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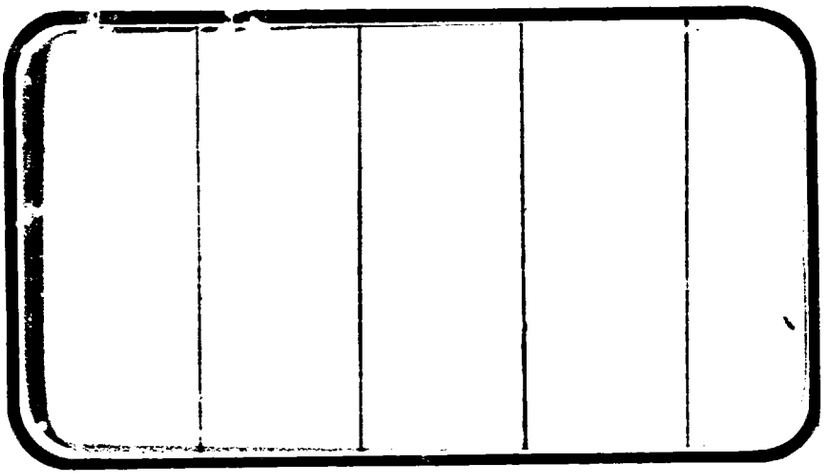
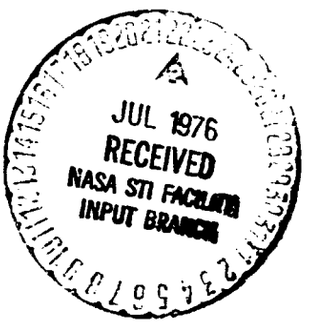


SPACE SHUTTLE

AEROTHERMODYNAMIC DATA REPORT



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SPACE DIVISION CHRYSLER CORPORATION

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AN INVESTIGATION TO DETERMINE THE PRESSURE DISTRIBUTION ON THE 0.0137 SCALE SOLID ROCKET BOOSTER FOREBODY (MSFC MODEL 467) AT ANGLES OF ATTACK AT OR NEAR 90° AND HIGH REYNOLDS NUMBERS IN THE MSFC HIGH REYNOLDS NUMBER WIND TUNNEL (SA29F)

by

Paul E. Ramsey, NASA/MSFC

Prepared under NASA Contract Number NAS9-13247

by

Data Management Services
Chrysler Corporation Space Division
New Orleans, La. 70189

for

Engineering Analysis Division

Johnson Space Center
National Aeronautics and Space Administration
Houston, Texas

WIND TUNNEL TEST SPECIFICS:

Test Number:	MSFC HRWT 033
NASA Series No.:	SA29F
Model Number:	467
Test Dates:	August 8 - September 18, 1974 June 25 - July 14, 1975

FACILITY COORDINATOR:

Mr. Dale Andrews
Marshall Space Flight Center
Mail Stop ED32
Huntsville, Alabama 35801

Phone: (205) 453-3174

PROJECT ENGINEER:

Mr. Paul E. Ramsey
Marshall Space Flight Center
Mail Stop ED32
Huntsville, Alabama 35801

Phone: (205) 453-3152

DATA MANAGEMENT SERVICES:

Prepared by: Liaison--V. W. Sparks
Operations--V. W. Sparks

Reviewed by: G. G. McDonald

Approved: _____
J. L. Glynn, Manager
Data Operations

Concurrence: _____
N. D. Kemp, Manager
Data Management Services

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AN INVESTIGATION TO DETERMINE THE PRESSURE DISTRIBUTION ON THE 0.0137 SCALE SOLID ROCKET BOOSTER FOREBODY (MSFC MODEL 467) AT ANGLES OF ATTACK AT OR NEAR 90° AND HIGH REYNOLDS NUMBERS IN THE MSFC HIGH REYNOLDS NUMBER WIND TUNNEL (SA29F)

by

Paul E. Ramsey, NASA/MSFC

ABSTRACT

An aerodynamic investigation was conducted in the MSFC High Reynolds Number Wind Tunnel to determine the pressure distribution over the forebody section of the current 146 inch diameter Shuttle SRB. The test model consisted of a 0.0137 scale version of the SRB nose cone and a forward portion of the cylindrical body which was approximately 2.7 calibers in length. The external configuration was defined by MSFC drawing number 10A00313 Revision A.

Data were obtained for Mach numbers of 0.4, 0.5, 0.6, 0.8, and 2.0; Reynolds numbers of from $2.3(10)^6$ to $20.1(10)^6$ based on body diameter; angle of attack of 72°, 90°, and 108°, circumferential body locations from 0° to 180°; and longitudinal station ratioed to body diameter (X/D) of from 0.340 to 2.160. Yaw was zero and no protuberances were fitted.

The pressure distributions are plotted as a function of longitudinal station ratioed to body diameter and circumferential location for

each angle of attack and Mach number. A Reynolds number variation study was made for Mach numbers of 0.4 and 0.6 at an angle of attack of 270° and roll angle of 180°.

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PLOTTED COEFFICIENTS SCHEDULE:

(A) CP versus X/D

(B) CP versus THETA

NOMENCLATURE

General

SYMBOL	PLOT SYMBOL	DEFINITION	UNITS
C_p	CP	pressure coefficient; $(p_l-p_\infty)/q_\infty$	
D		reference diameter (body diameter)	
ℓ_B	LBODY	length of the ET	in.
M		Mach number	
P_l		local pressure	psi
P_t		total pressure	psi
P_∞		freestream pressure	psi
q_∞	Q(PSI)	freestream dynamic pressure unit	psi
R_N	RN	Reynolds number based on model diameter	
R_N/L	RN/L	Reynolds number per unit length	
SRB		Solid Rocket Booster	
S_{Ref}	SREF	base area or reference area, ft^2	
T_t		freestream total temperature (°F)	deg.
X		distance from nose of SRB along X axis	in.
X_T, Y_T, Z_T		SRB stations	in.
X/D	X/D	longitudinal location of pressure measurement, expressed as a fraction of the SRB length, measured from the SRB nose	
P_o		plenum chamber pressure	psia

NOMENCLATURE (Concluded)

SYMBOL	PLOT SYMBOL	DEFINITION	UNITS
GREEK SYMBOLS			
α	ALPHA	angle of attack	deg.
ϕ	PHI	angle of roll	deg.
θ	THETA	circumferential location	deg.
SUBSCRIPTS			
ref		reference conditions	
∞		freestream conditions	
l		local	
t		total conditions	

INTRODUCTION

During the descent of the SRB, an atmospheric pressure switch or baroswitch will be used to initiate the Shuttle SRB parachute deployment system. This device will be located in a forward compartment which will be vented to the exterior environment. The internal pressure of this compartment is a function of the external conditions such as SRB velocity, attitude, and altitude which are predicted from aerodynamic force inputs into a dynamics analysis program. Based on the internal pressure, which corresponds to the desired parachute deployment altitude for a given entry trajectory, the baroswitch can be preset for recovery system initiation at the proper time. Initiation must occur within narrow altitude limits to assure the occurrence of the dynamic pressure needed for proper functioning of the parachute system. To obtain an accurate prediction of the forward compartment pressure needed to set the baroswitch, the external pressure distribution must be known for the full scale flight conditions.

Since the SRB will enter at an angle of attack near 90° where the flow around the body can be very sensitive to Reynolds number, a test Reynolds number as near to full scale as possible is necessary if adequate data are to be obtained.

Based on these observations, a test was conducted in the MSFC High Reynolds Number Wind Tunnel to determine the SRB forebody pressure distribution at 72° to 108° angle of attack. Pressures were measured over the nose cone and approximately one caliber of the cylindrical body. The

Mach range consisted of 0.4, 0.5, 0.6, 0.8, and 2.0 at Reynolds numbers based on the SRB diameter. No protuberances were fitted for this investigation.

TEST HARDWARE

The model configuration consisted of a spherically blunted cone/cylinder which simulated the forward portion of the current 146-inch-diameter SRB. The model was mounted at the aft end with a 90° "dog leg" sting which was then supported in an available tunnel sting. Major dimensions of the model and sting are presented in Figure 2.

Because only 18 pressure tubes of 0.125-inch O.D. could be accommodated in the model, 4 interchangeable nose sections were provided, each containing 18 pressure orifices. The pressure tubing passed out of the nose through an O-ring sealed quick-disconnect system which allowed easy interchangeability of the nose sections. From this disconnect the tubing passed through cavities in the sting to the tunnel exterior.

No protuberances were included on the test models. The model diameter was 2 inches, which resulted in a scale of 0.0137. The MSFC model number is 467 and was fabricated using drawings 80M42699, 80M42700, 80M42714 - 80M42717, and 80M51377.

INSTRUMENTATION

The orifice location and arrangement are shown in Figure 3. The pressure lines were tubed to 18 Statham 1000 psia pressure transducers, which were monitored real time during each run. Combining data from each nose resulted in a total set of data for 72 orifice locations distributed over the test SRB configuration. In effect, four blows or runs were required to obtain a complete set of data for each test condition; i.e., Mach number, α, P_0, and Reynolds number.

Two check orifices at thetas of 202½° and 337½° at longitudinal station 7 were included on nose 4 to give an indication of model misalignment or flow asymmetries. Because of the limited interior volume available near the front of the model, pressure taps were located on both sides of the nose for longitudinal station 1 on nose 4.

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 x 10^6 to 200 x 10^6 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 HRWTare presented in Reference 1.

DATA REDUCTION

The data were reduced to pressure coefficients as follows.

$$C_p = \frac{P_1 - P_\infty}{q_\infty}$$

and tabulated in the format shown in Table IV. The data were also formatted for inclusion in the CCSD data management system. Tunnel test condition parameters such as run number, Mach number, α, q_∞, T, RN, and P_0 are included in the tabulated data of the Appendix.

REFERENCES

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

TABLE I.

TEST: MSFC HRWT 033 | DATE: 10/17/75

TEST CONDITIONS

MACH NUMBER	REYNOLDS NUMBER (per unit length)	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq. inch)
0.4	2.3 x 10^6	7.3	37	67.8
	4.0	13.4	51	128.1
	6.0	19.9	46	191.4
	7.5	25.4	49	238.8
	8.4	28.2	51	263.1
	8.9	30.2	49	286.8
	10.2	32.7	38	315.9
	13.3	44.6	48	424.2
	18.1	61.2	48	589.8
	18.8	61.3	44	590.1
0.5	18.1	75.2	49	506.7
0.6	2.8	13.0	48	64.3
	4.0	18.7	41	92.2
	6.0	27.3	46	136.6
	7.5	34.4	51	175.4
	8.9	40.3	47	204.2

BALANCE UTILIZED: NONE - STATHAM PRESSURE TRANSDUCERS

	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	1000 PSI	± 5 PSI	± .06 @ q = 83 PSI
SF			
AF			
PM			
RM			
YM			

COMMENTS:

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

TABLE I. (Concluded)

TEST: MSFC HRWT 033 DATE:

TEST CONDITIONS

MACH NUMBER	REYNOLDS NUMBER (per unit length)	DYNAMIC PRESSURE (pounds/sq.inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)	STAGNATION PRESSURE (pounds/sq.inch)
0.6	9.7 x 10^6	44.8	51	228.9
	12.8	58.9	47	298.8
	13.3	60.1	41	303.6
	16.1	74.6	49	378.9
	18.1	82.6	46	412.4
	20.1	90.4	36	451.4
0.8	18.1	98.0	42	346.1
2.0	9.0	71.7	61	200.3

BALANCE UTILIZED: _____

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

COMMENTS:

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

TABLE II.

TEST: MSFC HRWT 033 — DATA SET/RUN NUMBER COLLATION SUMMARY — DATE: 10/17/75

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETERS/VALUES φ	PARAMETERS/VALUES R_N	NO. OF RUNS	MACH NUMBERS (OR ALTERNATE INDEPENDENT VARIABLE) 0.4	0.5	0.6	0.8	2.0	TEST RUN NUMBERS
RIE101	SRB NOSE	72	0	0	18.1		(1)		(9)	(14)		
		90					(2)		(11)	(16)		
		108					(3)		(13)	(18)		
RIE102		72						(4)				
		80						(5)	(10)	(15)		
		90						(6)				
		100						(7)	(12)	(17)		
		108						(8)				
RIE103		72			9.0						(19)	
		80									(20)	
		90									(21)	
		100									(22)	
		108									(23)	
RIE104		72			8.4		37/1					

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

CP COEFFICENTS IDVAR (1) IDVAR (2) NDV

α OR β SCHEDULES

TABLE II. (Continued)

TEST: MSFC HRWT 033 | DATA SET/RUN NUMBER COLLATION SUMMARY | DATE: 10/12/95

DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	SCHD. β	PARAMETER Φ	PARAMETER M	REYNOLDS NUMBER (OR ALTERNATE INDEPENDENT VARIABLE) 2.3	2.8	4.0	6.0	7.5	8.9	9.7	10.2	12.8	13.3	16.1	18.8	20.1	TEST RUN NUMBERS
RIE105	SRB NOSE	270	0	180	0.4			44/0	45/0	43/0	46/0				47/0		42/0		
RIE105	SRB NOSE	90	0	180	0.4	38/0							39/0						
RIE 106	SRB NOSE	270	0	180	0.6		41/2	48/0	49/0	52/0	50/0	53/0		40/1	51/1	56/0		54/1	

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

C.P. COEFFICENTS IDVAR (1) RN IDVAR (2) ALPHA NDV

α OR β SCHEDULES

TABLE II (Continued)

DATAMAN RUN NUMBER CORRELATION WITH TUNNEL RUN NUMBER

New Run Number	Tunnel Number	α	M
1	24/0, 19/0, 13/0, 18/0	72	0.4
2	1/0, 6/1, 12/1, 7/0	90	
3	25/0, 30/1, 36/0, 31/1	108	
4	57/0, 83/0	72	0.5
5	59/1, 79/0	80	
6	63/1, 77/2	90	
7	65/1, 73/0	100	
8	69/0, 71/3	108	
9	23/2, 20/0, 14/0, 17/0	72	0.6
10	60/1, 80/0	80	
11	2/0, 5/0, 11/1, 8/0	90	
12	66/1, 74/0	100	
13	26/0, 29/1, 35/0, 32/0	108	
14	22/2, 21/0, 15/0, 16/0	72	0.8
15	61/3, 81/0	80	
16	3/0, 4/0, 10/3, 9/0	90	
17	67/2, 75/0	100	
18	27/0, 28/0, 34/0, 33/0	108	
19	58/0, 84/0	72	2.0
20	62/0, 82/0	80	2.0

TABLE II. (Concluded)

New Run Number	Tunnel Number	α	M
21	64/2, 78/0	90	2.0
22	68/0, 76/1	100	2.0
23	70/0, 72/0	108	2.0

TABLE III.
MODEL DIMENSIONAL DATA

MODEL COMPONENT: BODY - SRB FORWARD SECTION

GENERAL DESCRIPTION: SPHERICALLY BLUNTED 18° HALF ANGLE NOSE CONE AND FORWARD PORTION OF CYLINDRICAL SECTION APPROXIMATELY 2.7 CALIBERS IN LENGTH.

SCALE = 0.0137

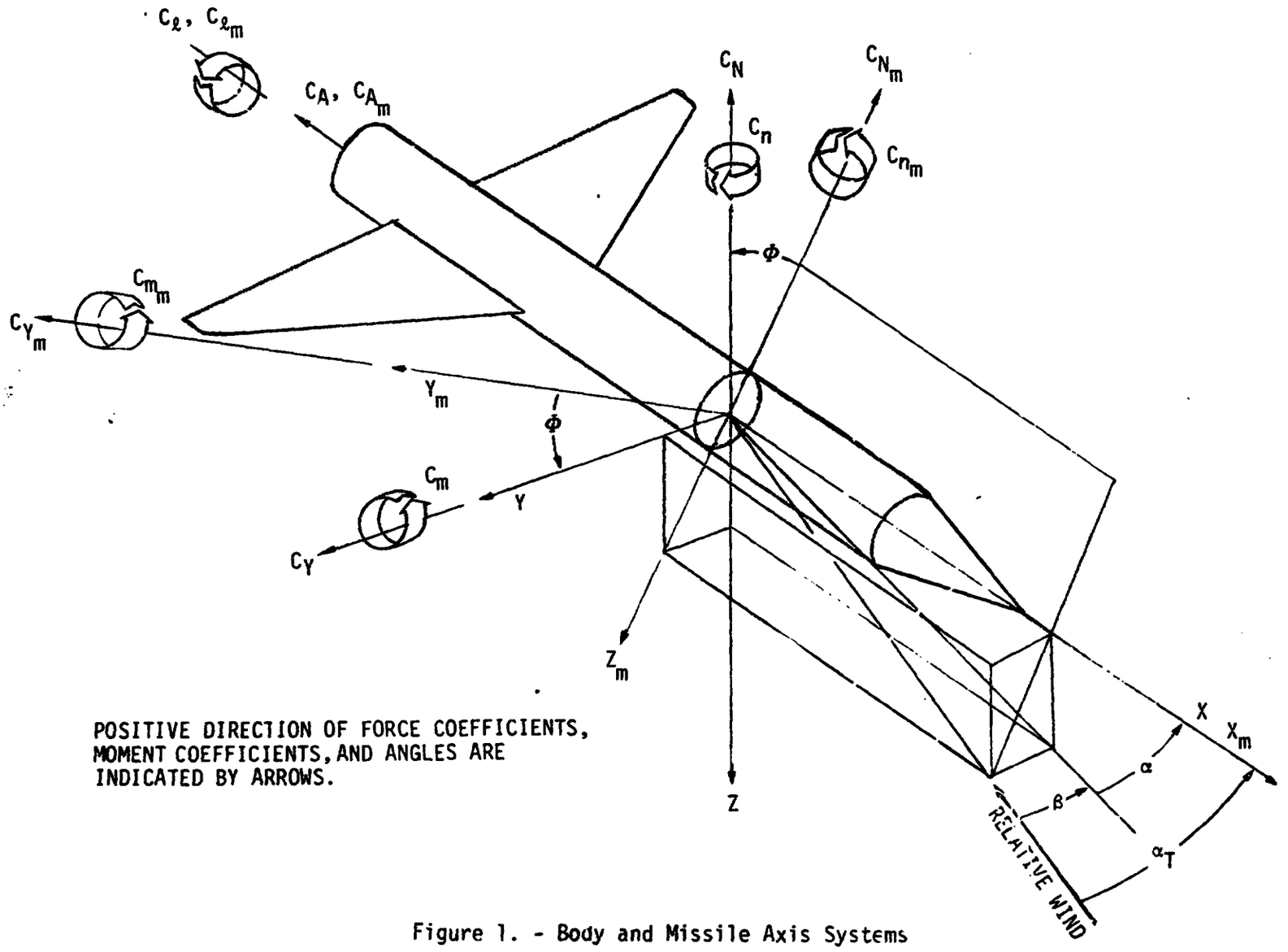
DRAWING NUMBER: MSFC DWG. 10A00313 REV. A

	THEORETICAL		ACTUAL MEASURED
DIMENSIONS:	FULL-SCALE	MODEL SCALE	MODEL SCALE
Length	583.9 in.	8 in.	
Max. Width	146 in.	2 in.	
Max. Depth	146 in.	2 in.	
Fineness Ratio			
Area			
Max. Cross-Sectional	16,741.5 $in.^2$	3.142 $in.^2$	
Planform			
Wetted			
Base	16,497.6 $in.^2$	3.096 $in.^2$	

Table IV. PRESSURE ORIFICE LONGITUDINAL/CIRCUMFERENTIAL LOCATIONS

NOSE NO.		4		3		1		2	
LONGITUDINAL STA. NO.		1	2	3	4	5	6	7	8
LONGITUDINAL LOCATION X (in.)		0.340	0.675	1.007	1.285	1.377	1.550	1.810	2.160
X/D		0.680	1.350	2.015	2.570	2.755	3.100	3.620	4.320
CIRCUMFERENTIAL STA. NO.									
CIRCUMFERENTIAL LOCATION θ (deg.)									
0	A	1	8	17	26	35	44	53	62
22 1/2	B	----	9	18	27	36	45	54	63
45	C	2	10	19	28	37	46	55	64
67 1/2	D	3	11	20	29	38	47	56	65
90	E	4	12	21	30	39	48	57	66
112 1/2	F	5	13	22	31	40	49	58	67
135	G	6	14	23	32	41	50	59	68
157 1/2	H	---	15	24	33	42	51	60	69
180	I	7	16	25	34	43	52	61	70
202 1/2	B'	----	----	----	----	----	----	71*	----
337 1/2	H'	----	----	----	----	----	----	72*	----

**Note that 71 and 72 are check orifices located on nose 4 and at longitudinal Station 7 position.*



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

Figure 1. - Body and Missile Axis Systems

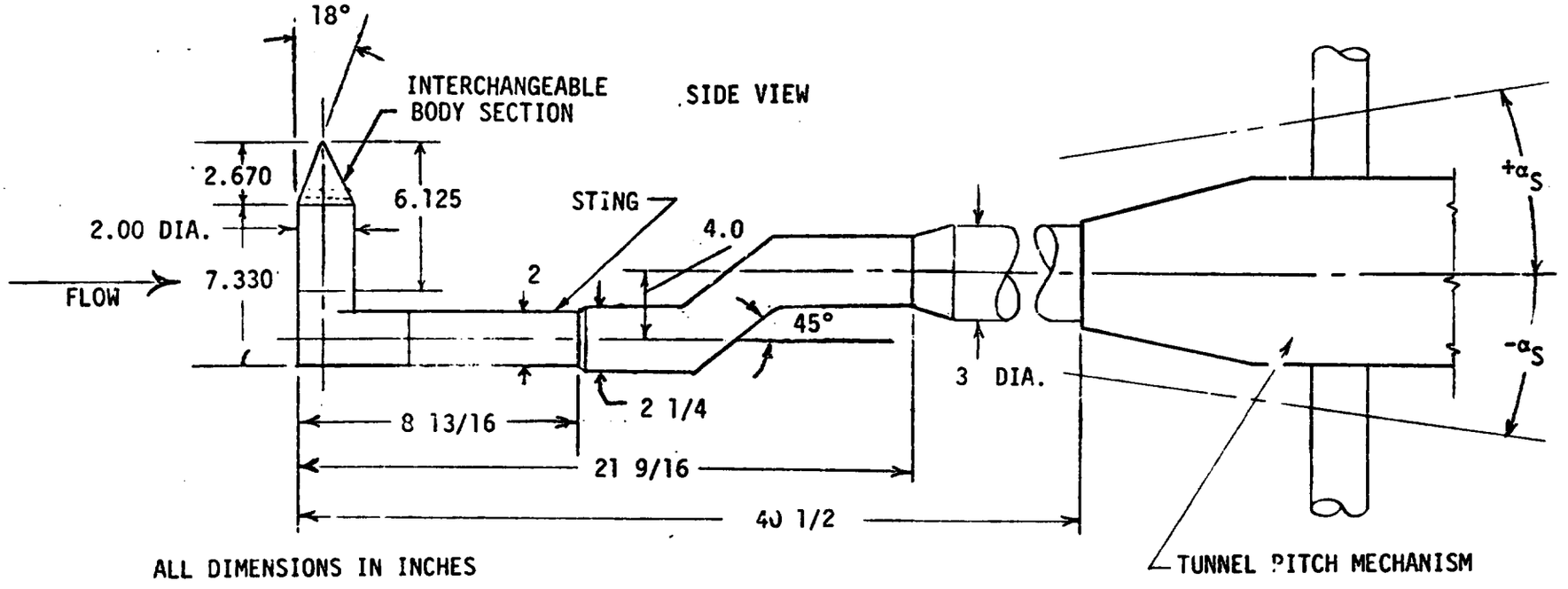


Figure 2. Details and Major Dimensions of SRB Forward Section and Sting

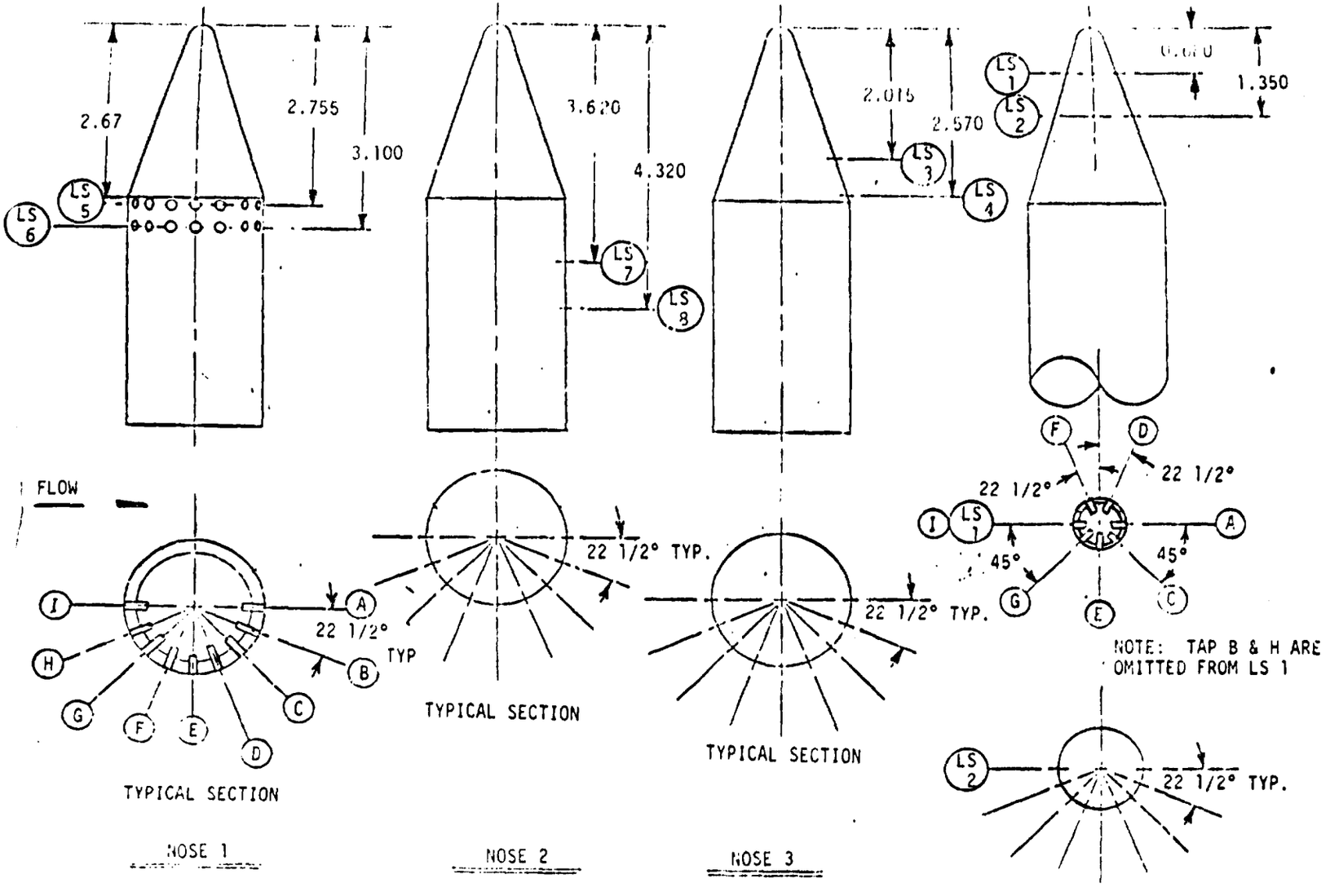


Figure 3. Pressure Orifice Location and Identification System

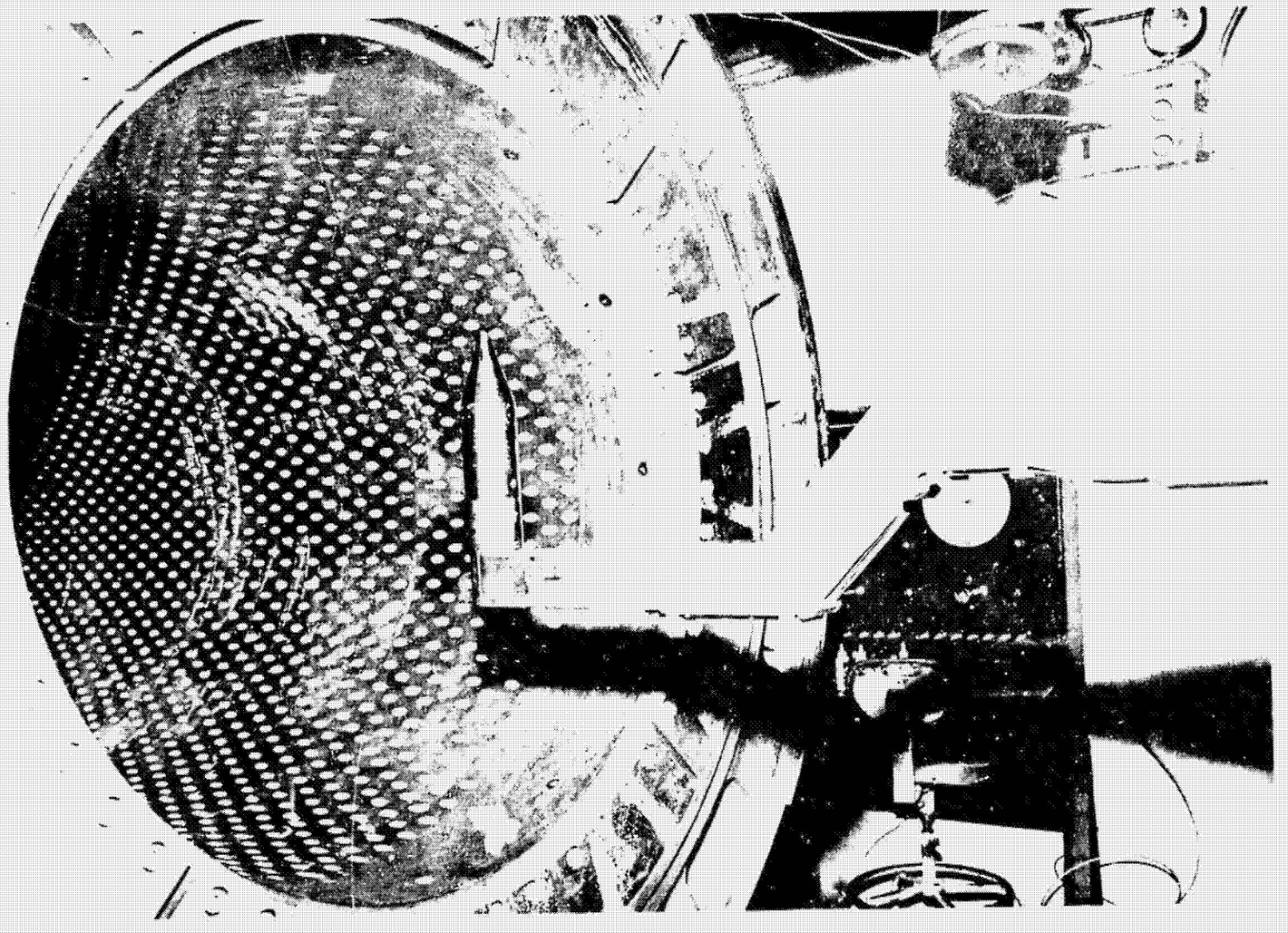


Figure 4. SRB Foresection Model Installed in the MSFC HRWT Transonic Test Section

DATA FIGURES

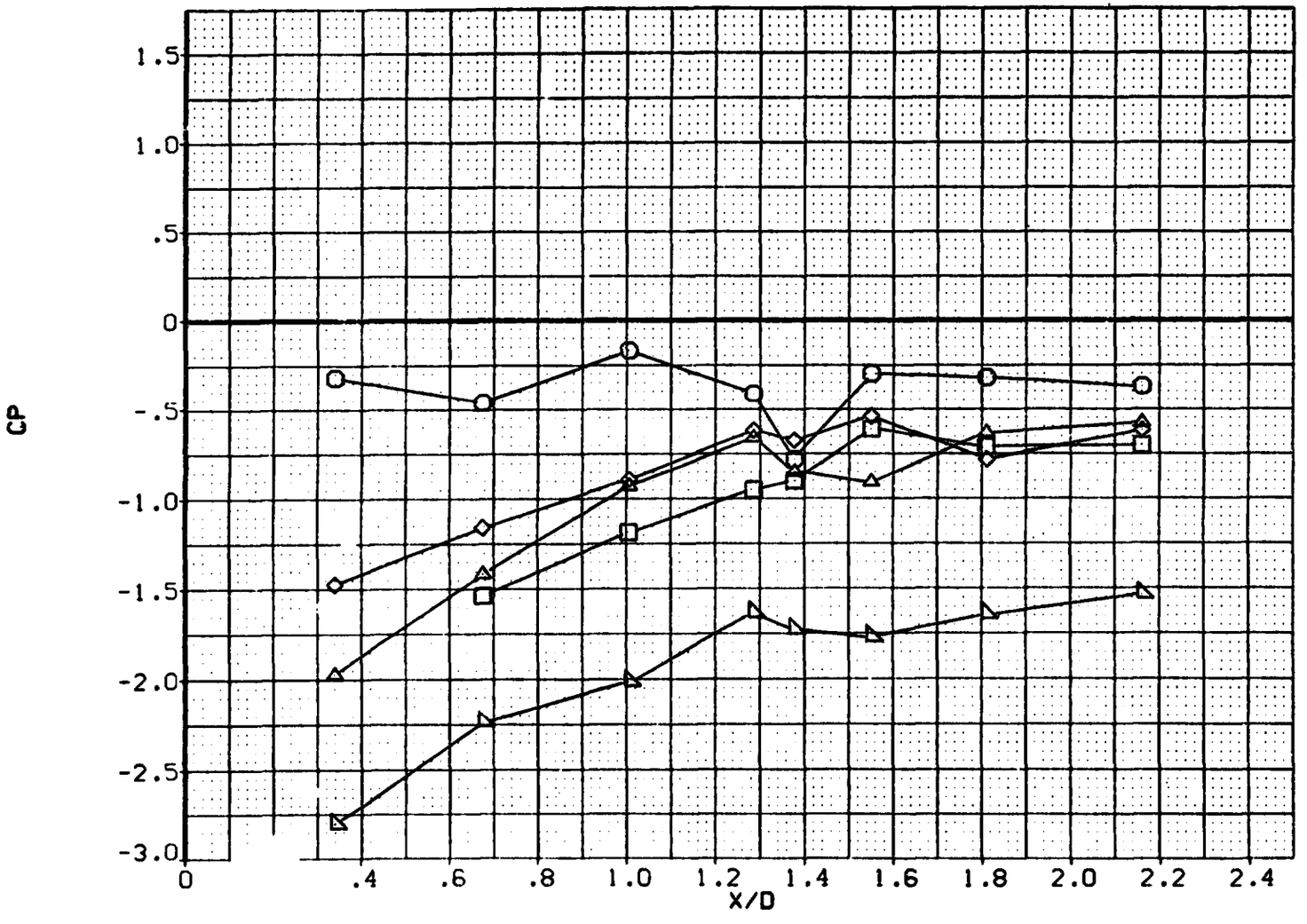
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (A1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	72.100	.410
□	22.500		
◇	45.000		
△	67.500		
▽	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

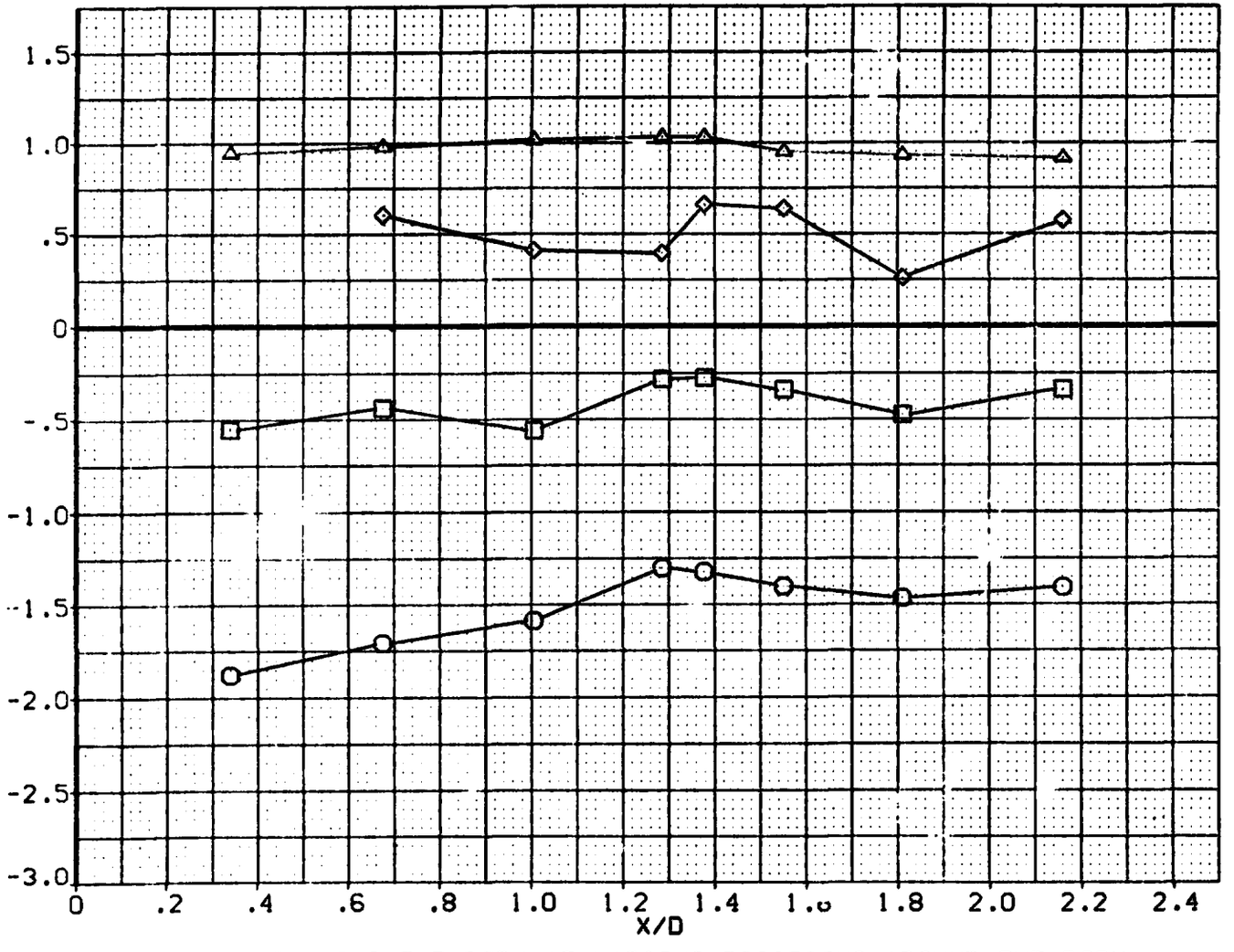
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (A1E101)

SYMBOL	THETA	IA	MACH
○	112.500	72.100	.410
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

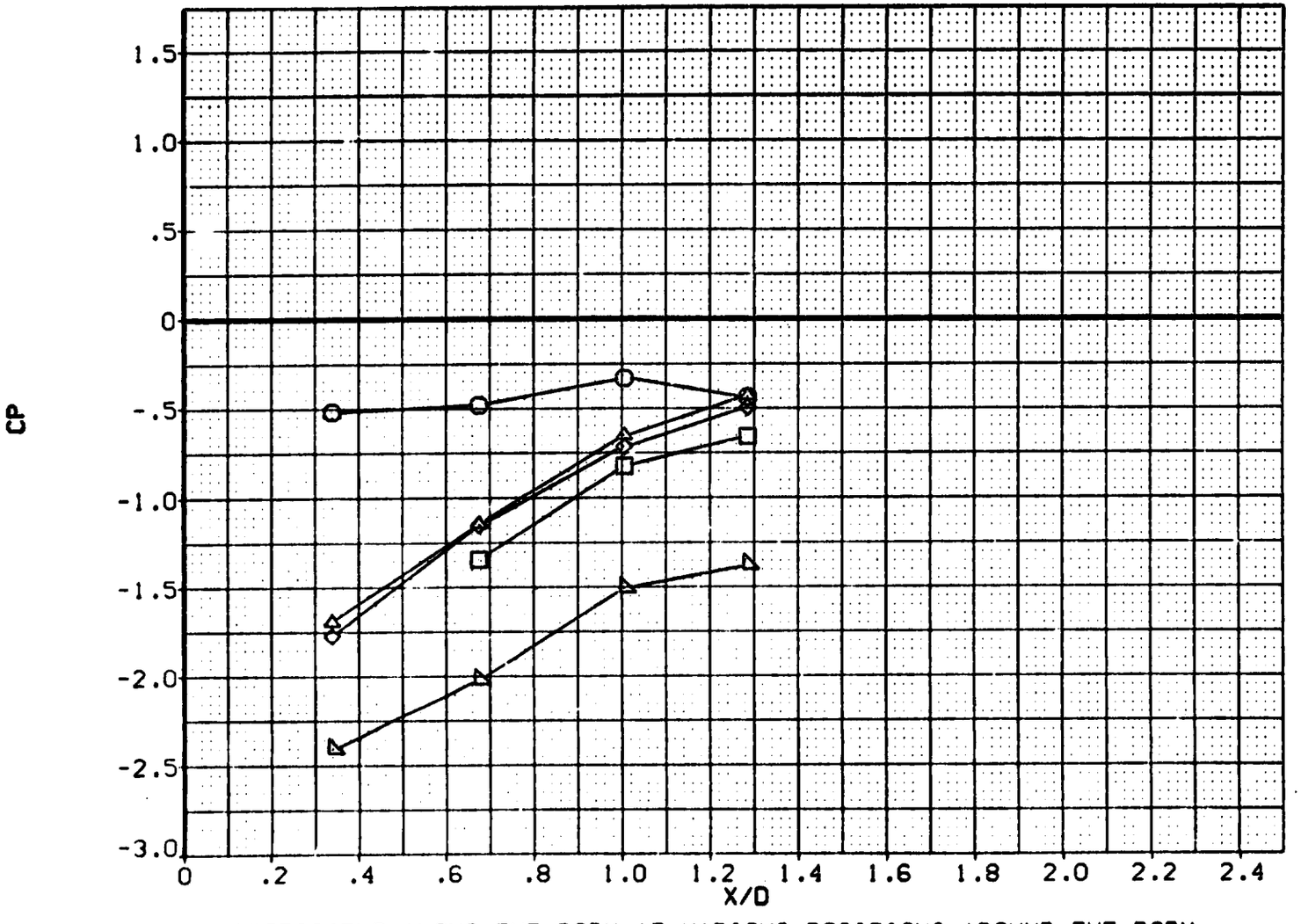
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (A1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	72.000	.500
□	22.500		
◇	45.000		
△	67.500		
◺	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



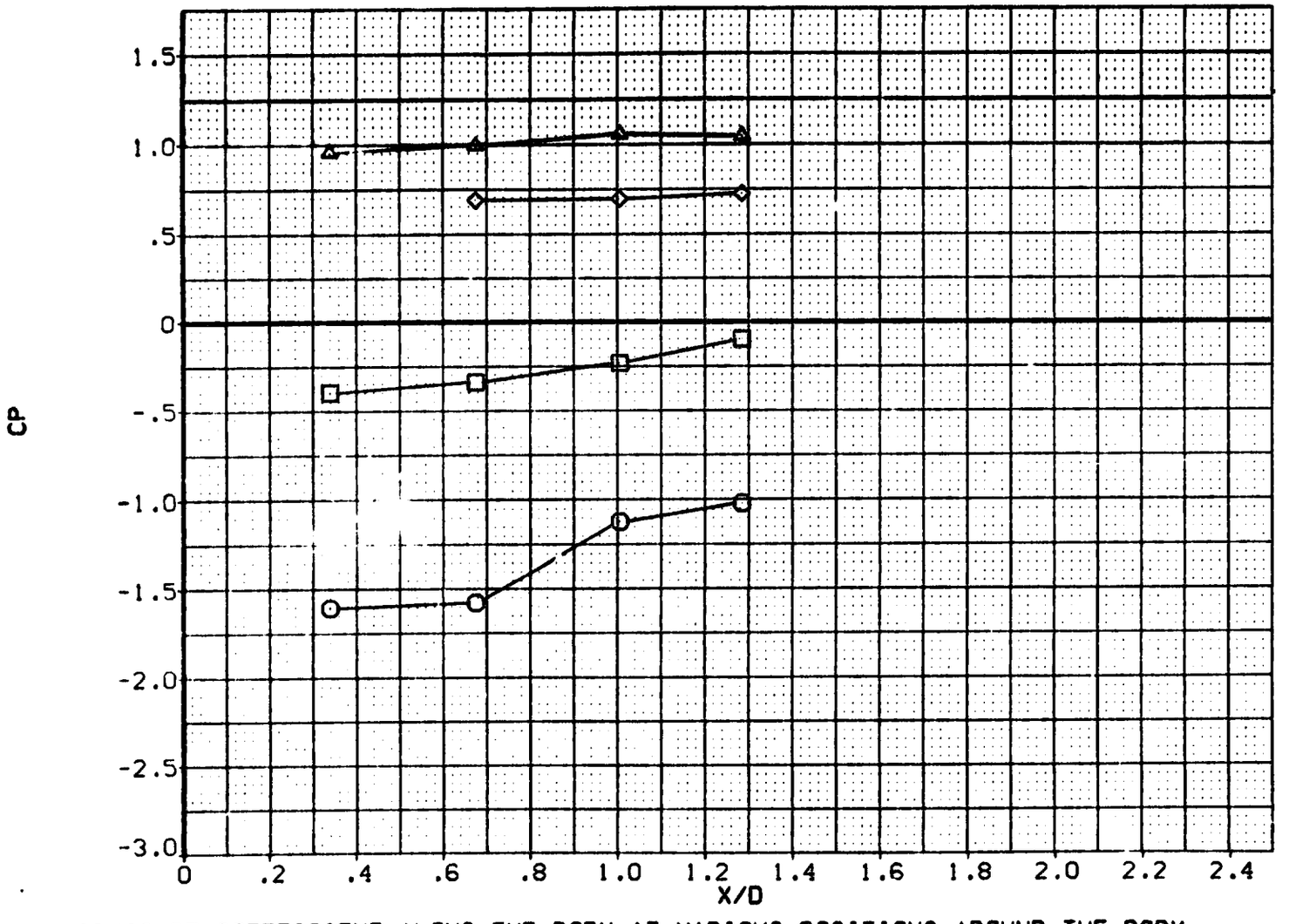
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (A1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	72.000	.500
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



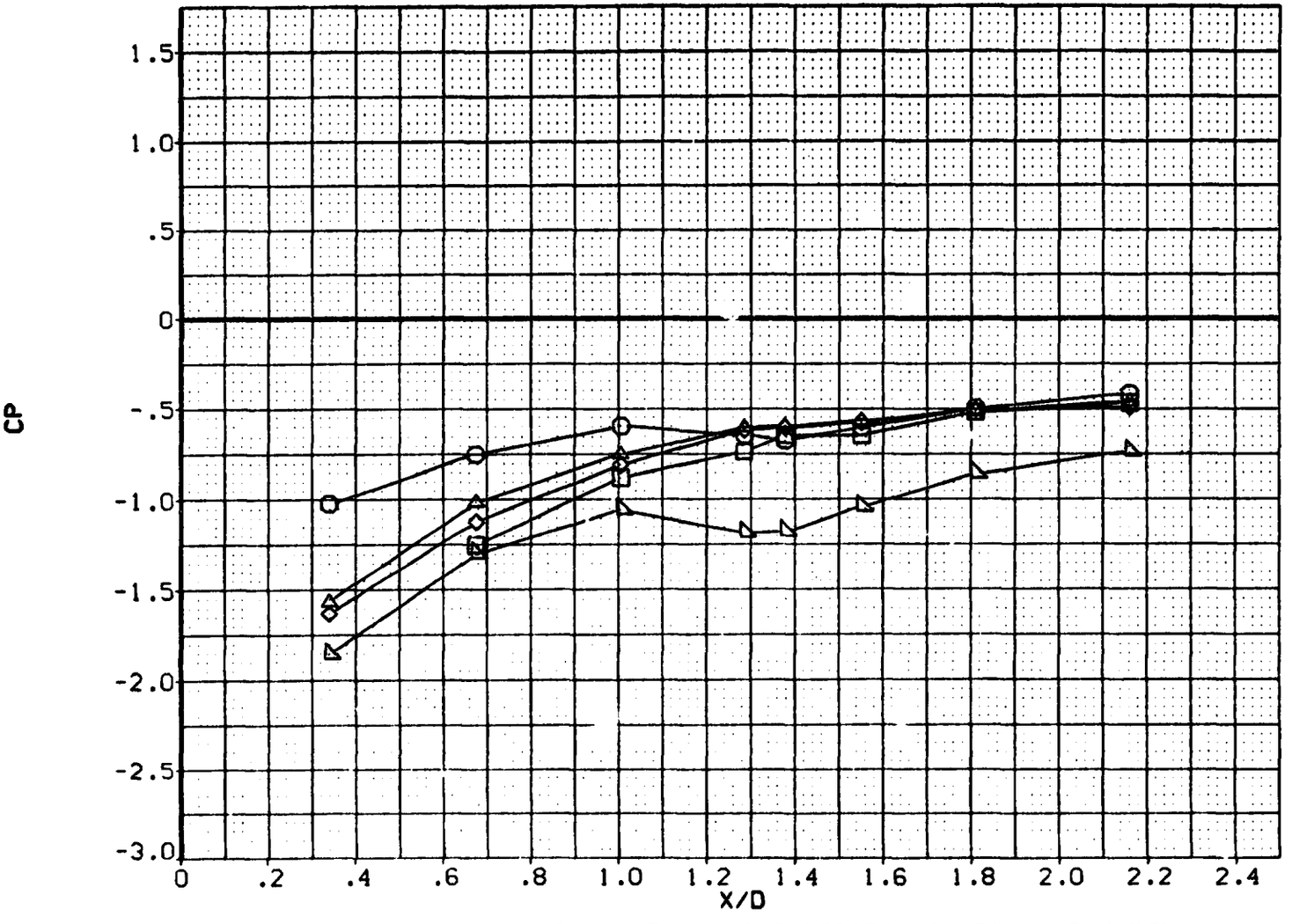
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	72.100	.600
□	22.500		
◇	45.000		
△	67.500		
◁	80.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

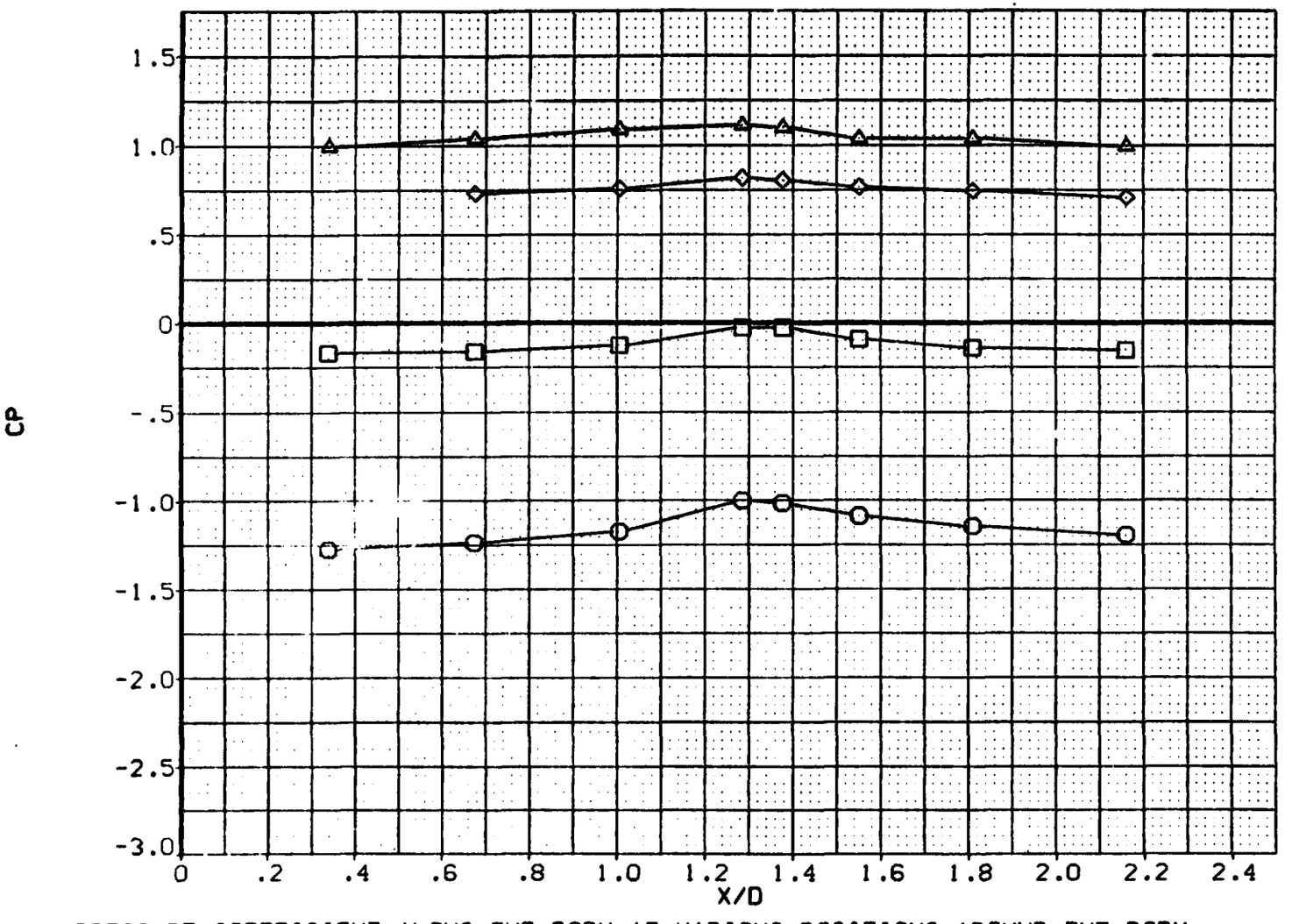
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	72.100	.600
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



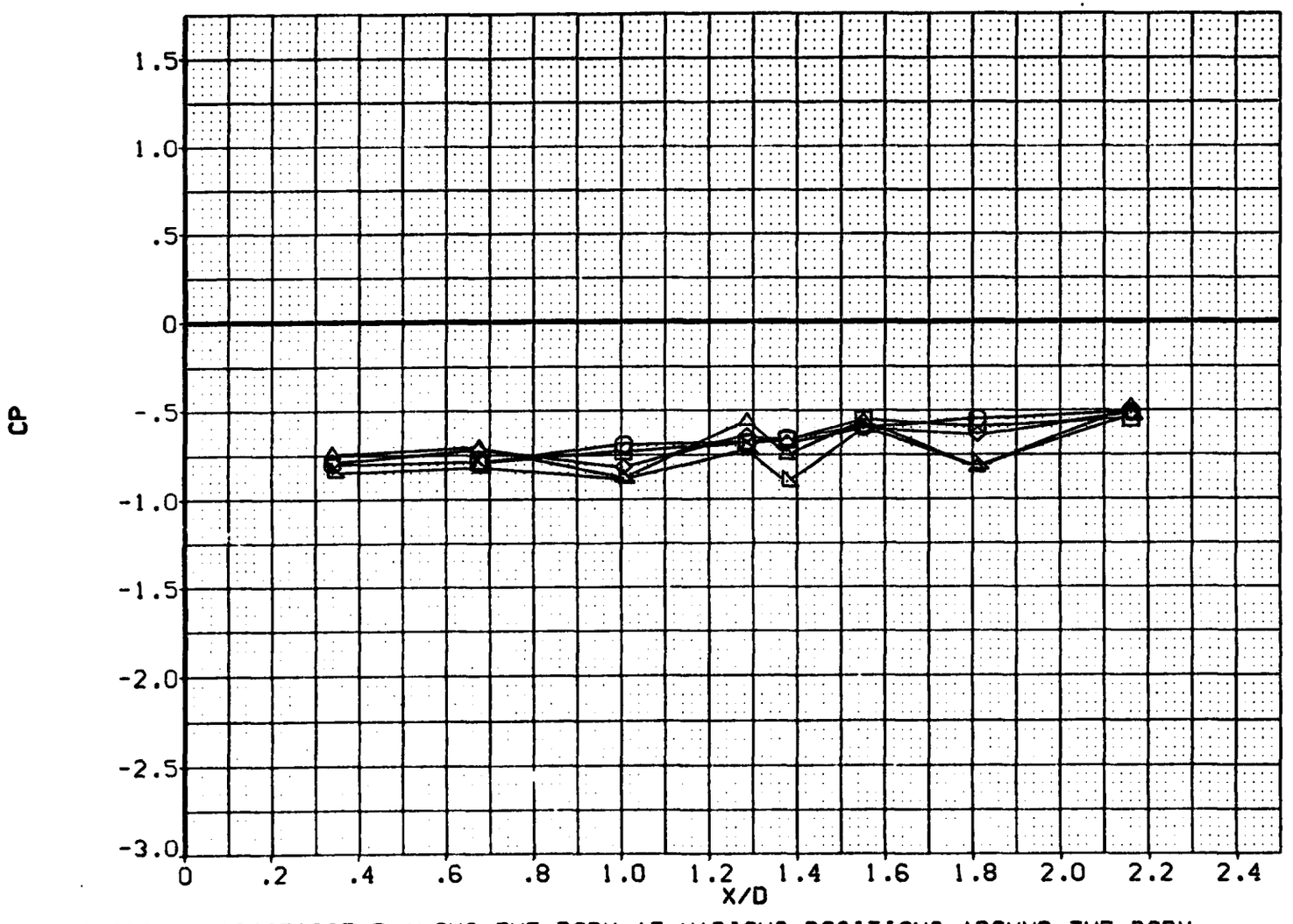
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	72.100	.760
□	22.500		
◇	45.000		
△	67.500		
▽	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

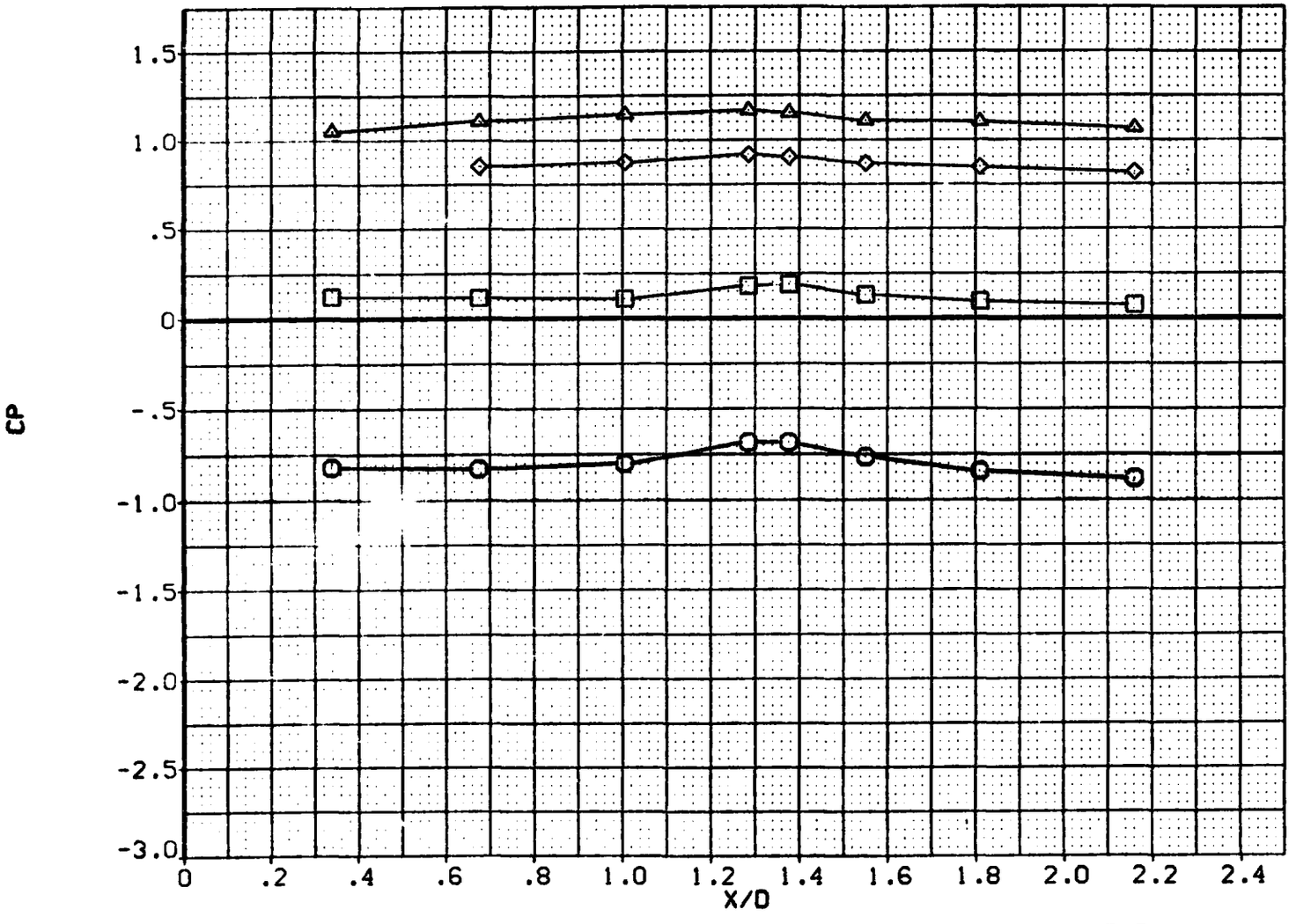
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	72.100	.760
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

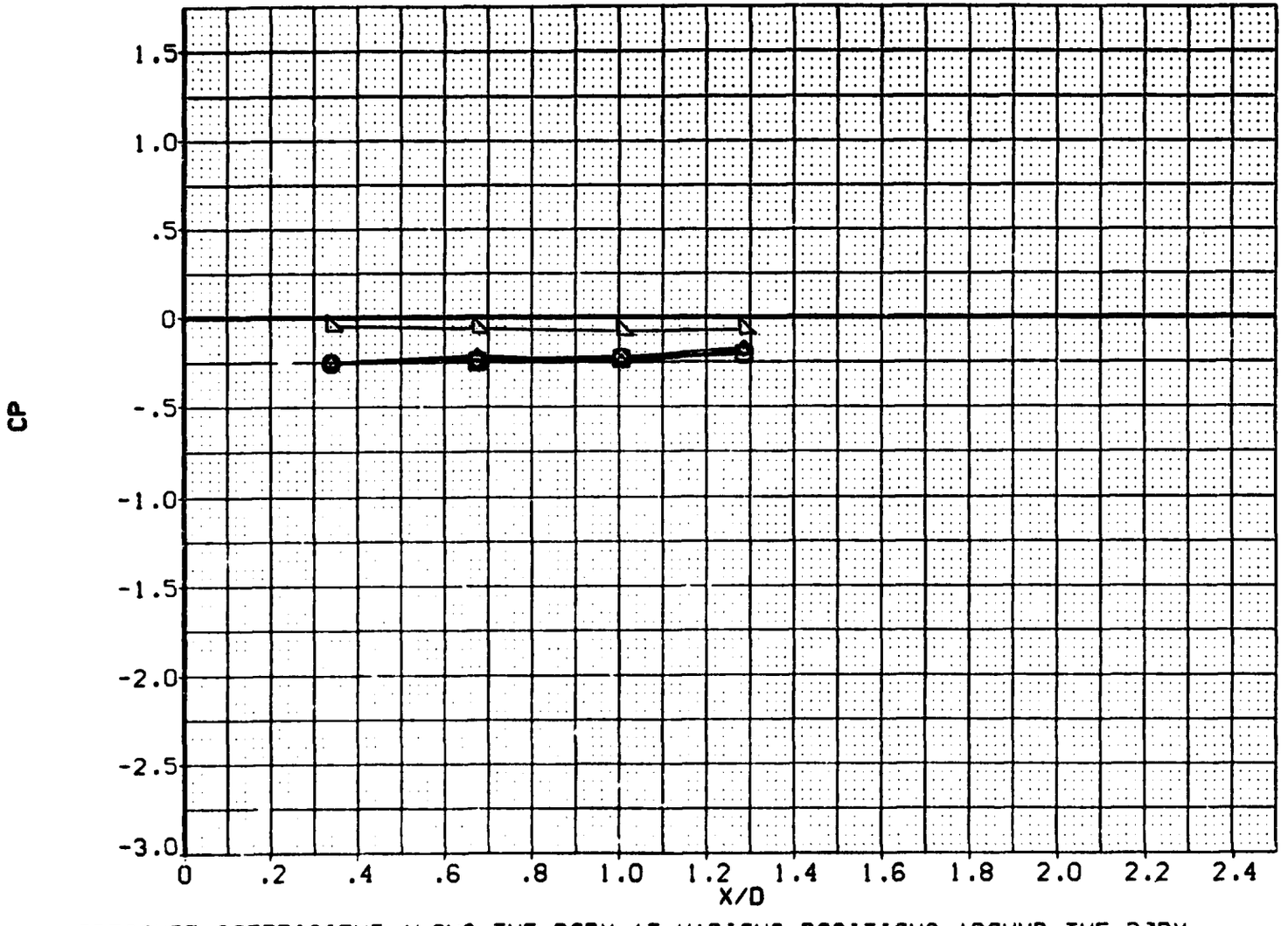
MSFC [illegible]WT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E103)

SYMBOL	THETA	ALPHA	MACH
○	.000	72.000	2.000
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



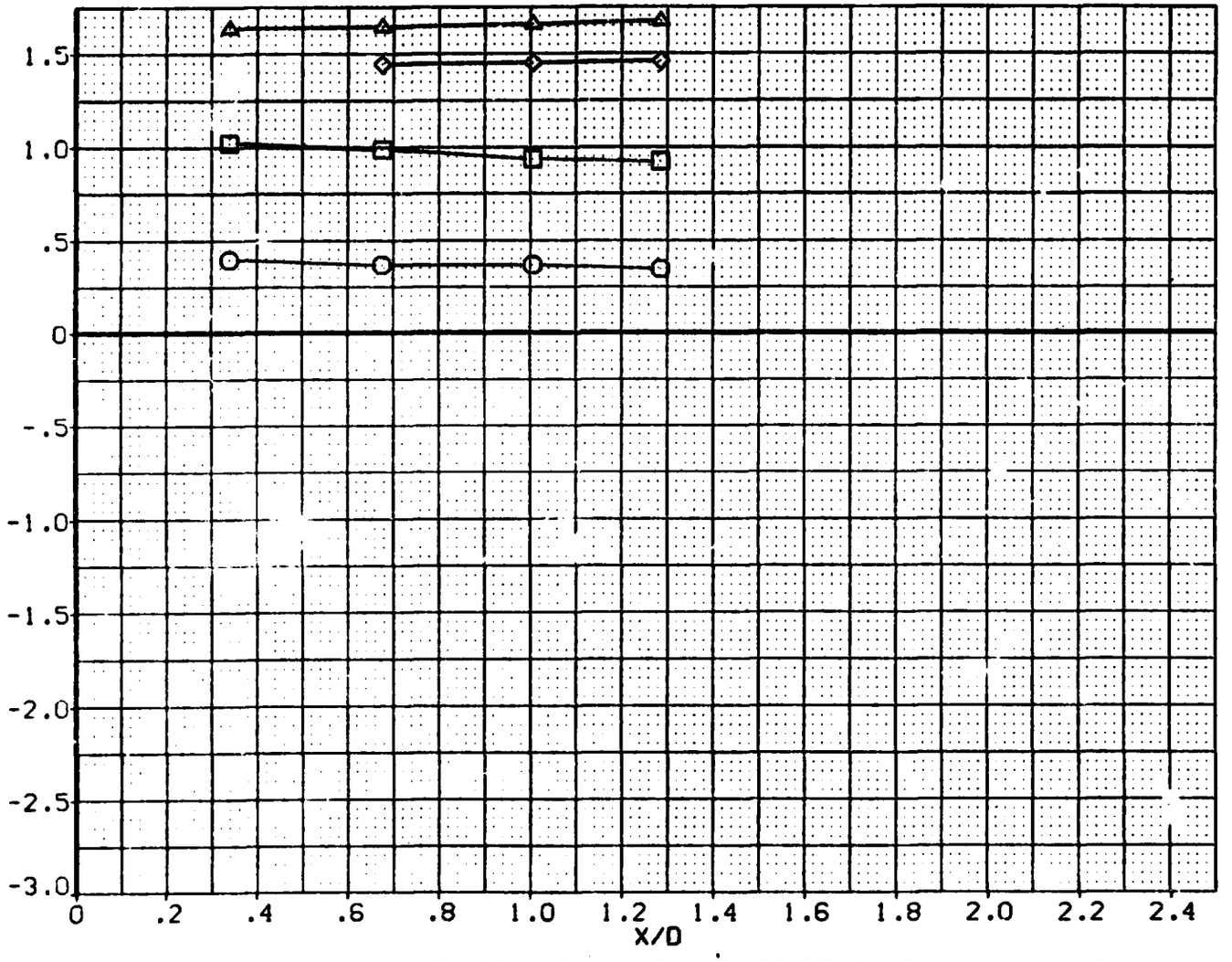
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E103)

SYMBOL	THETA	ALPHA	MACH
○	112.500	72.000	2.000
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	9.000		



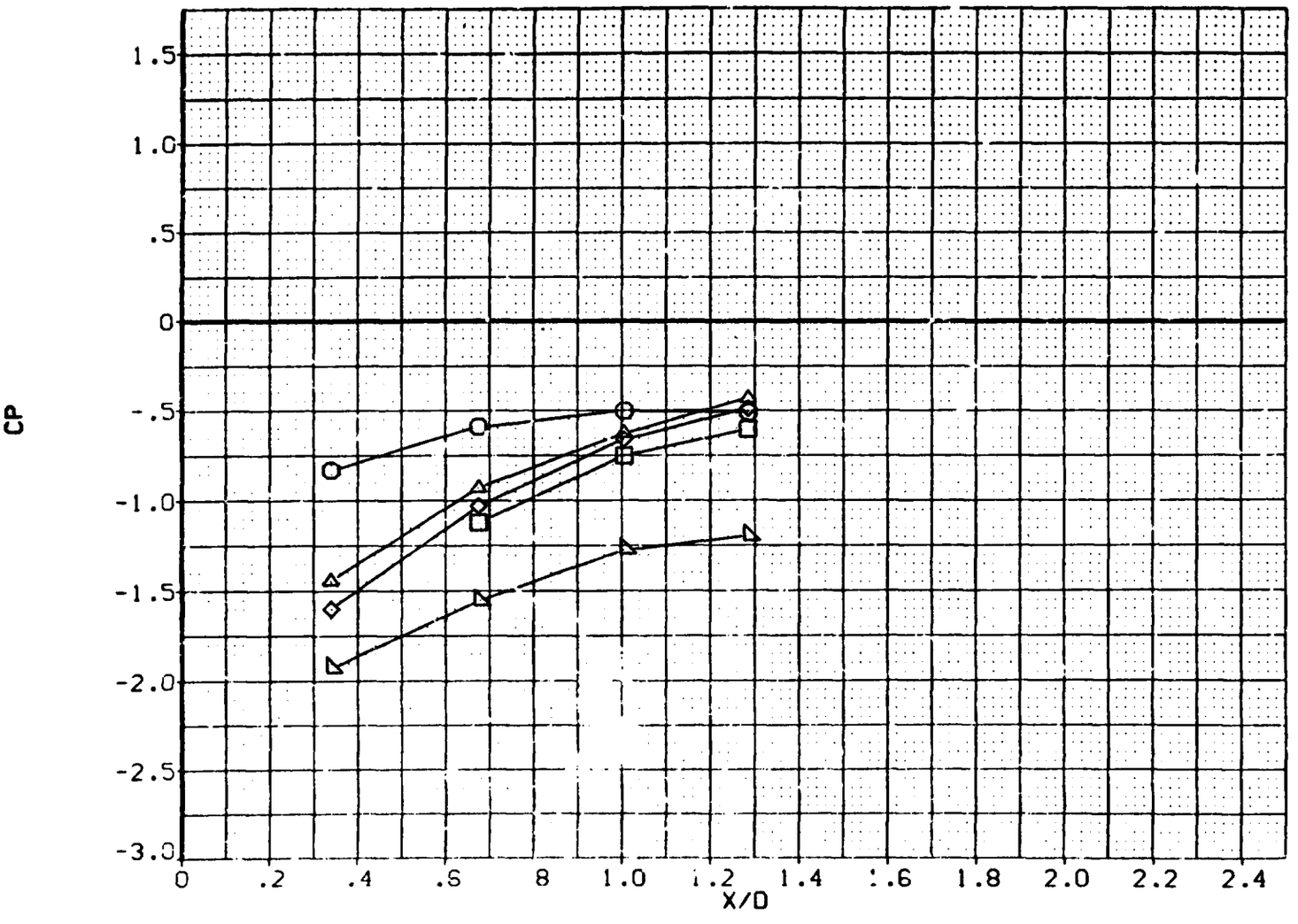
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (CA29F) SR. FORWARD NOSE SECTION (B1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	80.000	.510
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

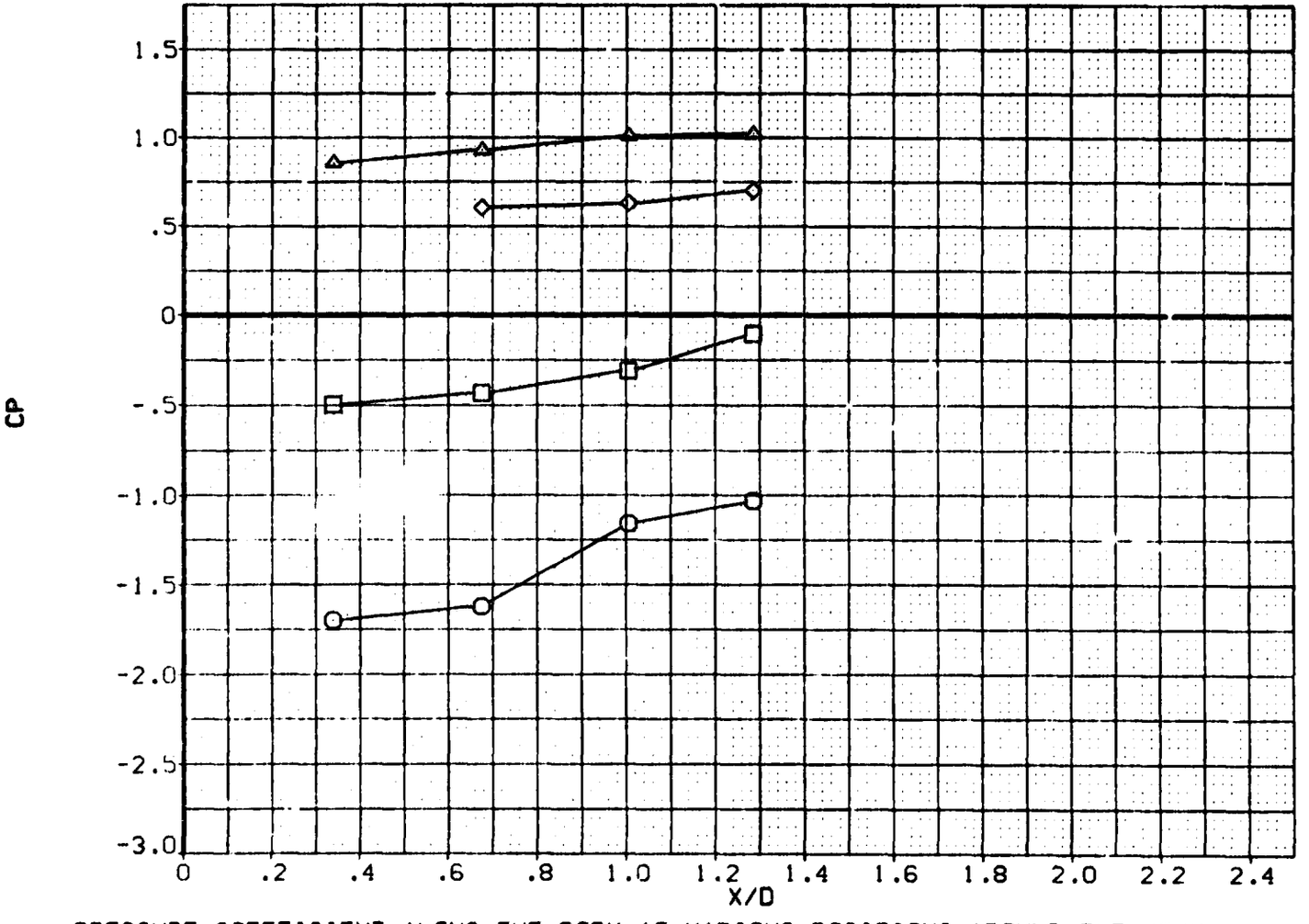
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	80.000	.510
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

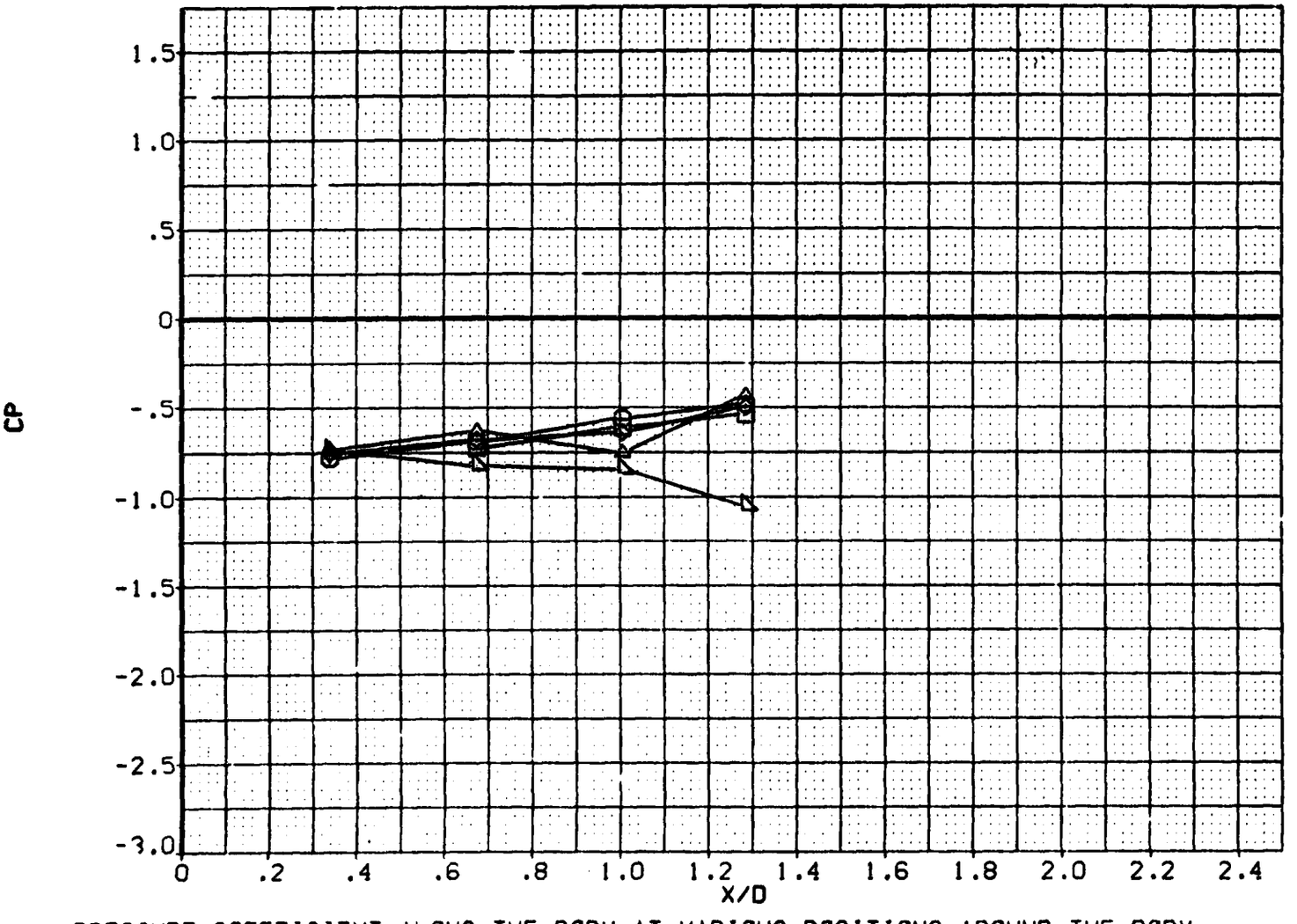
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	80.000	.600
□	22.500		
◇	45.000		
◁	67.500		
△	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

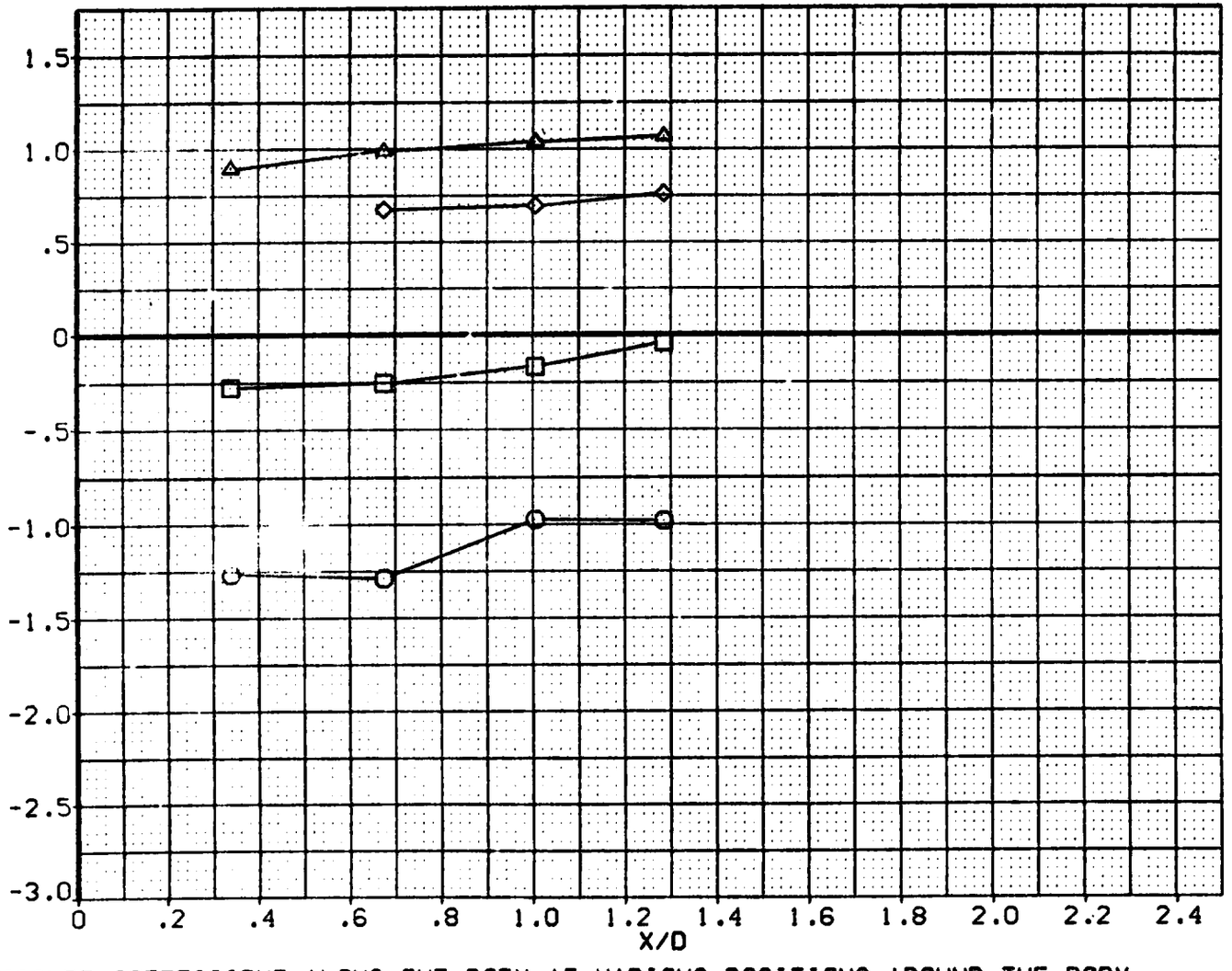
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	80.000	.600
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

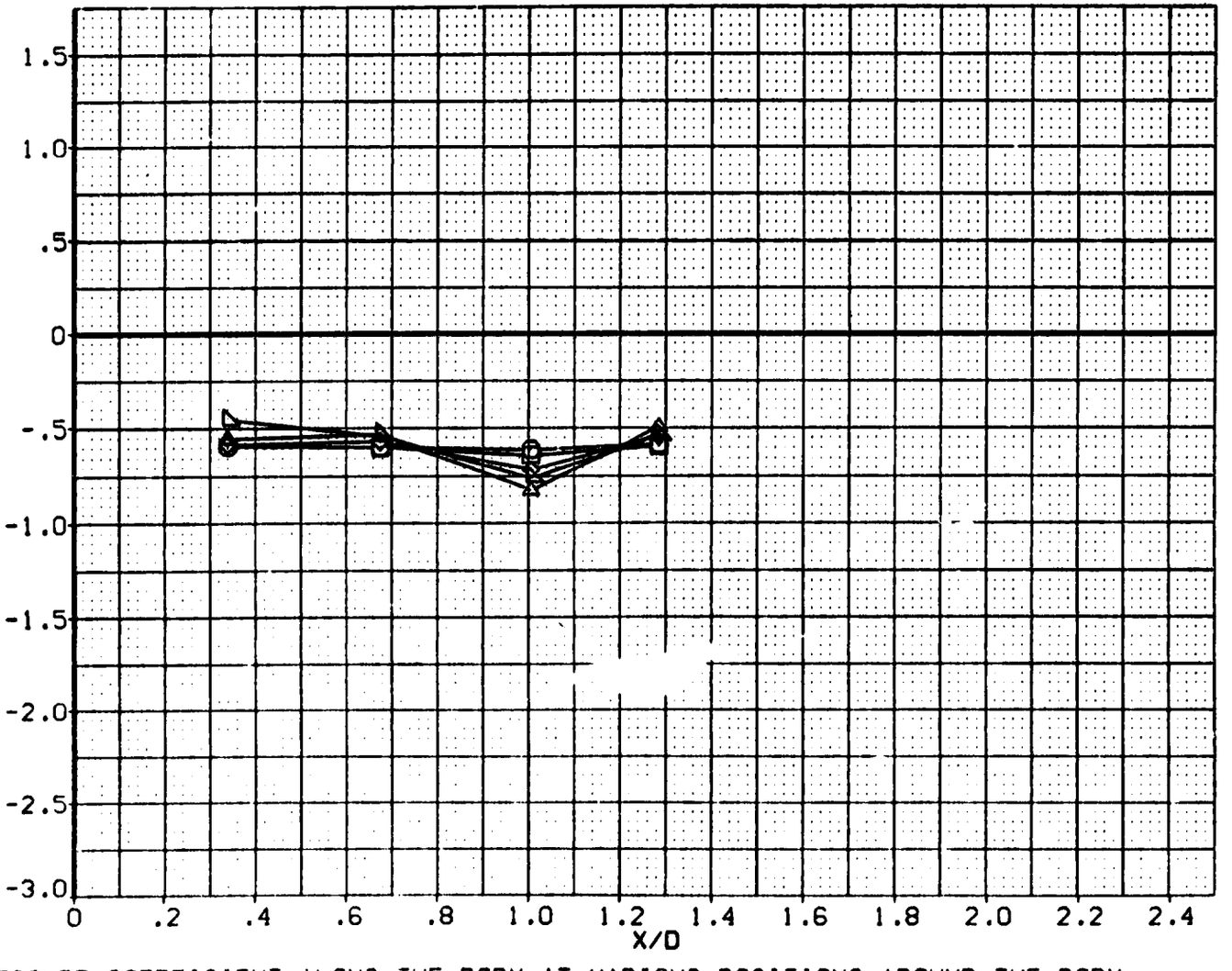
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	80.000	.790
□	22.500		
◇	45.000		
⊲	67.500		
△	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

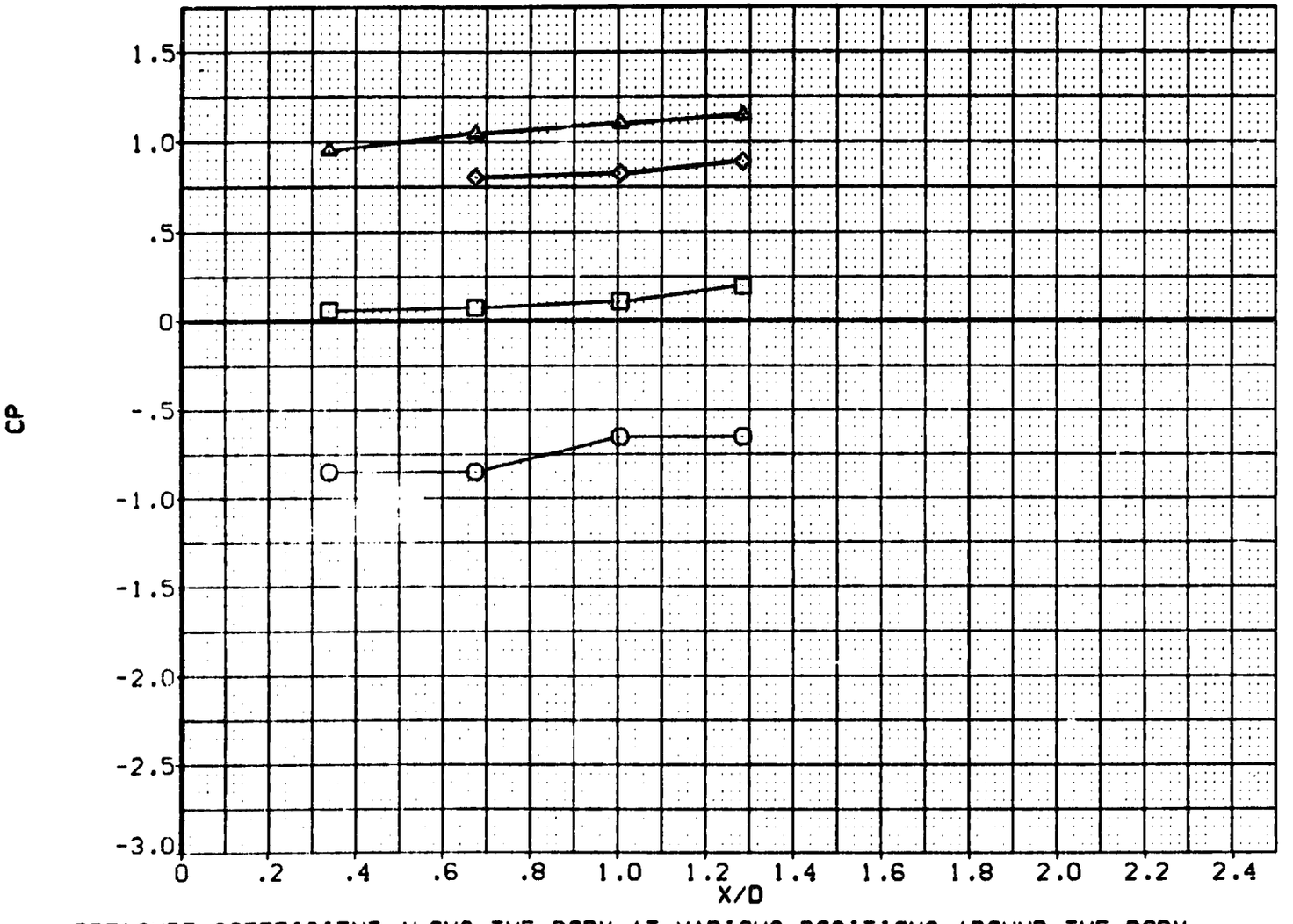
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	60.000	.790
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

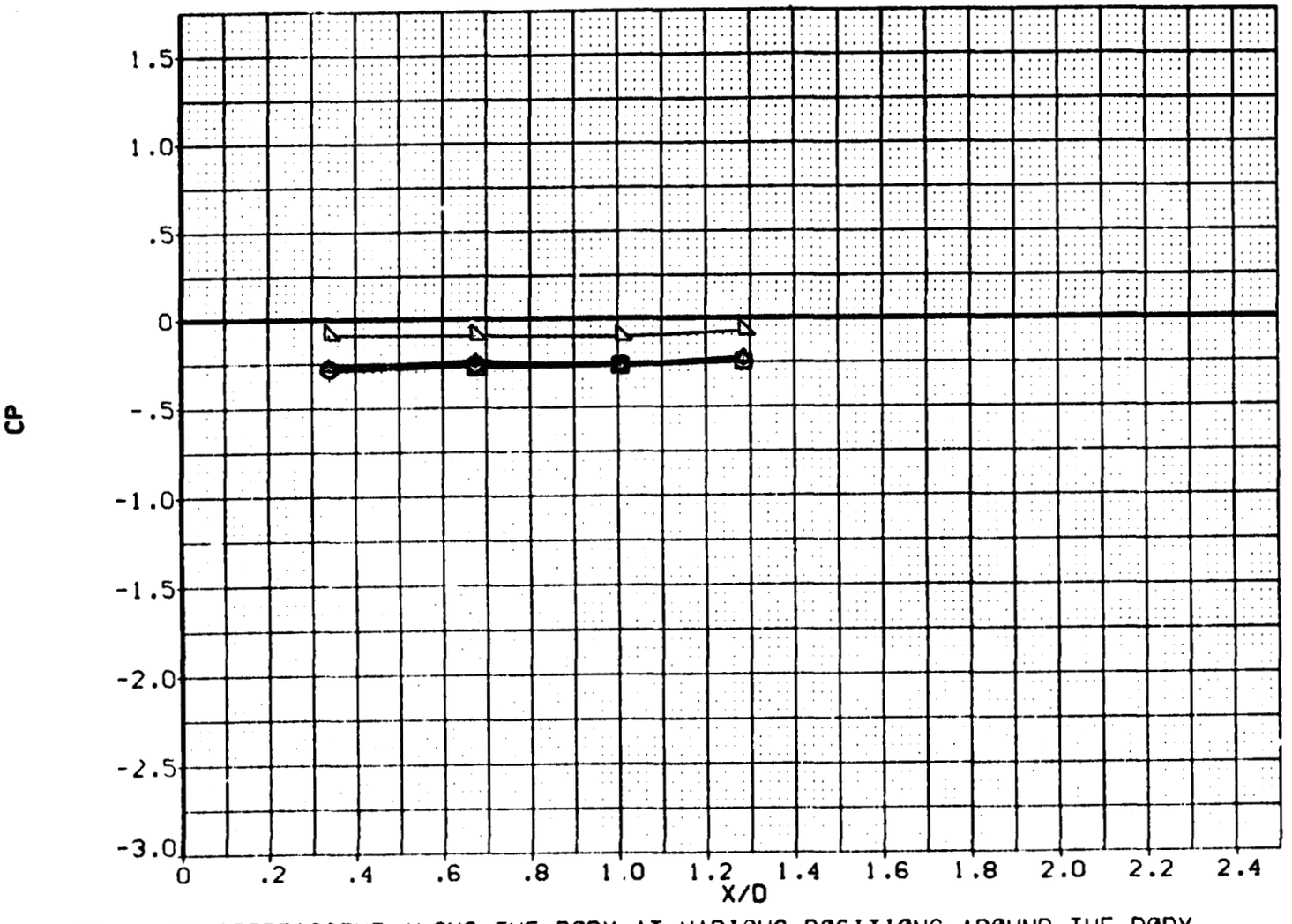
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E103)

SYMBOL	THETA	ALPHA	MACH
○	.000	80.000	2.000
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

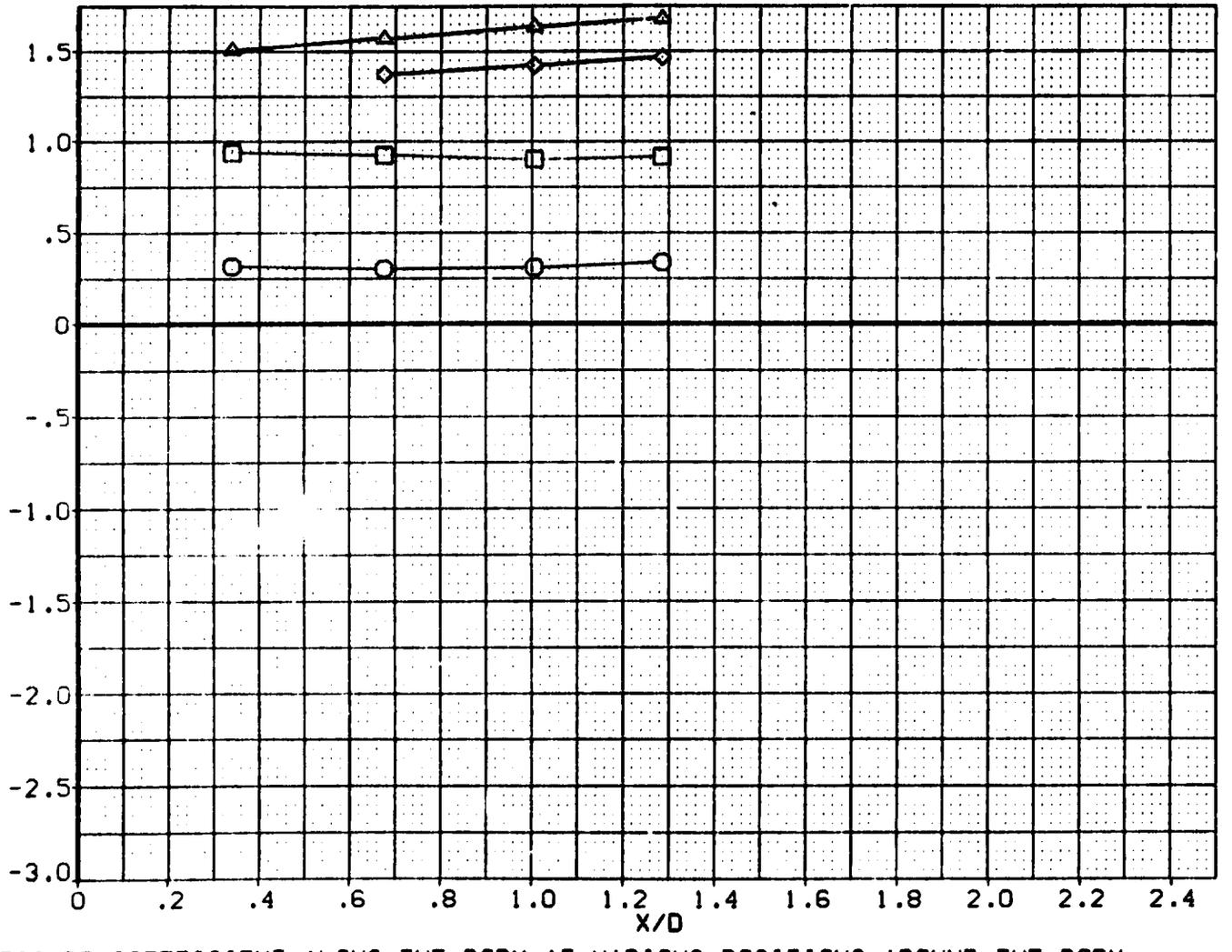
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E103)

SYMBOL	THETA	ALPHA	MACH
○	112.500	80.000	2.000
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

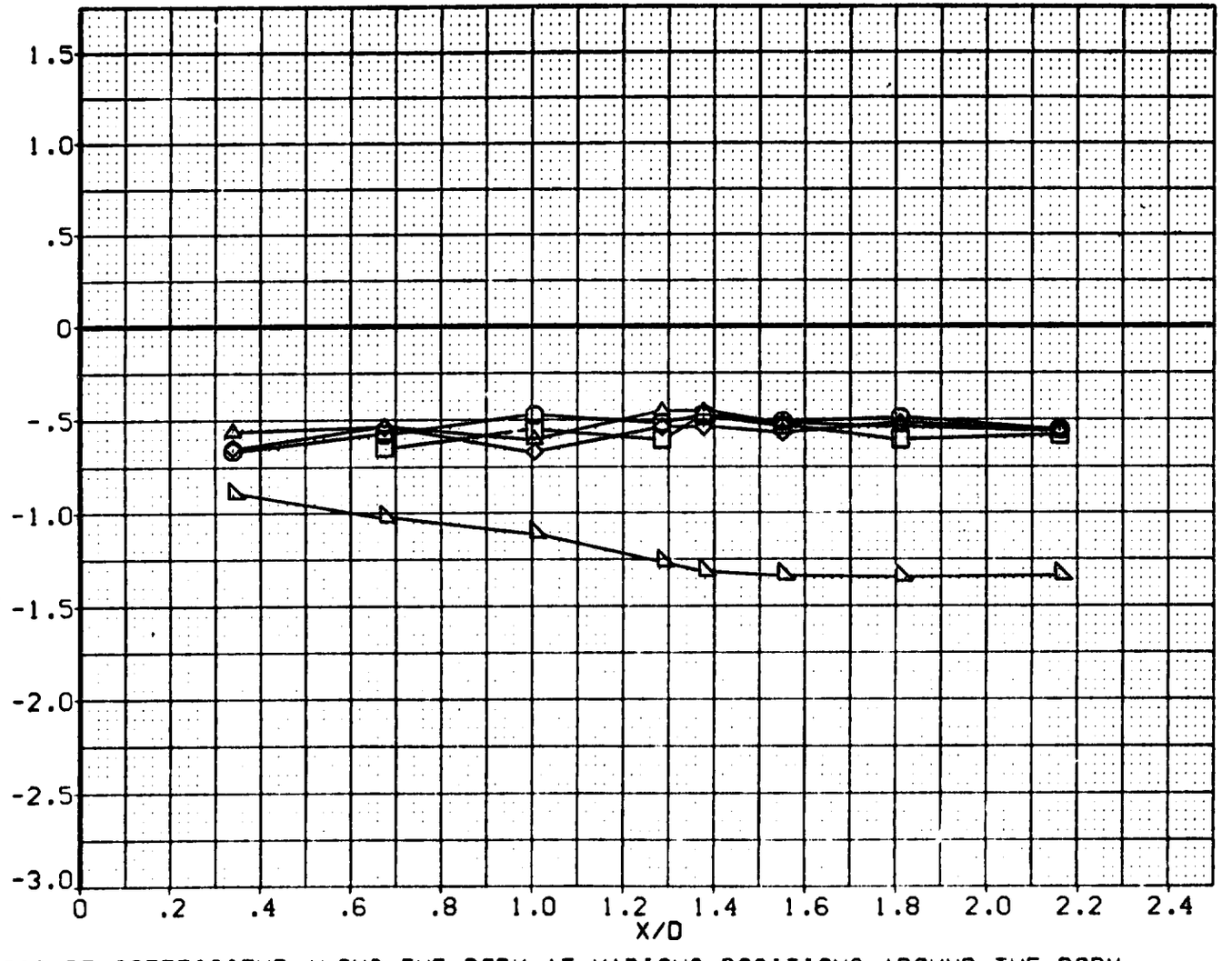
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	90.000	.400
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

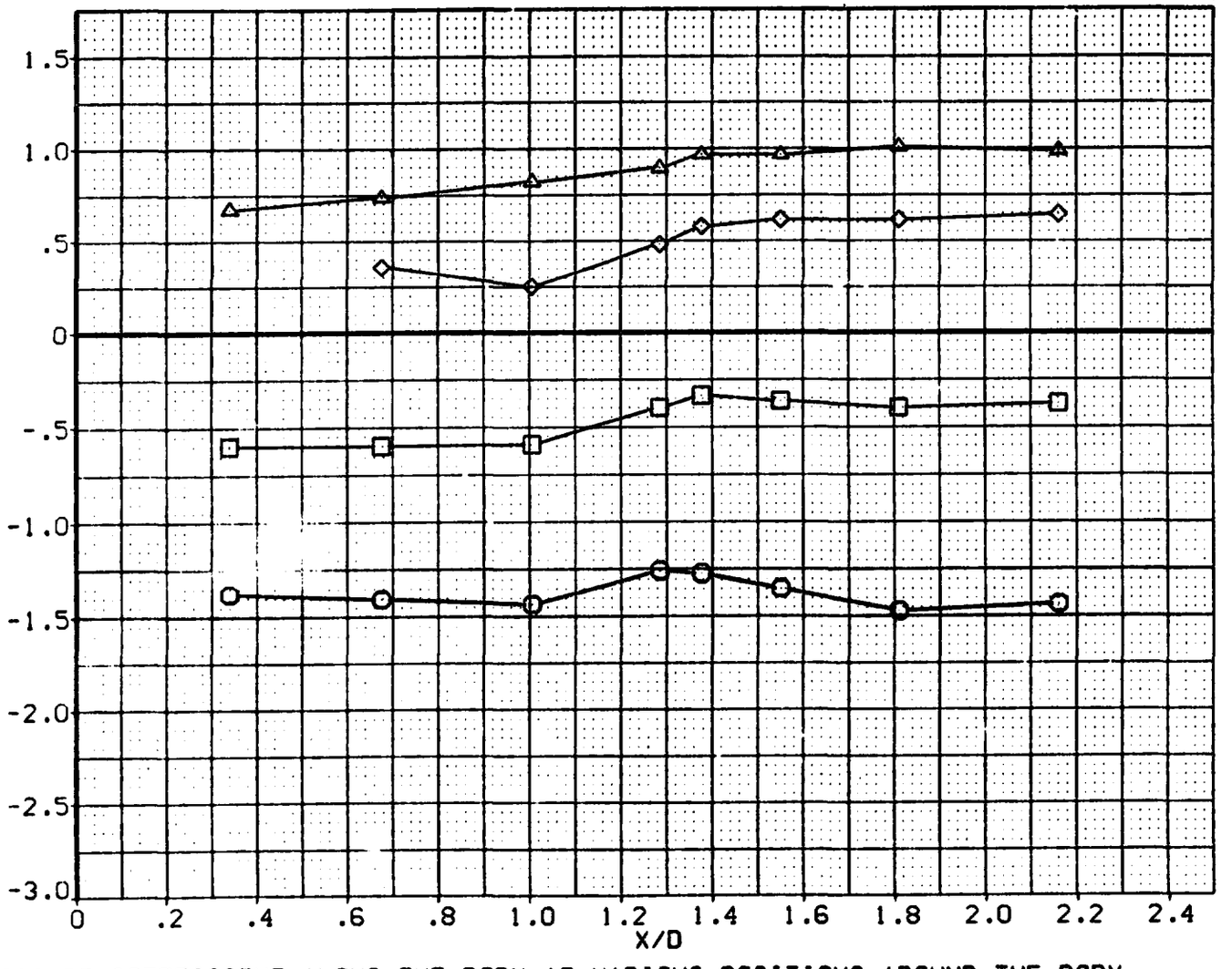
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	90.000	.400
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



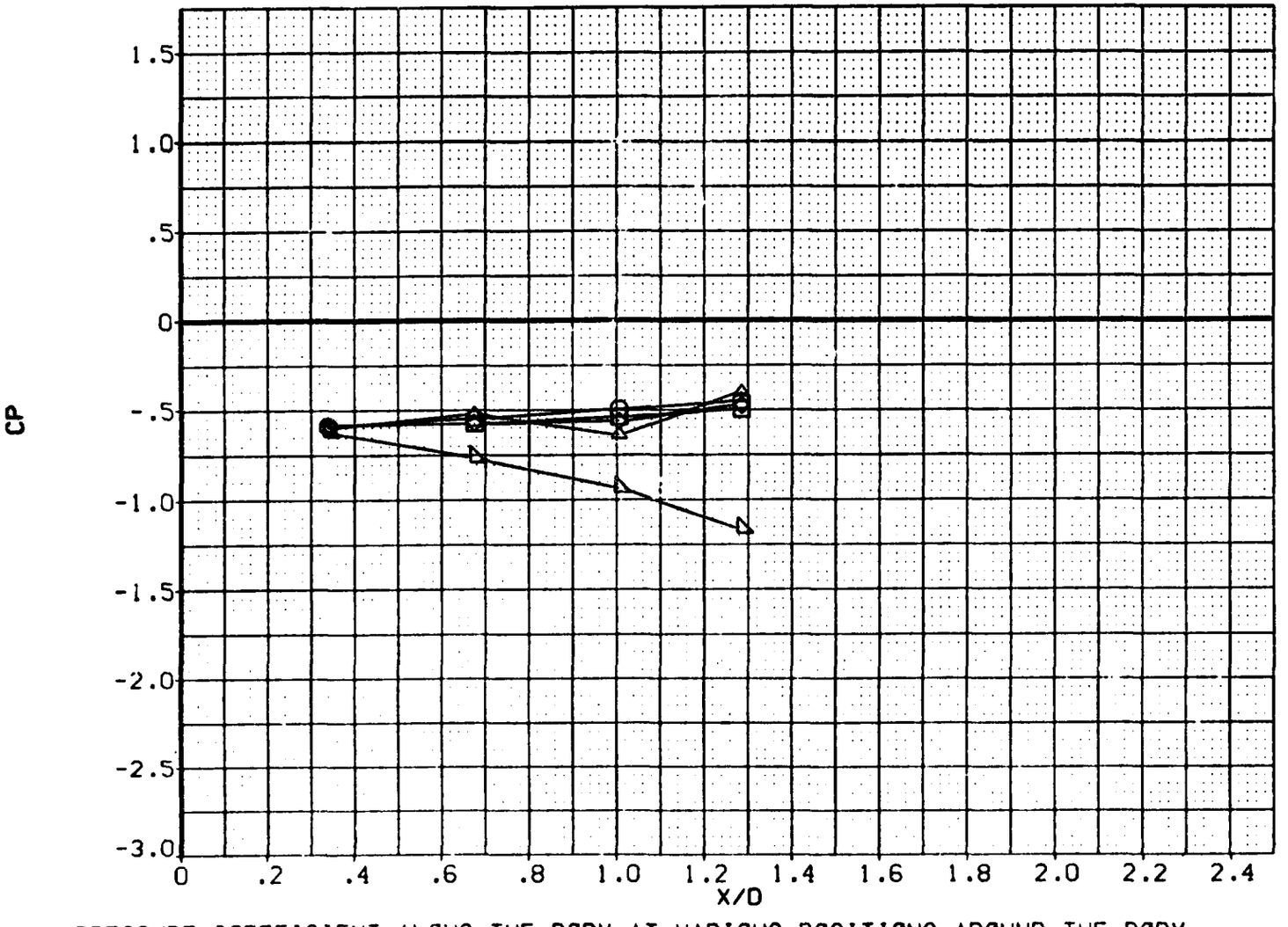
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	90.000	.490
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



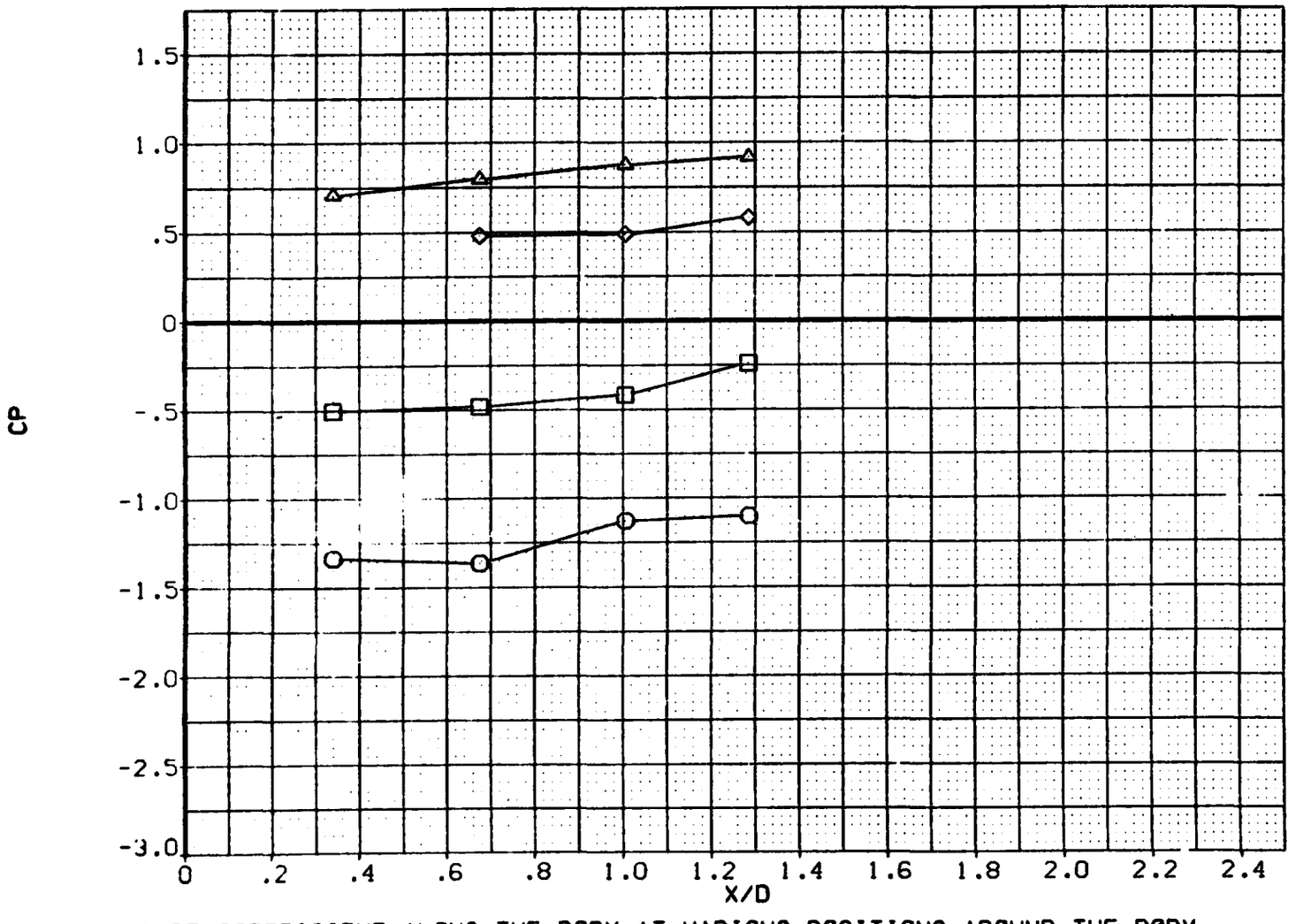
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	90.000	.490
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



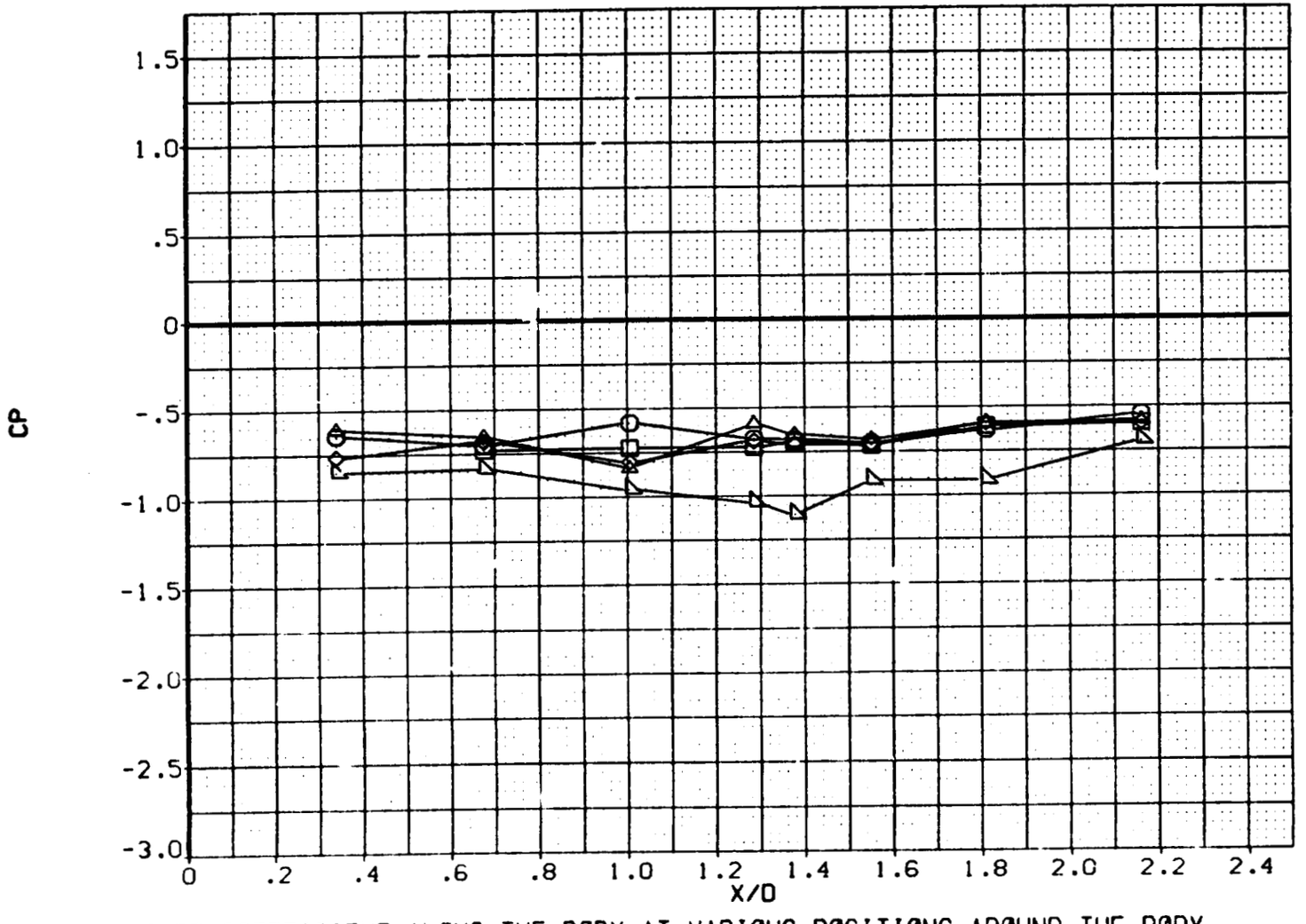
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	90.000	.600
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

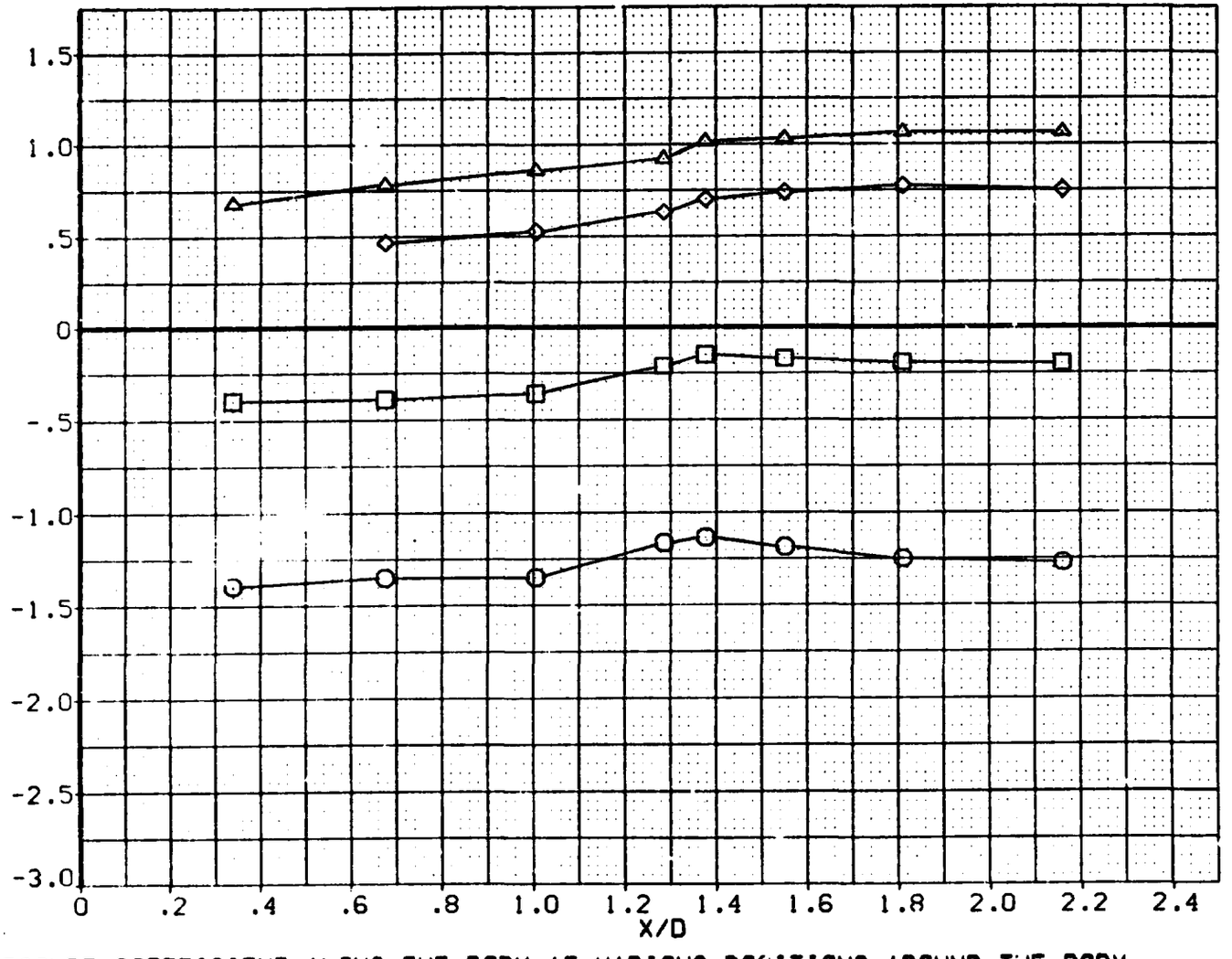
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	90.000	.600
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

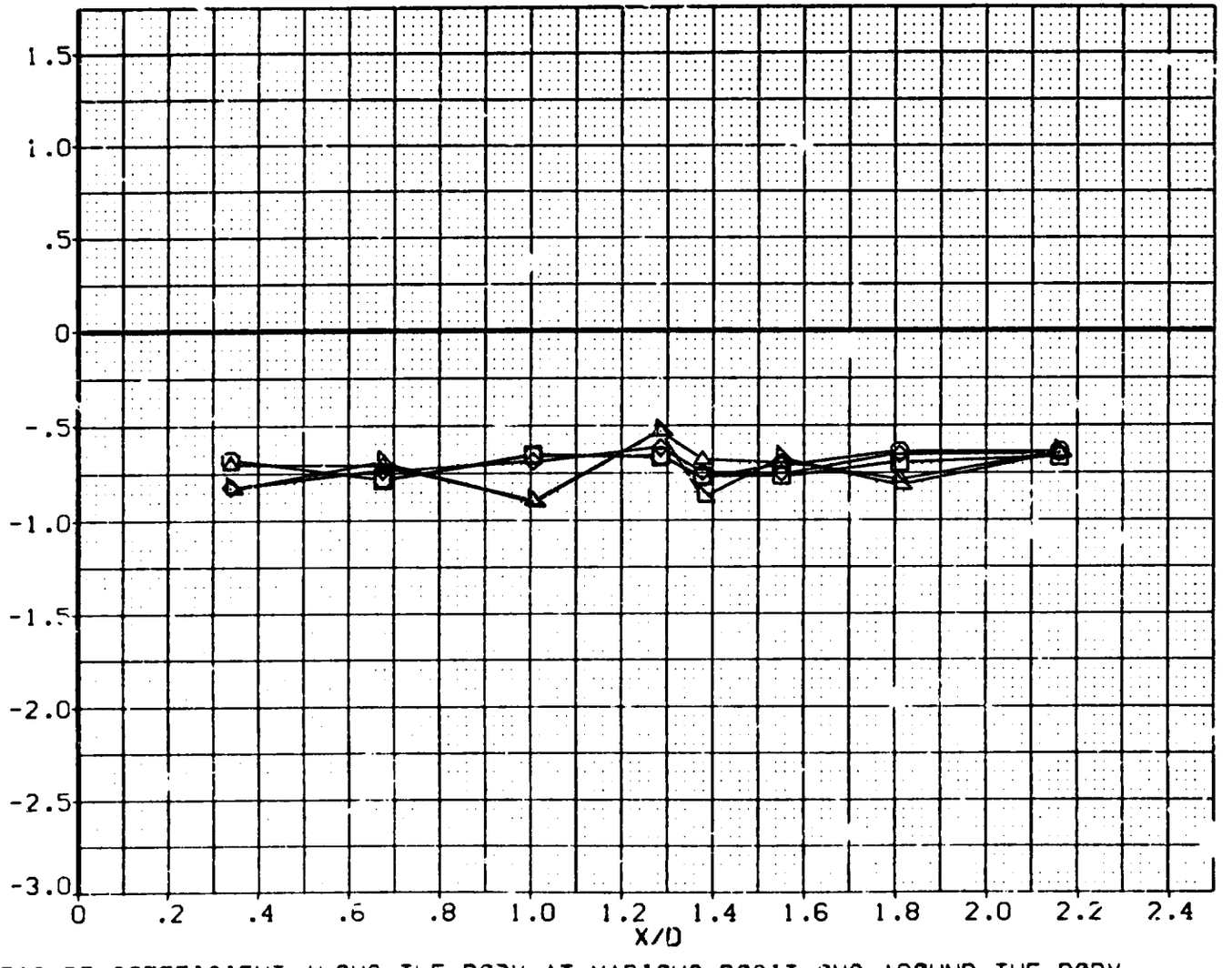
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	90.000	.780
□	22.500		
◇	45.000		
△	67.500		
▽	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

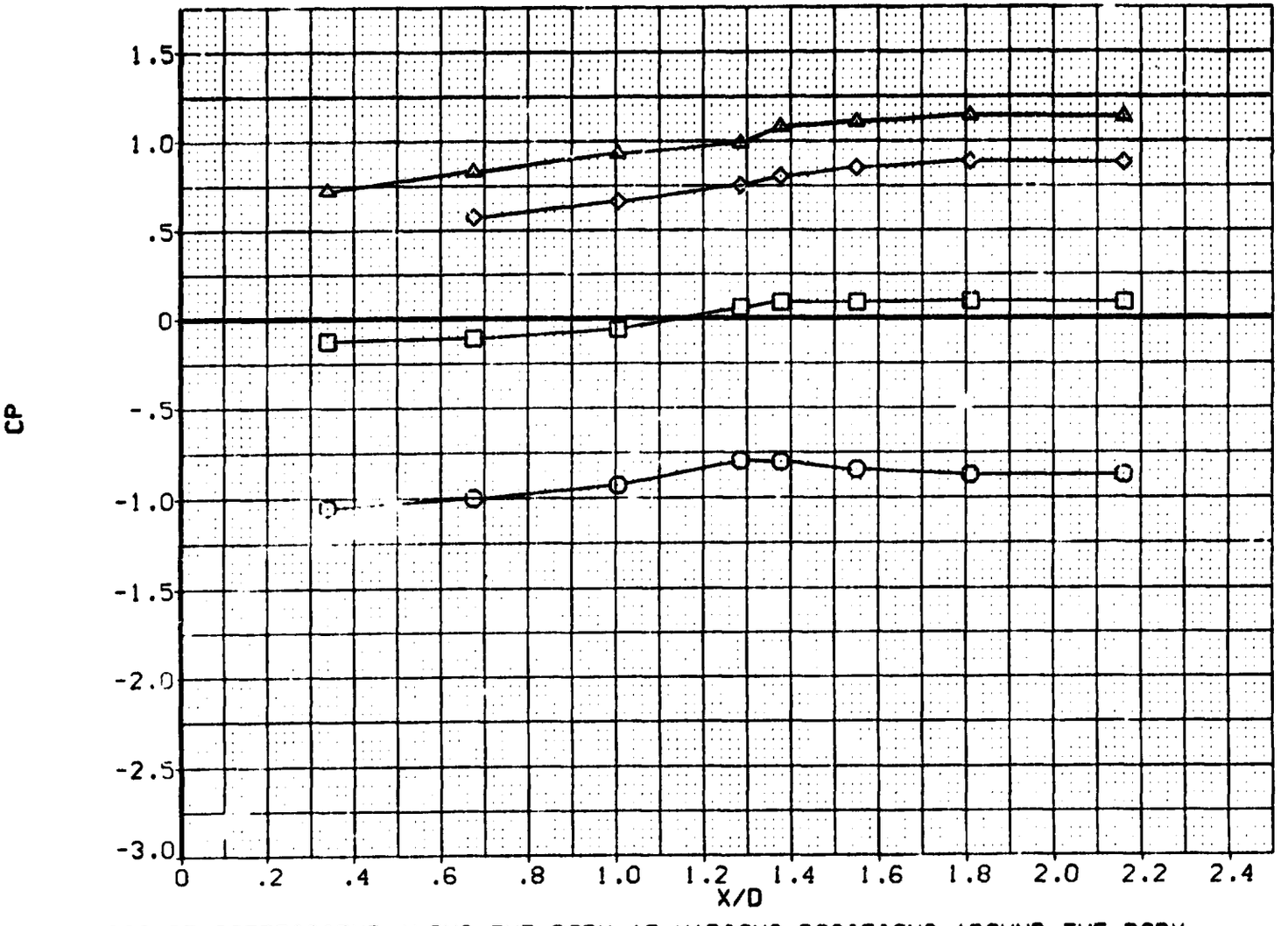
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	90.00	.780
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

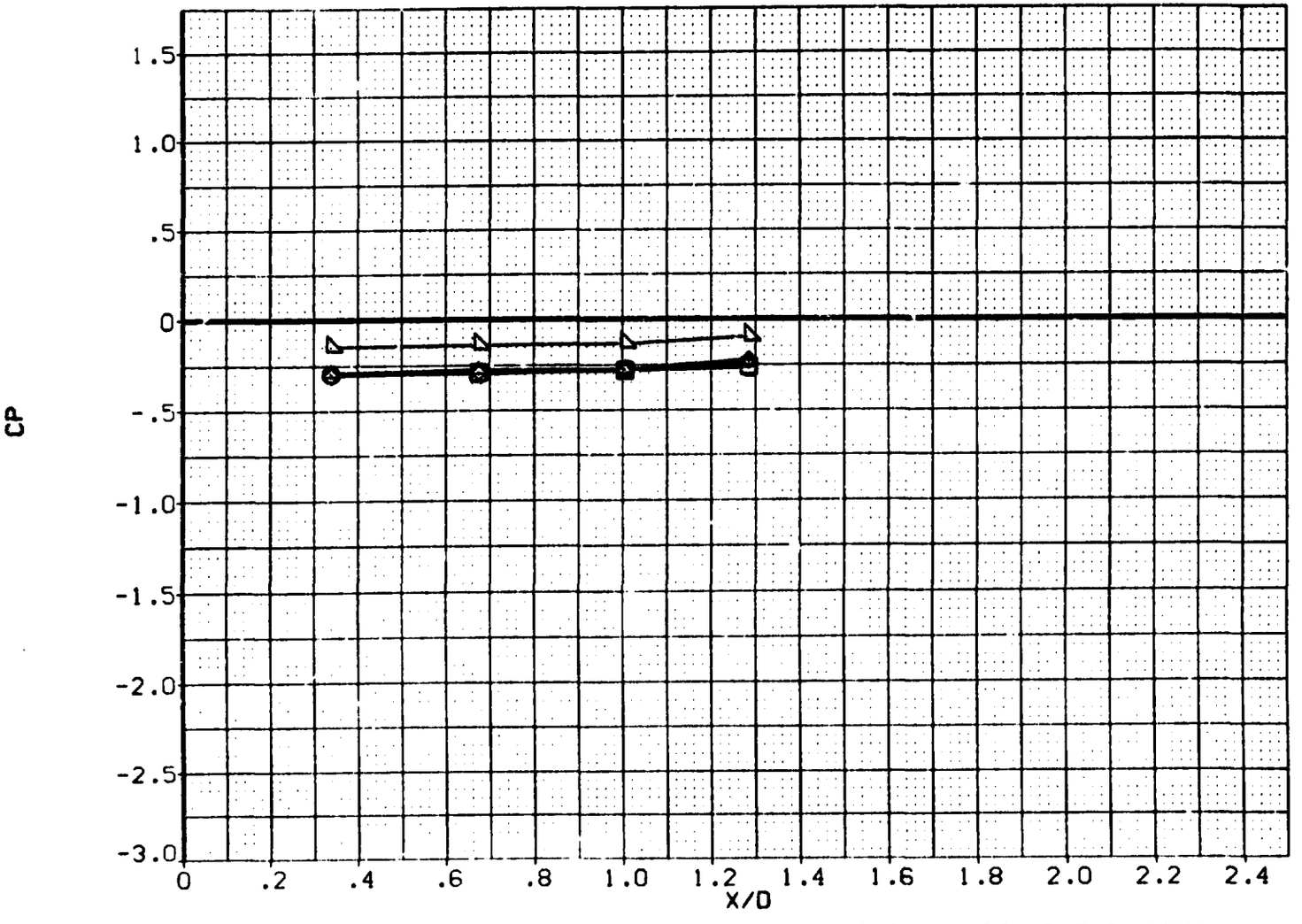
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E103)

SYMBOL	THETA	ALPHA	MACH
○	.000	90.000	2.000
□	22.500		
◇	45.000		
◁	67.500		
△	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



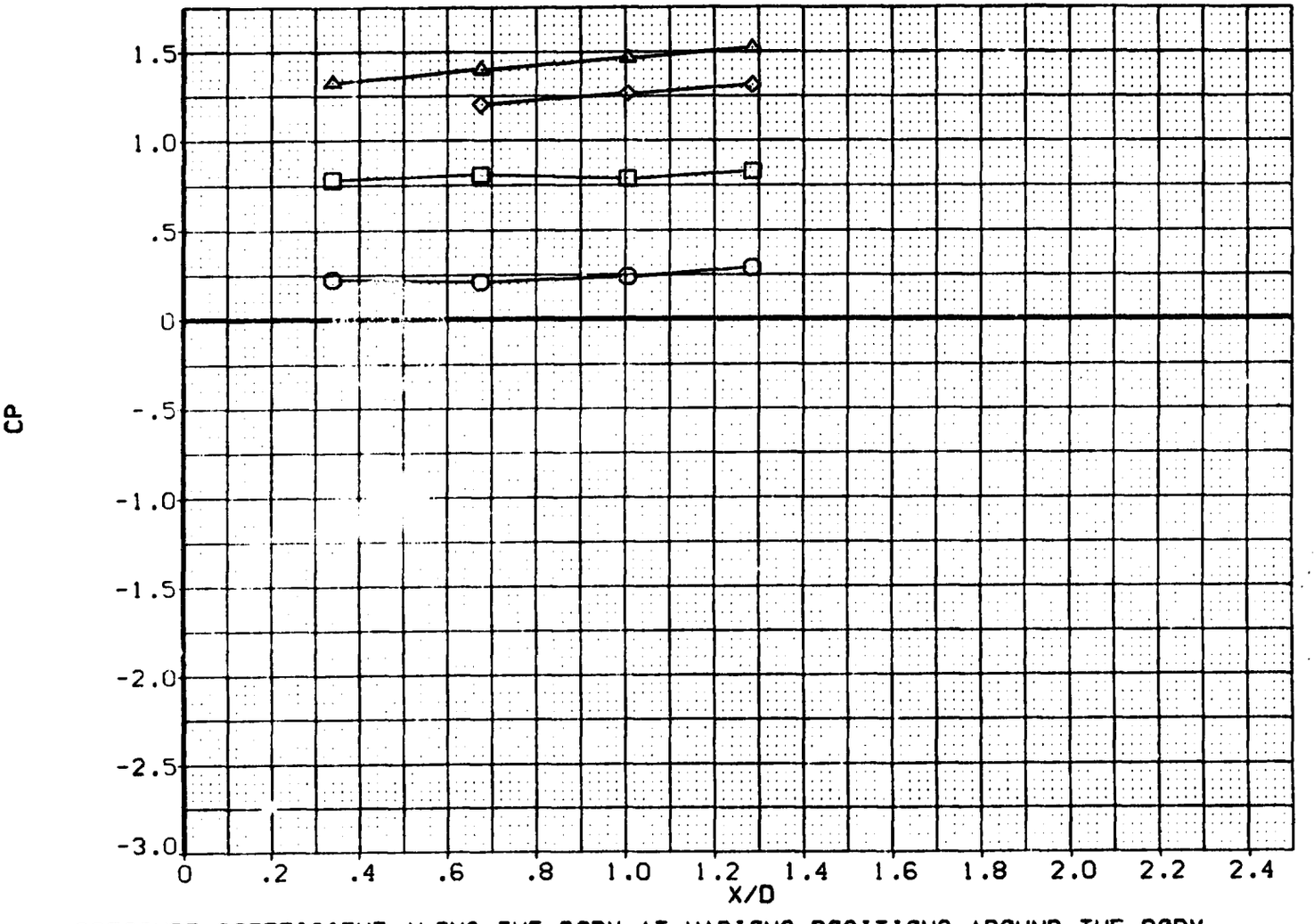
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E103)

SYMBOL	THETA	ALPHA	MACH
○	112.500	90.000	2.000
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	9.000		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

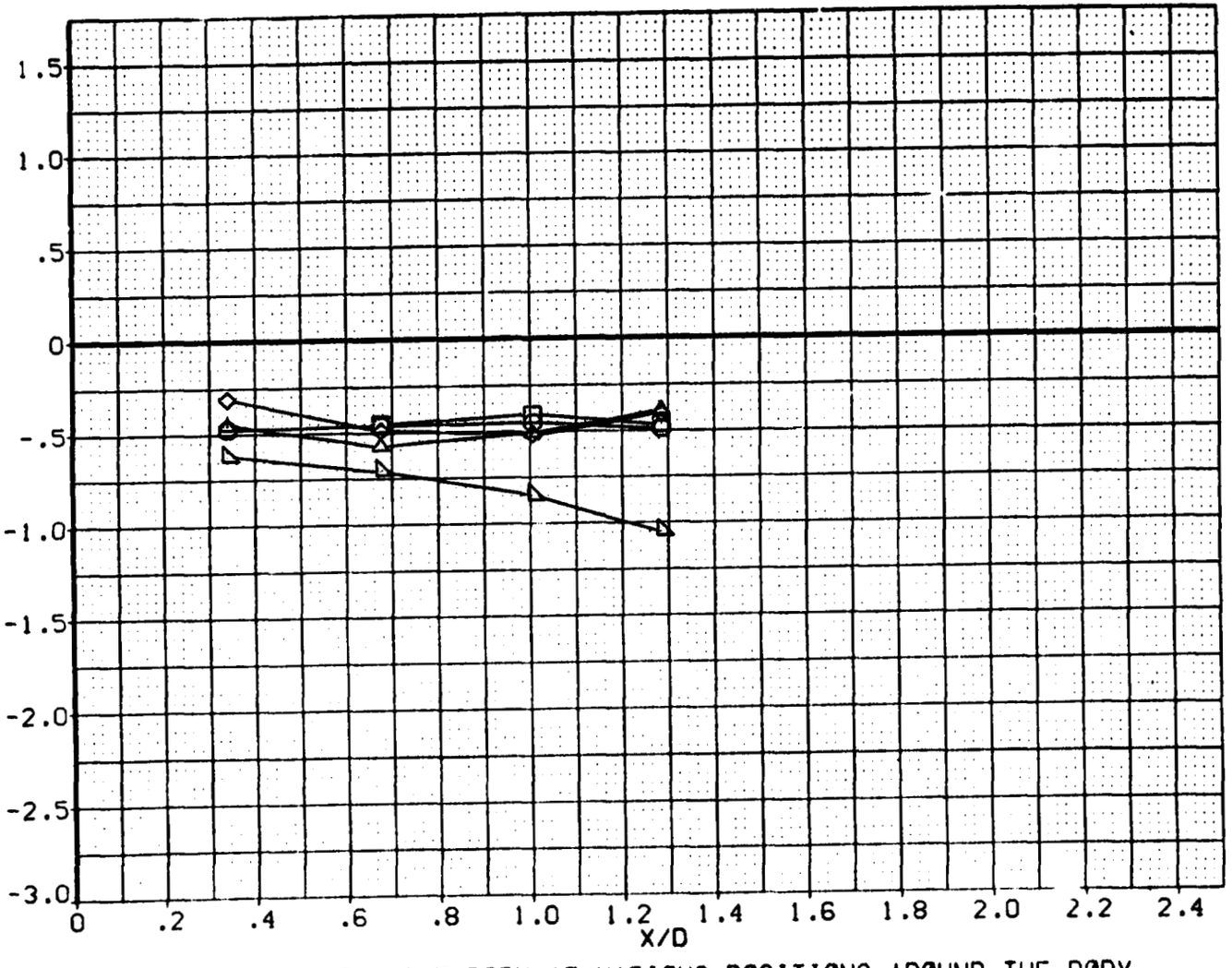
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	100.000	.500
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

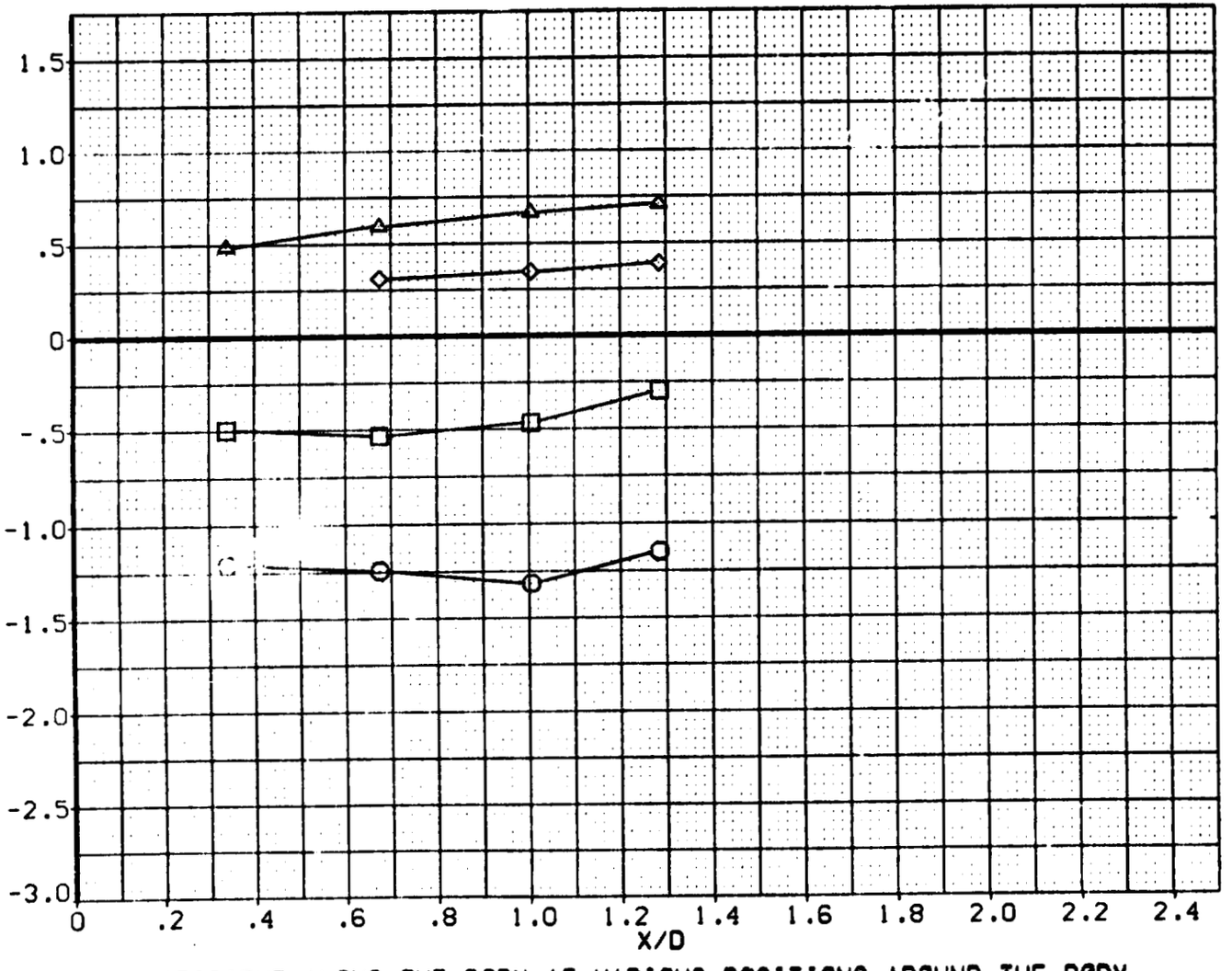
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	100.000	.500
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

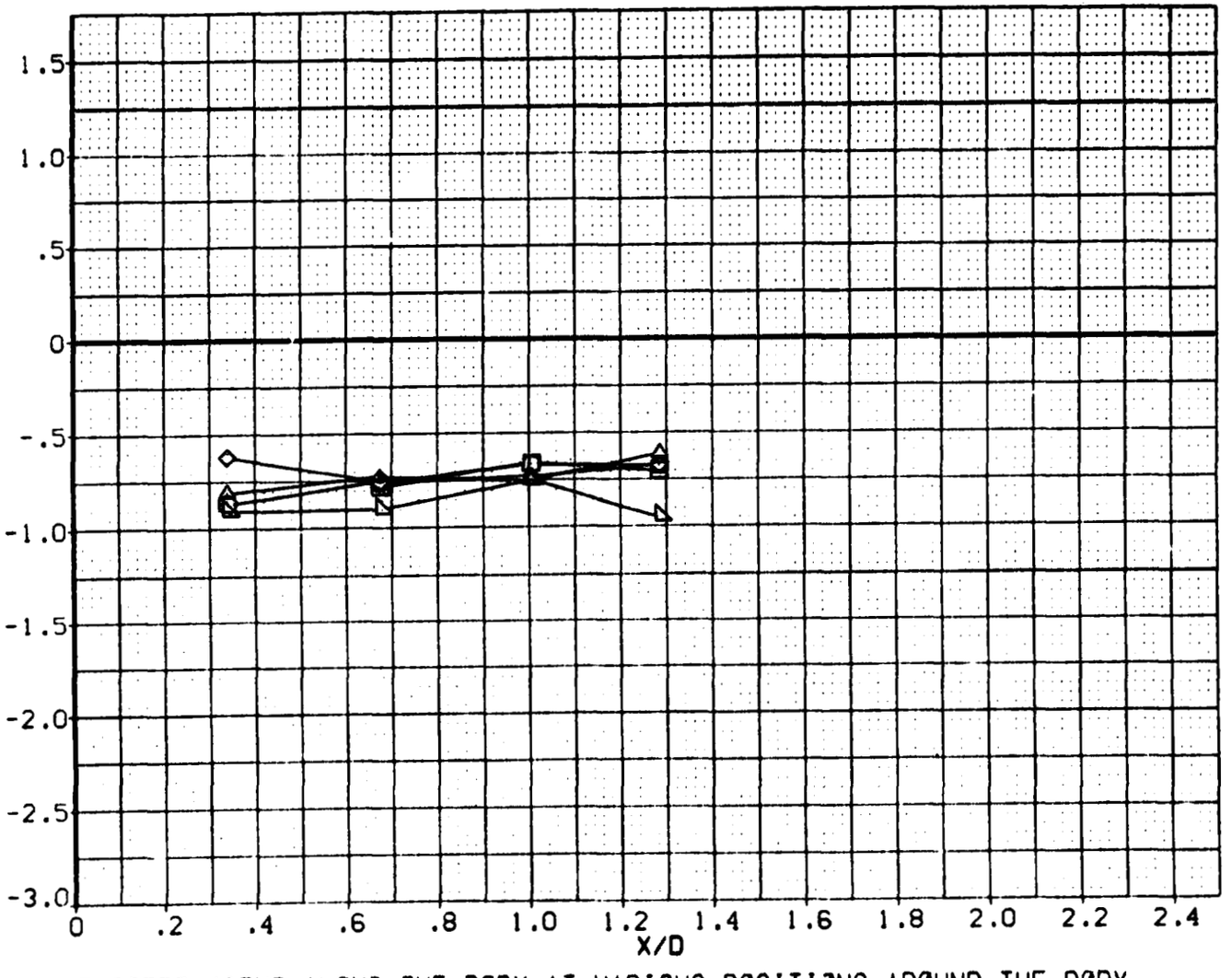
MSFC HRWI 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	100.000	.600
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



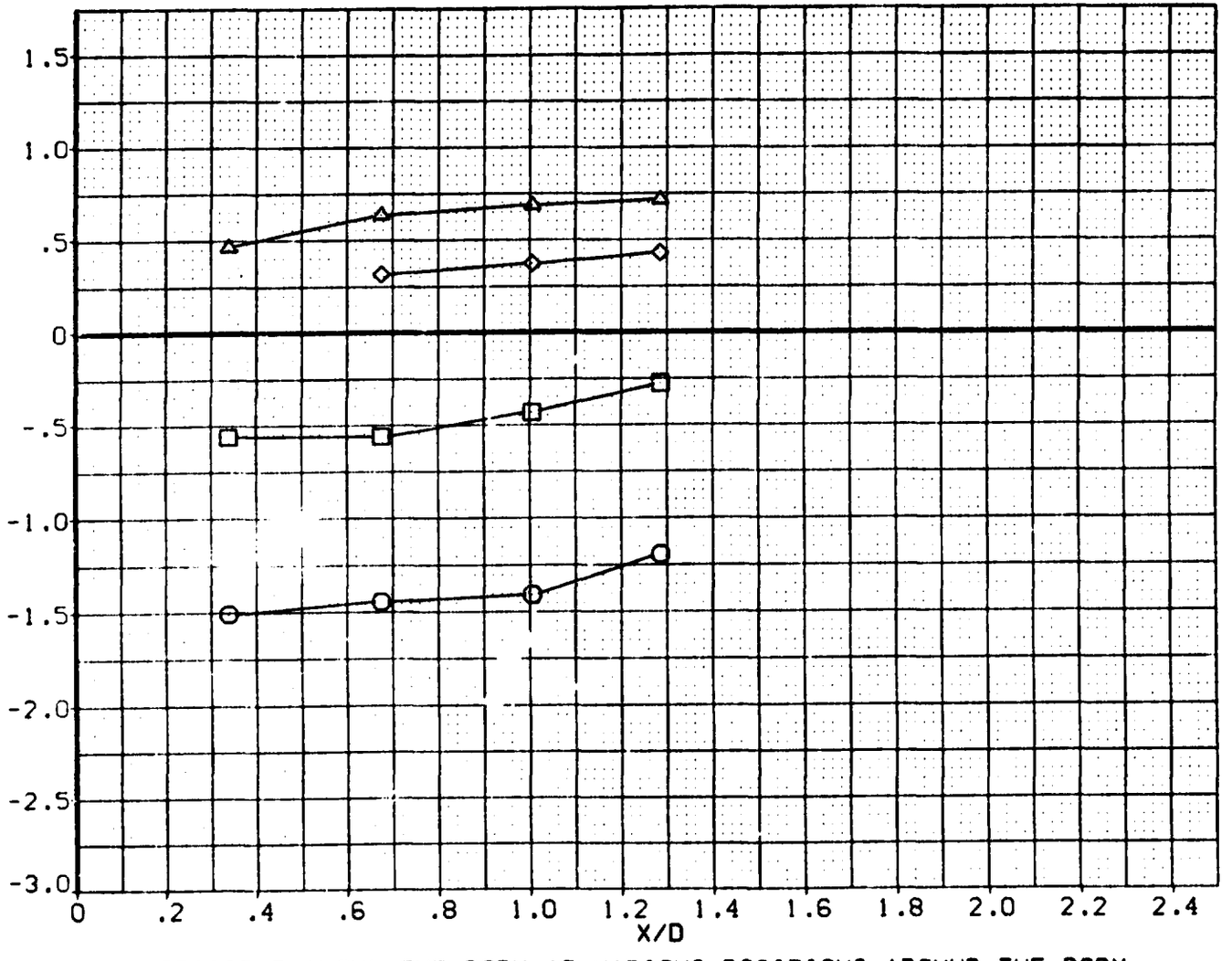
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	100.000	.600
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



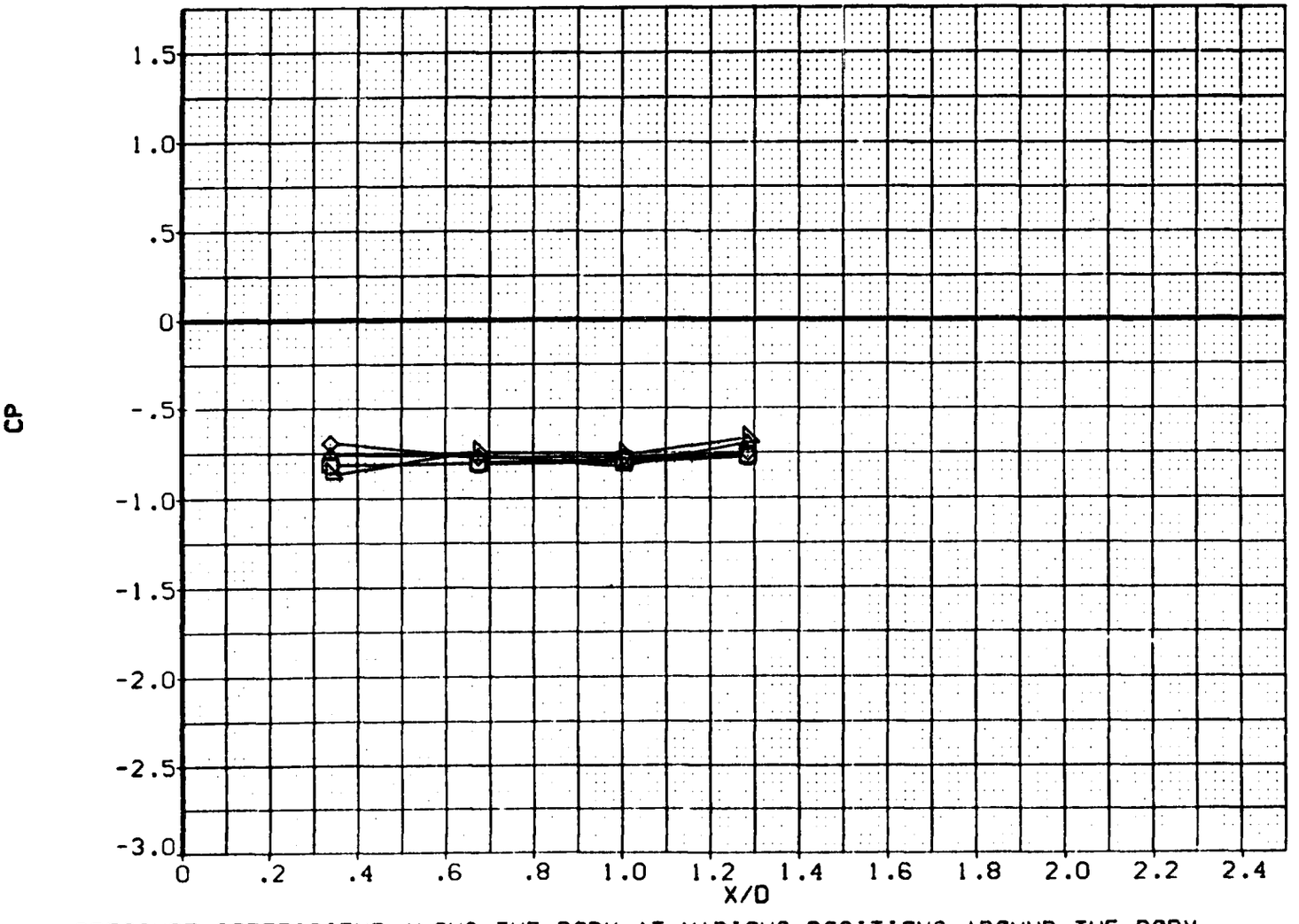
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (S.29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	THETA	ALPHA	MACH
○	.000	100.000	.790
□	22.500		
◇	45.000		
△	67.500		
◺	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

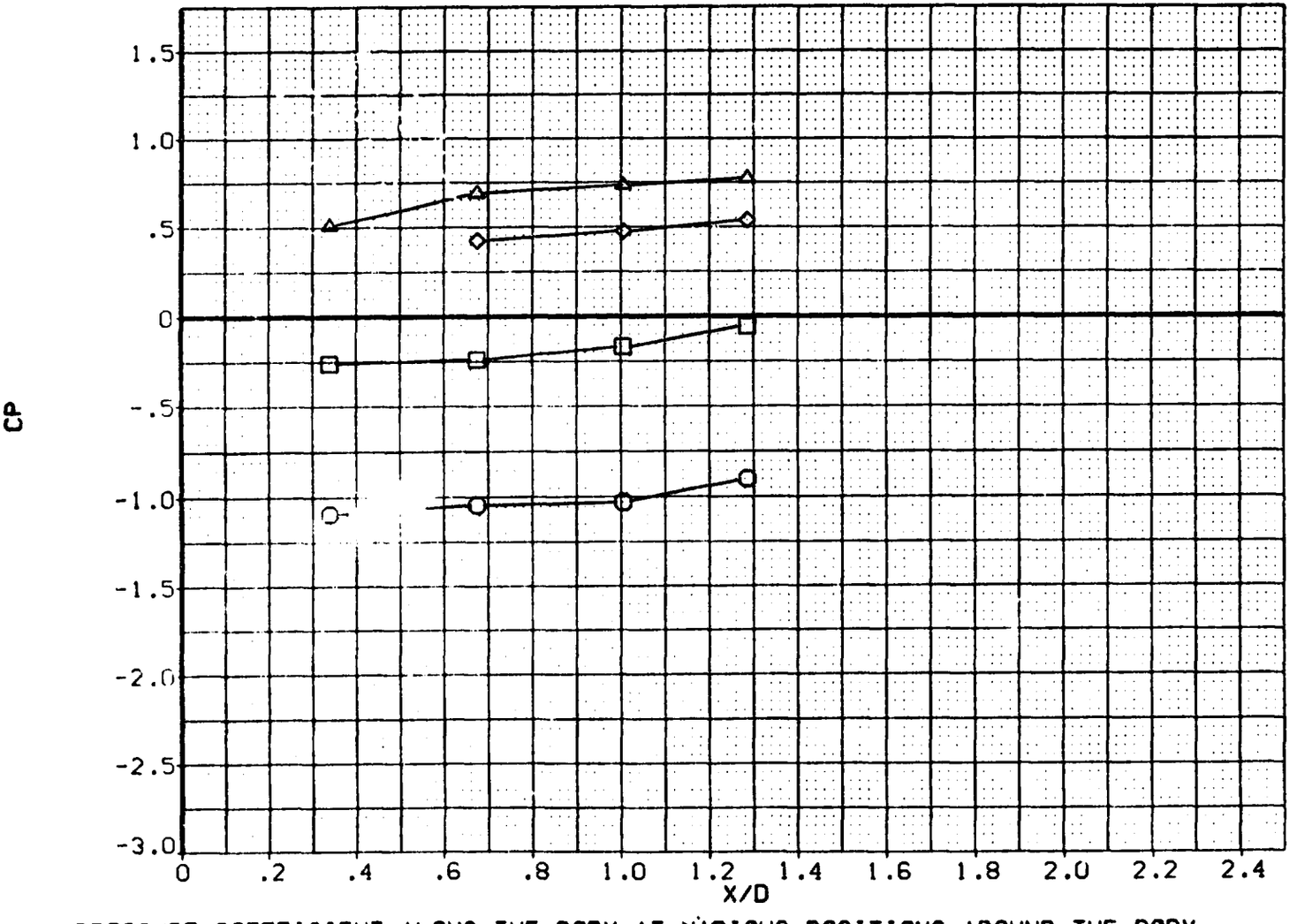
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	100.000	.790
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

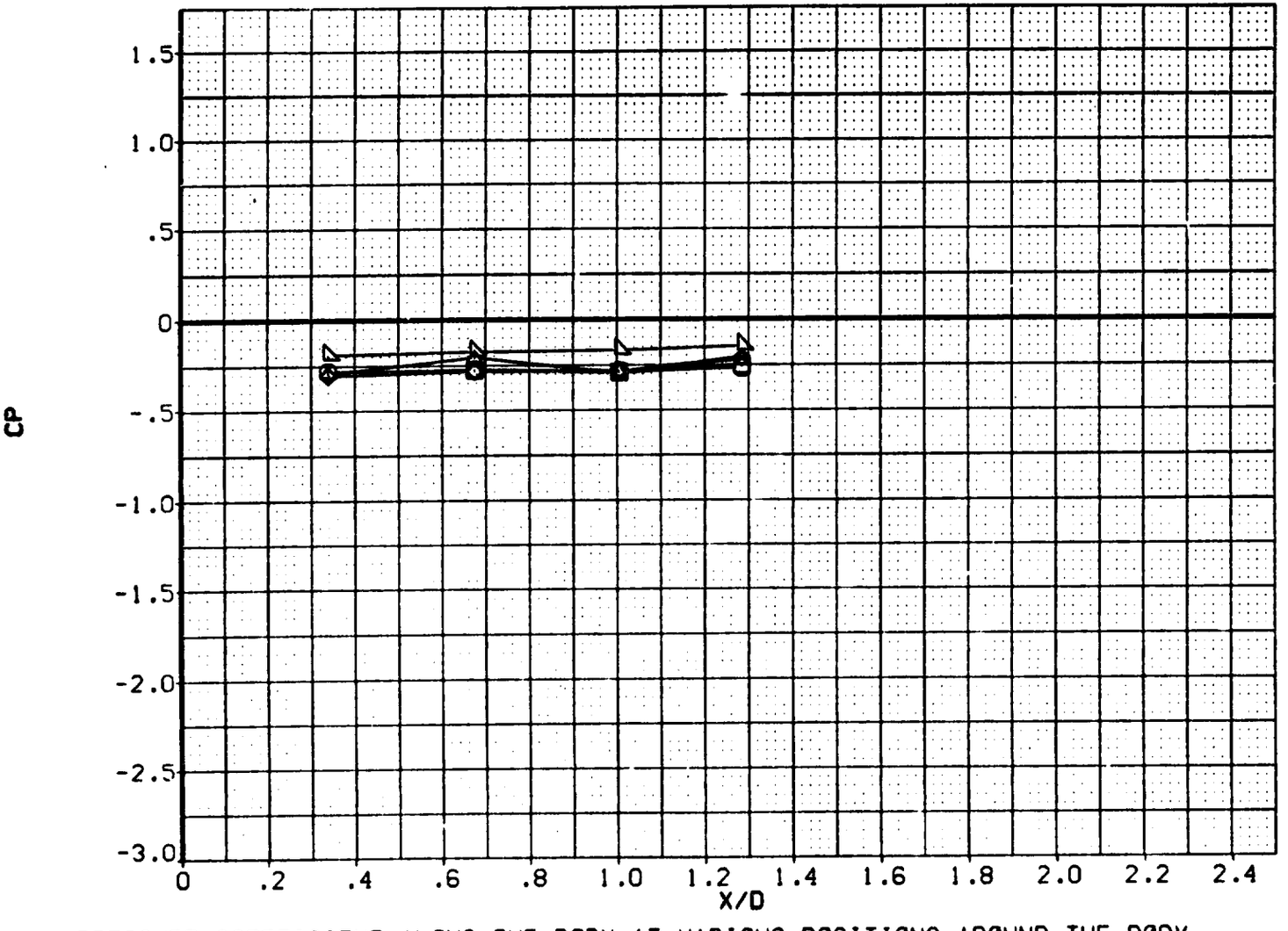
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E103)

SYMBOL	THETA	ALPHA	MACH
○	.000	100.000	2.000
□	22.500		
◇	45.000		
△	67.500		
▷	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



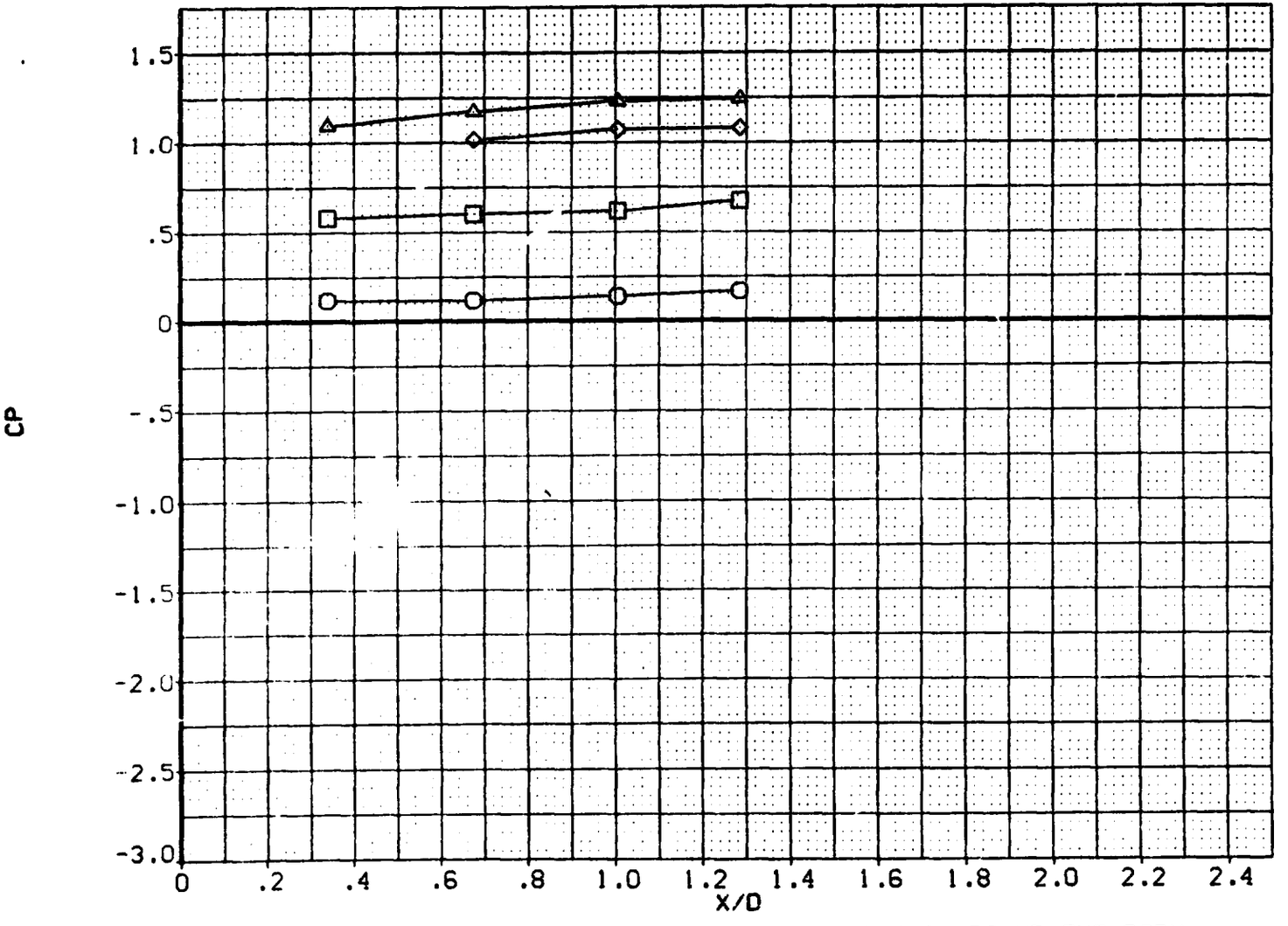
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E103)

SYMBOL	THETA	ALPHA	MACH
○	112.500	100.000	2.000
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	9.000		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

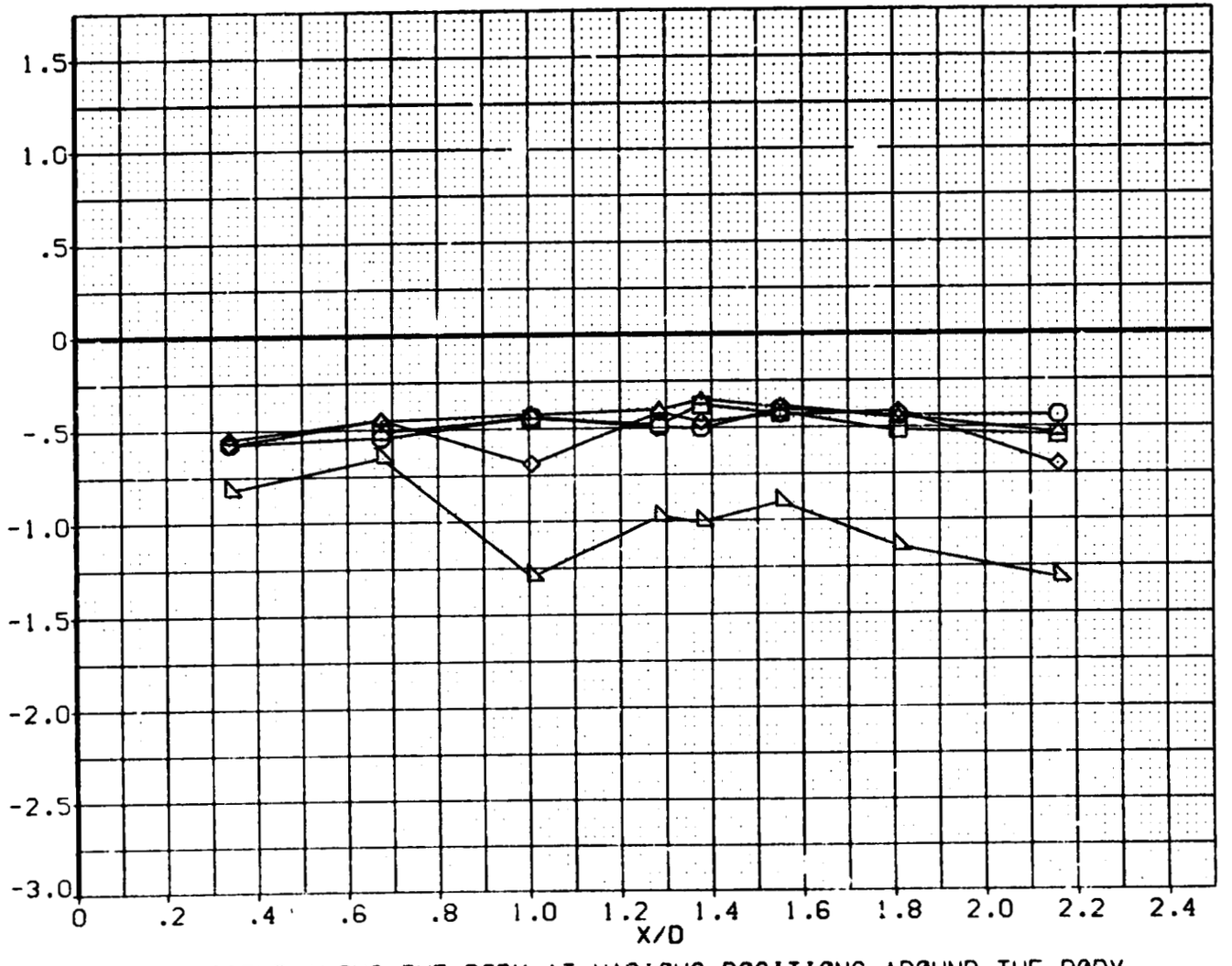
MSFC H[illegible] 033 (S/29F) SRB FORWARD NOSE SECTION (E1E101)

SYMBOL	THETA	ALPHA	MACH
▽	.000	107.900	.410
▷	22.500		
◇	45.000		
□	67.500		
○	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



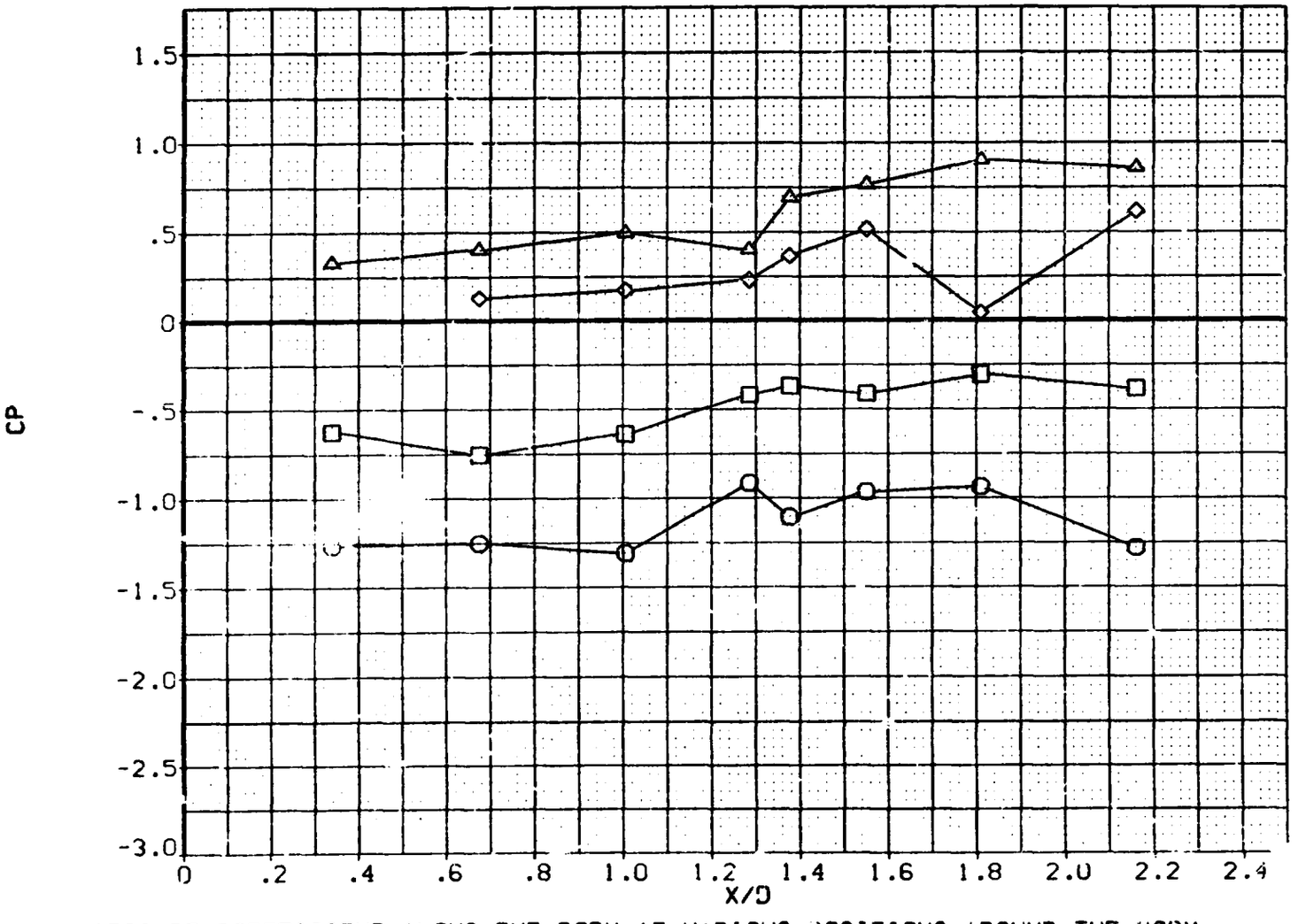
PRESSURE COEFFICIENT ALONG THE BODY AT VAR'OUS POSITIONS AROUND THE BODY

MSFC HRWT 0.3 (SA29F) SRB FORWARD NOSE SECTION (E1E101)

SYMBOL	THETA	ALPH	MACH
○	112.500	107.900	.410
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

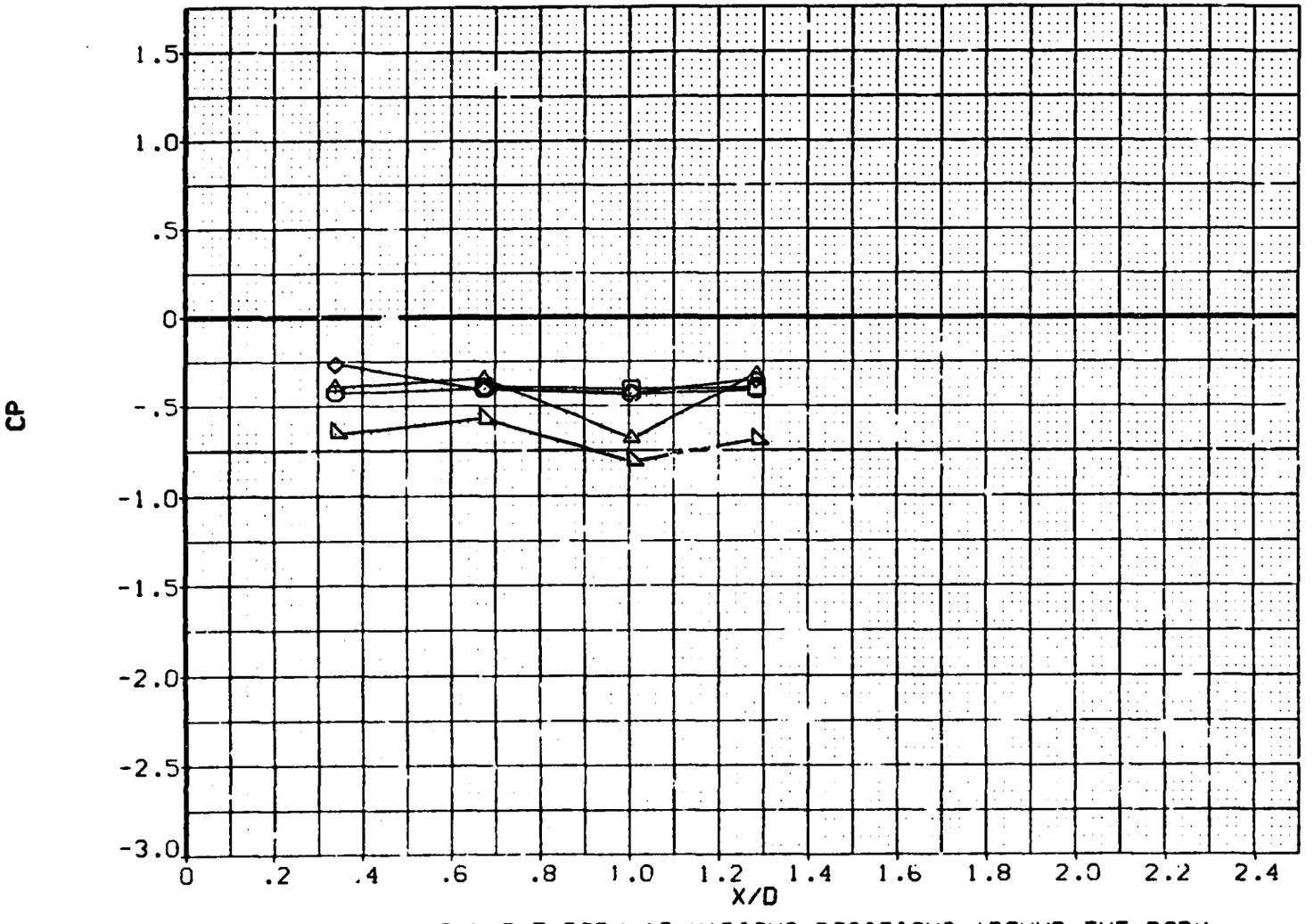
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E1C2)

SYMBOL	THETA	ALPHA	MACH
○	.000	108.000	.500
□	22.500		
◇	45.000		
△	67.500		
▽	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



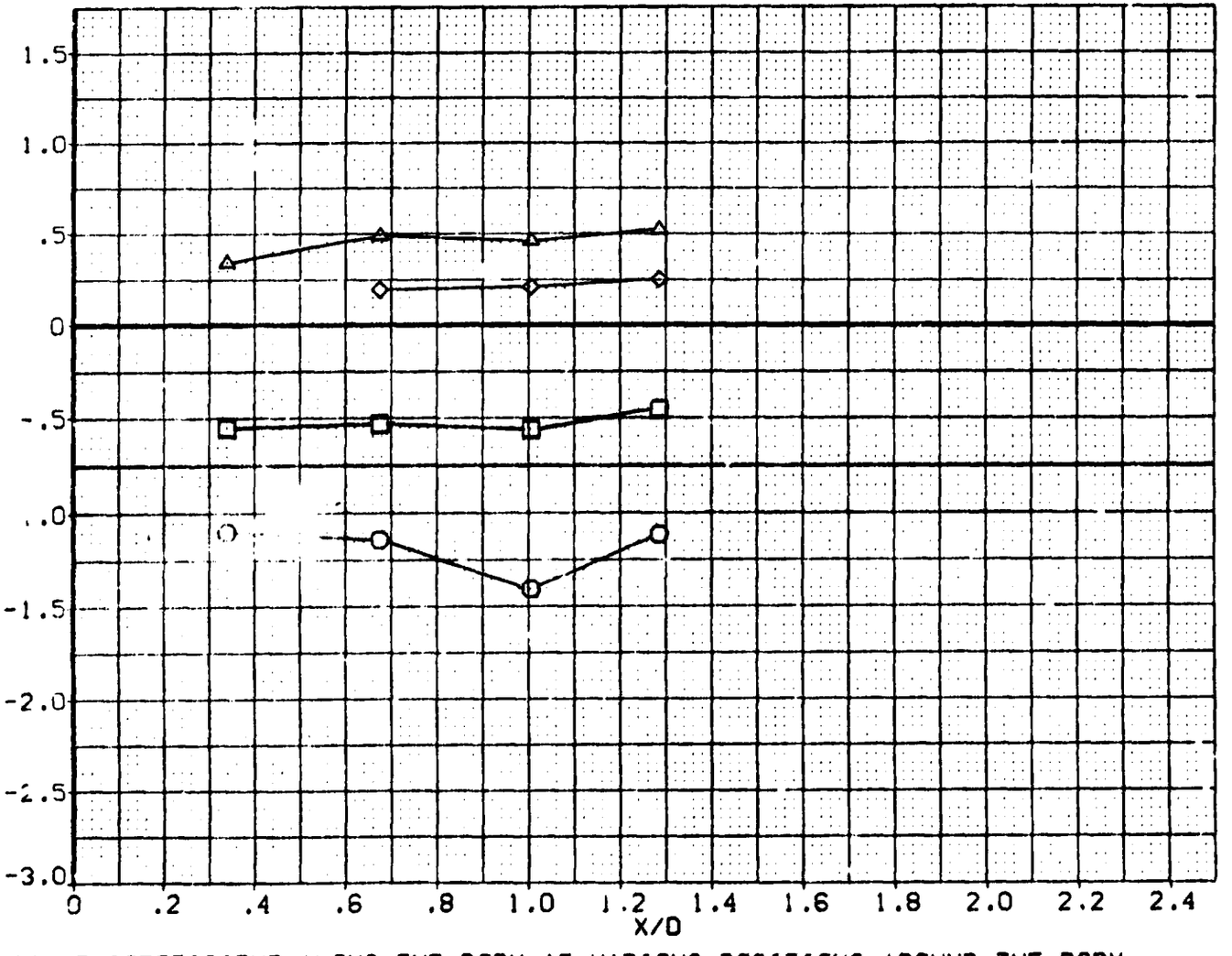
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E102)

SYMBOL	THETA	ALPHA	MACH
○	112.500	108.000	.500
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



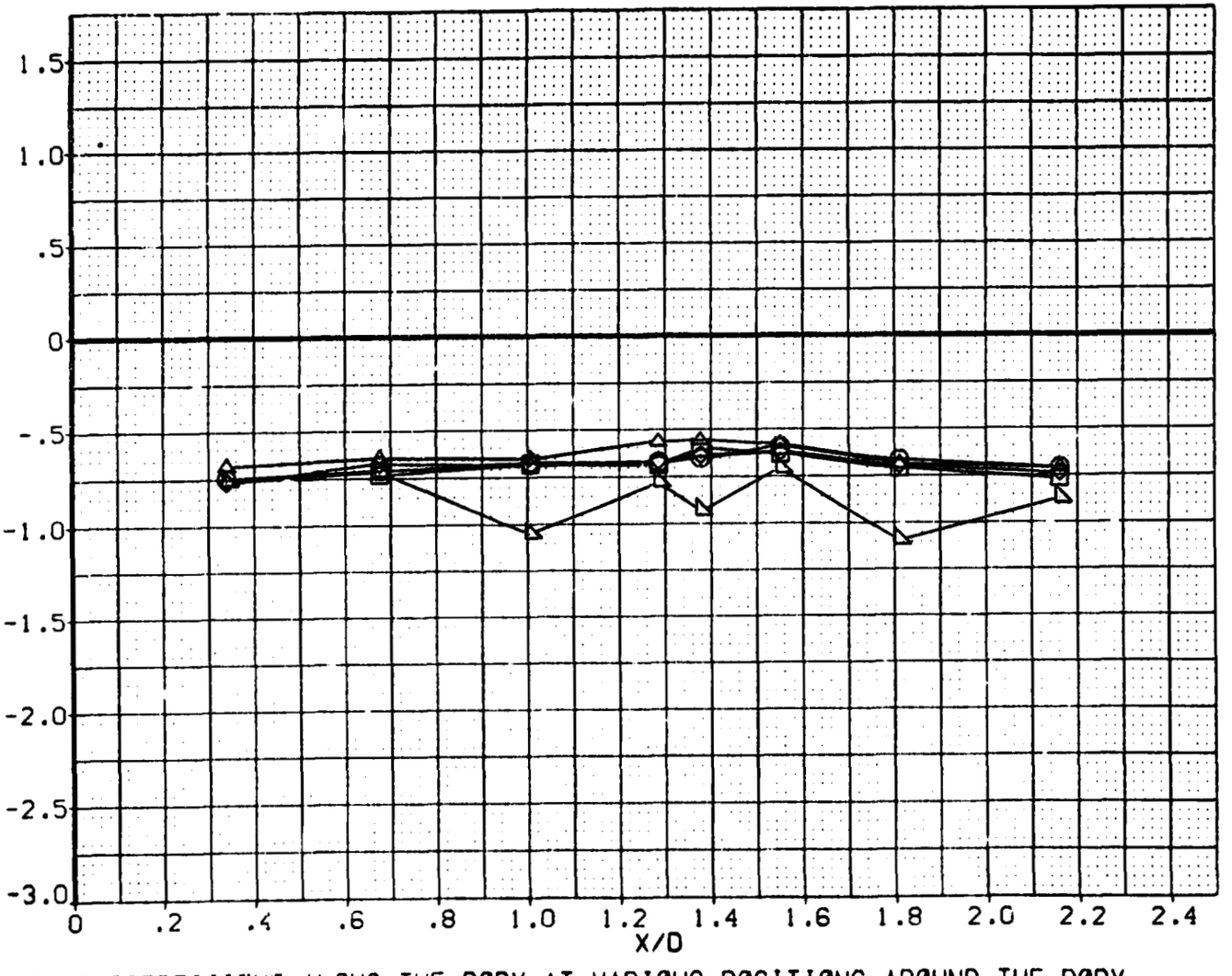
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 633 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	THETA	ALPHA	MACH
○	.000	107.900	.610
□	22.500		
◇	45.000		
△	67.500		
◺	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



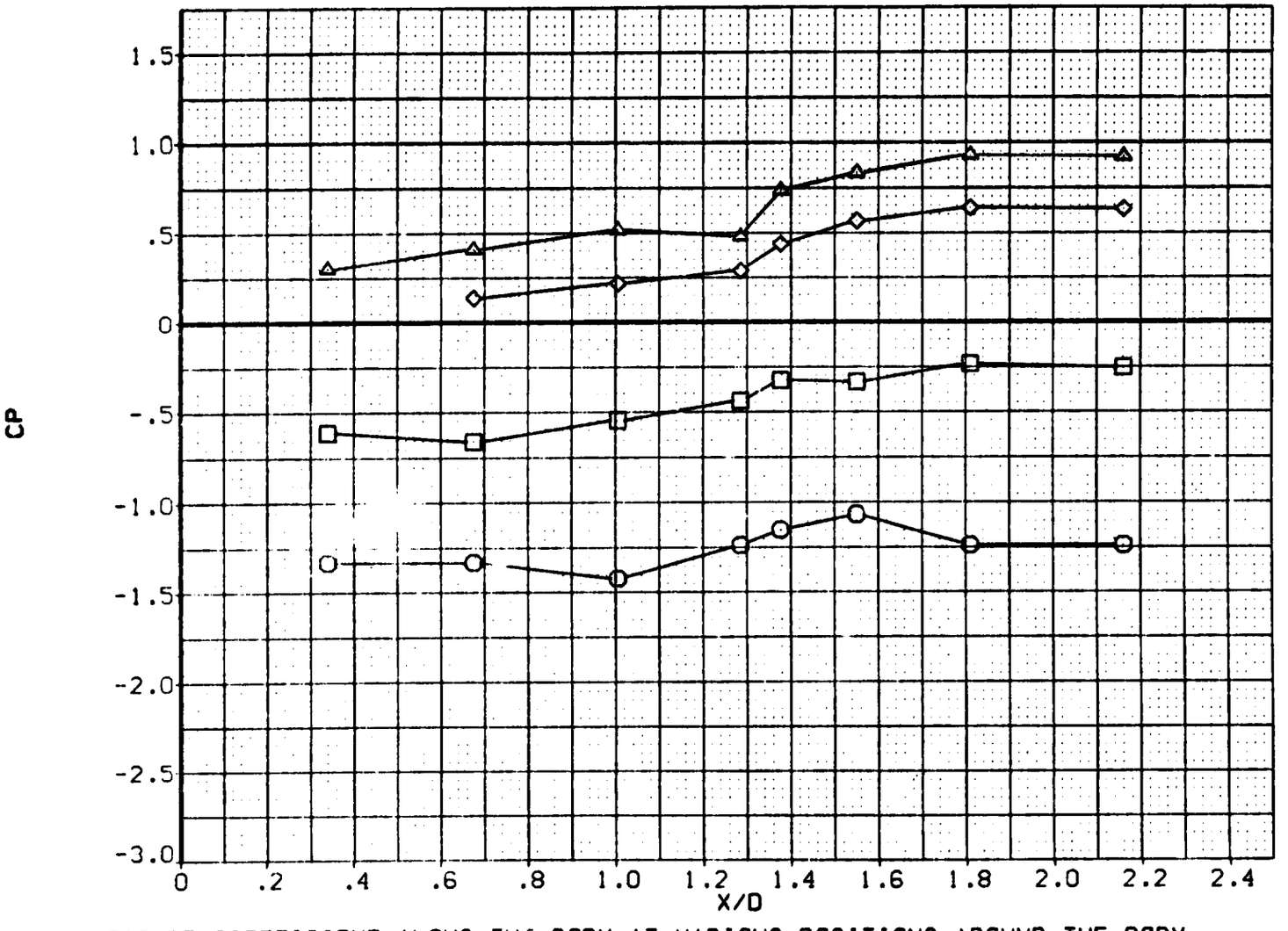
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	107.900	.610
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

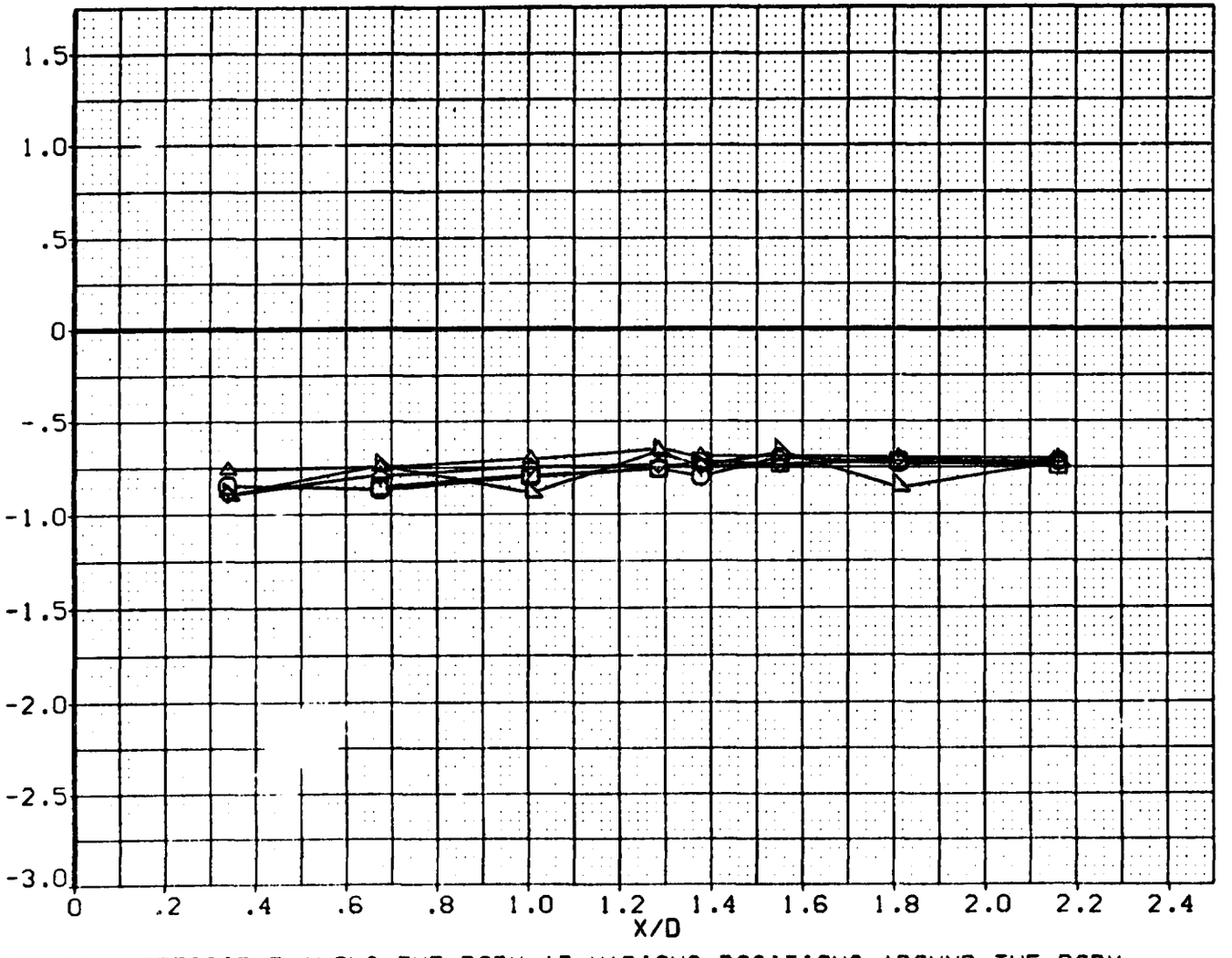
MSFC HRWT [illegible]3 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	THETA	ALPHA	Mach
○	.000	107.900	.760
□	22.500		
◇	45.000		
△	67.500		
◁	90.000		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



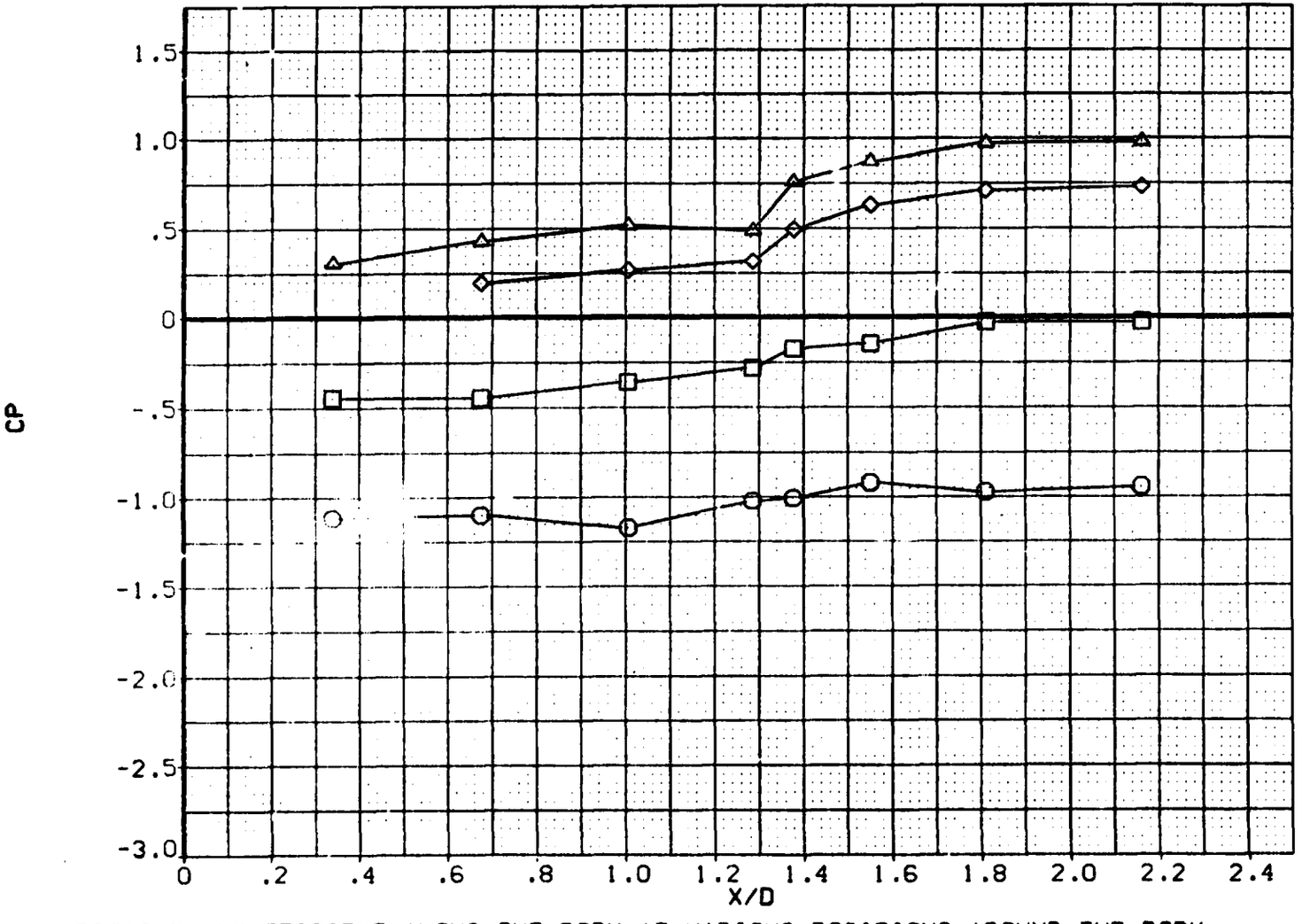
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	THETA	ALPHA	MACH
○	112.500	107.900	.760
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



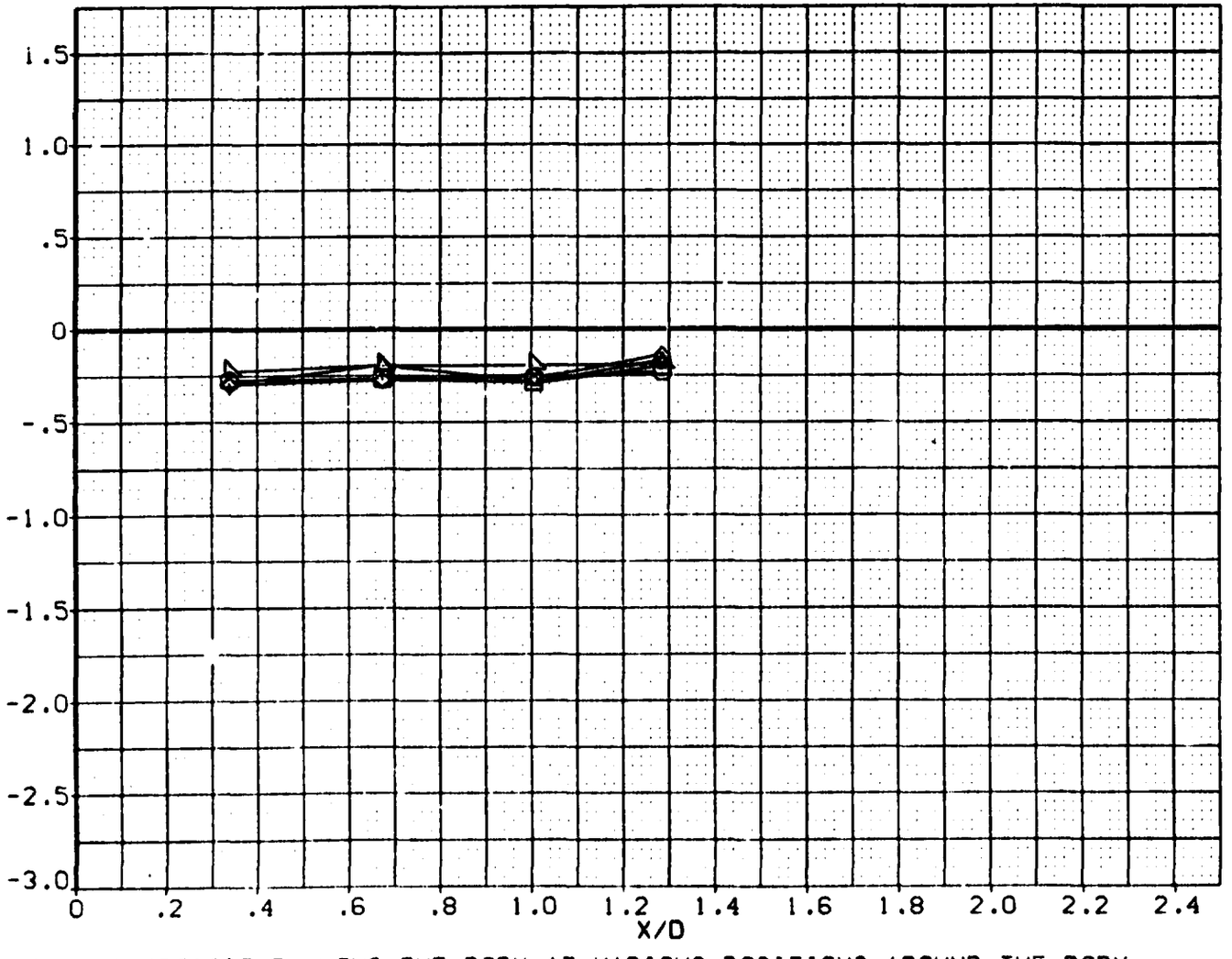
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRV: 033 (: 29F) SRB FORWARD NOSE SECTION (F1E103)

SYMBOL	THETA	ALPHA	MACH
○	.000	108.000	2.000
□	22.500		
◇	45.000		
△	67.500		
⊿	90.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	9.000		



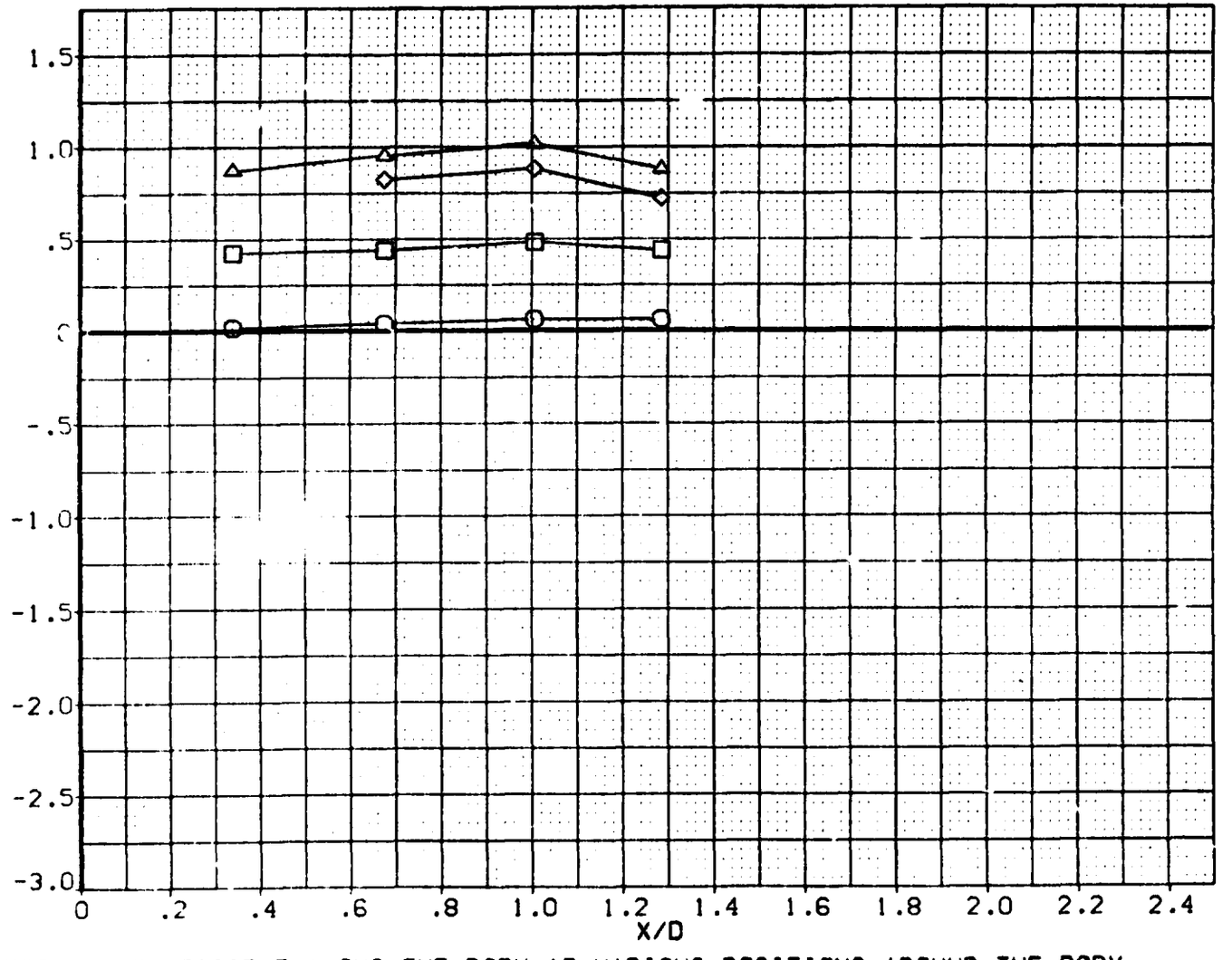
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E103)

SYMBOL	THETA	ALPHA	MACH
○	112.500	108.000	2.000
□	135.000		
◇	157.500		
△	180.000		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	8.000		



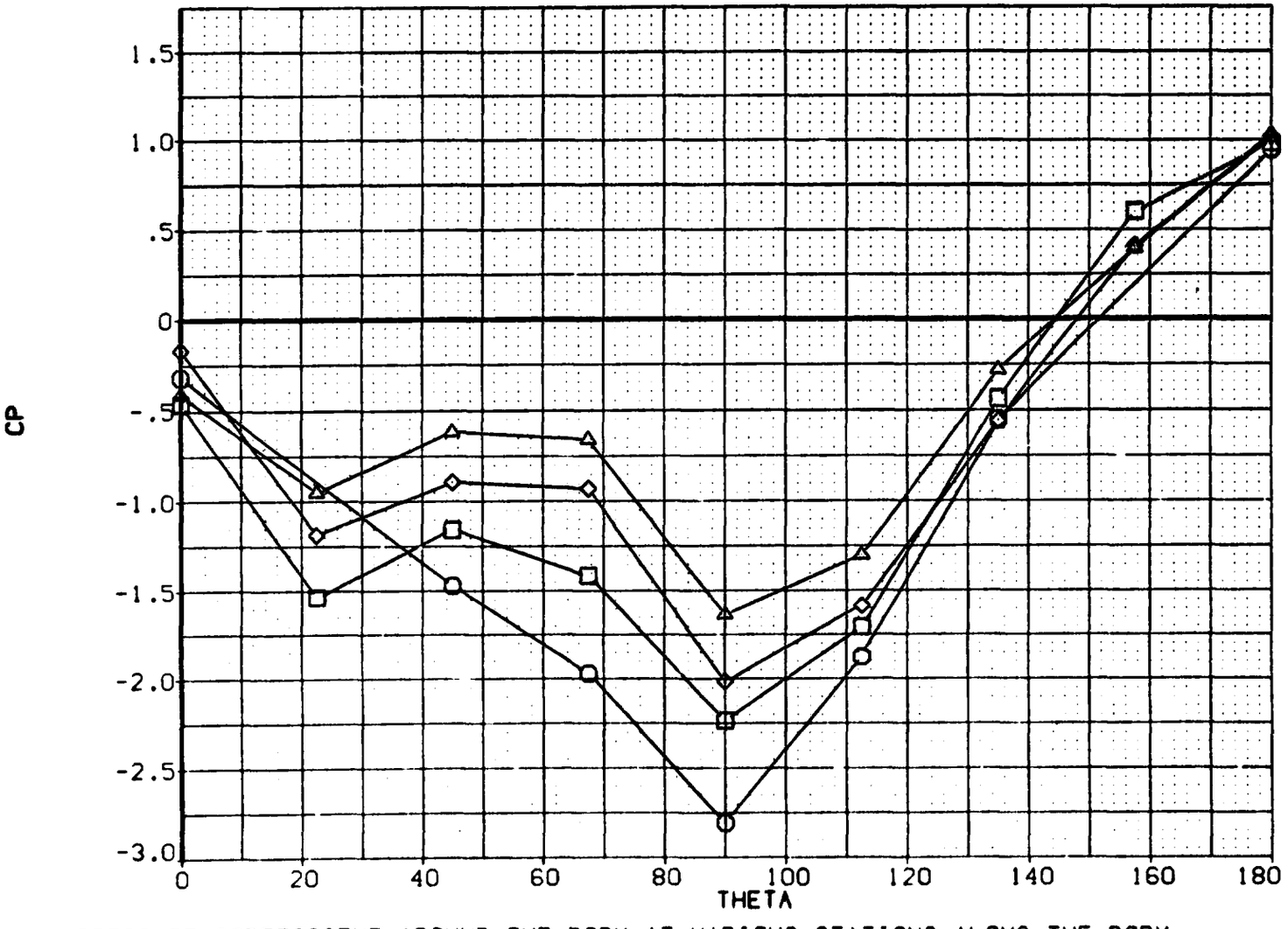
PRESSURE COEFFICIENT ALONG THE BODY AT VARIOUS POSITIONS AROUND THE BODY

MSFC HRWT 033 (S∩29F) SRB FORWARD NOSE SECTION (A1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	72.100	.410
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



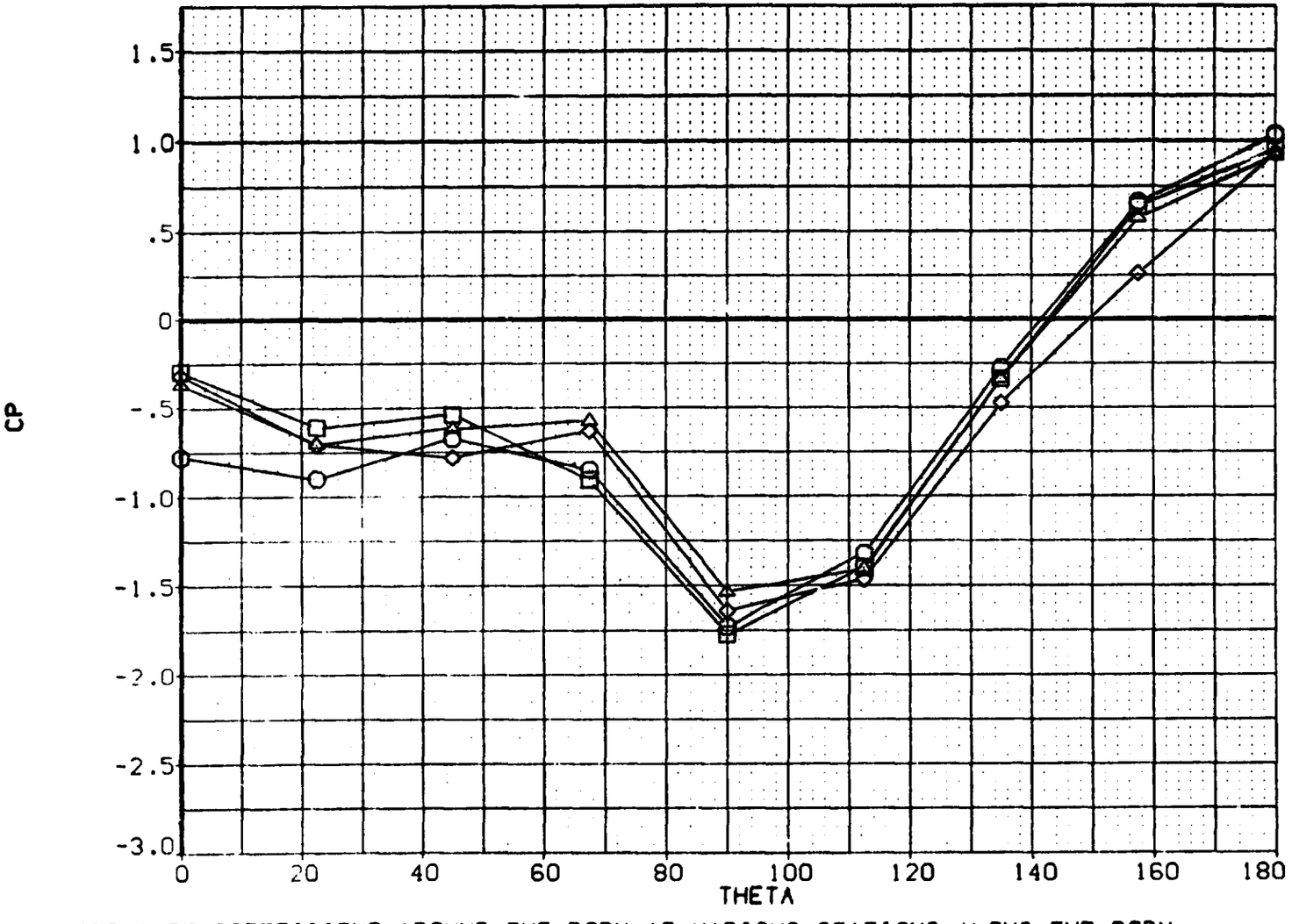
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (A1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	72.100	.410
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



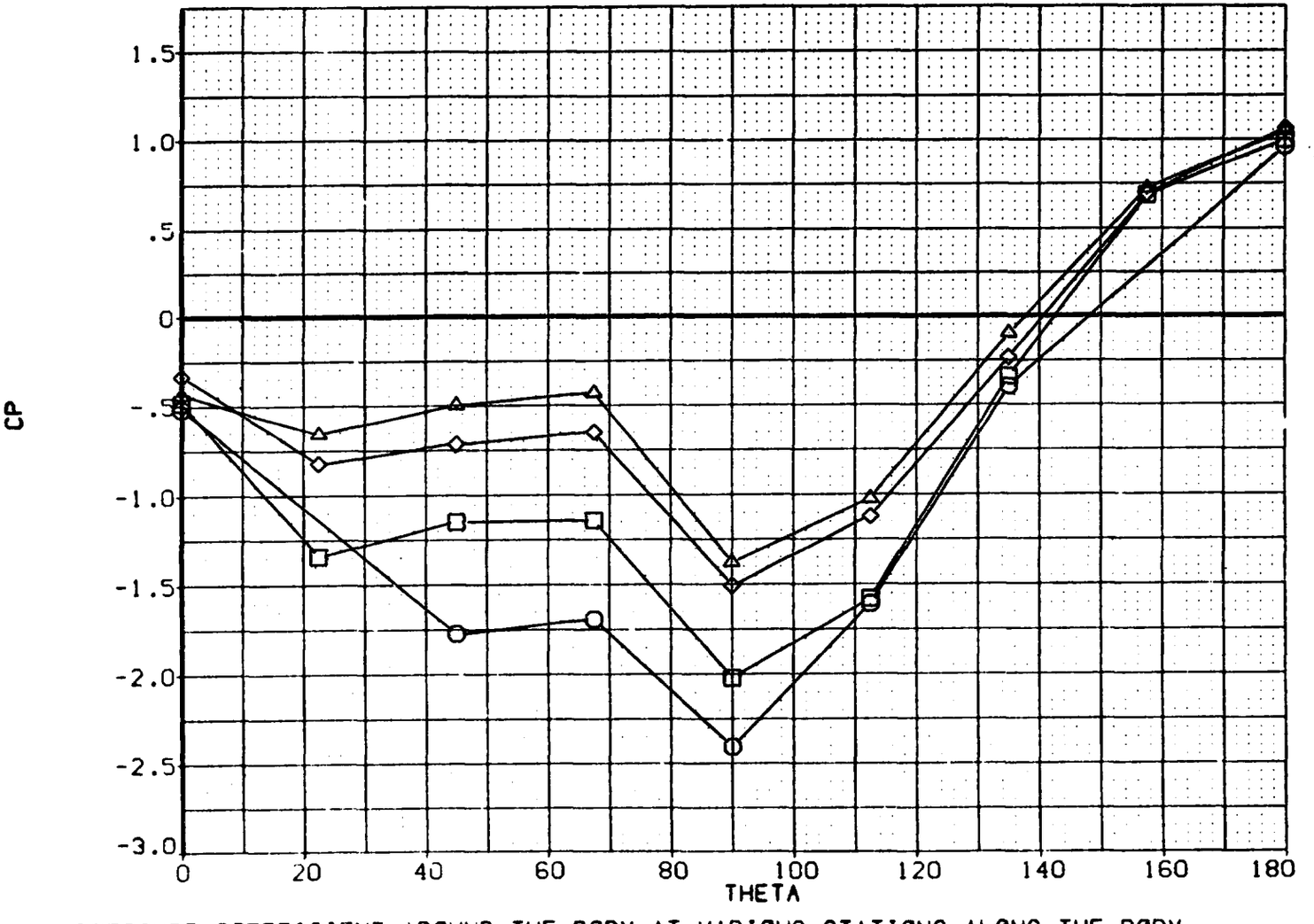
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HPWT 033 (SA29F) SRB FORWARD NOSE SECTION (A1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	72.000	.500
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



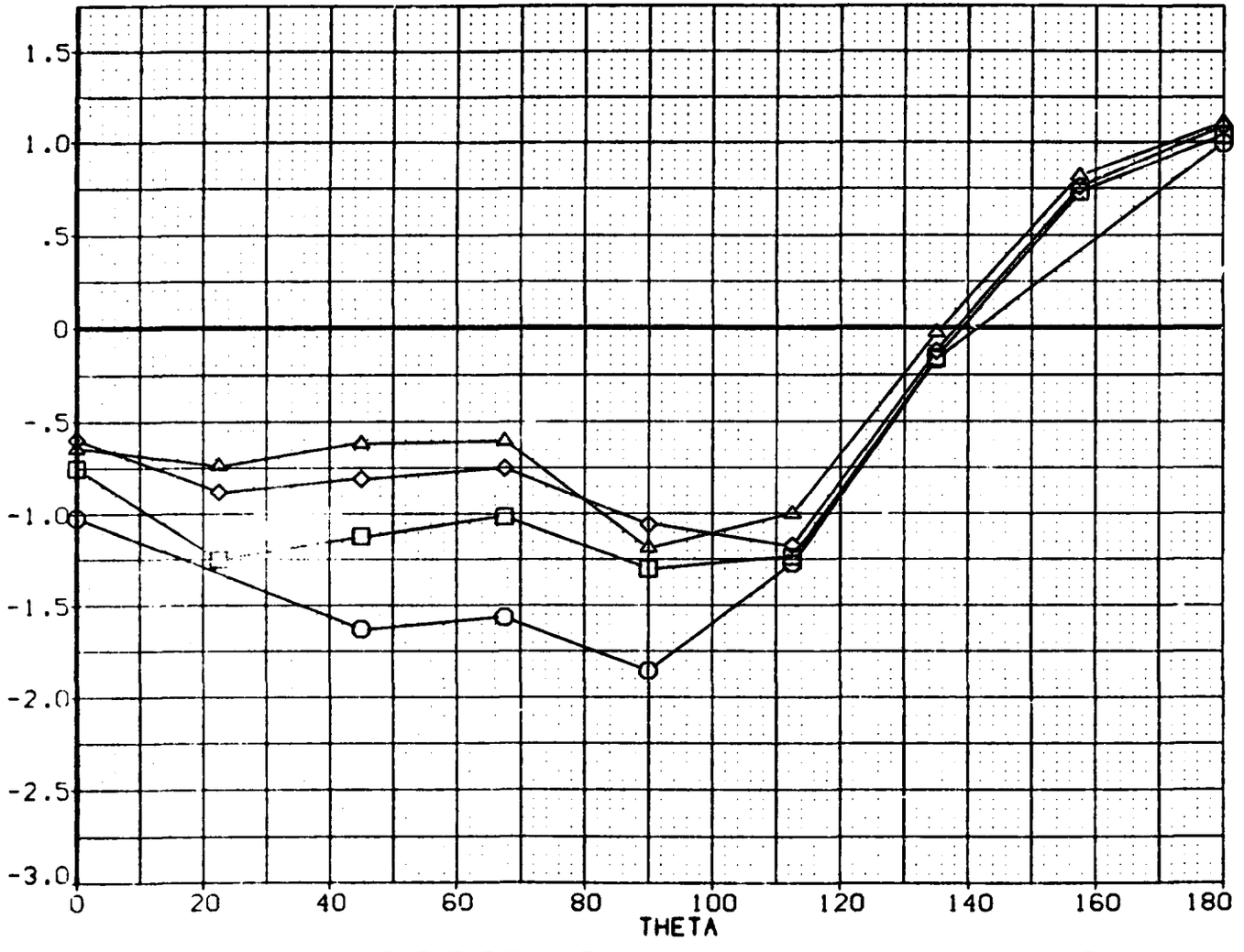
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	72.100	.600
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

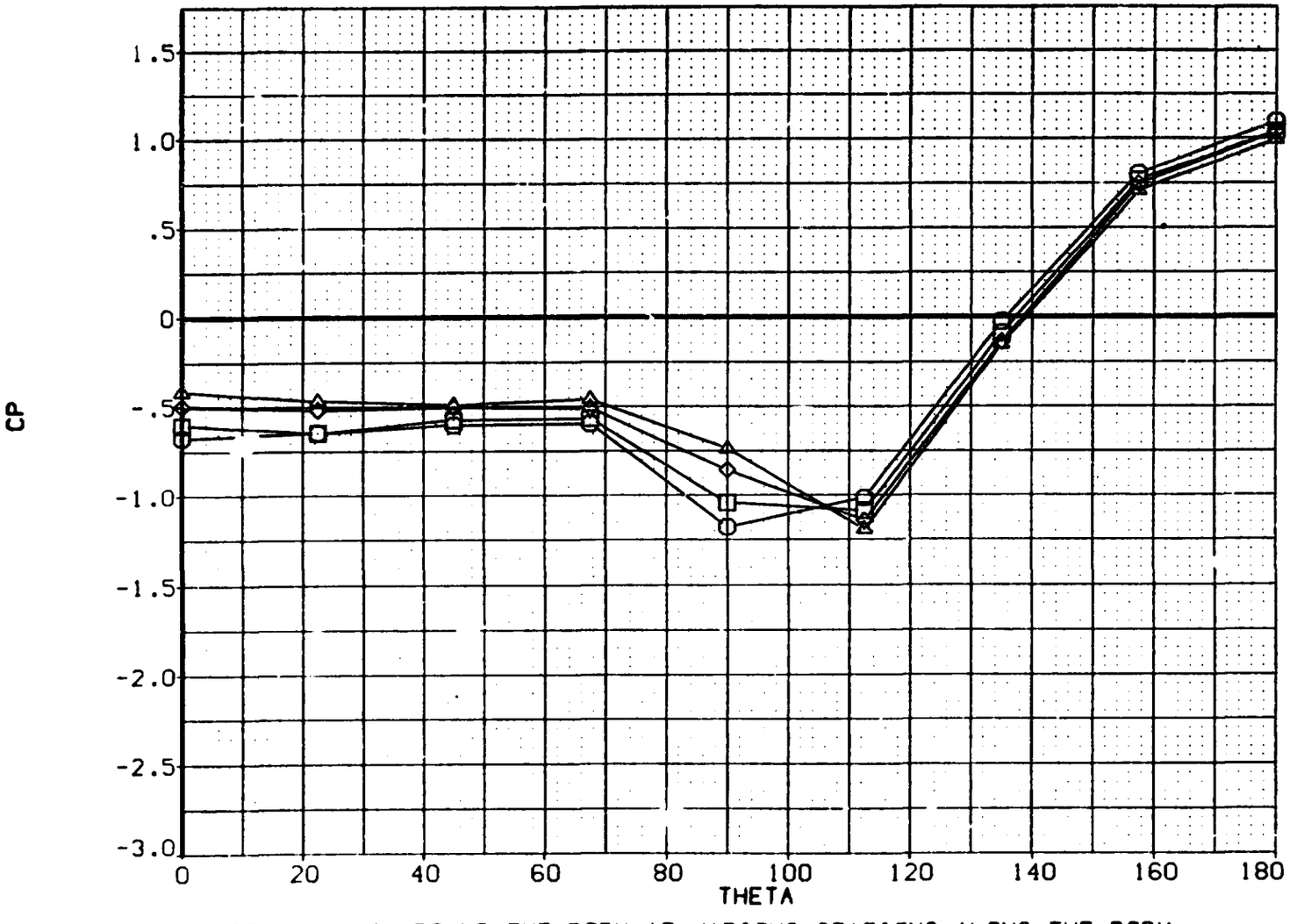
MSFC HRN 233 (CA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	72.100	.600
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

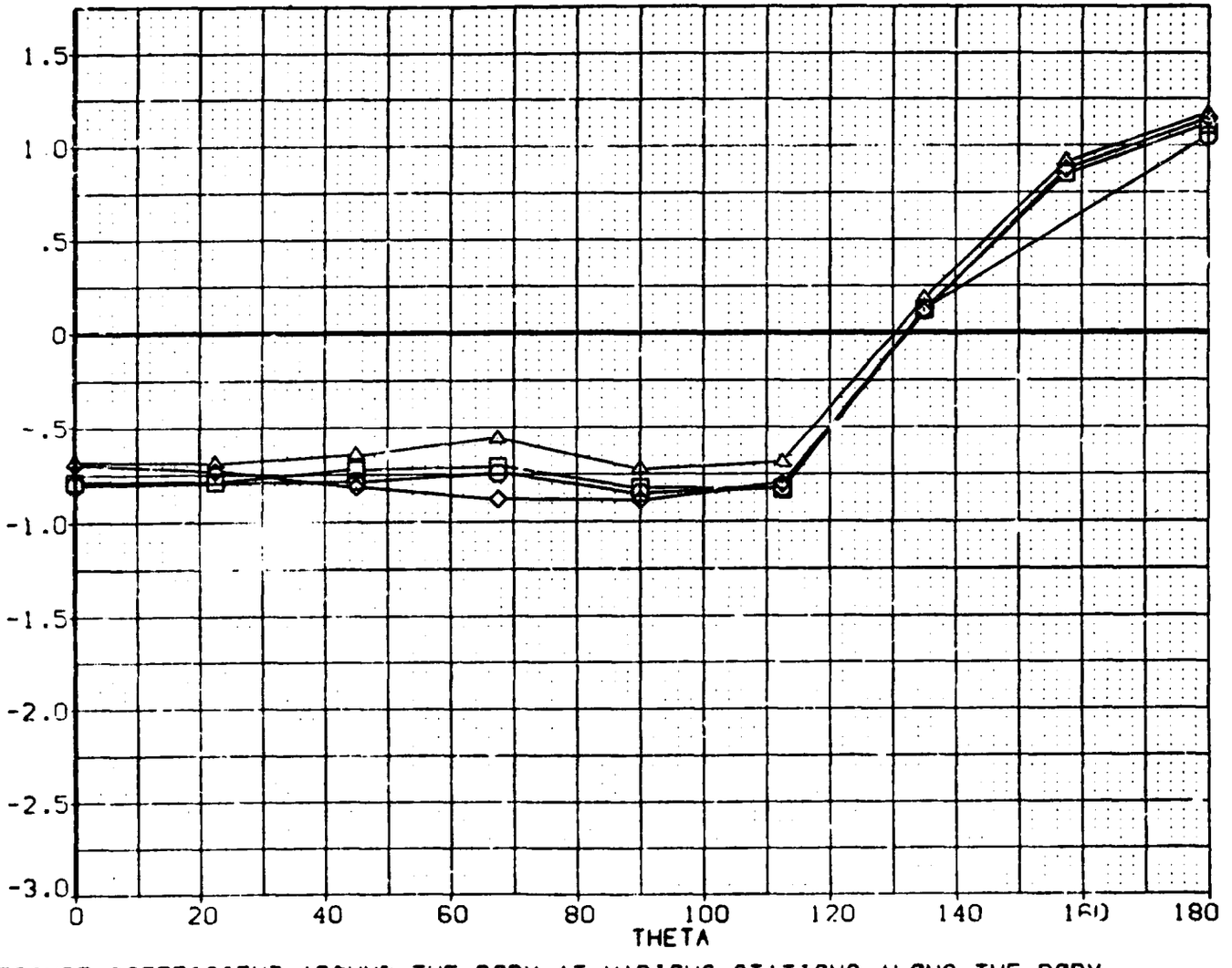
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	72.100	.760
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



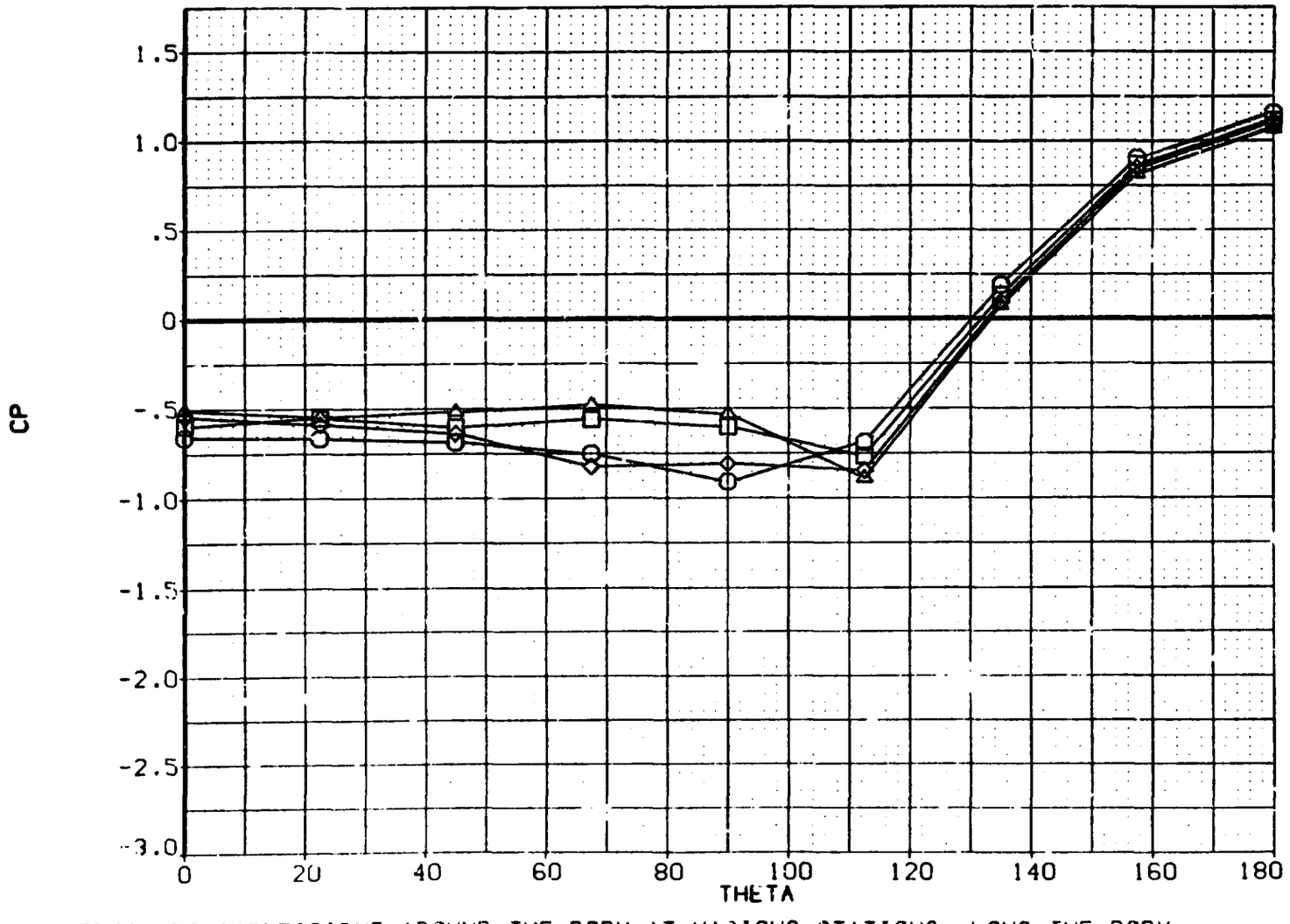
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	72.100	.760
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

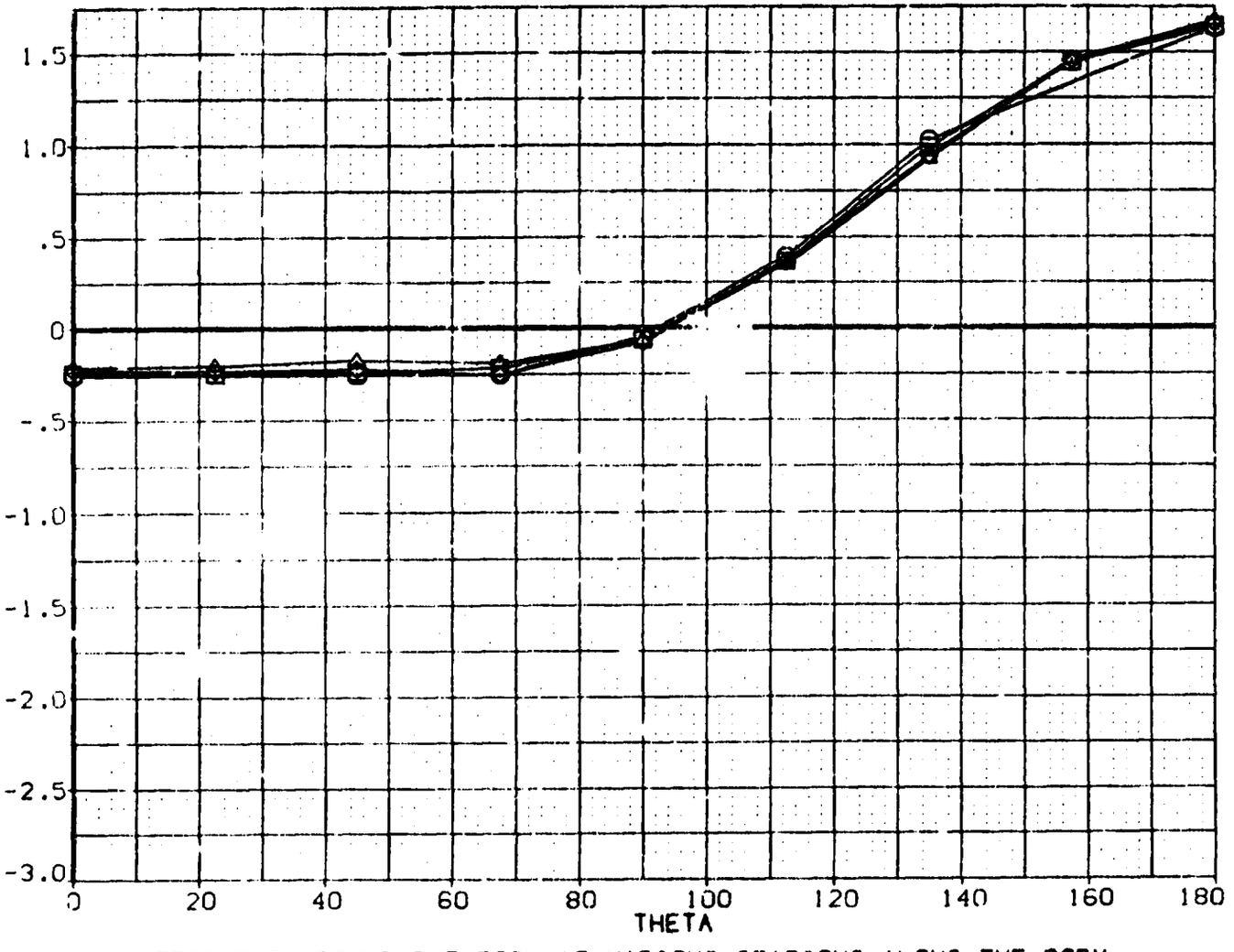
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E103)

SYMBOL	X/D	ALPHA	MACH
○	.340	72.000	2.000
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

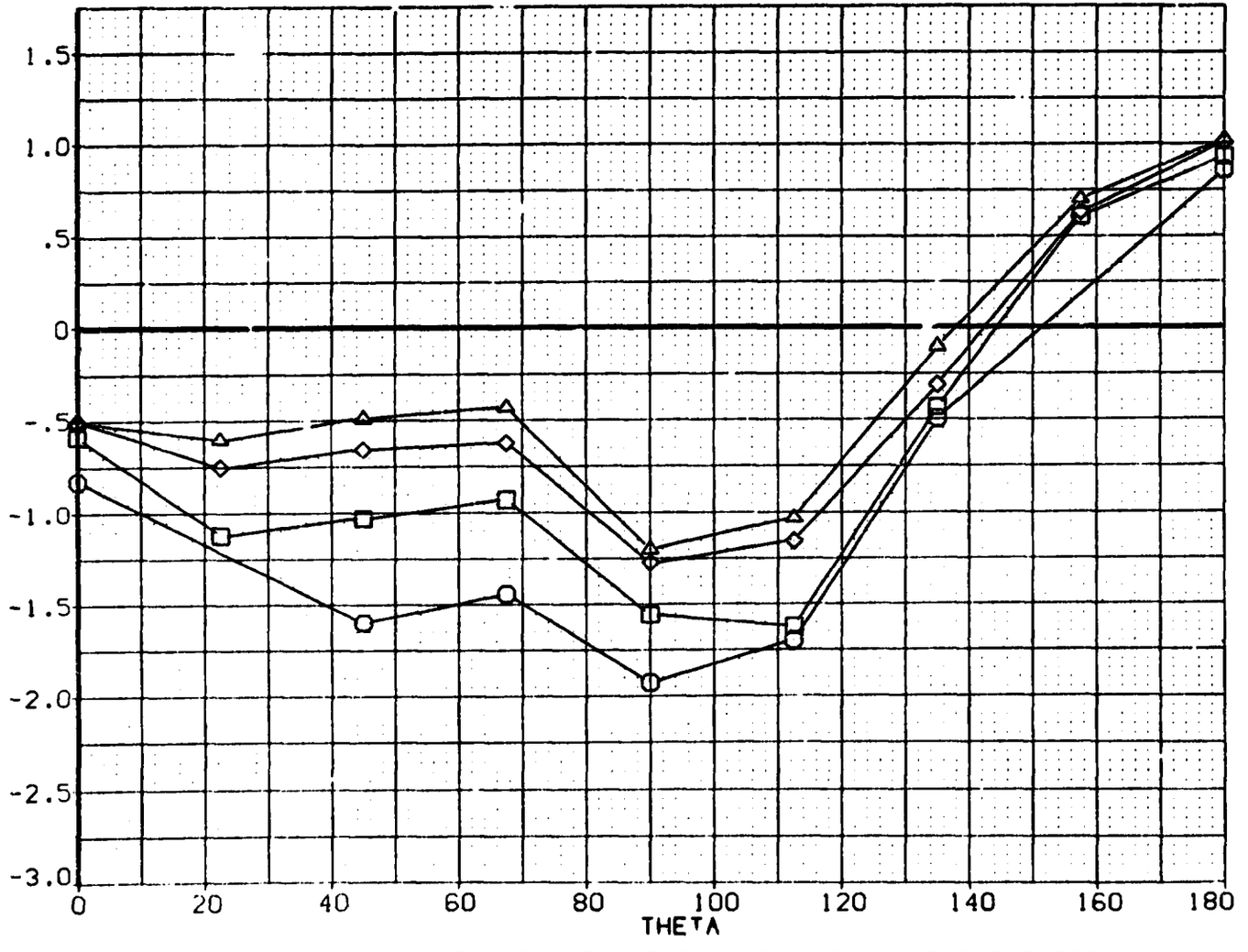
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	80.000	.510
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

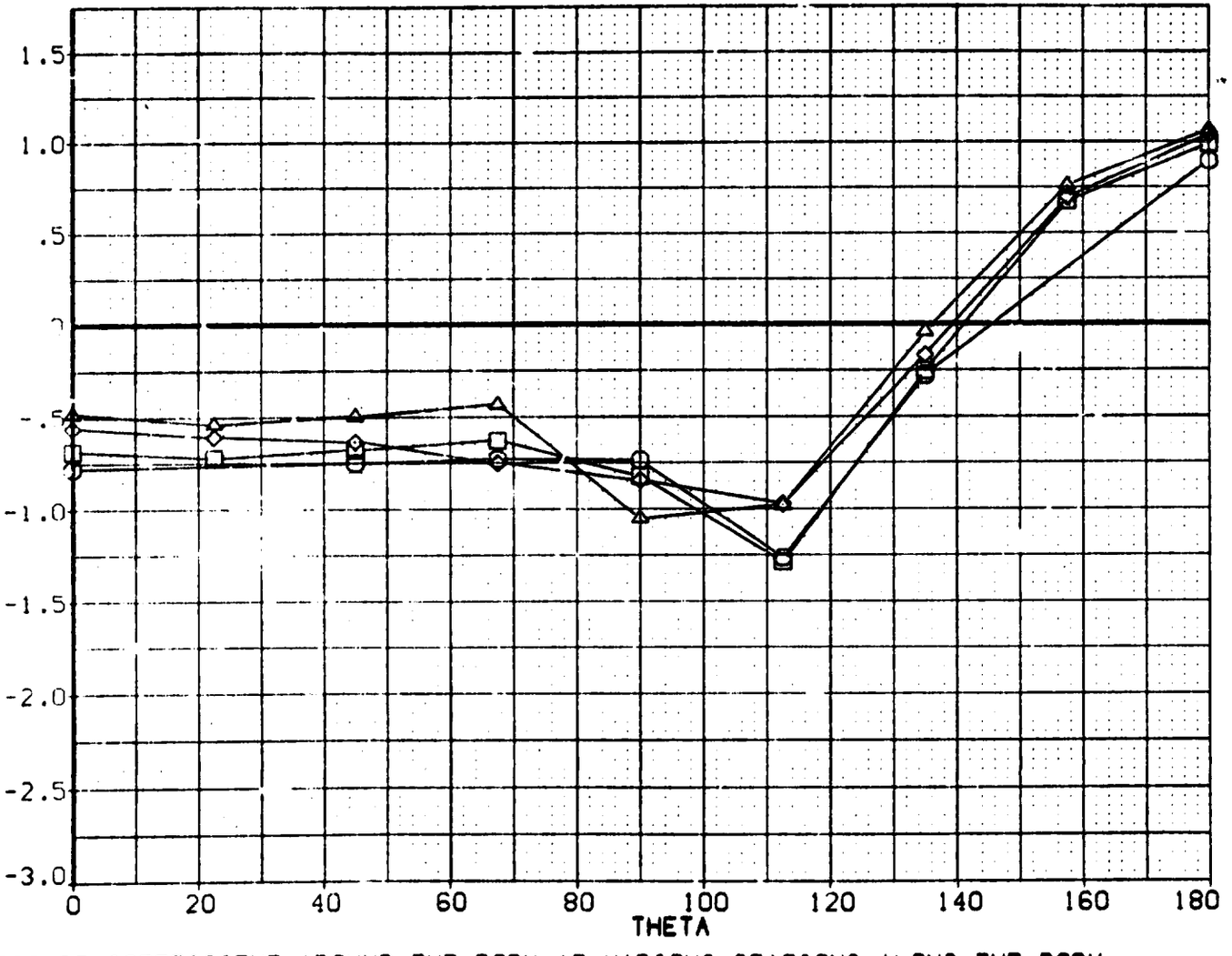
MSFC HRWT 033 (SA29?) [illegible] FORWARD NOSE SECTION (B1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	80.000	.600
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 10.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

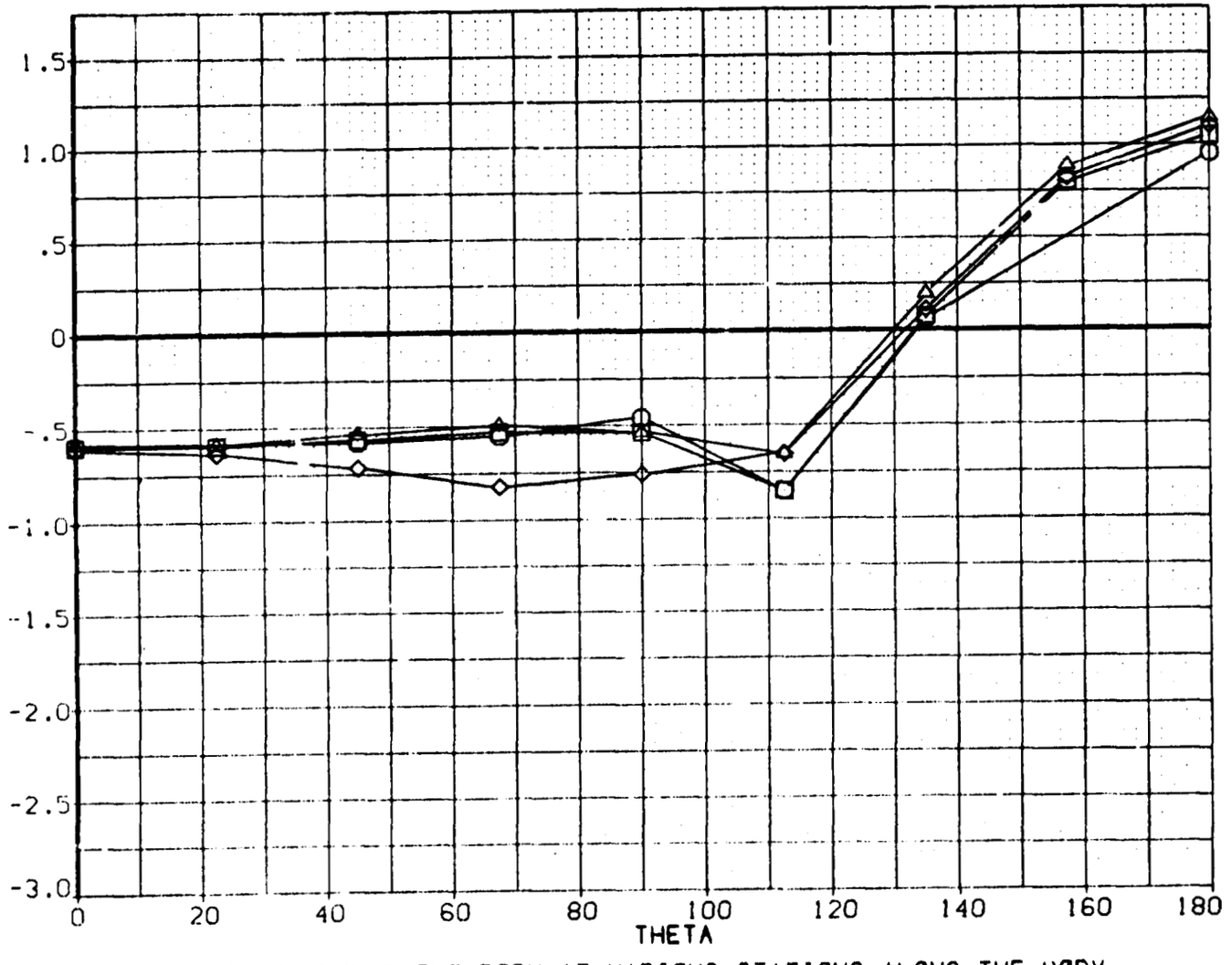
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	80.000	.790
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

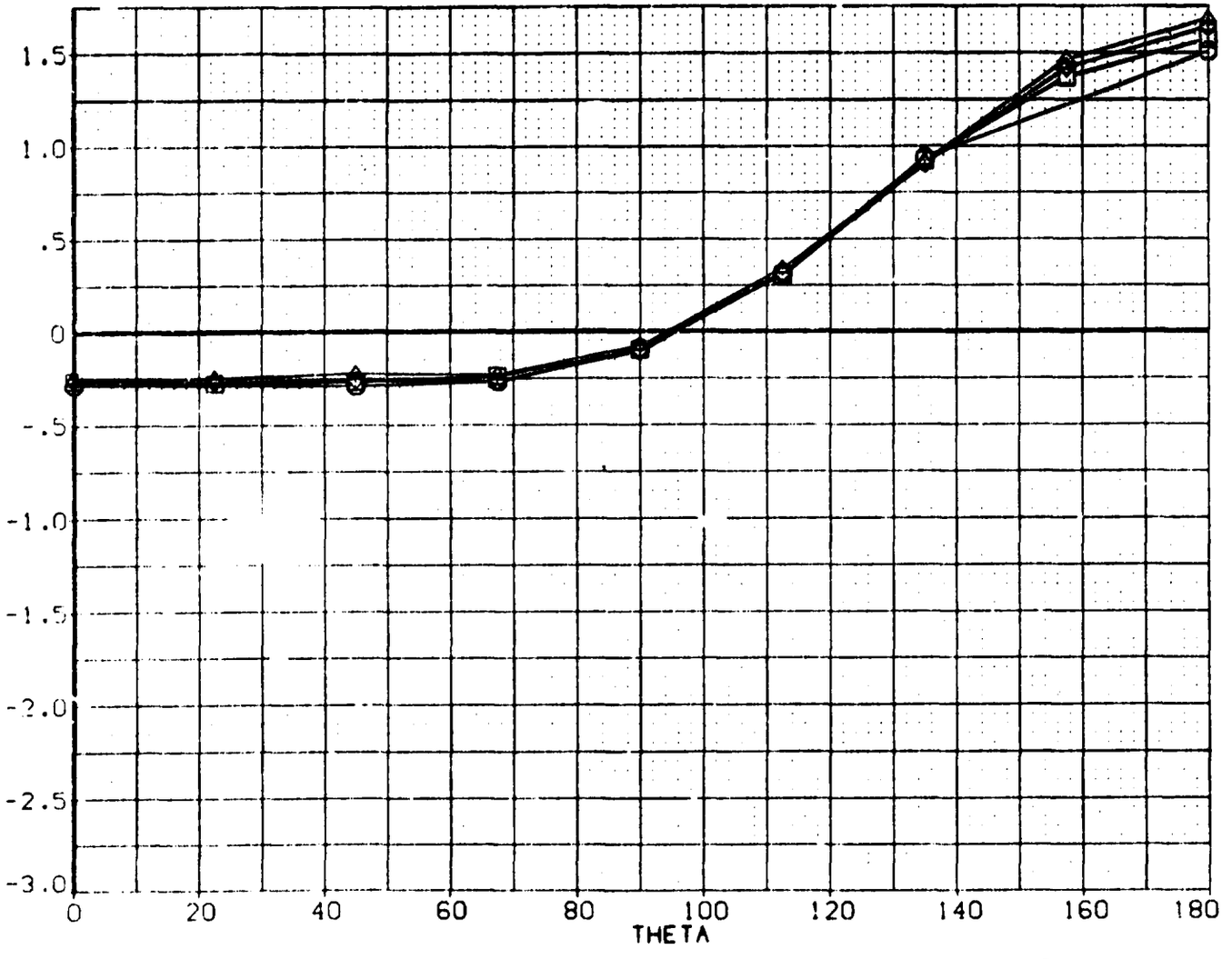
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E103)

SYMBOL	X/D	ALPHA	MACH
○	.340	80.000	2.000
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

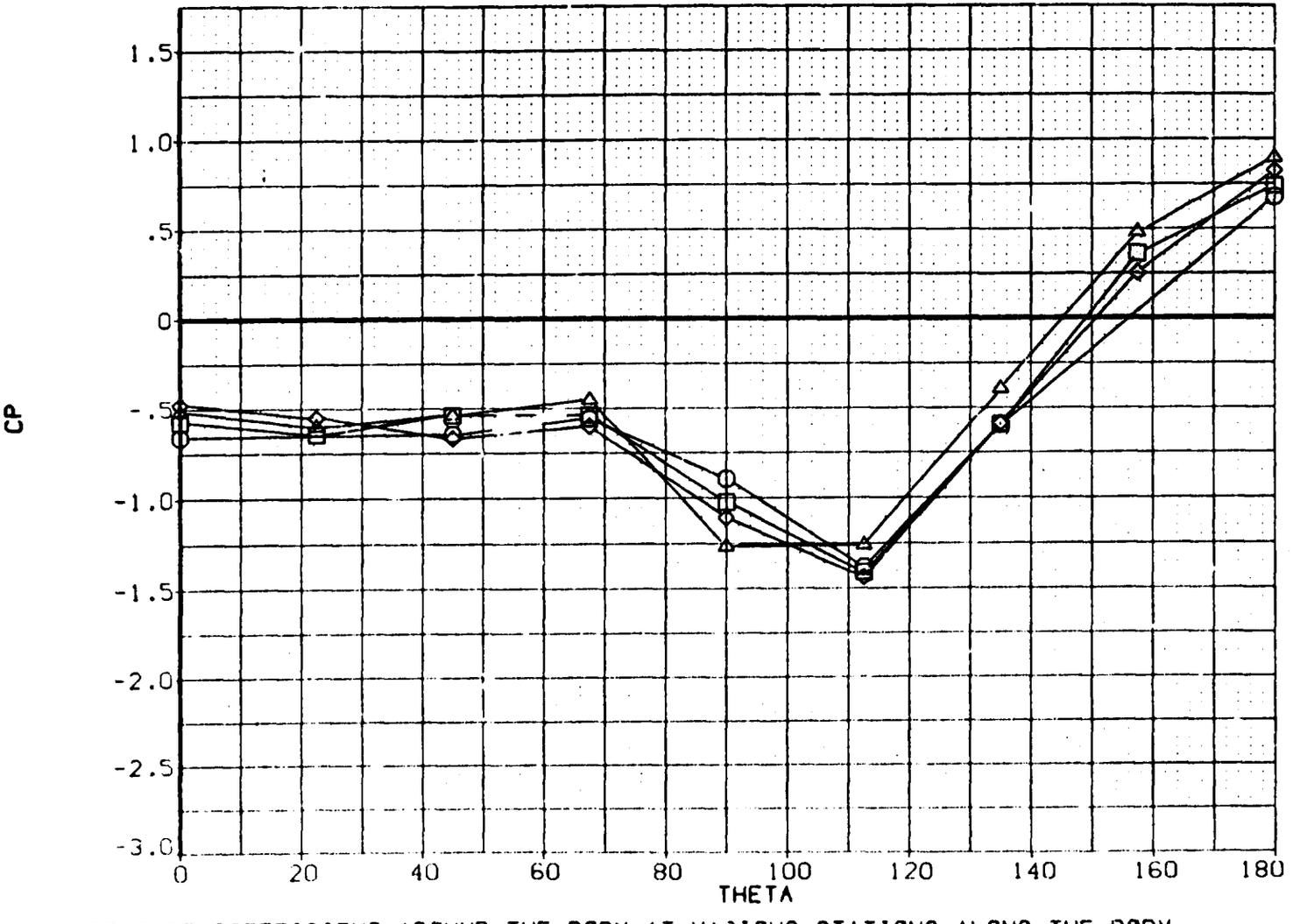
MSFC HRWT [illegible]3 (SA29F) SRB FORWARD NOSE SECTION (C1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	90.000	400
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



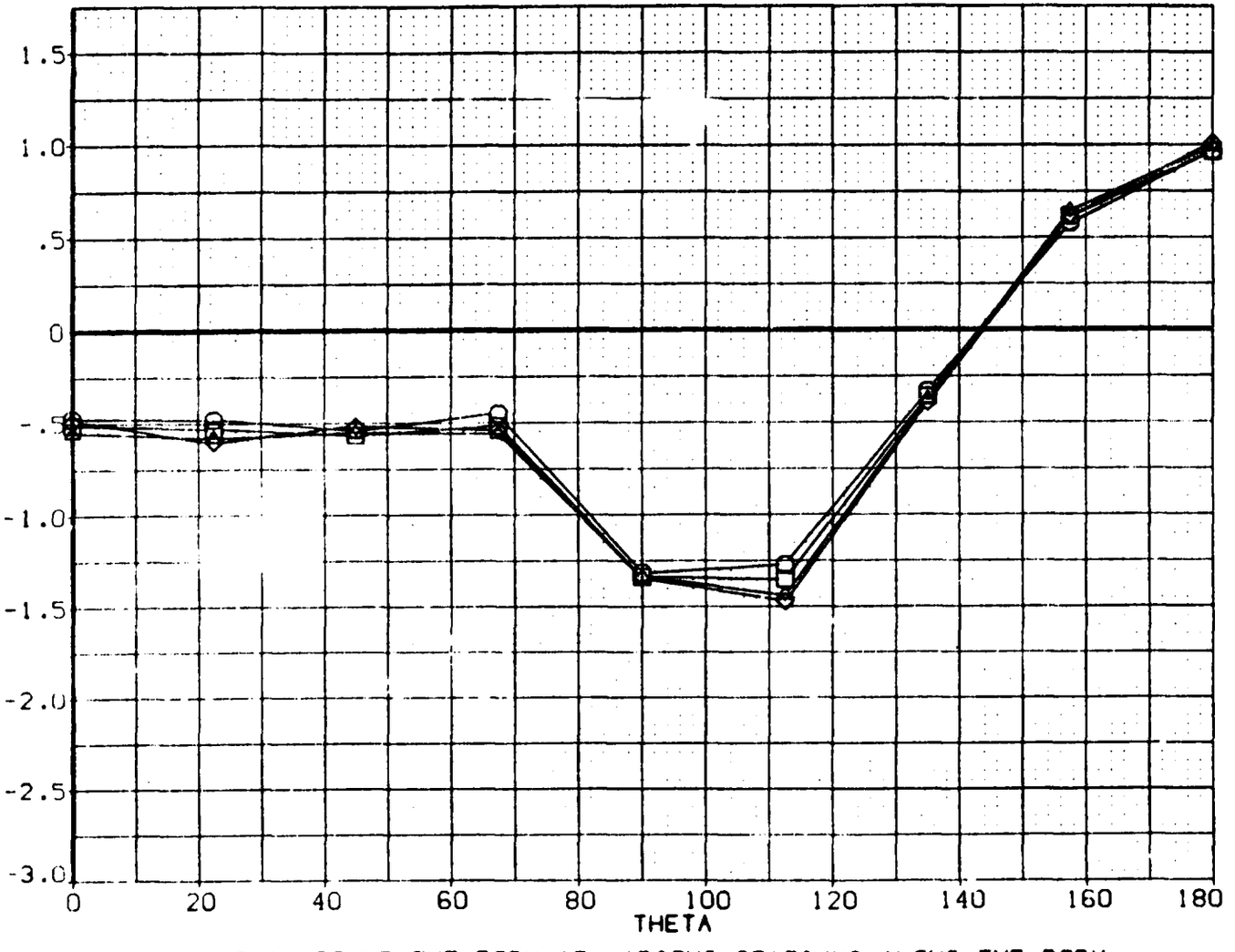
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	90.000	.400
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



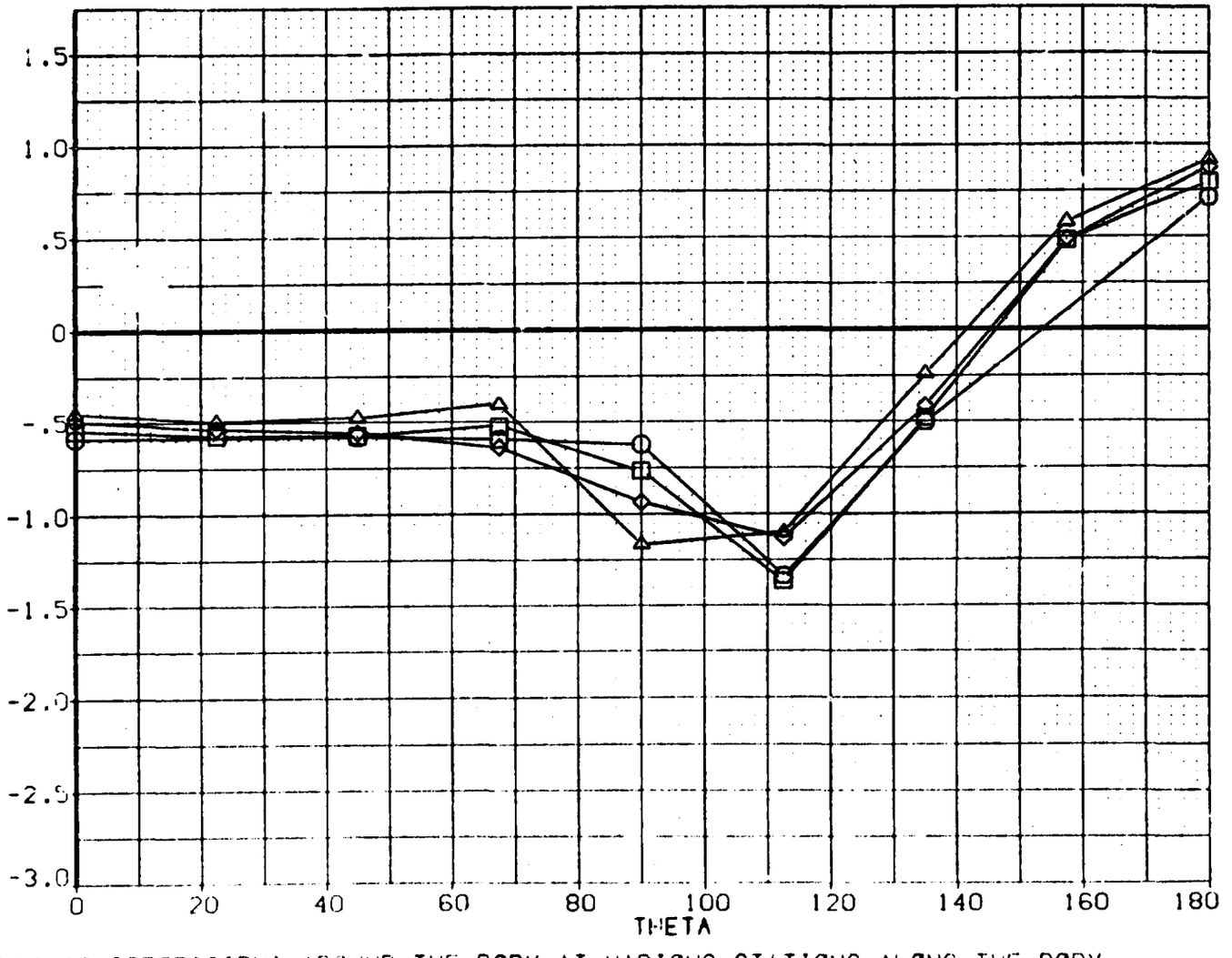
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (C1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	90.000	.490
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



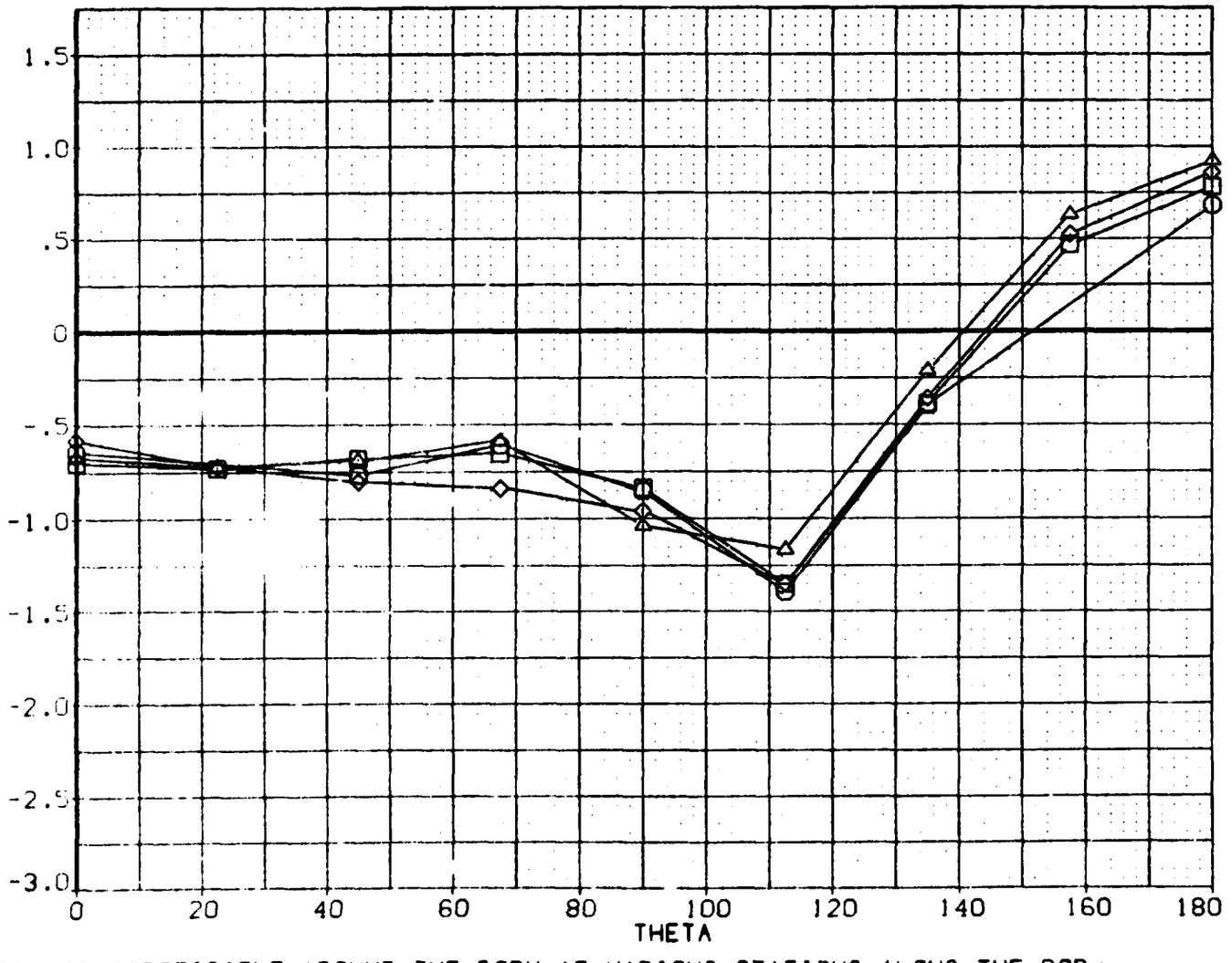
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	90.000	.600
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

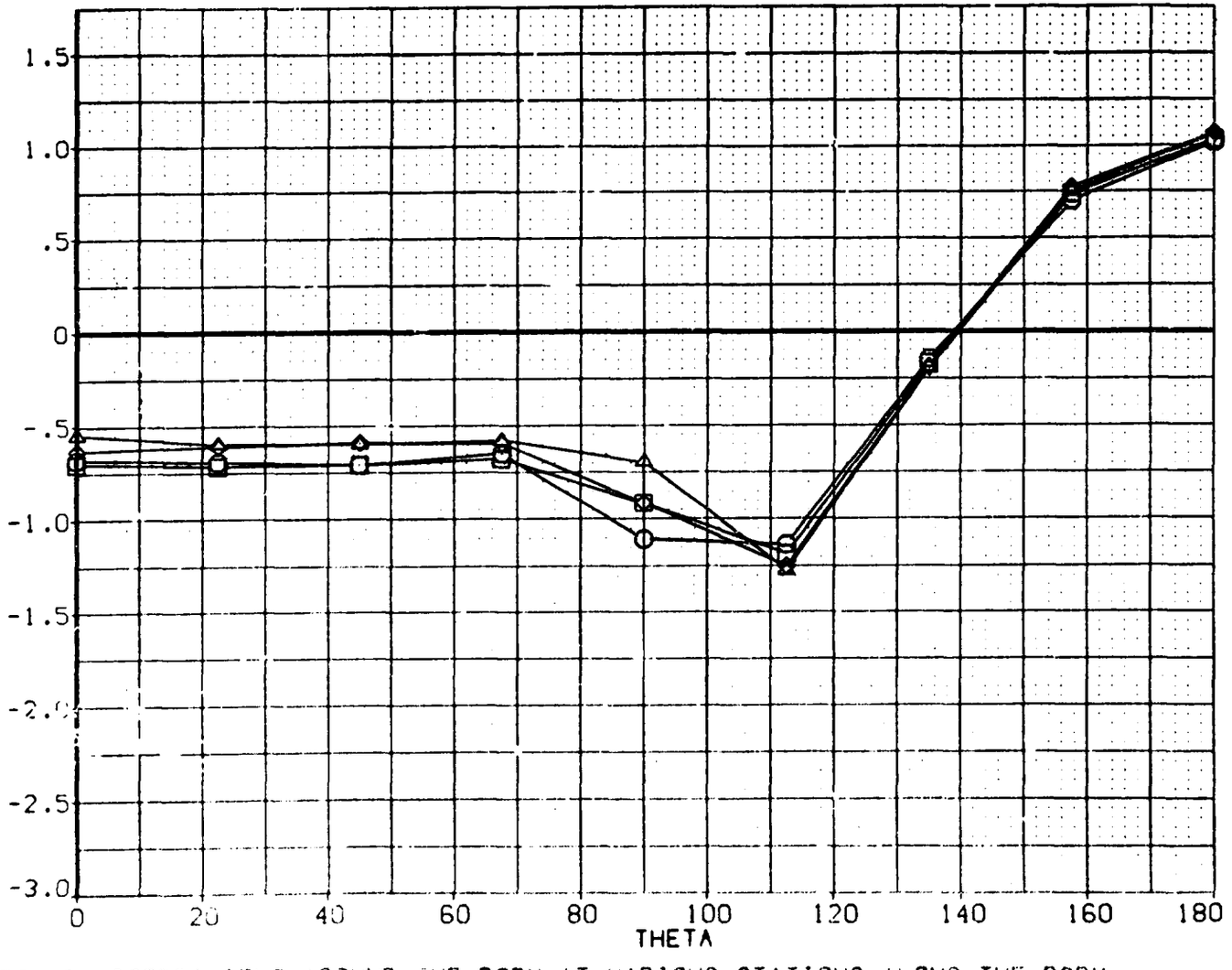
MSFC HRW: 033 (S/29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	90.000	.600
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



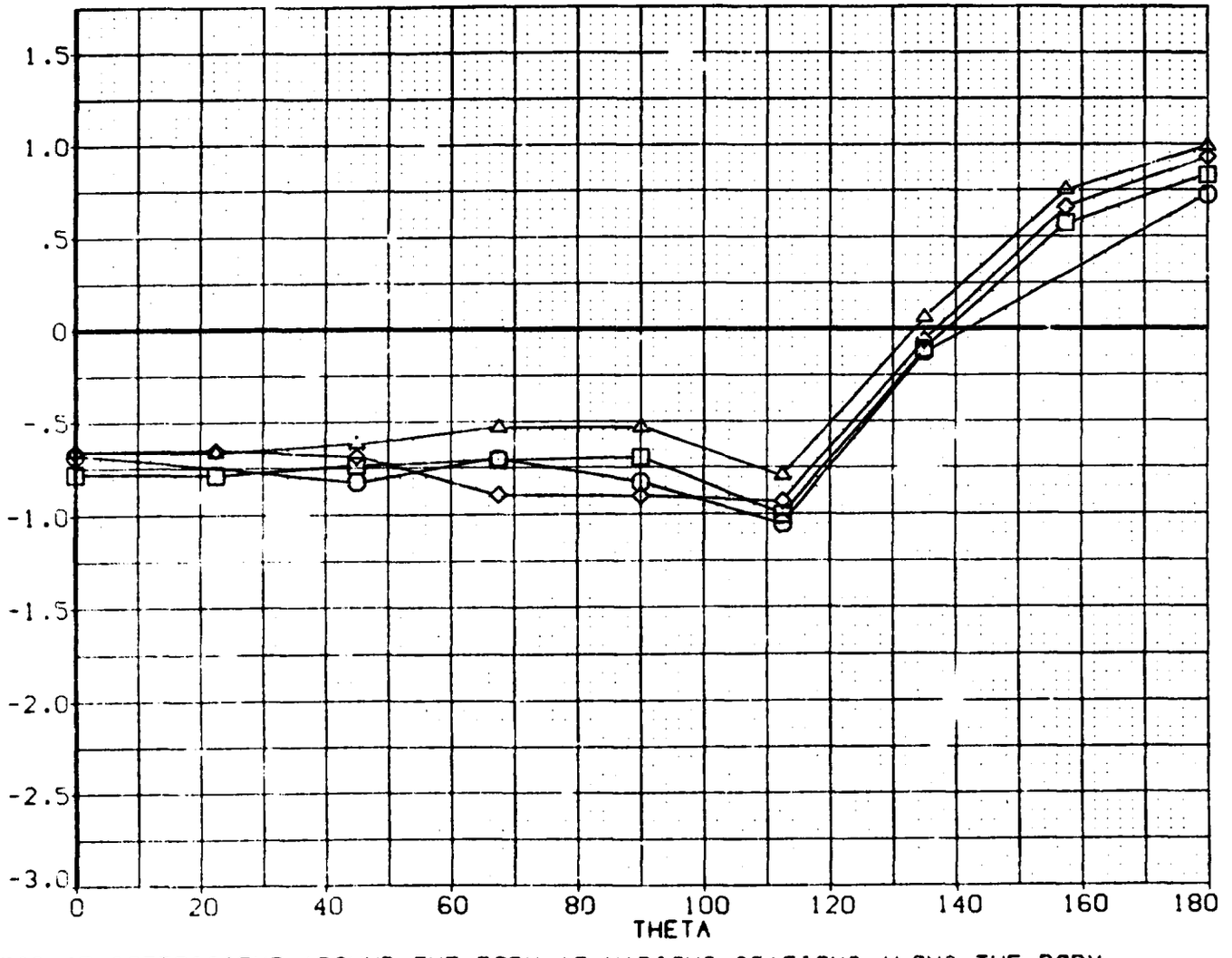
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	90.000	.780
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

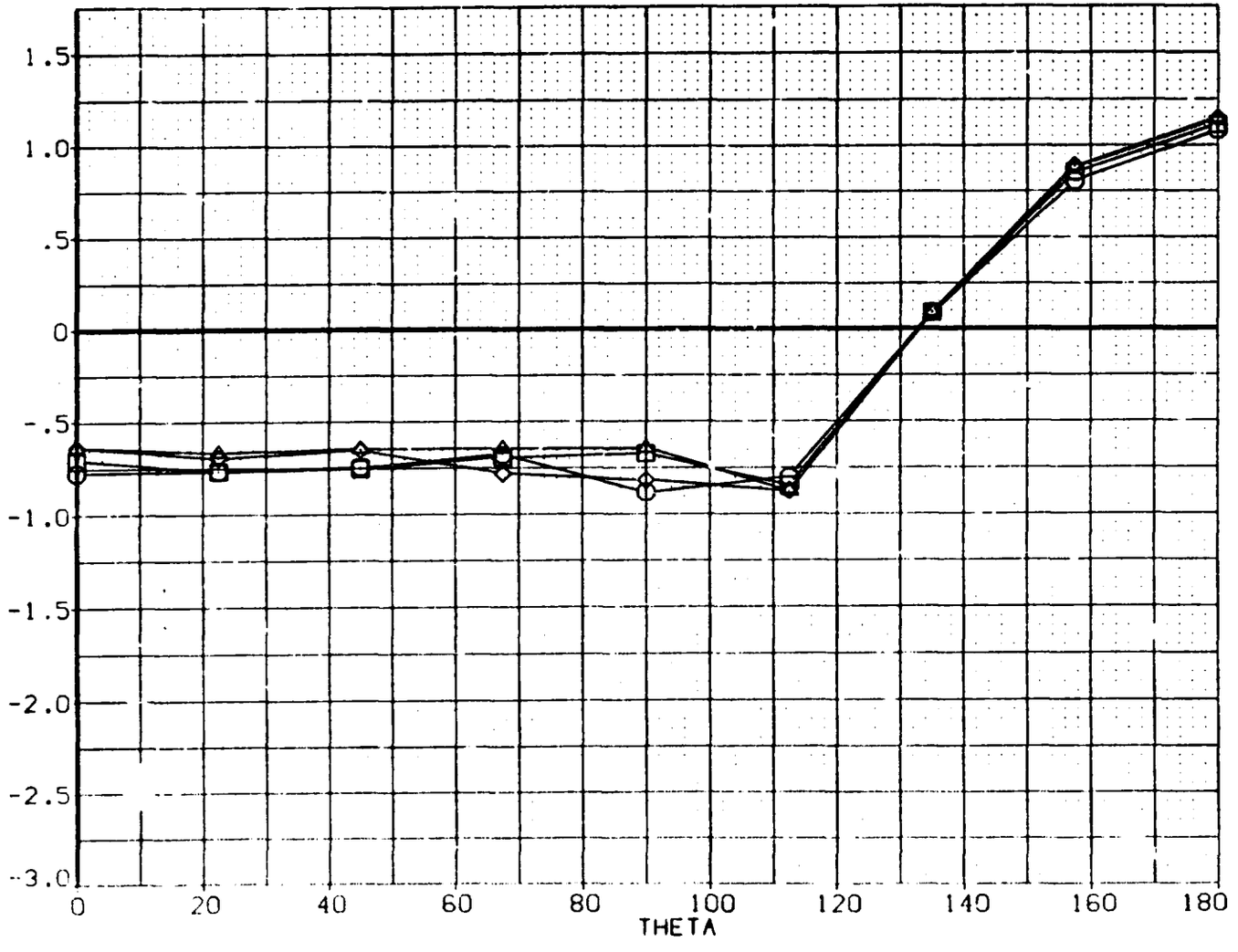
MSFC HRWT 033 (S229F) SRB FORWARD NOSE SECTION (D1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	90.000	.780
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



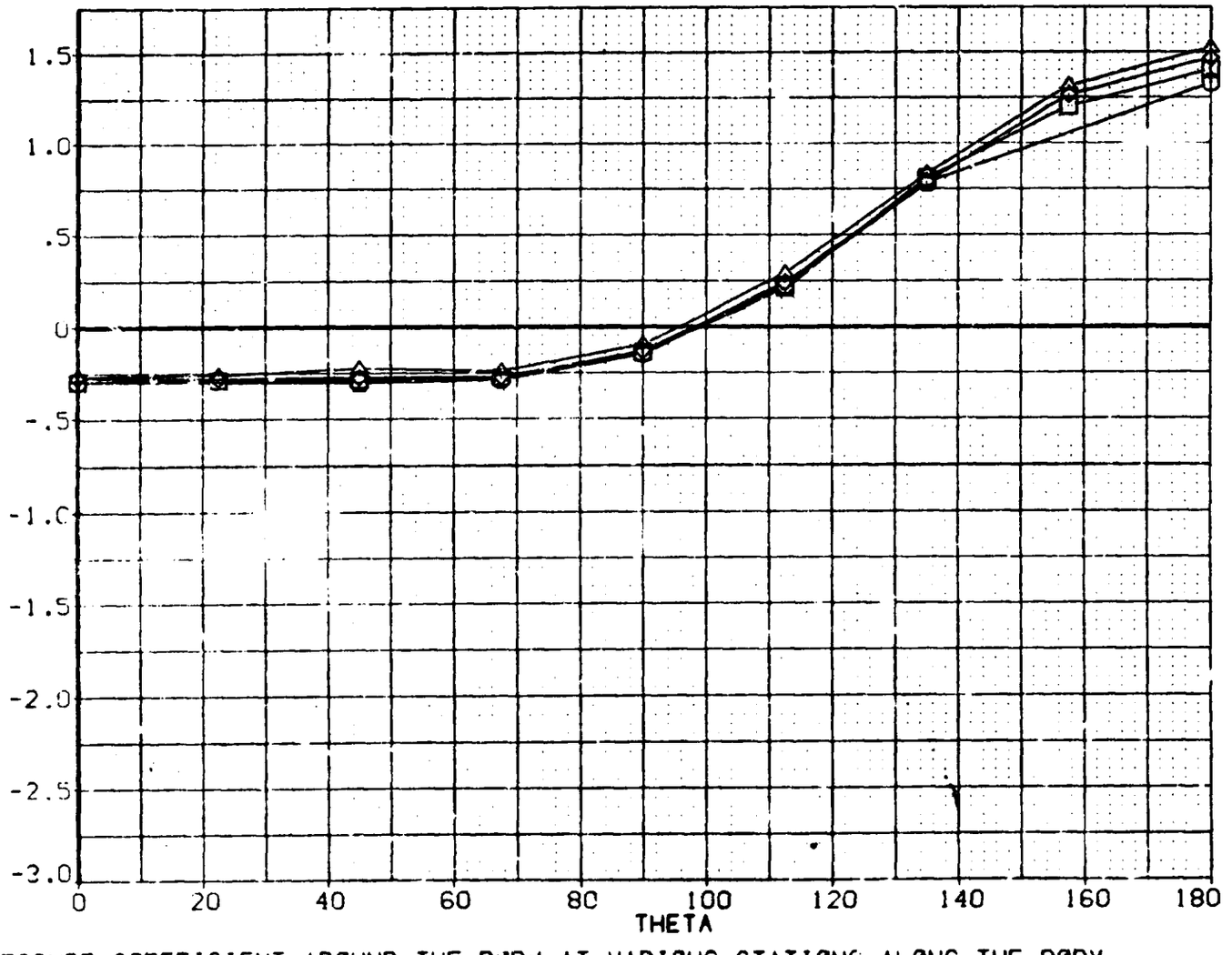
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC H. 033 (SA29F) SRB FORWARD NOSE SECTION (D1E103)

SYMBOL	X/D	ALPHA	MACH
○	.340	90.000	2.000
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	9.000		



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

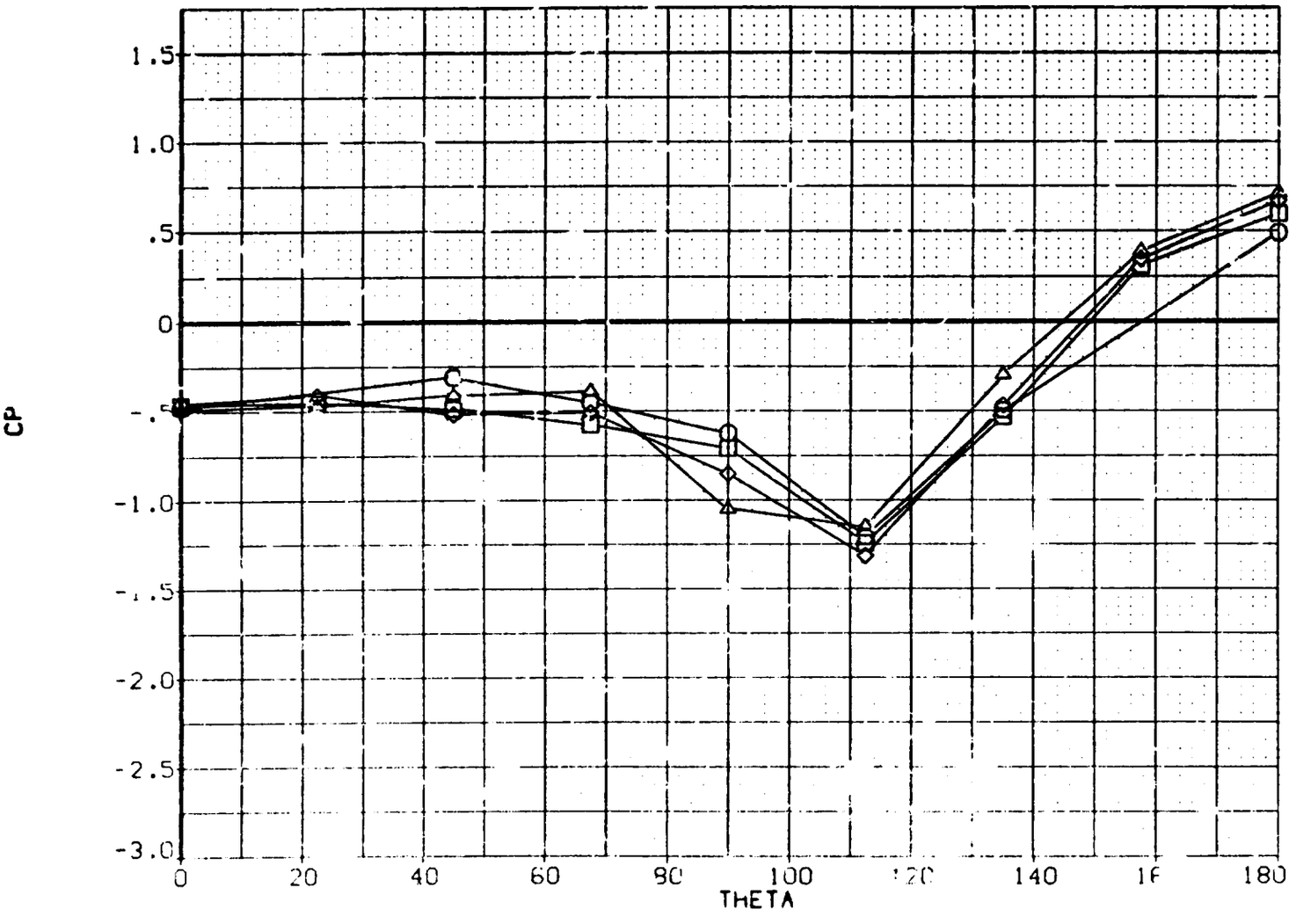
MSFC HRWT 033 (SA29F) SPB FORWARD NOSE SECTION (D1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	100.000	.900
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

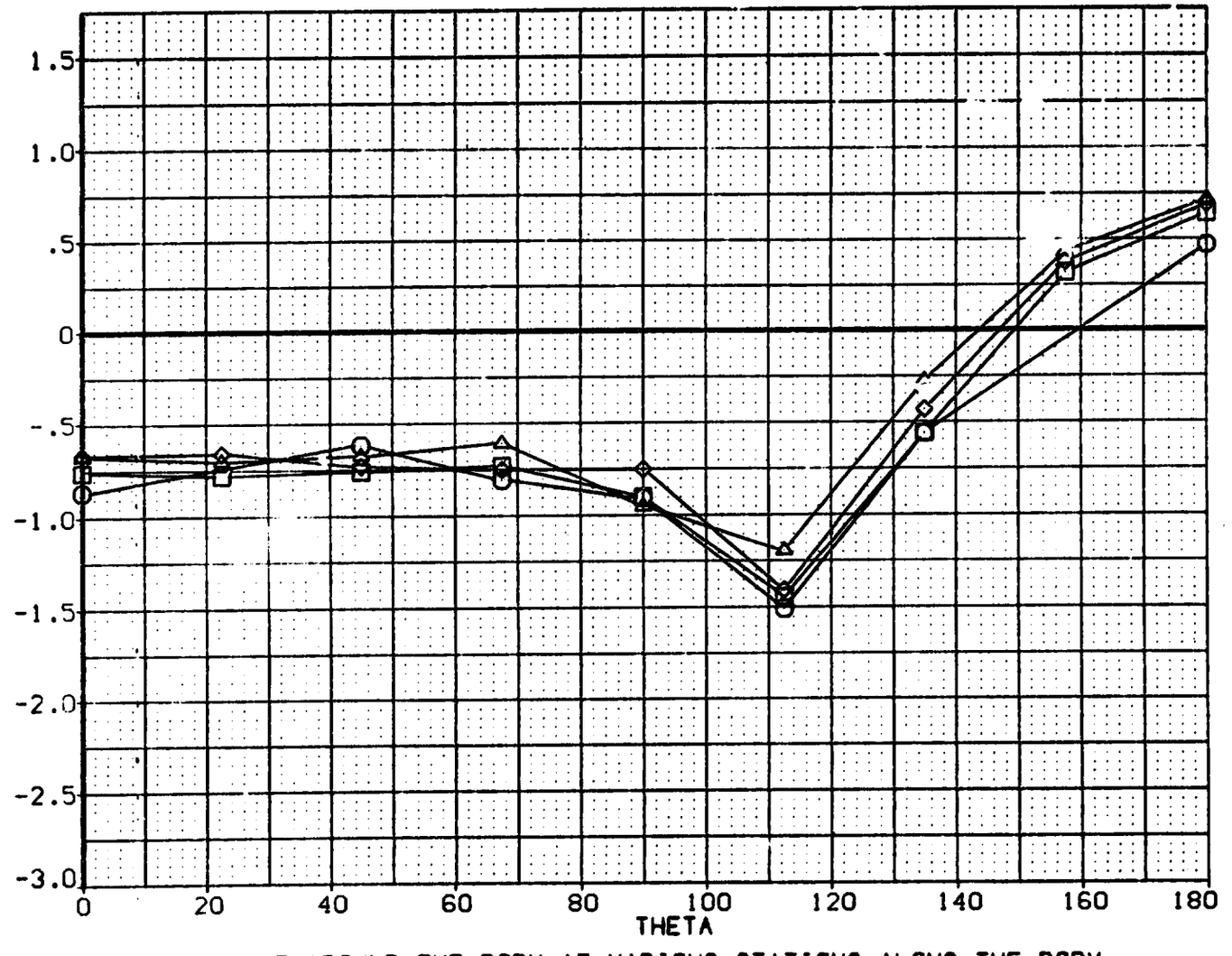
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	100.000	.600
□	.675		
◇	1.007		
△	1.265		

PARAMETRIC VALUES

BETA .000 PHI .00

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

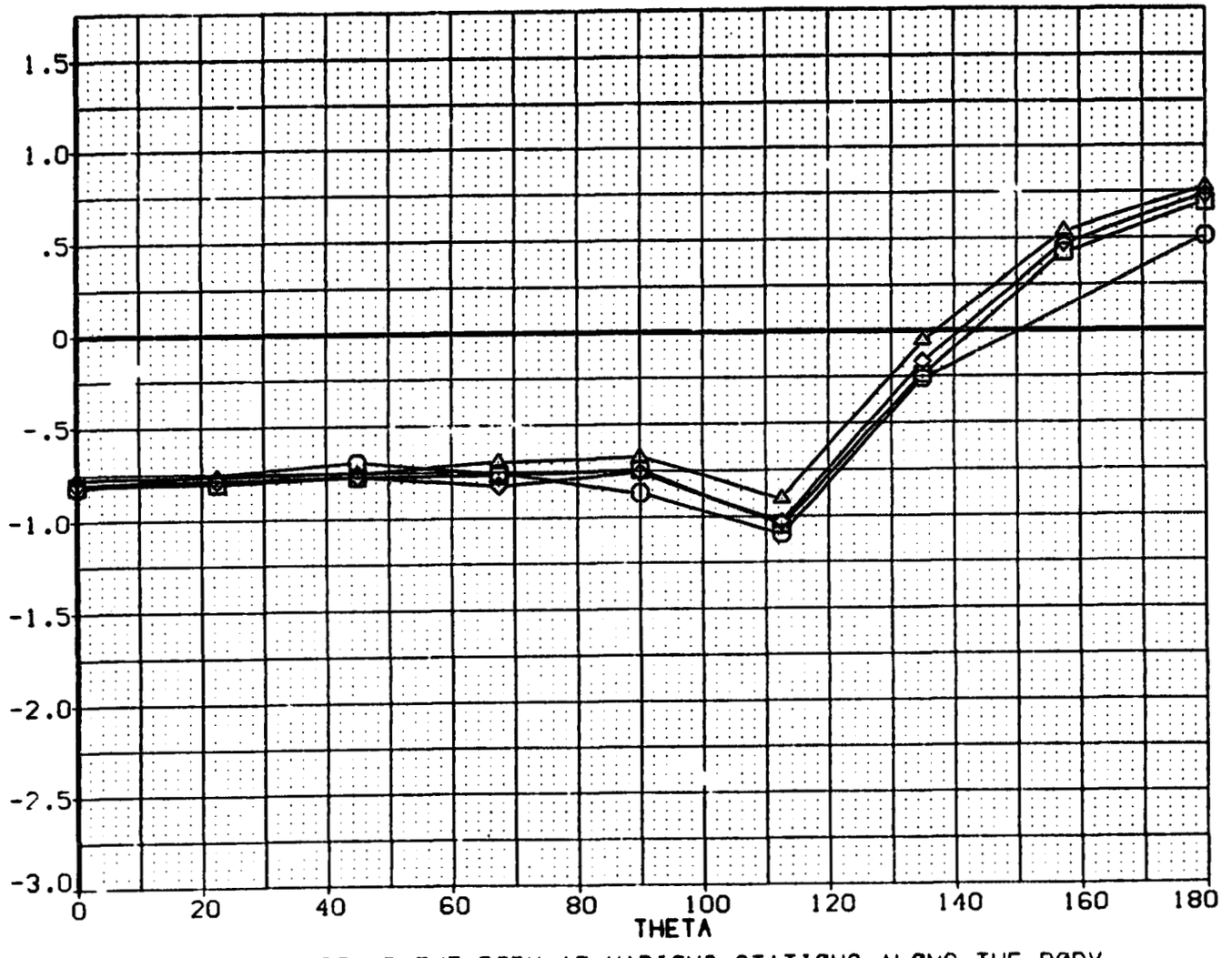
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (D1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	100.000	.790
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

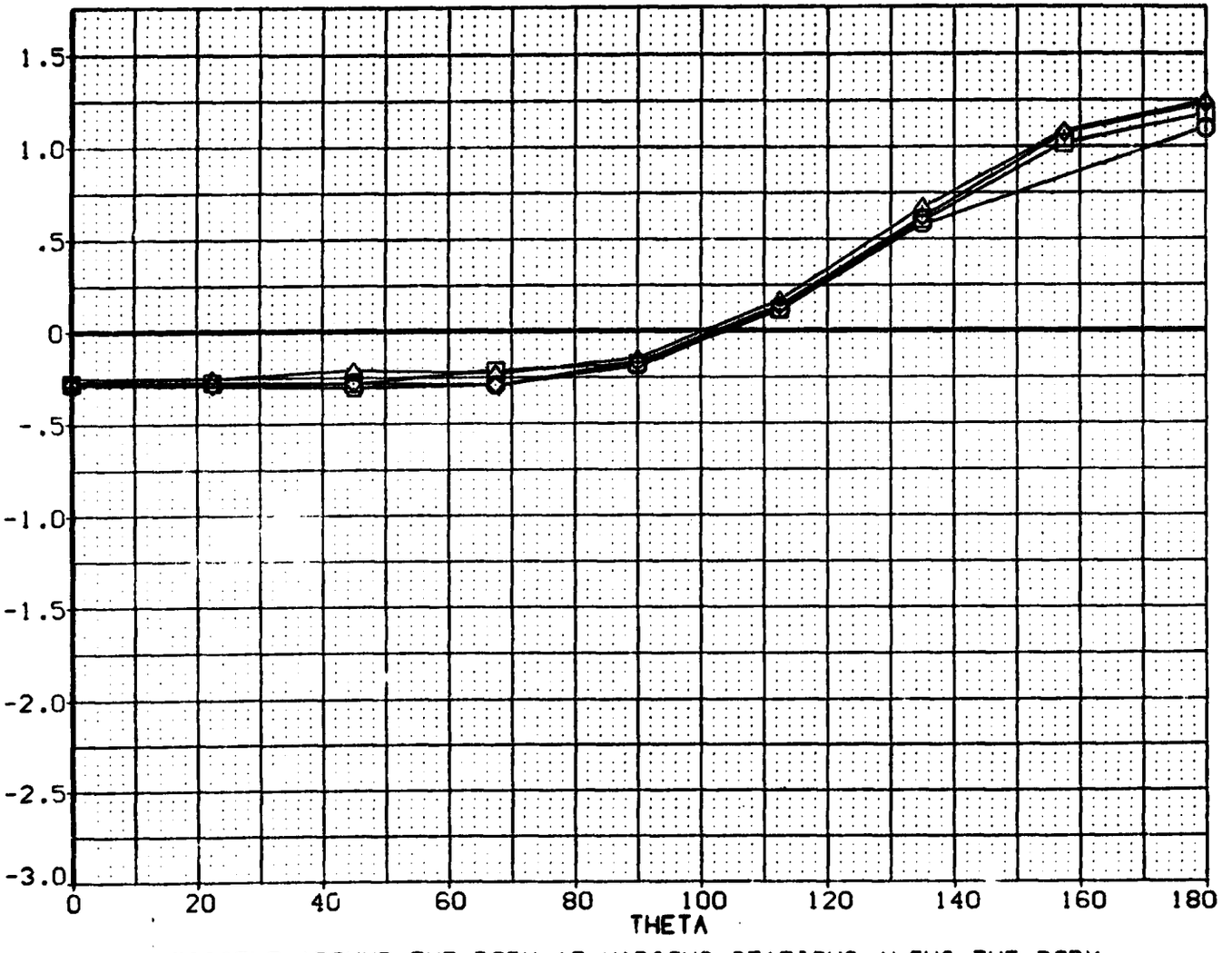
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E103)

SYMBOL	X/D	ALPHA	MACH
○	.340	100.000	2.000
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



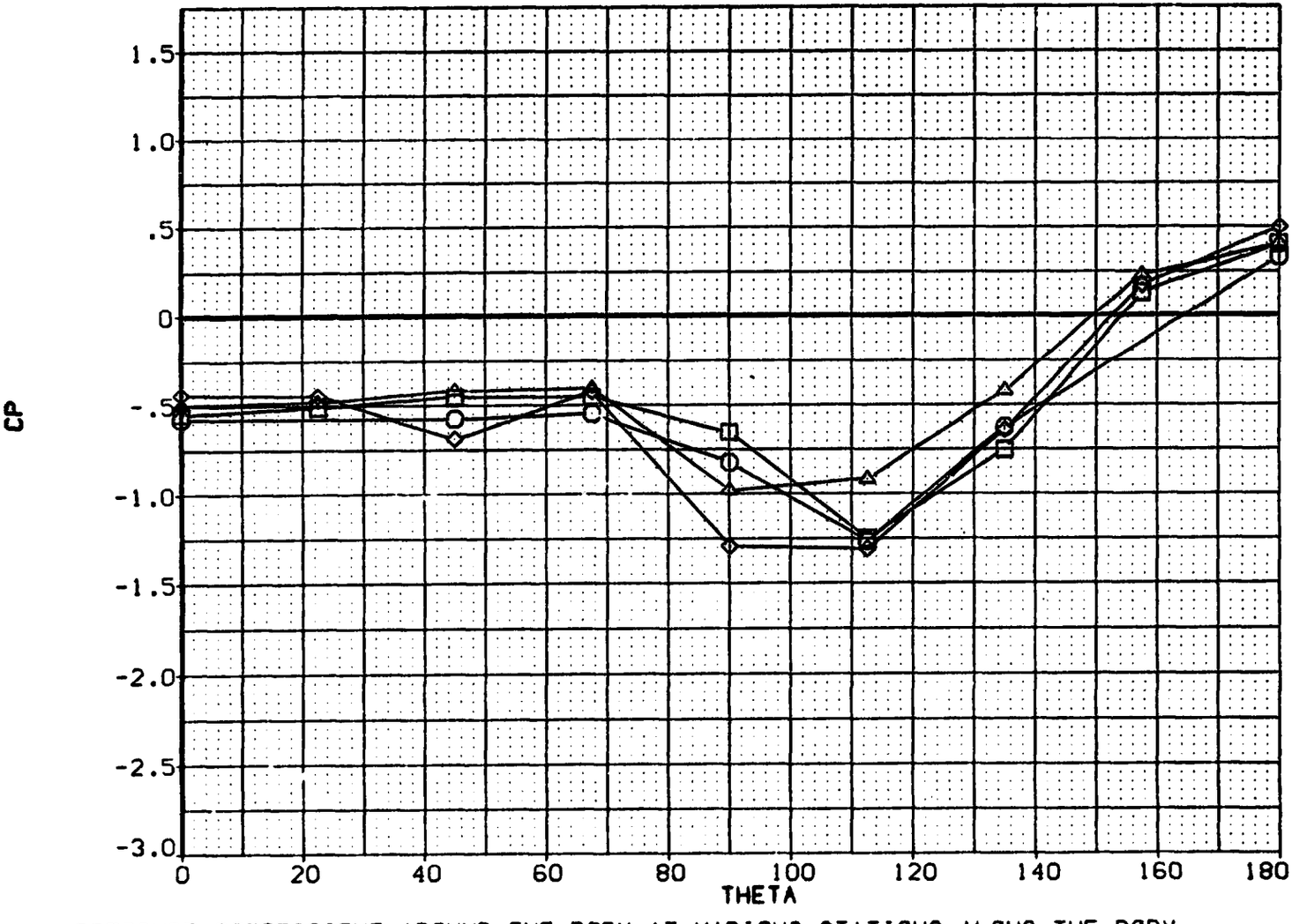
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	107.900	.410
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



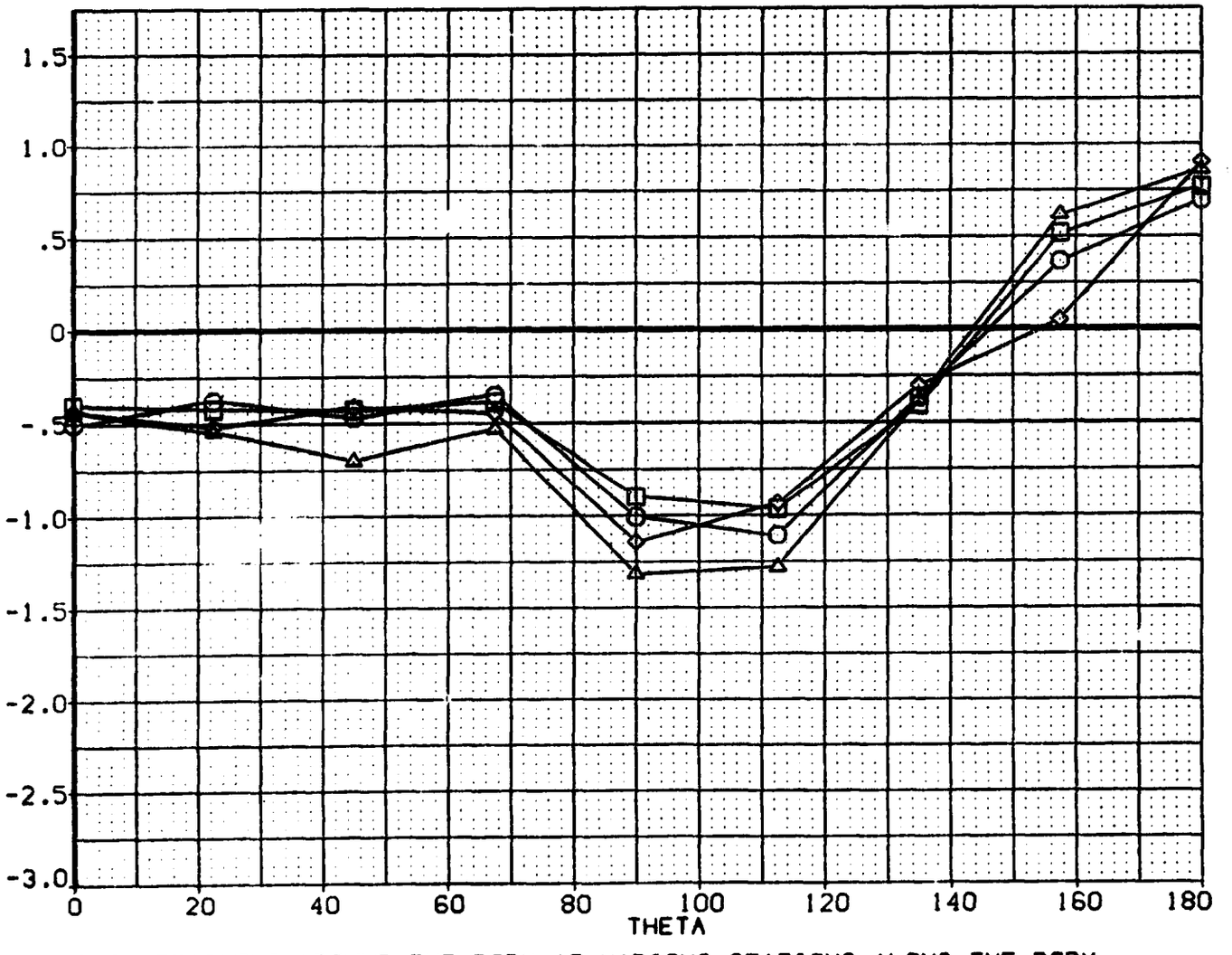
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	107.900	.410
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA	.000	PHI	.000
RN	18.100		



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

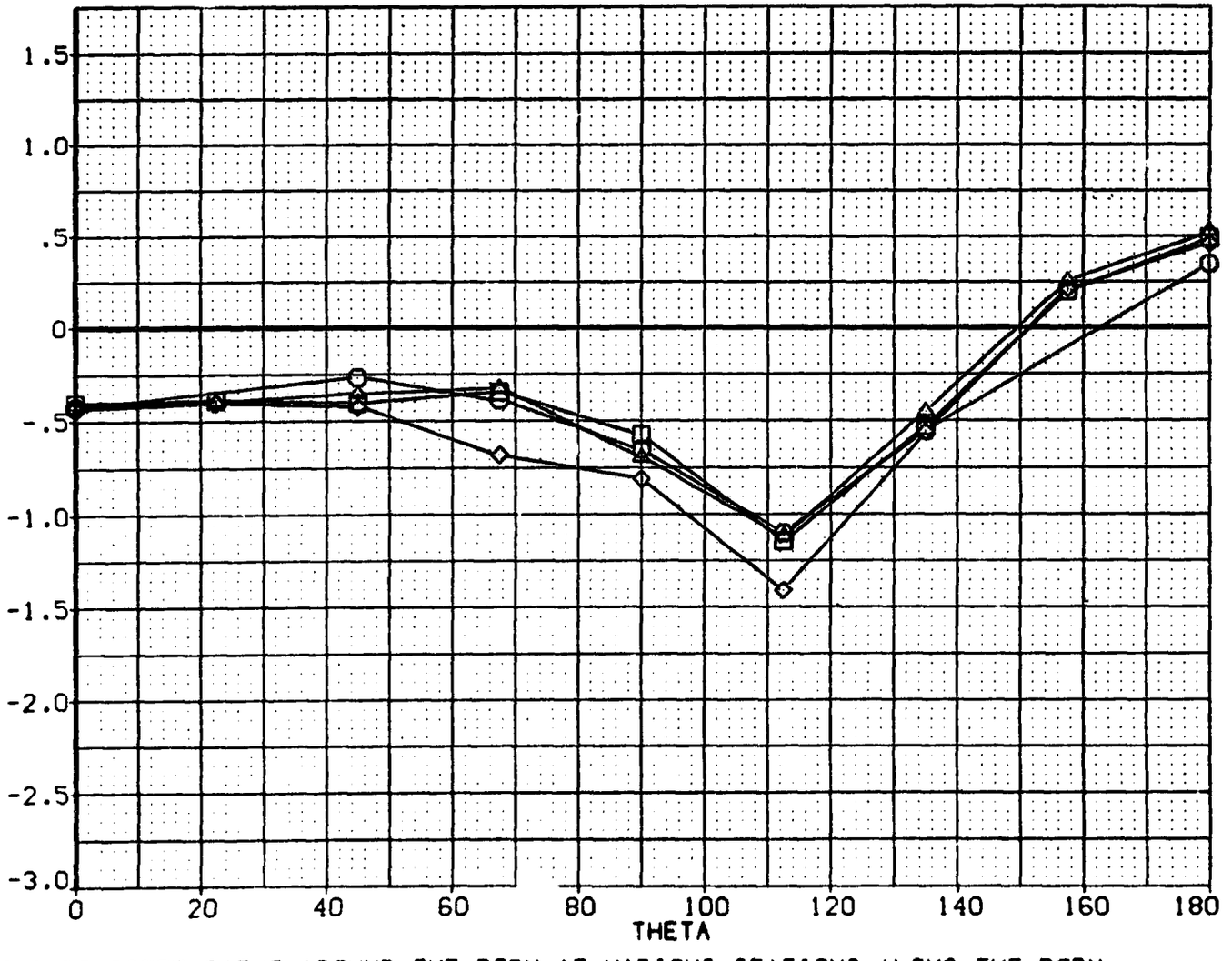
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (E1E102)

SYMBOL	X/D	ALPHA	MACH
○	.340	108.000	.500
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

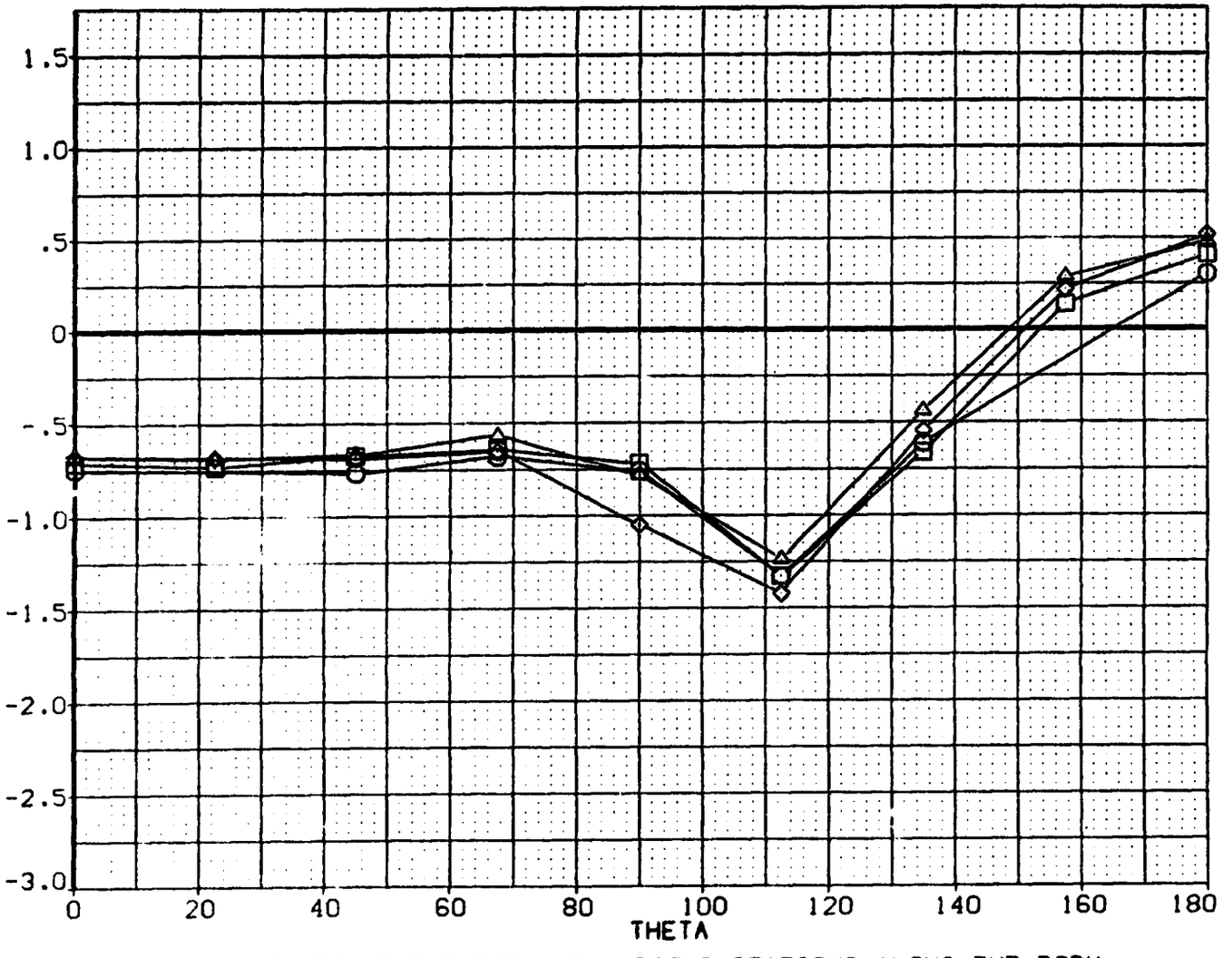
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	107.900	.610
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

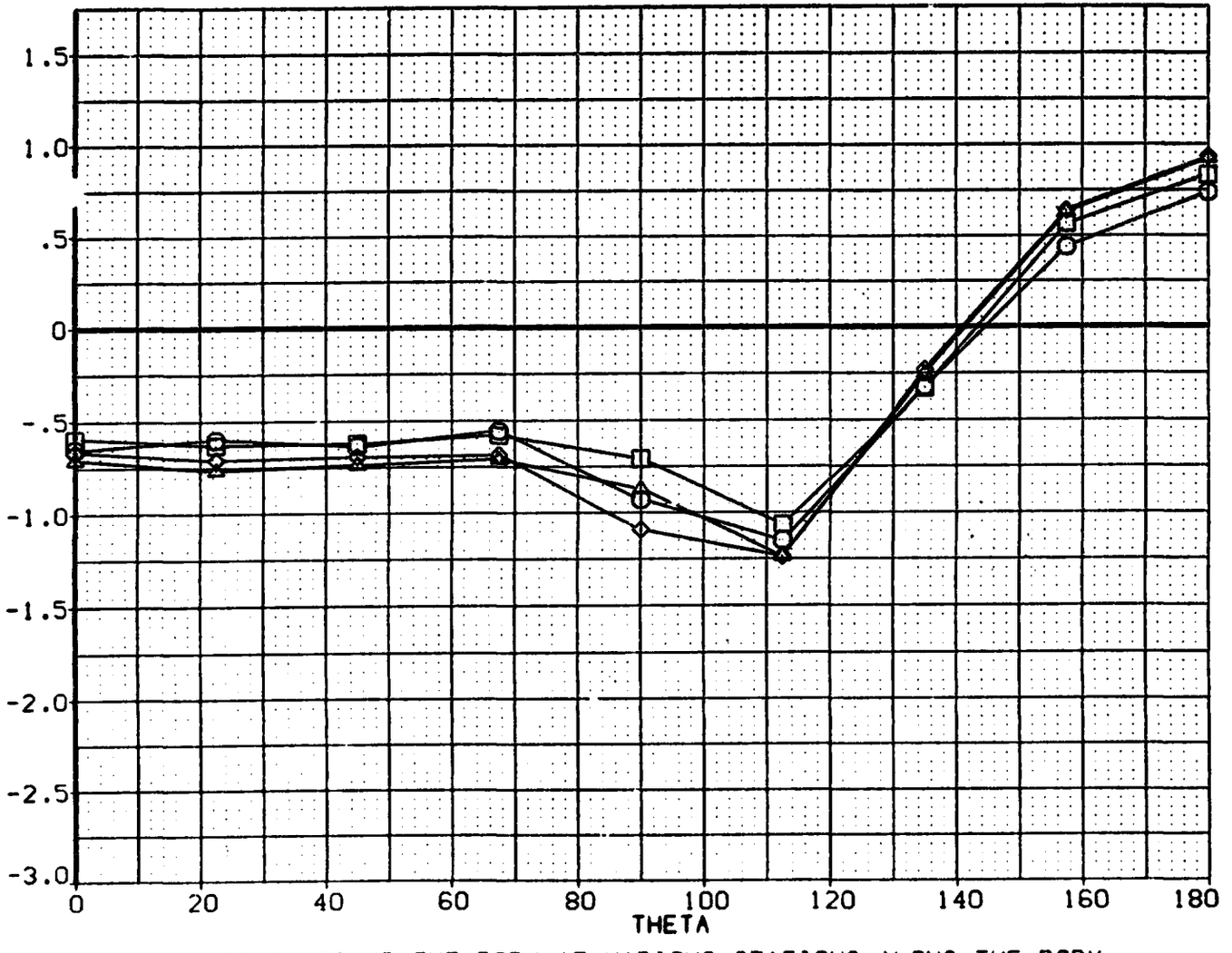
MSFC HRW: 033 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	107.900	.610
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

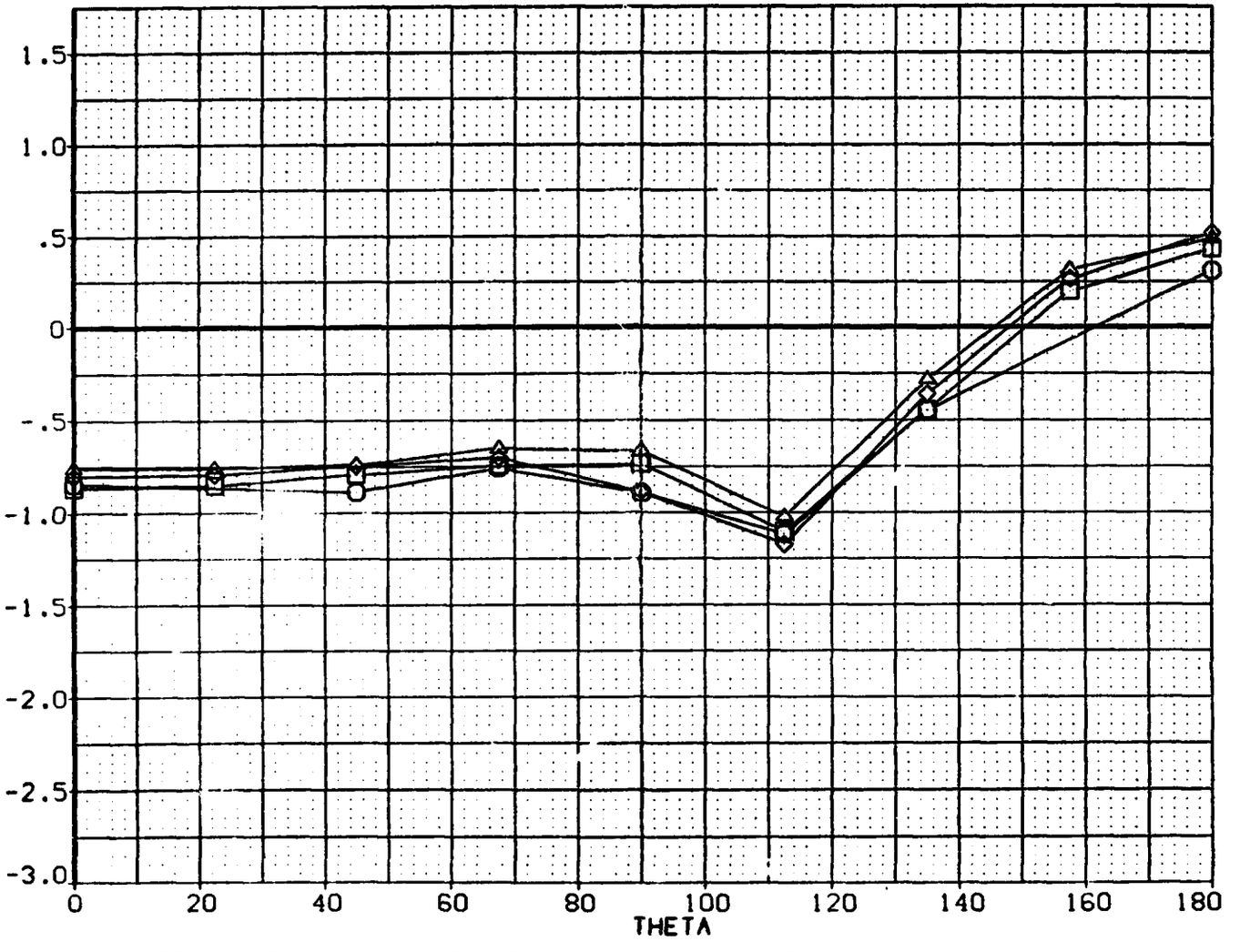
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	X/D	ALPHA	MACH
○	.340	107.900	.760
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

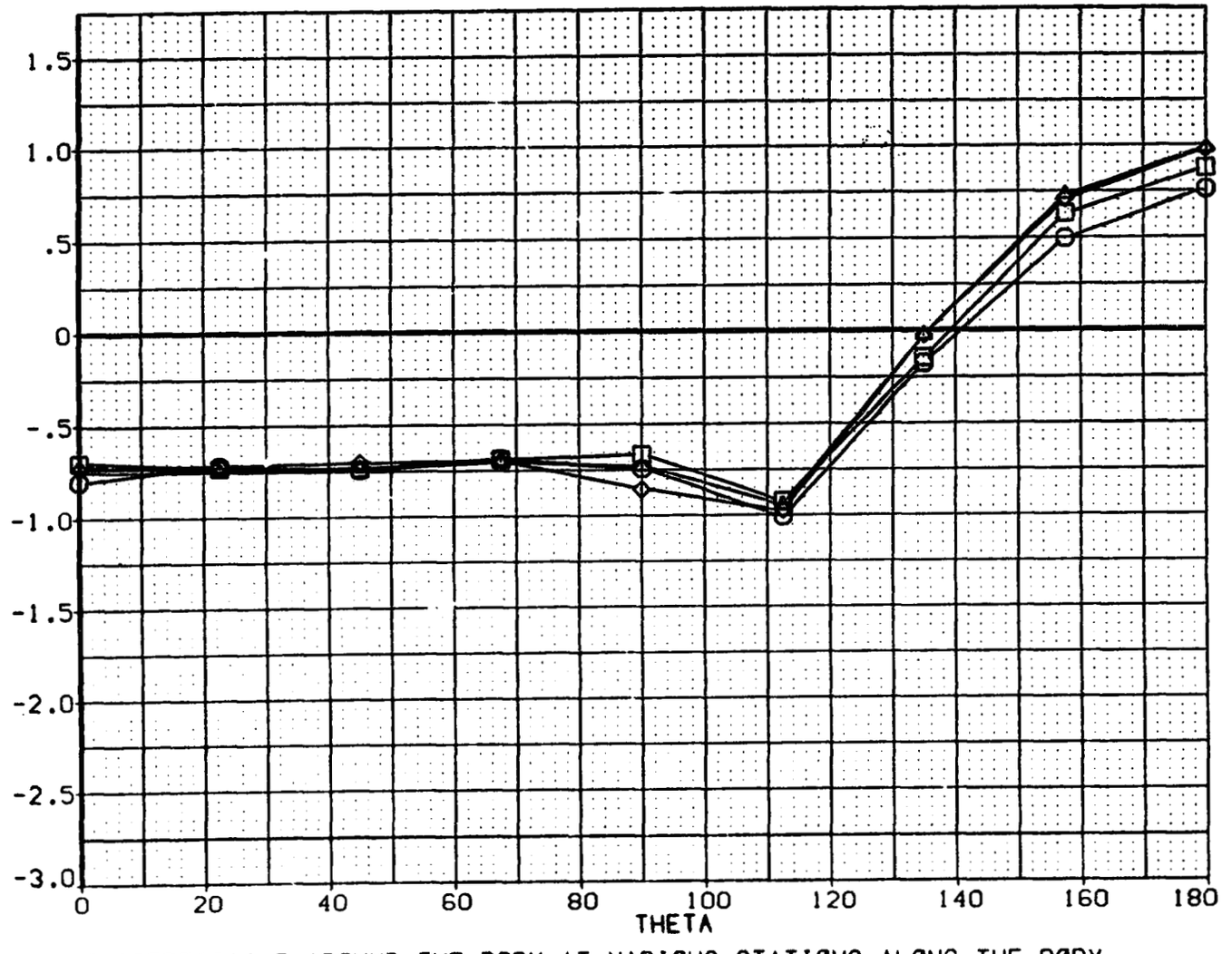
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E101)

SYMBOL	X/D	ALPHA	MACH
○	1.377	107.900	.760
□	1.550		
◇	1.810		
△	2.160		

PARAMETRIC VALUES

BET .000 PHI .000

RN 18.100



PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

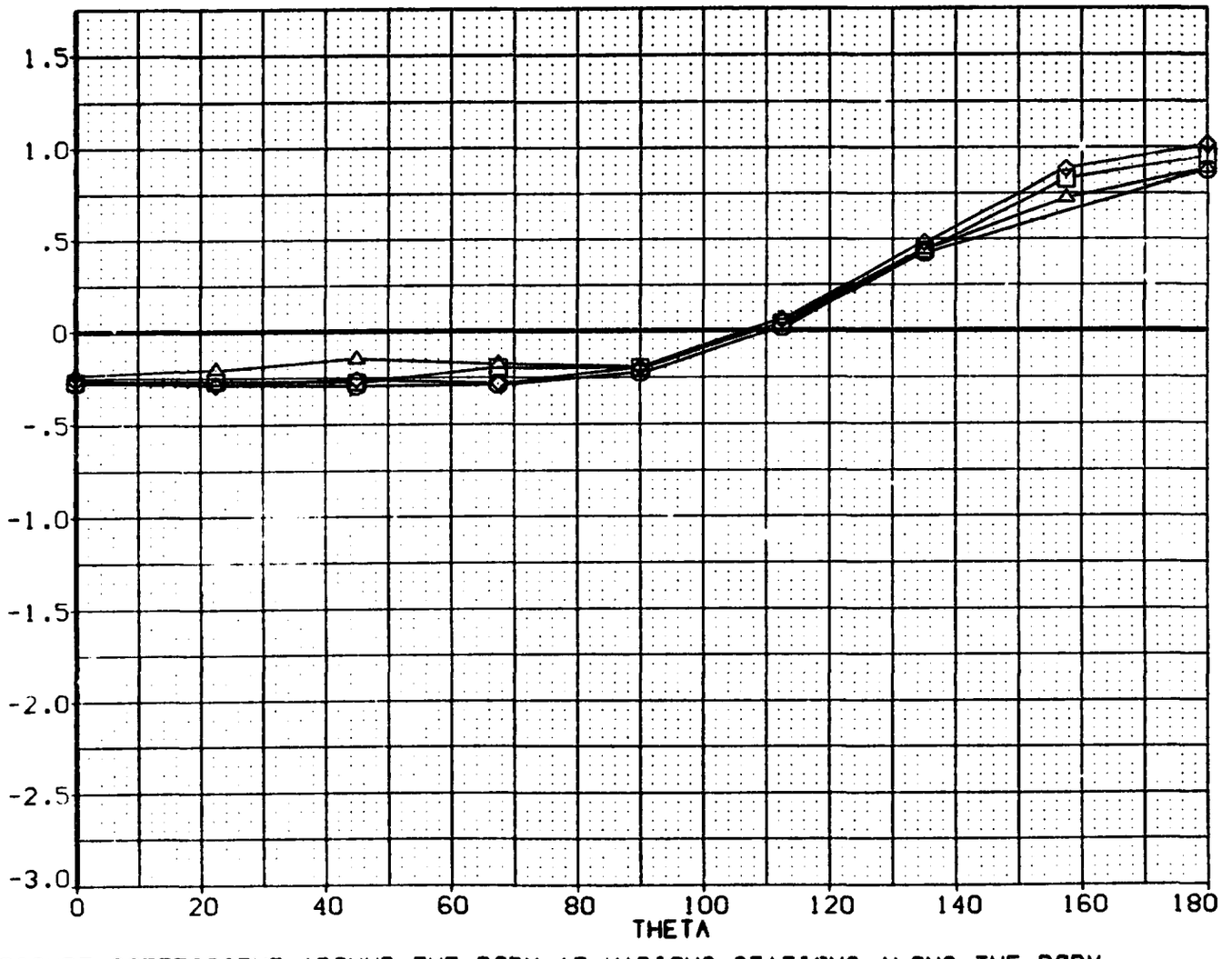
MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (F1E103)

SYMBOL	X/D	ALPHA	MACH
○	.340	108.000	2.000
□	.675		
◇	1.007		
△	1.285		

PARAMETRIC VALUES

BETA .000 PHI .000

RN 9.000



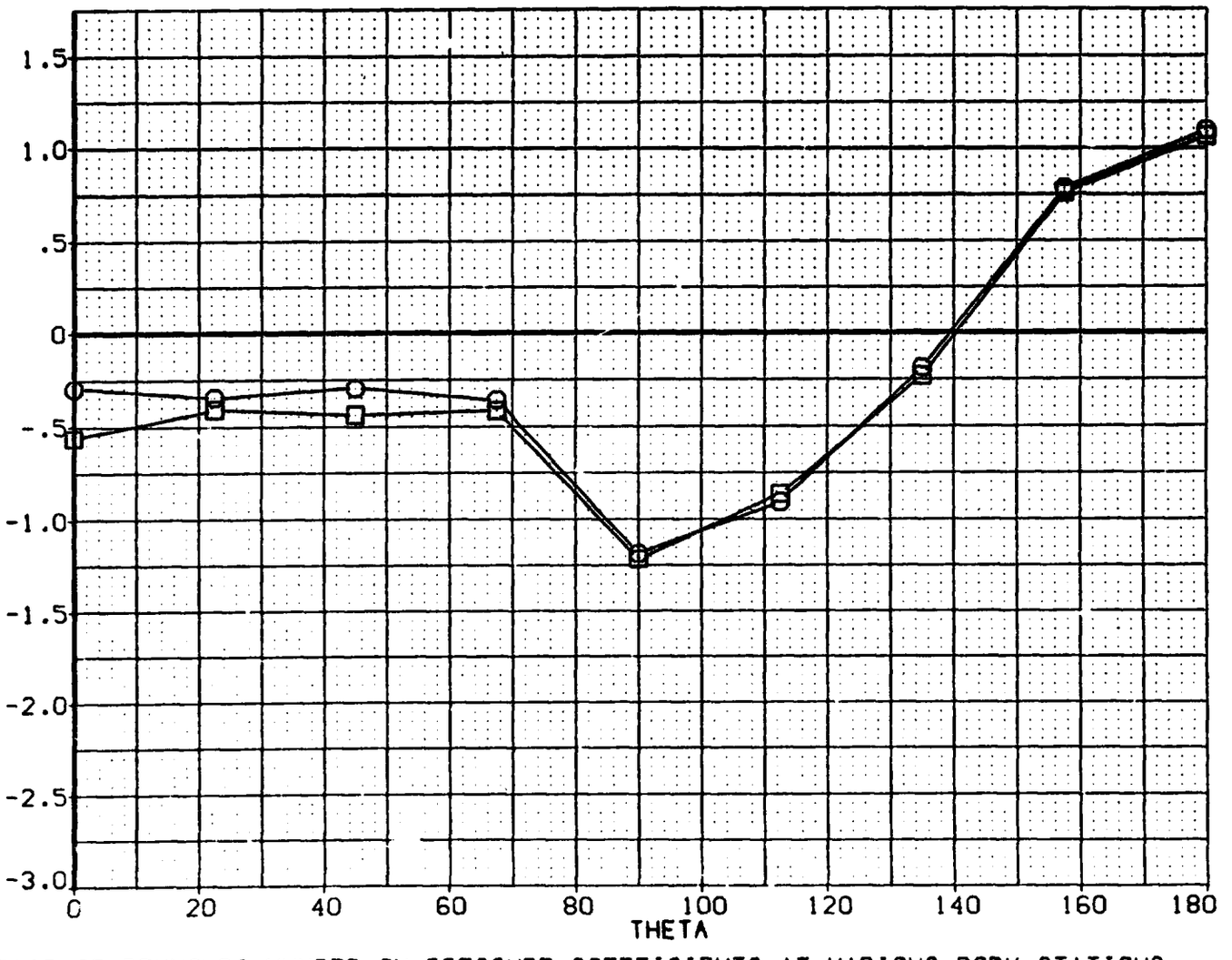
PRESSURE COEFFICIENT AROUND THE BODY AT VARIOUS STATIONS ALONG THE BODY

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

SYMBOL	RN	X/D	ALPHA
○	2.250	1.810	90.000
□	10.217		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.400		



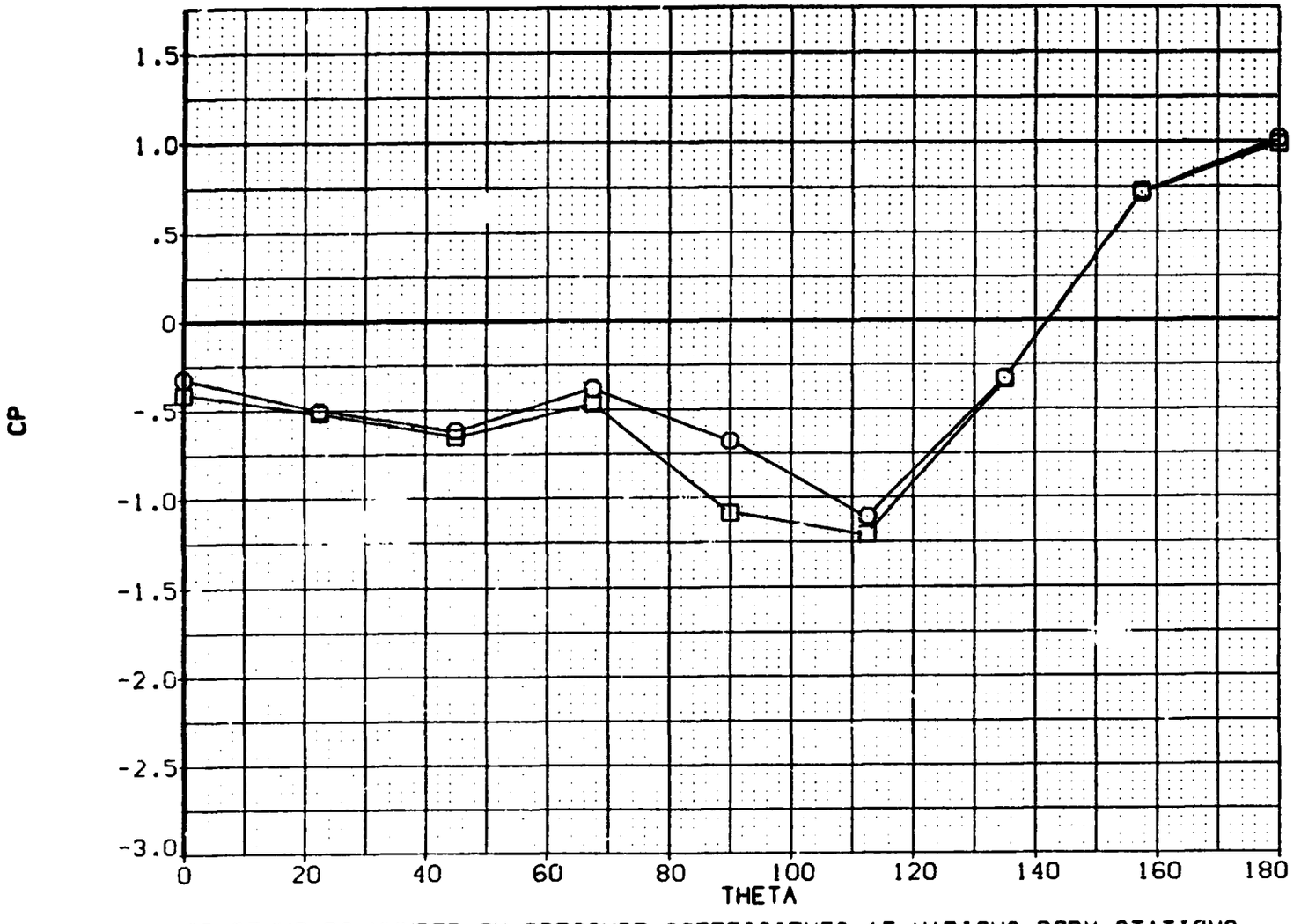
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

M3FC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

SYMBOL	RN	X/D	ALPHA
○	2.250	2.160	90.000
□	10.217		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.400		



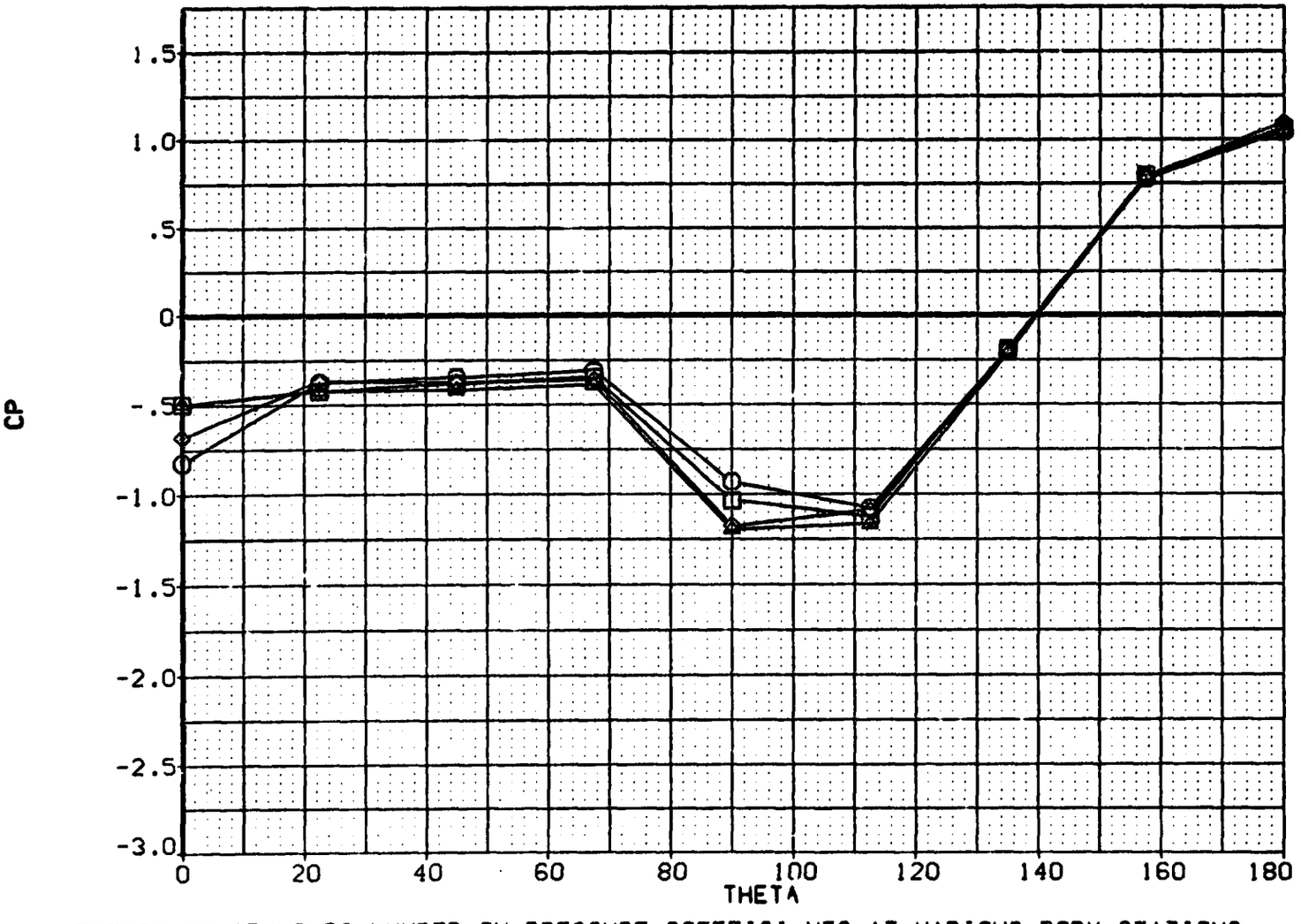
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

SYMBOL	RN	X/D	ALPHA
○	4.017	1.810	270.000
□	6.067		
◇	7.517		
△	9.017		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.400		



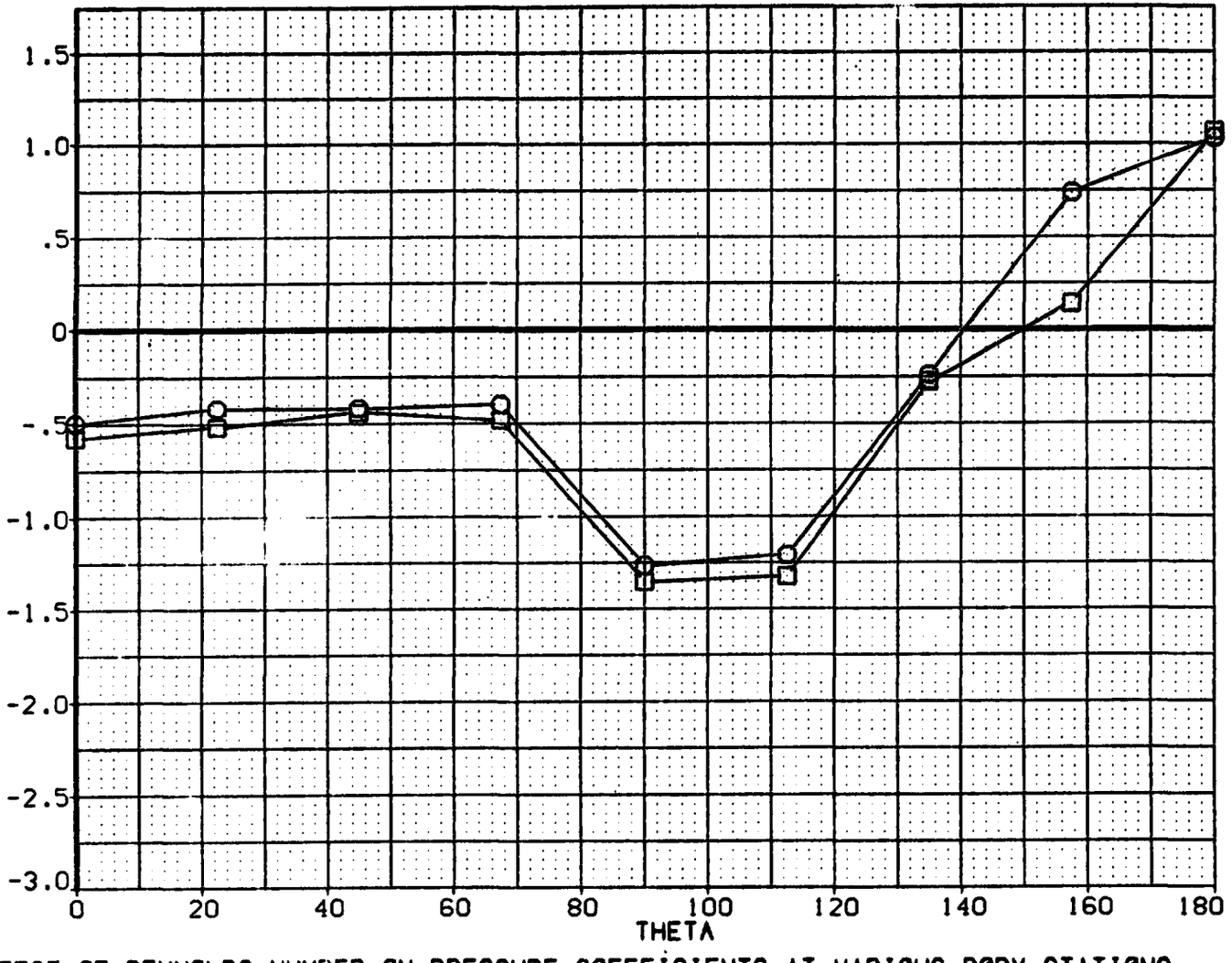
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

SYMBOL	RN	X/D	ALPHA
○	13.383	1.810	270.000
□	18.800		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.400		



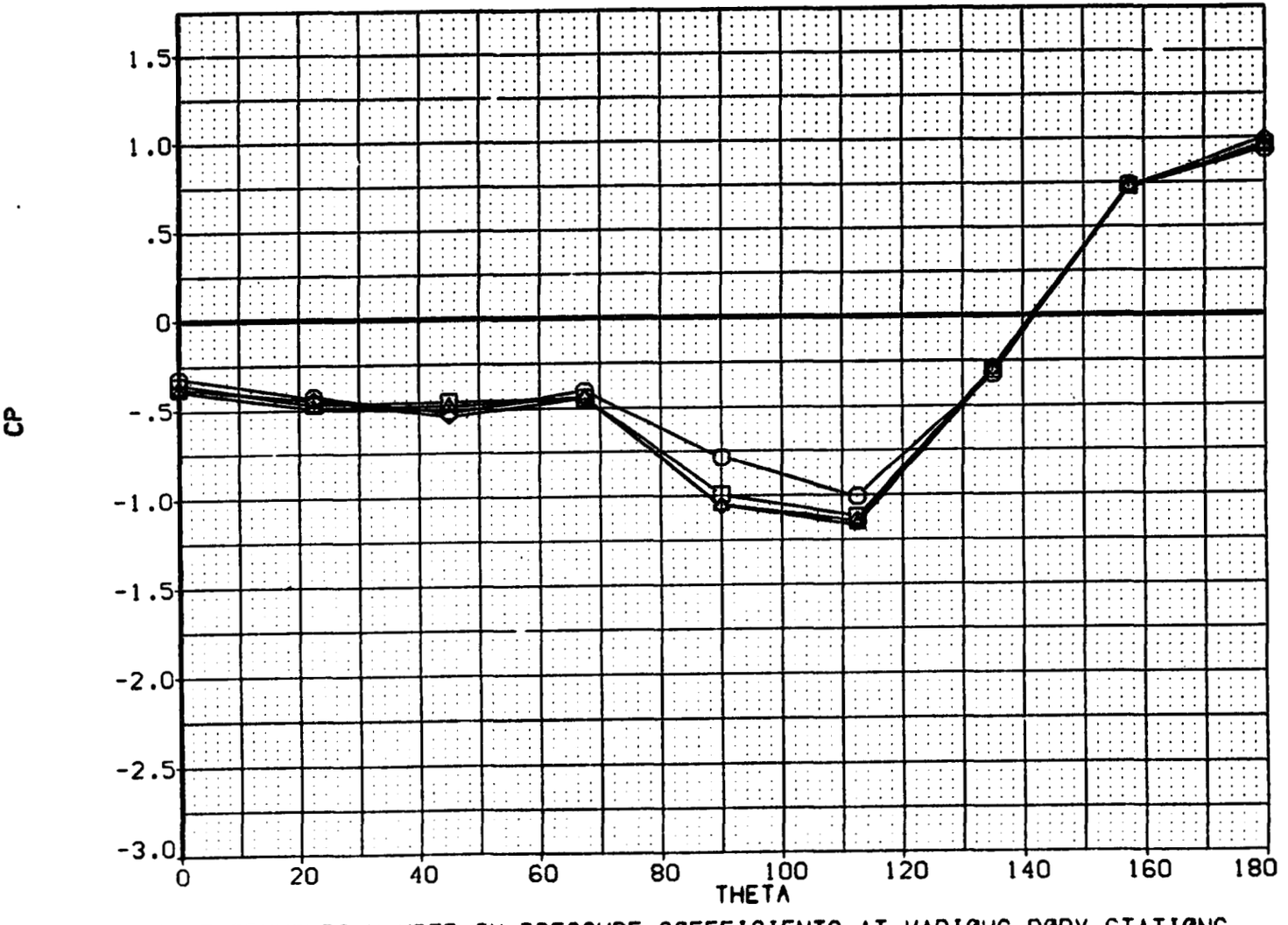
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

SYMBOL	RN	X/D	ALPHA
○	4.017	2.160	270.000
□	6.067		
◇	7.517		
△	9.017		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.400		



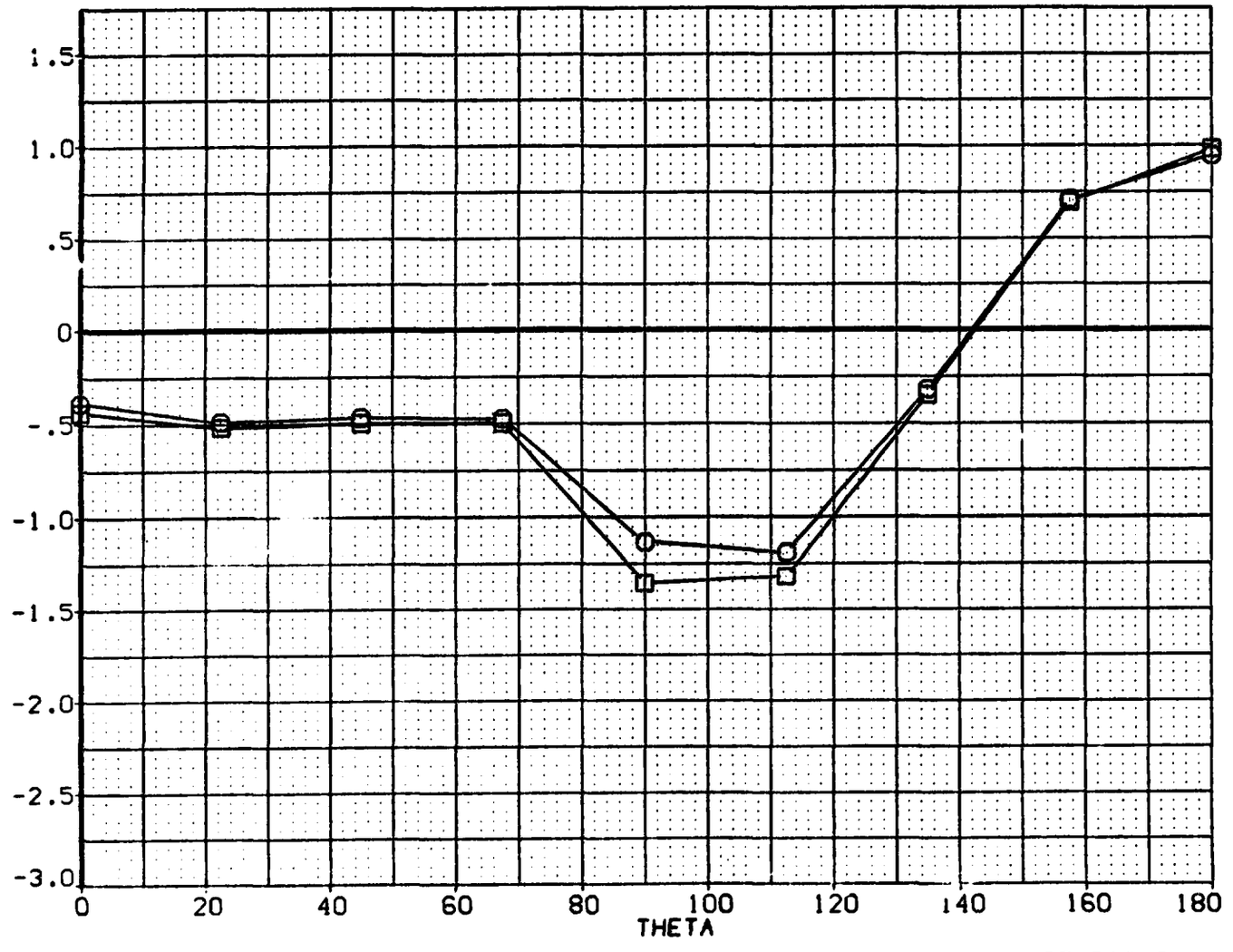
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29[illegible]) SRB FORWARD NOSE SECTION (R1E105)

SYMBOL	RN	X/D	ALPHA
○	13.383	2.160	270.000
□	18.800		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.400		



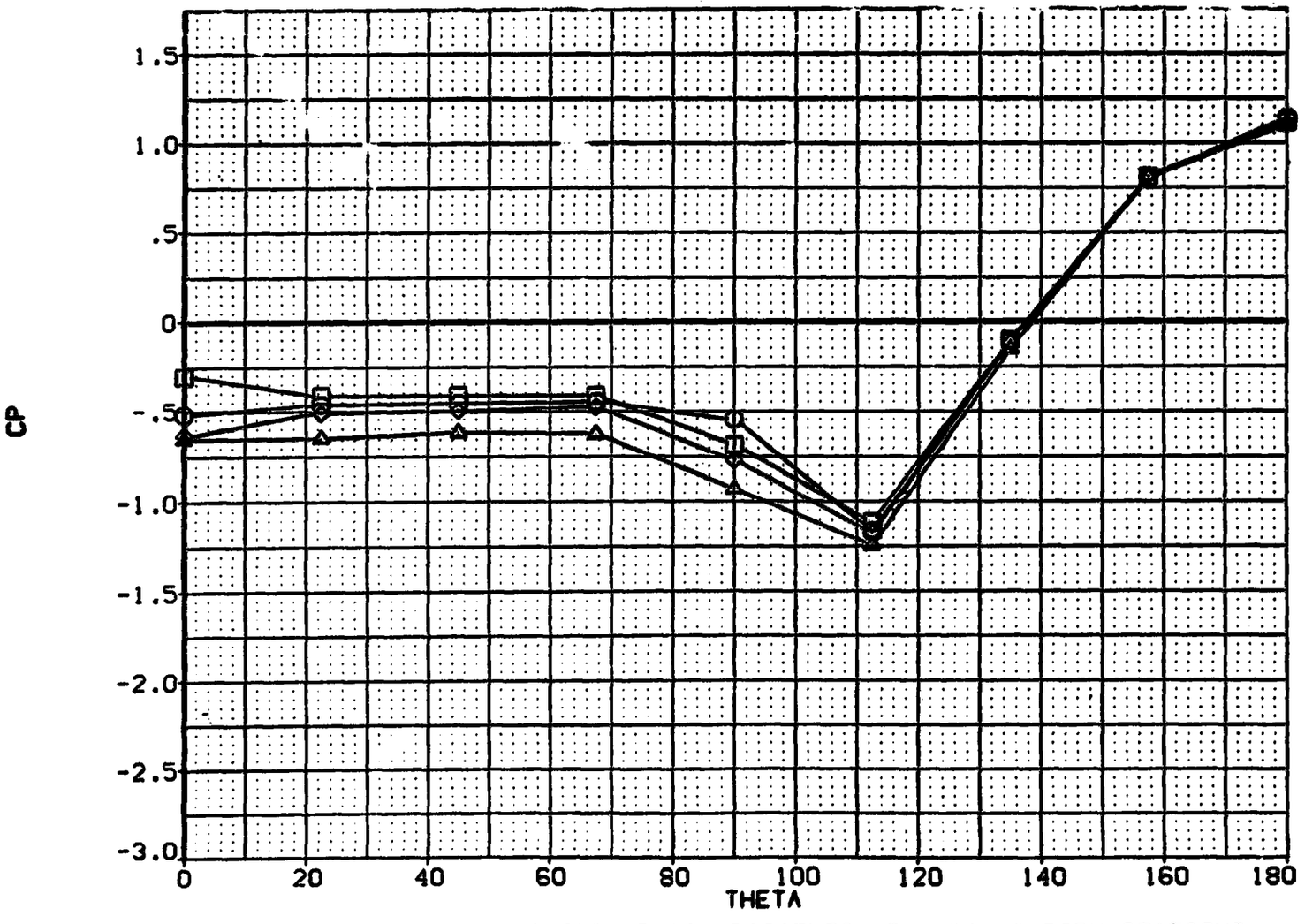
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E106)

SYMBOL	RN	X/D	ALPHA
○	2.767	1.810	270.000
□	4.050		
◇	5.850		
△	7.17		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.600		



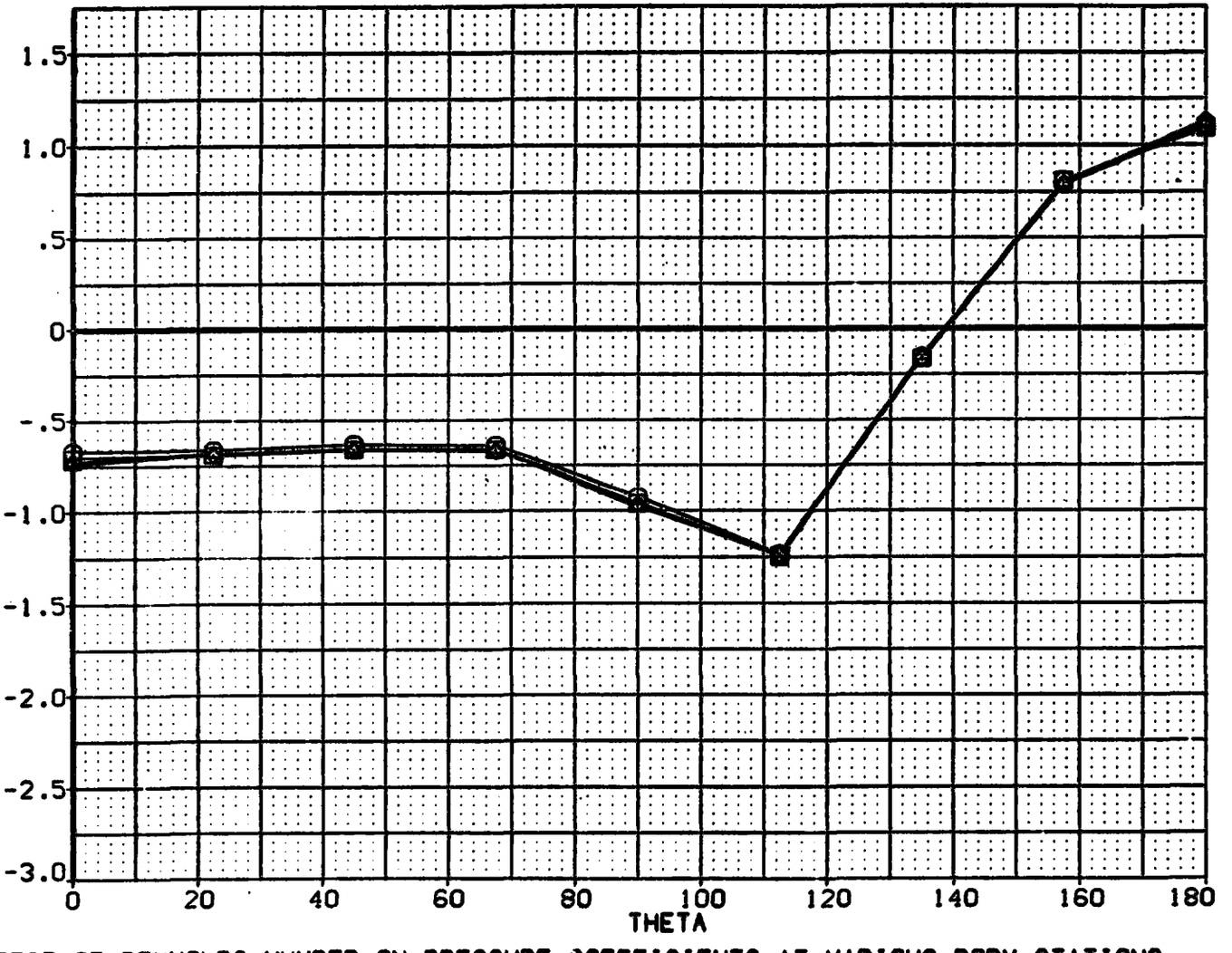
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033.(SA29F) SRB FORWARD NOSE SECTION (B1E106)

SYMBOL	RN	X/D	ALPHA
○	8.717	1.810	270.000
□	9.687		
◇	12.750		
△	13.167		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.800		



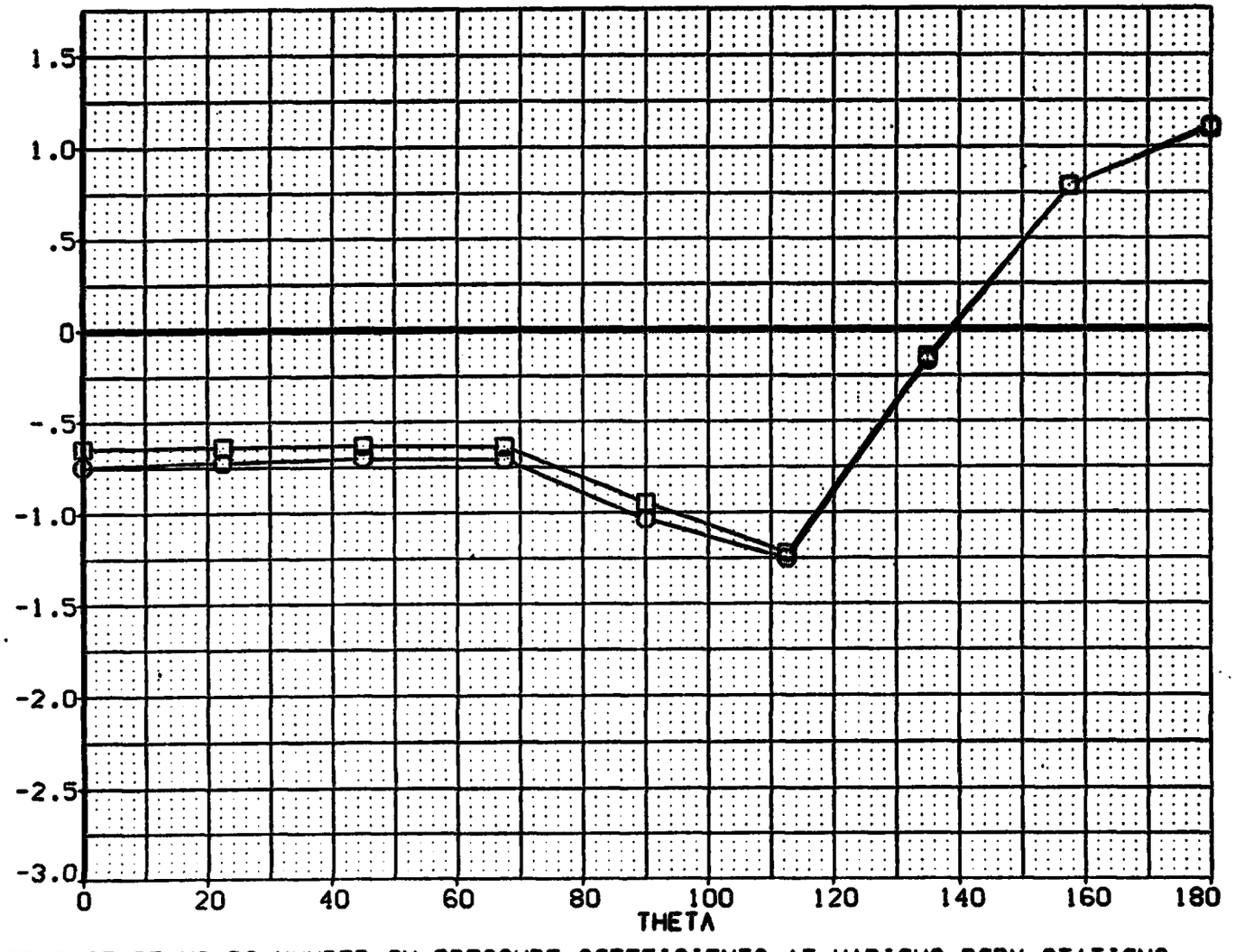
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E106)

SYMBOL	RN	X/D	ALPHA
○	16.083	1.810	270.000
□	20.050		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.600		



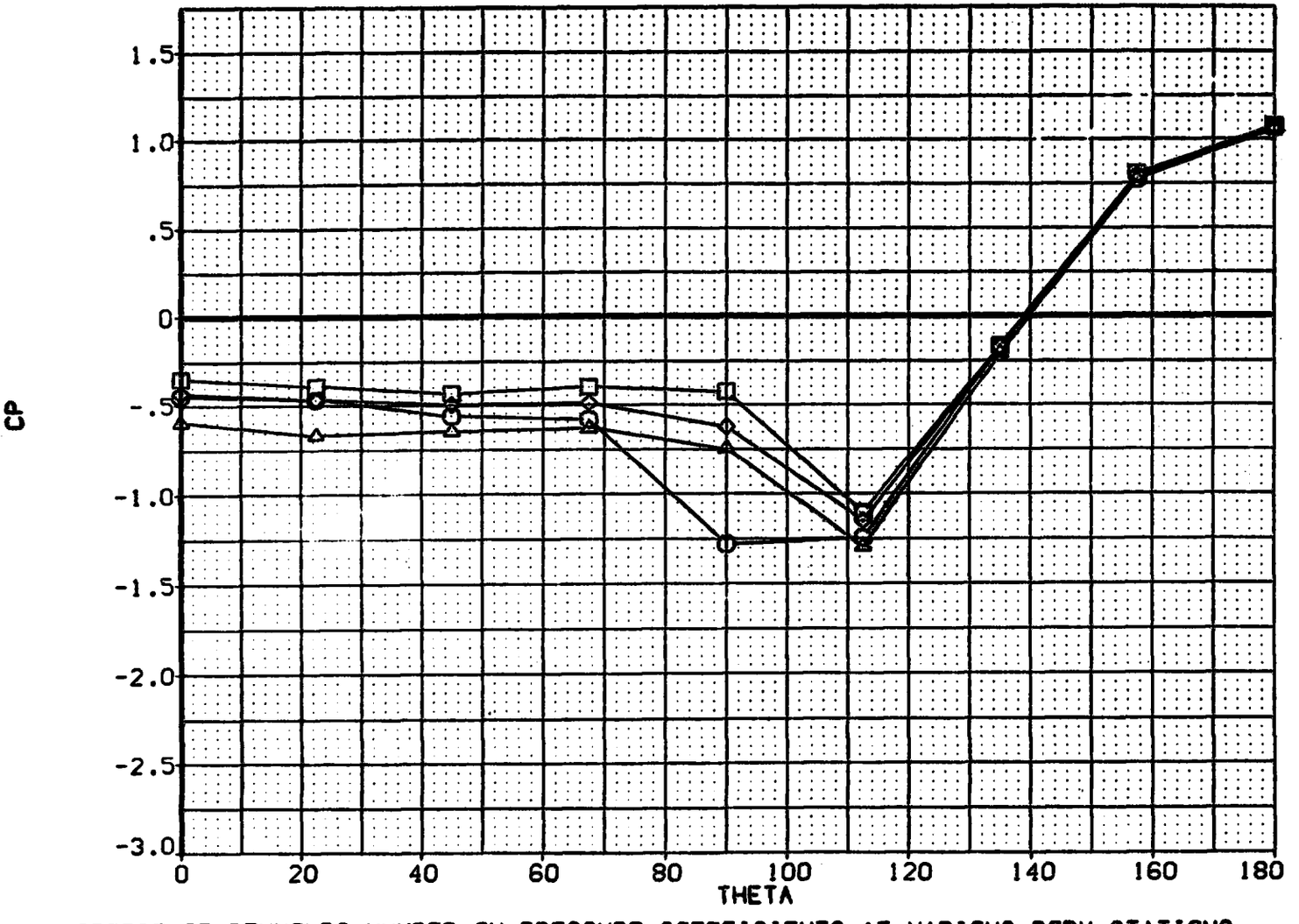
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E106)

SYMBOL	RN	X/D	ALPHA
○	2.767	2.160	270.000
□	4.050		
◇	5.850		
△	7.417		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.600		



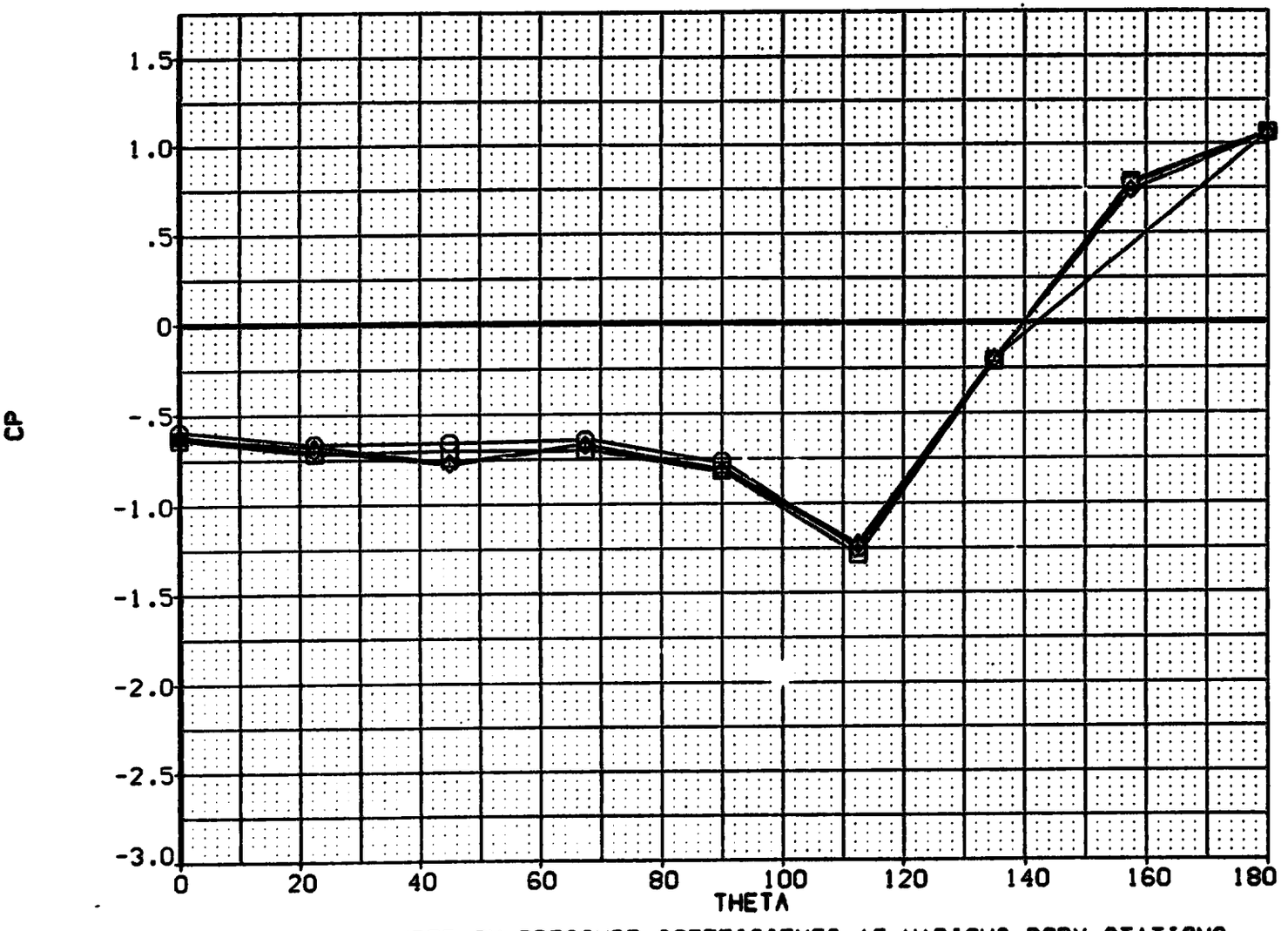
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E106)

SYMBOL	RN	X/D	ALPHA
○	8.717	2.160	270.000
□	9.667		
◇	12.750		
△	13.167		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.600		



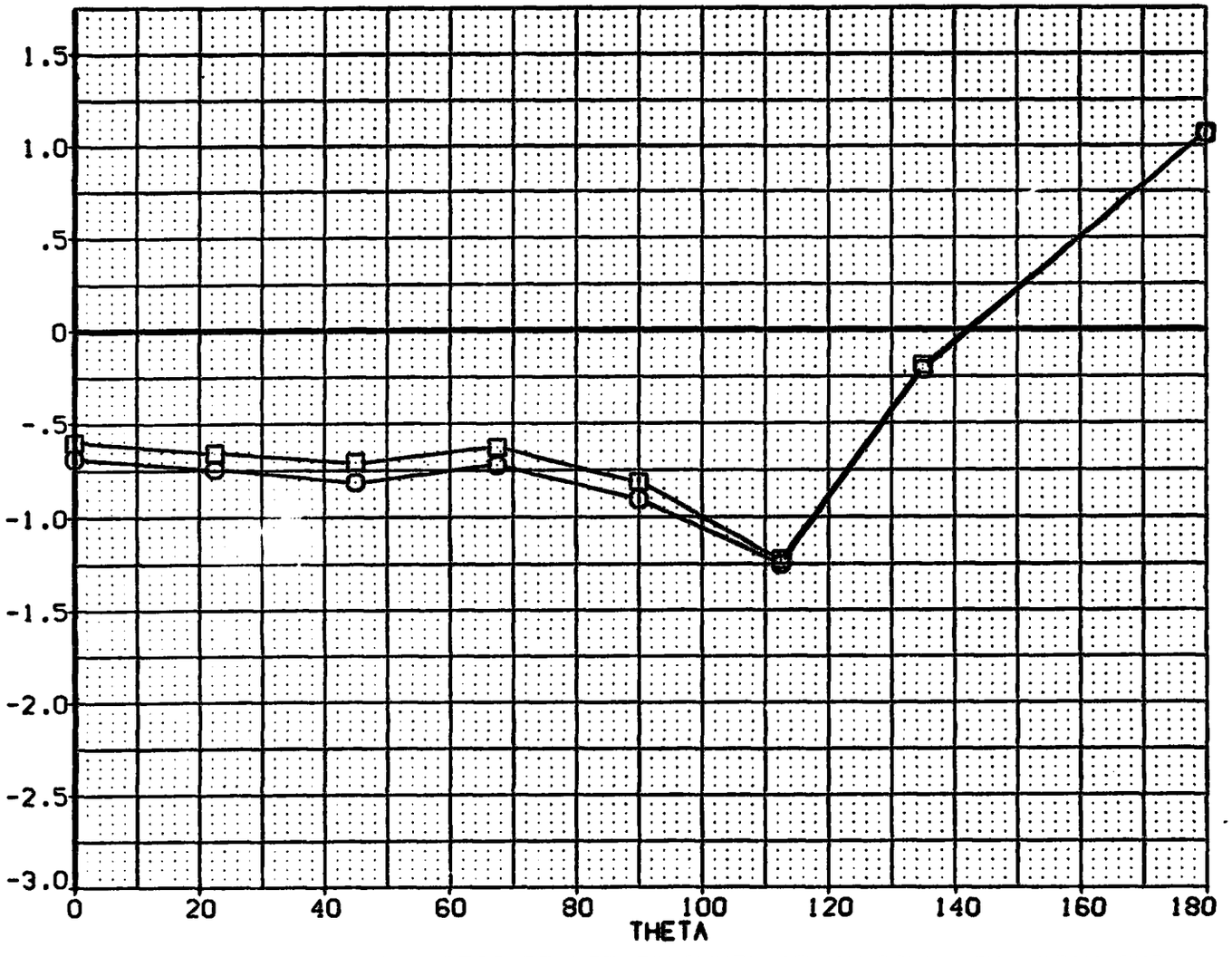
EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (B1E106)

SYMBOL	RN	X/D	ALPHA
○	16.083	2.160	270.000
□	20.050		

PARAMETRIC VALUES

BETA	.000	PHI	180.000
MACH	.600		



EFFECT OF REYNOLDS NUMBER ON PRESSURE COEFFICIENTS AT VARIOUS BODY STATIONS

APPENDIX

TABULATED SOURCE DATA

MSFC HRNT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E101) (15 DEC 75)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = 1044.0000 IN. XS
LREF = 146.0000 IN. YMRP = .0000 IN. YS
BREF = 146.0000 IN. ZMRP = .0000 IN. ZS
SCALE = .0137

PARAMETRIC DATA

BETA = .000 PHI = .000
RN = 18.100

MACH (1) = .410 ALPHA (1) = 72.100 Q(PSI) = 61.000 TO = 47.667 RN = 18.517 PO = 580.45

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.3160	-.4600	-.1690	-.4140	-.7830	-.2960	-.3180	-.3690
22.500		-1.5360	-1.1870	-.9510	-.9010	-.6090	-.7140	-.7000
45.000	-1.4720	-1.1590	-.8930	-.6210	-.6730	-.5370	-.7830	-.6200
67.500	-1.9710	-1.4140	-.9320	-.6590	-.8560	-.9080	-.6310	-.5750
90.000	-2.8050	-2.2320	-2.0130	-1.6340	-1.7280	-1.7700	-1.6450	-1.5350
112.500	-1.8760	-1.7050	-1.5840	-1.3050	-1.3210	-1.3990	-1.4650	-1.4060
135.000	-.5510	-.4380	-.5610	-.2830	-.2770	-.3410	-.4770	-.3430
157.500		.6020	.4060	.3940	.6580	.6370	.2590	.5680
180.000	.9390	.9750	1.0130	1.0270	1.0270	.9500	.9270	.9160

MACH (1) = .400 ALPHA (2) = 90.000 Q(PSI) = 61.000 TO = 47.667 RN = 18.517 PO = 580.45

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.6620	-.5720	-.4790	-.5210	-.4770	-.5130	-.4880	-.5540
22.500		-.6430	-.5540	-.6070	-.4830	-.5290	-.6030	-.5800
45.000	-.6440	-.5390	-.6650	-.5410	-.5390	-.5660	-.5190	-.5570
67.500	-.5620	-.5390	-.6040	-.4510	-.4560	-.5190	-.5390	-.5580
90.000	-.8940	-1.0240	-1.1080	-1.2690	-1.3140	-1.3370	-1.3440	-1.3370
112.500	-1.3220	-1.4090	-1.4380	-1.2590	-1.2720	-1.3500	-1.4760	-1.4370
135.000	-.5980	-.5930	-.5920	-.4000	-.3360	-.3630	-.3980	-.3780
157.500		.3600	.2490	.4780	.5810	.6120	.6160	.6450
180.000	.6690	.7360	.8200	.8940	.9660	.9620	1.0090	.9870

MSFC HRNT 033 (SA29F) SRB FORWARD NOSE SECTION (RIE101)

MACH (1) = .410 ALPHA (3) = 107.900 Q(PSI) = 61.000 TO = 47.667 RN = 18.517 PO = 580.45

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.5780	-.5480	-.4390	-.4980	-.5010	-.4070	-.4420	-.4410
22.500		-.5100	-.4480	-.4850	-.3850	-.4280	-.5200	-.5450
45.000	-.5730	-.4530	-.6890	-.4180	-.4700	-.4310	-.4220	-.7010
67.500	-.5490	-.4550	-.4280	-.4070	-.3570	-.3930	-.4450	-.5290
90.000	-.8250	-.6550	-1.2920	-.9790	-1.0120	-.9020	-1.1440	-1.3150
112.500	-1.2680	-1.2490	-1.3060	-.9190	-1.1110	-.9650	-.9370	-1.2810
135.000	-.6270	-.7500	-.6420	-.4200	-.3720	-.4140	-.3030	-.3820
157.500		.1310	.1710	.2320	.3650	.5110	.0410	.6170
180.000	.3860	.4020	.4900	.3970	.6920	.7660	.8980	.8570

MACH (2) = .600 ALPHA (1) = 72.100 Q(PSI) = 82.293 TO = 49.333 RN = 18.517 PO = 411.38

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-1.0260	-.7520	-.5940	-.6490	-.6740	-.6010	-.4980	-.4200
22.500		-1.2500	-.8830	-.7410	-.6440	-.6450	-.5180	-.4680
45.000	-1.6290	-1.1210	-.8120	-.6180	-.6020	-.5760	-.5030	-.4870
67.500	-1.5630	-1.0160	-.7510	-.6020	-.6000	-.5660	-.5120	-.4600
90.000	-1.8580	-1.3020	-1.0620	-1.1900	-1.1790	-1.0480	-.8610	-.7370
112.500	-1.2720	-1.2370	-1.1730	-1.0040	-1.0150	-1.0850	-1.1480	-1.1920
135.000	-.1670	-.1620	-.1300	-.0270	-.0270	-.0910	-.1420	-.1520
157.500		.7270	.7550	.8130	.7960	.7640	.7420	.7070
180.000	.9890	1.0330	1.0860	1.1060	1.0890	1.0360	1.0310	.9930

MACH (2) = .600 ALPHA (2) = 90.000 Q(PSI) = 82.293 TO = 49.333 RN = 18.517 PO = 411.38

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.6480	-.7010	-.5810	-.6730	-.6810	-.7020	-.6290	-.5480
22.500		-.7340	-.7280	-.7260	-.6970	-.7160	-.6080	-.5970
45.000	-.7700	-.6800	-.8030	-.6900	-.7070	-.7090	-.5910	-.5980
67.500	-.6140	-.6510	-.8370	-.5890	-.6560	-.6830	-.5930	-.5840
90.000	-.8550	-.8410	-.9600	-1.0400	-1.1090	-.9140	-.9200	-.6980
112.500	-1.3940	-1.3540	-1.3530	-1.1640	-1.1400	-1.1870	-1.2500	-1.2730
135.000	-.4000	-.3930	-.3620	-.2120	-.1470	-.1670	-.1880	-.1990
157.500		.4577	.5240	.6310	.6980	.7230	.7710	.7490
180.000	.5810	.7760	.8540	.9170	1.0140	1.0300	1.0630	1.0610

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E101)

MACH (2) = .610 ALPHA (3) = 107.900 Q(PSI) = 82.293 TO = 49.333 RN = 18.517 PO = 411.38

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.7480	-.7120	-.6760	-.6760	-.6520	-.5970	-.6710	-.7080
22.500		-.7290	-.6790	-.6910	-.6040	-.6320	-.7140	-.7650
45.000	-.7670	-.6730	-.6870	-.6710	-.6360	-.6240	-.6970	-.7420
67.500	-.6840	-.6430	-.6560	-.5700	-.5620	-.5800	-.6880	-.7070
90.000	-.7620	-.7150	-1.0510	-.7850	-.9290	-.7130	-1 0930	-.8760
112.500	-1.3320	-1.3330	-1.4260	-1.2410	-1.1540	-1.0700	-1.2370	-1.2380
135.000	-.6080	-.6580	-.5500	-.4410	-.3240	-.3310	-.2350	-.2530
157.500		.1350	.2170	.2840	.4380	.5670	.6330	.6310
180.000	.2990	.4060	.5120	.4780	.7320	.8310	.9310	.9220

MACH (3) = .760 ALPHA (1) = 72.100 Q(PSI) = 96.323 TO = 43.333 RN = 18.517 PO = 345.35

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.8030	-.7910	-.6940	-.6800	-.6620	-.5970	-.5450	-.5130
22.500		-.7870	-.7340	-.6890	-.6650	-.5510	-.5910	-.5470
45.000	-.7860	-.7230	-.8200	-.6490	-.6860	-.6040	-.6390	-.5210
67.500	-.7460	-.7080	-.8830	-.5640	-.7540	-.5600	-.8230	-.4800
90.000	-.8530	-.8260	-.8850	-.7260	-.9080	-.6060	-.8120	-.5340
112.500	-.8270	-.8280	-.8040	-.6880	-.6900	-.7690	-.8490	-.8870
135.000	.1220	.1170	.1110	.1770	.1840	.1310	.0940	.0730
157.500		.8480	.8680	.9110	.8990	.8660	.8420	.8130
180.000	1.0500	1.1020	1.1430	1.1610	1.1460	1.1020	1.0990	1.0620

MACH (3) = .780 ALPHA (2) = 90.000 Q(PSI) = 96.323 TO = 43.333 RN = 18.517 PO = 345.35

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850	1.3770	1.5500	1.8100	2.1600
THETA								
.000	-.6800	-.7830	-.6620	-.6620	-.7760	-.7110	-.6380	-.6400
22.500		-.7870	-.6540	-.6690	-.7700	-.7650	-.6940	-.6700
45.000	-.8210	-.7360	-.6920	-.6160	-.7480	-.7520	-.6520	-.6480
67.500	-.7050	-.7090	-.8960	-.5340	-.6790	-.6960	-.7810	-.6460
90.000	-.8300	-.6990	-.9050	-.5290	-.8830	-.6740	-.8160	-.6440
112.500	-1.0530	-1.0020	-.9280	-.7990	-.8060	-.0490	-.8730	-.8770
135.000	-.1240	-.1140	-.0000	.0580	.0850	.0890	.0920	.0840
157.500		.5680	.6550	.7480	.8010	.8470	.8880	.8770
180.000	.7220	.8310	.9250	.9860	1.0740	1.1030	1.1380	1.1370

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (RIE101)

MACH (3) = .760 ALPHA (3) = 107.900 Q(PSI) = 98.323 TO = 43.333 RN = 19.617 PO = 345.38

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.750	1.0070	1.2850	1.3?.0	1.5500	1.8100	2.1600
THETA								
.000	-.8480	-.8690	-.8050	-.7600	-.8000	-.8970	-.7310	-.7210
22.500		-.8530	-.7960	-.7570	-.7180	-.7300	-.7210	-.7440
45.000	-.8890	-.7930	-.7450	-.7380	-.7470	-.7360	-.7020	-.7350
67.500	-.7570	-.7470	-.7000	-.6530	-.6870	-.6880	-.6990	-.7040
90.000	-.8930	-.7420	-.8910	-.8660	-.7480	-.6650	-.8620	-.7320
112.500	-1.1140	-1.1050	-1.1740	-1.0260	-1.0120	-.9260	-.9770	-.9450
135.000	-.4480	-.4440	-.3640	-.2860	-.1780	-.1470	-.0300	-.0290
157.500		.1930	.2640	.3140	.4900	.6260	.7090	.7270
180.000	.3110	.4270	.5140	.4870	.7530	.8730	.9700	.9790

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E102) (15 DEC 75)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = 1044.0000 IN. XS
LREF = 146.0000 IN. YMRP = .0000 IN. YS
BREF = 146.0000 IN. ZMRP = .0000 IN. ZS
SCALE = .0137

PARAMETRIC DATA

BETA = .000 PHI = .000
RN = 18.100

MACH (1) = .500 ALPHA (1) = 72.000 Q(PSI) = 75.080 TO = 49.200 RN = 18.757 PO = 506.66

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.5160	-.4820	-.3300	-.4380
22.500		-1.3410	-.8230	-.6640
45.000	-1.7690	-1.1490	-.7190	-.4960
67.500	-1.6930	-1.1470	-.6570	-.4320
90.000	-2.4020	-2.0230	-1.5080	-1.3800
112.500	-1.6110	-1.5810	-1.1240	-1.0230
135.000	-.3970	-.3380	-.2330	-.0970
157.500		.6870	.6910	.7210
180.000	.9540	.9910	1.0540	1.0430

MACH (1) = .510 ALPHA (2) = 80.000 Q(PSI) = 75.080 TO = 49.200 RN = 18.757 PO = 506.66

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.8350	-.5910	-.5030	-.5140
22.500		-1.1250	-.7530	-.6030
45.000	-1.6030	-1.0340	-.6590	-.4870
67.500	-1.4440	-.9330	-.6270	-.4350
90.000	-1.9270	-1.5610	-1.2710	-1.2030
112.500	-1.6990	-1.6200	-1.1560	-1.0300
135.000	-.4960	-.4310	-.3090	-.1060
157.500		.6100	.6250	.6990
180.000	.8590	.9290	1.0030	1.0200

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (RIE102)

MACH (1) = .490 ALPHA (3) = 90.000 Q(PSI) = 75.080 TO = 49.200 RN = 18.757 PO = 506.68

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.5920	-.5460	-.4960	-.4550
22.500		-.5760	-.5410	-.5000
45.000	-.5810	-.5720	-.5640	-.4750
67.500	-.5970	-.5240	-.6360	-.4050
90.000	-.6230	-.7680	-.9410	-1.1690
112.500	-1.3350	-1.3670	-1.1320	-1.1040
135.000	-.5060	-.4810	-.4180	-.2440
157.500		.4810	.4850	.5780
180.000	.7040	.7900	.8690	.9110

MACH (1) = .500 ALPHA (4) = 100.000 Q(PSI) = 75.080 TO = 49.200 RN = 18.757 PO = 506.68

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.4740	-.4590	-.4560	-.4900
22.500		-.4520	-.4140	-.4680
45.000	-.3110	-.4920	-.5210	-.4090
67.500	-.4540	-.5730	-.5120	-.3870
90.000	-.6280	-.7080	-.8520	-1.0520
112.500	-1.2080	-1.2430	-1.3130	-1.1530
135.000	-.4970	-.5350	-.4690	-.2990
157.500		.3060	.3410	.3830
180.000	.4880	.5920	.6630	.7070

MACH (1) = .500 ALPHA (5) = 108.000 Q(PSI) = 75.080 TO = 49.200 RN = 18.757 PO = 506.68

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.4260	-.4060	-.4340	-.4110
22.500		-.3920	-.4060	-.3980
45.000	-.2720	-.4030	-.4290	-.3560
67.500	-.3880	-.3450	-.6810	-.3290
90.000	-.6520	-.5760	-.8090	-.6940
112.500	-1.1030	-1.1470	-1.4100	-1.1160
135.000	-.5530	-.5320	-.5600	-.4510
157.500		.1970	.2110	.2530
180.000	.3420	.4830	.4560	.5180

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E102)

MACH (2) = .600 ALPHA (1) = 80.000 Q(PSI) = 82.715 TO = 48.000 RN = 18.757 PO = 414.82

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.7820	-.6880	-.5610	-.4840
22.500		-.7250	-.6130	-.5400
45.000	-.7540	-.6840	-.6420	-.5000
67.500	-.7300	-.6340	-.7540	-.4360
90.000	-.7400	-.8250	-.8460	-1.0520
112.500	-1.2670	-1.2870	-.9760	-.9790
135.000	-.2730	-.2530	-.1680	-.0410
157.500		.6730	.6910	.7600
180.000	.8900	.9820	1.0370	1.0640

MACH (2) = .600 ALPHA (2) = 100.000 Q(PSI) = 82.715 TO = 48.000 RN = 18.757 PO = 414.82

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.8670	-.7590	-.6650	-.6750
22.500		-.7820	-.6580	-.7000
45.000	-.6180	-.7600	-.7330	-.6720
67.500	-.8090	-.7320	-.7510	-.6140
90.000	-.9120	-.9040	-.7520	-.9510
112.500	-1.5050	-1.4430	-1.4050	-1.1940
135.000	-.5600	-.5600	-.4300	-.2730
157.500		.3140	.3690	.4290
180.000	.4540	.6330	.6830	.7160

MACH (3) = .790 ALPHA (1) = 80.000 Q(PSI) = 101.19 TO = 41.000 RN = 18.757 PO = 347.11

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.5920	-.5930	-.6120	-.5850
22.500		-.5990	-.6400	-.5900
45.000	-.5820	-.5710	-.7190	-.5420
67.500	-.5550	-.5350	-.8260	-.4950
90.000	-.4600	-.5380	-.7600	-.5410
112.500	-.8530	-.8510	-.6550	-.6560
135.000	.0590	.0730	.1100	.1930
157.500		.7970	.8200	.8860
180.000	.9520	1.0420	1.0970	1.1400

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E102)

MACH (3) = .790 ALPHA (2) = 100.000 Q(PSI) = 101.19 TO = 41.000 RN = 18.757 PO = 347.11

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.8140	-.8100	-.8060	-.7760
22.500		-.8020	-.7890	-.7670
45.000	-.6970	-.7770	-.7780	-.7550
67.500	-.7630	-.7670	-.8210	-.6990
90.000	-.8660	-.7450	-.7620	-.6740
112.500	-1.0940	-1.0460	-1.0310	-.9030
135.000	-.2650	-.2370	-.1720	-.0530
157.500		.4230	.4720	.5340
180.000	.5070	.6940	.7290	.7740

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E107) (15 DEC 75)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = 1044.0000 IN. XS
LREF = 146.0000 IN. YMRP = .0000 IN. YS
BREF = 146.0000 IN. ZMRP = .0000 IN. ZS
SCALE = .0137

PARAMETRIC DATA

BETA = .000 PHI = .000
RN = 9.000

MACH (1) = 2.000 ALPHA (1) = 72.000 Q(PSI) = 71.840 TO = 59.600 RN = 9.0467 PO = 200.21

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.2520	-.2390	-.2280	-.2110
22.500		-.2460	-.2340	-.2040
45.000	-.2580	-.2380	-.2270	-.1740
67.500	-.2520	-.2160	-.2540	-.1940
90.000	-.0500	-.0590	-.0780	-.0700
112.500	.3900	.3650	.3620	.3400
135.000	1.0200	.9820	.9350	.9200
157.500		1.4420	1.4490	1.4580
180.000	1.6360	1.6410	1.6520	1.6710

MACH (1) = 2.000 ALPHA (2) = 80.000 Q(PSI) = 71.840 TO = 59.600 RN = 9.0467 PO = 200.21

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.2830	-.2620	-.2640	-.2490
22.500		-.2760	-.2670	-.2490
45.000	-.2890	-.2660	-.2640	-.2260
67.500	-.2710	-.2380	-.2670	-.2310
90.000	-.0920	-.0960	-.1070	-.0740
112.500	.3180	.3020	.3080	.3360
135.000	.9330	.9180	.9000	.9150
157.500		1.3680	1.4190	1.4600
180.000	1.5070	1.5710	1.6330	1.6760

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (RIE103)

MACH (1) = 2.000 ALPHA (3) = 90.000 Q(PSI) = 71.640 TO = 59.600 RN = 9.0487 PO = 200.21

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.2990	-.2940	-.2750	-.2670
22.500		-.2910	-.2810	-.2620
45.000	-.3040	-.2870	-.2770	-.2260
67.500	-.2920	-.2750	-.2780	-.2380
90.000	-.1470	-.1390	-.1350	-.1000
112.500	.2200	.2060	.2390	.2830
135.000	.7800	.8070	.7880	.8310
157.500		1.2000	1.2610	1.3150
180.000	1.3280	1.3970	1.4620	1.5190

MACH (1) = 2.000 ALPHA (4) = 100.000 Q(PSI) = 71.640 TO = 59.600 RN = 9.0487 PO = 200.21

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.2840	-.2770	-.2810	-.2660
22.500		-.2750	-.2920	-.2580
45.000	-.3020	-.2810	-.2830	-.2140
67.500	-.2930	-.2140	-.2890	-.2240
90.000	-.1930	-.1740	-.1700	-.1500
112.500	.1130	.1170	.1390	.1690
135.000	.5770	.5970	.6170	.6740
157.500		1.0140	1.0680	1.0790
180.000	1.0910	1.1720	1.2280	1.2380

MACH (1) = 2.000 ALPHA (5) 108.000 Q(PSI) = 71.640 TO = 59.600 RN = 9.0487 PO = 200.21

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750	1.0070	1.2850
THETA				
.000	-.2790	-.2710	-.2600	-.2320
22.500		-.2670	-.2890	-.2070
45.000	-.2970	-.2770	-.2610	-.1490
67.500	-.2910	-.1950	-.2850	-.1760
90.000	-.2230	-.2000	-.1980	-.1940
112.500	.0180	.0340	.0610	.0560
135.000	.4190	.4380	.4780	.4380
157.500		.8220	.8780	.7200
180.000	.8690	.9520	1.0110	.8810

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (RIE104) (15 DEC 75)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = 1044.0000 IN. XS
LREF = 146.0000 IN. YMRP = .0000 IN. YS
BREF = 146.0000 IN. ZMRP = .0000 IN. ZS
SCALE = .0137

PARAMETRIC DATA

BETA = .000 PHI = .000
RN = 8.400

MACH (1) = .420 ALPHA (1) = 72.100 Q(PSI) = 28.210 TO = 51.000 RN = 8.4000 PO = 283.12

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	.3400	.6750
THETA		
.000	-.3360	-.4240
22.500		-1.5200
45.000	-1.4640	-1.1110
67.500	-1.9910	-1.2530
90.000	-2.7080	-2.0720
112.500	-1.7980	-1.6390
135.000	-.5050	-.4200
157.500		.6080
180.000	.9530	.9790

MSFC HRHT 033 (SA29F) SRB FORWARD NOSE SECTION (RIE105) (15 DEC 75)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = 1044.0000 IN. XS
LREF = 146.0000 IN. YMRP = .0000 IN. YS
BREF = 146.0000 IN. ZMRP = .0000 IN. ZS
SCALE = .0137

PARAMETRIC DATA

BETA = .000 PHI = 180.000
MACH = .400

RN (1) = 2.250 ALPHA (1) = 90.000 Q(PSI) = 7.2900 TO = 37.000 RN = 2.2500 PO = 67.800

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.2970	-.3280
22.500	-.3460	-.5040
45.000	-.2950	-.6170
67.500	-.3600	-.3810
90.000	-1.1850	-.6800
112.500	-.9110	-1.1110
135.000	-.1930	-.3280
157.500	.7770	.7130
180.000	1.0940	1.0100

RN (2) = 4.017 ALPHA (1) = 270.000 Q(PSI) = 13.370 TO = 51.000 RN = 4.0167 PO = 128.12

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.8240	-.3290
22.500	-.3780	-.4360
45.000	-.3440	-.5200
67.500	-.3130	-.4080
90.000	-.9300	-.7900
112.500	-1.0920	-1.0390
135.000	-.1950	-.3290
157.500	.7780	.7330
180.000	1.0400	.9360

MSFC HRNT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

RN (3) = 6.067 ALPHA (1) = 270.000 Q(PSI) = 19.930 TO = 46.000 RN = 6.0667 PO = 191.41

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.4970	-.3640
22.500	-.4230	-.4710
45.000	-.3860	-.4620
67.500	-.3500	-.4470
90.000	-1.0390	-.9970
112.500	-1.1240	-1.1270
135.000	-.1930	-.3040
157.500	.7940	.7260
180.000	1.0570	.9570

RN (4) = 7.517 ALPHA (1) = 270.000 Q(PSI) = 25.360 TO = 49.000 RN = 7.5167 PO = 238.79

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.6830	-.3810
22.500	-.3710	-.4440
45.000	-.3770	-.5360
67.500	-.3590	-.4490
90.000	-1.1760	-1.0560
112.500	-1.0970	-1.1430
135.000	-.1880	-.2910
157.500	.7840	.7290
180.000	1.0930	.9920

RN (5) = 9.017 ALPHA (1) = 270.000 Q(PSI) = 30.220 TO = 49.000 RN = 9.0167 PO = 286.83

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.4970	-.3990
22.500	-.4270	-.4900
45.000	-.4190	-.4810
67.500	-.3890	-.4490
90.000	-1.1960	-1.0620
112.500	-1.1690	-1.1630
135.000	-.2150	-.3070
157.500	.7860	.7240
180.000	1.0400	.9510

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E105)

RN (6) = 10.217 ALPHA (1) = 90.000 Q(PSI) = 32.730 TO = 38.000 RN = 10.217 PO = 315.80

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.5620	-.4110
22.500	-.4120	-.5210
45.000	-.4410	-.6560
67.500	-.4160	-.4710
90.000	-1.2170	-1.0880
112.500	-.8640	-1.2060
135.000	-.2320	-.3320
157.500	.7580	.7240
180.000	1.0640	.9870

RN (7) = 13.383 ALPHA (1) = 270.000 Q(PSI) = 44.620 TO = 48.000 RN = 13.383 PO = 424.20

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.4980	-.3880
22.500	-.4220	-.4910
45.000	-.4210	-.4700
67.500	-.4000	-.4750
90.000	-1.2630	-1.1380
112.500	-1.2110	-1.1970
135.000	-.2370	-.3190
157.500	.7380	.7060
180.000	1.0250	.9430

RN (8) = 18.800 ALPHA (1) = 270.000 Q(PSI) = 61.330 TO = 44.000 RN = 18.800 PO = 580.06

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.5780	-.4420
22.500	-.5150	-.5190
45.000	-.4410	-.4950
67.500	-.4810	-.5000
90.000	-1.3490	-1.3620
112.500	-1.3240	-1.3260
135.000	-.2740	-.3500
157.500	.1340	.6250
180.000	1.0650	.9790

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E106) (15 DEC 75)

REFERENCE DATA

SREF = 116.2600 SQ.FT. XMRP = 1044.0000 IN. XS
LREF = 146.0000 IN. YMRP = .0000 IN. YS
BREF = 146.0000 IN. ZMRP = .0000 IN. ZS
SCALE = .0137

PARAMETRIC DATA

BETA = .000 PHI = 180.000
MACH = .600

RN (1) = 2.767 ALPHA (1) = 270.000 Q(PSI) = 12.990 TO = 48.000 RN = 2.7667 PO = 64.300

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.5150	-.4450
22.500	-.4590	-.4710
45.000	-.4560	-.5630
67.500	-.4450	-.5820
90.000	-.5480	-1.2770
112.500	-1.1640	-1.2470
135.000	-.1140	-.1760
157.500	.7970	.7730
180.000	1.1350	1.0650

RN (2) = 4.050 ALPHA (1) = 270.000 Q(PSI) = 19.680 TO = 41.000 RN = 4.0500 PO = 92.220

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.3080	-.3500
22.500	-.4140	-.3930
45.000	-.4100	-.4300
67.500	-.4090	-.3970
90.000	-.6900	-.4270
112.500	-1.1160	-1.1090
135.000	-.1030	-.1580
157.500	.6080	.6000
180.000	1.1100	1.0670

MSFC HRNT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E106)

RN (3) = 5.850 ALPHA (1) = 270.000 Q(PSI) = 27.260 TO = 46.000 RN = 5.8500 PO = 138.57

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.6340	-.4350
22.500	-.5110	-.4700
45.000	-.4950	-.4970
67.500	-.4740	-.4930
90.000	-.7760	-.6240
112.500	-1.1700	-1.1540
135.000	-.1180	-.1770
157.500	.8110	.7890
180.000	1.1060	1.0600

RN (4) = 7.417 ALPHA (1) = 270.000 Q(PSI) = 34.410 TO = 51.000 RN = 7.4167 PO = 175.40

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.6520	-.5930
22.500	-.6470	-.6690
45.000	-.6190	-.6430
67.500	-.6260	-.6350
90.000	-.9320	-.7470
112.500	-1.2480	-1.2930
135.000	-.1580	-.2140
157.500	.8030	.7730
180.000	1.0950	1.0590

RN (5) = 8.717 ALPHA (1) = 270.000 Q(PSI) = 40.290 TO = 47.000 RN = 9.7167 PO = 204.15

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.6690	-.5390
22.500	-.6580	-.6700
45.000	-.6340	-.6590
67.500	-.6360	-.6480
90.000	-.9210	-.7670
112.500	-1.2350	-1.2500
135.000	-.1550	-.2090
157.500	.8050	.7740
180.000	1.1030	1.0630

MSFC HRNT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E106)

RN (6) = 9.667 ALPHA (1) = 270.000 Q(PSI) = 44.820 TO = 51.000 RN = 9.6667 PO = 229.85

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.7040	-.6390
22.500	-.6890	-.7170
45.000	-.6620	-.7040
67.500	-.6640	-.7000
90.000	-.9620	-.8190
112.500	-1.2470	-1.2900
135.000	-.1590	-.2110
157.500	.8050	.7820
180.000	1.0910	1.0630

RN (7) = 12.750 ALPHA (1) = 270.000 Q(PSI) = 58.920 TO = 47.000 RN = 12.750 PO = 298.82

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.7240	-.6230
22.500	-.6870	-.7040
45.000	-.6630	-.7710
67.500	-.6660	-.6720
90.000	-.9690	-.8210
112.500	-1.2340	-1.2300
135.000	-.1620	-.2090
157.500	.7910	.7320
180.000	1.1240	1.0590

RN (8) = 13.167 ALPHA (1) = 270.000 Q(PSI) = 60.110 TO = 41.000 RN = 13.167 PO = 303.58

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.7420	-.6370
22.500	-.6800	-.6820
45.000	-.6590	-.7650
67.500	-.6610	-.6730
90.000	-.9800	-.8130
112.500	-1.2280	-1.2230
135.000	-.1480	-.1950
157.500	.7910	-2.2760
180.000	1.1090	1.0580

MSFC HRWT 033 (SA29F) SRB FORWARD NOSE SECTION (R1E108)

RN (9) = 18.083 ALPHA (1) = 270.000 Q(PSI) = 74.630 TO = 49.000 RN = 18.083 PO = 378.90

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.7470	-.5880
22.500	-.7260	-.7490
45.000	-.7030	-.8190
67.500	-.7090	-.7260
90.000	-1.0410	-.9120
112.500	-1.2540	-1.2550
135.000	-.1710	-.2120
157.500	.7840	-3.1300
180.000	1.1140	1.0600

RN (10) = 20.050 ALPHA (1) = 270.000 Q(PSI) = 90.350 TO = 36.000 RN = 20.050 PO = 451.37

SECTION (1)SRB NOSE DEPENDENT VARIABLE CP

X/D	1.8100	2.1600
THETA		
.000	-.6480	-.6040
22.500	-.6410	-.6640
45.000	-.6330	-.7100
67.500	-.6330	-.6310
90.000	-.9440	-.8180
112.500	-1.2230	-1.2280
135.000	-.1510	-.1910
157.500	.7870	-3.7420
180.000	1.0970	1.0660