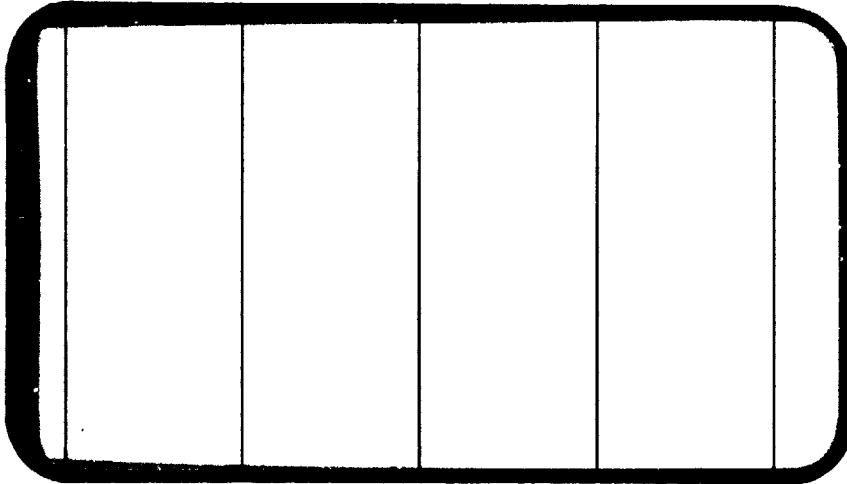




NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NASA CR. 134096



(NASA-CR-134096) HEAT TRANSFER TESTS OF
AN 0.006-SCALE THIN-SKIN SPACE SHUTTLE
MODEL (41-OIS) IN THE AMES 3.5-FOOT HWT
AT M EQUALS 5.3 (IH15) (Chrysler Corp.)
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SPACE SHUTTLE

AEROTHERMODYNAMIC DATA REPORT



JOHNSON SPACE CENTER

HOUSTON, TEXAS

DATA Management services

SPACE DIVISION



CHRYSLER CORPORATION

October, 1974

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HEAT TRANSFER TESTS OF AN 0.006-SCALE
THIN-SKIN SPACE SHUTTLE MODEL
(41-OTS) IN THE AMES 3.5-FOOT HWT AT $M = 5.3$
(IH15)

By

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W. K. Lockman, NASA Ames

Prepared under NASA Contract No. 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 SPECIFICS:

Test Number: Ames 3.5 HWT - 172
NASA Series No.: IH15
Model Number: 41-OTS
Date: 13 August 1973 - 17 August 1973
Occupancy: 48

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Chrysler Corporation Space Division assumes no responsibility for the data presented other than display characteristics.

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W. K. Lockman, NASA/Ames

ABSTRACT

This report presents data obtained from heat transfer tests of an 0.006-scale Space Shuttle Vehicle in the Ames Research Center, 3.5-foot HWT. The purpose of these tests was to parametrically investigate the ascent heating of the integrated vehicle. Configurations tested were complete for integrated vehicle, orbiter alone, external tank alone, and SRB alone. All configurations were tested with and without transition grit. Testing was conducted at a Mach number of 5.3, and at Reynolds numbers of 2 and 5 million per foot. The angle of attack range varied from 0 to -5 degrees, except for SRB alone, which was tested from -5 to 90 degrees. Heat transfer data were obtained from 223 iron-constantan thermocouples attached to thin-skin stainless steel inserts.

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COEFFICIENT SCHEDULE:

- A: H/HREF vs. X/L
- B: HI/HU vs. X/L
- C: H/HREF vs. X/C
- D: HI/HU vs. X/C
- E: H/HREF vs. X
- F: HI/HU vs. X

NOMENCLATURE

<u>Symbol</u>	<u>Plot Symbol</u>	<u>Definition</u>
A	-	Area of integration
b	-	Intercept of straight line equation
B.P.	B.P.	Butt plane, inches
C	-	Specific heat of model material, Btu/lbm-°R
c_p	-	Specific heat at constant pressure of airstream, Btu/lbm-°R
g	-	Gravitational acceleration, ft/sec ²
h	H	Heat-transfer coefficient, Btu/ft ² -sec-°R
H	-	Enthalpy, Btu/lb
H_{aw}	-	Adiabatic wall enthalpy, Btu/lb
H_i	HI	Heat transfer coefficient in interference region, BTU/ft ² -sec-°R
H_u	HU	Heat transfer coefficient in undisturbed region, BTU/ft ² -sec-°R
H_t	HT	Stagnation enthalpy, Btu/lb
k	-	Thermal conductivity coefficient, Btu/ft-sec-°R
m	-	Slope of straight line equation
M	MACH	Mach number
P_o	PO	Stagnation pressure, psia
P	-	Static pressure, psia
Pr	-	Prandtl number
\dot{q}	QDOT	Heat flux, Btu/ft ² -sec
q_{ot}	-	Stagnation-point heat-transfer rate calculated using Fay and Riddell's equation, Btu/(ft ²) (sec)
r_s	-	Radius of scaled one-ft sphere, inches
r	HAW/HT	Adiabatic wall temperature ratio, T_{aw}/T_o (recovery factor)

NOMENCLATURE (Continued)

<u>Symbol</u>	<u>Plot Symbol</u>	<u>Definition</u>
R	-	Gas constant, ft-lb/slug-°R
R_e	-	Reynolds Number
RN/L	RN/L	Unit Reynolds number, per foot
St	-	Stanton number
t	-	Time, sec
T	-	Temperature, °R
T_0	T_0	Tunnel total temperature, °R
T/C	-	Thermocouple
u	-	Velocity, ft/sec
W	-	Density of model material, lbm/ft ³
W.L.	W.L.	Waterline, inches
$2y/b$	$2Y/B$	Nondimensional spanwise location, fraction of span
X/C	X/C	Nondimensional chordwise location, fraction of local chord
X/l	X/L	Nondimensional longitudinal location, fraction of body length
Y	Y	Lateral distance from vehicle centerline, inches
α	ALPHA	Angle between model centerline and wind vector, degrees
τ	-	Model skin thickness, inches
μ	-	Viscosity of air, lb-sec/ft ²
ϕ	PHI	Angular coordinate on model surface, degrees
ϕ_m	PHI-M	Model roll angle, degrees
ρ	-	Density of model material, slug/ft ³
	RHOVEL	Product of density and velocity, slug/ft ² -sec
θ	-	Caloric imperfection effect on static to total temperature ratio
β	BETA	Angle of sideslip, degrees

NOMENCLATURE (Continued)

<u>Symbol</u>	<u>Plot Symbol</u>	<u>Definition</u>
h_s	HREF	Reference sphere heat transfer coefficient, Btu/ft ² -SEC -°R
h/h_s	H/HREF	Ratio of heat transfer coefficient to reference sphere heat transfer coefficient.
h_i/h_u	HI/HU	Ratio of heat transfer coefficient in interference region to heat transfer coefficient in undisturbed region.

Subscripts

<u>Symbol</u>	<u>Plot Symbol</u>	<u>Definition</u>
aw	-	Adiabatic wall
-	-	Tunnel free-stream conditions
i	-	Initial conditions
m	-	Measured
PG	-	Perfect gas
0,1,2	-	Constants in specific heat (temperature) equation
s	-	Reference sphere
t	-	Stagnation conditions
TPG	-	Thermally perfect gas
w	-	Model wall conditions
'	-	Primed quantities which indicate conditions behind normal shock

CONFIGURATION INVESTIGATED

The orbiter was a 0.006-scale representation of the modified VL70-00089B lines. The orbiter main body was defined by Grumman drawing SS-H-00326-11. The orbiter nose was defined by Grumman drawing SS-H-00326-15. Radii of 0.900 inch was provided at the left-hand and right-hand double delta wing junctures. The external tank was defined by the VL72-000061C configuration. Both solid rocket boosters are defined by the VL77-000062B lines.

The orbiter was a full-span configuration Stycast-type model (Grumman Material "G"). Thin-skin thermocouple instrumented inserts were located on the orbiter underside centerline region, left-hand wing underside, and left-hand windshield.

The external tank (ET) and left-hand solid rocket booster (SRB) were constructed of thin-skin (nominal skin thickness of 0.040-in.) 15-5 PH stainless steel. The right-hand SRB was constructed of solid steel material and was not instrumented.

The orbiter had no provisions for elevon, rudder, or body-flap deflections.

All thermocouple leads were spot-welded to the skin and clamped in bundles at convenient locations within the models.

As an aid in checkout, fiberglass masks with thermocouple locating holes in them were provided for the orbiter external tank, and solid rocket booster. This made for an accurate and rapid means of checking thermocouples.

CONFIGURATIONS INVESTIGATED (Continued)

The following configurations were tested. Dimensional data for these configurations are presented in Table III.

<u>Configuration</u>	<u>Description</u>
B ₁₀	Fuselage per -89B Lines, 2A configuration
C ₅	Orbiter canopy used on fuselage B ₁₀
D ₇	Manipulator housing per -93 Lines, 2A configuration
F ₄	Aft body flap used on fuselage B ₁₀
M ₃	OMS pods per -94A Lines, 2A configuration
V ₅	Centerline vertical tail, double wedge airfoil with rounded leading edges
W ₈₇	Wing per -93 Lines. Used on fuselage B ₁₀
T ₈	External tank which attaches to orbiter
S ₆	Solid rocket booster which attaches to external tank, T ₈

MODEL INSTRUMENTATION

The orbiter, external tank, and left-hand solid rocket booster were instrumented with a total of 223 iron-constantan thermocouples. All thermocouples were spot welded to thin skin (nominally 0.030-inch) stainless steel. The thermocouple leads were 50 feet long and all leads were fitted with plugs.

Prior to testing, all thermocouples were checked with a heat source to assure proper hook-up, polarity, and response. The exact locations of each thermocouple are presented in Tables IV, V, and VI and are illustrated in Figure 2.

TEST FACILITY DESCRIPTION

The NASA-Ames 3.5-Foot Hypersonic Wind Tunnel is a closed-circuit, blowdown-type tunnel capable of operating at nominal Mach numbers of 5, 7, and 10 at pressures to 1800 psia and temperatures to 3400°R for run times to four minutes. The major components of the facility include a gas storage system where the test gas is stored at 3000 psi, a storage heater filled with aluminum-oxide pebbles capable of heating the test gas to 3400°R, axisymmetric contoured nozzles with exit diameters of 42 inches for generating the desired Mach number, and a 900,000 ft³ vacuum storage system which operates to pressures of 0.3 psia. The test section itself is an open-jet type enclosed within a chamber approximately 12-feet in diameter and 40-feet in length, arranged transversally to the flow direction.

A model support system is provided that can pitch models through an angle-of-attack range of -20 to +18 degrees, in a vertical plane, about a fixed point of rotation on the tunnel centerline. This rotation point is adjustable from 1 to 5 feet from the nozzle exit plane. The model normally is out of the test stream (strut centerline 37-inches from tunnel centerline) until the tunnel test conditions are established after which it is inserted. Insertion time is adjustable to as little as 1/2 second and models may be inserted at any strut angle.

A high-speed, analog-to-digital data acquisition system is used to record test data on magnetic tape. The present system is equipped to measure and record the outputs from 80 transducers in addition to 20 channels of tunnel parameters.

TEST PROCEDURES

Heat transfer data were obtained by measuring the temperature rise over a period of time from a total of 223 iron-constantan thermocouples. The model was injected into the flow stream from the side and held on tunnel centerline for approximately 3 seconds, during which time temperature measurements were taken. Model angle of attack had to be preset manually before securing the test section for testing.

A maximum of 75 thermocouples could be recorded at any one time. Temperature measurements were collected through the Beckman Data Acquisition system. The thermocouple leads were routed through the model support system and connected to a terminal board. Leads that were exposed to flow conditions were wrapped with asbestos tape.

Thermocouple leads were connected directly to a terminal board in the test section. Thermocouple changes were a manual operation requiring the handling of each individual lead. After each thermocouple change, a response and location check was performed after each change to assure a proper hook up.

Prior to testing, a thermocouple heat response check, through the data system, was performed on all thermocouples. The model was leveled in pitch and roll by means of a leveling block which attached to the top of the orbiter. When leveling the external tank or solid rocket booster, the inclinometer was applied directly to the external surface. Proper roll relationships between the orbiter, external tank, and solid rocket booster were assured by scribe lines located on the stings of each component and on the attaching brackets.

When testing the SRB alone at high angles of attack, the SRB was positioned so that the longitudinal row containing thermocouples 1 through 17 was facing upstream.

DATA REDUCTION

All test data were reduced at the NASA/Ames Research Center using the data-reduction techniques outlined below. The thermocouple data were reduced using the one dimensional thin-wall equation:

$$\dot{q} = Wcb \frac{dT_w}{dt} = h (H_{aw} - H_w) \equiv hH_t \left(\frac{H_{aw}}{H_t} - \frac{H_w}{H_t} \right) \quad (1)$$

where: $C = C_0 + C_1 T_w + C_2 T_w^2$ for the T_w range in this test. (2)

Integration of equation (1) for $t = t_i$ to t and $T_w = T_{wi}$ to T_w yields the linear equation:

$$\begin{aligned} f(T_w) &= - \ln \left(\frac{T'_{aw} - T_w}{T'_{aw} - T_{wi}} \right) - \left[\frac{C_1}{C'_{aw}} + \frac{C_2}{C'_{aw}} \left(T'_{aw} + \frac{T_w + T_{wi}}{2} \right) \right] (T_w - T_{wi}) \\ &= \frac{hc}{WC'_{aw}} b (t - t_i) \end{aligned} \quad (3)$$

where it is defined that:

$$T'_{aw} \equiv \frac{H_{aw}}{c_p} \equiv \frac{H_{aw}}{H_t} \frac{H_t}{c_p} \geq (T_{aw})_{PG}$$

$$C'_{aw} \equiv C_0 + C_1 T'_{aw} + C_2 T'_{aw}{}^2$$

* specific heat at adiabatic wall temperature

The form of Eq (3) is $f(T_w) = mt + b$ where m is the slope and b is the intercept for a straight line.

The slope, m , of $f(T_w)$ vs t from Eq (3) is computed by a least-squares, straight-line fit over a finite time interval (approx 1 sec) after model reaches tunnel centerline where

$$m = \frac{hc_p}{WC'_{aw} b}$$

and the value of the heat-transfer coefficient, h , is then determined from:

$$h = \frac{WC'_{aw} b}{c_p} \quad (4)$$

Using this value of h , the heating rate is evaluated at the initial time, t_i , when the model is isothermal at the initial wall enthalpy, H_{wi}

$$\dot{q} = \dot{q}_i = h (H_{aw} - H_{wi}) \equiv hH_t \left(\frac{H_{aw}}{H_t} - \frac{H_{wi}}{H_t} \right) \quad (5)$$

where H_{aw}/H_t is the same value used to evaluate h . The resultant value of \dot{q} is independent of the value of H_{aw}/H_t used for both the h and \dot{q} evaluations.

The reference sphere heating is also evaluated at the initial wall enthalpy by the method of Fay and Riddell (ref. 1):

$$\dot{q}_s = h_s (H_t - H_{wi}) \equiv h_s H_t \left(1.0 - \frac{H_{wi}}{H_t} \right) \quad (6)$$

The model-to-sphere ratio of heat transfer coefficients is then determined from Eqs (5) and (6) as

$$\frac{h}{h_s} = \frac{\dot{q}_i}{\dot{q}_s} \left[\frac{1.0 - \frac{H_{wi}}{H_t}}{\frac{H_{aw}}{H_t} - \frac{H_{wi}}{H_t}} \right] \quad (7)$$

where \dot{q}_i is constant for all values of H_{aw}/H_t .

To determine h/h_s for various values of H_{aw}/H_t , the particular value of H_{aw}/H_t is substituted into Eq (7).

The Stanton number is defined as

$$ST \equiv \frac{h}{\rho u} = \frac{\dot{q}_i}{\rho u (H_{aw} - H_{w_i})} \quad (8)$$

where for free-stream conditions, $\rho u = \rho_\infty V_\infty$.

The calculations of the model heating, reference sphere heating and Reynolds number included the corrections of NACA report 1135 (ref. 2) for calorically imperfect, thermally perfect air. Keyes' equation for viscosity was also used for the sphere heating and Reynolds number computations.

REFERENCES

1. Fay, J. A.; and Ridell, F. R.: Theory of Stagnation Point Heat Transfer in Disassociated Air. *Journal of Aeronautical Science*, Vol. 25, No. 2, February 1958.
2. Equations, Tables and Charts for Compressible Flow. NACA 1135, 1953.

TABLE I.

TEST :	III15	DATE :	AUGUST, 1973
TEST CONDITIONS			
MACH NUMBER	REYNOLDS NUMBER (per unit length)	DYNAMIC PRESSURE (pounds/sq. inch)	STAGNATION TEMPERATURE (degrees Fahrenheit)
5.3	$2 \times 10^6/\text{ft}$		
5.3	$5 \times 10^6/\text{ft}$		
BALANCE UTILIZED: <u> N/A </u>			
	CAPACITY:	ACCURACY:	COEFFICIENT TOLERANCE:
NF	_____	_____	_____
SF	_____	_____	_____
AF	_____	_____	_____
PM	_____	_____	_____
RM	_____	_____	_____
YM	_____	_____	_____
COMMENTS: Model instrumented with 223 Iron-Constantan Thermocouples:			
	57 on Orbiter		
	111 on ET		
	55 on SRB		

TABLE II.

TEST: **IH-15** DATE: **8/16/57 14 52**

DATA SET/RUN NUMBER COLLATION SUMMARY

DATA SET IDENTIFIER	CONFIGURATION	SCHED. PARAMETERS/VALUES					NO. OF RUNS	RN/L			TEST RUN NUMBERS			T/C SCH (INCHES)					
		a	b	m	h	φ		2.0	5.0	5.0	ORB	ET	SRR	ORB	ET	SRR			
38001	ORB/ITER	0	0	5.3	—	0	2	2.0	3.1	5.0				A	—	—			
2	—	-5		—	—		2	3.2	3.3					A	—	—			
3	ORB + ET	0			.18		1		5					A	B	—			
4	—	0		—	—		1		18					—	A	—			
5	ORB + ET + SRB	0		—	—		2	6	7					A	B	—			
6	—	-5		—	—		1	8	9					A	B	—			
7	—	0		—	—		1	10	11					—	C	A			
8	—	-5		—	—		1	12	13					—	C	A			
9	—	0		—	—		1	14	15					—	A	—			
10	—	-5		—	—		1	16	17					—	A	—			
11	ET	0		—	—		1	19	20					—	A	—			
12	—	-5		—	—		1	21	22					—	A	—			
7																			75 76

COEFFICIENTS

a or b SCHEDULES h = vertical separation distance in inches, model scale IDVAR (1) IDVAR (2) NDV

*Data collated as
 R data sets, HAW/HT = 1.0
 A data sets, HAW/HT = 0.9
 B data sets, HAW/HT = 0.85
 Q data sets, QDOT (Btu/ft²-sec)

TABLE II. - Concluded.

TEST: IH-15			DATA SET/RUN NUMBER COLLATION SUMMARY										DATE: AUG 11 1973													
DATA SET IDENTIFIER	CONFIGURATION	SCHD. α	PARAMETERS/VALUES			NO. OF RUNS	R/N/L		T/C SCH (TABLE)			TEST RUN NUMBERS														
			β	M	n		0	2.0	5.0	ORB	ET	SR8														
-88013	SRB	00	5.3	-	0	2	23	24	-	-	A															
-114		-5	|	0	2	25	26	-	-	A																
-15		20	|	90	1		27	-	-	A																
-16		45	|	|			28	-	-	A																
-17		70	|	|			29	-	-	A																
-18		90	|	Y	Y	Y	30	-	-	A																

COEFFICIENTS

OR β SCHEDULES

IDVAR (1) IDVAR (2) NDV

TABLE III. - MODEL DIMENSIONAL DATA

Model Component: Body (10)

General Description: Fuselage, 2A configuration lightweight orbiter,
per Rockwell lines VL70-000089B

Model Scale = 0.00593

Drawing Number: VL70-000089B, VL70-000092, 93, 94A

Dimensions:	Full-Scale	Model Scale
Length - in.	<u>1328.3</u>	<u>7.87682</u>
Max width - in. (at $X_0 = 1528.3$)	<u>265.0</u>	<u>1.57145</u>
Max depth - in. (at $X_0 = 1480.52$)	<u>243.0</u>	<u>1.47064</u>
Fineness ratio	<u>5.012</u>	<u>5.012</u>
Area - ft ²		
Max cross-sectional	<u>456.4</u>	<u>0.01605</u>
Planform	<u> </u>	<u> </u>
Wetted	<u> </u>	<u> </u>
Base	<u> </u>	<u> </u>

TABLE III. - Continued.

Model Component: Canopy (C₅)

General Description: Orbiter canopy for lightweight orbiter configuration

Model Scale = 0.00593

Drawing Number: VL-70-000092

<u>Dimensions:</u>	<u>Full-Scale</u>	<u>Model Scale</u>
Sta fwd bulkhead - in.	<u>391.0</u>	<u>2.31863</u>
Sta TE - in.	<u>560.0</u>	<u>3.32080</u>
Canopy/body intersection - in.	<u>391.0</u>	<u>2.31863</u>
	<u> </u>	<u> </u>
	<u> </u>	<u> </u>
	<u> </u>	<u> </u>
	<u> </u>	<u> </u>
	<u> </u>	<u> </u>

TABLE III. - Continued.

Model Component: Manipulator Housing (D₇)

General Description: 2A configuration per Rockwell lines VL70-000093

Model Scale = 0.00593

Drawing Number: VL70-000093, SS-A-00092

Dimensions:	Full-Scale	Model Scale
Length - in.	881.0	5.22433
Max width - in.	51.0	0.30243
Max depth - in.	23.0	0.13639
Fincness ratio	-	-
Area - ft ²		
Max cross-sectional	-	-
Planform	-	-
Wetted	-	-
Base	-	-

Location at:

⊙ Fuselage BP = 0.0
 WP = 500.0 in. FS
 X₀ 426.0 to X₀ 1307.0 in. FS

TABLE III. - Continued.

Model Component: Body Flap (F4)

General Description: Aft body flap used on lightweight orbiter configuration

Model Scale = 0.00593

Drawing Number: VL-70-000094A, SS-A-00092

Dimensions:	Full-Scale	Model Scale
Length - in.	<u>84.70</u>	<u>0.50227</u>
Max width - in.	<u>265.00</u>	<u>1.57145</u>
Max depth - in.	<u>-</u>	<u>-</u>
Fineness ratio	<u>-</u>	<u>-</u>
Area - ft ²		
Max cross-sectional	<u>-</u>	<u>-</u>
Planform	<u>142.64</u>	<u>0.00502</u>
Wetted	<u>-</u>	<u>-</u>
Base	<u>38.65</u>	<u>0.00136</u>

TABLE III. - Continued.

Model Component: OMS Pod (M₃)

General Description: 2A lightweight orbiter configuration per Rockwell lines VL70-000094A

Drawing Number: VL70-000094A, SS-A-00092

Dimensions:	<u>Full-Scale</u>	<u>Model Scale</u>
Length ~ in.	<u>346.0</u>	<u>2.95178</u>
Max width ~ in. at X ₀ 1450.0	<u>108.0</u>	<u>0.64044</u>
Max depth ~ in. at X ₀ 1500.0	<u>113.8</u>	<u>0.67483</u>
Fineness ratio	<u>-</u>	<u>-</u>
Area ~ ft ²		
Max cross-sectional	<u>-</u>	<u>-</u>
Planform	<u>-</u>	<u>-</u>
Wetted	<u>-</u>	<u>-</u>
Base	<u>-</u>	<u>-</u>

Ⓞ of OMS pod

Z₀ = 463.9 in. FS: WP 400 + 63.9 = 463.9 in. FS

Y₀ = 80.0 in FS

Length: X₀1214.0 to X₀1560.0 = 346.0 in. FS

TABLE III. - Continued.

Model Component: Booster Solid Rocket Motor (S₆)

General Description: Booster solid rocket motor, lightweight orbiter configuration, body of revolution, data for 1 of 2 sides

Model Scale = 0.00593

Drawing Number: VL-72-000061C, VL-77-000012B, SS-A-00094

Dimensions:	<u>Full-Scale</u>	<u>Model Scale</u>
Length (includes nozzle), in.	<u>1741.0</u>	<u>10.32413</u>
Max width (tank dia), in.	<u>142.0</u>	<u>0.84206</u>
Max depth (aft shroud), in.	<u>259.0</u>	<u>1.53587</u>
Fineness ratio	<u>6.722</u>	<u>6.722</u>
Area - ft ²		
Max cross-sectional	<u>365.87</u>	<u>0.01287</u>
Planform	<u>-</u>	<u>-</u>
Wetted	<u>-</u>	<u>-</u>
Base	<u>-</u>	<u>-</u>
WP of BSRM centerline, (Z _T), in.	<u>400.0</u>	<u>2.3720</u>
FS of BSRM nose (X _T), in.	<u>743.0</u>	<u>4.40599</u>

TABLE III. - Continued.

Model Component: External Tank (T₈)

General Description: External oxygen-hydrogen tank lightweight orbiter configuration to which the orbiter and the two solid rocket motors attach

Model Scale = 0.00593

Drawing Number: VL-70-000061C, VL-78-000018, SS-A-00093

Dimensions:	<u>Full-Scale</u>	<u>Model Scale</u>
Length ~ in. (nose at X _T = 185.0)	<u>1989.0</u>	<u>11.79477</u>
Max width (dia), in.	<u>324.0</u>	<u>1.92132</u>
Max depth ~ in.	<u>-</u>	<u>-</u>
Fineness ratio	<u>6.1389</u>	<u>6.1389</u>
Area - ft ²		
Max cross-sectional	<u>572.56</u>	<u>0.02013</u>
Planform	<u>-</u>	<u>-</u>
Wetted	<u>-</u>	<u>-</u>
Base	<u>-</u>	<u>-</u>
WP of tank centerline, (Z _T) in.	<u>400.0</u>	<u>2.3720</u>

TABLE III. - Continued.

MODEL COMPONENT: WING - W87-- LIGHTWEIGHT ORBITER

GENERAL DESCRIPTION: Orbiter configuration per Rockwell Lines VL70-000093

NOTE: Dihedral angle is defined at the lower surface of the wing at the 75.33-percent element line projected into a plane perpendicular to the FRL.

MODEL SCALE: 0.00593

DRAWING NO. VL70-000093

DIMENSIONS:	FULL SCALE	MODEL SCALE
TOTAL DATA		
Planform area (theo) - ft ²	2690.0	0.09459
Span (theo) - in.	936.682	5.55452
Aspect ratio	2.265	2.265
Rate of taper	1.177	1.177
Taper ratio	0.200	0.200
Dihedral angle - deg.	3.500	3.500
Incidence angle - deg.	3.000	3.000
Aerodynamic twist - deg.	+ 3.000	+ 3.000
Sweep-back angles - deg.		
Leading edge	45.000	45.000
Trailing edge	- 10.24	- 10.24
0.25 element line	35.209	35.209
Chords - in.		
Root (theo) at BP 0.0	689.24	4.08919
Tip (theo) at BP	137.85	0.81745
M.A.C.	474.81	2.81562
Fus. sta. of 0.25 MAC	1136.89	6.74176
WP of 0.25 MAC	299.20	1.77426
BL of 0.25 MAC	182.13	1.08003
Exposed data		
Area (theo) - ft ²	1752.29	0.06162
Span (theo) - in. (BP 108.0 to tip)	720.68	4.27363
Aspect ratio	2.058	2.058
Taper ratio	0.2451	0.2451
Chords - In.		
Root at BP 108.0	562.40	3.33503
Tip at 1.00 b/2	137.85	0.81745
MAC	393.03	2.33067
Fus. sta of 0.25 MAC	1185.31	7.02889
WP of 0.25 MAC	300.20	1.78019
BL of 0.25 MAC	143.76	0.85250
Airfoil section (Rockwell mod NASA XXXX-64)		
t/c at root b/2 = 0.425	0.10	0.10
t/c at tip b/2 = 1.00	0.12	0.12
DATA FOR 1 OF 2 SIDES		
Leading edge cuff		
Planform area - ft ²	120.33	0.00423
Leading edge intersects fus at sta - in.	560.0	3.32080
Leading edge intersects wing at sta - in.	1035.0	6.13755

TABLE III. - Concluded.

Model Component: Vertical (V5)--Lightweight Orbiter Configuration

General Description: Centerline vertical tail, double-wedge airfoil with rounded leading edge

Model Scale = 0.00593

Drawing Number: VL-70-000095, SS-A-00092

Dimensions:	Full-Scale	Model Scale
Total Data		
Planform area (theo) ~ ft ²	413.25	0.01453
Span (theo) ~ in.	315.72	1.87222
Aspect ratio	1.675	1.675
Rate of taper	0.507	.507
Taper ratio	0.404	.404
Sweepback angles ~ deg		
Leading edge	45.000	45.000
Trailing edge	26.249	26.249
0.25 element line	41.130	41.130
Chords ~ in.		
Root (theo) WP	268.50	1.59220
Tip (theo) WP	108.47	0.62323
MAC	199.81	1.18487
Fus sta of 0.25 MAC	1463.50	8.67856
WP of 0.25 MAC	635.52	3.76863
BL of 0.25 MAC	0.0	0.0
Airfoil section		
Leading edge angle ~ deg	10.00	10.00
Trailing edge angle ~ deg	14.92	14.92
Leading edge radius ~ in.	2.00	0.01186
Void area ~ ft ²	13.17	0.00046
Blanketed area ~ ft ²	12.67	0.00045

TABLE IV. ORBITER THERMOCOUPLE LOCATIONS

T/C No.	Skin Thick.	* Location		Remarks	T/C No.	Skin Thick.	* Location		Remarks
		$y = b/2$	$x/1 - x/c$				$y = b/2$	$x/1 - x/c$	
1	.033	$Y = .047$	.1536	Windshield	31	.0315	$Y = .415$	1.00	Fuselage
2	.031	$Y = .047$	.1612		32	.0315	$b/2 = .40$	.225	Wing
3	.034	$Y = .047$	.1594		33	.033		.250	
4	.0375	$Y = .213$	.1588		34	.0312		.300	
5	.0375	$Y = .196$	.1657		35	.033		.400	
6	.0335	$Y = .178$	.1724	↓	36	.0335		.500	
7	.033	$Y = 0$	.0875	Fuselage	37	.032		.600	
8	.032		.100		38	.0315		.700	
9	.031		.125		39	.0315		.800	
10	.0305		.150		40	.0310	↓	.900	
11	.030		.175		41	.034	$b/2 = .60$	.175	
12	.031		.200		42	.032		.200	
13	.0295		.250		43	.031		.300	
14	.0295		.300		44	.033		.400	
15	.0275		.400		45	.032		.500	
16	.0302		.500		46	.032		.600	
17	.0312		.600		47	.0325		.700	
18	.0315		.700		48	.031		.800	
19	.031		.800		49	.0315	↓	.875	
20	.0295		.900		50	.035	$b/2 = .80$	.250	
21	.030		1.00		51	.033		.300	
22	.0305	↓	1.025		52	.033		.400	
23	.0285	$Y = .415$	.350		53	.0315		.500	
24	.0285		.375		54	.032		.600	
25	.0315		.400		55	.032		.700	
26	.0325		.500		56	.0335		.800	
27	.0320		.600		57	.033	↓	.850	↓
28	.0315		.700						
29	.0325		.800						
30	.0315	↓	.900	↓					

* model scale, in.

$x/1 = (t/c's 1-31)$

$x/c = (t/c's 32-57)$

TABLE V. - EXTERNAL TANK THERMOCOUPLE LOCATIONS

T/C No.	Skin Thick.	Location x/1	Location ϕ .deg.	T/C No.	Skin Thick.	Location x/1	Location ϕ .deg.	T/C No.	Skin Thick.	Location x/1	Location ϕ .deg.
1	.037	0	Nose	34	.032	.40	135	67	.030	.60	45
2	.030	.005	180	35	.033	.40	112.5	68	.030	.60	0
3	.030	.01	180	36	.033	.40	90	69	.033	.625	180
4	.030	.02	180	37	.030	.40	67.5	70	.033	.65	180
5	.030	.04	180	38	.029	.40	45	71	.032	.65	157.5
6	.030	.06	180	39	.031	.40	0	72	.031	.65	135
7	.029	.08	180	40	.032	.425	180	73	.030	.65	112.5
8	.029	.10	180	41	.032	.45	180	74	.030	.65	90
9	.028	.125	180	42	.033	.45	157.5	75	.030	.65	67.5
10	.028	.15	180	43	.031	.45	135	76	.033	.675	180
11	.028	.175	180	44	.031	.45	112.5	77	.033	.70	180
12	.028	.20	180	45	.031	.45	90	78	.032	.70	157.5
13	.028	.20	90	46	.033	.475	180	79	.032	.70	135
14	.032	.25	180	47	.033	.50	180	80	.031	.70	112.5
15	.029	.25	90	48	.033	.50	157.5	81	.030	.70	90
16	.030	.275	112.5	49	.032	.50	135	82	.031	.70	67.5
17	.030	.275	90	50	.033	.50	112.5	83	.029	.70	45
18	.034	.30	180	51	.031	.50	90	84	.033	.75	180
19	.031	.30	112.5	52	.031	.50	67.5	85	.033	.75	157.5
20	.031	.30	90	53	.030	.50	45	86	.032	.75	135
21	.031	.30	67.5	54	.032	.525	180	87	.031	.75	112.5
22	.031	.325	135	55	.032	.55	180	88	.031	.75	90
23	.031	.325	112.5	56	.033	.55	157.5	89	.030	.75	67.5
24	.031	.325	90	57	.031	.55	135	90	.033	.80	180
25	.032	.35	180	58	.031	.55	112.5	91	.033	.80	157.5
26	.032	.35	135	59	.031	.55	90	92	.032	.80	135
27	.031	.35	112.5	60	.032	.575	180	93	.032	.80	112.5
28	.031	.35	90	61	.032	.60	180	94	.031	.80	90
29	.031	.35	67.5	62	.033	.60	157.5	95	.030	.80	67.5
30	.034	.375	180	63	.031	.60	135	96	.029	.80	45
31	.032	.375	135	64	.031	.60	112.5	97	.030	.80	0
32	.033	.40	180	65	.031	.60	90	98	.033	.85	180
33	.032	.40	157.5	66	.031	.60	67.5	99	.032	.85	157.5

TABLE V. - Concluded.

T/C No.	Skin Thick.	Location	
		x/l	φ-deg.
100	.032	.85	135
101	.030	.85	112.5
102	.030	.85	90
103	.033	.90	180
104	.033	.90	157.5
105	.032	.90	135
106	.032	.90	112.5
107	.031	.90	90
108	.030	.90	67.5
109	.029	.90	45
110	.033	.935	180
111	.033	.974	180

TABLE VI. - SRB THERMOCOUPLE LOCATIONS

T/C No.	Skin Thick.	Location X/l	φ	T/C No.	Skin Thick.	Location X/l	φ
1	.040	0	0	29	.030	.100	180°
2	.035	0	270°	30	.035	.200	180°
3	.033	.025	270°	31	.034	.400	180°
4	.030	.050	270°	32	.034	.600	180°
5	.030	.100	270°	33	.033	.650	180°
6	.035	.112	270°	34	.033	.700	180°
7	.032	.150	270°	35	.034	.750	180°
8	.036	.200	270°	36	.035	.800	180°
9	.034	.300	270°	37	.035	.920	180°
10	.033	.400	270°	38	.035	.950	180°
11	.035	.500	270°	39	.034	.996	180°
12	.022	.600	270°	40	.040	.700	135°
13	.033	.700	270°	41	.040	.750	135°
14	.034	.800	270°	42	.038	.800	135°
15	.035	.920	270°	43	.030	.920	135°
16	.035	.950	270°	44	.034	.996	135°
17	.035	.990	270°	45	.032	.400	90°
18	.034	.200	225°	46	.038	.700	90°
19	.034	.300	225°	47	.038	.800	90°
20	.035	.400	225°	48	.030	.920	90°
21	.030	.600	225°	49	.030	.996	90°
22	.033	.650	225°	50	.025	.200	315°
23	.032	.700	225°	51	.028	.400	315°
24	.032	.750	225°	52	.030	.600	315°
25	.033	.800	225°	53	.029	.800	315°
26	.033	.920	225°	54	.032	.920	315°
27	.034	.996	225°	55	.032	.996	315°
28	.030	.05	180				

TABLE VII.

Instrumentation Groups - JH15 - ARC 3.5 Ft. HWT

<u>Grouping</u>	<u>Thermocouple No.</u>
ET-A	ET - 1
|	- 3 - 8
|	- 10
|	- 12 - 14
|	- 18 - 21
|	- 25
|	- 30
|	- 32 - 41
|	- 46 - 55
|	- 60 - 70
|	- 76 - 84
|	- 90 - 98
|	- 103 - 111
ET-B	ET - 42 - 43
|	- 45
|	- 56 - 57
|	- 59
|	- 71 - 74
|	- 85 - 88
|	- 99 - 102
ET-C	ET - 2
|	- 9
|	- 11
|	- 15 - 17
|	- 22 - 24
|	- 26 - 27
|	- 28 - 29
|	- 31
|	- 44
|	- 58
|	- 75
|	- 89
SRB-A	SRB - 1 - 55
ORB-A	ORB - 1 - 57

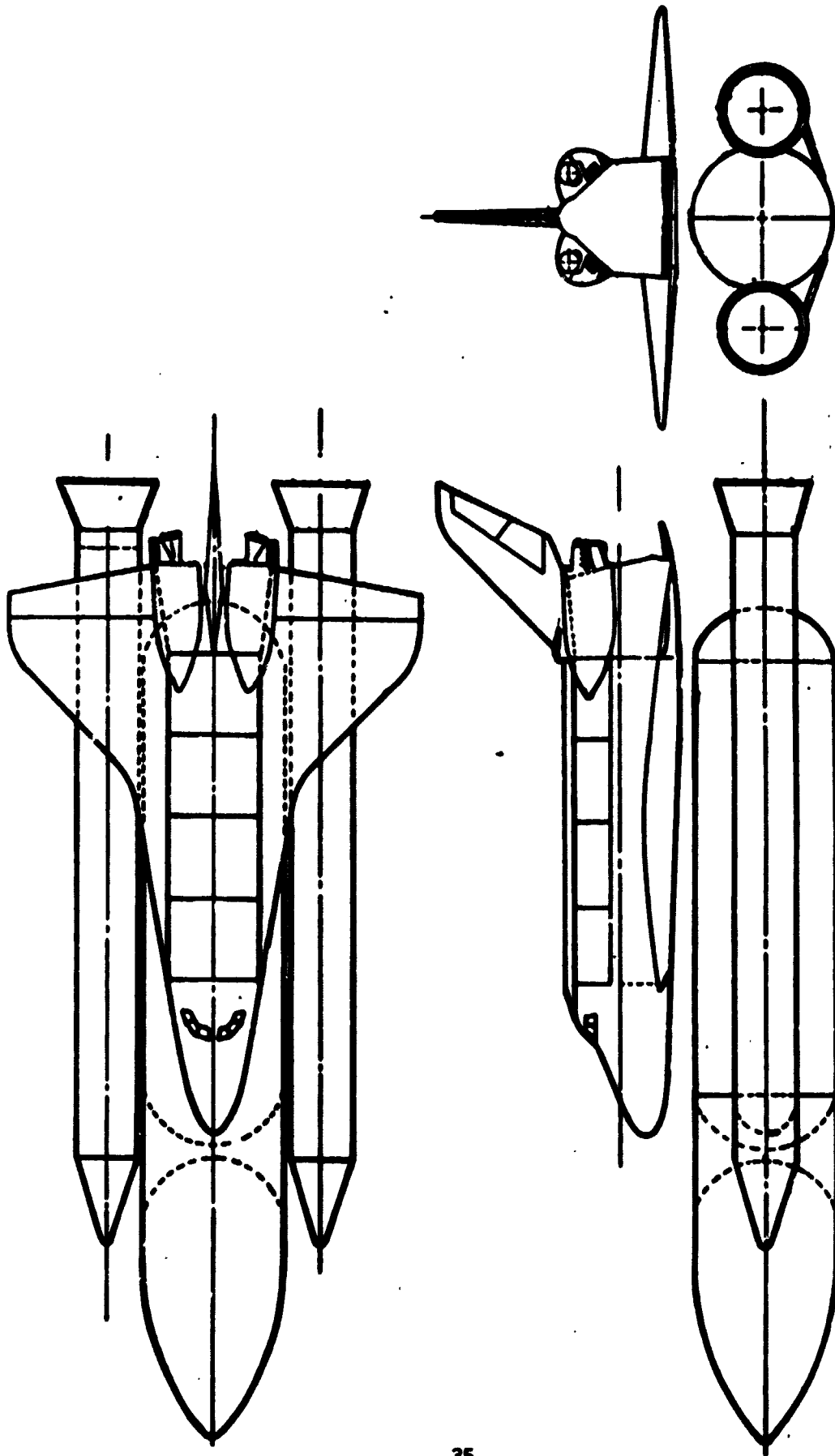
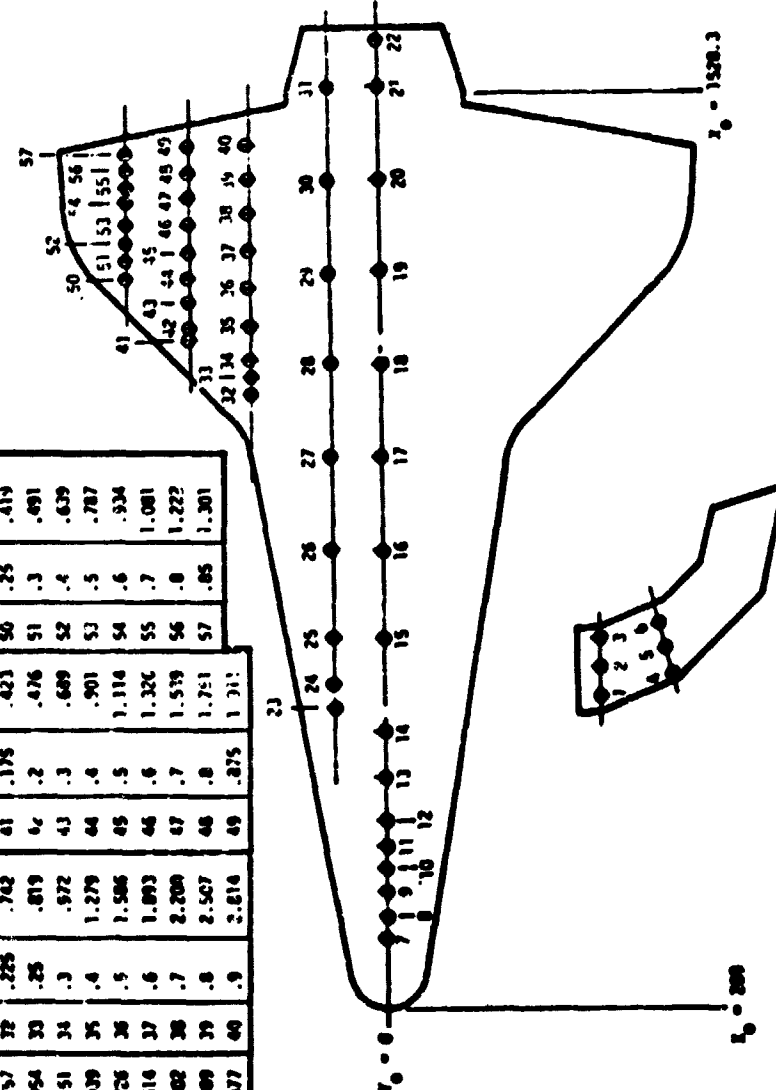


Figure 1. Integrated Vehicle General Arrangement.

TEMPERATURE LOCATIONS

STATIONFIELD		Y ₀			EP 7 ₀			- .6 W/2			.8 W/2		
DIST. FROM L.E.		M/L		DIST. FROM L.E.		M/L		DIST. FROM L.E.		M/L		DIST. FROM L.E.	
NO.	Y	NO.	Y	NO.	Y	NO.	Y	NO.	Y	NO.	Y	NO.	Y
1	1.210	1	.0075	23	.35	32	.225	41	.175	42	.175	50	.25
2	1.272	2	.100	24	.375	33	.25	42	.2	43	.2	51	.3
3	1.334	3	.125	25	.4	34	.3	43	.3	44	.3	52	.4
4	1.396	4	.150	26	.45	35	.4	44	.4	45	.4	53	.5
5	1.458	5	.175	27	.5	36	.5	45	.5	46	.5	54	.6
6	1.520	6	.20	28	.55	37	.6	46	.6	47	.6	55	.7
		7	.25	29	.6	38	.7	47	.7	48	.7	56	.8
		8	.3	30	.65	39	.8	48	.8	49	.8	57	.85
		9	.35	31	.7	40	.9	49	.9				
		10	.4										
		11	.45										
		12	.5										
		13	.55										
		14	.6										
		15	.65										
		16	.7										
		17	.75										
		18	.8										
		19	.85										
		20	.9										
		21	.95										
		22	1.0										
		23	1.075										



a. 41-OTS .006 Scale Orbiter T/C Locations (50)

Figure 2. Model Instrumentation.

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

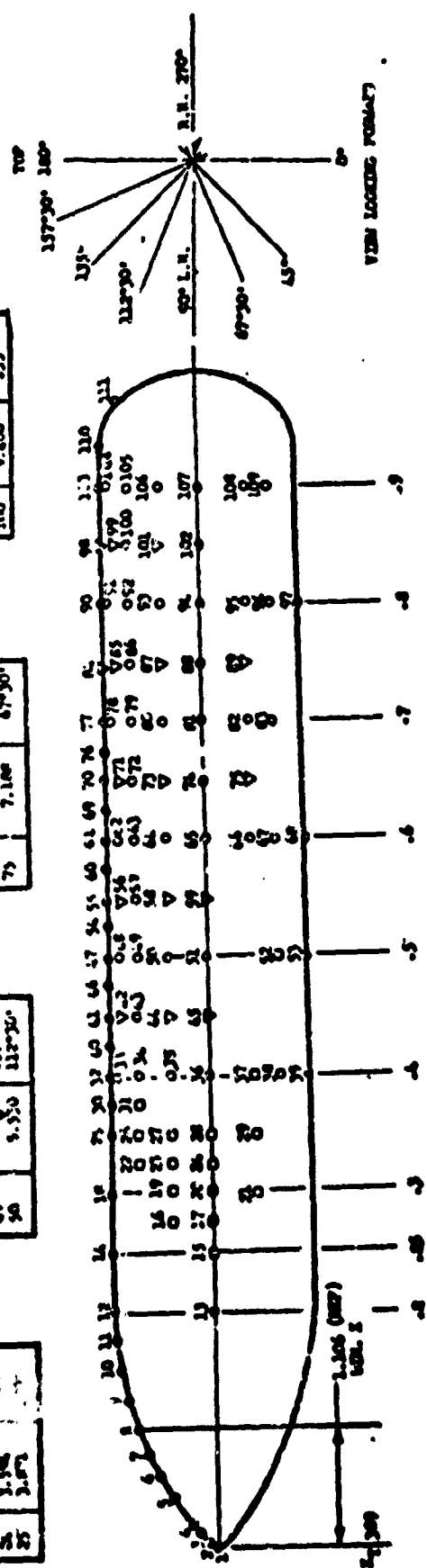
T/C NO.	DIR. I	φ
101	9.400	112°30'
102	9.400	90°
103	9.953	180°
104	↑	137°30'
105	↑	135°
106	↑	112°30'
107	9.953	90°
108	10.336	45°
109	↑	180°
110	↑	180°

T/C NO.	DIR. I	φ
76	7.245	180°
77	7.741	180°
78	↑	157°30'
79	↑	135°
80	↑	112°30'
81	7.741	90°
82	8.274	67°30'
83	↑	180°
84	↑	157°30'
85	↑	135°
86	↑	112°30'
87	8.274	90°
88	8.767	67°30'
89	↑	180°
90	↑	157°30'
91	↑	135°
92	↑	112°30'
93	8.767	90°
94	9.400	67°30'
95	9.400	45°
96	9.400	180°
97	9.400	157°30'
98	9.400	135°
99	9.400	112°30'
100	9.400	90°

T/C NO.	DIR. I	φ
51	5.530	90°
52	5.530	67°30'
53	5.530	45°
54	5.530	180°
55	6.082	137°30'
56	↑	135°
57	↑	112°30'
58	6.082	90°
59	6.359	180°
60	6.359	157°30'
61	6.359	135°
62	↑	112°30'
63	↑	90°
64	↑	67°30'
65	6.359	45°
66	6.359	180°
67	6.359	157°30'
68	6.359	135°
69	6.359	112°30'
70	6.359	90°
71	7.108	67°30'
72	↑	180°
73	↑	157°30'
74	↑	135°
75	7.108	112°30'
76	↑	90°
77	↑	67°30'

T/C NO.	DIR. I	φ
26	3.071	135°
27	↑	112°30'
28	↑	90°
29	3.071	67°30'
30	4.157	180°
31	4.157	157°30'
32	4.157	135°
33	4.157	112°30'
34	4.157	90°
35	4.157	67°30'
36	4.157	45°
37	4.157	180°
38	4.157	157°30'
39	4.157	135°
40	4.157	112°30'
41	4.157	90°
42	4.157	67°30'
43	4.157	45°
44	4.157	180°
45	4.157	157°30'
46	4.157	135°
47	4.157	112°30'
48	4.157	90°
49	4.157	67°30'
50	4.157	45°

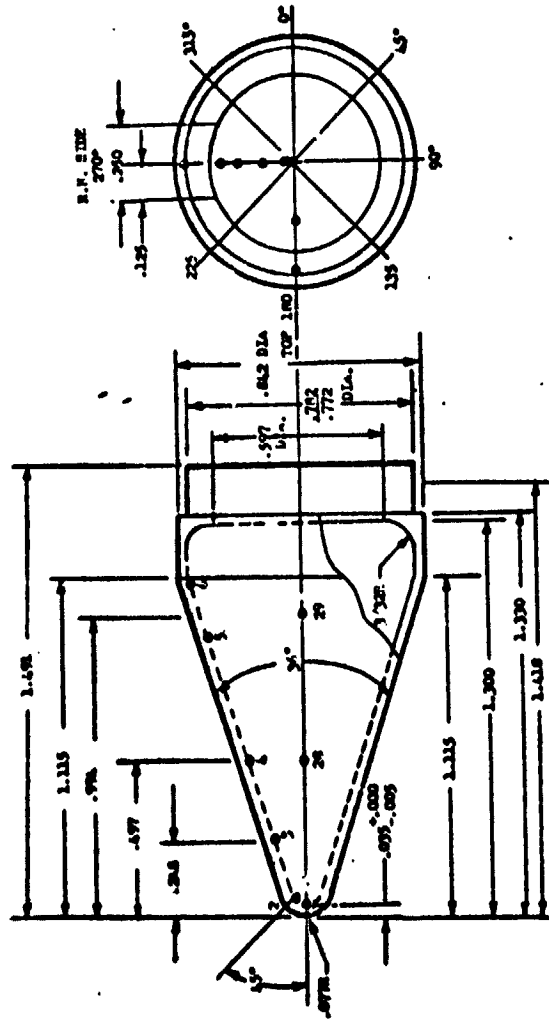
T/C NO.	DIR. I	φ
1	0.055	180°
2	1.111	180°
3	2.222	↑
4	3.333	↑
5	4.444	↑
6	5.555	↑
7	6.666	↑
8	7.777	↑
9	8.888	↑
10	9.999	↑
11	1.457	180°
12	1.457	180°
13	2.222	↑
14	2.222	↑
15	2.777	↑
16	2.777	↑
17	3.333	↑
18	3.333	↑
19	3.333	↑
20	3.333	↑
21	3.333	↑
22	3.333	↑
23	3.333	↑
24	3.333	↑
25	3.333	↑



b. h1-QTS 0.006 External Tank T/C Locations (111)

Figure 2. (Continued).

T/C NO.	I DIST.	Δ LOCATION	T/C NO.	I DIST.	Δ LOCATION
7	1.491		30	1.988	180°
8	1.988		31	3.976	
9	2.982		32	5.963	
10	3.976		33	6.460	
11	4.970		34	6.957	
12	5.963		35	7.454	
13	6.957		36	7.951	
14	7.951		37	8.448	
15	8.448		38	8.942	
16	8.942		39	9.435	
17	9.435		40	9.927	
18	9.927		41	10.419	
19	10.419		42	10.910	
20	10.910		43	11.401	
21	11.401		44	11.892	
22	11.892		45	12.383	
23	12.383		46	12.874	
24	12.874		47	13.365	
25	13.365		48	13.856	
26	13.856		49	14.347	
27	14.347		50	14.838	
			51	15.329	
			52	15.820	
			53	16.311	
			54	16.802	
			55	17.293	



T/C NO.	I DIST.	Δ LOCATION
0		
1	AT 45° CORNER	270°
2	.248	↑
3	.497	
4	.745	
5	.994	270°
6	1.241	180°
28	1.488	180°

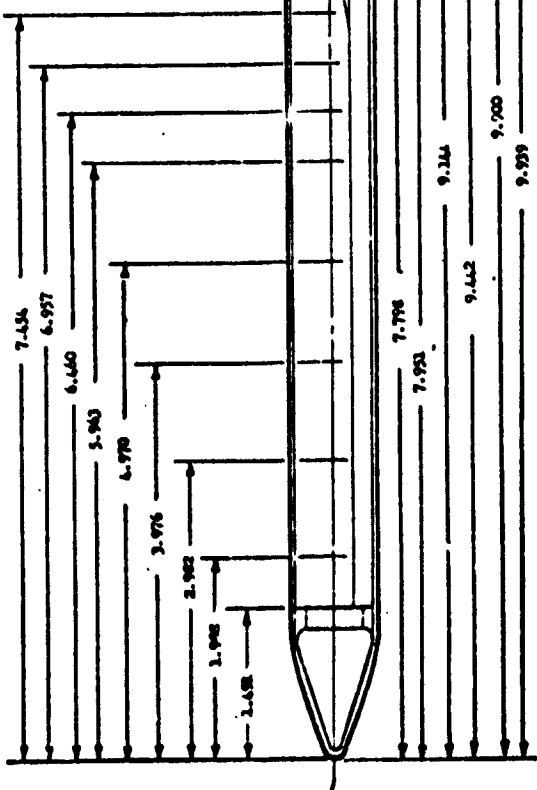
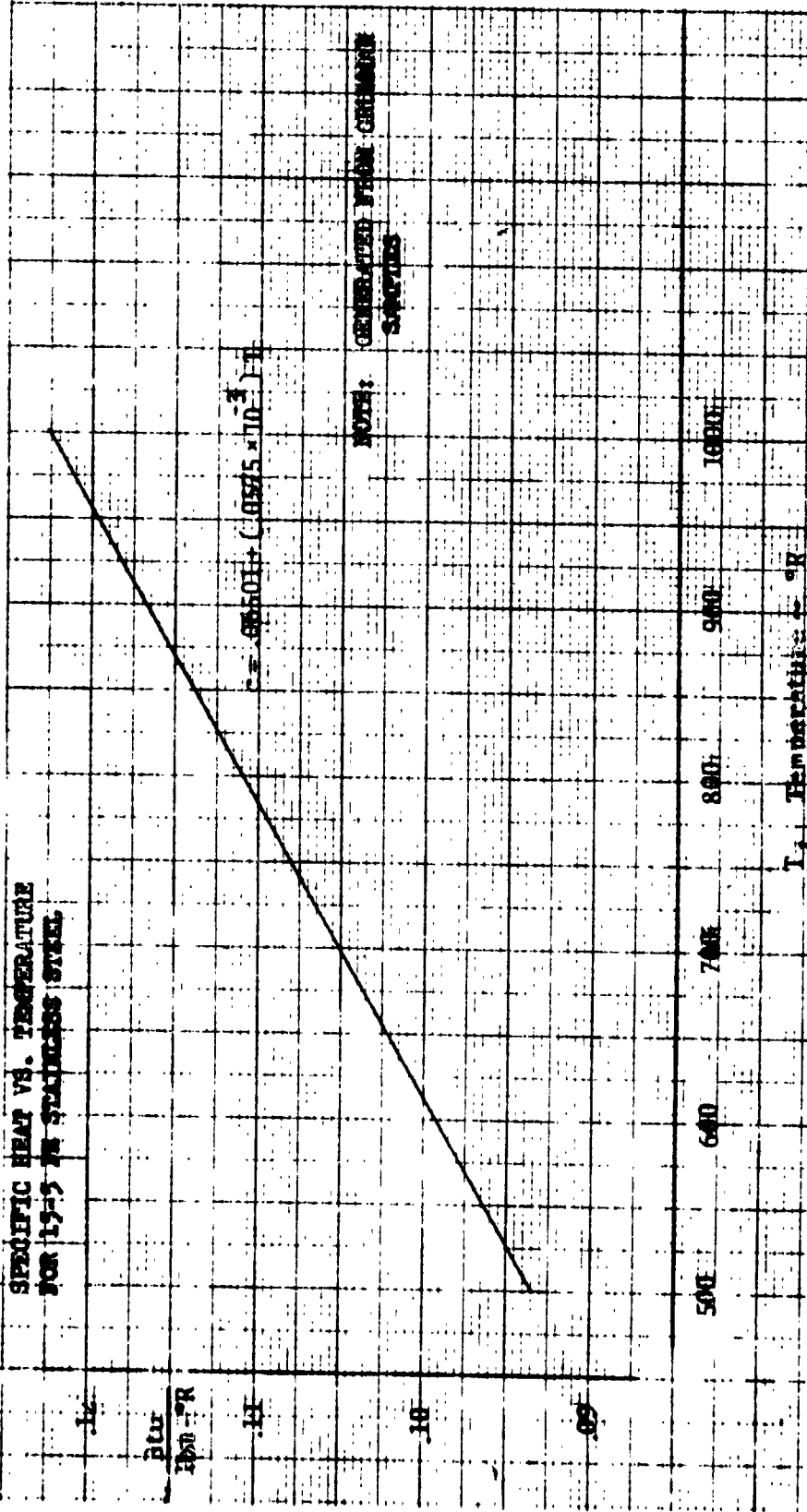


Figure 2. (Continued). c. A1-QTS 0.006-Scale BSRM (Left-Hand) T/C Locations (55)

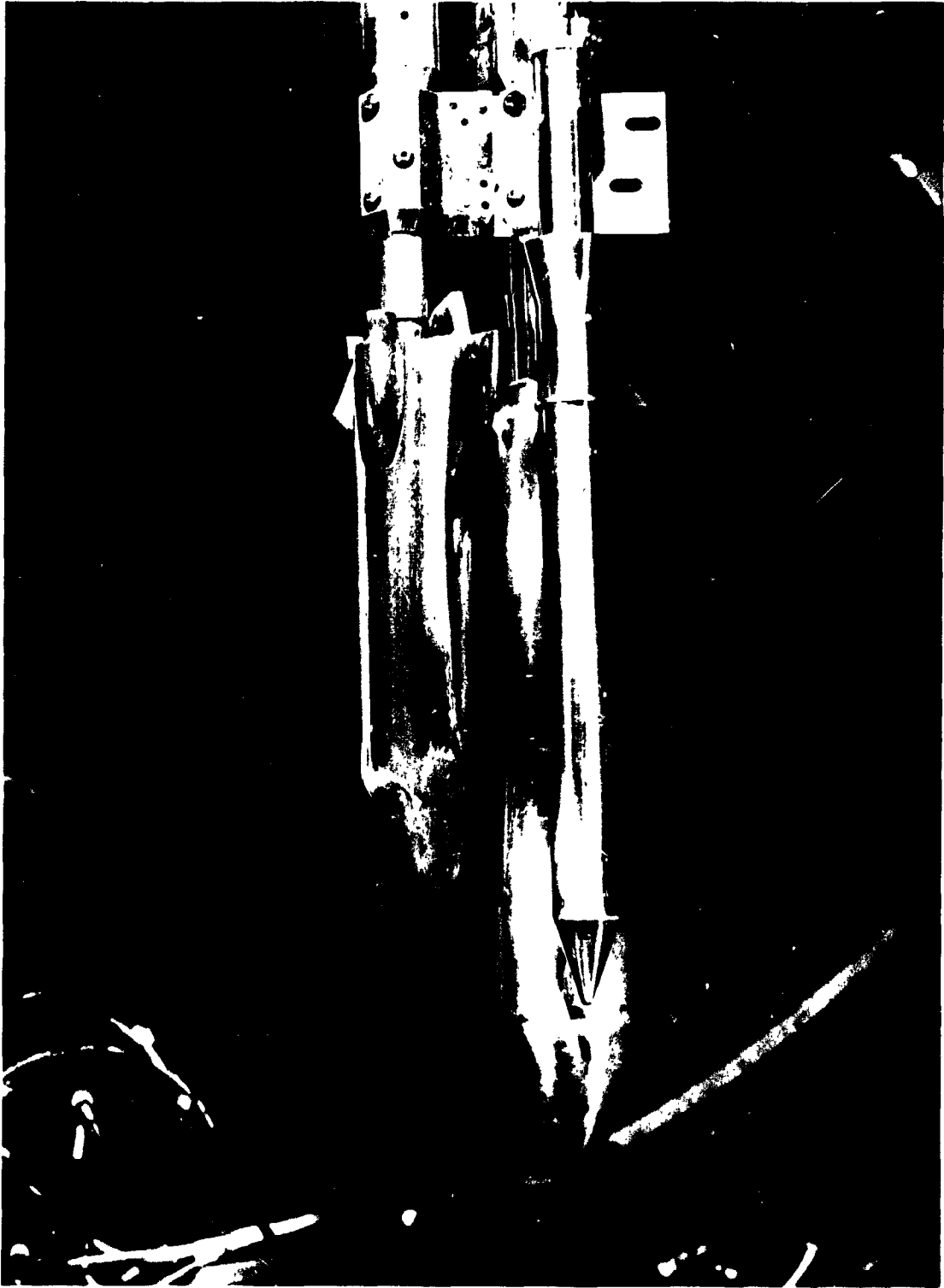
REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

**SPECIFIC HEAT VS. TEMPERATURE
FOR 15-5 PH STAINLESS STEEL**



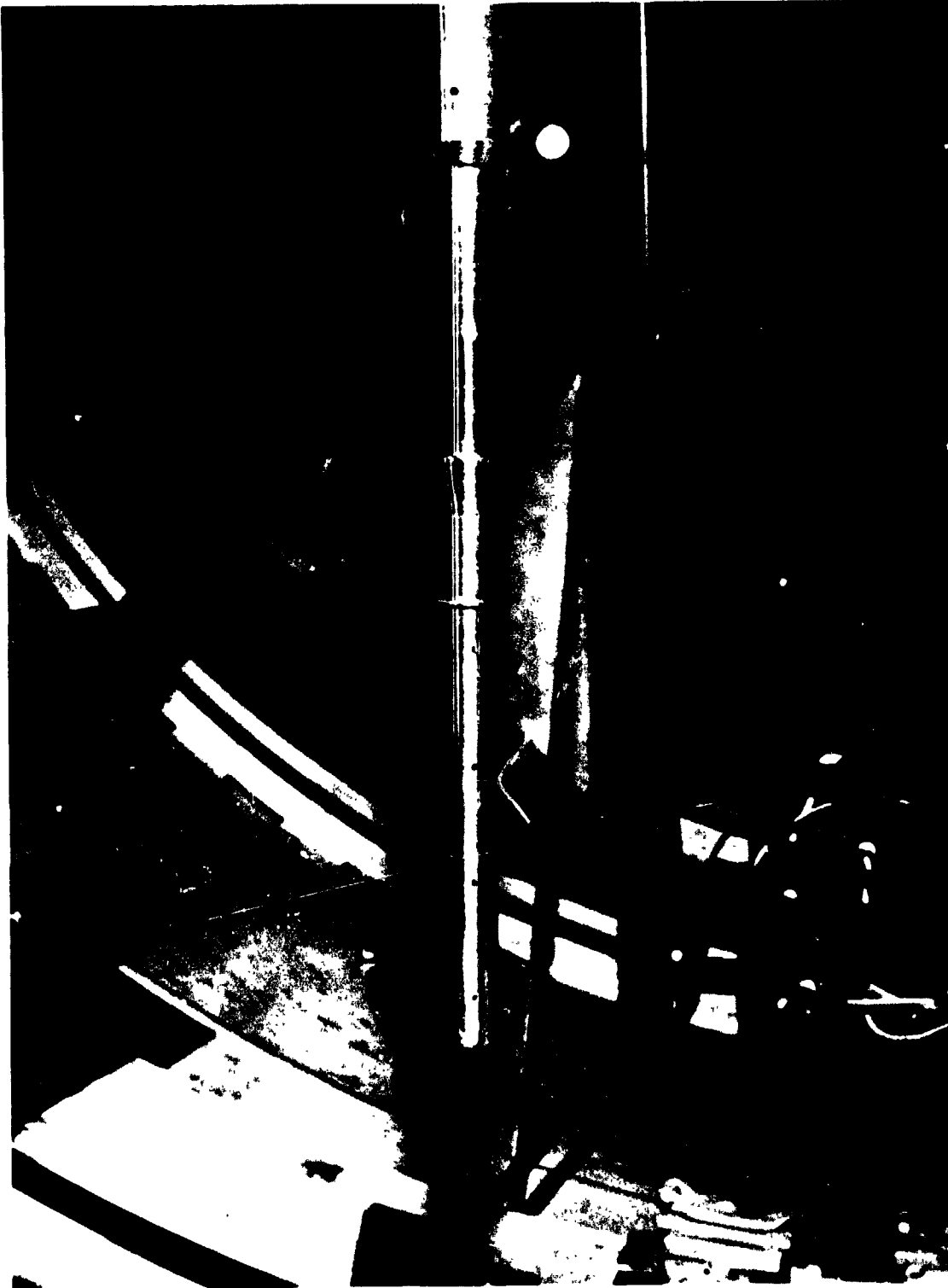
d. Specific Heat Curve
Figure 2. (Concluded).

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR



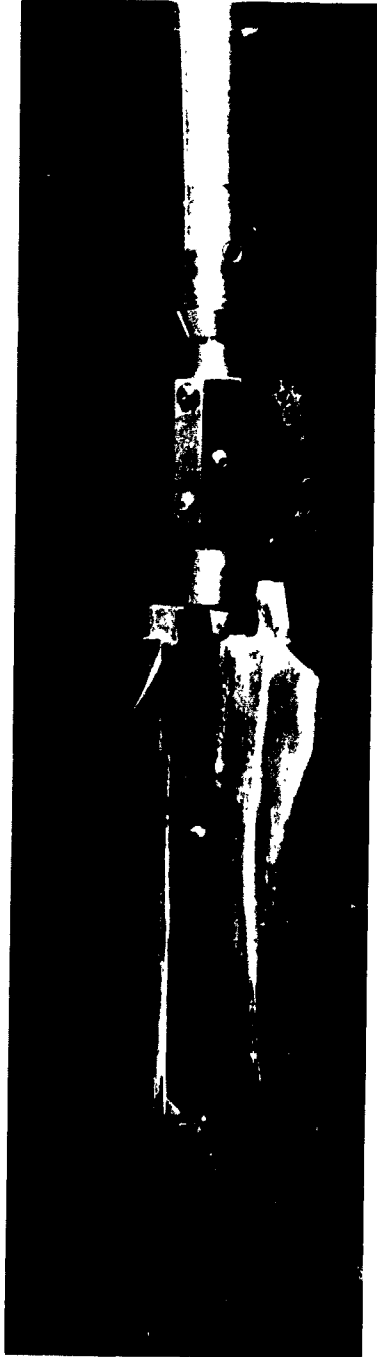
(a) Integrated vehicle

Figure 3. - Model Photographs.



(b) SRB alone

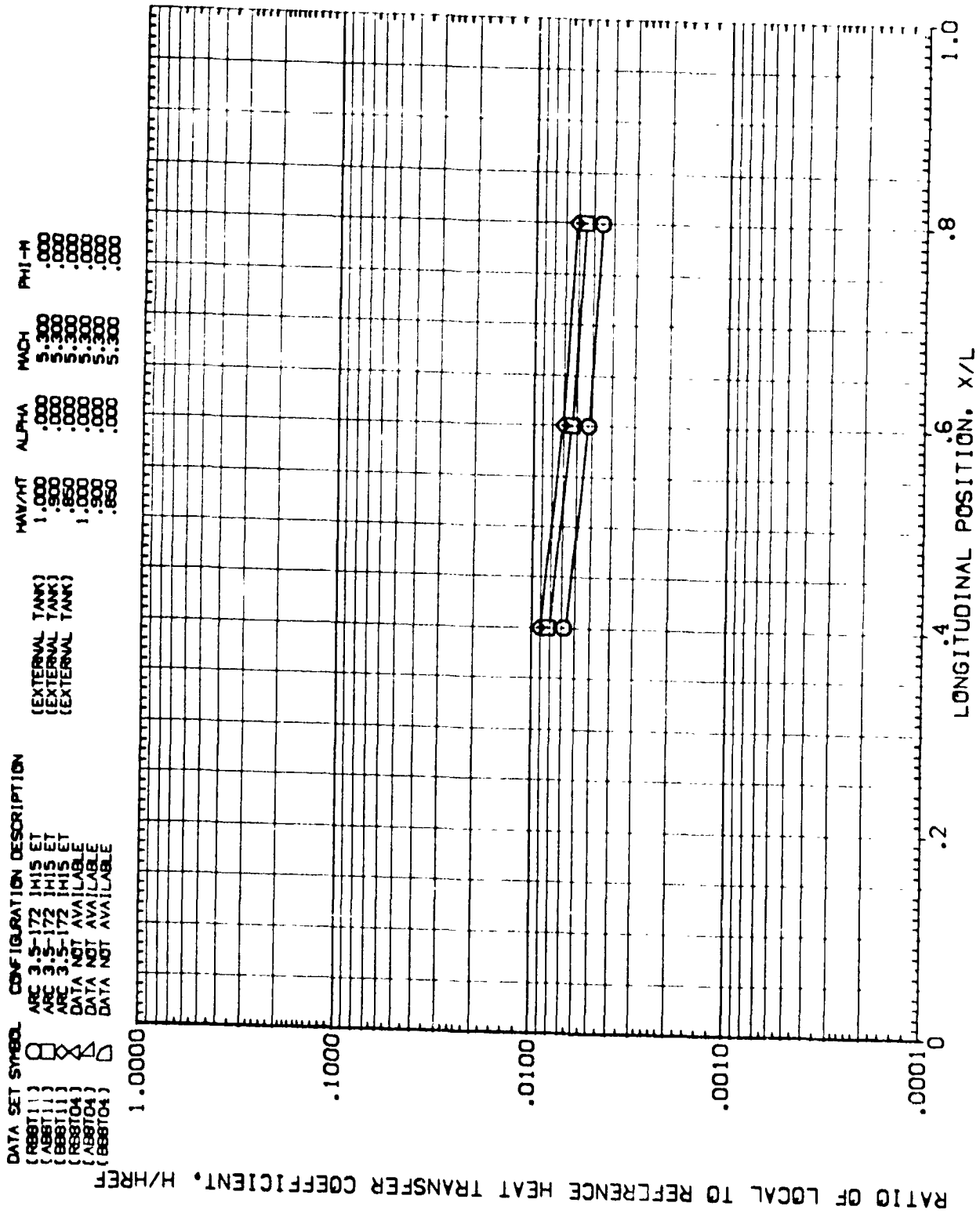
Figure 3. - Continued.



(c) Orbiter alone

Figure 3. - Concluded.

DATA FIGURES



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RB8T11) □ ARC 3.5-172 IH15 ET

(AB8T11) ○ ARC 3.5-172 IH15 ET

(BB8T04) △ ARC 3.5-172 IH15 ET

(RB8T04) DATA NOT AVAILABLE

(AB8T04) DATA NOT AVAILABLE

(BB8T04) DATA NOT AVAILABLE

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

MACH ALPHA MACH PHI-H

1.000 .000 5.300 .000

.900 .000 5.300 .000

.850 .000 5.300 .000

1.000 .000 5.300 .000

.850 .000 5.300 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MAC- = 5.300 PHI = .000

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HA/W/T	ALPHA	MACH	PHI-H
(RB8T11)	ARC 3.5-172 (H15 ET	1.000	.000	5.300	.000
(AB8T11)	ARC 3.5-172 (H15 ET	.500	.000	5.300	.000
(BB8T11)	ARC 3.5-172 (H15 ET	.850	.000	5.300	.000
(RB8T04)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(AB8T04)	DATA NOT AVAILABLE	.850	.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

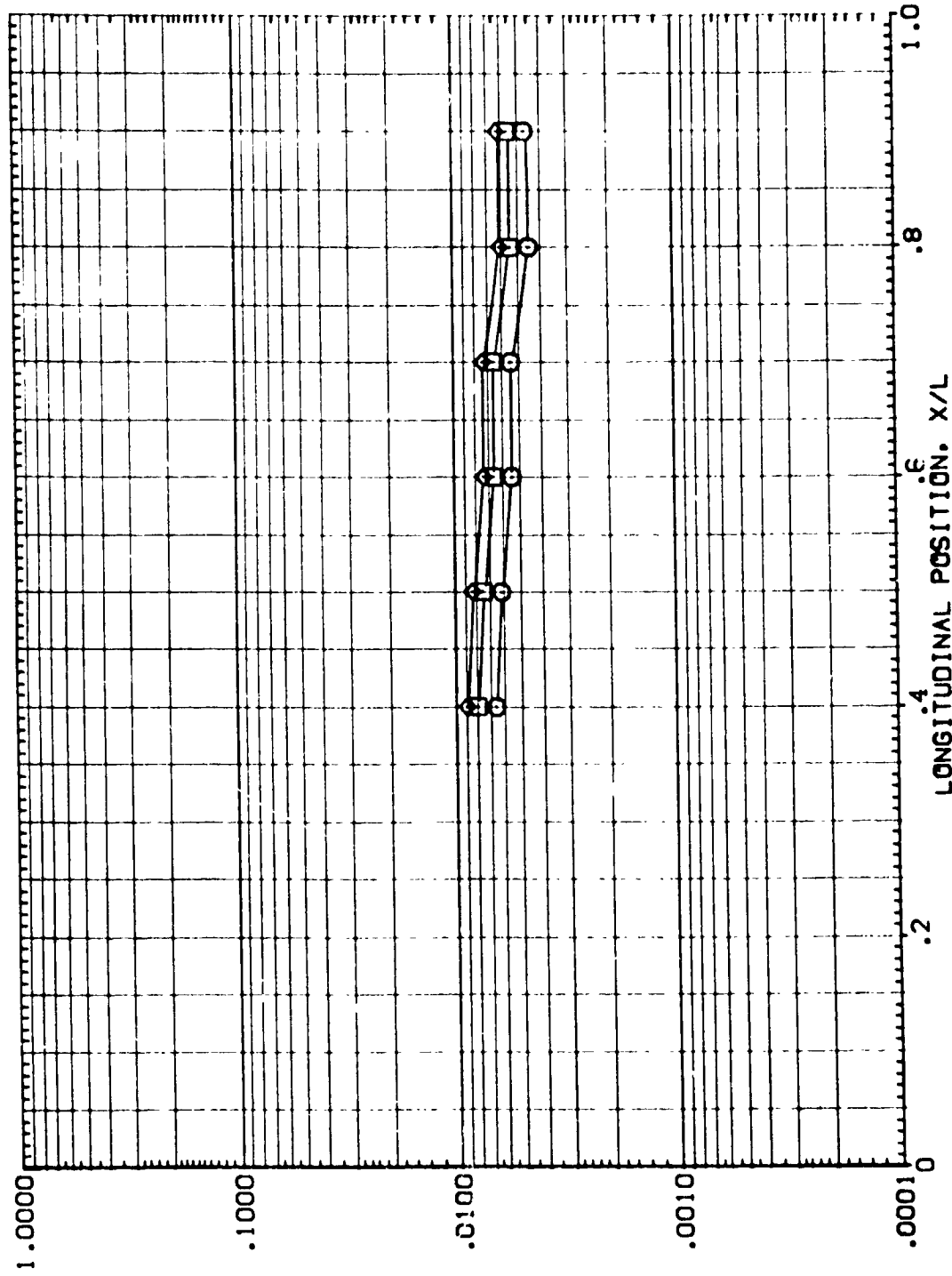


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 45.000

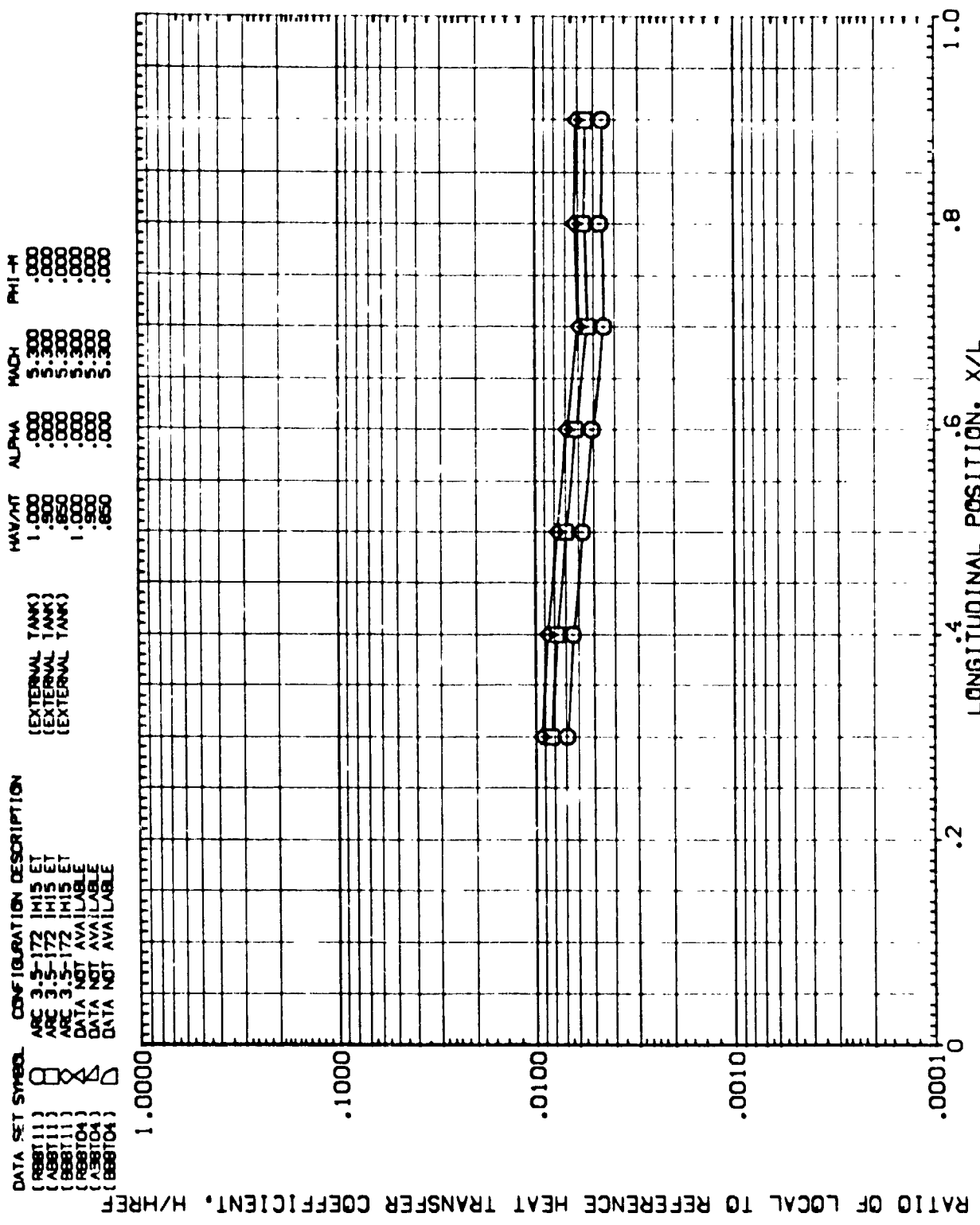


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RBBT11)	ARC 3.5-172 IH15 ET
(RBBT12)	ARC 3.5-172 IH15 ET
(RBBT13)	ARC 3.5-172 IH15 ET
(RBBT14)	DATA NOT AVAILABLE
(RBBT04)	DATA NOT AVAILABLE
(RBBT04)	DATA NOT AVAILABLE

(EXTERNAL TANK)	EXTERNAL TANK	HAW/HT	ALPHA	MACH	PHI-H
(EXTERNAL TANK)	(EXTERNAL TANK)	1.000	.000	5.300	.000
(EXTERNAL TANK)	(EXTERNAL TANK)	.500	.000	5.300	.000
(EXTERNAL TANK)	(EXTERNAL TANK)	.850	.000	5.300	.000
(EXTERNAL TANK)	(EXTERNAL TANK)	1.000	.000	5.300	.000
(EXTERNAL TANK)	(EXTERNAL TANK)	.850	.000	5.300	.000

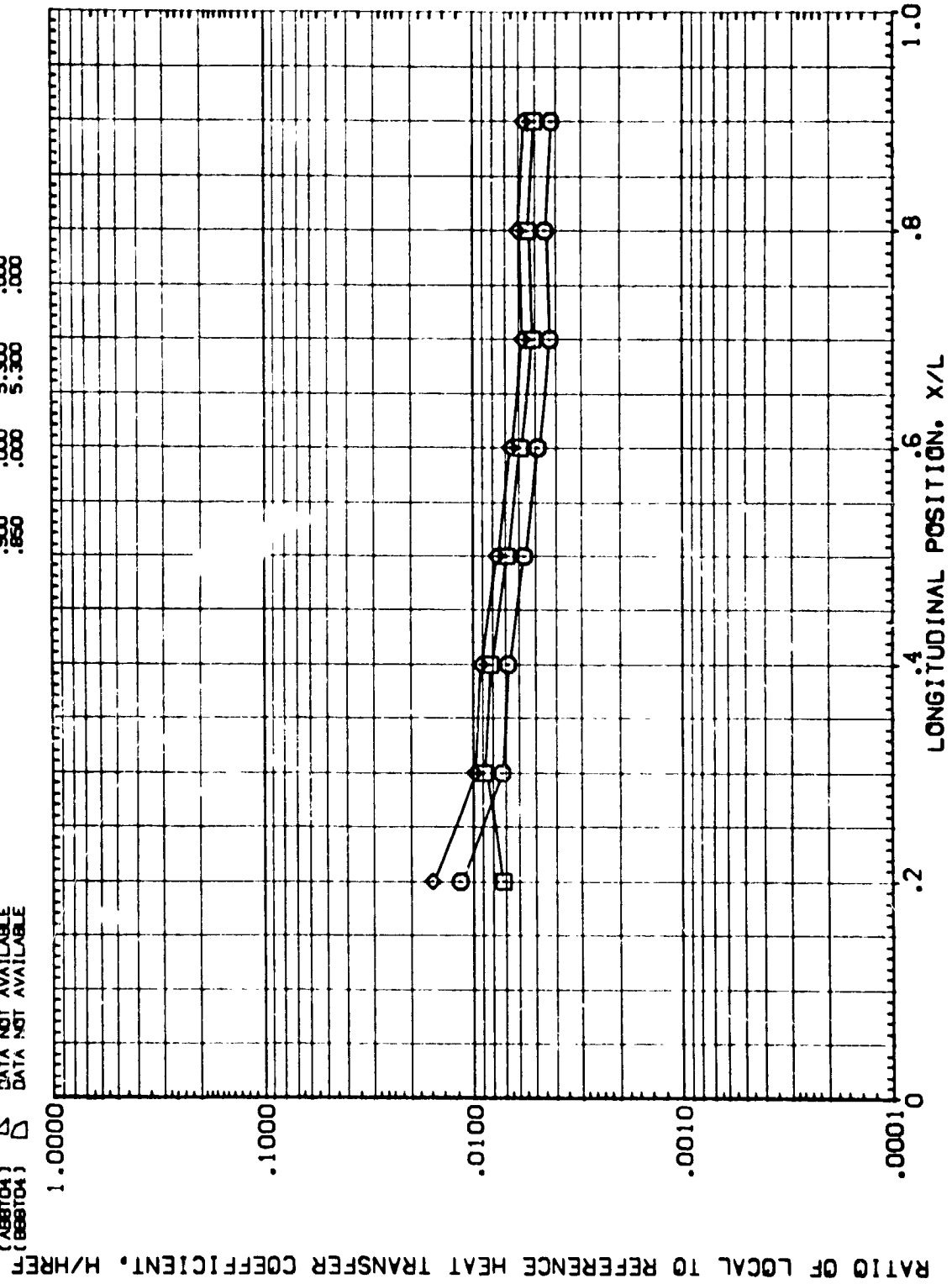


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 90.000 PAGE 4



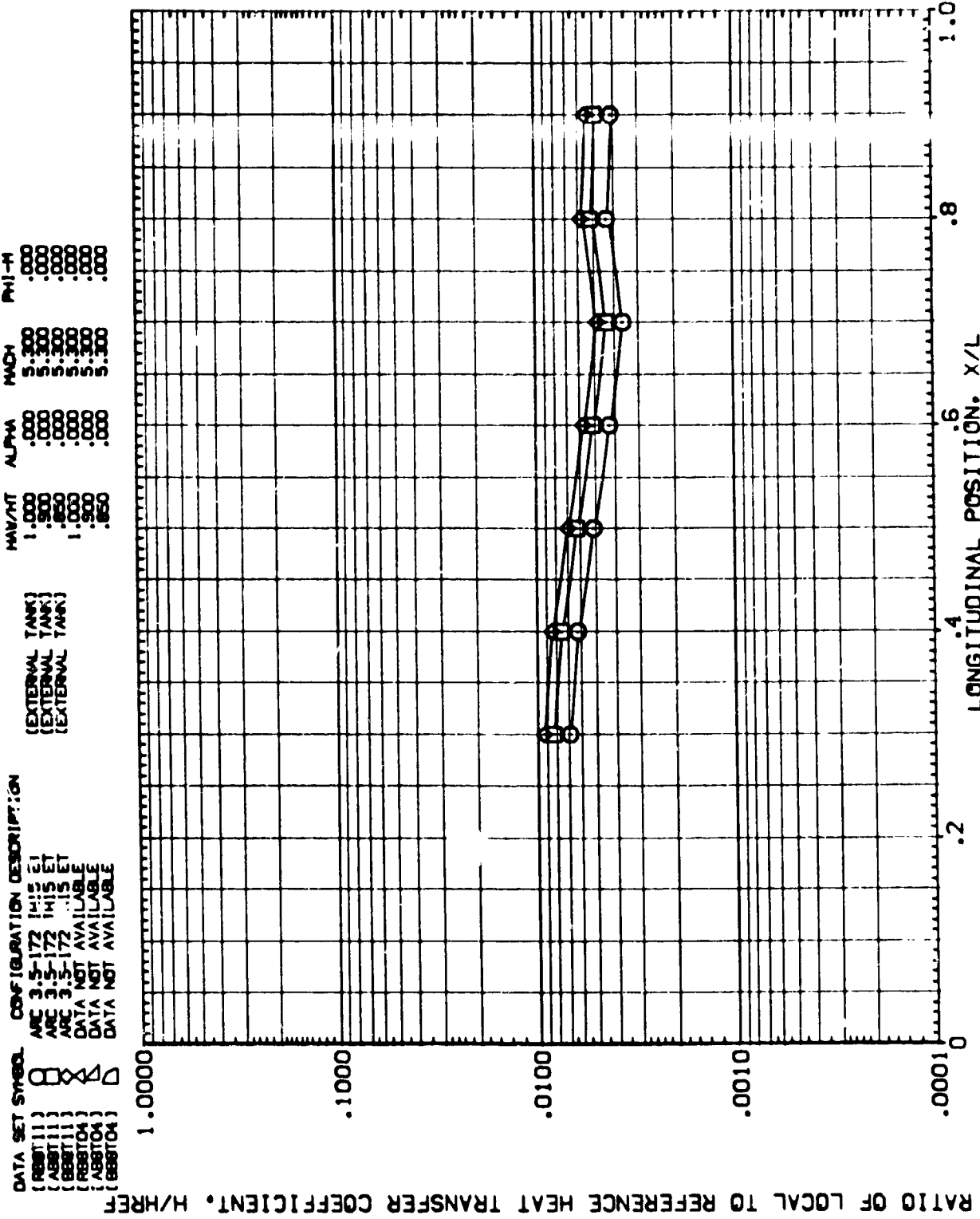


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 112.500 P 5E 5

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RB8711) ARC 3.5-172 IM15 ET
 (AB8711) ARC 3.5-172 IM15 ET
 (BB8711) ARC 3.5-172 IM15 ET
 (RB8704) DATA NOT AVAILABLE
 (AB8704) DATA NOT AVAILABLE
 (BB8704) DATA NOT AVAILABLE

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .800 .000 5.300 .000
 1.000 .000 5.300 .000
 .950 .000 5.300 .000

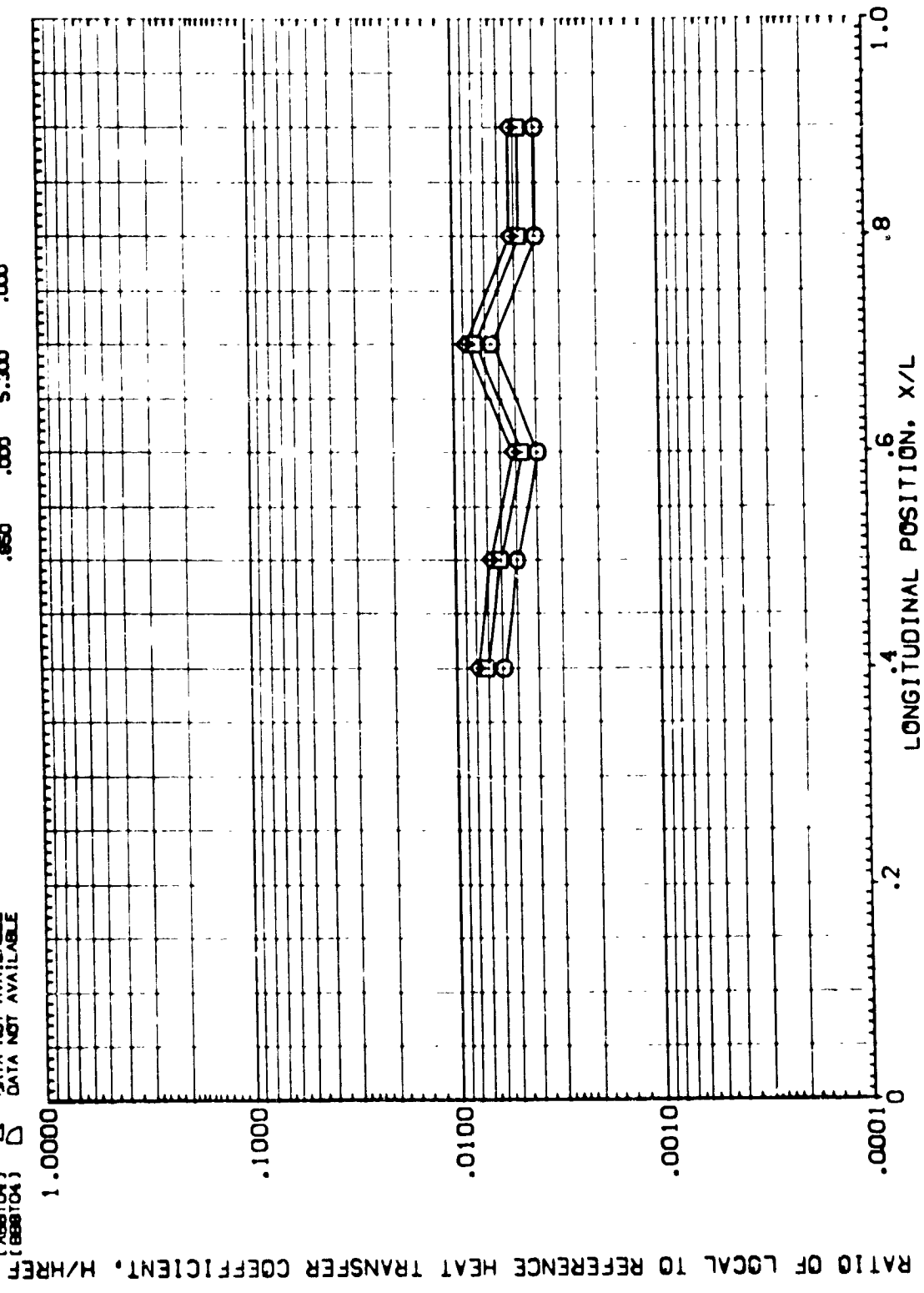


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 135.000 PAGE 6



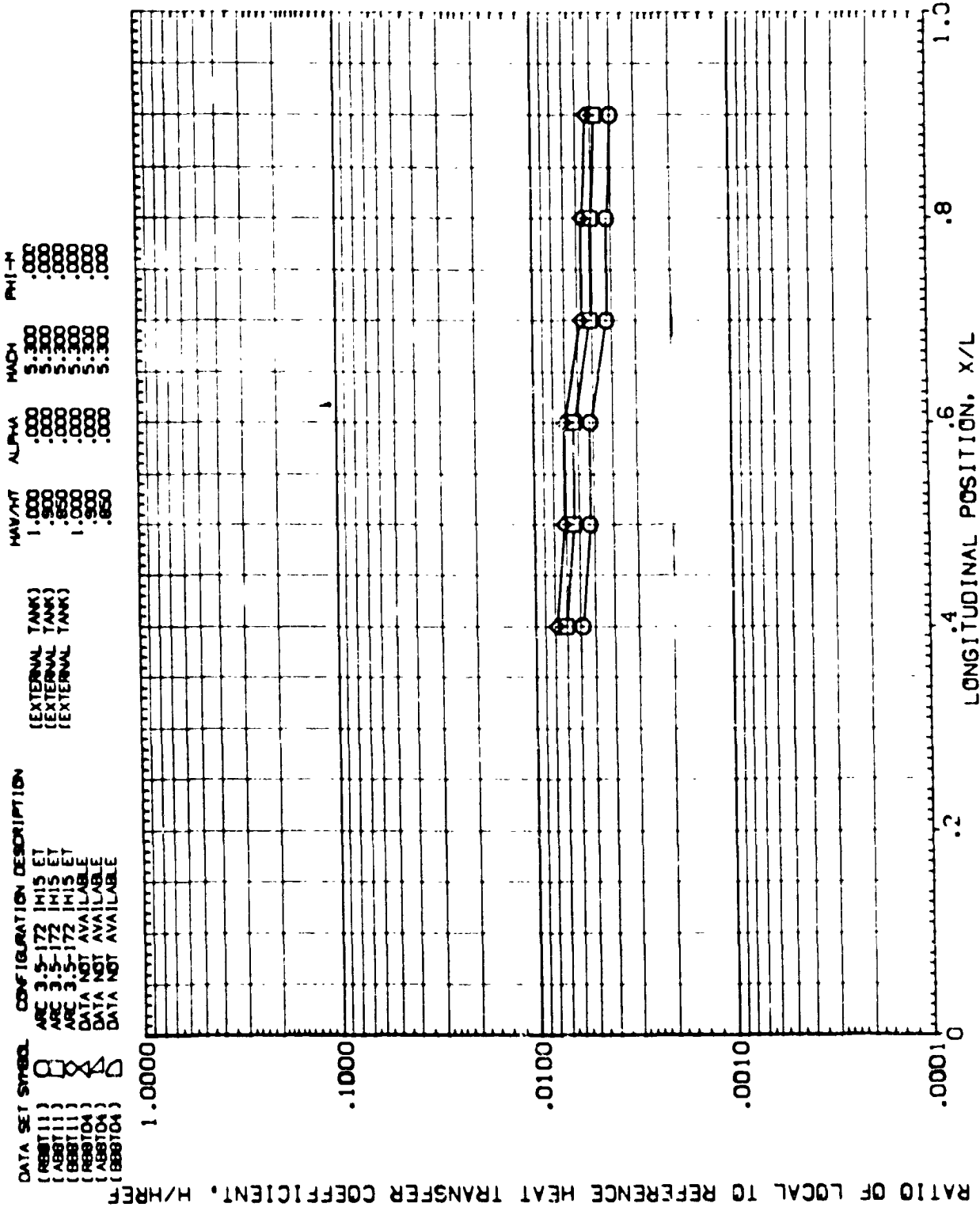


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 157.500

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R88T11)	ARC 3.5-172 IM15 ET
(A88T11)	ARC 3.5-172 IM15 ET
(B88T11)	ARC 3.5-172 IM15 ET
(R88T04)	DATA NOT AVAILABLE
(A88T04)	DATA NOT AVAILABLE
(B88T04)	DATA NOT AVAILABLE

(EXTERNAL TANK)	MAV/HT	ALPHA	MACH	PHI-H
(EXTERNAL TANK)	1.000	.000	5.300	.000
(EXTERNAL TANK)	.500	.000	5.300	.000
	.650	.000	5.300	.000
	1.000	.000	5.300	.000
	.650	.000	5.300	.000

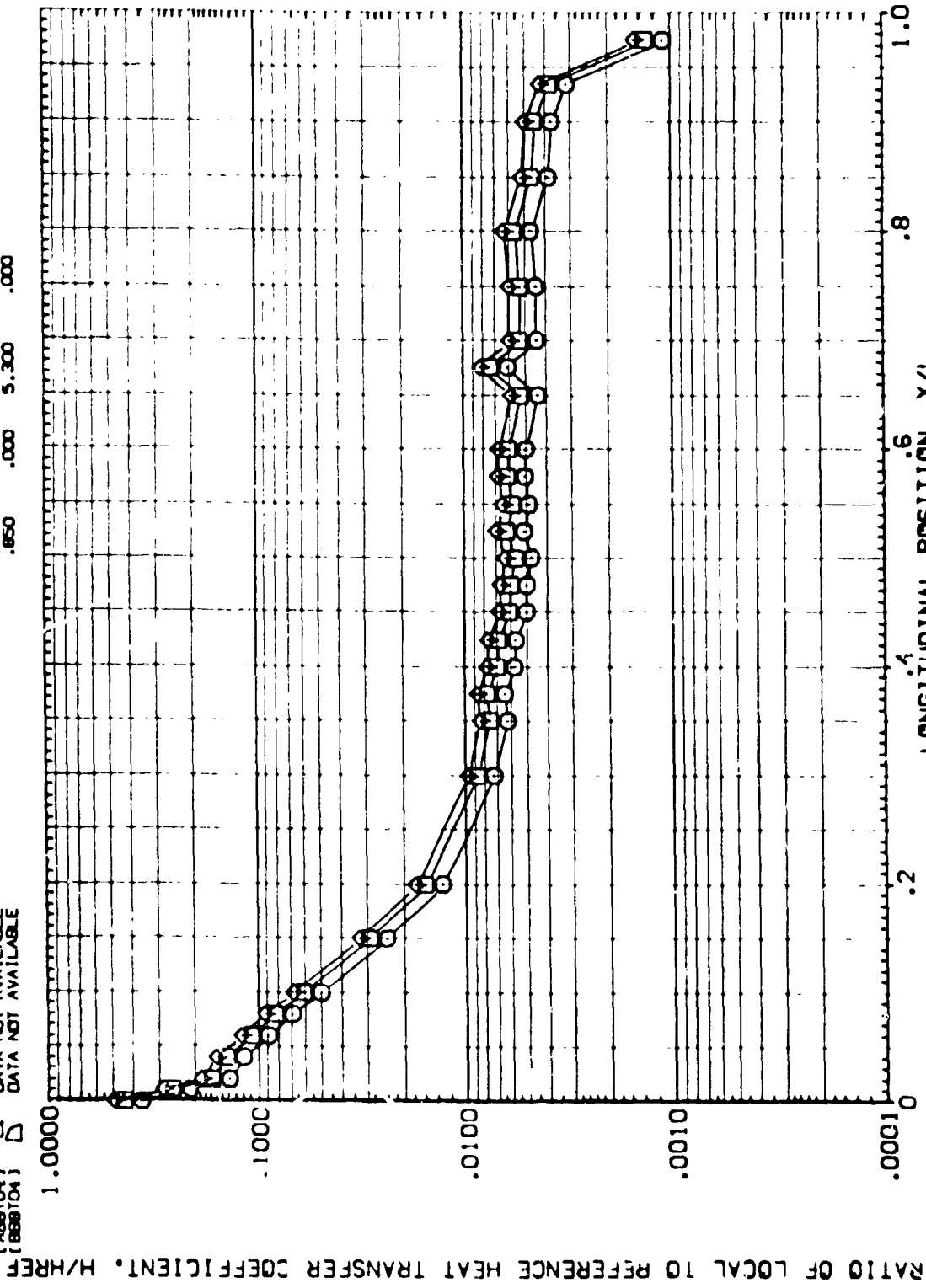


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 180.000 PAGE 8



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R88T11)	ARC 3.5-172 IH15 ET
(A88T11)	ARC 3.5-172 IH15 ET
(B88T11)	ARC 3.5-172 IH15 ET
(B88T04)	ARC 3.5-172 IH15 ORB + ET
(A88T04)	ARC 3.5-172 IH15 ORB + ET
(B88T04)	ARC 3.5-172 IH15 ORB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

MACH ALPHA MACH PHI-H

1.000	.000	5.300	.000
.850	.000	5.300	.000
1.000	.000	5.300	.000
.850	.000	5.300	.000

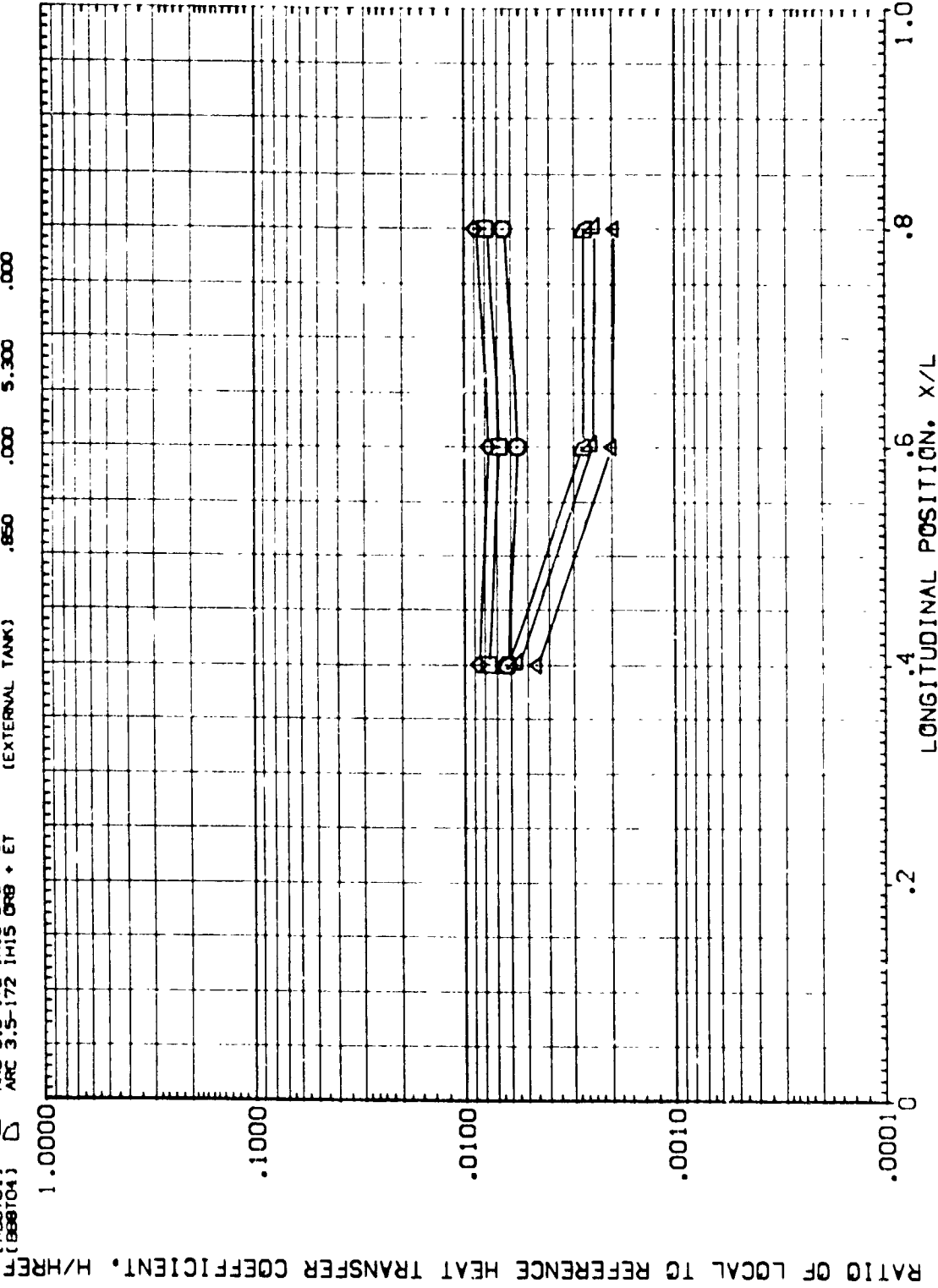


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HA/W/HT	ALPHA	MACH	PHI-H
(RB8T11)	ARC 3.5-172 IH15 ET	1.000	.000	5.300	.000
(AB8T11)	ARC 3.5-172 IH15 ET	.800	.000	5.300	.000
(BB8T11)	ARC 3.5-172 IH15 ET	.650	.000	5.300	.000
(RB8T04)	ARC 3.5-172 IH15 DR8 + ET	1.000	.000	5.300	.000
(AB8T04)	ARC 3.5-172 IH15 DR8 + ET	.900	.000	5.300	.000
(BB8T04)	ARC 3.5-172 IH15 DR8 + ET	.850	.000	5.300	.000

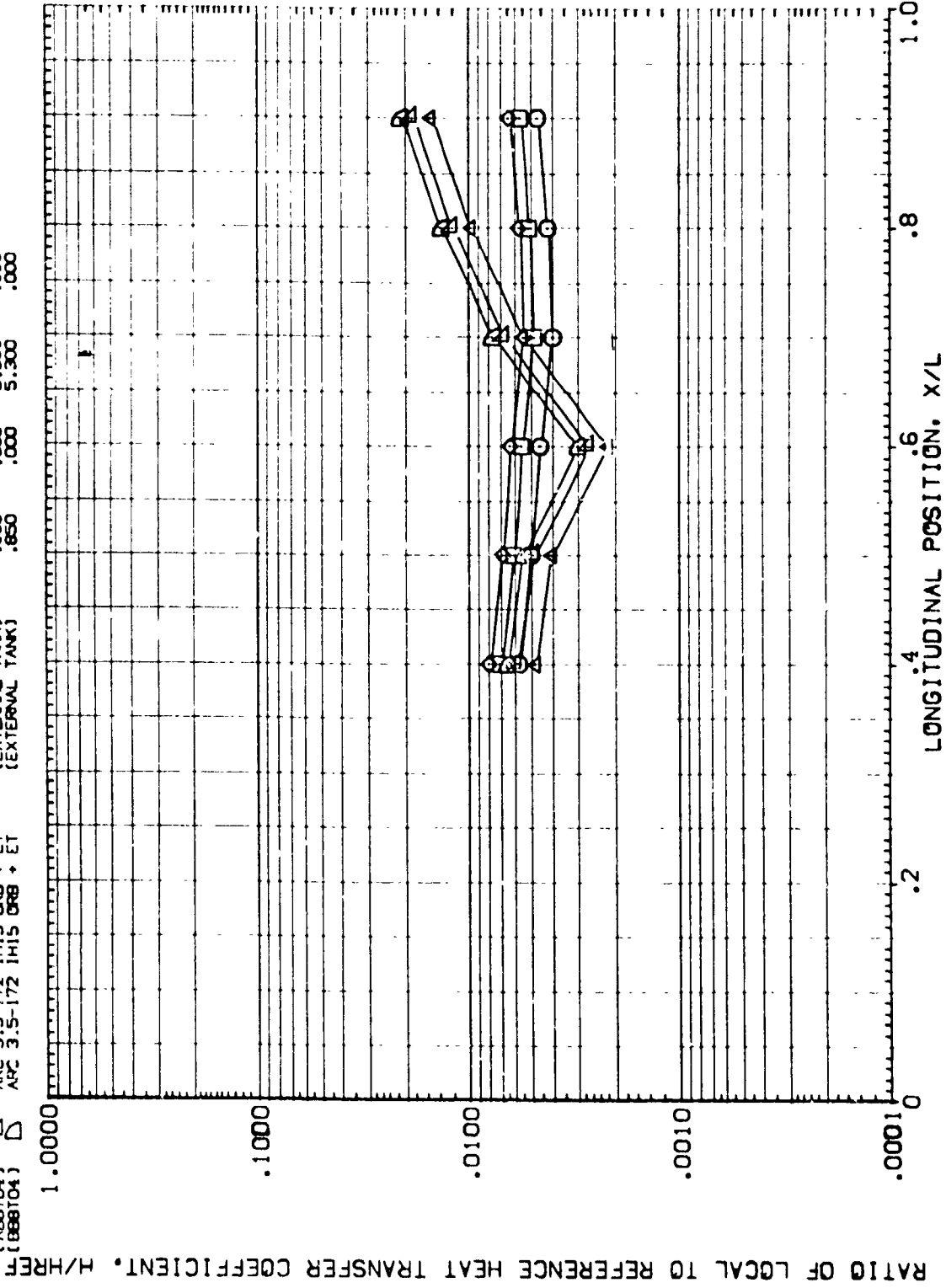


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 45.000

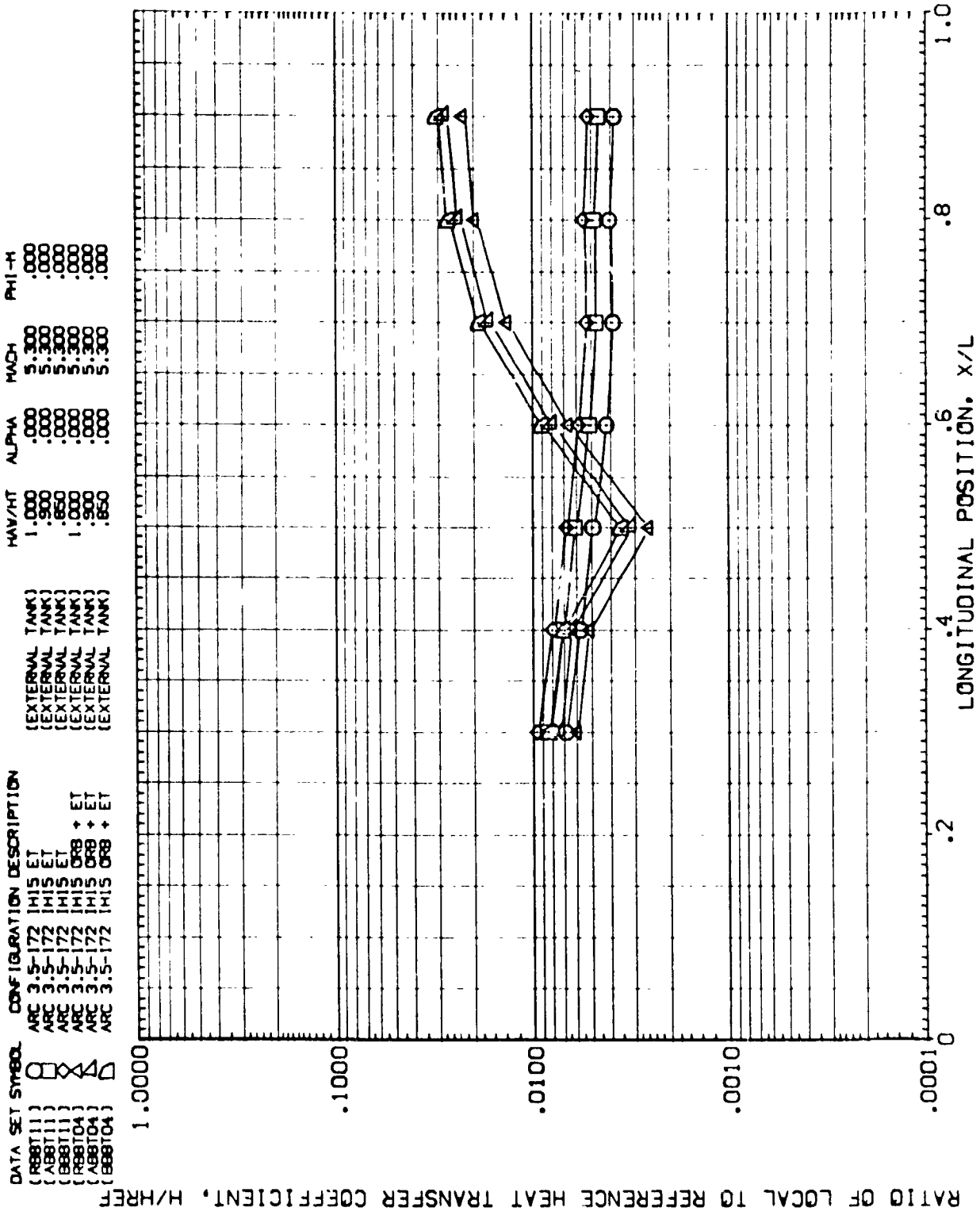


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 67.500

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RB8T11)	ARC 3.5-172 IH15 ET
(AB8T11)	ARC 3.5-172 IH15 ET
(RB8T11)	ARC 3.5-172 IH15 ET
(RB8T04)	ARC 3.5-172 IH15 DRB + ET
(AB8T04)	ARC 3.5-172 IH15 DRB + ET
(BB8T04)	ARC 3.5-172 IH15 DRB + ET

HAU/HT ALPHA MACH PHI-H

1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000
1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000

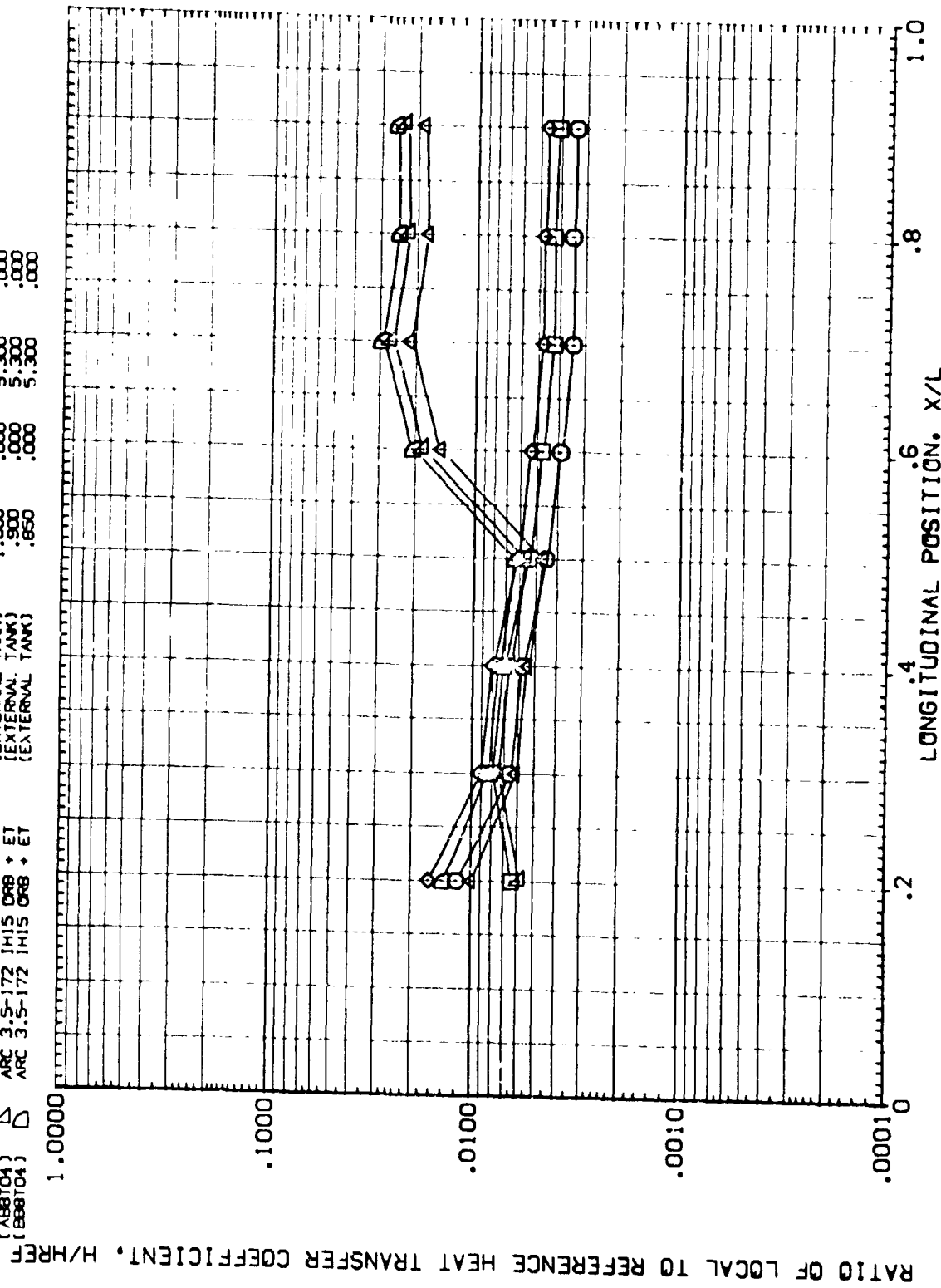


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 90.000 PAGE 12



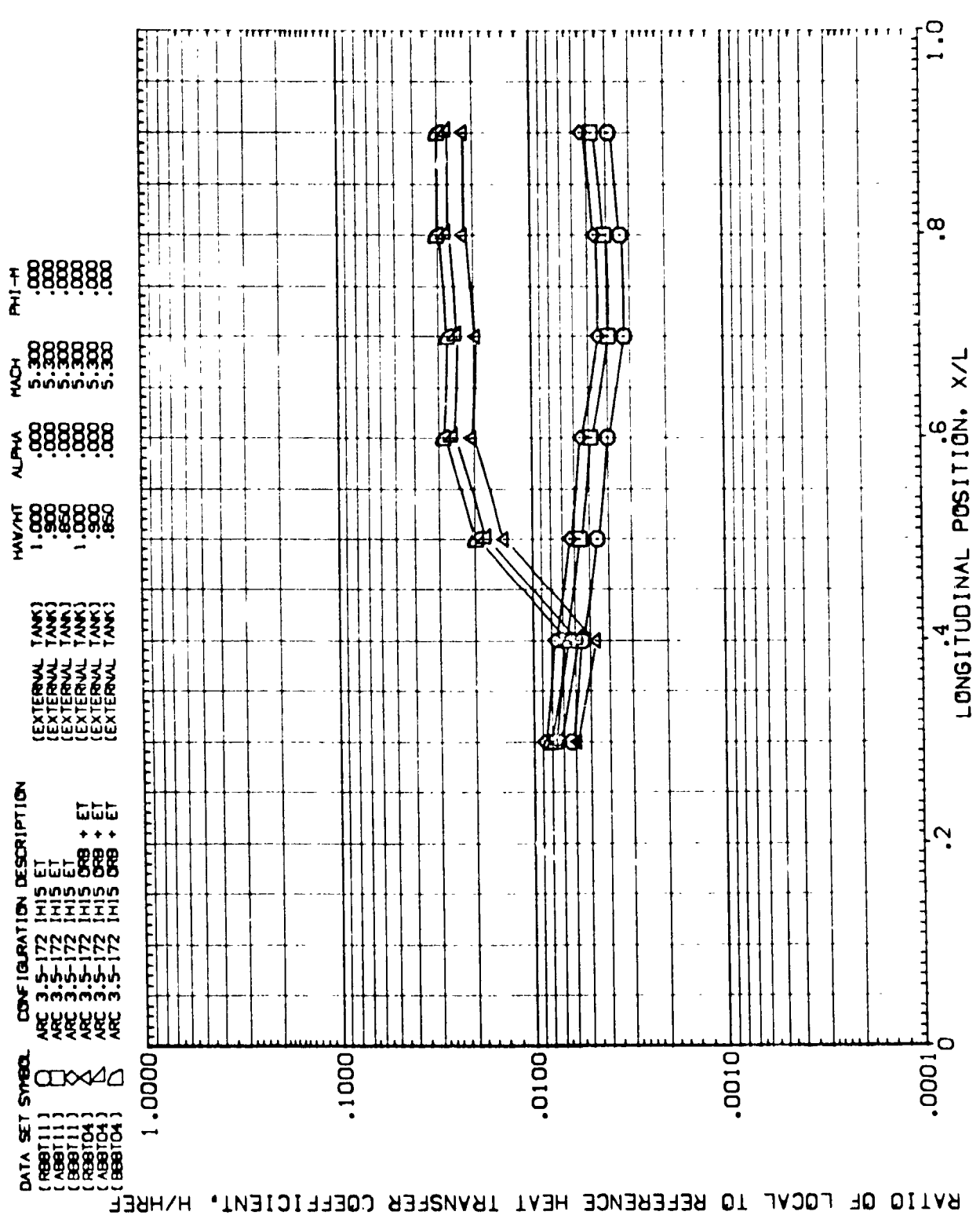


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RB8T11) ARC 3.5-172 IHIS ET

(AB8T11) ARC 3.5-172 IHIS ET

(BB8T11) ARC 3.5-172 IHIS ET

(RB8T04) ARC 3.5-172 IHIS ORB + ET

(AB8T04) ARC 3.5-172 IHIS ORB + ET

(BB8T04) ARC 3.5-172 IHIS ORB + ET

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

HAW/HT ALPHA MACH PHI-H

1.000 .000 5.300 .000

.900 .000 5.300 .000

.850 .000 5.300 .000

1.000 .000 5.300 .000

.850 .000 5.300 .000

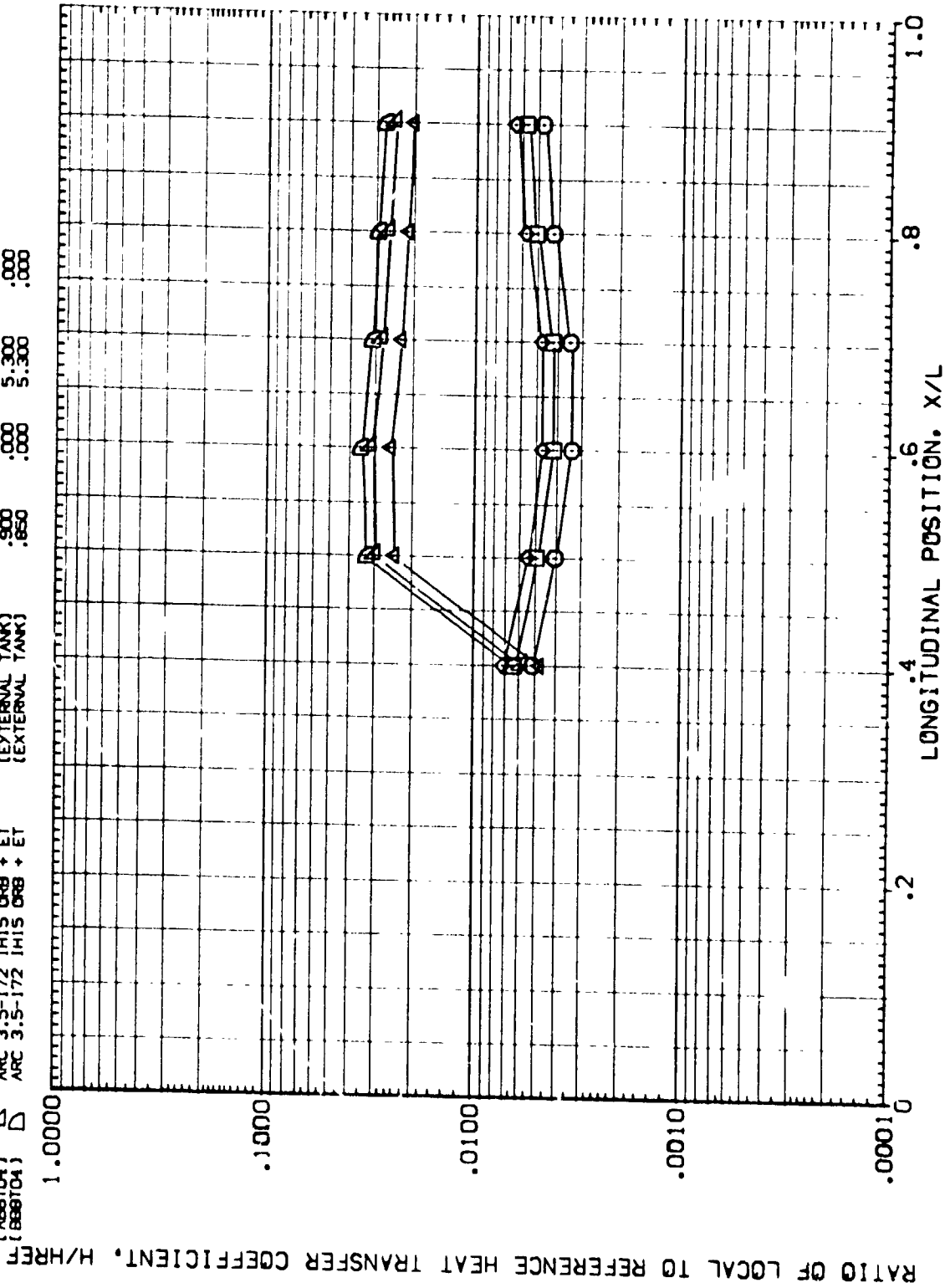


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 135.000

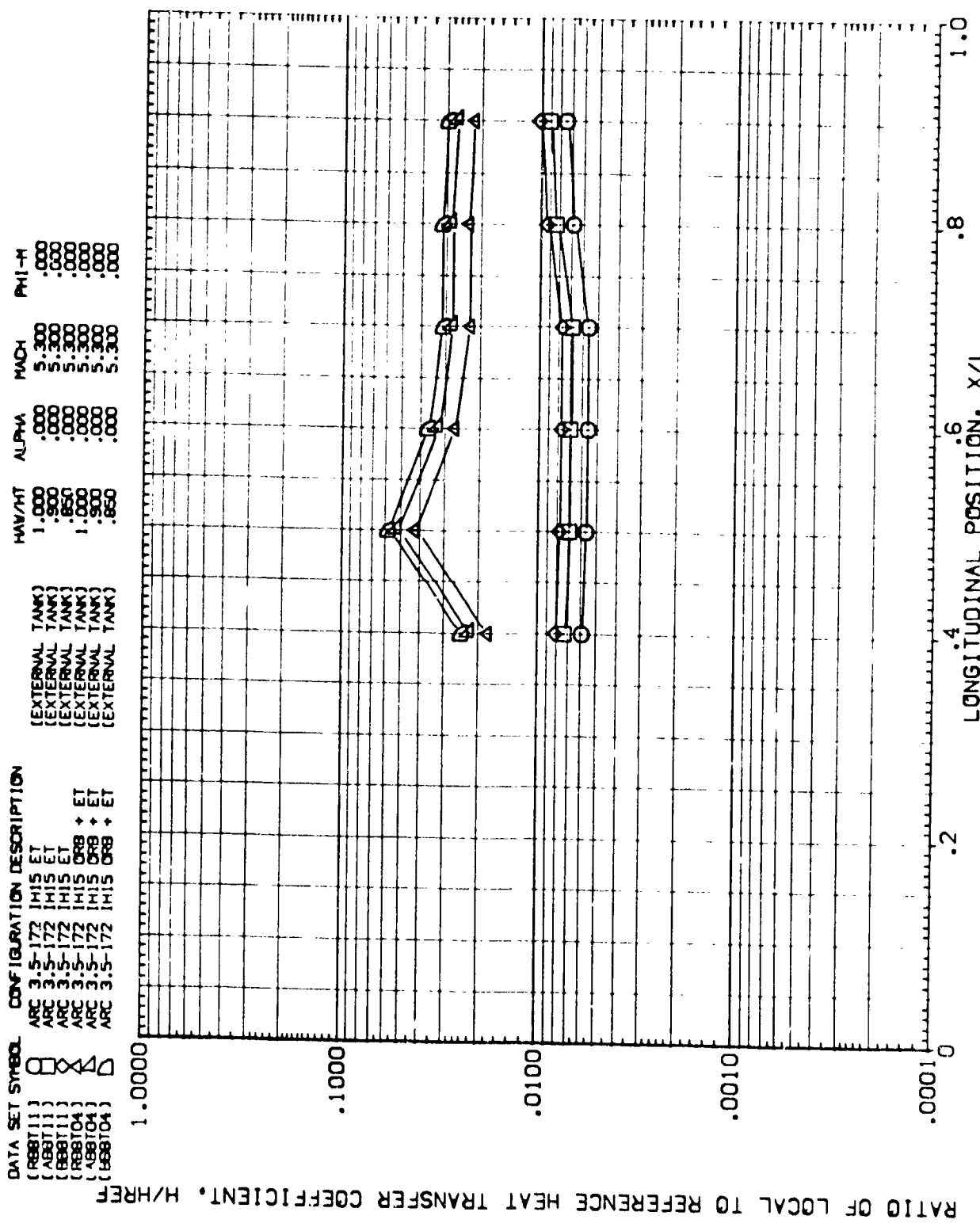


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 157.500

DATA SET SYMBOL
 (R88T11)
 (A88T11)
 (S88T11)
 (R88T04)
 (A88T04)
 (S88T04)

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ET
 ARC 3.5-172 IH15 ET
 ARC 3.5-172 IH15 ET
 ARC 3.5-172 IH15 DR8 + ET
 ARC 3.5-172 IH15 DR8 + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

MACH ALPHA MACH PHI-M
 5.300 .000 5.300 .000
 5.300 .000 5.300 .000
 5.300 .000 5.300 .000
 5.300 .000 5.300 .000

MACH ALPHA
 1.000 .000
 .650 .000
 1.000 .000
 .650 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

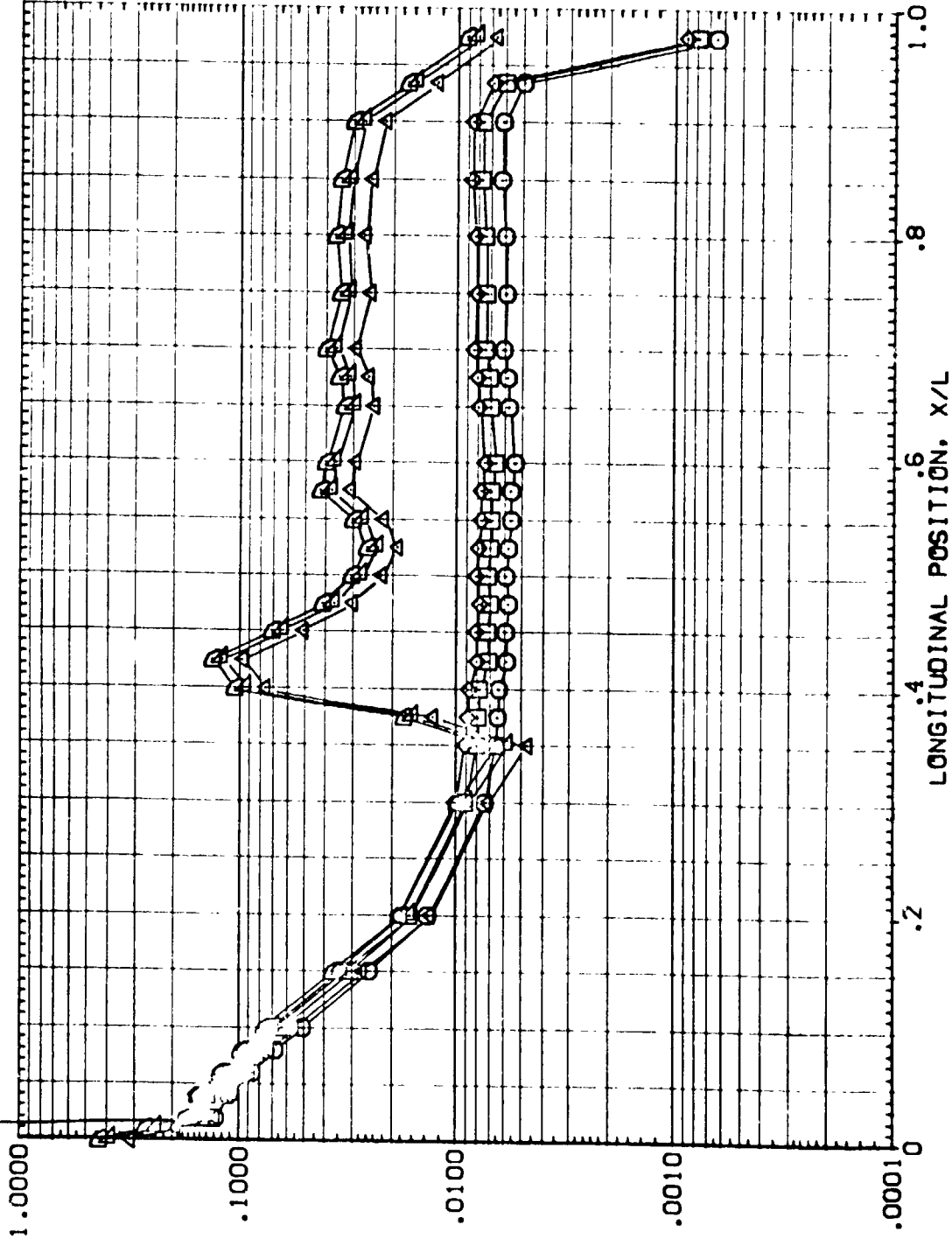


FIG. 4 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 180.000



DATA SET SYMBOL CONFIGURATION DESCRIPTION (EXTERNAL TANK) MACH ALPHA PHI-H

(DBBIT04) ARC 3.5-172 IH15 ORB + ET (EXTERNAL TANK) 5.300 .000 .000

(EBBIT04) ARC 3.5-172 IH15 ORB + ET (EXTERNAL TANK) 5.300 .000 .000

(FBBIT04) ARC 3.5-172 IH15 ORB + ET (EXTERNAL TANK) 5.300 .000 .000

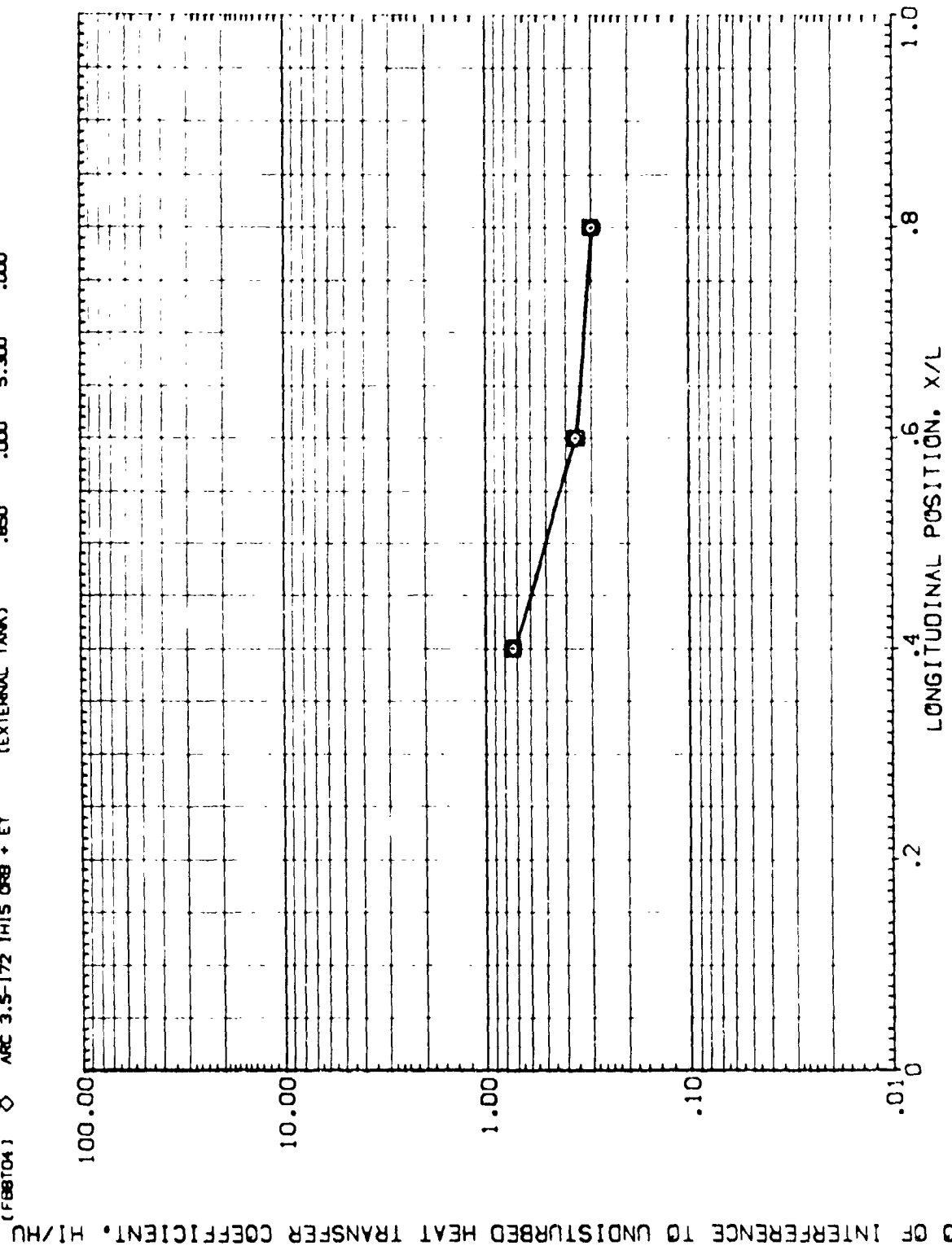


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

GRN/L = 4.781 MACH = 5.300 PHI = .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DB8T04) ○ ARC 3.5-172 IH15 ORB + ET
 (EF3T04) ○ ARC 3.5-172 IH15 ORB + ET
 (F8T04) ○ ARC 3.5-172 IH15 ORB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

MAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .650 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

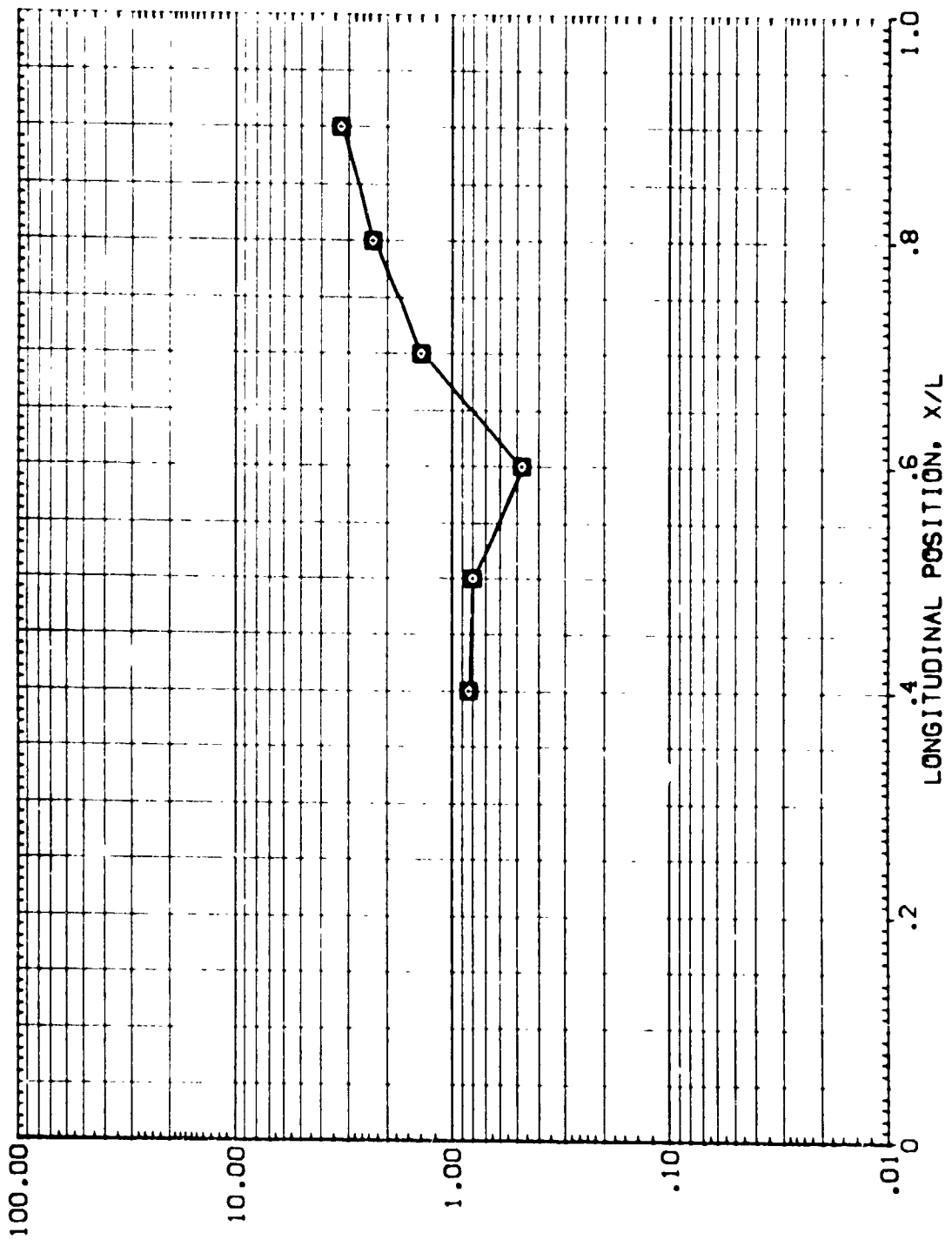


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 GRN/L = 4.781 MACH = 5.300 PHI = 45.000 PAGE 18



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DBBTO4)  ARC 3.5-172 IHIS DRB + ET
 (EBBTO4)  ARC 3.5-172 IHIS DRB + ET
 (FBBTO4)  ARC 3.5-172 IHIS DRB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

MAV/HT 1.000
 .850

ALPHA .000
 .000
 .000

MACH 5.300
 5.300
 5.300

PHI-H .000
 .000
 .000

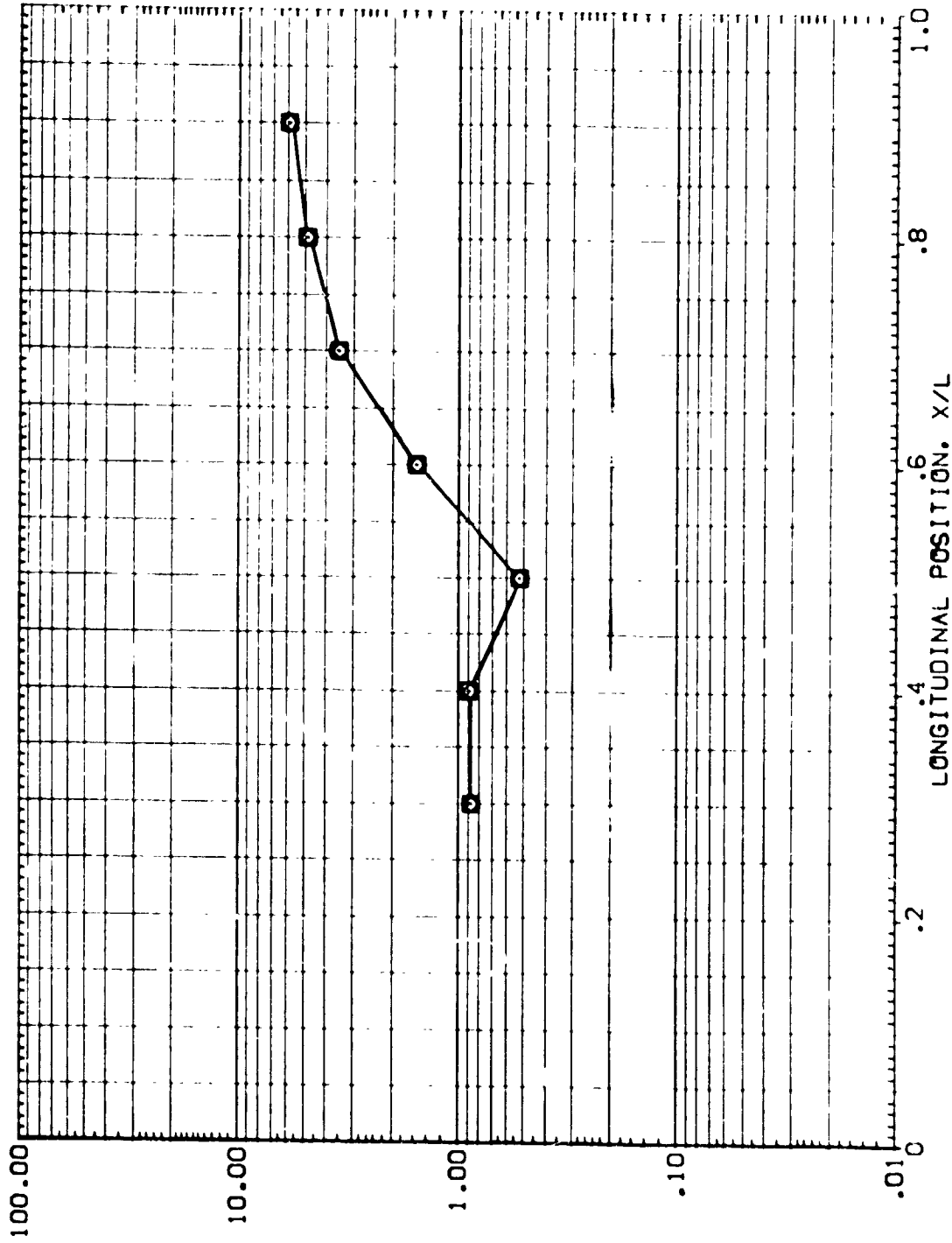


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., EXTERNAL TANK.
 ORN/L = 4.78; MACH = 5.300 PHI = 67.500

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (OBB104) ARC 3.5-172 IM15 ORB + ET
 (EBB104) ARC 3.5-172 IM15 ORB + ET
 (FBB104) ARC 3.5-172 IM15 ORB + ET

MAV/AT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .850 .000 5.300 .000

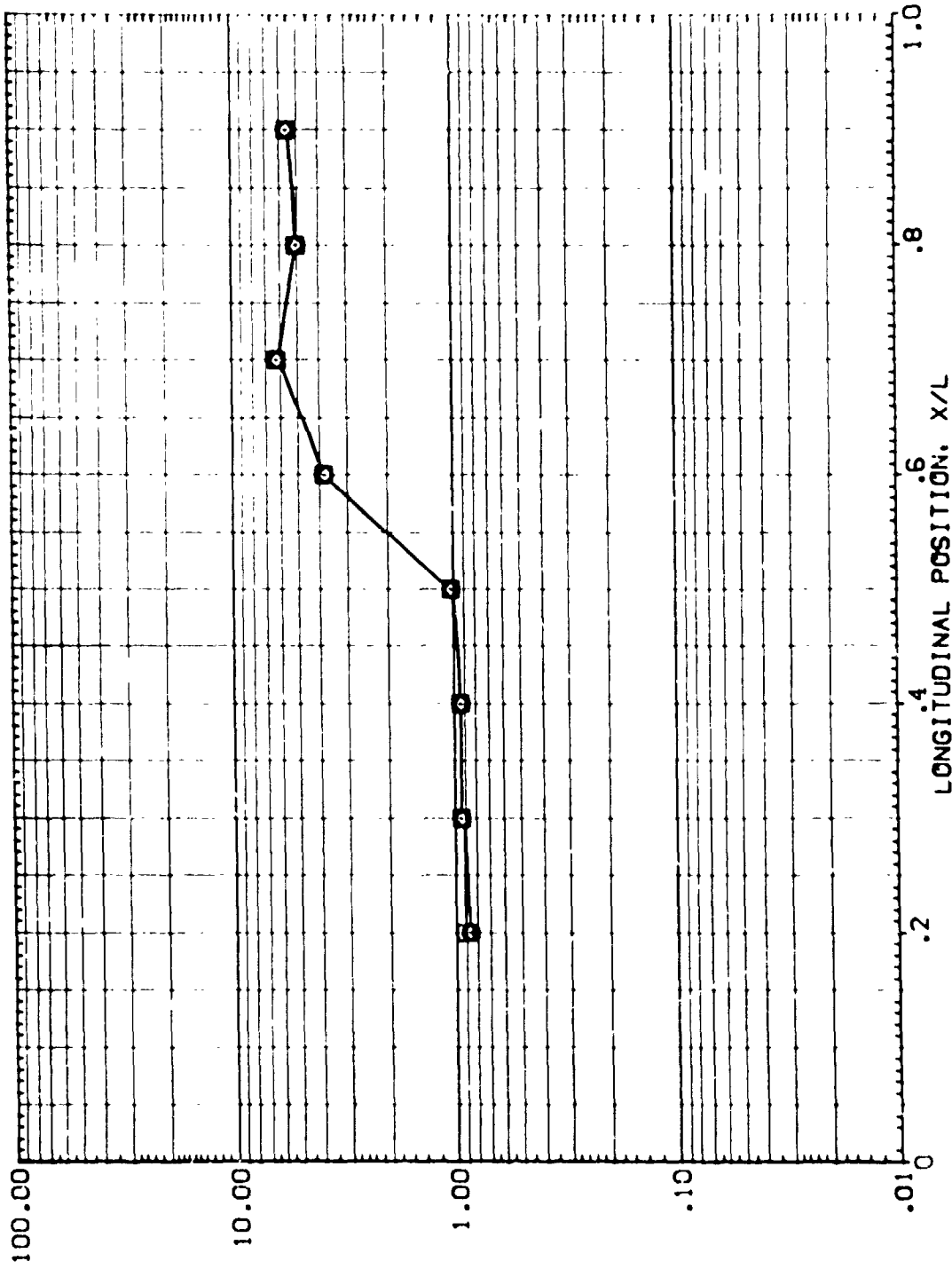


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 CTRW/L = 4.781 MACH = 5.300 PHI = 90.000 PAGE 20



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (EBB104) ARC 3-5-172 1415 ORB + ET
 (FBB104) ARC 3-5-172 1415 ORB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

HA/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .650 .000 5.300 .000

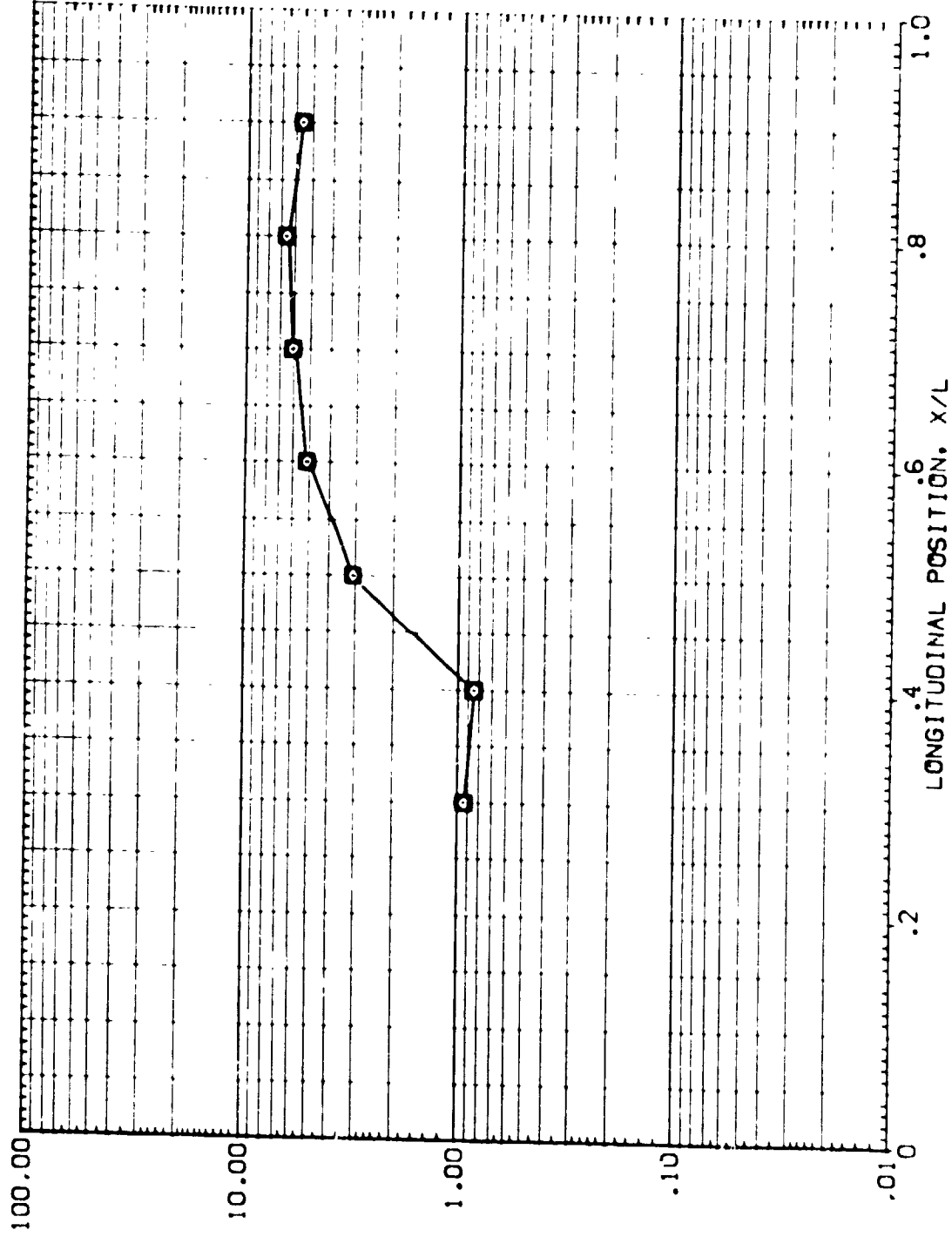


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF. EXTERNAL TANK.

GRN/L = 4.78; MACH = 5.300 PHI = 112.500

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DBB104) ARC 3.5-172 IM15 ORB + ET
 (EBB104) ARC 3.5-172 IM15 ORB + ET
 (FBB104) ARC 3.5-172 IM15 ORB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

NAV/HT ALPHA MACH PH1-H
 1.000 .000 5.300 .000
 .800 .000 5.300 .000
 .600 .000 5.300 .000

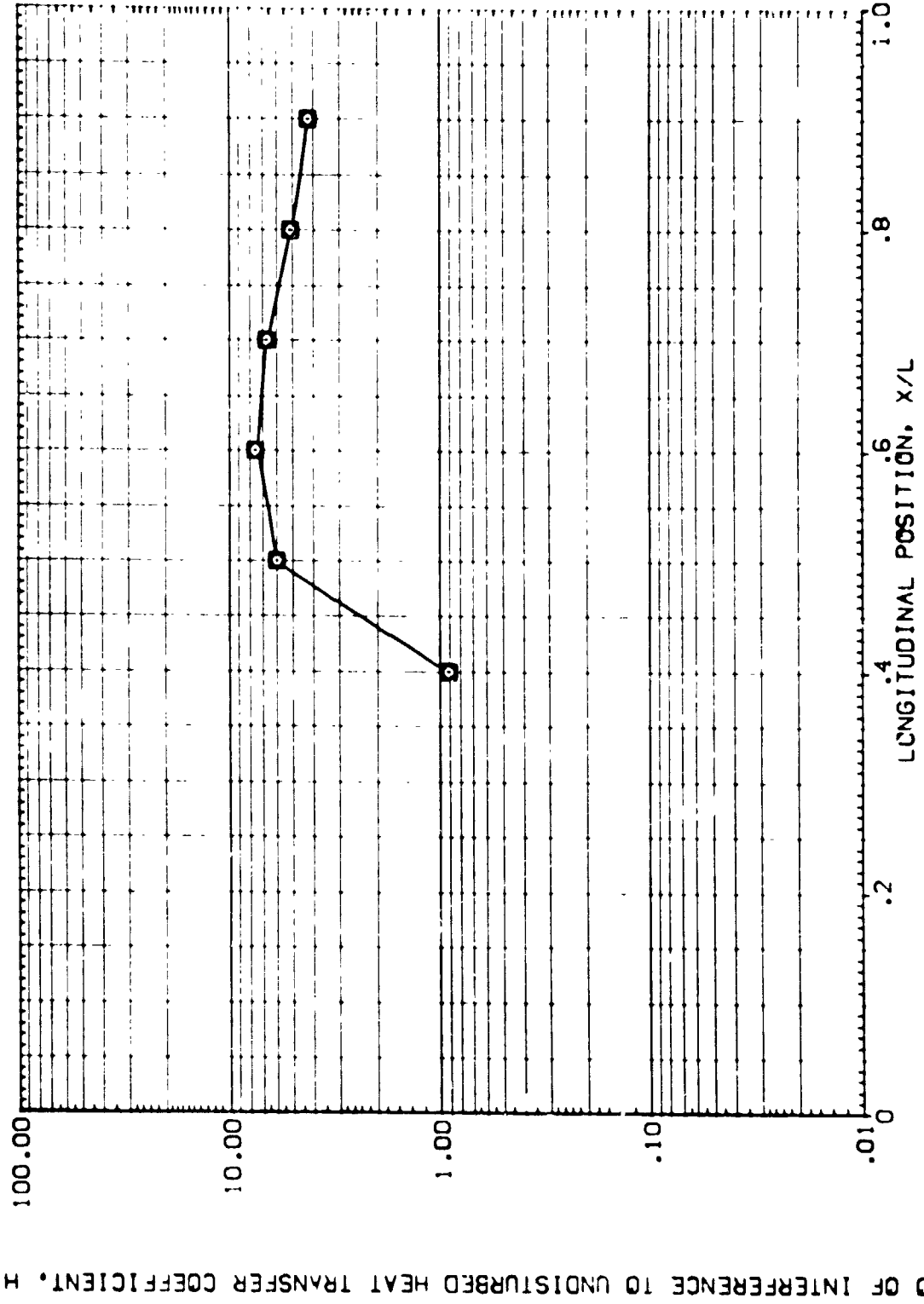


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., EXTERNAL TANK.
 ORN/L = 4.781 MACH = 5.300 PH1 = 135.000 PAGE 22



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DBB104) ARC 3.5-172 IH'S CRB + ET
 (EBB104) ARC 3.5-172 IH'S CRB + ET
 (FBB104) ARC 3.5-172 IH'S CRB + ET

(EXT. RNAL TANK)
 (E. RNAL TANK)
 (E. RNAL TANK)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

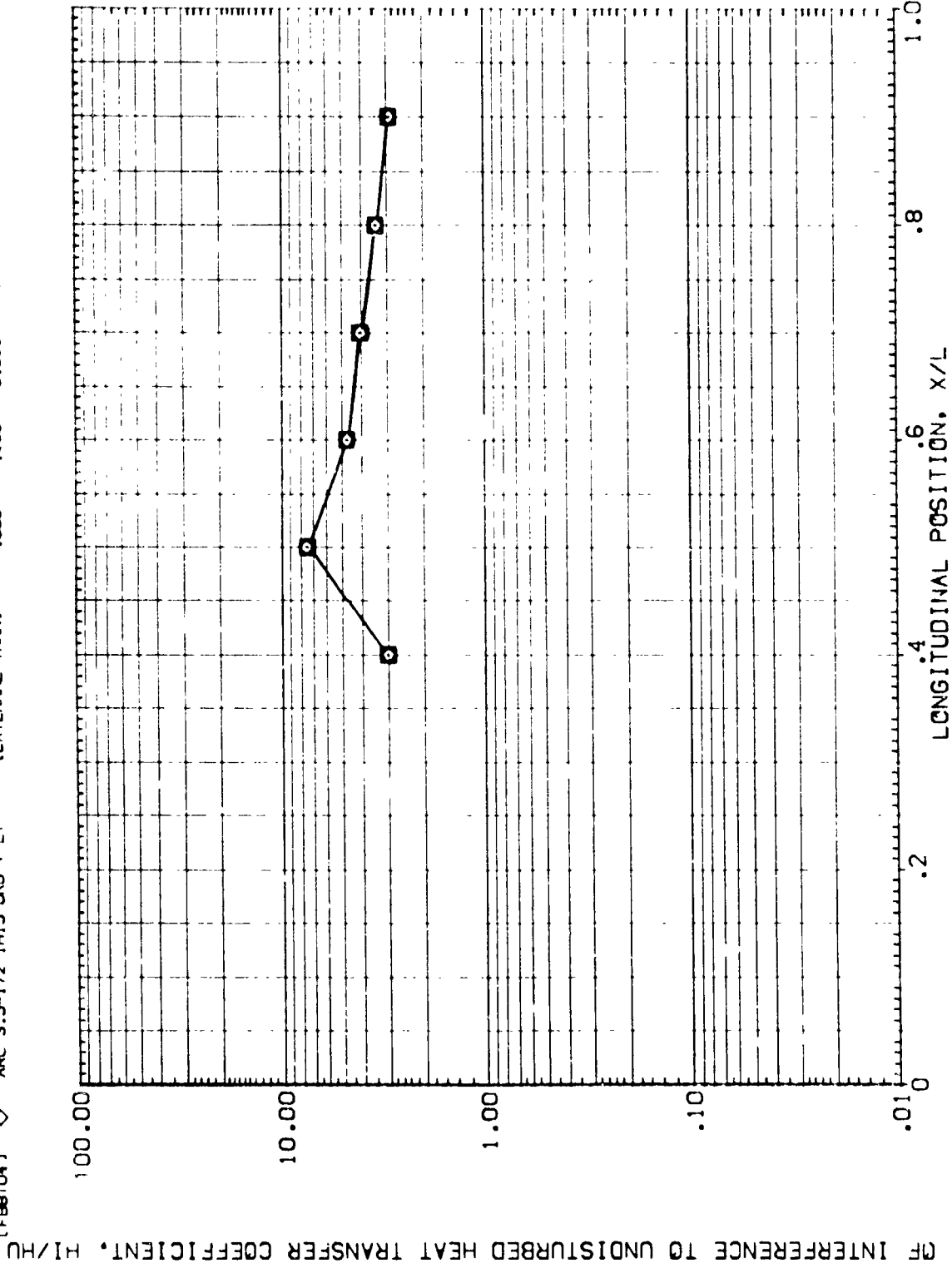


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 CRN/L = 4.781 MACH = 5.300 PHI = 157.500 PAGE 23

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (088704) ARC 3.5-172 IHIS ORB + ET
 (E88704) ARC 3.5-172 IHIS ORB + ET
 (F88704) ARC 3.5-172 IHIS ORB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

MACH 5.300
 5.300
 5.300

PHI-M .000
 .000
 .000

MAV/HT 1.000
 .900
 .850

ALPHA .000
 .000
 .000

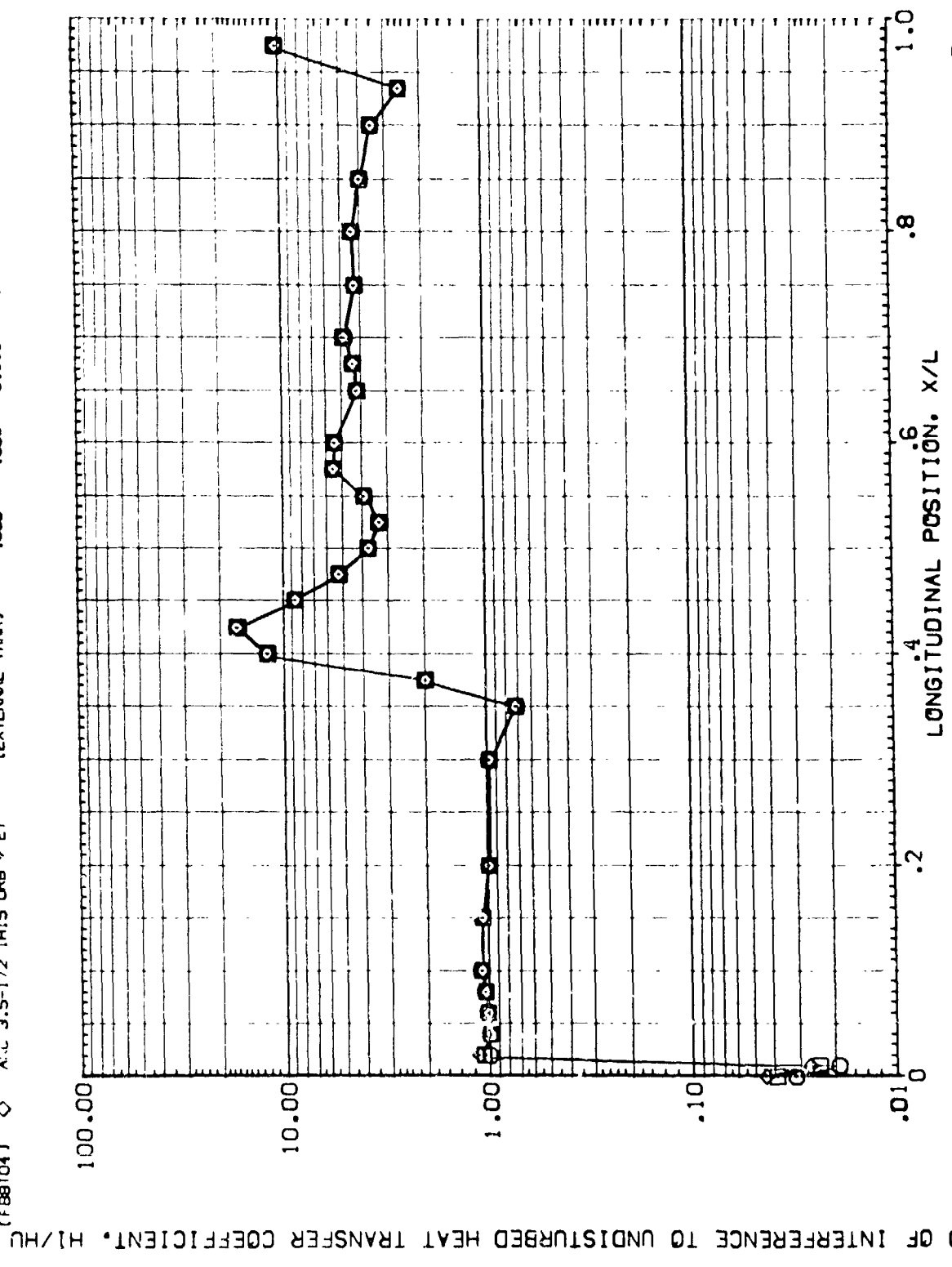


FIG. 5 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., EXTERNAL TANK.
 ORN/L = 4.781 MACH = 5.300 PHI = 180.000



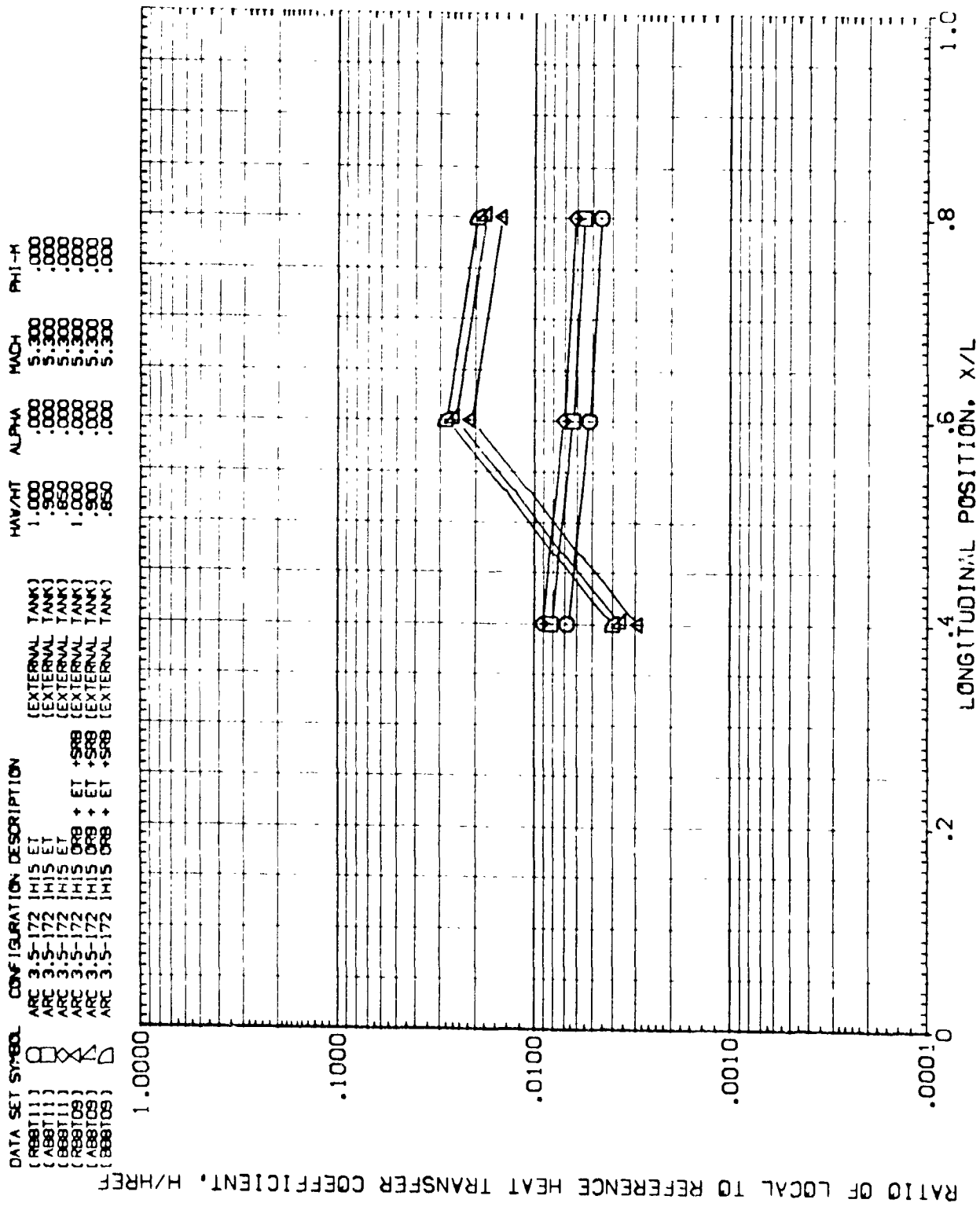


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HA/HT	ALPHA	MACH	PHI-M
(R88T11)	ARC 3.5-172 IHIS ET	1.000	.000	5.300	.000
(A88T11)	ARC 3.5-172 IHIS ET	.900	.000	5.300	.000
(B88T11)	ARC 3.5-172 IHIS ET	.850	.000	5.300	.000
(R88T09)	ARC 3.5-172 IHIS ORB + ET +SRB	1.000	.000	5.300	.000
(A88T09)	ARC 3.5-172 IHIS ORB + ET +SRB	.900	.000	5.300	.000
(B88T09)	ARC 3.5-172 IHIS ORB + ET +SRB	.850	.000	5.300	.000

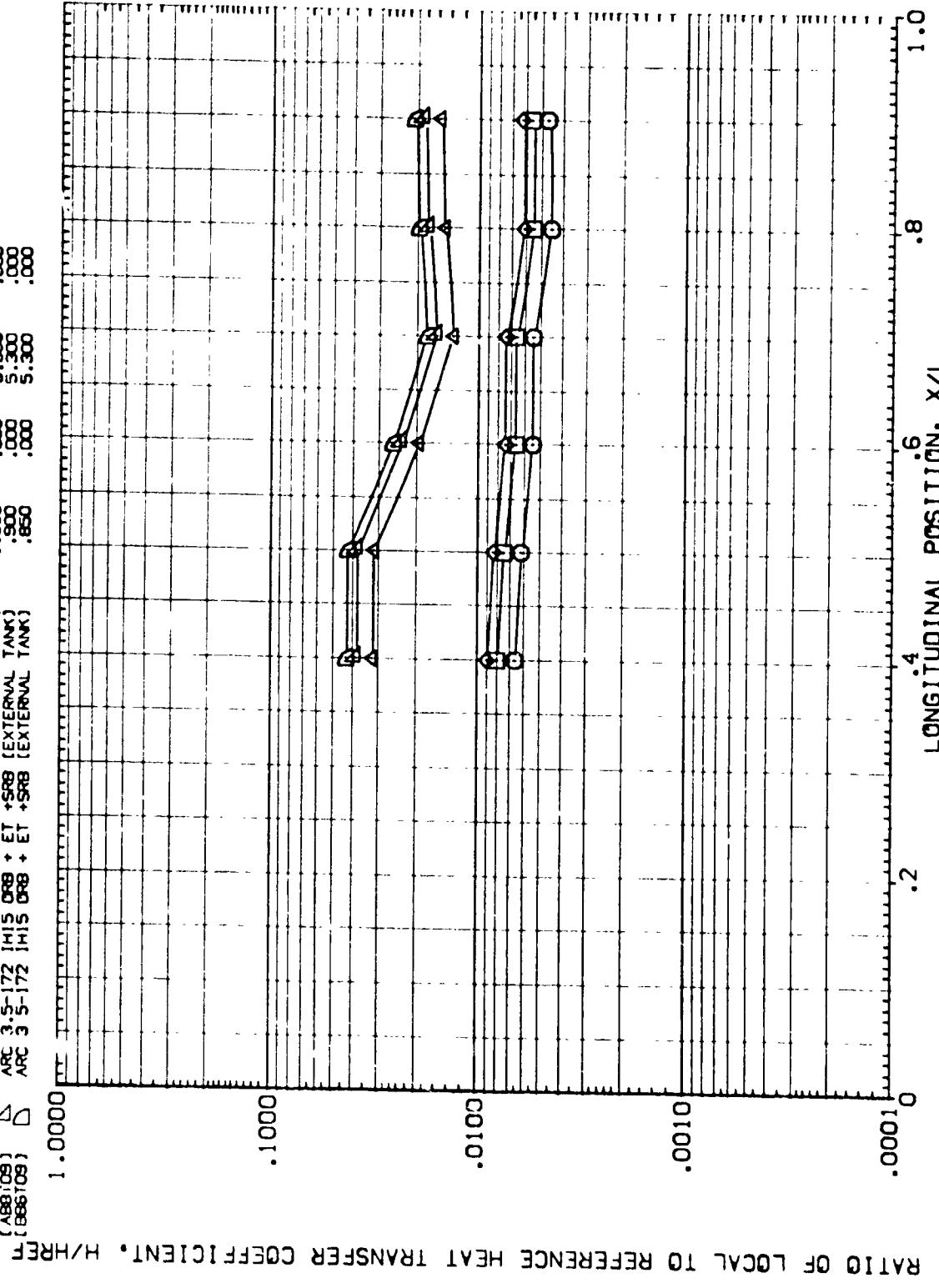


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 45.000 PAGE 26



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R88T11)	ARC 3.5-172	IM15	ET	(EXTERNAL TANK)	HAW/HT	ALPHA	MACH	PHI-H
(A88T11)	ARC 3.5-172	IM15	ET	(EXTERNAL TANK)	1.000	.000	5.300	.000
(B88T11)	ARC 3.5-172	IM15	ET	(EXTERNAL TANK)	.900	.000	5.300	.000
(R88T09)	ARC 3.5-172	IM15	ORB	ET +SRB	.850	.000	5.300	.000
(A88T09)	ARC 3.5-172	IM15	ORB	ET +SRB	1.000	.000	5.300	.000
(B88T09)	ARC 3.5-172	IM15	ORB	ET +SRB	.900	.000	5.300	.000
(R88T08)	ARC 3.5-172	IM15	ORB	ET +SRB	.850	.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

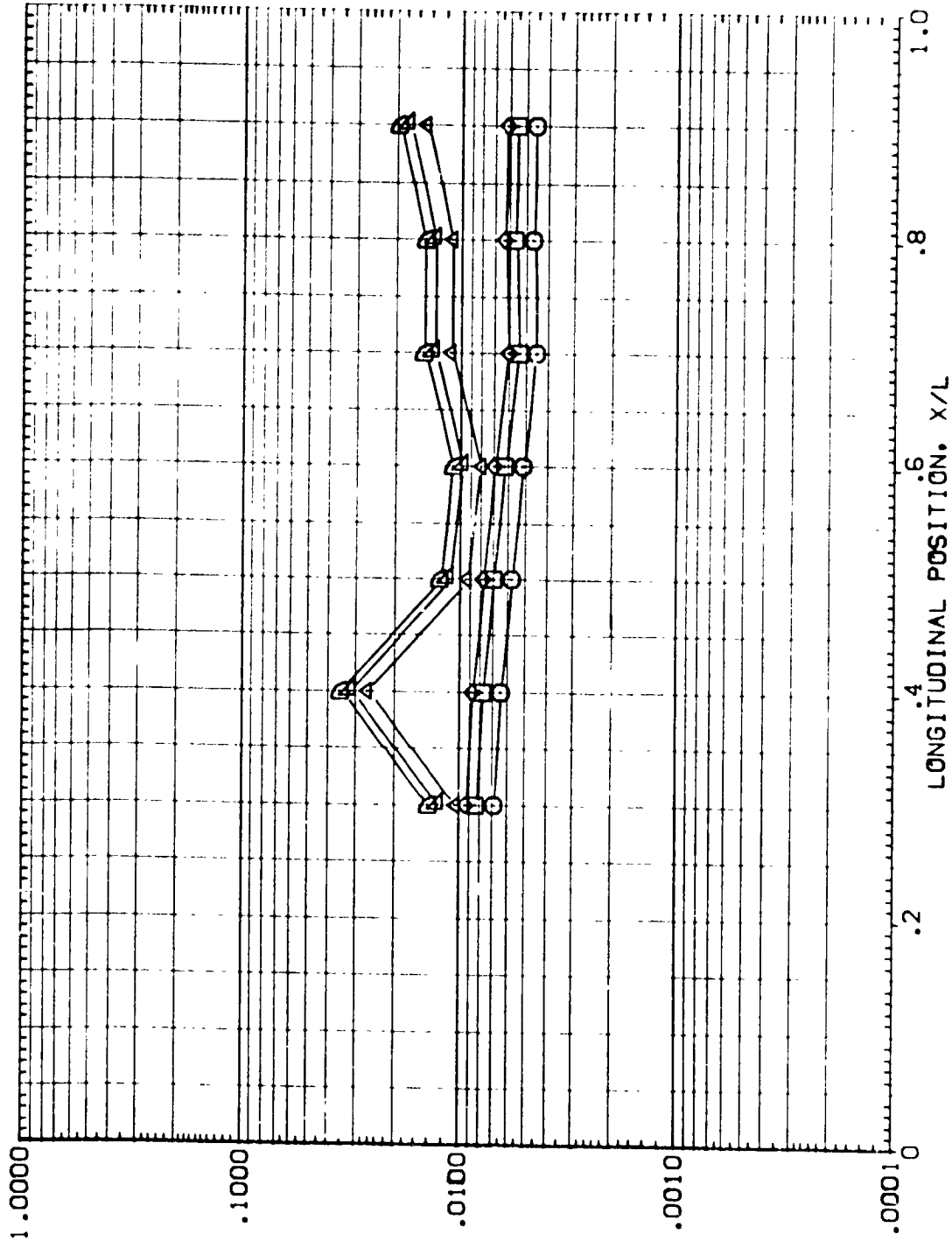


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 67.500

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(R88T11) ARC 3.5-172 IH15 ET 1.000 .000 5.300 .000

(A88T11) ARC 3.5-172 IH15 ET .850 .000 5.300 .000

(B88T11) ARC 3.5-172 IH15 ET 1.000 .000 5.300 .000

(R88T09) ARC 3.5-172 IH15 DRB + ET +S8B .900 .000 5.300 .000

(A88T09) ARC 3.5-172 IH15 DRB + ET +S8B .850 .000 5.300 .000

(S88T09) ARC 3.5-172 IH15 DRB + ET +S8B .850 .000 5.300 .000

(EXTERNAL TANK)
(EXTERNAL TANK)
(EXTERNAL TANK)
(EXTERNAL TANK)
(EXTERNAL TANK)

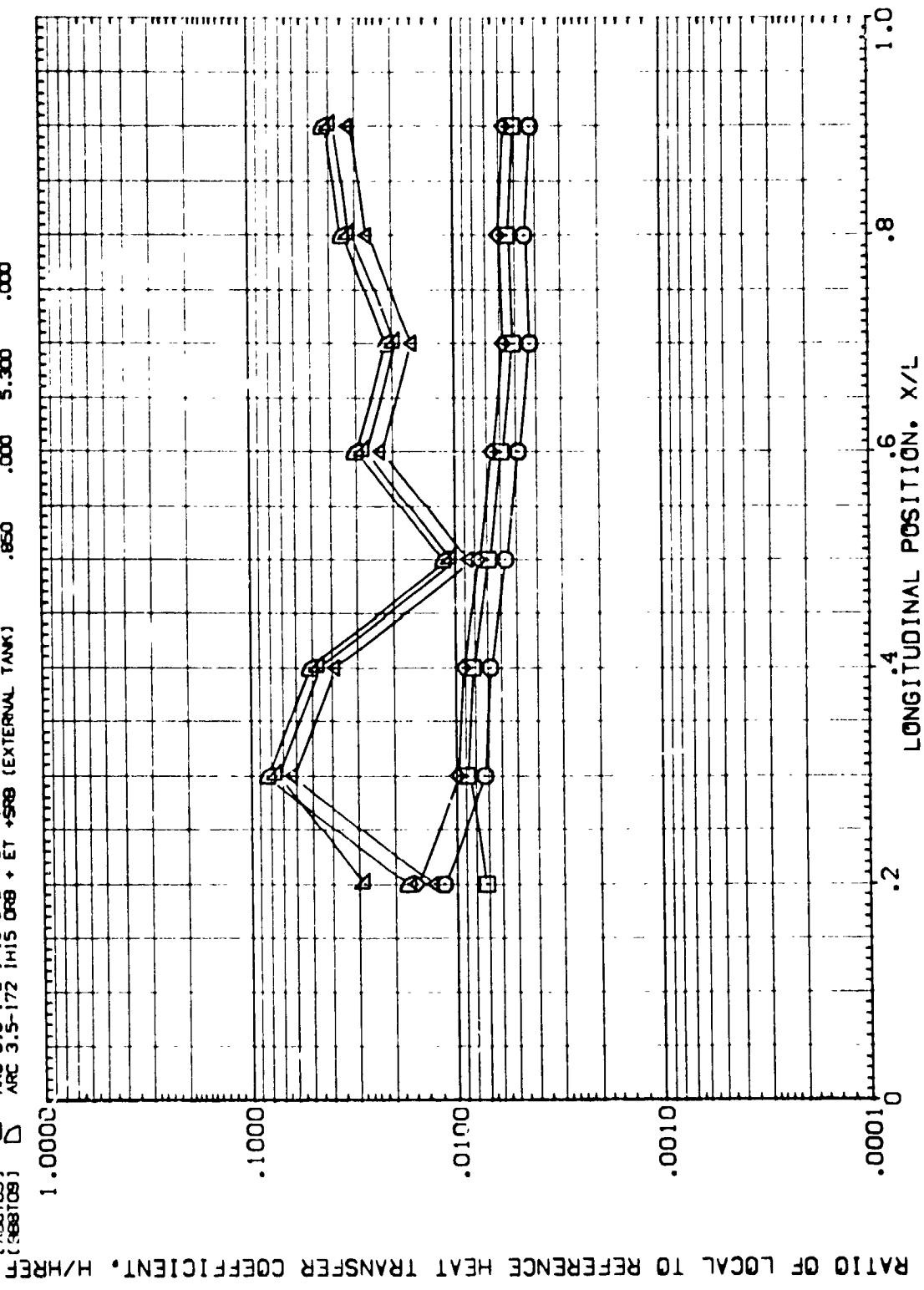


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

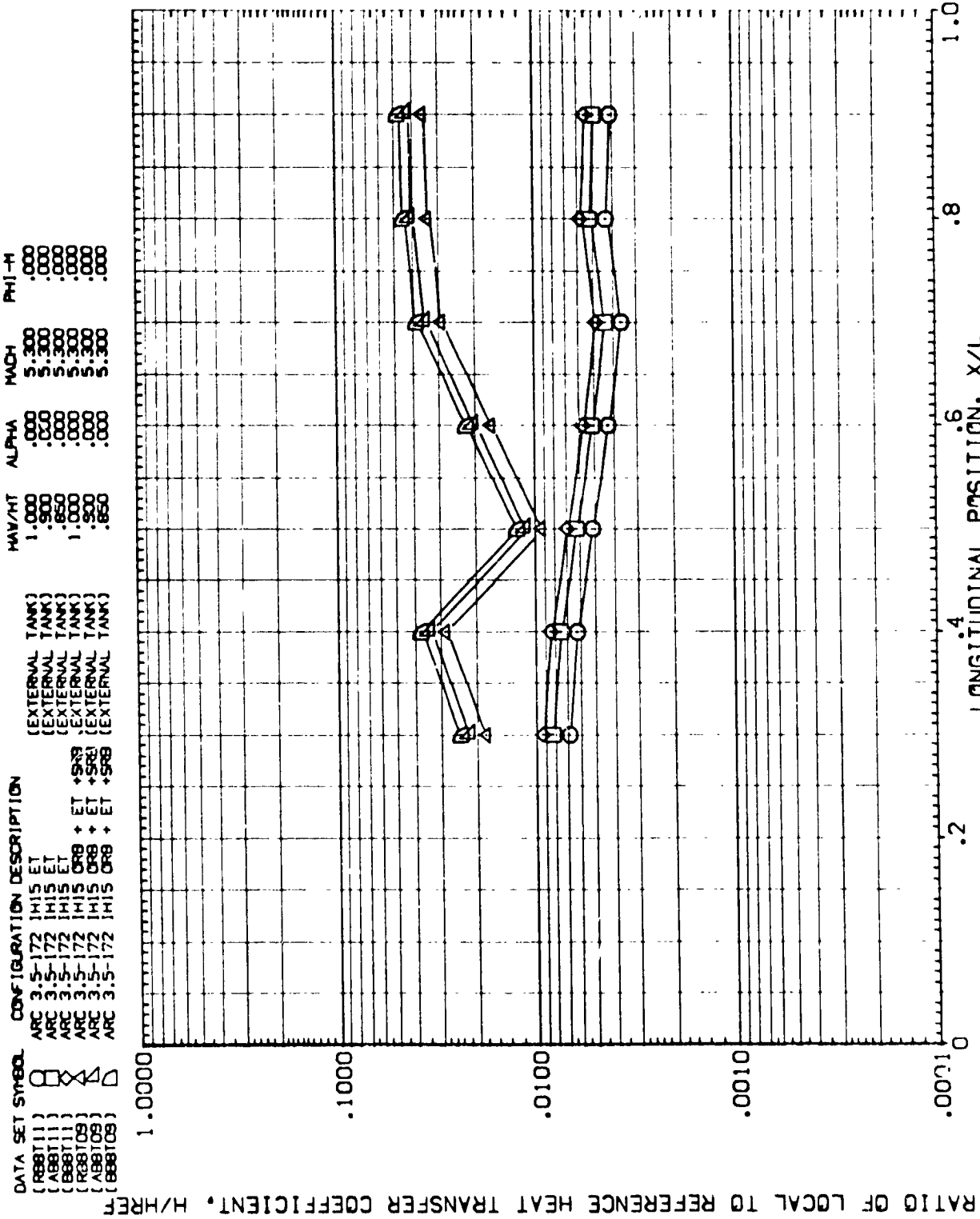


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R88T11)	ARC 3.5-172 IH15 ET
(A88T11)	ARC 3.5-172 IH15 ET
(B88T11)	ARC 3.5-172 IH15 ET
(R88T09)	ARC 3.5-172 IH15 DRB + ET +SRB
(A88T09)	ARC 3.5-172 IH15 DRB + ET +SRB
(B88T09)	ARC 3.5-172 IH15 DRB + ET +SRB

MAV/AT	ALPHA	MACH	PHI-H
1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000
1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

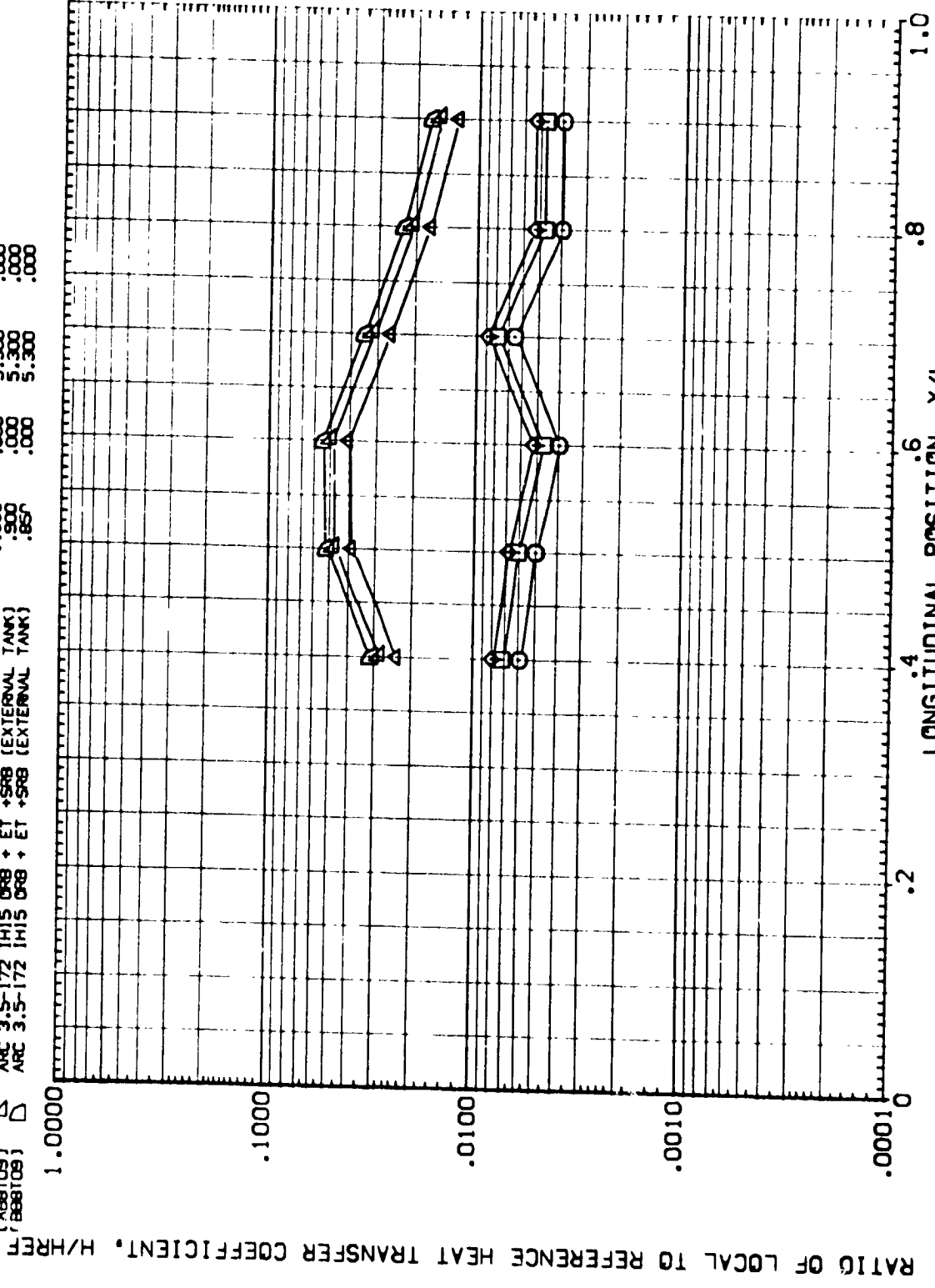


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 135.000

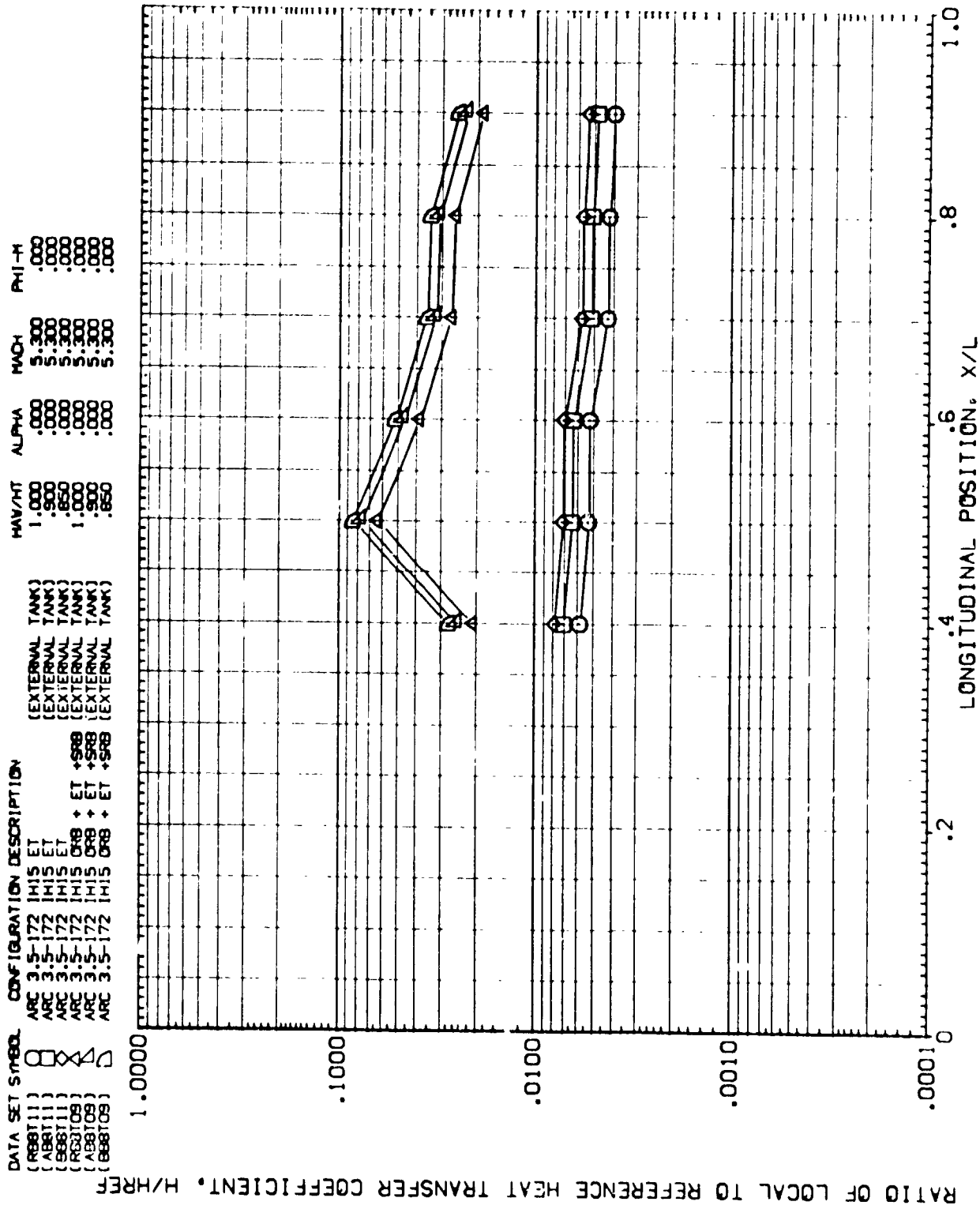


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.982 MACH = 5.300 PHI = 157.500

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/MT	ALPHA	MACH	PHI-M
(R88T11)	ARC 3.5-172 IH15 ET	1.000	.000	5.300	.000
(A88T11)	ARC 3.5-172 IH15 ET	.500	.000	5.300	.000
(B88T11)	ARC 3.5-172 IH15 ET	.850	.000	5.300	.000
(R88T09)	ARC 3.5-172 IH15 DR8 + ET +S19	1.000	.000	5.300	.000
(A88T09)	ARC 3.5-172 IH15 DR8 + ET +S19	.500	.000	5.300	.000
(B88T09)	ARC 3.5-172 IH15 DR8 + ET +S19	.850	.000	5.300	.000

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

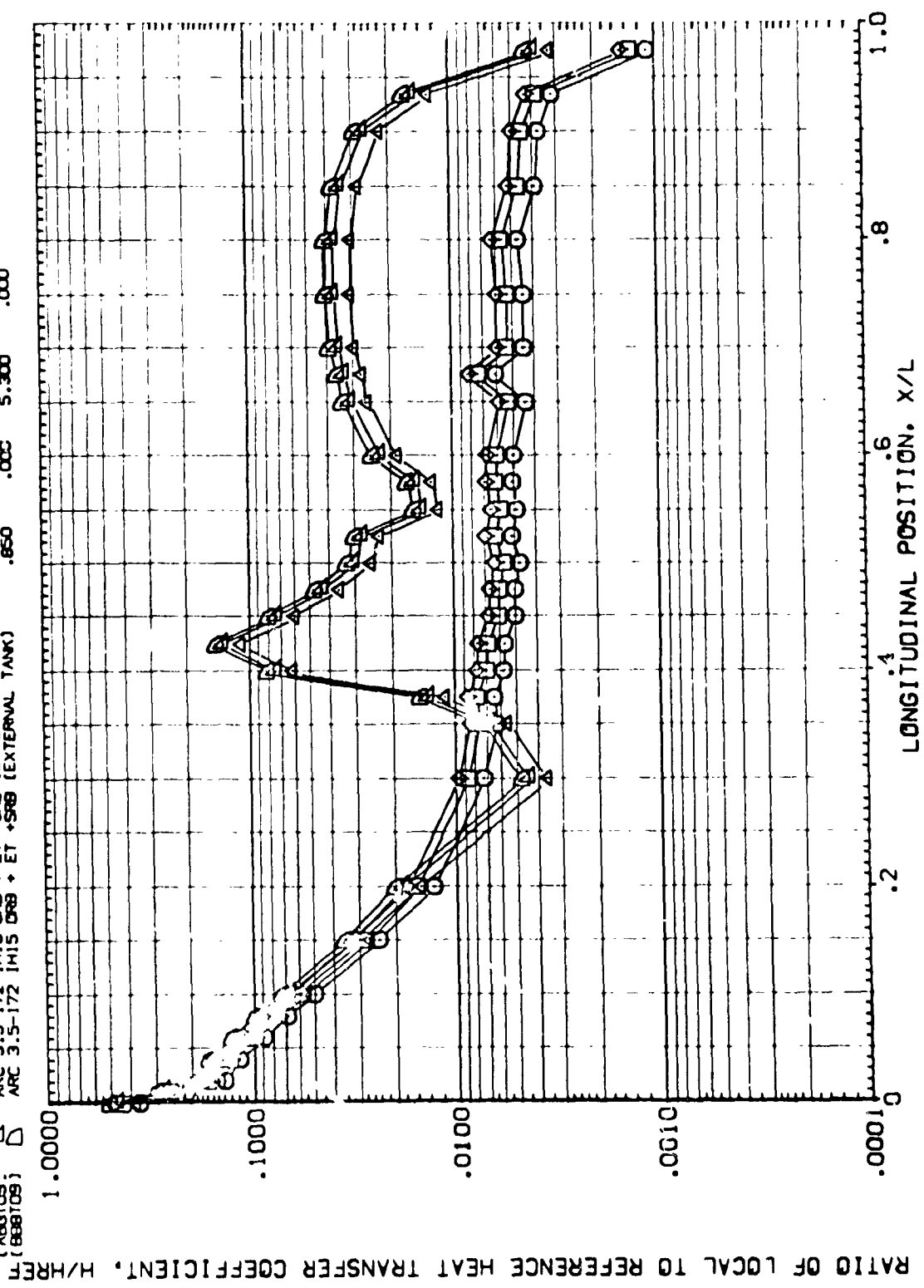


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

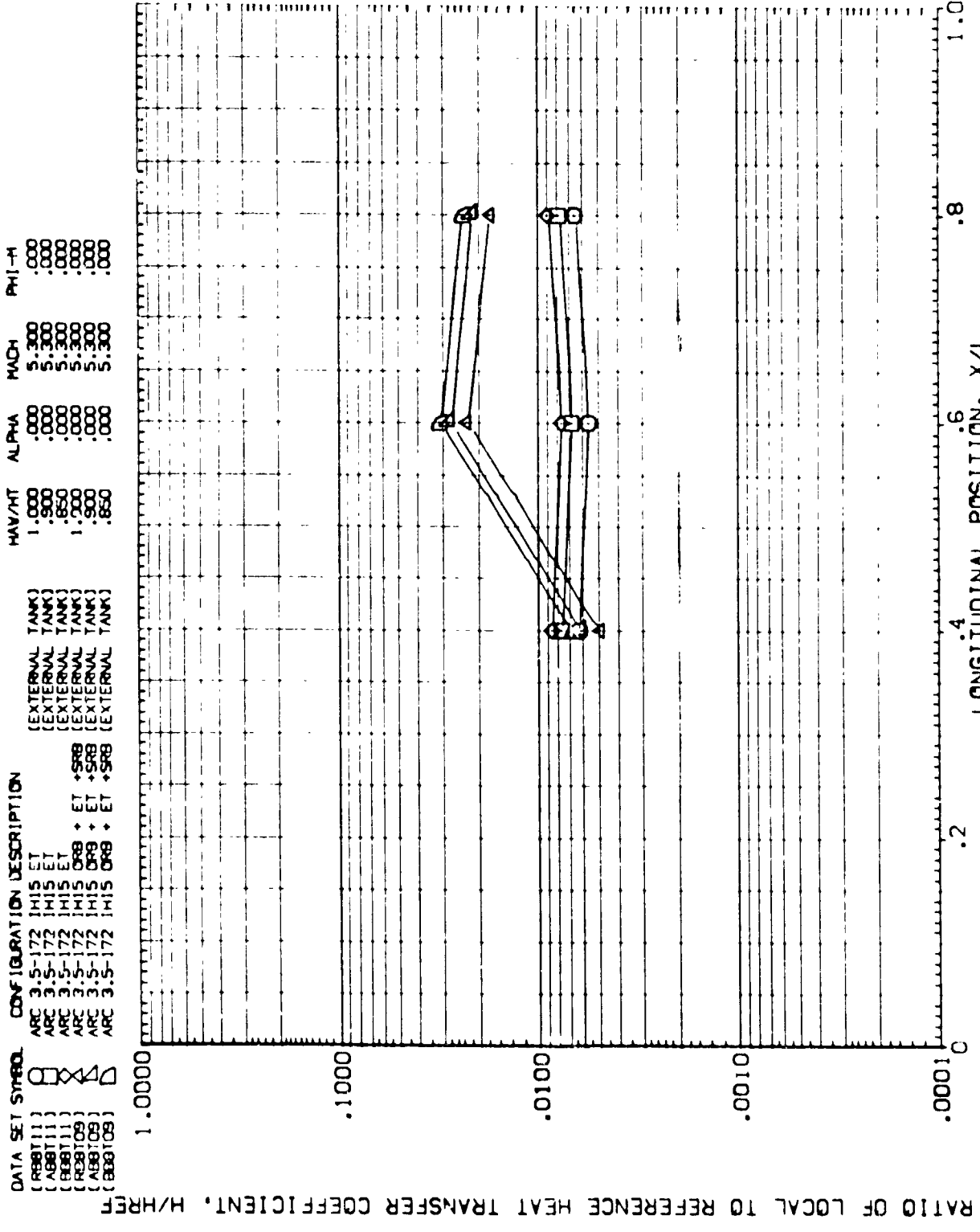


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	PHI-H
(R8B111)	ARC 3-5-172 IH15 ET	5.300	.000
(A8B111)	ARC 3-5-172 IH15 ET	5.300	.000
(R8B111)	ARC 3-5-172 IH15 ET	5.300	.000
(R8B109)	ARC 3-5-172 IH15 DRB + ET +SRB	5.300	.000
(A8B109)	ARC 3-5-172 IH15 DRB + ET +SRB	5.300	.000
(R8B109)	ARC 3-5-172 IH15 DRB + ET +SRB	5.300	.000

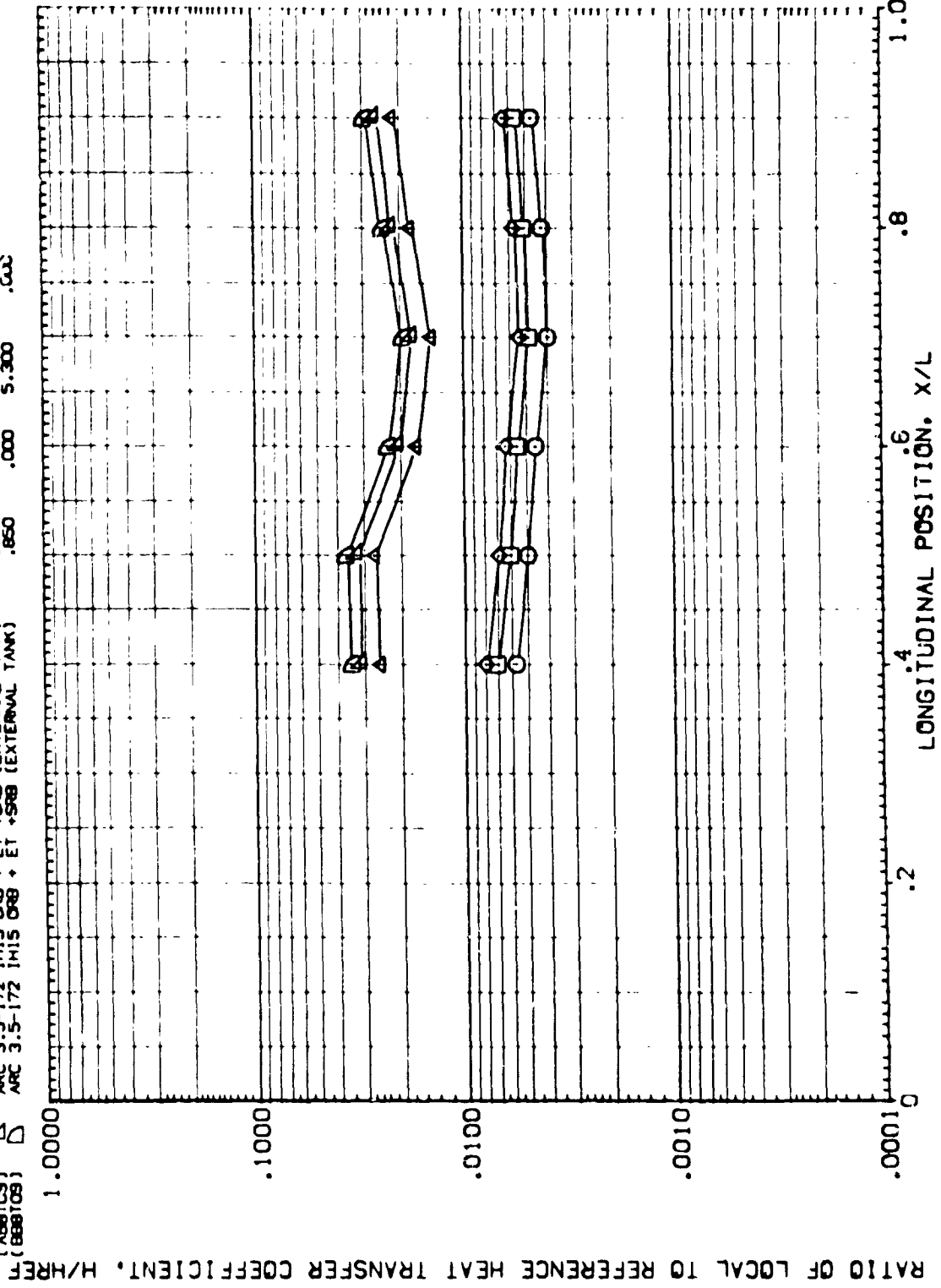


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

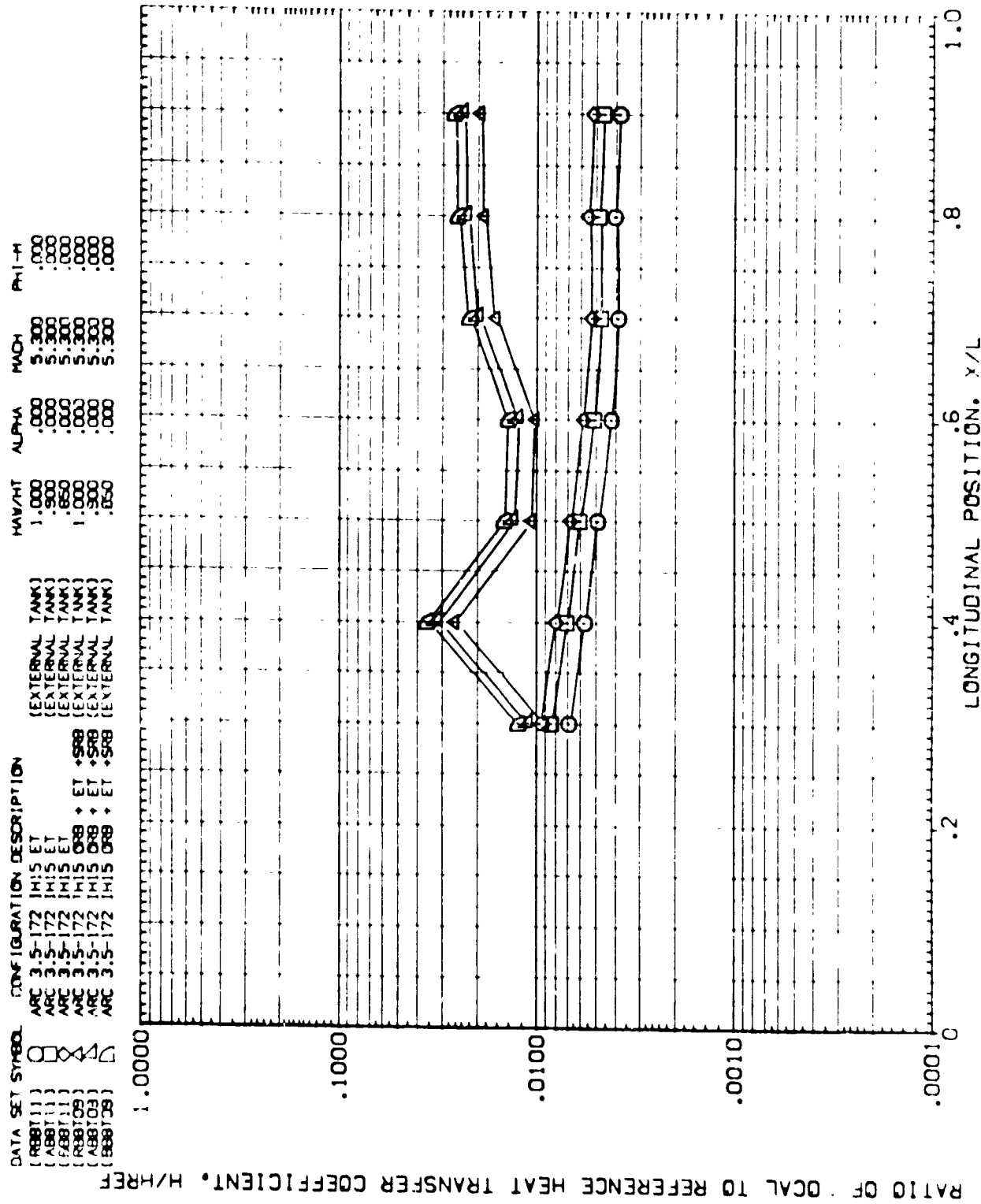


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R0BT11)	ARC 3.5-172	IM15 ET	(EXTERNAL TANK)
(A0BT11)	ARC 3.5-172	IM15 ET	(EXTERNAL TANK)
(R0BT08)	ARC 3.5-172	IM15 DRB + ET +SRB	(EXTERNAL TANK)
(A0BT08)	ARC 3.5-172	IM15 DRB + ET +SRB	(EXTERNAL TANK)

MACH	5.300
ALPHA	.000
MV/HT	1.000
MACH	5.300
ALPHA	.000
MV/HT	.850
MACH	5.300
ALPHA	.000
MV/HT	1.000
MACH	5.300
ALPHA	.000
MV/HT	.650

R/T10 OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

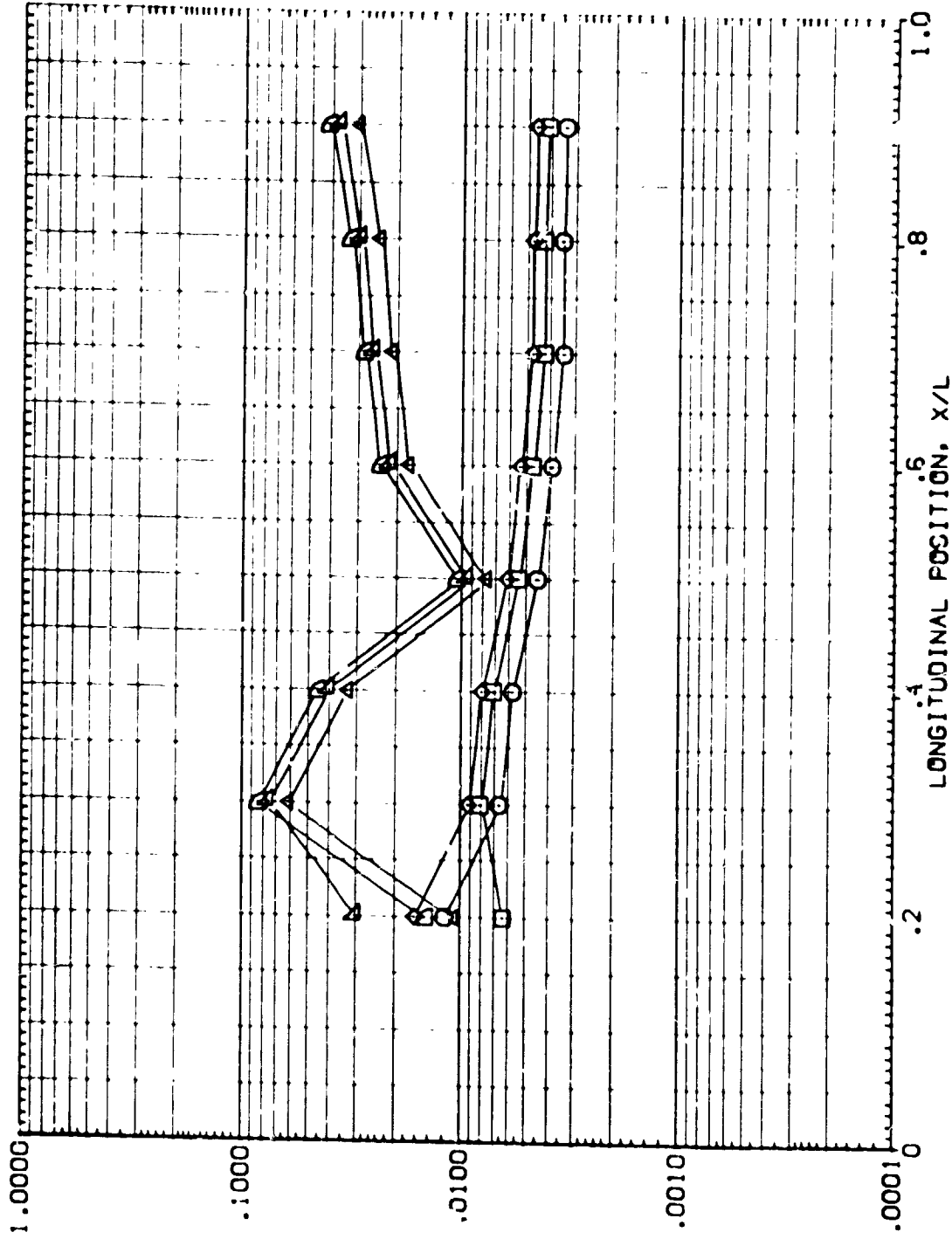


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 90.000

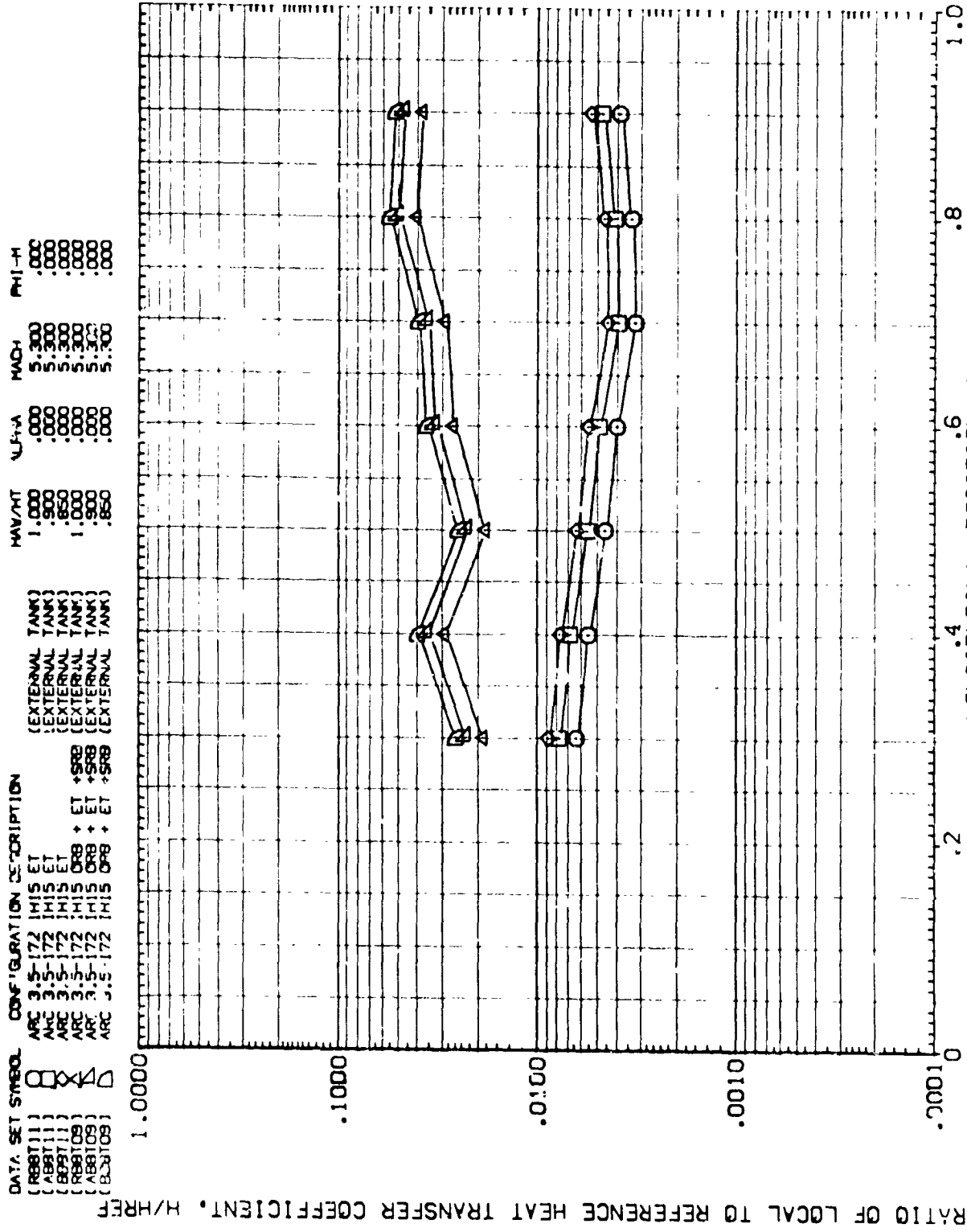


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 112.500

DATA SET SYMBOL. CONFIGURATION DESCRIPTION

(R88T11) ARC 3.5-172 IH15 ET
 (A98T11) ARC 3.5-172 IH15 ET
 (B88T11) ARC 3.5-172 IH15 ET
 (A88T08) ARC 3.5-172 IH15 ORB + ET + SRB
 (B88T08) ARC 3.5-172 IH15 ORB + ET + SRB

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-H

1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

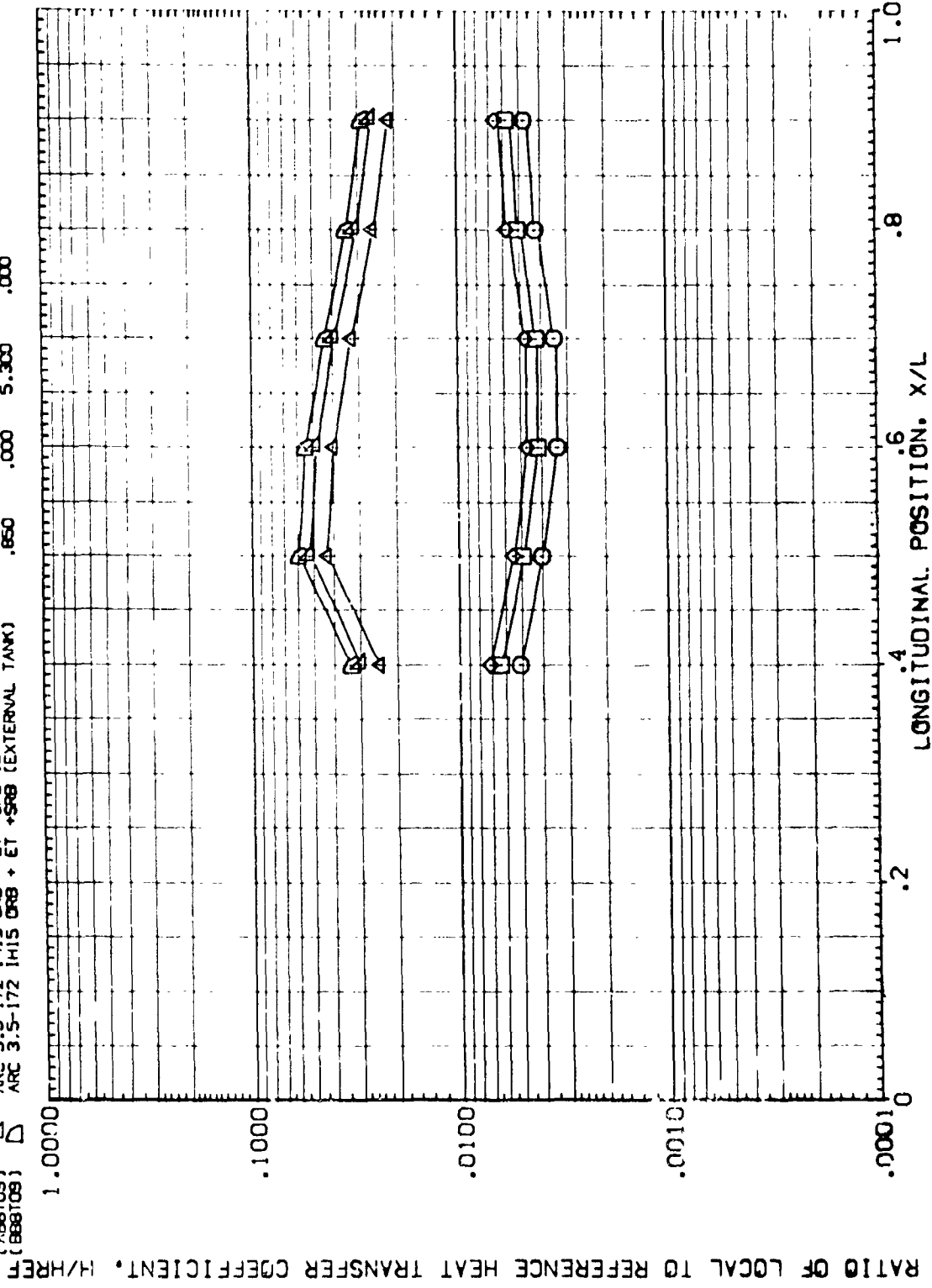


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 135.000

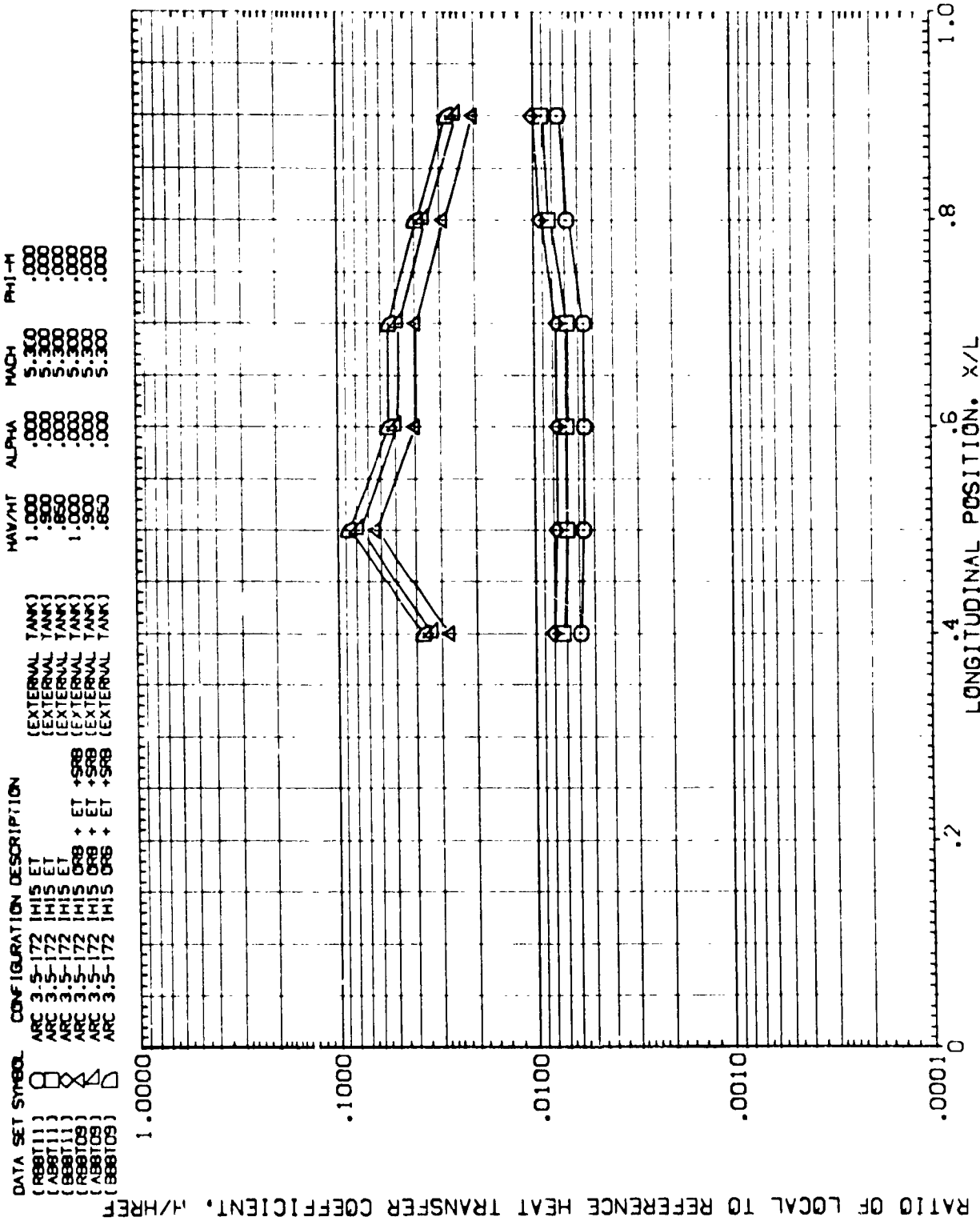


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MAC = 5.300 PHI = 157.500

DATA SET SYMBOL
 (R88T11)
 (A88T11)
 (B88T11)
 (R88T09)
 (A88T09)
 (B88T09)

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ET
 ARC 3.5-172 IH15 ET
 ARC 3.5-172 IH15 ET
 ARC 3.5-172 IH15 DRB + ET +SRB
 ARC 3.5-172 IH15 DRB + ET +SRB
 ARC 3.5-172 IH15 DRB + ET +SRB

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .650 .000 5.300 .000
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .650 .000 5.300 .000

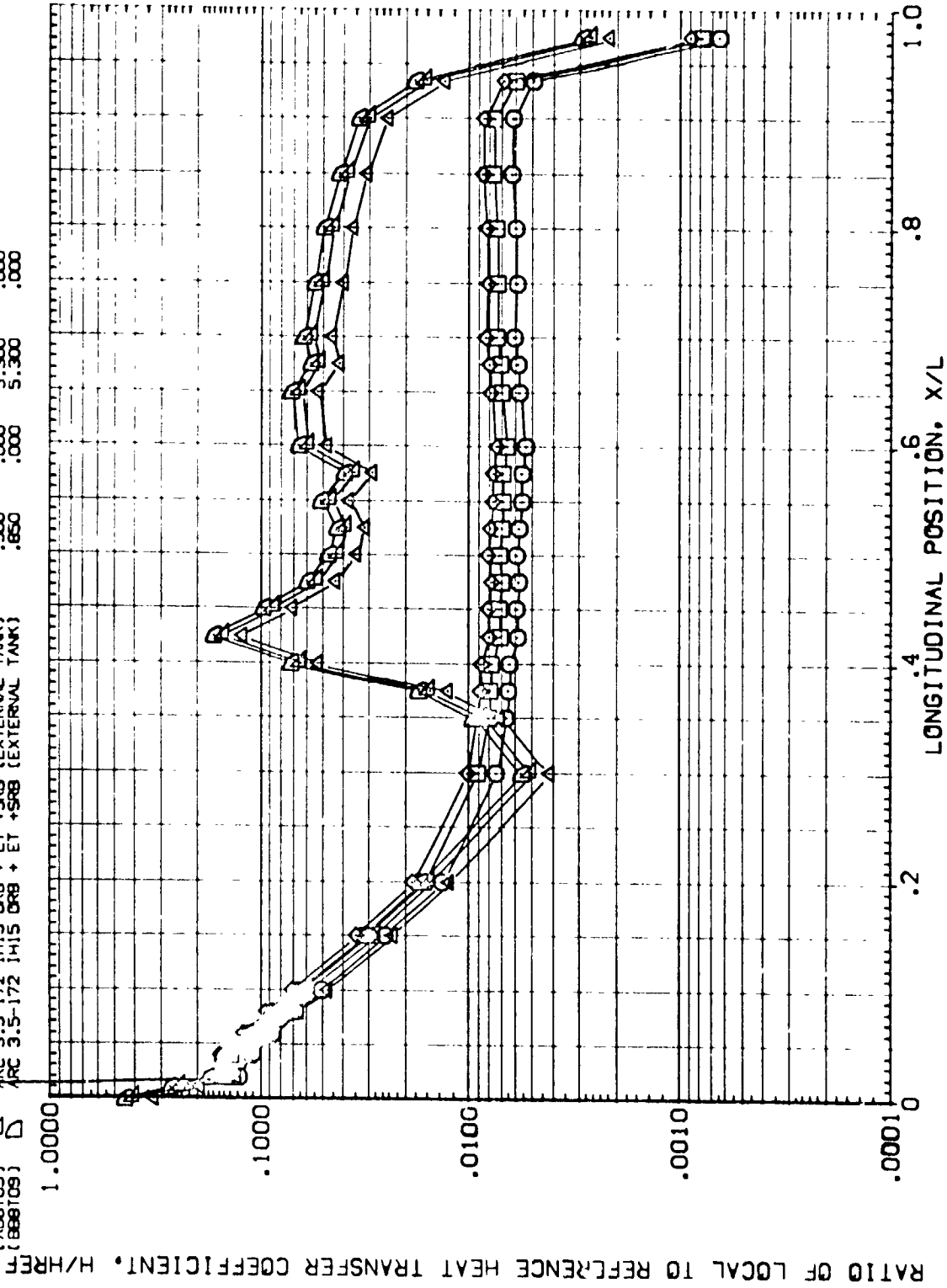


FIG. 6 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.674 MACH = 5.300 PHI = 180.000 PAGE 40



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(J88T09) ARC 3.5-172 IH15 DR8 + ET +5R8 (EXTERNAL TANK) 5.300 .000 .000

(E88T09) ARC 3.5-172 IH15 DR8 + ET +5R8 (EXTERNAL TANK) 5.300 .000 .000

(F88T09) ARC 3.5-172 IH15 DR8 + ET +9R8 (EXTERNAL TANK) 5.300 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU ORN/L = 1.804 MACH = 5.300 PHI = .000

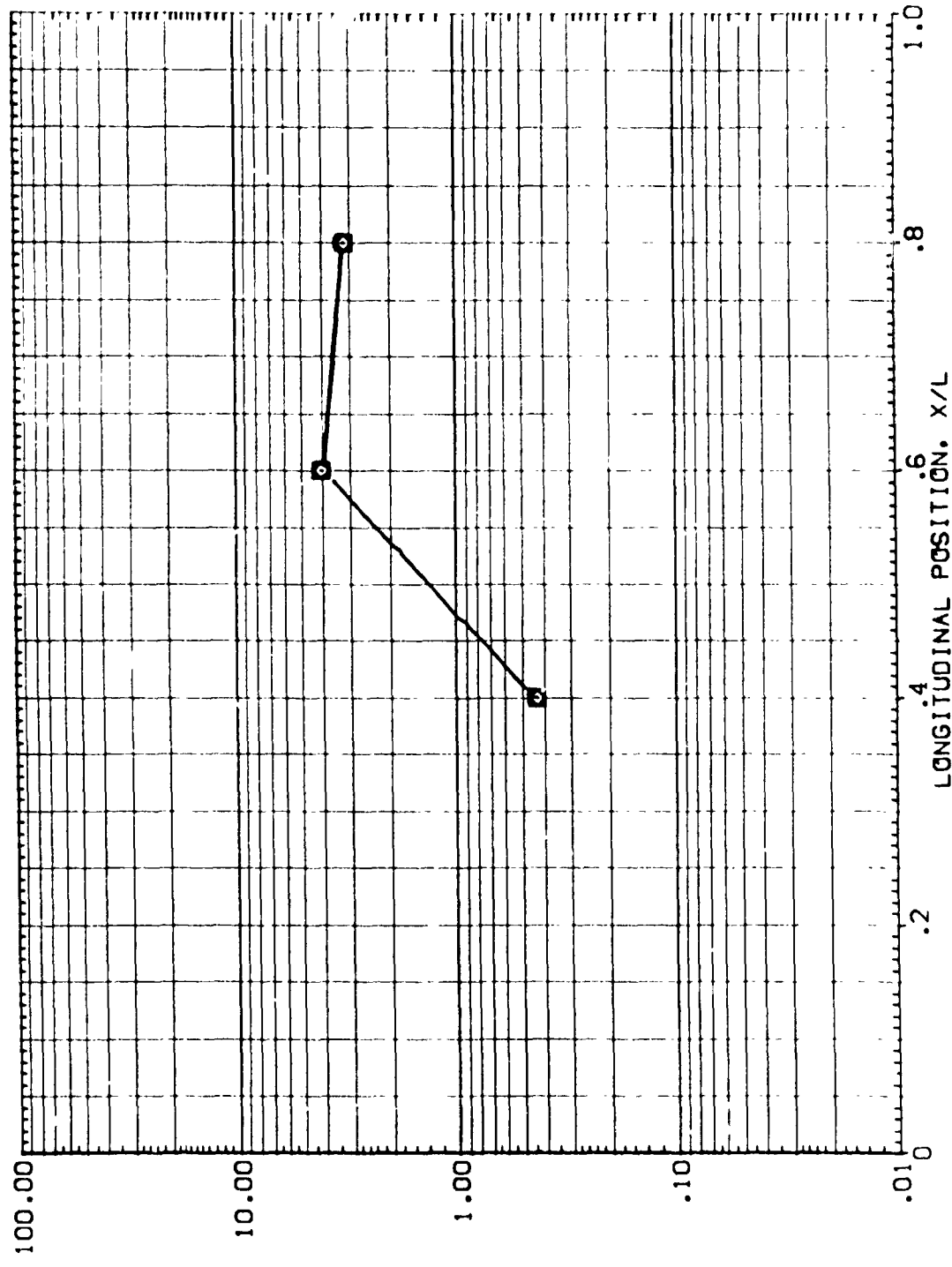


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 1.804 MACH = 5.300 PHI = .000 PAGE 41

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DB8109) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

(EB8109) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

(FB8109) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

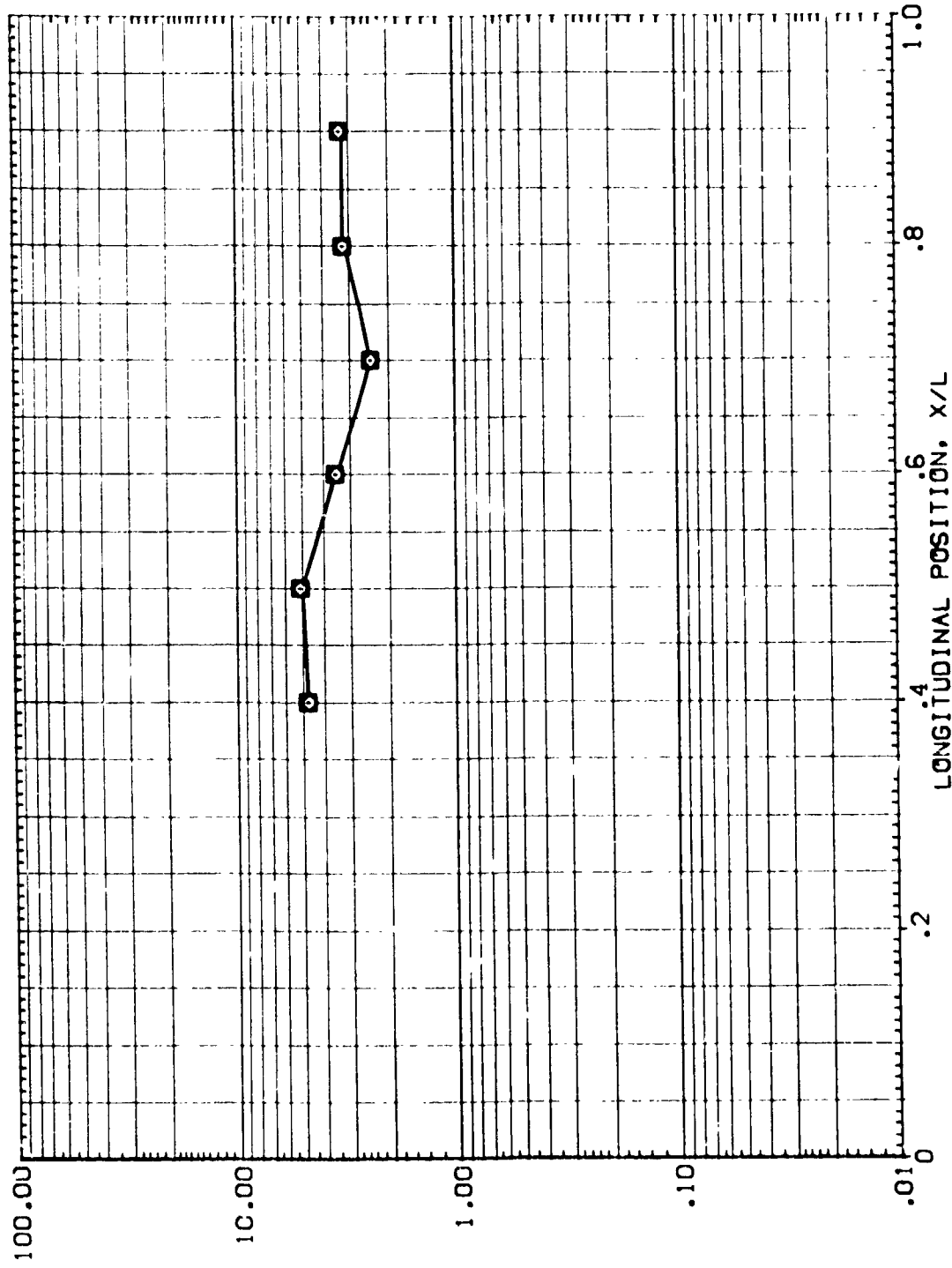


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF.. EXTERNAL TANK.
 ORN/L = 1.804 MACH = 5.300 PHI = 45.000 PAGE 42



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	AV/MT	ALPHA	MACH	PHI-H
(088108)	ARC 3.5-172 IH15 DR8 + ET +SR8 (EXTERNAL TANK)	1.000	.000	5.300	.000
(088109)	ARC 3.5-172 IH15 DR8 + ET +SR8 (EXTERNAL TANK)	.900	.000	5.300	.000
(F88109)	ARC 3.5-172 IH15 DR8 + ET +SR8 (EXTERNAL TANK)	.650	.000	5.300	.000

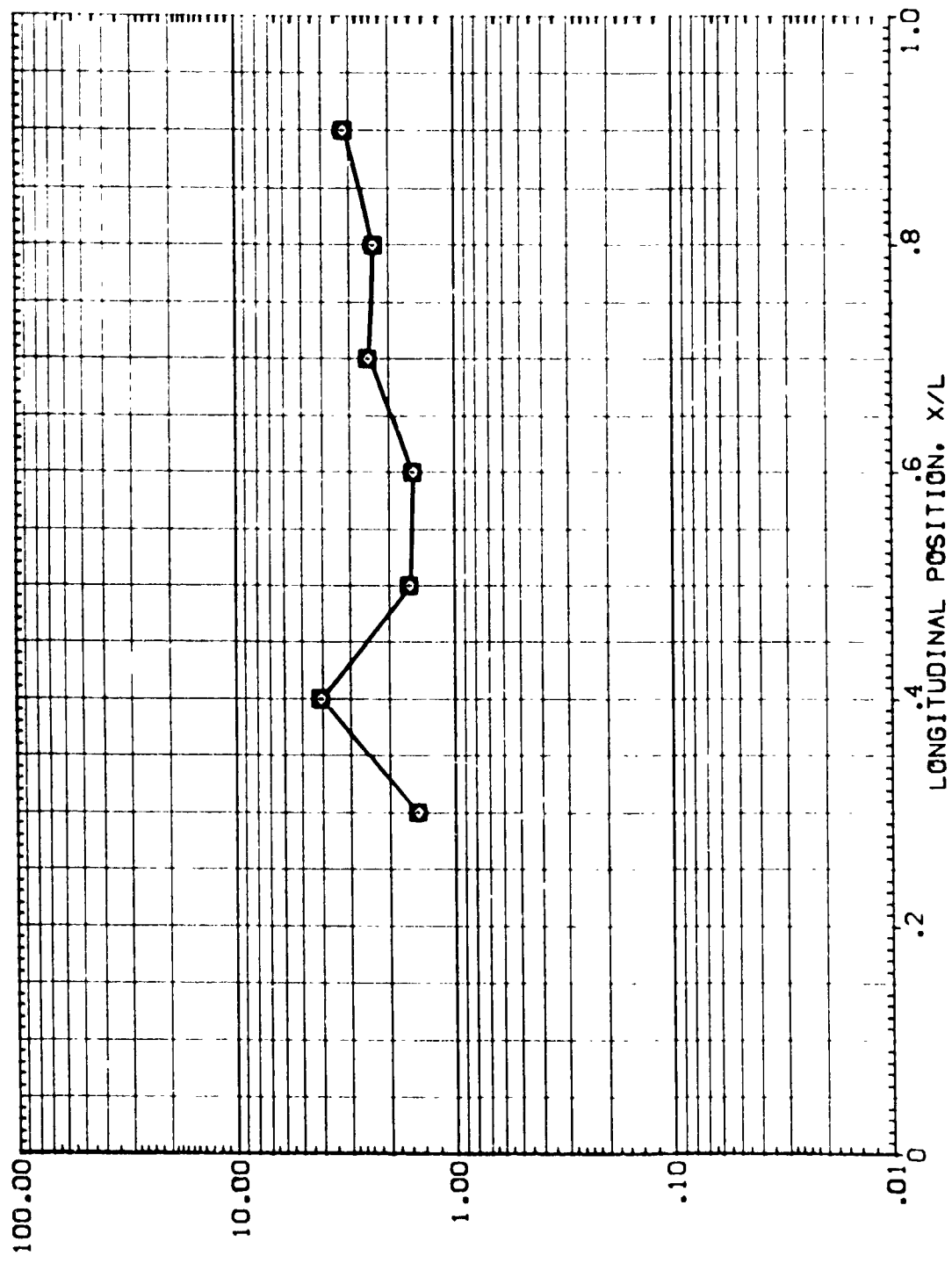


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

ORNL/L = 1.804 MACH = 5.300 PHI = 67.500

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DB8T09) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 1.000 .000 .000

(EB8T09) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) .900 .000 .000

(FB8T09) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) .850 .000 .000

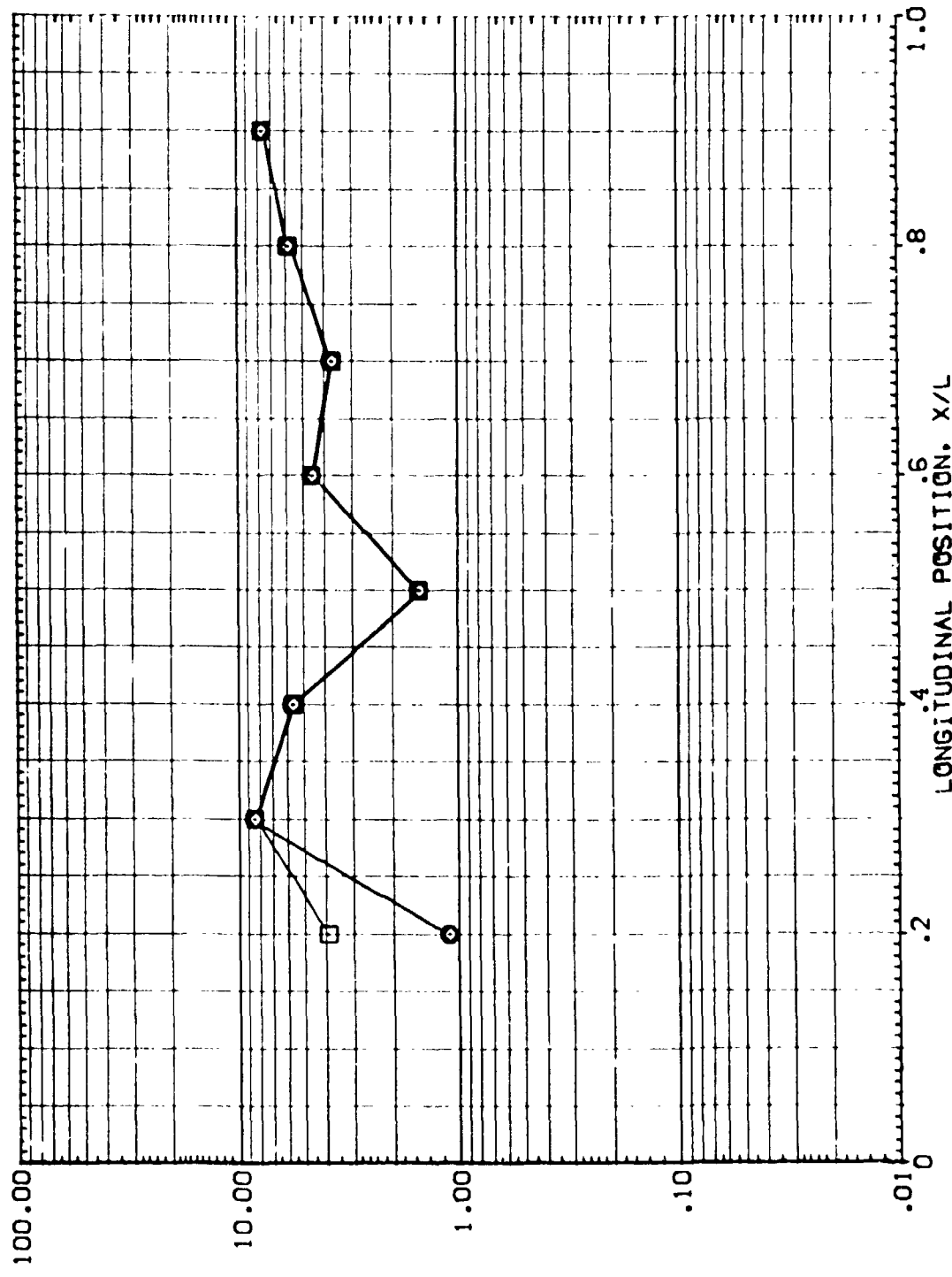


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ARN/L = 1.804 MACH = 5.300 PHI = 90.000 PAGE 44



DATA SET SYMBOL CONFIGURATION DESCRIPTION MAV/MT ALPHA MACH PHI-M

(DBBTOS) ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) 1.000 .000 5.300 .000

(EBBTOS) ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) .900 .000 5.300 .000

(FBBTOS) ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU ORN/L = 1.804 MACH = 5.300 PHI = 112.500

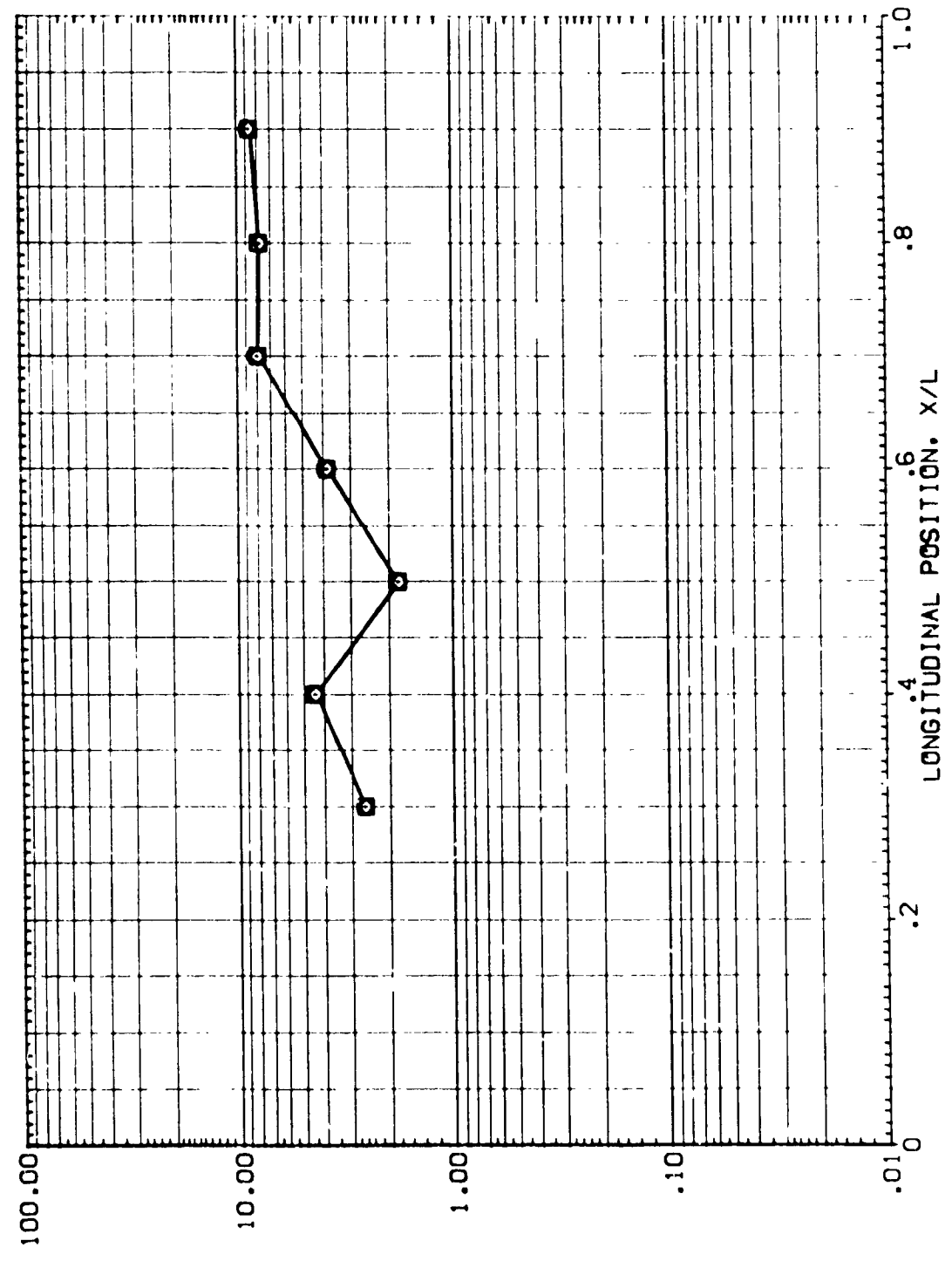
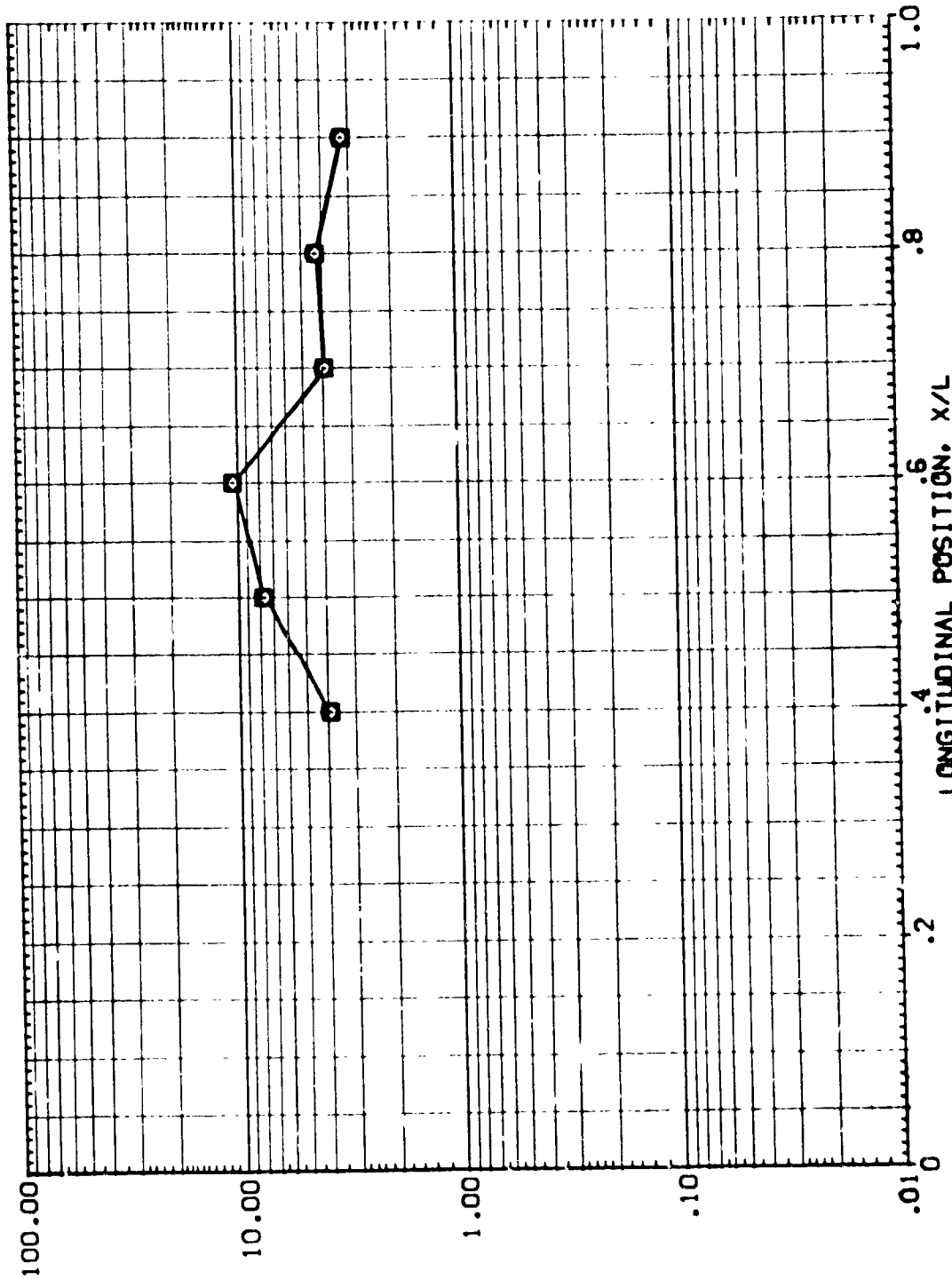


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF.. EXTERNAL TANK.

DATA SET SYMBOL: (DB8T08) (EB8T08) (FB8T08)  CONFIGURATION DESCRIPTION: ARC 3.1 72 [HIS ORB + ET +SRB (EXTERNAL TANK)] ARC 3.1 72 [HIS ORB + ET +SRB (EXTERNAL TANK)] ARC 3.1 72 [HIS ORB + ET +SRB (EXTERNAL TANK)]

HAV/HT: 1.000 .900 .850
 ALPHA: .000 .000 .000
 MACH: 5.300 5.300 5.300
 PHI-H: .000 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU



LONGITUDINAL POSITION, X/L

FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 BRN/L = 1.804 MACH = 5.300 PHI = 135.000



DATA SET SYMBOL: (DBBT09) (FBT09) (FBT09)

CONFIGURATION DESCRIPTION	MAV/MT	ALPHA	MACH	PHI-H
ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK)	1.000	.000	5.300	.000
ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK)	.900	.000	5.300	.000
ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK)	.850	.000	5.300	.000

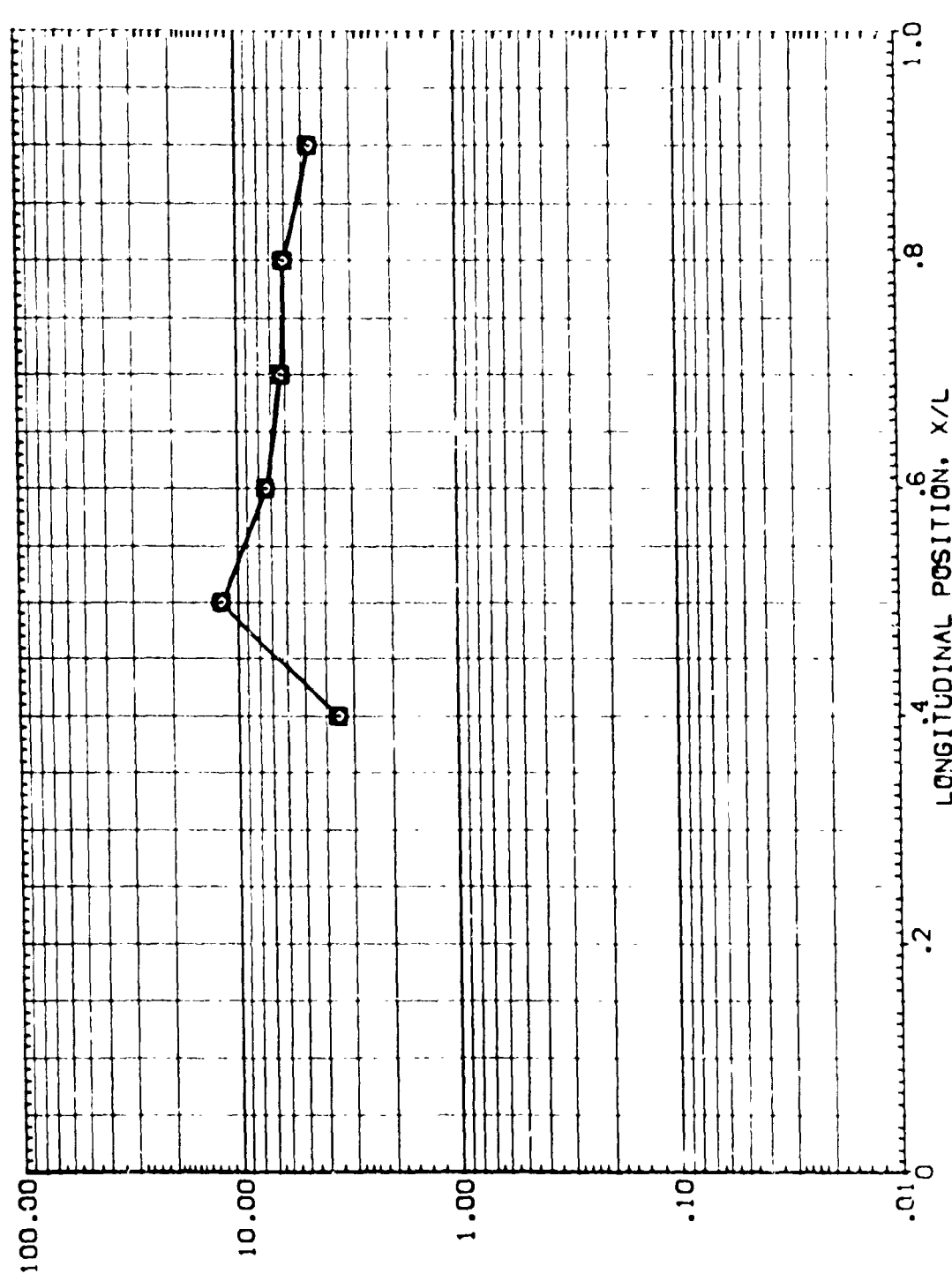


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(DBBT08)	ARC 3.5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)]	1.000	.000	5.300	.000
(EBBT08)	ARC 3.5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)]	.900	.000	5.300	.000
(FBBT08)	ARC 3.5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)]	.850	.000	5.300	.000

Ratio of Interference to Undisturbed Heat Transfer Coefficient, h_i/h_u

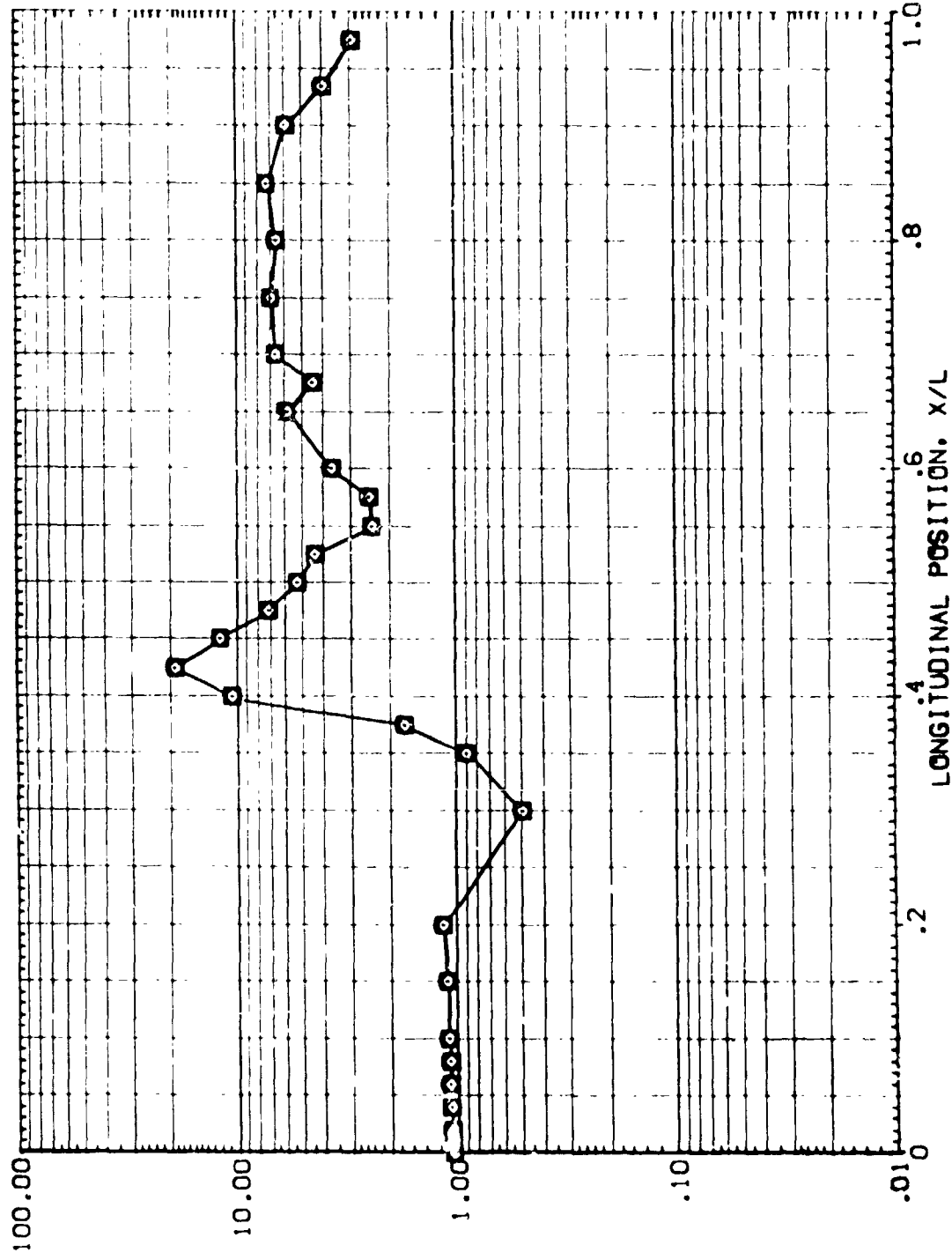


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., EXTERNAL TANK.

$\alpha_{RN}/L = 1.804$ MACH = 5.300 PHI = 180.00C

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(CBBT09) ARC 3.5-172 IHS CRB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

(EBBT09) ARC 3.5-172 IHS CRB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

(FBBT09) ARC 3.5-172 IHS CRB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

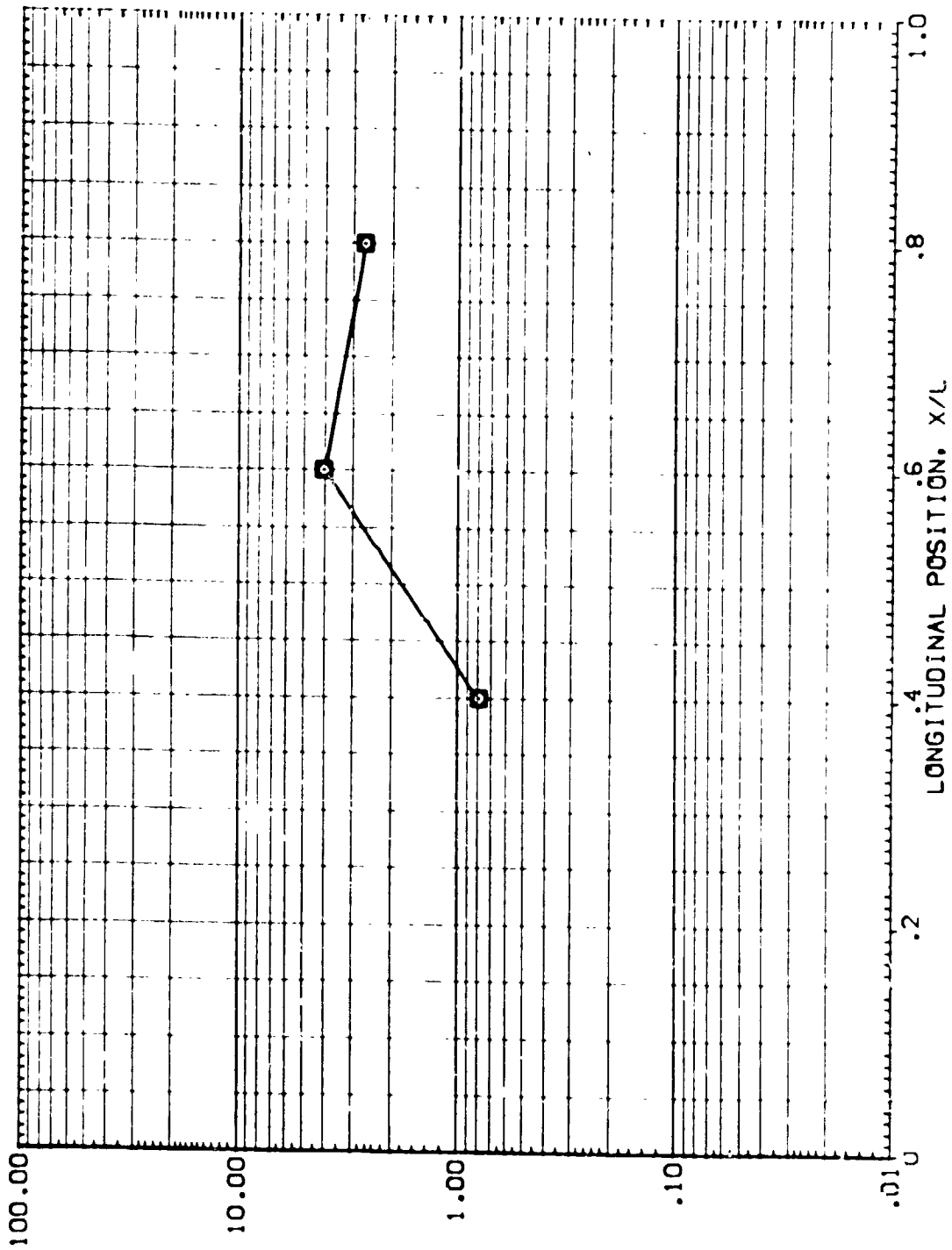


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

DATA SET SYMBOL
 (088109) □
 (188109) ○
 (F88109) ◇

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

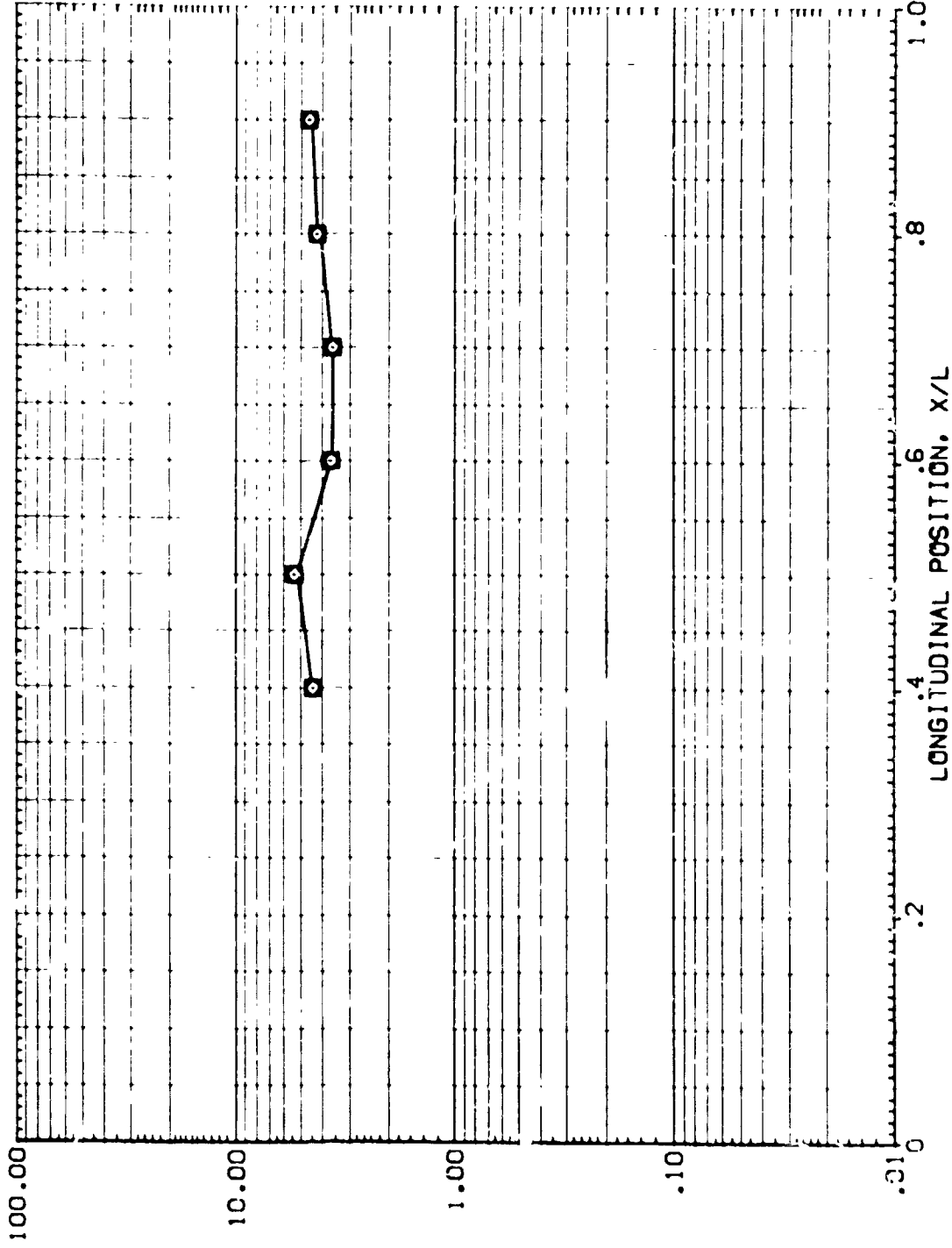


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

SRN/L = 4.652 MACH = 5.300 PHI = 45.000

PAGE 50

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA MACH PHI-H

(DBBT09) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 .000 5.300 .000

(EBBT09) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 .000 5.300 .000

(FBBT09) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU GRN/L = 4.652 MACH = 5.300 PHI = 67.500 PAGE 51

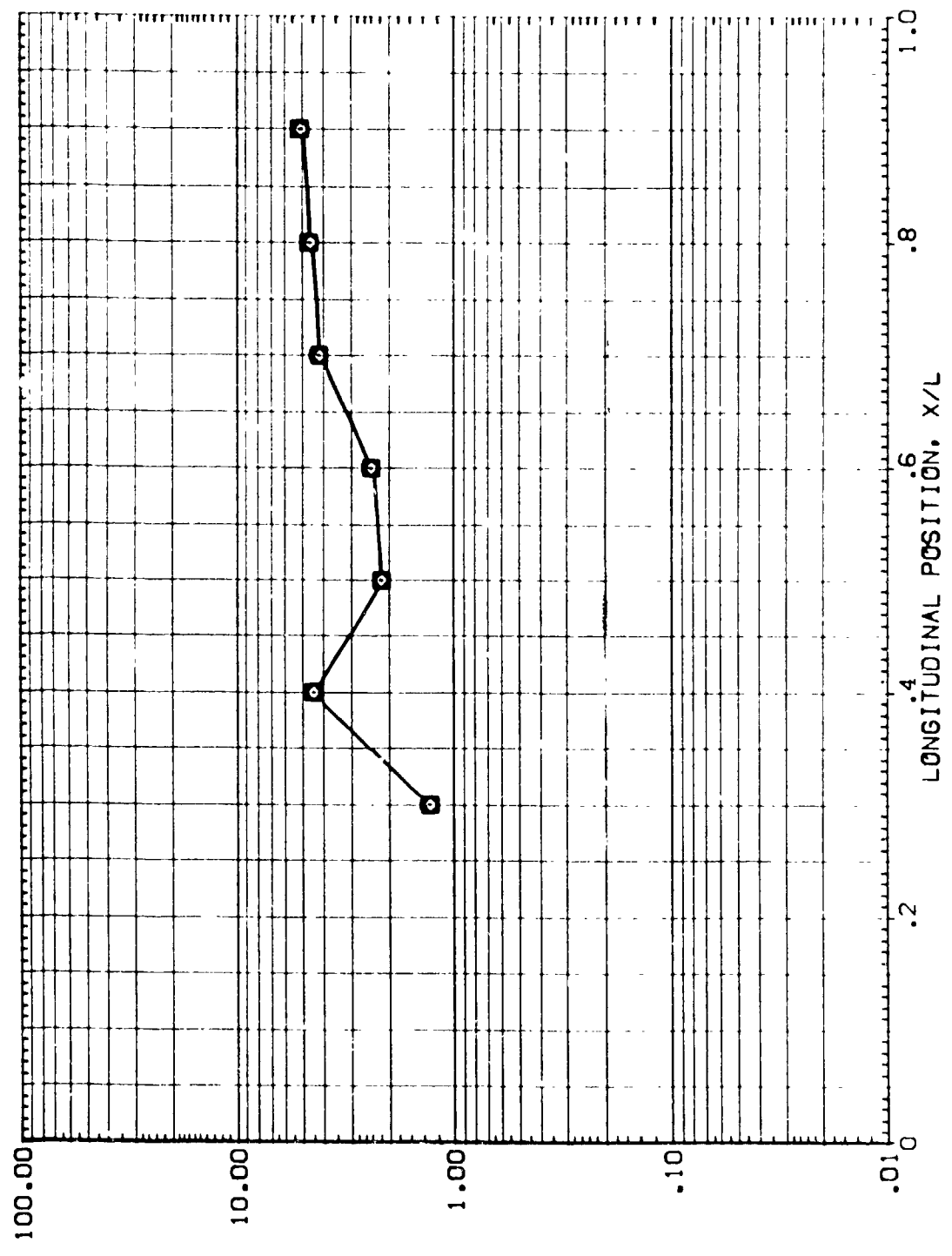


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(DBB109) ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) 1.000 .000 5.300 .000

(E8B109) ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) .900 .000 5.300 .000

(F8B109) ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) .650 .000 5.300 .000

Ratio of Interference to Undisturbed Heat Transfer Coefficient, HI/HU

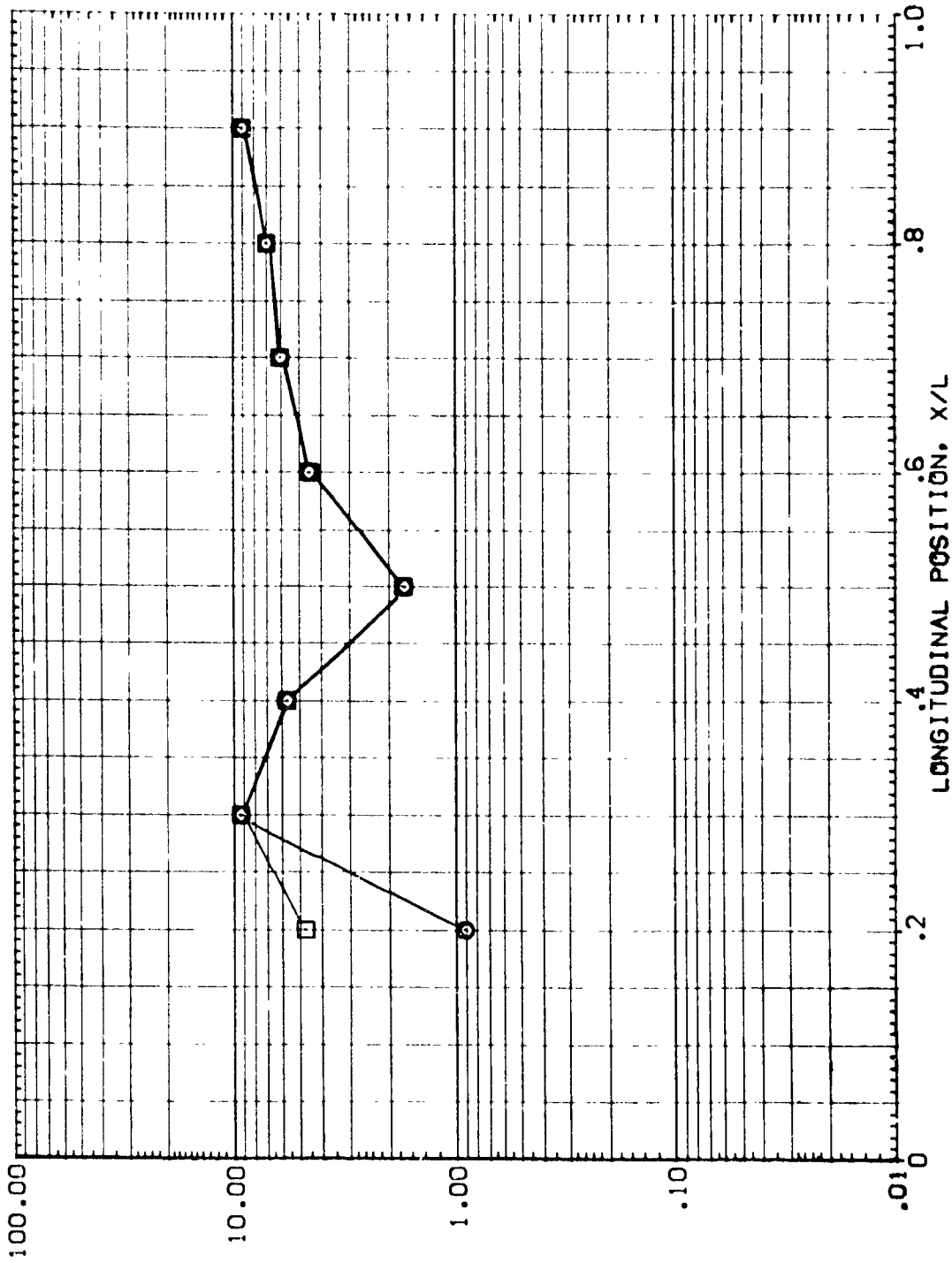


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 4.652 MACH = 5.300 PHI = 90.000



DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(DBBTOS) □ ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) 1.000 .000 5.300 .000

(EBBTOS) ◇ ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) .800 .000 5.300 .000

(FBBTOS) ○ ARC 3.5-172 IHIS ORB + ET +SRB (EXTERNAL TANK) .650 .000 5.300 .000

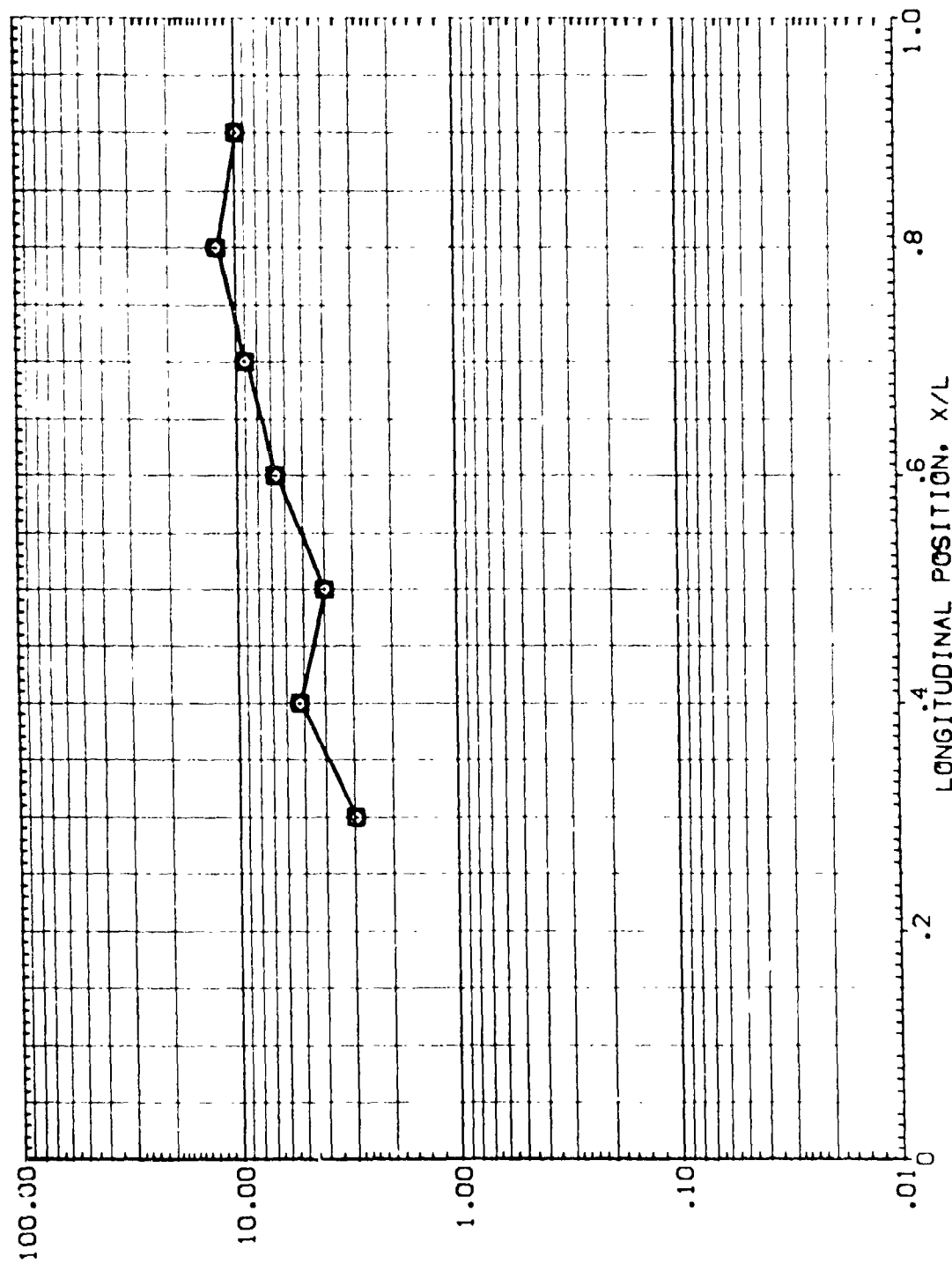


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

PHI/L = 4.652 MACH = 5.300 PHI = 112.500 PAGE 53

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-M

(DB8T09) ARC 3.5-172 H15 DRB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

(EB8T09) ARC 3.5-172 H15 DRB + ET +SRB (EXTERNAL TANK) 5.300 .000 .000

(FB8T09) ARC 3.5-172 H15 DRB + ET +SRB (EXTERNAL TANK) 4.650 .000 .000

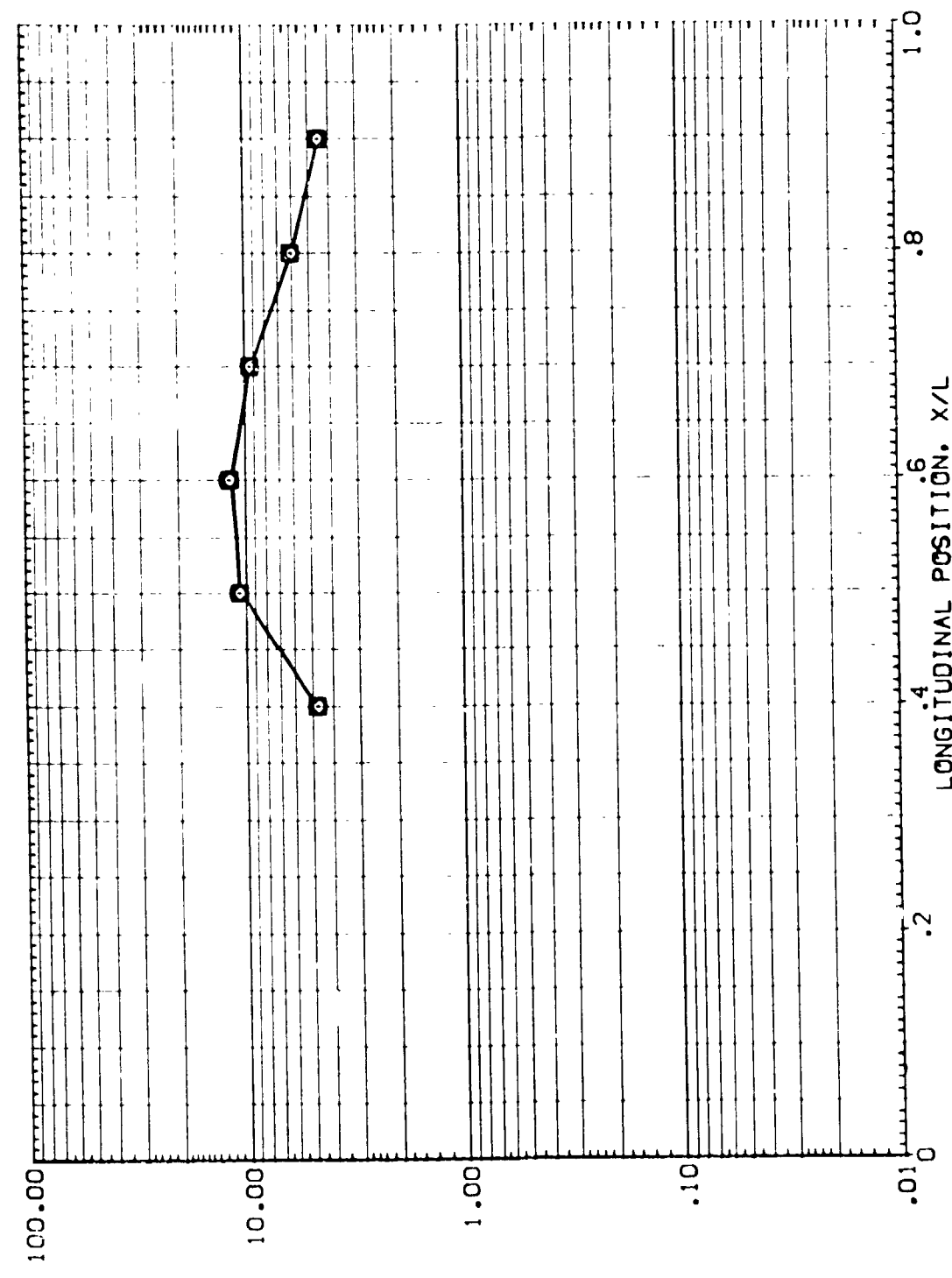





FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 4.652 MACH = 5.300 PHI = 135.000



DATA SET SYMBOL
 (DBBT09) 
 (EBBT09) 
 (FBBT09) 

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

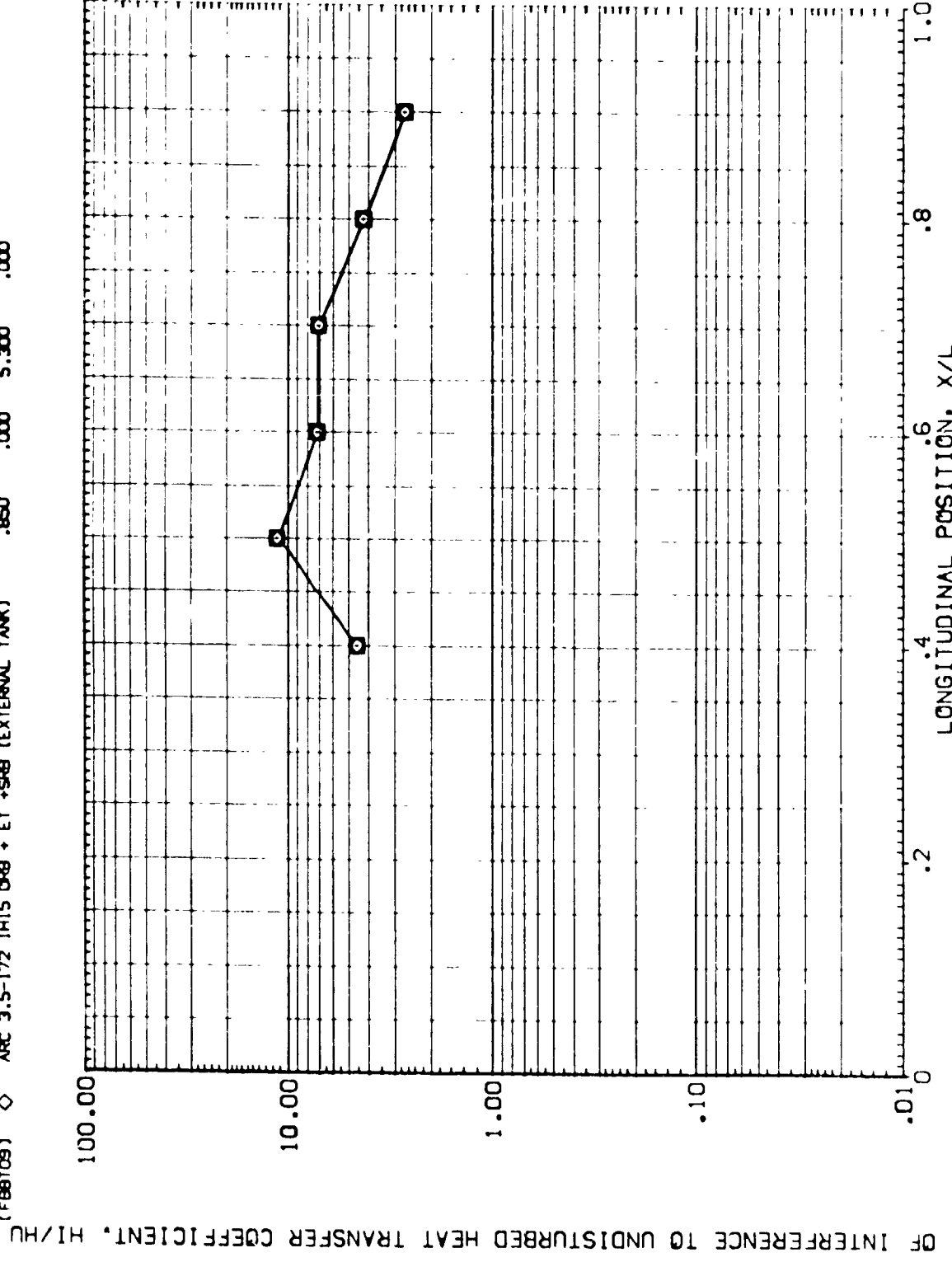


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 4.652 MACH = 5.300 PHI = :57.500 PAGE 55

DATA SET SYMBOL
 (DBBTO9) □
 (EBBTO9) ○
 (FBBTO9) ◇

CONFIGURATION DESCRIPTION
 ARC 3.5-172 [HIS ORB + ET +SRB (EXTERNAL TANK)]
 ARC 3.5-172 [HIS ORB + ET +SRB (EXTERNAL TANK)]
 ARC 3.5-172 [HIS ORB + ET +SRB (EXTERNAL TANK)]

MACH ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

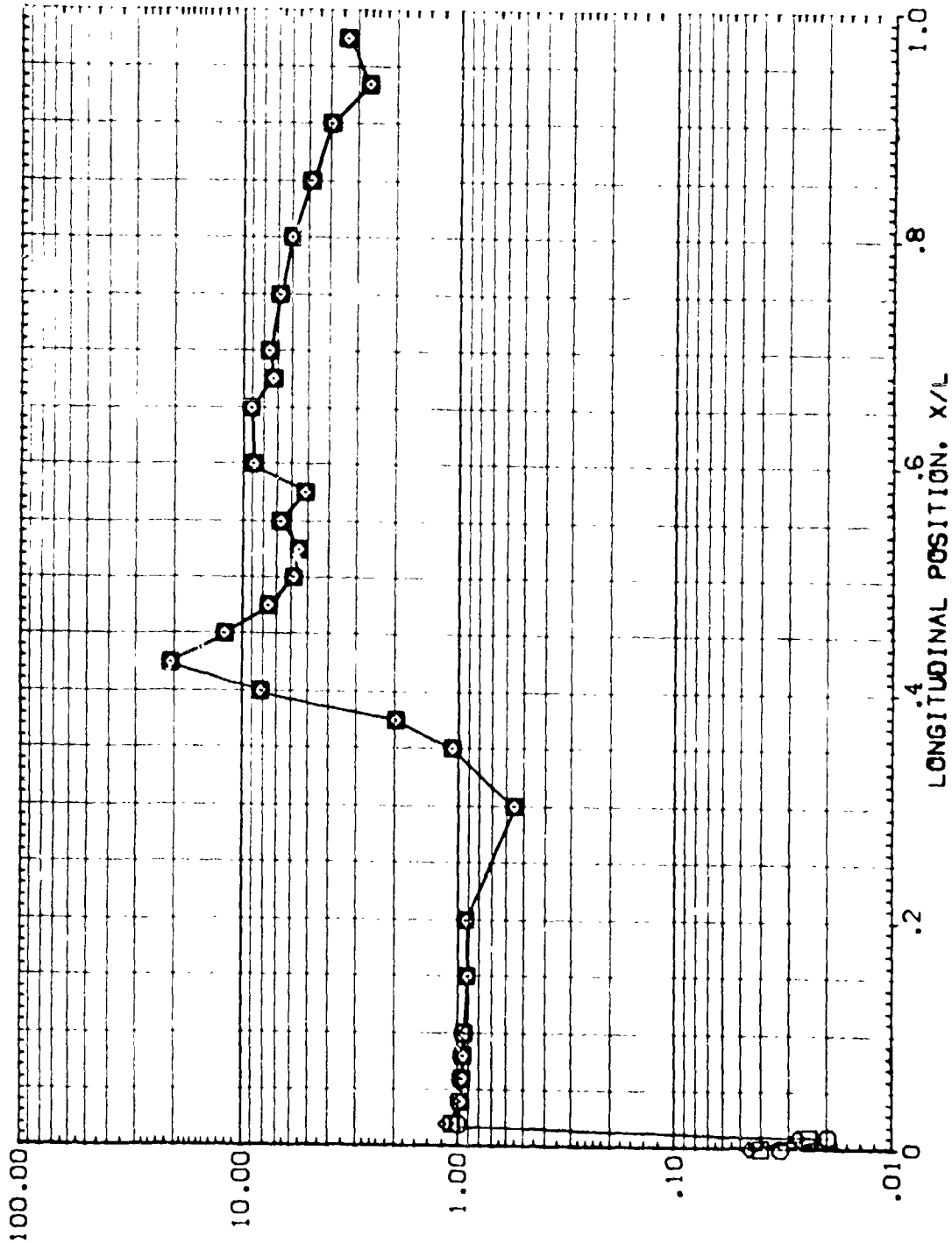


FIG. 7 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 4.652 MACH = 5.300 PHI = 180.000



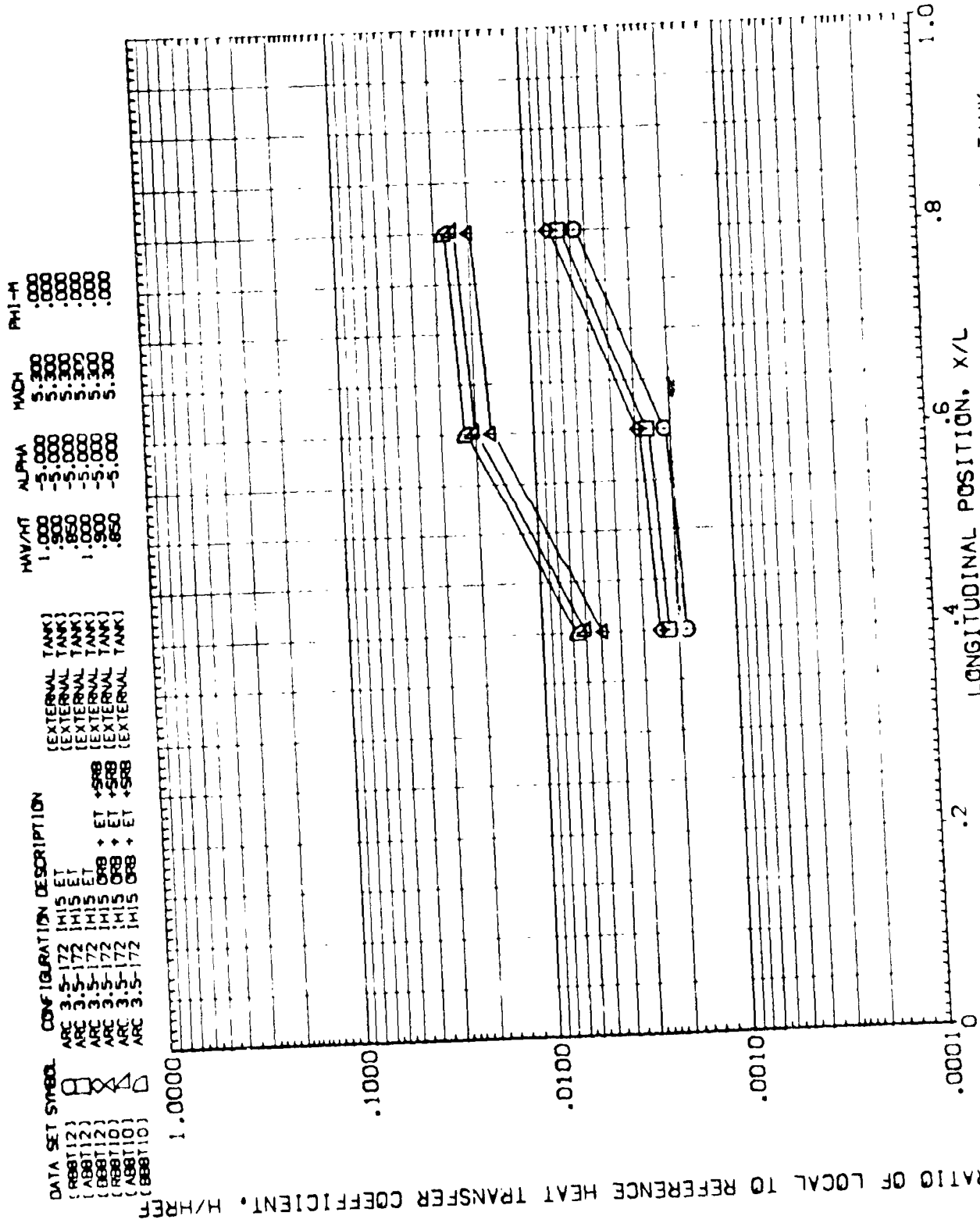


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

PN/L = 2.021 MACH = 5.300 PHI = .000

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-M
(RB8T12)	ARC 3-5-172 IH15 ET	1.000	-5.000	5.300	.000
(AB8T12)	ARC 3-5-172 IH15 ET	.900	-5.000	5.300	.000
(BB8T12)	ARC 3-5-172 IH15 ET	.850	-5.000	5.300	.000
(RB8T10)	ARC 3-5-172 IH15 ORB + ET +SRB	1.000	-5.000	5.300	.000
(AB8T10)	ARC 3-5-172 IH15 ORB + ET +SRB	.900	-5.000	5.300	.000
(BB8T10)	ARC 3-5-172 IH15 ORB + ET +SRB	.850	-5.000	5.300	.000

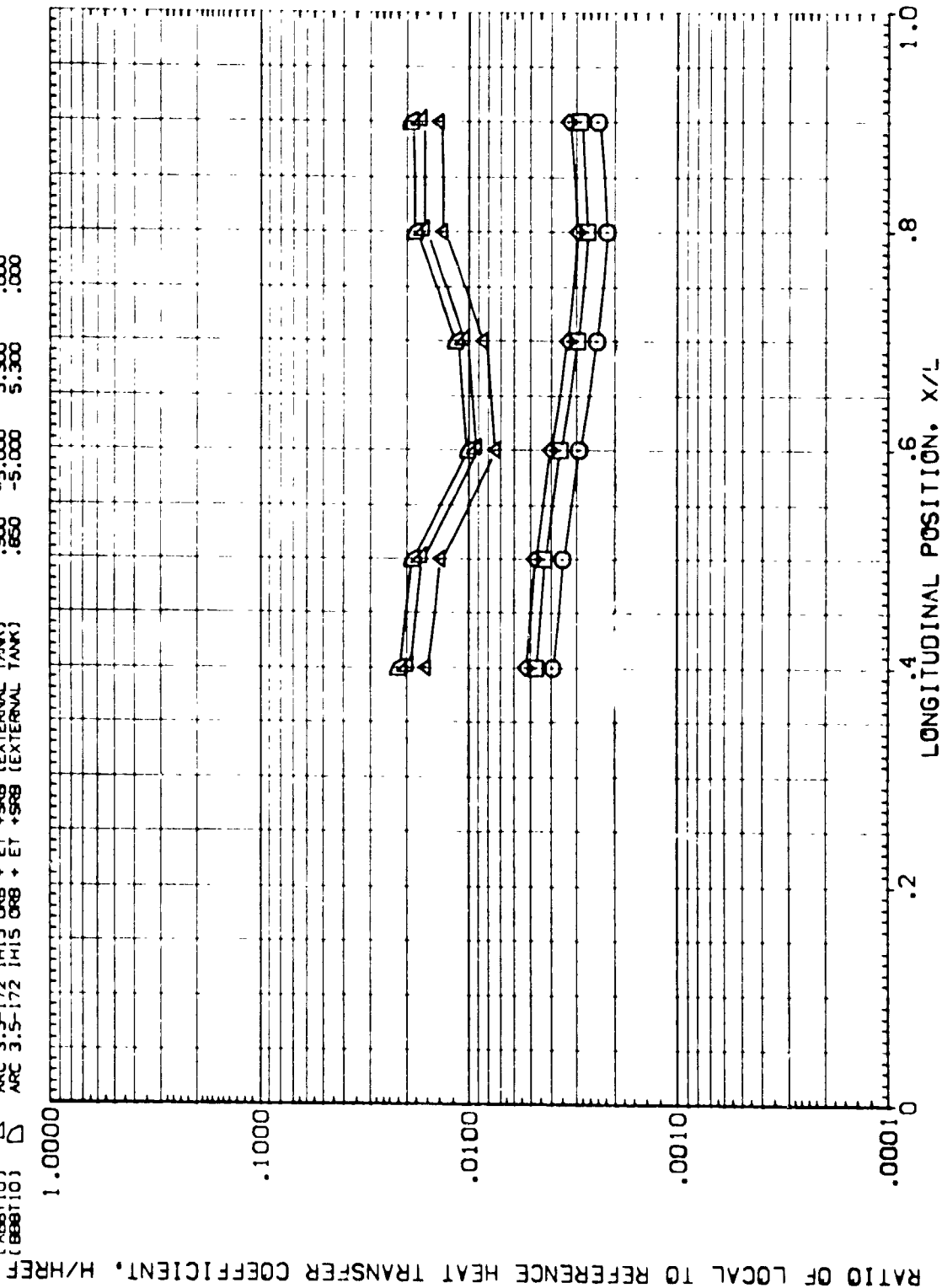


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 2.021 MACH = 5.300 PHI = 45.000

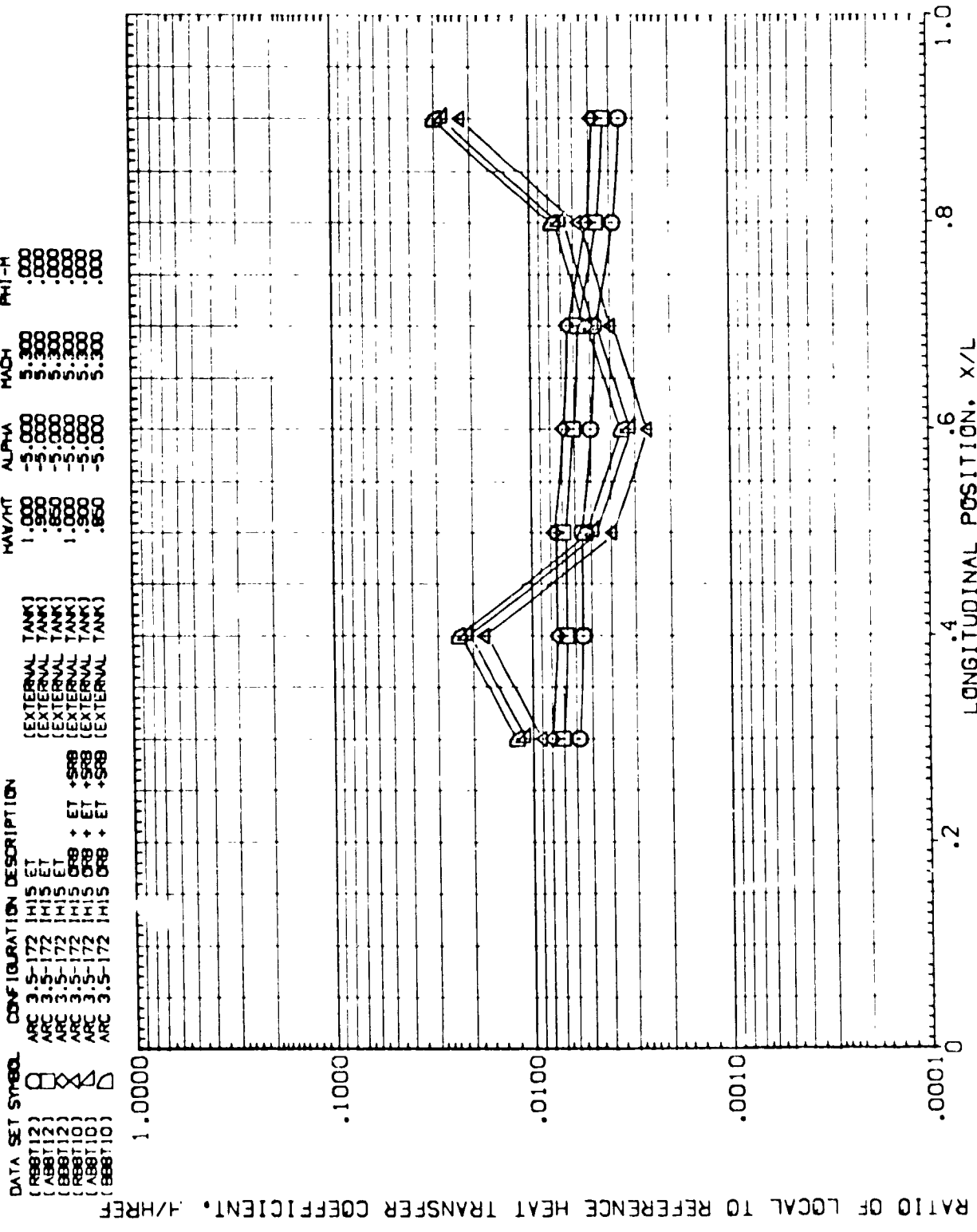


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RB8T12)	ARC 3.5-172 (H15 ET
(AB8T12)	ARC 3.5-172 (H15 ET
(B88T12)	ARC 3.5-172 (H15 ET
(R38T10)	ARC 3.5-172 (H15 ORB + ET +SRB
(AB8T10)	ARC 3.5-172 (H15 ORB + ET +SRB
(B88T10)	ARC 3.5-172 (H15 ORB + ET +SRB

HAU/HT	ALPHA	MACH	PHI
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

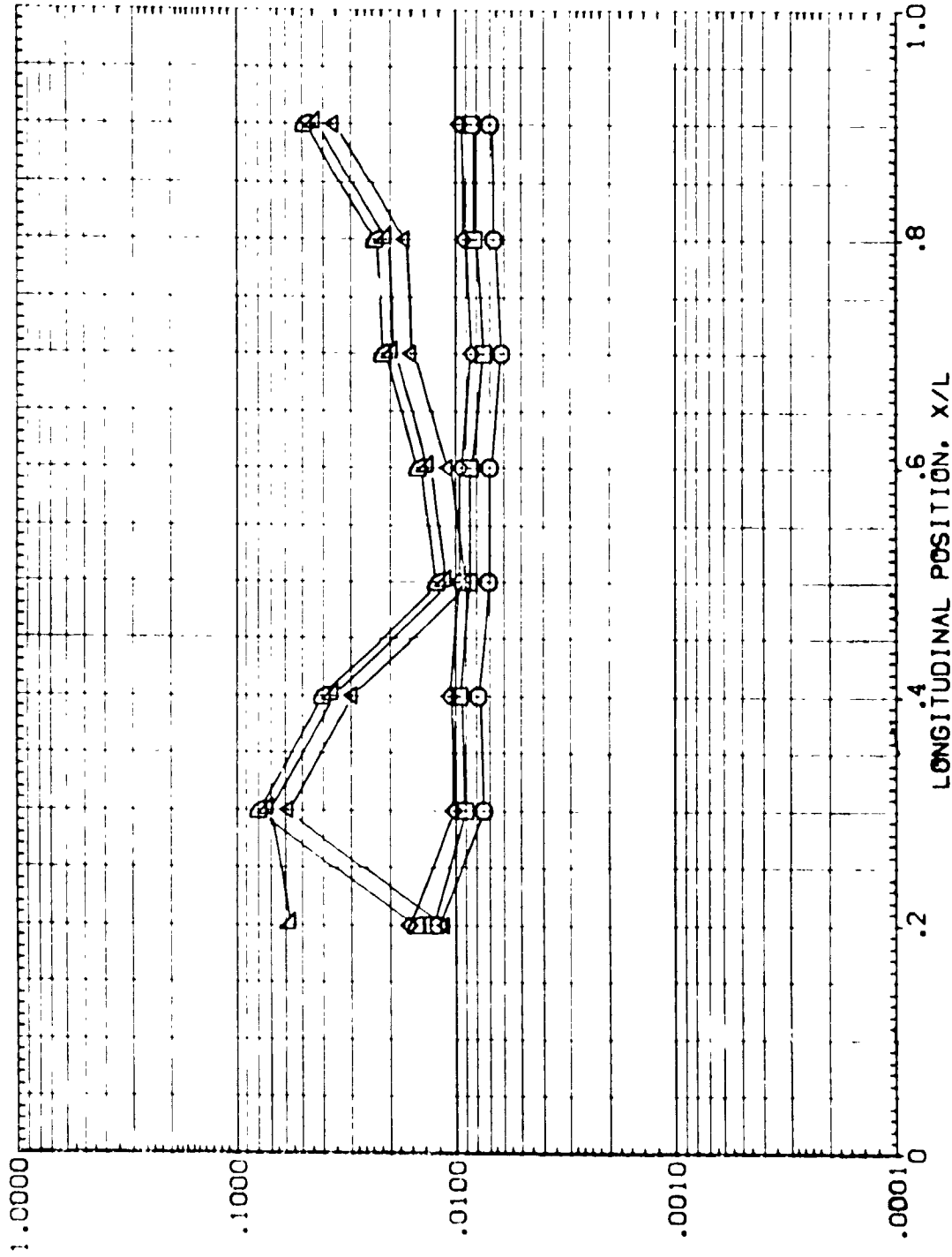


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 2.021 MACH = 5.300 PHI = 90.000

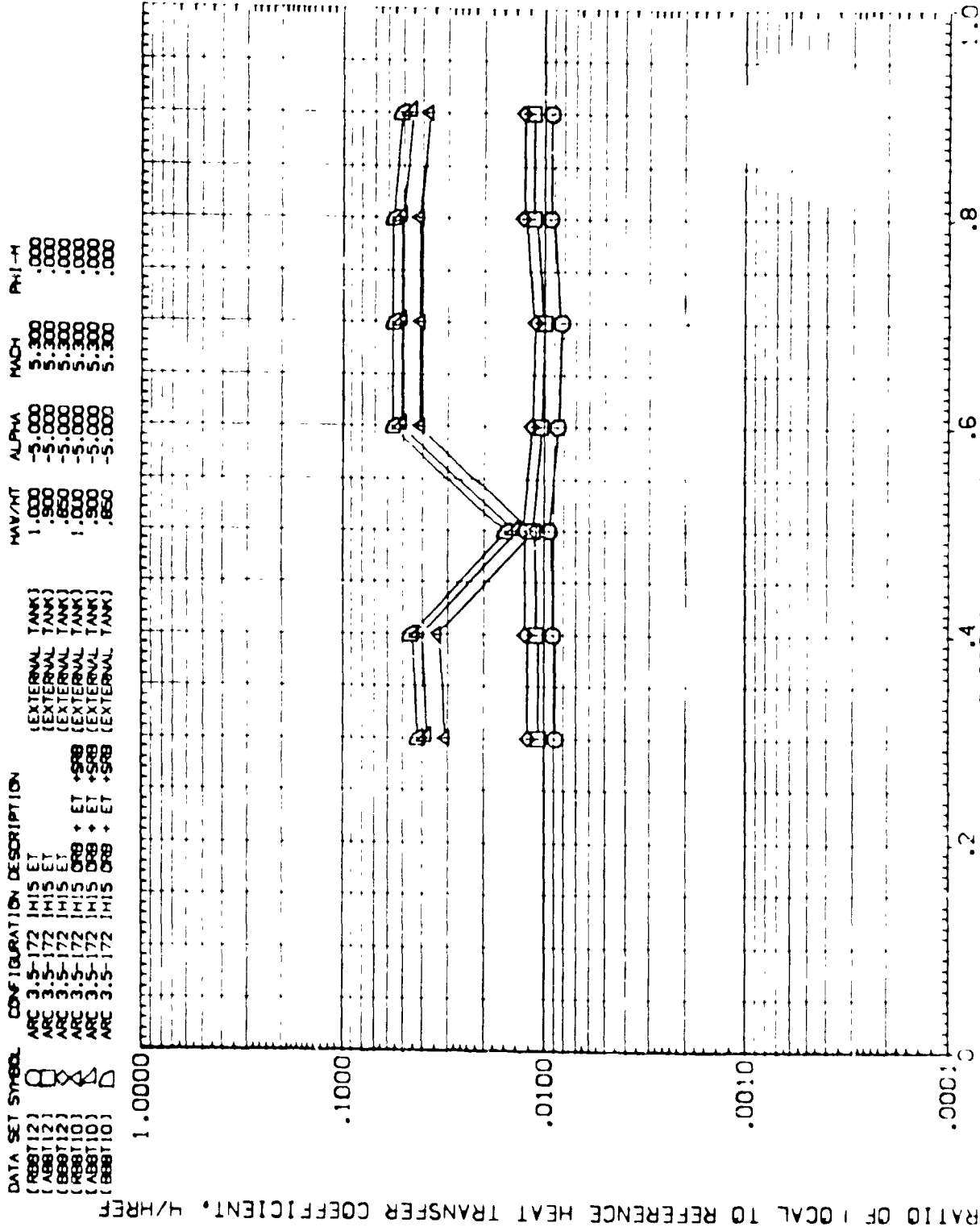


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	PHI-H
(R08T12)	ARC 3.5-172 | H15 ET	5.300	.000
(A08T12)	ARC 3.5-172 | H15 ET	5.300	.000
(R08T12)	ARC 3.5-172 | H15 ET	5.300	.000
(A08T10)	ARC 3.5-172 | H15 ORB + ET + SRB	5.300	.000
(R08T10)	ARC 3.5-172 | H15 ORB + ET + SRB	5.300	.000
(A08T10)	ARC 3.5-172 | H15 ORB + ET + SRB	5.300	.000

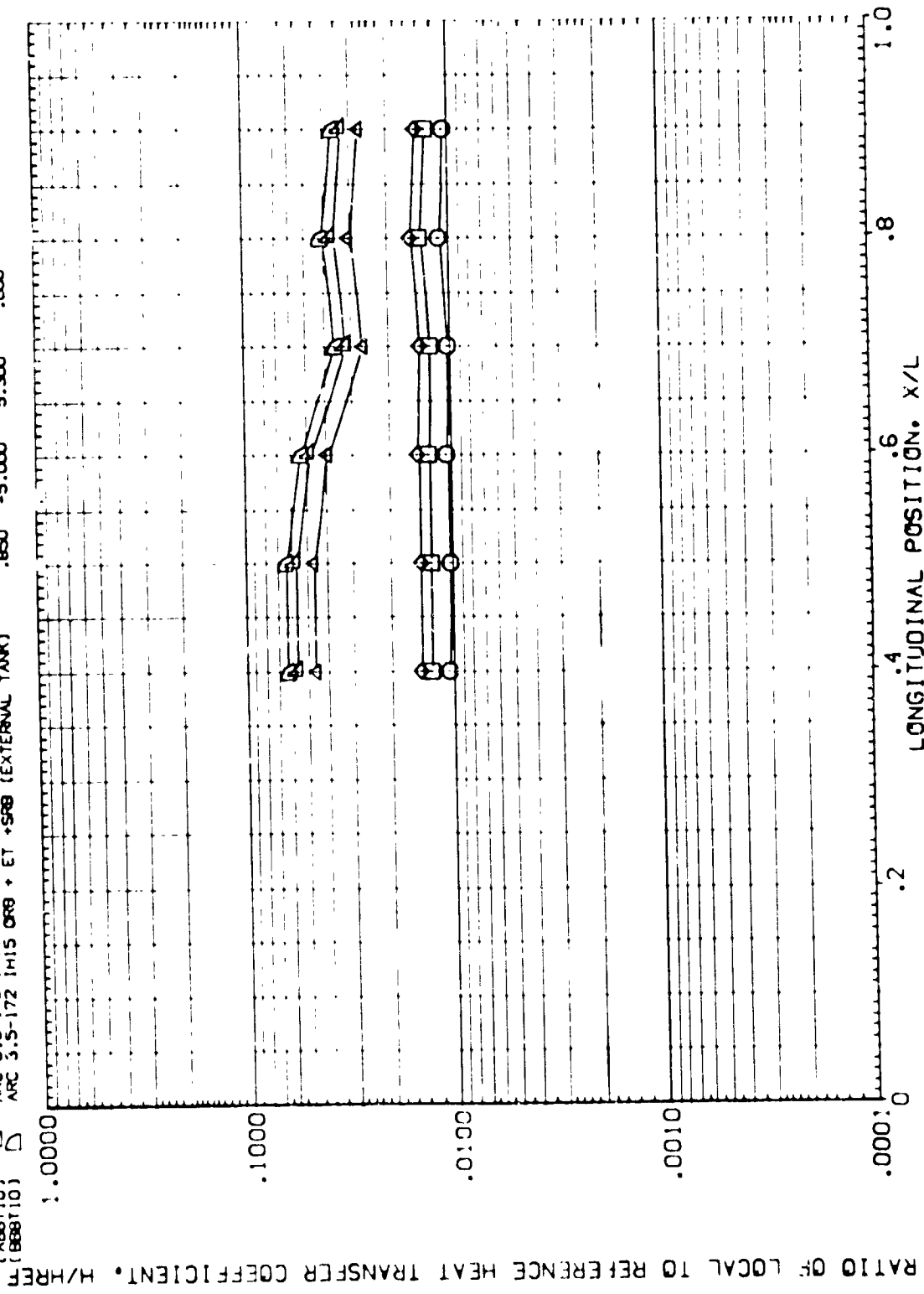


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

R_{N/L} = 2.02; MACH = 5.300 PHI = 135.000 PAGE 62



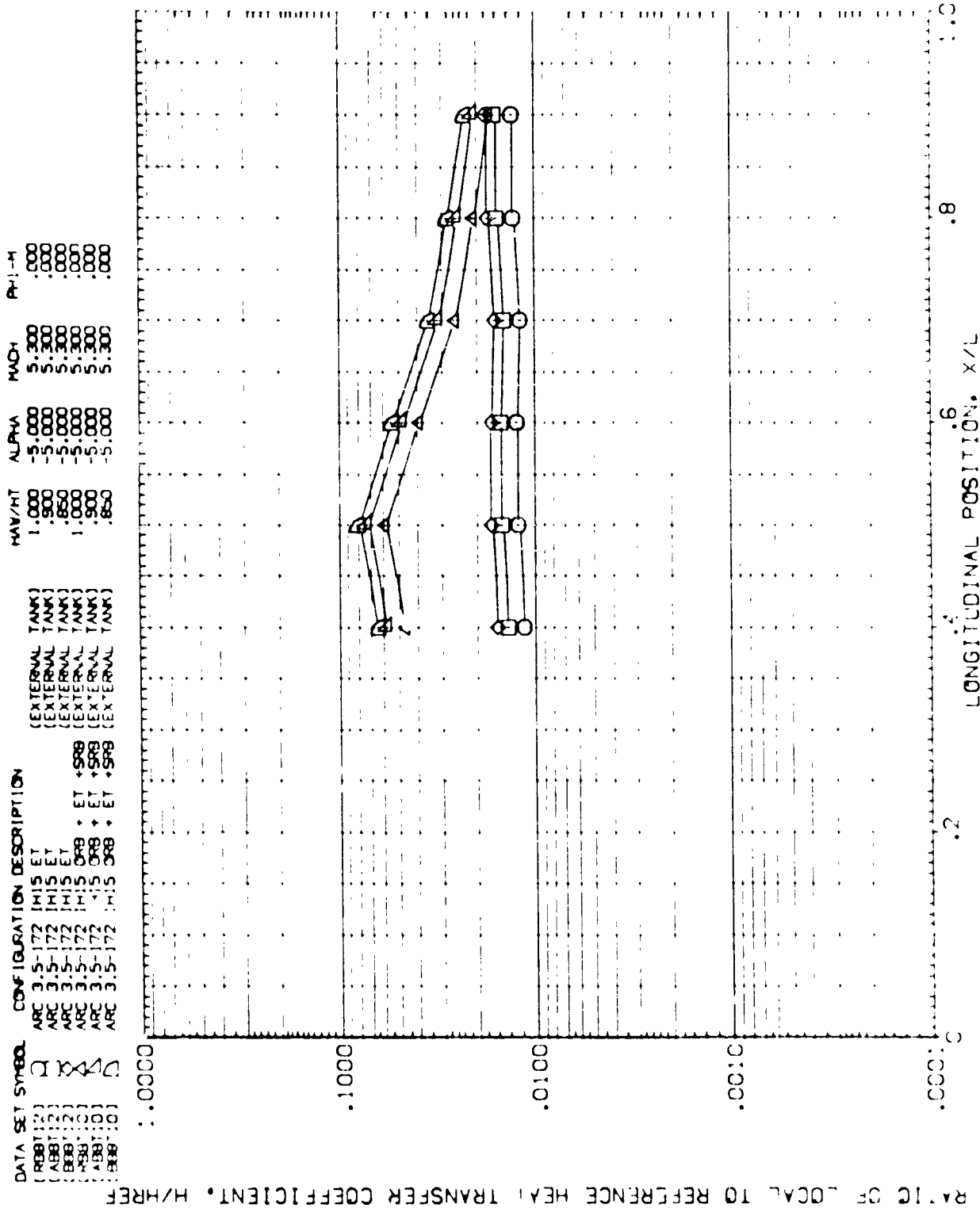


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONF. JURATION DESCRIPTION

(R88T12) ARC 3.5-173 I115 ET

(A88T12) ARC 3.5-173 I115 ET

(B88T12) ARC 3.5-173 I115 ET

(R88T10) ARC 3.5-172 I115 ORB + ET +SRB

(A88T10) ARC 3.5-172 I115 ORB + ET +SRB

(B88T10) ARC 3.5-172 I115 ORB + ET +SRB

NAV/HT ALPHA MACH PHI-M

1.000 -5.000 5.300 .000

.500 -5.000 5.300 .000

.850 -5.000 5.300 .000

1.000 -5.000 5.300 .000

.900 -5.000 5.300 .000

.850 -5.000 5.300 .000

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

(EXTERNAL TANK)

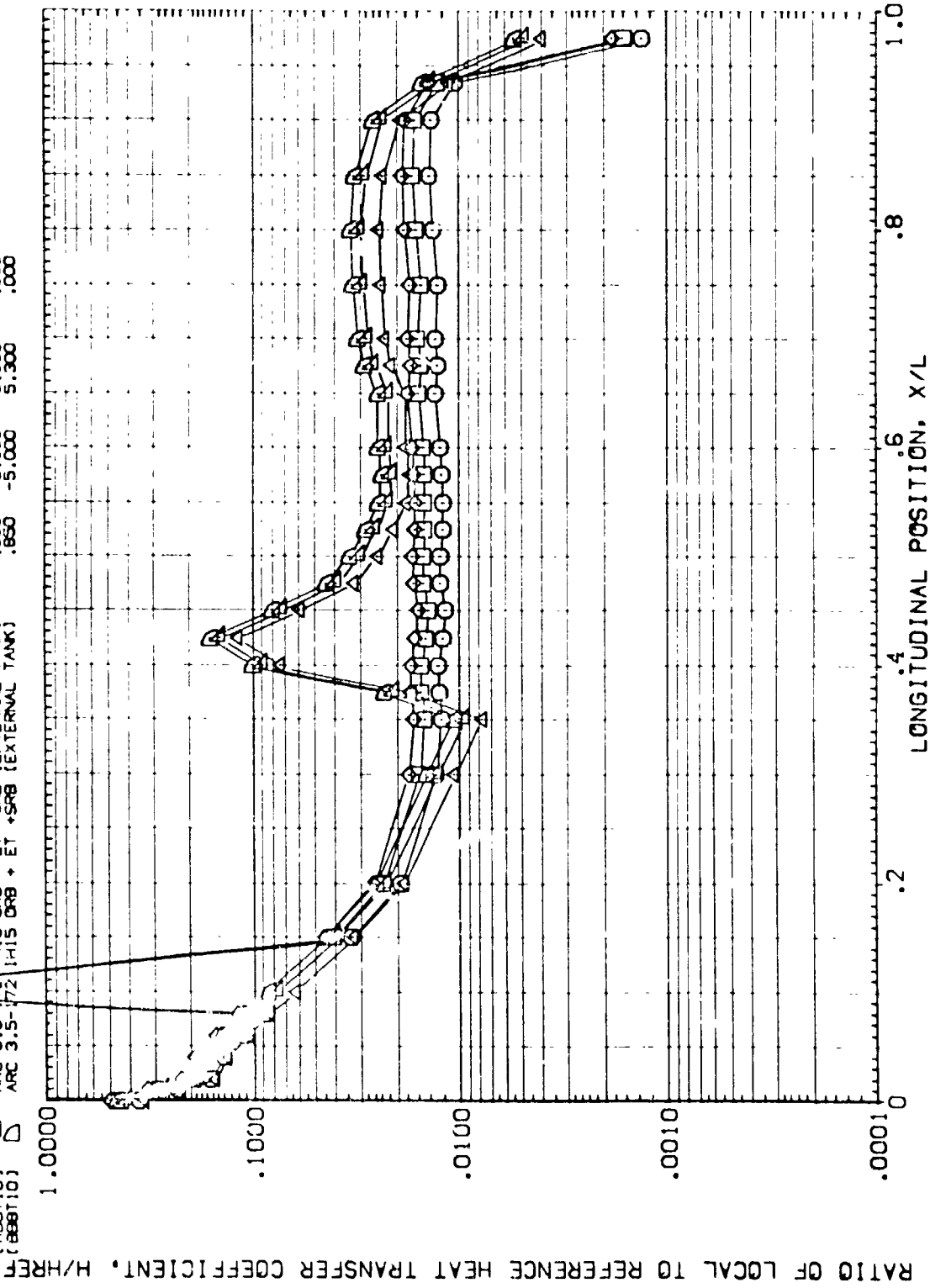


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.



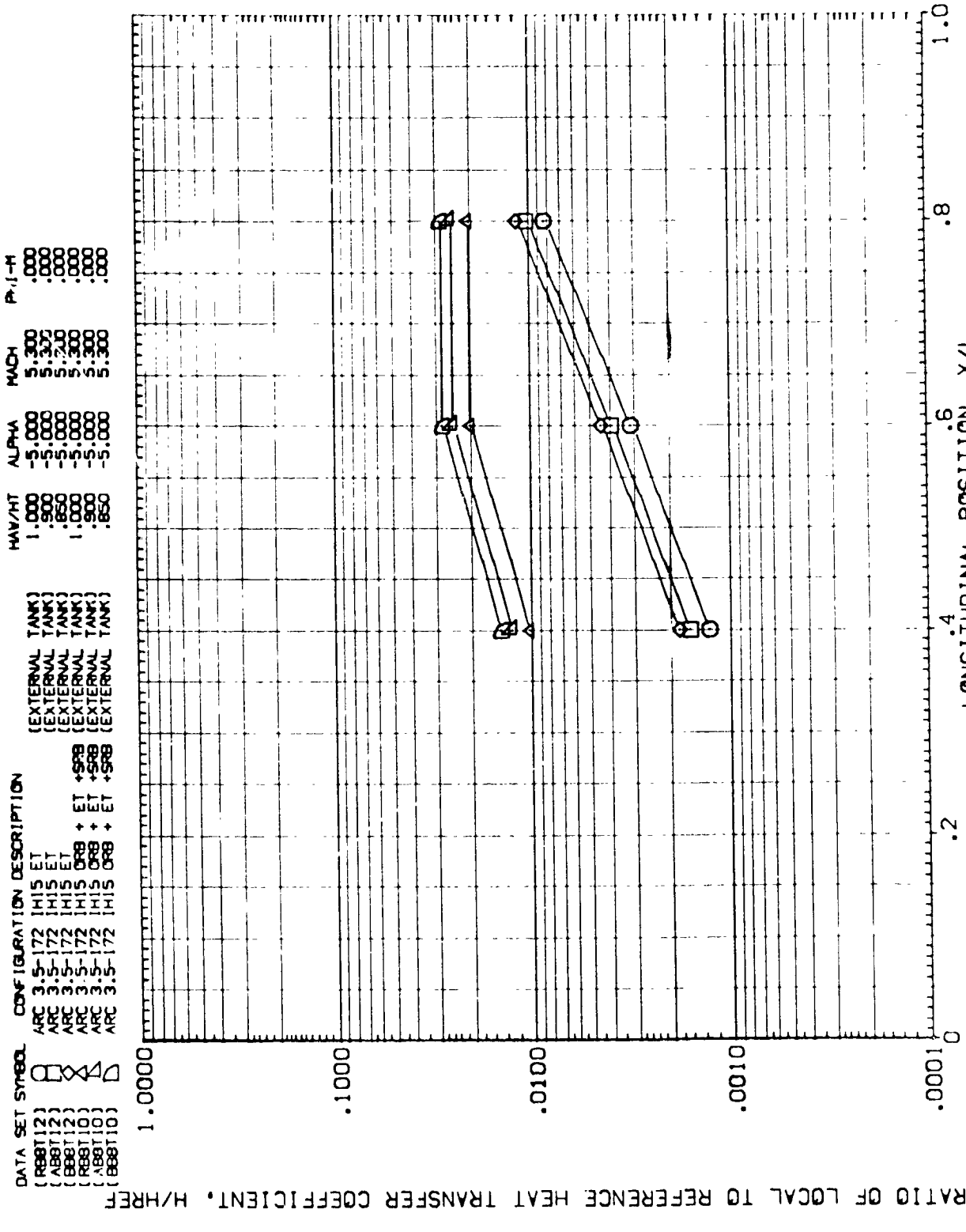


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

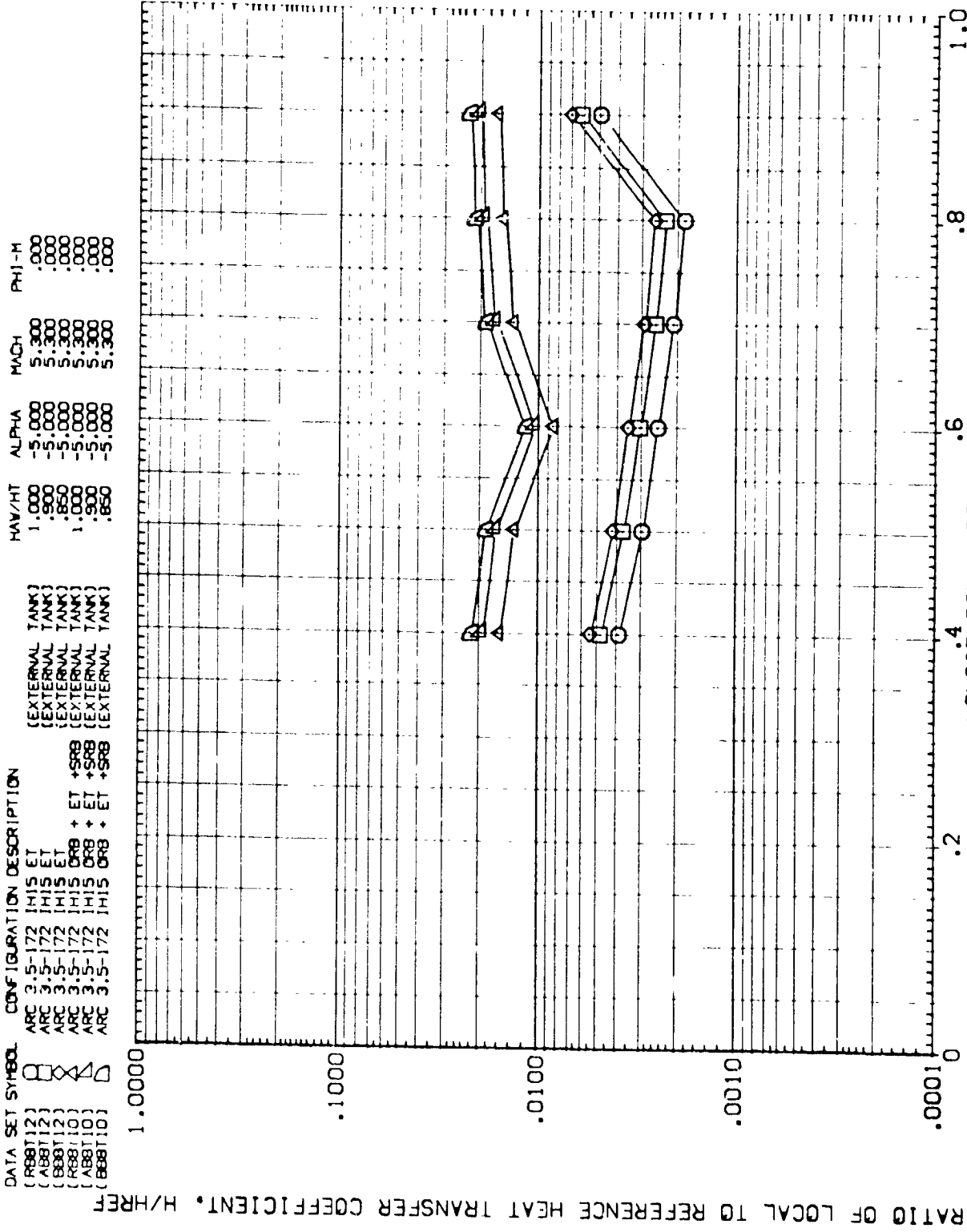


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 5.266 MACH = 5.300 PHI = 45.000 PAGE 66

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-H
(R00T12)	ARC 3.5-172 IH15 ET	1.000	-5.000	5.300	.000
(A00T12)	ARC 3.5-172 IH15 ET	.900	-5.000	5.300	.000
(S00T12)	ARC 3.5-172 IH15 ET	.850	-5.000	5.300	.000
(R00T10)	ARC 3.5-172 IH15 ORB + ET +SRB	1.000	-5.000	5.300	.000
(A00T10)	ARC 3.5-172 IH15 ORB + ET +SRB	.900	-5.000	5.300	.000
(S00T10)	ARC 3.5-172 IH15 ORB + ET +SRB	.850	-5.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

LONGITUDINAL POSITION, X/L

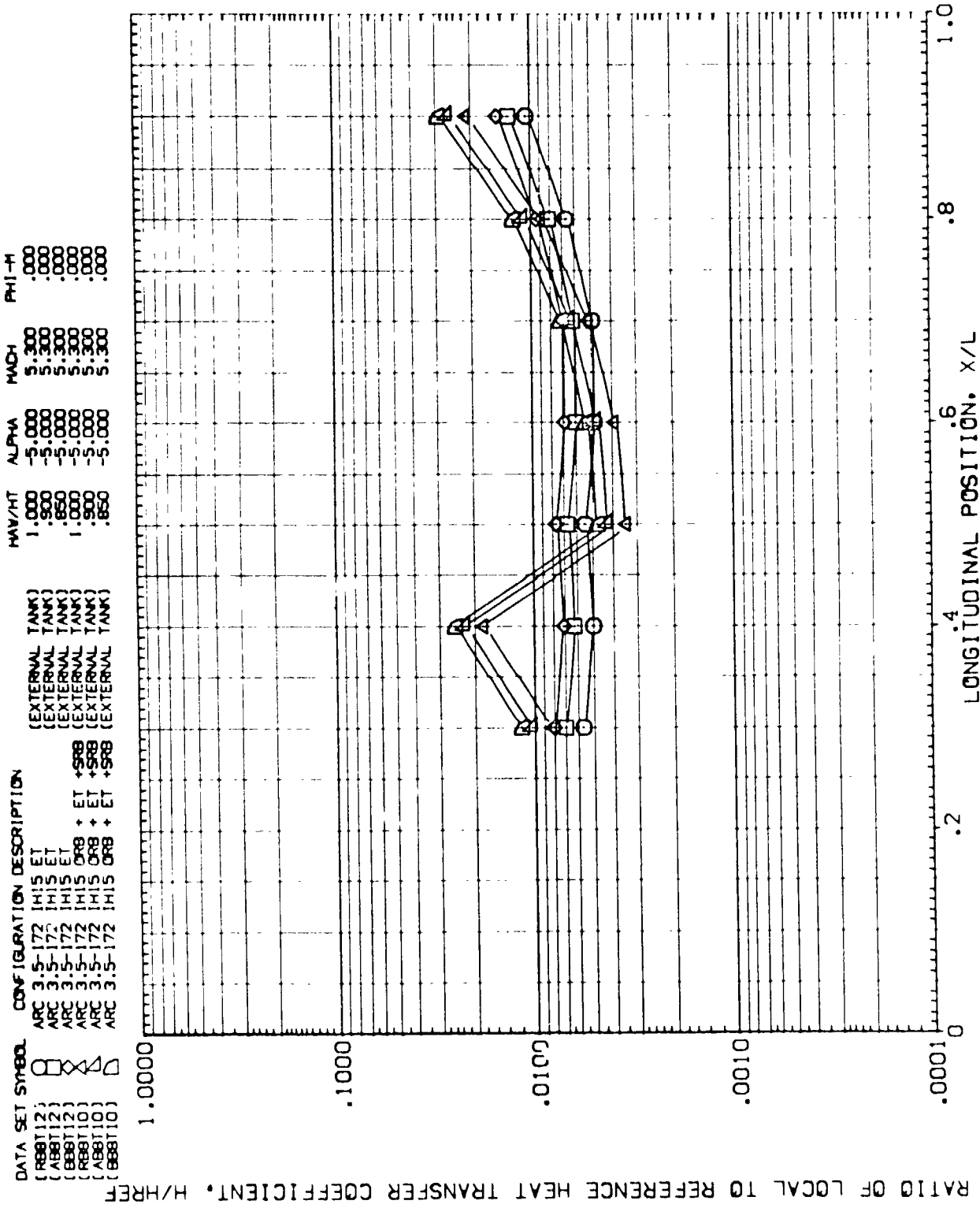


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(R88T12)	ARC 3.5-172 IH15 ET	1.000	-5.000	5.300	.000
(A 8T12)	ARC 3.5-172 IH15 ET	.900	-5.000	5.300	.000
(B88T12)	ARC 3.5-172 IH15 ET	.850	-5.000	5.300	.000
(R88T10)	ARC 3.5-172 IH15 DR8 + ET +SR8	1.000	-5.000	5.300	.000
(A88T10)	ARC 3.5-172 IH15 DR8 + ET +SR8	.900	-5.000	5.300	.000
(B88T10)	ARC 3.5-172 IH15 DR8 + ET +SR8	.850	-5.000	5.300	.000

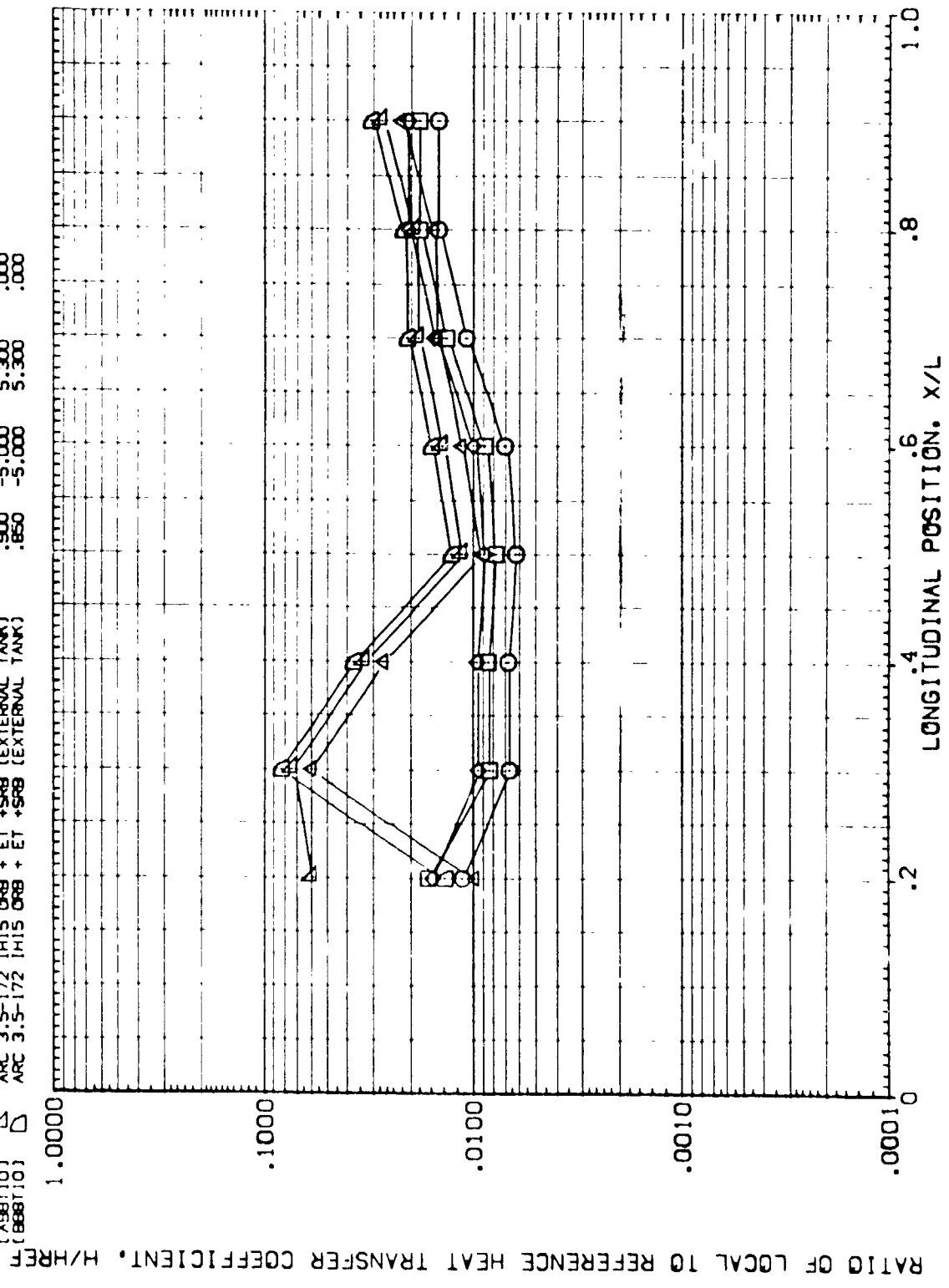


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 5.266 MACH = 5.300 PHI = 90.000 PAGE 68



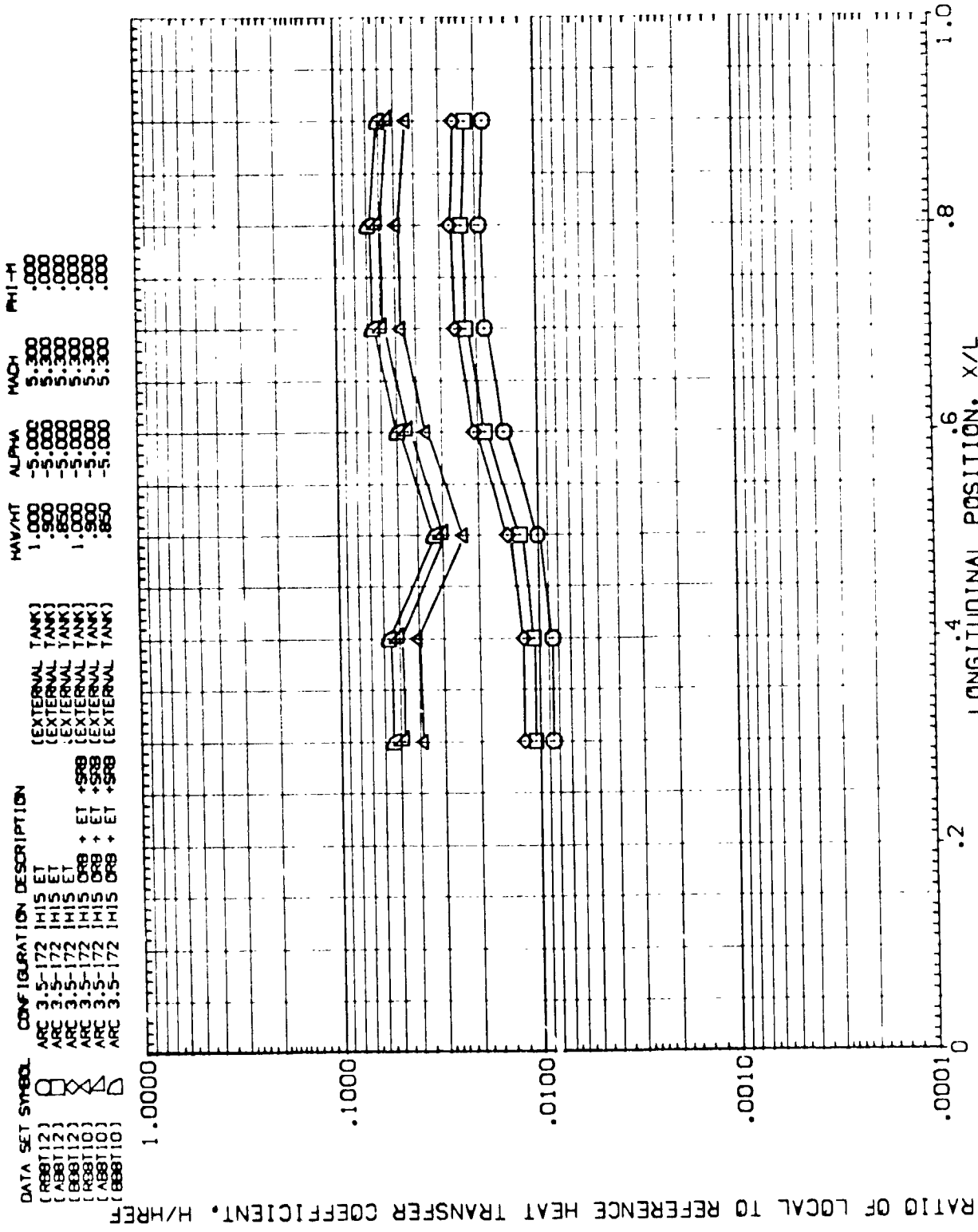


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RB8T12)	ARC 3.5-172 IH15 ET	(EXTERNAL TANK)
(AB8T12)	ARC 3.5-172 IH15 ET	(EXTERNAL TANK)
(EB8T12)	ARC 3.5-172 IH15 ET	(EXTERNAL TANK)
(RB8T10)	ARC 3.5-172 IH15 OR8 + ET +SR8	(EXTERNAL TANK)
(AB8T10)	ARC 3.5-172 IH15 OR8 + ET +SR8	(EXTERNAL TANK)
(BB8T10)	ARC 3.5-172 IH15 OR8 + ET +SR8	(EXTERNAL TANK)

MAV/HT ALPHA MACH PHI-H

1.000	-5.000	5.300	.000
.500	-5.000	5.300	.000
.850	-5.000	5.300	.000
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000

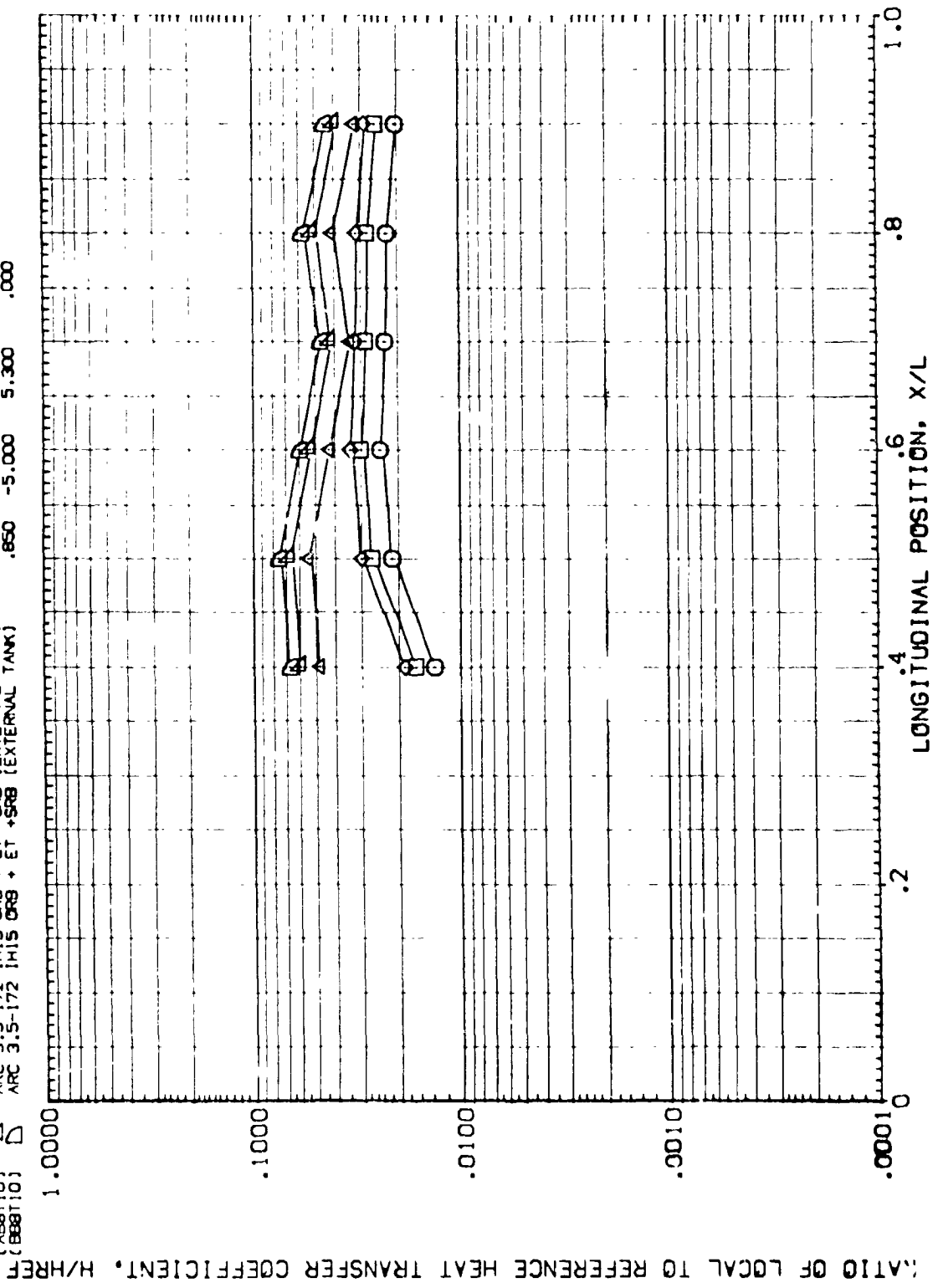


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 5.266 MACH = 5.300 PHI = 135.000 PAGE 70



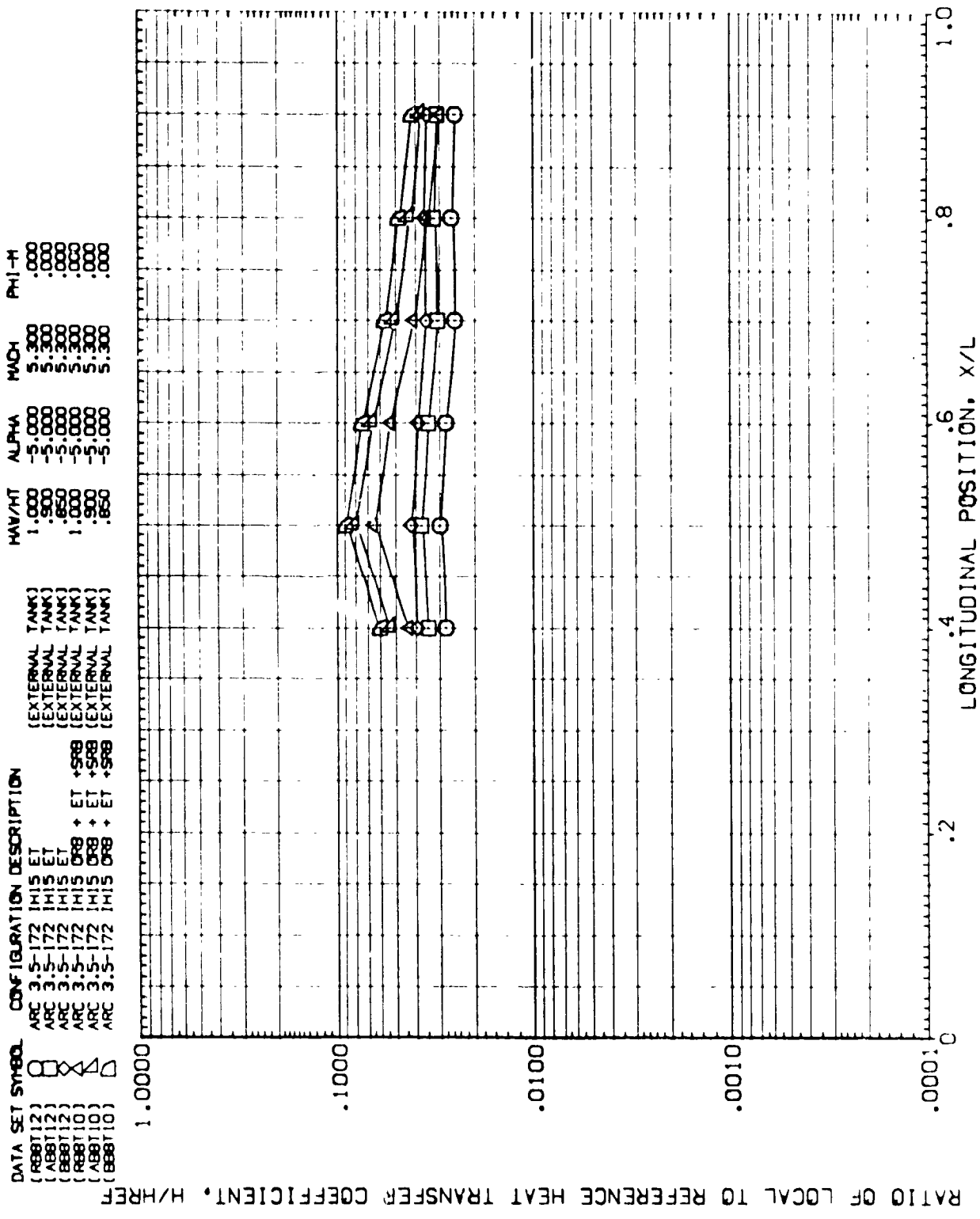


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

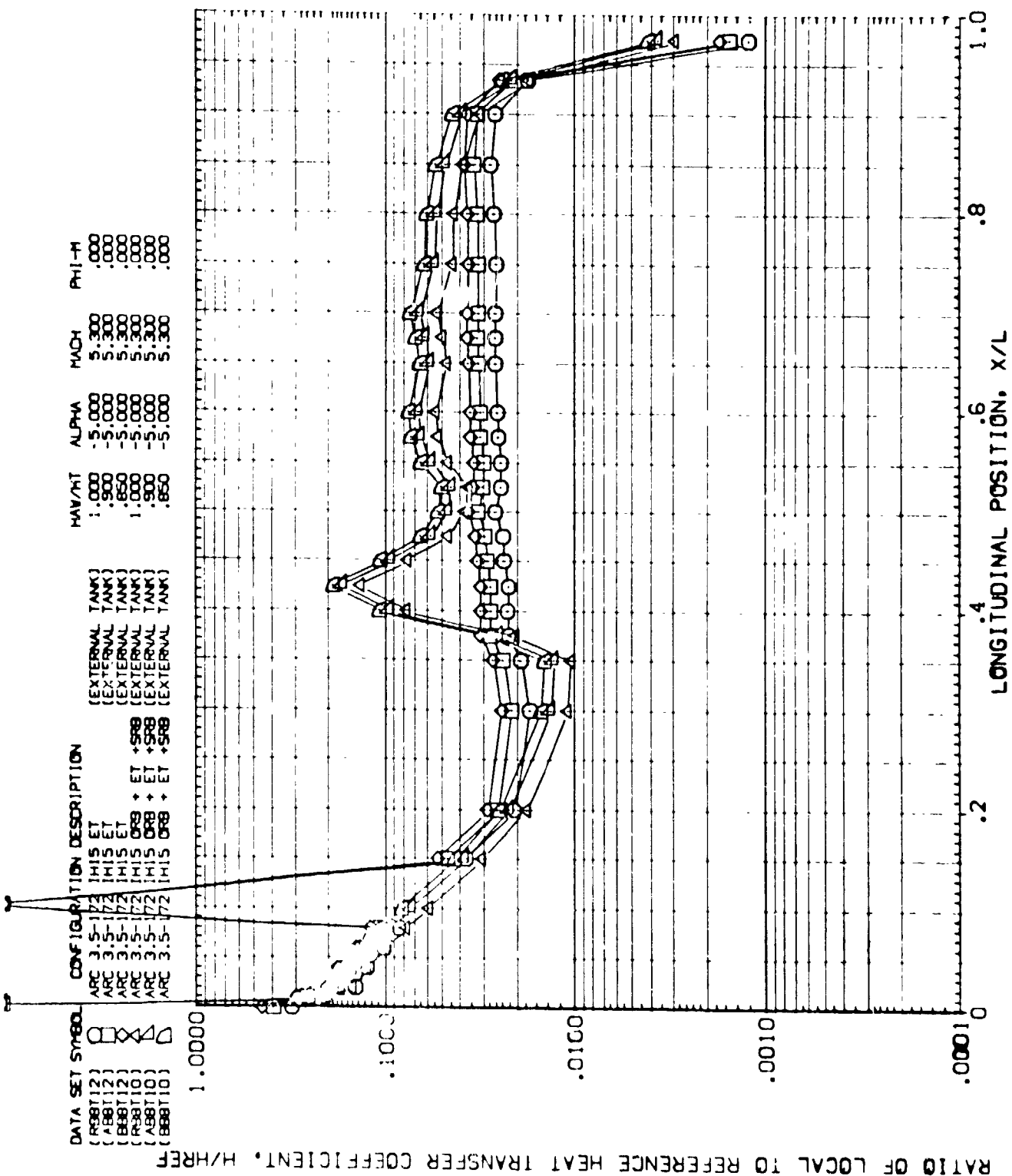


FIG. 8 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RV/L = 5.266 MACH = 5.300 PHI = 180.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H
 (088T10) ARC 3.5-172 IH15 OR8 + ET +988 (EXTERNAL TANK) 5.300 -5.000 .000
 (EB8T10) ARC 3.5-172 IH15 OR8 + ET +988 (EXTERNAL TANK) 5.300 -5.000 .000
 (FB8T10) ARC 3.5-172 IH15 OR8 + ET +988 (EXTERNAL TANK) 5.300 -5.000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

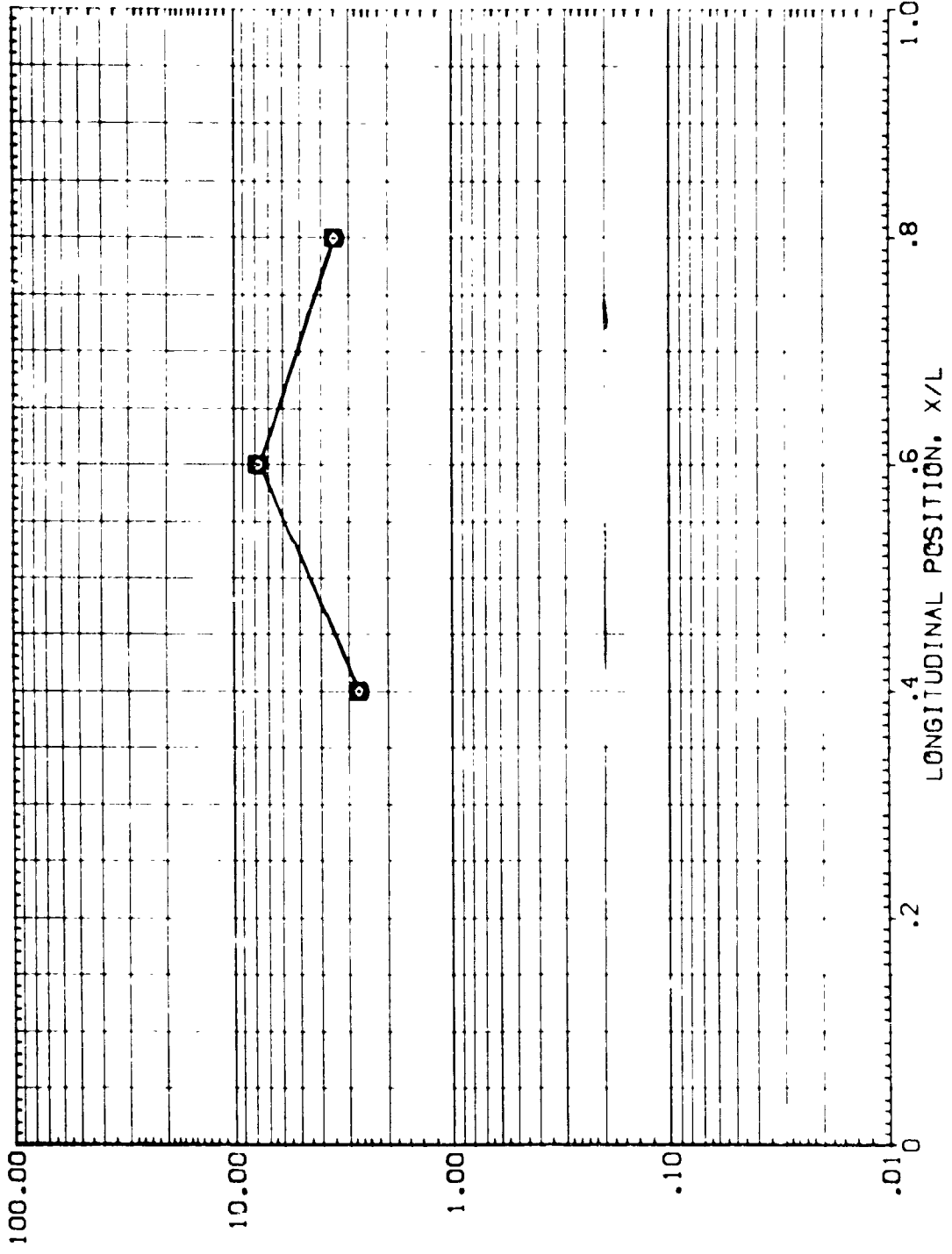


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

BRN/L = 2.009 MACH = 5.300 PHI = .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPH-A PHI-M

(DBBT10) ARC 3.5-172 (H15 DRB + ET +SRB (EXTERNAL TANK) 5.300 .000

(EBBT10) ARC 3.5-172 (H15 DRB + ET +SRB (EXTERNAL TANK) 5.300 .000

(FBBT10) ARC 3.5-172 (H15 DRB + ET +SRB (EXTERNAL TANK) 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

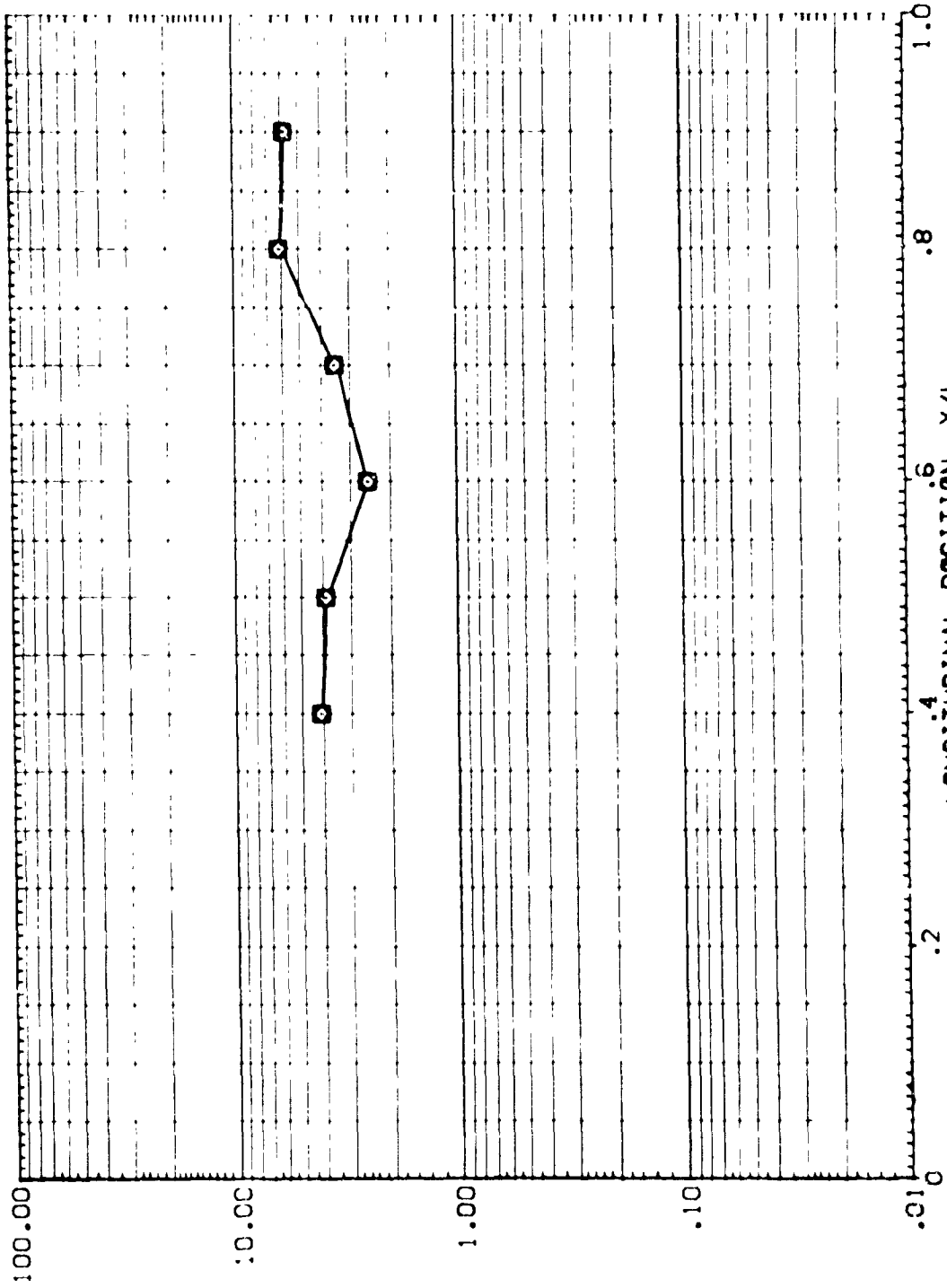


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 GRN/L = 2.009 MACH = 5.300 PHI = 45.000



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA HAV/HT PH/HT

(DBB110) □ ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 1.000 5.000 .000

(EBB110) ∞ ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .500 5.300 .000

(FBB110) ∞ ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK) .850 -5.000 .850 5.300 .000

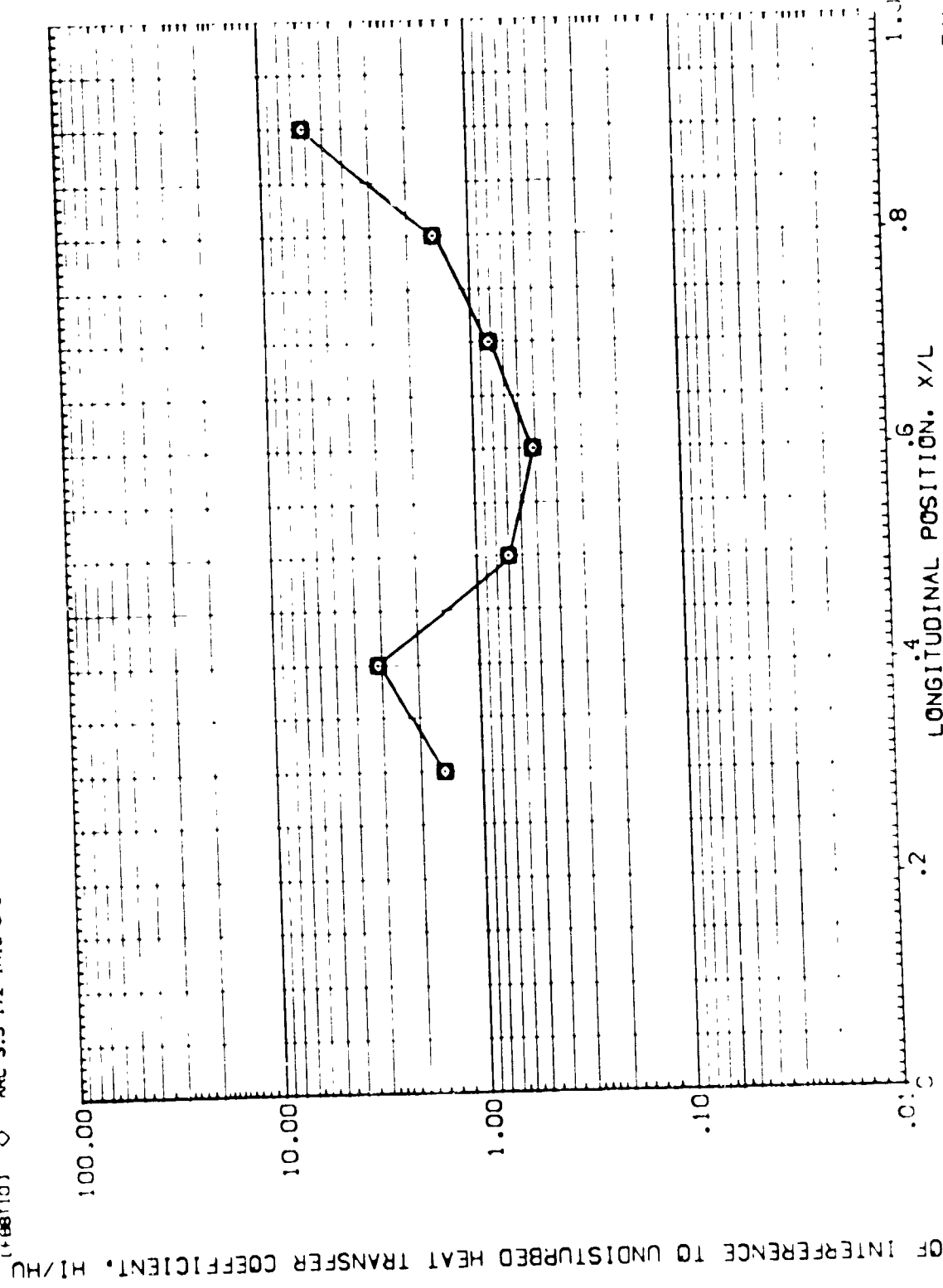


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

$\rho_{10}/\rho_{\infty} = 2.009$ $\mu_{10}/\mu_{\infty} = 5.300$ $\rho_{11} = 67.500$ PAGE 75

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DBBT10) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(EBBT10) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(FBBT10) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

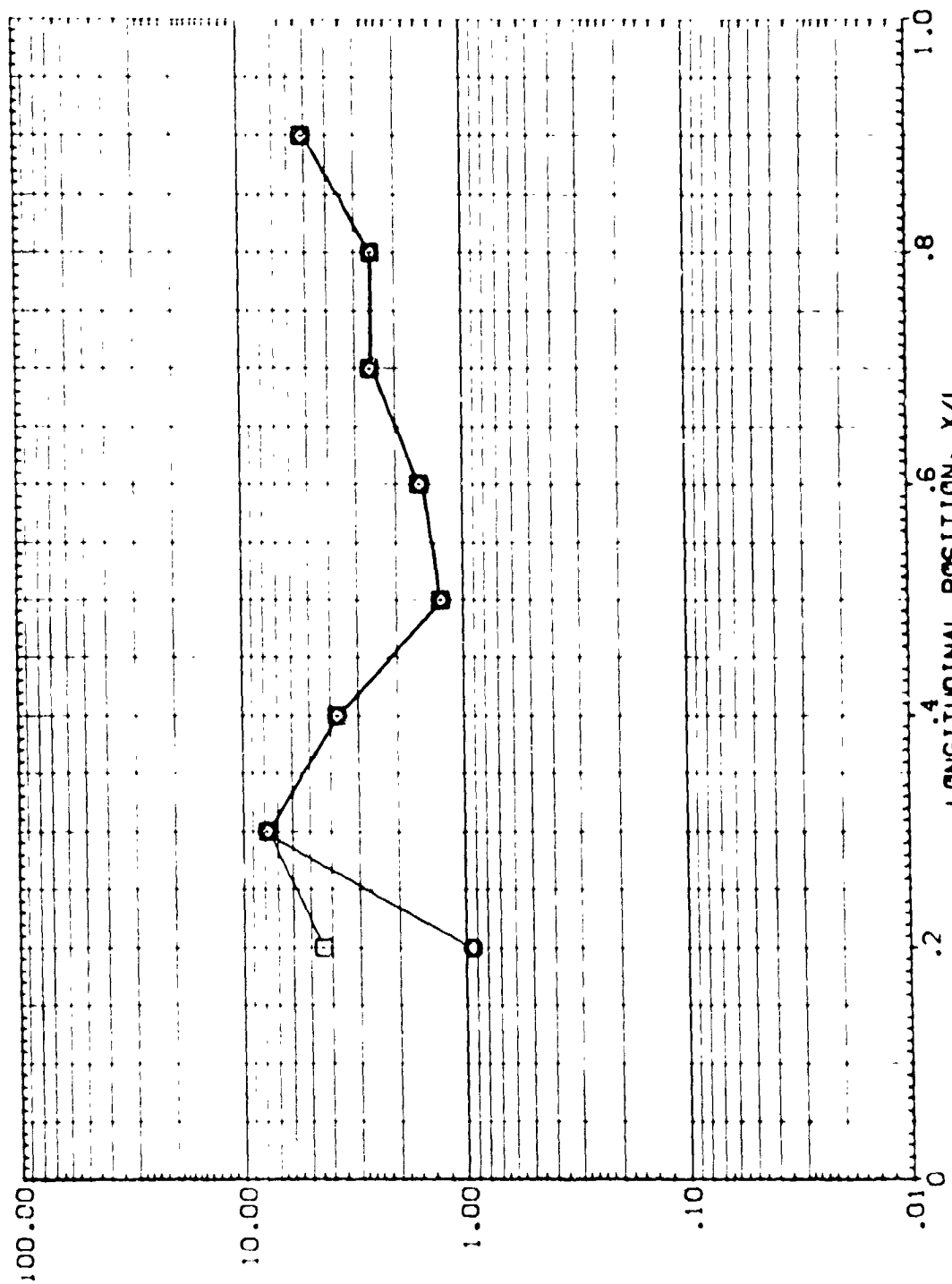


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA MACH PHI-TH

(088110) ARC 3.5-172 (M)S DRB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 5.300 .000

(188110) ARC 3.5-172 (M)S DRB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 5.300 .000

(288110) ARC 3.5-172 (M)S DRB + ET +SRB (EXTERNAL TANK) .850 -5.000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H/H₀

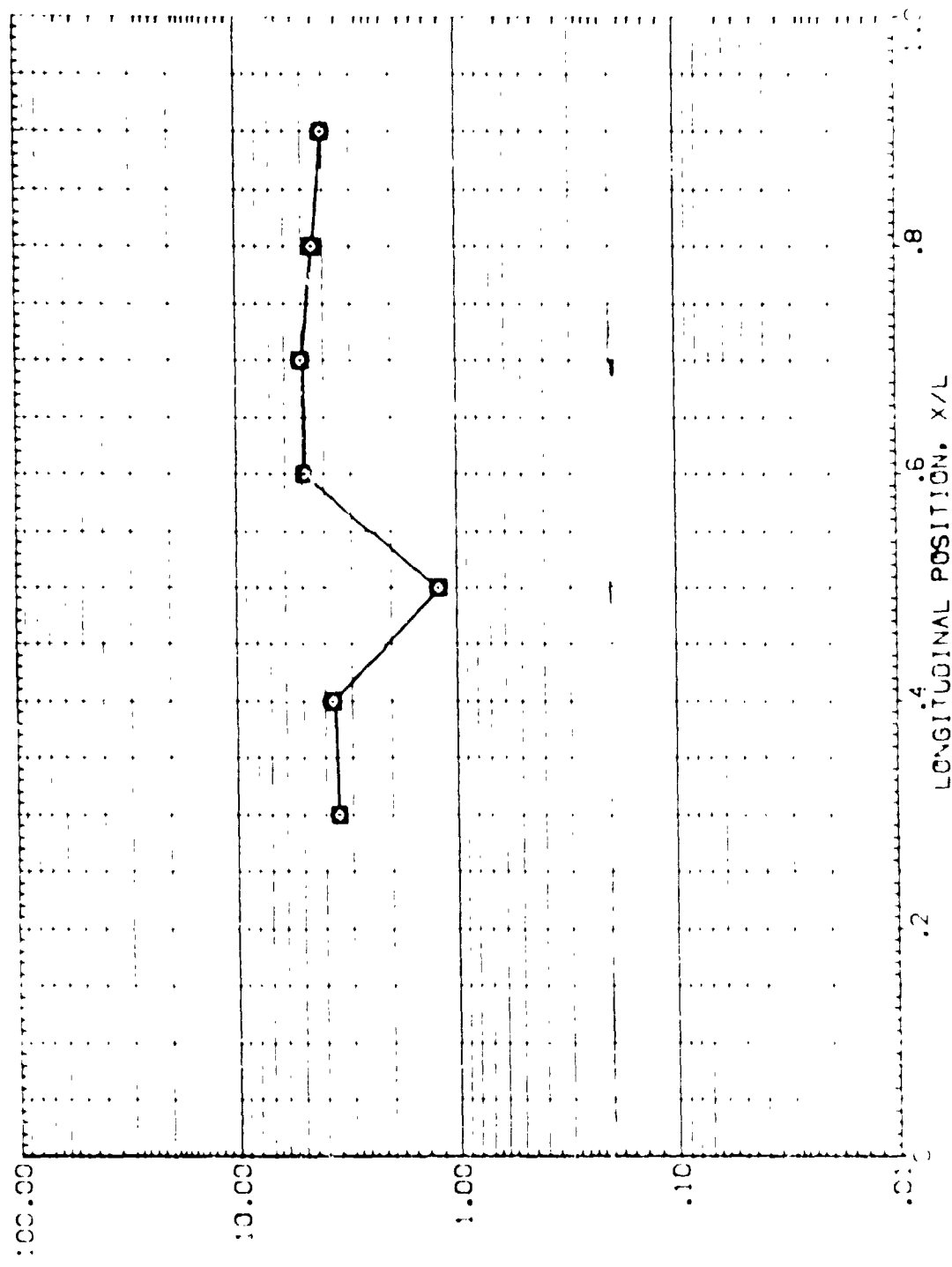


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF. EXTERNAL TANK.

DATA SET SYMBOL
 (DB8110)
 (EB8110)
 (FB8110)

CONFIGURATION DESCRIPTION
 ARC 3-5-172 IHIS ORB + ET +SRB (EXTERNAL TANK)
 ARC 3-5-172 IHIS ORB + ET +SRB (EXTERNAL TANK)
 ARC 3-5-172 IHIS ORB + ET +SRB (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-M
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

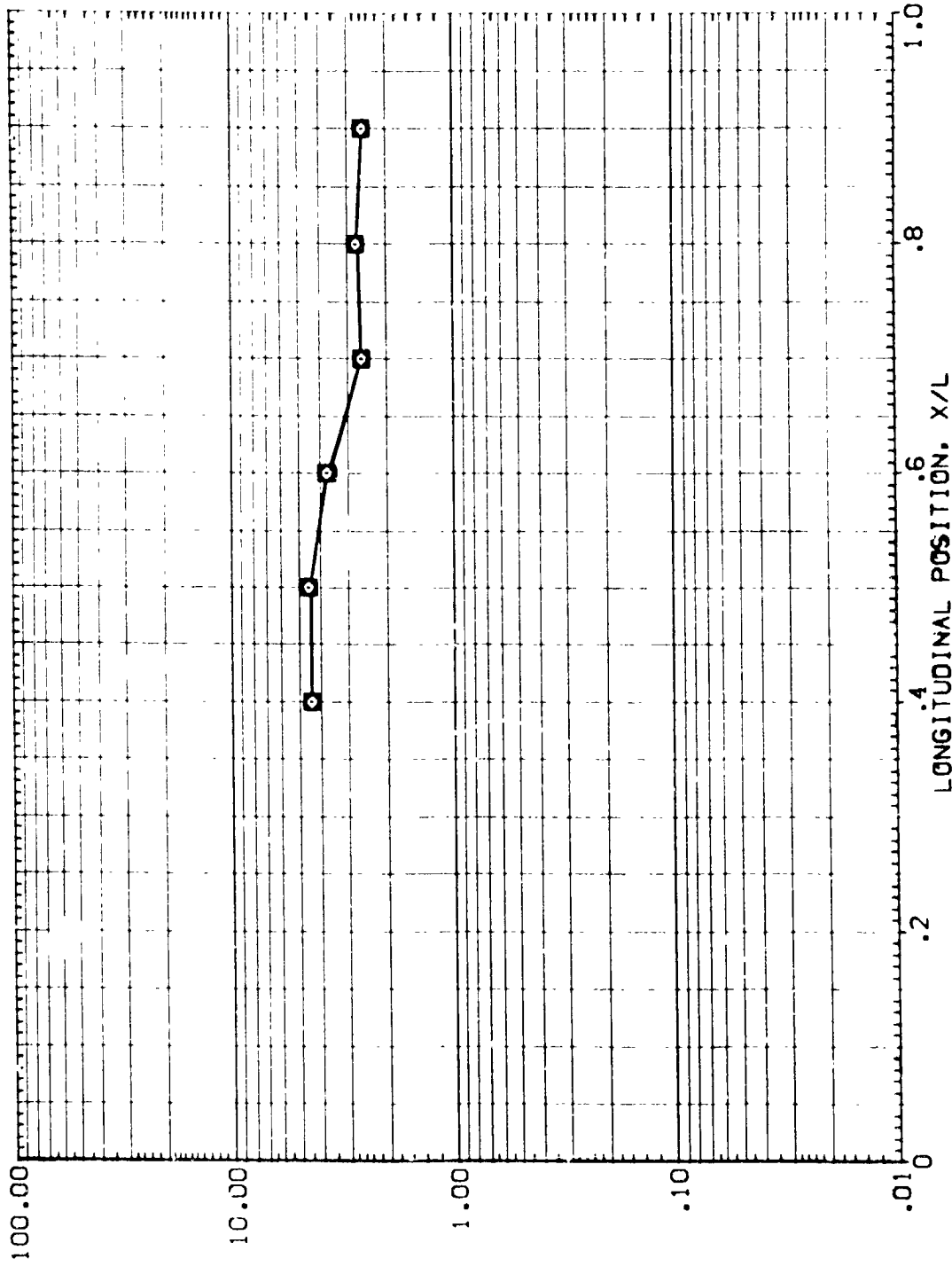


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

ORNL = 2.009 MACH = 5.300 PHI = 135.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DBBT10) ARC 3.5-172 IH15 DRB + ET +SRB (EXTERNAL TANK)
 (EBBT10) ARC 3.5-172 IH15 DRB + ET +SRB (EXTERNAL TANK)
 (FBBT10) ARC 3.5-172 IH15 DRB + ET +SRB (EXTERNAL TANK)

MAV/HT ALPHA MACH PHI-H
 1.000 -3.000 5.300 .000
 .650 -3.000 5.300 .000

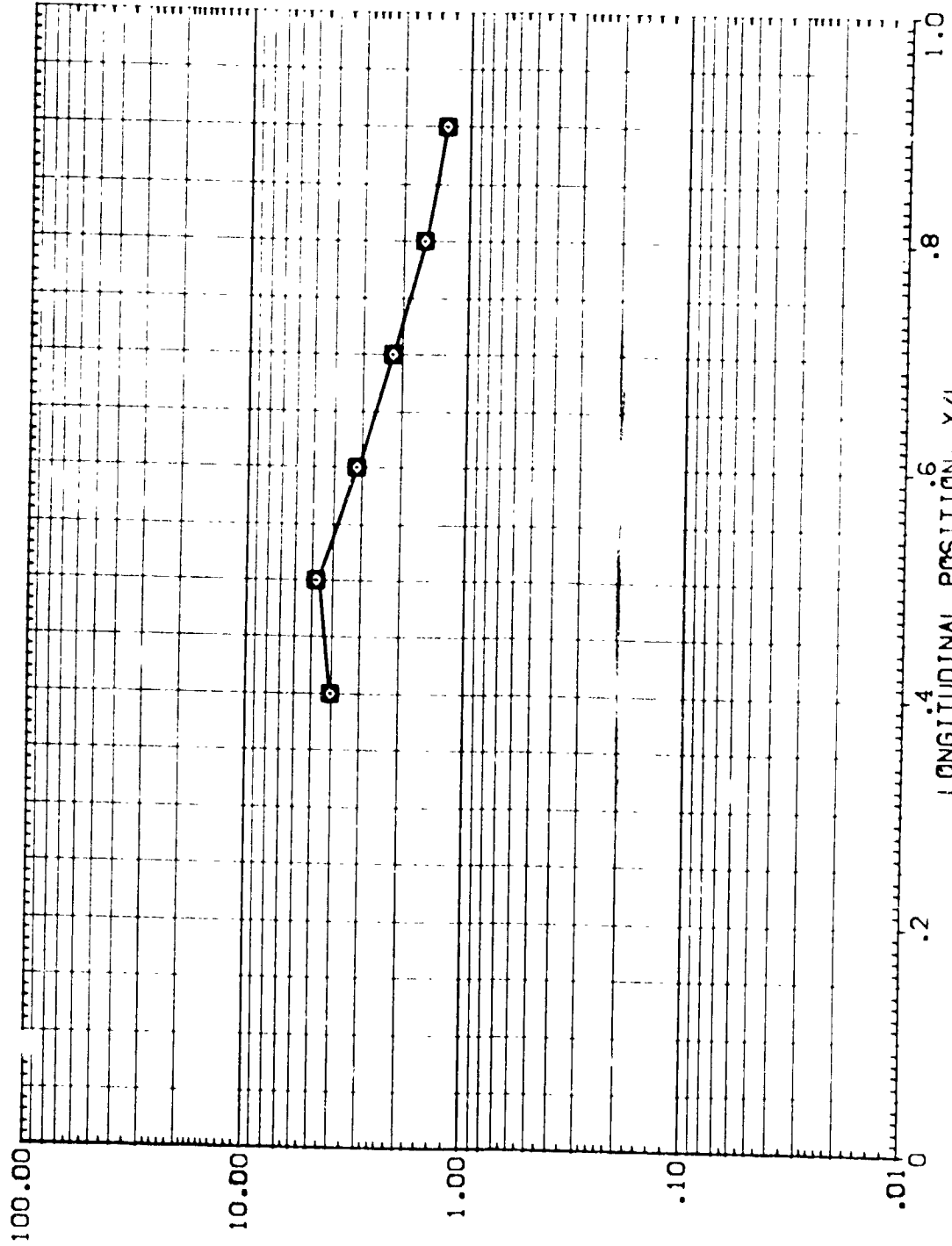


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 2.009 MACH = 5.300 PHI = .57.500 PAGE 79

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(088T10) ◯ ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(E88T10) ◯ ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(F88T10) ◊ ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

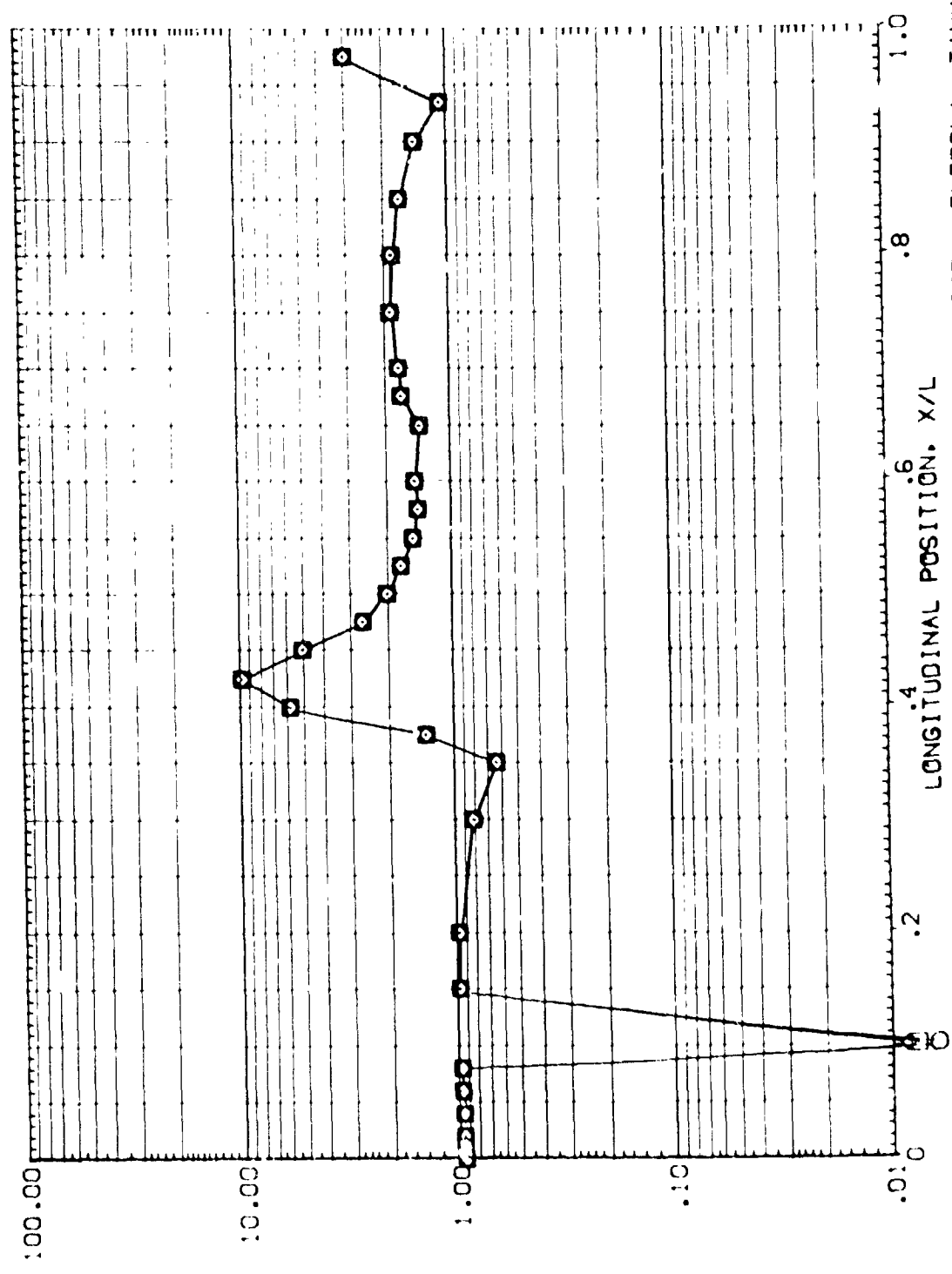


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORBITAL = 2.009 MACH = 5.300 P-I = 180.000 PAGE 8C



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DBB110) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(FBB110) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(FBB110) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

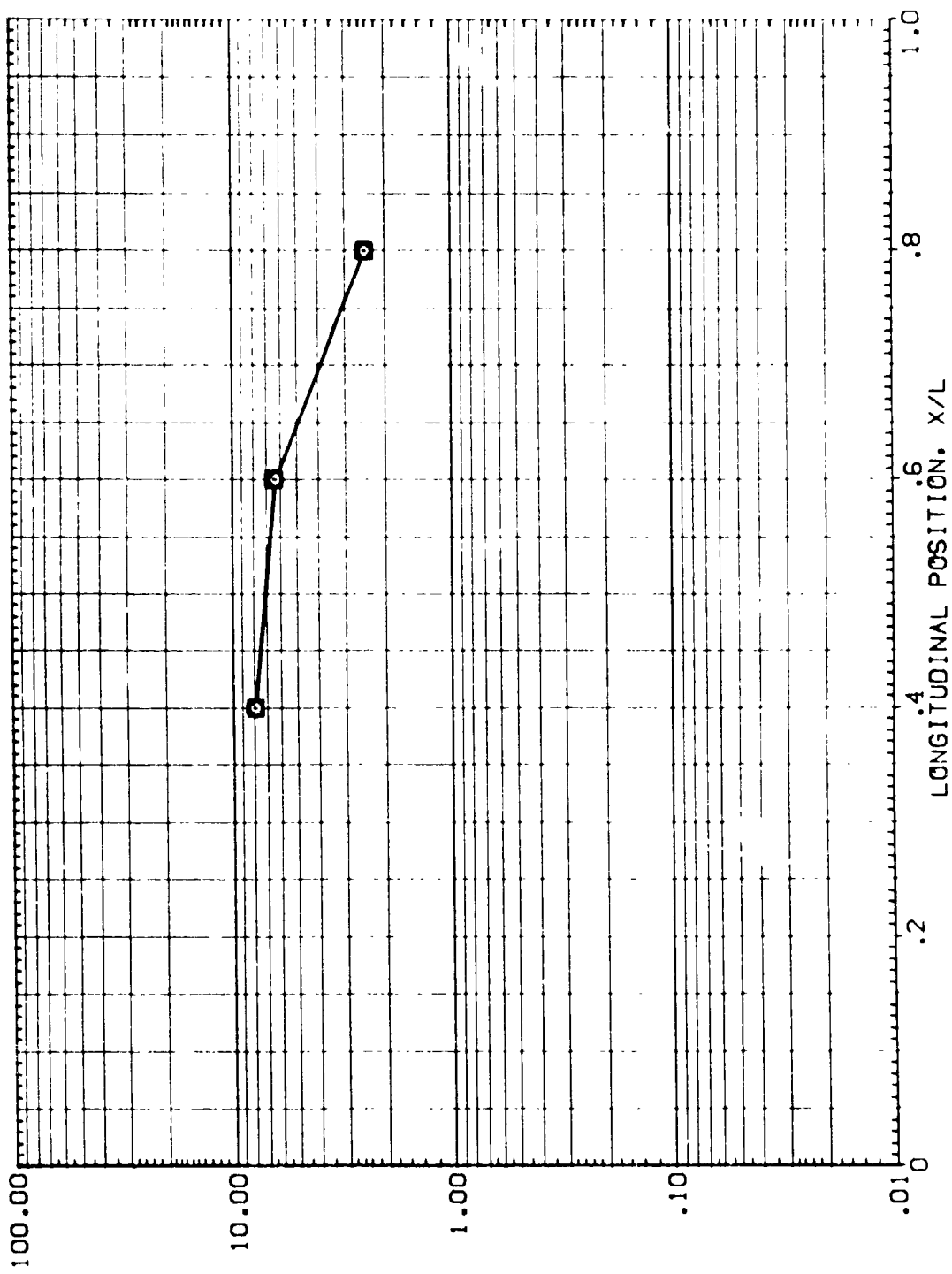


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DBBT10) ARC 3.5-172 IH15 DRB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(EBBT10) ARC 3.5-172 IH15 DRB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

(FBBT10) ARC 3.5-172 IH15 DRB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU ARN/L = 4.771 MACH = 5.300 PHI = 45.000

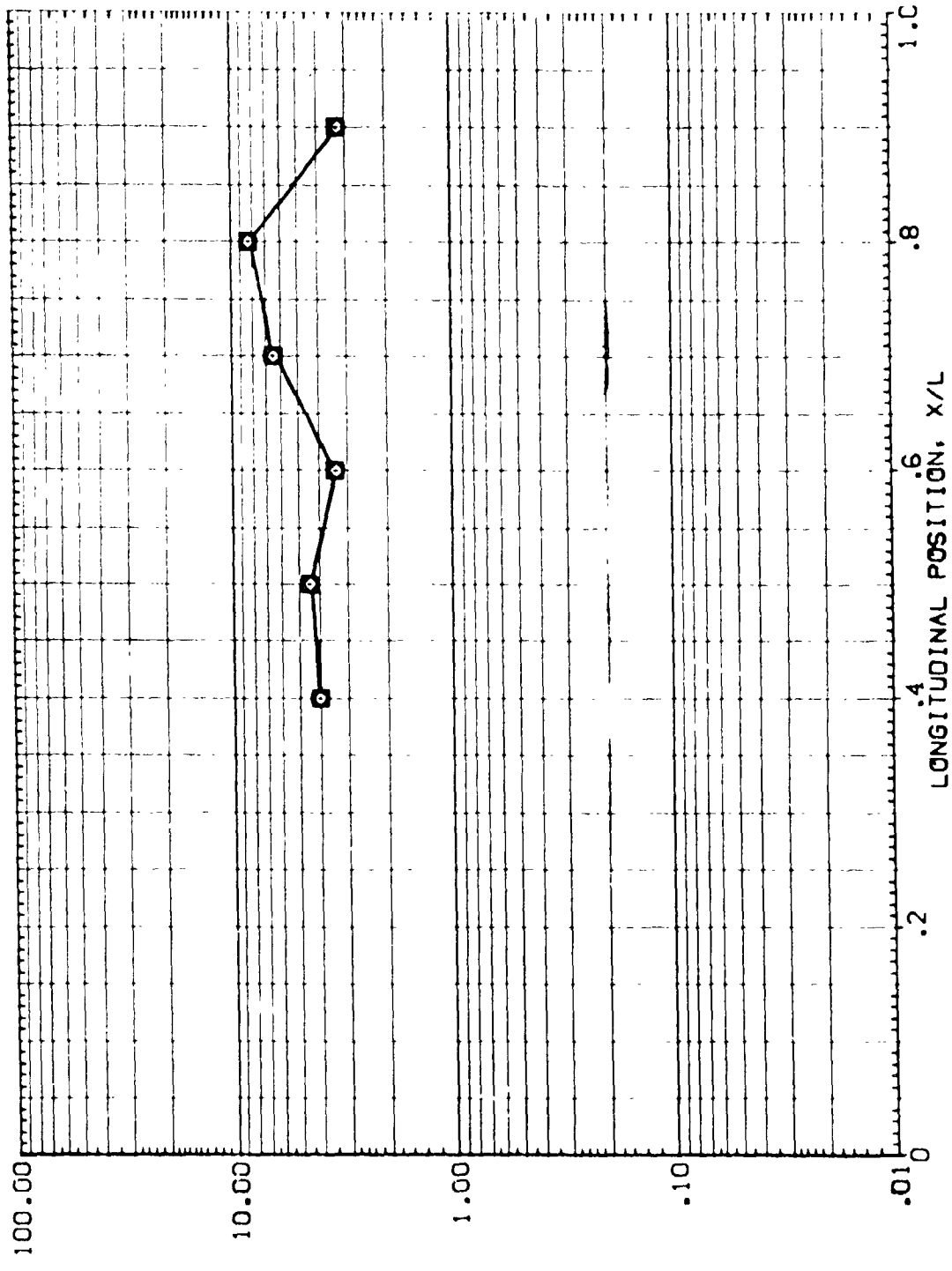


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-M

(DBB110) ARC 3.5-172 IH15 C38 + ET +SR8 (EXTERNAL TANK) 5.300 -5.000 .000

(EBB110) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) 5.300 -5.000 .000

(FBB110) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) 5.300 -5.000 .000

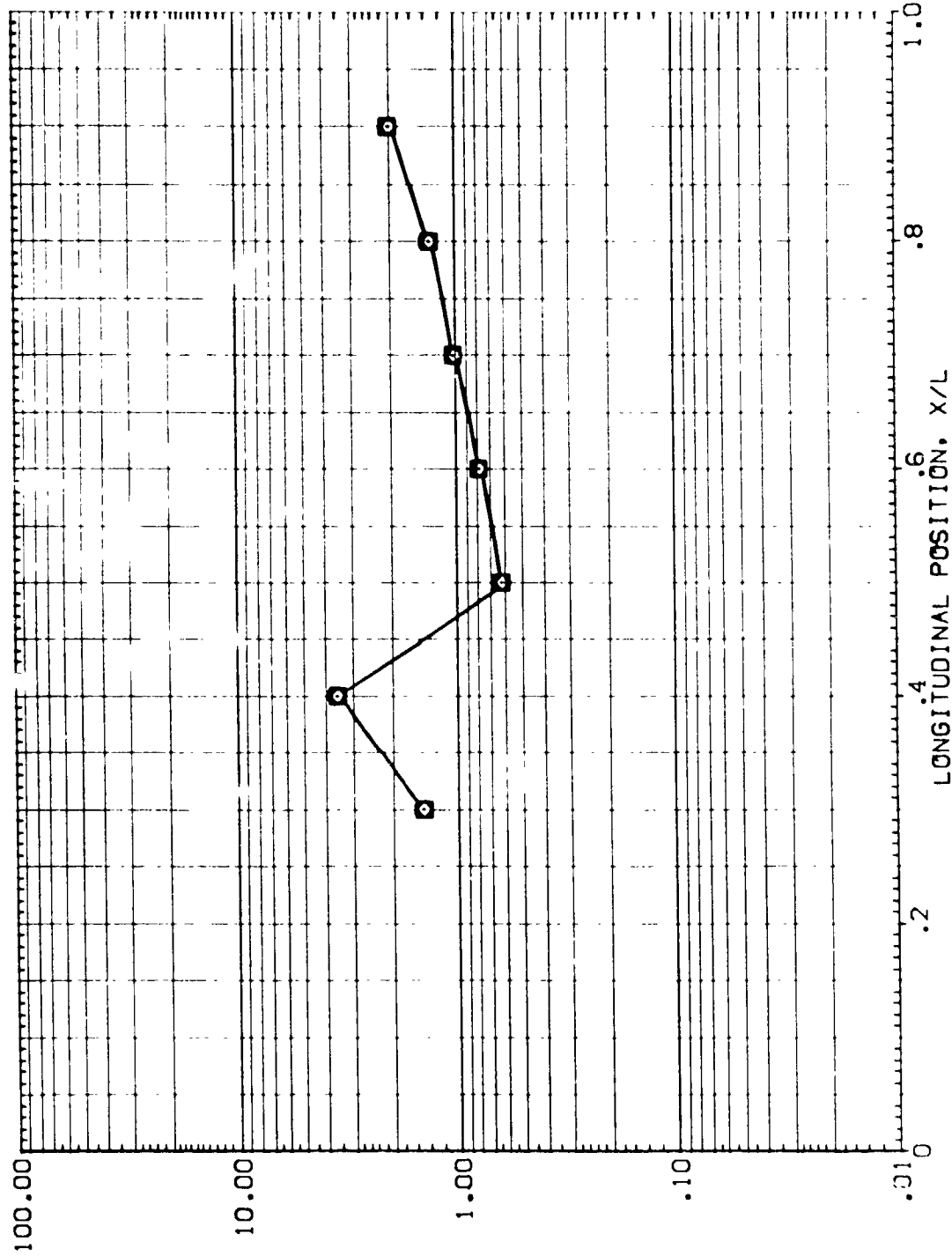


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(D88T10) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) 1.000 -5.000 5.300 .000

(E88T10) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) .900 -5.000 5.300 .000

(F88T10) ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK) .850 -5.000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

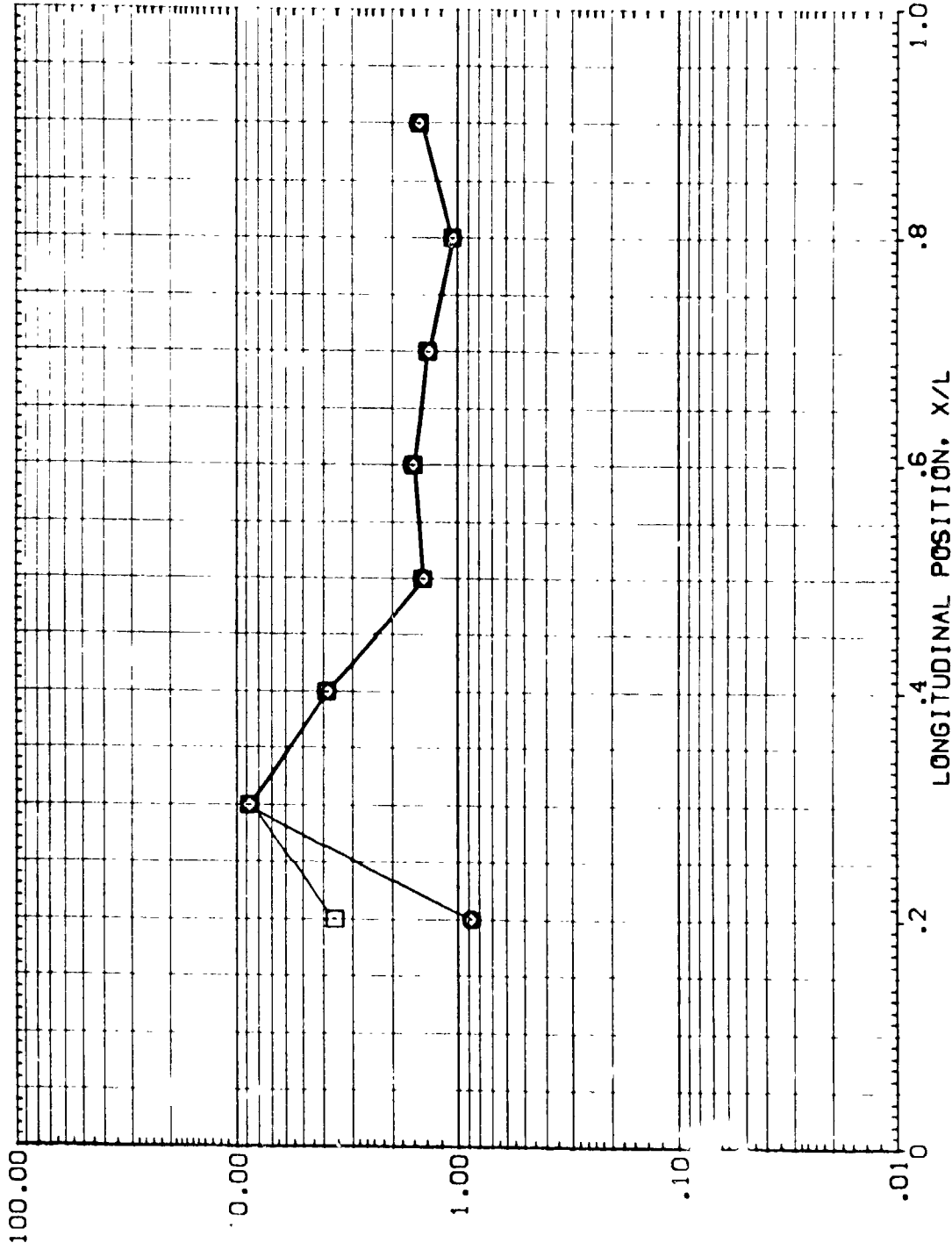


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.

ORNL/L = 4.771 MACH = 5.300 PHI = 90.000

DATA SET SYMBOL: (DBB710) (EBB110) (FBB110)

CONFIGURATION DESCRIPTION	MAV/MT	ALPHA	MACH	PHI-H
ARC 3.5-172 IM15 ORB + ET +SRB (EXTERNAL TANK)	1.000	-5.000	5.300	.000
ARC 3.5-172 IM15 ORB + ET +SRB (EXTERNAL TANK)	.900	-5.000	5.300	.000
ARC 3.5-172 IM15 ORB + ET +SRB (EXTERNAL TANK)	.850	-5.000	5.300	.000

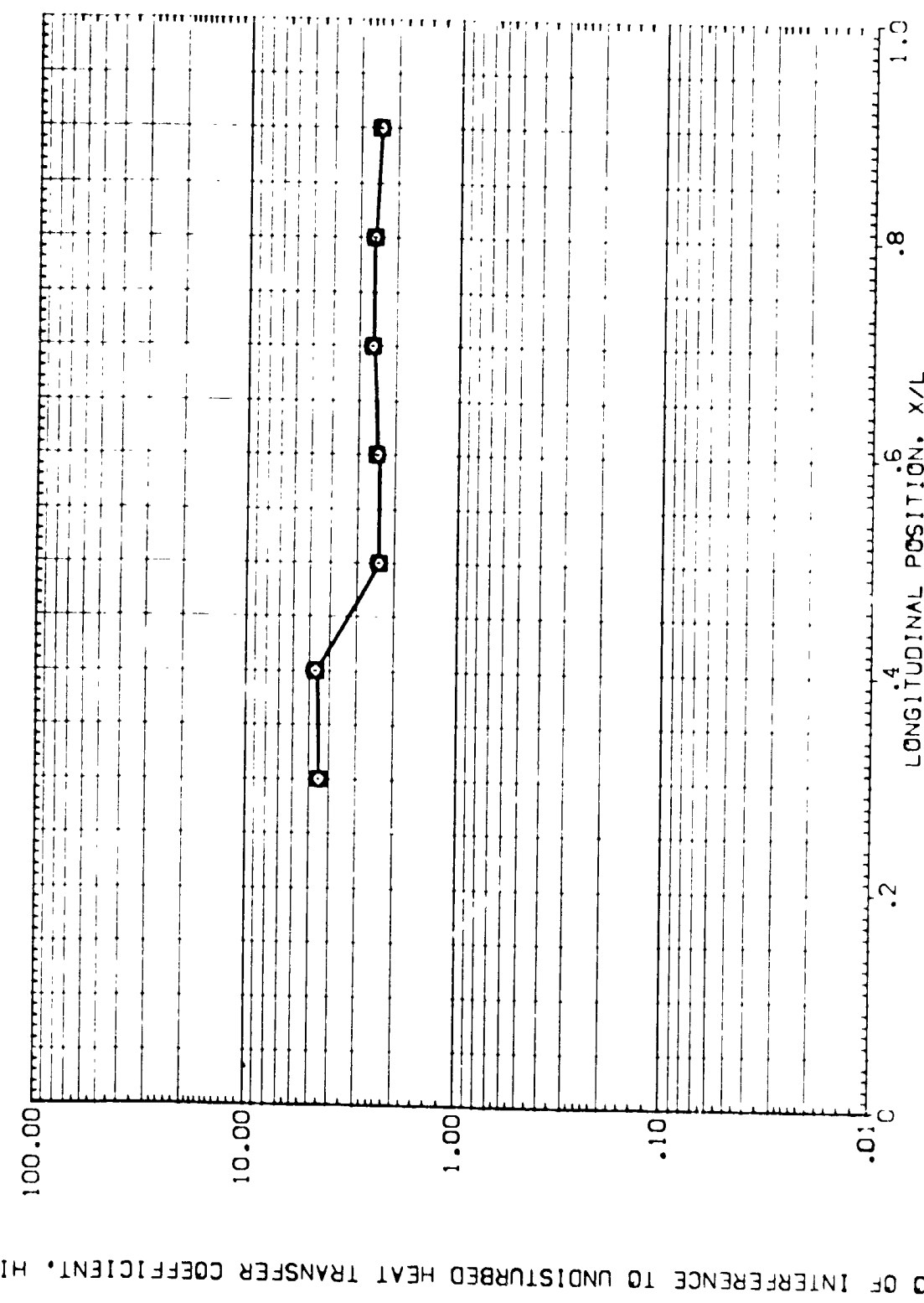


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 $OPH/L = 4.77$; $MACH = 5.300$ $PHI = 112.500$ PAGE 85

DATA SET SYMBOL: (088T10) (E88T10) (P88T10)

CONFIGURATION DESCRIPTION	MACH	PHI-H
ARC 3.5-172 H15 DRB + ET +SRB (EXTERNAL TANK)	5.300	.000
ARC 3.5-172 H15 DRB + ET +SRB (EXTERNAL TANK)	5.300	.000
ARC 3.5-172 H15 DRB + ET +SRB (EXTERNAL TANK)	5.300	.000

MACH: 1.000, .900, .850

PHI-H: .000, .000, .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

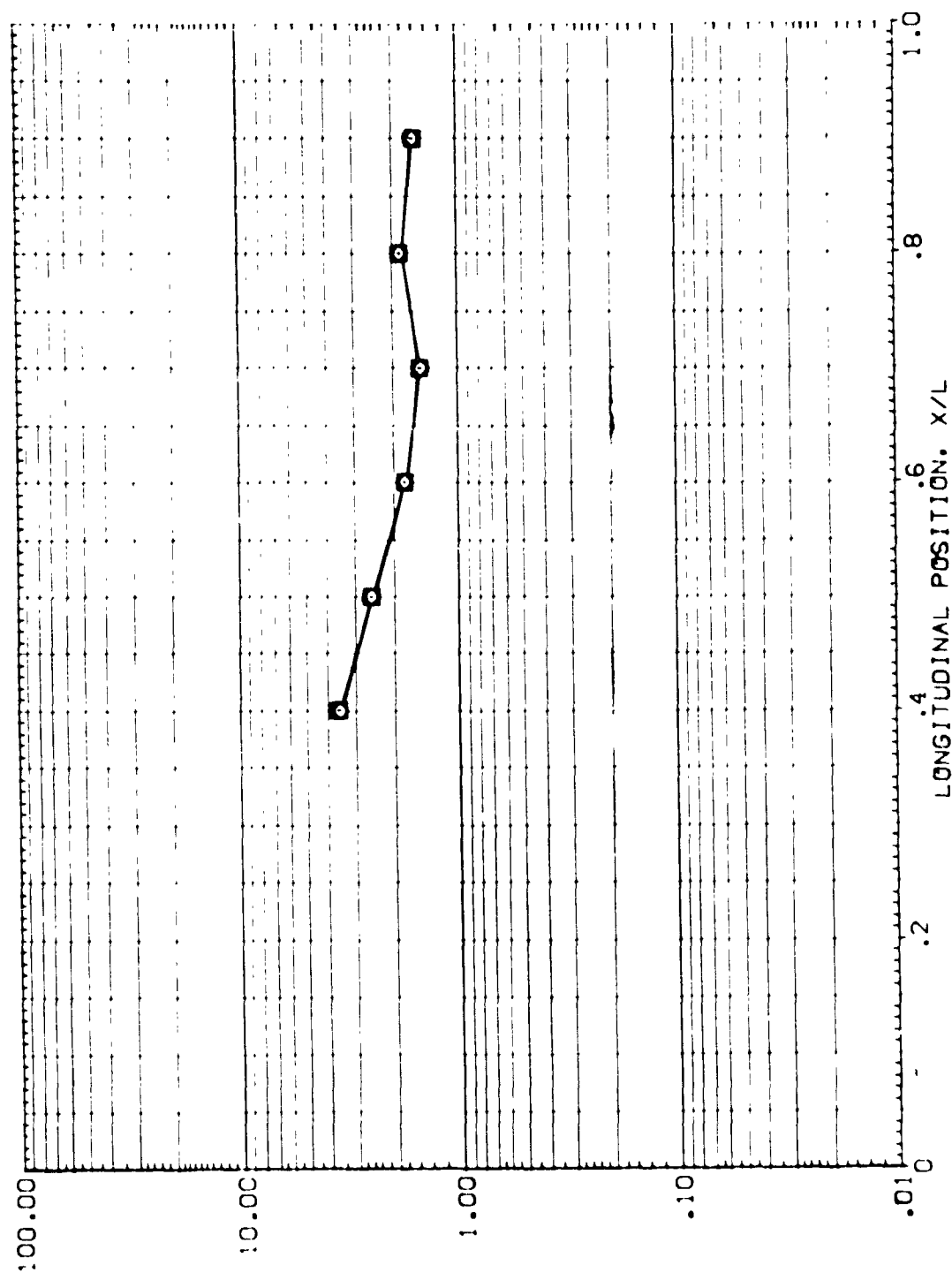


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.



DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PH1-H

(DBB110) ARC 3-5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)] 1.000 -5.000 5.300 .000

(EBB110) ARC 3-5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)] .900 -5.000 5.300 .000

(FBB110) ARC 3-5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)] .850 -5.000 5.300 .000

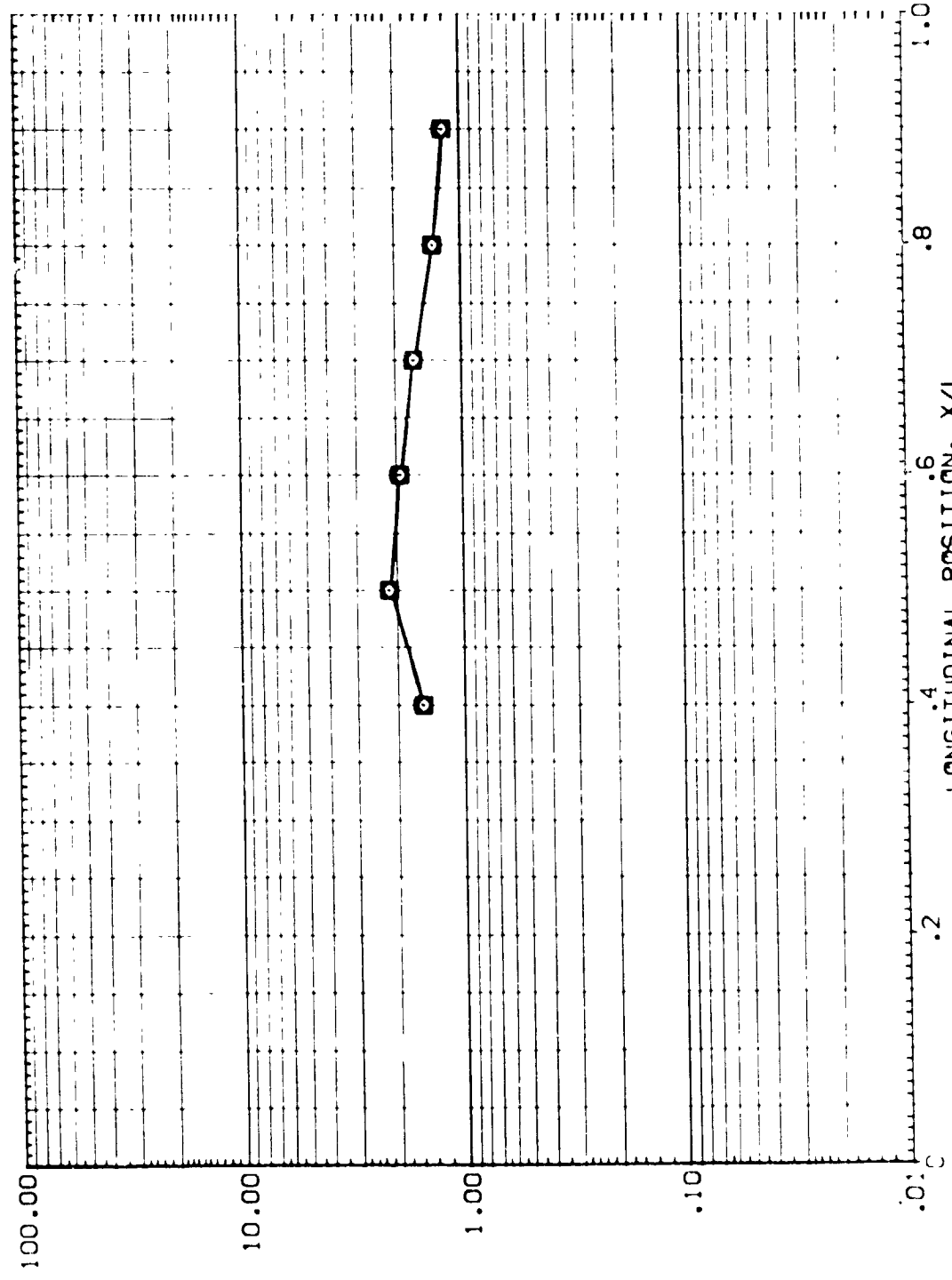


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 $Ma_{\infty}/L = 4.771$ $MACH = 5.300$ $PH1 = .57.500$ PAGE 87

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA HAV/HT PHI-M

(DBB710) ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 1.000 .000

(FBB710) ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .900 .000

(FBB710) ARC 3.5-172 IMIS ORB + ET +SRB (EXTERNAL TANK) 5.300 -5.000 .850 .000

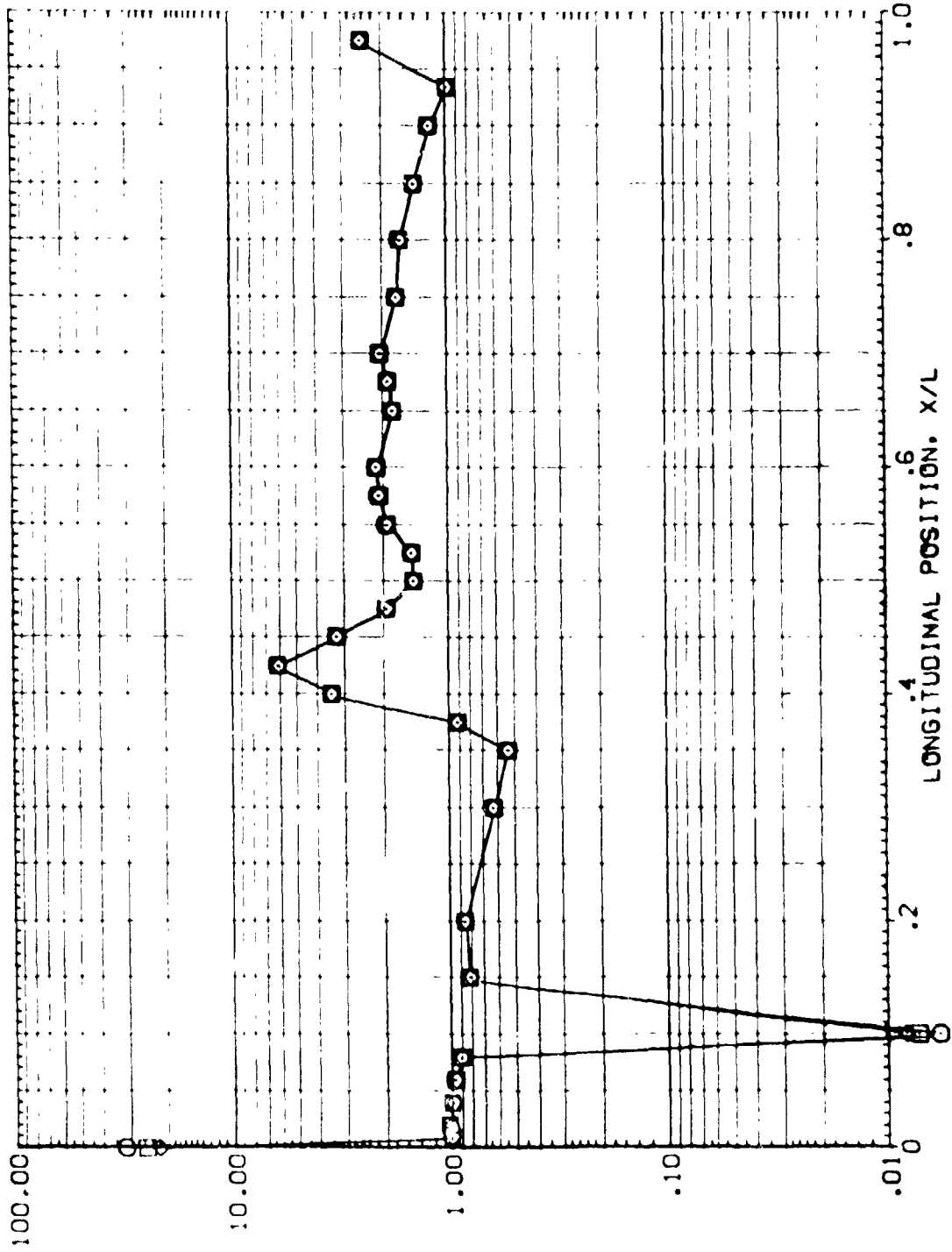


FIG. 9 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., EXTERNAL TANK.
 ORN/L = 4.771 MACH = 5.300 PHI = 180.000 PAGE 88



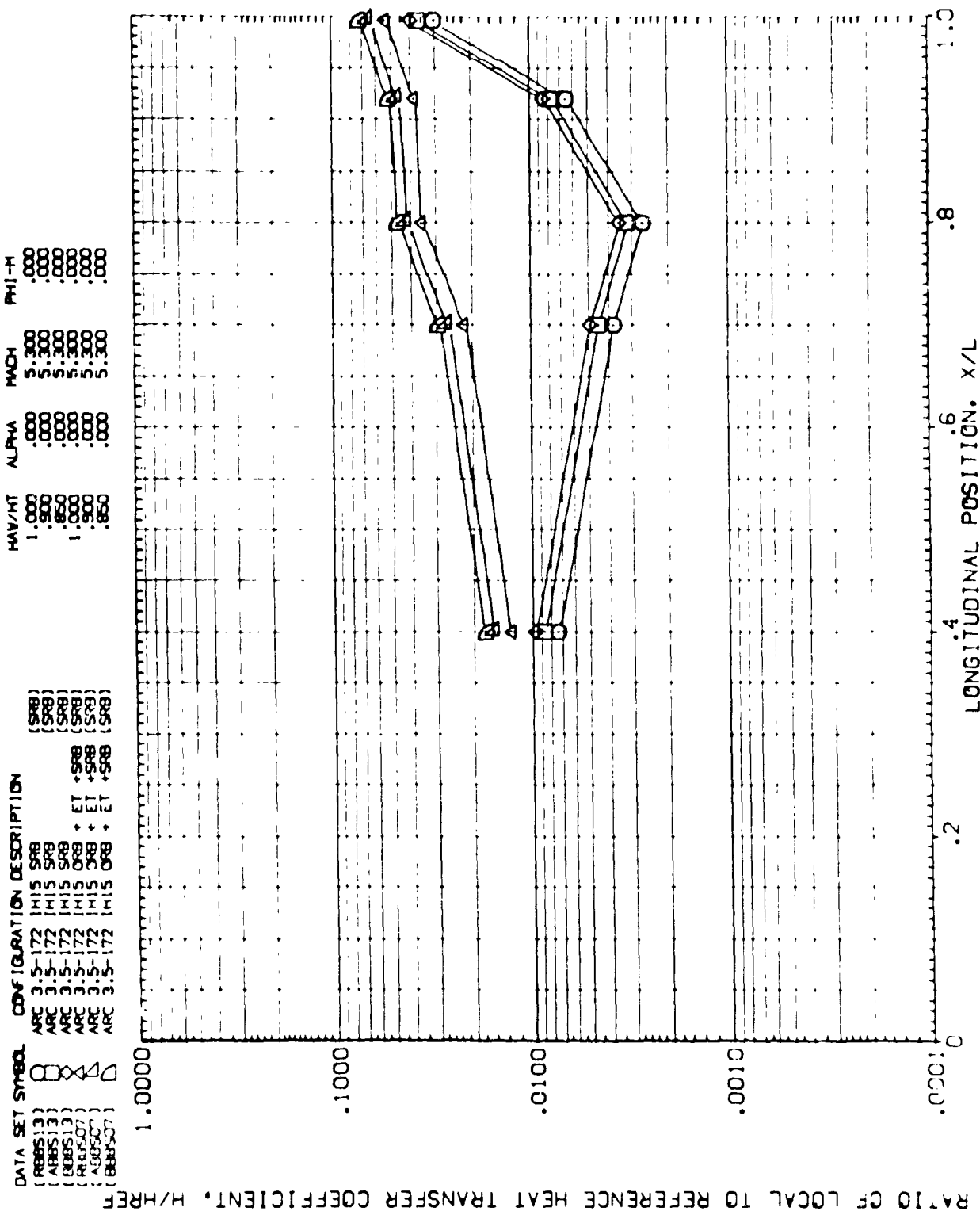


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER PATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(RB66-13)	ARC 3.5-172 (M15 SRB)	1.000	.000	5.300	.000
(RB66-13)	ARC 3.5-172 (M15 SRB)	.900	.000	5.300	.000
(RB66-13)	ARC 3.5-172 (M15 SRB)	.850	.000	5.300	.000
(RB66-13)	ARC 3.5-172 (M15 SRB) + ET + SRB	1.000	.000	5.300	.000
(RB66-507)	ARC 3.5-172 (M15 SRB) + ET + SRB	.900	.000	5.300	.000
(RB66-507)	ARC 3.5-172 (M15 SRB) + ET + SRB	.850	.000	5.300	.000

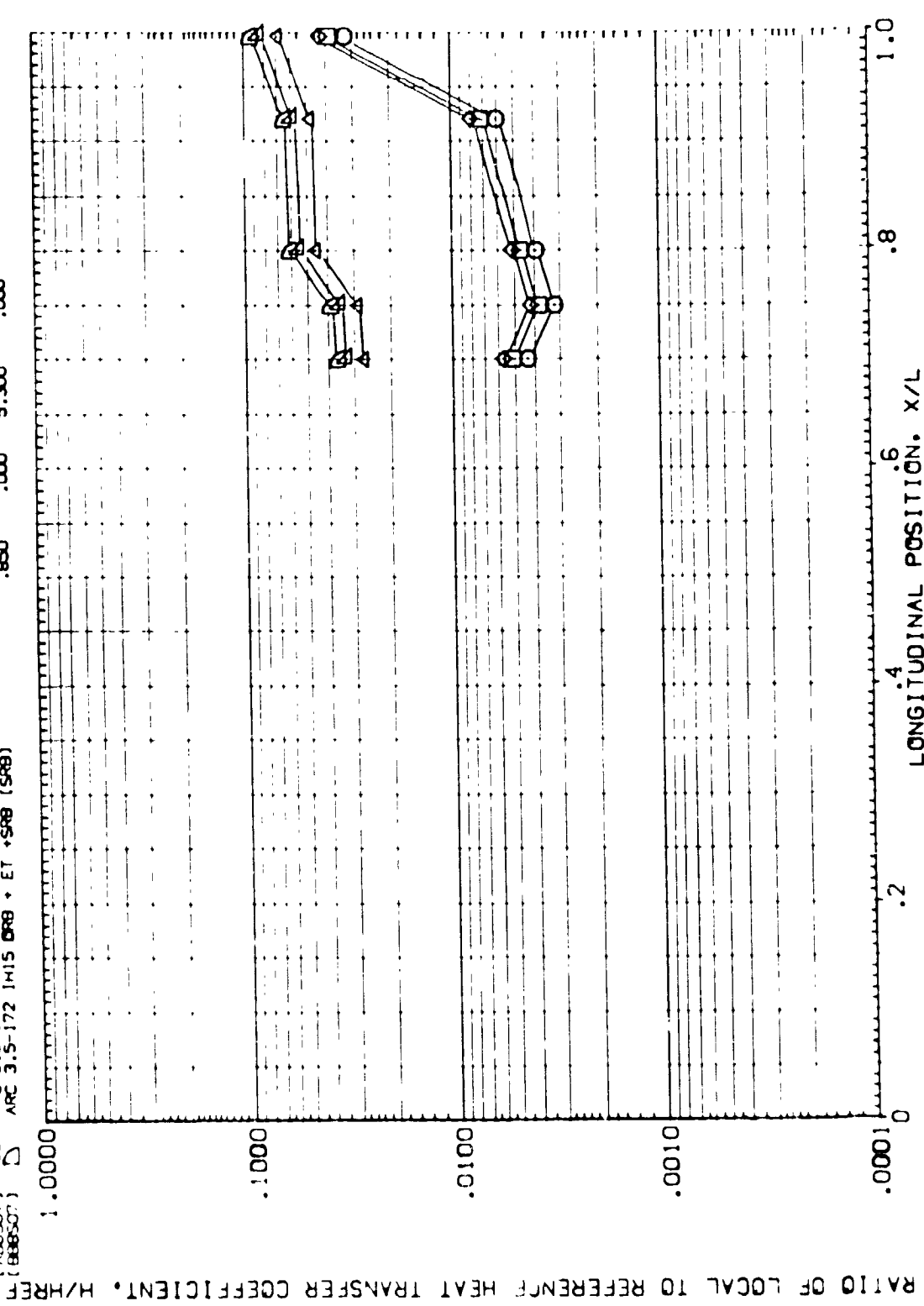


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 1.697 MACH = 5.300 PHI = 135.000 PAGE 90



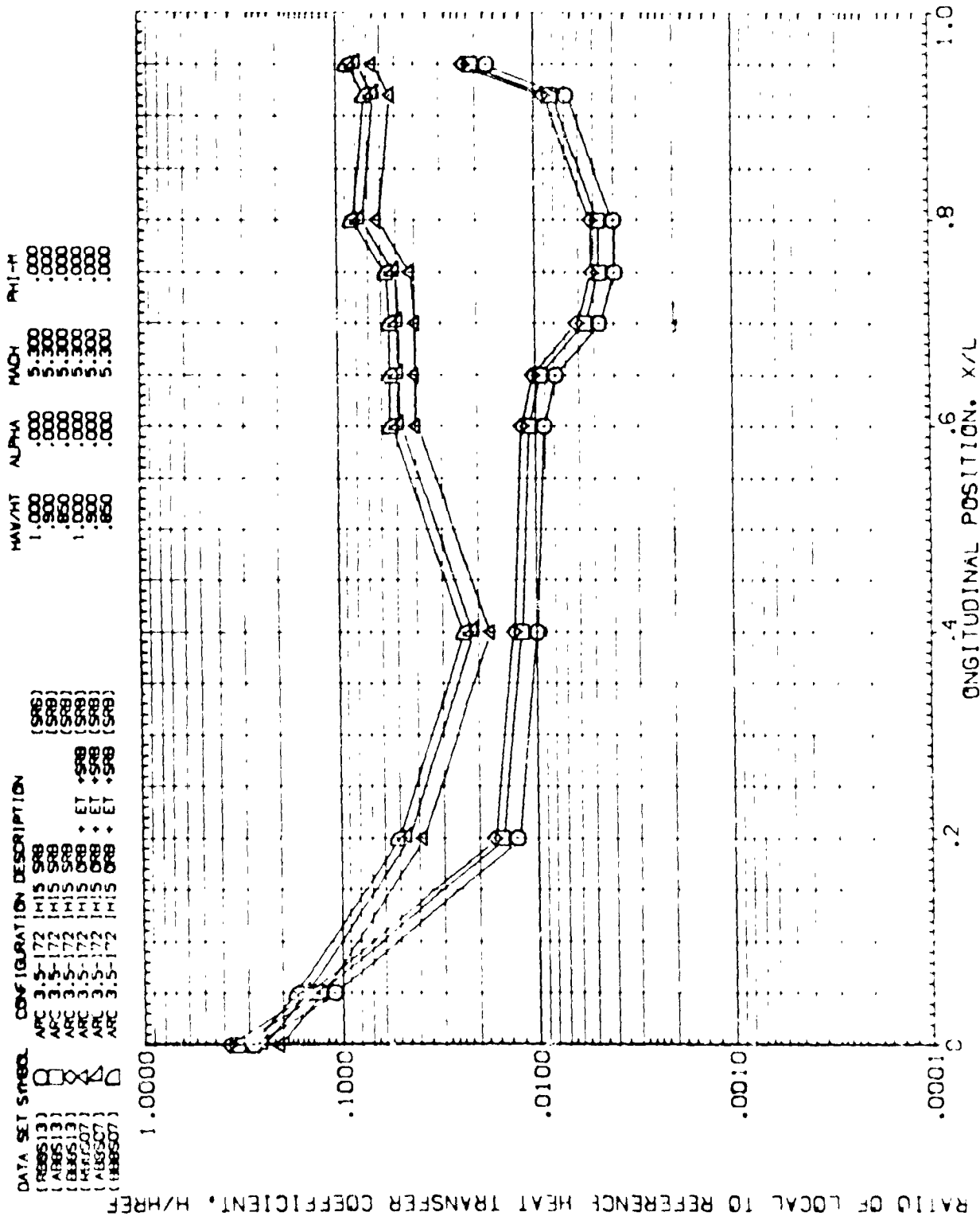
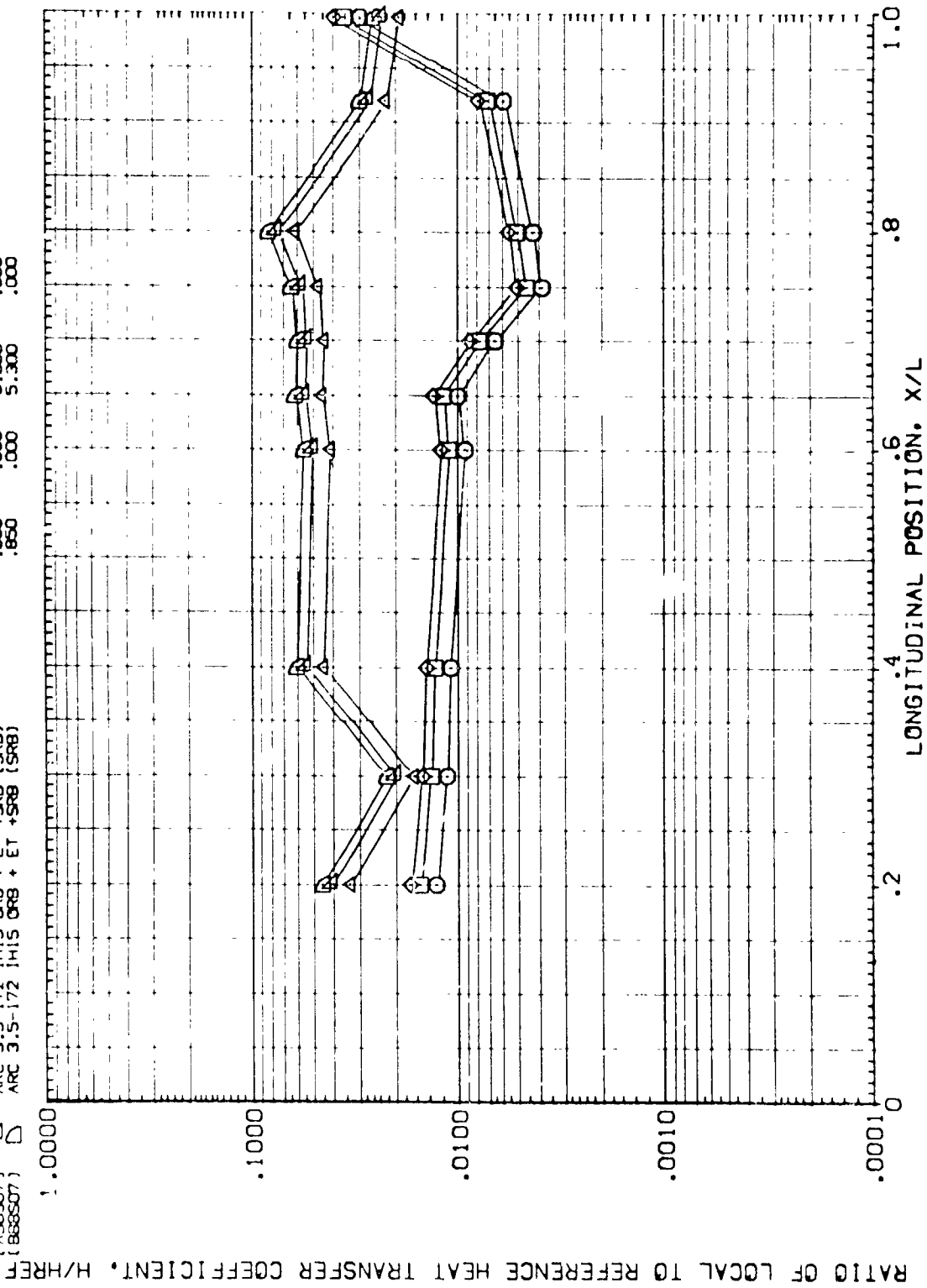


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(RBBS13)	ARC 3.5-172 IH15 SRB	1.000	.000	5.300	.000
(ABBS13)	ARC 3.5-172 IH15 SRB	.500	.000	5.300	.000
(EBBS13)	ARC 3.5-172 IH15 SRB	.850	.000	5.300	.000
(RBS507)	ARC 3.5-172 IH15 DRB + ET +SRB	1.000	.000	5.300	.000
(ABS507)	ARC 3.5-172 IH15 DRB + ET +SRB	.500	.000	5.300	.000
(BBS507)	ARC 3.5-172 IH15 DRB + ET +SRB	.850	.000	5.300	.000



RN/L = 1.687 MACH = 5.300 PHI = 225.000 PAGE 92



MAV/HT	ALPHA	MACH	PHI-H
1.000	.000	5.300	.000
.850	.000	5.300	.000
1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000

CONFIGURATION DESCRIPTION	(SRB)
ARC 3.5-172 [H15 SRB	(SRB)
ARC 3.5-172 [H15 SRB	(SRB)
ARC 3.5-172 [H15 SRB	(SRB)
ARC 3.5-172 [H15 DRB + ET	+SRB (SRB)
ARC 3.5-172 [H15 DRB + ET	+SRB (SRB)
ARC 3.5-172 [H15 DRB + ET	+SRB (SRB)

DATA SET SYMBOL	DESCRIPTION
(RBBS13)	(SRB)
(ABBS13)	(SRB)
(BBOS13)	(SRB)
(RBBS07)	(SRB)
(ABBS07)	(SRB)
(BBOS07)	(SRB)

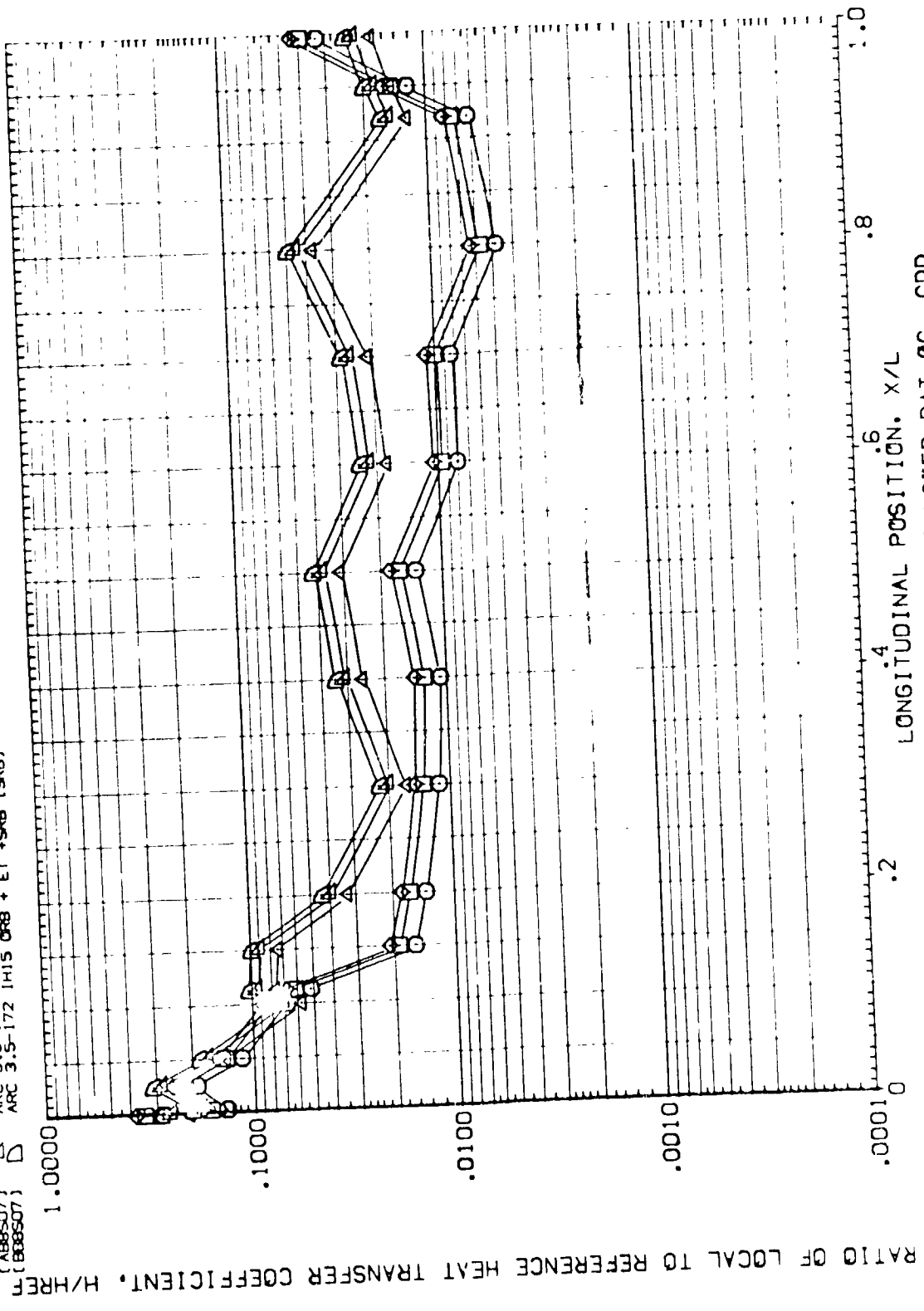


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-H
(RBBS13)	ARC 3.5-172 I15 SRB (SRB)	1.000	.000	5.300	.000
(ABBS13)	ARC 3.5-172 I15 SRB (SRB)	.900	.000	5.300	.000
(BBBS13)	ARC 3.5-172 I15 SRB (SRB)	.850	.000	5.300	.000
(RBS07)	ARC 3.5-172 I15 DRB + ET +SRB (SRB)	1.000	.000	5.300	.000
(ABS07)	ARC 3.5-172 I15 DRB + ET +SRB (SRB)	.900	.000	5.300	.000
(BBS07)	ARC 3.5-172 I15 DRB + ET +SRB (SRB)	.850	.000	5.300	.000

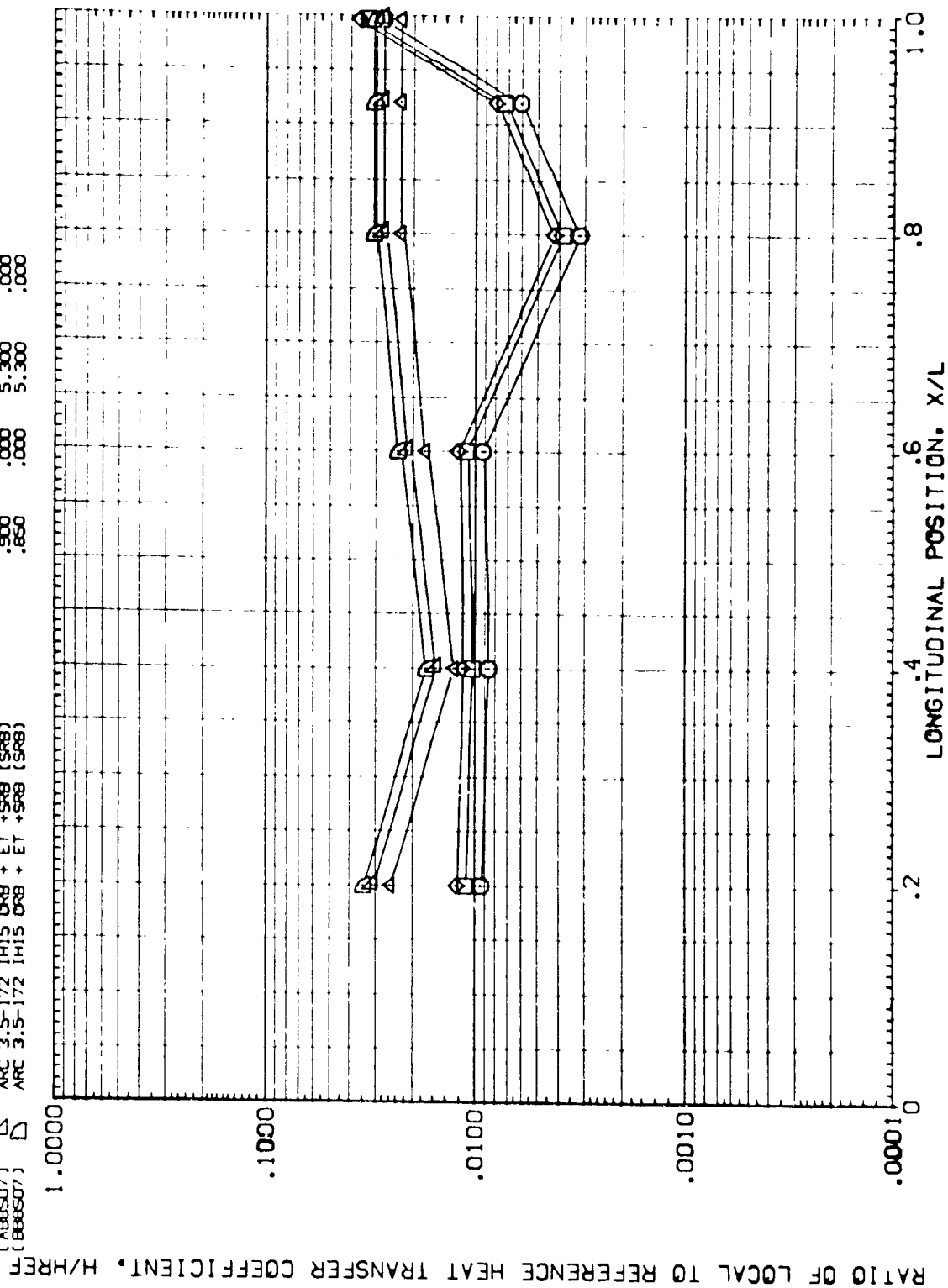


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(RBBS13)	ARC 3.5-172 IH15 SRB (SRB)	1.000	.000	5.300	.000
(ABBS13)	ARC 3.5-172 IH15 SRB (SRB)	.900	.000	5.300	.000
(BBS13)	ARC 3.5-172 IH15 SRB (SRB)	.850	.000	5.300	.000
(RBS07)	ARC 3.5-172 IH15 DRB + ET (SRB)	1.000	.000	5.300	.000
(ABS07)	ARC 3.5-172 IH15 DRB + ET (SRB)	.900	.000	5.300	.000
(BBS07)	ARC 3.5-172 IH15 DRB + ET (SRB)	.850	.000	5.300	.000

(RBBS13) ARC 3.5-172 IH15 SRB (SRB)
 (ABBS13) ARC 3.5-172 IH15 SRB (SRB)
 (BBS13) ARC 3.5-172 IH15 SRB (SRB)
 (RBS07) ARC 3.5-172 IH15 DRB + ET (SRB)
 (ABS07) ARC 3.5-172 IH15 DRB + ET (SRB)
 (BBS07) ARC 3.5-172 IH15 DRB + ET (SRB)

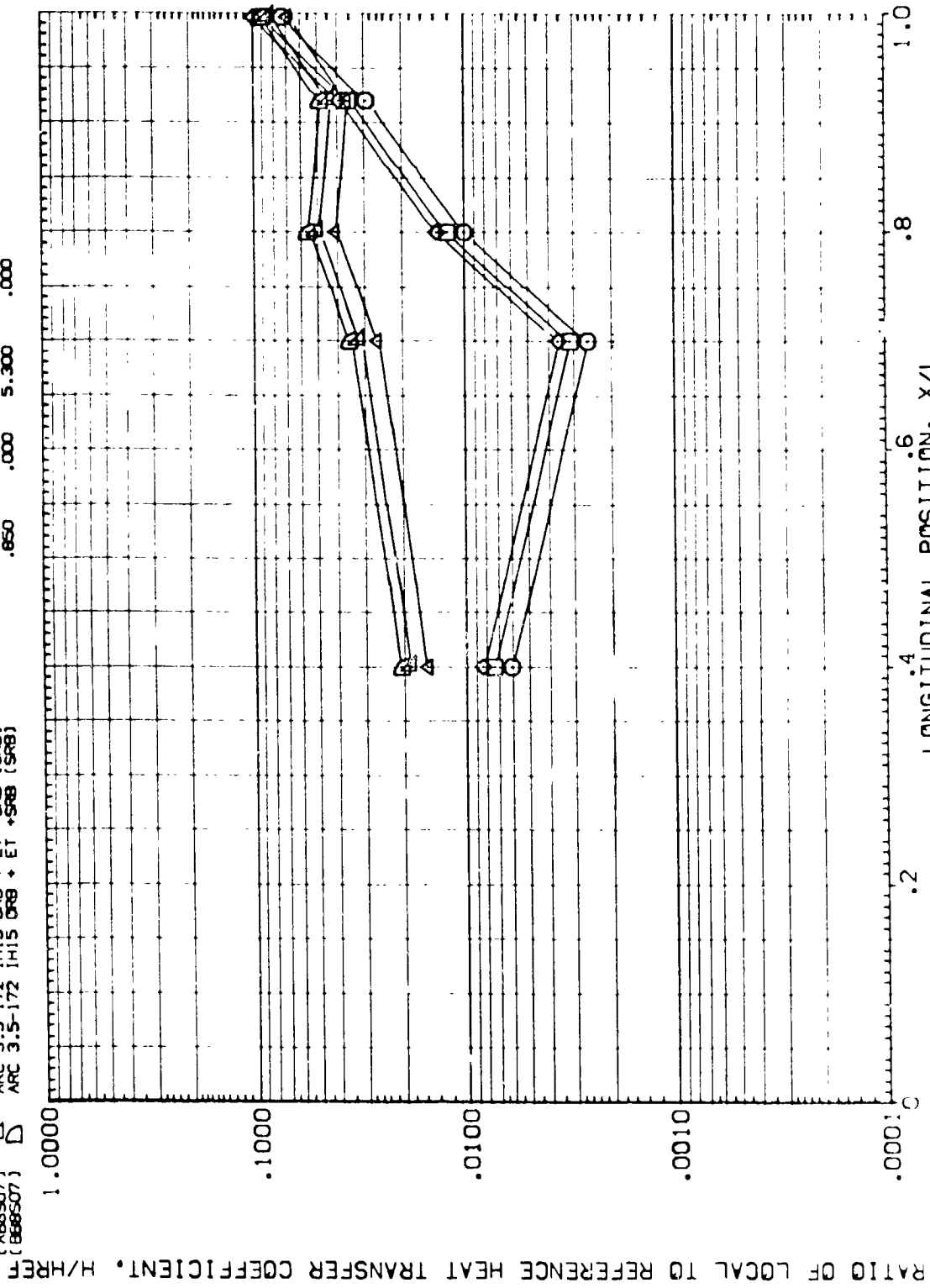


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RBBS13)	ARC 3.5-172 IH15 SRB	(SRB)
(ABBS13)	ARC 3.5-172 IH15 SRB	(SRB)
(BBBS13)	ARC 3.5-172 IH15 SRB	(SRB)
(RBS07)	ARC 3.5-172 IH15 ORB	+ ET +SRB
(ABS07)	ARC 3.5-172 IH15 ORB	+ ET +SRB
(BBS07)	ARC 3.5-172 IH15 ORB	+ ET +SRB

HAW/HT	ALPHA	MACH	PHI-H
1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000
1.000	.000	5.300	.000
.900	.000	5.300	.000
.850	.000	5.300	.000

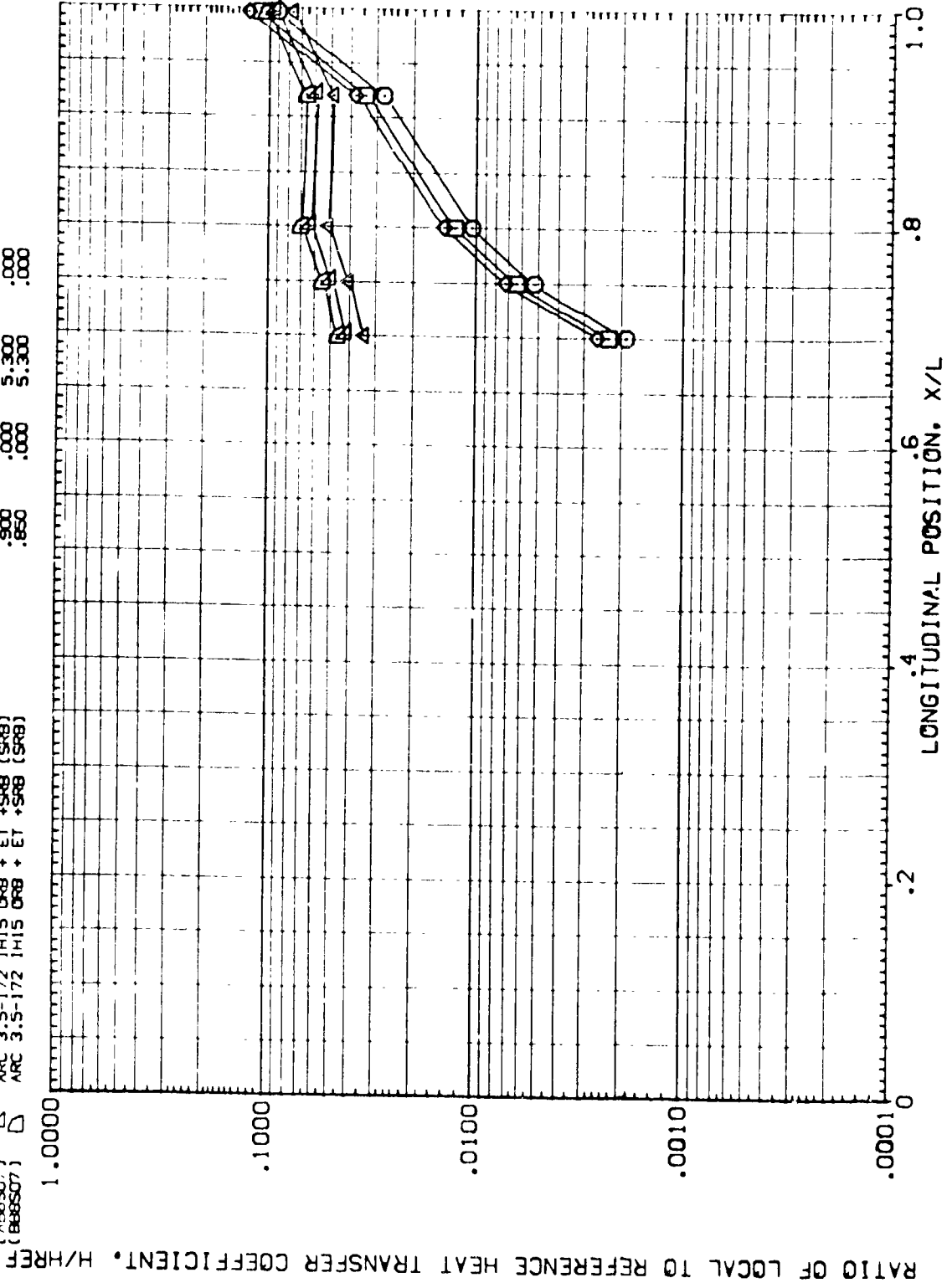


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.634 MACH = 5.300 PHI = 135.000



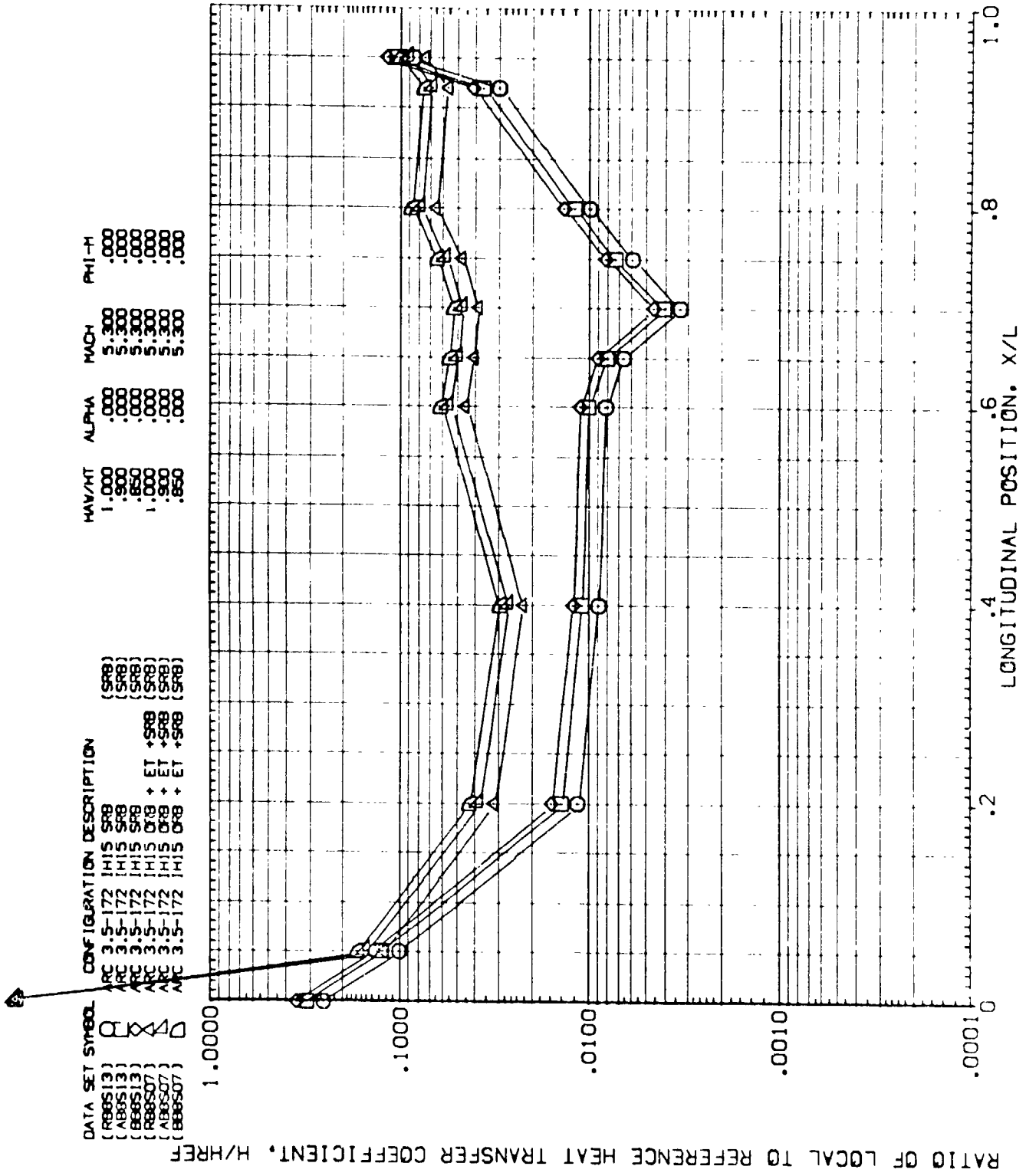


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(X)MS13)	ARC 3.5-172	(H)S	SRB	(SRB)
(+)S13)	ARC 3.5-172	(H)S	SRB	(SRB)
(-)S13)	ARC 3.5-172	(H)S	SRB	(SRB)
(X)S07)	ARC 3.5-172	(H)S	DRB + ET	+SRB (SRB)
(X)S07)	ARC 3.5-172	(H)S	DRB + ET	+SRB (SRB)
(X)S07)	ARC 3.5-172	(H)S	DRB + ET	+SRB (SRB)

MAV/UT ALPHA MACH PHI-M

1.000	.000	5.300	.000
.900	.000	5.300	.000
.800	.000	5.300	.000
1.000	.000	5.300	.000
.900	.000	5.300	.000
.800	.000	5.300	.000

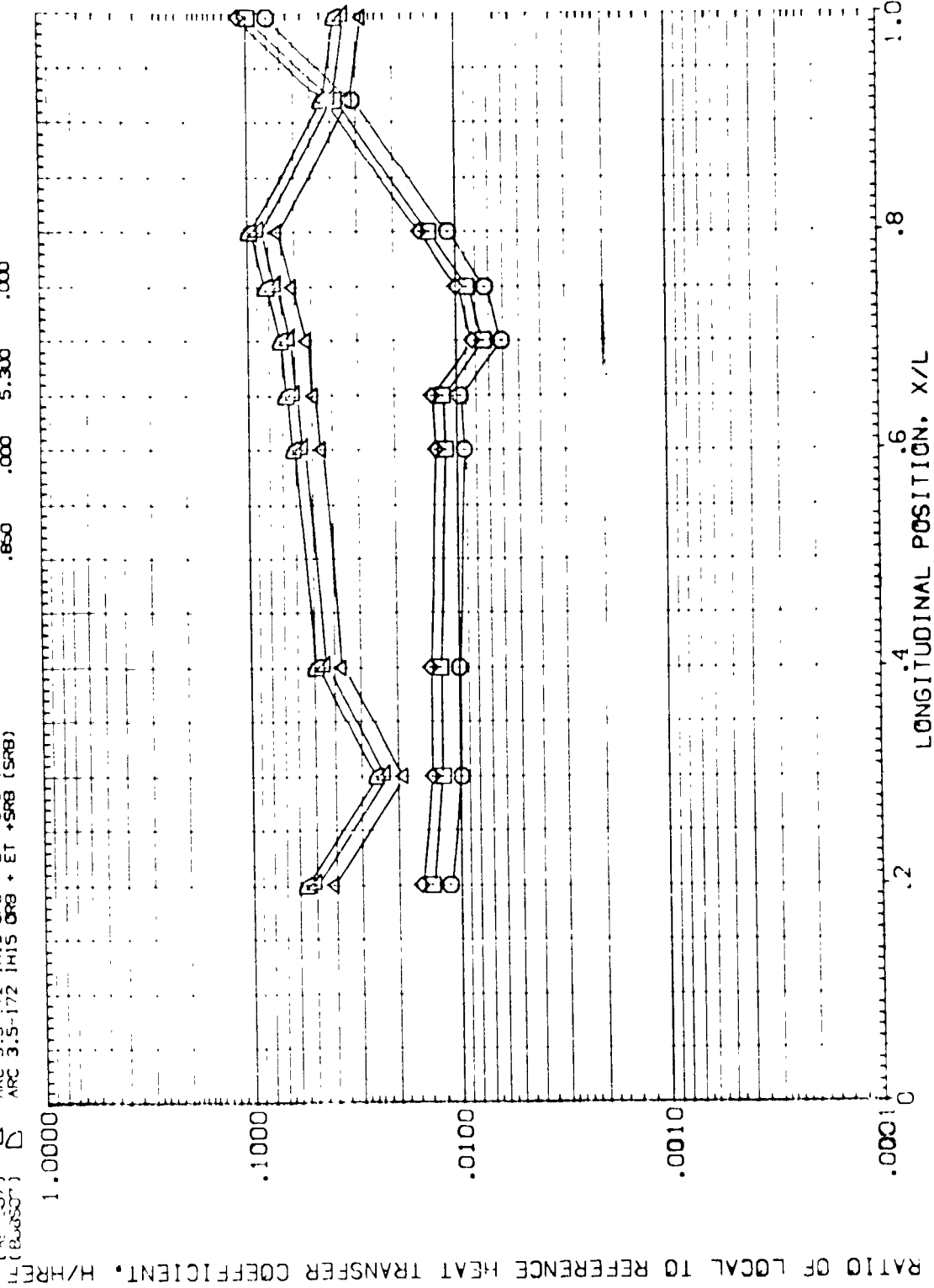


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

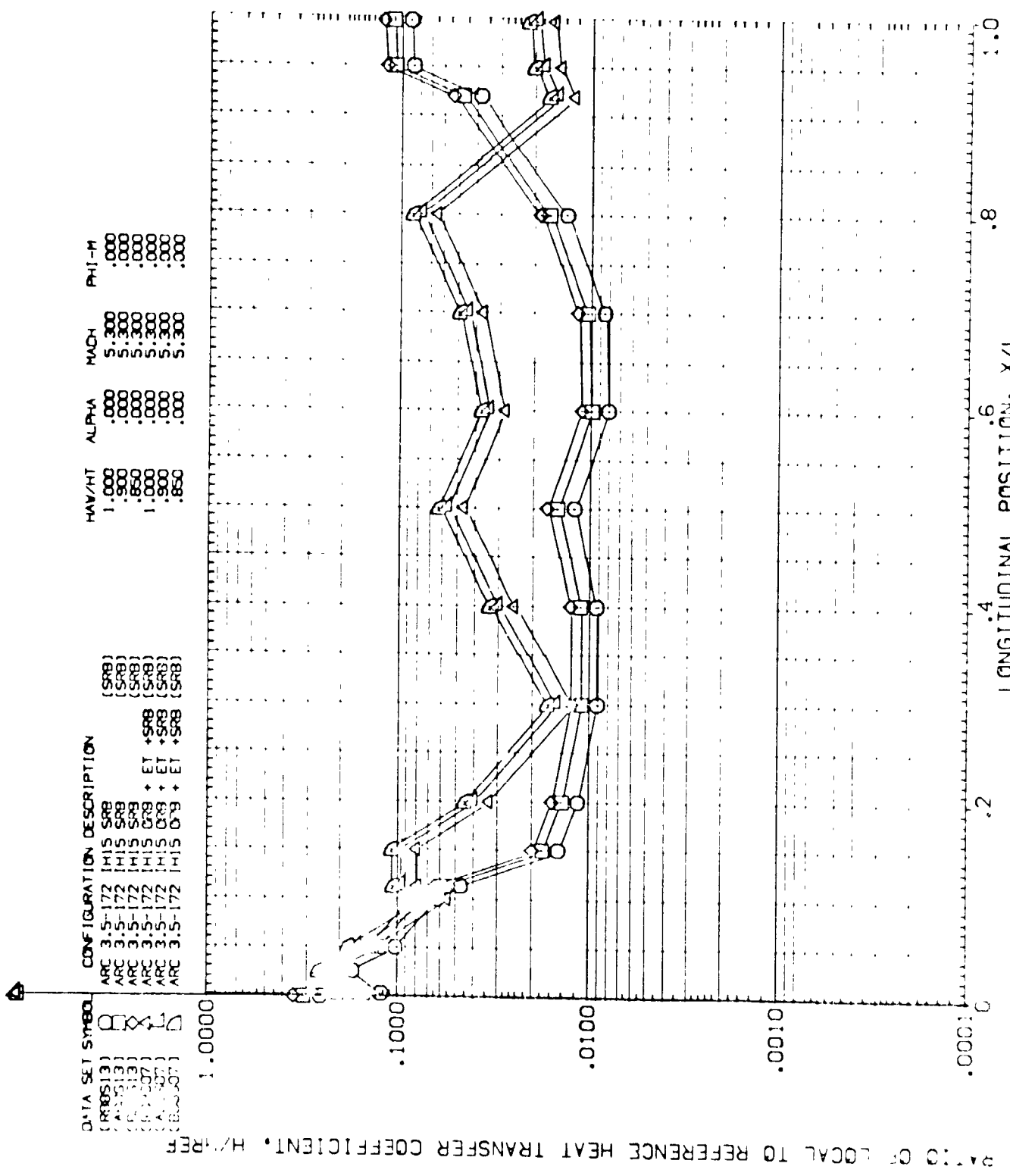


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

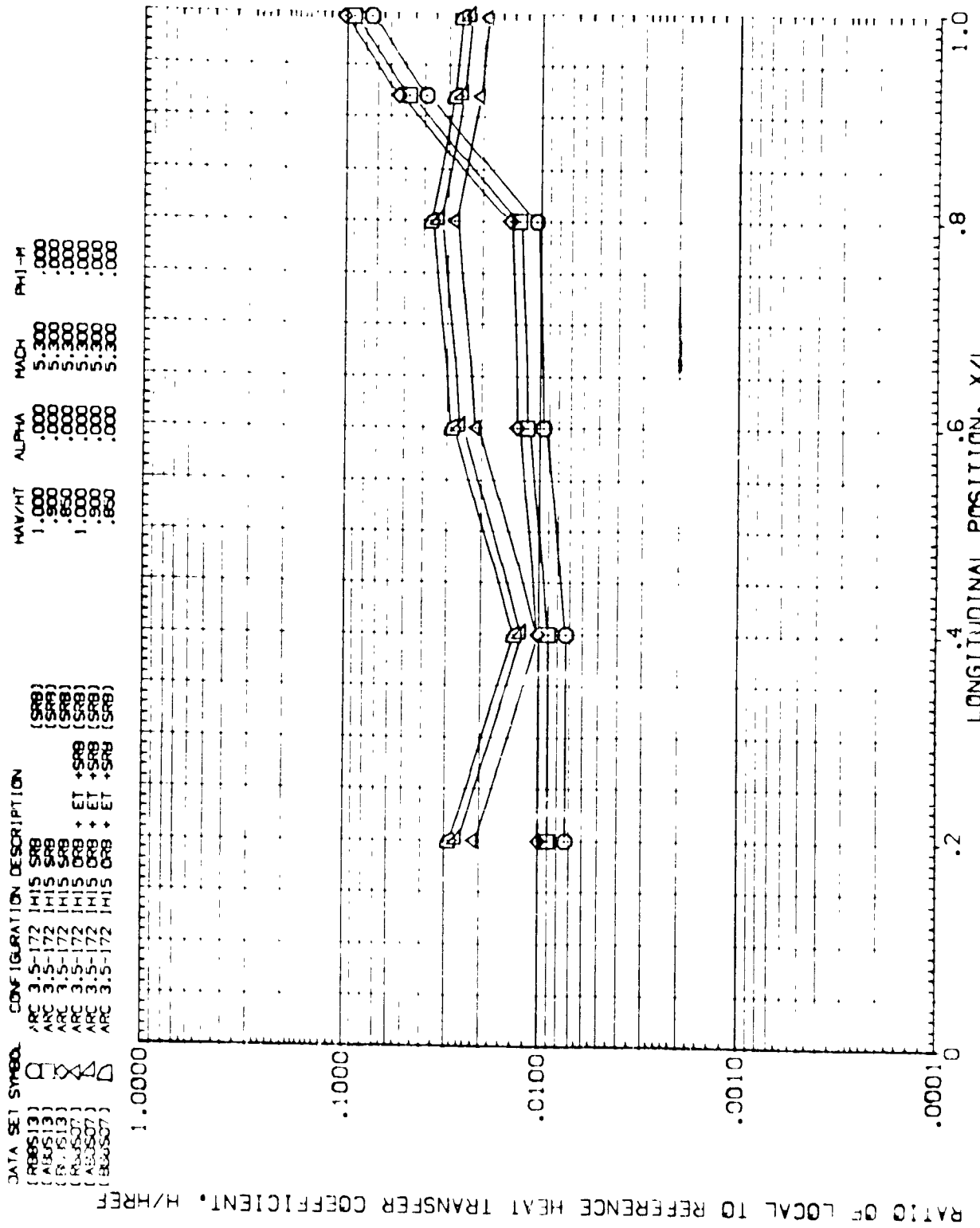


FIG. 10 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

R₀₀/L = 4.634 MACH = 5.300 PHI = 315.000 PAGE 100

DATA SET SYMBOL: (088507) (188507) (188507)
 CONFIGURATION DESCRIPTION: ARC 3.5-172 H15 RB + ET +SRB (SRB) H15 JRB + ET +SRB (SRB) H15 ORB + ET +SRB (SRB)

MACH: 5.300 5.300 5.300
 ALPHA: .000 .000 .000
 PHI-M: .000 .000 .000
 HAV/HT: 1.000 .900 .850

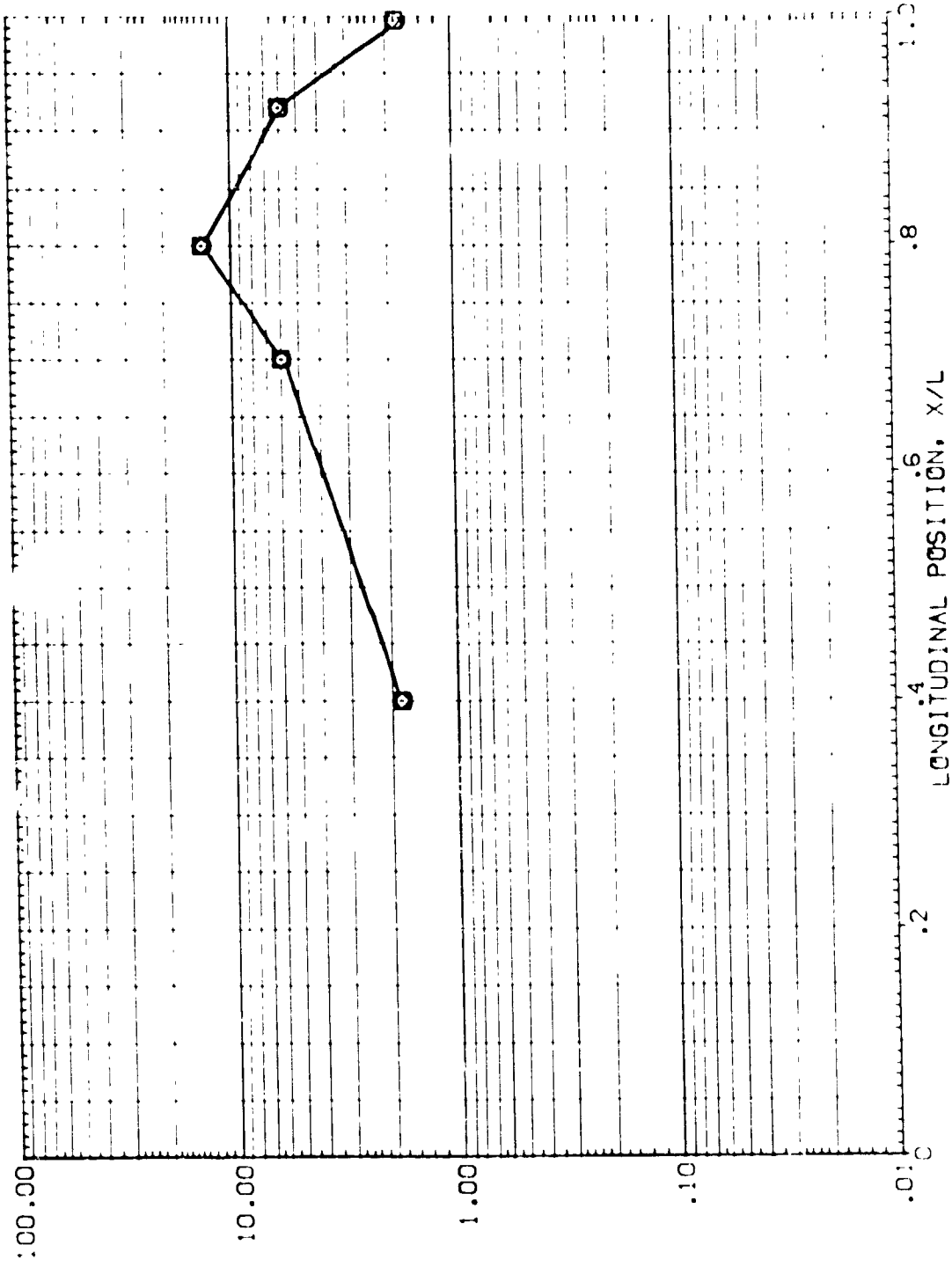


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., SRB

MACH ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .850 .000 5.300 .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (OR8507) Q ARC 3.5-172 [M15 OR8 + ET +SR8 (SR8)
 (E8507) Q ARC 3.5-172 [M15 OR8 + ET +SR8 (SR8)
 (E8507) Q ARC 3.5-172 [M15 OR8 + ET +SR8 (SR8)

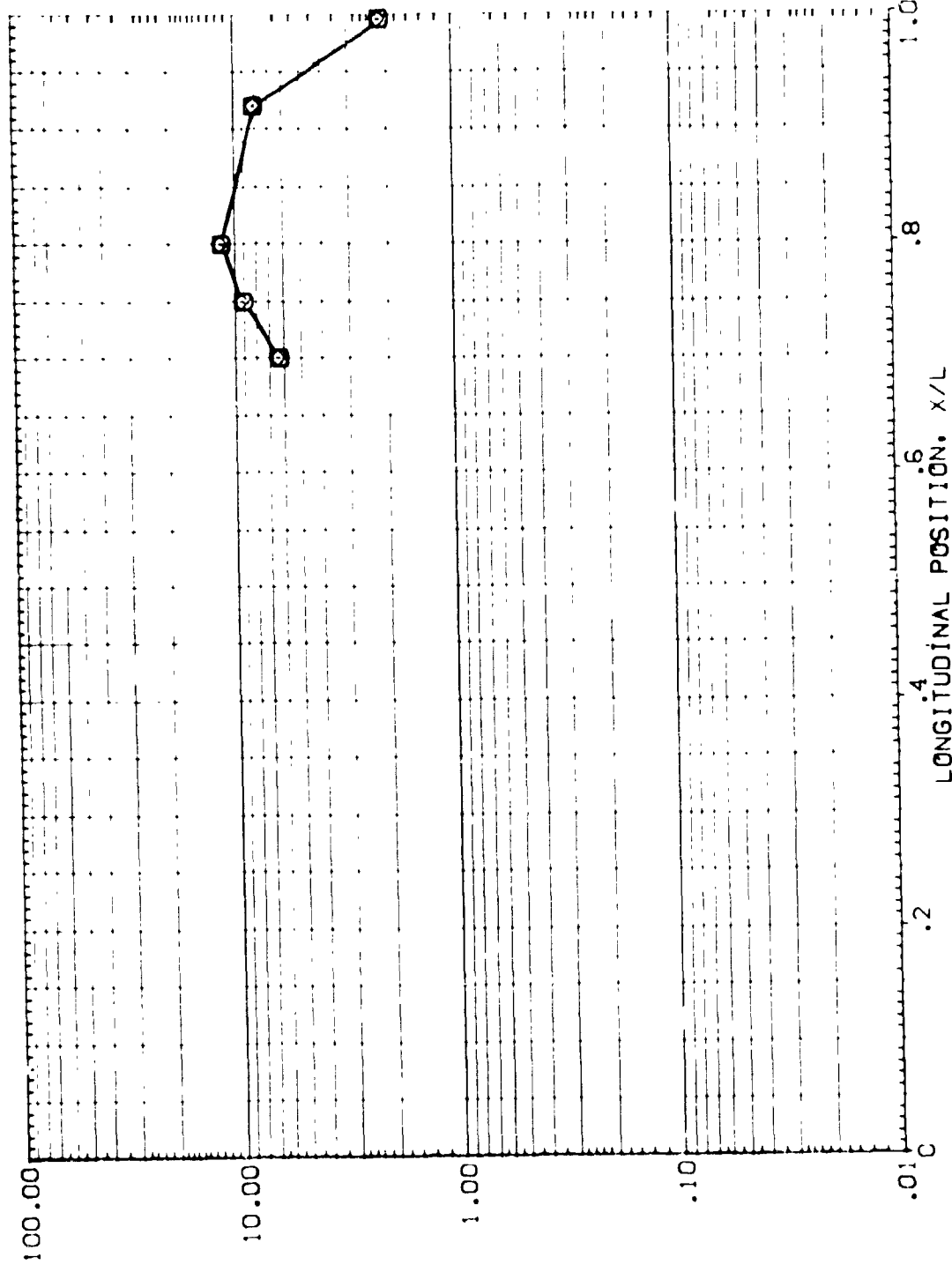
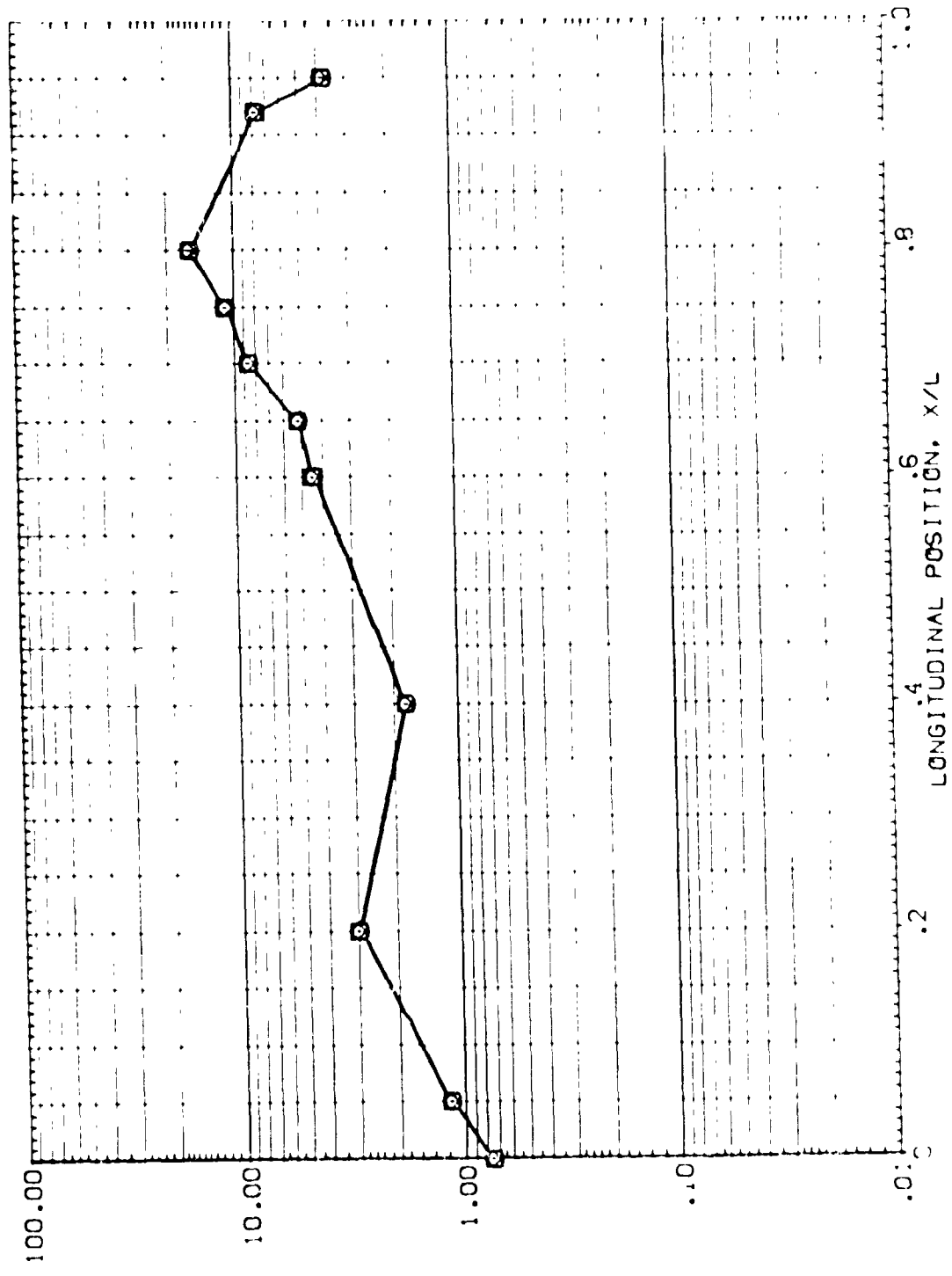


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRE.

$\alpha = 0.983$ MACH = 5.300 PHI = 135.000

MACH ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .850 .000 5.300 .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DB8507) □ ARC 3.5-172 (HIS ORB + ET +SRB (SRB)
 (LB8507) ◇ ARC 3.5-172 (HIS ORB + ET +SRB (SRB)
 (FB8507) ◇ ARC 3.5-172 (HIS ORB + ET +SRB (SRB)



RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H/H_∞

FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF. SRB

MACH = 5.300 PHI = 180.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(088507) O ARC 3.5-172 IH15 ORB + ET +SRB (SRB) 1.000 .000 5.300 .000

(188507) X ARC 3.5-172 IH15 ORB + ET +SRB (SRB) .900 .000 5.300 .000

(188507) X ARC 3.5-172 IH15 ORB + ET +SRB (SRB) .850 .000 5.300 .000

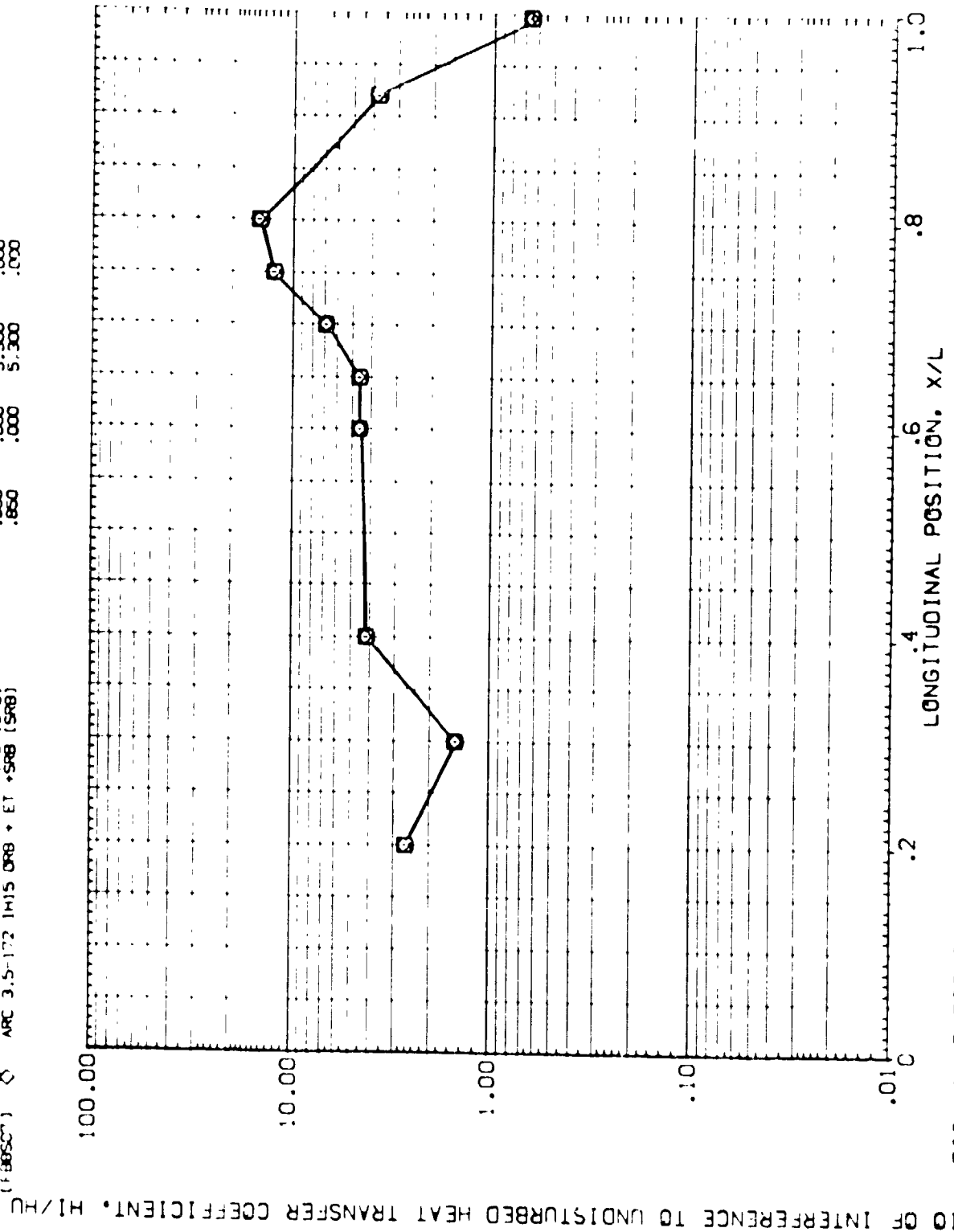
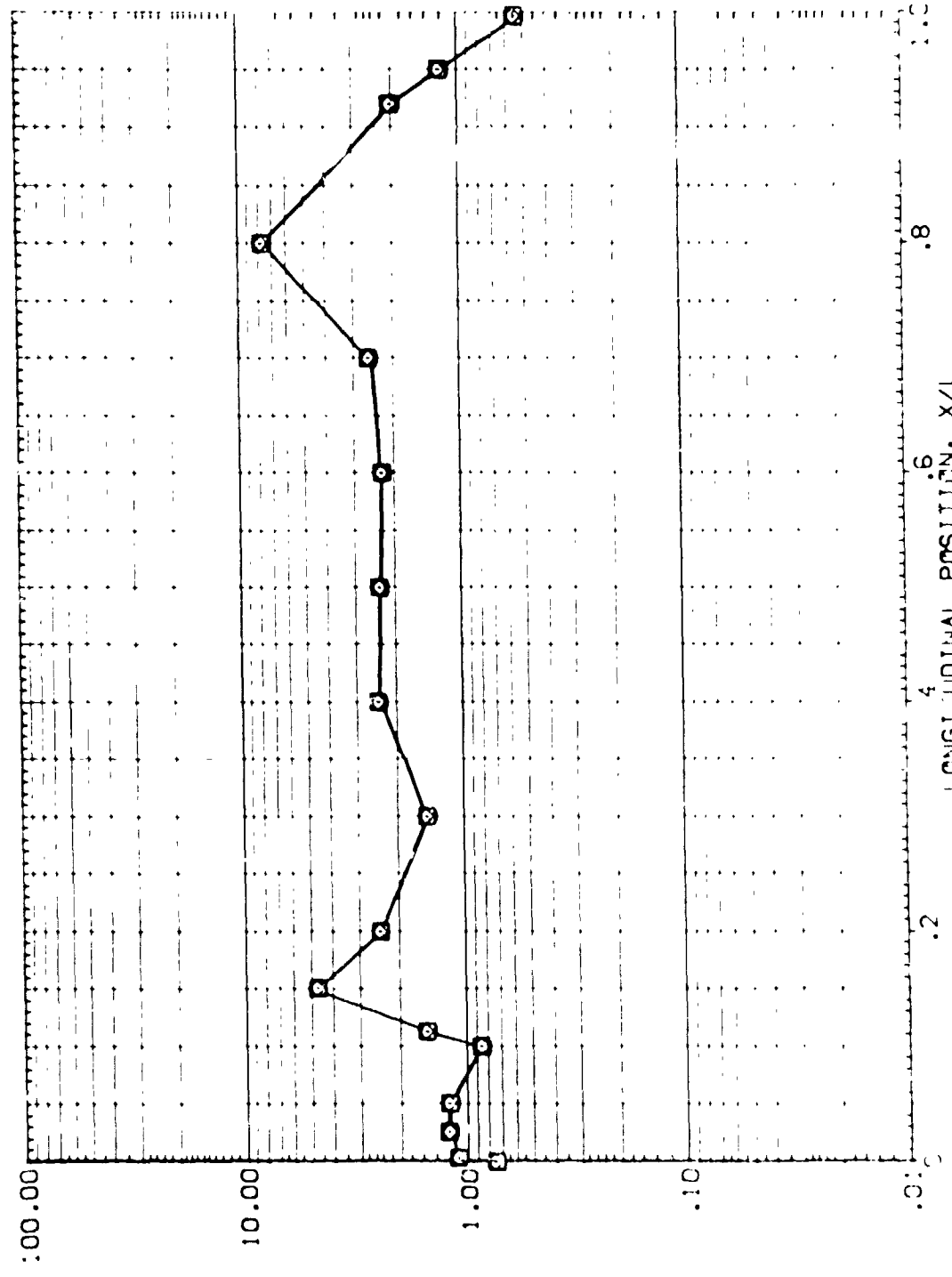


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H
 (DEFS07) ARC 3.5-172 1415 ORB + ET +SRB (SRB) 5.300 .000 .000
 (138507) ARC 3.5-175 1415 ORB + ET +SRB (SRB) 5.300 .000 .000
 (186507) ARC 3.5-172 1415 ORB + ET +SRB (SRB) 5.300 .000 .000
 (186507) ARC 3.5-172 1415 ORB + ET +SRB (SRB) 5.300 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU LONGI UDINAL POSITION, X/L 1.983 MACH = 5.300 PHI = 270.000 F-GE 105



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (ORF507) ○ ARC 3.5-172 [H]S ORB + ET +SRB (SRB)
 (F6507) ○ ARC 3.5-172 [H]S ORB + ET +SRB (SRB)
 (L6007) ○ ARC 3.5-172 [H]S ORB + E +SRB (SRB)

PHI-H MACH ALPHA
 1.000 5.300 .000
 .900 5.300 .000
 .850 5.300 .000

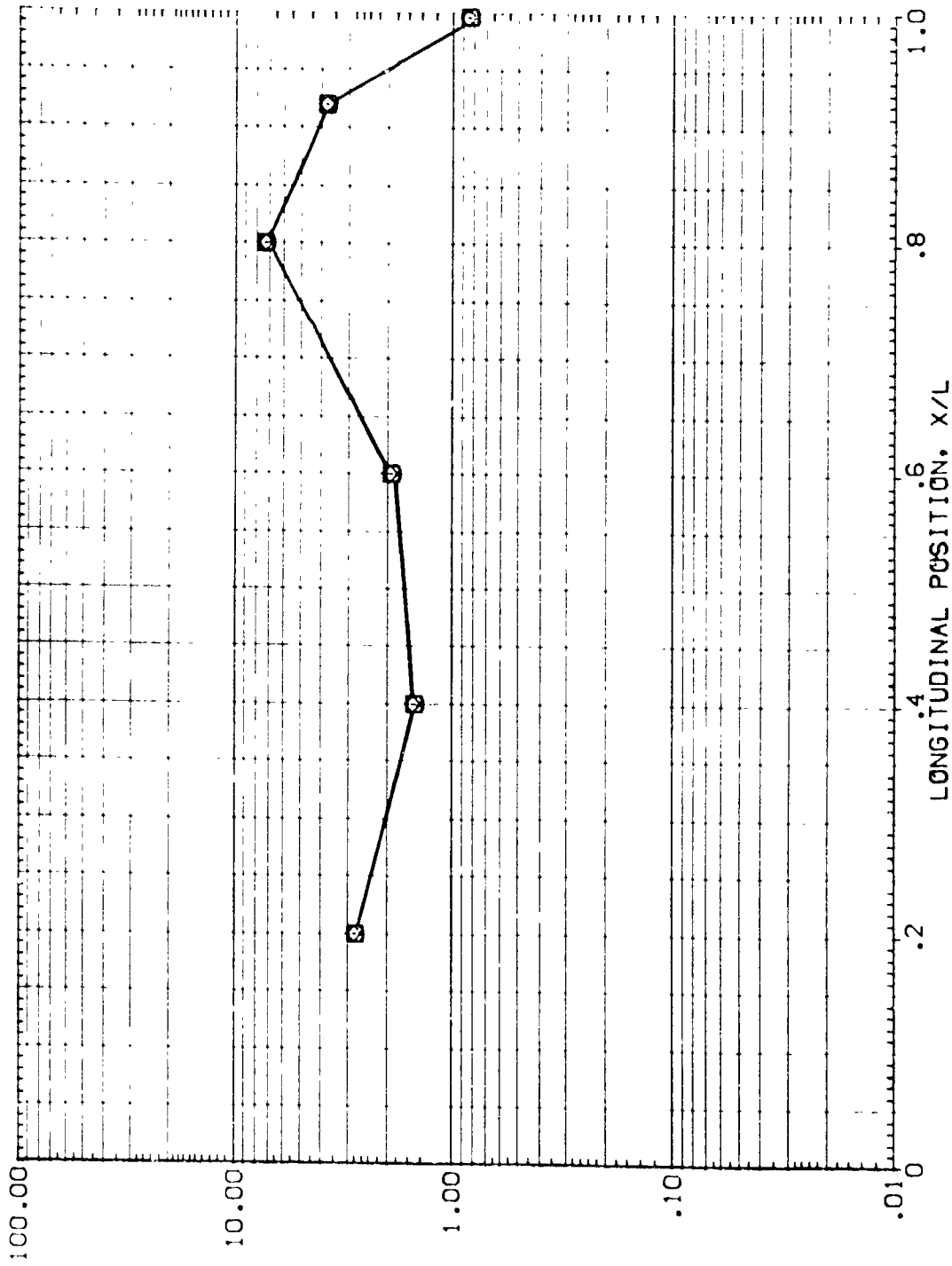


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., SRB.

ORNL/L = 1.983 MACH = 5.300 PHI = 315.000 PASE 106

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DB6507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)
 (EB6507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)
 (FB6507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

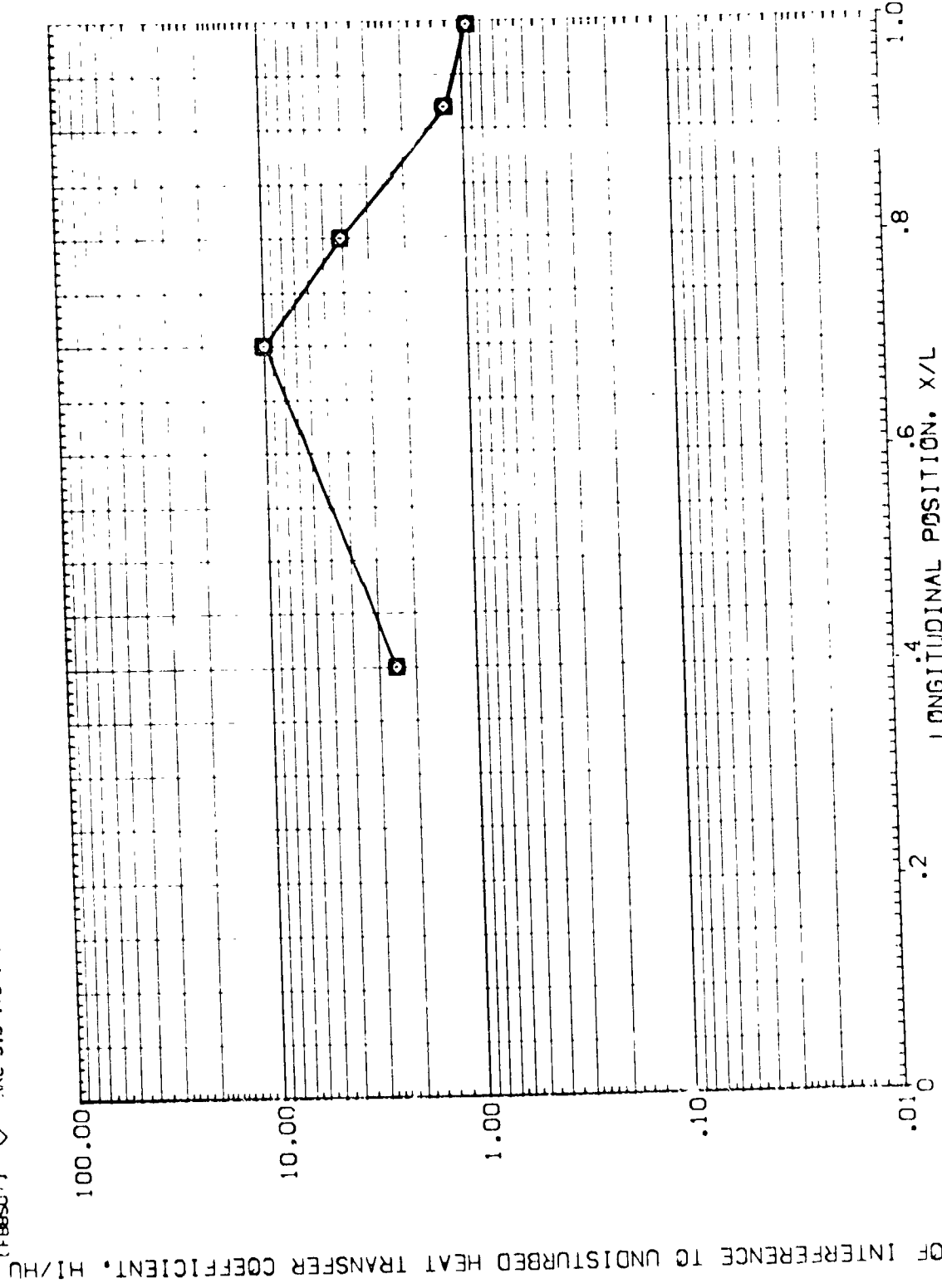


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., SRB
 ORN/L = 4.21; MACH = 5.300 PHI = 90.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (046507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)
 (E85507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)
 (F88507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

HAV/HT ALPHA MACH PHI-M
 .000 .000 5.300 .000
 .900 .000 5.300 .000
 .650 .000 5.300 .000

ATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

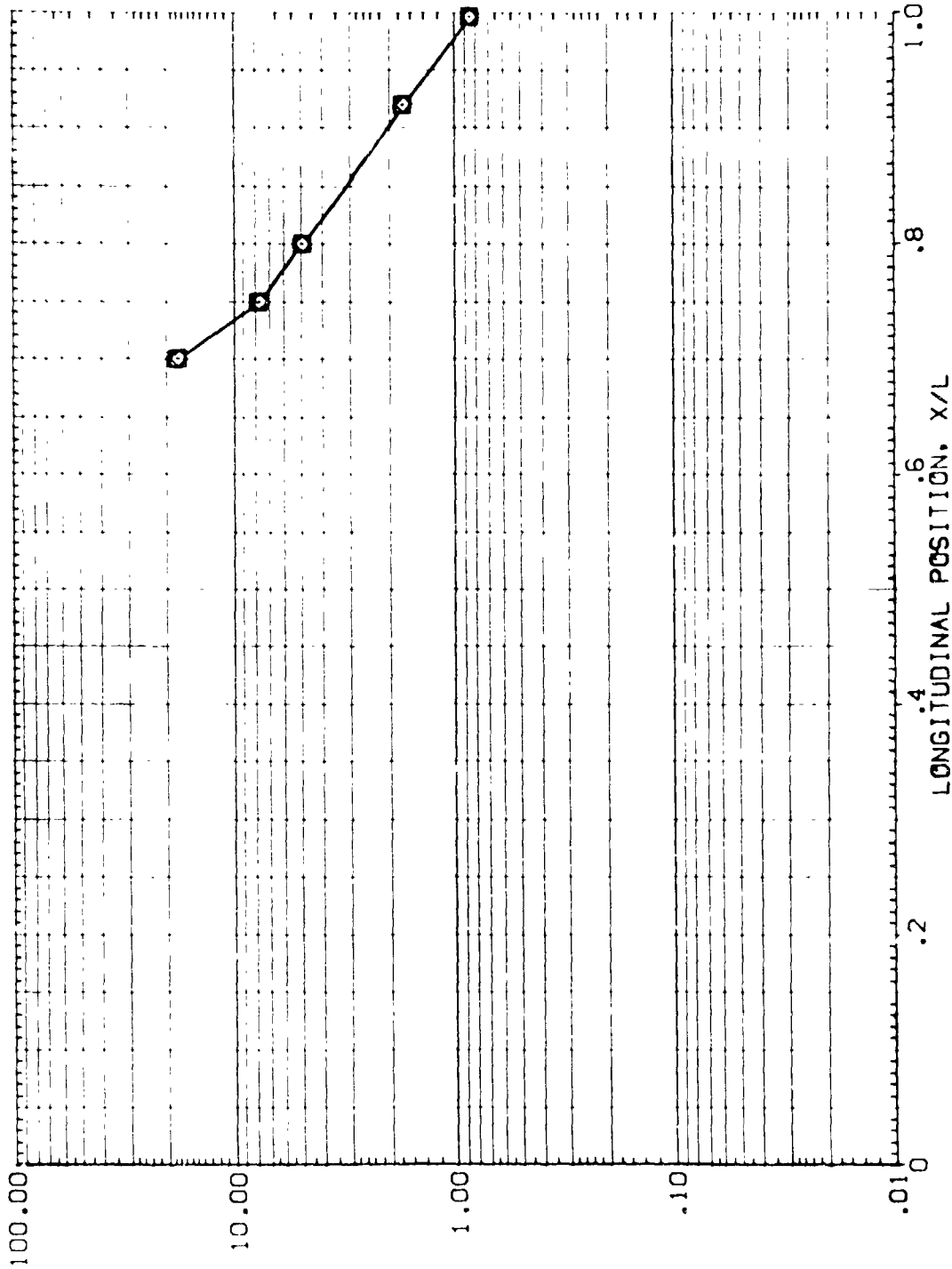


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

GRN/L = 4.311 MACH = 5.300 PHI = 135.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(DB8507) ARC 3.5-172 IHIS ORB + ET +SRB (SRB) 1.000 .000 5.300 .000

(EB8507) ARC 3.5-172 IHIS ORB + ET +SRB (SRB) .900 .000 5.300 .000

(FB8507) ARC 3.5-172 IHIS ORB + ET +SRB (SRB) .850 .000 5.300 .000

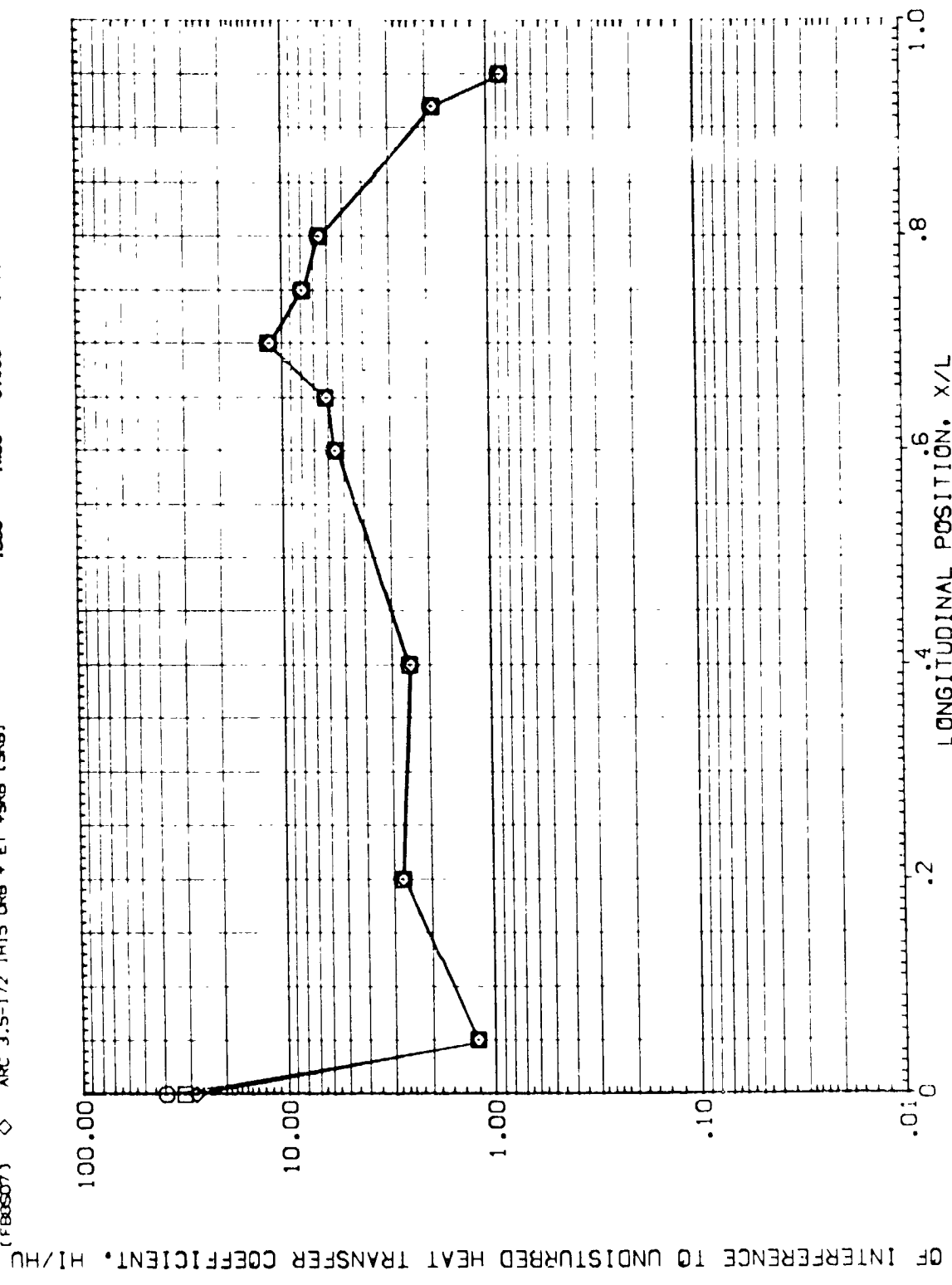


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., SRB
 PHU/L = 4.311 MACH = 5.300 PHI = 180.000 P GE 109

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(088507) ARC 3.5-172 IM15 DR8 + ET +SR8 (SR8) 1.000 .000 5.300 .000

(142507) ARC 3.5-172 IM15 DR8 + ET +SR8 (SR8) .900 .000 5.300 .000

(186507) ARC 3.5-172 IM15 DR8 + ET +SR8 (SR8) .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

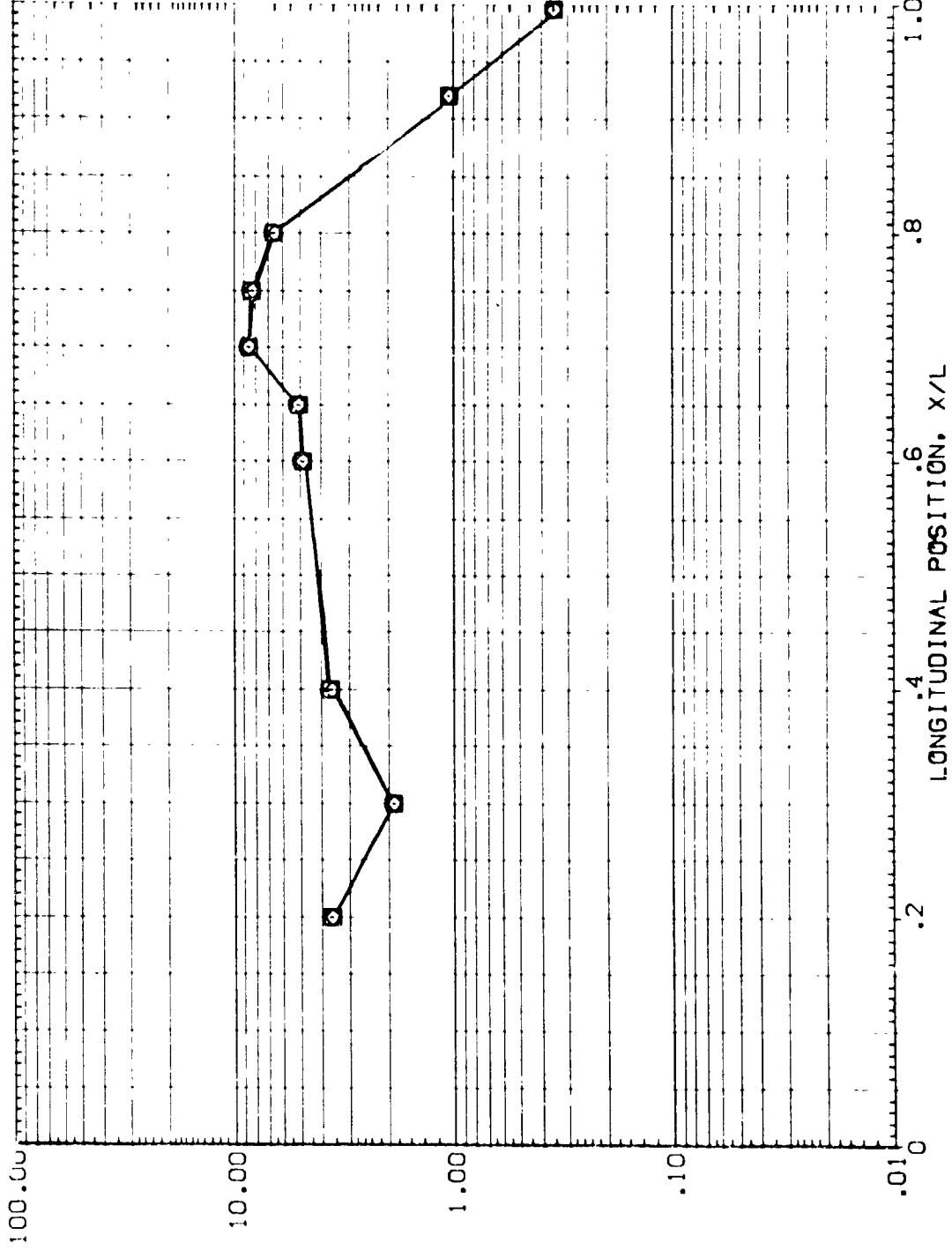


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SR8.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HX/HU ALPHA MACH PHI-M

(DB8507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

(EB8507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

(FB8507) ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

1.000 .000 5.300 .000

.900 .000 5.300 .000

.850 .000 5.300 .000

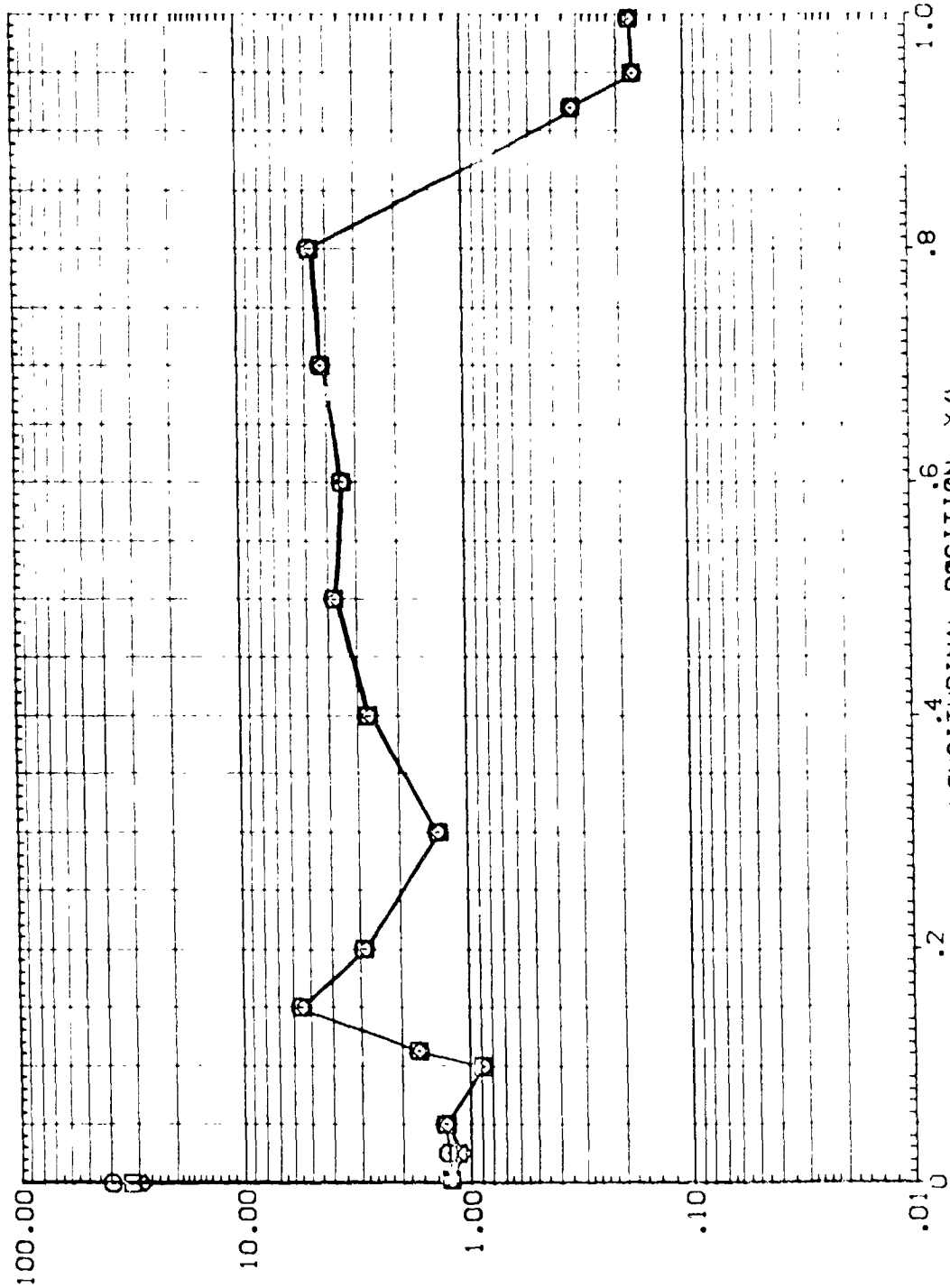


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRE

ORV/L = 4.31; MACH = 5.300 PHI = 270.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (080507) ARC 3.5-172 [HIS ORB + ET +SRB (SRB)
 (130507) ARC 3.5-172 [HIS ORB + ET +SRB (SRB)
 (180507) ARC 3.5-172 [HIS ORB + ET +SRB (SRB)

HAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

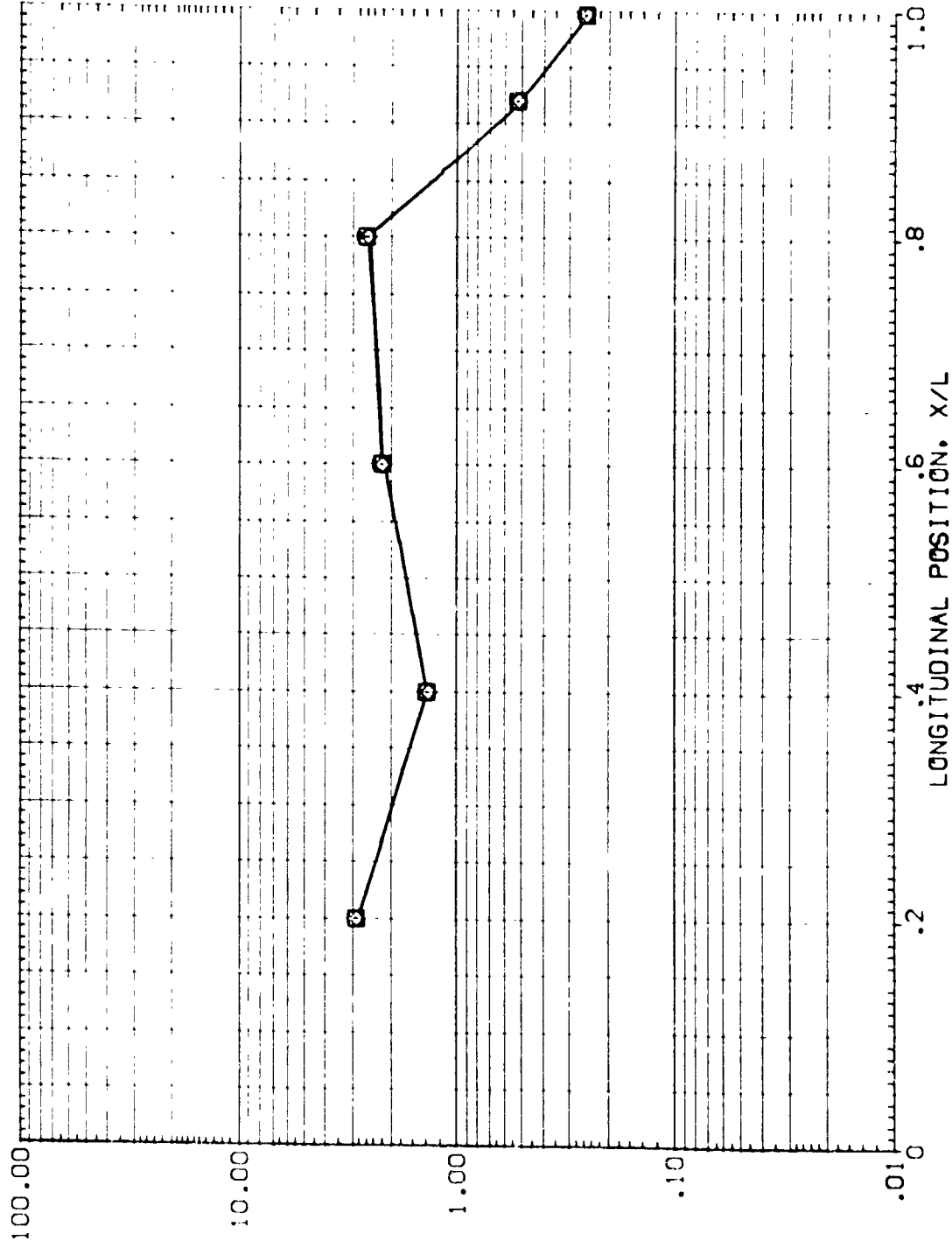


FIG. 11 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

OR/N/L = 4.311 MACH = 5.300 PHI = 315.000

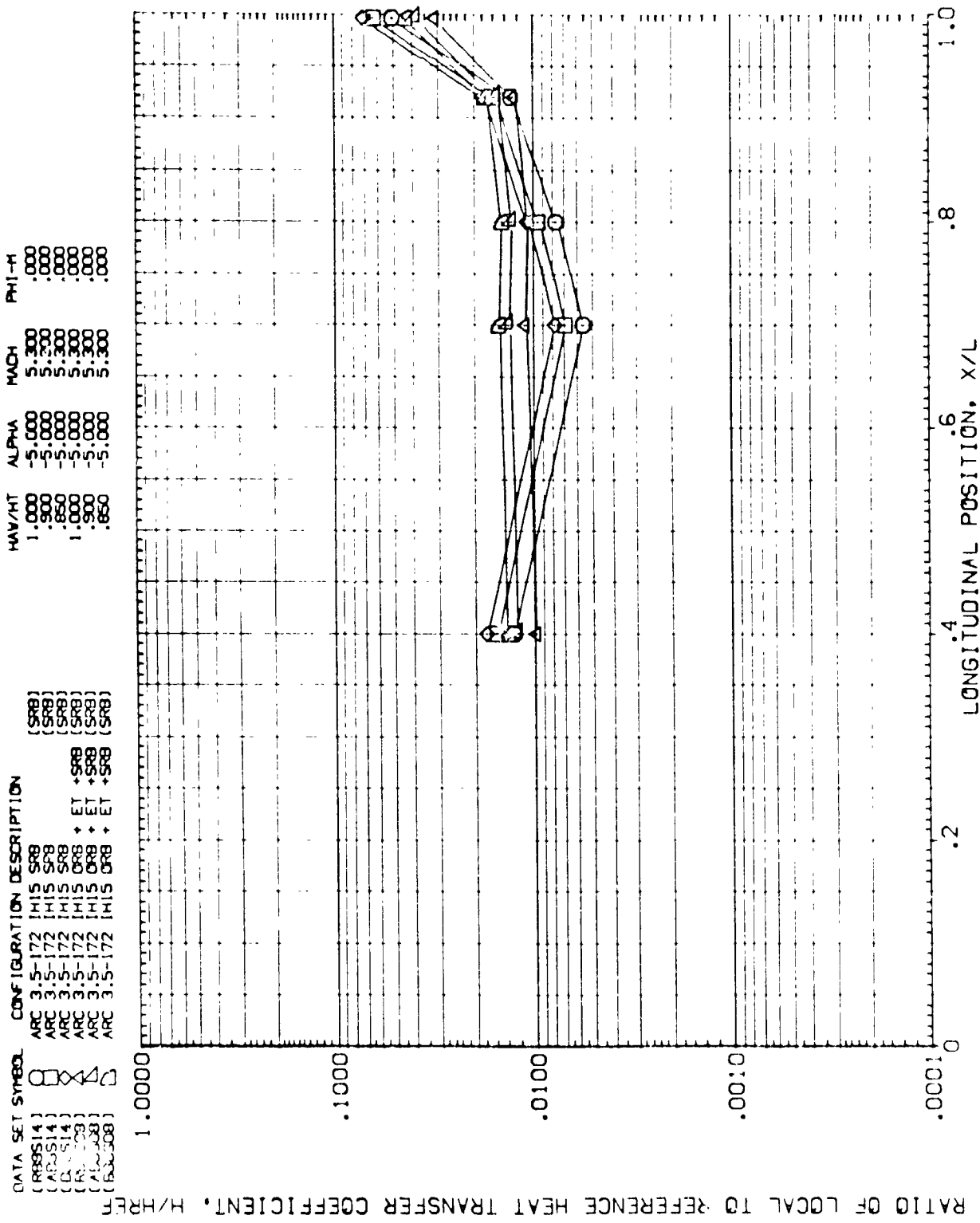


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

R/L = 2.138 MACH = 5.300 PHI = 90.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(A90S14)	ARC 3.5-172 (H15 SRB (SRB))
(A90S14)	ARC 3.5-172 (H15 SRB (SRB))
(A90S14)	ARC 3.5-172 (H15 SRB (SRB))
(A90S14)	ARC 3.5-172 (H15 SRB + ET +SRB (SRB))
(A90S14)	ARC 3.5-172 (H15 SRB + ET +SRB (SRB))
(A90S14)	ARC 3.5-172 (H15 SRB + ET +SRB (SRB))

HAV/HT	ALPHA	MACH	PHI-M
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000

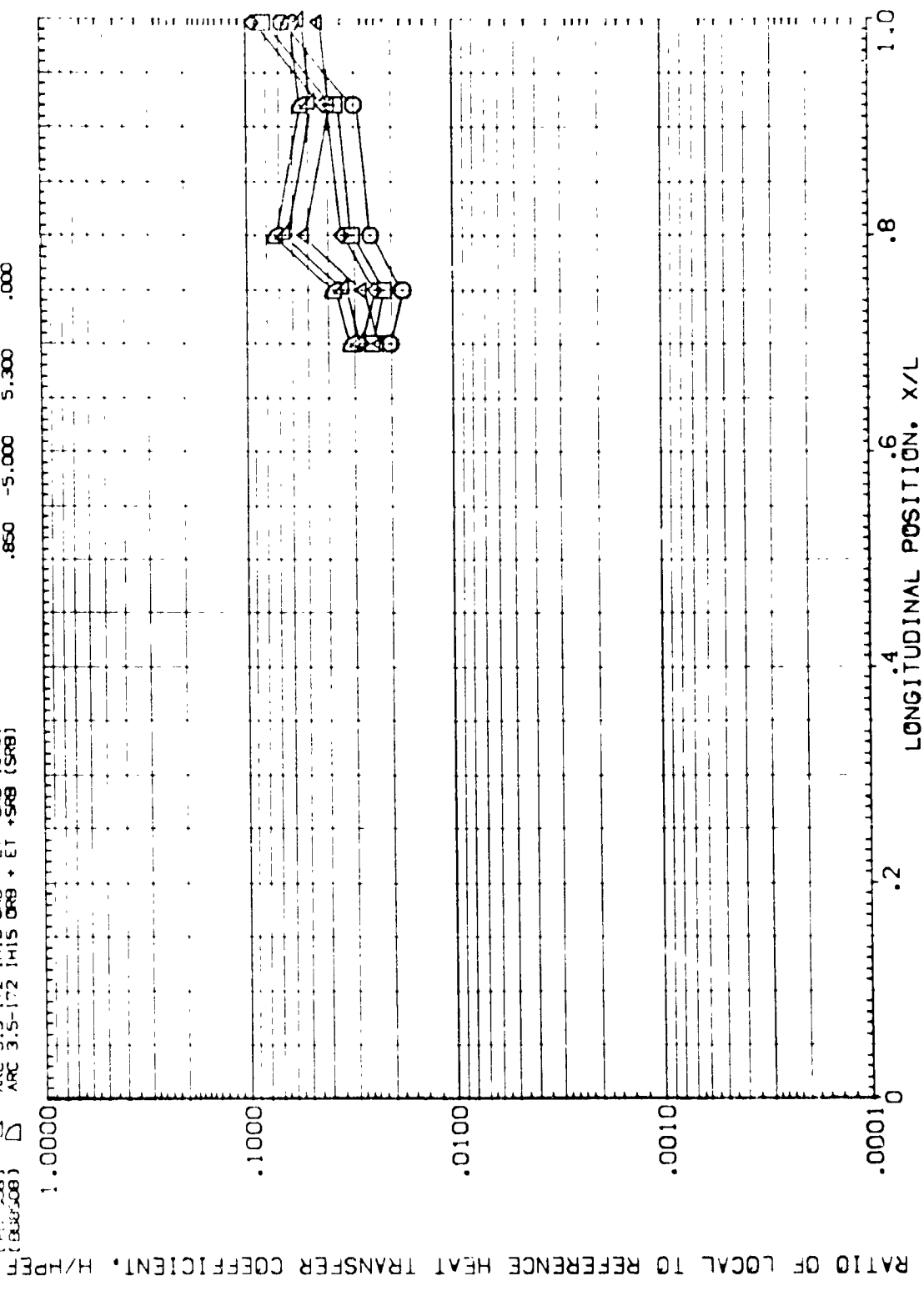


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 2.138 MACH = 5.300 PHI = 135.000

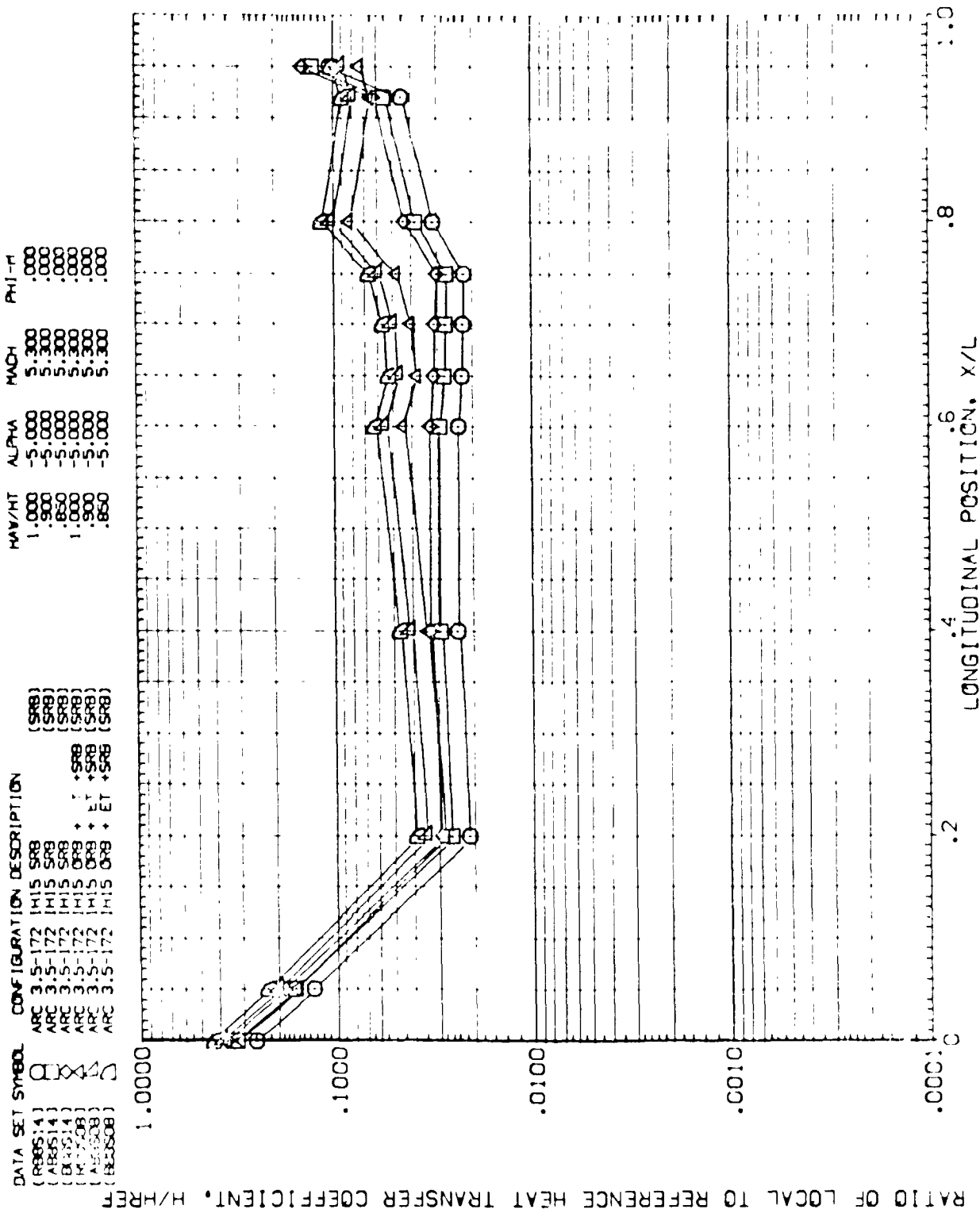


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

MAV/L = 2.138 MAV/D = 5.300 PHI = 180.000 PAGE 115

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R00S14)	ARC 3.5-172	M15	SRB	(SRB)
(AR0S14)	ARC 3.5-172	M15	SRB	(SRB)
(B00S14)	ARC 3.5-172	M15	SRB + ET	+SRB (SRB)
(A00S20)	ARC 3.5-172	M15	OR8 + ET	+SRB (SRB)
(E00S08)	ARC 3.5-172	M15	OR8 + ET	+SRB (SRB)

MACH ALPHA MACH PHI-H

1.000	-5.000	5.300	.000
.850	-5.000	5.300	.000
1.000	-5.000	5.300	.000
.850	-5.000	5.300	.000

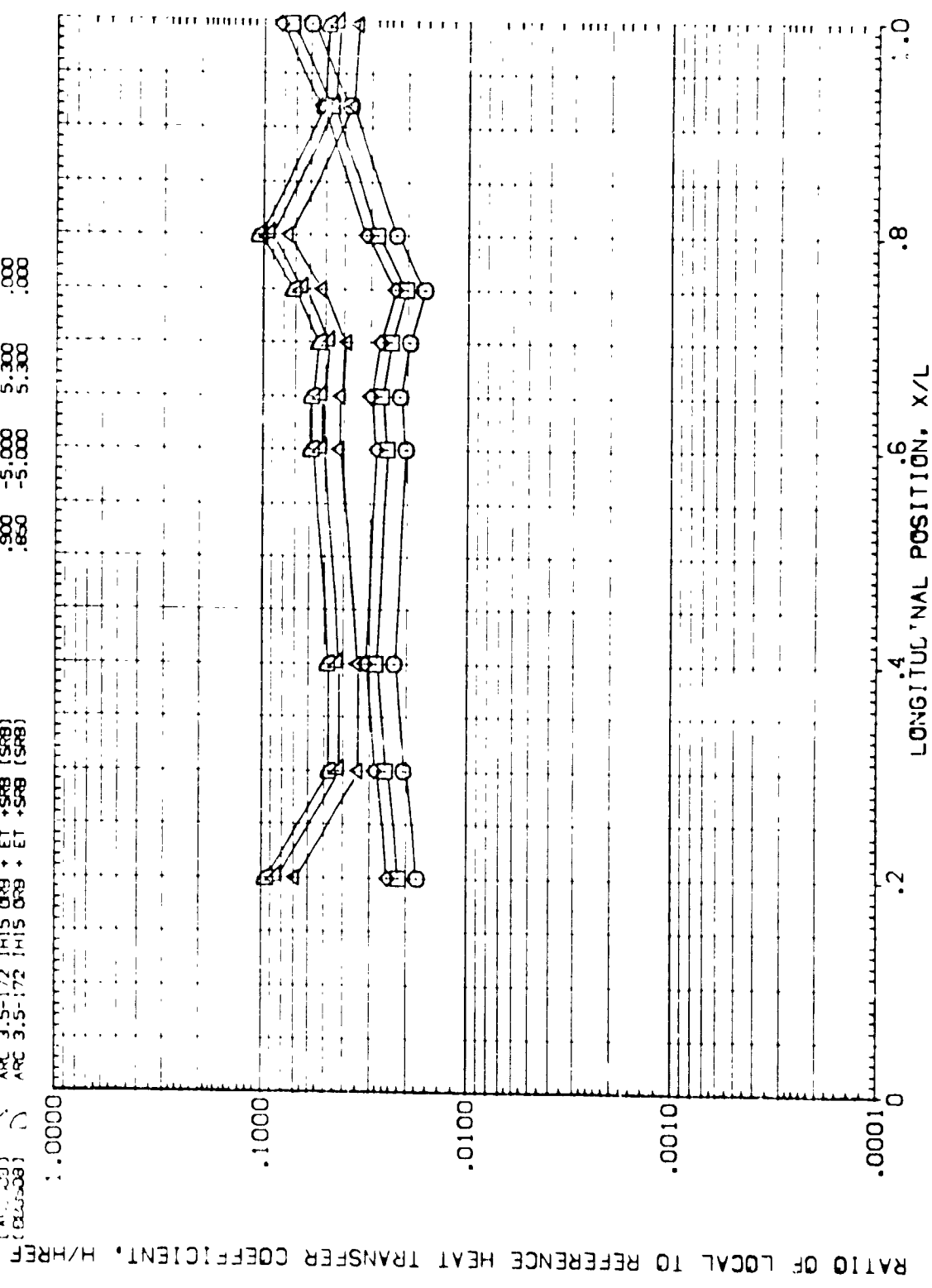


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 2.138 MACH = 5.300 PHI = 225.000 PAGE 116

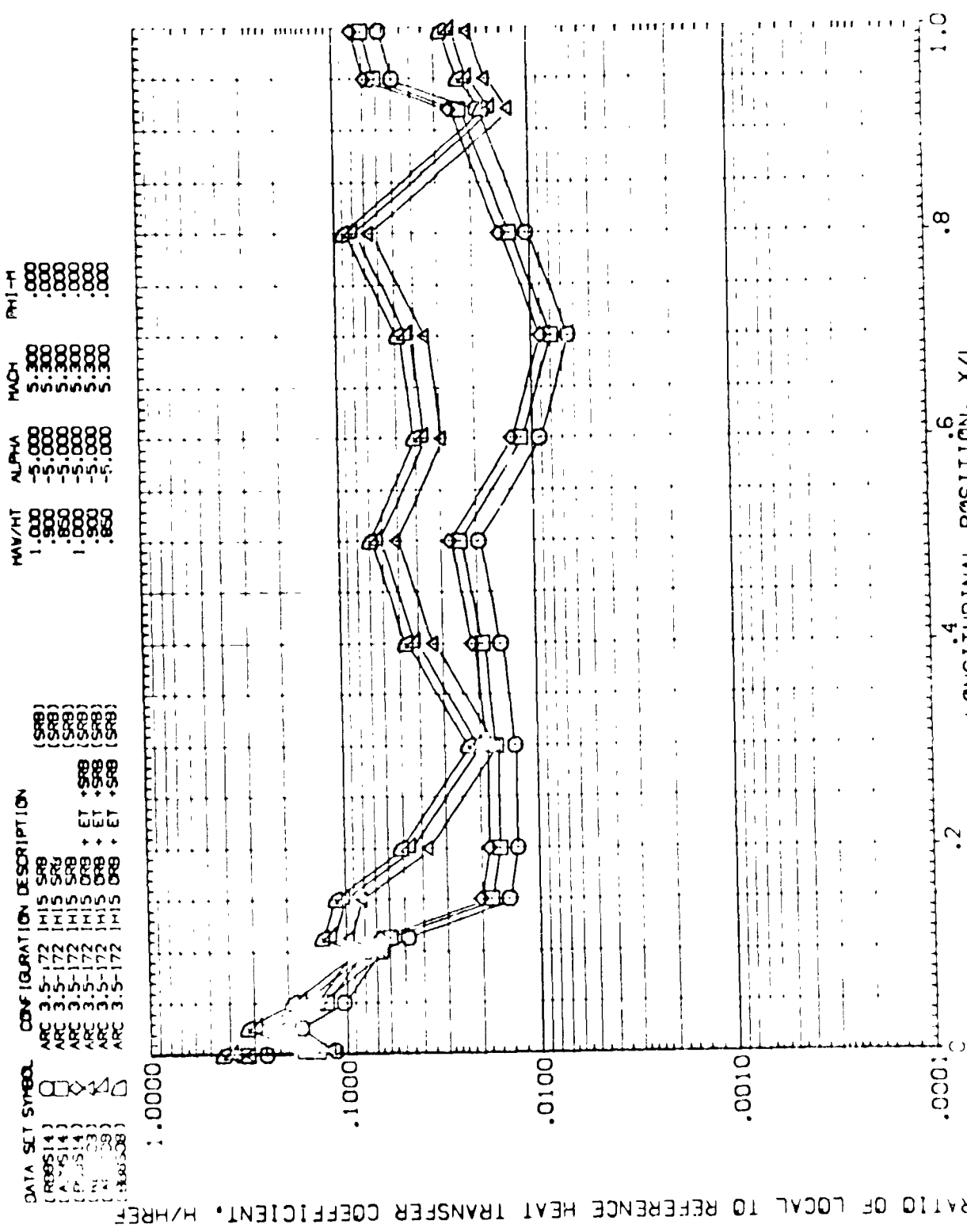


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA P11-M

ARC 3.5-172 IHS SRB (SRB)
 ARC 3.5-172 IHS SRB (SRB)
 ARC 3.5-172 IHS SRB (SRB)
 ARC 3.5-172 IHS SRB + ET + SRB (SRB)
 ARC 3.5-172 IHS DRB + ET + SRB (SRB)
 ARC 3.5-172 IHS DRB + ET + SRB (SRB)

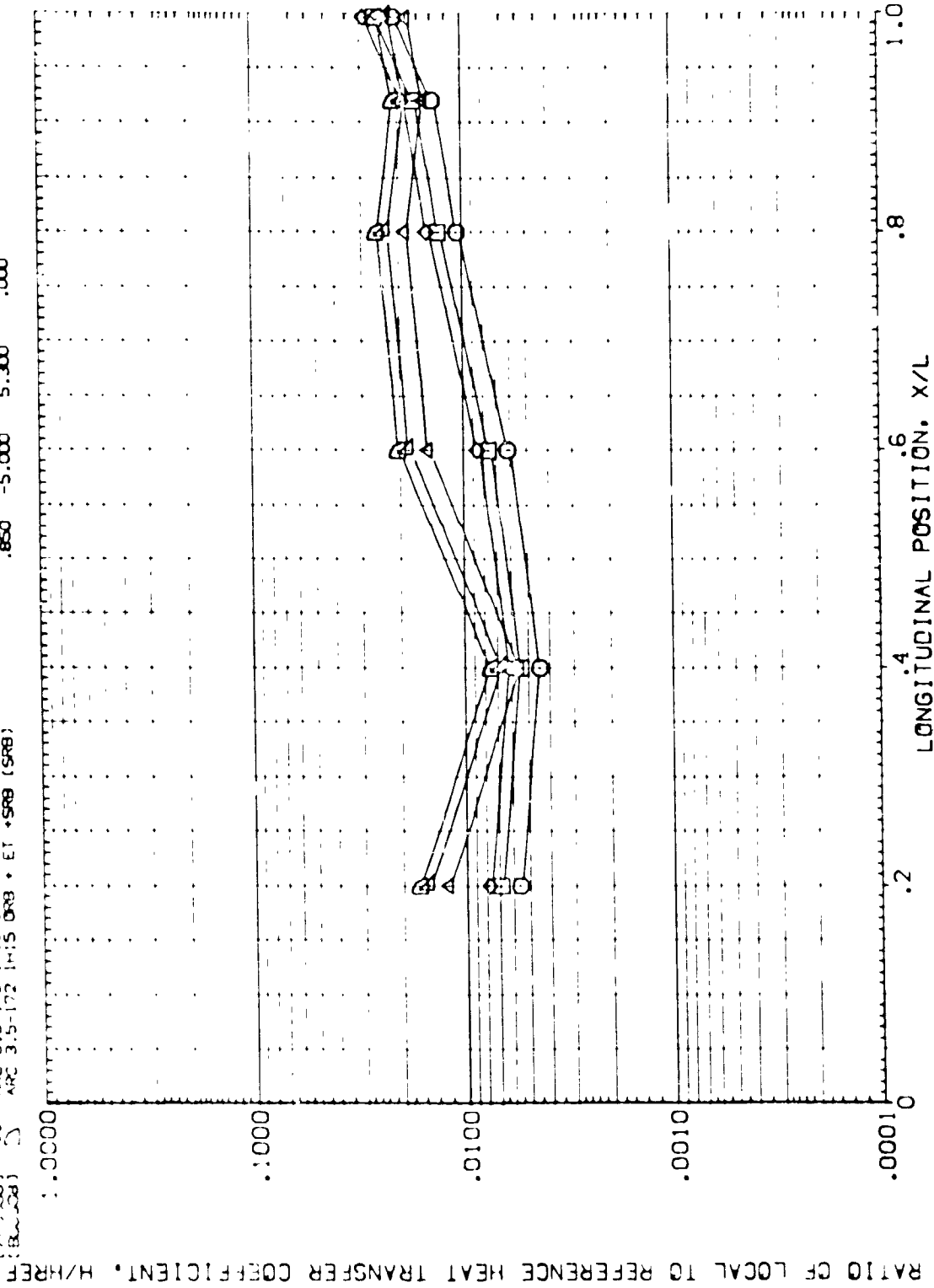


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

$R^*/L = 2.138$ $MACH = 5.300$ $PHI = 315.000$ PAGE 118

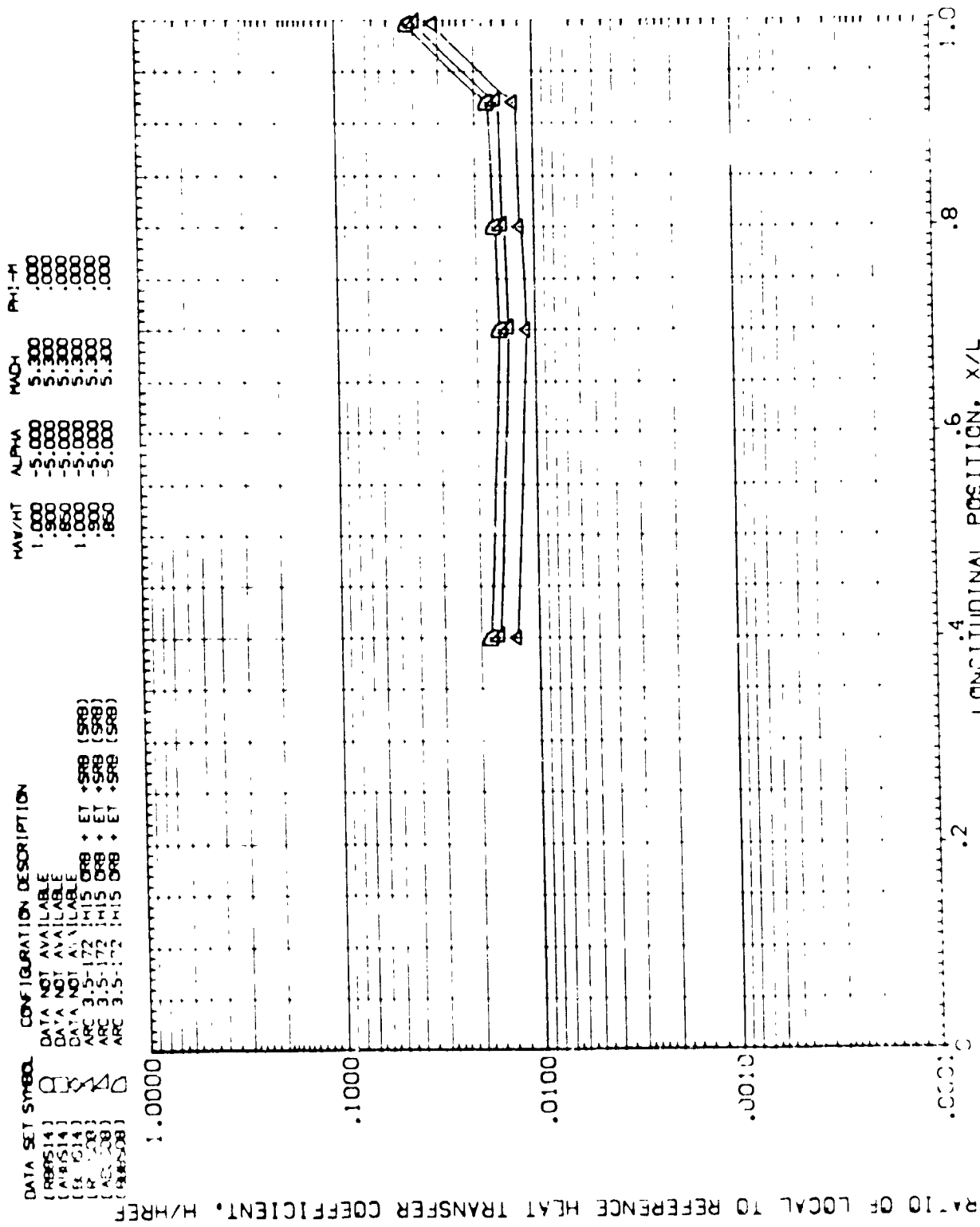


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R9S14) DATA NOT AVAILABLE
 (A9S14) DATA NOT AVAILABLE
 (B1S14) CAT, NOT AVAILABLE
 (R3508) ARC 3.5-172 IH15 DT3 + ET +SRB (SRB)
 (A3508) ARC 3.5-172 IH15 DS8 + ET +SRB (SRB)
 (B3508) ARC 3.5-172 IH15 DS8 + ET +SRB (SRB)

HAW/HT ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

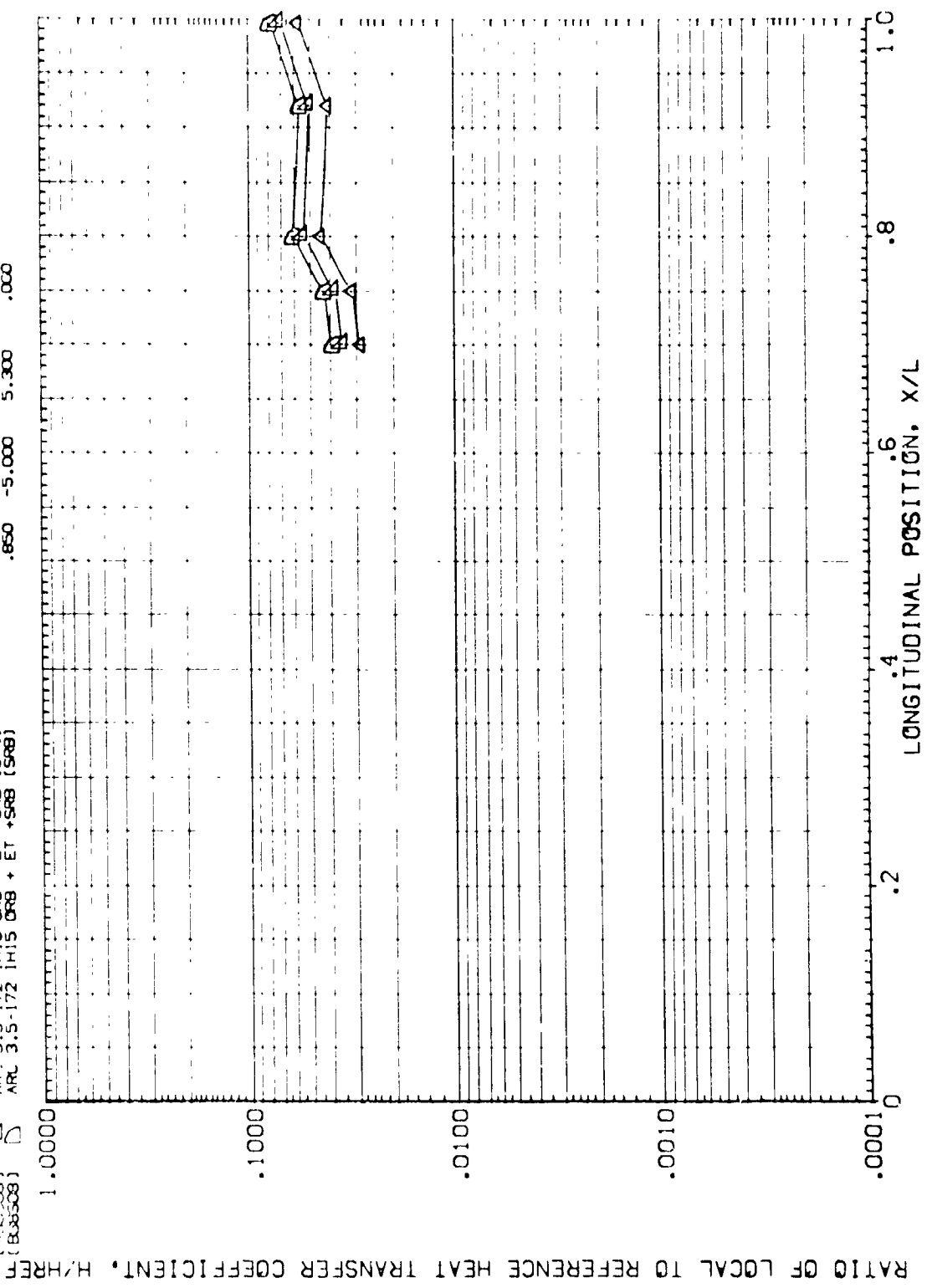


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RBS14) DATA NOT AVAILABLE
 (A-PS14) DATA NOT AVAILABLE
 (B-PS14) DATA NOT AVAILABLE
 (R-PS14) ARC 3.5-172 | H15 DRB + ET +SRB (SRB)
 (R-PS14) ARC 3.5-172 | H15 DRB + ET +SRB (SRB)
 (R-PS14) ARC 3.5-172 | H15 DRB + ET +SRB (SRB)
 (R-PS14) ARC 3.5-172 | H15 DRB + ET +SRB (SRB)

HAV/HT ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

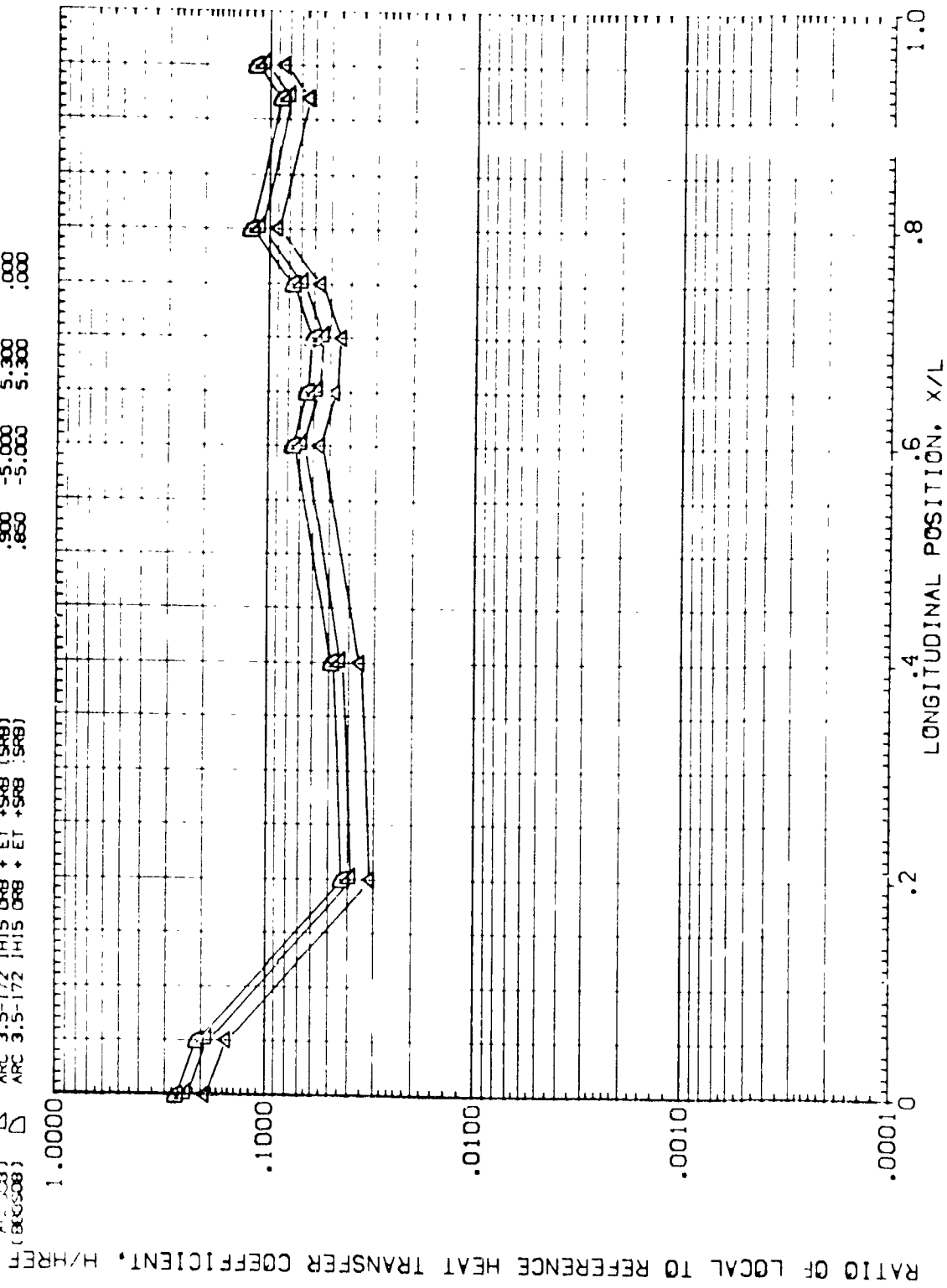


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.713 MACH = 5.300 PHI = 180.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(R08S14) DATA NOT AVAILABLE 1.000 -5.000 5.300 .000
 (A08S14) DATA NOT AVAILABLE .500 -5.000 5.300 .000
 (E08S14) DATA NOT AVAILABLE .850 -5.000 5.300 .000
 (F08S14) ARC 3.5-172 IH15 ORB + ET +SRB (SRB) 1.000 -5.000 5.300 .000
 (A08S08) ARC 3.5-172 IH15 ORB + ET +SRB (SRB) .500 -5.000 5.300 .000
 (E08S08) ARC 3.5-172 IH15 ORB + ET +SRB (SRB) .850 -5.000 5.300 .000

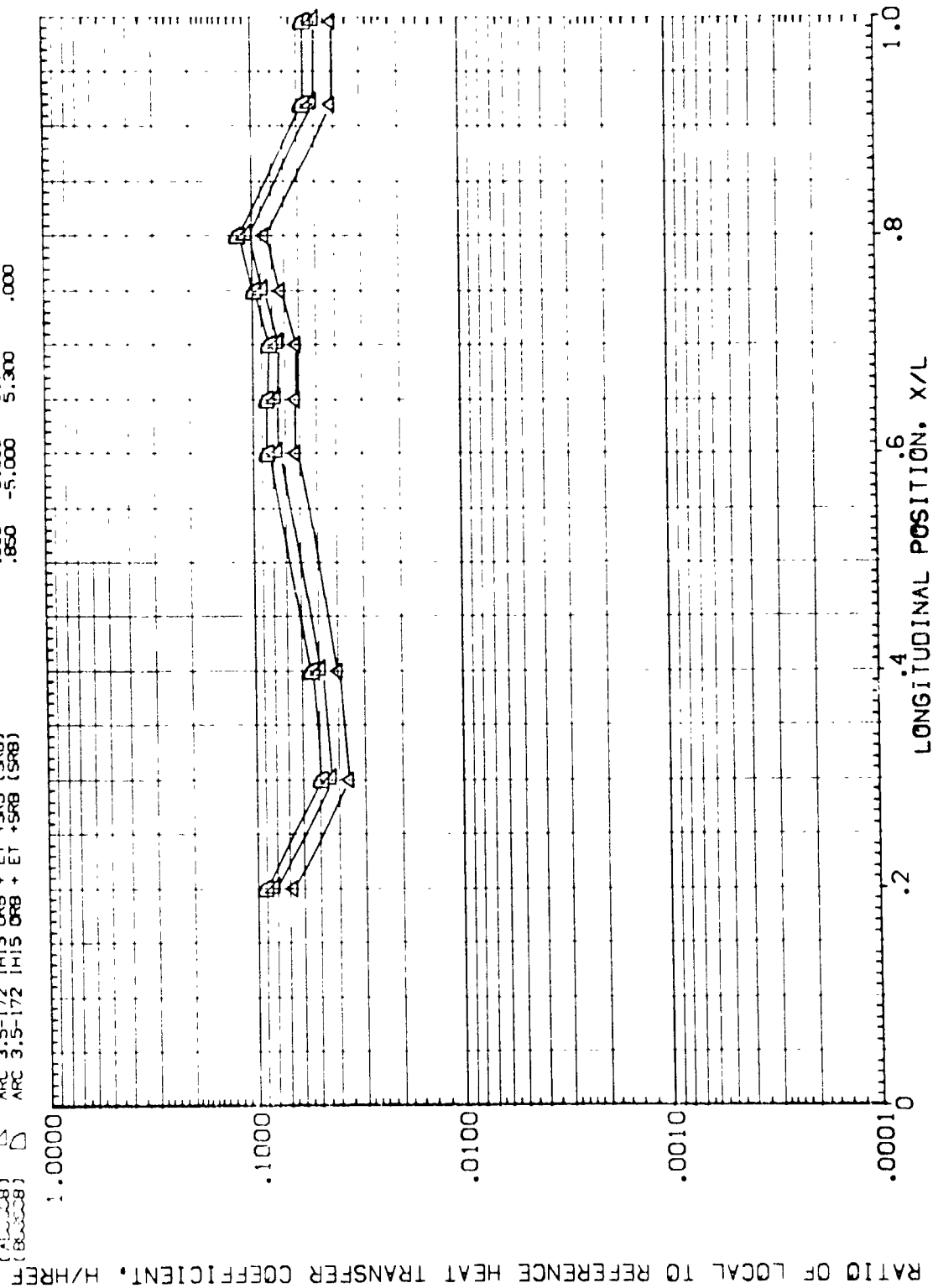
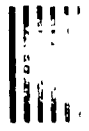


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.713 MACH = 5.300 PHI = 225.000 PAGE 122



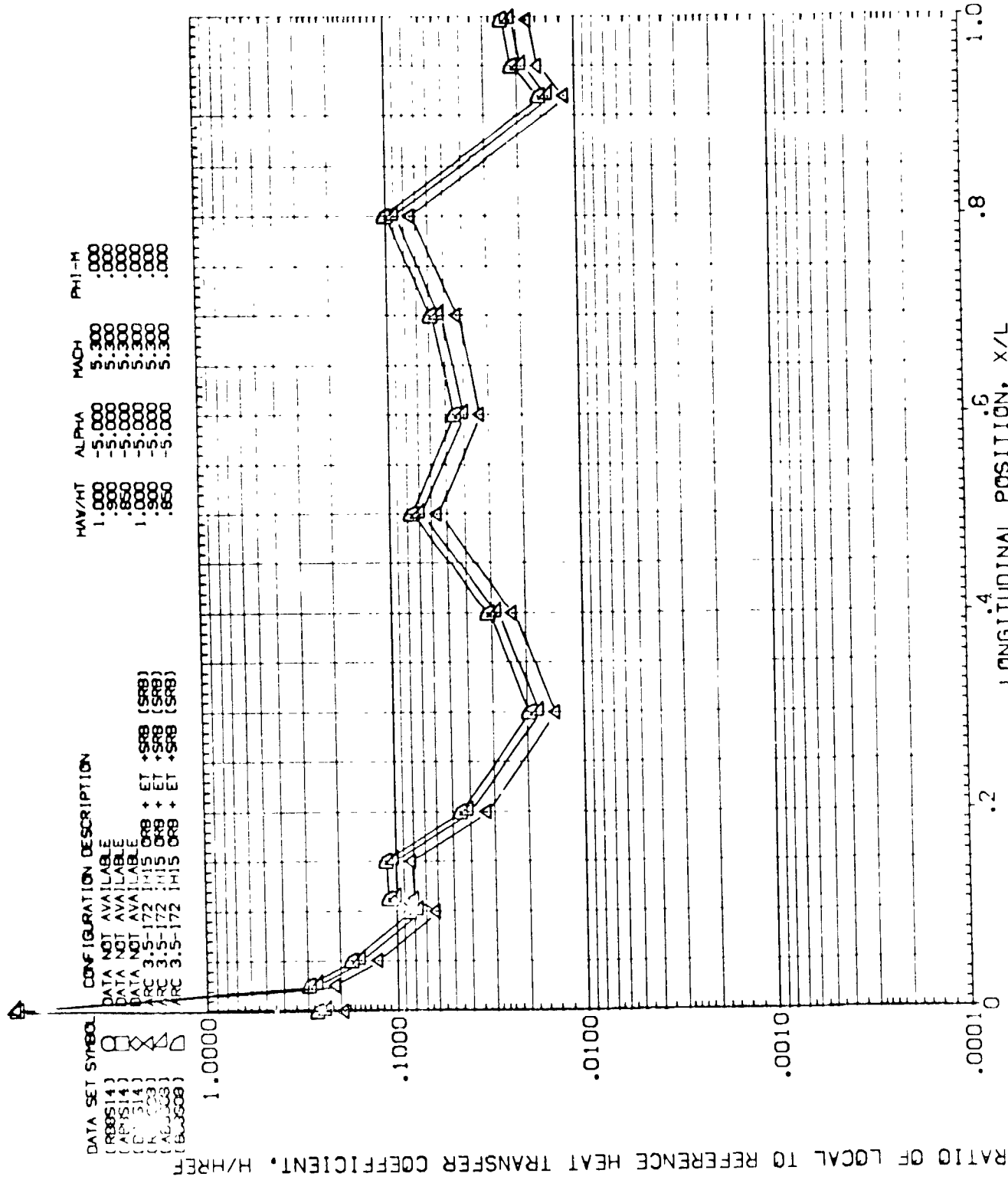


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.713 MACH = 5.300 PHI = 270.000

H/W/H	ALPHA	MACH	PHI-M
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.850	-5.000	5.300	.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R88514) DATA NOT AVAILABLE

(A88514) DATA NOT AVAILABLE

(S88514) DATA NOT AVAILABLE

(R88523) ARC 3.5-172 IH15 CR8 + ET +SR8 (SR8)

(A88523) ARC 3.5-172 IH15 CR8 + ET +SR8 (SR8)

(B88523) ARC 3.5-172 IH15 CR8 + ET +SR8 (SR8)

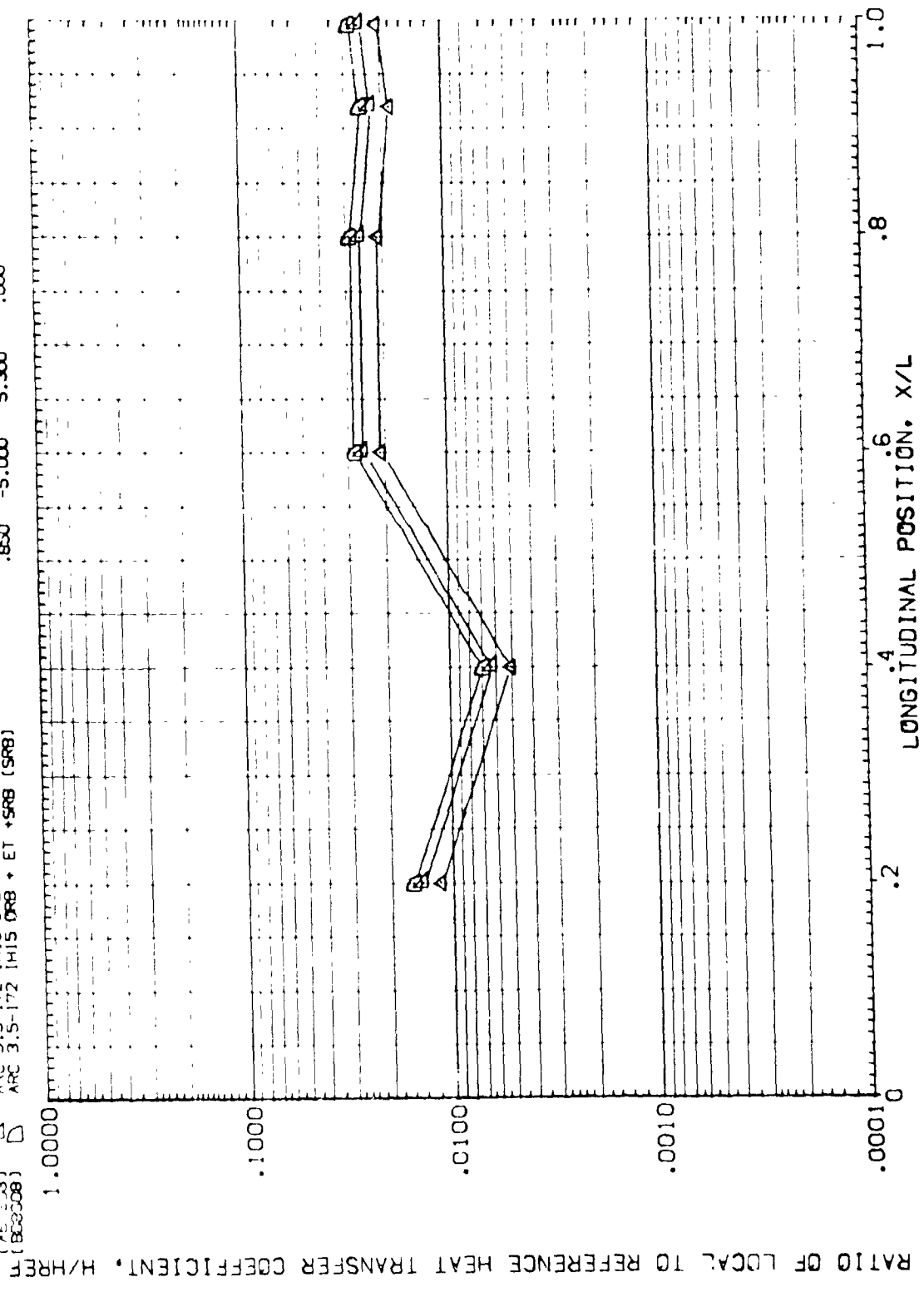


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.713 MACH = 5.300 PHI = 315.000

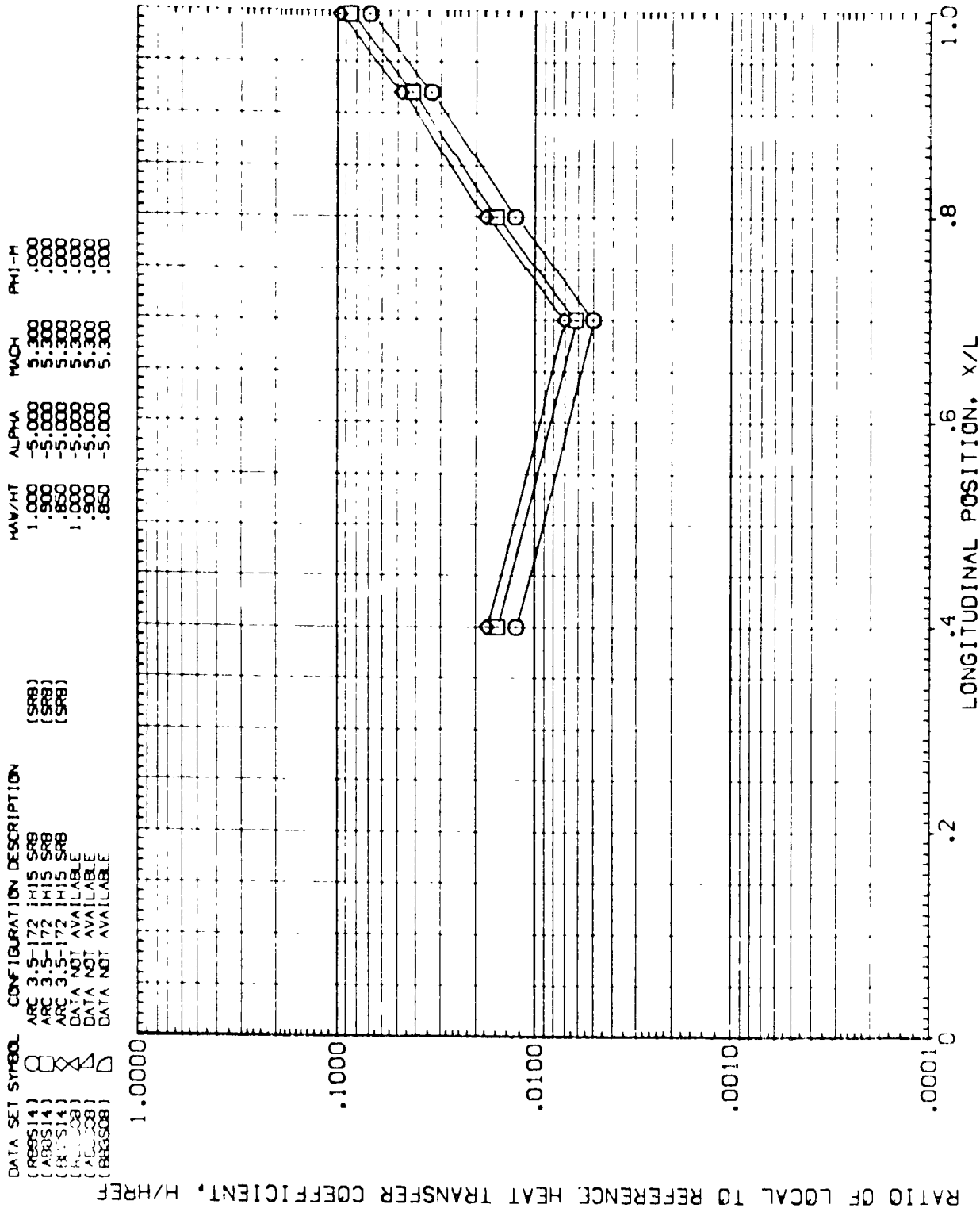


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.469 MACH = 5.300 PHI = 90.000

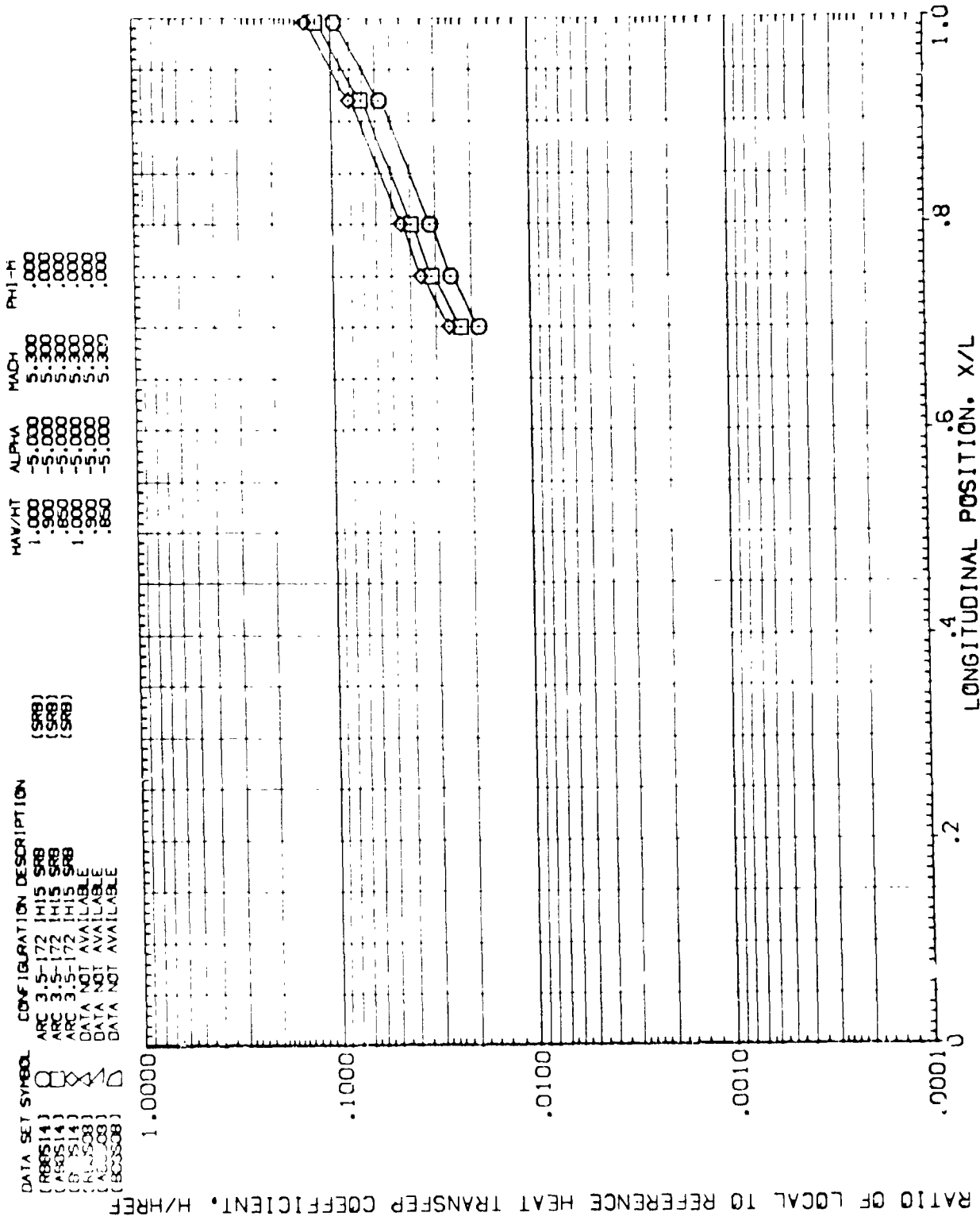


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.469 MACH = 5.300 PHI = 135.000

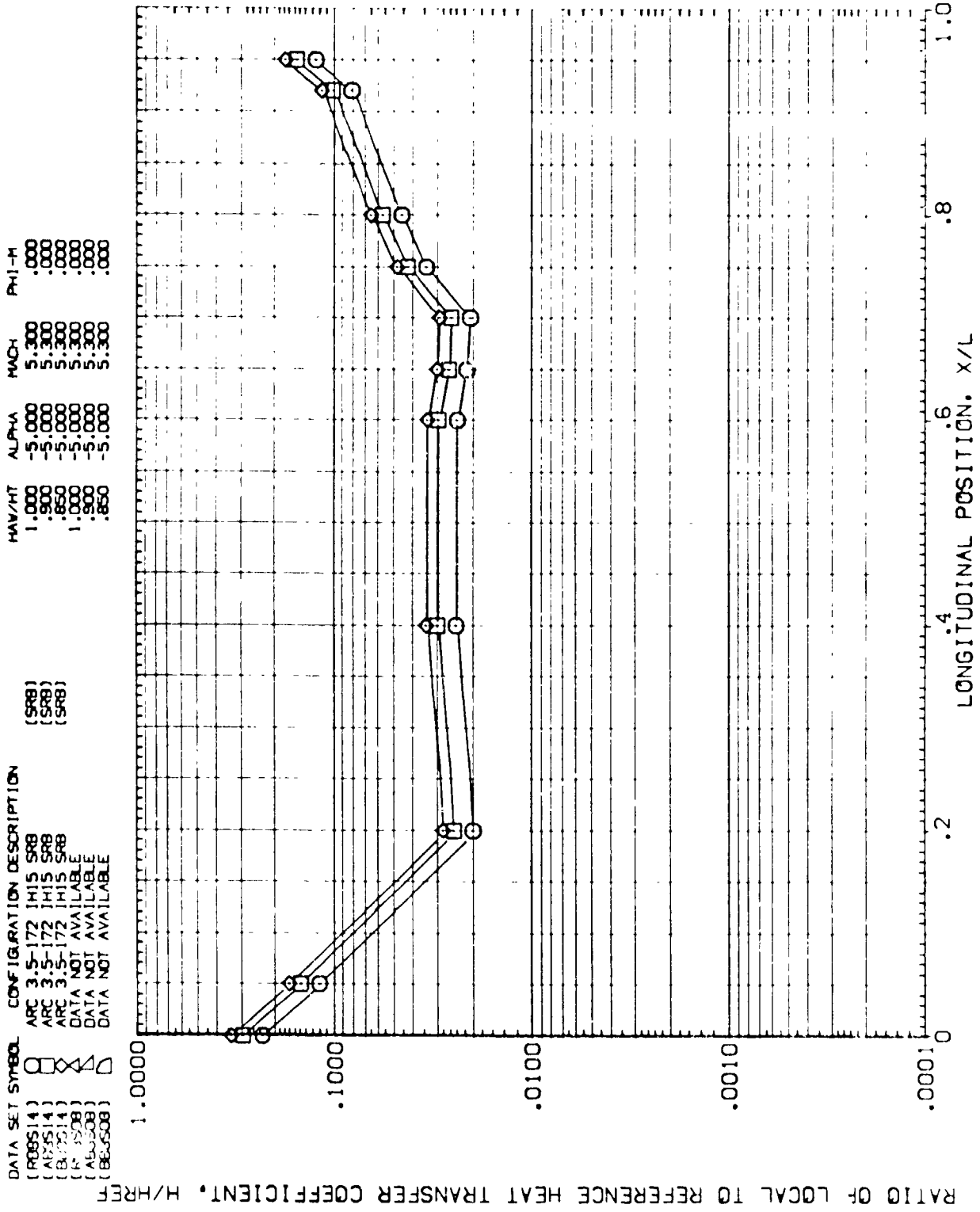


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

PH/L = 5.469 MACH = 5.300 PHI = 180.000

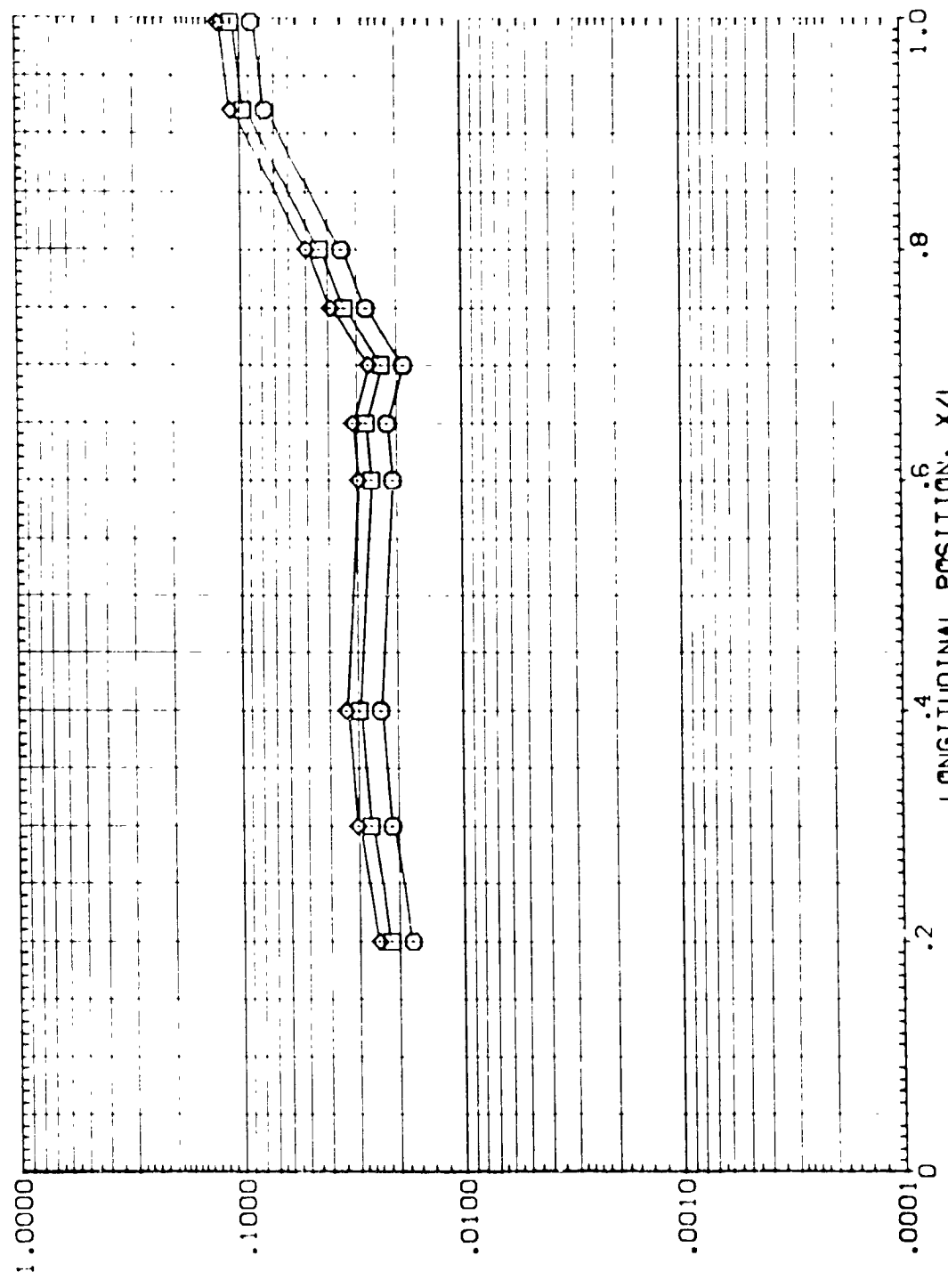
DATA SET SYMBOL CONFIGURATION DESCRIPTION (SRB) MACH ALPHA PH1-M

(R00514)	ARC 3.5-172 IH15 SRB	(SRB)	5.300	-5.000	.000
(A13514)	ARC 3.5-172 IH15 SRB	(SRB)	5.300	-5.000	.000
(C13514)	ARC 3.5-172 IH15 SRB	(SRB)	5.300	-5.000	.000
(A13508)	DATA NOT AVAILABLE		5.300	-5.000	.000
(A13503)	DATA NOT AVAILABLE		5.300	-5.000	.000
(B13508)	DATA NOT AVAILABLE		5.300	-5.000	.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION (SRB) MACH ALPHA PH1-M

(R00514)	ARC 3.5-172 IH15 SRB	(SRB)	5.300	-5.000	.000
(A13514)	ARC 3.5-172 IH15 SRB	(SRB)	5.300	-5.000	.000
(C13514)	ARC 3.5-172 IH15 SRB	(SRB)	5.300	-5.000	.000
(A13508)	DATA NOT AVAILABLE		5.300	-5.000	.000
(A13503)	DATA NOT AVAILABLE		5.300	-5.000	.000
(B13508)	DATA NOT AVAILABLE		5.300	-5.000	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF



LONGITUDINAL POSITION, X/L

FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.469 MACH = 5.300 PH1 = 225.000 PAGE 128

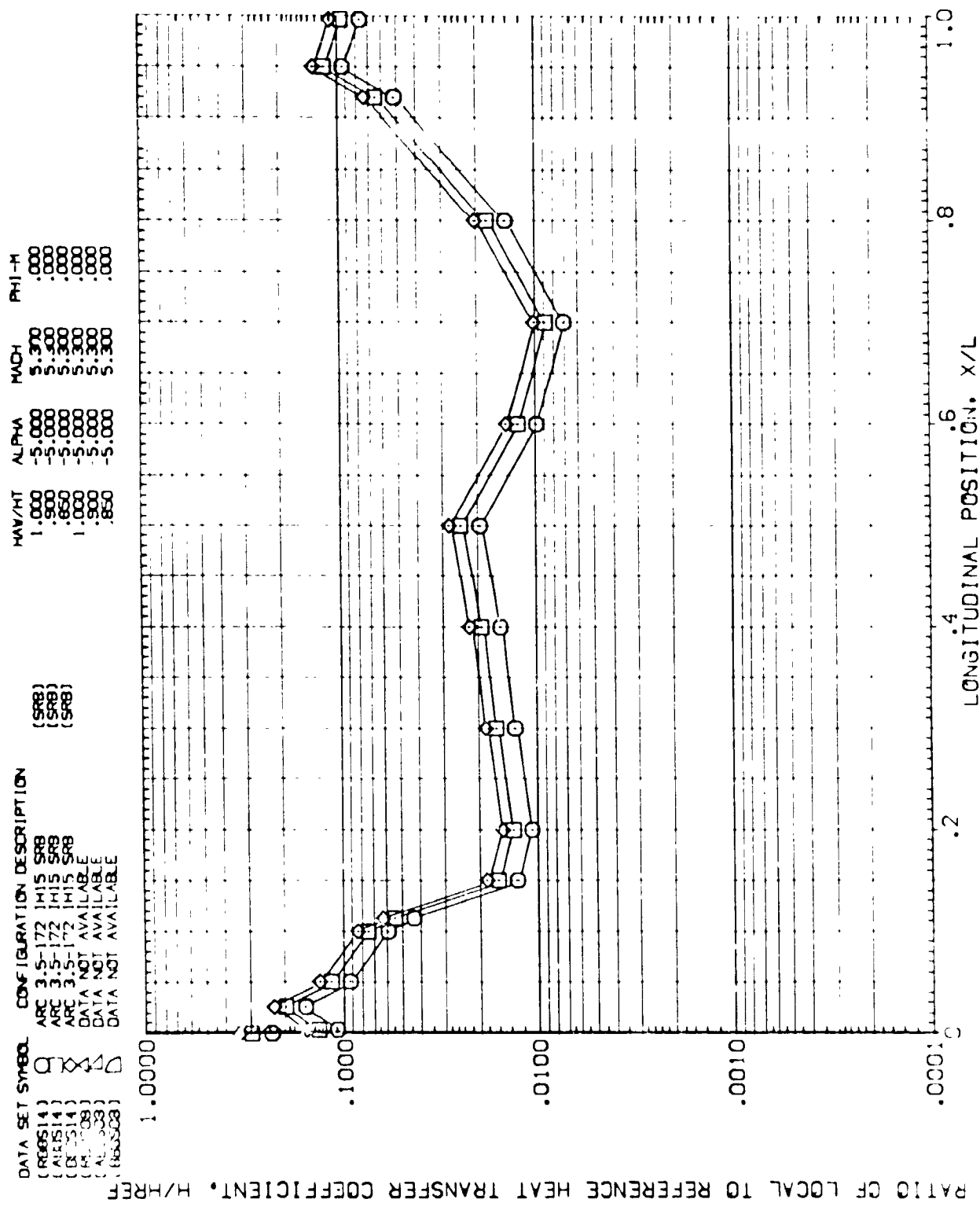


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	PHI-M
(RUBS14)	ARC 3.5-172 THIS SRB	5.300	.000
(LPGS14)	ARC 3.5-172 THIS SRB	5.300	.000
(RUBS14)	ARC 3.5-172 THIS SRB	5.300	.000
(LPGS14)	ARC 3.5-172 THIS SRB	5.300	.000
(LPGS14)	DATA NOT AVAILABLE	5.300	.000
(LPGS14)	DATA NOT AVAILABLE	5.300	.000
(LPGS14)	DATA NOT AVAILABLE	5.300	.000

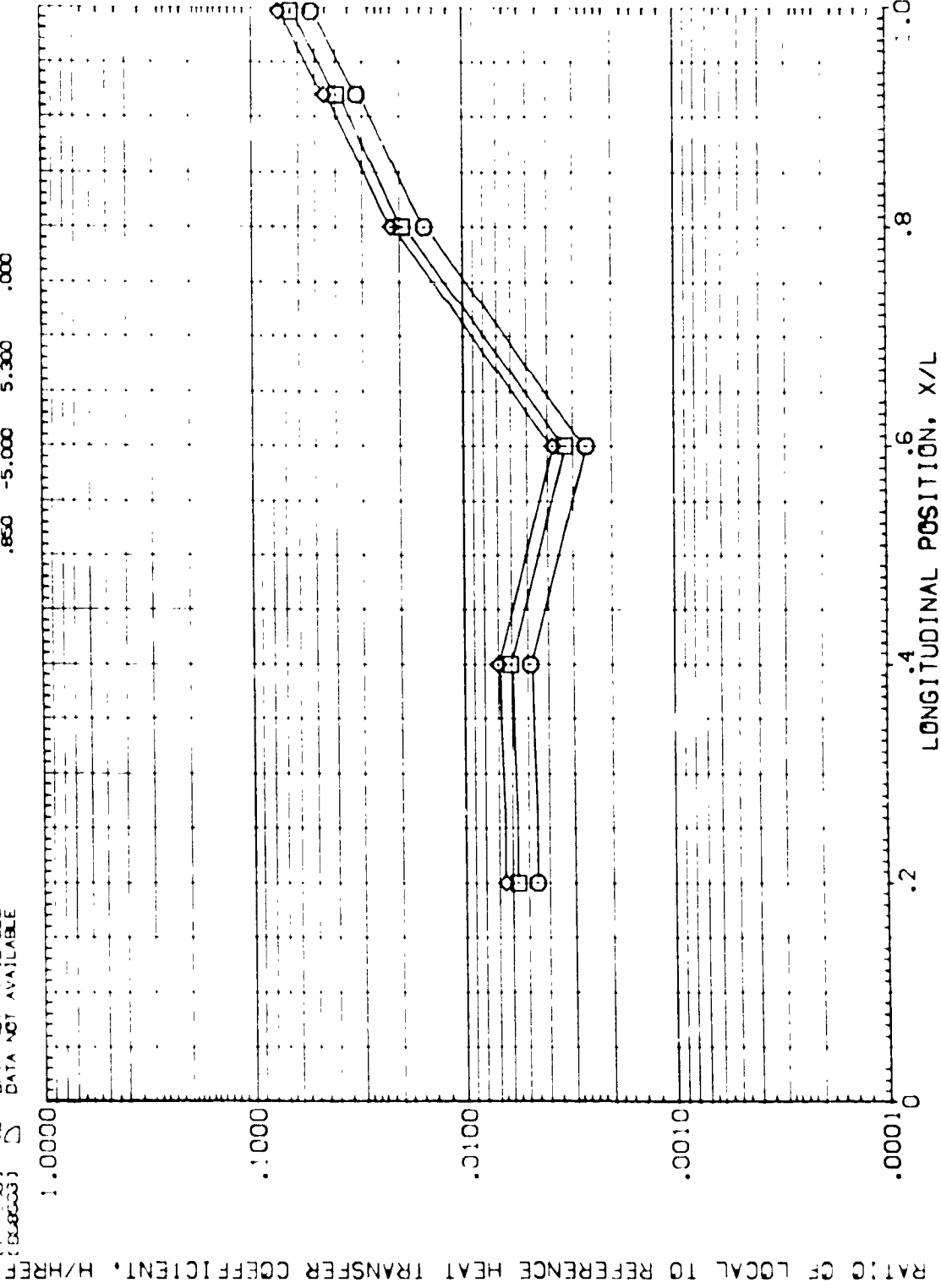


FIG. 12 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

PN/L = 5.469 MACH = 5.300 PHI = 315.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(089508) ARC 3.5-172 IM15 ORB + ET +SRB (SRB)

(E0508) ARC 3.5-172 IM15 ORB + ET +SRB (SRB)

(F0508) ARC 3.5-172 IM15 ORB + ET +SRB (SRB)

MACH ALPHA MAV/AT PHI-M

5.300 -5.000 1.000 .000

5.300 -5.000 .900 .000

5.300 -5.000 .850 .000

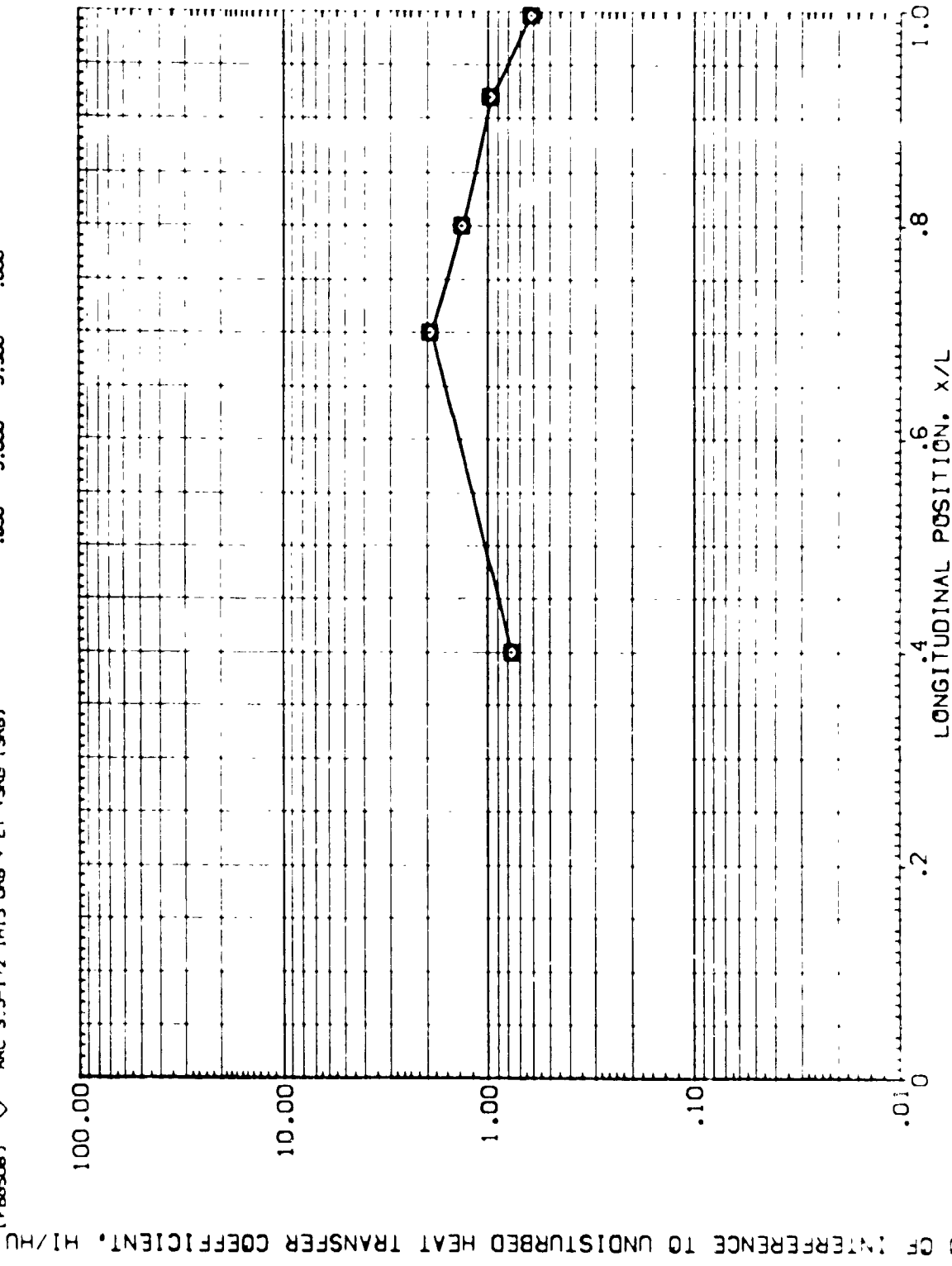


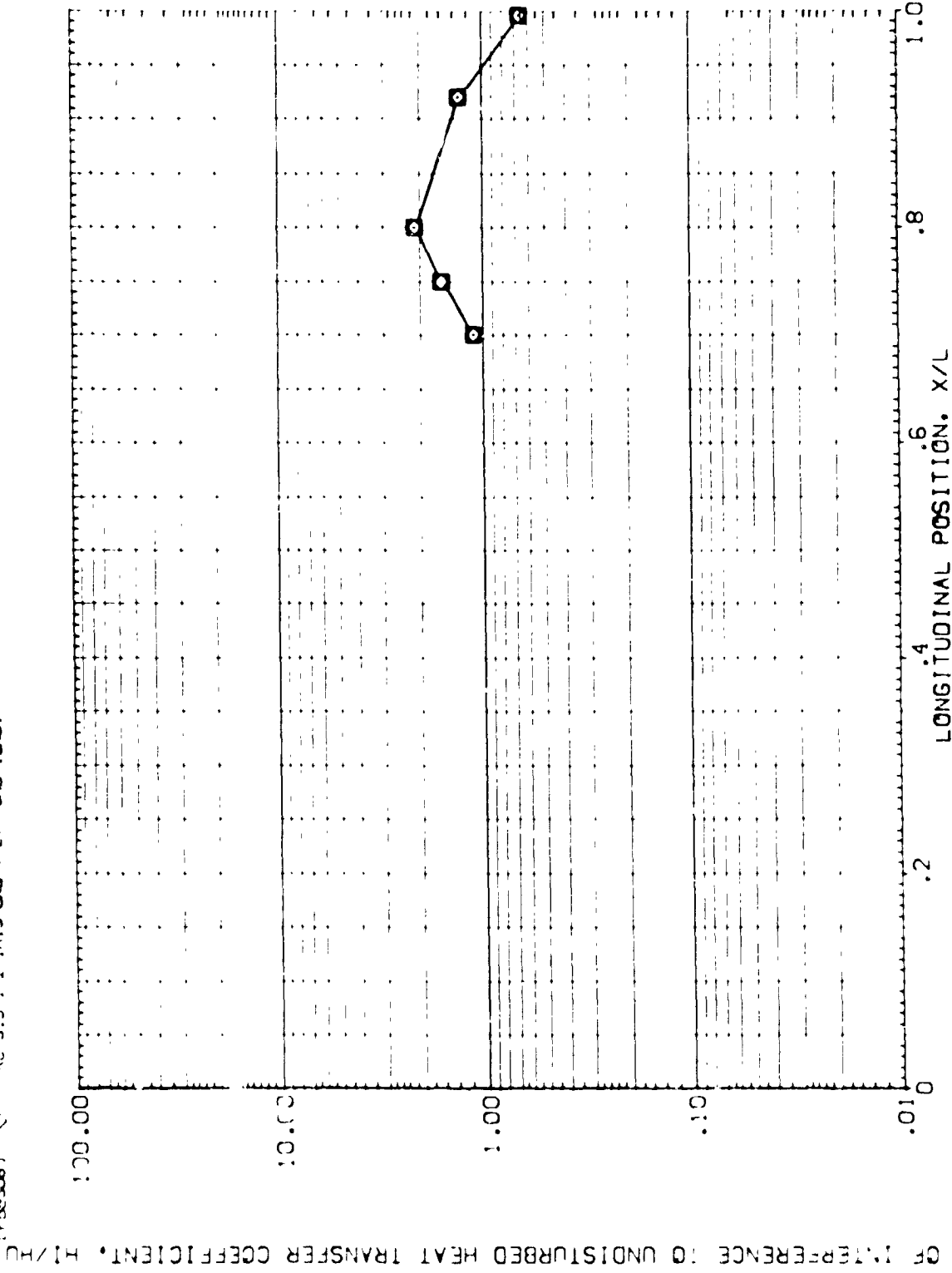
FIG. 13 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH PHI-M

(DUK508) ARC 3.5-172 H15 ORB + ET +SRB (SRB) 5.300 .000

(LUG508) ARC 3.5-172 H15 ORB + ET +SRB (SRB) 5.300 .000

(LUG508) ARC 3.5-172 H15 ORB + ET +SRB (SRB) 5.300 .000



LONGITUDINAL POSITION, X/L

FIG. 13 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-M

(ORF508) ○ ARC 3.5-172 H15 ORB + ET +SRB (SRB) 1.000 -5.000 .000

(E10503) ○ ARC 3.5-172 H15 ORB + ET +SRB (SRB) .900 -5.000 .000

(E10508) ○ ARC 3.5-172 H15 ORB + ET +SRB (SRB) .850 -5.000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H/H₀

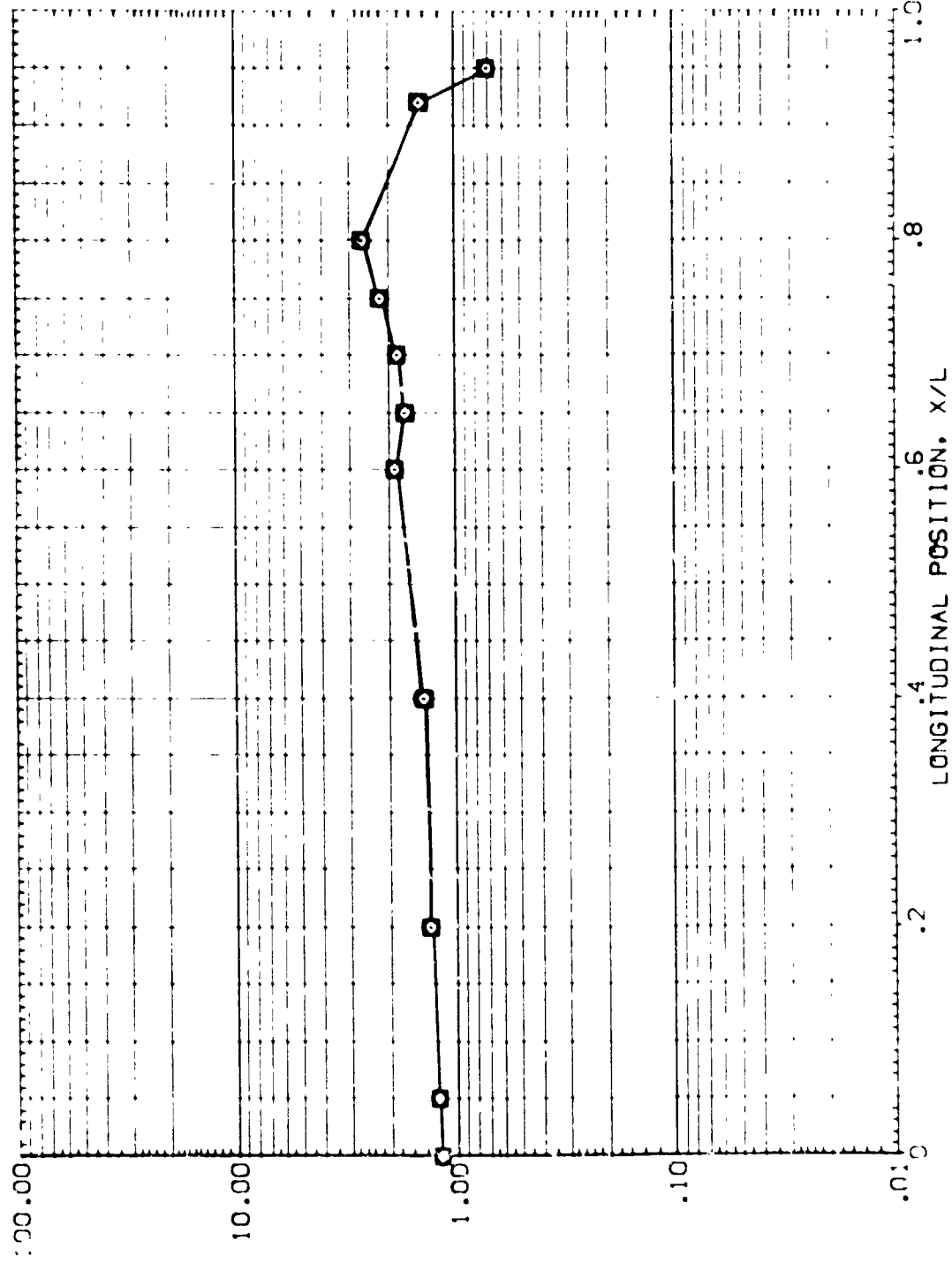


FIG. 13 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., SRB

MACH = 2.225 MACH = 5.300 PHI = 180.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(085008) Q ARC 3.5-172 [H15] CR8 + ET +SRB (SRB)
 (125008) Q ARC 3.5-172 [H15] CR8 + ET +SRB (SRB)
 (185008) Q ARC 3.5-172 [H15] CR8 + ET +SRB (SRB)

(085008) Q ARC 3.5-172 [H15] CR8 + ET +SRB (SRB)
 (125008) Q ARC 3.5-172 [H15] CR8 + ET +SRB (SRB)
 (185008) Q ARC 3.5-172 [H15] CR8 + ET +SRB (SRB)

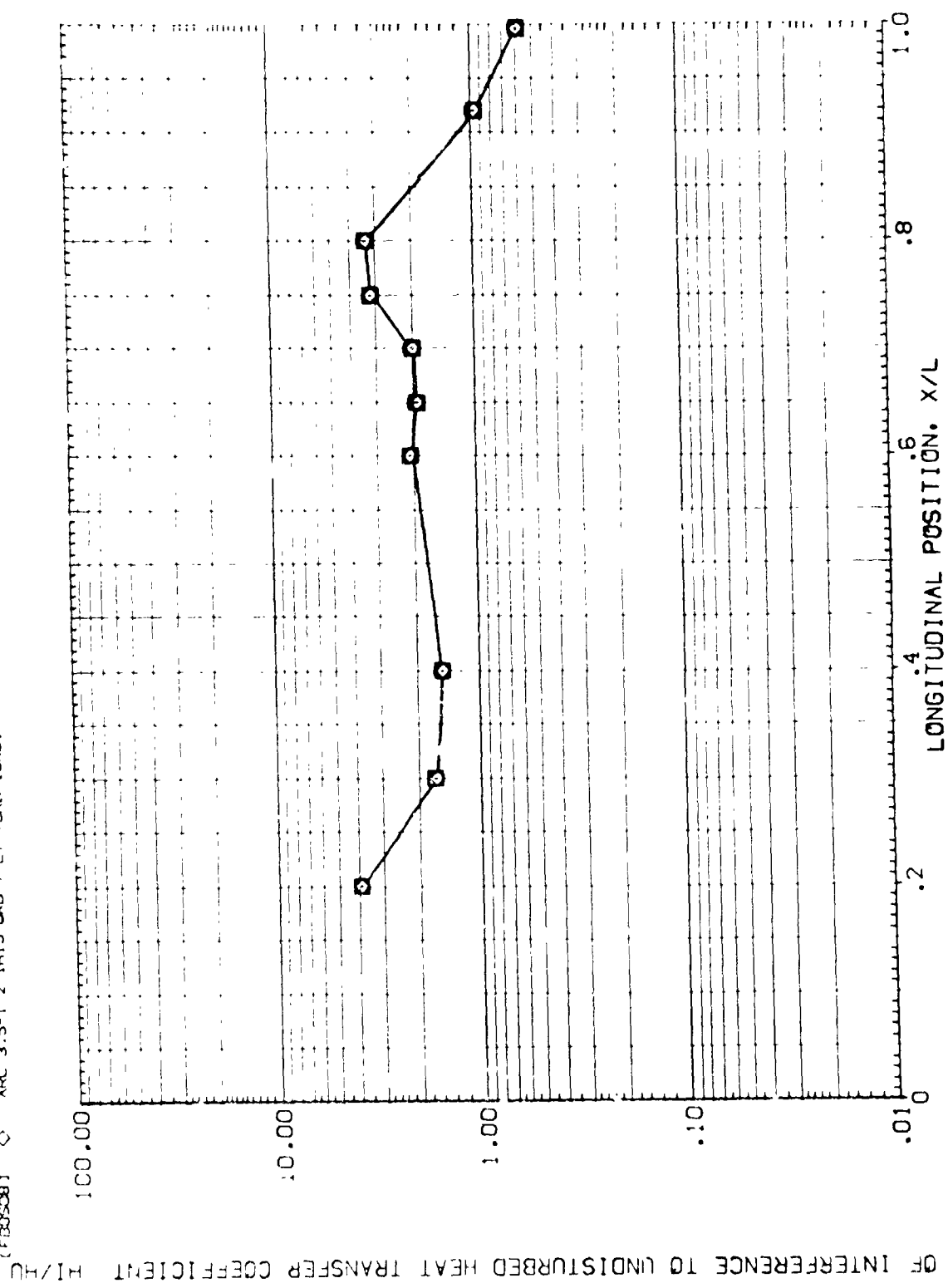


FIG. 13 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

GRN/L = 2.225 MACH = 5.300 PHI = 225.000 PAGE 134



DATA SET SYMBOL: (DECS08) (FBES08) (FB6S08)

CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-T
ARC 3.5-172 [H15 ORB + ET +SRB (SRB)	1.000	-5.000	5.300	.000
ARC 3.5-172 [H15 ORB + ET +SRB (SRB)	.900	-5.000	5.300	.000
ARC 3.5-172 [H15 ORB + ET +SRB (SRB)	.850	-5.000	5.300	.000

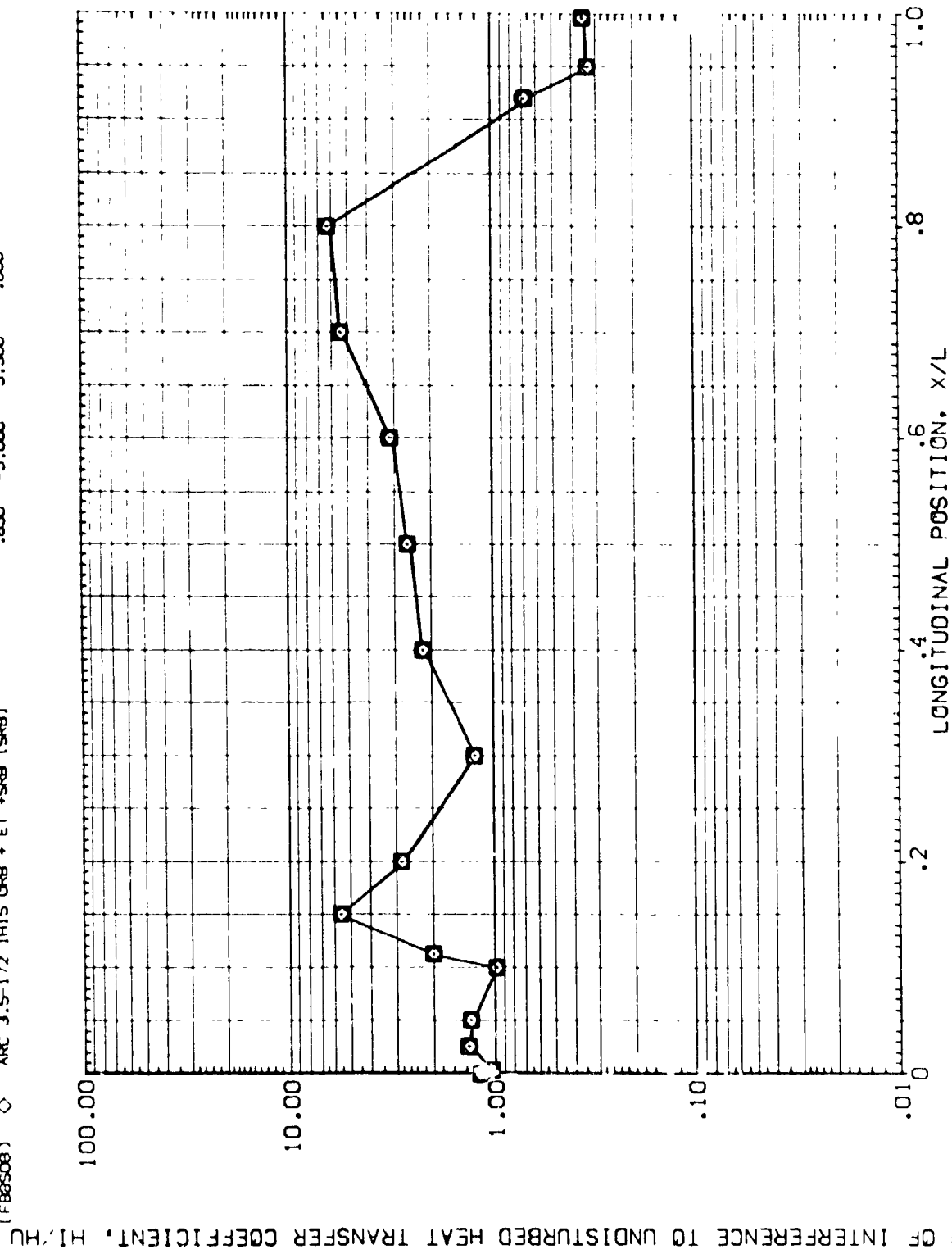


FIG. 13 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., SRB.

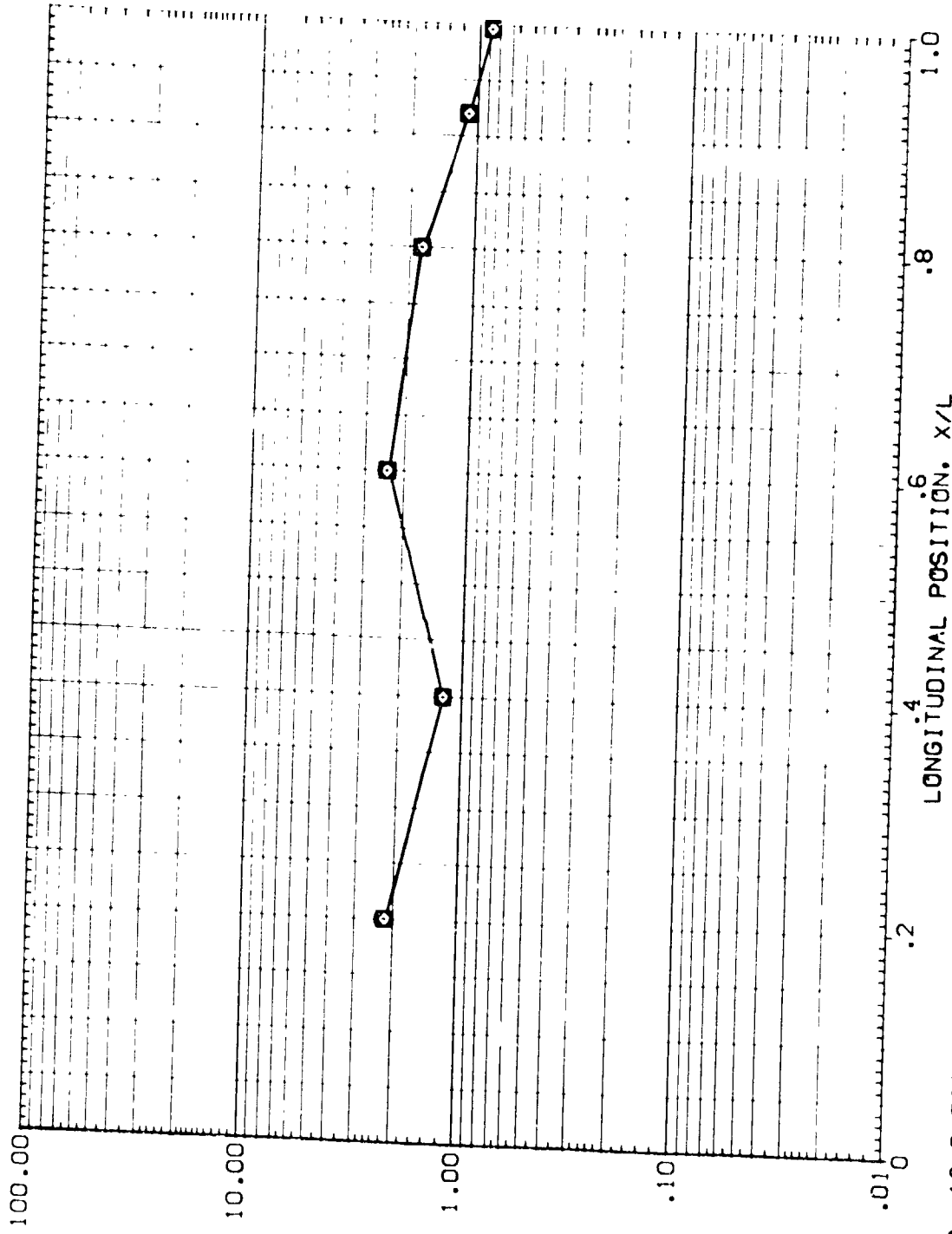
DATA SET SYMBOL

(088508)
(143508)
(188508)

CONFIGURATION DESCRIPTION

ARC 3.5-172 IHIS ORB + ET +SRB (SRB)
ARC 3.5-172 IHIS ORB + ET +SRB (SRB)
ARC 3.5-172 IHIS ORB + ET +SRB (SRB)

HAW/HT	ALPHA	MACH	PHI-M
1.000	-5.000	5.300	.000
.900	-5.000	5.300	.000
.650	-5.000	5.300	.000



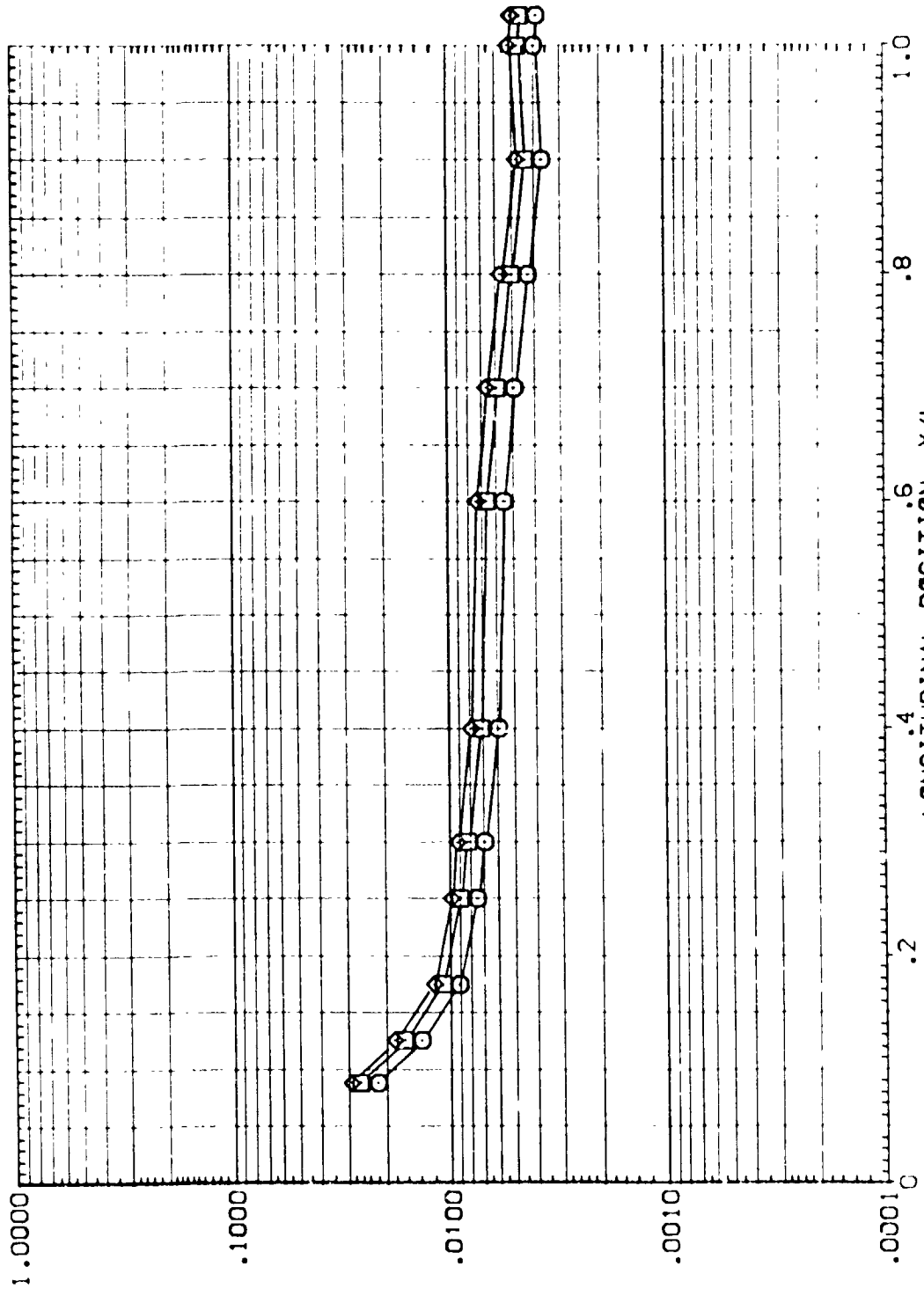
LONGITUDINAL POSITION, X/L

FIG. 13 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., SRB.

$RN/L = 2.225$ MACH = 5.300 PHI = 315.000

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(R86001)	ARC 3.5-172 IHIS ORBITER	1.000	.000	5.300	.000
(A5-101)	ARC 3.5-172 IHIS ORBITER	.500	.000	5.300	.000
(R5-301)	ARC 3.5-172 IHIS ORBITER	.670	.000	5.300	.000
(N5-303)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(A5-303)	DATA NOT AVAILABLE	.500	.000	5.300	.000
(R5-303)	DATA NOT AVAILABLE	.650	.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF



LONGITUDINAL POSITION, X/L

FIG. 14 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

RN/L = 1.764 MACH = 5.300 Y = .000

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-M
(R00001)	ARC 3.5-172 IH15 ORBITER	1.000	.000	5.300	.000
(R00002)	ARC 3.5-172 IH15 ORBITER	.900	.000	5.300	.000
(R00003)	ARC 3.5-172 IH15 ORBITER	.850	.000	5.300	.000
(R00004)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(R00005)	DATA NOT AVAILABLE	.900	.000	5.300	.000
(R00006)	DATA NOT AVAILABLE	.850	.000	5.300	.000

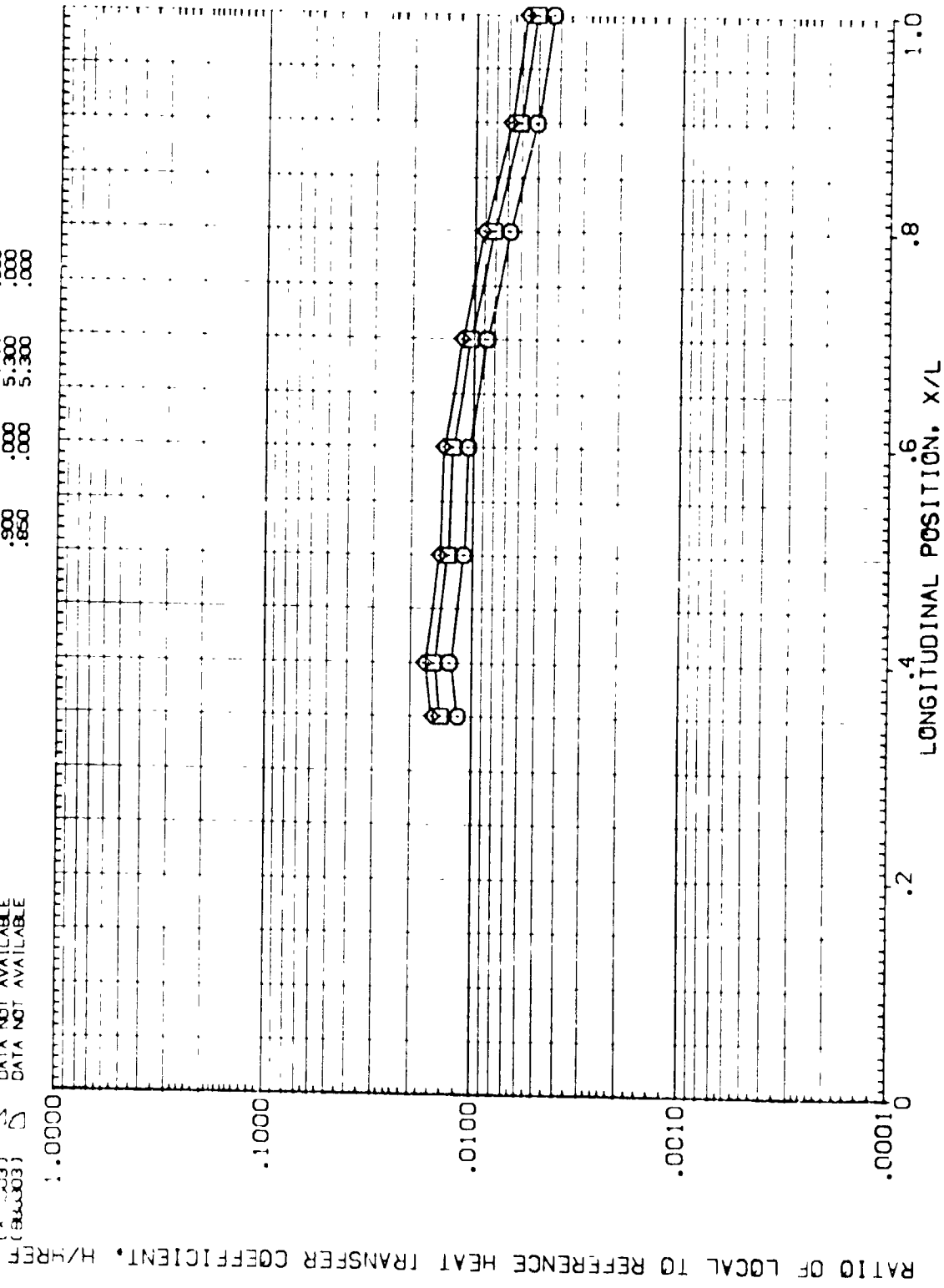
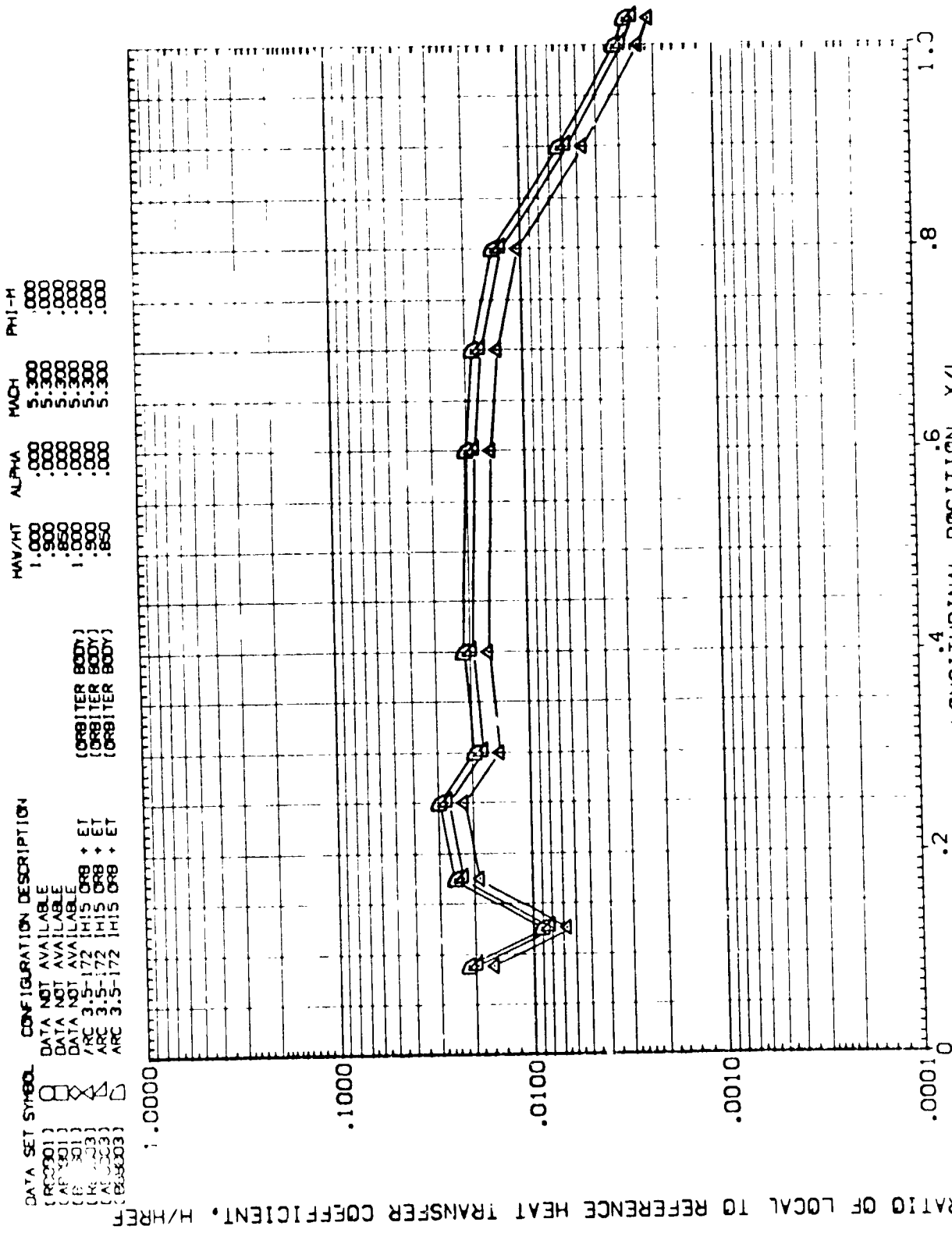


FIG. 14 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

RN/L = 1.764 MACH = 5.300 Y = .415



HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R00001) DATA NOT AVAILABLE
 (AF0001) DATA NOT AVAILABLE
 (E00001) DATA NOT AVAILABLE
 (R00003) ARC 3.5-172 IH'S ORB + ET (ORBITER BODY)
 (AF0003) ARC 3.5-172 IH'S ORB + ET (ORBITER BODY)
 (E00003) ARC 3.5-172 IH'S ORB + ET (ORBITER BODY)

FIG. 14 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

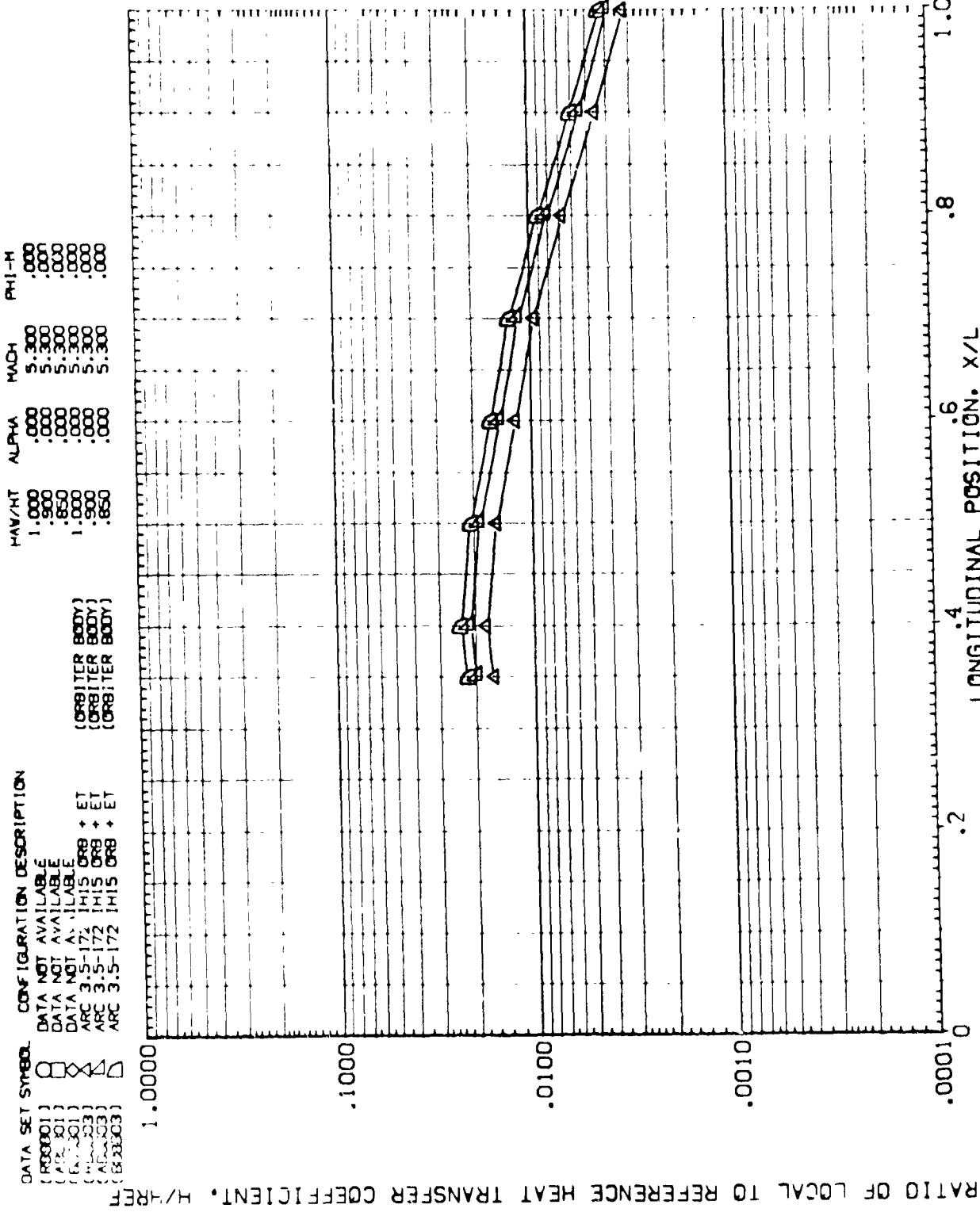


FIG. 14 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

RN/L = 4.332 MACH = 5.300 Y = .415 PAGE 140

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A13001) □ ARC 3.5-172 (H15 ORBITER)
 (A13002) × ARC 3.5-172 (H15 ORBITER)
 (A13003) ▽ ARC 3.5-172 (H15 ORBITER)
 (A13003) □ DATA NOT AVAILABLE
 (B36003) × DATA NOT AVAILABLE
 (B36003) ▽ DATA NOT AVAILABLE

MAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .800 .000 5.300 .000
 1.000 .000 5.300 .000
 .850 .000 5.300 .000

(ORBITER BODY)
 (ORBITER BODY)
 (ORBITER BODY)

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

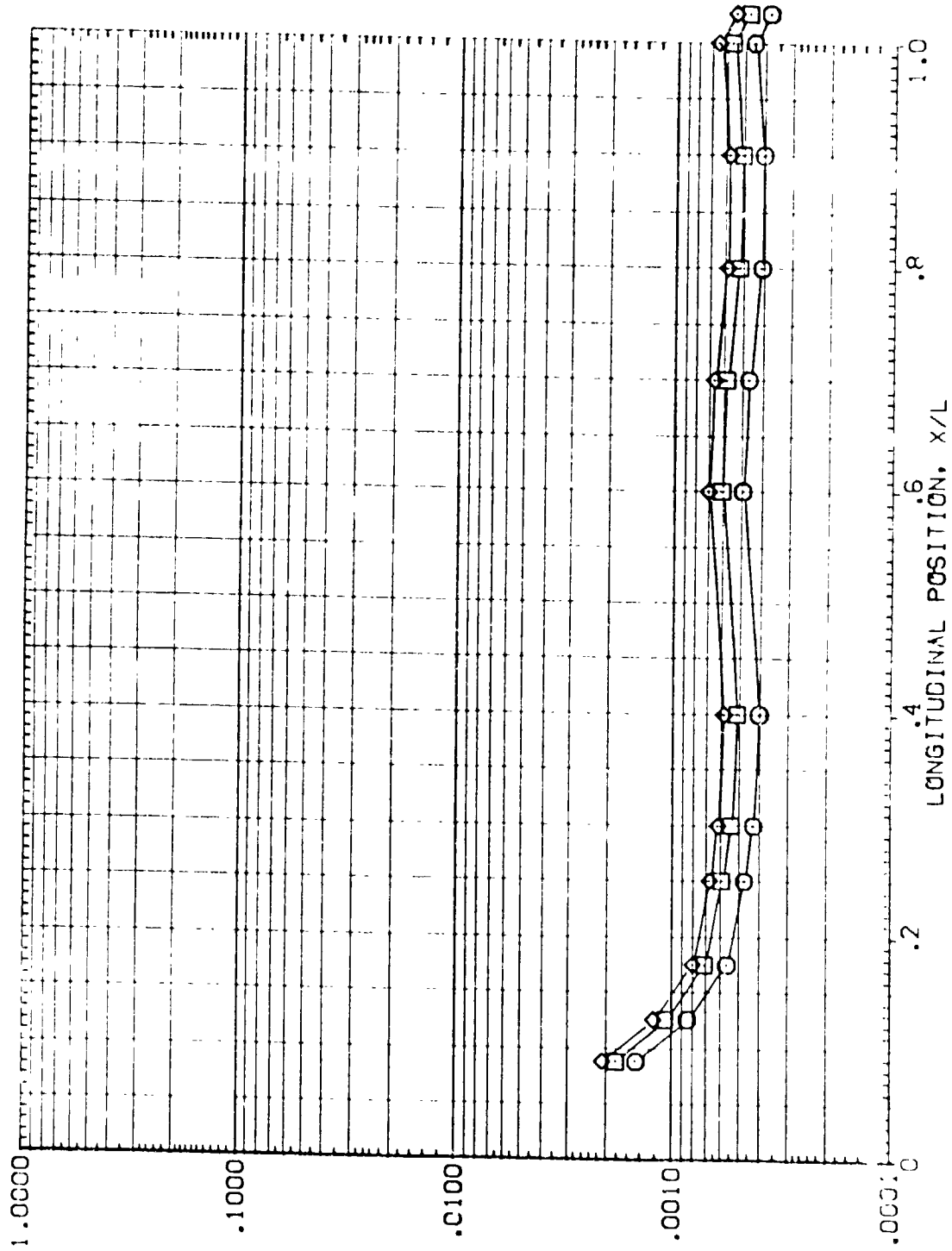


FIG. 14 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

PHI-H = 5.214 MACH = 5.300 Y = .000

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DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88901) ARC 3-5-172 IHIS ORBITER
 (A88901) ARC 3-5-172 IHIS ORBITER
 (B88901) ARC 3-5-172 IHIS ORBITER
 (K88903) DATA NOT AVAILABLE
 (A88903) DATA NOT AVAILABLE
 (S88903) DATA NOT AVAILABLE

HAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

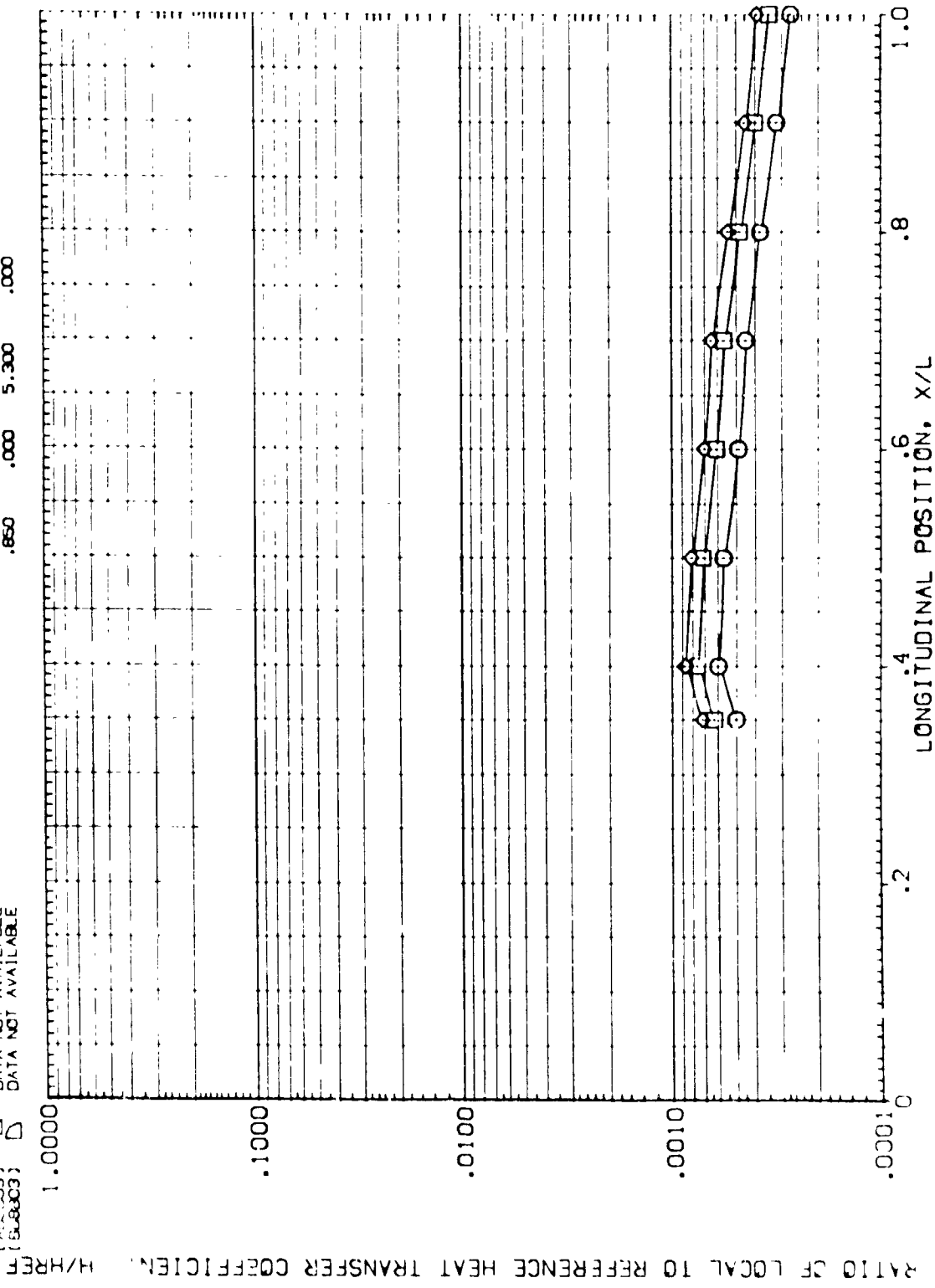


FIG. 14 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.
 $\beta_{1/2} = 5.2:1.4$ MACH = 5.300 $\gamma = .415$ PAGE 142

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALFMA HAV/HT PHI-H

(REF001) ARC 3.5-172 [H]S ORBITER (ORBITER BODY) 5.300 .000 .000

(A1001) ARC 3.5-172 [H]S ORBITER (ORBITER BODY) 5.300 .000 .000

(L1001) ARC 3.5-172 [H]S ORBITER (ORBITER BODY) 5.300 .000 .000

(R1001) ARC 3.5-172 [H]S ORB + ET +SRB (ORBITER BODY) 5.300 .000 .000

(A1002) ARC 3.5-172 [H]S ORB + ET +SRB (ORBITER BODY) 5.300 .000 .000

(R1002) ARC 3.5-172 [H]S ORB + ET +SRB (ORBITER BODY) 5.300 .000 .000

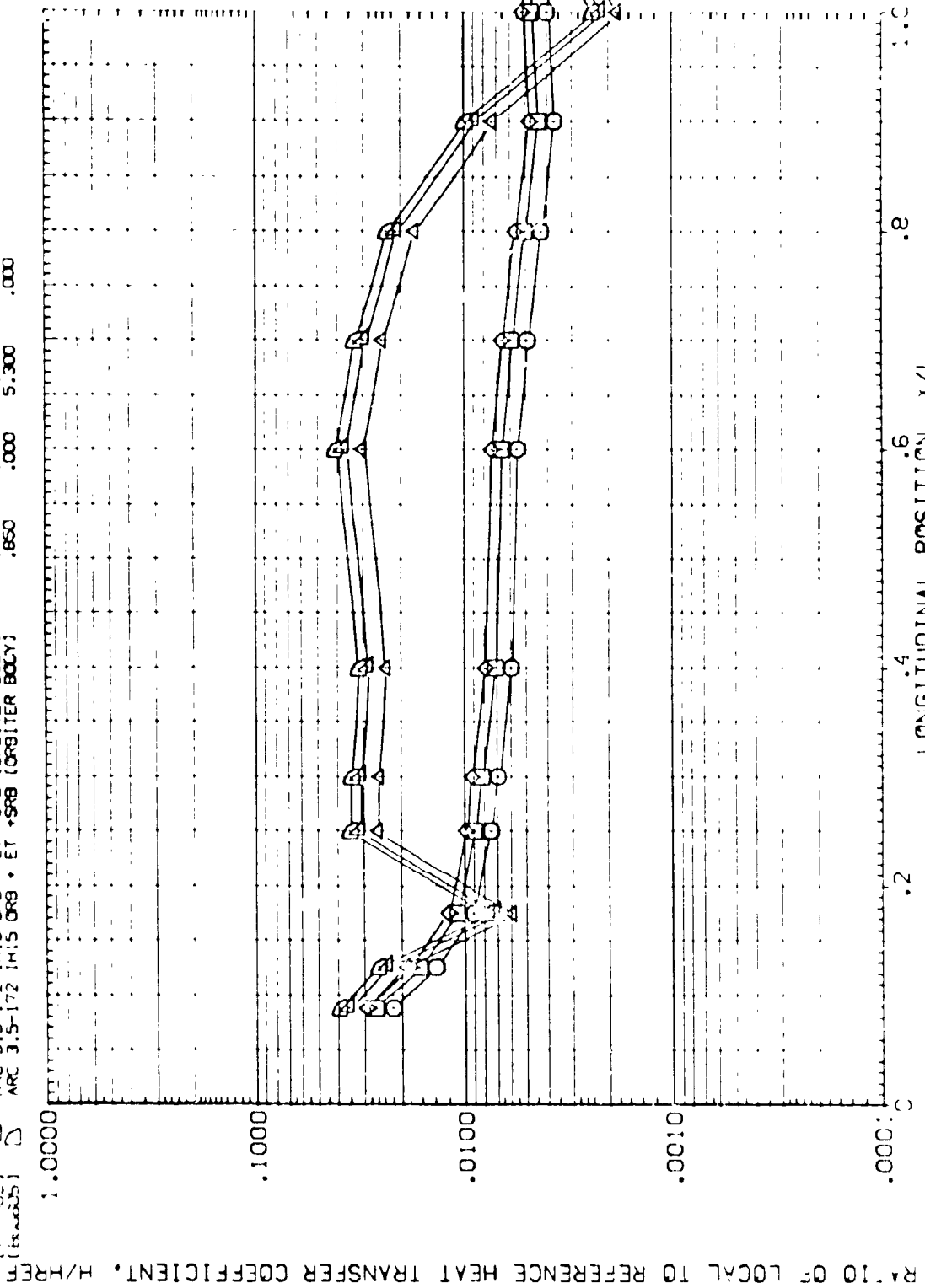


FIG. 15 UNDISTURBED AND INTERFERENCE HEAT TRANSFER COEFFICIENTS, ORBITER BODY

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-M
ARC 3.5-172	[H15 ORBITER BODY]	1.000	.000	5.300	.000
ARC 3.5-172	[H15 ORBITER BODY]	.900	.000	5.300	.000
ARC 3.5-172	[H15 ORBITER BODY]	.850	.000	5.300	.000
ARC 3.5-172	[H15 ORBITER BODY] + ET + S98	1.000	.000	5.300	.000
ARC 3.5-172	[H15 ORBITER BODY] + ET + S98	.900	.000	5.300	.000
ARC 3.5-172	[H15 ORBITER BODY] + ET + S98	.850	.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, Y/REF

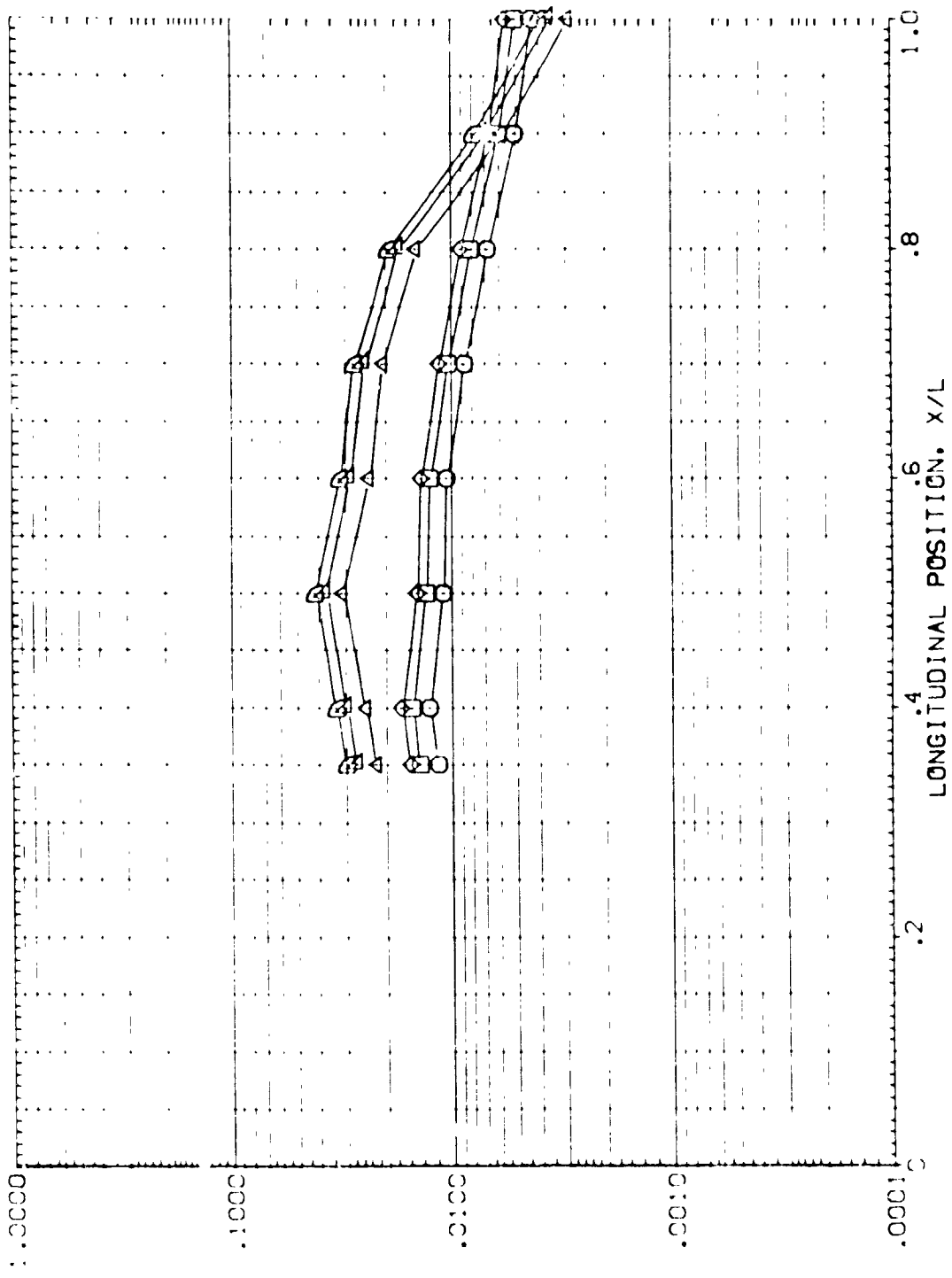


FIG. 15 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/MT	ALPHA	MACH	PHI-T
(REF001)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(A1001)	DATA NOT AVAILABLE	.900	.000	5.300	.000
(A1002)	DATA NOT AVAILABLE	.850	.000	5.300	.000
(A1003)	ARC 3-5-172 [MIS ORB + ET +SRB (ORBITER BODY)	1.000	.000	5.300	.000
(A1004)	ARC 3-5-172 [MIS ORB + ET +SRB (ORBITER BODY)	.900	.000	5.300	.000
(A1005)	ARC 3-5-172 [MIS ORB + ET +SRB (ORBITER BODY)	.850	.000	5.300	.000

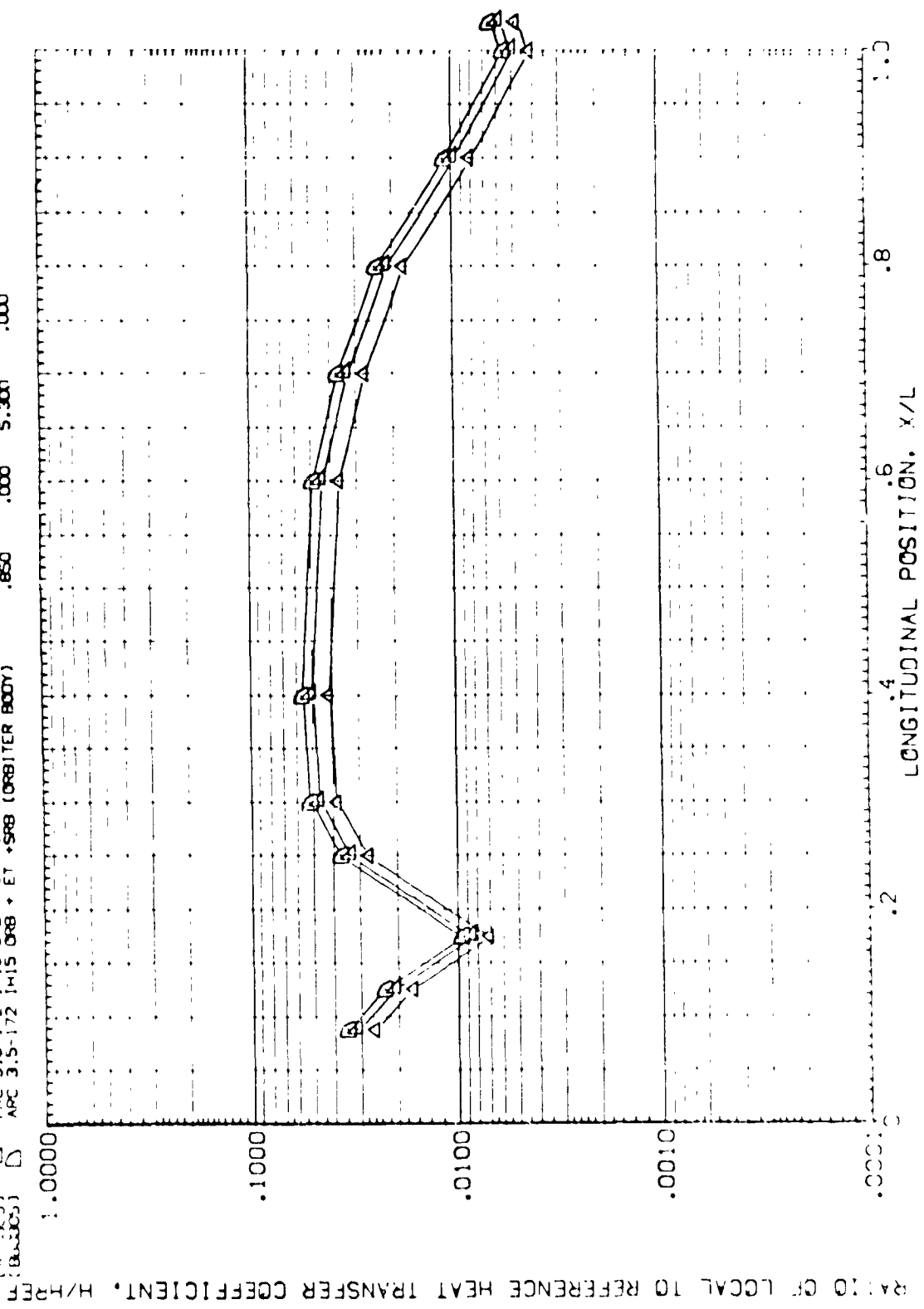


FIG. 15 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

DATA SET SYMBOL CONFIGURATION DESCRIPTION H/W/H/T ALPHA MACH γ H/H

(P00000) DATA NOT AVAILABLE 1.000 .000 5.300 .000

(P10000) DATA NOT AVAILABLE .900 .000 5.300 .000

(P20000) DATA NOT AVAILABLE .850 .000 5.300 .000

(P30000) ARC 3.5-172 H15 DR8 + ET +SR8 (ORBITER BODY) 1.000 .000 5.300 .000

(P40000) ARC 3.5-172 H15 DR8 + ET +SR8 (ORBITER BODY) .900 .000 5.300 .000

(P50000) ARC 3.5-172 H15 DR8 + ET +SR8 (ORBITER BODY) .850 .000 5.300 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

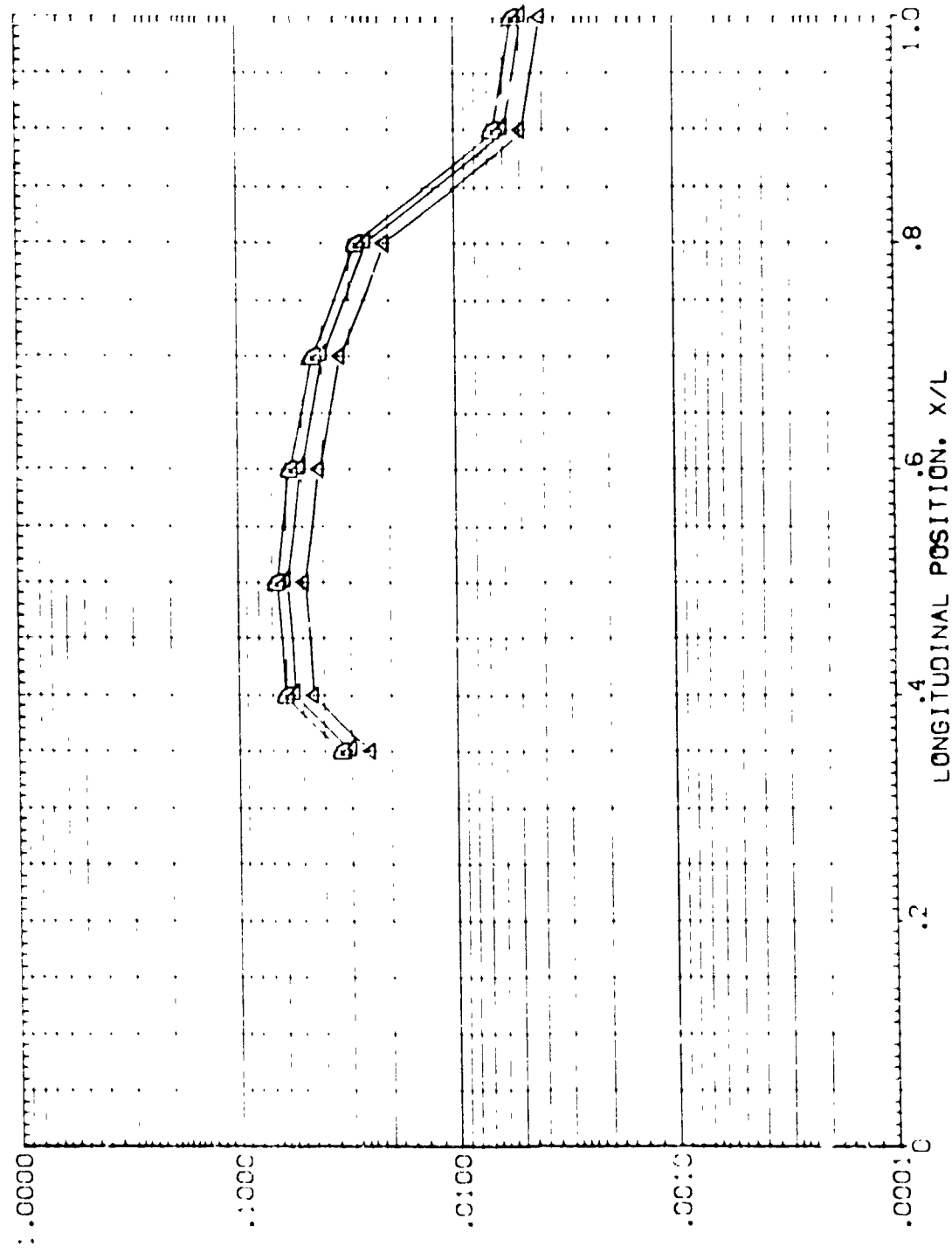


FIG. 15 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

H/W/H/T = 4.43^o MACH = 5.300 γ = .415 PAGE 14B



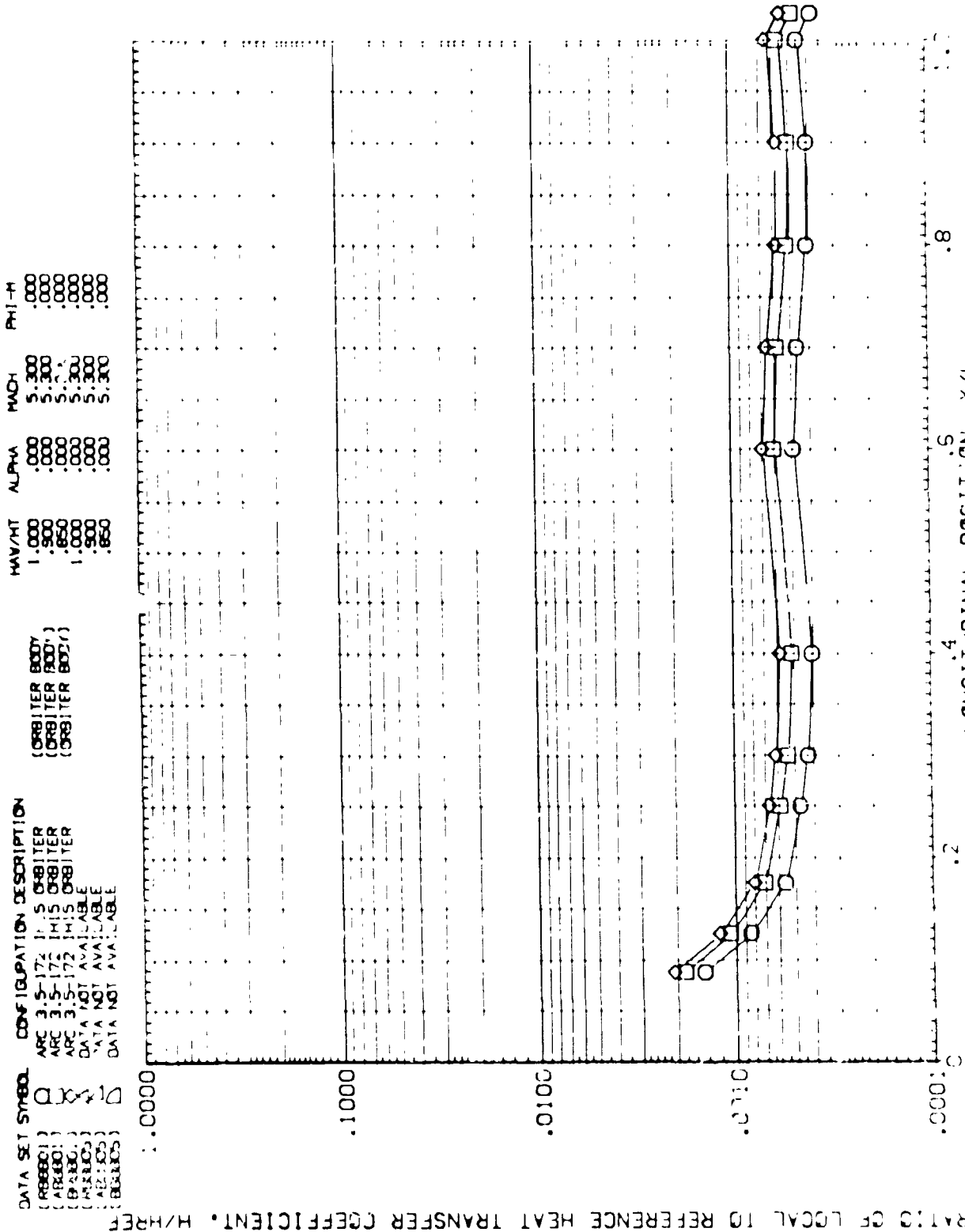


FIG. 15 UNDISCORDED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY

DATA SET SYMBOL = R8000 - R8100 - R8200 - R8300 - R8400 - R8500 - R8600 - R8700 - R8800

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R66801) ARC 3.5-172 IH15 ORBITER
 (R66801) ARC 3.5-172 IH15 ORBITER
 (R66801) ARC 3.5-172 IH15 ORBITER
 (R66801) DATA NOT AVAILABLE
 (R66801) DATA NOT AVAILABLE
 (R66801) DATA NOT AVAILABLE

MAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .850 .000 5.300 .000

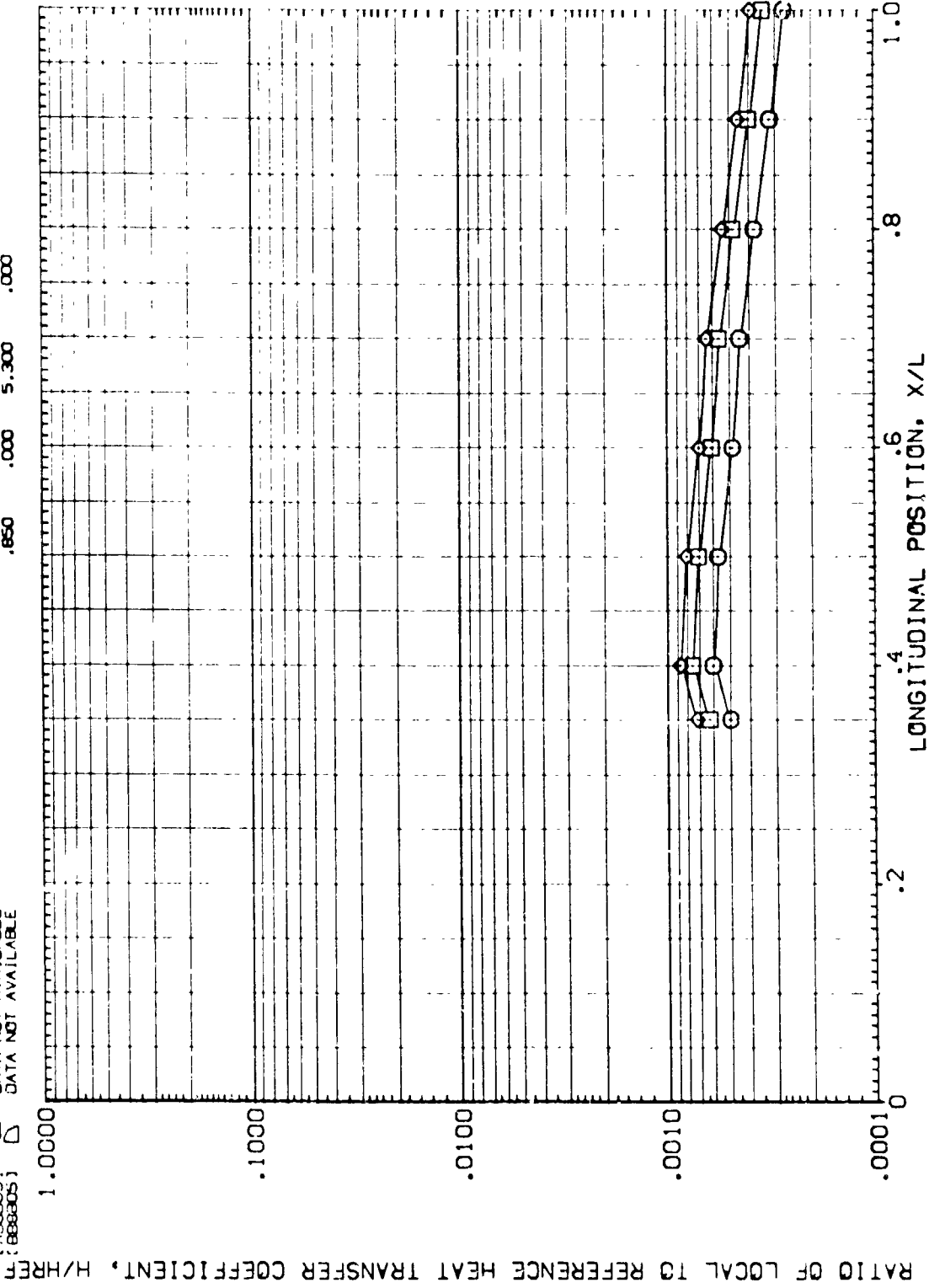


FIG. 15 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

RN/L = 5.214 MACH = 5.300 Y = .415 PAGE 148



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DB8005) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)ITER BODY) 5.300 .000 .000

(EB8005) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)ITER BODY) 5.300 .000 .000

(FB8005) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)ITER BODY) 5.300 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

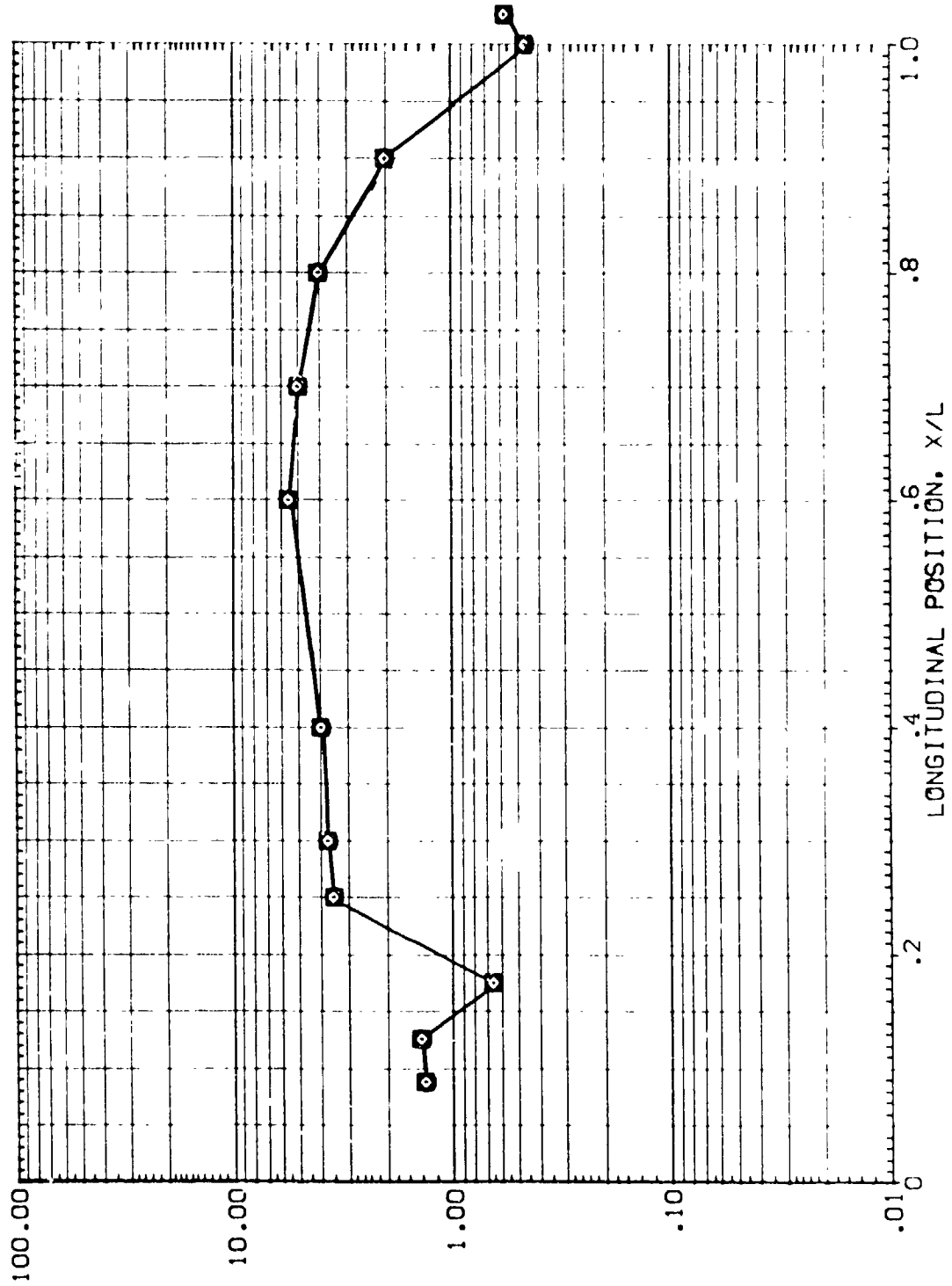


FIG. 16 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF. ORBITER BODY.

ORNL/L = 1.845 MACH = 5.300 Y = .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (DB8805) □ ARC 3.5-172 (H15 ORB + ET + SRB (ORB) TER BODY)
 (EB8805) ◇ ARC 3.5-172 (H15 ORB + ET + SRB (ORB) TER BODY)
 (FB8805) ◇ ARC 3.5-172 (H15 ORB + ET + SRB (ORB) TER BODY)

HAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

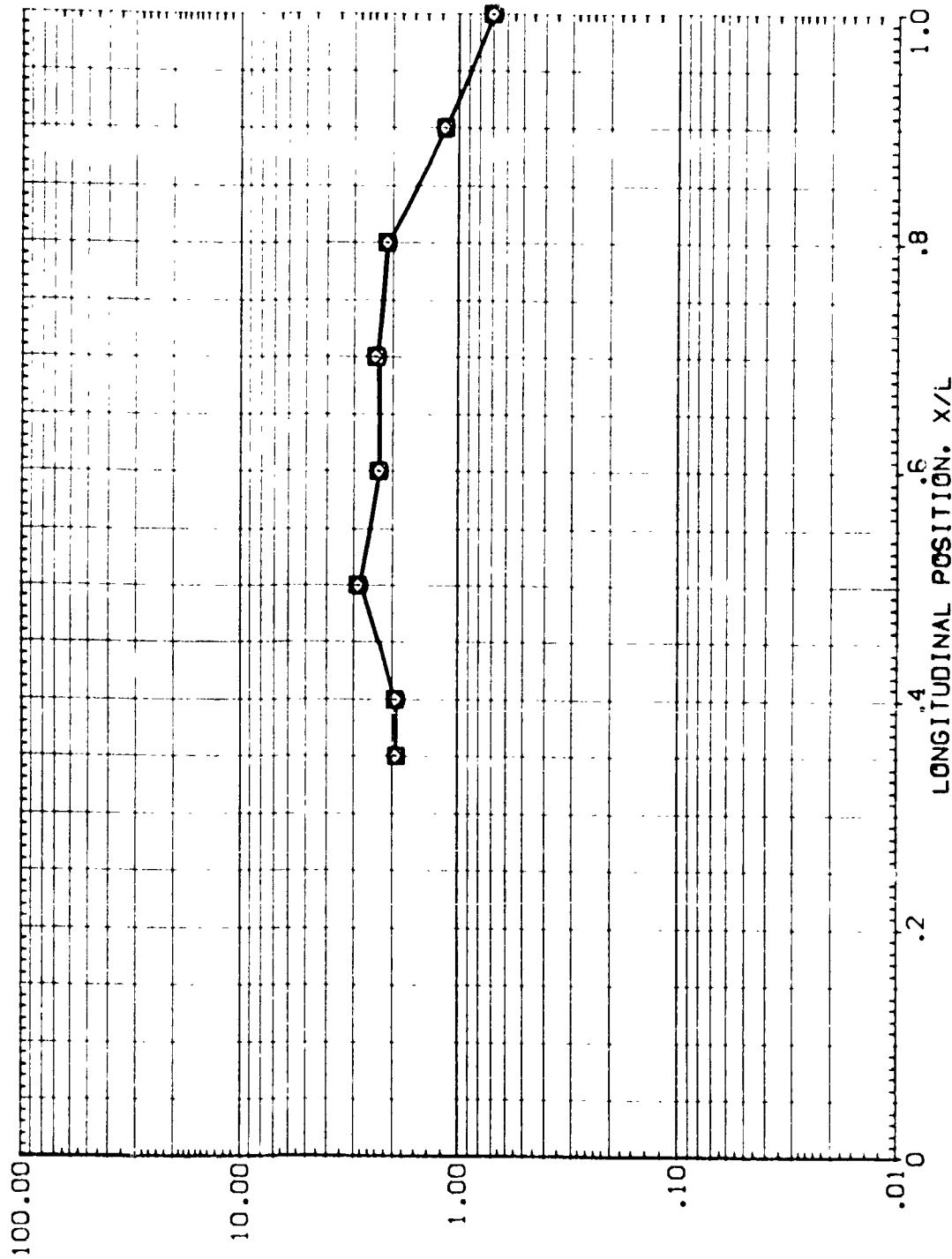


FIG. 16 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., ORBITER BODY.

ORBITER BODY = 1.845 MACH = 5.300 Y = .415

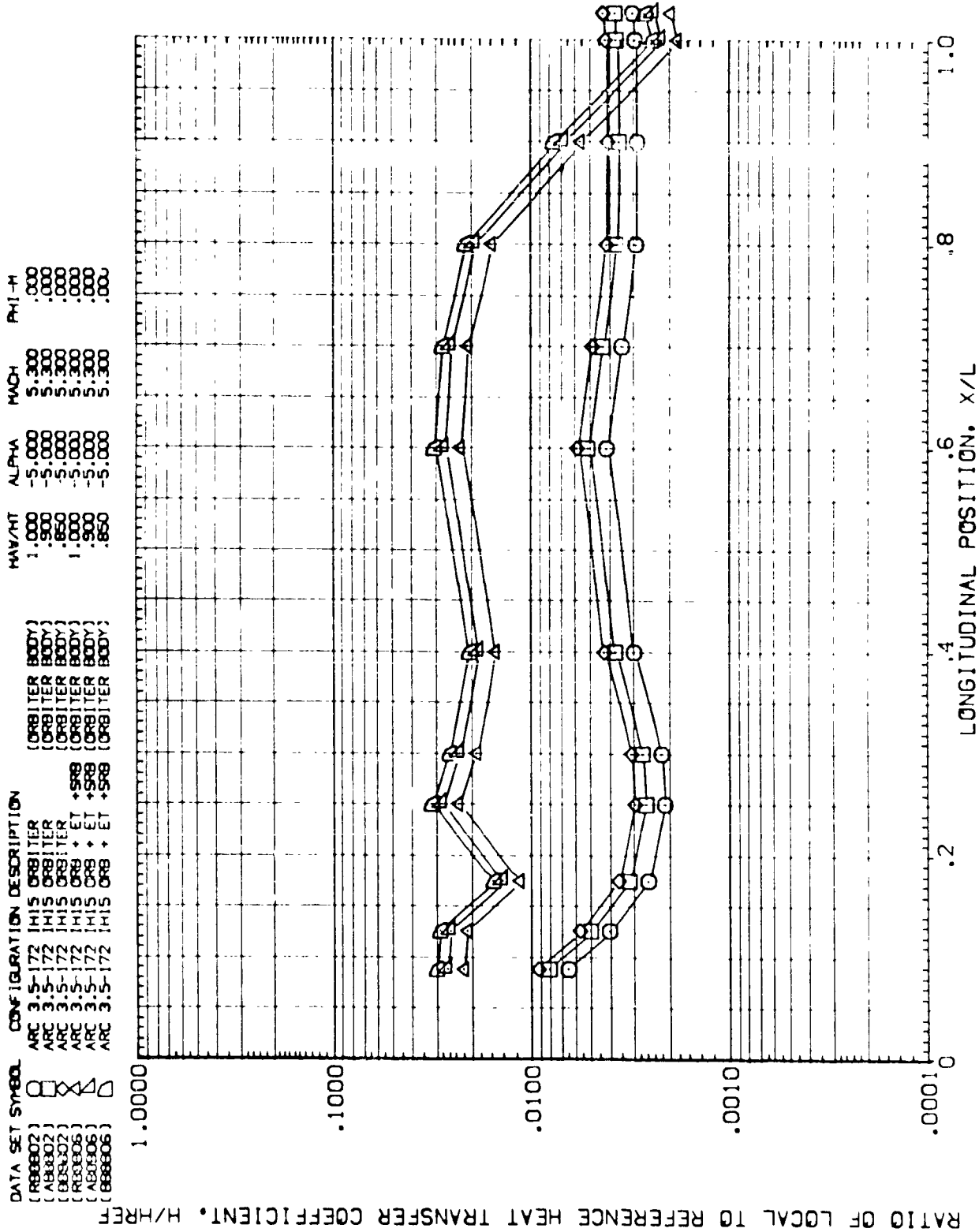


FIG. 17 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY

DATA SET SYMBOL
 (R88802) □
 (A88802) ○
 (B88802) △
 (C88806) ◇

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ORBITER
 ARC 3.5-172 IH15 ORBITER
 ARC 3.5-172 IH15 ORBITER
 ARC 3.5-172 IH15 ORB + ET +SRB
 ARC 3.5-172 IH15 ORB + ET +SRB
 ARC 3.5-172 IH15 ORB + ET +SRB

MAN/HT ALPHA MAC PHI-M
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

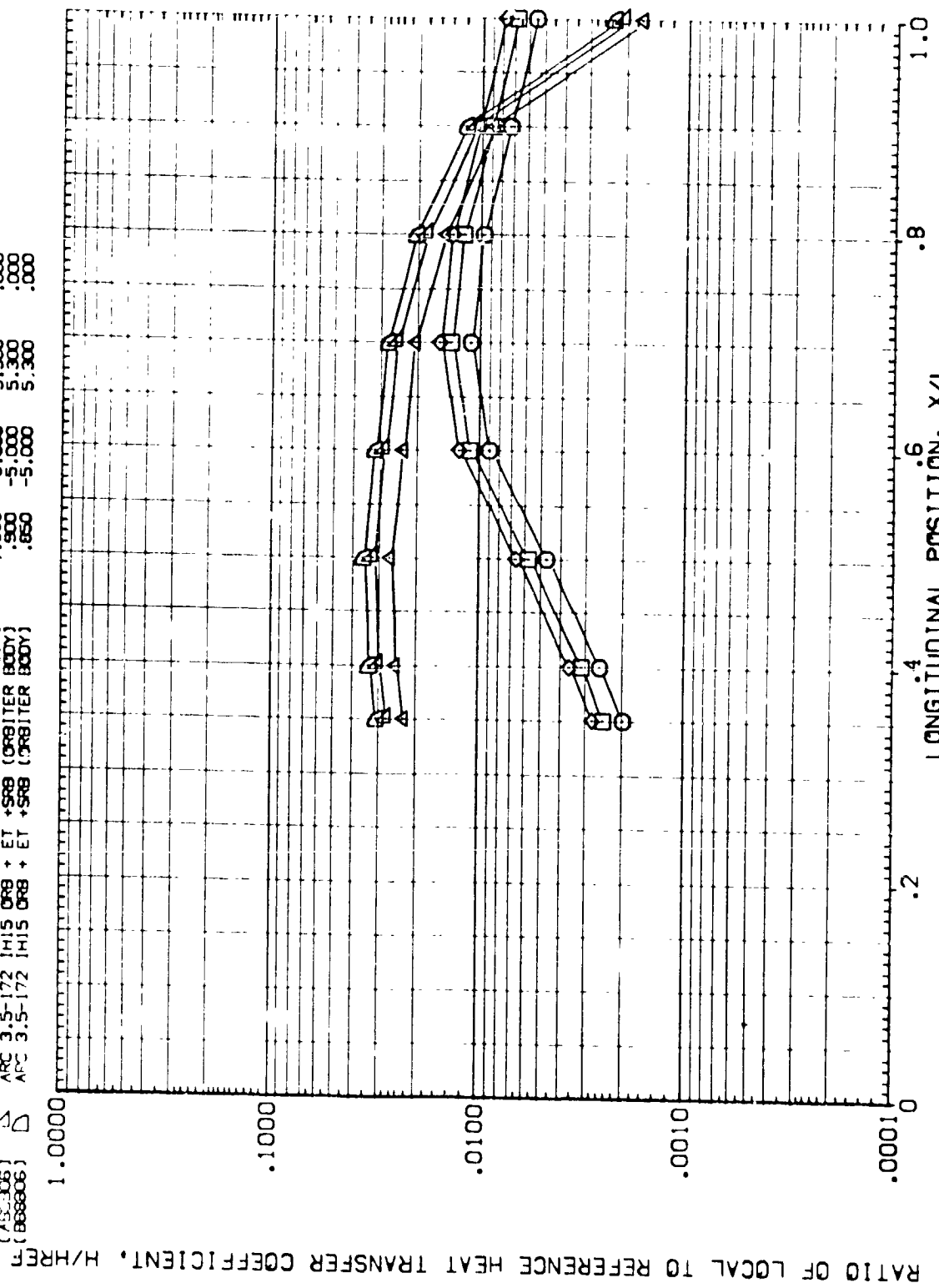


FIG. 17 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

RN/L = 2.143 MACH = 5.300 Y = .415

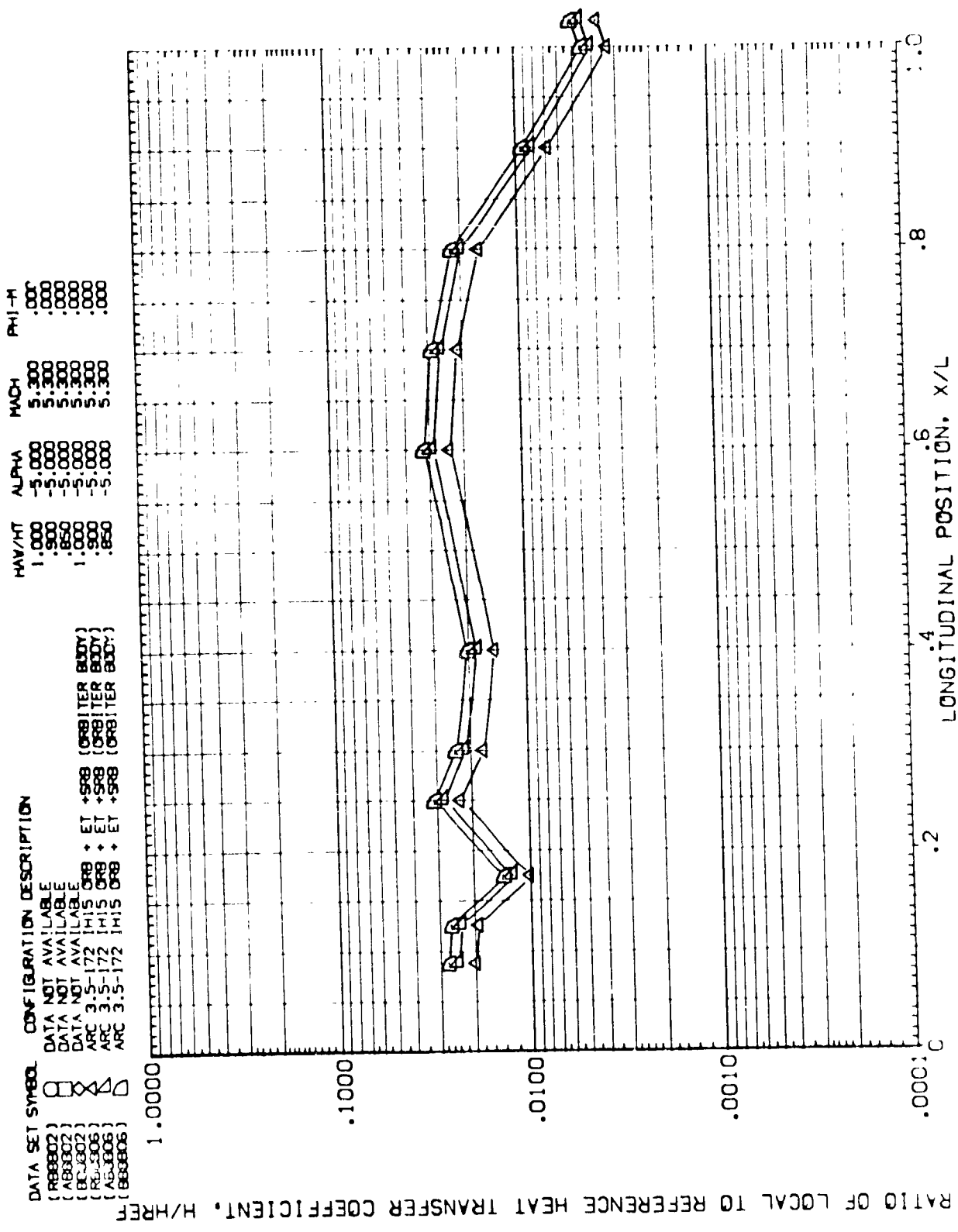


FIG. 17 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-M
(R88602)	DATA NOT AVAILABLE	1.000	-5.000	5.300	.000
(A22602)	DATA NOT AVAILABLE	.900	-5.000	5.300	.000
(E11602)	DATA NOT AVAILABLE	.850	-5.000	5.300	.000
(E11606)	ARC 3.5-172 IH15 ORB + ET +SR8 (ORBITER BODY)	1.000	-5.000	5.300	.000
(A11606)	ARC 3.5-172 IH15 ORB + ET +SR8 (ORBITER BODY)	.900	-5.000	5.300	.000
(E33306)	ARC 3.5-172 IH15 ORB + ET +SR8 (ORBITER BODY)	.850	-5.000	5.300	.000

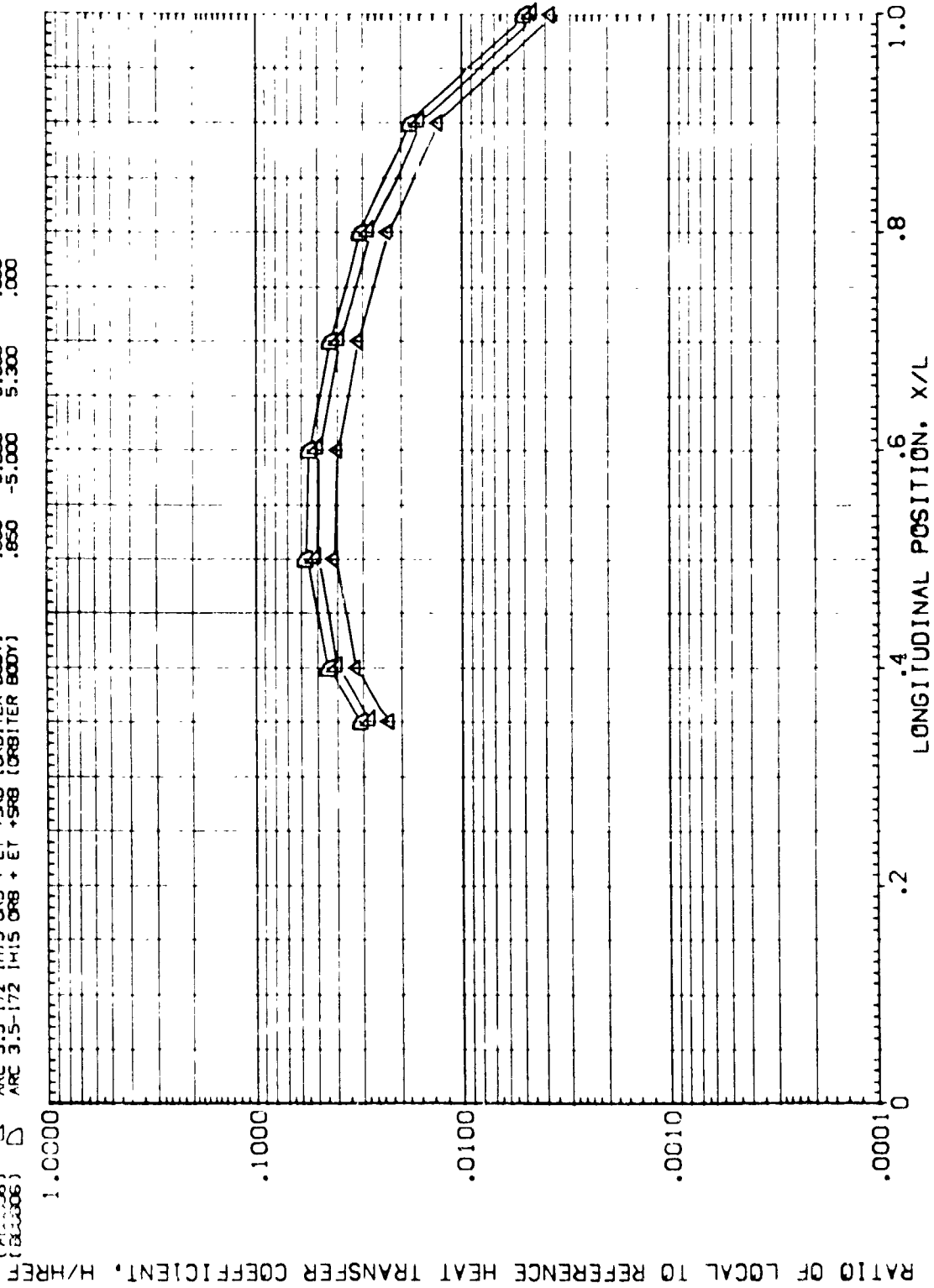


FIG. 17 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/MT	ALPHA	MACH	PHI-M
(RB8802)	ARC 3.5-172 (ORBITER BODY)	1.000	-5.000	5.300	.000
(AS1802)	ARC 3.5-172 (ORBITER BODY)	.900	-5.000	5.300	.000
(EB3302)	ARC 3.5-172 (ORBITER BODY)	.850	-5.000	5.300	.000
(RC3305)	DATA NOT AVAILABLE	1.000	-5.000	5.300	.000
(AS3305)	DATA NOT AVAILABLE	.900	-5.000	5.300	.000
(BC3305)	DATA NOT AVAILABLE	.850	-5.000	5.300	.000

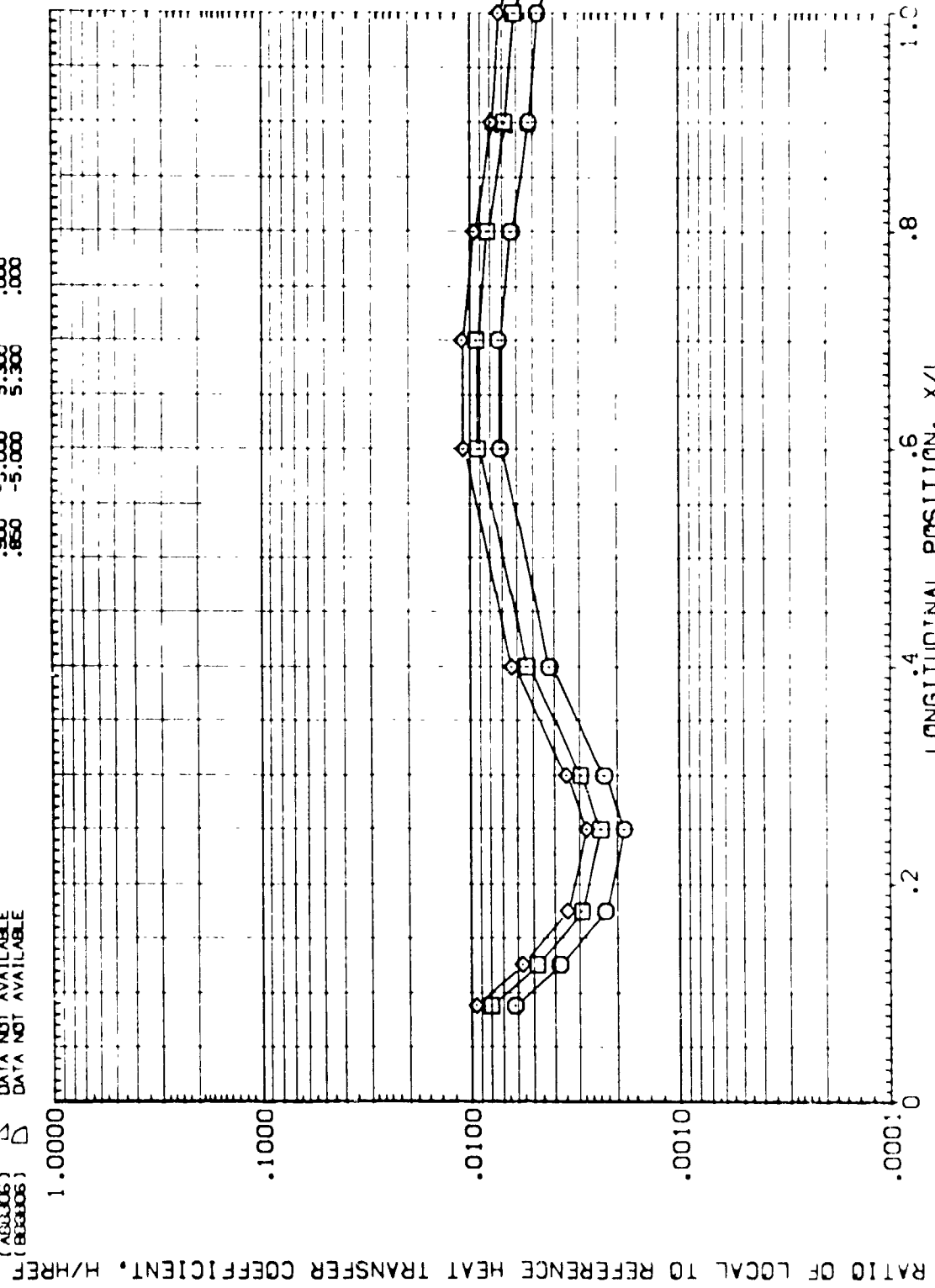


FIG. 17 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BCC

MAV/MT = 6.13; MACH = 5.300; Y = .000; PAC = 155

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R00002) ARC 3.5-172 IM15 ORBITER
 (A00002) ARC 3.5-172 IM15 ORBITER
 (E00002) ARC 3.5-172 IM15 ORBITER
 (R00103) DATA NOT AVAILABLE
 (A00106) DATA NOT AVAILABLE
 (E00106) DATA NOT AVAILABLE

(ORBITER BODY)
 (ORBITER BODY)
 (ORBITER BODY)

MAV/HT ALPHA MACH PHI-H

1.000 -5.000 5.300 .000
 .500 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .650 -5.000 5.300 .000

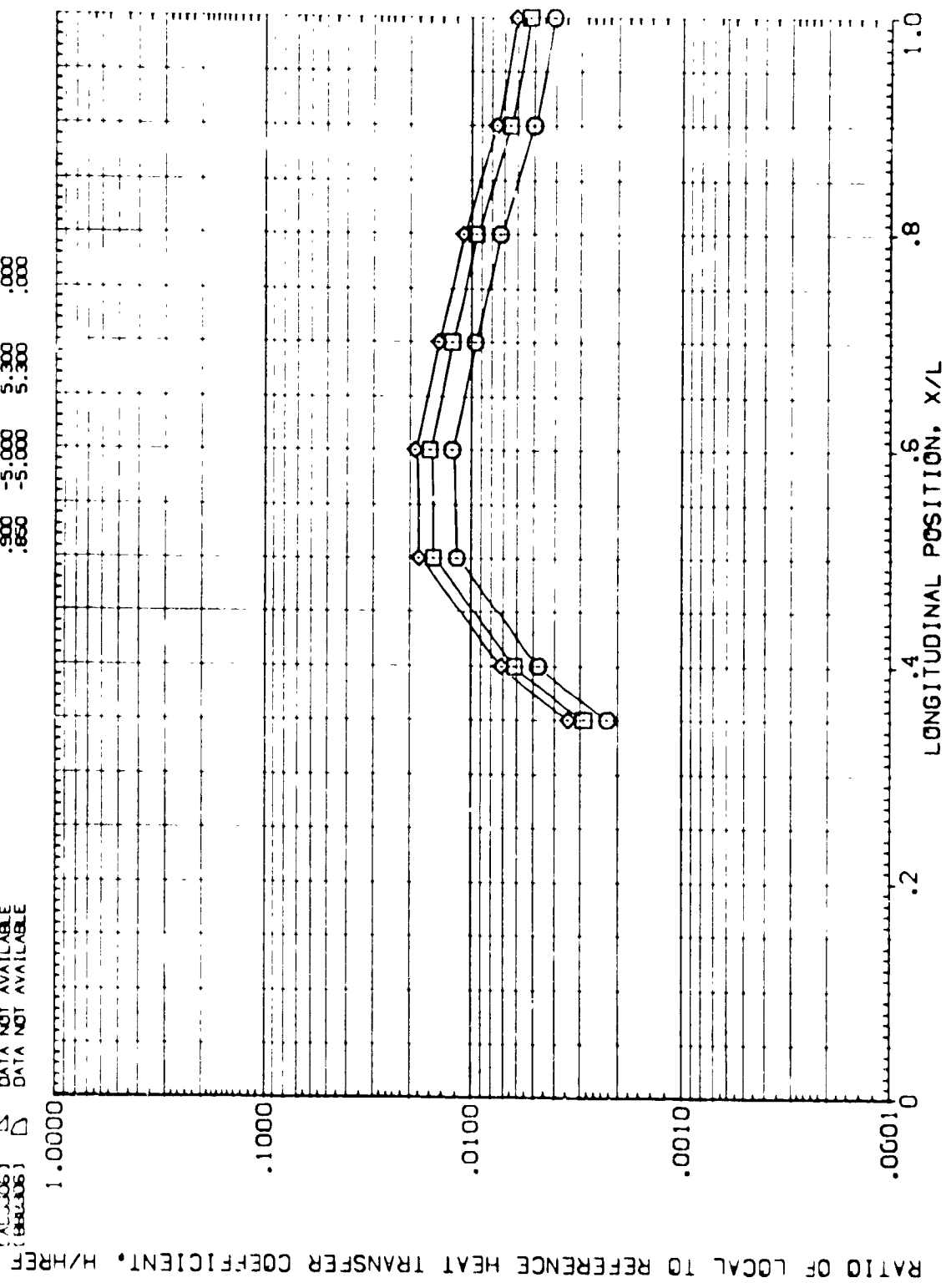


FIG. 17 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER BODY.

RN/L = 6.131 MACH = 5.300 Y = .415 PAGE 156

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DEB006) Ⓚ ARC 3.5-172 IM15 ORB + ET +SRB (ORBITER BODY) 1.000 -5.000 .000

(EBB006) Ⓚ ARC 3.5-172 IM15 ORB + ET +SRB (ORBITER BODY) .900 -5.000 .000

(FEB006) Ⓚ ARC 3.5-172 IM15 ORB + ET +SRB (ORBITER BODY) .850 -5.000 .000

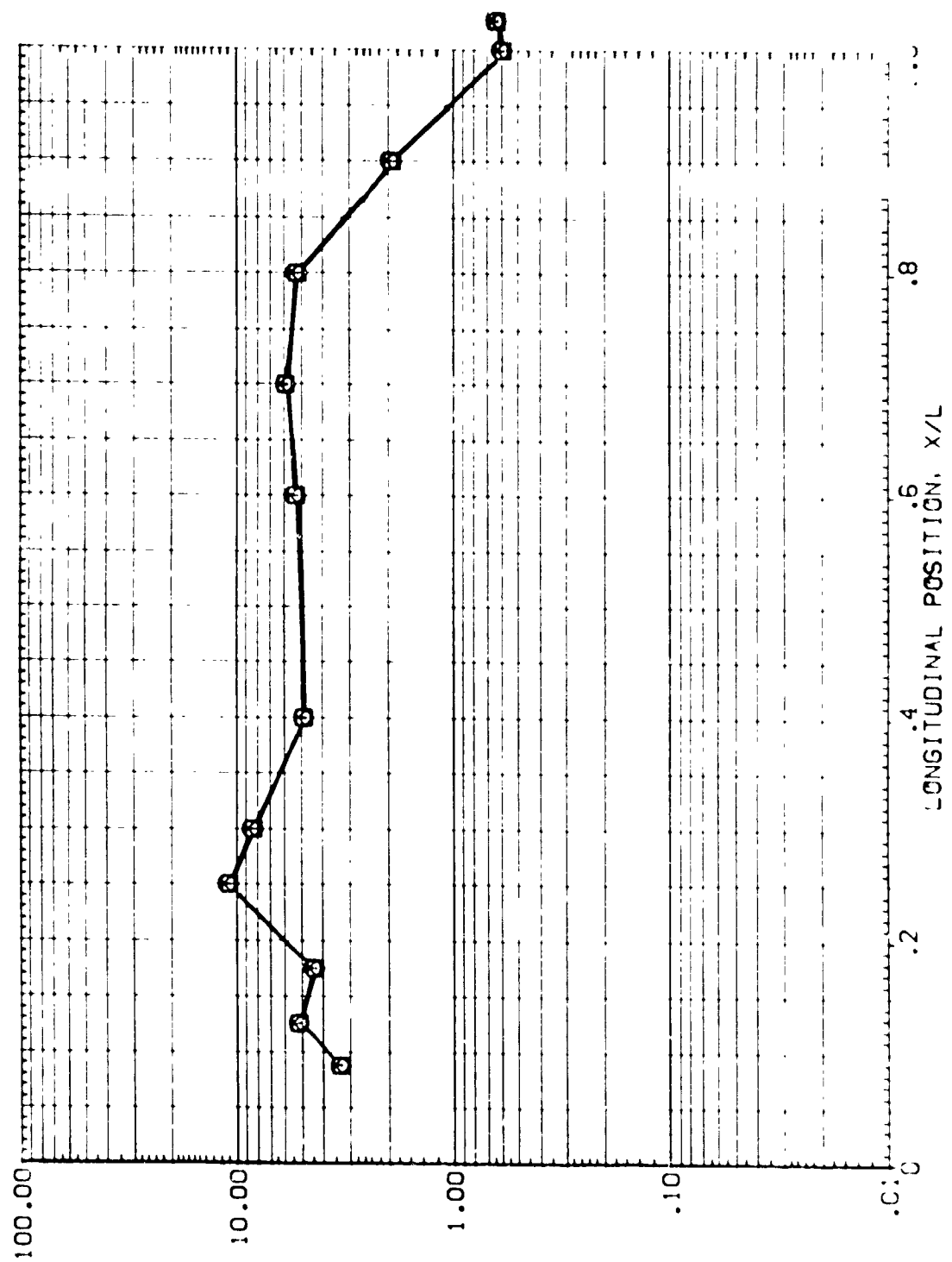


FIG. 18 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, H/HU, VERSUS LONGITUDINAL POSITION, X/L

ARC 3.5-172 MACH = 5.300 Y = .000 PHI-H = .157

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(ORBITER BODY) ARC 3.5-172 |H15 ORB + ET +S68 (ORBITER BODY)
 (ORBITER BODY) ARC 3.5-172 |H15 ORB + ET +S68 (ORBITER BODY)
 (ORBITER BODY) ARC 3.5-172 |H15 ORB + ET +S68 (ORBITER BODY)

1.000 5.300 .000
 .900 5.300 .000
 .850 5.300 .000

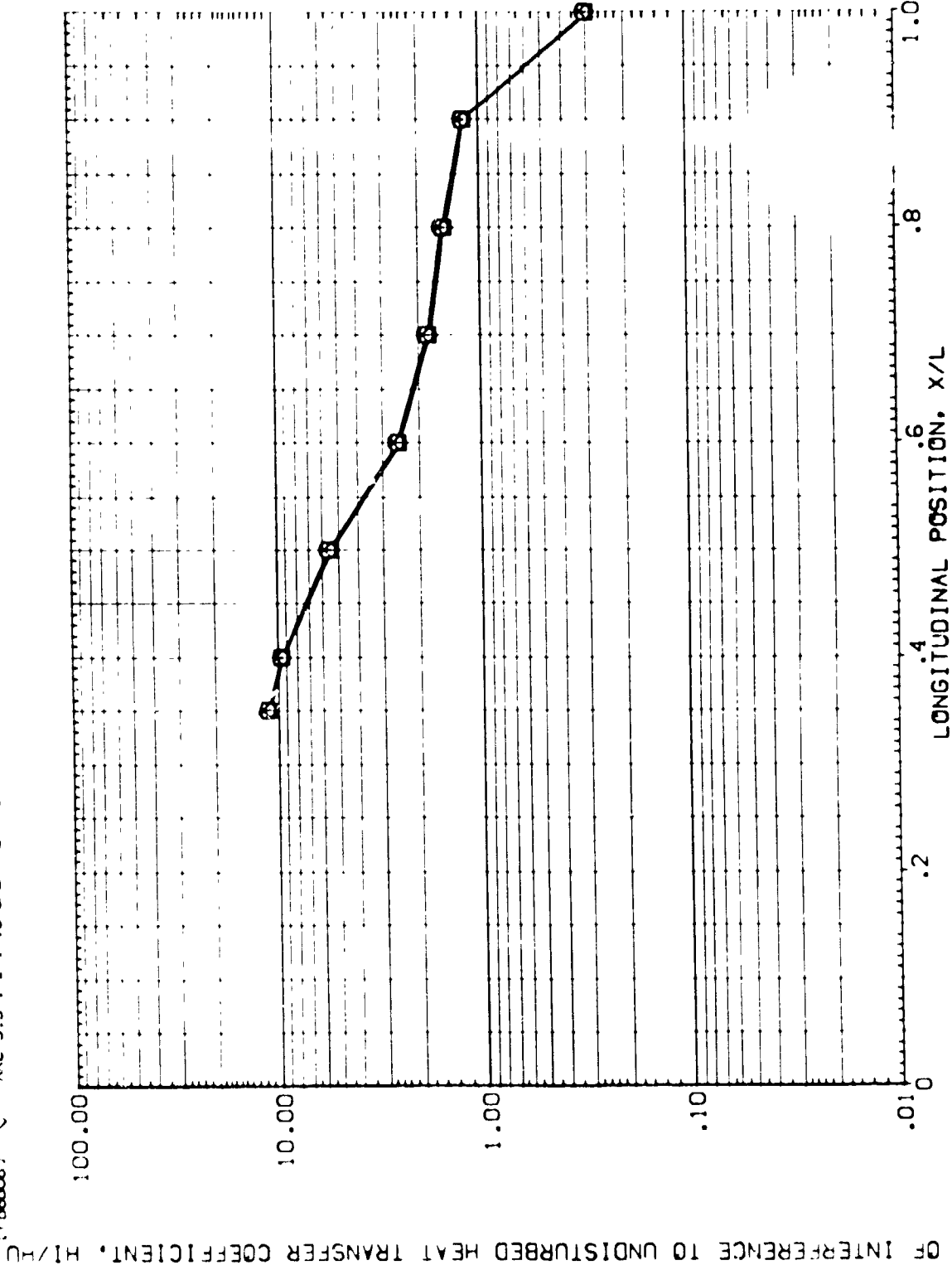


FIG. 18 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., ORBITER BODY.
 $\alpha_{RN}/L = 1.952$ MACH = 5.300 Y = .415

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (888V01) ARC 3-5-172 |H15 DRB|TER
 (888V02) ARC 3-5-172 |H15 DRB|TER
 (888V03) DATA NOT AVAILABLE
 (888V04) DATA NOT AVAILABLE

(ORB|TER V|NG)
 (ORB|TER V|NG)
 (ORB|TER V|NG)

HAW/AT 1.500
 .800
 1.000
 .900
 .800

ALPHA .000
 .000
 .000
 .000
 .000

MACH 5.300
 5.300
 5.300
 5.300
 5.300

PHI-H .000
 .000
 .000
 .000
 .000

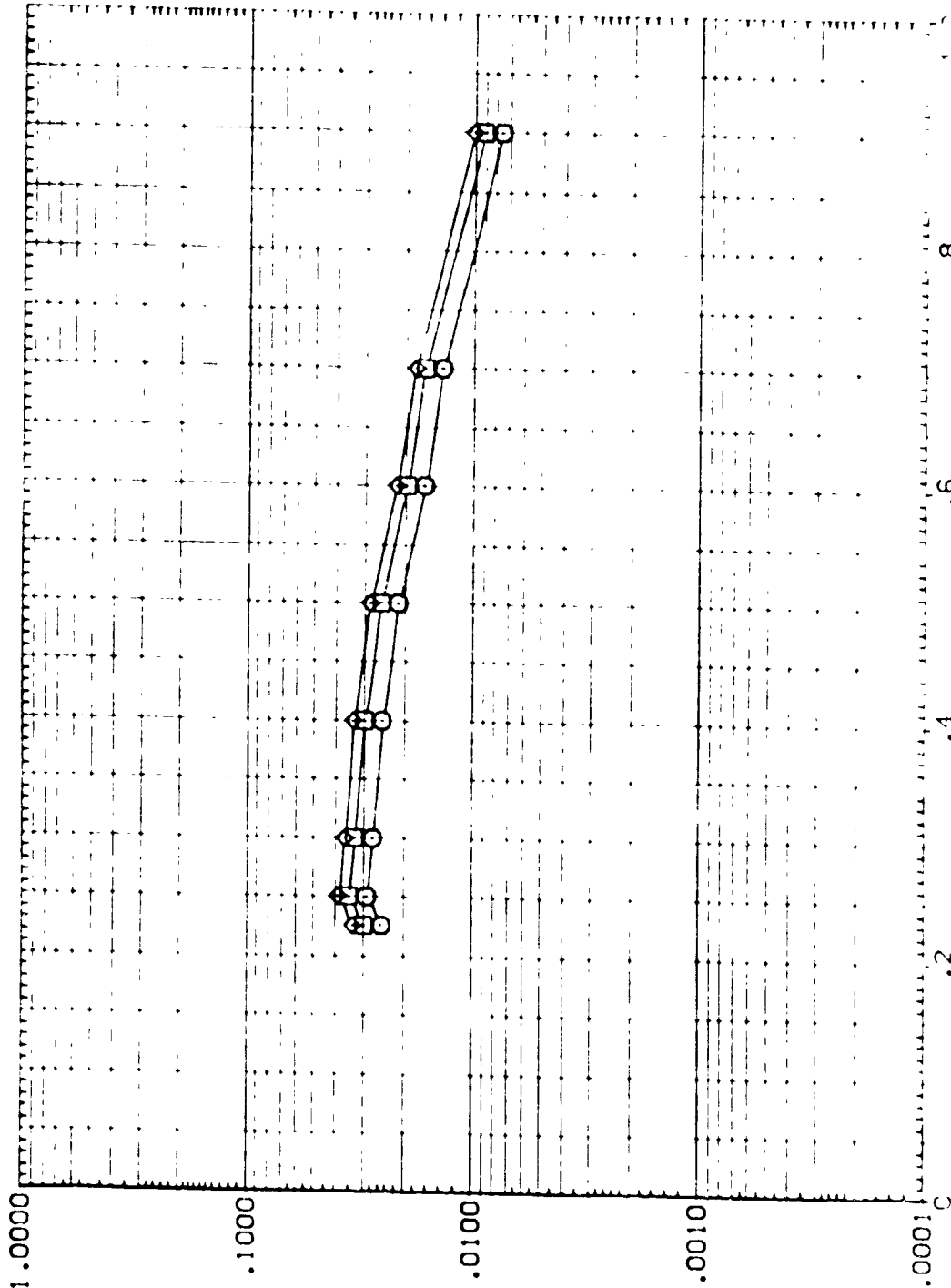


FIG. 19 UNDISTURBED AND INTERFERED HEAT TRANSFER COEFFICIENTS AT CHORDWISE POSITIONS .2, .4, .6, .8, AND 1.0
 HAW/AT = 1.500 MACH = 5.300 ALPHA = .000 PHI-H = .000
 (ORB|TER V|NG) = OS (ORB|TER V|NG)

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (ORBITER) ARC 3.5-172 IM15 ORBITER
 (ORBITER) ARC 3.5-172 IM15 ORBITER
 (ORBITER) ARC 3.5-172 IM15 ORBITER
 (ORBITER) DATA NOT AVAILABLE
 (ORBITER) DATA NOT AVAILABLE
 (ORBITER) DATA NOT AVAILABLE

RAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .860 .000 5.300 .000
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .860 .000 5.300 .000

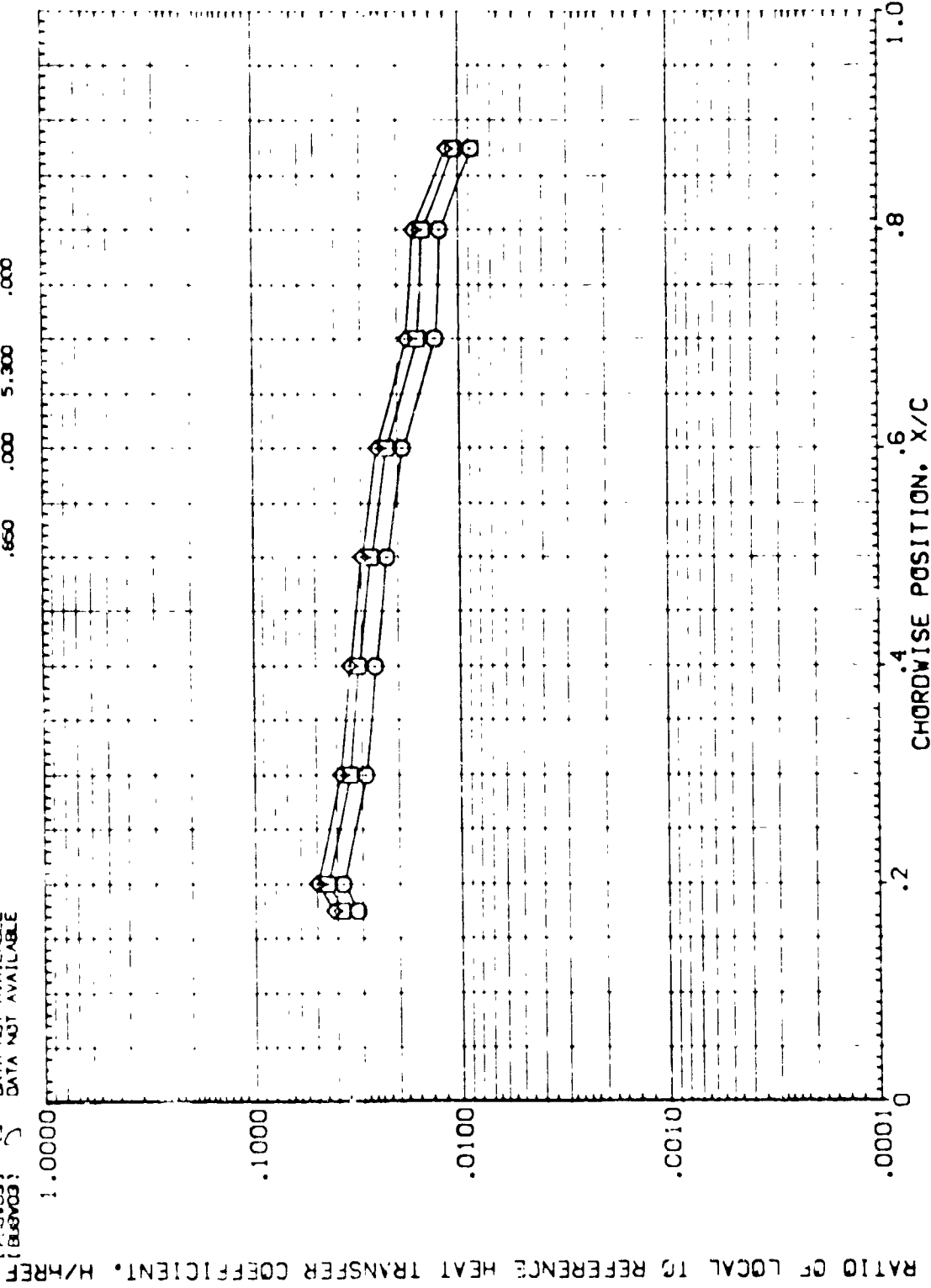


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(RBBV01)	ARC 3.5-172	IM15	ORBITER
(ABBV01)	ARC 3.5-172	IM15	ORBITER
(EGBV01)	ARC 3.5-172	IM15	ORBITER
(RBBV03)	DATA NOT AVAILABLE		
(ABBV03)	DATA NOT AVAILABLE		

(ORBITER WING)
(ORBITER WING)
(ORBITER WING)

MACH	ALPHA	MAV/HT	PHI-H
5.300	.000	1.000	.000
5.300	.000	.500	.000
5.300	.000	.850	.000
5.300	.000	1.000	.000
5.300	.000	.850	.000

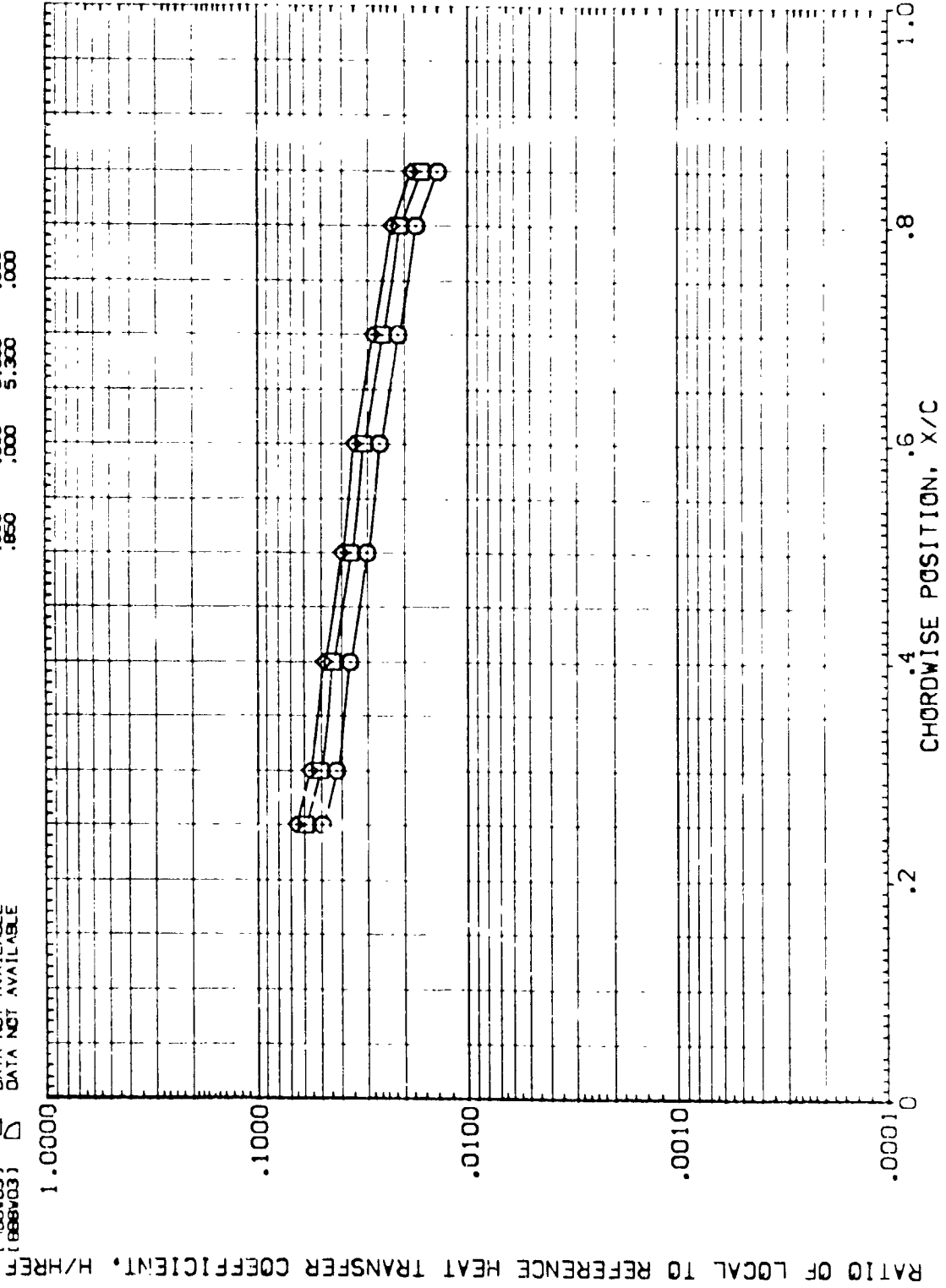


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 1.764 M_∞ = 5.300 2Y/B = .800 P/E = 161

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(R38V01) DATA NOT AVAILABLE 1.000 .000 5.300 .000

(A98V01) DATA NOT AVAILABLE .500 .000 5.300 .000

(B88V01) DATA NOT AVAILABLE .650 .000 5.300 .000

(R38V03) ARC 3.5-172 (HIS ORB + ET) 1.000 .000 5.300 .000

(A98V03) ARC 3.5-172 (HIS ORB + ET) .900 .000 5.300 .000

(B88V03) ARC 3.5-172 (HIS ORB + ET) .850 .000 5.300 .000

(ORBITER WING) (ORBITER WING)

(ORBITER WING) (ORBITER WING)

(ORBITER WING) (ORBITER WING)

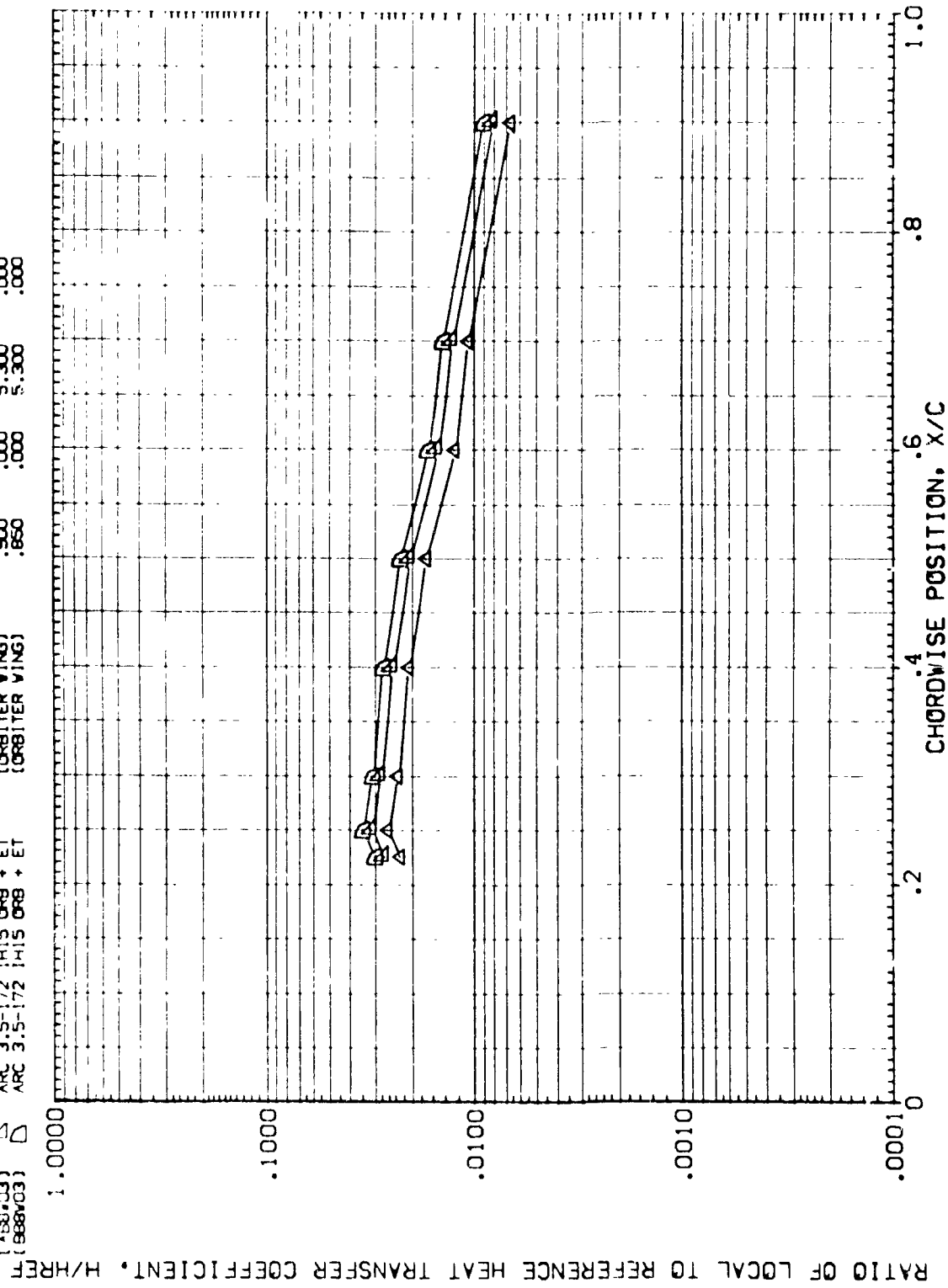


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 4.332 MACH = 5.300 2Y/B = .400 PAGE 162



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(R88V01)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(A88V01)	DATA NOT AVAILABLE	.900	.000	5.300	.000
(S88V01)	DATA NOT AVAILABLE	.850	.000	5.300	.000
(R88V03)	ARC 3-S-172 IH1S ORB + ET (ORBITER WING)	1.000	.000	5.300	.000
(A88V03)	ARC 3-S-172 IH1S ORB + ET (ORBITER WING)	.900	.000	5.300	.000
(S88V03)	ARC 3-S-172 IH1S ORB + ET (ORBITER WING)	.850	.000	5.300	.000

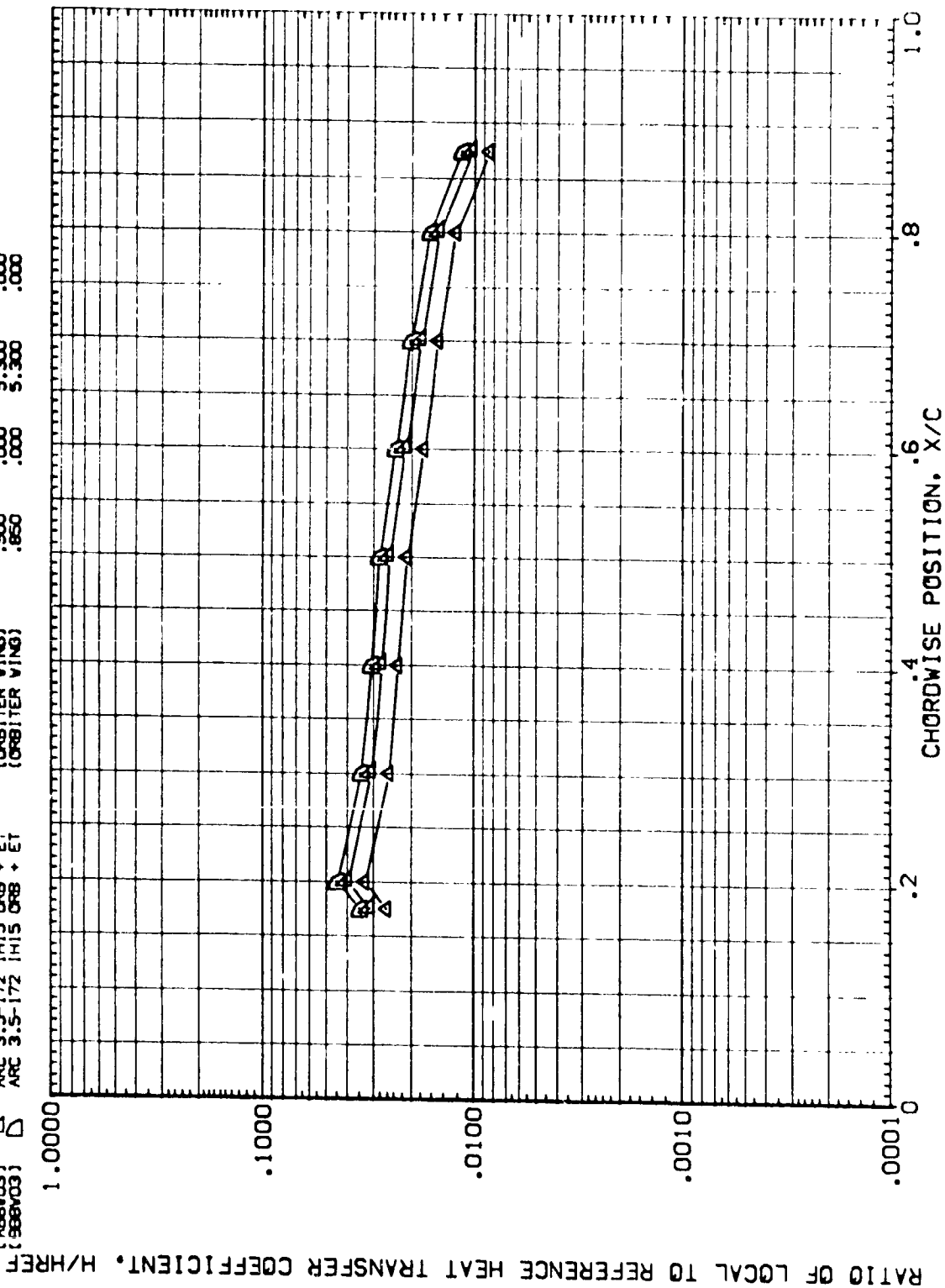


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 4.332 MACH = 5.300 2Y/B = .600

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	H/W/H/T	ALPHA	MACH	PHI-M
(R88V01)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(A88V01)	DATA NOT AVAILABLE	.900	.000	5.300	.000
(E88V01)	DATA NOT AVAILABLE	.850	.000	5.300	.000
(R88V03)	ARC 3.5-172 IH15 ORB + ET (ORBITER WING)	1.000	.000	5.300	.000
(A88V03)	ARC 3.5-172 IH15 ORB + ET (ORBITER WING)	.900	.000	5.300	.000
(E88V03)	ARC 3.5-172 IH15 ORB + ET (ORBITER WING)	.850	.000	5.300	.000

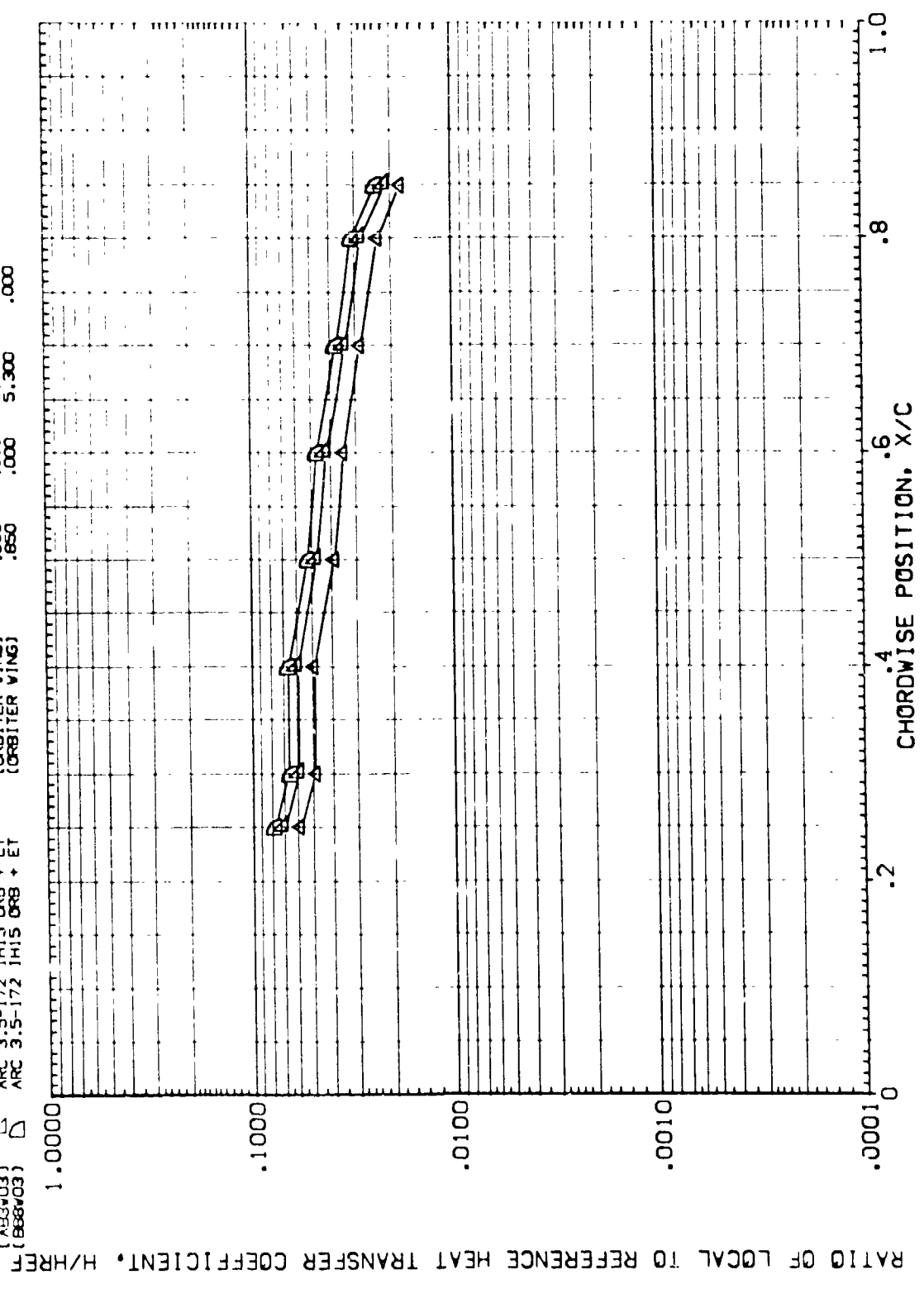


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 4.332 MACH = 5.300 2Y/B = .800 PAGE 164



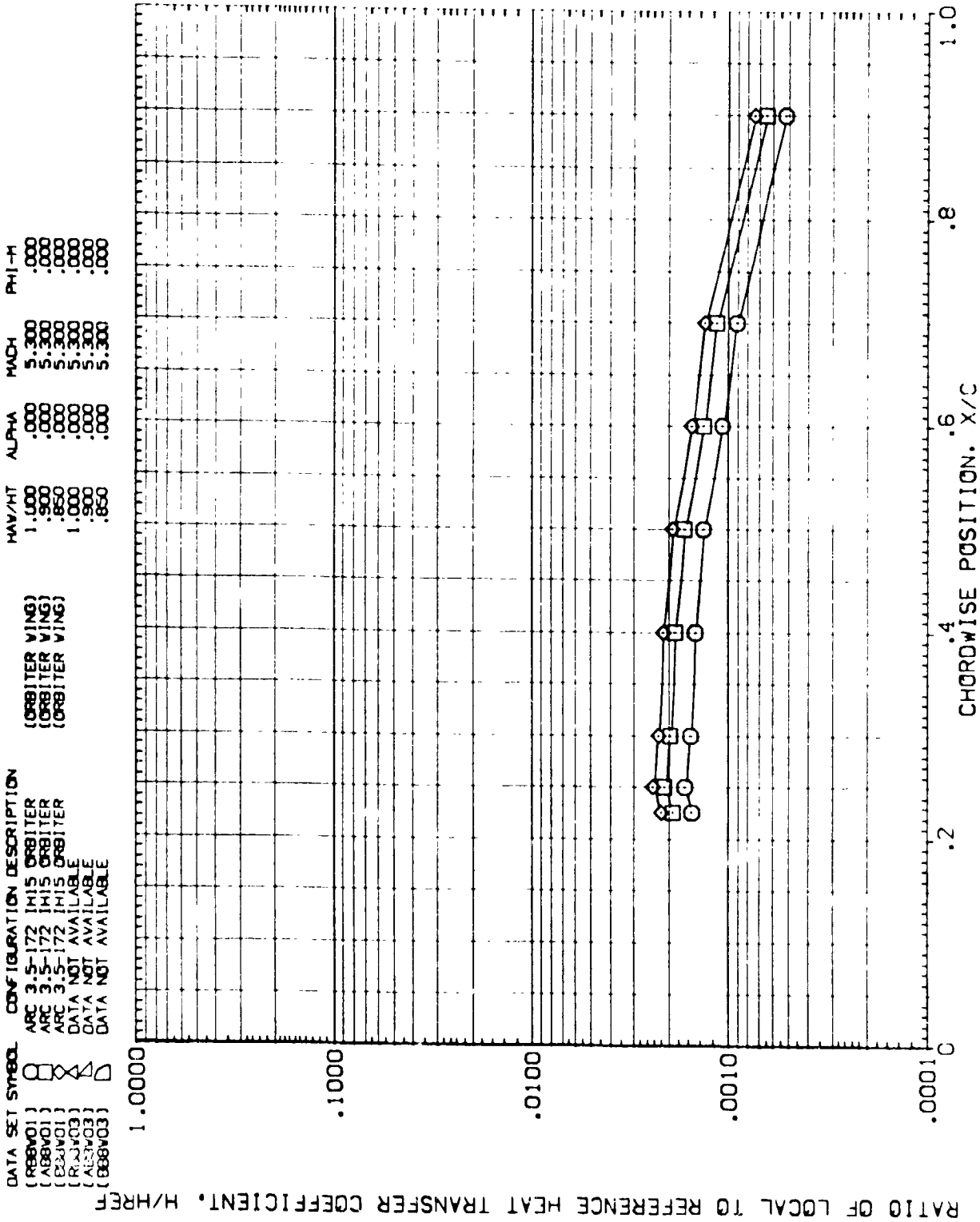


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

DATA SET SYMBOL
 (R88V01)
 (A55V01)
 (B3V01)
 (A55V03)
 (B88V03)

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ORBITER
 ARC 3.5-172 IH15 ORBITER
 ARC 3.5-172 IH15 ORBITER
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

MAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .850 .000 5.300 .000

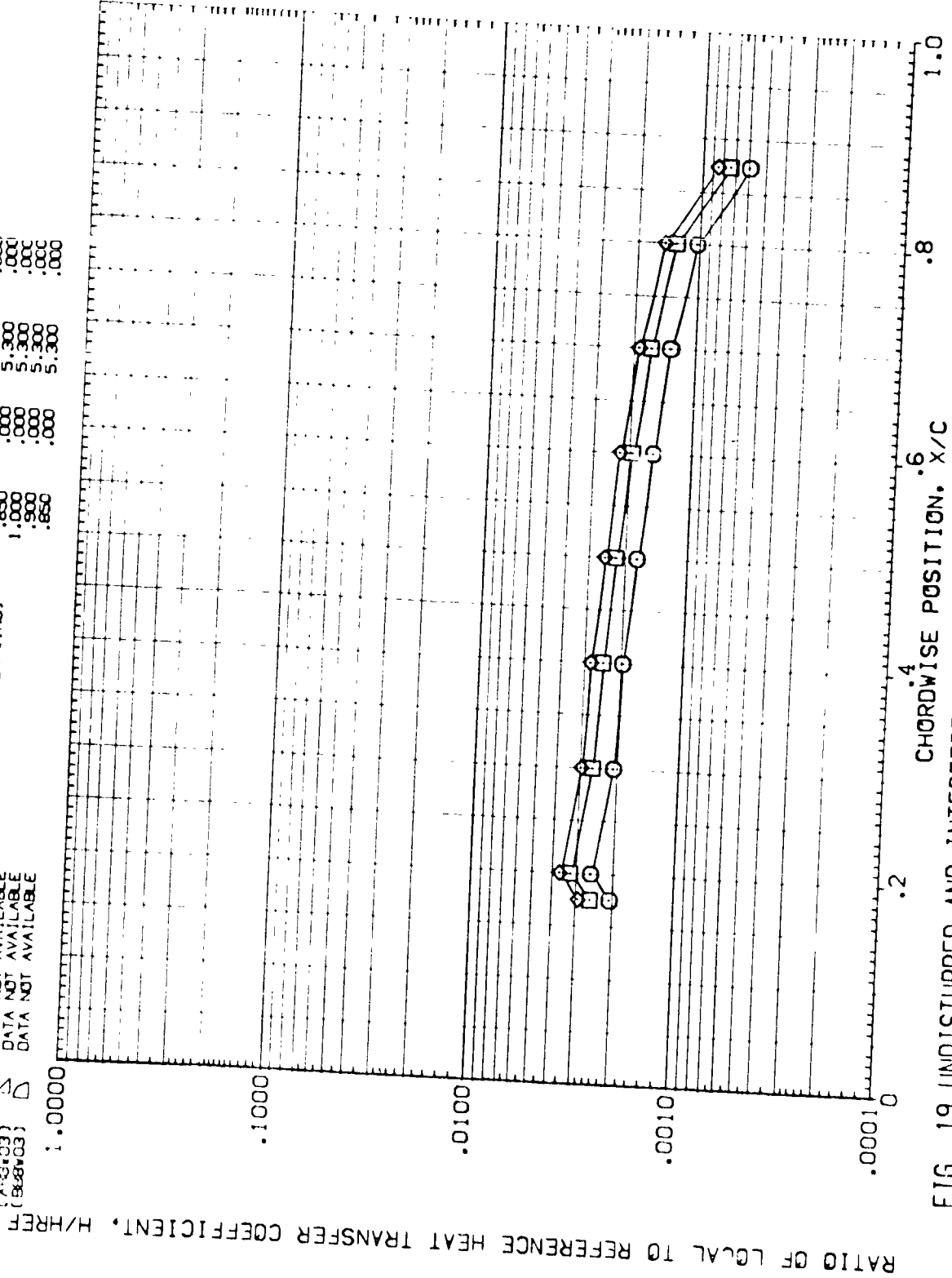


FIG. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.
 RN/L = 5.214 MACH = 5.300 2Y/B = .600



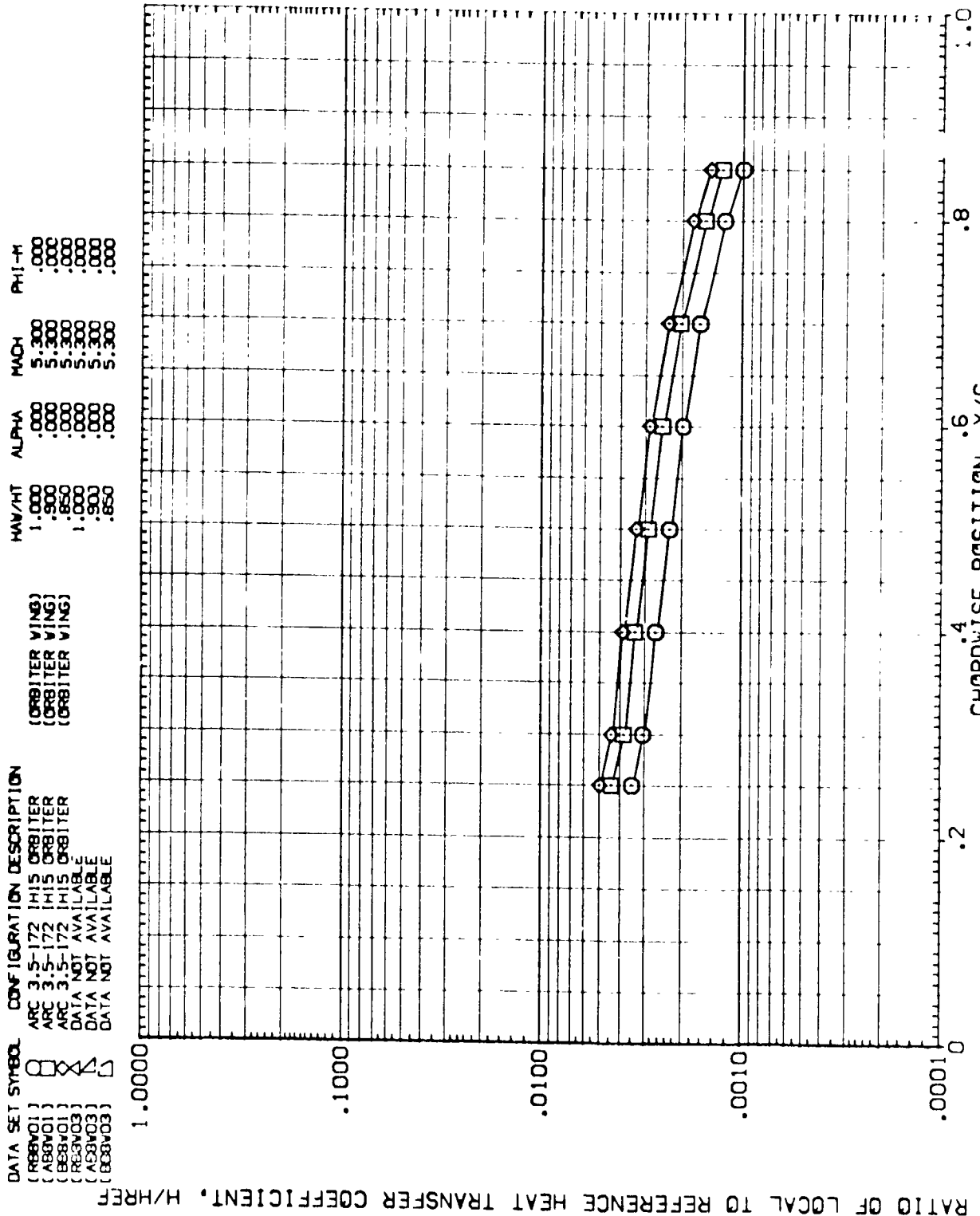


Fig. 19 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RM/C = 5.214 MACH = 5.300 2Y/B = .800

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-M
(R88V01)	ARC 3.5-172 IH15 ORBITER (ORBITER WING)	1.000	.000	5.300	.000
(A33V01)	ARC 3.5-172 IH15 ORBITER (ORBITER WING)	.900	.000	5.300	.000
(B33V01)	ARC 3.5-172 IH15 ORBITER (ORBITER WING)	.850	.000	5.300	.000
(P33V05)	ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING)	1.000	.000	5.300	.000
(A33VCS)	ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING)	.900	.000	5.300	.000
(B33VCS)	ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING)	.850	.000	5.300	.000

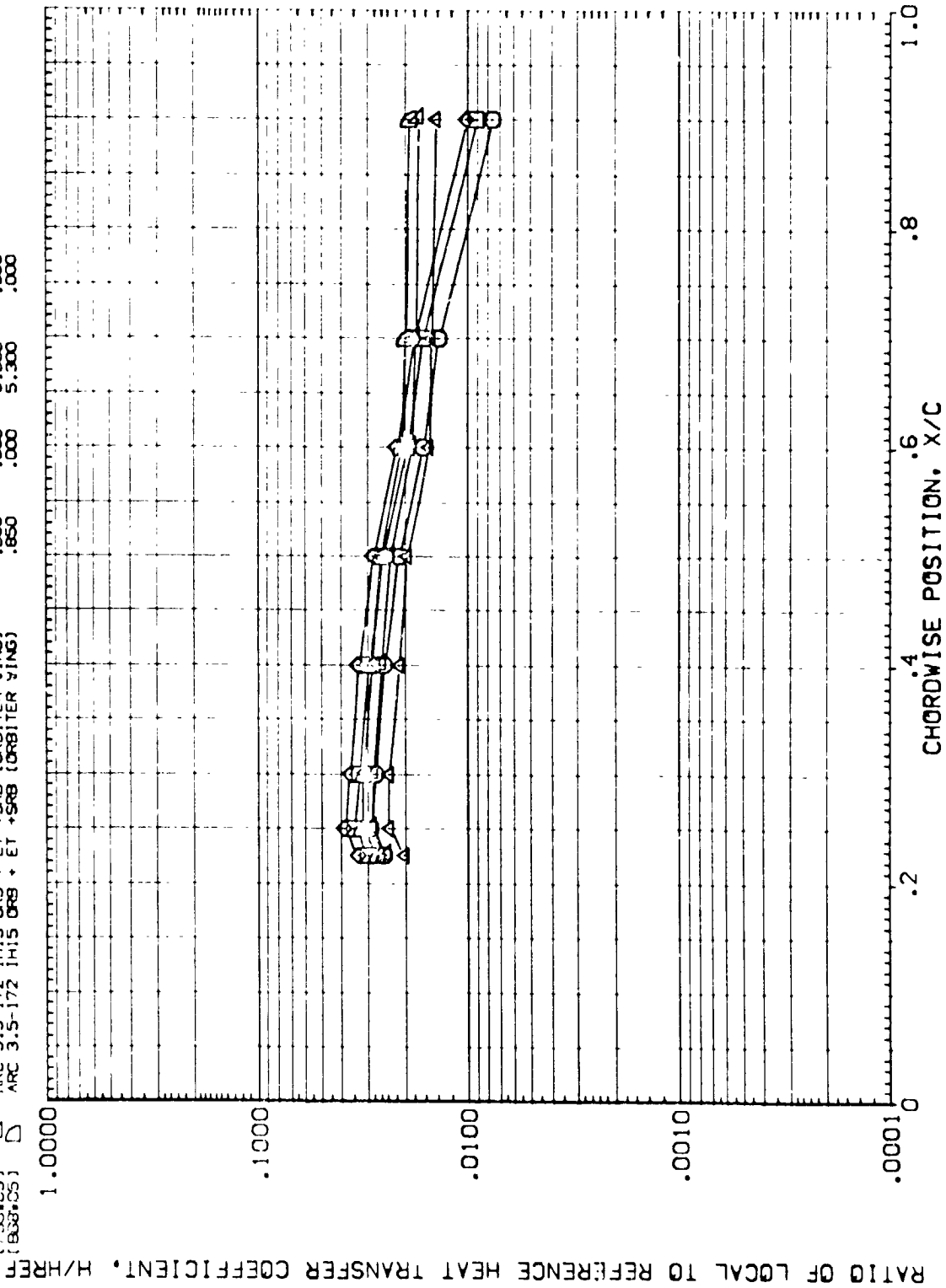


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 1.764 MACH = 5.300 2Y/B = .400

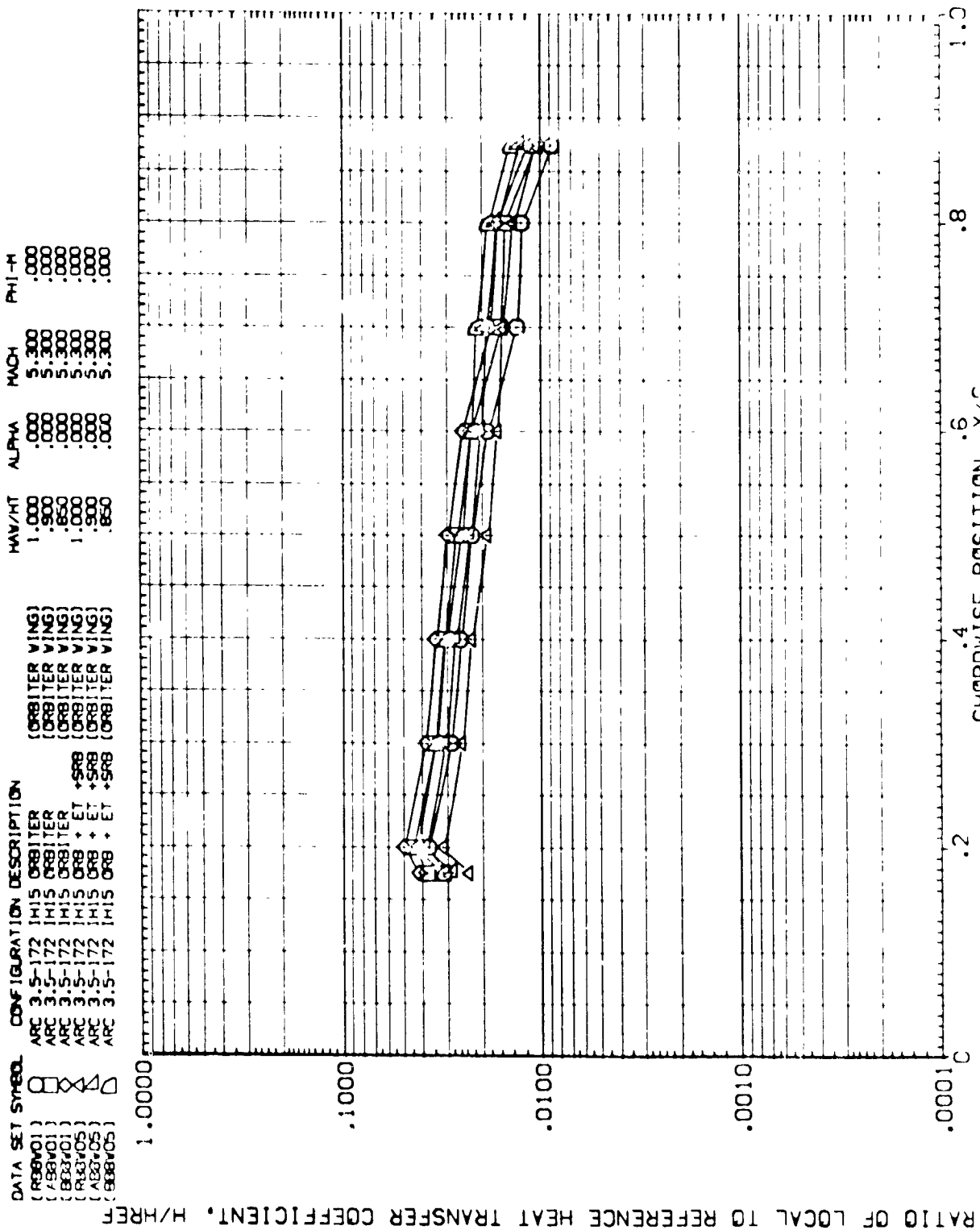


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RM/L = 1.764 MACH = 5.300 2Y/B = .600 P 3E 169

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

ARC 3.5-172	H15	ORBITER	(ORBITER WING)	1.000	.000	5.300	.000
ARC 3.5-172	H15	ORBITER	(ORBITER WING)	.900	.000	5.300	.000
ARC 3.5-172	H15	ORBITER	(ORBITER WING)	.850	.000	5.300	.000
ARC 3.5-172	H15	ORB + ET	(ORBITER WING)	1.000	.000	5.300	.000
ARC 3.5-172	H15	ORB + ET	(ORBITER WING)	.900	.000	5.300	.000
ARC 3.5-172	H15	ORB + ET	(ORBITER WING)	.850	.000	5.300	.000

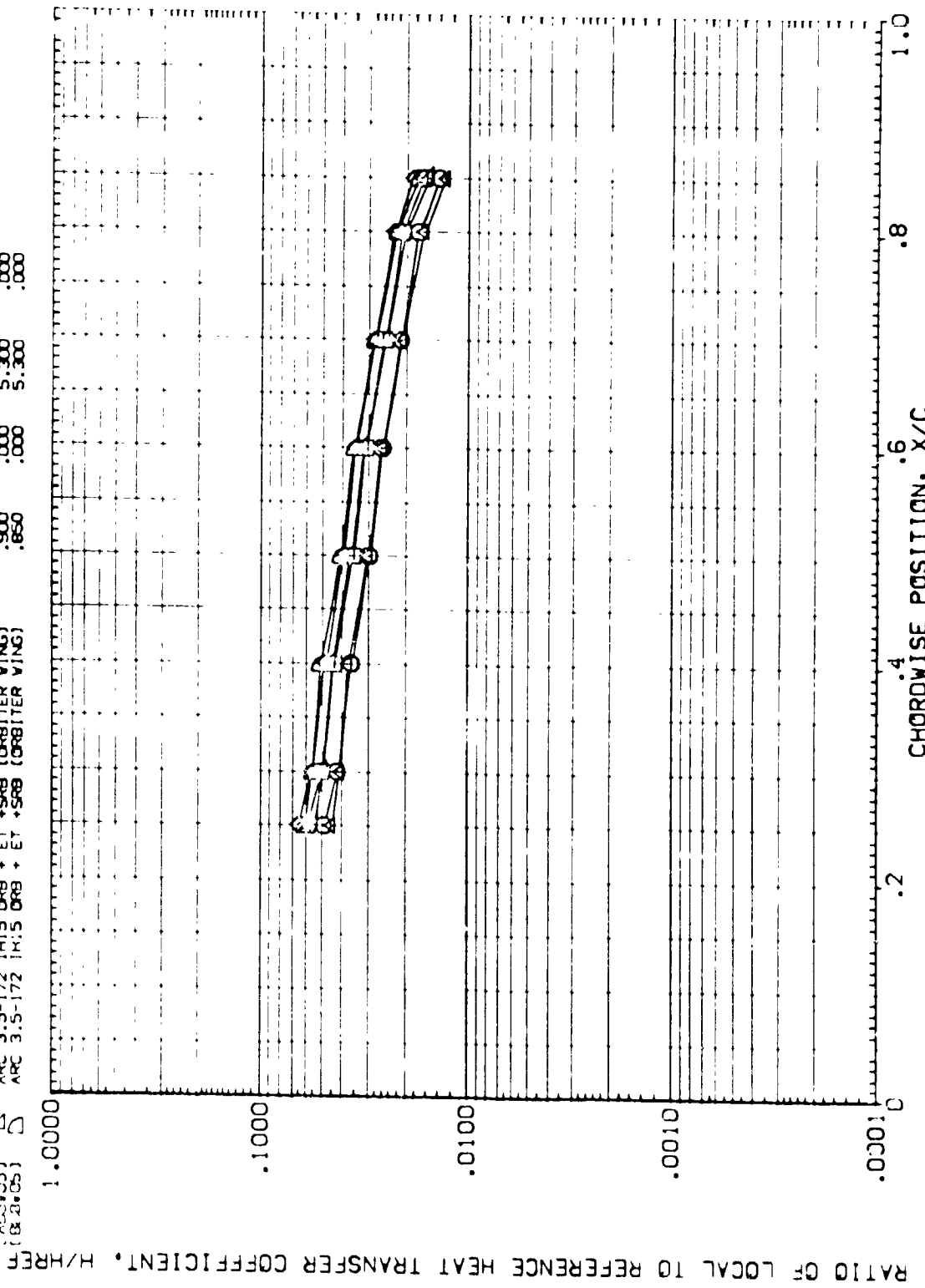


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RM/L = 1.764 MACH = 5.300 2Y/B = .800 PAGE 170

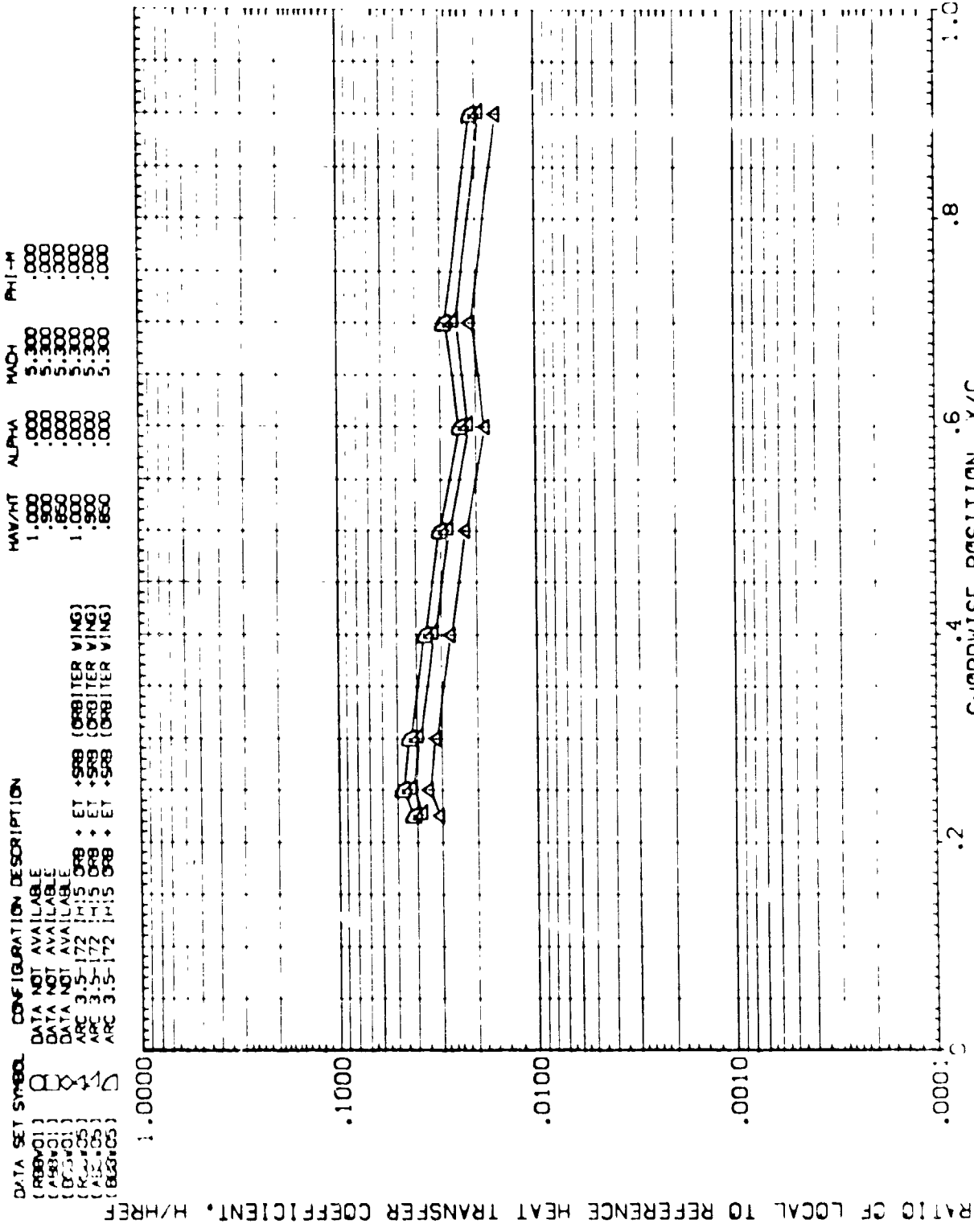


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

R/W/L = 4.437 MACH = 5.300 2Y/B = .400 PAGE 17

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88V01) DATA NOT AVAILABLE
 (A88V01) DATA NOT AVAILABLE
 (E88V01) DATA NOT AVAILABLE
 (R88V05) ARC 3.5-172 IH15 ORB + ET +SR8 (ORBITER WING)
 (A88V05) ARC 3.5-172 IH15 ORB + ET +SR8 (ORBITER WING)
 (E88V05) ARC 3.5-172 IH15 ORB + ET +SR8 (ORBITER WING)

MAV/AT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .800 .000 5.300 .000
 1.000 .000 5.300 .000
 .800 .000 5.300 .000

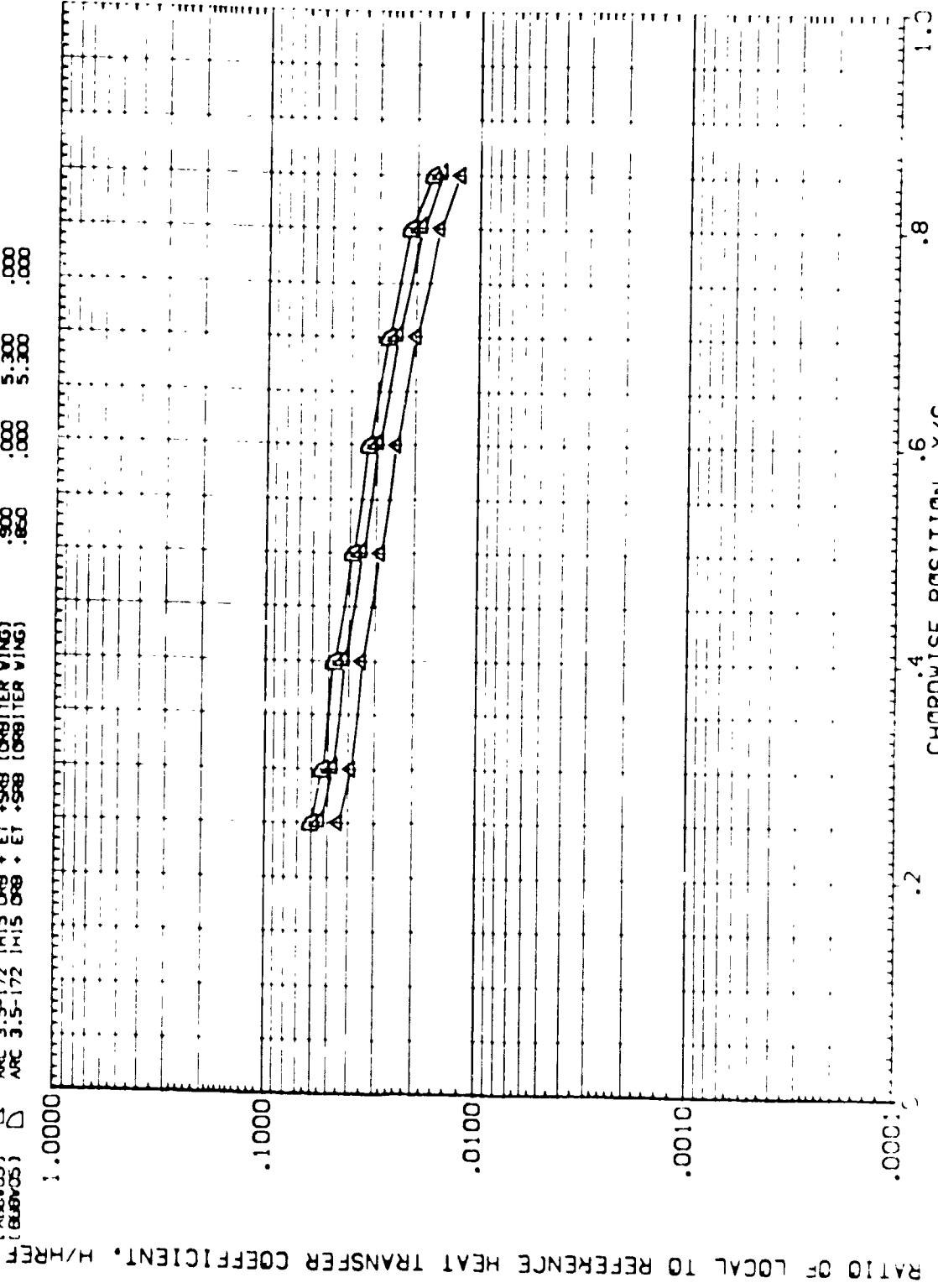


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

SCALE = 4.43" MACH = 5.300 2Y/B = .800

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA MACH PHIT

(ORBITER) ARC 3-5-172 1H15 ORBITER 5.300 .000 5.300 .000

(ARC) ARC 3-5-172 1H15 ORBITER 5.300 .000 5.300 .000

(ORBITER) ARC 3-5-172 1H15 ORBITER 5.300 .000 5.300 .000

(ORBITER) DATA NOT AVAILABLE 5.300 .000 5.300 .000

(ARC) DATA NOT AVAILABLE 5.300 .000 5.300 .000

(ORBITER) DATA NOT AVAILABLE 5.300 .000 5.300 .000

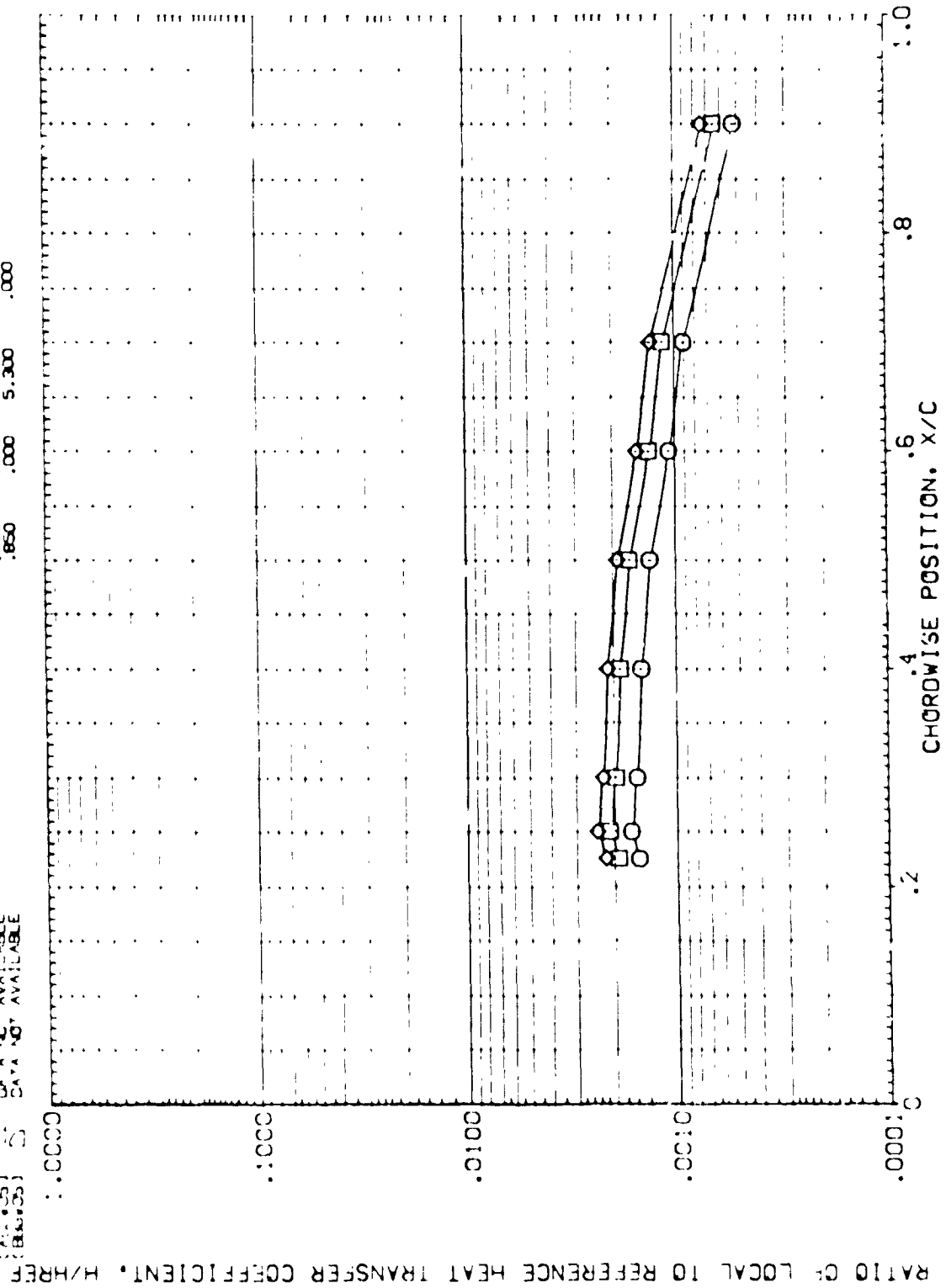


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

ARC 3-5-172 MACH = 5.300 ALPHA = .400 PAGE 174

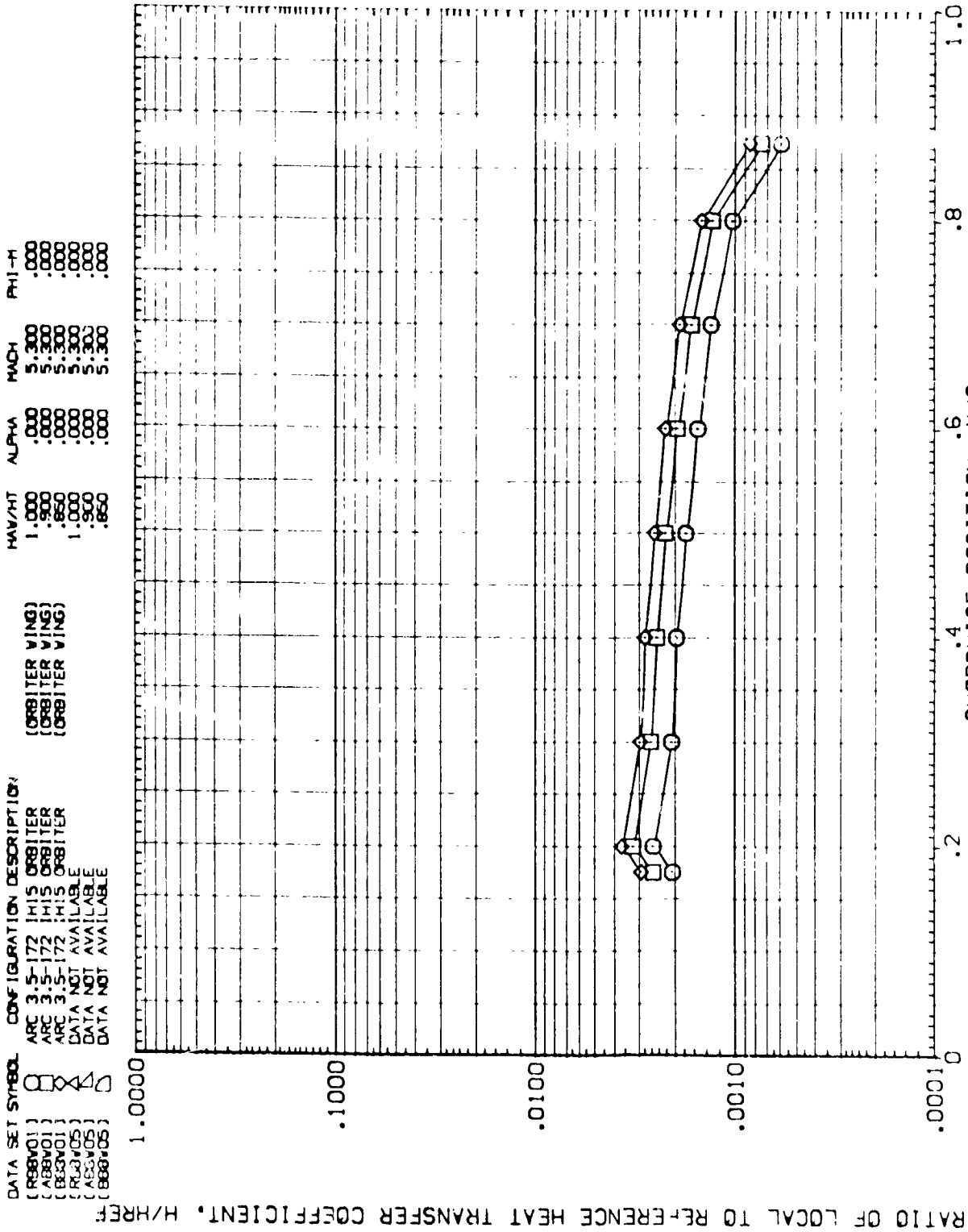


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 5.214 MACH = 5.300 2Y/B = .600 P SE 175

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAW/HT ALPHA MACH PHI-H

(R88V01)	ARC 3.5-172 IH15 ORBITER	1.000	.000	5.300	.000
(A56V01)	ARC 3.5-172 IH15 ORBITER	.900	.000	5.300	.000
(B60V01)	ARC 3.5-172 IH15 ORBITER	.850	.000	5.300	.000
(R68V05)	DATA NOT AVAILABLE	1.000	.000	5.300	.000
(A53V05)	DATA NOT AVAILABLE	.900	.000	5.300	.000
(B60V05)	DATA NOT AVAILABLE	.850	.000	5.300	.000

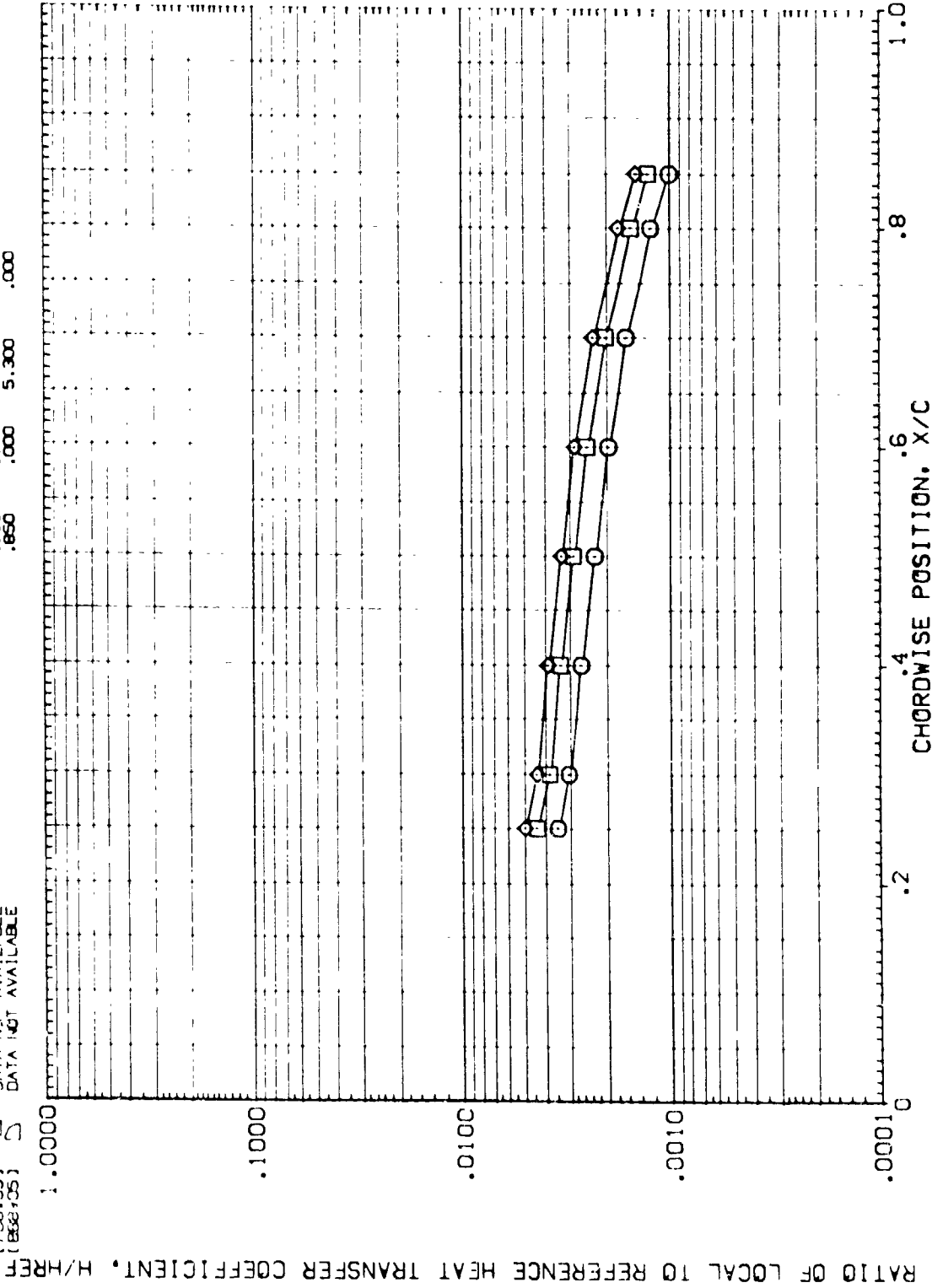


FIG. 20 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 5.214 MACH = 5.300 2Y/B = .800 PAGE 176



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

(DB8V05) ARC 3.5-172 IH15 DR8 + ET +SR8 (SR81TER WING) 5.300 .000 .000

(EB8V05) ARC 3.5-172 IH15 DR8 + ET +SR8 (SR81TER WING) 5.300 .000 .000

(FB8V05) ARC 3.5-172 IH15 DR8 + ET +SR8 (SR81TER WING) 5.300 .000 .000

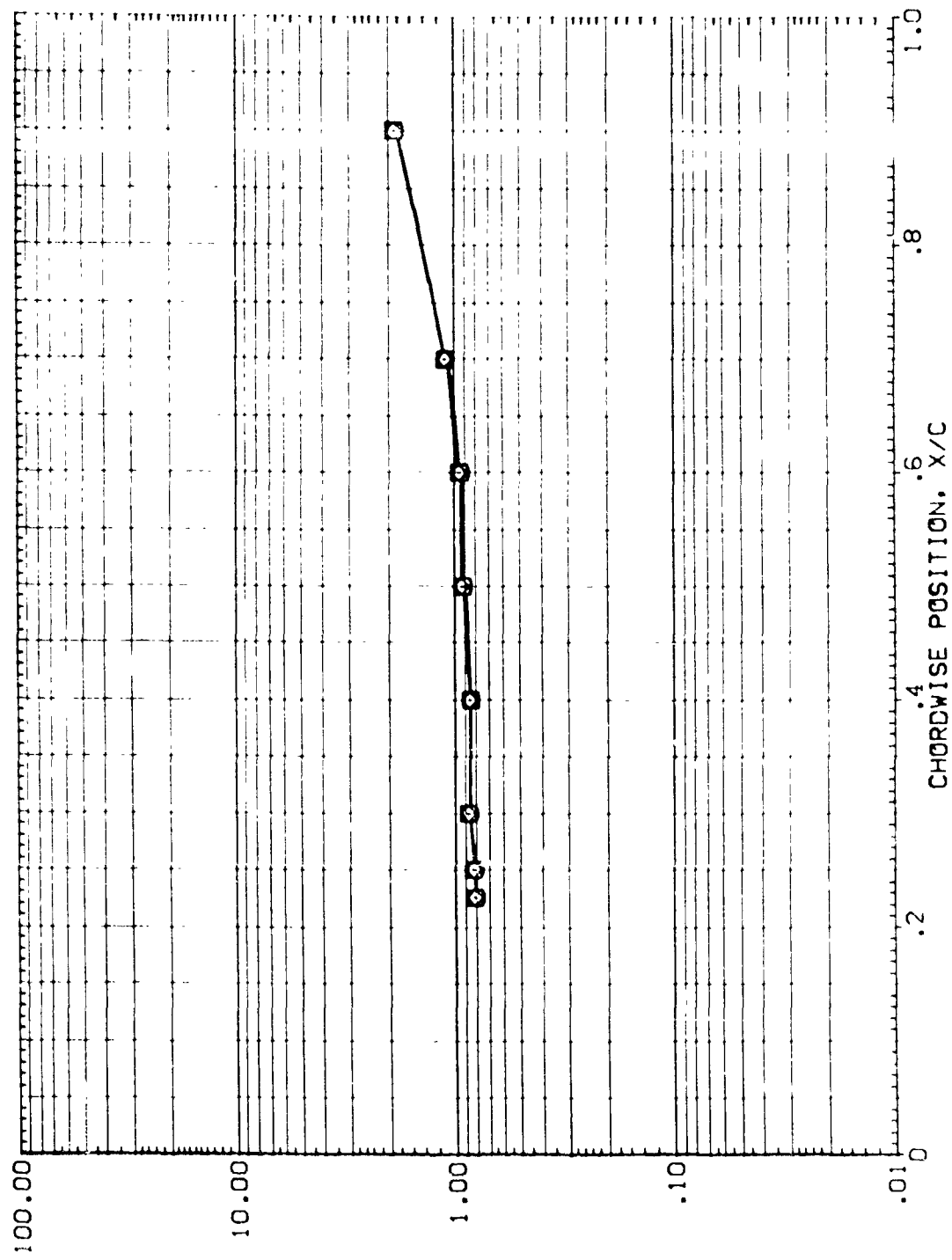


FIG. 21 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., ORBITER WING.
 $\phi = 1.845$ MACH = 5.300 $2Y/B = .400$ P/E = .177

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-M

(ORBITER) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 5.300 .000 .000

(ESG) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 5.300 .000 .000

(FESG) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 5.300 .000 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

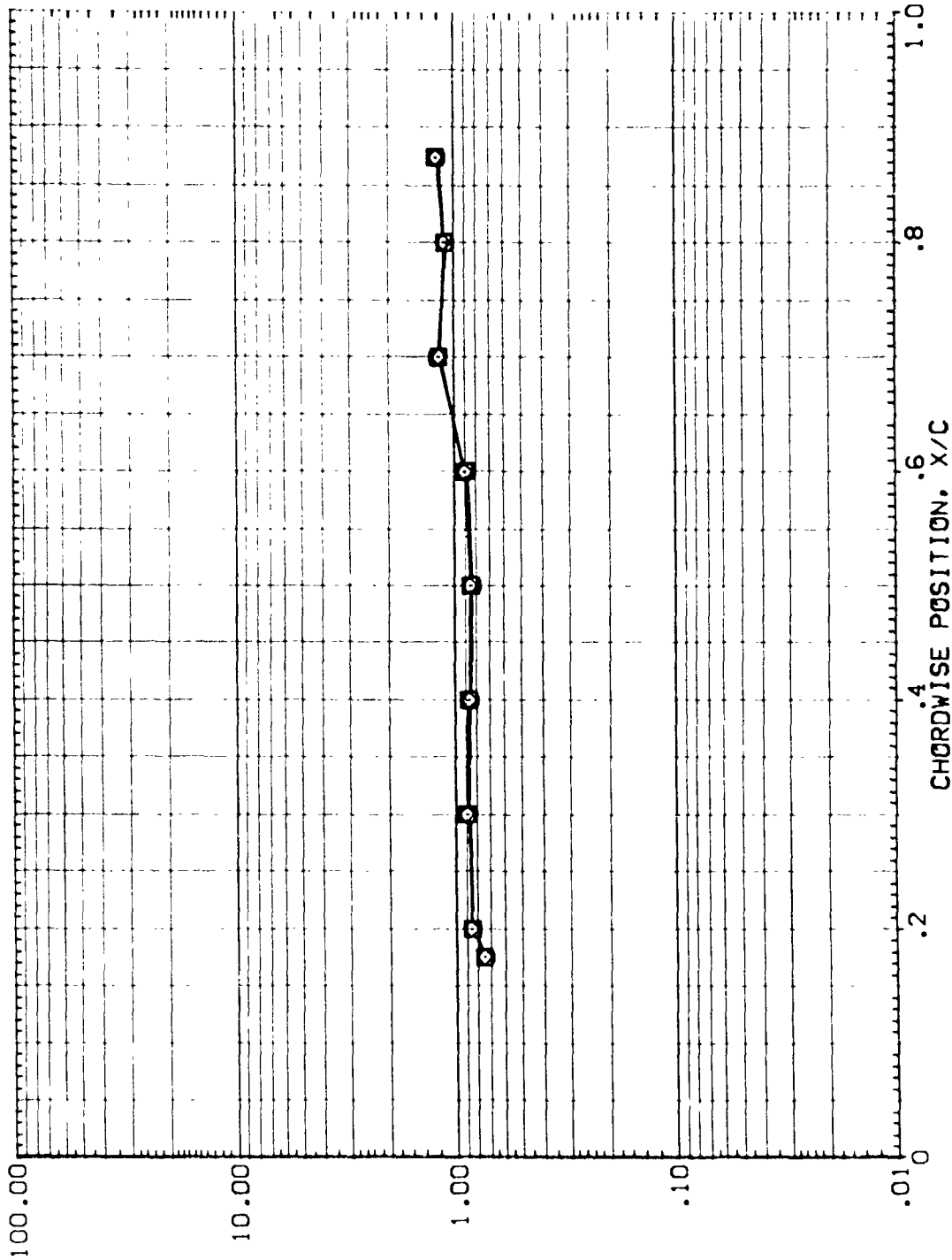


FIG. 21 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., ORBITER WING.

ORN/L = 1.845 MACH = 5.300 2Y/B = .600

DATA SET SYMBOL
 (DE88V05)
 (E88V05)
 (F88V05)



CONFIGURATION DESCRIPTION
 ARC 3.5-172 | H15 ORB + ET +SRB (ORBITER WING)
 ARC 3.5-172 | H15 ORB + ET +SRB (ORBITER WING)
 ARC 3.5-172 | H15 ORB + ET +SRB (ORBITER WING)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

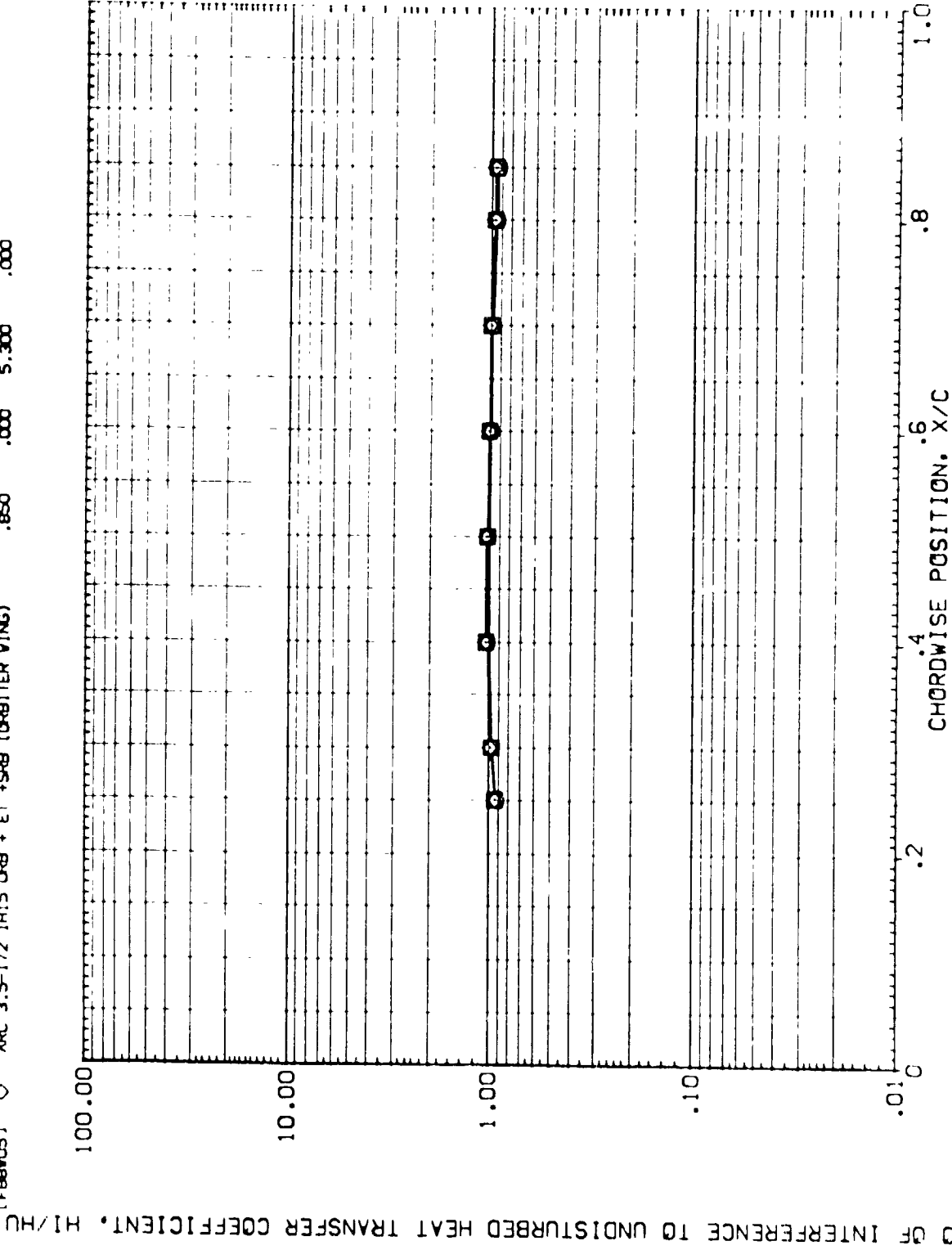


FIG. 21 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., ORBITER WING.
 $M_{\infty}/L = 1.845$ $M_{\infty}/C = 5.300$ $2Y/B = .800$ PAGE 179

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88V02) □ ARC 3-5-172 (H15 ORBITER VING)
 (A55V02) ⊗ ARC 3-5-172 (H15 ORBITER VING)
 (E8V02) ⊗ ARC 3-5-172 (H15 ORBITER VING)
 (A55V03) ⊗ ARC 3-5-172 (H15 ORB + ET +SRB (ORBITER VING)
 (E8V03) ⊗ ARC 3-5-172 (H15 ORB + ET +SRB (ORBITER VING)
 (B88V06) ⊗ ARC 3-5-172 (H15 ORB + ET +SRB (ORBITER VING)

HAV/HT ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

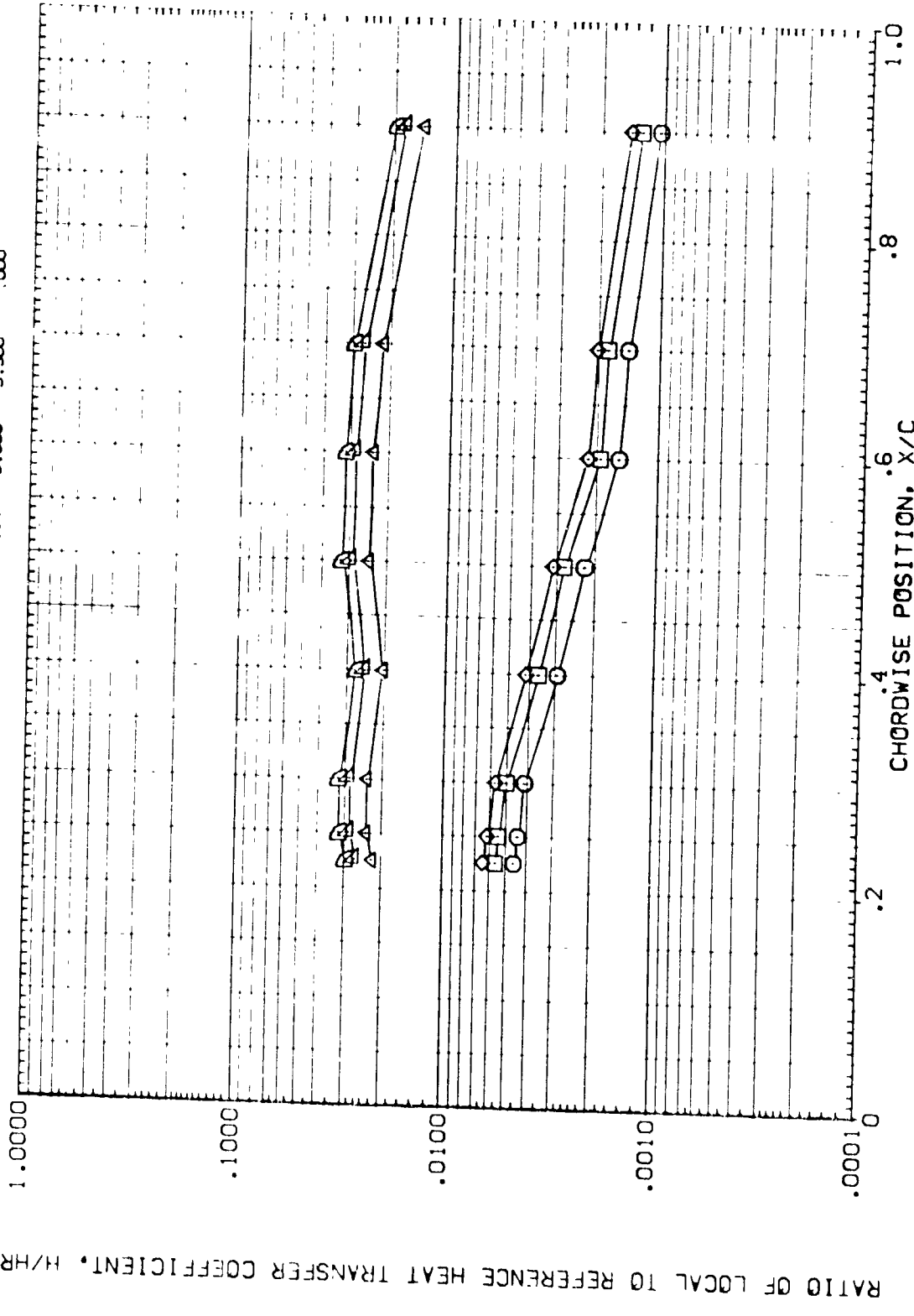


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.
 RN/L = 2.143 MACH = 5.300 2Y/B = .400



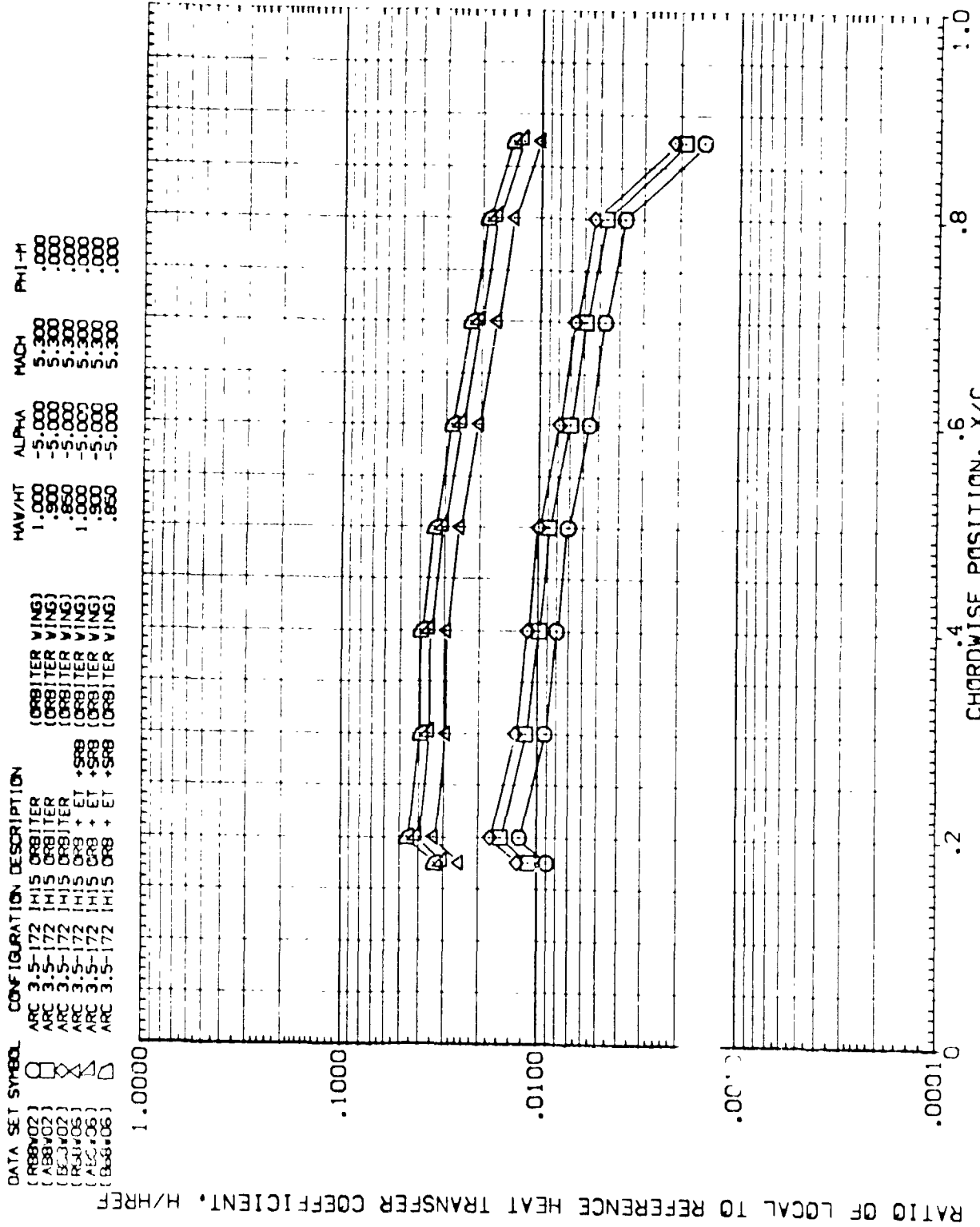


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

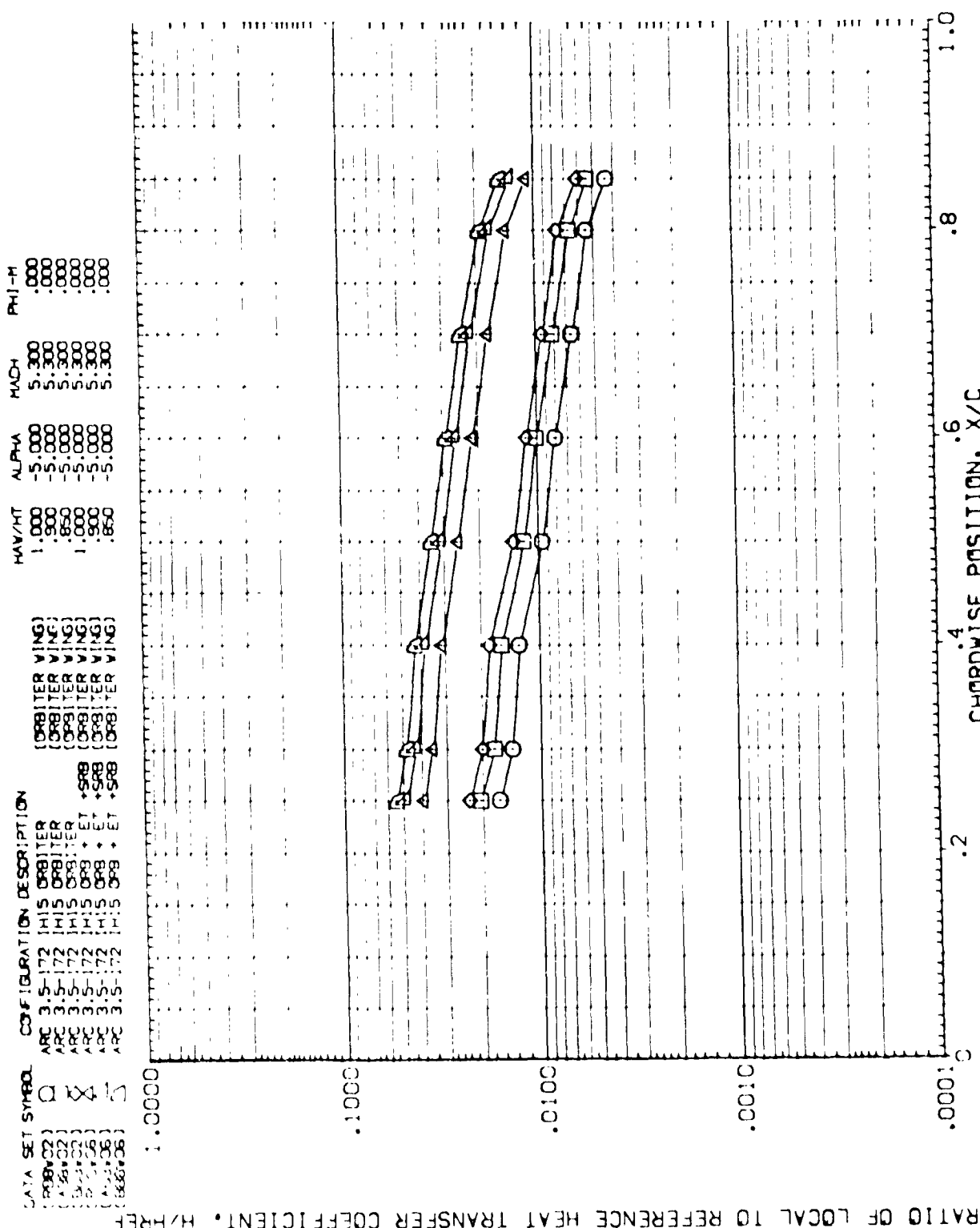


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

PHI/L = 2.143 MACH = 5.300 2Y/B = .800 PAGE 182



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHIT-M

(REMOVED) DATA NOT AVAILABLE 5.300 -5.000 .000

(486002) DATA NOT AVAILABLE 5.300 -5.000 .000

(511002) DATA NOT AVAILABLE 5.300 -5.000 .000

(511006) ARC 3.5-72 H15 OP8 + ET +5P8 (ORBITER WING) 5.300 -5.000 .000

(411006) ARC 3.5-72 H15 OP8 + ET +5P8 (ORBITER WING) 5.300 -5.000 .000

(366006) ARC 3.5-72 H15 OP8 + ET +5P8 (ORBITER WING) 5.300 -5.000 .000

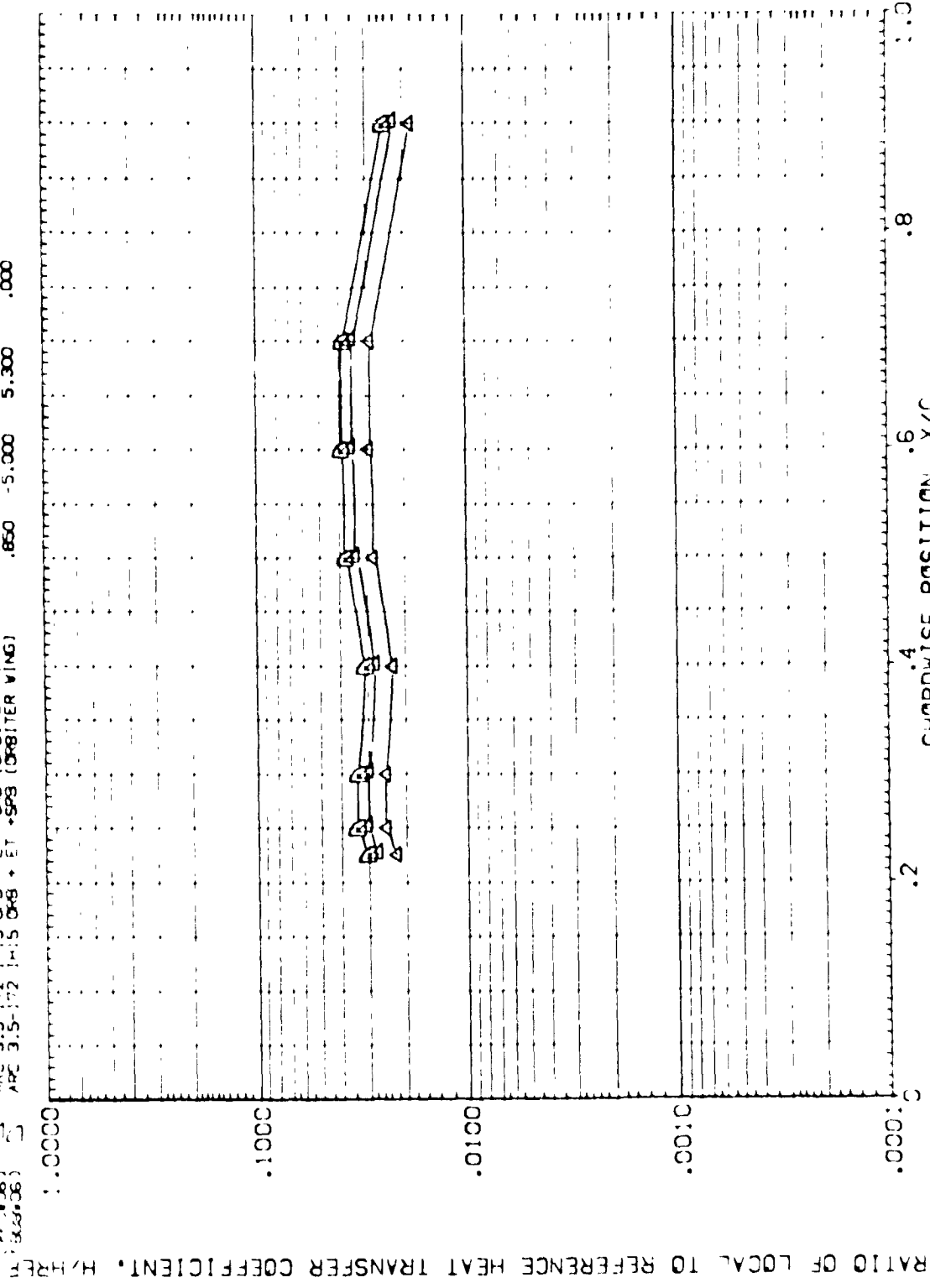


FIG. 22 UNDISCORDED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

DATA SET SYMBOL CONFIGURATION DESCRIPTION H/W/H/T ALPHA MACH PH) -M

(R88V02) DATA NOT AVAILABLE 1.000 -5.000 5.300 .000

(A88V02) DATA NOT AVAILABLE .900 -5.000 5.300 .000

(B88V02) DATA NOT AVAILABLE .850 -5.000 5.300 .000

(M88V06) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)TER WING) 1.000 -5.000 5.300 .000

(A88V06) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)TER WING) .900 -5.000 5.300 .000

(B88V06) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)TER WING) .850 -5.000 5.300 .000

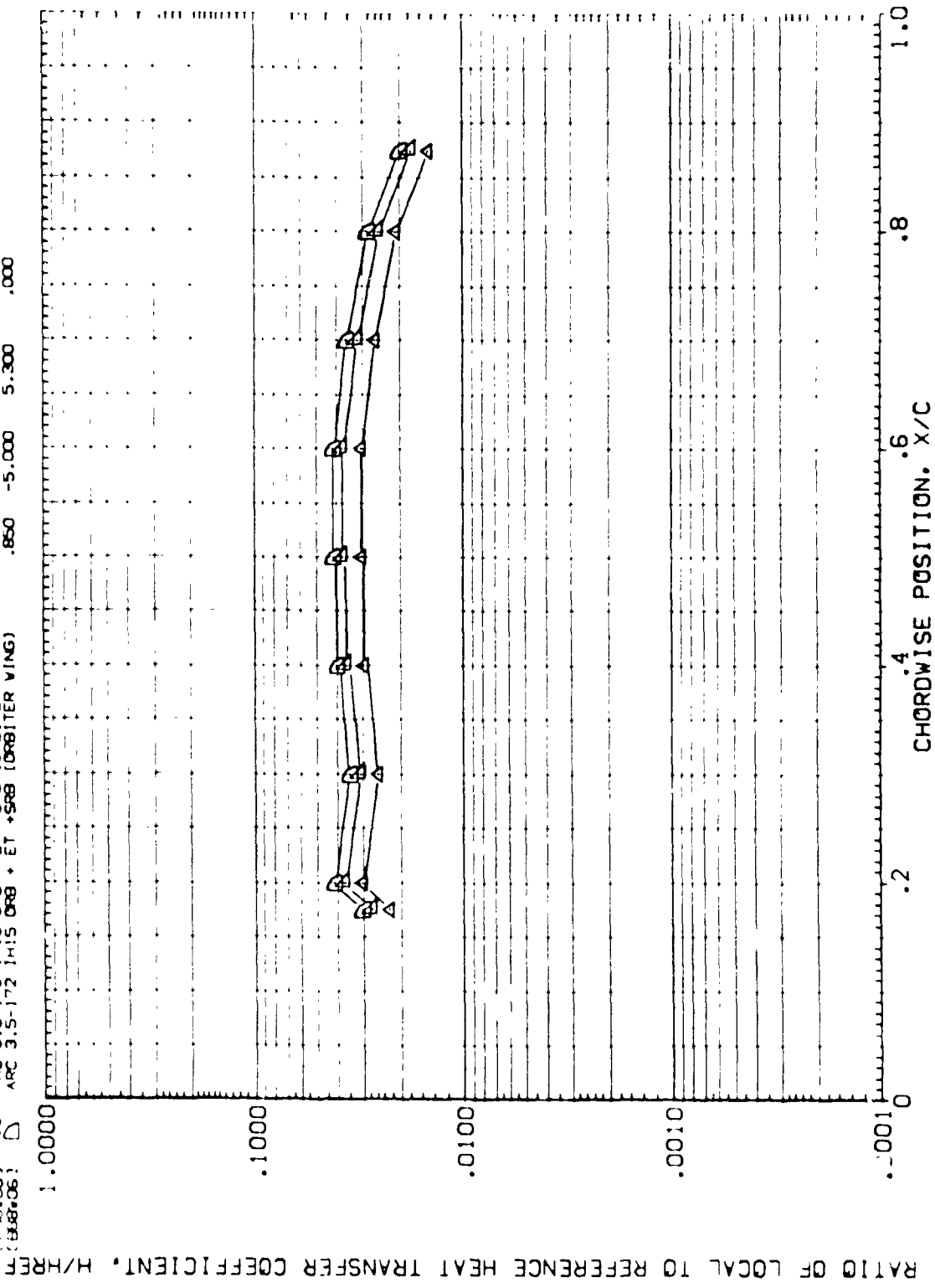


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RN/L = 4.570 MACH = 5.300 2Y/B = .600 PAGE 184



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (F8BVC2) DATA NOT AVAILABLE
 (A8BVC2) DATA NOT AVAILABLE
 (G8BVC2) DATA NOT AVAILABLE
 (K2J06) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)TER VING)
 (A5306) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)TER VING)
 (B8BVC6) ARC 3.5-172 (H15 ORB + ET +SRB (ORB)TER VING)

MACH ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/REF

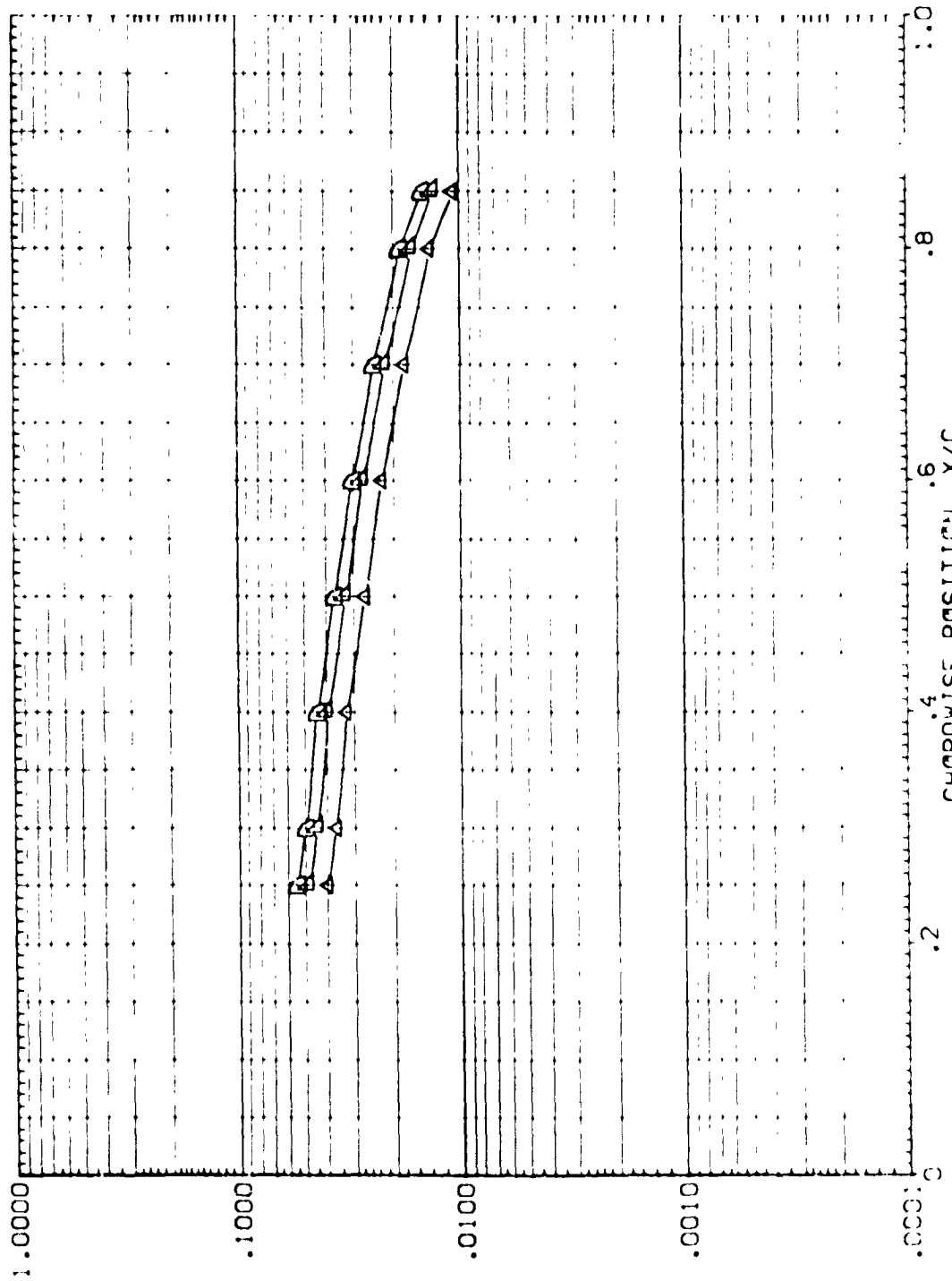


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

PHI-H = 4.570 MACH = 5.300 2Y/B = .800 P SE 185

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (ORBITER WING) (ORBITER WING) (ORBITER WING)
 (ORBITER WING) (ORBITER WING) (ORBITER WING)
 (ORBITER WING) (ORBITER WING) (ORBITER WING)
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

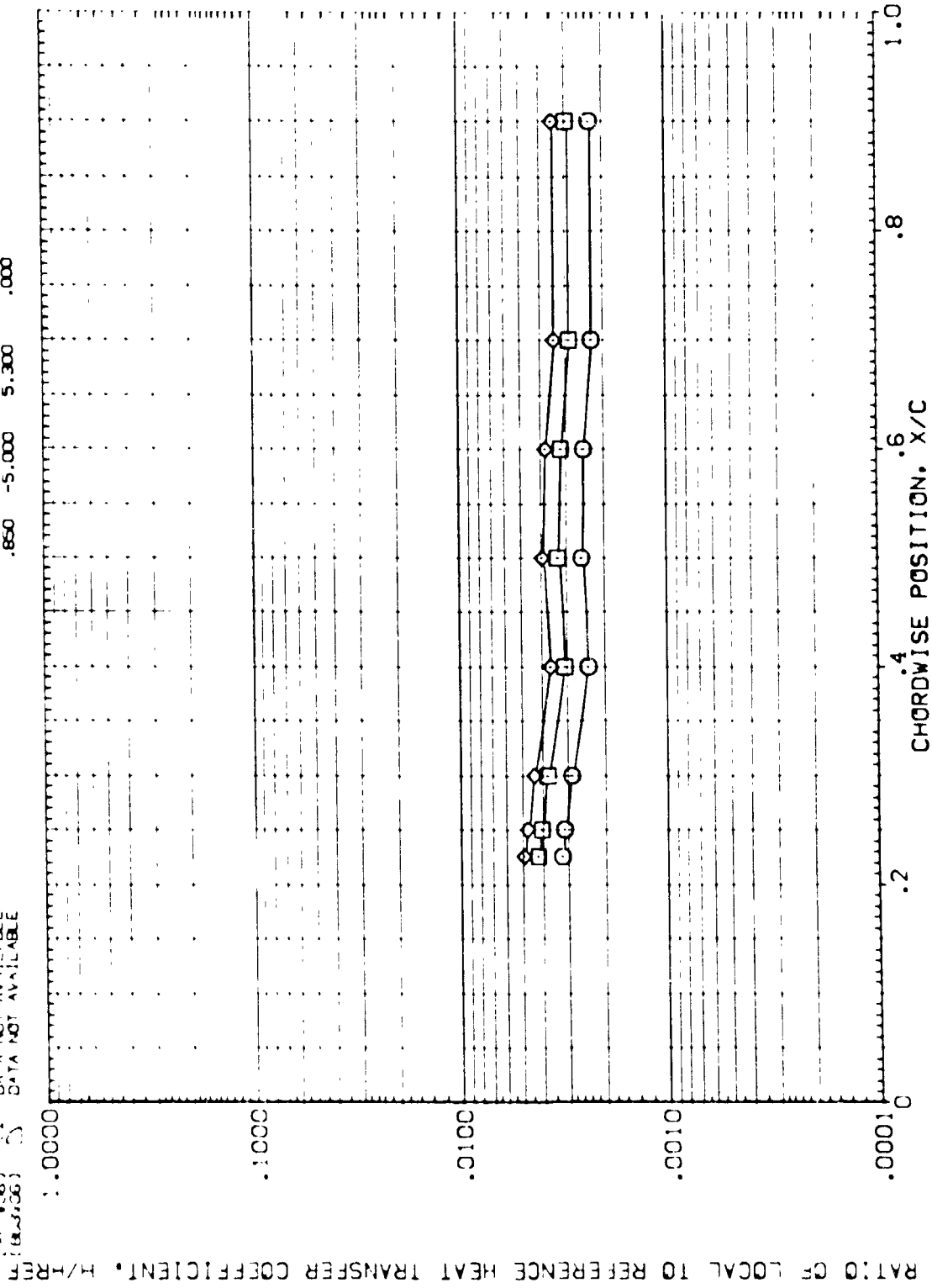


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

Re/L = 6.13; MACH = 5.300 2Y/B = .400 PAGE 186

DATA SET SYMBOL: (ORBITER VING) (ORBITER VING) (ORBITER VING)

CONFIGURATION DESCRIPTION: ARC 3.5-172 | H15 ORBITER | H15 ORBITER | H15 ORBITER

MAV/MT: 1.000 | .900 | .850 | 1.000 | .900 | .850

ALPHA: -5.000 | -5.000 | -5.000 | -5.000 | -5.000 | -5.000

MACH: 5.300 | 5.300 | 5.300 | 5.300 | 5.300 | 5.300

PHI-M: .000 | .000 | .000 | .000 | .000 | .000

DATA NOT AVAILABLE

DATA NOT AVAILABLE

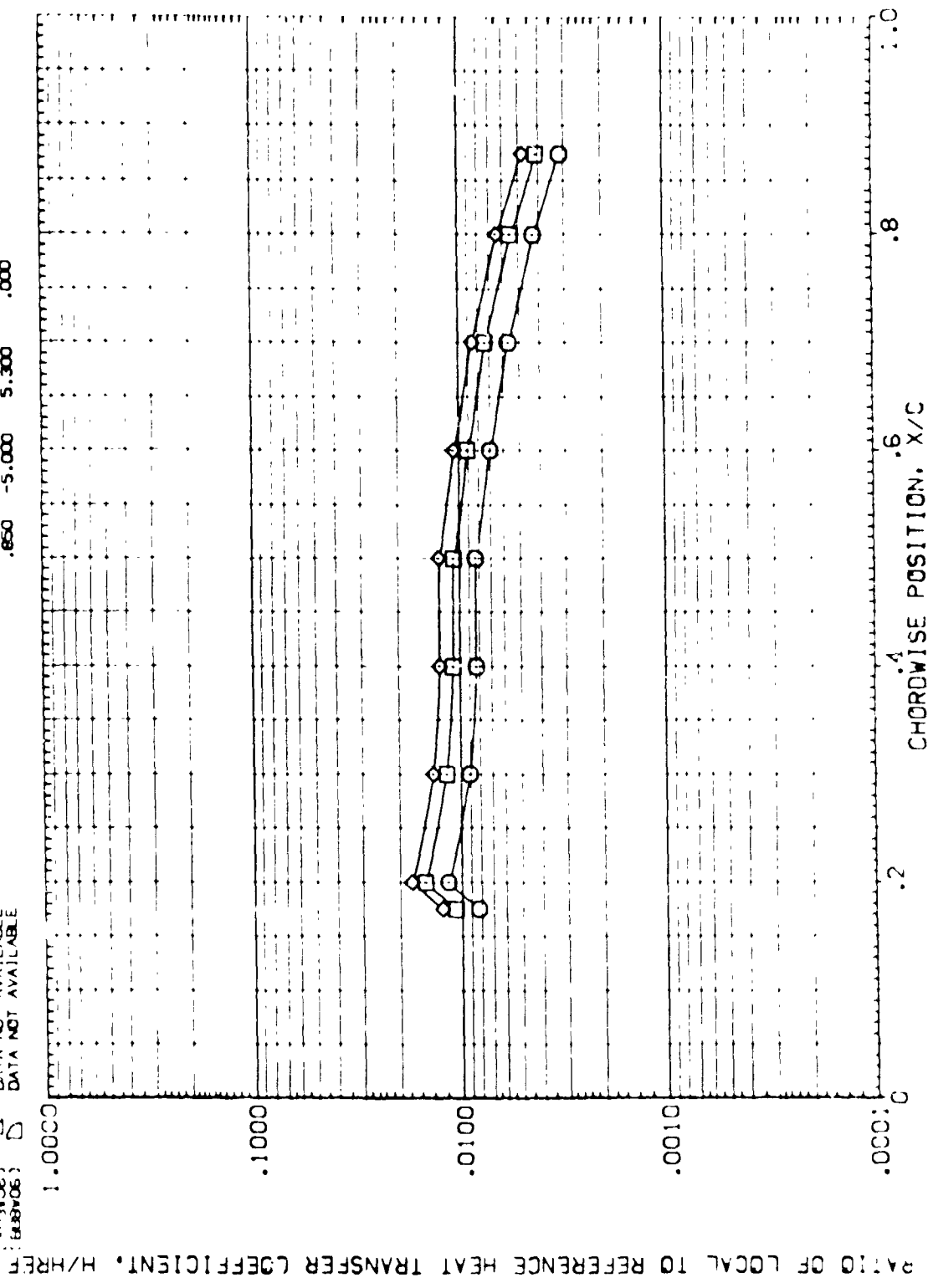


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

DATA SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H
 (ORBITER WING) (ORBITER WING) (ORBITER WING)
 (ORBITER WING) (ORBITER WING) (ORBITER WING)
 (ORBITER WING) (ORBITER WING) (ORBITER WING)
 DATA NOT AVAILABLE DATA NOT AVAILABLE
 DATA NOT AVAILABLE DATA NOT AVAILABLE

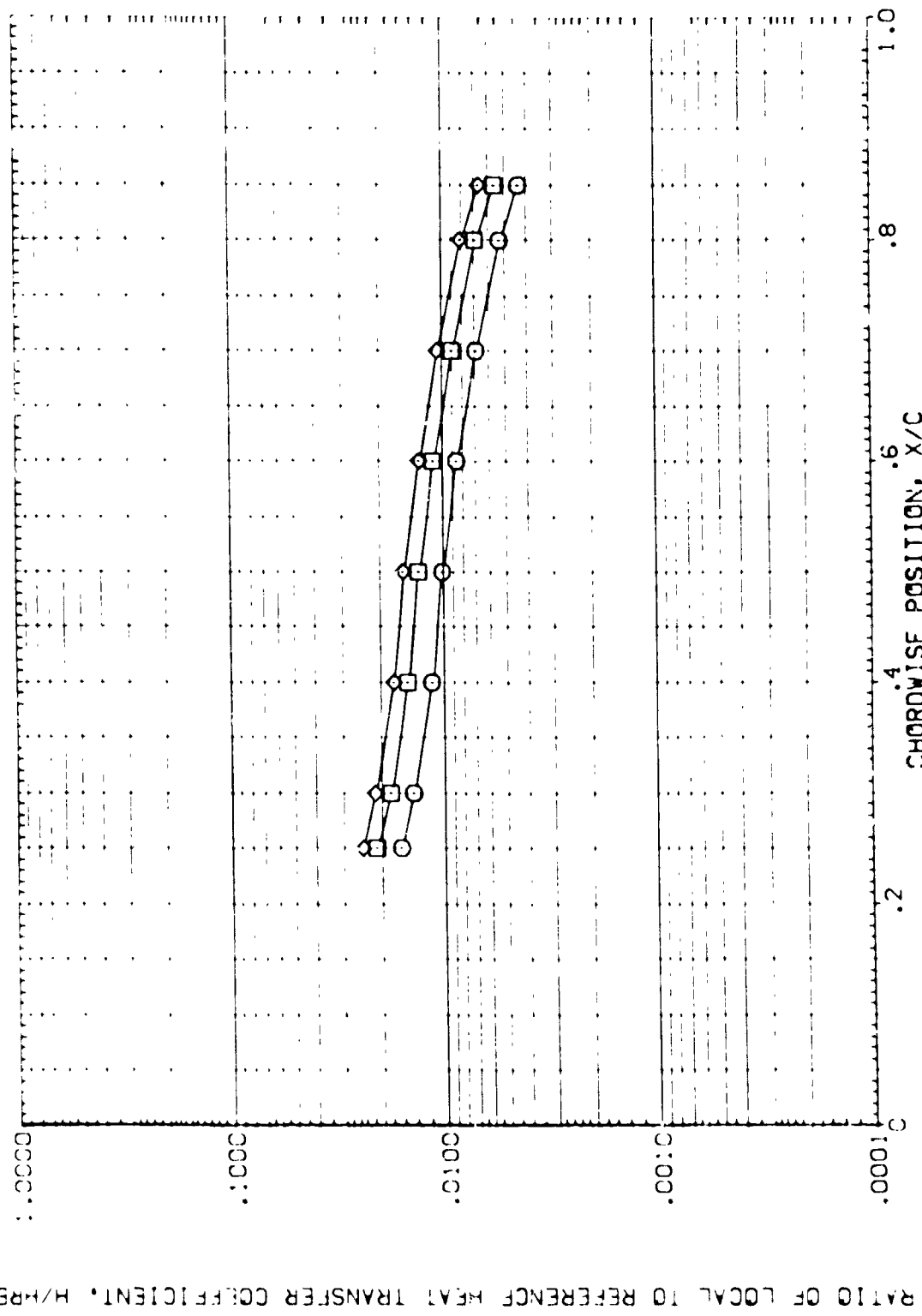


FIG. 22 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, ORBITER WING.

RNY = 5.131 MACH = 5.300 2Y/B = .800 PAGE 188



100.00
10.00
1.00
.10
.01

DATA SET SYMBOL CONFIGURATION DESCRIPTION MAV/HT ALPHA MACH PHI-H

(086/06) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 1.000 -5.000 5.300 .000

(659/06) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) .900 -5.000 5.300 .000

(188/06) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) .850 -5.000 5.300 .000

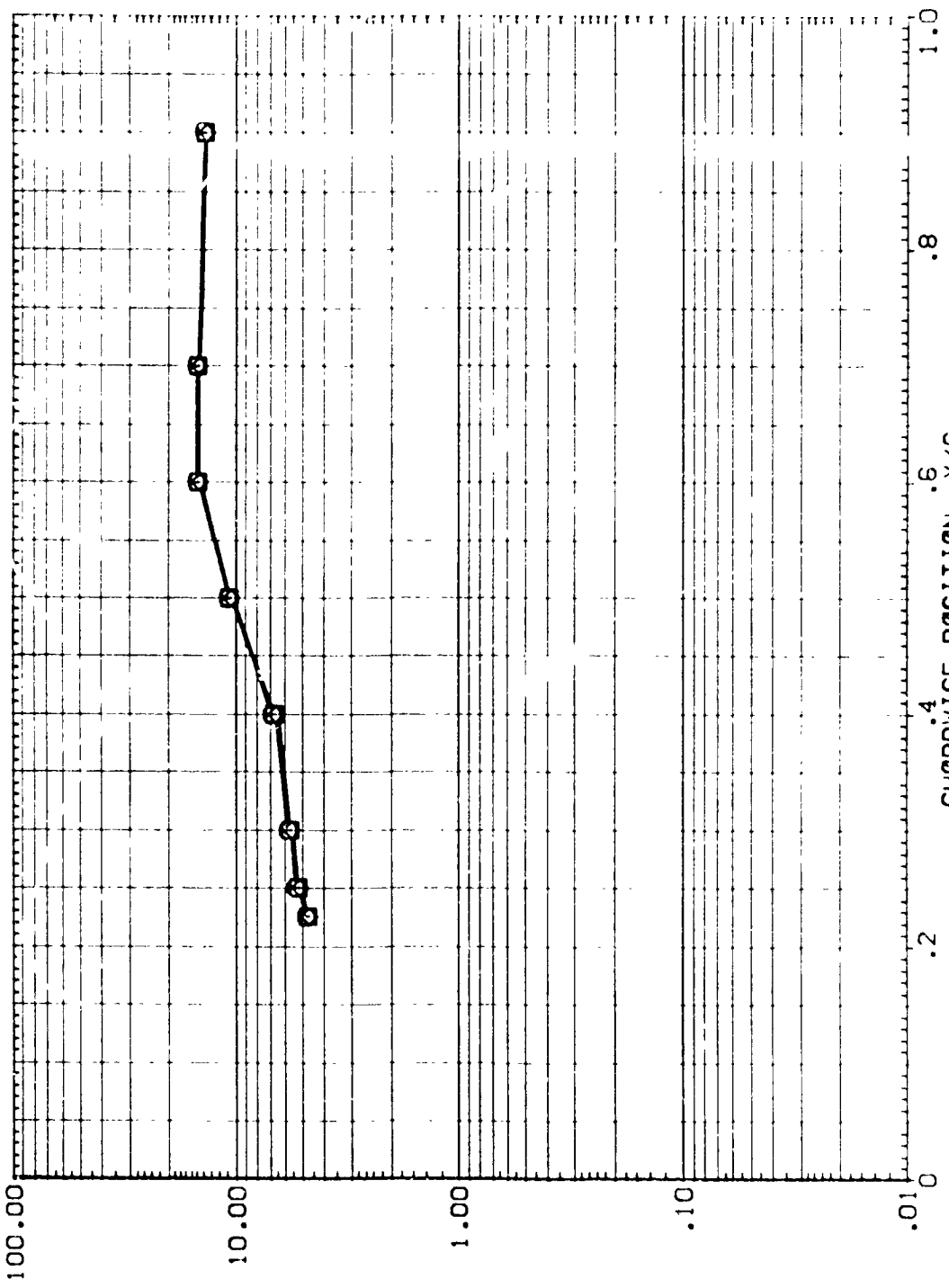


FIG. 23 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., ORBITER WING.
ORN/L = 1.952 MACH = 5.300 2Y/B = .400 P/SE 189

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-M
(ORB*06)	ARC 3.5-172 IHIS ORB + ET +SRB (ORBITER WING)	1.000	-5.000	5.300	.000
(ELB*06)	ARC 3.5-172 IHIS ORB + ET +SRB (ORBITER WING)	.900	-5.000	5.300	.000
(FBU*06)	ARC 3.5-172 IHIS ORB + ET +SRB (ORBITER WING)	.850	-5.000	5.300	.000

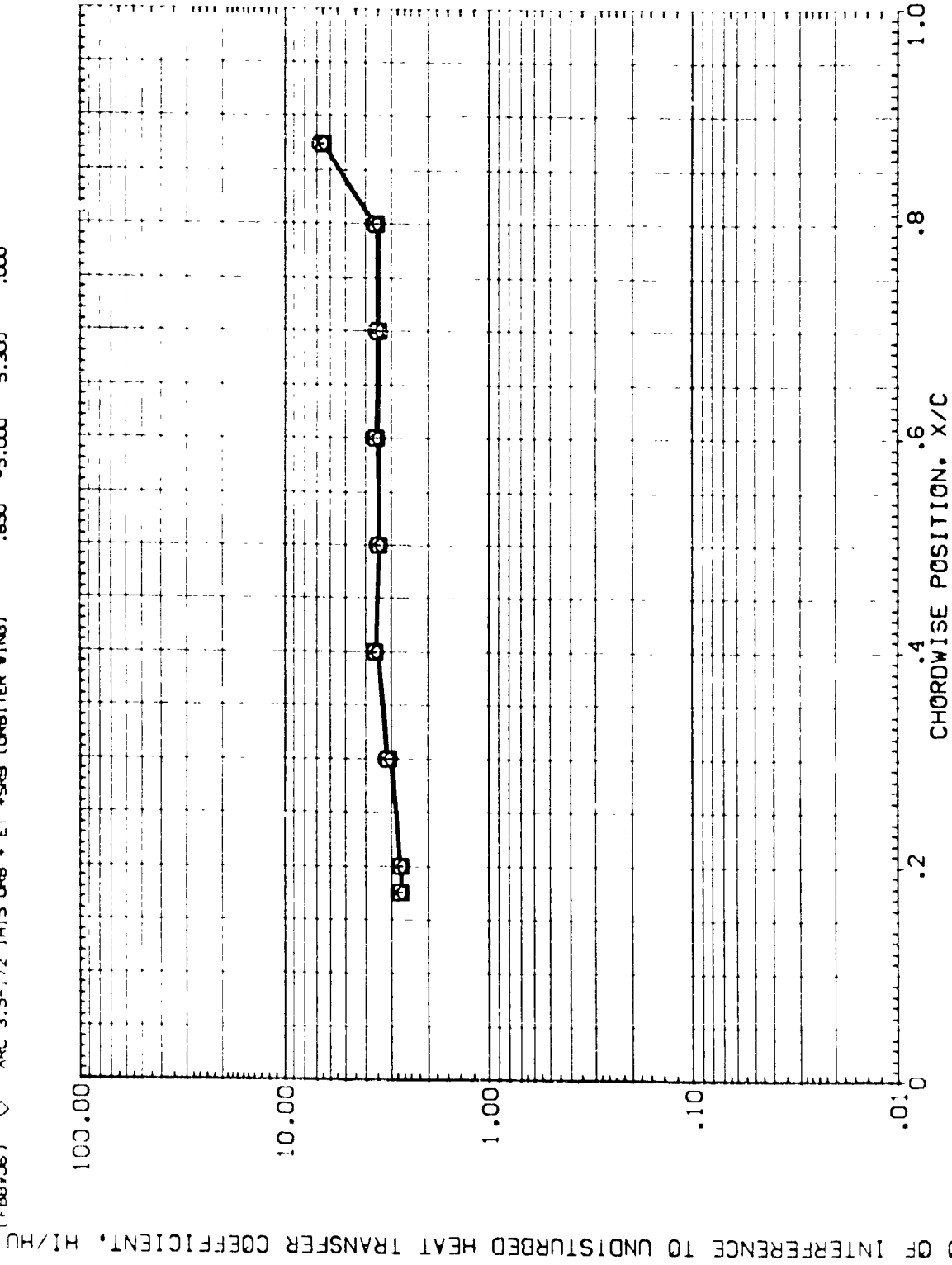


FIG. 23 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., ORBITER WING.
 $\alpha_{RN}/L = 1.952$ MACH = 5.300 $2Y/B = .600$ PAGE 190



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA HAV/HT PHJ-H

(D88V06) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 5.300 -5.000 1.000 .000

(E88V06) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 5.300 -5.000 .900 .000

(F88V06) ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER WING) 5.300 -5.000 .850 .000

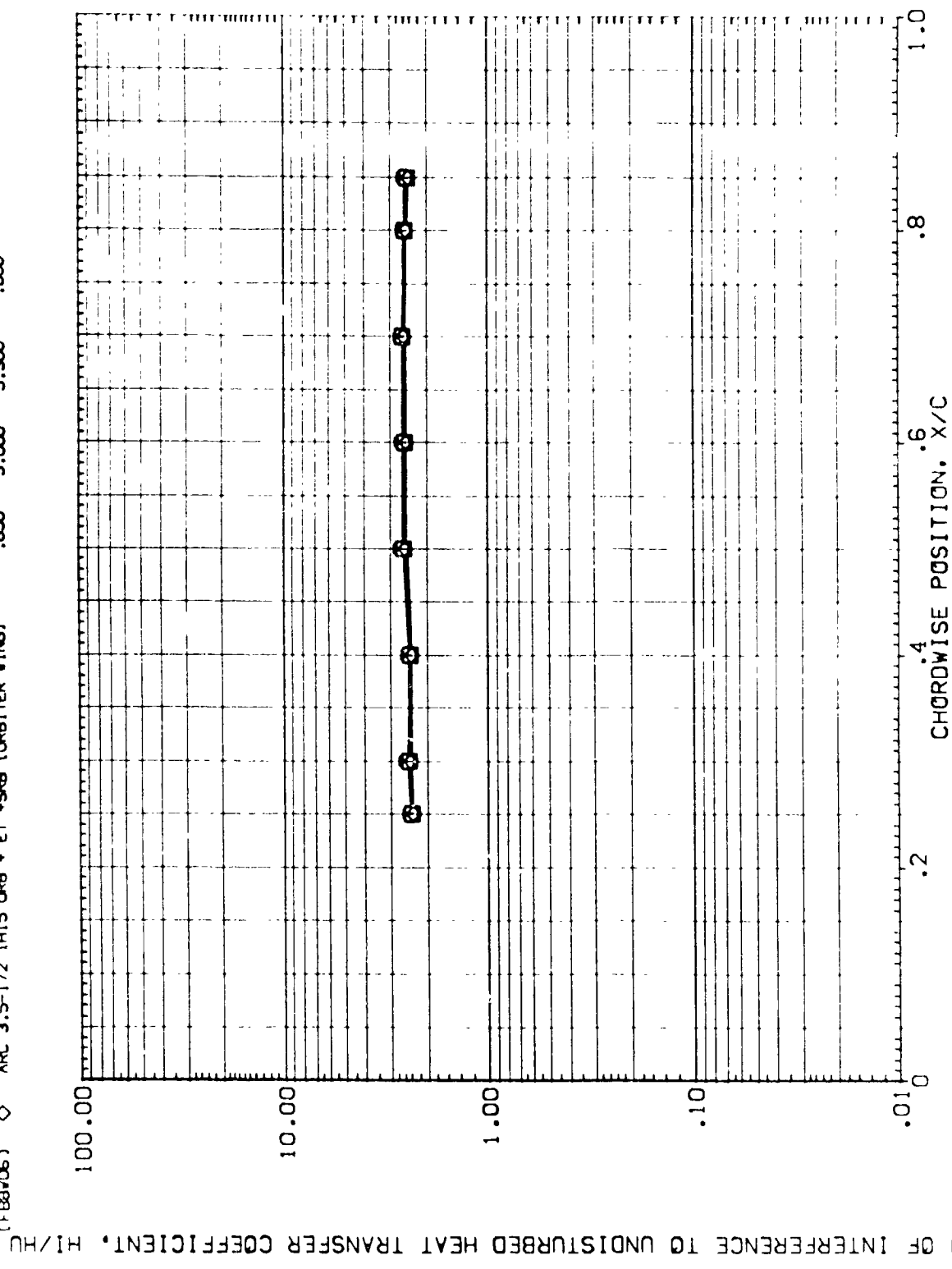


FIG. 23 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., ORBITER WING.
 ORN/L = 1.952 MACH = 5.300 2Y/B = .800 P 5E 191

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	WINDSHIELD	HAW/HT	ALPHA	MACH	PHI-H
(E88C01)	ARC 3.5-172 IH15 ORBITER	(WINDSHIELD)	1.000	.000	5.300	.000
(A88C01)	ARC 3.5-172 IH15 ORBITER	(WINDSHIELD)	.900	.000	5.300	.000
(E88C01)	ARC 3.5-172 IH15 ORBITER	(WINDSHIELD)	1.000	.000	5.300	.000
(E88C03)	DATA NOT AVAILABLE		.900	.000	5.300	.000
(A88C03)	DATA NOT AVAILABLE		.850	.000	5.300	.000
(E88C03)	DATA NOT AVAILABLE		.850	.000	5.300	.000

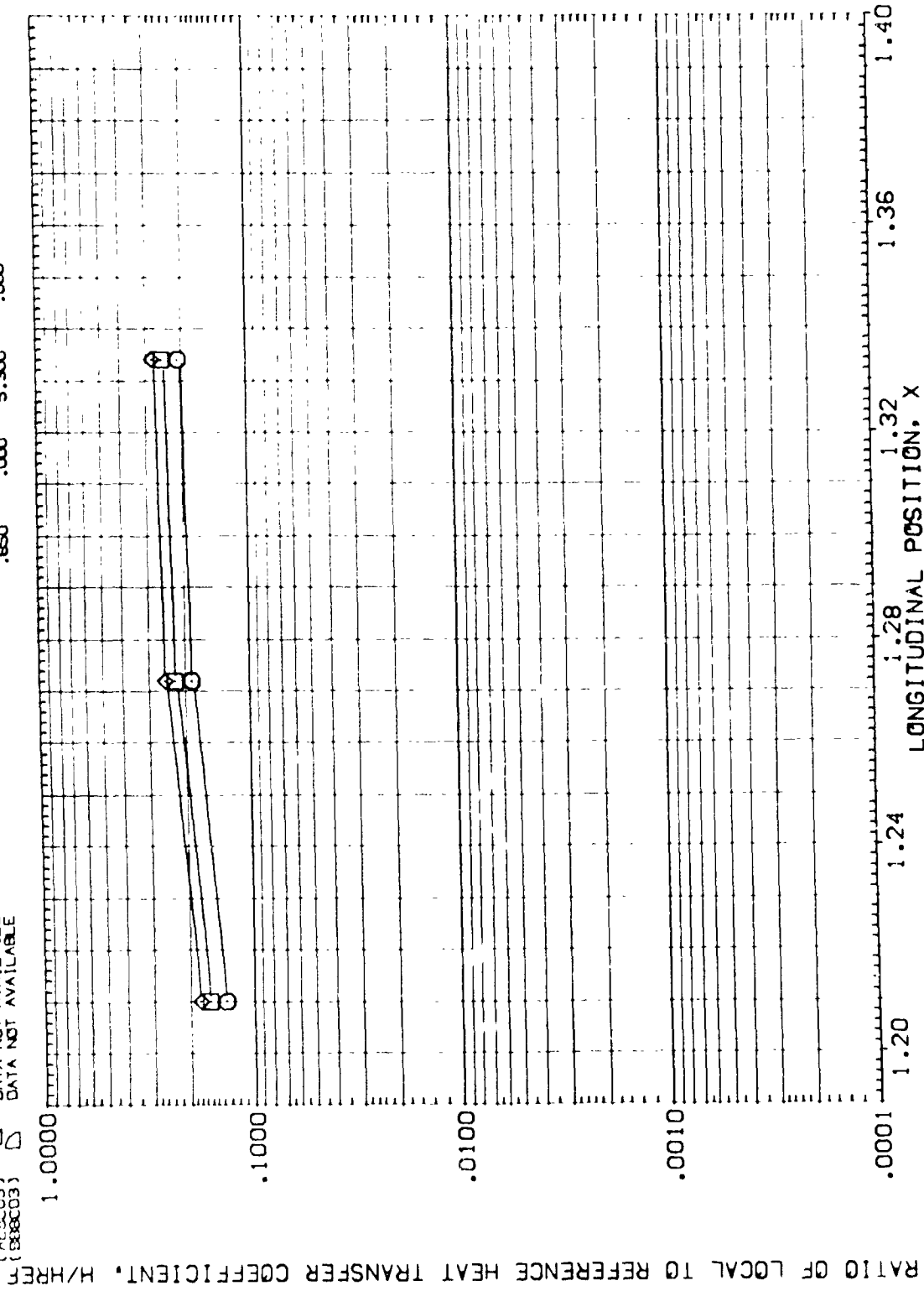


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 1.764 MACH = 5.300 Y = .047 PAGE 192



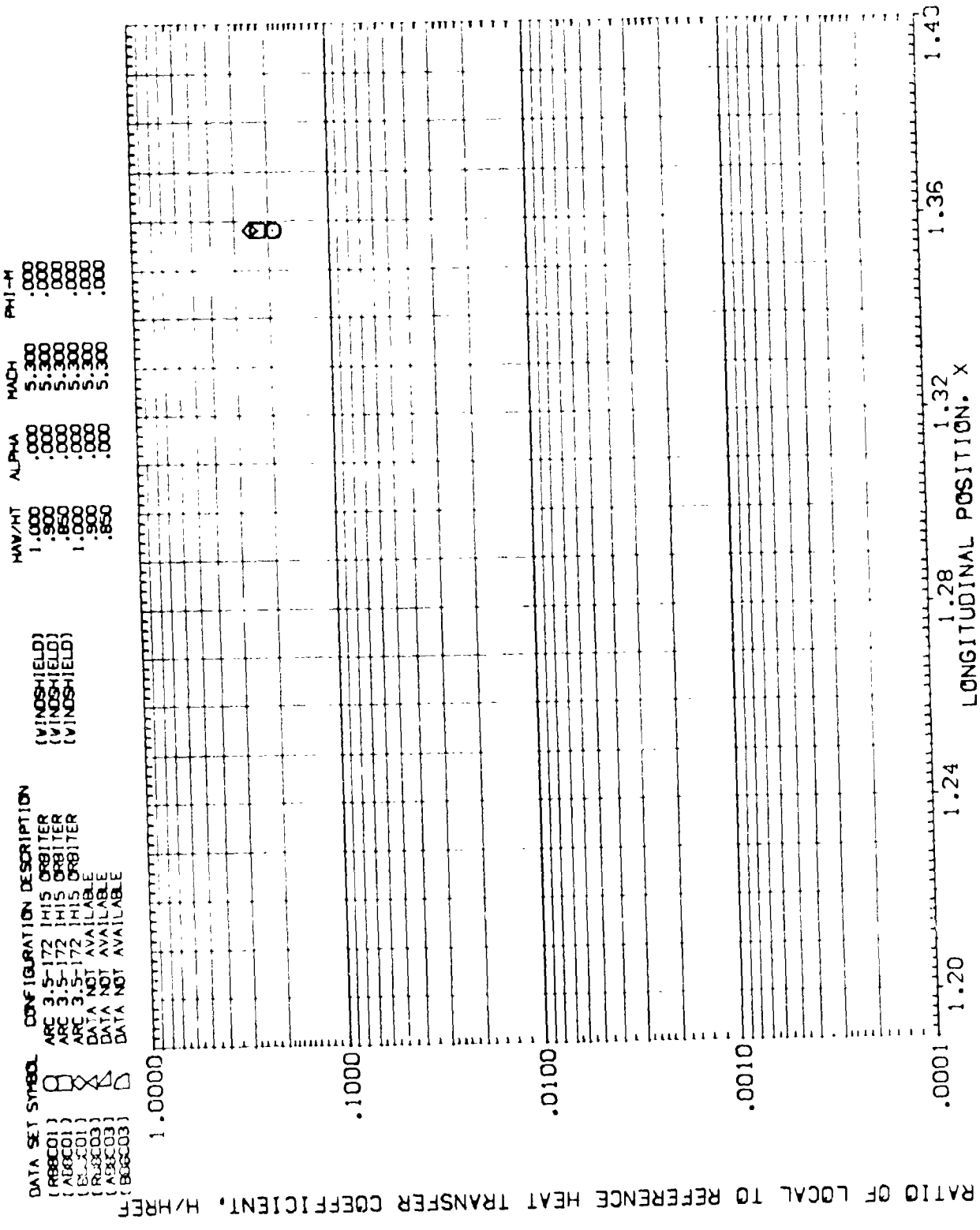


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88C01) ARC 3-5-172 IH15 ORBITTER
 (A88C01) ARC 3-5-172 IH15 ORBITTER
 (P88C01) ARC 3-5-172 IH15 ORBITTER
 (Y88C03) DATA NOT AVAILABLE
 (A88C03) DATA NOT AVAILABLE
 (R88C03) DATA NOT AVAILABLE

(WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)

MAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

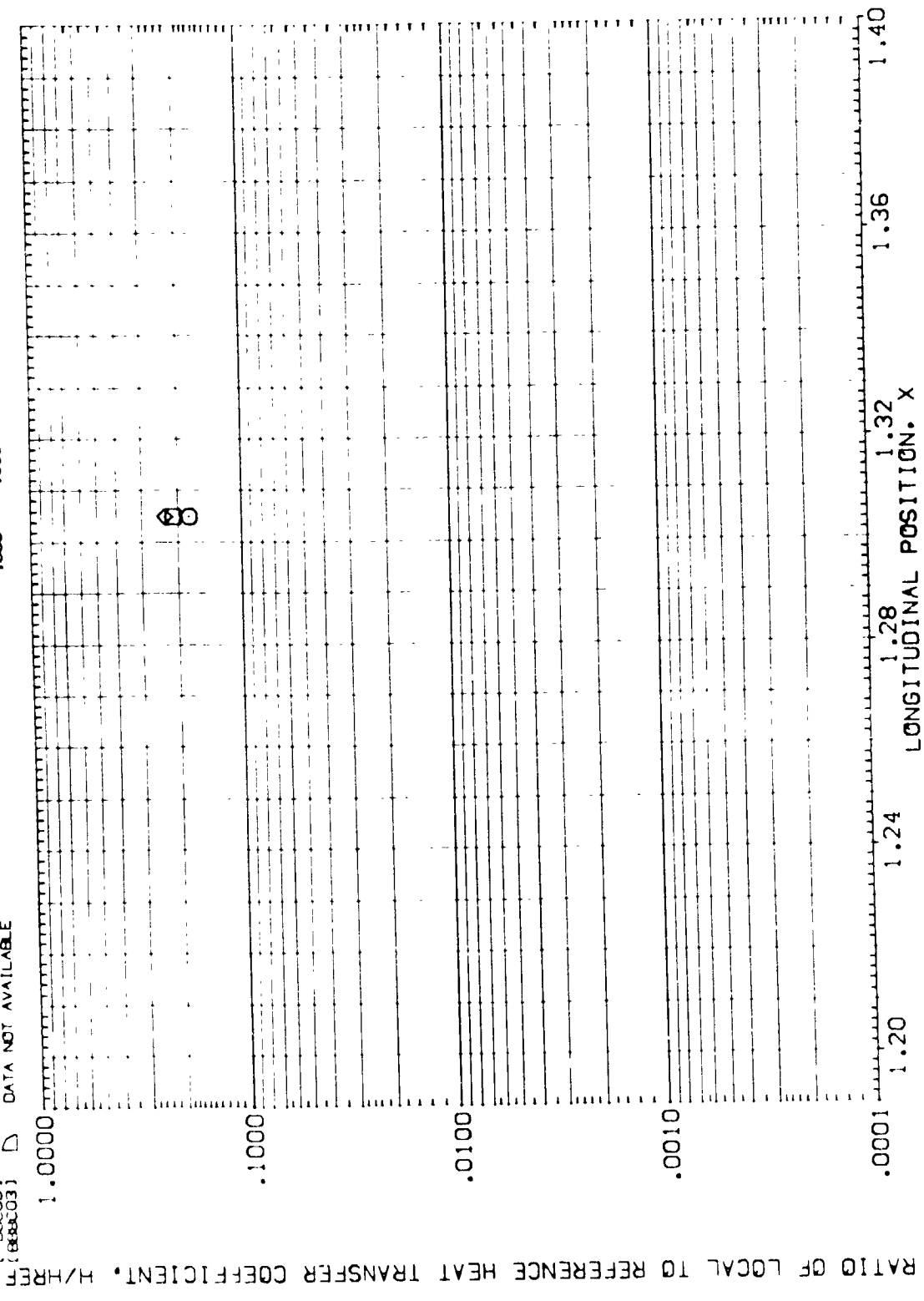


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 1.764 MACH = 5.300 Y = .196 PAGE 194



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88C01) ARC 3.5-172 IH15 ORBITER
 (A88C01) ARC 3.5-172 IH15 ORBITER
 (B88C01) ARC 3.5-172 IH15 ORBITER
 (C88C01) DATA NOT AVAILABLE
 (R88C03) DATA NOT AVAILABLE
 (A88C03) DATA NOT AVAILABLE
 (B88C03) DATA NOT AVAILABLE

(WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)

MACH ALPHA MAV/HT PHI-X
 5.300 .000 1.000 .000
 5.300 .000 .850 .000
 5.300 .000 1.000 .000
 5.300 .000 .850 .000

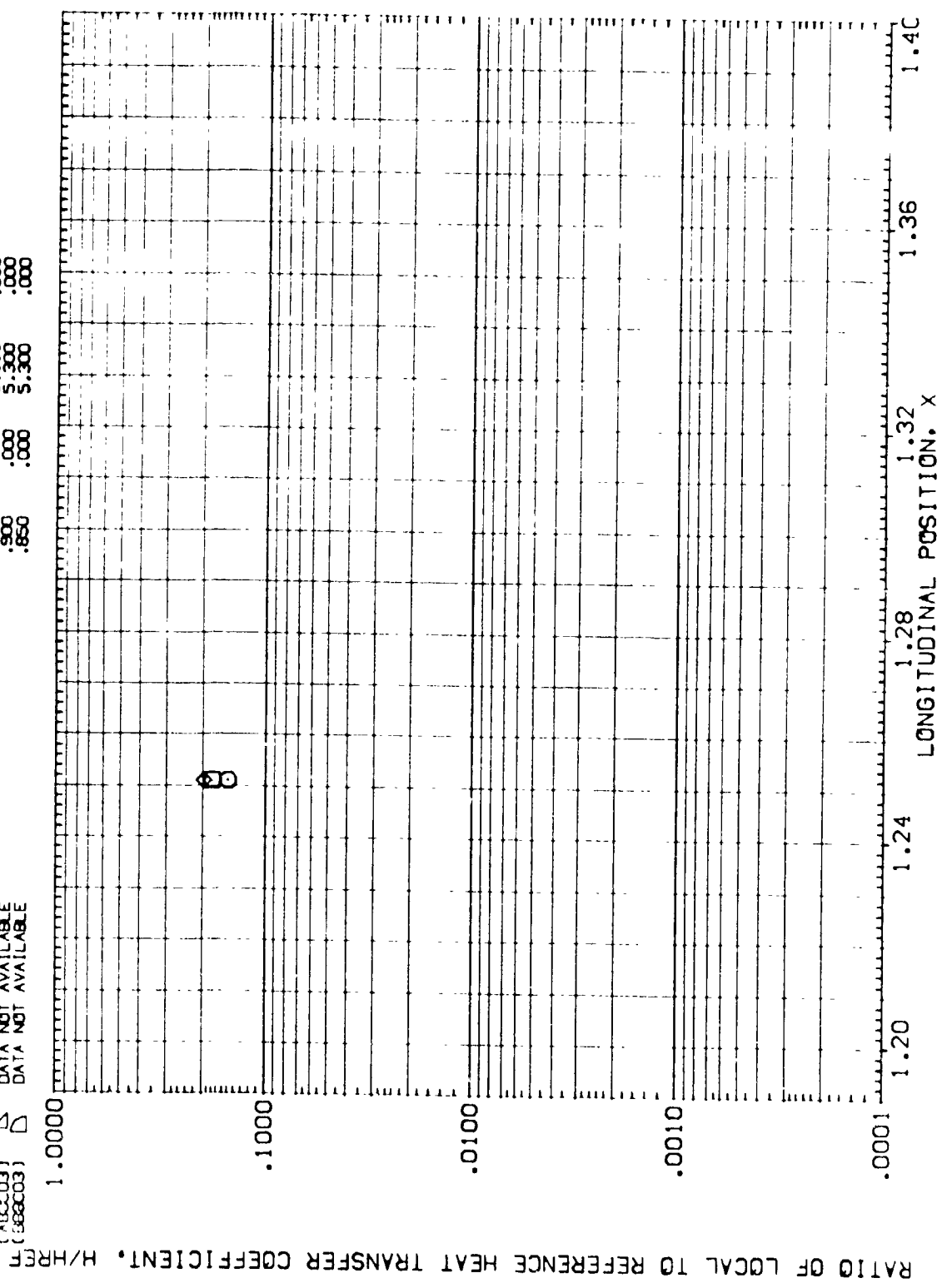


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
[R00001]	DATA NOT AVAILABLE	1.000	.000	5.300	.000
[A00001]	DATA NOT AVAILABLE	.850	.000	5.300	.000
[S00001]	DATA NOT AVAILABLE	1.000	.000	5.300	.000
[R00003]	ARC 3.5-172 IHIS DRB + ET	.900	.000	5.300	.000
[A00003]	ARC 3.5-172 IHIS DRB + ET	.850	.000	5.300	.000
[B00003]	ARC 3.5-172 IHIS DRB + ET	.850	.000	5.300	.000

(WINDSHIELD)
(WINDSHIELD)
(WINDSHIELD)

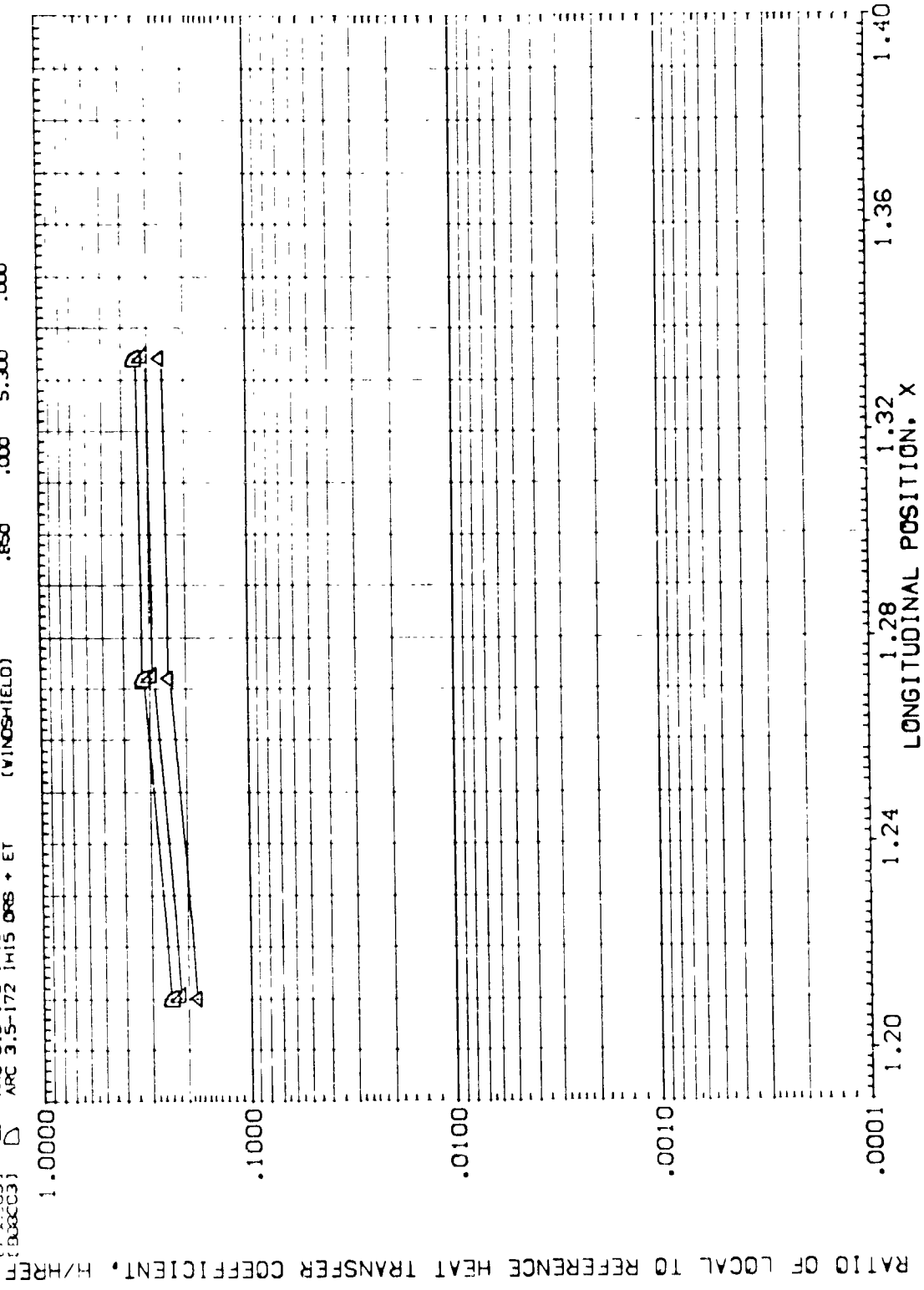


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.332 MACH = 5.300 Y = .047 PAGE 196



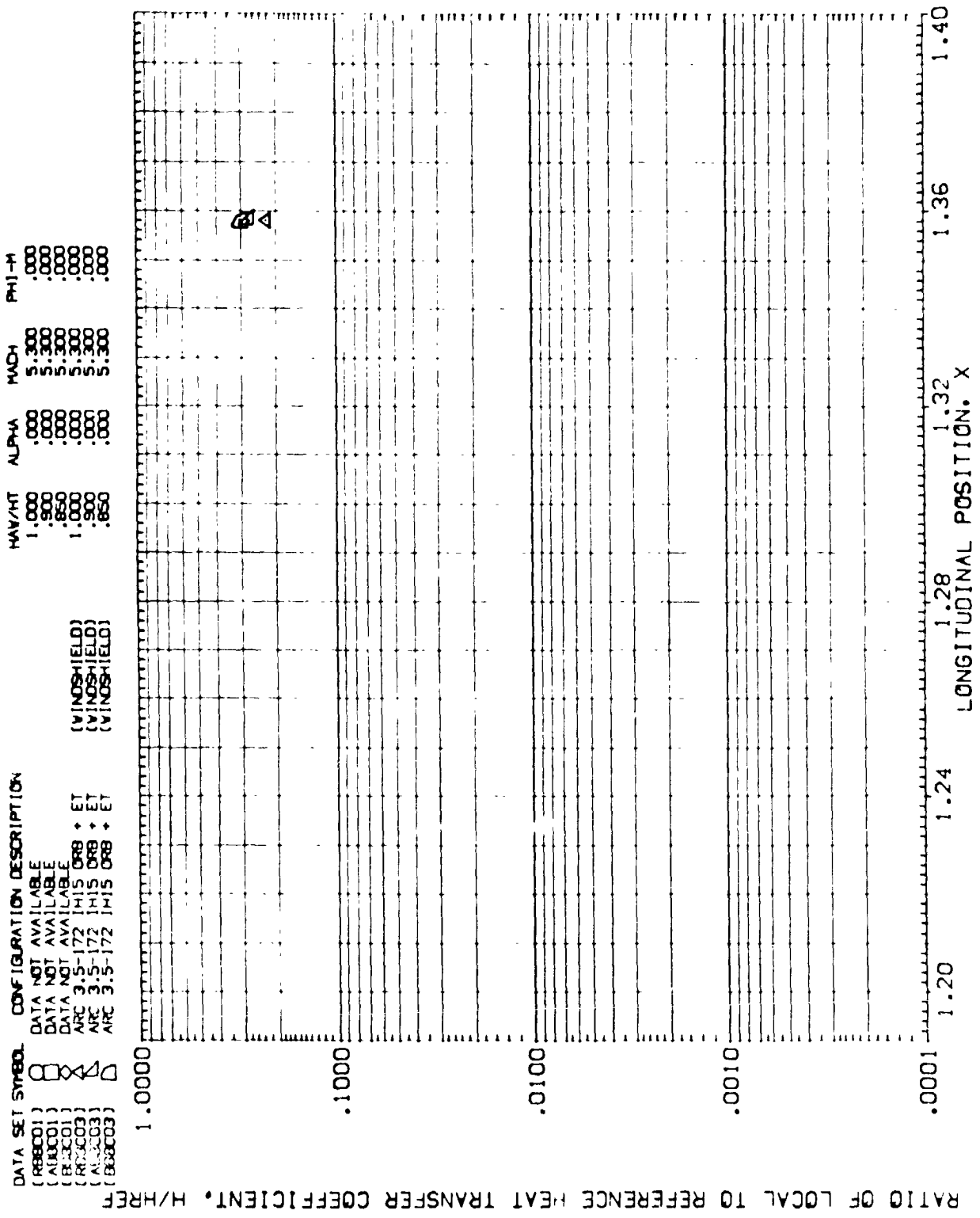


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHJ-M

(R86C01) DATA NOT AVAILABLE 1.000 .000 5.300 .000

(A86C01) DATA NOT AVAILABLE .500 .000 5.300 .000

(R86C03) DATA NOT AVAILABLE .850 .000 5.300 .000

(A86C03) ARC 3.5-172 I-15 OR8 + ET 1.000 .000 5.300 .000

(R86C03) ARC 3.5-172 I-15 OR8 + ET .900 .000 5.300 .000

(A86C03) ARC 3.5-172 I-15 OR8 + ET .850 .000 5.300 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

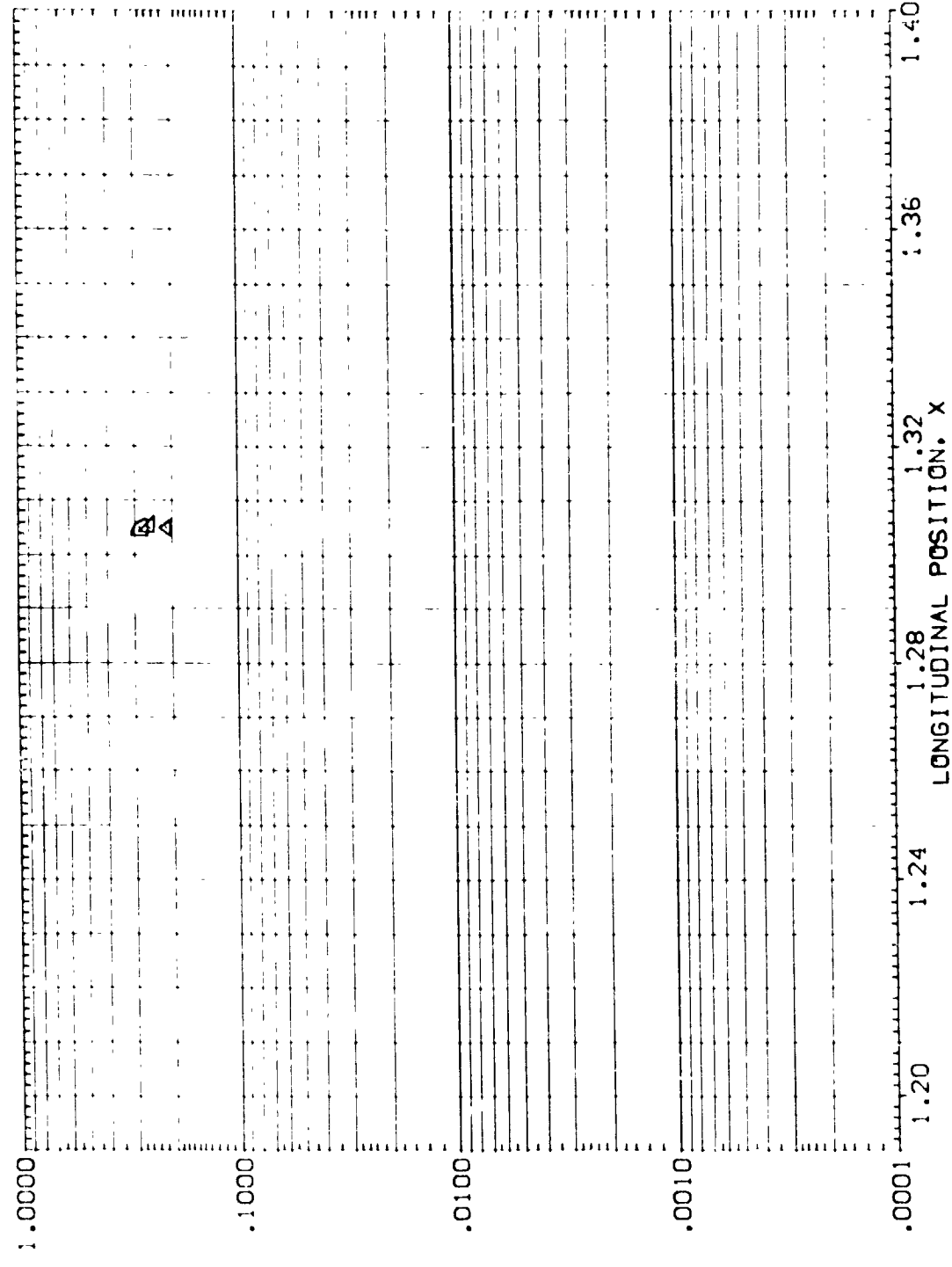


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.332 MACH = 5.300 Y = .196 PAGE 198



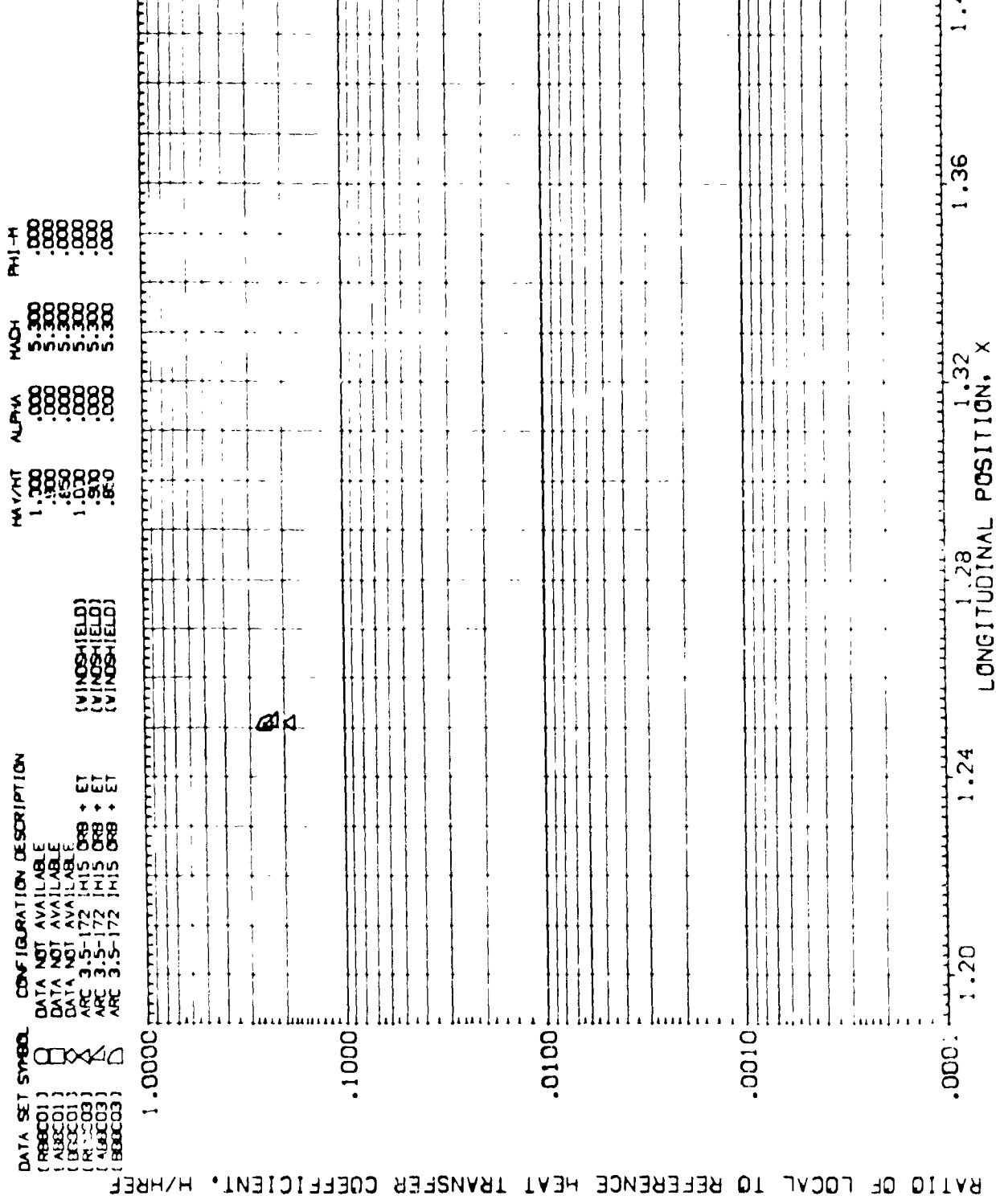


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAW/HT ALPHA MACH PHI-H

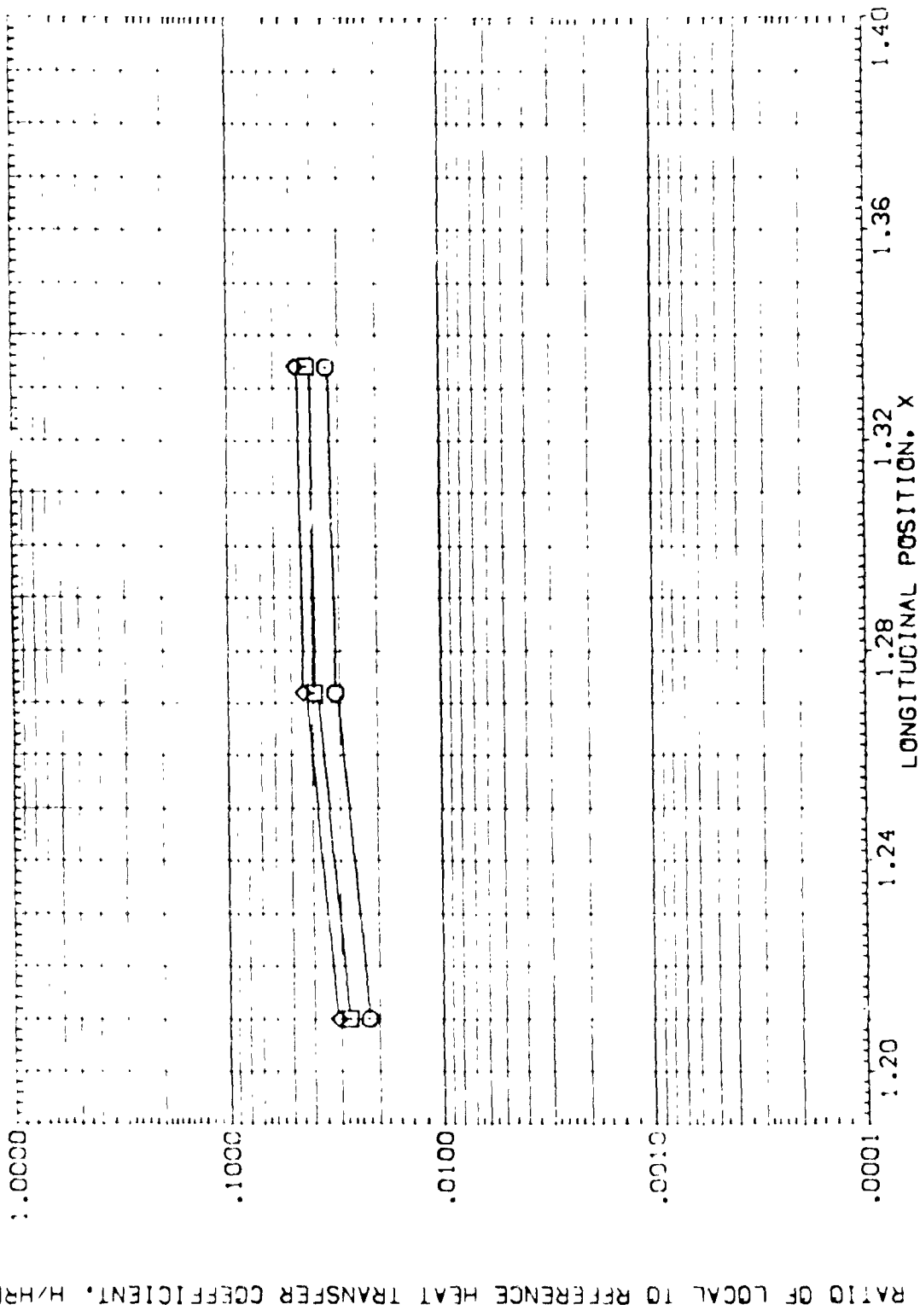


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 5.214 MACH = 5.300 Y = .047 PAGE 200



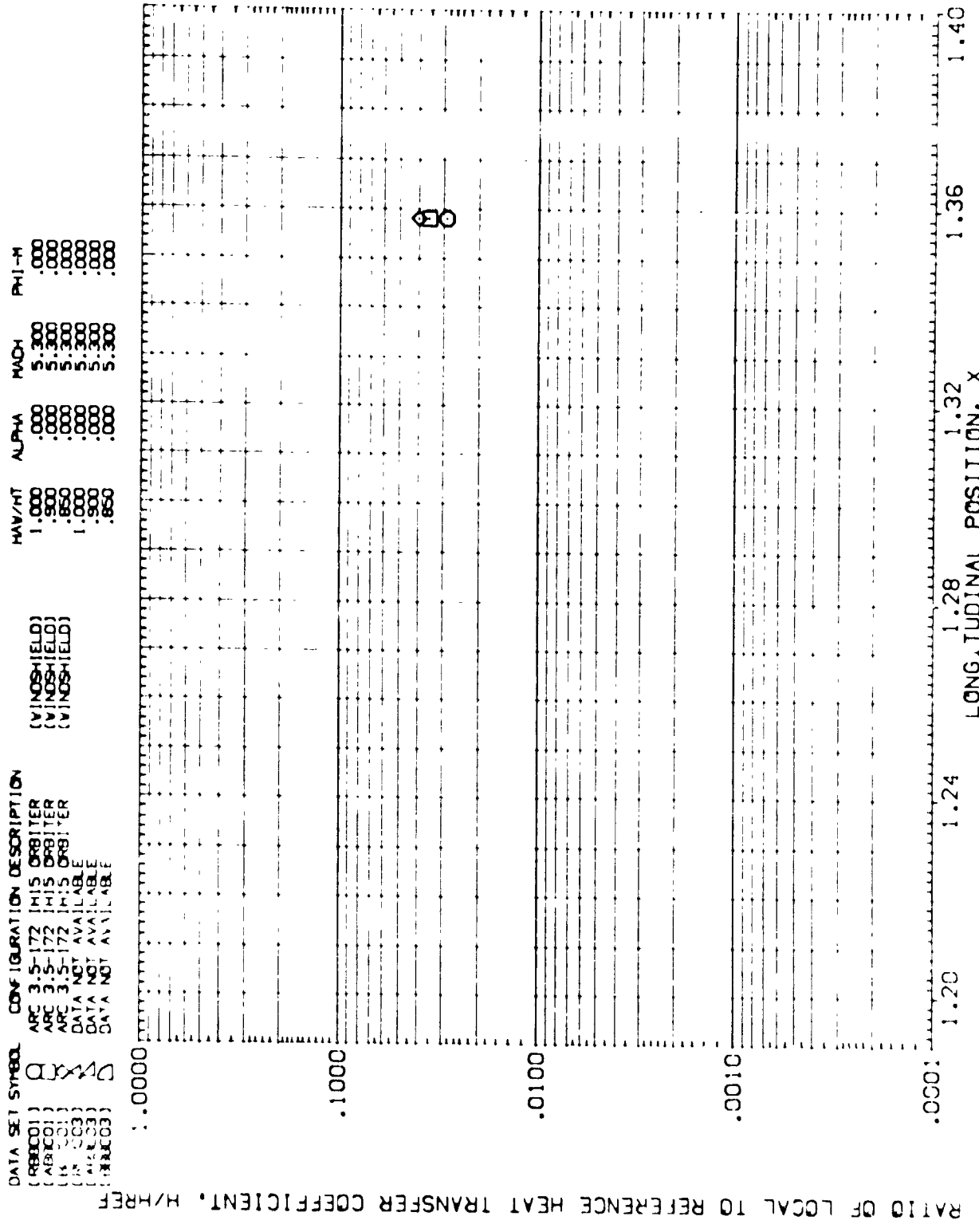


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD

R_{N/L} = 5.2:4 MACH = 5.300 Y = .178 P 3E 201

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (ARC) 3.5-172 (MIS) (DR) TER
 (ARC) 3.5-172 (MIS) (DR) TER
 (ARC) 3.5-172 (MIS) (DR) TER
 (ARC) 3.5-172 (MIS) (DR) TER
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

(WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)

HAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .800 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

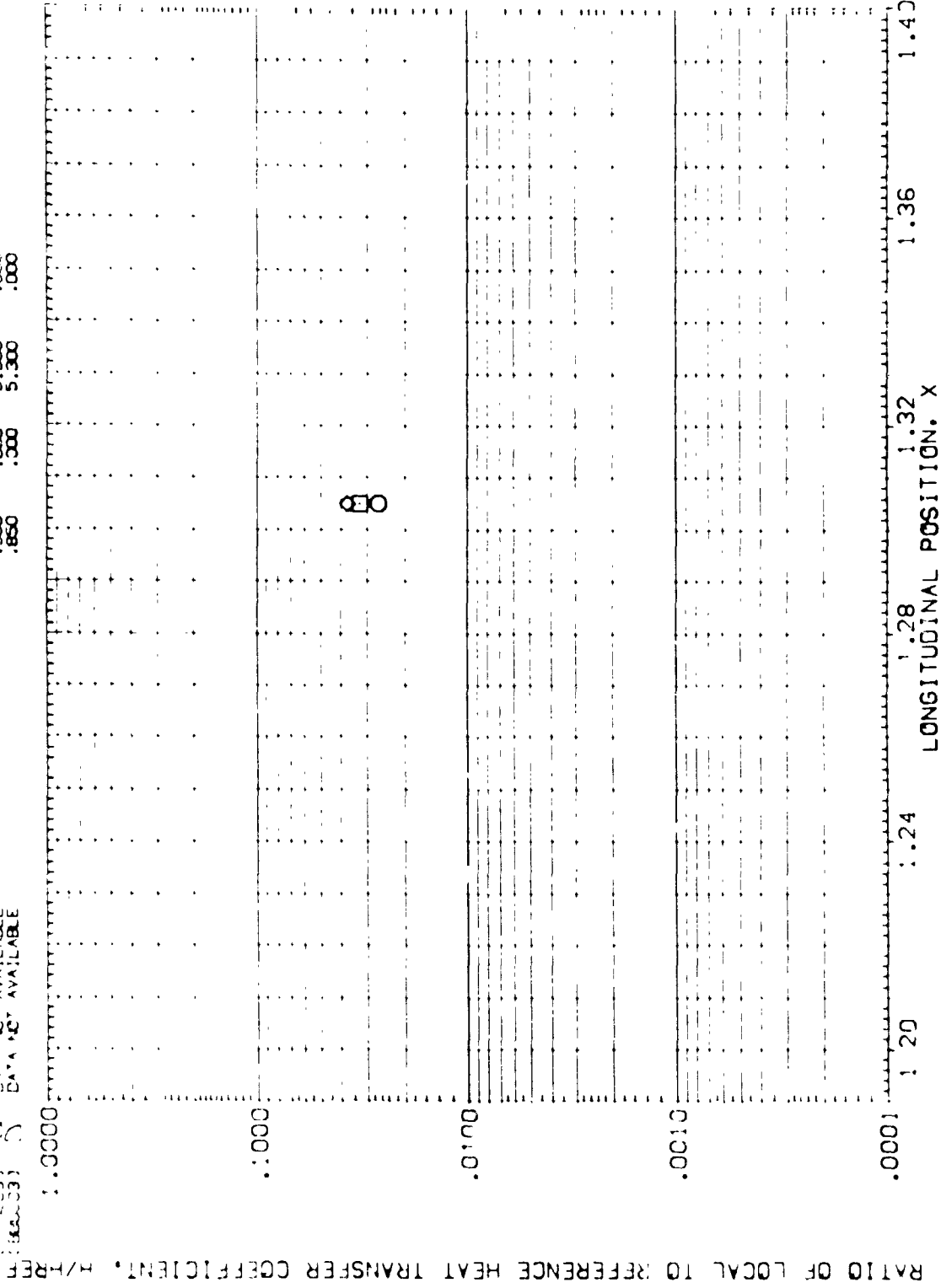


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

Re/ρL = 5.214 MACH = 5.300 γ = .196 PAGE 202

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R86C01) ARC 3.5-172 IH15 ORBITER
 (A86C01) ARC 3.5-172 IH15 ORBITER
 (B86C01) ARC 3.5-172 IH15 ORBITER
 (R86C03) DATA NOT AVAILABLE
 (A86C03) DATA NOT AVAILABLE
 (B86C03) DATA NOT AVAILABLE

(WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)
 HAV/HT ALPHA MACH PHI-HI
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

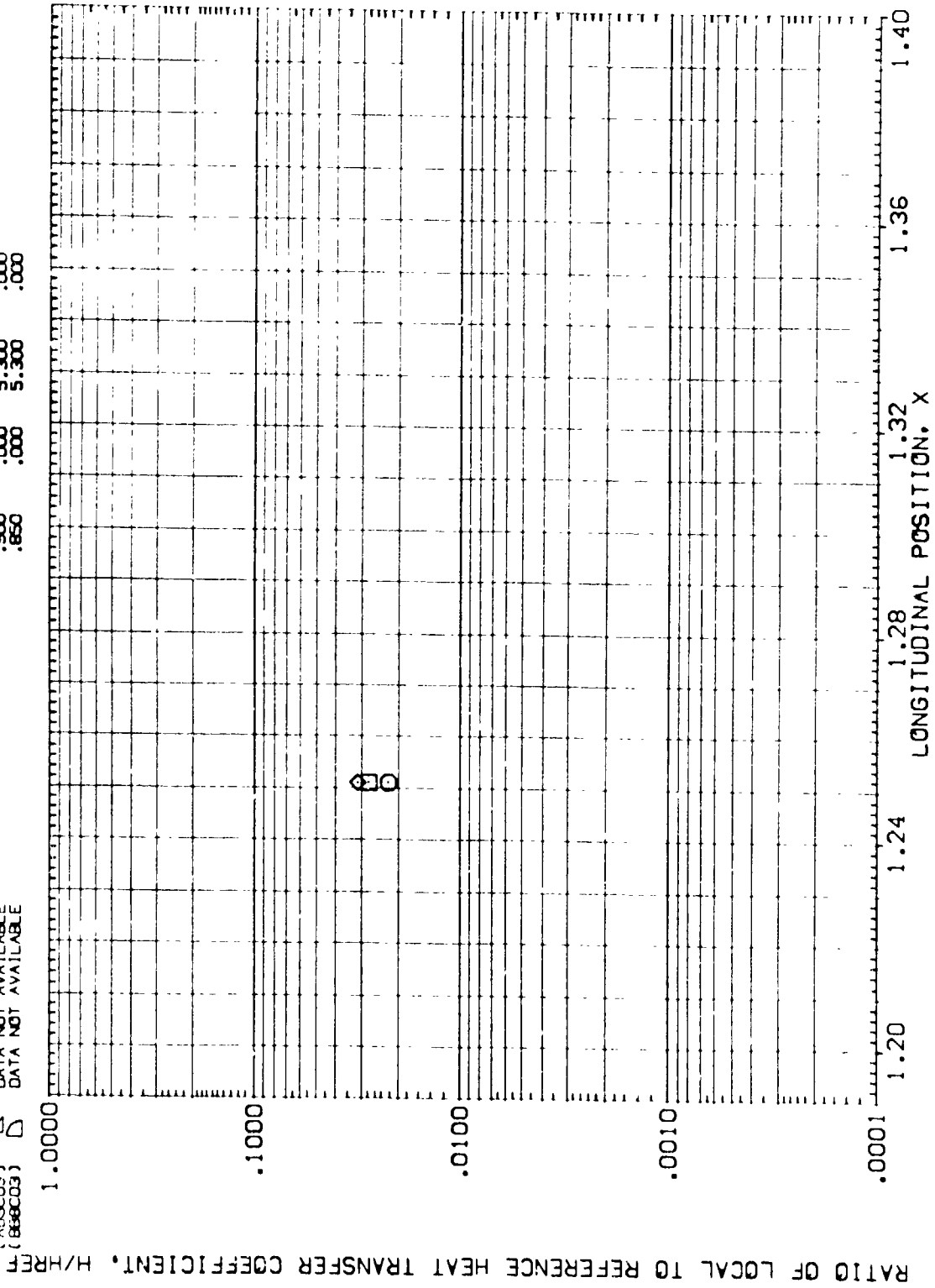


FIG. 24 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL
 (085001)
 (A15001)
 (A15002)
 (A15003)
 (A15004)
 (A15005)

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 DRB1TER
 ARC 3.5-172 IH15 DRB1TER
 ARC 3.5-172 IH15 DRB1TER
 ARC 3.5-172 IH15 DRB1TER + ET +SRB
 ARC 3.5-172 IH15 DRB1TER + ET +SRB
 ARC 3.5-172 IH15 DRB1TER + ET +SRB

HAY/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

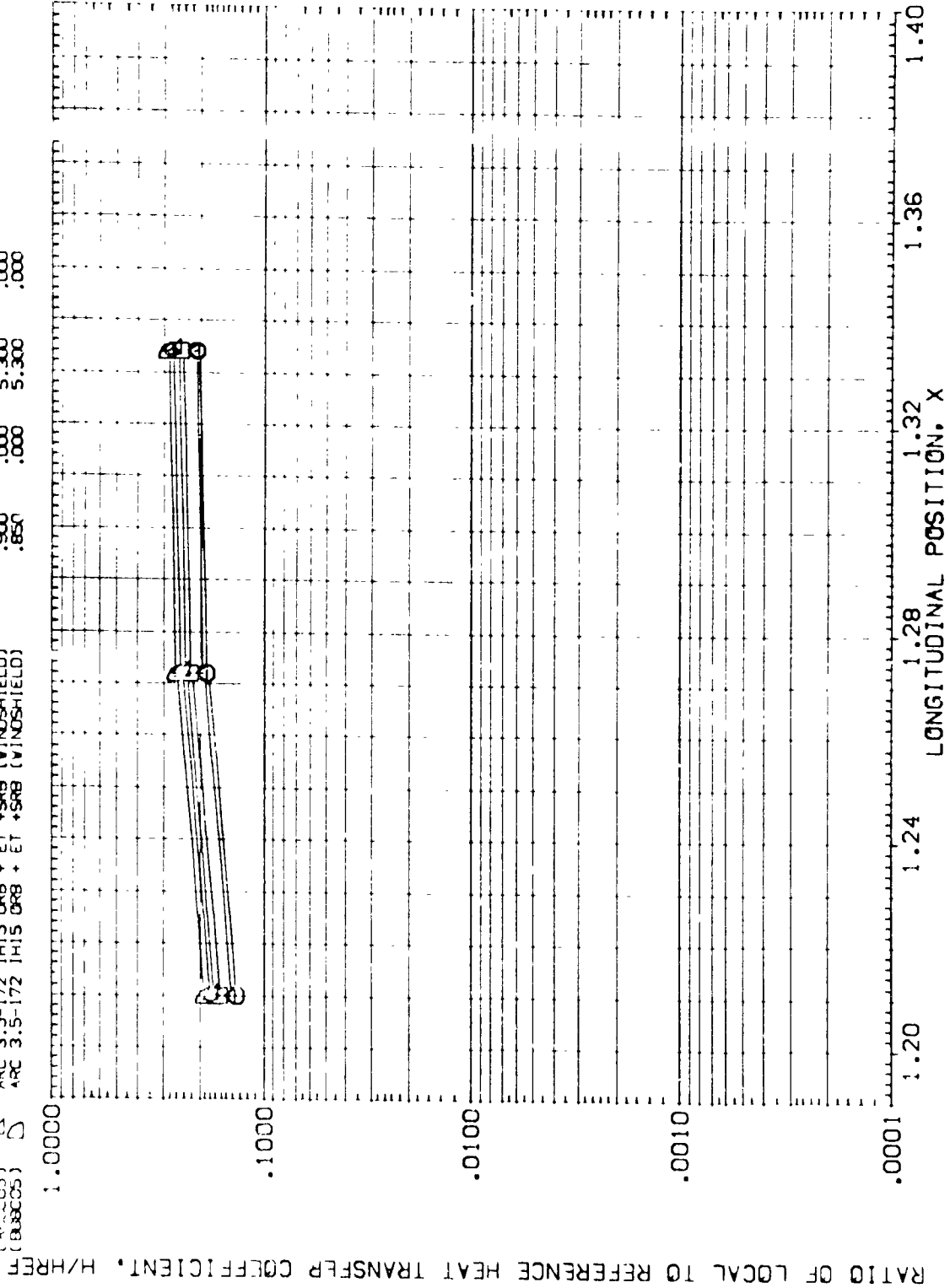


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 1.764 MACH = 5.300 Y = .047

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	WINDSHIELD	MAV/HT	ALPHA	MACH	PHI-H
(R88C01)	ARC 3.5-172 IH15 DRB|TER	(WINDSHIELD)	1.000	.000	5.300	.000
(A88C01)	ARC 3.5-172 IH15 DRB|TER	(WINDSHIELD)	.900	.000	5.300	.000
(B88C01)	ARC 3.5-172 IH15 DRB|TER	(WINDSHIELD)	.850	.000	5.300	.000
(R1J005)	ARC 3.5-172 IH15 DRB + ET +SR8	(WINDSHIELD)	1.000	.000	5.300	.000
(A1B005)	ARC 3.5-172 IH15 DRB + ET +SR8	(WINDSHIELD)	.900	.000	5.300	.000
(B88C05)	ARC 3.5-172 IH15 DRB + ET +SR8	(WINDSHIELD)	.850	.000	5.300	.000

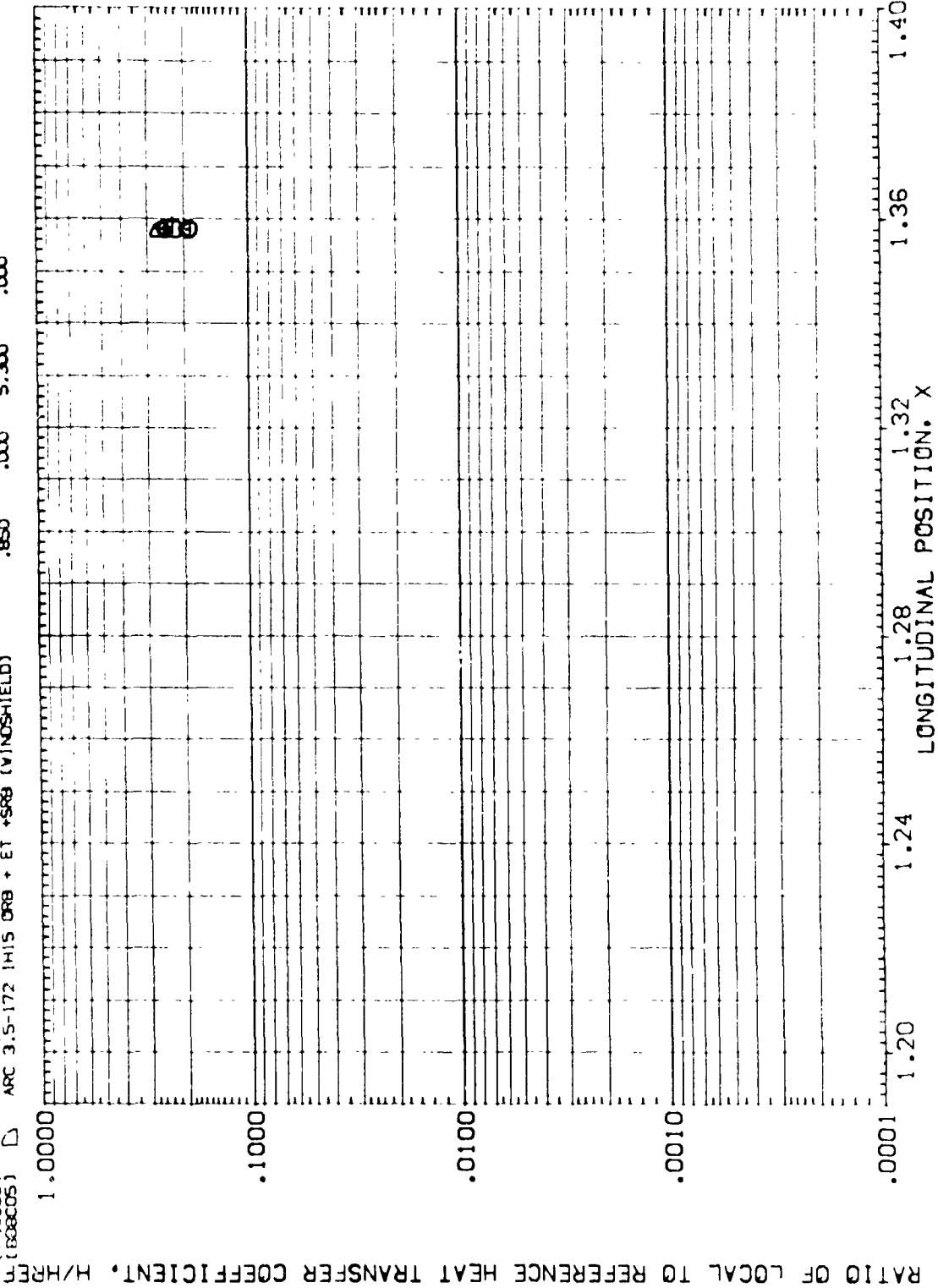


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 1.764 MACH = 5.300 Y = .178 PAGE 205

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAW/HT	ALPHA	MACH	PHI-M
(R88001)	ARC 3.5-172 IH15 ORBITER (WINDSHIELD)	1.000	.000	5.300	.000
(A88001)	ARC 3.5-172 IH15 ORBITER (WINDSHIELD)	.900	.000	5.300	.000
(R12001)	ARC 3.5-172 IH15 ORBITER (WINDSHIELD)	.850	.000	5.300	.000
(A12001)	ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)	1.000	.000	5.300	.000
(R13001)	ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)	.900	.000	5.300	.000
(A13001)	ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)	.850	.000	5.300	.000

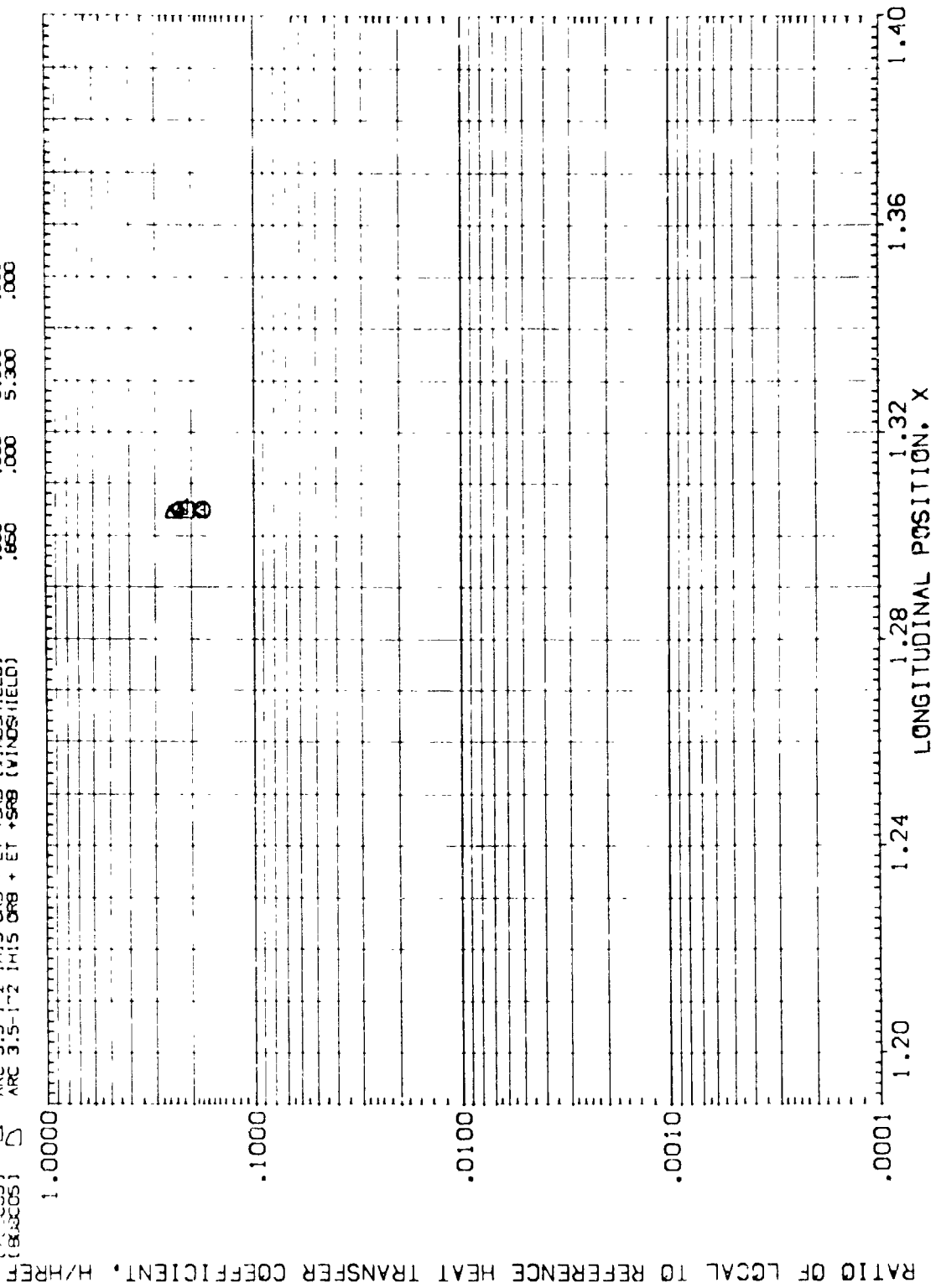


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 1.764 MACH = 5.300 Y = .196 PAGE 206



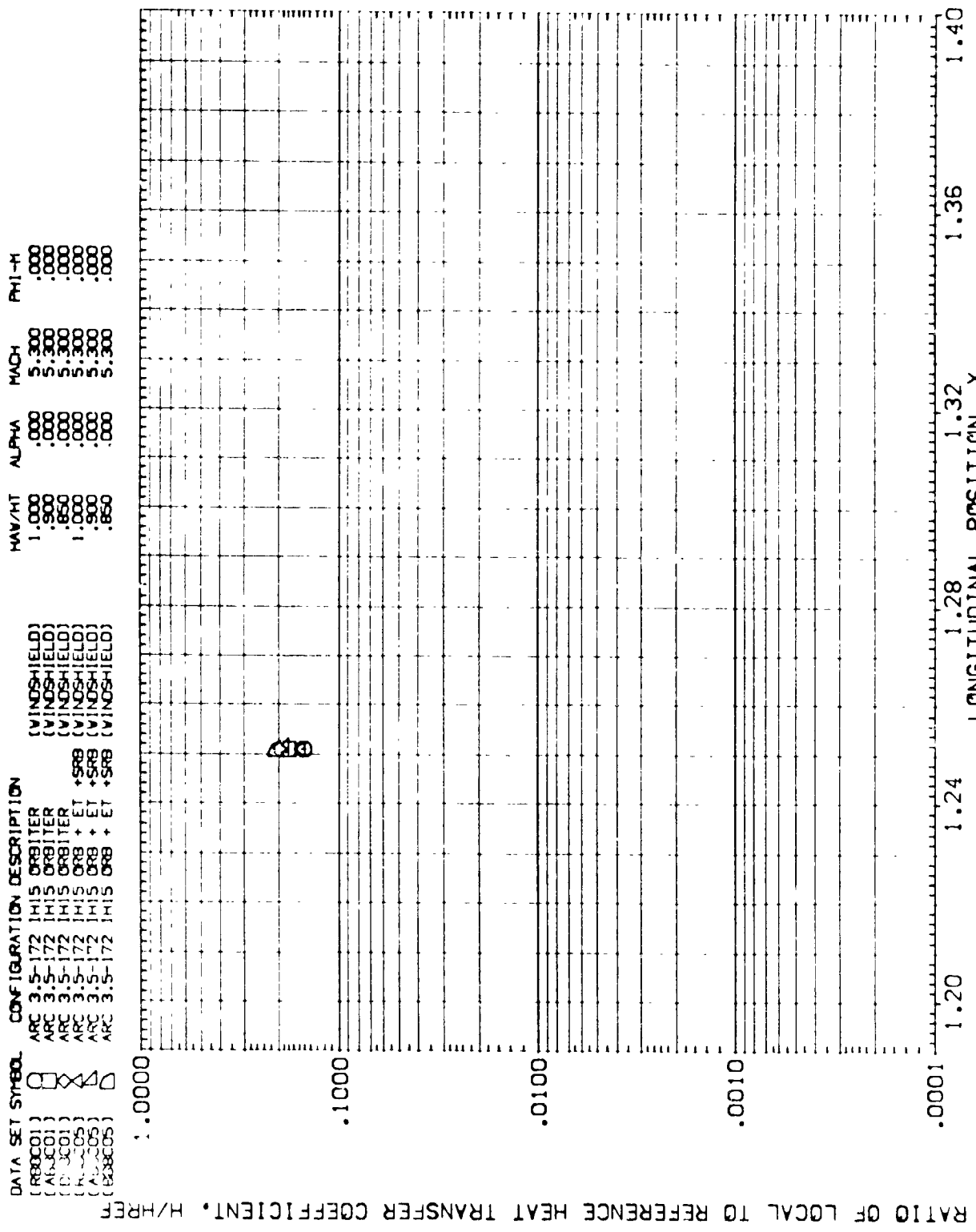


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 1.764 MACH = 5.300 Y = .213 LONGITUDINAL POSITION, X

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88C01) DATA NOT AVAILABLE
 (A88C01) DATA NOT AVAILABLE
 (E88C01) DATA NOT AVAILABLE
 (R88C05) ARC 3.5-172 (HIS ORB + ET +SRB (WINDSHIELD)
 (A88C05) ARC 3.5-172 (HIS ORB + ET +SRB (WINDSHIELD)
 (E88C05) ARC 3.5-172 (HIS ORB + ET +SRB (WINDSHIELD)

HAW/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

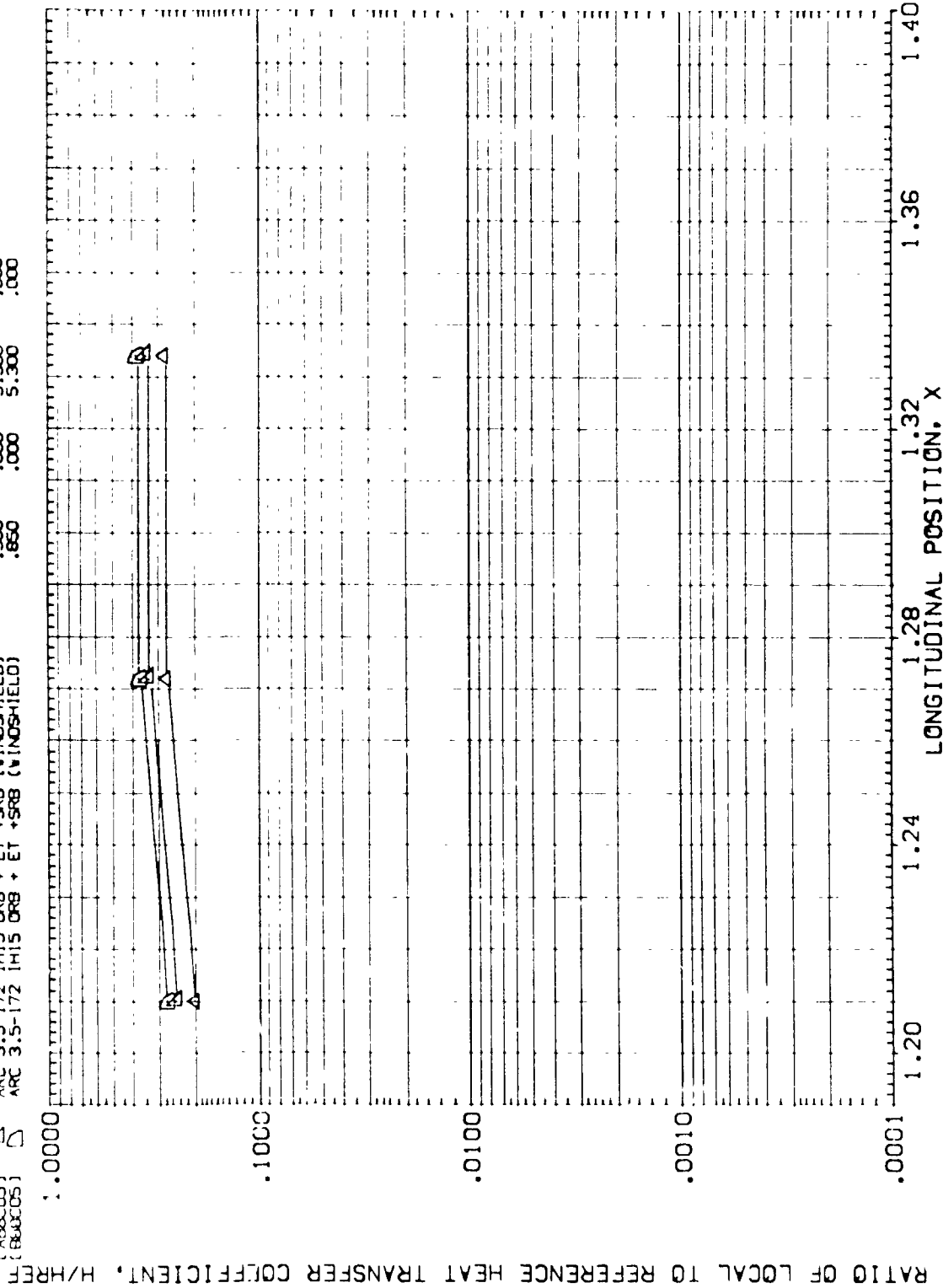


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.437 MACH = 5.300 Y = .047 PAGE 208



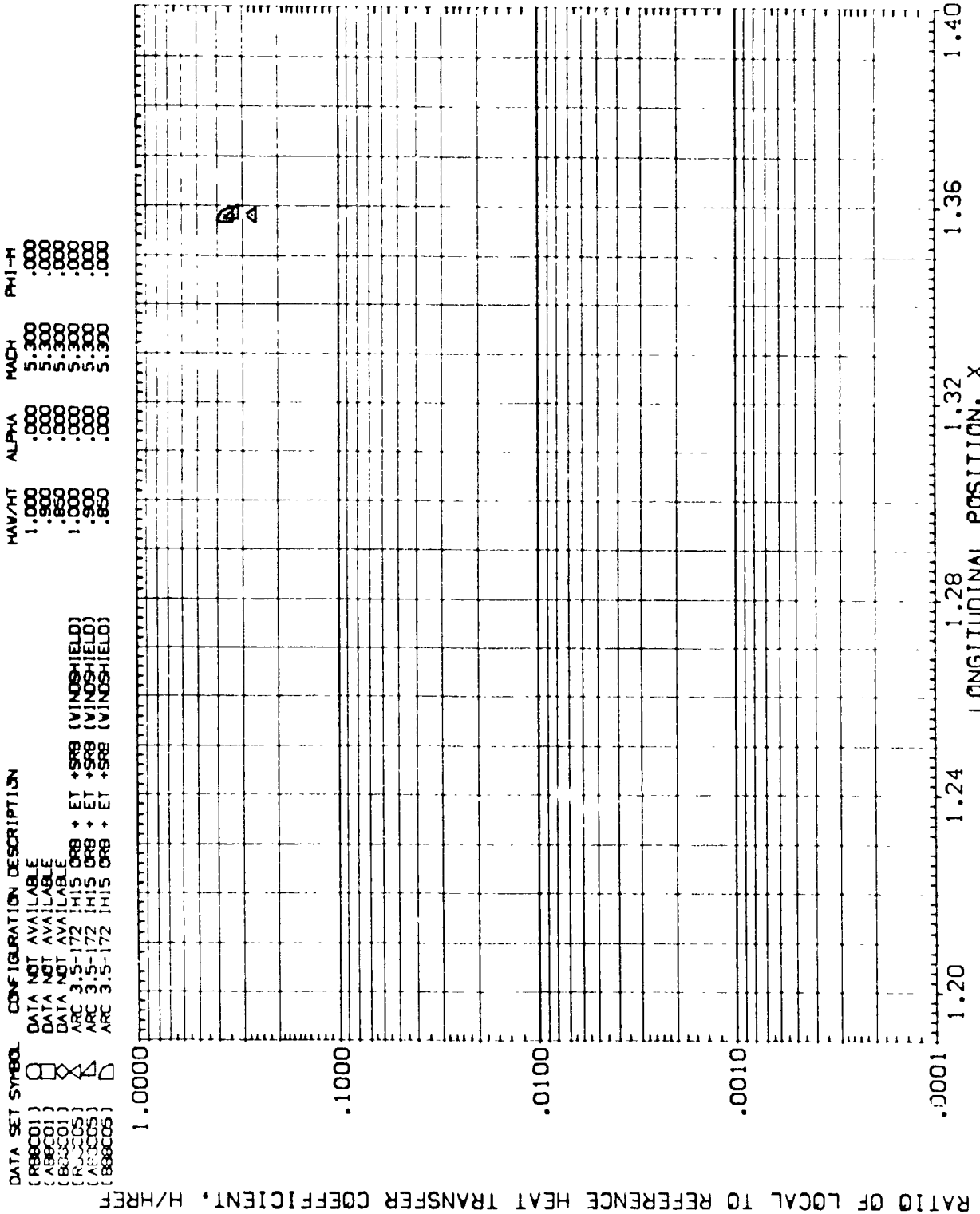


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R)BCO1) DATA NOT AVAILABLE
 (A)BCO1) DATA NOT AVAILABLE
 (B)BCO1) DATA NOT AVAILABLE
 (M)A-05) ARC 3-5-172 IH15 DRB + ET +SRB (WINDSHIELD)
 (A)A-05) ARC 3-5-172 IH15 DRB + ET +SRB (WINDSHIELD)
 (B)BCO5) ARC 3-5-172 IH15 DRB + ET +SRB (WINDSHIELD)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .850 .000 5.300 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

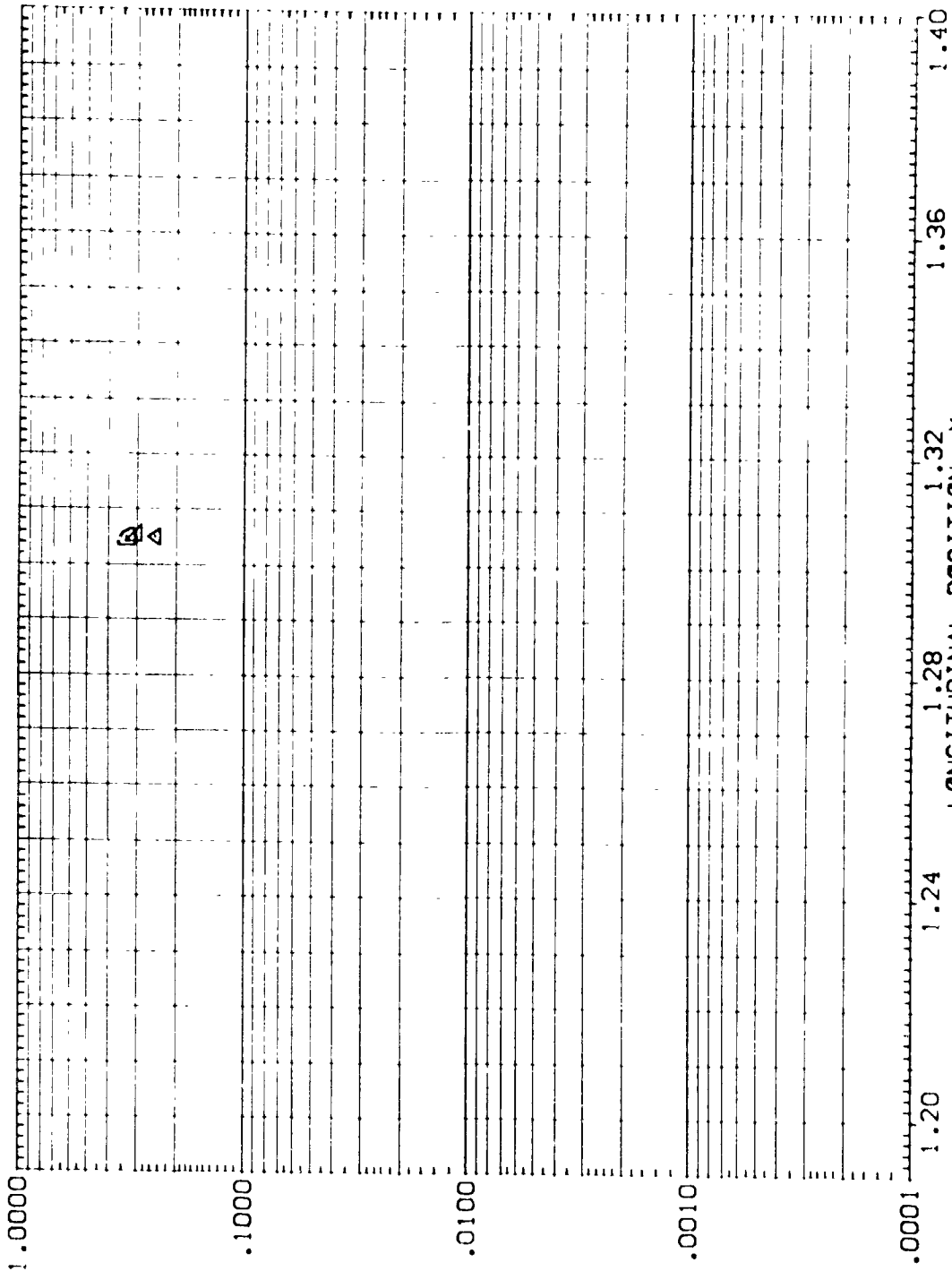


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.437 MACH = 5.300 Y = .196

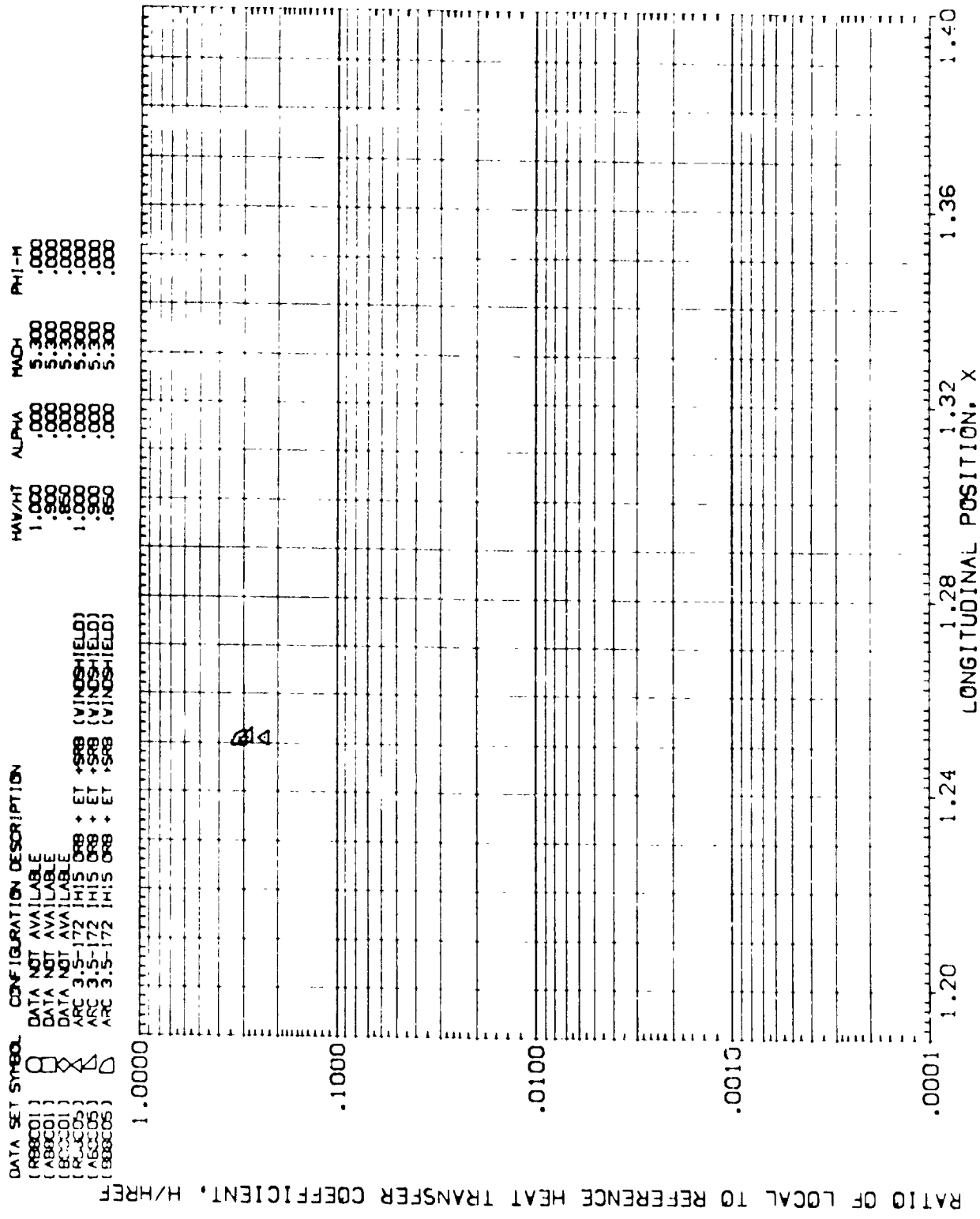


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (488001) ARC 3.5-172 IH15 ORBITER
 (488002) ARC 3.5-172 IH15 ORBITER
 (488003) ARC 3.5-172 IH15 ORBITER
 (488004) DATA NOT AVAILABLE
 (488005) DATA NOT AVAILABLE
 (488006) DATA NOT AVAILABLE

HAV/HT ALPHA MACH PH/M
 1.000 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .850 .000 5.300 .000

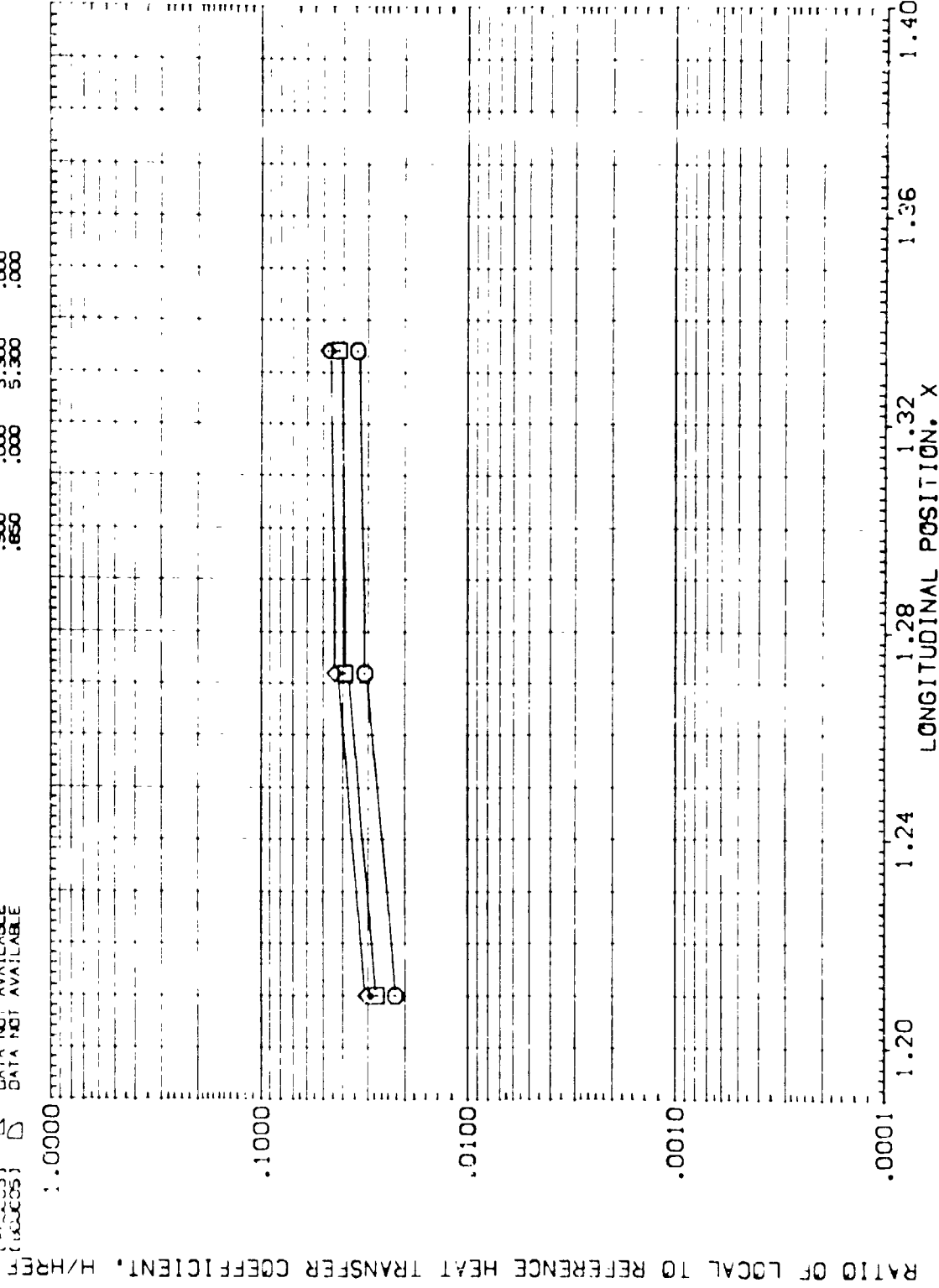


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD

RN/L = 5.214 MACH = 5.300 Y = .047 P. SE 212



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R0000) ARC 3-5-172 IM15 ORBITER
 (A0000) ARC 3-5-172 IM15 ORBITER
 (B0000) ARC 3-5-172 IM15 ORBITER
 (C0000) DATA NOT AVAILABLE
 (D0000) DATA NOT AVAILABLE
 (E0000) DATA NOT AVAILABLE

(WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

H/W/H T ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

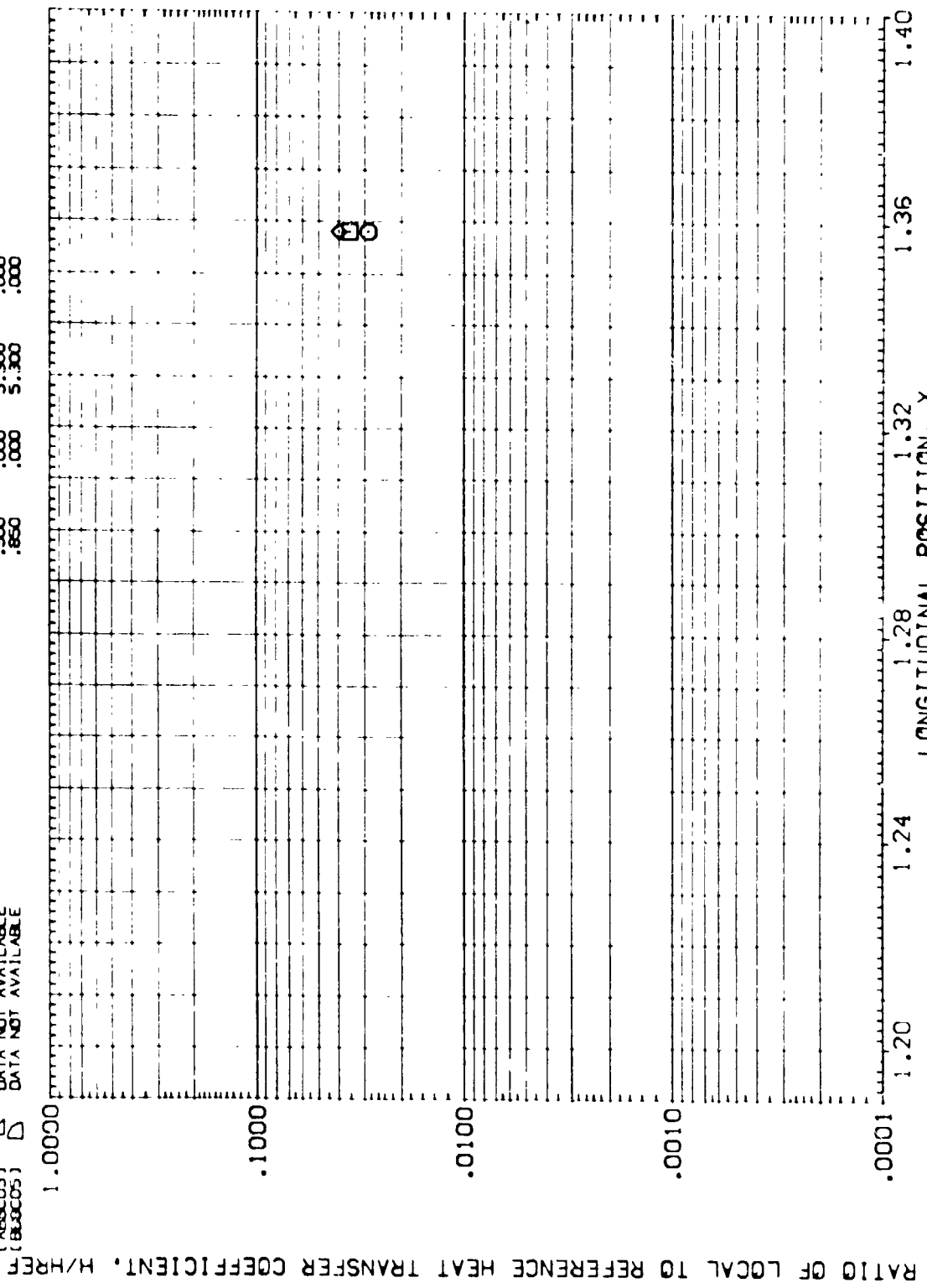


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (MOC) ARC 3.5-172 IHIS ORBITER
 (MOC) ARC 3.5-172 IHIS ORBITER
 (MOC) ARC 3.5-172 IHIS ORBITER
 (MOC) DATA NOT AVAILABLE
 (MOC) DATA NOT AVAILABLE
 (MOC) DATA NOT AVAILABLE

(WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)
 (WINDSHIELD)

MACH
 5.300
 5.300
 5.300
 5.300
 5.300
 5.300

PHI-A
 .000
 .000
 .000
 .000
 .000
 .000

MACH
 5.300
 5.300
 5.300
 5.300
 5.300
 5.300

MACH
 5.300
 5.300
 5.300
 5.300
 5.300
 5.300

MACH
 5.300
 5.300
 5.300
 5.300
 5.300
 5.300

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

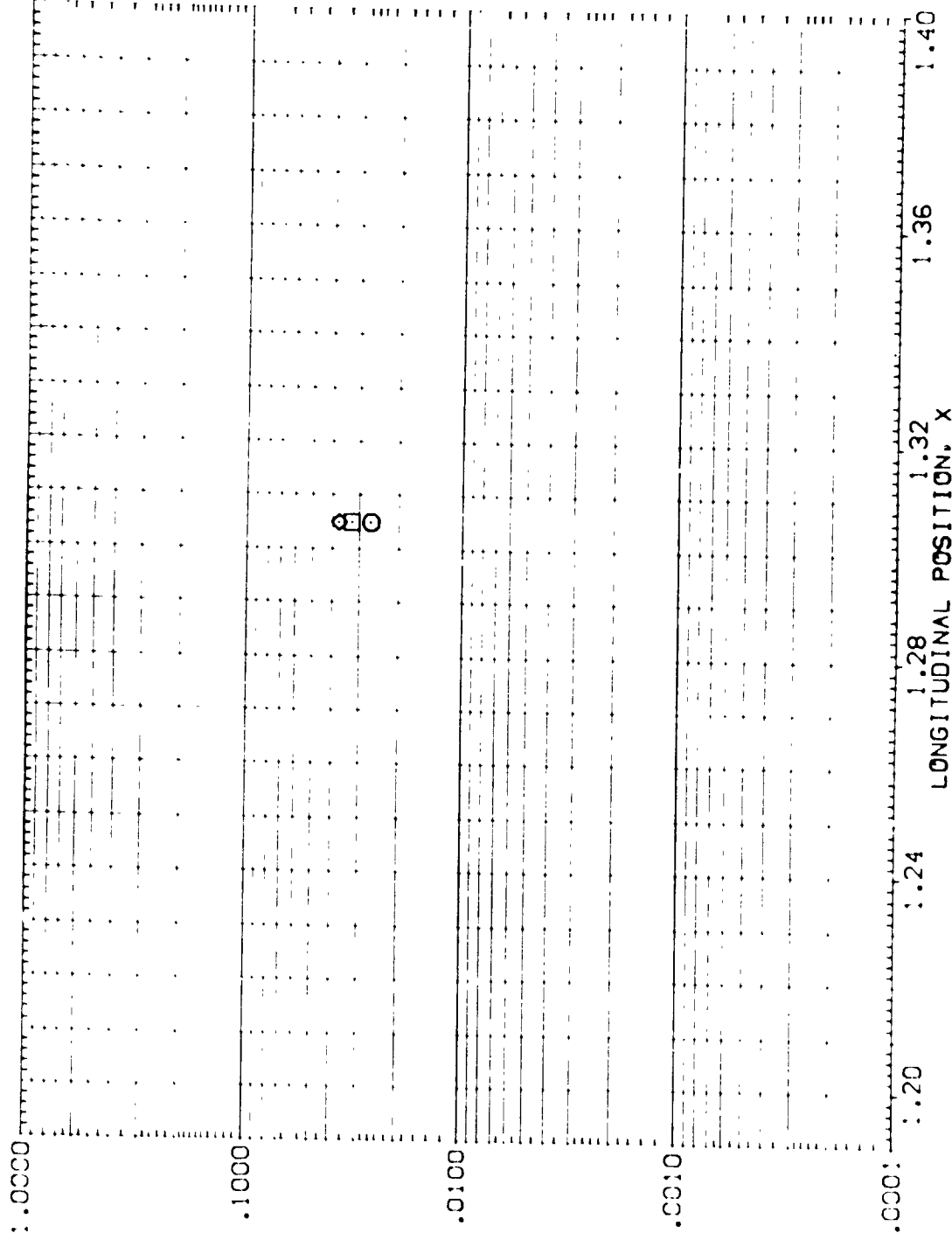


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 5.214 MACH = 5.300 Y = .196 PAGE 214

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R3B3C01) ARC 3 5-172 IH15 DRBITER
 (A3B3C01) ARC 3 5-172 IH15 DRBITER
 (B3B3C01) ARC 3 5-172 IH15 DRBITER
 (R3J3C05) DATA NOT AVAILABLE
 (A3J3C05) DATA NOT AVAILABLE
 (B3J3C05) DATA NOT AVAILABLE

(V)WINDSHIELD)
 (V)WINDSHIELD)
 (V)WINDSHIELD)
 (V)WINDSHIELD)
 (V)WINDSHIELD)
 (V)WINDSHIELD)

MAV/HT 1.000
 .500
 .650
 1.000
 .500
 .650

ALPHA .000
 .000
 .000
 .000
 .000
 .000

MACH 5.300
 5.300
 5.300
 5.300
 5.300
 5.300

PHI-TH .000
 .000
 .000
 .000
 .000
 .000

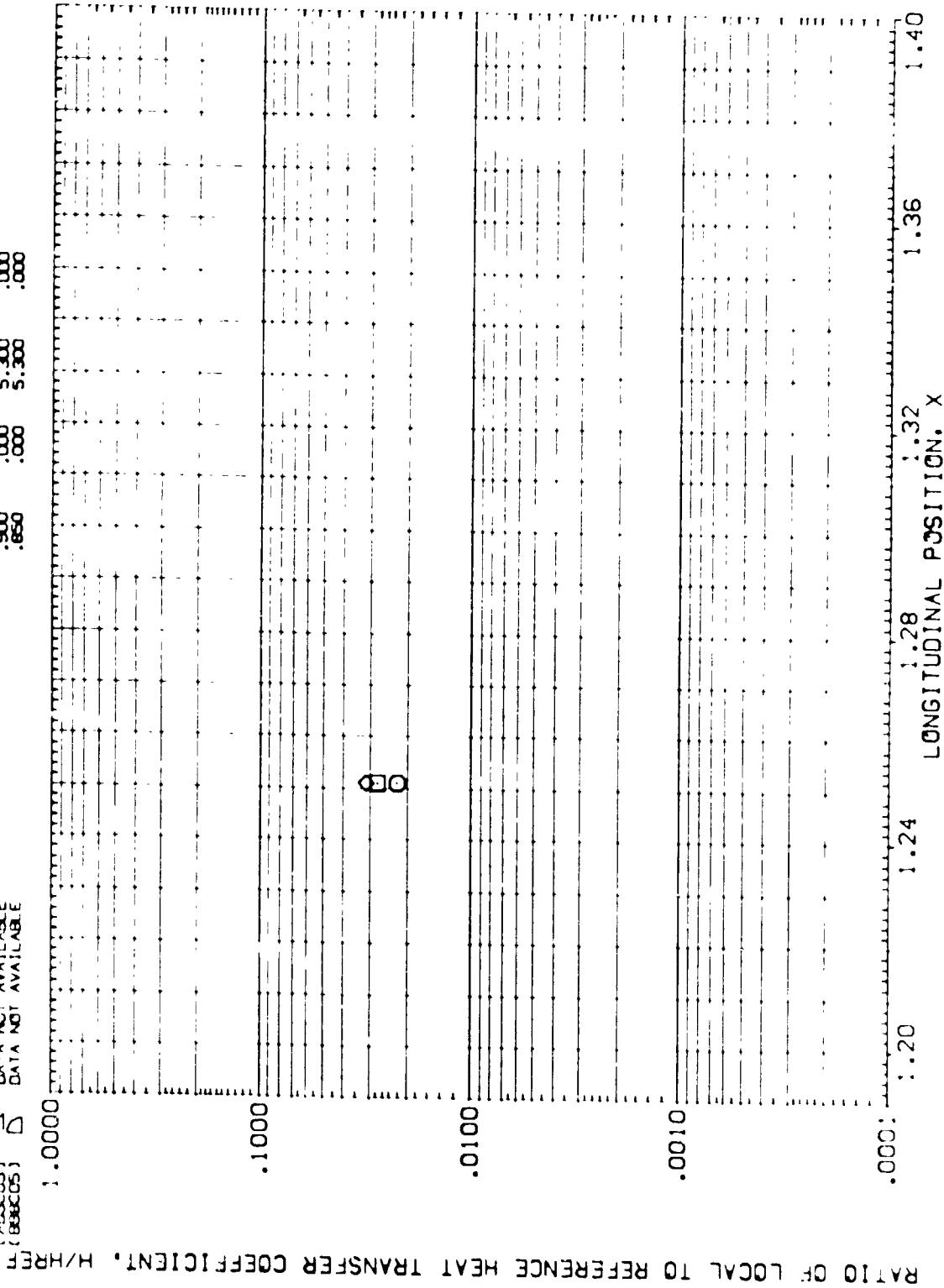


FIG. 25 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RAVL = 5.2:4 MACH = 5.300 Y = .2:3 PAGE 2:5

DATA SET SYMBOL. CONFIGURATION DESCRIPTION
 (1) ARC 3.5-172 IMIS ORB + ET + SRB (WINDSHIELD)
 (2) ARC 3.5-172 IMIS ORB + ET + SRB (WINDSHIELD)
 (3) ARC 3.5-172 IMIS ORB + ET + SRB (WINDSHIELD)

HAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .650 .000 5.300 .000

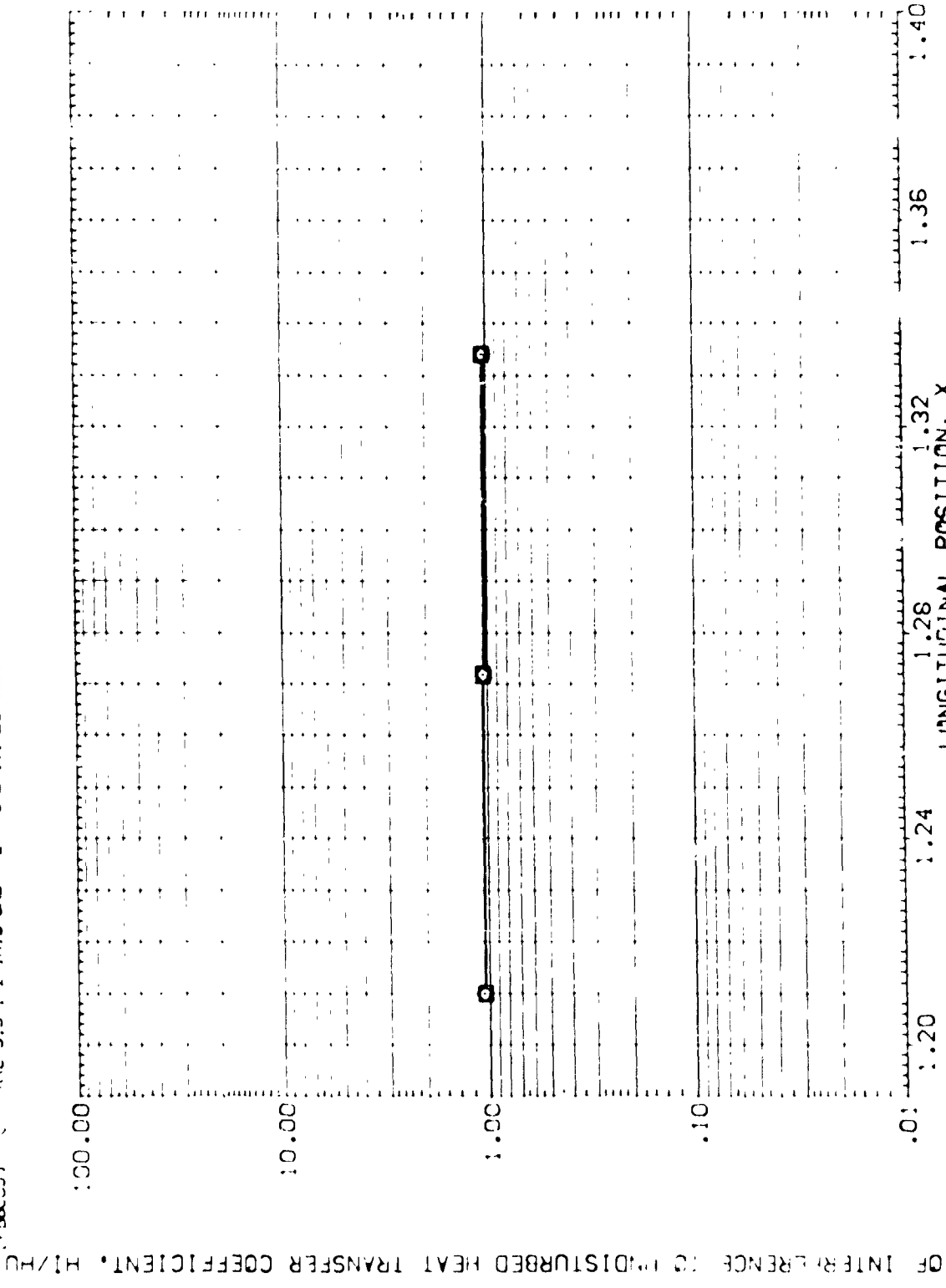
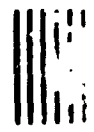


FIG. 23 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF. WINDSHIELD.



DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA PHI-H

ARC 3.5-172 [H13 ORB + ET +SRB (WINDSHIELD)]
 ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]
 ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]

1.000 .000 .000
 .850 .000 .000

5.300
 5.300

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

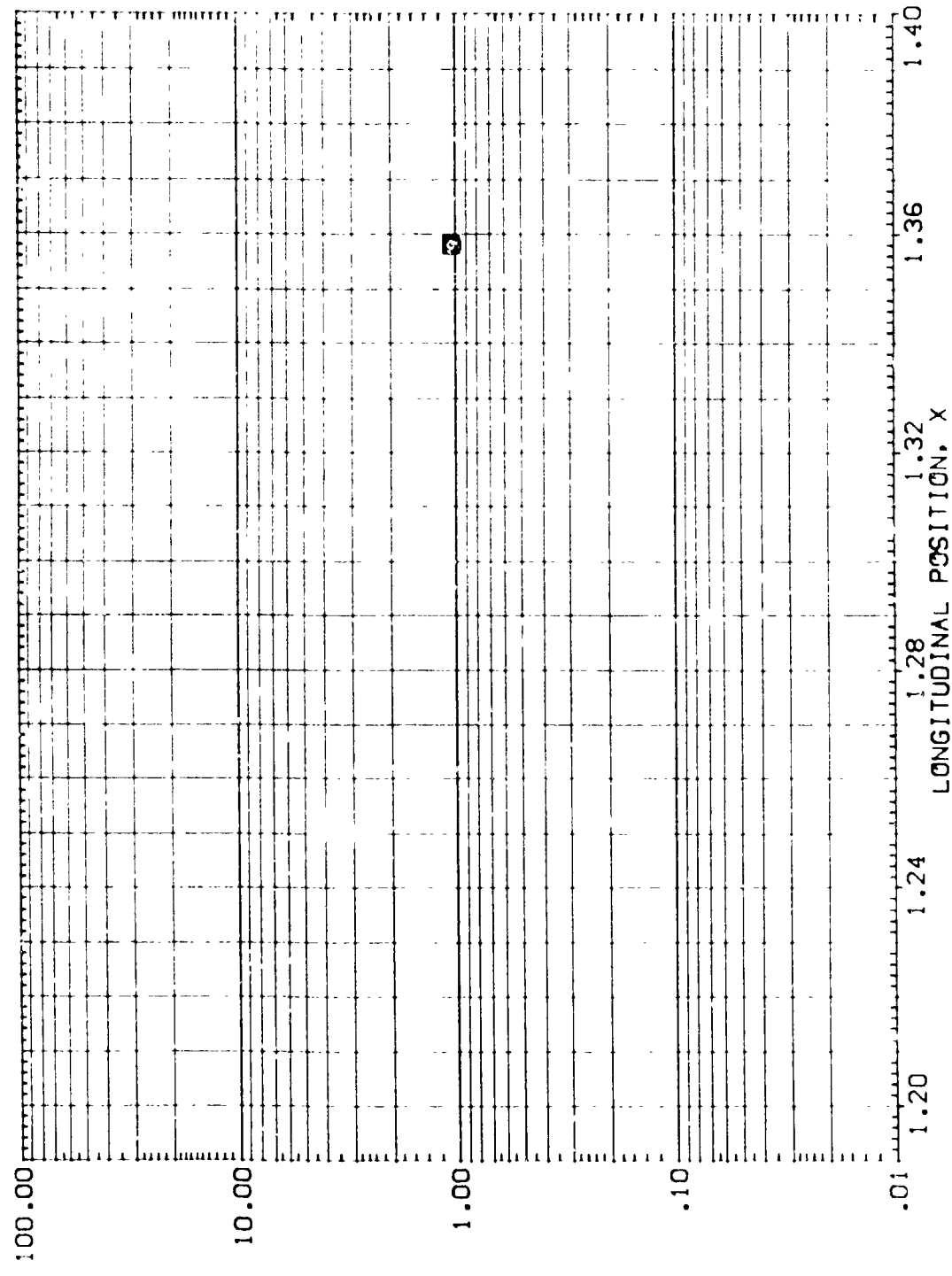


FIG. 26 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF.. WINDSHIELD.

ORNL/L = 1.845 MACH = 5.300 Y = .178

DATA SET SYMBOL
 (ORF005)
 (ORF005)
 (ORF005)

CONFIGURATION DESCRIPTION

ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)
 ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)
 ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)

HAV/HT ALPHA MACH PH1-M
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

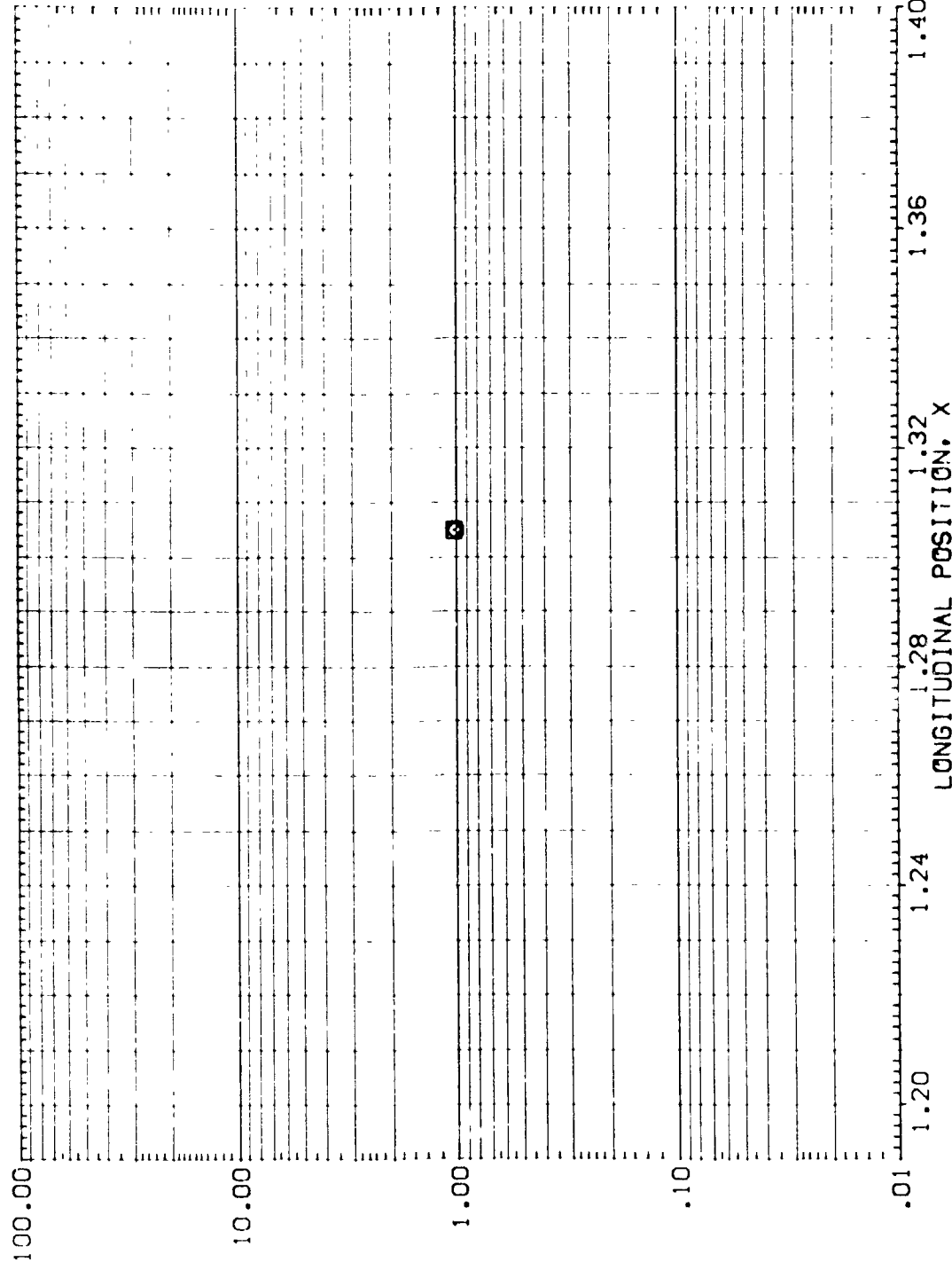


FIG. 26 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., WINDSHIELD.

ORN/L = 1.845 MACH = 5.300 Y = .196

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DATA SET SYMBOL. CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PMI-M

(DRSC05) ARC 3.5-172 IM15 DRB + ET +SRB (WINDSHIELD)
 (EBBC05) ARC 3.5-172 IM15 DRB + ET +SRB (WINDSHIELD)
 (FBBC05) ARC 3.5-172 IM15 DRB + ET +SRB (WINDSHIELD)

1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

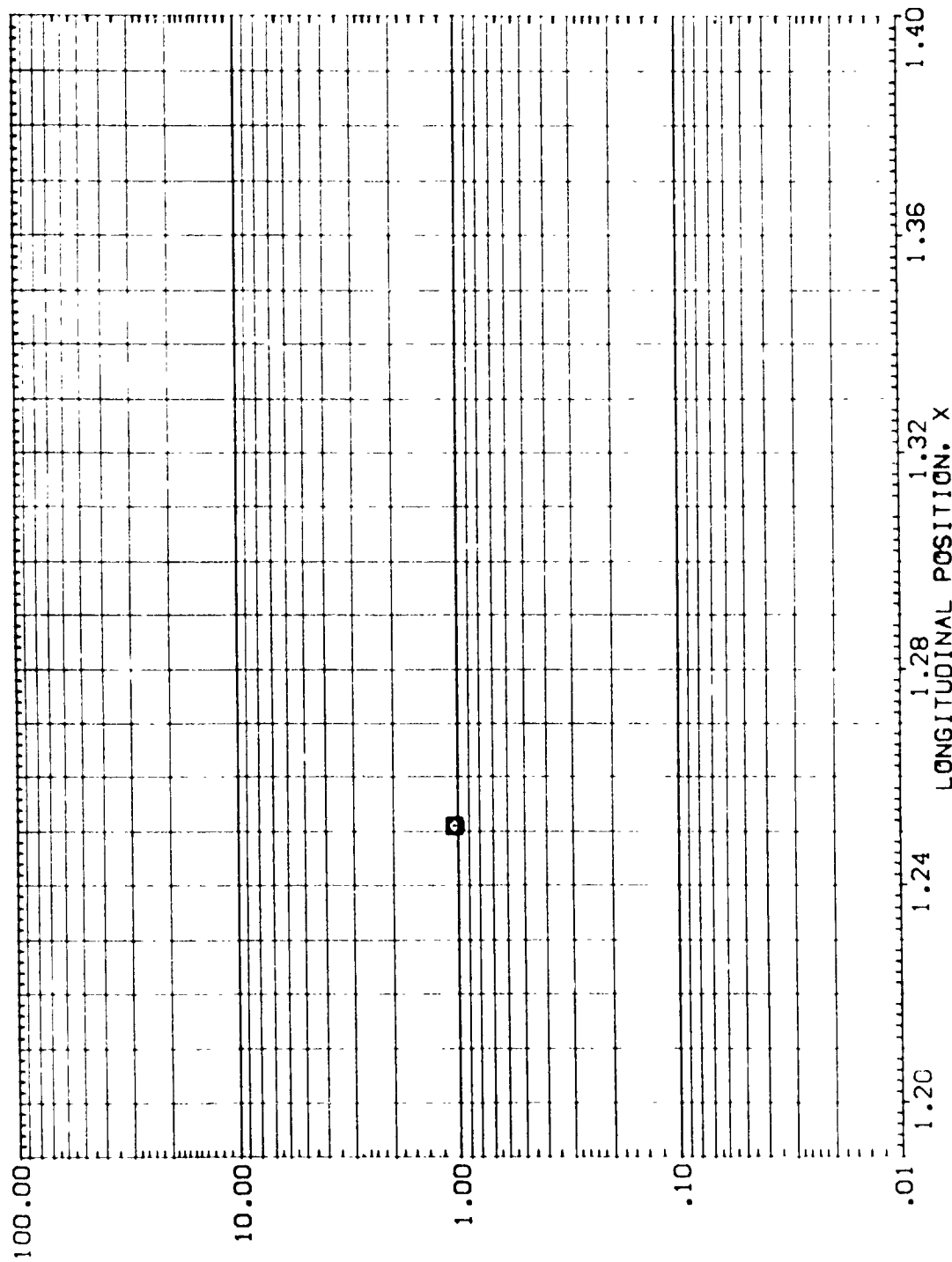


FIG. 26 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., WINDSHIELD.

ORNL = 1.845 MACH = 5.300 Y = .213

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	NAV/HT	ALPHA	MACH	PHI-M
(R90C02)	ARC 3.5-172 IH15 ORBITER	1.000	-5.000	5.300	.000
(A8UC02)	ARC 3.5-172 IH15 ORBITER	.900	-5.000	5.300	.300
(B73C02)	ARC 3.5-172 IH15 ORBITER	.850	-5.000	5.300	.000
(R53C06)	AF 3.5-172 IH15 ORB + ET +SRB	1.000	-5.000	5.300	.000
(A1UC06)	ARC 3.5-172 IH15 ORB + ET +SRB	.900	-5.000	5.300	.000
(B38C06)	ARC 3.5-172 IH15 ORB + ET +SRB	.850	-5.000	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

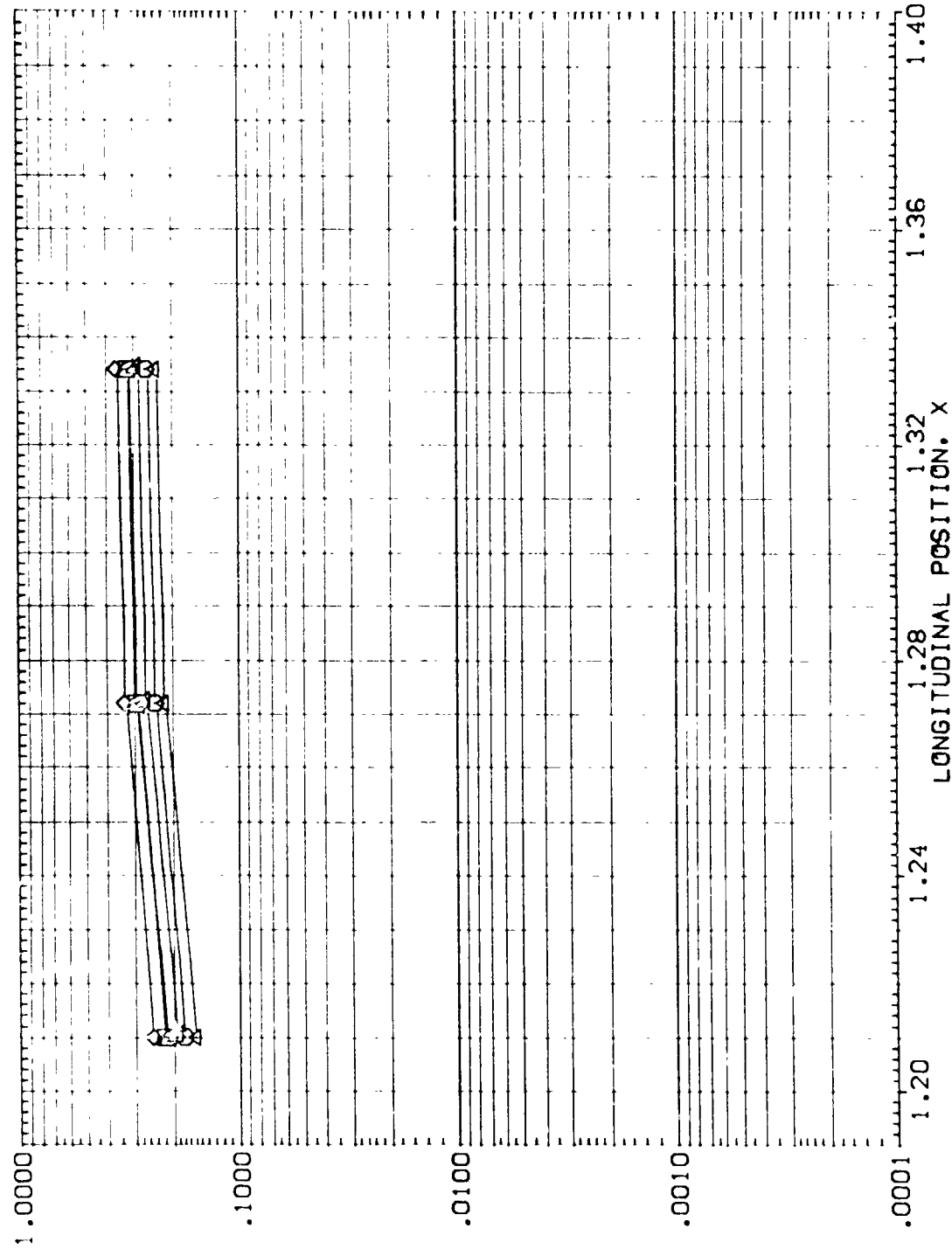


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 2.143 MACH = 5.300 Y = .047 PAGE 220



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-H
(R00C02)	ARC 3.5-172 [H15 ORBITER (WINDSHIELD)]	1.000	-5.000	5.300	.000
(A10C07)	ARC 3.5-172 [H15 ORBITER (WINDSHIELD)]	.900	-5.000	5.300	.000
(B10C02)	ARC 3.5-172 [H15 ORBITER (WINDSHIELD)]	.850	-5.000	5.300	.000
(R10C06)	ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]	1.000	-5.000	5.300	.000
(A10C06)	ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]	.900	-5.000	5.300	.000
(B10C06)	ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]	.850	-5.000	5.300	.000

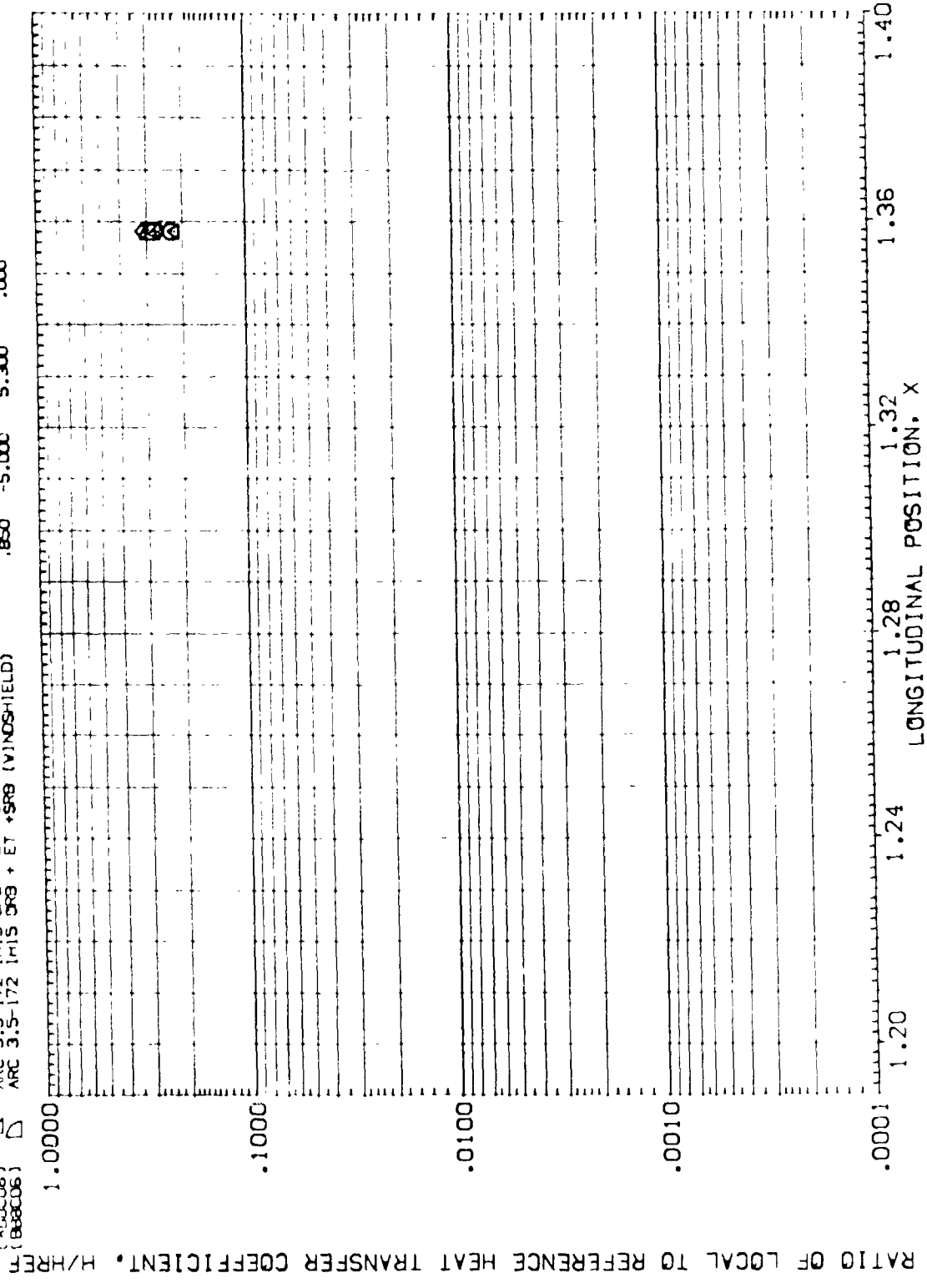


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAW/HT	ALPHA	MACH	PHI-M
(B33C02)	ARC 3.5-172 [HIS ORBITER (WINDSHIELD)]	1.000	-5.000	5.300	.000
(A33C03)	ARC 3.5-172 [HIS ORBITER (WINDSHIELD)]	.900	-5.000	5.300	.000
(K33C03)	ARC 3.5-172 [HIS ORBITER (WINDSHIELD)]	.850	-5.000	5.300	.000
(B33C03)	ARC 3.5-172 [HIS ORBITER + SRB (WINDSHIELD)]	1.000	-5.000	5.300	.000
(A33C06)	ARC 3.5-172 [HIS ORBITER + ET + SRB (WINDSHIELD)]	.900	-5.000	5.300	.000
(B33C06)	ARC 3.5-172 [HIS ORBITER + ET + SRB (WINDSHIELD)]	.850	-5.000	5.300	.000

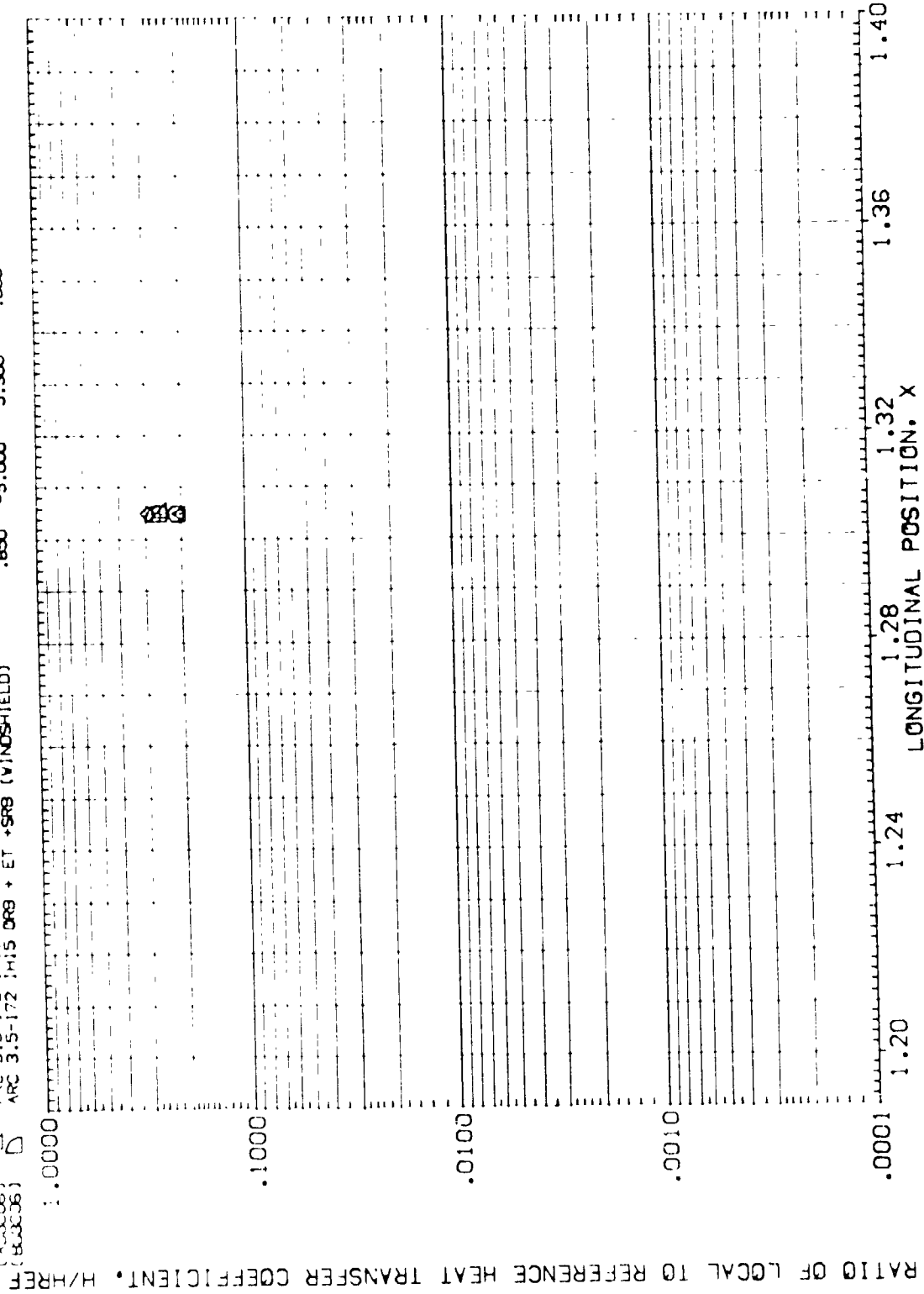


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 2.143 MACH = 5.300 Y = .196 PAGE 222



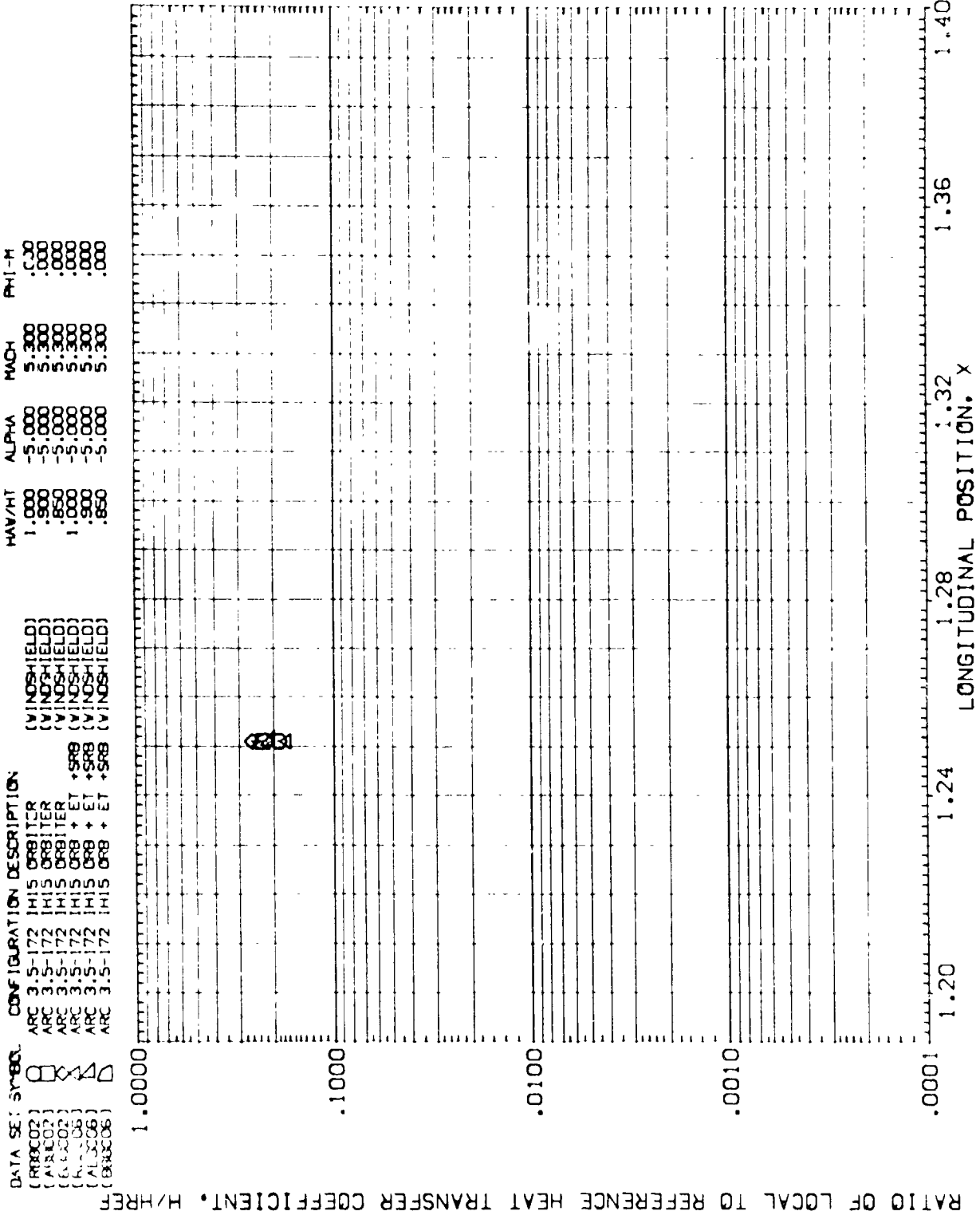


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88C02) DATA NOT AVAILABLE
 (A88C02) DATA NOT AVAILABLE
 (B88C02) DATA NOT AVAILABLE
 (P88C08) ARC 3.5-172 IHS ORB + ET +SRB (WINDSHIELD)
 (A88C06) ARC 3.5-172 IHS ORB + ET +SRB (WINDSHIELD)
 (B88C06) ARC 3.5-172 IHS ORB + ET +SRB (WINDSHIELD)

HAV/HT ALPHA MACH PHI-M
 1.000 -5.000 5.300 .000
 .970 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

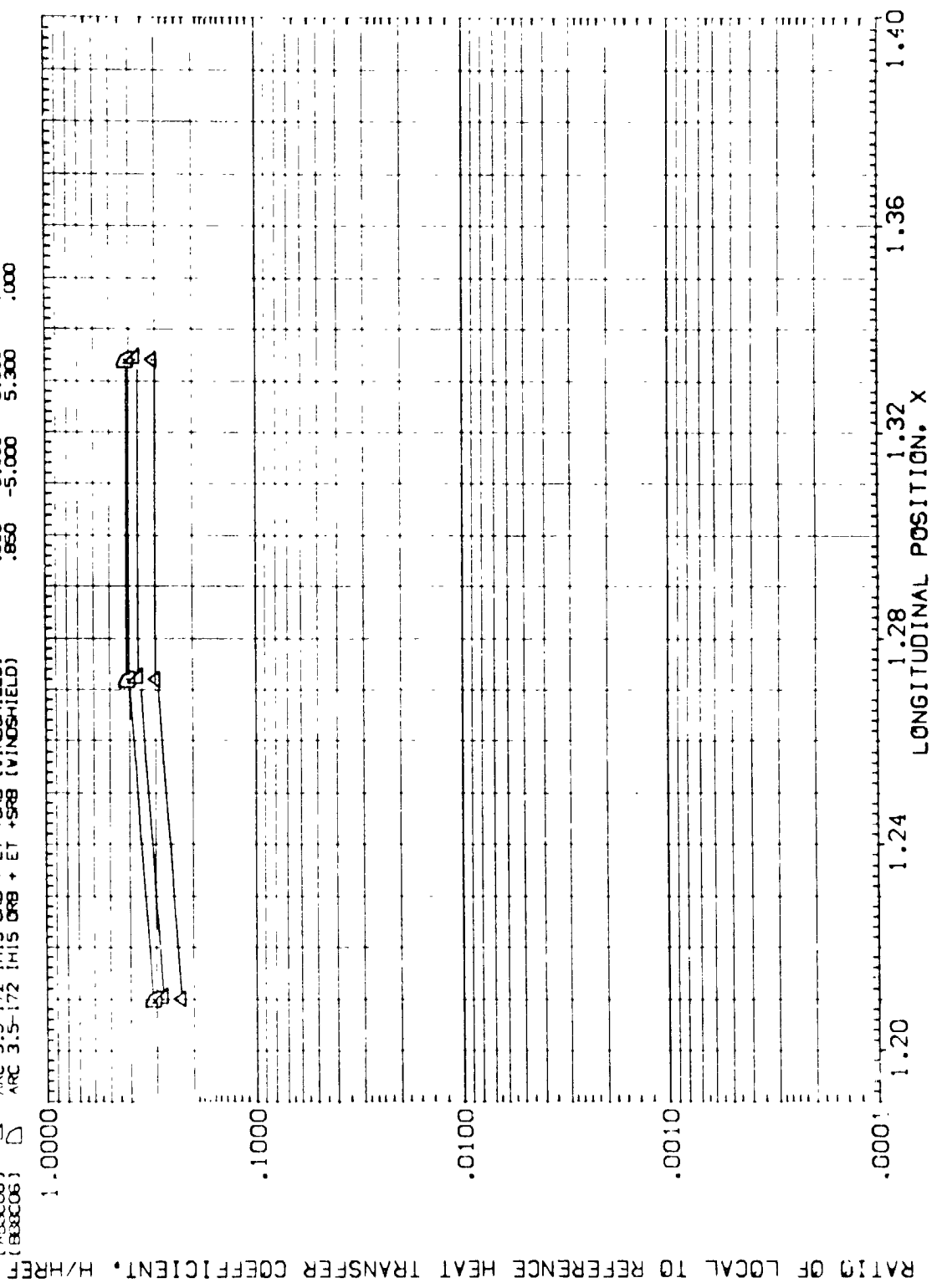


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.570 MACH = 5.300 Y = .047 PAGE 224



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RB8C02) DATA NOT AVAILABLE
 (AB8C02) DATA NOT AVAILABLE
 (BC3C02) DATA NOT AVAILABLE
 (783C06) ARC 3.5-172 IH15 DR8 + ET +SR8 (WINDSHIELD)
 (AB8C06) ARC 3.5-172 IH15 DR8 + ET +SR8 (WINDSHIELD)
 (BB8C06) ARC 3.5-172 IH15 DR8 + ET +SR8 (WINDSHIELD)

HAV/AT ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

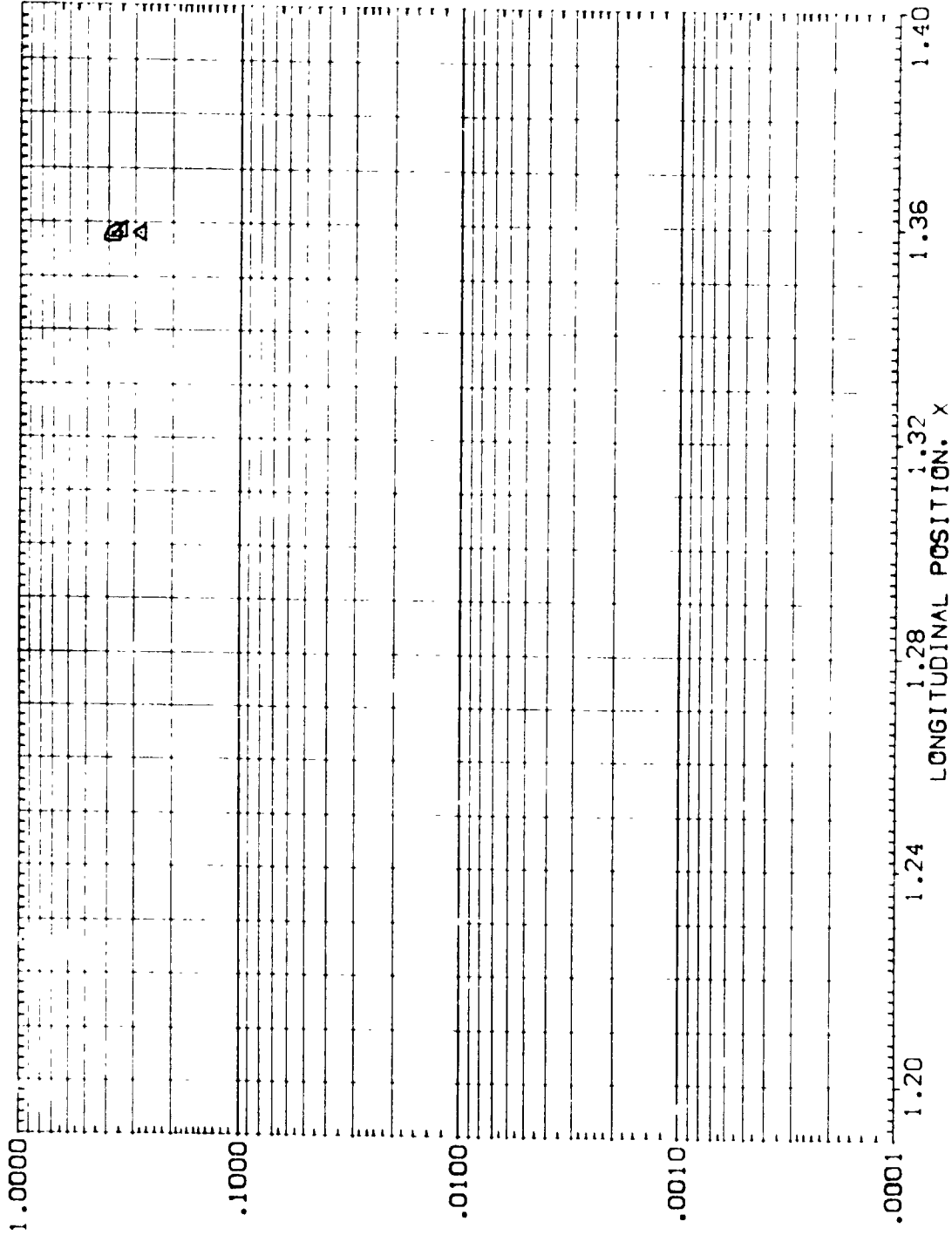


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.570 MAC = 5.300 Y = .178

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(R8000) DATA NOT AVAILABLE 1.000 -5.000 5.300 .000
 (A8000) DATA NOT AVAILABLE .850 -5.000 5.300 .000
 (B8000) DATA NOT AVAILABLE 1.000 -5.000 5.300 .000
 (C8000) ARC 3.5-172 |H15 OR8 + ET +S88 (WINDSHIELD)
 (A13206) ARC 3.5-172 |H15 OR8 + ET +S88 (WINDSHIELD)
 (B8000) ARC 3.5-172 |H15 OR8 + ET +S88 (WINDSHIELD)

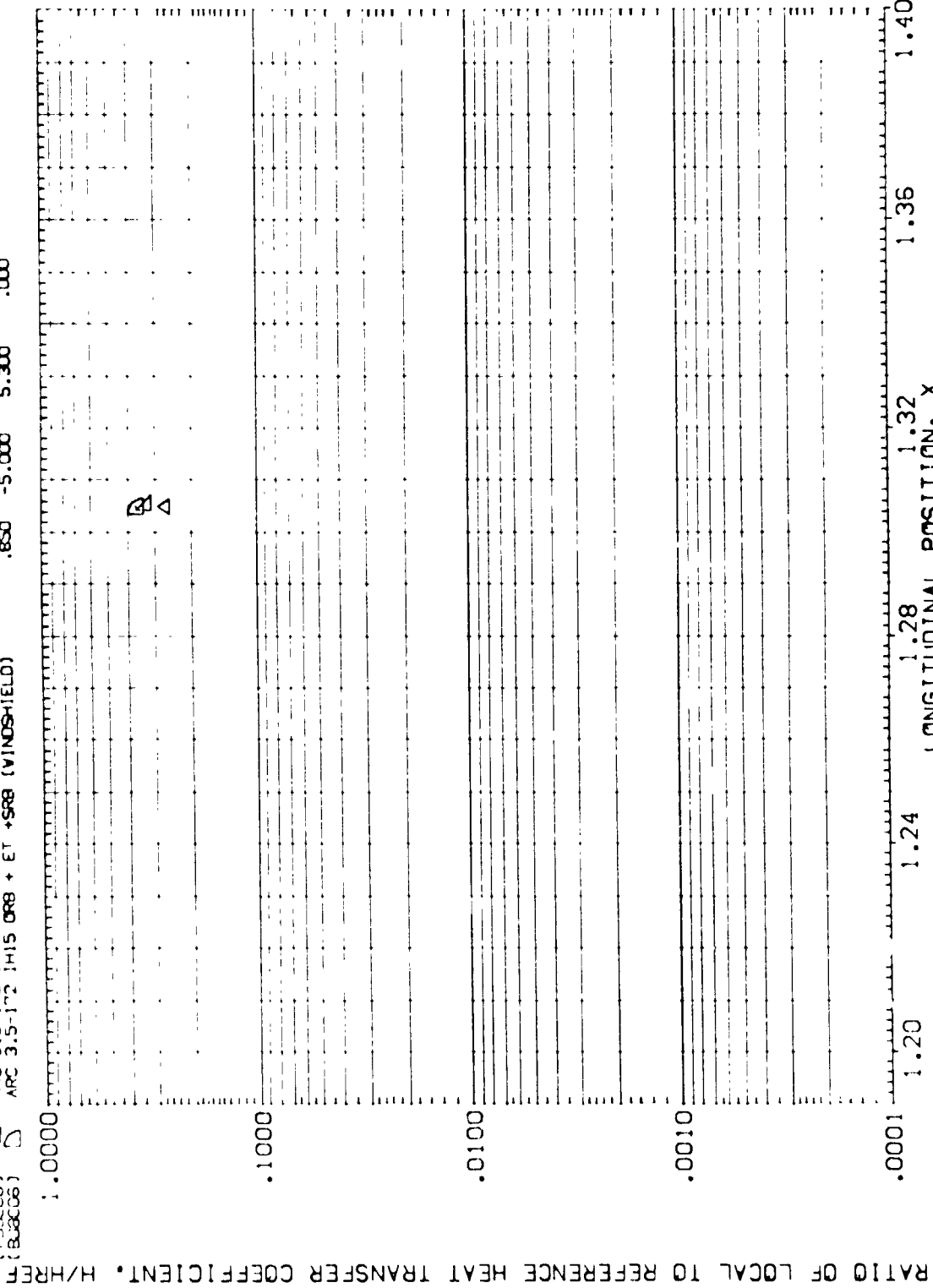


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.570 MACH = 5.300 γ = .196 PAGE 226



HAW/HT ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (RBCC02) DATA NOT AVAILABLE
 (ABCC02) DATA NOT AVAILABLE
 (BACC02) DATA NOT AVAILABLE
 (RCAC06) ARC 3.5-172 TH'S ORB + ET +SRB (WINDSHIELD)
 (ALAC06) ARC 3.5-172 TH'S ORB + ET +SRB (WINDSHIELD)
 (BACC06) ARC 3.5-172 TH'S ORB + ET +SRB (WINDSHIELD)

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

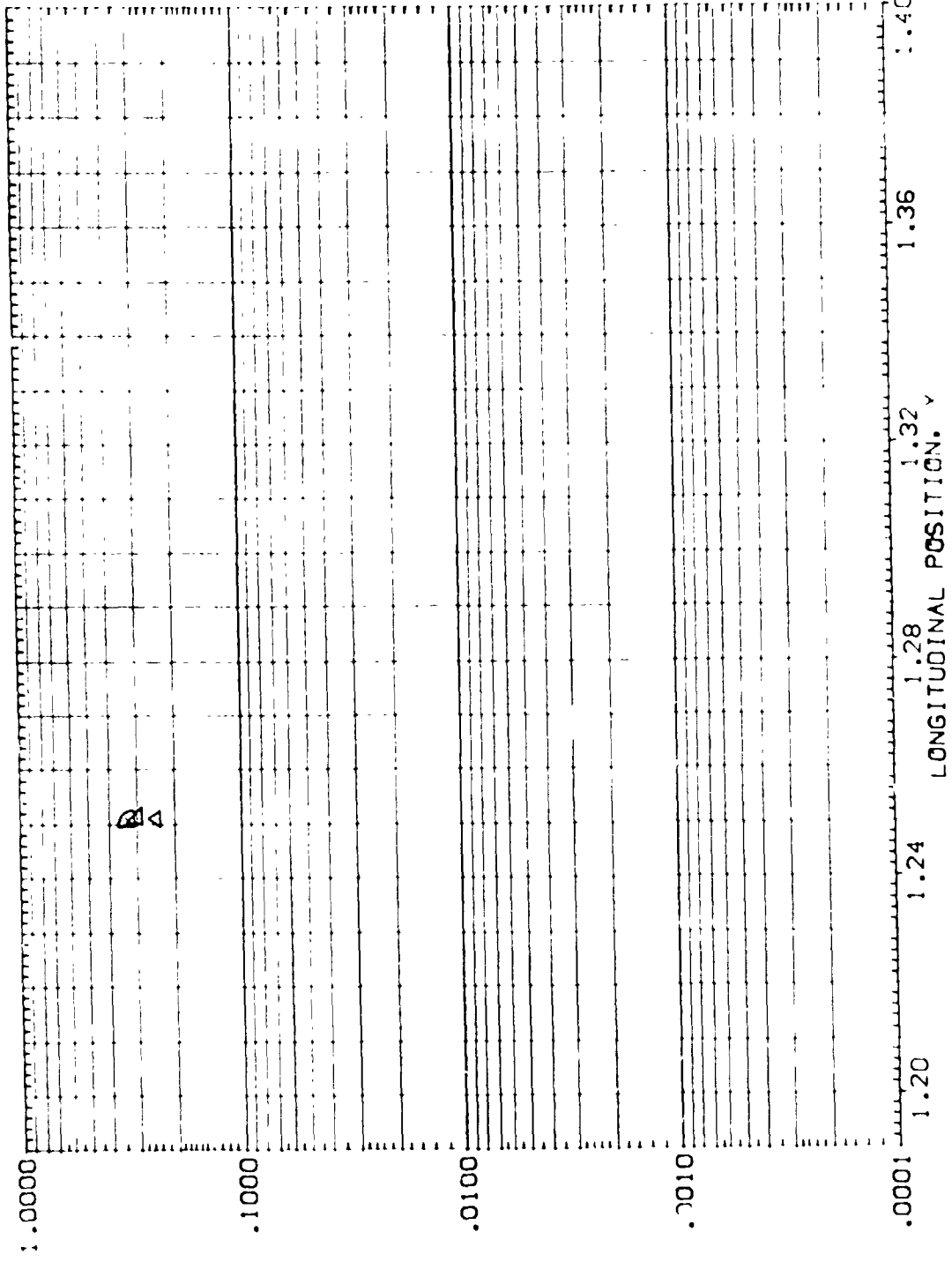


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 4.570 MACH = 5.300 Y = .215

HAV/HT ALPHA MACH PHI-M
 1.000 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .850 -5.000 5.300 .000

(WINDSHIELD)
 (WINDSHIELD)

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ORBITER
 ARC 3.5-175 IH15 ORBITER
 ARC 3.5-172 IH15 ORBITER
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

DATA SET SYMBOL
 [ARC002]
 [ARC002]
 [ARC002]
 [ARC006]
 [ARC006]
 [ARC006]

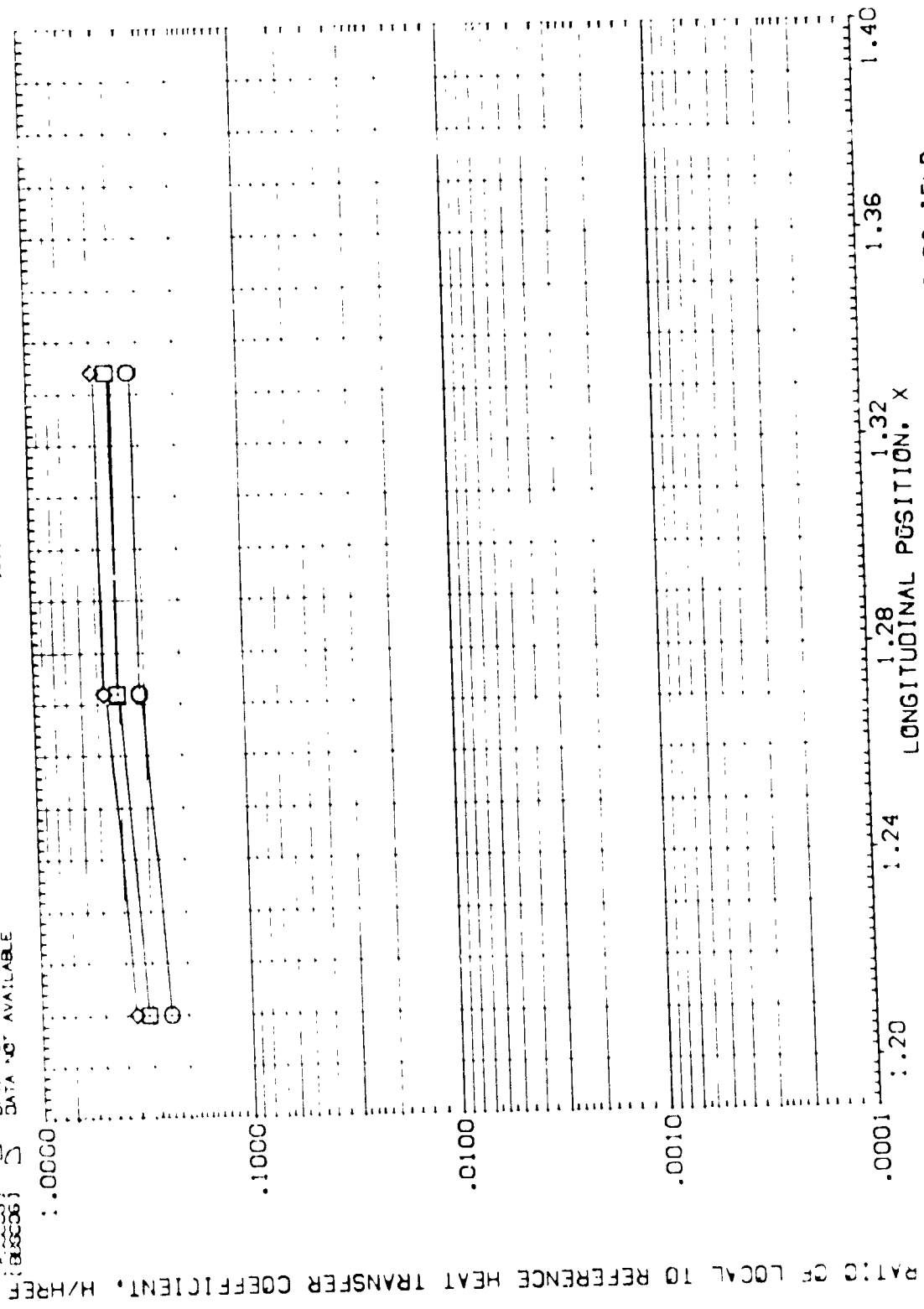


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 6.13: MACH = 5.300 Y = .047 PAGE 228



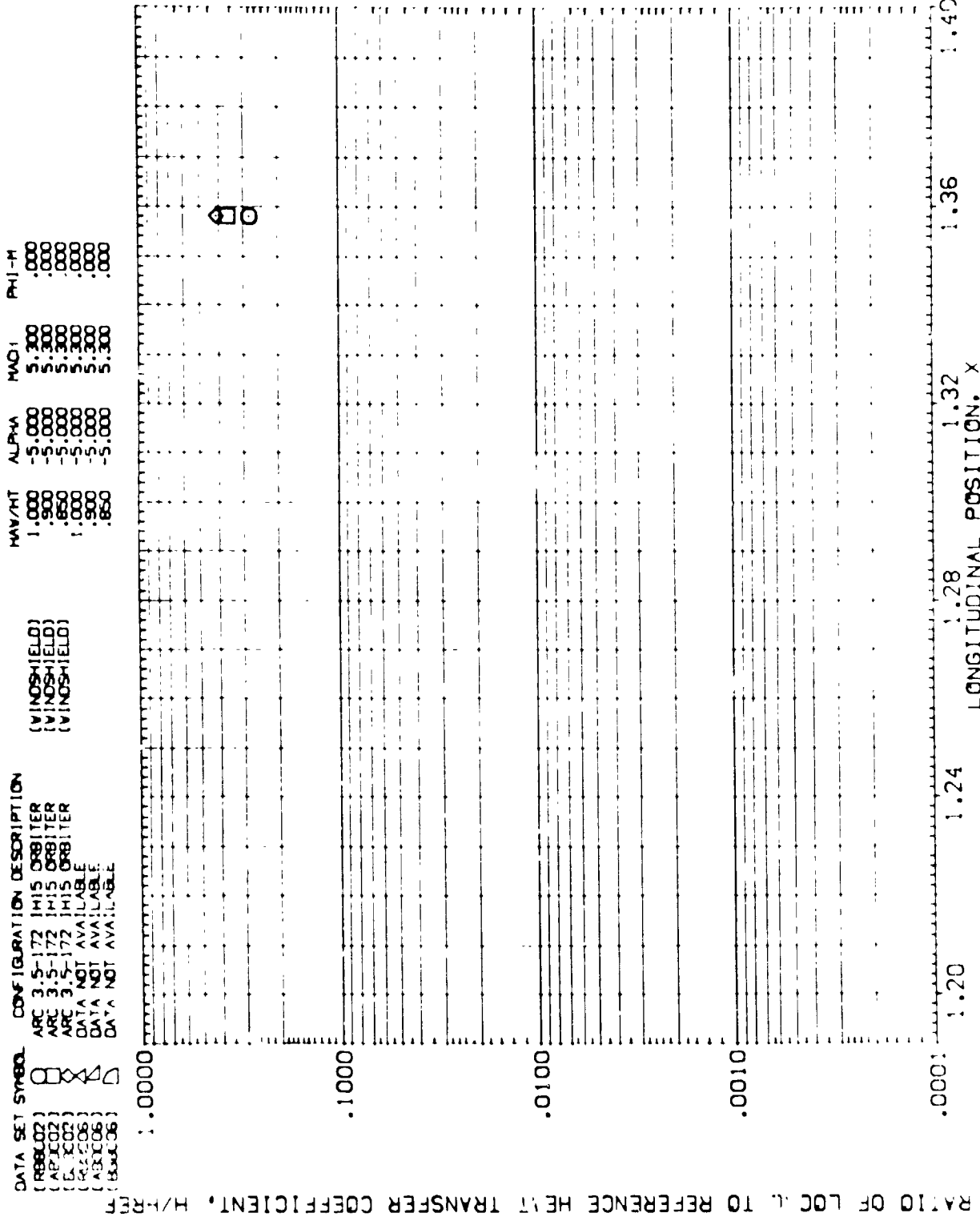


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R) (C) (S) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) (R) (S) (T) (U) (V) (W) (X) (Y) (Z) (AA) (AB) (AC) (AD) (AE) (AF) (AG) (AH) (AI) (AJ) (AK) (AL) (AM) (AN) (AO) (AP) (AQ) (AR) (AS) (AT) (AU) (AV) (AW) (AX) (AY) (AZ) (BA) (BB) (BC) (BD) (BE) (BF) (BG) (BH) (BI) (BJ) (BK) (BL) (BM) (BN) (BO) (BP) (BQ) (BR) (BS) (BT) (BU) (BV) (BW) (BX) (BY) (BZ) (CA) (CB) (CC) (CD) (CE) (CF) (CG) (CH) (CI) (CJ) (CK) (CL) (CM) (CN) (CO) (CP) (CQ) (CR) (CS) (CT) (CU) (CV) (CW) (CX) (CY) (CZ) (DA) (DB) (DC) (DD) (DE) (DF) (DG) (DH) (DI) (DJ) (DK) (DL) (DM) (DN) (DO) (DP) (DQ) (DR) (DS) (DT) (DU) (DV) (DW) (DX) (DY) (DZ) (EA) (EB) (EC) (ED) (EE) (EF) (EG) (EH) (EI) (EJ) (EK) (EL) (EM) (EN) (EO) (EP) (EQ) (ER) (ES) (ET) (EU) (EV) (EW) (EX) (EY) (EZ) (FA) (FB) (FC) (FD) (FE) (FF) (FG) (FH) (FI) (FJ) (FK) (FL) (FM) (FN) (FO) (FP) (FQ) (FR) (FS) (FT) (FU) (FV) (FW) (FX) (FY) (FZ) (GA) (GB) (GC) (GD) (GE) (GF) (GG) (GH) (GI) (GJ) (GK) (GL) (GM) (GN) (GO) (GP) (GQ) (GR) (GS) (GT) (GU) (GV) (GW) (GX) (GY) (GZ) (HA) (HB) (HC) (HD) (HE) (HF) (HG) (HH) (HI) (HJ) (HK) (HL) (HM) (HN) (HO) (HP) (HQ) (HR) (HS) (HT) (HU) (HV) (HW) (HX) (HY) (HZ) (IA) (IB) (IC) (ID) (IE) (IF) (IG) (IH) (II) (IJ) (IK) (IL) (IM) (IN) (IO) (IP) (IQ) (IR) (IS) (IT) (IU) (IV) (IW) (IX) (IY) (IZ) (JA) (JB) (JC) (JD) (JE) (JF) (JG) (JH) (JI) (JJ) (JK) (JL) (JM) (JN) (JO) (JP) (JQ) (JR) (JS) (JT) (JU) (JV) (JW) (JX) (JY) (JZ) (KA) (KB) (KC) (KD) (KE) (KF) (KG) (KH) (KI) (KJ) (KK) (KL) (KM) (KN) (KO) (KP) (KQ) (KR) (KS) (KT) (KU) (KV) (KW) (KX) (KY) (KZ) (LA) (LB) (LC) (LD) (LE) (LF) (LG) (LH) (LI) (LJ) (LK) (LL) (LM) (LN) (LO) (LP) (LQ) (LR) (LS) (LT) (LU) (LV) (LW) (LX) (LY) (LZ) (MA) (MB) (MC) (MD) (ME) (MF) (MG) (MH) (MI) (MJ) (MK) (ML) (MM) (MN) (MO) (MP) (MQ) (MR) (MS) (MT) (MU) (MV) (MW) (MX) (MY) (MZ) (NA) (NB) (NC) (ND) (NE) (NF) (NG) (NH) (NI) (NJ) (NK) (NL) (NM) (NO) (NP) (NQ) (NR) (NS) (NT) (NU) (NV) (NW) (NX) (NY) (NZ) (OA) (OB) (OC) (OD) (OE) (OF) (OG) (OH) (OI) (OJ) (OK) (OL) (OM) (ON) (OO) (OP) (OQ) (OR) (OS) (OT) (OU) (OV) (OW) (OX) (OY) (OZ) (PA) (PB) (PC) (PD) (PE) (PF) (PG) (PH) (PI) (PJ) (PK) (PL) (PM) (PN) (PO) (PP) (PQ) (PR) (PS) (PT) (PU) (PV) (PW) (PX) (PY) (PZ) (QA) (QB) (QC) (QD) (QE) (QF) (QG) (QH) (QI) (QJ) (QK) (QL) (QM) (QN) (QO) (QP) (QQ) (QR) (QS) (QT) (QU) (QV) (QW) (QX) (QY) (QZ) (RA) (RB) (RC) (RD) (RE) (RF) (RG) (RH) (RI) (RJ) (RK) (RL) (RM) (RN) (RO) (RP) (RQ) (RR) (RS) (RT) (RU) (RV) (RW) (RX) (RY) (RZ) (SA) (SB) (SC) (SD) (SE) (SF) (SG) (SH) (SI) (SJ) (SK) (SL) (SM) (SN) (SO) (SP) (SQ) (SR) (SS) (ST) (SU) (SV) (SW) (SX) (SY) (SZ) (TA) (TB) (TC) (TD) (TE) (TF) (TG) (TH) (TI) (TJ) (TK) (TL) (TM) (TN) (TO) (TP) (TQ) (TR) (TS) (TT) (TU) (TV) (TW) (TX) (TY) (TZ) (UA) (UB) (UC) (UD) (UE) (UF) (UG) (UH) (UI) (UJ) (UK) (UL) (UM) (UN) (UO) (UP) (UQ) (UR) (US) (UT) (UU) (UV) (UW) (UX) (UY) (UZ) (VA) (VB) (VC) (VD) (VE) (VF) (VG) (VH) (VI) (VJ) (VK) (VL) (VM) (VN) (VO) (VP) (VQ) (VR) (VS) (VT) (VU) (VV) (VW) (VX) (VY) (VZ) (WA) (WB) (WC) (WD) (WE) (WF) (WG) (WH) (WI) (WJ) (WK) (WL) (WM) (WN) (WO) (WP) (WQ) (WR) (WS) (WT) (WU) (WV) (WW) (WX) (WY) (WZ) (XA) (XB) (XC) (XD) (XE) (XF) (XG) (XH) (XI) (XJ) (XK) (XL) (XM) (XN) (XO) (XP) (XQ) (XR) (XS) (XT) (XU) (XV) (XW) (XX) (XY) (XZ) (YA) (YB) (YC) (YD) (YE) (YF) (YG) (YH) (YI) (YJ) (YK) (YL) (YM) (YN) (YO) (YP) (YQ) (YR) (YS) (YT) (YU) (YV) (YW) (YX) (YZ) (ZA) (ZB) (ZC) (ZD) (ZE) (ZF) (ZG) (ZH) (ZI) (ZJ) (ZK) (ZL) (ZM) (ZN) (ZO) (ZP) (ZQ) (ZR) (ZS) (ZT) (ZU) (ZV) (ZW) (ZX) (ZY) (ZZ)

MA/HT ALPHA MACH PHI-H
 1.000 -5.000 5.310 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

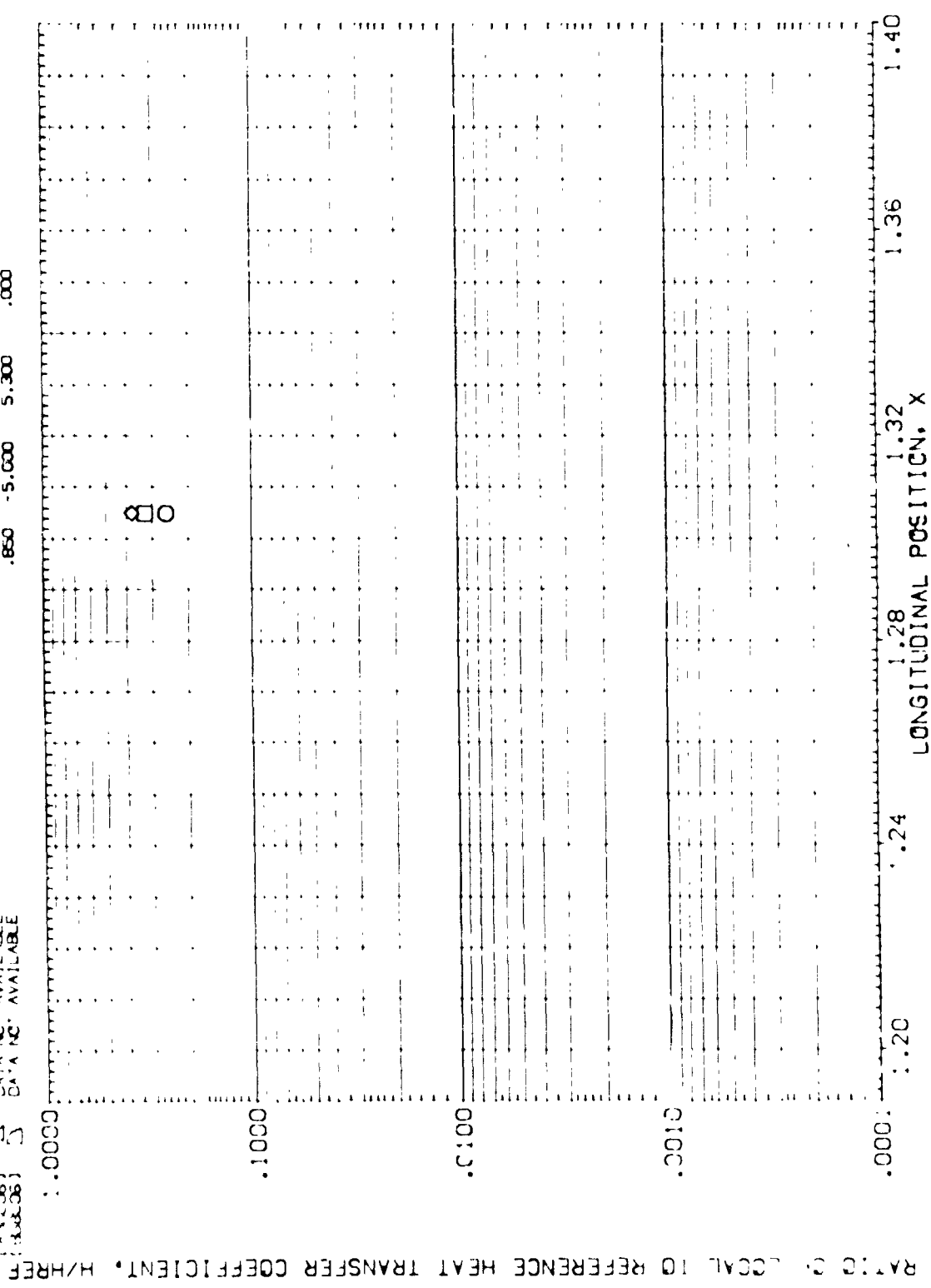


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

DATA SET SYMBOL

CONFIGURATION DESCRIPTION

(WINDSHIELD)
(WINDSHIELD)
(WINDSHIELD)

MAV/MT ALPHA MACH PHI-M

1.000 -5.000 5.300 .000
 .900 -5.000 5.200 .000
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

(R80C02)
(A80C02)
(H80C02)
(K80C06)
(A80C06)
(S80C06)

ARC 3.5-172 THIS ORBITER
 ARC 3.5-172 THIS ORBITER
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

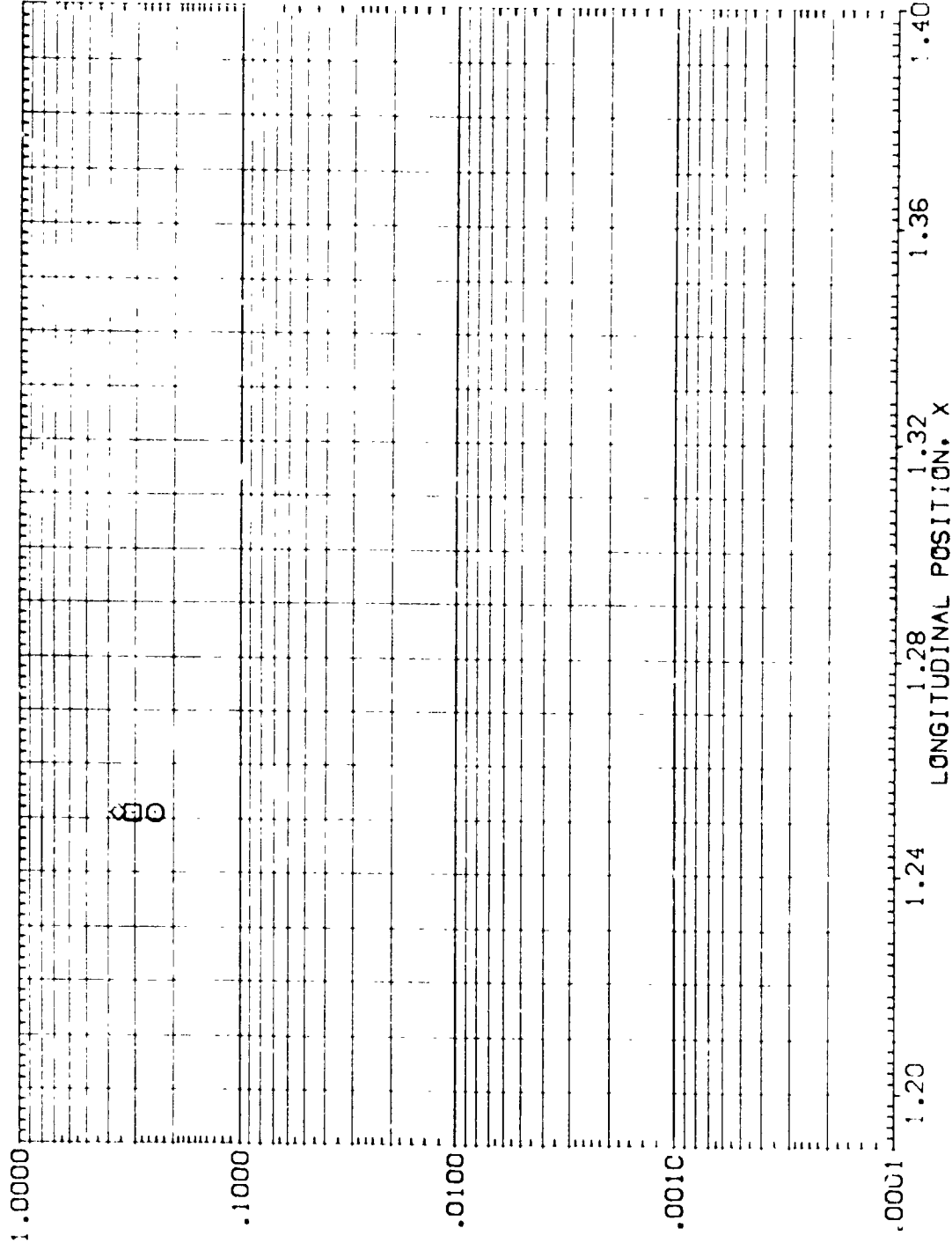


FIG. 27 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, WINDSHIELD.

RN/L = 6.131 MACH = 5.300 Y = .213

DATA POINT SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA HAV/HT PHI-TM

(108C06)	ARC 3.5-172	[HIS DRB + ET *SRB (WINDSHIELD)]	5.300	-5.000	1.000	.000
(108C06)	ARC 3.5-172	[HIS DRB + ET *SRB (WINDSHIELD)]	5.300	-5.000	.900	.000
(108C06)	ARC 3.5-172	[HIS DRB + ET *SRB (WINDSHIELD)]	5.300	-5.000	.850	.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

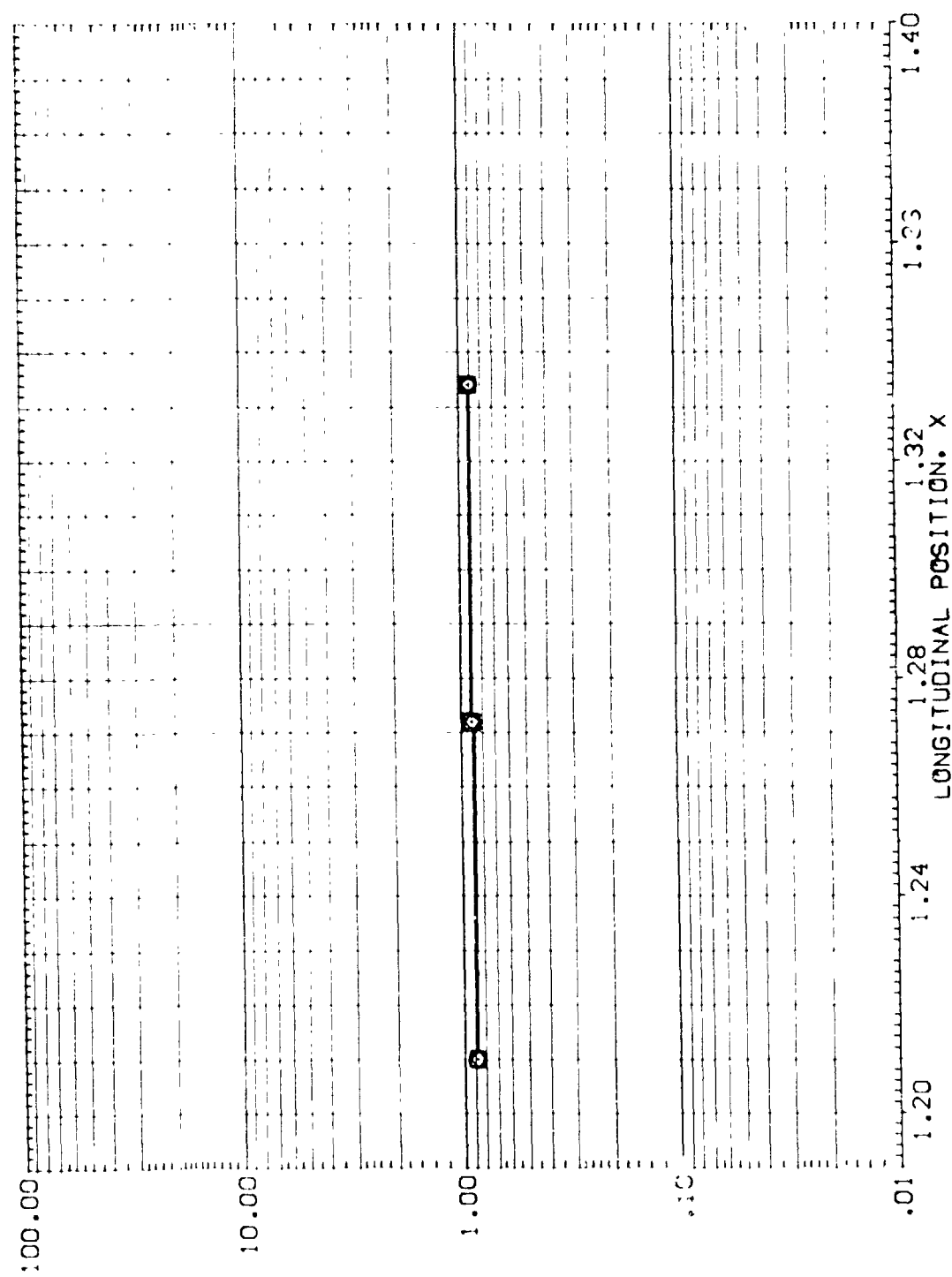


FIG. 28 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., WINDSHIELD.

ORNL/L = 1.952 MACH = 5.300 Y = .047 PAGE 232



DATA SET SYMBOL
 (DB8C06)
 (EB8C06)
 (FB8C06)

CONFIGURATION DESCRIPTION

ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]
 ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]
 ARC 3.5-172 [H15 ORB + ET +SRB (WINDSHIELD)]

HAV/HT ALPHA MACH PHI-H
 1.000 -5.000 5.300 .000
 .900 -5.000 5.300 .000
 .850 -5.000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

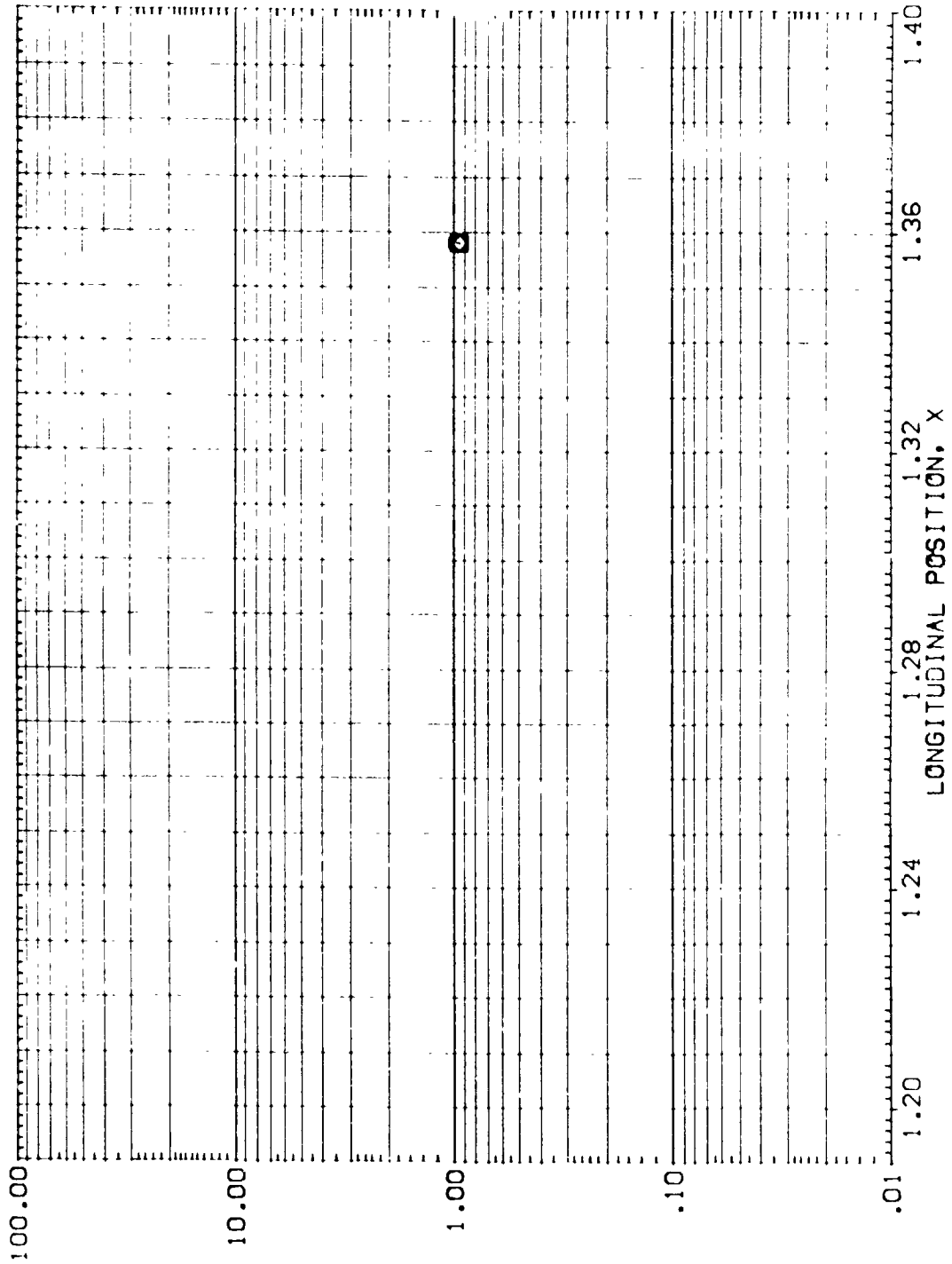


FIG. 28 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., WINDSHIELD.

ORNL = 1.952 MACH = 5.300 Y = .178

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(ORBC06) Q ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)
 (EBC06) X ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)
 (FBC06) Y ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)

HAW/HT ALPHA MACH RH[-] M
 1.000 -5.000 5.300 .000
 .500 -5.000 5.300 .000
 .650 -5.000 5.300 .000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

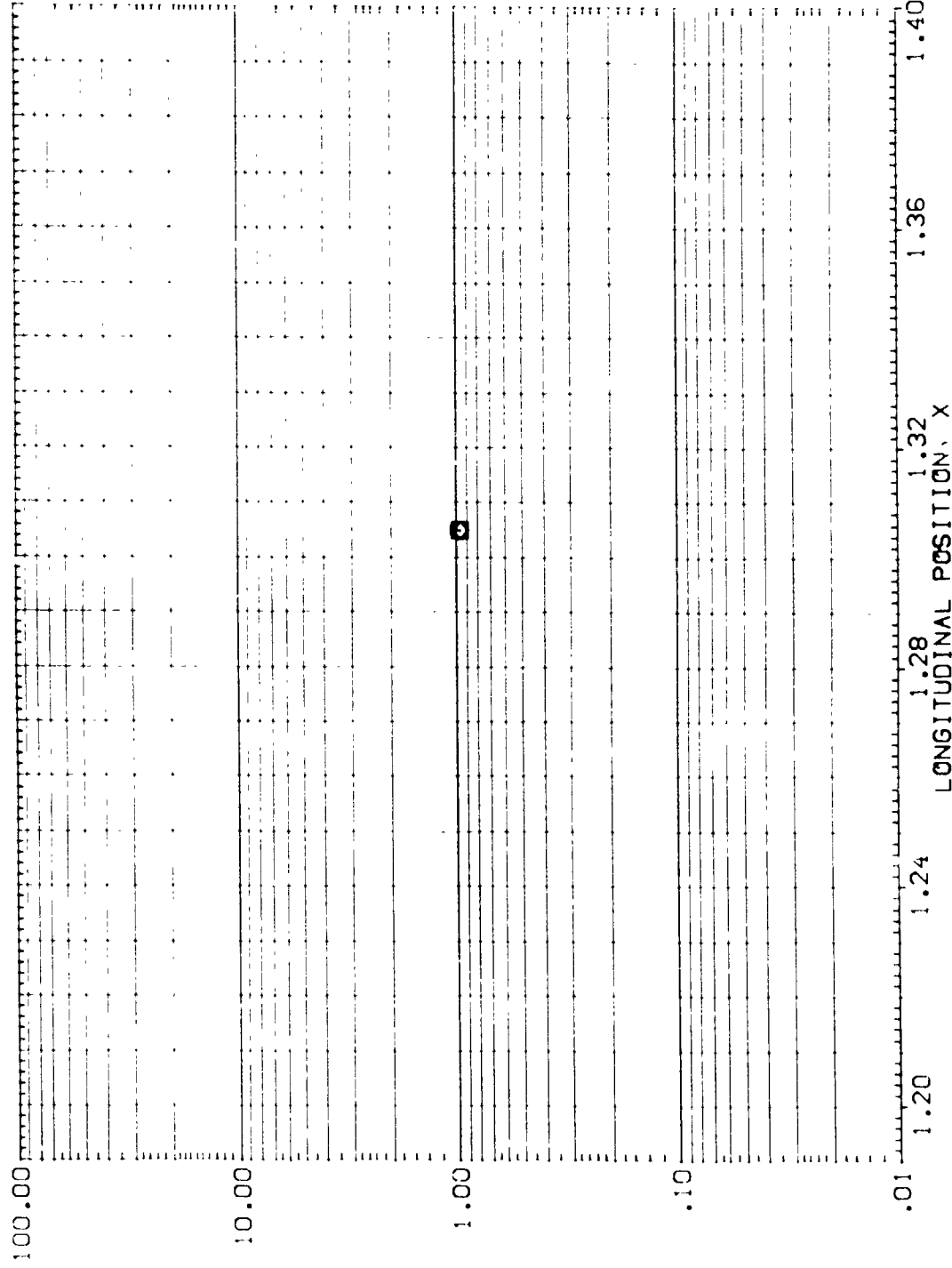


FIG. 28 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFF., WINDSHIELD.

ORN/L = 1.952 MACH = 5.300 Y = .196 PAGE 234



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-M
(DB8C06)	ARC 3.5-172 IH15 OR8 + ET +SR8 (WINDSHIELD)	1.000	-5.000	5.300	.000
(EB8C06)	ARC 3.5-172 IH15 OR8 + ET +SR8 (WINDSHIELD)	.800	-5.000	5.300	.000
(FB8C06)	ARC 3.5-172 IH15 OR8 + ET +SR8 (WINDSHIELD)	.650	-5.000	5.300	.000

RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEFFICIENT, HI/HU

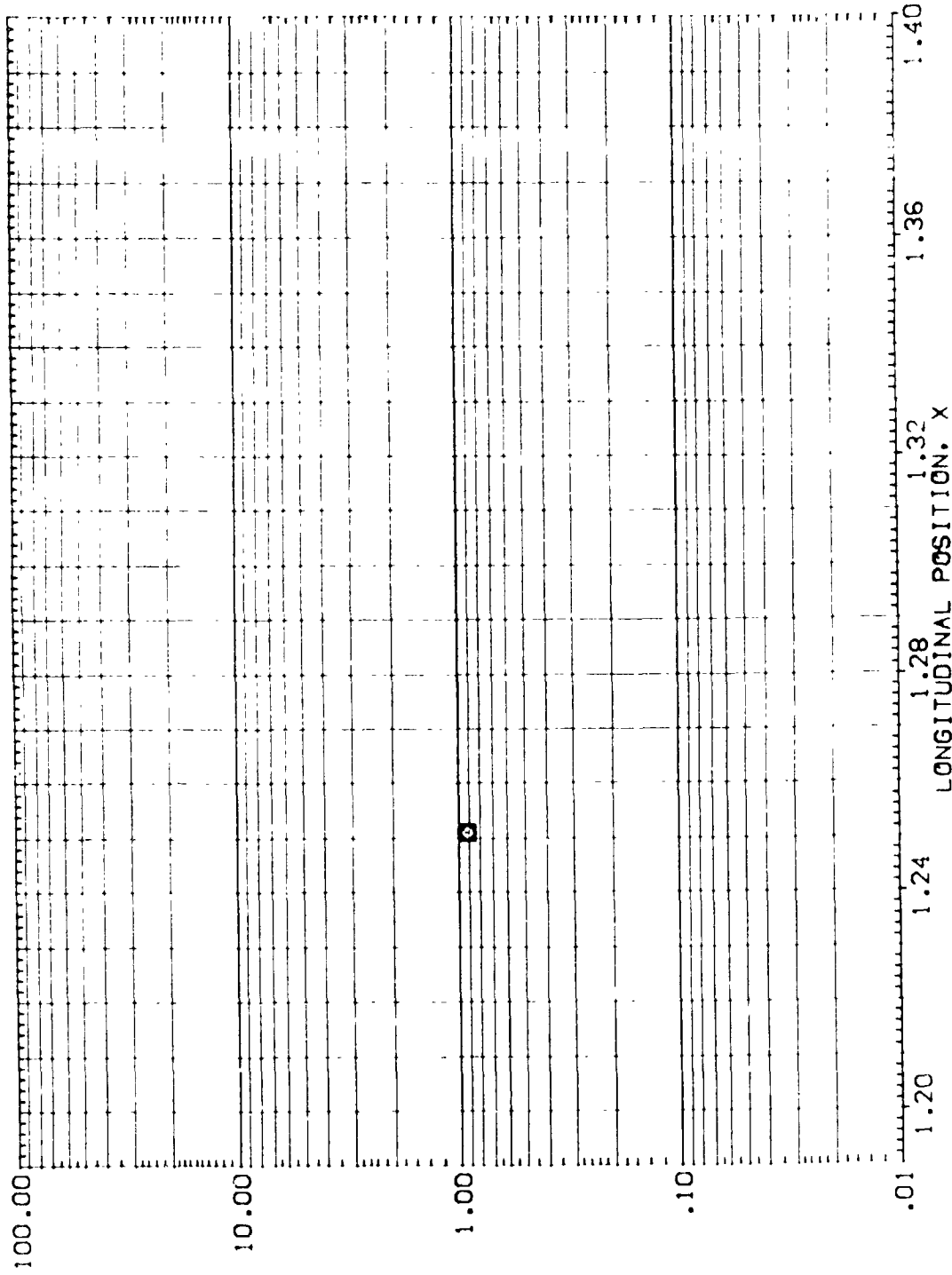


FIG. 28 RATIO OF INTERFERENCE TO UNDISTURBED HEAT TRANSFER COEF., WINDSHIELD.

CPN/L = 1.952 CH = 5.300 Y = .213

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (038103) ARC 3.5-172 IHIS ORB + ET
 (138103) ARC 3.5-172 IHIS ORB + ET
 (338103) ARC 3.5-172 IHIS ORB + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

HAW/HT 1.000
 .900
 .850

ALPHA .000
 .000
 .000

M/CH 5.300
 5.300
 5.300

PHI-M .000
 .000
 .000

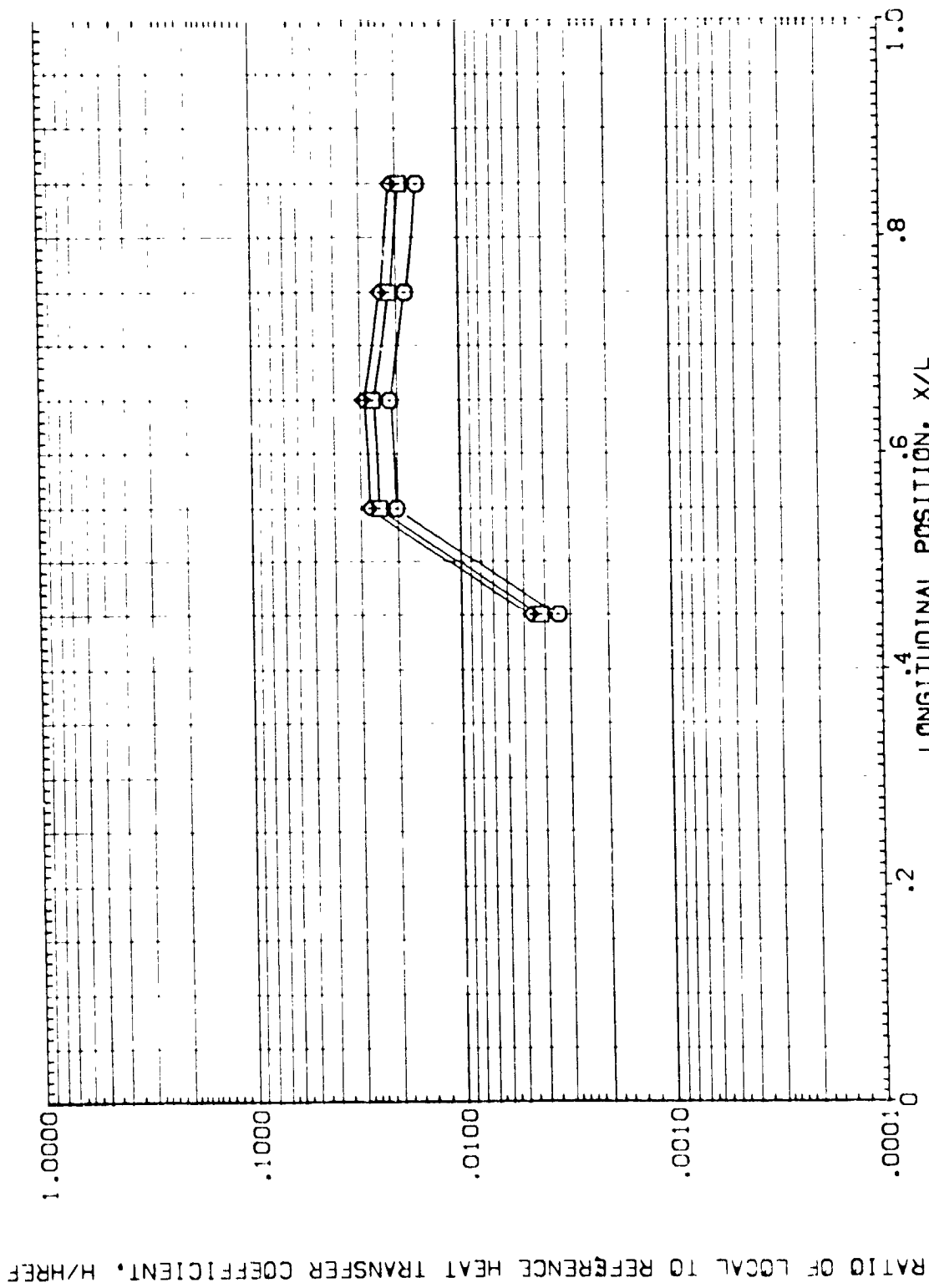


FIG. 29 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.332 MACH = 5.300 PHI = 90.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88103) ARC 3.5-172 [H]S DR8 + ET
 (A88103) ARC 3.5-172 [H]S DR8 + ET
 (B88103) ARC 3.5-172 [H]S DR8 + ET

(EXTERNAL TANK)
 (EXTERNAL TANK)
 (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .500 .000 5.300 .000
 .850 .000 5.300 .000

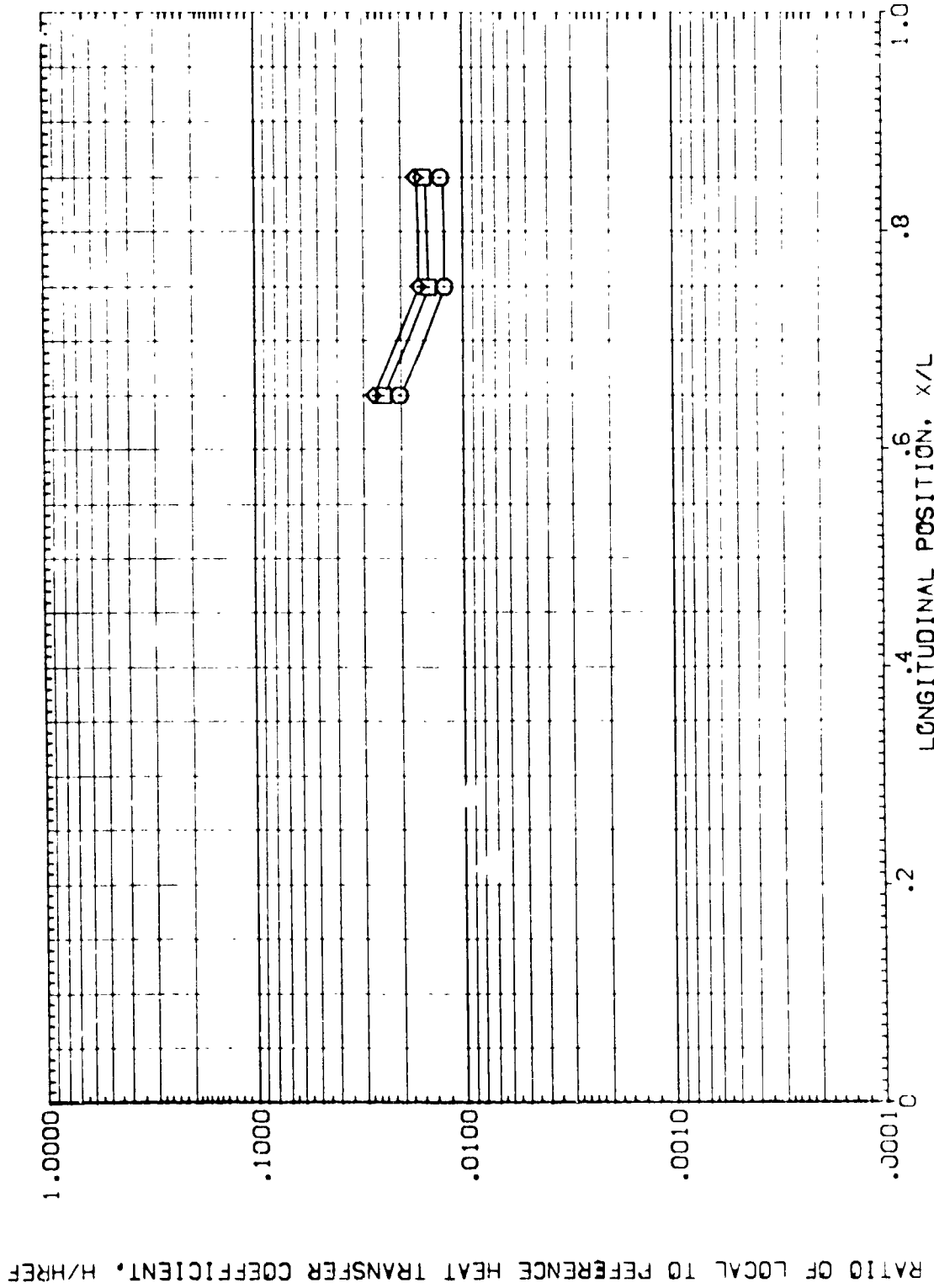


FIG. 29 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(438103) ARC 3.5-172 IM15 OR8 + ET 1.000 .000 5.300 .000

(438103) ARC 3.5-172 IM15 OR8 + ET .900 .000 5.300 .000

(838103) ARC 3.5-172 IM15 OR8 + ET .850 .000 5.300 .000

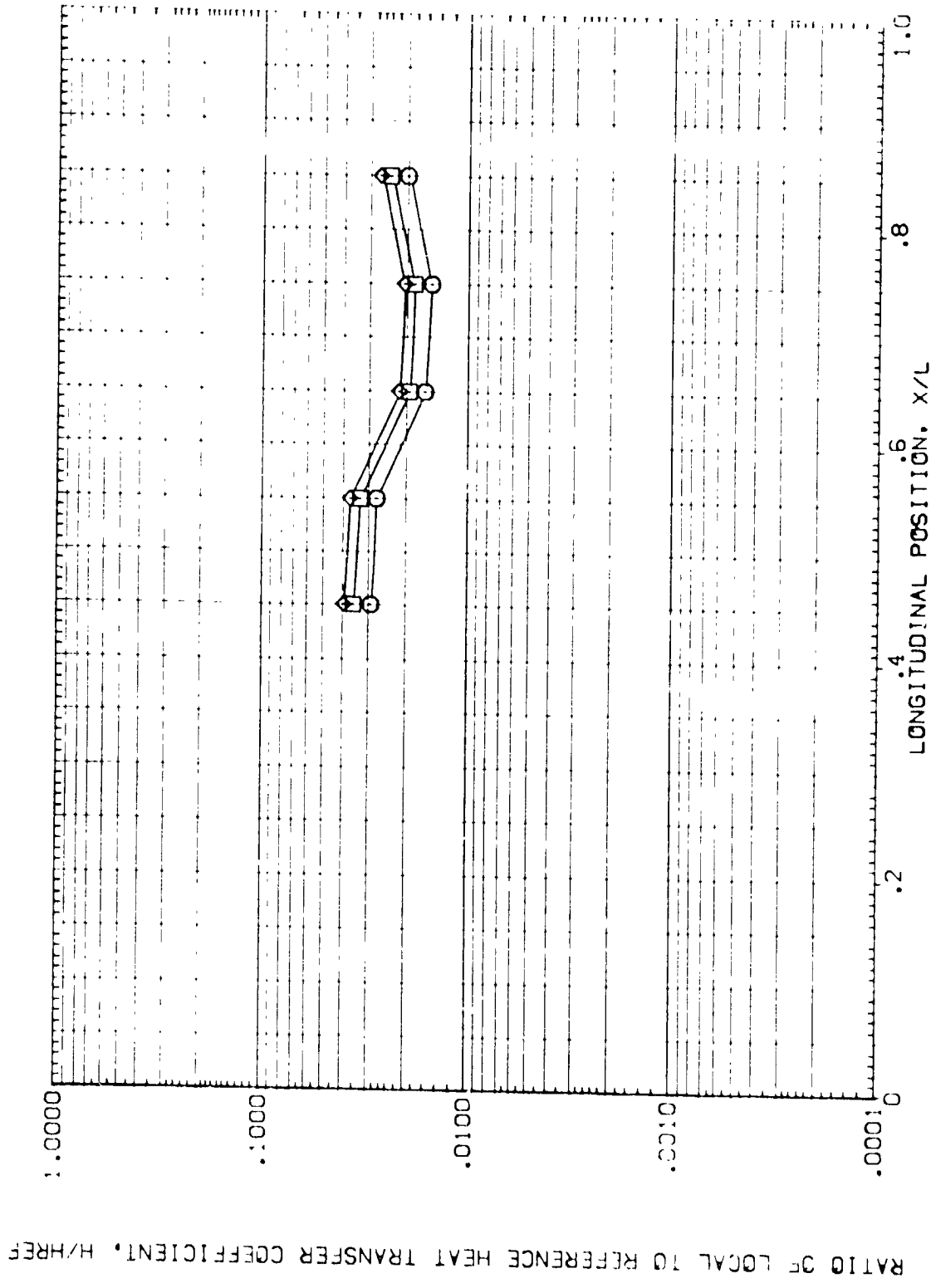


FIG. 2^a UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.332 MACH = 5.300 PHI = 135.000 PAGE 238



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (P88T03) ○ ARC 3.5-172 IH15 DR8 + ET (EXTERNAL TANK)
 (A88T03) ⊗ ARC 3.5-172 IH15 DR8 + ET (EXTERNAL TANK)
 (B88T03) ⊗ ARC 3.5-172 IH15 DR8 + ET (EXTERNAL TANK)

MAV/HT ALPHA MACH PHI-H
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

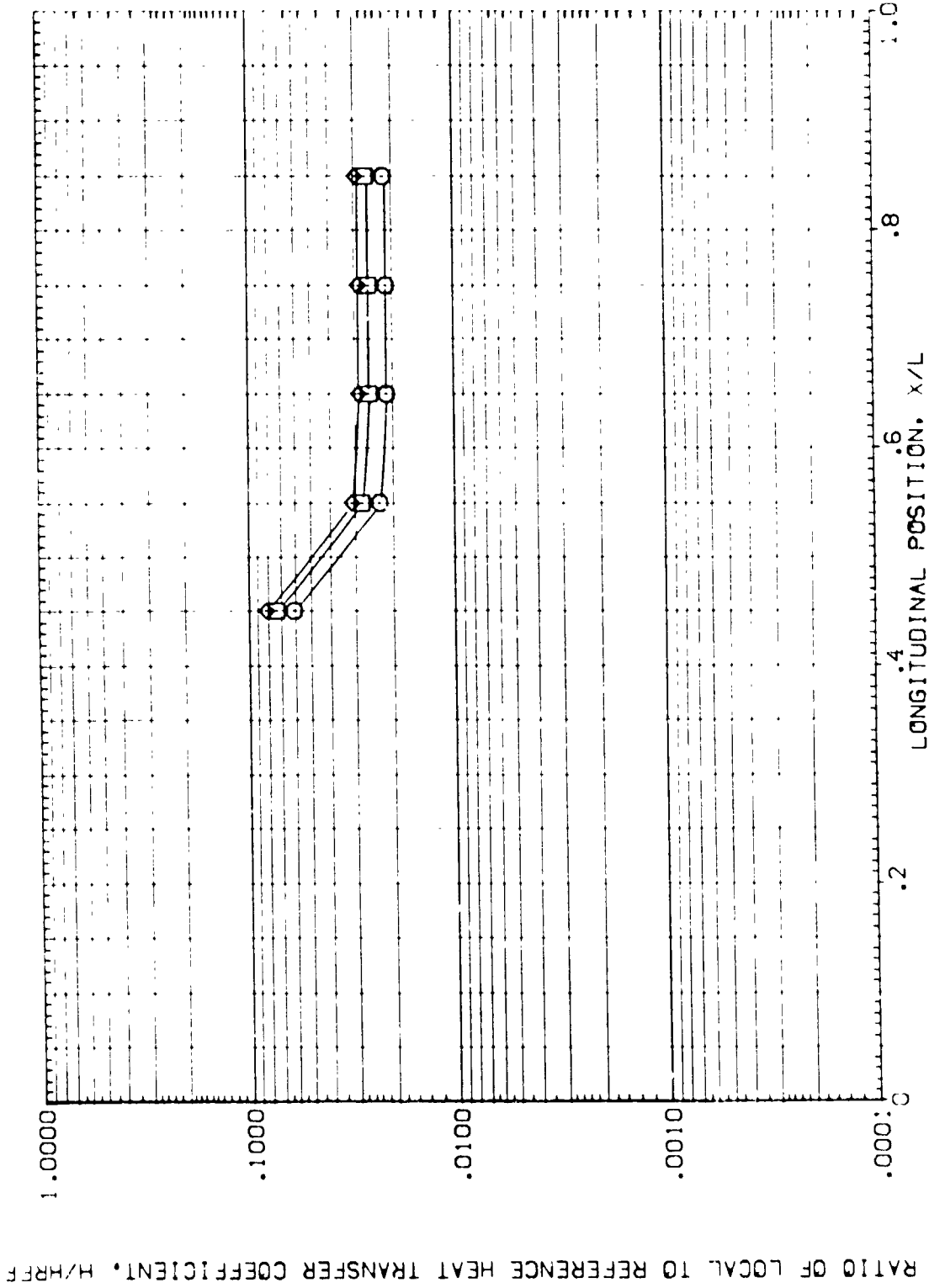


FIG. 29 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK

DATA SET SYMBOL C SUBURATION DESCRIPTION
 (488'05) DATA NOT AVAILABLE
 (488'06) DATA NOT AVAILABLE
 (488'07) DATA NOT AVAILABLE
 (488'08) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)
 (488'09) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)
 (488'10) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)
 (488'11) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)

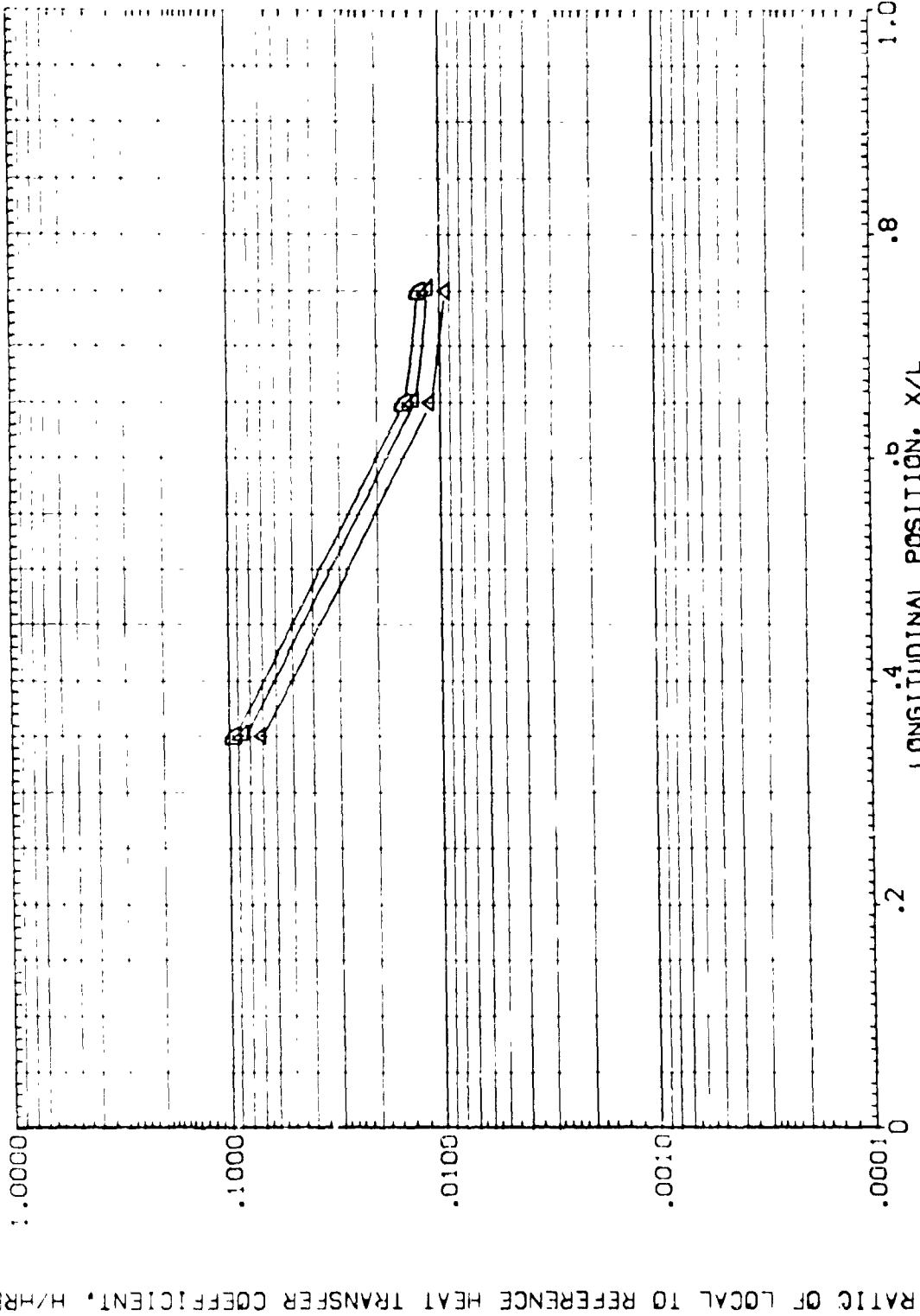


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.845 MACH = 5.300 PHI = 67.50° PAGE 240



DATA SET SYMBOL: **03-12**

CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
ARC 3-5-172 H15 D98 + ET +SR8 (EXTERNAL TANK)	1.000	.000	5.300	.000
ARC 3-5-172 H15 D98 + ET +SR8 (EXTERNAL TANK)	.900	.000	5.300	.000
ARC 3-5-172 H15 D98 + ET +SR8 (EXTERNAL TANK)	.850	.000	5.300	.000
ARC 3-5-172 H15 D98 + ET +SR8 (EXTERNAL TANK)	1.000	.000	5.300	.000
ARC 3-5-172 H15 D98 + ET +SR8 (EXTERNAL TANK)	.900	.000	5.300	.000
ARC 3-5-172 H15 D98 + ET +SR8 (EXTERNAL TANK)	.850	.000	5.300	.000

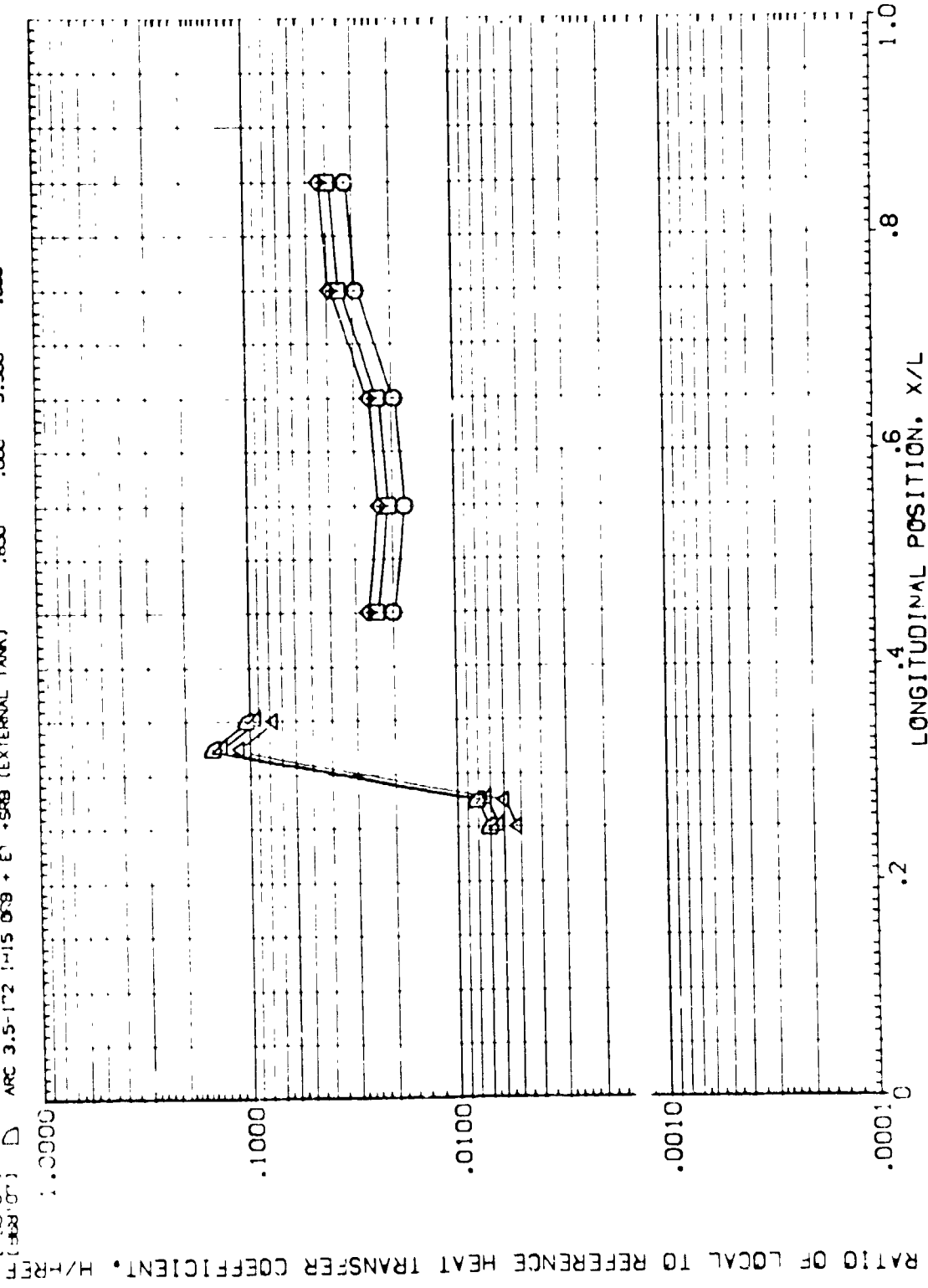


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.845 MAC = 5.300 PHI = 90.000 PAGE 241

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	PHI-M
(X8705)	ARC 3.5-172 (HIS DR8 + ET +SR8 (EXTERNAL TANK)	5.300	.000
(A7805)	ARC 3.5-172 (HIS DR8 + ET +SR8 (EXTERNAL TANK)	5.300	.000
(X7105)	ARC 3.5-172 (HIS DR3 + ET +SR3 (EXTERNAL TANK)	5.300	.000
(A7305)	ARC 3.5-172 (HIS DR3 + ET +SR3 (EXTERNAL TANK)	5.300	.000
(X3005)	ARC 3.5-172 (HIS DR3 + ET +SR3 (EXTERNAL TANK)	5.300	.000
(A3005)	ARC 3.5-172 (HIS DR3 + ET +SR3 (EXTERNAL TANK)	5.300	.000

RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF

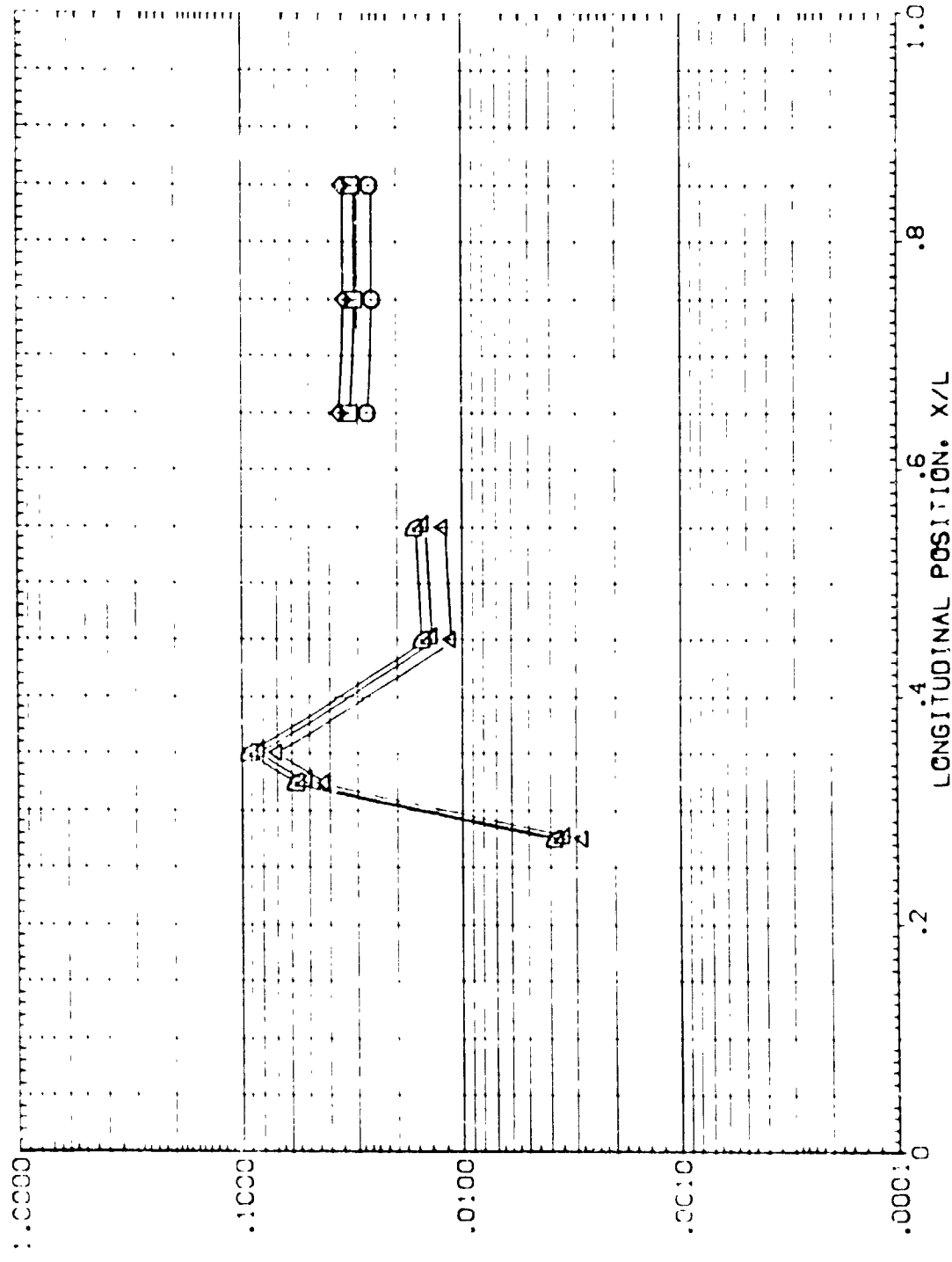
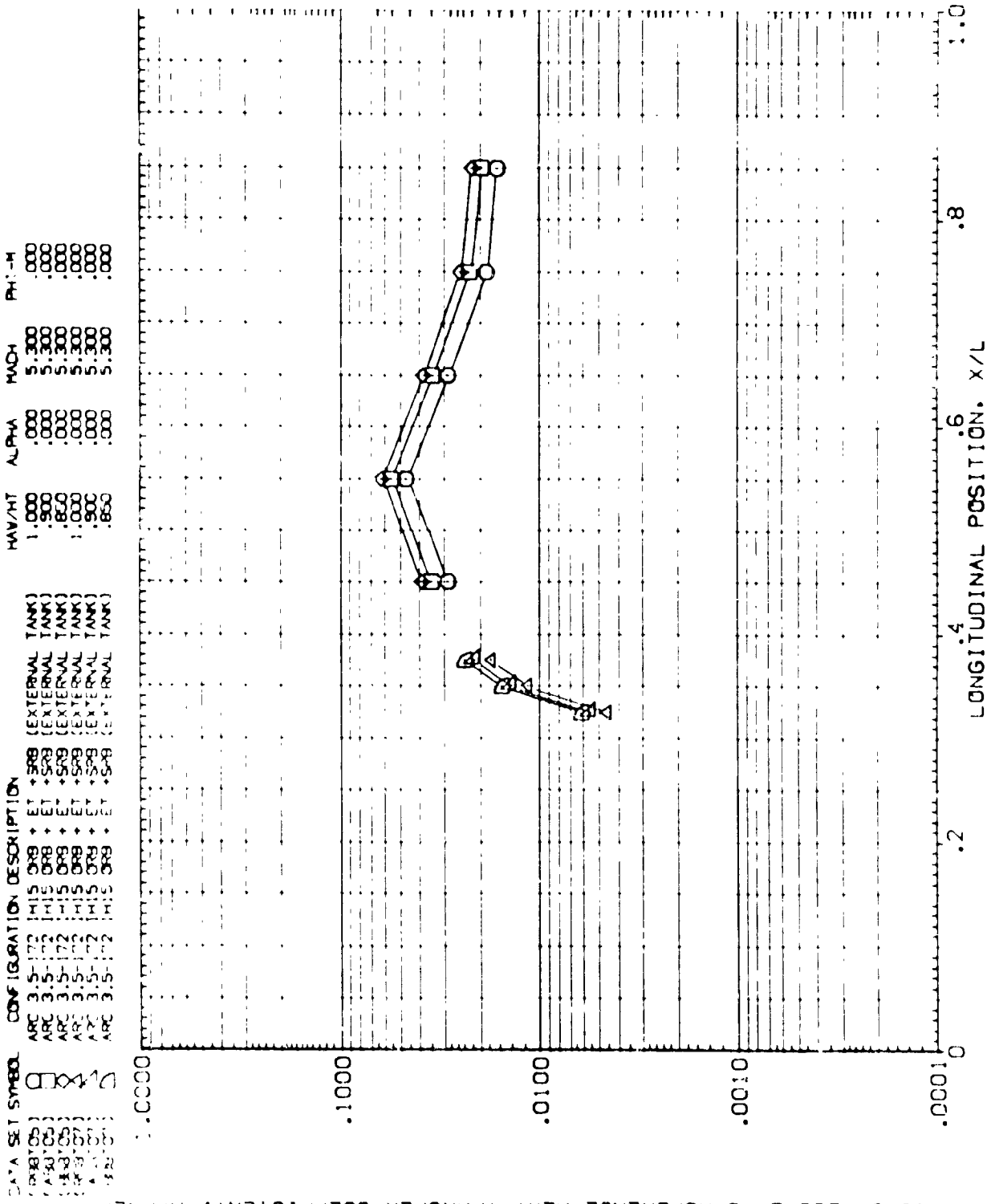


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.



RATIO OF LOCAL TO REFERENCE HEAT TRANSFER COEFFICIENT, H/HREF



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
ARC 3.5-172	HIS ORB + ET + SFB (EXTERNAL TANK)	1.000	.000	5.300	.000
ARC 3.5-172	HIS ORB + ET + SFB (EXTERNAL TANK)	.500	.000	5.300	.000
ARC 3.5-172	HIS ORB + ET + SFB (EXTERNAL TANK)	.800	.000	5.300	.000
ARC 3.5-172	HIS ORB + ET + SFB (EXTERNAL TANK)	1.000	.000	5.300	.000
ARC 3.5-172	HIS ORB + ET + SFB (EXTERNAL TANK)	.500	.000	5.300	.000
ARC 3.5-172	HIS ORB + ET + SFB (EXTERNAL TANK)	.800	.000	5.300	.000

FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK

MACH ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IM15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IM15 ORB + ET +SPB (EXTERNAL TANK)
 ARC 3.5-172 IM15 ORB + ET +SRB (EXTERNAL TANK)

DATA SET SYMBOL
 (S) (S) (S) (S) (S) (S)
 (S) (S) (S) (S) (S) (S)
 (S) (S) (S) (S) (S) (S)
 (S) (S) (S) (S) (S) (S)

DATA NOT AVAILABLE
 DATA NOT AVAILABLE

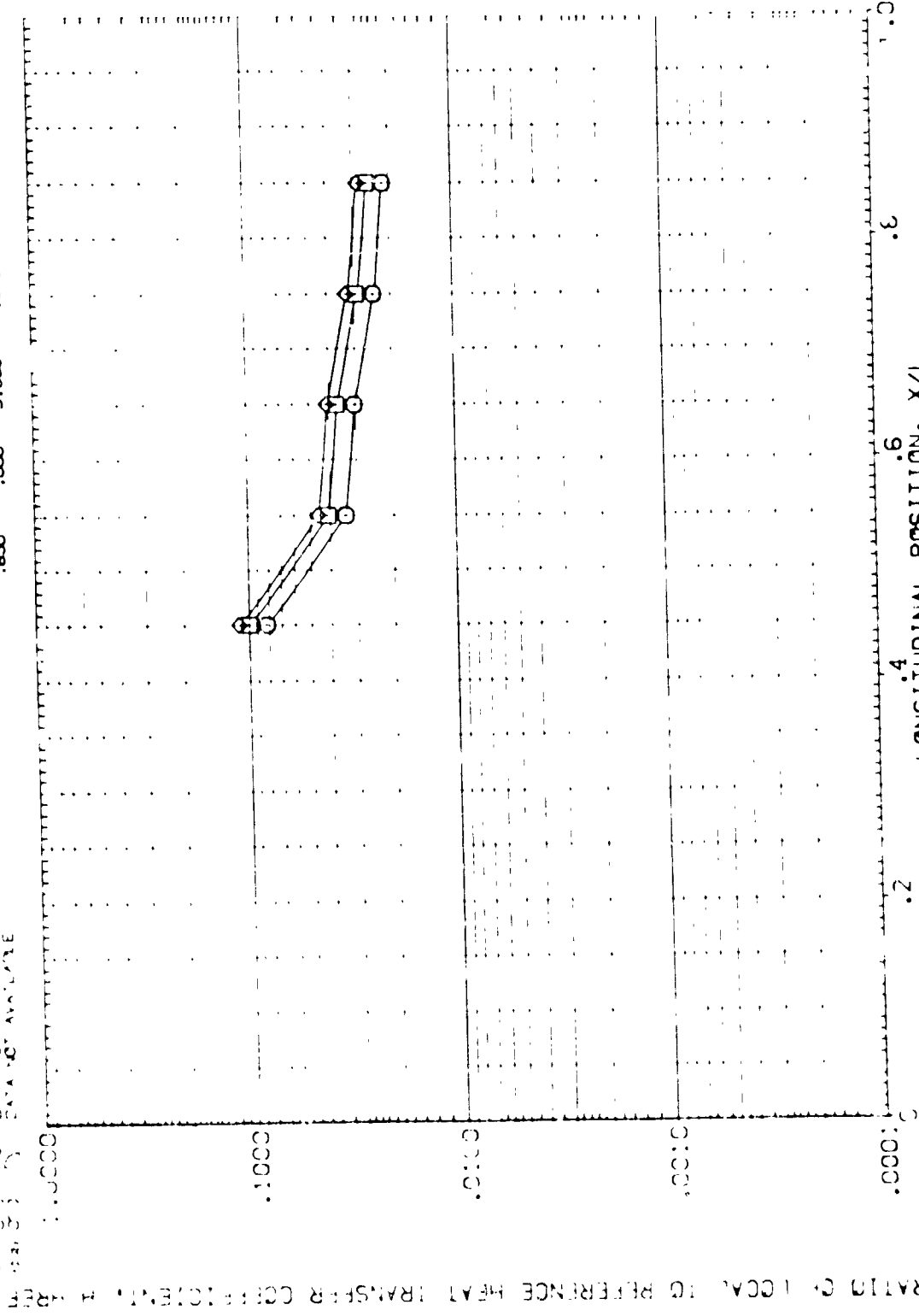


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

$R_{REF} = 1.845$ $MACH = 5.300$ $PHI = 157.500$

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-H

(R08105) DATA NOT AVAILABLE 1.000 .000 5.300 .000
 (A08105) DATA NOT AVAILABLE .900 .000 5.300 .000
 (E08105) DATA NOT AVAILABLE .850 .000 5.300 .000
 (R03107) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)) 1.000 .000 5.300 .000
 (A03107) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)) .900 .000 5.300 .000
 (E03107) ARC 3.5-172 (HIS ORB + ET +SRB (EXTERNAL TANK)) .850 .000 5.300 .000

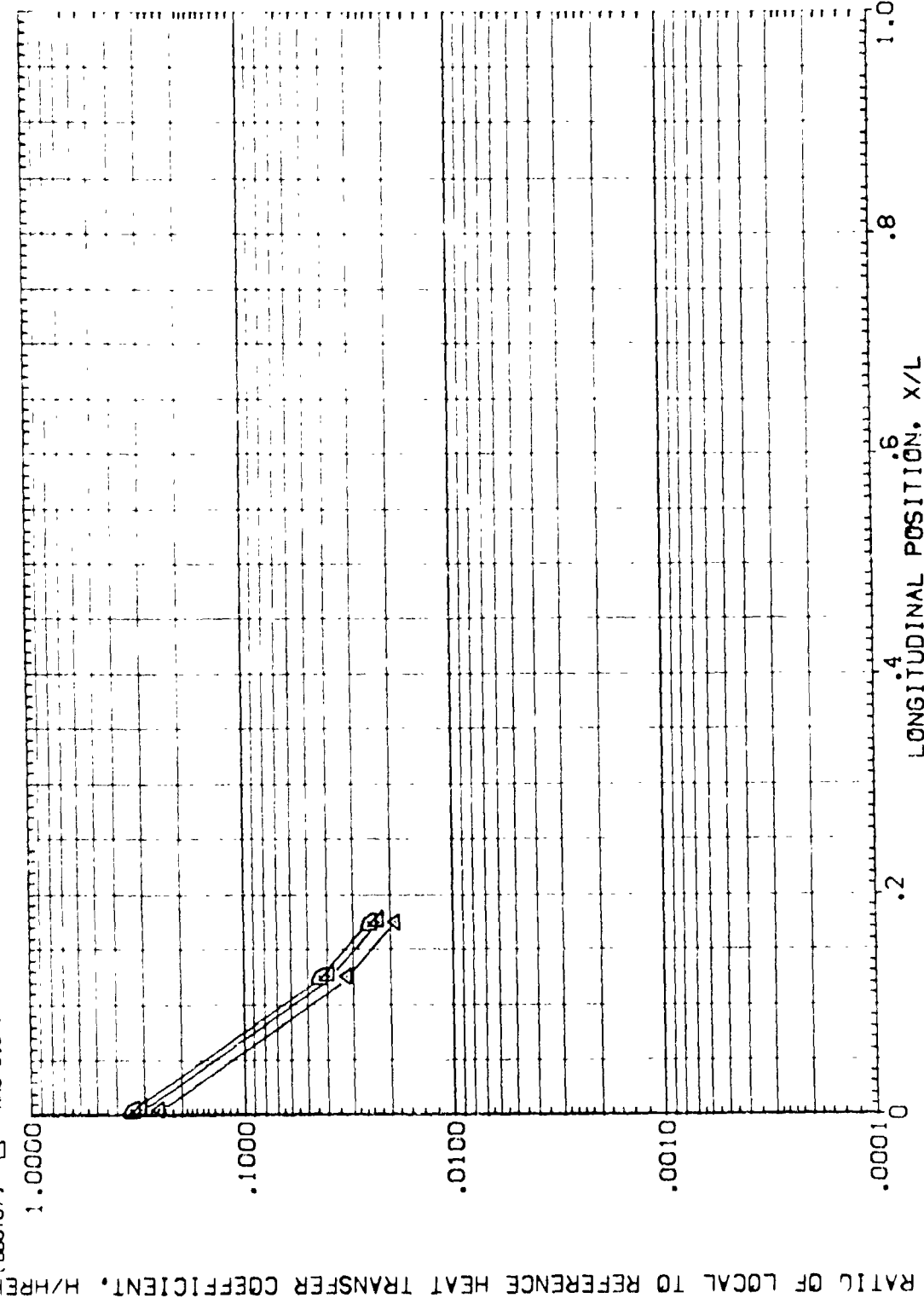


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK,

RN/L = 1.845 MACH = 5.300 PHI = 180.000 PAGE 245

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAW/HT ALPHA MACH PHI-H

(R887C5) DATA NOT AVAILABLE 1.000 .000 5.300 .000

(A887C5) DATA NOT AVAILABLE .900 .000 5.300 .000

(9887C5) DATA NOT AVAILABLE .850 .000 5.300 .000

(R887C7) ARC 3.5-172 I415 ORB + ET +SRB (EXTERNAL TANK) 1.000 .000 5.300 .000

(A887C7) ARC 3.5-172 I415 ORB + ET +SRB (EXTERNAL TANK) .900 .000 5.300 .000

(8887C7) ARC 3.5-172 I415 ORB + ET +SRB (EXTERNAL TANK) .850 .000 5.300 .000

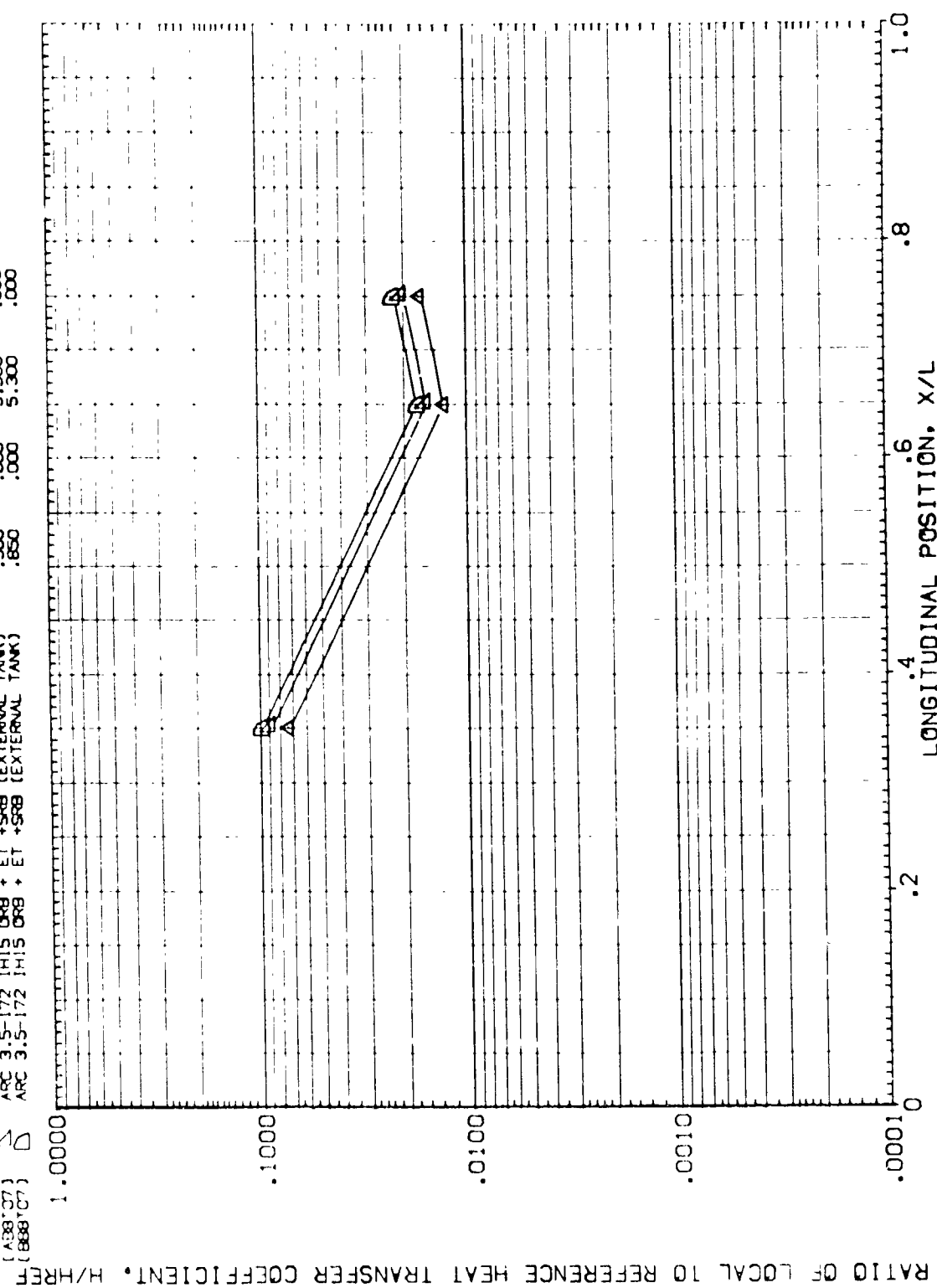


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.437 MACH = 5.300 PHI = 67.500 PAGE 246

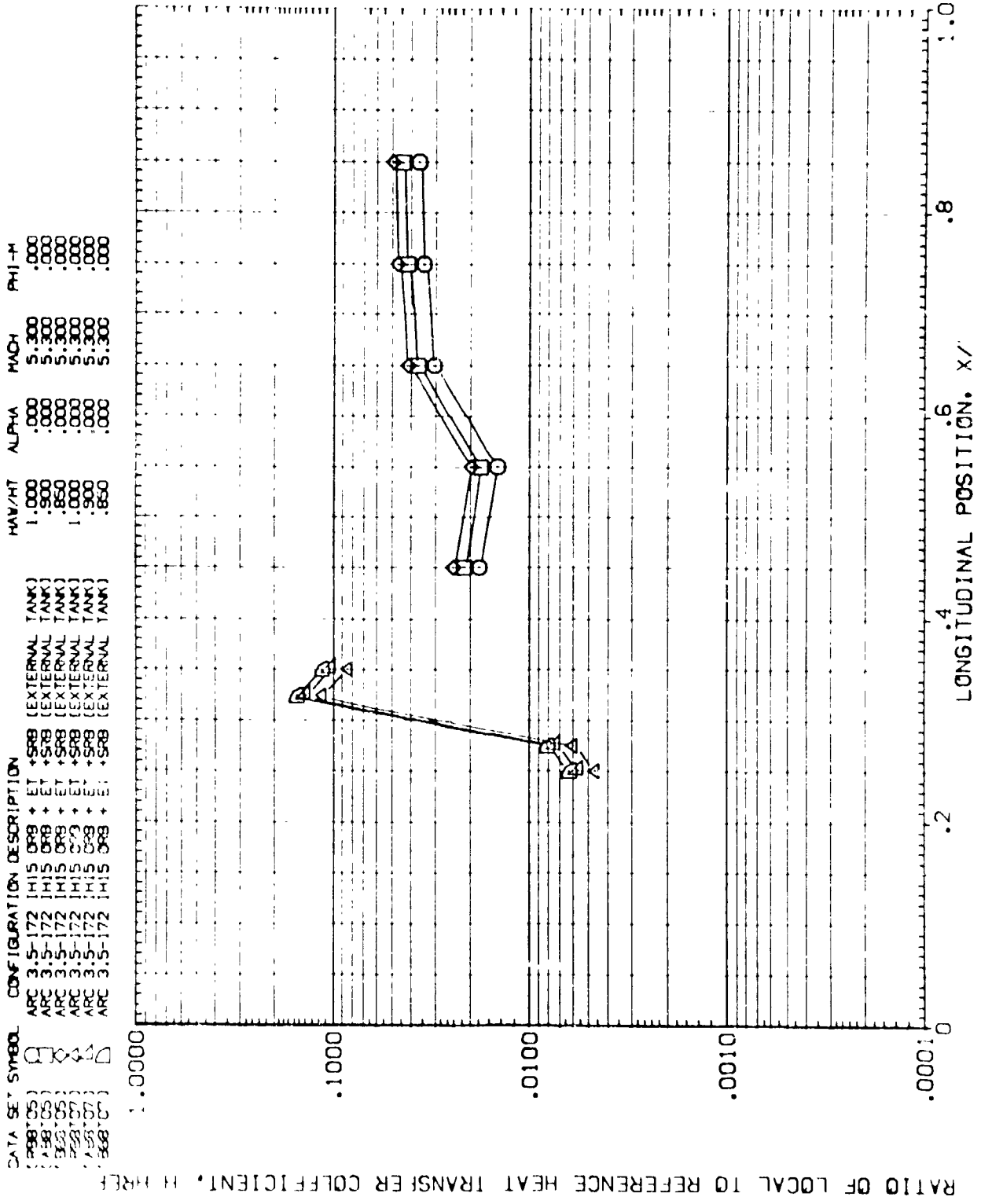


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL
 (R8B105)
 (A5B106)
 (B3B105)
 (R8B107)
 (A5B107)
 (B3B107)

CONFIGURATION DESCRIPTION
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)
 ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)

HAV/HT ALPHA MACH PHI-M
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000
 1.000 .000 5.300 .000
 .900 .000 5.300 .000
 .850 .000 5.300 .000

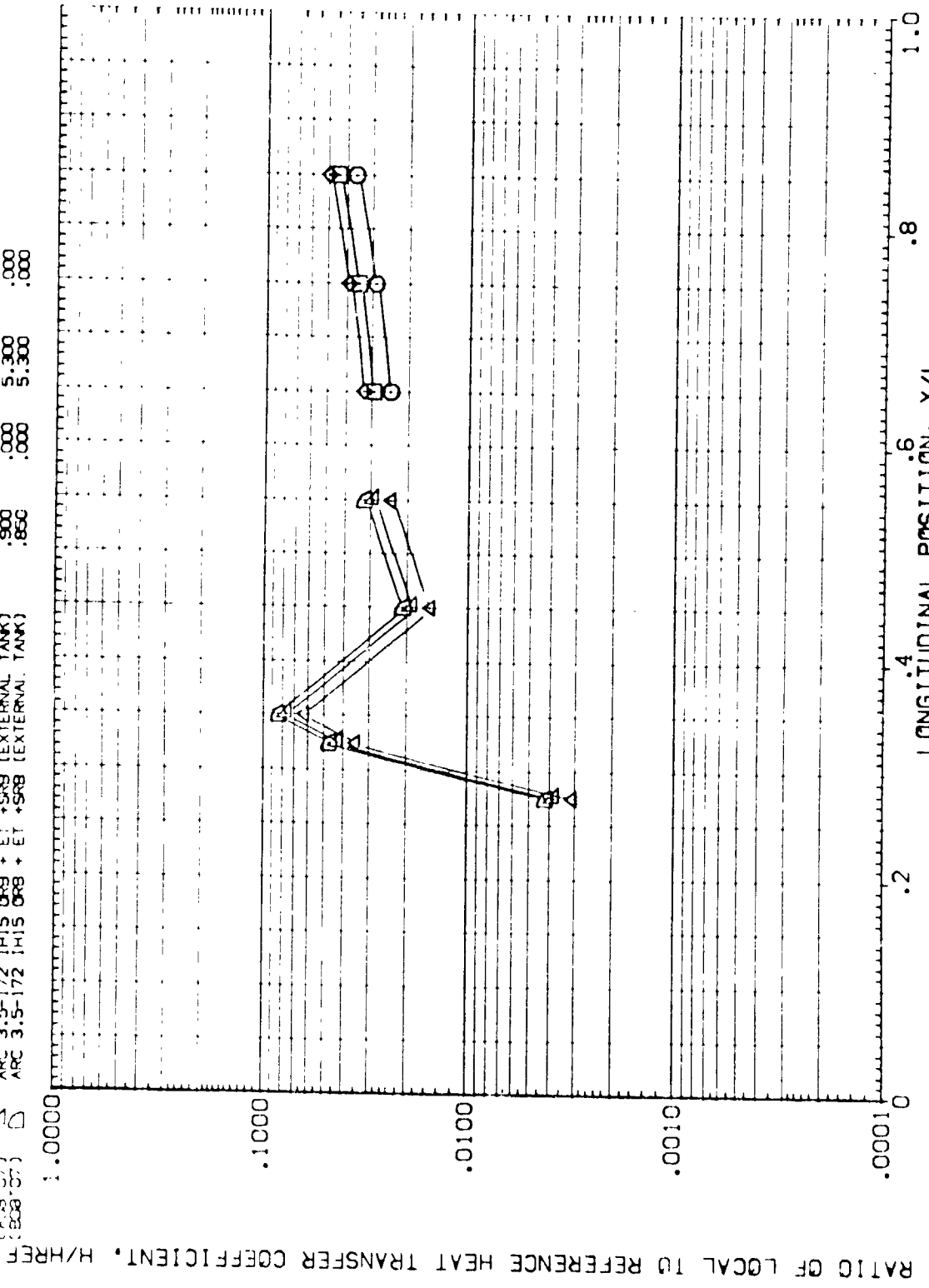


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

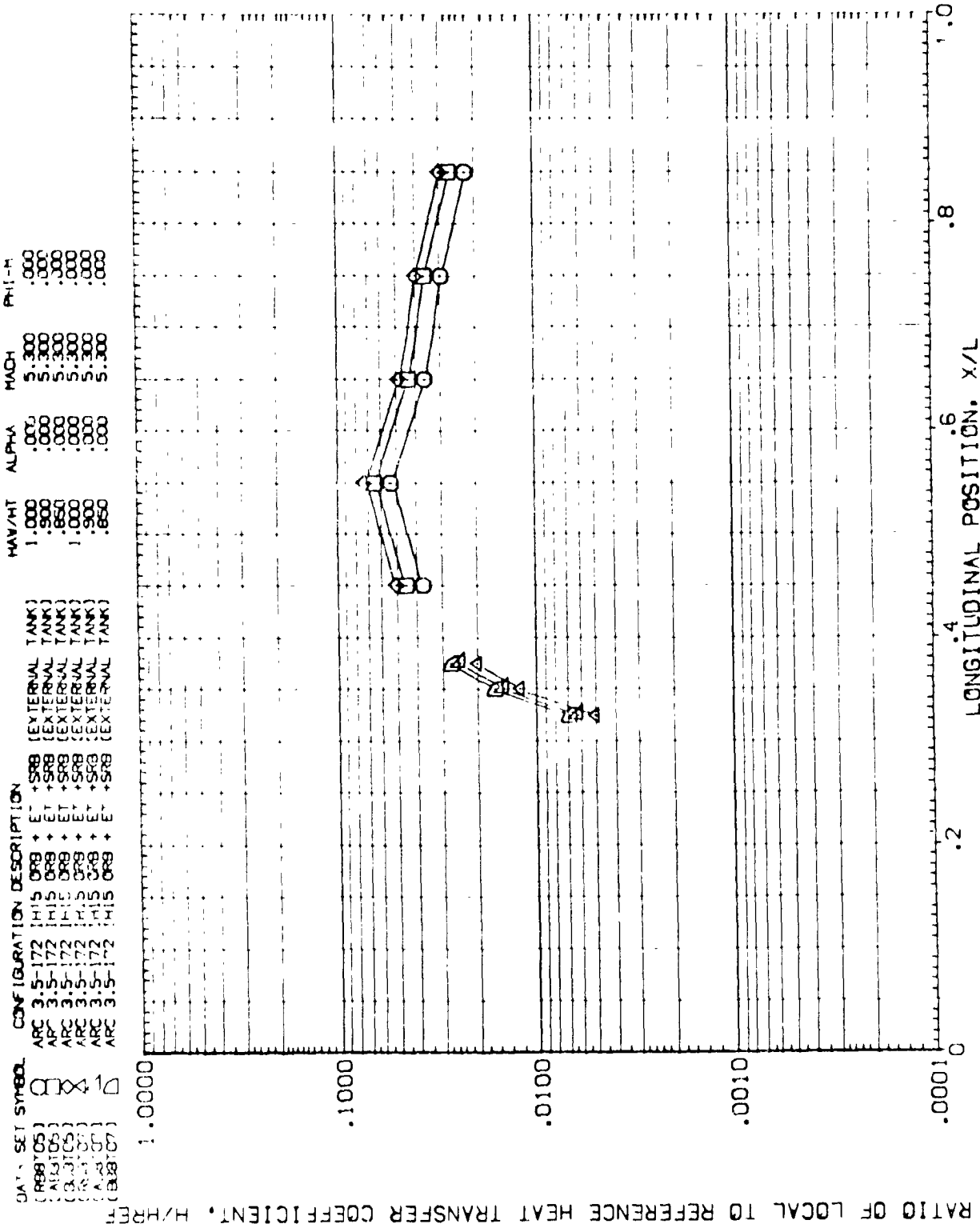


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK

RN/L = 4.437 MAC = 5.300 PHI = 135.000 P. 5 245

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(F38102) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) 1.000 .000 5.300 .000

(A18103) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) .900 .000 5.300 .000

(E73105) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) .850 .000 5.300 .000

(R73107) DATA NOT AVAILABLE 1.000 .000 5.300 .000

(A88107) DATA NOT AVAILABLE .950 .000 5.300 .000

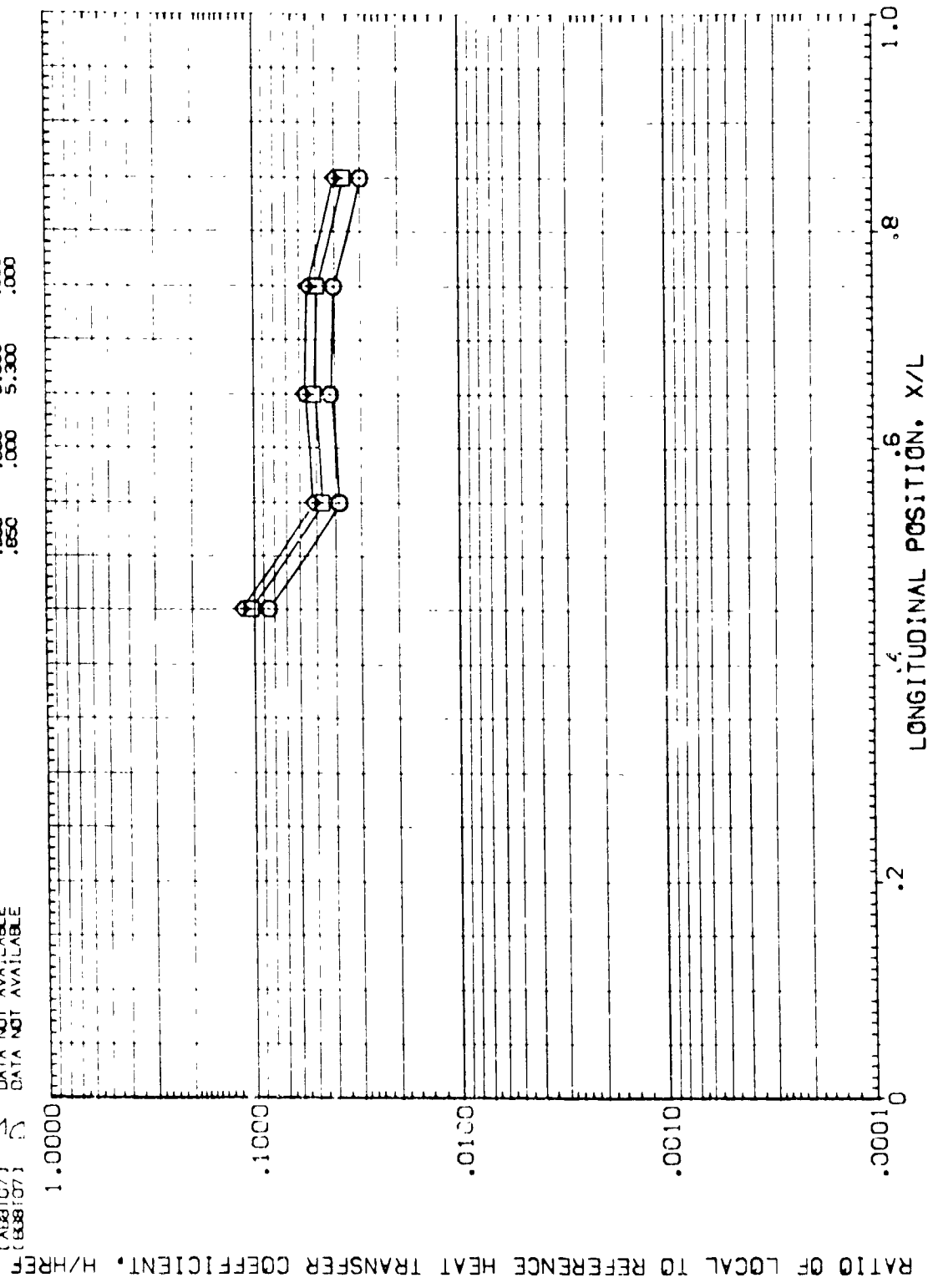


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.437 MACH = 5.300 PHI = 157.500 PAGE 250



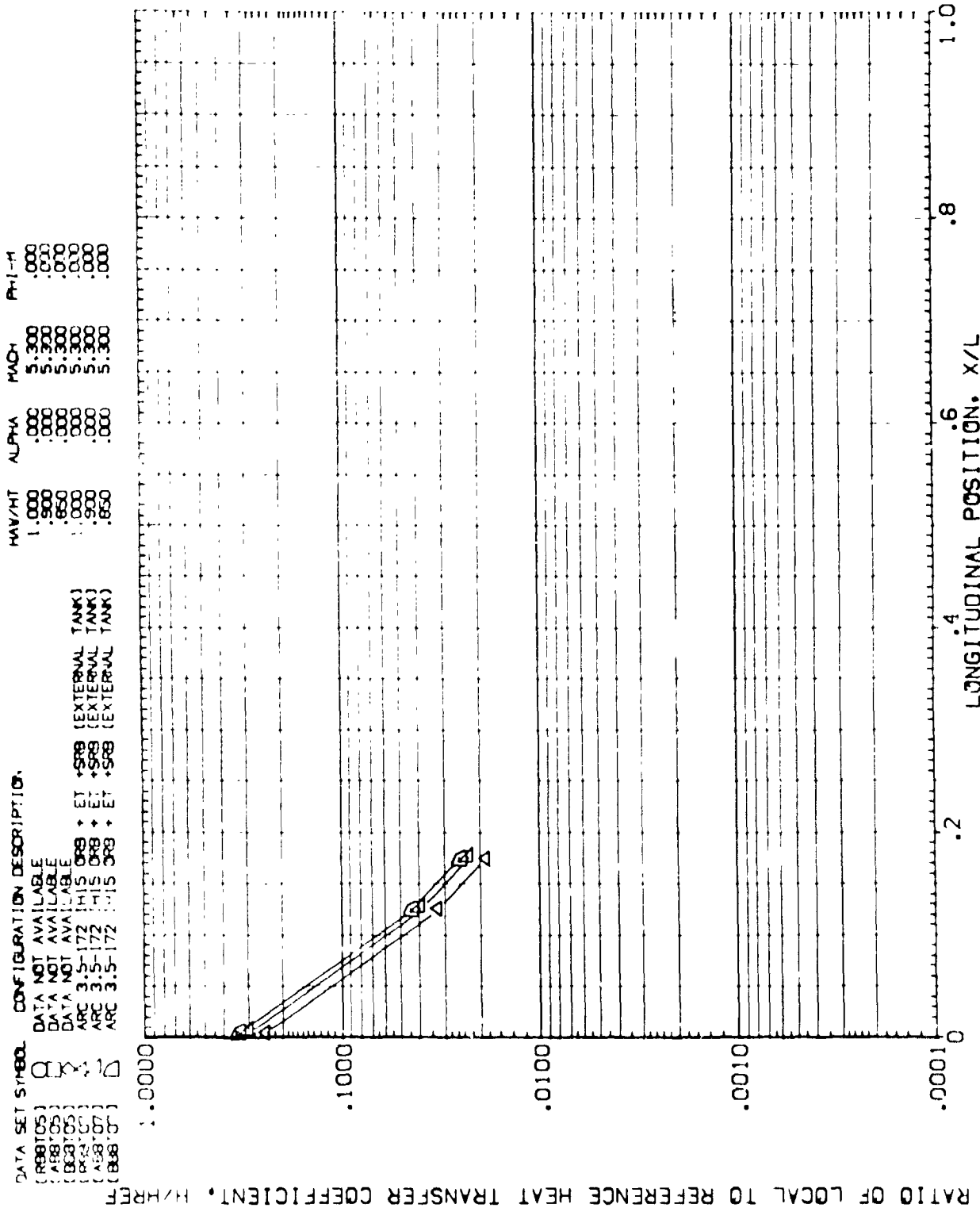


FIG. 30 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (A8706) DATA NOT AVAILABLE
 (A8705) DATA NOT AVAILABLE
 (A8706) DATA NOT AVAILABLE
 (A8708) ARC 3.5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)]
 (A8808) ARC 3.5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)]
 (A8808) ARC 3.5-172 [H15 ORB + ET +SRB (EXTERNAL TANK)]

MAV/HT ALPHA MACH PHI-M
 1.000 -5.000 5.300 .000
 .850 -5.000 5.300 .000
 1.000 -5.000 5.300 .000
 .850 -5.000 5.300 .000

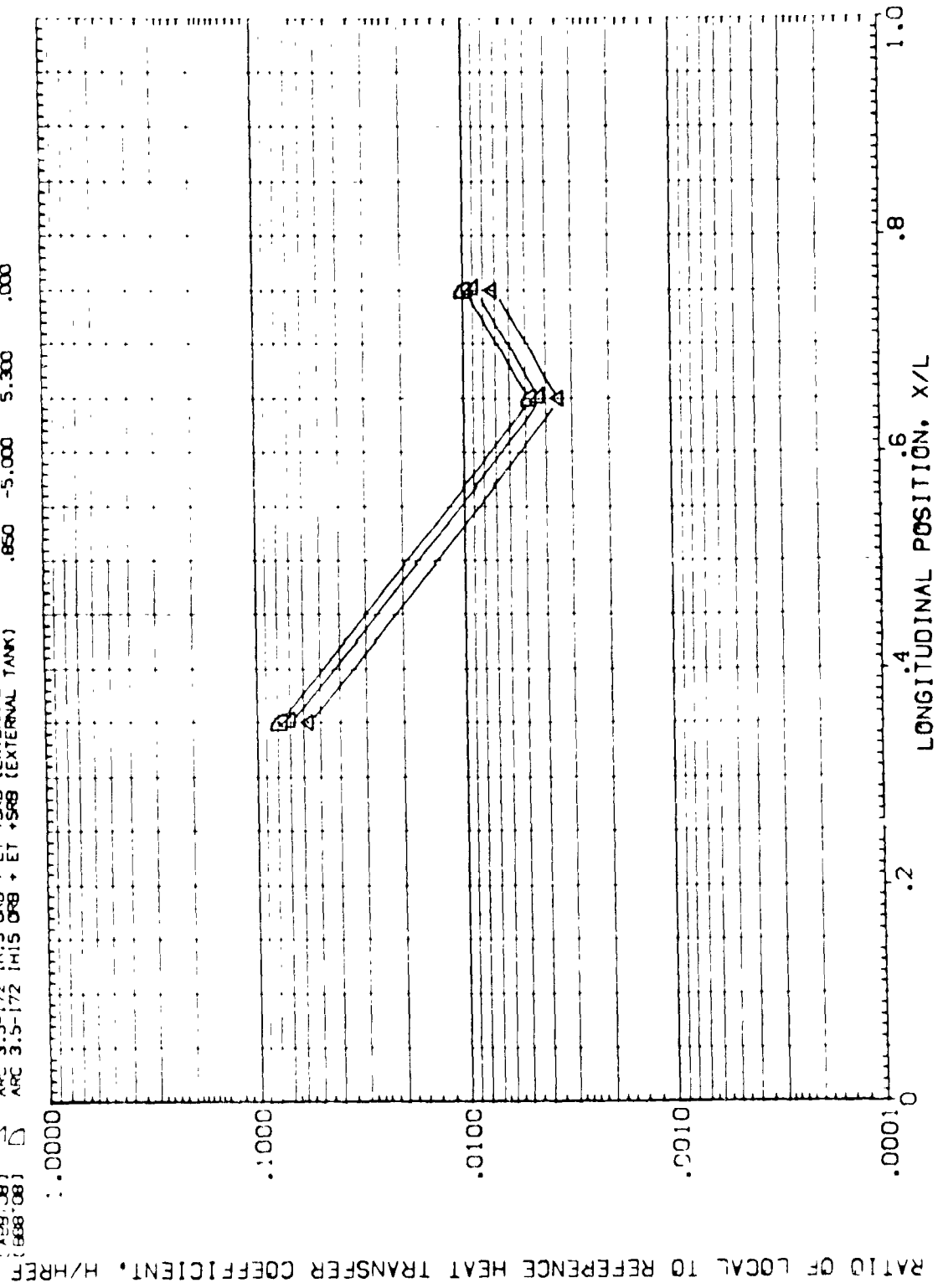


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.952 MACH = 5.300 PHI = 67.500 PAGE 252



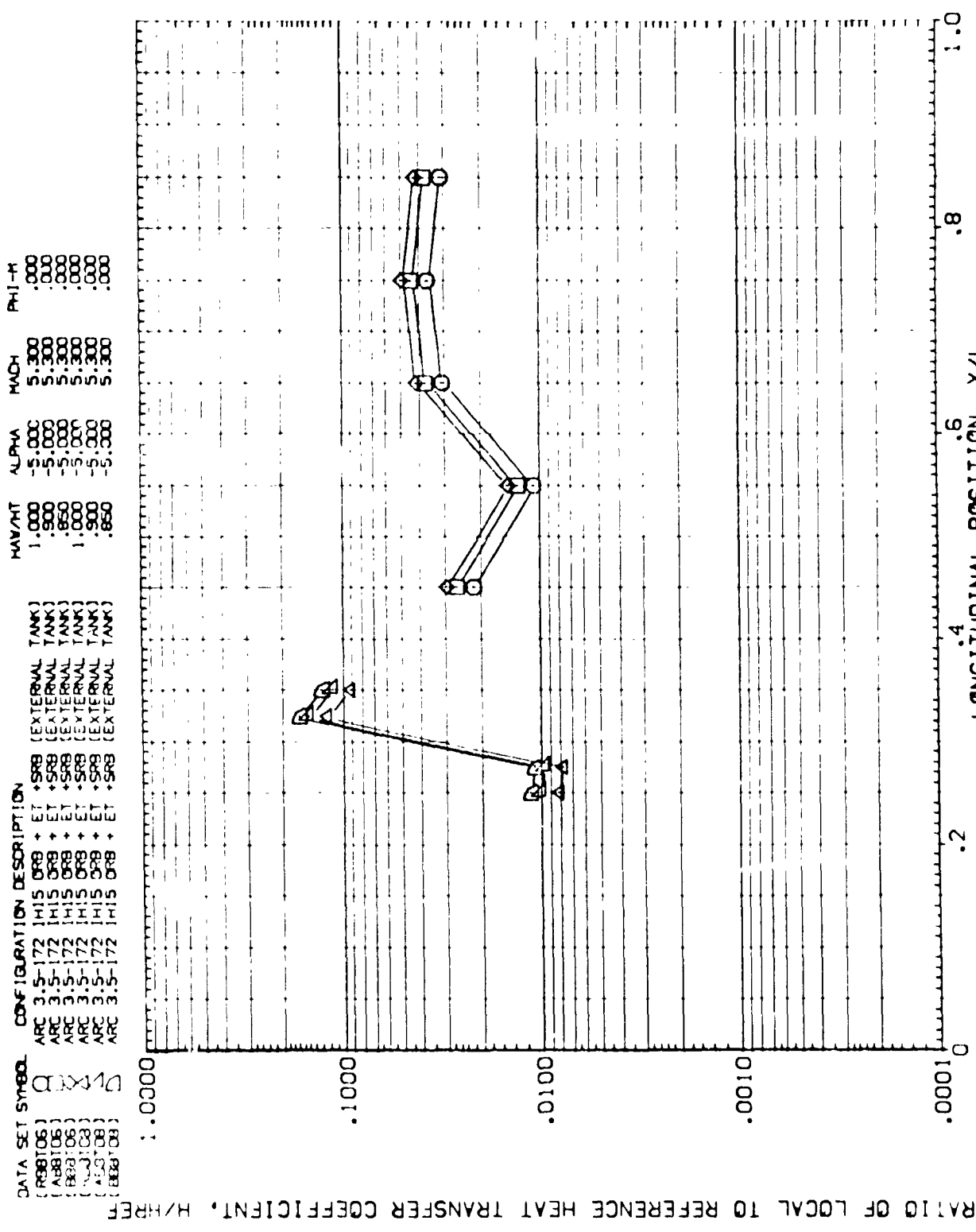


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.952 MACH = 5.300 PHI = 90.000 PAGE 253

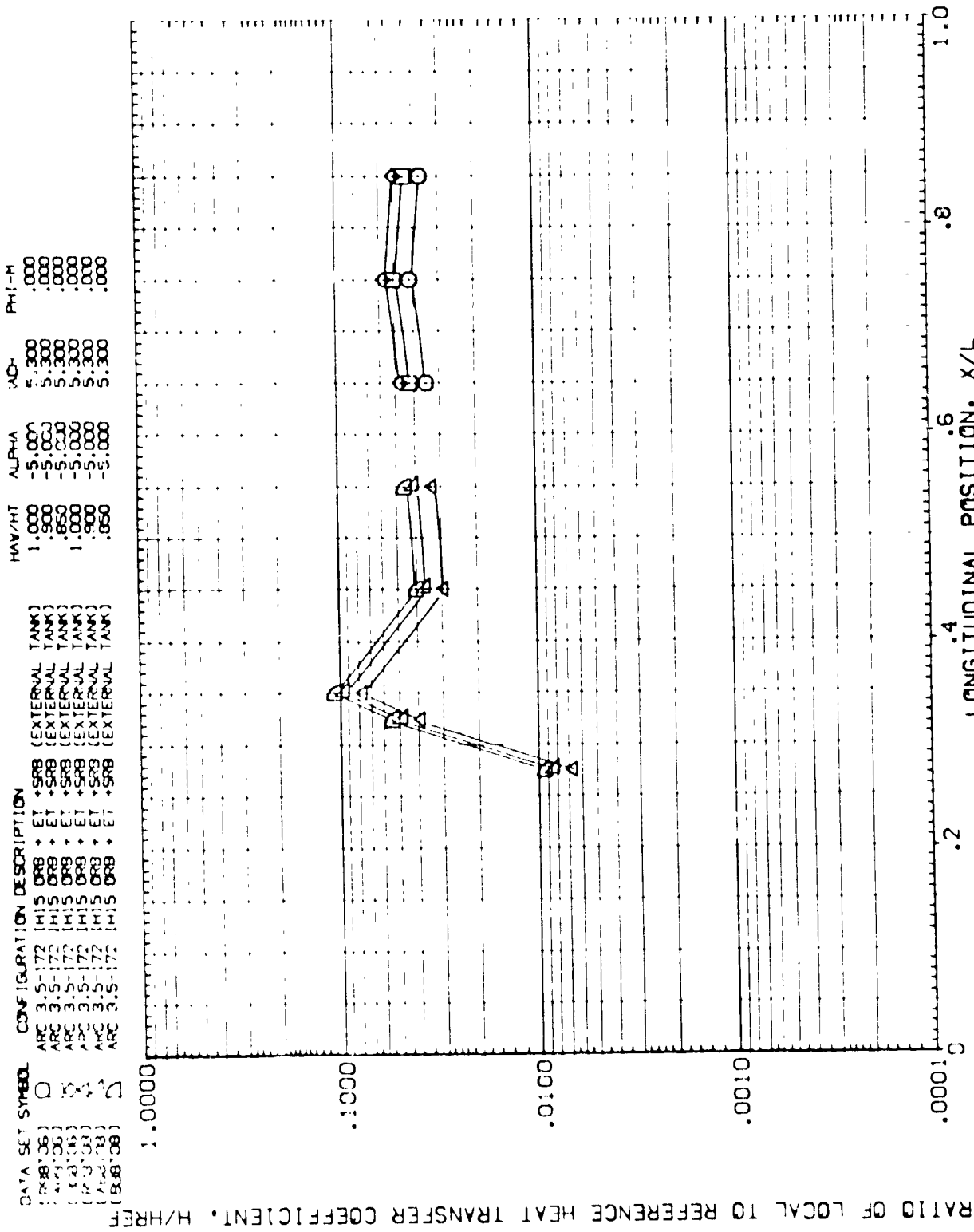


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.952 MACH = 5.300 PHI = 112.500 P/SE 254



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	ALPHA	MAV/RT	PHI, °H
(P88)06)	ARC 3.5-172 H15 DR8 + ET +SR8 (EXTERNAL TANK)	5.300	-5.000	1.000	.000
(A88)06)	ARC 3.5-172 H15 DR8 + ET +SR8 (EXTERNAL TANK)	5.300	-5.000	.900	.000
(L12)00)	ARC 3.5-172 H15 DR8 + ET +SR8 (EXTERNAL TANK)	5.300	-5.000	.850	.000
(A88)06)	ARC 3.5-172 H15 DR8 + ET +SR8 (EXTERNAL TANK)	5.300	-5.000	1.000	.000
(A88)06)	ARC 3.5-172 H15 DR8 + ET +SR8 (EXTERNAL TANK)	5.300	-5.000	.900	.000
(A88)06)	ARC 3.5-172 H15 DR8 + ET +SR8 (EXTERNAL TANK)	5.300	-5.000	.850	.000

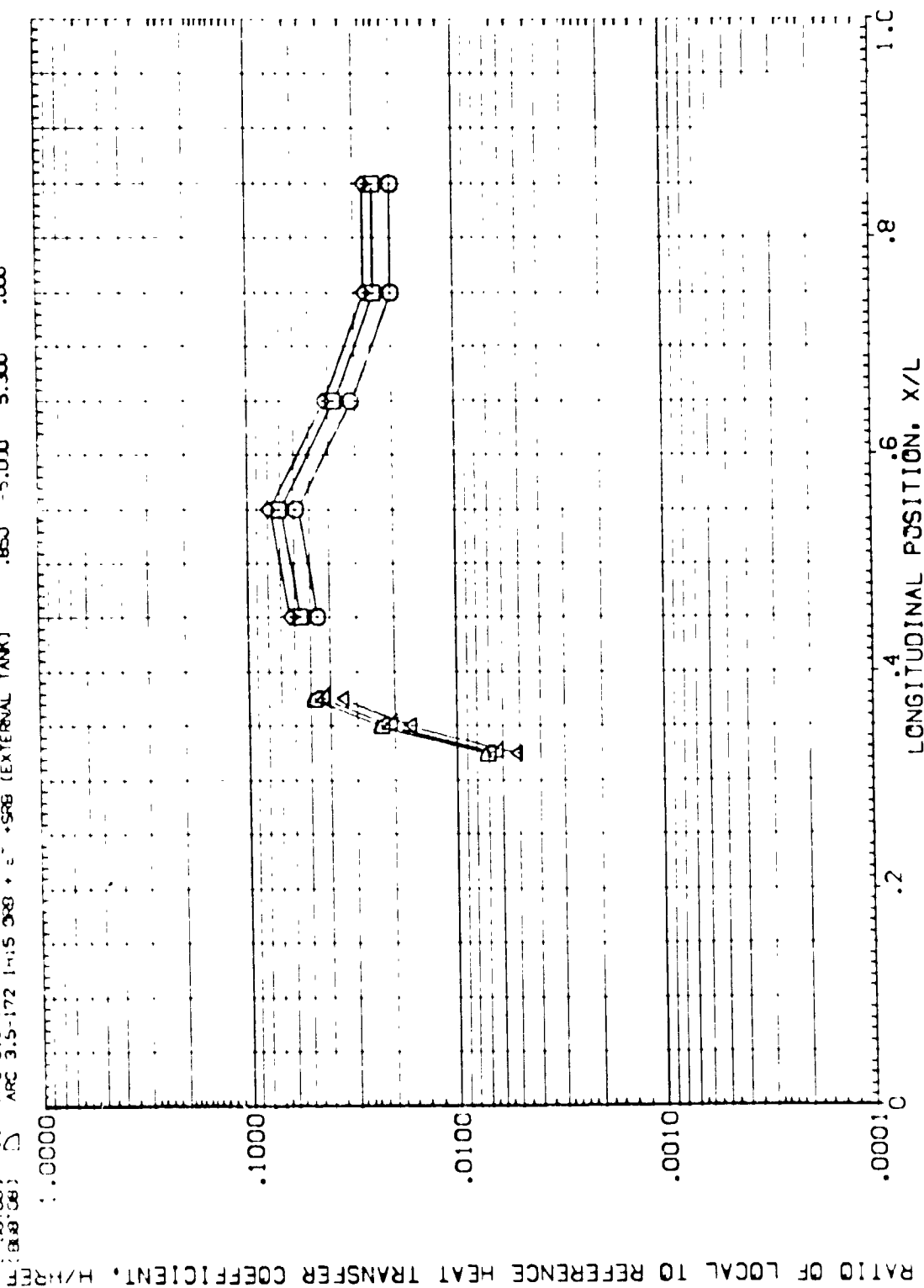


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

R₁/L = 1.952 M₁ = 5.300 PHI = 135.000 PAGE 255

DATA SET SYMBOL CONFIGURATION DESCRIPTION MACH ALPHA MACH PHI-M

(098)06)	ARC 3.5-172 IM15 DR8 + ET +SR8 (EXTERNAL TANK)	1.000	-5.000	5.300	.000
(098)07)	ARC 3.5-172 IM15 DR8 + ET +SR8 (EXTERNAL TANK)	.900	-5.000	5.300	.000
(098)08)	ARC 3.5-172 IM15 DR8 + ET +SR8 (EXTERNAL TANK)	.850	-5.000	5.300	.000
(098)09)	DATA NOT AVAILABLE	1.000	-5.000	5.300	.000
(098)10)	DATA NOT AVAILABLE	.850	-5.000	5.300	.000

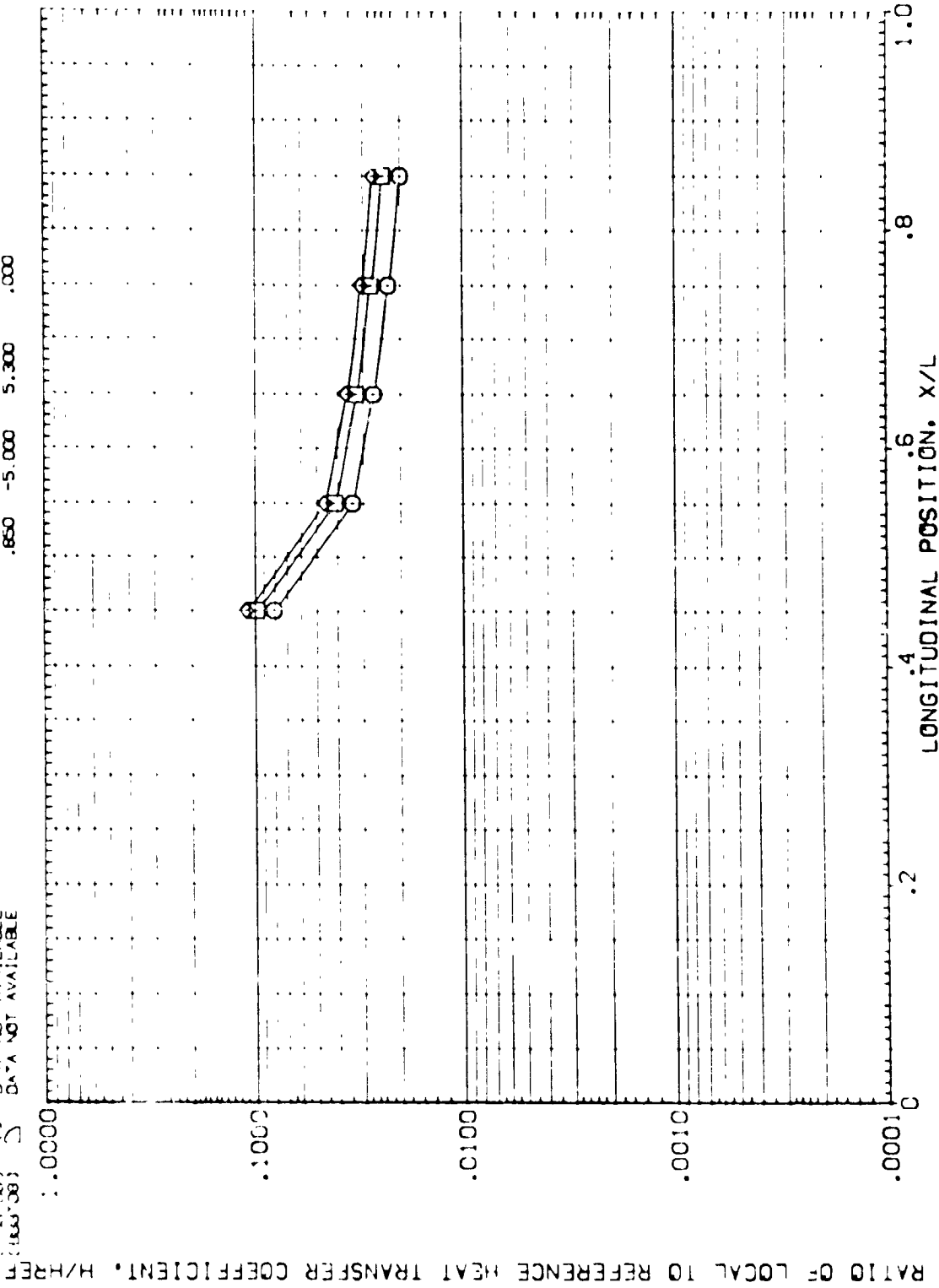


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 1.952 MACH = 5.300 PHI = 157.500 PAGE 256

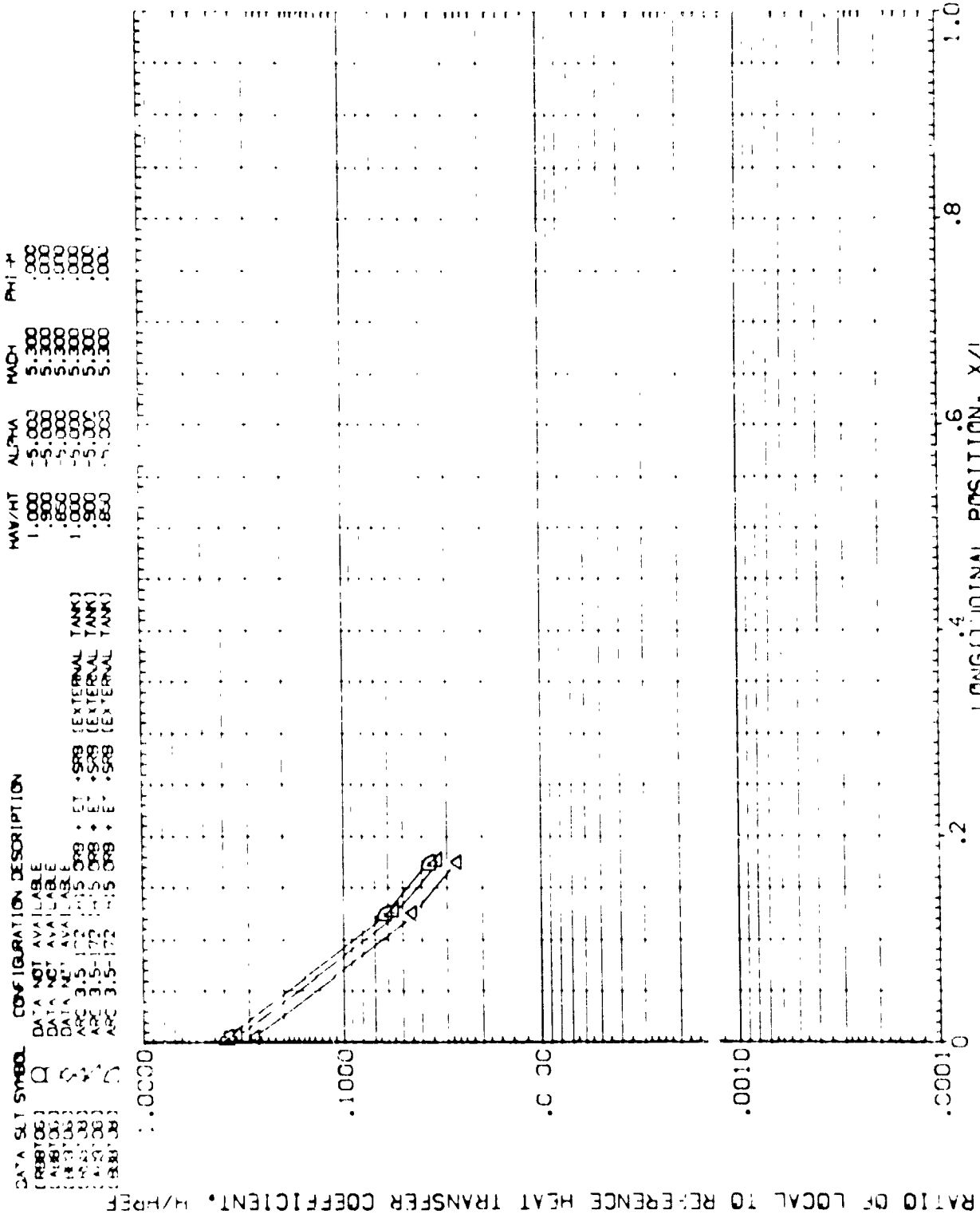


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL CONFIGURATION DESCRIPTION HAW/HT ALPHA MACH PHI-M

(PROB1G) DATA NOT AVAILABLE 1.000 -5.000 5.300 .000

(ASB106) DATA NOT AVAILABLE .900 -5.000 5.300 .000

(E3106) DATA NOT AVAILABLE .850 -5.000 5.300 .000

(RC8108) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) 1.000 -5.000 5.300 .000

(AG3108) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) .900 -5.000 5.300 .000

(B88108) ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK) .850 -5.000 5.300 .000

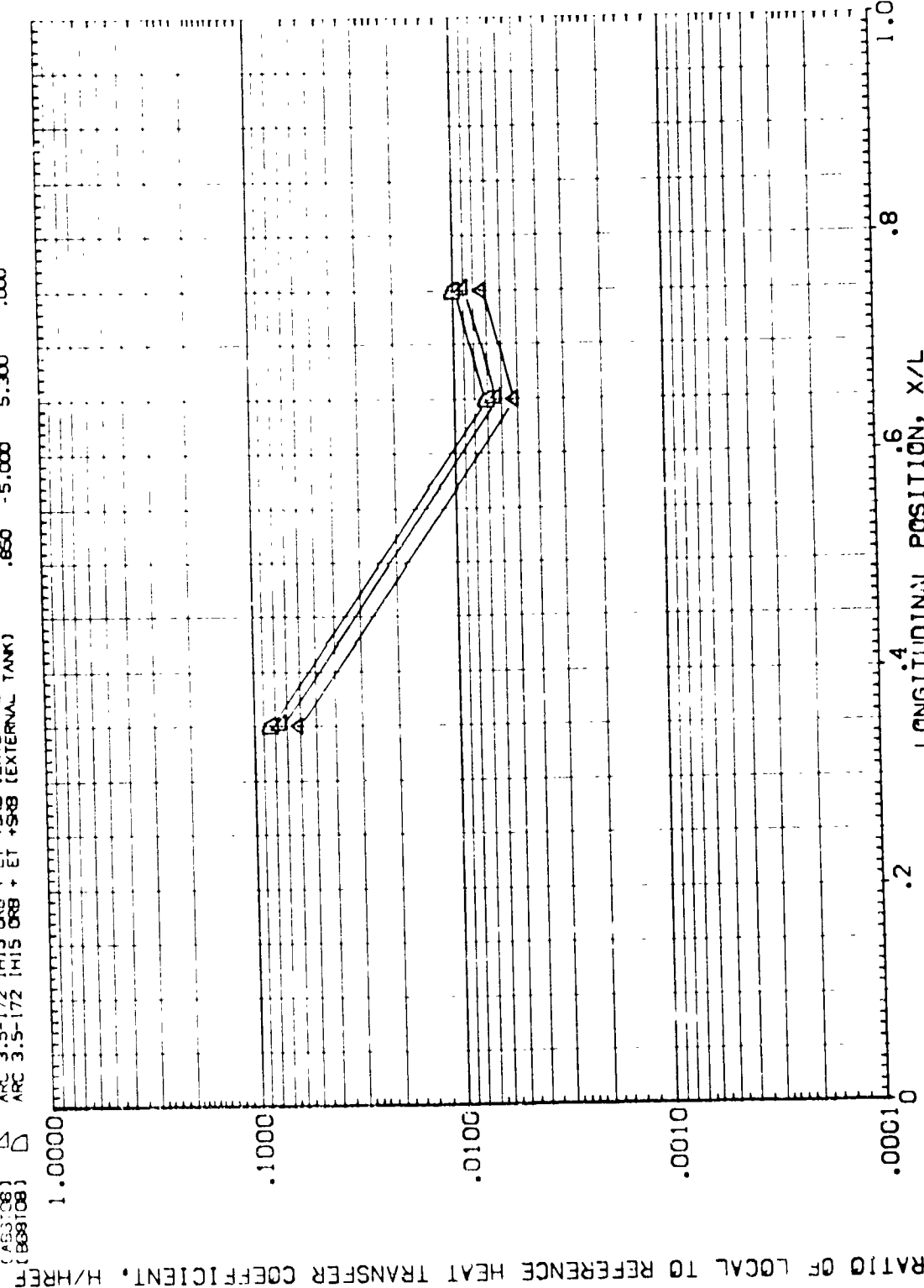


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.570 MACH = 5.300 PHI = 67.500 PAGE 258



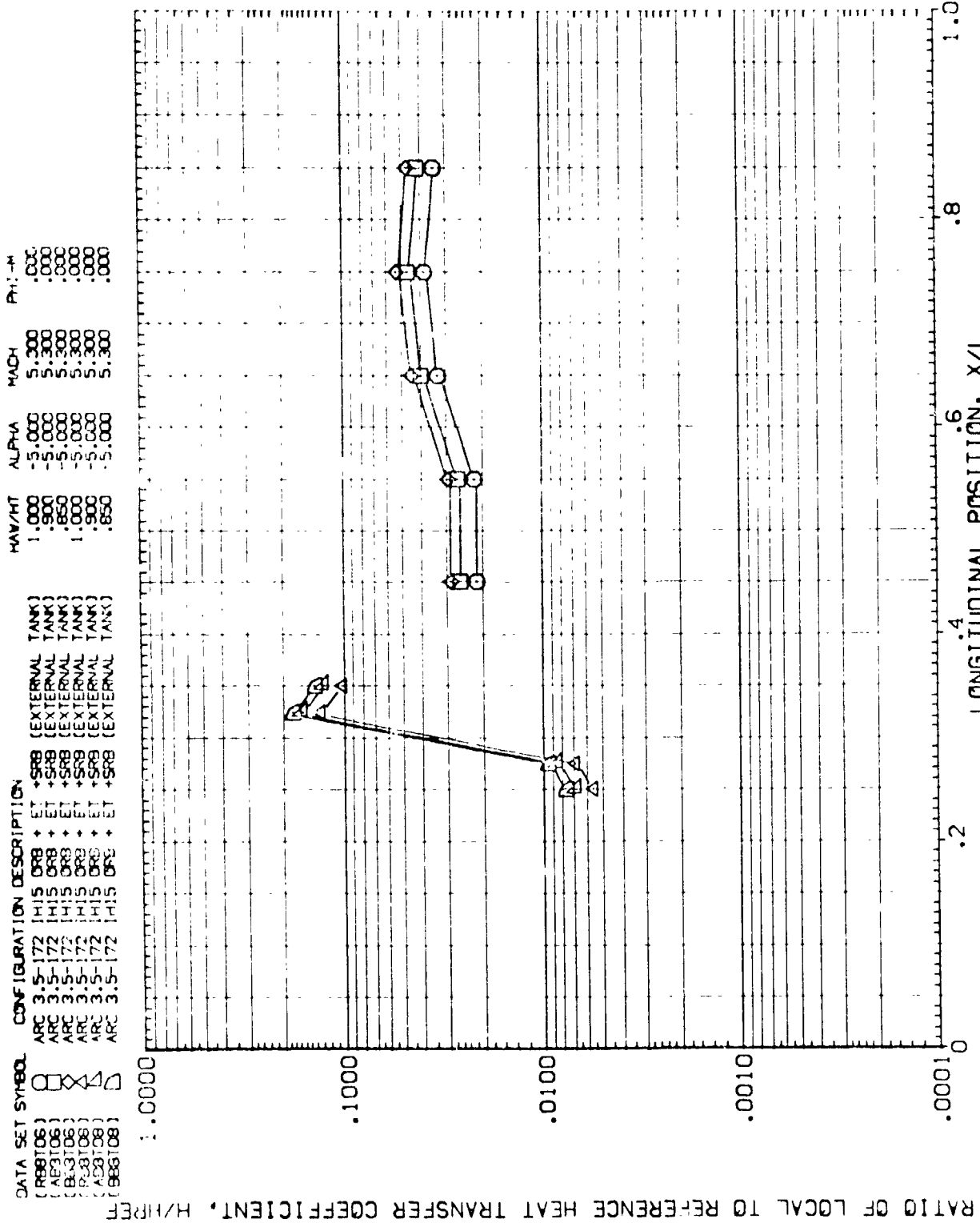


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	HAV/HT	ALPHA	MACH	PHI-TH
(R88T06)	ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK)	1.000	-5.000	5.300	.000
(A88T06)	ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK)	.900	-5.000	5.300	.000
(E88T06)	ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK)	.850	-5.000	5.300	.000
(R88T08)	ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK)	1.000	-5.000	5.300	.000
(A88T08)	ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK)	.900	-5.000	5.300	.000
(E88T08)	ARC 3.5-172 IH15 OR8 + ET +SR8 (EXTERNAL TANK)	.850	-5.000	5.300	.000

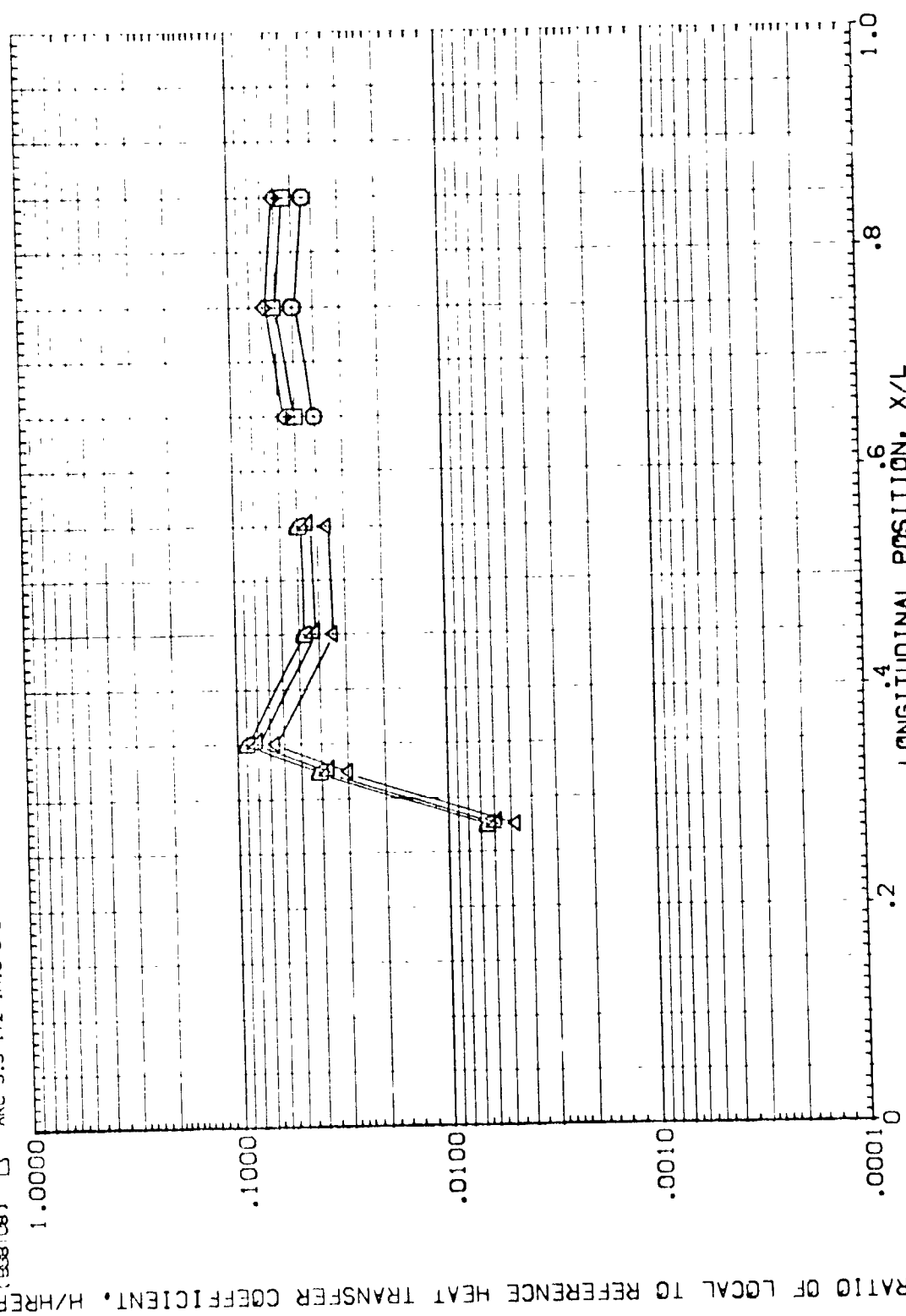


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.570 MACH = 5.300 PHI = 112.500 PAGE 260



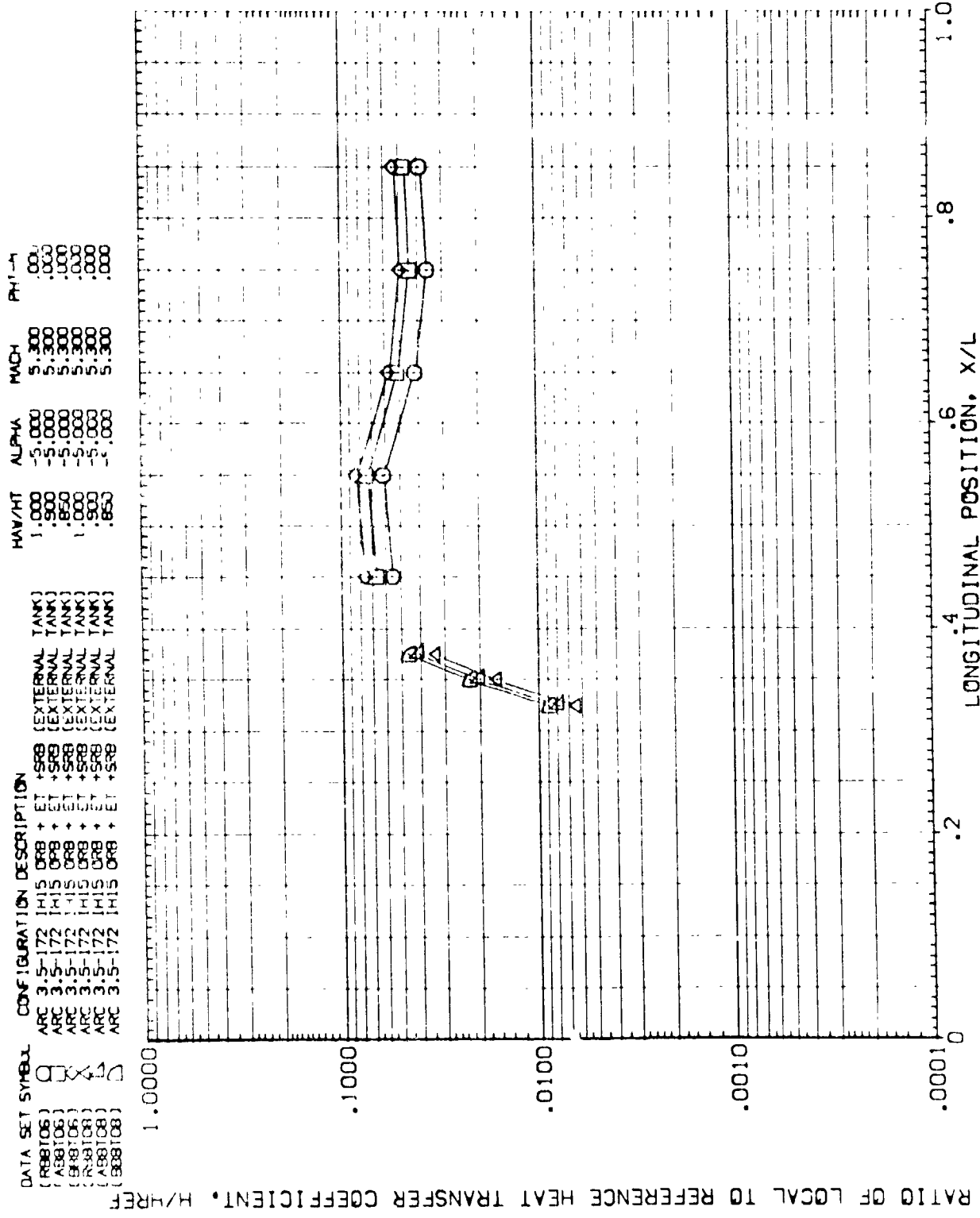


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK

RN/L = 4.570 MACH = 5.300 PHI = .35.030 PAGE 261

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MAC	PHI-M
-98TJ6)	ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)	1.000	-5.000	5.300	.000
(A 1176)	ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)	.900	-5.000	5.300	.000
(348T06)	ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)	.850	-5.000	5.300	.000
(R-3T08)	DATA NOT AVAILABLE	1.000	-5.000	5.300	.000
(A38T08)	DATA NOT AVAILABLE	.900	-5.000	5.300	.000
(888T08)	DATA NOT AVAILABLE	.850	-5.000	5.300	.000

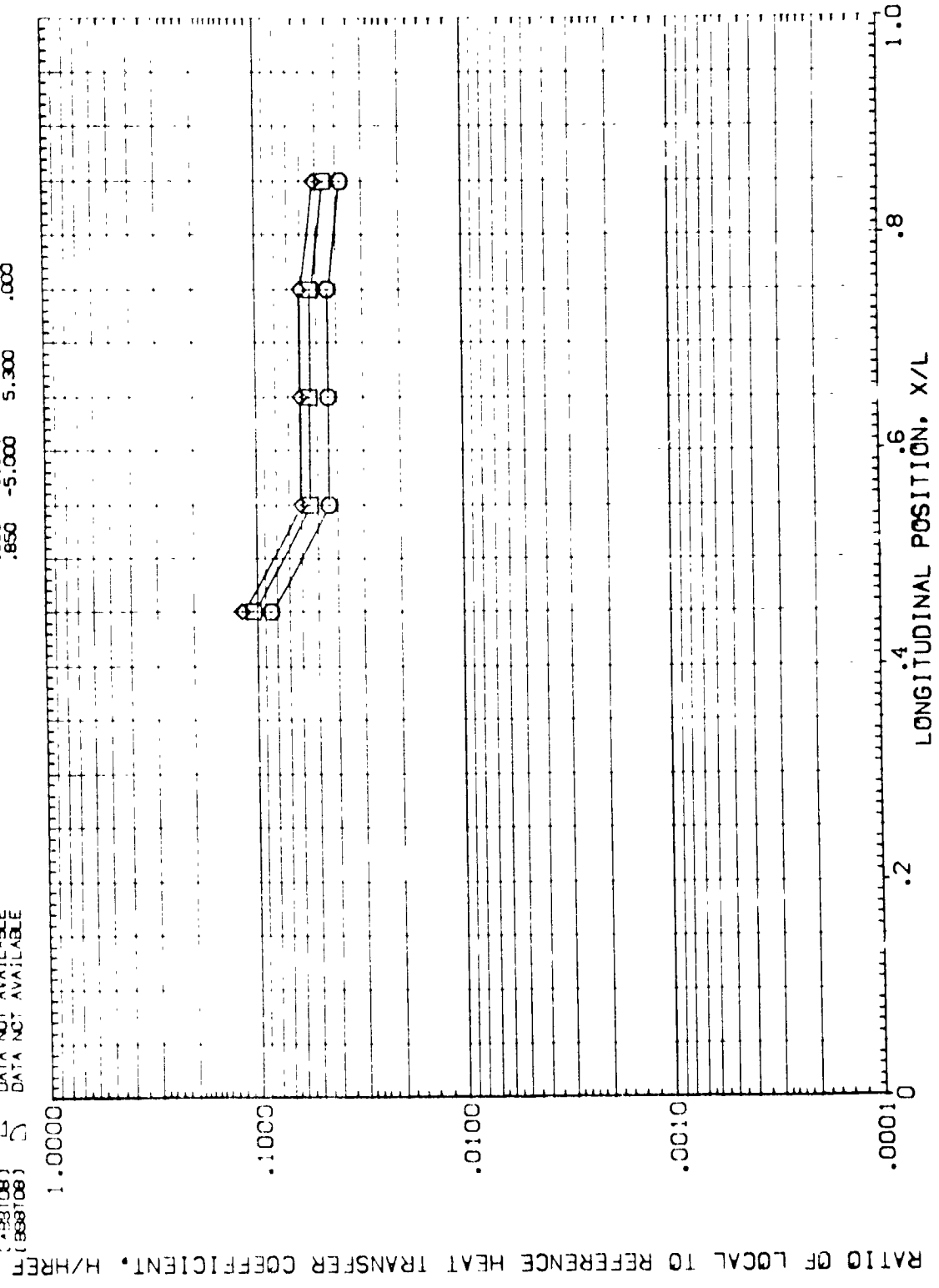


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.



DATA SET SYMBOL CONFIGURATION DESCRIPTION HAV/HT ALPHA MACH PHI-M

(R88106) DATA NOT AVAILABLE 1.000 -5.000 5.300 .000

(A88106) DATA NOT AVAILABLE .900 -5.000 5.300 .000

(E83106) DATA NOT AVAILABLE .850 -5.000 5.300 .000

(M83106) ARC 3.5-172 PH15 DR8 + ET -SR8 (EXTERNAL TANK) 1.000 -5.000 5.300 .000

(A83106) ARC 3.5-172 PH15 DR8 + ET +SR8 (EXTERNAL TANK) .500 -5.000 5.300 .000

(B83106) ARC 3.5-172 PH15 DR8 + ET -SR8 (EXTERNAL TANK) .850 -5.000 5.300 .000

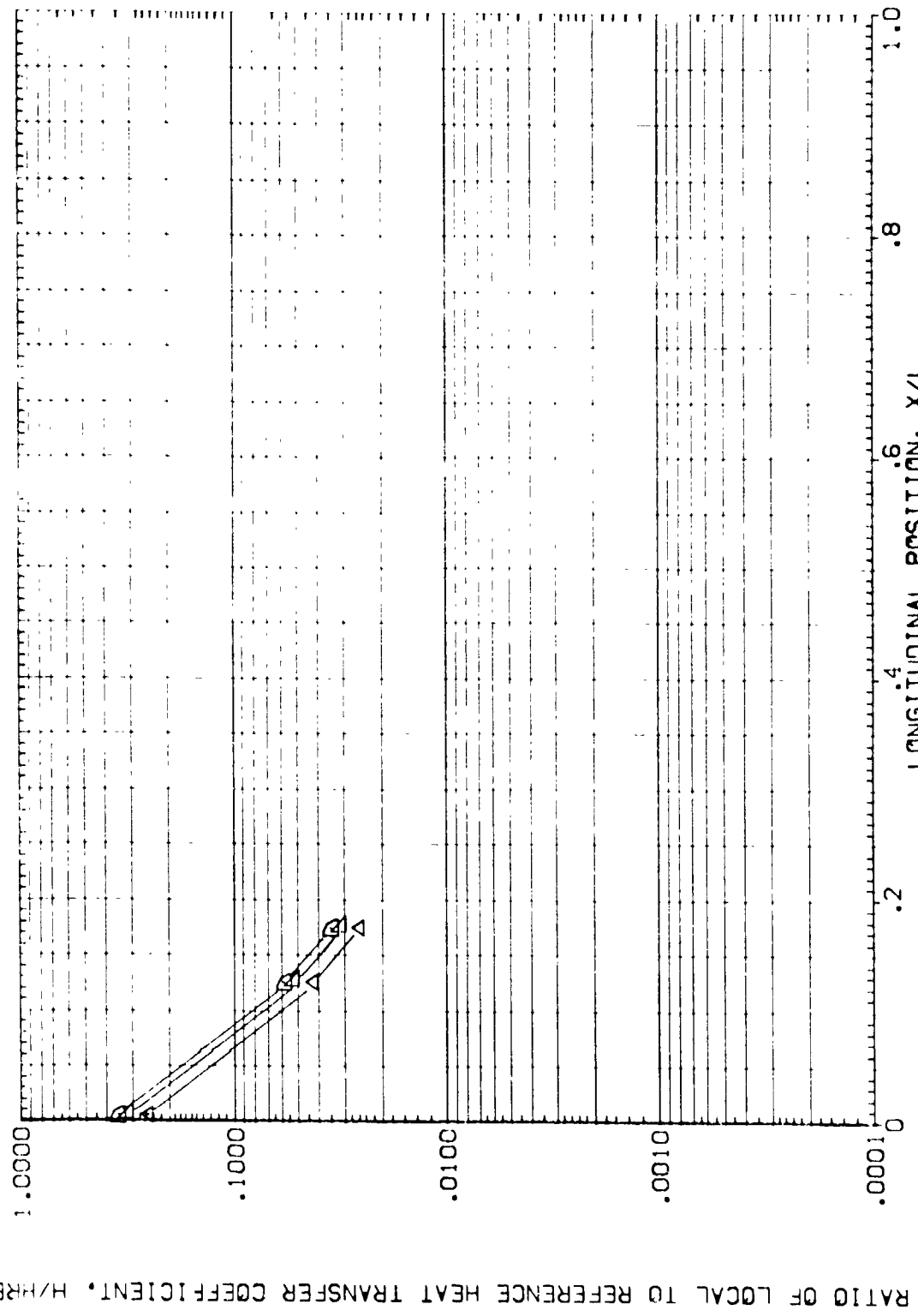


FIG. 31 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, EXTERNAL TANK.

RN/L = 4.570 MACH = 5.300 PHI = 180.000 PAGE 263

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	SRB	HAV/HT	ALPHA	MACH	PHI-M
(S005:5)	ARC 3.5-172 IH15 SRB	(SRB)	1.000	20.000	5.300	90.000
(A005:5)	ARC 3.5-172 IH15 SRB	(SRB)	.500	20.000	5.300	90.000
(C005:5)	ARC 3.5-172 IH15 SRB	(SRB)	.650	20.000	5.300	90.000
(Y005:5)	ARC 3.5-172 IH15 SRB	(SRB)	1.000	45.000	5.300	90.000
(4005:6)	ARC 3.5-172 IH15 SRB	(SRB)	.900	45.000	5.300	90.000
(B005:6)	ARC 3.5-172 IH15 SRB	(SRB)	.650	45.000	5.300	90.000

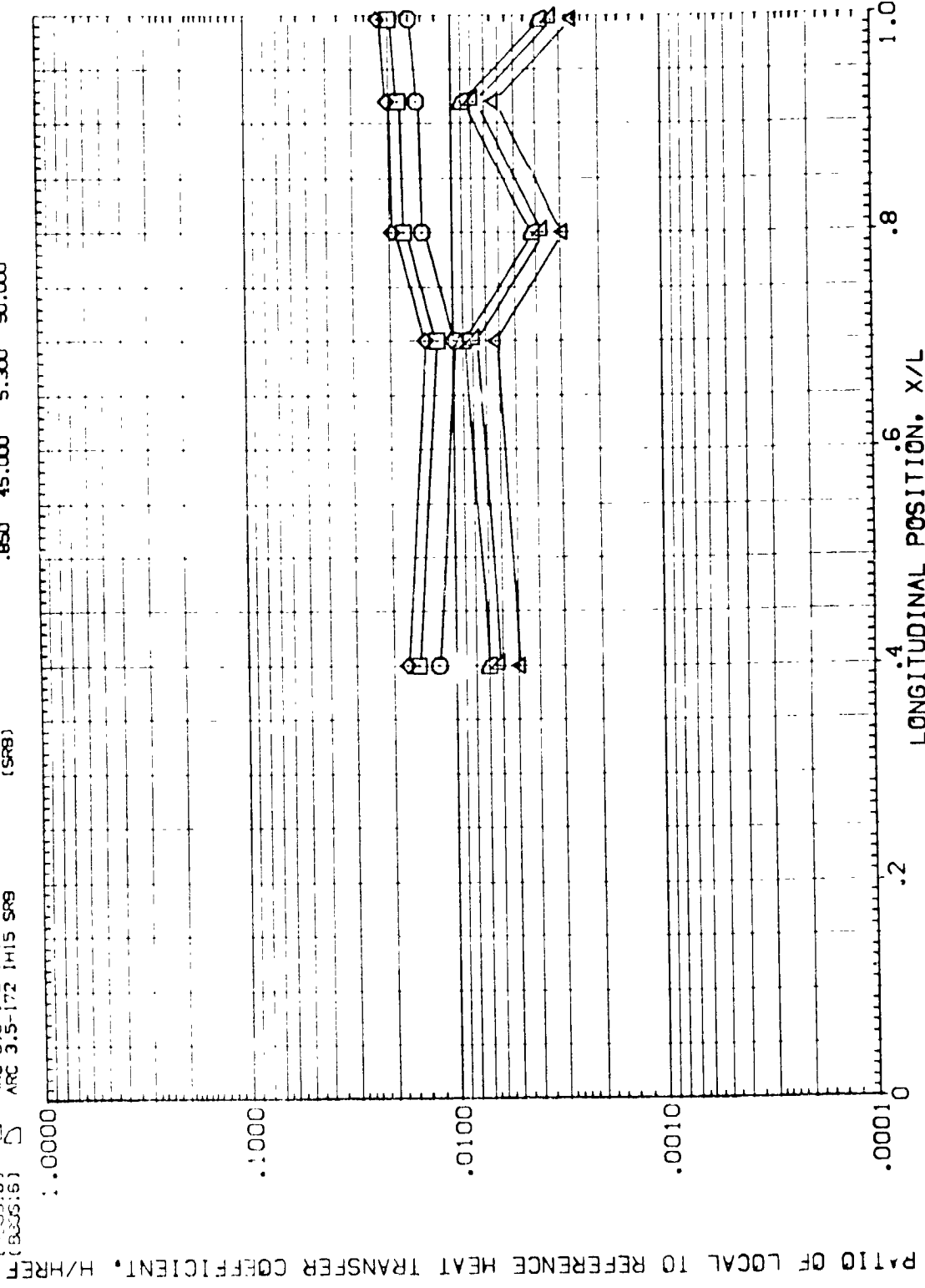


FIG. 32 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.304 MACH = 5.300 PHI = 90.000 PAGE 264



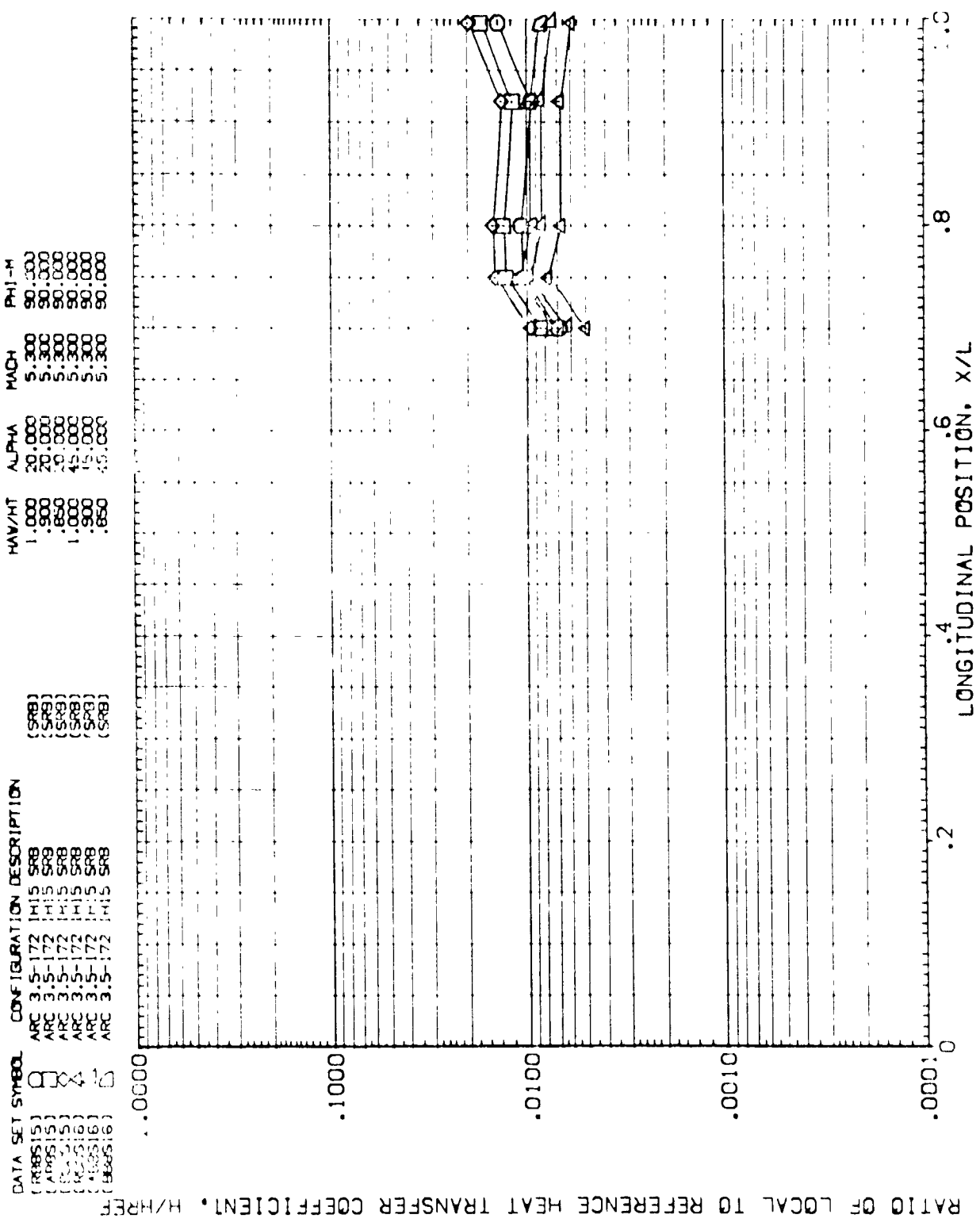


FIG. 32 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	ALPHA	PHI-M
(R#0515)	ARC 3-5-172 (H15 SRB)	5.300	20.000	90.000
(R#0515)	ARC 3-5-172 (H15 SRB)	5.300	20.000	90.000
(R#0515)	ARC 3-5-172 (H15 SRB)	5.300	20.000	90.000
(R#0516)	ARC 3-5-172 (H15 SRB)	5.300	45.000	90.000
(R#0516)	ARC 3-5-172 (H15 SRB)	5.300	45.000	90.000
(R#0516)	ARC 3-5-172 (H15 SRB)	5.300	45.000	90.000

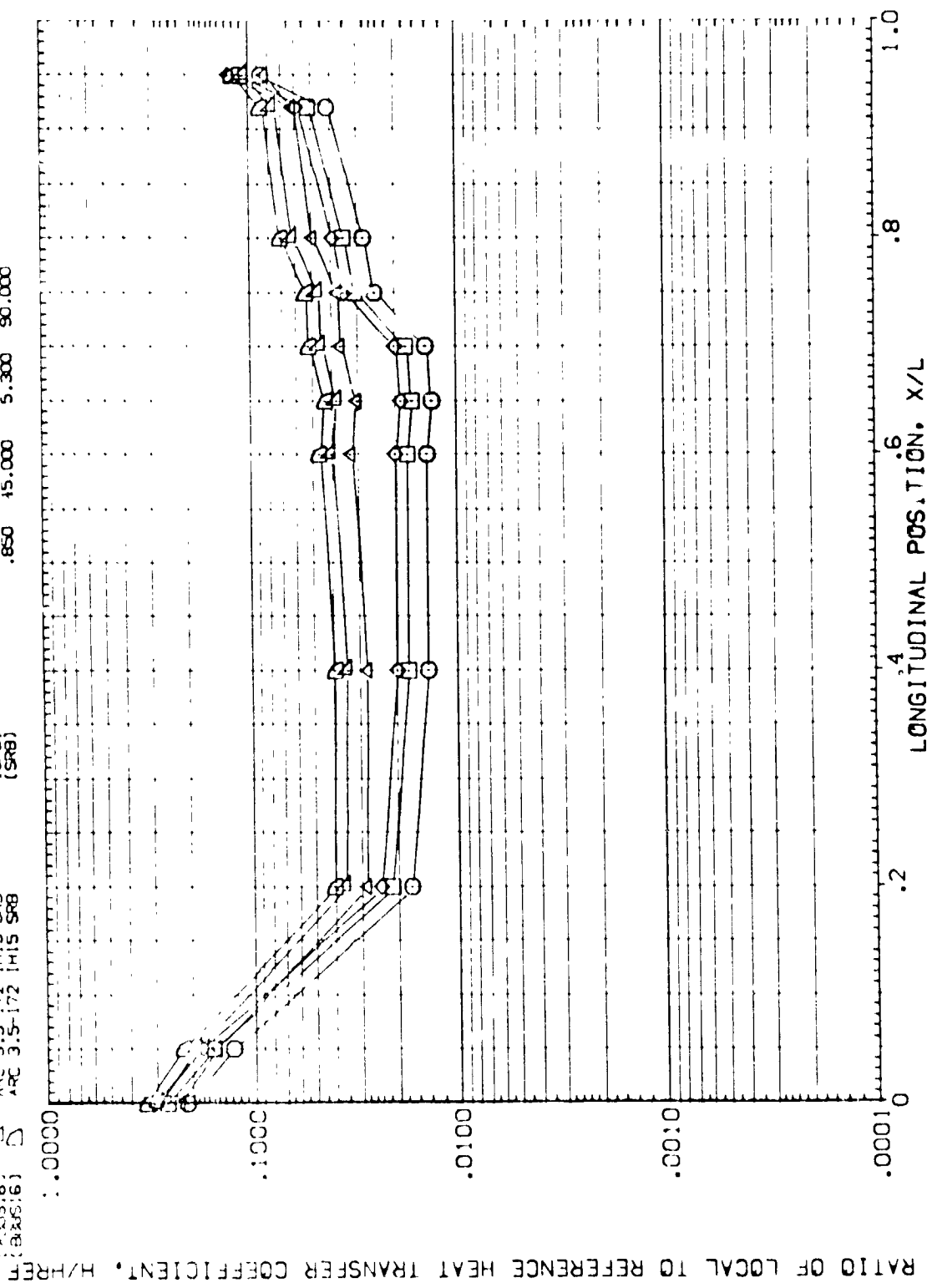


FIG. 32 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.304 MACH = 5.300 PHI = 180.000 P^GE 266



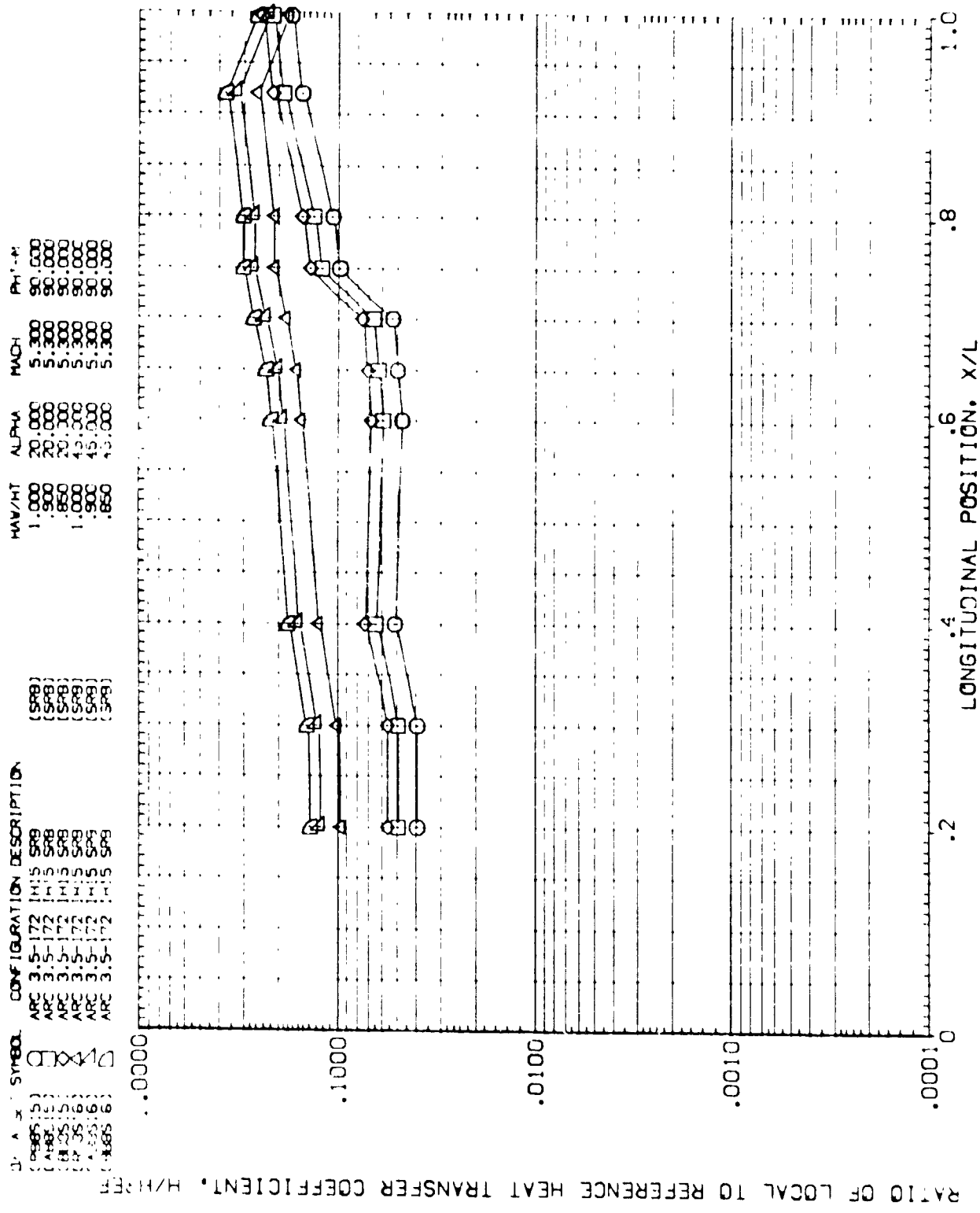


FIG. 32 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

R₀/L = 5.304 M₀ = 5.300 Phi = 225.000 P. E. 267

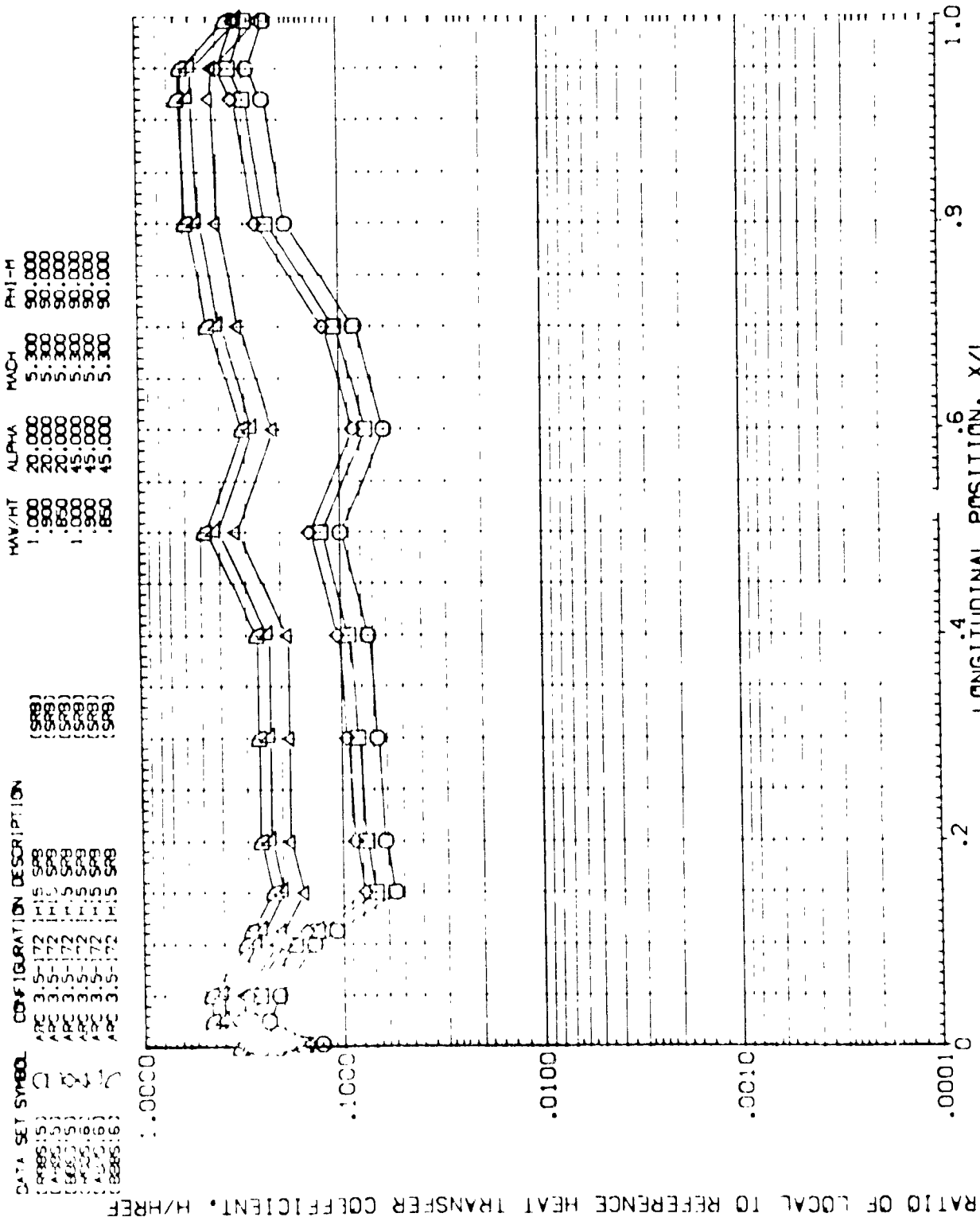


FIG. 32 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

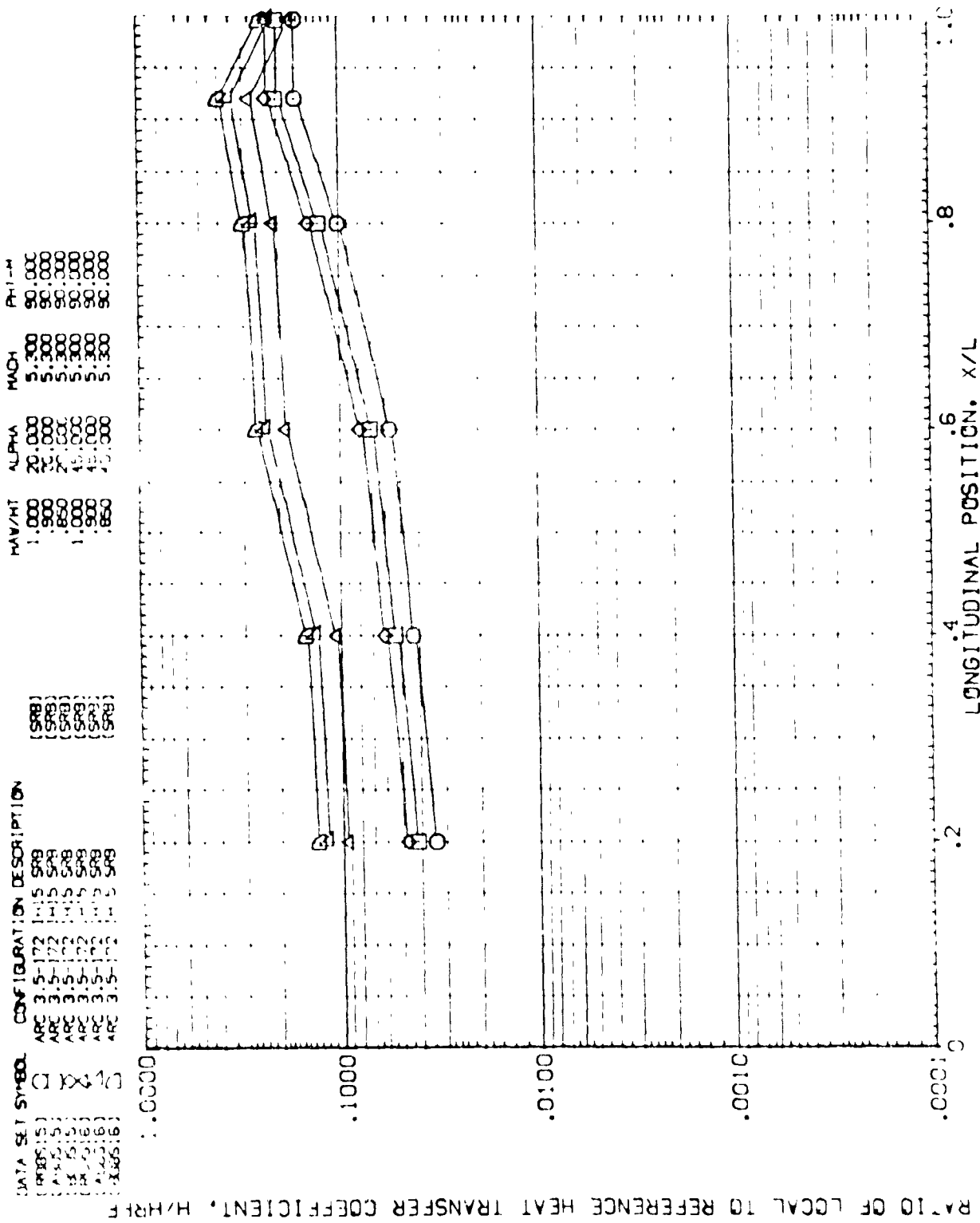


FIG. 32 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION (SRB) MACH ALPHA HAV/HT PHI-M

(SERIES 1) ARC 3.5-172 (HIS SRB) (SRB) 5.300 70.000 1.000 90.000

(SERIES 2) ARC 3.5-175 (HIS SRB) (SRB) 5.300 70.000 .900 90.000

(SERIES 3) ARC 3.5-175 (HIS SRB) (SRB) 5.300 70.000 .850 90.000

(SERIES 4) DATA NOT AVAILABLE 1.000 90.000

(SERIES 5) DATA NOT AVAILABLE .900 90.000

(SERIES 6) DATA NOT AVAILABLE .850 90.000

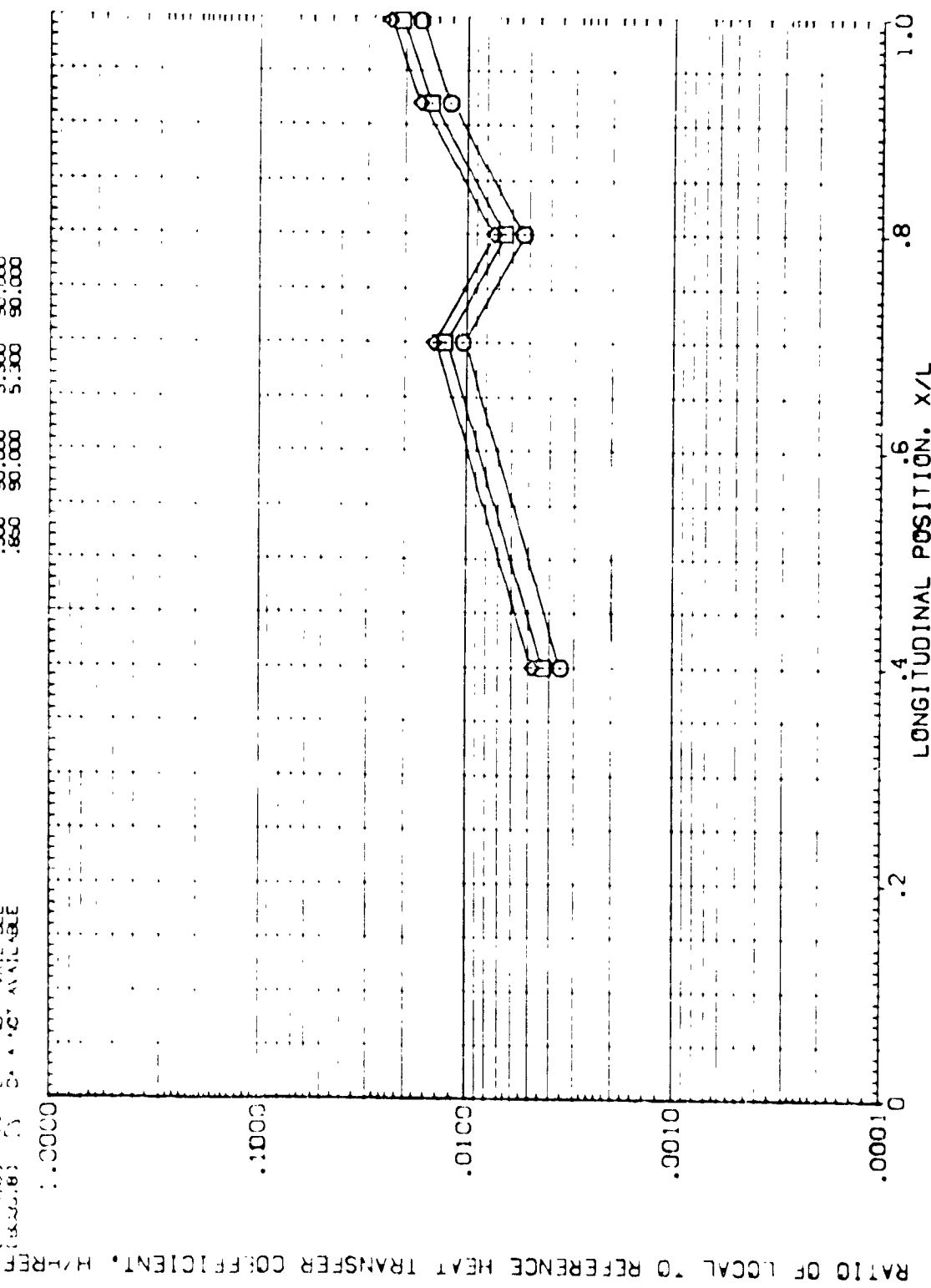


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.



DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)
 (SRB) (SRB) (SRB)

MACH 5.300
 5.300
 5.300
 5.300
 5.300
 5.300
 5.300
 5.300

ALPHA 70.000
 70.000
 70.000
 70.000
 70.000
 70.000
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 70.000

PHIT 90.000
 90.000
 90.000
 90.000
 90.000
 90.000
 90.000
 90.000

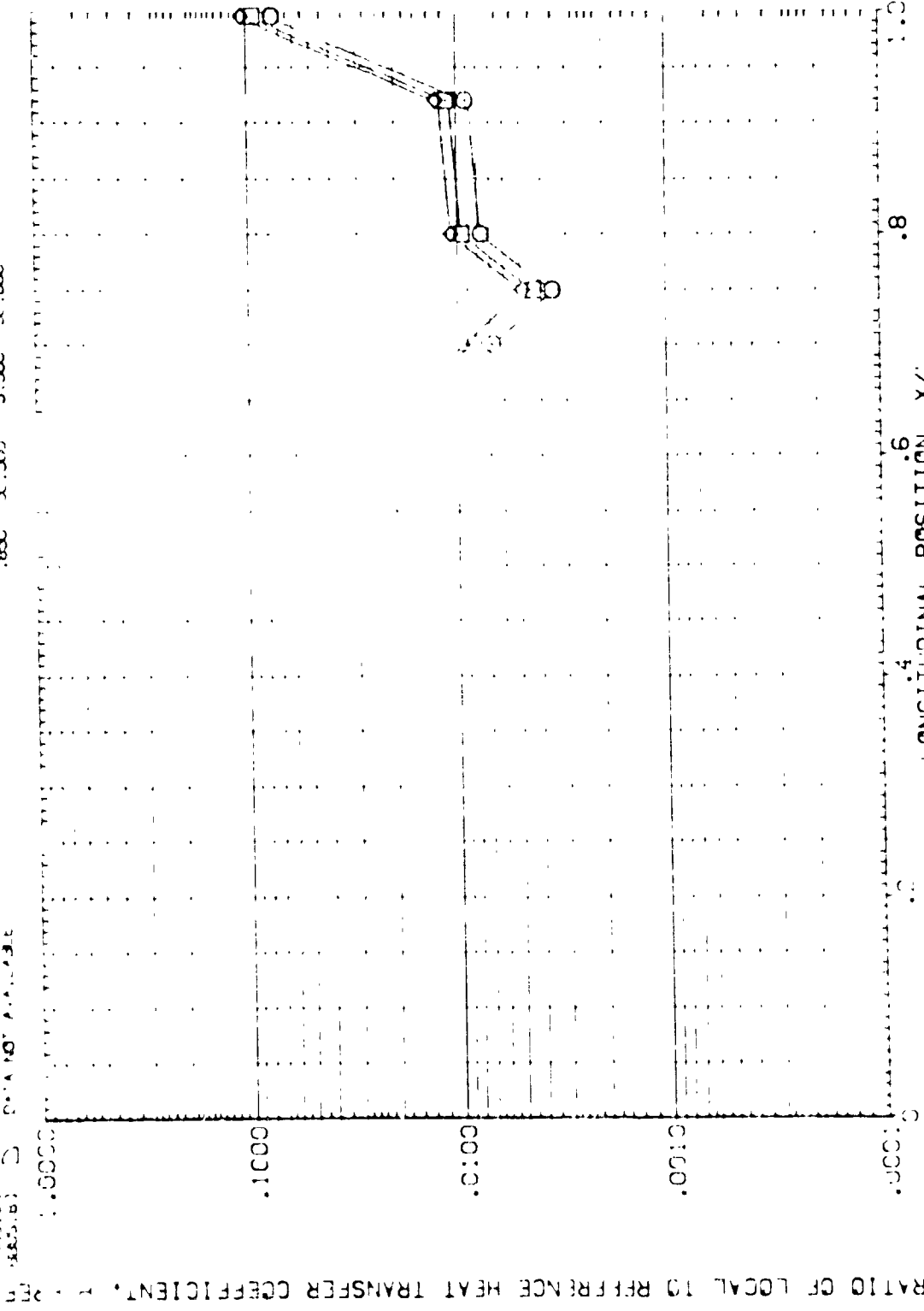


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MAV/HT	ALPHA	MACH	PHI-H
(A805:17)	ARC 3.5-172 IH15 SRB (SRB)	1.000	70.000	5.300	90.000
(A805:17)	ARC 3.5-172 IH15 SRB (SRB)	.900	70.000	5.300	90.000
(A805:17)	ARC 3.5-172 IH15 SRB (SRB)	.850	70.000	5.300	90.000
(A805:18)	DATA NOT AVAILABLE	1.000	90.000	5.300	90.000
(A805:18)	DATA NOT AVAILABLE	.900	90.000	5.300	90.000
(A805:18)	DATA NOT AVAILABLE	.850	90.000	5.300	90.000

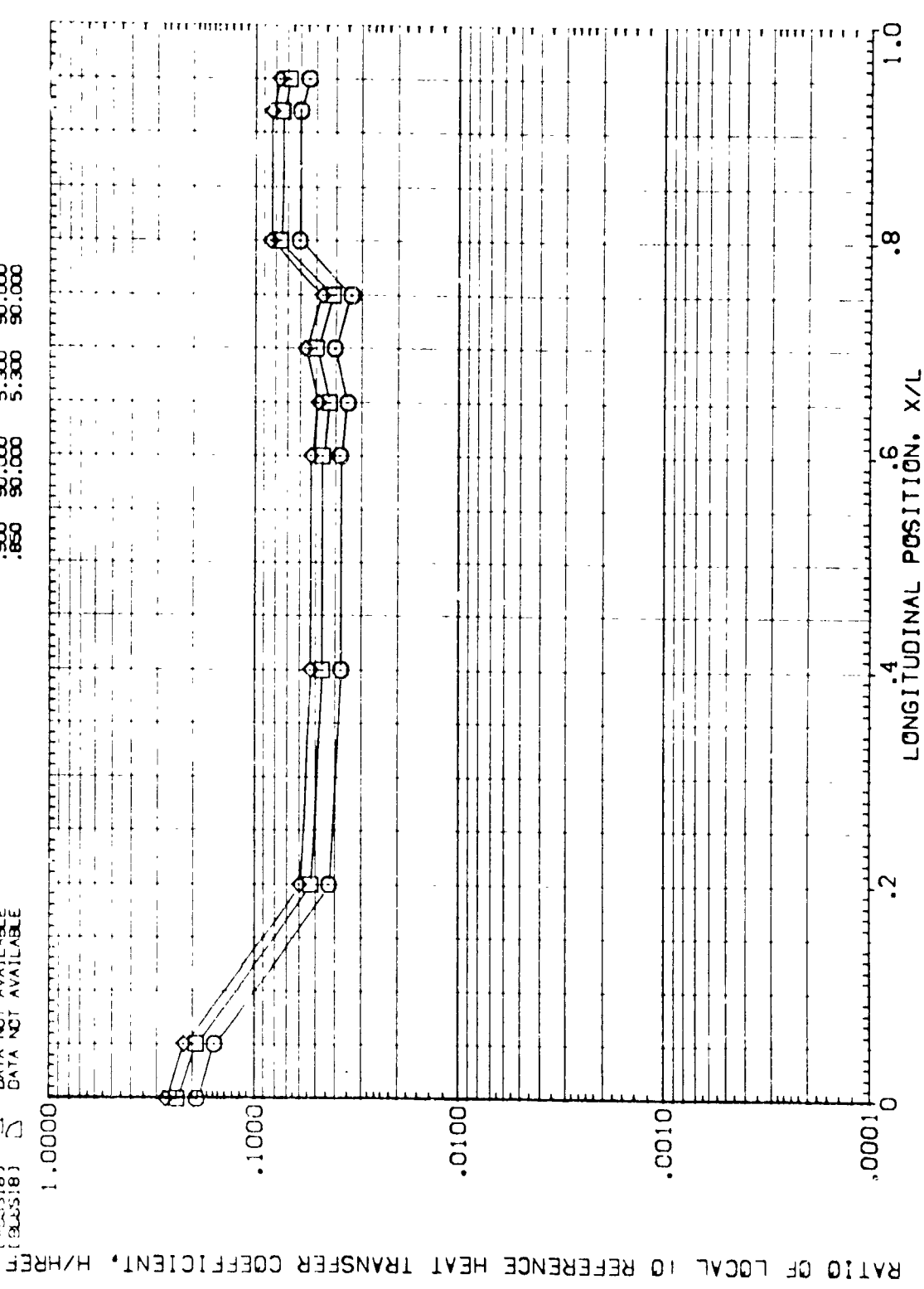


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.926 MACH = 5.300 PHI = 180.000 PAGE 272



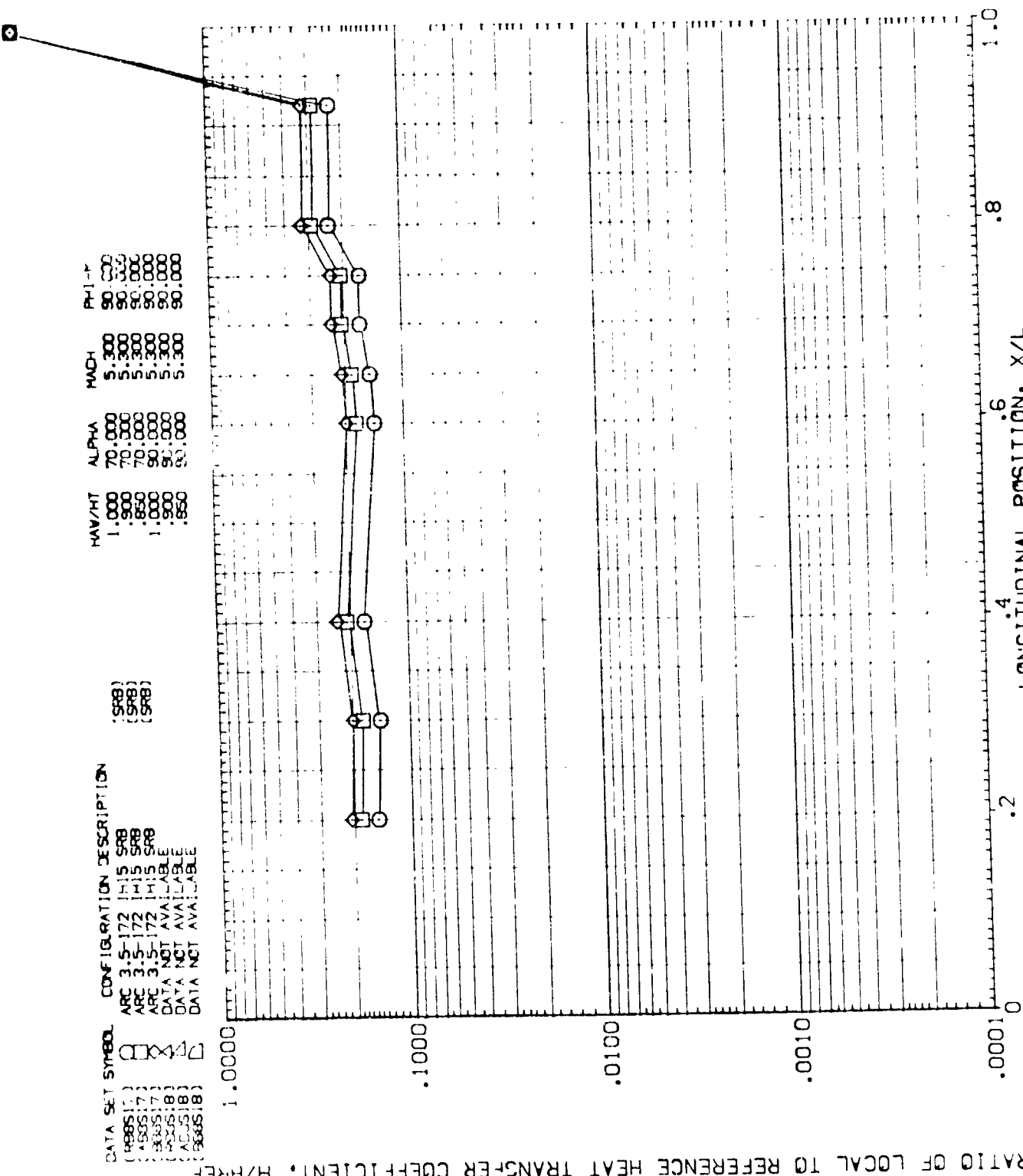


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.926 MACH = 5.300 PHI = 225.000 PAGE 273

DATA SET SYMBOL
 (RBBS17) □
 (ABBS17) ○
 (EBBS17) △
 (RBBS18) ◇
 (ABBS18) ○
 (EBBS18) △

CONFIGURATION DESCRIPTION
 ARC 3-5-172 IH15 SRB (SRB)
 ARC 3-5-172 IH15 SRB (SRB)
 ARC 3-5-172 IH15 SRB (SRB)
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE

MACH ALPHA HAY/HT PHI-M
 5.300 70.000 1.000 90.000
 5.300 70.000 .900 90.000
 5.300 70.000 .850 90.000
 5.300 90.000 1.000 90.000
 5.300 90.000 .900 90.000
 5.300 90.000 .850 90.000

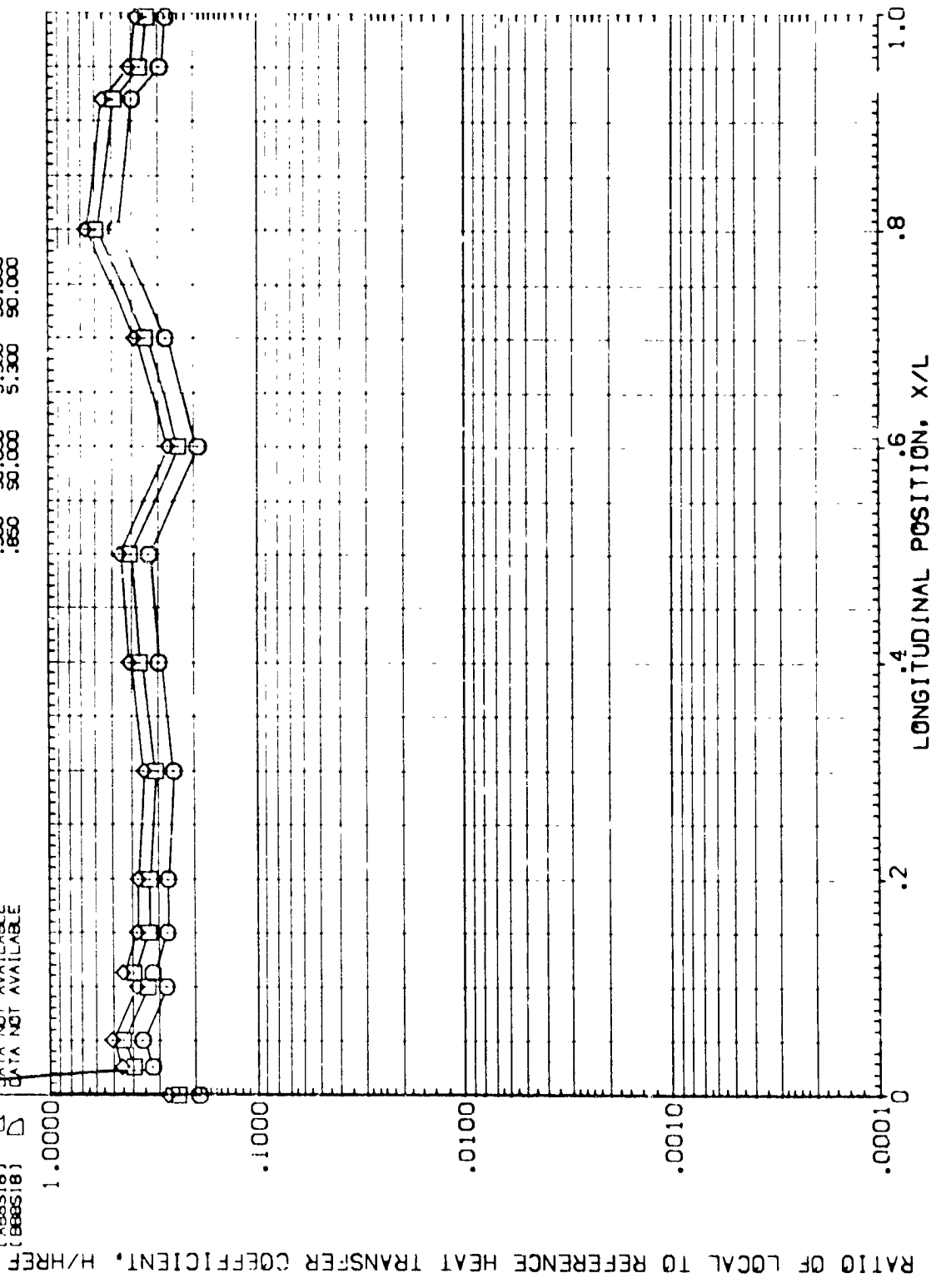


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.926 MACH = 5.300 PHI = 270.000 PAGE 274

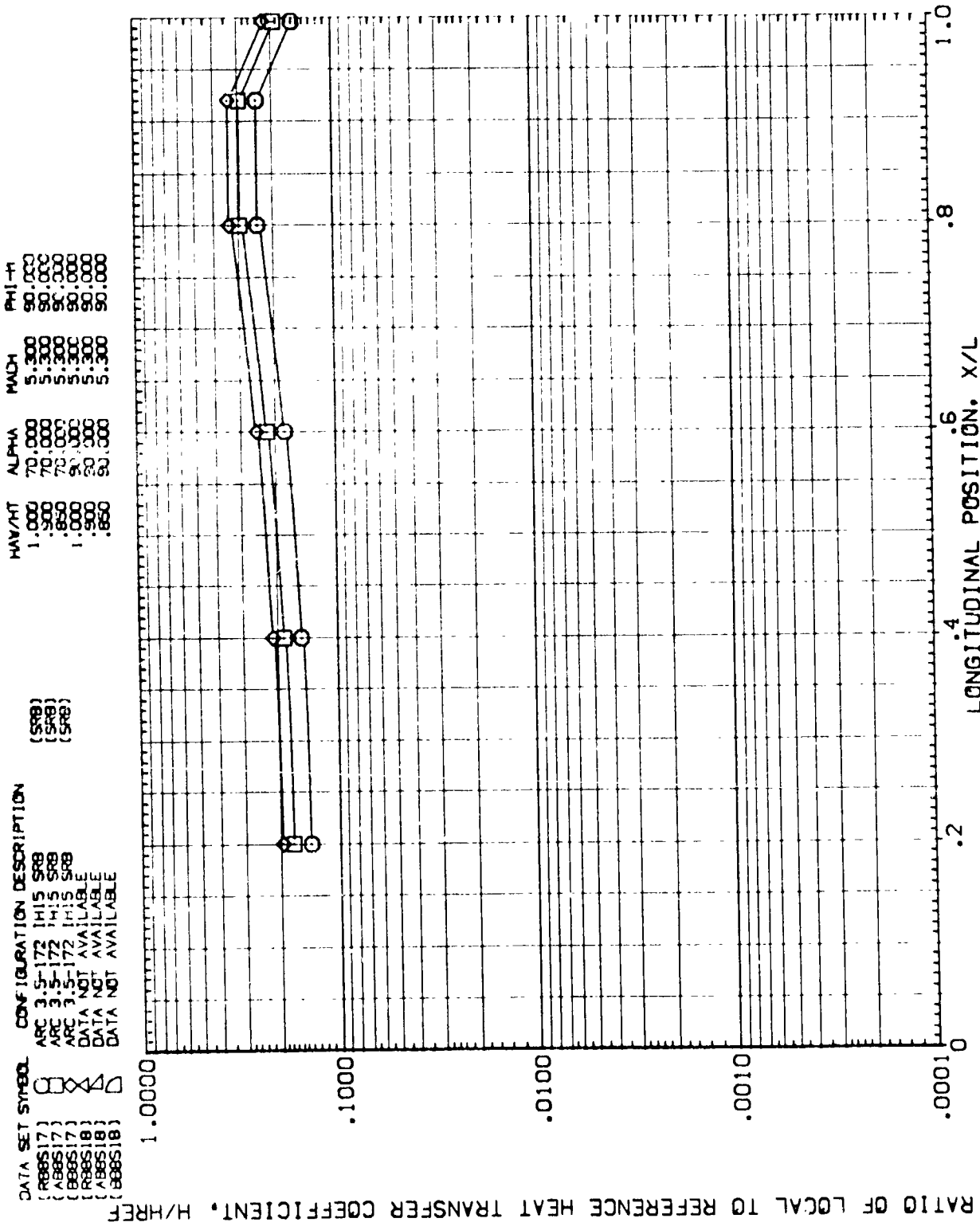


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 4.926 MACH = 5.300 PHI = 315.000

DATA SET SYMBOL CONFIGURATION DESCRIPTION

(R66S:17) DATA NOT AVAILABLE

(A63S:17) DATA NOT AVAILABLE

(B22S:17) DATA NOT AVAILABLE

(R66S:18) ARC 3.5-172 IH15 SRB (SRB)

(A63S:18) ARC 3.5-172 IH15 SRB (SRB)

(B66S:18) ARC 3.5-172 IH15 SRB (SRB)

HAW/HT ALPHA MACH PHI-M

1.000 70.000 5.300 90.000

.900 70.000 5.300 90.000

.850 70.000 5.300 90.000

1.000 90.000 5.300 90.000

.900 90.000 5.300 90.000

.850 90.000 5.300 90.000

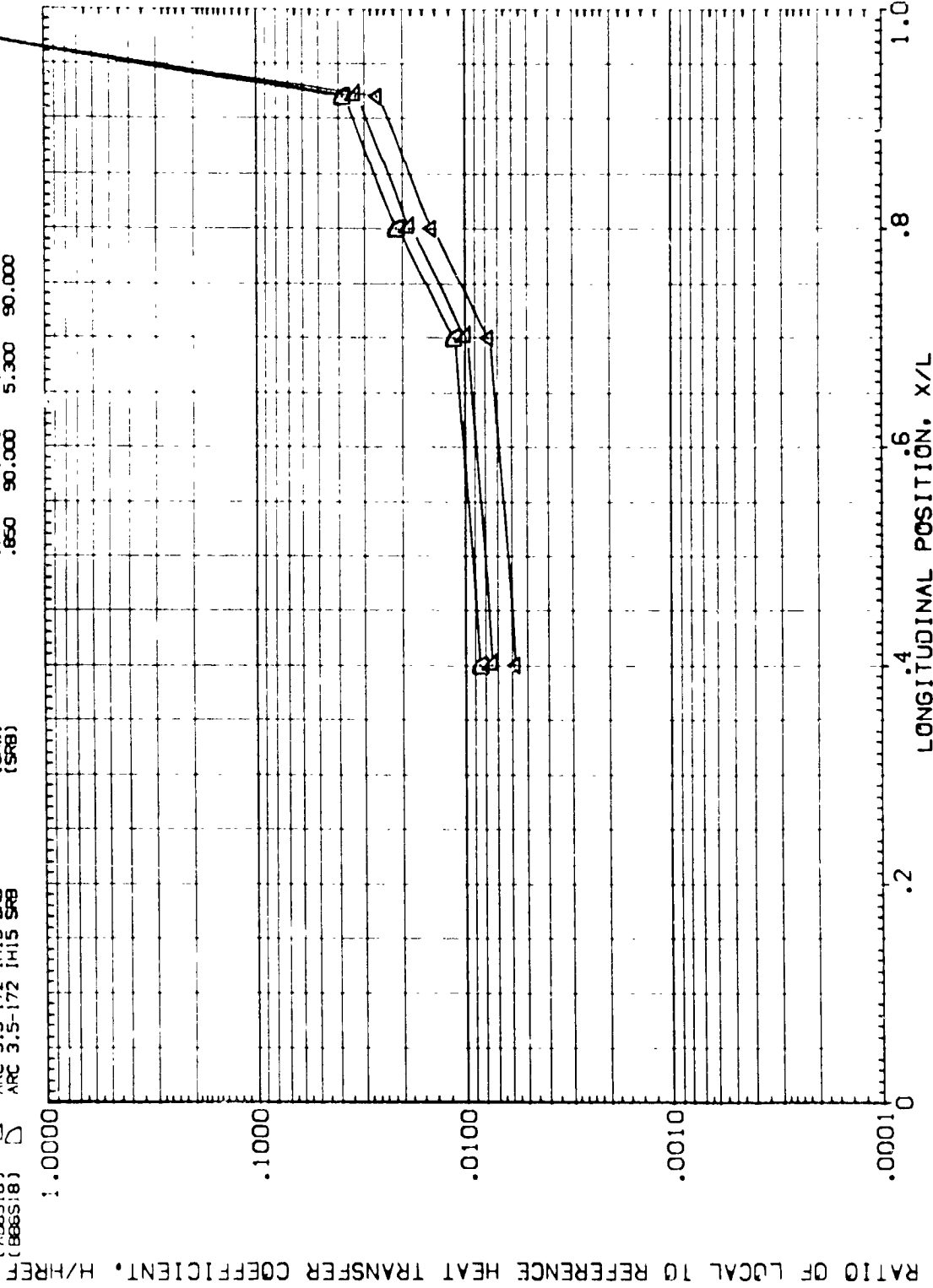


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	MACH	ALPHA	MAV/HT	PHI
(RBBS17)	DATA NOT AVAILABLE	5.300	70.000	1.000	90.000
(ABBS17)	DATA NOT AVAILABLE	5.300	70.000	.900	90.000
(RBBS17)	DATA NOT AVAILABLE	5.300	70.000	.850	90.000
(RBBS18)	ARC 3.5-172 H15 SRB	5.300	90.000	1.000	90.000
(ABBS18)	ARC 3.5-172 H15 SRB	5.300	90.000	.900	90.000
(RBBS18)	ARC 3.5-172 H15 SRB	5.300	90.000	.850	90.000

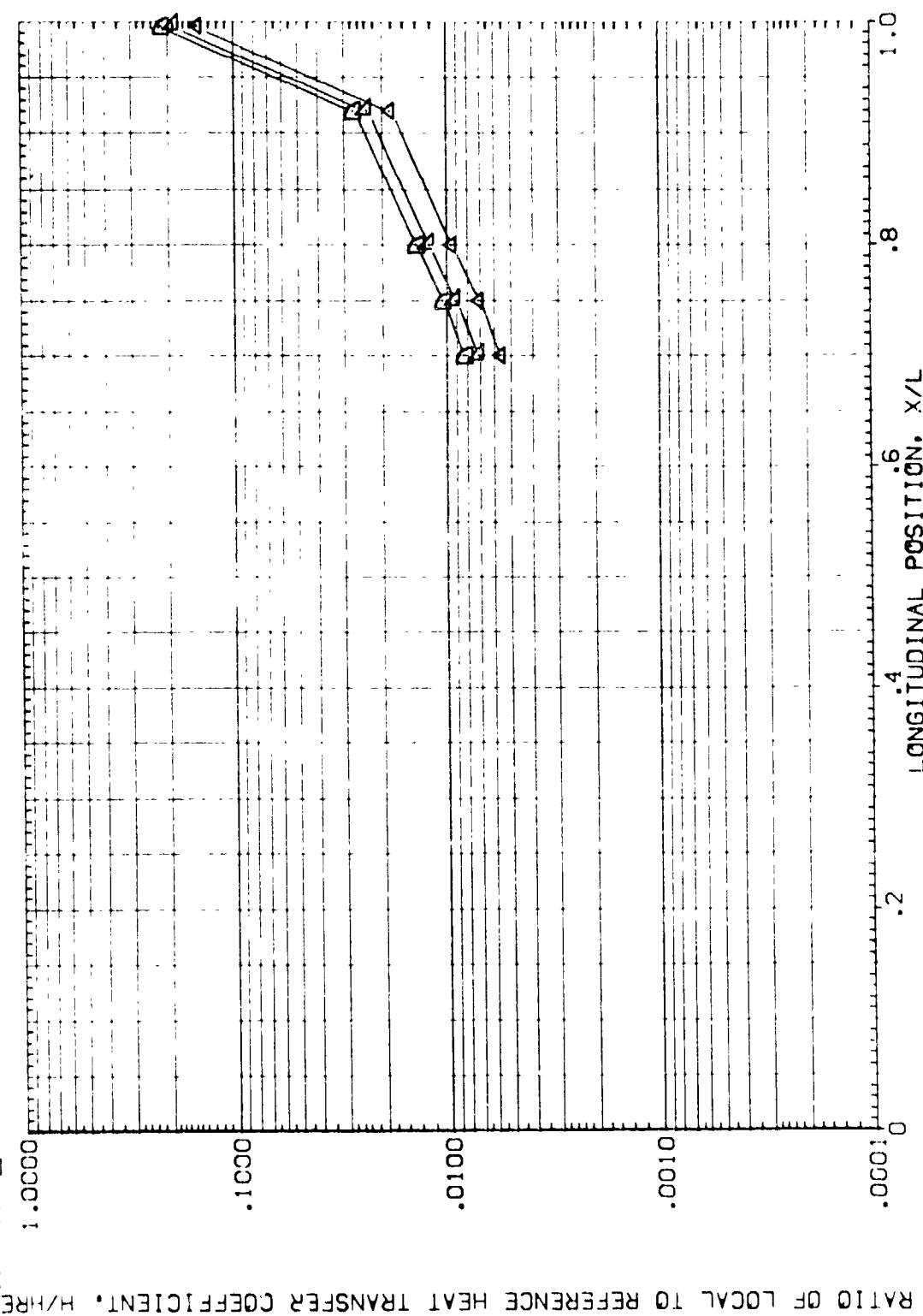


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

DATA SET SYMBOL CONFIGURATION DESCRIPTION
 (R88S17) DATA NOT AVAILABLE
 (A88S17) DATA NOT AVAILABLE
 (B88S17) DATA NOT AVAILABLE
 (F88S18) ARC 3.5-172 I415 SR8
 (A88S18) ARC 3.5-172 I415 SR8
 (B88S18) ARC 3.5-172 I415 SR8

HAV/HT ALPHA MACH PHI-M
 1.000 70.000 5.300 90.000
 .500 70.000 5.300 90.000
 .850 70.000 5.300 90.000
 1.070 90.000 5.300 90.000
 .500 90.000 5.300 90.000
 .850 90.000 5.300 90.000

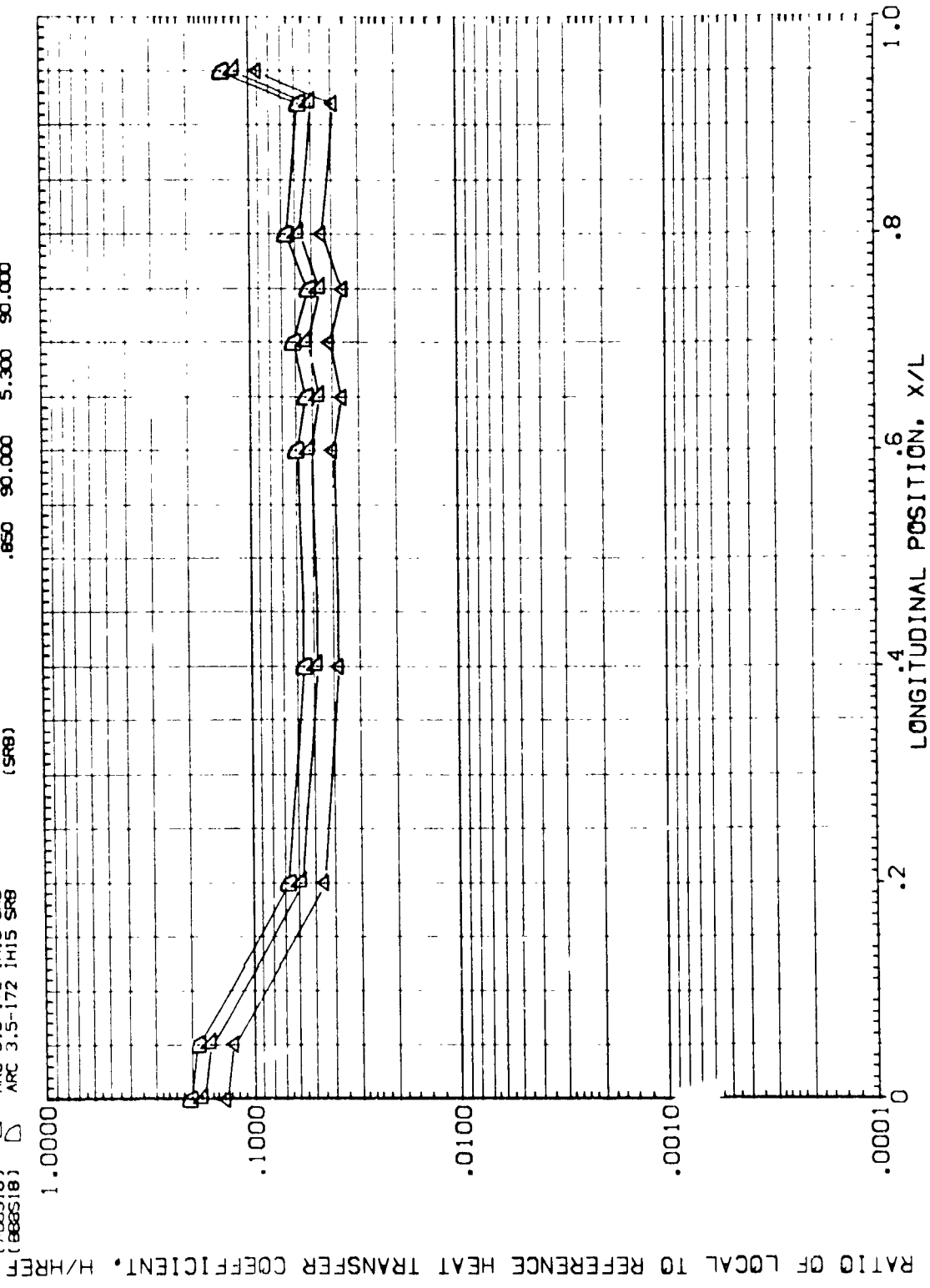


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.872 MACH = 5.300 PHI = 180.000 PAGE 278



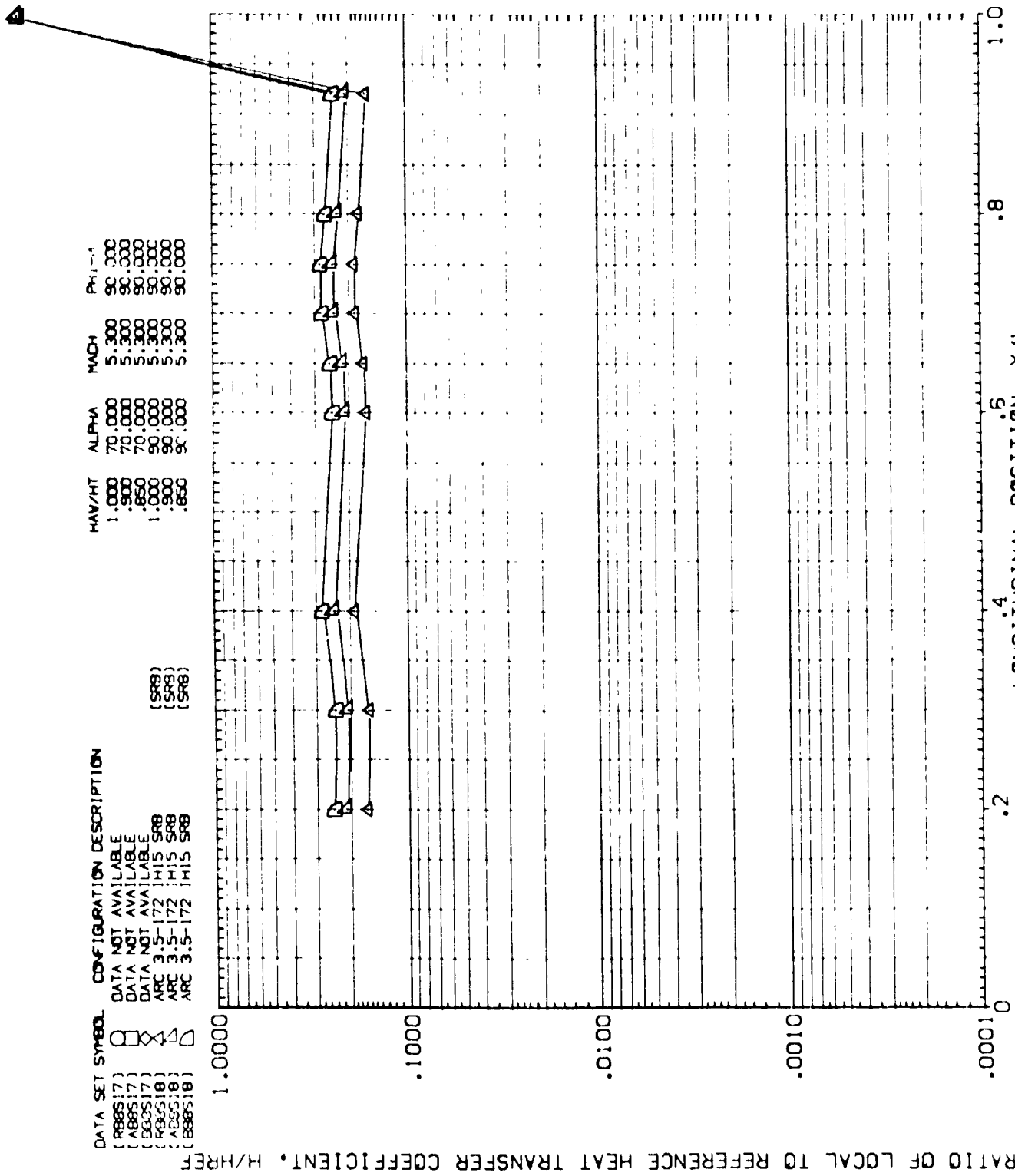


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

R/V/L = 5.872 MACH = 5.300 PHI = 225.000 PAGE 275

DATA SET SYMBOL
 (P88S:17)
 (A99S:17)
 (S88S:17)
 (S99S:18)
 (A88S:18)
 (S88S:18)

CONFIGURATION DESCRIPTION
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 DATA NOT AVAILABLE
 ARC 3.5-172 [HIS SRB
 (SRB)
 ARC 3.5-172 [HIS SRB
 (SRB)
 (SRB)

HAV/HT ALPHA MACH PHI^{1/4}
 1.000 70.000 5.300 90.000
 .900 70.000 5.300 90.000
 .850 70.000 5.300 90.000
 1.000 90.000 5.300 90.000
 .900 90.000 5.300 90.000
 .850 90.000 5.300 90.000

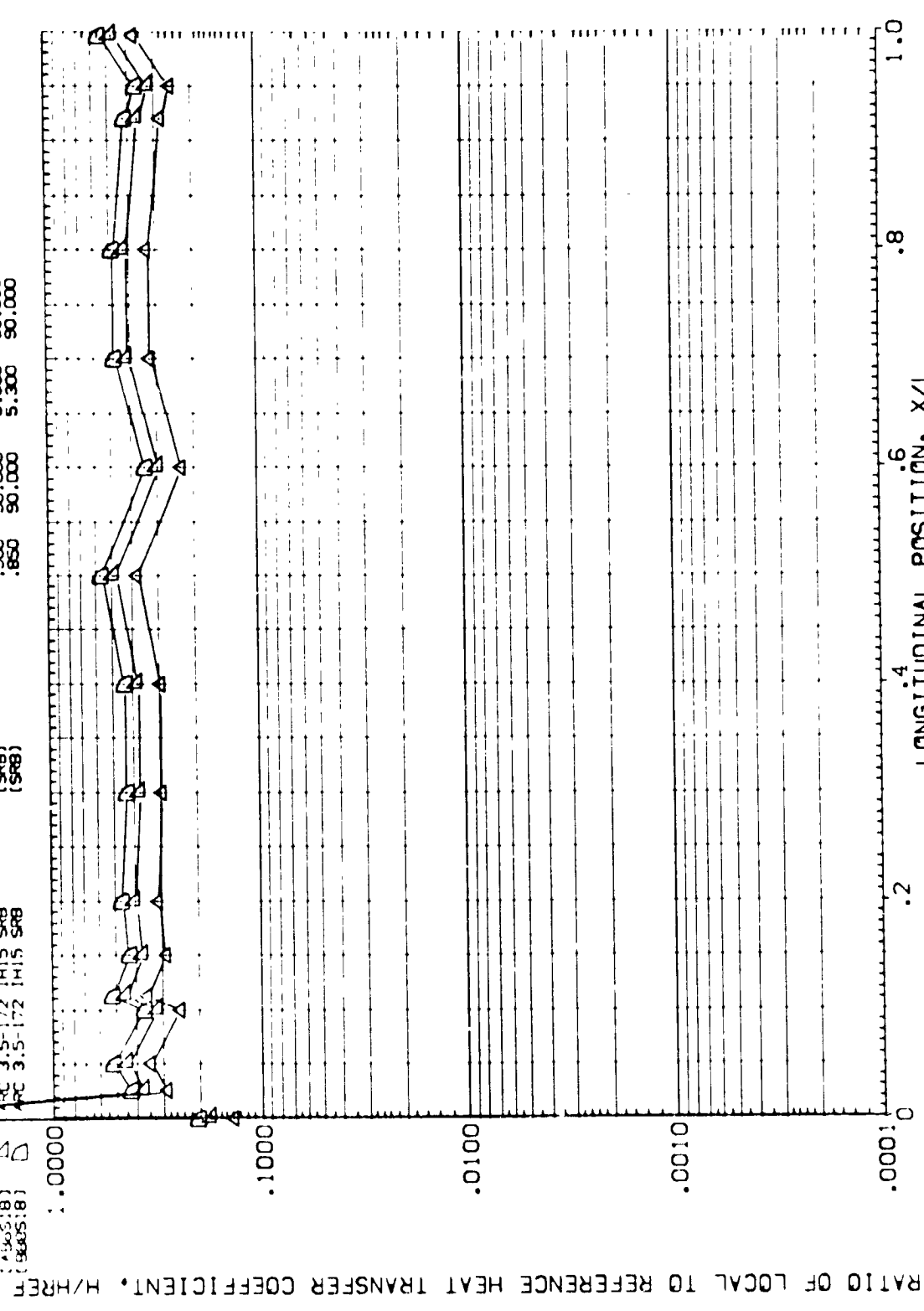


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

RN/L = 5.872 MACH = 5.300 PHI = 270.000 PAGE 280



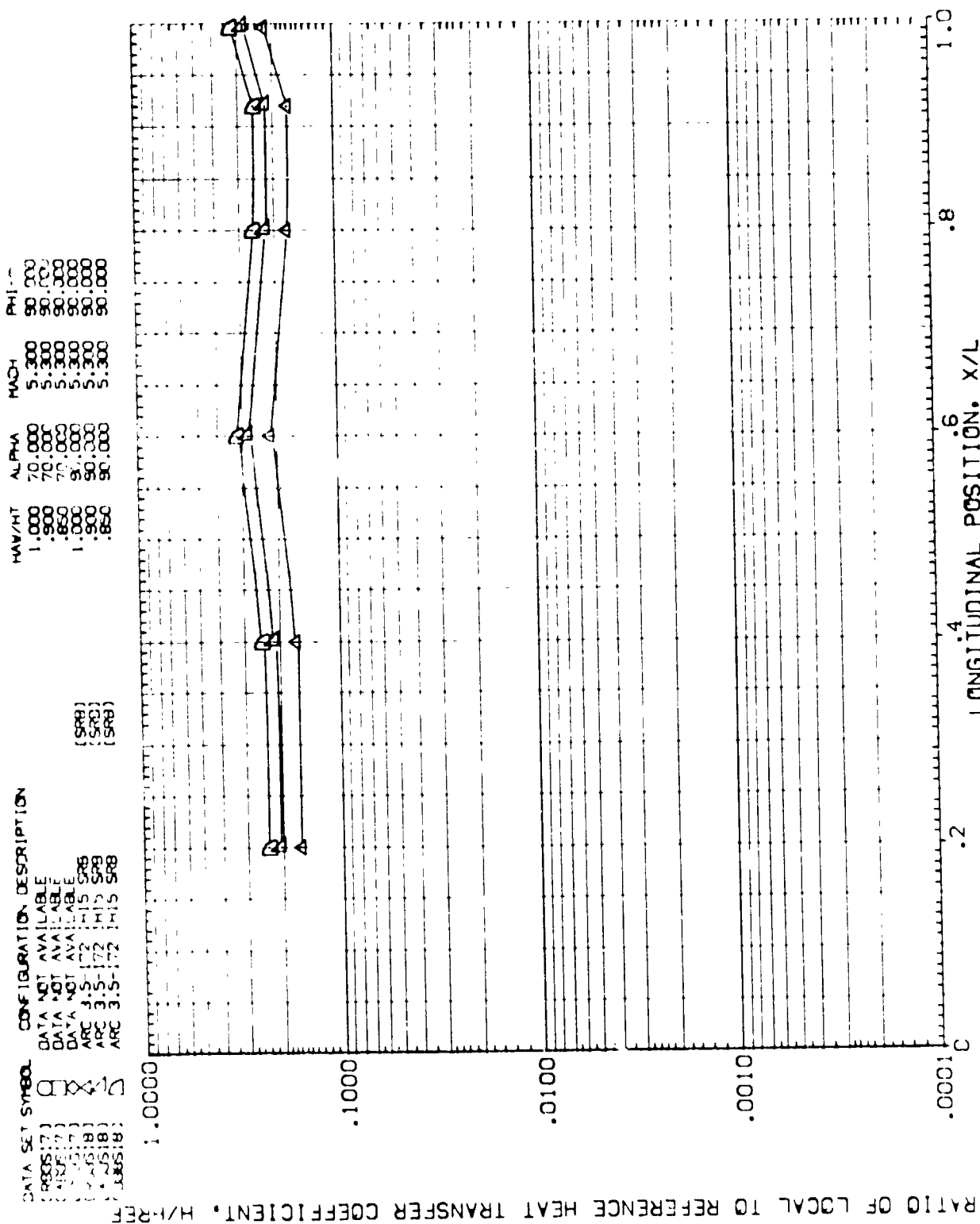


FIG. 33 UNDISTURBED AND INTERFERENCE HEAT TRANSFER RATIOS, SRB.

APPENDIX
TABULATED SOURCE DATA

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

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172) (R00001) (20 AUG 74)

ARC 3.5-172 IH15 ORBITER (ORBITER BODY)

PARAMETRIC DATA

REF = 2090.0000 SQ.FT. WREF = .0000 IN. ALPHA = .000 BETA = .000
 USEF = 474.6100 IN. VREF = .0000 IN. MACH = 5.300 PHI-M = .000
 DREF = 936.6020 IN. ZREF = .0000 IN. HEIGHT = 1.000

MM/L (1) = 1.764 MACH (1) = 5.300 MU = 151.428 TO = 1348.180 HT = 329.726 RHOVEL = .301

SECTION (1141-015) DEPENDENT VARIABLE W/HREF

Y	MM/L
0.000	.4150
0.066	.0220
0.125	.0137
0.175	.0090
0.250	.0074
0.300	.0069
0.350	.0117
0.400	.0059
0.500	.0110
0.600	.0056
0.700	.0049
0.800	.0043
0.900	.0037
1.000	.0040
1.025	.0039

MM/L (2) = 5.214 MACH (1) = 5.300 PO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .762

SECTION (1141-015) DEPENDENT VARIABLE W/HREF

Y	MM/L
0.000	.4150
0.066	.0014
0.125	.0009
0.175	.0006
0.250	.0005
0.300	.0004
0.350	.0005
0.400	.0004
0.500	.0006
0.600	.0005
0.700	.0005
0.800	.0004
0.900	.0004
1.000	.0005
1.025	.0004

(4888:2) (2) AUG 74

ARC 3.5-172 IM15 ORBITER (ORBITER BODY)

REFERENCE DATA

WREF = 2990.0000 56. FT. WREF = .0000 IN.
 LREF = 474.8100 IN. WREF = .0000 IN.
 BREF = 936.6600 IN. WREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PWT-M = .000
 HAW-M1 = .000

RM/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.949 RUMOVEL = .323

SECTION (1)41-015 DEPENDENT VARIABLE W/HREF

Y .0000 .4150

W/L	Y
.0068	.0065
.125	.0240
.175	.0326
.250	.0521
.300	.0722
.350	.0920
.410	.0925
.500	.0947
.600	.0942
.700	.0935
.800	.0929
.900	.0929
1.000	.0930
1.025	.0930

RM/L (2) = 6.131 MACH (1) = 5.300 FO = 150.041 TO = 1040.830 HT = 251.898 RUMOVEL = .808

SECTION (1)41-015 DEPENDENT VARIABLE W/HREF

Y .0000 .4150

W/L	Y
.0068	.0062
.125	.0237
.175	.0323
.250	.0518
.300	.0723
.350	.0922
.400	.0942
.500	.0918
.600	.0912
.700	.0912
.800	.0913
.900	.0912
1.000	.0948
1.025	.0943



AKC 3.5-1/2 (M15 ORB + ET (ORBITTER BODY) (KBR803) (20 AUG 74)

PARAMETRIC DATA
 ALPHA = 1.000 E TA = .0000
 MACH = 5.210 M1-M = .0000
 H1/M11 = 1.1111

REFERENCE DATA
 MREF = 2000.0000 50 FT. MREF = .0000 IN.
 LREF = 474.0100 IN. MREF = .0000 IN.
 DREF = 930.0020 IN. MREF = .0000 IN.
 SCALE = .0060

AM/L (1) = 4.332 MACH (1) = 5.300 RC = 352.769 TO = 1304.520 H1 = 218.677 RMVEL = .716

SECTION (1) 41-075 DEPENDENT VARIABLE N/REF

Y	N/L
.0000	.0161
.125	.0067
.175	.0166
.250	.0203
.300	.03
.350	.0161
.400	.0177
.500	.0154
.600	.0190
.700	.0135
.800	.0105
.900	.0047
1.000	.0024
1.025	.0021

TABULATED DATA LISTING FOR IM15 (ARC 3.5 172)

(588805) (20 AUG 74)

ARC 3.5-172 1-15 ORB + ET +S68 (ORBITER BODY)

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAWHT = 1.000

REFERENCE DATA

REF = 2690.0000 56.171. YREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 BREF = 939.6823 IN. YREF = .0000 IN.
 SCALE = .0000

RN/L (1) = 1.845 MACH (1) = 5.300 FO = 149.964 TO = 1303.100 HT = 318.311 RHOVEL = .705

DEPENDENT VARIABLE H/HREF

SECTION (1) 41-075

Y .0000 .4150

X/L	Y
.068	.0295
.125	.0191
.175	.0059
.250	.0259
.300	.0255
.350	.0222
.400	.0247
.500	.0311
.600	.0305
.700	.0246
.800	.0172
.900	.0073
1.000	.0018
1.025	.0022

RN/L (2) = 4.437 MACH (1) = 5.300 FO = 353.867 TO = 1287.480 HT = 314.371 RHOVEL = .704

DEPENDENT VARIABLE H/HREF

SECTION (1) 41-075

Y .0000 .4150

X/L	Y
.068	.0258
.125	.0170
.175	.0071
.250	.0272
.300	.0303
.350	.0248
.400	.0418
.500	.0492
.600	.0384
.700	.0275
.800	.0176
.900	.0081
1.000	.0041
1.025	.0048



REFERENCE DATA

XREF = 2090.0000 SQ.FT. XMRP = .0000 IN.
 YREF = 474.6100 IN. YMRP = .0000 IN.
 ZREF = 936.6620 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-H = .000
 HAW/HT = 1.0000

RAYL (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.530 HT = 311.506 RHOVEL = .316

SECTION (1) 41-015

DEPENDENT VARIABLE K/HREF

Y	X
.0000	.4150
.0068	.0220
.125	.0211
.175	.0115
.250	.0233
.300	.0189
.350	.0228
.400	.0247
.500	.0264
.600	.0226
.700	.0208
.800	.0157
.900	.0056
1.000	.0018
1.025	.0020

RAYL (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1) 41-015

DEPENDENT VARIABLE K/HREF

Y	X
.0000	.4150
.0068	.0199
.125	.0190
.175	.0102
.250	.0228
.300	.0174
.350	.0229
.400	.0229
.500	.0417
.600	.0239
.700	.0212
.800	.0162
.900	.0069
1.000	.0033
1.025	.0038

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

DATE 05 SEP 74

(RBB401) (20 AUG 74)

ARC 3.5-172 IH15 ORBITER (ORBITER WING)

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
 MACH = 5.300 PHI-M = .0000
 HAW/HT = 1.0000

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 BREF = 936.6820 IN. ZREF = .0000 IN.
 SCALE = .0060

RN/L (1) = 1.764 MACH (1) = 5.300 FO = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .30.

SECTION (1) 141-015 DEPENDENT VARIABLE H/MREF

2V78 .4000 .6000 .8000

X/C

.175	.0316
.200	.0375
.225	.0293
.250	.0294
.300	.0276
.400	.0252
.500	.0214
.600	.0164
.700	.0137
.800	.0125
.850	.0139
.875	.0088
.900	.0076

RN/L (2) = 5.214 MACH (1) = 5.300 FO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .76.

SECTION (1) 141-015 DEPENDENT VARIABLE H/MREF

2V78 .4000 .6000 .8000

X/C

.175	.0020
.200	.0026
.225	.0015
.250	.0017
.300	.0016
.400	.0015
.500	.0013
.600	.0011
.700	.0009
.800	.0010
.850	.0010
.875	.0006
.900	.0005



DATE 05 SEP 74

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

PAGE 7

ARC 3.5-172 IH15 ORBITER (ORBITER WING)

(RB8W02) (2J AUG 74)

REFERENCE DATA

SREF = 2090.0000 SQ.FT. MREF = .0000 IN.
LREF = 474.8100 IN. YREF = .0000 IN.
BREF = 936.6820 IN. ZREF = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 PHI-M = .000
MAW/HT = 1.000

RM/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.949 RHOVEL = .323

SECTION (1) 41-OTS DEPENDENT VARIABLE M/HREF

Z/B .4000 .6000 .8000

M/C

.175 .0089
.200 .0123
.225 .0045
.250 .0044
.300 .0041 .0092 .0141
.400 .0029 .0080 .0128
.500 .0022 .0071 .0096
.600 .0016 .0056 .0082
.700 .0014 .0047 .0066
.800 .0038 .0054
.875 .0015
.900 .0010

RM/L (2) = 6.131 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .808

SECTION (1) 41-OTS

DEPENDENT VARIABLE M/HREF

Z/B .4000 .6000 .8000

M/C

.175 .0082
.200 .0116
.225 .0033
.250 .0031 .0161
.300 .0029 .0091 .0140
.400 .0024 .0084 .0115
.500 .0026 .0083 .0101
.600 .0025 .0070 .0086
.700 .0022 .0057 .0069
.800 .0042 .0053
.875 .0032
.900 .0023

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

ARC 3.5-172 IH15 ORB + ET (ORBITER WING) (RB8W03) (20 AUG 74)

REFERENCE DATA

BASE = 2690.0000 SQ.FT. XMRP = .0000 IN.
LREF = 474.6100 IN. YMRP = .0000 IN.
BREF = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAWHT = 1.000

RN/L (1) = 4.332 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 HI = 318.677 RHVEL = .716

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

ZY/B	.4000	.6000	.8000
X/C			
.175	.0261		
.200	.0331		
.225	.0227		
.250	.0260		.0567
.300	.0235	.0235	.0488
.400	.0206	.0231	.0495
.500	.0170	.0212	.0392
.600	.0125	.0176	.0352
.700	.0106	.0150	.0293
.800		.0122	.0231
.850			.0178
.875		.0085	
.900	.0067		



REFERENCE DATA
 BREF = 2690.0000 SQ.FT. WREF = .0000 IN. ALPHA = .000 BETA = .000
 LREF = 474.6103 IN. YREF = .0000 IN. MACH = 5.300 PHI-M = .000
 BREF = 936.6820 IN. ZREF = .0000 IN. MAW/HT = 1.000
 SCALE = .0063

PARAMETRIC DATA
 RM/L (1) = 1.845 MACH (1) = 5.300 PO = 149.964 TO = 1303.180 HT = 318.311 RMVEL = .30*

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

Z7/B .4000 .6000 .8000

M/C	.4000	.6000	.8000
.175	.0235		
.200	.0317		
.225	.0203		
.250	.0239		
.300	.0237	.0255	.0457
.400	.0213	.0224	.0378
.500	.0195	.0189	.0307
.600	.0154	.0168	.0263
.700	.0148	.0158	.0211
.800	.0137	.0166	.0190
.850			.0105
.875			
.900	.0142		

RM/L (2) = 4.437 MACH (1) = 5.300 PO = 353.867 TO = 1287.480 HT = 314.301 RMVEL = .72*

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

Z7/B .4000 .6000 .8000

M/C	.4000	.6000	.8000
.175	.0214		
.200	.0293		
.225	.0310		
.250	.0352		
.300	.0321	.0235	.0393
.400	.0270	.0259	.0351
.500	.0226	.0287	.0287
.600	.0179	.0297	.0245
.700	.0212	.0265	.0199
.800	.0217	.0215	.0156
.850			.0125
.875			.0191
.900	.0155		

ARC 3.5-172 IH15 CRB + ET +SRB (ORBITER WING)

(RBRW06) (20 AUG 74)

REFERENCE DATA

SRF = 2690.0000 SQ.FT. MRFP = .0000 IN.
 LREF = 474.8100 IN. MRFP = .0000 IN.
 BRF = 936.6820 IN. MRFP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = 1.000

RN/L (1) = 1.952 MACH (1) = 5.300 PO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .316

SECTION (1)41-OTS

DEPENDENT VARIABLE H/REF

Z/Y/B	.4000	.6000	.8000
M/C			
.175	.0246		
.200	.0337		
.225	.0219		
.250	.0235		
.300	.0236	.0292	.0399
.400	.0201	.0291	.0314
.500	.0241	.0250	.0255
.600	.0234	.0203	.0213
.700	.0217	.0166	.0177
.800	.0137	.0140	.0140
.875	.0101		
.900	.0145		

RN/L (2) = 4.570 MACH (1) = 5.300 PO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1)41-OTS

DEPENDENT VARIABLE H/REF

Z / B	.4000	.6000	.8000
M/C			
.175	.0224		
.200	.0306		
.225	.0224		
.250	.0250		
.300	.0246	.0255	.0402
.400	.0228	.0295	.0325
.500	.0279	.0307	.0269
.600	.0291	.0306	.0224
.700	.0288	.0263	.0178
.800	.0208	.0135	.0135
.875	.0107		
.900	.0145		



ARC 3.5-172 IH15 ORB + ET +SFB (SFB)

(RB8807) (20 AUG 74)

REFERENCE DATA

ORF = 2690.0000 SQ.FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BREF = 936.6800 IN. ZMRP = .0000 IN.
SCALE = .00160

PARAMETRIC DATA

ALPHA = .070 BETA = .000
MACH = 5.300 PHI-M = .000
HAWHT = 1.000

RN/L (1) = 1.963 MACH (1) = 5.300 FO = 155.638 TO = 1274.720 HT = 311.029 RHOVEL = .370

SECTION (1) 141-015 DEPENDENT VARIABLE H/HREF

PHI 90.0000135 .0000180 .0000225 .0000270 .0000315 .0000

N/L	PHI	PHI	PHI	PHI	PHI
.000	.2108	.2108	.2108	.2108	.2108
.002	.1494	.1494	.1494	.1494	.1494
.025	.2293	.2293	.2293	.2293	.2293
.050	.1373	.1373	.1373	.1373	.1373
.100	.0574	.0574	.0574	.0574	.0574
.112	.0767	.0767	.0767	.0767	.0767
.150	.0736	.0736	.0736	.0736	.0736
.200	.0335	.0335	.0335	.0335	.0335
.300	.0165	.0165	.0165	.0165	.0165
.400	.0173	.0450	.0255	.0127	.0127
.500	.0315	.0315	.0315	.0315	.0315
.600	.0403	.0414	.0179	.0174	.0174
.650	.0405	.0455	.0455	.0455	.0455
.700	.0221	.0270	.0403	.0243	.0214
.750	.0290	.0422	.0473	.0473	.0473
.800	.0353	.0634	.07619	.0373	.0228
.920	.0385	.0481	.0529	.0125	.0227
.950	.0654	.0654	.0147	.0147	.0147
.996	.0534	.0689	.0192	.0120	.0229

RN/L (2) = 4.311 MACH (1) = 5.300 FO = 352.586 TO = 1308.780 HT = 319.591 RHOVEL = .774

SECTION (1) 141-015 DEPENDENT VARIABLE H/HREF

PHI 90.0000135 .0000180 .0000225 .0000270 .0000315 .0000

N/L	PHI	PHI	PHI	PHI	PHI
.000	9.9900	9.9900	9.9900	9.9900	9.9900
.002	.1509	.1509	.1509	.1509	.1509
.025	.2174	.2174	.2174	.2174	.2174
.050	.1321	.1321	.1321	.1321	.1321
.100	.0549	.0549	.0549	.0549	.0549
.112	.0726	.0726	.0726	.0726	.0726
.150	.0730	.0730	.0730	.0730	.0730
.200	.0516	.0414	.0314	.0213	.0213
.300	.0189	.0189	.0123	.0123	.0123
.400	.0152	.0221	.0368	.0249	.0101
.500	.0461	.0461	.0461	.0461	.0461



(RB8SD/7)

MACH (2) = 4.311 MACH (1) = 5.300

ARC 3.5-1/2 JH15 CRB + ET + SRB (SRB)

SECTION (1) 41-015

DEPENDENT VARIABLE NAME

PHI 90.0000135.00000180.0000225.0000270.0000315.0000

M/L

.600	.0455	.0457	.0280	.0212
.650	.0406	.0493		
.700	.0264	.0342	.0368	
.750	.0408	.0476	.0612	
.800	.0413	.0518	.0727	.0647
.850	.0360	.0485	.0327	.0125
.900		.0745	.0148	.0207
.950	.0688	.0771	.0282	.0159
				.0192



TABULATED DATA LISTING FOR IHI5 (A/C 3.5-172)

DATE 05 SEP 74

(888508) (20 AUG 74)

ACC = 9-172 IHI5 ORB + ET +558 (SRB)

PARAMETRIC DATA

ALPHA = -5.000 BETA = .0000
MACH = 5.300 PHI-M = .0000
WAV/HT = 1.000

REFERENCE DATA

SRWF = 2690.0000 SQ.FT. MRWF = .0000 IN.
LREF = 474.8100 IN. MRWF = .0000 IN.
DRWF = 936.6820 IN. MRWF = .0000 IN.
SCALE = .0000

RN/L (1) = 2.225 MACH (1) = 5.300 FO = .33.442 TO = 1174 JI HI = 285.439 RMOMEL = .33:

SECTION (1) 41-075 DEPENDENT VARIABLE NUMBER

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

M/L				
.000	.3123			.3123
.002				.1209
.025				.2340
.050	.1638			.1373
.100				.0638
.112				.0955
.150				.0312
.200	.0281	.0688	.0370	.0122
.300		.0341		.0165
.400	.0099	.0338	.0337	.0055
.500			.0506	
.600	.0448	.0422	.0293	.0148
.650	.0379	.0418		
.700	.0109	.0227	.0403	.0388
.750		.0275	.0480	.0521
.800	.0105	.0524	.0732	.0760
.920	.0127	.0393	.0649	.0368
.950		.0734		.0163
.996	.0313	.0444	.0351	.0202
				.0181

RN/L (2) = 4.713 MACH (1) = 5.300 FO = 352.403 TO = 1236.210 HI = 301.186 RMOMEL = .73

SECTION (1) 41-075 DEPENDENT VARIABLE NUMBER

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

M/L				
.000	.1928			.1928
.002				9.9900
.025				.2117
.050	.1526			.1264
.100				.0618
.112				.0799
.150				.0227
.200	.0314	.0673	.0333	.0116
.300		.0359		.0141
.400	.0131	.0357	.0430	.0230
.500				.0561

(RBR508)

RM/L (2) = 4.713 MACH (1) = 5.300

ARC 3.5-172 IM15 ORB + E1 + SAB (SAB)

SECTION (1141-013) DEPENDENT VARIABLE H/HREF

PHI 90.0000135,0000180,0000225,0000270,0000315,0000360

H/L	0.000	.0555	.0625	.0331	.0209
.050	.0473	.0626			
.700	.0112	.0289	.0442	.0613	.0433
.750	.0317	.0560	.0725		
.800	.0119	.0448	.0902	.0865	.0735
.920	.0126	.0415	.0642	.0415	.0113
.950	.0546		.0155		
.996	.0718	.0575	.0405	.0175	.0207



(B8513) (20 AUG 74)

(SR8)

ARC 3.5-172 IM15 SR8

PARAMETRIC DATA

ALPHA = .001 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HI = 1.000

REFERENCE DATA

MREF = 2090.0000 90.F1. MREF = .0000 IN.
LREF = 474.8100 IN. MREF = .0010 IN.
BREF = 936.6600 IN. MREF = .0000 IN.
SCALE = .0060

MACH (1) = 1.687 MACH (1) = 5.300 FO = 153.442 TO = 1397.700 HI = 342.151 RMVEL = .289

SECTION (1141-075) DEPENDENT VARIABLE H/REF

PHI 90.0000135.0000160.0000225.0000270.0000315.0000

M/L	PHI	90.0000135	0000160	0000225	0000270	0000315	0000
.000		.2853					.2853
.002							.1363
.025							.1497
.050							.1141
.100							.0678
.112							.0511
.150							.0158
.200							.0128
.300							.0113
.400							.0109
.500							.0136
.600							.0092
.650							.0079
.700							.0047
.750							.0032
.800							.0039
.920							.0065
.950							.0174
.996							.0304

MACH (2) = 4.834 MACH (1) = 5.300 FO = 351.487 TO = 1247.410 HI = 354.045 RMVEL = .732

SECTION (1141-075) DEPENDENT VARIABLE H/REF

PHI 90.0000135.0000160.0000225.0000270.0000315.0000

M/L	PHI	90.0000135	0000160	0000225	0000270	0000315	0000
.000		.2342					.2342
.002							.1223
.025							.1724
.050							.1006
.100							.0521
.112							.0466
.150							.0144
.200							.0115
.300							.0114
.400							.0099
.500							.0081
.600							.0069
.700							.0100
.800							.0132
.920							.0122
.950							.0122

DATE 09 SEP 74 TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)

(R88513)

(S69)

ARC 3.5-172 IM15 S68

NNVL (2) = 4.834 MACH (1) = 9.300

SECTION (1141-015 DEPENDENT VARIABLE NAMEEF

MM1 90.0000135,0000180,0000225,0000270,0000315,0000

MM1	00.0000135	00.0000180	00.0000225	00.0000270	00.0000315	00.0000
.800	.0002	.0092	.0080	.0095		
.850	.0366	.0396				
.900	.0028	.0019	.0061	.0085		
.950	.0052	.0059	.0075			
1.000	.0100	.0099	.0139	.0135	.0106	
.920	.0291	.0278	.0312	.0387	.0395	
.950	.0358		.0868			
.998	.0729	.0905	.0802	.0899	.0749	



ARC 3.5-172 IM15 S49 (S49B) (R88514) (23 AUG 74)

REFERENCE DATA
 WARP = 2630.0000 36. FT. MREF = .0000 IN. ALPHA = -5.0000 BETA = .0000
 LREF = 474.8100 IN. MREF = .0000 IN. MACH = 5.300 M1-M = .0000
 DRFP = 938.8070 IN. MREF = .0000 IN. MAWHT = 1.000
 SCALE = .0060

PARAMETRIC DATA
 MACH (1) = 2.138 MACH (1) = 5.300 FO = 151.245 TO = 1193.393 HI = 290.290 RMDEL = .350

SECTION (1) 141-073 DEPENDENT VARIABLE NUMBER

M/L	FO	TO	HI	RMDEL
.000	.2618			
.002	.1157			
.025	.1776			
.050	.1335			
.100	.0655			
.112	.0481			
.150	.0344			
.200	.0211	.0176	.0036	
.300	.0206	.0132	.0045	
.400	.0238	.0229	.0062	
.500	.0236	.0202	.0033	
.600	.0224	.0217	.0064	
.700	.0203	.0221	.0174	.0176
.800	.0175	.0164	.0137	.0137
.900	.0077	.0214	.0239	.0239
.950	.0130	.0302	.0594	.0594
.996	.0306	.0669	.0573	.0278

MACH (2) = 5.469 MACH (1) = 5.300 FO = 351.853 TO = 1123.620 HI = 272.646 RMDEL = .770

SECTION (1) 141-073 DEPENDENT VARIABLE NUMBER

M/L	FO	TO	HI	RMDEL
.000	.2341			
.002	.1176			
.025	.1571			
.050	.1192			
.100	.0534			
.112	.0439			
.150	.0329			
.200	.0199	.0173	.0046	
.300	.0214	.0214	.0049	
.400	.0242	.0239	.0049	
.500	.0129			

ARC 3.5-172 IH15 SRB

(SRB)

(RB8514)

RW/L (2) = 5.469 MACH (1) = 5.300

SECTION (1) 41-015

DEPENDENT VARIABLE H/HREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L					
.600	.0237	.0207	.0098	.0026	
.650	.0212	.0219			
.700	.0050	.0182	.0187	.0071	
.750	.0253	.0339	.0274		
.800	.0126	.0318	.0352	.0140	.0154
.920	.0338	.0569	.0767	.0513	.0318
.950		.1248	.0937		
.996	.0694	.0952	.0881	.0769	.0521



(RB8S16) (20 AUG 74)

(SRB)

ARC 3.5-172 IH15 SRB

PARAMETRIC DATA

ALPHA = 45.000 BETA = .000
MACH = 5.350 PHI-M = 90.000
RAW/HT = 1.000

REFERENCE DATA

BRFP = 2690.0000 56. FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BRFP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

RN/L (1) = 5.559 MACH (1) = 5.350 FO = 351.670 HT = 1111.580 RHOMEL = .783

SECTION (1141-013) DEPENDENT VARIABLE HVHREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L					
.000	.2338	.2338	.2338	.2338	.2338
.002					.1502
.025					.3189
.050	.1544				.3216
.100					.2180
.112					.2030
.150					.1579
.200	.0286	.0973	.1816	.0941	
.300		.1013	.1833		
.400	.0049	.0277	.1263	.1856	.1066
.500			.3327		
.600		.0325	.1549	.2164	.1874
.650		.0304	.1630		
.700	.0063	.0366	.1859	.3203	
.750		.0078	.0375	.2130	
.800	.0029	.0067	.0495	.2113	.4061
.920	.0063	.0068	.0613	.2598	.4375
.950		.0836		.4244	.2807
.996	.0026	.0059	.1796	.2538	.1740



ARC 3.5-172 IH15 SRB
 REFERENCE DATA
 BRFP = 2690.0000 36. FT. WREF = .0000 IN.
 LREF = 474.8100 IN. WREF = .0000 IN.
 DRFP = 936.6820 IN. WREF = .0000 IN.
 SCALE = .3060

PARAMETRIC DATA
 ALPHA = 70.0000 BETA = .03
 MACH = 5.300 PH1-A = 90.000
 HAW/H1 = 1.000

RW/L (1) = 4.926 MACH (1) = 5.300 FO = 353.667 IO = 1203.180 HT = 293.284 RHOVEL = .752

SECTION (1) 41-015 DEFENDENT VARIABLE H/HREF

PH1	90.0000135	.0000180	.0000225	.0000270	.0000315	.0000
R/L	.000	.1932	.1932	.1932	.1932	.1932
	.025	.3210	.3210	.3210	.3210	.3210
	.050	.4598	.4598	.4598	.4598	.4598
	.100	.7664	.7664	.7664	.7664	.7664
	.112	.8198	.8198	.8198	.8198	.8198
	.150	.9236	.9236	.9236	.9236	.9236
	.200	1.0432	1.0432	1.0432	1.0432	1.0432
	.300	1.1445	1.1445	1.1445	1.1445	1.1445
	.400	1.2377	1.2377	1.2377	1.2377	1.2377
	.500	1.3294	1.3294	1.3294	1.3294	1.3294
	.600	1.4381	1.4381	1.4381	1.4381	1.4381
	.650	1.496	1.496	1.496	1.496	1.496
	.700	1.5668	1.5668	1.5668	1.5668	1.5668
	.750	1.6337	1.6337	1.6337	1.6337	1.6337
	.800	1.7077	1.7077	1.7077	1.7077	1.7077
	.920	1.8122	1.8122	1.8122	1.8122	1.8122
	.950	1.8597	1.8597	1.8597	1.8597	1.8597
	.996	1.9547	1.9547	1.9547	1.9547	1.9547

(RB8518) (20 AUG 74)

(SRB)

ARC 3.5-172 IH15 SRB

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 BREF = 996.6900 IN. ZREF = .0000 IN.
 SCALE = .0060

RM/L (1) = 5.872 MACH (1) = 5.300 FO = 353.135 TO = 1076.200 HT = 260.731 RMDEL = .800

SECTION (1) 141-075

DEPENDENT VARIABLE H/HREF

PHI 90.0000135 .0000180 .0000225 .0000270 .0000315 .0000

X/L

.000	.1389	.1589	.1665	.1631	.1631	.2188
.025	.1389	.1589	.1665	.1631	.1631	.2188
.050	.1254	.1254	.1615	.1686	.1686	.3233
.100	.2473	.2473	.1892	.1845	.1877	.3290
.112	.3526	.3526	.1892	.1614	.1614	.2799
.150	.2897	.2897	.1631	.1631	.1631	.2497
.200	.3130	.3130	.1665	.1631	.1631	.3719
.300	.2949	.2949	.1615	.1686	.1686	.2213
.400	.1687	.1687	.1892	.1845	.1877	
.500	.3202	.3202	.1892	.1614	.1614	
.600	.2317	.2317	.1631	.1631	.1631	
.650	.1686	.1686	.1686	.1686	.1686	
.700	.3233	.3233	.1845	.1845	.1845	
.750	.1877	.1877	.1877	.1877	.1877	
.800	.3290	.3290	.1789	.1789	.1789	
.920	.1711	.1711	.1614	.1614	.1614	
.950	.2497	.2497	.1631	.1631	.1631	
.996	.3719	.3719	.1665	.1631	.1631	

PARAMETRIC DATA

ALPHA = 90.0000 BETA = .0000
 MACH = 5.3000 PHI-M = 90.0000
 HAW/HT = 1.0000



ARC 3.5-172 IH15 CRITTER (WINDSHIELD) (RB8CD1) (20 AUG 74)

REFERENCE DATA

BREF = 2690.0000 SQ.FT. XREF = .0000 IN.
 LREF = 474.6100 IN. YREF = .0000 IN.
 DREF = 936.6820 IN. ZREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 FHT-M = .000
 HAW/HI = 1.000

RM/L (1) = 1.764 MACH (1) = 5.300 FO = 151.428 TO = 1348.180 HI = 329.926 RMVEL = .301

SECTION (1) 41-073 DEPENDENT VARIABLE H/HREF

Y	X	Value
	1.210	.1350
	1.231	.1500
	1.272	.1679
	1.305	.1768
	1.334	.2095
	1.358	.1897

RM/L (2) = 5.214 MACH (1) = 5.300 FO = 349.474 TO = 1153.370 HI = 280.152 RMVEL = .762

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

Y	X	Value
	1.210	.0222
	1.231	.0223
	1.272	.0315
	1.305	.0266
	1.334	.0339
	1.358	.0288

ARC 3.5-172 IH15 ORBITTER (WINDSHIELD)

(RBR002) (23 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
 LRFP = 474.8100 IN. YMRP = .0000 IN.
 BRFP = 936.6800 IN. ZMRP = .0000 IN.
 SCALE = .00160

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = 1.000

RA/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.949 RHOMEL = .323

SECTION (1) 41-OTS DEPENDENT VARIABLE H/HREF

Y	X	VALUE
.0470	.1780	.1960 .2130
1.210	.1813	
1.251		.1898
1.272	.2426	
1.305		.2111
1.334	.2637	
1.358	.2275	

RA/L (2) = 6.131 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHOMEL = .808

SECTION (1) 41-OTS DEPENDENT VARIABLE H/HREF

Y	X	VALUE
.0470	.1780	.1960 .2130
1.210	.2449	
1.251		.2445
1.272	.3177	
1.305		.2581
1.334	.3341	
1.358	.2809	



(RBBC03) 03 AUG 74)

ARC 3.5-172 IH15 CRB + ET (WINDSHIELD)

PARAMETRIC DATA

REFERENCE DATA

SREF = 2690.0700 56.FT. MREF = .0000 IN. ALPHA = .000 BETA = .000
 LREF = 474.6100 IN. YREF = .0000 IN. MACH = 5.300 PHI-M = .000
 DREF = 936.6820 IN. ZREF = .0000 IN. HAW/HT = 1.000
 SCALE = .0060

RM/L (1) = 4.332 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 HT = 318.677 RHOVEL = .716

SECTION (1) 141-015 DEPENDENT VARIABLE H/HREF

Y	X
.0470	.1817
.1780	.1960
.1960	.2130
.2425	.2111
.2603	.2254
.2877	.1877

(588005) (20 AUG 74)

ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)

REFERENCE DATA
 MREF = 2690.0000 50.FT. MREF = .0000 IN.
 LREF = 474.8100 IN. MREF = .0000 IN.
 DREF = 936.8320 IN. MREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA
 ALPHA = .0000 BETA = .0000
 MACH = 5.300 PHI-M = .0000
 HAWHT = 1.000

RN/L (1) = 1.845 MACH (1) = 5.300 FO = 149.964 TO = 1303.199 HT = 318.311 RHOVEL = .305

SECTION (1) 41-OTS
 DEPENDENT VARIABLE H/HREF

SECTION (1) 41-OTS
 DEPENDENT VARIABLE H/HREF

Y	X	VALUE
.0470		.1960 .2130
1.210	.1422	
1.251		.1543
1.272	.1966	
1.305		.1800
1.334	.2159	
1.356		.1954

Y	X	VALUE
.0470		.1960 .2130
1.210	.2043	
1.251		.2353
1.272	.2752	
1.305		.2464
1.334	.2837	
1.356		.2693

RN/L (2) = 4.437 MACH (1) = 5.300 FO = 353.867 TO = 1287.480 HT = 314.301 RHOVEL = .724

SECTION (1) 41-OTS
 DEPENDENT VARIABLE H/HREF

SECTION (1) 41-OTS
 DEPENDENT VARIABLE H/HREF

Y	X	VALUE
.0470		.1960 .2130
1.210	.2043	
1.251		.2353
1.272	.2752	
1.305		.2464
1.334	.2837	
1.356		.2693

Y	X	VALUE
.0470		.1960 .2130
1.210	.2043	
1.251		.2353
1.272	.2752	
1.305		.2464
1.334	.2837	
1.356		.2693



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 TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)
 (RB&C06) (20 AUG 74)

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 FACH = 5.510 PHI-M = .000
 HAW/HT = 1.000

SCALE = .0000
 R/W/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.880 HT = 311.506 R/HOVEL = .316

DEPENDENT VARIABLE H/HREF

SECTION (1) 41-015
 Y .0470 .1780 .1960 .2130

X
 1.210 .1592
 1.251 .1756
 1.272 .2200
 1.305 .2042
 1.334 .2404
 1.356 .2180

R/W/L (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 R/HOVEL = .750

DEPENDENT VARIABLE H/HREF

SECTION (1) 41-015
 Y .0470 .1780 .1960 .2130

X
 1.210 .2296
 1.251 .2440
 1.272 .3003
 1.305 .2690
 1.334 .3070
 1.356 .2816

DATE 09 SEP 74

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

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ARC 3.5-172 IH15 CRB + ET (EXTERNAL TANK)

(588103) (20 AUG 74)

REFERENCE DATA

SREF = 2690.0000 56.71. MREF = .0000 IN.
 LREF = 474.8173 IN. YREF = .0000 IN.
 BREF = 976.6170 IN. ZREF = .0000 IN.
 SCALE = .1163

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.320 PHI-M = .000
 HAW/HT = 1.073

RWL (1) = 4.352 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 HT = 318.677 RWVEL = .716

SECTION (1141-075 DEPENDENT VARIABLE H/REF

PHI 90.0000112.5000135.0000157.5000

M/L

.450	.0034	.0294	.0609
.550	.0272	.0275	.0231
.650	.0215	.0201	.0161
.750	.0180	.0122	.0151
.850	.0158	.0128	.0119



ARC 3.9-1 2 IN15 ORB + S1 + SFB (EXTERNAL TANK)

(R88705) (20 AUG 74)

REFERENCE DATA

SHEP = 2090.0000 36.511 SHEP = 10000.000
SHEP = 474.0000 IN. SHEP = 10000.000 IN.
SHEP = 936.6622 IN. SHEP = 10000.000 IN.
SCALE = 1.0000

PARAMETRIC DATA

ALPHA = 10.0000 BETA = 1000.0000
MACH = 5.3000 M1-M = 10000.0000
MAWHT = 1.0000

AN = (1) = 1.845 MAGN (1) = 5.300 FO = 149.904 TO = 1303.110 HI = 318.311 RUMVEL = 1.305

SECTION (1141-075

DEPENDENT VARIABLE NUMBER

PHI 90.0760112.5300135.0000157.5000

ML	PHI	ALPHA	BETA	MACH	M1-M	MAWHT
.450	.0198	.0288	.0821			
.550	.0172	.0465	.0342			
.650	.0148	.0209	.0287	3.5		
.750	.0120	.0256	.0137	1.241		
.850	.0127	.0260	.0163	1.212		

AN = (2) = 4.437 MAGN (1) = 5.300 FO = 353.867 TO = 1287.450 HI = 314.301 RUMVEL = 1.724

SECTION (1141-075

DEPENDENT VARIABLE NUMBER

PHI 90.0760112.5300135.0000157.5000

ML	PHI	ALPHA	BETA	MACH	M1-M	MAWHT
.450	.0177	.0375	.0853			
.550	.0145	.0259	.0346			
.650	.0120	.0242	.0425	3.5		
.750	.0146	.0290	.0297	1.241		
.850	.0166	.0221	.0299	1.212		



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TABULATED DATA LISTING FOR IN:5 (ARC 3.5-172)

PAGE 31

ARC 3.5-172 IN:5 CRB + E' +SRB (EXTERNAL TANK)

(RB8106) 20 AUG 74

REFERENCE DATA

MAP = 2000.0000 36.FT. MAPF = .0000 IN.
LAF = 474.6100 IN. LAFP = .0000 IN.
DRP = 938.6820 IN. DRPF = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .0005
MACH = 5.300 PH1-M = .000
PH1-MHT = 1.000

AN/L (1) = 1.932 MACH (1) = 5.300 FO = 153.629 TO = 1276.580 HI = 311.306 RMVEL = .316

SECTION (1) 141-073

DEPENDENT VARIABLE NUMBER

PH1 90.0000112.5000135.0000157.5000

M/L
450 .0217 .0461 .0807
950 .0106 .0365 .0539
050 .0307 .0550 .0720
750 .0365 .0420 .0199 .022
050 .0313 .0371 .0199 .0199

AN/L (2) = 4.970 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HI = 307.600 RMVEL = .73

SECTION (1) 141-073

DEPENDENT VARIABLE NUMBER

PH1 90.0000112.5000135.0000157.5000

M/L
450 .0212 .0550 .0857
950 .0218 .0616 .0443
050 .0329 .0409 .0421 .0443
750 .0386 .0502 .0361 .0440
050 .0343 .0444 .0391 .0378

ARC 3.5-172 IH15 ORB + E1 +SRB (EXTERNAL TANK)

(RB8107) (20 AUG 74)

REFERENCE DATA

SRF = 2690.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BRKF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .00160

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HI = 1.000

RN/L (1) = 1.983 MACH (1) = 5.300 FO = 155.638 TO = 1274.720 HI = 311.029 RHOVEL = .290

SECTION (1) 141-075

DEPENDENT VARIABLE H/MREF

PHI 67.5000 90.0000 112.5000 135.0000 180.0000

X/L	.005	.125	.175	.250	.275	.325	.350	.375	.450	.550	.650	.750
	.2543	.0324	.0187									
				.0053	.0060	.0045	.0045	.0115	.0177			
										.0113	.0123	
										.0111	.0093	

RN/L (2) = 4.311 MACH (1) = 5.300 FO = 352.586 TO = 1309.080 HI = 319.591 RHOVEL = .714

SECTION (1) 141-075

DEPENDENT VARIABLE H/MREF

PHI 67.5000 90.0000 112.5000 135.0000 180.0000

X/L	.005	.125	.175	.250	.275	.325	.350	.375	.450	.550	.650	.750
	.2458	.0326	.0186									
				.0046	.0031	.0051	.0122	.0202				
										.0154	.0239	
										.0128	.0167	



(R88108) (20 AUG 74)

ARC 3.5-1/2 IH15 CRB + ET +SRB (EXTERNAL TANK)

REFERENCE DATA

SRFP = 2690.0000 56. FT. MRFP = .0000 IN.
LREF = 474.8100 IN. VMFP = .0000 IN.
BRFP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = -3.000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = 1.000

RN/L (1) = 2.225 MACH (1) = 5.300 FO = 153.442 TO = 1174.260 HT = 285.439 RHOVEL = .331

SECTION (1) 41-013 DEPENDENT VARIABLE H/HREF

PHI 67.5000 90.0000112.5000135.0000180.0000

X/L	PHI
.075	.2789
.125	.0447
.175	.0268
.250	.0081
.275	.0078
.325	.1201
.350	.0566
.375	.0916
.450	.0294
.500	.0331
.650	.0035
.750	.0072

RN/L (2) = 4.713 MACH (1) = 5.300 FO = 352.403 TO = 1236.210 HT = 301.186 RHOVEL = .758

SECTION (1) 41-013 DEPENDENT VARIABLE H/HREF

PHI 67.5000 90.0000112.5000135.0000180.0000

X/L	PHI
.005	.2554
.125	.0423
.175	.0255
.250	.0056
.275	.0069
.325	.1319
.350	.0612
.375	.1026
.450	.0345
.500	.0362
.650	.0052
.750	.0074

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(RB8109) ARC 3.5-172 IM15 ORB + E1 +SRB (EXTERNAL TANK)

RM/L (2) = 4.852 MACH (1) = 5.300 FO = 352.769 TO = 1247.200 H1 = 303.991 RMXCEL = .735

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

PHI .0000 45.0000 67.5000 90.0000112.5000135.0000157.5000180.0000

N/L	PHI	FO	TO	H1	RMXCEL
.000	.0000	45.0000	67.5000	90.0000	112.5000
.010	.0000	45.0000	67.5000	90.0000	112.5000
.020	.0000	45.0000	67.5000	90.0000	112.5000
.040	.0000	45.0000	67.5000	90.0000	112.5000
.060	.0000	45.0000	67.5000	90.0000	112.5000
.080	.0000	45.0000	67.5000	90.0000	112.5000
.100	.0000	45.0000	67.5000	90.0000	112.5000
.150	.0000	45.0000	67.5000	90.0000	112.5000
.200	.0000	45.0000	67.5000	90.0000	112.5000
.300	.0000	45.0000	67.5000	90.0000	112.5000
.350	.0000	45.0000	67.5000	90.0000	112.5000
.375	.0000	45.0000	67.5000	90.0000	112.5000
.400	.0000	45.0000	67.5000	90.0000	112.5000
.425	.0000	45.0000	67.5000	90.0000	112.5000
.450	.0000	45.0000	67.5000	90.0000	112.5000
.475	.0000	45.0000	67.5000	90.0000	112.5000
.500	.0000	45.0000	67.5000	90.0000	112.5000
.525	.0000	45.0000	67.5000	90.0000	112.5000
.550	.0000	45.0000	67.5000	90.0000	112.5000
.575	.0000	45.0000	67.5000	90.0000	112.5000
.600	.0000	45.0000	67.5000	90.0000	112.5000
.650	.0000	45.0000	67.5000	90.0000	112.5000
.675	.0000	45.0000	67.5000	90.0000	112.5000
.700	.0000	45.0000	67.5000	90.0000	112.5000
.750	.0000	45.0000	67.5000	90.0000	112.5000
.800	.0000	45.0000	67.5000	90.0000	112.5000
.850	.0000	45.0000	67.5000	90.0000	112.5000
.900	.0000	45.0000	67.5000	90.0000	112.5000
.935	.0000	45.0000	67.5000	90.0000	112.5000
.975	.0000	45.0000	67.5000	90.0000	112.5000

REFERENCE DATA

WREF = 2690.0000 56.F1. WREF = .0000 IN.
 LREF = 474.8100 IN. LREF = .0000 IN.
 BREF = 936.6820 IN. BREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.350 PHI-M = .000
 HAWAHT = 1.000

RW/L (1) = 2.009 MACH (1) = 5.300 PO = 156.004 TO = 1265.870 H1 = 308.762 RMVEL = .322

SECTION (1) 41-07S DEPENDENT VARIABLE W/HREF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

X/L	.000	.010	.020	.040	.060	.080	.100	.150	.200	.300	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.650	.675	.700	.750	.800	.900	.935	.975							
	.3394	.2239	.1548	.1340	.1062	.0831	.0625	.0326	.0186	.0113	.0089	.0089	.0298	.0338	.0464	.0469	.0138	.0039	.0090	.0115	.0470	.0594	.0243	.0209	.021	.021	.0187	.0191	.0213	.0227	.0239	.0246	.0234	.0192	.0112	.0040



(RB8110)
ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)

M/N/L (2) = 4.771 MACH (1) = 5.300 FO = 352.036 TO = 1223.870 HT = 298.951 RHOVEL = .741

SECTION (1141-013

DEPENDENT VARIABLE H/HREF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

M/L	PHI	FO	TO	HT	RHOVEL
.000	.0000	45.0000	67.5000	90.0000	112.5000
.010	.0103	.0157	.0180	.0268	.0408
.020	.0134	.0034	.0092	.0240	.0541
.040	.0202	.0085	.0039	.0115	.0361
.060	.0135	.0051	.0150	.0475	.0342
.080	.0204	.0154	.0388	.0155	.0492
.100	.0163	.0210	.0221	.0437	.0324
.150	.0202	.0085	.0039	.0115	.0361
.200	.0135	.0051	.0150	.0475	.0342
.300	.0204	.0154	.0388	.0155	.0492
.375	.0163	.0210	.0221	.0437	.0324
.400	.0202	.0085	.0039	.0115	.0361
.425	.0135	.0051	.0150	.0475	.0342
.450	.0204	.0154	.0388	.0155	.0492
.475	.0163	.0210	.0221	.0437	.0324
.500	.0202	.0085	.0039	.0115	.0361
.525	.0135	.0051	.0150	.0475	.0342
.550	.0204	.0154	.0388	.0155	.0492
.575	.0163	.0210	.0221	.0437	.0324
.600	.0202	.0085	.0039	.0115	.0361
.625	.0135	.0051	.0150	.0475	.0342
.650	.0204	.0154	.0388	.0155	.0492
.675	.0163	.0210	.0221	.0437	.0324
.700	.0202	.0085	.0039	.0115	.0361
.750	.0135	.0051	.0150	.0475	.0342
.800	.0204	.0154	.0388	.0155	.0492
.850	.0163	.0210	.0221	.0437	.0324
.900	.0202	.0085	.0039	.0115	.0361
.935	.0135	.0051	.0150	.0475	.0342
.975	.0204	.0154	.0388	.0155	.0492

(RB88111) (20 AUG 74)

(EXTERNAL TANK)

ARC 3.5-172 IH15 ET

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = 1.000

REFERENCE DATA

SAEP = 2690.0000 50. FT. XREF = .0000 IN.
LREF = 474.8100 IN. XREF = .0000 IN.
BREF = 936.6820 IN. ZREF = .0000 IN.
SCALE = .0060

RN/L (1) = 1.982 MACH (1) = 5.300 FO = 154.357 TO = 1268.500 HT = 309.436 RHYVEL = .310

SECTION (1141-015) DEPENDENT VARIABLE H/HREF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

H/L	.000	.010	.020	.040	.060	.080	.100	.150	.200	.300	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.650	.675	.700	.750	.800	.850	.900	.925	.975
	.3647	.2133	.1379	.1171	.0893	.0625	.0501	.0242	.0136	.0072	.0363	.0064	.0058	.0057	.0050	.0050	.0050	.0053	.0052	.0052	.0052	.0052	.0052	.0052	.0052	.0052	.0052	.0052	.0052	.0052



ARC 3.5-172 IH15 ET (EXTERNAL TANK) (RB8112) (20 AUG 74)

REFERENCE DATA

SREF = 2090.0000 SQ.FT. 1MRP = .0000 IN.
 LREF = 474.8100 IN. 1MRP = .0000 IN.
 BREF = 936.6820 IN. 2MRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .0000
 MACH = 5.300 PHI-M = .0000
 HAWHT = 1.0000

RW/L (1) = 2.021 MACH (1) = 5.300 PO = 151.611 TO = 1238.660 HI = 301.810 RHOMEL = .31

SECTION (1) 41-015

DEPENDENT VARIABLE H/HREF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

PHI	0.000	0.010	0.020	0.040	0.060	0.080	0.100	0.150	0.200	0.300	0.396	0.575	0.400	0.425	0.450	0.475	0.500	0.525	0.550	0.575	0.600	0.620	0.675	0.700	0.750	0.800	0.850	0.900	0.925	0.975	
	.0016	.0039	.0055	.0079	.0091	.0105	.0115	.0120	.0059	.0075	.0089	.0120	.0018	.0035	.0056	.0071	.0094	.0103	.0123	.0120	.0122	.0120	.0117	.0123	.0123	.0120	.0120	.0120	.0120	.0120	
	.0022	.0030	.0050	.0070	.0086	.0106	.0124	.0034	.0034	.0193	.0129	.0122	.0033	.0033	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	.0126	
	.0024	.0040	.0062	.0082	.0102	.0119	.0119	.0040	.0040	.0062	.0082	.0102	.0024	.0040	.0062	.0082	.0102	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119	.0119
	.0037	.0022	.0038	.0067	.0093	.0112	.0130	.0037	.0037	.0067	.0093	.0112	.0037	.0037	.0067	.0093	.0112	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130	.0130
	.0024	.0035	.0070	.0092	.0105	.0133	.0135	.0024	.0024	.0035	.0092	.0105	.0024	.0024	.0035	.0092	.0105	.0133	.0135	.0135	.0135	.0135	.0135	.0135	.0135	.0135	.0135	.0135	.0135	.0135	.0135
	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010	.0010



ARC 3.5-172 IH15 CRBITER

(CRBITER BODY)

(AR8801) (20 AUG 74)

REFERENCE DATA

SRF = 2890.0000 56.FT. MREF = .0000 IN.
LREF = 474.0130 IN. YREF = .0000 IN.
BREF = 936.0020 IN. ZREF = .0000 IN.
SCALE = .0160

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 TH-M = .000
HAW/HT = .000

RN/L (1) = 1.764 MACH (1) = 5.300 FO = 151.428 TO = 1348.180 HT = 329.976 RHOVEL = .800

SECTION (1) 41-075

DEPENDENT VARIABLE H/HREF

Y .0000 .4150

R/L

.066 .0264
.125 .0165
.175 .0108
.250 .0089
.300 .0083
.350 .0140
.400 .0071
.450 .0154
.500 .0131
.600 .0067
.700 .0059
.800 .0051
.900 .0044
1.000 .0047
1.025 .0046

RN/L (2) = 5.214 MACH (1) = 5.300 FO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .760

SECTION (1) 41-075

DEPENDENT VARIABLE H/HREF

Y .0000 .4150

R/L

.066 .0018
.125 .0011
.175 .0007
.250 .0005
.300 .0004
.350 .0003
.400 .0003
.450 .0003
.500 .0003
.600 .0002
.700 .0002
.800 .0002
.900 .0002
1.000 .0002
1.025 .0002



ASC 3 5-172 IM15 ORBITER (ORBITER BODY) IAB88021 (20 AUG 74)

PARAMETRIC DATA
 ALPHA = -5.0000 BETA = .0000
 MACH = 5.1300 HRI-M = .0000
 HAW/HT = .9000

REFERENCE DATA
 MREF = 2090.0000 Sm.Ft. MREF = .0000 IN.
 LREF = 474.8100 IN. MREF = .0000 IN.
 OREF = 976.6400 IN. MREF = .0000 IN.
 SCALE = .0000

RNVL (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.949 RPNVEL = .323

SECTION (1) 41-OTS DEPENDENT VARIABLE H/REF

Y	H/REF
.0000	.4150
.0066	.0081
.125	.0050
.175	.0032
.250	.0026
.300	.0027
.350	.0025
.400	.0038
.450	.0058
.500	.0052
.550	.0043
.600	.0036
.650	.0026
.700	.0037
.750	.0058
.800	.0036
.850	.0026
.900	.0037
.950	.0058
1.000	.0036
1.050	.0026
1.100	.0037
1.150	.0058

RNVL (2) = 6.151 MACH (2) = 9.300 FO = 350.041 TO = 1040.890 HT = 251.898 RPNVEL = .808

SECTION (2) 41-OTS DEPENDENT VARIABLE H/REF

Y	H/REF
.0000	.4150
.0066	.0080
.125	.0048
.175	.0029
.250	.0024
.300	.0024
.350	.0029
.400	.0051
.450	.0053
.500	.0033
.550	.0024
.600	.0032
.650	.0026
.700	.0036
.750	.0058
.800	.0036
.850	.0026
.900	.0037
.950	.0058
1.000	.0036
1.050	.0026
1.100	.0037
1.150	.0058

ARC 3.5-1/2 IH15 ORB + ET (ORBITER BODY) (AB8803) (20 AUG 74)

REFERENCE DATA

SAEP = 2090.0000 56 FT. XREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 DRFP = 936.6800 IN. ZREF = .0000 IN.
 SCALE = .016

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 FM1-M = .000
 MAX/M1 = .900 RUMWEL = .716

AN/L (1) = 4.532 MACH (1) = 5.303 FC = 352.769 TO = 1304.520 HI = 318.677 RUMWEL = .716

SECTION (1) 141-075

DEPENDENT VARIABLE H/WREF

Y	X
.0000	.4150
.0068	.0194
.0129	.0040
.0175	.0225
.0250	.0269
.0300	.0173
.0350	.0195
.0400	.0214
.0500	.0186
.0600	.0146
.0700	.0163
.0800	.0282
.0900	.0257
1.0000	.0279
1.0225	.0225



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TABULATED DATA LISTING FOR 1415 ARC 3.5-112

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(AB8805) 01 AUG 74

ARC 3.5-112 1415 (AR + E) +SRB (ORBITER BTD)

PARAMETRIC DATA

ALPHA = 1.00 BETA = 0.00
 MACH = 5.00 THETA = 0.00
 HAWTH = 0.00

REFERENCE DATA

SMV = 2992.0000 IN. SMV = 0.0000 IN.
 SMV = 474.0000 IN. SMV = 0.0000 IN.
 SMV = 930.0000 IN. SMV = 0.0000 IN.
 SCALE = 0.0001

RW/L (1) = 1.845 MACH (1) = 5.000 FO = 149.964 TO = 1303.120 HT = 314.311 RWHEEL = 0.300

SECTION (1)141-0705

DEPENDENT VARIABLE H/HREF

Y 0.0000 0.4150

M/L	.0066	.0357
	.129	.0231
	.175	.0271
	.210	.0314
	.250	.0358
	.280	.0268
	.310	.0299
	.340	.0317
	.370	.0289
	.400	.0247
	.430	.0206
	.460	.0168
	.490	.0120
	.520	.0072
	.550	.0026

RW/L (2) = 4.437 MACH (2) = 5.300 FO = 353.867 TO = 1237.480 HT = 314.321 RWHEEL = 0.70

SECTION (2)141-0715

DEPENDENT VARIABLE H/HREF

Y 0.0000 0.4150

M/L	.0069	.0313
	.129	.0206
	.175	.0266
	.210	.0329
	.250	.0365
	.280	.0300
	.310	.0258
	.340	.0243
	.370	.0297
	.400	.0251
	.430	.0202
	.460	.0154
	.490	.0106
	.520	.0058
	.550	.0010

DATE 05 SEP 74

TABULATED DATA LISTING FOR IH15 (ARC 3,5-172)

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ARC 3,5-172 IH15 CR8 + ET +S&B (ORBITER BODY)

(ABBD016) (20 AUG 74)

REFERENCE DATA

SREF = 690.0000 SQ.FT. HREF = .0000 IN.
 LREF = 174.8100 IN. VREF = .0000 IN.
 BREF = 336.6820 IN. WREF = .0000 IN.
 SCALE = .0063

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
 MACH = 5.300 H41 M = .0000
 HAW/M1 = .933

R/V/L (1) = 1.952 MACH (1) = 5.300 FC = 193.625 TO = 1276.580 HT = 311.506 RHOVEL = .371

SECTION (1141-07S

DEPENDENT VARIABLE H/REF

Y .0000 .4150

X/L

.068 .0267
 .125 .0257
 .175 .0139
 .250 .0283
 .300 .0230
 .350 .0275
 .400 .0183
 .500 .0321
 .600 .0274
 .700 .0252
 .800 .0190
 .900 .0069
 1.000 .0022
 1.025 .0024

R/V/L (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1141-07S

DEPENDENT VARIABLE H/REF

Y .0000 .4150

X/L

.068 .0243
 .125 .0232
 .175 .0124
 .250 .0279
 .300 .0213
 .350 .0279
 .400 .0180
 .500 .0309
 .600 .0291
 .700 .0258
 .800 .0198
 .900 .0053
 1.000 .0041
 1.025 .0046

ARC 3.5-172 IH15 ORBITER (ORBITER WING)

(AB8401) (20 AUG 74)

REFERENCE DATA

WREF = 2990.0000 SQ.FT. WMRP = .0000 IN.
 LREF = 474.8100 IN. LMRP = .0000 IN.
 DREF = 936.6820 IN. DMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PM1-M = .000
 HAW/HT = .900

RM/L (1) = 1.764 MACH (1) = 5.300 FC = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .301

SECTION (1) 41-OTS

DEPENDENT VARIABLE H/HREF

ZT/B .4000 .6000 .8000

X/C

.175 .0379
 .200 .0450
 .225 .0302
 .250 .0352
 .300 .0331 .0345 .0592
 .400 .0302 .0312 .0440 .0510
 .500 .0256 .0270 .0360 .0314
 .600 .0196 .0226 .0314
 .700 .0163 .0160 .0256
 .800 .0150 .0210
 .850 .0166
 .875 .0105
 .900 .0091

RM/L (2) = 1.214 MACH (1) = 5.300

FC = 349.474 TO = 1153.370

HT = 280.192 RHOVEL = .761

SECTION (1) 41-OTS

DEPENDENT VARIABLE H/HREF

ZT/B .4000 .6000 .8000

X/C

.175 .0026
 .200 .0032
 .225 .0019
 .250 .0021
 .300 .0020 .0026 .0044 .0038
 .400 .0019 .0025 .0034 .0029
 .500 .0017 .0022 .0029 .0025
 .600 .0013 .0019 .0025
 .700 .0011 .0017 .0020
 .800 .0013 .0015
 .850 .0013 .0013
 .875 .0007
 .900 .0006

ARC 3.5-172 IH15 ORBITER

(ORBITER WING)

(ABRW02) (20 AUG 74)

REFERENCE DATA

BRFL = 2690.0000 56.671. MMRP = .0000 IN.
 UREF = 474.8100 IN. YMRP = .0000 IN.
 BRFL = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0080

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 FWH-M = .000
 HAW/HT = .900

RNV/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.948 RHOVEL = .32

SECTION (1) 141-075

DEPENDENT VARIABLE H/HREF

Z/Y/B .4000 .6000 .8000

X/C
 .175 .0111
 .200 .0153
 .225 .0056
 .250 .0055
 .300 .0050 .0114 .0175 .0200
 .400 .0036 .0099 .0158
 .500 .0028 .0088 .0119
 .600 .0019 .0070 .0101
 .700 .0018 .0058 .0082
 .800 .0047 .0067
 .850 .0054
 .875 .0019
 .900 .0013

RNV/L (2) = 6.131 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .80

SECTION (1) 141-075

DEPENDENT VARIABLE H/HREF

Z/Y/B .4000 .6000 .8000

X/C
 .175 .0107
 .200 .0150
 .225 .0042
 .250 .0040
 .300 .0037 .0117 .0182 .0209
 .400 .0031 .0108 .0149
 .500 .0033 .0168 .0152
 .600 .0032 .0090 .0111
 .700 .0029 .0074 .0090
 .800 .0055 .0069
 .850 .0056
 .875 .0041
 .900 .0030



(AB884033) (25 AUG 74)

ARC 3.5-172 IH15 ORB + ET (ORBITER W/ING)

REFERENCE DATA

SREF = 2690.0000 56. FT. MREF = .0000 IN.
 LREF = 474.0100 IN. YREF = .0000 IN.
 BREF = 936.6920 IN. ZREF = .0000 IN.
 SCALE = .0060

RW/L (1) = 4.332 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 H1 = 319.677 RHOMEL = .716

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 F41-M = .000
 HAM/HT = .900

DEPENDENT VARIABLE H/REF

SECTION (1) 41-015

Z7/B .4000 .6000 .8000

X/C	.175	.315	.450	.585	.720	.855	.990
	.0315	.0400					
	.225	.0274					
	.250	.0314	.0710				
	.300	.0283	.0308	.0590			
	.400	.0249	.0279	.0598			
	.500	.0205	.0256	.0474			
	.600	.0151	.0213	.0425			
	.700	.0128	.0181	.0343			
	.800	.0148	.0279				
	.857		.0215				
	.875		.0193				
	.900	.0081					

(AB8W05) (20 AUG 74)

ARC 3.5-172 IH15 CRB + ET +SRB (ORBITER WING)

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 ρ_{sl-M} = .000
 HAW/HT = .000

REFERENCE DATA

SRF = 2690.0000 SQ.FT. Δ MRP = .0000 IN.
 LREF = 474.8100 IN. Δ MRP = .0000 IN.
 BRF = 936.6820 IN. Δ MRP = .0000 IN.
 SCALE = .0060

RN/L (1) = 1.845 MACH (1) = 5.300 FO = 149.964 TO = 1303.100 HI = 318.311 RHOVEL = .30

DEPENDENT VARIABLE H/HREF

SECTION (1) 41-OTS

ZY/B .4000 .6000 .8000

X/C	.175	.200	.225	.250	.300	.400	.500	.600	.700	.800	.875	.900
	.0284	.0384	.0245	.0289	.0309	.0497	.0593	.0271	.0458	.0371	.0318	.0255
								.0203	.0318	.0255	.0201	.0158
								.0179	.0191	.0255	.0166	.0127
												.0171

RN/L (2) = 4.437 MACH (1) = 5.300 FO = 353.867 TO = 1287.480 HI = 314.301 RHOVEL = .72

DEPENDENT VARIABLE H/HREF

SECTION (1) 41-OTS

ZY/B .4000 .6000 .8000

X/C	.175	.200	.225	.250	.300	.400	.500	.600	.700	.800	.875	.900
	.0260	.0355	.0376	.0427	.0389	.0205	.0477	.0545	.0314	.0425	.0348	.0297
									.0360	.0297	.0241	.0189
									.0321	.0241	.0262	.0151
											.0232	.0168



ARC 3.5-1/2 IH15 ORB + ET +SRB (ORBITER WING)

(AB8W06) (0 AUG 74)

REFERENCE DATA

REF = 2690.0000 S6.FT. YREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 BREF = 936.6820 IN. ZREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = .900

RW/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .310
 SECTION (1) : 1-073

DEPENDENT VARIABLE H/HREF

ZY/B .4000 .6000 .8000

M/C

.175	.0300
.200	.0410
.225	.0267
.250	.0285
.300	.0287
.400	.0244
.500	.0293
.600	.0285
.700	.0264
.800	.0166
.850	.0171
.875	.0134
.900	.0123
.900	.0176

.0485

.0430

.0355

.0354

.0311

.0249

.0215

.0166

.0171

.0134

.0123

.0176

RW/L (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1) : 1-073

DEPENDENT VARIABLE H/HREF

ZY/B .4000 .6000 .8000

M/C

.175	.0273
.200	.0372
.225	.0272
.250	.0304
.300	.0300
.400	.0278
.500	.0340
.600	.0354
.700	.0350
.800	.0253
.850	.0253
.875	.0165
.900	.0131
.900	.0177
.900	.0222

.0490

.0444

.0397

.0329

.0273

.0217

.0165

.0131

.0177

.0222

ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

(AB83D7) (20 AUG 74)

REFERENCE DATA

REF = 2690.0000 SQ.FT. NMRP = .0000 IN.
LREF = 474.8100 IN. NMRP = .0000 IN.
DREF = 936.6820 IN. NMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 9.300 PHI-M = .000
HAWHT = .900

RM/L (1) = 1.983 MACH (1) = 5.300 FO = 155.638 TO = 1274.720 HT = 311.029 RHOVEL = .32

SECTION (1) 41-OT3 DEPENDENT VARIABLE H/HREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	PHI	FO	TO	HT	RHOVEL
.000	.2558	.2558			
.002		.1812			
.025		.2782			
.050	.1535	.1665			
.100		.0695			
.112		.0928			
.150		.0889			
.200	.0464	.0398	.0310		
.300	.0200	.0200			
.400	.0158	.0544	.0309	.0154	
.500		.0381			
.600	.0488	.0501	.0217	.0210	
.650	.0490	.0549			
.700	.0267	.0327	.0536	.0259	
.750	.0351	.0510	.0571		
.800	.0426	.0547	.0749	.0451	.0276
.920	.0466	.0582	.0271	.0152	.02
.980		.0792	.017		
.996	.0646	.0834	.0232	.0218	.0277

RM/L (2) = 4.311 MACH (1) = 5.300 FO = 352.586 TO = 1308.080 HT = 319.591 RHOVEL = .71.

SECTION (1) 41-OT3 DEPENDENT VARIABLE H/HREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	PHI	FO	TO	HT	RHOVEL
.000	9.9900	9.9900			
.002		.1846			
.025		.2442			
.050	.1501	.1615			
.100		.0667			
.112		.0954			
.150		.0969			
.200	.0363	.0500	.0403	.0258	
.300	.0228	.0148			
.400	.0184	.0267	.0445	.0301	.0122
.500		.0557			



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(AB0807)

ARC 3.5-172 IM15 CRB + ET +SRB (SRB)

INVL (2) = 4.311 MACH (1) = 5.300

SECTION (1) 41-078 DEPENDENT VARIABLE M/HREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	.650	.650	.700	.750	.800	.850	.900	.998
	.0590	.0491	.0414	.0493	.0498	.0436	.0903	.0934
	.0592	.0595	.0466	.0575	.0878	.0676	.0341	.0341
	.0336	.0337	.0837	.0739	.0878	.0397	.0179	.0192
	.0256	.0445	.0781	.0781	.0152	.0251	.0232	.0232



ARC 3.5-172 IH15 CRB + E1 +SRB (SRB)

(AB8958) 20 AUG 74

REFERENCE DATA

MRFP = 2690.0000 56. FT. MRFP = .0000 IN.
 LRFP = 474.8100 IN. MRFP = .0000 IN.
 BRFP = 936.6820 IN. MRFP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = .900

RNO (1) = 2.225 MACH (1) = 5.300 FO = 153.442 TO = 1174.260 HT = 285.439 HMOVEL = .331

SECTION (1) 41-015

DEPENDENT VARIABLE H/REF

PHI 90.0000135,0000180,0000225,0000270,0000315,0000

X/L	PHI	PHI	PHI	PHI	PHI
.000	.3658	.3658	.3658	.3658	.3658
.002	.1494	.1494	.1494	.1494	.1494
.025	.2891	.2891	.2891	.2891	.2891
.050	.1694	.1694	.1694	.1694	.1694
.100	.0785	.0785	.0785	.0785	.0785
.112	.1174	.1174	.1174	.1174	.1174
.150	.0996	.0996	.0996	.0996	.0996
.200	.0346	.0346	.0346	.0346	.0346
.300	.0419	.0419	.0419	.0419	.0419
.400	.0415	.0415	.0415	.0415	.0415
.500	.0550	.0550	.0550	.0550	.0550
.600	.0466	.0466	.0466	.0466	.0466
.700	.0279	.0279	.0279	.0279	.0279
.750	.0336	.0336	.0336	.0336	.0336
.800	.0129	.0129	.0129	.0129	.0129
.920	.0156	.0156	.0156	.0156	.0156
.950	.0483	.0483	.0483	.0483	.0483
.996	.0903	.0903	.0903	.0903	.0903
	.0384	.0384	.0384	.0384	.0384
	.0546	.0546	.0546	.0546	.0546
	.0432	.0432	.0432	.0432	.0432
	.0249	.0249	.0249	.0249	.0249
	.0223	.0223	.0223	.0223	.0223

RNO/L (2) = 4.713 MACH (1) = 5.300 FO = 352.403 TO = 1236.210 HT = 301.186 HMOVEL = .738

SECTION (1) 41-015

DEPENDENT VARIABLE H/REF

PHI 90.0000135,0000190,0000225,0000270,0000315,0000

X/L	PHI	PHI	PHI	PHI	PHI
.000	.2378	.2378	.2378	.2378	.2378
.002	9.9900	9.9900	9.9900	9.9900	9.9900
.025	.2612	.2612	.2612	.2612	.2612
.050	.1558	.1558	.1558	.1558	.1558
.100	.0757	.0757	.0757	.0757	.0757
.112	.0977	.0977	.0977	.0977	.0977
.150	.1009	.1009	.1009	.1009	.1009
.200	.0383	.0383	.0383	.0383	.0383
.300	.0437	.0437	.0437	.0437	.0437
.400	.0159	.0159	.0159	.0159	.0159
.500	.0435	.0435	.0435	.0435	.0435
	.0488	.0488	.0488	.0488	.0488
	.0280	.0280	.0280	.0280	.0280
	.0062	.0062	.0062	.0062	.0062
	.0683	.0683	.0683	.0683	.0683



ARC 3.5-172 IH15 SKB

(SKB)

(AB8513) (20 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 SQ.FT. MRFP = .0000 IN.
 LRAF = 474.6100 IN. YMRP = .0000 IN.
 DRFP = 939.6570 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .030 BETA = .000
 MACH = 5.300 PHI-M
 HAW/HT = .933

RM/L (1) = 1.687 MACH (1) = 5.300 FO = 153.442 TO = 1397.700 HT = 342.751 RHOVEL = .297

SECTION (1) 41-013

DEPENDENT VARIABLE H/HREF

PHI 90.0000135.0000160.0000225.0000270.0000315.0000

V/L				
.000	.3417	.3417	.3417	.3417
.002				.1632
.025				.2273
.097		.1313		.1366
.100				.0811
.112				.0611
.150				.0189
.200		.0153	.0154	.0111
.300			.0134	.0135
.400	.0068	.0119	.0130	.0129
.500			.0162	.0162
.600		.1108	.0109	.0096
.650		.0794	.0119	.0110
.700	.0045	.0056	.0078	.0100
.750		.0036	.0047	.0046
.800	.0032	.0047	.0051	.0058
.920	.0078	.0072	.0082	.0075
.950		.0207	.0146	.0146
.996	.0363	.0390	.0356	.0397
				.0331

RM/L (2) = 4.634 MACH (1) = 5.300 FO = 351.487 TO = 1247.410 HT = 304.045 RHOVEL = .732

SECTION (1) 41-013

DEPENDENT VARIABLE H/HREF

PHI 90.0000135.0000160.0000225.0000270.0000315.0000

V/L				
.000	.3129	.3129	.3129	.3129
.002				.1504
.025				.2123
.090		.1236		.1257
.100				.0760
.112				.0470
.150				.0176
.200		.0140	.0136	.0140
.300			.0121	.0110
.400	.0074	.0106	.0122	.0090
.500			.0112	.0112
				.0149

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ARC 3.3-172 IM15 SAB

(SAB)

(AB8513)

ARC (2) = 4.834 MACH (1) = 5.300

SECTION (1) 141-073

DEPENDENT VARIABLE NUMBER

PHI 80.0000155 .0000180 .0000223 .0000270 .0000315 .0000

M/L					
.000		.0100	.0113	.0099	.0117
.050		.0080	.0117		
.100	.0032	.0040	.0077	.0104	
.150	.0064	.0072	.0089		
.200	.0121	.0126	.0133	.0166	.0129
.250	.0354	.0359	.0361	.0474	.0480
.300		.1047	.1062		
.350	.0889	.1103	.0980	.1138	.0915

ARC 3.5-172 IM15 SRB (SRB)

(AB0814) (20 AUG 74)

REFERENCE DATA

WREF = 2690.0000 56.571. WREF = .0000 IN.
LREF = 474.6100 IN. WREF = .0000 IN.
BREF = 936.6020 IN. WREF = .0000 IN.
SCALE = .00160

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
MACH = 5.3000 PHI-N = .0000
HAW/HT = .9000

SN/L (1) = 2.136 MACH (1) = 5.300 FO = 151.245 TO = 1193.390 HT = 290.290 RHOVEL = .323

SECTION (1) 41-075 DEPENDENT VARIABLE NUMBER

PHI 90.0000155,0000160,0000225,0000270,0000315,0000

N/L	PHI	FO	HT	RHOVEL
.000	.3234	.0260	.0217	.0160
.002	.1431	.0255	.0163	.0066
.025	.2148	.0293	.0169	.0055
.050	.1650	.0249	.0114	.0076
.075	.0608	.0276	.0239	.0079
.100	.0593	.0215	.0266	.0202
.110	.0178	.0307	.0279	.0128
.150	.0293	.0469	.0226	.0169
.200	.0291	.1283	.0732	.0705
.300	.0267			.0256
.400	.0249			
.500	.0272			
.600	.0215			
.700	.0268			
.750	.0215			
.800	.0307			
.820	.0159			
.850	.0371			
.900	.0159			
.950	.0623			

PHI (2) = 5.469 MACH (1) = 5.300 FO = 351.653 TO = 1123.620 HT = 272.646 RHOVEL = .778

SECTION (1) 41-078 DEPENDENT VARIABLE NUMBER

PHI 90.0000155,0000160,0000225,0700270,0000315,0000

N/L	PHI	FO	HT	RHOVEL
.000	.2944	.0246	.0216	.0133
.002	.1353	.0287	.0161	.0061
.025	.1977	.0301	.0298	.0191
.050	.1162			.0242
.100	.0742			
.112	.0547			
.150	.0160			
.200	.0216			
.300	.0287			
.400	.0161			
.500	.0191			
.500	.0242			



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TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)

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ARC 3.5-172 IM15 SRB (SRB)

(AB8514)

SN/L (2) = 3.489 MAGN (1) = 5.300

SECTION (1) 141-013

DEPENDENT VARIABLE NUMBER

PHI 90.0000133,0200180,0000225,0000270,0000315,0000

PHI	90.0000133	0200180	0000225	0000270	0000315	0000
.600	.0295	.0259	.0123	.0033		
.650	.0264	.0273				
.700	.0062	.0228	.0233	.0069		
.750	.0314	.0422	.0341			
.800	.0157	.0395	.0438	.0175	.0192	
.820	.0420	.0736	.1012	.0642	.0398	
.850		.1554		.1171		
.898	.0652	.1185	.1099	.0960	.0650	



ARC 3.5-172 IH15 SRB

(SRB)

(AB8815) (20 AUG 74)

REFERENCE DATA

SREF = 2690.0000 56. FT. YMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0080

PARAMETRIC DATA

ALPHA = 20.0000 BETA = .0000
 MACH = 5.3000 PHI-M = 90.0000
 HAWHT = .9000

RW/L (1) = 5.304 MACH (1) = 5.300 PO = 350.938 TO = 1143.860 HT = 277.751 RHOVEL = .769

SECTION (1141-075) DEPENDENT VARIABLE HVRREF

PHI 90.0000135,0000180,0000225,0000270,0000315,0000

W/L	.000	.002	.025	.050	.100	.112	.150	.200	.300	.400	.500	.600	.650	.700	.750	.800	.920	.950	.996
	.2677	.2677	.1596					.0213	.0491	.0172	.0174	.0164	.0085	.0128	.0172	.0181	.0199		
	.2677	.1622	.2991	.2643	.1741	.1351	.0687	.0765	.0828	.0915	.1244	.0751	.0622	.0663	.1215	.1336	.1902	.3503	.2874
								.0419		.0536		.0705				.2296	.2966		.2018



ARC 3.5-172 IH15 SRB

(SRB)

(AB8516) (20 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 36 FT. XMRP = .0000 IN.
 LRFP = 474.8100 IN. YMRP = .0000 IN.
 BRFP = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

RN/L (1) = 5.559 MACH (1) = 5.300 PO = 351.670 IO = 1111.580 HT = 269.615 RMVEL = .783

PARAMETRIC DATA

ALPHA = 45.000 BETA = .000
 MACH = 5.300 PHI-M = 90.000
 HAW/HT = .900

SECTION (1) 41-OTS

DEPENDENT VARIABLE H/HREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	.000	.002	.025	.030	.100	.112	.150	.200	.300	.400	.500	.600	.650	.700	.750	.800	.920	.950	.996																	
	.2943	.2943	.1888	.4016	.4045	.2728	.2537	.1971	.0358	.1218	.2269	.1172	.1268	.2292	.2319	.1329	.4170	.0407	.1943	.2710	.2337	.0380	.2044	.4011	.0469	.2669	.0619	.2647	.5085	.2677	.5480	.3506	.5716	.2251	.3139	.2171

ARC 3.5-172 IH15 SRB (SRB)

(AB8517) (20 AUG 74)

REFERENCE DATA

SRF = 2990.0000 SQ.FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
SRF = 936.6920 IN. ZMRP = .0000 IN.
SCALE = .0080

PARAMETRIC DATA

ALPHA = 70.000 BETA = .000
MACH = 5.300 PHI-M = 90.000
HAW/HT = .900

R/V L (1) = 4.926 MACH (1) = 5.300 PO = 353.867 IO = 1203.180 HT = 293.284 R/WDEL = .752

SECTION (1141-013) DEPENDENT VARIABLE H/WREF

PHI 90.0000135,0000160,0000225,0000270,0000315,0000

R/V L	PHI	PHI	PHI	PHI	PHI
.000	.2391	.2391	.2391	.2391	.2391
.025	.3974	.3974	.3974	.3974	.3974
.050	.4451	.4451	.4451	.4451	.4451
.100	.3406	.3406	.3406	.3406	.3406
.112	.3937	.3937	.3937	.3937	.3937
.150	.3367	.3367	.3367	.3367	.3367
.200	.1850	.1850	.1850	.1850	.1732
.300	.1782	.1782	.1782	.1782	.3090
.400	.0043	.0484	.2106	.3651	.1878
.500		.0470	.1770	.2384	.4067
.600		.0431	.1847	.2384	.2212
.650		.0502	.2058	.3418	
.700	.0186	.0084	.0415	.2059	
.750	.0043	.0095	.0752	.2929	.5851
.800	.0065	.0095	.0752	.2929	.2963
.900	.0150	.0111	.0736	.2848	.4856
.950		.0675	.0675	.3613	.2981
.996	.0206	.0929	.3341	.1961	.3613



(ABBS18) () AUG 74)

(SRB)

ARC 3.5-172 IH13 SRB

REFERENCE DATA

SAIF = 2690.0000 56.F7, XMRP = .0000 IN.
 LMRP = 474.8100 IN, YMRP = .0000 IN.
 BREF = 936.6620 IN, ZMRP = .0000 IN.
 SCALE = .0063

PARAMETRIC DATA

ALPHA = 90.000 BETA = .000
 MACH = 5.300 PHI-M = 90.000
 MAWHT = .900

RNVL (1) = 5.872 MACH (1) = 5.300 FO = 353.135 TO = 1076.200 HI = 260.731 RMDEL = .800

SECTION (1141-075

DEPENDENT VARIABLE M/REF

PHI 90.0000135,0000140,0000225,0000270,000315,0000

M/L	1783	1783	1783
.000	.1783	.1783	.1783
.025	.1608	.1608	.1608
.050	.1436	.1436	.1436
.075	.1264	.1264	.1264
.100	.1092	.1092	.1092
.112	.1049	.1049	.1049
.150	.0877	.0877	.0877
.200	.0705	.0705	.0705
.300	.0533	.0533	.0533
.400	.0361	.0361	.0361
.500	.0189	.0189	.0189
.600	.0017	.0017	.0017
.650	.0014	.0014	.0014
.700	.0011	.0011	.0011
.750	.0009	.0009	.0009
.800	.0007	.0007	.0007
.850	.0005	.0005	.0005
.900	.0003	.0003	.0003
.950	.0001	.0001	.0001
.996	.0000	.0000	.0000

ARC 3.5-172 IH15 ORBITER (WINDSHIELD)

LAB001 (20 AUG 74)

REFERENCE DATA

REF = 2690.0000 SQ.FT. MRRP = .0000 IN.
 VREF = 474.8100 IN. VRRP = .0000 IN.
 PRPF = 936.6920 IN. ZRRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
 MACH = 5.300 PHI-M = .0000
 HAWHT = .900

INVL (1) = 1.764 MACH (1) = 5.300 FO = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .300
 INVL (2) = 3.214 MACH (2) = 5.300 FO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .762

SECTION (1) 141-075 DEPENDENT VARIABLE H/REF

Y .0470 .1780 .1960 .2130

X

1.210 .1617
 1.251
 1.272 .1796
 1.305
 1.334 .2118
 1.356 .2272

SECTION (2) 141-075 DEPENDENT VARIABLE H/REF

Y .0470 .1780 .1960 .2130

X

1.210 .0274
 1.251
 1.272 .0390
 1.305 .0329
 1.334 .0420
 1.356 .0356



TABULATED DATA LISTING FOR THIS (ARC 3.5-172)

(ABSCOR) (20 AUG 74)

ARC 3.5-172 THIS ORBITTER (WINDSHIELD)

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = .900

REFERENCE DATA

SRF = 2690.0000 56.F1. WREF = .0000 IN.
LREF = 474.6100 IN. VREF = .0000 IN.
DRF = 936.6820 IN. ZREF = .0000 IN.
SCALE = .0060

RA/L (1) = 2.143 MACH (1) = 5.300 PO = 150.493 TO = 1188.110 HT = 288.549 RHOVEL = .323

SECTION (1) 41-OTS

DEPENDENT VARIABLE W/REF
Y .0470 .1760 .1960 .2130

X	1.210	.2218
	1.251	.2322
	1.272	.2369
	1.305	.2582
	1.334	.3227
	1.356	.2784

RA/L (2) = 6.131 MACH (1) = 5.300 PO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .806

SECTION (1) 41-OTS

DEPENDENT VARIABLE W/REF
Y .0470 .1760 .1960 .2130

X	1.210	.3109
	1.251	.3102
	1.272	.4034
	1.305	.3276
	1.334	.4244
	1.356	.3567

(ABSC03) (20 AUG 74)

ARC 3.5-172 IM15 ORB + E1 (WINDSHIELD)

PARAMETRIC DATA

REFERENCE DATA

SREF = 2690.0000 50.FT. XREF = .0000 IN. ALPHA = .000 BETA = .000
 LREF = 474.6100 IN. YREF = .0000 IN. MACH = 5.300 PHI-M = .000
 OREF = 936.6820 IN. ZREF = .0000 IN. MAW/HT = .900
 SCALE = .0060
 RA/L (1) = 4.032 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 HT = 316.677 RHOVEL = .716

SECTION (1) 41-01'S DEPENDENT VARIABLE H/HREF

Y	X
.0470	.1780
.1960	.2130
.2192	.2264
.2927	.2546
.3142	.2719



ARC 3.5-172 IH15 ORB + ET +568 (WINDSHIELD)

(ABSC05) (ED AUG 74)

REFERENCE DATA

BRZ = 2960.0000 96.FT. MRP = .0000 IN.
LREF = 414.8100 IN. VMRP = .0000 IN.
BRZ = 936.6620 IN. MRP = .0000 IN.
SCALE = .0060

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/H1 = .900

RM/L (1) = 1.845 MACH (1) = 5.300 PO = 149.964 TO = 1303.100 H1 = 318.311 RMVEL = .305

SECTION (1) 41-078 DEPENDENT VARIABLE H/HREF

Y .0470 .1780 .1960 .1960 .2130

X
1.210 .1720
1.251 .1866
1.272 .2376
1.305 .2176
1.334 .2612
1.356 .2563

RM/L (2) = 4.437 MACH (1) = 5.300 FO = 353.667 TO = 1287.480 H1 = 314.301 RMVEL = .724

SECTION (1) 41-078 DEPENDENT VARIABLE H/HREF

Y .0470 .1780 .1960 .1960 .2130

X
1.210 .2473
1.251 .2648
1.272 .3332
1.305 .2983
1.334 .3435
1.356 .3280



ARC 3.5-1/2 IH15 OEB + ET + SEB (WINDSHIELD)

(ABSC06) (20 AUG 74)

REFERENCE DATA

REF = 2990.0000 96.FT. MRP = .0000 IN.
 LREF = 474.6100 IN. NREF = .0000 IN.
 BREF = 936.6820 IN. PREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
 MACH = 5.300 PHI-M = .0000
 HAWHT = .0000

RN/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .316

SECTION (1) 141-015 DEPENDENT VARIABLE H/REF

Y	.0470	.1760	.1960	.2130
X				
1.210	.1934			
1.251			.2109	
1.272	.2673			
1.305		.2481		
1.334	.2921			
1.356		.2646		

RN/L (2) = 4.970 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .751

SECTION (1) 141-015 DEPENDENT VARIABLE H/REF

Y	.0470	.1760	.1960	.2130
X				
1.210	.2795			
1.251			.2971	
1.272	.3637			
1.305		.3275		
1.334	.3740			
1.356		.3432		



DATE 05 SEP 74 TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

(AB8103) (20 AUG 74)

ARC 3.5-172 IH15 CR8 + ET (EXTERNAL TANK)

REFERENCE DATA

SRCP = 2990.0000 56. FT. MREF = 0.0000 IN.
LREF = 474.8100 IN. VREF = 0.0000 IN.
DRCP = 936.6020 IN. RCP = 0.0000 IN.
SCALE = .00100

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
MACH = 5.3000 MACH-M = .0000
HAW/H1 = .9700

RM/L (1) = 4.332 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 H1 = 318.677 RMHVEL = .716

SECTION (1) 41-075 DEPENDENT VARIABLE H1/REF

PM1 90.0000112.5000135.0000157.5000

M/L			
.450	.0241	.0356	.0737
.550	.0244	.0333	.0279
.650	.0260	.0243	.0258
.750	.0217	.0148	.0257
.850	.0190	.0154	.0265



ARC 3.5-172 IM15 OR9 + ET (EXTERNAL TANK)

(AB8104) (20 AUG 74)

REFERENCE DATA

SAFE = 2690.0000 56. FT. WREF = .0000 IN.
 LREF = 474.0170 IN. WREF = .0000 IN.
 DREF = 936.6820 IN. WREF = .0000 IN.
 SCALE = .0063

RN/L (1) = 4.781 MACH (1) = 5.300 FO = 352.403 TO = 1225.000 HI = 299.350 RCHVEL = .74

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
 MACH = 5.3000 HI-M = .0000
 RCHVEL = .74

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

PH1 .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

N/L	.000	.010	.020	.040	.060	.080	.100	.150	.200	.300	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.650	.675	.700	.750	.800	.850	.900	.950	.975	
	.3964	.0379	.1578	.1367	.1135	.1273	.0687	.0300	.0162	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000		
	.0056	.0059	.0063	.0066	.0068	.0070	.0071	.0072	.0073	.0074	.0075	.0076	.0077	.0078	.0079	.0080	.0081	.0082	.0083	.0084	.0085	.0086	.0087	.0088	.0089	.0090	.0091	.0092	.0093	.0094	
	.0024	.0027	.0031	.0036	.0042	.0049	.0056	.0063	.0071	.0079	.0087	.0095	.0103	.0111	.0119	.0127	.0135	.0143	.0151	.0159	.0167	.0175	.0183	.0191	.0199	.0207	.0215	.0223	.0231	.0239	
	.0024	.0027	.0031	.0036	.0042	.0049	.0056	.0063	.0071	.0079	.0087	.0095	.0103	.0111	.0119	.0127	.0135	.0143	.0151	.0159	.0167	.0175	.0183	.0191	.0199	.0207	.0215	.0223	.0231	.0239	
	.0066	.0068	.0070	.0071	.0072	.0073	.0074	.0075	.0076	.0077	.0078	.0079	.0080	.0081	.0082	.0083	.0084	.0085	.0086	.0087	.0088	.0089	.0090	.0091	.0092	.0093	.0094	.0095	.0096	.0097	.0098
	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	.0186	
	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	.0216	
	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	
	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	
	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	.0267	



ARC 3.5-172 IH15 ONE * E1 *568 (EXTERNAL TANK)

(AB8105)

25 AUG)

REFERENCE DATA

WREF = 2090.0000 56.81, WREF = .0000 IN.
LAREF = 474.8100 IN, WREF = .0000 IN.
DREF = 936.6825 IN, WREF = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
MACH = 5.300 PHI-M = .0000
HAW/M = .0000

RW/L (1) = 1.645 MACH (1) = 5.300 FO = 149.964 TO = 1303.100 HT = 318.311 RMVEL = .300

SECTION (1141-075

DEPENDENT VARIABLE NUMBER

PHI 90.0000112.5000135.0000157.5000

M/L	.450	.550	.650	.750	.850
	.0239	.0206	.0233	.0353	.0395
	.0348	.0562	.0347	.0225	.0197
	.0993	.0413	.0368	.0292	.0256

RW/L (2) = 4.437 MACH (1) = 5.300 FO = 353.867 TO = 1287.480 HT = 314.301 RMVEL = .72

SECTION (1141-075

DEPENDENT VARIABLE NUMBER

PHI 90.0000112.5000135.0000157.5000

M/L	.450	.550	.650	.750	.850
	.0215	.0176	.0369	.0419	.0443
	.0454	.0652	.0435	.0360	.0268
	.1034	.0469	.0515	.0494	.0362

(AB81.6) (20 AUG 74)

ARC 3.5-1/2 IM15 ORB + ET +S88 (EXTERNAL TANK)

REFERENCE DATA

SALEP = 2092.0000 IN. MREF = 0.0000 IN.
LREF = 474.8000 IN. MREF = 0.0000 IN.
BREF = 976.6000 IN. MREF = 0.0000 IN.
SCALE = 1.0000

PARAMETRIC DATA

ALPHA = -5.0000 BETA = 0.0000
MACH = 5.0000 MREF = 0.0000
MACHREF = 5.0000

MACH (1) = 1.952 MACH (2) = 5.300 FO = 153.625 TO = 1276.58 H1 = 111.576 RMVEL = .314

SECTION (1:41-ORIS) DEPENDENT VARIABLE NUMBER

M1 90.0000 112.5000 155.0000 197.5000

M1	M2	M3	M4
.490	.0264	.0160	.0380
.550	.0129	.0111	.0411
.600	.0372	.0429	.0326
.650	.0443	.0519	.0278
.700	.0360	.0340	.0162

MACH (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.33 H1 = 307.630 RMVEL = .77

SECTION (1:41-ORIS) DEPENDENT VARIABLE NUMBER

M1 90.0000 112.5000 155.0000 197.5000

M1	M2	M3	M4
.490	.0229	.0671	.1041
.550	.0162	.0751	.0543
.600	.0471	.0492	.0243
.650	.0471	.0611	.0537
.700	.0418	.0541	.0461



ARC 3.5-172 IH15 ORB + E1 +SRF (EXTERNAL TANK)

(AB0107) (20 AUG 74)

REFERENCE DATA

ORF = 8990.0000 96.871, XMRP = .0000 IN.
LREF = 474.8100 IN, YMRP = .0000 IN.
ORF = 9375.6620 IN, ZMRP = .0000 IN.
SCALE = .0009

RM/L (1) = 1.963 MACH (1) = 5.300 FO = 155.638 TO = 1274.720 HT = 311.029 RHOVEL = .820

SECTION (1) 41-073 DEPENDENT VARIABLE H/HREF

PHI 87.5000 90.0000 112.5000 135.0000 160.0000

X/L
.005 .3080
.125 .0392
.175 .0226
.250 .0064
.275 .0034
.325 .1346 .0512 .0055
.350 .0655 .0927 .0838 .0139
.375 .0214
.450 .0137
.550 .0148
.650 .0134
.750 .0113

RM/L (2) = 4.311 MACH (1) = 5.300 FO = 352.586 TO = 1308.080 HT = 319.591 RHOVEL = .712

SECTION (1) 41-073 DEPENDENT VARIABLE H/HREF

PHI 87.5000 90.0000 112.5000 135.0000 160.0000

X/L
.005 .3003
.125 .0395
.175 .0225
.250 .0056
.275 .0037
.325 .1390 .0426 .0061
.350 .0694 .1022 .0752 .0148
.375 .0245
.450 .0186
.550 .0289
.650 .0154
.750 .0201



ARC 3.5-172 IH15 CRB + E1 +SRB (EXTERNAL TANK)

(AB8T08) (20 AUG 74)

REFERENCE DATA

SRWF = 2690.0000 56.FT. MRFP = .0000 IN.
LREF = 474.8100 IN. MRFP = .0000 IN.
BRFP = 936.6825 IN. MRFP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = .900

RN/L (1) = 2.225 MACH (1) = 5.300 FO = 153.442 TO = 1174.260 HT = 205.439 RHOVEL = .530

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

PHI 67.5000 90.0000112.5000135.0000180.0000

X/L	PHI
.005	.3444
.125	.0550
.175	.0329
.250	
.275	.0100
.325	.0096
.350	.0083
.375	.0096
.400	.0082
.450	.0048
.500	.0201
.550	.0361
.600	.0426
.650	.0361
.700	.0407

RN/L (2) = 4.713 MACH (1) = 5.300 FO = 352.403 TO = 1236.210 HT = 301.186 RHOVEL = .700

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

PHI 67.5000 90.0000112.5000135.0000180.0000

X/L	PHI
.005	.3145
.125	.0518
.175	.0311
.250	
.275	.0068
.325	.0085
.350	.0058
.375	.0078
.400	.0069
.450	.0078
.500	.0078
.550	.0081
.600	.0078
.650	.0421
.700	.0442



ARC 3.5-1/2 IH15 CR8 + ET +SR8 (EXTERNAL TANK)

(AB6110)

RM/L (2) = 4.771 MAG (1) = 5.300 FC = 352.036 TO = 1225.870 HT = 299.551 REMOVE = .74

SECTION (1)41-018 DEPENDENT VARIABLE H/HREF

PHI .0000 45.0000 87.9000 90.0000112.5000135.0000157.5000180.0000

M/L	9.9900	2618	1855	1562	1225	9558	6728	3382	2219	1133	3128	9253	1585	3346	3574	3467	3449	3576	1651	3673	3582	3614	3663	3549	3539	3481	3389	3214	3037		
.000																															
.010																															
.020																															
.040																															
.060																															
.080																															
.100																															
.150																															
.200																															
.300																															
.350																															
.375																															
.400																															
.425																															
.450																															
.475																															
.500																															
.525																															
.550																															
.575																															
.600																															
.650																															
.675																															
.700																															
.750																															
.800																															
.850																															
.900																															
.935																															
.975																															



ARC 3.5-1/2 1M15 E7

(EXTERNAL TANK)

(AB6112) (20 AUG 74)

REFERENCE DATA

WREF = 2690.0000 56.171. WREF = .0000 IN.
LREF = 474.8133 IN. WREF = .0000 IN.
DREF = 936.6820 IN. WREF = .0000 IN.
SCALE = .0001

AN/L (I) = 2.021 MACH (I) = 5.300 FO = 151.611 TO = 1238.660 H) = 301.810 RHOVEL = .517

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 F4I-M = .000
HAW/M1 = .900

SECTION (1141-OTS

DEPENDENT VARIABLE H/WREF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

N/L

.000	.4457
.010	.2893
.020	.1945
.040	.1724
.060	.1353
.080	.1059
.100	9.9970
.150	.0407
.200	.0234
.300	.0157
.350	.0148
.375	.0152
.400	.0153
.425	.0146
.450	.0142
.475	.0149
.500	.0150
.525	.0146
.550	.0146
.575	.0148
.600	.0150
.650	.0158
.675	.0153
.700	.0159
.750	.0154
.800	.0163
.850	.0169
.900	.0164
.950	.0127
.975	.0131



(BB8801) 2 AUG 74

(ORBITER BODY)

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
MACH/HT = .850

REFERENCE DATA

WREF = 2990.0000 56 FT. WREF = .0000 IN.
LREF = 474.6100 IN. WREF = .0000 IN.
BREF = 936.6020 IN. WREF = .0000 IN.
SCALE = .0060

RW/L (1) = 1.764 MACH (1) = 5.300 FO = 151.426 TO = 1348.180 HT = 329.926 R-MOVEL = .301

DEPENDENT VARIABLE NAME/REF

SECTION (1141-015

Y .0000 .4150

M/L

- .066 .0293
- .125 .0183
- .175 .0120
- .250 .0099
- .300 .0092
- .350 .0156
- .400 .0079
- .500 .0171
- .600 .0145
- .700 .0074
- .800 .0140
- .900 .0066
- .950 .0115
- .990 .0057
- .995 .0091
- 1.000 .0046
- 1.005 .0068
- 1.010 .0055
- 1.025 .0057
- 1.050 .0051

RW/L (2) = 5.214 MACH (1) = 5.300 FO = 349.474 TO = 1153.370 HT = 260.152 R-MOVEL = .761

DEPENDENT VARIABLE NAME/REF

SECTION (1141-015

Y .0000 .4150

M/L

- .066 .0021
- .125 .0012
- .175 .0006
- .250 .0007
- .300 .0006
- .350 .0006
- .400 .0006
- .500 .0006
- .600 .0007
- .700 .0007
- .800 .0006
- .900 .0006
- .950 .0006
- .990 .0006
- .995 .0006
- 1.000 .0006
- 1.005 .0006
- 1.010 .0006
- 1.025 .0006
- 1.050 .0006

(BB4802) (20 AUG 74)

ARC 3.5-172 IM15 ORBITER (ORBITTER BODY)

REFERENCE DATA

REF = 2000.0000 96.071, MRP = .0000 IN.
LREF = 474.6123 IN, MRP = .0000 IN.
BREF = 938.6023 IN, MRP = .0000 IN.
SCALE = .0000

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 WTI-M = .000
MAM/HT = .830

MVL (1) = 2.143 MACH (1) = 5.300 PO = 150.493 TO = 1100.110 HT = 288.949 R-NOVEL = .323

SECTION (1) 141-018

DEPENDENT VARIABLE NUMBER

Y .0000 .4150

M/L

.0068 .0092
.1125 .0097
.1175 .0036
.2500 .0030
.3000 .0031
.3500 .0028
.4000 .0036
.5000 .0068
.6000 .0127
.7000 .0049
.8000 .0041
.9000 .0041
1.0000 .0042
1.0225 .0043

MVL (2) = 6.131 MACH (1) = 5.300 PO = 350.041 TO = 1040.690 HT = 251.698 R-NOVEL = .800

SECTION (1) 141-018

DEPENDENT VARIABLE NUMBER

Y .0000 .4150

M/L

.0068 .0094
.1125 .0097
.1175 .0034
.2500 .0028
.3000 .0035
.3500 .0034
.4000 .0064
.5000 .0160
.6000 .0109
.7000 .0110
.8000 .0096
.9000 .0079
1.0000 .0072
1.0225 .0065



TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)

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(080803) (20 AUG 74)

ARC 3.5-172 IM15 ORB + ET (ORBITER BODY)

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PMI-M = .000
MACH/MI = .850

REFERENCE DATA

WLEP = 2090.0000 56.81. WLEP = .0000 IN.
LREF = 474.8100 IN. WLEP = .0000 IN.
OREP = 936.6020 IN. WLEP = .0000 IN.
SCALE = .01760

WNL (1) = 4.332 MACH (1) = 5.300 PO = 352.769 TO = 1304.520 HI = 318.677 RHOVEL = .716

SECTION (1141-075

DEPENDENT VARIABLE NUMBER

Y	X	VALUE
1	0000	.4190
2	0000	.0217
3	0001	.0091
4	0002	.0291
5	0003	.0201
6	0004	.0193
7	0005	.0216
8	0006	.0239
9	0007	.0208
10	0008	.0163
11	0009	.0129
12	0010	.0141
13	0011	.0091
14	0012	.0061
15	0013	.0032
16	0014	.0028

(BBB005) (20 AUG 74)

ARC 3.5-172 IM15 ORB + E1 + SAB (ORBITER BODY)

REFERENCE DATA

SAEP = 2000.0000 56.871, 1966P = .0000 IN.
LSEP = 474.8130 IN, 1966P = .0000 IN.
DSEP = 936.6420 IN, 1966P = .0000 IN.
SCALE = .0000

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HI = .25

RM/L (1) = 1.845 MACH (1) = 5.300 PO = 149.964 TO = 1303.100 HI = 318.311 RHOVEL = .305

SECTION (1) 41-015

Y .0000 .4150

M/L

.000 .0399
.125 .0298
.175 .0000
.250 .0351
.300 .0344
.350 .0300
.400 .0318
.500 .0421
.600 .0413
.700 .0353
.800 .0232
.900 .0098
1.000 .0024
1.025 .0030

DEPENDENT VARIABLE NUMBER

RM/L (2) = 4.437 MACH (1) = 5.300 PO = 353.867 TO = 1287.480 HI = 314.301 RHOVEL = .724

SECTION (1) 41-015

Y .0000 .4150

M/L

.000 .0390
.125 .0230
.175 .0098
.250 .0366
.300 .0520
.350 .0336
.400 .0607
.500 .0668
.600 .0494
.700 .0371
.800 .0239
.900 .0000
1.000 .0058
1.025 .0065



ARC 3.5-172 IM15 ORB + E1 +SRB (ORBITER BODY)

(388806) (20 AUG 74)

REFERENCE DATA

SRKF = 2890.0000 SQ.FT. XMRP = .0000 IN.
LRKF = 474.8100 IN. YMRP = .0000 IN.
BRKF = 936.6020 IN. ZMRP = .0000 IN.
SCALE = .00160

ALPHA = -5.000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = .850

PARAMETRIC DATA

RN/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .916

SECTION (1)41-015 DEPENDENT VARIABLE H/HREF

Y .0000 .4150

X/L	
.068	.0299
.125	.0288
.175	.0156
.250	.0317
.300	.0257
.350	.0308
.400	.0205
.500	.0360
.600	.0307
.700	.0283
.800	.0213
.900	.0077
1.000	.0025
1.025	.0027

RN/L (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1)41-015 DEPENDENT VARIABLE H/HREF

.0000 .4150

X/L	
.068	.0273
.125	.0261
.175	.0139
.250	.0313
.300	.0239
.350	.0313
.400	.0203
.500	.0372
.600	.0327
.700	.0290
.800	.0222
.900	.0094
1.000	.0046
1.025	.0052

DATE 05 SEP 74

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

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ARC 3.5-172 IH15 ORBITER

(ORBITER WING)

(BB8M01) (20 AUG 74)

REFERENCE DATA

WREF = 2690.0000 SQ.FT. WREFP = .0000 IN.
LREF = 474.8100 IN. LREFP = .0000 IN.
BREF = 936.6820 IN. BREFP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/H1 = .850

RN/L (1) = 1.764 MACH (1) = 5.300 FO = 151.428 TO = 1348.180 H1 = 329.926 RHOVEL = .301

SECTION (1) 41-OTS

DEPENDENT VARIABLE H/HREF

ZY/B .4000 .6000 .8000

X/C

.175 .0421
.200 .0500
.225 .0334
.250 .0391
.300 .0367 .0383 .0658
.400 .0335 .0347 .0489 .0566
.500 .0284 .0300 .0401
.600 .0216 .0251 .0349
.700 .0181 .0180 .0284
.800 .0167 .0233
.875 .0117
.900 .0101

RN/L (2) = 5.214 MACH (1) = 5.300 FO = 349.474 TO = 1153.370 H1 = 280.152 RHOVEL = .782

SECTION (1) 41-OTS

DEPENDENT VARIABLE H/HREF

ZY/B .4000 .6000 .8000

X/C

.175 .0029
.200 .0037
.225 .0022
.250 .0024
.300 .0022 .0030 .0090 .0044
.400 .0021 .0028 .0038
.500 .0019 .0025 .0033
.600 .0015 .0022 .0028
.700 .0013 .0019 .0023
.800 .0015 .0018 .0014
.875 .0009
.900 .0007



REFERENCE DATA
 XREF = 2690 .0000 50.F1. XREF = .0000 IN.
 YREF = 474.6100 IN. YREF = .0000 IN.
 ZREF = 936.6820 IN. ZREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA
 ALPHA = -5.0000 BETA = .0000
 MACH = 5.303 PHI-M = .0000
 HAW/H1 = .850

RM/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 289.949 RHOVEL = .323

SECTION (1) 141-OTS
 DEPENDENT VARIABLE H/HREF

ZY/B	.4000	.6000	.8000
X/C			
.175	.0126		
.200	.0174		
.225	.0064		
.250	.0062	.0233	
.300	.0057	.0199	
.400	.0041	.0113	.0180
.500	.0031	.0100	.0136
.600	.0022	.0079	.0115
.700	.0020	.0066	.0093
.800	.0053	.0077	
.850		.0061	
.875		.0021	
.900	.0015		

RM/L (2) = 6.131 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .808

SECTION (1) 141-OTS
 DEPENDENT VARIABLE H/HREF

ZY/B	.4000	.6000	.8000
X/C			
.175	.0125		
.200	.0176		
.225	.0049		
.250	.0047	.0248	
.300	.0044	.0214	
.400	.0036	.0127	.0175
.500	.0039	.0126	.0154
.600	.0036	.0106	.0131
.700	.0034	.0086	.0105
.800		.0065	.0081
.850		.0065	.0066
.875		.0048	
.900	.0035		

ARC 3.5-172 IM15 ORB + E1 (ORBITER WING)

(888W03) (20 AUG 74)

REFERENCE DATA

REF = 2990.0000 \$6.FT. XREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 BR.F = 936.6920 IN. ZREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = .850

RN/L (1) = 4.332 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 HT = 318.677 RHOMEL = .716

SECTION (1)/41-013

Z/R/S	X/C	DEPENDENT VARIABLE H/MREF
.175		.0351
.200		.0446
.225	.0309	
.250	.0350	.0793
.300	.0315	.0659
.400	.0277	.0311
.500	.0229	.0289
.600	.0168	.0237
.700	.0143	.0202
.800		.0165
.850		.0240
.875		.0115
.900	.0091	



ARC 3.5-172 IH15 ORB + E1 +SAB (ORBITER WING)

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.333 PHI-M = .000
MAW/H1 = .853

RW/L (1) = 1.845 MACH (1) = 5.300 FO = 149.964 TO = 1303.100 H1 = 318.311 RHOMEL = .305

REFERENCE DATA

SWEP = 2990.0000 56.671. WREF = .0000 IN.
LREF = 474.8100 IN. WREF = .0000 IN.
BREF = 936.6870 IN. WREF = .0000 IN.
SCALE = .0060

DEPENDENT VARIABLE H1/REF

SECTION (1) 41-OTS

ZY/B .4000 .6000 .8000

Z/C	.4000	.6000	.8000
.175	.0317		
.200	.0429		
.225	.0274		
.250	.0323		.0618
.300	.0320	.0345	.0556
.400	.0287	.0303	.0512
.500	.0263	.0256	.0415
.600	.0208	.0226	.0356
.700	.0200	.0213	.0285
.800		.0185	.0225
.850			.0176
.875		.0142	
.900		.0191	

RW/L (2) = 4.437 MACH (1) = 5.300 FO = 353.867 TO = 1287.480 H1 = 314.301 RHOMEL = .725

DEPENDENT VARIABLE H2/REF

SECTION (1) 41-OTS

ZY/B .4000 .6000 .8000

Z/C	.4000	.6000	.8000
.175	.0290		
.200	.0396		
.225	.0420		
.250	.0477		.0610
.300	.0434	.0319	.0533
.400	.0364	.0351	.0476
.500	.0305	.0368	.0389
.600	.0242	.0402	.0332
.700	.0287	.0359	.0270
.800		.0293	.0212
.850			.0169
.875		.0259	
.900		.0210	

ARC 3.5-172 IH15 ORB + E1 +SRB (ORBITER WING)

(BB84036) (20 AUG 74)

REFERENCE DATA

SRF = 2690.0000 36 FT. XREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 BRF = 936.6623 IN. ZREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-H = .000
 HAW/HT = .850

RN/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 6.580 HT = 311.506 RHOMEL = .316

SECTION (1) 141-075 DEPENDENT VARIABLE H/MREF

Z/Y/B	.4000	.6000	.8000
X/C			
.175	.0336		
.200	.0460		
.225	.0299		
.250	.0320	.0544	
.300	.0321	.0462	
.400	.0273	.0397	.0428
.500	.0328	.0341	.0348
.600	.0319	.0279	.0291
.700	.0296	.0227	.0241
.800	.0186	.0192	
.850		.0150	
.875		.0136	
.900	.0197		

RN/L (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOMEL = .730

SECTION (1) 41-075 DEPENDENT VARIABLE H/MREF

Z/Y/B	.4000	.6000	.8000
X/C			
.175	.0306		
.200	.0416		
.225	.0305		
.250	.0341	.0551	
.300	.0336	.0346	.0499
.400	.0311	.0403	.0445
.500	.0361	.0419	.0368
.600	.0397	.0418	.0307
.700	.0392	.0358	.0244
.800		.0283	.0185
.850		.0196	
.875		.0147	
.900	.0249		



(888507) (23 AUG 74)

ARC 3.5-172 IH15 ORB + ET + SRB (SRB)

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = .850

RW/L (1) = 1.983 MACH (1) = 5.300 FO = 155.638 IO = 1274.720 HT = 311.029 RHOVEL = .320

REFERENCE DATA

SRBF = 2890.0000 50.FT. XMRP = .0000 IN.
LRFP = 474.8100 IN. YMRP = .0000 IN.
BRFP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0160

SECTION (1) 41-015

PHI 90.0000135,0000180,0000225,0000270,0000315,0000

X/L	PHI	FO	IO	HT	RHOVEL
.000	.2863	.2863			
.002		.2028			
.025		.3114			
.090	.1717	.1863			
.100		.0777			
.112		.1036			
.150		.0993			
.200	.0518	.0452	.0445	.0346	
.300	.0223	.0223	.0223	.0172	
.400	.0176	.0234	.0607	.0345	.0172
.500		.0425		.0425	
.600	.0545	.0559	.0242	.0235	
.650	.0547	.0614			
.700	.0298	.0365	.0544	.0598	.0289
.750	.0393	.0569	.0638		
.800	.0476	.0611	.0843	.0836	.0504
.820	.0520	.0651	.0716	.0302	.0170
.900	.0885	.0885	.0199	.0199	.0199
.996	.0722	.09	.0260	.0243	.0310

RW/L (2) = 4.311 MACH (1) = 5.300 FO = 352.586 IO = 1308.080 HT = 319.591 RHOVEL = .714

SECTION (1) 41-015

PHI 90.0000135,0000180,0000225,0000270,0000315,0000

X/L	PHI	FO	IO	HT	RHOVEL
.000	9.9900	9.9900			
.002		.2079			
.025		.2603			
.090	.1688	.1817			
.100		.0748			
.112		.1068			
.150		.1083			
.200	.0428	.0358	.0450	.0288	
.300	.0254	.0254	.0166	.0166	
.400	.0298	.0498	.0335	.0136	
.500		.0622			

(888307)

RM/L (2) = 4.311 MACH (1) = 5.300

ARC 3.5-1/2 IM15 ORB + ET + SRB (SRB)

SECTION (1141-013 DEPENDENT VARIABLE H/MREF

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

PHI	90.0000135	0000180	0000225	0000270	0000315	0000
.600	.0614	.0615	.0378	.0286		
.650	.0548	.0664				
.700	.0355	.0461	.0519	.0710	.0496	
.750		.0550	.0641	.0824		
.800	.0555	.0698	.0875	.0979	.0871	.0372
.920	.0486	.0655	.0755	.0444	.0170	.0281
.950		.1011			.0201	
.996	.0930	.1044	.0382	.0215	.0260	



REFERENCE DATA

MA/L (1) = 2.225 MACH (1) = 5.300 PO = 153.442 TO = 1174.260 HT = 285.439 RHOVEL = .33.
 REF = 26 .0000 56 FT. WREF = .0000 IN. ALPHA = -5.000 BETA = .000
 USEP = 474.0100 IN. WREF = .0000 IN. MACH = 5.300 PHI-M = .0000
 DREF = 336.0020 IN. WREF = .0000 IN. WAW/HT = .053

PARAMETRIC DATA

SCALE = .0060

SECTION (1) 41-018 DEPENDENT VARIABLE NUMBER

PW1 90.0000135.0000180.0000225.0000270.0000315.0000

N/L	.4372	.4372	.4372
.000		.4372	.4372
.002		.1692	.1692
.025		.3276	.3276
.050	.2289	.1919	.1919
.100		.0888	.0888
.112		.1326	.1326
.150		.1124	.1124
.200		.0953	.0953
.300		.0473	.0228
.400	.0137	.0469	.0469
.500		.0621	.0584
.600		.0525	.0579
.700	.0152	.0565	.0538
.750		.0666	.0721
.800	.0145	.0728	.1154
.820	.0176	.0543	.0991
.900		.1020	.1020
.996	.0434	.0617	.0488

MA/L (2) = 4.713 MACH (1) = 5.300 PO = 352.403 TO = 1236.210 HT = 301.186 RHOVEL = .73+

SECTION (1) 41-018 DEPENDENT VARIABLE NUMBER

PW1 90.0000135.0000180.0000225.0000270.0000315.0000

N/L	.2693	.2693	.2693
.000		.2693	.2693
.002		9.9900	9.9900
.025		.2959	.2959
.050	.2125	.1763	.1763
.100		.0853	.0853
.112		.1100	.1100
.150		.1133	.1133
.200	.0430	.0922	.0456
.300		.0491	.0193
.400	.0179	.0468	.0547
.500		.0315	.0070
.503		.0767	.0767



(BB8508)

ARC 3.5-1'2 IH15 CR8 + E1 +558 (568)

INVL (2) = 4.713 MACH (1) = 5.300

SECTION (1)41-078 DEPENDENT VARIABLE NUMBER

PM1 90.0000135.0000160.0000225.0000270.0000315.0000

INVL	0.000	0.050	0.100	0.150	0.200	0.250	0.300	0.350	0.400	0.450	0.500	0.550	0.600	0.650	0.700	0.750	0.800	0.850	0.900	0.950	1.000	
	.0760	.0634	.0452	.0285																		
	.0647	.0656	.0837	.0591																		
	.0795	.0604	.0837	.0591																		
	.0434	.0765	.0989																			
	.0162	.0612	.1233	.1181	.1004	.0287																
	.0172	.0568	.0881	.0570	.0155	.0250																
	.1162			.0213																		
	.0436	.0769		.0556	.0241	.0285																



TABULATED DATA LISTING FOR IH15 (ARC 3.5-1/2)

(BB6513) (SRB) (AUG 74)

ARC 3.5-1/2 IH15 SFB

(SRB)

REFERENCE DATA

WAPP = 2650.0000 SG.FT. MSEP = .0000 IN. ALPHA = .000 BETA = .000
LAPP = 474.8100 IN. MSEP = .0000 IN. MACH = 5.300 FM1-M = .000
BAPP = 936.6620 IN. MSEP = .0000 IN. MAW/M = .850
SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 FM1-M = .000
MAW/M = .850

W/L (1) = 1.867 MACH (1) = 5.300 FO = 153.447 IO = 1397.700 HT = 342.751 RHOVEL = .299

SECTION (1) 141-075 DEPENDENT VARIABLE NUMBER

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

W/L	PHI	FO	IO	HT	RHOVEL
.000	.3793	.3793			
.002	.1811	.1811			
.025	.2523	.2523			
.050	.1516	.1516			
.100	.0898	.0898			
.112	.0677	.0677			
.150	.0209	.0209			
.200	.0170	.0170	.0182	.0123	
.300	.0149	.0149	.0153	.0114	
.400	.0132	.0132	.0144	.0114	
.500	.0120	.0120	.0136	.0122	
.600	.0104	.0104	.0132	.0111	
.700	.0087	.0087	.0087	.0111	
.750	.0057	.0057	.0051	.0064	.0042
.800	.0052	.0052	.0056	.0083	.0083
.850	.0053	.0053	.0079	.0162	.0162
.900	.0080	.0080	.0091	.0394	.0367
.950	.0229	.0229			
.998	.0432	.0432			

W/L (2) = 4.1 MACH (2) = 5.300 FO = 351.487 IO = 1247.410 HT = 304.045 RHOVEL = .732

SECTION (1) 141-075 DEPENDENT VARIABLE NUMBER

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

W/L	PHI	FO	IO	HT	RHOVEL
.000	.3539	.3539			
.002	.1699	.1699			
.025	.2401	.2401			
.050	.1421	.1421			
.100	.0856	.0856			
.112	.0641	.0641			
.150	.0198	.0198			
.200	.0157	.0157	.0195	.0100	
.300	.0136	.0136	.0124	.0124	
.400	.0121	.0121	.0137	.0126	.0101
.500	.0112	.0112	.0168	.0168	

(080513)

ARC 3.5-172 IM15 SKB (SKB)

AM/L (2) = 4.634 MACH (1) = 5.300

SECTION (1) 41-015

DEPENDENT VARIABLE NUMBER

PHI 90.0000135 .0000180 .0000225 .0000270 .0000315 .0000360

N/L	.000	.0112	.0127	.0111	.0131
.050		.0090	.0132		
.100	.0035	.0026	.0045	.0083	.0117
.150		.0071	.0081	.0100	
.200	.0136	.0141	.0135	.0150	.0187
.250	.0397	.0361	.0412	.0429	.0534
.300		.1176		.1196	
.350	.0998	.1239	.1101	.1236	.1130



TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)

ARC 3.5-172 IM15 SAB (SAB)

REFERENCE DATA

MAP = 2090.0000 96.171. MKRF = .0000 IN.
 JAP = 474.8100 IN. MKRF = .0000 IN.
 BRP = 936.6020 IN. MKRF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -9.000 BETA = .000
 MACH = 5.300 PHI-H = .000
 MAXWGT = .050

NOVL (1) = 2.136 MACH (1) = 5.300 PO = 151.245 IO = 1193.390 M1 = 290.290 RHOVEL = .320

DEPENDENT VARIABLE NUMBER

SECTION (1) 41-073
 PHI 90.0000135.0000160.0000225.0000270.0000315.0000

N/L	PHI	FO	IO	M1	RHOVEL
.000	.3674	.0245	.0181	.0078	
.002	.1623	.0286	.0185		
.025	.2437	.0317	.0214	.0062	
.050	.1453	.0272	.0201	.0086	
.100	.0914	.0293	.0181		
.112	.0671	.0286	.0185		
.150	.0201	.0331	.0214		
.200	.0245	.0329	.0202		
.300	.0185	.0312	.0302		
.400	.0317	.0307	.0270		
.500	.0272	.0243	.0303		
.600	.0201	.0437	.0316	.0147	
.650	.0281	.0347	.0256	.0192	
.700	.0243	.0324	.0231	.0629	
.750	.0107	.0419	.0145	.0290	
.800	.0180	.0450	.0163		
.825	.0160	.0450	.0163		
.850	.0145	.0428	.0173		
.900	.0930				
.950					
.996					

NOVL (2) = 5.489 MACH (1) = 5.300 FO = 351.653 IO = 1123.620 M1 = 272.646 RHOVEL = .776

DEPENDENT VARIABLE NUMBER

SECTION (1) 41-073
 PHI 90.0000135.0000160.0000225.0000270.0000315.0000

N/L	PHI	FO	IO	M1	RHOVEL
.000	.3360	.0246	.0183	.0065	
.002	.1552	.0304	.0184		
.025	.2270	.0342	.0218	.0070	
.050	.1334	.0268	.0200		
.100	.0846	.0282	.0152		
.112	.0625	.0282	.0152		
.150	.0183	.0304	.0184		
.200	.0246	.0342	.0218		
.300	.0184	.0342	.0218		
.400	.0176	.0342	.0218		
.500					
.600					
.700					
.800					
.900					
.950					
.996					

DATE 09 SEP 74 TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)

(BB0314)

ARC 3.5-172 IM15 SAB (SRB)

RM/L (2) = 3.489 NACH (1) = 3.300

SECTION (1141-013 DEPENDENT VARIABLE NUMBER

PH1 00.0000133.0000180.0.000225.0000270.0000315.0000

WL					
.000		.0336	.0295	.0140	.0037
.050		.0300	.0312		
.100	.0071	.0291	.0266	.0101	
.150		.0357	.0389		
.200	.0178	.0449	.0500	.0200	.0220
.250	.0478	.0806	.1153	.0733	.0454
.300		.1772		.1339	
.350	.0971	.1351	.1254	.1096	.0742



ARC 3.5-172 IH15 SR8

(SR8)

(888816) (20 AUG 74)

REFERENCE DATA

MREF = 2690.0000 50. FT. MREF = .0000 IN.
 LREF = 474.8100 IN. MREF = .0000 IN.
 BREF = 936.6820 IN. 2MREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = 45.000 BETA = .000
 MACH = 5.333 PHI-M = 90.000
 HAW/HT = .850

RW/L (1) = 5.559 MACH (1) = 5.300 FO = 351.670 TO = 1111.580 HT = 269.615 RHOVEL = .783

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

PHI 90.00000135.00000180.0000225.0000270.0000315.0000

K/L

.000	.3380	.3380	.3380	.3380
.002	.2166	.2166	.2166	.2166
.025	.4614	.4614	.4614	.4614
.050	.4643	.4643	.4643	.4643
.100	.3119	.3119	.3119	.3119
.112	.2899	.2899	.2899	.2899
.150	.2251	.2251	.2251	.2251
.200	.0409	.1393	.2593	.1336
.300	.1451	.2619	.2651	.1516
.400	.0396	.1812	.4776	.1516
.500	.0465	.2226	.3102	.2667
.600	.0434	.2341	.2669	.4590
.650	.0523	.2669	.3056	.4590
.700	.0089	.0072	.0111	.0537
.750	.0111	.0537	.3056	.3056
.800	.0042	.0096	.0708	.3030
.900	.0089	.0097	.0878	.3719
.950	.0038	.0085	.1199	.6085
.996	.0038	.0085	.2577	.3590
				2478

ARC 3.5-172 IH15 SRB

(SRB)

(888918) (20 AUG 74)

REFERENCE DATA

SRF = 2690.0000 36.FT, 1MRP = .0000 IN,
 LREF = 474.6100 IN, 1MRP = .0000 IN,
 BRF = 936.6620 IN, 2MRP = .0000 IN,
 SCALE = .0080

PARAMETRIC DATA

ALPHA = 90.000 BETA = .000
 MACH = 5.300 PHI-M = 90.000
 HAW/HT = .850

RA/L (1) = 5.672 MACH (1) = 5.300 FO = 353.135 IO = 1076.200 HT = 260.731 RHVEL = .800

SECTION (1) 41-015

PHI 90.0000135 .0000180 .0000225 .0000270 .0000315 .0000

X/L	DEPENDENT VARIABLE H/HREF					
.000	.2078	.2468	.4278	.3435	.2387	.2078
.025	.1873	.2397	.4358	.3567	.2477	.4316
.050		.2809	.4379	.3647		.5168
.100						.3666
.112						.5218
.150						.4278
.200		.0675	.4627	.3435	.2387	.4627
.300		.2397	.4358			.4358
.400	.0085	.0561	.2809	.4379	.2477	.4379
.500			.5647			.5647
.600		.0597	.2426	.3435	.3214	
.650		.0536	.2506			
.700	.0113	.0614	.2743	.4792		
.750		.0524	.2789			
.800	.0212	.0140	.2654	.4876	.2569	
.920	.0364	.0272	.2400	.4149	.2518	
.950		.1349		.3701		
.996	9.9900	.2165		.5499	.3254	



DATE 09 SEP 74 TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

(BB6C01) (20 AUG 74)

ARC 3.5-172 IH15 ORBITER (WINDSHIELD)

REFERENCE DATA

REF - 2990.0000 \$6.FT. MREF = .0000 IN.
LREF = 474.8100 IN. VREF = .0000 IN.
DREF = 936.6920 IN. ZREF = .0000 IN.
SCALE = .0080

RN/L (1) = 1.764 MACH (1) = 5.300 PO = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .301

SECTION (1) 141-073 DEPENDENT VARIABLE H/HREF

Y	.0470	.1780	.1980	.2130
X	1.210	.1794		.1993
	1.251	.2498		
	1.272		.2350	
	1.305			
	1.334	.2785		
	1.358	.2521		

RN/L (2) = 5.214 MACH (1) = 5.300 PO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .762

SECTION (1) 141-075 DEPENDENT VARIABLE H/HREF

Y	.0470	.1780	.1980	.2130
X	1.210	.0311		.0312
	1.251			
	1.272	.0442		
	1.305		.0373	
	1.334	.0476		
	1.358	.0404		

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HT = .830

ARC 3.5-172 IM15 ORBITER

(WINDSHIELD)

(20 AUG 74)

REFERENCE DATA

MREF = 2990.0000 SQ.FT. MREF = .0000 IN.
 LREF = 474.8100 IN. MREF = .0000 IN.
 BREF = 936.6820 IN. MREF = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000
 MAW/HT = .850

RW/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.949 RHVEL = .323

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

Y	X	Value
	1.210	.2497
	1.251	.2614
	1.272	.3343
	1.305	.2907
	1.334	.3633
	1.356	.3135

RW/L (2) = 6.131 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHVEL = .808

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

Y	X	Value
	1.210	.3593
	1.251	.3585
	1.272	.4664
	1.305	.5785
	1.334	.4906
	1.356	.4123



ARC 3.5-172 IH15 ORB + E1 (WINDSHIELD) (BB8C03) (20 AUG 74)

REFERENCE DATA

SREF = 2690.0000 56.FT. MRFP = .0000 IN.
LREF = 474.8100 IN. MRFP = .0000 IN.
BRFP = 936.6820 IN. MRFP = .0000 IN.
SCALE = .00160

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
MACH = 5.300 PHI-M = .0000
HAW/HT = .850
RML (1) = 4.332 MACH (1) = 5.300 FO = 352.769 TO = 1304.520 HT = 319.677 RHOVEL = .716

SECTION (1141-013)
(DEPENDENT) VARIABLE HVHREF

Y	X
1.210	.2445
1.291	.2525
1.272	.3264
1.305	.2840
1.334	.3505
1.356	.3033

ARC 3.5-172 IM15 ORB + ET + SEA (WINDSHIELD)

(BB8C05) (20 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. NREF = .0000 IN.
 LREF = 474.8100 IN. VREF = .0000 IN.
 BREF = 936.6820 IN. ZREF = .0000 IN.
 SCALE = .0060

RW/L (1) = 1.845 MACH (1) = 5.300 FO = 149.964 TO = 1303.100 HT = 318.311 RHOMEL = .307
 ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = .850

PARAMETRIC DATA

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

Y .0470 .1780 .1960 .2130

X

1.210 .1921
 1.251 .2084
 1.272 .2656
 1.305 .2430
 1.334 .2917
 1.356 .2839

RW/L (2) = 4.437 MACH (1) = 5.300 FO = 353.867 TO = 1287.480 HT = 314.301 RHOMEL = .724

SECTION (1) 41-015 DEPENDENT VARIABLE H/HREF

Y .0470 .1780 .1960 .2130

X

1.210 .2764
 1.251 .3183
 1.272 .3725
 1.305 .3334
 1.334 .3641
 1.356 .3644



REFERENCE DATA

DRPF = 2990.0000 36. FT. MREF = .0000 IN.
 DRPF = 474.8100 IN. MREF = .0000 IN.
 DRPF = 936.6620 IN. MREF = .0000 IN.
 SCALE = .0080

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PNT-M = .000
 MACH/M1 = .850

RW/L (1) = 1.952 MACH (1) = 5.300 FO = 133.625 TO = 1276.580 M1 = 1.1576 RHOVEL = .318
 SECTION (1) 41-OTS DEPENDENT VARIABLE NUMBER

Y	.0470	.1780	.1960	.2130
A				
1.210	.2166			
1.251			.2363	
1.272	.2995			
1.305			.2779	
1.334	.3273			
1.356		.2967		

RW/L (2) = 4.570 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 M1 = 307.600 RHOVEL = .730
 SECTION (1) 41-OTS DEPENDENT VARIABLE NUMBER

Y	.0470	.1780	.1960	.2130
A				
1.210	.3137			
1.251			.3334	
1.272	.4105			
1.305			.3675	
1.334	.4199			
1.356		.3651		

ARC 3.5-172 IN15 ORB + P (INTERNAL TANK)

(080103) (20 AUG 74)

REFERENCE DATA

DREF = 2990.0000 00.071. VWRP = .0000 IN.
 LREF = 474.6100 IN. VWRP = .0000 IN.
 BREF = 936.6020 IN. VWRP = .0000 IN.
 SCALE = .0060

R/V/L (1) = 4.332 MACH (1) = 5.300 FO = 332.769 TO = 304.520 HT = 318.877 G-NOVEL = .716

SECTION (1) 41-073 DEPENDENT VARIABLE: H/HREF

PHI 90.0000112.5000139.0000137.5000

R/V/L	H/HREF
.450	.0046
.550	.0273
.650	.0291
.750	.0242
.850	.0212
	.0397
	.0372
	.0271
	.0165
	.0172
	.0268
	.0296

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = .950



ARC 3.5-1/2 IH15 ORB + ET +SRB (EXTERNAL TANK)

(888103) (20 AUG 74)

REFERENCE DATA

WREF = 2090.0000 LB.FT. WREF = .0000 IN.
LREF = 474.8100 IN. VREF = .0000 IN.
BREF = 938.6820 IN. ZREF = .0000 IN.
SCALE = .0000

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAW/HI = .850

NO/L (1) = 1.645 MACH (1) = 5.300 PO = 149.964 TO = 1303.100 HI = 318.311 RHOVEL = .305

SECTION (1) 41-015

DEPENDENT VARIABLE H/HREF

PHI 90.0000112.5000135.0000157.5000

X/L

.450 .0267 .0368 .1108
.550 .0233 .0627 .0461
.650 .0260 .0363 .0387 .0411
.750 .0394 .0346 .0252 .0323
.850 .0441 .0353 .0220 .0286

NO/L (2) = 4.437 MACH (2) = 5.300 PO = 353.867 TO = 1287.480 HI = 314.301 RHOVEL = .724

SECTION (1) 41-015

DEPENDENT VARIABLE H/HREF

PHI 90.0000112.5000135.0000157.5000

X/L

.450 .0240 .0508 .1157
.550 .0196 .0730 .0524
.650 .0413 .0328 .0487 .0576
.750 .0468 .0393 .0403 .0553
.850 .0495 .0493 .0300 .0405



ARC 3.5-1/2 (H15 ORF + E) +568 (EXTERNAL TANK)

(BB8106) 20 AUG 74

REFERENCE DATA

SAFE = 2990.0000 SQ.FT. WREF = .0370 IN.
LREF = 474.8100 IN. VREF = .0000 IN.
DREF = 970.6670 IN. WREF = .0000 IN.
SCALE = .0006

PARAMETRIC DATA

ALPHA = 0.0000 BETA = .0000
MACH = 5.0000 PHI-M = .0000
MACH-T = .0000

RN/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .716

SECTION (1141-015

PMI 90.0000112.5000135.0000157.5000

M/L	DEPENDENT VARIABLE NUMBER
.450	.0295
.500	.0145
.550	.0796
.600	.0417
.650	.0476
.700	.0495
.750	.0570
.800	.0425
	.0270
	.0271

RN/L (2) = 4.570 MACH (2) = 5.300 FO = 352.769 TO = 1261.333 HT = 307.600 RHOVEL = .733

SECTION (1141-015

PMI 90.0000112.5000135.0000157.5000

M/L	DEPENDENT VARIABLE NUMBER
.450	.0290
.500	.0298
.550	.0444
.600	.0559
.650	.0576
.700	.0666
.750	.0469
.800	.0607
	.0535
	.0519



ARC 3.5-172 IH15 ORB + E1 +SAB (INTERNAL TANK)

(898107) (20 AUG 74)

REFERENCE DATA

SAEP = 7990.0000 56.F1, 396F = .0000 IN.
LREF = 474.8100 IN, 196F = .0000 IN.
BREF = 936.6420 IN, 496F = .0000 IN.
SCALE = .0061

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 P41-M = .000
HAW/H1 = .850

RH/L (1) = 1.983 MACH (1) = 5.300 FO = 155.638 IO = 1274.720 HT = 311.023 RHOVEL = .350

SECTION (1)41-075 DEPENDENT VARIABLE NUMBER

P41 67.5000 90.0000112.5000135.0000160.0000

N/L	005	044	042	025	007	003	057	035	015	023
	.005	.3444	.0438	.0253						
	.129									
	.175									
	.250	.0071								
	.275	.0061	.0036							
	.329	.1904	.0572	.0061						
	.350	.0934	.1035	.0936	.0155					
	.375				.0239					
	.450				.0153					
	.550				.0166					
	.650	.0150								
	.750	.0128								

RH/L (2) = 4.311 MACH (1) = 5.300 FO = 352.568 IO = 1308.080 HT = 319.591 RHOVEL = .714

SECTION (1)41-075 DEPENDENT VARIABLE NUMBER

P41 67.5000 90.0000112.5000135.0000160.0000

N/L	005	044	042	025	007	003	057	035	015	023
	.005	.3378	.0442	.0251						
	.129									
	.175									
	.250	.0063								
	.275	.0062	.0042							
	.329	.1555	.0478	.0063						
	.350	.0999	.1145	.0840	.0165					
	.375				.0275					
	.450				.0206					
	.550				.0322					
	.650	.0172								
	.750	.0225								



ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)

(888108) (20 AUG 74)

REFERENCE DATA

SRP = 2690.0000 96.FT. MRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
DRP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 P1-M = .000
HAW/M1 = .850

RN/L (1) = 3.225 MACH (1) = 5.300 FO = 193.442 TO = 1174.260 HT = 285.439 RHQVEL = .331

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

PHI 67.5000 90.0000112.5000135.0000180.0000

X/L

.005 .3903
.125 .0621
.175 .0372
.250 .0113
.275 .0108 .0094
.325 .1667 .0545 .0070
.350 .0786 .1270 .1071 .0227
.375 .0481
.450 .0407
.550 .0460
.650 .0048
.750 .0100

RN/L (2) = 4.713 MACH (1) = 5.300 FO = 352.403 TO = 1236.210 HT = 301.186 RHQVEL = .739

SECTION (1) 41-075 DEPENDENT VARIABLE H/HREF

PHI 67.5000 90.0000112.5000135.0000180.0000

X/L

.005 .3557
.125 .0583
.175 .0350
.250 .0077
.275 .0095 .0066
.325 .1814 .0415 .0088
.350 .0642 .1409 .0901 .0225
.375 .0460
.450 .0473
.550 .0496
.650 .0071
.750 .0100

ARC 3.5-172 IH15 CRB + ET +SRB (EXTERNAL TANK)

(BB8109) (20 AUG 74)

REFERENCE DATA

SRF = 2990.0000 56.71, MRP = .0000 IN.
LREF = 474.8100 IN, YMRP = .0000 IN.
BRF = 936.6820 IN, ZMRP = .0000 IN.
SCALE = .0080

RN/L (1) = 1.804 MACH (1) = 5.300 PO = 150.696 TO = 1325.300 H1 = 324.022 RHOVEL = .303

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000
HAWHT = .050

SECTION (1141-075

DEPENDENT VARIABLE H/MREF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

R/L	.000	.010	.020	.040	.060	.100	.150	.200	.300	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.625	.650	.675	.700	.750	.800	.850	.900	.935	.975					
PHI	.5133	.3049	.1978	.1683	.1292	.0992	.0738	.0360	.0211	.0048	.0075	.0149	.0618	.1474	.0805	.0482	.0337	.0304	.0157	.0168	.0248	.0345	.0366	.0396	.0412	.0410	.0378	.0293	.0169	.0043					
									.0175	.0048	.0075	.0149	.0618	.1474	.0805	.0482	.0337	.0304	.0157	.0168	.0248	.0345	.0366	.0396	.0412	.0410	.0378	.0293	.0169	.0043					
									.0139	.0833	.0242																								
	.0039	.0428	.0355	.0513	.0376	.0313	.0277																												
		.0426	.0125	.0115	.0125	.0524	.0854																												
		.0285	.0260	.0104	.0303	.0223	.0551	.0523																											
		.0178	.0149	.0214	.0389	.0349	.0360	.0360																											
	.0196	.0196	.0147	.0351	.0456	.0228	.0346	.0346																											
		.0208	.0197	.0433	.0481	.0170	.0250	.0250																											



ARC 3.5-172 IH15 ORB + ET +SKB (EXTERNAL TANK) (BB3110) (20 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 56.FT. MRFP = .0000 IN.
LRFP = 474.8100 IN. YMRP = .0000 IN.
BRFP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0050

RN/L (1) = 2.009 MACH (1) = 5.300 FO = 156.004 TO = 1265.870 HT = 3.18.762 RHOVEL = .322

PARAMETRIC DATA

AU/HA = -5.000 BETA = .000
MACH = 5.300 FHT-H = .000
HA/HHT = .850

SECTION (1141-015) DEPENDENT VARIABLE H/HREF

FHT .0000 45.0000 67.3000 90.0000112.5000135.0000157.5000180.0000

N/L	.0000	.0100	.0200	.0300	.0400	.0500	.0600	.0700	.0800	.0900	.1000	.1100	.1200	.1300	.1400	.1500	.1600	.1700	.1800	.1900	.2000	.2100	.2200	.2300	.2400	.2500	.2600	.2700	.2800	.2900	.3000	.3100	.3200	.3300	.3400	.3500	.3600	.3700	.3800	.3900	.4000	.4100	.4200	.4300	.4400	.4500	.4600	.4700	.4800	.4900	.5000	.5100	.5200	.5300	.5400	.5500	.5600	.5700	.5800	.5900	.6000	.6100	.6200	.6300	.6400	.6500	.6600	.6700	.6800	.6900	.7000	.7100	.7200	.7300	.7400	.7500	.7600	.7700	.7800	.7900	.8000	.8100	.8200	.8300	.8400	.8500	.8600	.8700	.8800	.8900	.9000	.9100	.9200	.9300	.9400	.9500	.9600	.9700	.9800	.9900
	.0000	.0110	.0219	.0324	.0434	.0542	.0652	.0761	.0869	.0974	.1083	.1191	.1297	.1403	.1508	.1613	.1717	.1821	.1925	.2028	.2131	.2234	.2336	.2438	.2539	.2640	.2741	.2842	.2943	.3044	.3145	.3246	.3347	.3448	.3549	.3650	.3751	.3852	.3953	.4054	.4155	.4256	.4357	.4458	.4559	.4660	.4761	.4862	.4963	.5064	.5165	.5266	.5367	.5468	.5569	.5670	.5771	.5872	.5973	.6074	.6175	.6276	.6377	.6478	.6579	.6680	.6781	.6882	.6983	.7084	.7185	.7286	.7387	.7488	.7589	.7690	.7791	.7892	.7993	.8094	.8195	.8296	.8397	.8498	.8599	.8700	.8801	.8902	.9003	.9104	.9205	.9306	.9407	.9508	.9609	.9710	.9811	.9912		



ARC 3.5-1/2 IM15 E1

(EXTERNAL TANK)

(BB8111) (20 AUG 74)

REFERENCE DATA

SREF = 2990.0000 90.FT, MRP = .0000 IN.
 LREF = 474.6100 IN, MRP = .0000 IN.
 DREF = 936.6820 IN, MRP = .0000 IN.
 SCALE = .0080

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/M1 = .830

RW/L (1) = 1.982 MACH (1) = 5.300 FO = 154.357 TO = 1268.500 HT = 309.436 RHOMEL = .312

SECTION (1141-013

DEPENDENT VARIABLE H/REF

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

N/L	.000	.010	.020	.040	.060	.080	.100	.150	.200	.300	.350	.375	.400	.425	.450	.475	.500	.525	.550	.575	.600	.650	.675	.700	.750	.800	.850	.900	.935	.975			
	.4948	.2891	.1868	.1586	.1208	.0926	.0678	.0326	.0175	.0098	.0084	.0087	.0092	.0085	.0080	.0079	.0072	.0070	.0068	.0072	.0071	.0069	.0068	.0059	.0082	.0060	.0060	.0057	.0063	.0052	.0050	.0043	.0015



ARC 3.5-172 1H15 ET

(EXTERNAL TANK)

(BB8112) (20 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SG, FT. MREF = .0000 IN.
 LREF = 474.8100 IN. YREF = .0000 IN.
 DREF = 936.6000 IN. ZREF = .0000 IN.
 SCALE = .0060

RN/L (1) = 2.021 MACH (1) = 5.300 FO = 151.611 TO = 1238.660 HT = 301.810 RMVEL = .317

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000
 HAW/HT = .850

SECTION (1141-015

DEPENDENT VARIABLE H/HREF

FHT .0000 45.0000 87.9000 90.0000112.5000135.0000157.5000180.0000

M/L	.000	.5016
.010	.3254	.3254
.020	.2231	.2231
.040	.1937	.1937
.060	.1519	.1519
.080	.1190	.1190
.100	9.9900	9.9900
.150	.0456	.0456
.200	.0263	.0263
.300	.0176	.0176
.350	.0166	.0166
.375	.0171	.0171
.400	.0053	.0108
.425	.0075	.0124
.450	.0080	.0144
.475	.0077	.0129
.500	.0048	.0097
.525	.0046	.0077
.550	.0029	.0069
.575	.0040	.0096
.600	.0033	.0065
.650	.0033	.0048
.675	.0030	.0052
.700	.0078	.0030
.750	.0033	.0048
.800	.0033	.0048
.850	.0033	.0048
.900	.0033	.0048
.955	.0033	.0048
.975	.0033	.0048



ARC 3.5-172 IH15 ORBITER (ORBITER BODY)

(068801) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

RV/L (1) = 1.764 MACH (1) = 5.300 PO = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .301

SECTION (1)41-075 DEPENDENT VARIABLE ROOT

.0000 .4150

X/L

.068 67.4130
 .125 67.5115
 .175 67.6776
 .250 67.6289
 .300 67.5422
 .350 67.4803
 .400 67.5101 67.4373
 .500 68.3761
 .600 67.7844 67.8121
 .700 67.9287 67.9587
 .800 68.0186 68.1284
 .900 68.1092 68.1880
 1.000 68.0194 68.0791
 1.025 67.9687

RV/L (2) = 5.214 MACH (1) = 5.300 PO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .762

SECTION (1)41-075 DEPENDENT VARIABLE ROOT

.0000 .4150

X/L

.068 70.0883
 .125 70.2045
 .175 70.3878
 .250 70.3732
 .300 70.3116
 .350 70.2313
 .400 70.2806 70.1781
 .500 70.2899
 .600 70.5374 70.5043
 .700 70.8622 70.6350
 .800 70.7671 70.7846
 .900 70.7671 70.7666
 1.000 70.5145 70.5449
 1.025 70.4280



DATE 06 SEP 74

T-RULATED DATA LISTING FOR IH15 (ARC 3.5-172)

PAG 125

ARC 3.5-172 IH15 ORBITER (ORBITER BODY)

(QB8802) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
 YREF = 474.8100 IN. YMRP = .0000 IN.
 DREF = 936.6020 IN. ZMRP = .0000 IN.
 SCALE = .0160

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .000
 MACH = 5.300 PHI-M = .000

RN/L (1) = 2.143 MACH (1) = 5.300 PO = 150.493 TO = 1188.110 HT = 288.949 RHOVEL = .323

SECTION (1) 41-015 DEPENDENT VARIABLE QDOT

Y .0000 .4150

X/L

.088 49.7071
 .125 49.7286
 .175 49.7712
 .250 49.7389
 .300 49.7123
 .350 49.6862
 .400 49.7093 49.6773
 .500 49.7153
 .600 49.7868 49.7929
 .700 49.8269 49.8364
 .800 49.8508 49.9028
 .900 49.8873 49.9322
 1.000 49.8838 49.9069
 1.025 49.8762

RN/L (2) = 6.131 MACH (1) = 5.300 PO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .808

SECTION (1) 41-015 DEPENDENT VARIABLE QDOT

Y .0000 .4150

X/L

.088 55.4631
 .125 55.5420
 .175 55.6654
 .250 55.6290
 .300 55.5727
 .350 55.4937
 .400 55.5435 55.4559
 .500 55.5420
 .600 55.7243 55.7090
 .700 55.8304 55.8056
 .800 55.8989 55.9301
 .900 55.9217 55.9371
 1.000 55.7740 55.7943
 1.025 55.7184

ARC 3.5-172 IH15 ORB + ET (ORBITER BODY)

(QB8B03) (19 AUG 74)

REFERENCE DATA

XREF = 2690.0000 98.171
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0006

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

MACH (1) = 4.332 MACH (1) = 5.300 PO = 352.769 TO = 1304.520 HT = 318.677 RHOVEL = .716

SECTION (1141-073

DEPENDENT VARIABLE QOOT

X/L	QOOT
.000	94.9048
.125	95.0985
.175	95.5571
.250	95.3943
.300	95.2576
.350	95.5372
.400	94.9651
.500	95.2563
.600	95.5019
.700	95.5024
.800	95.7797
.900	96.0534
1.000	96.1680
1.000	96.4551
1.000	96.6804
1.000	96.6640
1.025	96.1308
1.025	96.2424
1.025	95.9751



ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER BODY)

REFERENCE DATA
 XREF = 2690.0000 SQ.FT. XMRP = .0000 IN. ALPHA = .0000 BETA = .0000
 YREF = 474.8100 IN. YMRP = .0000 IN. MACH = 5.300 PHI-M = .0000
 ZREF = 936.6420 IN. ZMRP = .0000 IN.
 SCALE = .0060

RN/L (1) = 1.445 MACH (1) = 5.300 RO = 149.964 TO = 1303.100 HT = 318.311 RHOVEL = .305

SECTION (1) 41-OTS DEPENDENT VARIABLE GOOD

Y	X
.0000	.4150
M/L	
.068	61.7595
.125	61.6031
.175	61.9294
.250	61.6550
.300	61.8286
.350	61.6720
.400	61.7566
.450	61.7741
.500	61.6352
.600	61.9194
.700	61.9726
.800	62.0717
.900	62.2020
1.000	62.1065
1.025	62.0639

SECTION (2) 4.437 MACH (1) = 5.300 RO = 353.667 TO = 1287.480 HT = 314.301 RHOVEL = .724

SECTION (1) 41-OTS DEPENDENT VARIABLE GOOD

Y	X
.0000	.4150
M/L	
.068	92.3343
.125	92.5336
.175	92.9392
.250	92.7101
.300	92.5927
.350	92.6325
.400	92.3795
.500	92.5256
.600	92.6490
.700	92.6703
.800	93.4456
.900	93.5234
1.000	93.0762
1.25	93.1633

ARC 3.5-172 IH15 ORB + ET +SRB (ORBITER BODY)

(888806) (19 AUG 74)

REFERENCE DATA

SRP = 2990.0000 50.FT. WRRP = .0000 IN.
LREF = 474.8170 IN. YMRP = .0000 IN.
BREF = 936.6020 IN. ZMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
MACH = 5.3000 PHI-M = .0000

RM/L (1) = 1.952 MACH (1) = 5.300 PO = 153.625 TO = 1276.580 HT = 311.506 R-NOVEL = .316

SECTION (1) 41-073

DEPENDENT VARIABLE GOOD

.0000 .4150

X/L

.000 59.6215
.125 59.6663
.175 59.9788
.250 59.9088
.300 59.6678
.350 59.9187
.400 59.6097 59.6137
.500 59.8377
.600 59.9242 59.9187
.700 59.9754 59.9247
.800 60.0567 60.0055
.900 60.2082 60.0405
1.000 60.1369 60.0497
1.025 60.1189

RM/L (2) = 4.970 MACH (1) = 5.300 PO = 352.769 TO = 1261.330 HT = 307.600 R-NOVEL = .730

SECTION (1) 41-075

DEPENDENT VARIABLE GOOD

.0000 .4150

X/L

.000 67.7116
.125 67.8819
.175 68.2344
.250 67.9613
.300 67.8349
.350 68.2770
.400 67.5753 67.6893
.500 68.0424
.600 68.0847 68.3772
.700 68.2854 68.5276
.800 68.5355 68.5032
.900 68.9442 68.9727
1.000 68.6549 68.7962
1.025 68.5245



ARC 3.5-172 IM15 ORBITER (ORBITER WING) (089401) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 F-H-M = .000

RN/L (1) = 1.764 MACH (1) = 5.300 PO = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .301

SECTION (1)41-OTS

DEPENDENT VARIABLE QDOT

Z1/B .4000 .6000 .8000

X/C

.175 67.4818
 .200 67.4033
 .225 69.3089
 .250 68.0584 67.2634
 .300 68.0942 67.4555 67.2791
 .400 68.1691 67.5102 67.3213
 .500 68.2355 67.5257 67.2575
 .600 68.2937 67.5422 67.2968
 .700 68.3044 67.5438 67.3115
 .800 67.5455 67.2811
 .850 67.3117
 .875 67.5555
 .900 68.3323

RN/L (2) = 5.214 MACH (1) = 5.300 PO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .762

SECTION (1)41-OTS

DEPENDENT VARIABLE QDOT

Z1/B .4000 .6000 .8000

X/C

.175 70.5069
 .200 70.4265
 .225 70.6187
 .250 70.6118 70.1042
 .300 70.6231 70.4436 70.0952
 .400 70.6666 70.4931 70.1374
 .500 70.7207 70.4846 70.0898
 .600 70.7669 70.5102 70.1000
 .700 70.7664 70.4933 70.1176
 .800 70.4753 70.0912
 .850 70.1301
 .875 70.4899
 .900 70.7170

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

DATE 08 SEP 74

(088WJ2) (19 AUG 74)

ARC 3.5-172 IH15 ORBITER (ORBITER WING)

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
MACH = 5.3000 PHI-M = .0000

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BREF = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

RM/L (1) = 2.143 MACH (1) = 5.300 FO = 150.493 TO = 1188.110 HT = 288.949 RHOVEL = .323

DEPENDENT VARIABLE QDOT

SECTION (1) 41-OTS

ZY/B	.4000	.6000	.8000
X/C			
.175	49.9018		
.200	49.8709		
.225	49.8722		
.250	49.8652	49.8498	
.300	49.8903	49.8958	49.8401
.400	49.9024	49.9081	49.8812
.500	49.9281	49.9209	49.8604
.600	49.9609	49.9279	49.8739
.700	49.9569	49.9340	49.8683
.800	49.9297	49.8620	
.850	49.8741		
.875	49.9400		
.900	49.9813		

RM/L (2) = 6.151 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .808

DEPENDENT VARIABLE QDOT

SECTION (1) 41-OTS

ZY/B	.4000	.6000	.8000
X/C			
.175	55.7459		
.200	55.6722		
.225	55.6040		
.250	55.7999	55.4629	
.300	55.8194	55.7080	55.4680
.400	55.8535	55.7437	55.4992
.500	55.9009	55.7516	55.4691
.600	55.9392	55.7762	55.4883
.700	55.9388	55.7663	55.4954
.800	55.7527	55.4797	
.850	55.5064		
.875	55.7773		
.900	55.9237		



DATE 08 SEP 74

TABULATED DATA LISTING FOR IH15 (ARC 3,5-172)

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ARC 3,5-172 IH15 ORB + ET

(ORBITER WING)

(088403) (19 AUG 74)

REFERENCE DATA

XREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BREF = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

ALPHA = .0000 BETA = .0000
MACH = 5.300 PHI-H = .0000

RN/L (1) = 4.332 MACH (1) = 5.300 PO = 352.769 TO = 1304.520 HT = 318.677 NHVEL = .716

SECTION (1)41-OTS DEPENDENT VARIABLE 000T

Z1/B .4000 .6000 .8000

X/C

.175	96.1069
.200	95.8941
.225	96.3930
.250	96.3252
.300	96.4697 95.9879 95.3475
.400	96.8394 96.1326 95.3493
.500	96.8065 96.1631 95.4349
.600	96.7759 96.2823 95.4909
.700	96.7541 96.4648 95.5553
.800	96.4728 95.4538
.850	95.6224
.875	96.4281
.900	96.7377

PARAMETRIC DATA

ARC 3.5-172 IM15 ORB + ET +SRB (ORBITER WING) (888405) (19 AUG 74)

REFERENCE DATA

XREF = 2690.0 JO SQ.FT. XMRP = .0000 IN.
 YREF = 474.8100 IN. YMRP = .0000 IN.
 ZREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .00160

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

RN/L (1) = 1.645 MACH (1) = 5.300 PO = 149.964 TO = 1303.100 HT = 318.311 RHOVEL = .305

SECTION (1) I41-QTS DEPENDENT VARIABLE QDOT

Z1/B	.4000	.6000	.8000
X/C			
.175	61.8269		
.200	61.8088		
.225	62.0159		
.250	61.9920	61.6175	
.300	62.1243	61.6275	61.6216
.400	62.1392	61.6720	61.6327
.500	62.1010	61.6809	61.6717
.600	62.0751	61.9138	61.6734
.700	62.0521	61.9314	61.6757
.800	61.9504	61.5362	
.850		61.7248	
.875		61.9294	
.900	62.0443		

RN/L (2) = 4.437 MACH (1) = 5.300 PO = 353.867 TO = 1287.480 HT = 314.301 RHOVEL = .724

SECTION (1) I41-QTS DEPENDENT VARIABLE QDOT

Z1/B	.4000	.6000	.8000
X/C			
.175	93.3362		
.200	93.2154		
.225	93.4848		
.250	93.4537	92.7435	
.300	93.5486	93.2577	92.7625
.400	93.9289	93.3402	92.7638
.500	93.8196	93.3645	92.8752
.600	93.7661	93.4479	92.8923
.700	93.6909	93.6352	92.9192
.800		93.5981	92.8413
.850		92.9866	
.875		93.5098	
.900	93.8467		



J-172 IH15 ORB + ET + SRB (ORBITER WING) (8850436) : 19 A. 74 }

REFERENCE DATA

SREF = 2690.0000 SQ. FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000

RN/L (1) = 1.952 MACH (1) = 5.300 PO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .316

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

ZT/B .4000 .6000 .8000

X/C

.175 59.7117
 .200 59.6993
 .225 59.9297
 .250 59.9117
 .300 60.0038 59.7106 59.5201
 .400 60.0286 59.7452 59.5227
 .500 59.9852 59.7504 59.5712
 .600 59.9534 59.8019 59.5902
 .700 59.9427 59.8149 59.5824
 .800 59.8322 59.5527
 .850 59.6396
 .875 59.8123
 .900 59.9513

RN/L (2) = 4.570 MACH (1) = 5.300 PO = 392.769 TO = 1261.330 HT = 307.800 RHOVEL = .730

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

ZT/B .4000 .6000 .8000

X/C

.175 88.9013
 .200 88.7262
 .225 88.9517
 .250 88.9534
 .300 89.0603 88.7927 88.2445
 .400 89.5650 88.9052 88.2462
 .500 89.4626 88.9390 88.3480
 .600 89.3968 89.0371 88.3877
 .700 89.3309 89.2796 88.4310
 .800 89.2362 88.3493
 .850 88.5123
 .875 89.1305
 .900 89.2625

ARC 3.5-172 IH15 CRB + ET +SRB (SRB)

(888807) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 90.FT, XMRP = .0000 IN.
LREF = 474.8100 IN, YMRP = .0000 IN.
BREF = 936.6820 IN, ZMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
MACH = 5.300 PH1-M = .0000

RN/L (1) = 1.983 MACH (1) = 5.300 PO = 155.638 TO = 1274.720 HT = 311.029 RHOVEL = .320

SECTION (1)/41-OTS DEPENDENT VARIABLE QDOT

PH1 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	60.6735	60.6735	60.6735	60.6735	60.6735
.000					
.002					
.025					
.050					
.100					
.112					
.150					
.200					
.300					
.400	61.4326	61.5625	61.7212	61.8387	61.6031
.500		61.5999	61.7500	61.7294	61.5299
.600			61.7812		
.650		61.6028	61.7385	61.8452	61.5399
.700	61.5440	61.5243	61.6976	61.7512	61.8408
.750		61.5472	61.7739	61.7500	
.800	61.6796	61.5581	61.7206	61.7500	61.8797
.920	61.5734	61.4332	61.4870	61.3236	61.2761
.940			61.3451		61.1989
.996	61.4408	61.3184	61.2253	61.1599	61.0418

RN/L (2) = 4.311 MACH (1) = 5.300 PO = 352.966 TO = 1308.080 HT = 319.591 RHOVEL = .714

SECTION (1)/41-OTS DEPENDENT VARIABLE QDOT

PH1 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	9.9900	9.9900	9.9900	9.9900	9.9900
.000					
.002					
.025					
.050					
.100					
.112					
.150					
.200					
.300					
.400	96.0002	95.5985	95.9958	96.0567	96.1685
.500		95.1544	95.5815	95.5593	95.6514
			95.8908	96.0002	
				96.0567	96.1685
				96.0567	96.1685



(J58517)

ARC 3.5-172 IH15 GRB + E1 +SRB (SRB)

RN/L (2) = 4.1.1 MACH (1) = 5.300

SECTION (1141-OTS DEPENDENT VARIABLE QDOT

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L

.600	95.9089	96.1579	96.3638	96.4421		
.650	96.0025	96.2582				
.700	96.5244	96.0435	95.2047	96.4474	96.5443	
.750	96.1327	96.2520	96.4474			
.800	96.5554	96.0912	96.0954	96.2299	96.1199	95.9791
.820	95.8194	95.2068	94.7754	94.2267	93.8047	93.8541
.850		94.3300	93.7060			
.906	95.2574	94.7930	94.3423	94.3195	94.2499	

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TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

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ARC 3.5-172 IH15 ORB + ET +SRB (SRB)

(888308)

RM/L (2) = 4.713 MACH (1) = 5.330

SECTION (1) 41-OTS DEPENDENT VARIABLE 0007

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L

.600	86.4333	86.6625	86.9007	86.9636
.650	86.5198	86.7363		
.700	86.9772	86.5382	86.6964	86.8717
.750	86.6269	86.7069	86.9209	87.0164
.800	87.0001	86.6445	86.6120	86.8295
.850	86.4553	86.0538	85.7444	85.3909
.900		85.3739	85.1035	85.1907
.950			85.3342	85.3194
.996	85.9439	85.6539		85.3621

ARC 3.5-172 IH15 SRB (SRB)

(088513) (19 A1 74)

REFERENCE DATA

SRFP = 2690.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BRFP = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

RN/L (1) = 1.687 MACH (1) = 5.300 PO = 153.442 TO = 1397.700 HT = 342.751 RHOVEL = .299

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

SECTION (1)41-075 DEPENDENT VARIABLE ROOT

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	71.0610	71.0610	71.0610	71.0610	71.0610
.000					
.002					
.025					
.050					
.100					
.112					
.150					
.200					
.300					
.400					
.500					
.600					
.650					
.700					
.750					
.800					
.920					
.950					
.996					

SECTION (1)41-075 DEPENDENT VARIABLE ROOT

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	83.1436	83.1436	83.1436	83.1436	83.1436
.000					
.002					
.025					
.050					
.100					
.112					
.150					
.200					
.300					
.400					
.500					



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(1BR313)

(SRB)

ARC 3.5-172 I-1.5 SRB

RM/L (2) = 4.634 MACH (1) = 5.300

SECTION (1141-OTS DEPENDENT VARIABLE QDOT

PH1 90.0000155.0000180.0000225.0000270.0000315.0000

X/L	QDOT
.000	87.1413 86.1290 85.3729 85.8755
.050	87.1540 86.2248
.100	88.1519 87.8161 87.1863 86.1935 85.5364
.150	87.7021 87.3153 86.2709
.200	87.9907 87.6581 87.2405 86.3933 85.4913 85.6788
.250	87.5071 87.2540 86.3107 86.0155 85.4470 85.5386
.300	86.7997 85.4887
.350	86.8957 86.9036 86.4870 85.9699 86.0703

ARC 3.5-172 IH15 SR8

(SR8)

(088914) (19 AUG 74)

REFERENCE DATA

XREF = 2690.0000 94.FT. XCRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 DREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .00100

PARAMETRIC DATA

ALPHA = -5.000 SEYA = .000
 MACH = 5.300 PH1-M = .000

RW/L (1) = 2.138 MACH (1) = 5.300 PO = 151.245 TO = 1193.390 HT = 290.290 RHOMEL .323

SECTION (1) 141-OTS

.323

PH1 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	DEPENDENT VARIABLE QDOT
.000	50.8604
.002	50.8614
.025	50.9843
.050	30.8026
.100	50.9507
.112	51.1504
.150	51.6595
.200	51.8259
.300	52.0012
.400	52.3164
.500	52.0453
.600	51.9088
.700	52.0385
.800	51.9660
.900	51.8524
.950	52.1799
.996	51.8722
	51.7472
	51.9247
	51.3353
	51.3407
	52.1344
	51.7748
	51.5909
	51.3407
	52.1332
	51.3029
	51.6334
	52.3400
	52.1734
	51.8174
	52.4964
	52.3161
	51.8574
	51.6201
	51.7844
	.925
	52.3095
	52.1700
	51.0029
	51.6973
	51.5926
	51.6811
	.950
	51.9509
	51.5994
	.996
	52.0617
	52.0607
	51.8870
	51.7838
	51.8585

RW/L (2) = 5.469 MACH (1) = 5.300 PO = 351.853 TO = 1123.620 HT = 272.646 RHOMEL .778

SECTION (1) 141-OTS

.778

PH1 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	DEPENDENT VARIABLE QDOT
.000	67.7553
.002	67.7553
.025	68.0255
.050	67.6446
.100	67.9650
.112	69.4643
.150	69.5351
.200	69.9489
.300	70.3968
.400	71.1376
.500	70.5482
.600	70.1883
.700	70.4119
.800	70.4279
.900	70.0780
.950	71.8731
.996	70.9153
	70.2477
	69.8831
	70.1594
	69.4535



ARC 3.5-172 IH15 SRB

(SRB)

(888314)

RM/L (2) = 9.469 MACH (1) = 5.300

SECTION (1141-013

DEPENDENT VARIABLE GOOD

PHI 90.0000135,0000180,0000225,0000270,0000315,0000360

W/L	70.8907	70.0724	69.5346	70.0173
.600	70.8725	70.1323		
.650	71.648	71.4359	70.9002	70.0965
.70	71.5523	70.9797	70.1646	
.75	71.5576	71.2718	70.9688	70.2275
.800	71.5652	70.8855	70.5741	69.6831
.850		70.48c	69.4702	
.906	70.9726	70.6056	70.2184	69.8831
				69.9364

ARC 3.5-172 IH15 SRB (SRB)

(QB8516) (19 AUG 74)

REFERENCE DATA

ZREF = 2690.0000 50. FT. YMRP = .0000 IN.
 LREF = 475.8100 IN. YMRP = .0000 IN.
 BREF = 936.6420 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = 45.0000 BETA = .0000
 MACH = 5.3000 PHI-M = .000000

RN/L (1) = 5.559 MACH (1) = 5.300 PO = 551.670 TO = 1111.580 HT = 269.615 RHOVEL = .783

SECTION (1141-OTS) DEPENDENT VARIABLE QDOT

PHI 90.0000135.0000180.0000225.0000270.0000315.0000

X/L	66.7859	66.7859	66.7859	66.7859	66.7859
.000					
.002					
.025					
.050					
.100					
.112					
.150					
.200					
.300					
.400					
.500					
.600					
.650					
.700					
.750					
.800					
.920					
.950					
.996					

ARC 3.5-172 IM15 SRB

(SRB)

TERMIN (19 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BRFP = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .00160

PARAMETRIC DATA

ALPHA = 90.0000 BETA = .0000
 MACH = 5.3000 PM1-M = 90.0000

RN/L (1) = 5.872 MACH (1) = 5.300 FO = 353.135 TO = 1076.200 HT = 260.731 RHOVEL = .800

SECTION (1) 41-OTS DEPENDENT VARIABLE GOOD

PM1 90.0000135.0000180.0000225.0000270.0000315.0000

X/L
 .000
 .025
 .050
 .100
 .112
 .150
 .200
 .300
 .400
 .500
 .600
 .650
 .700
 .750
 .800
 .920
 .950
 .996

59.9355
 59.8563
 60.0088
 61.0609
 61.2989
 61.5697
 61.3696
 60.9750
 61.2171
 61.1079
 61.1037
 61.1333
 62.0809
 62.6962
 62.2565
 9.9900

61.0969
 61.4349
 62.2931
 60.8482
 61.2493
 62.3144
 60.8237
 61.0969
 62.2604
 61.1071
 60.8165
 61.1062
 62.4710
 61.0973
 61.1037
 61.4120

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TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

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ARC 3.5-172 IH15 ORBITER

(WINDSHIELD)

(688C01) (19 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 SQ.FT. XMRP = .0000 IN.
LRFP = 474.8100 IN. YMRP = .0000 IN.
BRFP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .00160

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
MACH = 5.3000 PHI-H = .0000

RN/L (1) = 1.764 MACH (1) = 5.300 PO = 151.428 TO = 1348.180 HT = 329.926 RHOVEL = .301

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

Y .0470 .1780 .1960 .2130

X

1.210 67.8706
1.251 67.9387
1.272 67.8425
1.305 67.9331
1.334 67.8208
1.358 67.8715

RN/L (2) = 5.214 MACH (1) = 5.300 PO = 349.474 TO = 1153.370 HT = 280.152 RHOVEL = .762

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

Y .0470 .1780 .1960 .2130

X

1.210 74.9331
1.251 74.9755
1.272 74.7993
1.305 74.9569
1.334 74.7366
1.358 74.8430



ARC 3.5-172 IH15 ORBITER (WINDSHIELD) (S88032) (19 AUG 74)

REFERENCE DATA

XREF = 2690.0000 90.FT. XMRP = .0000 IN.
 YREF = 474.8100 IN. YMRP = .0000 IN.
 ZREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0000

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
 MACH = 5.3000 PHI-M = .0000

RN/L (1) = 2.143 MACH (1) = 5.300 PO = 150.493 TO = 1188.110 HT = 288.949 RHOVEL = .323

SECTION (1) 41-OTS DEPENDENT VARIABLE QDOT

Y .0470 .1780 .1960 .2130

X

1.210 53.0247
 1.251 53.0930
 1.272 53.0069
 1.305 53.0902
 1.334 52.9971
 1.358 53.0411

RN/L (2) = 6.131 MACH (1) = 5.300 FO = 350.041 TO = 1040.890 HT = 251.898 RHOVEL = .808

SECTION (1) 41-OTS DEPENDENT VARIABLE QDOT

Y .0470 .1780 .1960 .2130

X

1.210 59.9222
 1.251 59.9910
 1.272 59.8288
 1.305 59.9811
 1.334 59.7870
 1.358 59.8864

ARC 3.5-172 IH15 CRIB + ET (WINDSHIELD) (080033) (19 AUG 74)

REFERENCE DATA

SREF = 2680.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

RN/L (1) = 4.332 MACH (1) = 5.300 PO = 352.769 TO = 1304.520 HT = 316.677 RHOVEL = .716

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

Y	X	QDOT
1.210	96.2936	
1.231		96.3540
1.272	96.1961	
1.305		96.3434
1.334	96.1392	
1.358		96.2465



ARC 3.5-172 IH15 ORB + ET + SR8 (WINDSHIELD) (886C05) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 94.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

RM/L (1) = 1.845 MACH (1) = 5.300 PO = 149.964 TO = 1303.100 HT = 318.311 RHOVEL = .305
 ALPHA = .000 BETA = .000
 MACH = 5.303 PHI-M = .000

PARAMETRIC DATA

DEPENDENT VARIABLE: QDOT

SECTION (1) 41-OTS

Y	X	QDOT
.0470	.1780	.1960
.2130		
1.210	61.9869	
1.251		62.0170
1.272	61.9584	
1.305		62.0257
1.334	61.9426	
1.358	61.9494	

RM/L (2) = 4.437 MACH (1) = 5.300 PO = 353.867 TO = 1287.480 HT = 314.301 RHOVEL = .724

DEPENDENT VARIABLE: QDOT

SECTION (1) 41-OTS

Y	X	QDOT
.0470	.1780	.1960
.2130		
1.210	93.4254	
1.251		93.5.2.
1.272	93.3332	
1.305		93.5044
1.334	93.3155	
1.358	93.4488	



ARC 3.5-172 IH15 ORB + ET +SRB (WINDSHIELD)

(888CU6) (19 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 96. FT. 1MRP = .0000 IN.
 LREF = 474.8100 IN. 1MRP = .0000 IN.
 BRFP = 936.6820 IN. 2MRP = .0000 IN.
 SCALE = .0080

RN/L (1) = 1.952 MACH (1) = 5.300 PO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .316

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

Y .0470 .1780 .1960 .2130

X
 1.210 59.9765
 1.251 60.0055
 1.272 59.9464
 1.305 60.0095
 1.334 59.9265
 1.358 59.9614

RN/L (2) = 4.570 MACH (1) = 5.300 PO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1) 41-OTS

DEPENDENT VARIABLE QDOT

Y .0470 .1780 .1960 .2130

X
 1.210 66.6664
 1.251 66.7883
 1.272 66.5805
 1.305 66.7905
 1.334 66.5250
 1.358 66.7167

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
 MACH = 5.300 PHI-M = .000

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TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

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ARC 3.5-172 IH15 ORB + ET

(EXTERNAL TANK)

(ORBIT) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 SQ.FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BREF = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .0060

RN/L (1) = 4.332 MACH (1) = 5.300

PO = 352.769 TO = 1304.520 HT =

318.677 RHOVEL = .716

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
MACH = 5.3000 PHI-M = .0000

DEPENDENT VARIABLE QDOT

SECTION (1) 41-OTS

PHI 90.0000 112.5000 135.0000 157.5000

X/L

.450 95.1056 95.3647 95.4724
.550 95.2457 95.5156 95.5438
.650 95.4318 95.5200 95.6193 95.5849
.75 95.5359 95.5827 95.6962 95.5809
.850 95.5990 95.6875 95.6895 95.5725

ARC 3.5-172 IH15 ORB + E7 (EXTERNAL TANK)

(088704) (19 AUG 74)

REFERENCE DATA

SREF = 2990.0000 SQ.FT. XMRP = .0000 IN.
 LREF = 474.8100 IN. YMRP = .0000 IN.
 BREF = 936.6820 IN. ZMRP = .0000 IN.
 SCALE = .0060

PARAMETRIC DATA

ALPHA = .0000 BETA = .0000
 MACH = 5.3000 PHI-M = .0000

RN/L (1) = 4.781 MACH (1) = 5.300 PO = 352.403 TO = 1225.090 HT = 298.350 RHOVEL = .742

SECTION (1141-013

DEPENDENT VARIABLE ROOT

PHI .0000 45.0000 67.9000 87.9000 90.0000 112.5000 135.0000 157.5000 180.0000

R/L	PHI	Y	Z	HT	TO	HT	TO
.000	81.2236						
.010	81.7640						
.020	82.2265						
.040	82.4071						
.060	82.7963						
.080	83.0511						
.100	83.2598						
.150	83.7489						
.200	84.2038						
.300	84.2641						
.350	84.1606						
.375	84.1676						
.400	83.6090	83.564	83.6452	83.5550	83.5498	83.7110	83.8857
.425							
.450							
.475							
.500							
.525							
.550							
.575							
.600	83.3327	83.5877	83.6861	83.6813	83.6055	83.7070	83.9559
.650							
.675							
.700							
.750							
.800	83.3879	83.7759	83.8526	83.8317	83.8007	83.9075	83.9145
.850							
.900							
.935							
.975							



ARC 3.5-172 IH15 ORB - ET +988 (EXTERNAL TANK)

(080715) (19 AUG 74)

REFERENCE DATA

GREY = 2690.0000 98.0FT. XGRP = .0000 IN.
 LREF = 474.8100 IN. YGRP = .0000 IN.
 GREY = 936.6820 IN. ZGRP = .0000 IN.
 SCALF = .0060

RW/L (1) = 1.845 MACH (1) = 5.300 PO = 149.964 TO = 1303.100 HT = 318.311 RHOMEL = .305
 ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

PARAMETRIC DATA

SECTION (1) 141-OTS DEPENDENT VARIABLE GOOD

PHI 90.0000112.9000135.0000157.5000

X/L
 .450 62.3347 62.2063 62.0742
 .550 62.3462 62.2236 62.1021
 .650 62.3696 62.3324 62.2348 62.1295
 .750 62.3869 62.3609 62.3033 62.1824
 .850 62.4771 62.4762 62.3713 62.2414

RW/L (2) = 4.437 MACH (1) = 5.300 PO = 353.867 TO = 1287.480 HT = 514.301 RHOMEL = .724

SECTION (1) 141-OTS DEPENDENT VARIABLE GOOD

PHI 90.0000112.9000135.0000157.5000

X/L
 .450 93.2445 93.0677 92.8012
 .550 93.3813 93.1728 92.8197
 .650 93.4492 93.3919 93.1413 92.8351
 .750 93.4775 93.4060 93.2171 92.8483
 .850 93.5924 93.5464 93.3248 92.9025



ARC 3.5-172 IH15 CR8 + ET +SR8 (EXTERNAL TANK)

(088708) (19 AUG 74)

REFERENCE DATA

BRZF = 2680.0000 98.FT. YMRP = .0000 IN.
LNEY = 474.8100 IN. YMRP = .0000 IN.
BREF = 936.6620 IN. YMRP = .0000 IN.
SCALE = .02160

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
MACH = 5.3000 PHI-M = .0000

RN/L (1) = 1.952 MACH (1) = 5.300 FO = 153.625 TO = 1276.580 HT = 311.506 RHOVEL = .316

SECTION (1) 41-O7S DEPENDENT VARIABLE GOOD

PHI 90.0000112.9000135.0000157.5000

N/L

.490 80.3044 80.2082 80.0966
.590 80.3157 80.2264 80.1213
.690 80.3331 80.3041 80.2273 80.1415
.790 80.3575 80.3259 80.2928 80.2082
.890 80.4469 80.4423 80.3685 80.2696

RN/L (2) = 4.970 MACH (1) = 5.300 FO = 352.769 TO = 1261.330 HT = 307.600 RHOVEL = .730

SECTION (1) 41-O7S DEPENDENT VARIABLE GOOD

PHI 90.0000112.9000135.0000157.5000

N/L

.490 86.3327 86.1253 87.6468
.590 86.4415 86.1362 87.8527
.690 86.4992 86.4118 88.1336 87.8645
.790 96.5252 86.4000 88.1816 87.8632
.890 86.6102 86.5062 88.2488 87.9456



TABULATED DATA LISTING FOR IM15 (ARC 3.5-172)

DATE 08 SEP 74

(QB8JTD7) (19 AUG 74)

ARC 3.5-172 (M15 ORB + ET +SRB (EXTERNAL TANK)

REFERENCE DATA

ORFZ = 2090.0000 SQ.FT. KTRP = .0000 IN.
URFP = 474.6126 IN. YMRP = .0000 IN.
ORFZ = 936.6625 IN. ZMRP = .0000 IN.
SCALE = .0060

PARAMETRIC DATA

ALPHA = .000 BETA = .000
MACH = 5.300 PHI-M = .000

RNVL (1) = 1.983 MAON (1) = 5.300 PO = 155.638 TO = 1274.720 HT = 311.029 RHOVEL = .320

SECTION (1)/41-OTS DEPENDENT VARIABLE @DOT

PHI 67.5000 90.0000 112.5000 135.0000 160.0000

K/L	61.1117	61.6621	61.6367
.005			
.125			
.175			
.250	61.6028		
.275	61.5478	61.6167	
.325	61.6258	61.6040	61.7209
.350	61.7709	61.6935	61.6055
.375		61.6846	
.450		61.7241	
.550		61.6911	
.650	61.7032		
.750	61.7041		

RNVL (2) = 4.311 MAON (1) = 5.300 PO = 352.586 TO = 1343.080 HT = 319.591 RHOVEL = .714

SECTION (1)/41-OTS DEPENDENT VARIABLE @DOT

PHI 67.5000 90.0000 112.5000 135.0000 160.0000

K/L	90.8953	94.0128	94.8962
.005			
.125			
.175			
.250	94.7276		
.275	94.6232	94.6549	
.325	94.6802	95.0187	95.3735
.350	94.8371	94.9758	95.2323
.375		95.2323	95.5393
.450		95.9195	
.550		96.1477	
.650	96.1580		
.750	96.1376		



DATE 08 SEP 74

TABULATED DATA LISTING FOR IH15 (ARC 3.5-172)

(080706) (19 AUG 74)

ARC 3.5-172 IH15 ORB + ET +SR8 (EXTERNAL TANK)

PARAMETRIC DATA

ALPHA = -5.000 BETA = .000
MACH = 5.300 PHI-M = .000

REFERENCE DATA

SPDF = 2000.0000 30.FT. SZC = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BREF = 938.6020 IN. ZMRP = .0000 IN.
SCALE = .0000

PH/L (1) = 2.225 MACH (1) = 5.300 PO = 153.14 TO = 1174.260 HT = 285.439 RMVEL = .331

SECTION (1) 41-073 DEPENDENT VARIABLE ROOT

PHI 87.5000 90.0000 112.5000 135.0000 160.0000

X/L	PHI
.005	50.7217
.125	51.5223
.175	51.6684
.250	51.7070
.275	51.6834 51.7823
.325	51.7716 51.8185 51.8301
.350	51.7803 51.8944 51.8952 51.8655
.375	51.8402
.450	51.9763
.500	51.9650
.650	51.9509
.750	51.9311

PH/L (2) = 4.713 MACH (1) = 5.300 PO = 352.403 TO = 1236.210 HT = 301.186 RMVEL = .736

SECTION (1) 41-073 DEPENDENT VARIABLE ROOT

PHI 87.5000 90.0000 112.5000 135.0000 160.0000

X/L	PHI
.005	82.3302
.125	84.7985
.175	85.4071
.250	85.4403
.275	85.2984 85.5508
.325	85.2768 85.5984 85.6581
.350	85.3378 85.5455 85.7566 85.9198
.375	85.9404
.450	86.2702
.500	86.1794
.650	86.4044
.750	86.4750



(088109)

ARC 3.5-172 IH15 ORB + ET +SRB (EXTERNAL TANK)

RM/L (2) = 4.652 MACH (1) = 5.300 PO = 352.769 TO = 1247.200 HT = 3013.991 RHOVEL = .735

SECTION (1) 41-QTS DEPENDENT VARIABLE ROOT

PHI .0000 45.0000 67.5000 90.0000112.5000135.0000157.5000180.0000

X/L	84.8366	85.1799	85.6562	85.8179	86.2107	86.4496	86.6945	87.1238	87.5146	87.5540	87.5904	87.4676	87.4602	87.2455	87.2070	87.1931	87.1833	87.0936	87.1523	87.1334	87.1037	87.0254	37.0954	87.1597	87.0118	86.9703	87.1046	87.2013	87.1991	87.6927	
.000																															
.010																															
.020																															
.040																															
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.750																															
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.850																															
.900																															
.935																															
.975																															



ARC 3.5-172 IM15 ORB + ET +SFB (EXTERNAL TANK)

(088T10) (19 AUG 74)

REFERENCE DATA

SRFP = 2690.0000 50.FT. XMRP = .0000 IN.
LREF = 474.8100 IN. YMRP = .0000 IN.
BRFP = 936.6820 IN. ZMRP = .0000 IN.
SCALE = .00760

PARAMETRIC DATA

ALPHA = -5.0000 BETA = .0000
MACH = 5.300 PHI-M = .0000

RN/L (1) = 2.009 MACH (1) = 5.300 PO = 156.004 TO = 1265.870 HT = 308.762 RHOVEL = .322

SECTION (1141-OTS) DEPENDENT VARIABLE 000T

K/L	PHI	0000	45	00000	67	5000	90	00000112	50000135	00000157	5000180	00000
.000												58.5901
.010												58.7879
.020												58.9434
.040												58.9849
.060												59.1310
.080												59.2054
.100												59.2926
.150												59.4276
.200												59.5672
.300												59.4853
.350												59.4285
.375												59.4186
.400												59.3977
.425												59.2975
.450												59.2842
.475												59.2434
.500												59.2496
.525												59.1969
.550												59.2071
.575												59.2059
.600												59.1946
.650												59.1394
.675												59.1597
.700												59.2106
.750												59.1647
.800												59.1836
.900												59.2778
.935												59.2911
.975												59.4736



(0887110)

ARC 3.5-172 IH:5 ORB + ET +SRB (EXTERNAL TANK)

RH/L (2) = 4.771 MACH (1) = 5.300 PO = 352.036 TO = 1225.870 HT = 298.551 RHOVEL = .741

SECTION (1) 41-OTS DEPENDENT VARIABLE QDOT

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

X/L	9.9900	78.9753	79.3863	79.5291	79.9124	80.1802	80.4928	81.0867	81.7088	81.9380	81.8546	81.8529	81.6907	81.6553	81.6053	81.5966	81.5578	81.5889	81.5880	81.5300	81.4621	81.5328	81.5708	81.4044	81.3846	81.5182	81.5358	81.4199	81.6997
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.010																													
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.850																													
.900																													
.955																													
.975																													



ARC 3.5-172 IH15 ET (EXTERNAL TANK) (19 AUG 74)

REFERENCE DATA

SREF = 2690.0000 50. FT. XREF = .0000 IN.
 LREF = 474.8730 IN. YREF = .0000 IN.
 BREF = 936.6020 IN. ZREF = .0000 IN.
 SCALE = .0000

RN/L (I) = 1.982 MACH (I) = 5.300 PO = 154.357 TO = 1268.500 HT = 309.436 RHOVEL = .318

PARAMETRIC DATA

ALPHA = .000 BETA = .000
 MACH = 5.300 PHI-M = .000

SECTION (1141-07)

DEPENDENT VARIABLE QDOT

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

X/L	60.2413	61.4435	60.6054	60.6522	60.7818	60.8307	60.8799	60.9922	61.1116	61.0776	61.0746	61.1057	61.0905	61.0746	61.0746	61.0746	61.0746	61.0746	60.9990	61.0183	61.0770	61.0746	61.1630	61.1651	61.0779	61.2320	
.000																											
.010																											
.020																											
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.935																											
.975																											



ARC 3.5-172 IH15 ET (EXTERNAL TANK) (QB8T11)

RM/L (2) = 4.674 MACH (1) = 5.300 PO = 350.369 TO = 1238.190 HT = 301.691 RHOVEL = .735

SECTION (1) 41-OTS DEPENDENT VARIABLE QDOT

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

X/L	9.9900	9.9900	126.7290	80.4019	80.9657	81.4979	82.1238	83.5045	84.9146	86.1500	86.1968	86.2405	86.1635	86.1430	86.1129	86.1094	86.1229	86.1094	86.1931	86.1343	86.0570	86.1094	86.6461	85.1164	85.6683	
.000																										
.010																										
.020																										
.040																										
.060																										
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.900																										
.935																										
.975																										



ARC 3.5-172 IH15 ET (EXTERNAL TANK) PARAMETRIC DATA

REF = 2600.0000 36. FT. XMRP = .0000 IN. ALPHA = -5.0000 BETA = .0000
 UREF = 474.8100 IN. YMRP = .0000 IN. MACH = 5.3000 PHI-M = .0000
 DREF = 936.6620 IN. ZMRP = .0000 IN.
 SCALE = .0060

RN/L (1) = 2.021 MACH (1) = 5.300 PO = 151.611 TO = 1238.660 HT = 301.610 RHOVEL = .317

SECTION (3) 141-OTS DEPENDENT VARIABLE GOOD

PHI	.0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000	
.000	55.9160	
.010	56.1151	
.020	56.3006	
.040	56.3789	
.060	56.5636	
.080	56.7035	
.100	9.9900	
.150	57.1760	
.200	57.5009	
.300	57.7211	
.350	57.7228	
.375	57.7518	
.400	57.4751 57.3116 57.2770 57.2602 57.3194 57.4220 57.5492 57.7399	
.425	57.7049	
.450	57.6944	
.475	57.6750	
.500	57.3001 57.3131 57.2602 57.3102 57.4110 57.5795 57.6791	
.525	57.6548	
.550	57.6678	
.575	57.6526	
.600	57.3289 57.2810 57.2808 57.2602 57.2839 57.4191 57.5347 57.6365	
.650	57.5914	
.675	57.6128	
.700	57.2677 57.2758 57.3035 57.3731 57.4601 57.4971 57.6417	
.750	57.5981	
.800	57.4772 57.3362 57.3090 57.2862 57.3168 57.3919 57.4717 57.5876	
.850	57.6976	
.900	57.3185 57.3442 57.3515 57.4046 57.5032 57.5798 57.6649	
.935	57.5463	
.975	57.6258	

(080712)

(EXTERNAL TANK)

REMOVE = .767

= 279.260

HT = 1149.840

TO = 351.304

PO = 5.300

MACH (1) =

5.266

SECTION (1141-073 DEPENDENT VARIABLE 0007

PHI .0000 45.0000 67.5000 90.0000 112.5000 135.0000 157.5000 180.0000

M/L	PHI	70.7200	71.1230	71.5262	71.9294	72.3326	72.7358	73.1390	73.5422	73.9454	74.3486	74.7518	75.1550	75.5582	75.9614	76.3646	76.7678	77.1710	77.5742	77.9774	78.3806	78.7838	79.1870	79.5902	79.9934	80.3966	80.7998	81.2030	81.6062	82.0094	82.4126	82.8158	83.2190	83.6222	84.0254	84.4286	84.8318	85.2350	85.6382	86.0414	86.4446	86.8478	87.2510	87.6542	88.0574	88.4606	88.8638	89.2670	89.6702	90.0734	90.4766	90.8798	91.2830	91.6862	92.0894	92.4926	92.8958	93.2990	93.7022	94.1054	94.5086	94.9118	95.3150	95.7182	96.1214	96.5246	96.9278	97.3310	97.7342	98.1374	98.5406	98.9438	99.3470	99.7502	100.1534	100.5566	100.9598	101.3630	101.7662	102.1694	102.5726	102.9758	103.3790	103.7822	104.1854	104.5886	104.9918	105.3950	105.7982	106.2014	106.6046	107.0078	107.4110	107.8142	108.2174	108.6206	109.0238	109.4270	109.8302	110.2334	110.6366	111.0398	111.4430	111.8462	112.2494	112.6526	113.0558	113.4590	113.8622	114.2654	114.6686	115.0718	115.4750	115.8782	116.2814	116.6846	117.0878	117.4910	117.8942	118.2974	118.7006	119.1038	119.5070	119.9102	120.3134	120.7166	121.1198	121.5230	121.9262	122.3294	122.7326	123.1358	123.5390	123.9422	124.3454	124.7486	125.1518	125.5550	125.9582	126.3614	126.7646	127.1678	127.5710	127.9742	128.3774	128.7806	129.1838	129.5870	129.9902	130.3934	130.7966	131.1998	131.6030	132.0062	132.4094	132.8126	133.2158	133.6190	134.0222	134.4254	134.8286	135.2318	135.6350	136.0382	136.4414	136.8446	137.2478	137.6510	138.0542	138.4574	138.8606	139.2638	139.6670	140.0702	140.4734	140.8766	141.2798	141.6830	142.0862	142.4894	142.8926	143.2958	143.6990	144.1022	144.5054	144.9086	145.3118	145.7150	146.1182	146.5214	146.9246	147.3278	147.7310	148.1342	148.5374	148.9406	149.3438	149.7470	150.1502	150.5534	150.9566	151.3598	151.7630	152.1662	152.5694	152.9726	153.3758	153.7790	154.1822	154.5854	154.9886	155.3918	155.7950	156.1982	156.6014	157.0046	157.4078	157.8110	158.2142	158.6174	159.0206	159.4238	159.8270	160.2302	160.6334	161.0366	161.4398	161.8430	162.2462	162.6494	163.0526	163.4558	163.8590	164.2622	164.6654	165.0686	165.4718	165.8750	166.2782	166.6814	167.0846	167.4878	167.8910	168.2942	168.6974	169.1006	169.5038	169.9070	170.3102	170.7134	171.1166	171.5198	171.9230	172.3262	172.7294	173.1326	173.5358	173.9390	174.3422	174.7454	175.1486	175.5518	175.9550	176.3582	176.7614	177.1646	177.5678	177.9710	178.3742	178.7774	179.1806	179.5838	179.9870	180.3902	180.7934	181.1966	181.5998	182.0030	182.4062	182.8094	183.2126	183.6158	184.0190	184.4222	184.8254	185.2286	185.6318	186.0350	186.4382	186.8414	187.2446	187.6478	188.0510	188.4542	188.8574	189.2606	189.6638	190.0670	190.4702	190.8734	191.2766	191.6798	192.0830	192.4862	192.8894	193.2926	193.6958	194.0990	194.5022	194.9054	195.3086	195.7118	196.1150	196.5182	196.9214	197.3246	197.7278	198.1310	198.5342	198.9374	199.3406	199.7438	200.1470	200.5502	200.9534	201.3566	201.7598	202.1630	202.5662	202.9694	203.3726	203.7758	204.1790	204.5822	204.9854	205.3886	205.7918	206.1950	206.5982	207.0014	207.4046	207.8078	208.2110	208.6142	209.0174	209.4206	209.8238	210.2270	210.6302	211.0334	211.4366	211.8398	212.2430	212.6462	213.0494	213.4526	213.8558	214.2590	214.6622	215.0654	215.4686	215.8718	216.2750	216.6782	217.0814	217.4846	217.8878	218.2910	218.6942	219.0974	219.5006	219.9038	220.3070	220.7102	221.1134	221.5166	221.9198	222.3230	222.7262	223.1294	223.5326	223.9358	224.3390	224.7422	225.1454	225.5486	225.9518	226.3550	226.7582	227.1614	227.5646	227.9678	228.3710	228.7742	229.1774	229.5806	229.9838	230.3870	230.7902	231.1934	231.5966	232.0000
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