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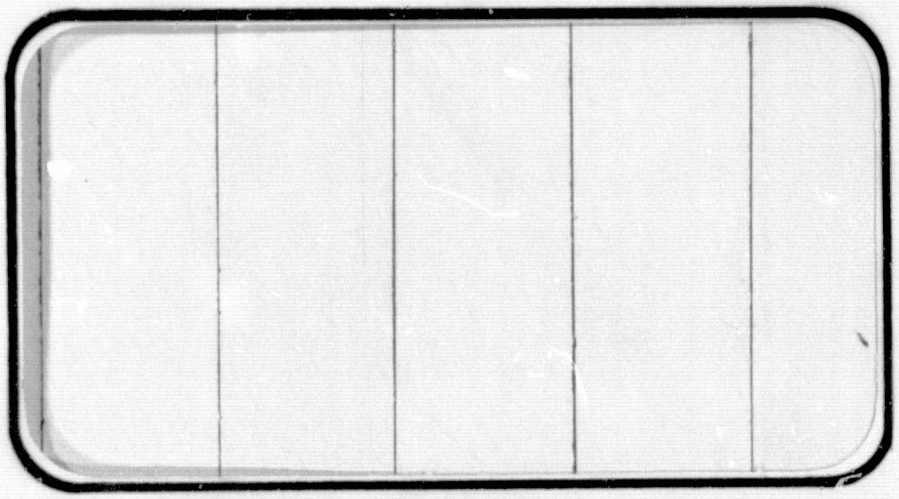

SPACE SHUTTLE

AEROTHERMODYNAMIC DATA REPORT

JOHNSON SPACE CENTER

HOUSTON, TEXAS

DATA MANagement services

SPACE DIVISION CHRYSLER CORPORATION

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FORCE TEST OF A 0.88 PERCENT SCALE 142-INCH DIAMETER SOLID ROCKET BOOSTER (MSFC MODEL NUMBER 461) IN THE NASA/MSFC HIGH REYNOLDS NUMBER WIND TUNNEL (SA13F)

by

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Prepared under NASA Contract Number NAS9-13247

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Engineering Analysis Division

Johnson Space Center
National Aeronautics and Space Administration
Houston, Texas

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ABSTRACT

This document presents the results of MSFC HRWT 034 (NASA Series No. SA13F), a force test of a 0.88 percent scale model (MSFC #461) of the 142 inch diameter solid rocket booster without protuberances conducted in the MSFC High Reynolds Number Wind Tunnel. Objective of this test was to obtain aerodynamic force data over a large range of Reynolds numbers. The test was conducted over a Mach number range from 0 4 to 3.5. Reynolds numbers based on model diameter (1.25 inches) ranged from .75 million to 13.5 million. The angle of attack range was from 35 degrees to 145 degrees.

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NOMENCLATURE

GENERAL

SYMBOL	PLOT SYMBOL	DEFINITION
AF		abbreviation for axial force
F_N		normal force, lbs
F_Y		side force, lbs
ℓ_B	LBODY	length of SRB model, in.
ℓ_{ref}	LREF	reference length; diameter of the cylindrical section of the model, in.
MRP	MRP	moment reference point
M_y		pitching moment, in.-lbs
M_z		yawing moment, in.-lbs
NF		abbreviation for normal force
P_c		wind tunnel charge pressure, psi
P_o	PO	total pressure, psi
P_s		static pressure, psi
PM		abbreviation for pitching moment
q	Q	dynamic pressure, psi
R_N	RN	Reynolds Number (based on the model diameter)
RM		abbreviation for rolling moment
SF		abbreviation for side force
SRB		Solid Rocket Booster
S_{ref}	SREF	reference area (cross-sectional area of the cylindrical section of the model), $in.^2$
T_o		total temperature, ^oF
T_c		tunnel charge temperature, ^oF
X_m, Y_m, Z_m		missile axes system
X_{cp}/ℓ_B	XCP/L	longitudinal position of the center of pressure, expressed as a fraction of the SRB length (ℓ_B = 15.326) measured from nose

$$\frac{X_{cp}}{\ell_B} = \frac{XMRP}{\ell_B} - \frac{C_{m_m}}{C_{N_m}} \frac{\ell_{ref}}{\ell_B}$$

NOMENCLATURE (Continued)

SYMBOL	PLOT SYMBOL	DEFINITION
XMRP	XMRP	abbreviations for location of the moment reference point in the missile axis system, measured from centerline of model at nose (XMRP measured in negative direction of X_m), in.
YMRP	YMRP	
ZMRP	ZMRP	
YM		abbreviation for yawing moment

COEFFICIENTS

SYMBOL	PLOT SYMBOL	DEFINITION
C_{m_m}	CLMM	pitching moment coefficient in the missile axes system; $C_{m_m} = \frac{M_y}{q\, S_{ref}\, \ell_{ref}}$
C_{N_m}	CNM	normal force coefficient; $C_{N_m} = \frac{F_N}{q\, S_{ref}}$
C_{n_m}	CYNM	yawing moment coefficient; $C_{n_m} = \frac{M_z}{q\, S_{ref}\, \ell_{ref}}$
C_{Y_m}	CYM	side force coefficient; $C_{Y_m} = \frac{F_Y}{q\, S_{ref}}$

GREEK SYMBOLS

SYMBOL	PLOT SYMBOL	DEFINITION
α		angle of attack of model, since there is no yaw angle (β), then α is the same as the total angle of attack (α_T), deg
α_T	ALPHA	total angle of attack, deg.
β	BETA	angle of sideslip, deg
M	MACH	Mach number

SYMBOL	PLOT SYMBOL	DEFINITION
ϕ	PHI	roll angle, i.e., angle between the missile Y_m-axis and the plane defined by the missile X_m-axis and the relative wind vector (from a pilot's viewpoint in an airplane, a positive roll angle is a clockwise rotation). Since the model was axisymmetric the roll angle was considered to be zero , deg
γ		ratio of specific heats (for air γ = 1.4)

SUBSCRIPTS

SYMBOL	PLOT SYMBOL	DEFINITION
ref	REF	reference conditions
o		total conditions
c		charge conditions
B		model body
m		missile axis system
s		static conditions

INTRODUCTION

The wind tunnel test described herein is a continuation of a series of tests that are being conducted to establish the static stability characteristics of the Space Shuttle Solid Rocket Booster (SRB) during reentry. This test was a high Reynolds number force test conducted on a 0.88 percent scale model of the 142 inch diameter SRB without attach hardware or protuberances.

A four-component balance was used to obtain normal force, side force, pitching moment, and yawing moment data. Force data were obtained at Mach numbers of 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.42, 2.0, and 3.5. The Reynolds number based on model diameter (1.25 inches) varied from 0.75 million to 13.50 million. The SRB model was tested at angles of attack between 35 and 145 degrees.

This High Reynolds number test along with those of References 1 through 5 provides a complete set of aerodynamic force data for the same SRB configuration over a Reynolds number range from the subcritical ($R_N \leq 3.5 \times 10^5$) through the supercritical ($3.5 \times 10^5 < R_N \leq 2 \times 10^6$) and transcritical ($R_N > 2 \times 10^6$). Transonic SRB reentry flight Reynolds numbers are in the transcritical range. Other wind tunnel tests that provide static aerodynamic stability characteristics at other Reynolds numbers on the same SRB configuration are TWT 565 (Ref. 1), TWT 572 (Ref. 2), TWT 578 (Ref. 3), LaRC 8' TPT Test 655 and 662 (Ref. 4), and TWT 590 and 595 (Ref. 5).

MODEL DESCRIPTION AND SUPPORT HARDWARE

Model Description

The model, MSFC model 461, was a 0.88 percent scale model of a 142 inch diameter SRB. The model was a "clean" configuration in that it contained no protuberances or attach rings. The general arrangement of the model is shown in Figure 2. The model consisted of four basic parts: the nose section, the body section, the tail section, and the engine section. The model had a hollow aft skirt and nozzle skirt. A cross sectional view of the model tail section and engine section is presented in Figure 3. Model and full scale dimensions are presented in Table III.

Support Hardware

The support hardware included two different stings and an extension. The two stings allowed testing over a large angle of attack range. Model-sting configurations for the various angle of attack ranges are presented in Figure 4. A 45-degree offset sting was utilized for testing at angles of attack of 35, 45, and 55 degrees. A 135 degree offset sting arrangement was utilized for testing at angles of attack 125, 135, and 145 degrees. For angles of attack of 80, 90, and 100 degrees, a 90-degree offset sting was used. Figure 5 presents an installation photograph of the model mounted on the 90-degree offset sting.

The extension was used to connect the stings to the strut of the tunnel. Figure 4 shows the sting sting-extension configurations for 90- and 45-degree stings. Since the nose and tail sections of the model

were interchangeable, the 45-degree offset sting had the added capability of becoming a 135-degree offset sting by interchanging the nose and tail and rolling both model and sting 180 degrees (See Figure 4). The model stings were held in the extension by two set screws, which allowed the sting to rotate 180 degrees. The pitch mechanism for the sting support hardware had a +11 and -18 degrees movement from the horizontal.

A four-component balance, designated as MSFC #243, was used to obtain the force data. The balance was capable of measuring 3000 pounds in normal force and side force and 3000 inch-pounds in pitching moment and yawing moment. Both stings of the model support system provided a passage for the wires from the balance to the interior of the sting support hardware. The balance wiring was not exposed to the tunnel air flow.

TEST PROGRAM

The test was conducted at Mach numbers of .4, .5, .6, .7, .8, .9, 1.0, 1.2, 1.42, 2.0, and 3.5. The Reynolds number range extended from .75 million to 13.50 million based on the model diameter of 1.25 inches. The roll angle for the model was always considered to be zero since the model was axisymmetric. The Data Set/Run Number Collation Summary is presented in Table II.

The first part of the test was conducted with the 90-degree sting set up; see Figure 4(a). The angles of attack for this set up were 80, 90, and 100 degrees. The 90-degree sting was removed and replaced by the 45-degree sting setup, Figure 4(b). The angles of attack were 35, 45, and 55 degrees. Upon interchange of nose and tail for the 45-degree sting set up, and rolling the sting-model combination to a 180-degree position, the 135-degree sting set up was established. This allowed testing at angles of attack of 125, 135, and 145 degrees, Figure 4(c).

TEST FACILITY DESCRIPTION

The MSFC High Reynolds Number Wind Tunnel (HRWT) is a Ludwieg tube tunnel capable of producing a Reynolds number range of 7 million to 200 million per foot over a Mach number range of 0.25 to 3.50. The test section is 32 inches in diameter by 64 inches in length.

The supply tube has a 52-inch inside diameter and is 386 feet long. It is terminated on one end with a hemispherical head and on the other end with a stilling chamber. The stilling chamber is 20 feet long and has a maximum diameter of 78 inches. The entrance cone has an 8-degree included angle.

The facility uses six interchangeable, axisymmetric, contoured nozzles. The diameters at the entrance and exit of each nozzle are 52 and 32 inches, respectively. The "sonic" nozzle is used to produce all subsonic and transonic speeds. The other five nozzles are designed for discrete Mach numbers, 1.4, 1.7, 2.0, 2.75, and 3.5. Further details and performance characteristics of the HRWT are presented in Reference 6.

DATA REDUCTION

Parameters measured and recorded during this test were as follows:

- o Wind tunnel conditions (P_o, P_s, P_c, and T_o)
- o Four-component force and moment data
- o Sting attitude

Tunnel conditions were used to calculate the Mach number, the dynamic pressure, and the Reynolds number. Table I gives the average tunnel conditions for the test. All four component force and moment data are presented in the form of non-dimensionalized static stability coefficients (C_{N_m}, C_{Y_m}, C_{m_m}, and C_{n_m}) in the missile axes system. The missile axes system is shown in Figure 1.

The model was set at a nominal attitude in the tunnel using an inclinometer. The angle of attack was determined by correcting the nominal attitude for balance and sting deflections.

The moment reference point (MRP) is taken to be the SRB's burn out center of gravity and its location is measured from the center line of the SRB at the nose. The model had a moment reference point of 8.683 inches from the nose (see Figure 2). Changes in the balance moment center (BMC) due to the model nose and tail sections interchange for the 135-degree sting offset was reflected in the data reduction program by input of the appropriate transfer distance between the BMC and MRP. The reference length (ℓ_{ref}) was the model diameter of 1.25 inches. The model reference area was 1.227 square inches, which was the cross-sectional area of the cylindrical section of the model.

Two problems were found in the data:

(a) Excessively large fluctuations in the force and moment readings.

(b) Incorrect temperatures.

A set of 131 runs was selected from the total of 211 runs from HRWT 034. The runs not selected had tunnel conditions that were unacceptable or the standard deviation of the balance load trace exceeded 30% of the mean value. A data set/run number collation summary for the 131 runs is presented in Table II.

For those runs that had incorrect temperature recordings, a temperature correction was made as follows: assuming the temperature in the charge tube of the tunnel to be the same as ambient temperature, the total temperature was determined from the following relation of total temperature to charge tube temperature, T_o/T_c.

$$\frac{T_o + 459.7}{T_c + 459.7} = \left(\frac{P_o}{P_c}\right)^{\frac{\gamma-1}{\gamma}}$$

Ambient temperature was obtained from the MSFC weather station for the time the run was made. P_o is the total pressure (measured in the stilling chamber), and P_c is the supply tube initial charge pressure. Gamma (γ) is the ratio of specific heats, 1.4 for air. Refer to Reference 7 for the derivation of the preceding relation. Since the total pressure to charge pressure had been established for each of the test section Mach numbers (Reference 6), substitution in the above equations gave the total temperature. The value of total temperature thus determined was used to calculate run Reynolds number.

REFERENCES

1. Johnson, J. D., Radford, W. D., "Aerodynamic Characteristics of a 142-Inch Diameter Solid Rocket Booster with and without Strakes," NASA CR-128, 767, May 1973.

2. Johnson, J. D., Radford, W.D., "Aerodynamic Characteristics of a 142-Inch Diameter Solid Rocket Booster (Configuration 89B and 139)," NASA CR-128, 774, August 1973.

3. Johnson, J. D., Braddock, W. F., "Effect of Engine Shroud Configuration on the Static Aerodynamic Characteristics of a 0.00563 Scale 142-Inch Diameter Solid Rocket Booster (SA10F)," NASA CR-134, 116, August 1974.

4. Radford, Walter D., Johnson, Josh D., "Aerodynamic Characteristics of a 142-inch Diameter Solid Rocket Booster, Configuration 139 (SA2FA/SA2FB)," NASA CR-134, 105, June 1974.

5. Johnson, J. D., Braddock, W. F., "Reentry Aerodynamic Characteristics of a Space Shuttle Solid Rocket Booster Model 449 tested in MSFC 14 x 14 inch TWT (SA26F)," NASA CR-134, 435, November 1974.

6. Gwin, H.S., "The George C. Marshall Space Flight Center High Reynolds Number Wind Tunnel Technical Handbook," NASA TM X-64831, December 1973.

7. Davis, J. W. and Gwin, H. S., "Feasibility Studies of a Short Duration High Reynolds Number Tube Wind Tunnel," NASA TM X-53571, January 9, 1968.

Table I.

TEST: HRWT 034				DATE: 6/17/75
TEST CONDITIONS				
MACH NUMBER	*REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
0.4	0.74×10^6	3.60	36	37.61
	1.14	5.63	26	54.36
	1.37	7.21	52	71.36
	1.82	10.00	71	99.22
	1.96	10.20	35	97.23
	2.01	10.20	41	101.28
	3.13	16.59	53	159.82
	4.19	21.65	47	210.60
	5.19	26.10	37	264.93
	5.33	26.90	37	266.33
	6.64	33.07	31	326.70
	7.53	38.30	48	387.03
	7.85	42.59	70	426.82
	8.10	44.40	57	426.24
	8.21	43.43	52	426.34
▼	8.24	43.80	53	429.09

BALANCE UTILIZED: MSFC No. 243

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE: @ q=116.26
NF	3000 lbs.	± 15 lbs.	± 0.105
SF	3000 lbs.	± 15 lbs.	± 0.105
AF	N.A.	N.A.	N.A.
PM	3000 in.-lb.	± 15 in.-lb.	± 0.084
RM	N.A.	N.A.	N.A.
YM	3000 in.-lb.	± 15 in.-lb.	± 0.084

COMMENTS: *Reynolds Number based on model diameter*

Table I. (Continued)

TEST: HRWT 034			DATE:	
TEST CONDITIONS				
MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq. inch)
0.4	8.33 X 10^6	43.90	47	427.18
	8.44	43.40	41	426.28
	8.88	43.76	30	426.39
	10.20	52.70	38	511.12
	10.21	51.00	36	508.93
↓	11.94	60.78	42	591.62
0.5	0.86	5.54	46	36.08
	1.22	7.23	25	49.12
	1.59	10.29	58	69.59
	3.48	23.46	72	155.71
	4.87	33.24	71	217.05
	6.94	44.13	47	295.98
	9.50	61.50	54	412.02
	9.64	61.70	50	414.13
	10.04	61.98	36	415.75
↓	11.62	73.30	42	496.93

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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Table I. (Continued)

TEST: HRWT 034			DATE:	
TEST CONDITIONS				
MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
0.5	11.78 X10^6	73.40	41	494.48
	11.90	70.10	38	495.36
	13.30	82.60	39	555.12
0.6	1.10	7.80	19	37.20
	1.12	7.75	28	40.18
	1.47	10.38	28	51.98
	1.86	14.20	62	71.81
	2.43	18.37	58	91.74
	2.46	18.70	57	93.99
	2.58	18.70	36	93.29
	3.06	24.04	68	118.69
	3.87	30.48	72	151.38
	4.46	34.87	69	173.17
	6.91	49.30	31	249.13
	7.01	49.50	35	252.28
↓	7.70	56.20	50	288.25

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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Table I. (Continued)

TEST: HRWT 034 DATE:

TEST CONDITIONS

MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
0.6	8.86 X 10^6	63.90	44	326.78
	10.17	80.00	72	402.63
	10.39	79.86	63	402.16
	10.82	79.70	48	403.02
	10.84	79.40	47	402.89
	10.98	78.95	40	400.60
	11.00	79.60	43	404.54
	13.16	95.00	40	480.34
	13.50	96.80	37	483.18
0.7	1.30	10.10	18	39.95
	1.61	13.89	55	54.72
	2.31	19.59	53	78.63
	2.58	21.90	59	90.22
	3.67	32.72	70	129.47
	6.43	55.80	62	222.23
	7.20	60.94	51	242.13

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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Table I. (Continued)

TEST: HRWT 034				DATE:
TEST CONDITIONS				
MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
0.7	8.69×10^6	73.10	54	299.54
↓	9.51	82.99	64	333.44
↓	11.17	98.20	66	393.44
↓	11.95	97.90	42	395.75
↓	12.07	101.85	46	397.31
0.8	1.10	10.00	46	34.37
↓	1.33	11.54	26	38.86
↓	1.69	16.04	60	54.07
↓	2.10	19.17	49	65.70
↓	12.23	115.90	59	390.46
↓	12.64	115.17	44	390.67
↓	12.83	116.26	39	388.96
0.9	3.04	29.78	42	88.57
↓	7.78	80.40	63	238.51
↓	8.05	81.79	53	239.40
↓	8.12	82.16	52	241.84

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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Table I. (Continued)

TEST: HRWT 034			DATE:	
TEST CONDITIONS				
MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
0.9	8.23×10^6	80.55	45	242.81
↓	8.40	80.54	36	242.09
↓	8.57	81.89	32	242.15
↓	8.61	81.52	28	240.63
1.0	3.58	39.99	67	107.13
↓	8.43	87.40	43	238.23
↓	8.66	89.56	39	241.48
1.2	1.47	17.47	56	41.63
↓	2.82	33.31	56	79.97
↓	5.08	62.07	72	149.93
↓	5.83	68.32	53	163.77
↓	5.94	68.21	46	163.90
↓	6.00	68.44	48	166.55
↓	6.17	69.30	38	166.42
↓	6.19	68.63	32	164.35
↓	6.23	69.45	32	165.36

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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Table I. (Continued)

TEST: HRWT 034			DATE:	
TEST CONDITIONS				
MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
1.2	6.29×10^6	69.05	29	165.58
	6.29	68.64	30	166.34
	6.37	68.30	24	165.49
1.42	5.90	71.33	47	165.46
	6.05	71.67	39	166.23
	6.24	72.32	31	167.77
	6.27	71.77	27	166.48
2.0	1.59	20.33	69	56.83
	1.69	20.21	45	56.49
	2.92	35.31	49	98.68
	4.19	50.67	49	141.60
	5.28	65.83	60	183.99
	5.28	65.97	61	184.36
	5.29	66.32	62	185.33
	5.38	66.37	56	185.22
	5.39	66.18	55	184.95

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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Table I. (Continued)

TEST: HRWT 034 | DATE:

TEST CONDITIONS

MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
2.0	5.39×10^6	66.18	56	185.50
	5.44	65.75	49	183.77
	5.46	65.97	49	184.38
	7.63	95.57	62	267.08
	7.70	95.71	59	267.47
↓	7.86	95.76	52	267.61
3.5	2.94	23.18	48	206.16
	3.97	33.95	75	302.08
	3.97	33.95	77	303.84
	4.38	33.94	43	301.89
	7.42	66.28	90	589.59
	7.67	66.17	78	588.64
	7.68	66.17	78	589.36
	7.77	66.18	74	588.70
	7.80	66.07	72	587.76
↓	7.86	66.17	70	588.63

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

MSFC - Form 263-1 (Rev. April 1973)

Table I. (Concluded)

TEST: HRWT 034 DATE:

TEST CONDITIONS

MACH NUMBER	REYNOLDS NUMBER	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
3.5	8.92×10^6	66.06	29	587.66

BALANCE UTILIZED: _____

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF			
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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TABLE II.

TEST: HRWT 034 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE: JUNE 17, 1975

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES ϕ	PARAMETERS/VALUES $R_N \times 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
R1F 001	SRB W/O PROT.	35	0	0	5.30	1										62/0	
002					5.90	1									147/0		
003					6.30	1								146/0			
004					7.90	2										59/1	66/0
005					8.40	1	143/1										
006					8.65	1						145/0					
007					10.20	1			144/0								
008		45			2.00	1	73/0										
009					2.60	1			74/0								
010					3.00	1						75/0					
011					4.00	1											64/0
012					5.20	1	78/0										
013					5.30	1										61/0	
014					6.40	1								76/0			
015					6.90	1			79/0								
016					7.60	1										58/0	
017					7.75	1											65/0
018					8.00	1						80/0					

TEST RUN NUMBERS

1	7	13	19	25	31	37	43	49	55	61	67	75 76
CNM	CLMM	CYM	CYNM	XCP/L	RN							6

COEFFICENTS — IDVAR (1) — IDVAR (2) — NCV

α OR β SCHEDULES

MSFC - Form 263-2 (Rev. May 1972)

TABLE II. (Continued)

TEST: HRWT 034 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE:

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	SCHD. ϕ	PARAMETERS/VALUES $R_N \times 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
RIF 019	SRB W/O PROT.	45	0	0	8.20	1	138/0										
020					8.40	1							81/0				
021					9.50	1		139/0									
022					11.00	1			140/0								
023					11.20	1				141/1							
024		↓			12.20	1					142/1						
025		55			5.30	1										63/0	
026					6.20	1								71/0			
027					7.70	2										60/0	67/0
028					7.85	1	68/0										
029					8.65	1						70/1					
030		↓			10.40	1			69/2								
031		80			5.45	1										37/0	
032					5.90	1								26/0			
033					7.40	1											47/0
034					8.10	1						25/0					
035					10.20	1	22/0										
↓ 036	↓	↓	↓	↓	11.60	1		23/0									

TEST RUN NUMBERS

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

COEFFICENTS IDVAR (1) IDVAR (2) NDV

α OR β SCHEDULES

MSFC - Form 263-3 (Rev. May 1972)

TABLE II (Continued)

TEST: HRWT 034 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE:

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES ϕ	PARAMETERS/VALUES $R_N \times 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
RIF 037	SRB W/O PROT.	80	0	0	13.50	1			24/1								
038		90			0.75	1	83/2										
039					0.85	1		84/1									
040					1.10	2			25/1		87/0						
041					1.12	2	129/0		128/0								
042					1.20	1		132/0									
043					1.35	3	91/0			207/0	204/1						
044					1.45	2			121/0					90/1			
045					1.55	1		92/0									
046					1.60	2				94/0						32/0	
047					1.70	1					95/0						
048					1.86	1			93/0								
049					2.00	1	130/0										
050					2.10	1					127/0						
051					2.30	1				122/0							
052					2.45	1			3/1								
053					2.60	1				4/2							
054					2.80	1								124/0			

TEST RUN NUMBERS

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

COEFFICENTS — IDVAR (1) — IDVAR (2) — N...

α OR β SCHEDULES

MSFC - Form 353-3 (Rev. May 1973)

TABLE II. (Continued)

TEST: HRWT 034 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE:

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	SCHD. ϕ	PARAMETERS/VALUES $R_N \times 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
R1F 055	SRB W/O PROT.	90	0	0	2.90	2										33/0	34/0
056					3.10	2	99/1		120/0								
057					3.50	1		100/0									
058					3.60	2				102/0			105/0				
059					3.90	1			101/2								
060					4.20	2	131/0									35/0	
061					4.40	1											38/0
062					4.45	1			125/0								
063					4.90	1		119/0									
064					5.10	1								112/0			
065					5.45	1										36/0	
066					6.20	1								112/2			
067					6.40	1				126/0							
068					6.60	1	113/1										
069					6.90	1		114/1									
070					7.20	1				11/0							
071					7.50	1	200/0										
072					7.70	1			205/0								

TEST RUN NUMBERS

1 7 13 19 25 31 37 43 49 55 61 67 73

COEFFICENTS — IDVAR (1) — IDVAR (2)

α OR β SCHEDULES

MSFC - Form 363-1 (Rev. May 1971)

TABLE II. (Continued)

TEST: HRWT 034 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE:

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES ϕ	PARAMETERS/VALUES $R_N \times 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
R1F 073	SRB W/O PROT.	90	0	0	8.65	1				202/0							
074					8.85	2	14/0		116/0								
075					9.50	1				117/0							
076					10.00	1		15/0									
077					11.90	2	19/4	201/0									
078					12.10	1				134/0							
079					12.60	1					134/1						
080		↓			13.30	1		20/0									
081		100			5.45	1										39/0	
082					5.80	1								30/0			
083					7.80	1						31/0					
084					10.20	1	27/1										
085					11.80	1		28/0									
086		↓			13.15	1			29/0								
087		125			5.40	1										171/0	
088					6.00	1								151/0			
089					6.30	1									152/0		
↓ 090	↓	↓	↓	↓	7.80	1											174/1

TEST RUN NUMBERS

1 7 13 19 25 31 37 43 49 55 61 67 73 76

COEFFICENTS — IDVAR (1) — IDVAR (2) — N.V.

α OR β SCHEDULES

MSFC - Form 263-3 (Rev. May 1973)

TABLE II. (Continued)

TEST: HRWT 034 | DATA SET/RUN NUMBER COLLATION SUMMARY | DATE:

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES φ	PARAMETERS/VALUES $R_N X 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
R1F091	SRB W/O PROT.	125	0	0	8.10	1	148/1										
092					8.20	1						150/0					
093		↓			10.80	1			149/0								
094		135			1.70	1										208/0	
095					1.80	1	164/0										
096					2.45	1			165/0								
097					4.00	1											175/0
098					5.30	1	153/0										
099					5.40	1										172/0	
100					6.20	1									158/0		
101					6.30	1								157/0			
102					7.00	1			154/1								
103					7.70	1											176/0
104					8.30	1	159/0										
105					8.40	1						155/0					
106					8.65	1							156/1				
107					9.60	1		160/0									
↓ 108	↓	↓		↓	10.84	1			161/0								

TEST RUN NUMBERS

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

COEFFICENTS IDVAR (1) IDVAR (2) NC

α OR β SCHEDULES

MSFC - Form 263-1 (Rev. May 1972)

TABLE II (Continued)

TEST: HRWT 034 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE:

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	SCHD. ∅	PARAMETERS/VALUES $R_N \times 10^6$	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) .4	.5	.6	.7	.8	.9	1.0	1.2	1.42	2.0	3.5
R1F 109	SRB W/O PROT.	135	0	0	11.90	1				162/0							
110		↓	↓	↓	12.80	1					163/0						
111		145			5.40	1										173/0	
112					6.00	1									170/0		
113					6.20	1								169/0			
114					8.20	1	166/0										
115					8.60	1						168/1					
116					8.90	1											177/0
↓ 117	↓	↓	↓	↓	11.00	1			167/2								

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

COEFFICENTS IDVAR (1) IDVAR (2) N

α OR β SCHEDULES

TEST RUN NUMBERS

MSFC - Form 261-2 (Rev. May 1973)

TABLE II (Continued)

DATA SET IDENTIFIERS GROUPING

FOR RESULTING DATA SET A1F201

Mach	Data Set
0.4	R1F005
	019
	028
	035
	077
	084
	091
	104
	114
0.5	R1F021
	036
	080
	085
	107
0.6	R1F007
	022
	030
	037
	074
	086
	093
	108
	117
0.7	R1F023
	078
	109
0.8	R1F024
	079
	110
0.9	R1F006
	018
	029
	034
	083
	092
	105
	115

TABLE II (Concluded)

Mach	Data Set
1.0	R1F020
	58
	106
1.2	R1F003
	014
	026
	032
	066
	082
	088
	101
	113
1.42	R1F002
	089
	100
	112
2.0	R1F004
	016
	027
	031
	065
	081
	087
	099
	111
3.5	R1F004
	017
	027
	033
	061
	090
	103
	116

Table III.

MODEL DIMENSIONAL DATA

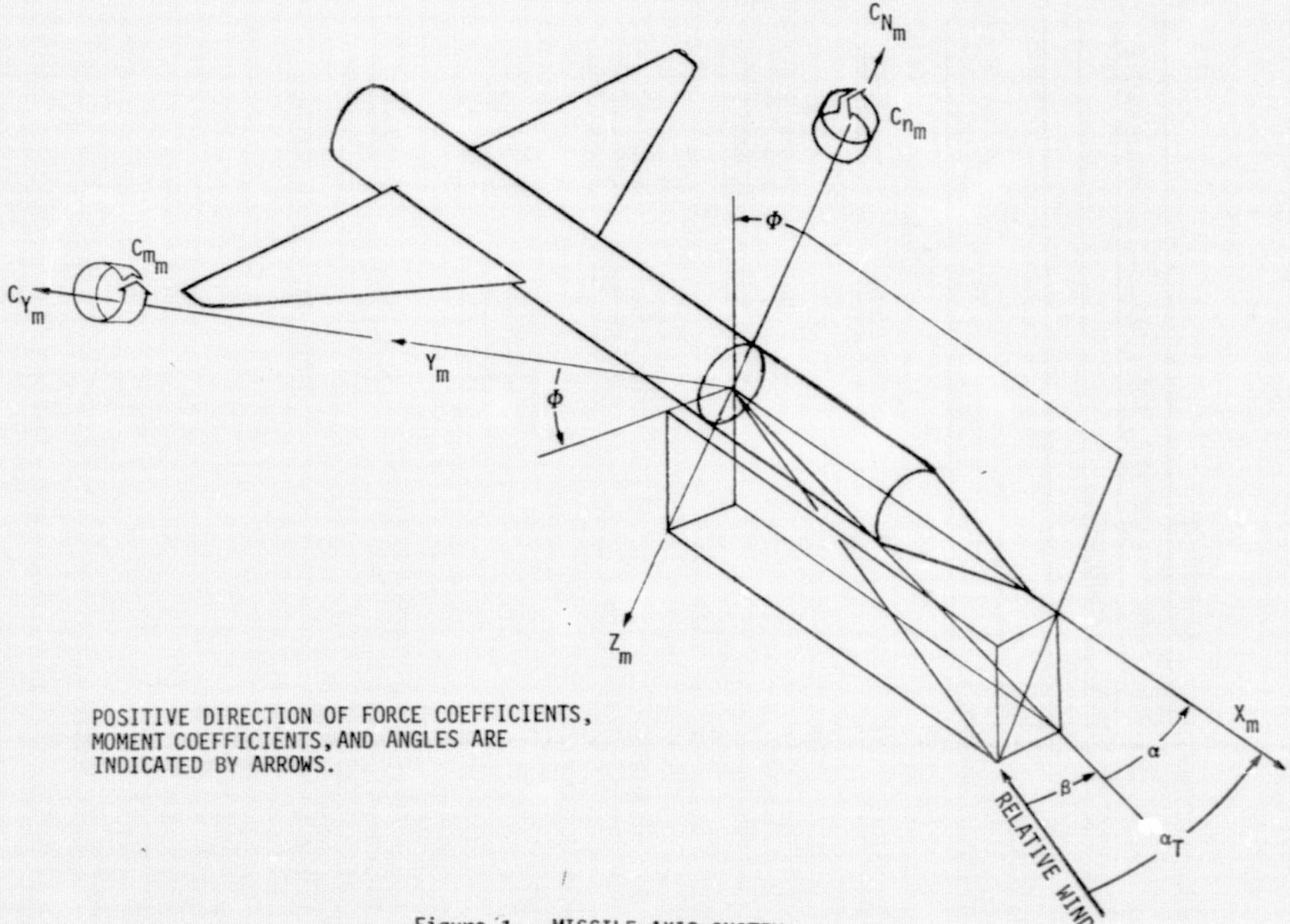
MODEL COMPONENT: 142 INCH SRB

GENERAL DESCRIPTION: 142 INCH SRB NOSE, BODY, AND ENGINE SHROUD/NOZZLE COMBINATION WITHOUT PROTUBERANCES

MODEL SCALE: 0.0088

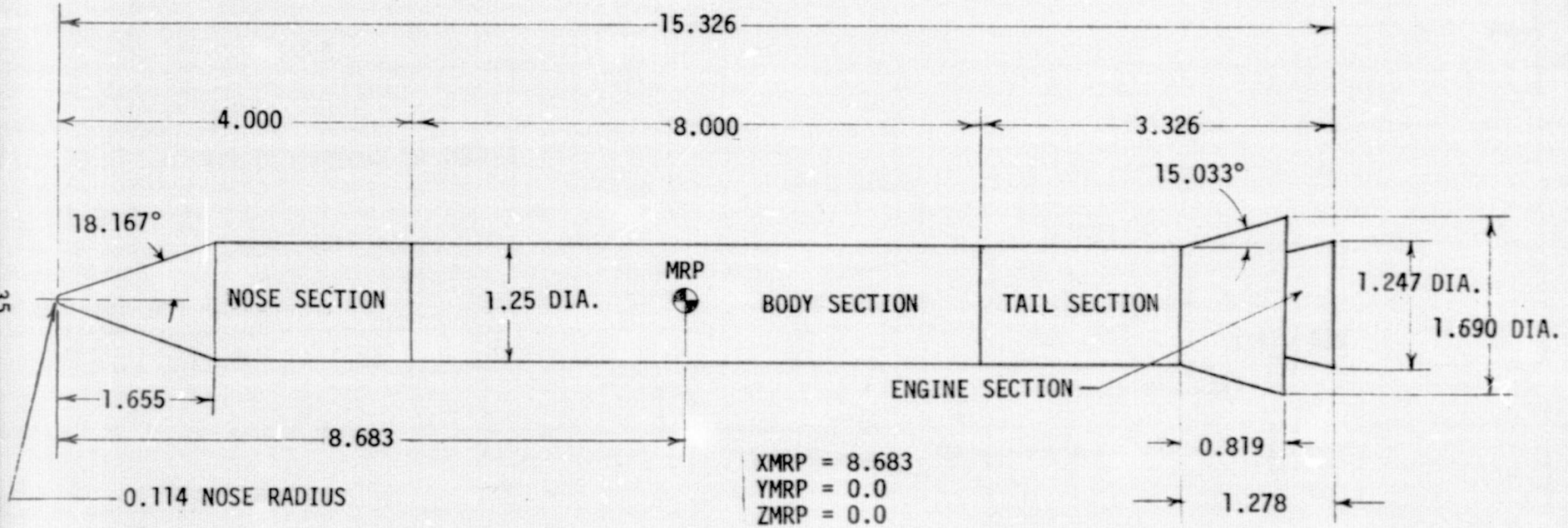
REFERENCE DRAWING(S):

DIMENSIONS:	THEORETICAL FULL-SCALE	THEORETICAL MODEL-SCALE
NOSE		
Length	188.0 IN.	1.655 IN.
Max. Diameter	142.0 IN.	1.250 IN.
Cone Angle	18.167°	18.167°
BODY		
Length	1408.0 IN.	12.393 IN.
Max. Diameter	142.0 IN.	1.250 IN.
Max. Cross-Sectional Area	109.98 FT.^{2}	1.227 IN.^{2}
ENGINE SHROUD		
Flare Angle	15.033°	15.033°
Length	93.0 IN.	0.819 IN.
Max. Diameter	192.0 IN.	1.690 IN.
ENGINE NOZZLE		
Length (Distance behind engine shroud)	52.0 IN.	0.459 IN.
Max. Diameter	141.7 IN.	1.247 IN.
TOTAL LENGTH OF SRB	1741.0 IN.	15.326 IN.



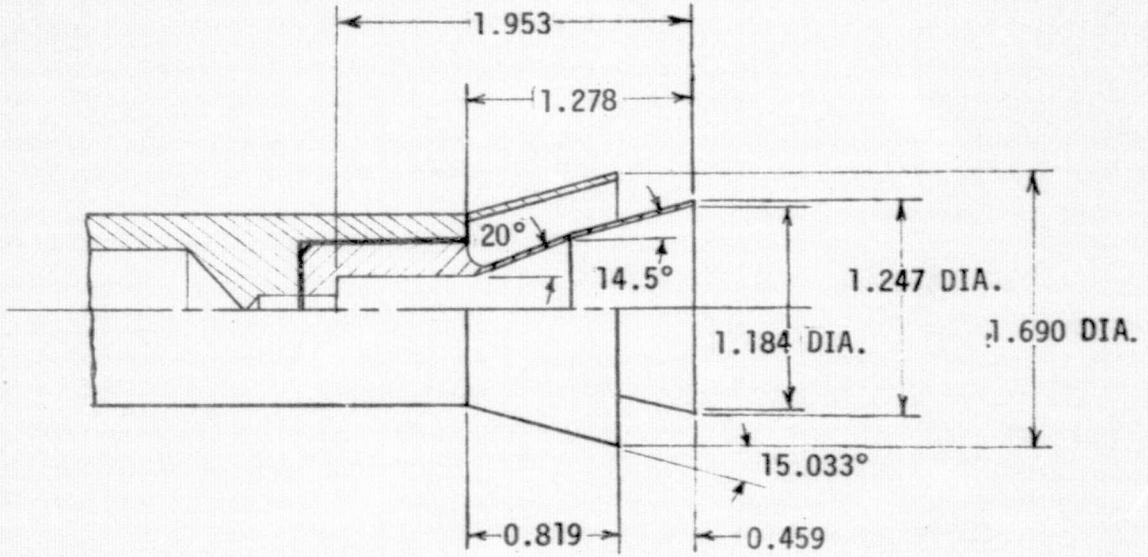
POSITIVE DIRECTION OF FORCE COEFFICIENTS, MOMENT COEFFICIENTS, AND ANGLES ARE INDICATED BY ARROWS.

Figure 1. MISSILE AXIS SYSTEM



ALL DIMENSIONS IN INCHES

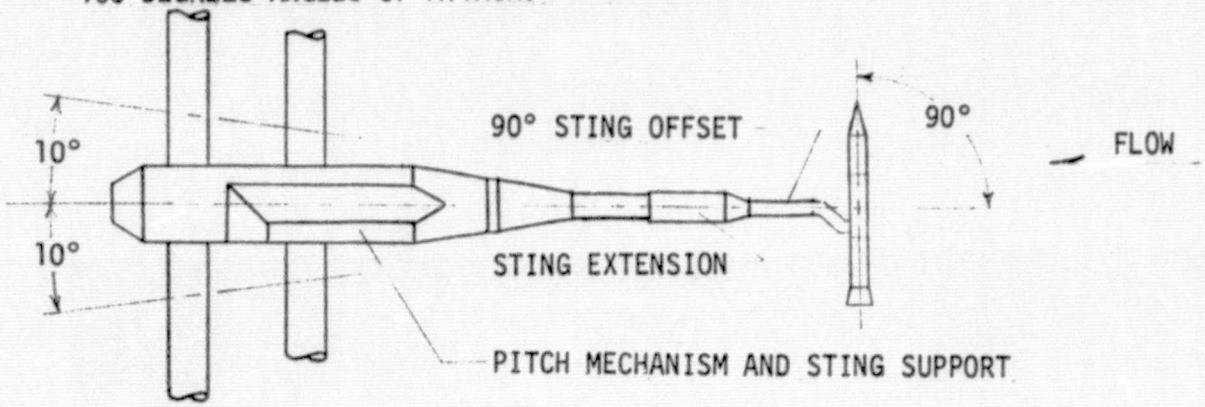
Figure 2. GENERAL ARRANGEMENT OF MODEL SOLID ROCKET BOOSTER



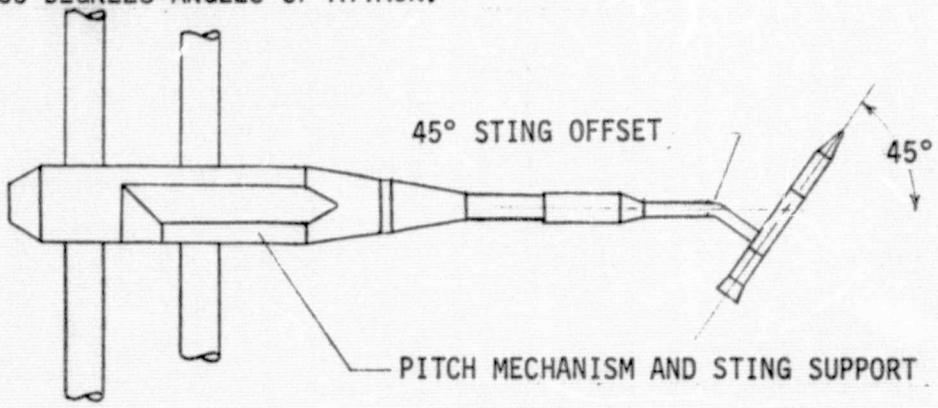
ALL DIMENSIONS IN INCHES

Figure 3. SHROUD/ENGINE NOZZLE ARRANGEMENT

(a) THE 90-DEGREE OFFSET STING, FOR 80, 90, AND 100 DEGREES ANGLES OF ATTACK.



(b) THE 45-DEGREE OFFSET STING, FOR 35, 45, AND 55 DEGREES ANGLES OF ATTACK.



(c) THE 135-DEGREE OFFSET STING (UTILIZING THE 45-DEGREE OFFSET BY INTERCHANGING NOSE AND TAIL SECTIONS AND ROTATING STING AND MODEL COMBINATION 180 DEGREES), FOR 125, 135 AND 145 DEGREES ANGLES OF ATTACK.

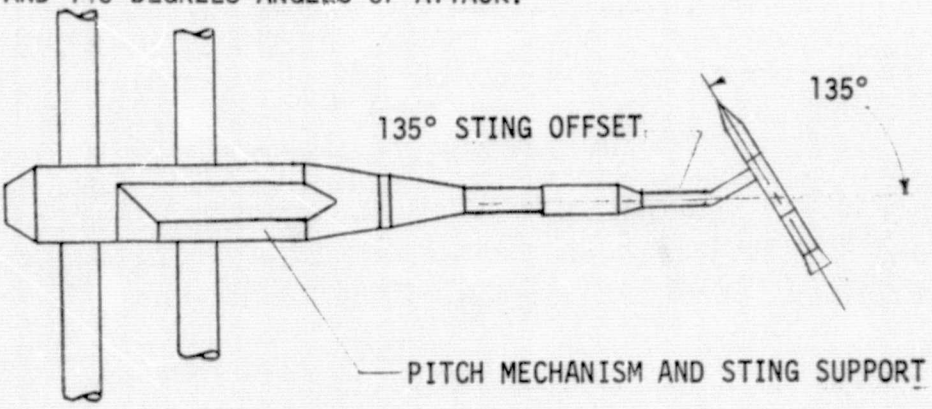


Figure 4. EXAMPLE MODEL SUPPORT DIAGRAMS

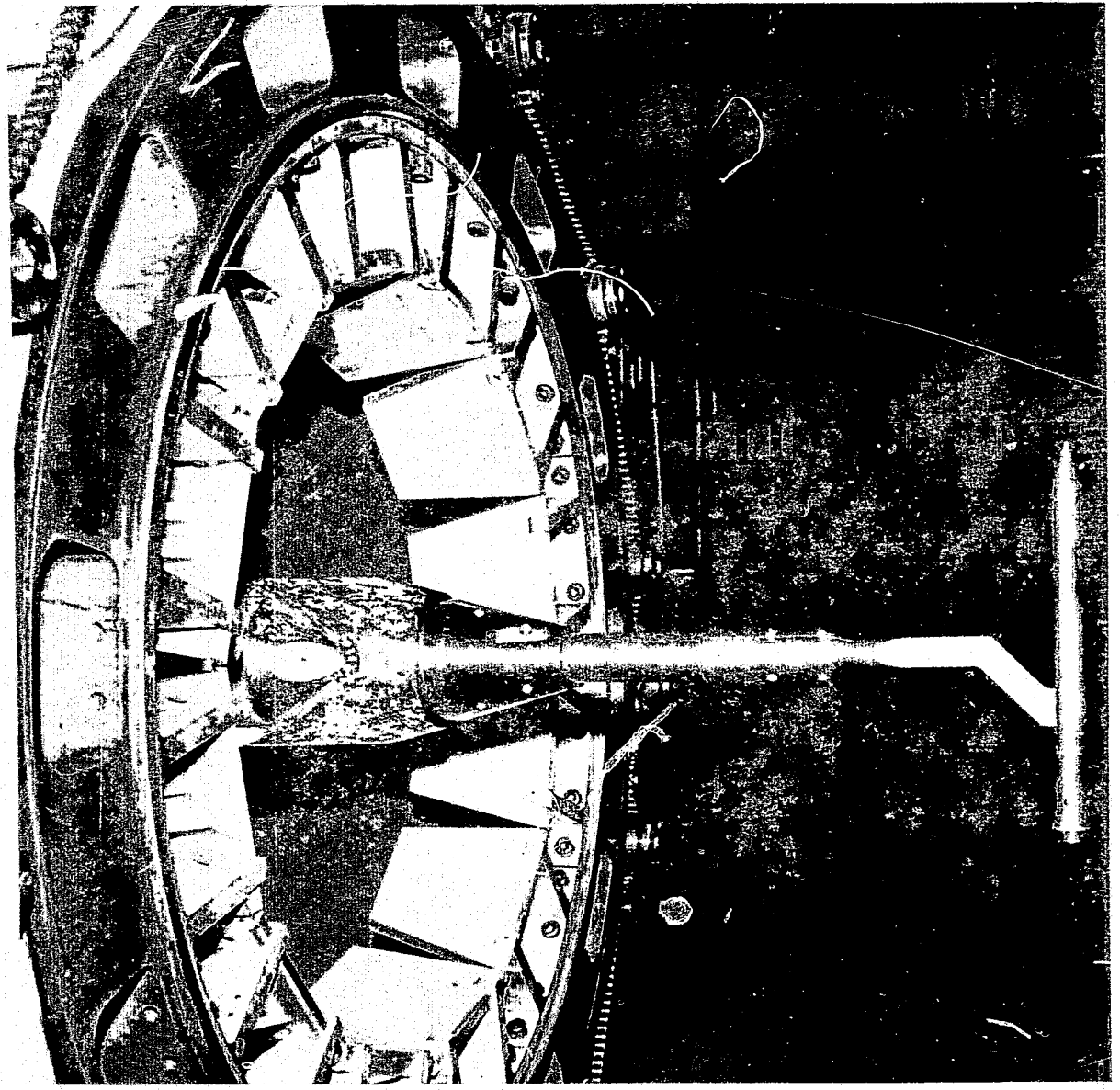


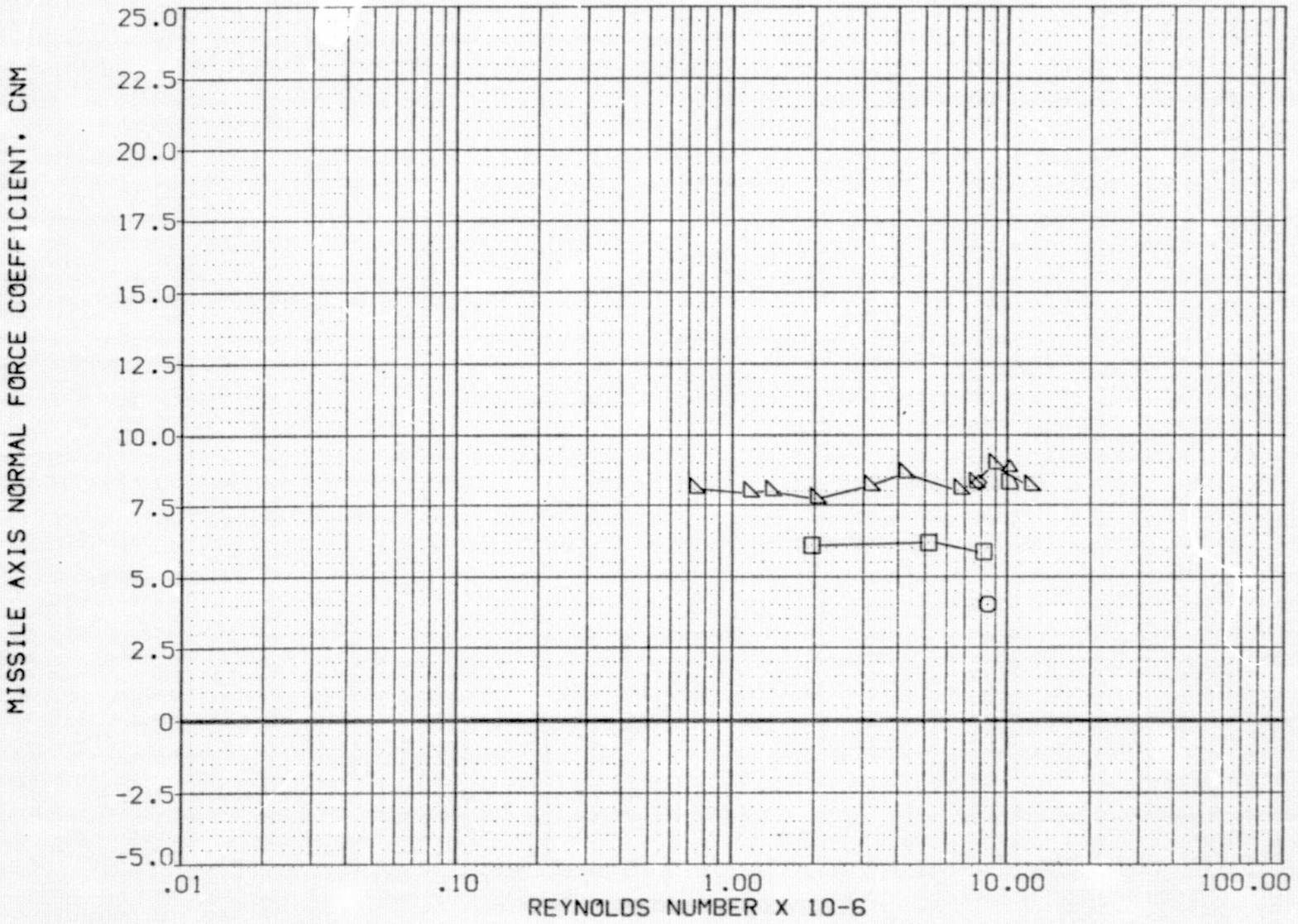
Figure 5. INSTALLATION PHOTOGRAPH OF THE MODEL WITH THE 90 DEGREE OFFSET STING SET UP

DATA FIGURES

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

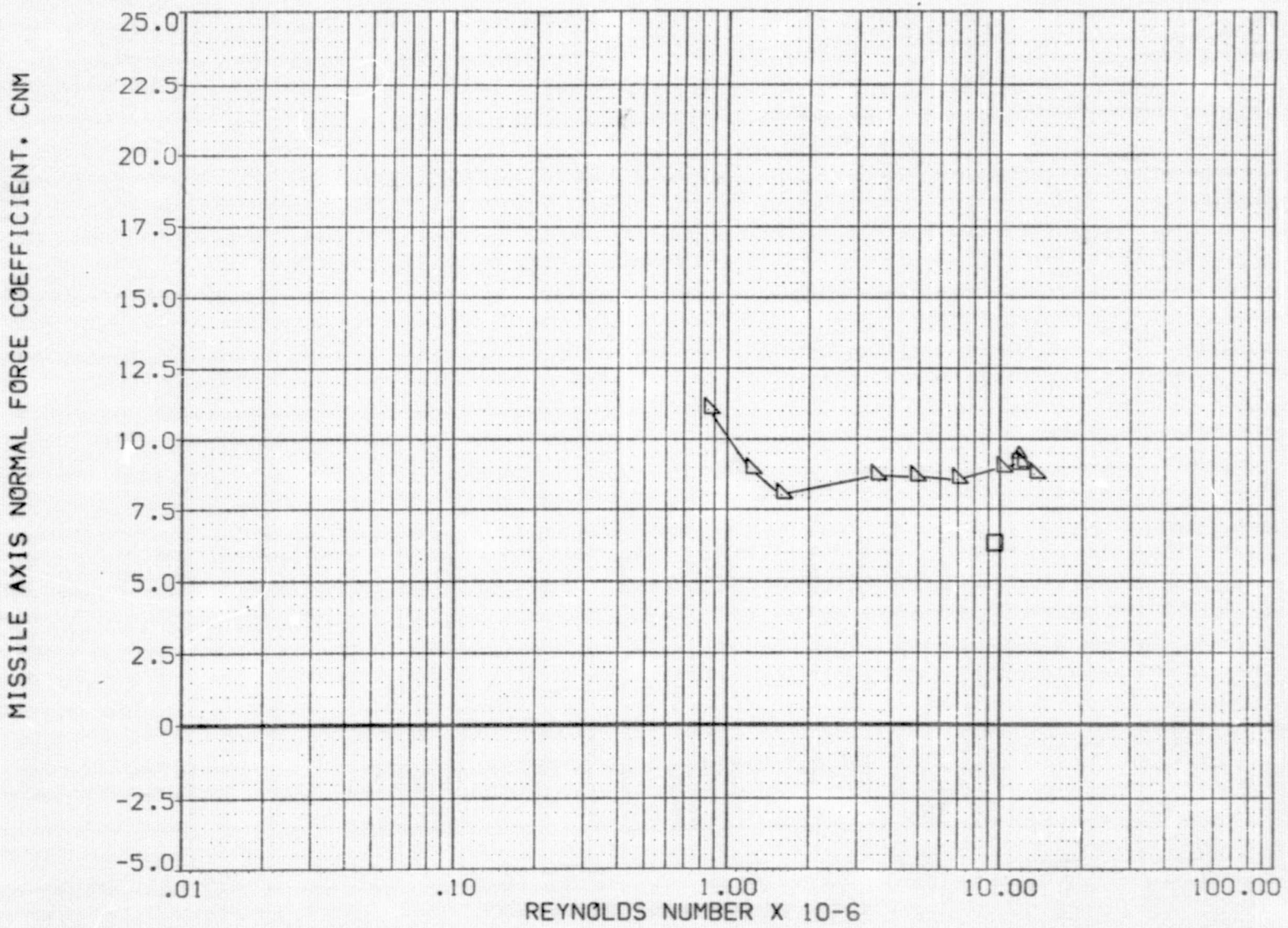


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

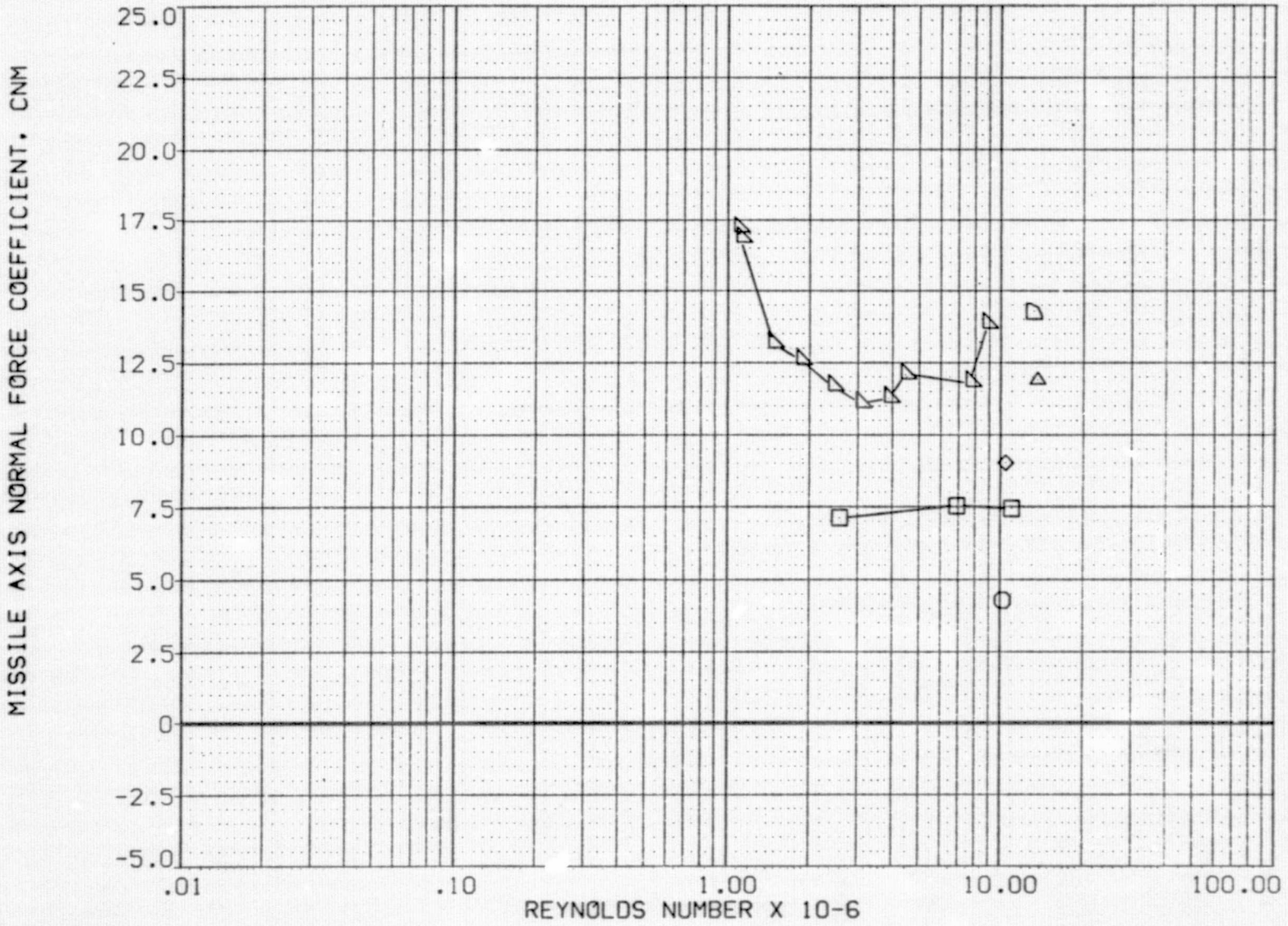


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

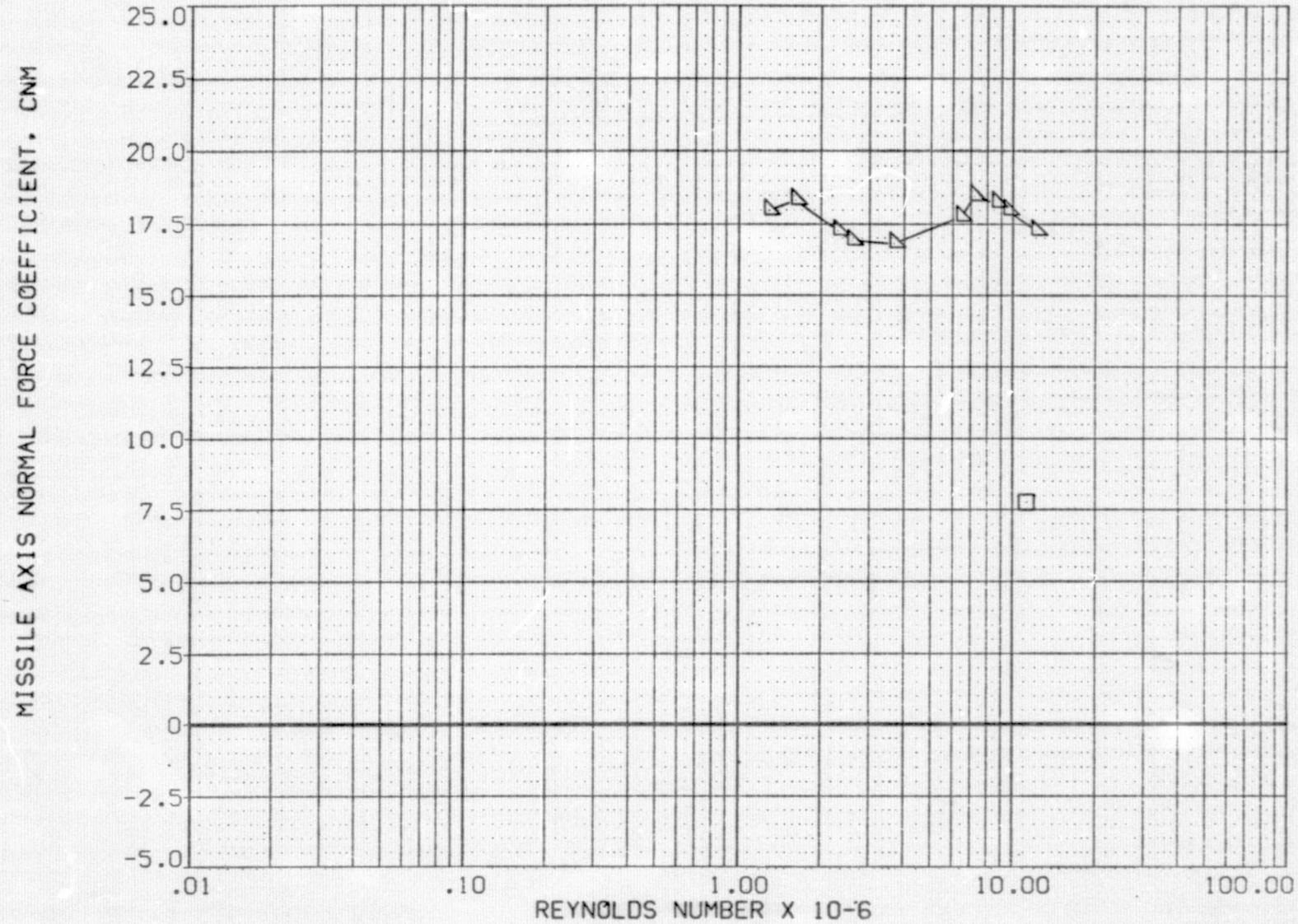


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	▽	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

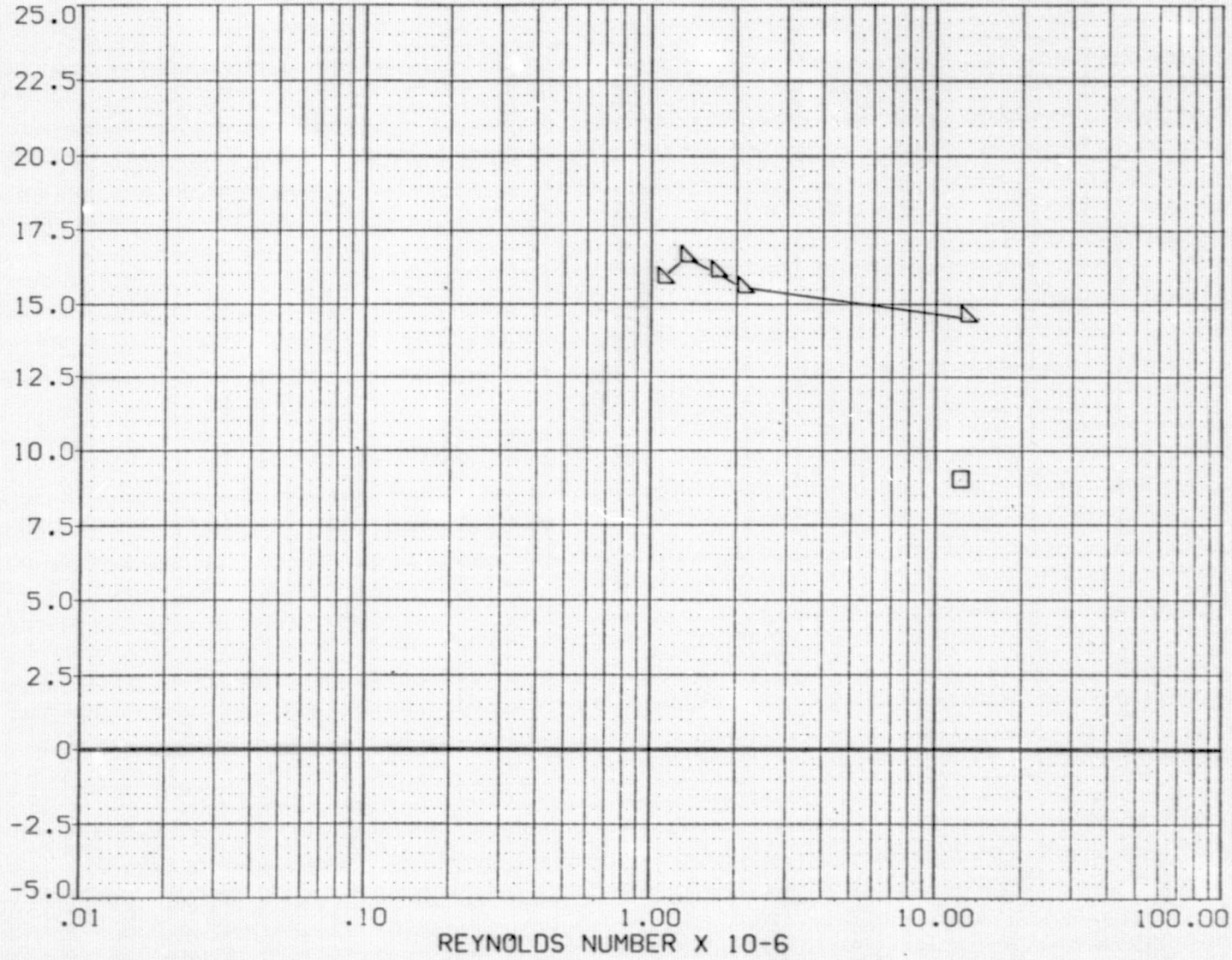


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	○	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	△	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

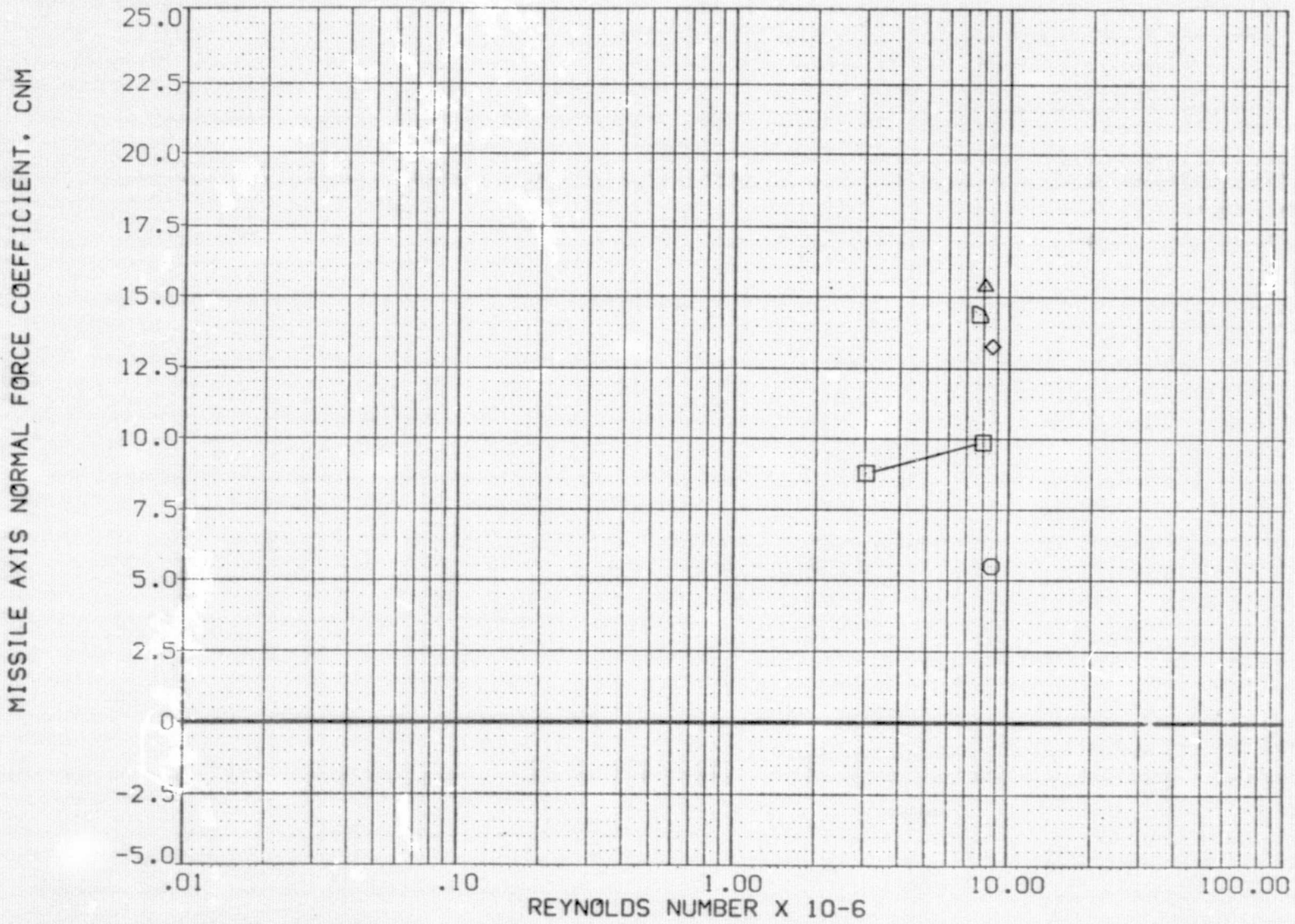


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	⊲	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



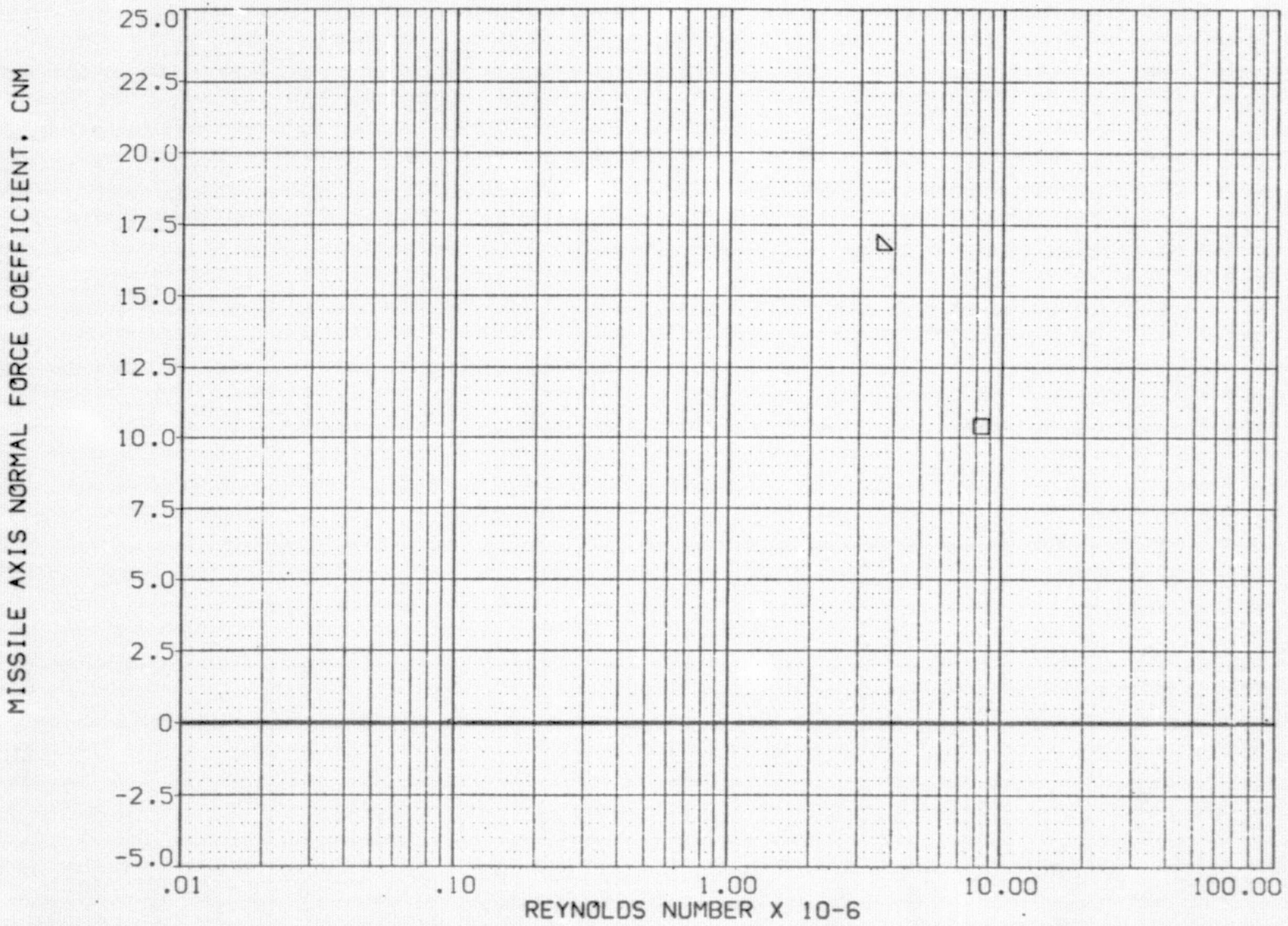
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .91

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	⊡	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▽	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

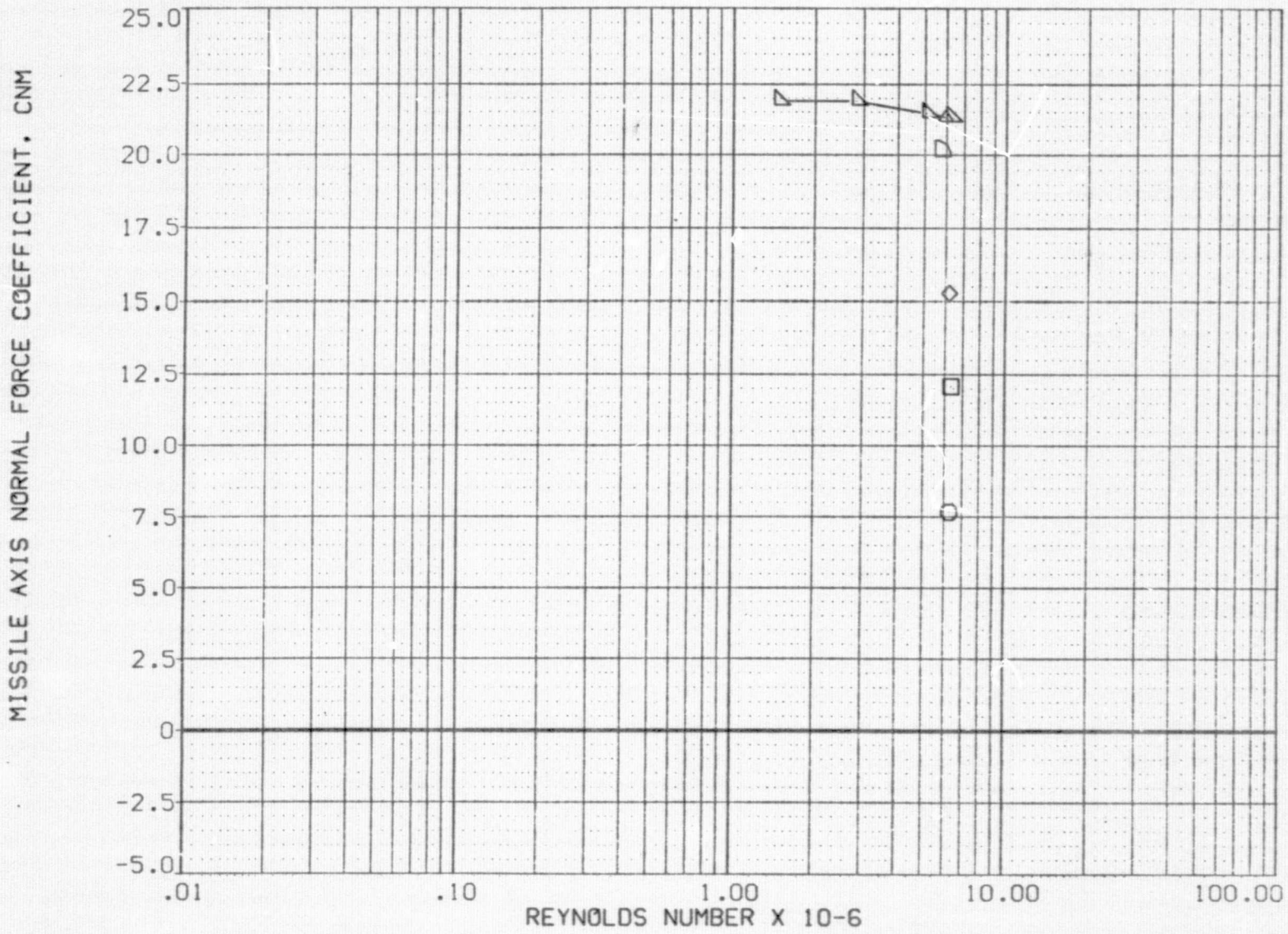


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = .99

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

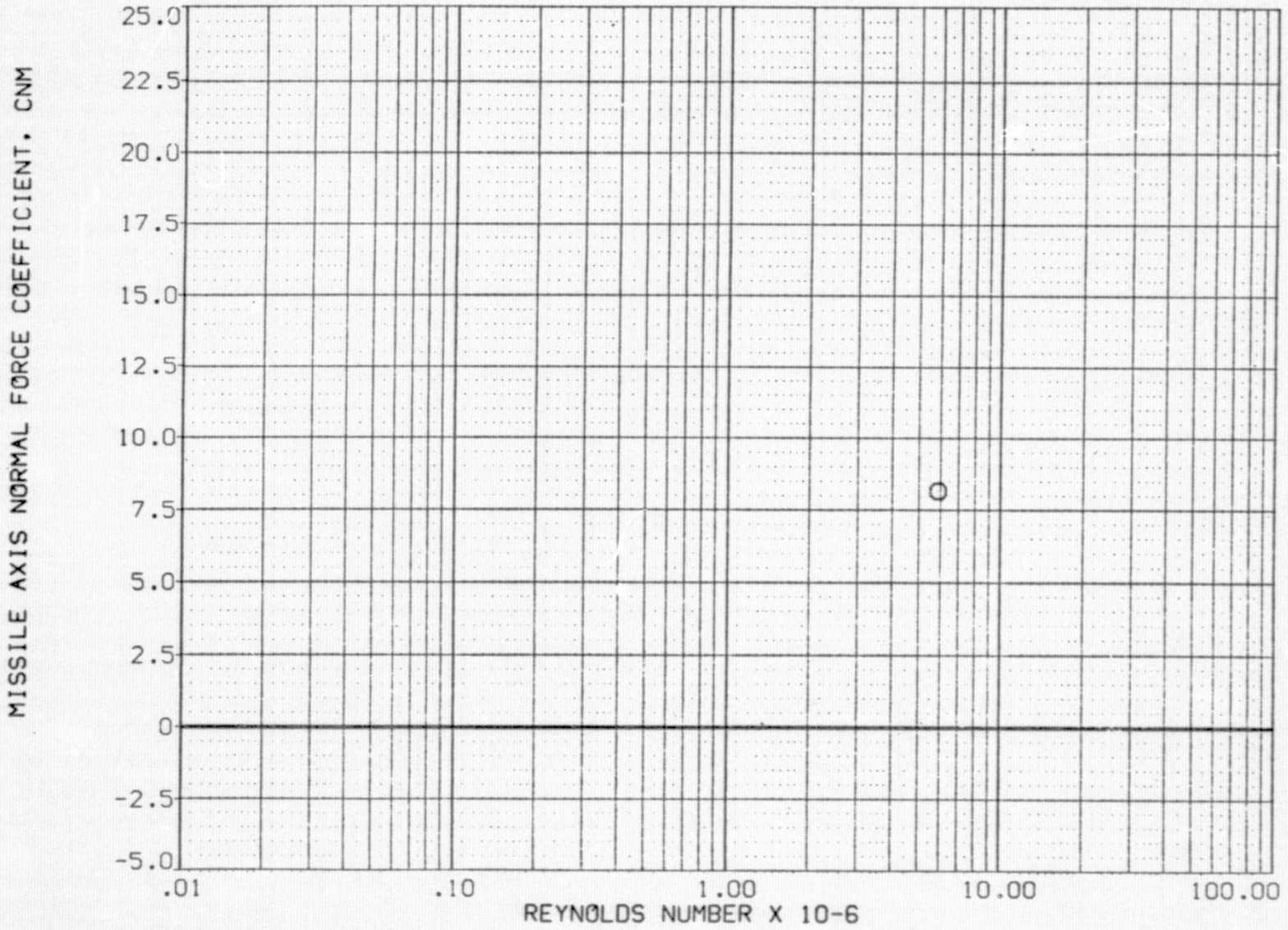


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.21

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	DATA NOT AVAILABLE	45.000	.000	.000
(B1F025)	⊲	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	△	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	⊳	DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	▽	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

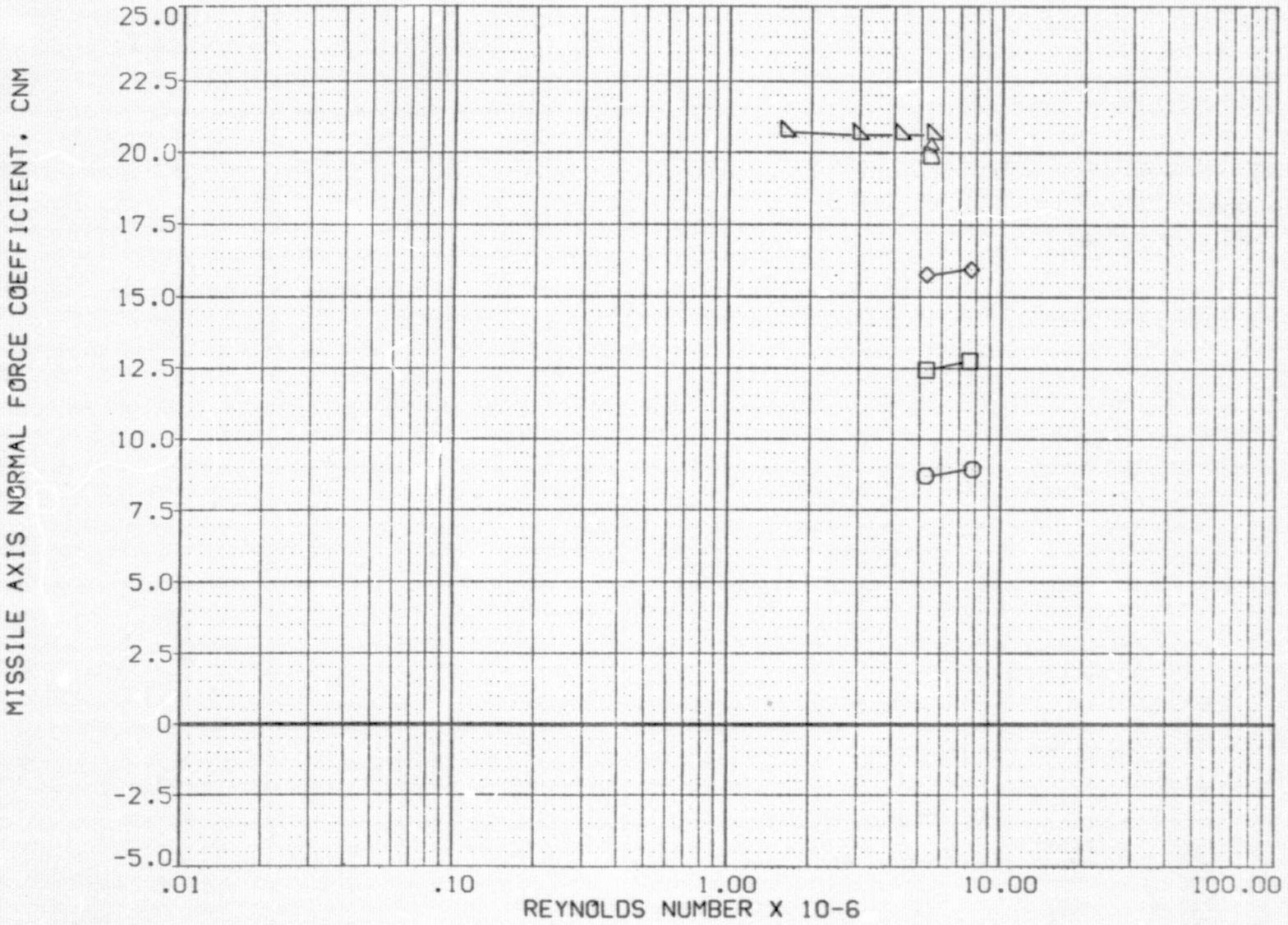


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



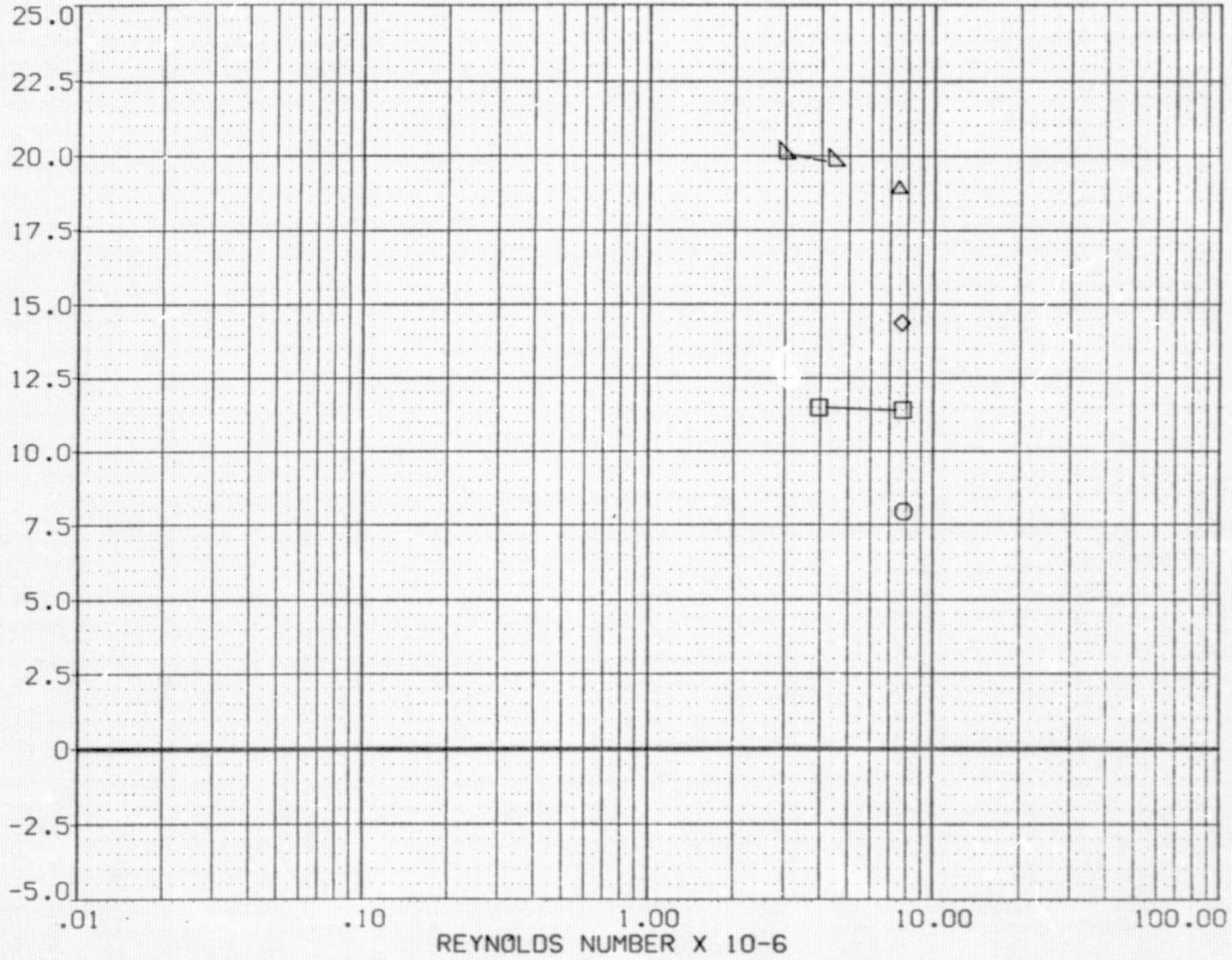
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▽	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

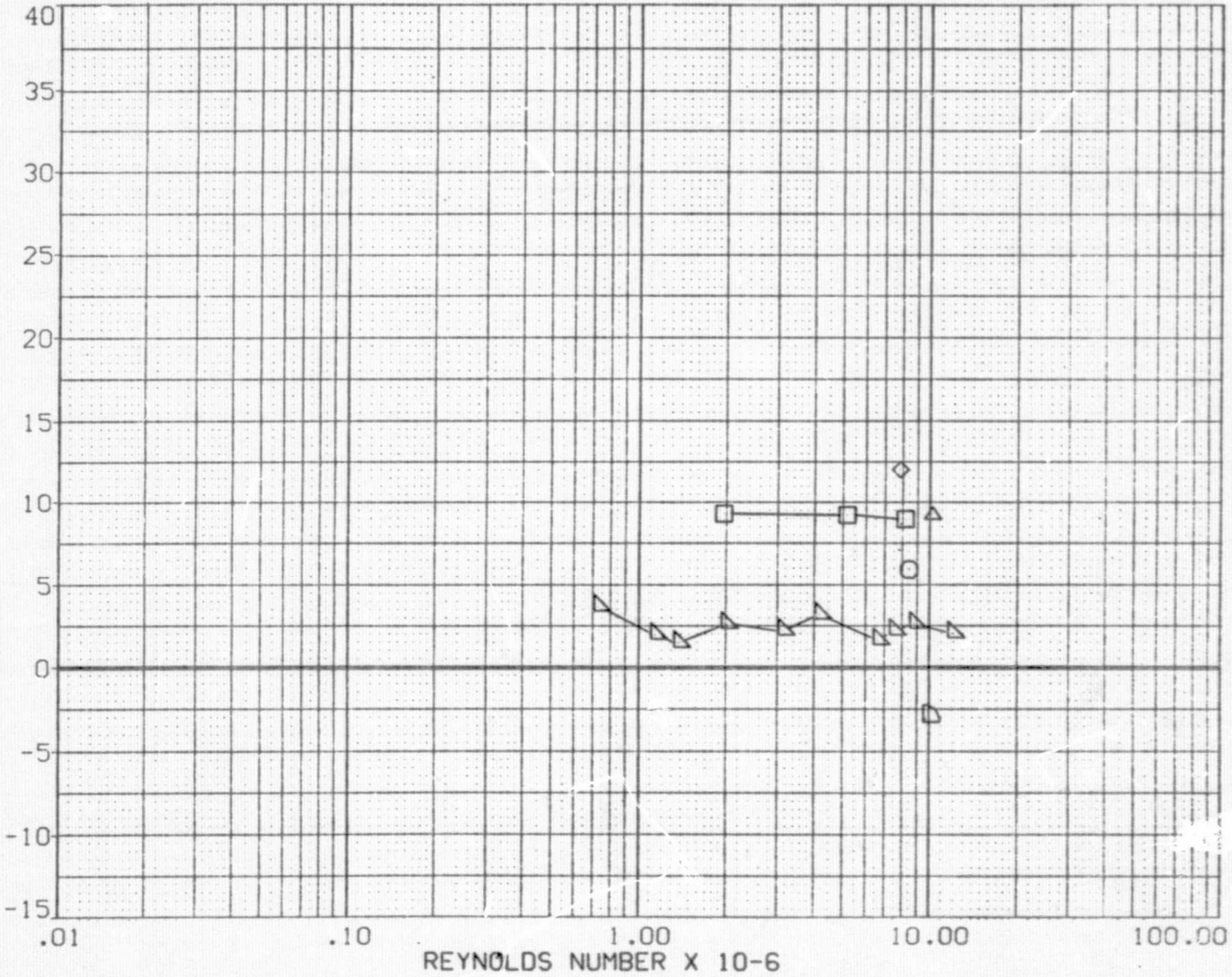


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

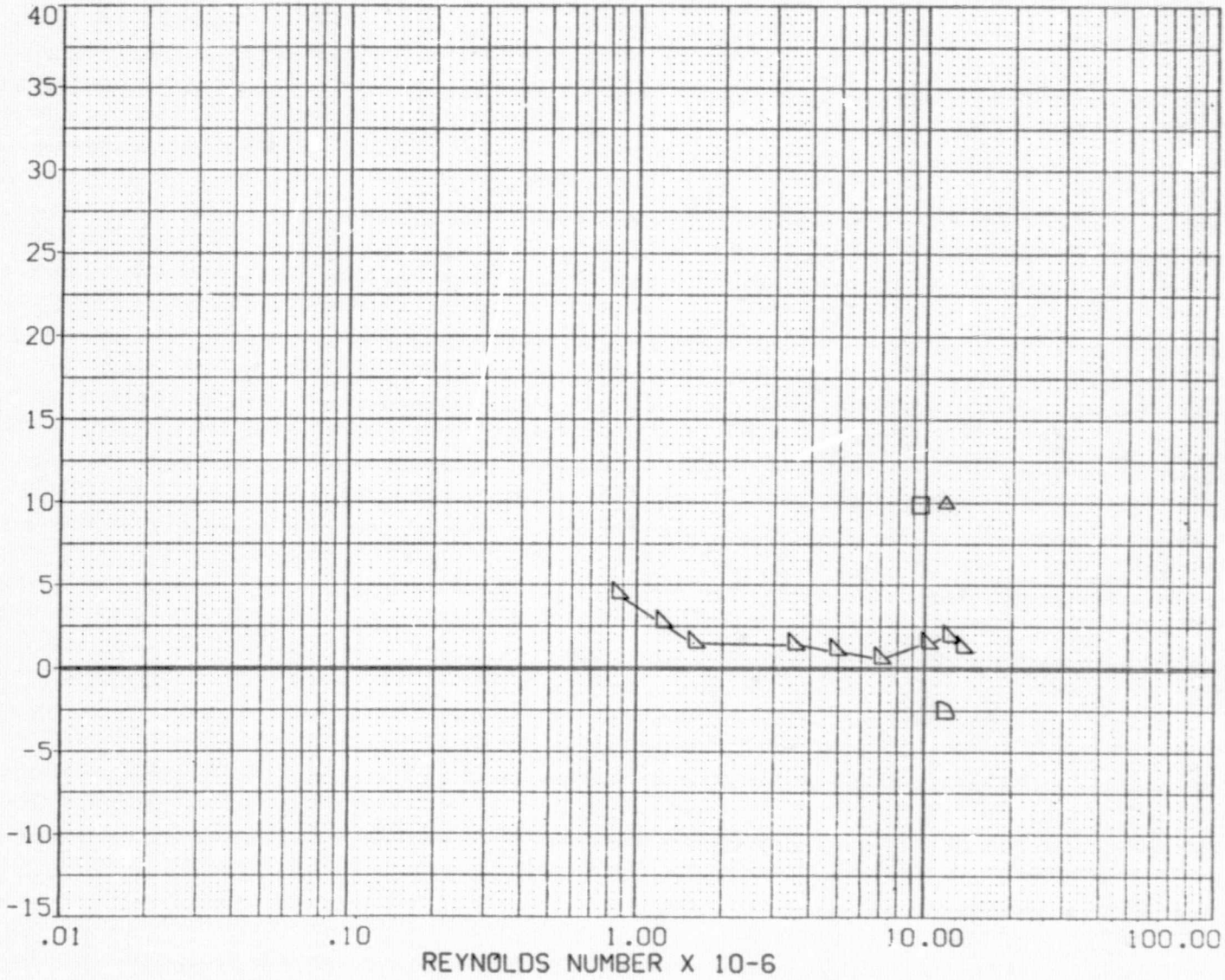


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

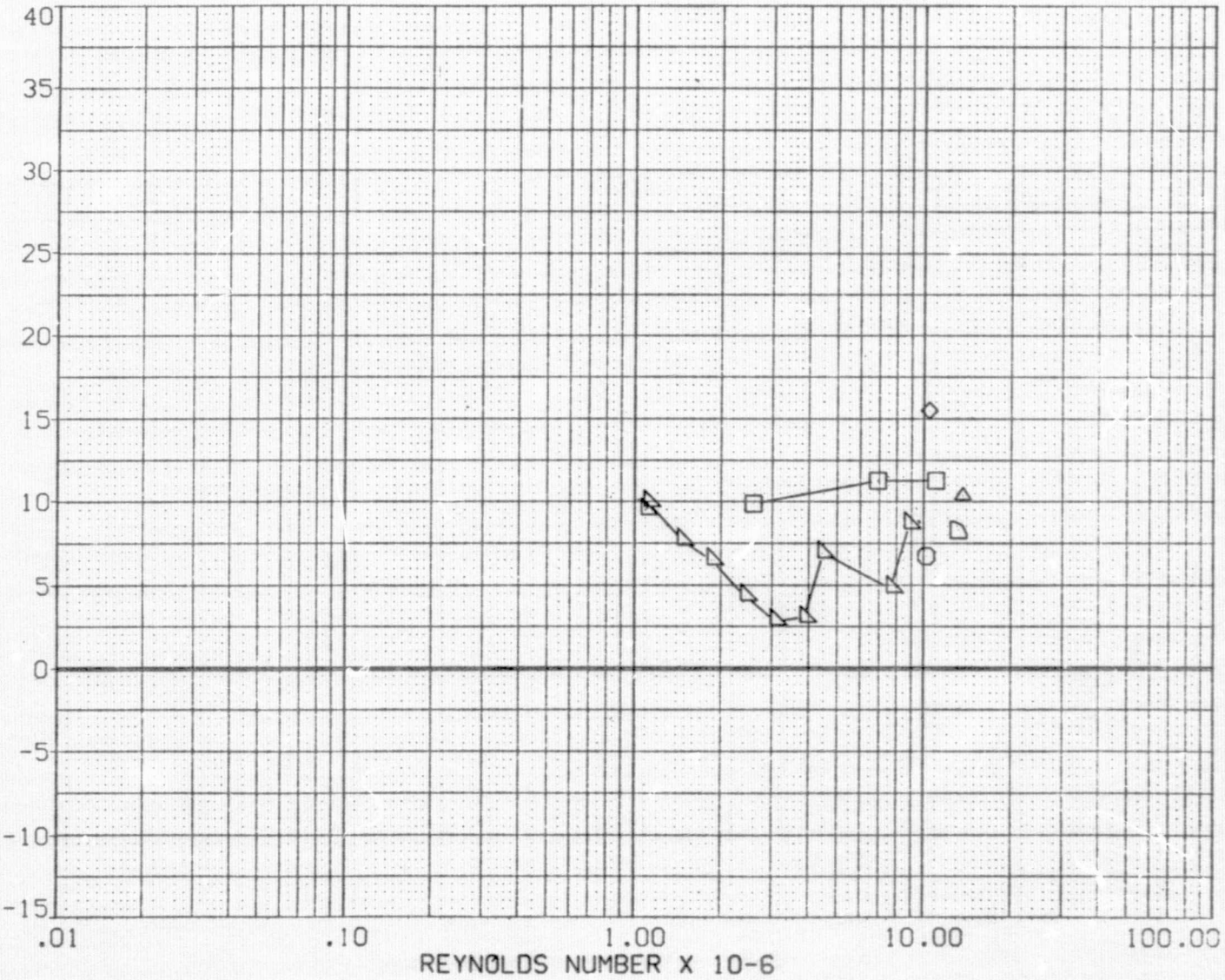


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

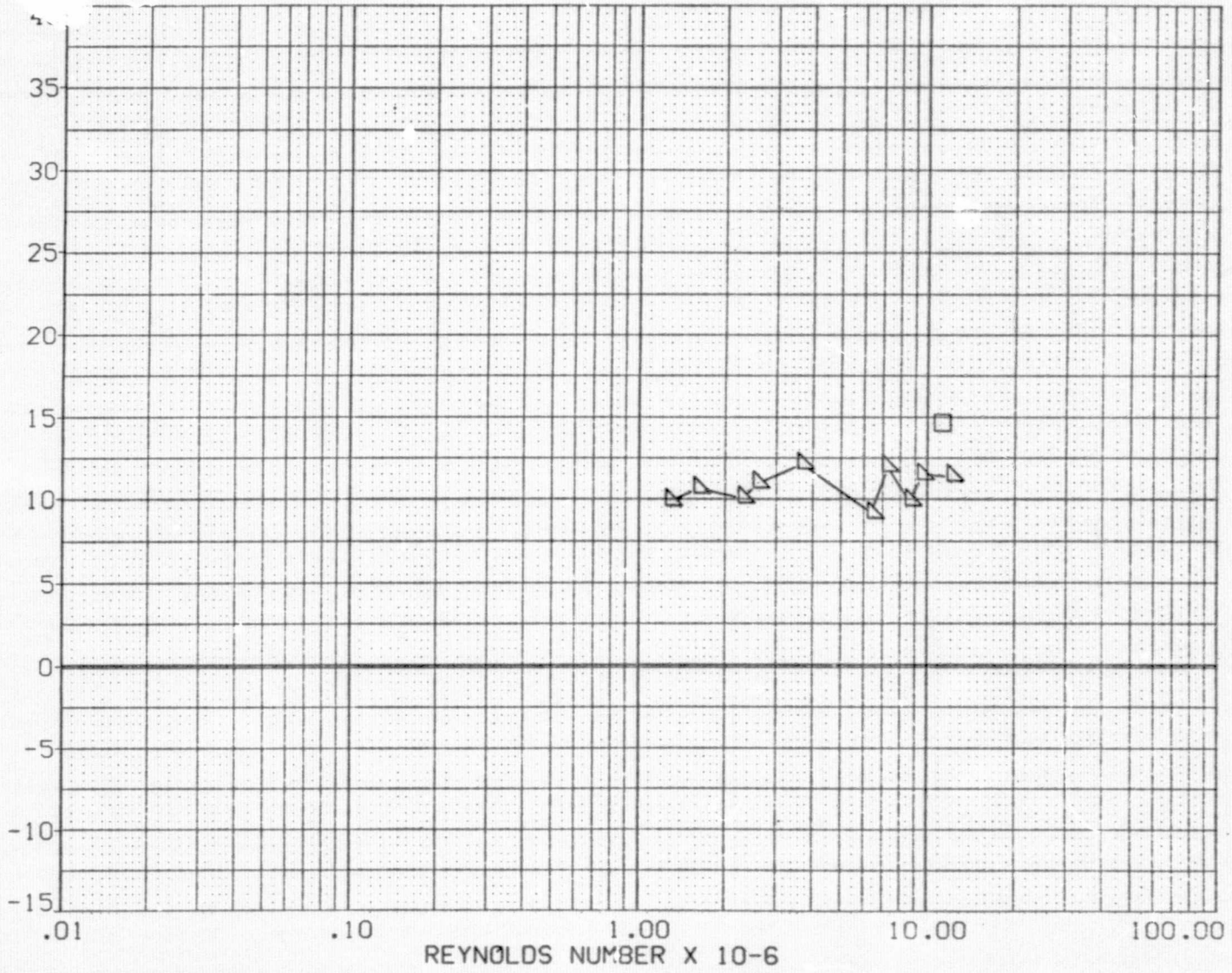


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	⊠	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	⊠	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	⊠	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

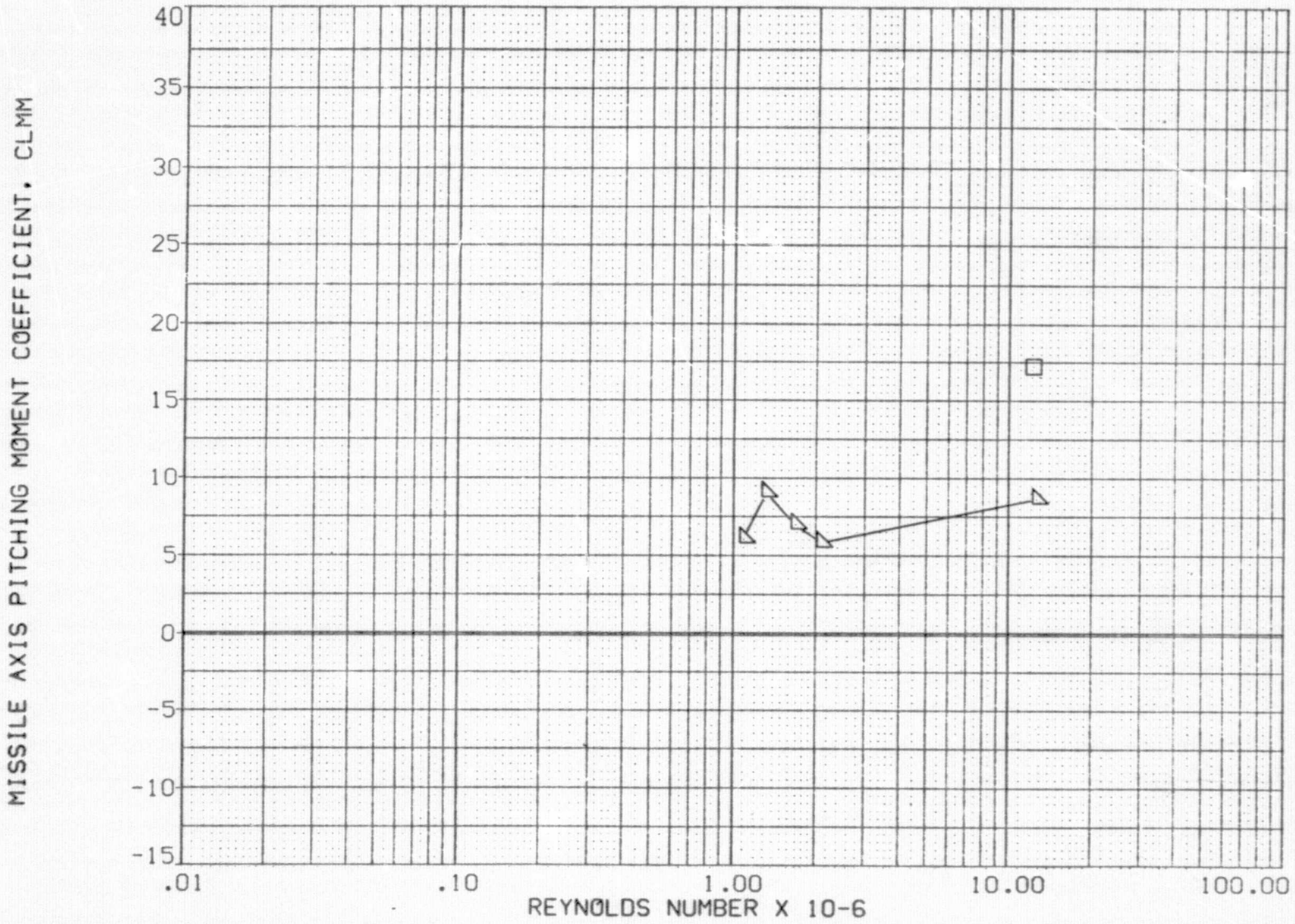


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



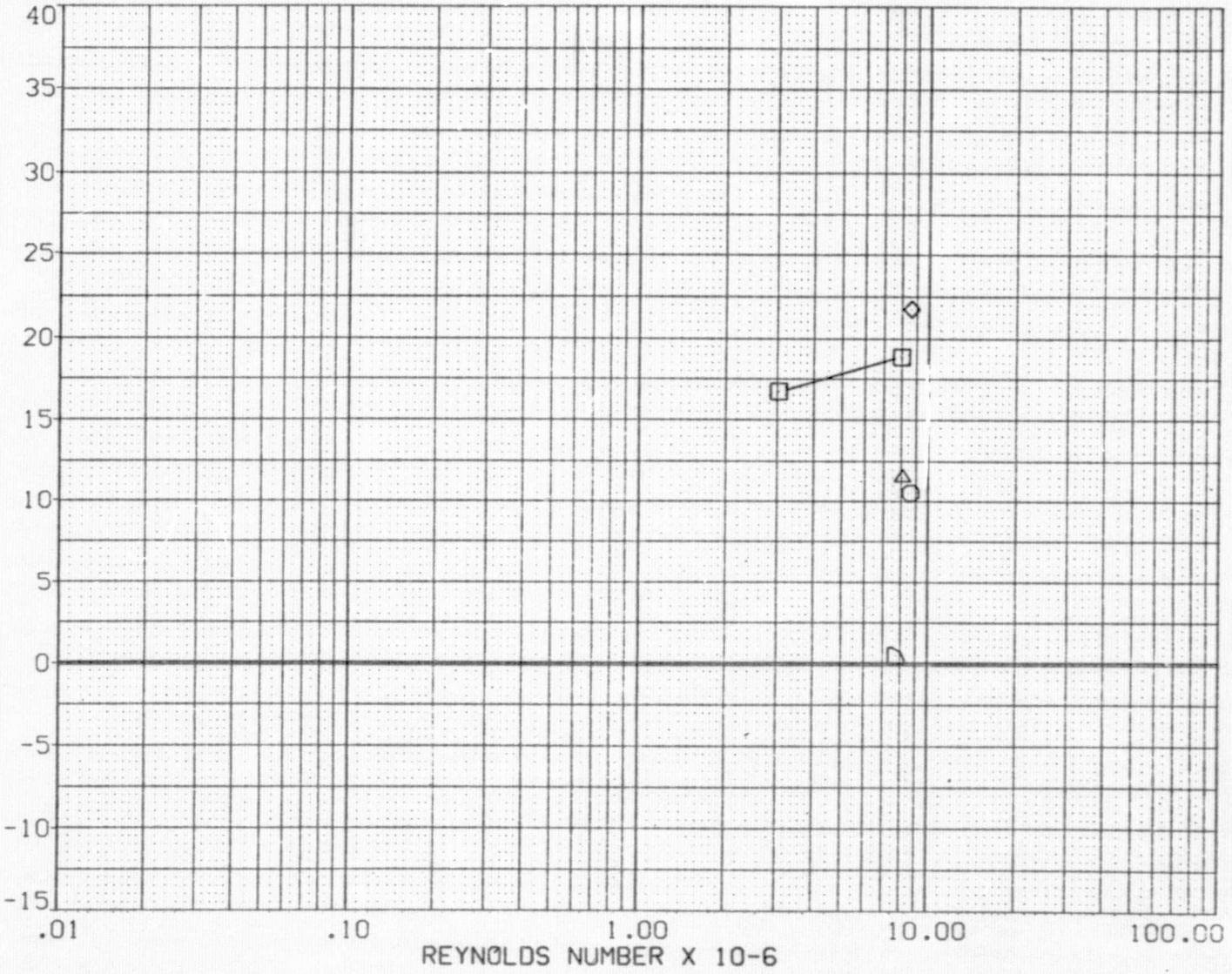
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

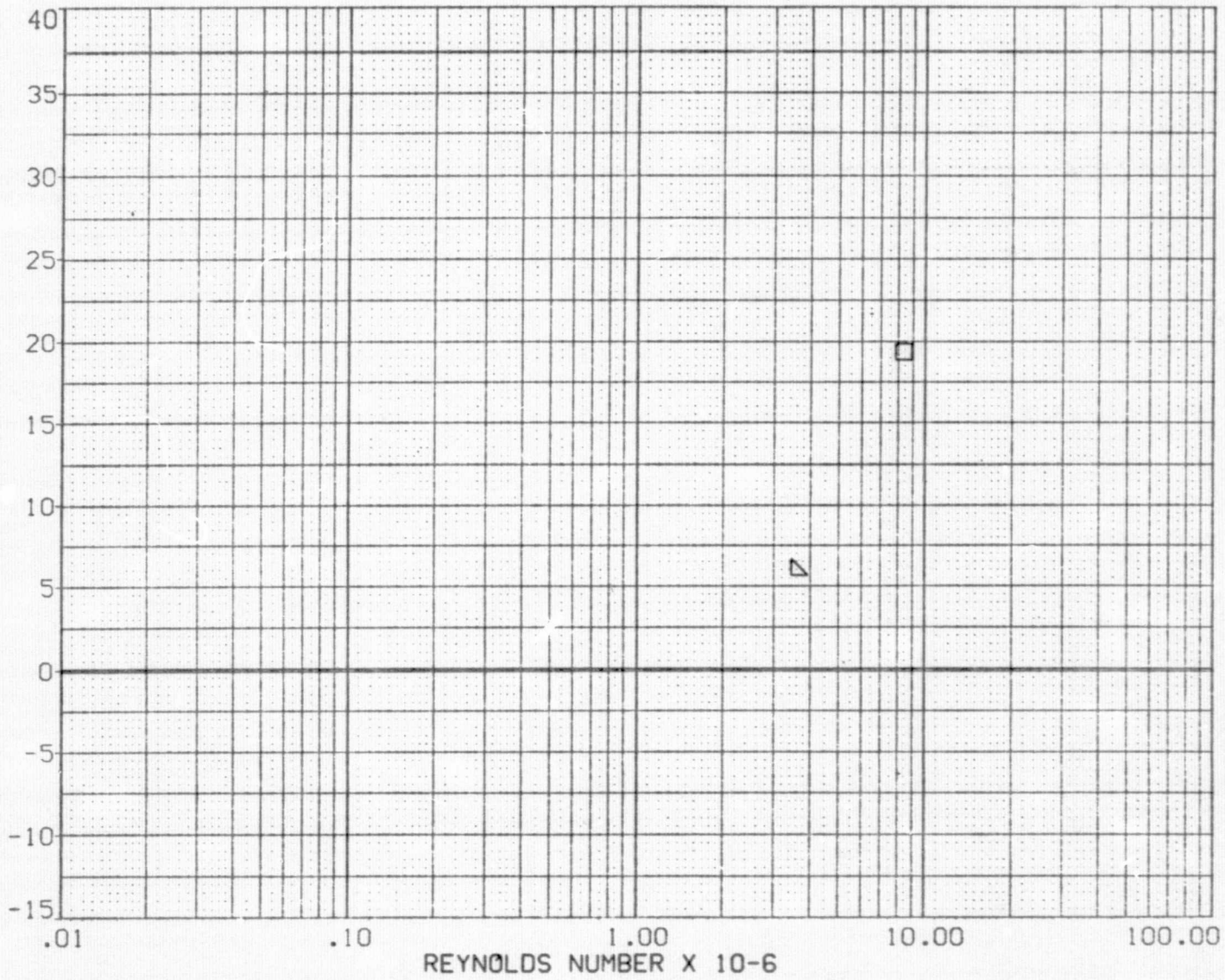


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .91

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	▽	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	⊠	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	△	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMPP	.0000	IN.
SCALE	.0088	

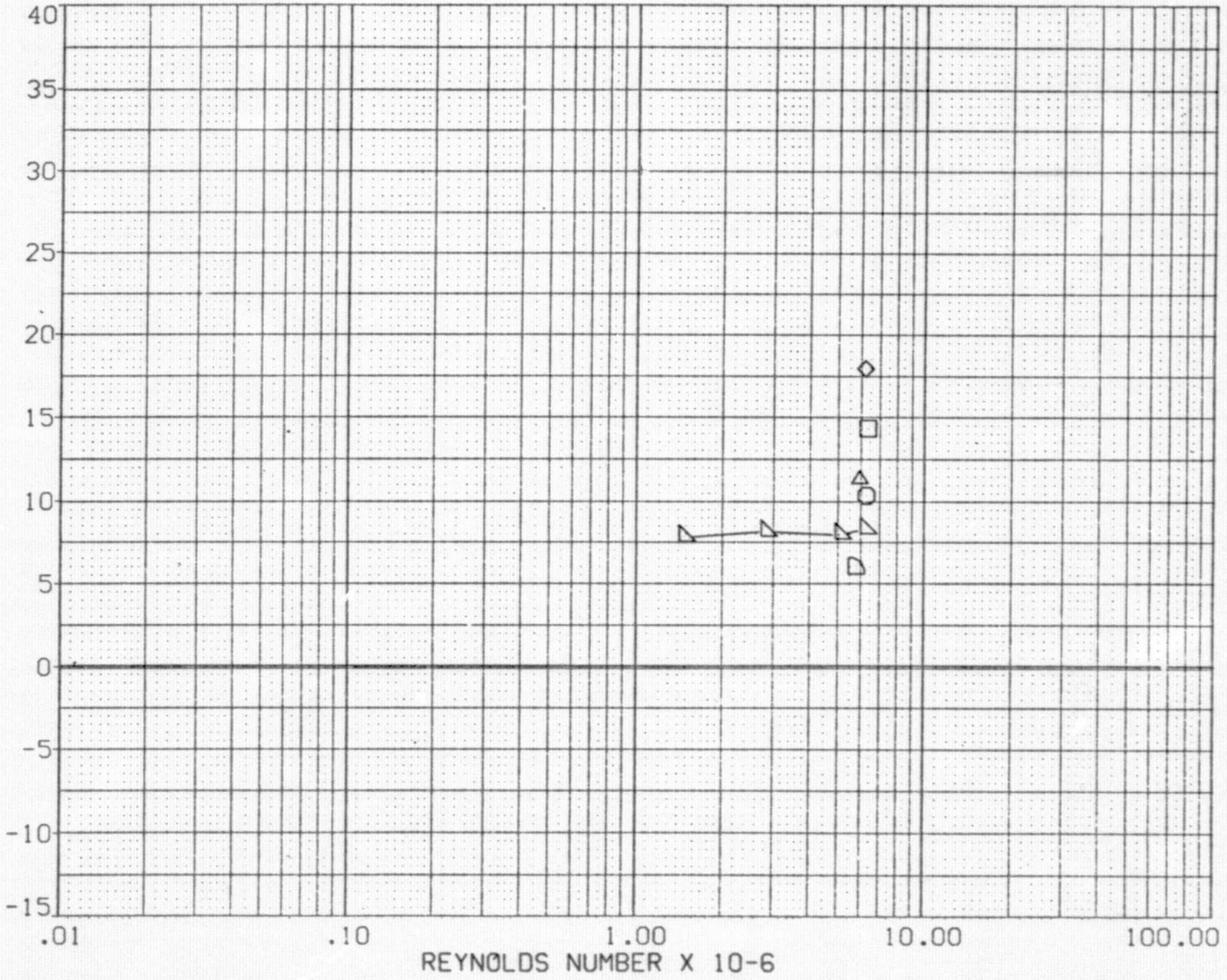


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = .99

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

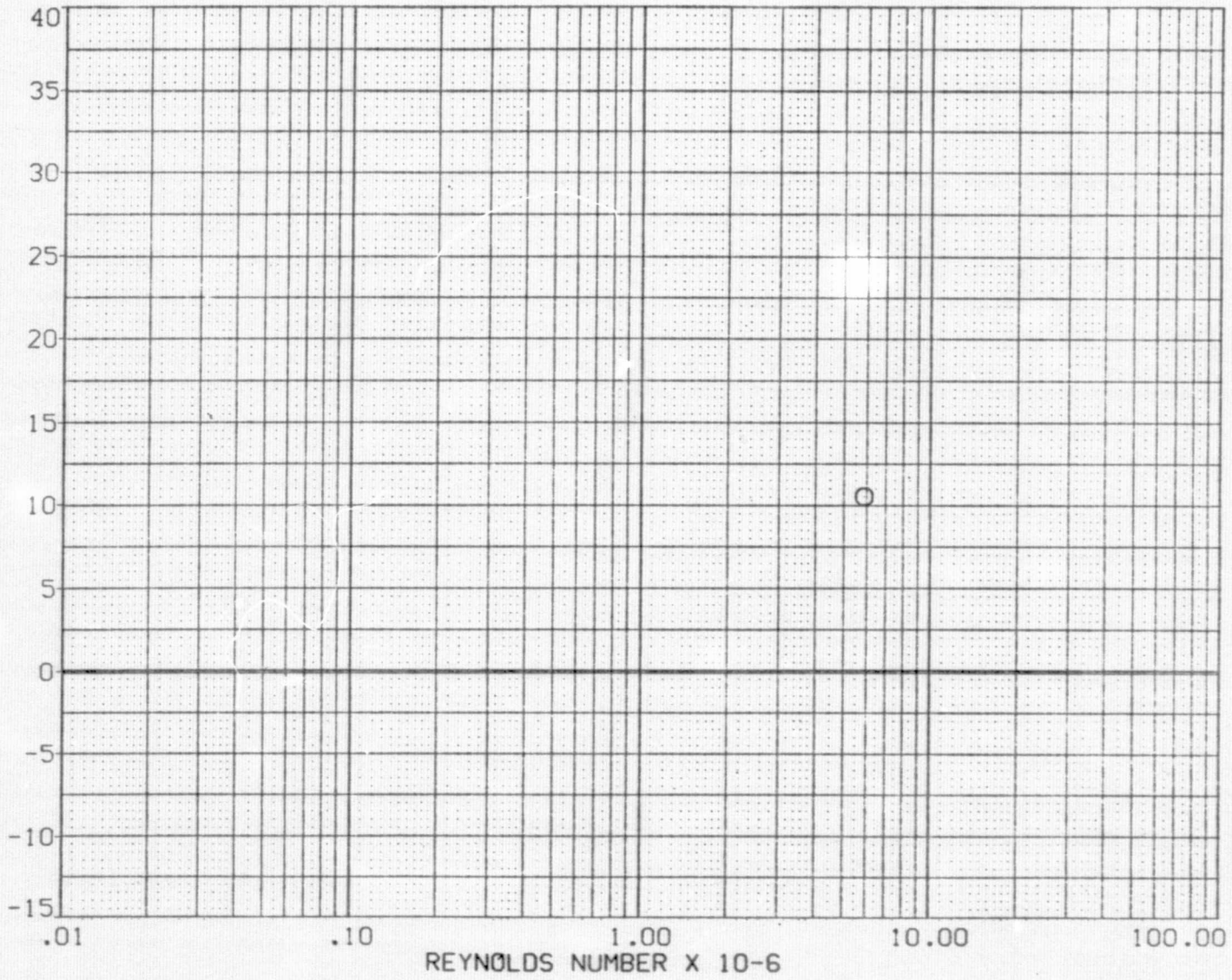


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.21

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	□	DATA NOT AVAILABLE	45.000	.000	.000
(B1F025)	⋈	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	◁	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	▷	DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	▽	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

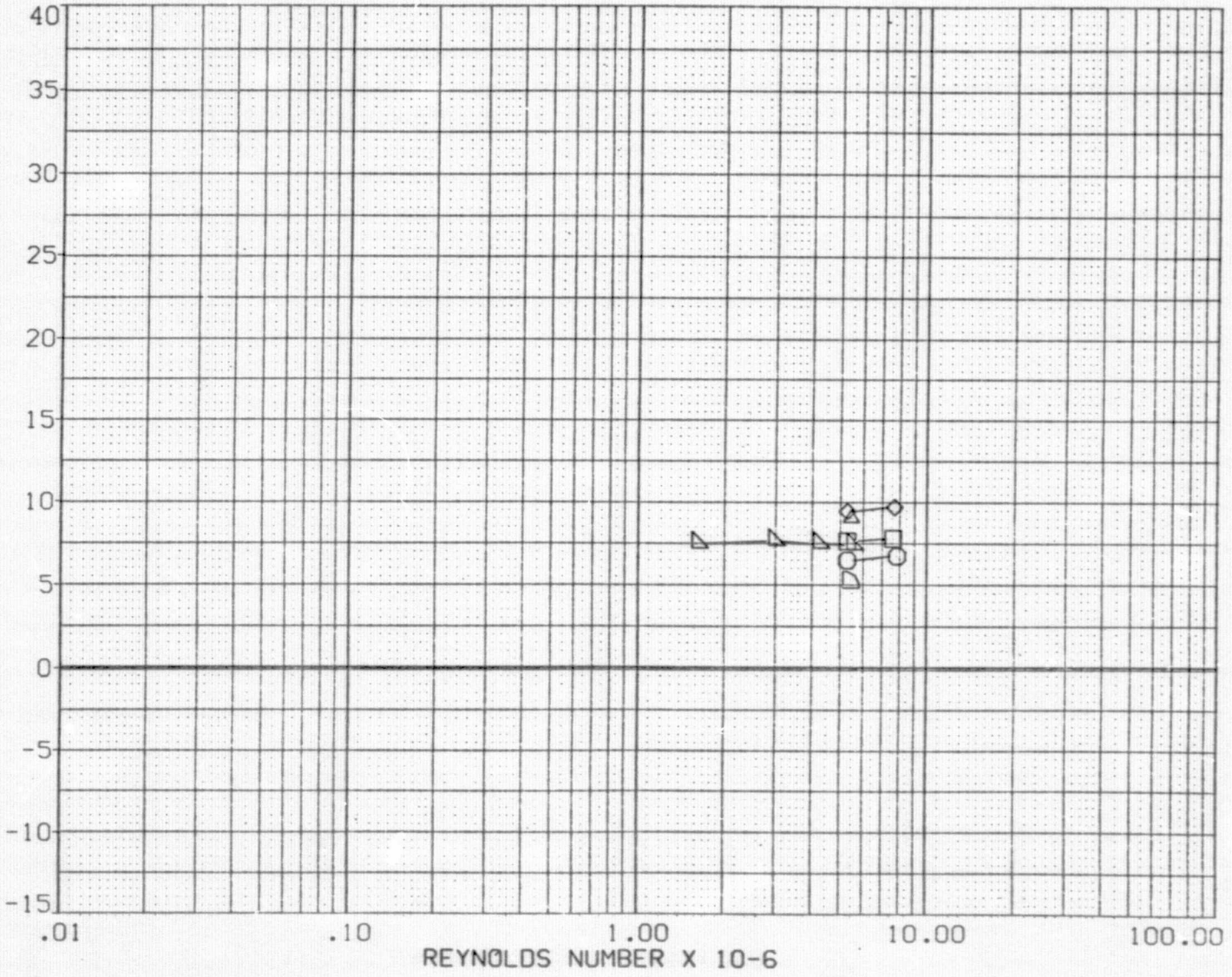


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

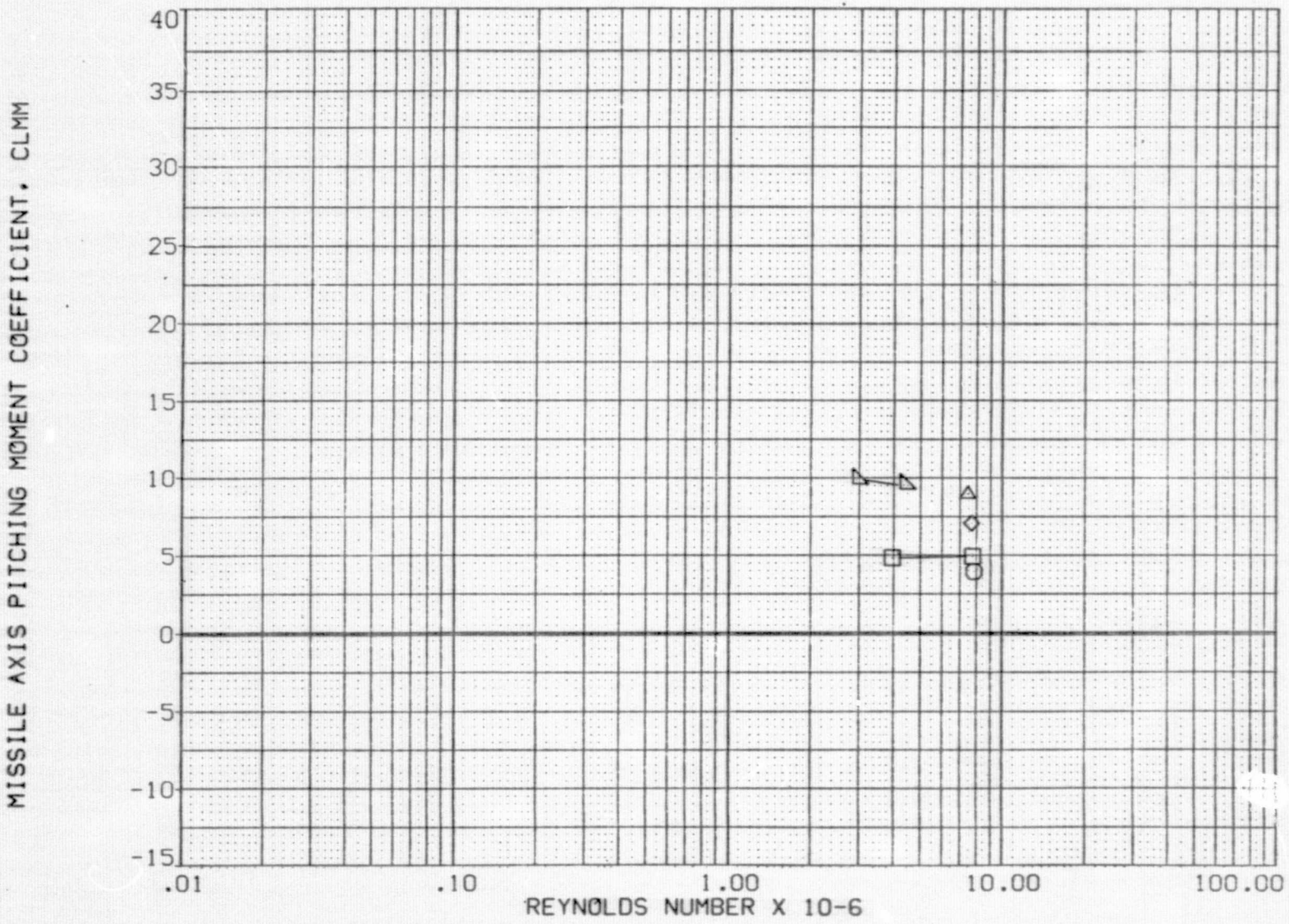


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

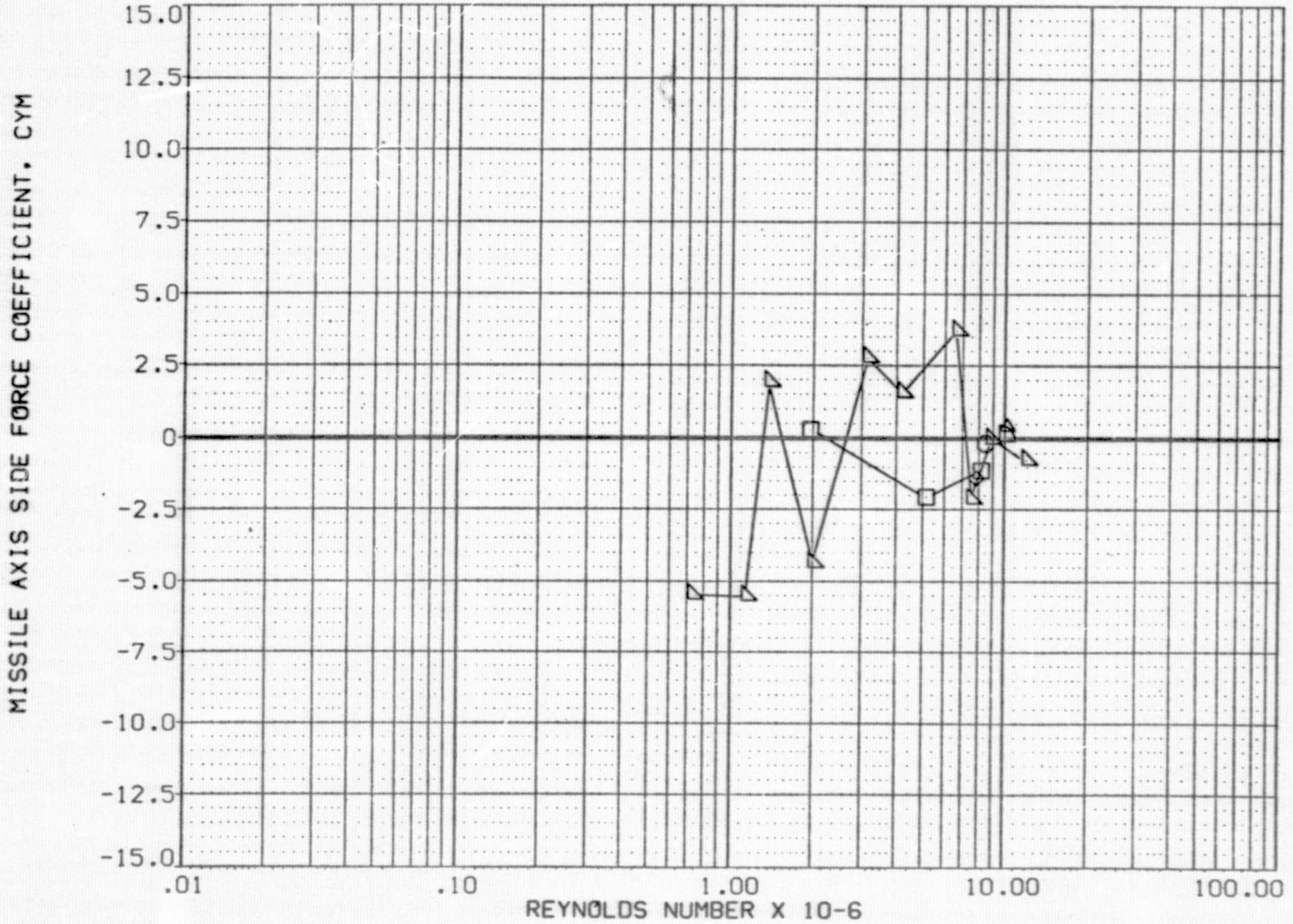


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

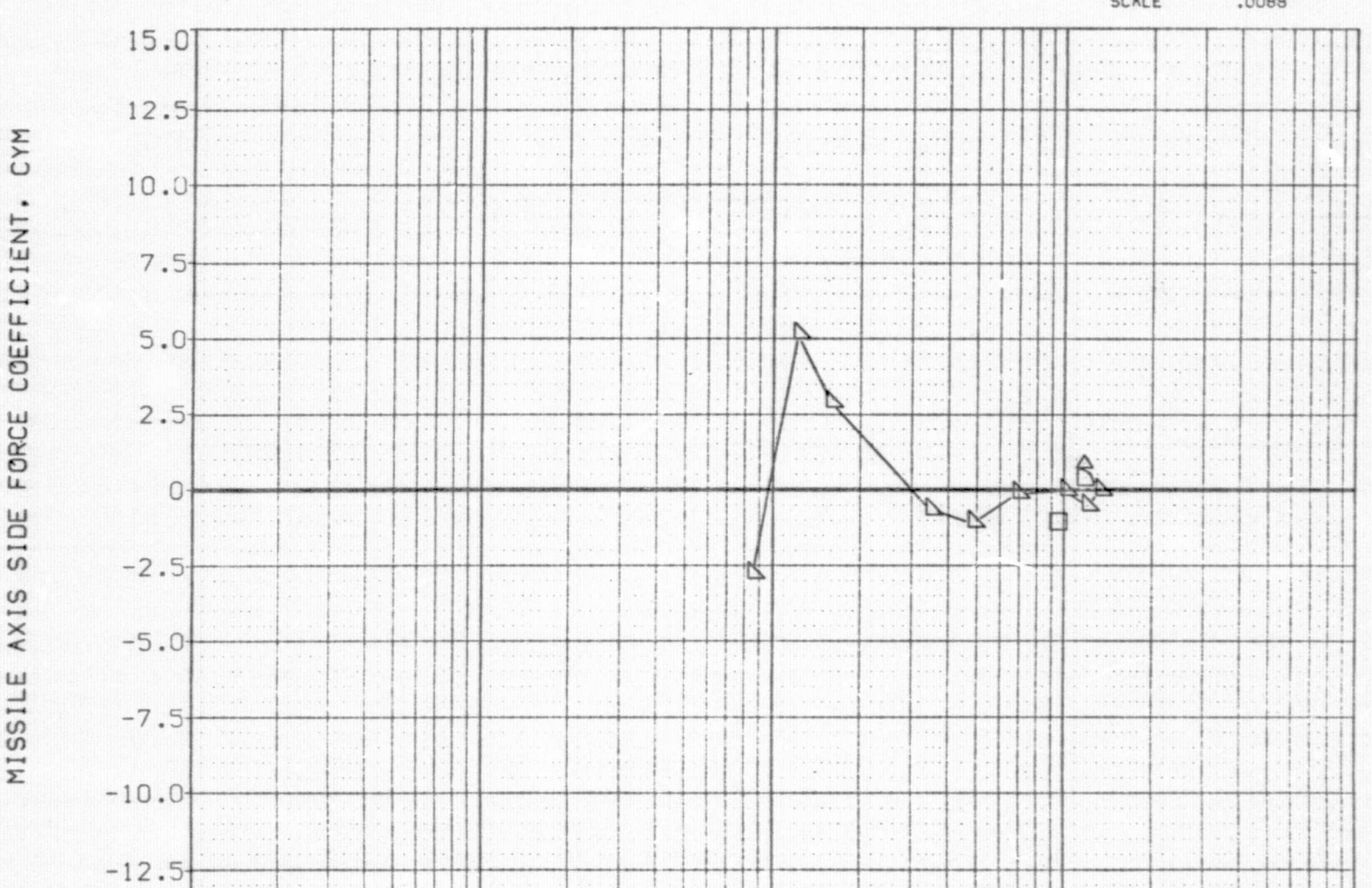


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

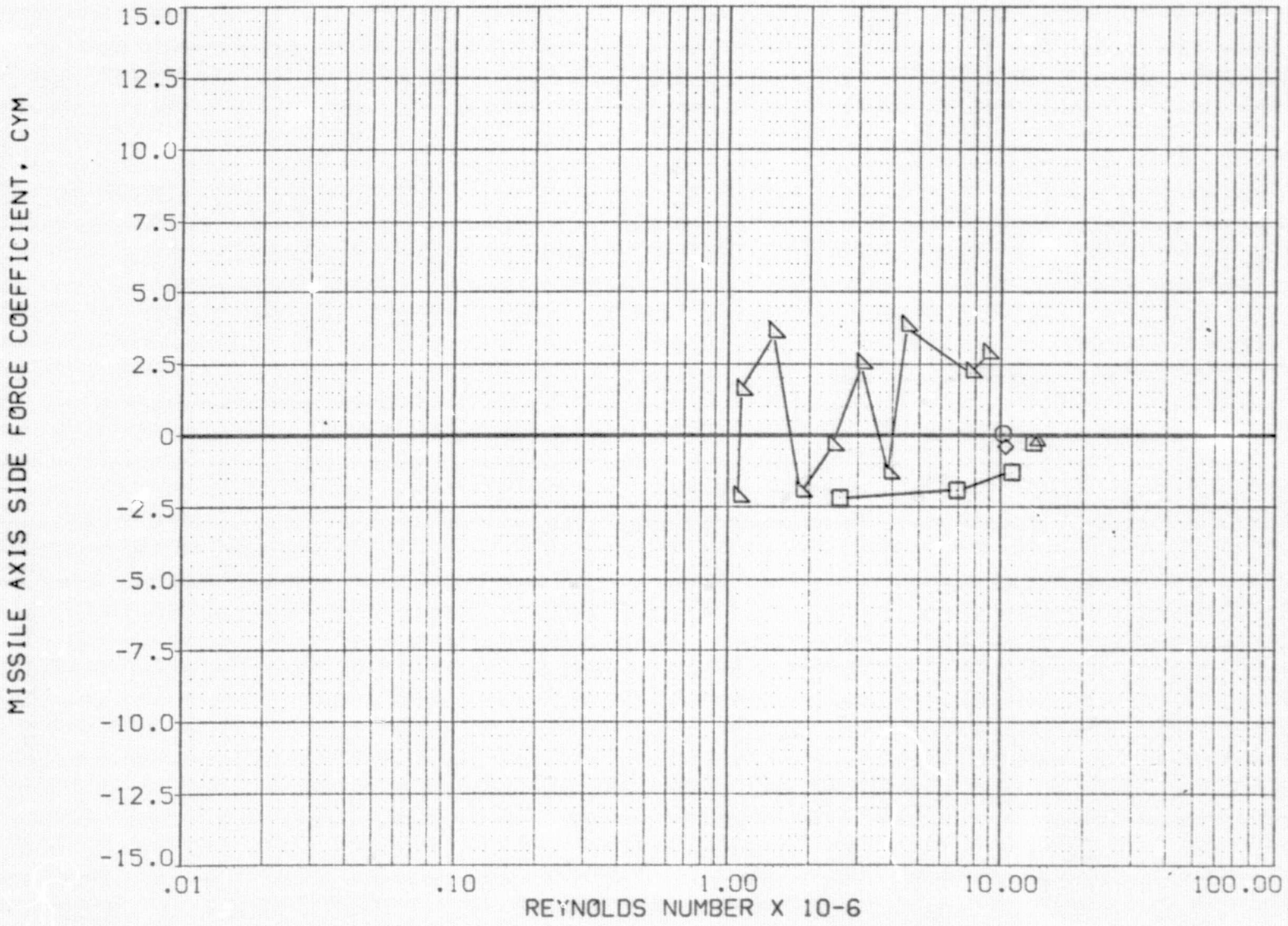


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

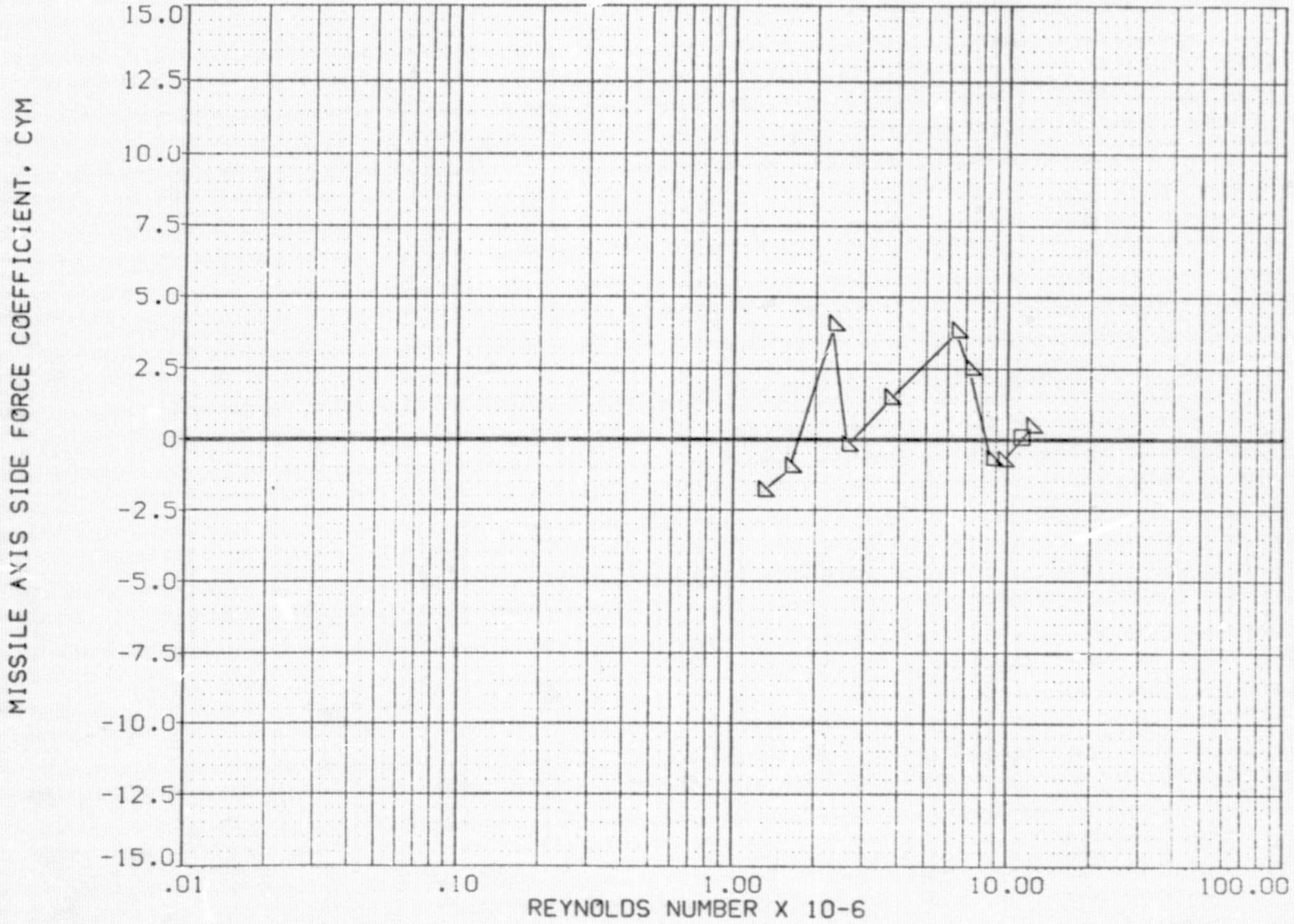


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

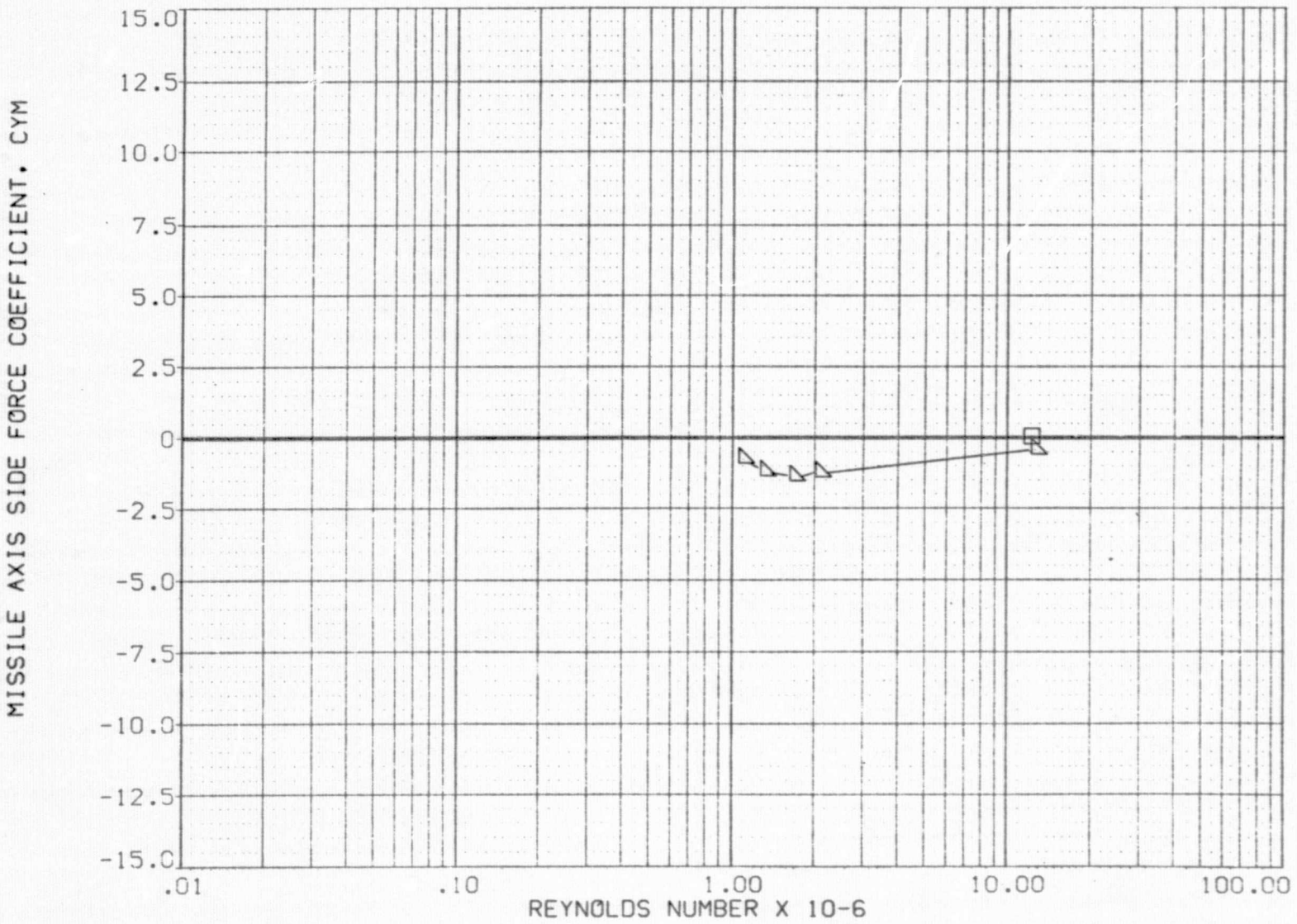


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

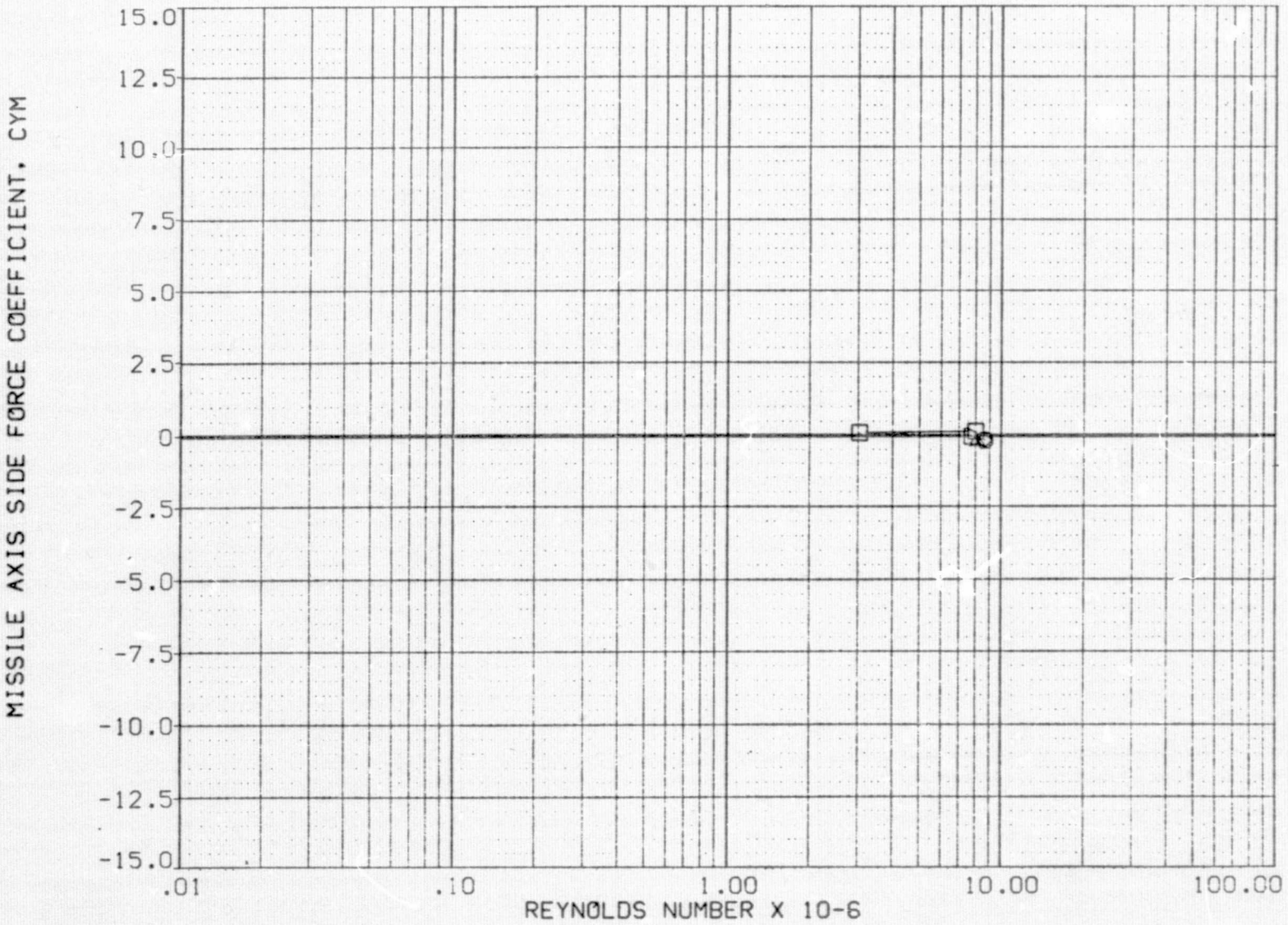


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

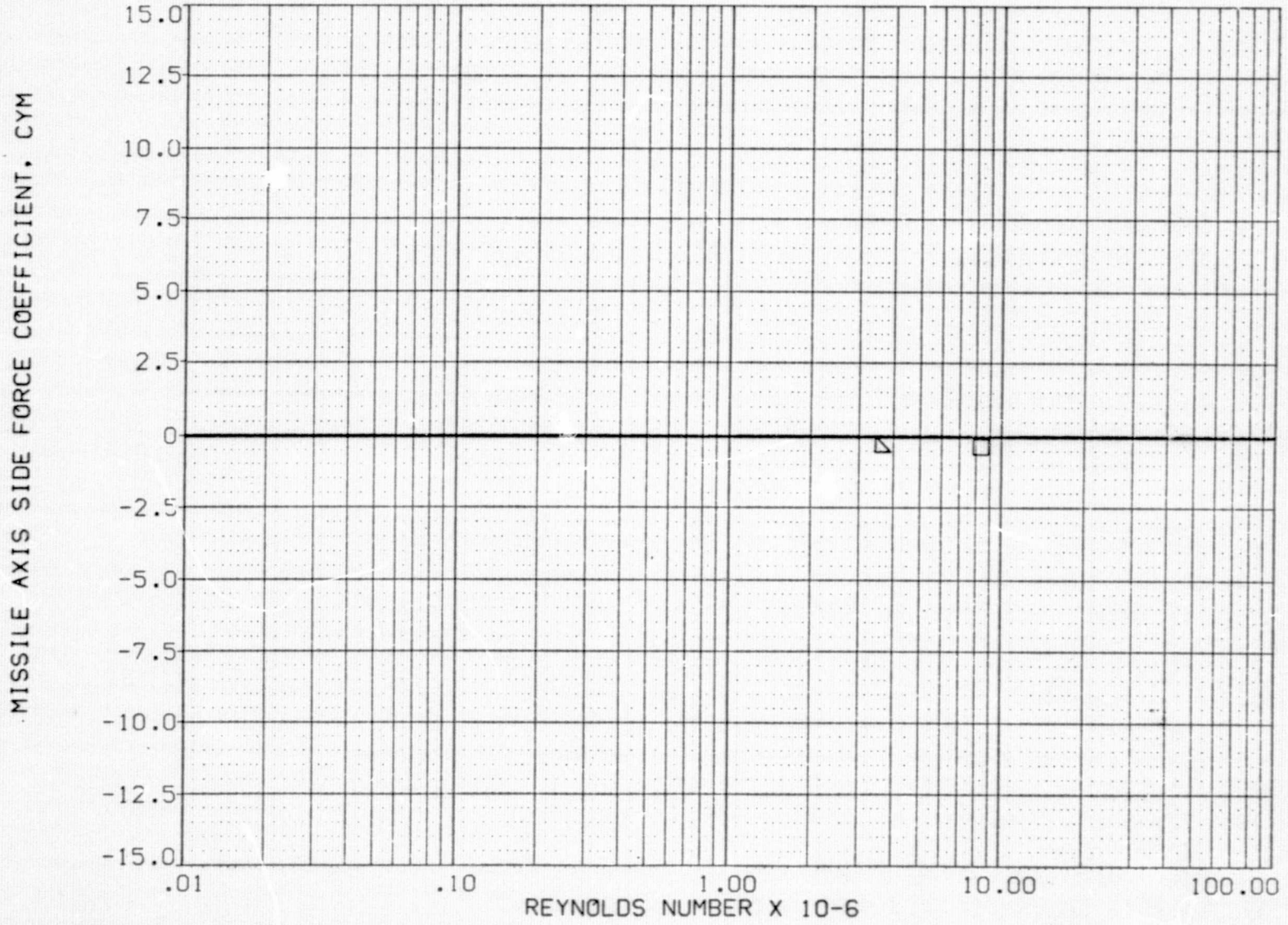


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .91

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◁	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	▷	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	△	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



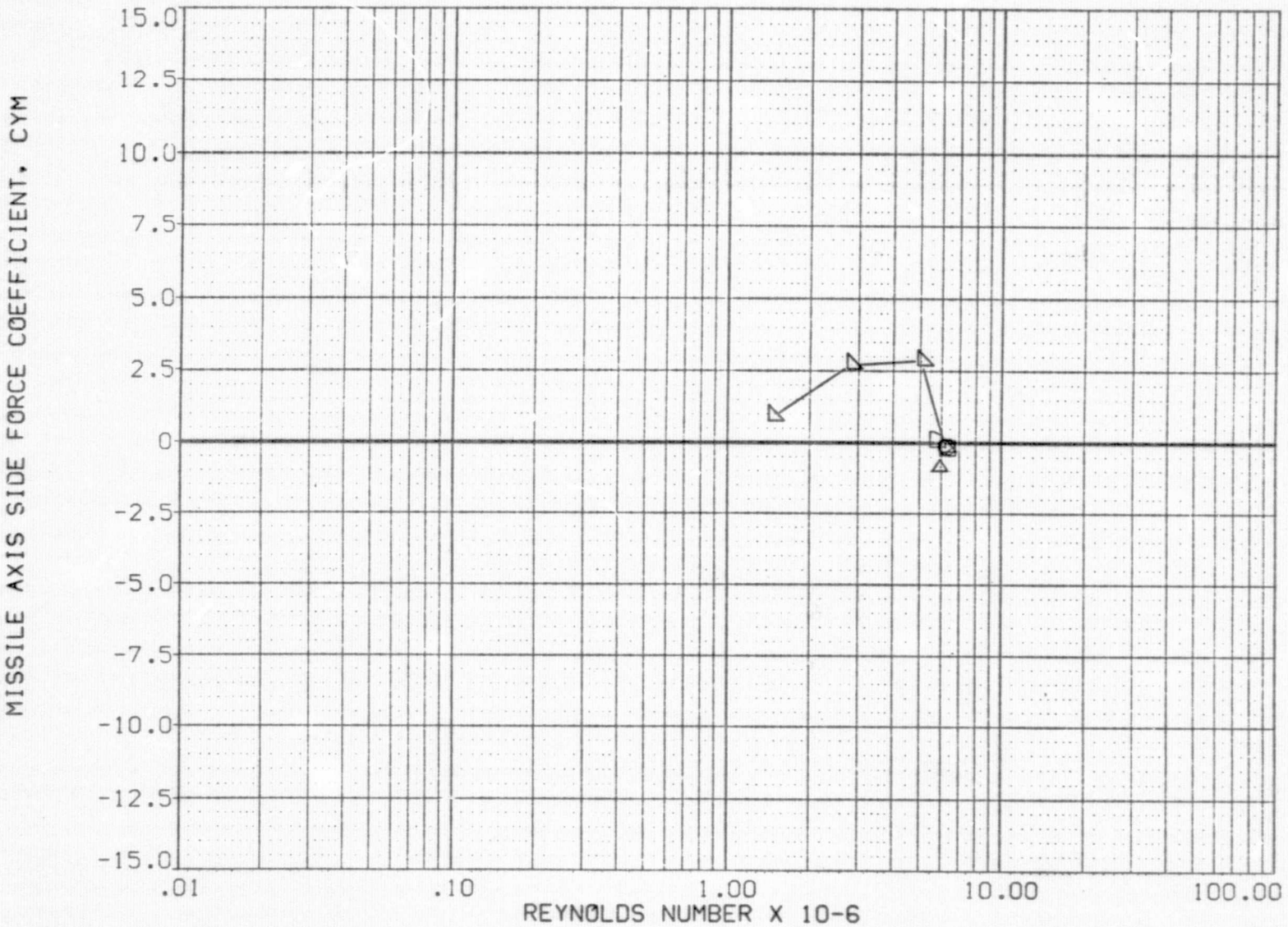
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = .99

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

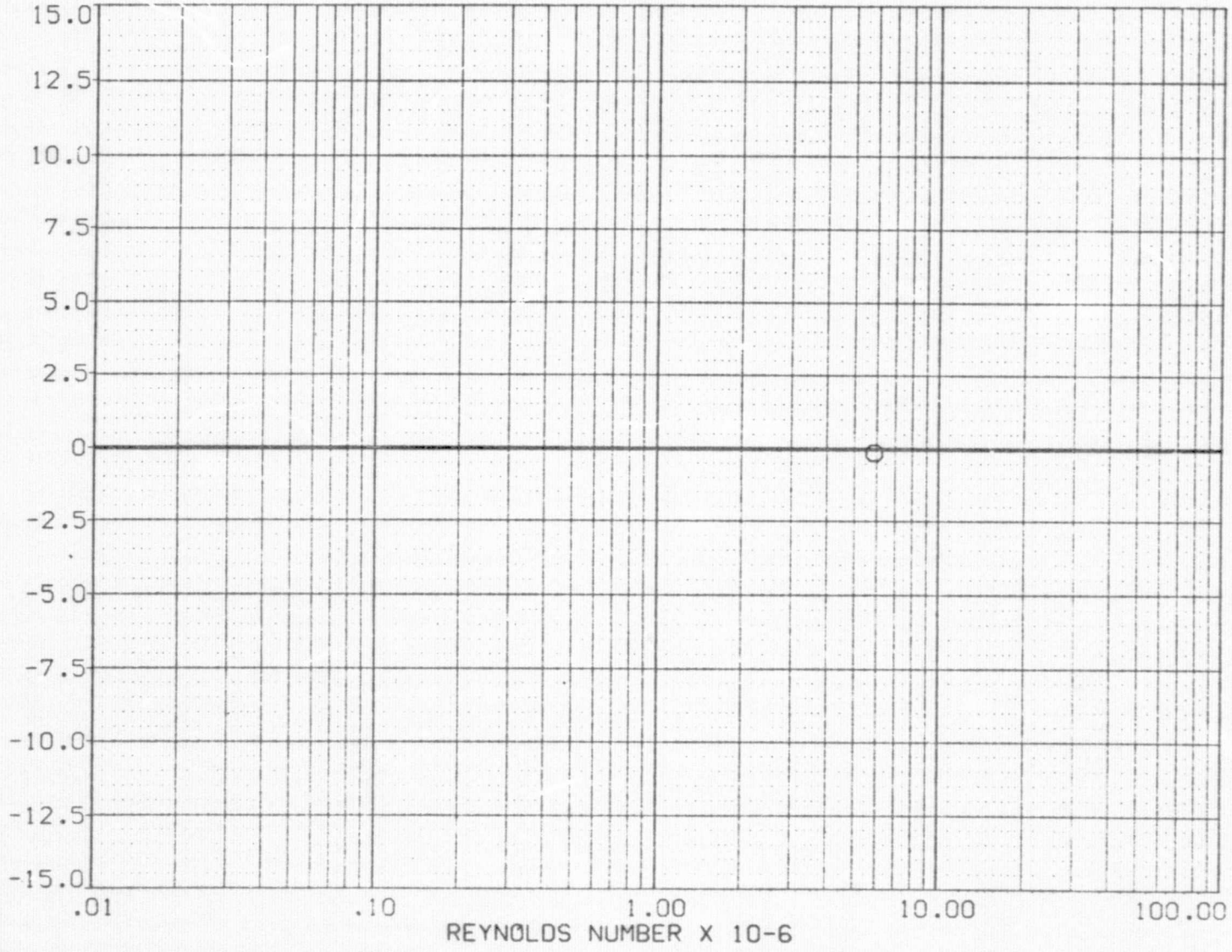


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.21

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)		DATA NOT AVAILABLE	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

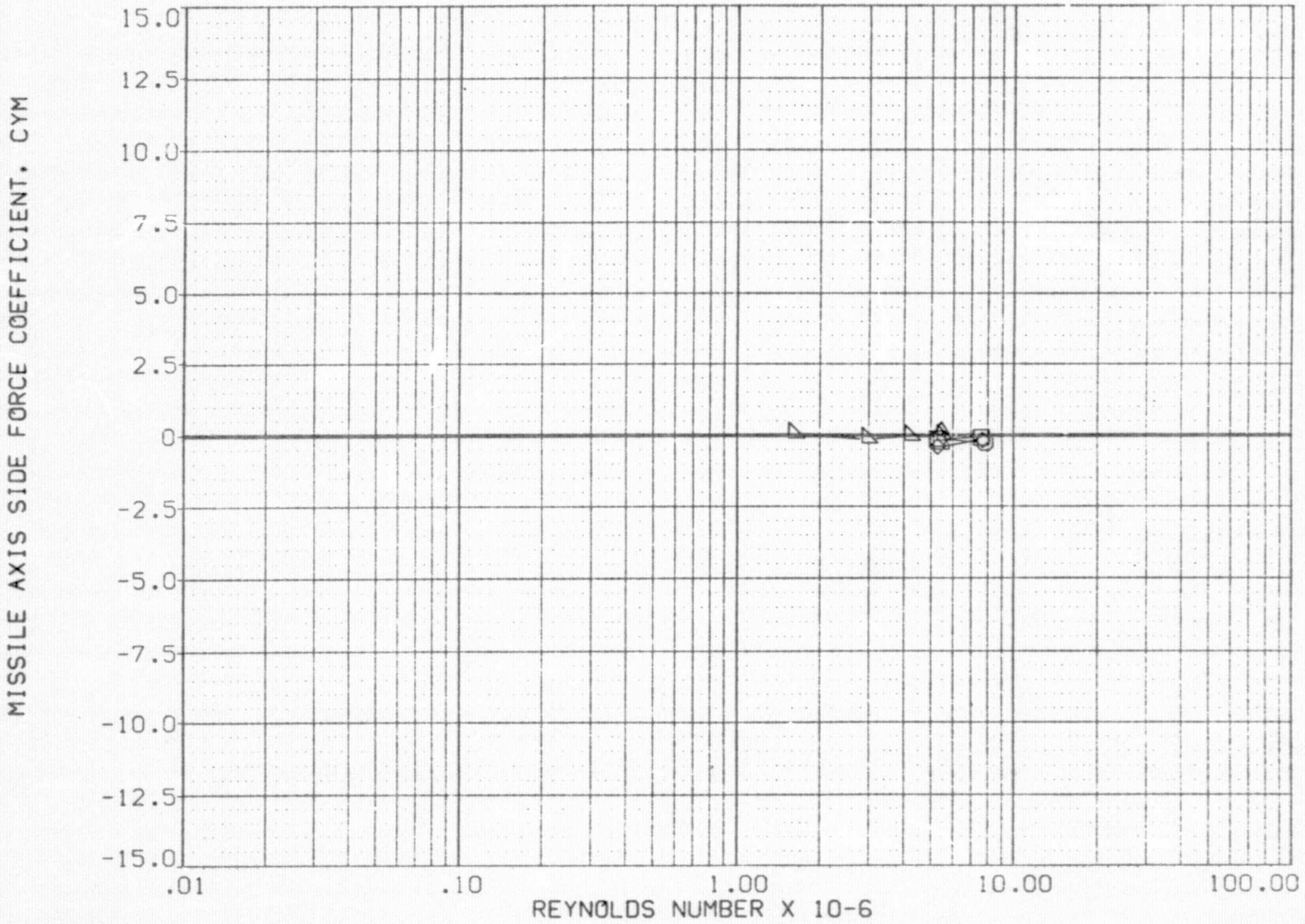


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

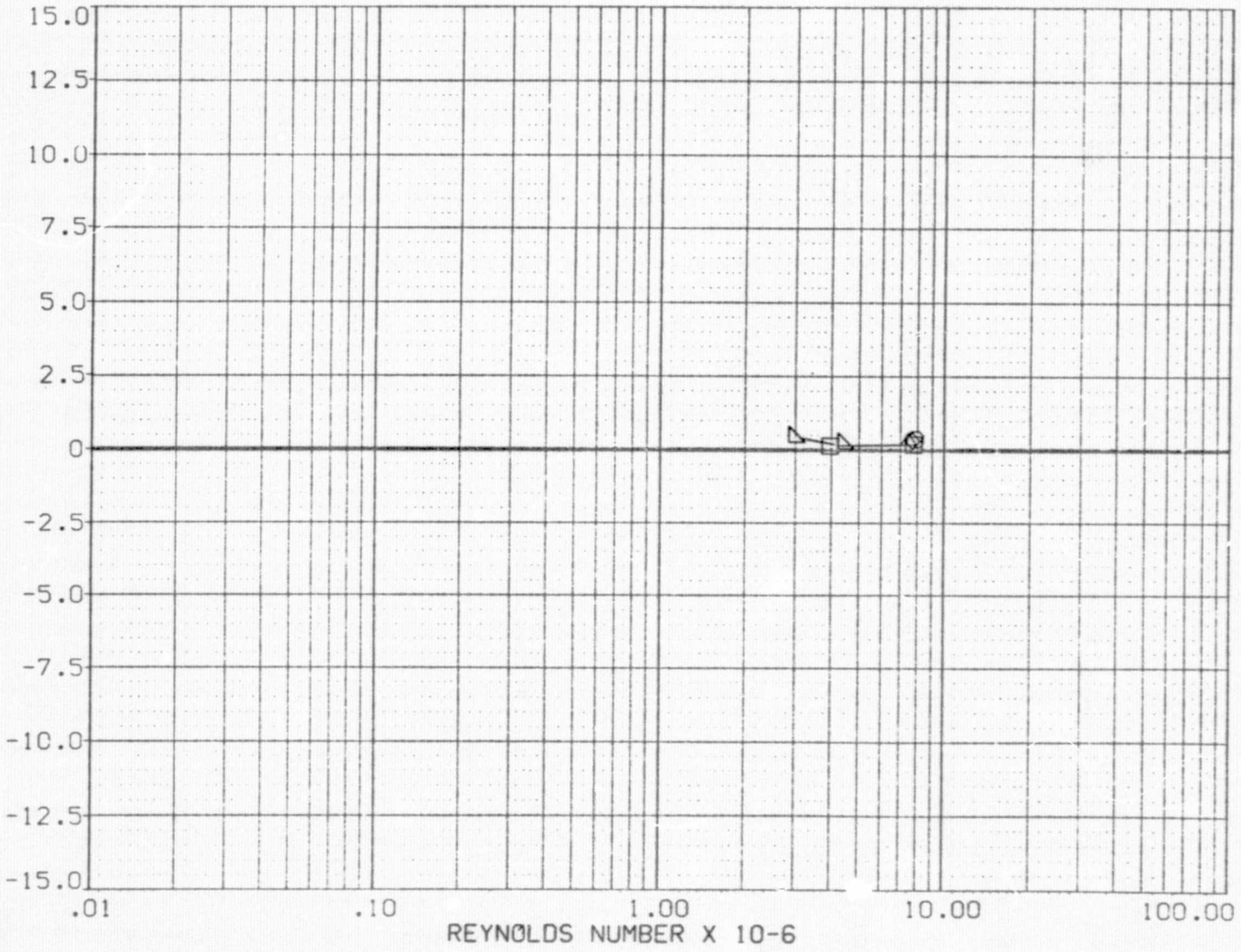


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

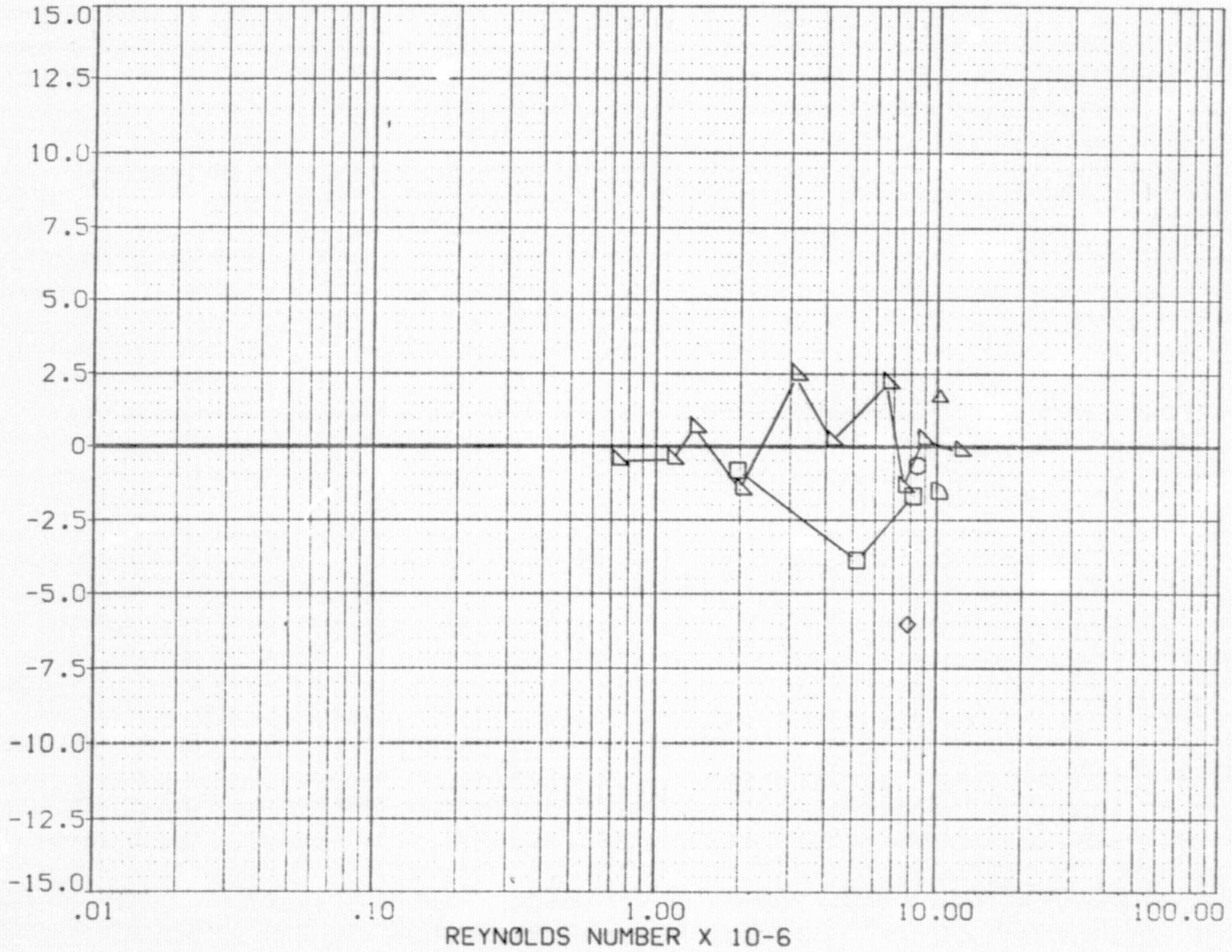


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	⬠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

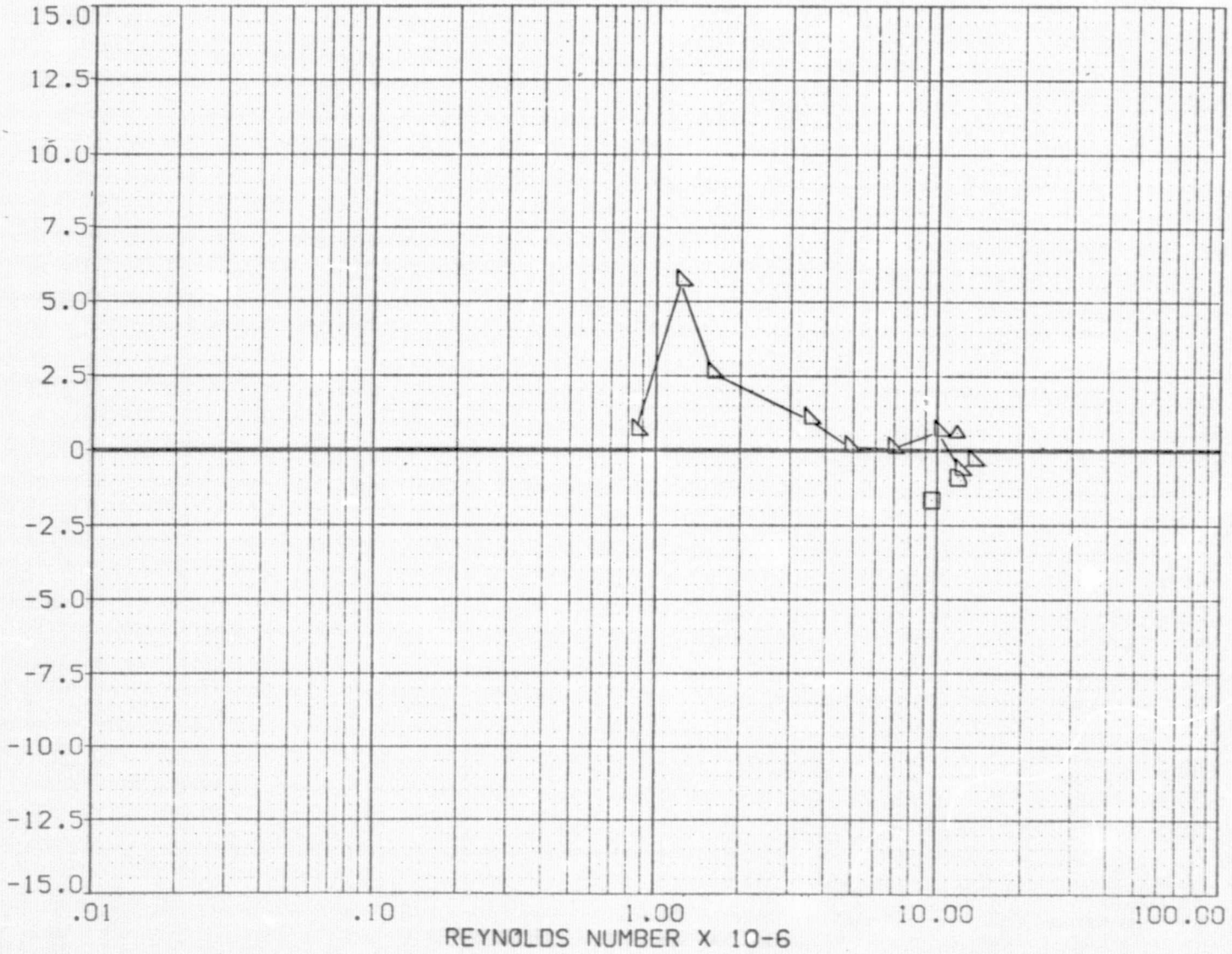


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

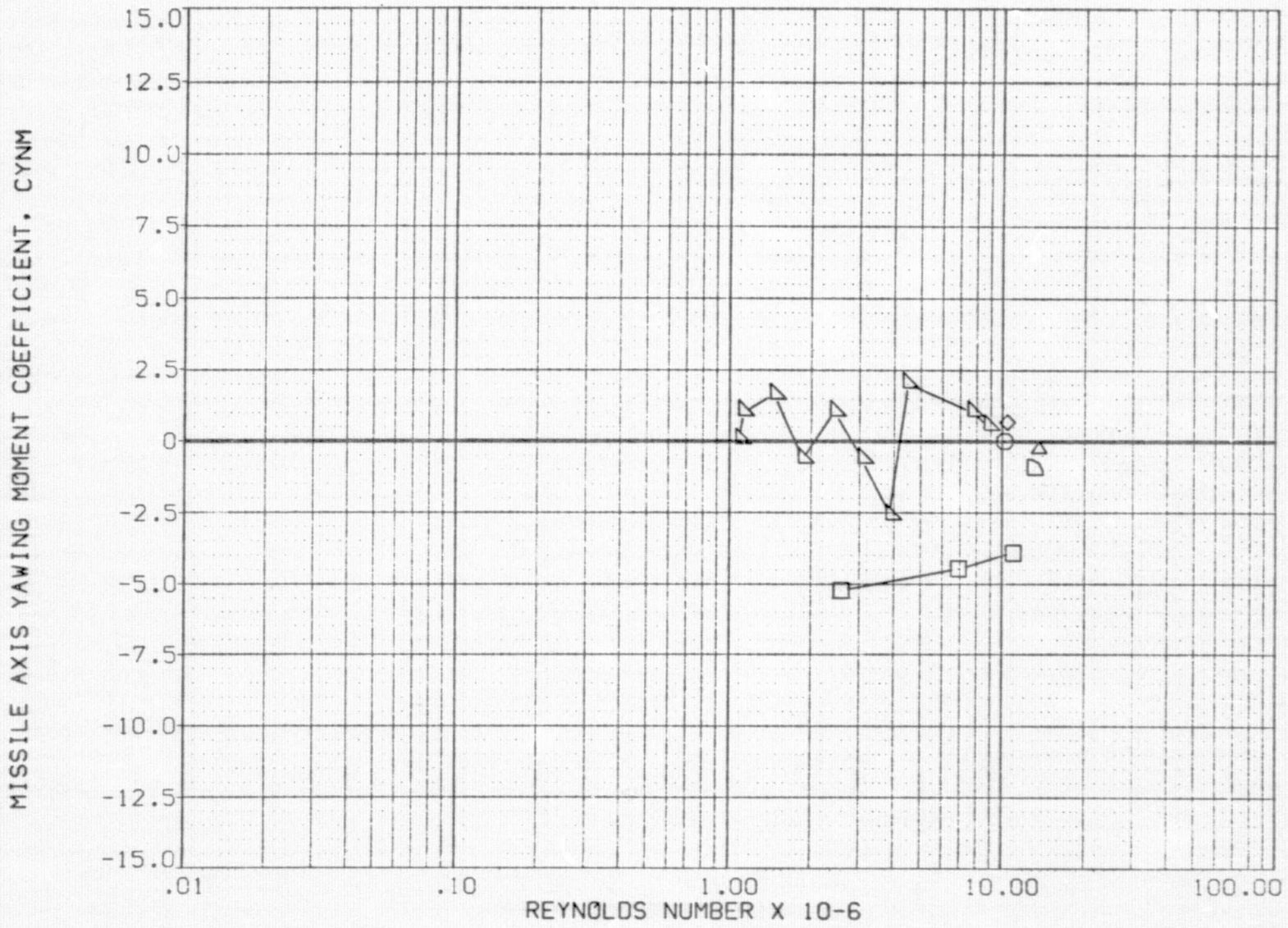


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

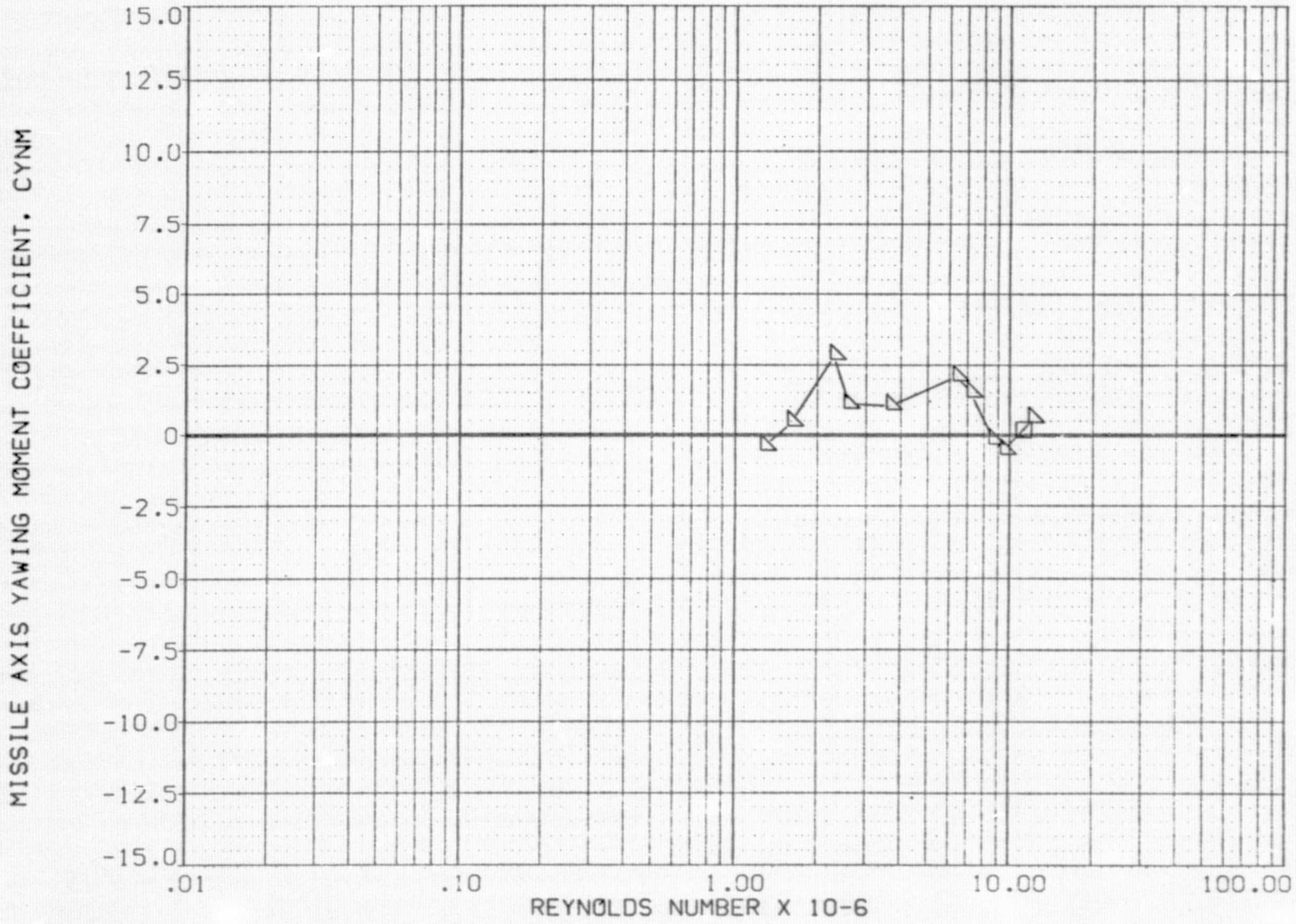


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

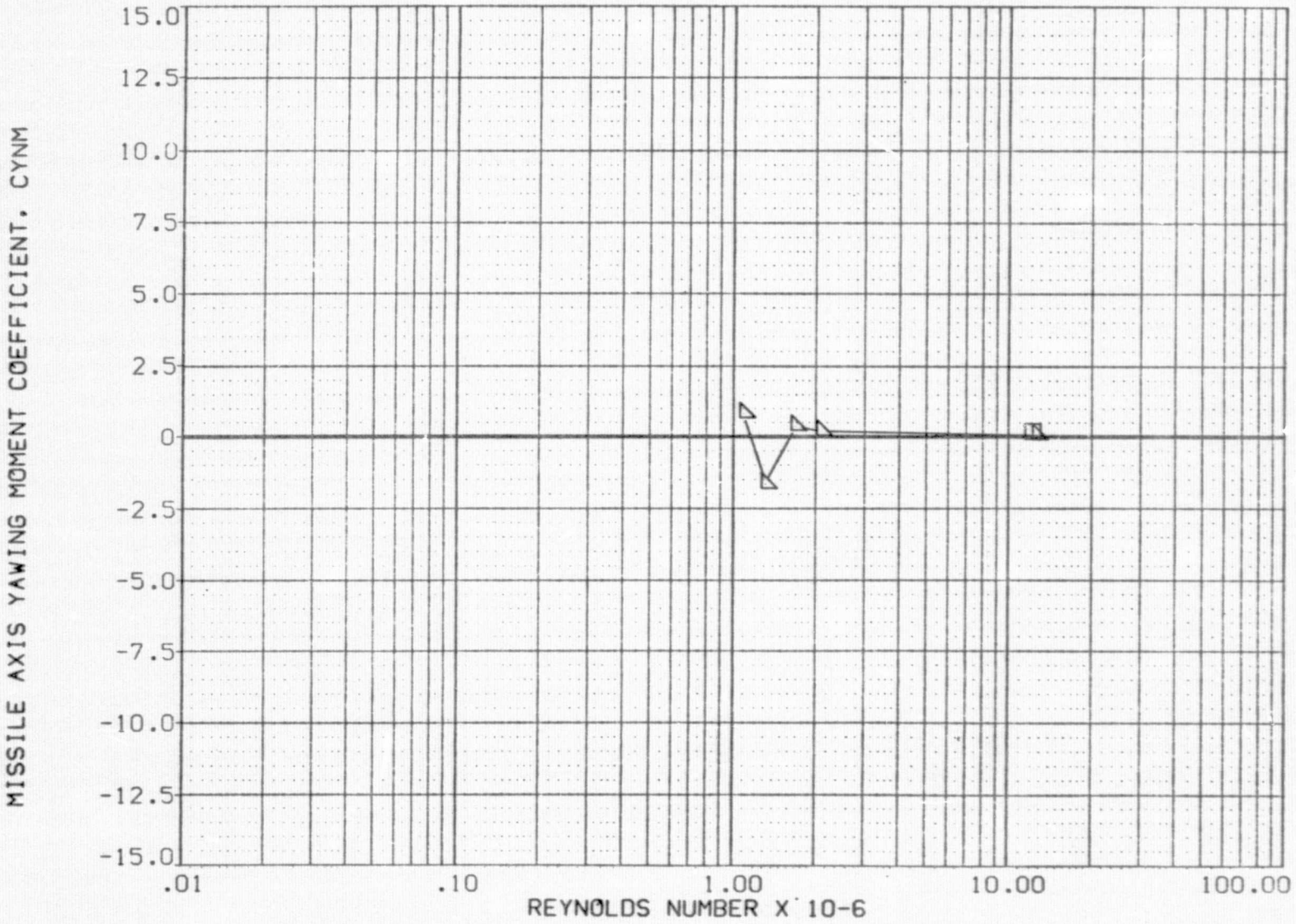


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

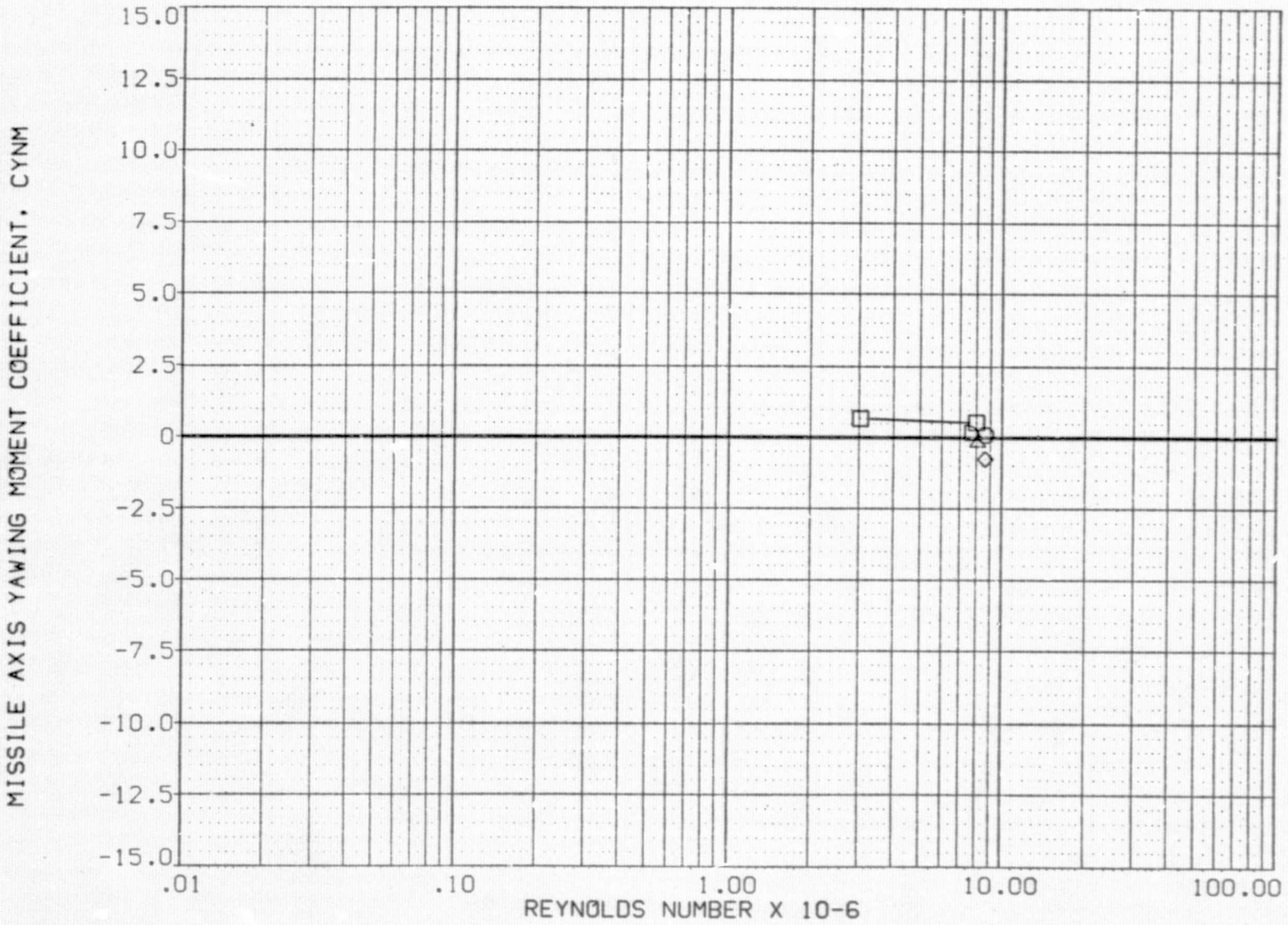


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .31

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)		DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

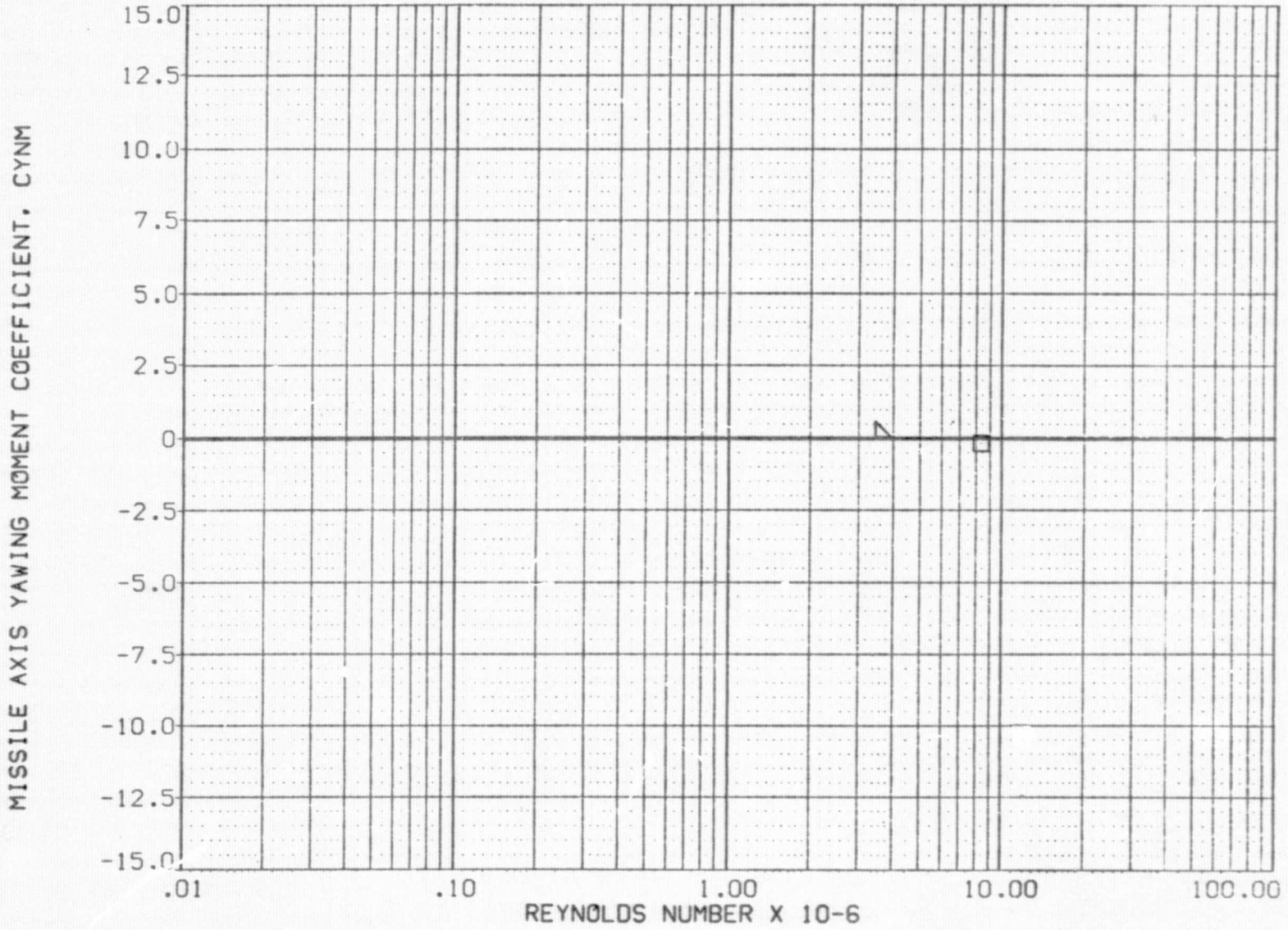


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .91

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)		DATA NOT AVAILABLE	35.000	.000	.000
(B1F008)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)		DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)		DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)		MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

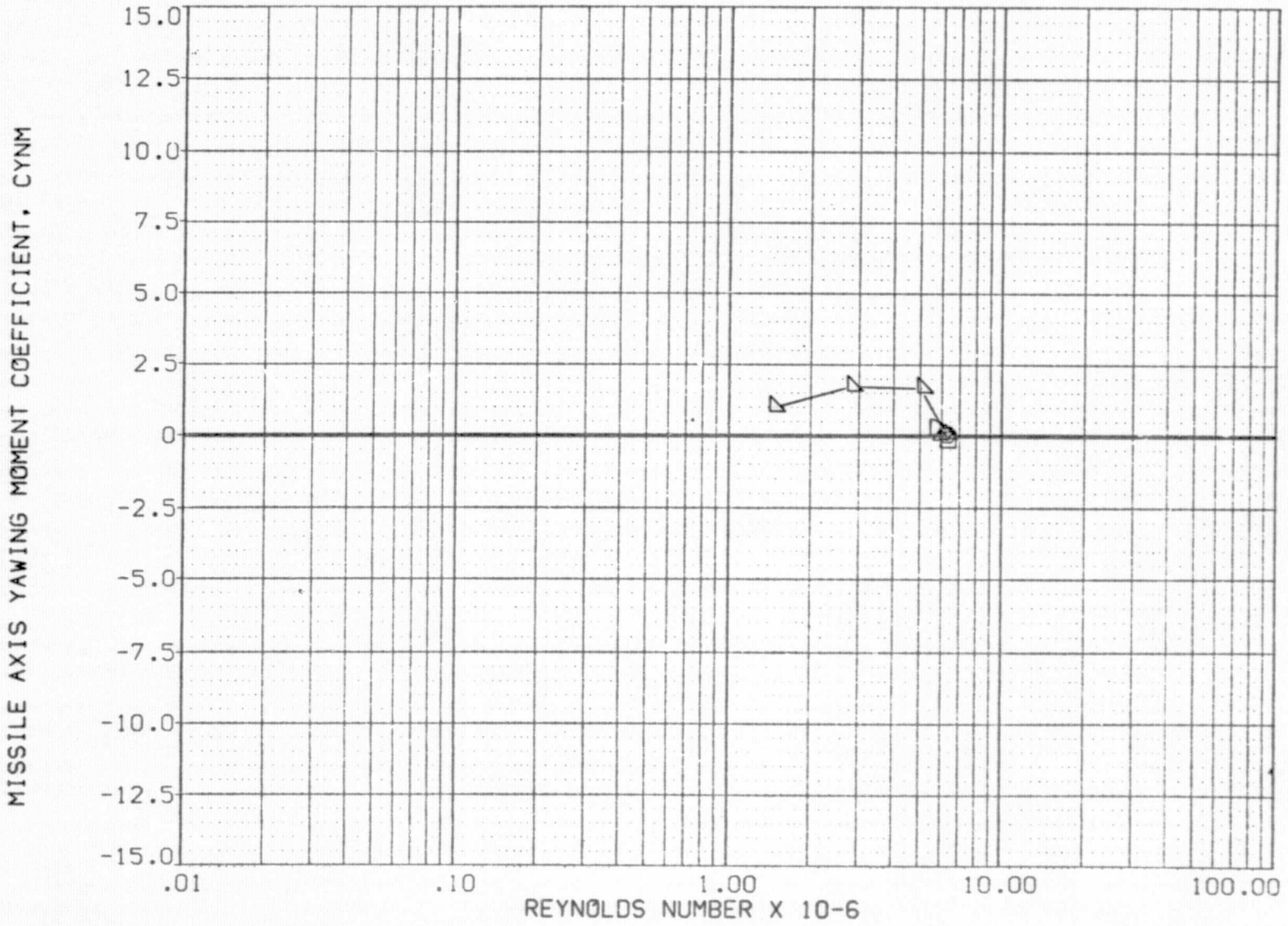


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = .99

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	⊲	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	⊳	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

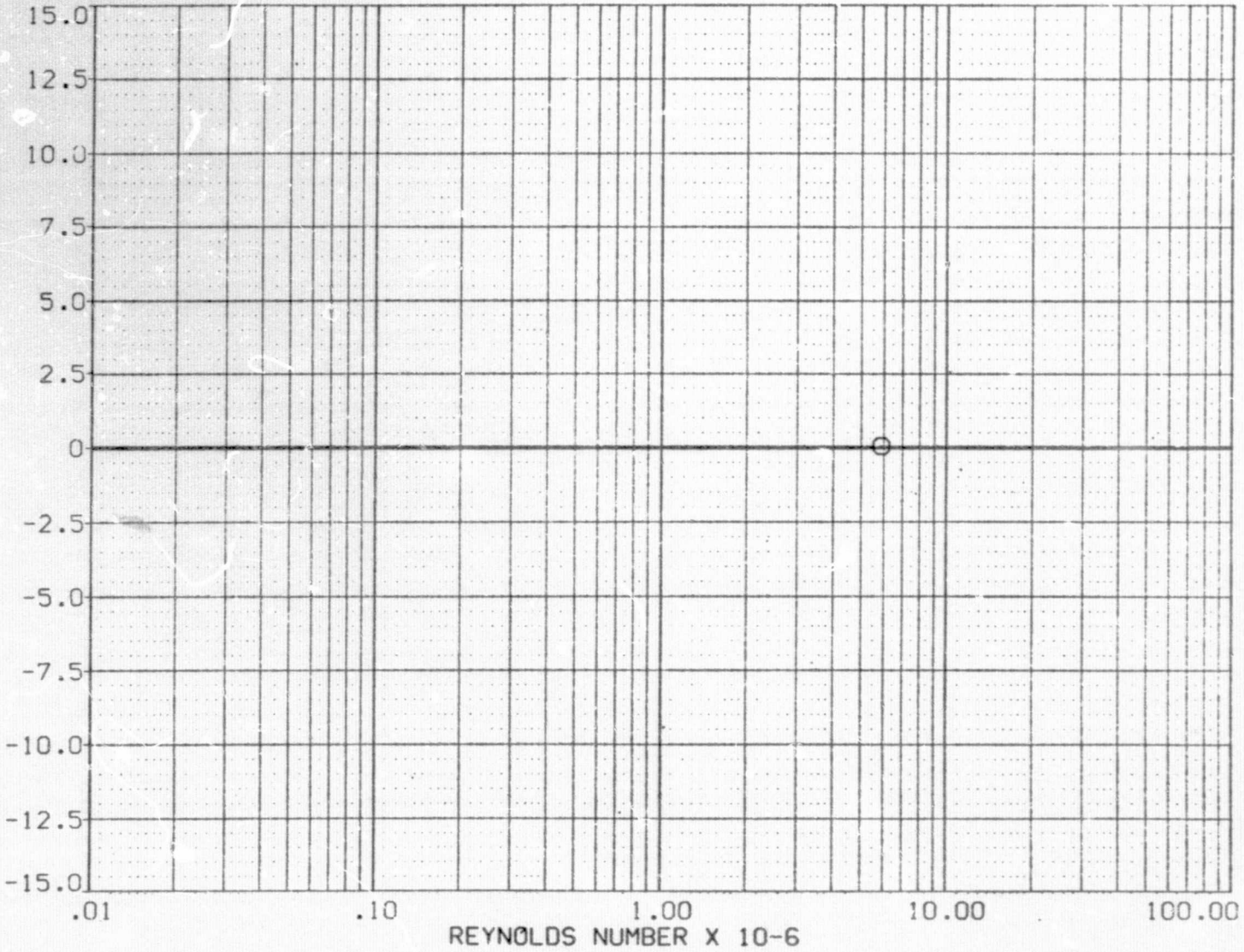


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.21

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	REFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	◇	DATA NOT AVAILABLE	45.000	.000	.000
(B1F025)	△	DATA NOT AVAILABLE	55.000	.000	.000
(B1F031)	▽	DATA NOT AVAILABLE	80.000	.000	.000
(B1F038)	◁	DATA NOT AVAILABLE	90.000	.000	.000
(B1F081)	▷	DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



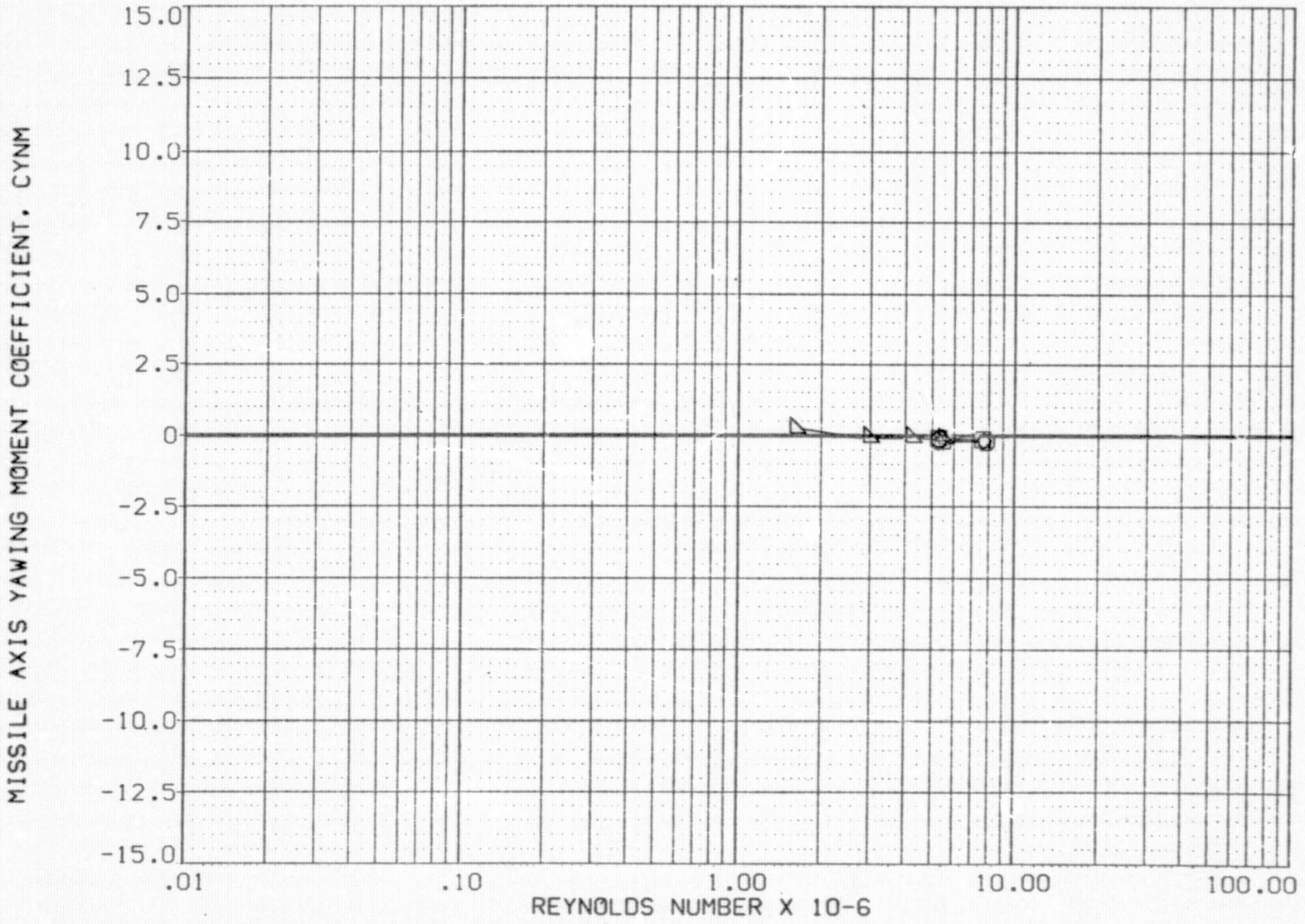
MISSILE AXIS YAWING MOMENT COEFFICIENT, CYNM

EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	⋈	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	◁	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)	▷	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0089	

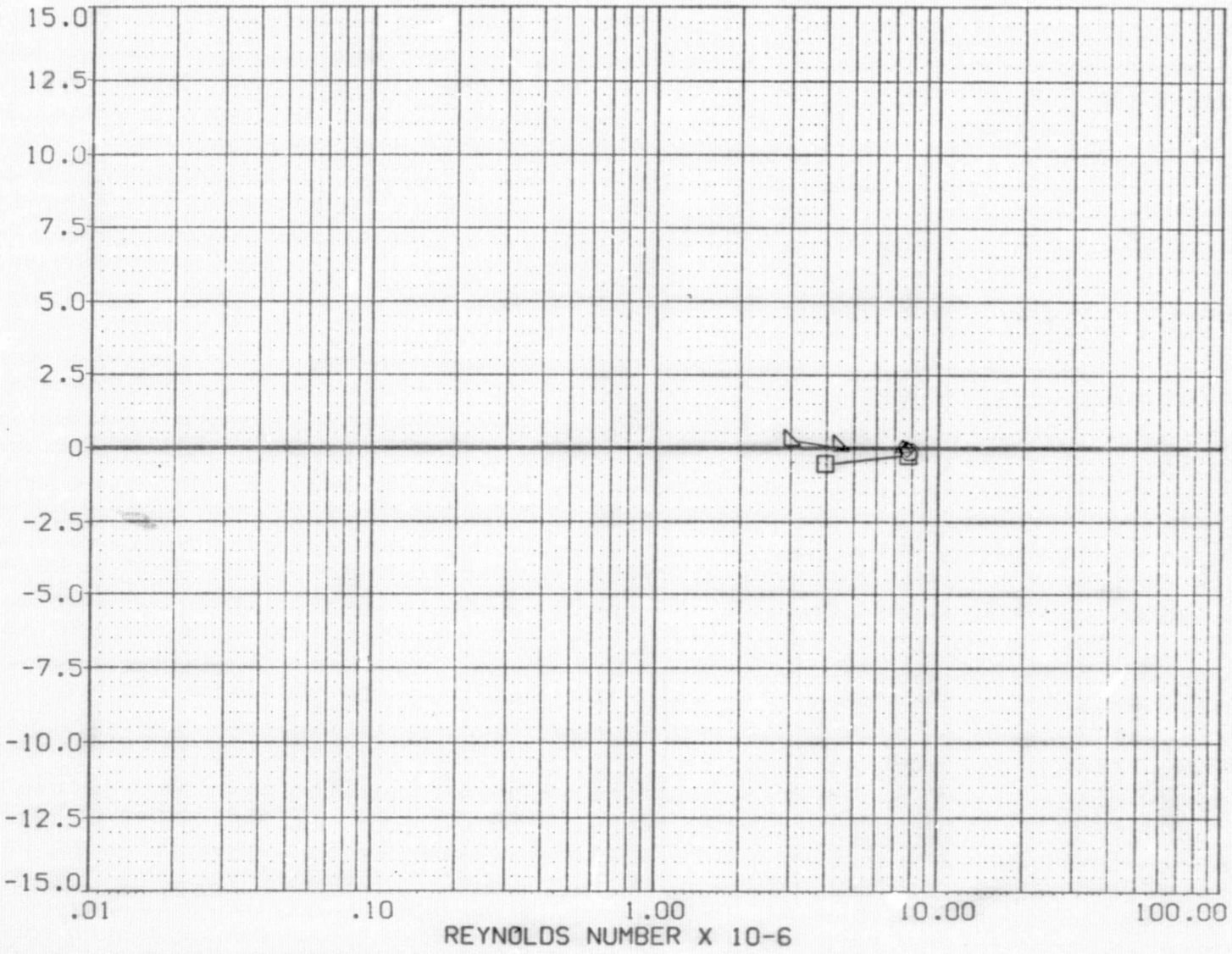


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F001)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	35.000	.000	.000
(B1F008)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	45.000	.000	.000
(B1F025)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	55.000	.000	.000
(B1F031)	△	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	80.000	.000	.000
(B1F038)	▽	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	90.000	.000	.000
(B1F081)		DATA NOT AVAILABLE	100.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

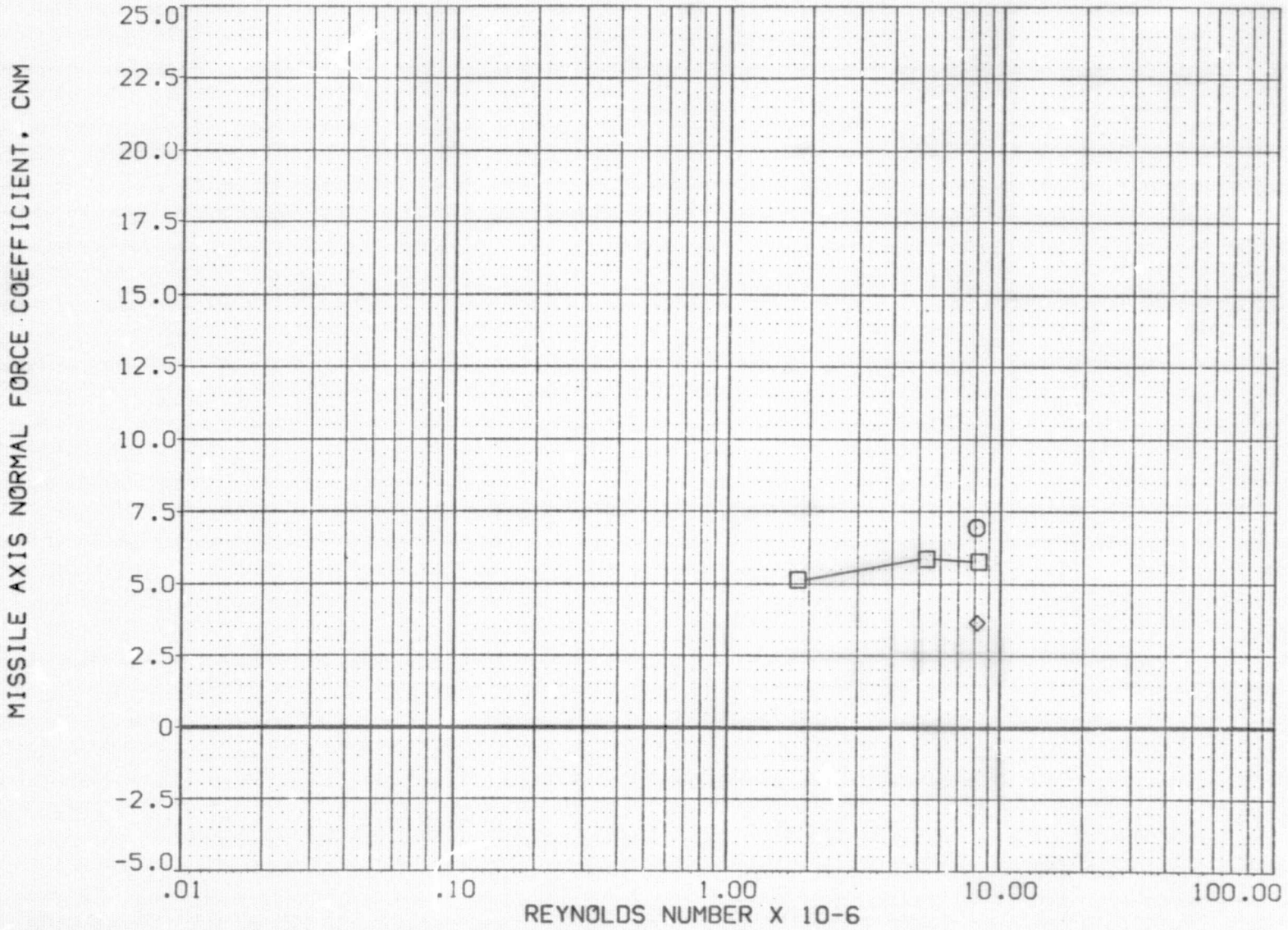


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

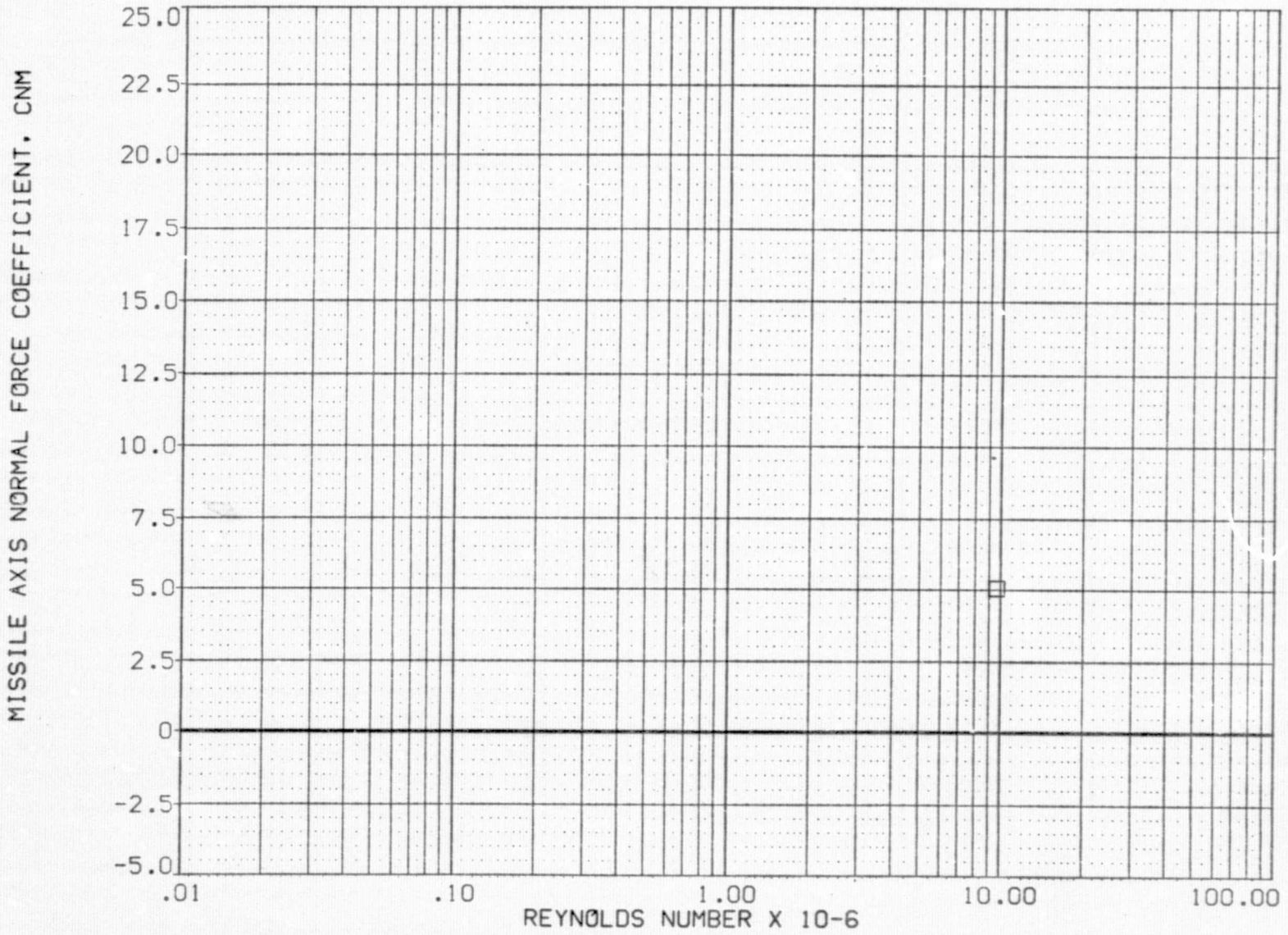


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	◫	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

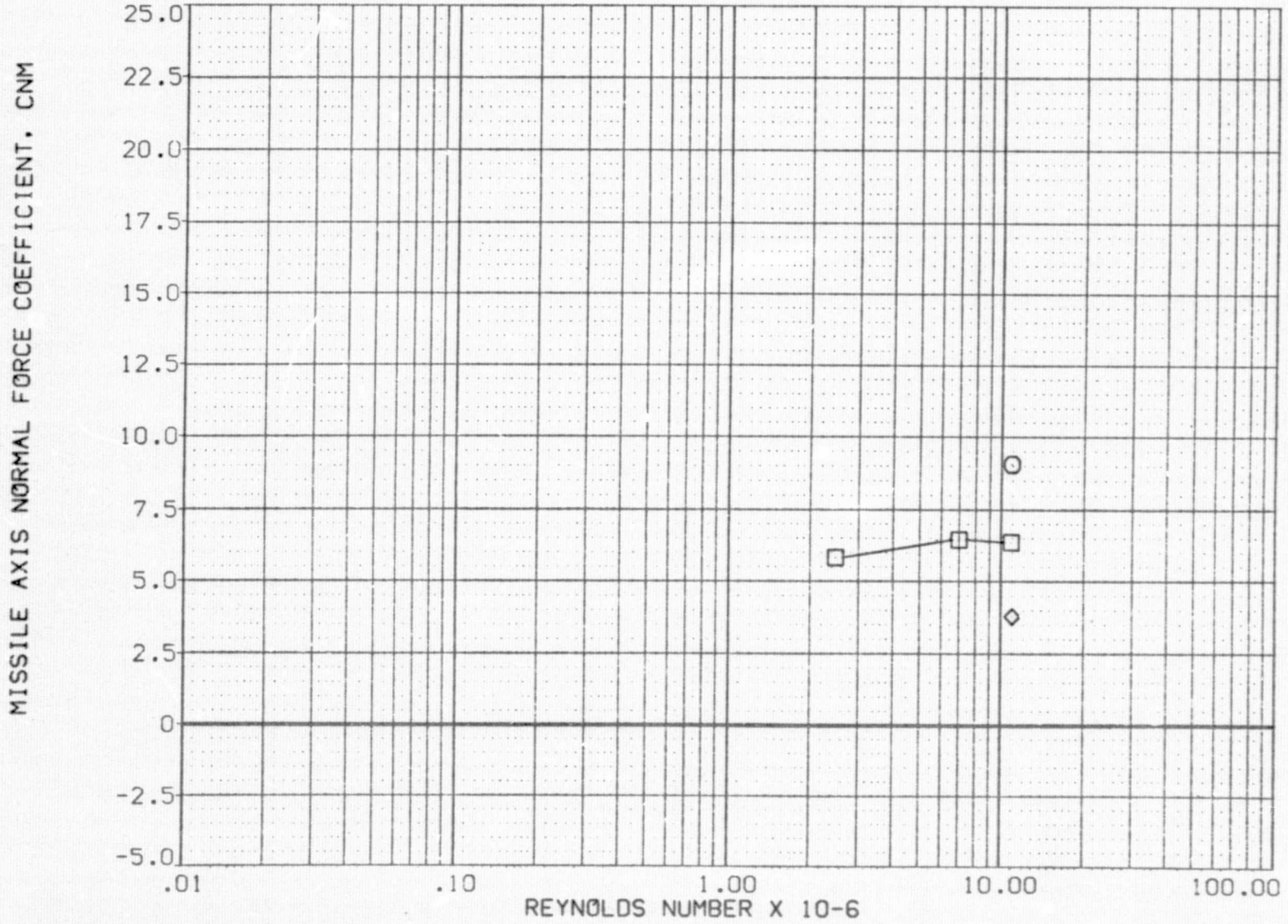


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

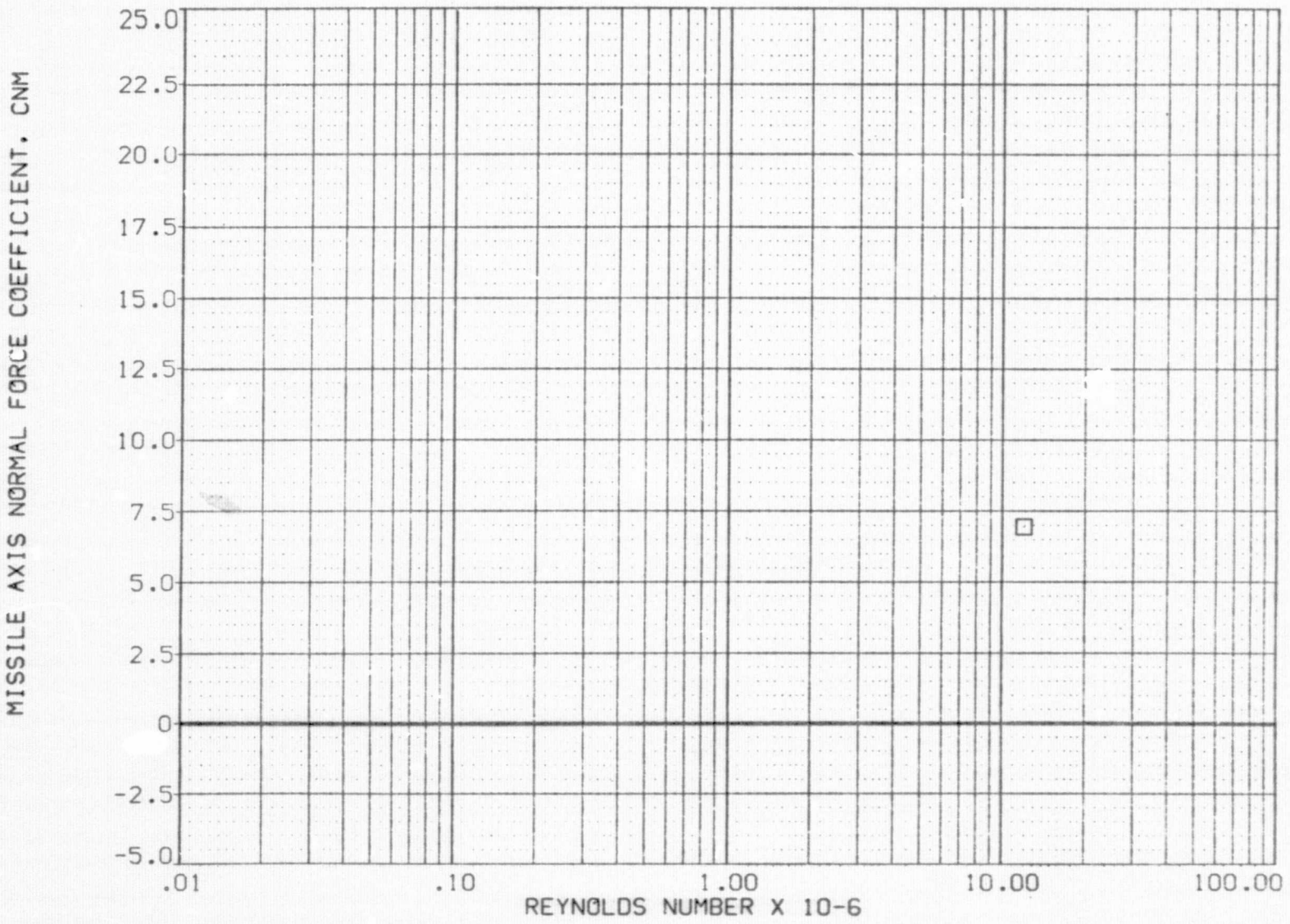


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

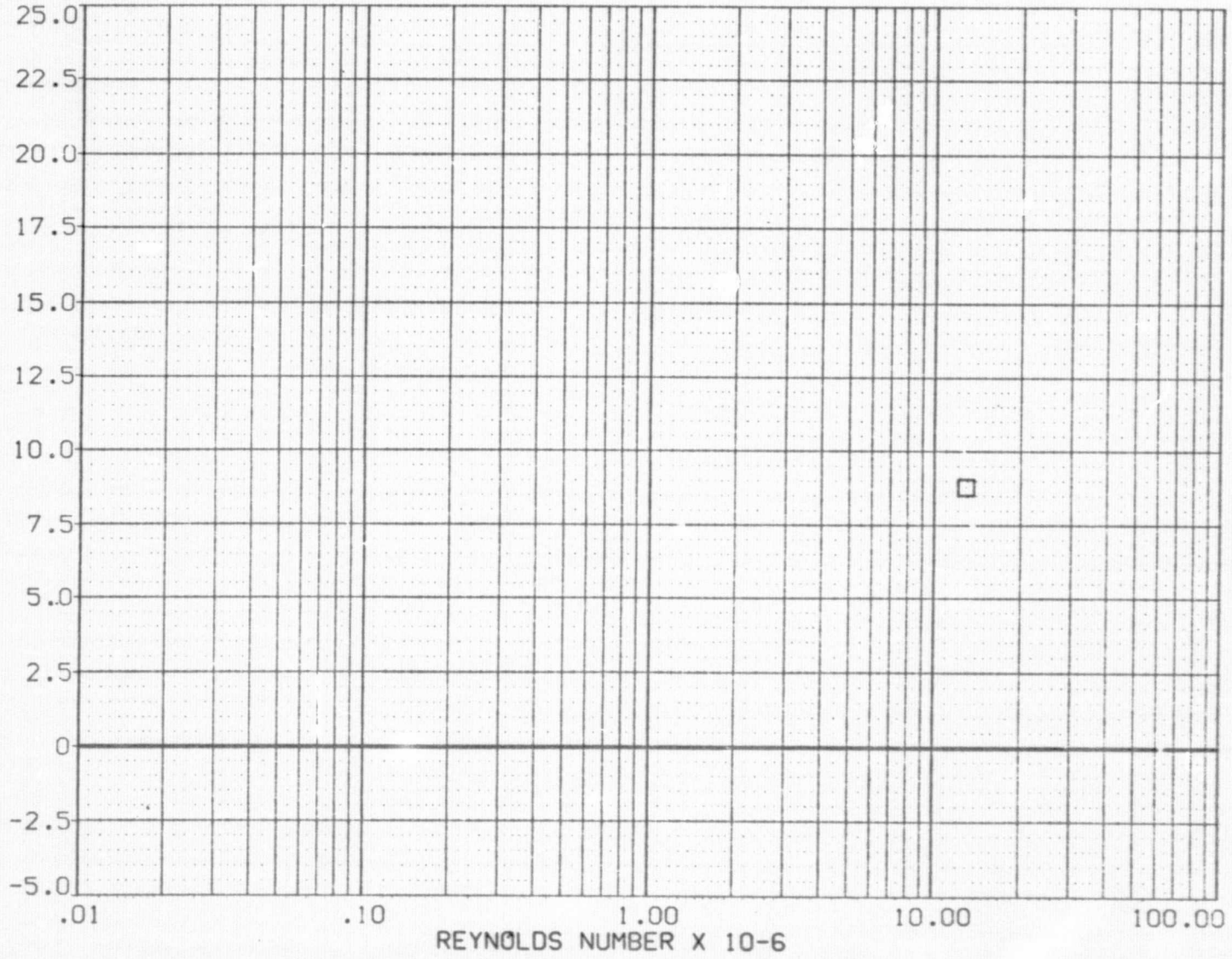


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

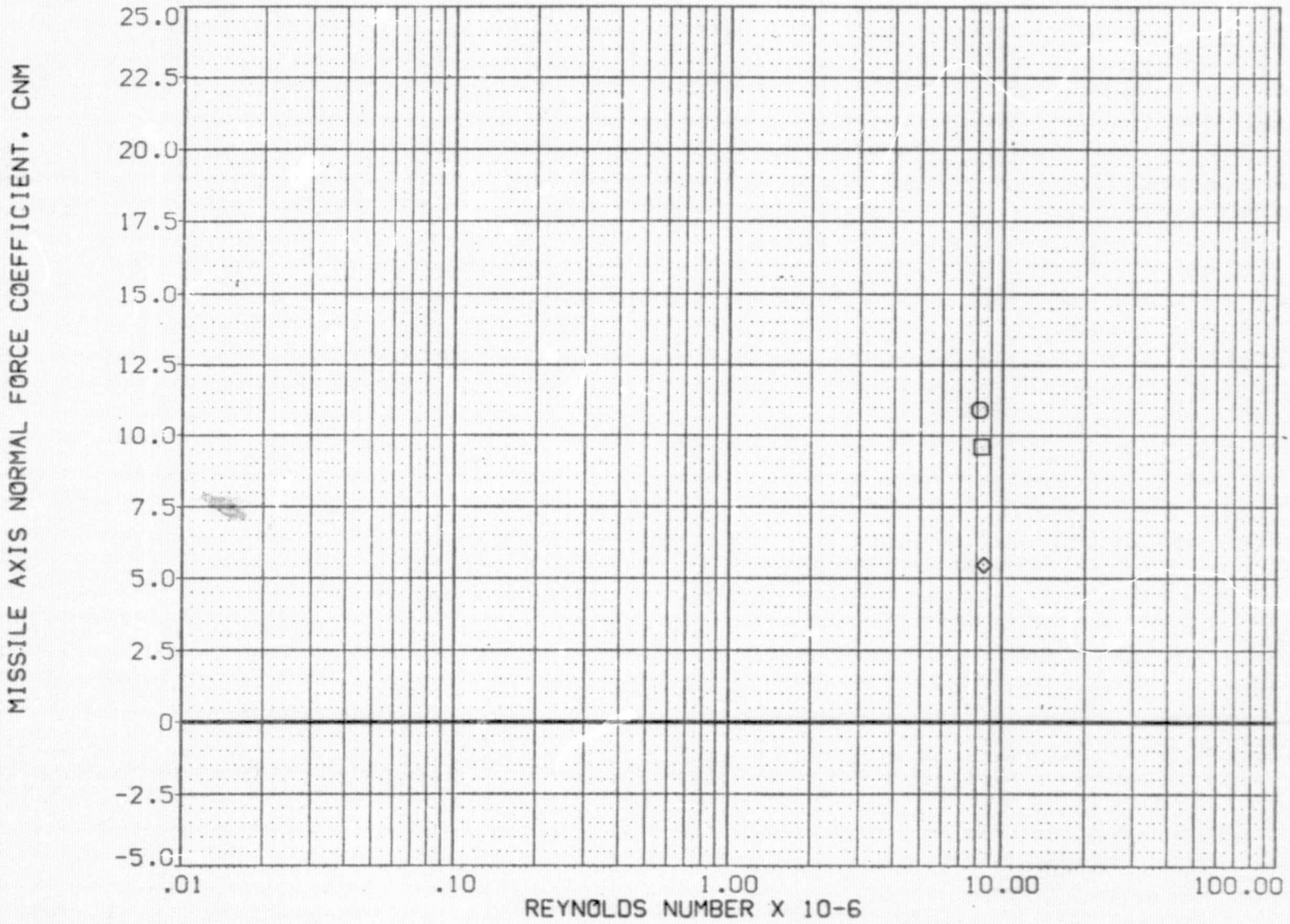


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



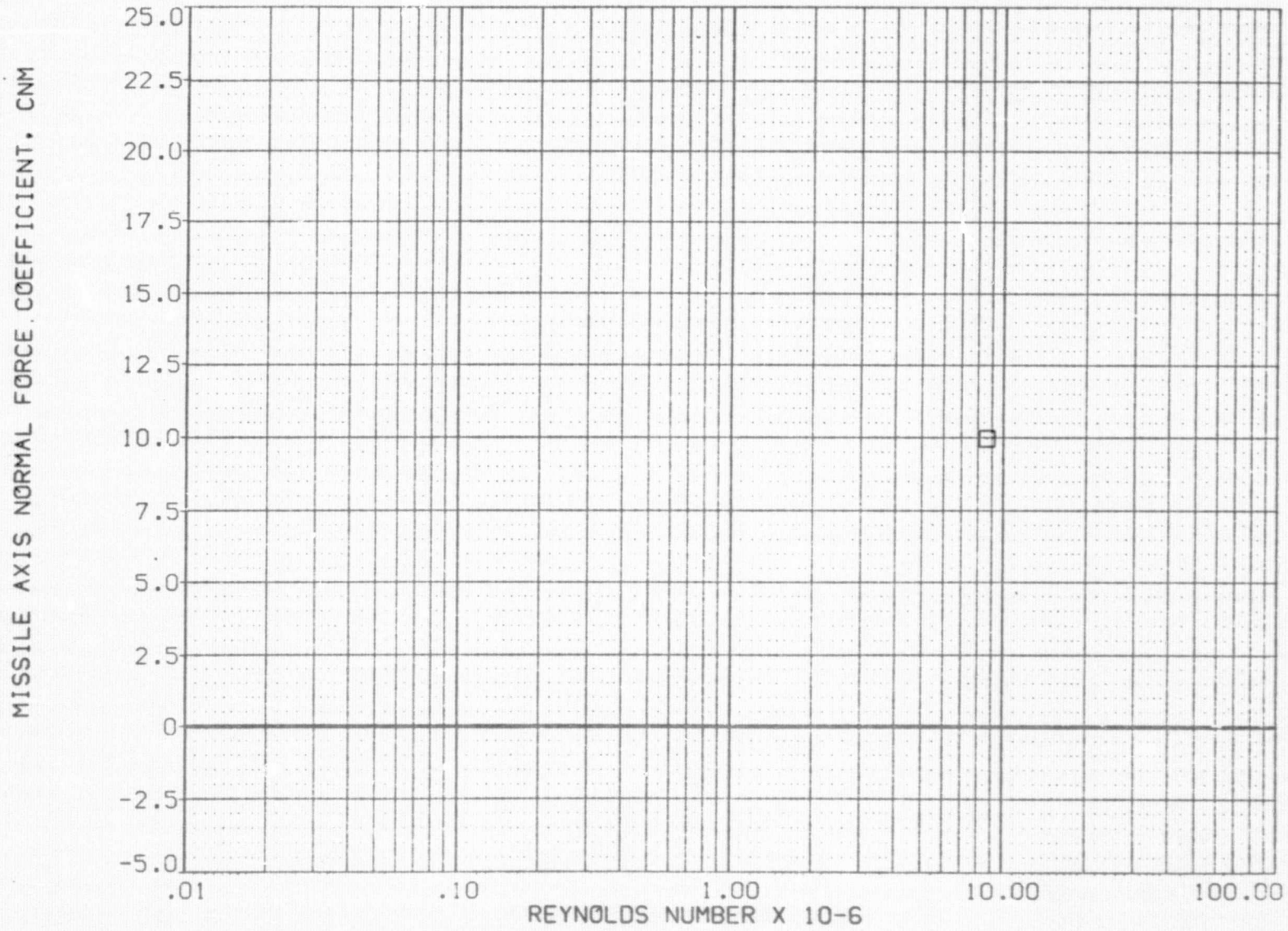
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .89

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

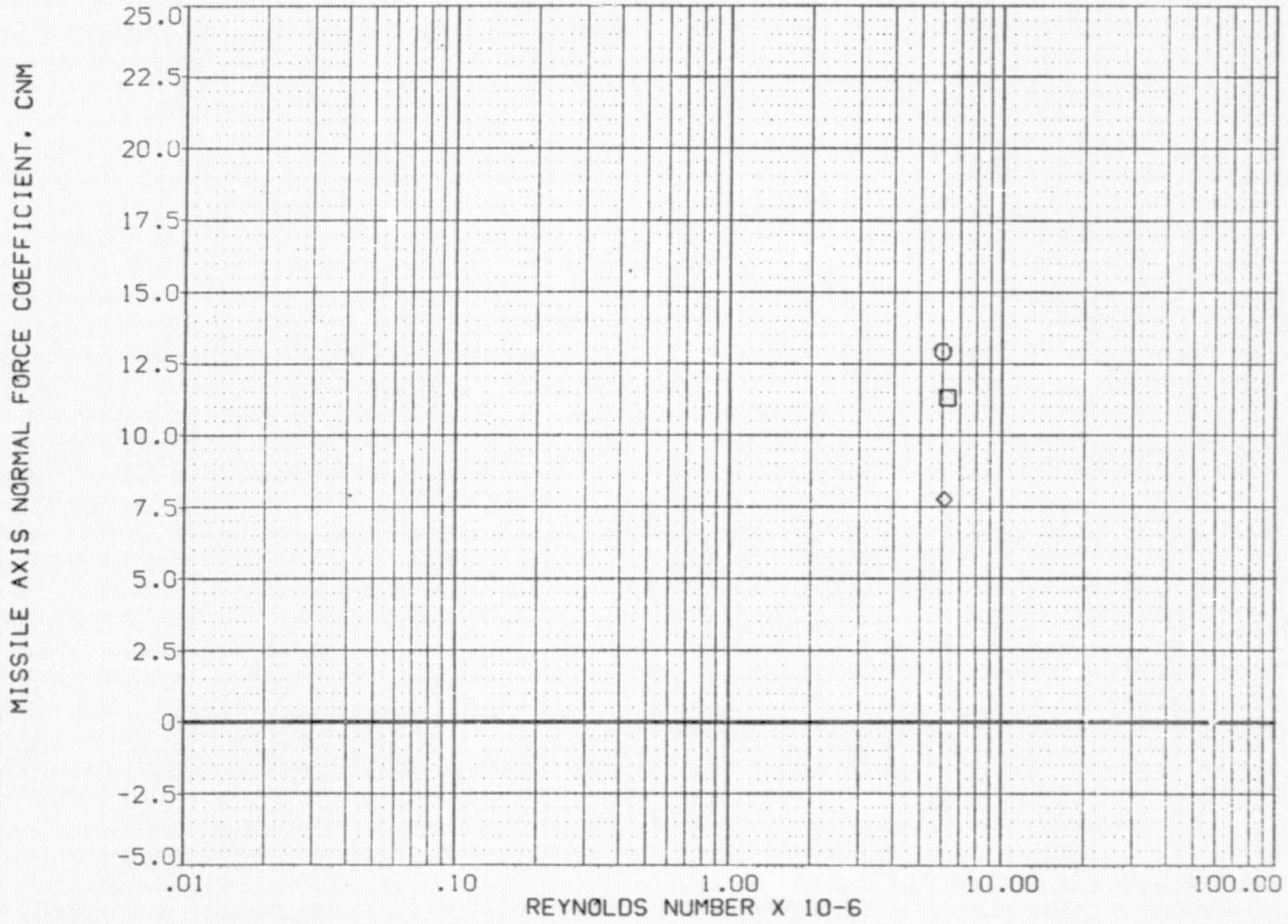


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = 1.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

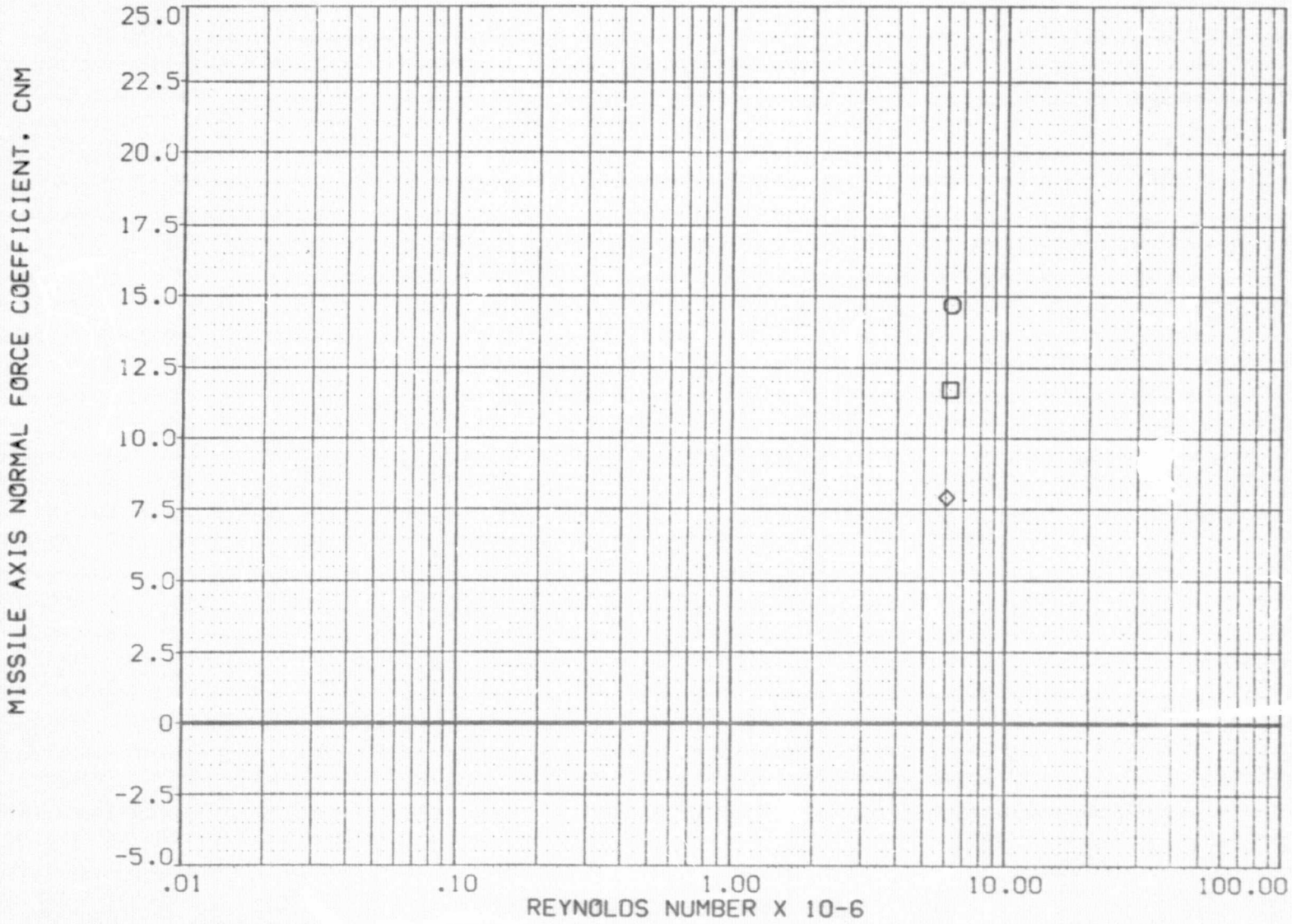


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.17

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

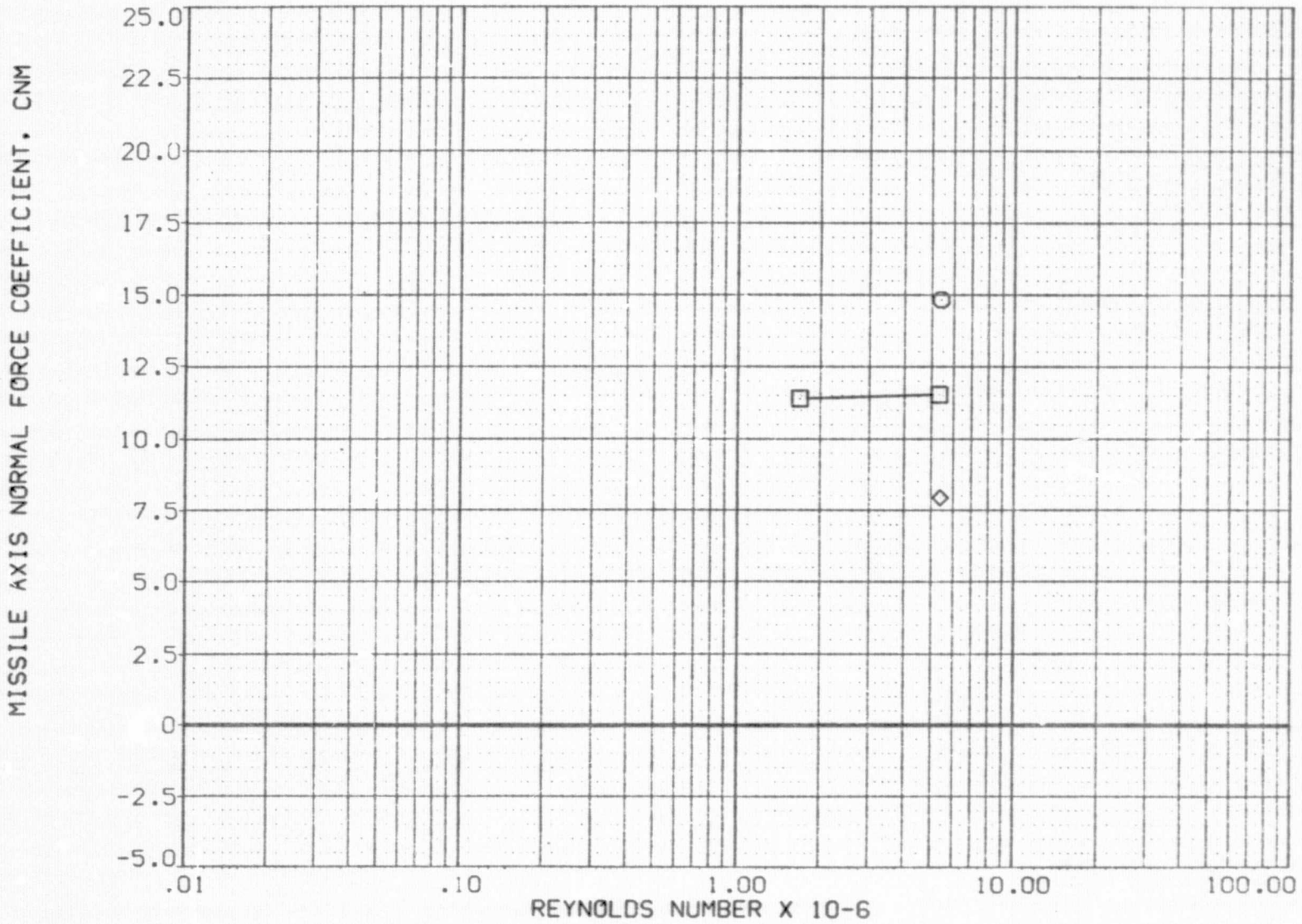


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(1)MACH = 1.42

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087) ○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094) □	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111) ◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

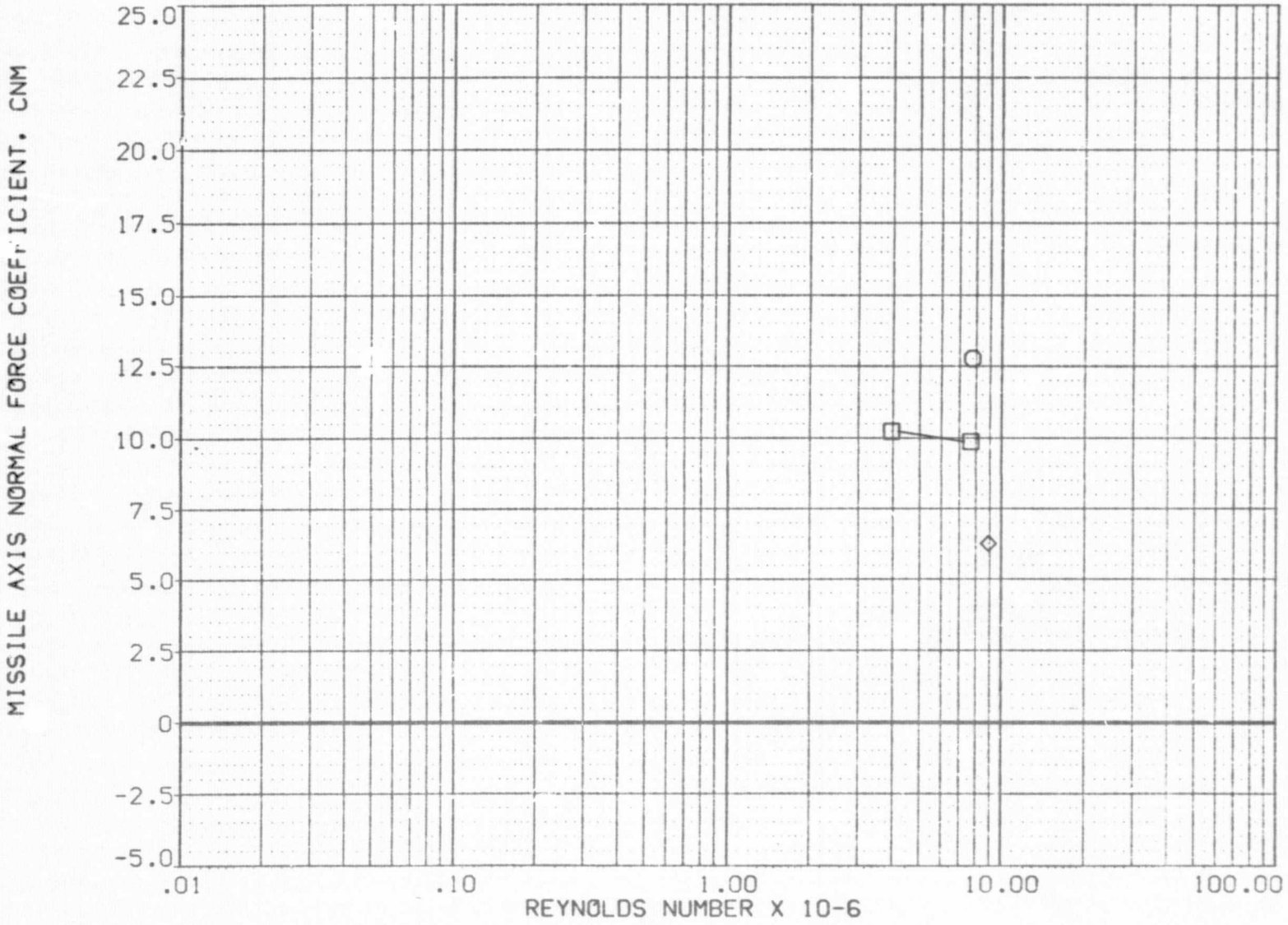


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

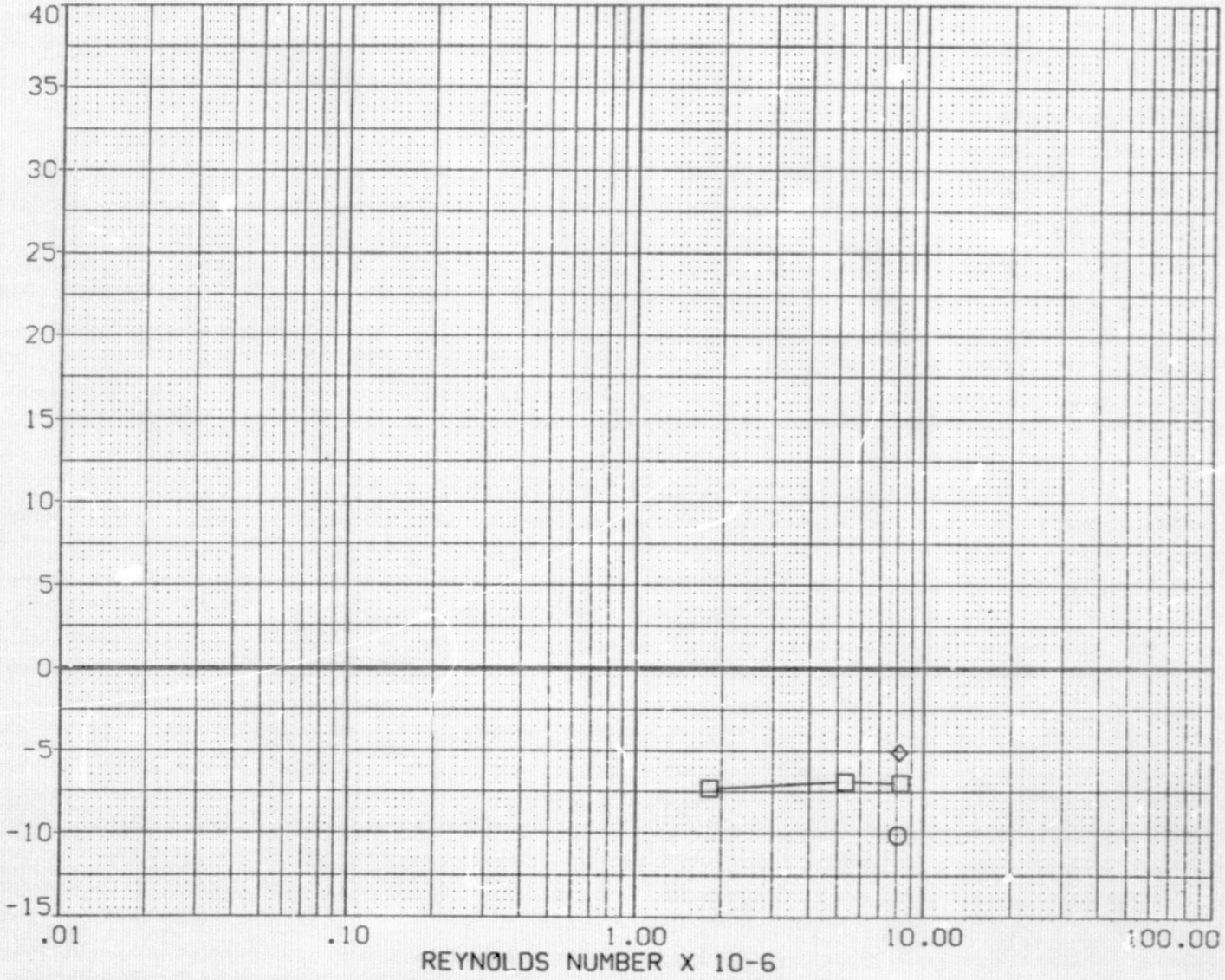


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

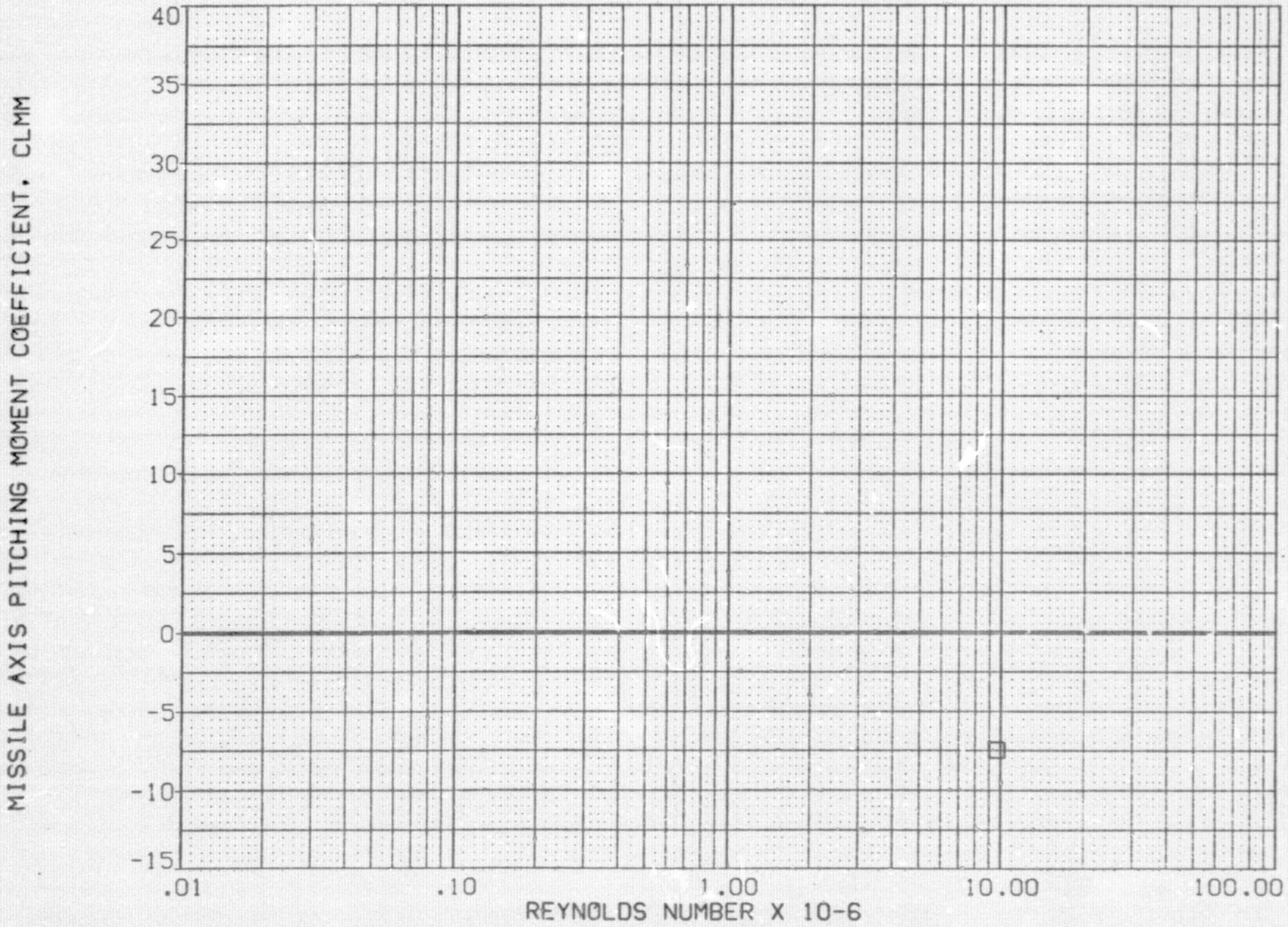


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

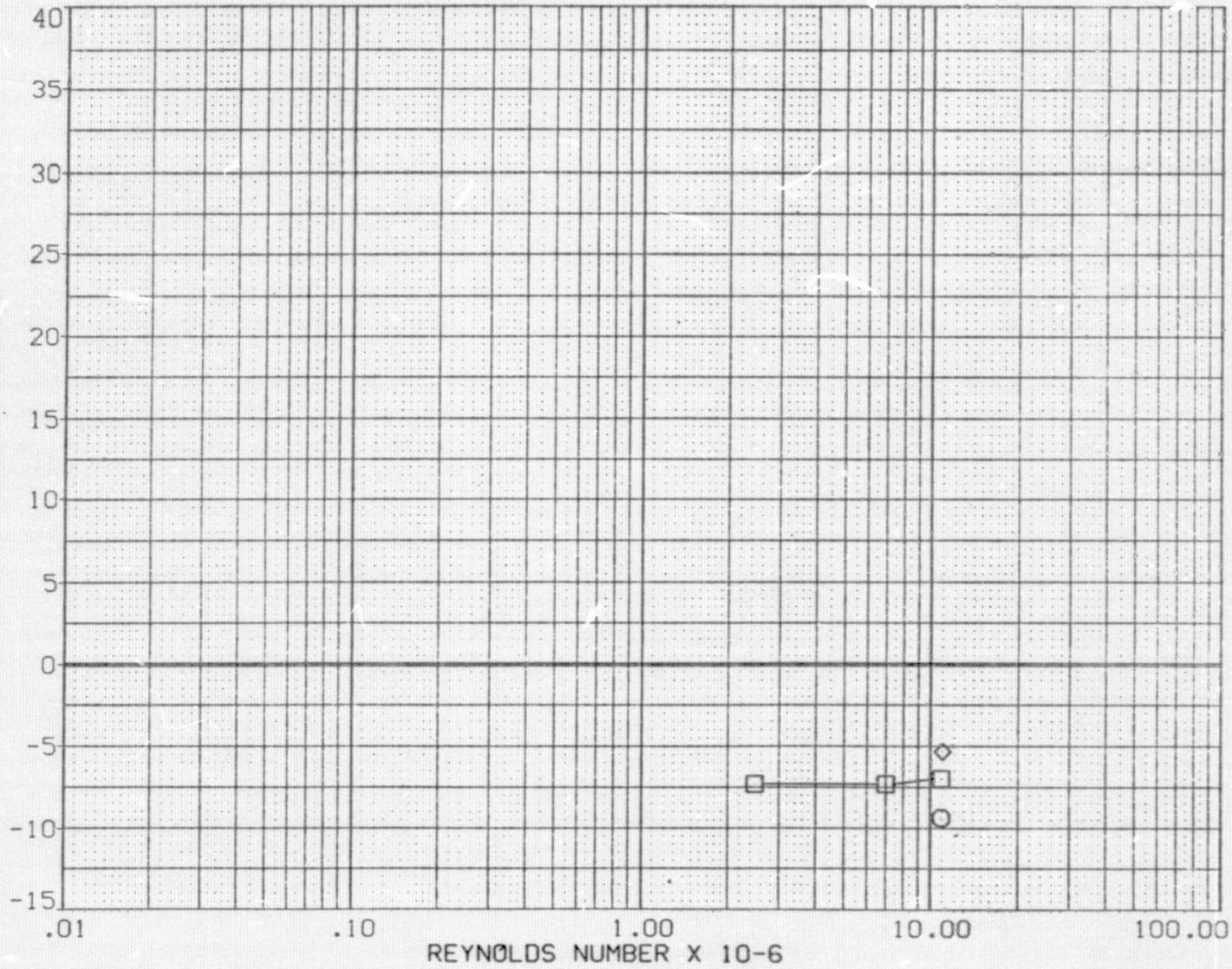


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

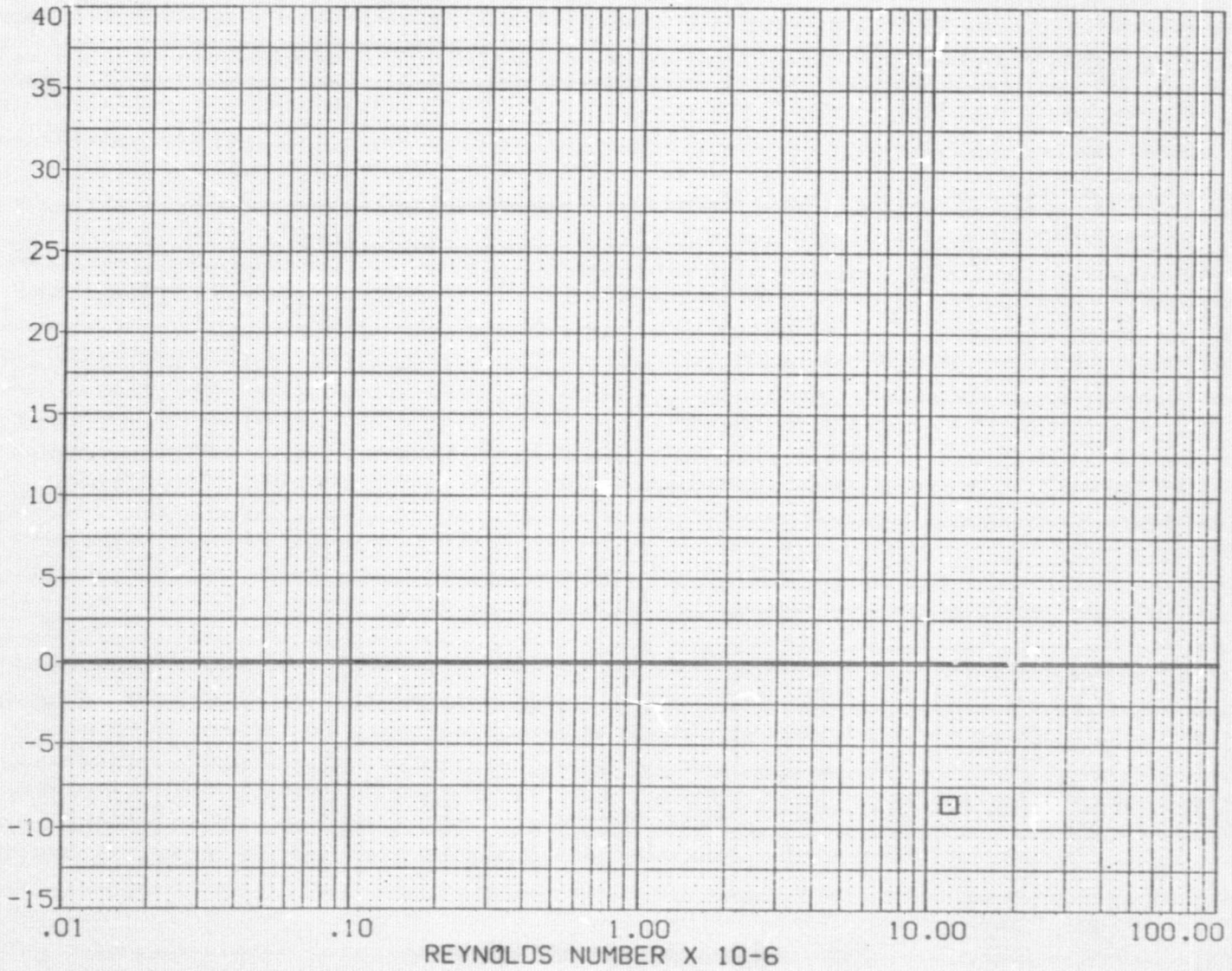


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	⊡	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

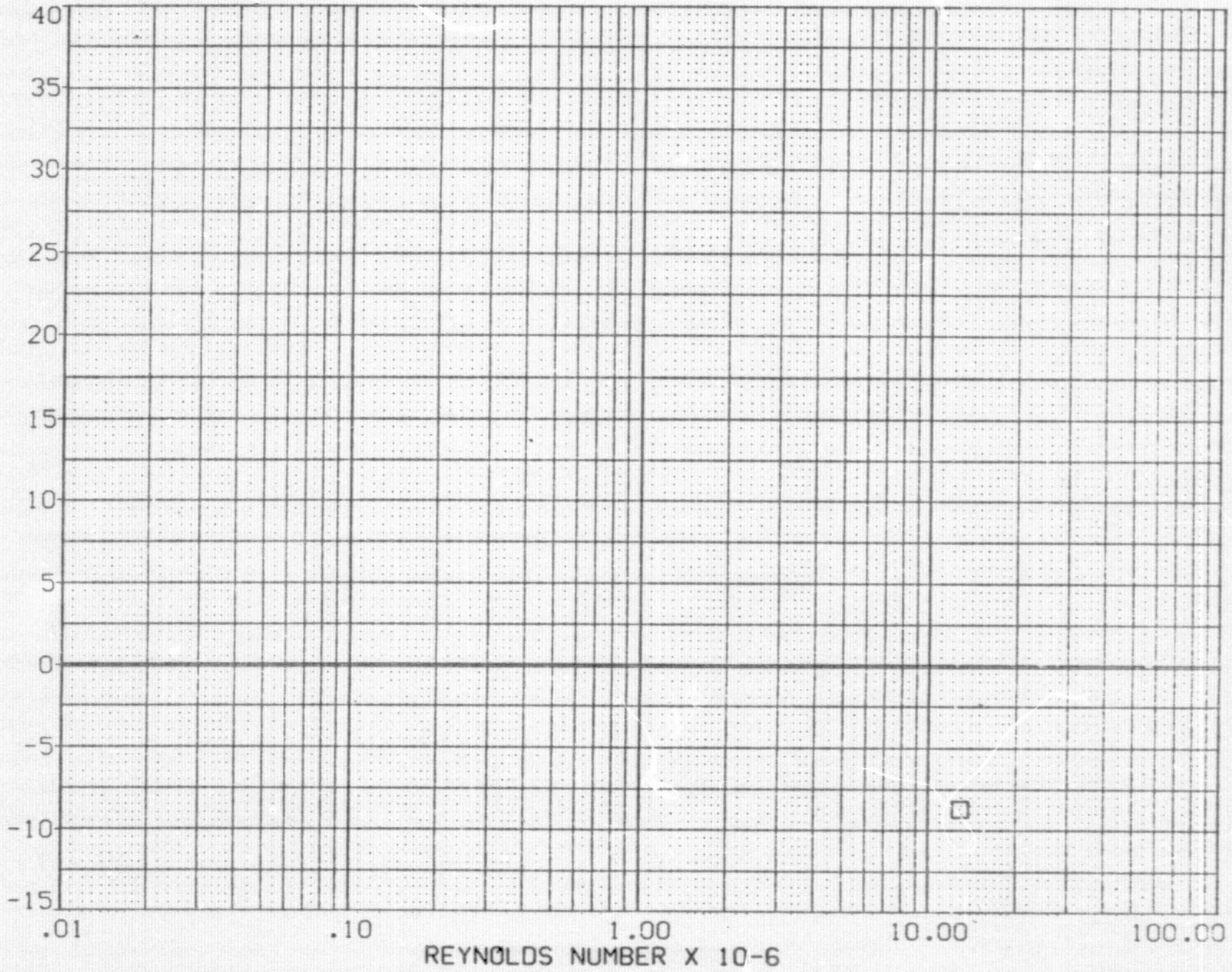


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRMT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

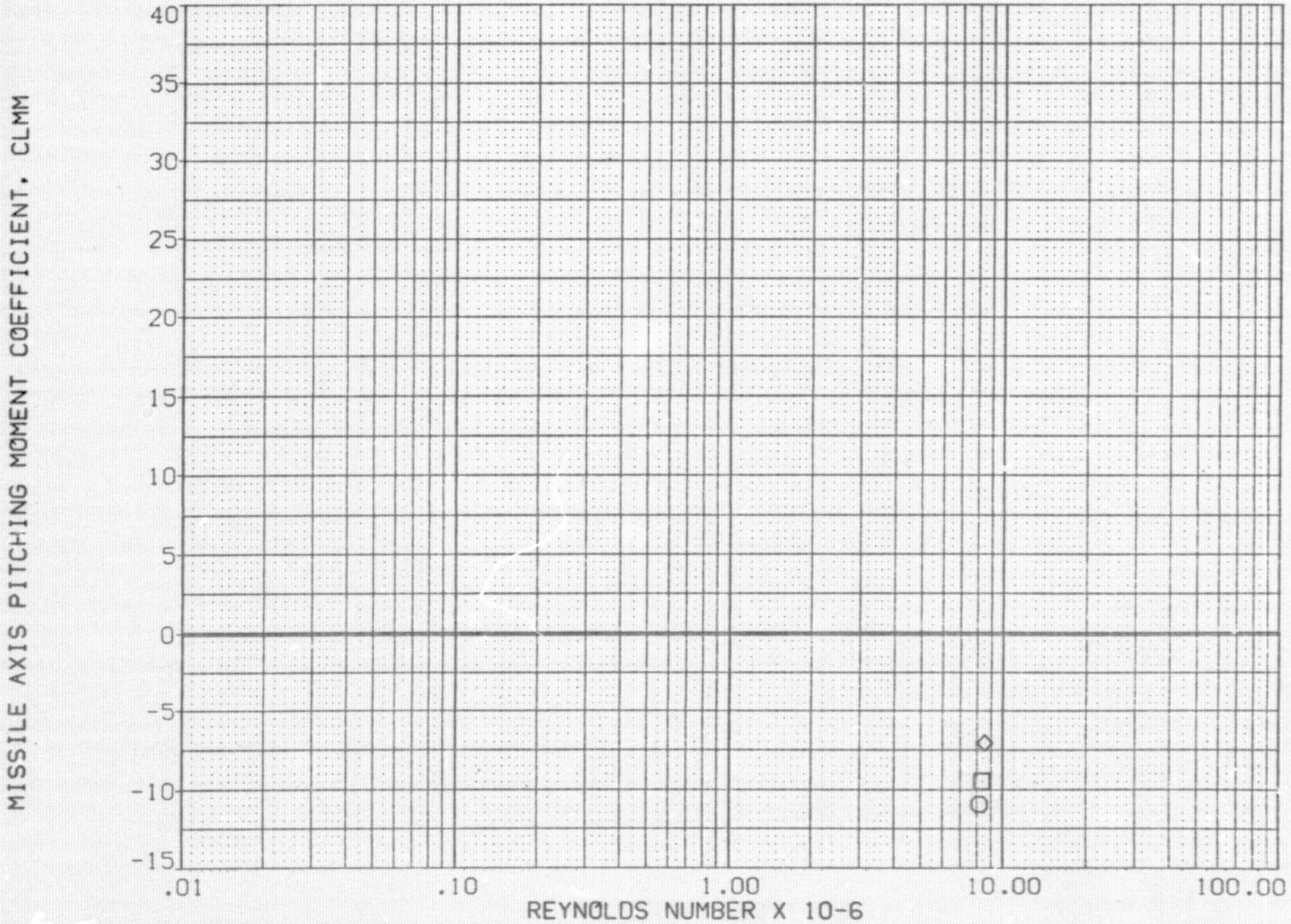


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

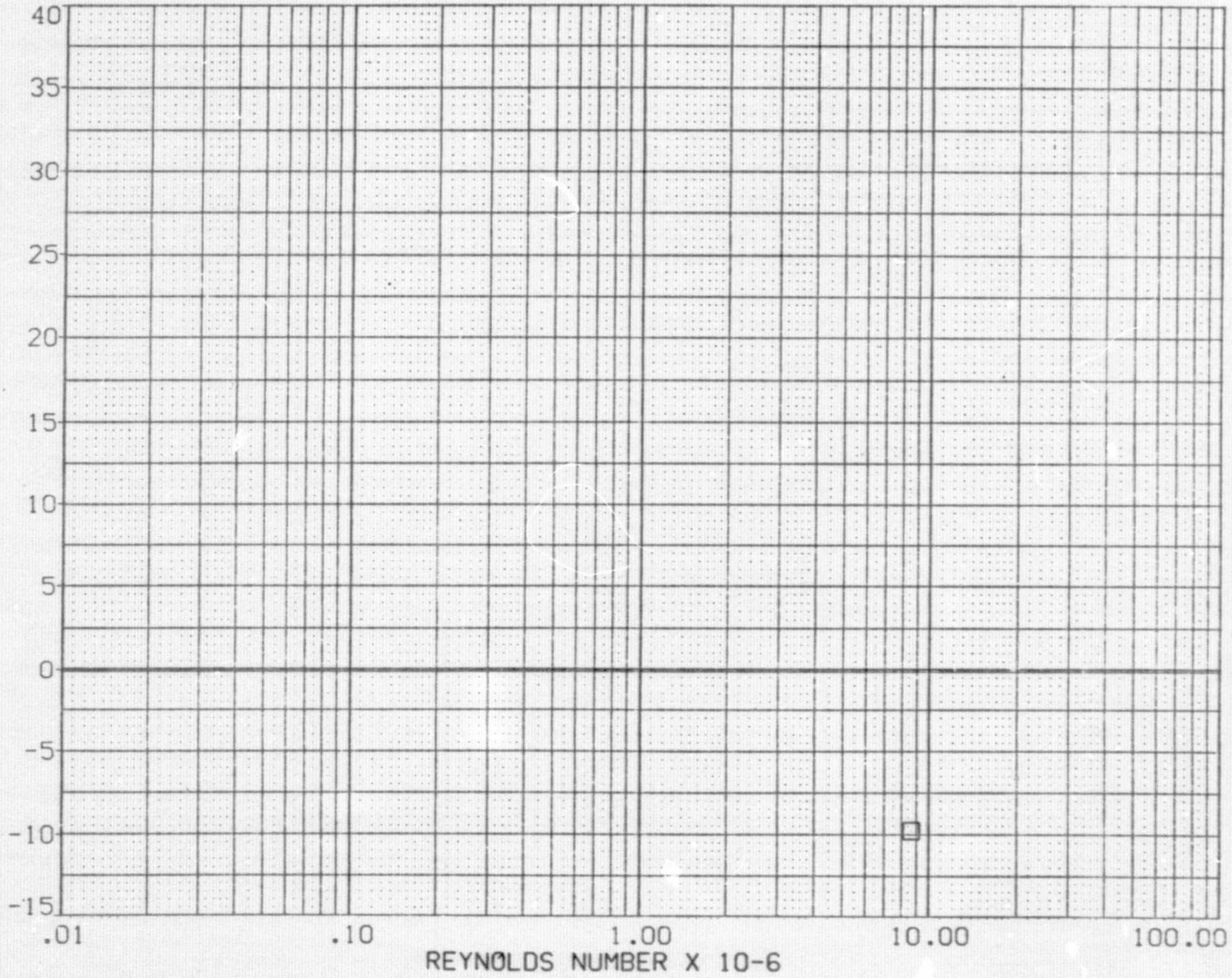


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .89

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	▭	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



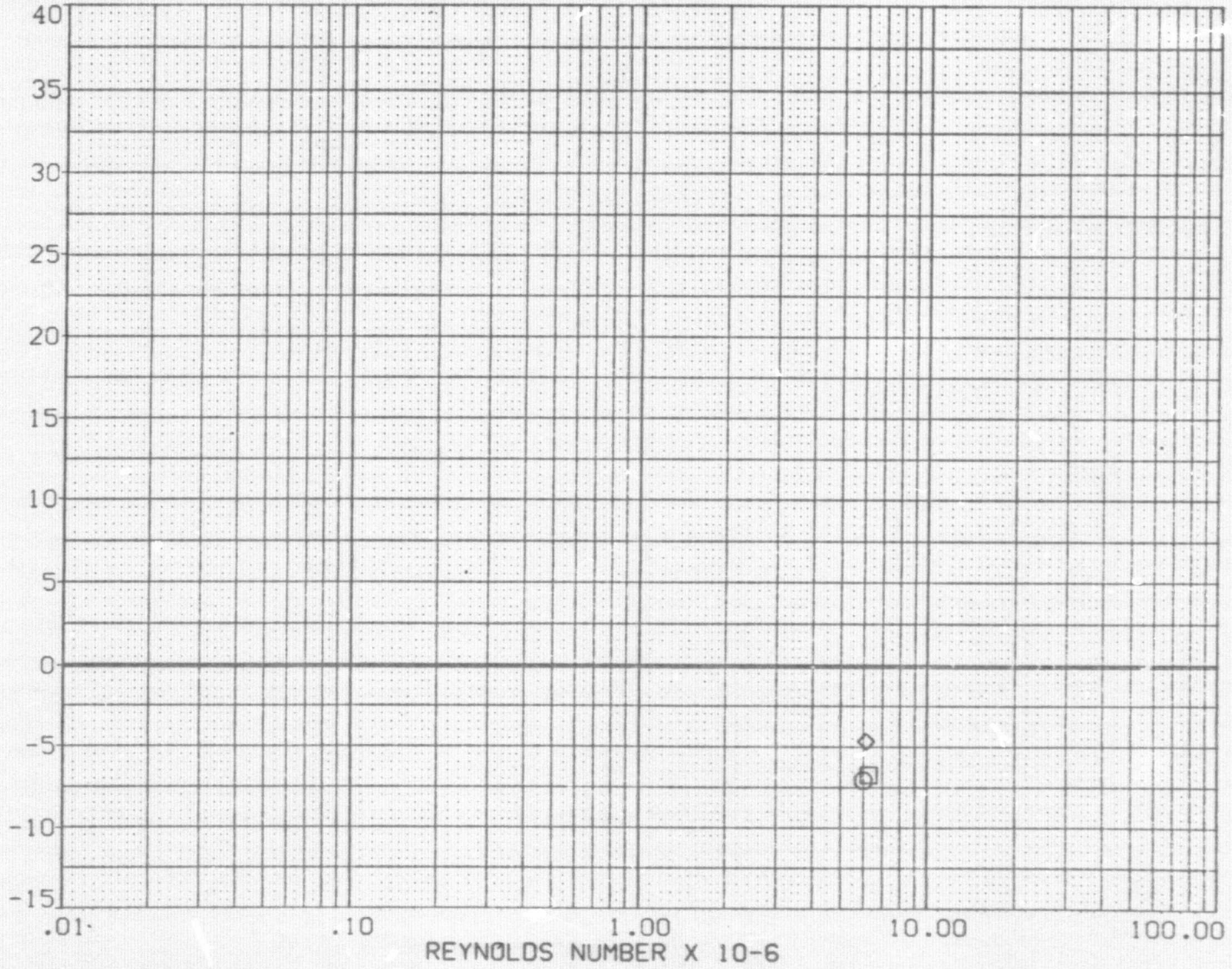
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = 1.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

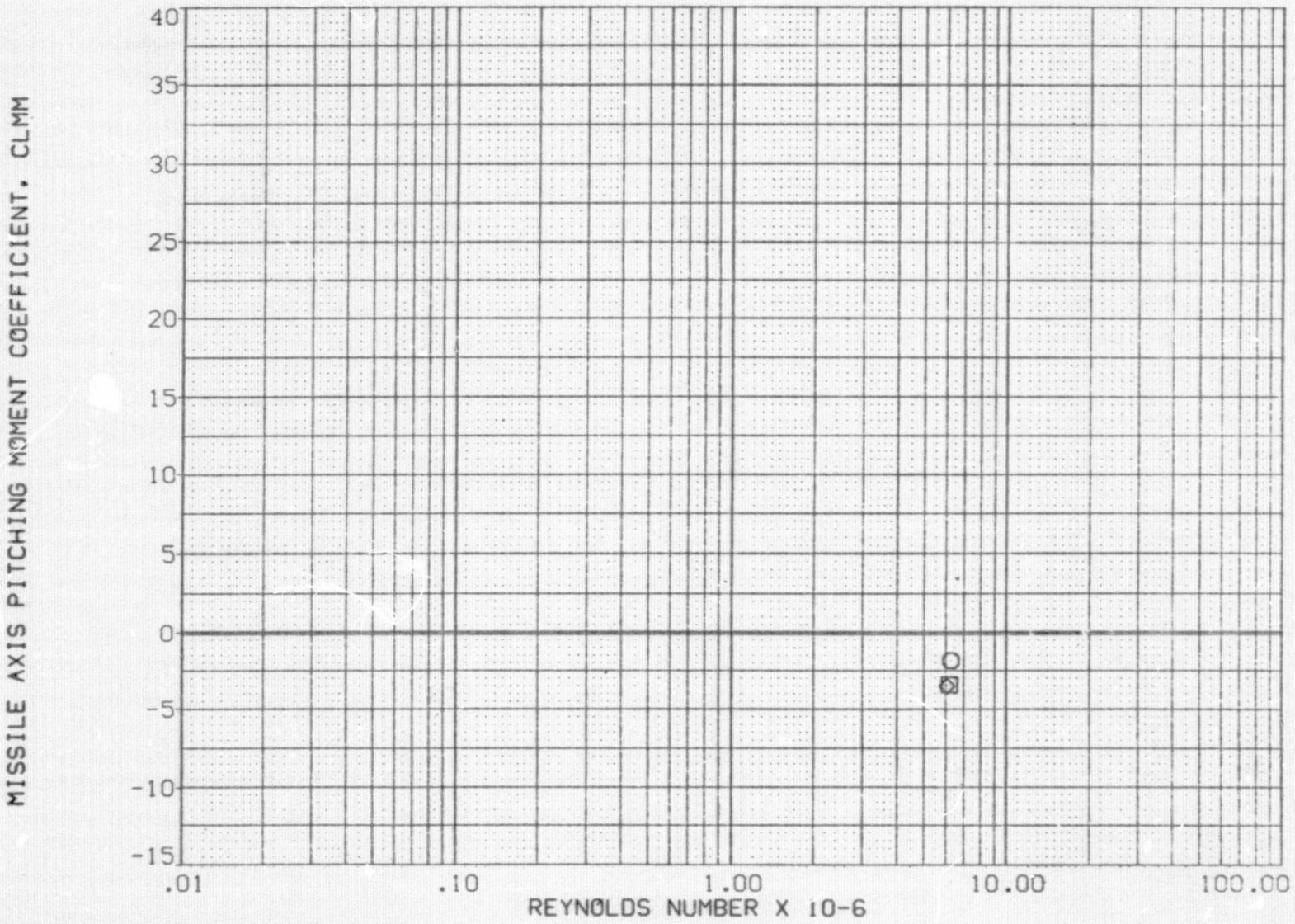


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.17

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	⊠	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

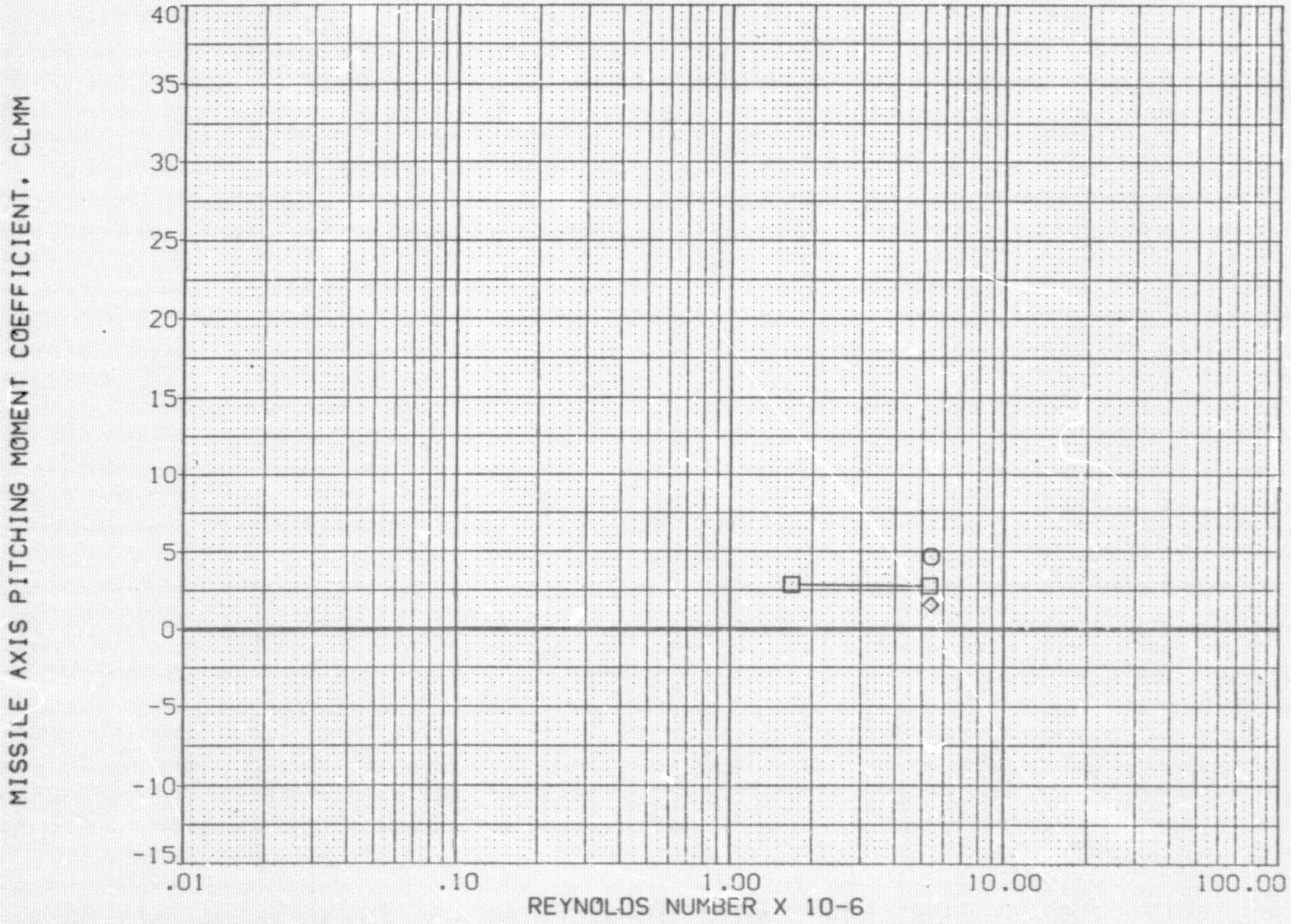


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

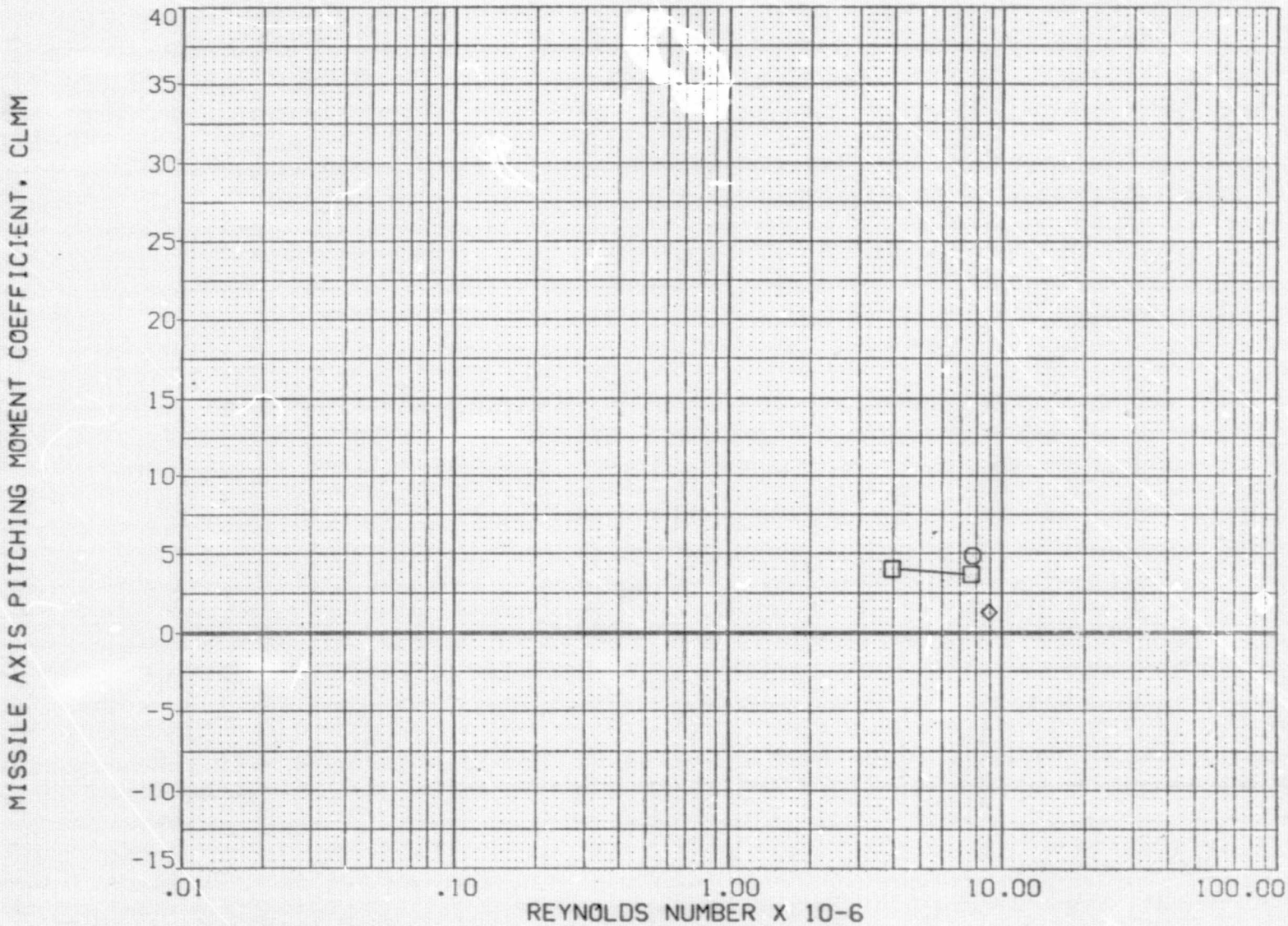


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

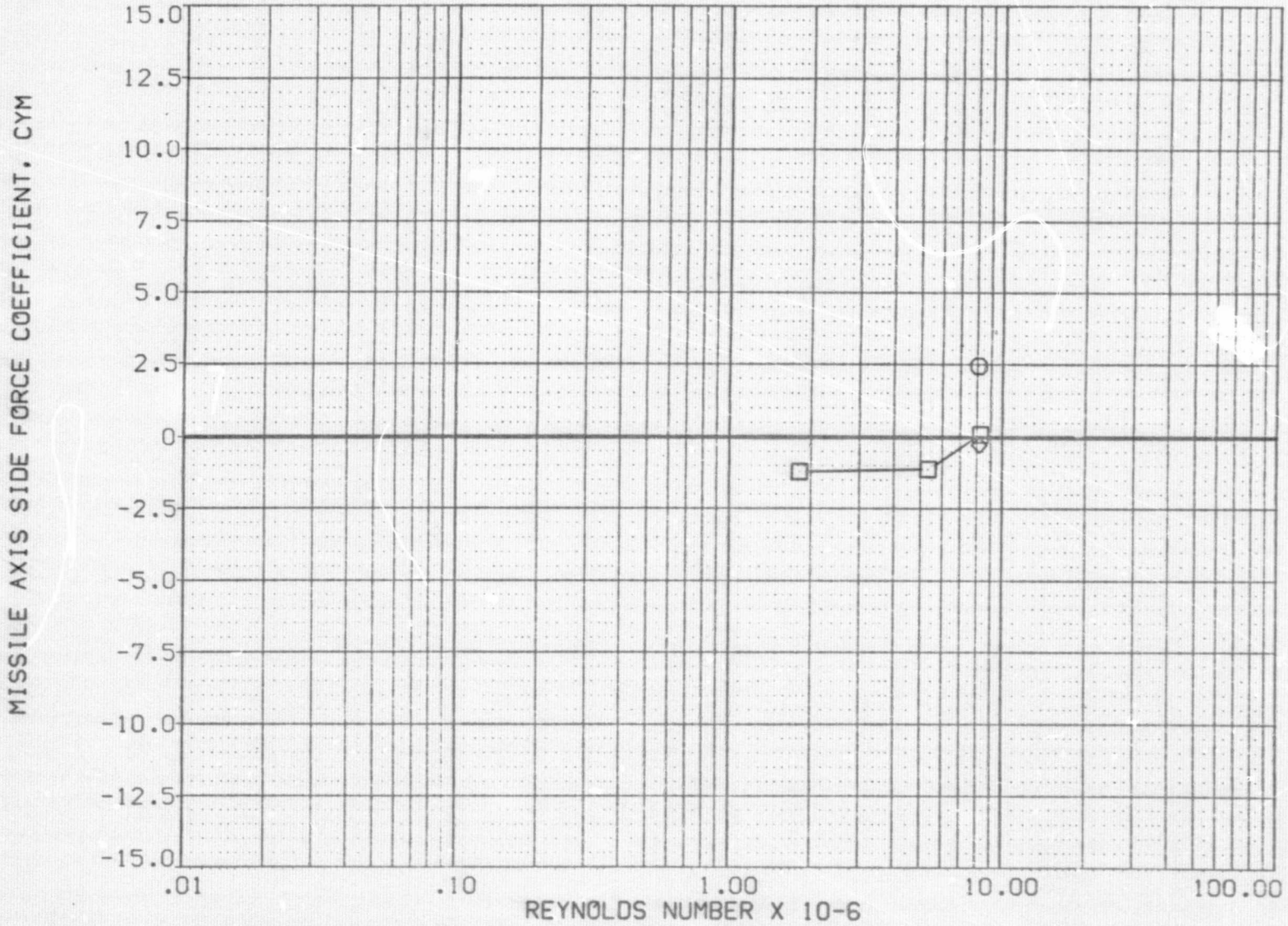


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

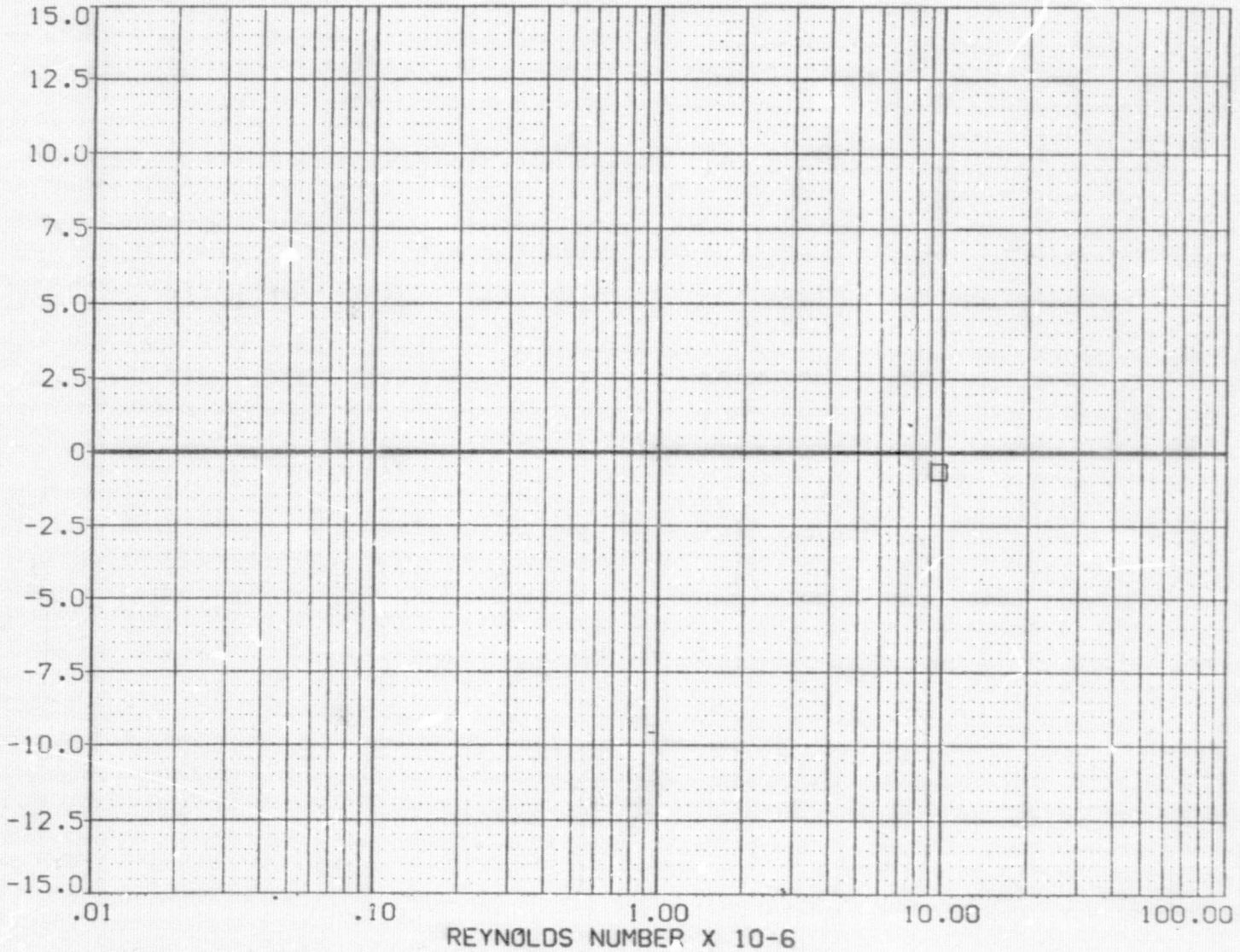


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	◇□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

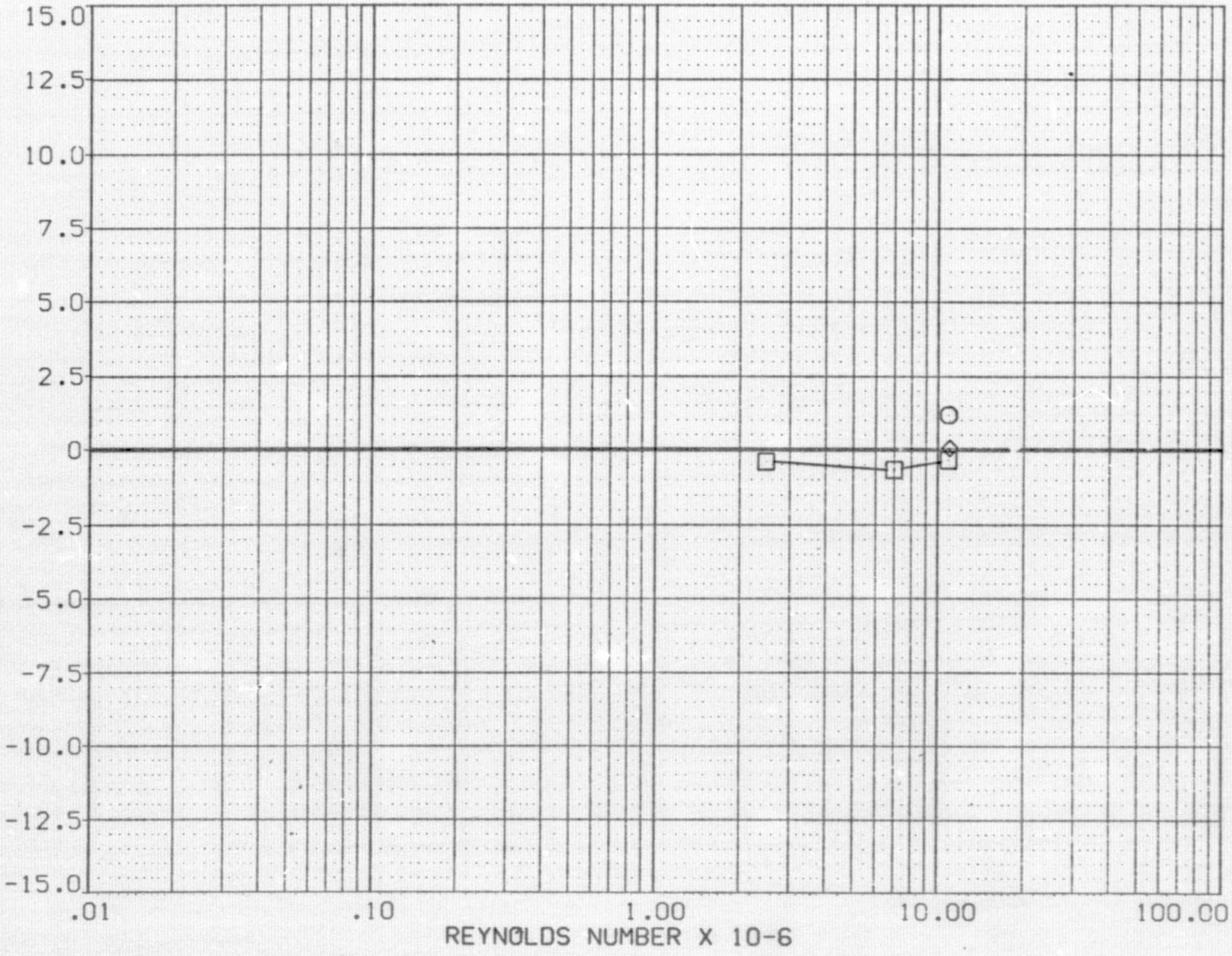


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



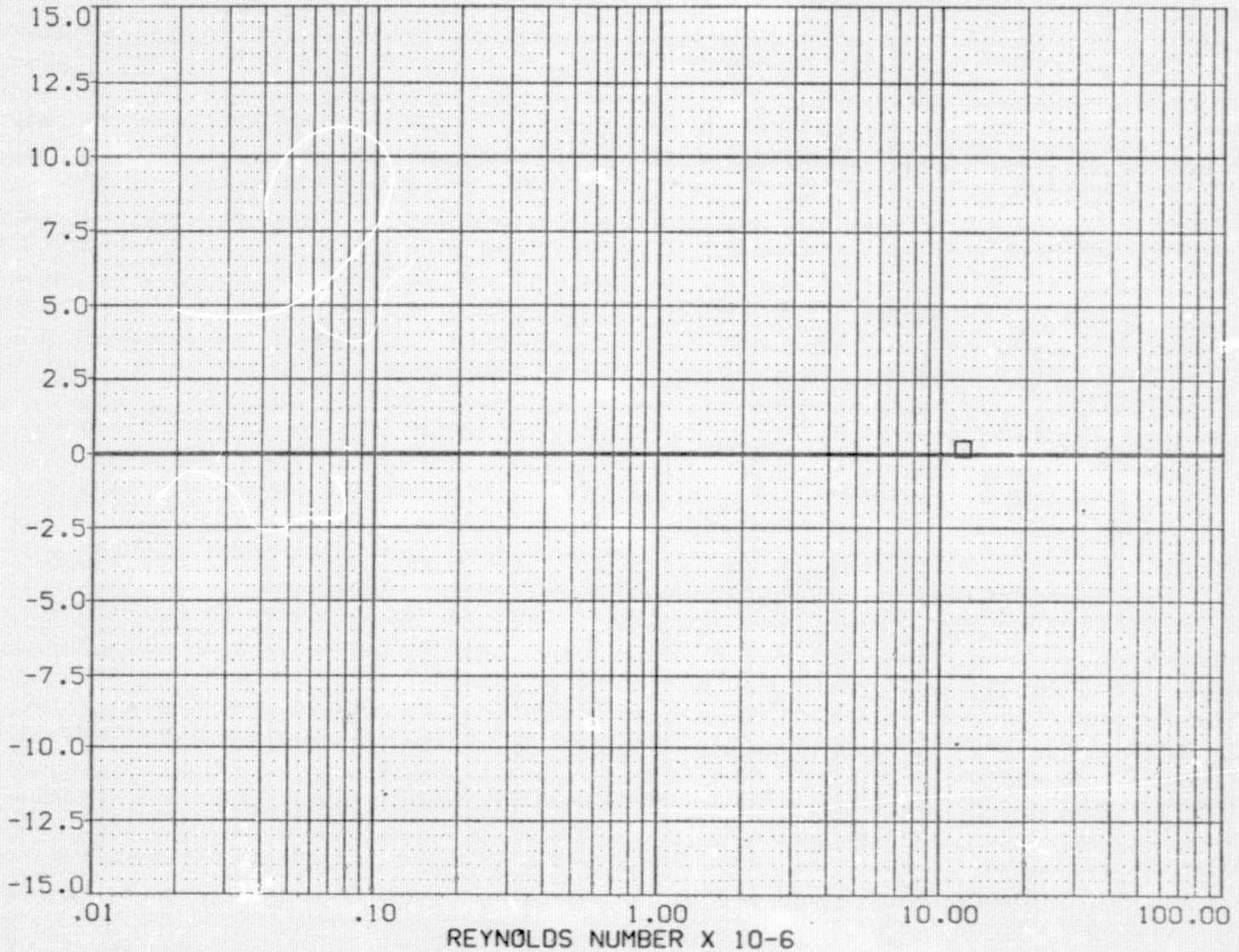
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



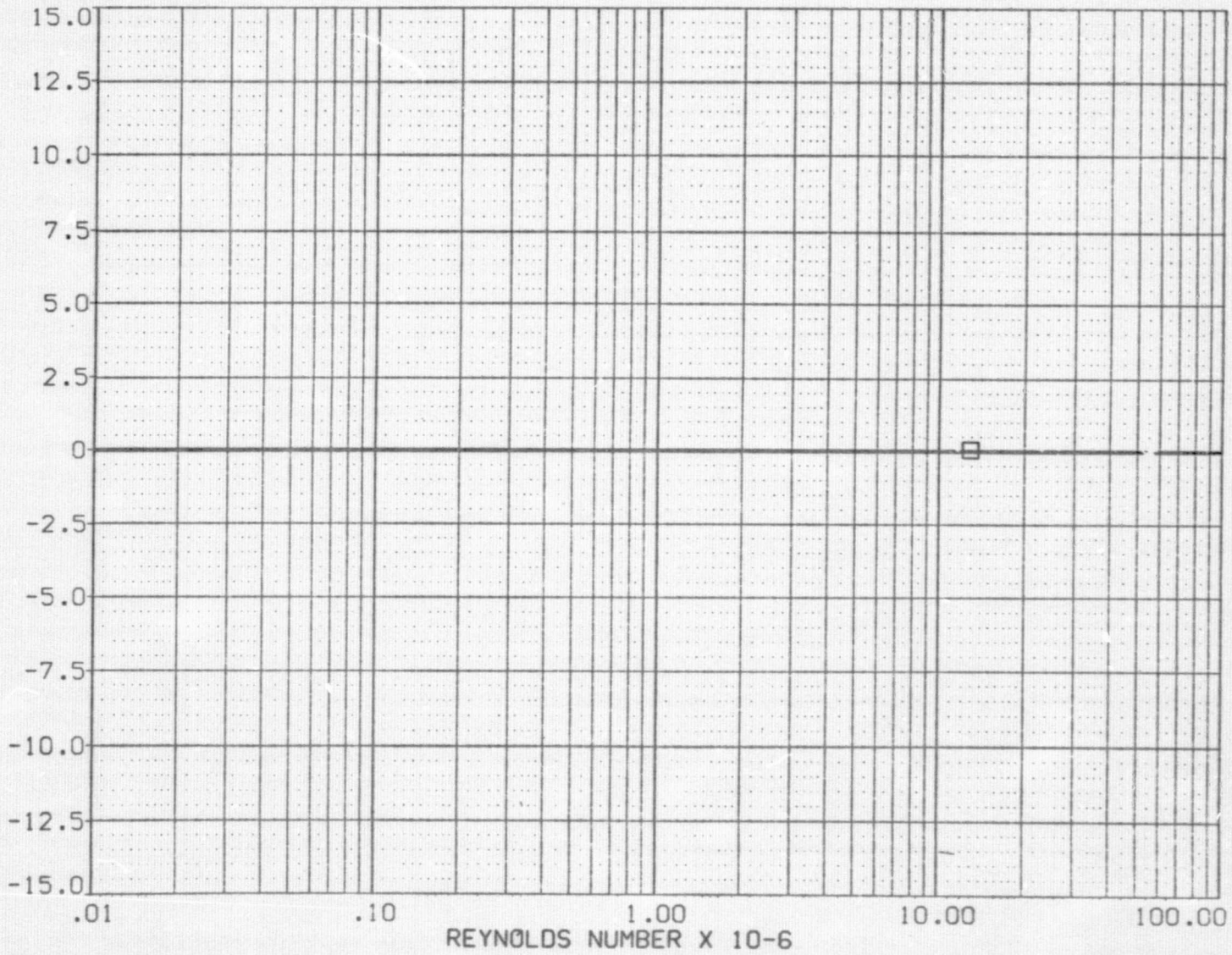
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

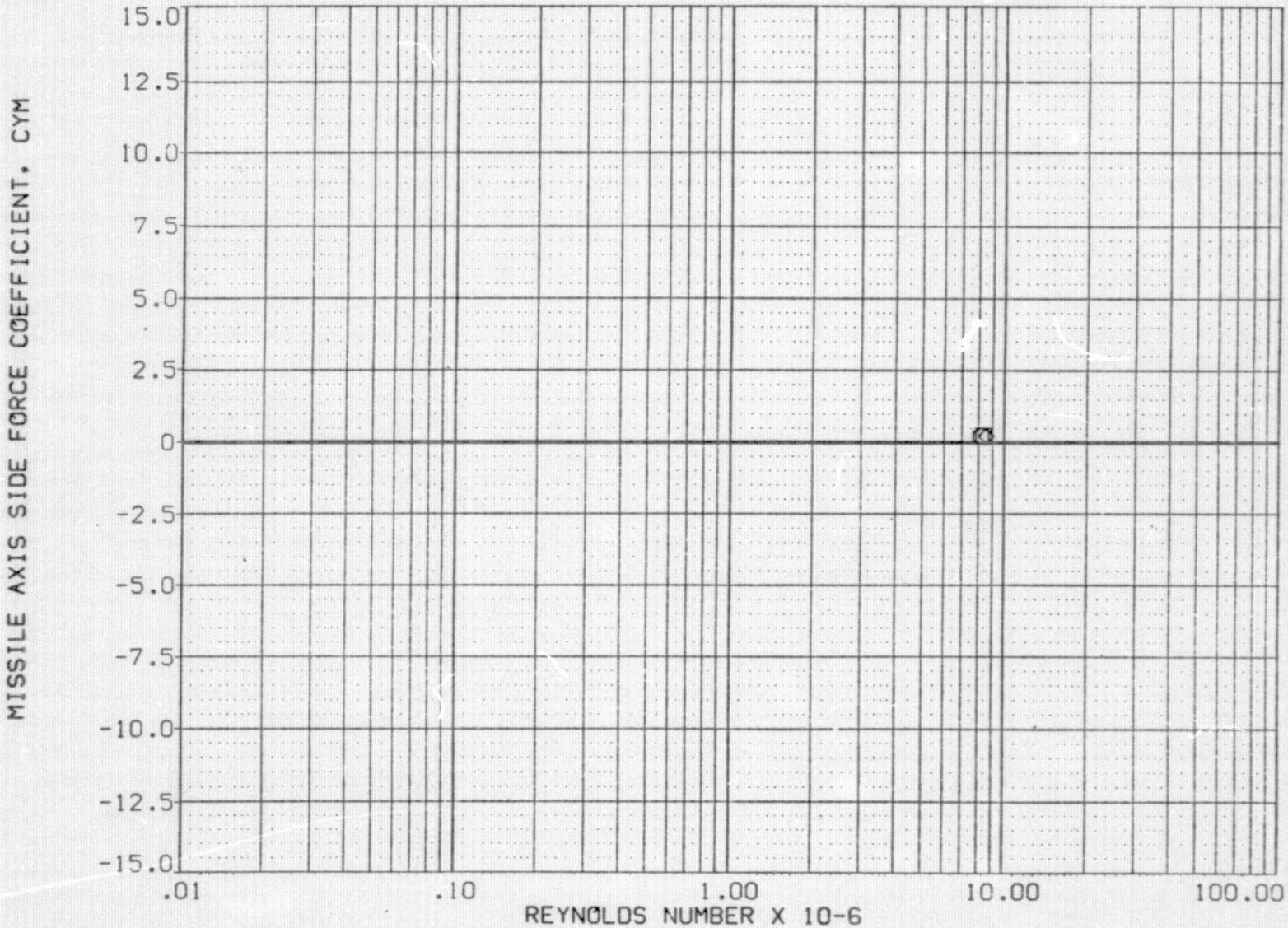


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

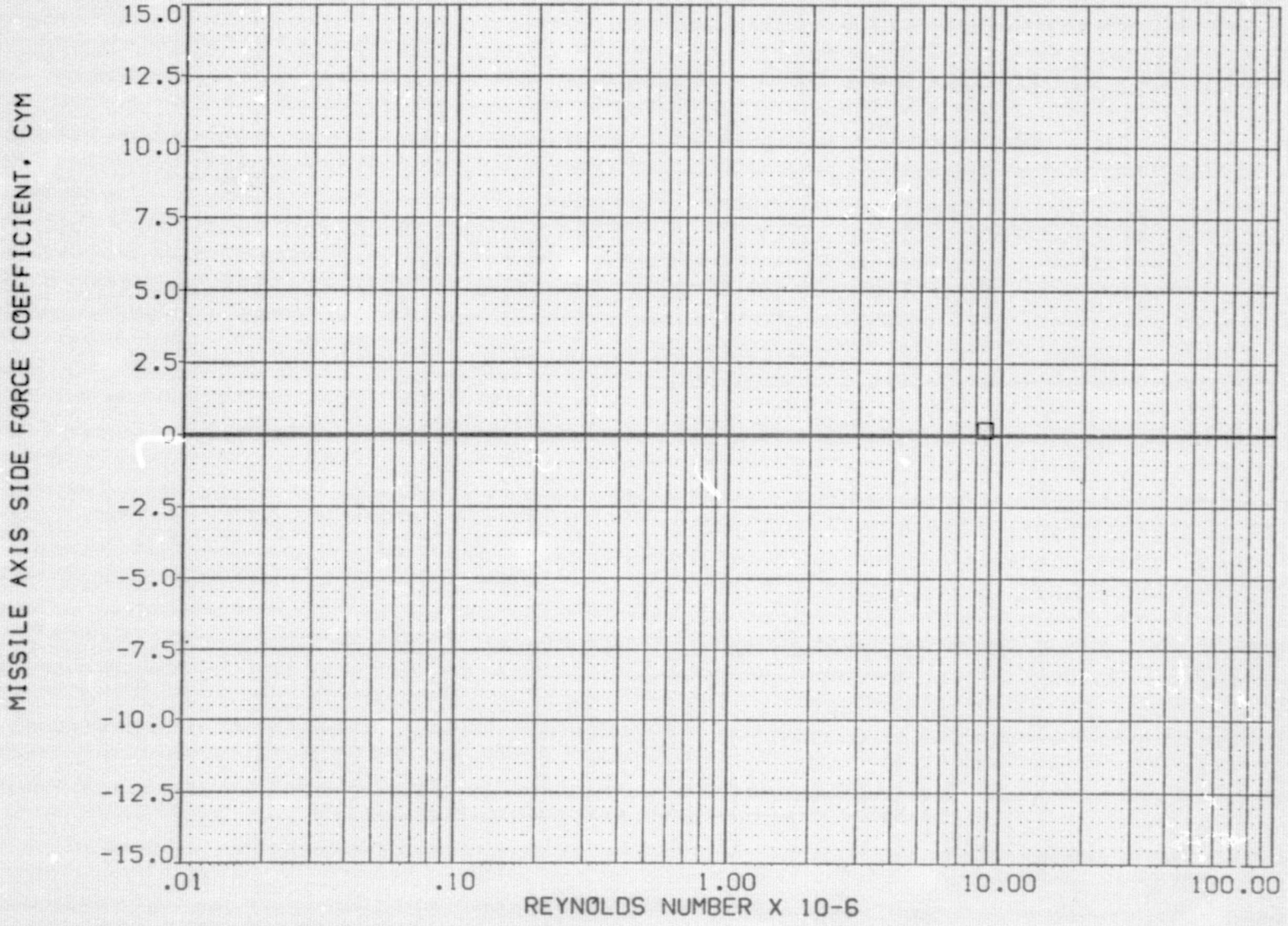


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .89

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

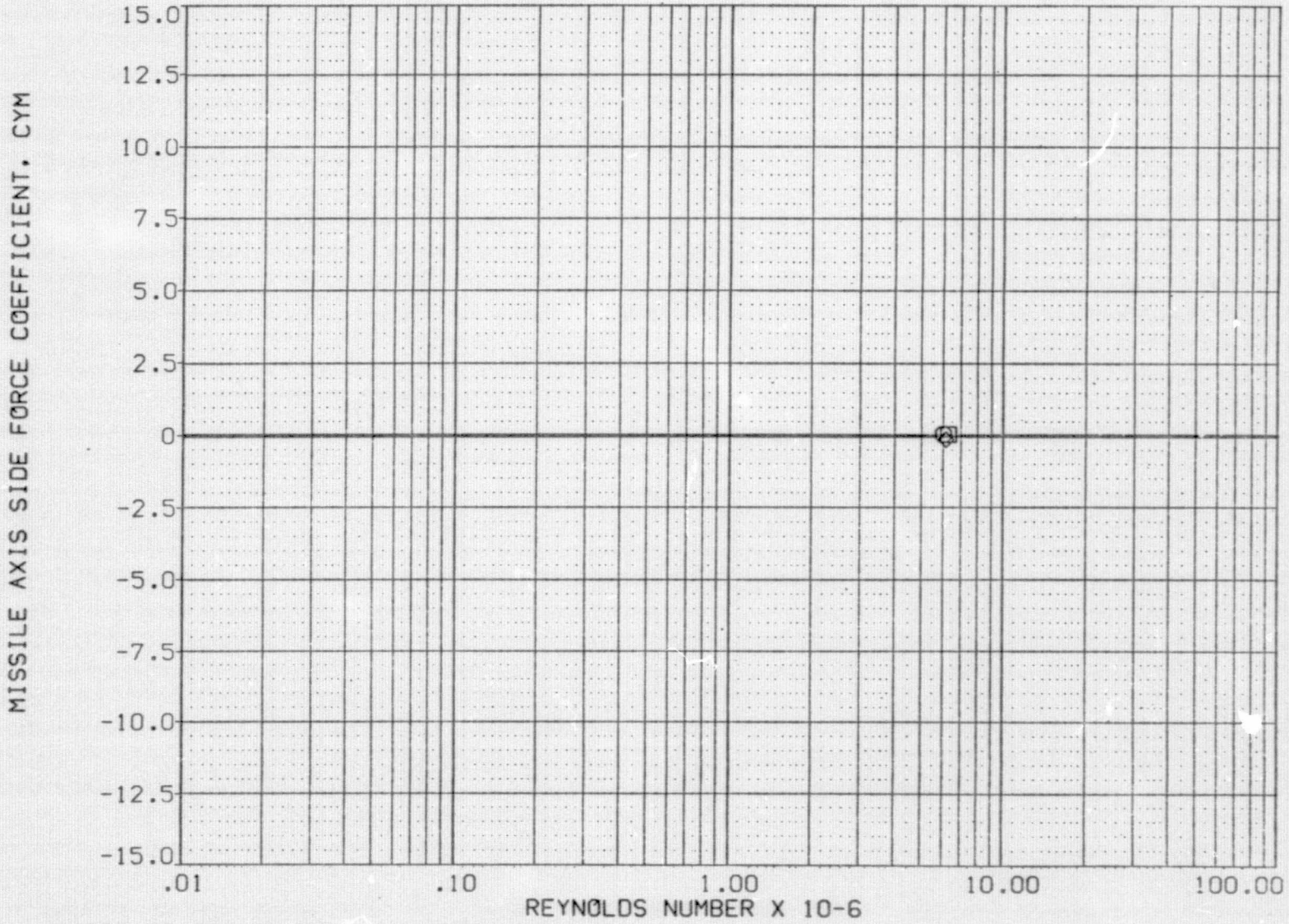


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = 1.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



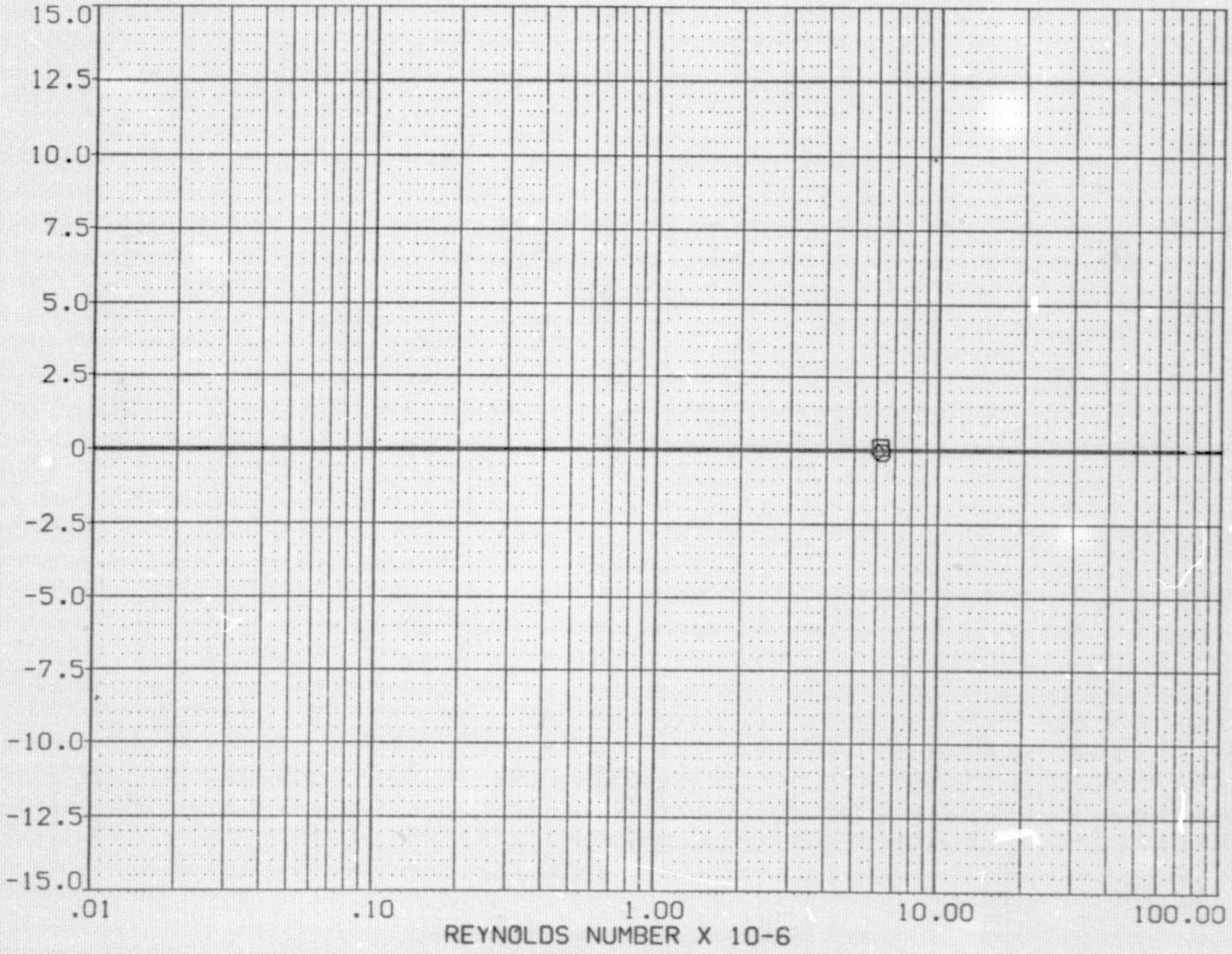
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.17

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

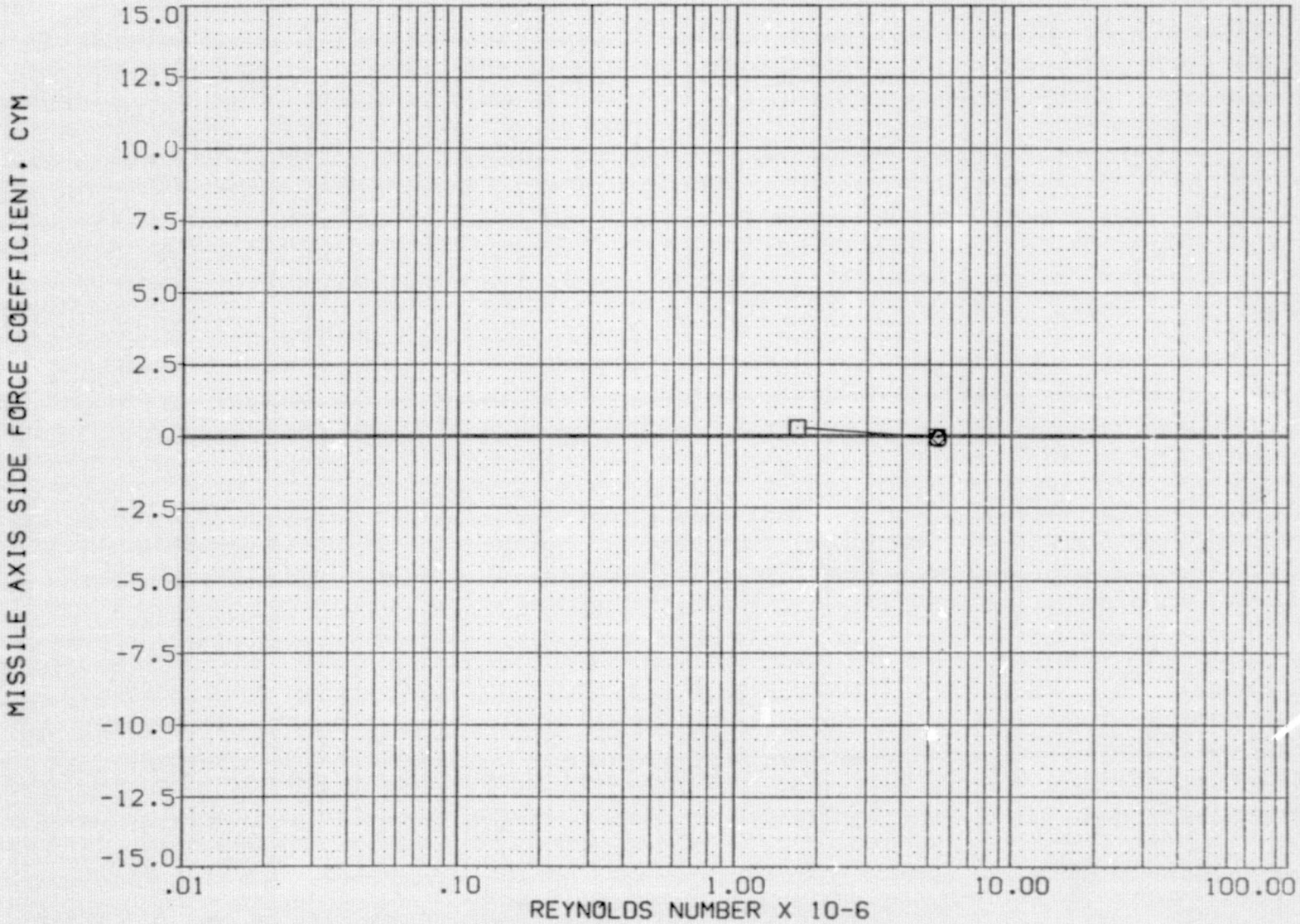


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

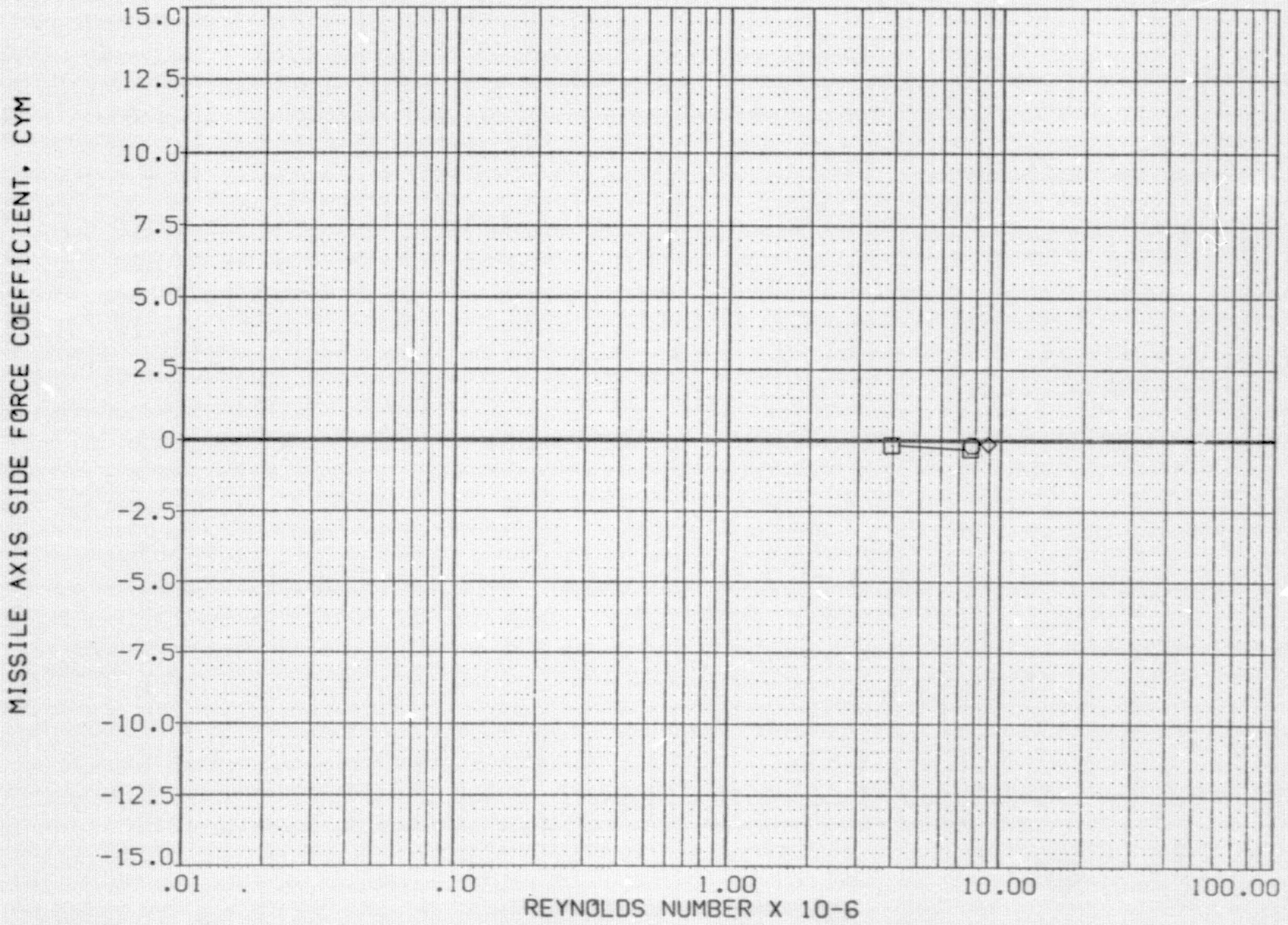


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

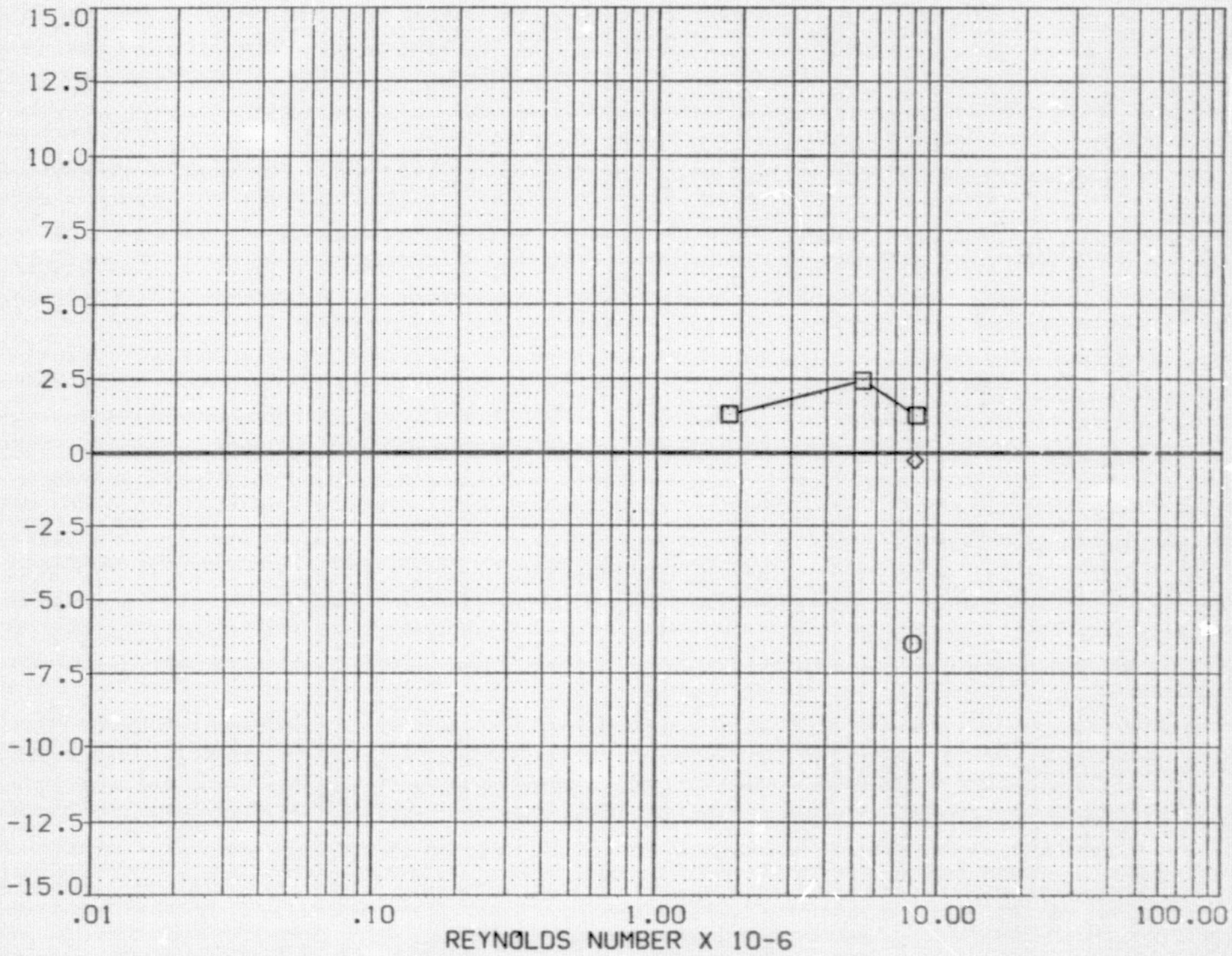


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(K)MACH = 3.50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



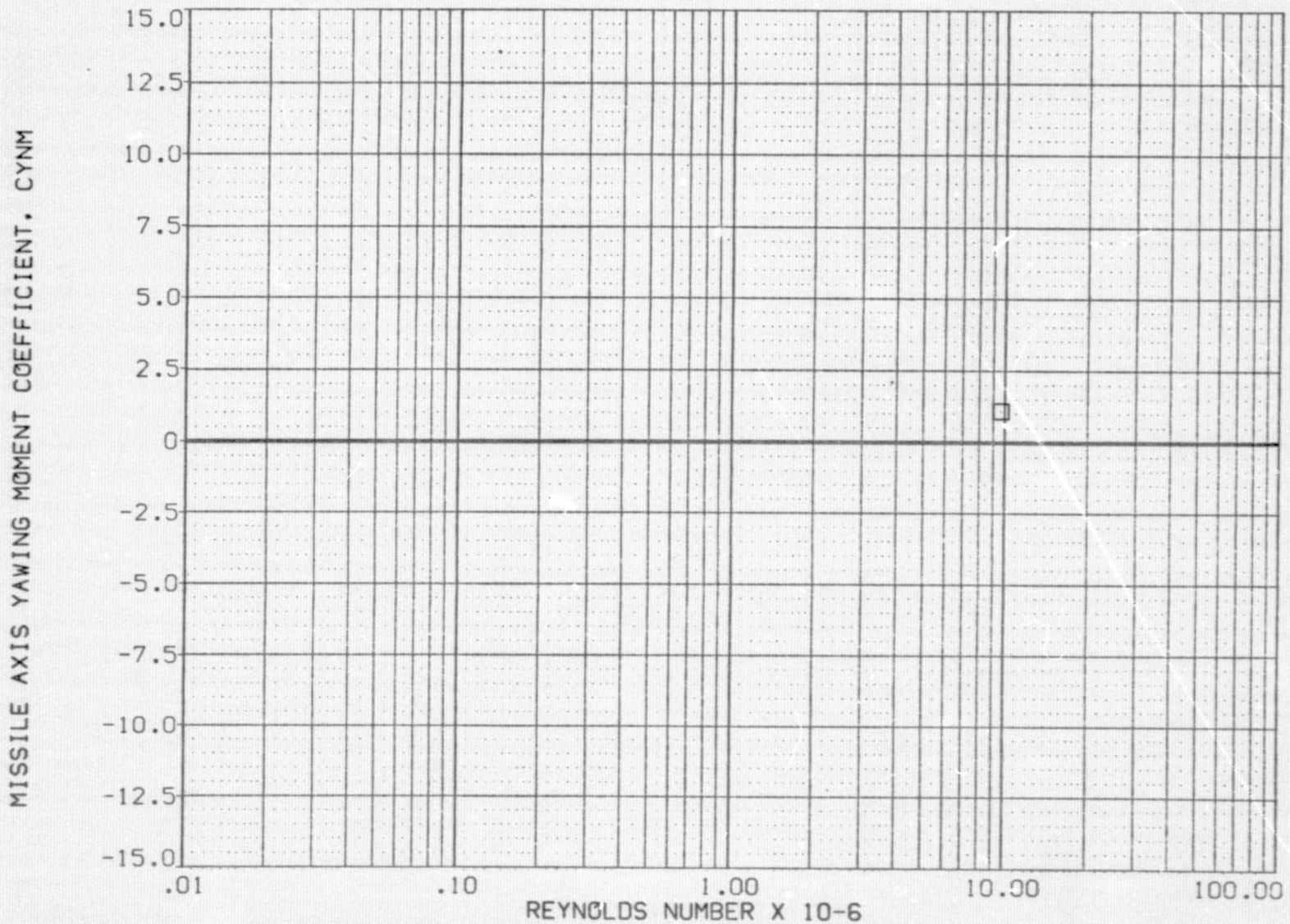
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(A)MACH = .40

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

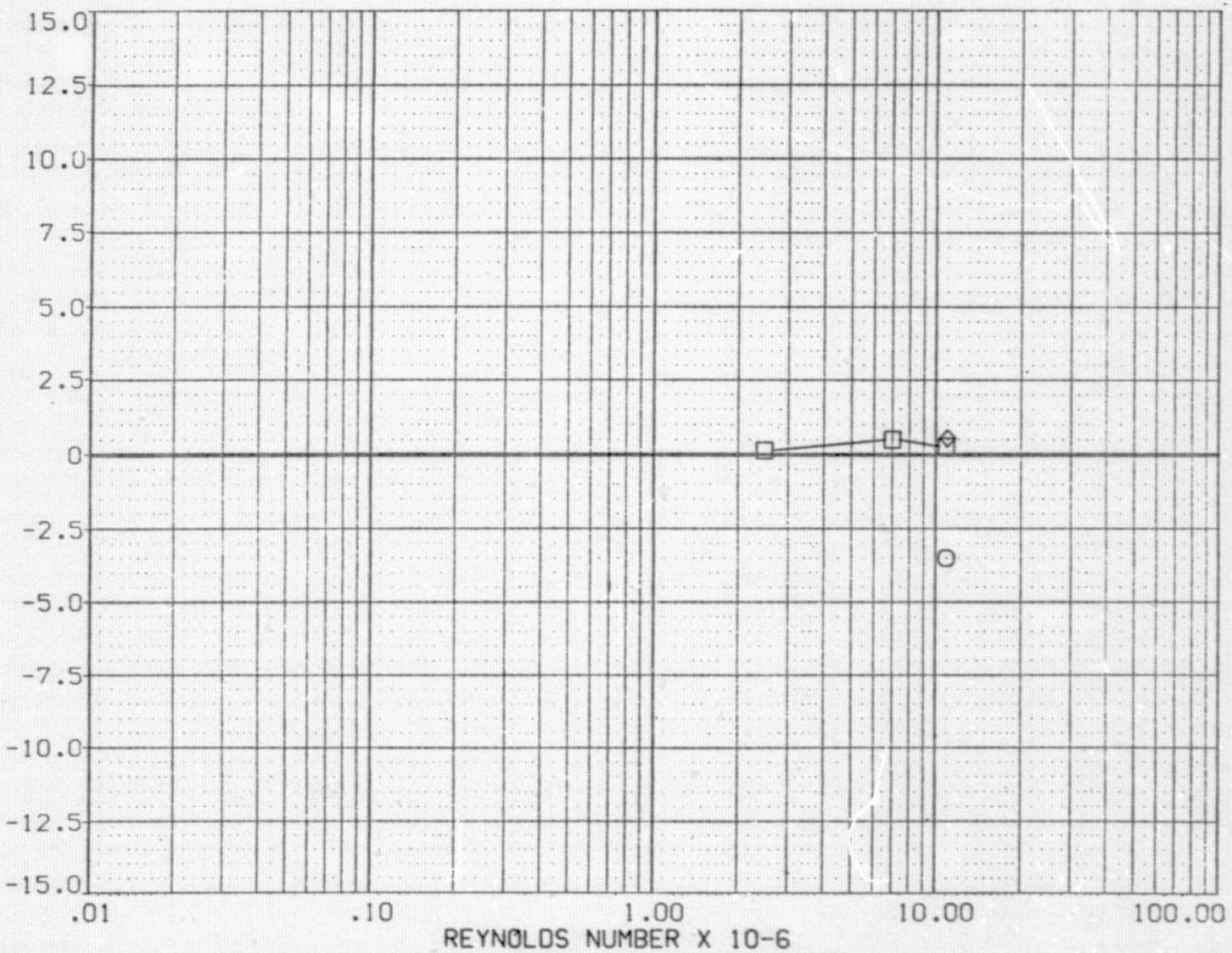


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(B)MACH = .50

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	◻	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

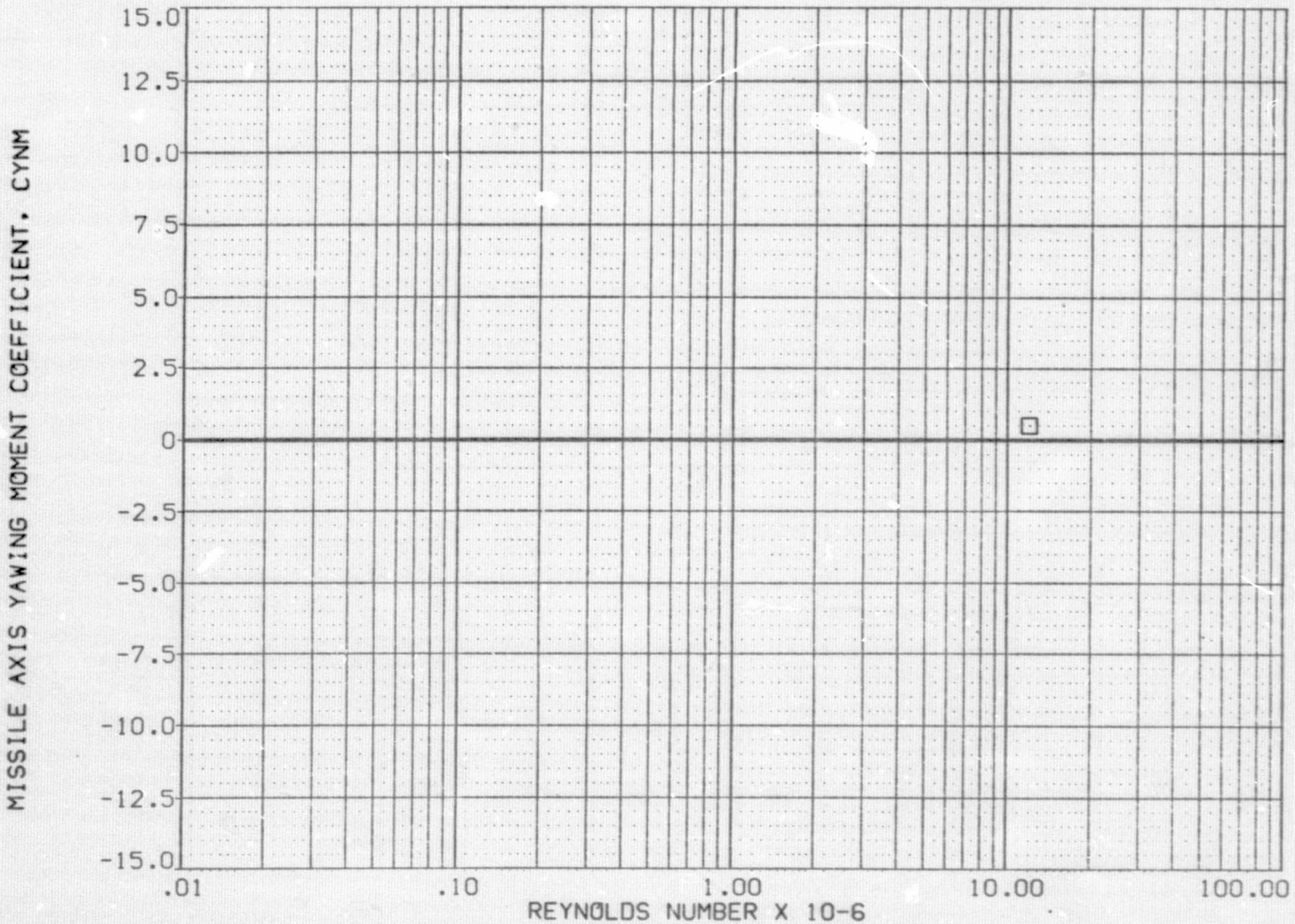


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(C)MACH = .60

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



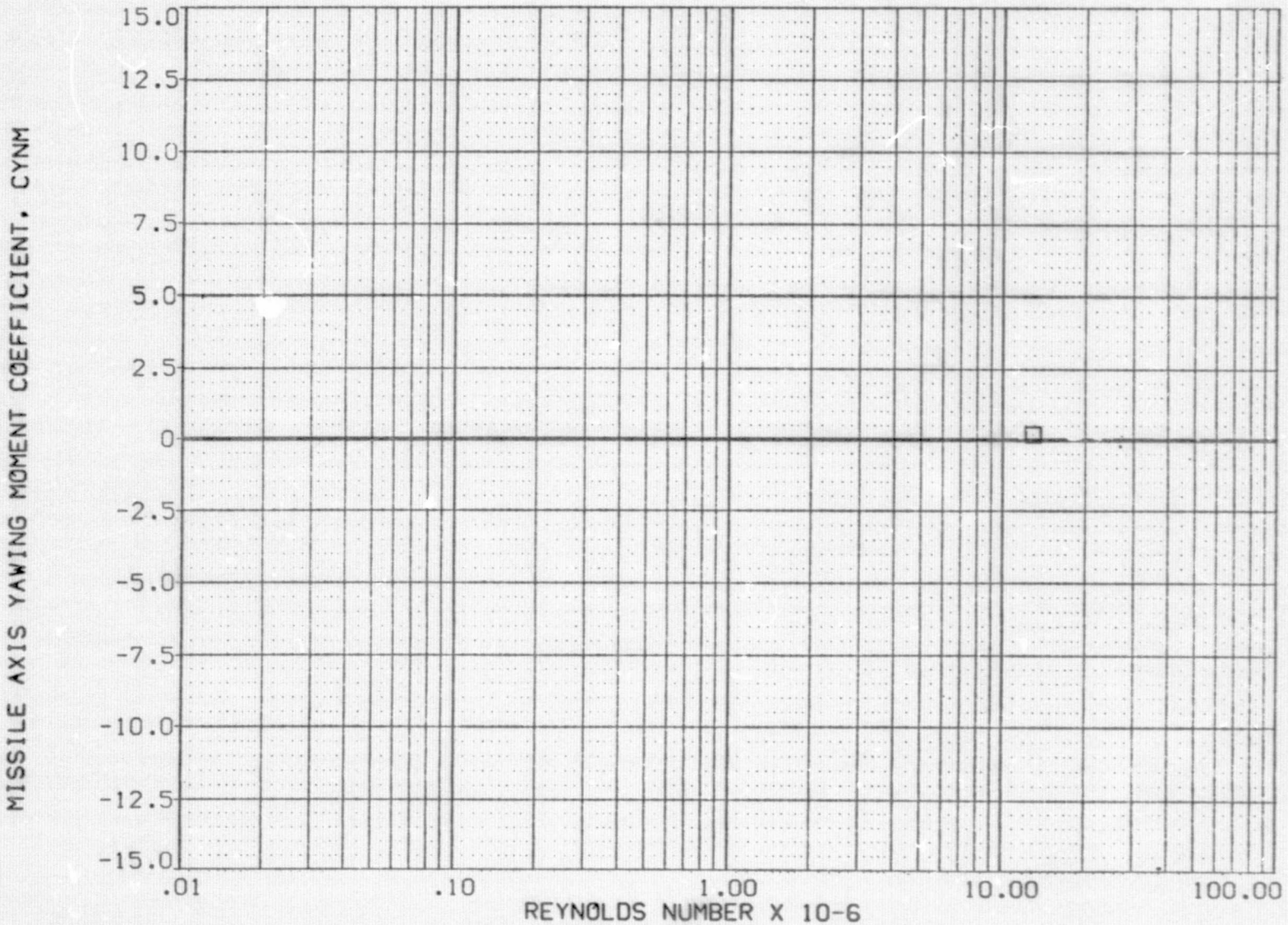
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(D)MACH = .70

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

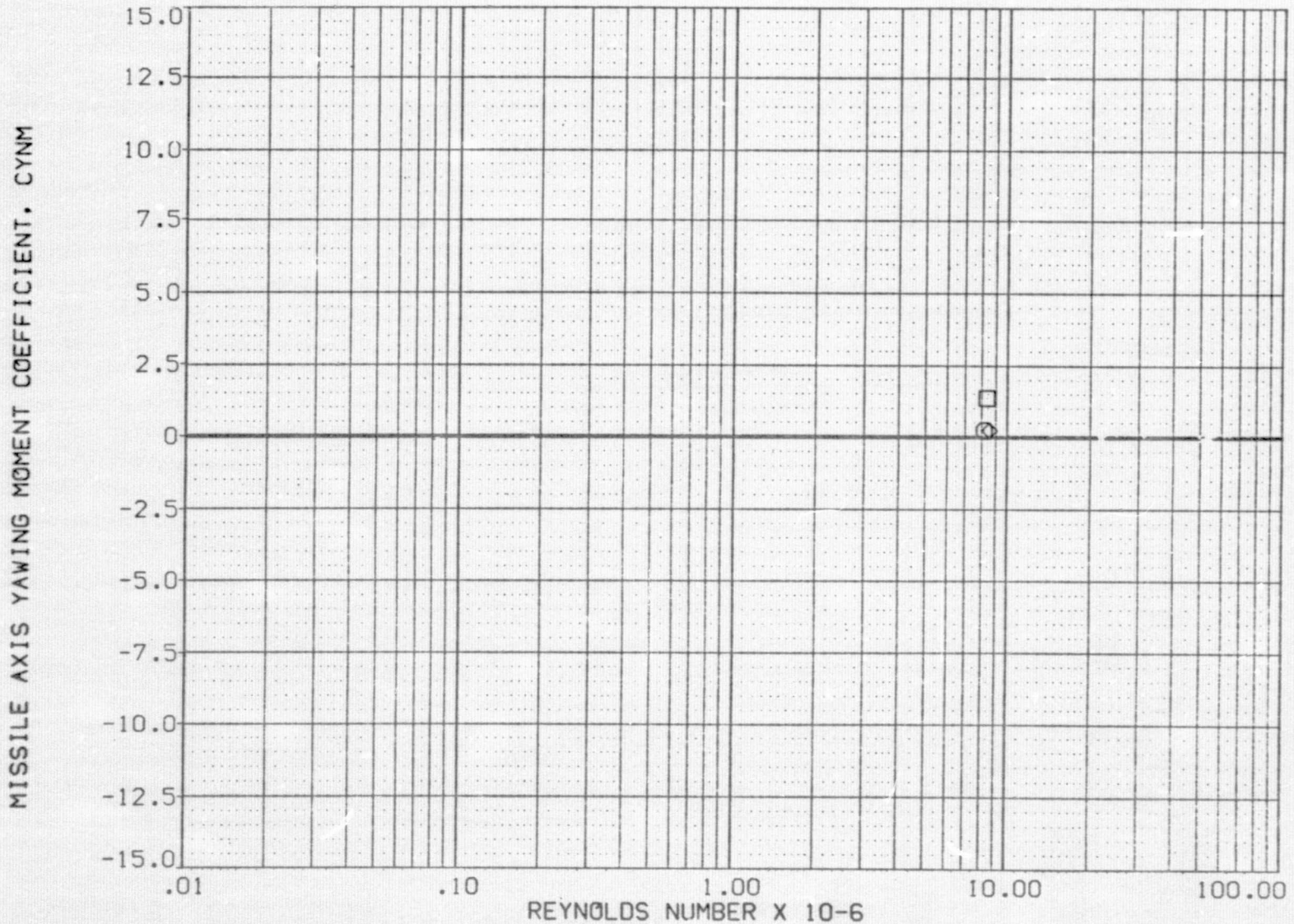


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(E)MACH = .81

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F!11)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



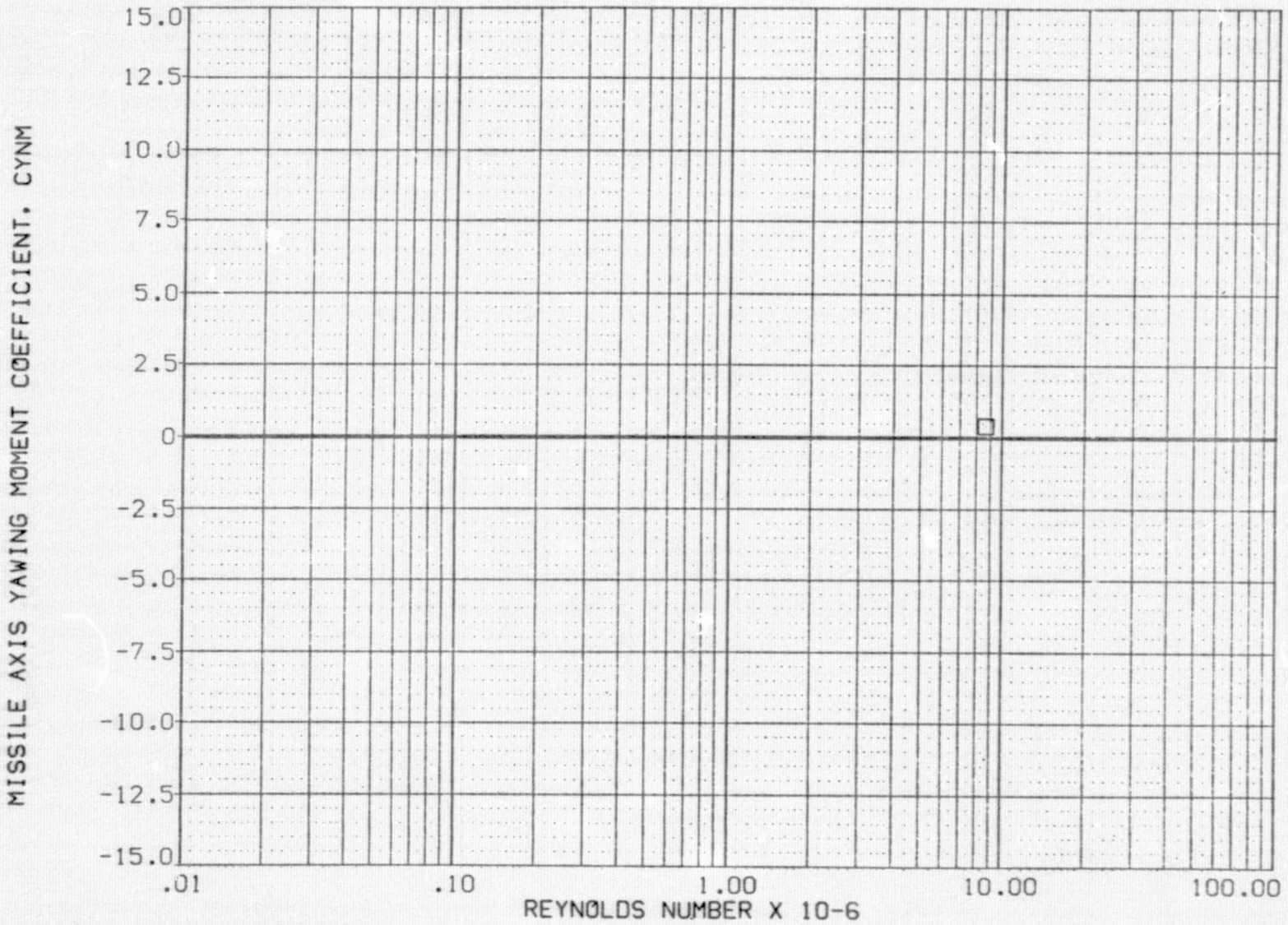
EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(F)MACH = .89

DATA SET SYMBOL		CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	DATA NOT AVAILABLE	125.000	.000	.000
(B1F094)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)		DATA NOT AVAILABLE	145.000	.000	.000

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

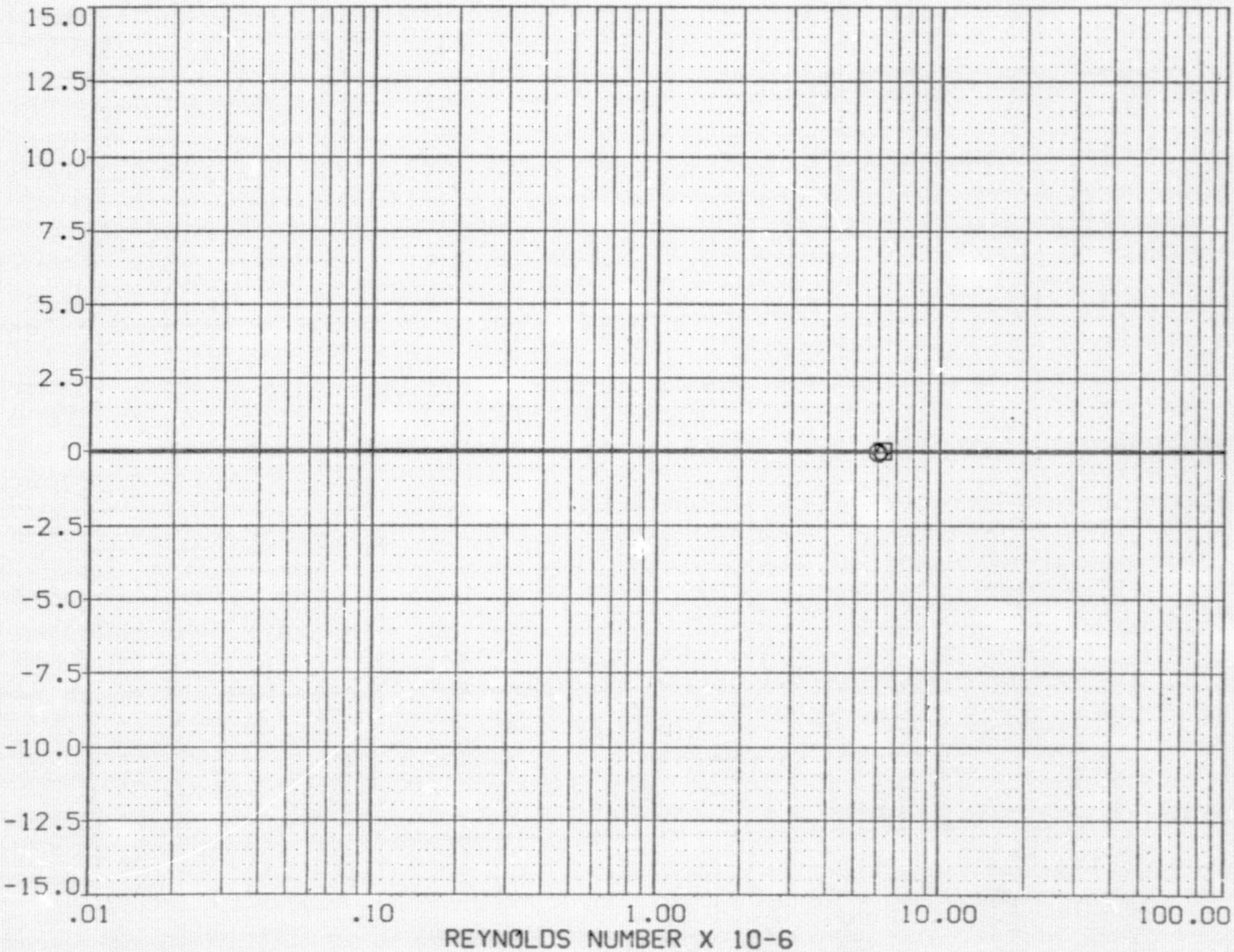


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(G)MACH = 1.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

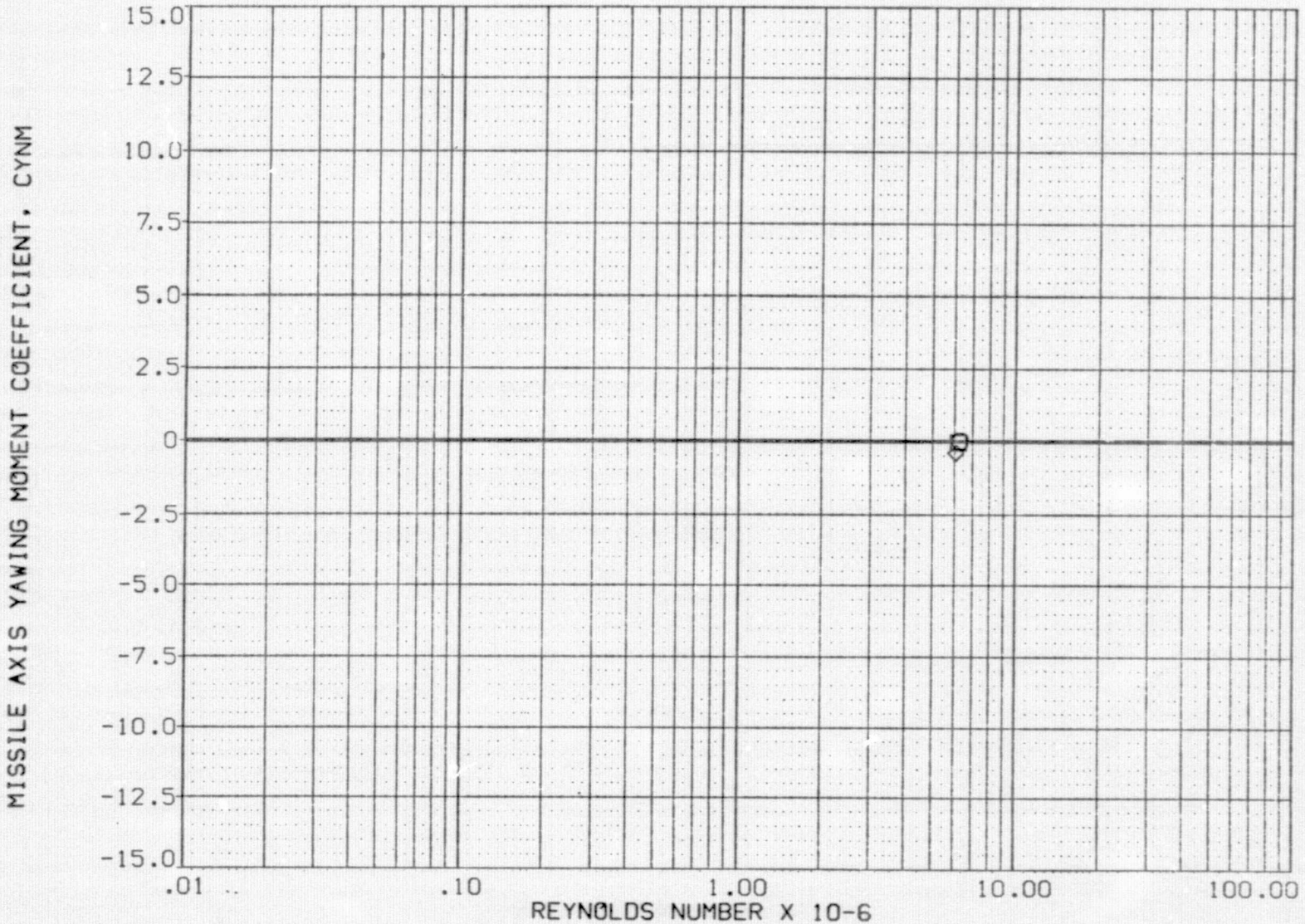


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(H)MACH = 1.17

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	○	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

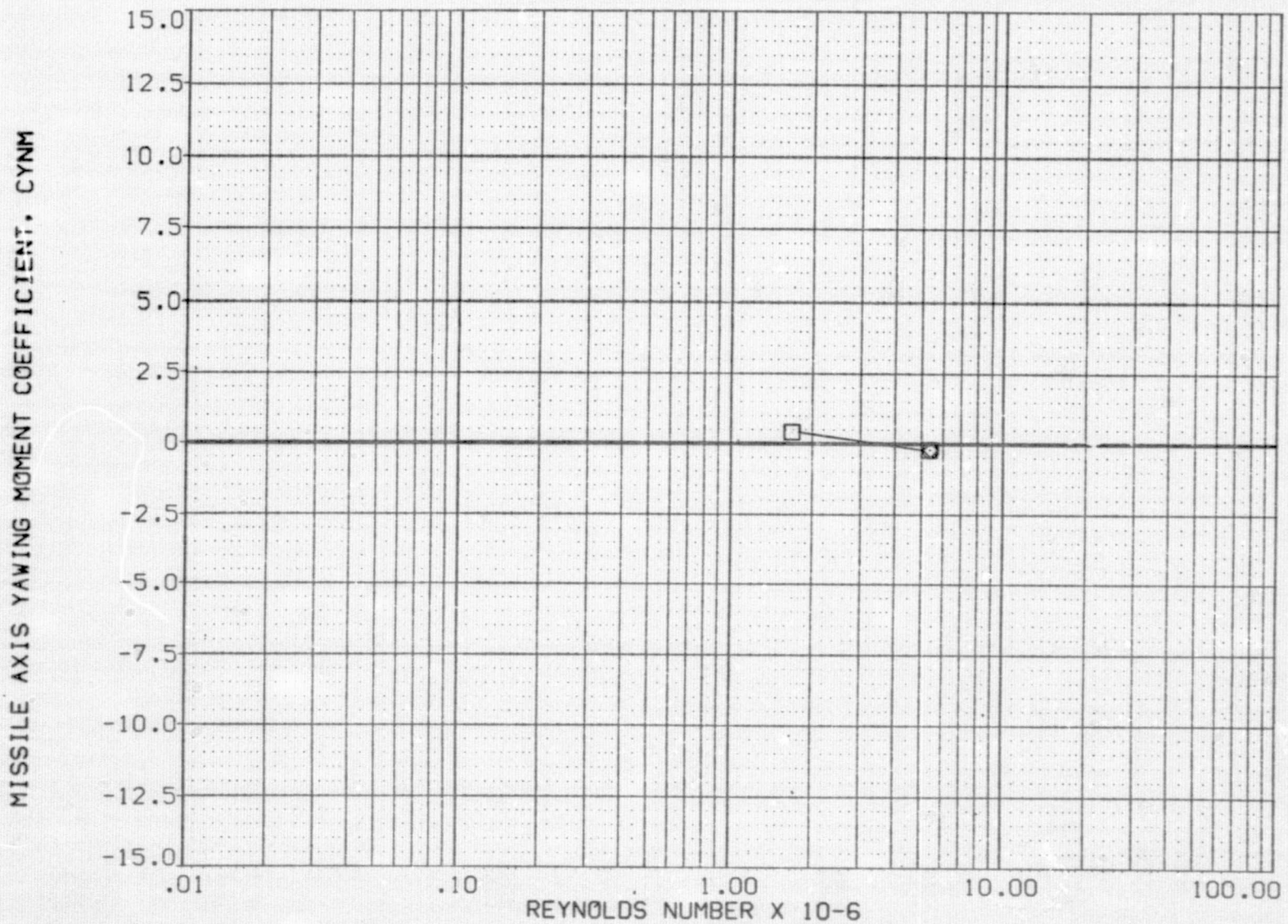


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(I)MACH = 1.42

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	⊡	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

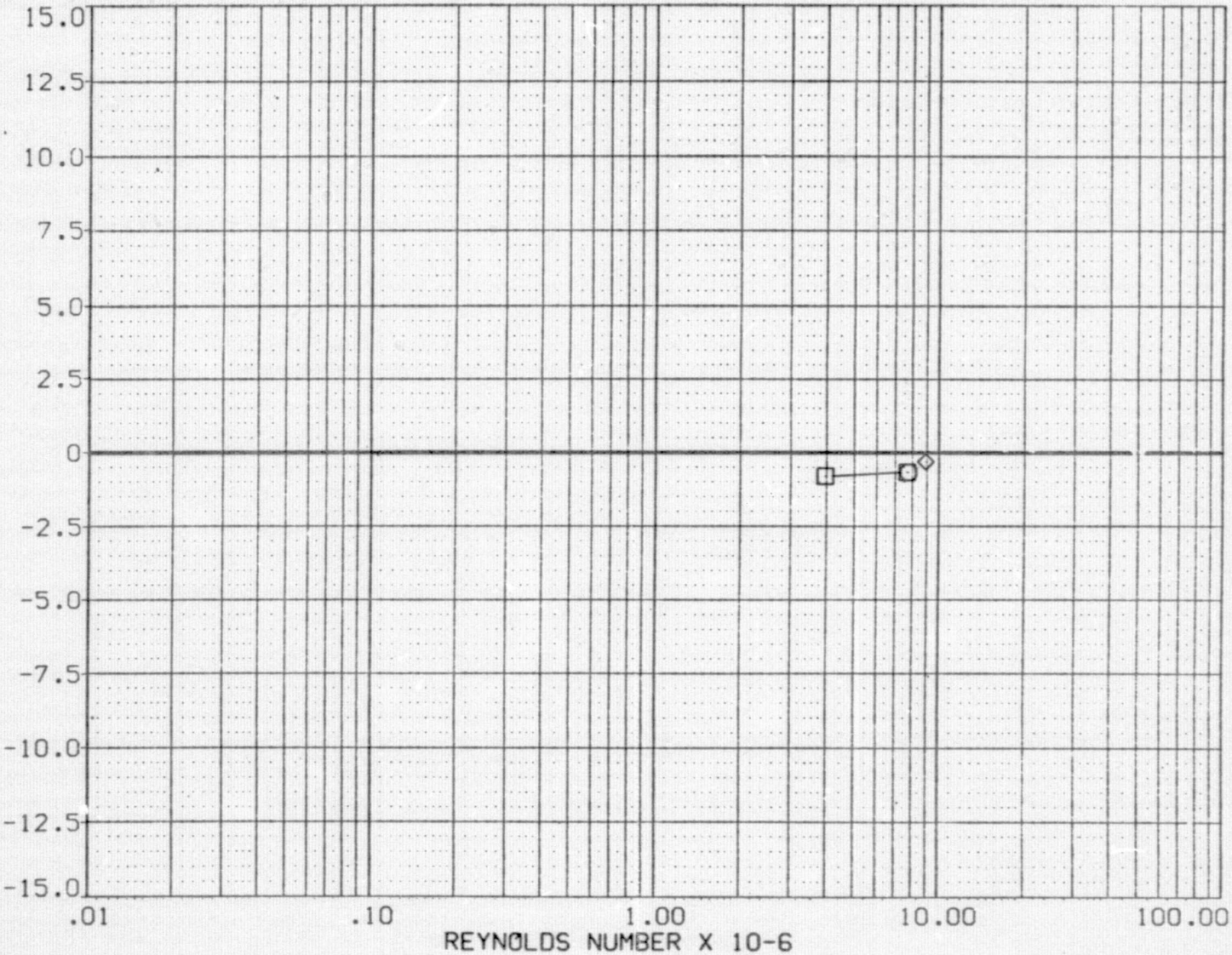


EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

(J)MACH = 2.00

DATA SET	SYMBOL	CONFIGURATION DESCRIPTION	ALPHA	BETA	PHI
(B1F087)	□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	125.000	.000	.000
(B1F094)	◇□	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	135.000	.000	.000
(B1F111)	◇	MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES	145.000	.000	.000

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



EFFECT OF REYNOLDS NUMBER ON AERODYNAMIC CHARACTERISTICS

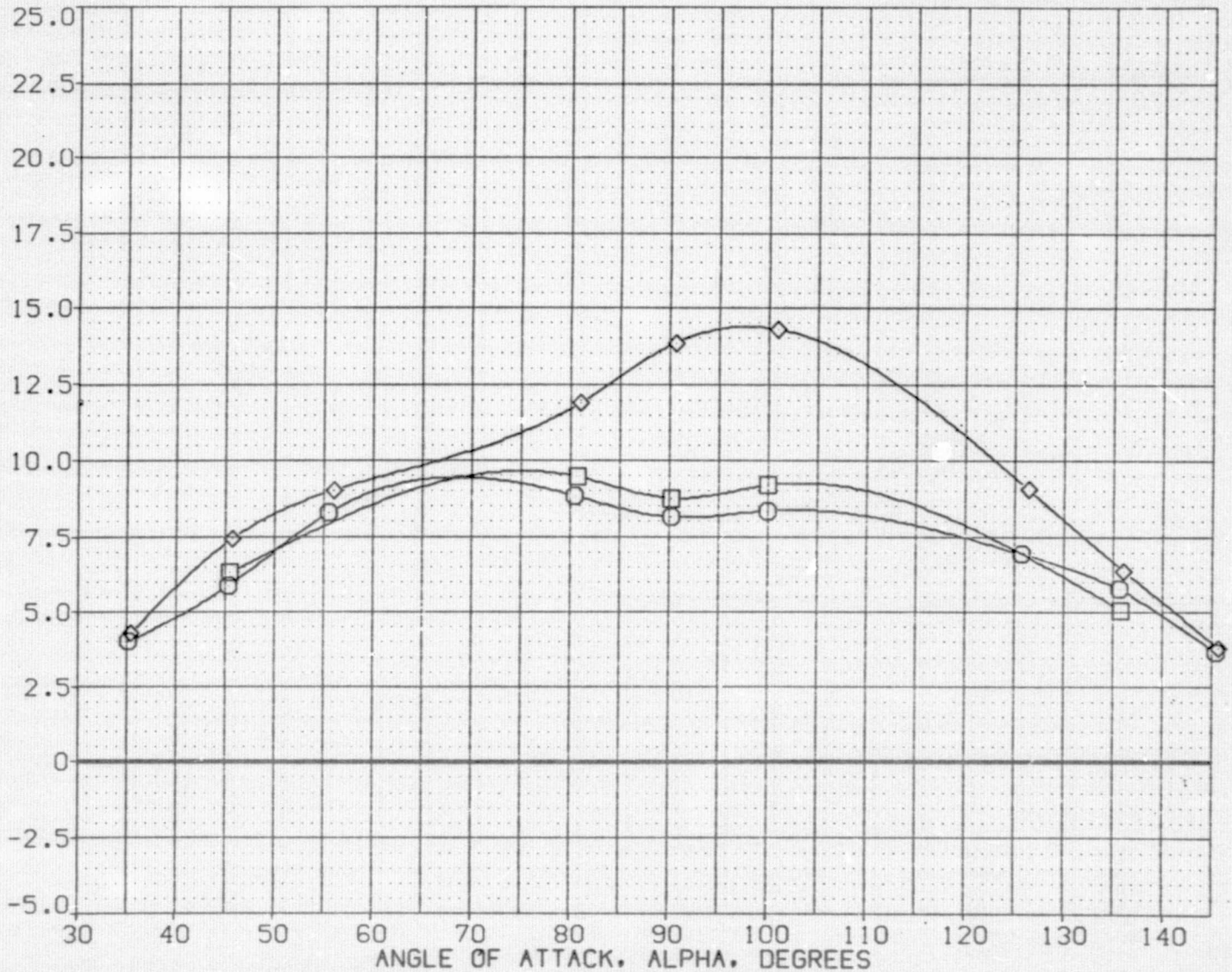
(K)MACH = 3.50

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH	PARAMETRIC VALUES			
○	.400	BETA	.000	PHI	.000
□	.500				
◇	.600				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



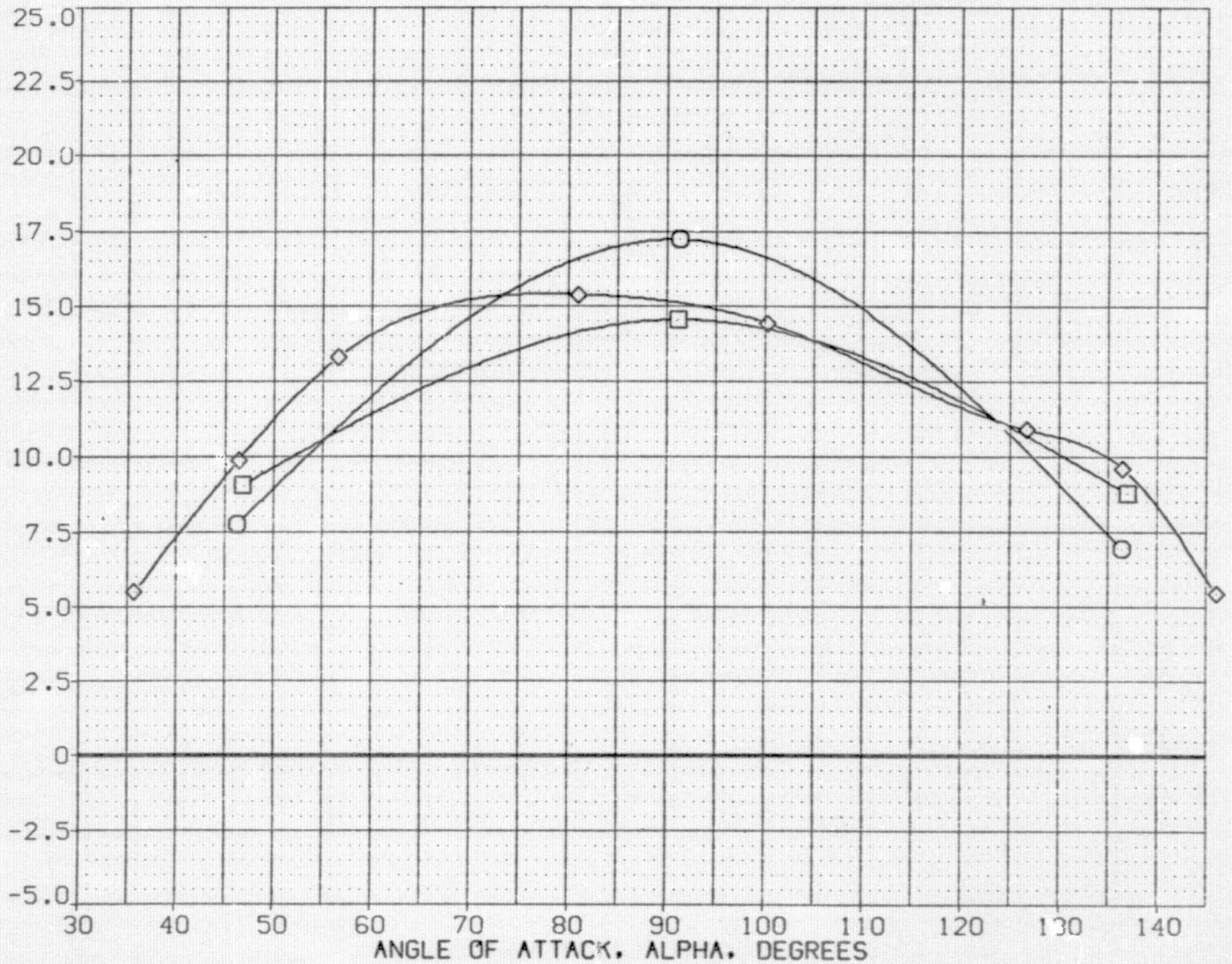
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH	PARAMETRIC VALUES			
○	.700	BETA	.000	PHI	.000
□	.810				
◇	.910				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH	PARAMETRIC VALUES			
○	.990	BETA	.000	PHI	.000
□	1.170				
◇	1.210				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	1.420	BETA	.000	PHI	.000
□	2.000				
◇	3.500				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

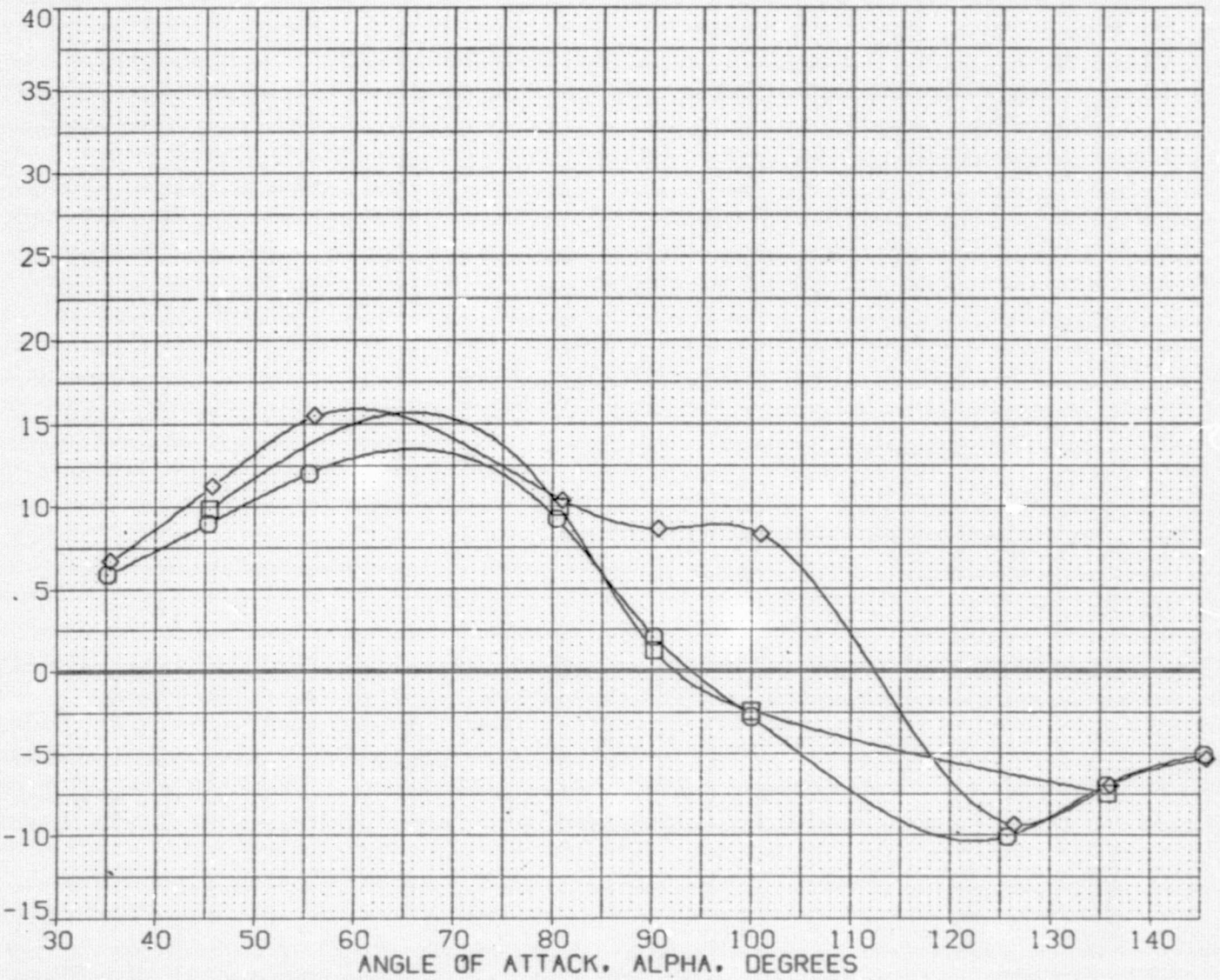
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (1F201)

SYMBOL	MACH.	PARAMETRIC VALUES			
○	.400	BETA	.000	PHI	.000
□	.500				
◇	.600				

REFERENCE INFORMATION

SREF	10.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



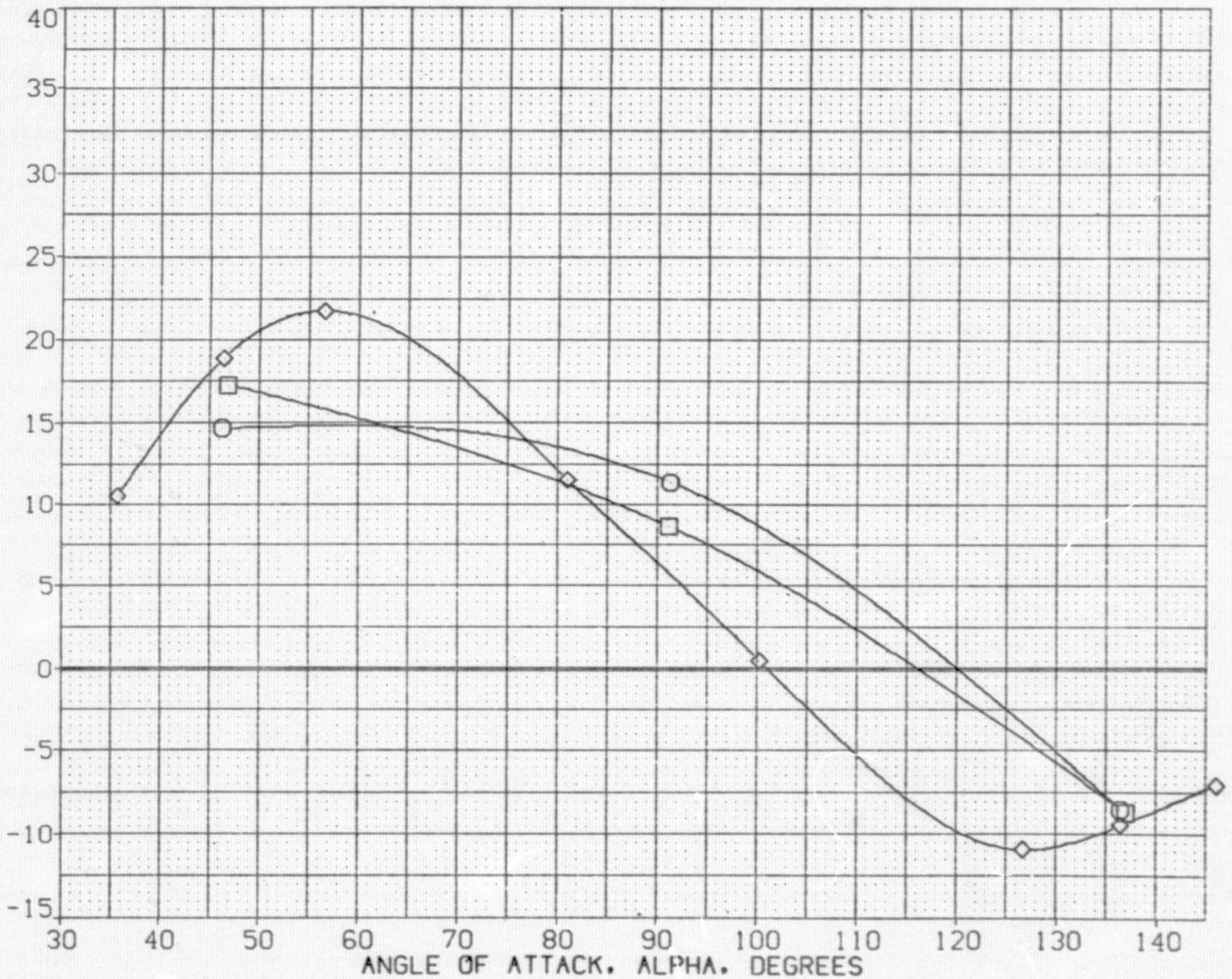
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.700	BETA	.000	PHI	.000
□	.810				
◇	.910				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



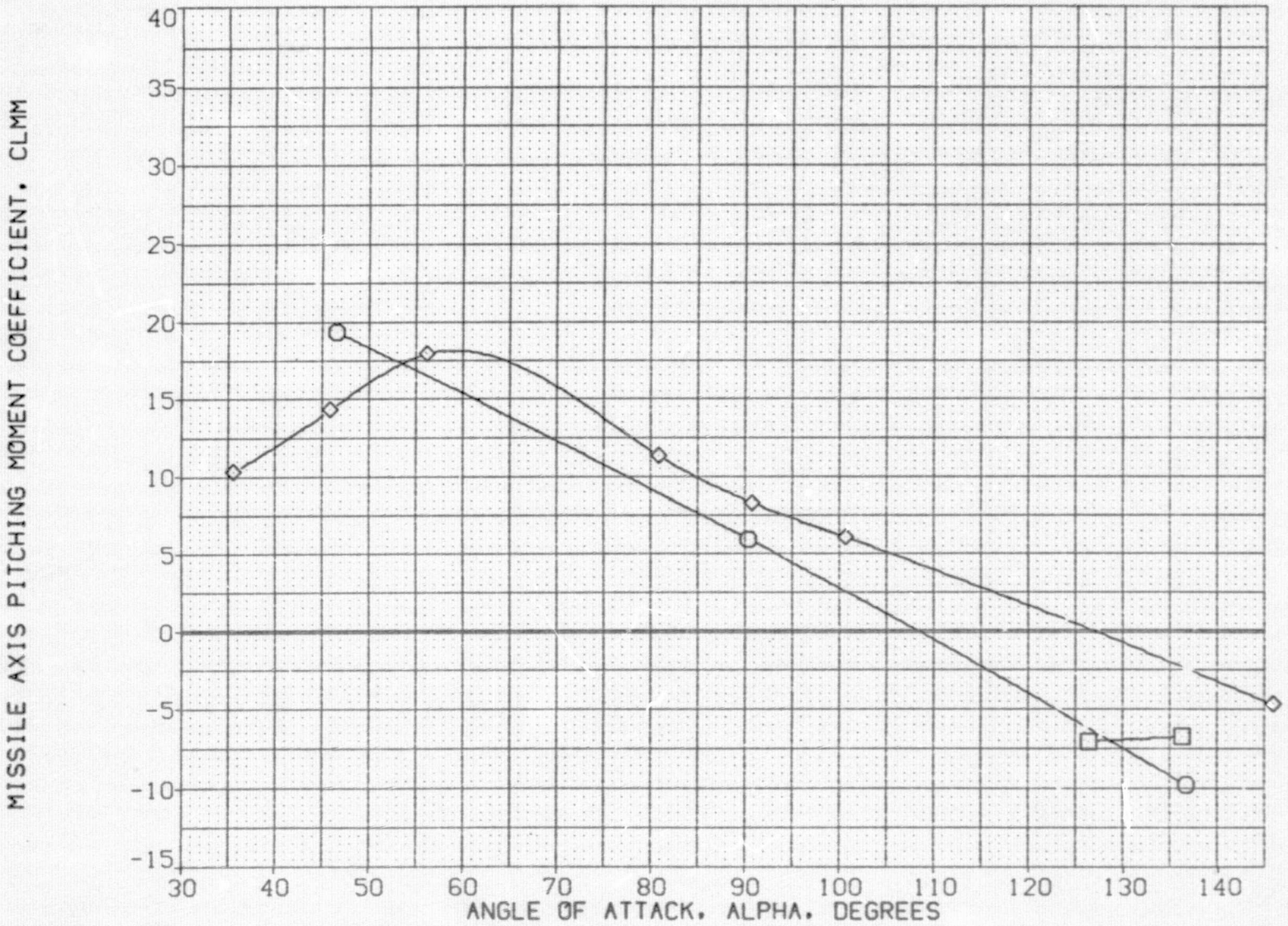
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.990	BETA	.000	PHI	.000
□	1.170				
◇	1.210				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



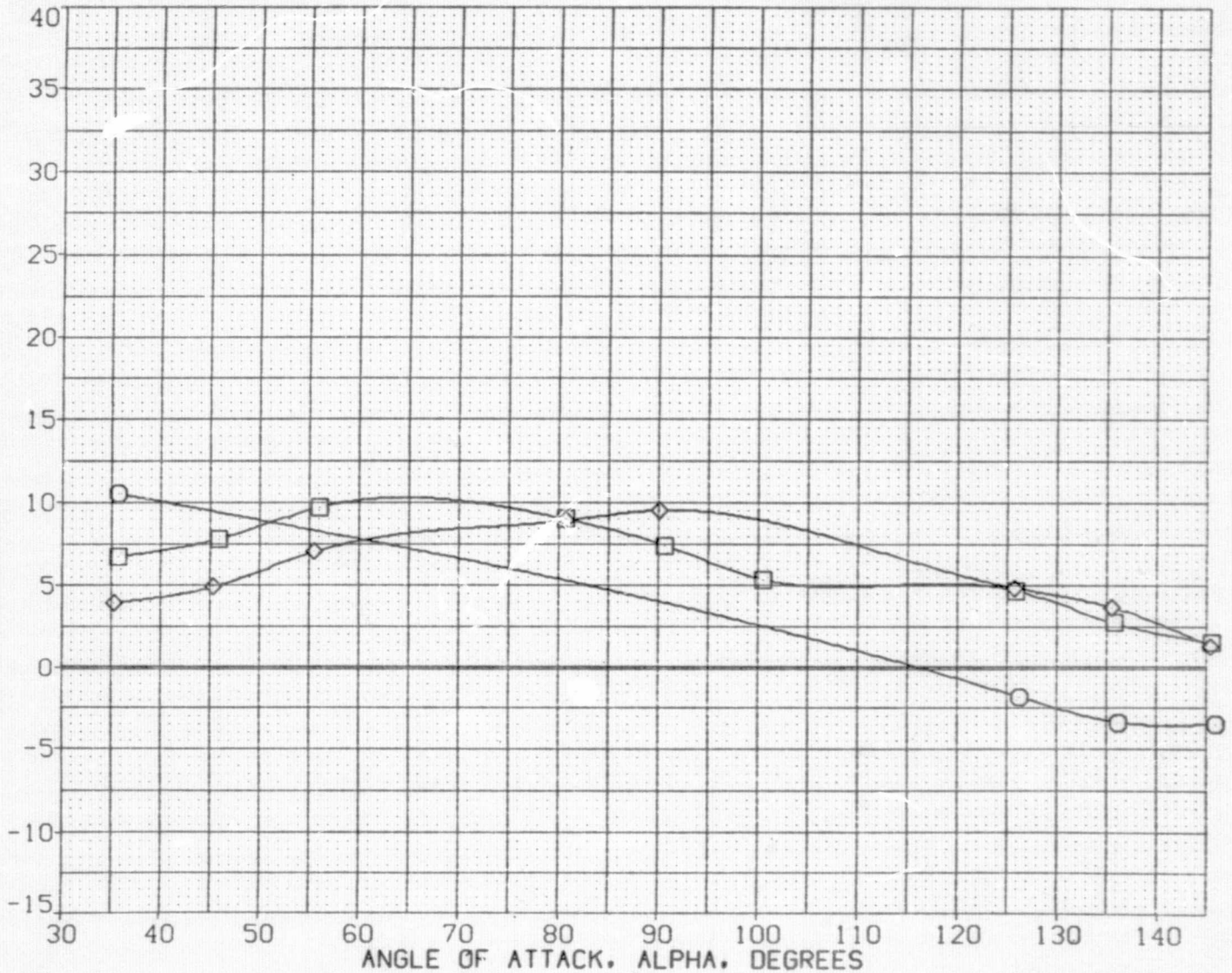
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH	PARAMETRIC VALUES			
○	1.420	BETA	.000	PHI	.000
□	2.000				
◇	3.500				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



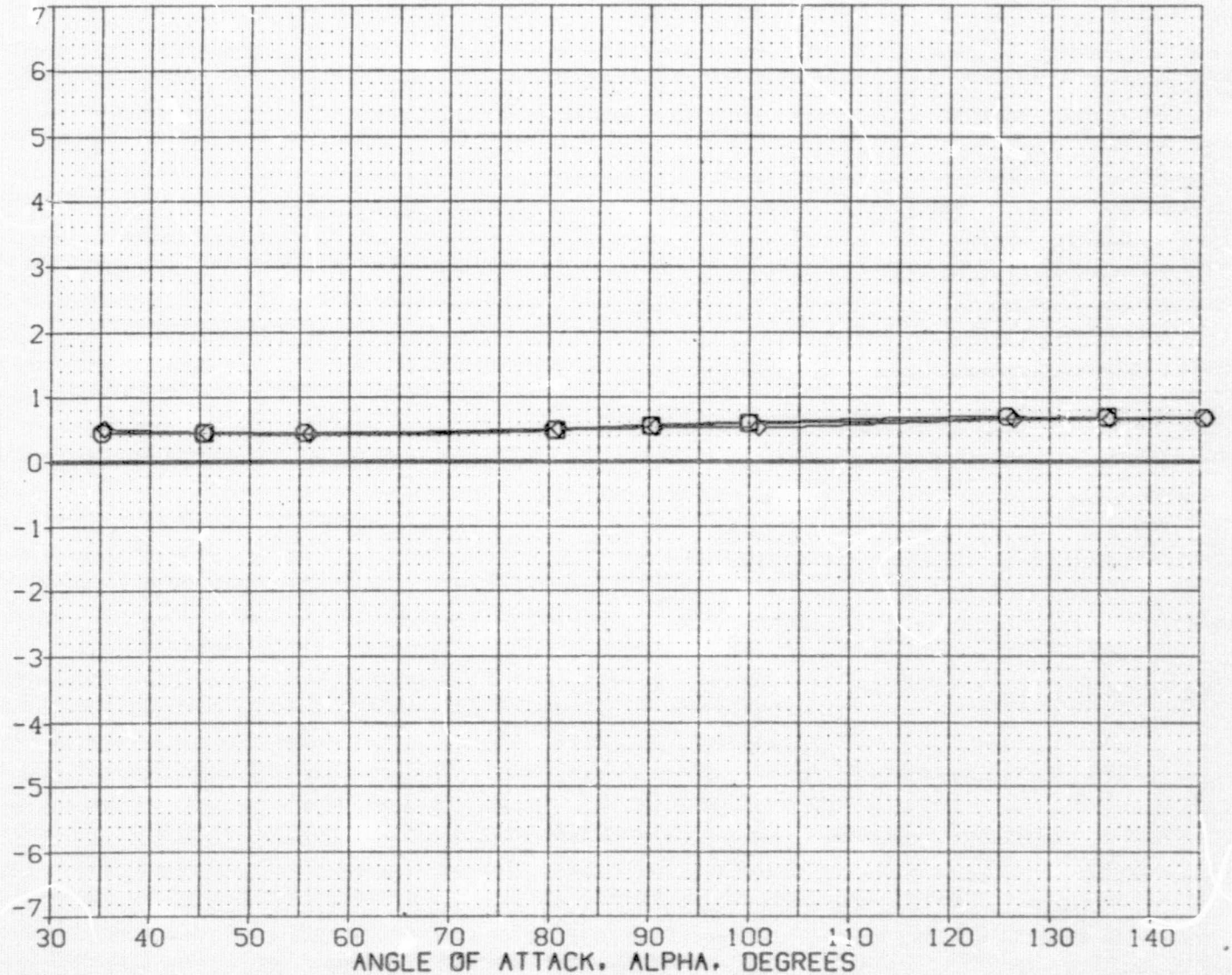
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.400	BETA	.000	PHI	.000
□	.500				
◇	.600				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



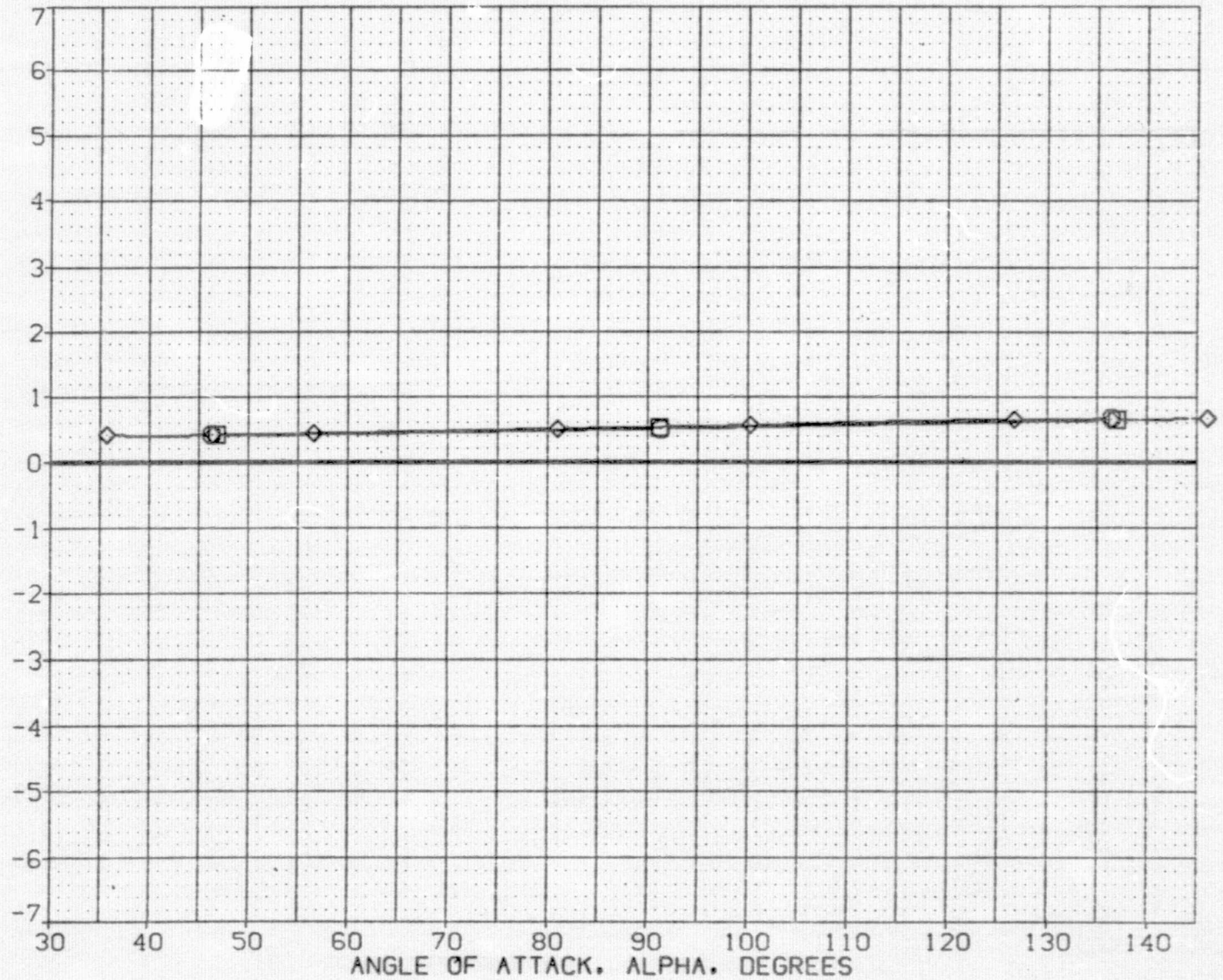
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.700	BETA	.000	PHI	.000
□	.810				
◇	.910				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



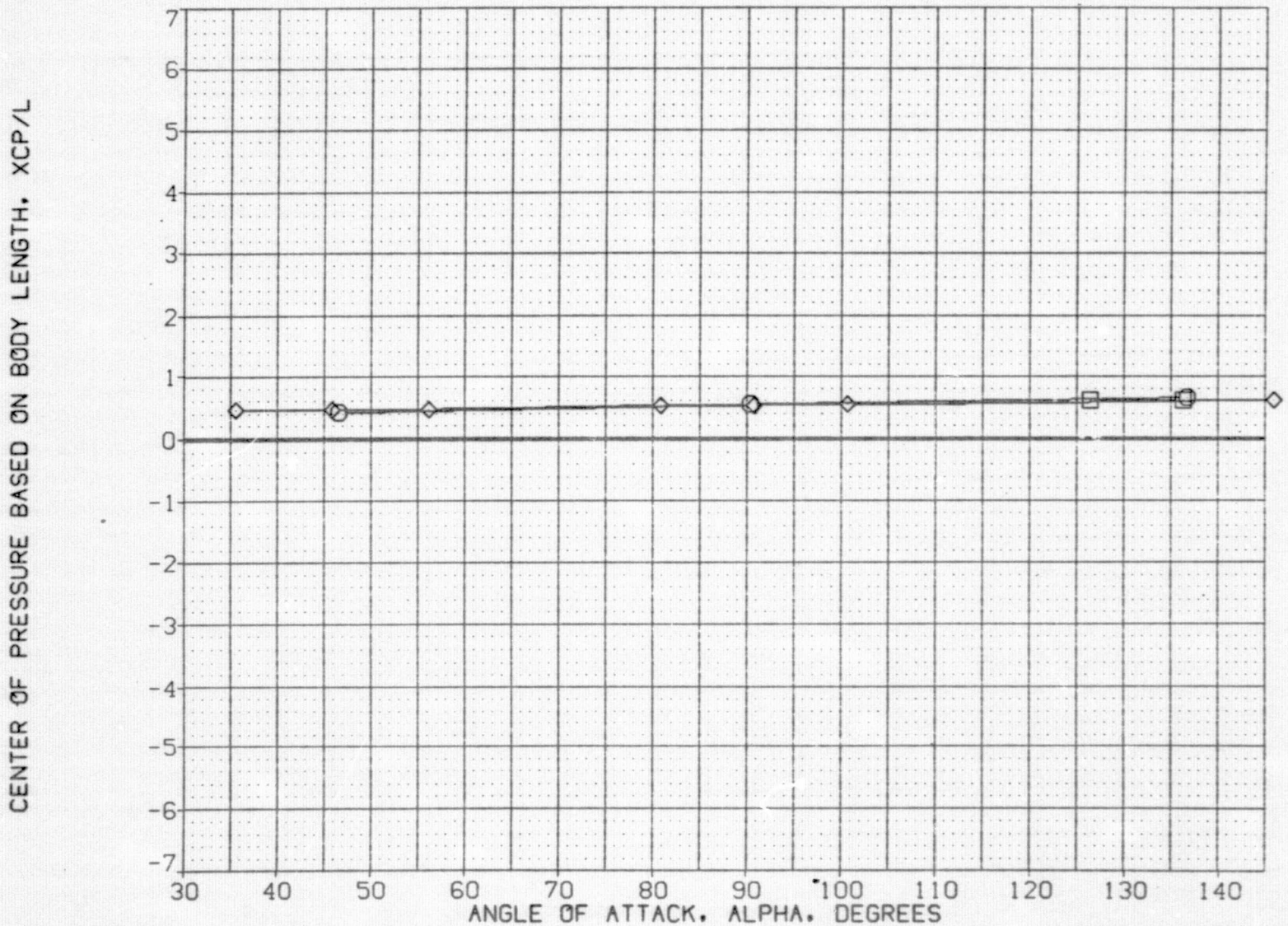
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.990	BETA	.000	PHI	.000
□	1.170				
◇	1.210				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



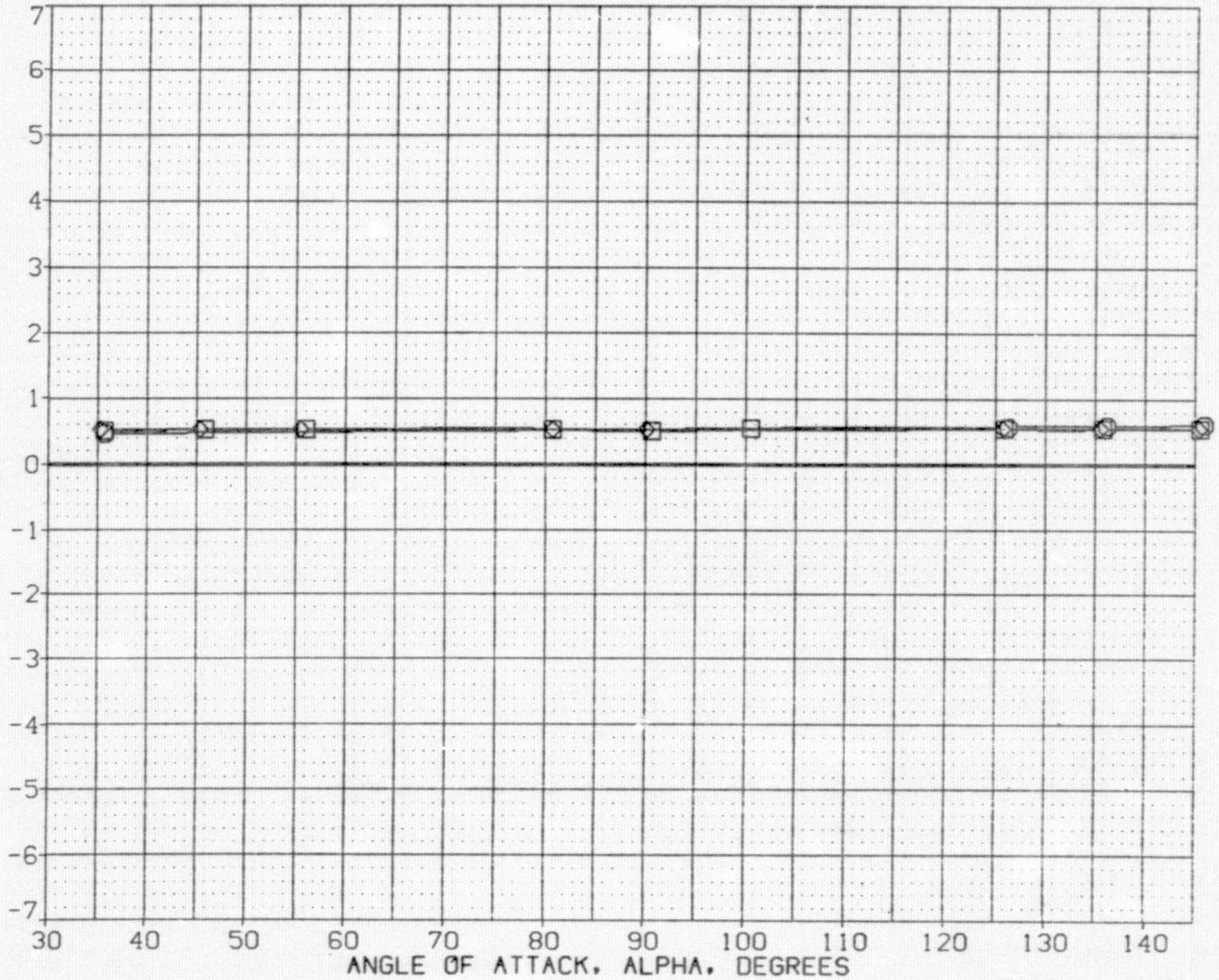
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	1.420	BETA	.000	PHI	.000
□	2.000				
◇	3.500				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



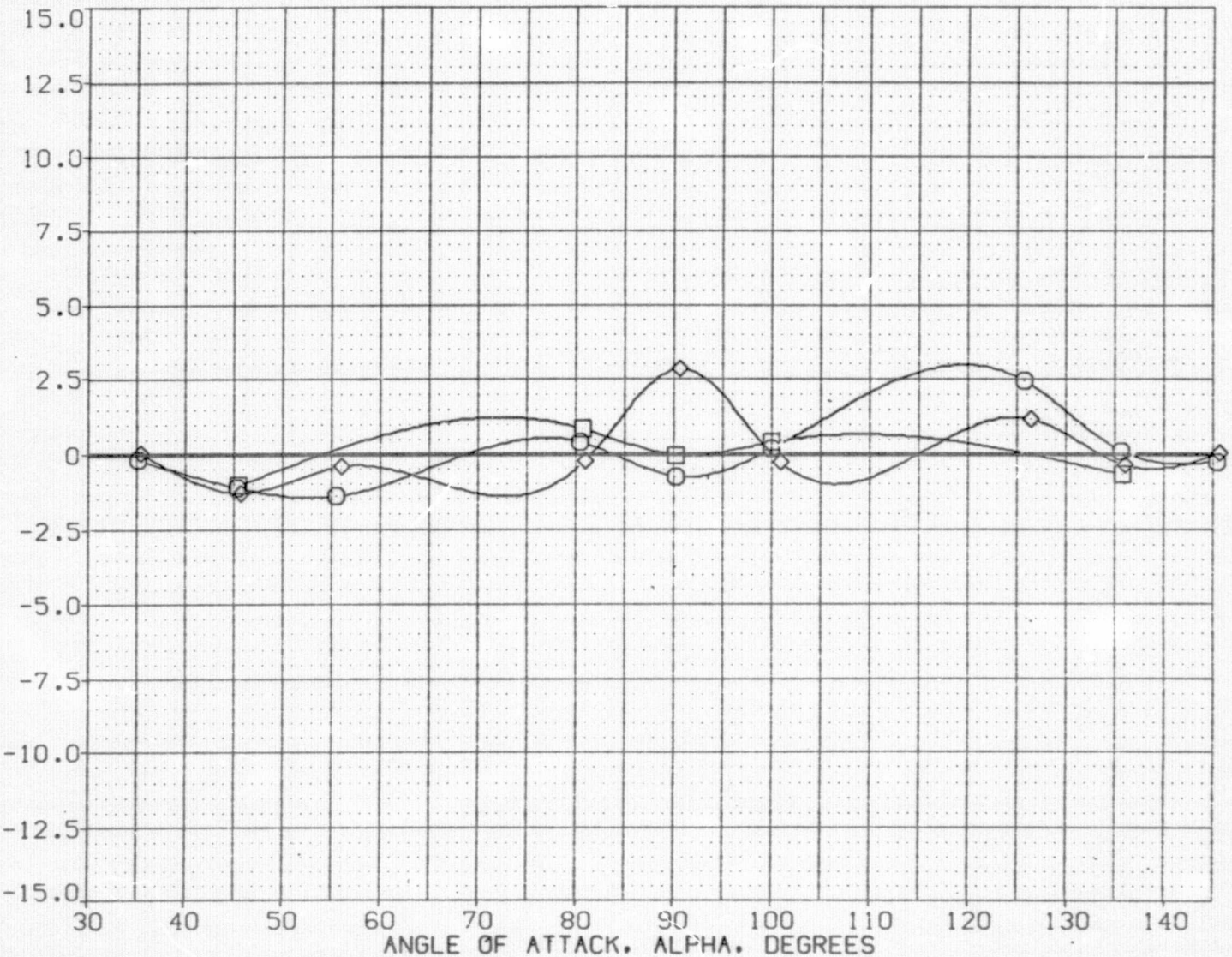
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.400	BETA	.000	PHI	.000
□	.500				
◇	.600				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



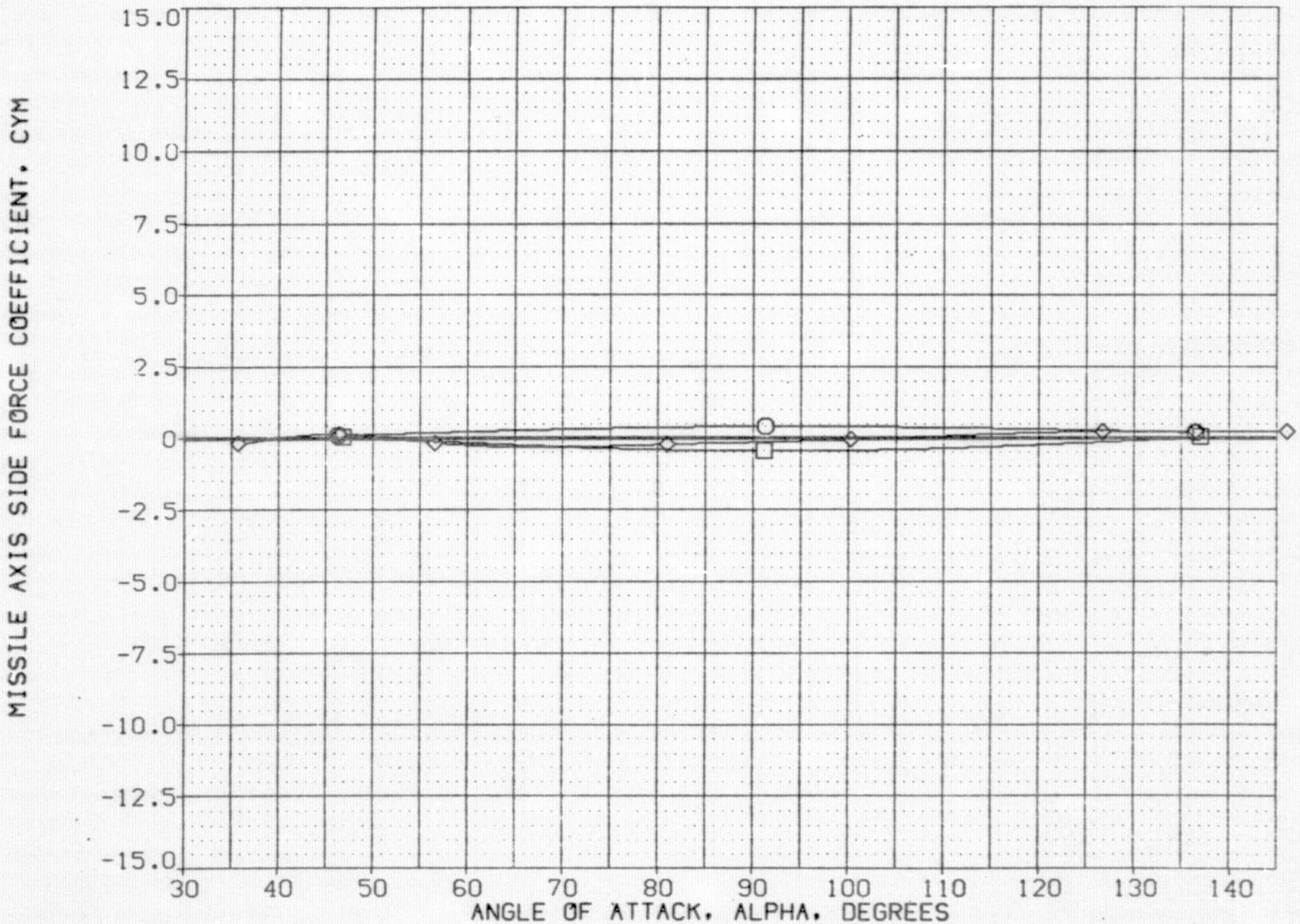
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.700	BETA	.000	PHI	.000
□	.810				
◇	.910				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



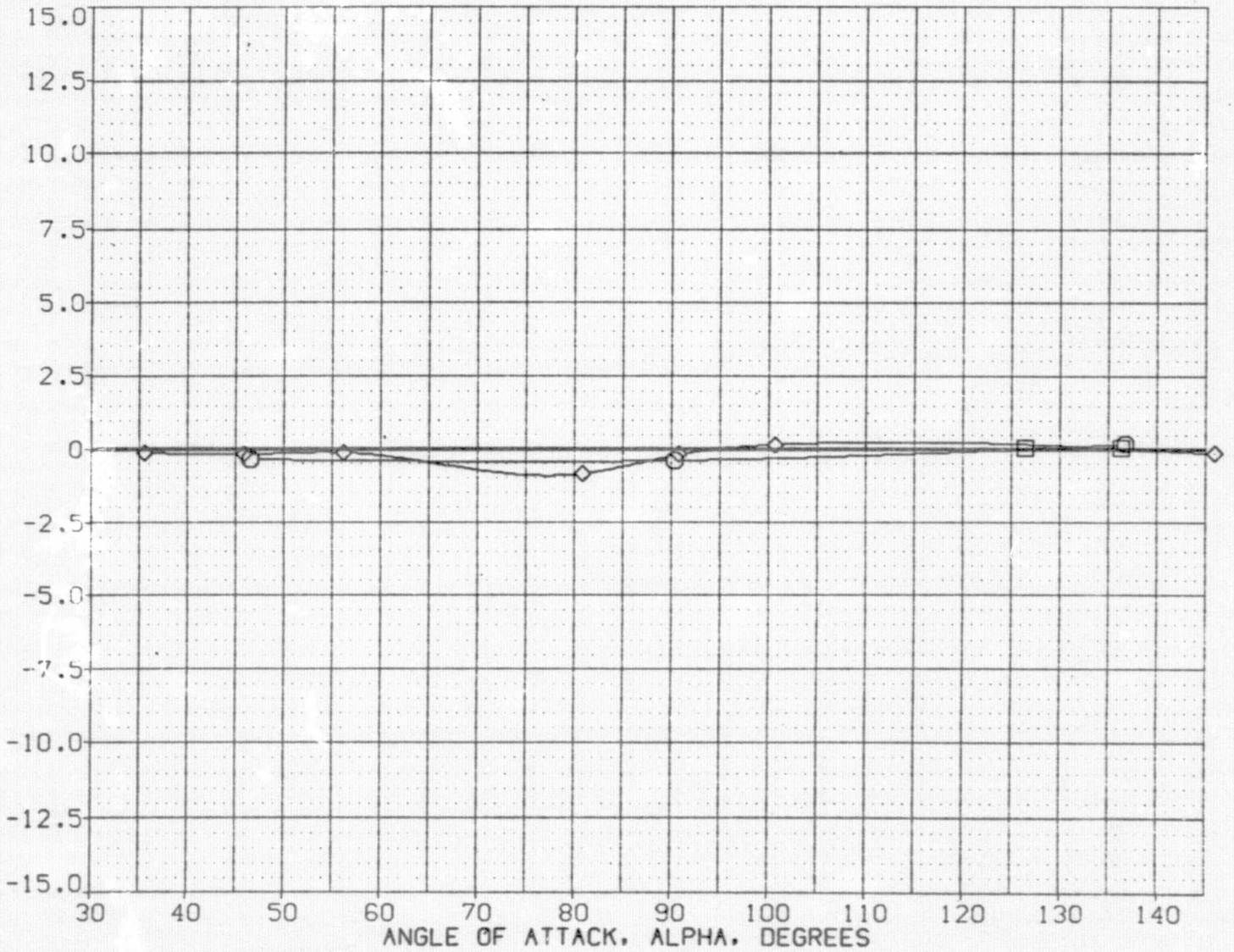
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.990	BETA	.000	PHI	.000
□	1.170				
◇	1.210				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



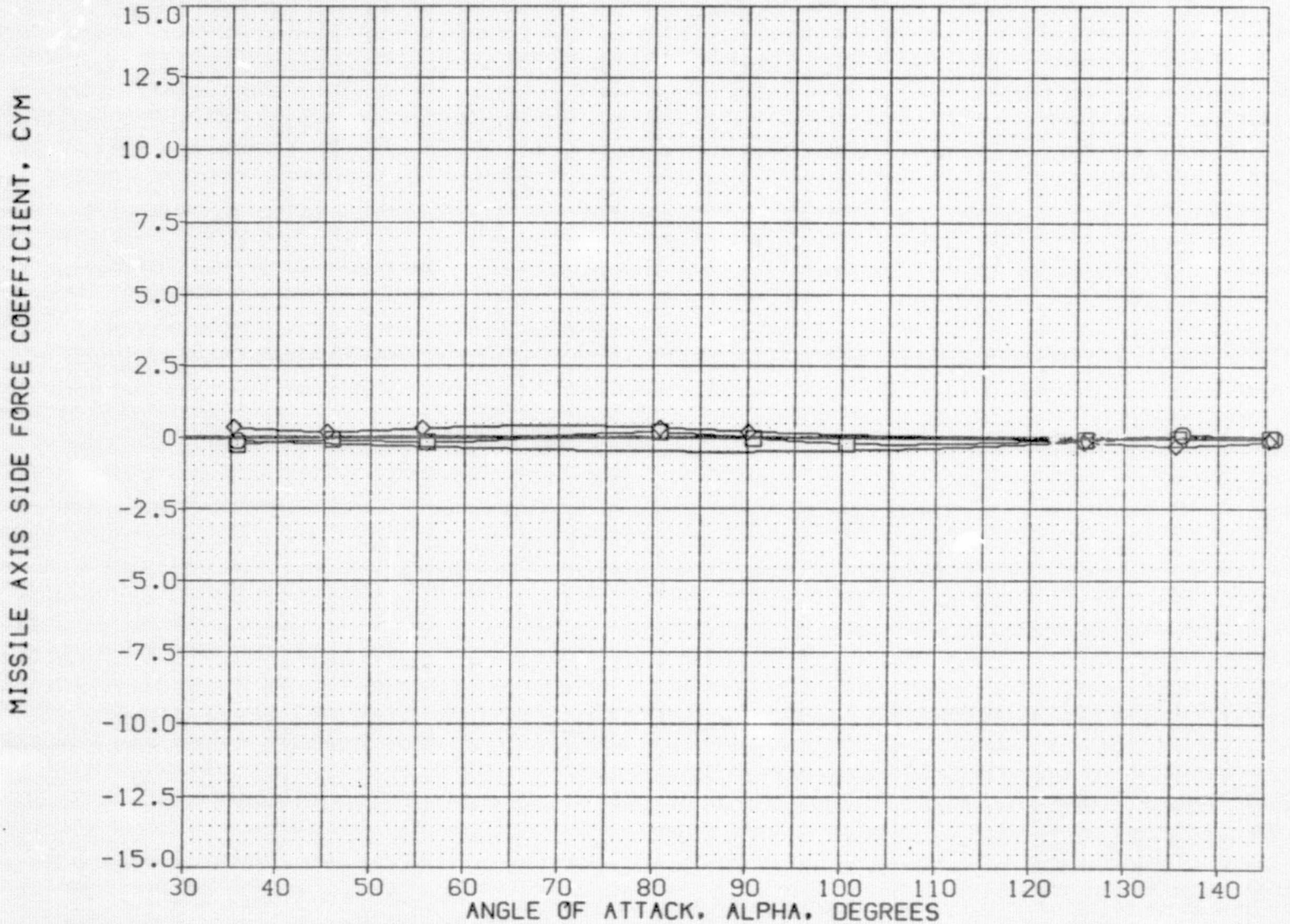
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	1.420	BETA	.000	PHI	.000
□	2.000				
◇	3.500				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	

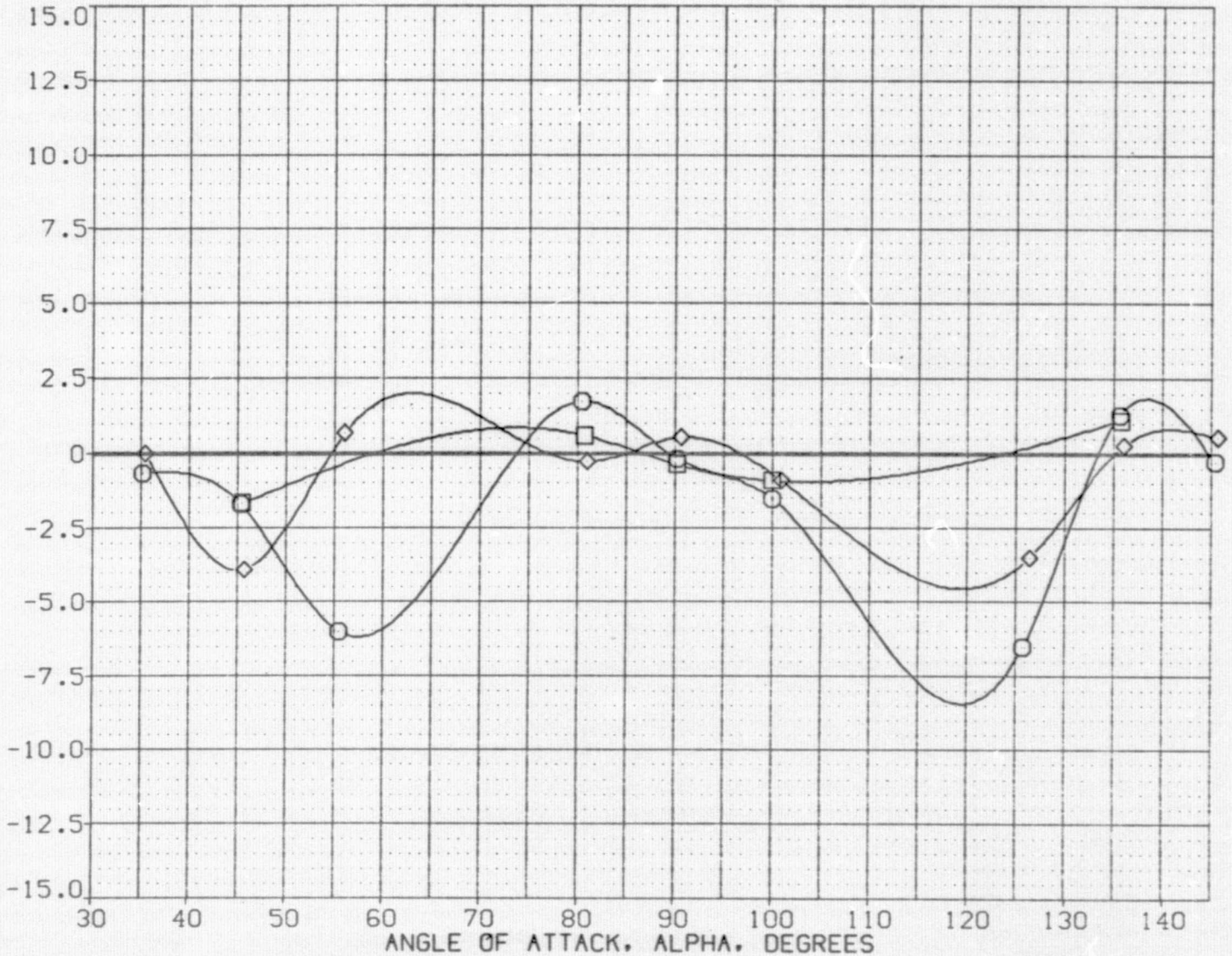


EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.400	BETA	.000	PHI	.000
□	.500				
◇	.600				

REFERENCE INFORMATION		
SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



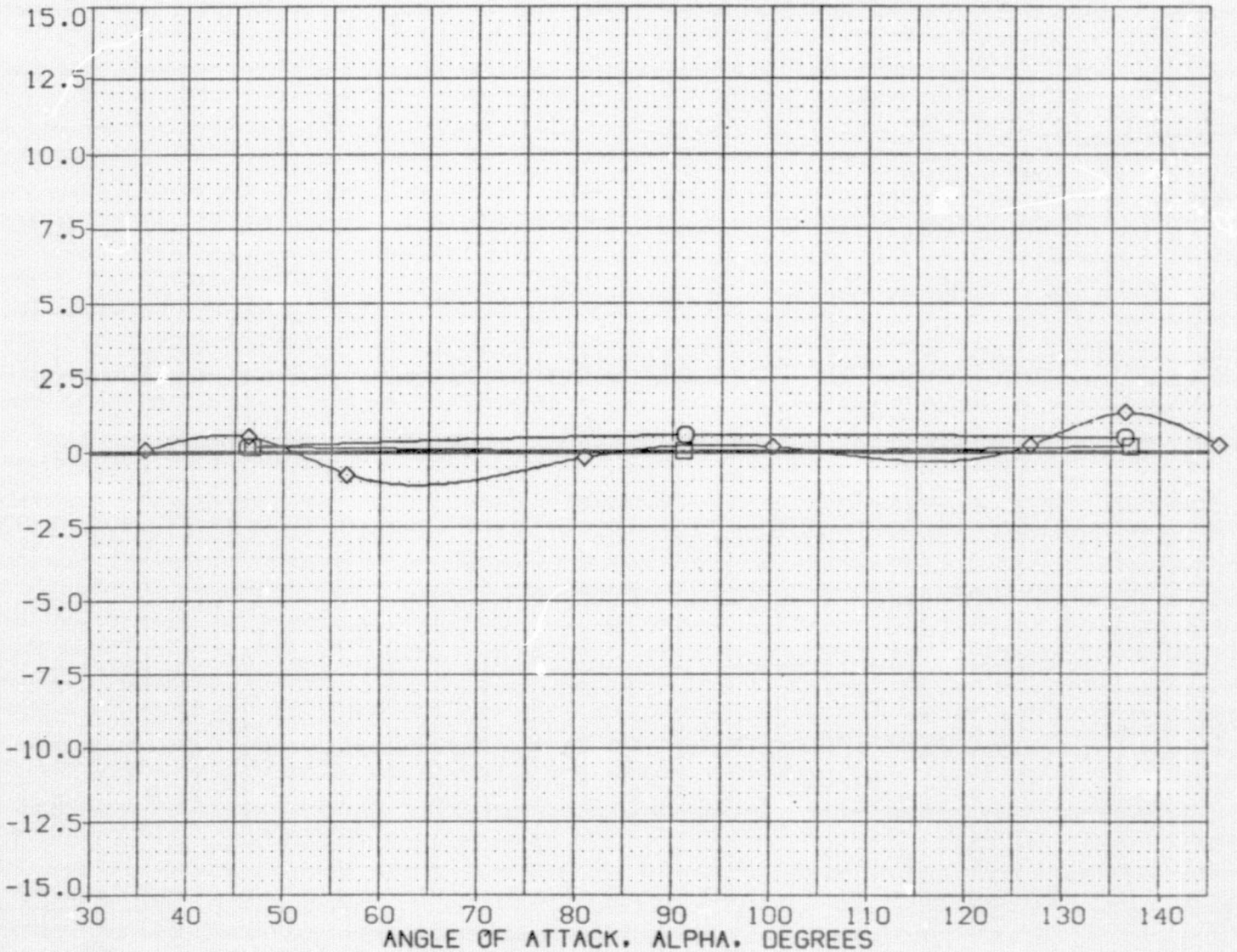
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH		PARAMETRIC VALUES		
○	.700	BETA	.000	PHI	.000
□	.810				
◇	.910				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



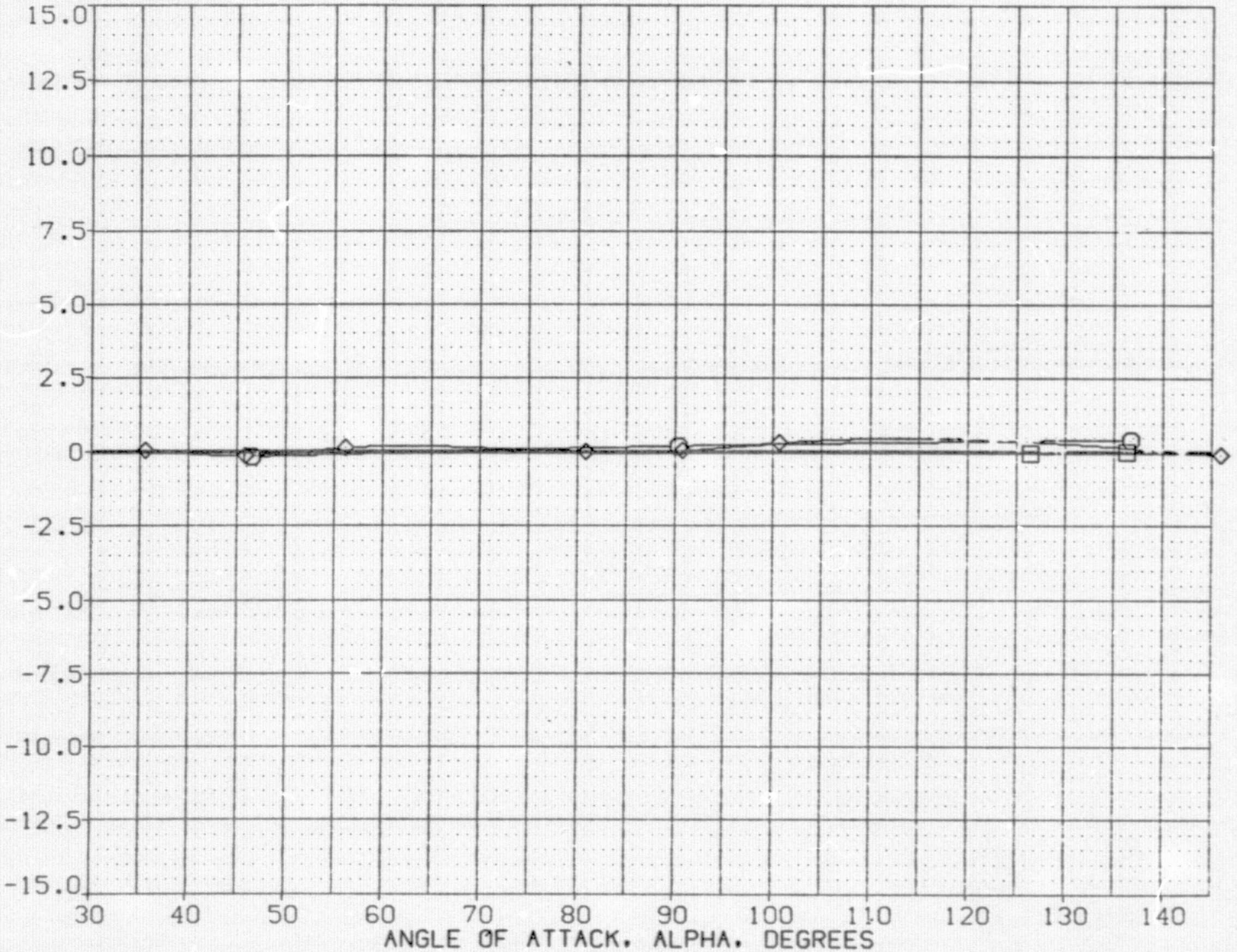
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH	PARAMETRIC VALUES			
○	.990	BETA	.000	PHI	.000
□	1.170				
◇	1.210				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



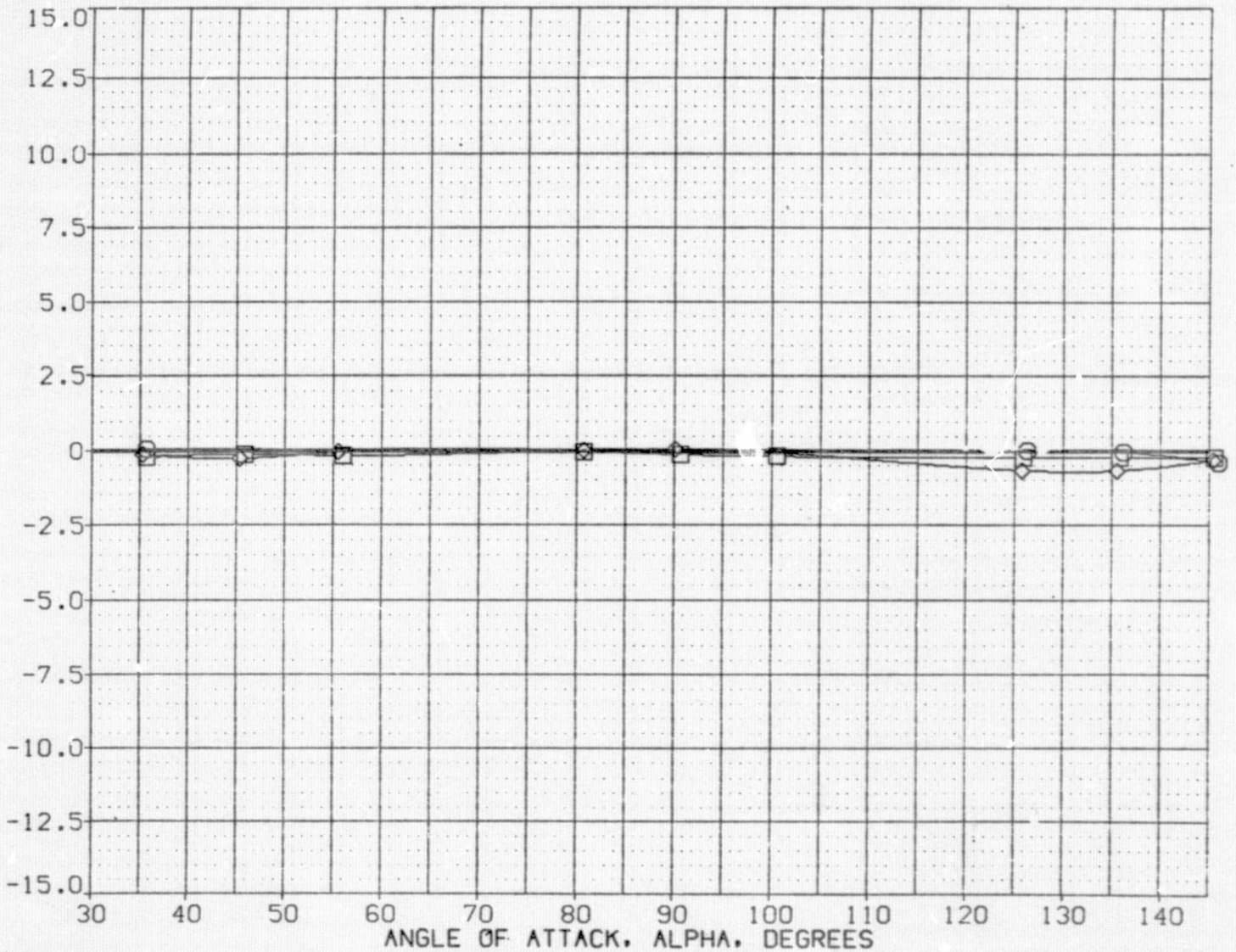
EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (A1F201)

SYMBOL	MACH	PARAMETRIC VALUES			
○	1.420	BETA	.000	PHI	.000
□	2.000				
◇	3.500				

REFERENCE INFORMATION

SREF	110.0000	SQ.FT.
LREF	142.0000	IN.
BREF	142.0000	IN.
XMRP	986.7050	IN.
YMRP	.0000	IN.
ZMRP	.0000	IN.
SCALE	.0088	



EFFECT OF ANGLE OF ATTACK ON AERODYNAMIC CHARACTERISTICS

APPENDIX

TABULATED SOURCE DATA

Tabulations of plotted data are available on request from Data Management Services.

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F001) (29 OCT 75)

REFERENCE DATA

SREF	=	110.0000 SQ.FT.	XMRP	=	986.7050 IN.	BETA	=	.000	ALPHA	=	35.000
LREF	=	142.0000 IN.	YMRP	=	.0000 IN.	PHI	=	.000	RN	=	5.300
BREF	=	142.0000 IN.	ZMRP	=	.0000 IN.						
SCALE	=	.0088									

PARAMETRIC DATA

RUN NO. 62/ 0 RN/L = 5.29 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	35.460	8.69000	6.51300	-.12700	-.13500	.50600	5.29000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F002) (29 OCT 75)

REFERENCE DATA

SREF	=	110.0000 SQ.FT.	XMRP	=	986.7050 IN.	BETA	=	.000	ALPHA	=	35.000
LREF	=	142.0000 IN.	YMRP	=	.0000 IN.	PHI	=	.000	RN	=	5.900
BREF	=	142.0000 IN.	ZMRP	=	.0000 IN.						
SCALE	=	.0088									

PARAMETRIC DATA

RUN NO. 147/ 0 RN/L = 5.89 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.420	35.730	8.17400	10.52900	-.13600	.06100	.46200	5.89000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F003) (29 OCT 75)

REFERENCE DATA

SREF	=	110.0000 SQ.FT.	XMRP	=	986.7050 IN.	BETA	=	.000	ALPHA	=	35.000
LREF	=	142.0000 IN.	YMRP	=	.0000 IN.	PHI	=	.000	RN	=	6.300
BREF	=	142.0000 IN.	ZMRP	=	.0000 IN.						
SCALE	=	.0088									

PARAMETRIC DATA

RUN NO. 146/ 0 RN/L = 6.28 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.210	35.680	7.65500	10.31600	-.13200	.06600	.45700	6.28000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F004) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 35.000
PHI = .000 RN = 7.900

RUN NO. 59/ 1 RN/L = 7.85 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	35.690	8.91800	6.73200	-.26400	-.22100	.50500	7.85000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 66/ 0 RN/L = 7.85 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	35.320	7.93400	3.95200	.34200	-.14900	.52600	7.85000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F005) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 35.000
PHI = .000 RN = 8.400

RUN NO. 143/ 1 RN/L = 8.44 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	35.240	3.99900	5.88800	-.19900	-.66000	.44200	8.44000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F006) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 35.000
PHI = .000 RN = 8.650

RUN NO. 145/ 0 RN/L = 8.61 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.910	35.790	5.50900	10.55100	-.20000	.09600	.41000	8.61000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F007) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 35.000
PHI = .000 RN = 10.200

RUN NO. 144/ 0 RN/L = 10.17 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	35.500	4.29100	6.69900	.03500	.01500	.50000	10.17000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F008) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 2.000

RUN NO. 73/ 0 RN/L = 1.95 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	45.090	6.07300	9.28100	.25400	-.85800	.44300	1.95000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F009) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 2.600

RUN NO. 74/ 0 RN/L = 2.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	45.180	7.14300	9.88100	-2.19400	-5.19900	.45400	2.58000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F010) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 3.000

RUN NO. 75/ 0 RN/L = 3.03 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.900	45.450	8.78800	16.68600	.10100	.68700	.41200	3.03000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F011) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 4.000

RUN NO. 64/ 0 RN/L = 3.97 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	45.210	11.49200	4.83800	.15400	-.52400	.53200	3.97000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F012) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 5.200

RUN NO. 78/ 0 RN/L = 5.18 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.390	45.230	6.17300	9.24100	-2.05500	-3.85300	.44500	5.18000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F013) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 5.300

RUN NO. 61/ 0 RN/L = 5.27 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	45.570	12.44100	7.60600	-.11600	-.08700	.51700	5.27000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F014) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 6.400

RUN NO. 76/ 0 RN/L = 6.37 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.200	45.960	12.06400	14.29700	-.18800	-.13400	.47000	6.37000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTURERANCES (R1F015) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	45.000
PHI =	.000	RN =	6.900

RUN NO. 79/ 0 RN/L = 6.90 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.590	45.520	7.51100	11.22500	-1.92300	-4.43800	.44500	6.90000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F016) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	45.000
PHI =	.000	RN =	7.600

RUN NO. 58/ 0 RN/L = 7.62 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	45.850	12.74700	7.80600	-.11100	-.12100	.51700	7.62000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F017) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	45.000
PHI =	.000	RN =	7.750

RUN NO. 65/ 0 RN/L = 7.76 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	45.410	11.40400	4.90400	.18600	-.27000	.53200	7.76000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F018) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 8.000

RUN NO. 80/ 0 RN/L = 8.04 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.920	46.410	9.88200	18.86400	.13900	.52500	.41100	8.04000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F019) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 8.200

RUN NO. 138/ 0 RN/L = 8.20 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	45.370	5.86800	8.95600	-1.11800	-1.71300	.44200	8.20000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F020) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 8.400

RUN NO. 81/ 0 RN/L = 8.42 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.990	46.550	10.40200	19.36400	-.36500	-.17400	.41500	8.42000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F021) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 9.500

RUN NO. 139/ 0 RN/L = 9.49 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	45.570	6.30800	9.84700	-1.05100	-1.68400	.43900	9.49000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F022) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 11.000

RUN NO. 140/ 0 RN/L = 10.97 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	45.840	7.45100	11.25600	-1.29900	-3.90400	.44300	10.97000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F023) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 11.200

RUN NO. 141/ 1 RN/L = 11.16 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.700	46.320	7.75200	14.65300	.08600	.18400	.41200	11.16000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRP WITHOUT PROTUBERANCES (R1F024) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 45.000
PHI = .000 RN = 12.200

RUN NO. 142/ 1 RN/L = 12.22 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.810	46.830	9.03600	17.23800	.04800	.19200	.41100	12.22000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F025) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 55.000
PHI = .000 RN = 5.300

RUN NO. 63/ 0 RN/L = 5.28 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	55.710	15.76400	9.45100	-.40100	-.22300	.51800	5.28000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F026) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 55.000
PHI = .000 RN = 6.200

RUN NO. 71/ 0 RN/L = 6.23 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.230	56.220	15.26900	17.91600	-.12600	.11800	.47100	6.23000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F027) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 55.000
PHI = .000 RN = 7.700

RUN NO. 60/ 0 RN/L = 7.70 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	56.050	15.92200	9.69700	-.19600	-.17400	.51700	7.70000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 67/ 0 RN/L = 7.67 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	55.570	14.36200	7.02100	.29700	-.04900	.52700	7.67000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F028) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 55.000
PHI = .000 RN = 7.850

RUN NO. 68/ 0 RN/L = 7.85 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	55.510	8.28500	12.02200	-1.41100	-6.01500	.44900	7.85000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F029) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.			BETA =	.000	ALPHA =	55.000
LREF =	142.0000 IN.	YMRP =	.0000 IN.			PHI =	.000	RN =	8.650
BREF =	142.0000 IN.	ZMRP =	.0000 IN.						
SCALE =	.0088								

PARAMETRIC DATA

RUN NO. 70/ 1 RN/L = 8.65 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.910	56.660	13.28800	21.75500	-.16800	-.74600	.43300	8.65000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F030) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.			BETA =	.000	ALPHA =	55.000
LREF =	142.0000 IN.	YMRP =	.0000 IN.			PHI =	.000	RN =	10.400
BREF =	142.0000 IN.	ZMRP =	.0000 IN.						
SCALE =	.0088								

PARAMETRIC DATA

RUN NO. 69/ 2 RN/L = 10.38 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	56.140	9.03100	15.42800	-.40900	.67300	.42700	10.38000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F031) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.			BETA =	.000	ALPHA =	80.000
LREF =	142.0000 IN.	YMRP =	.0000 IN.			PHI =	.000	RN =	5.450
BREF =	142.0000 IN.	ZMRP =	.0000 IN.						
SCALE =	.0088								

PARAMETRIC DATA

RUN NO. 37/ 0 RN/L = 5.44 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	80.740	20.19800	8.99900	.15800	-.03800	.53000	5.44000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F032) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 996.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 80.000
PHI = .000 RN = 5.900

RUN NO. 26/ 0 RN/L = 5.94 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.200	80.910	21.29700	11.30900	-.85500	-.02200	.52300	5.94000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F033) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 80.000
PHI = .000 RN = 7.400

RUN NO. 47/ 0 RN/L = 7.42 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	80.730	18.91000	8.92700	.32900	.02100	.52800	7.42000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F034) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 80.000
PHI = .000 RN = 8.100

RUN NO. 25/ 0 RN/L = 8.11 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.910	81.020	15.37200	11.51000	-.23200	-.18500	.50600	8.11000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F035) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 80.000
PHI = .000 RN = 10.200

RUN NO. 22/ 0 RN/L = 10.20 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	80.490	8.82900	9.19300	.39900	1.72000	.48100	10.20000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F036) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 80.000
PHI = .000 RN = 11.600

RUN NO. 23/ 0 RN/L = 11.62 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.490	80.730	9.45900	9.91700	.84900	.58200	.48100	11.62000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F037) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 80.000
PHI = .000 RN = 13.500

RUN NO. 24/ 1 RN/L = 13.50 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.610	81.040	11.90800	10.34800	-.20700	-.28500	.49600	13.50000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F038) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = .750

RUN NO. 83/ 2 RN/L = .73 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.390	90.020	8.04800	3.67000	-5.49000	-.52800	.52900	.73000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F039) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = .850

RUN NO. 84/ 1 RN/L = .86 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.510	90.030	11.03200	4.39300	-2.77300	.64800	.53400	.86000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F040) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.100

RUN NO. 85/ 1 RN/L = 1.10 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.620	90.090	17.21200	9.44800	-2.21800	.05900	.52200	1.10000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 87/ 0 RN/L = 1.09 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.790	90.080	15.86100	6.06500	-.75400	.81200	.53500	1.09000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F041) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.120

RUN NO. 129/ 0 RN/L = 1.14 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.410	90.020	7.93500	1.96800	-5.55000	-.49800	.54600	1.14000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 128/ 0 RN/L = 1.12 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.590	90.090	16.82100	9.90300	1.54200	1.02000	.51900	1.12000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F042) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.200

RUN NO. 132/ 0 RN/L = 1.22 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	90.030	8.93300	2.71500	5.14400	5.65500	.54200	1.22000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F043) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.350

RUN NO. 91/ 0 RN/L = 1.37 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	90.020	7.96700	1.46400	1.88600	.61500	.55200	1.37000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 207/ 0 RN/L = 1.29 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.710	90.120	17.95700	9.84400	-1.90000	-.39800	.52200	1.29000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 204/ 1 RN/L = 1.32 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.810	90.120	16.54700	9.04500	-1.23000	-1.65000	.52200	1.32000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F044) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.450

RUN NO. 121/ 0 RN/L = 1.47 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	90.090	13.12900	7.61800	3.56200	1.60400	.51900	1.47000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 90/ 1 RN/L = 1.46 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.230	90.190	21.88600	7.83400	.92000	1.01100	.53700	1.46000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F045) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.550

RUN NO. 92/ 0 RN/L = 1.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	90.030	8.00700	1.41200	2.87800	2.55600	.55200	1.58000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F046) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.600

RUN NO. 94/ 0 RN/L = 1.61 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.710	90.170	18.33700	10.58400	-1.01800	.45800	.52000	1.61000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 32/ 0 RN/L = 1.59 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	90.210	20.68000	7.48000	.02700	.22800	.53700	1.59000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF047) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.700

RUN NO. 95/ 0 RN/L = 1.68 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.810	90.140	16.06200	6.98600	-1.41500	.37600	.53100	1.68000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF048) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 1.960

RUN NO. 93/ 0 RN/L = 1.85 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	90.110	12.54600	6.50400	-2.04600	-.62900	.52400	1.85000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF049) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.000

RUN NO. 130/ 0 RN/L = 2.00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	90.040	7.68800	2.59300	-4.36000	-1.54400	.53900	2.00000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF050) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.100

RUN NO. 127/ 0 RN/L = 2.09 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.800	90.150	15.51000	5.83000	-1.27100	.16400	.53600	2.09000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF051) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.300

RUN NO. 122/ 0 RN/L = 2.30 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.700	90.230	17.25500	10.03800	3.94700	2.81300	.51900	2.30000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF052) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.450

RUN NO. 3/ 1 RN/L = 2.42 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.610	90.110	11.65800	4.34800	-.40900	1.02800	.53600	2.42000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F053) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.600

RUN NO. 47 2 RN/L = 2.58 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.690	90.270	16.90300	10.92200	-.27500	1.08600	.51400	2.58000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F054) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.800

RUN NO. 124/ 0 RN/L = 2.82 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.210	90.360	21.86900	8.13000	2.72100	1.68700	.53600	2.82000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F055) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 2.900

RUN NO. 33/ 0 RN/L = 2.92 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	90.360	20.58800	7.64400	-.13300	-.09800	.53600	2.92000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 34/ 0 RN/L = 2.94 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	90.050	20.01500	9.84400	.42600	.21400	.52700	2.94000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F056) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 3.100

RUN NO. 99/ 1 RN/L = 3.13 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.410	90.060	8.15500	2.21500	2.74500	2.42300	.54500	3.13000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 120/ 0 RN/L = 3.06 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.610	90.110	11.09600	2.83700	2.45500	-.60800	.54600	3.06000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F057) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 3.500

RUN NO. 100/ 0 RN/L = 3.48 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.510	90.070	8.68000	1.39200	-.66000	1.02700	.55400	3.48000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F058) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 3.600

RUN NO. 102/ 0 RN/L = 3.66 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.710	90.410	16.77600	12.09600	1.38400	1.03800	.50800	3.66000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 105/ 0 RN/L = 3.57 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.010	90.330	16.76400	5.93700	-.40400	.19400	.53800	3.57000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F059) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 3.900

RUN NO. 101/ 2 RN/L = 3.86 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.610	90.140	11.26900	2.97900	-1.38600	-2.63000	.54500	3.86000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F060) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 4.200

RUN NO. 131/ 0 RN/L = 4.19 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.410	90.090	8.59200	3.19400	1.53300	.18800	.53600	4.19000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 35/ 0 RN/L = 4.19 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	90.510	20.58400	7.43600	-.05400	-.10000	.53700	4.19000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F061) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 4.400

RUN NO. 38/ 0 RN/L = 4.37 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	90.080	19.79900	9.53800	.19500	.05600	.52700	4.37000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F062) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 4.450

RUN NO. 125/ 0 RN/L = 4.45 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.610	90.280	12.08100	6.90100	3.79400	2.02400	.52000	4.45000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F063) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0098

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 4.900

RUN NO. 119/ 0 RN/L = 4.86 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.510	90.090	8.66100	1.04100	-1.08300	.07700	.55700	4.86000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F064) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0098

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 5.100

RUN NO. 112/ 0 RN/L = 5.07 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.190	90.660	21.42300	7.92600	2.63900	1.67300	.53600	5.07000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F065) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 5.450

RUN NO. 36/ 0 RN/L = 5.45 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	90.660	20.57100	7.41800	-.03700	-.13800	.49800	5.45000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F066) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 6.200

RUN NO. 112/ 2 RN/L = 6.19 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.210	90.750	21.31100	8.30100	-.19300	.03000	.53500	6.19000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F067) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0068

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 6.400

RUN NO. 126/ 0 RN/L = 6.42 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.710	90.610	17.75100	9.09700	3.74600	2.08600	.52500	6.42000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F068) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 6.600

RUN NO. 113/ 1 RN/L = 6.64 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	90.130	8.03500	1.60400	3.68100	2.17600	.55000	6.64000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F069) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 6.900

RUN NO. 114/ 0 RN/L = 6.94 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	90.090	8.55400	.57400	-.13900	.05300	.56100	6.94000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F070) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 7.200

RUN NO. 11/ 0 RN/L = 7.20 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.710	90.810	18.43500	11.96000	2.42800	1.46800	.51400	7.20000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F071) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 7.500

RUN NO. 200/ 0 RN/L = 7.52 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	90.130	8.24400	2.17100	-2.14700	-1.45300	.54500	7.52000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F072) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 7.700

RUN NO. 205/ 0 RN/L = 7.69 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	90.350	11.78300	4.86400	2.13800	1.04600	.53300	7.69000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F073) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 8.650

RUN NO. 202/ 0 RN/L = 8.68 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.690	90.850	18.23500	9.88600	-.76600	-.19200	.52200	8.68000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F074) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	90.000		
PHI =	.000	RN =	8.850		

RUN NO. 14/ 0 RN/L = 8.87 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.410	90.170	8.93400	2.60000	-.02600	.21600	.54300	8.87000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 116/ 0 RN/L = 8.86 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	90.620	13.84500	8.60900	2.81700	.53100	.51600	8.86000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F075) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	90.000		
PHI =	.000	RN =	9.500		

RUN NO. 117/ 0 RN/L = 9.51 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.700	91.060	17.96600	11.40400	-.80400	-.53100	.51500	9.51000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F076) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	90.000		
PHI =	.000	RN =	10.000		

RUN NO. 15/ 0 RN/L = 10.03 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	90.180	8.97800	1.46500	-.05200	.64500	.55300	10.03000
GRADIENT		.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F077) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	90.000		
PHI =	.000	RN =	11.900		

RUN NO. 19/ 4 RN/L = 11.93 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.410	90.200	8.14700	2.06000	-.74400	-.17100	.54600	11.93000
GRADIENT		.00000	.00000	.00000	.00000	.00000	.00000

RUN NO. 201/ 0 RN/L = 11.89 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	90.240	9.13200	1.86500	-.52200	-.68300	.54900	11.89000
GRADIENT		.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F078) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 12.100

RUN NO. 134/ 0 RN/L = 12.06 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.720	91.290	17.22900	11.36800	.40100	.58200	.51300	12.06000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F079) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 12.600

RUN NO. 134/ 1 RN/L = 12.64 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.800	91.140	14.53500	8.62600	-.46800	.02400	.51800	12.64000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F080) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0068

PARAMETRIC DATA

BETA = .000 ALPHA = 90.000
PHI = .000 RN = 13.300

RUN NO. 20/ 0 RN/L = 13.29 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	90.220	8.75800	1.20200	-.02500	-.37300	.55500	13.29000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F081) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 100.000
PHI = .000 RN = 5.450

RUN NO. 39/ 0 RN/L = 5.45 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	100.540	19.89200	5.34400	-.22500	-.19700	.54500	5.45000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F082) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 100.000
PHI = .000 RN = 5.800

RUN NO. 30/ 0 RN/L = 5.82 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.210	100.610	20.20300	6.06400	.14700	.29800	.54200	5.82000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F083) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0098

PARAMETRIC DATA

BETA = .000 ALPHA = 100.000
PHI = .000 RN = 7.800

RUN NO. 31/ 0 RN/L = 7.78 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.910	100.260	14.42200	.48700	-.06100	.17000	.56400	7.78000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F084) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 100.000
PHI = .000 RN = 10.200

RUN NO. 27/ 1 RN/L = 10.21 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	99.970	8.35500	-2.75200	.16600	-1.51700	.59300	10.21000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F085) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 100.000
PHI = .000 RN = 11.800

RUN NO. 28/ 0 RN/L = 11.78 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	99.990	9.18400	-2.39900	.40000	-.91200	.58800	11.78000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F086) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 100.000
PHI = .000 RN = 13.150

RUN NO. 29/ 0 RN/L = 13.16 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	100.910	14.27900	8.30700	-.27800	-.91100	.51900	13.16000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F087) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	125.000		
PHI =	.000	RN =	5.400		

RUN NO. 171/ 0 RN/L = 5.38 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	125.810	14.82900	4.68800	-.08900	-.21700	.54100	5.38000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F088) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	125.000		
PHI =	.000	RN =	6.000		

RUN NO. 151/ 0 RN/L = 5.99 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.170	126.350	12.91400	-7.03500	.05800	-.02600	.61100	5.99000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F089) (29 OCT 75)

REFERENCE DATA

SREF =	110.0000 SQ.FT.	XMRP =	986.7050 IN.		
LREF =	142.0000 IN.	YMRP =	.0000 IN.		
BREF =	142.0000 IN.	ZMRP =	.0000 IN.		
SCALE =	.0088				

PARAMETRIC DATA

BETA =	.000	ALPHA =	125.000		
PHI =	.000	RN =	6.300		

RUN NO. 152/ 0 RN/L = 6.26 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.420	126.250	14.66700	-1.83600	-.10700	-.00600	.57700	6.26000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F090) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 125.000
PHI = .000 RN = 7.800

RUN NO. 174/ 1 RN/L = 7.79 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	125.660	12.76500	4.85600	-.17300	-.66500	.53600	7.79000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F091) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 125.000
PHI = .000 RN = 8.100

RUN NO. 148/ 1 RN/L = 8.10 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	125.700	6.94200	-10.08400	2.43200	-6.52100	.68500	8.10000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F092) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 125.000
PHI = .000 RN = 8.200

RUN NO. 150/ 0 RN/L = 8.22 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.890	126.670	10.88700	-10.93900	.22800	.23200	.64900	8.22000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F093) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 125.000
PHI = .000 RN = 10.800

RUN NO. 149/ 0 RN/L = 10.81 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	126.390	9.03700	-9.33100	1.17000	-3.48900	.65000	10.81000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F094) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 1.700

RUN NO. 208/ 0 RN/L = 1.69 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	135.200	11.37800	2.86400	.25300	.39300	.54600	1.69000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F095) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 1.800

RUN NO. 164/ 0 RN/L = 1.82 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	135.120	5.12700	-7.31800	-1.22700	1.28500	.68300	1.82000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F096) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 2.450

RUN NO. 165/ 0 RN/L = 2.46 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	135.260	5.82700	-7.31200	-.38900	.12900	.66900	2.46000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F097) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 4.000

RUN NO. 175/ 0 RN/L = 3.97 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	135.270	10.20800	3.97300	-.18600	-.83100	.53500	3.97000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F098) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 5.300

RUN NO. 153/ 0 RN/L = 5.32 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
4.00	135.320	5.87500	-6.91500	-1.14100	2.41800	.66200	5.32000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F099) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 5.400

RUN NO. 172/ 0 RN/L = 5.37 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	135.680	11.50900	2.73700	-.04500	-.21700	.54700	5.37000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F100) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 6.200

RUN NO. 158/ 0 RN/L = 6.23 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.430	136.120	11.69300	-3.38600	.07300	-.03900	.59000	6.23000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F101) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 6.300

RUN NO. 157/ 0 RN/L = 6.29 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.180	136.220	11.31600	-6.72500	.03800	-.01100	.61500	6.29000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F102) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 7.000

RUN NO. 154/ 1 RN/L = 7.00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	135.640	6.45800	-7.25800	-.69300	.50700	.65800	7.00000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F103) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 7.700

RUN NO. 176/ 0 RN/L = 7.68 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	135.510	9.86800	3.68000	-.30300	-.67600	.53600	7.68000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F104) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 8.300

RUN NO. 159/ 0 RN/L = 8.32 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	135.520	5.76400	-6.93700	.10500	1.27000	.66400	8.32000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF105) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 8.400

RUN NO. 155/ 0 RN/L = 8.40 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.890	136.460	9.60200	-9.44100	.22300	1.32900	.64700	8.40000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF106) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0089

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 8.650

RUN NO. 156/ 1 RN/L = 8.65 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.000	136.680	9.94200	-9.77600	.16300	.41900	.64700	8.65000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF107) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0098

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 9.600

RUN NO. 160/ 0 RN/L = 9.64 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.500	135.710	5.07100	-7.41500	-.69700	1.08500	.68500	9.64000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F108) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 10.840

RUN NO. 161/ 0 RN/L = 10.83 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	136.000	6.37900	-6.94000	-.37300	.26800	.65300	10.83000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F109) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 11.900

RUN NO. 162/ 0 RN/L = 11.94 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.700	136.410	6.93000	-8.50700	.18700	.48400	.66800	11.94000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F110) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 135.000
PHI = .000 RN = 12.800

RUN NO. 163/ 0 RN/L = 12.83 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.810	135.930	8.77600	-8.67200	.02300	.19100	.64700	12.83000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F111) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 5.400

RUN NO. 173/ 0 RN/L = 5.38 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
2.000	145.490	7.93800	1.52600	-.04100	-.23100	.55100	5.38000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F112) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0089

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 6.000

RUN NO. 170/ 0 RN/L = 6.05 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.420	145.820	7.90300	-3.47700	-.03000	-.38700	.60300	6.05000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (R1F113) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0098

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 6.200

RUN NO. 169/ 0 RN/L = 6.16 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
1.200	145.850	7.76600	-4.69100	-.15300	-.10300	.61600	6.16010
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF114) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 8.200

RUN NO. 166/ 0 RN/L = 8.23 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.400	145.350	3.65200	-5.02400	-.26000	-.28700	.68000	8.23000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF115) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 8.600

RUN NO. 168/ 1 RN/L = 8.57 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.910	145.950	5.44300	-7.00700	.20800	.23600	.67200	8.57000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF116) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 8.900

RUN NO. 177/ 0 RN/L = 8.91 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
3.500	145.380	6.24900	1.29700	-.15700	-.31500	.55000	8.91000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000

MSFC HRWT 034 (SA13F) SRB WITHOUT PROTUBERANCES (RIF117) (29 OCT 75)

REFERENCE DATA

SREF = 110.0000 SQ.FT. XMRP = 986.7050 IN.
LREF = 142.0000 IN. YMRP = .0000 IN.
BREF = 142.0000 IN. ZMRP = .0000 IN.
SCALE = .0088

PARAMETRIC DATA

BETA = .000 ALPHA = 145.000
PHI = .000 RN = 11.000

RUN NO. 167/ 2 RN/L = 10.99 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CNM	CLMM	CYM	CYNM	XCP/L	RN
.600	145.670	3.81400	-5.27500	.02400	.52700	.67900	10.99000
	GRADIENT	.00000	.00000	.00000	.00000	.00000	.00000