equivalent)		2.576
Inb'd equivalent chord		1.061
Outb'd equivalent chord		0.099
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord		
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge		57.68
Tailing Edge		0
Hingeline		
Area Moment (Normal to hinge line)		

Hinge line located at 25% of M.A.C.of exposed area

MODEL COMPONENT: Vertical - V_7

GENERAL DESCRIPTION: Basic vertical for B-15B Delta Wing Configuration

DRAWING NUMBER: WT-70-103222

DIMENSIONS:	FULL-SCALE	MODEL SCALE AS BUILT
Area		2.135
Span (equivalent)		1.674
Inb'd equivalent chord		1.723
Outb'd equivalent chord		0.826
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord		0.35
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge		36.40
Tailing Edge		11.29
Hingeline		19.83
Area Moment (Normal to hinge line)		

3.0 MODEL DESCRIPTION

3.2 Model Nomenclature

3.2.1 Expendable Second Stage - (Cont'd)

MODEL COMPONENT: BODY - U ESS plus MDAC payload

GENERAL DESCRIPTION: Expendable second stage and MDAC space station are cylinders with a NASA nose cone.

Model Scale: 0.0031

DRAWING NUMBER: _____

DIMENSIONS:	FULL-SCALE ESS	FULL-SCALE MDAC	MODEL SCALE
Length, in.	950	1370	7.192
Max. Width, in.	396	396	1.228
Max. Depth, in.	396	396	1.228
Fineness Ratio			
Area			
Max. Cross-Sectional, ft.^{2}	855	855	0.008225
Planform			
Wetted			
Base			
Apex Angle (Cone)	50°		50°

3.0 MODEL DESCRIPTION

3.3 Dimensional Data

3.3.1 Expendable Second Stage - (Cont'd)

MODEL COMPONENT: BODY U2ESS plus RNS Payl

GENERAL DESCRIPTION: Expendable Second Stage and RNS payload are cylinder with NASA nose cone and adaptor.

Model Scale: 0.0031

DRAWING NUMBER:

DIMENSIONS:	FULL-SCALE ESS	FULL-SCALE + RNS	MODEL SCALE
Length, in.	950	2100	9.455
Max. Width, in.	396	396	1.228
Max. Depth, in.	396	396	1.228
Fineness Ratio			
Area			
Max. Cross-Sectional, ft.^{2}	855	855	0.008225
Planform			
Wetted			
Base			
Apex Angle (Cone)	50°		50°

3.0 MODEL DESCRIPTION -

3.2 Model Nomenclature

3.2.1 Expendable Second Stage - (Cont'd)

MODEL COMPONENT: BODY - U_3 ESS plus Space Tug Payload

GENERAL DESCRIPTION: Expendable Second Stage and Space Tug payload are cylinders with NASA nose cones and adaptor.

Model Scale: 0.0031

DRAWING NUMBER:

DIMENSIONS:	FULL-SCALE ESS + Space Tug	MODEL SCALE
Length, in.	950 1250	6.820
Max. Width, in.	396 180	1.228
Max. Depth , in.	396 180	1.228
Fineness Ratio		
Area		
Max. Cross-Sectional, ft^2	855 176.75	0.008225
Planform		
Wetted		
Base		
Apex Angle (Cone)	50°	50°

GENERAL NOMENCLATURE

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/	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 axi:
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; $C_A - C_{A_t}$
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}

NOMENCLATURE (Continued)

Body Axis System

SYMBOL	SADSAC SYMBOL	DEFINITION
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; $[-1]\ [(p_b - p_\infty)/q]\ (A_b/S)$
C_{A_f}	CAF	forebody axial force coefficient; $C_A - C_{A_b}$
C_m	CIM	pitching moment coefficient; $M_Y/qS\ \ell_{ref}$
C_y	CY	side force coefficient; F_Y/qS
C_n	CYN	yawing moment coefficient; $M_Z/qS\ b_{ref}$
C_ℓ	CBL	rolling moment coefficient, $M_X/qS\ b_{ref}$

NOMENCLATURE (Continued)

Stability Axis System

SYMBOL	SADSAC SYMBOL	DEFINITION
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_m	CLM	pitching moment coefficient; $M_{Y,s}/qS\ \ell_{ref}$
C_y	CY	side force coefficient; F_Y/qS
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

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		ıtisymmetrical surface deflection angle, degrees; ɔsitive 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
NR	Mr. C. R. Leef

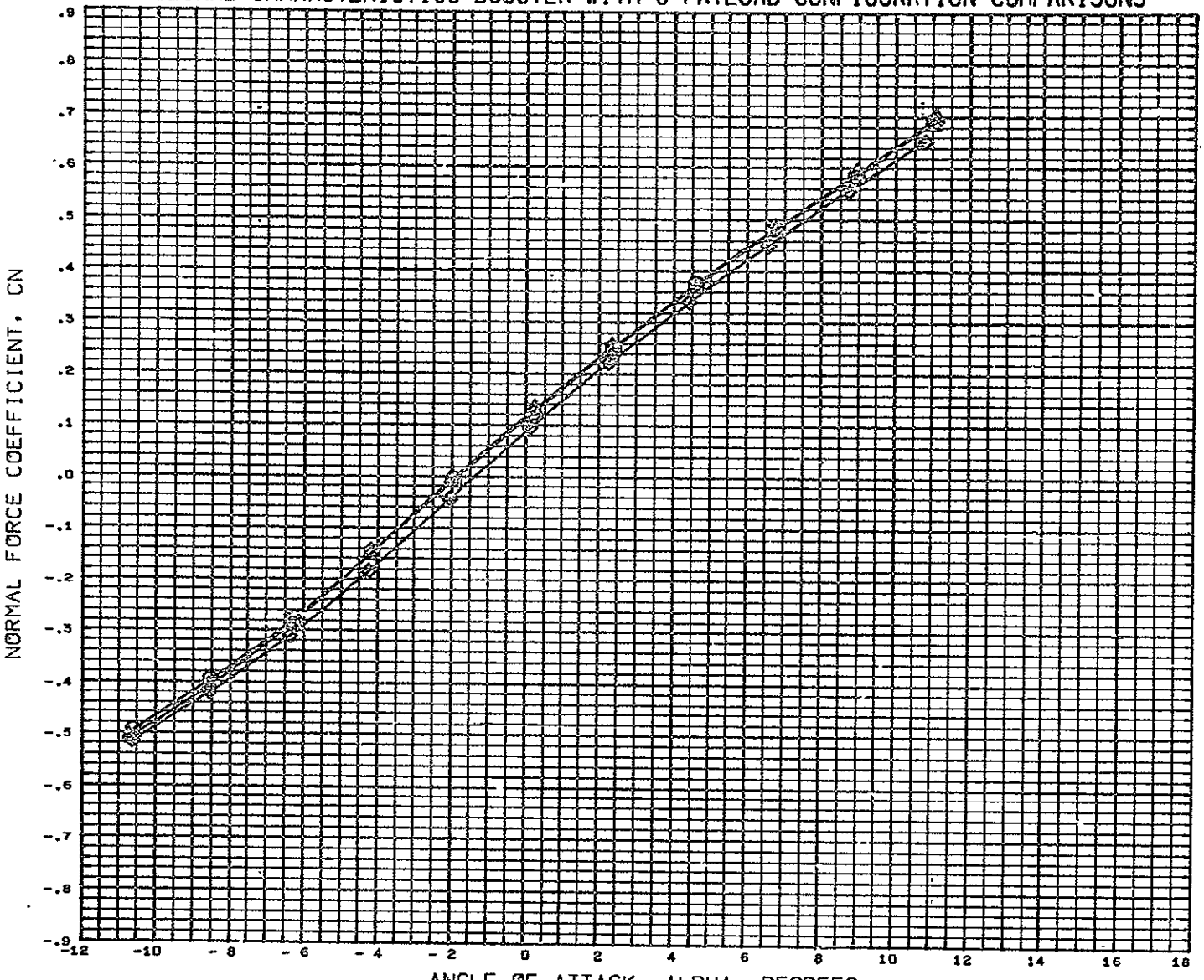
If copies of this listing are desired, please contact the above or the cognizant SADSAC personnel who, for this data, is:

Mr. J. Ziler
Department 2780
Chrysler Corporation Space Division
New Orleans, La. 70129

(504) 255-2304

DATA

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.030	0.000	0.000	0.000
0.010	0.000	0.000	0.000

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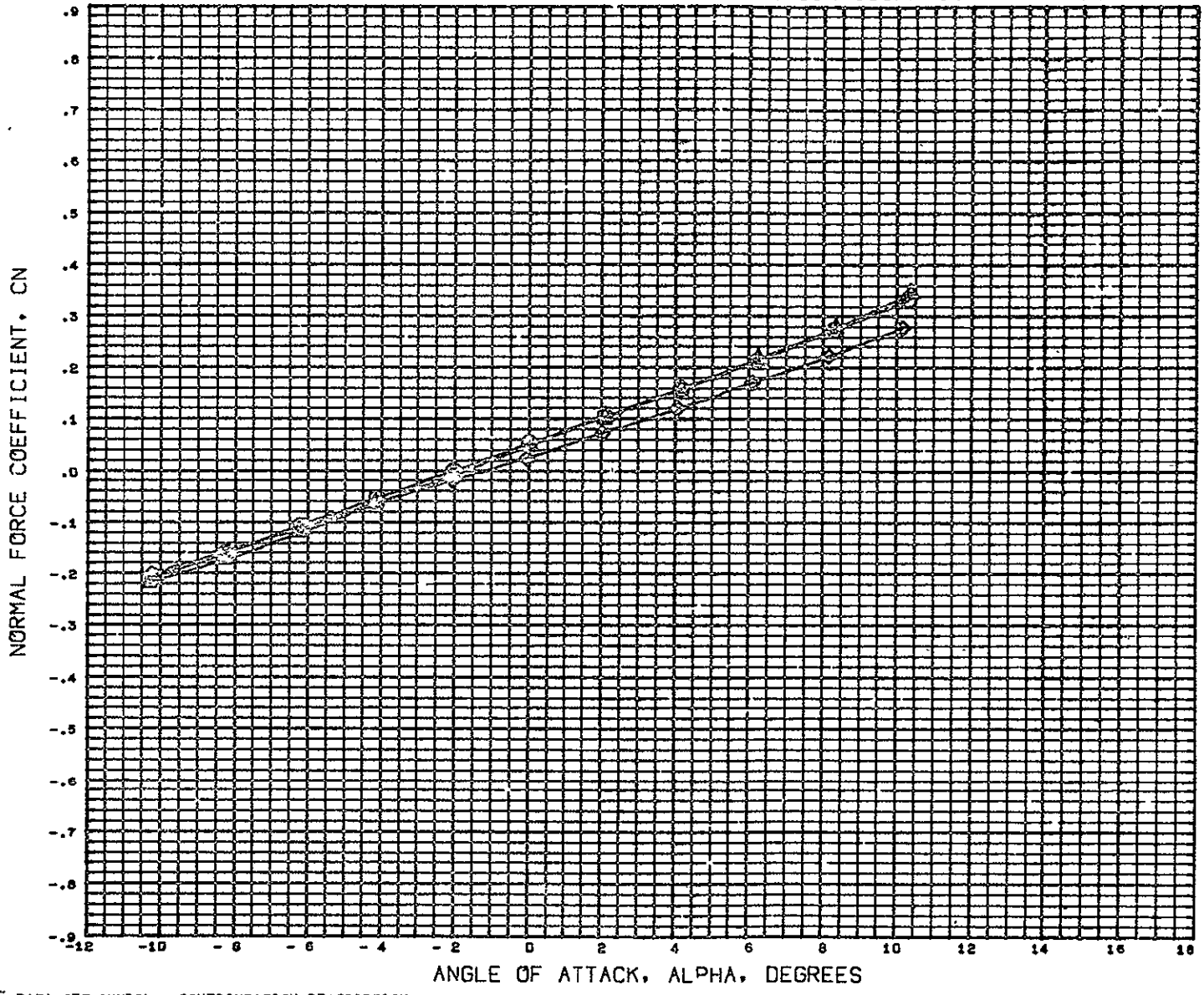
MACH 1.200

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	0.030	0.000	0.000	0.000
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	0.010	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
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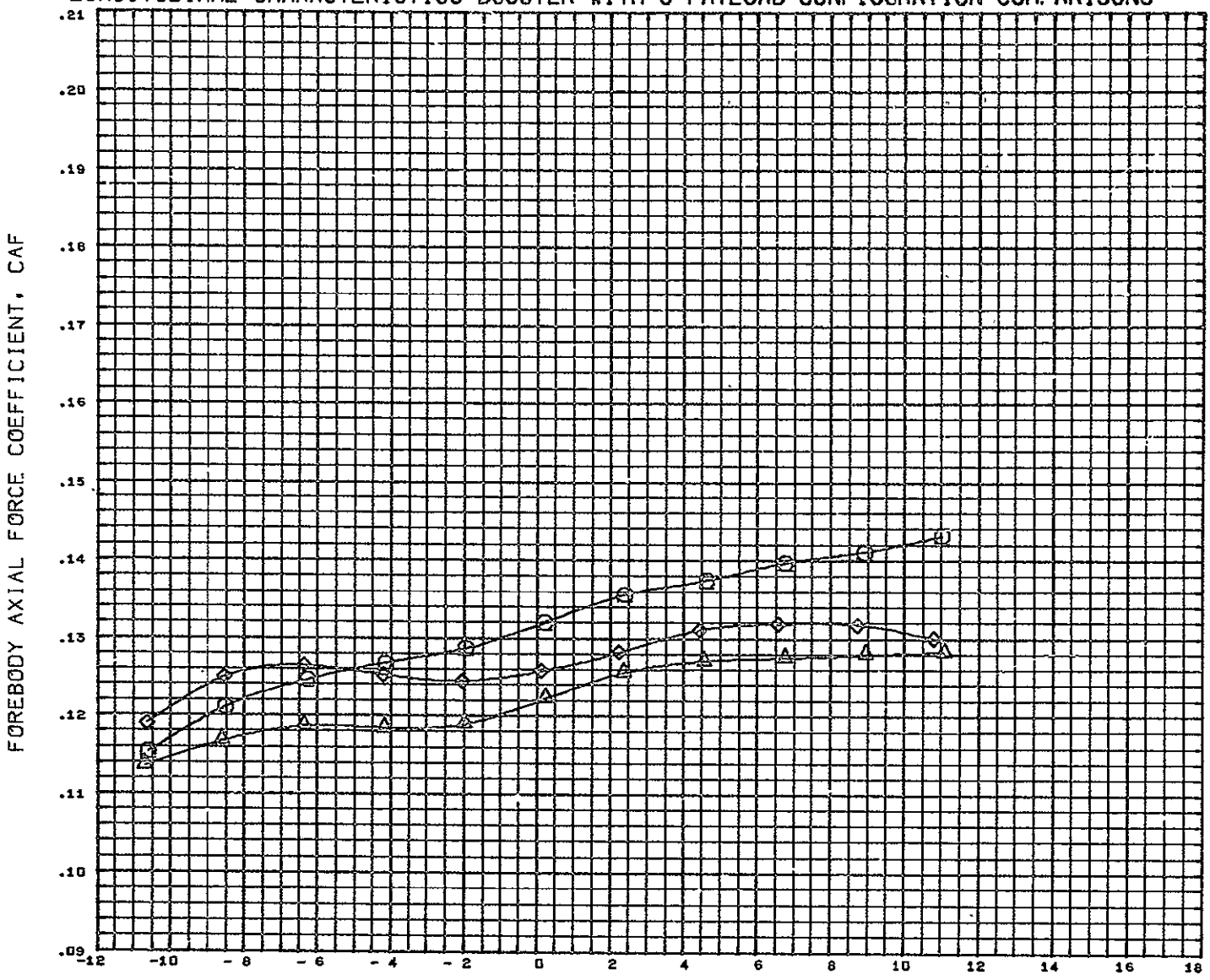
LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	0.030	0.000	0.000	0.000
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	0.010	0.000	0.000	0.000

MACH 1.200

REFERENCE INFORMATION		
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BREF	6.0990	INCHES
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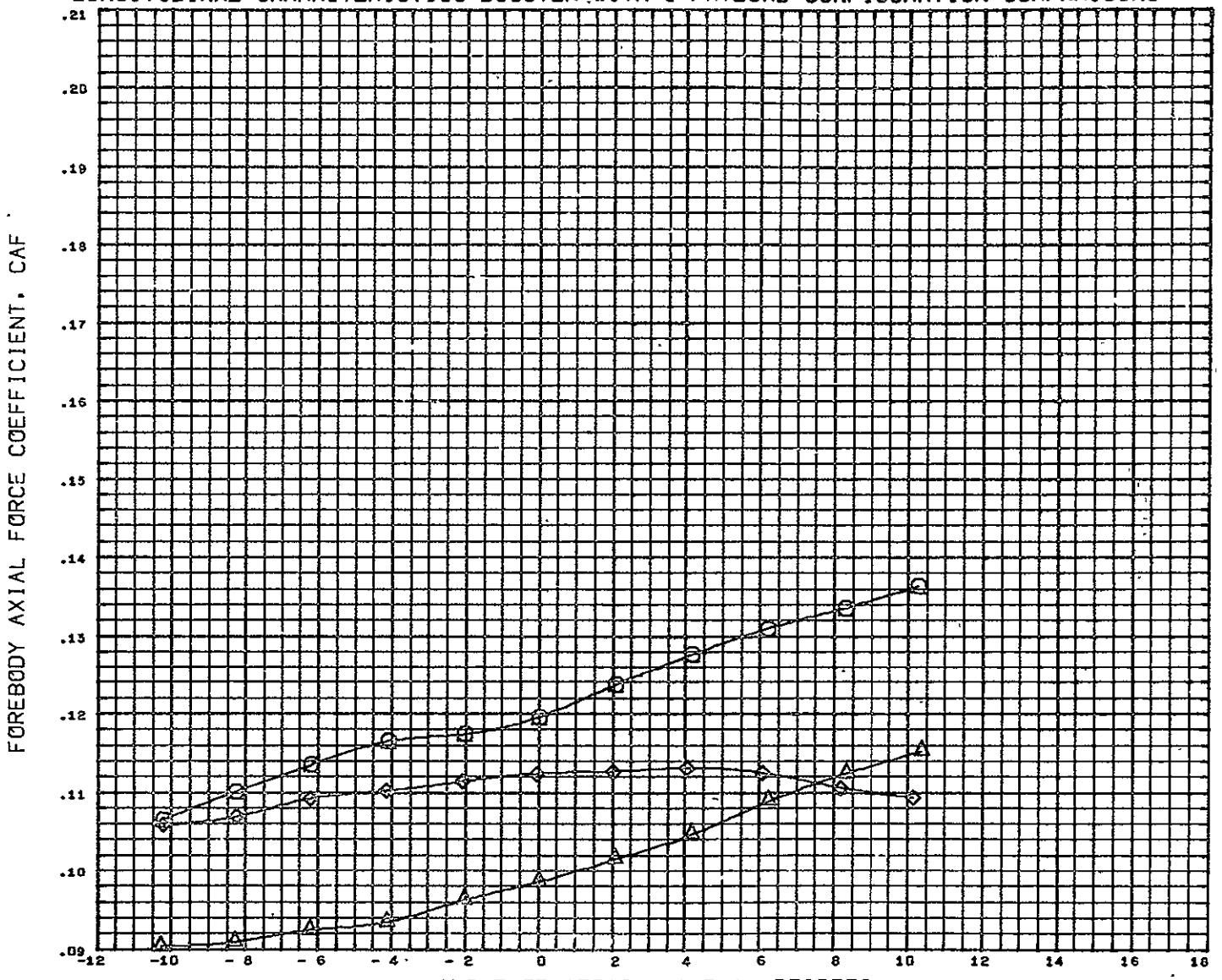
LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	0.030	0.000	0.000	0.000
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	0.010	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
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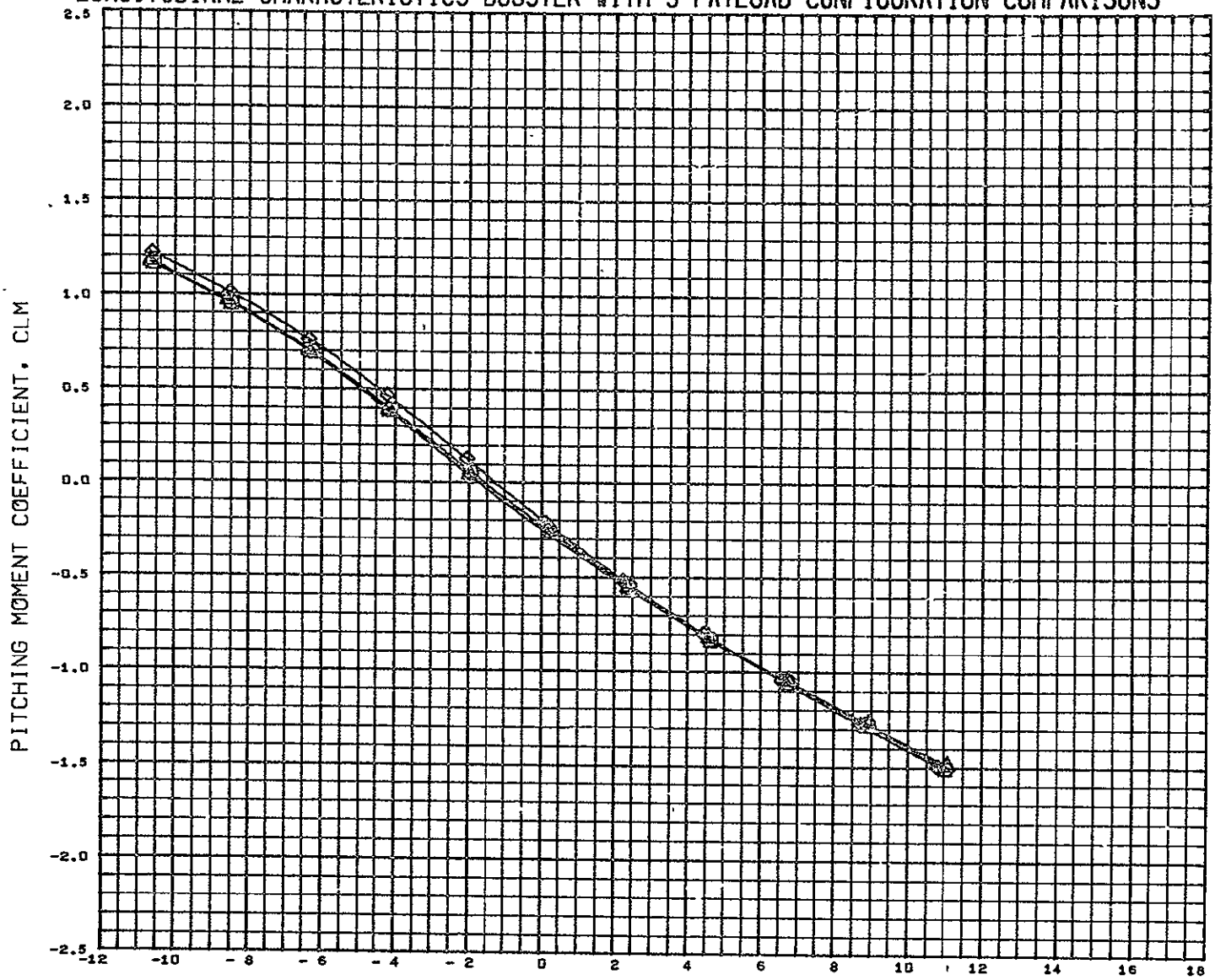
LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



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(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.030	0.000	0.000	0.000
0.010	0.000	0.000	0.000

REFERENCE INFORMATION		
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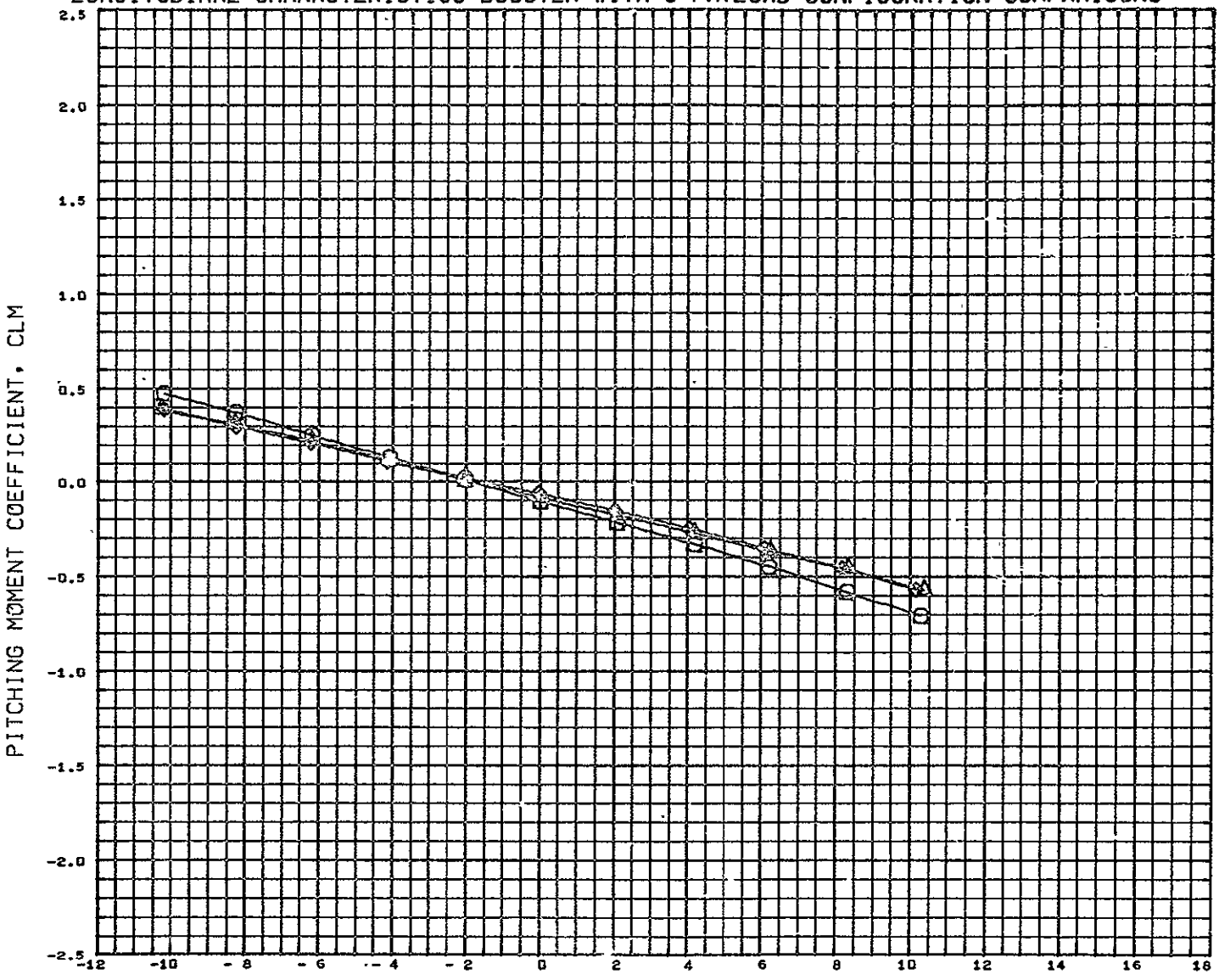
MACH 1.200

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	0.030	0.000	0.000	0.000
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	0.010	0.000	0.000	0.000

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YMRP	0.0000	
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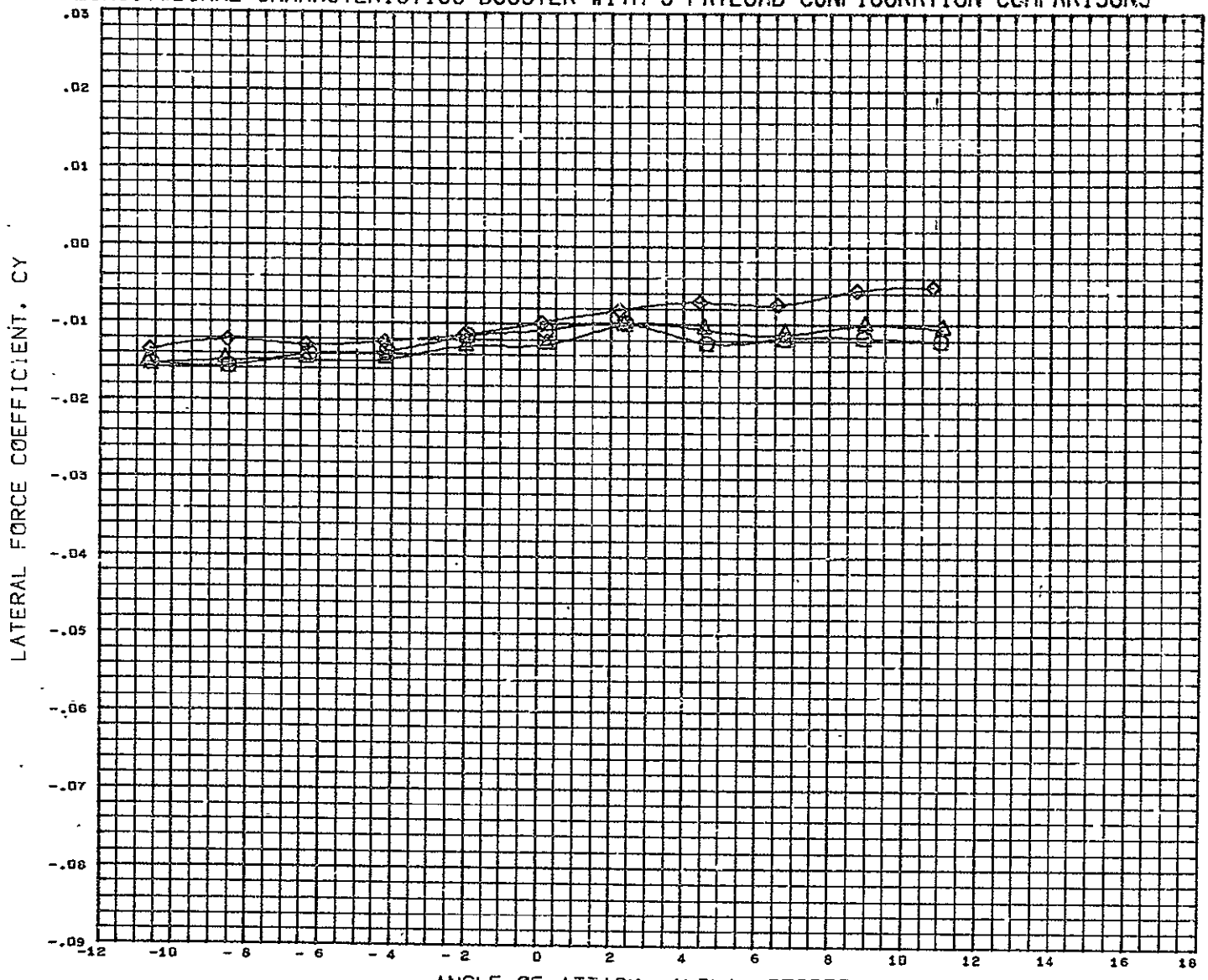
SCALE	0.0031	SCALE

.MACH 2.990

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



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(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

BETA	ELVATR	AILRON	RUDDER
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0.030	0.000	0.000	0.000
[illegible]	0.000	0.000	0.000

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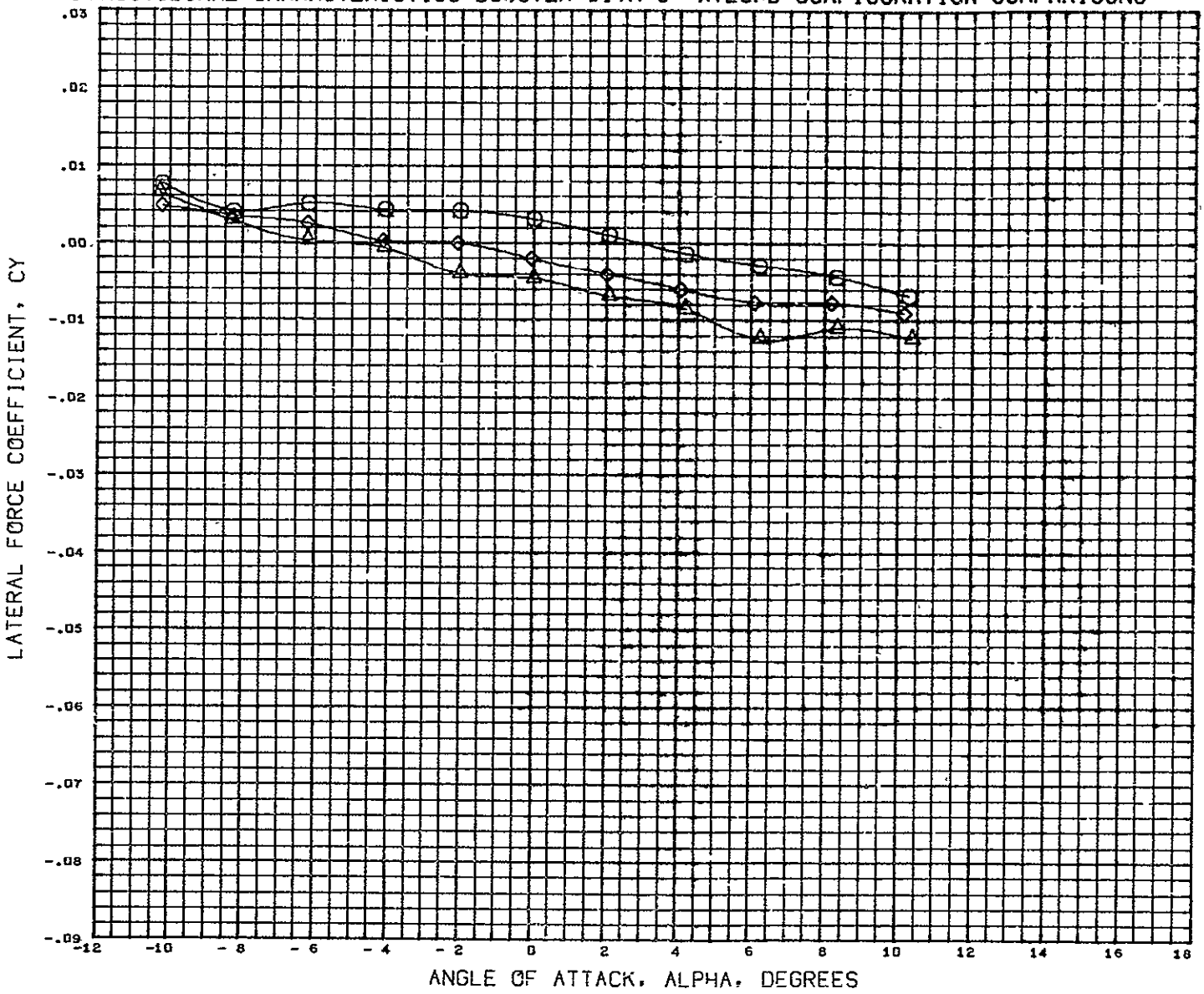
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.030	0.000	0.000	0.000
0.010	0.000	0.000	0.000

REFERENCE INFORMATION		
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BREF	6.0990	INCHES
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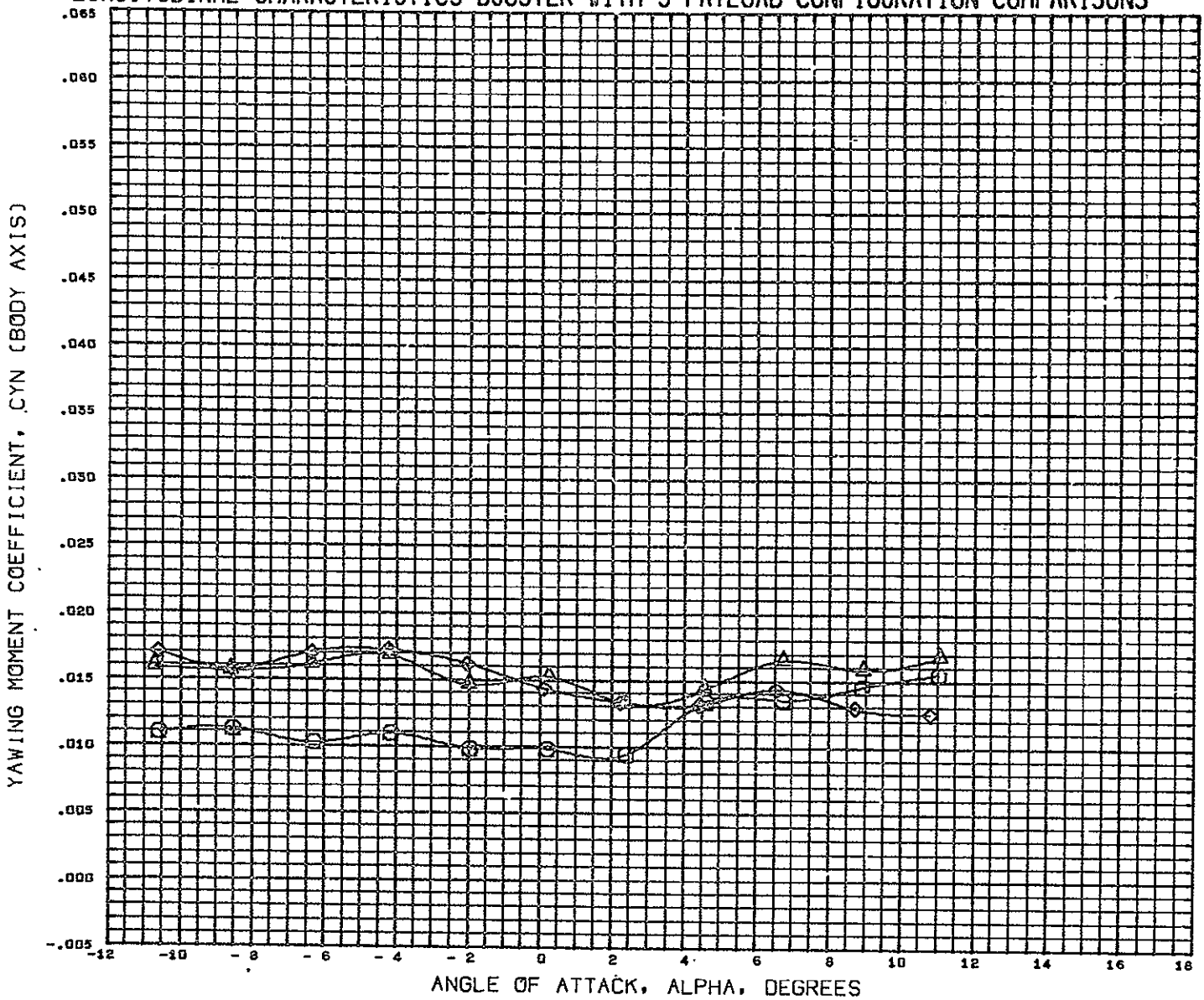
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



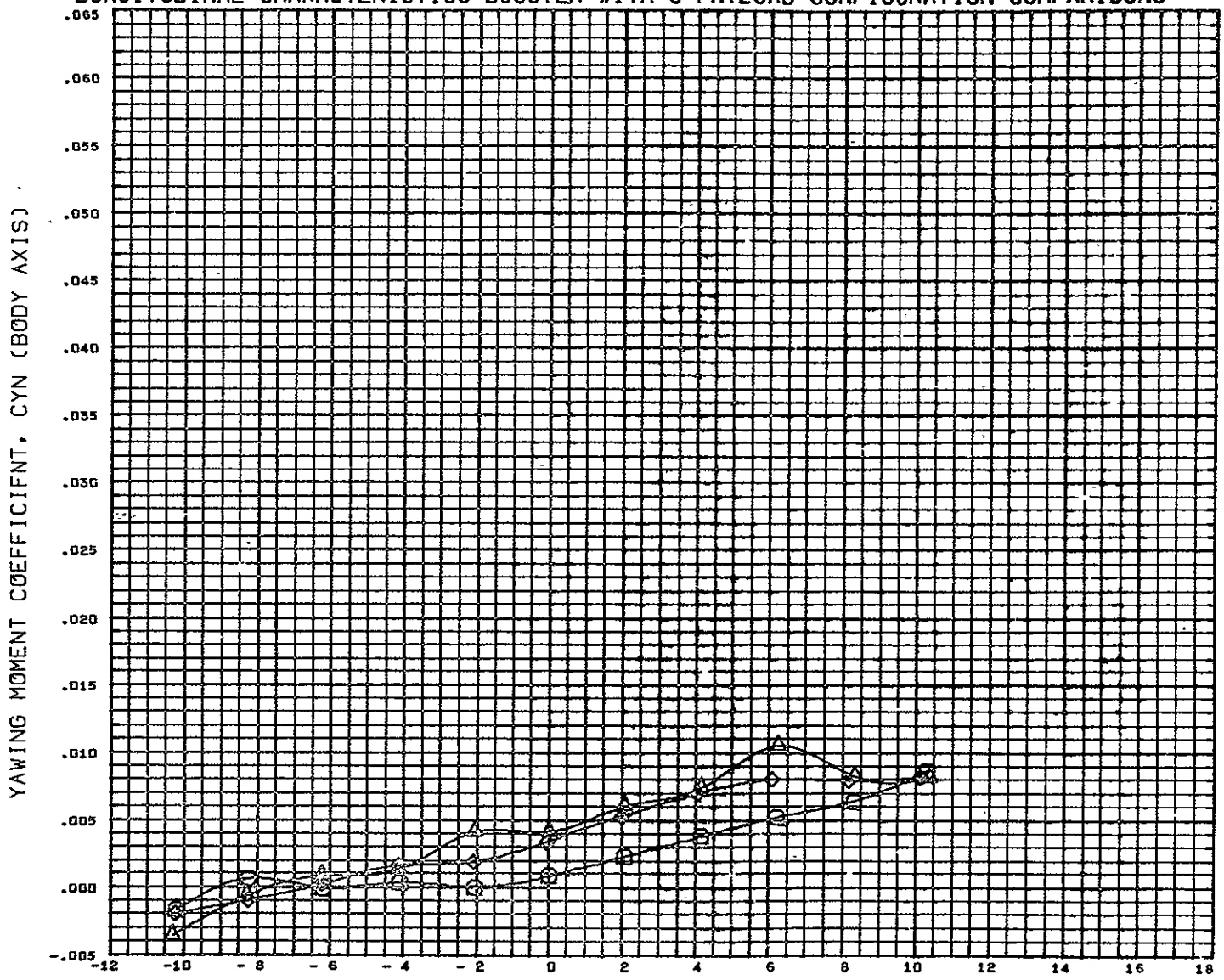
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.030	0.000	0.000	0.000
0.010	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS

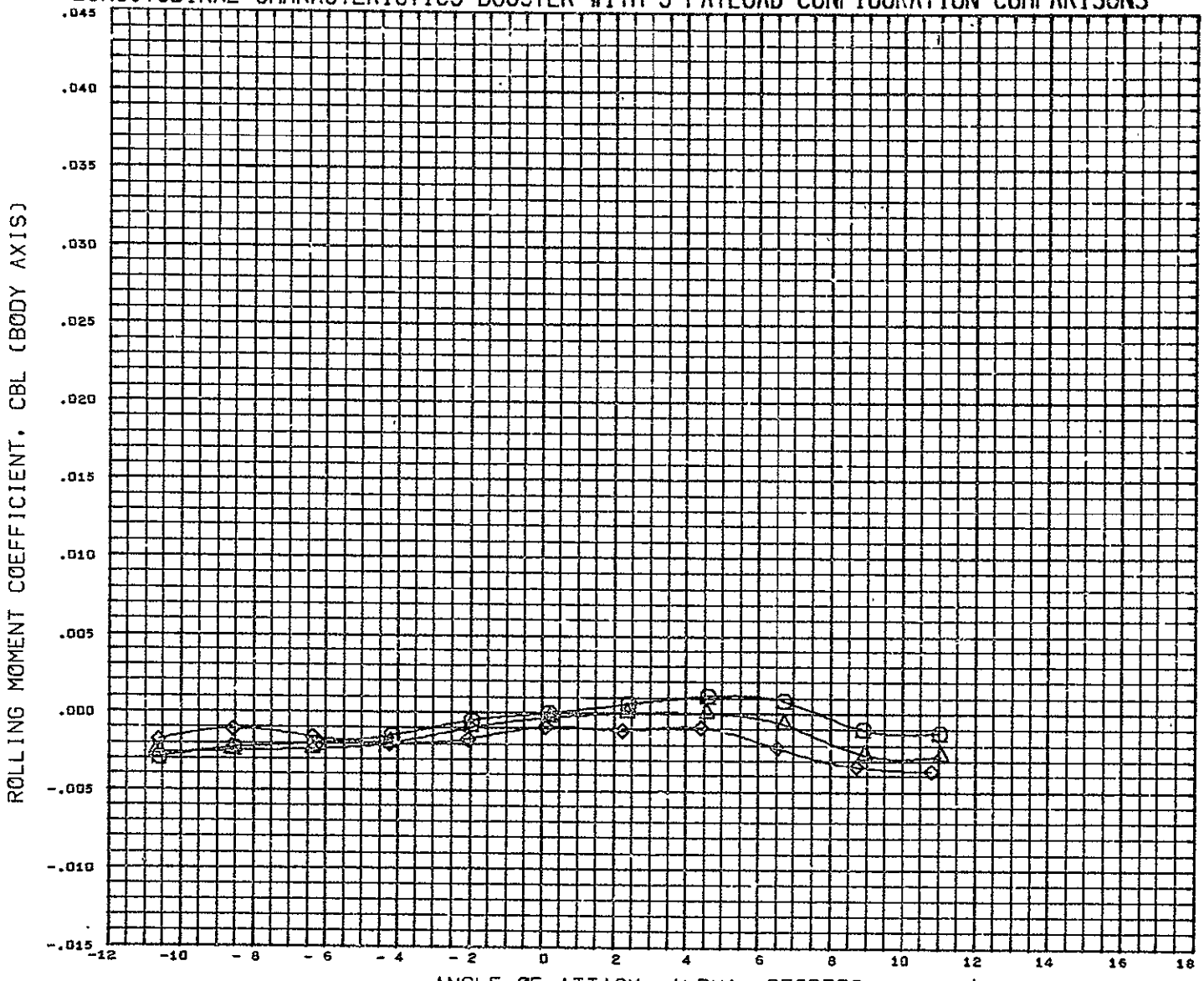


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	0.030	0.000	0.000	0.000
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	0.010	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS



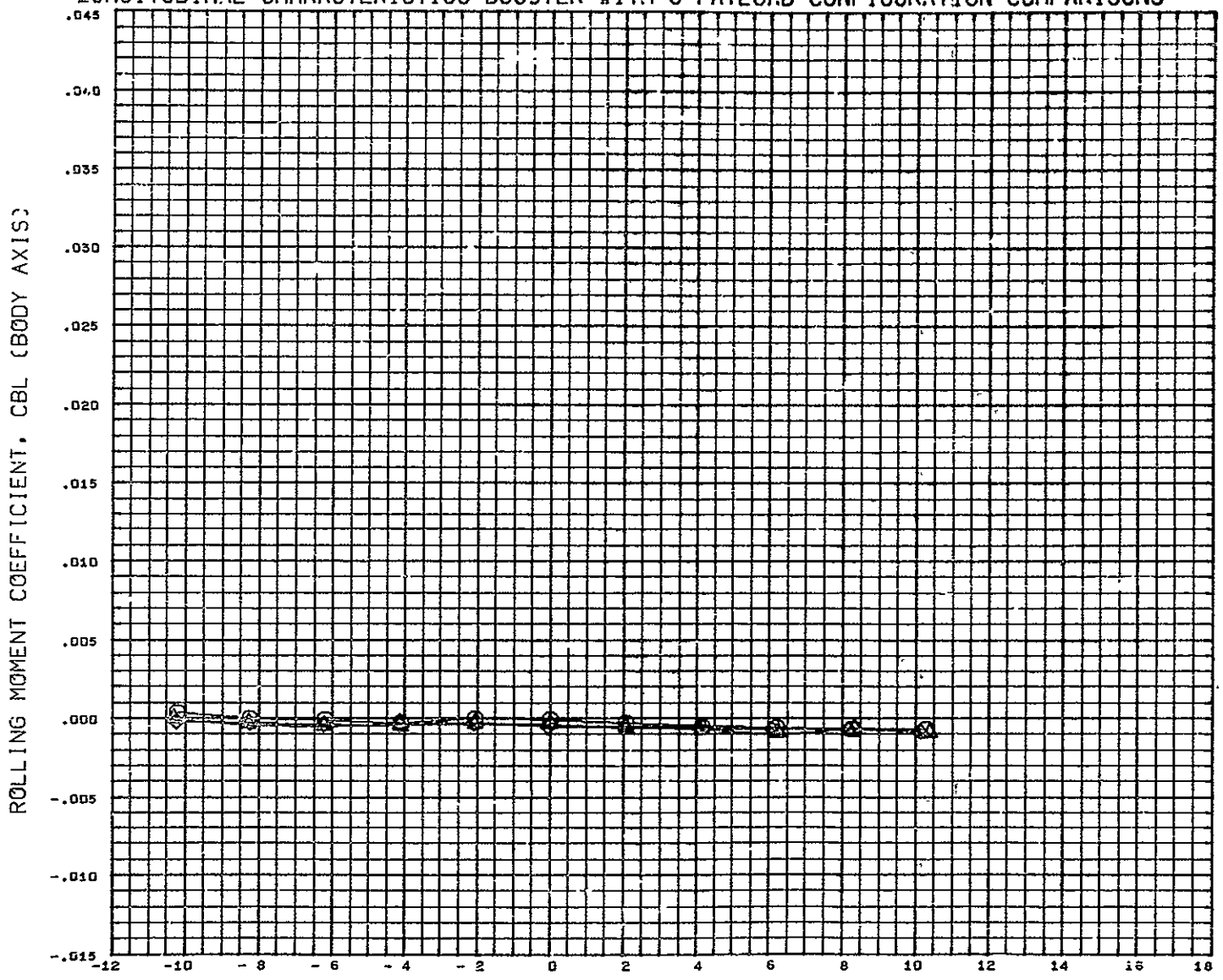
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.030	0.000	0.000	0.000
0.010	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

LONGITUDINAL CHARACTERISTICS-BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS

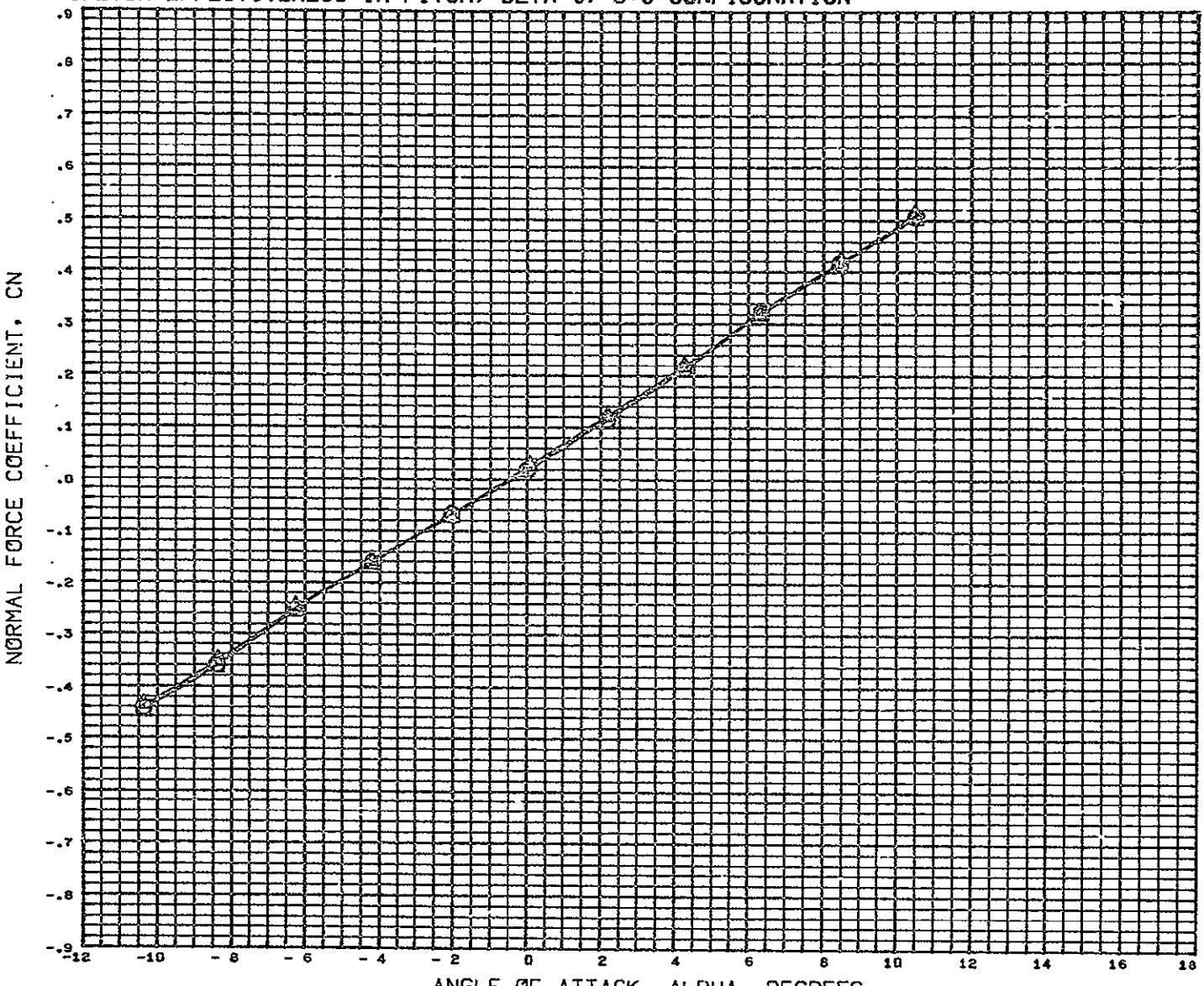


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(C3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3117C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	0.030	0.000	0.000	0.000
(R3118C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	0.010	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRF	0.0000	
YMRF	0.0000	
ZMRF	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



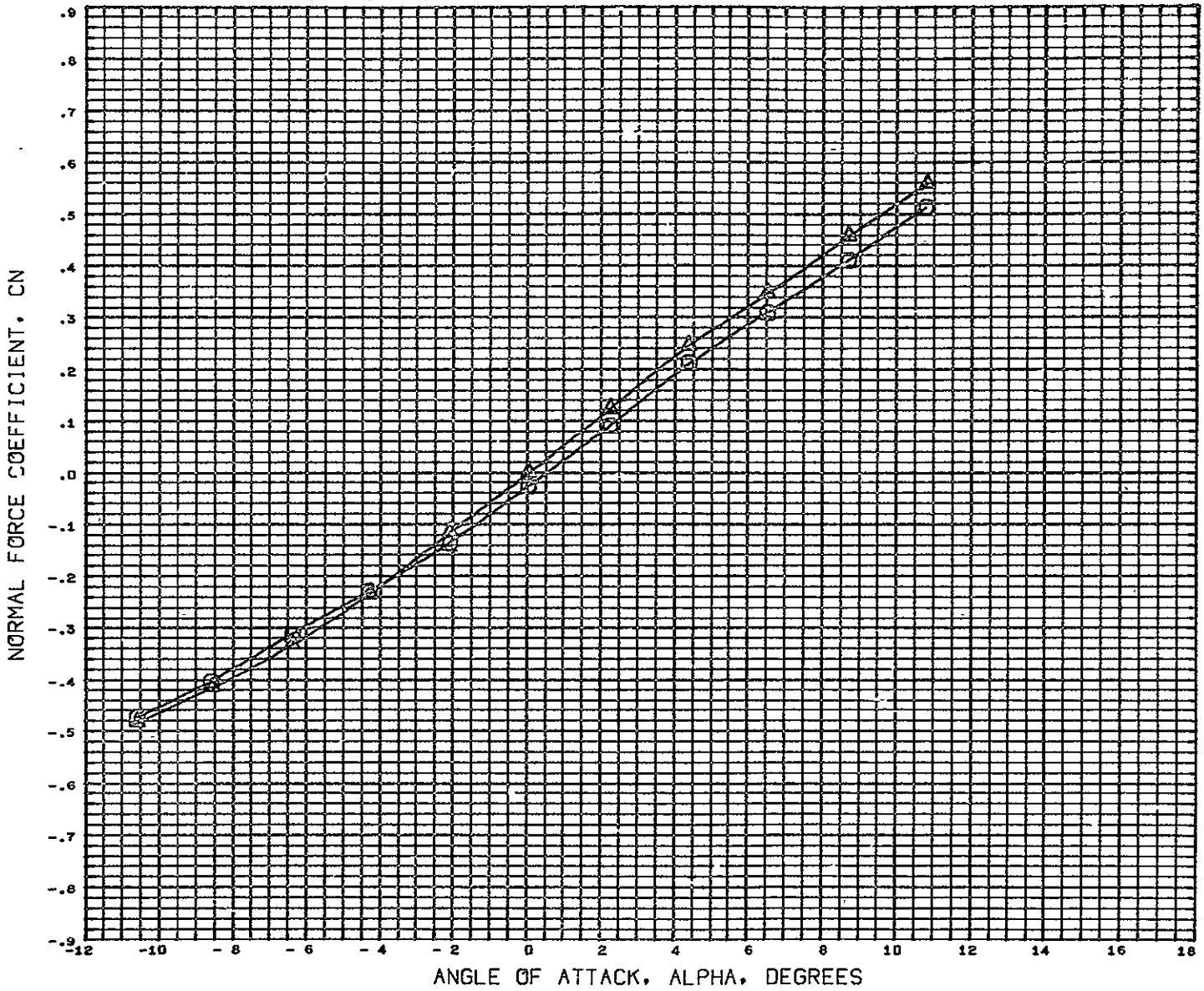
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.604

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
[illegible]	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0959	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

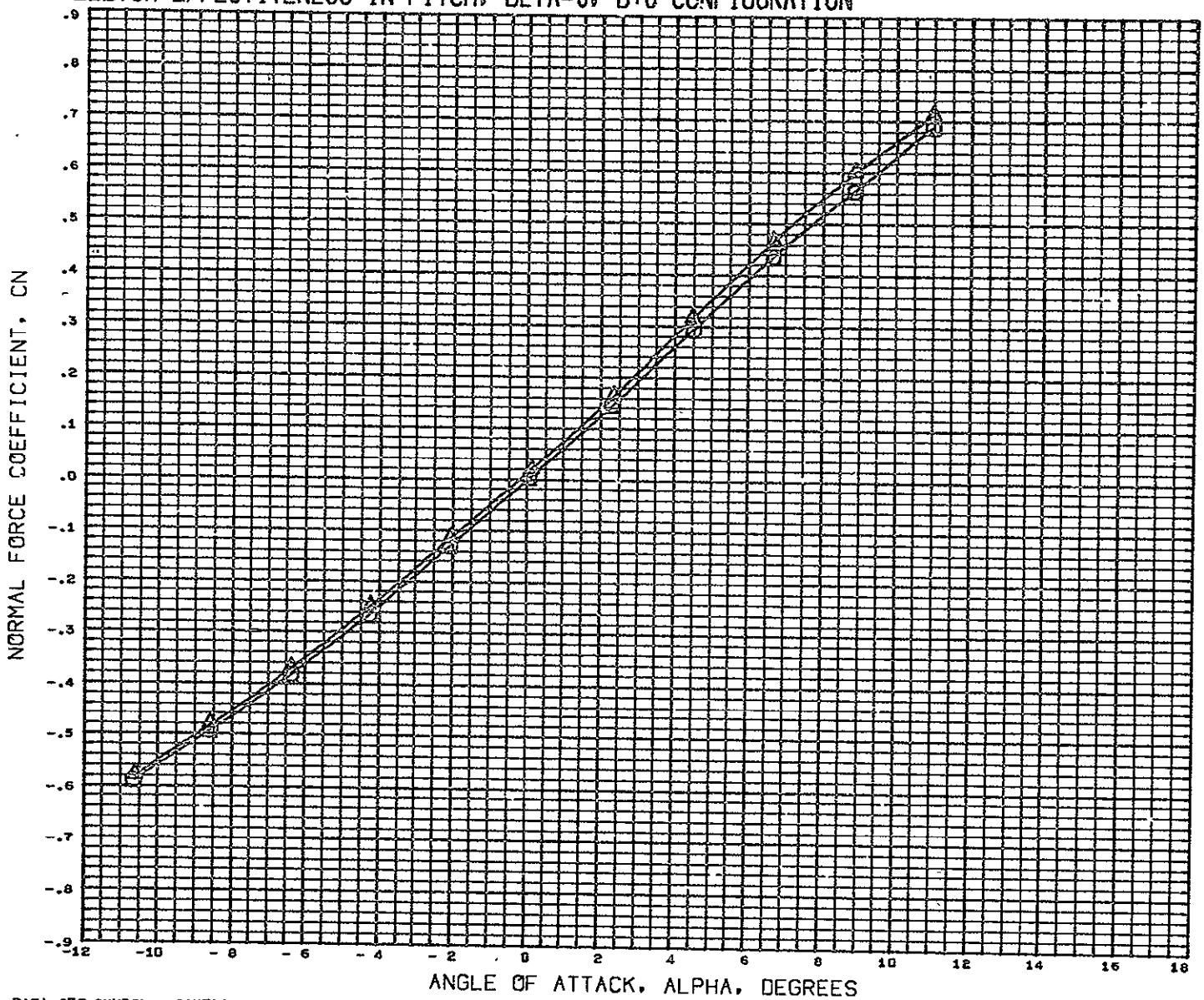


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 0.900

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



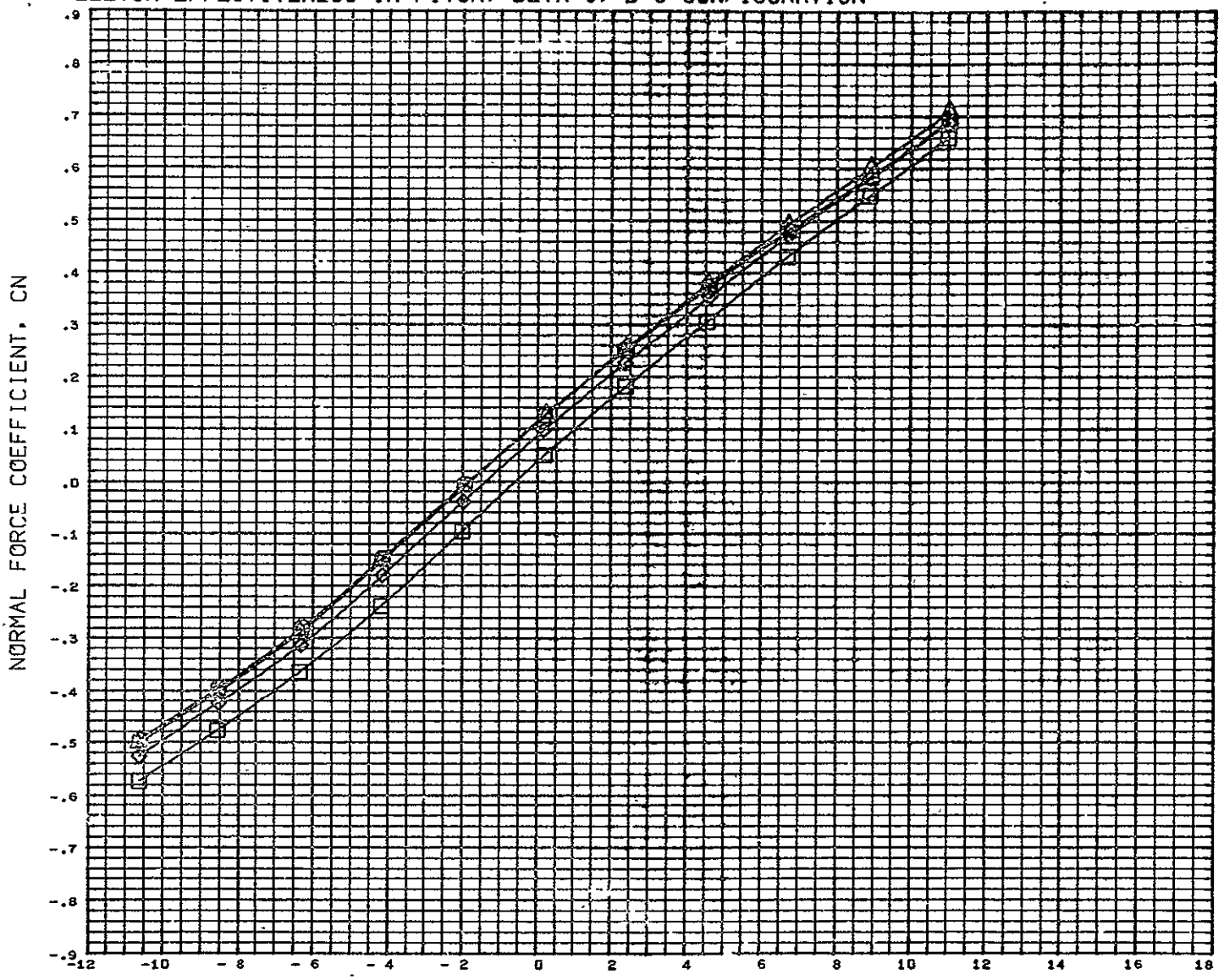
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.994

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.656)	SQ IN
LREF	5.0950	INCHES
BREF	6.8990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

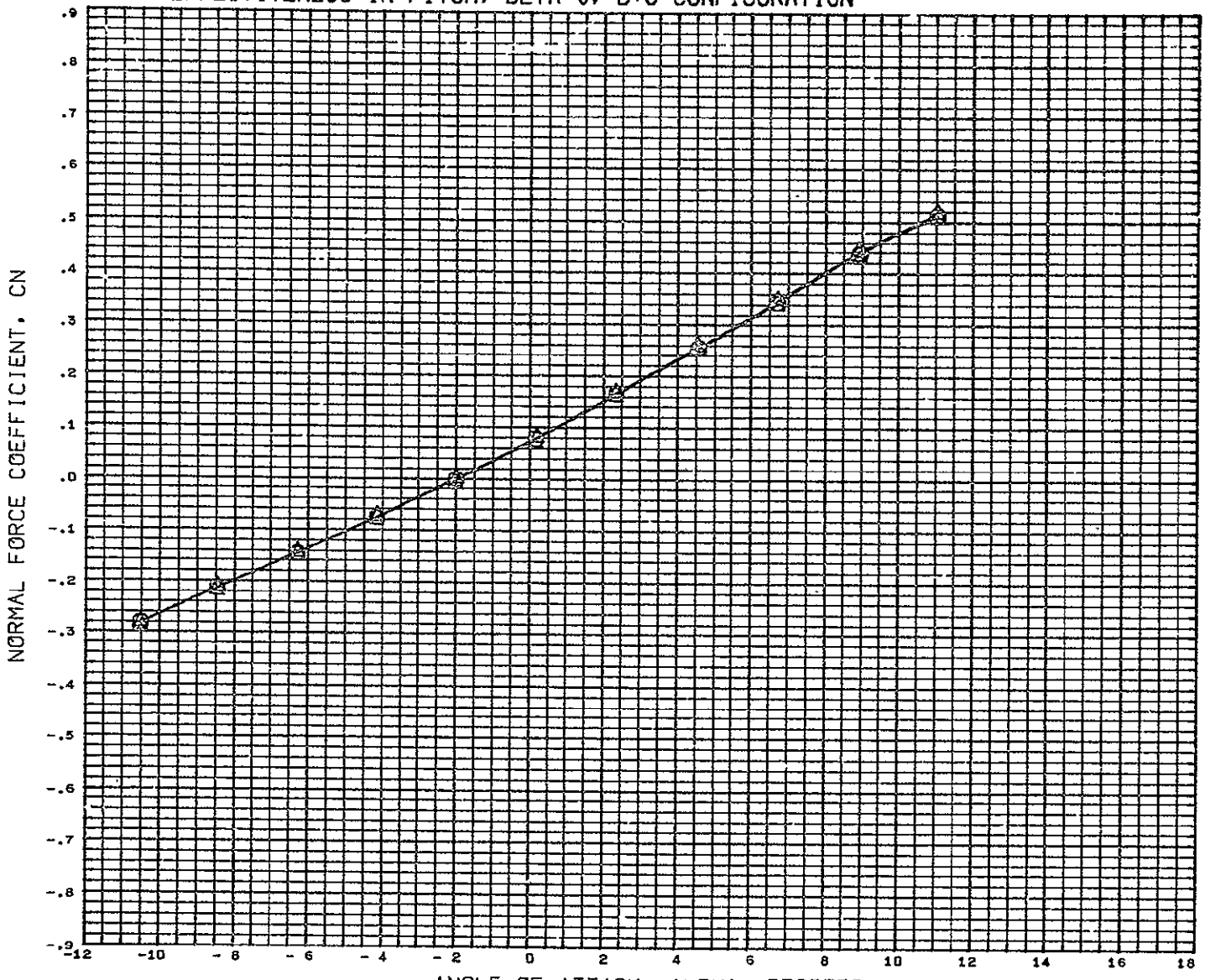


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-5.000	15.000	0.000
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-15.000	25.000	0.000

MACH 1.200

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



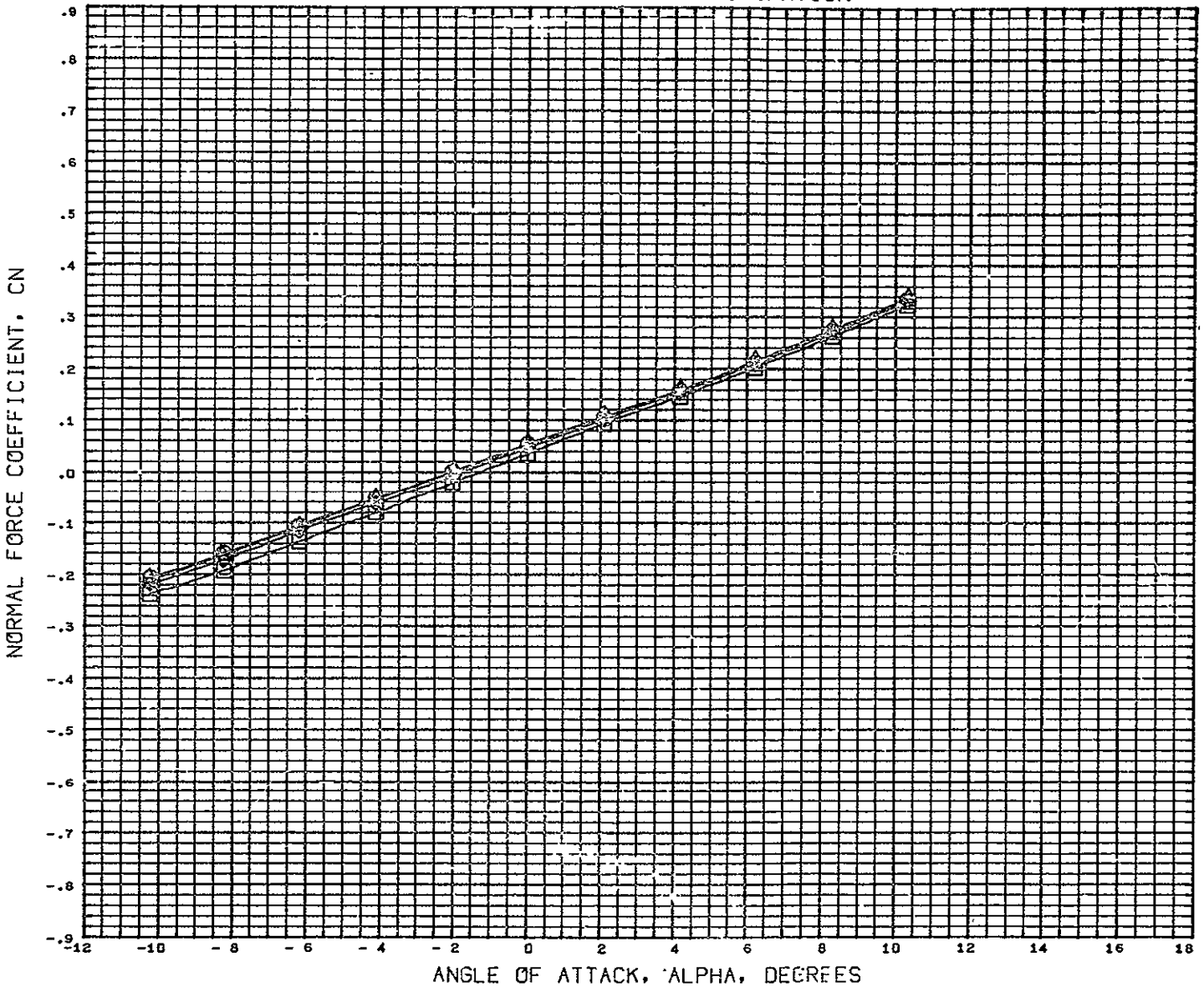
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19WI4C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 1.962

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

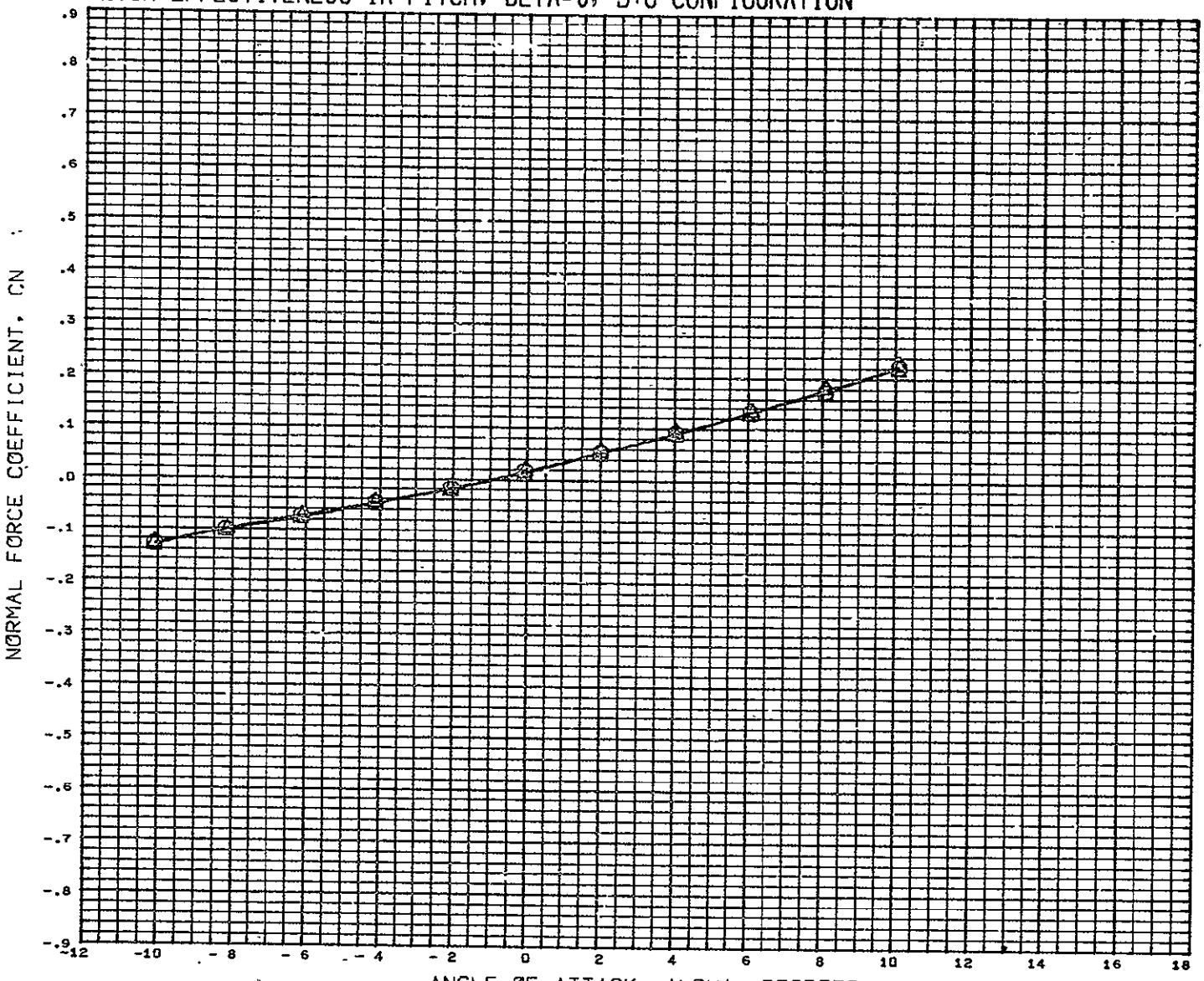


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-5.000	15.000	0.000
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



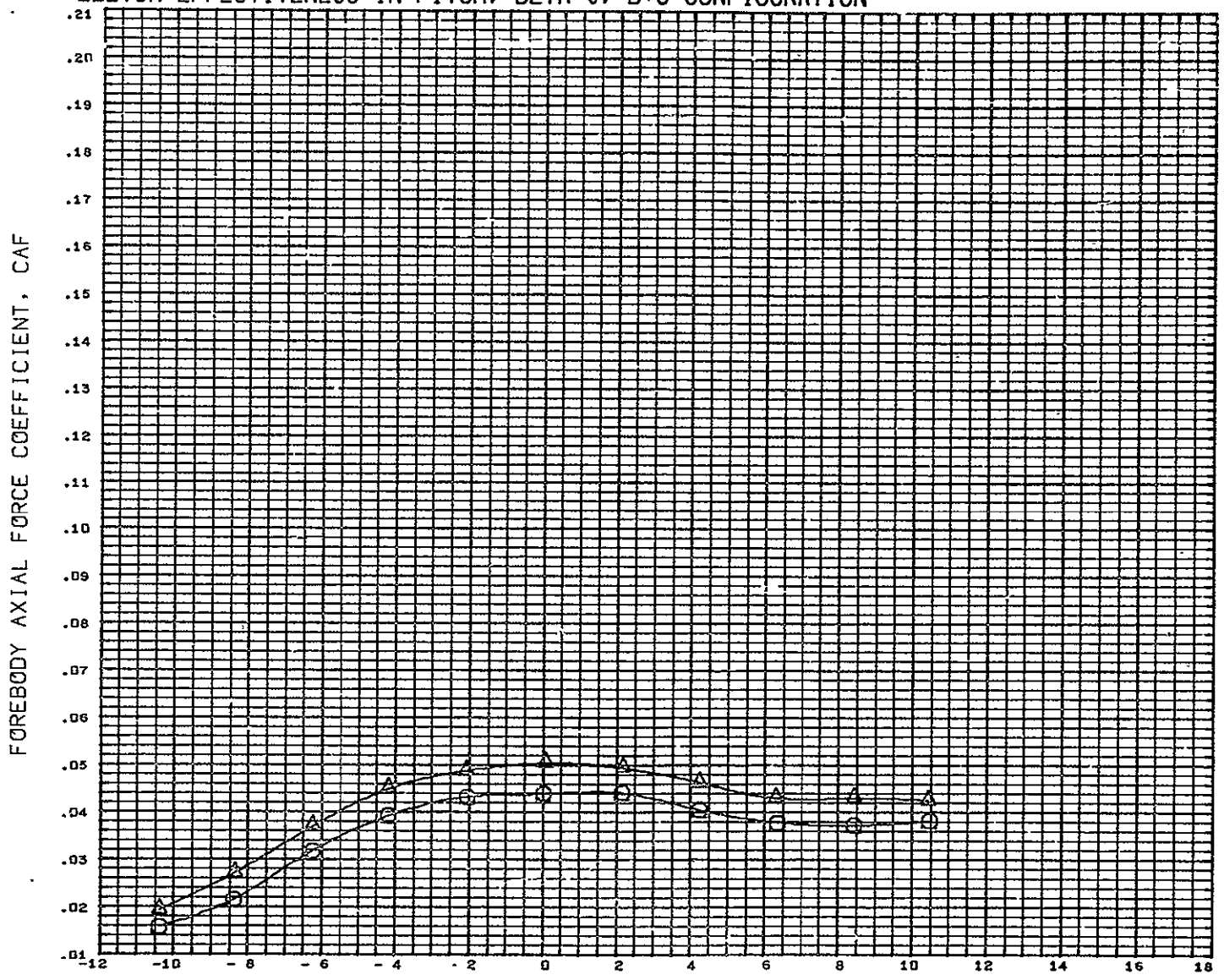
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 4.959

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN

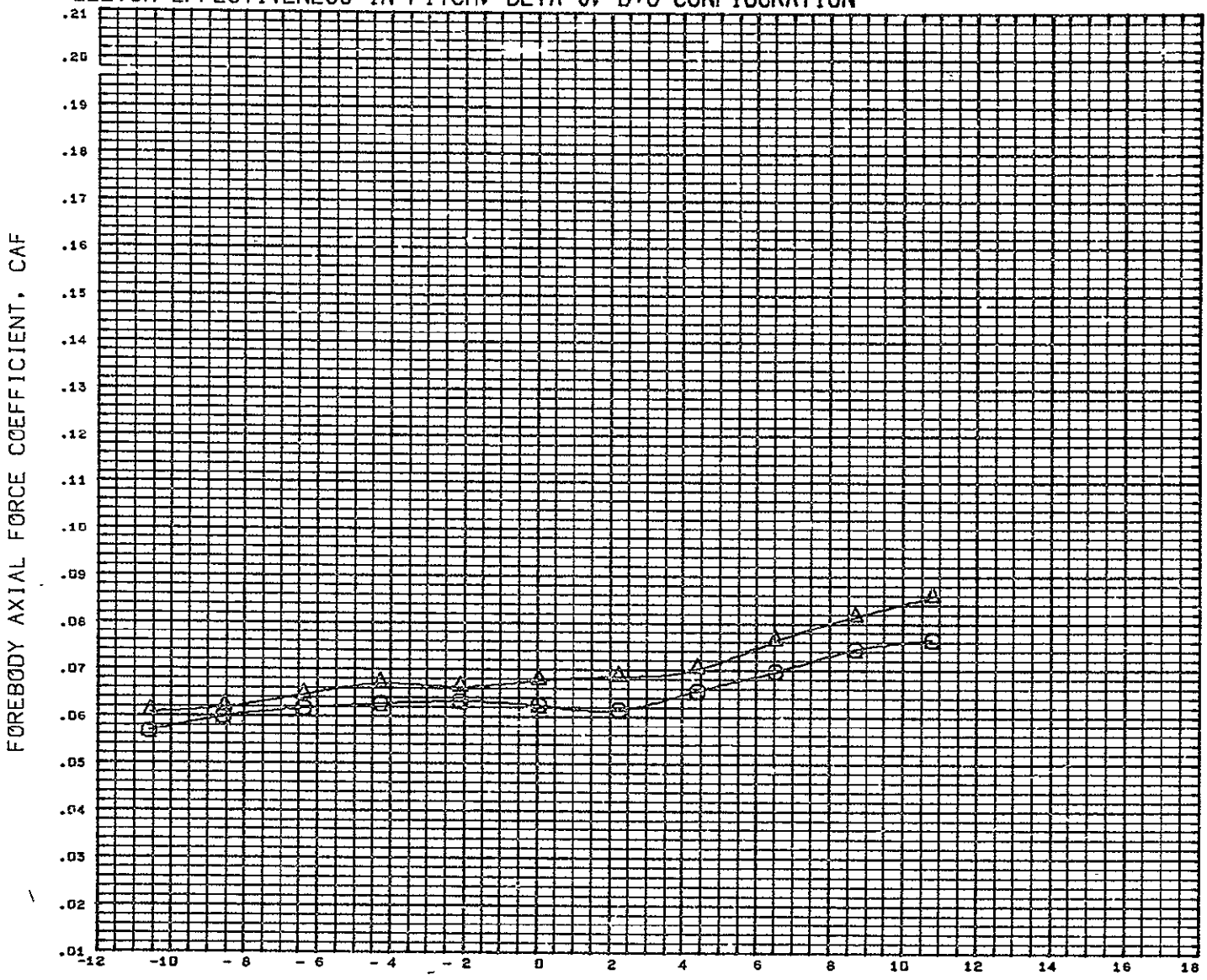


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 0.604

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



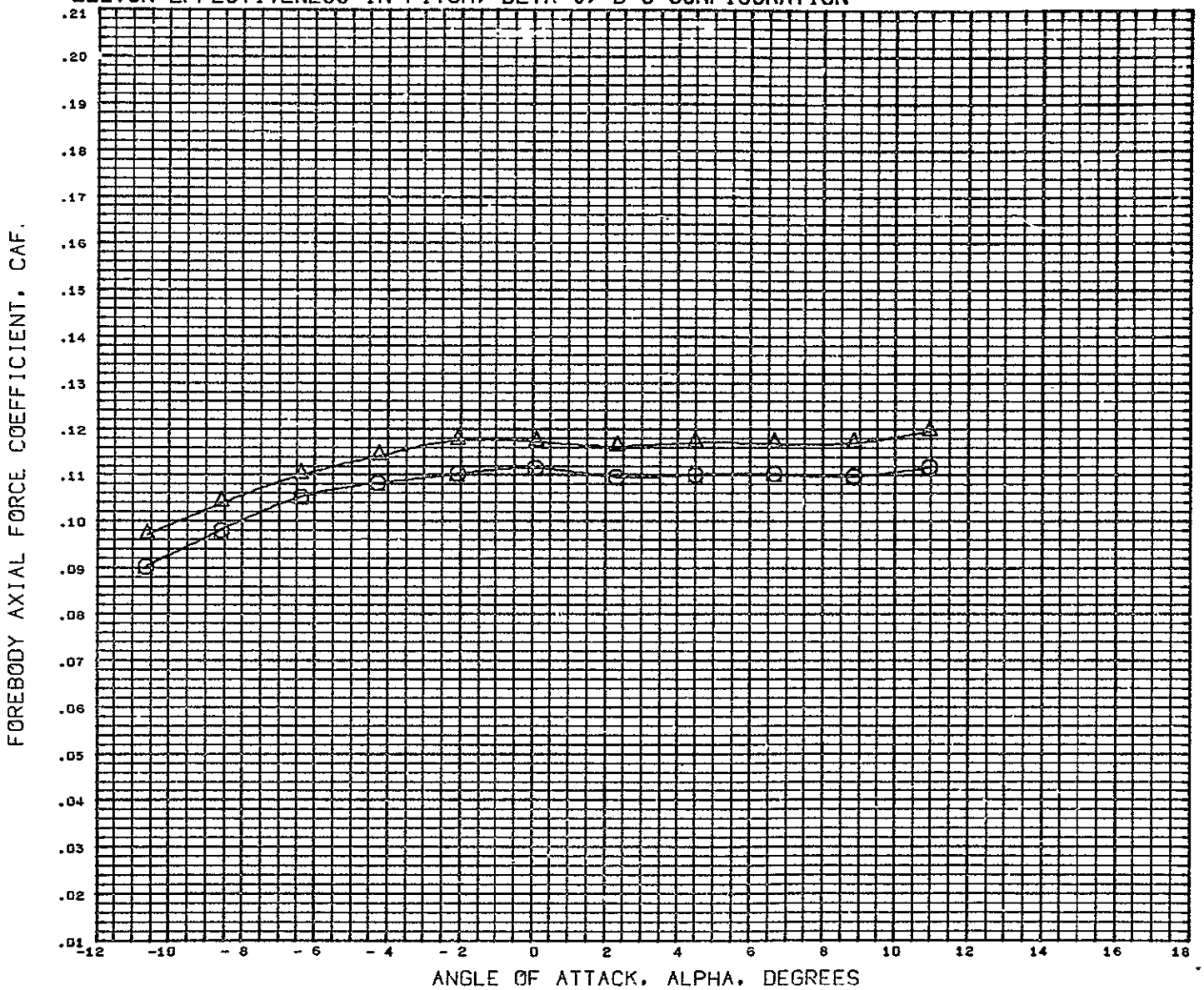
DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.900

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

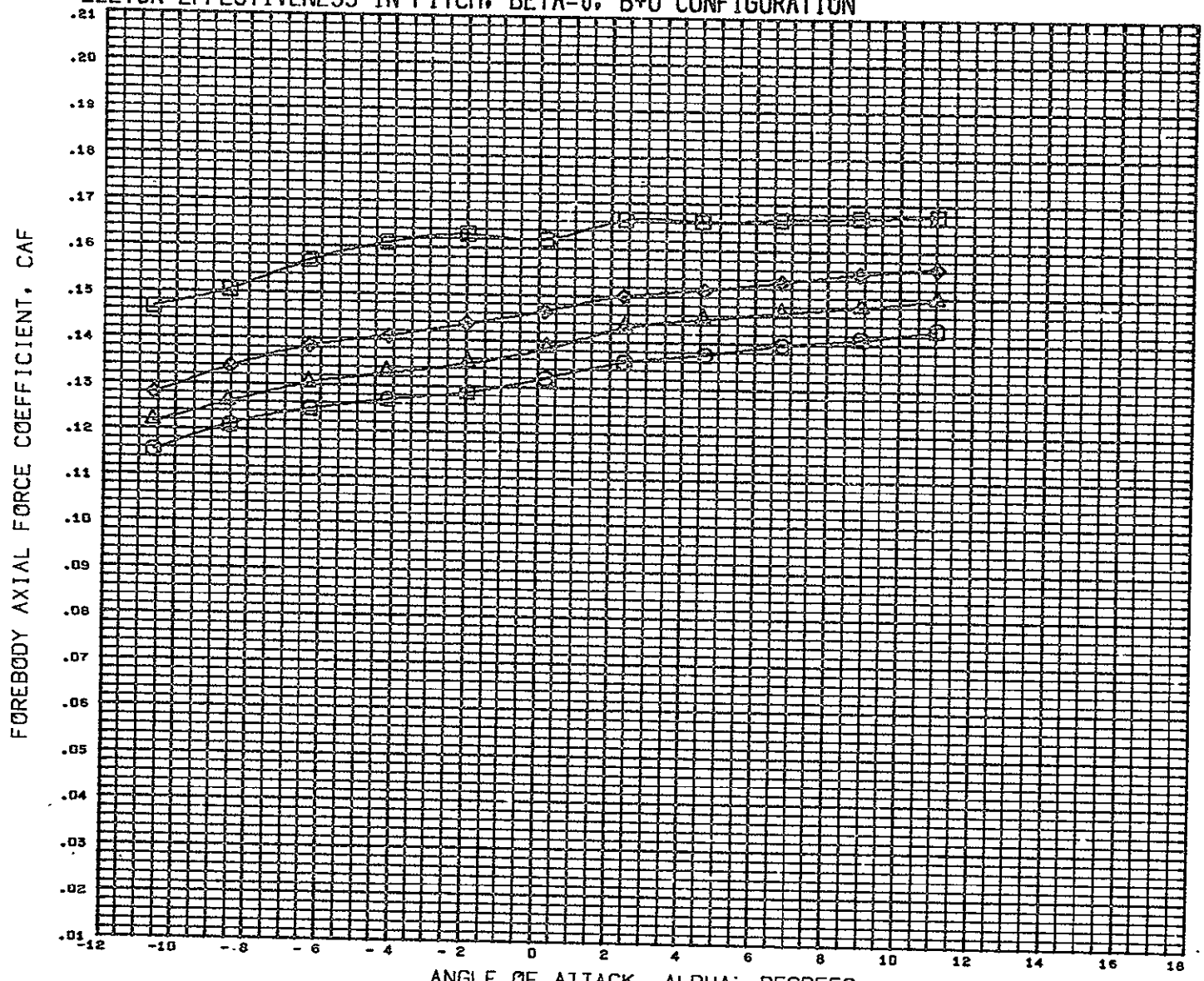


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 0.994

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



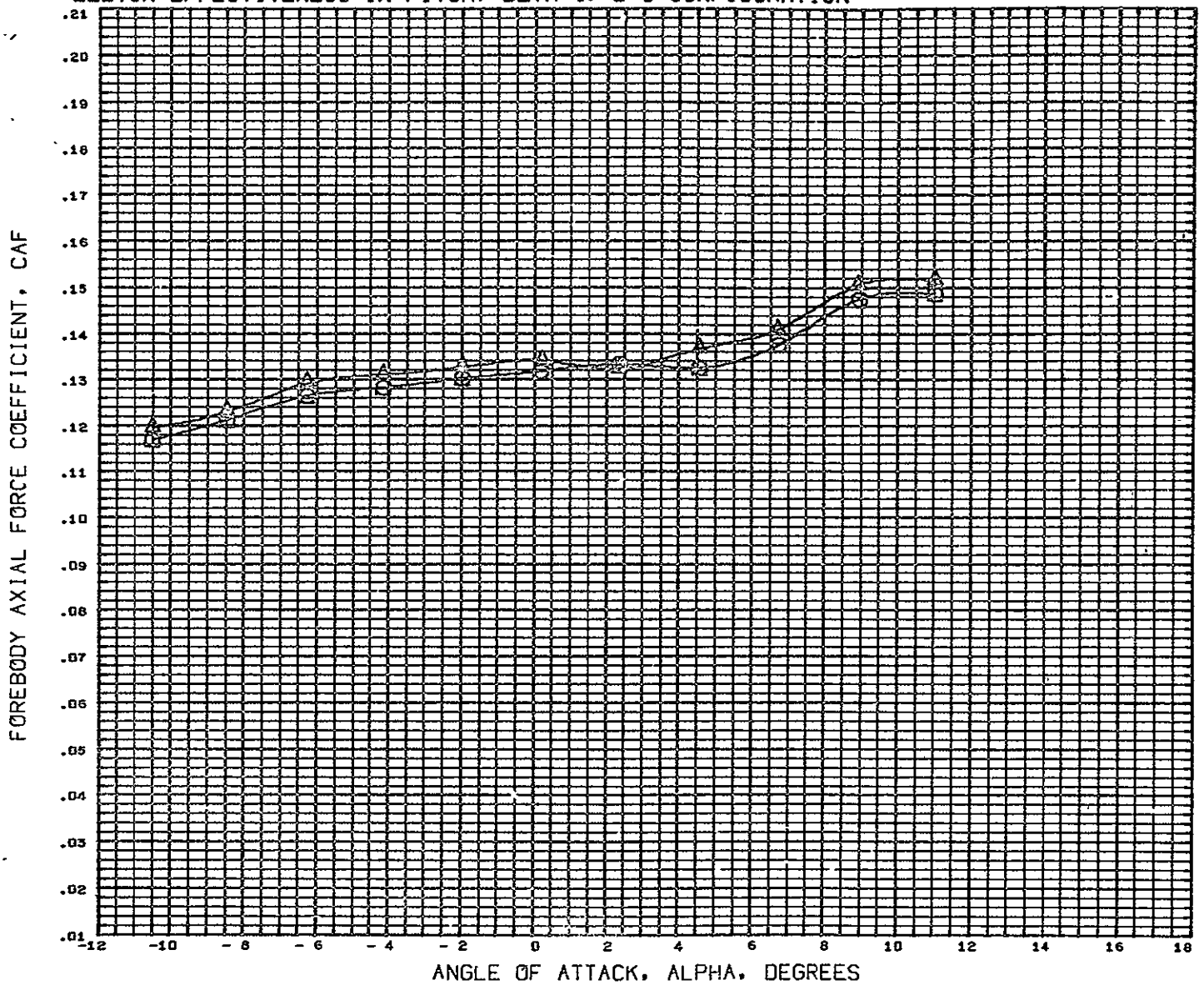
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.200

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0990	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

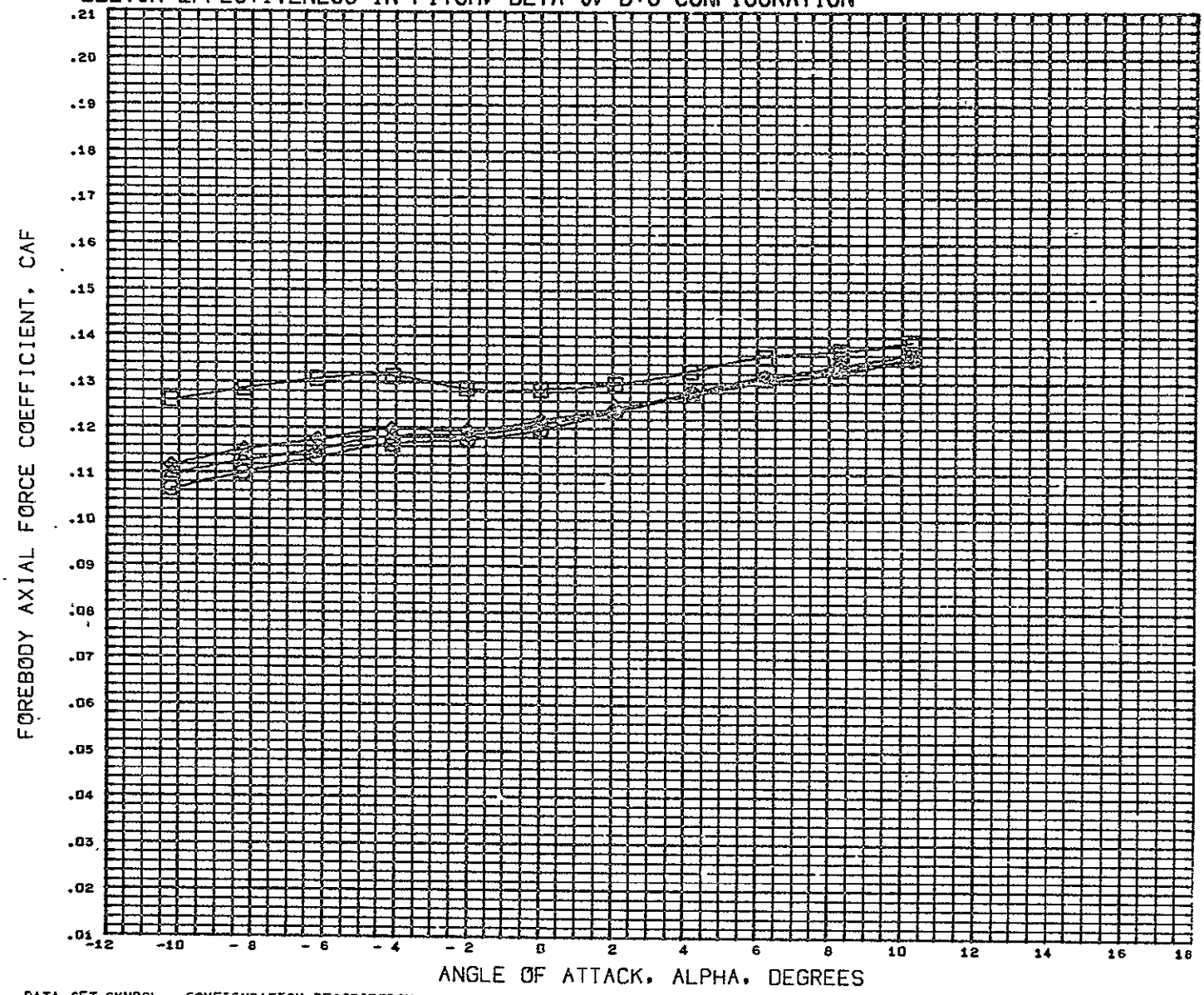


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.060	-15.000	25.000	0.000

MACH 1.962

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



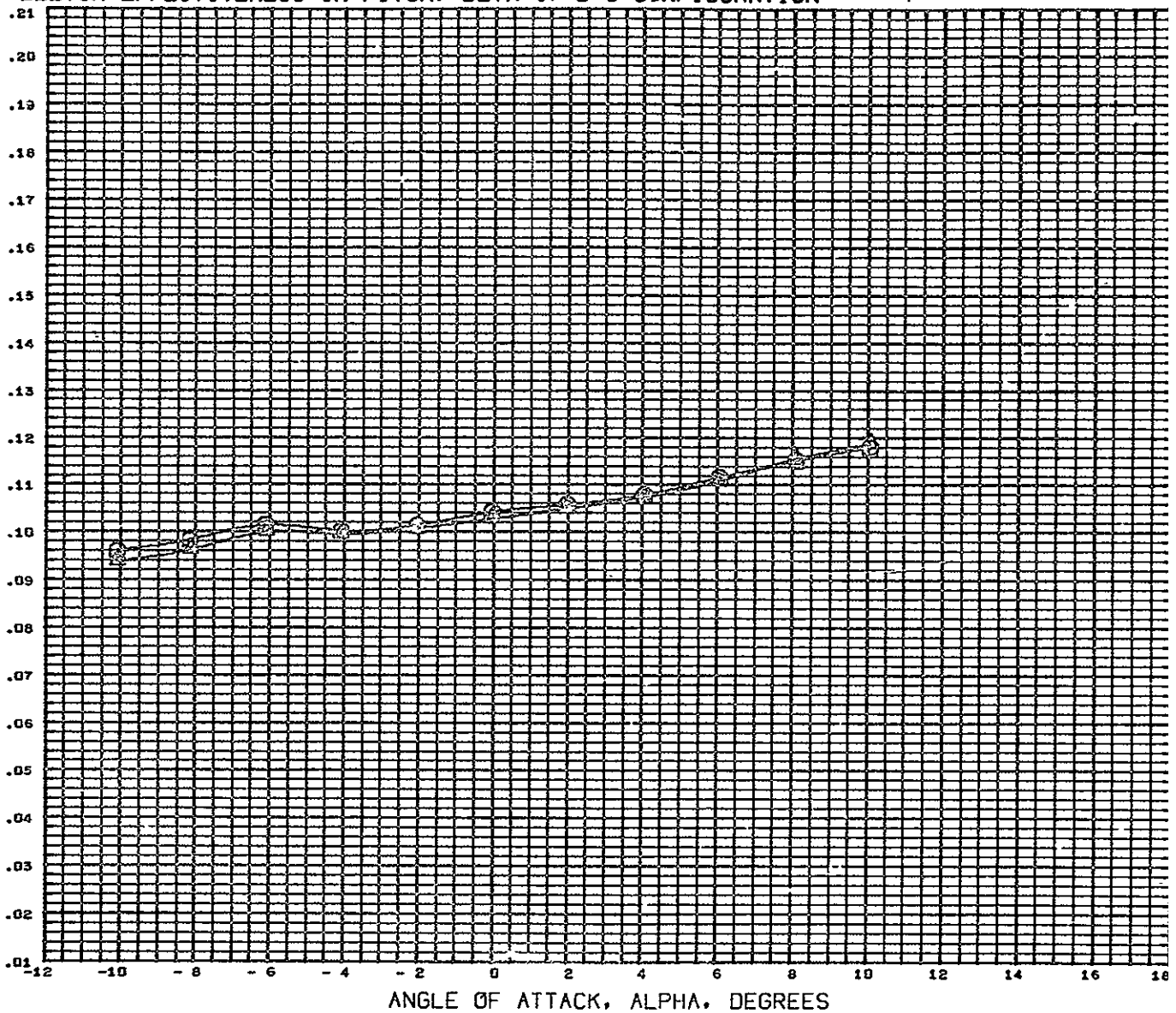
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 2.990

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.9750	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

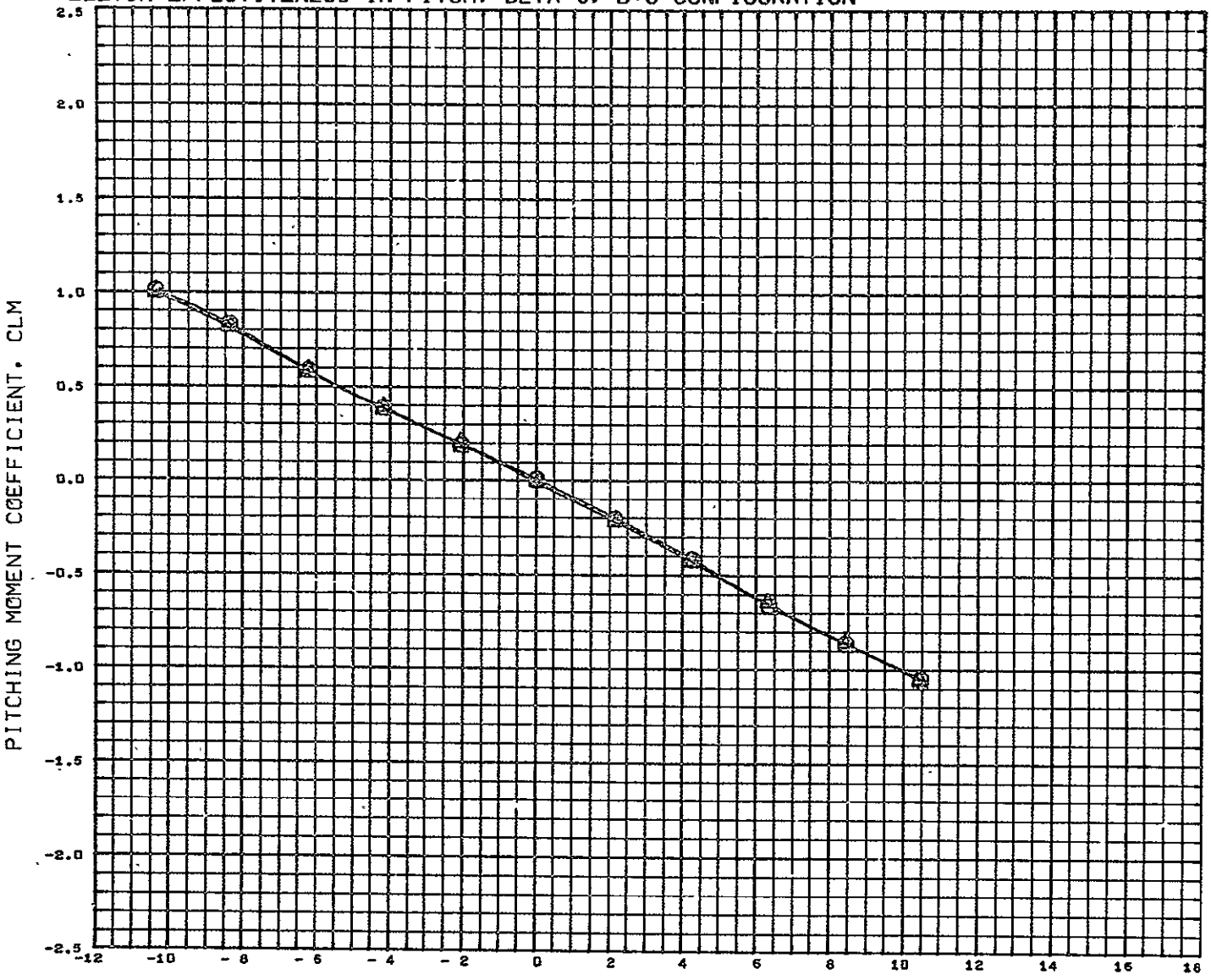


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 4.959

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0450	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



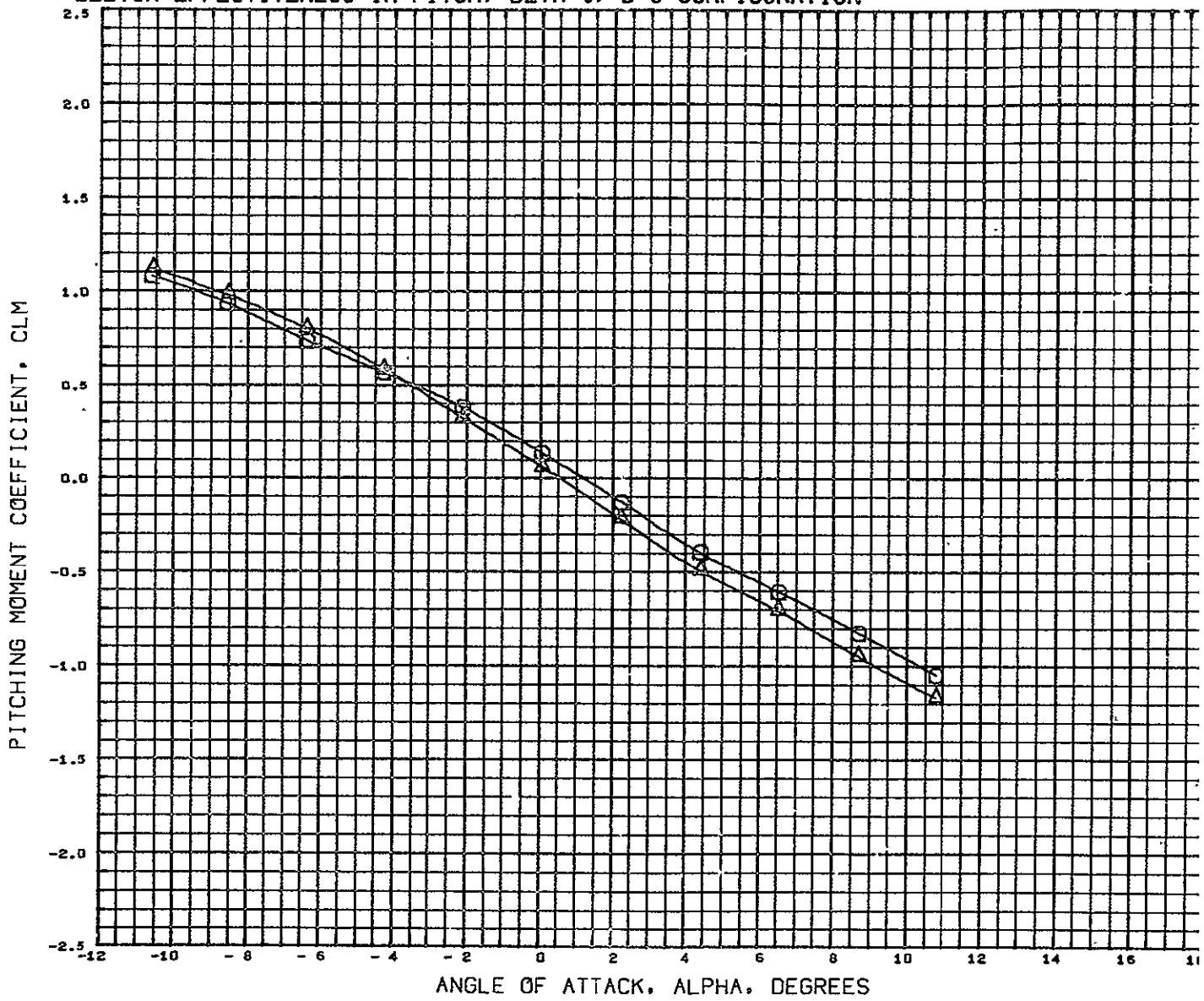
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	HSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	HSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.604

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0939	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



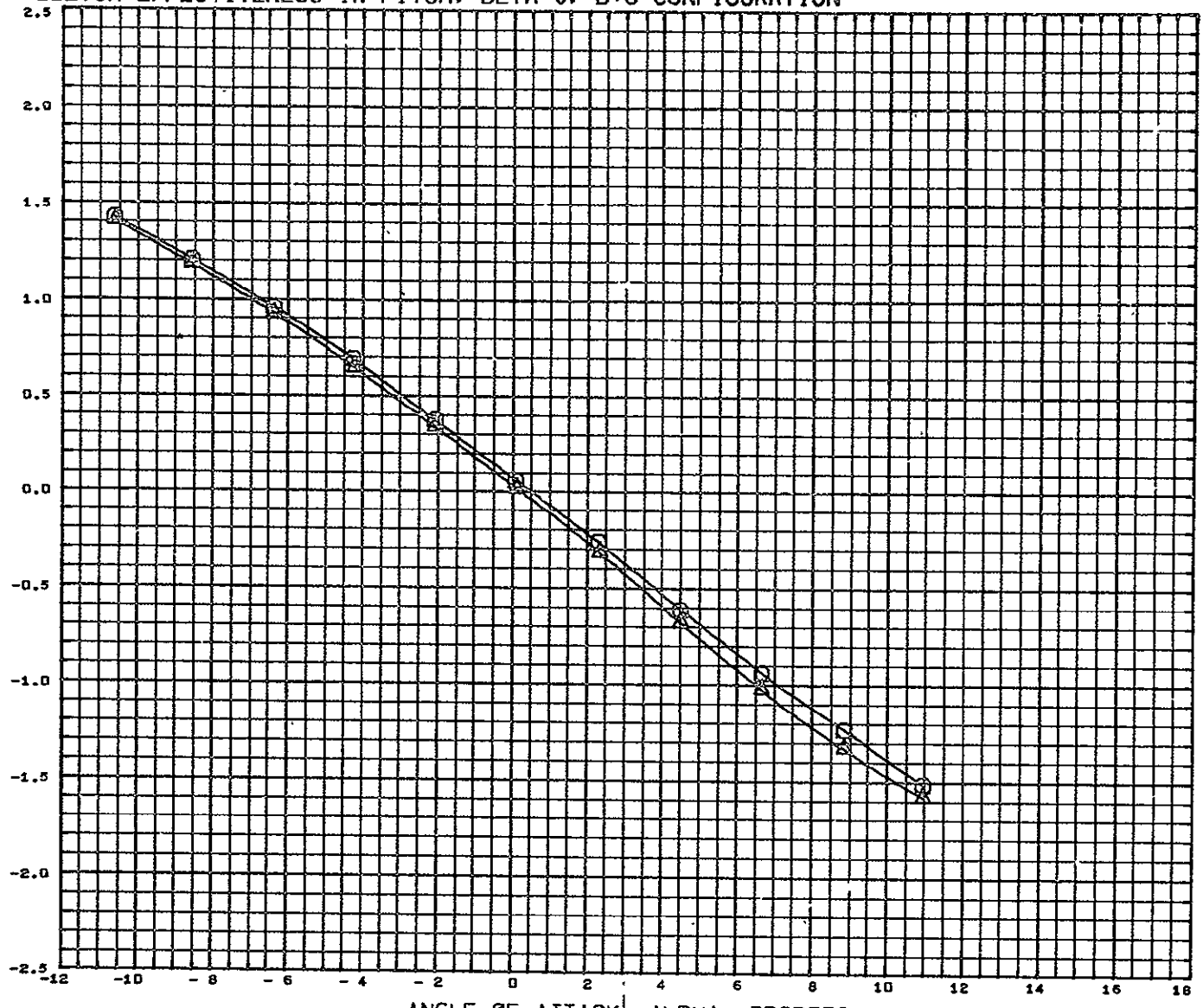
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(.3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.900

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



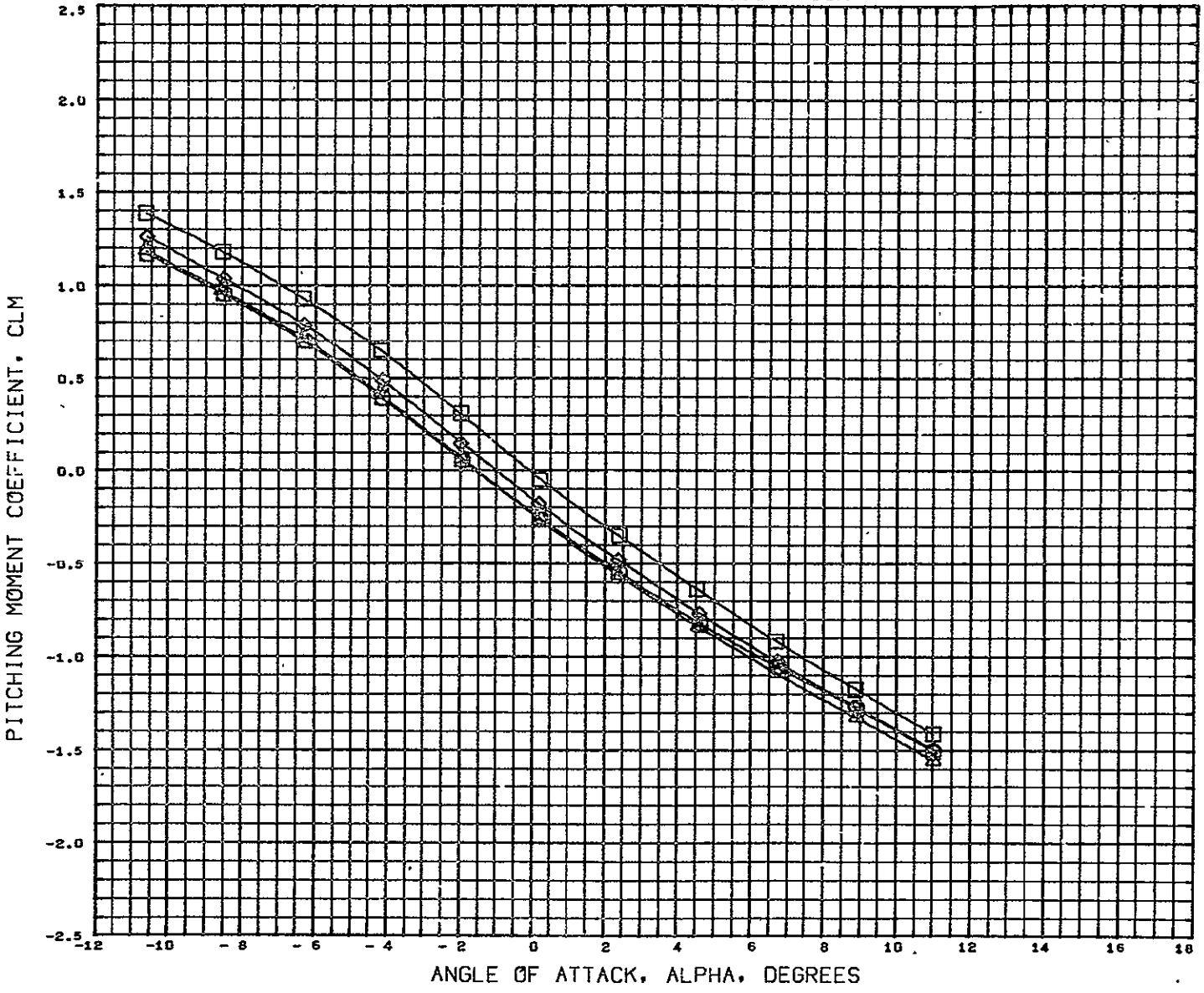
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.994

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

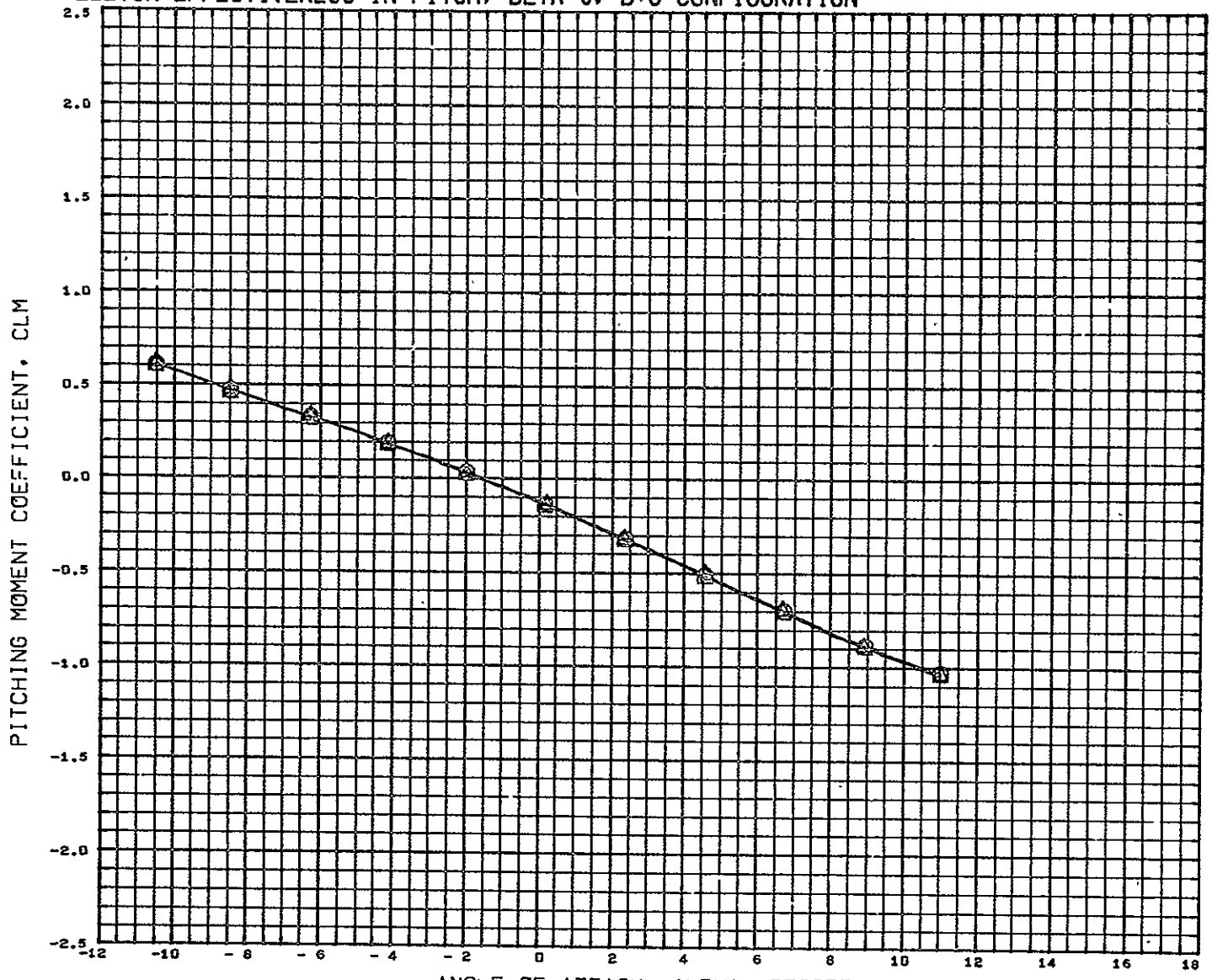


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-5.000	15.000	0.000
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-15.000	25.000	0.000

MACH 1.200

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



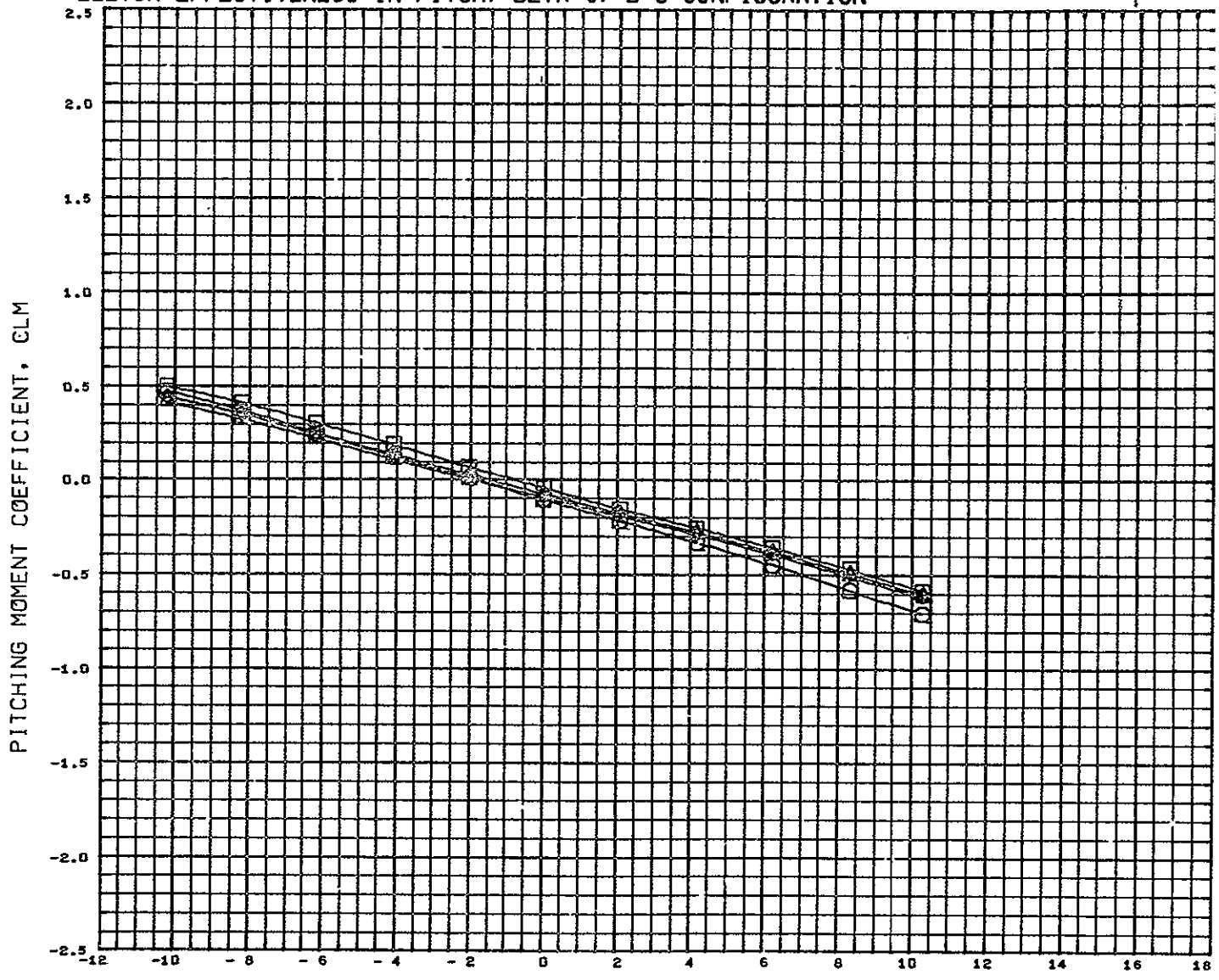
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 1.962

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0630	INCHES
BREF	6.9990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



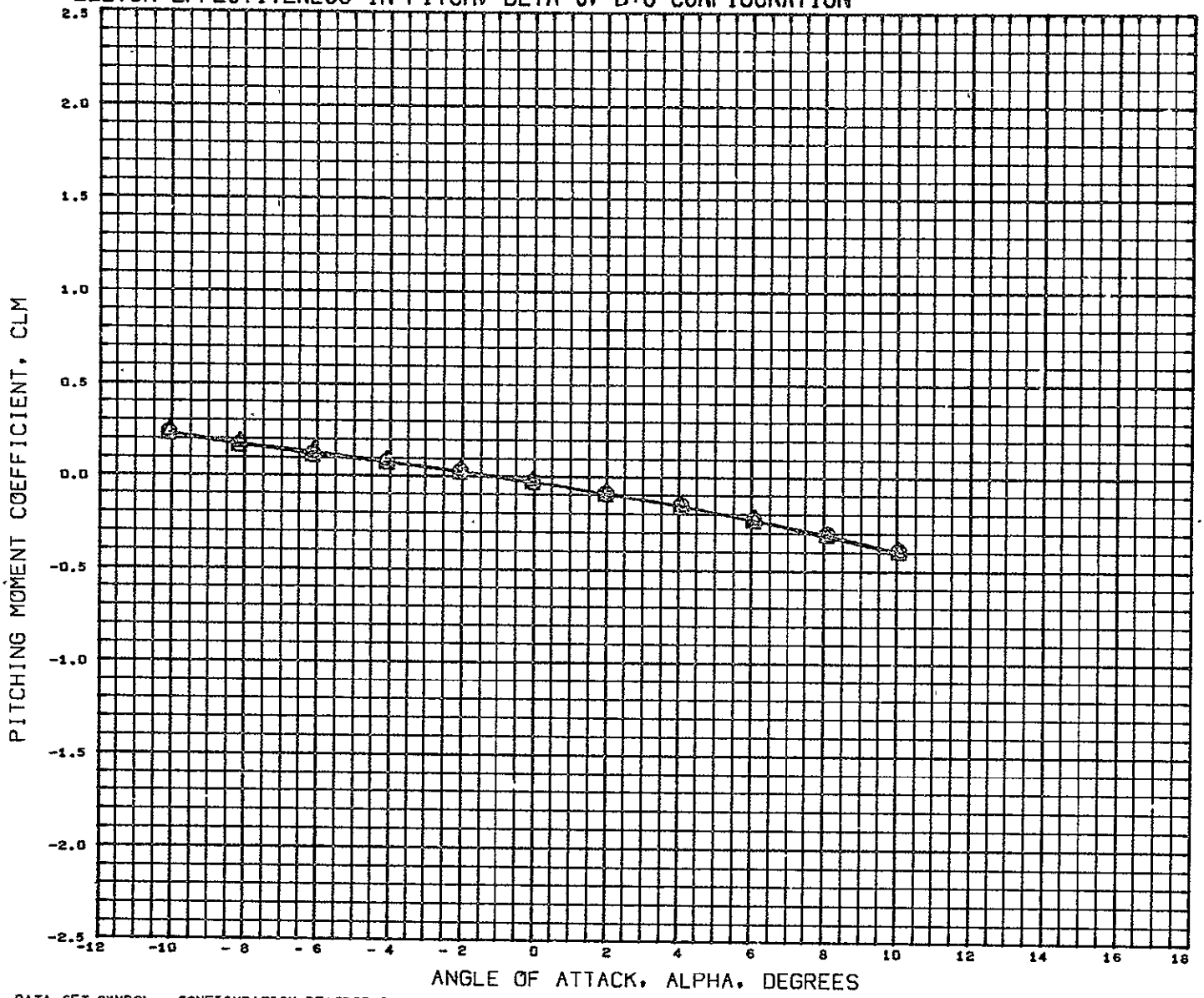
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(A3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 2.990

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATION



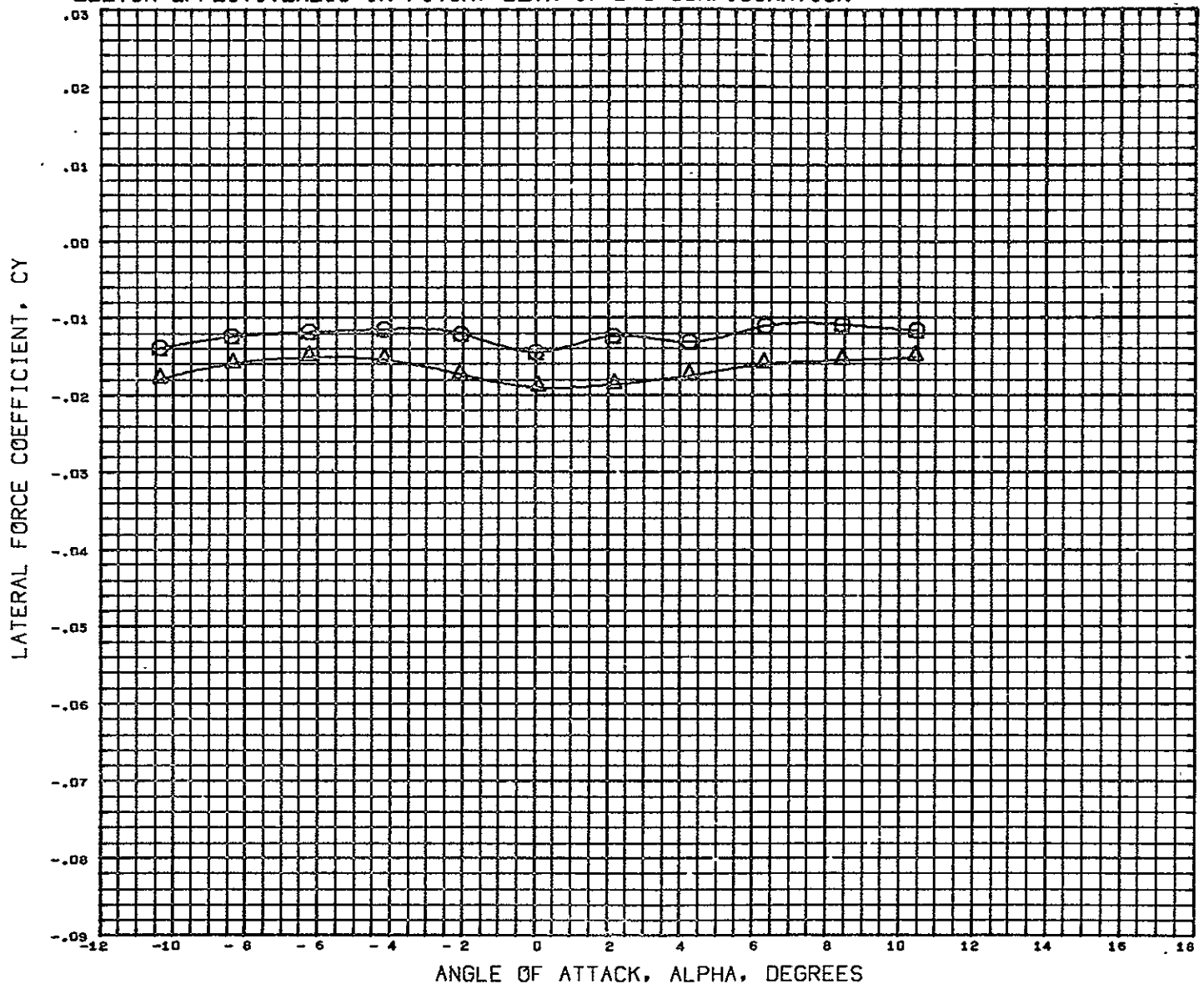
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 4.959

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

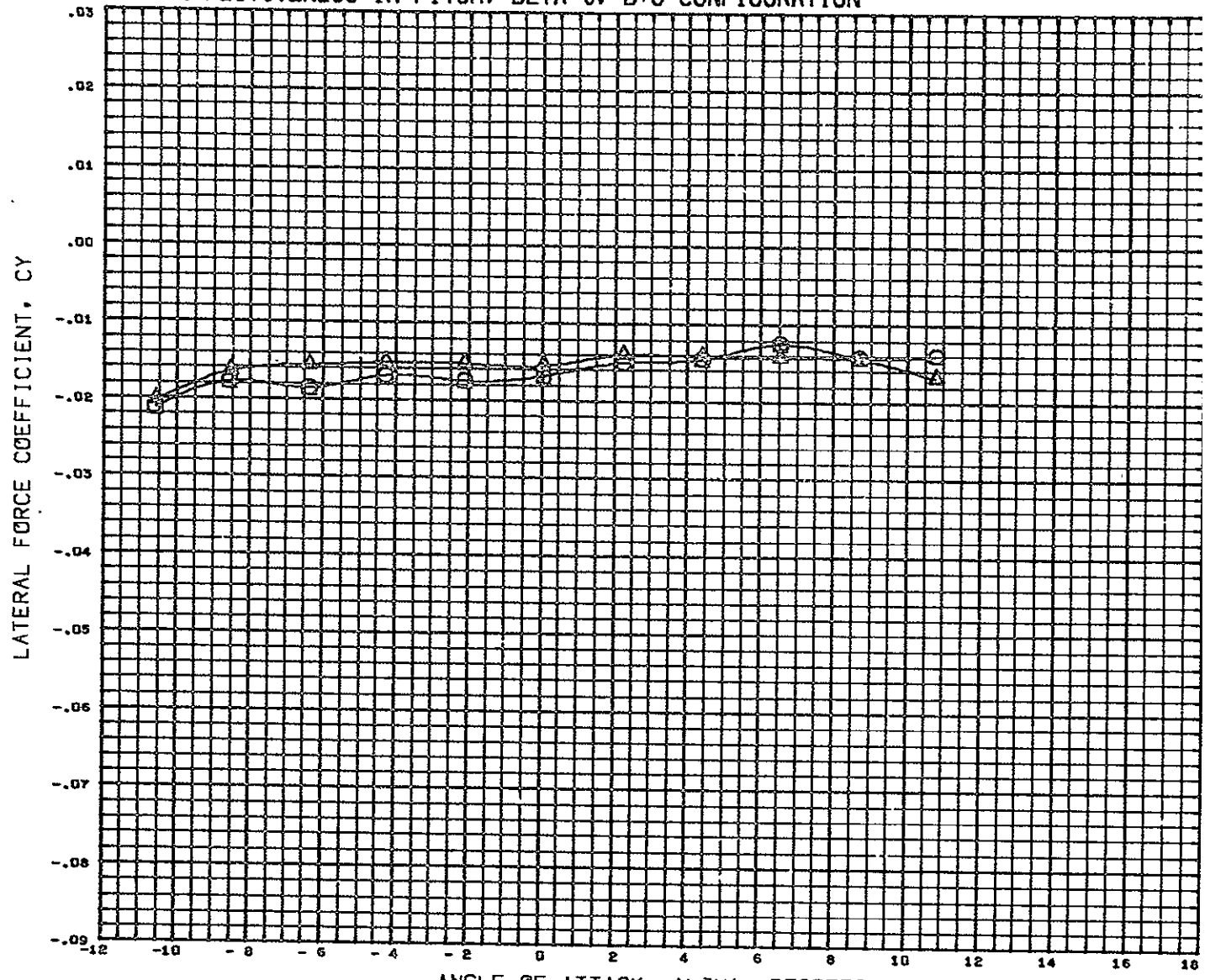


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 0.604

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



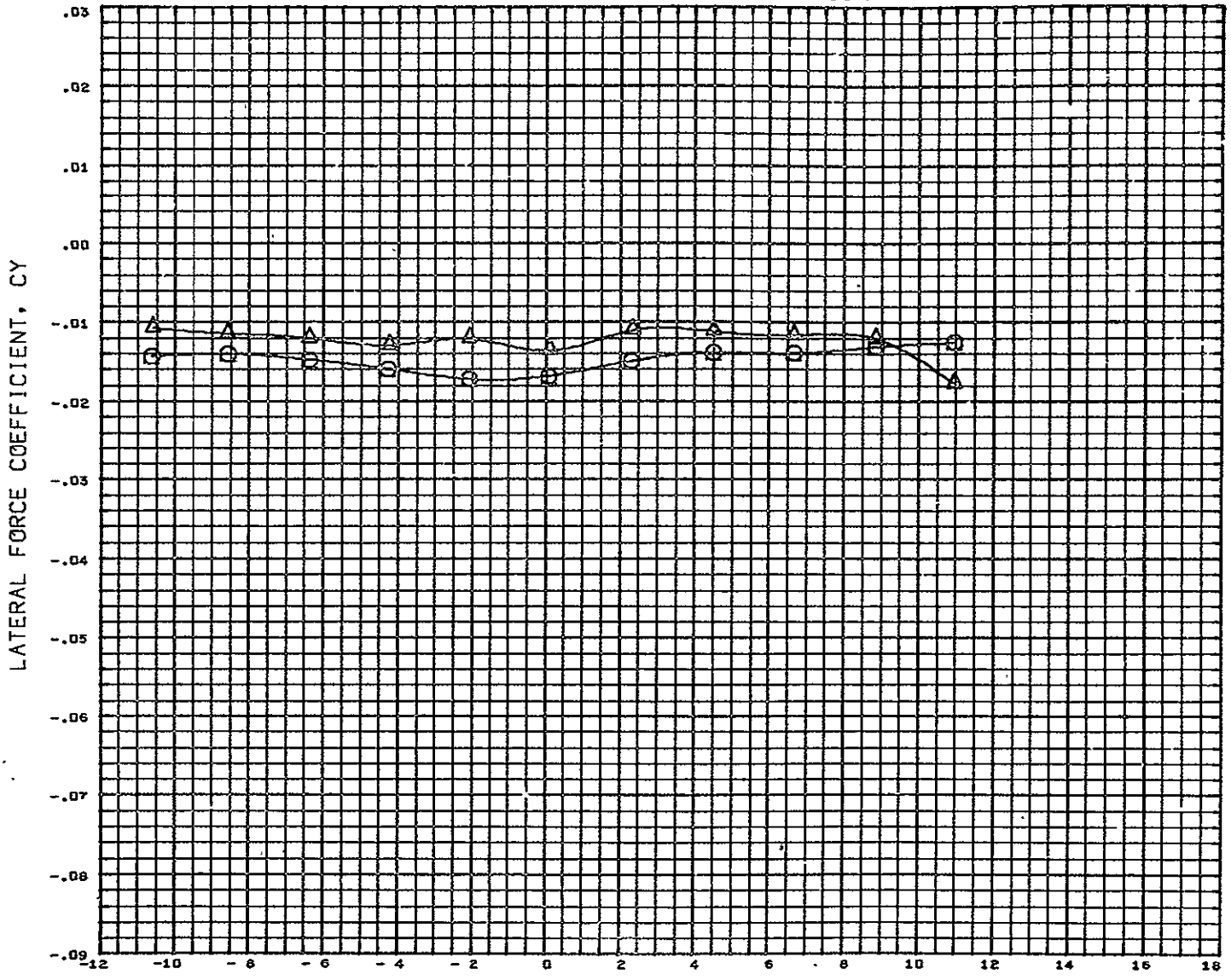
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.900

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6569	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, R+U CONFIGURATION

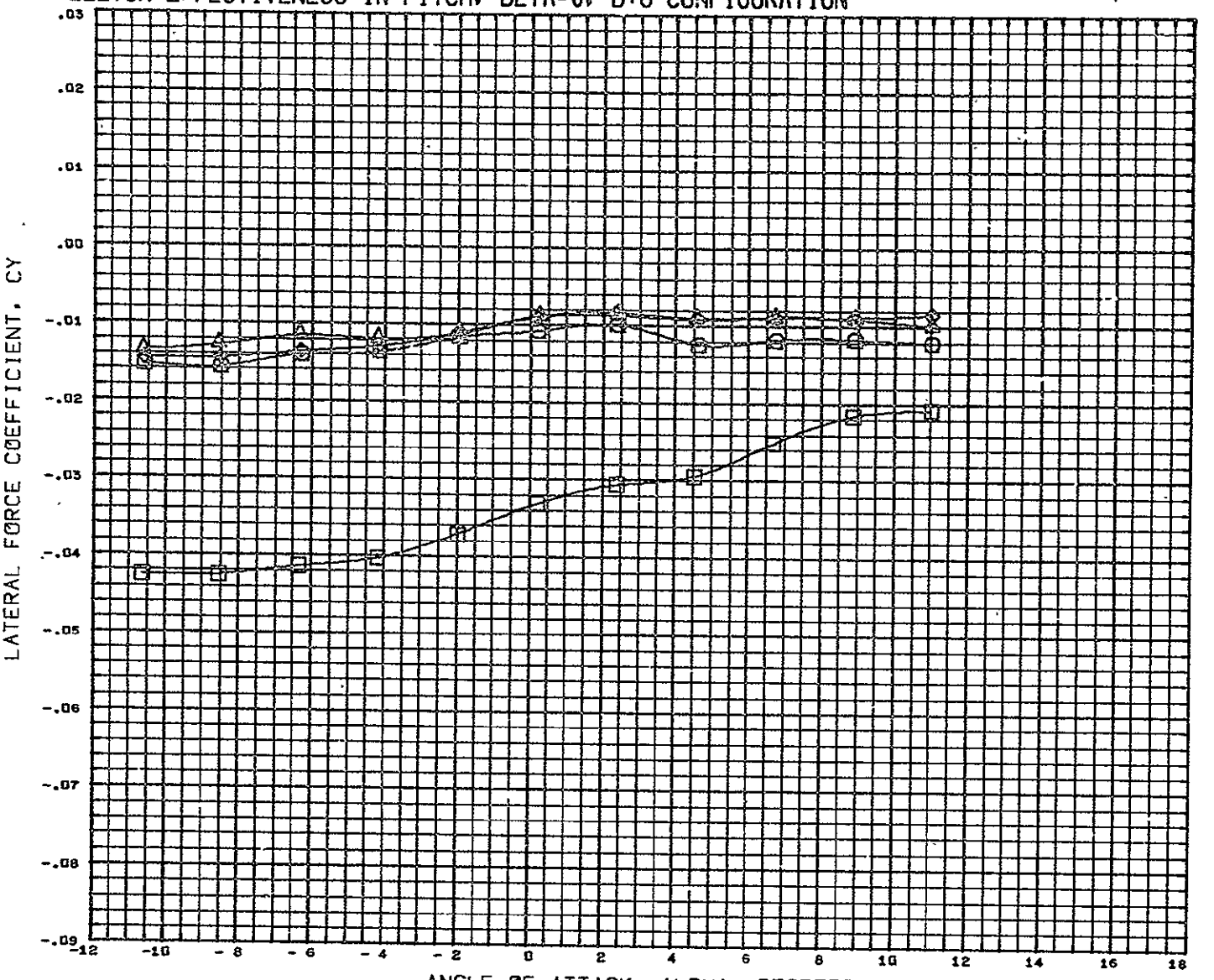


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.653	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



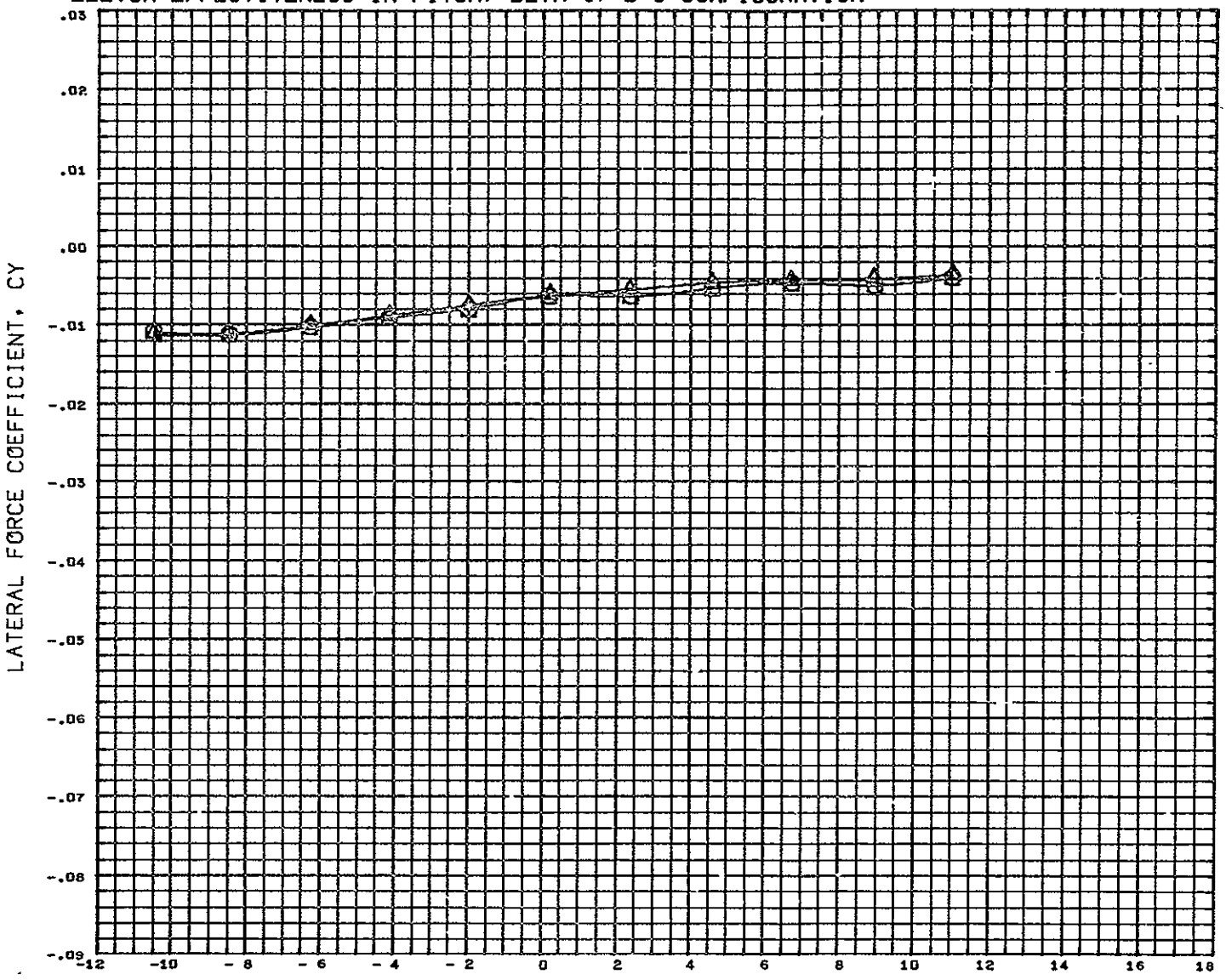
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.200

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.656[illegible]	SQ IN
LREF	3.09[illegible]	INCHES
BREF	6.099[illegible]	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

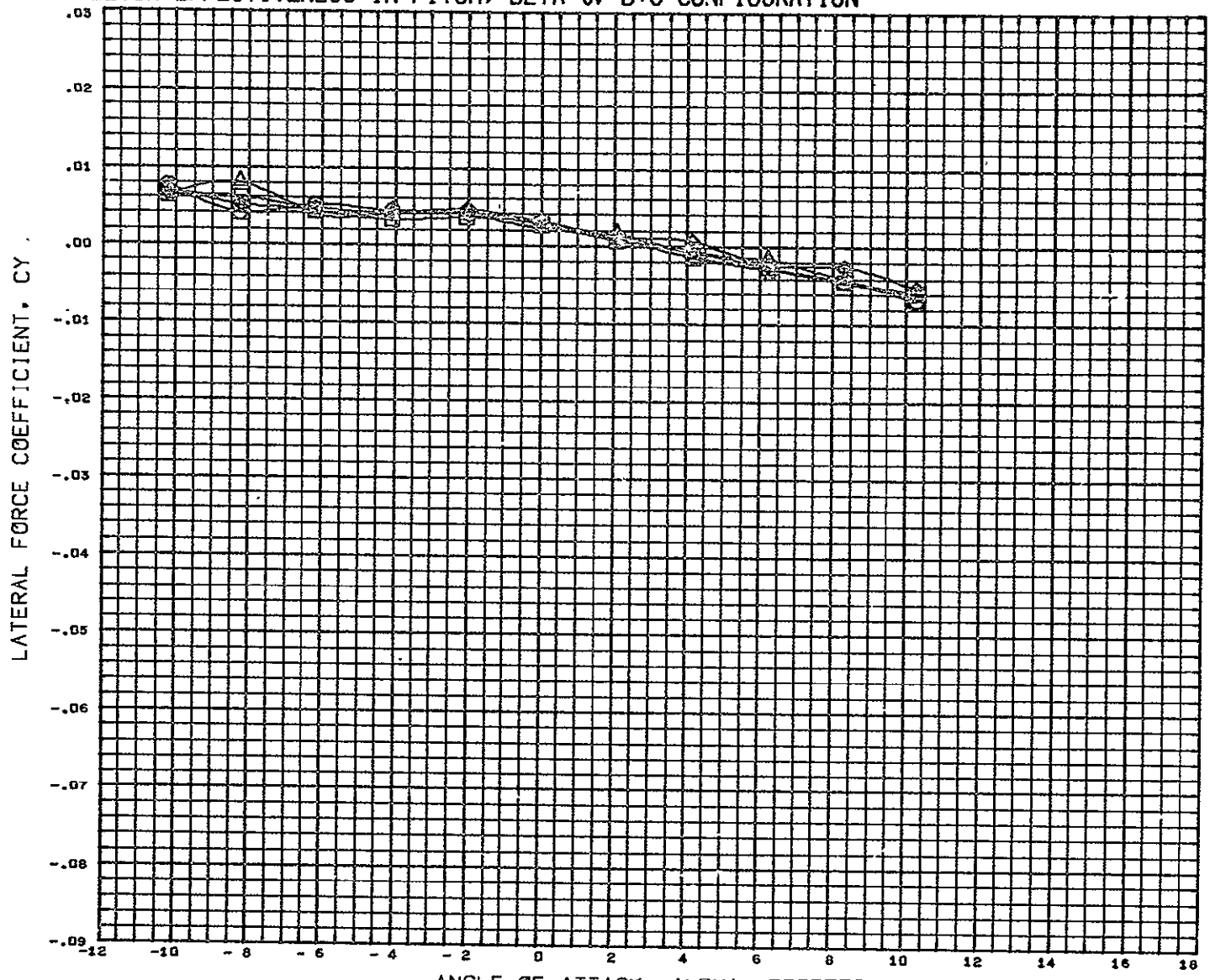


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 1.962

REFERENCE INFORMATION		
SREF	15.6510	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



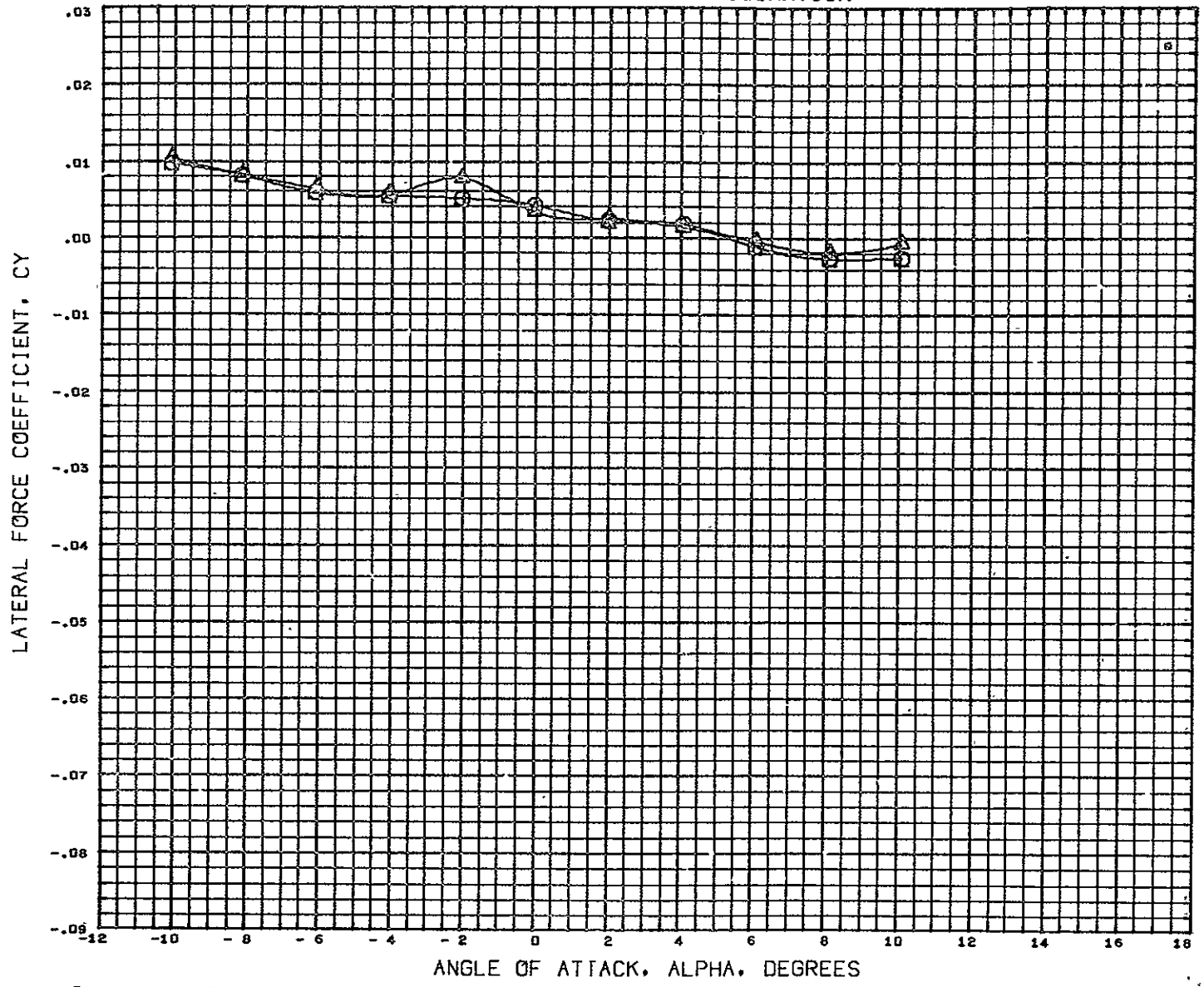
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 2.990

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN

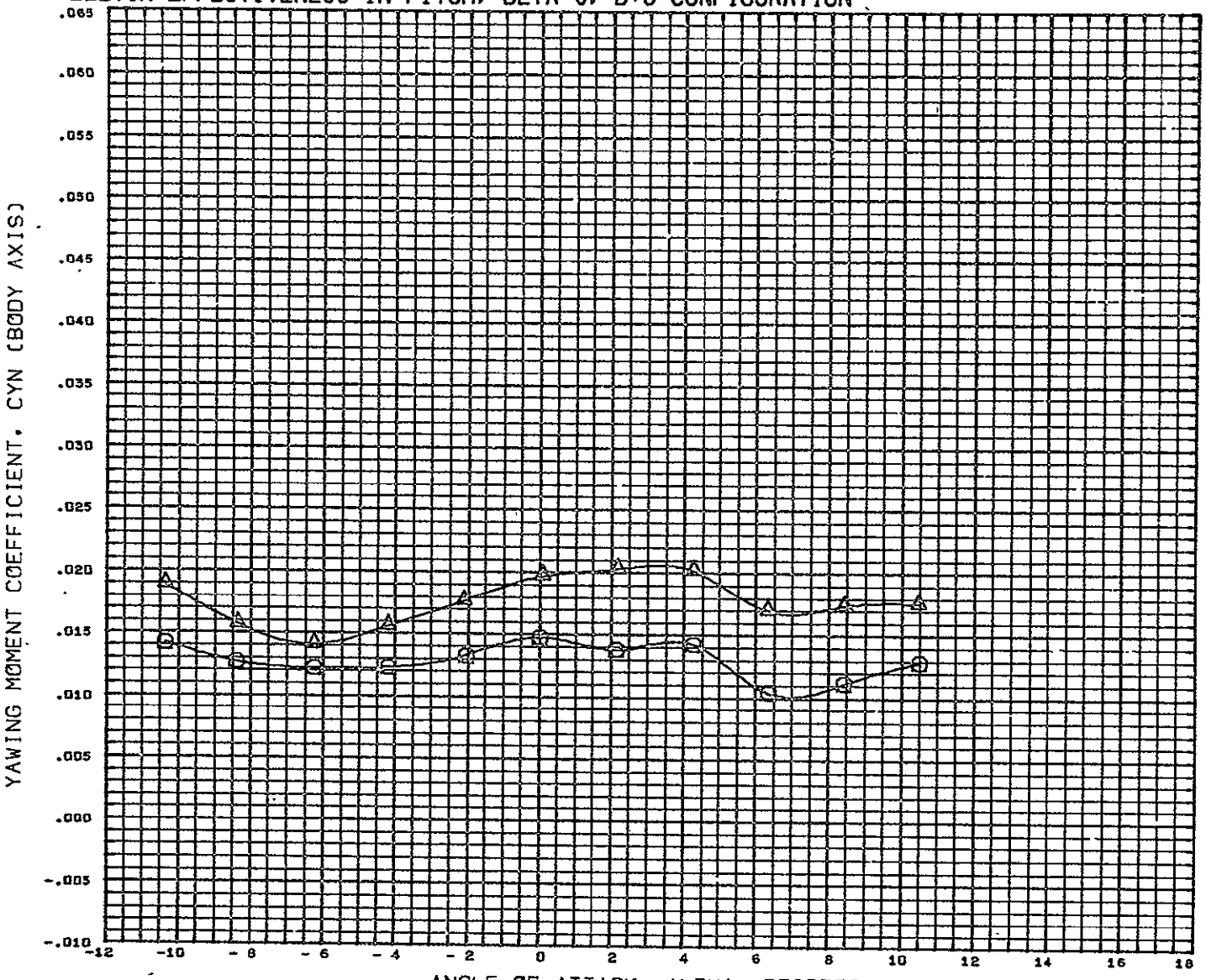


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 4.959

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



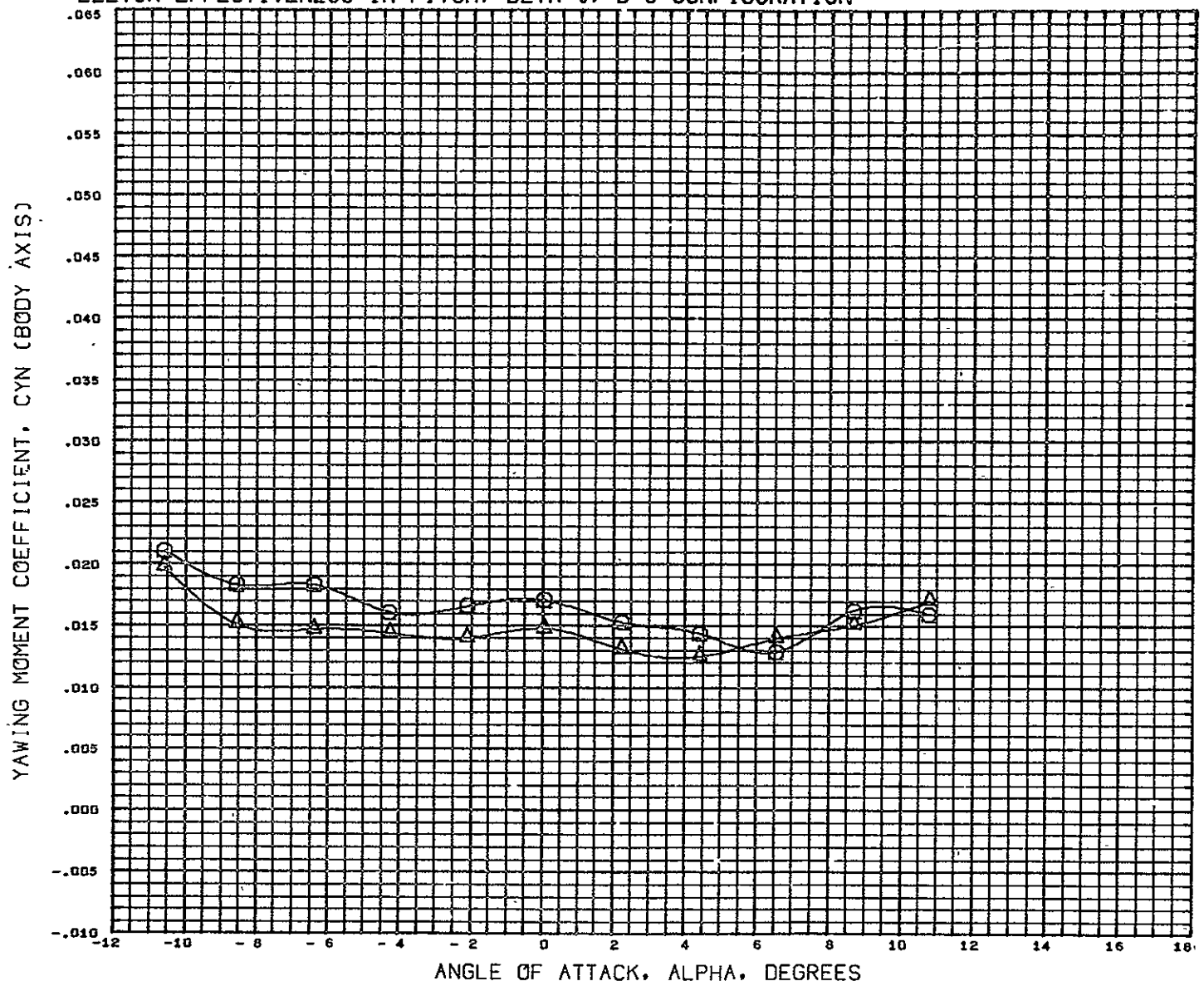
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.604

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	.0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



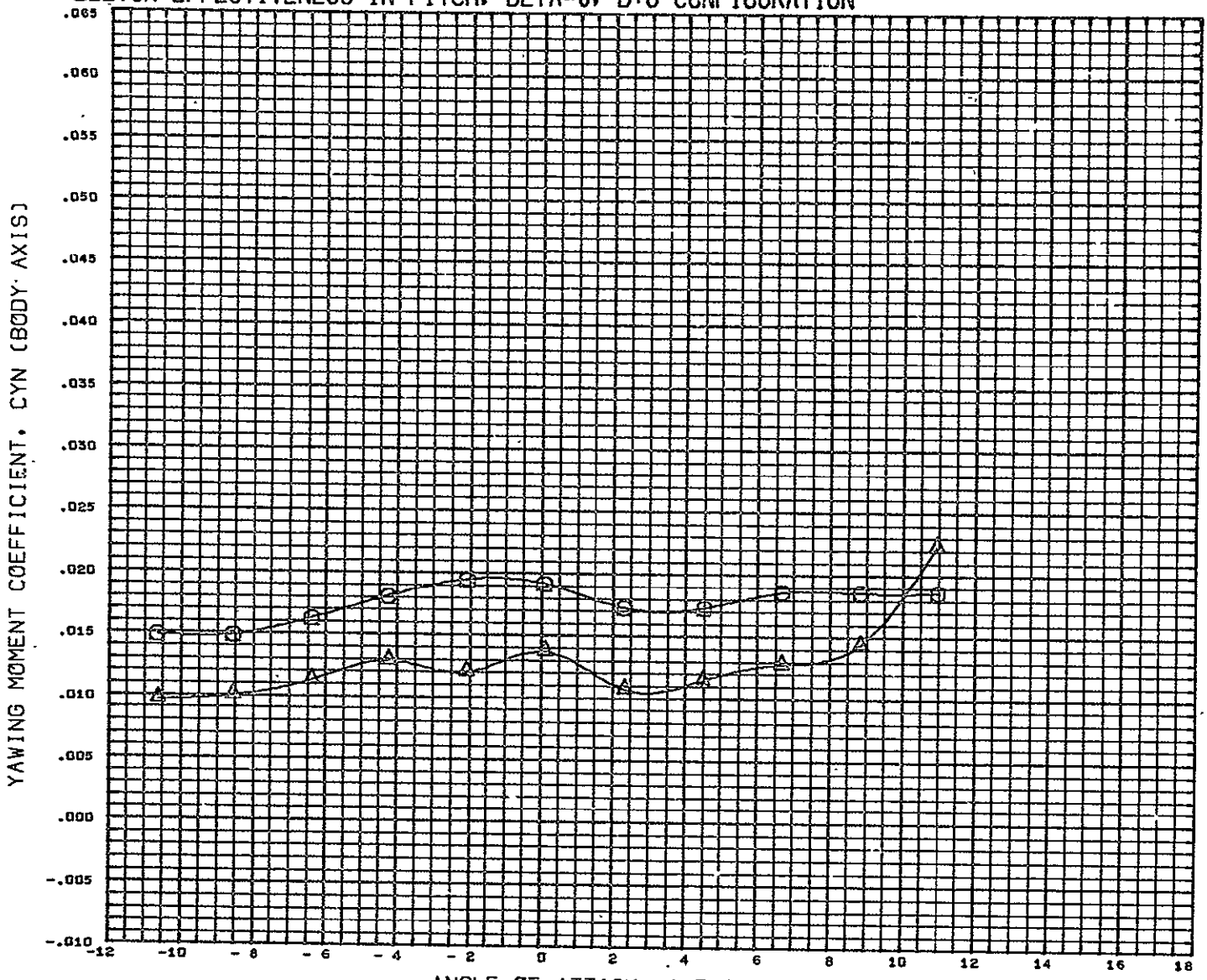
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.900

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6569	SQ IN
LREF	5.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



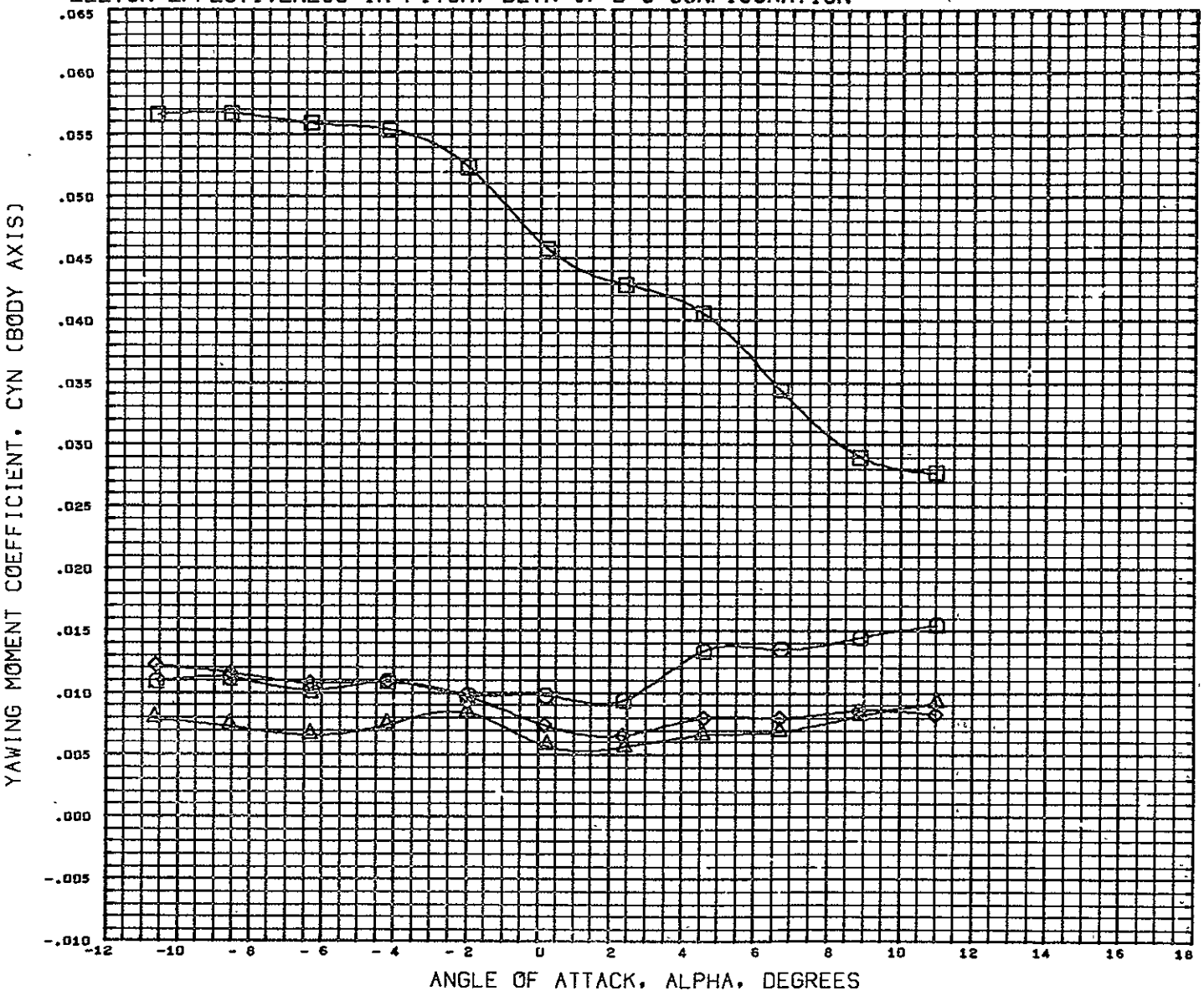
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.994

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

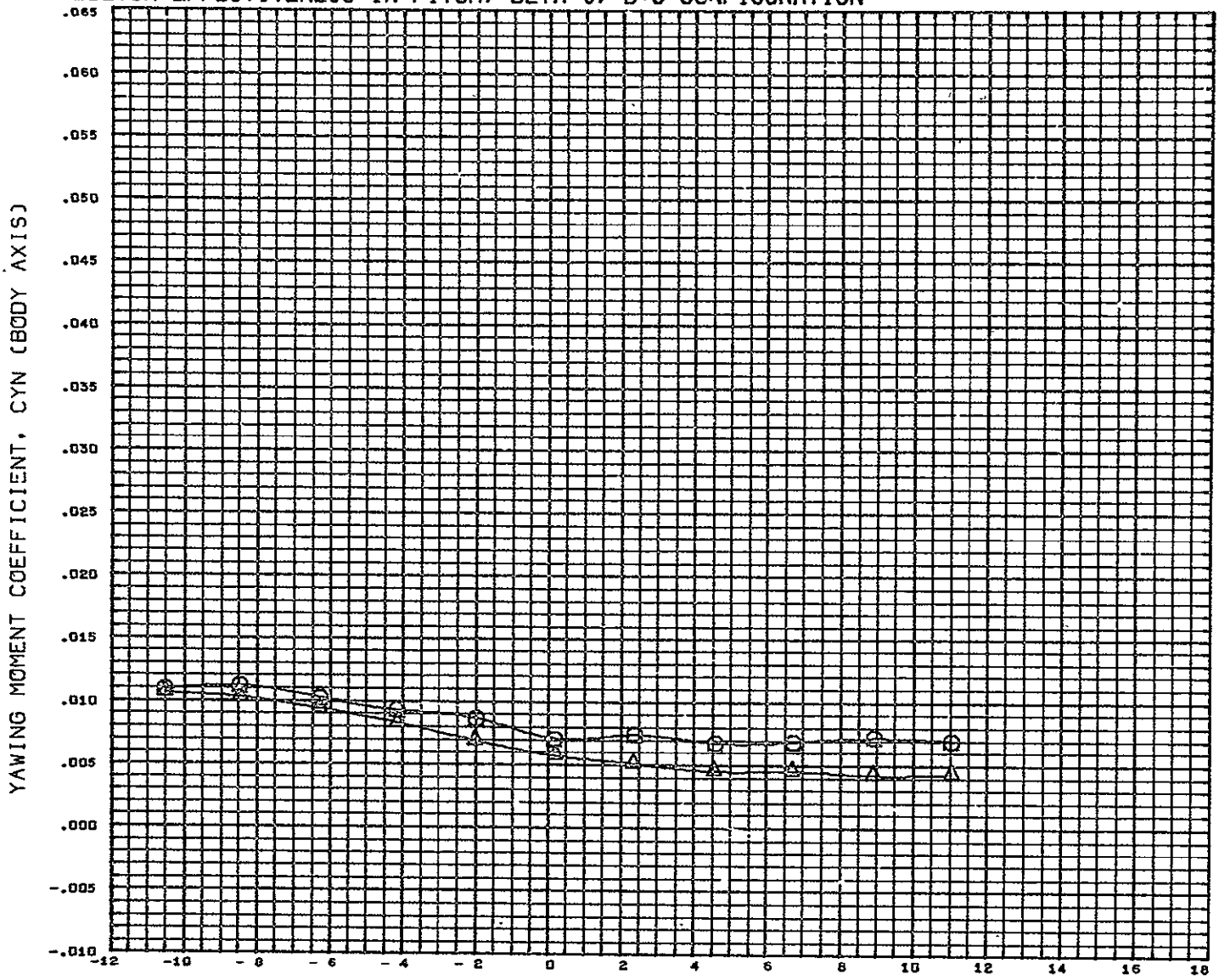


DATA SET SYMBOL		CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-5.000	15.000	0.000
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-15.000	25.000	0.000

MACH 1.200

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



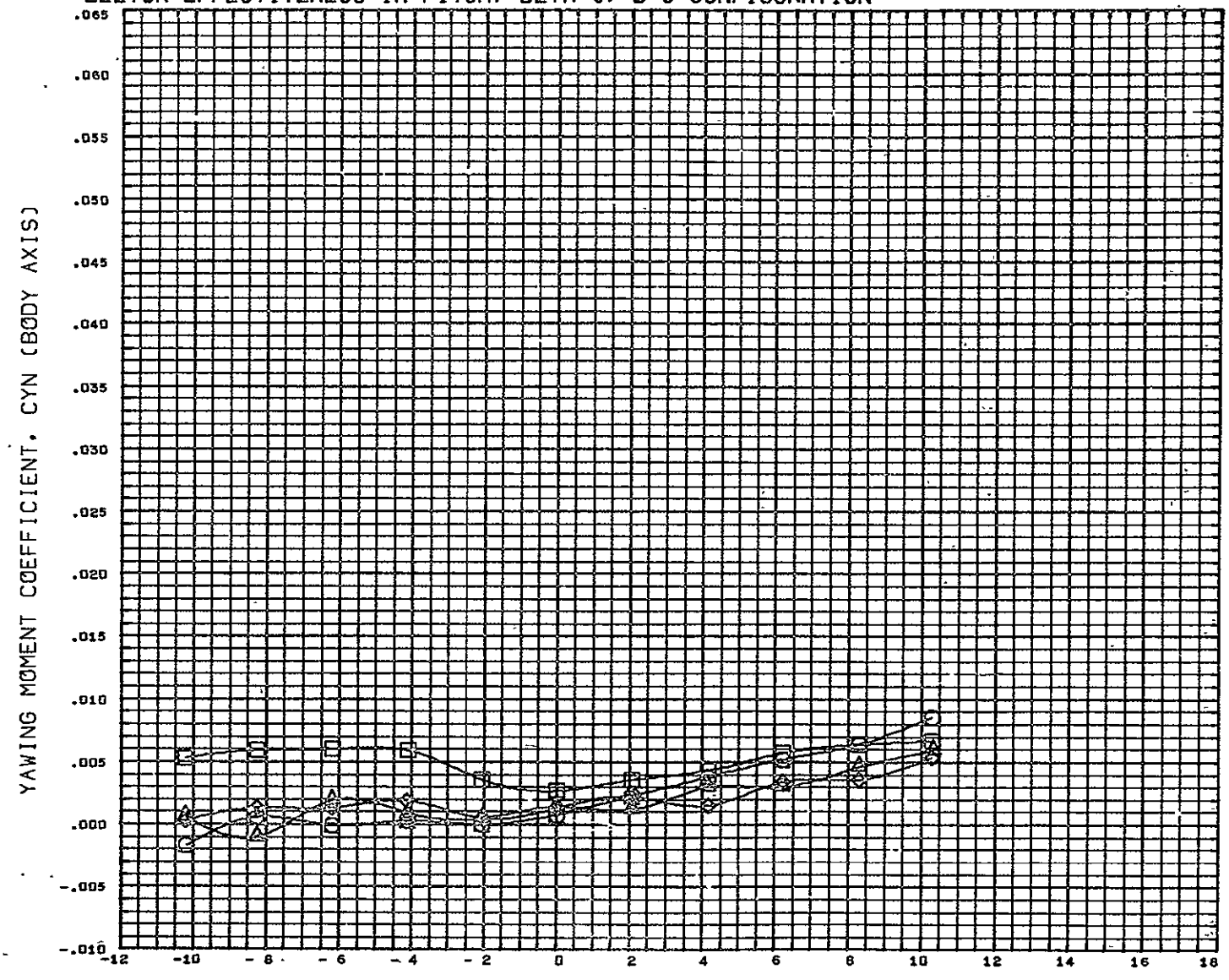
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 1.962

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

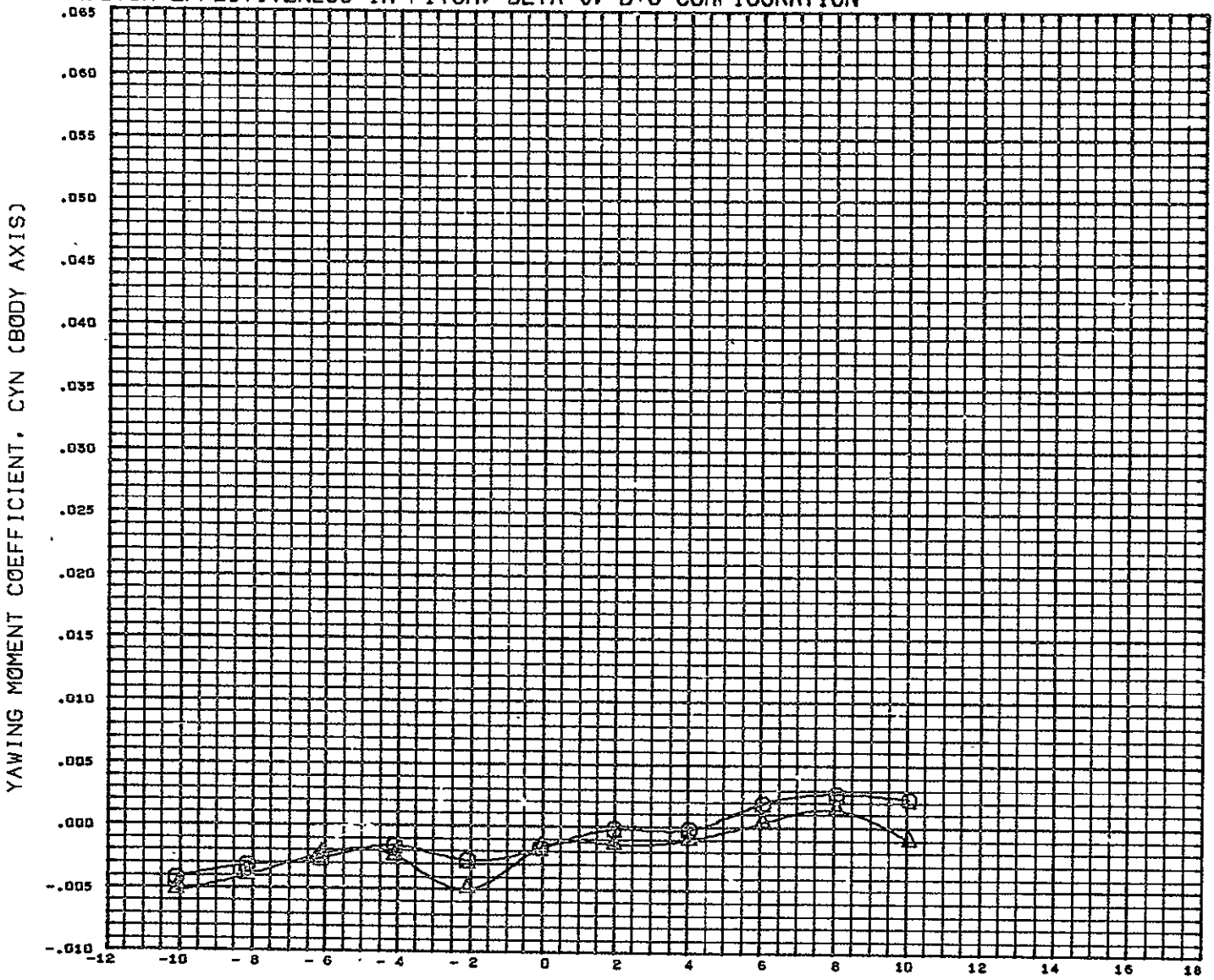


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-5.000	15.000	0.000
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



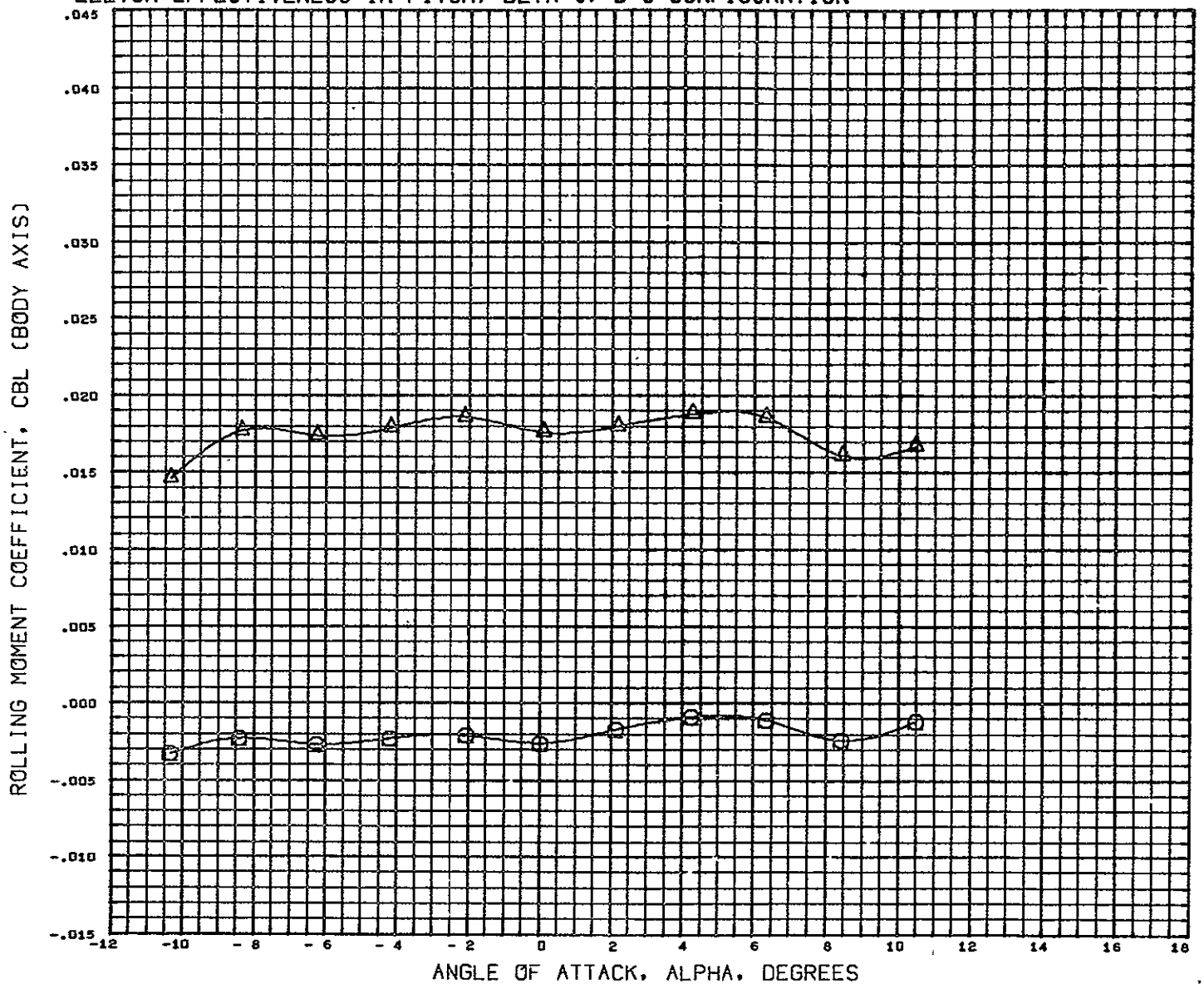
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 4.959

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

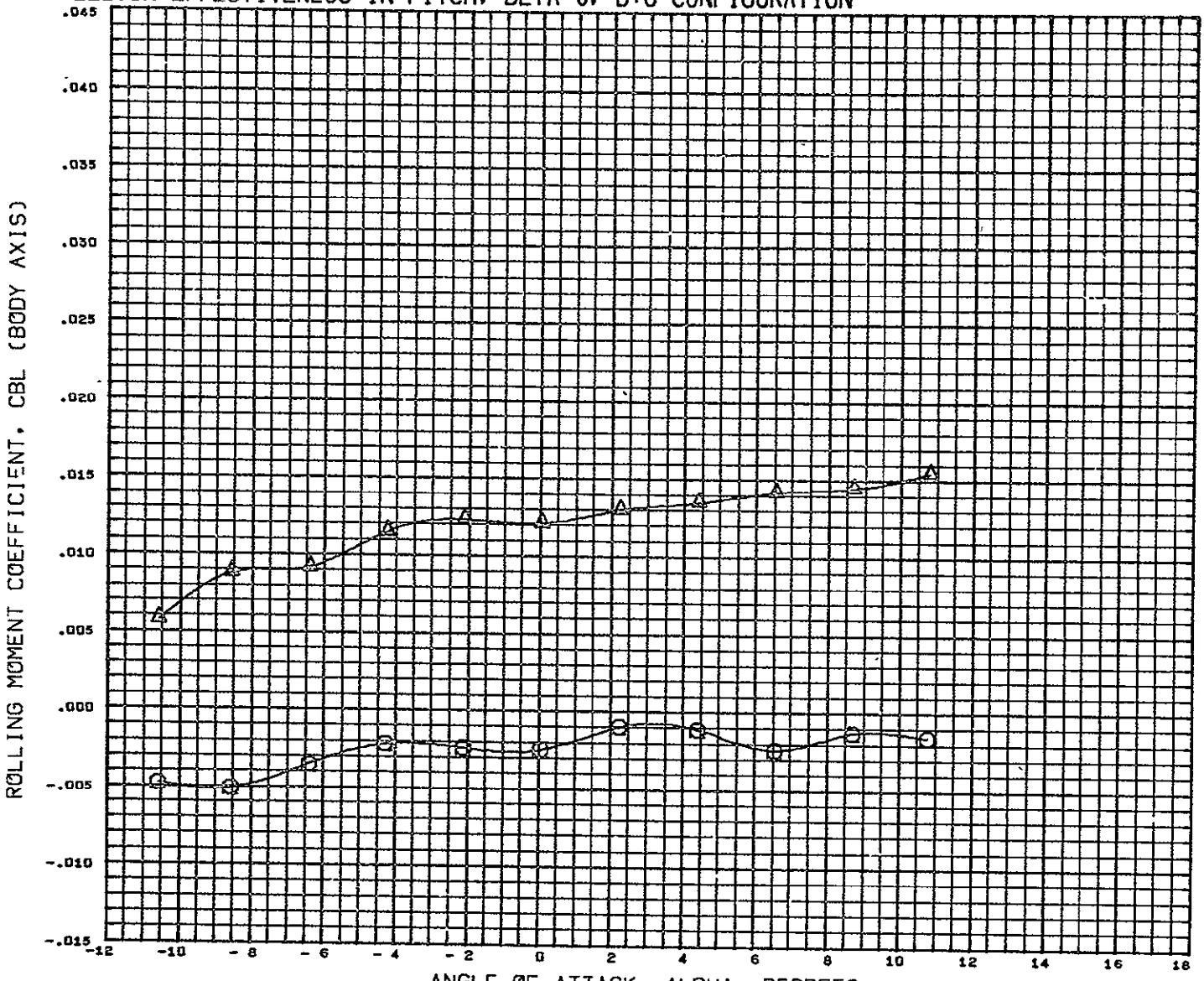


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 0.604

REFERENCE INFORMATION		
SREF	15.6563	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



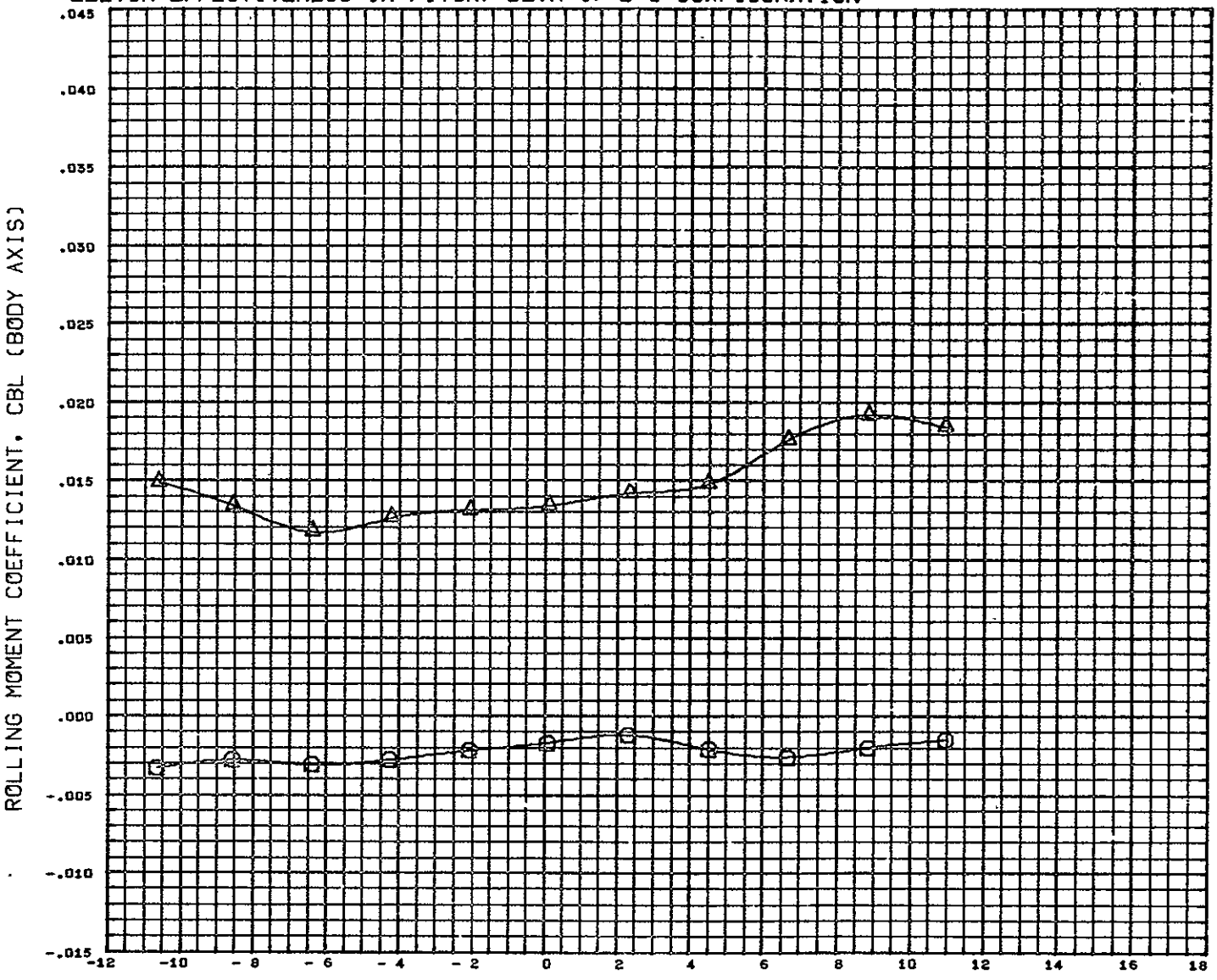
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

MACH 0.900

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN



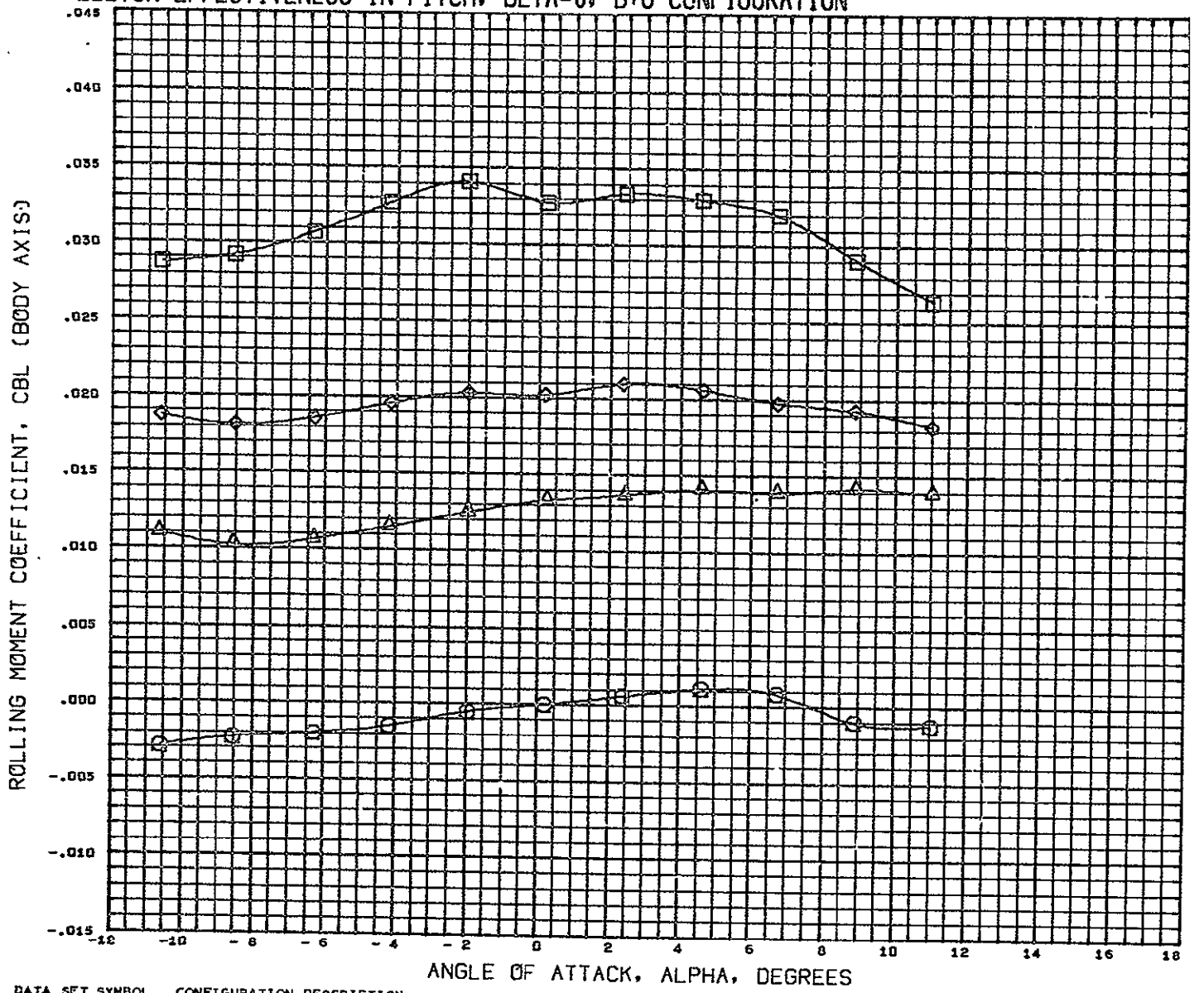
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MsFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0953	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



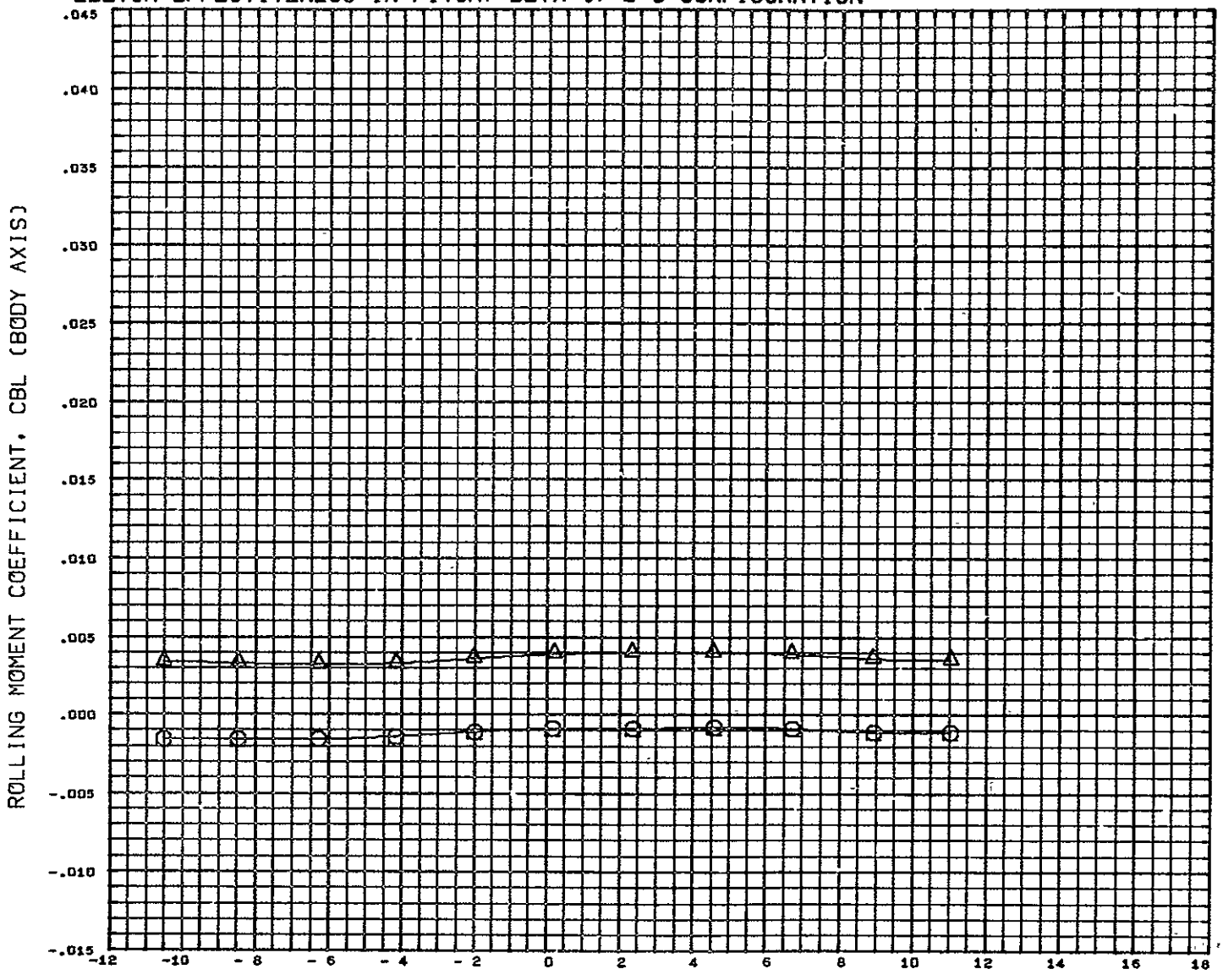
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.200

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

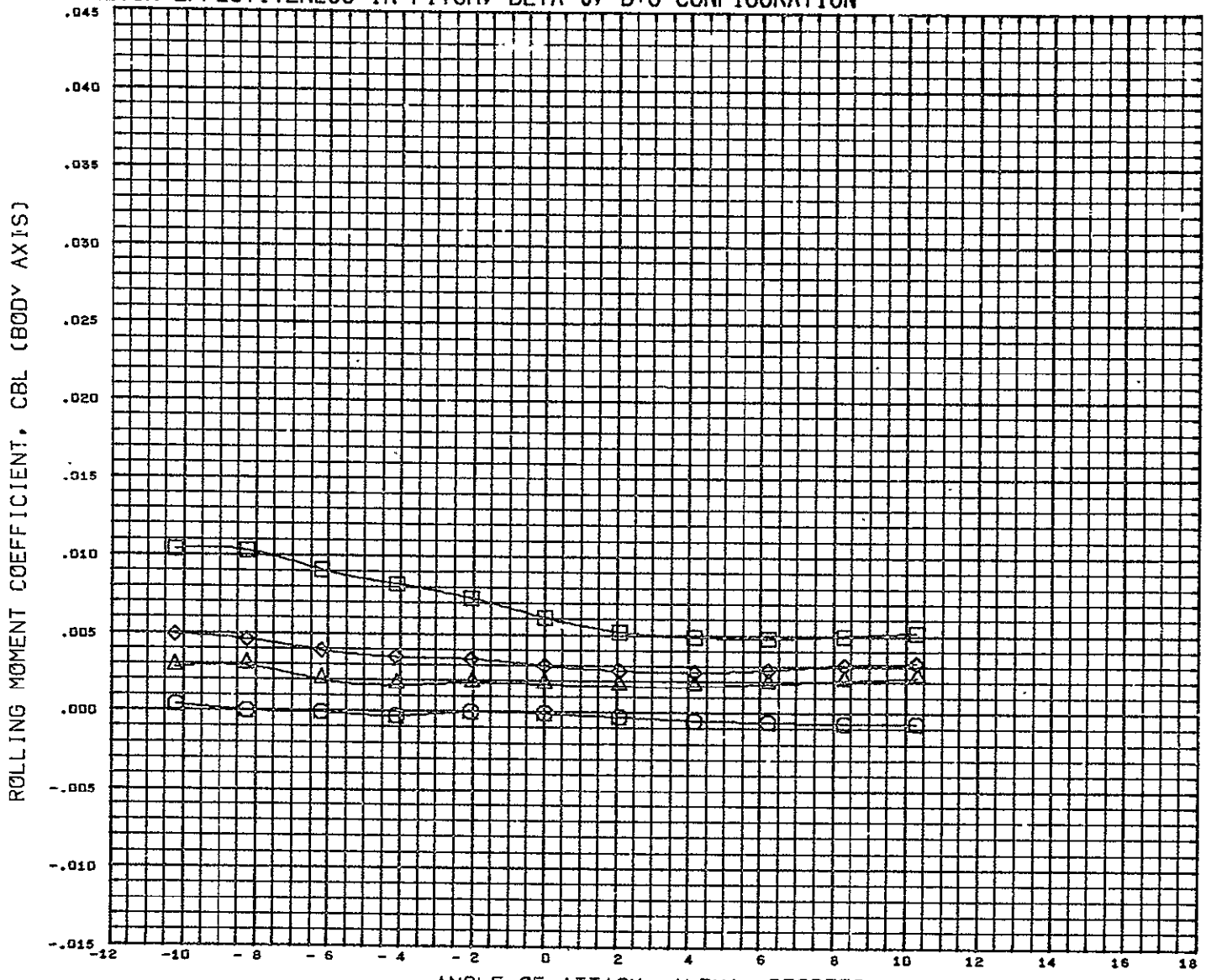


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-8.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 1.962

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN



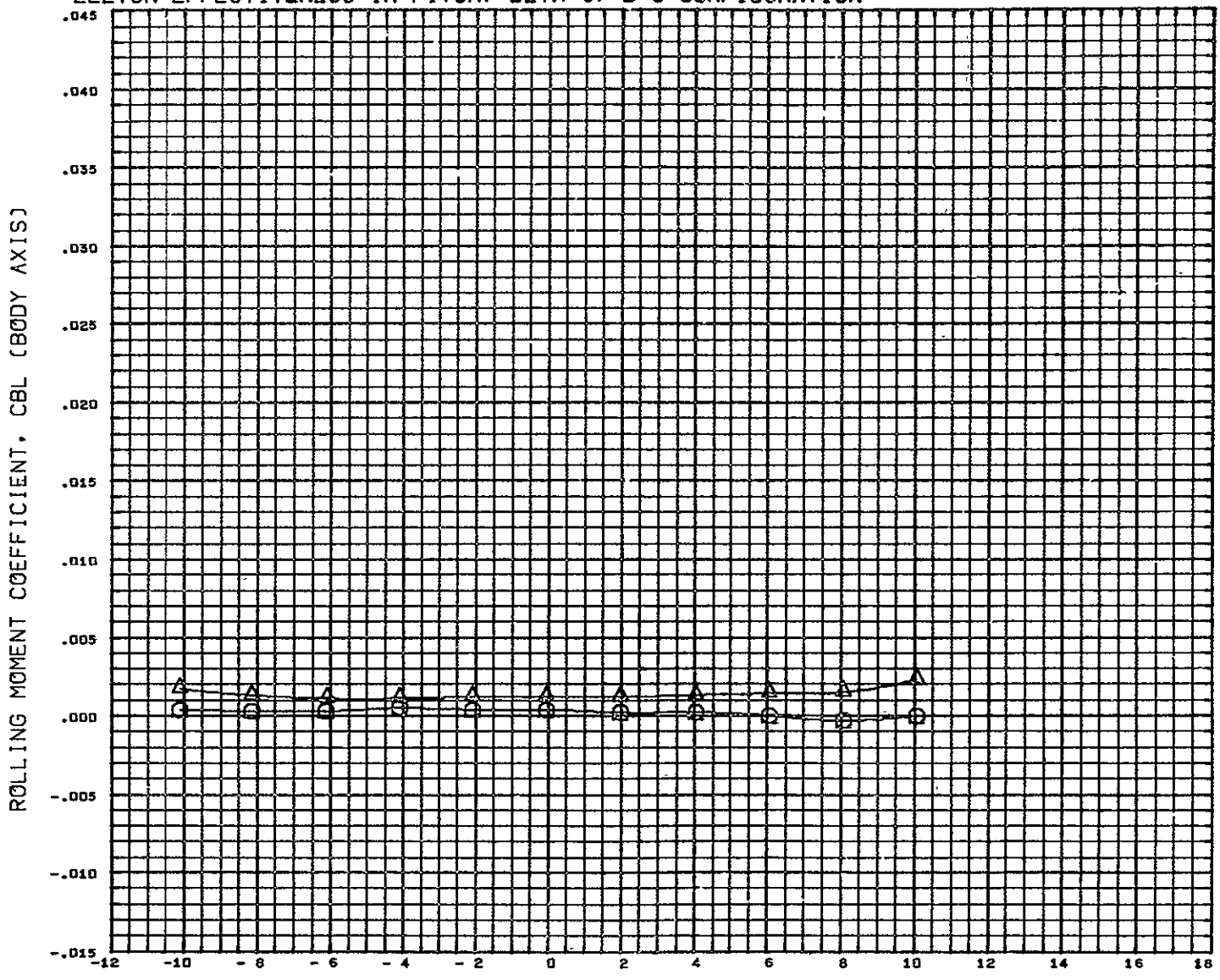
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3105C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3106C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3107C)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 2.990

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.020	0.000	10.000	0.000
0.040	-5.000	15.000	0.000
0.040	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

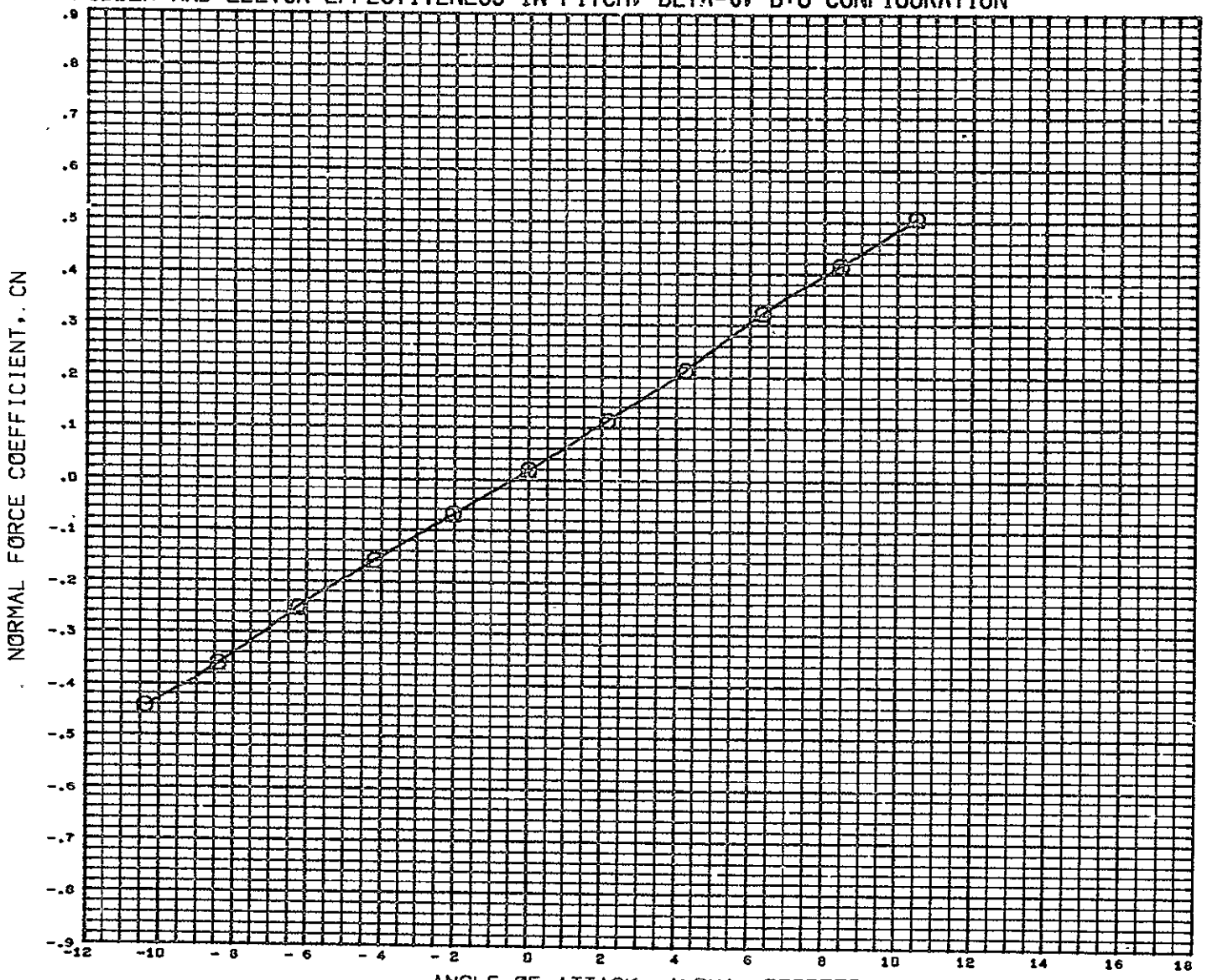


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(A3105C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.020	0.000	10.000	0.000
(A3106C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-5.000	15.000	0.000
(A3107C)	□	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.040	-15.000	25.000	0.000

MACH 4.959

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



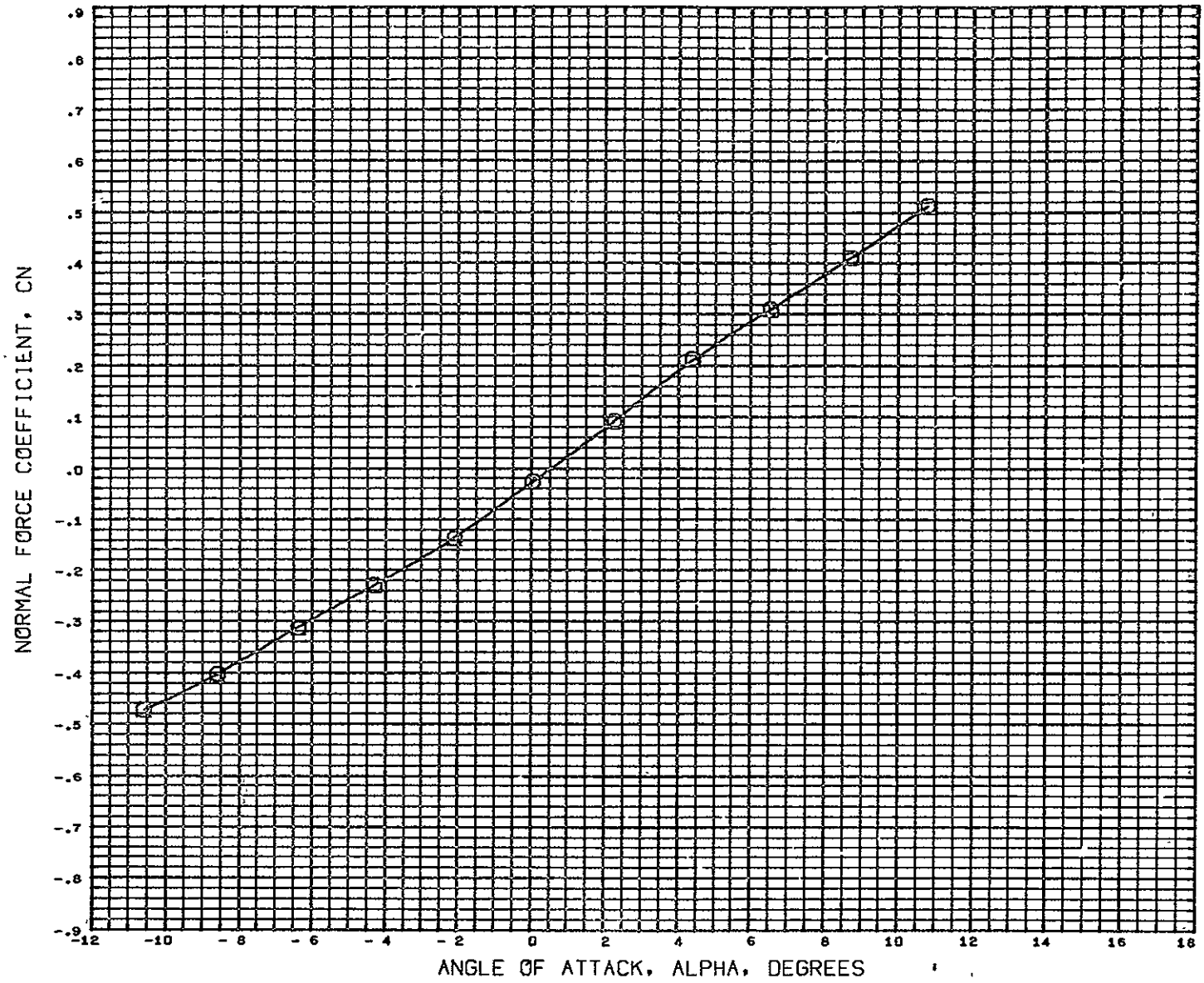
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.604

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

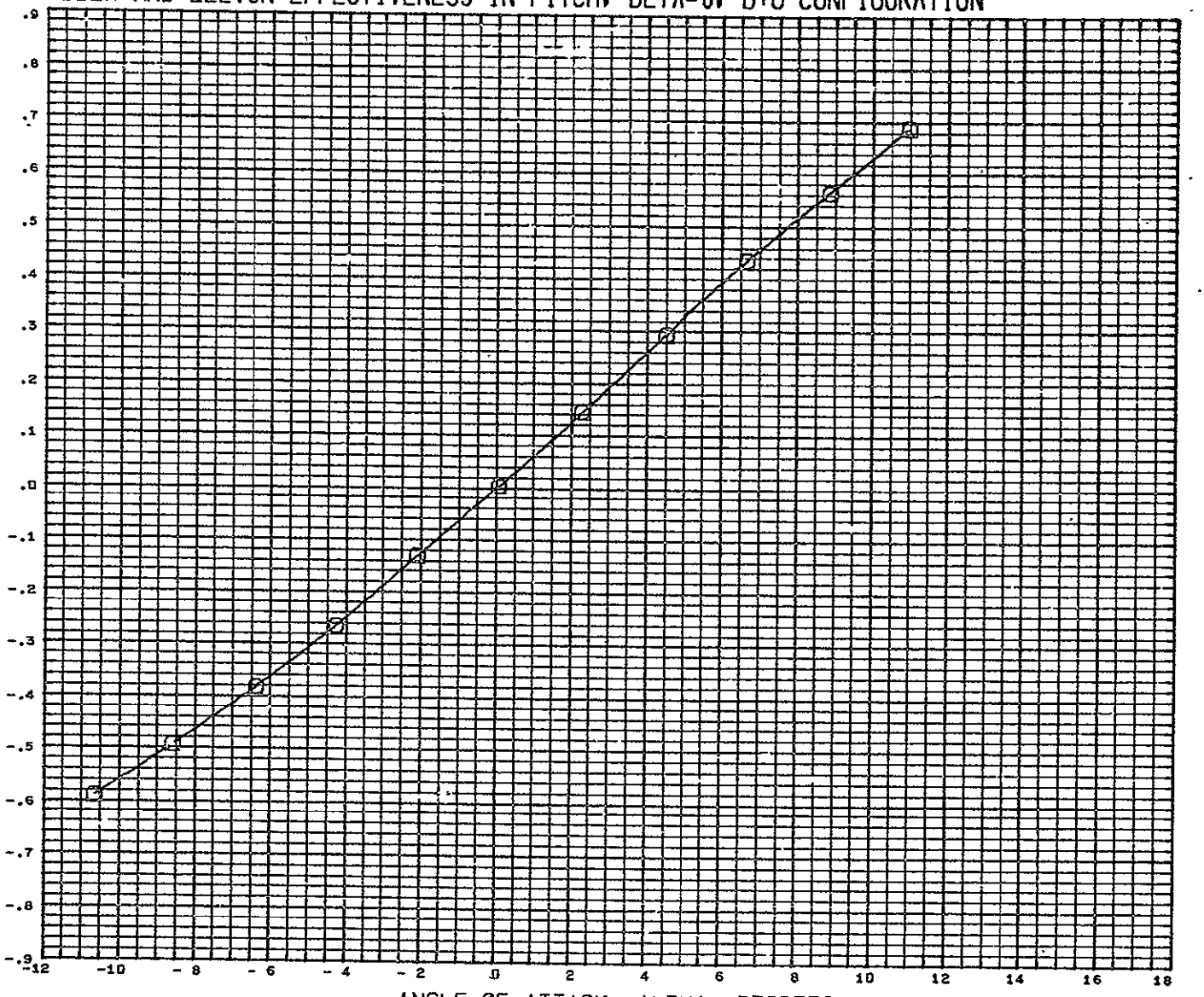


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 0.900

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



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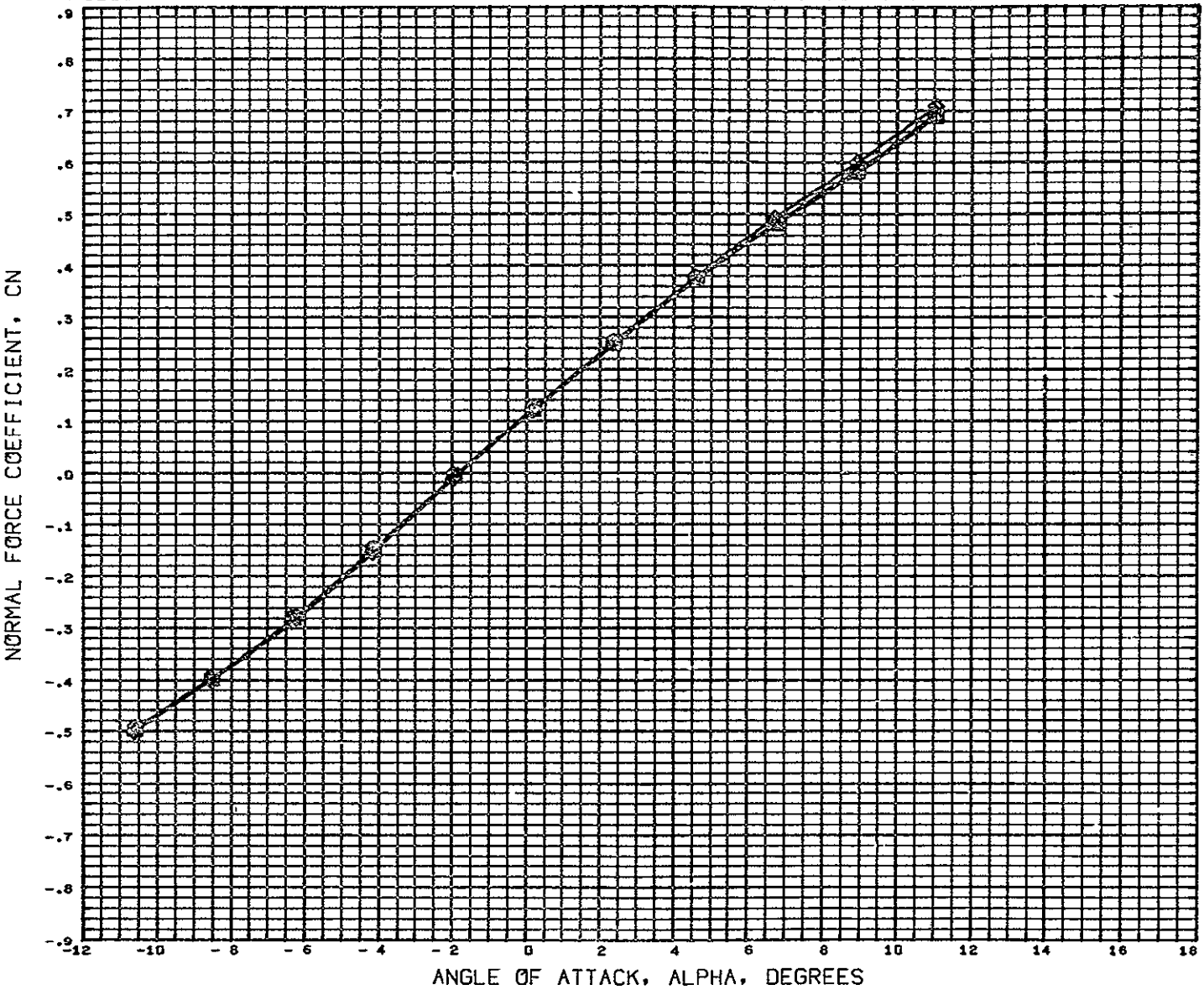
TA SET	SYMBOL	CONFIGURATION DESCRIPTION
3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

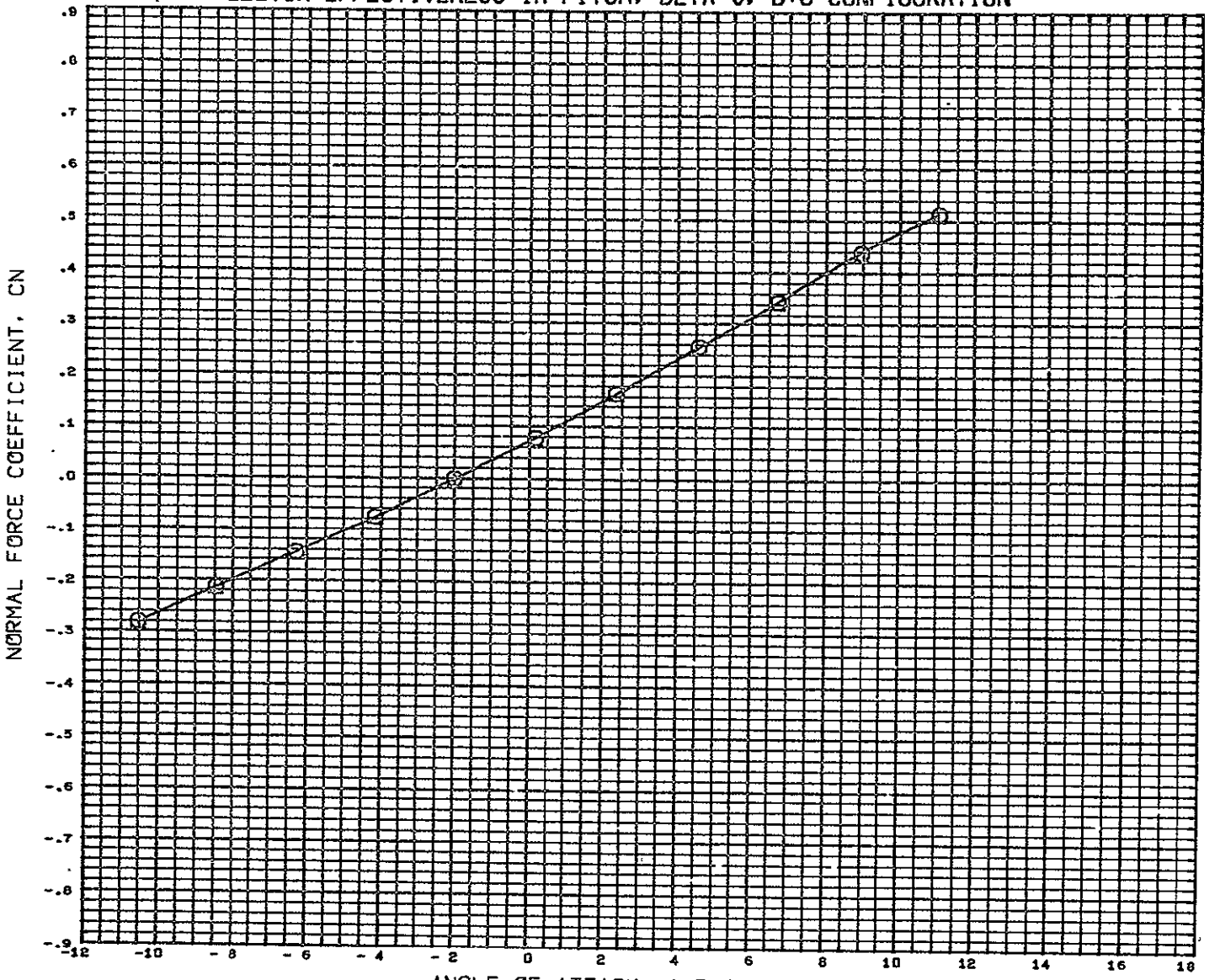


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

MACH 1.200

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.9599	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



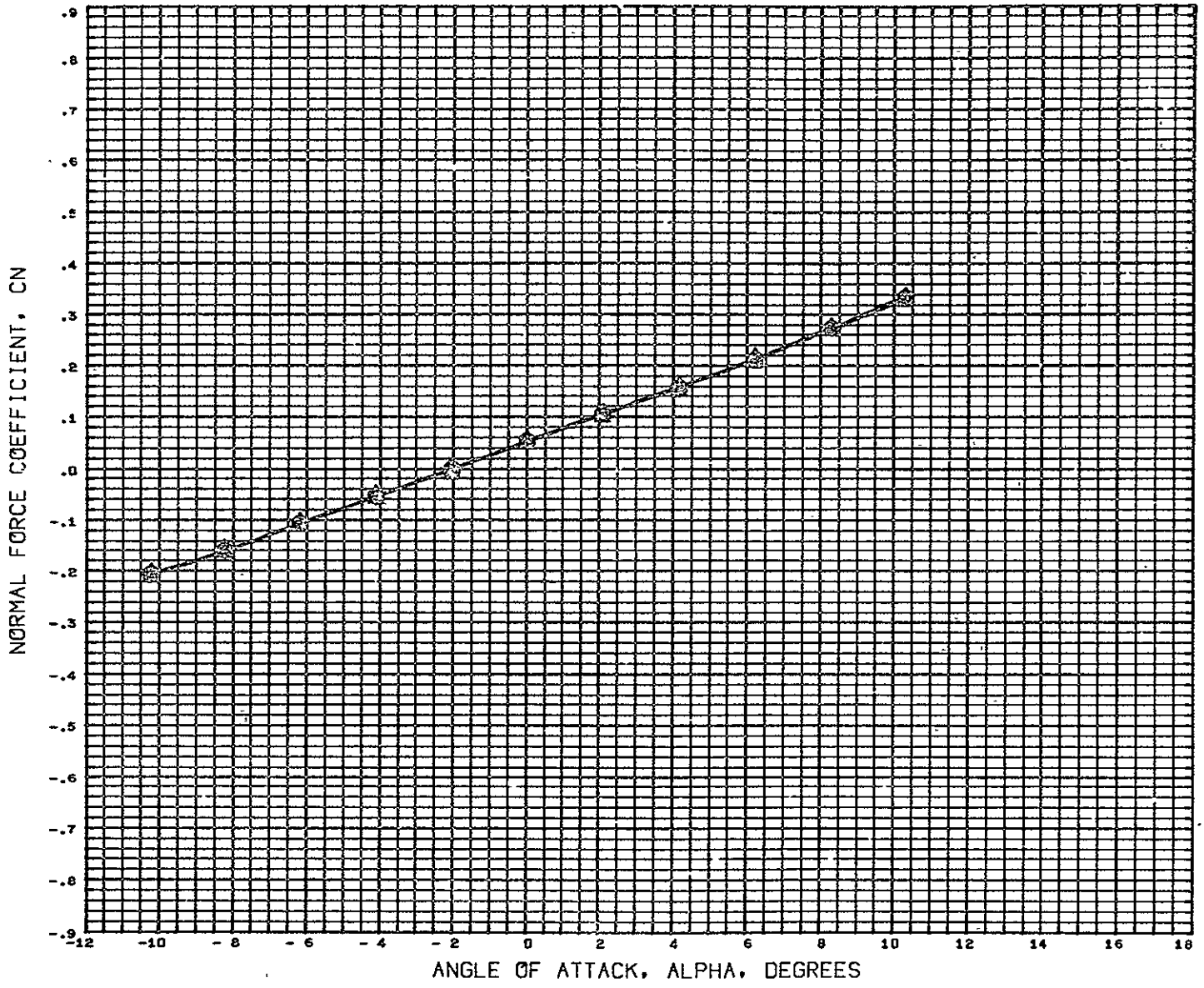
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(R3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.655U	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.962

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

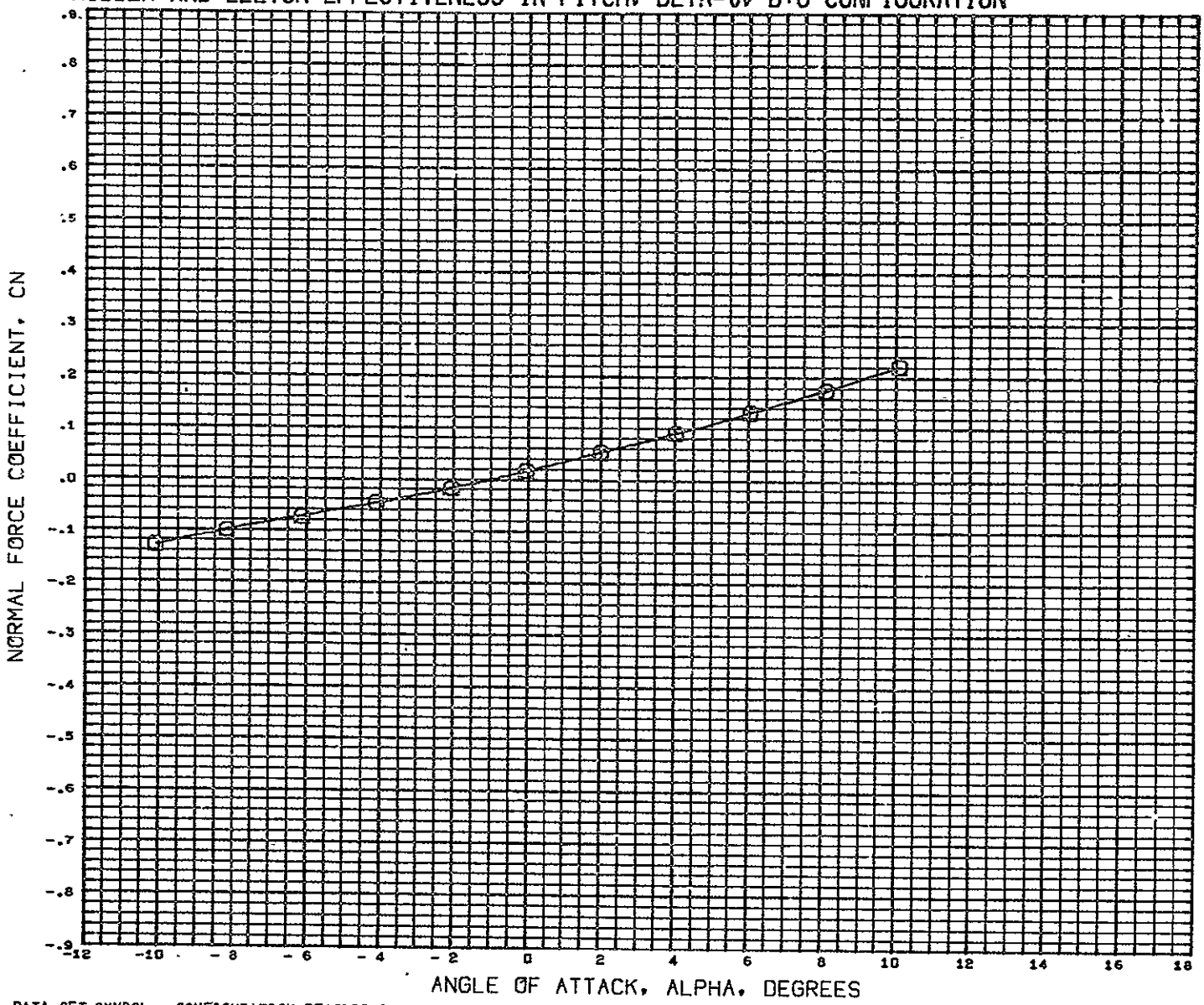


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6563	SQ IN
LREF	3.0930	INCHE
BREF	6.0990	INCHE
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHE
SCALE	0.0031	SCALE

1 MACH 2.990

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



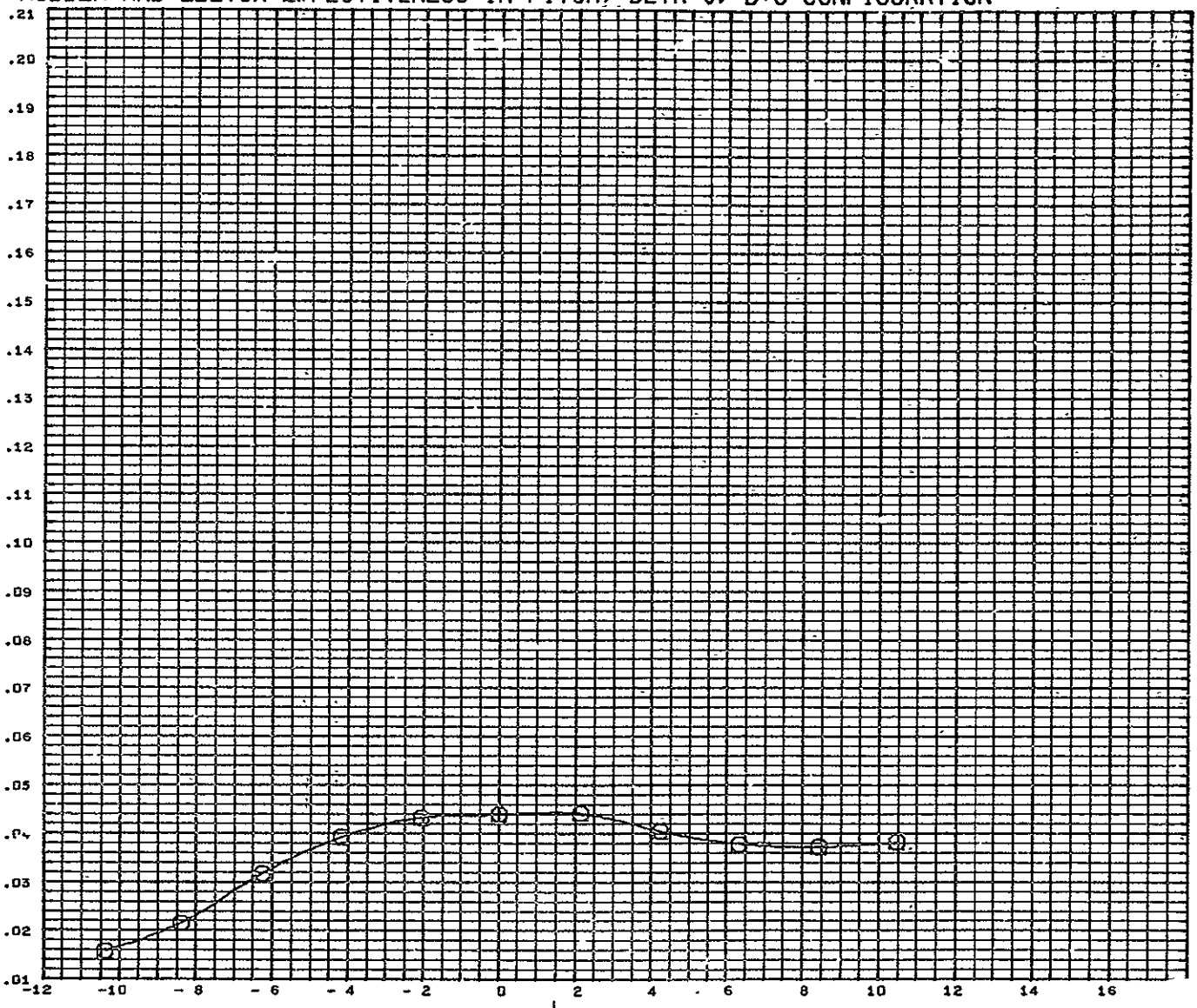
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 4.959

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

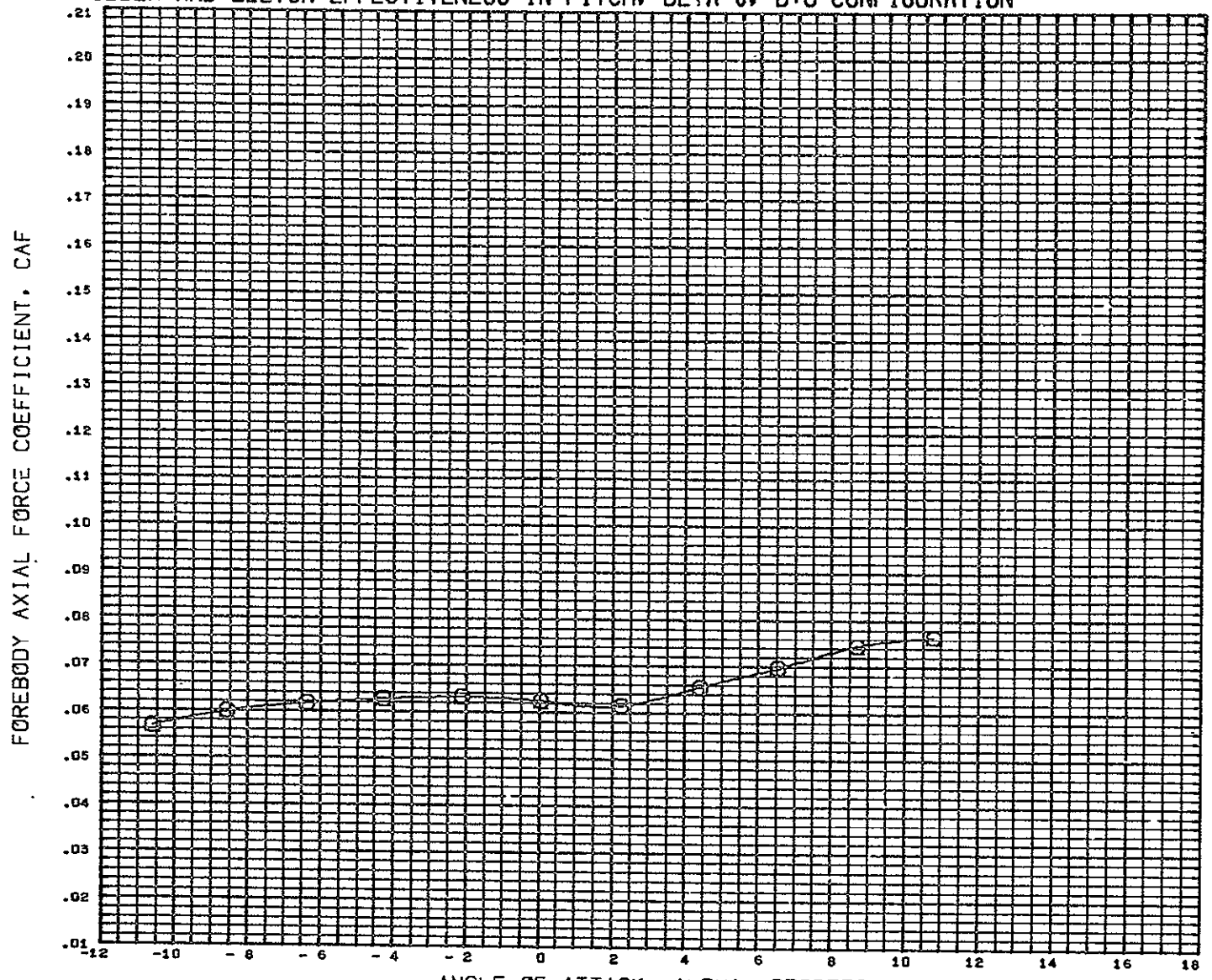


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.60

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



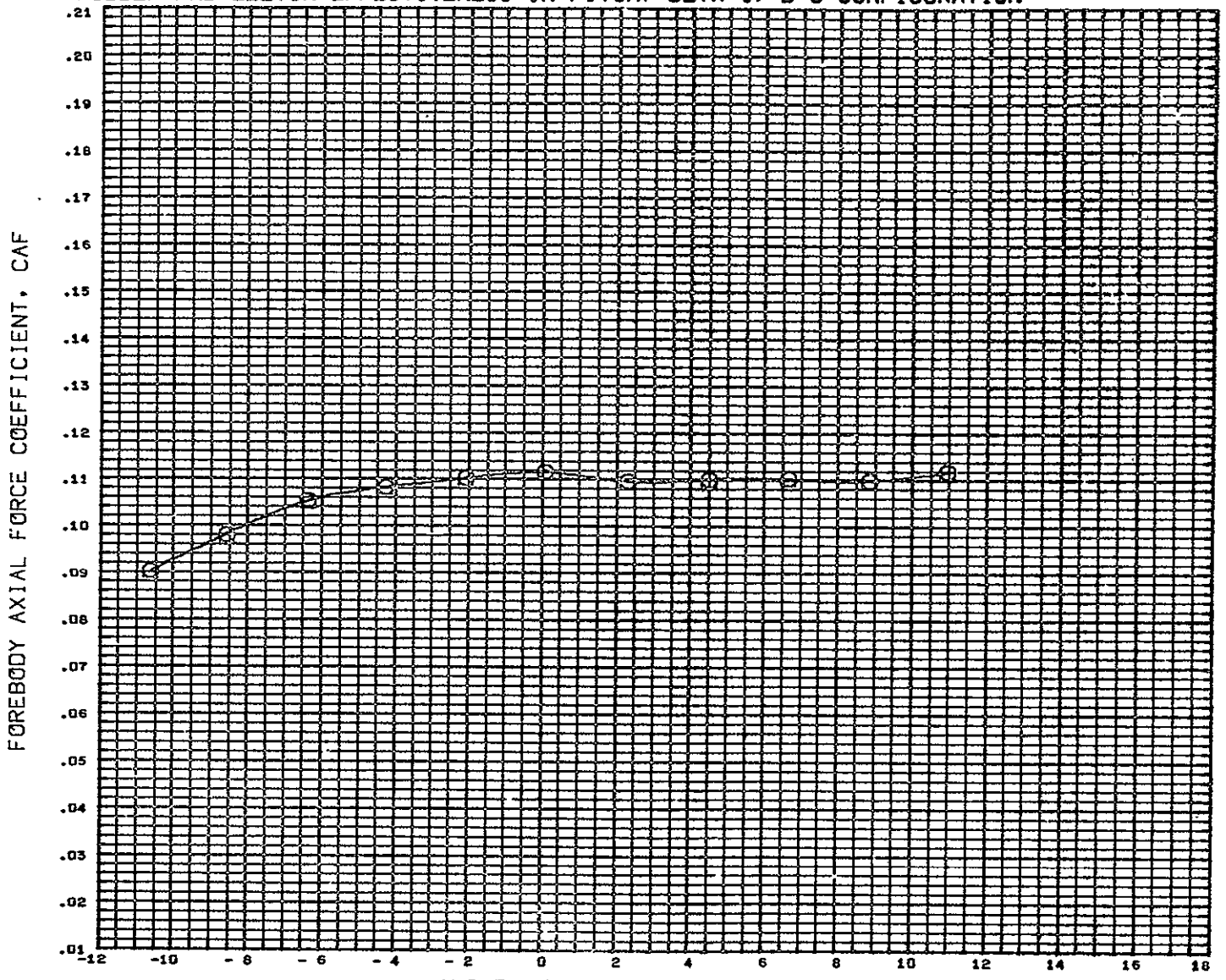
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0250	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.900

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

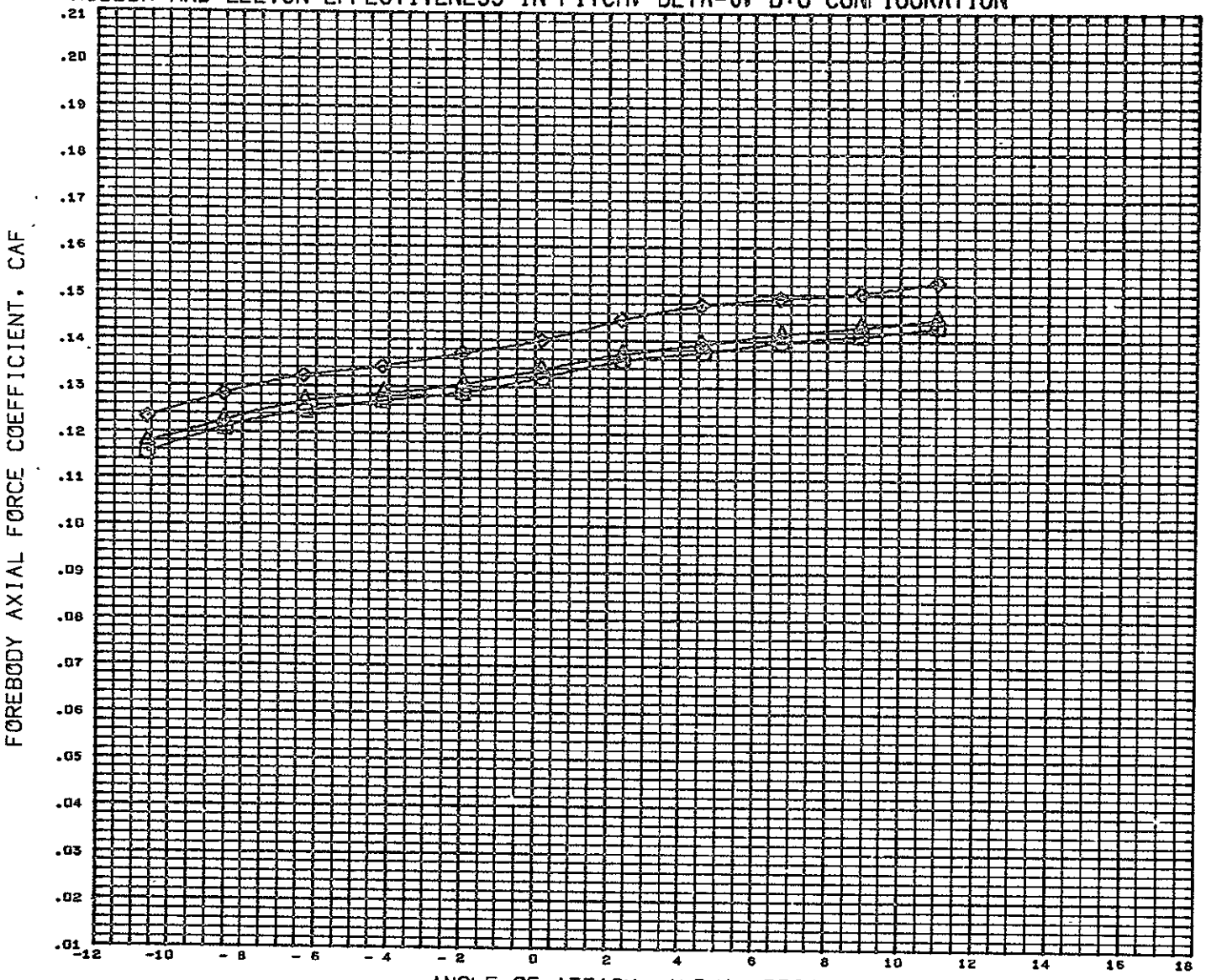


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 0.994

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



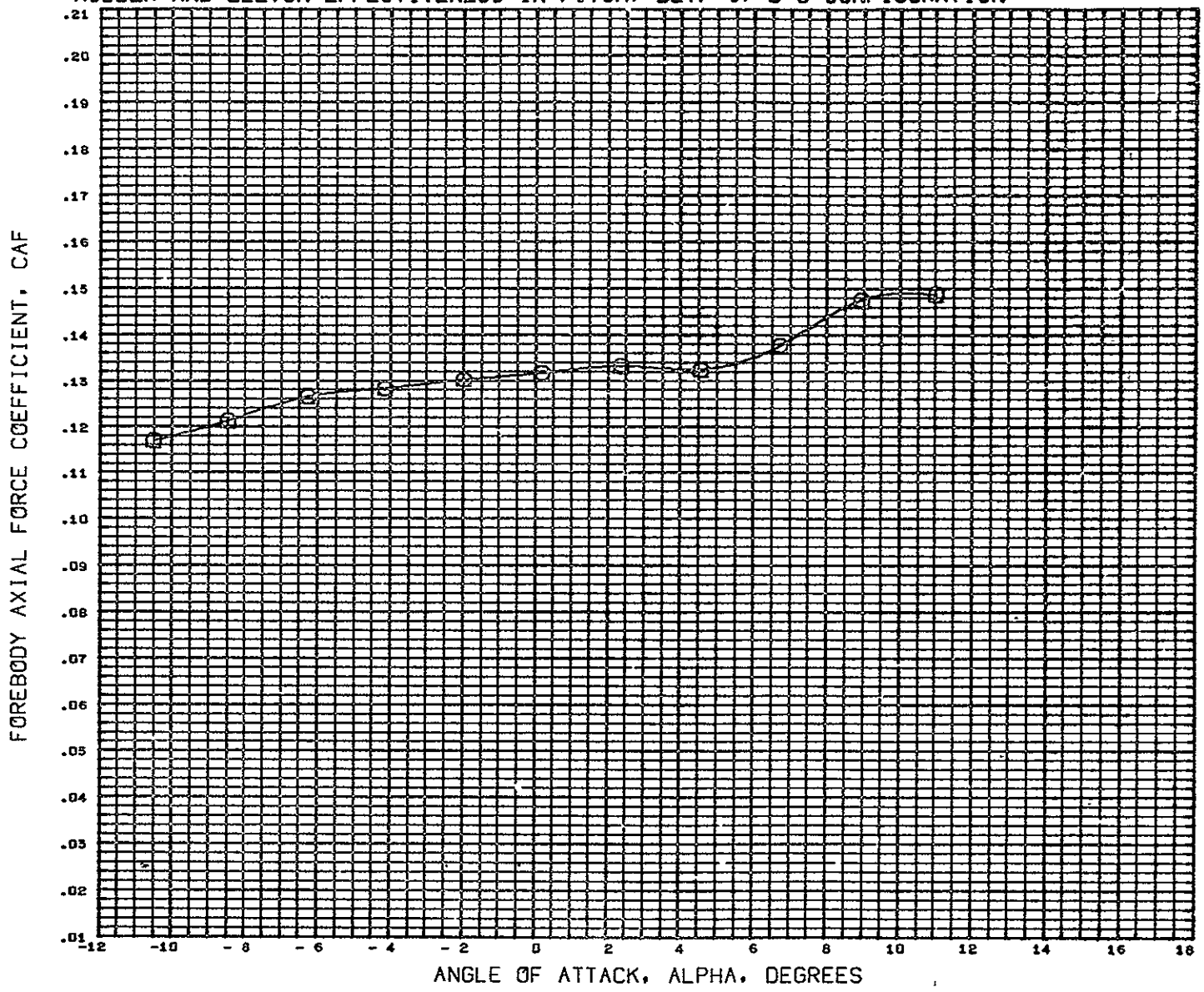
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

RUDDER AND ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN

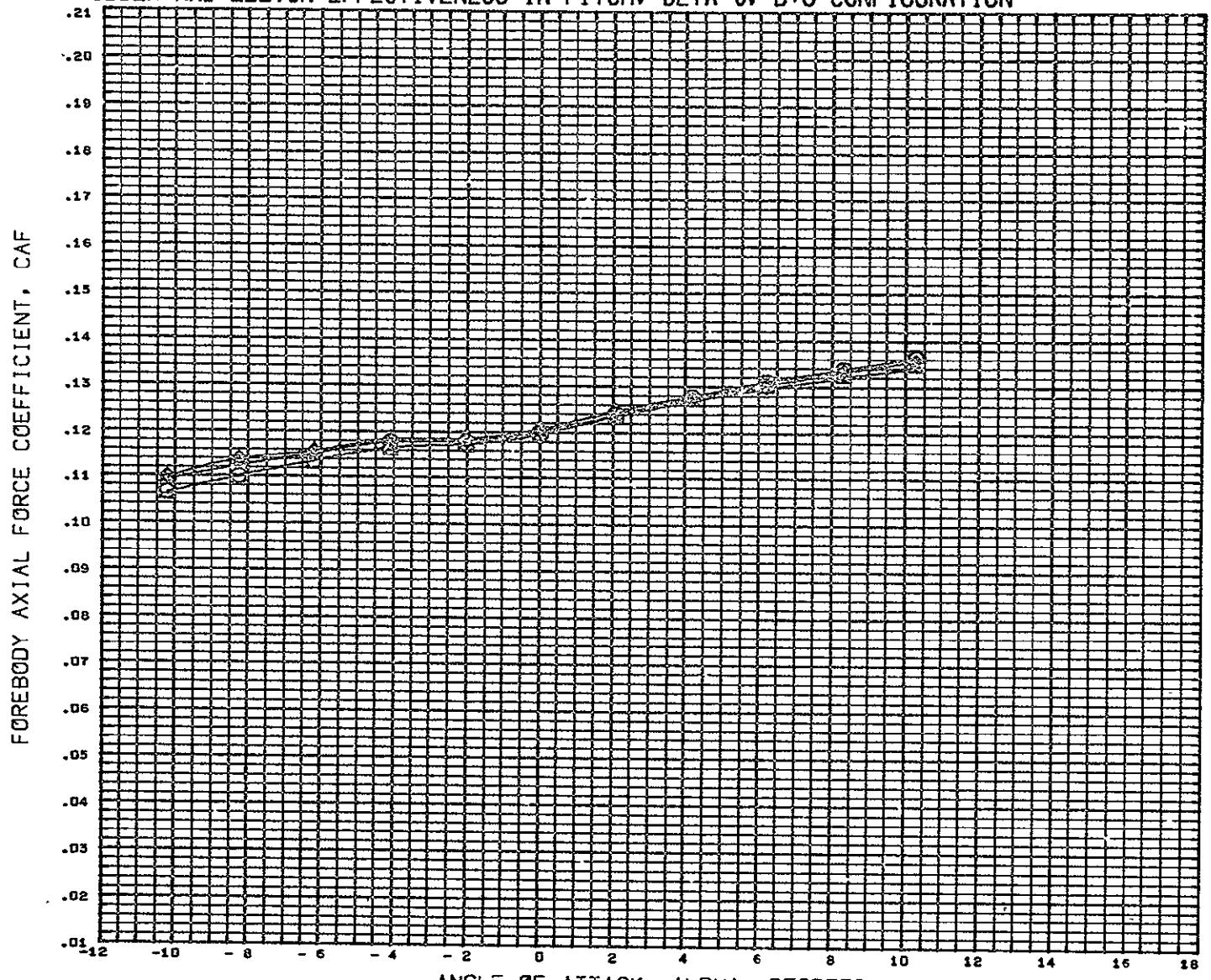


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	5.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.962

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

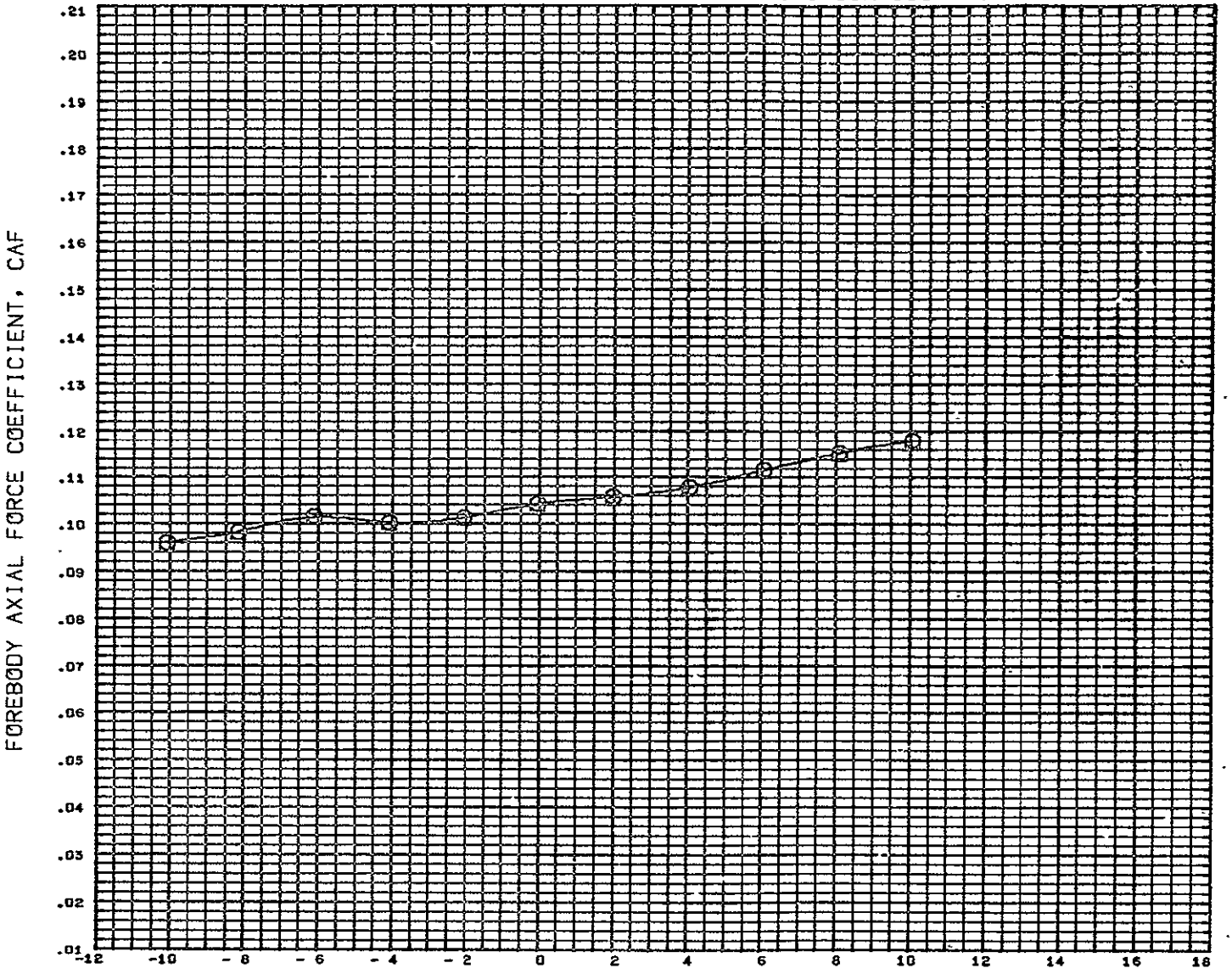


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

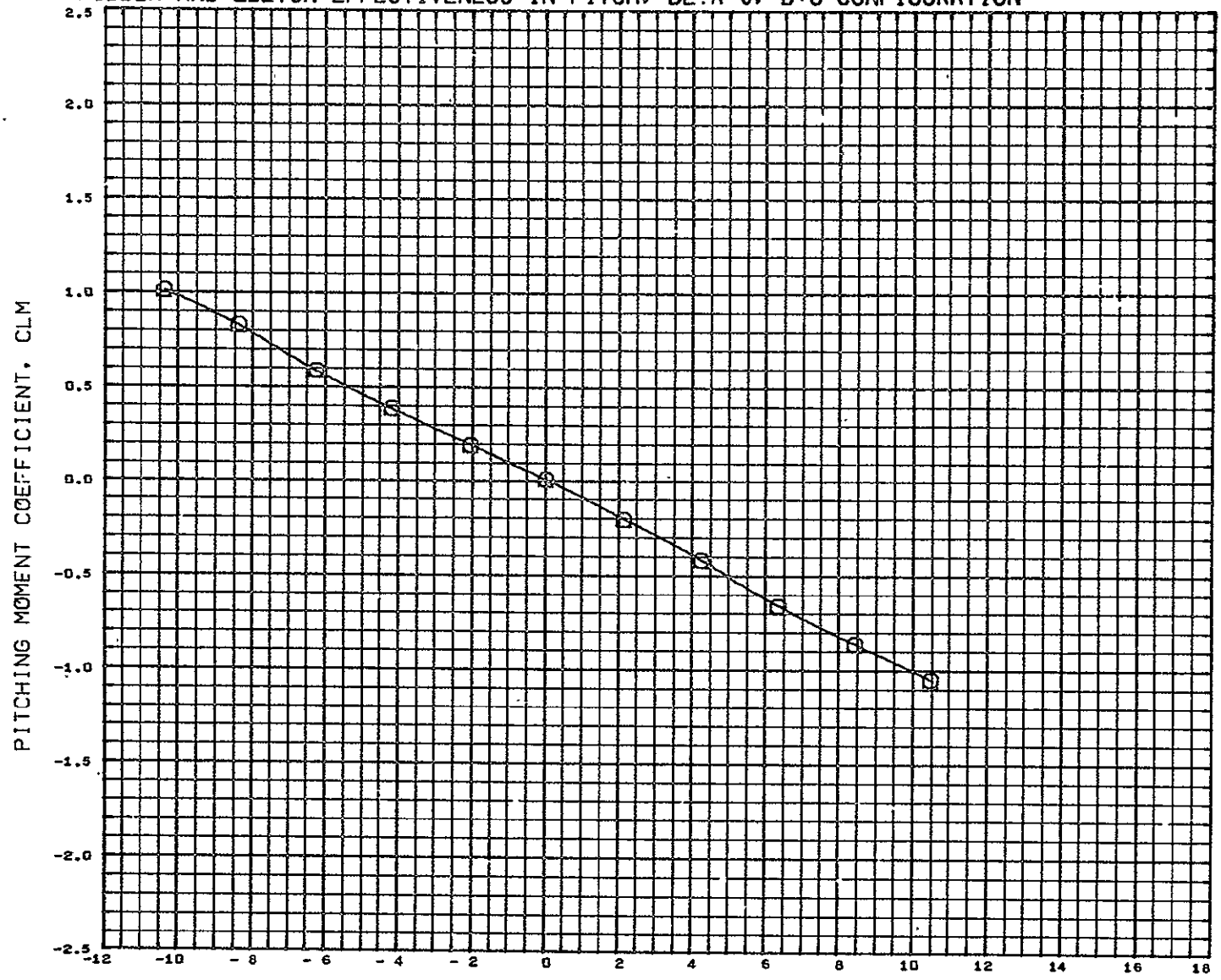


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 4.959

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0; B+U CONFIGURATION



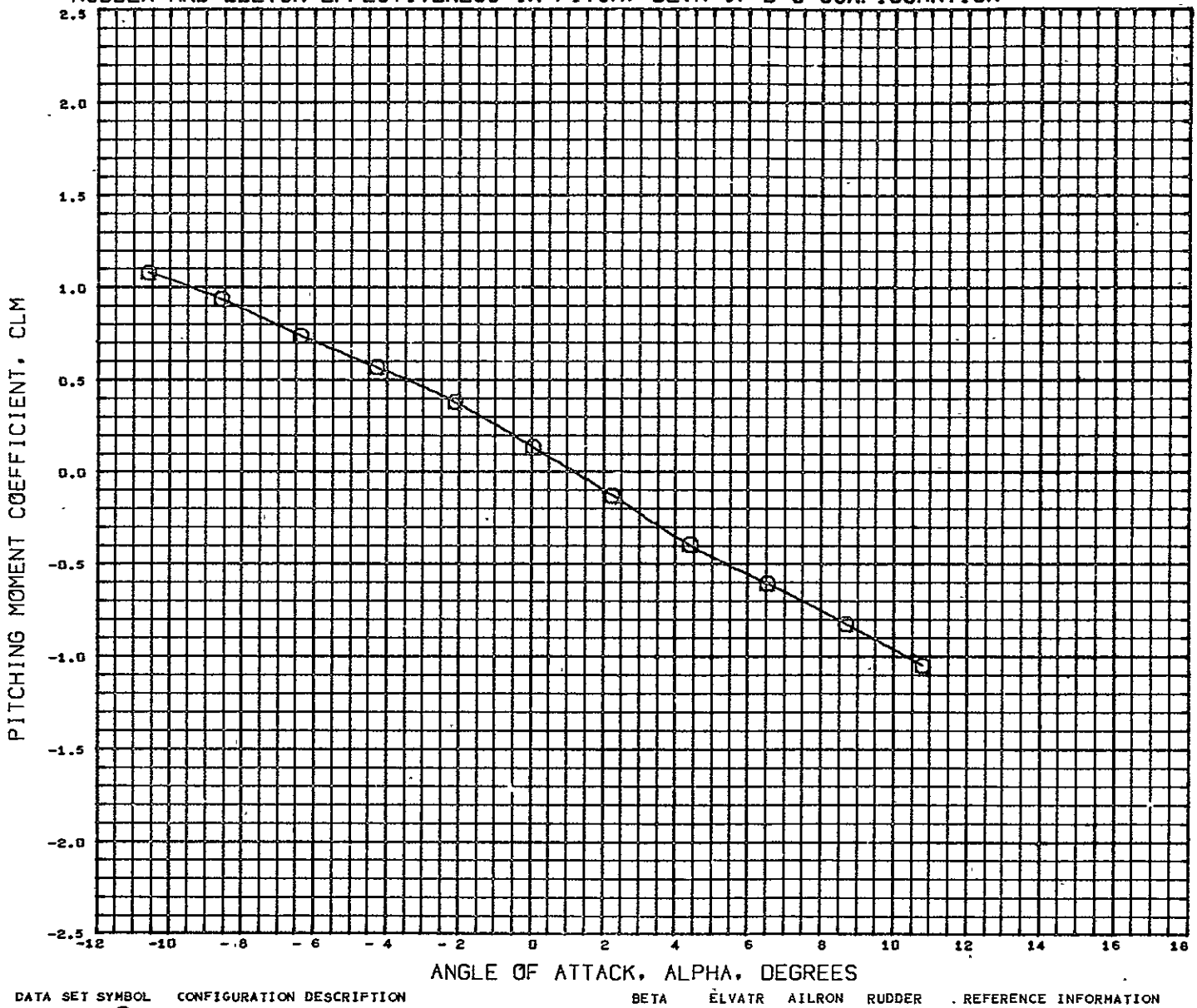
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.910	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0e30	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.604

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

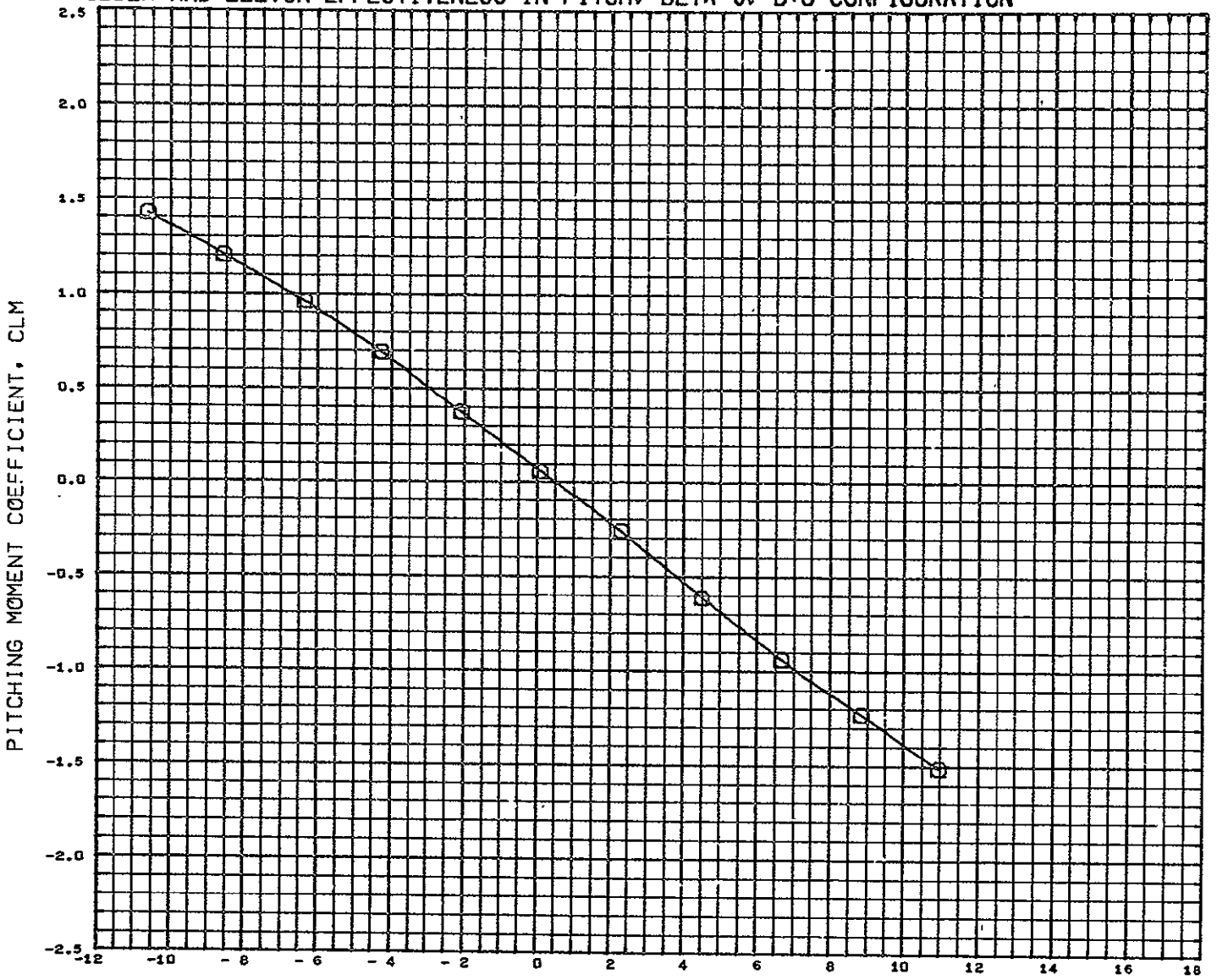


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 0.900

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



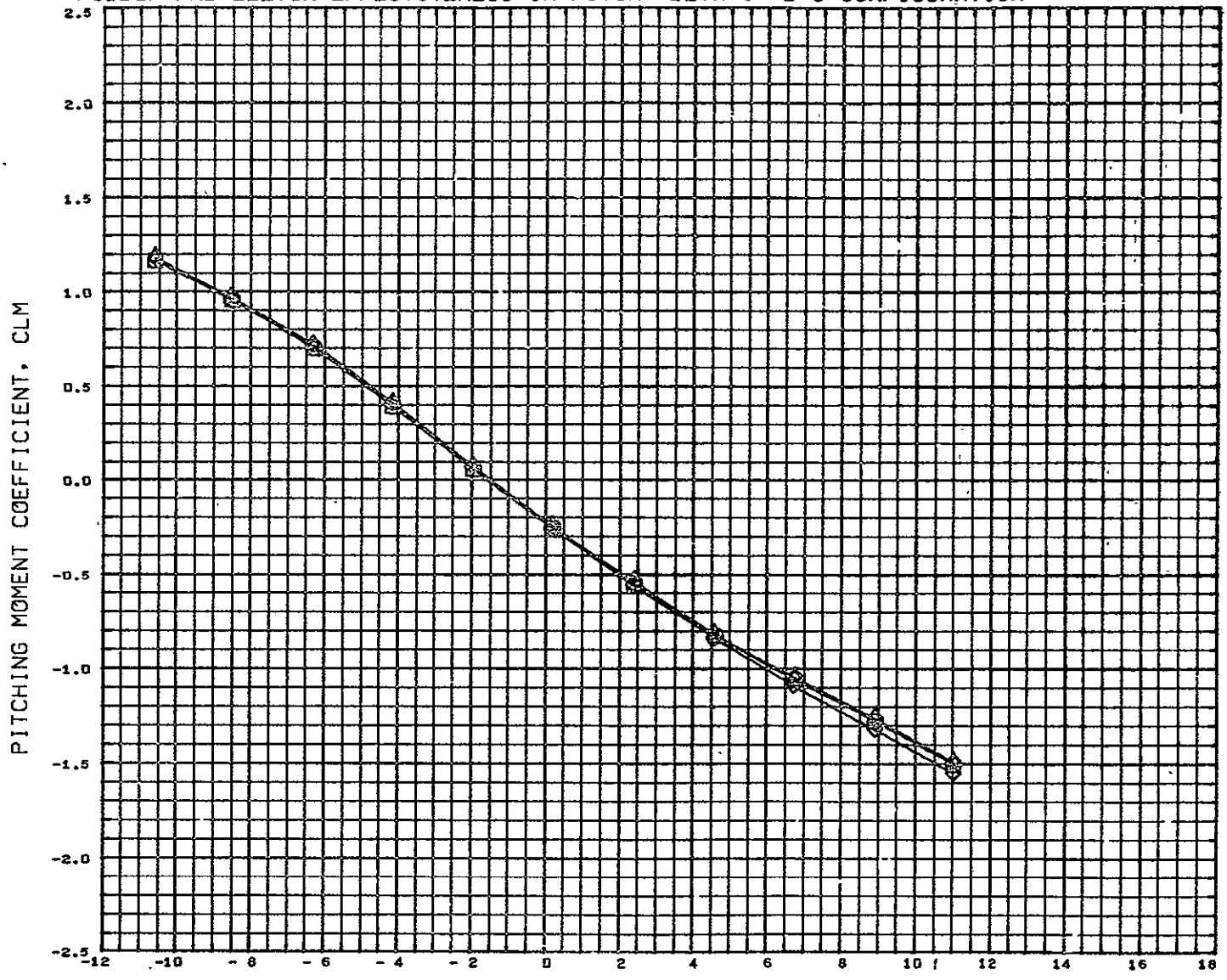
DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6563	SQ IN
LREF	3.0510	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

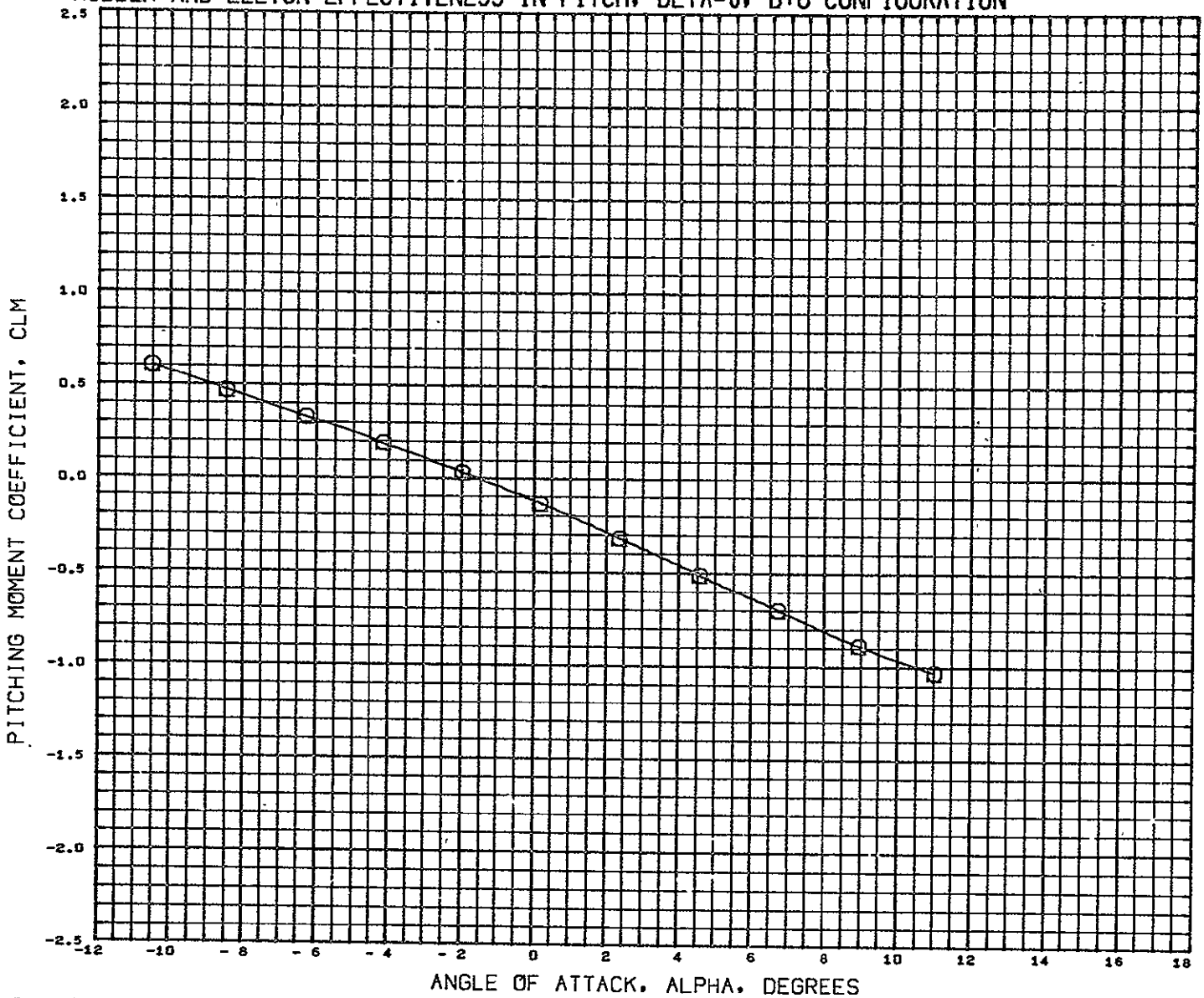


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



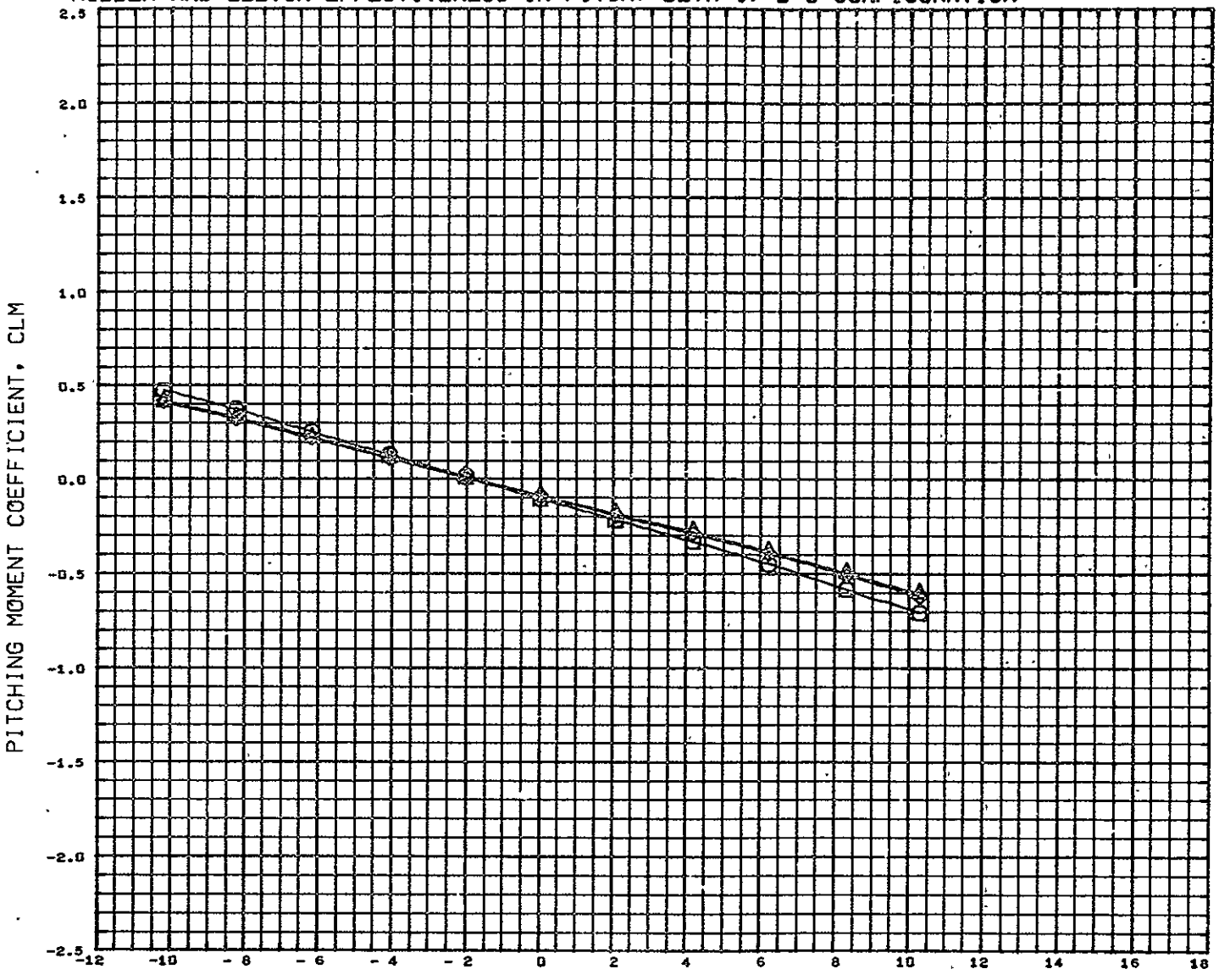
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3106C)	⊠	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.962

RUDDER AND ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATIØN

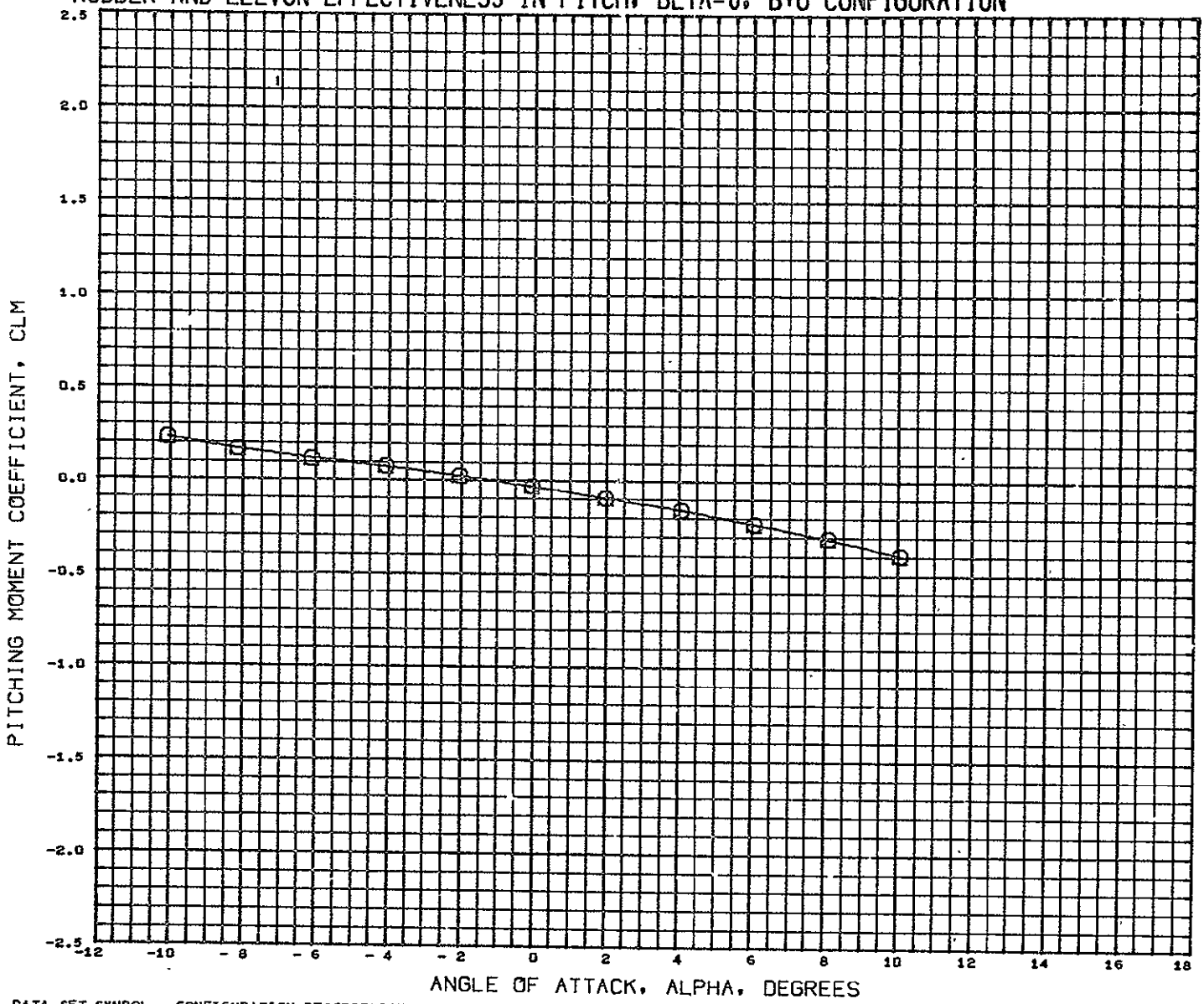


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



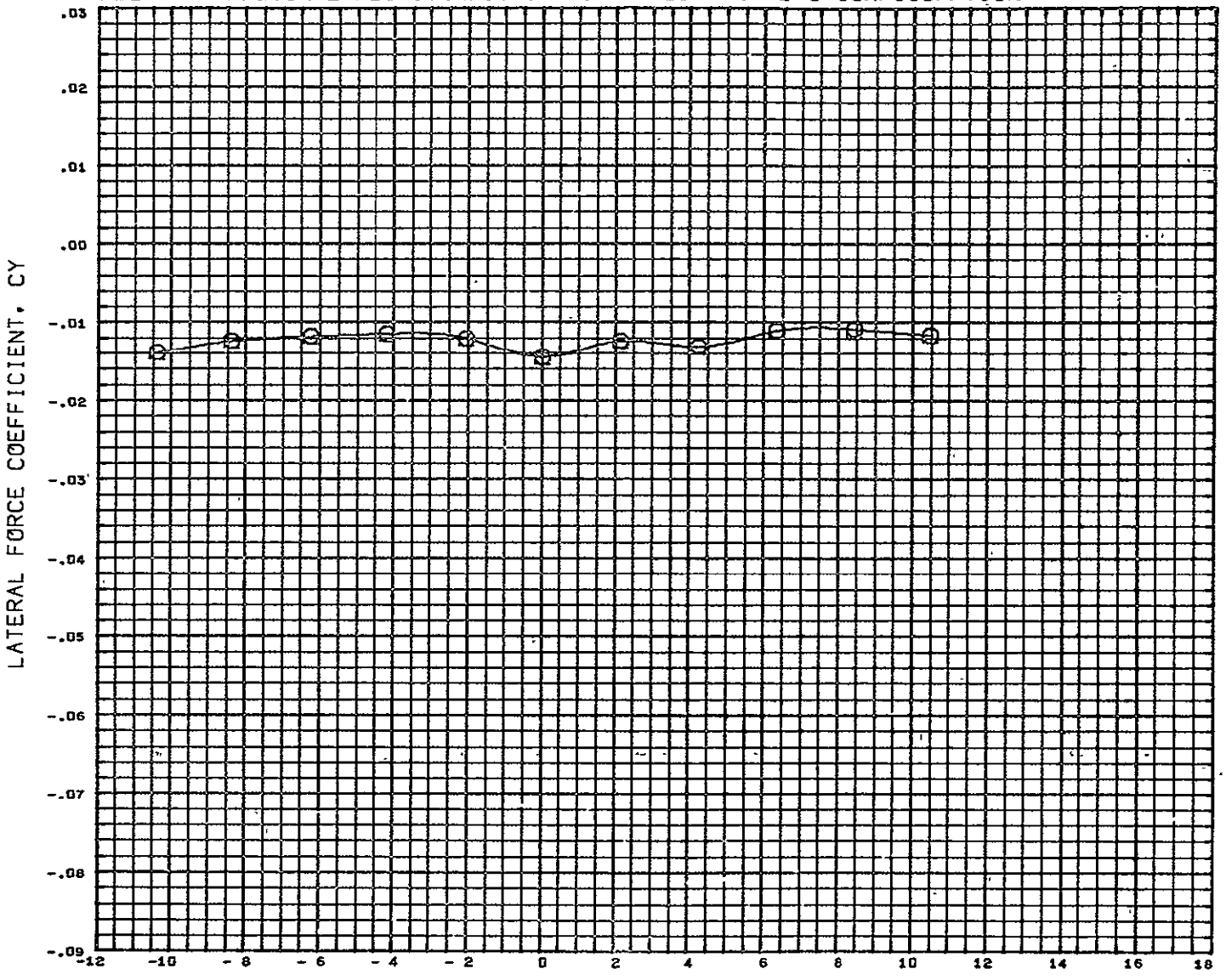
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0960	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 4.959

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



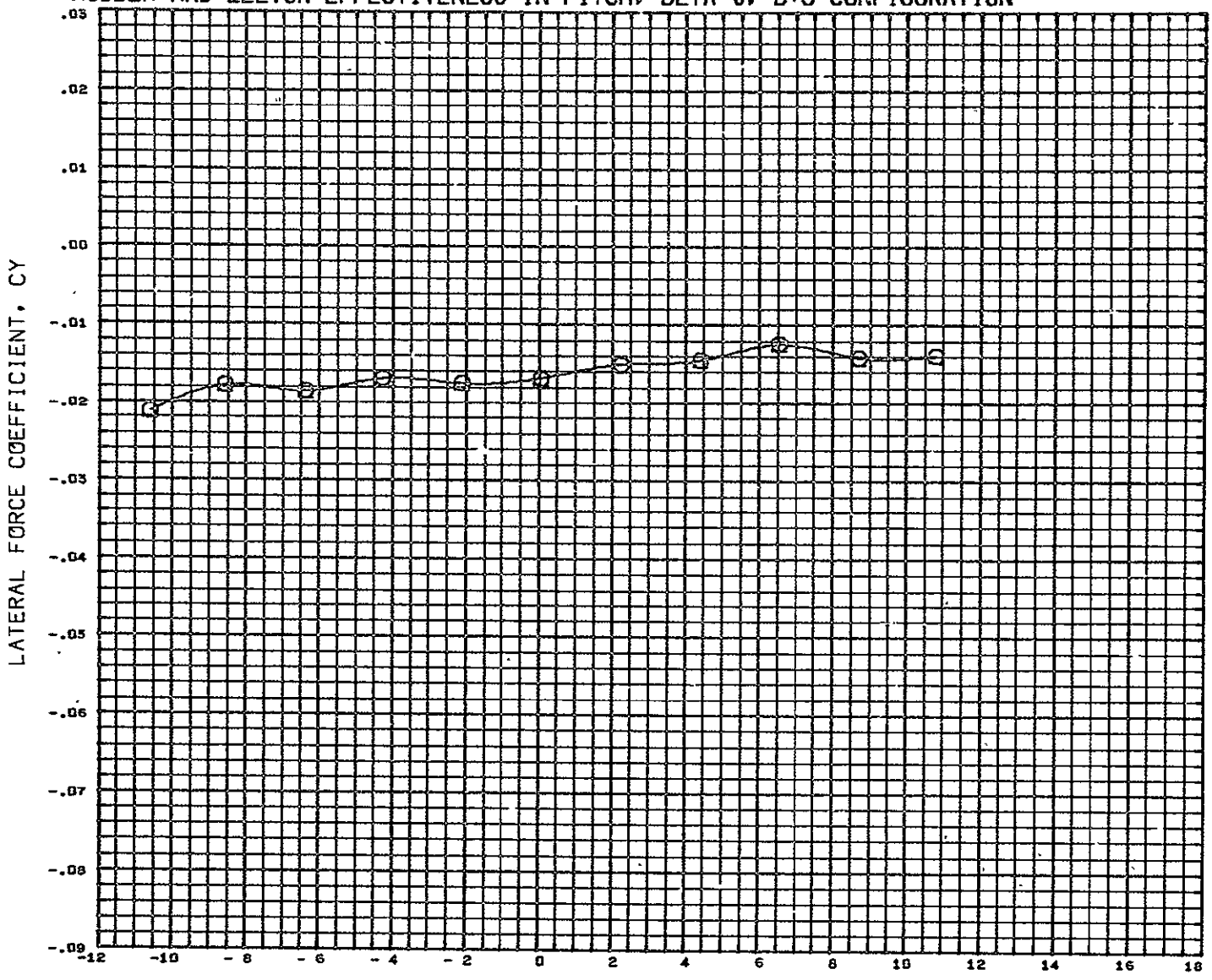
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6567	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.604

RUDDER AND ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN



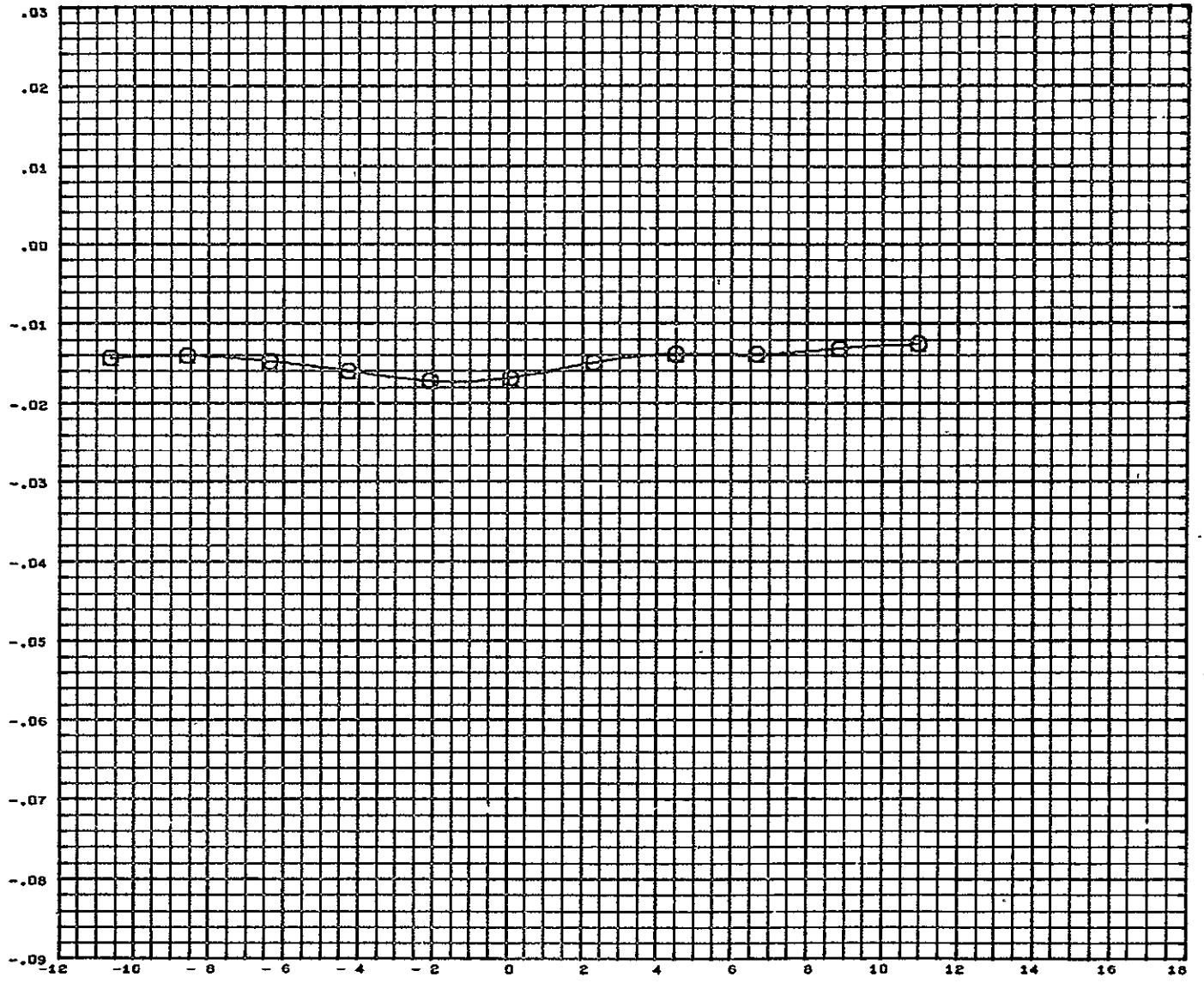
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.900

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

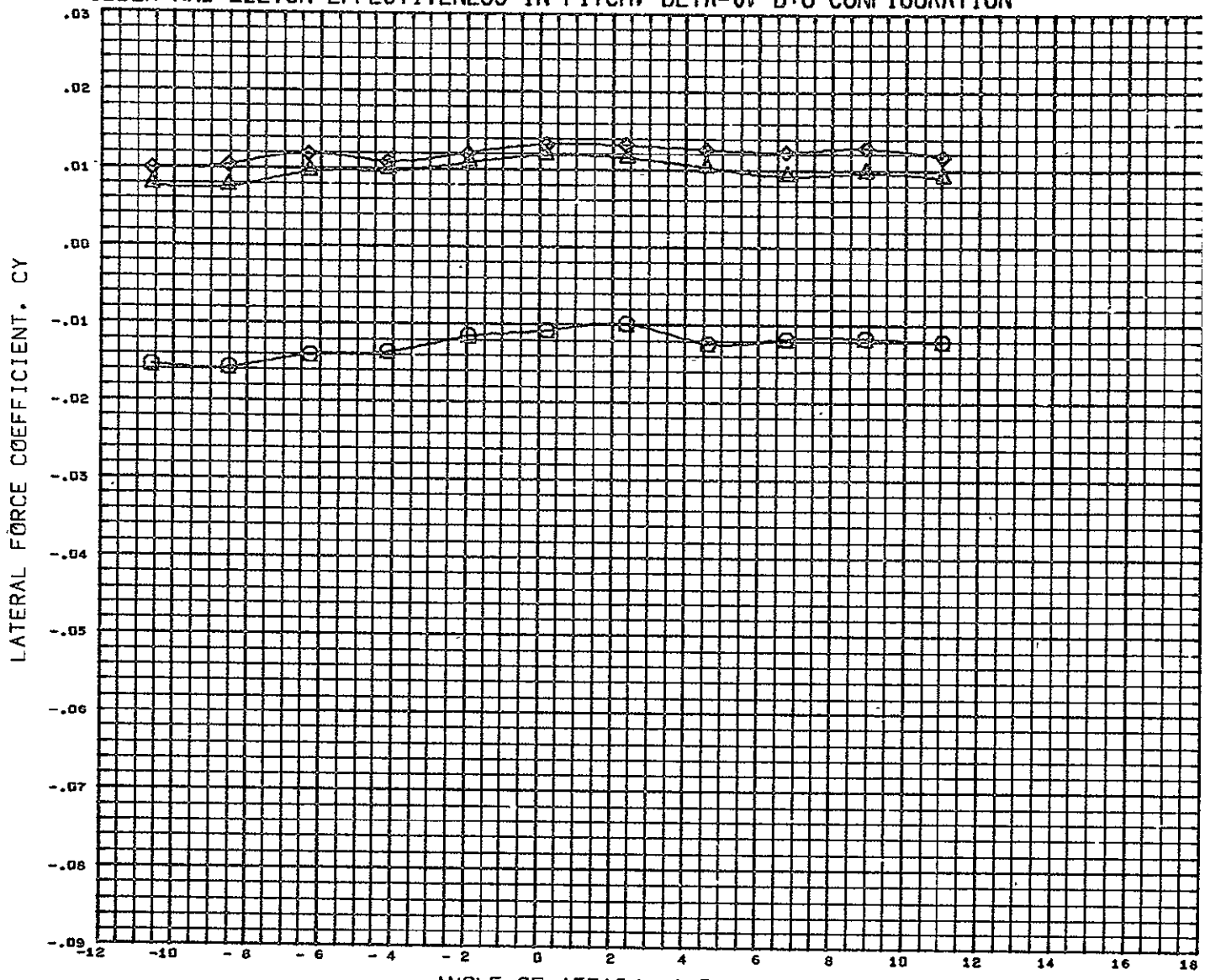


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN*
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



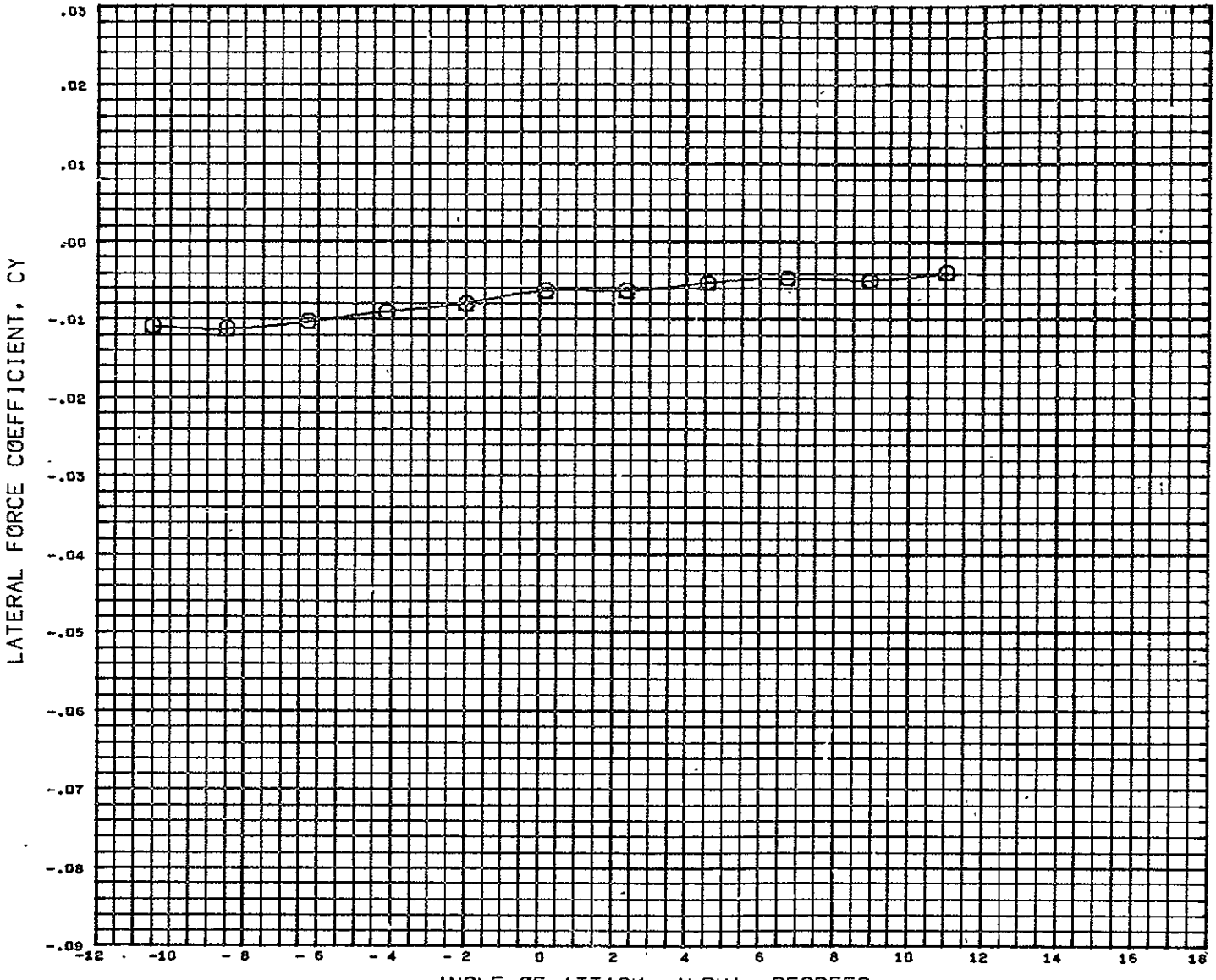
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

RUDDER AND ELEVON EFFECTIVENESS IN PITCH. BETA=0. B+U CONFIGURATION

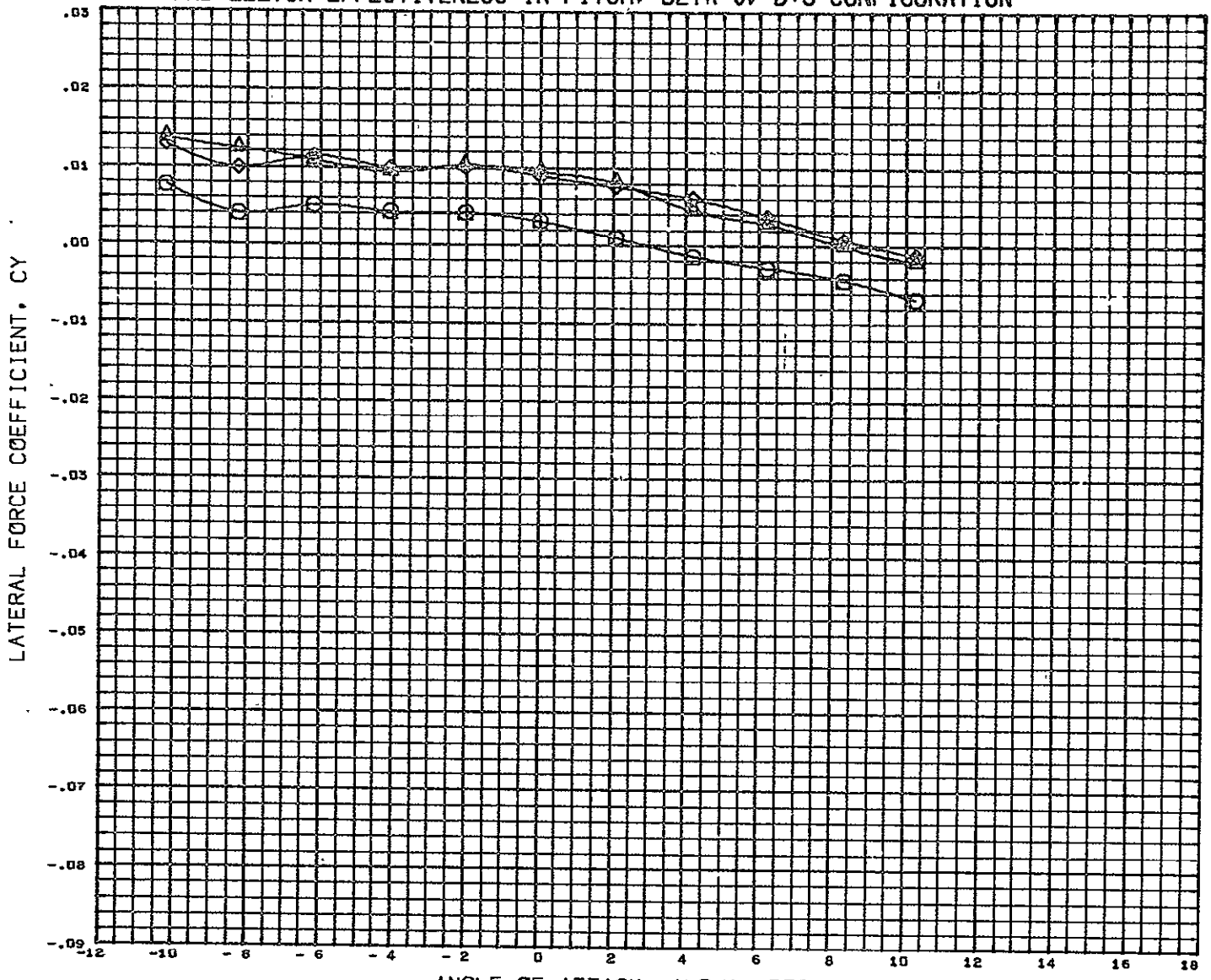


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 1.962

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0650	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



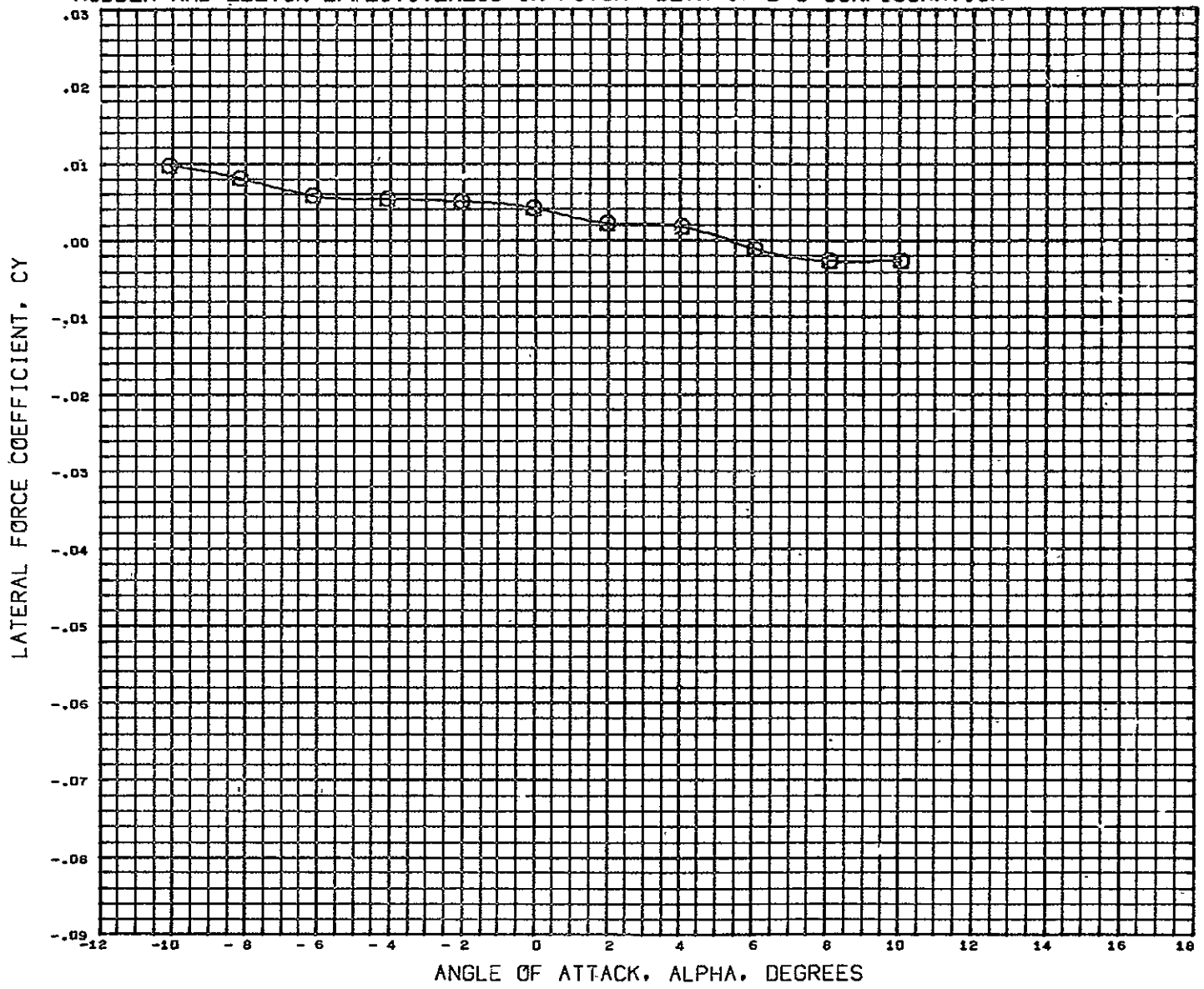
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

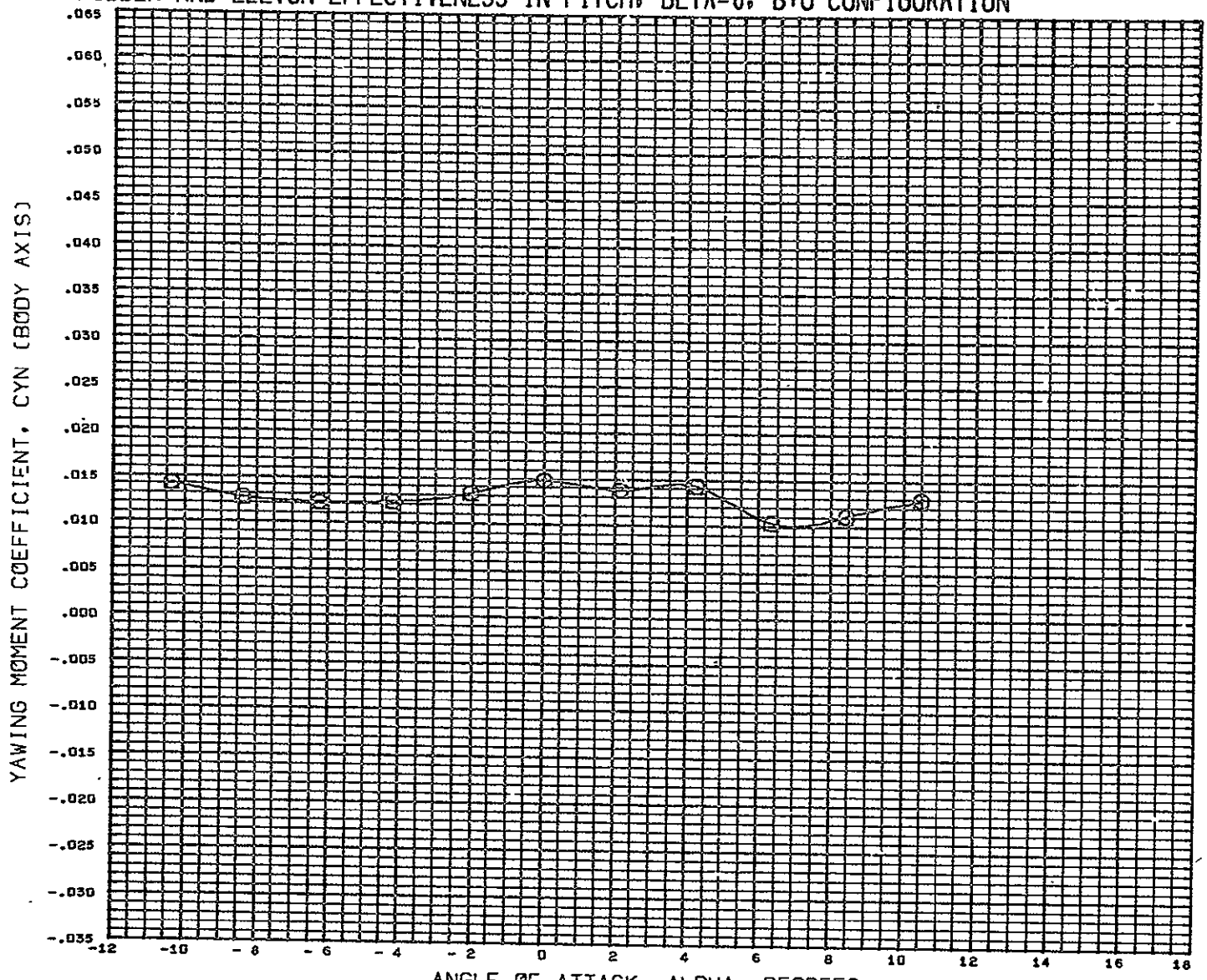


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 4.959

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CØNFIGURATIØN



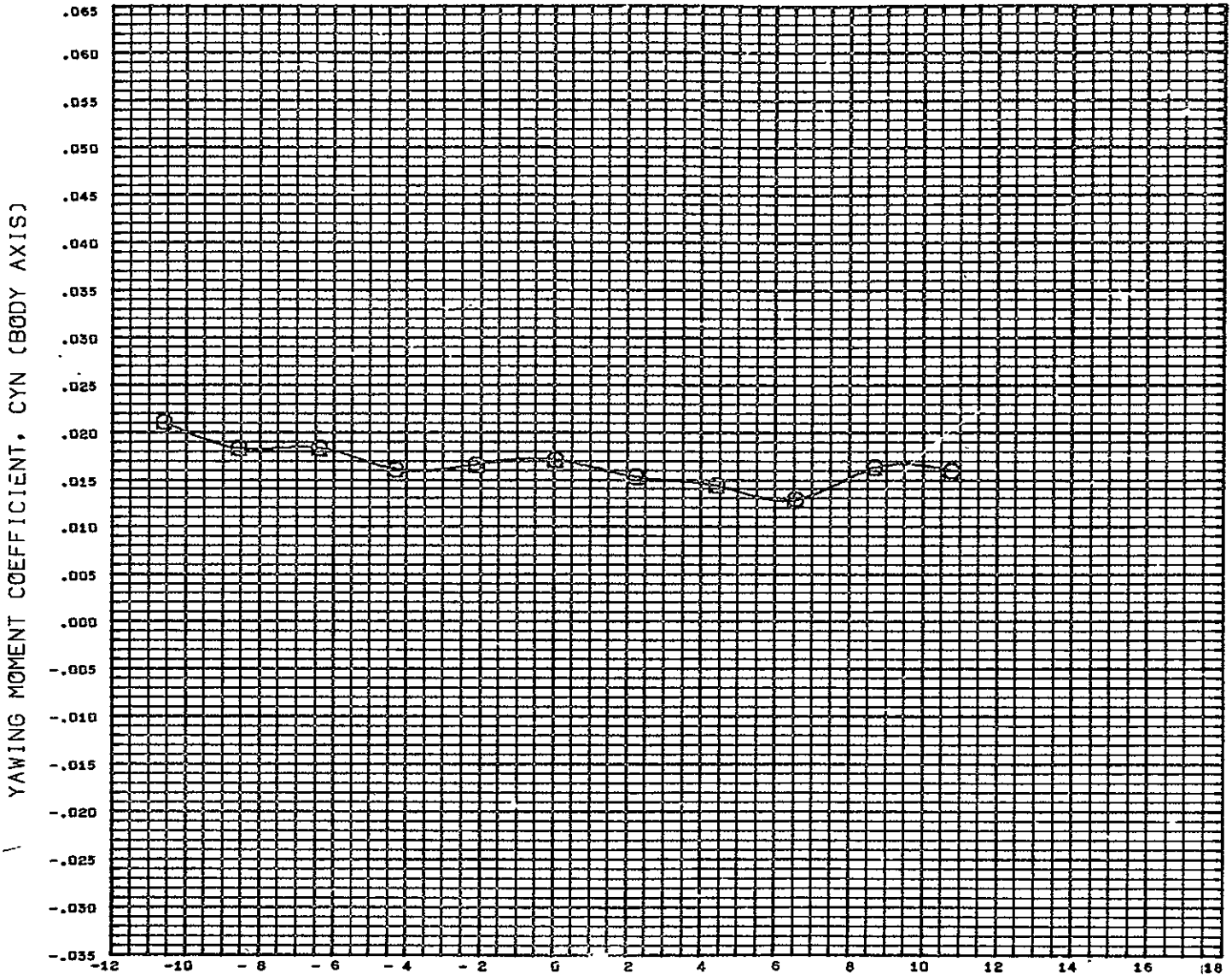
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3109C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	5.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.604

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

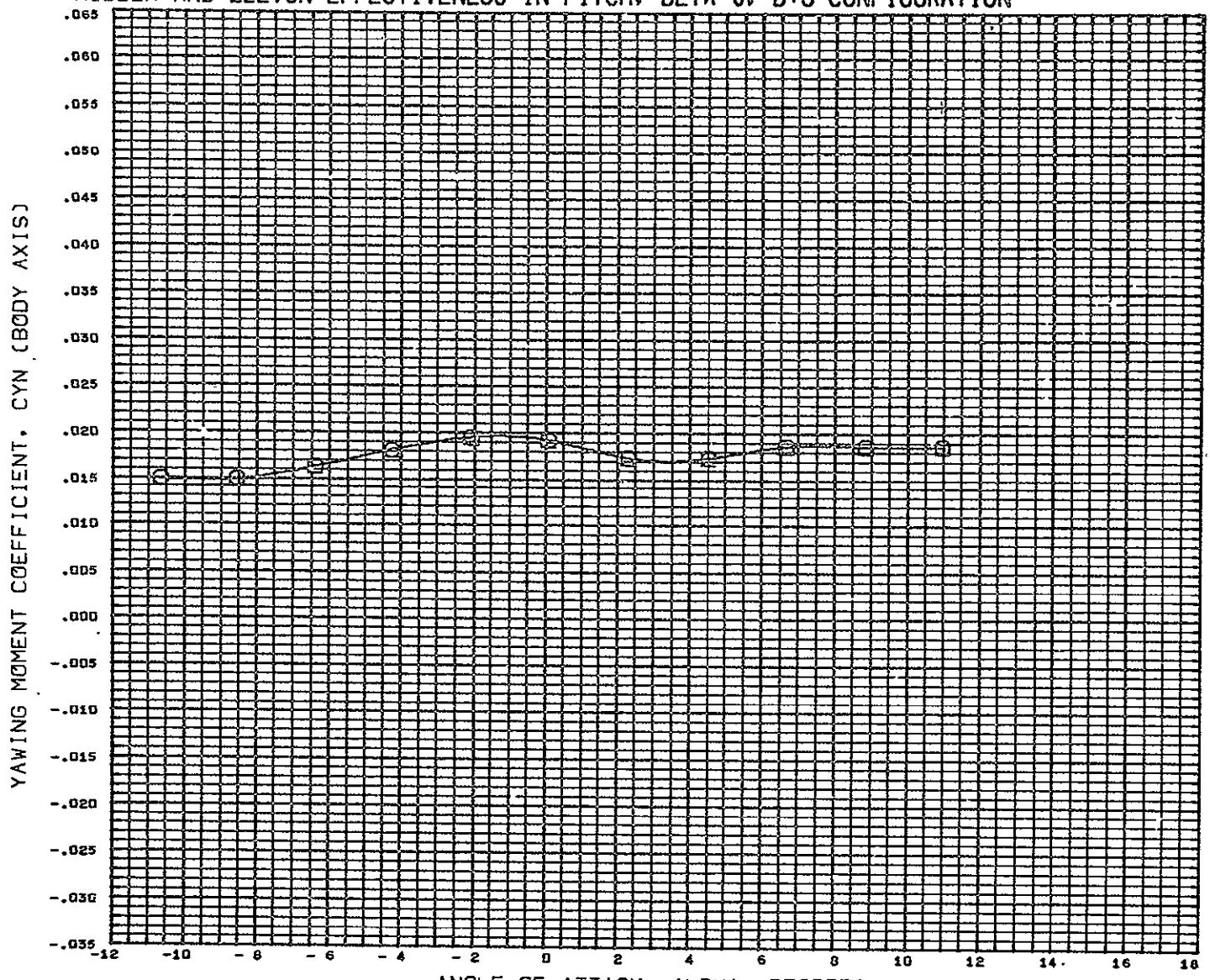


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 0.900

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



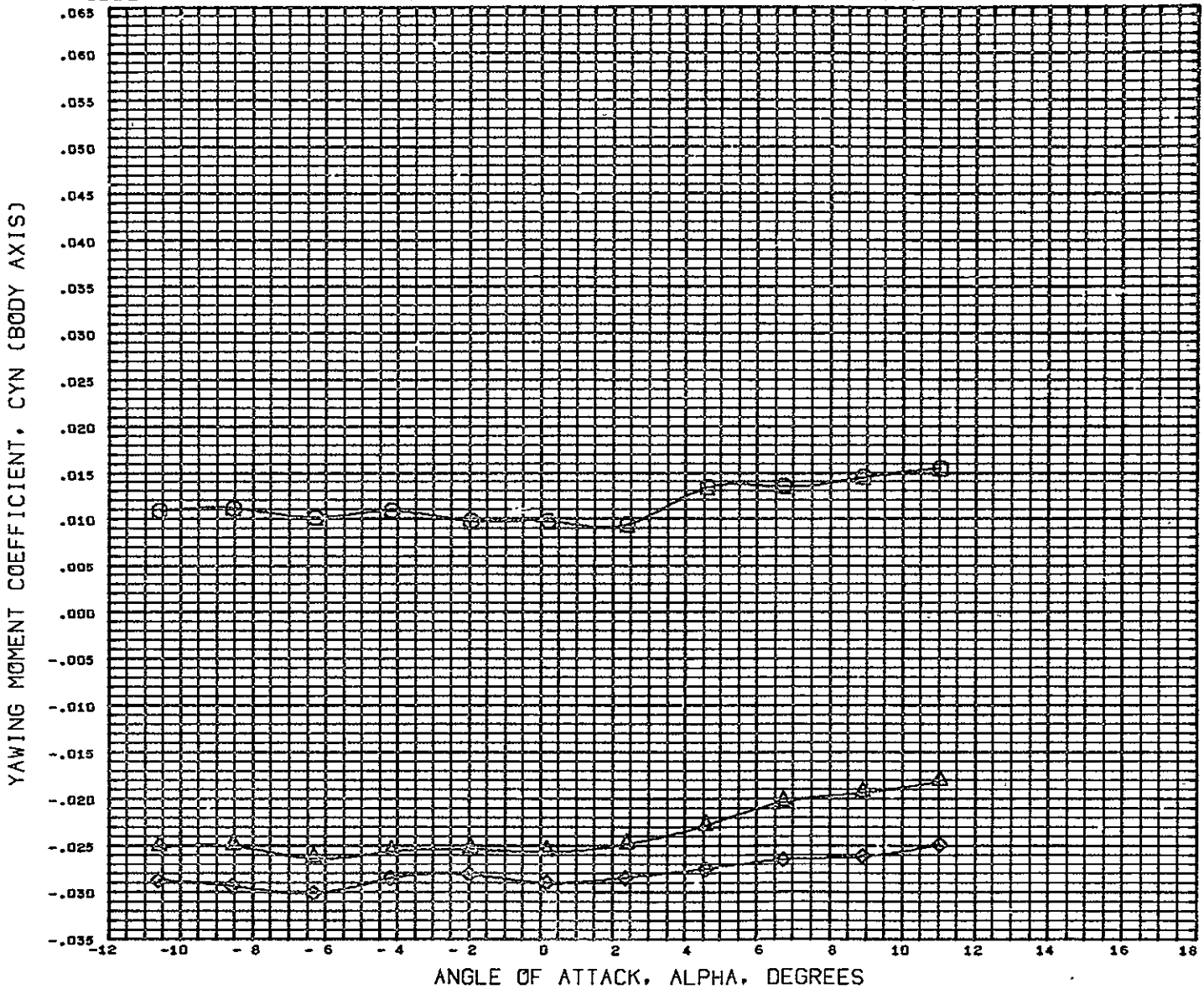
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0570	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

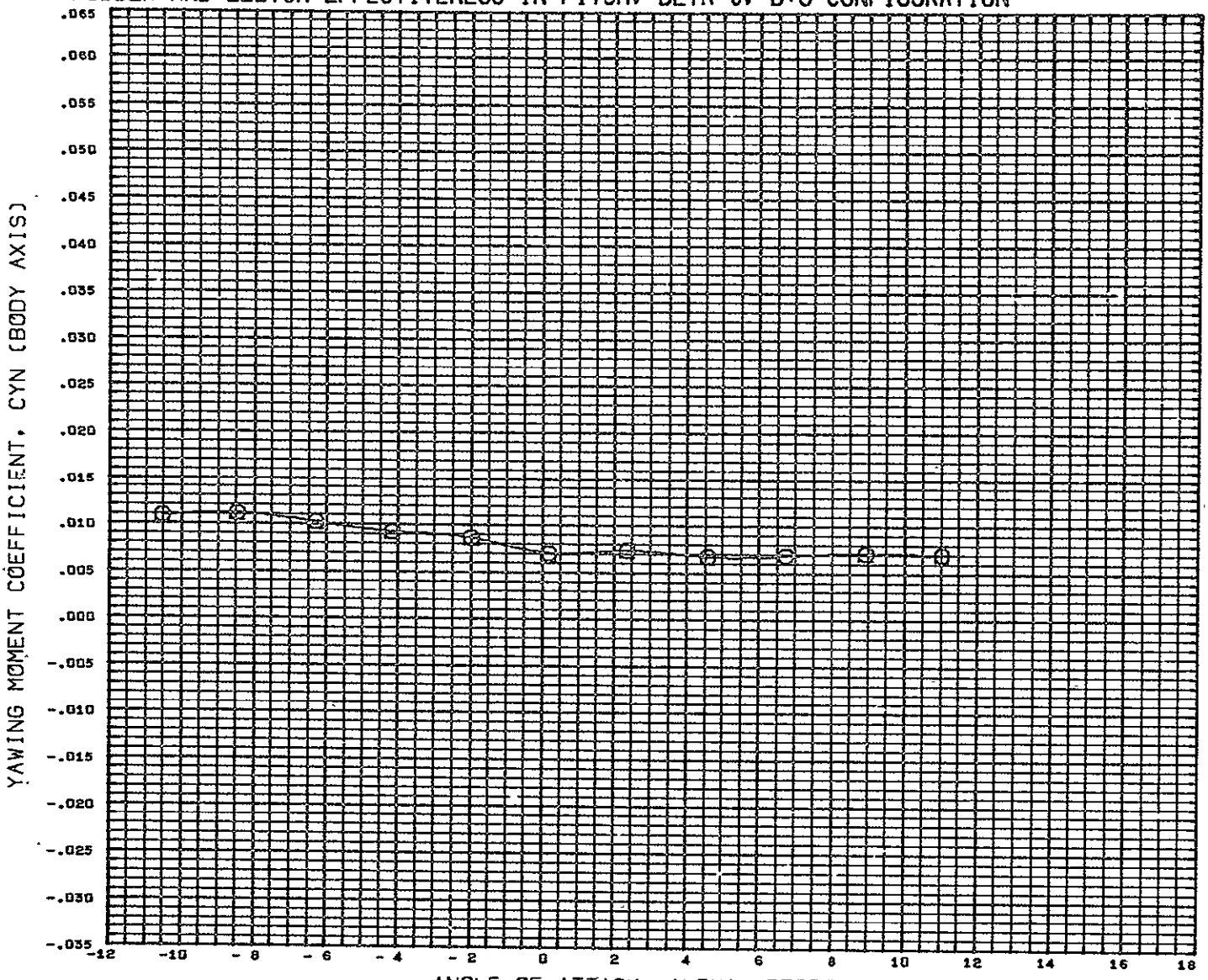


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0990	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



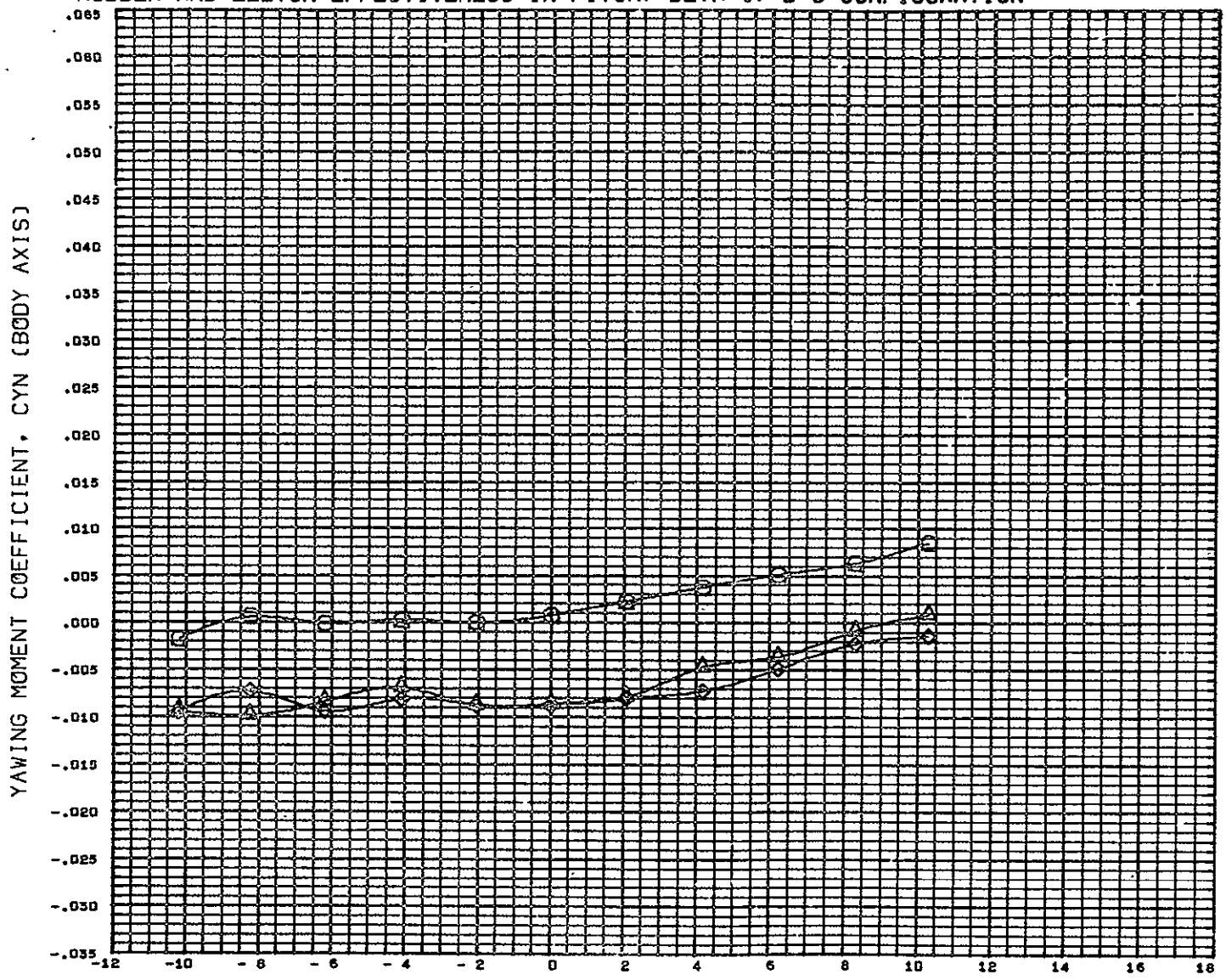
DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U .
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6569	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.962

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

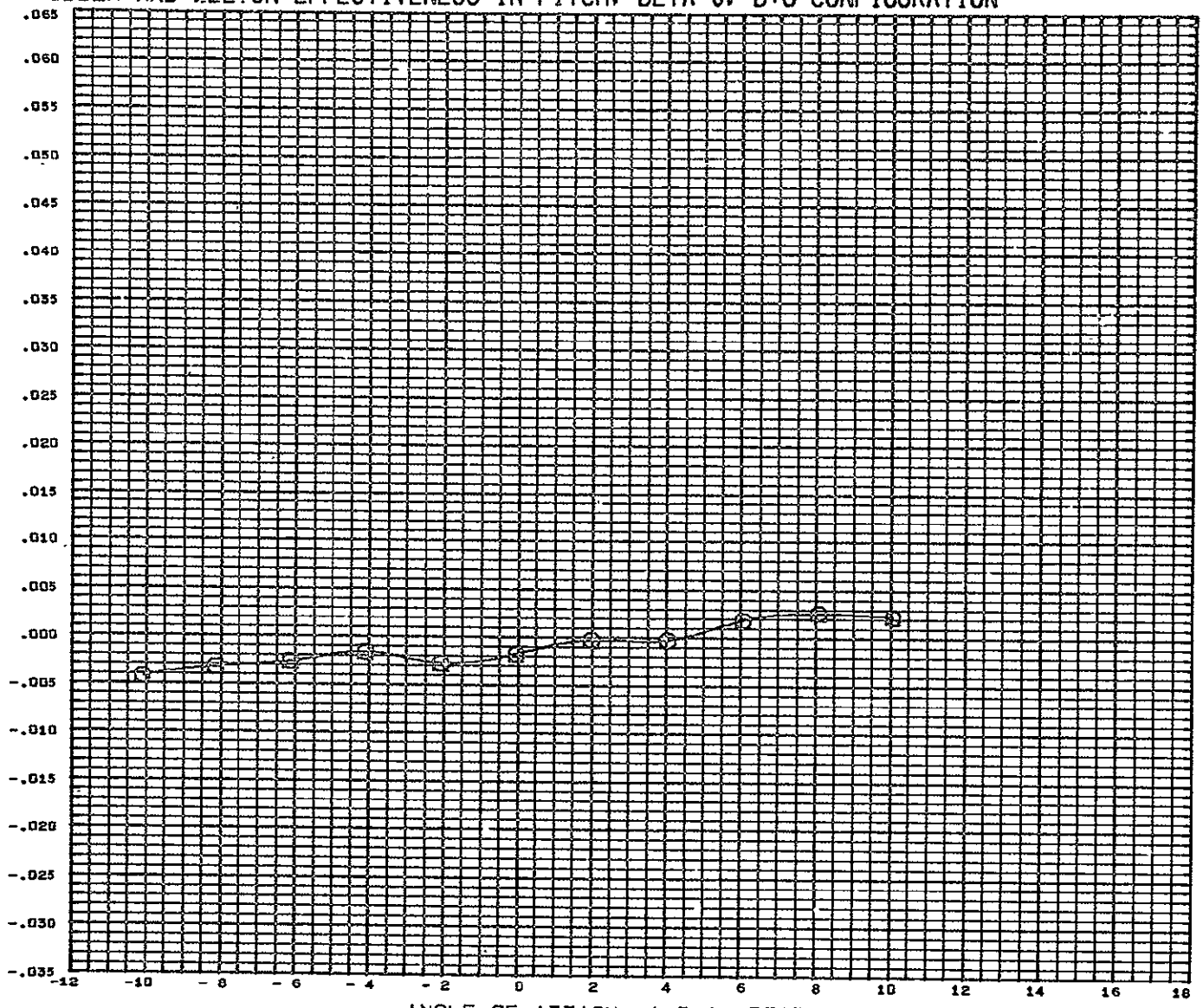


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.656D	SQ IN
LREF	3.0959	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



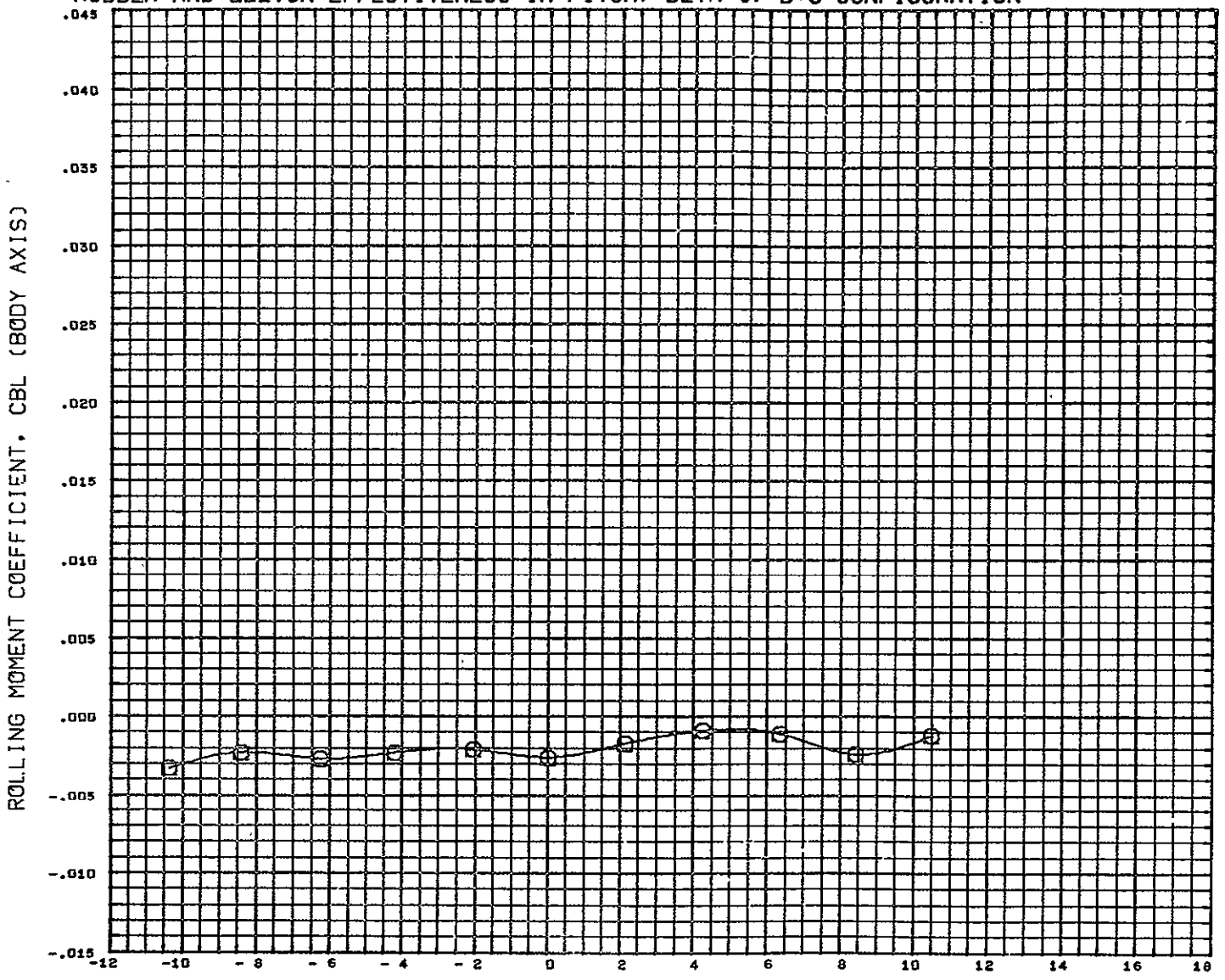
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 4.959

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

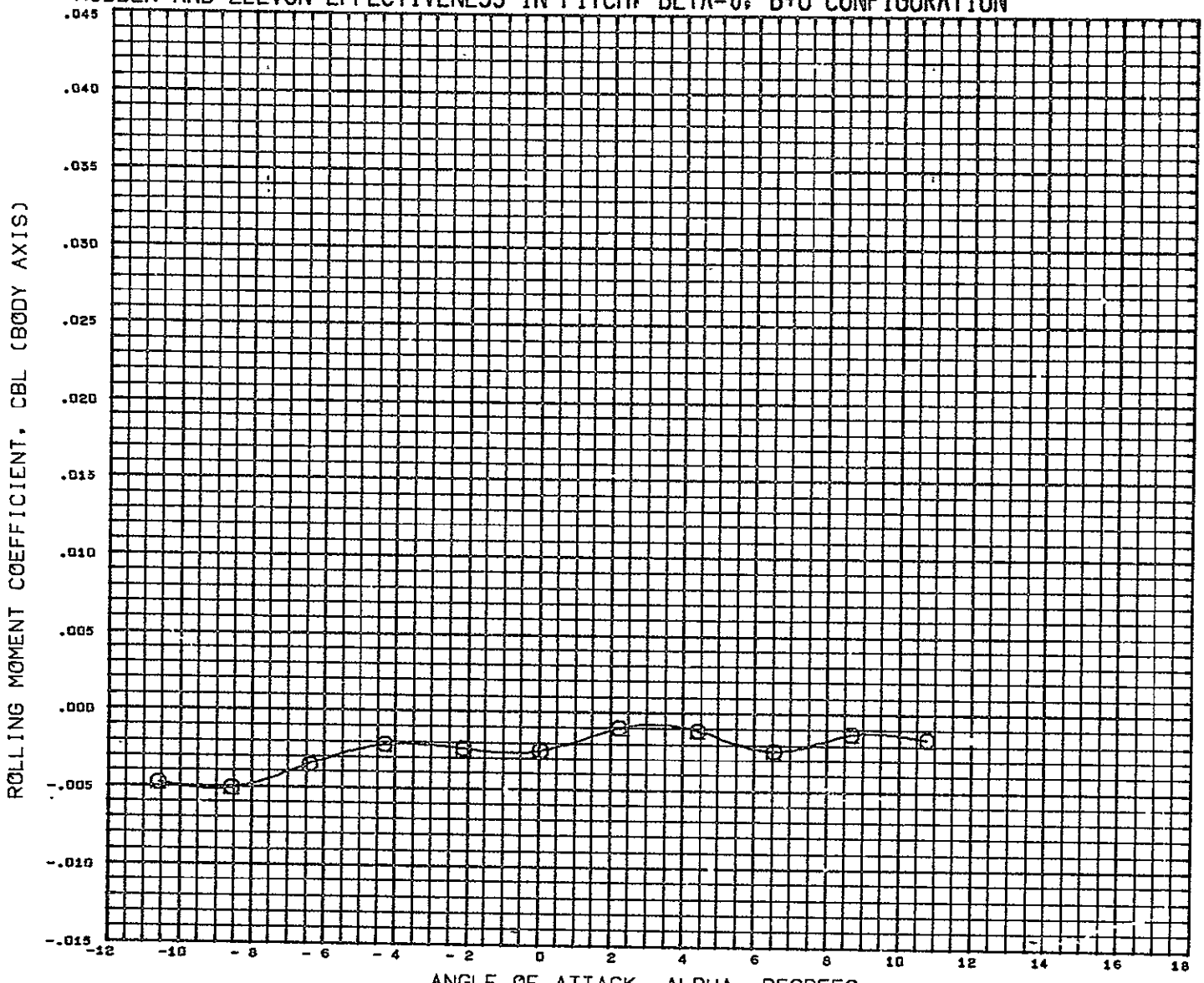


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.604

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



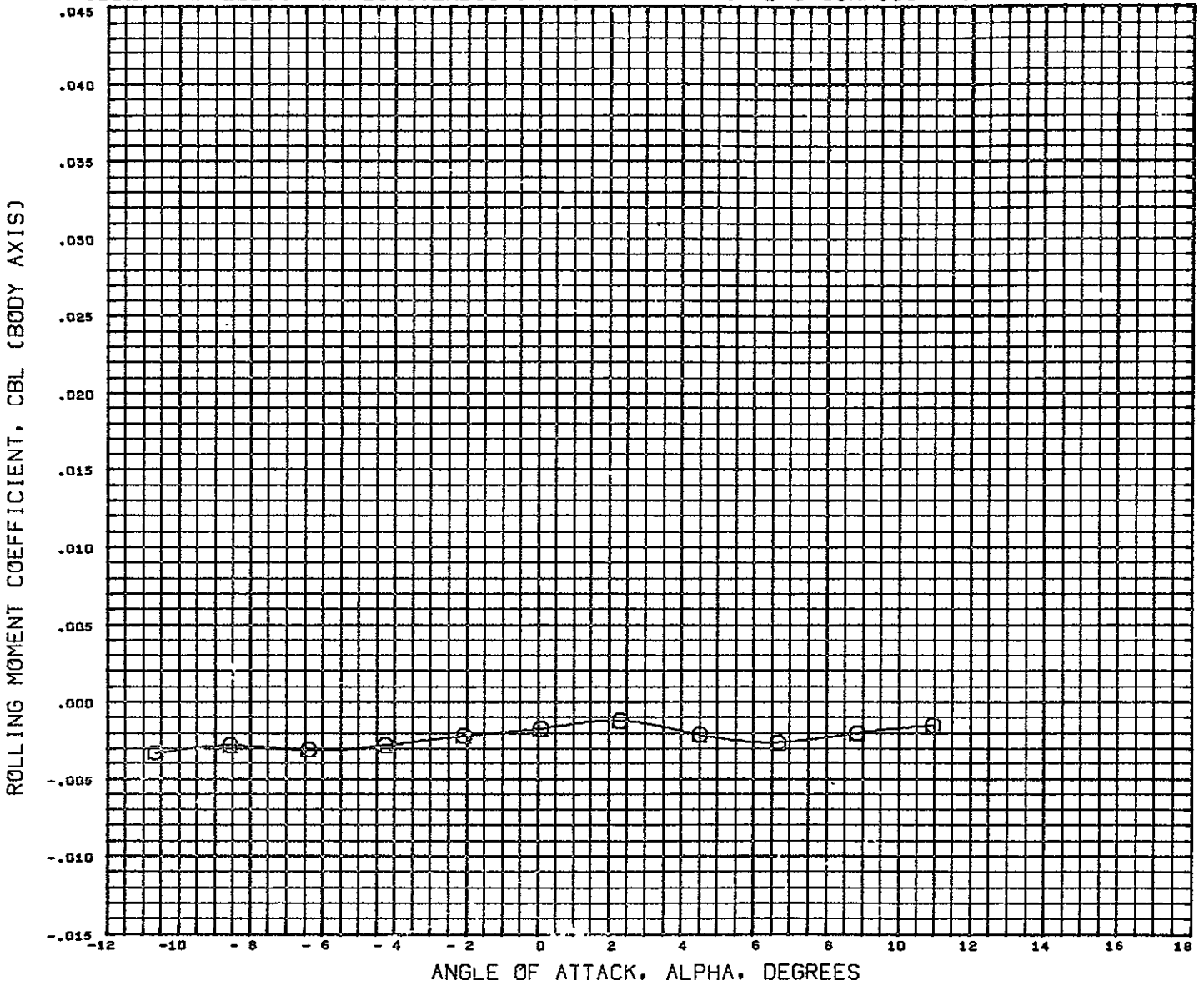
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.3990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.900

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

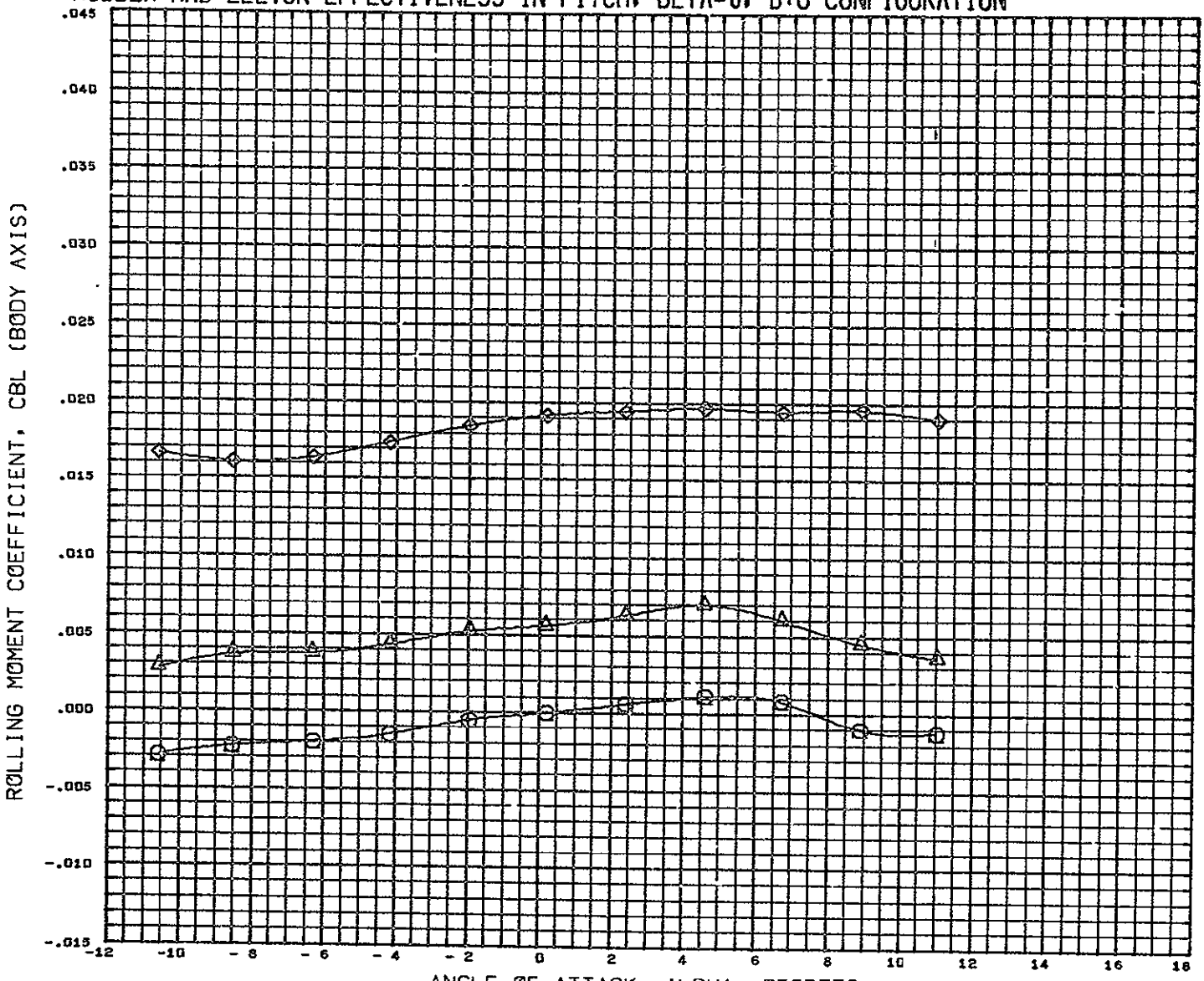


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0650	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 0.994

RUDDER AND ELEVØN EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



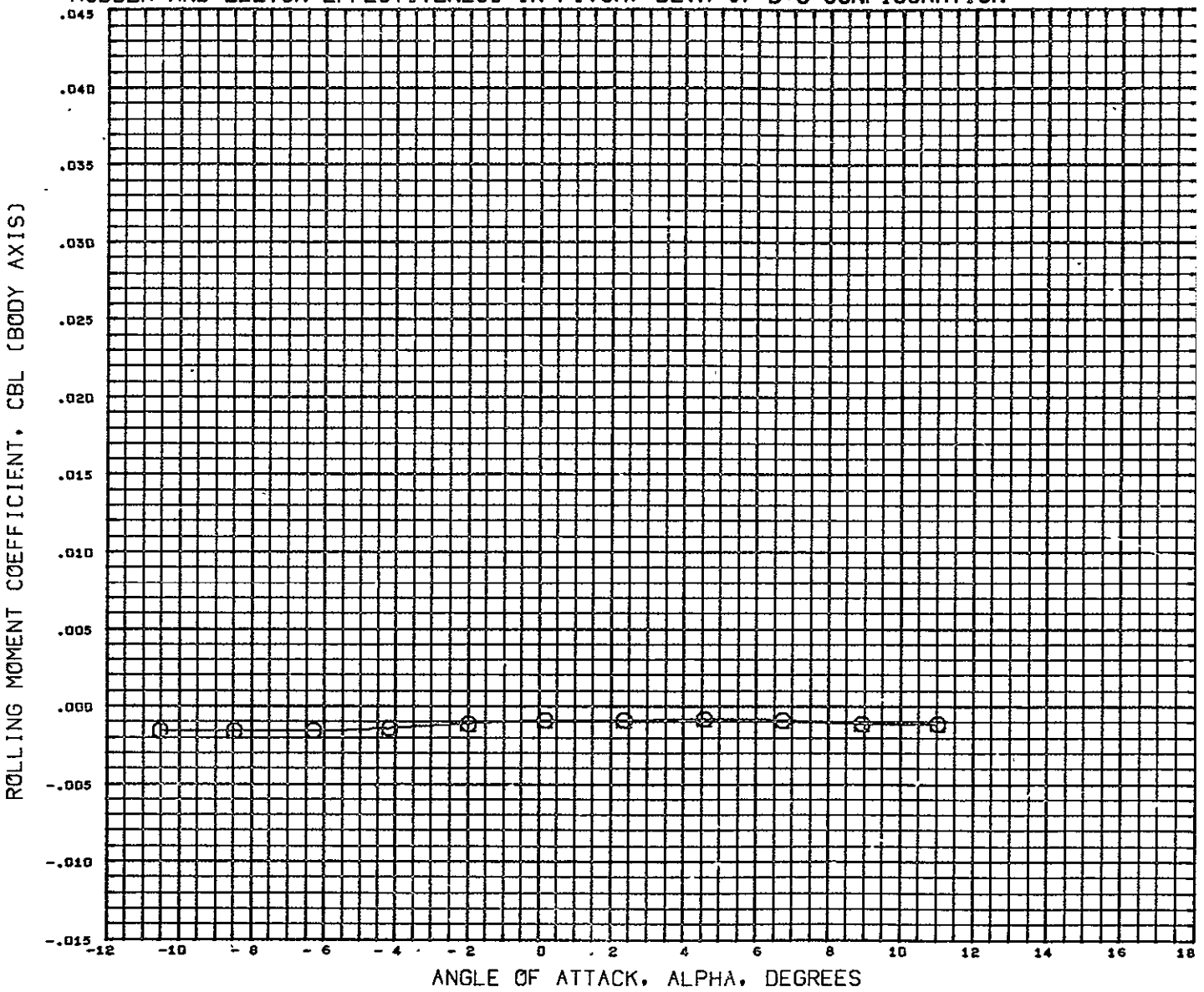
DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(A3109C)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

BETA	ELVATR	AILRON	RUDDER
0.010	0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.200

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION



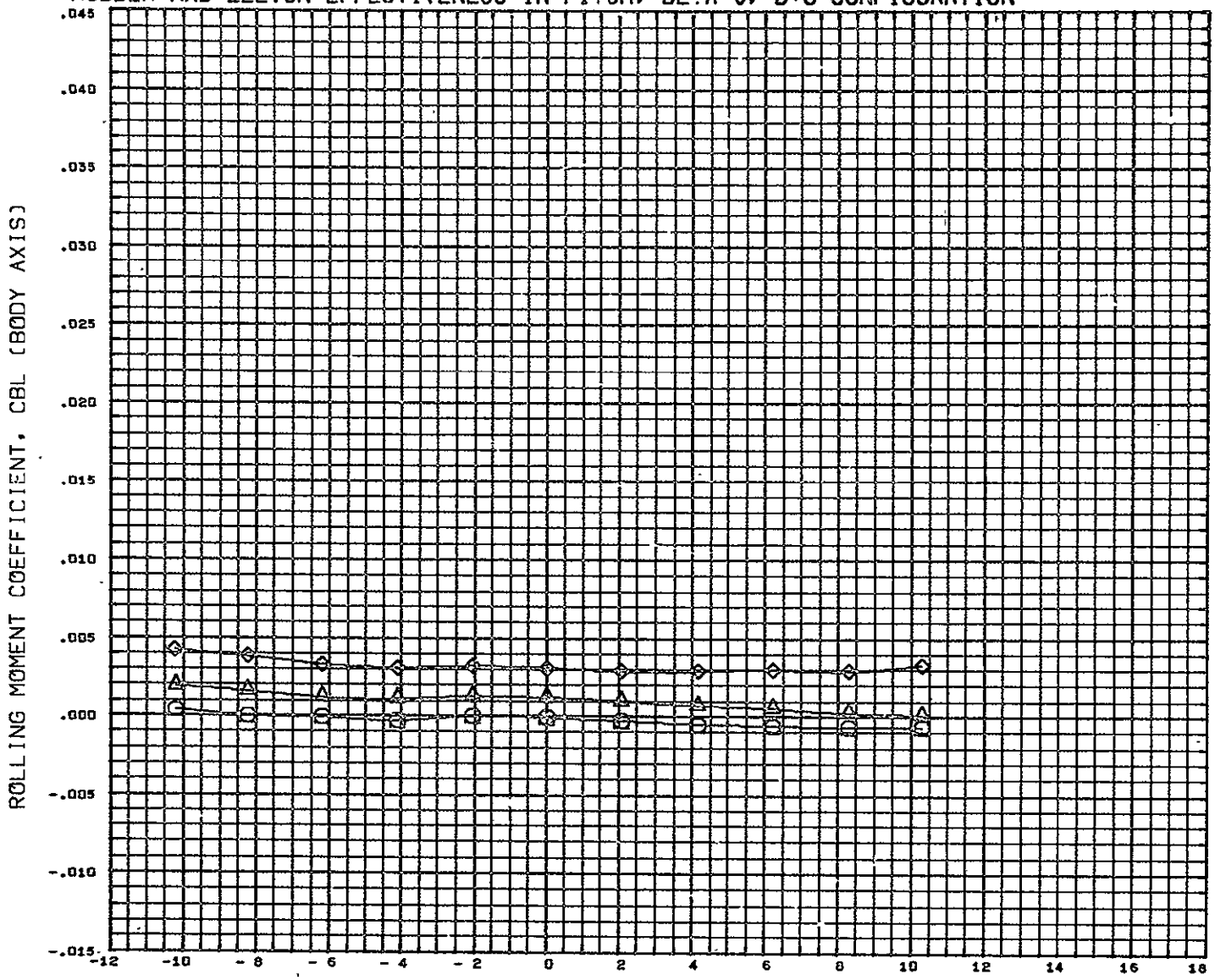
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS

BETA	ELVATR	AILRON	RUDDER
0.010	-0.000	0.000	0.000
0.050	0.000	0.000	10.000
0.050	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6564	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.962

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

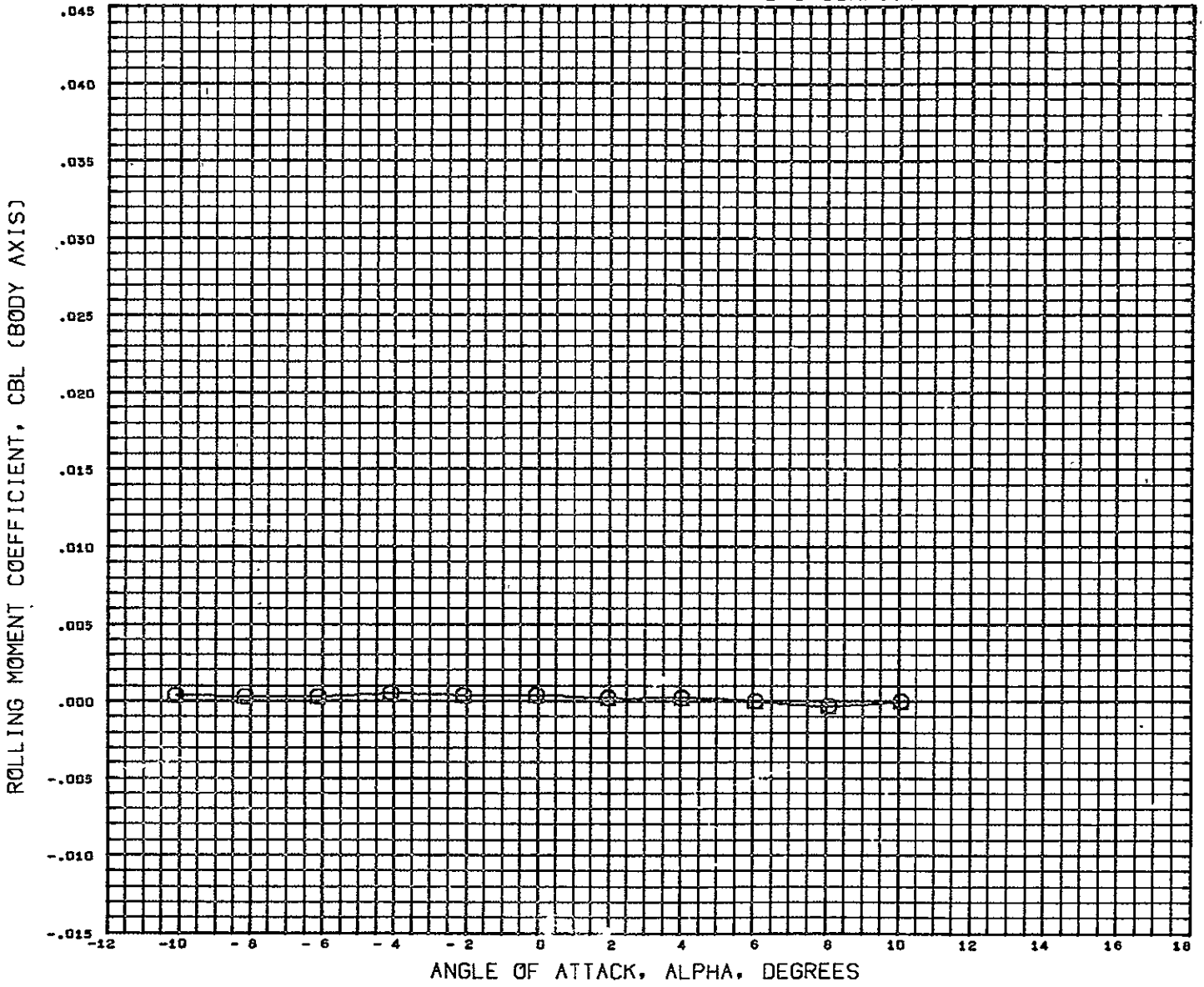


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C) ○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C) △	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	0.000	10.000
(A3109C) ◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.050	0.000	10.000	10.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0630	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN PITCH, BETA=0, B+U CONFIGURATION

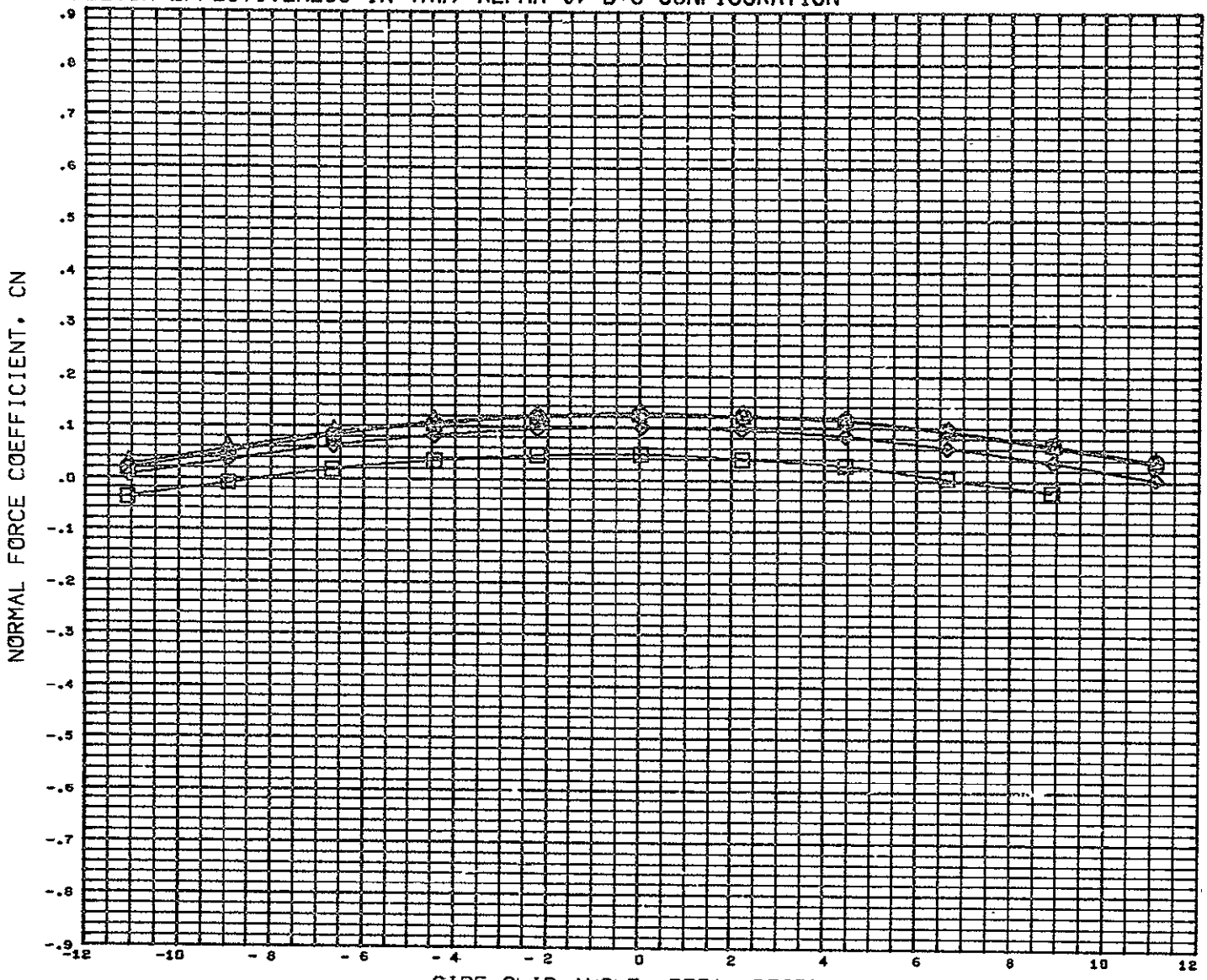


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA	ELVATR	AILRON	RUDDER
(R3104C)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.010	0.000	0.000	0.000
(R3108C)	△	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	0.000	10.000
(A3109C)	◇	DATA NOT AVAILABLE FOR ALL CONDITIONS	0.050	0.000	10.000	10.000

MACH 4.959

REFERENCE INFORMATION		
SREF	15.656[illegible]	SQ IN
LREF	3.09[illegible]	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVØN EFFECTIVENESS IN YAW, ALPHA=0, B+U CØNFIGURATION



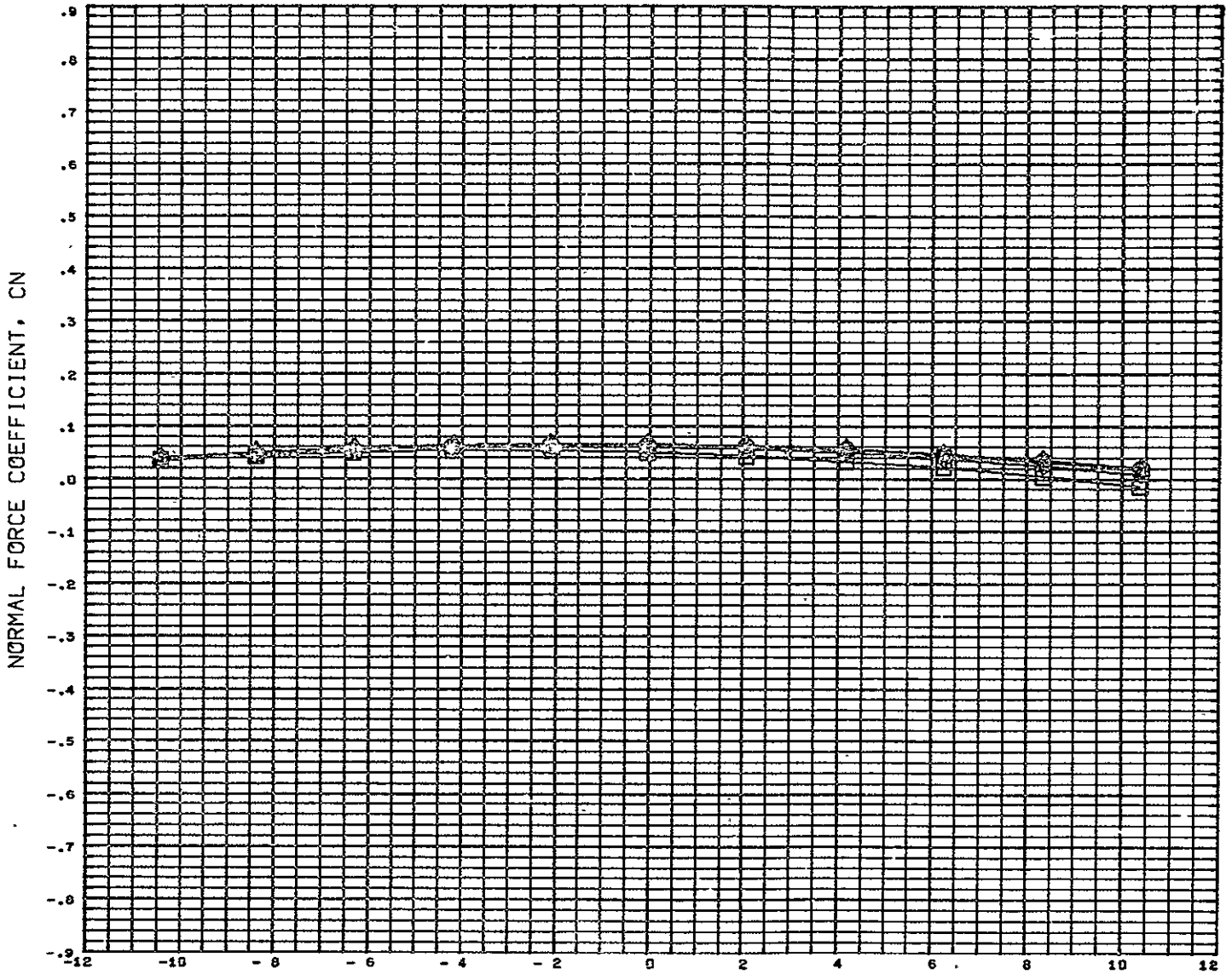
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3111B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3112B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3113B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.135	-5.000	15.000	0.000
0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.195

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION

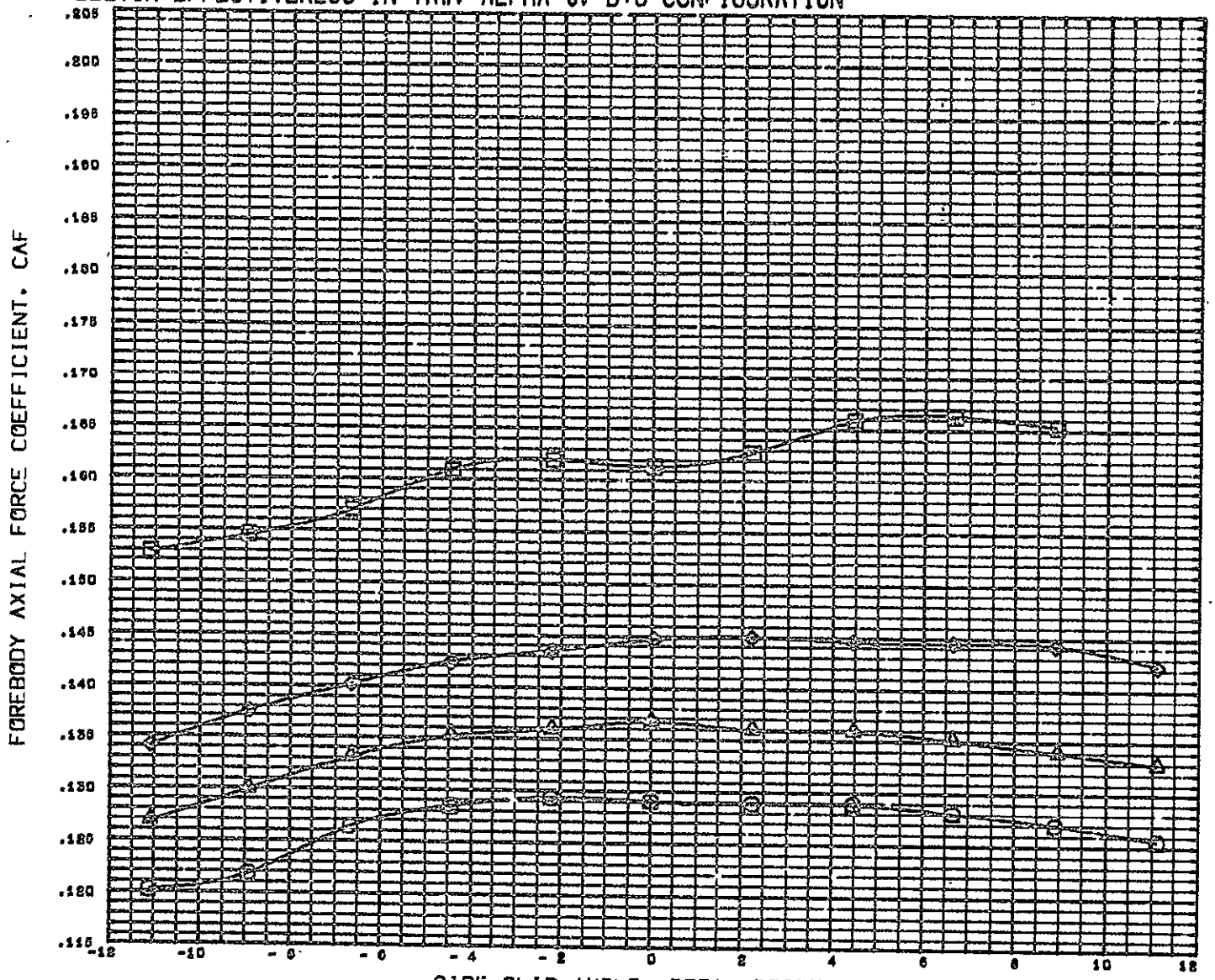


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0090	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION



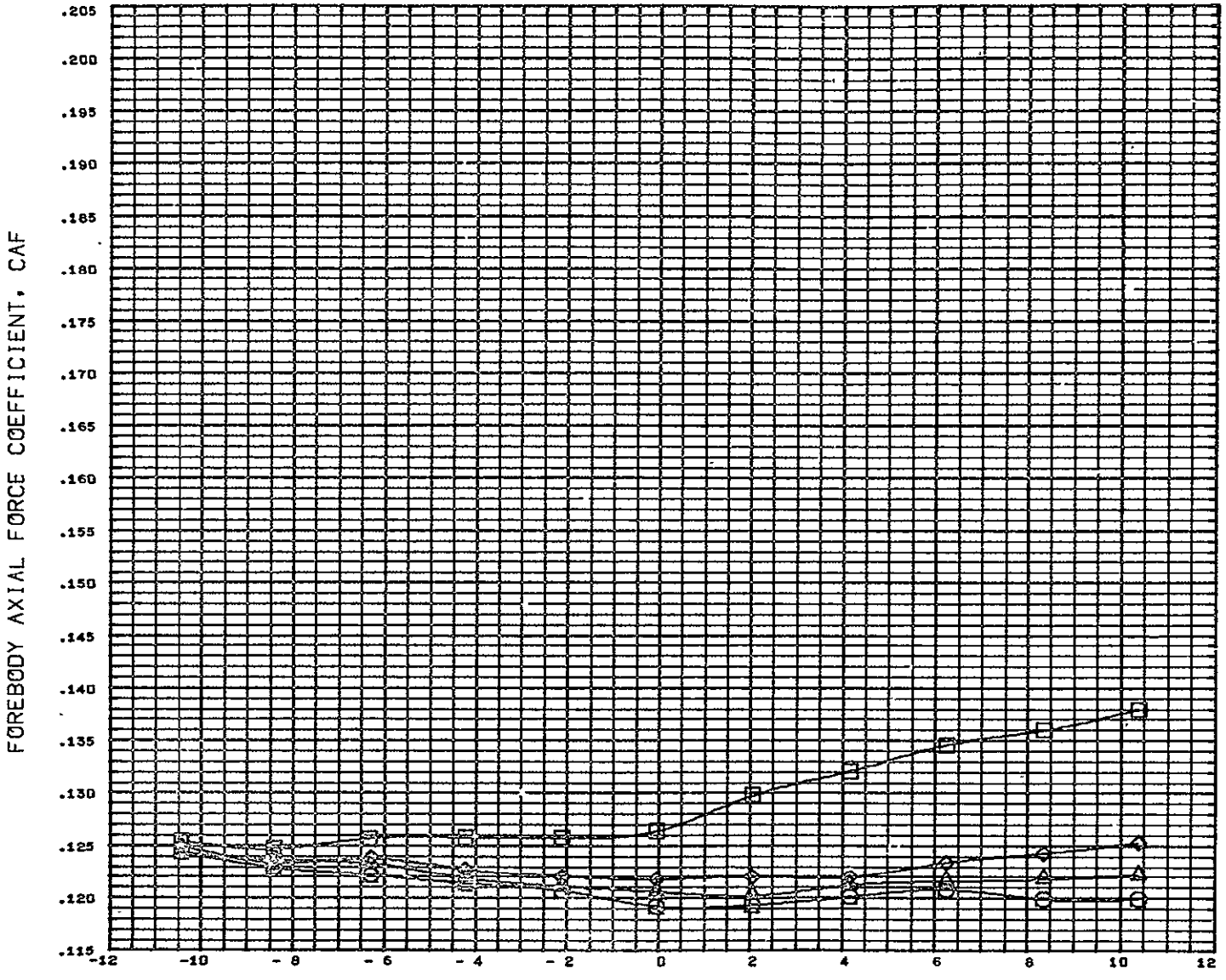
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110D)	○	M8FC469 NR/GD E86 LAUNCH B19W14C4AV7+U
(C3111B)	◇	M8FC469 NR/GD E86 LAUNCH B19W14C4AV7+U
(C3112B)	△	M8FC469 NR/GD E86 LAUNCH B19W14C4AV7+U
(C3113B)	□	M8FC469 NR/GD E86 LAUNCH B19W14C4AV7+U

MACH 1.195

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.130	-5.000	15.000	0.000
0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6563	SQ IN
LREF	5.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION

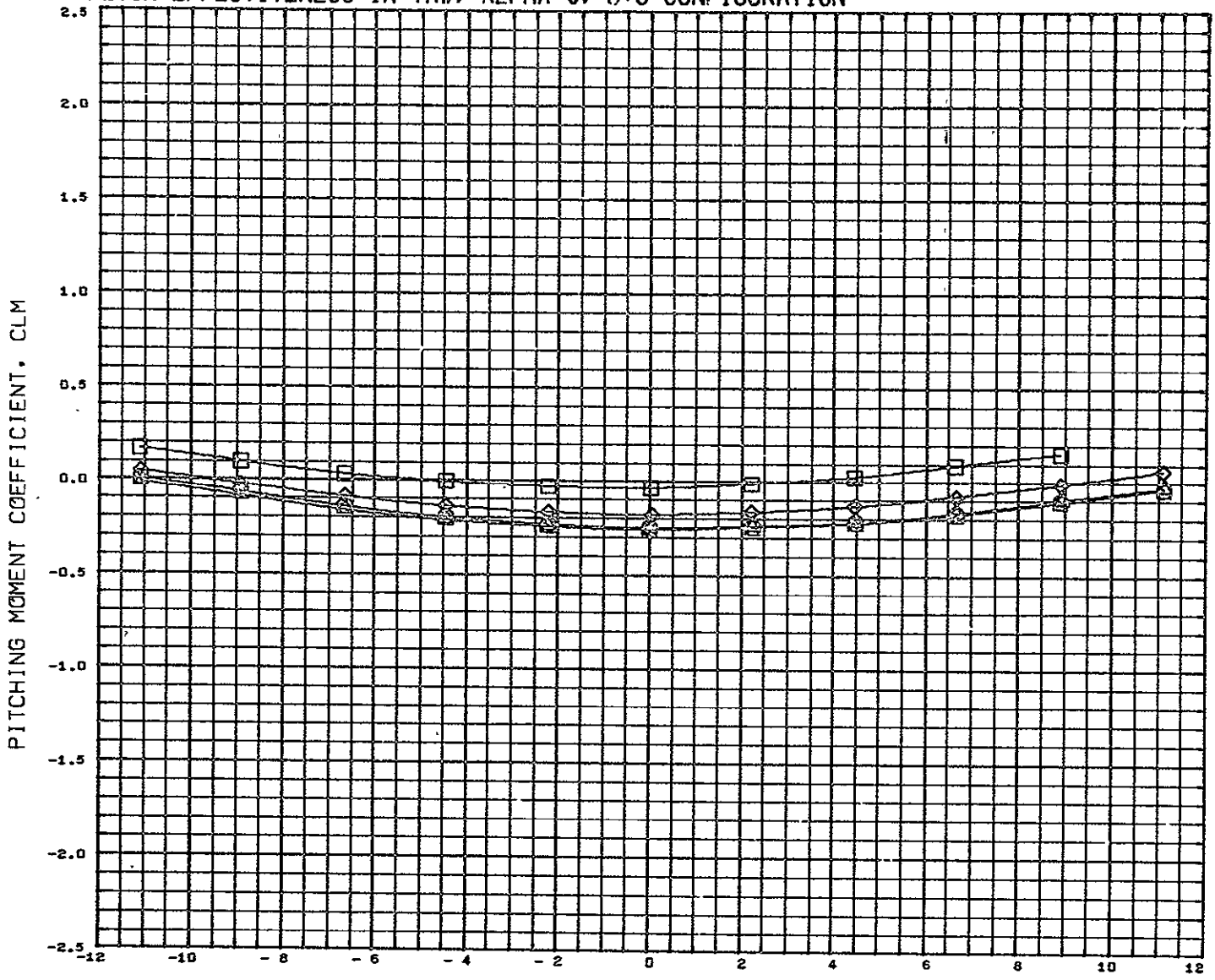


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6566	SQ IN
LREF	5.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION



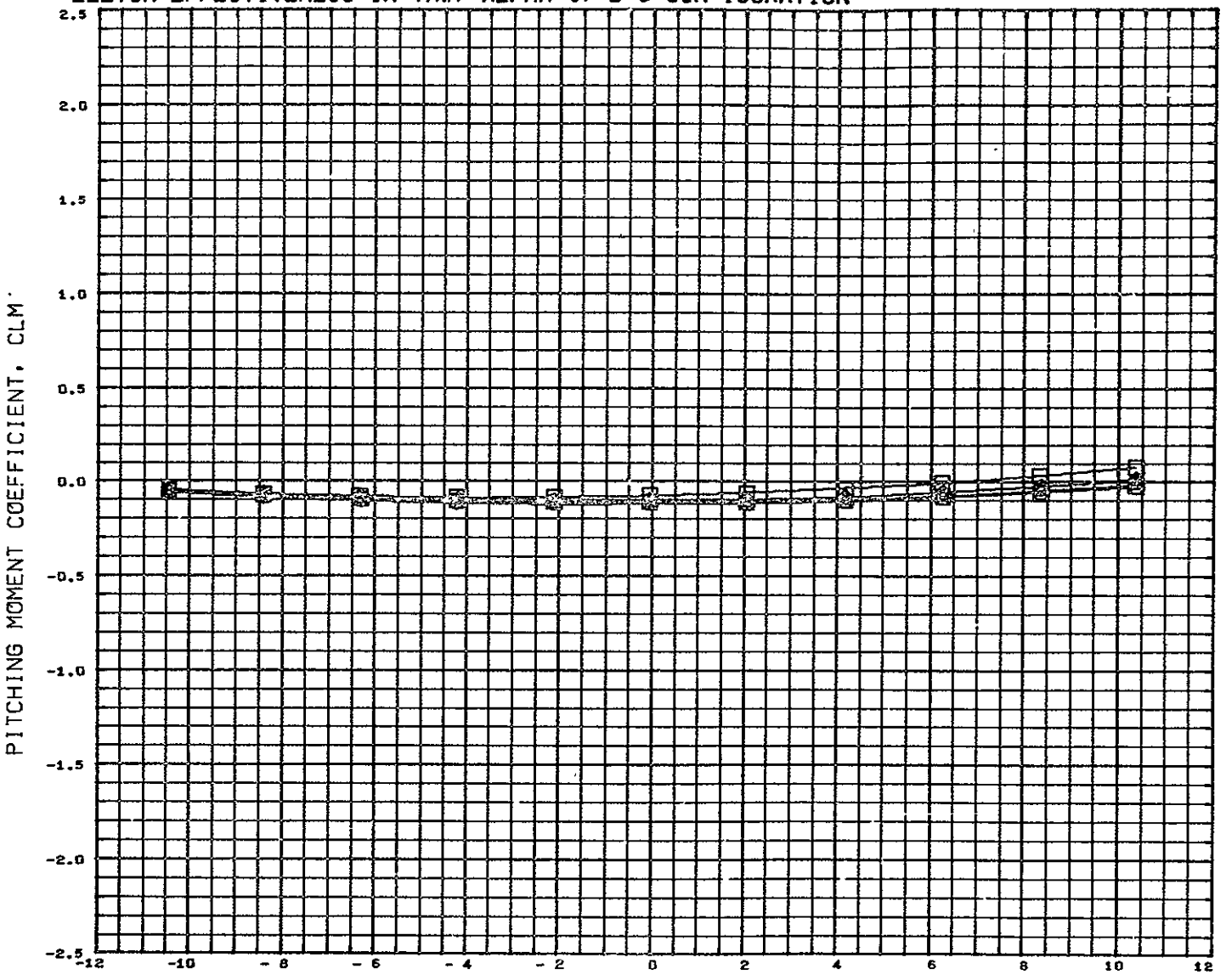
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.195

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.130	-5.000	15.000	0.000
0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0920	INCHES
BREF	6.6990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION

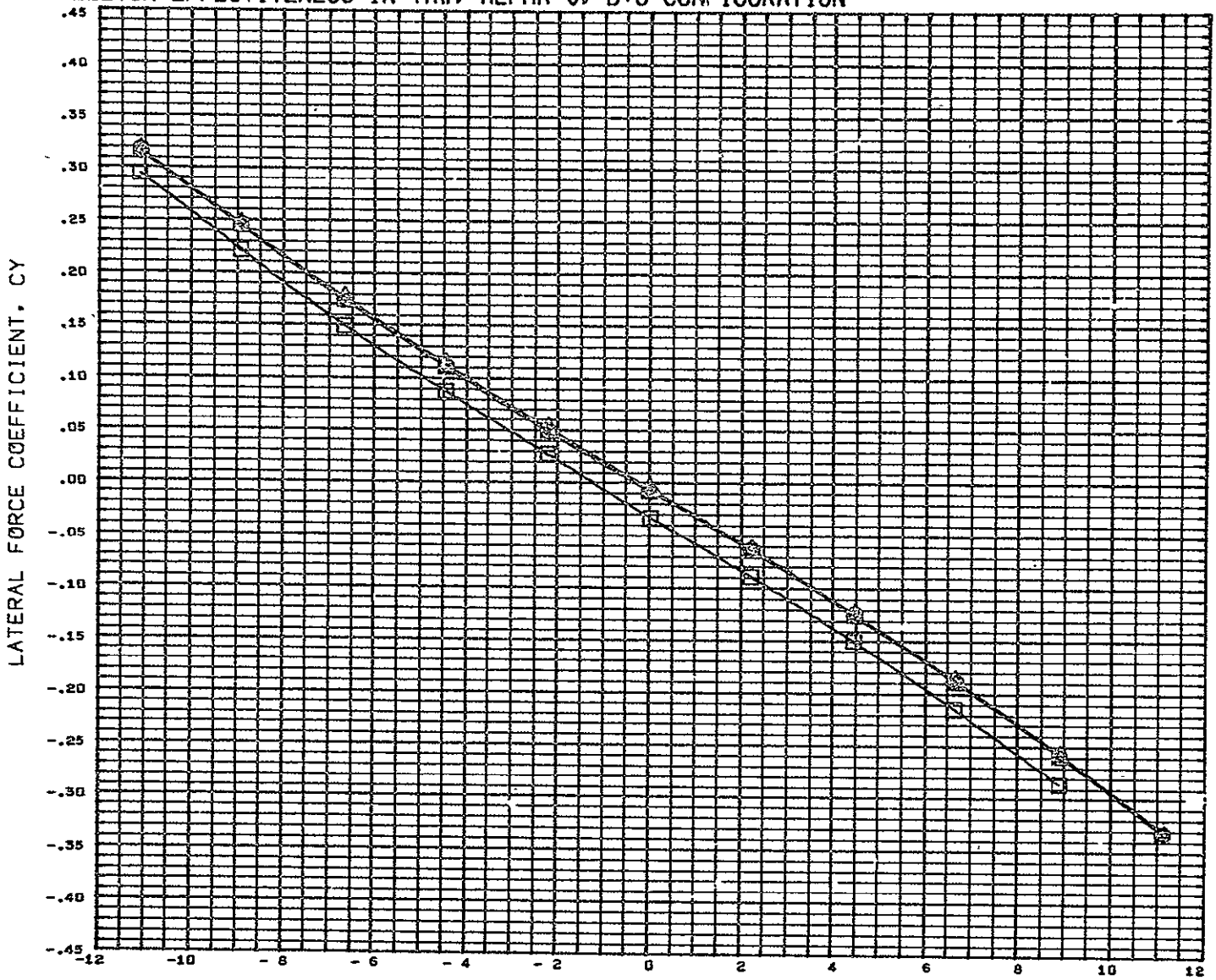


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION



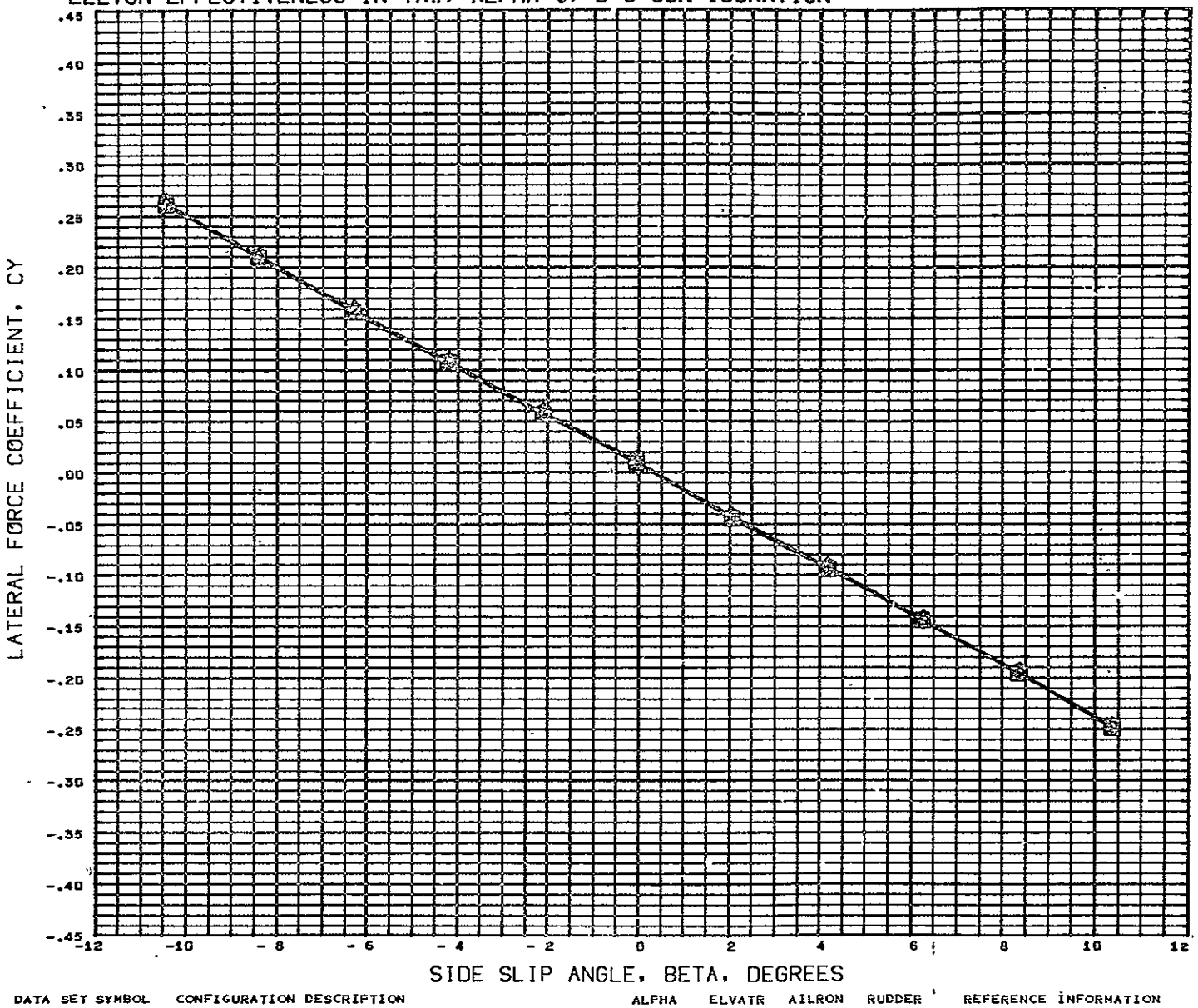
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.130	-5.000	15.000	0.000
0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0500	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.195

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION

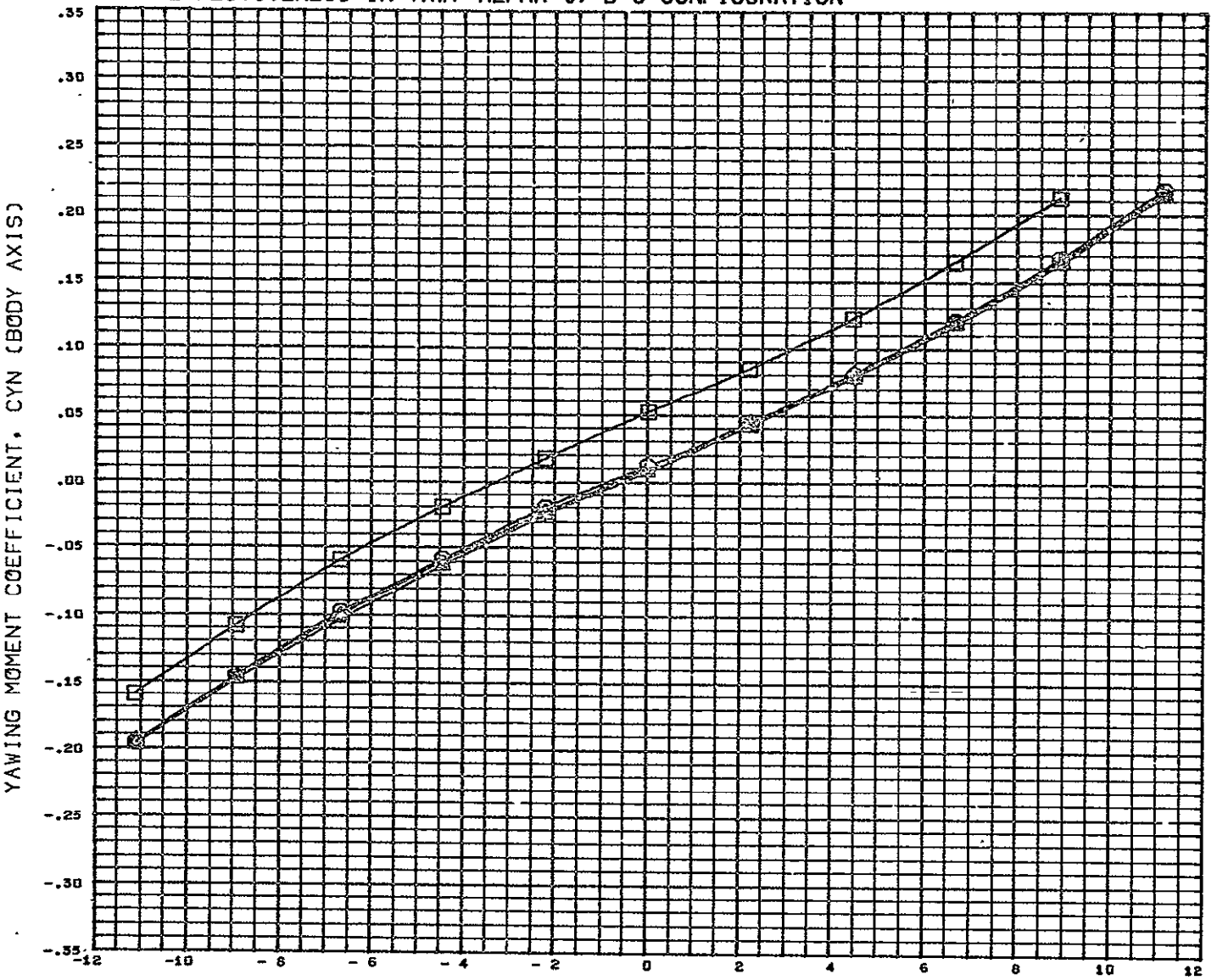


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0650	INCHES
BREF	6.9990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION



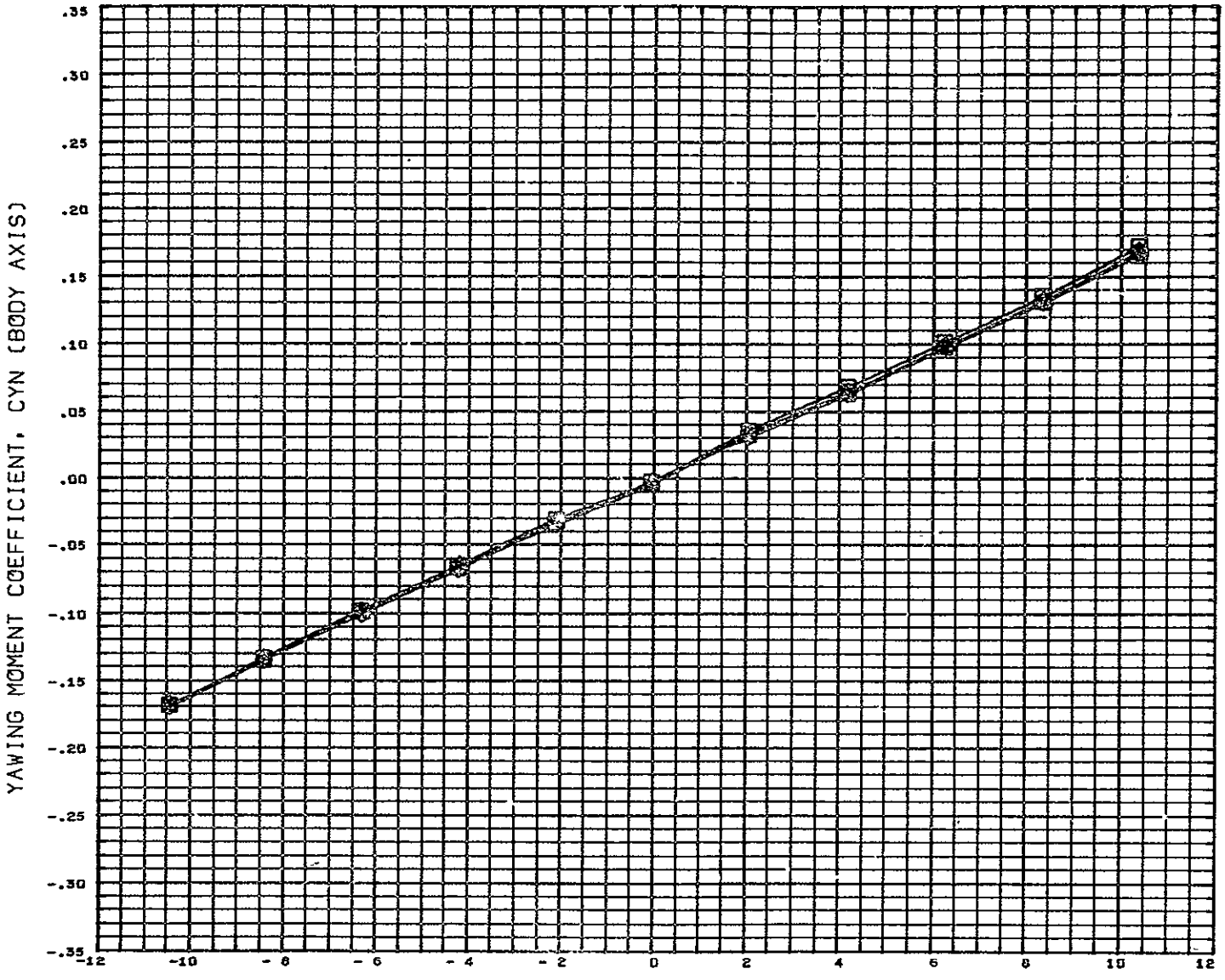
DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3111B)	⊠	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.195

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.130	-5.000	15.000	0.000
3.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	5.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION

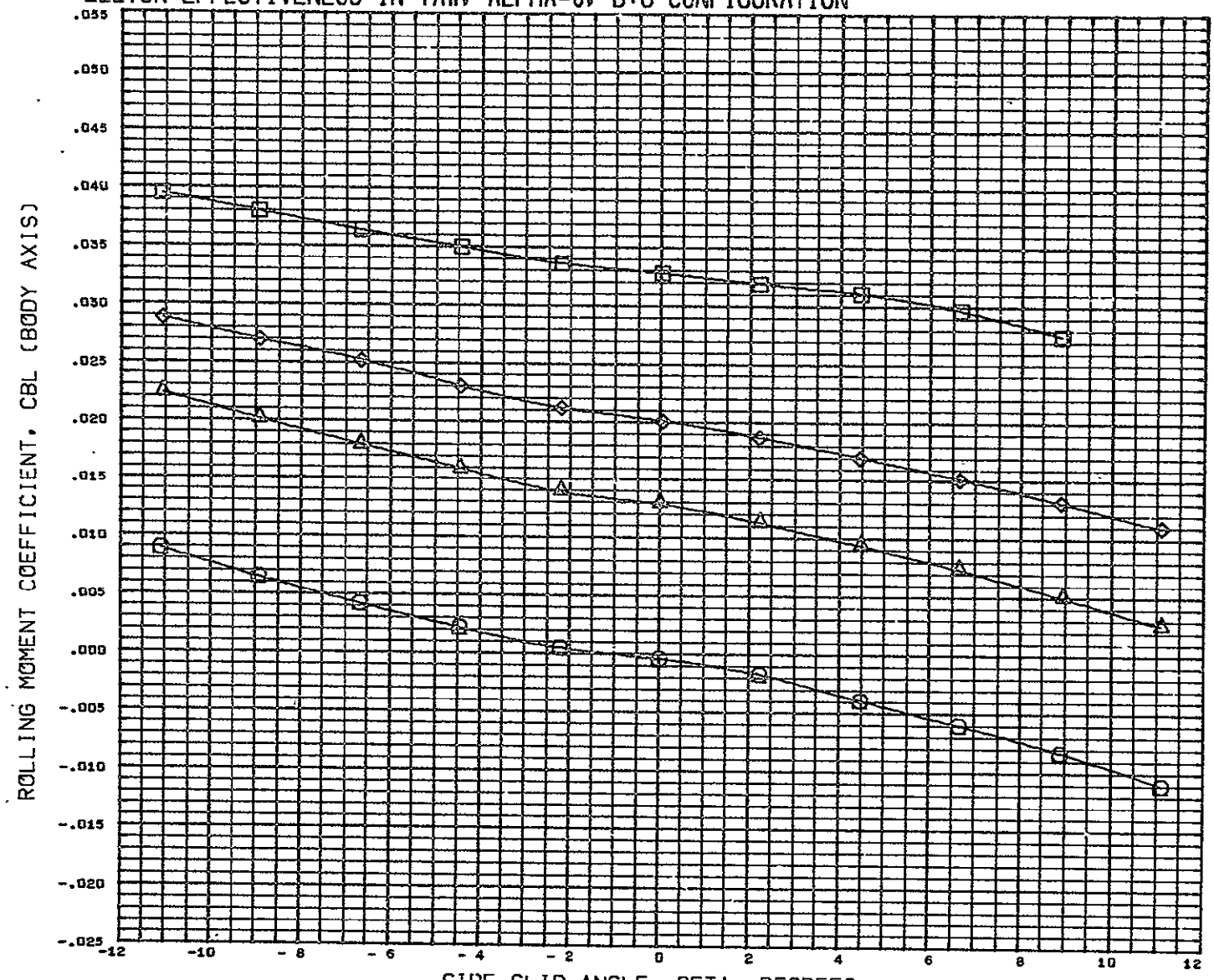


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION



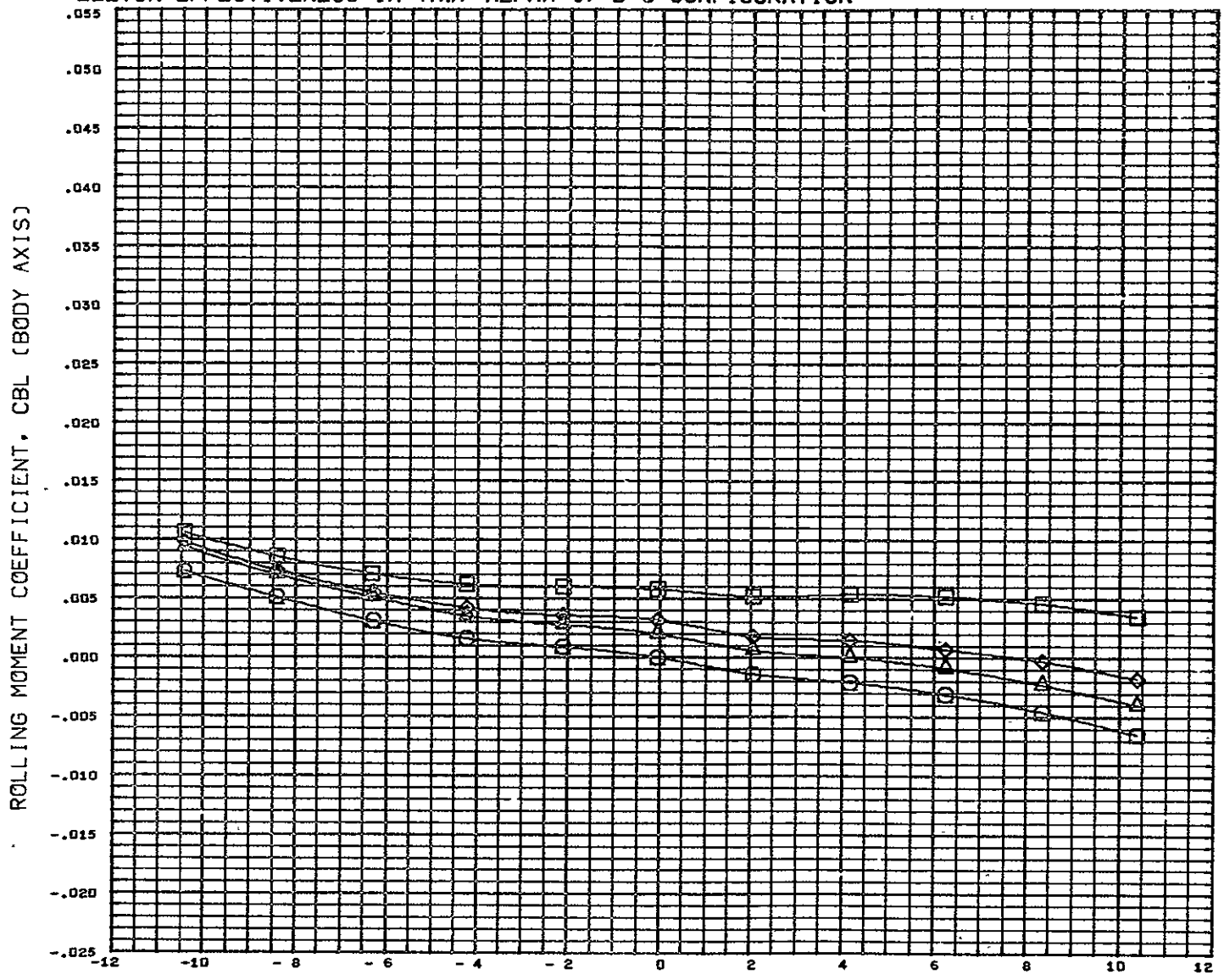
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3111B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3112B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3113B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.195

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.130	-5.000	15.000	0.000
0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

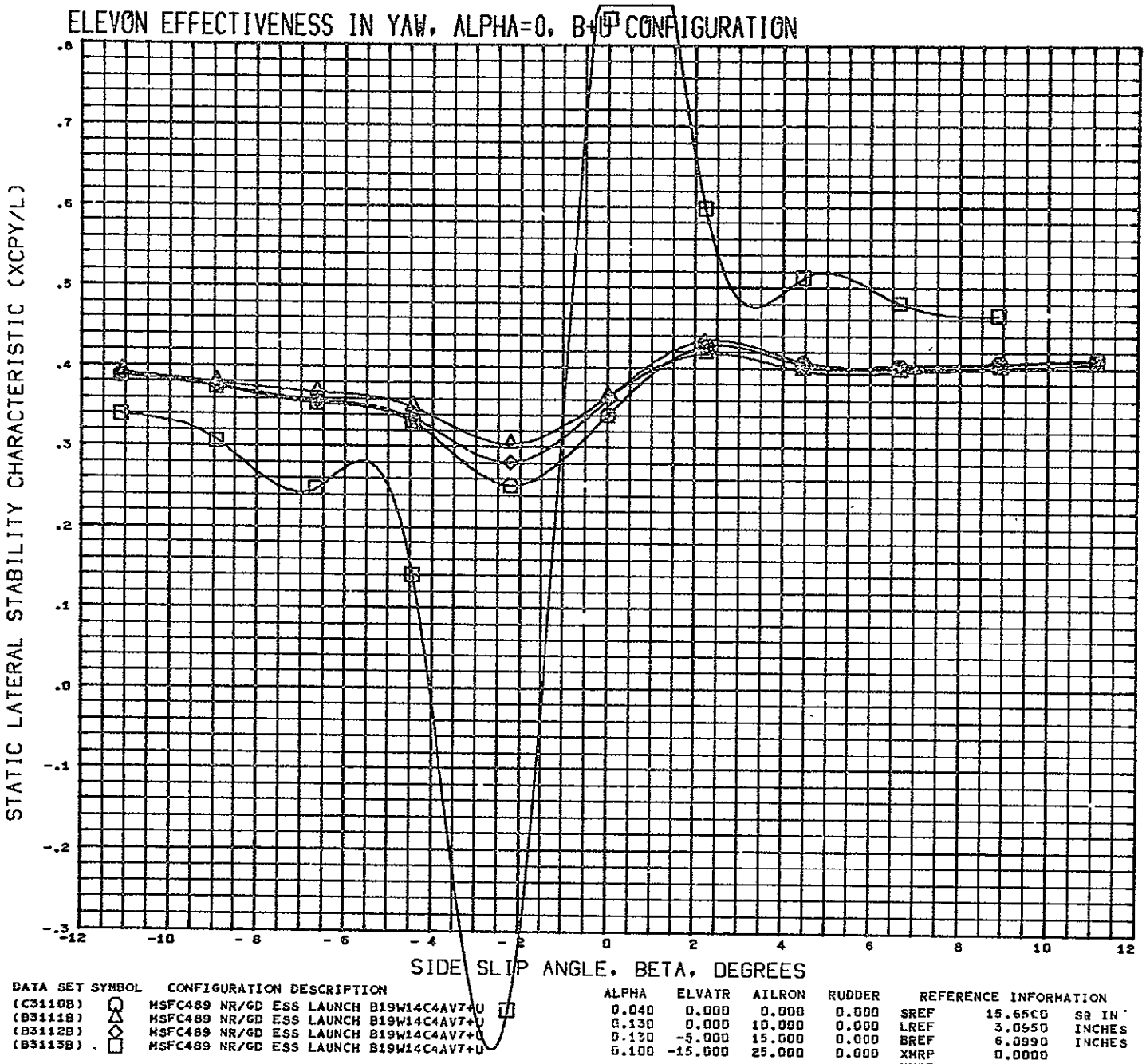
ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.5990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE



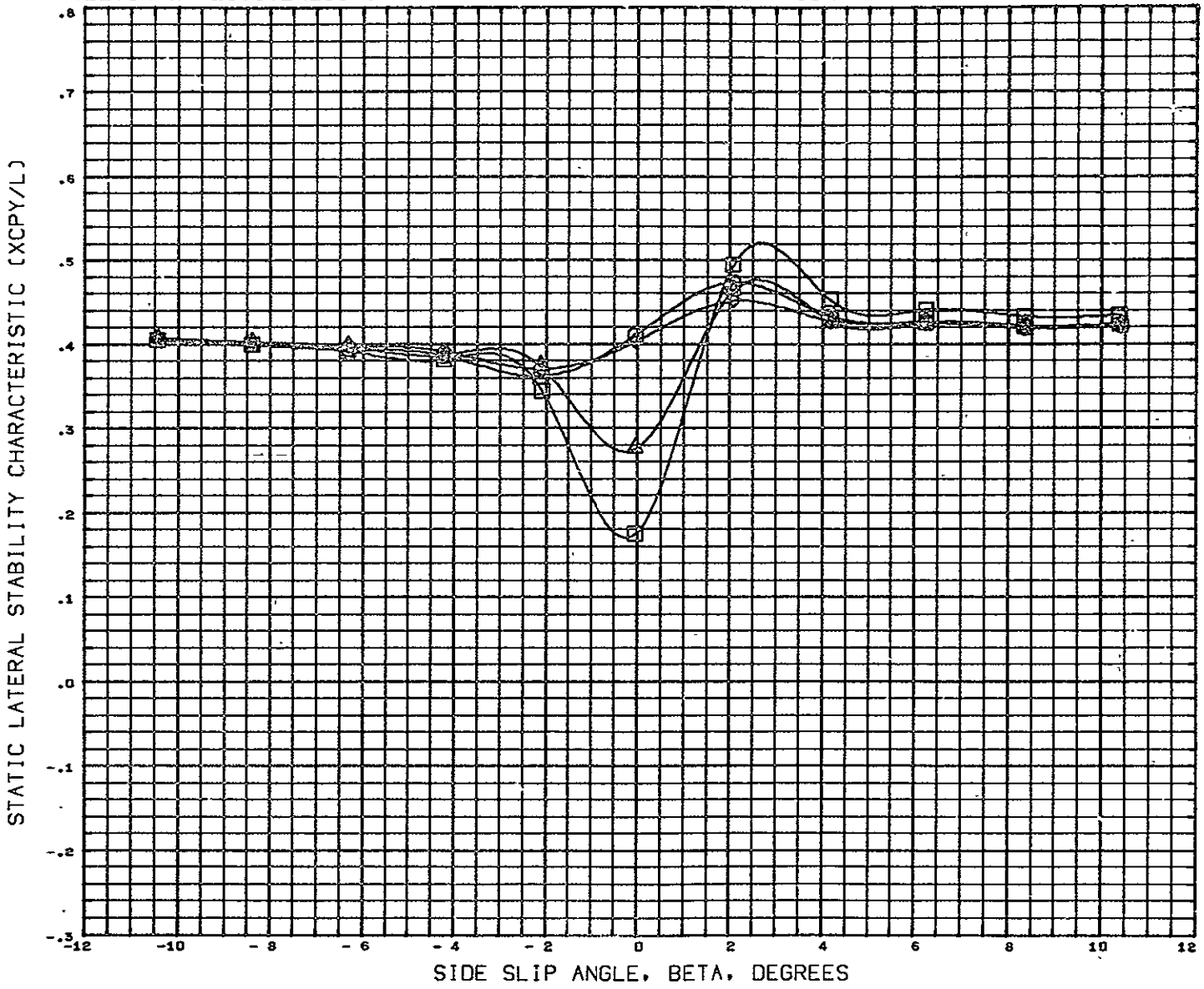
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3111B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3112B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3113B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.195

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
0.130	0.000	10.000	0.000
0.130	-5.000	15.000	0.000
0.100	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6500	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRF	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=0, B+U CONFIGURATION

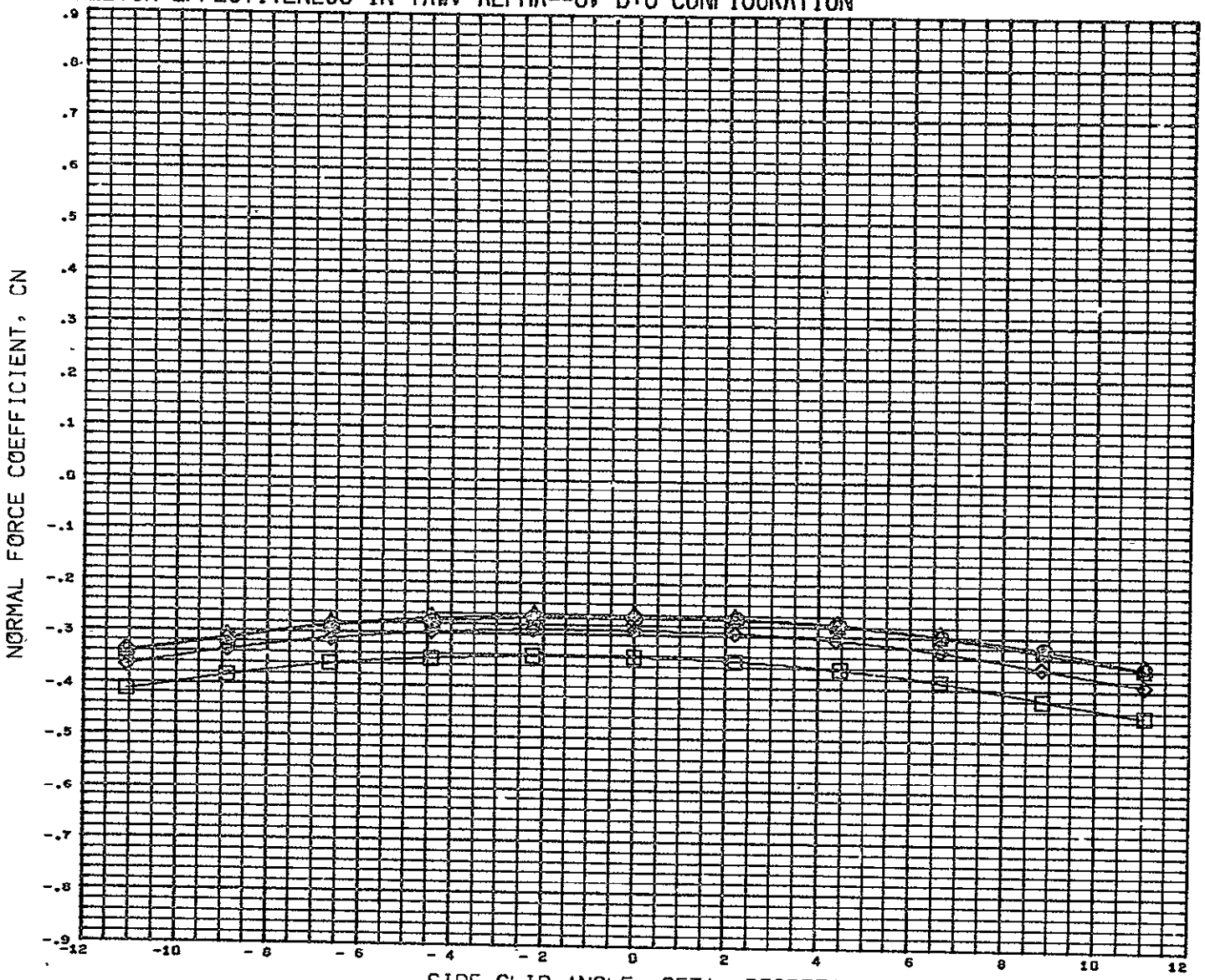


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(B3111B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	0.000	10.000	0.000
(B3112B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.130	-5.000	15.000	0.000
(B3113B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.100	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



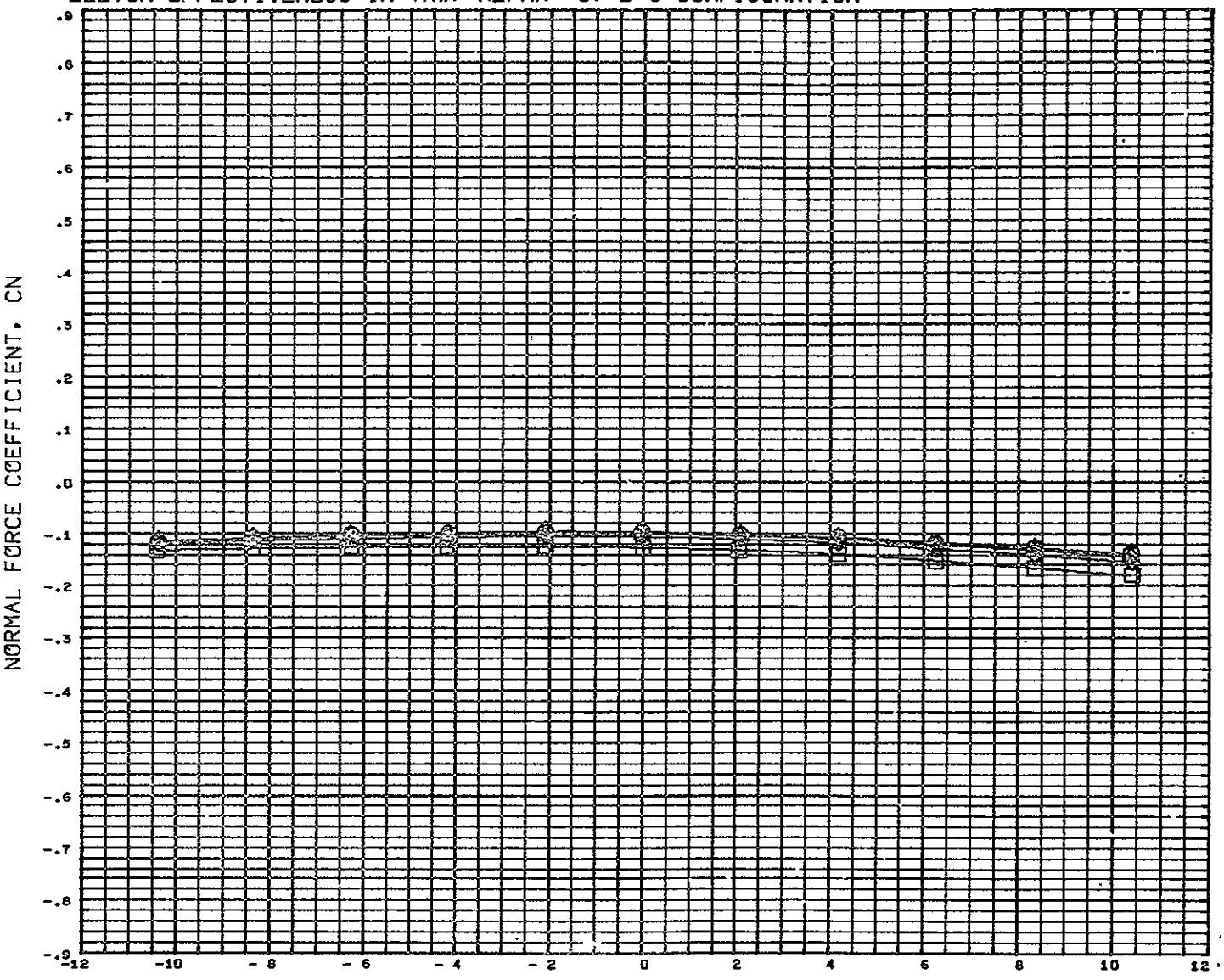
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.470	-13.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0-50	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

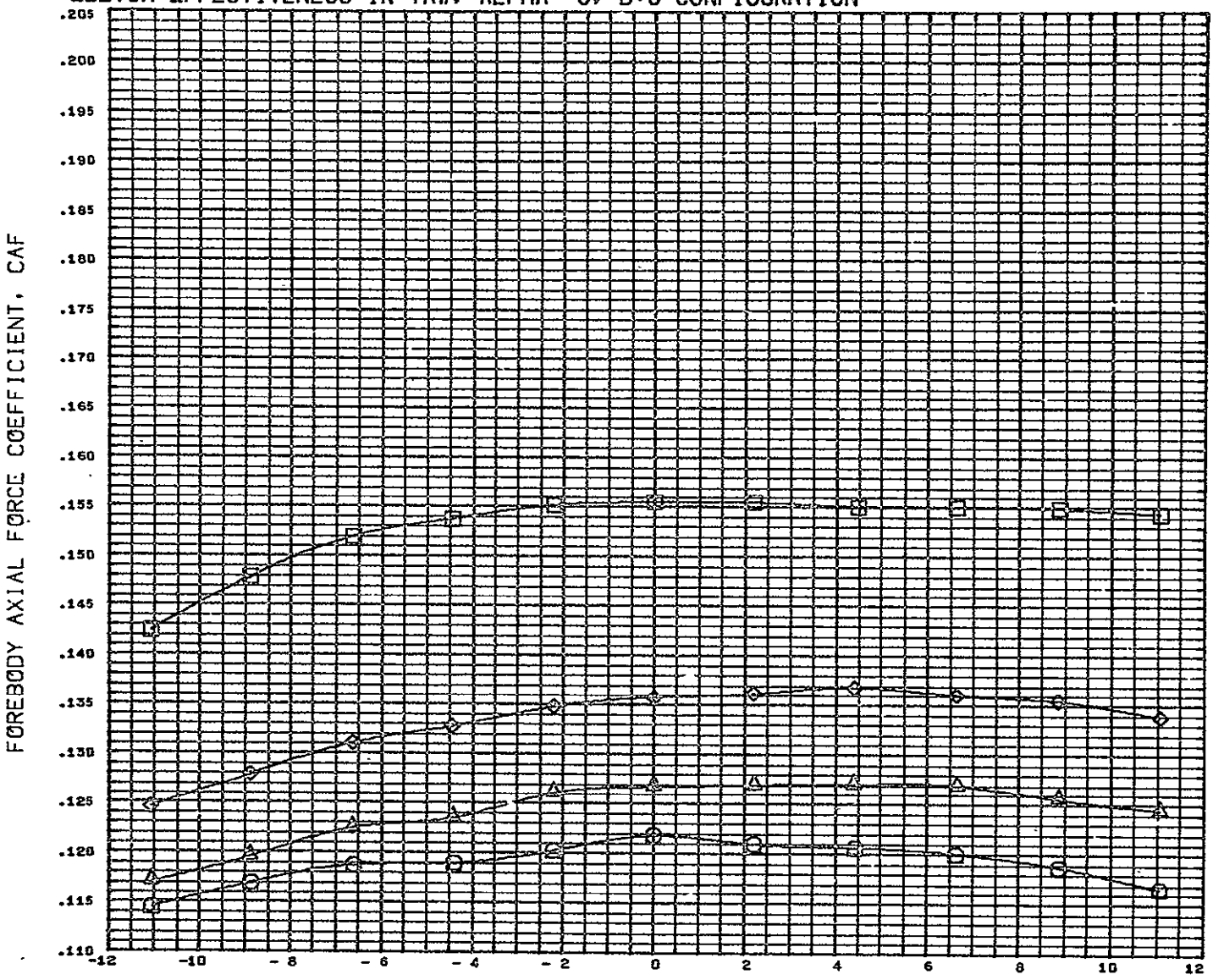


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	0.000
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.450	-5.000	15.000	0.000
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



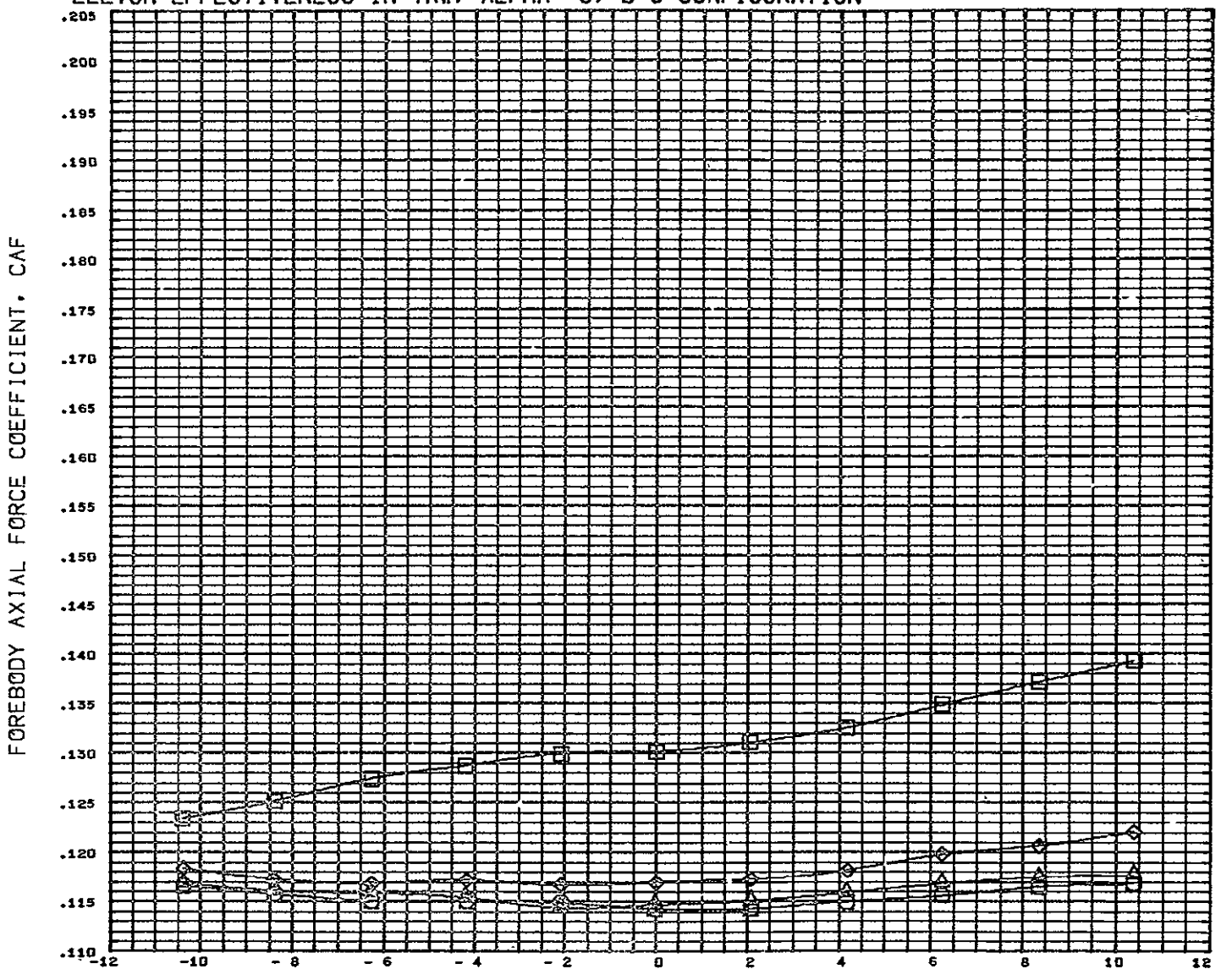
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0650	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

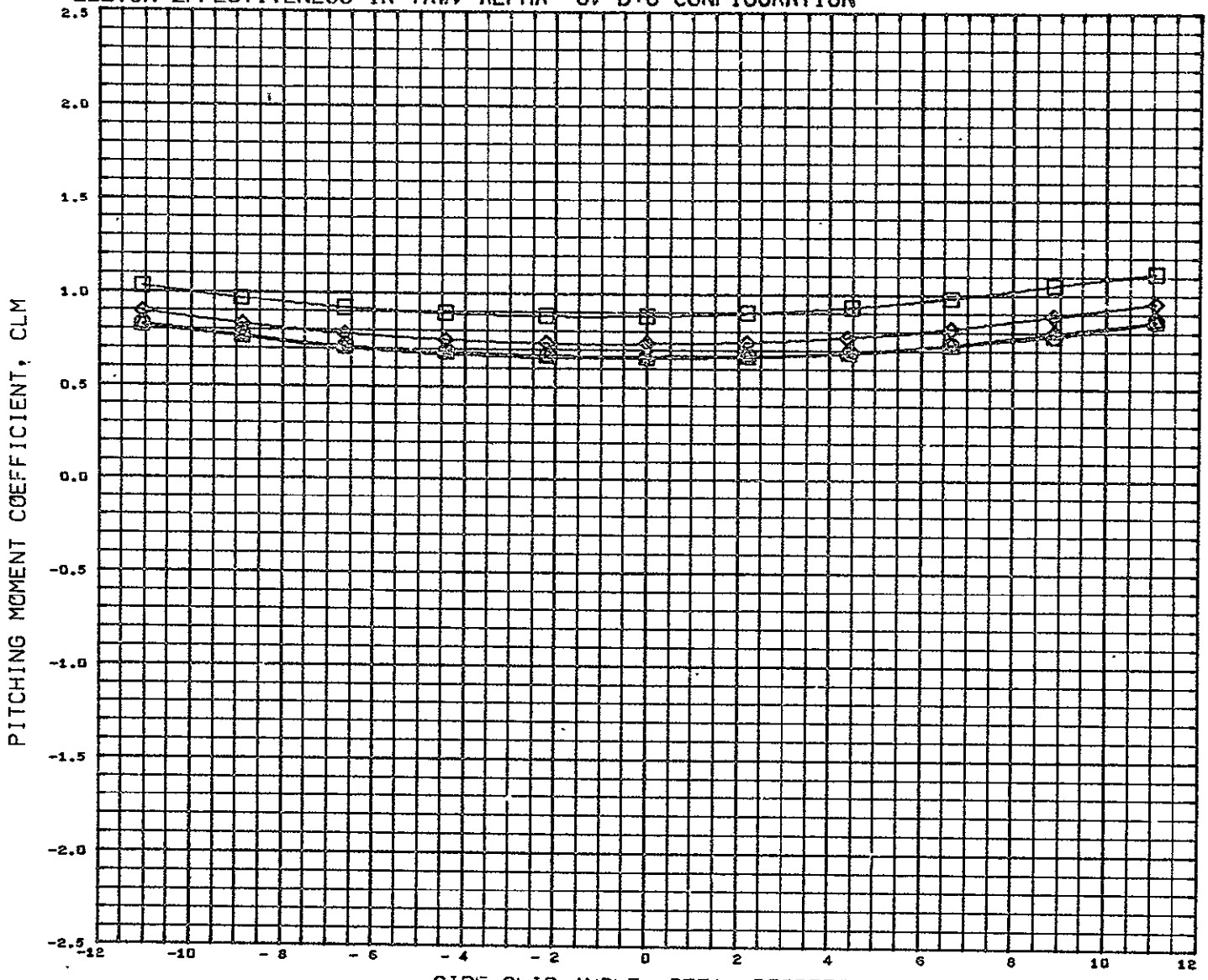


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(83105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	0.000
(83106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.450	-5.000	15.000	0.000
(83107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.470	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



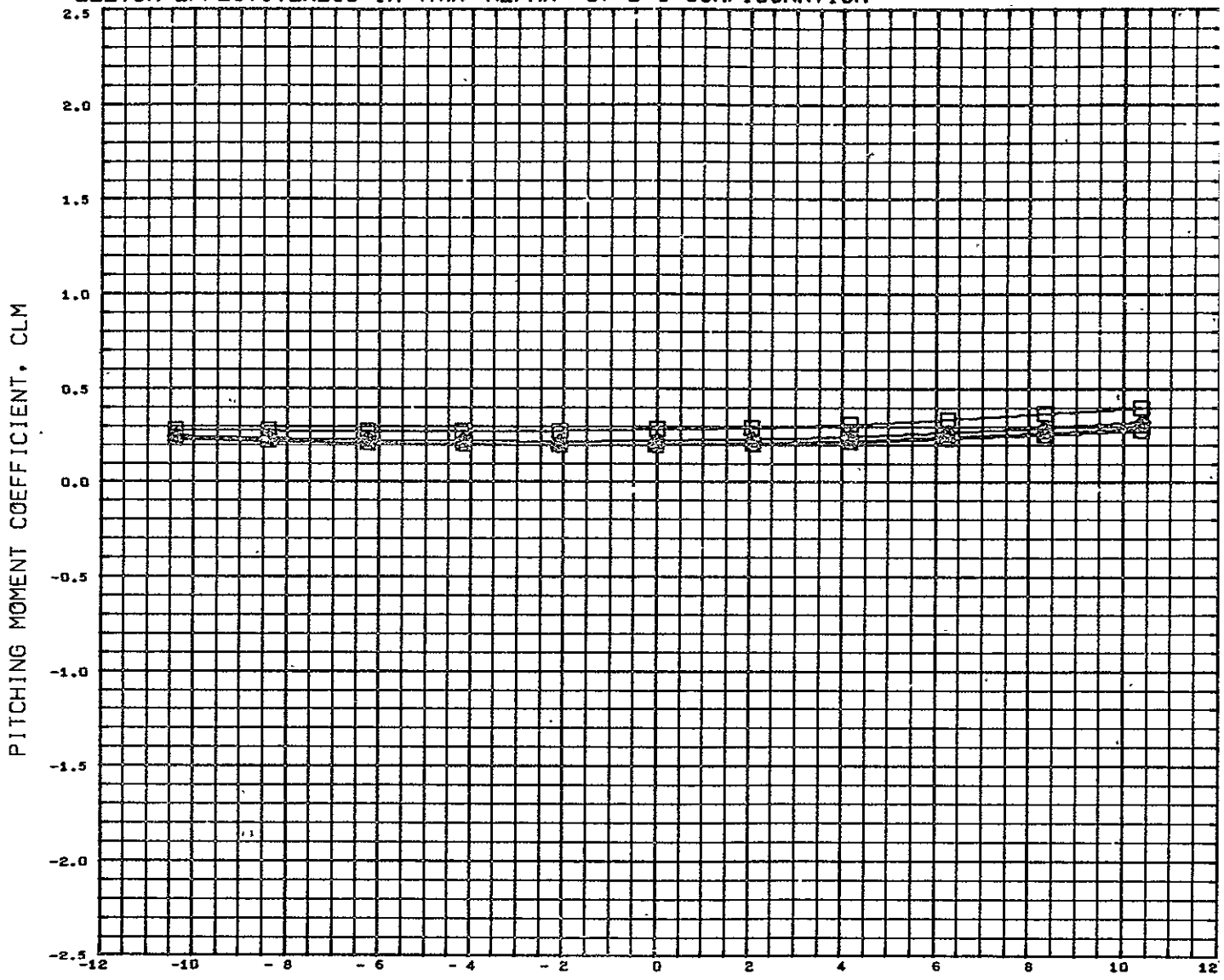
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0630	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

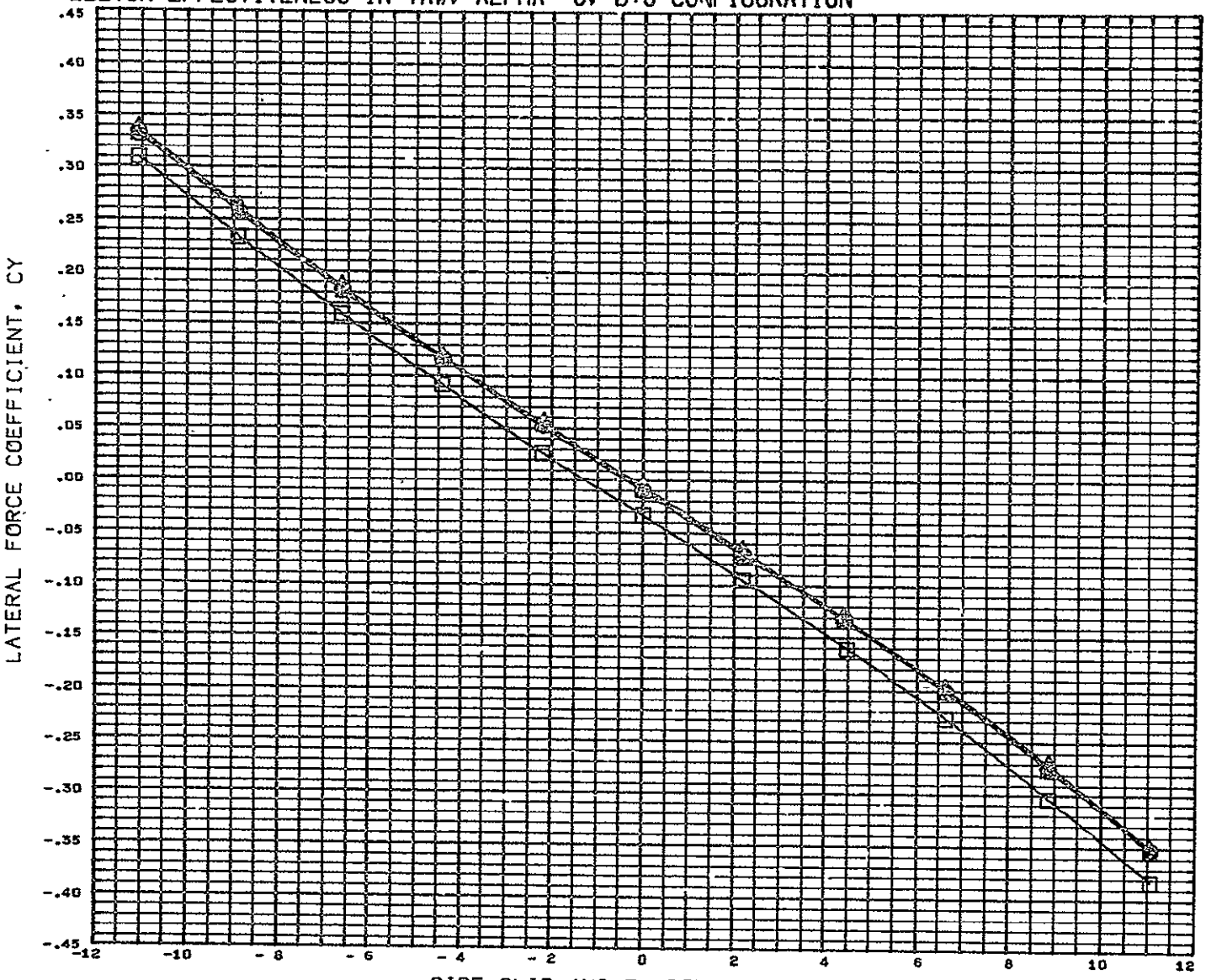


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	0.000
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.450	-5.000	15.000	0.000
(93107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.470	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



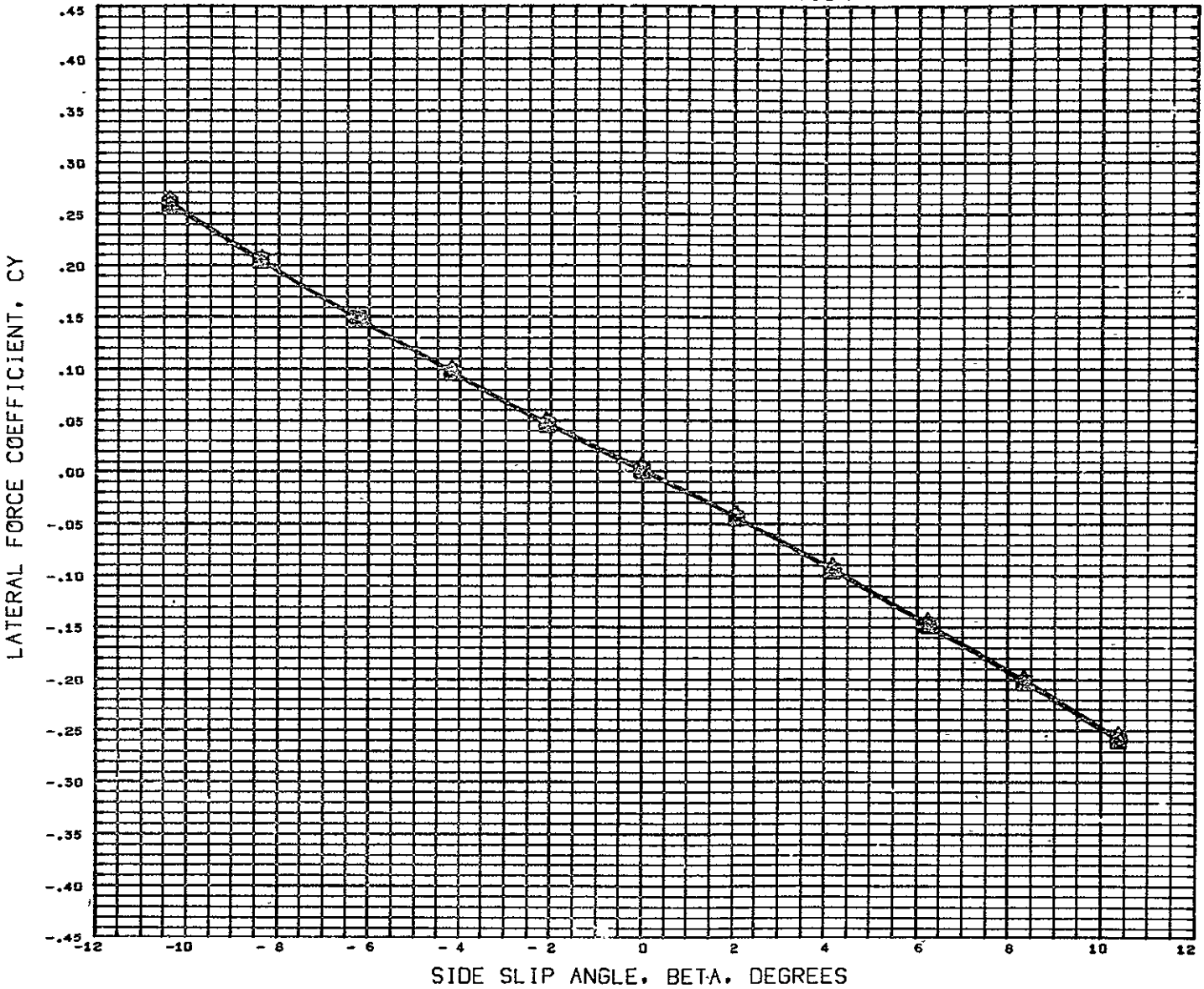
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	◇	MSFC439 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

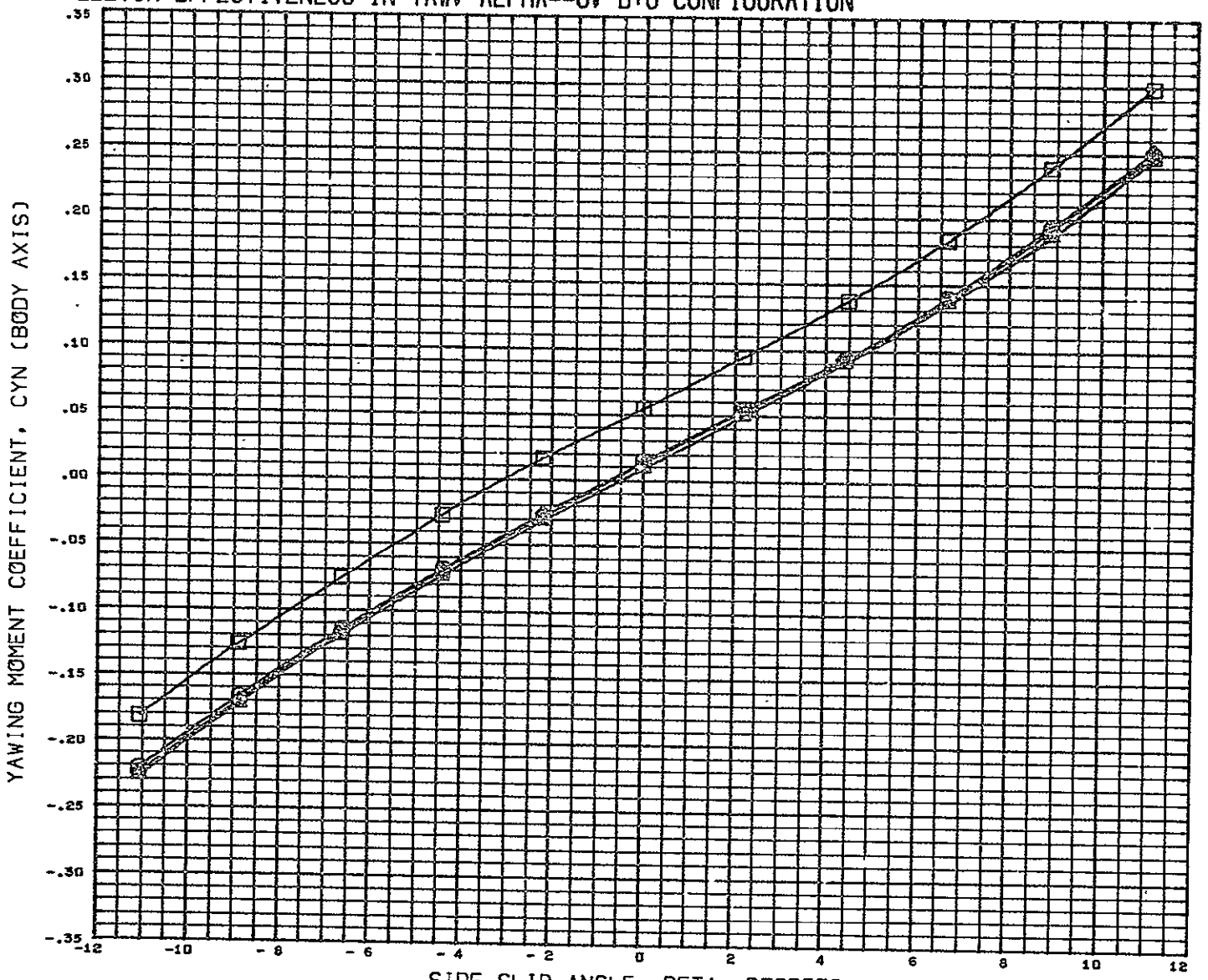


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	0.000
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.450	-5.000	15.000	0.000
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.470	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0090	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



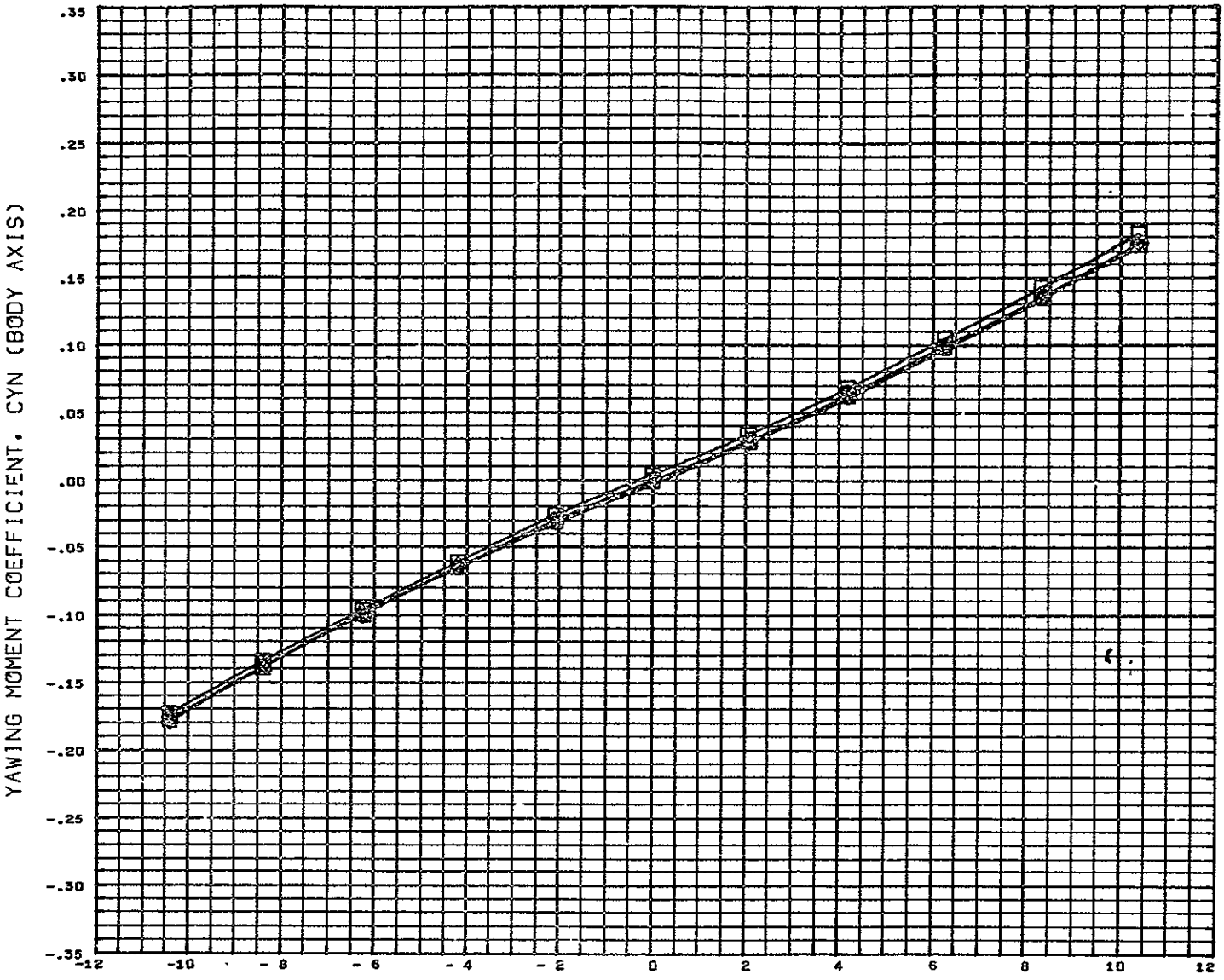
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.479	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



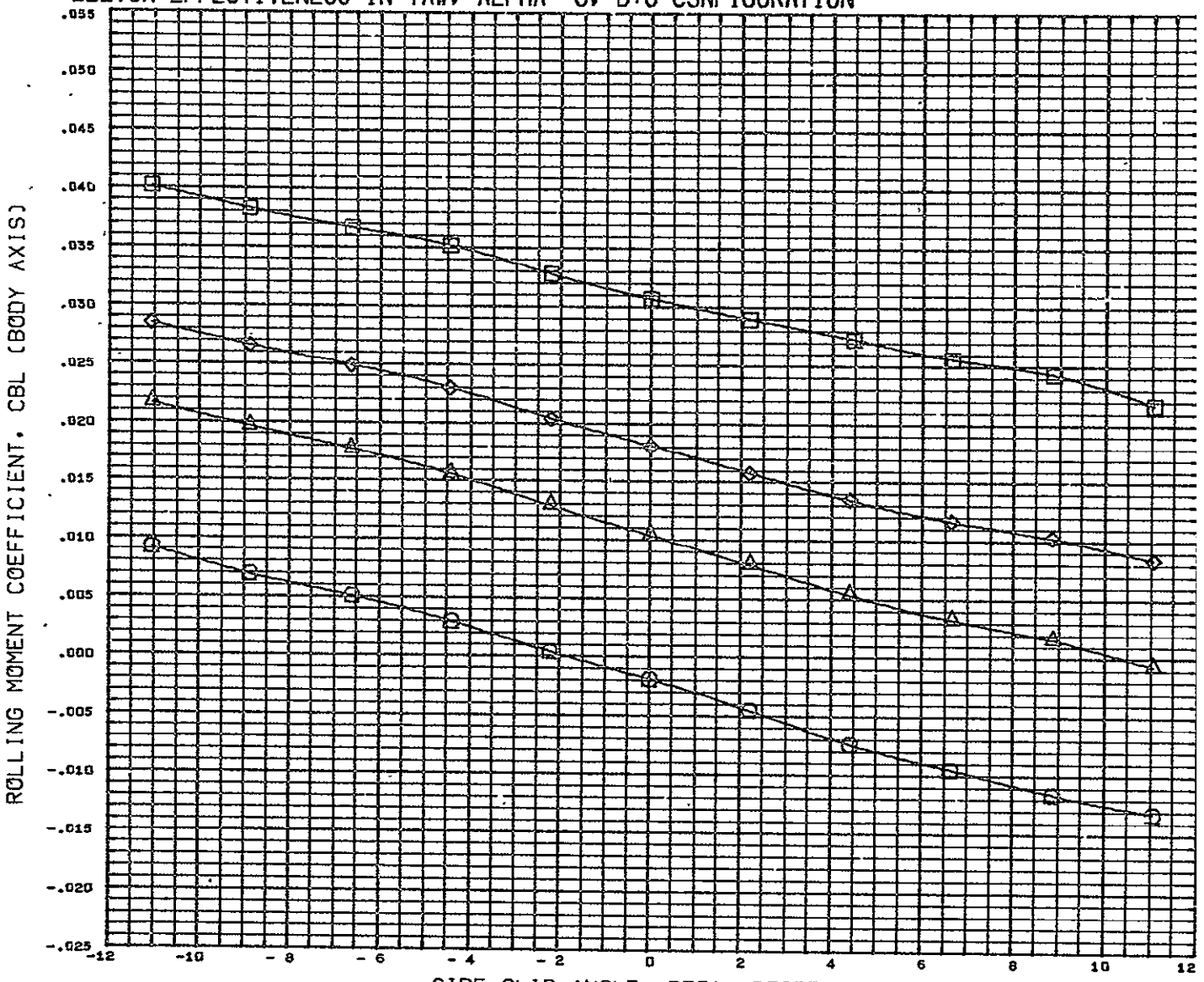
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



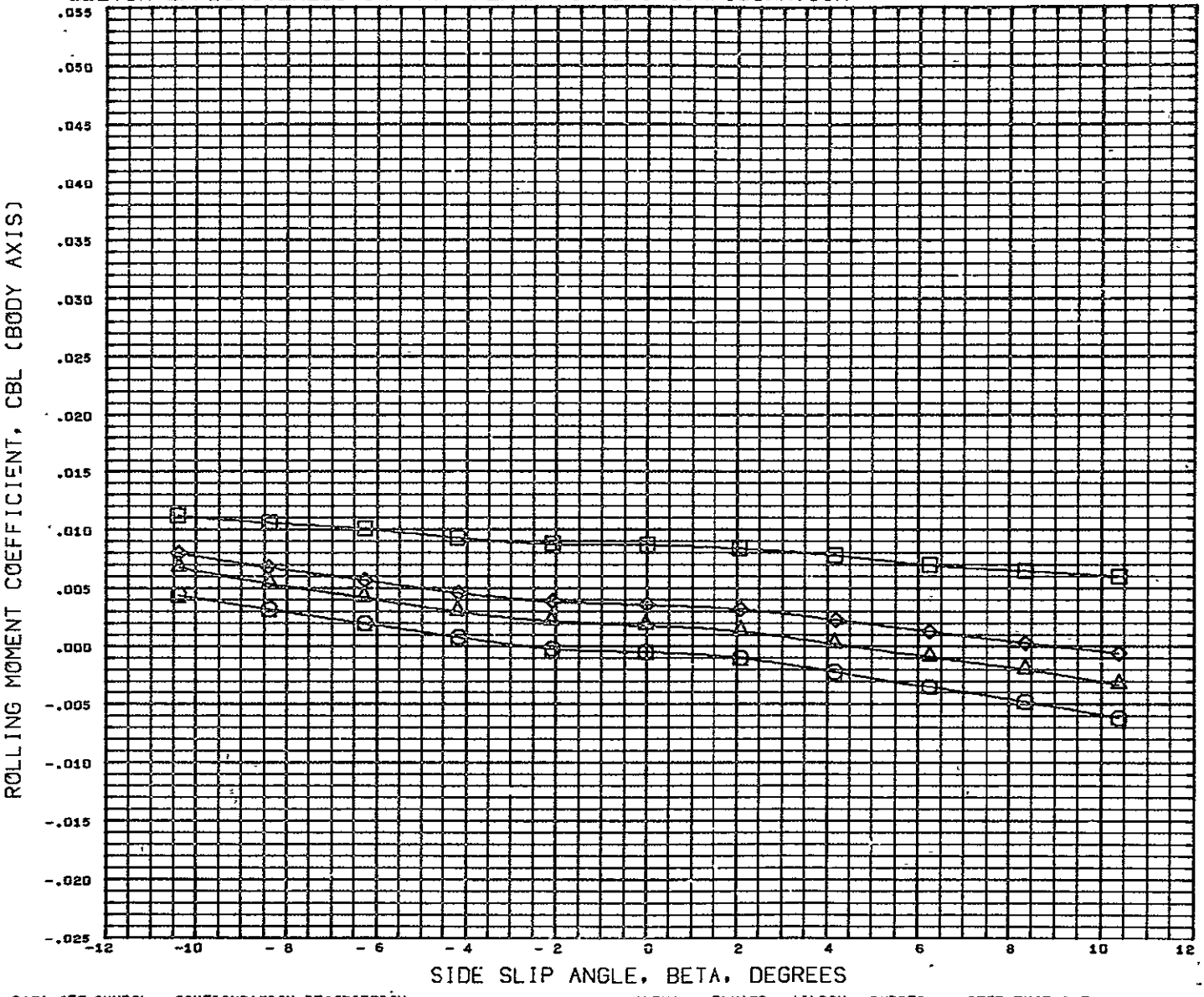
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C31048)	NSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B31058)	NSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B31068)	NSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B31078)	NSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

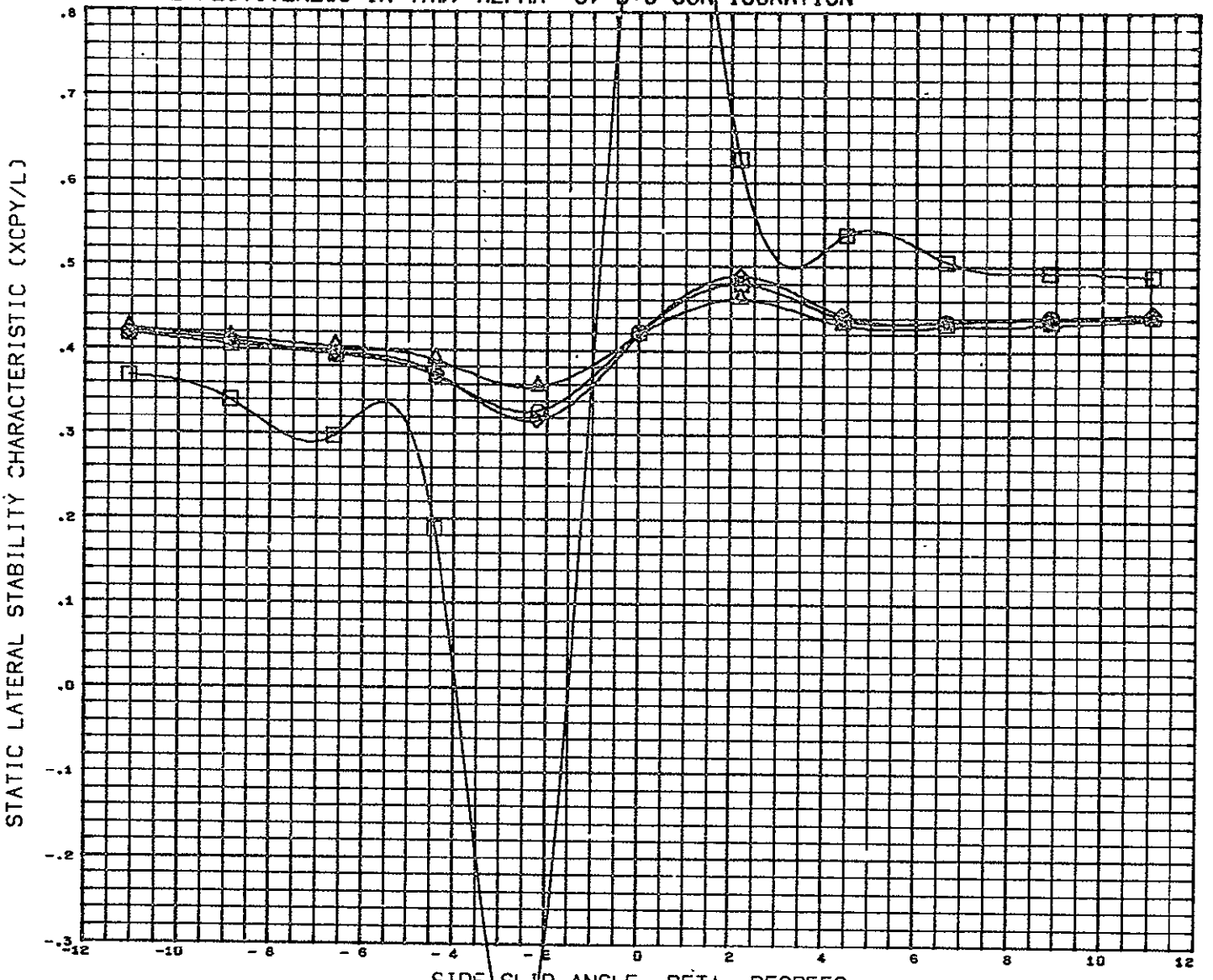


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	0.000
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.450	-5.000	15.000	0.000
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.470	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B4U CONFIGURATION



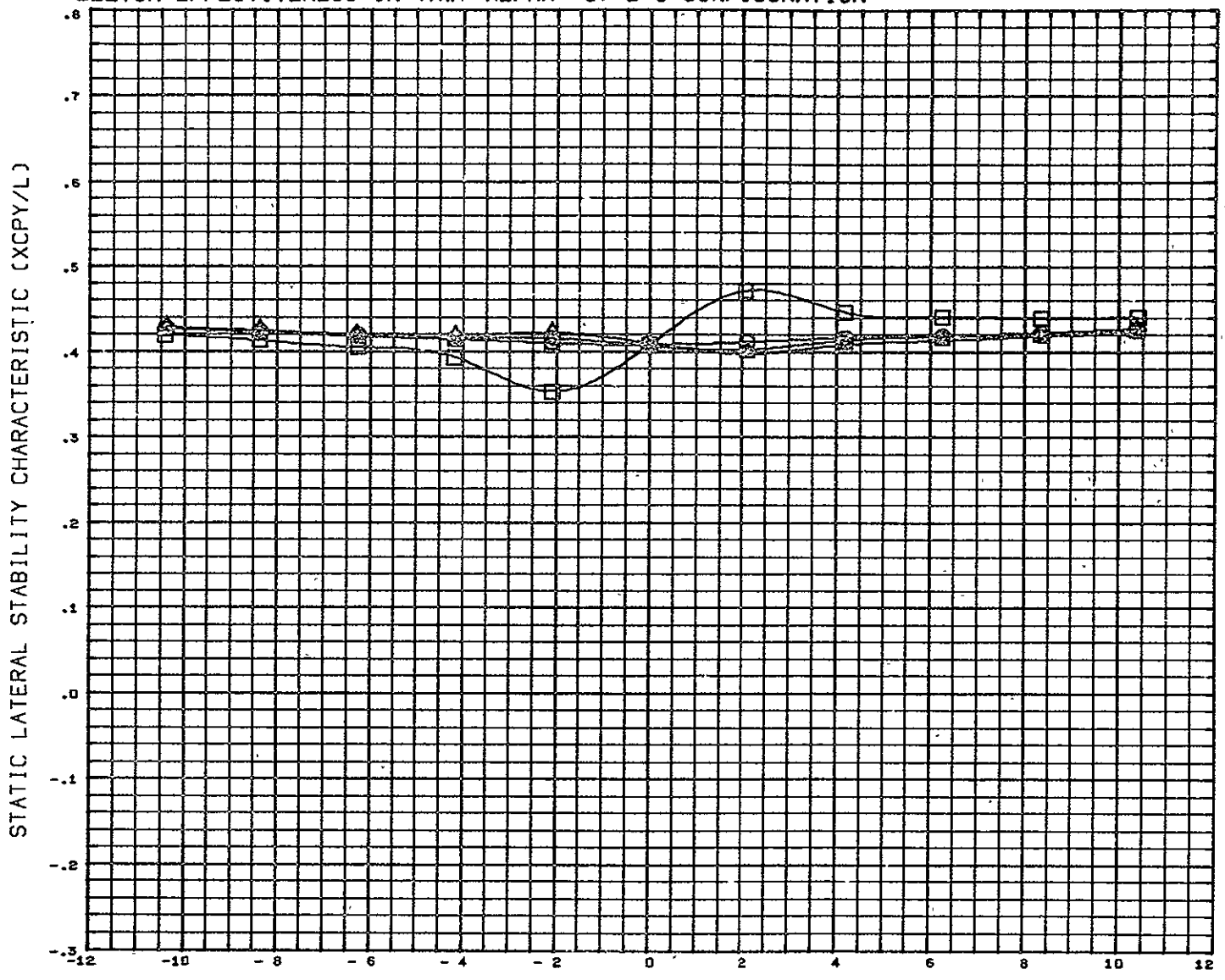
DATA SET SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3105B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3106B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3107B)	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	10.000	0.000
-6.450	-5.000	15.000	0.000
-6.470	-15.000	25.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0650	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

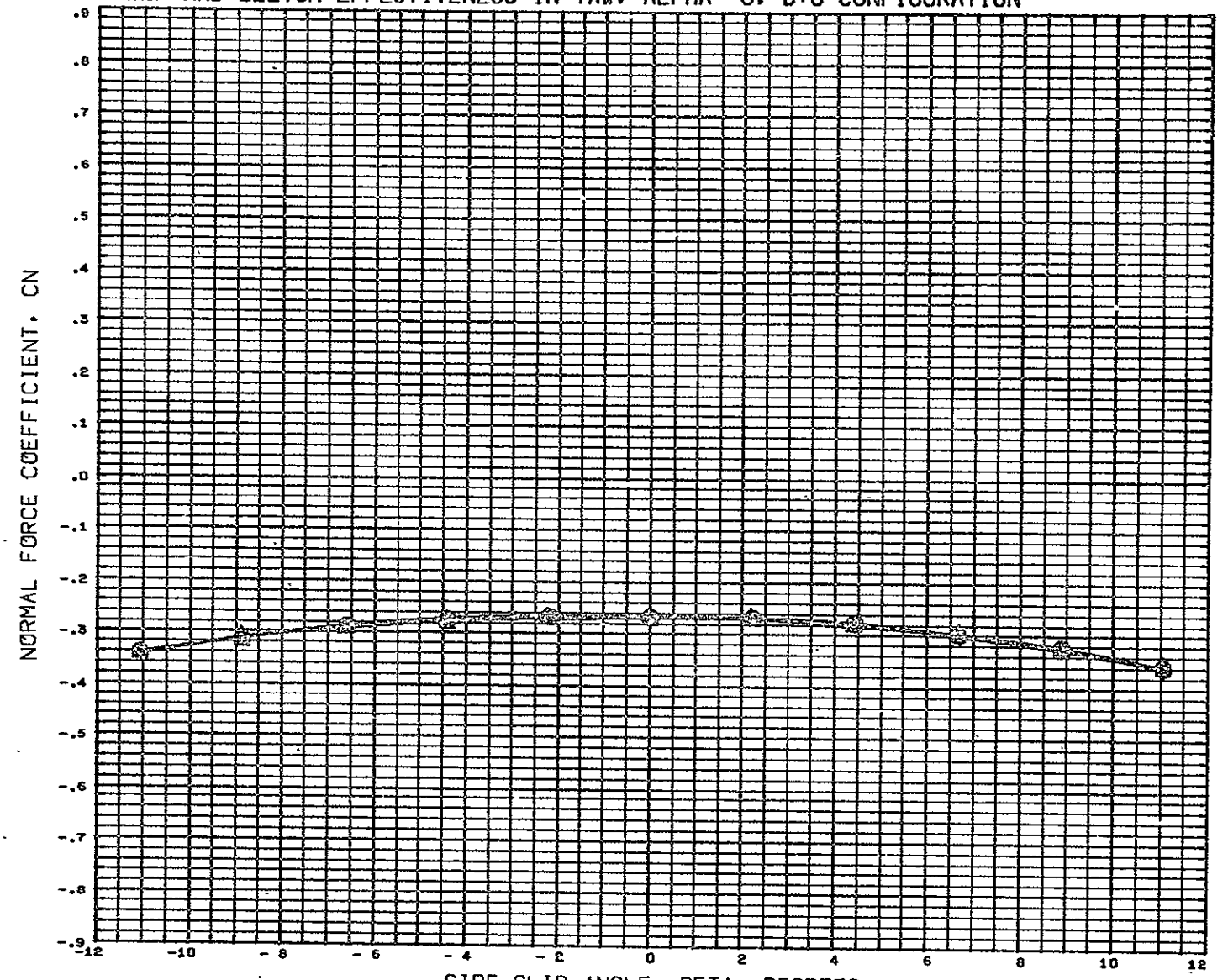


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3105B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	0.000
(B3106B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.450	-5.000	15.000	0.000
(B3107B)	□	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.470	-15.000	25.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0939	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

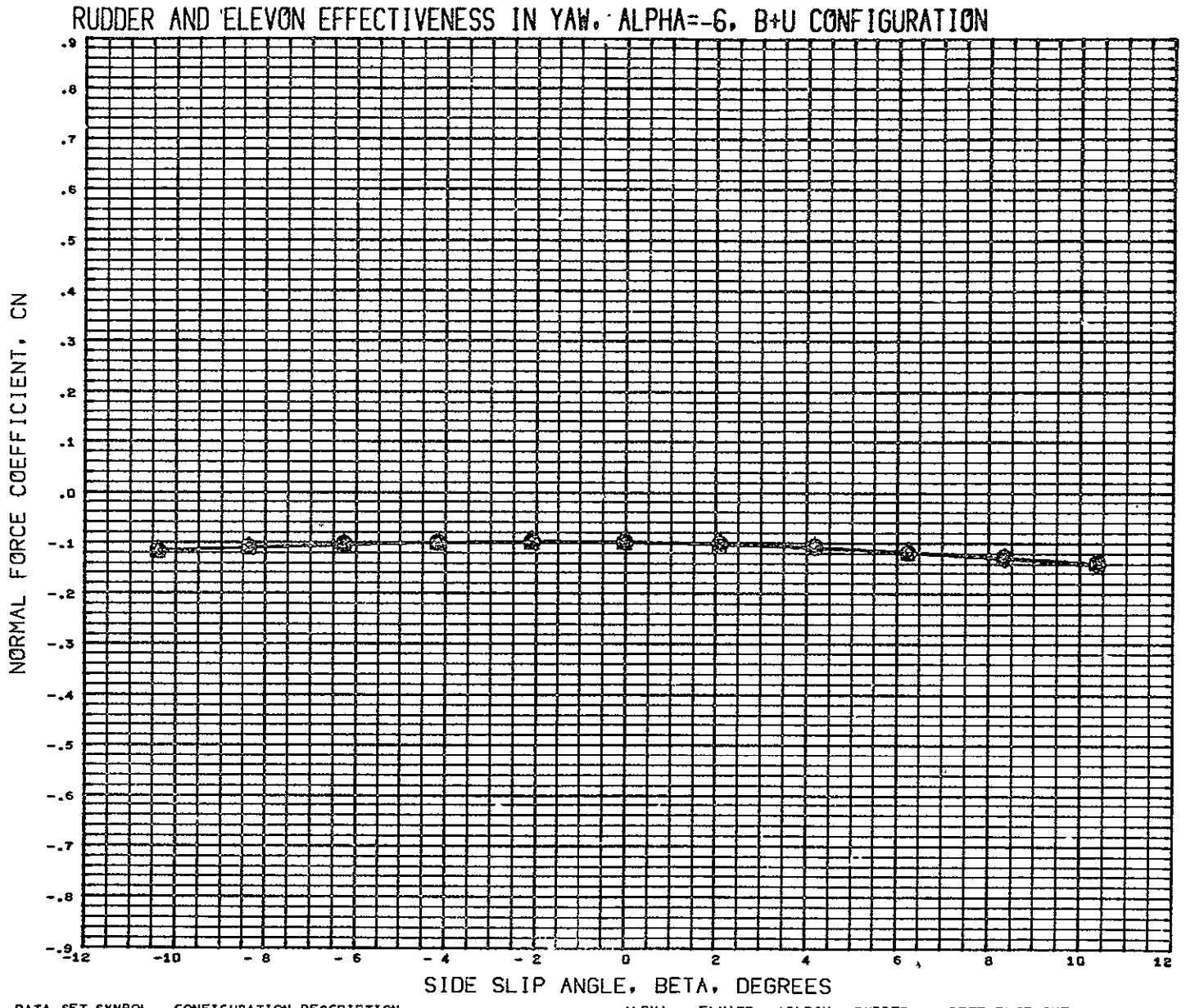


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0000	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

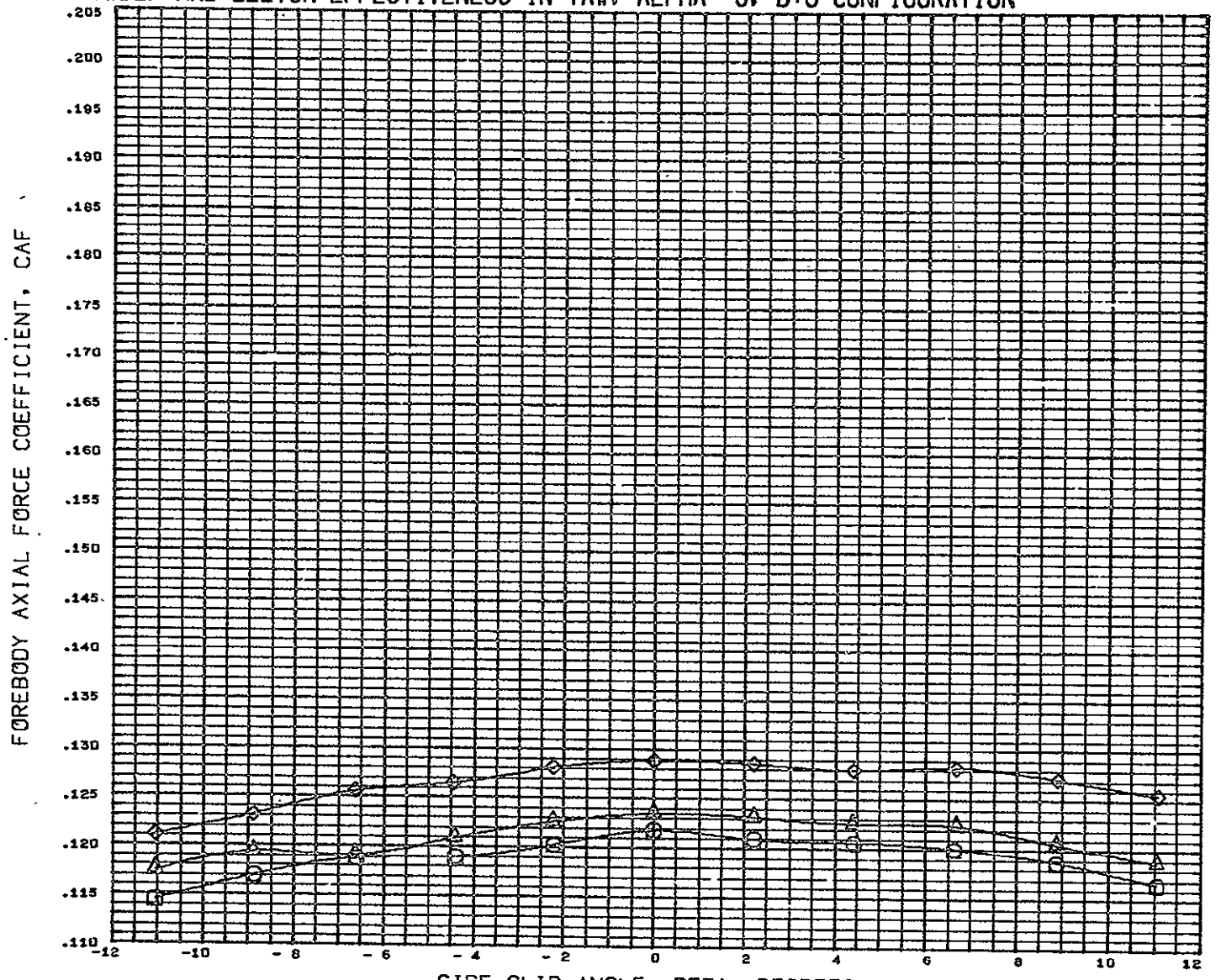


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	0.000	10.000
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	10.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



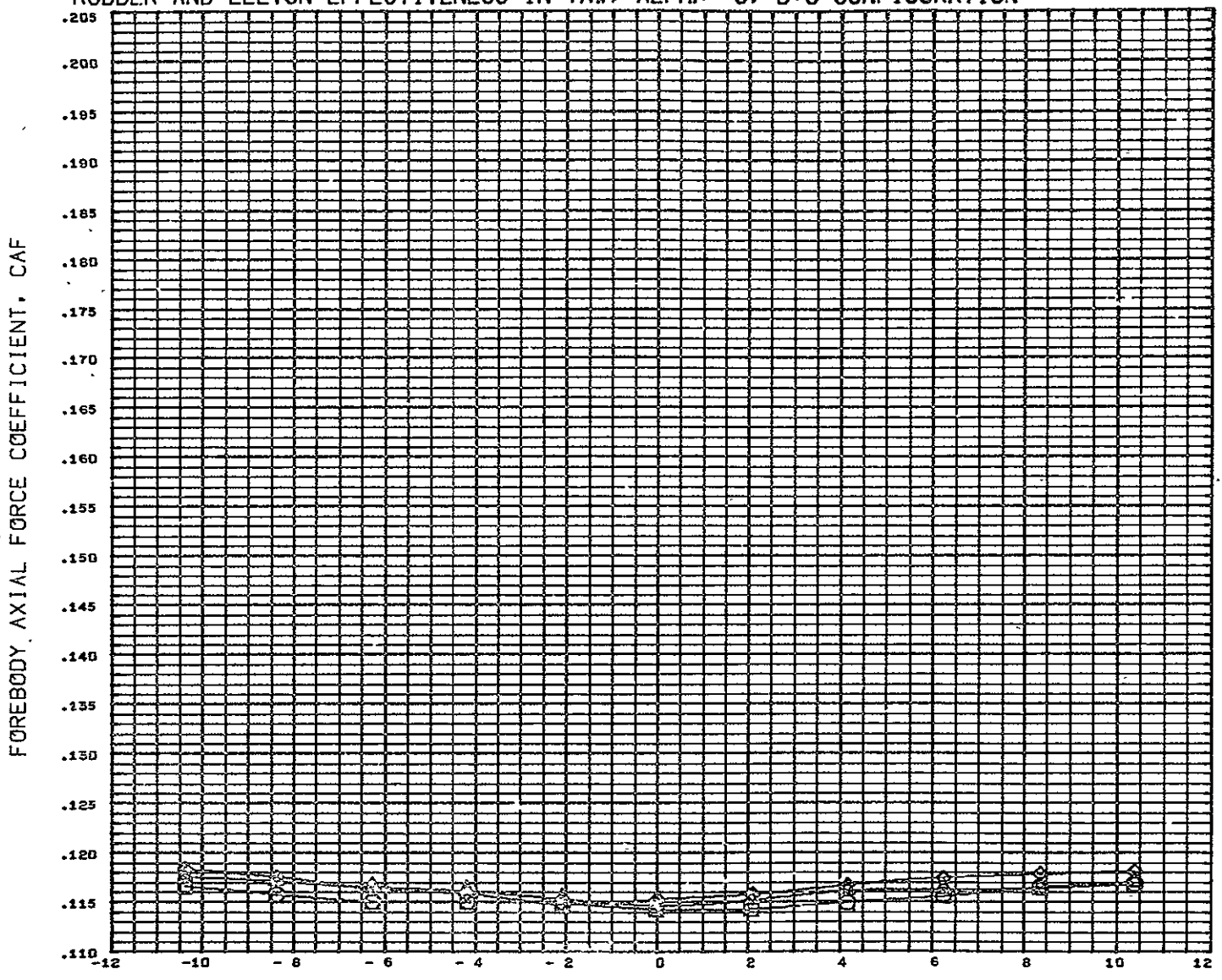
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

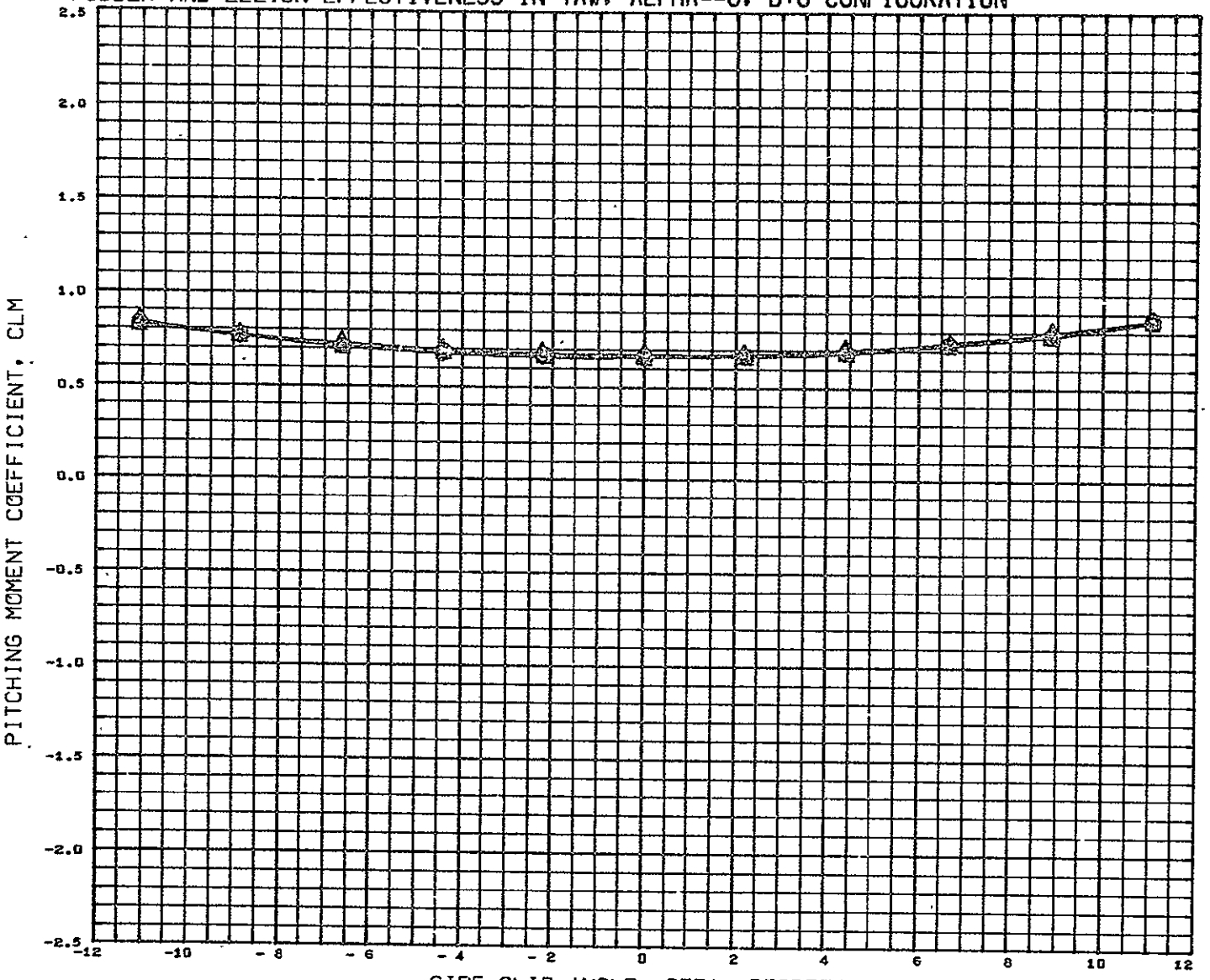


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	0.000	10.000
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6563	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



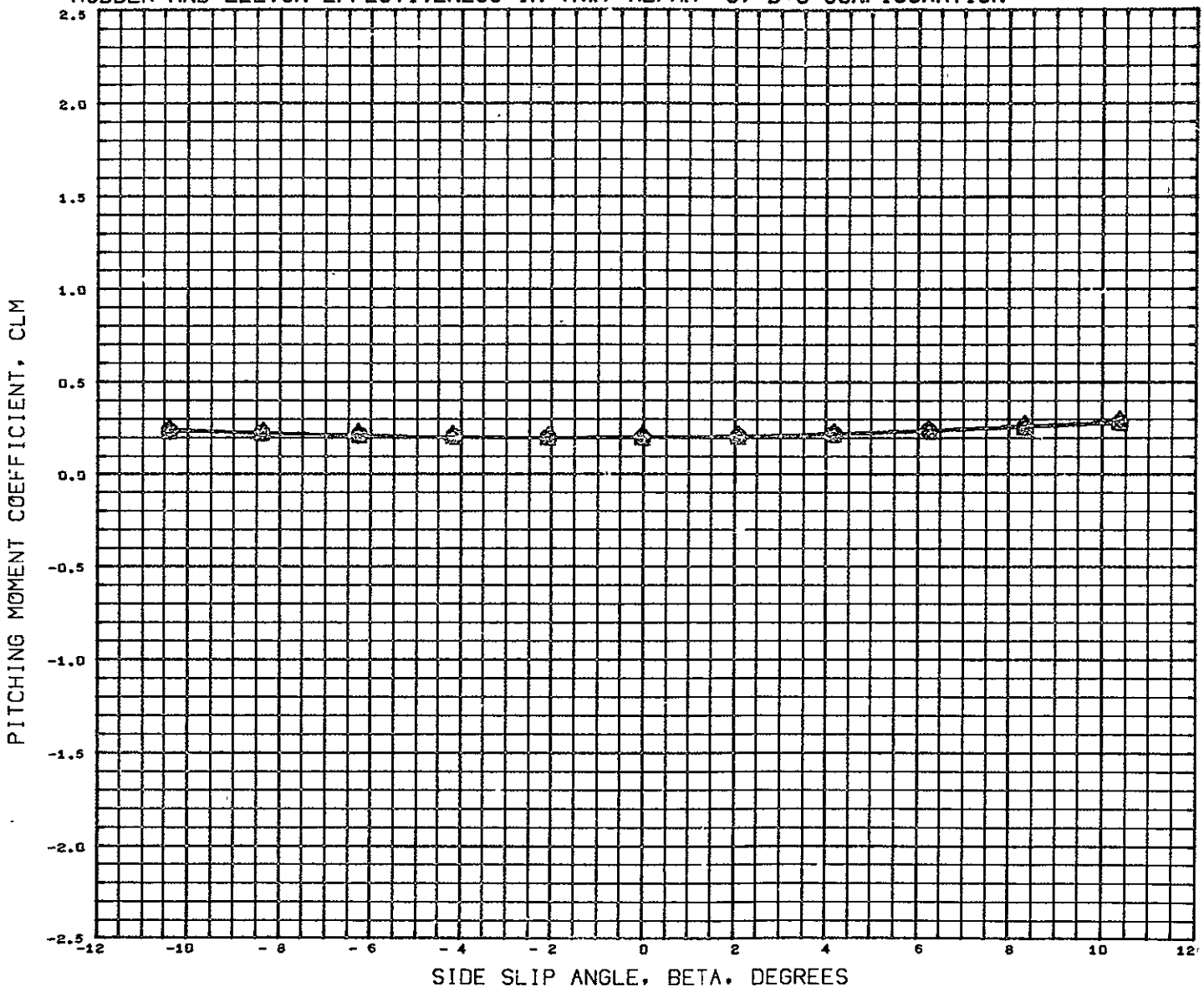
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

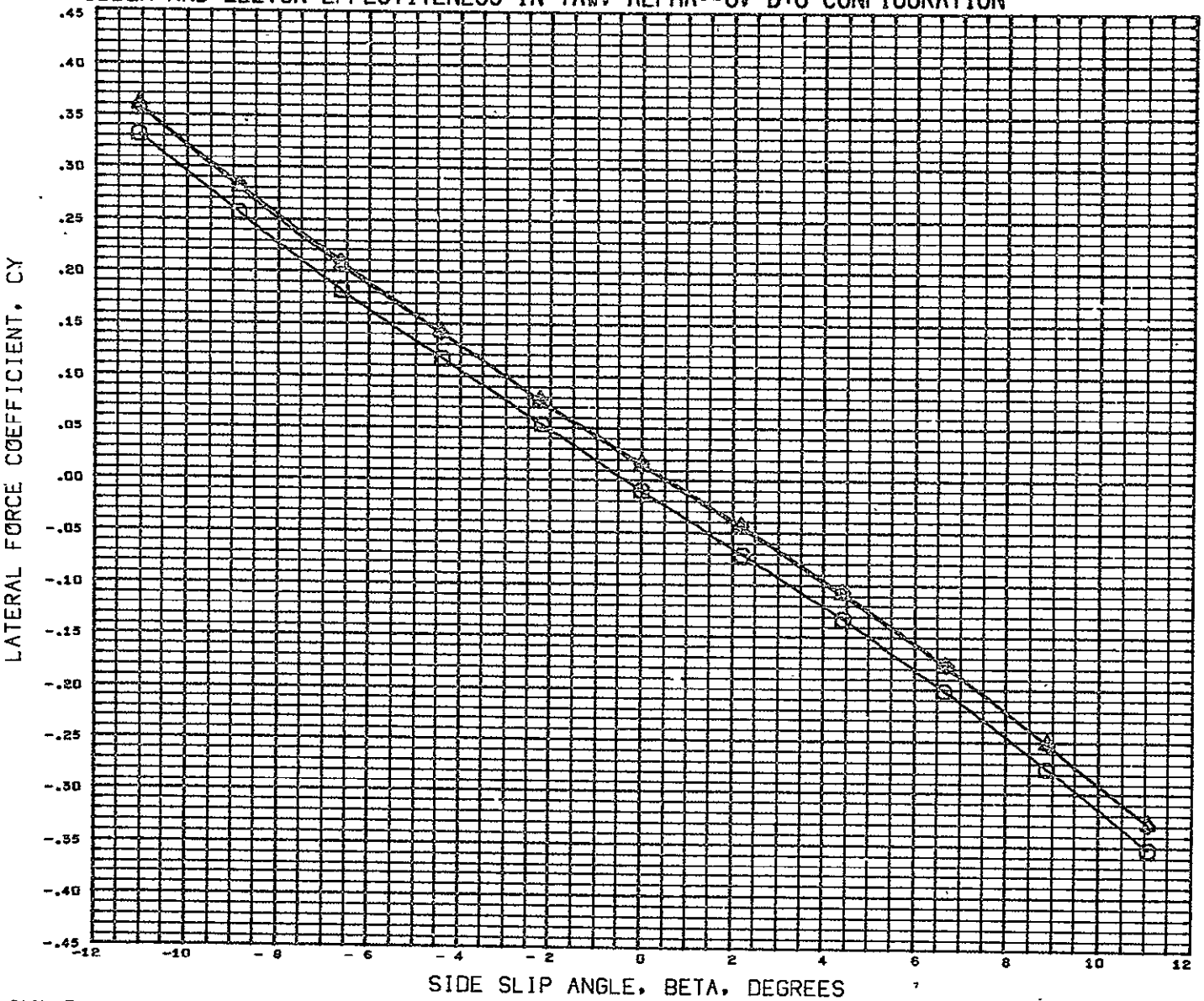


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3108B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	0.000	10.000
(B3109B)		MSFC489 NR/GD ESS LAUNCH B19W14C4A/7+U	-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.6350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



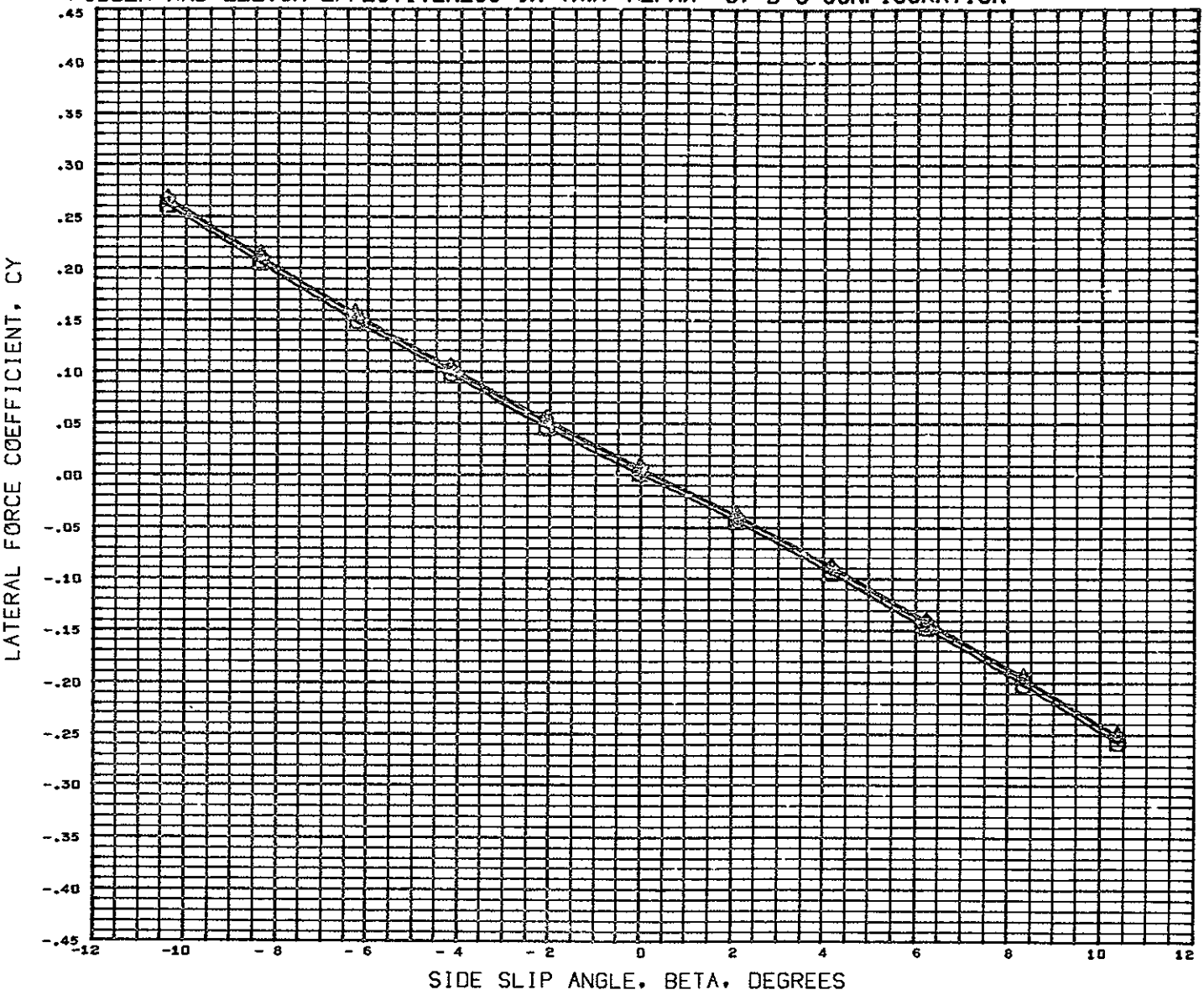
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

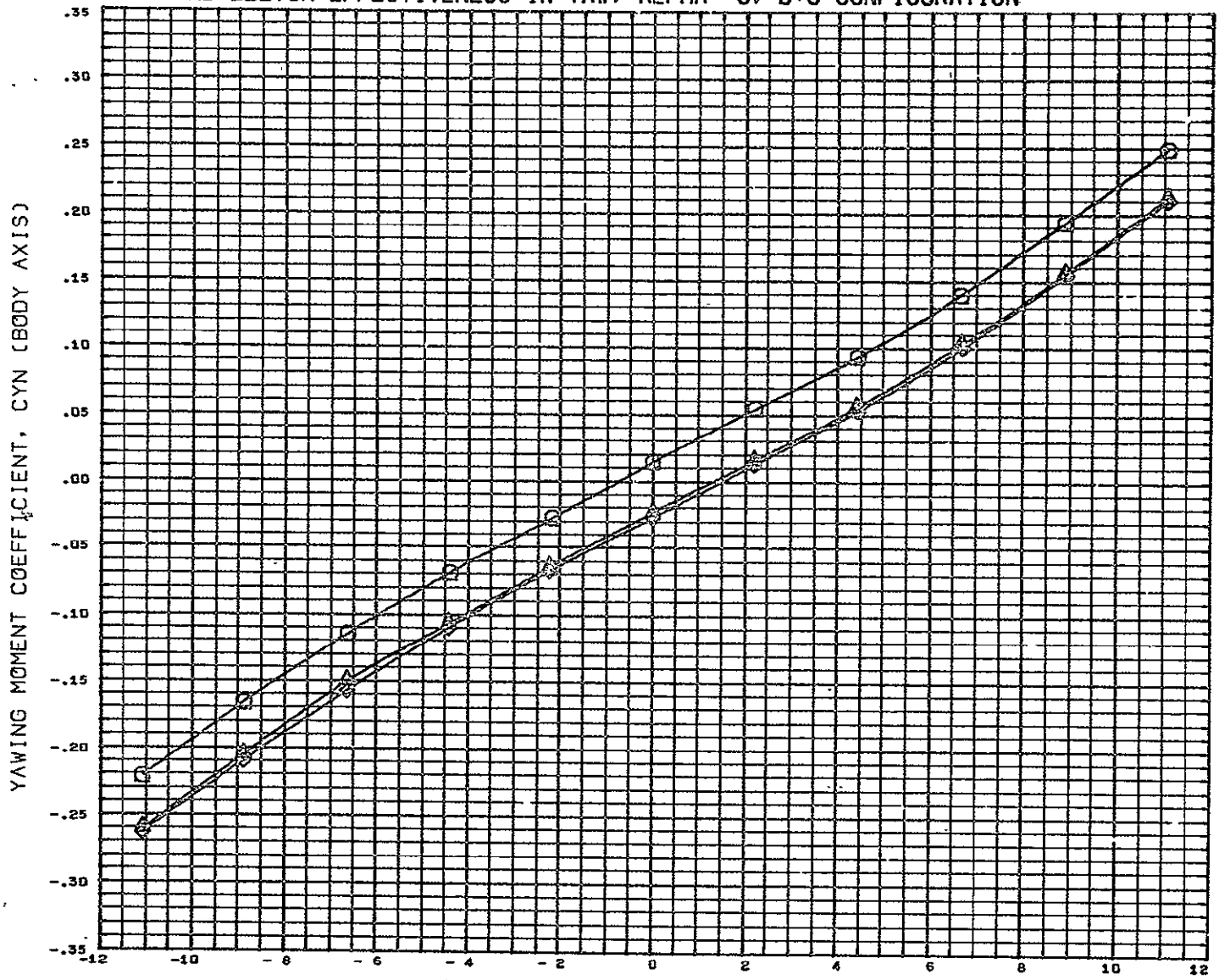


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	0.000	10.000
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	10.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



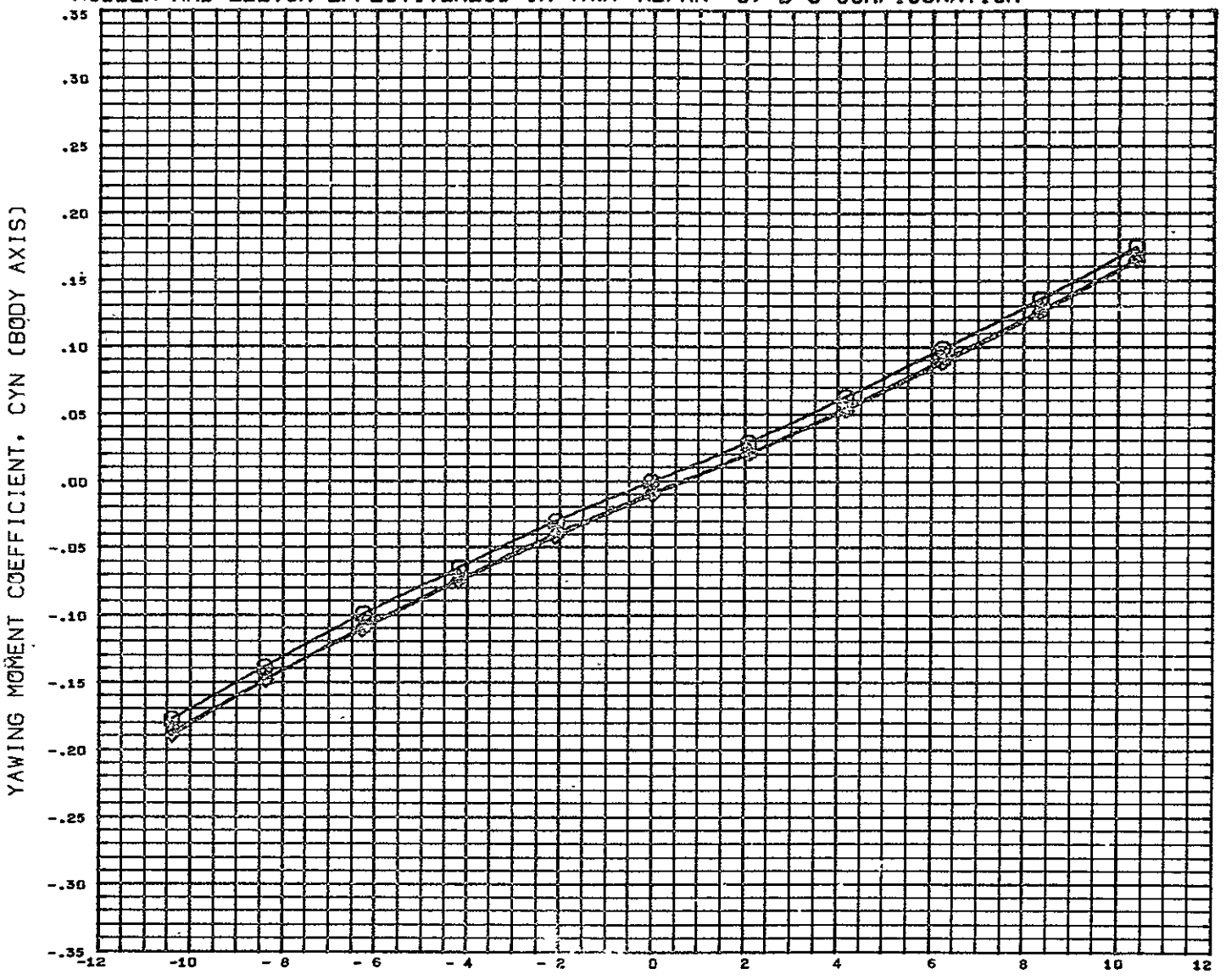
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

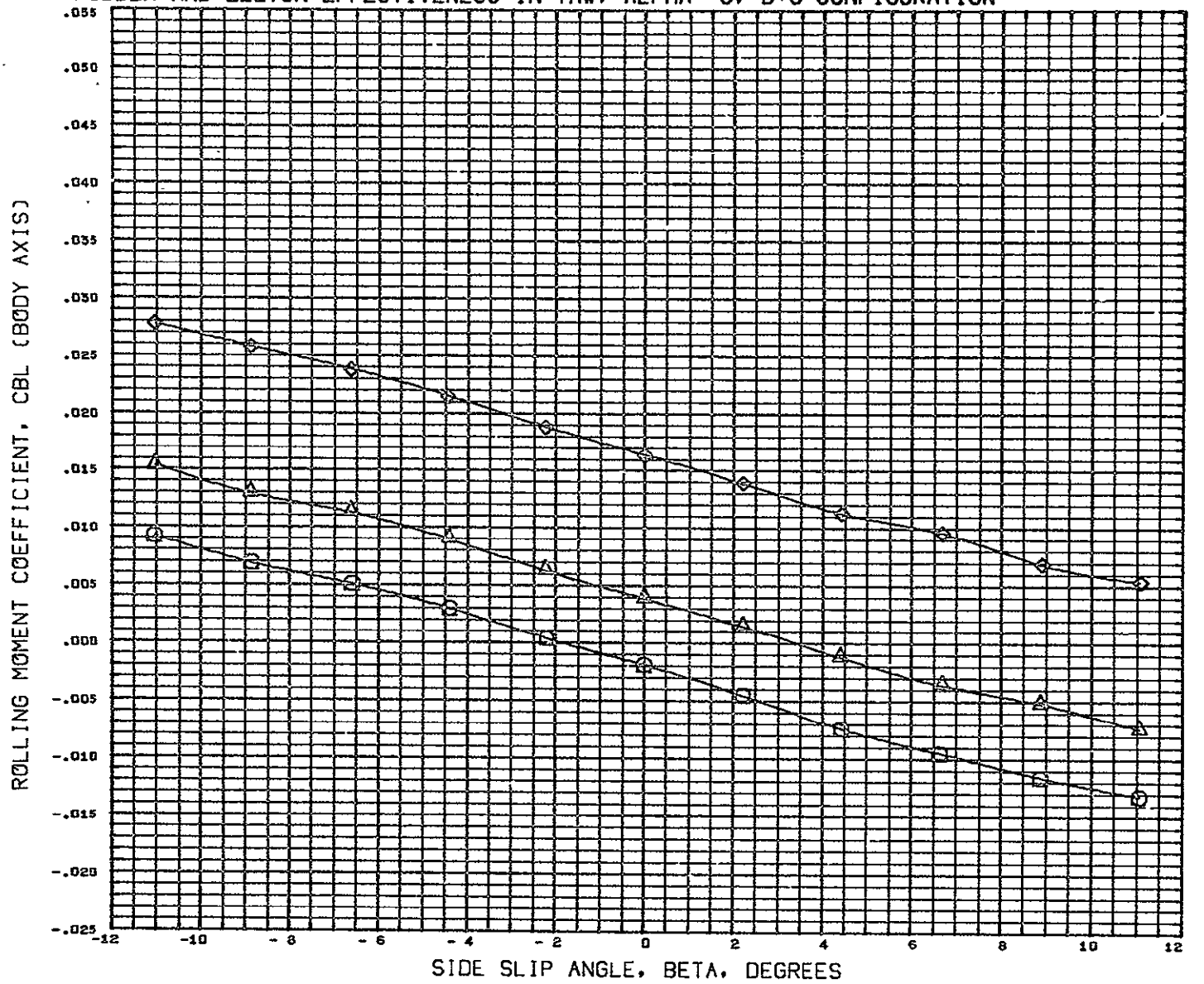


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	0.000	10.000
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	10.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



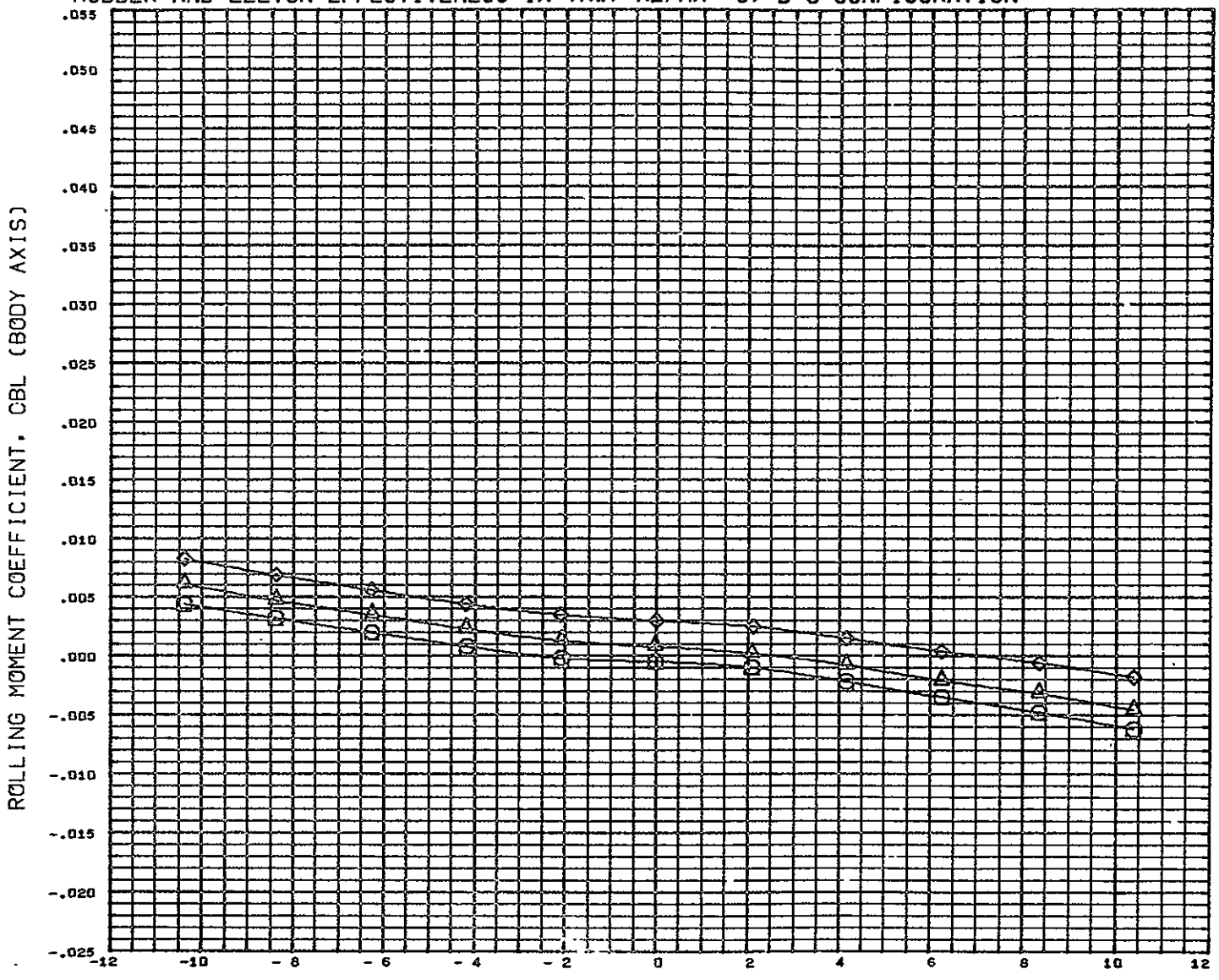
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.656C	SQ IN
LREF	3.09.9	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION

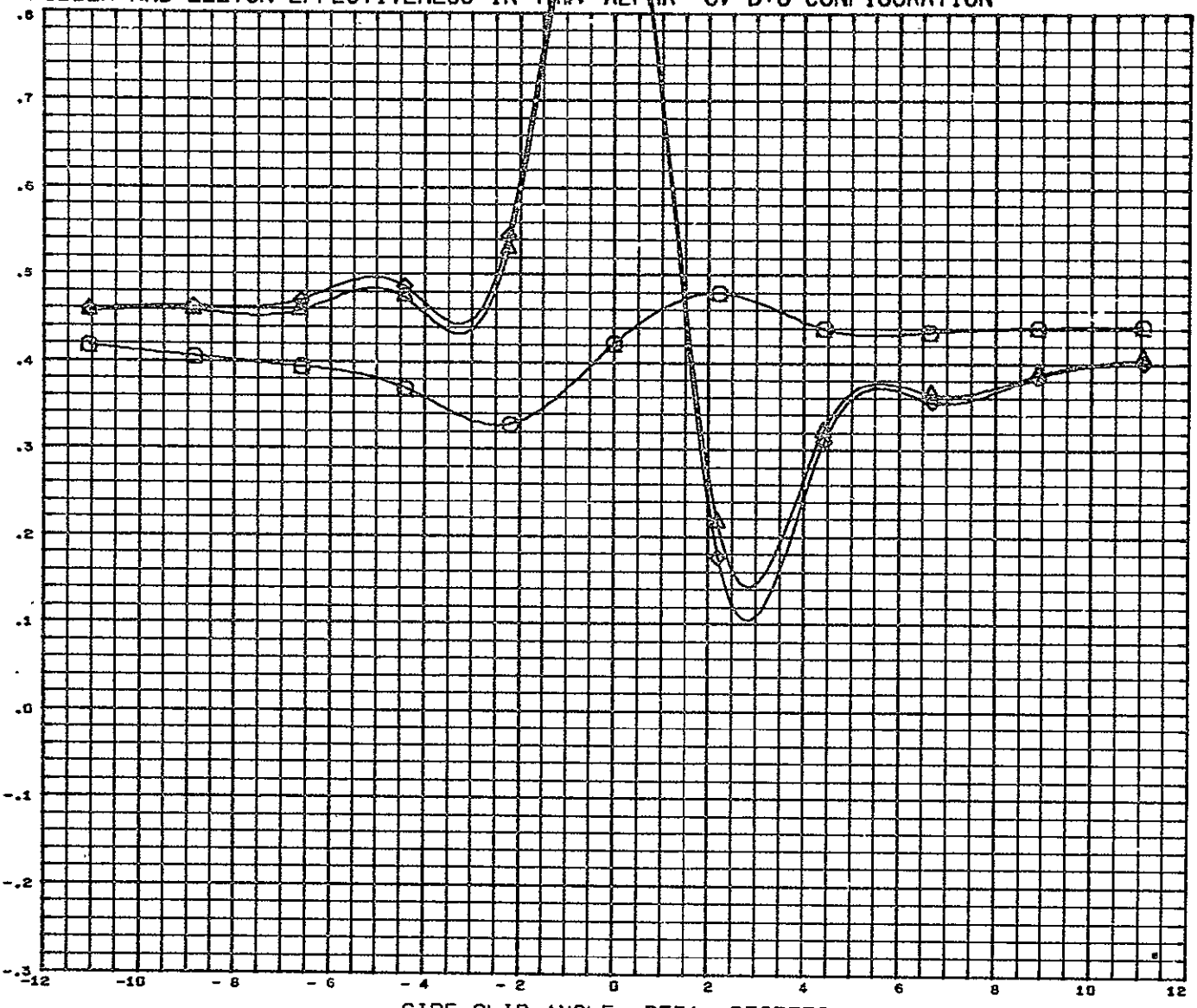


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(83108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	0.000	10.000
(83109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



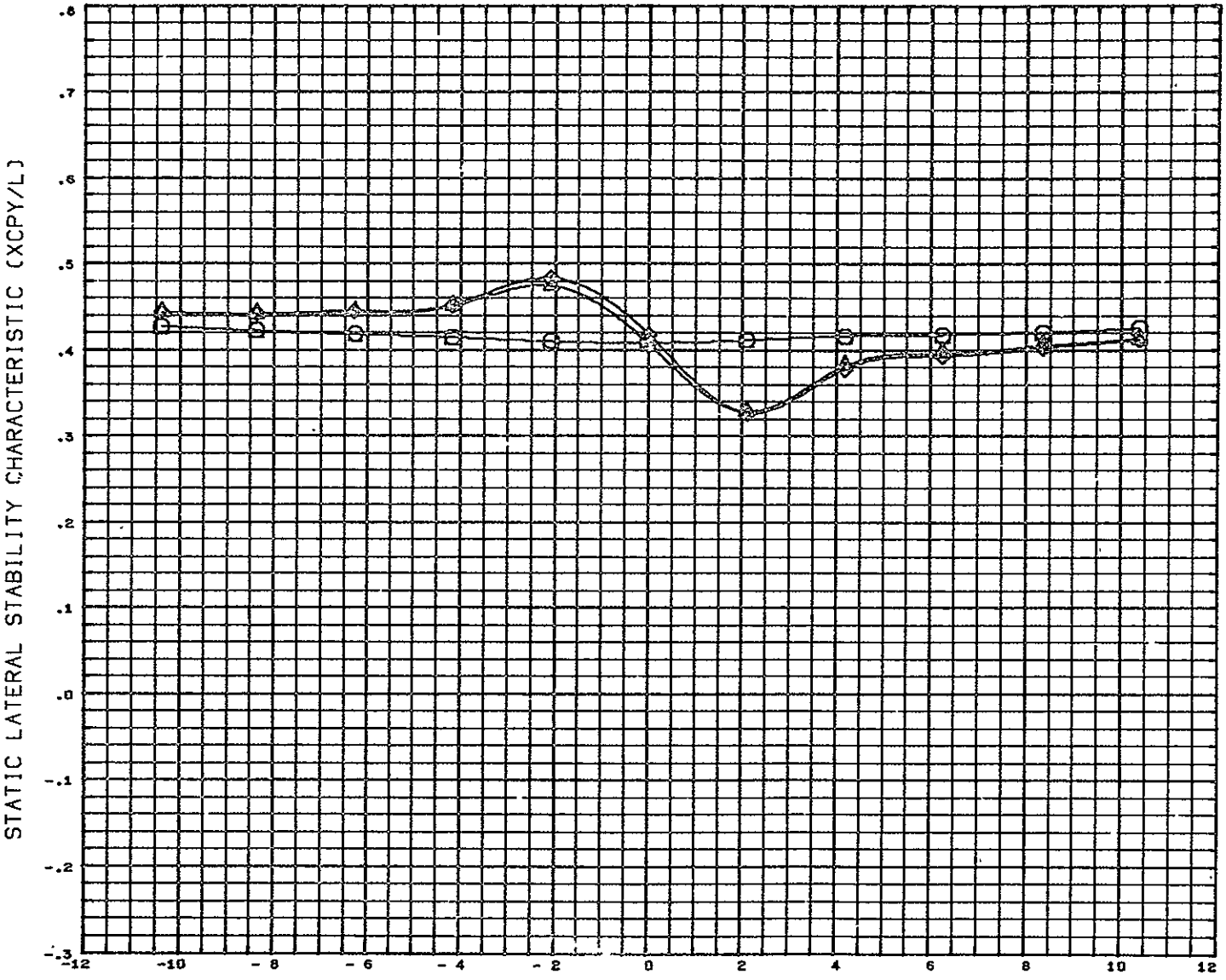
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

RUDDER AND ELEVON EFFECTIVENESS IN YAW, ALPHA=-6, B+U CONFIGURATION



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3108B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3109B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.440	0.000	0.000	10.000
-6.440	0.000	10.000	10.000

REFERENCE INFORMATION		
SREF	15.6564	SQ IN
LREF	3.0960	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
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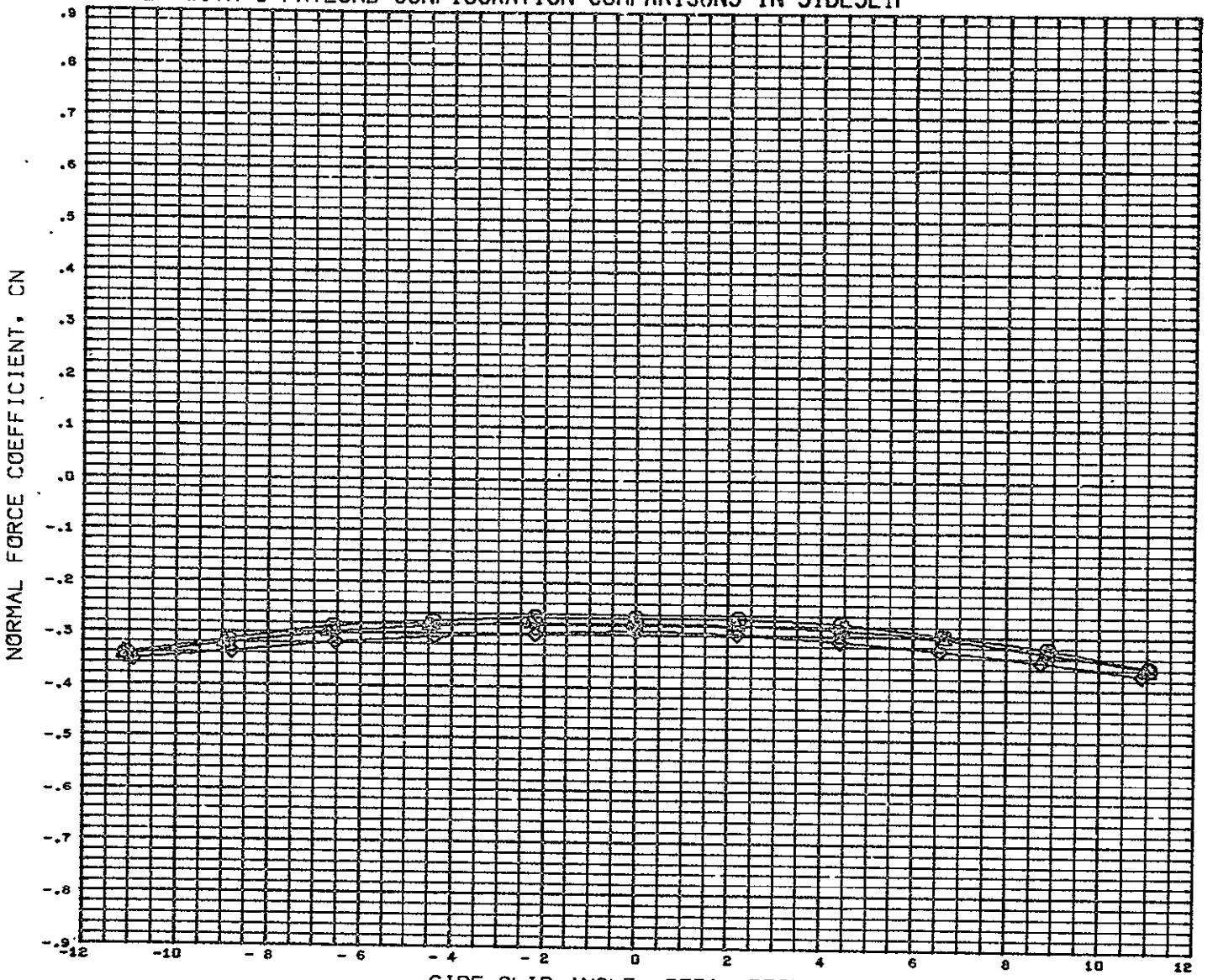
SCALE	0.0031	SCALE

MACH 2.990

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	□	MSFC469 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3115B)	△	MSFC469 NR/GD ESS LAUNCH B19W14C4AV7+U2
(B3119B)	◇	MSFC469 NR/GD ESS LAUNCH B19W14C4AV7+U3

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.490	0.000	0.000	0.000
-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6566	SQ IN
LREF	3.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
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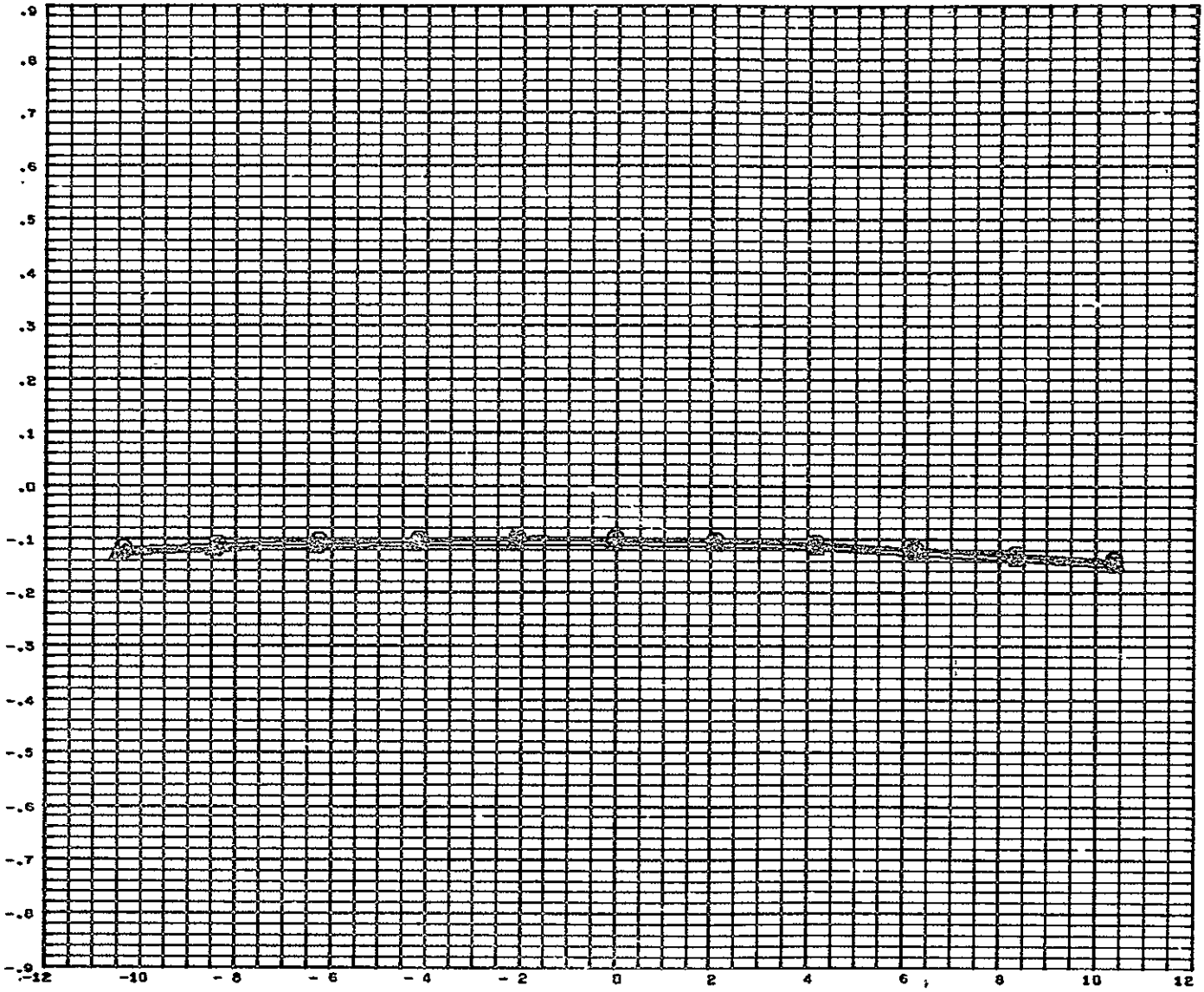
SCALE	0.0031	SCALE

MACH 1.197

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRF	0.0000	
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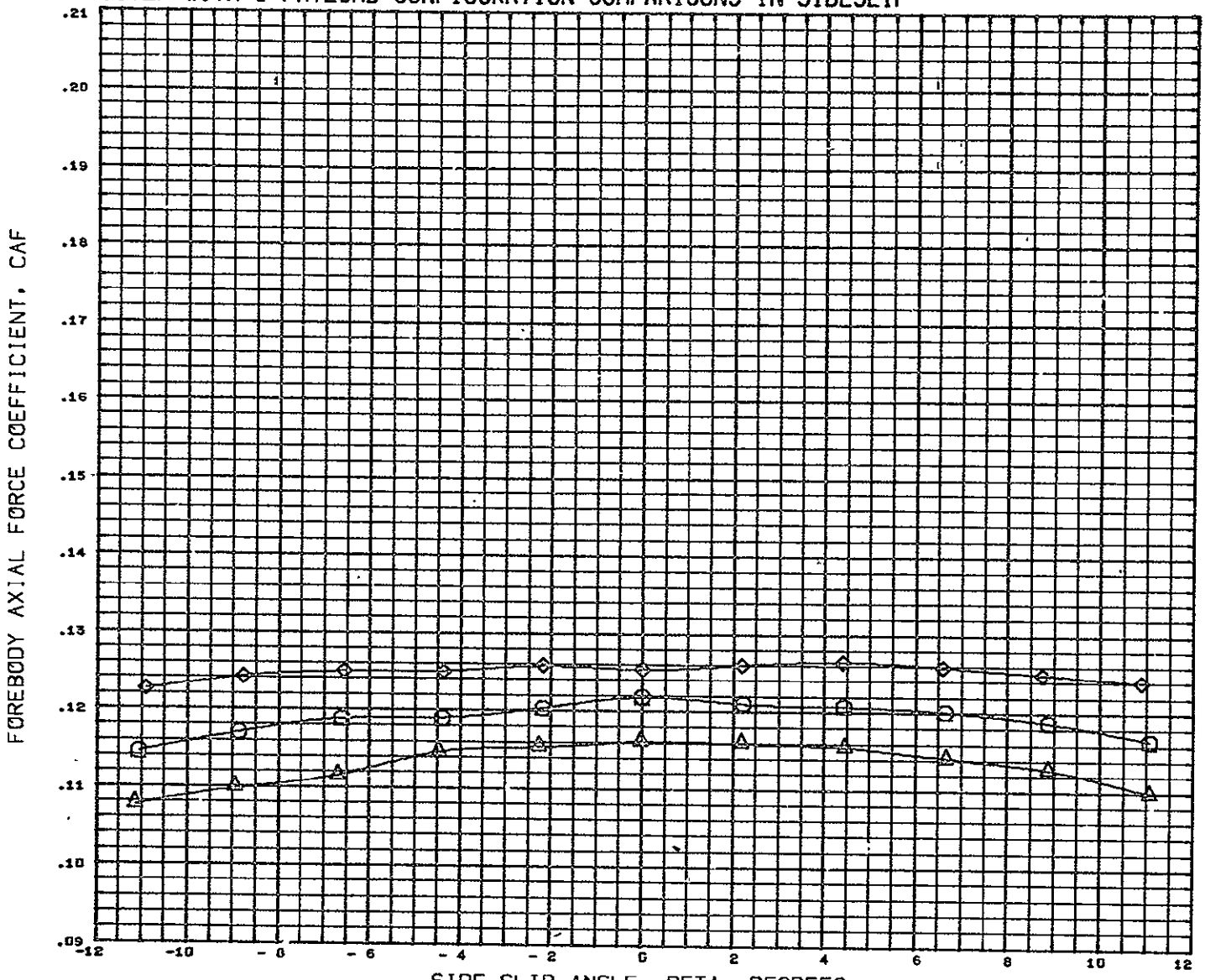
SCALE	0.0031	SCALE

MACH 2.990

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.490	0.000	0.000	0.000
-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
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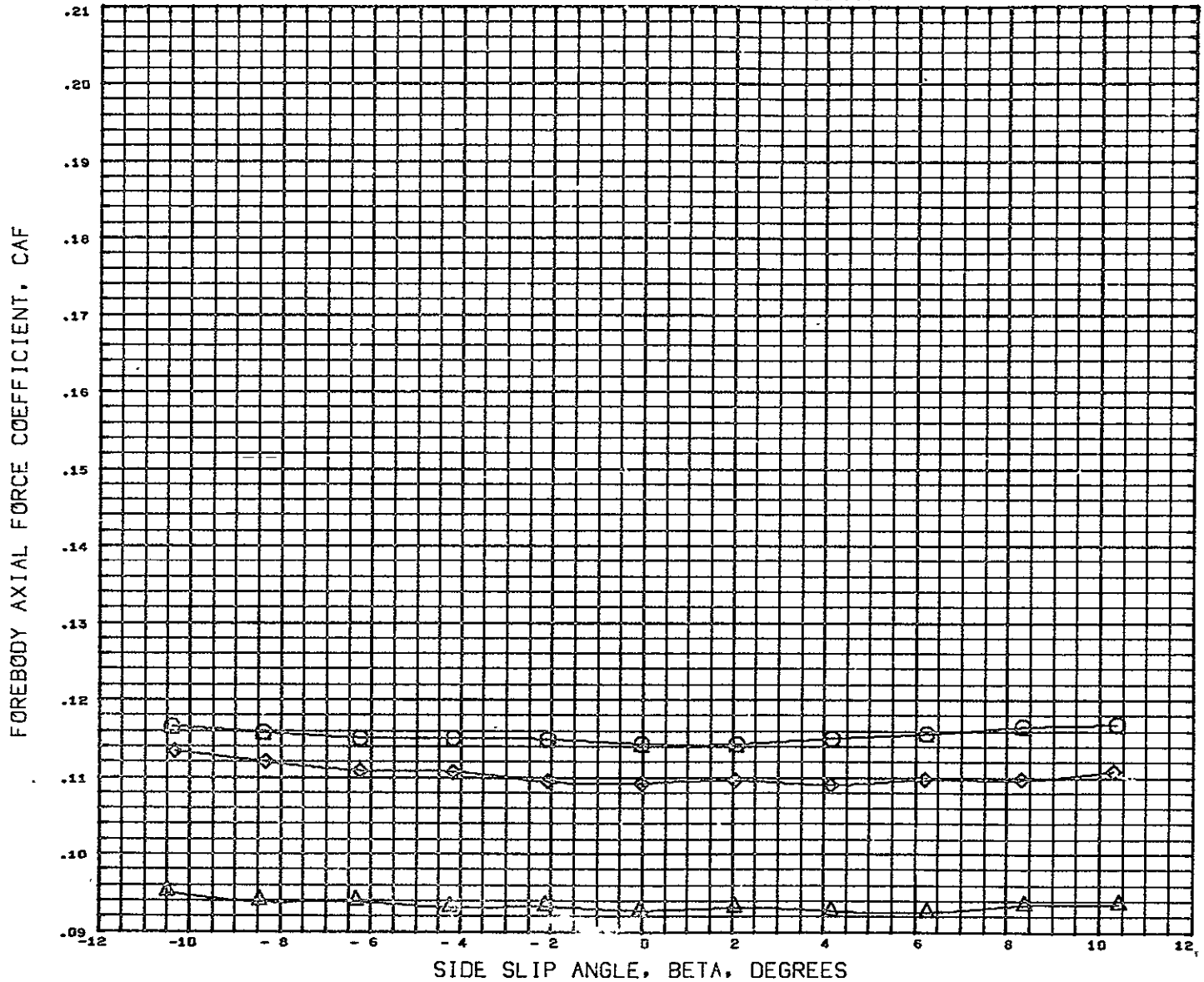
SCALE	0.0031	SCALE

MACH 1.197

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP

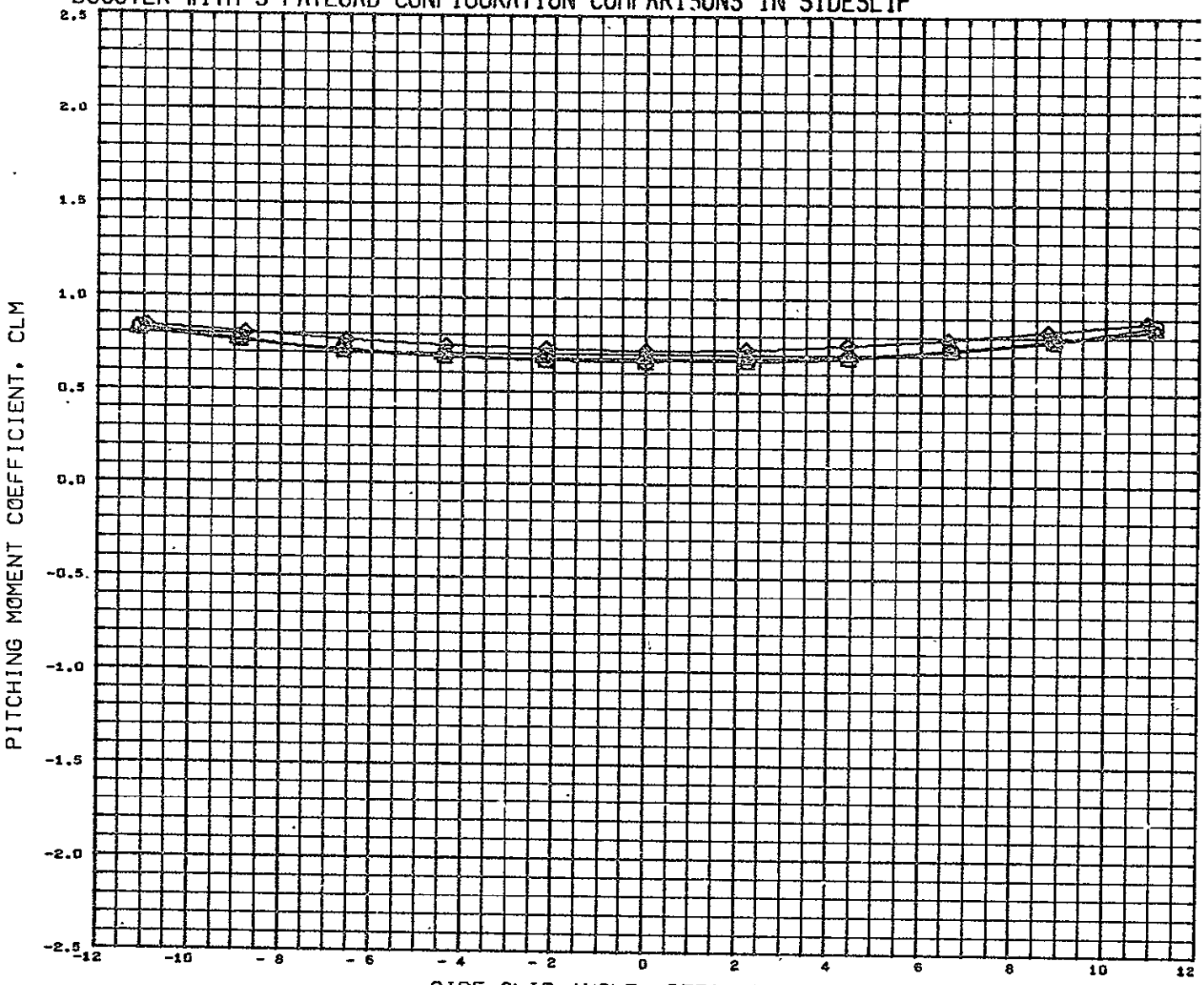


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.480	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.490	0.000	0.000	0.000
-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0350	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

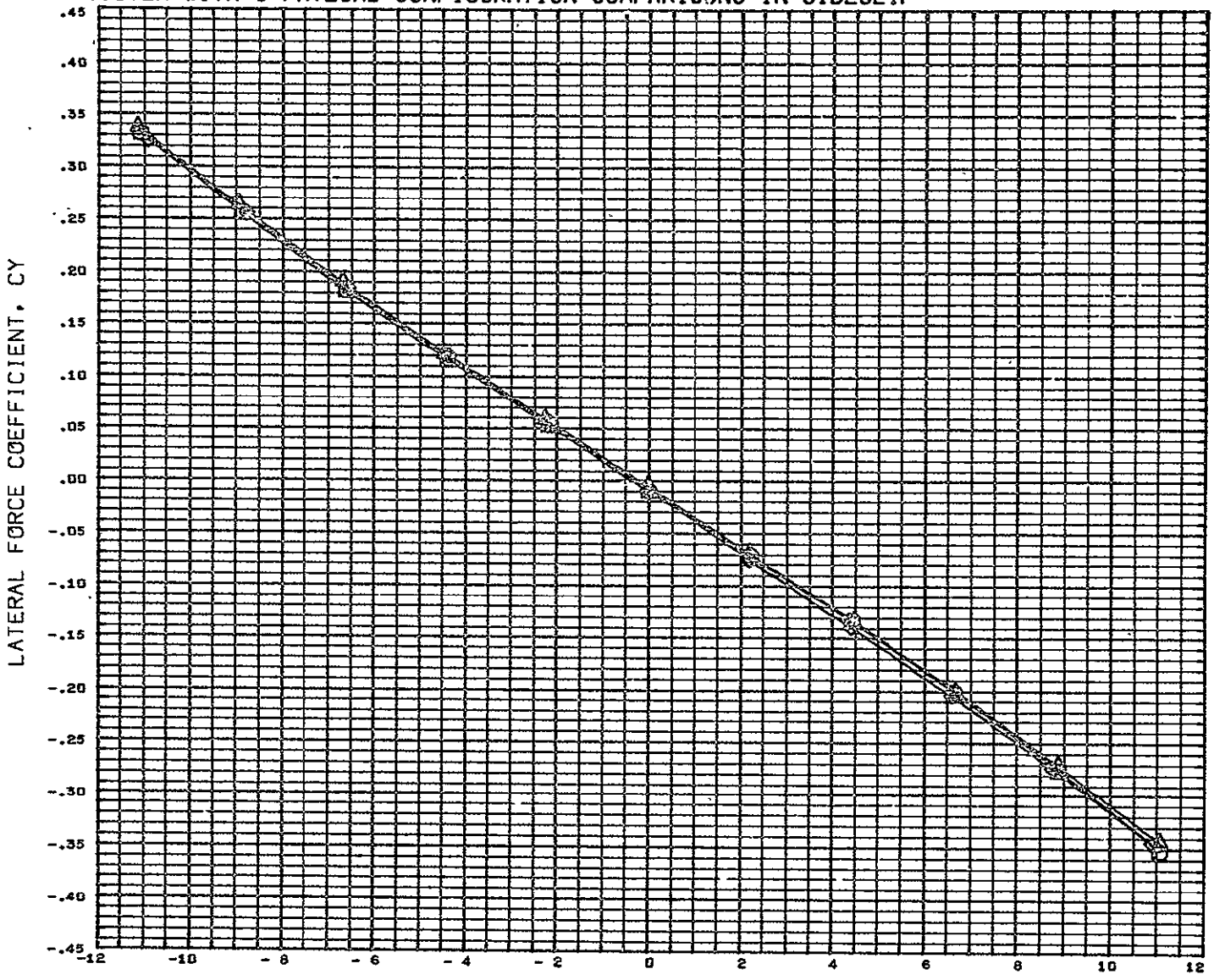
BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP

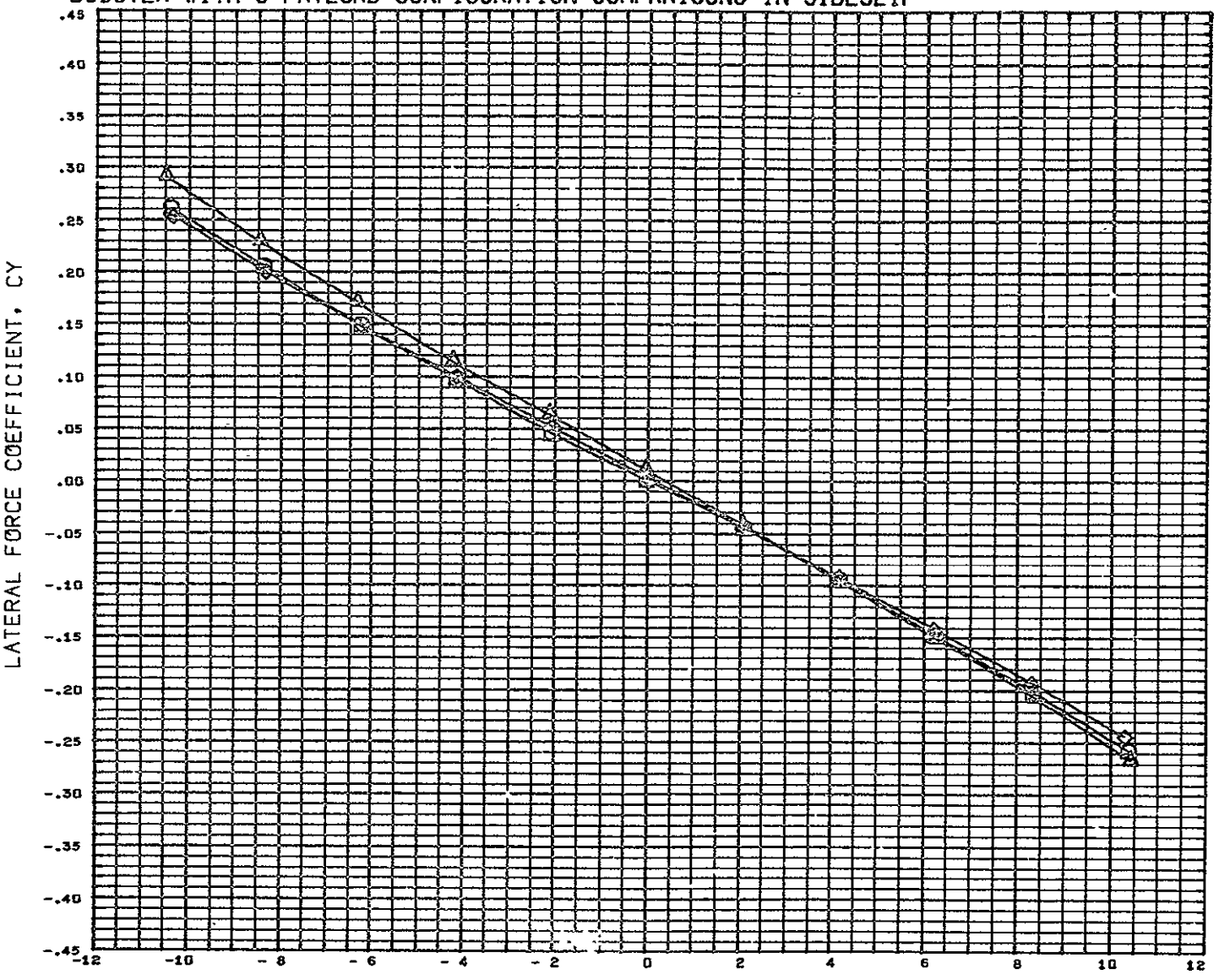


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.480	0.000	0.000	0.000

MACH 1.197

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRF	0.0000	
YMRF	0.0000	
ZMRF	0.0000	INCHES
SCALE	0.0031	SCALE

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP

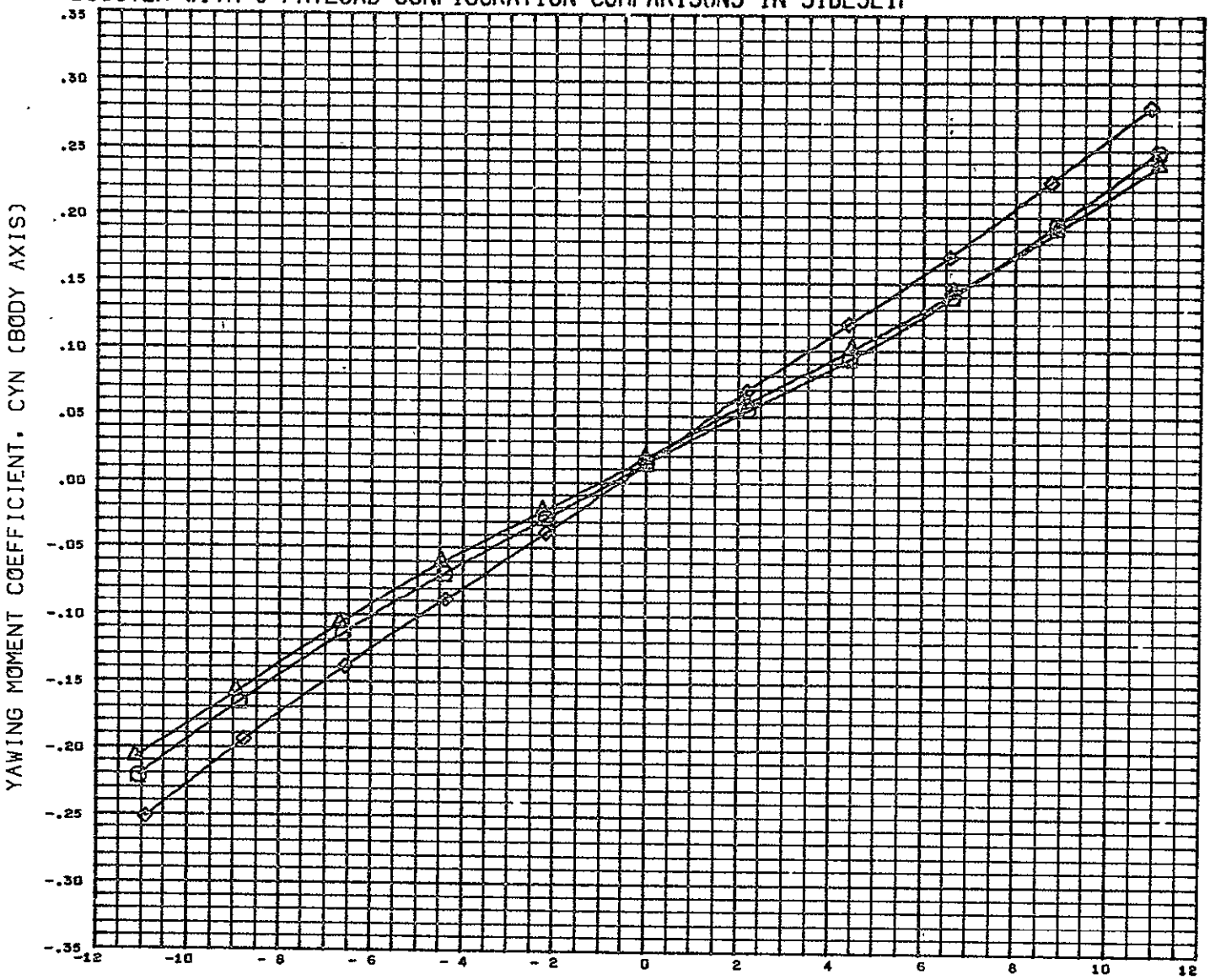


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.430	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



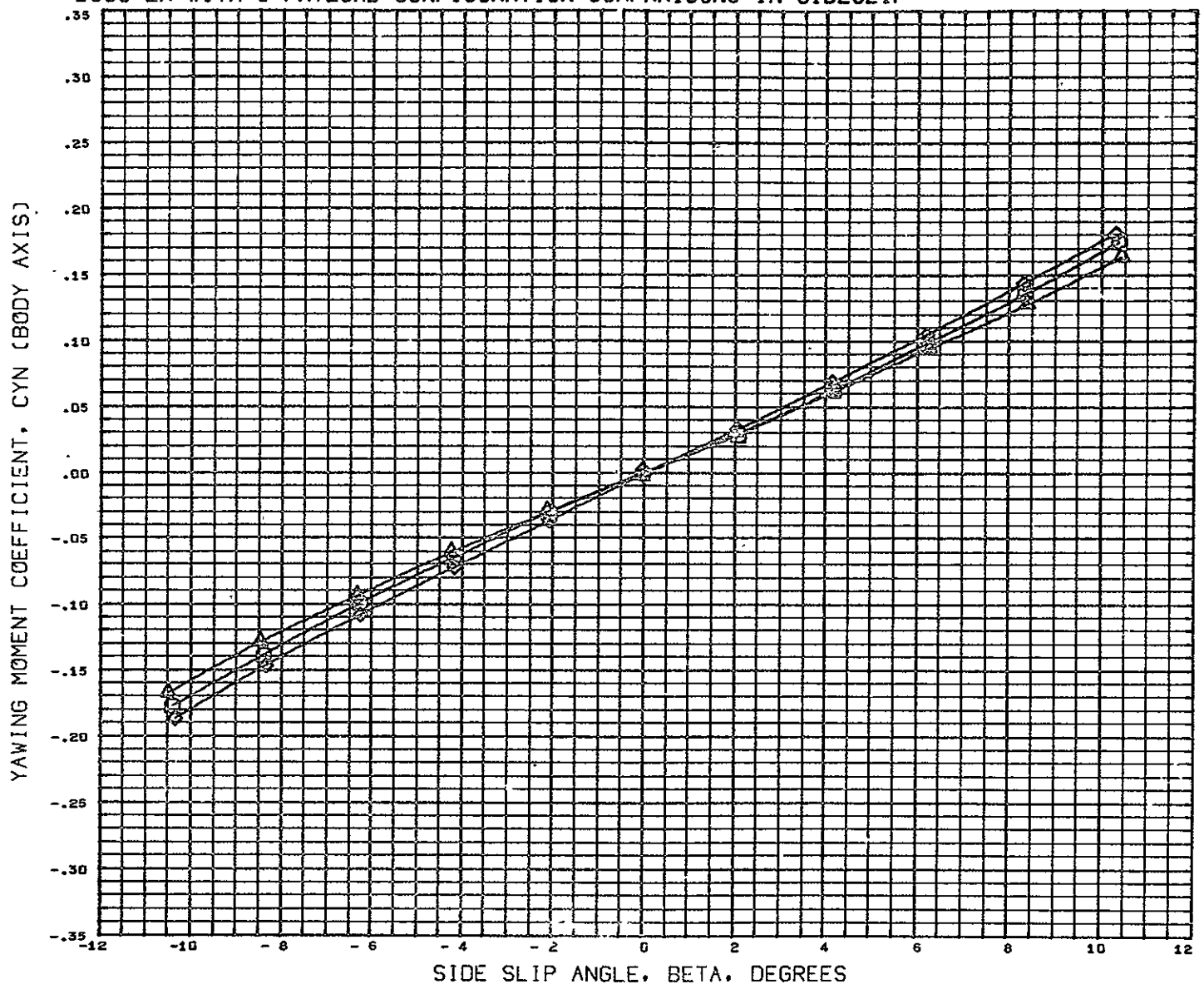
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.490	0.000	0.000	0.000
-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0900	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP

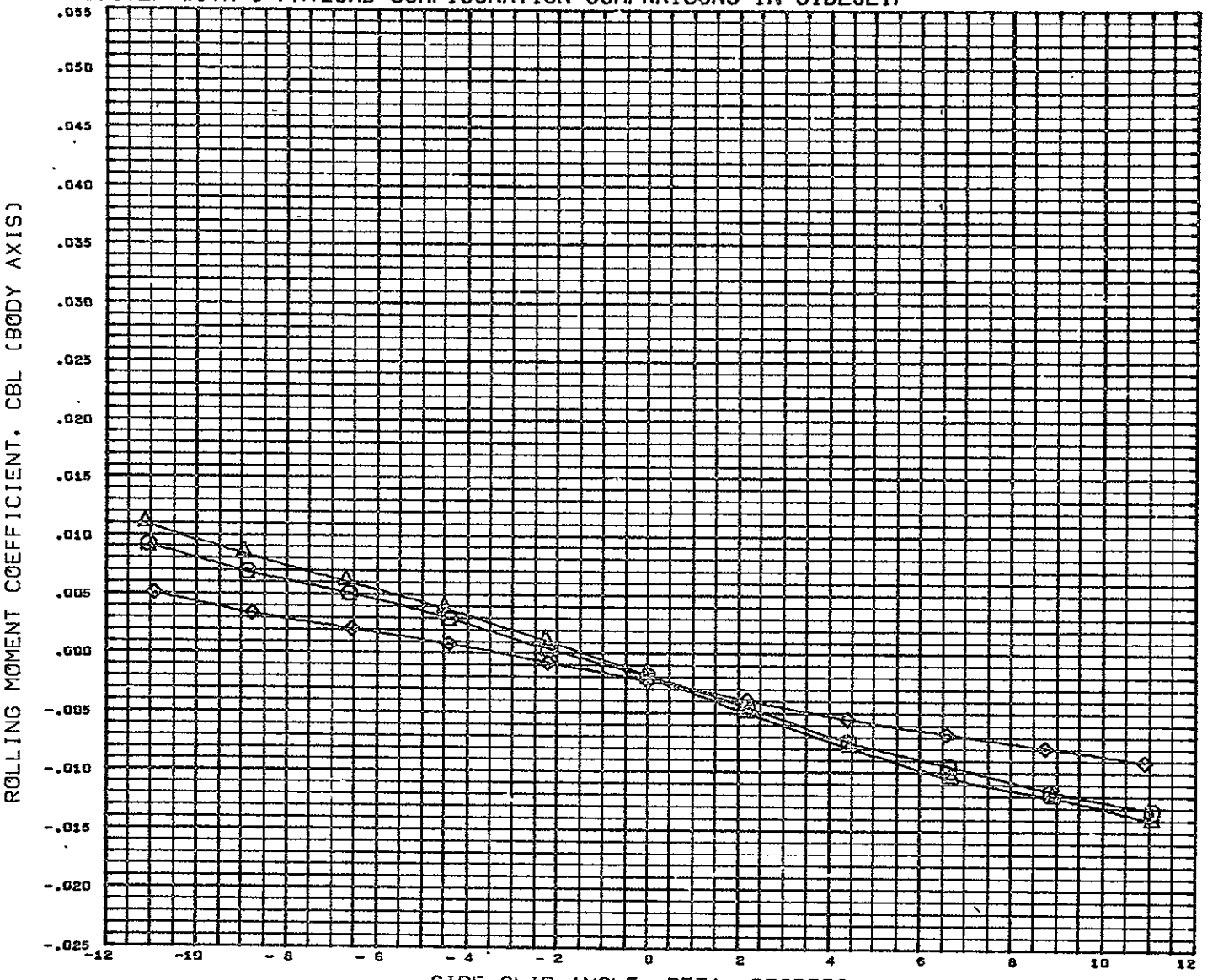


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.480	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0630	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

BØOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



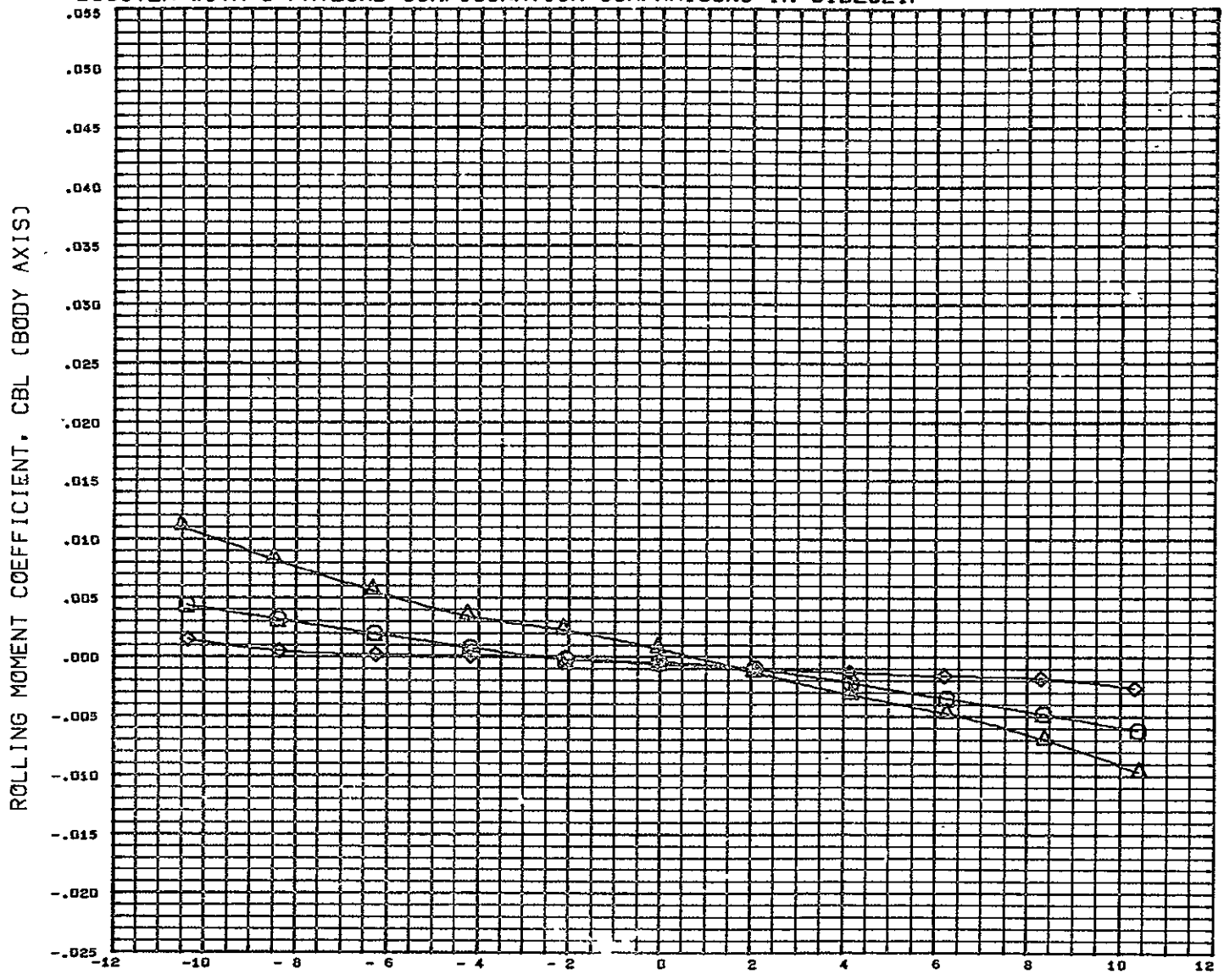
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.490	0.000	0.000	0.000
-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0630	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.197

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP

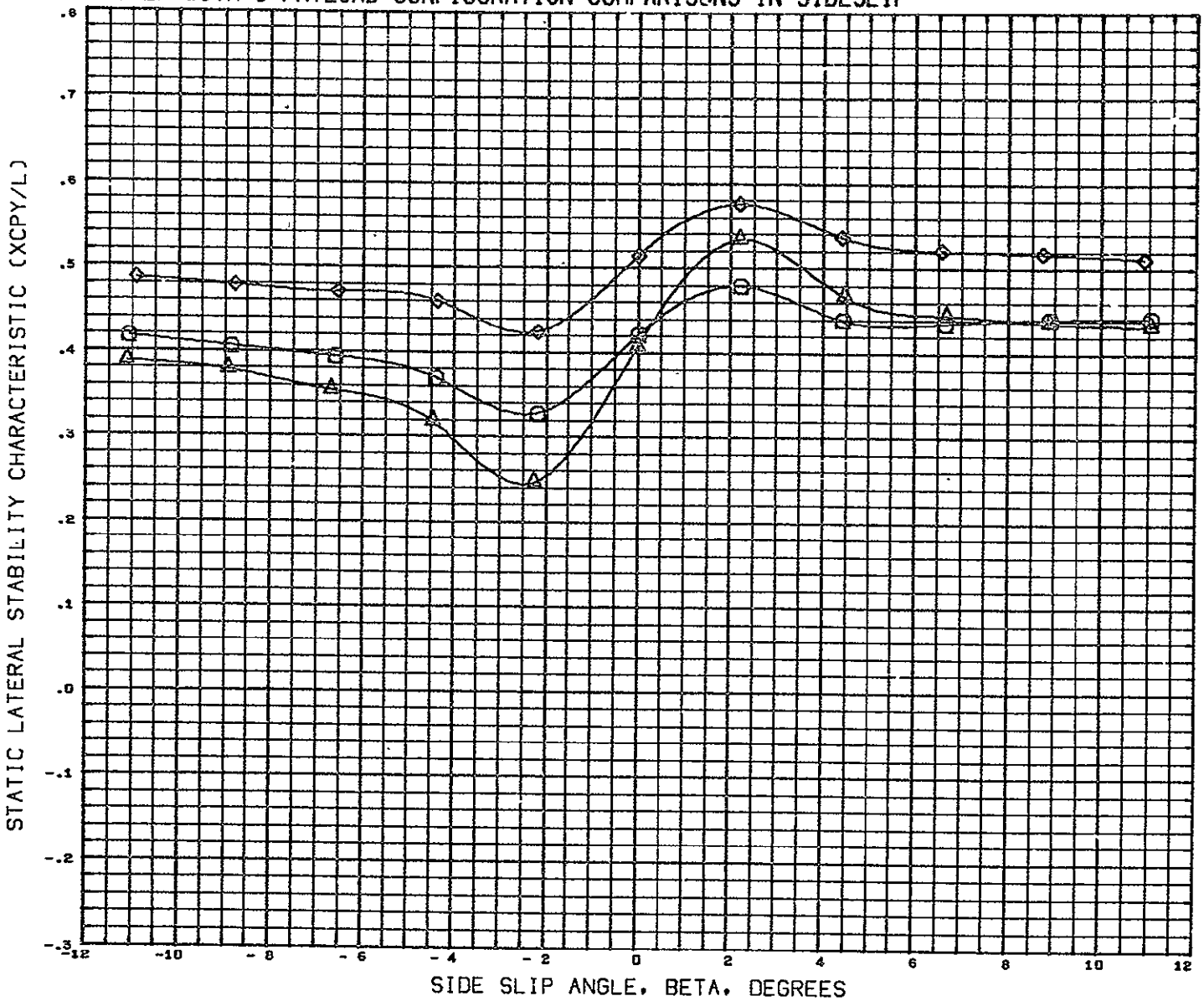


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.480	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



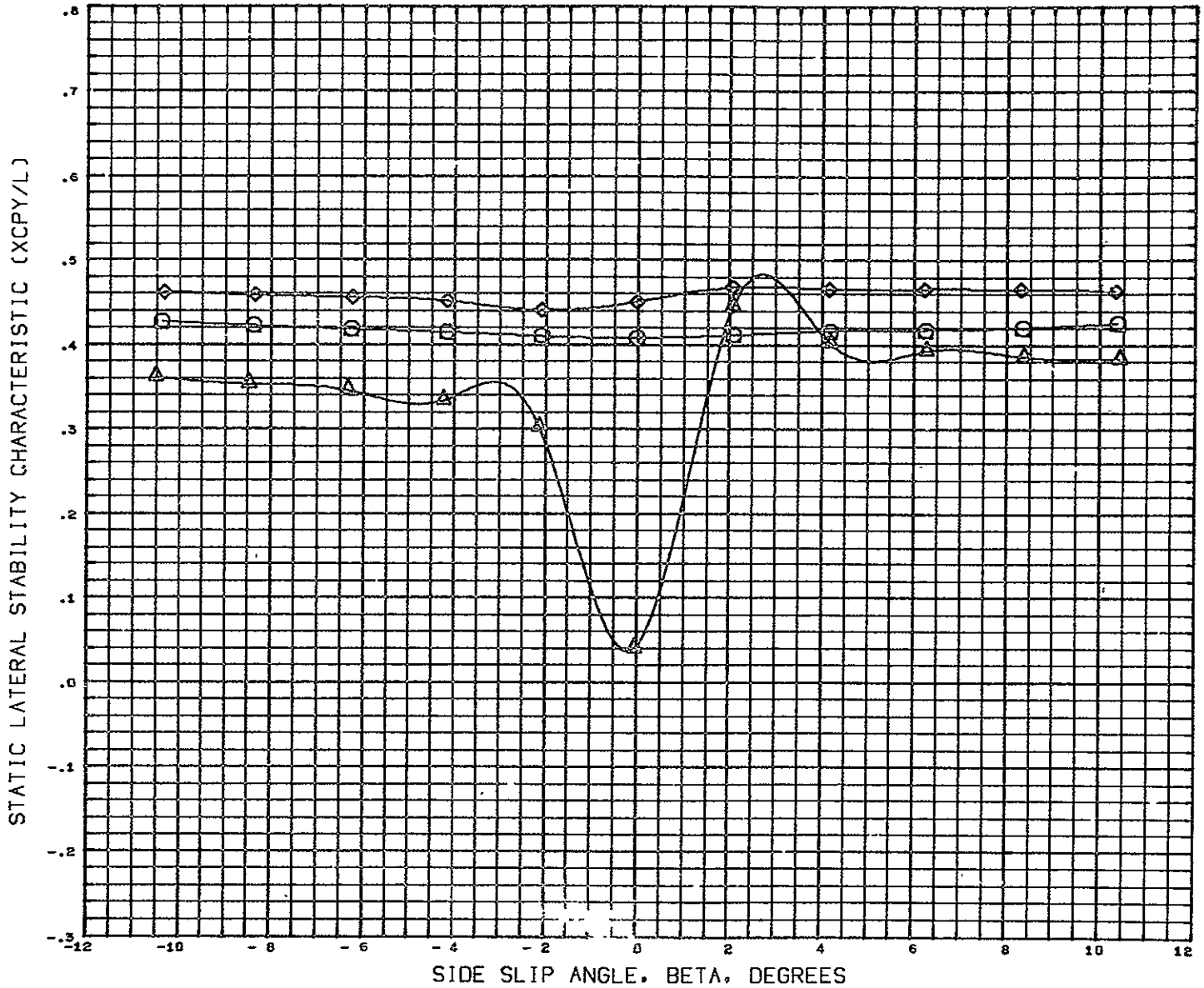
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3

MACH 1.197

ALPHA	ELVATR	AILRON	RUDDER
-6.430	0.000	0.000	0.000
-6.490	0.000	0.000	0.000
-6.480	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0953	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

BOOSTER WITH 3 PAYLOAD CONFIGURATION COMPARISONS IN SIDESLIP



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3104B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000
(B3115B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U2	-6.490	0.000	0.000	0.000
(B3119B)	◇	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U3	-6.485	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6563	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
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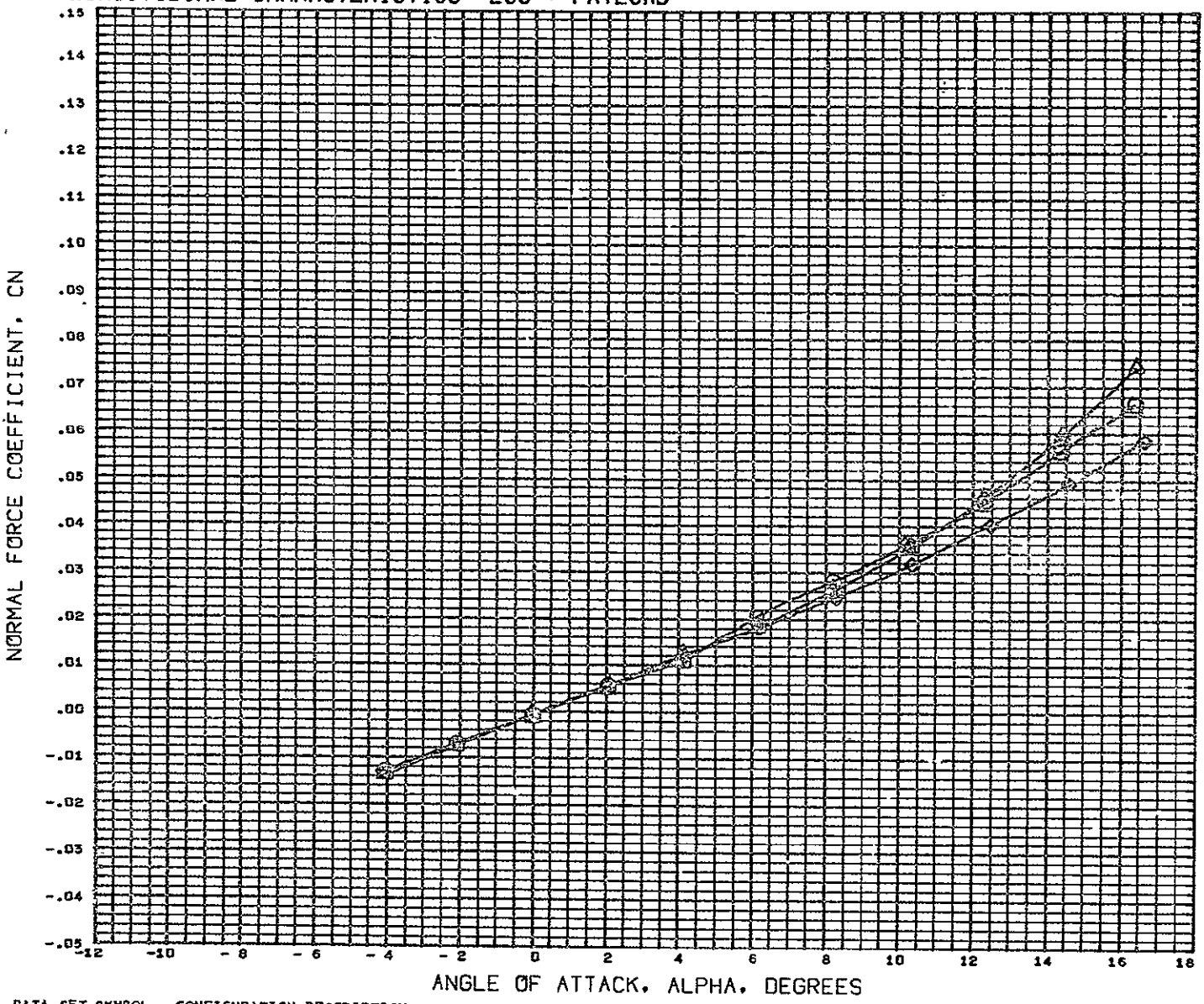
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3

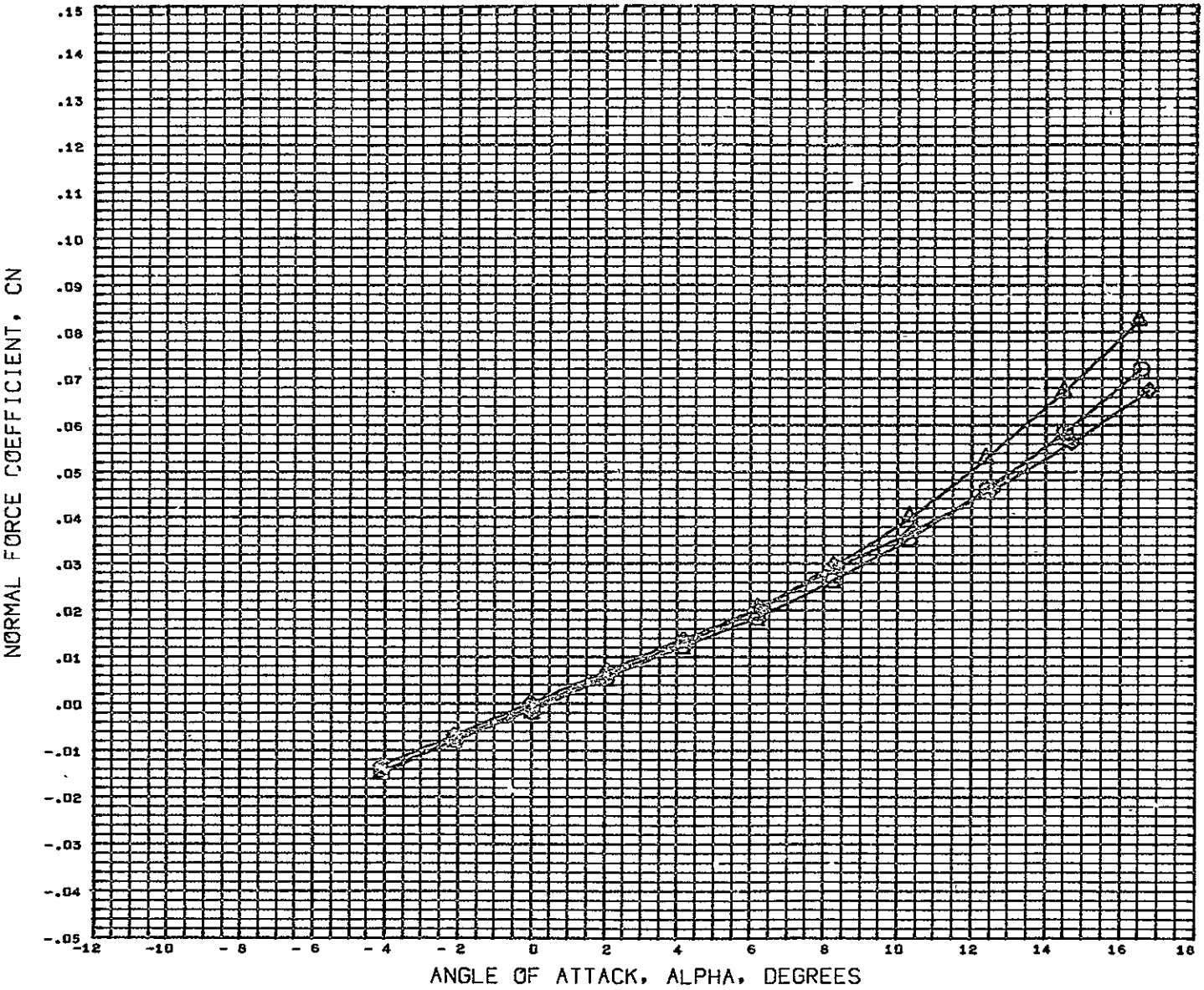
BETA
0.000
0.000
0.000

MACH 0.904 ,

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



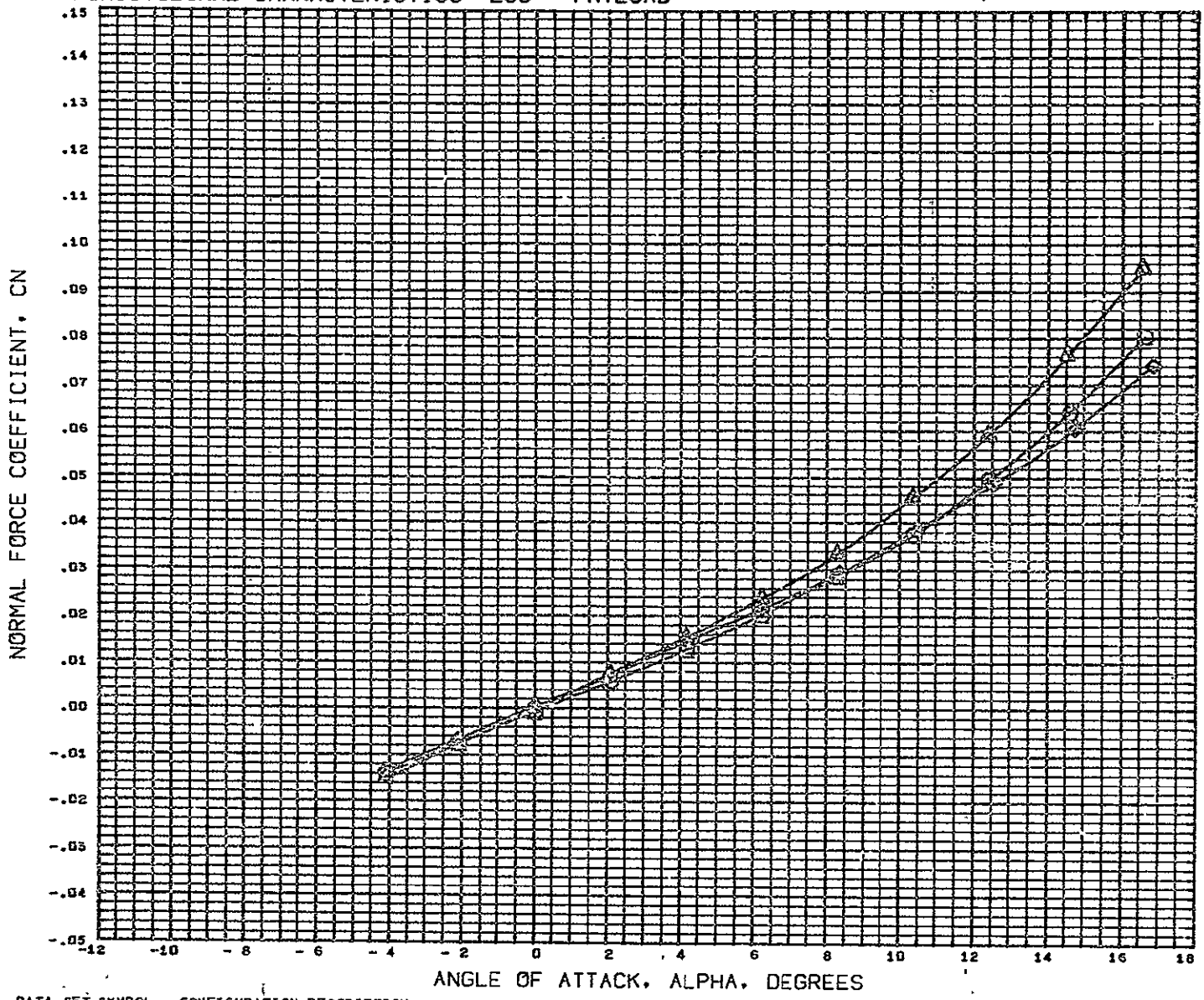
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 0.998

REFERENCE INFORMATION

SREF	15.6569	SQ IN
LREF	5.09.0	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



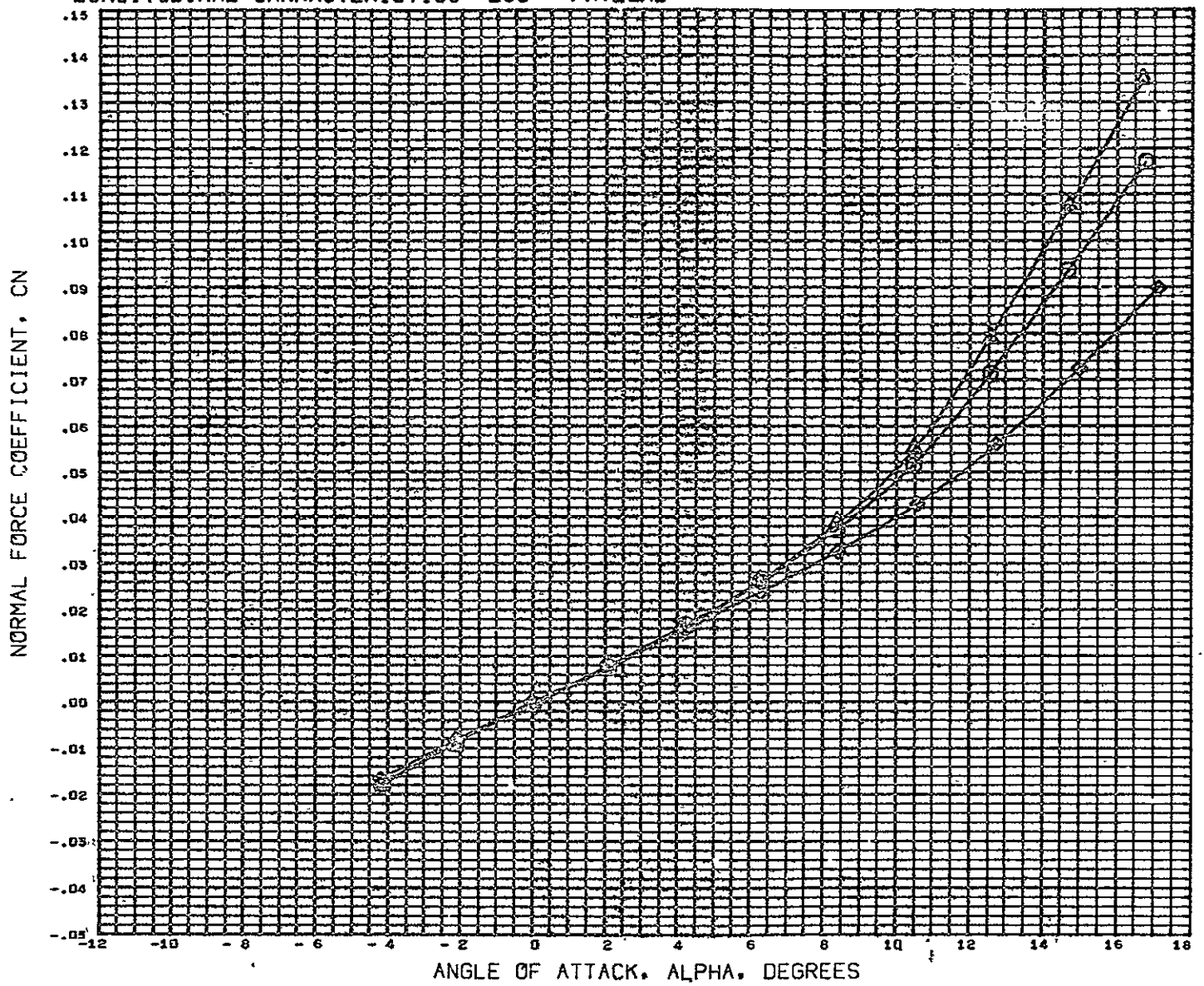
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 1.192

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0450	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



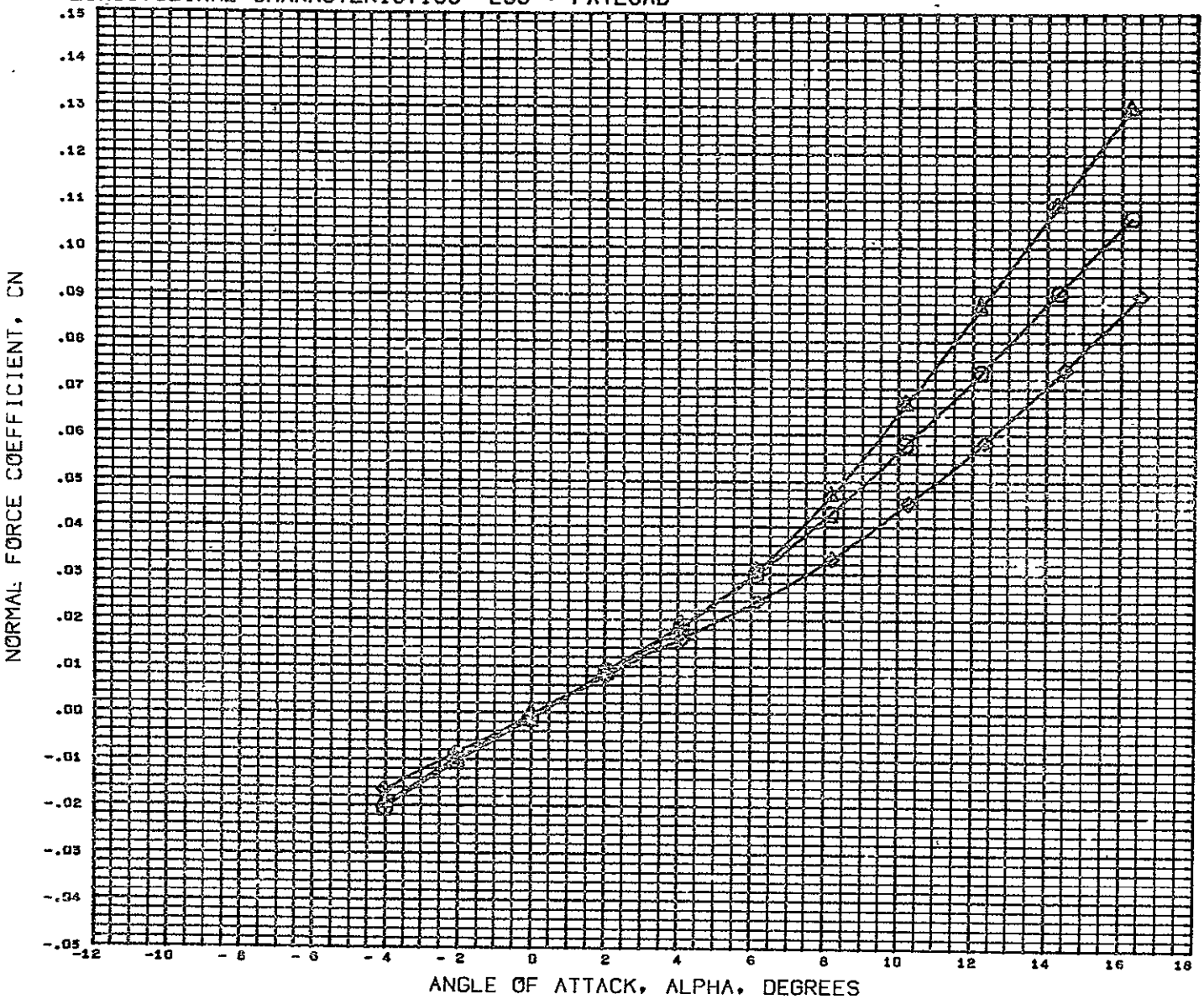
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 1.958

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



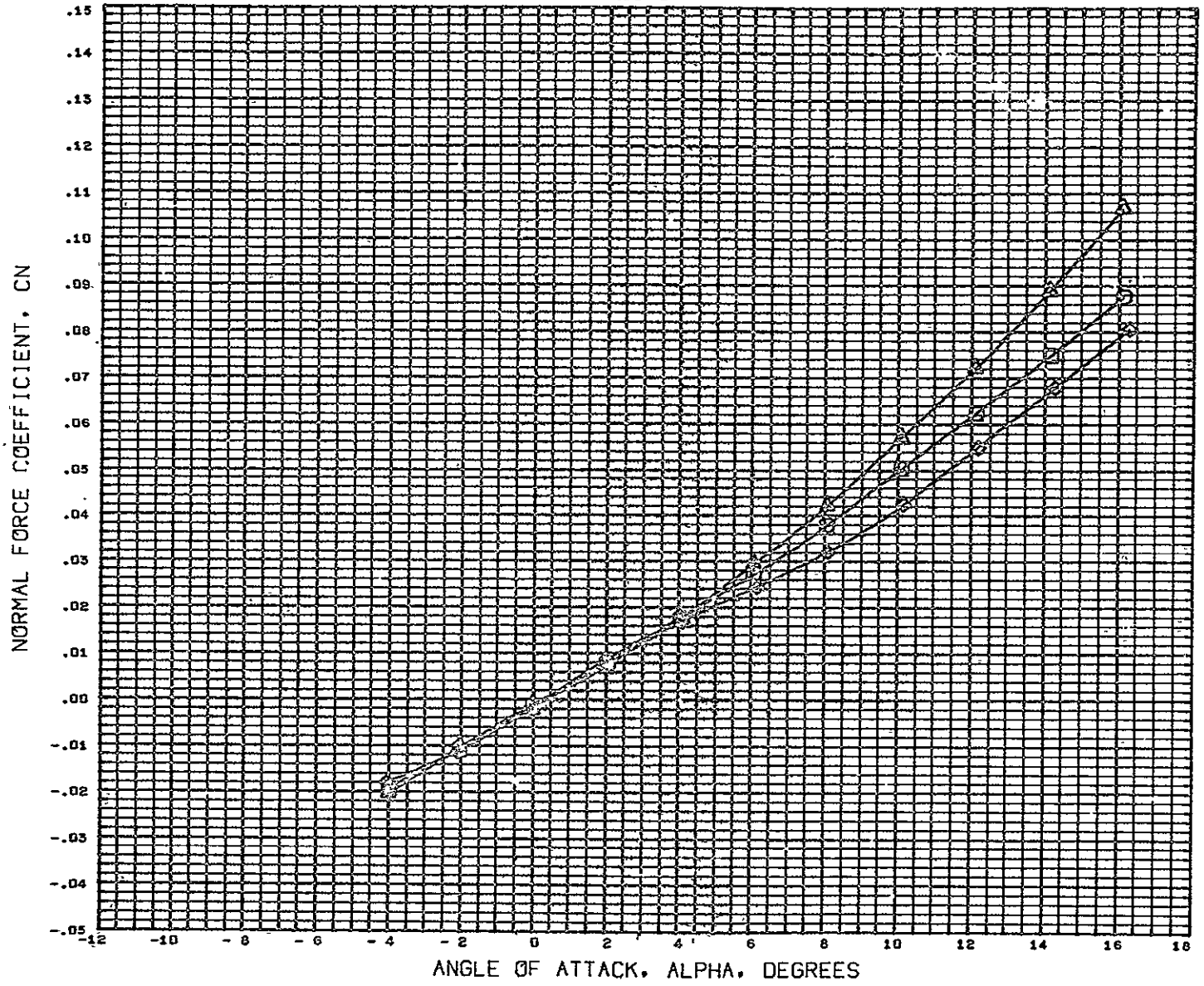
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+NDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



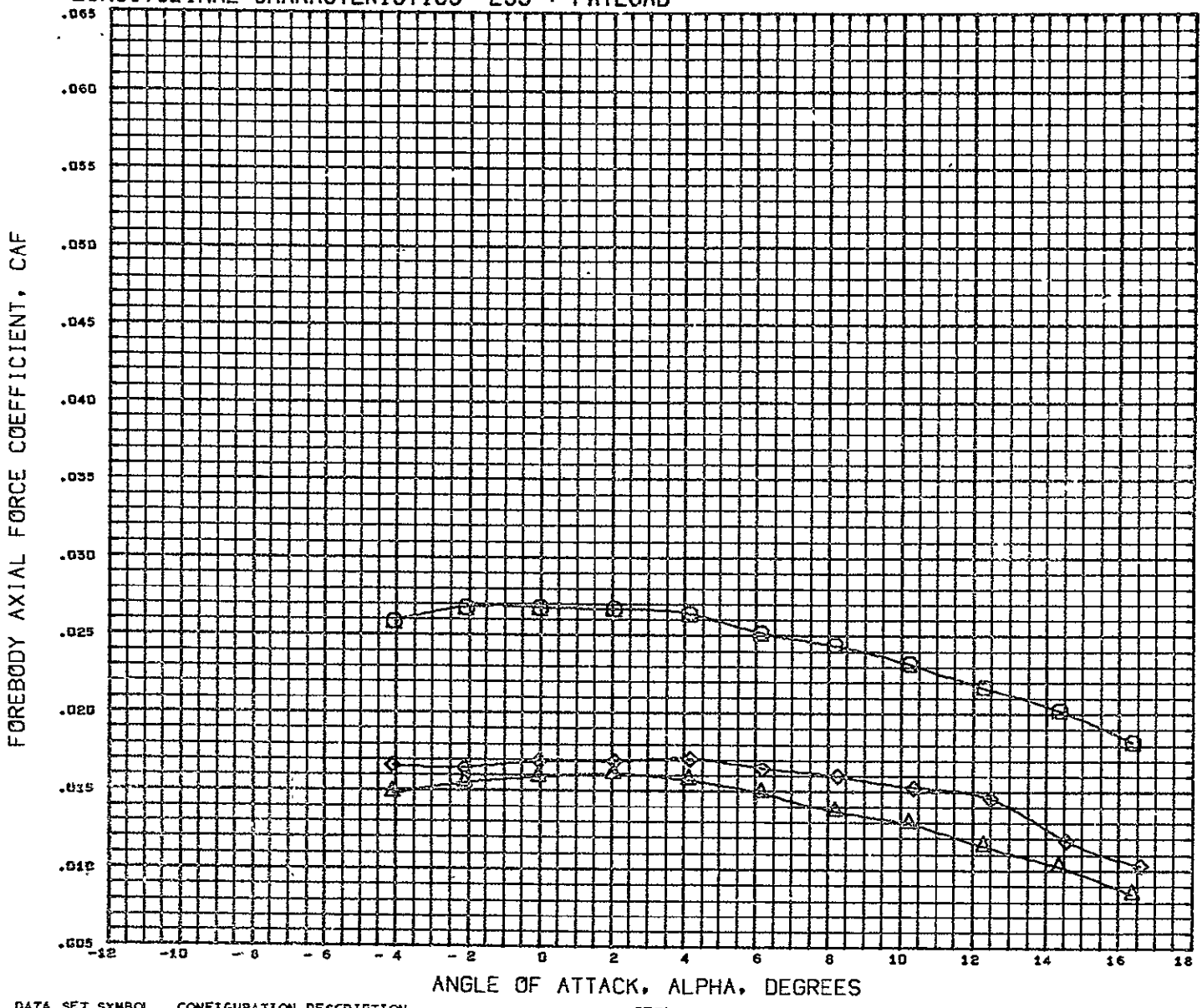
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+HDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 4.959

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



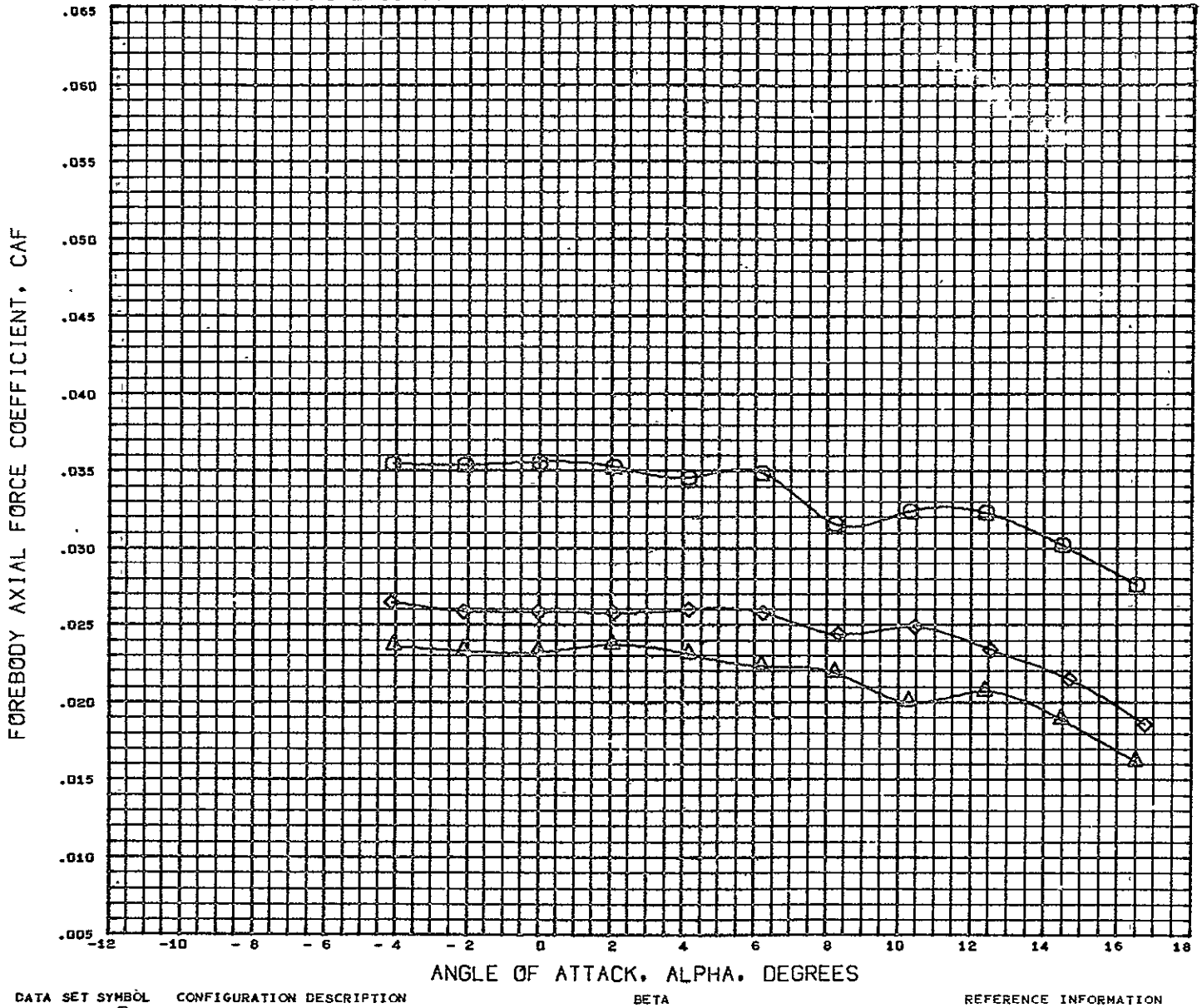
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	NSFC489 NR ESS+HDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	NSFC489 NR ESS+SPACE TUG U3	0.000

MACH 0.904

REFERENCE INFORMATION

SREF	15.6563	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



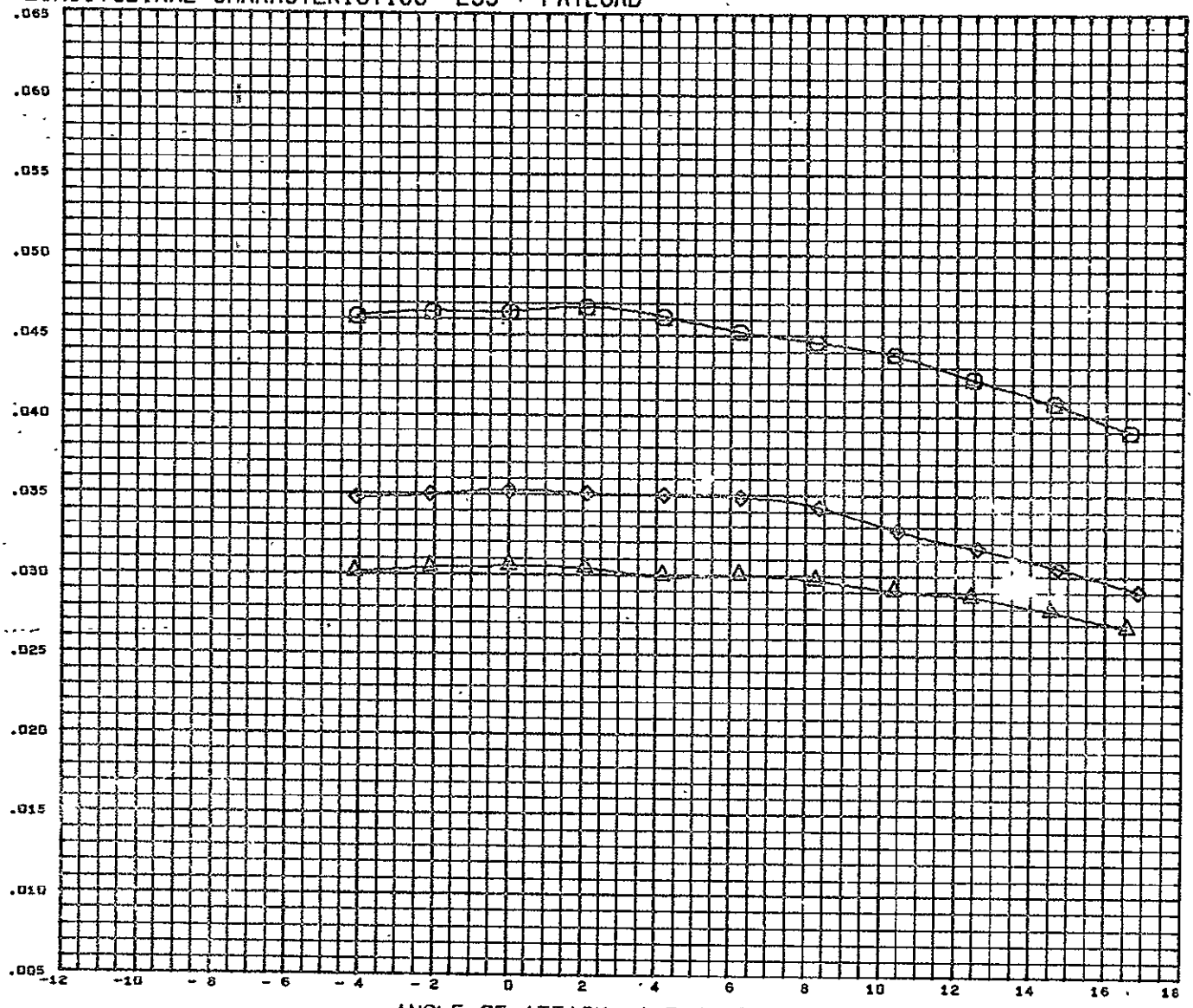
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 0.998

REFERENCE INFORMATION

SREF	15.6569	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



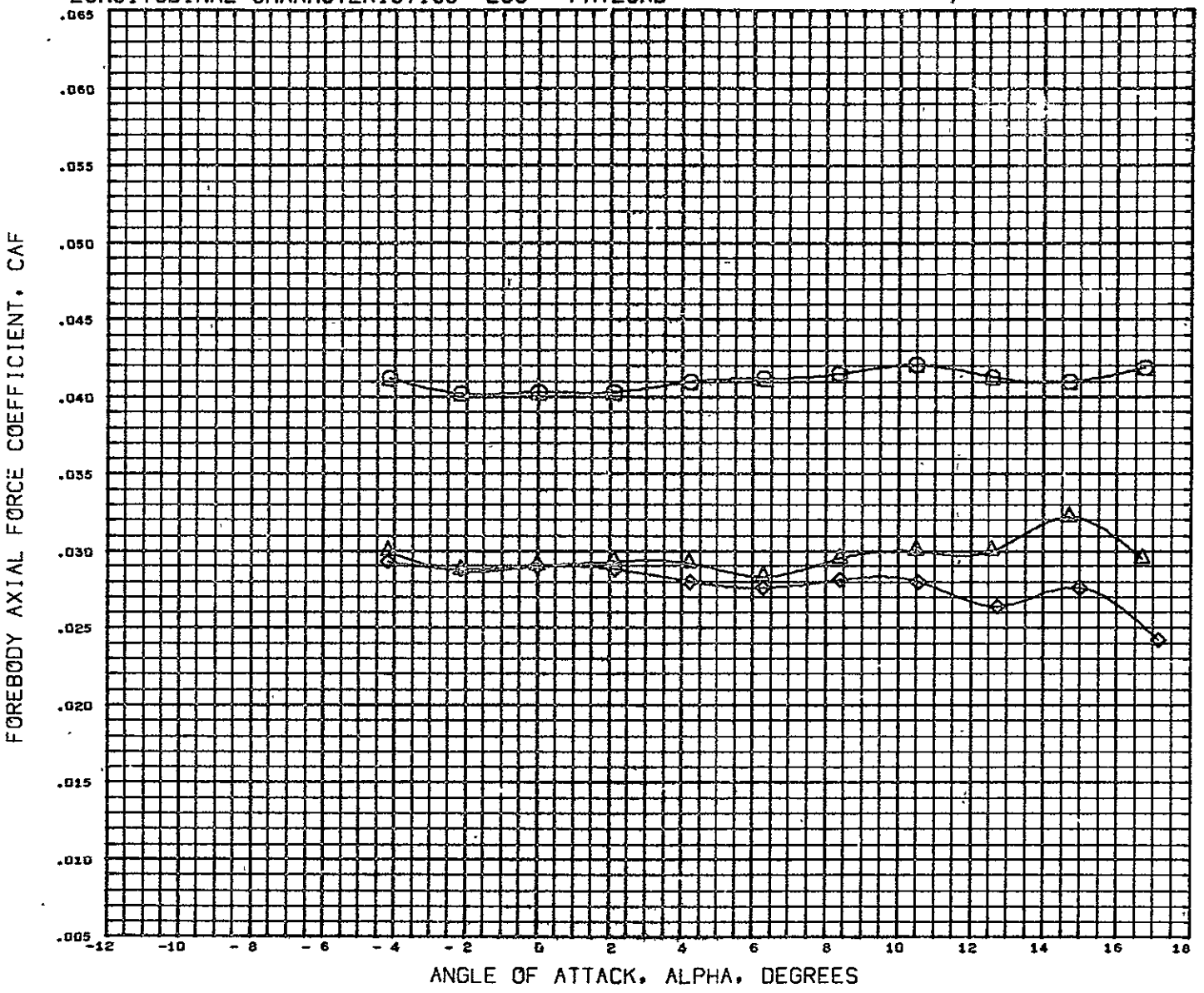
DATA SET SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R31G1A)	MSFC489 NR ESS+NDAC SPACE STATION U	0.000
(R3102A)	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R31D3A)	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 1.192

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



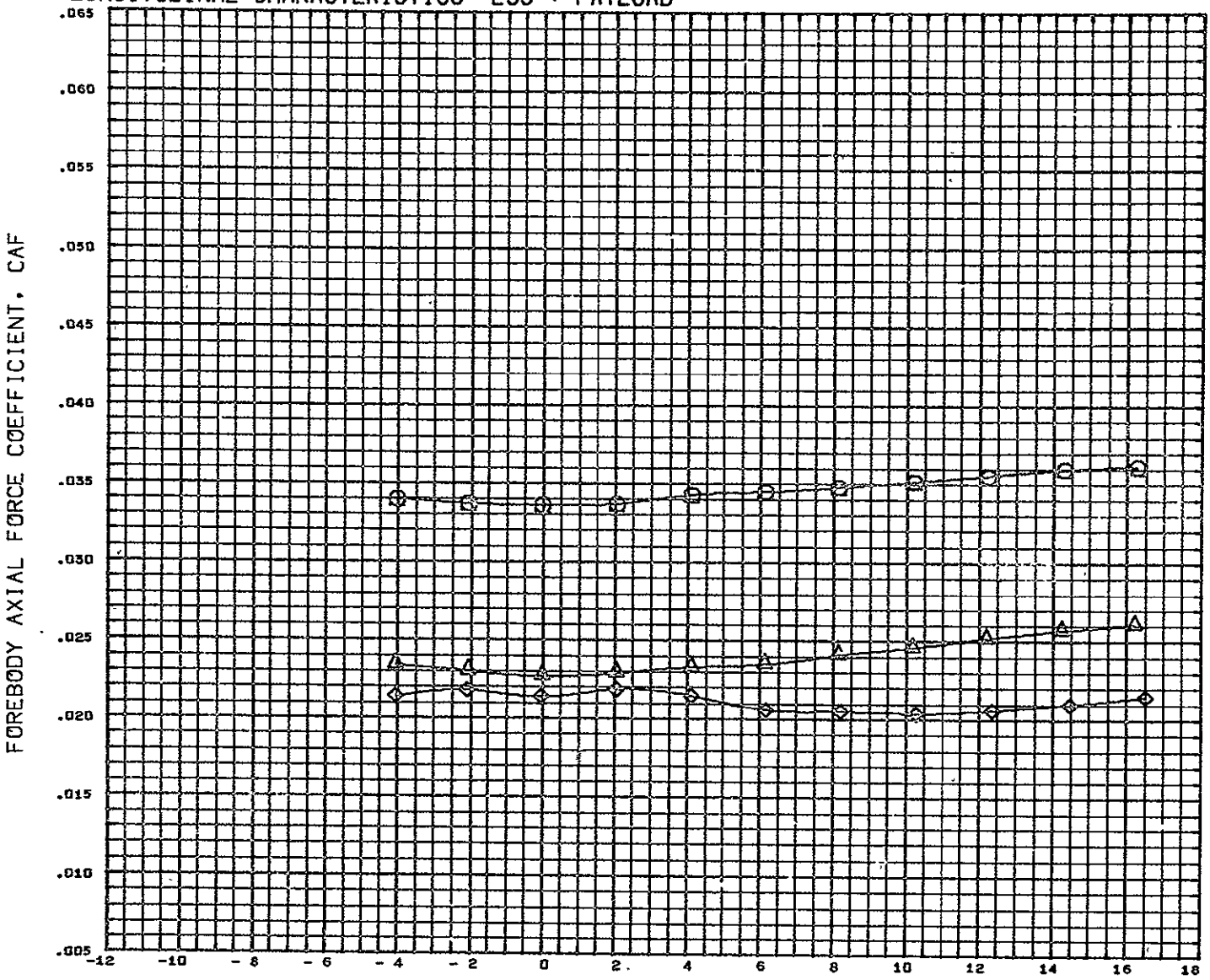
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 1.958

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0050	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



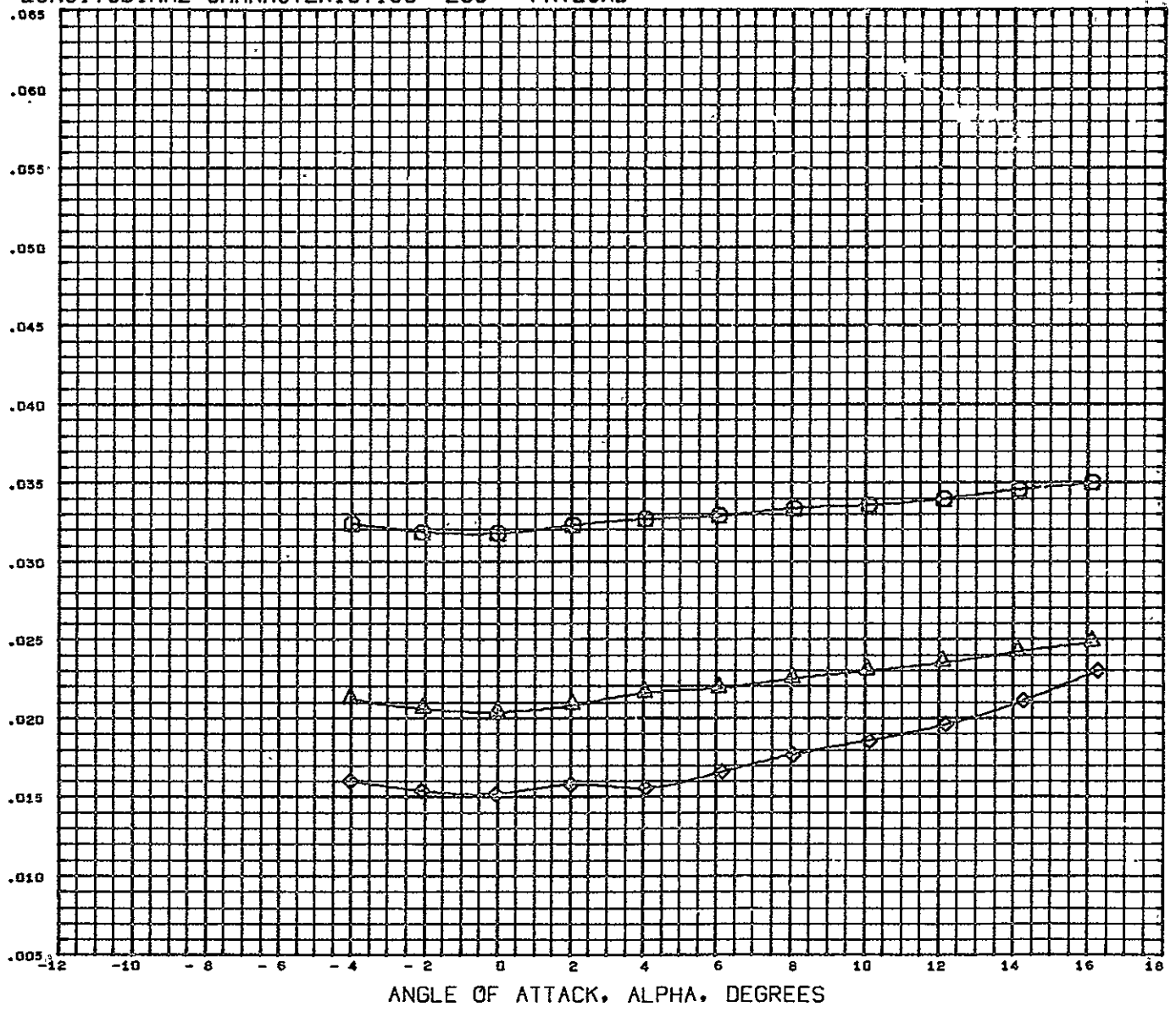
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



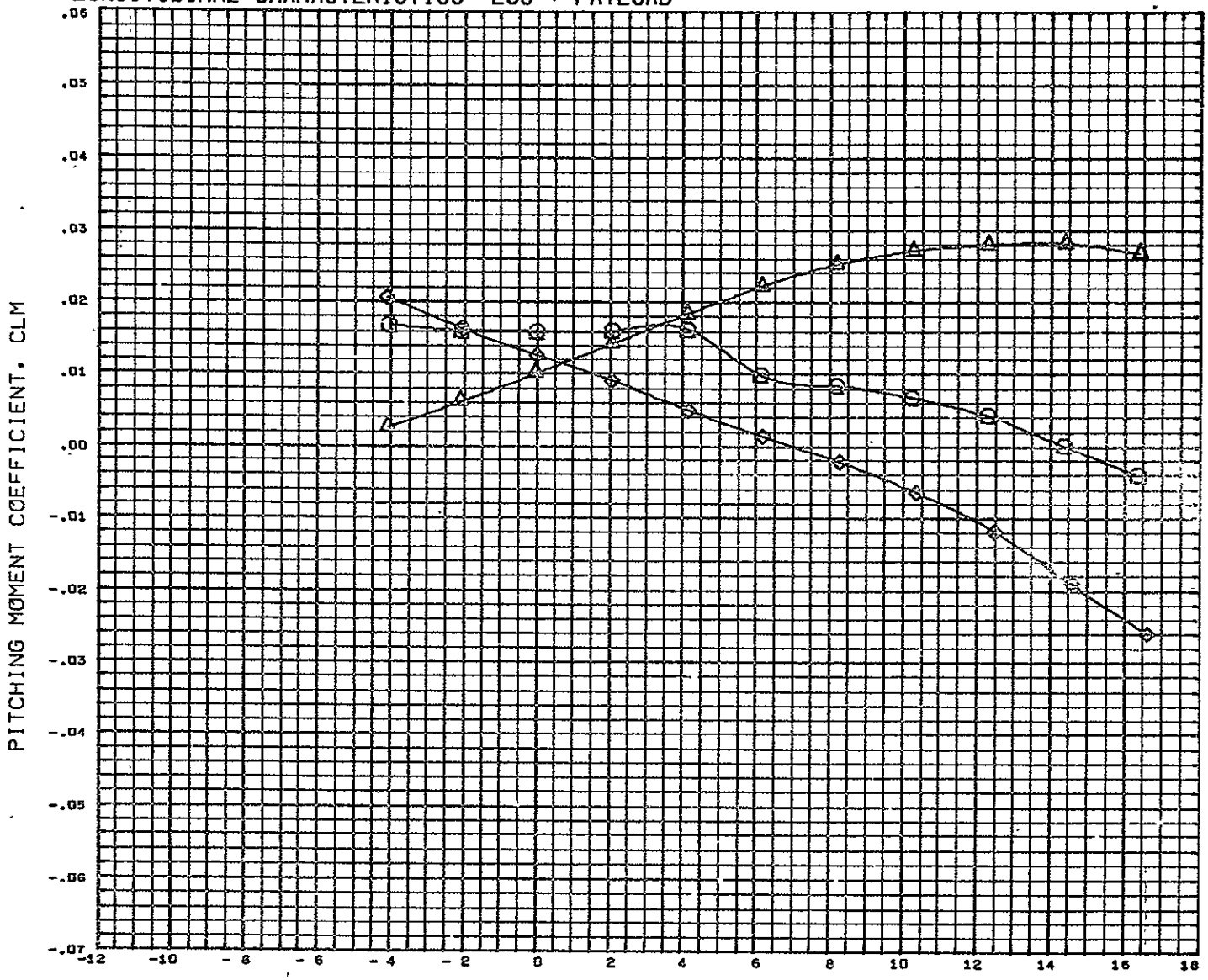
DATA SET SYMBOL		CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 4.959

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0850	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



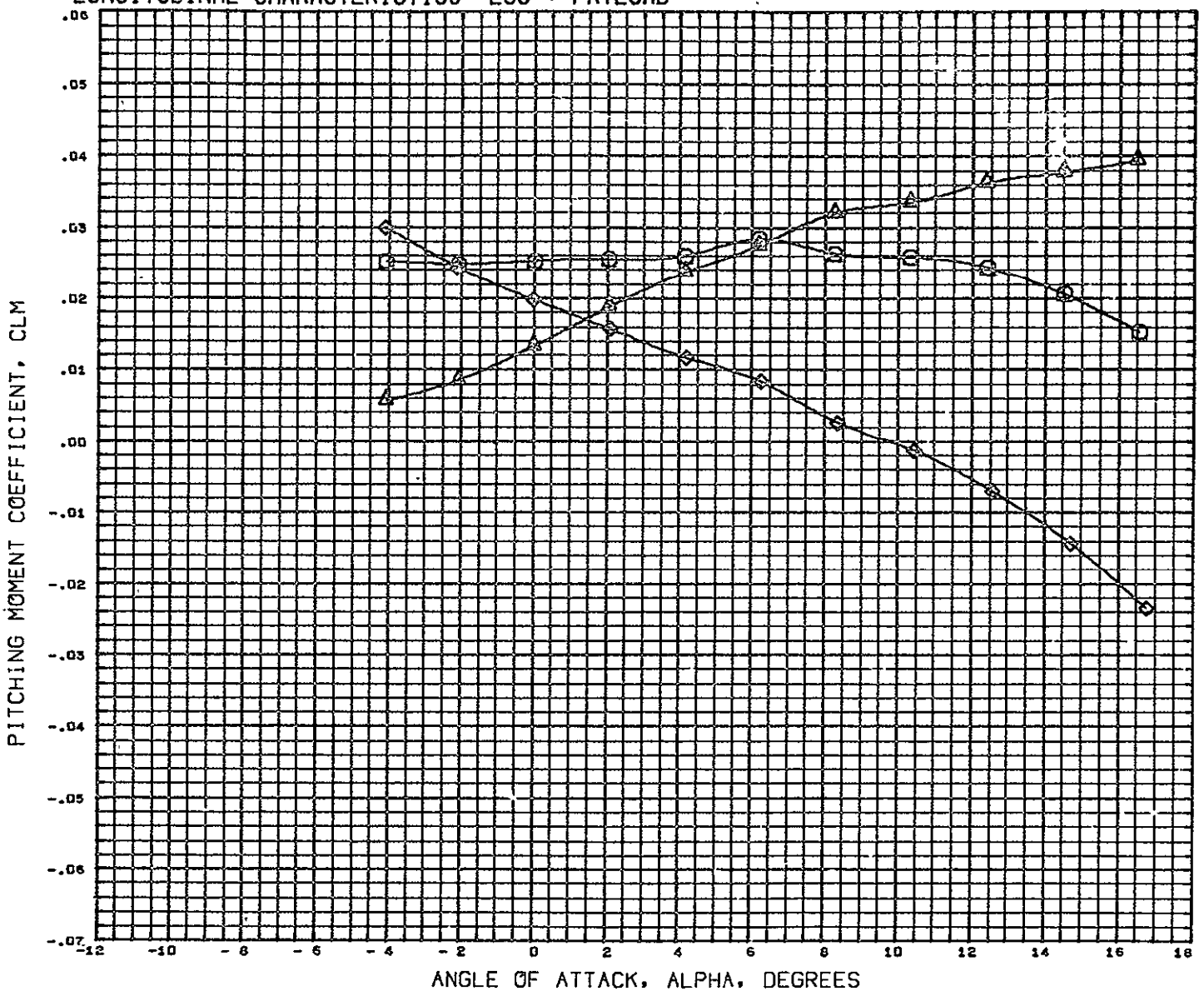
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 0.904

REFERENCE INFORMATION

SREF	15.6569	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LØNGITUDINAL CHARACTERISTICS- ESS + PAYLØAD



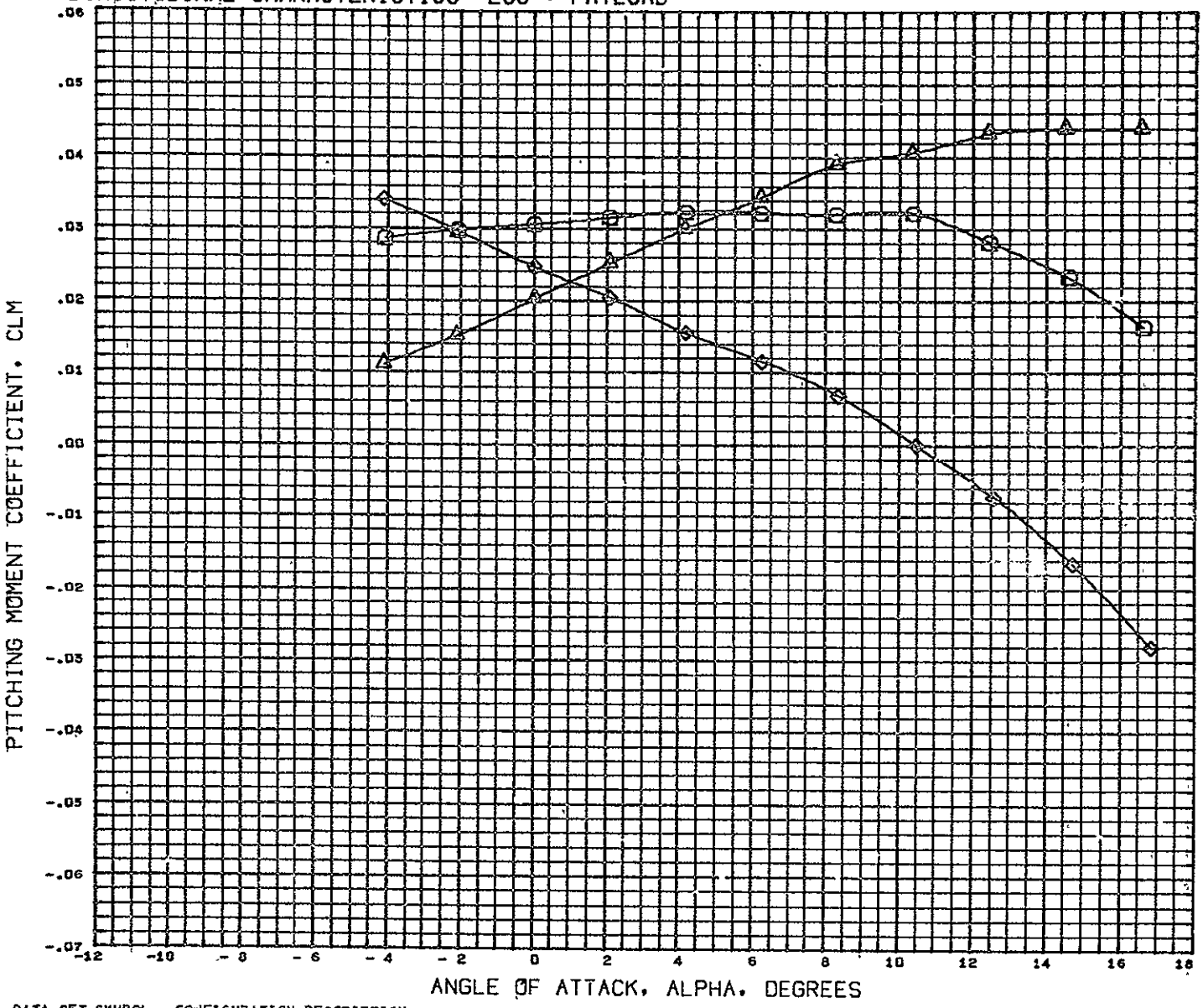
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 0.998

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD

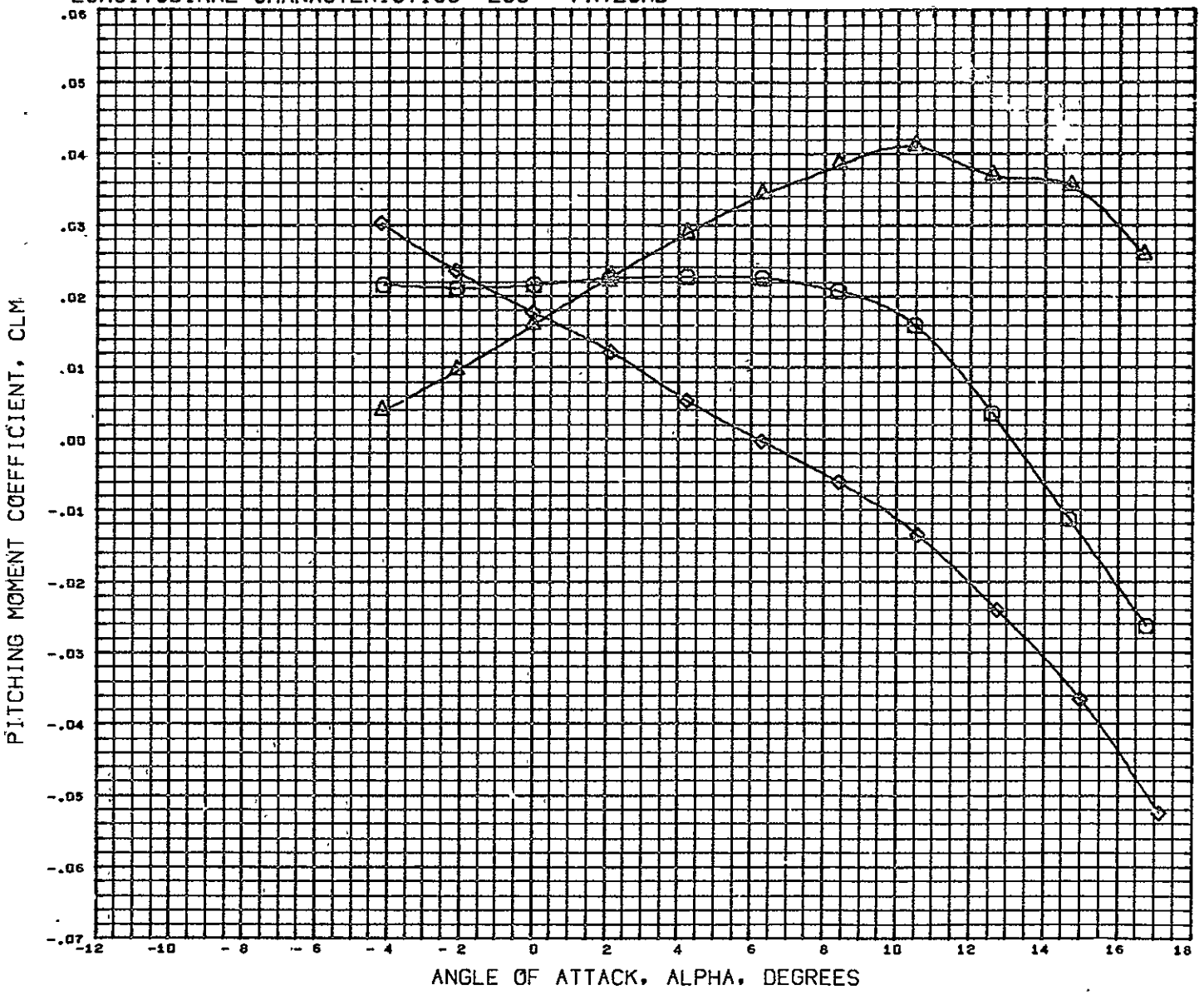


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 1.192

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0955	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD

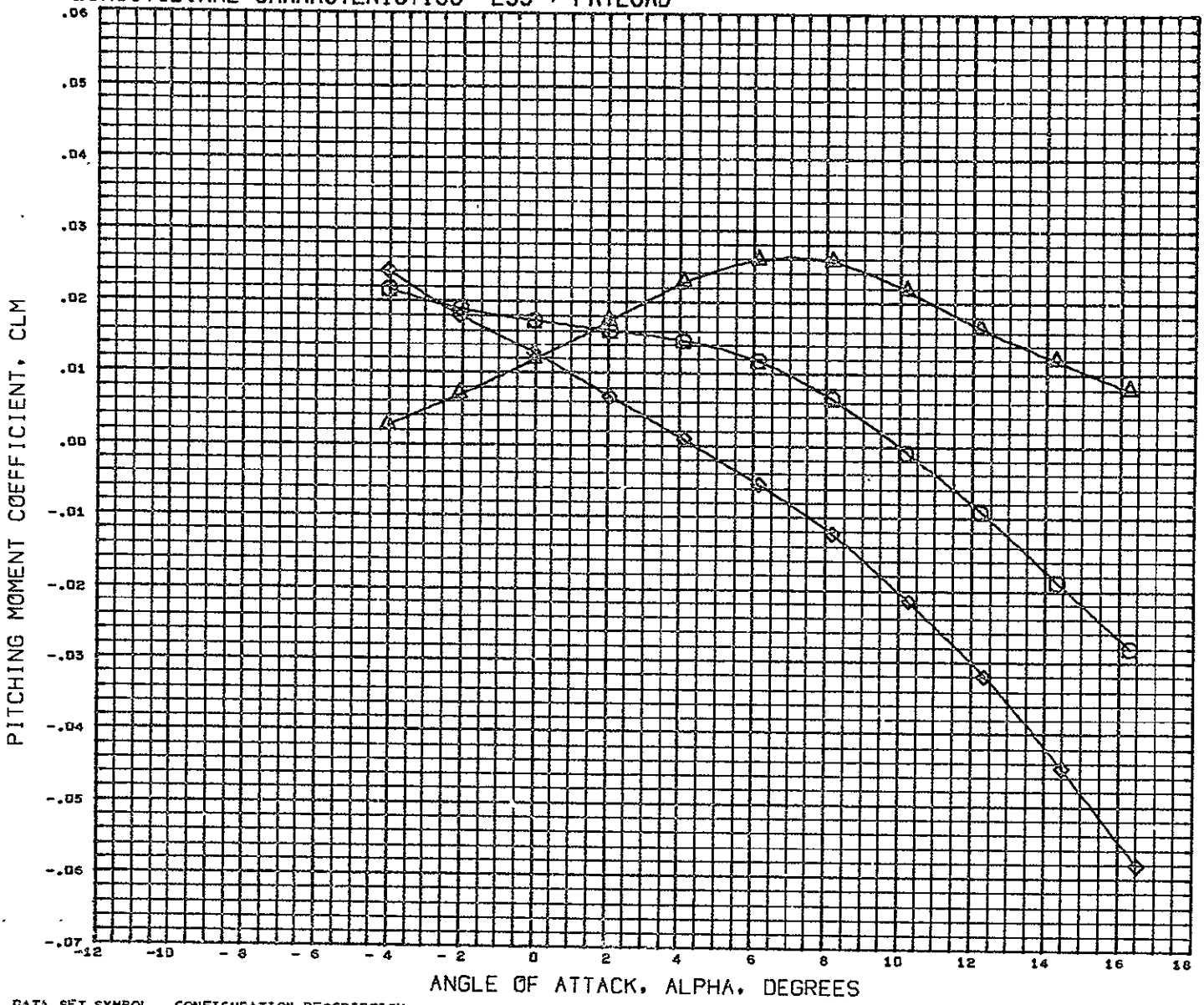


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 1.958

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

LØNGITUDINAL CHARACTERISTICS- ESS + PAYLØAD



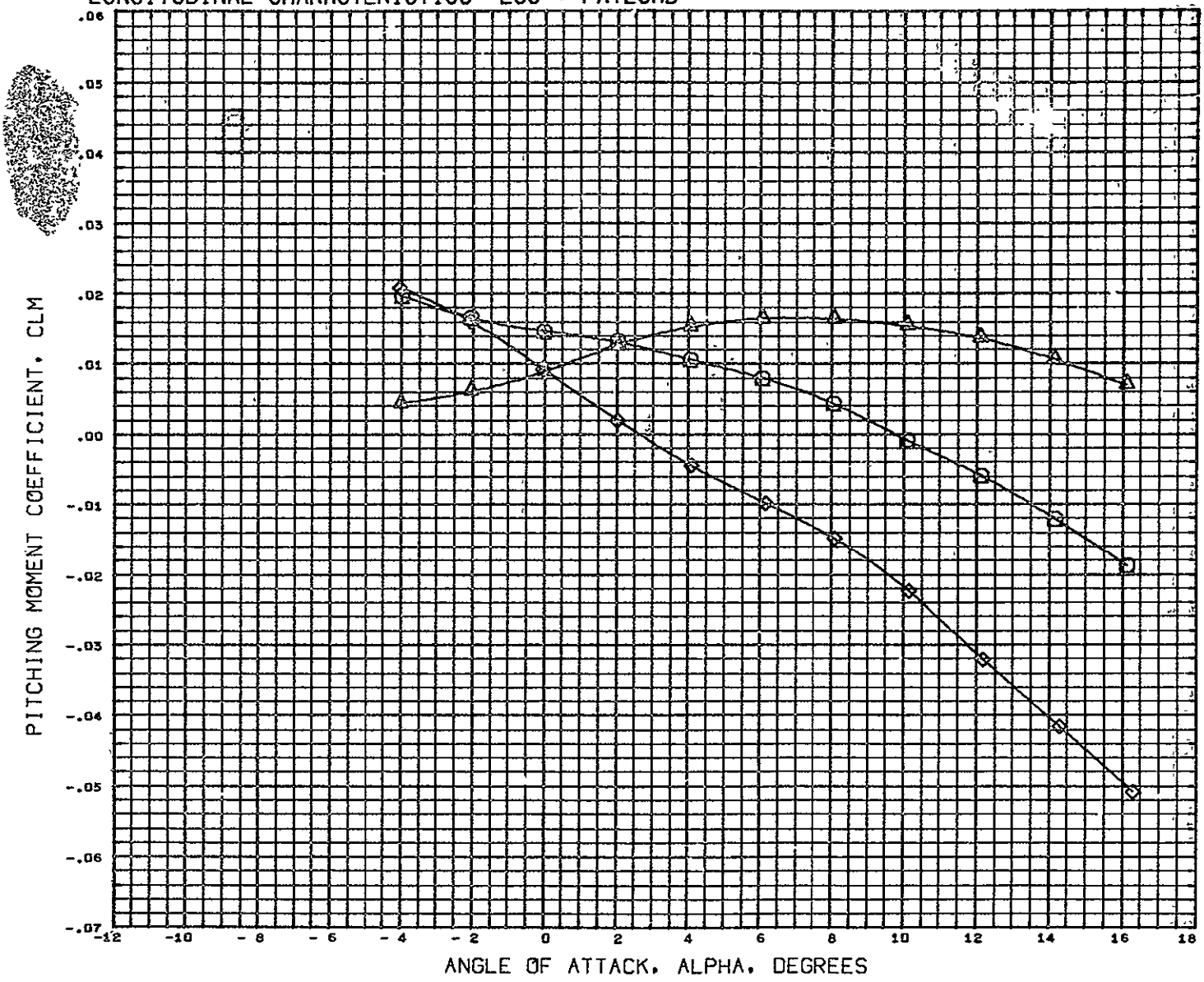
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0956	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

LONGITUDINAL CHARACTERISTICS- ESS + PAYLOAD



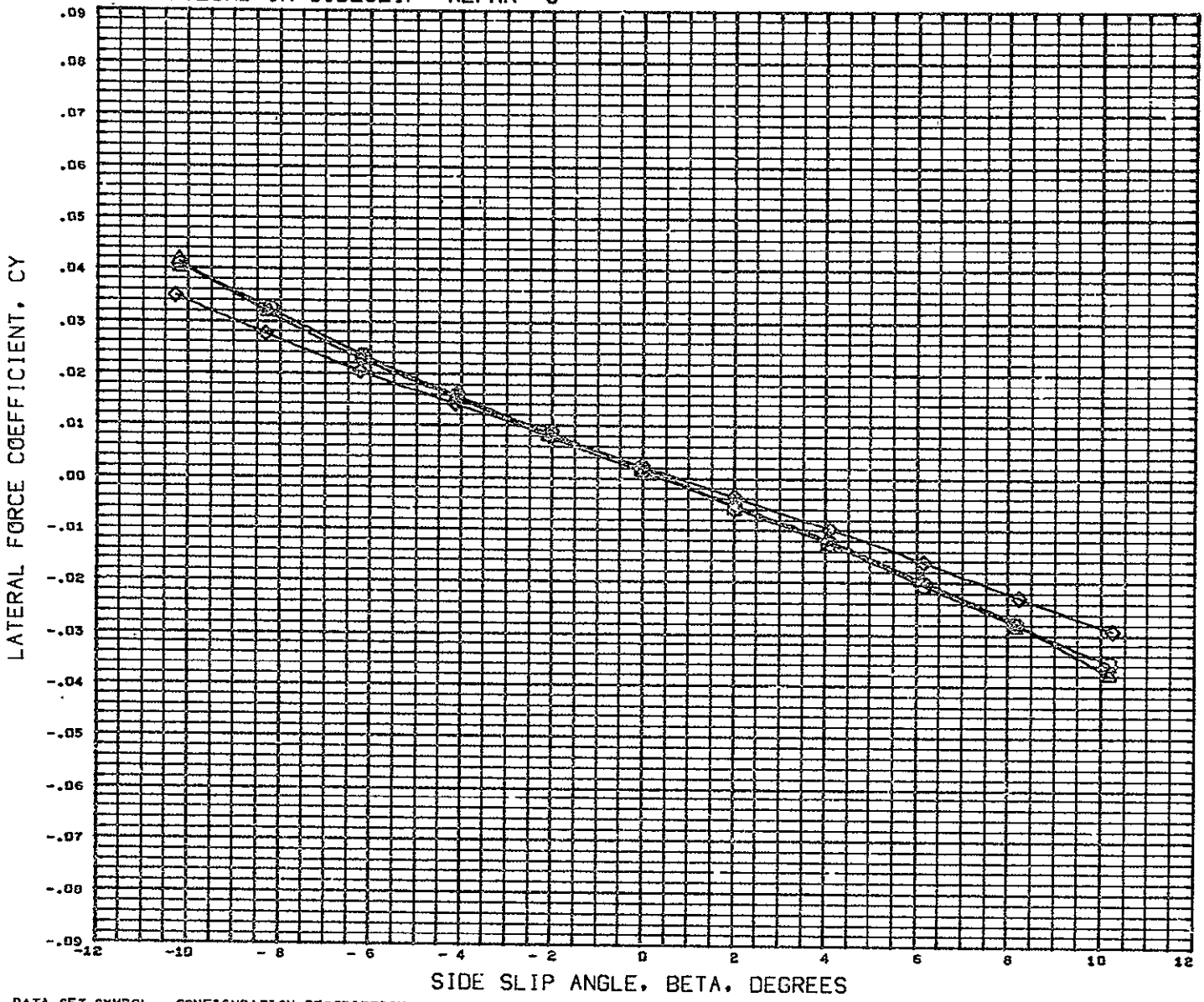
DATA SET SYMBOL		CONFIGURATION DESCRIPTION	BETA
(R3101A)	○	MSFC489 NR ESS+MDAC SPACE STATION U	0.000
(R3102A)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	0.000
(R3103A)	◇	MSFC489 NR ESS+SPACE TUG U3	0.000

MACH 4.959

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN.SIDESLIP -ALPHA=-6

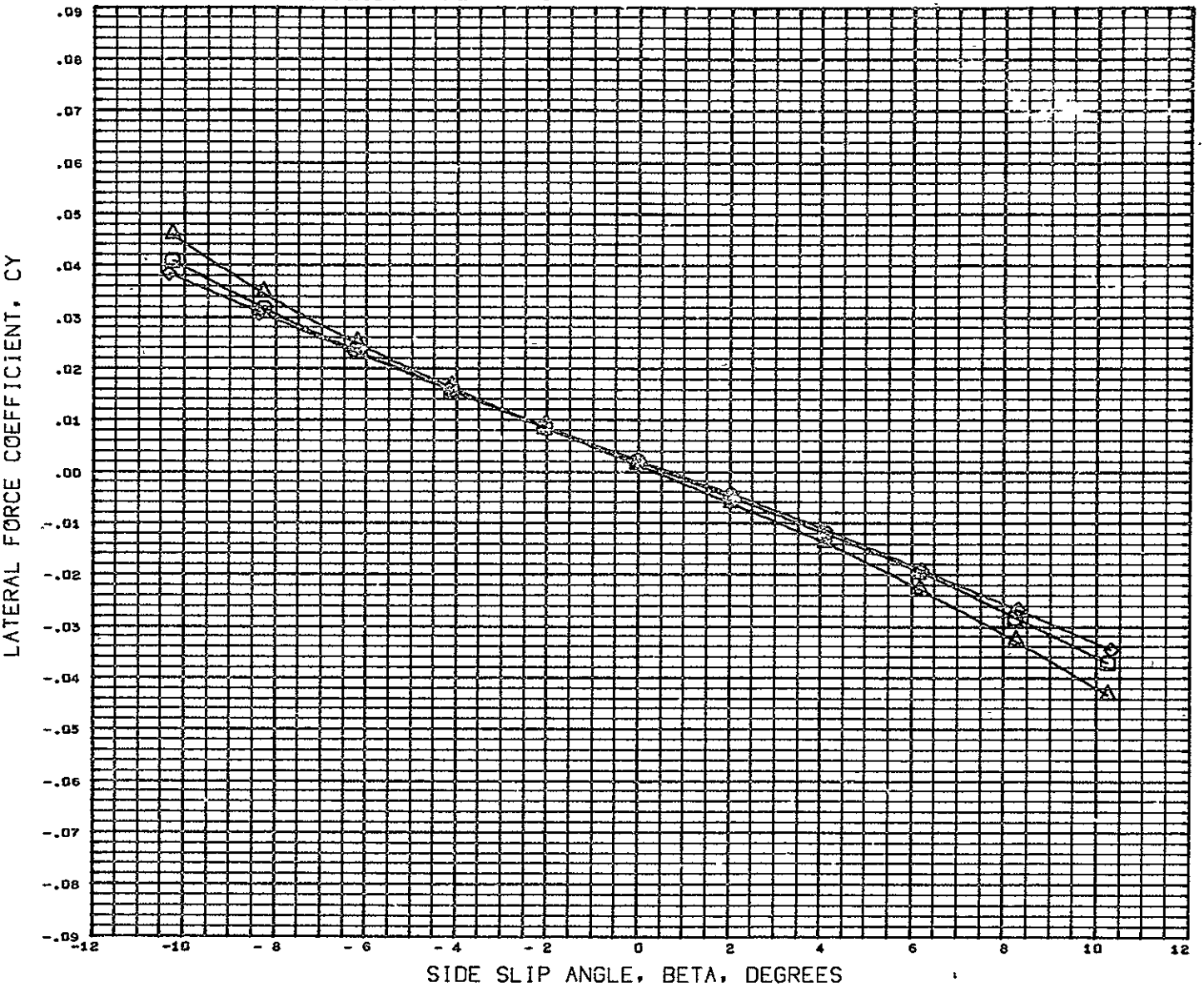


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C31018) ○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B) △	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B) ◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.901

REFERENCE INFORMATION		
SREF	15.6569	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



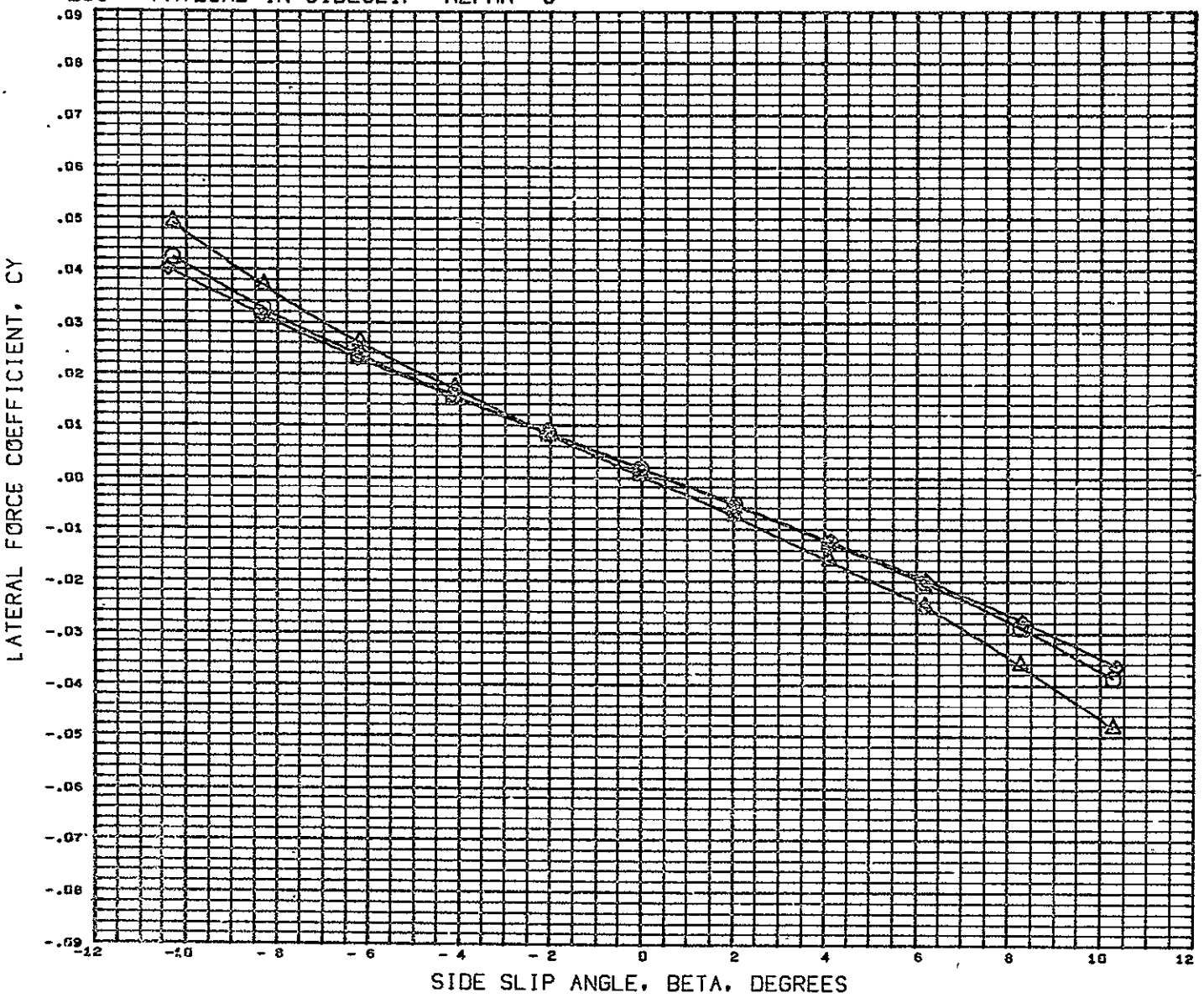
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.998

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.9950	INCHES
BREF	6.0090	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



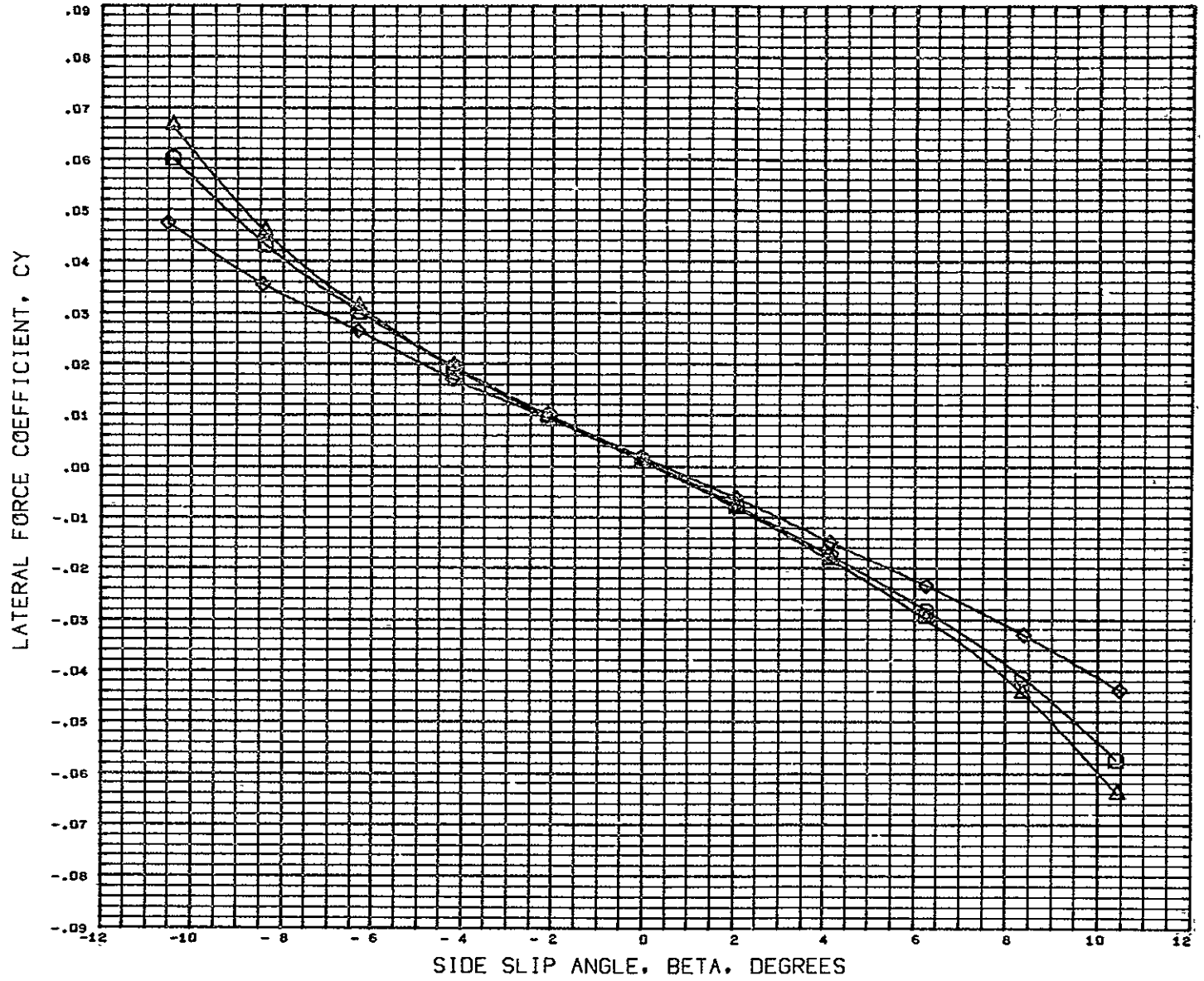
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C31018)	○	HSFC489 NR ESS+MDAC SPACE STATION U	-6.190
(B3102B)	△	HSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	HSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 1.194

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



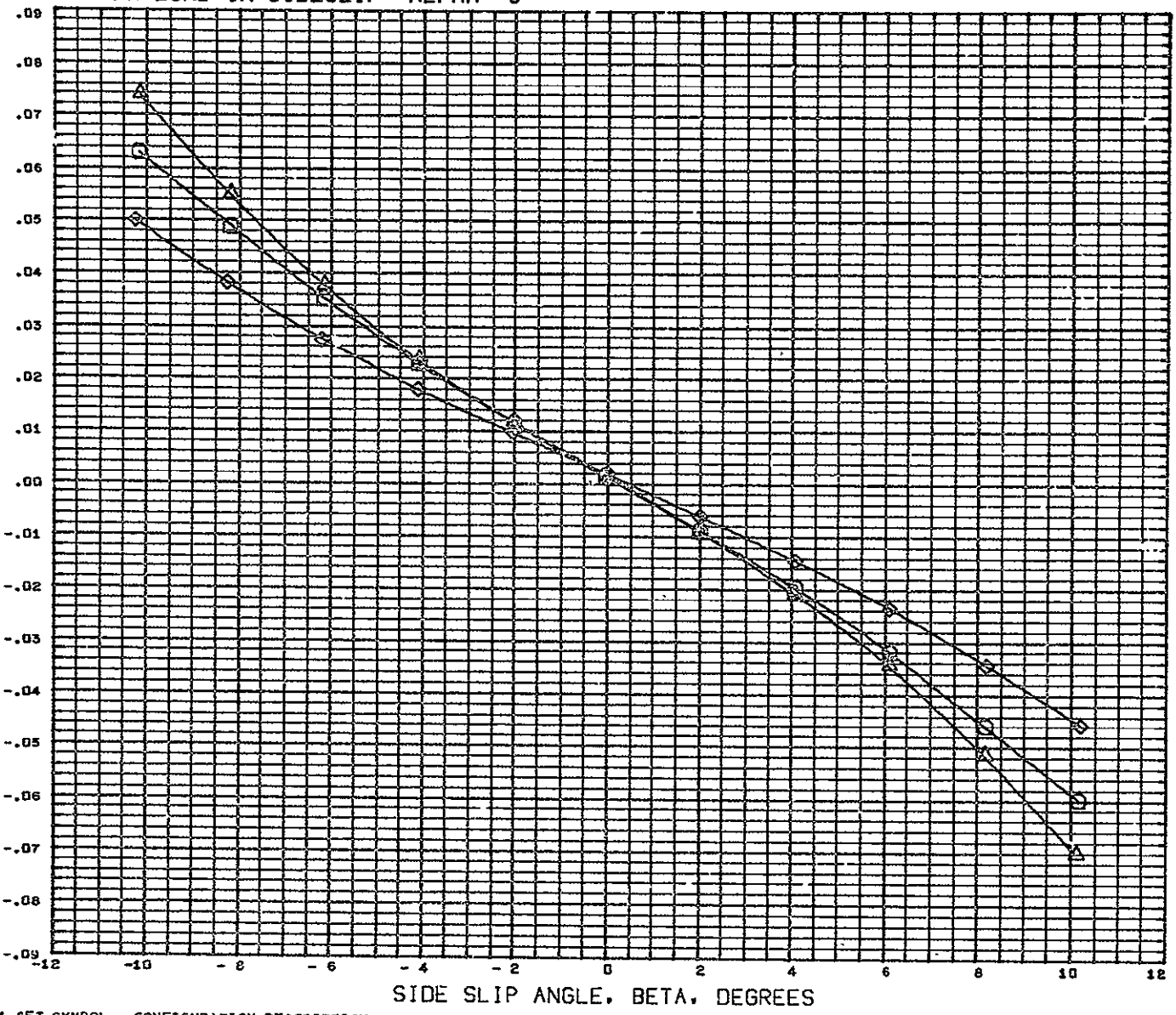
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SFACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR FAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SFACE TUG U3	-6.230

MACH 1.958

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



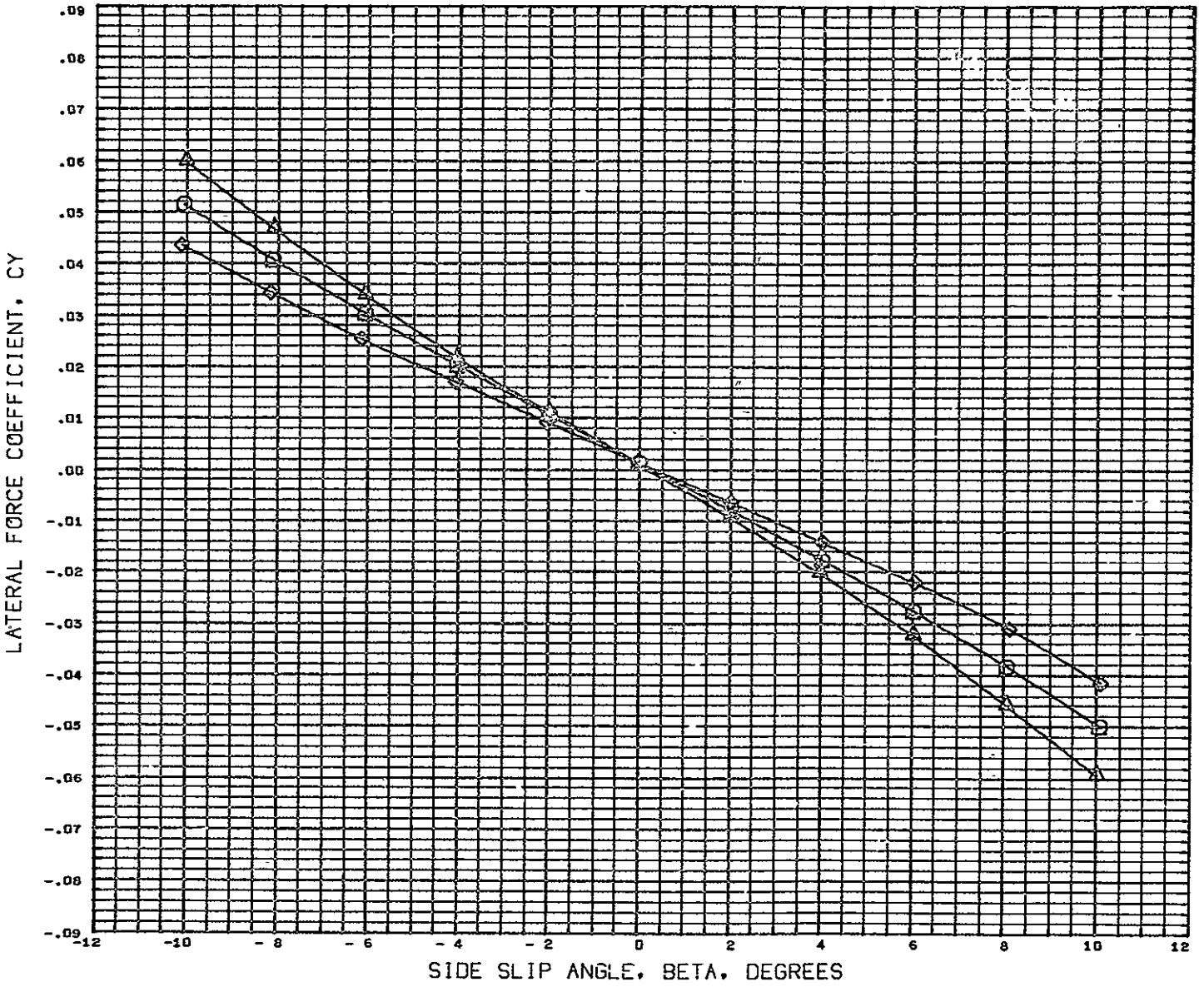
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(83102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(83103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0955	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



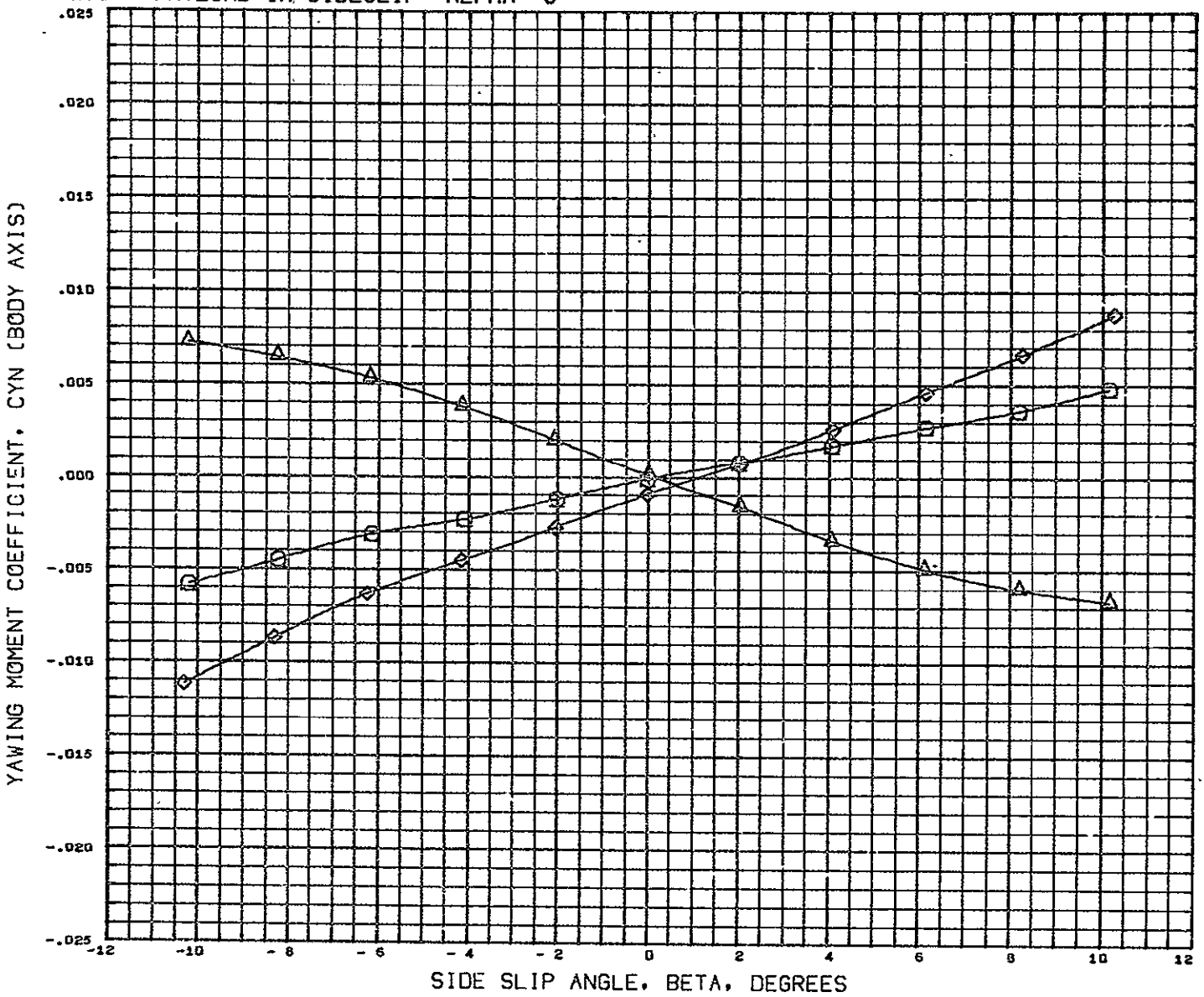
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 4.959

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0952	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6

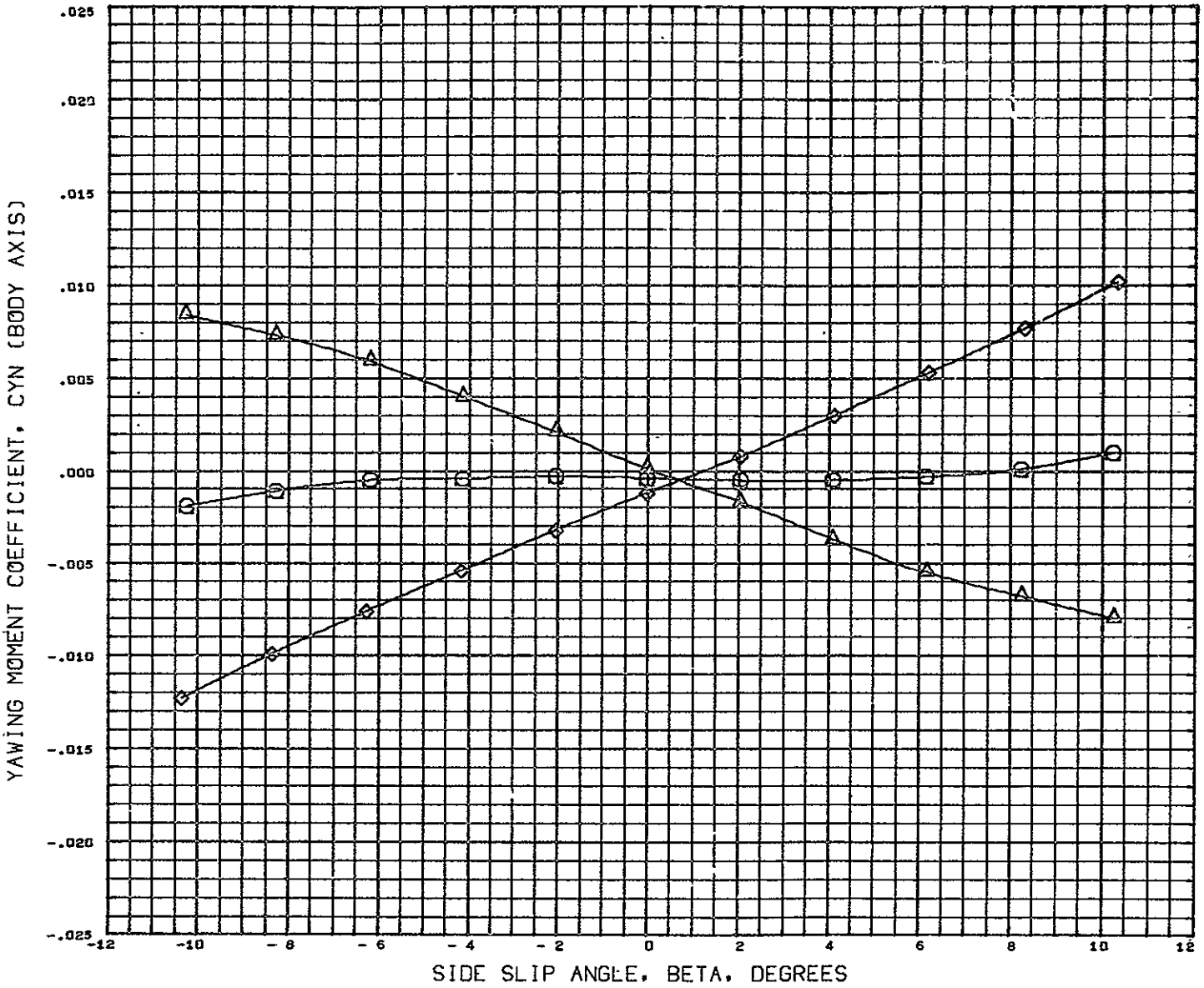


DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.901

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



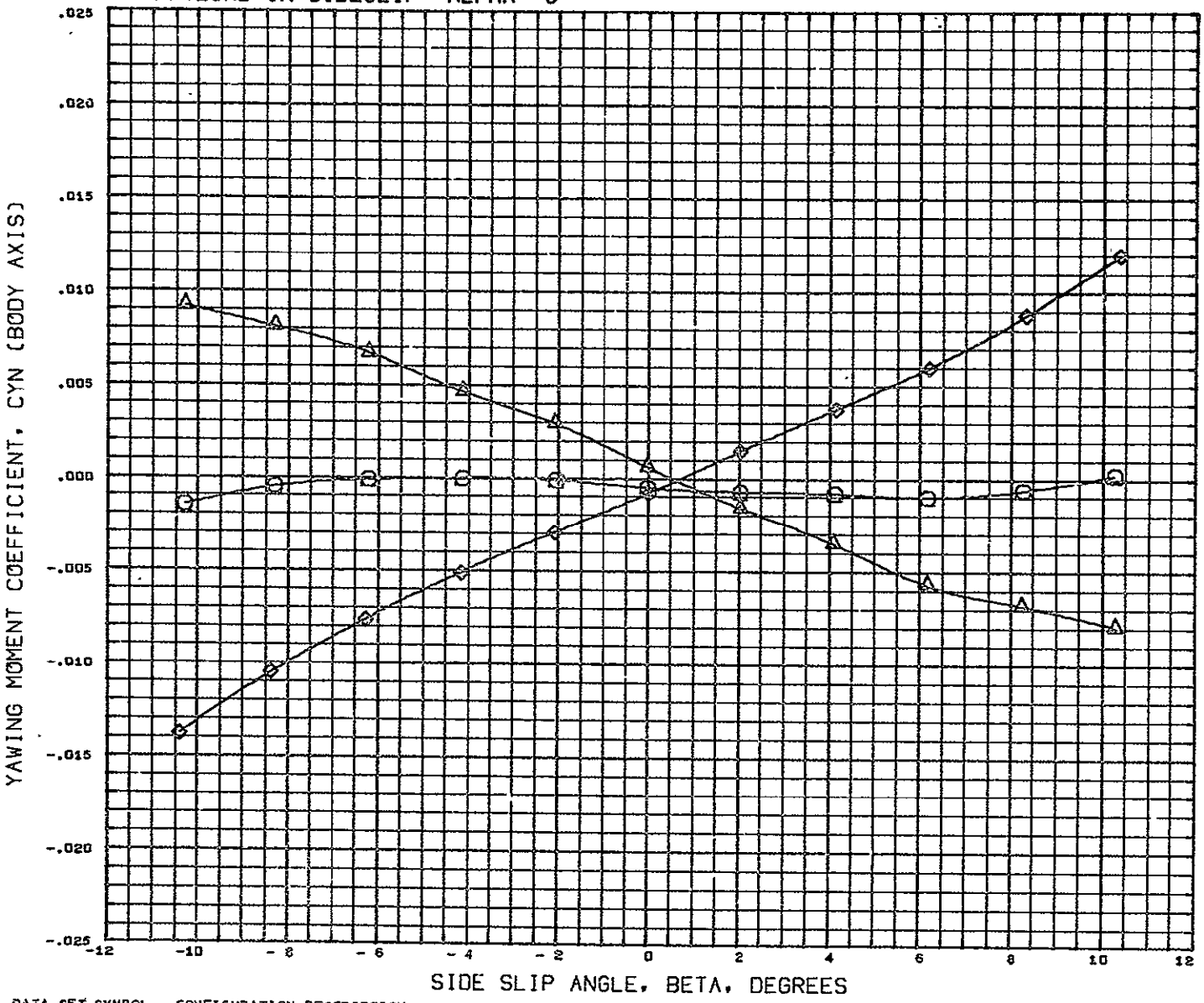
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.998

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0953	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3

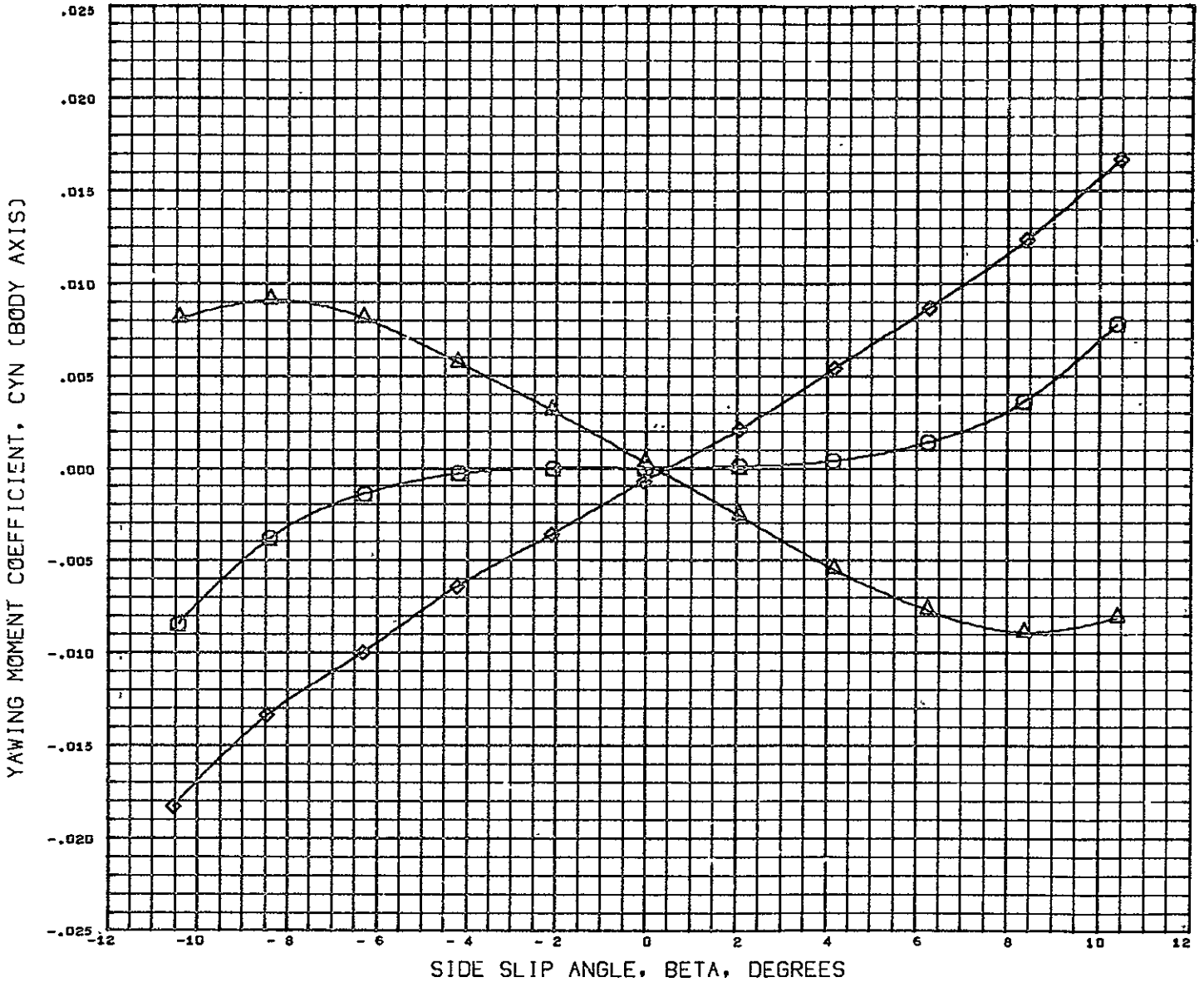
ALPHA
-6.100
-6.170
-6.230

MACH 1.194

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



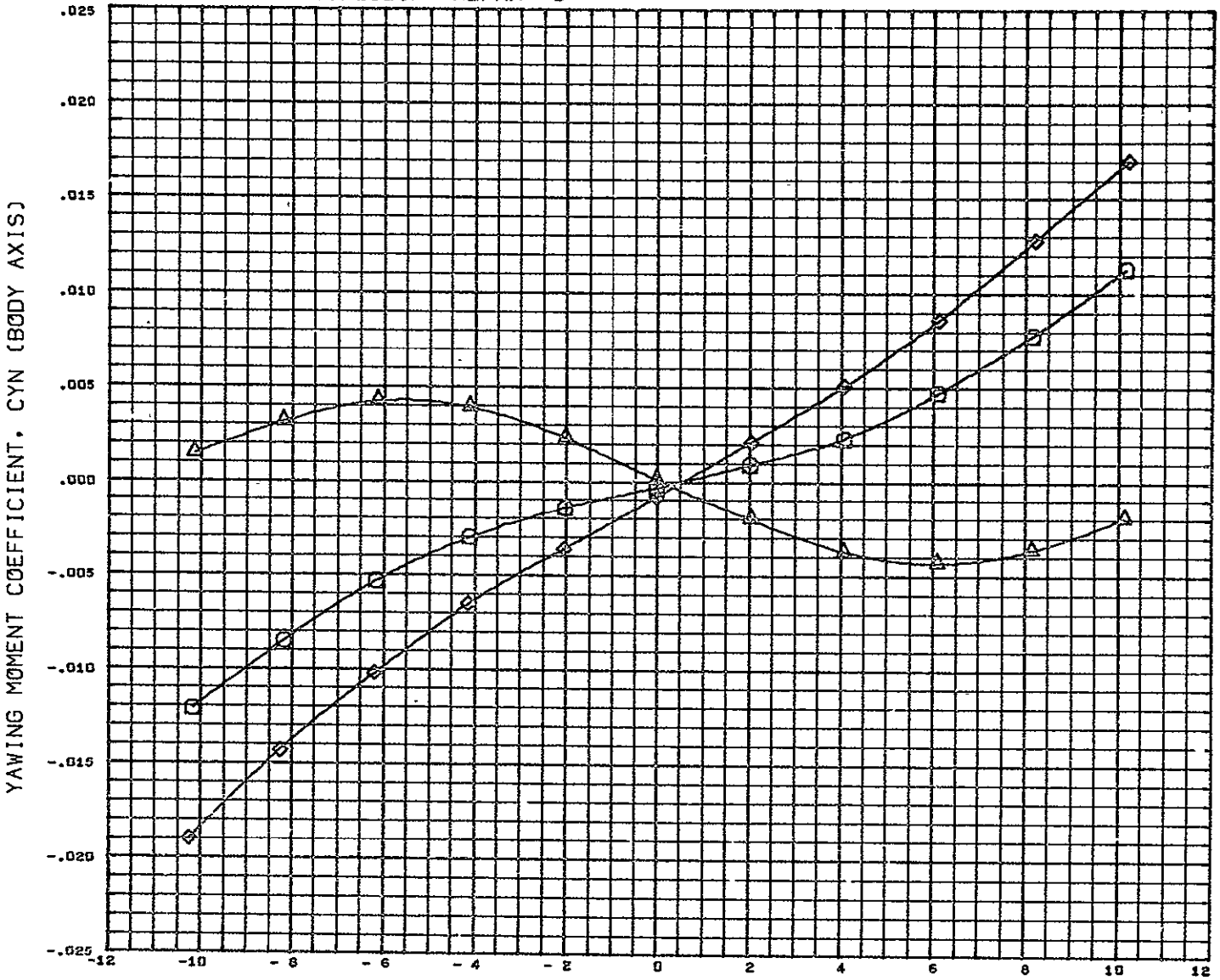
DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+NDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 1.958

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0510	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3

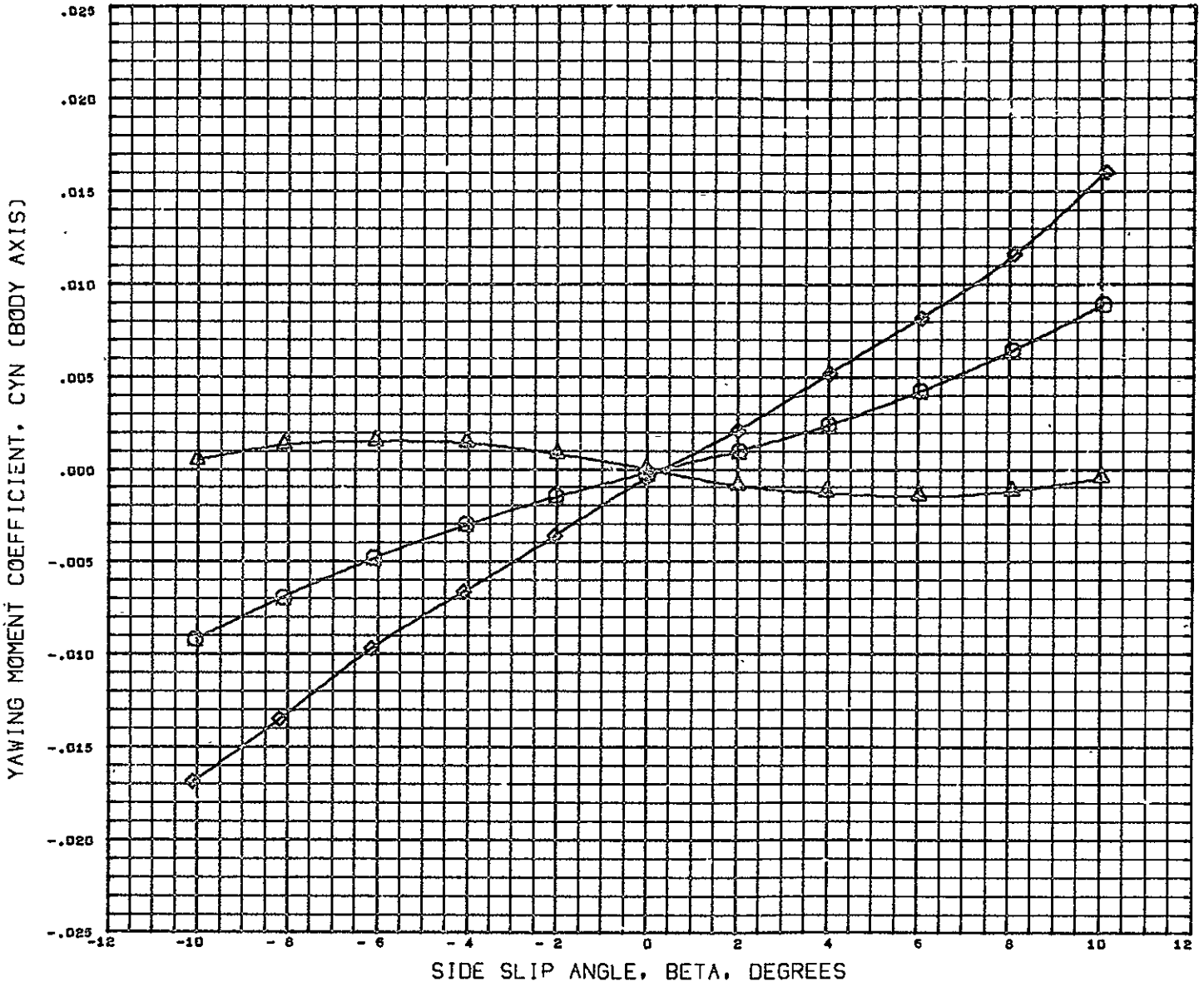
ALPHA
-6.100
-6.170
-5.230

MACH .2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6

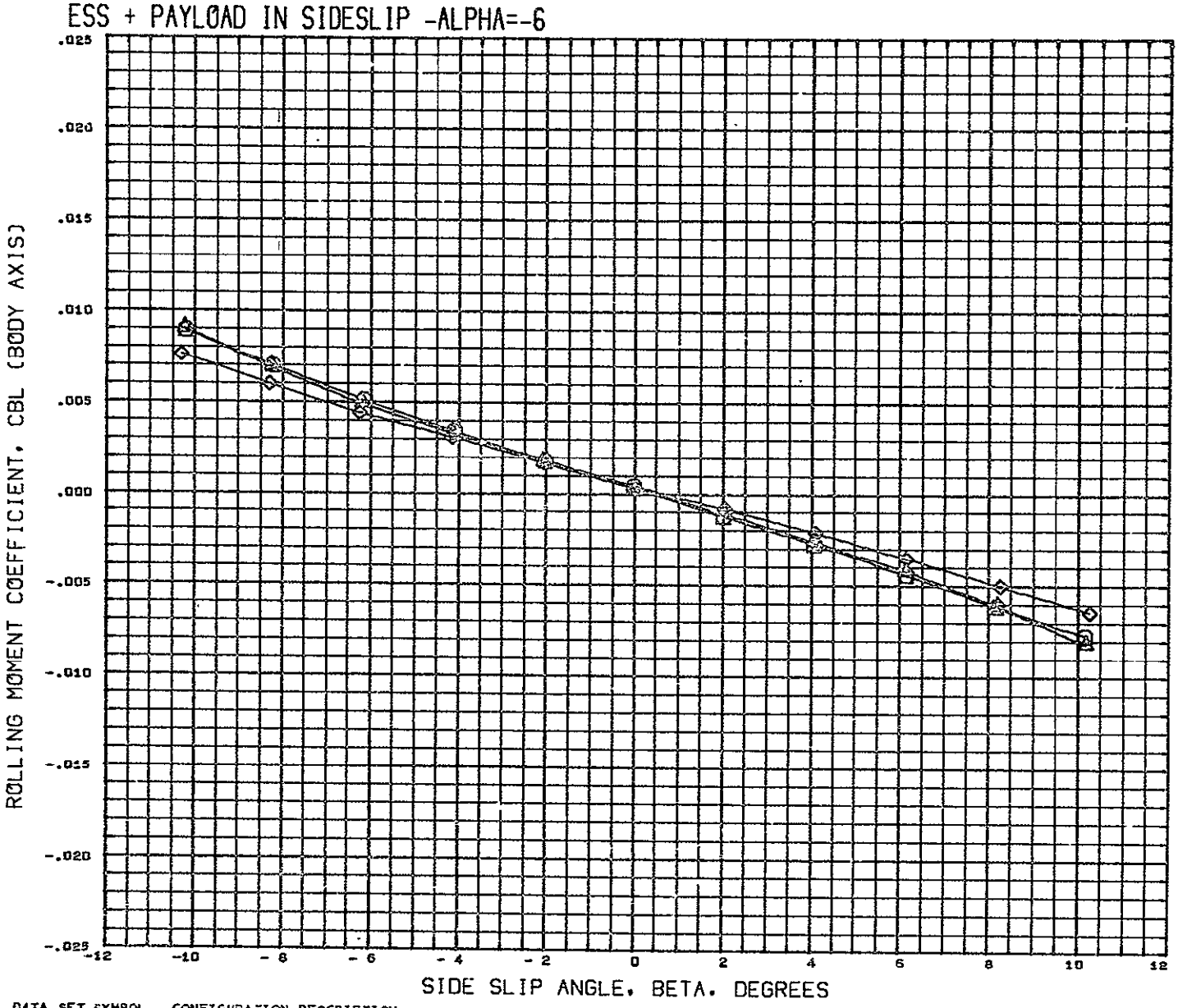


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 4.959

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0830	INCHES
BREF	6.9990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0051	SCALE



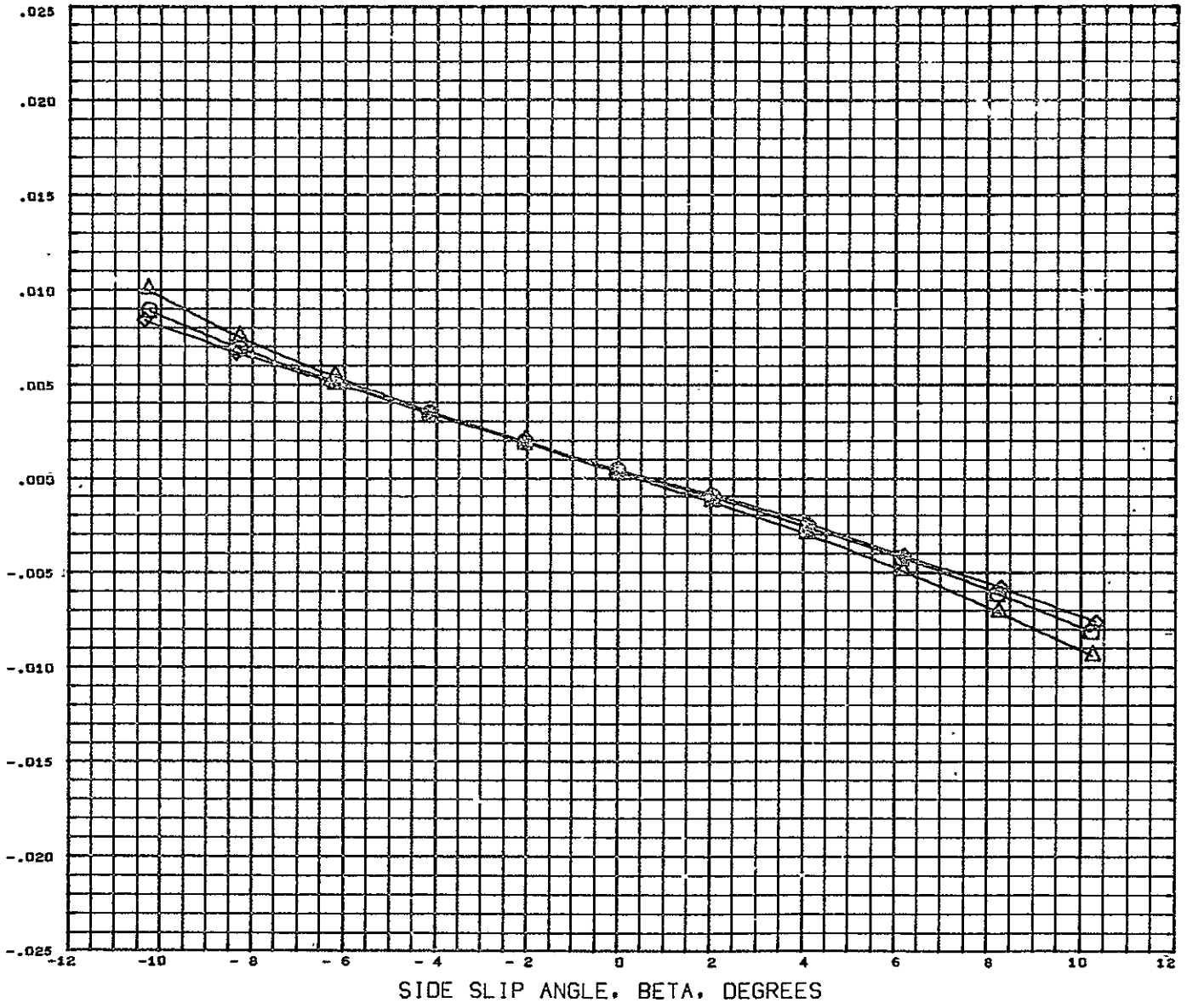
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+HDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.175
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.901

REFERENCE INFORMATION

SREF	15.6569	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6

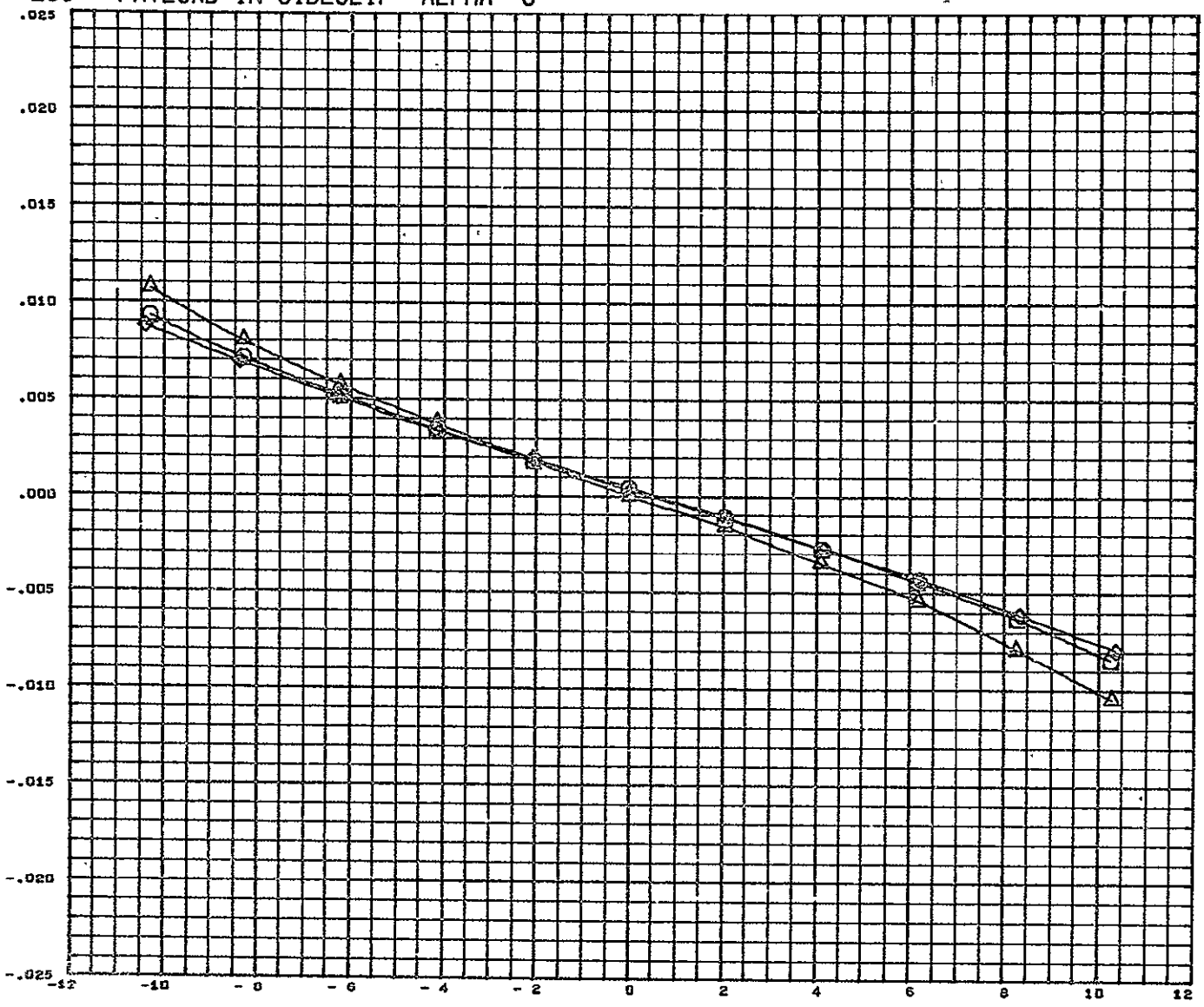


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.998

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0960	INCHES
BREF	6.7990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



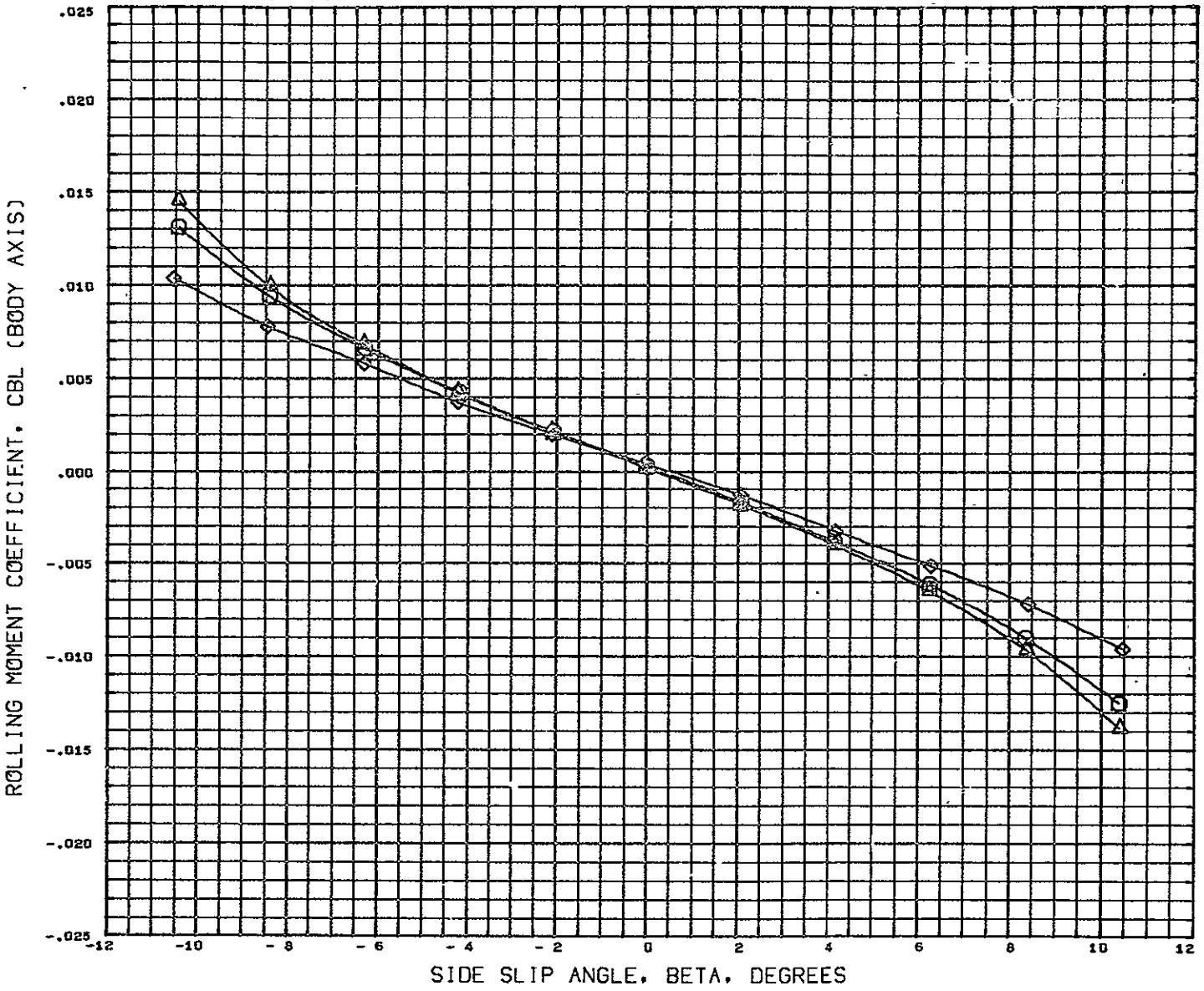
DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 1.194

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



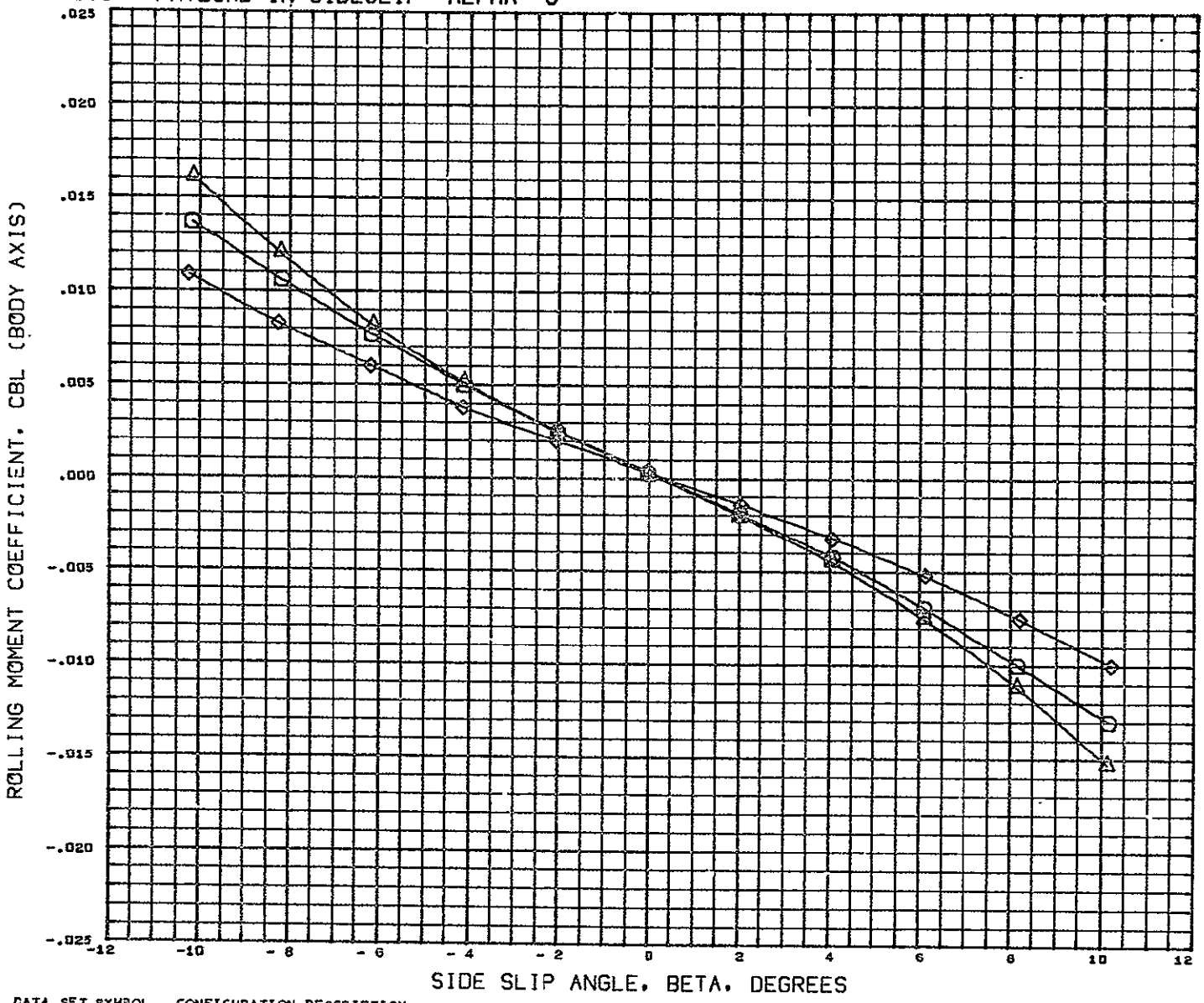
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 1.958

REFERENCE INFORMATION

SREF	15.656[illegible]	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



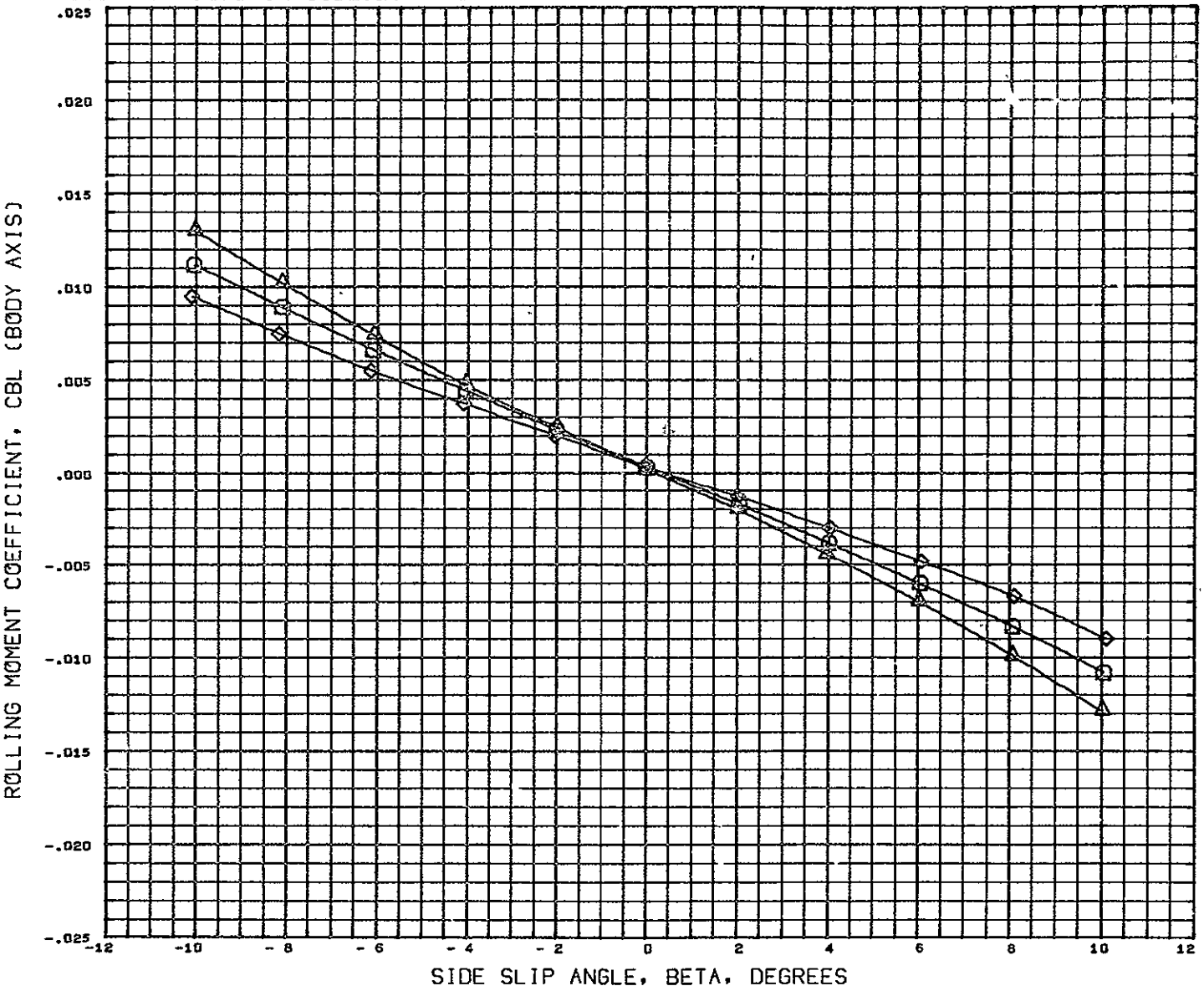
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C31018)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B31028)	□	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B31038)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0650	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6

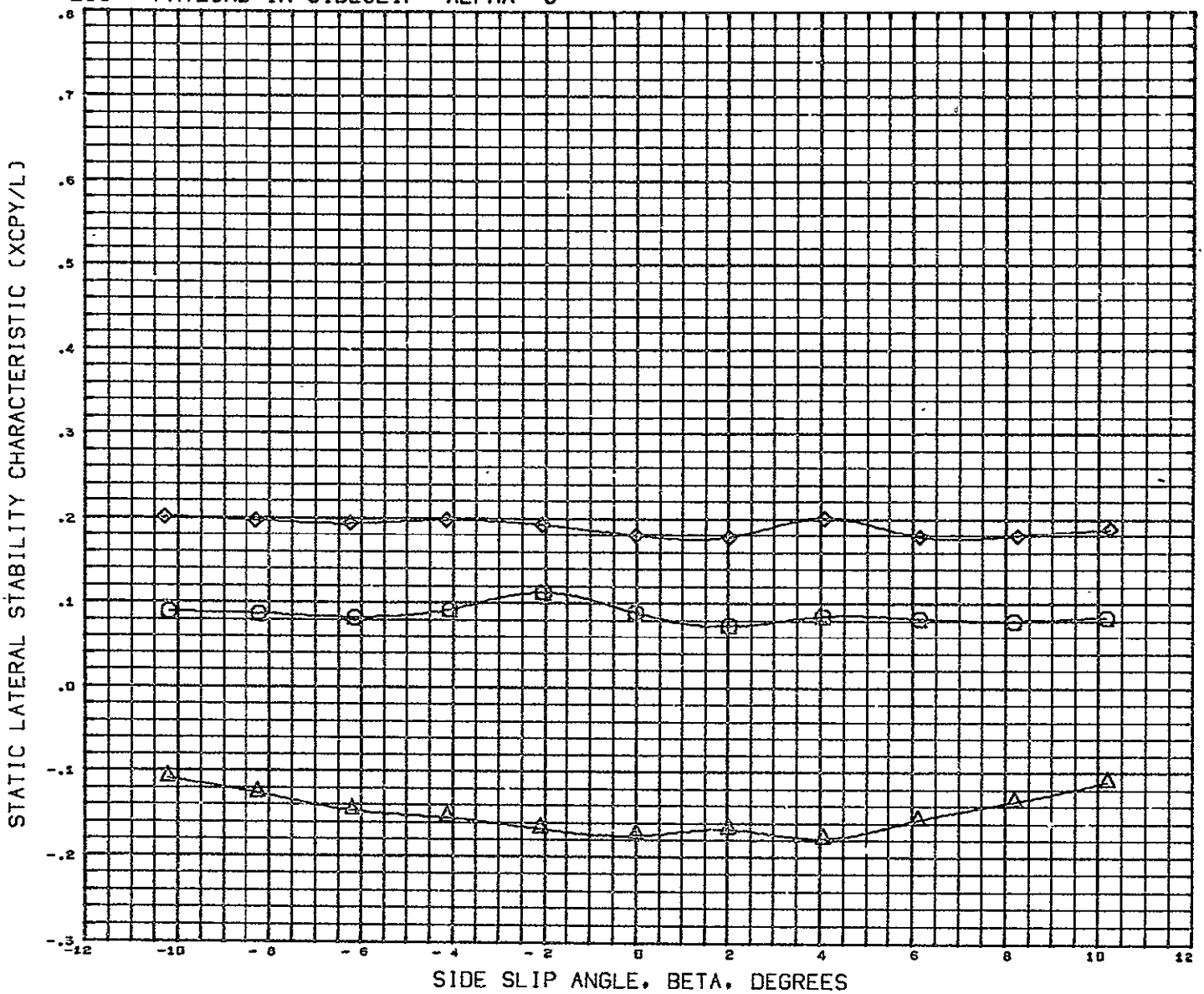


DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 4.959

REFERENCE INFORMATION			
SREF		15.656[illegible]	SQ IN
LREF		3.095[illegible]	INCHES
BREF		6.0390	INCHES
XMRP		1.7170	INCHES
YMRP		0.0000	
ZMRP	-	1.3320	INCHES
SCALE		0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



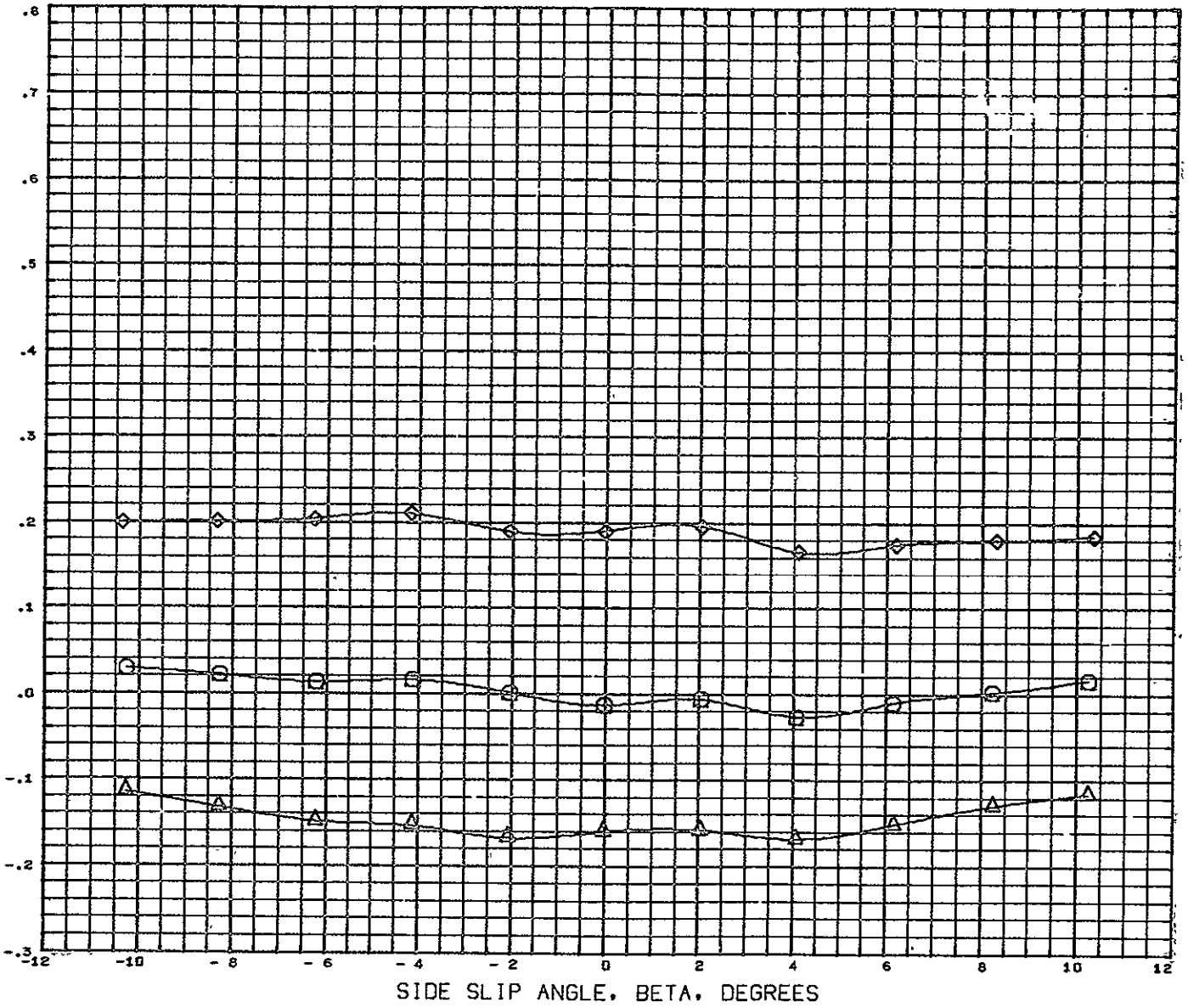
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+HDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.901

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0590	INCHES
BREF	6.9990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP -ALPHA=-6



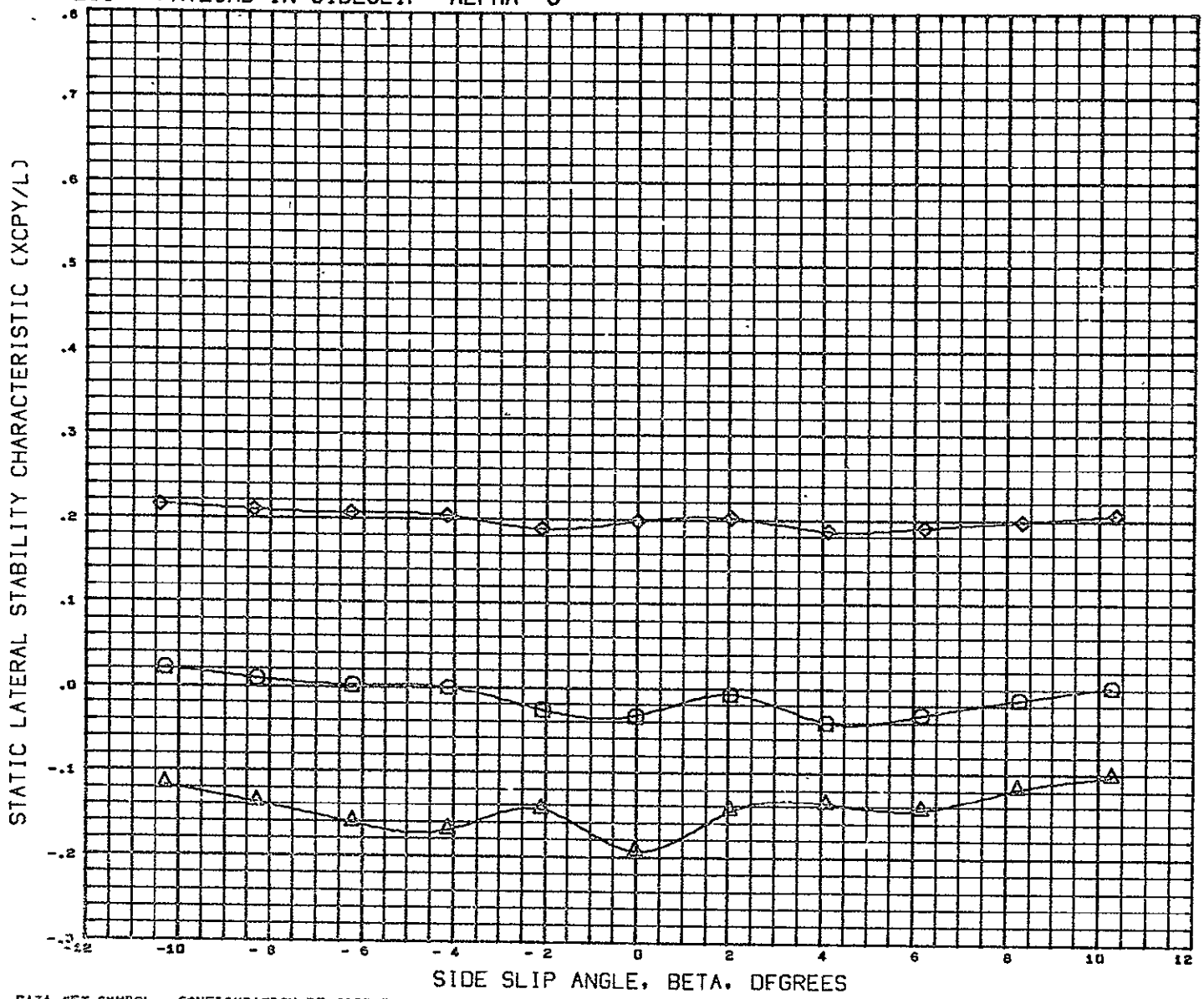
DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA
(C31G1B)	○	MSFC489 NR ESS+HDAC SPACE STATION U	-6.100
(B31G2B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B31G3B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 0.998

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0930	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C31018)	○	MSFC489 NR ESS+MDAC SPACE STATION U
(83102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2
(83103B)	◇	MSFC489 NR ESS+SPACE TUG U3

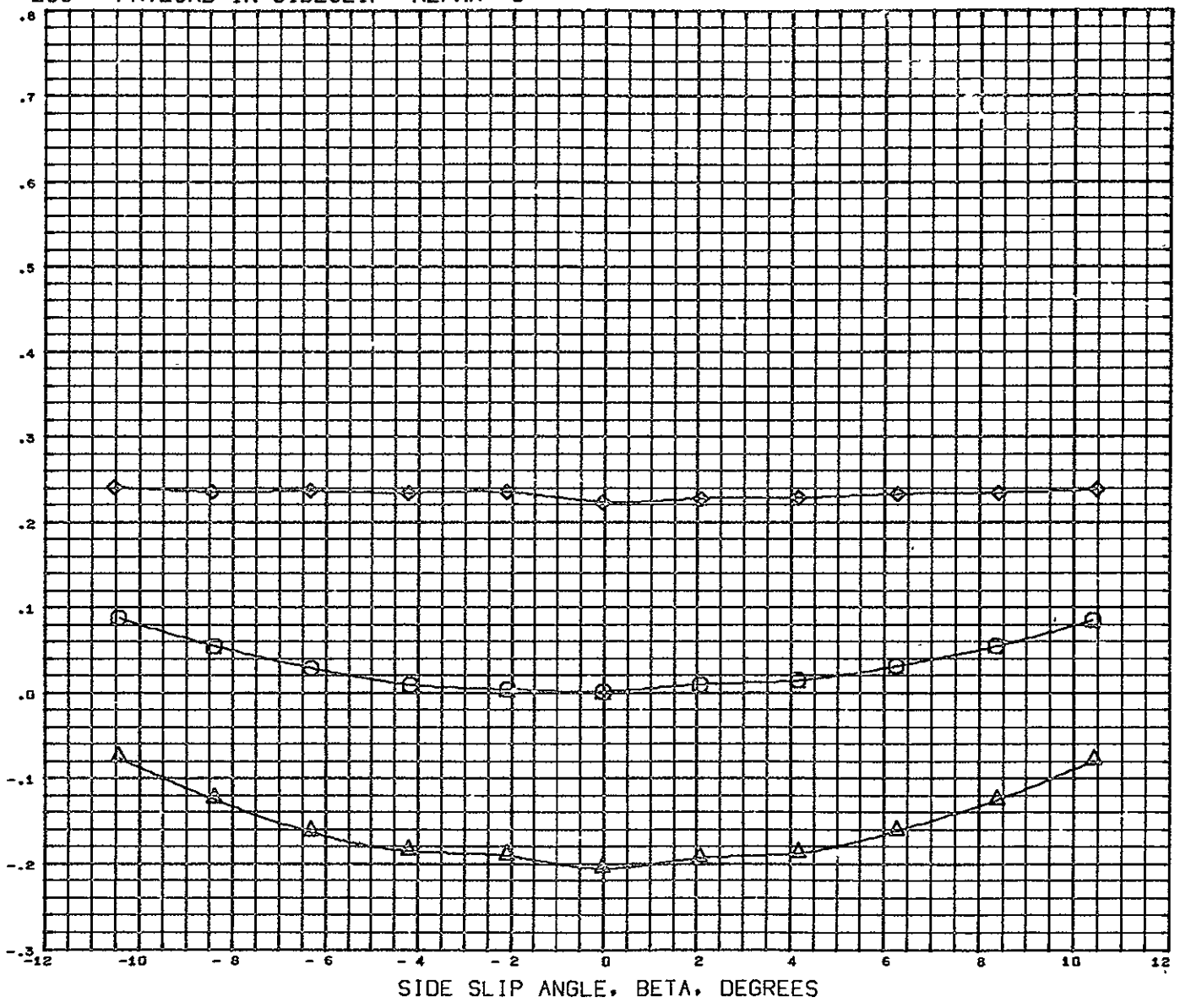
ALPHA
-6.100
-6.170
-6.230

MACH 1.194

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



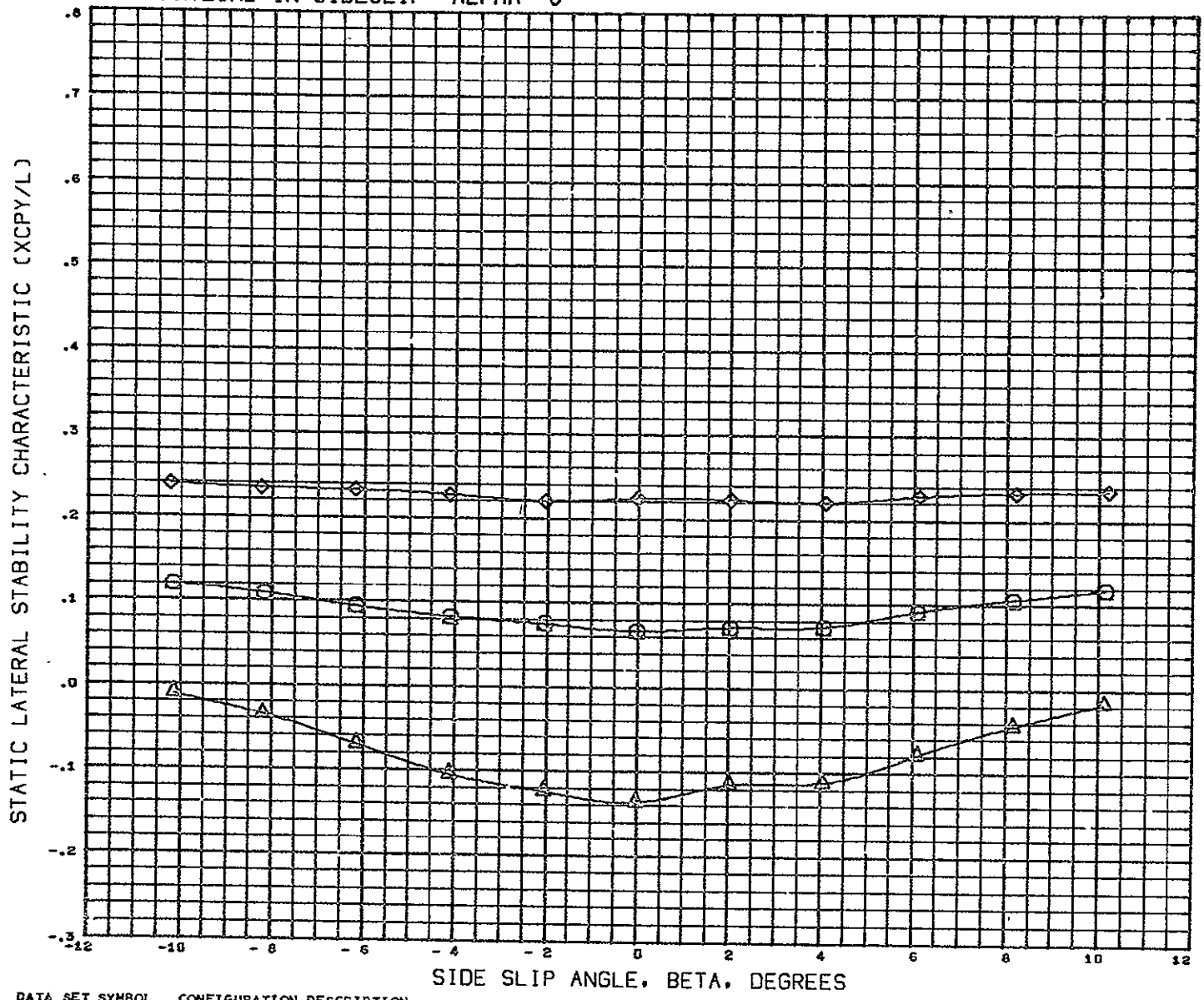
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.100
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 1.958

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0550	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP	- 1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3

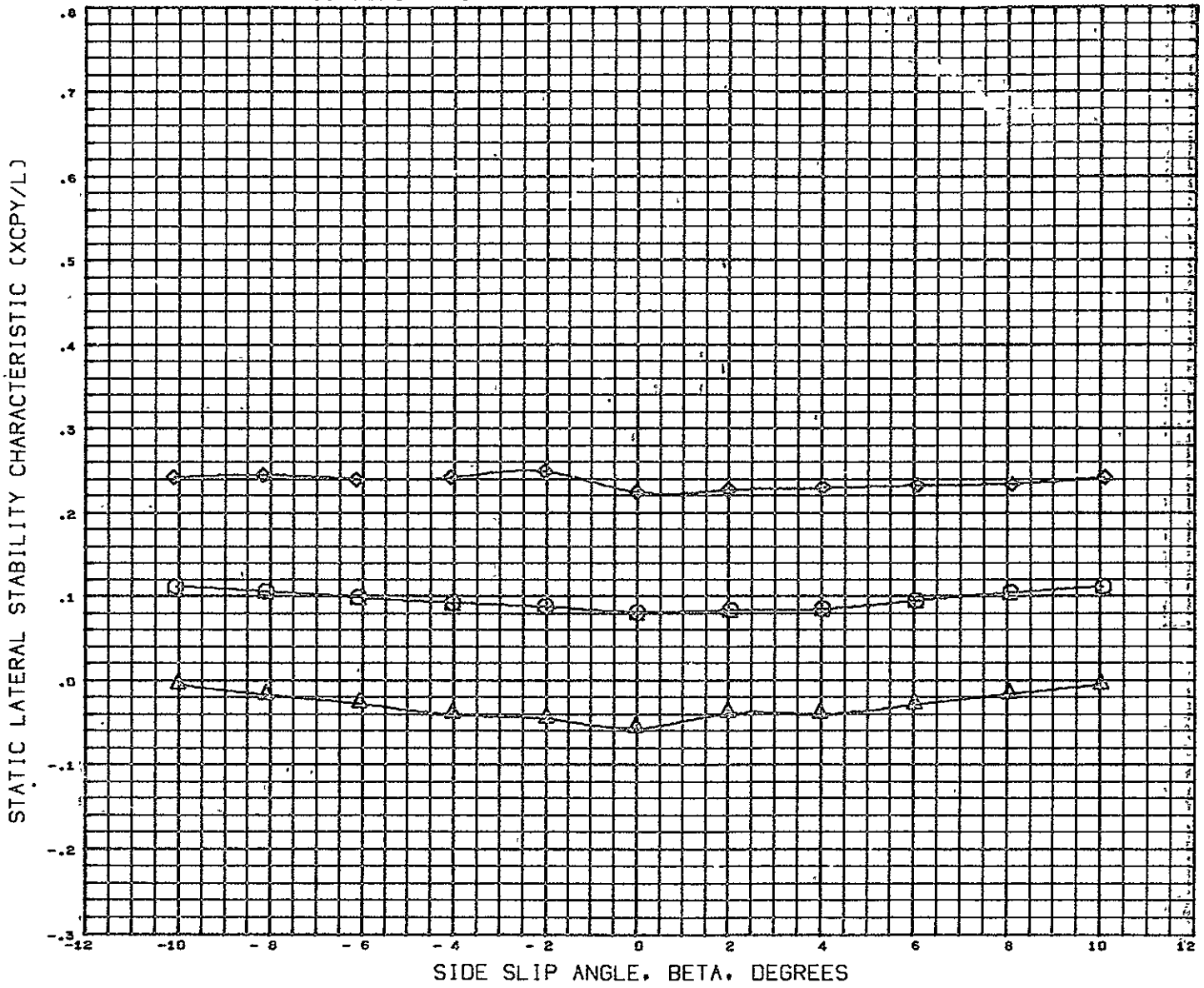
ALPHA
-6.100
-6.170
-6.230

MACH 2.990

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.7990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP -ALPHA=-6



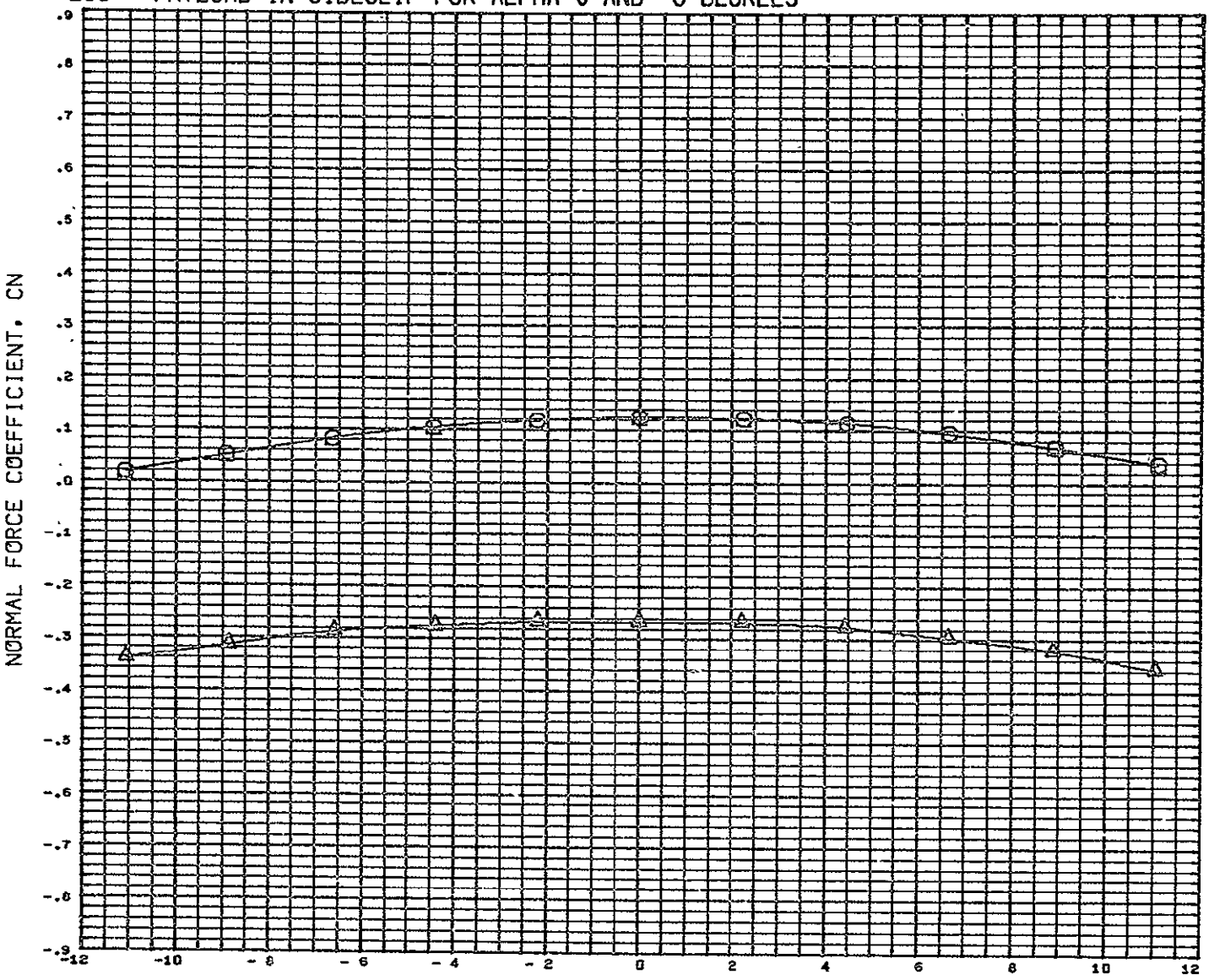
DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA
(C3101B)	○	MSFC489 NR ESS+MDAC SPACE STATION U	-6.160
(B3102B)	△	MSFC489 NR ESS+NUCLEAR PAYLOAD U2	-6.170
(B3103B)	◇	MSFC489 NR ESS+SPACE TUG U3	-6.230

MACH 4.959

REFERENCE INFORMATION

SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	1.7170	INCHES
YMRP	0.0000	
ZMRP -	1.3320	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES

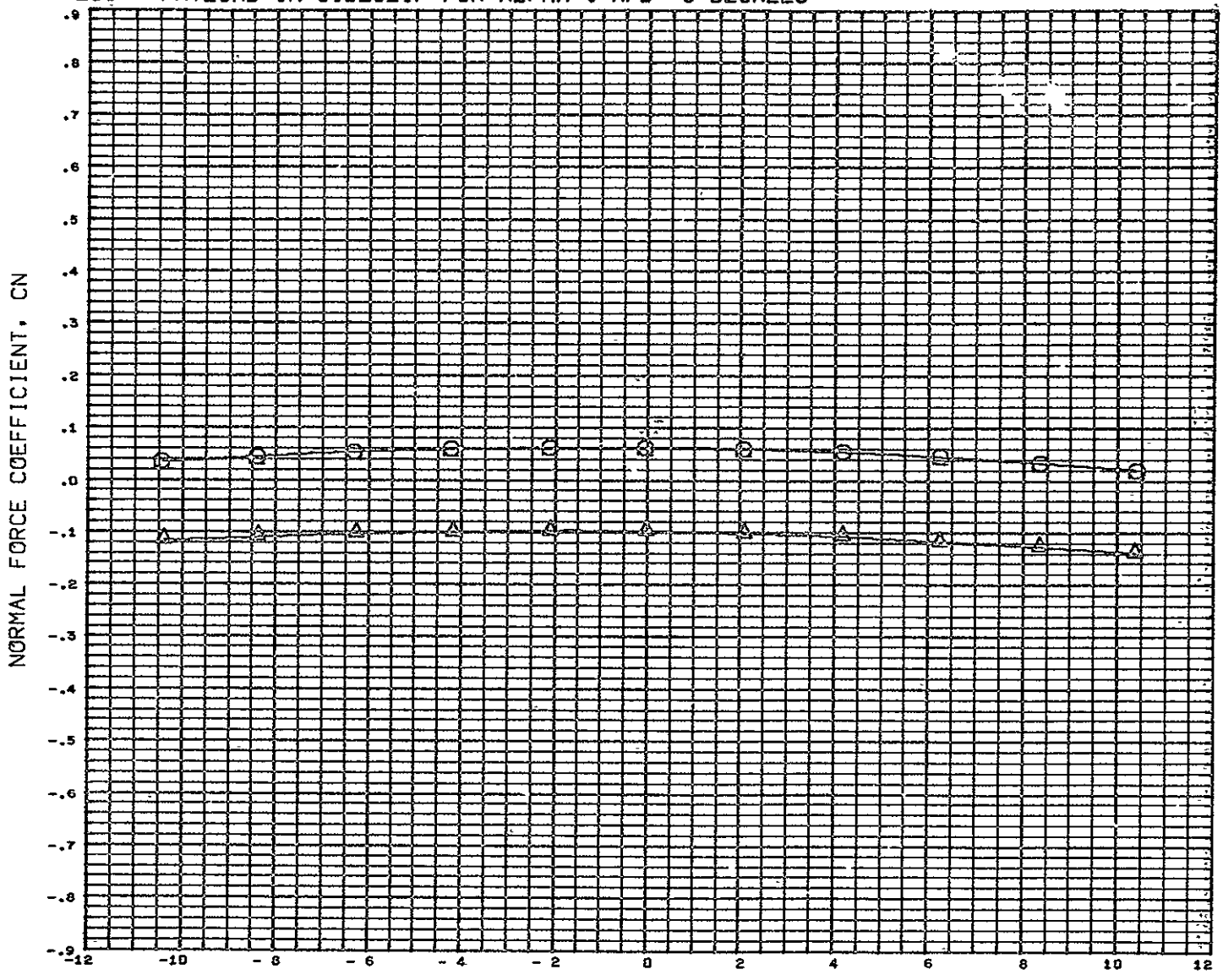


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)		HSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)		HSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.5560	SQ IN
LREF	3.0950	INCHES
BREF	6.0390	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.195

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES

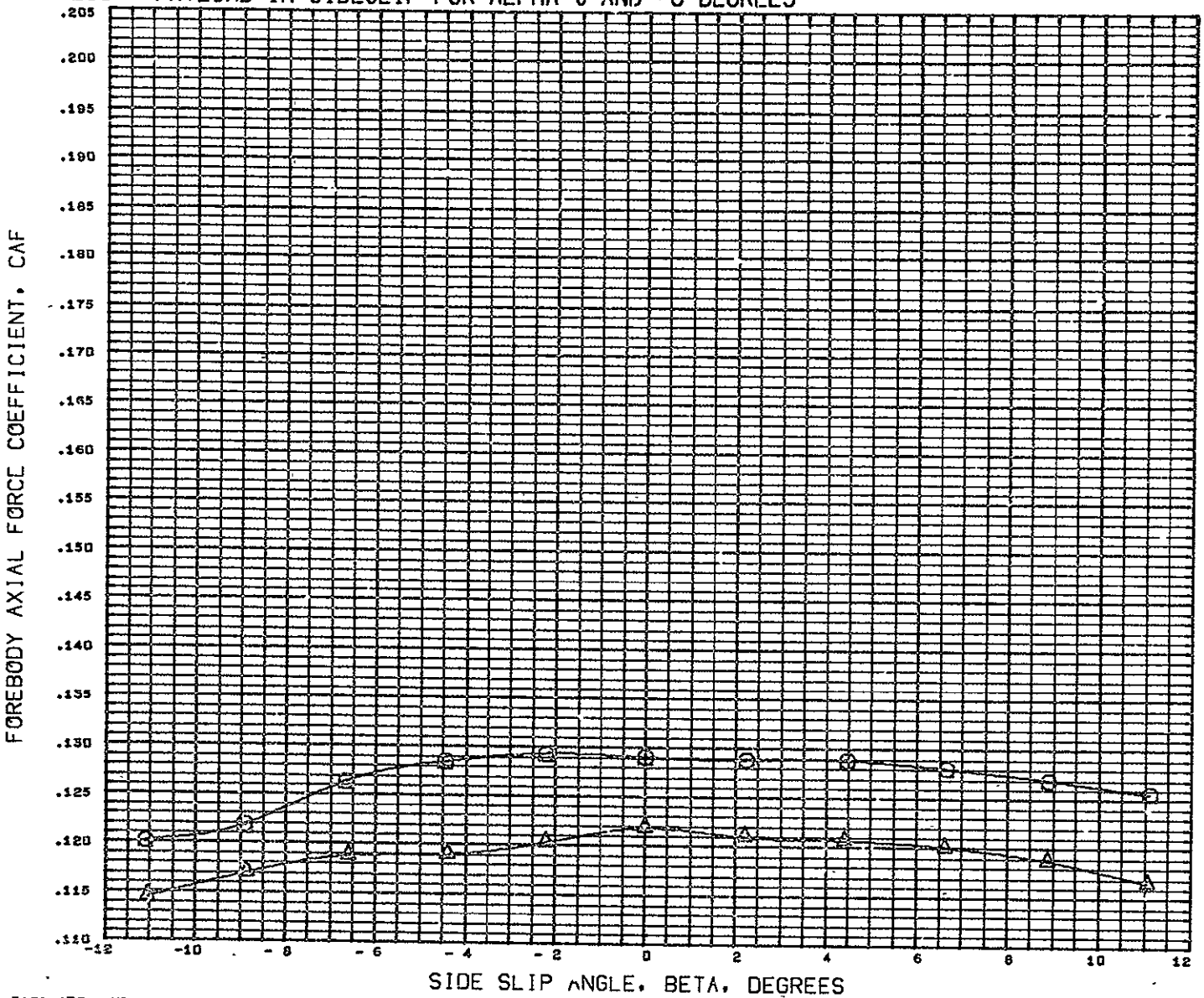


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6500	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.999

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES



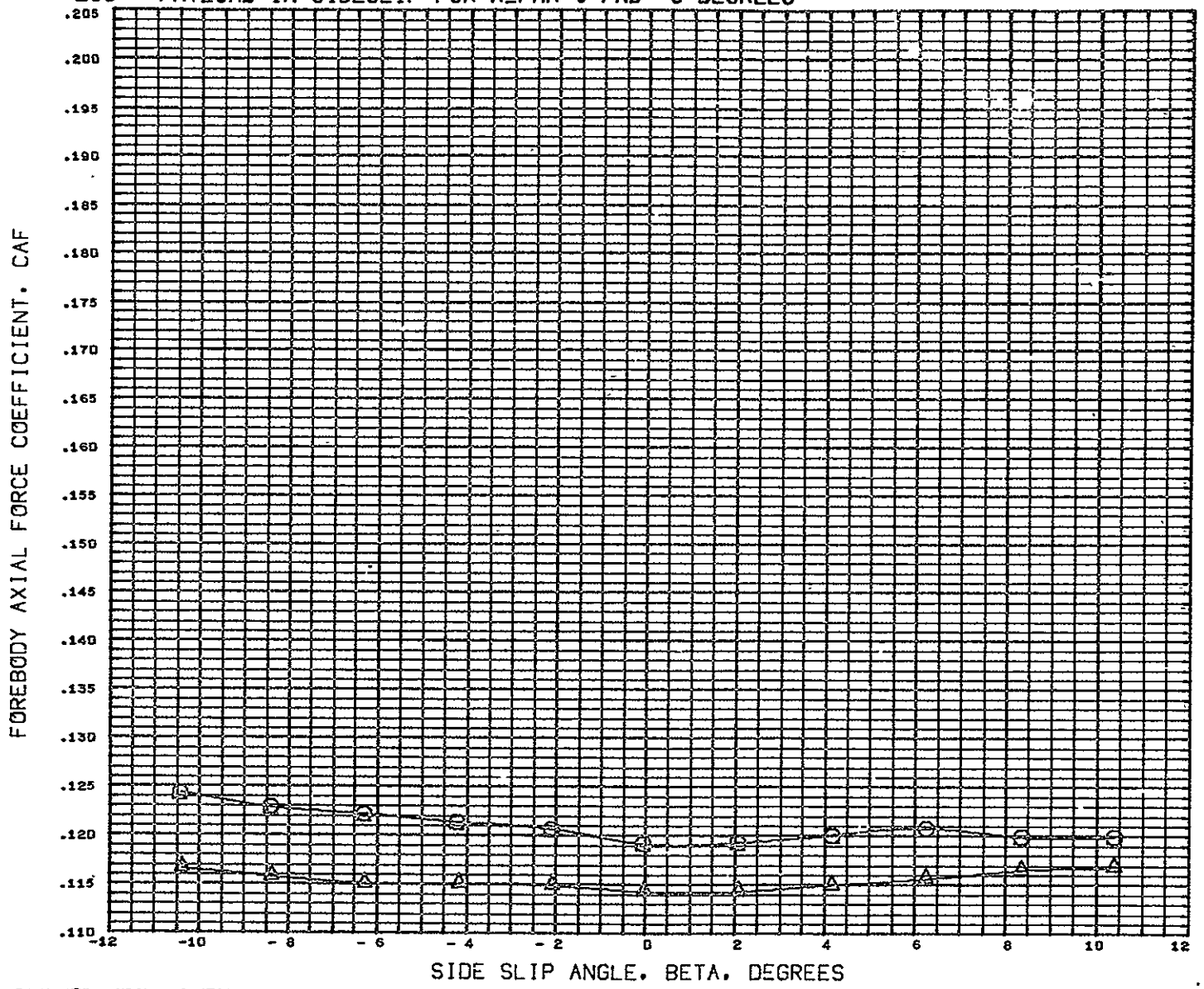
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
-6.430	0.000	0.000	0.000

MACH 1.195

REFERENCE INFORMATION		
SREF	15.65[illegible]	SQ IN
LREF	3.05[illegible]	INCHES
BREF	6.3990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES

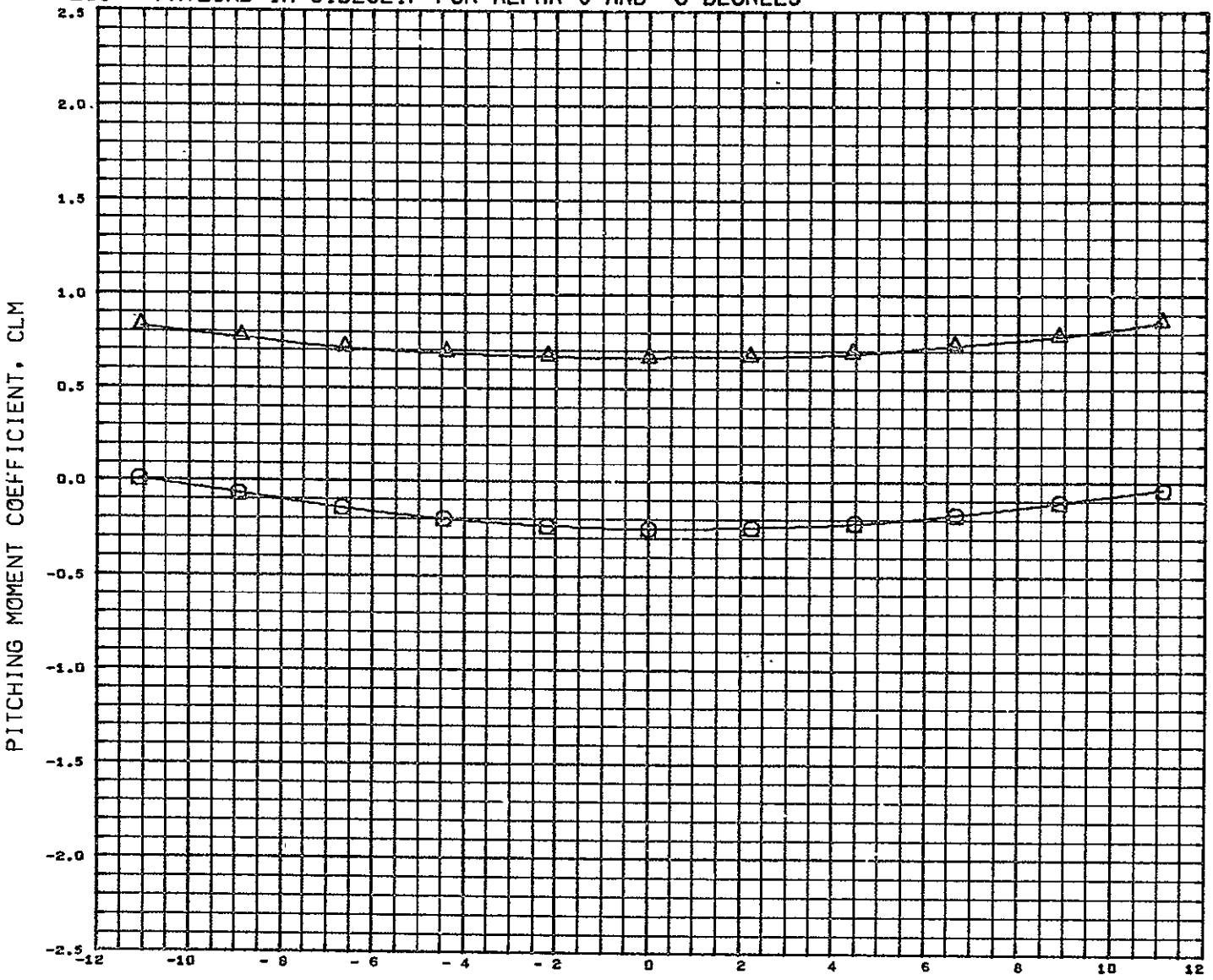


DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B) ○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B) △	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6760	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES



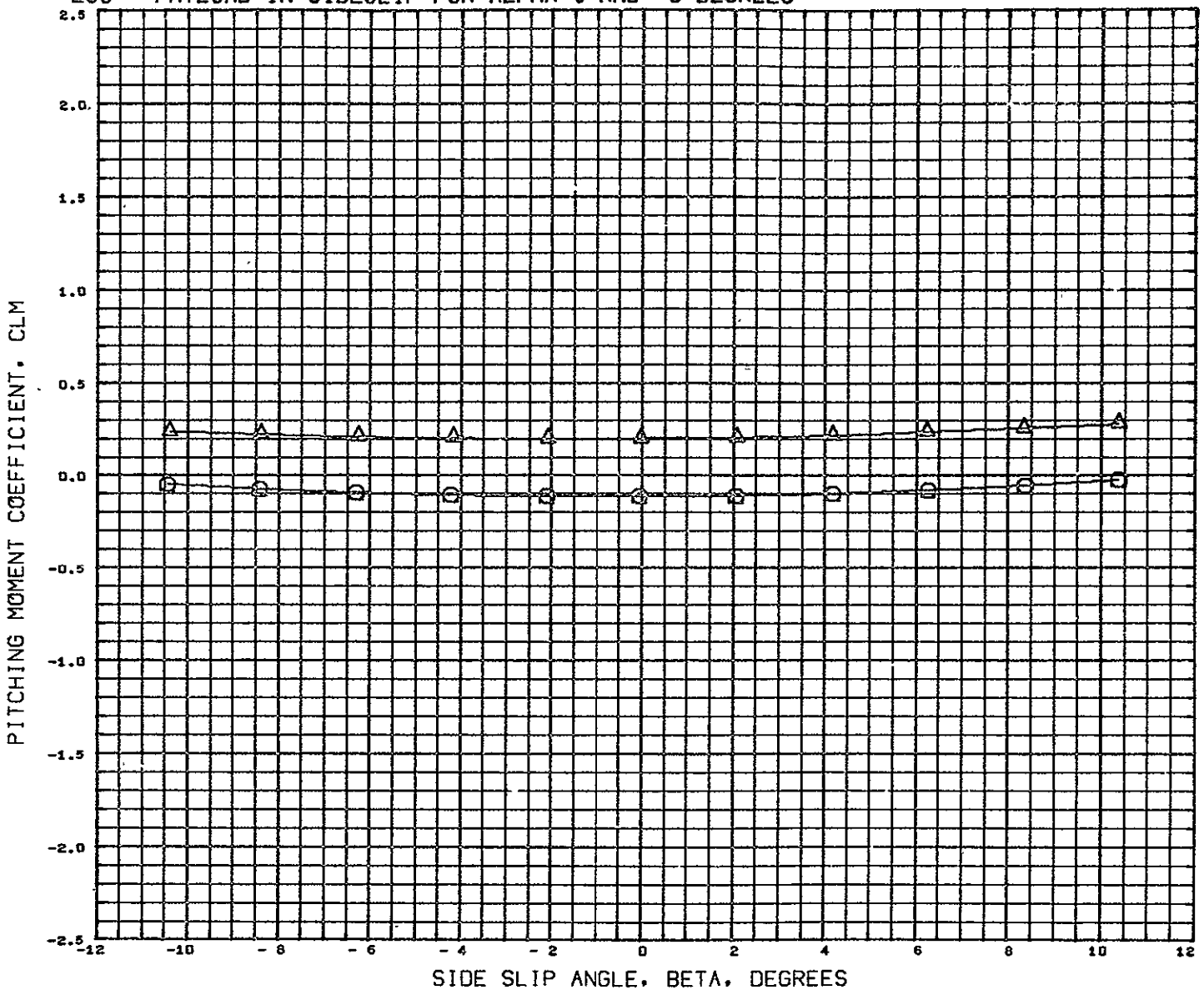
DATA SET SYMBOL		CONFIGURATION DESCRIPTION
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

MACH 1.195

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.003*	SCALE

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES

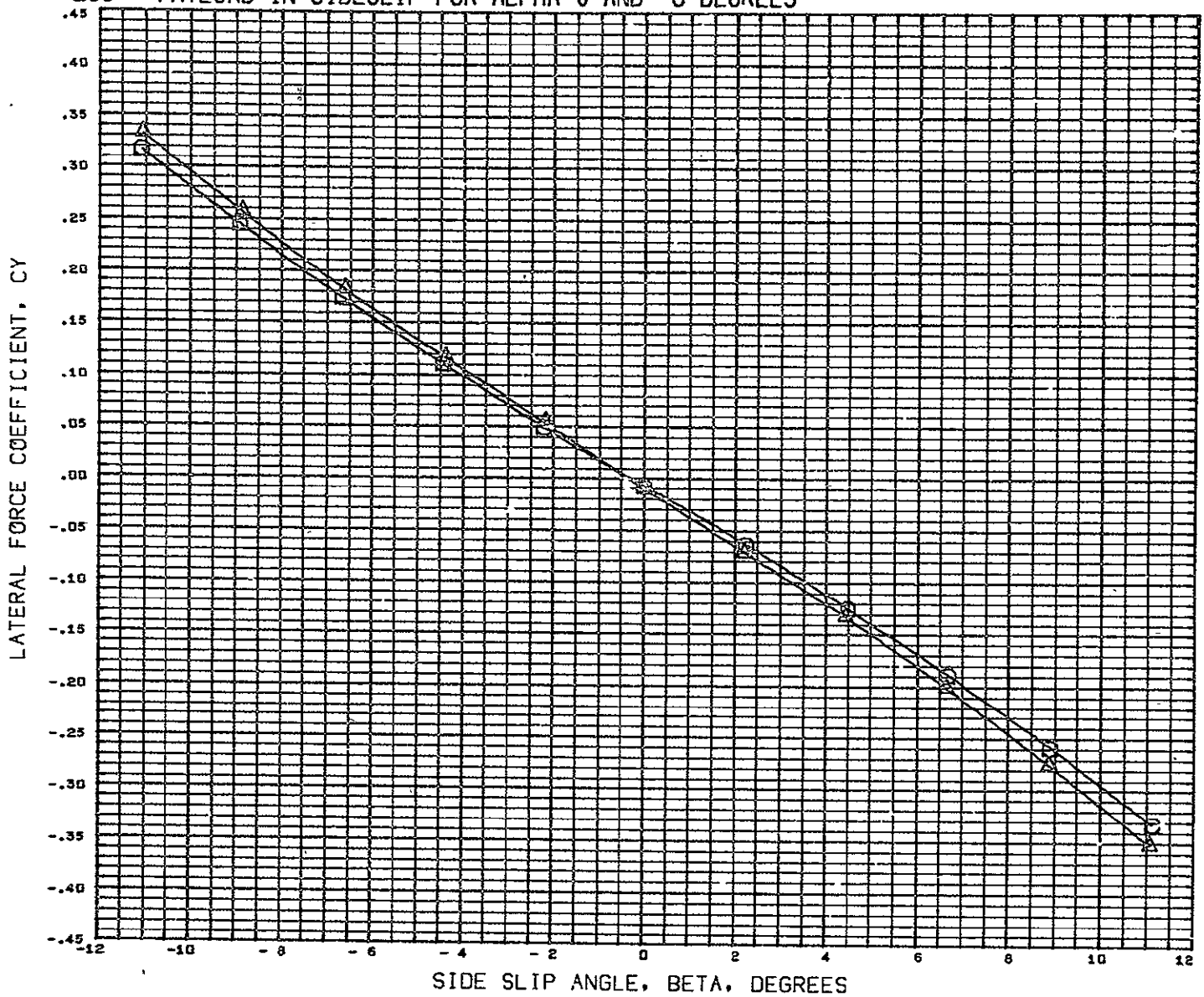


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6561	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES



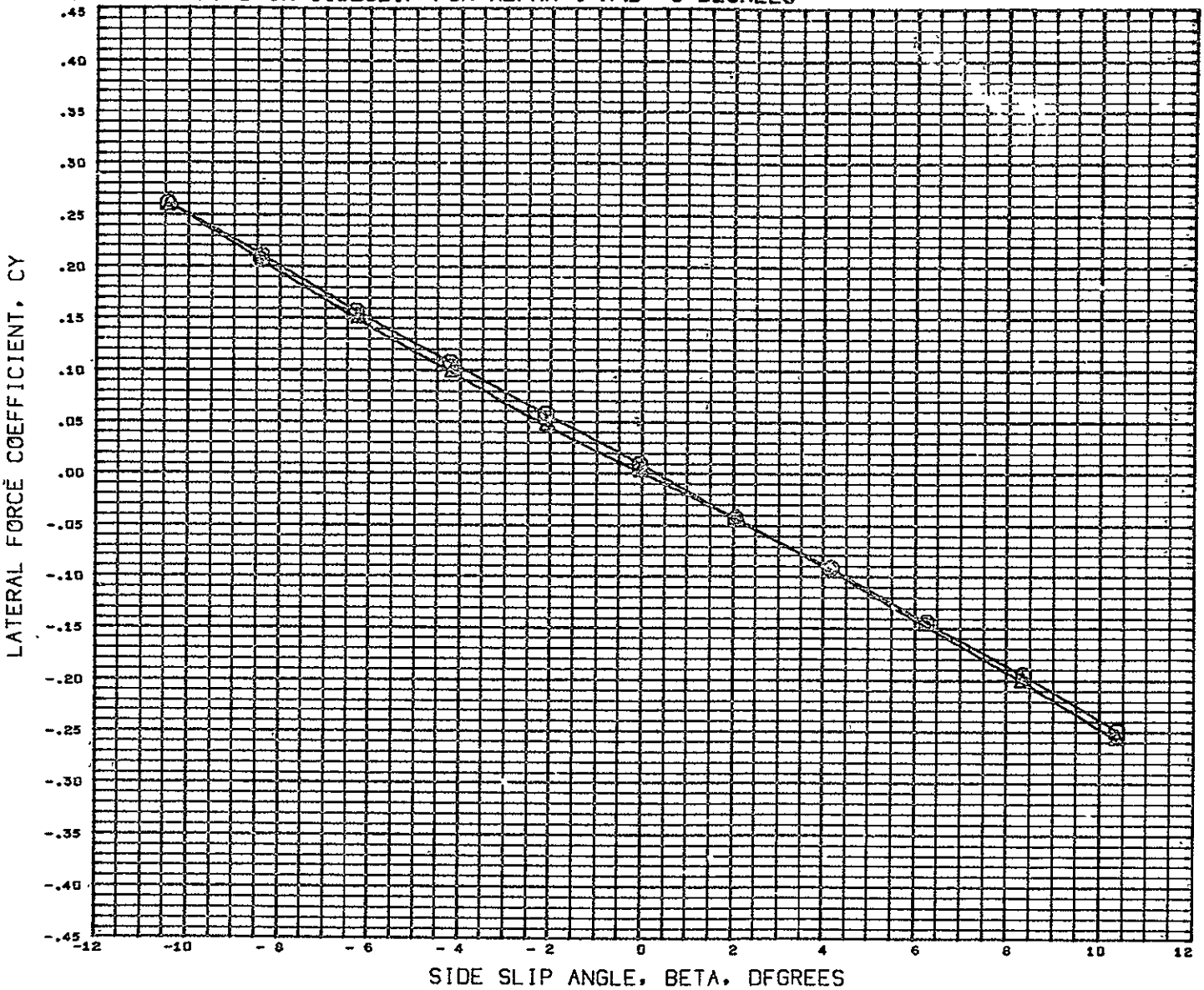
DATA SET SYMBOL.		CONFIGURATION DESCRIPTION
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.195

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES

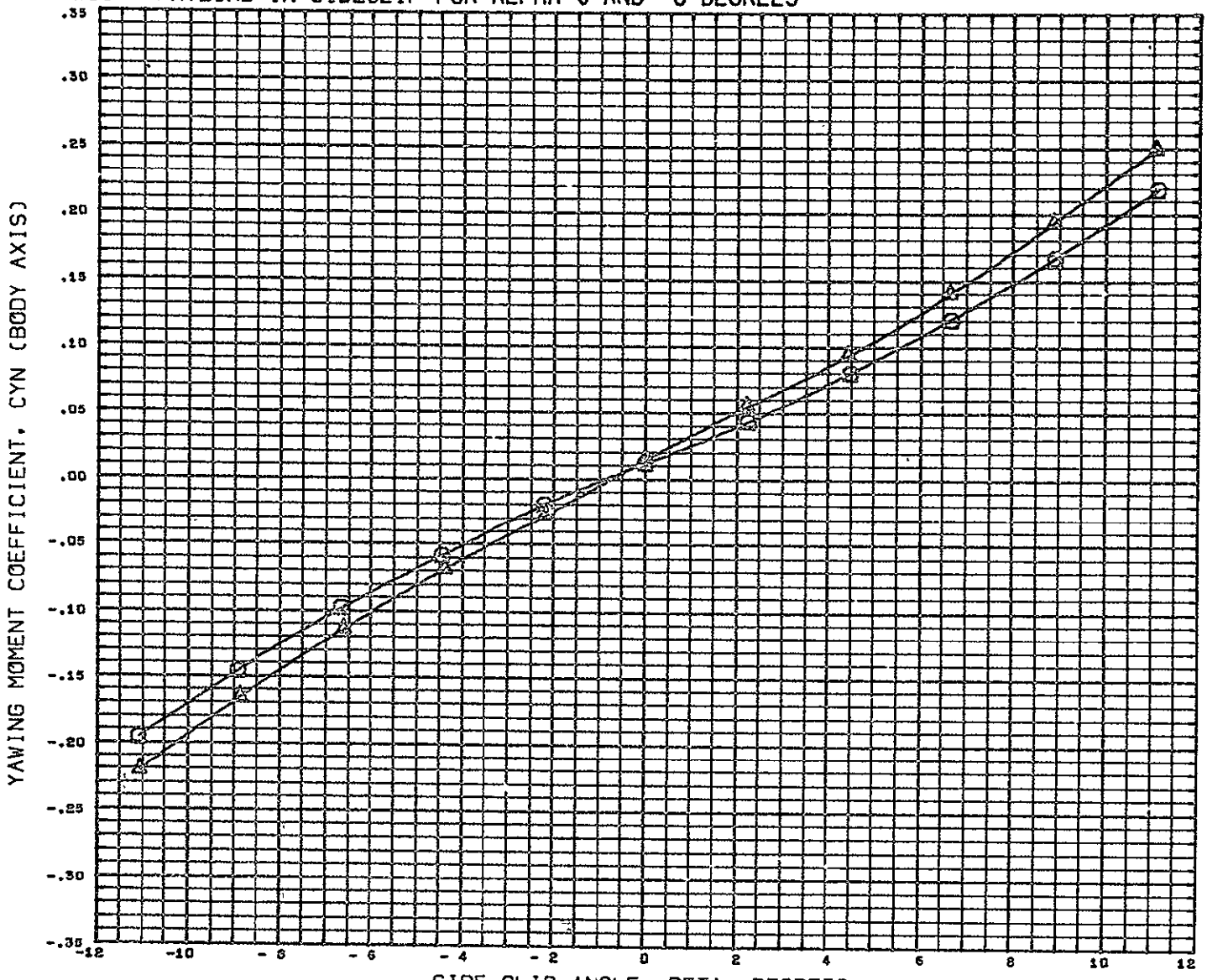


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES

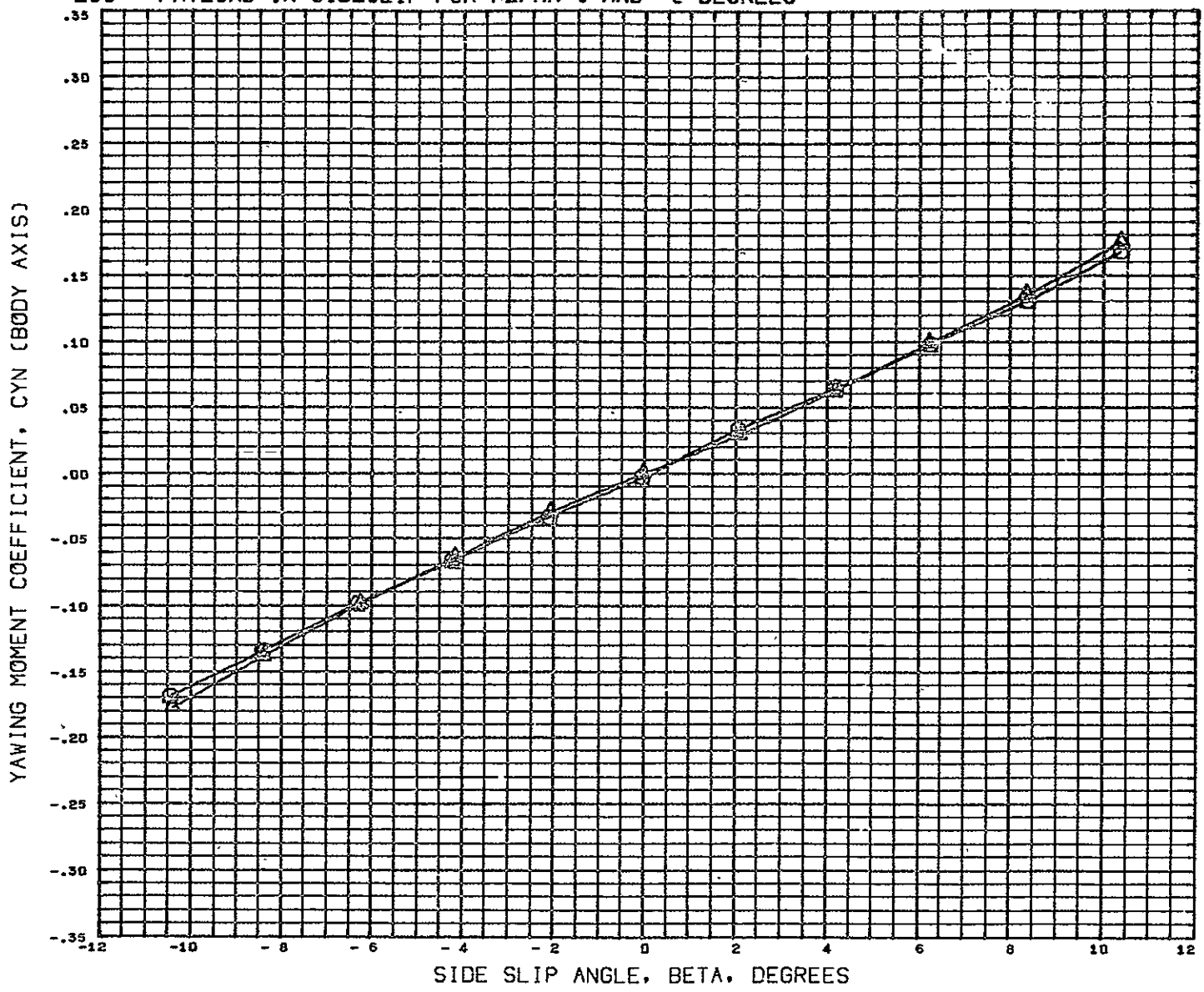


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

MACH 1.195

REFERENCE INFORMATION		
SREF	15.6760	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES

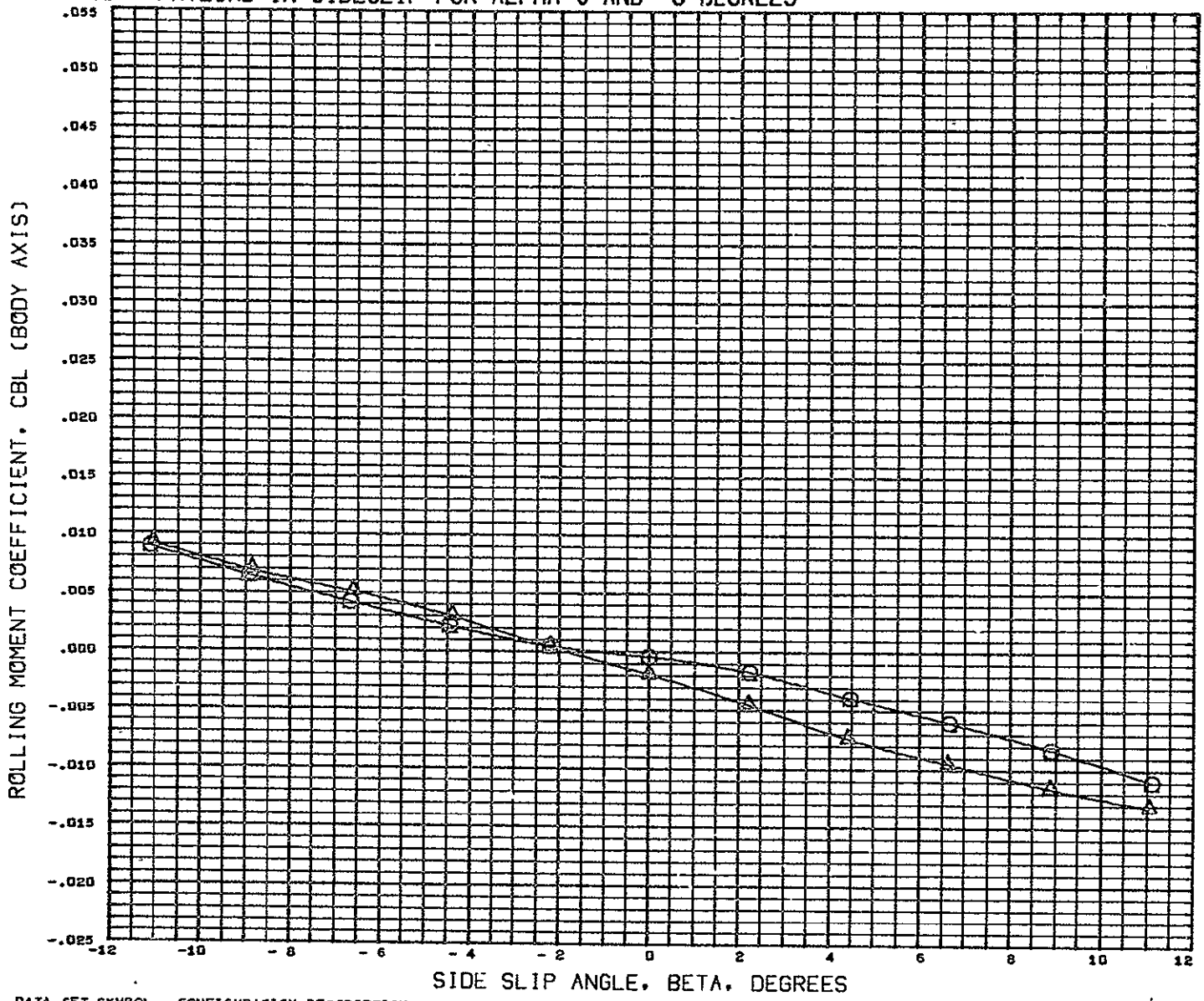


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.003.	SCALE

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES



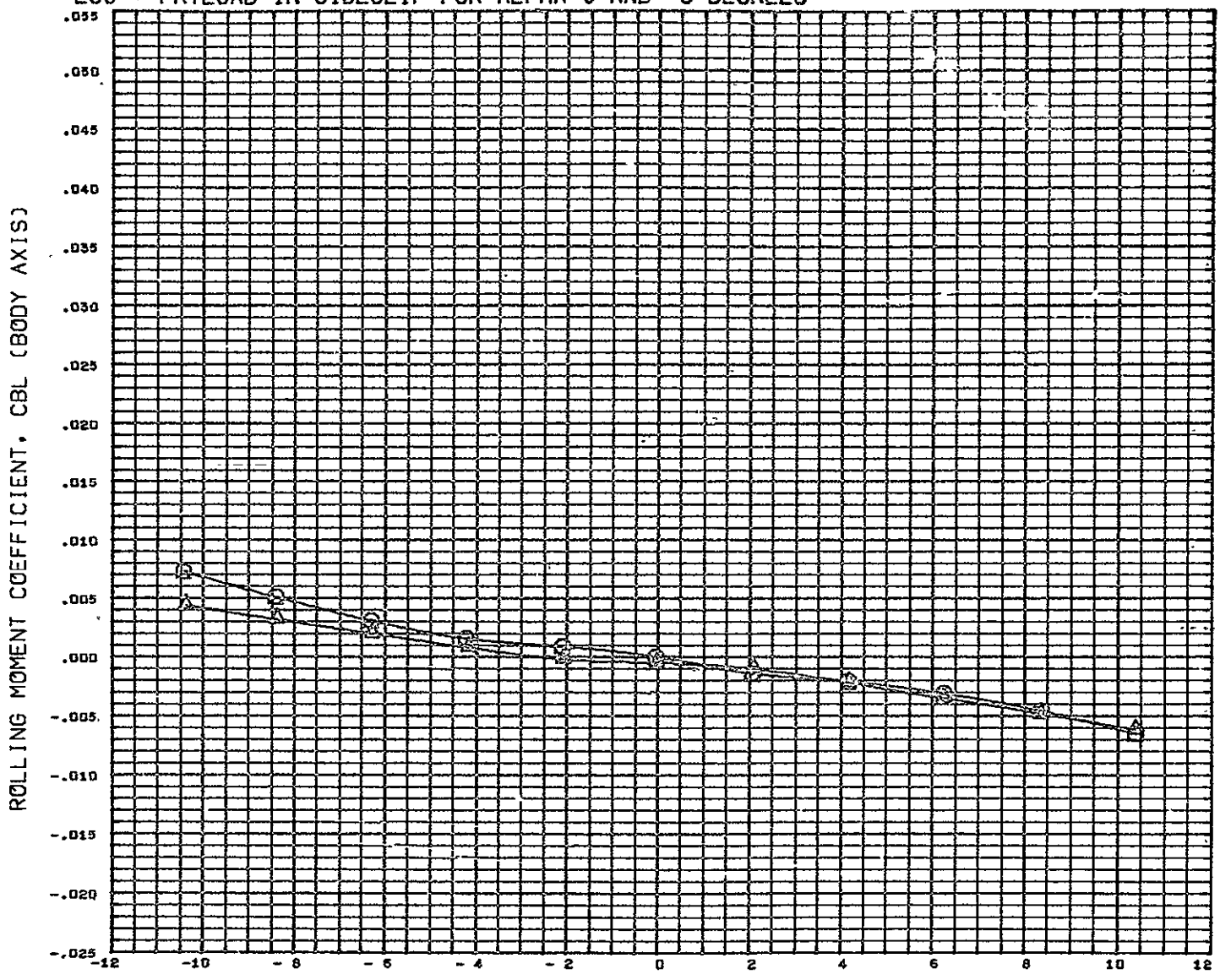
DATA SET	SYMBOL	CONFIGURATION DESCRIPTION
(C3110B)	O	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U
(C3104B)	Δ	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U

ALPHA	ELVATR	AILRON	RUDDER
0.040	0.000	0.000	0.000
-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0970	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 1.195

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES

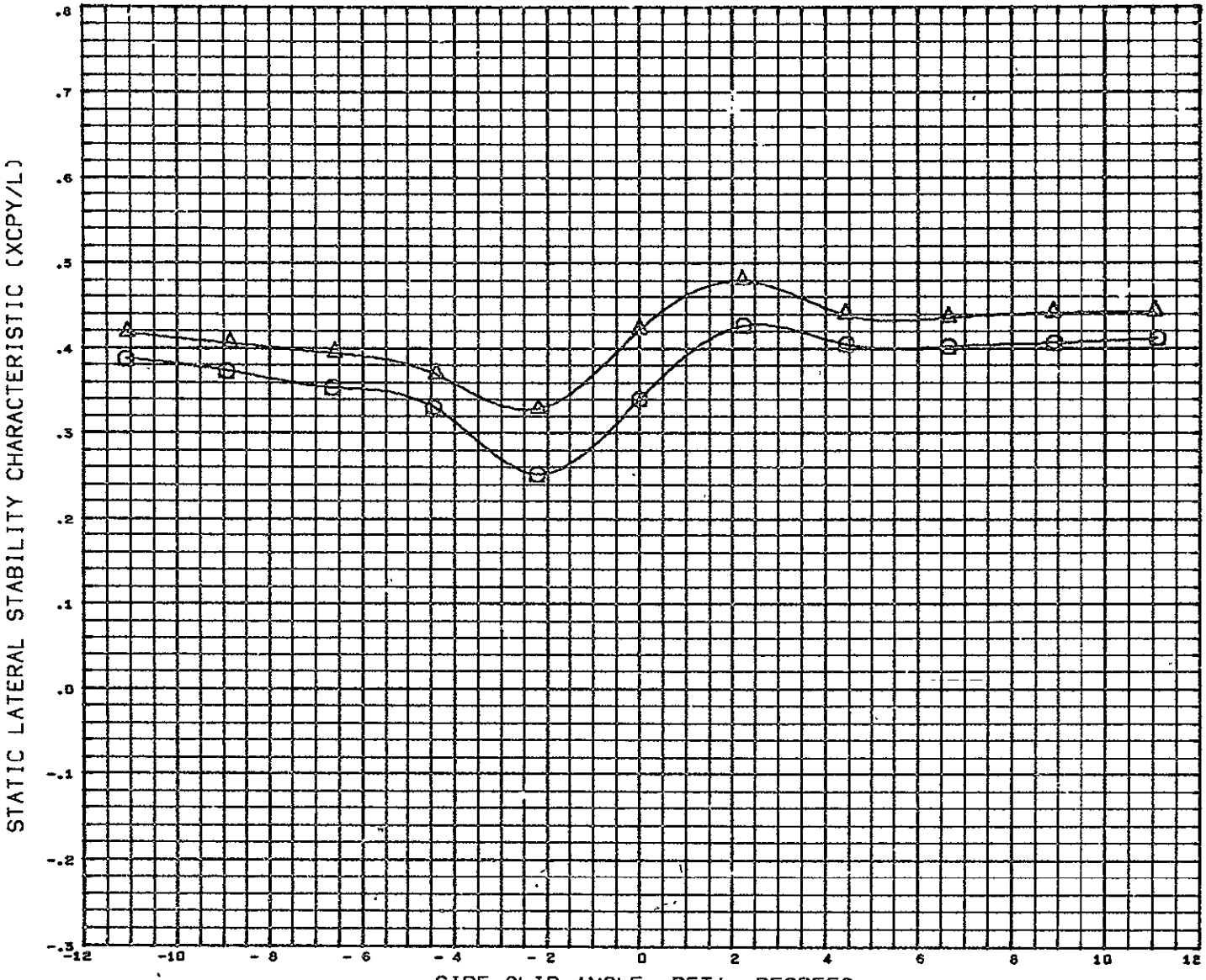


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.049	0.000	0.000	0.000
(C3104B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

MACH 2.990

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0960	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ESS + PAYLØAD IN SIDESLIP FØR ALPHA=0 AND -6 DEGREES

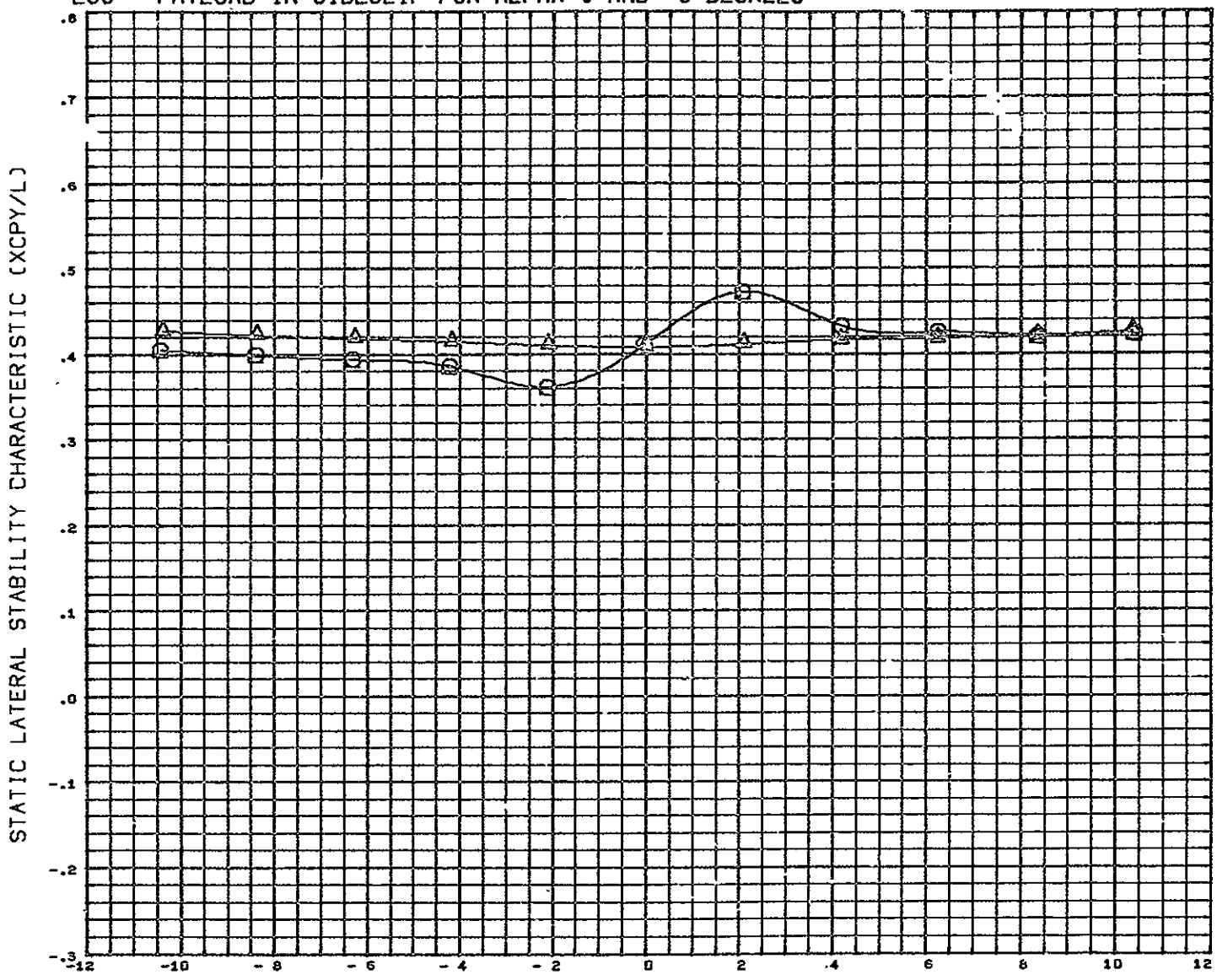


DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)	○	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)	△	MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

MACH 1.195

REFERENCE INFORMATION		
SREF	15.6560	SQ IN
LREF	3.0953	INCHES
BREF	6.0890	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

ESS + PAYLOAD IN SIDESLIP FOR ALPHA=0 AND -6 DEGREES



DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	ELVATR	AILRON	RUDDER
(C3110B)		MSFC489 NR/GD ESS LAUNCH.B19W14C4AV7+U	0.040	0.000	0.000	0.000
(C3104B)		MSFC489 NR/GD ESS LAUNCH B19W14C4AV7+U	-6.430	0.000	0.000	0.000

REFERENCE INFORMATION		
SREF	15.6550	SQ IN
LREF	3.0950	INCHES
BREF	6.0990	INCHES
XMRP	0.0000	
YMRP	0.0000	
ZMRP	0.0000	INCHES
SCALE	0.0031	SCALE

MACH 2.990