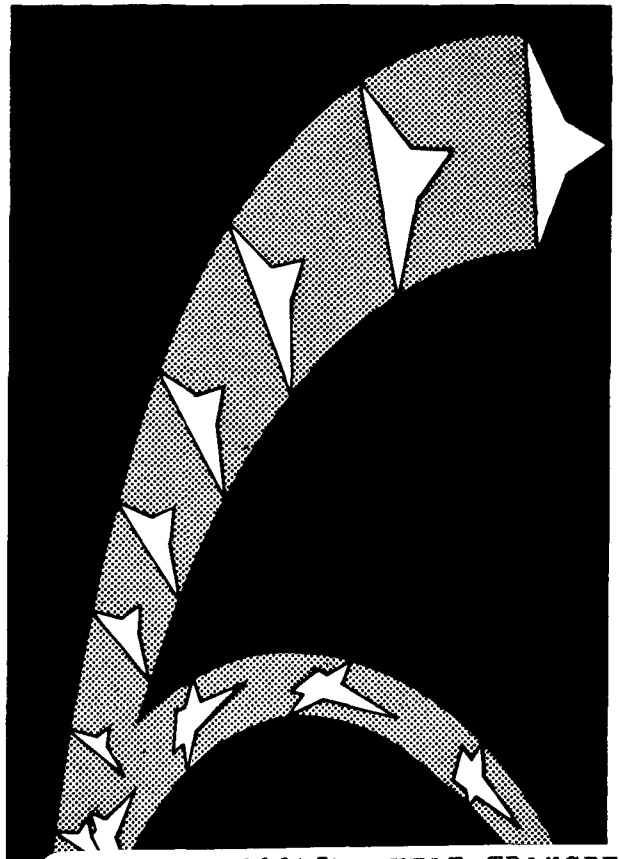
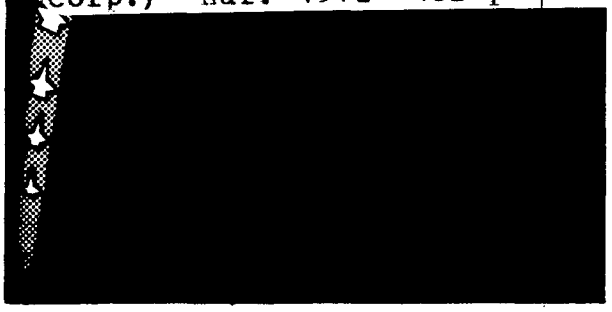
DMS-DR-1224
CR-120,045
VOLUME II
MARCH 1972





SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION CHRYSLER CORPORATION

—SPACE SHUTTLE—

HEAT TRANSFER INVESTIGATION OF LANGLEY RESEARCH CENTER TRANSITION MODELS AT A MACH NUMBER OF 8

by

R.K. Matthews, ARO, Inc.
W.R. Martindale, ARO, Inc.
J. Warmbrod, MSFC
C.B. Johnson, LaRC

VKF 50-INCH
HYPERSONIC TUNNEL B

Arnold Engineering
Development Center

This document should be referenced as NASA CR-120,045

CAT-3/

NASA Series Number: H-1031

DMS-DR-1224
CR-120,045
VOLUME II
March, 1972

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION: Langley Research Center Transition Models

TEST PURPOSE: To Determine the Heat Transfer Rate Distributions at a Mach Number of 8.

TEST FACILITY: AEDC VKF 50-Inch Hypersonic Tunnel B

TESTING AGENCY: AEDC-MSFC

TEST NO. & DATE: VT 1162-5 June and September 1972

FACILITY COORDINATOR: L. L. Trimmer, ARO, INC.

PROJECT ENGINEER(S): R. K. Matthews, W. R. Martindale, ARO, INC.
J. D. Warmbrod, MSFC, and C. B. Johnson, LaRC

DATA MANAGEMENT SERVICES

LIAISON: John E. Vaughn
J. E. Vaughn

DATA OPERATIONS: J. R. Ziler
J. R. Ziler
Aero-Thermo Data Group

RELEASE APPROVAL: J. L. Glynn
FOR N. D. Kemp, Supervisor
Aero Thermo Data Group

CONTRACT NAS 8-4016. AMENDMENT 153 DRL 184 - 58

FACILITY COORDINATOR:

Mr. L. L. Trimmer
Aerodynamics Projects Branch
von Karman Gas Dynamics Facility
ARO, Inc.
Arnold Air Force Station, Tennessee 37389

Phone: (615) 455-2611, Ext. 7377

PROJECT ENGINEERS:

Mr. R. H. Eaves
Aerodynamics Projects Branch
von Karman Gas Dynamics Facility
ARO, Inc.
Arnold Air Force Station, Tennessee 37389

Phone: (615) 455-2611, Ext. 7103

Mr. T. D. Buchanan
Aerodynamics Projects Branch
von Karman Gas Dynamics Facility
ARO, Inc.
Arnold Air Force Station, Tennessee 37389

Phone: (615) 455-2611, Ext. 7128

Mr. J. D. Warmbrod
S&E - AERO - AF
Building 4610
NASA-MSFC
Huntsville, Alabama 35812

Phone: (205) 453-0170

Mr. Charles B. Johnson
Entry Vehicles Configuration Section
Mail Stop 161
NASA-Langley Research Center
Hampton, Virginia 23365

Phone: (703) 827-2228

SADSAC LIAISON:

Mr. John E. Vaughn
Chrysler Corp. - Huntsville Division
102 Wynn Drive, Department 4820
Huntsville, Alabama 35805

Phone: (205) 895-1560

SADSAC OPERATIONS:

Mr. J. R. Ziler
Chrysler Corp. Space Division
P. O. Box 29200, Department 2780
New Orleans, Louisiana 70129

Phone: (504) 255-2304

FOREWORD

The work reported herein was sponsored by the Marshall Space Flight Center (MSFC), NASA. The results of tests presented were obtained by ARO, Inc. (a subsidiary of Sverdrup and Parcel and Associates, Inc.), contract operator of the Arnold Engineering Development Center (AEDC), AFSC, Arnold Air Force Station, Tennessee. Ascent and reentry conditions were simulated on shuttle models designed by McDonnell Douglas (MDAC), North American Rockwell (NAR) and General Dynamics Convair (GDC). In addition a limited amount of data were obtained on two research models provided by the Langley Research Center (LRC). Because of the broad scope of these tests the data will be presented in a series of SADSAC reports. This report presents the results of the phase-change paint test conducted at Mach 8 in Tunnel B on the Langley Research Center models.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

NOMENCLATURE

ALPHA-MODEL (α)	Model angle of attack, deg
ALPHA-PREBEND	Sting prebend angle, deg
ALPHA-SECTOR	Tunnel sector pitch angle, deg
H(TO) or H	Heat-transfer coefficient based on $T_{aw} = T_o$, BTU/ft^2 - sec - °R, and

$$H(TO) = \frac{\beta\sqrt{\rho ck}}{\sqrt{\Delta t}}$$

where β is obtained from

$$\frac{T_{pc} - T_i}{T_{aw} - T_i} = 1 - e^{\beta^2}\ \text{erfc}\beta$$

and $\Delta t \sim$ del time

$T_{pc} \sim$ phase-change paint temperature, °R

$T_i \sim$ initial model temperature, °R

$T_{aw} \sim$ adiabatic wall temperature, °R

$\sqrt{\rho ck} \sim$ model material properties = $0.11-0.008\sqrt{(\Delta t)}$ or 0.037 $BTU/ft^2\text{-}sec^{1/2}$ - °R

H(.9TO)	Heat transfer coefficient based on $T_{aw} = 0.9T_o$
H(.85TO)	Heat transfer coefficient based on $T_{aw} = .85T_o$
HREF	Reference heat transfer coefficient based on Fay-Riddell theory, BTU/ft^2-sec °R

$$HREF = \left[\frac{8.139(P01)^{0.5}\ (MU\text{-}0)^{0.4}\ (1\text{-}P\text{-}INF/P01)^{0.25}}{(R)^{0.5}\ (T0)^{0.15}}\right] X$$

$$[0.2235 + 0.0000135\ (T_o + 760)]$$

where P01 $\sim$ stagnation pressure downstream of a normal shock, psia

MU-0 $\sim$ air viscosity based on T_o, lb_f sec/ft^2

R $\sim$ reference nose radius, (0.056 ft)

L	Model length (24.0 in.)
MU-INF	Free-stream viscosity, lb-sec/ft^2
P-INF	Free-stream static pressure, psia
PO	Tunnel stilling chamber pressure, psia
Q-INF	Free-stream dynamic pressure, psia
RE/FT	Free-stream unit Reynolds number, ft^{-1}
RHO-INF	Free-stream density, slugs/ft^3
ROLL-MODEL	Model roll angle, deg
ST(TO)	Stanton number based on T_o, $ST(TO) = \frac{H(TO)}{\rho_\infty V_\infty [0.2235+0.0000135 (T_o+T_{pc})]x(32.17)}$
STREF	Reference Stanton number $STREF = \frac{HREF}{\rho_\infty V_\infty [0.2235+0.0000135 (T_o+T_{pc})]x(32.17)}$
T-INF	Free-stream static temperature, °R
TO	Tunnel stilling chamber temperature, °R
TW	Model wall temperature, °R
TIME	Time from start of model injection, sec
DEL-TIME (Δt)	Time model exposed to airstream, sec
V-INF (V_∞)	Free-stream velocity, ft/sec
YAW	Model yaw angle, deg
X,Y,Z	Model coordinates (see Fig. 1), in.
YMAX	Local semi-span at a given model station, in.

SECTION 1

INTRODUCTION

This report presents the results of a wind tunnel test program to determine aerodynamic heat transfer distributions on the Langley Research Center transition models. The tests were conducted at the Arnold Engineering Development Center (AEDC) in Tunnel B of the von Karman Gas Dynamics Facility (VKF). The test period was in June and September 1971.

Heat-transfer rates were determined by the phase-change paint technique on Stycast® and RTV models using Tempilaq® as the surface temperature indicator. The nominal test conditions were: Mach 8, length Reynolds numbers of 5.0×10^6 and 7.4×10^6, and angles of attack of 20, 40, and 60 deg.

Model details, test conditions, and reduced heat-transfer data are presented in this report. Data reduction of the phase-change paint photographs was performed by VKF personnel utilizing a new technique which is described in the data presentation section.

SECTION 2

MODELS AND APPARATUS

2.1 MODEL DESCRIPTION

Drawings and photographs of the models are presented in Figures 1 and 2 respectively. The models were provided by the Langley Research Center and were fabricated with a 1/4-in. layer of Stycast over a fiberglass mandrel. During the June entry the Stycast cracked on the windward surface of the delta body and as a result the Stycast layer was removed and replaced with RTV prior to the September entry.

2.2 FACILITY DESCRIPTION

Tunnel B is a continuous, closed-circuit, variable density wind tunnel with an axisymmetric contoured nozzle and a 50-in.-diam test section. The tunnel can be operated at a nominal Mach number of 6 or 8 at stagnation pressures from 20 to 300 and 50 and 900 psia, respectively, at stagnation temperatures up to 1350°R. The model may be injected into the tunnel for a test run and then retracted for model cooling or model changes without interrupting the tunnel flow.

SECTION 3

PROCEDURES

3.1 TEST TECHNIQUE

Prior to each run the model was cleaned and cooled with alcohol and then spray painted with Tempilaq. The models were installed on the model injection mechanism at the desired test attitude and the model temperature was measured with a thermocouple probe or with model-embedded thermocouples. During the course of the test many of the embedded thermocouples became inoperative and the probe temperature was generally used to determine the model initial temperature. The model was then injected into the airstream for approximately 15 seconds and during this time the model surface temperature rise produced isotherm melt lines. The progression of the melt lines was photographed with 70-mm sequenced cameras operating at two frames per second.

3.2 TEST CONDITIONS

Nominal test conditions are presented in the data summary sheets (Table 1). The specific test conditions for each run (or group) are provided on the data tabulation sheets preceding each set of melt line tracings. As mentioned in the foreword this test was part of a comprehensive Space Shuttle investigation and as a result the run numbers are not consecutive.

3.3 DATA REDUCTION

During each run the tunnel conditions and time of each picture were recorded on magnetic tape. The heat transfer coefficient for each

picture was calculated from the semi-infinite slab transient heat conduction equation.

$$\frac{T_{pc} - T_i}{T_{aw} - T_i} = 1 - e^{\beta^2} \operatorname{erfc} \beta$$

where $\beta = \frac{h\sqrt{\Delta t}}{\sqrt{\rho ck}}$, and $\sqrt{\rho ck} = 0.11\text{-}0.008\sqrt{\Delta t}$ for Stycast, $\sqrt{\rho ck} = 0.037$ for RTV.

The equation for the thermal properties ($\sqrt{\rho ck}$) of Stycast was obtained by evaluation of a considerable amount of hemisphere calibration data and supplemented by VKF laboratory measurements. The value of $\sqrt{\rho ck}$ for RTV was obtained from Langley personnel.

Heat-transfer coefficients were calculated from assumed adiabatic wall temperatures of T_o, $0.9T_o$, and $0.85T_o$ (see tabulated data sheets). The use of three values of T_{aw} provides an indication of the sensitivity of the heat-transfer coefficient (h) to the values of T_{aw} assumed. For the sake of consistency all plots and melt lines in this report are based on $T_{aw} = T_o$.

All heat-transfer coefficients were non-dimensionalized by dividing by the stagnation point heat-transfer coefficient (Ref. 1) on a 0.056-ft radius sphere.

SECTION 4

DATA PRESENTATION

The test results are presented as individual melt contours in body coordinates grouped as follows:

Model	Re/ft	α, deg
LRC-DB Bottom Surface	2.5×10^6	20,40,60
" " "	3.7×10^6	20,40,60
LRC-SB Bottom Surface	2.5×10^6	20,40,60
" " "	3.7×10^6	20,40,60

Preceding each set of melt contours is a tabulated data sheet which lists the specific test conditions and the time of each picture with the corresponding heat-transfer parameters. Following each set of surface contour plots are axial and spanwise data plots.

These figures were machine generated utilizing a data reduction technique recently developed at the VKF. This technique has simplified the tedious film reading task and provided body coordinates of melt line contours on magnetic tape.

The 70-mm film was projected onto an 8 x 10-in. glass plate and an experienced engineer traced the melt line contours. In regions of relatively constant heating a distinct melt line is extremely difficult to define and in some cases the melt line tracings were terminated because of poor definition. Of course, the melt line tracings are in picture plane coordinates, whereas body coordinates are desired. The transformation to body coordinates was accomplished as follows:

1) The model coordinates were measured at many model stations with a modified Sheffield Cordax coordinate measuring machine (Model 200),
2) the camera location relative to the model was determined,
3) using the principles of photogrammetry and the information obtained in steps 1 and 2, the model coordinates were transformed into the film plane,

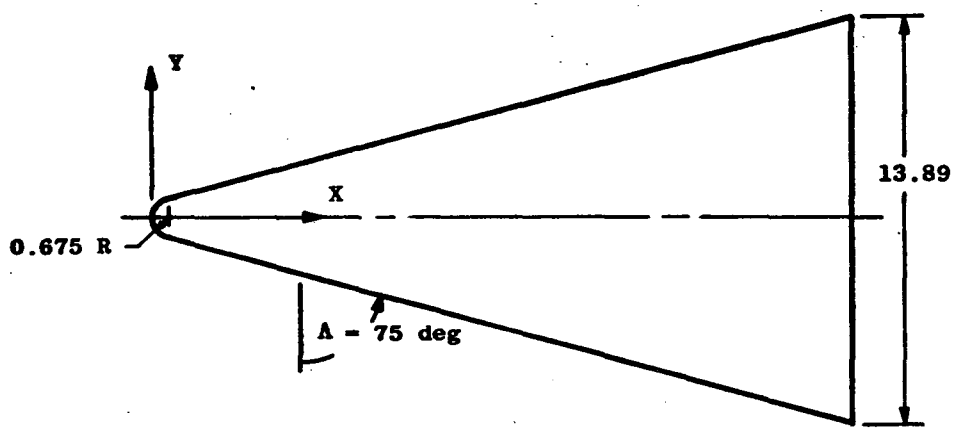
4) the body coordinates of a given melt line were then obtained by interpolation in the film plane, with the results being stored on magnetic tape.

The level of the heat-transfer coefficient associated with each melt line was obtained by the procedure outlined in Section 3.3.

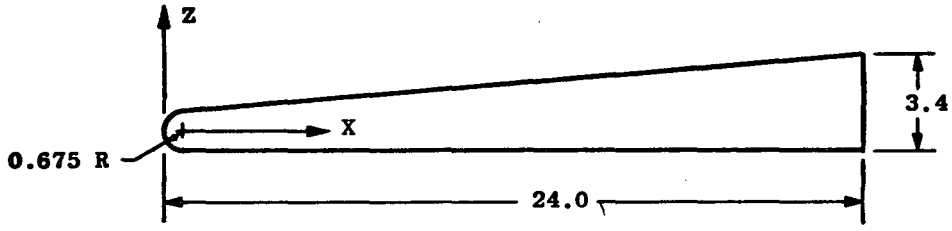
Table 2, Page 13, presents a summary of the plotted data.

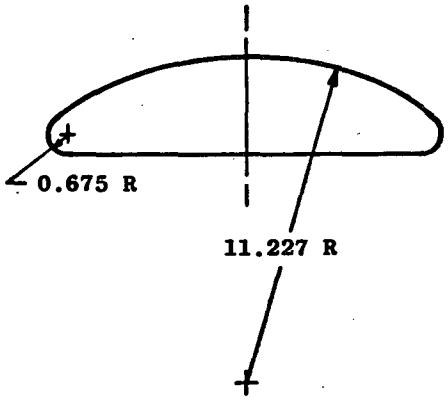
REFERENCES

1. Fay, J. A. and Riddell, F. R. "Theory of Stagnation Point Heat Transfer in Dissociated Air." Journal of the Aeronautical Sciences, Vol. 25, 1958, pp. 73-85.



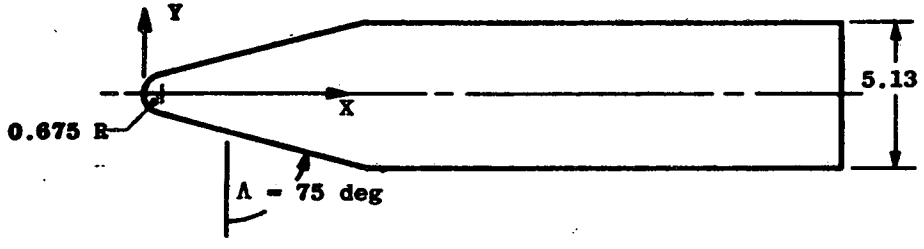
All Dimensions in Inches



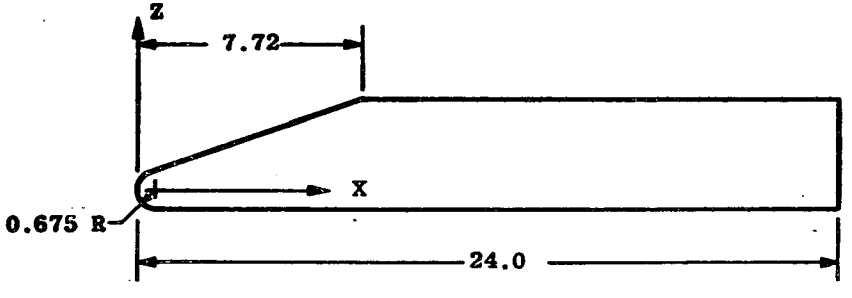


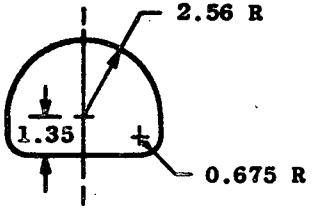
a. Configuration 11, Delta Body (LRC-DB)

Fig. 1 Sketches of the Langley Research Center Transition Models

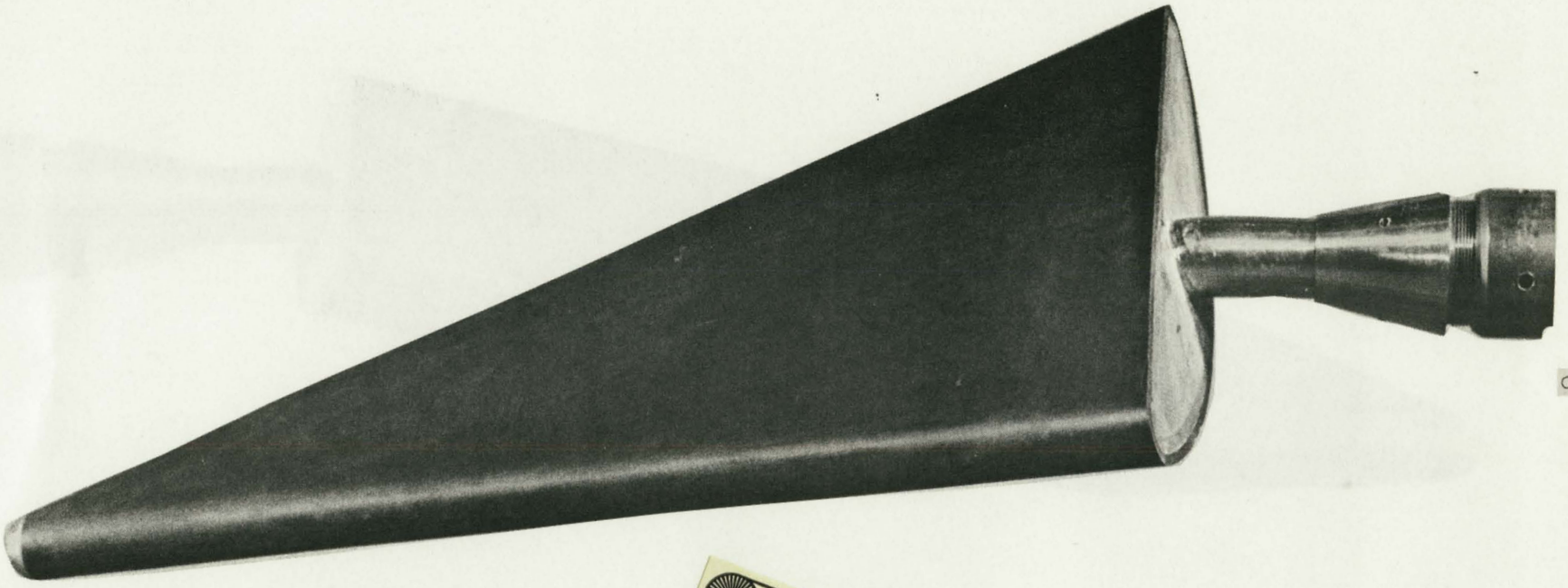


All Dimensions in Inches



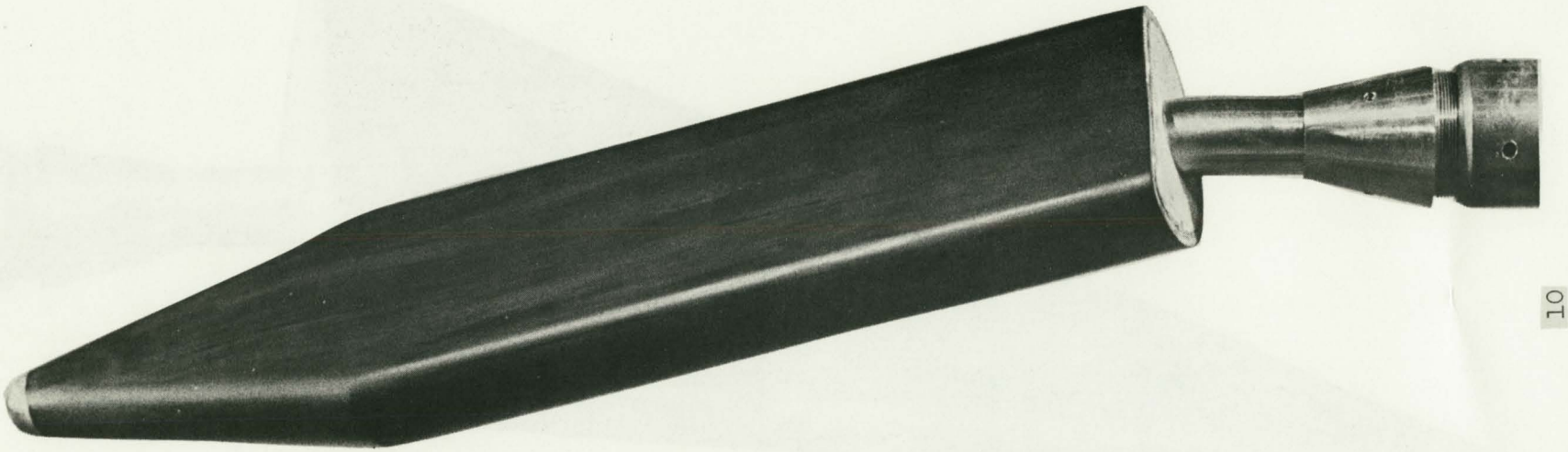


b. Configuration 12, Straight Body (LRC-SB)
Fig. 1 Concluded



a. Configuration 11, Delta Body (LRC-DB)

Fig. 2 Photographs of the Langley Research Center Transition Models



b. Configuration 12, Straight Body (LRC-SB)

Fig. 2 Concluded

Table 1

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Phase-Change Coating Test on Langley Transition Models

TEST NUMBER: VT1162-5 **TEST FACILITY:** VKF Tunnel B

TEST DATE: June and Sept. 1971 **TEST ENGINEER:** R. K. Matthews

Run No.	Model Configuration Identification	Model Length in.	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	T_{aw} * / T_{total}	RNX10^6 / Ft	Phase Change Temp. (°F)	Model Position (degrees) α	β	Φ	Model Surface
147	LRC-DB (Conf. 11)	24.0	8.0	555	1310	1.0	2.5	113	20	0	180	Bottom
129	↓	↓	↓	↓	↓	↓	↓	200	40	↓	↓	↓
354	↓	↓	↓	↓	↓	↓	↓	350	40	↓	↓	↓
360	↓	↓	↓	↓	↓	↓	↓	350	60	↓	↓	↓
149	↓	↓	↓	860	1345	↓	3.7	200	20	↓	↓	↓
163	↓	↓	↓	↓	↓	↓	↓	163	20	↓	↓	↓
171	↓	↓	↓	↓	↓	↓	↓	200	40	↓	↓	↓
348	↓	↓	↓	↓	↓	↓	↓	400	40	↓	↓	↓
350	↓	↓	↓	↓	↓	↓	↓	400	60	↓	↓	↓
143	LRC-SB (Conf. 12)	↓	↓	555	1310	↓	2.5	125	20	0	180	↓
358	↓	↓	↓	↓	↓	↓	↓	250	40	↓	↓	↓
136	↓	↓	↓	↓	↓	↓	↓	200	60	↓	↓	↓

* T_{aw} = adiabatic wall temperature

Table 1 - Concluded

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Phase-Change Coating Test on Langley Transition Models

TEST NUMBER: VT1162-5 **TEST FACILITY:** VKF Tunnel B

TEST DATE: June and Sept. 1971 **TEST ENGINEER:** R. K. Matthews

Run No.	Model Configuration Identification	Model Length in.	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (^{o}R)	$\frac{T_{aw}*}{T_{total}}$	$\frac{RNX10^{6}}{Ft}$	Phase Change Temp. (^{o}F)	Model Position (degrees)			Model Surface
									α	β	ϕ	
164	LRC-SB (Conf. 12)	24.0	8.0	860	1345	1.0	3.7	163	20	0	180	Bottom
173	↓	↓	↓	↓	↓	↓	↓	250	40	↓	↓	↓
349	↓	↓	↓	↓	↓	↓	↓	300	40	↓	↓	↓
351	↓	↓	↓	↓	↓	↓	↓	300	40	↓	↓	↓
178	↓	↓	↓	↓	↓	↓	↓	300	60	↓	↓	↓

* T_{aw} = adiabatic wall temperature

TABLE 2
SUMMARY DATA PLOT INDEX

MODEL CONFIGURATION	MODEL SURFACE	PAGES	Re/FT 10^6		ANGLE OF ATTACK - DEGREES		
			2.5	3.7	20	40	60
LRC-DB(CONF.11)	Bottom	15 - 17	X		X		
		19 - 23	X			X	
		25 - 32	X			X	
		33 - 41	X				X
		43 - 45		X	X		
		47 - 51		X	X		
		53 - 55		X		X	
		57 - 65		X		X	
LRC-DB(CONF.11)	Bottom	67 - 74		X			X
LRC-SB(CONF.12)	Bottom	76 - 80	X		X		
		82 - 88	X			X	
		90 - 95	X				X
		97 - 100		X	X		
		102 - 106		X		X	
		108 - 113		X		X	
		115 - 120		X		X	
LRC-SB(CONF.12)	Bottom	122 - 126		X			X

6/ 1/71

AEDC(AHO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
147	11	LRC-DH	8.00	554.1	1305	20.00	3.00	-23.00	180.00	.0

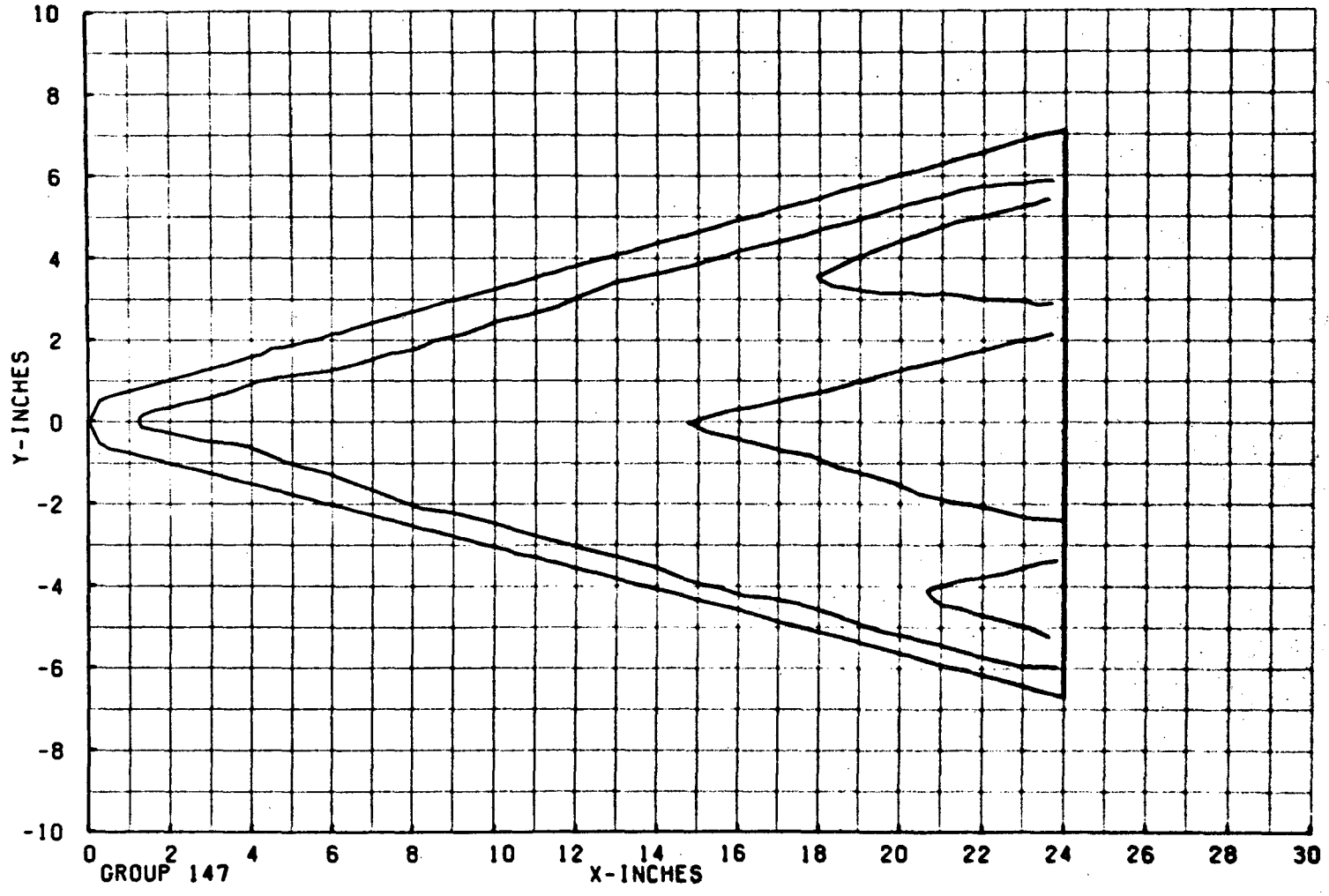
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
94.5	.057	2.543	3812	5.037E-05	7.012E-08	2.52E 06	2.209E-02	1.433E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	113		
SIDE(S)	113	AVERAGE Tw = 77	-0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	113		

	PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F		
T	2553 (113)	4.20	3.16	2.32E-03	.1049	2.813E-03	.1273	3.149E-03	.1425	1.507E-03	0	77	78	0
T	2556 (113)	5.80	4.76	1.82E-03	.0826	2.214E-03	.1002	2.479E-03	.1122	1.187E-03	0	79	78	0

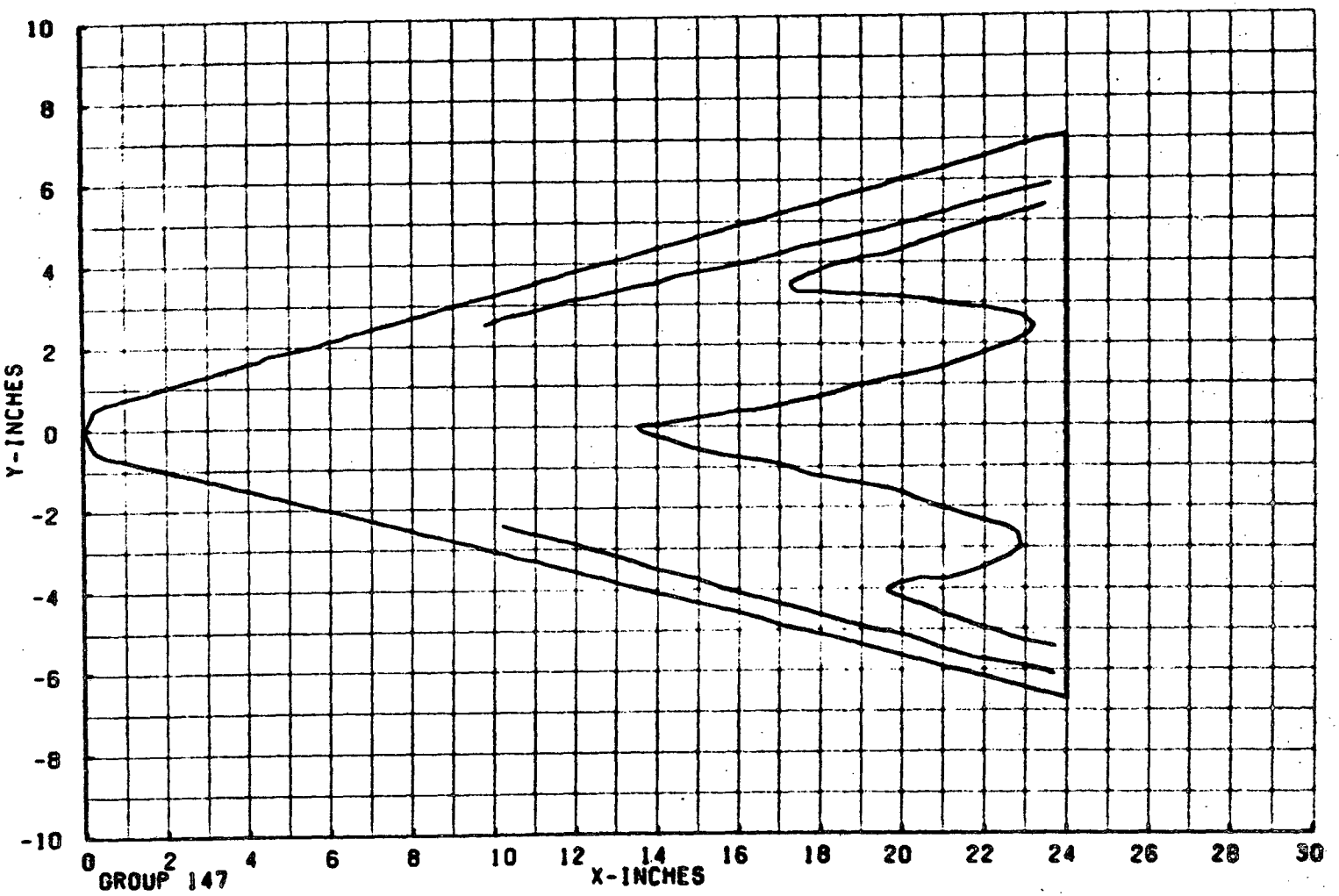
GROUP 147 PIC. NO. 2553 H/HREF 1.049E-01 MODEL SURFACE - BOTTOM

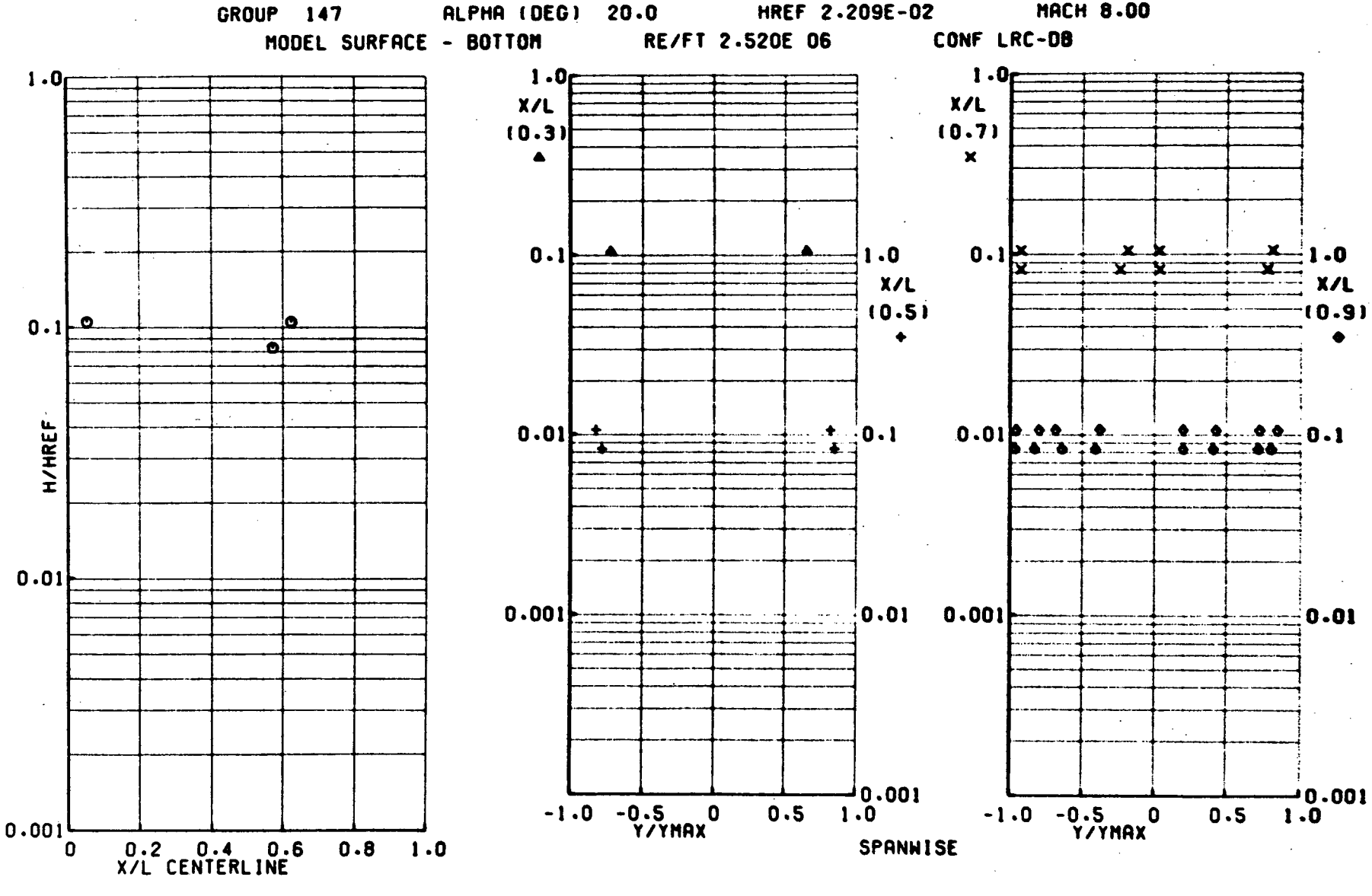
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.209E-02 RE/FT 2.520E 06 CONF LRC-08



GROUP 147 PIC. NO. 2556 H/HREF 8.260E-02 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.209E-02 RE/FT 2.520E 06 CONF LRC-08




GROUP 147 ALPHA (DEG) 20.0 HREF 2.209E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 2.520E 06 CONF LRC-08
H/HREF
1.0
0.1
0.01
0.001
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L
(0.3)
(0.5)
(0.7)
(0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

6/ 1/71

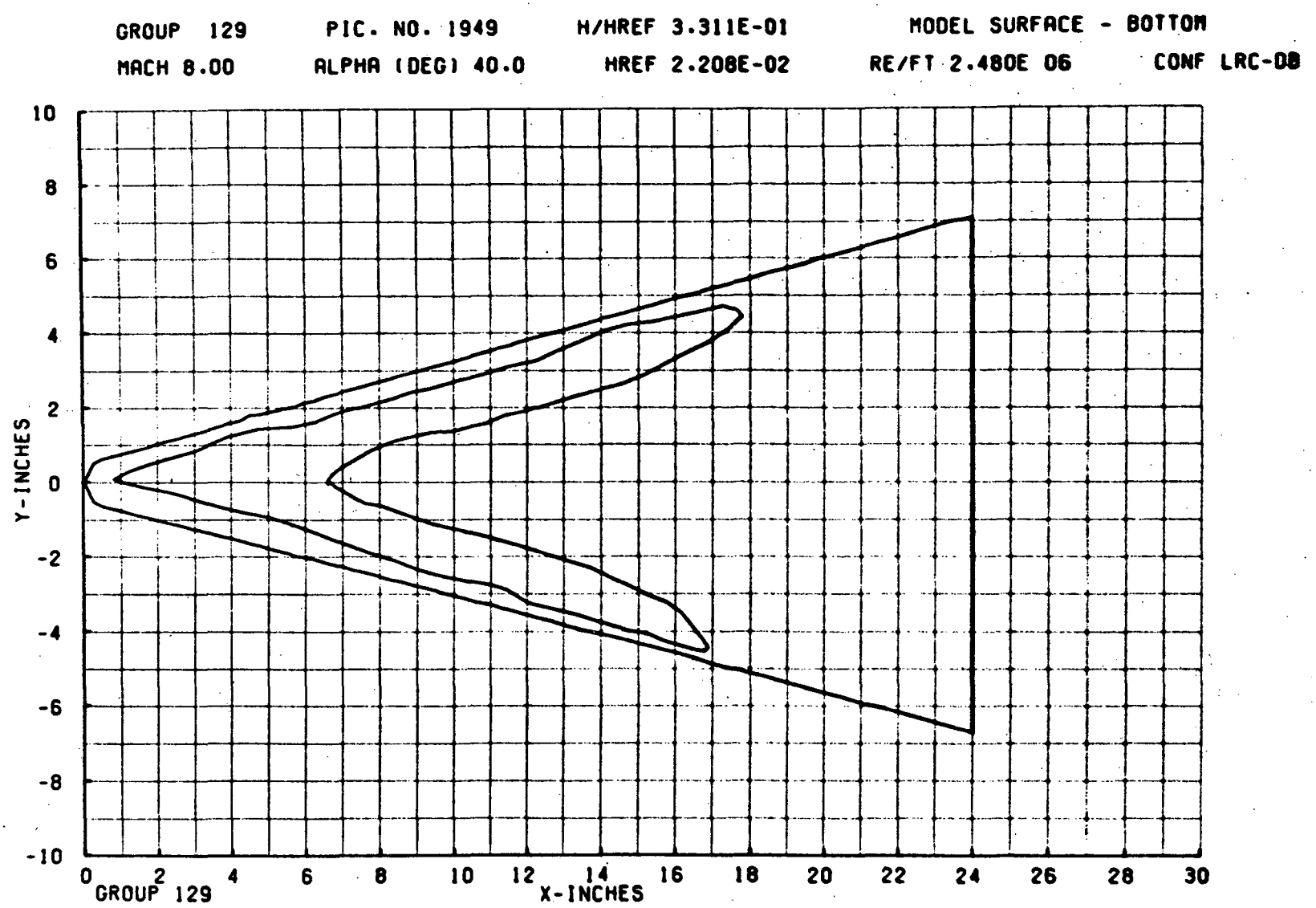
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL R
V11162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
129	11	LRC-DH	8.00	551.9	1314	39.98	10.02	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (H= .056FT)	STHEF (H= .056FT)
99.3	.057	2.533	3826	4.980E-05	7.609E-08	2.48E 06	2.208E-02	1.442E-02

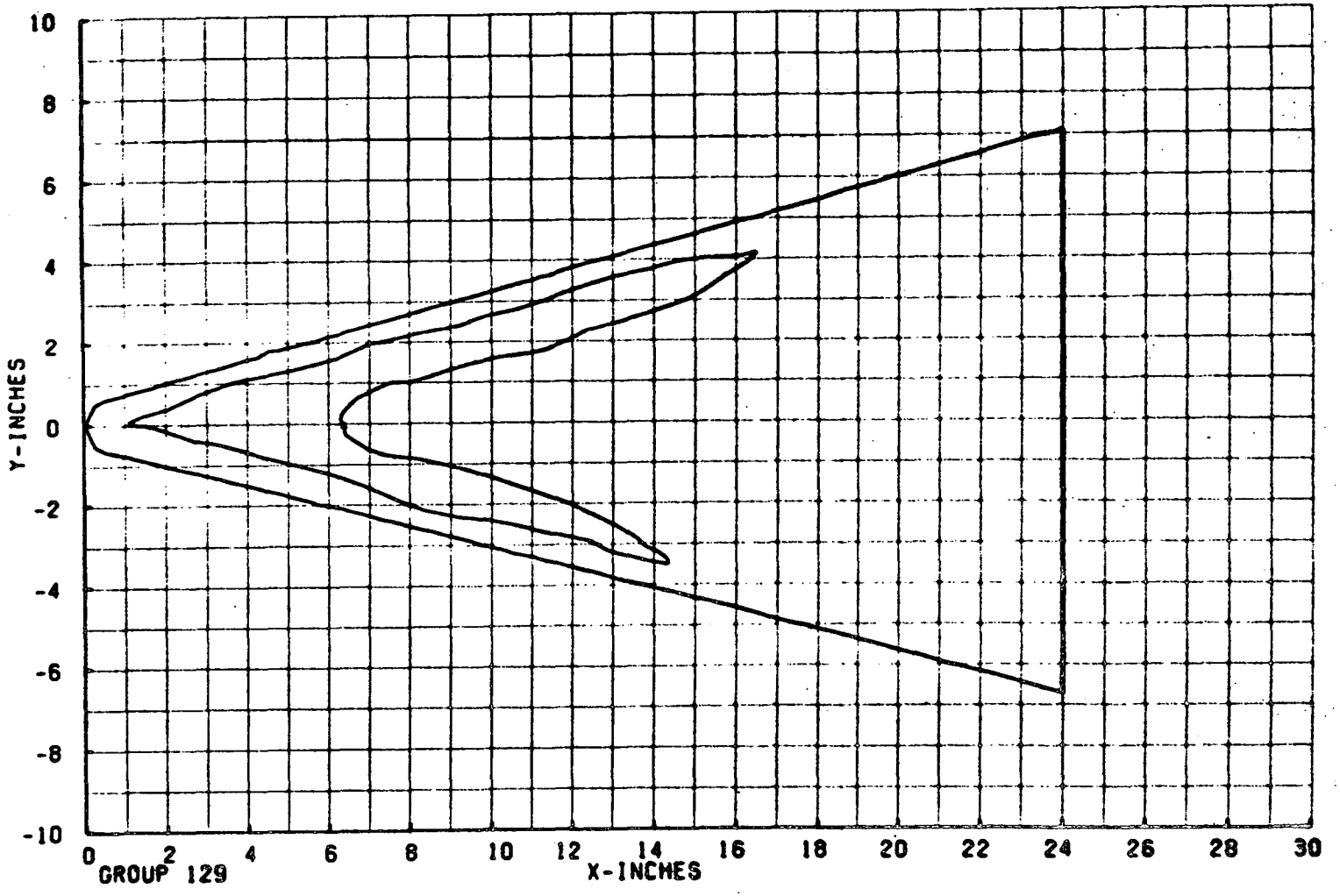
CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCAK)
TOP(T)	200		
SIDE(S)	113	AVERAGE TW = 107	=0.00R(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	113		

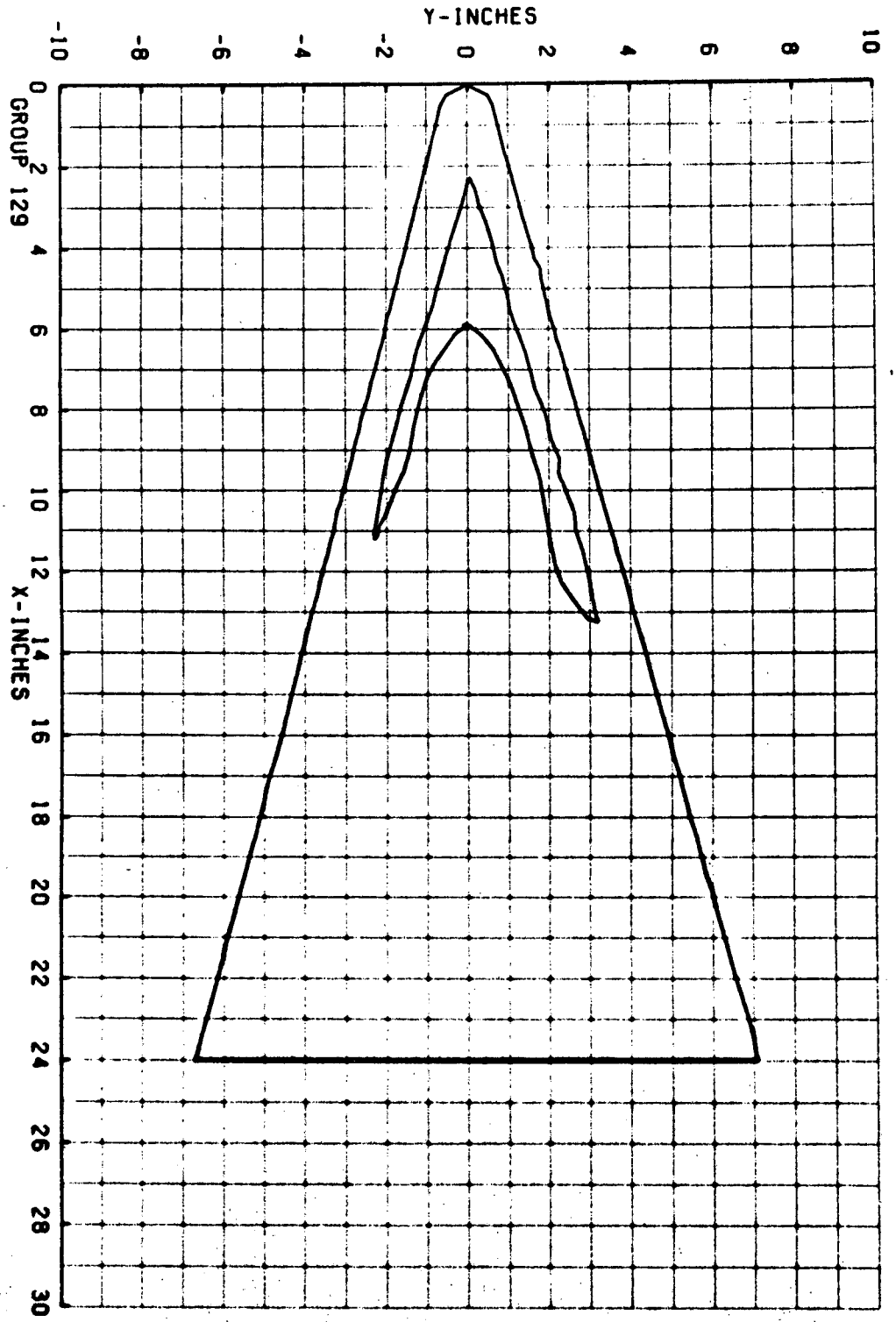
	PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F		
T	1949 (200)	3.70	2.66	7.31E-03	.3311	9.088E-03	.4117	1.035E-02	.4687	4.770E-03	106	133	82	0
T	1952 (200)	5.30	4.26	5.57E-03	.2523	6.925E-03	.3137	7.884E-03	.3571	3.634E-03	108	133	82	0
T	1958 (200)	8.45	7.41	3.99E-03	.1806	4.956E-03	.2246	5.642E-03	.2557	2.602E-03	110	133	83	0
T	1962 (200)	10.60	9.56	3.39E-03	.1536	4.217E-03	.1910	4.800E-03	.2175	2.213E-03	111	133	84	0


GROUP 129 PIC. NO. 1949 H/HREF 3.311E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.208E-02 RE/FT 2.480E 06 CONF LRC-08
Y-INCHES
X-INCHES
GROUP 129

GROUP 129 PIC. NO. 1952 H/HREF 2.523E-01 MODEL SURFACE - BOTTOM

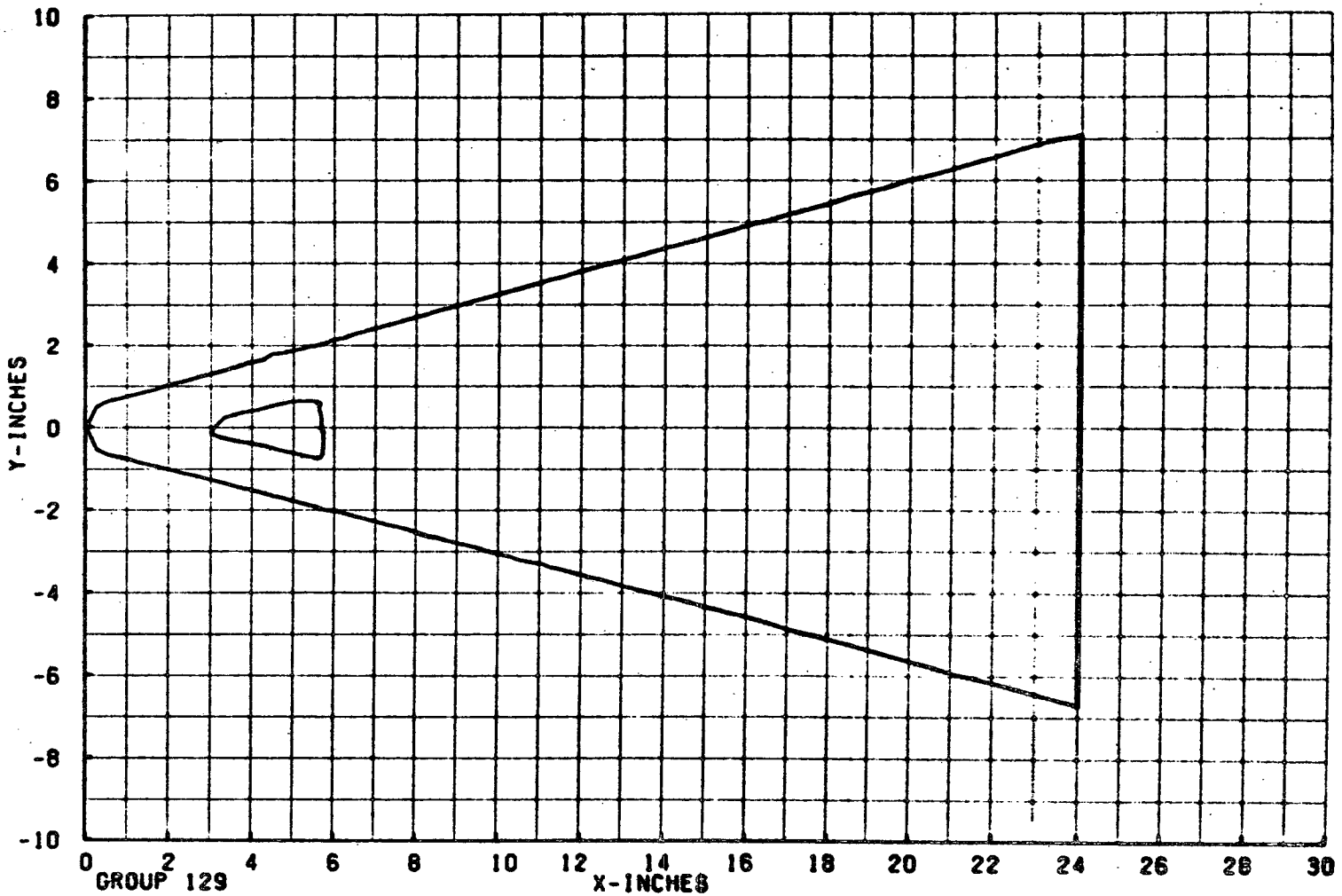
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.208E-02 RE/FT 2.480E 06 CONF LRC-DB

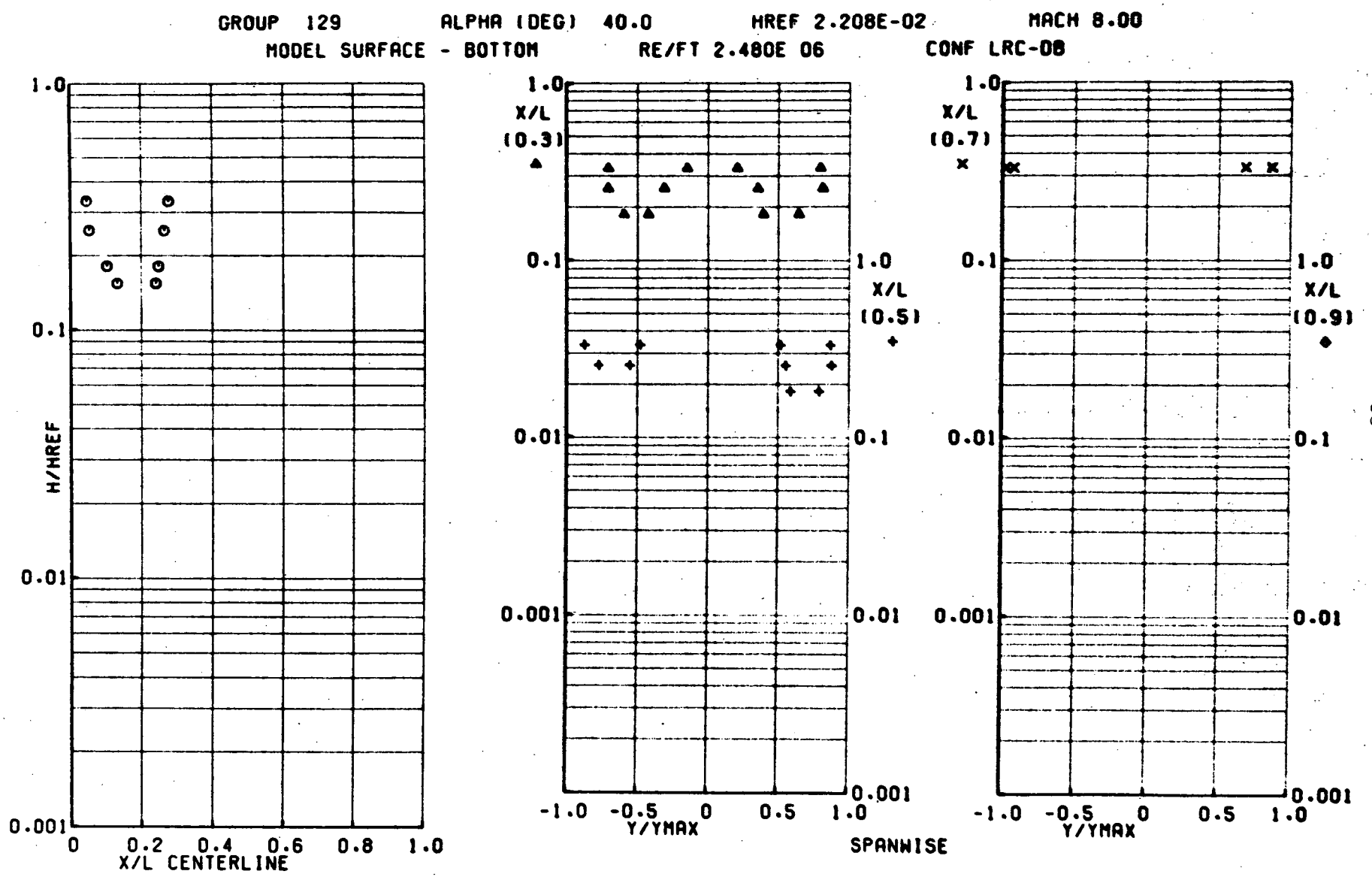



Y-INCHES
-10
-8
-6
-4
-2
0
2
4
6
8
10
GROUP 129
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
X-INCHES
GROUP 129 PIC. NO. 1958 H/HREF 1.806E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.208E-02 RE/FT 2.480E 06 CONF LRC-08

GROUP 129 PIC. NO. 1962 H/HREF 1.536E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.208E-02 RE/FT 2.480E 06 CONF LRC-DB




GROUP 129 ALPHA (DEG) 40.0 HREF 2.208E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 2.480E 06 CONF LRC-08
1.0
0.1
0.01
0.001
H/HREF
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

9/17/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
354	11	LRC-DB	8.00	557.3	1312	40.00	10.00	50.00	180.00	-.0

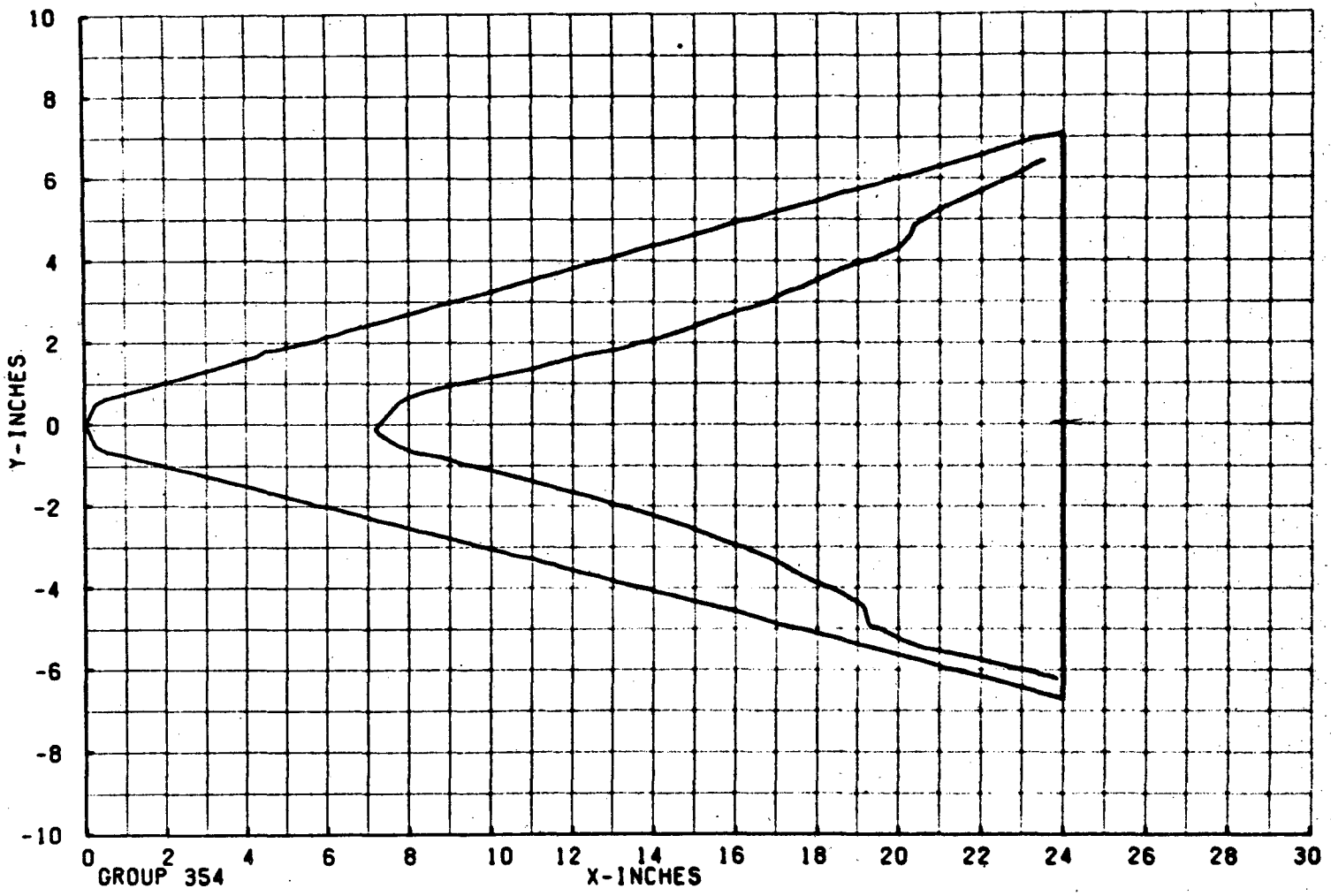
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	SIREF (R= .056FT)
95.1	.057	2.558	3823	5.036E-05	7.057E-08	2.51E 06	2.218E-02	1.434E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	350		
SIDE(S)	350	AVERAGE TW = 92	.037
BOTTOM(B)	350		

	PIC NO		TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP	F	
T	1023	(350)	4.20	3.08	8.79E-03	.3963	1.163E-02	.5243	1.389E-02	.6262	5.629E-03	0	0	0	0
T	1024	(350)	4.75	3.63	8.10E-03	.3650	1.071E-02	.4829	1.279E-02	.5768	5.183E-03	0	0	0	0
T	1026	(350)	5.80	4.68	7.13E-03	.3215	9.432E-03	.4252	1.127E-02	.5079	4.566E-03	0	0	0	0
T	1029	(350)	7.35	6.23	6.18E-03	.2787	8.174E-03	.3687	9.764E-03	.4404	3.960E-03	0	0	0	0
T	1032	(350)	8.95	7.83	5.51E-03	.2485	7.291E-03	.3288	8.709E-03	.3927	3.531E-03	0	0	0	0
T	1036	(350)	11.05	9.93	4.89E-03	.2207	6.474E-03	.2919	7.733E-03	.3487	3.135E-03	0	0	0	0
T	1042	(350)	14.20	13.08	4.26E-03	.1923	5.641E-03	.2545	6.738E-03	.3039	2.733E-03	0	0	0	0

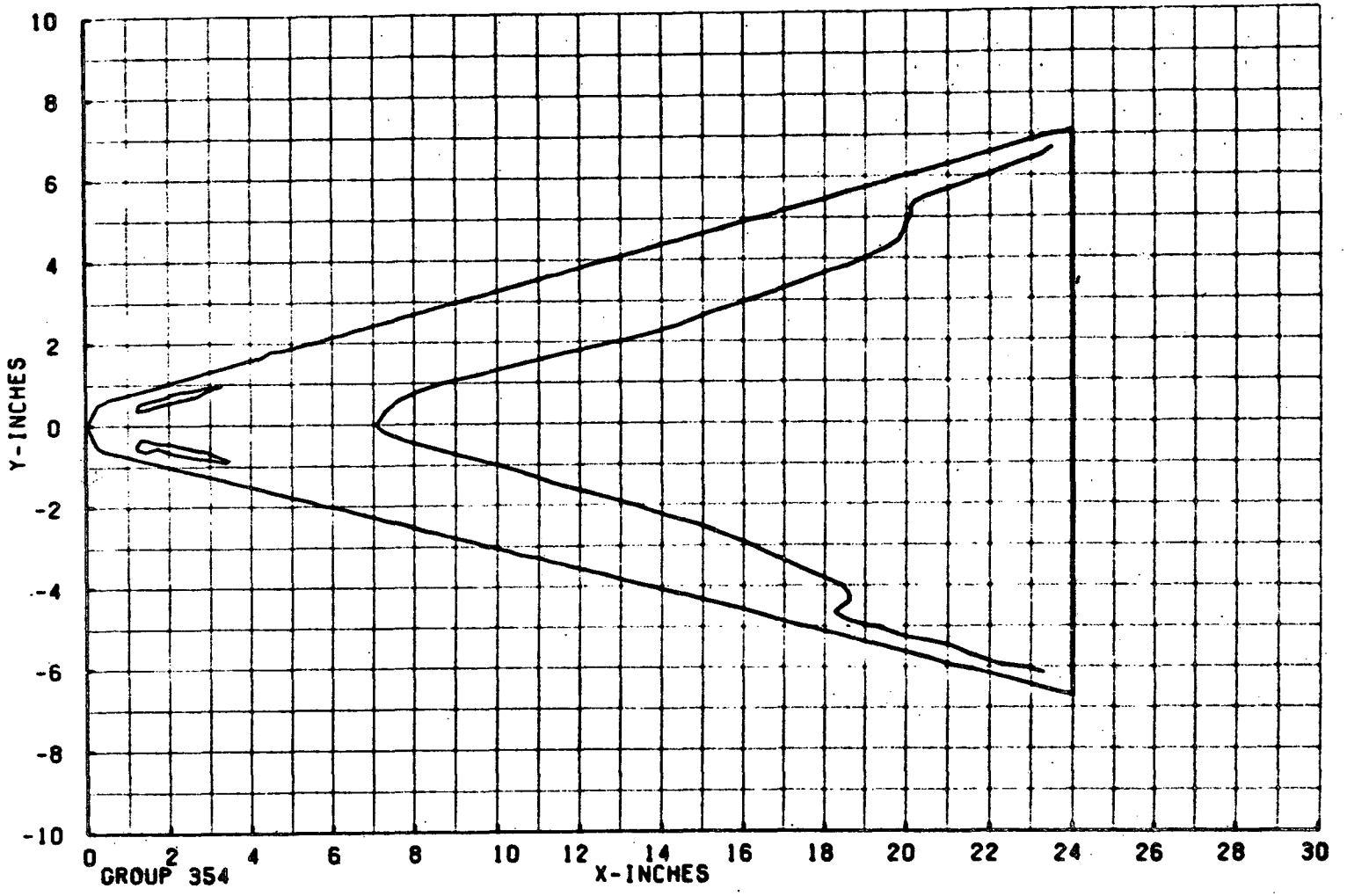
GROUP 354 PIC. NO. 1023 M/MREF 3.963E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 MREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB



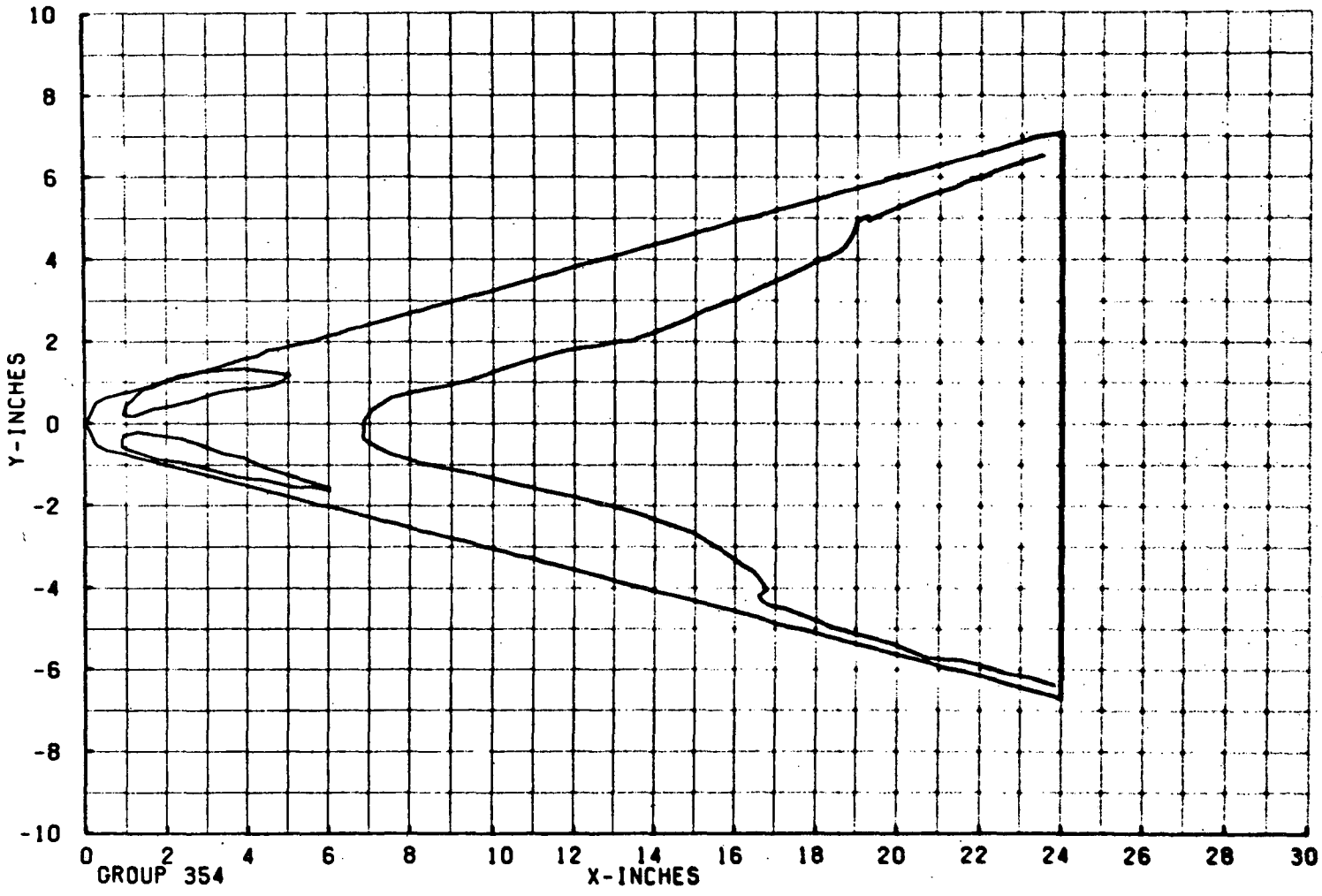
GROUP 354 PIC. NO. 1024 H/HREF 3.650E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB



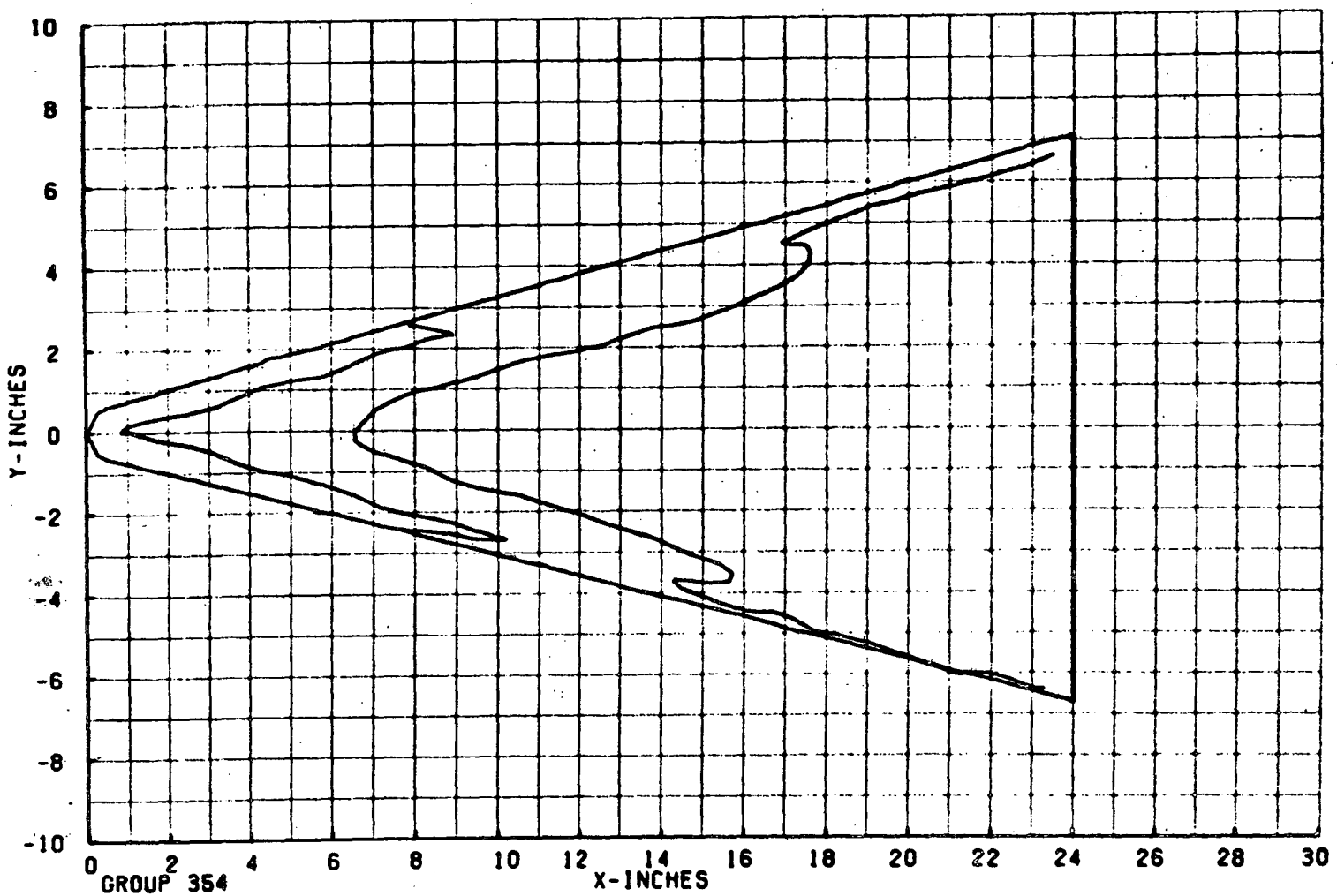
GROUP 354 PIC. NO. 1026 H/HREF 3.215E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB



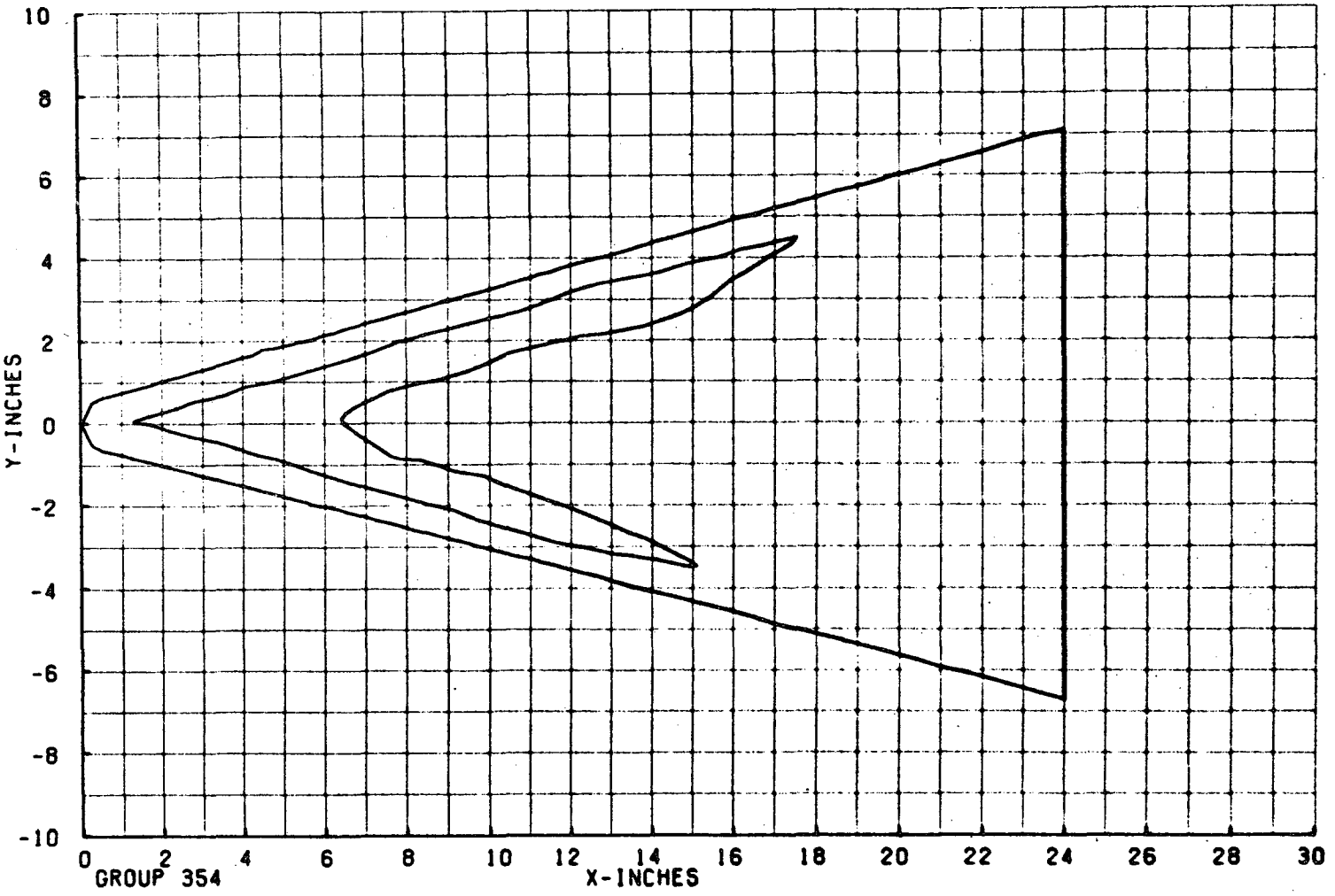
GROUP 354 PIC. NO. 1029 H/HREF 2.787E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB



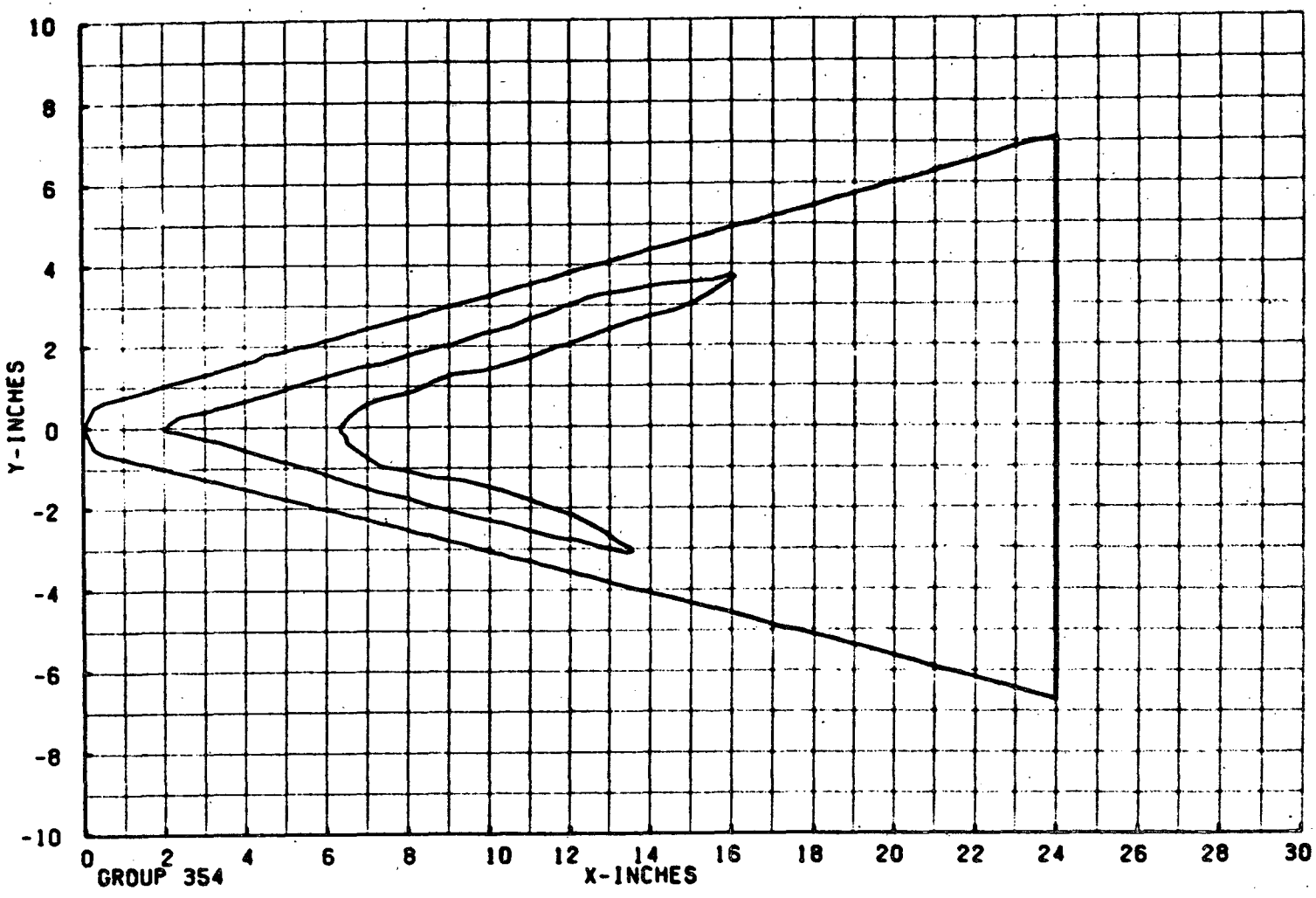
GROUP 354 PIC. NO. 1032 H/HREF 2.485E-01 MODEL SURFACE - BOTTOM

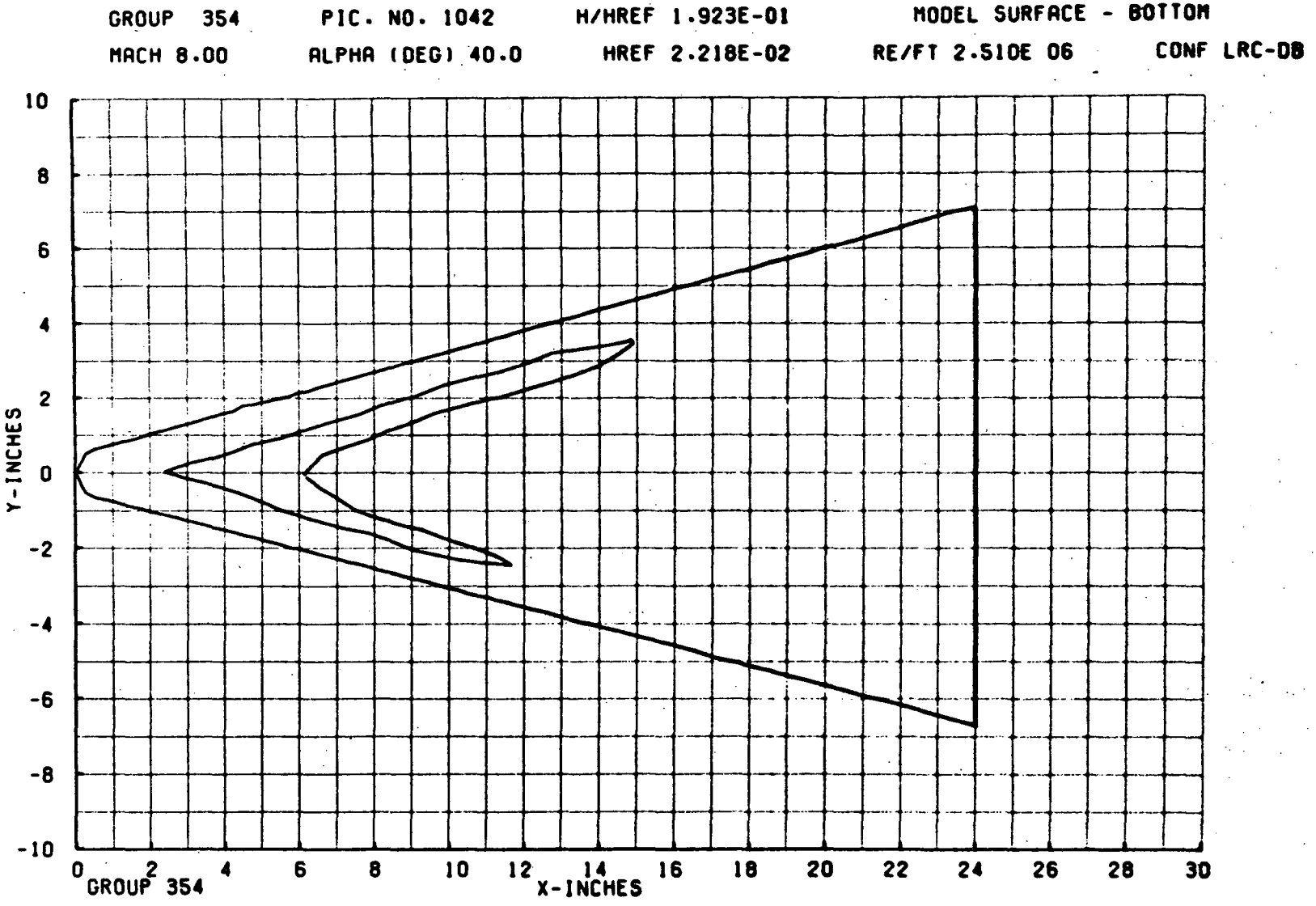
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB



GROUP 354 PIC. NO. 1036 H/HREF 2.207E-01 MODEL SURFACE - BOTTOM

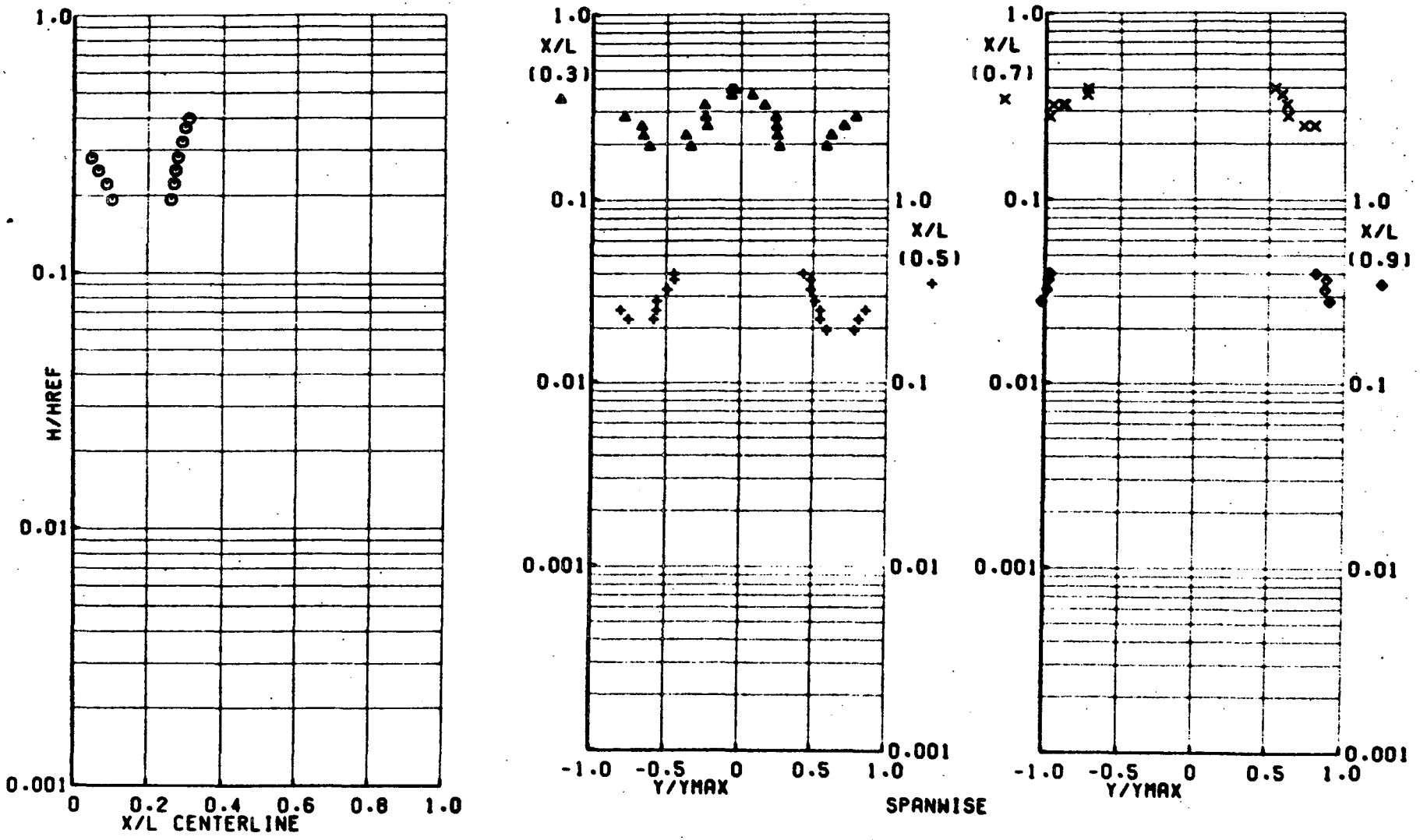
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB




GROUP 354 PIC. NO. 1042 H/HREF 1.923E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.218E-02 RE/FT 2.510E 06 CONF LRC-DB
Y-INCHES
X-INCHES
GROUP 354
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

GROUP 354 ALPHA (DEG) 40.0 HREF 2.218E-02 MACH 8.00

MODEL SURFACE - BOTTOM RE/FT 2.510E 06 CONF LRC-DB



9/17/71

AEDC(AHO•INC•) ARNOLD AFS• TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
360	11	LMC-UA	8.00	553.9	1303	60.00	-10.00	50.00	180.00	-.0

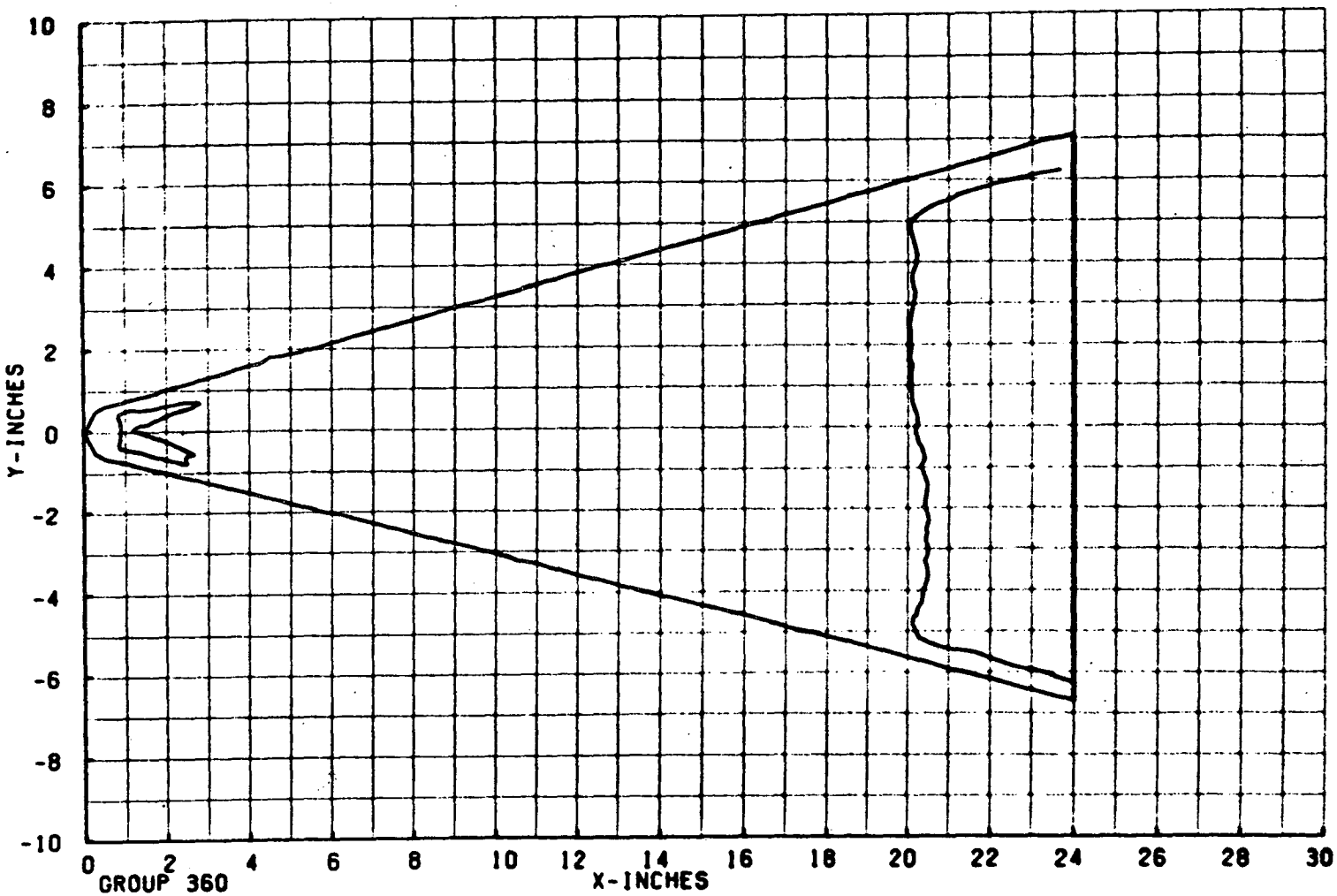
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (H= .056FT)	SIHEF (H= .056FT)
94.4	.057	2.542	3808	5.044E-05	7.599E-08	2.53E-06	2.208E-02	1.432E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOACXK)
TOP(T)	350		
SIDE(S)	350	AVERAGE Tw = 95	.037
BOTTOM(B)	350		

PIC	NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T	1244 (350)	3.65	2.50	9.85E-03	.4462	1.310E-02	.5929	1.570E-02	.7109	6.329E-03	92	88	0	97
T	1247 (350)	5.25	4.10	7.69E-03	.3483	1.023E-02	.4629	1.226E-02	.5549	4.939E-03	94	89	0	97
T	1250 (350)	6.80	5.65	6.55E-03	.2967	8.710E-03	.3942	1.044E-02	.4727	4.206E-03	97	91	0	97
T	1254 (350)	8.90	7.75	5.60E-03	.2533	7.437E-03	.3366	8.916E-03	.4036	3.591E-03	102	95	0	98
T	1260 (350)	12.05	10.90	4.72E-03	.2136	6.271E-03	.2838	7.518E-03	.3403	3.026E-03	110	103	0	99
T	1266 (350)	15.20	14.05	4.16E-03	.1881	5.523E-03	.2499	6.622E-03	.2997	2.665E-03	119	111	0	101
T	1269 (350)	17.55	16.40	3.85E-03	.1741	5.112E-03	.2313	6.129E-03	.2773	2.466E-03	126	118	0	102

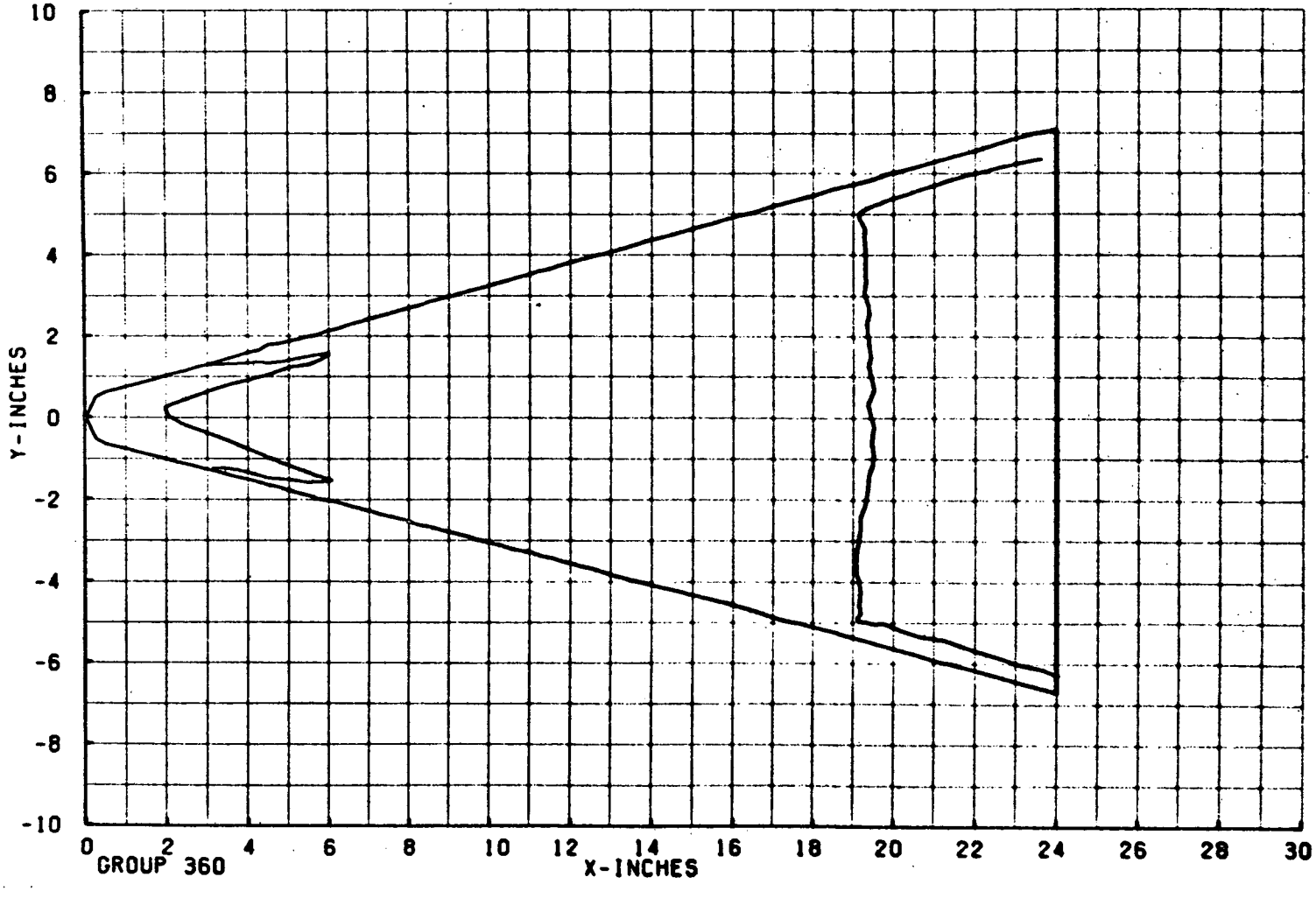
GROUP 360 PIC. NO. 1244 H/HREF 4.462E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-DB



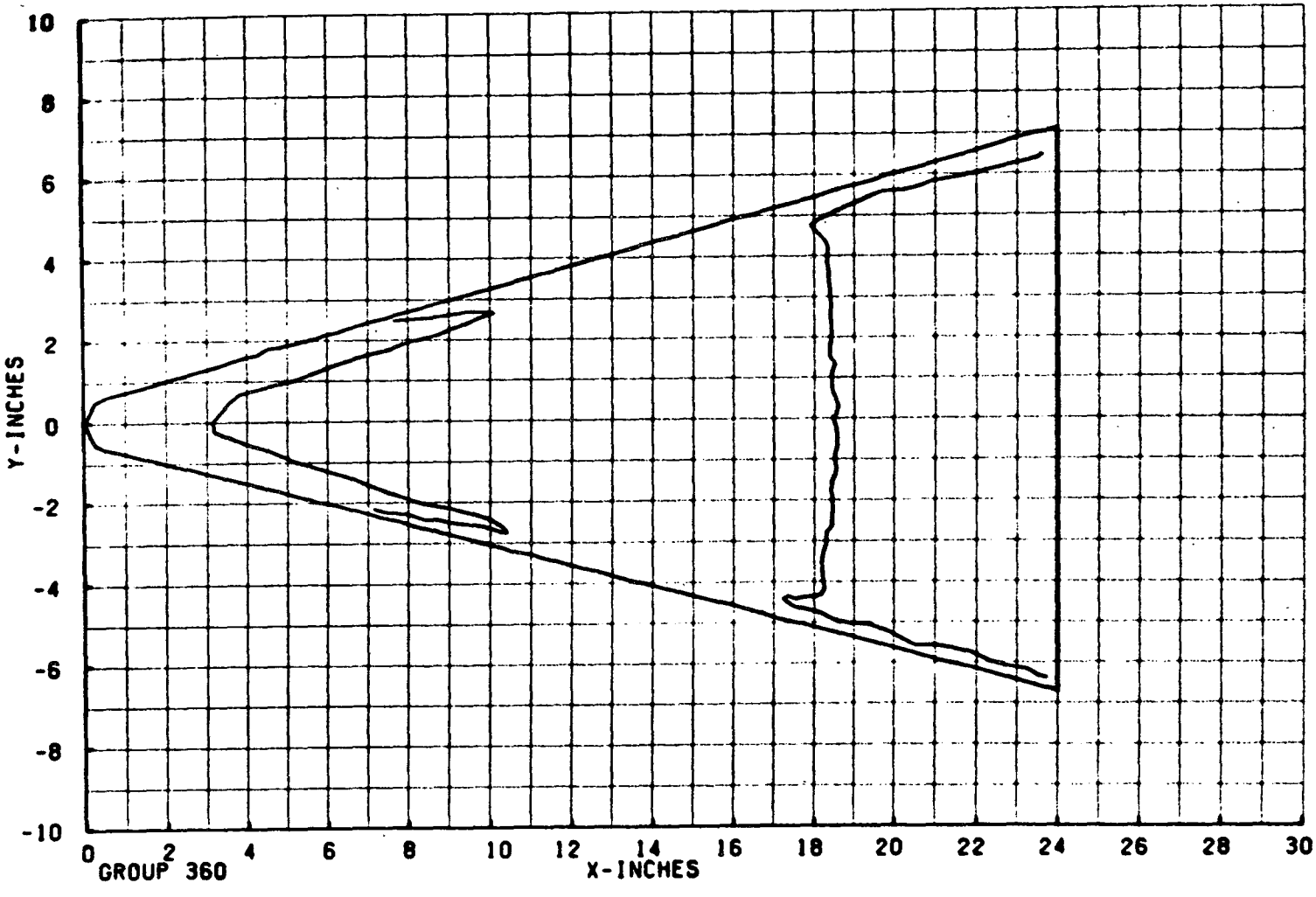
GROUP 360 PIC. NO. 1247 H/HREF 3.483E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-DB



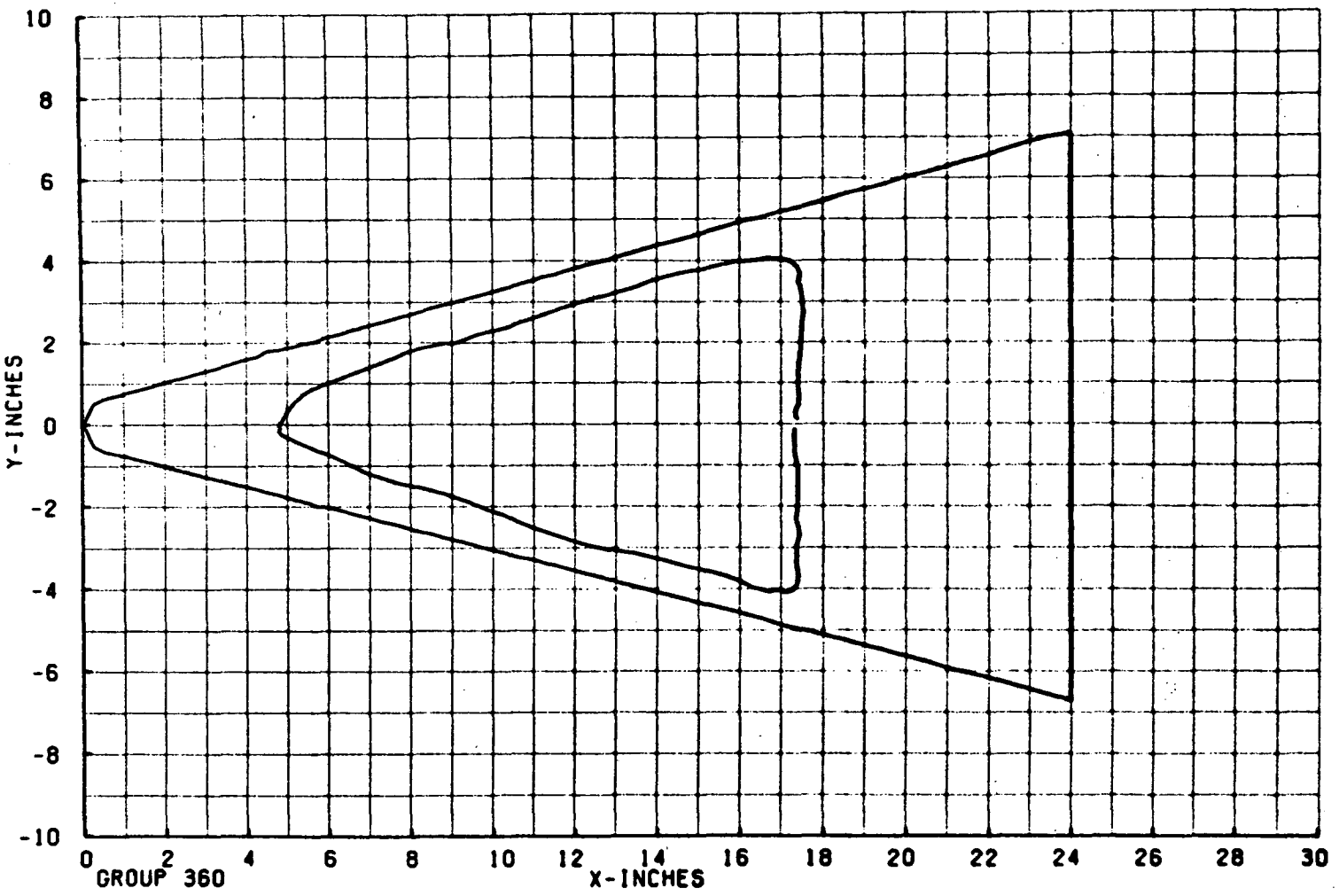
GROUP 360 PIC. NO. 1250 H/HREF 2.967E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-08



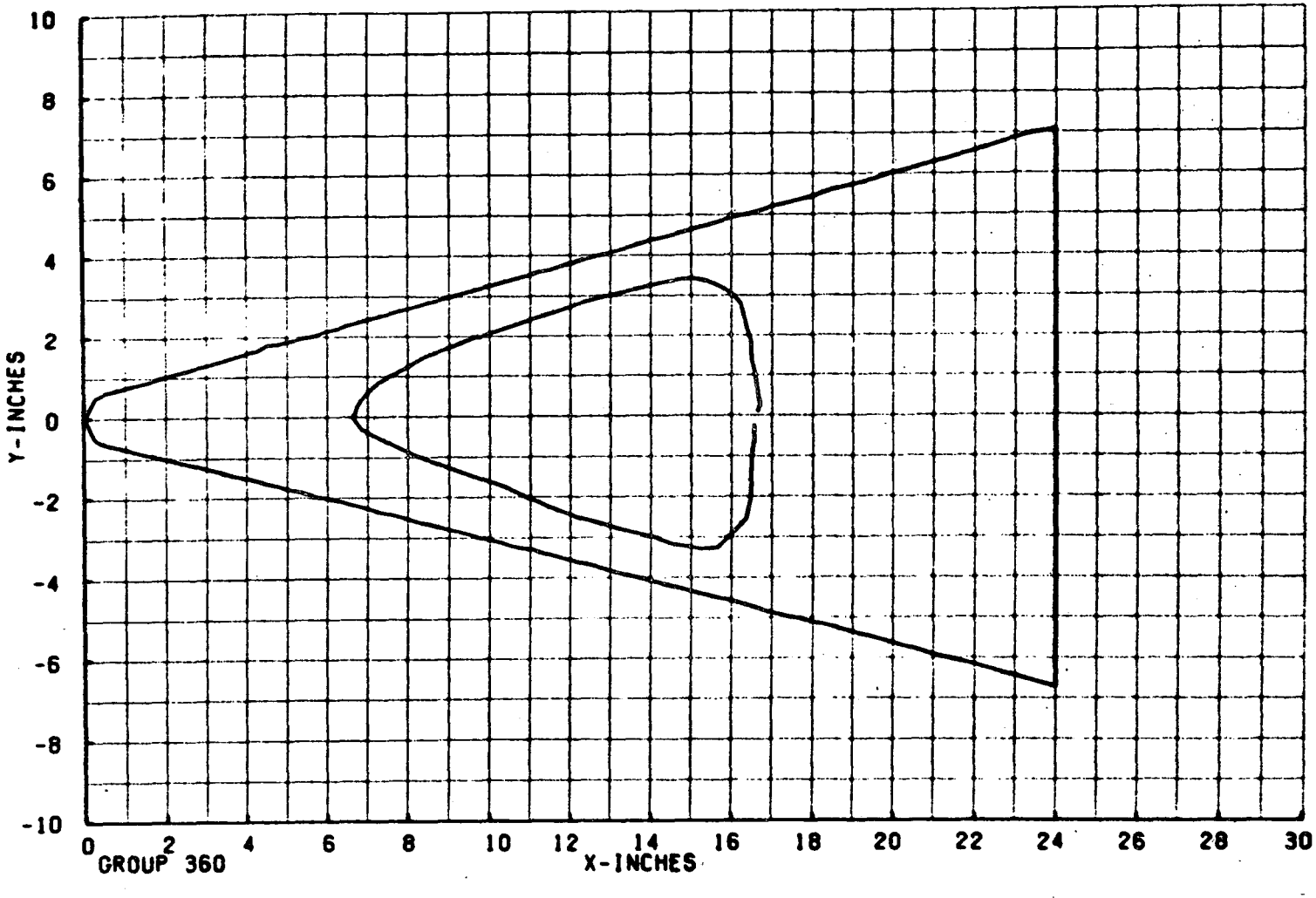
GROUP 360 PIC. NO. 1254 H/HREF 2.533E-01 MODEL SURFACE - BOTTOM

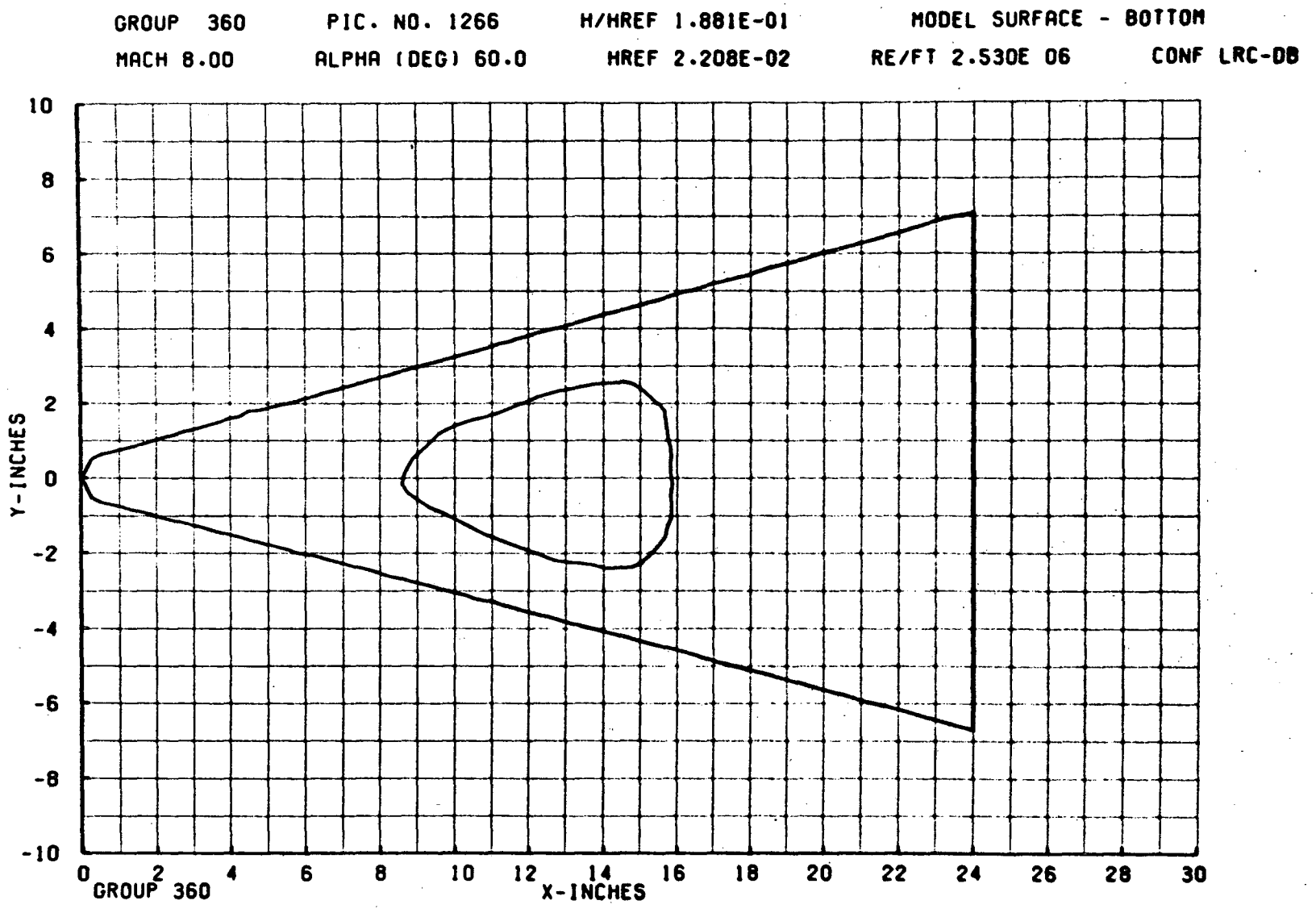
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-DB



GROUP 360 PIC. NO. 1260 H/HREF 2.136E-01 MODEL SURFACE - BOTTOM

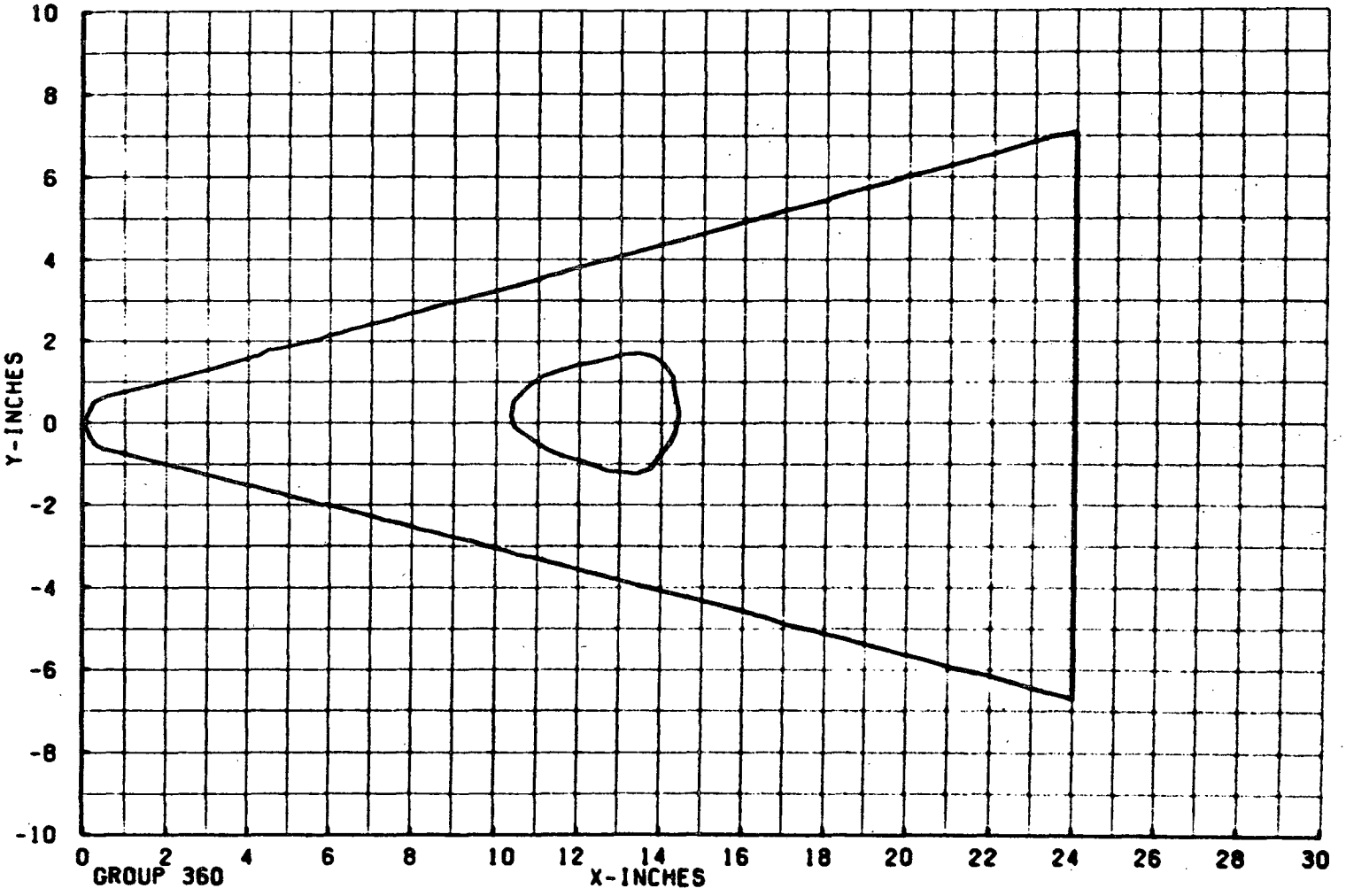
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-D8

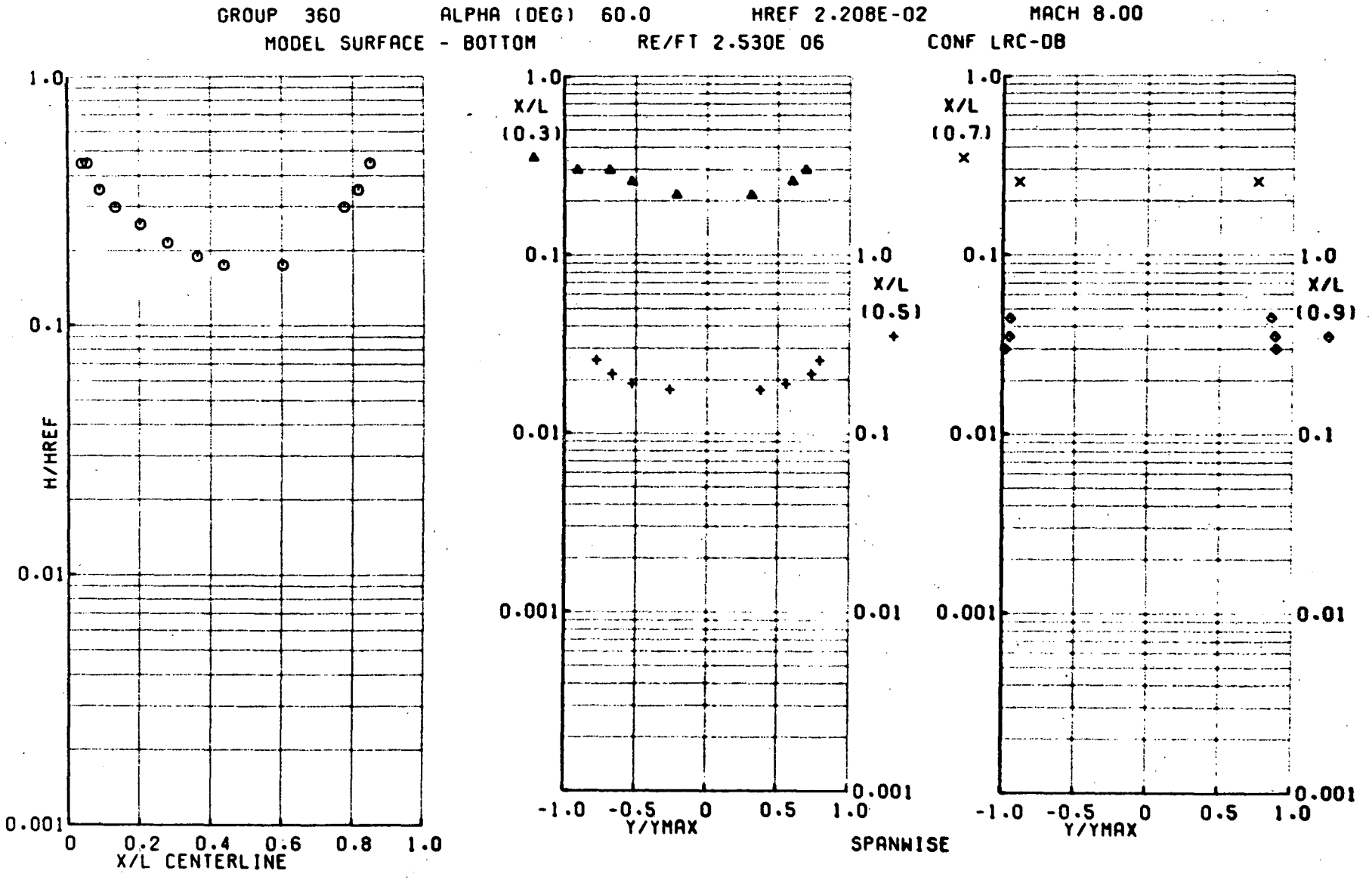



GROUP 360 PIC. NO. 1266 H/HREF 1.881E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-DB
Y-INCHES
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
X-INCHES
GROUP 360

GROUP 360 PIC. NO. 1269 H/HREF 1.741E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.208E-02 RE/FT 2.530E 06 CONF LRC-DB




GROUP 360 ALPHA (DEG) 60.0 HREF 2.208E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 2.530E 06 CONF LRC-08
H/HREF
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
Y/YMAX
SPANWISE

6/ 1/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
149	11	LRC-D8	8.00	859.3	1320	19.97	3.03	-23.00	180.00	.0

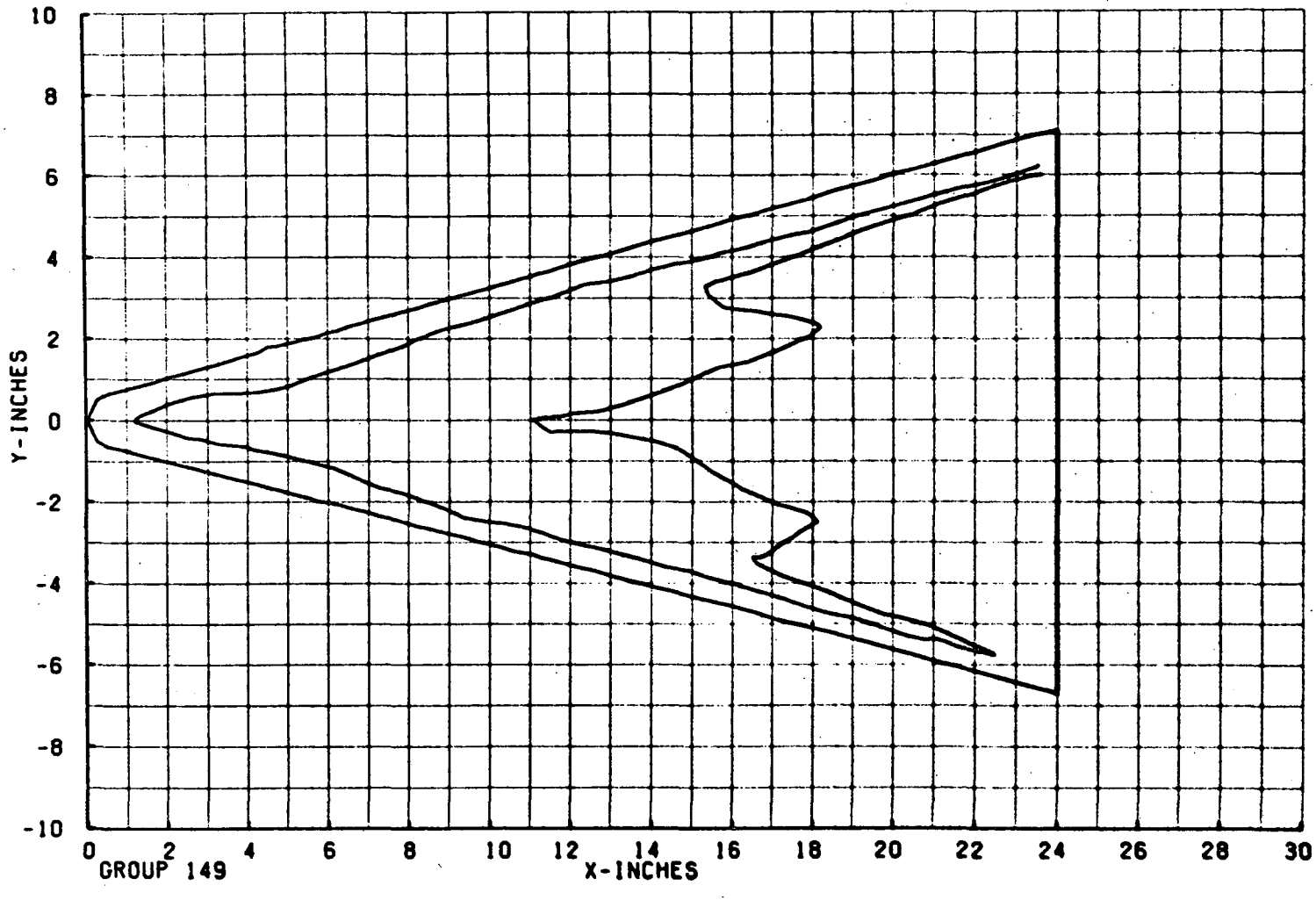
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
95.7	.088	3.943	3834	7.718E-05	7.703E-08	3.84E 06	2.757E-02	1.159E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	200		
SIDE(S)	200	AVERAGE TW = 95	=0.008(SQUARE ROOT DEL TIME) +:0.11
BOTTOM(B)	200		

	PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.910)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP	F	
T	2602 (200)	6.80	5.76	5.15E-03	.1869	6.386E-03	.2319	7.263E-03	.2637	2.165E-03	0	0	95	0
T	2606 (200)	8.90	7.86	4.25E-03	.1543	5.273E-03	.1915	5.997E-03	.2178	1.789E-03	0	0	96	0

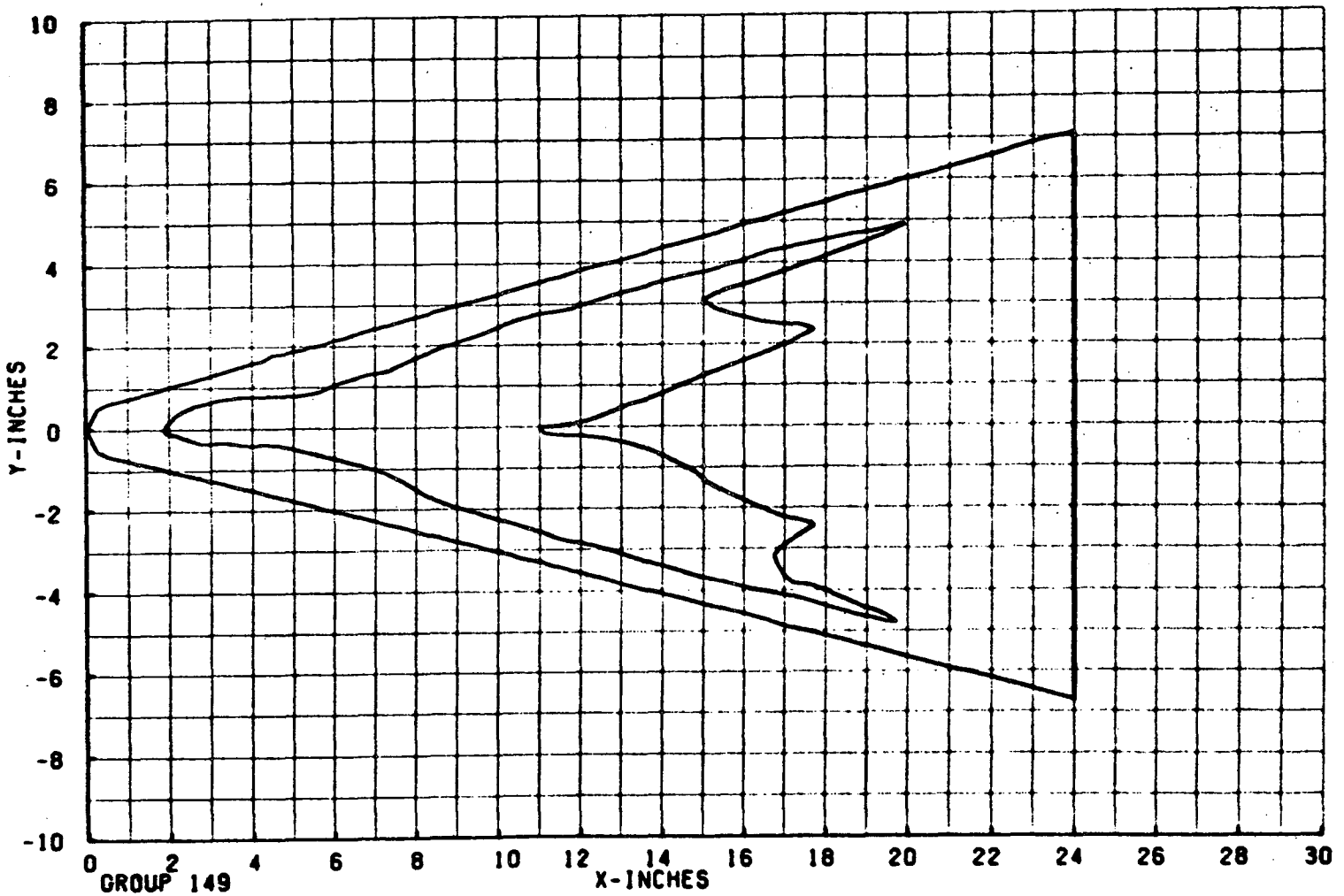
GROUP 149 PIC. NO. 2602 H/HREF 1.869E-01 MODEL SURFACE - BOTTOM

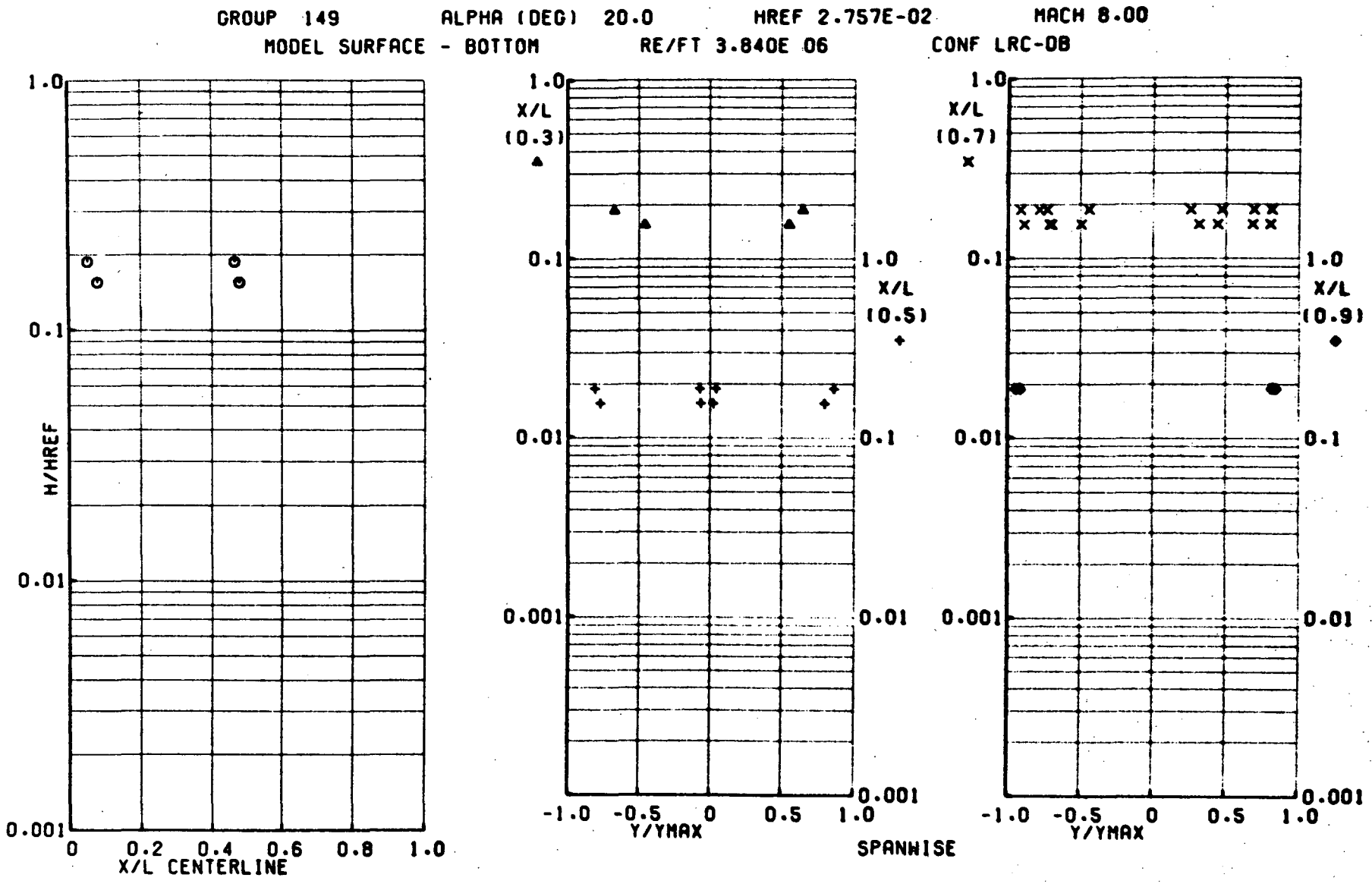
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.757E-02 RE/FT 3.840E 06 CONF LRC-DB



GROUP 149 PIC. NO. 2606 H/HREF 1.543E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.757E-02 RE/FT 3.840E 06 CONF LRC-DB




GROUP 149 ALPHA (DEG) 20.0 HREF 2.757E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.840E 06 CONF LRC-OB
1.0
0.1
0.01
0.001
H/HREF
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

6/ 2/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
163	11	LRC-08	8.00	857.2	1363	19.98	3.02	-23.00	180.00	.0

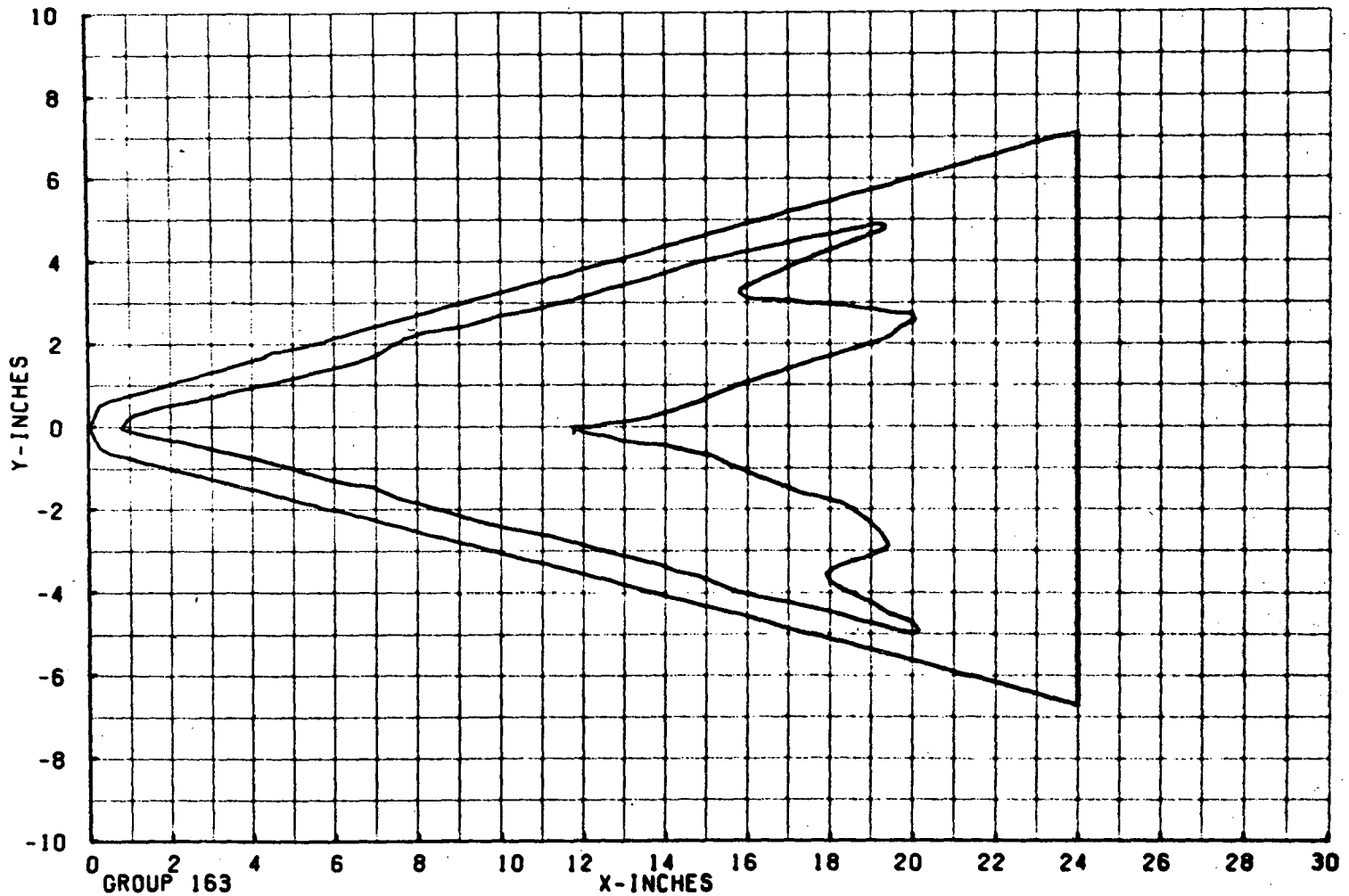
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
98.7	.088	3.933	3895	7.461E-05	7.949E-08	3.66E 06	2.769E-02	1.183E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	163		
SIDE($)	163	AVERAGE TW = 74	=0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	163		

	PIC NO		TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F		
T	3298	(163)	4.20	3.16	5.61E-03	.2026	6.844E-03	.2472	7.689E-03	.2777	2.396E-03	0	75	0	0
T	3303	(163)	6.80	5.76	3.94E-03	.1423	4.806E-03	.1736	5.399E-03	.1950	1.683E-03	0	81	0	0
T	3308	(163)	9.35	8.31	3.14E-03	.1134	3.831E-03	.1384	4.304E-03	.1554	1.341E-03	0	89	0	0
T	3311	(163)	10.90	9.86	2.82E-03	.1017	3.434E-03	.1240	3.858E-03	.1393	1.203E-03	0	95	0	0

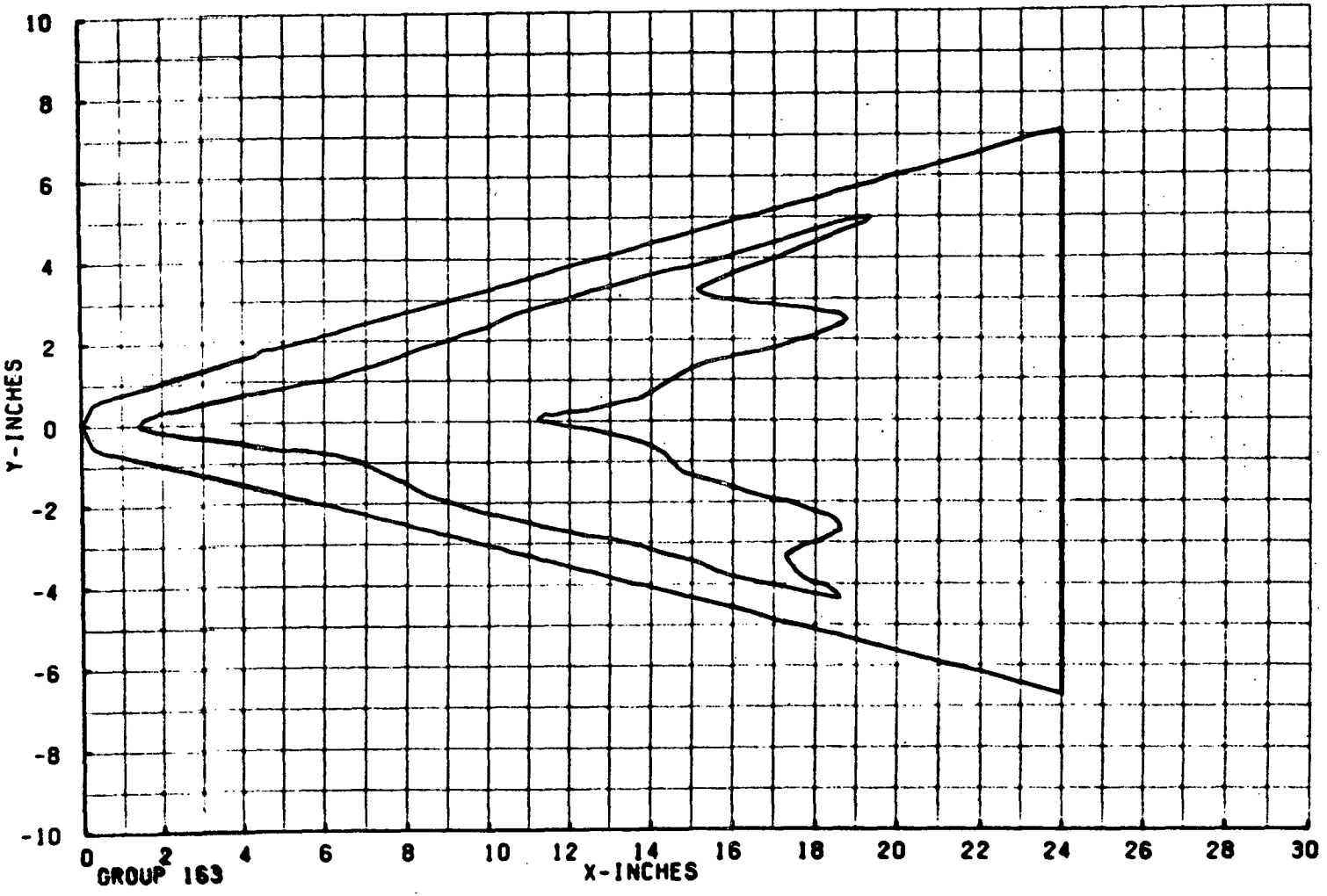
GROUP 163 PIC. NO. 3298 H/HREF 2.026E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.769E-02 RE/FT 3.660E 06 CONF LRC-DB



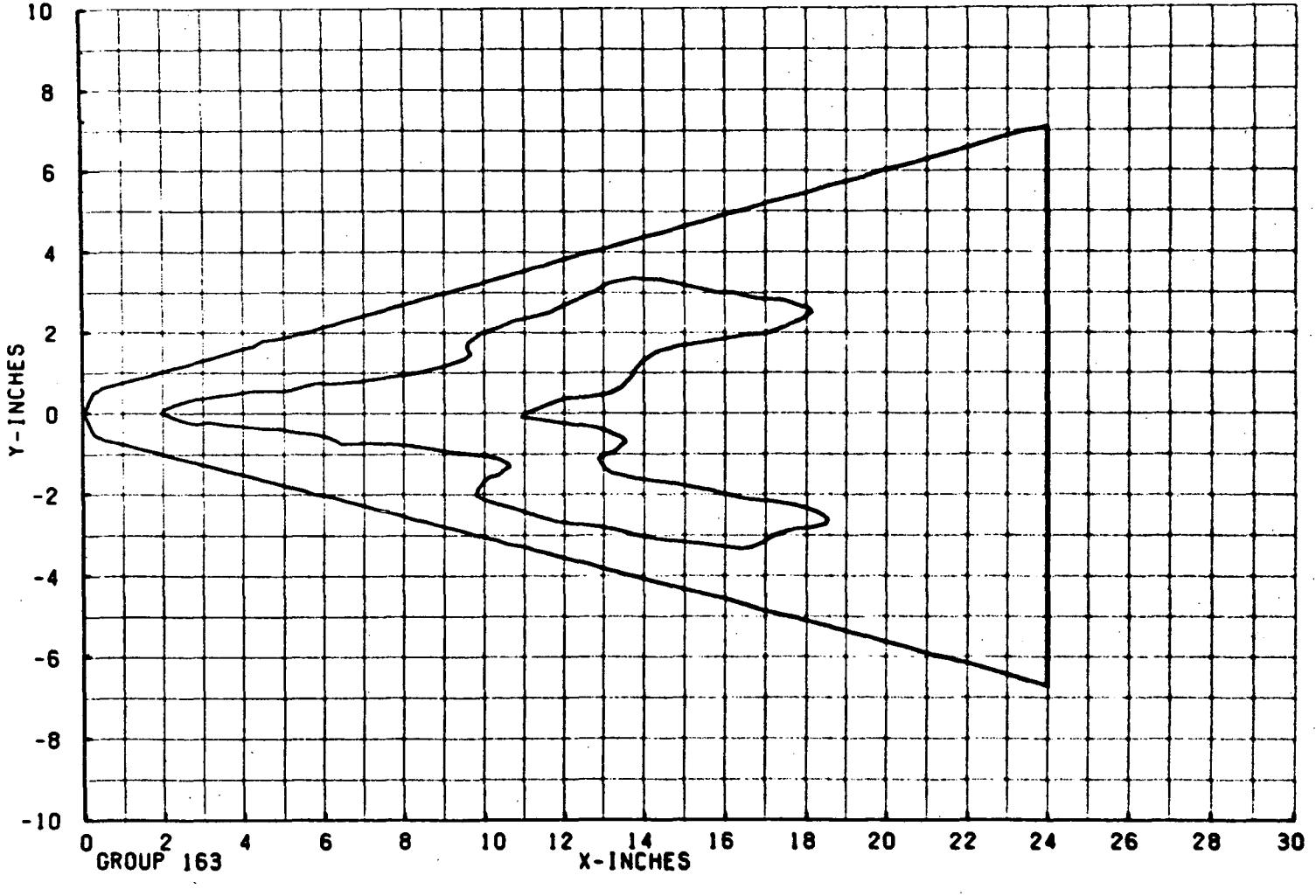
GROUP 163 PIC. NO. 3303 H/HREF 1.423E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.769E-02 RE/FT 3.660E 06 CONF LRC-DB



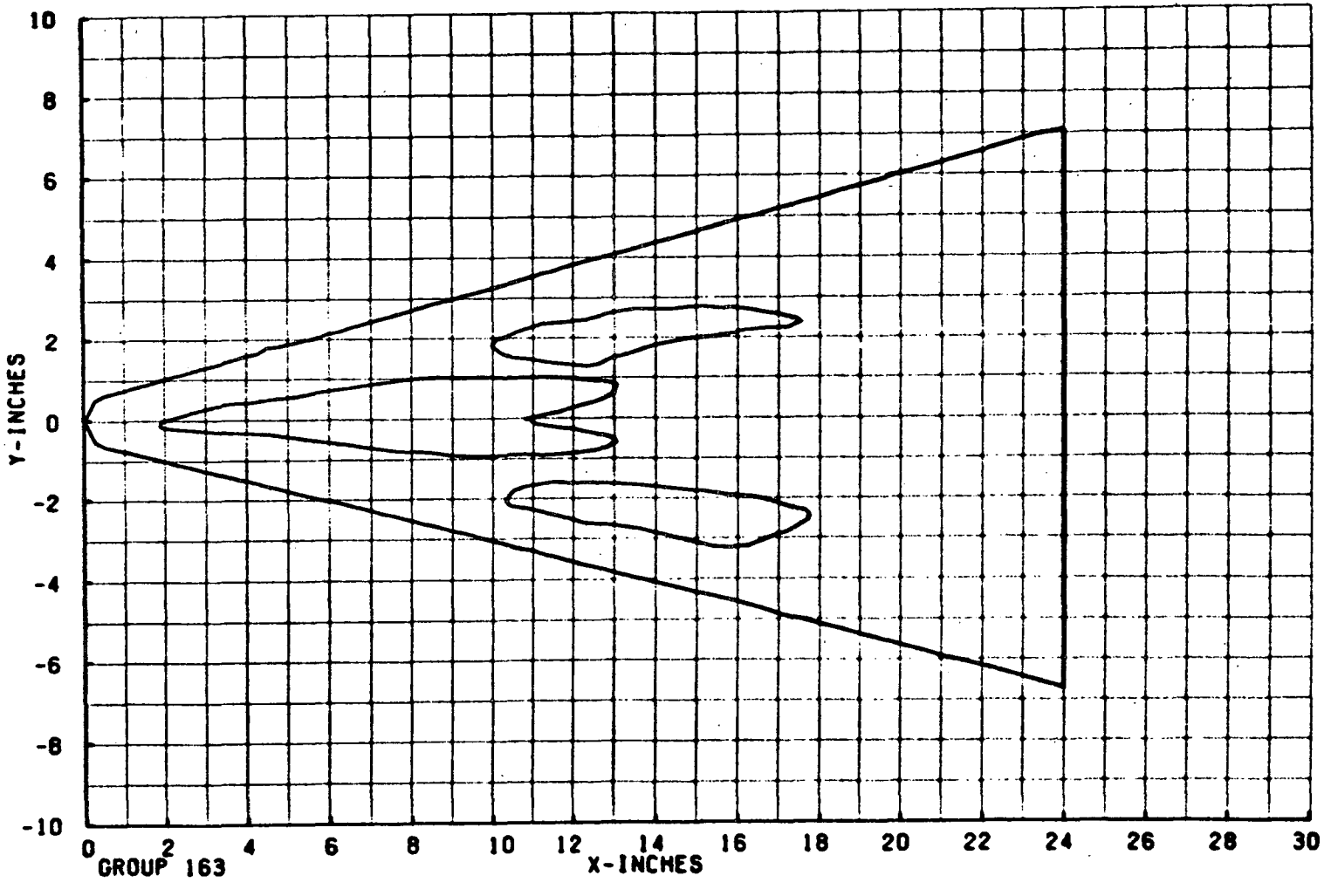
GROUP 163 PIC. NO. 3308 H/HREF 1.134E-01 MODEL SURFACE - BOTTOM

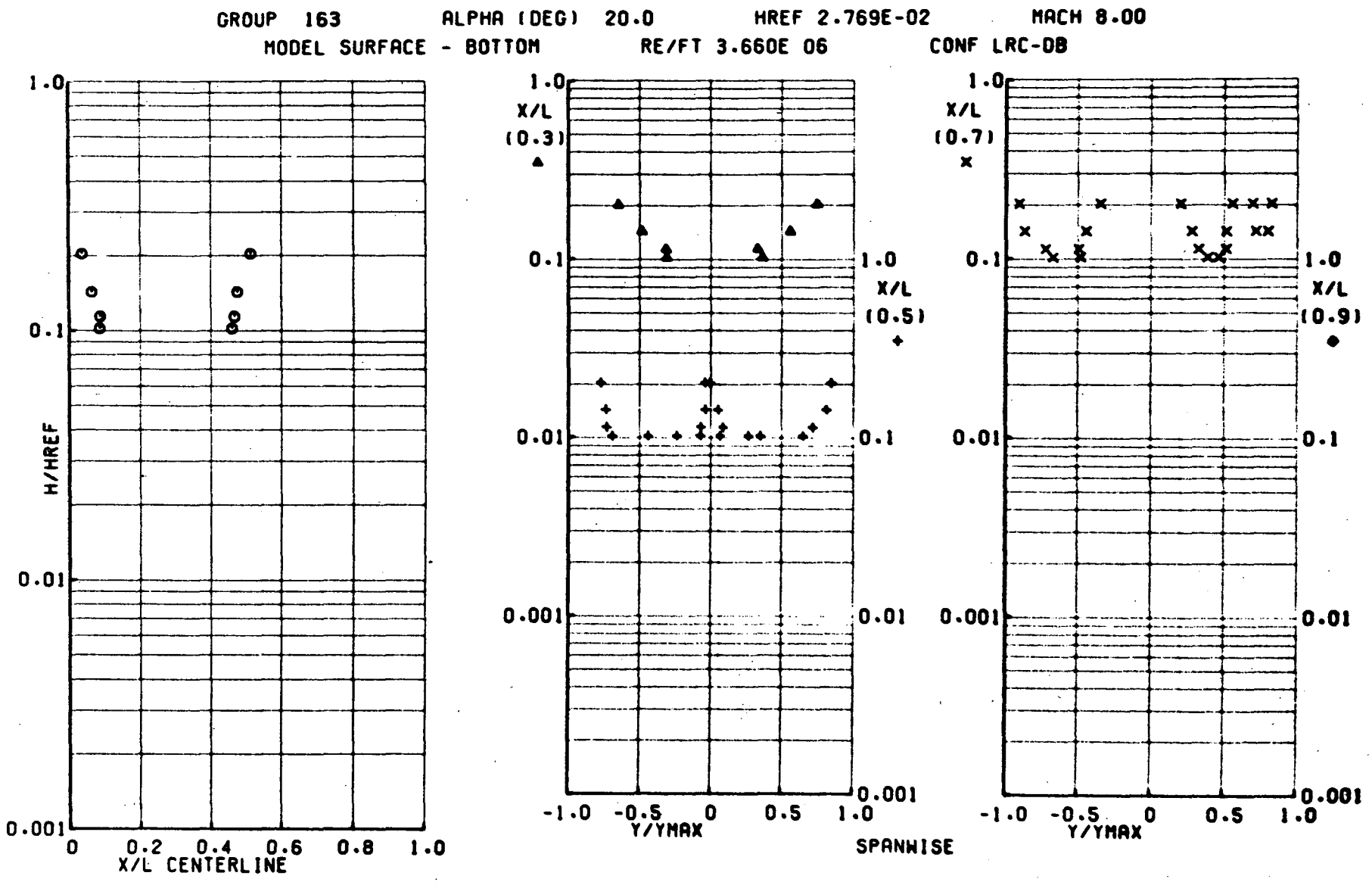
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.769E-02 RE/FT 3.660E 06 CONF LRC-08



GROUP 163 PIC. NO. 3311 H/HREF 1.017E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.769E-02 RE/FT 3.660E 06 CONF LRC-D8




GROUP 163 ALPHA (DEG) 20.0 HREF 2.769E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.660E 06 CONF LRC-DB
H/HREF
1.0
0.1
0.01
0.001
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

6/ 2/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
171	11	LRC-DH	8.00	855.9	1347	40.00	10.00	-50.00	180.00	.0

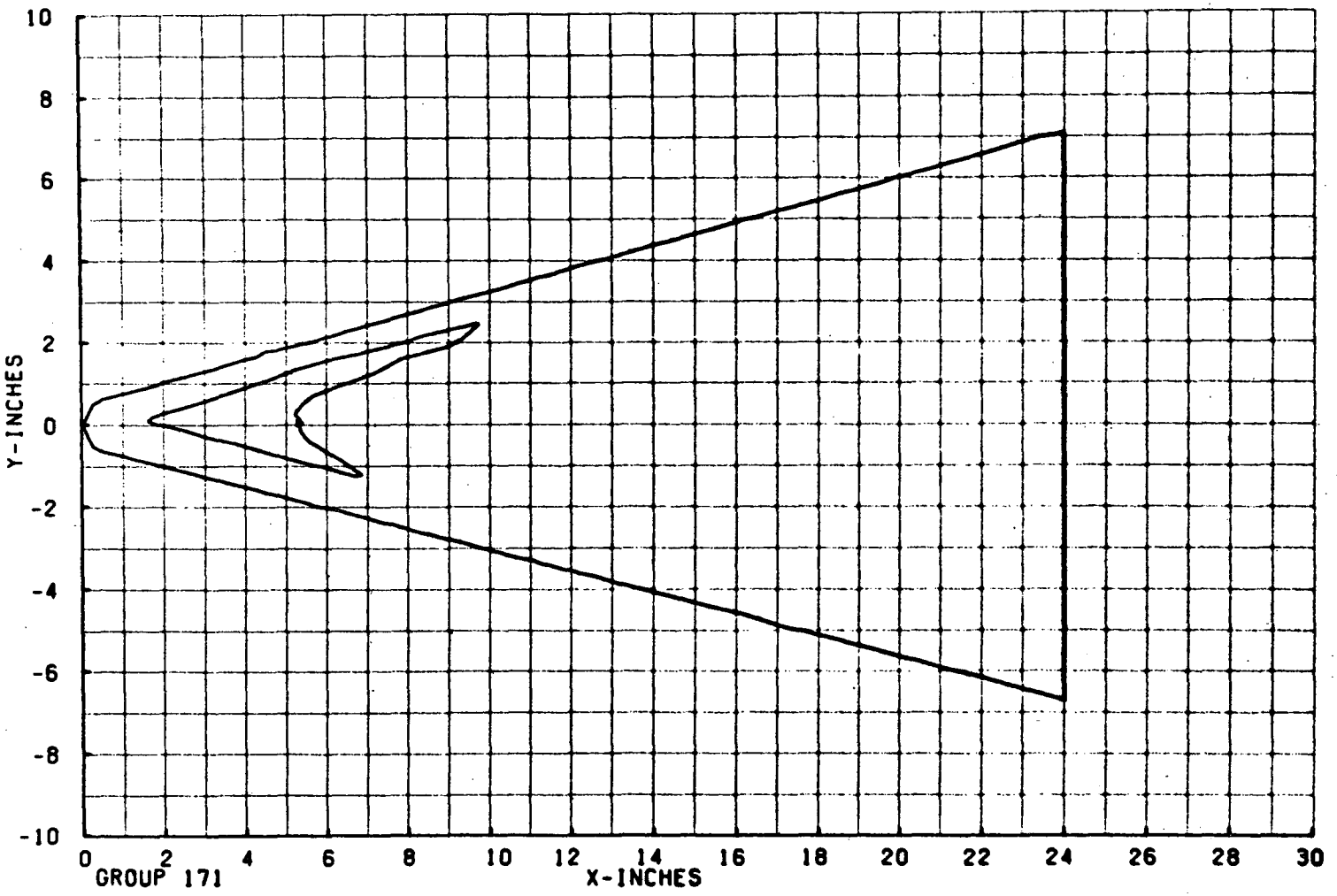
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
97.6	.088	3.927	3873	7.536E-05	7.857E-08	3.71E 06	2.761E-02	1.175E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	200		
SIDE(S)	200	AVERAGE TW = 73	=0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	200		

	PIC NO		TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T	3531	(200)	3.70	2.66	9.36E-03	.3392	1.156E-02	.4186	1.309E-02	.4742	3.981E-03	73	75	75	0
T	3534	(200)	5.25	4.21	7.18E-03	.2602	8.868E-03	.3212	1.004E-02	.3638	3.054E-03	78	77	75	0

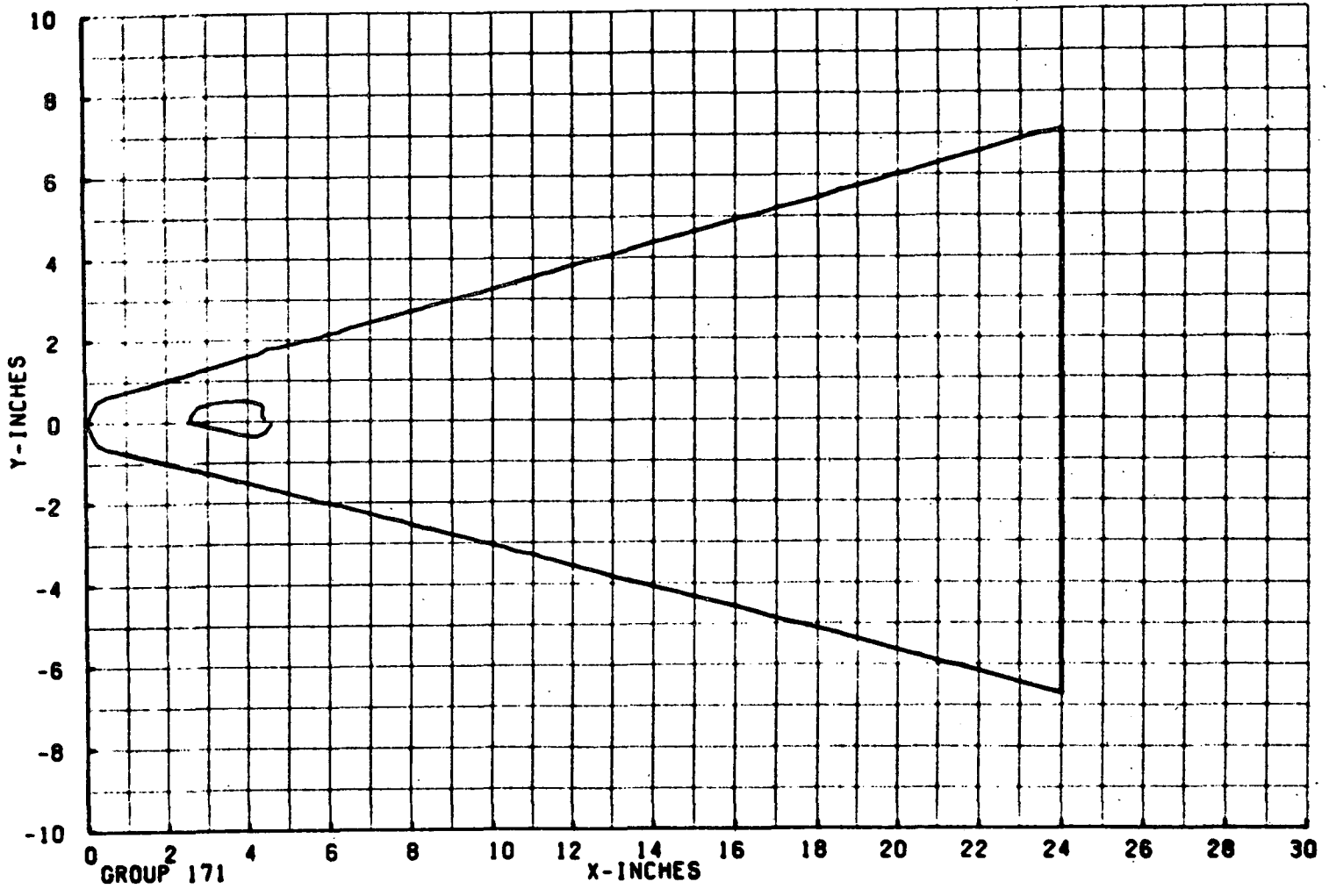
GROUP 171 PIC. NO. 3531 H/HREF 3.392E-01 MODEL SURFACE - BOTTOM

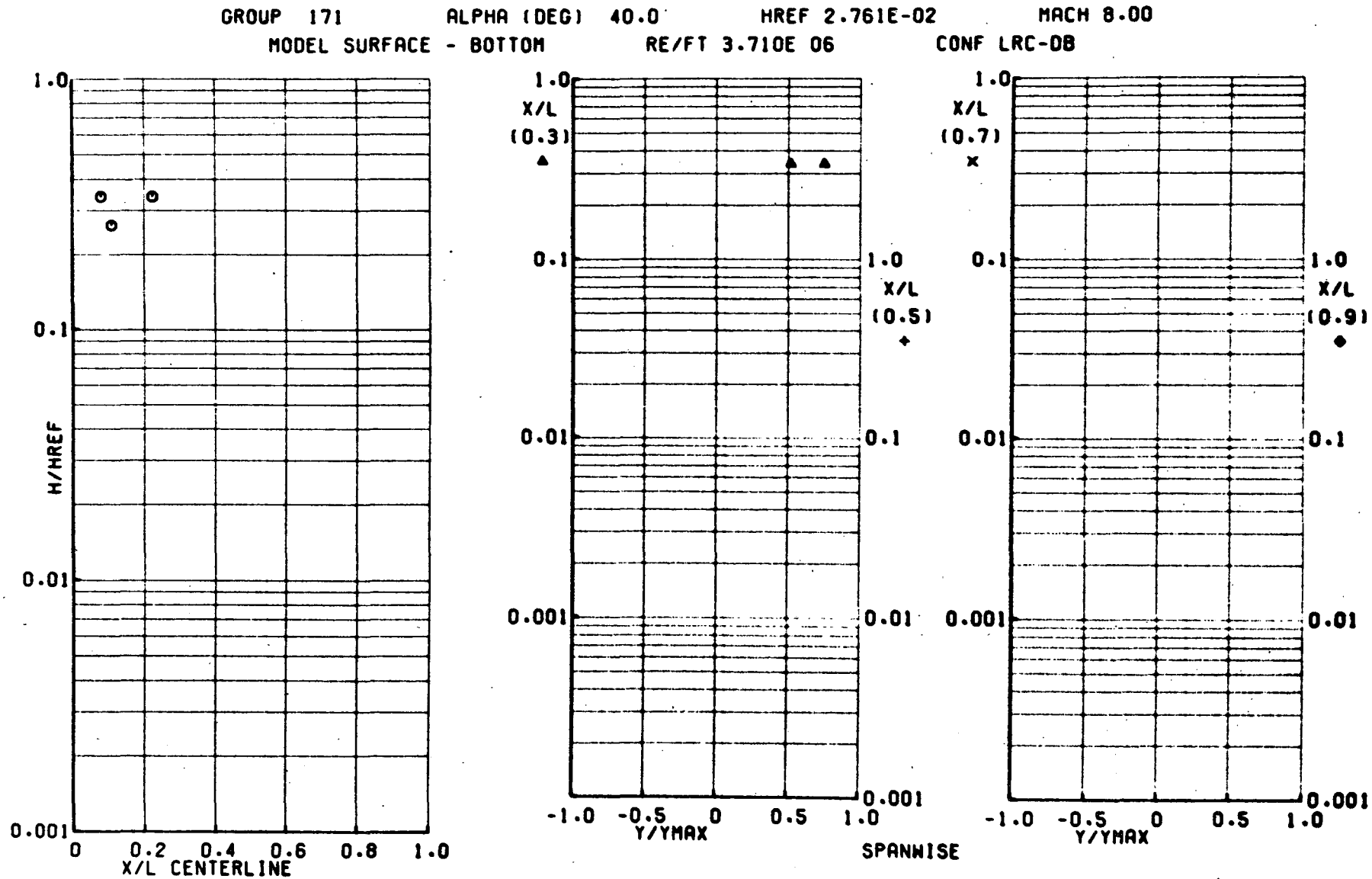
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.761E-02 RE/FT 3.710E 06 CONF LRC-08



GROUP 171 PIC. NO. 3534 H/HREF 2.602E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.761E-02 RE/FT 3.710E 06 CONF LRC-DB




GROUP 171 ALPHA (DEG) 40.0 HREF 2.761E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.710E 06 CONF LRC-08
H/HREF
1.0
0.1
0.01
0.001
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.7)
1.0 X/L (0.5)
1.0 X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

9/17/71

AEDC(AHO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL H
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
348	11	LHC-U8	8.00	865.9	1343	40.00	10.00	50.00	180.00	-.0

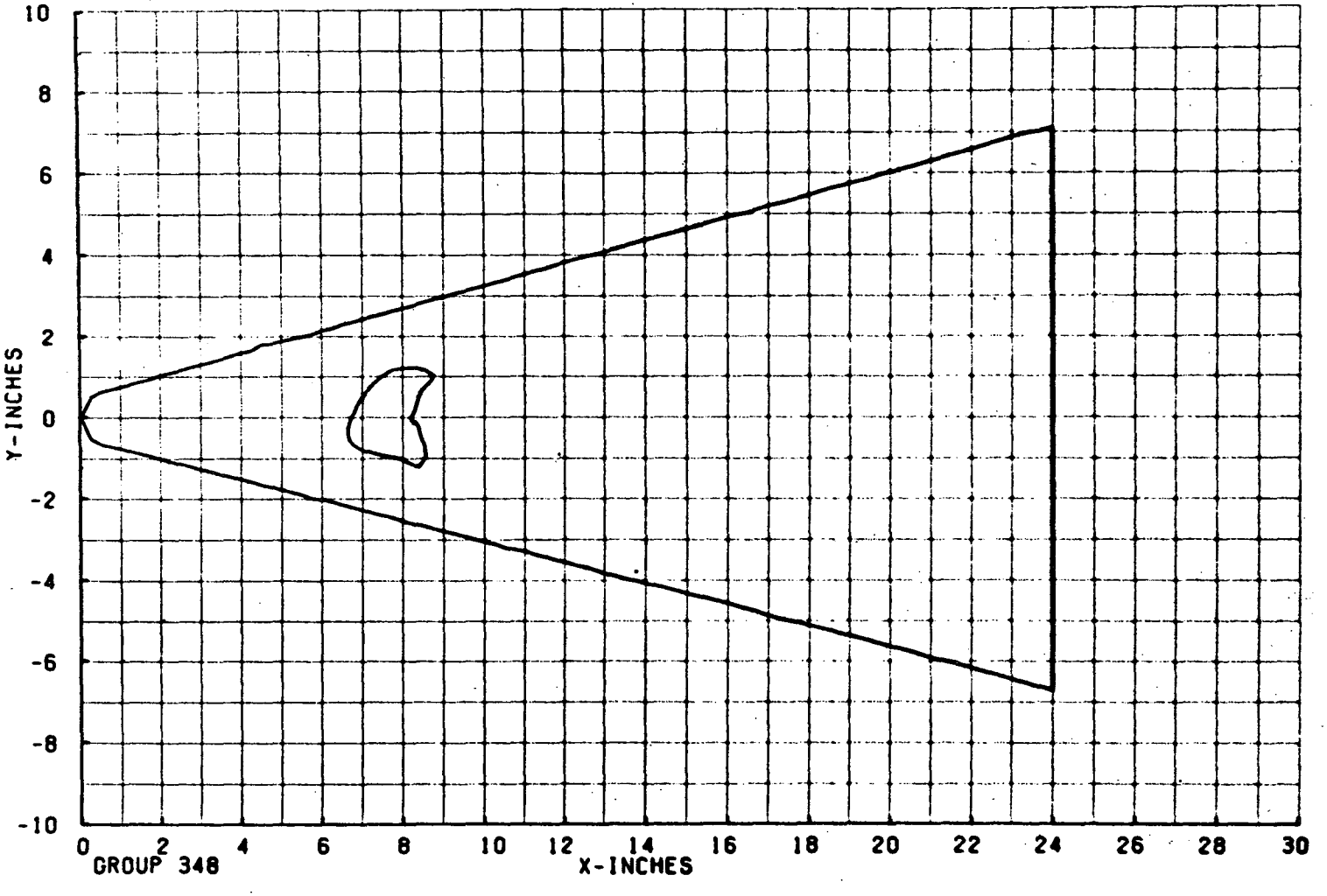
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	SINEF (R= .056FT)
97.3	.0849	3.974	3867	7.648E-05	1.834E-08	3.17E 06	2.776E-02	1.166E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RMUXCXK)
TOP(T)	400		
SIDE(S)	400	AVERAGE Tw = 75	.037
BOTTOM(B)	400		

	PIC NO	TYPE	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.8TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F	
T	836 (400)	3.15	2.03	1.39E-02	.5013	1.874E-02	.6749	2.273E-02	.8187	5.773E-03	75	0	75 76
T	837 (400)	3.70	2.58	1.23E-02	.4446	1.662E-02	.5986	2.016E-02	.7262	5.121E-03	76	0	74 76
T	839 (400)	4.75	3.63	1.04E-02	.3749	1.401E-02	.5047	1.699E-02	.6122	4.319E-03	77	0	74 76
T	840 (400)	5.25	4.13	9.75E-03	.3514	1.313E-02	.4731	1.593E-02	.5738	4.048E-03	78	0	74 76
T	842 (400)	6.30	5.18	8.71E-03	.3138	1.172E-02	.4225	1.422E-02	.5124	3.615E-03	81	0	75 76
T	844 (400)	7.35	6.23	7.94E-03	.2862	1.069E-02	.3854	1.297E-02	.4675	3.299E-03	85	0	76 76
T	851 (400)	11.05	9.93	6.29E-03	.2266	8.467E-03	.3051	1.027E-02	.3700	2.609E-03	103	0	79 79
T	860 (400)	15.80	14.68	5.17E-03	.1864	6.963E-03	.2509	8.447E-03	.3044	2.146E-03	128	0	88 84

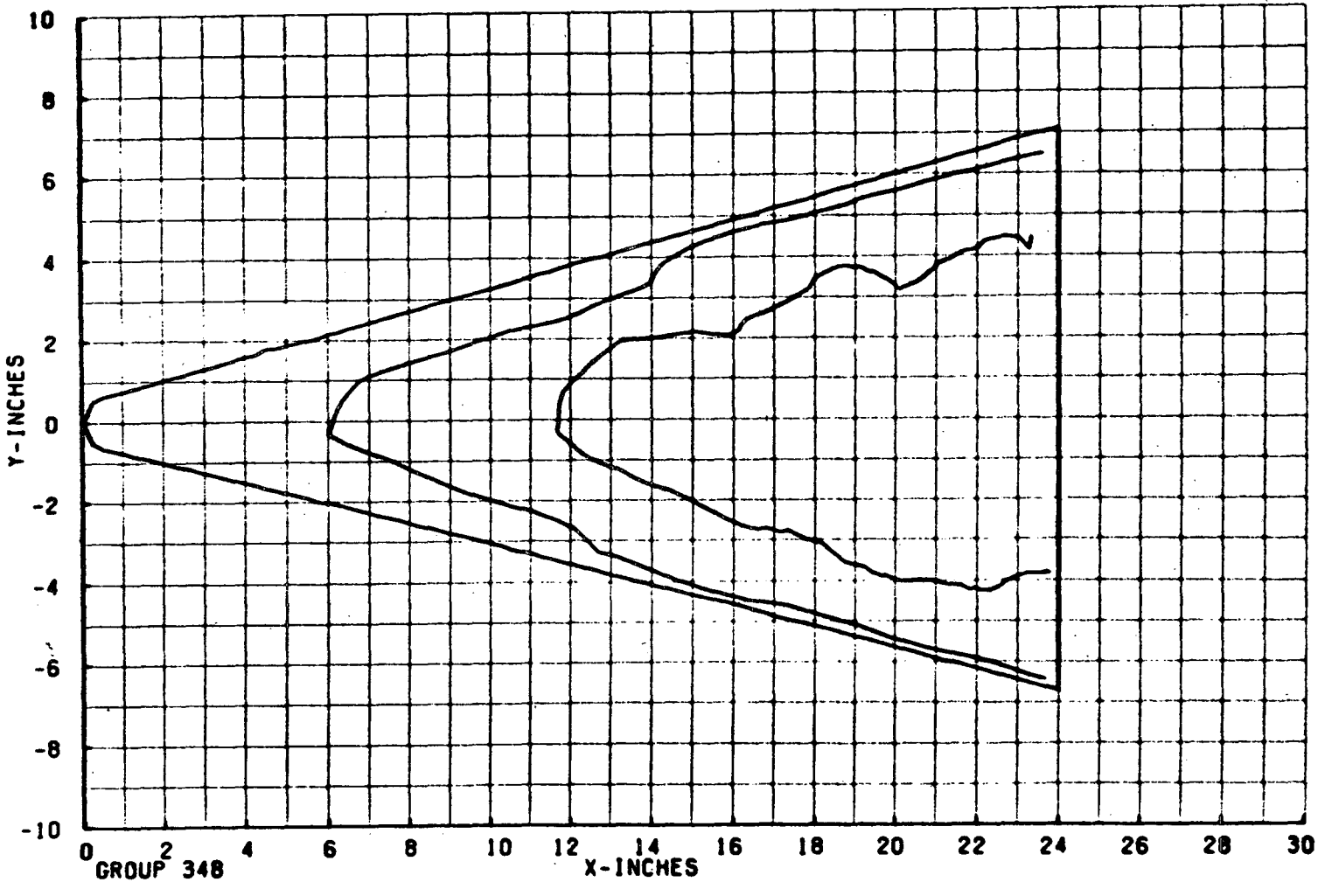
GROUP 348 PIC. NO. 836 H/HREF 5.013E-01 MODEL SURFACE - BOTTOM

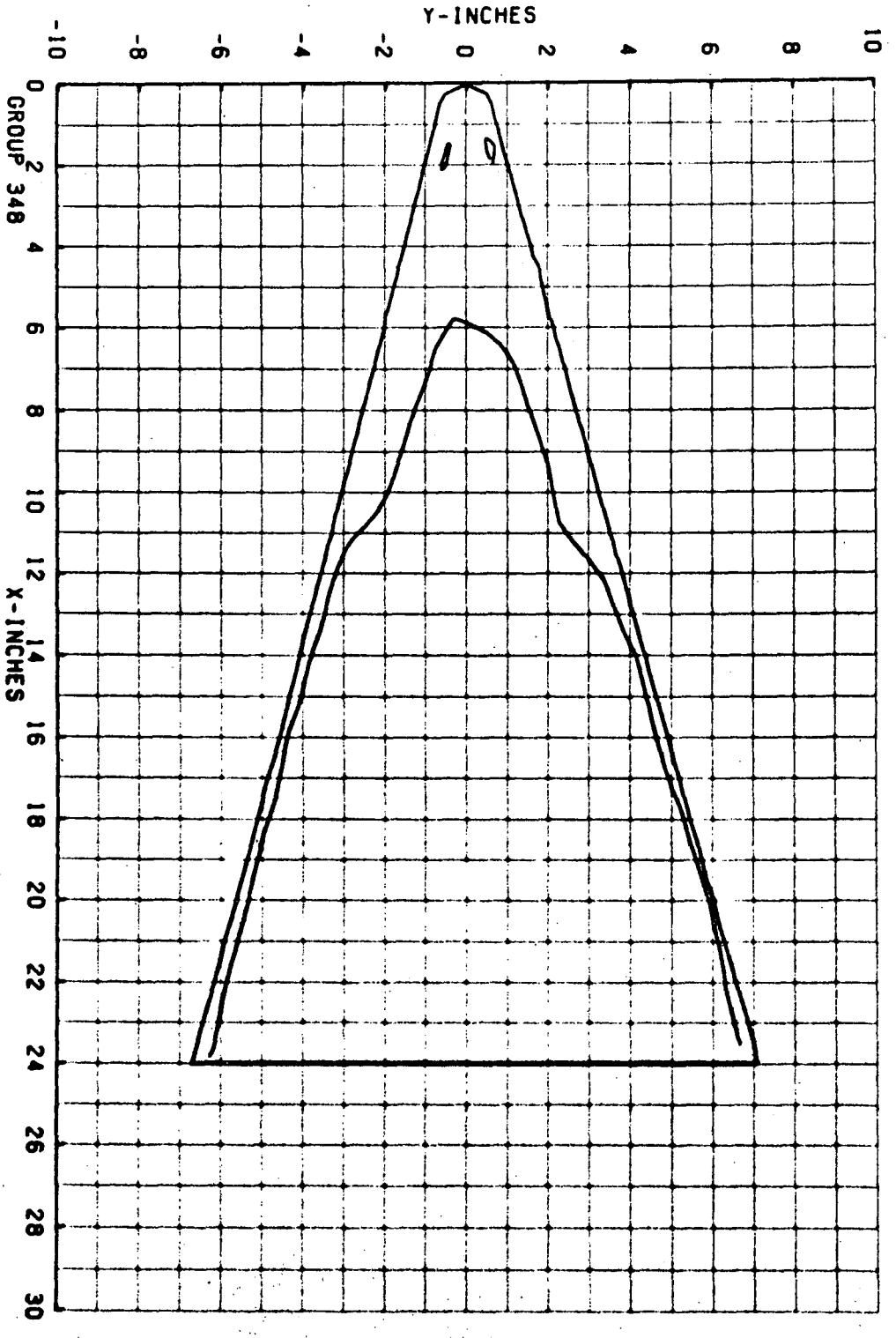
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-DB



GROUP 348 PIC. NO. 837 H/HREF 4.446E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-DB



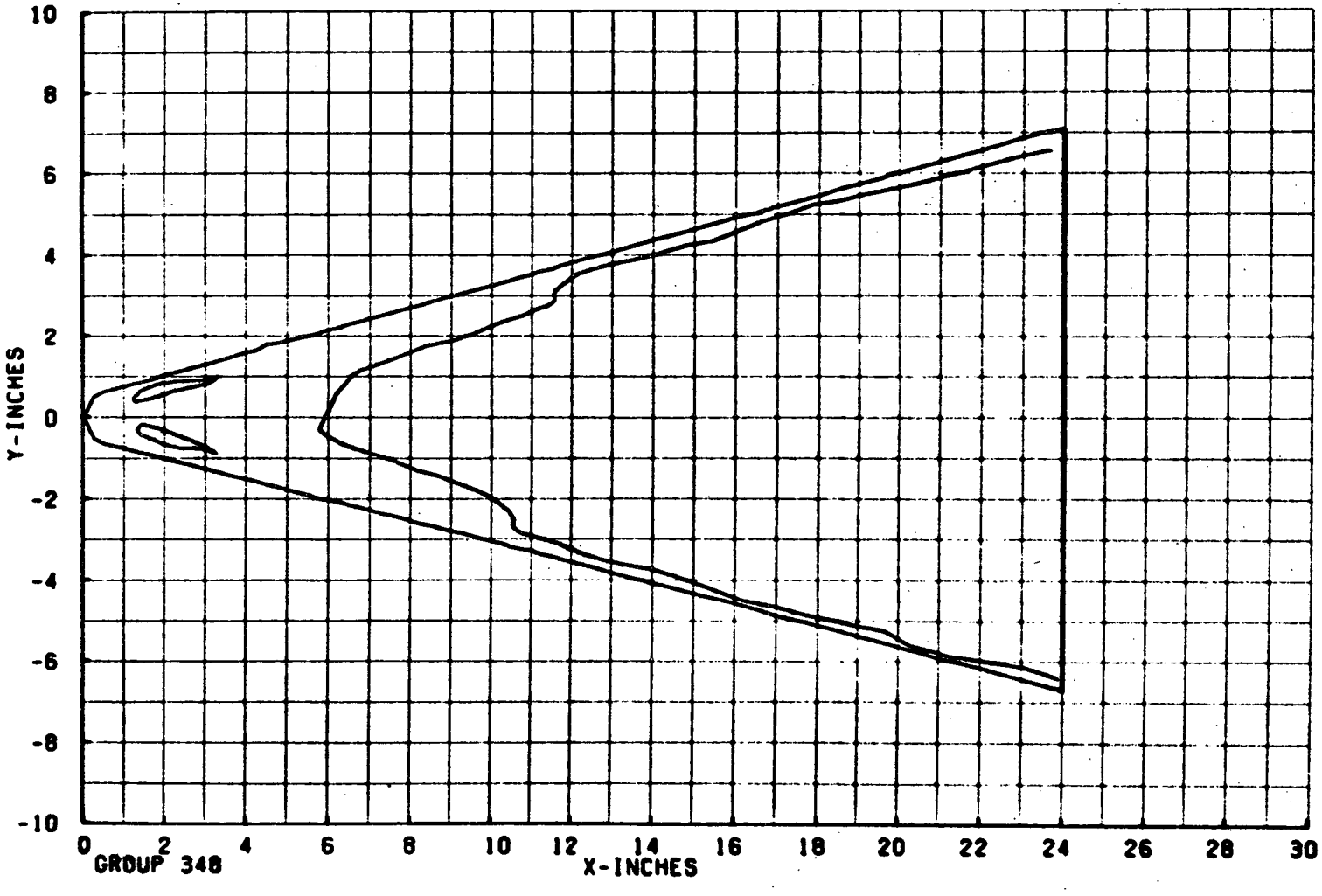


GROUP 348 PIC. NO. 839 H/HREF 3.749E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-08

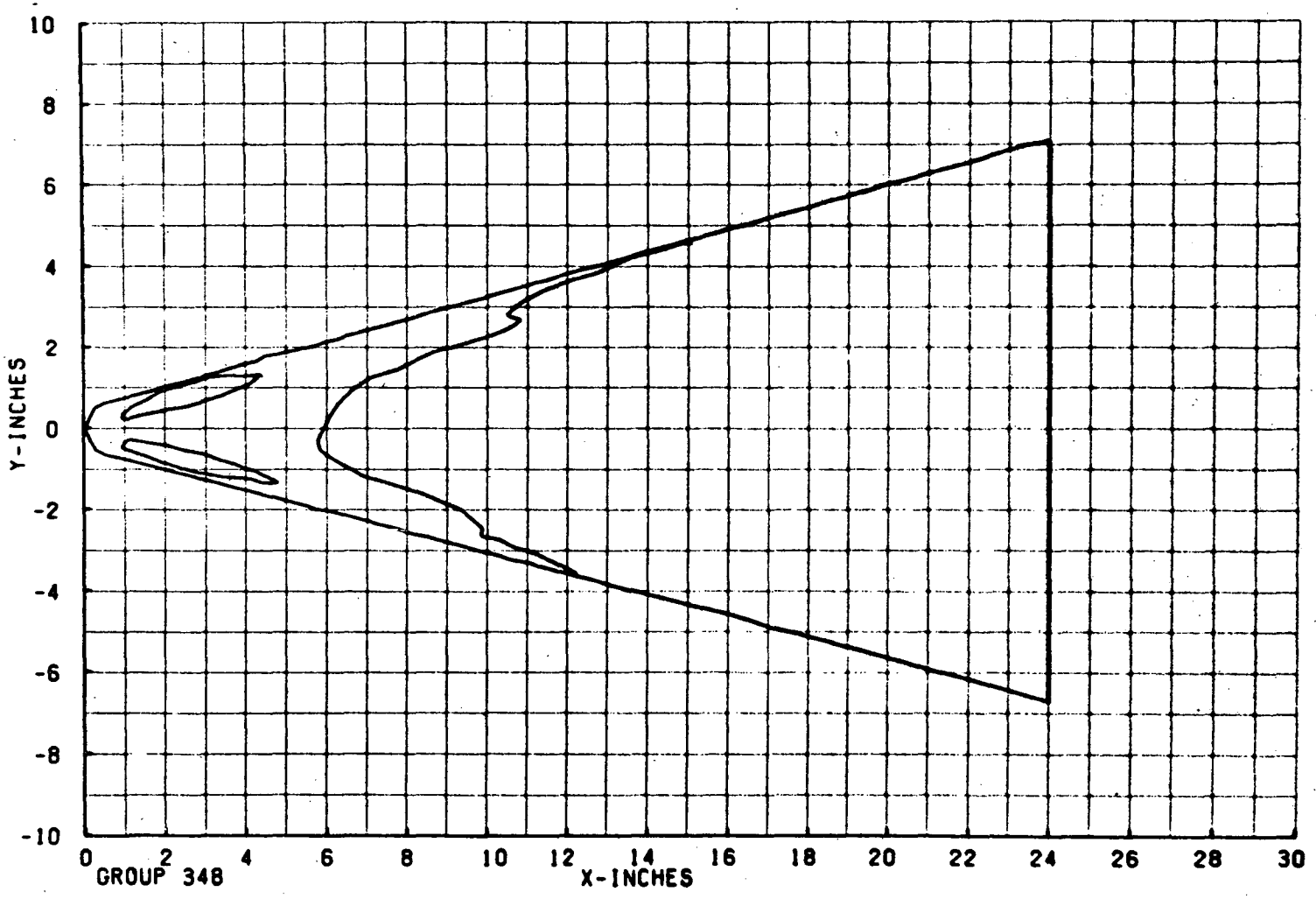
GROUP 348 PIC. NO. 840 H/HREF 3.514E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-08



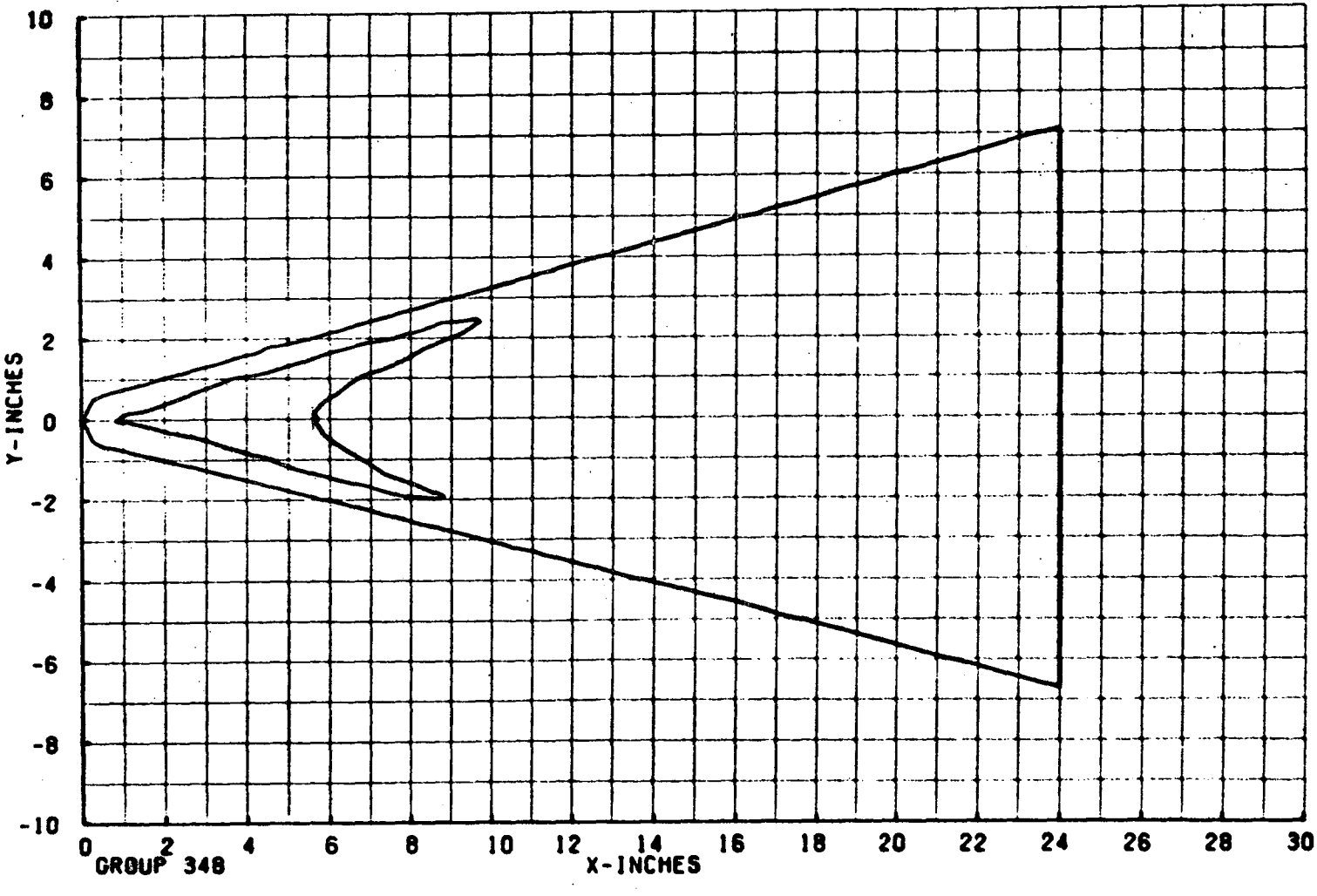
GROUP 348 PIC. NO. 842 H/HREF 3.138E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-D8



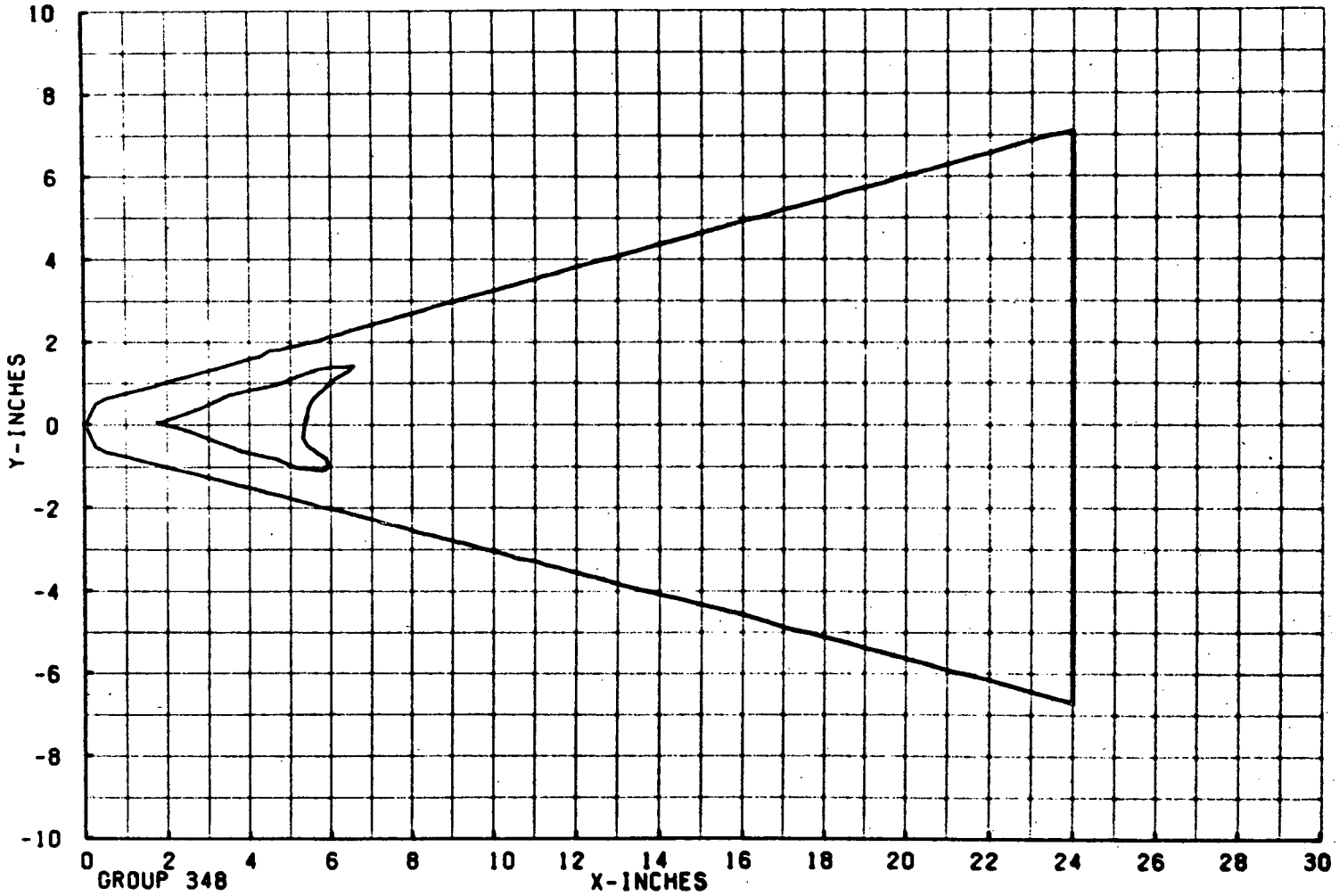
GROUP 348 PIC. NO. 844 H/HREF 2.862E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-DB



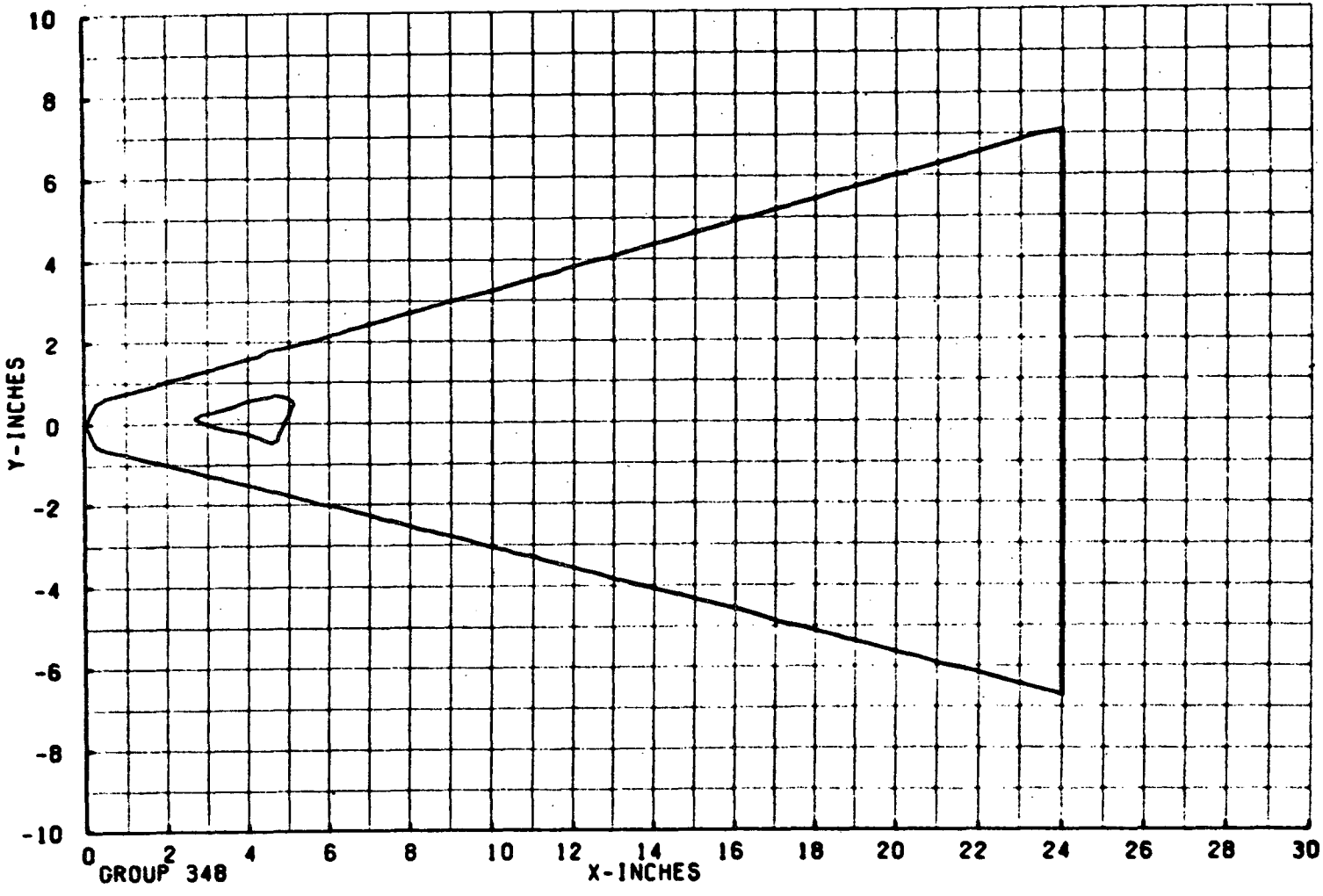
GROUP 348 PIC. NO. 851 H/HREF 2.266E-01 MODEL SURFACE - BOTTOM

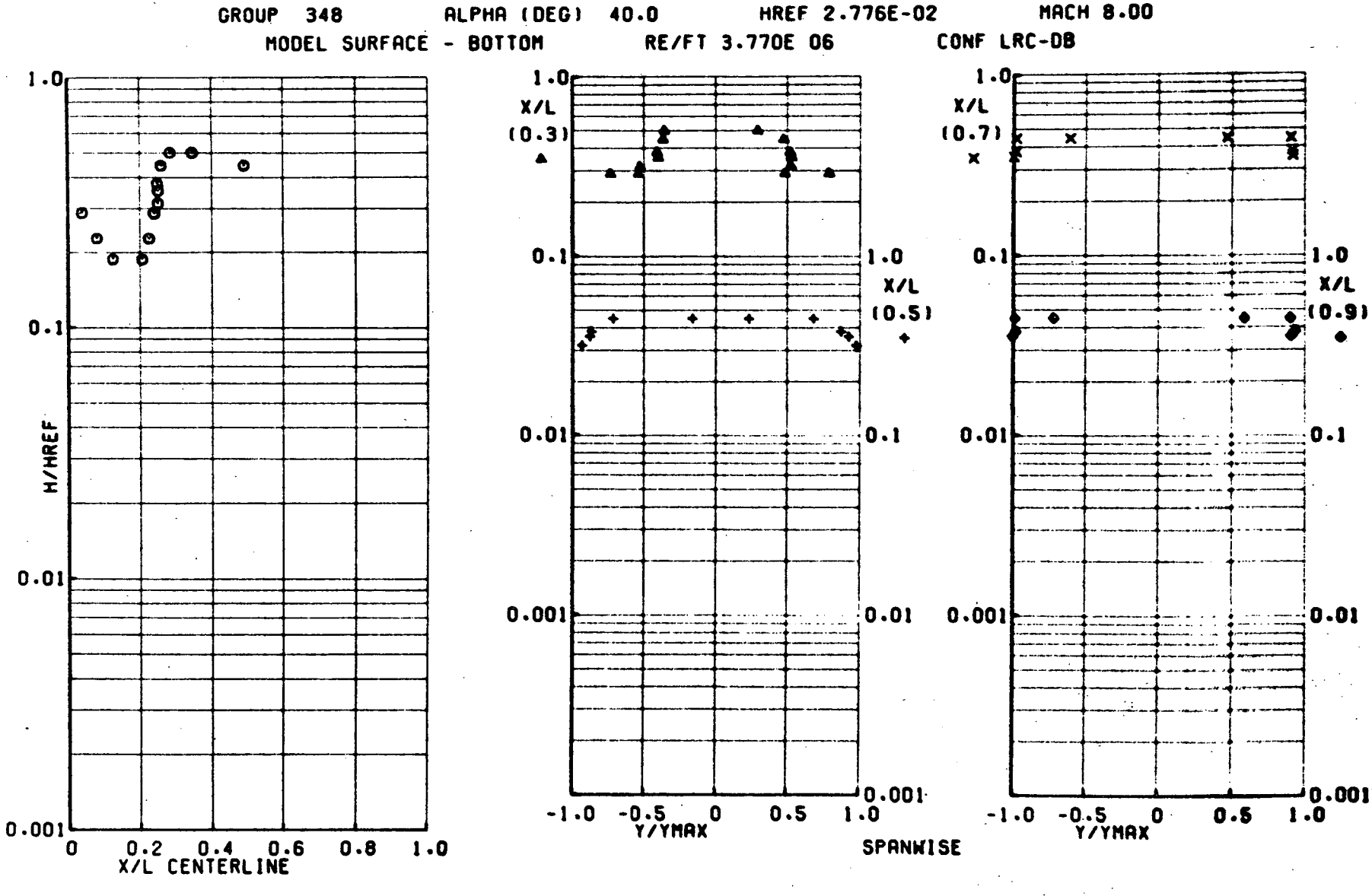
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-08



GROUP 348 PIC. NO. 860 H/HREF 1.864E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.776E-02 RE/FT 3.770E 06 CONF LRC-DB




GROUP 348 ALPHA (DEG) 40.0 HREF 2.776E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.770E 06 CONF LRC-DB
H/HREF
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
Y/YMAX
SPANWISE

9/17/71

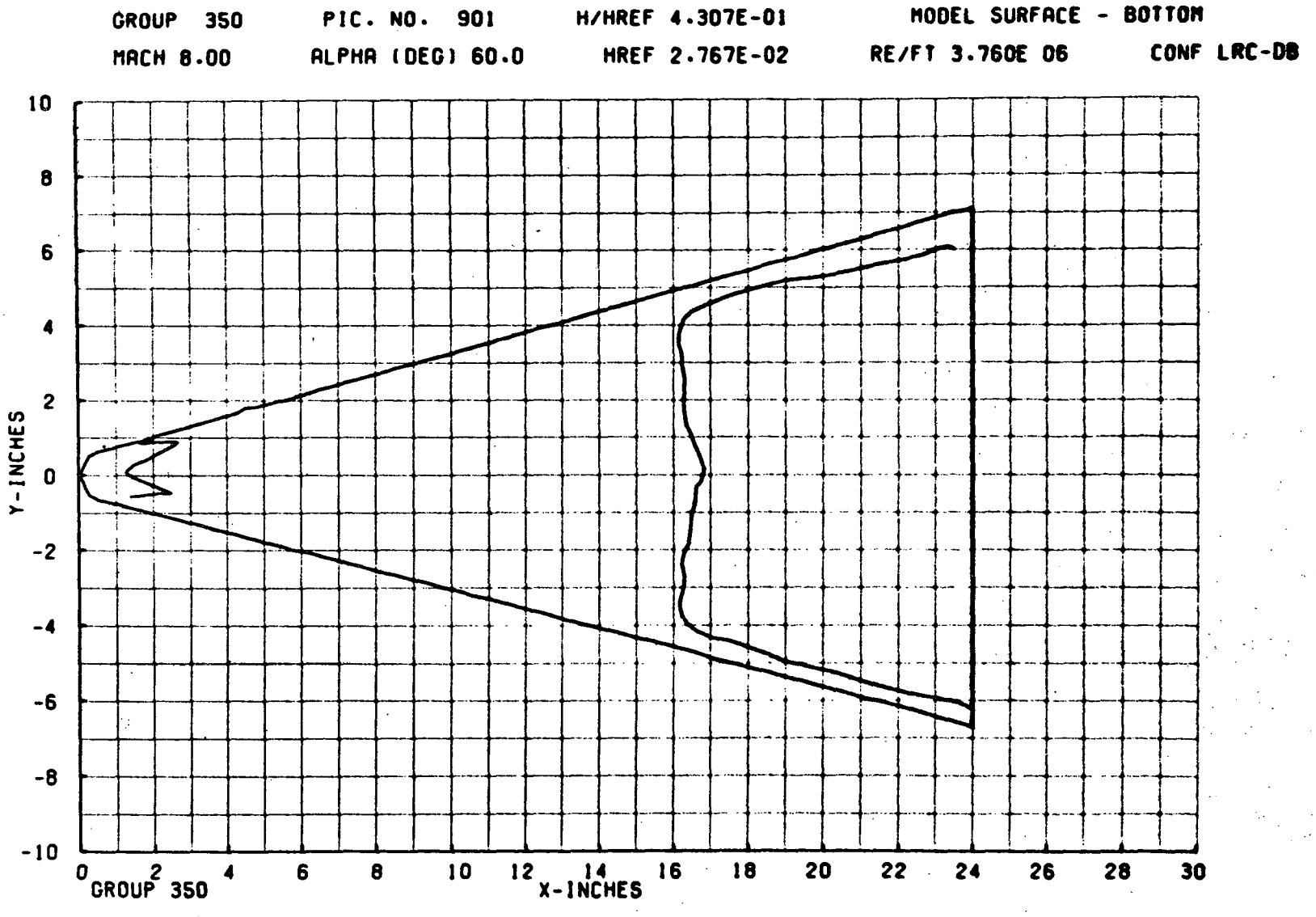
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL H
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
350	11	LRC-08	8.00	861.1	1341	60.00	-10.00	50.00	180.00	-.0

T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
97.2	.048	3.952	3864	7.616E-05	7.823E-08	3.76E 06	2.767E-02	1.169E-02

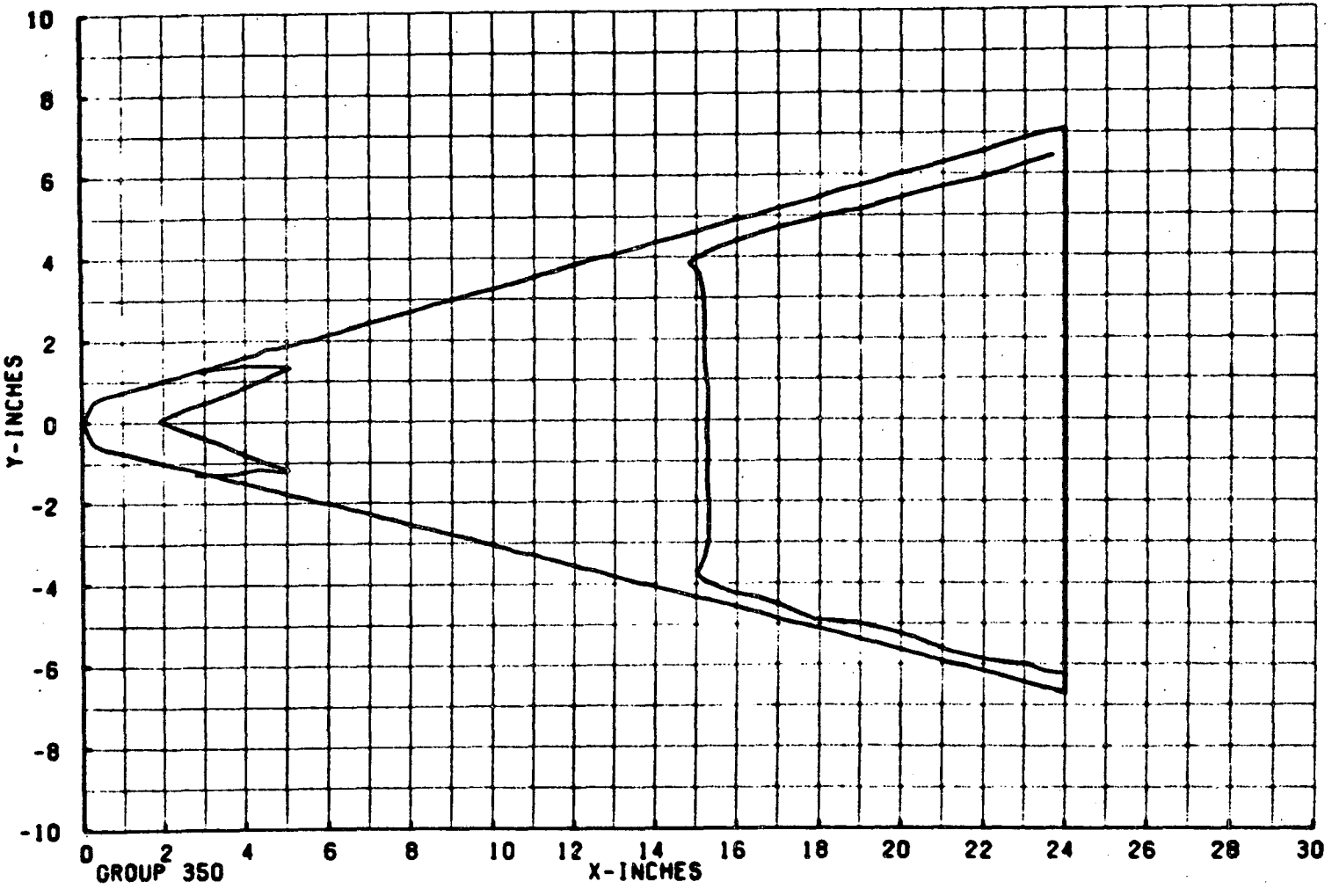
CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	400		
SIDE(S)	400	AVERAGE TW = 90	.037
BOTTOM(B)	400		

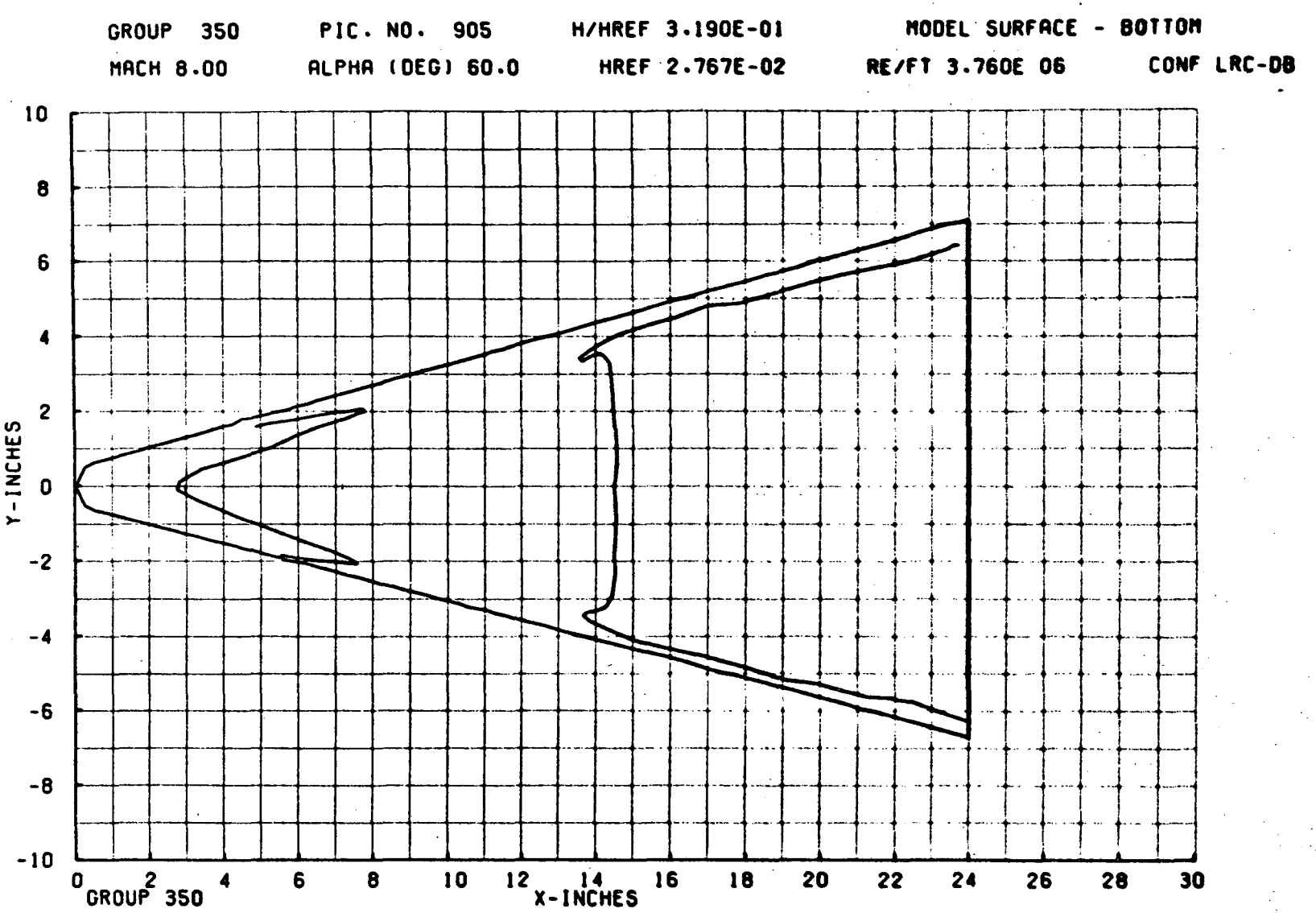
PIC	NO		TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP	F	
T	901	(400)	3.70	2.55	1.19E-02	.4307	1.607E-02	.5807	1.952E-02	.7051	4.973E-03	86	66	0	85
T	903	(400)	4.75	3.60	1.00E-02	.3625	1.353E-02	.4887	1.643E-02	.5934	4.184E-03	88	52	0	85
T	905	(400)	5.80	4.65	8.83E-03	.3190	1.190E-02	.4301	1.445E-02	.5223	3.685E-03	91	89	0	85
T	907	(400)	6.85	5.70	7.97E-03	.2880	1.075E-02	.3883	1.305E-02	.4715	3.326E-03	94	91	0	85
T	910	(400)	8.45	7.30	7.05E-03	.2545	9.499E-03	.3431	1.153E-02	.4166	2.939E-03	100	95	0	86
T	915	(400)	11.10	9.95	6.03E-03	.2180	8.136E-03	.2939	9.879E-03	.3569	2.516E-03	112	103	0	87
T	920	(400)	13.70	12.55	5.37E-03	.1941	7.244E-03	.2617	8.797E-03	.3177	2.240E-03	124	111	0	89


GROUP 350 PIC. NO. 901 H/HREF 4.307E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-D8
Y-INCHES
X-INCHES
GROUP 350
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

GROUP 350 PIC. NO. 903 H/HREF 3.625E-01 MODEL SURFACE - BOTTOM

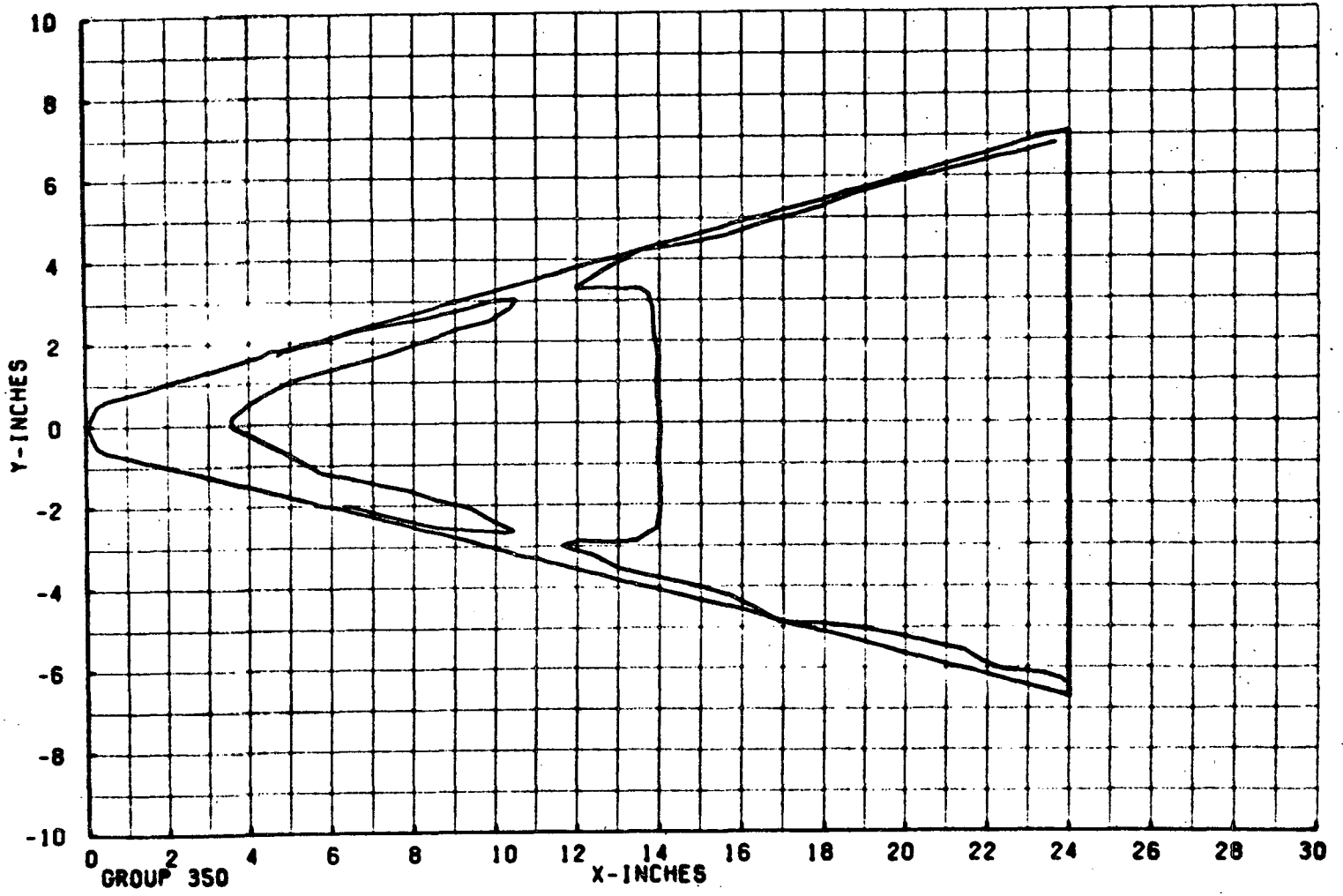
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-DB




GROUP 350 PIC. NO. 905 H/HREF 3.190E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-DB
Y-INCHES
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
X-INCHES
GROUP 350

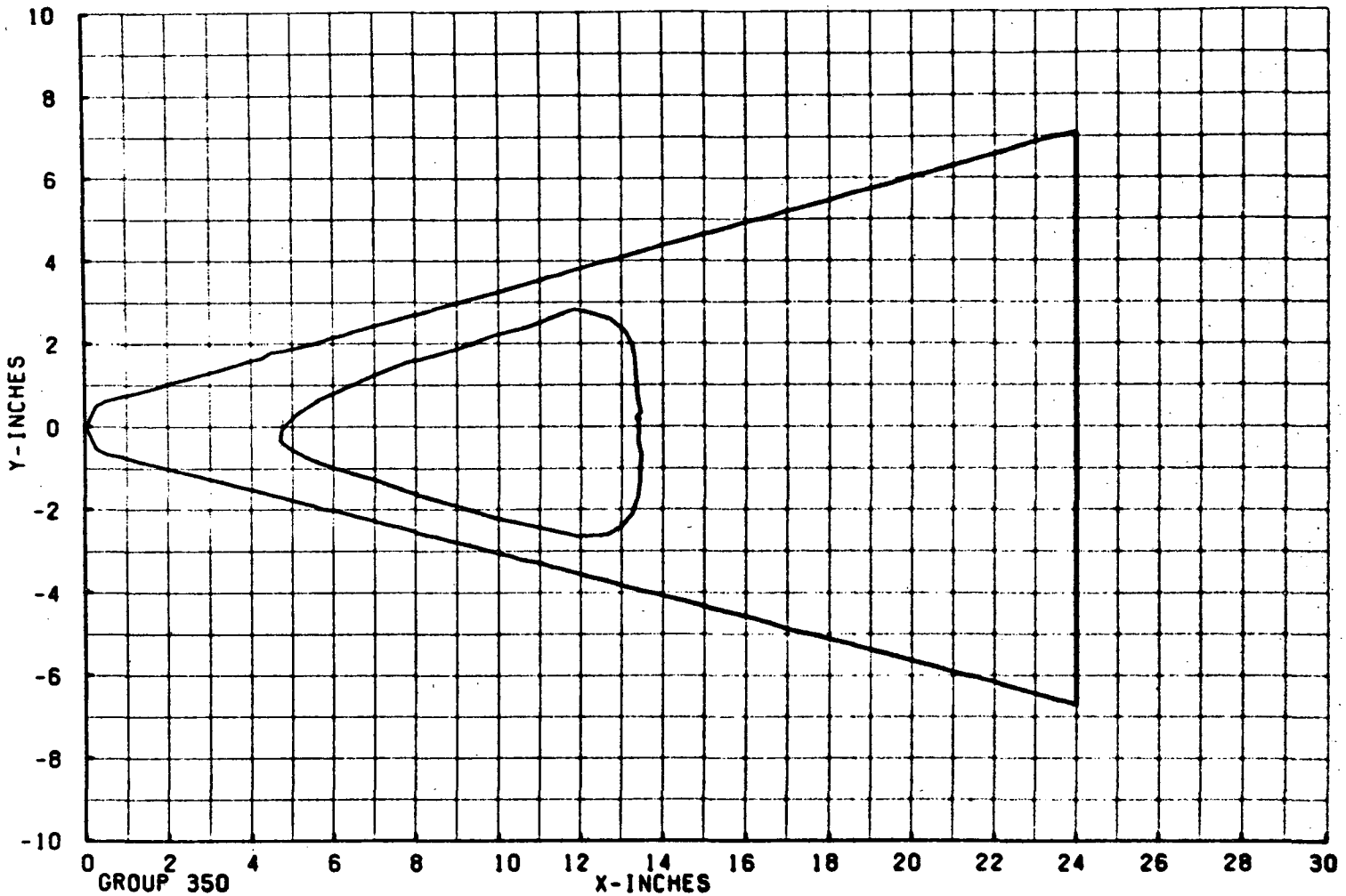
GROUP 350 PIC. NO. 907 H/HREF 2.880E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-DB



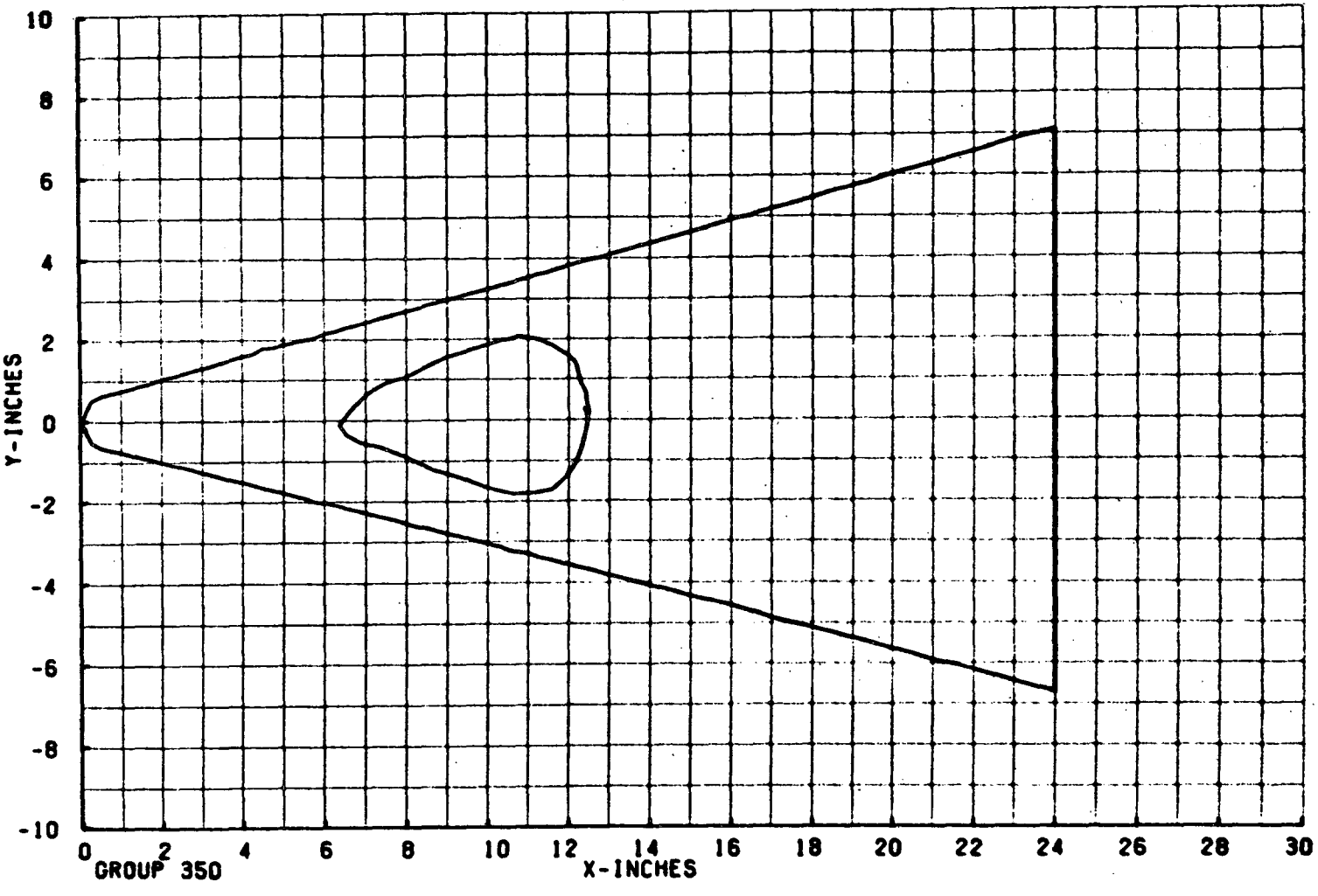
GROUP 350 PIC. NO. 910 H/HREF 2.545E-01 MODEL SURFACE - BOTTOM

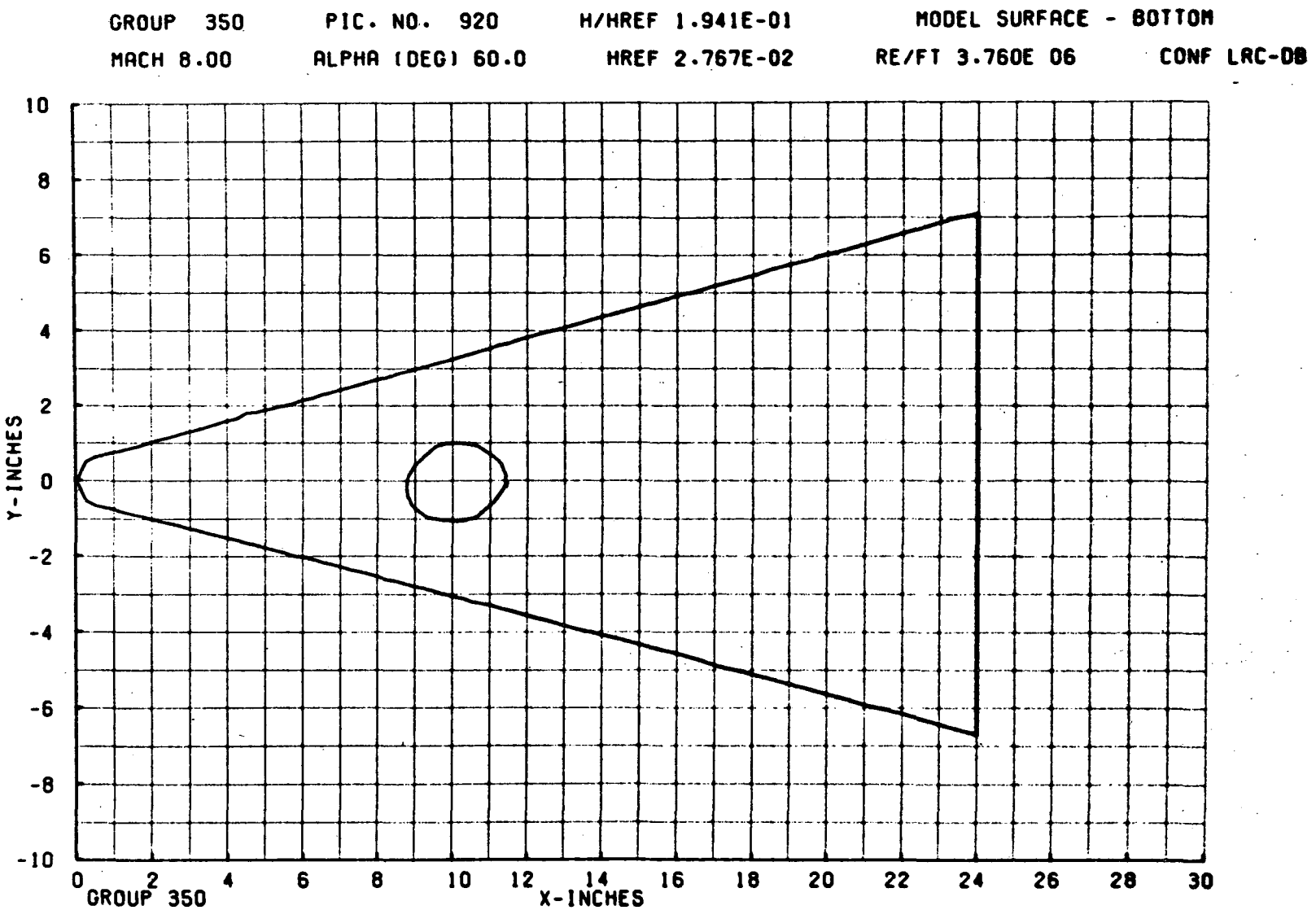
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-DB



GROUP 350 PIC. NO. 915 H/HREF 2.180E-01 MODEL SURFACE - BOTTOM

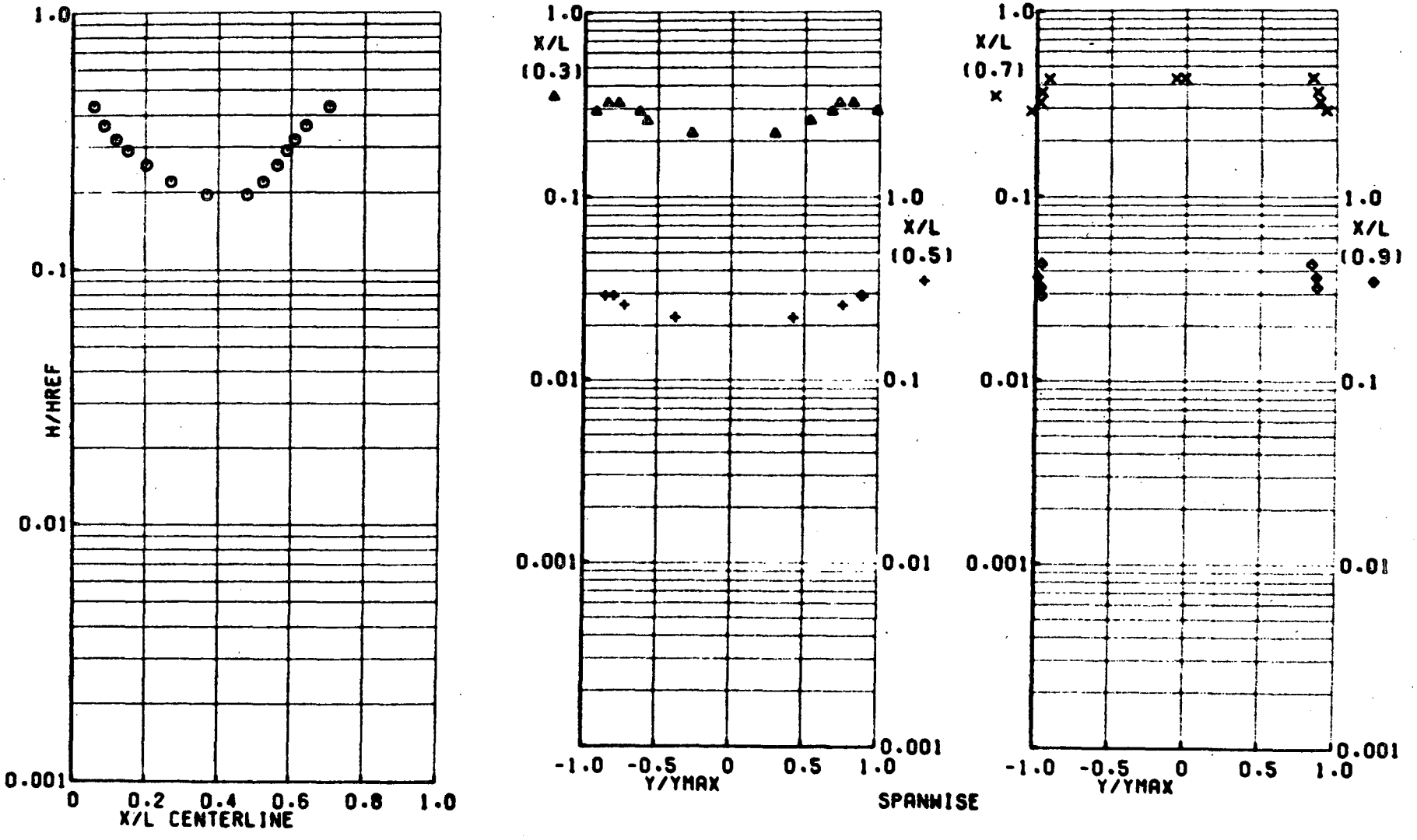
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-DB




GROUP 350 PIC. NO. 920 H/HREF 1.941E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.767E-02 RE/FT 3.760E 06 CONF LRC-08
Y-INCHES
X-INCHES
GROUP 350

GROUP 350 ALPHA (DEG) 60.0 HREF 2.767E-02 MACH 8.00

MODEL SURFACE - BOTTOM RE/FT 3.760E 06 CONF LRC-08



6/ 1/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
143	12	LRC-SR	8.00	554.8	1306	19.99	3.01	-23.00	180.00	.0

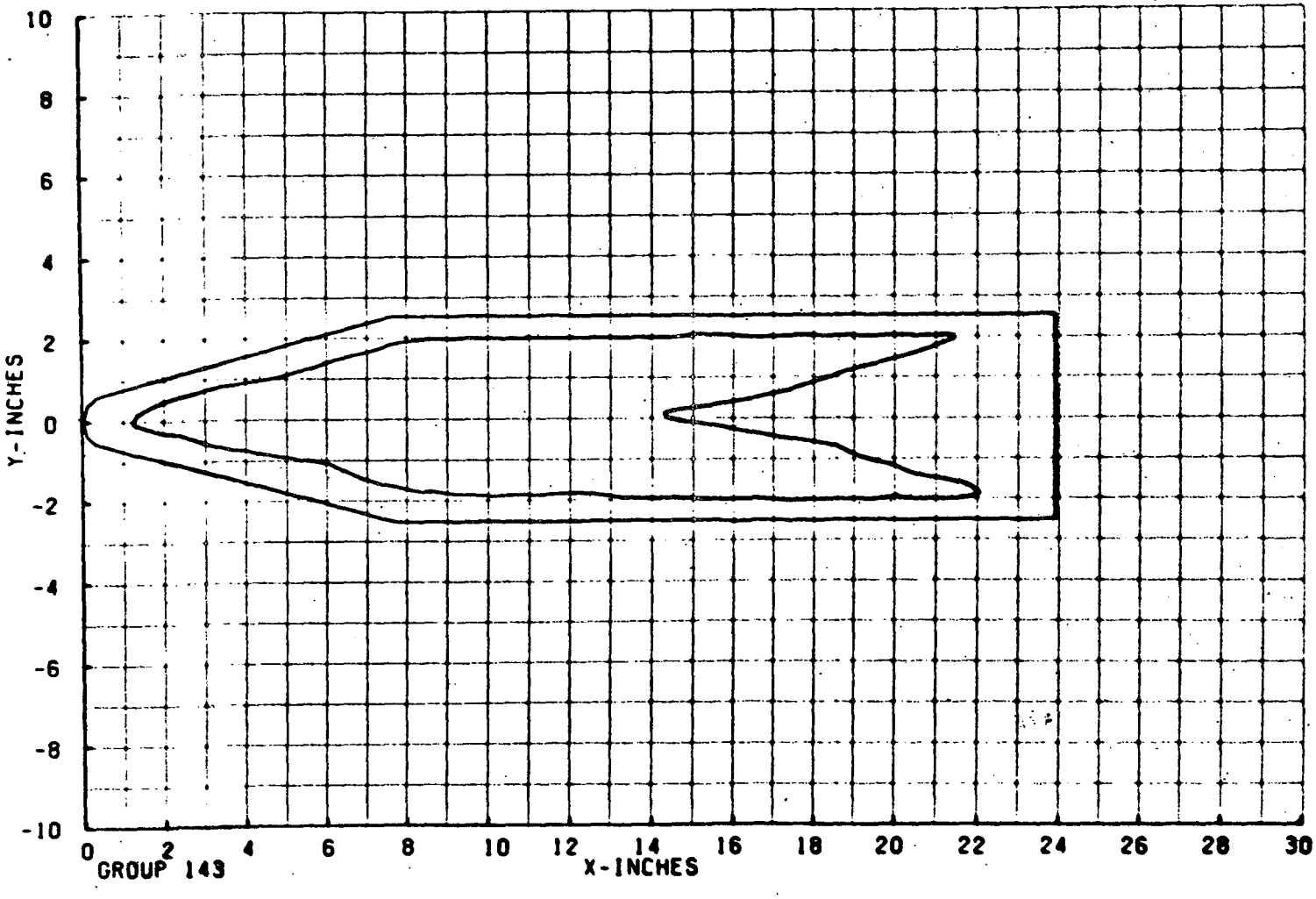
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
94.6	.057	2.546	3813	5.038E-05	7.619E-08	2.52E 06	2.211E-02	1.433E-02

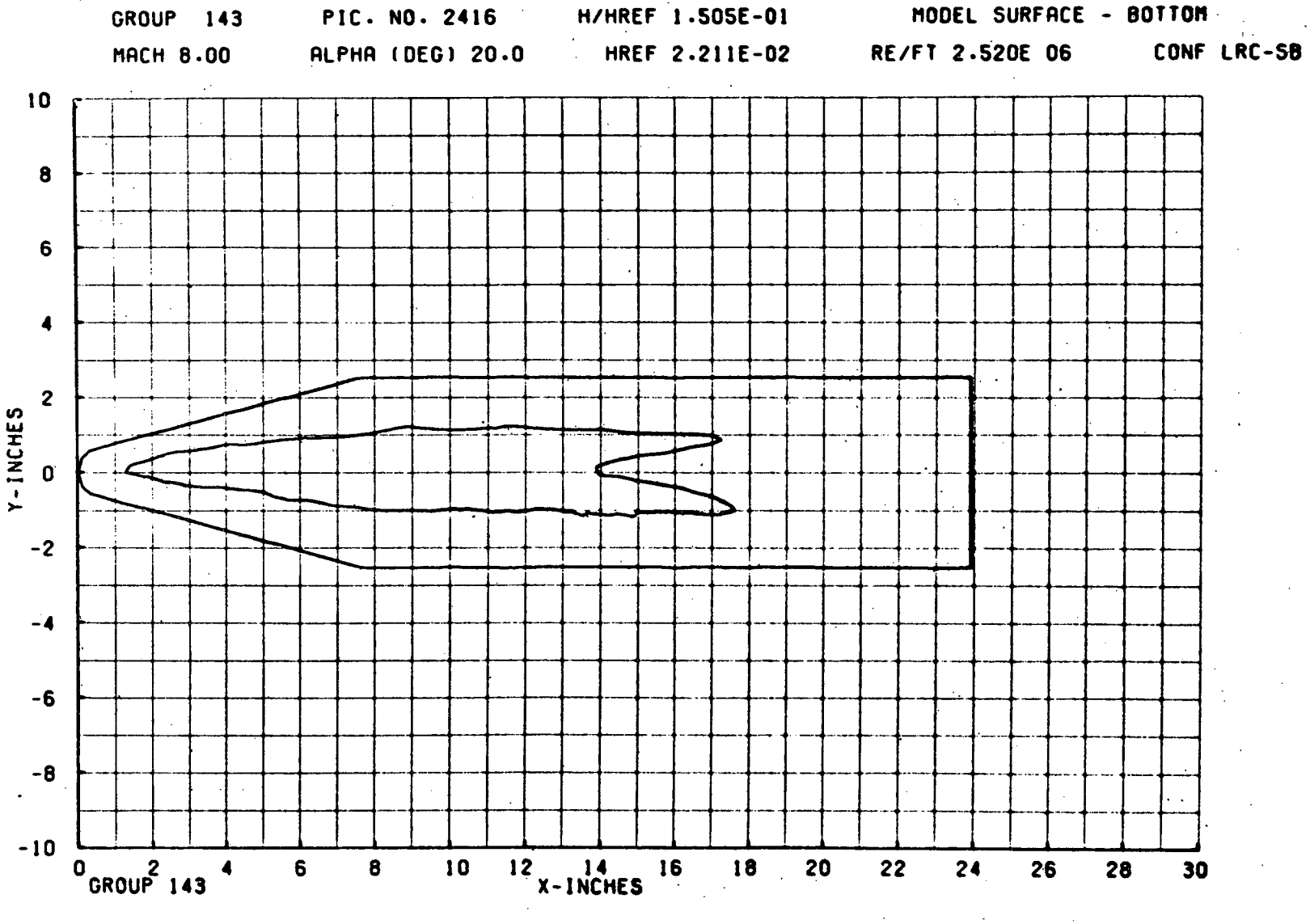
CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	125		
SIDE(S)	125	AVERAGE Tw = 79	-0.008(SQUARE ROOT OF TIME) + 0.11
BOTTOM(B)	125		

	PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T	2414 (125)	2.65	1.61	4.40E-03	.1992	5.363E-03	.2426	6.020E-03	.2723	2.862E-03	80	78	0	0
T	2416 (125)	3.70	2.66	3.33E-03	.1505	4.052E-03	.1832	4.548E-03	.2057	2.161E-03	79	78	0	0
T	2422 (125)	6.85	5.81	2.11E-03	.0953	2.566E-03	.1160	2.880E-03	.1302	1.369E-03	80	80	0	0
T	2436 (125)	14.20	13.16	1.25E-03	.0565	1.522E-03	.0688	1.708E-03	.0773	8.125E-04	84	93	0	0

GROUP 143 PIC. NO. 2414 H/HREF 1.992E-01 MODEL SURFACE - BOTTOM

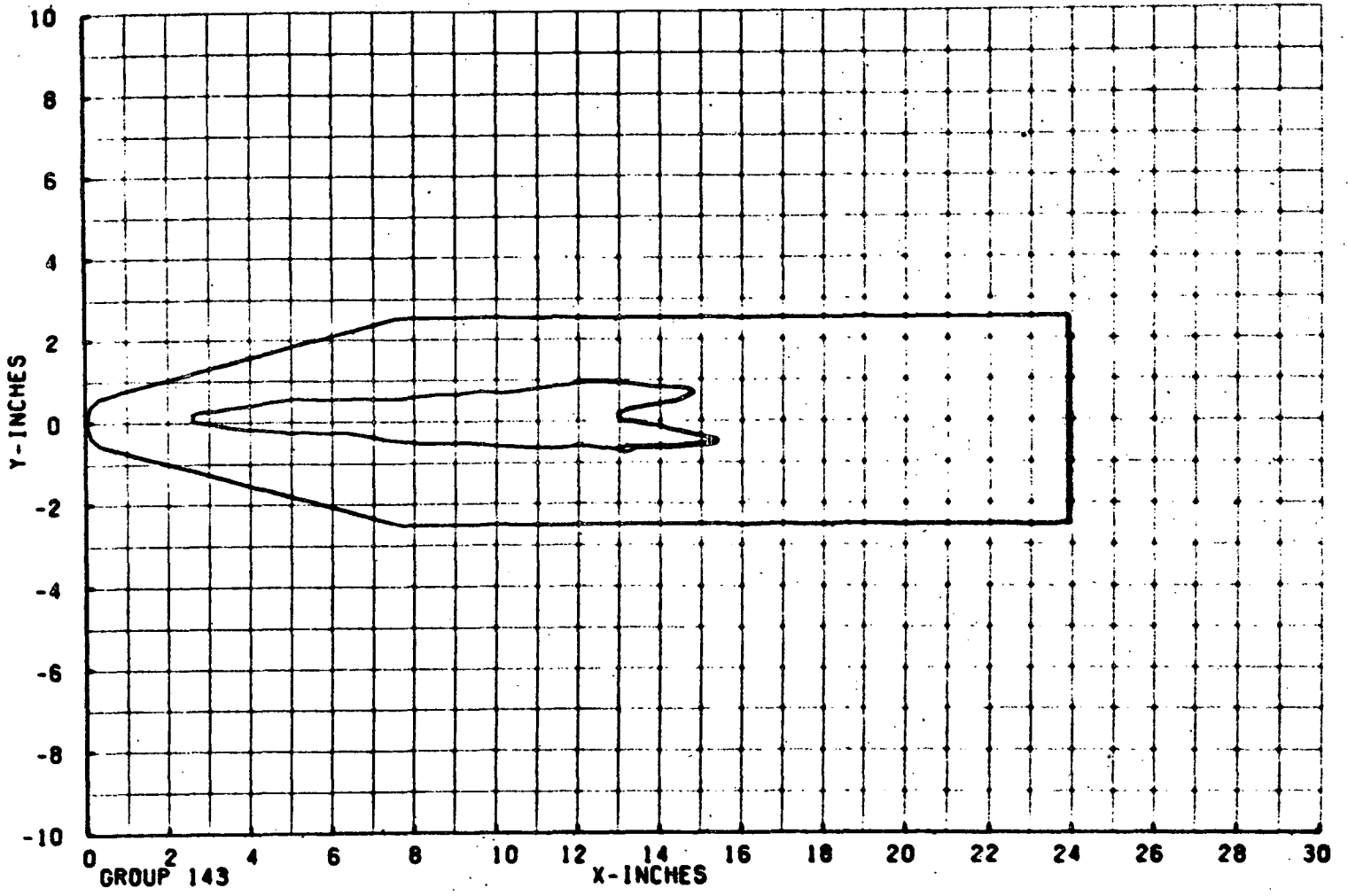
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.211E-02 RE/FT 2.520E 06 CONF LRC-SB




GROUP 143 PIC. NO. 2416 M/MREF 1.505E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 20.0 MREF 2.211E-02 RE/FT 2.520E 06 CONF LRC-SB
Y-INCHES
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
X-INCHES
GROUP 143

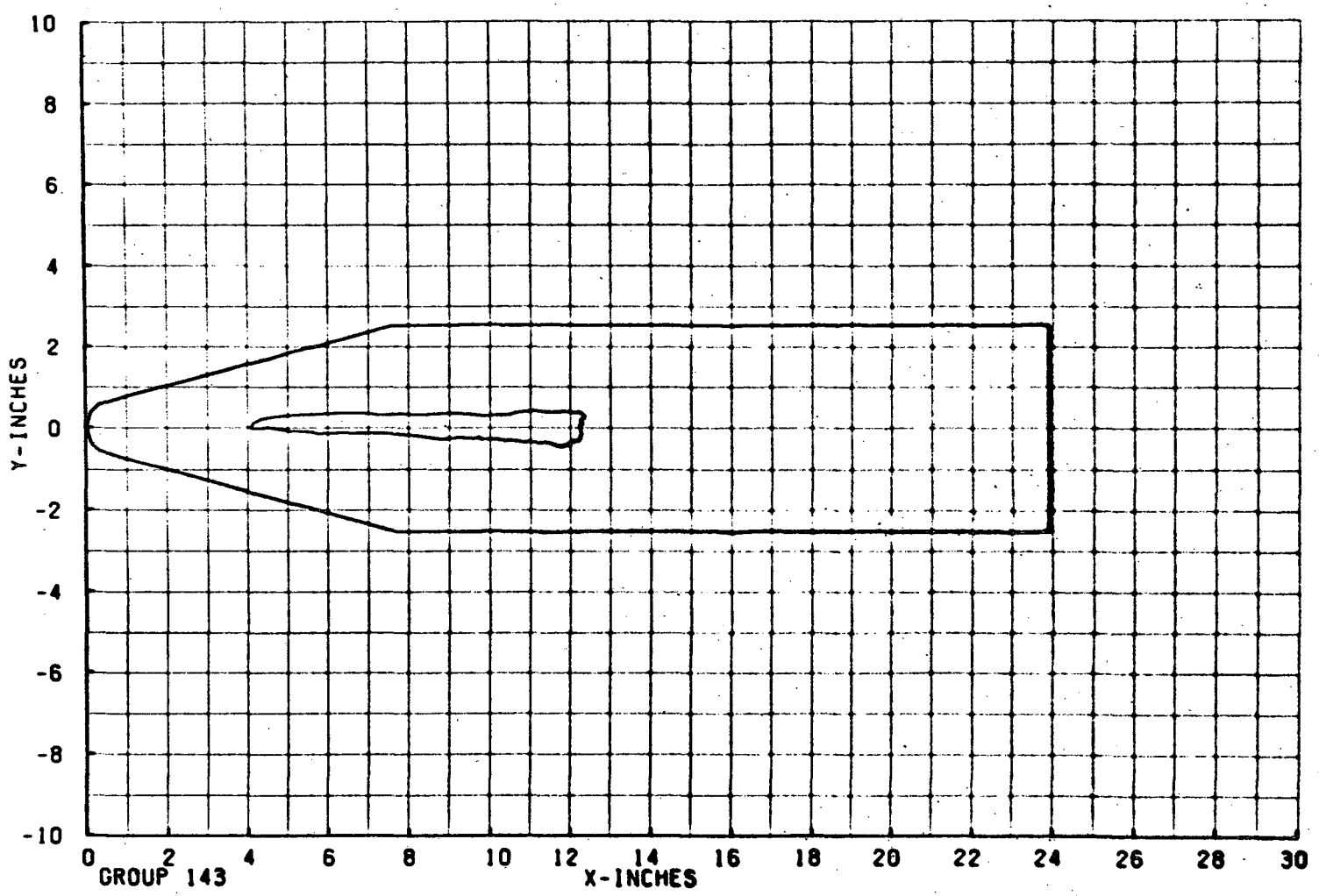
GROUP 143 PIC. NO. 2422 H/HREF 9.530E-02 MODEL SURFACE - BOTTOM

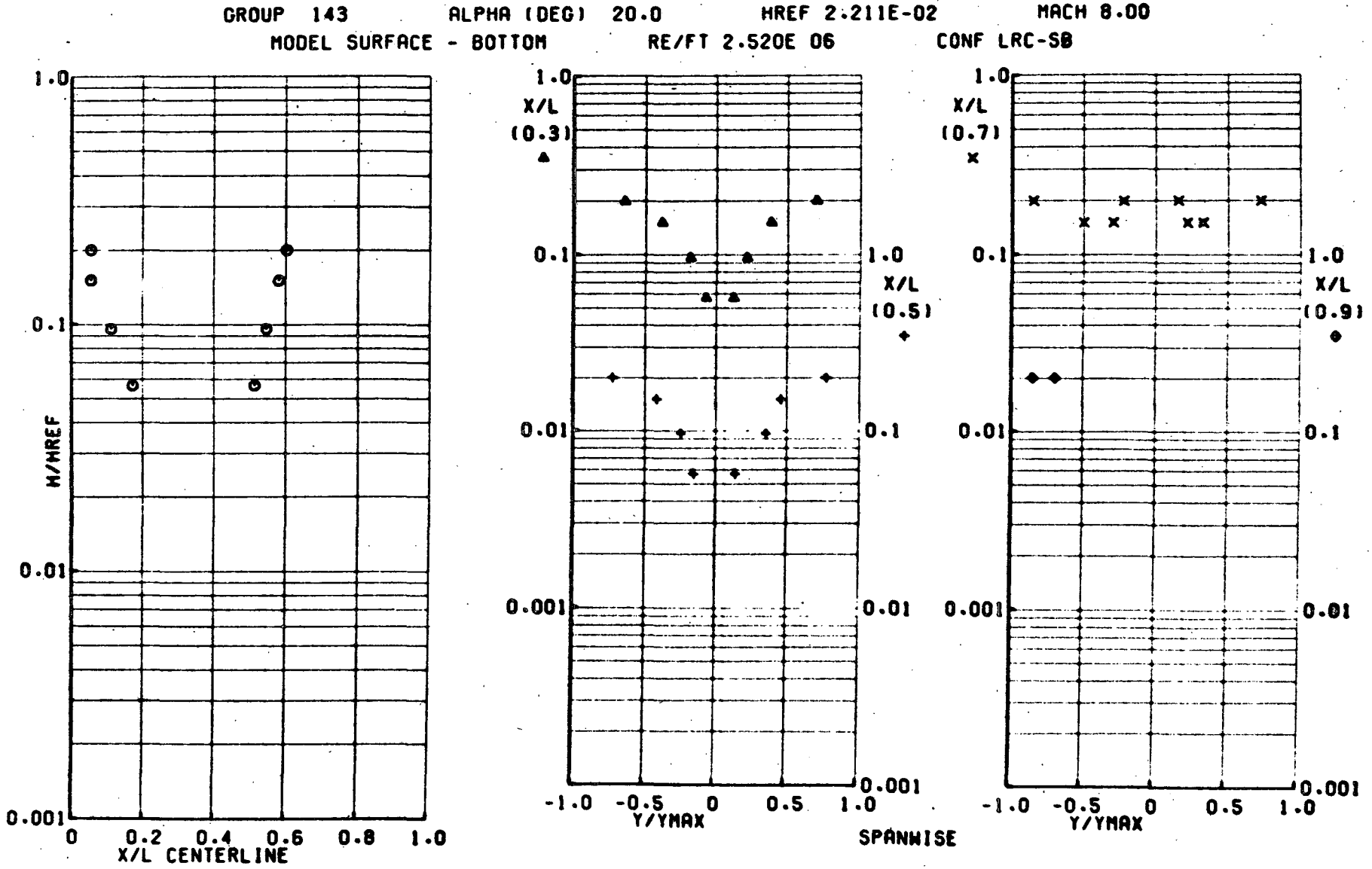
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.211E-02 RE/FT 2.520E 06 CONF LRC-SB



GROUP 143 PIC. NO. 2436 H/HREF 5.650E-02 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.211E-02 RE/FT 2.520E 06 CONF LRC-SB




GROUP 143 ALPHA (DEG) 20.0 HREF 2.211E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 2.520E 06 CONF LRC-SB
H/HREF
1.0
0.1
0.01
0.001
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

9/17/71

AEDC(AHO•INC.) ARNOLD AFS• TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11162

GROOP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PHEBEND	ROLL-MODEL	YAW
358	12	LRC-5H	8.00	555.5	1307	40.00	10.00	50.00	180.00	-.0

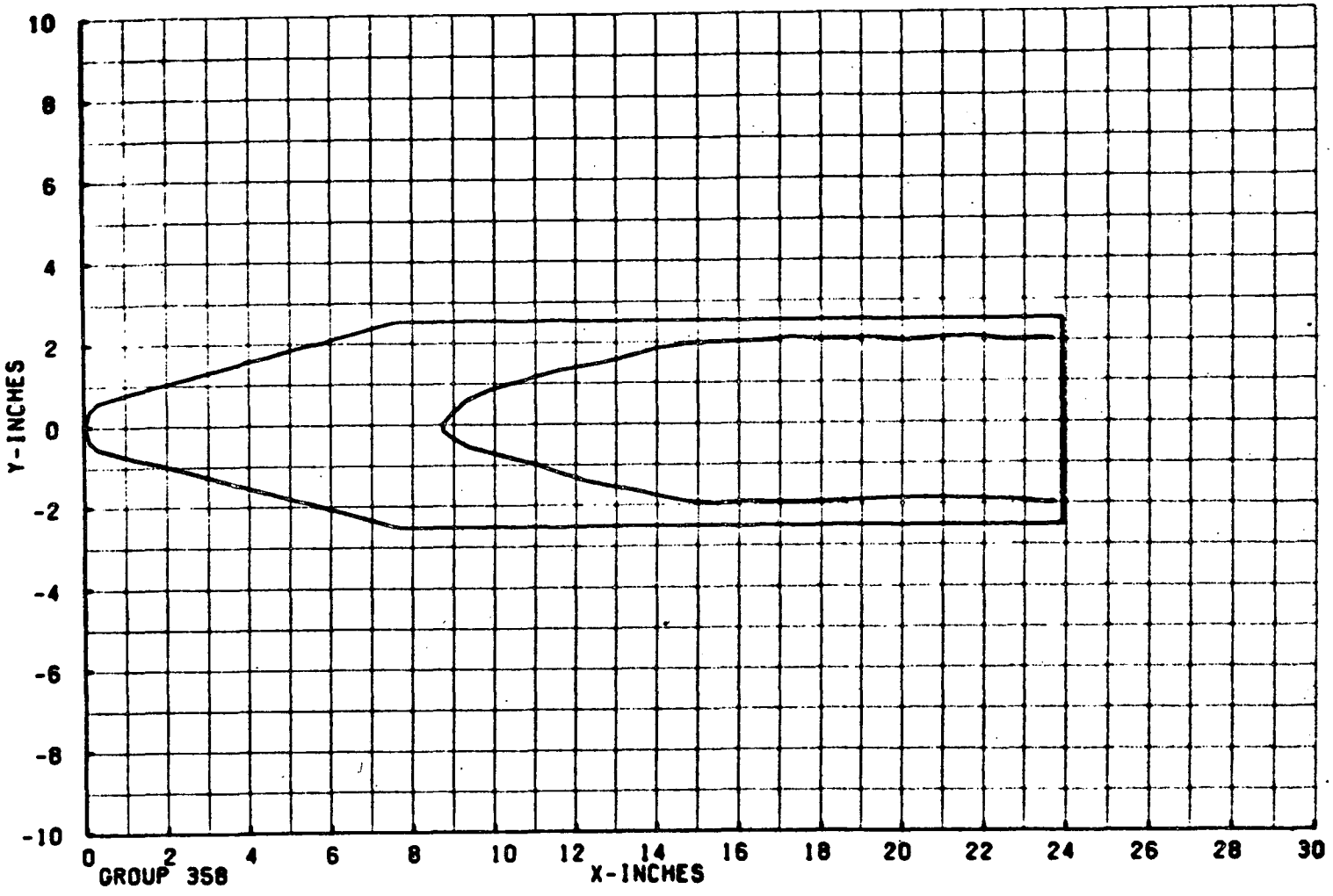
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	SIMEF (R= .056FT)
94.7	.057	2.549	3814	5.043E-05	7.622E-08	2.52E 06	2.213E-02	1.433E-02

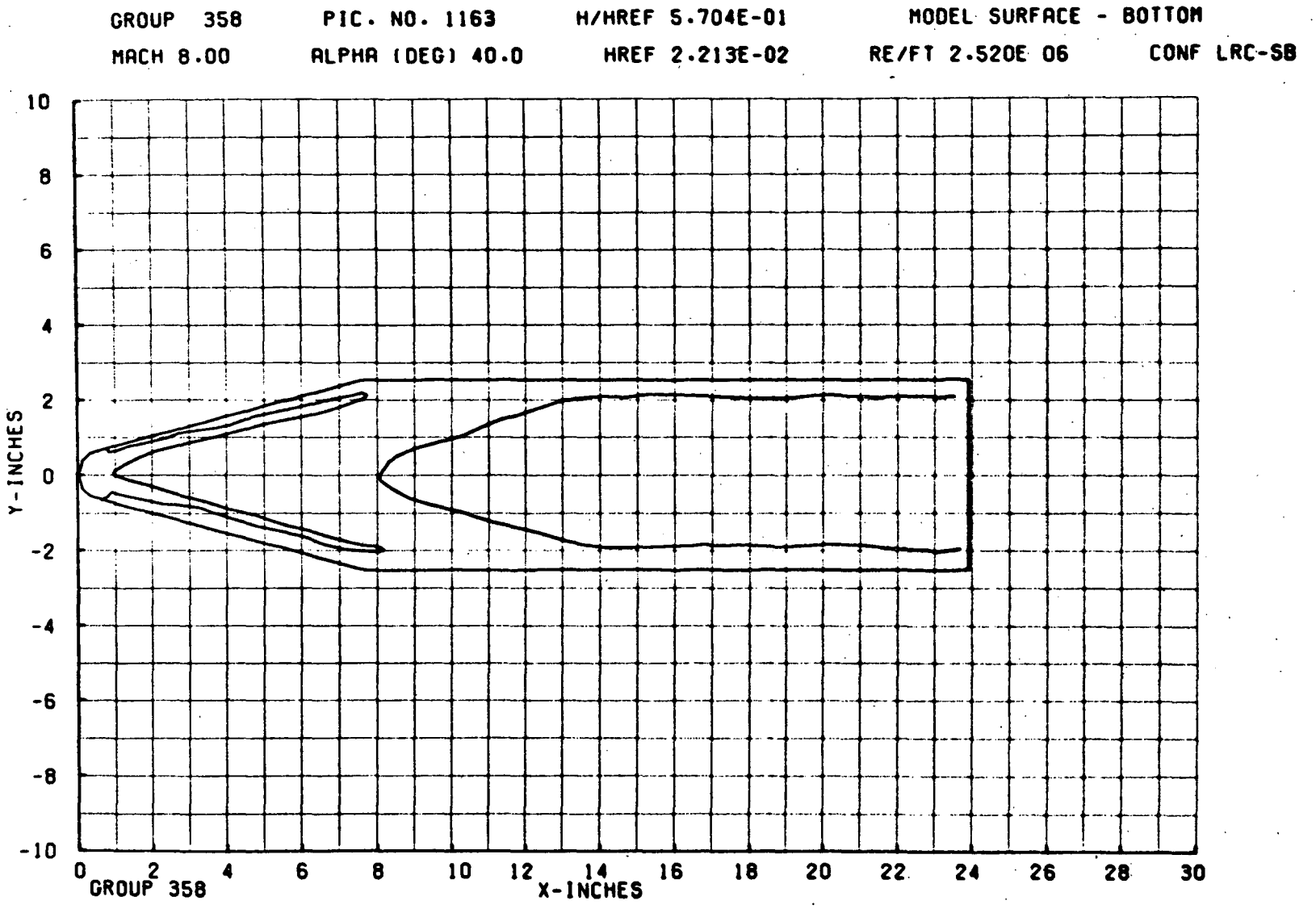
CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	250		
SIDE(S)	250	AVERAGE Tw = 85	=0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	250		

	PIC NO		TIME	DELTIME	H/TOT	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F		
T	1161	(250)	3.20	2.08	1.59E-02	.7190	2.012E-02	.9095	2.320E-02	1.0487	1.026E-02	84	82	0	94
T	1163	(250)	4.25	3.13	1.26E-02	.5704	1.597E-02	.7214	1.841E-02	.8319	8.133E-03	84	82	0	94
T	1168	(250)	6.90	5.78	8.79E-03	.3974	1.112E-02	.5027	1.283E-02	.5797	5.666E-03	86	83	0	94
T	1174	(250)	10.10	8.98	6.69E-03	.3021	8.457E-03	.3822	9.752E-03	.4407	4.307E-03	90	86	0	95
T	1184	(250)	15.45	14.33	4.90E-03	.2217	6.203E-03	.2804	7.153E-03	.3233	3.158E-03	101	95	0	98
T	1188	(250)	18.60	17.48	4.26E-03	.1928	5.394E-03	.2439	6.219E-03	.2813	2.745E-03	107	101	0	101

GROUP 358 PIC. NO. 1161 H/HREF 7.190E-01 MODEL SURFACE - BOTTOM

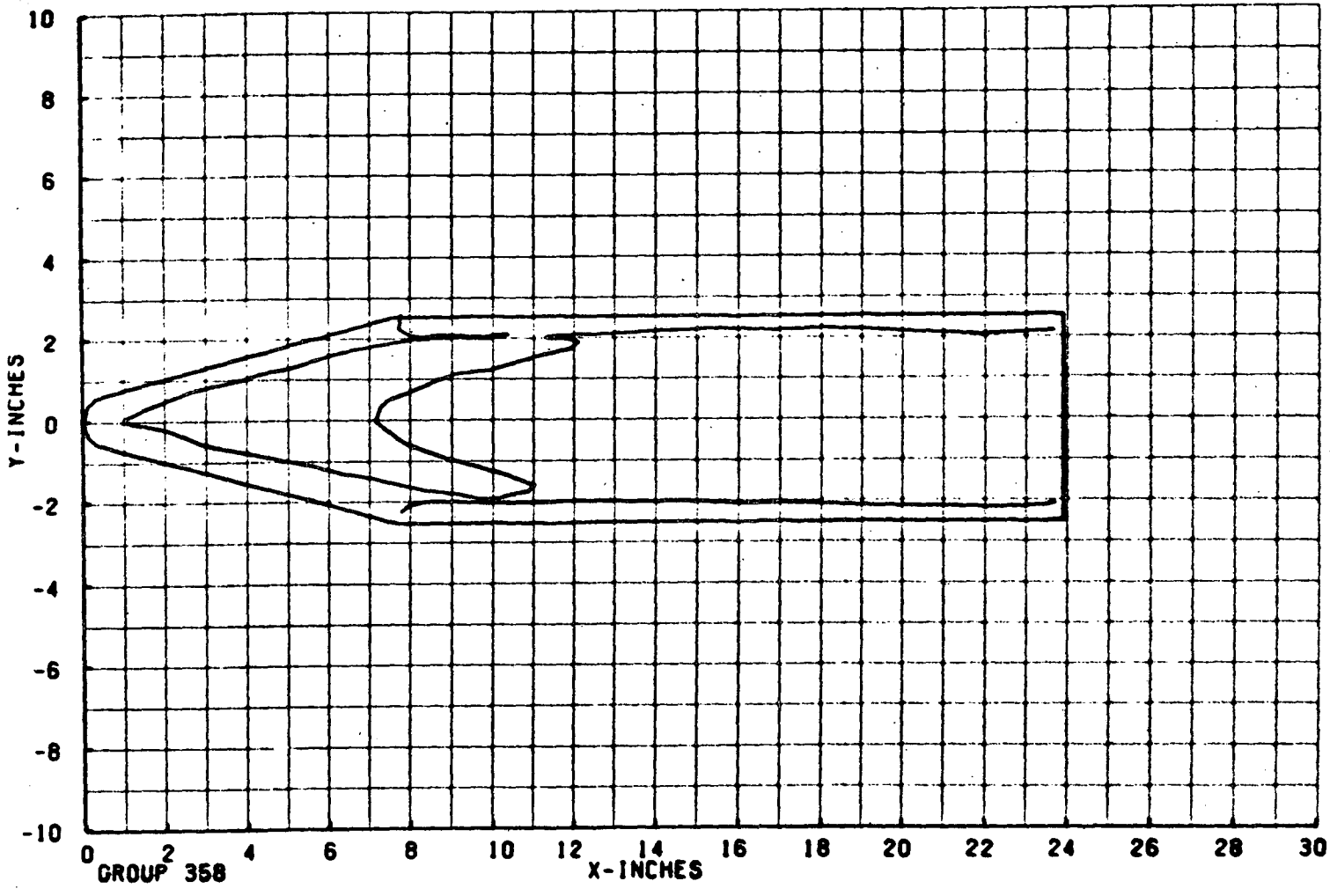
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.213E-02 RE/FT 2.520E 06 CONF LRC-SB




GROUP 358 PIC. NO. 1163 H/HREF 5.704E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.213E-02 RE/FT 2.520E 06 CONF LRC-SB
Y-INCHES
X-INCHES
GROUP 358

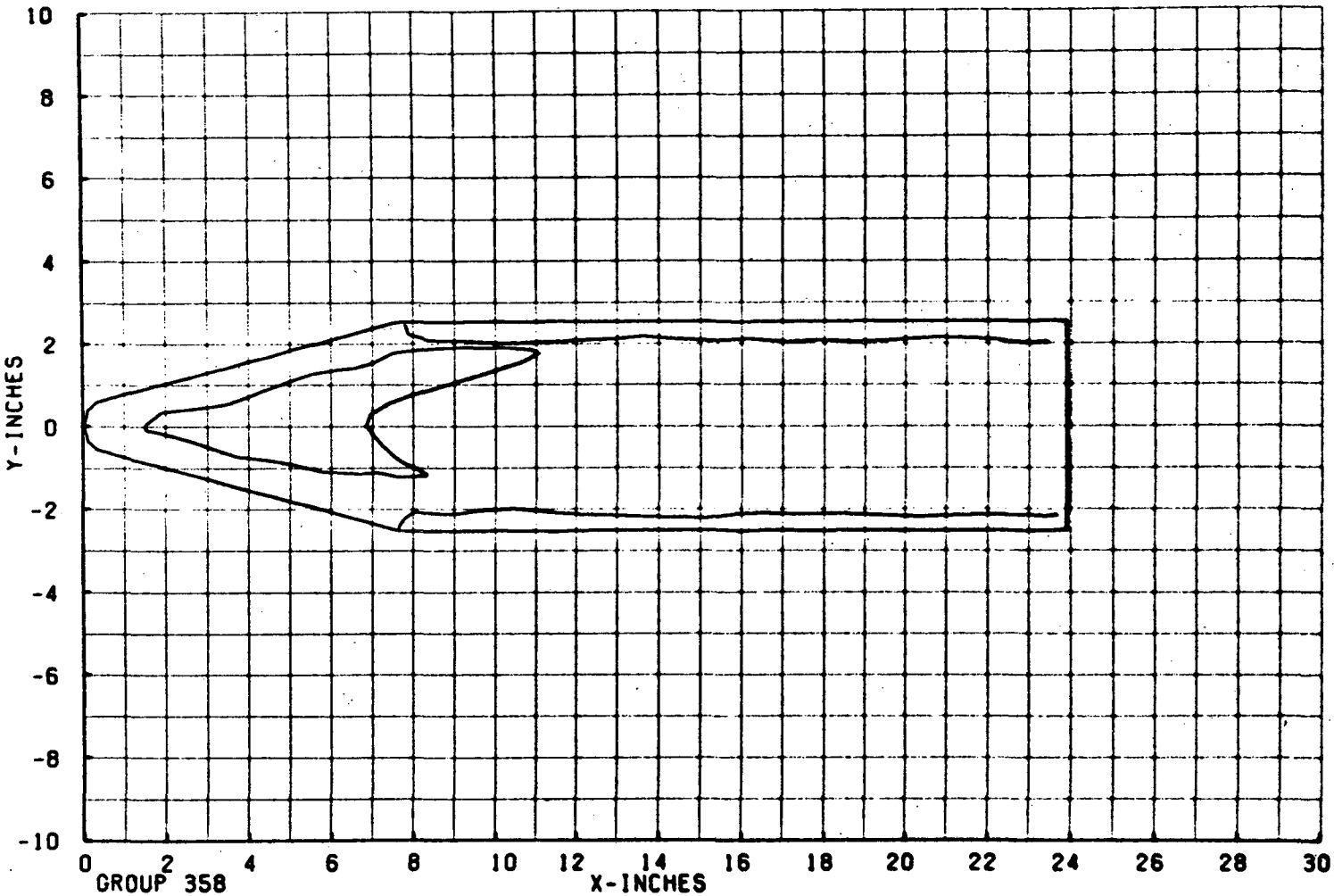
GROUP 358 PIC. NO. 1168 H/HREF 3.974E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.213E-02 RE/FT 2.520E 06 CONF LRC-SB



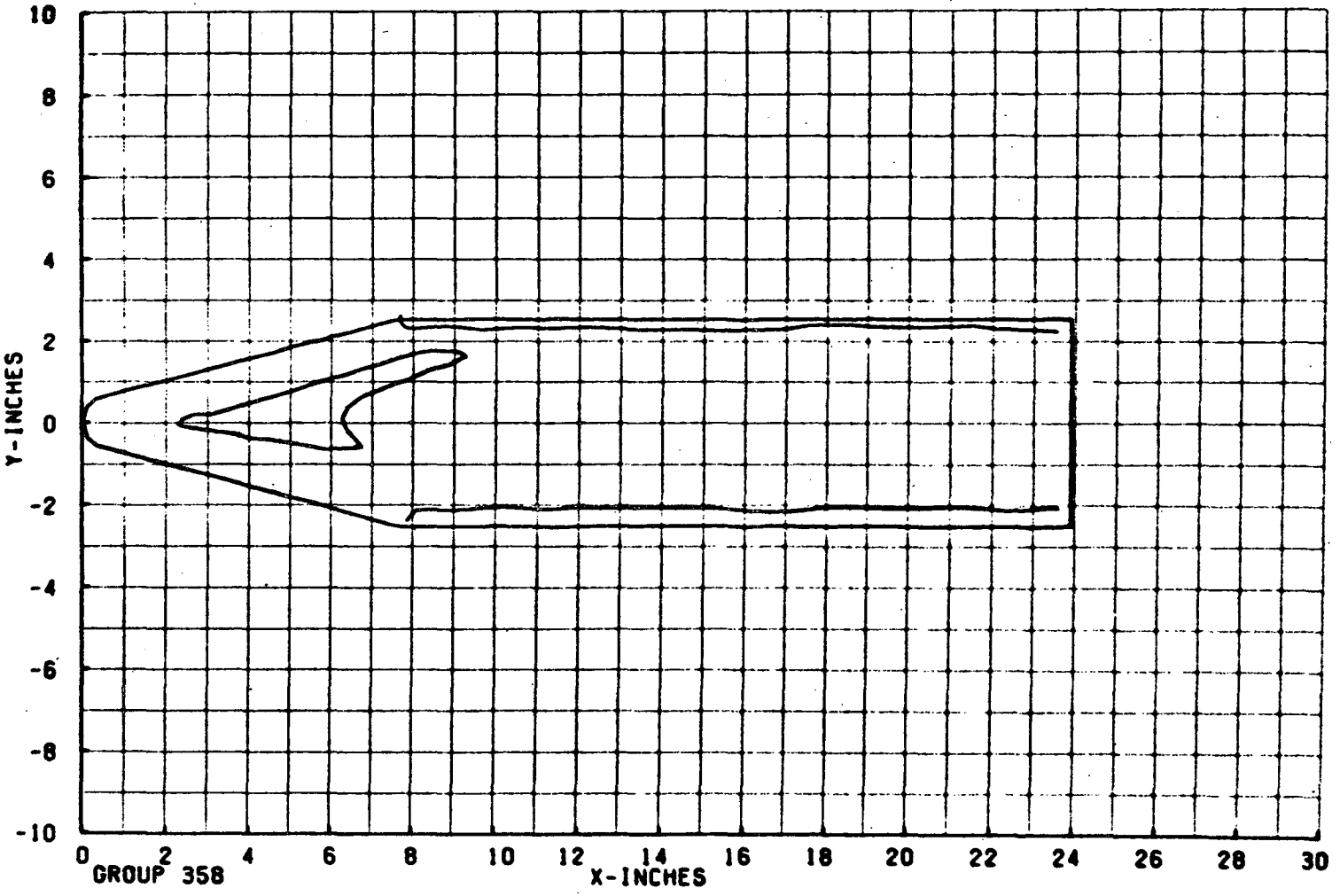
GROUP 358 PIC. NO. 1174 H/HREF 3.021E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.213E-02 RE/FT 2.520E 06 CONF LRC-SB



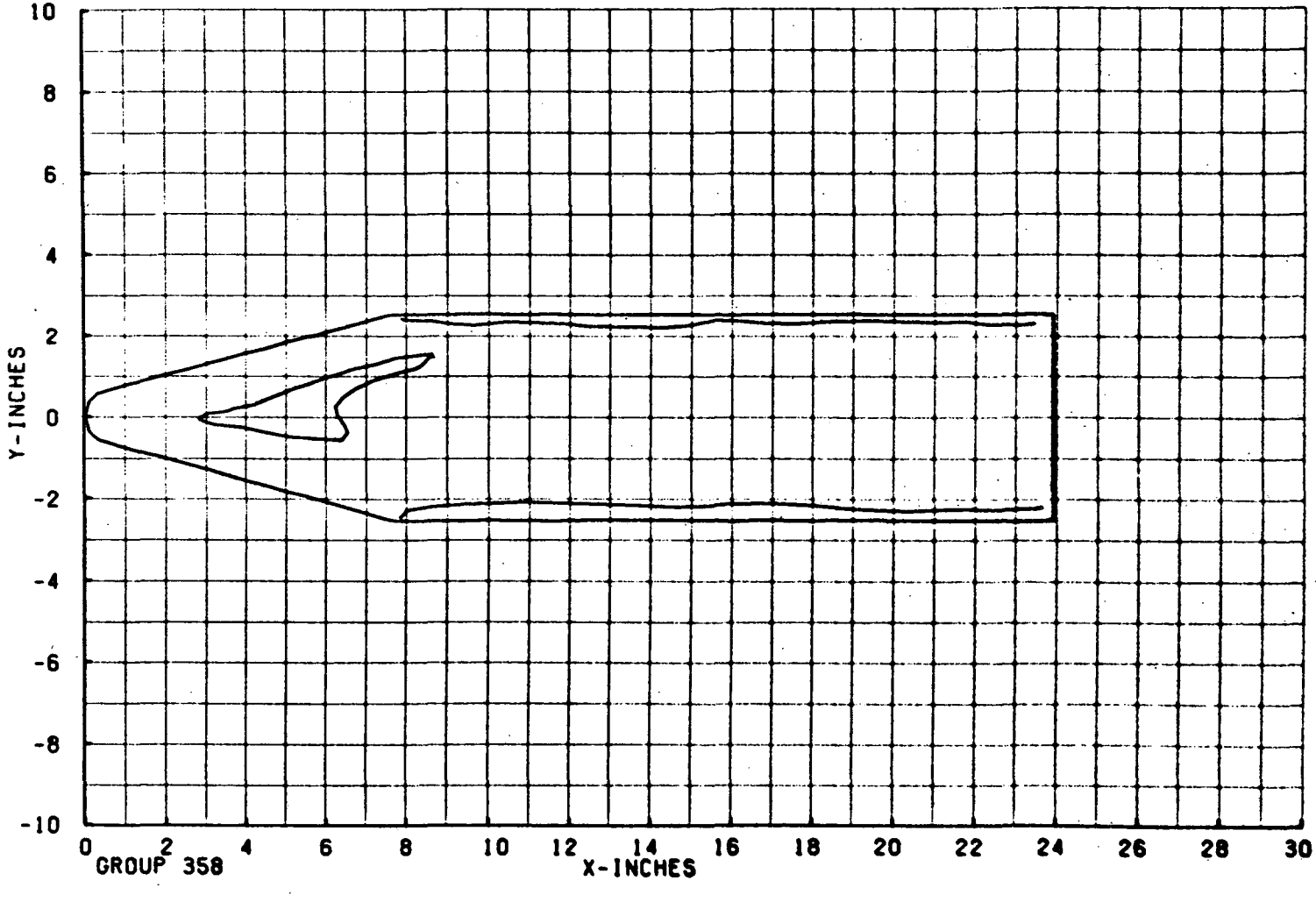
GROUP 358 PIC. NO. 1184 H/HREF 2.217E-01 MODEL SURFACE - BOTTOM

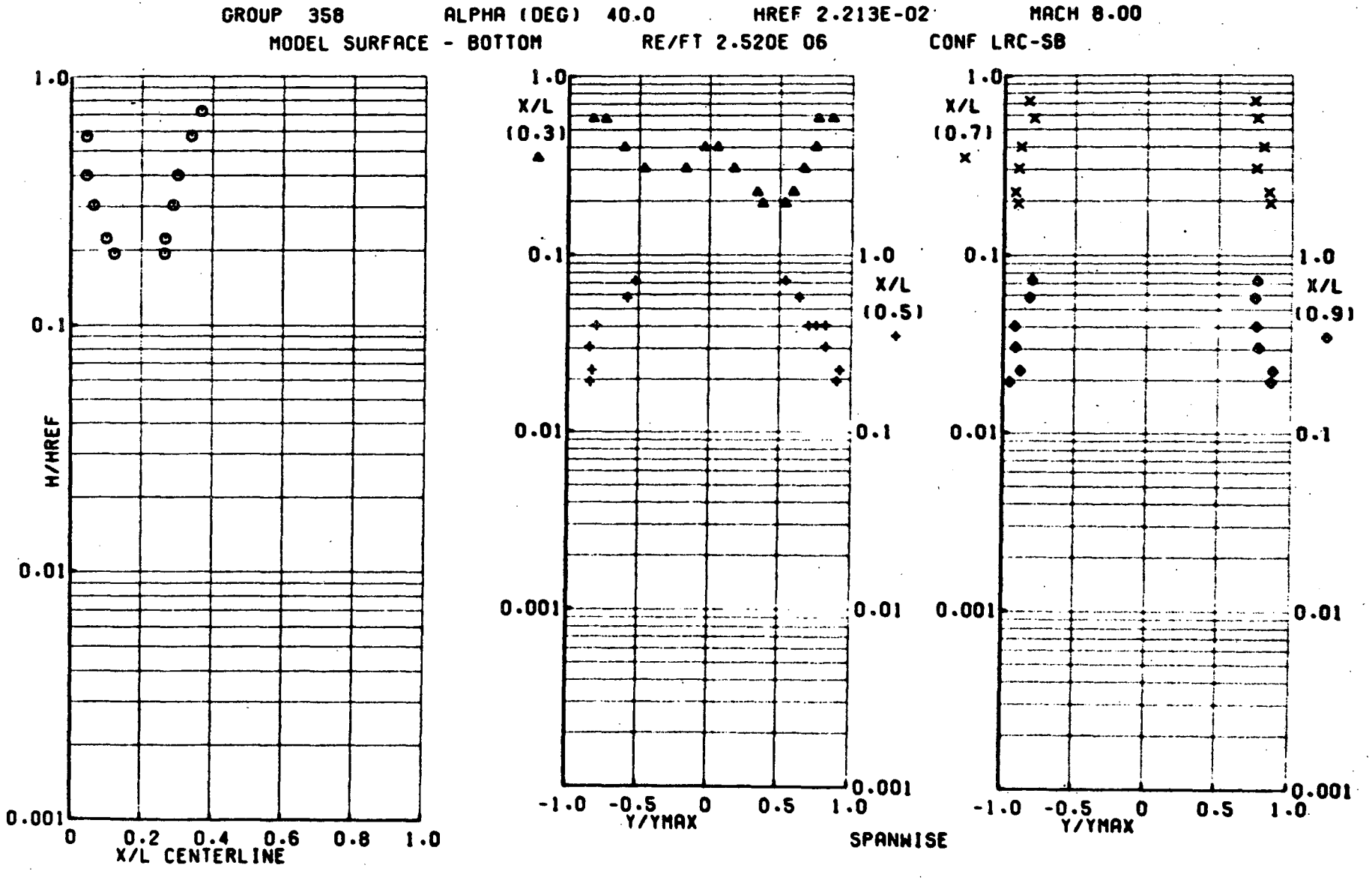
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.213E-02 RE/FT 2.520E 06 CONF LRC-SB



GROUP 358 PIC. NO. 1188 H/HREF 1.928E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.213E-02 RE/FT 2.520E 06 CONF LRC-S8




GROUP 358 ALPHA (DEG) 40.0 HREF 2.213E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 2.520E 06 CONF LRC-SB
H/HREF
1.0
0.1
0.01
0.001
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

6/ 1/71

AEDC(AHO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL A
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
136	12	LRC-SH	8.00	553.9	1308	59.98	-9.98	-50.00	180.00	.0

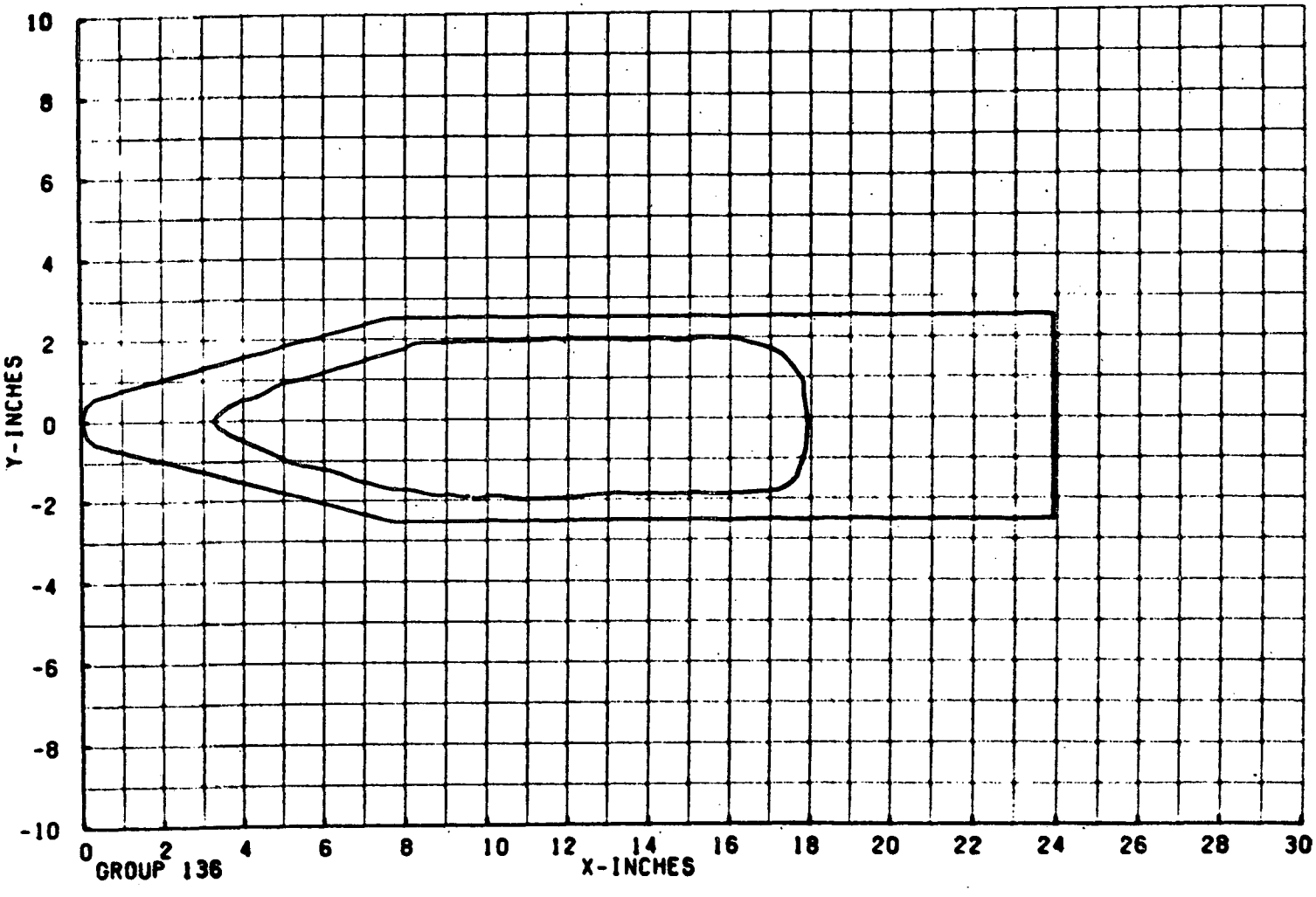
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STHEF (R= .056FT)
94.8	.057	2.542	3816	5.023E-05	7.631E-08	2.51E 06	2.210E-02	1.436E-02

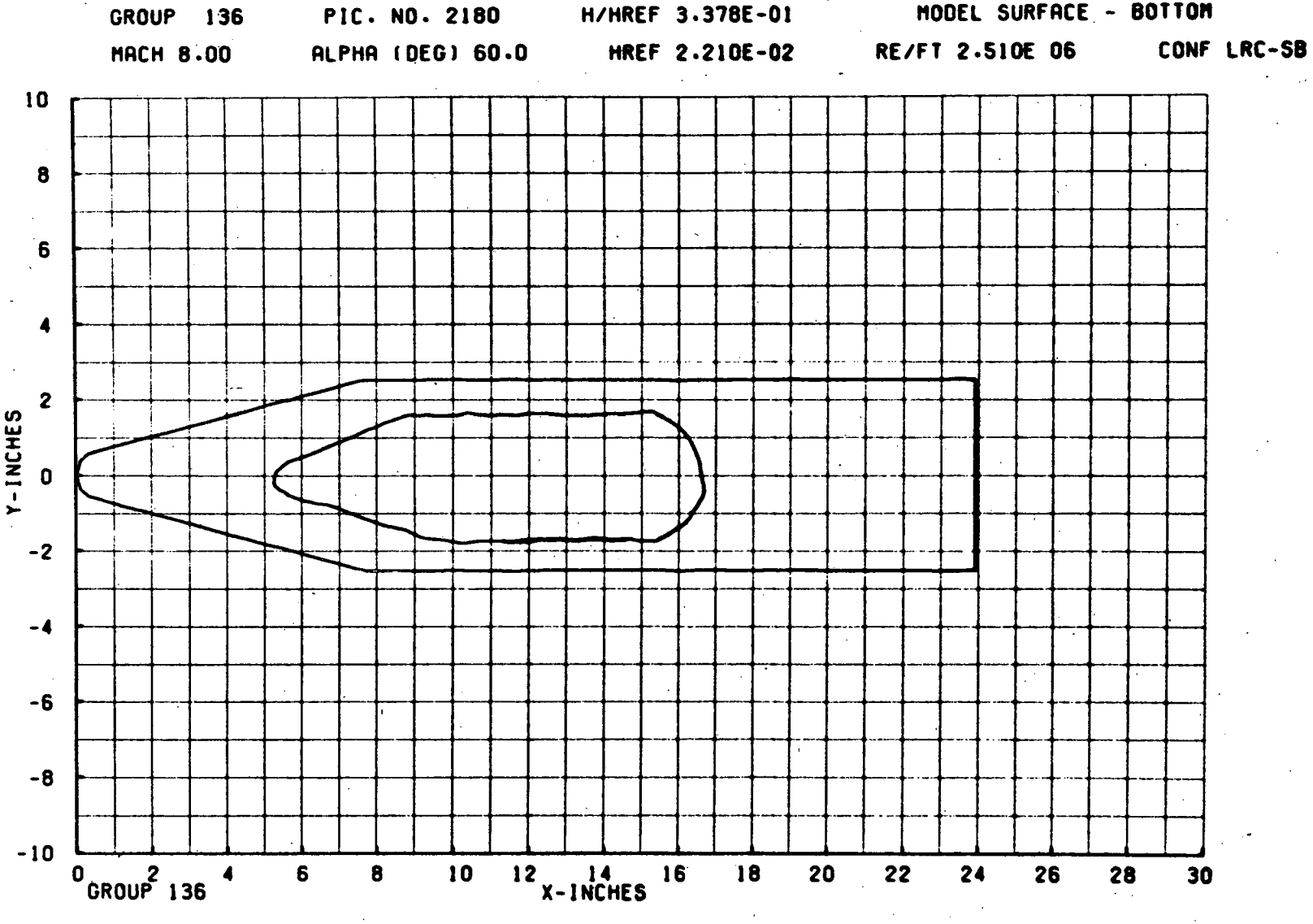
CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	200		
SIDE(S)	200	AVERAGE IW = 84	-0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	200		

PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T 2178 (200)	3.70	2.66	9.11E-03	.4121	1.132E-02	.5122	1.289E-02	.5831	5.904E-03	0	84	0	0
T 2180 (200)	4.80	3.76	7.47E-03	.3378	9.281E-03	.4199	1.057E-02	.4780	4.840E-03	0	84	0	0
T 2181 (200)	5.30	4.26	6.94E-03	.3140	8.628E-03	.3903	9.822E-03	.4444	4.500E-03	0	84	0	0
T 2182 (200)	5.85	4.81	6.46E-03	.2923	8.030E-03	.3633	9.142E-03	.4136	4.189E-03	0	85	0	0
T 2183 (200)	6.40	5.36	6.05E-03	.2740	7.527E-03	.3405	8.569E-03	.3877	3.926E-03	0	85	0	0

GROUP 136 PIC. NO. 2178 H/HREF 4.121E-01 MODEL SURFACE - BOTTOM

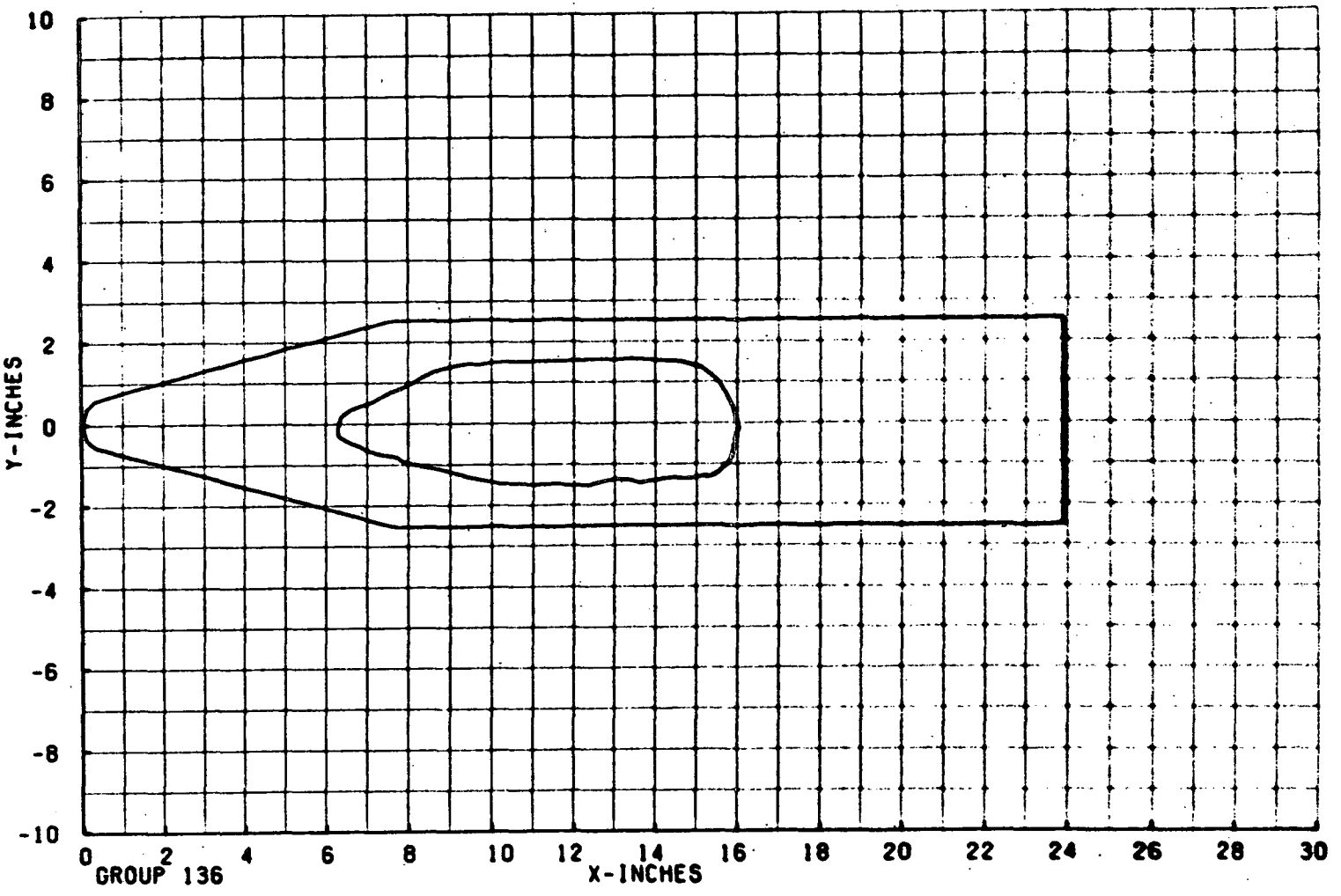
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.210E-02 RE/FT 2.510E 06 CONF LRC-SB




GROUP 136 PIC. NO. 2180 H/HREF 3.378E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.210E-02 RE/FT 2.510E 06 CONF LRC-SB
Y-INCHES
10
8
6
4
2
0
-2
-4
-6
-8
-10
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
X-INCHES
GROUP 136

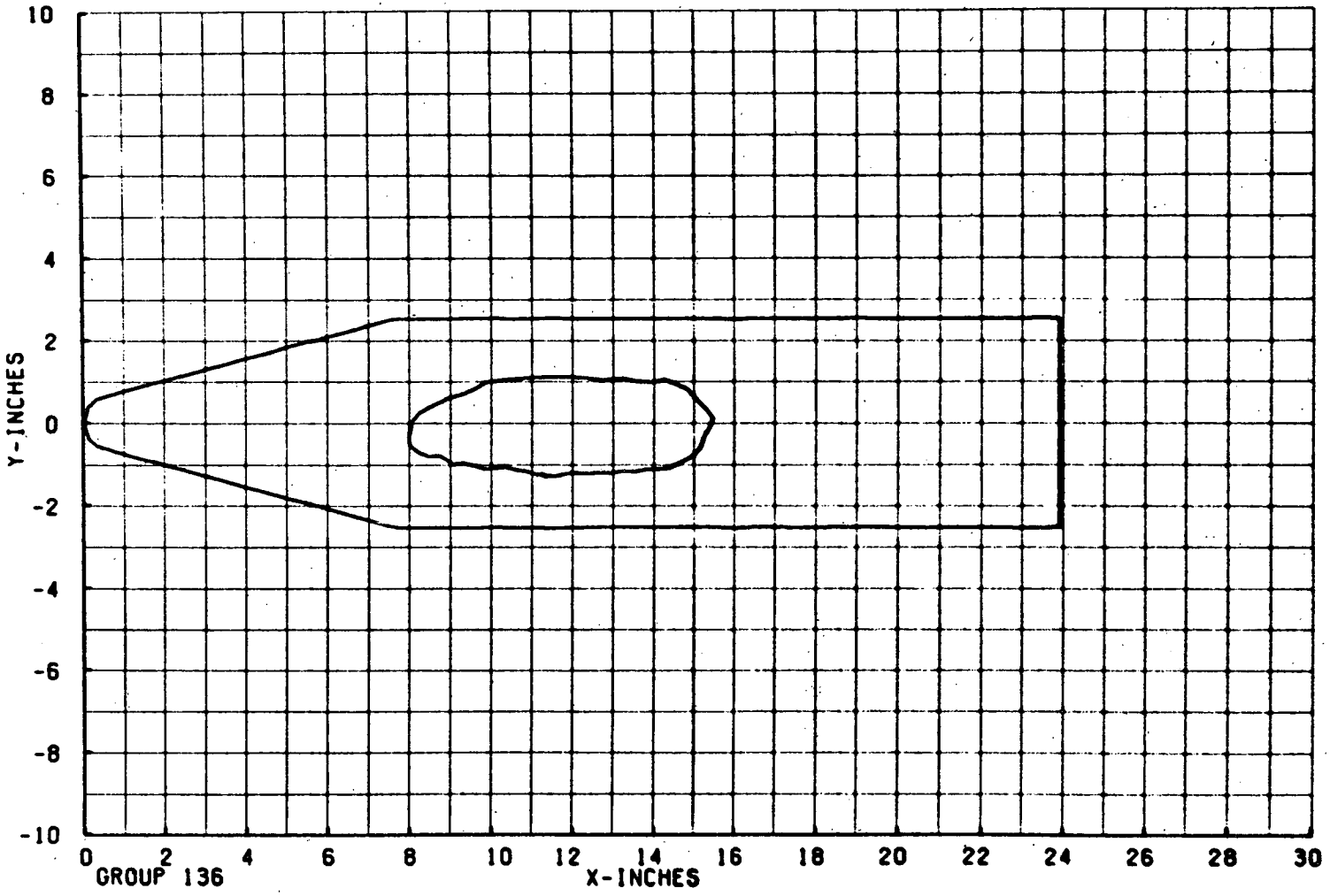
GROUP 136 PIC. NO. 2181 H/HREF 3.140E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.210E-02 RE/FT 2.510E 06 CONF LRC-SB



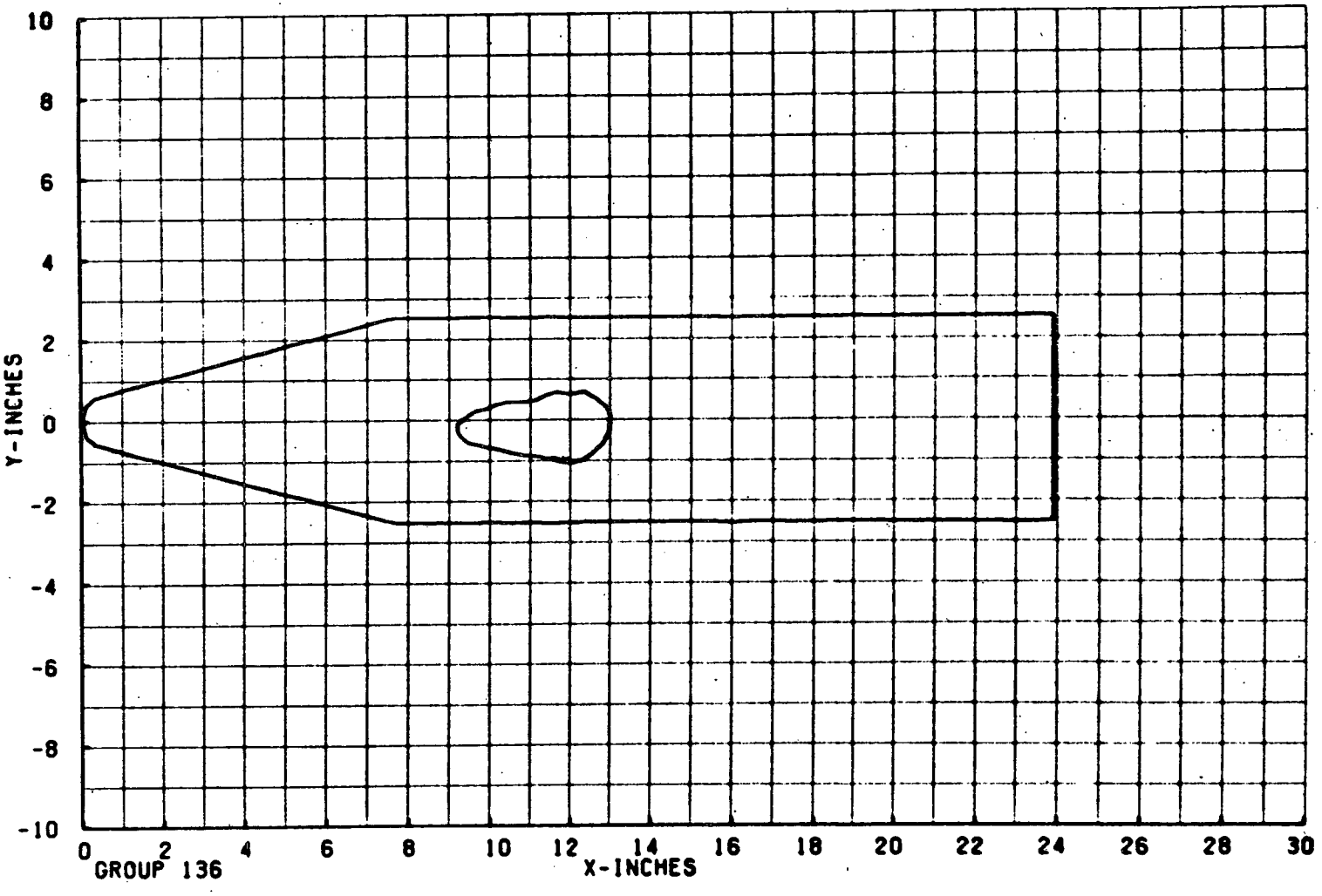
GROUP 136 PIC. NO. 2182 H/HREF 2.923E-01 MODEL SURFACE - BOTTOM

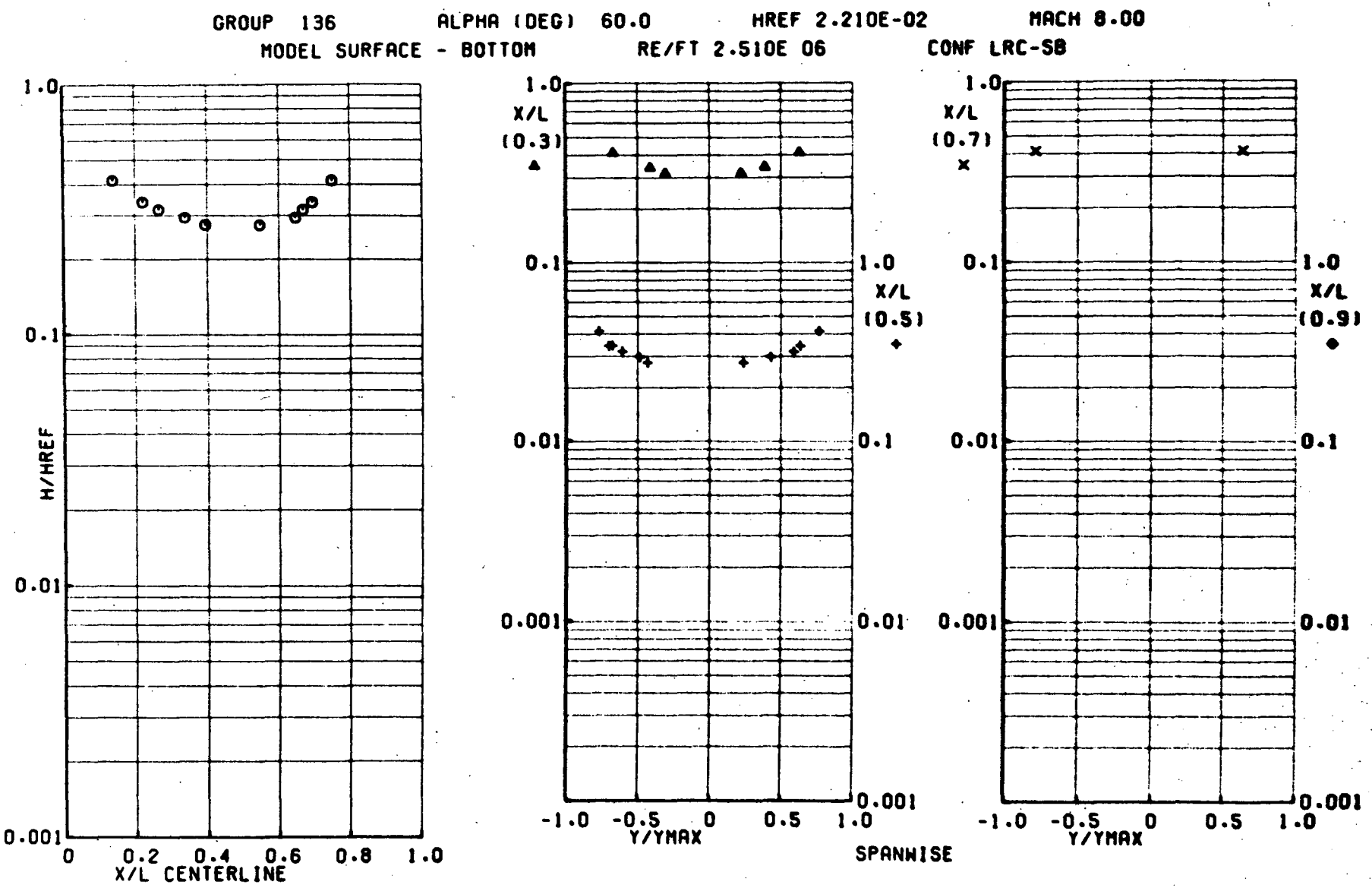
MACH 8.00 ALPHA (DEG) 60.0 HREF 2.210E-02 RE/FT 2.510E 06 CONF LRC-SB



GROUP 136 PIC. NO. 2183 H/HREF 2.740E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.210E-02 RE/FT 2.510E 06 CONF LRC-SB




GROUP 136 ALPHA (DEG) 60.0 HREF 2.210E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 2.510E 06 CONF LRC-SB
H/HREF
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
Y/YMAX
SPANWISE

6/ 2/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
164	12	LRC-S8	8.00	856.4	1351	20.00	3.00	-23.00	180.00	.0

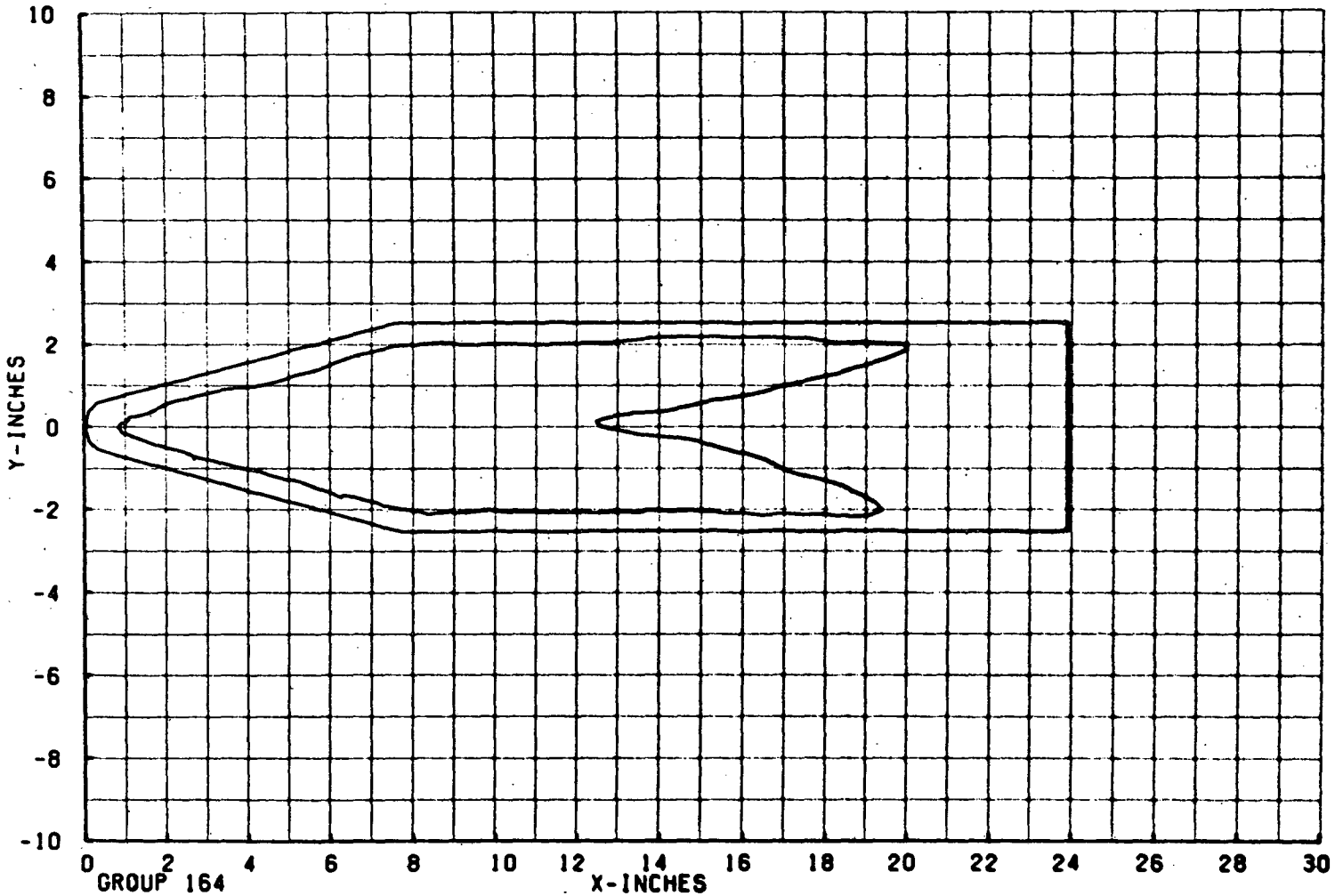
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
97.9	.088	3.930	3878	7.518E-05	7.881E-08	3.70E 06	2.763E-02	1.177E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	163		
SIDE(S)	163	AVERAGE TW = 70	-0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	163		

PIC	NO		TYPE	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T	3322	(163)	3.65	2.61	6.61E-03	.2394	8.079E-03	.2924	9.086E-03	.3289	2.820E-03	70	70	71	0
T	3326	(163)	5.70	4.66	4.73E-03	.1713	5.776E-03	.2092	6.497E-03	.2352	2.018E-03	70	71	72	0
T	3333	(163)	9.35	8.31	3.32E-03	.1203	4.056E-03	.1469	4.561E-03	.1652	1.417E-03	72	77	79	02

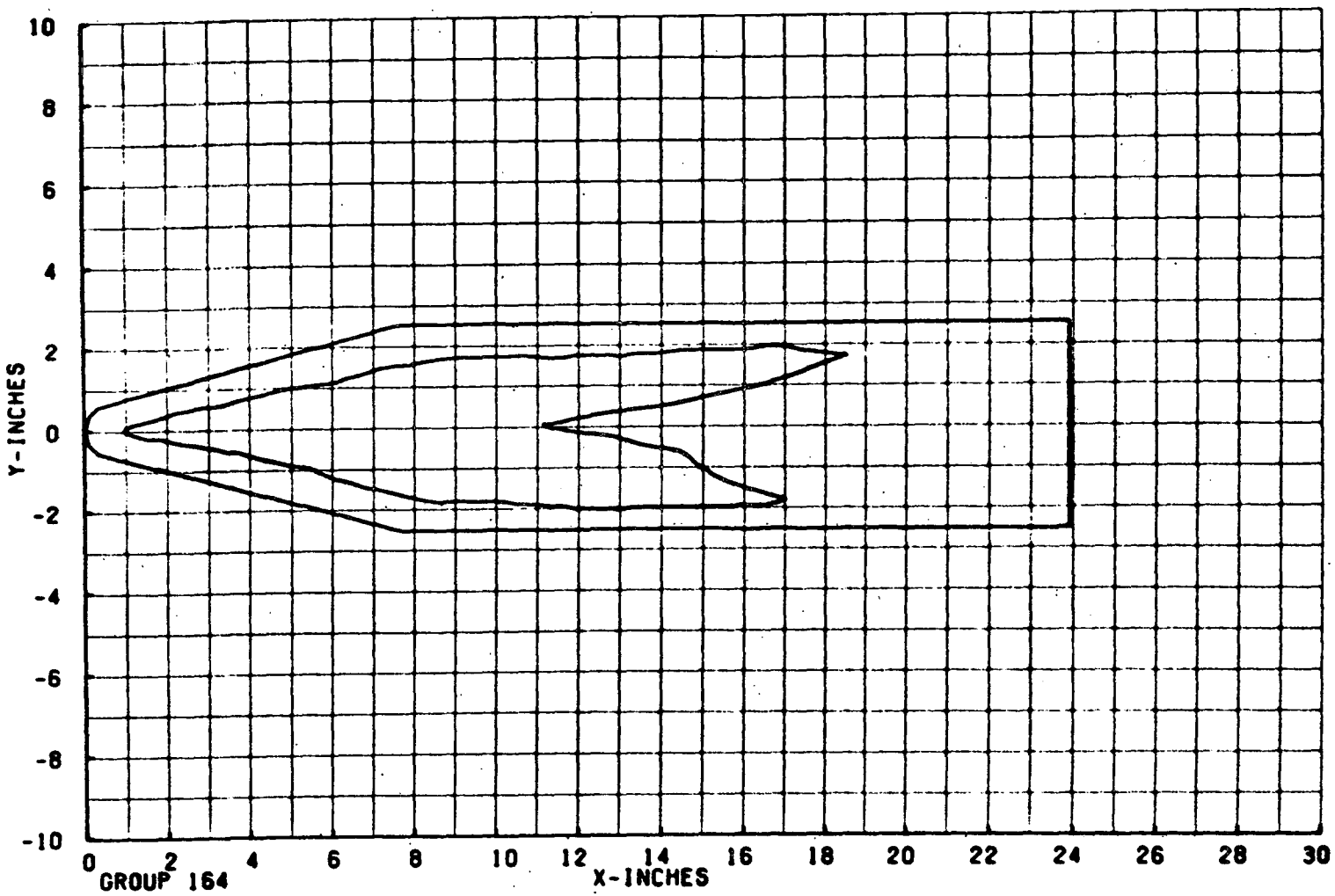
GROUP 164 PIC. NO. 3322 H/HREF 2.394E-01 MODEL SURFACE - BOTTOM

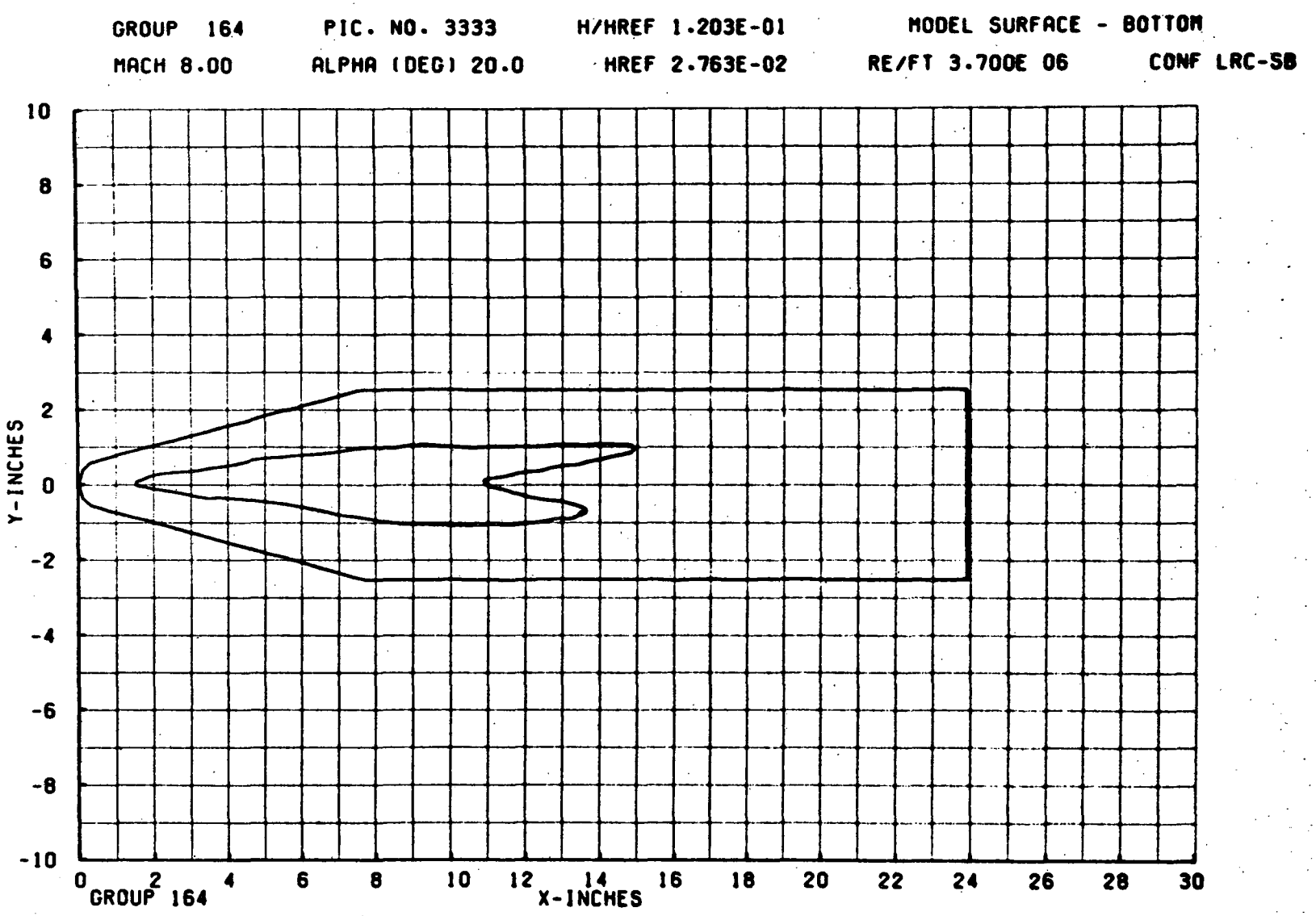
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.763E-02 RE/FT 3.700E 06 CONF LRC-SB



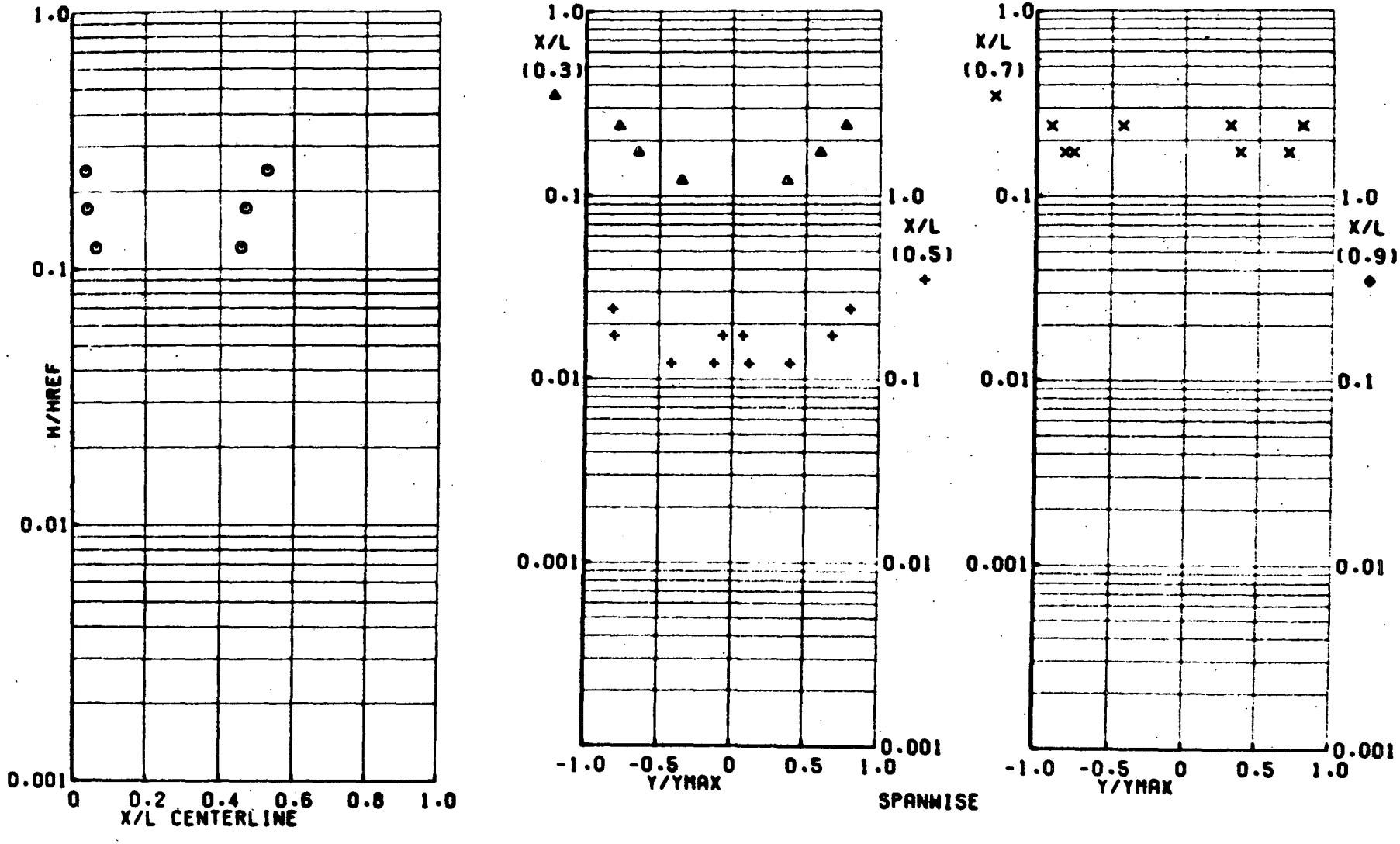
GROUP 164 PIC. NO. 3326 H/HREF 1.713E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 20.0 HREF 2.763E-02 RE/FT 3.700E 06 CONF LRC-SB




GROUP 164 PIC. NO. 3333 H/HREF 1.203E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 20.0 HREF 2.763E-02 RE/FT 3.700E 06 CONF LRC-SB
Y-INCHES
X-INCHES
GROUP 164

GROUP 164 ALPHA (DEG) 20.0 HREF 2.763E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.700E 06 CONF LRC-SB



6/ 2/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREREND	ROLL-MODEL	YAW
173	12	LRC-SB	8.00	858.6	1346	39.99	10.01	-50.00	180.00	.0

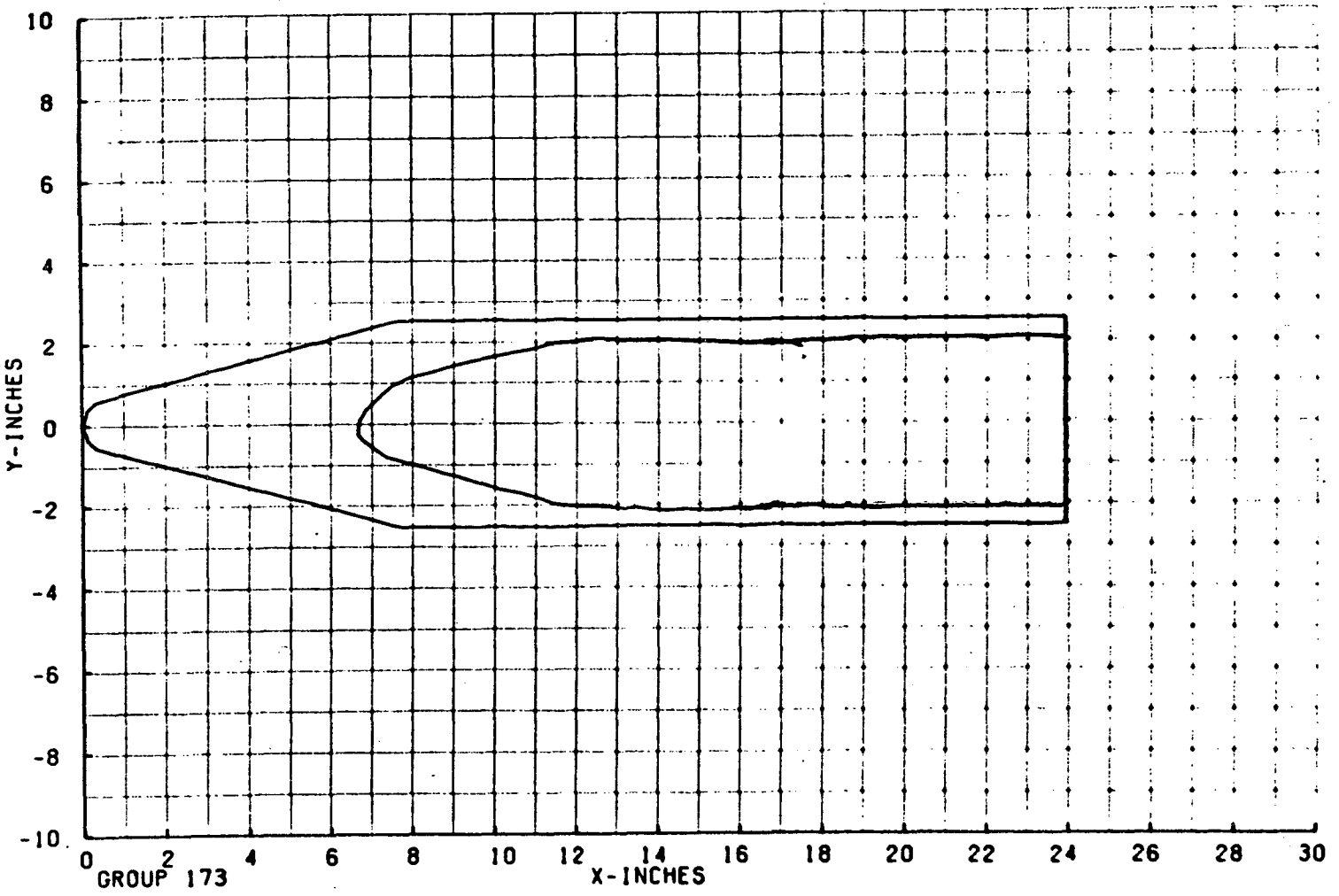
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
97.6	.088	3.940	3872	7.564E-05	7.854E-08	3.73E 06	2.765E-02	1.173E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	250		
SIDE(S)	100	AVERAGE TW = 73	-0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	100		

PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T 3581 (250)	2.60	1.56	1.87E-02	.6771	2.34HE-02	.8488	2.689F-02	.9723	7.908E-03	73	73	0	0
T 3585 (250)	4.70	3.66	1.16E-02	.4188	1.452E-02	.5249	1.663E-02	.6013	4.892E-03	74	74	0	0
T 3592 (250)	8.35	7.31	7.65E-03	.2765	9.587E-03	.3466	1.09AF-02	.3971	3.229E-03	80	78	0	0
T 3594 (250)	9.40	8.36	7.03E-03	.2541	8.812E-03	.3186	1.009E-02	.3650	2.968E-03	83	80	0	0

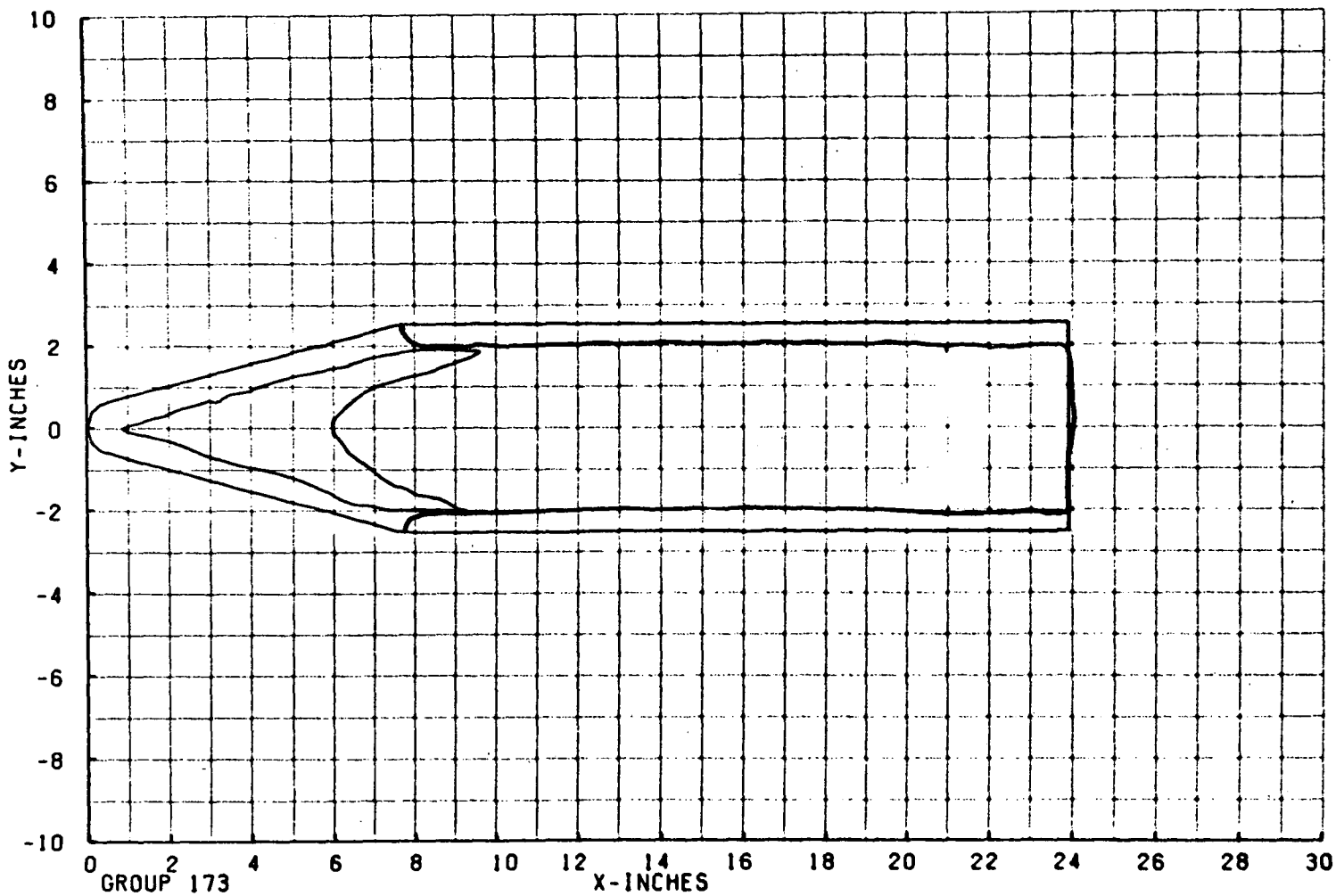
GROUP 173 PIC. NO. 3581 H/HREF 6.771E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.765E-02 RE/FT 3.730E 06 CONF LRC-SB



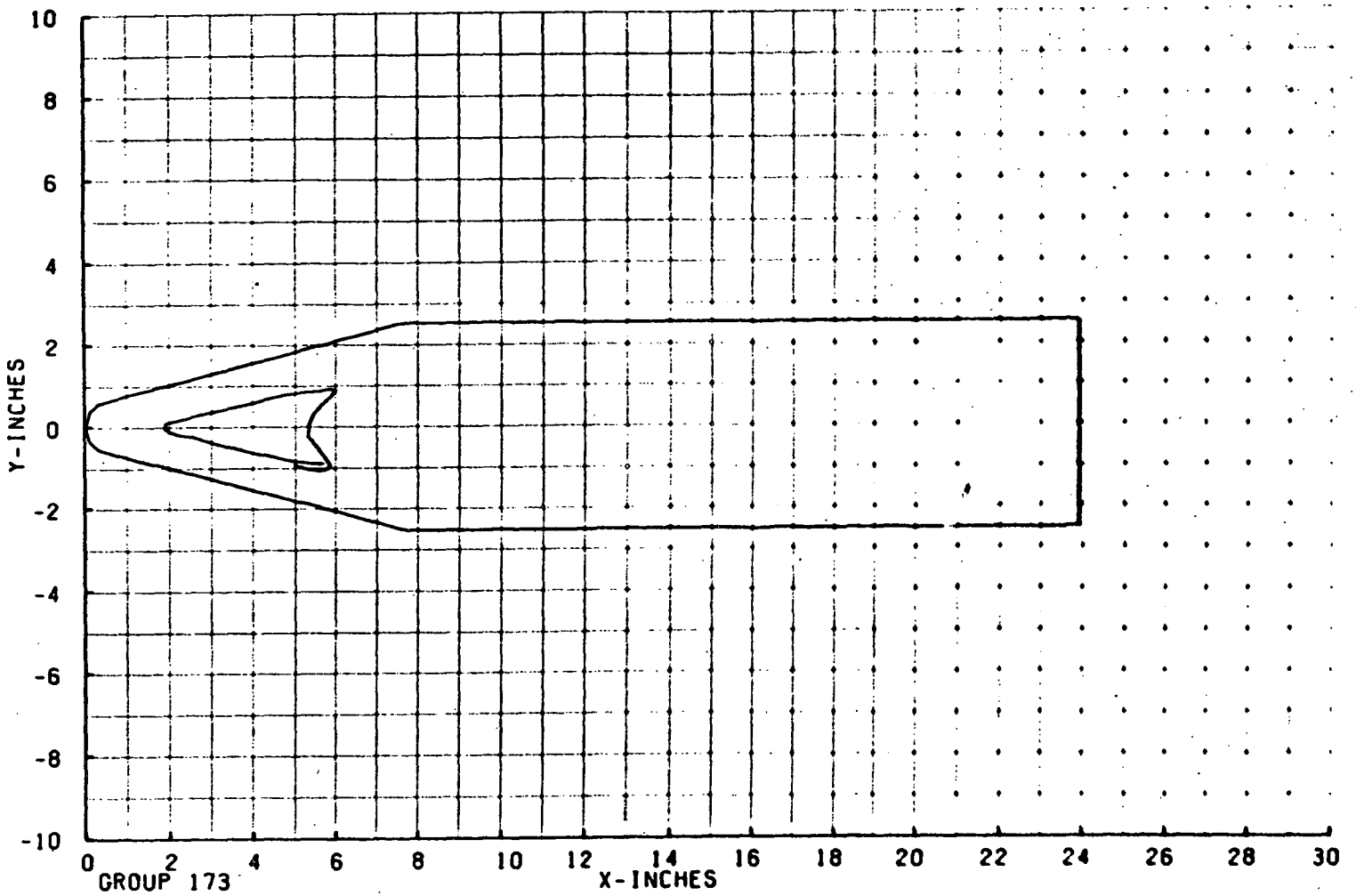
GROUP 173 PIC. NO. 3585 H/HREF 4.188E-01 MODEL SURFACE - BOTTOM

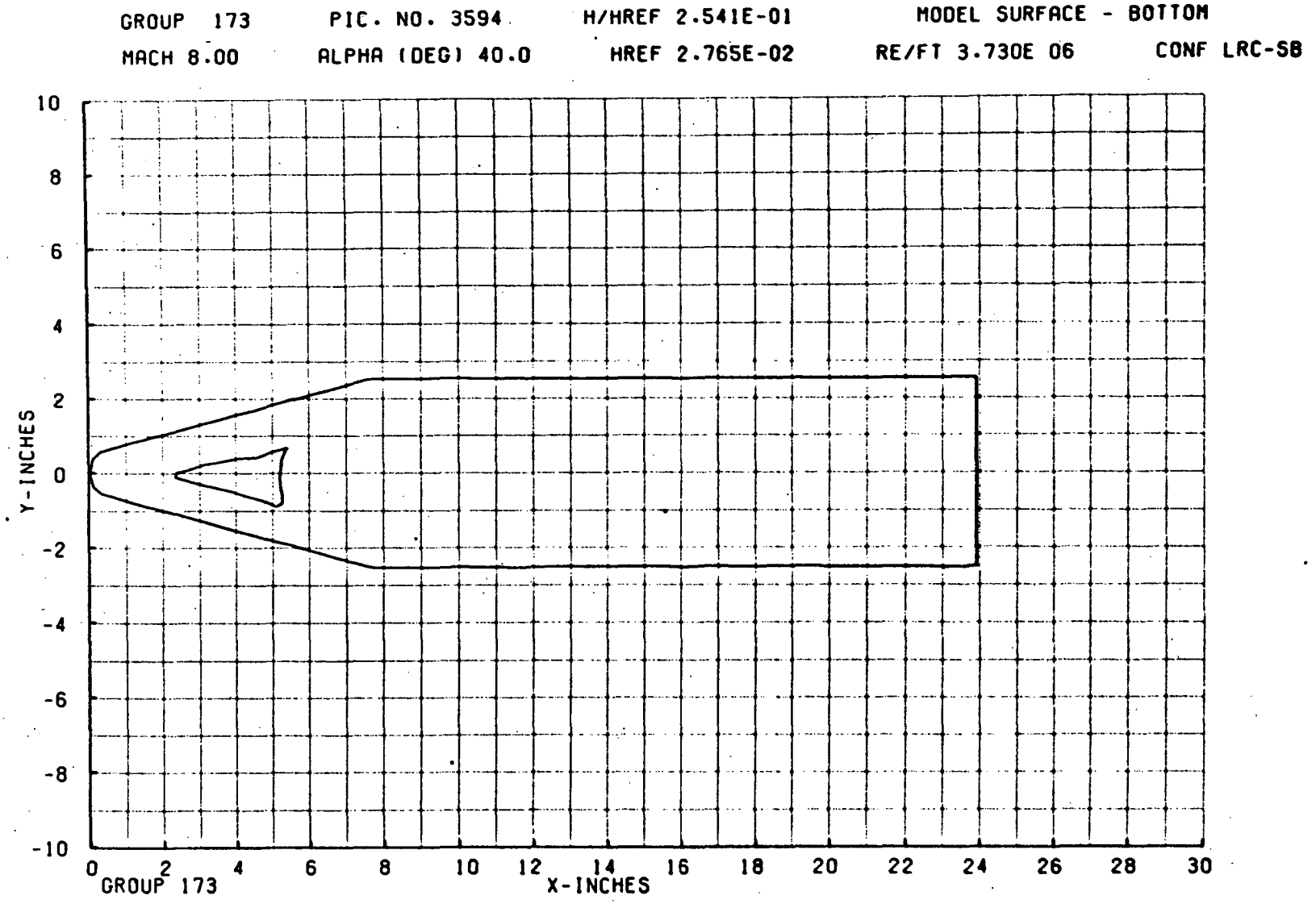
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.765E-02 RE/FT 3.730E 06 CONF LRC-SB

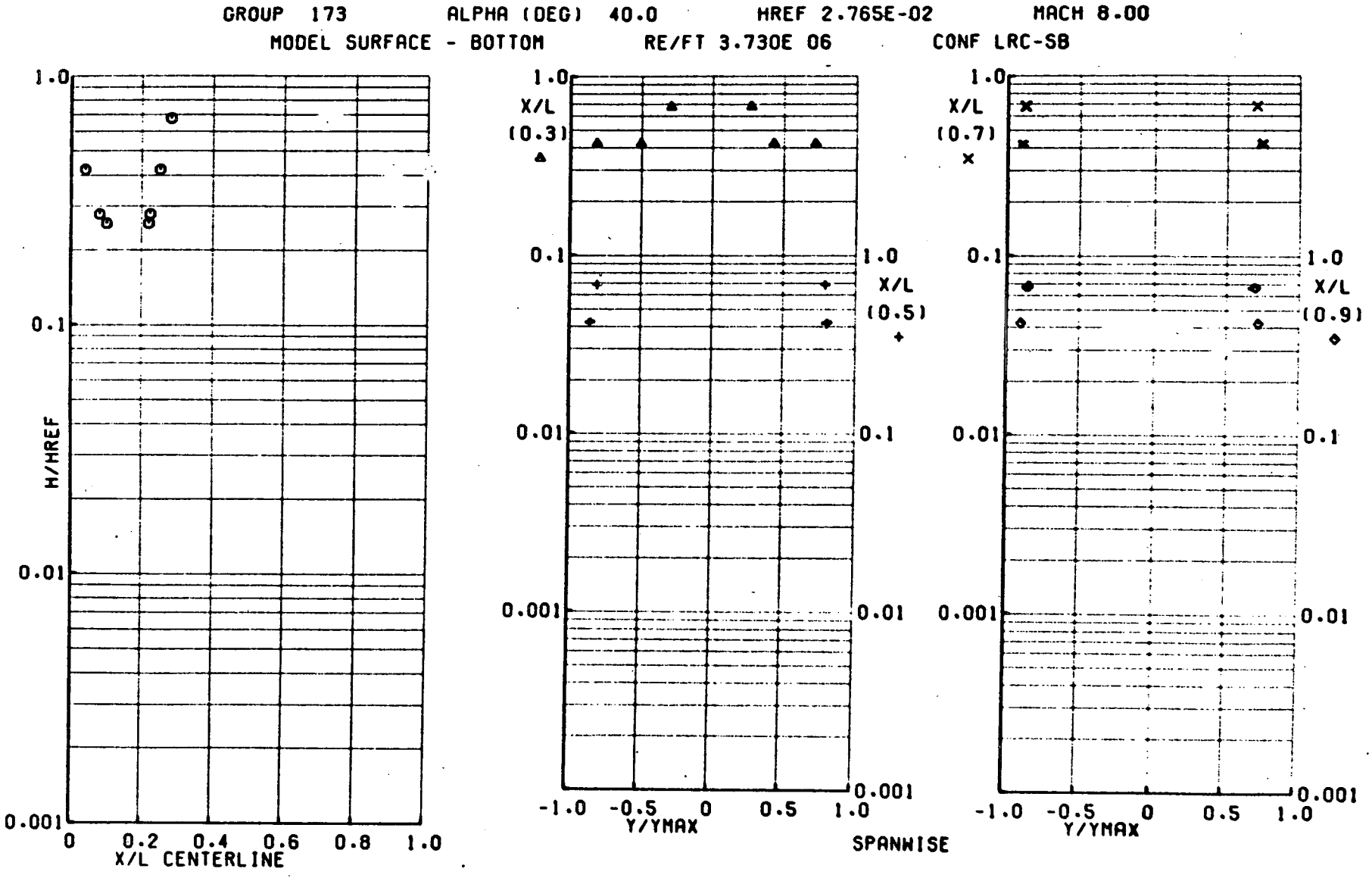


GROUP 173 PIC. NO. 3592 H/HREF 2.765E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.765E-02 RE/FT 3.730E 06 CONF LRC-S8




GROUP 173 PIC. NO. 3594 H/HREF 2.541E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.765E-02 RE/FT 3.730E 06 CONF LRC-SB
Y-INCHES
X-INCHES
GROUP 173
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30


GROUP 173 ALPHA (DEG) 40.0 HREF 2.765E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.730E 06 CONF LRC-SB
H/HREF
1.0
0.1
0.01
0.001
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

9/17/71

AEDC(AHO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VTI162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
349	12	LRC-58	8.00	861.5	1342	40.00	10.00	50.00	180.00	-.0

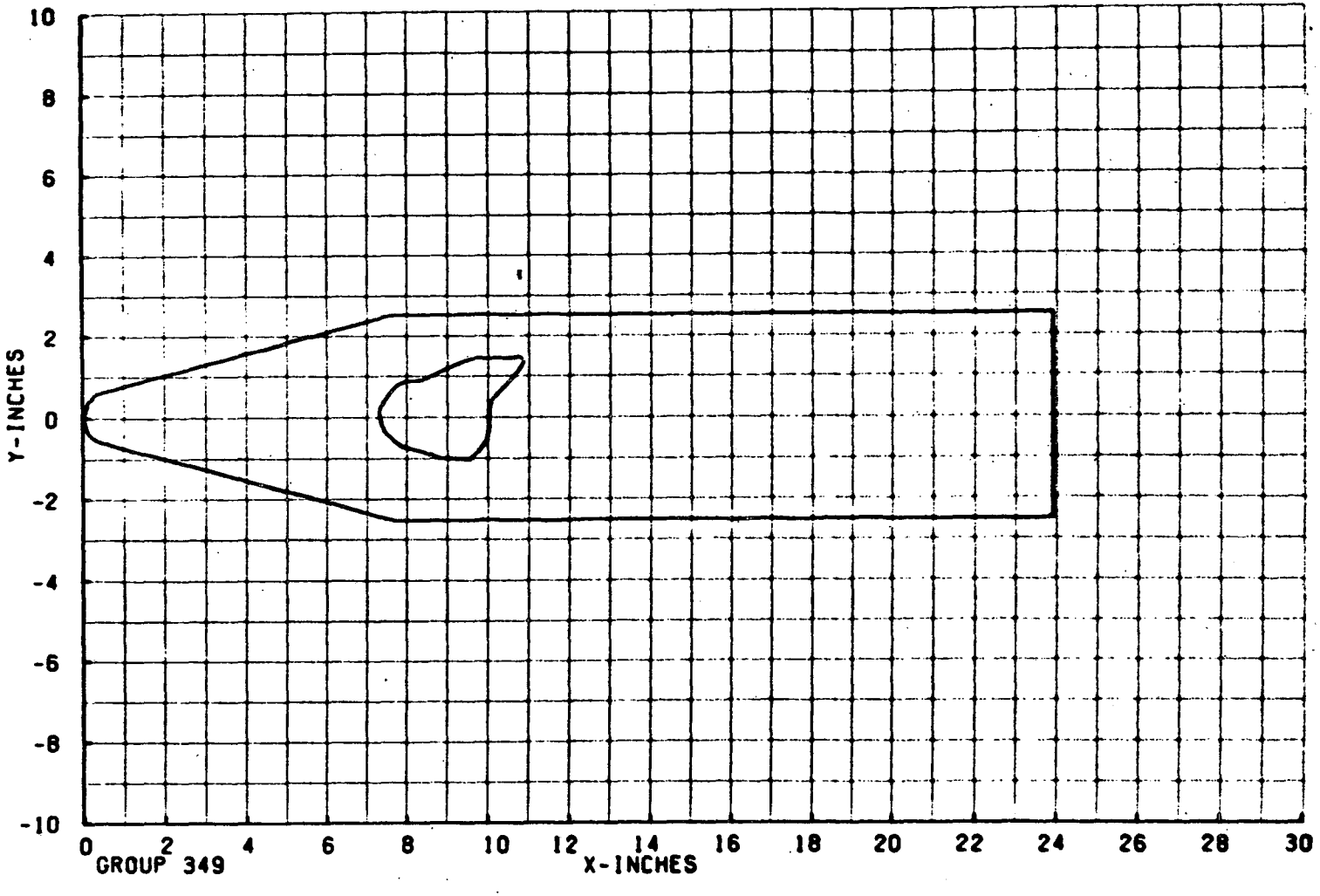
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STNEF (R= .056FT)
97.2	.088	3.953	3865	7.615E-05	7.828E-08	3.76E 06	2.768E-02	1.169E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	300		
SIDE(S)	300	AVERAGE Tw = 83	-0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	300		

	PTC NO		TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TC)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F		
T	869	(300)	3.15	2.03	2.14E-02	.7746	2.744E-02	.9910	3.192E-02	1.1529	8.993E-03	76	74	0	72
T	871	(300)	4.20	3.08	1.69E-02	.6120	2.168E-02	.7830	2.522E-02	.9108	7.105E-03	77	74	0	72
T	872	(300)	4.75	3.63	1.54E-02	.5566	1.972E-02	.7121	2.294E-02	.8284	6.463E-03	77	74	0	72
T	877	(300)	7.35	6.23	1.12E-02	.4036	1.430E-02	.5164	1.663E-02	.6007	4.685E-03	81	76	0	73
T	890	(300)	14.20	13.08	6.94E-03	.2507	8.883E-03	.3208	1.033E-02	.3731	2.910E-03	104	88	0	79

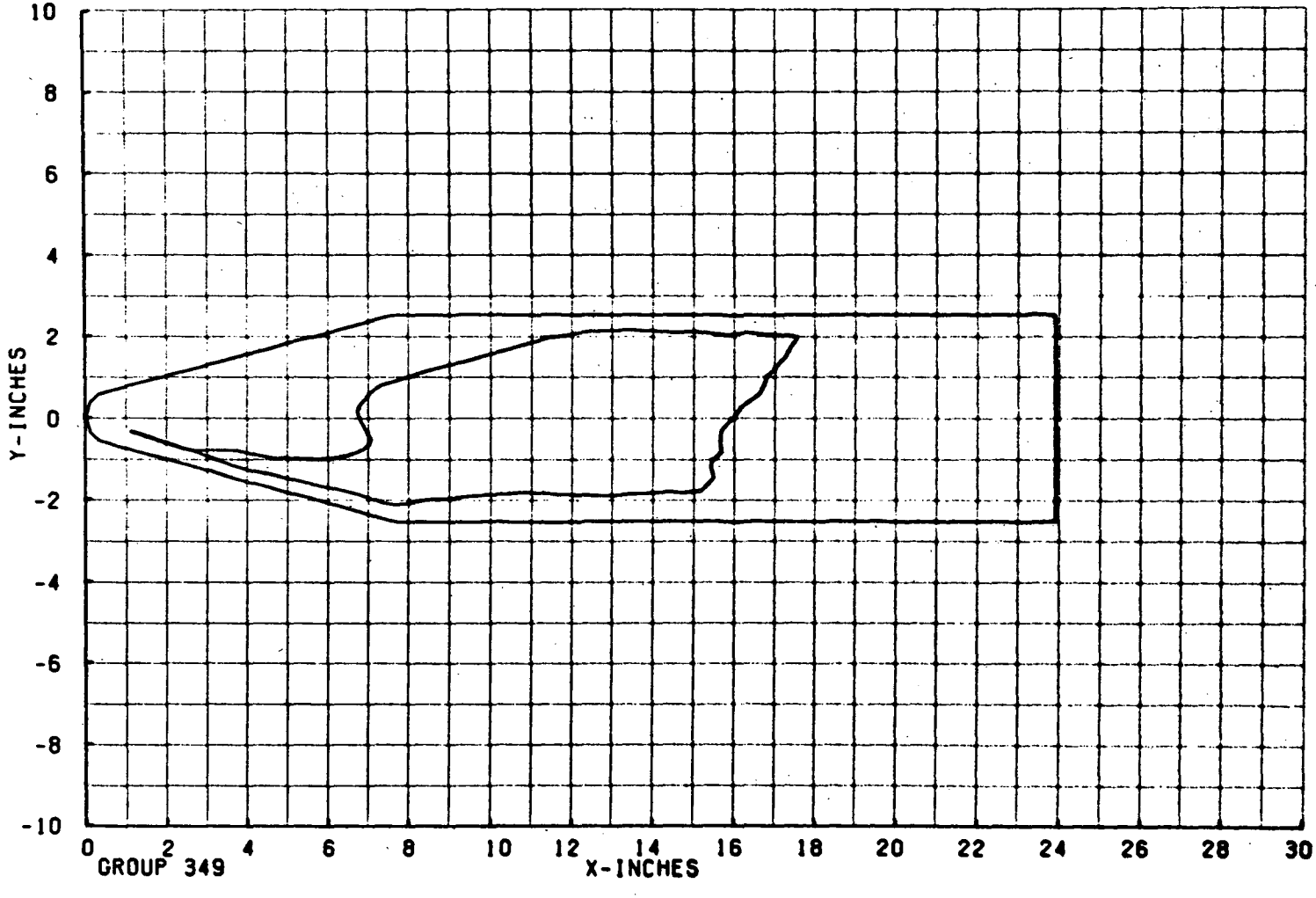
GROUP 349 PIC. NO. 869 H/HREF 7.746E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.768E-02 RE/FT 3.760E 06 CONF LRC-SB



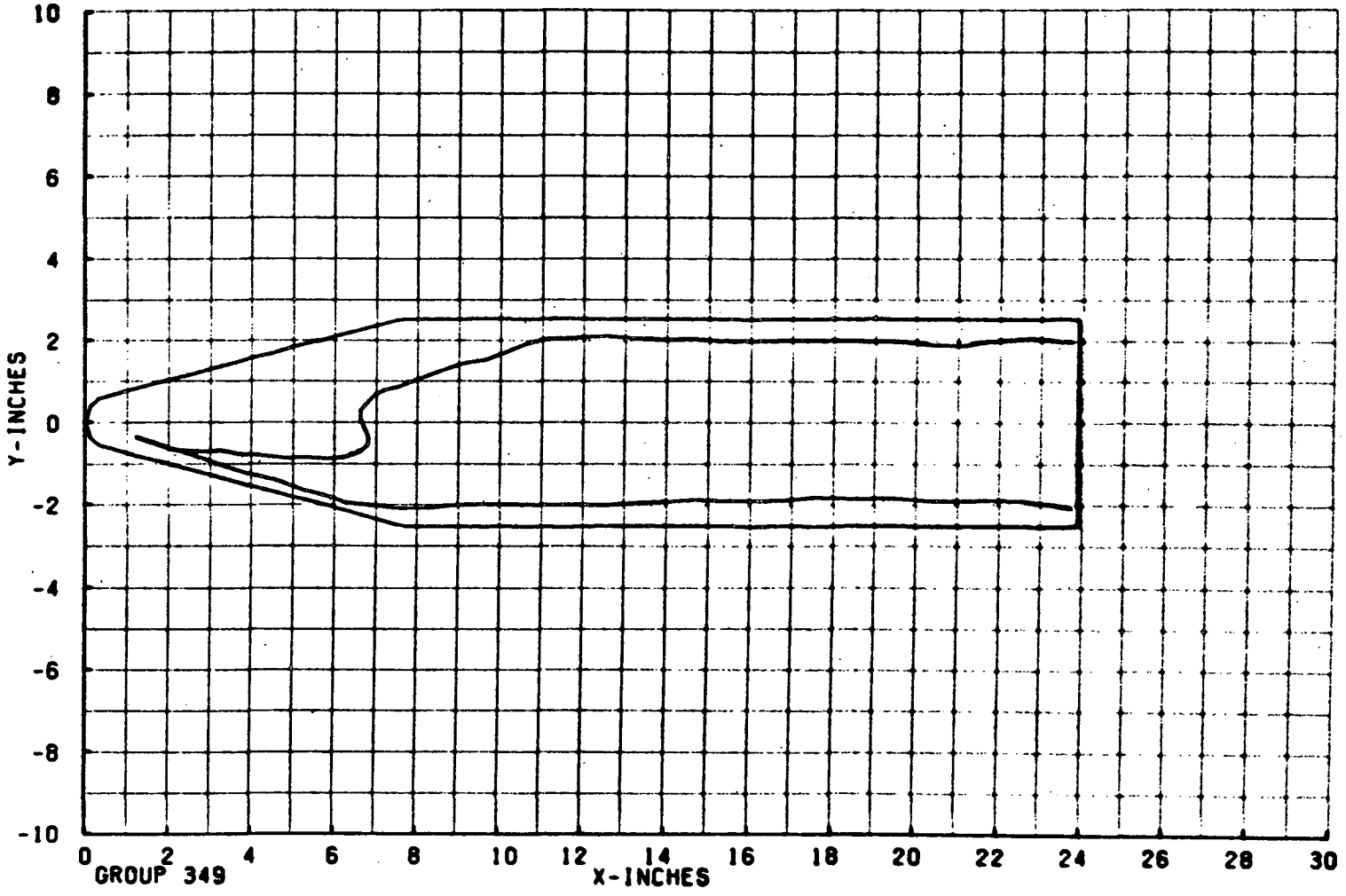
GROUP 349 PIC. NO. 871 H/HREF 6.120E-01 MODEL SURFACE - BOTTOM

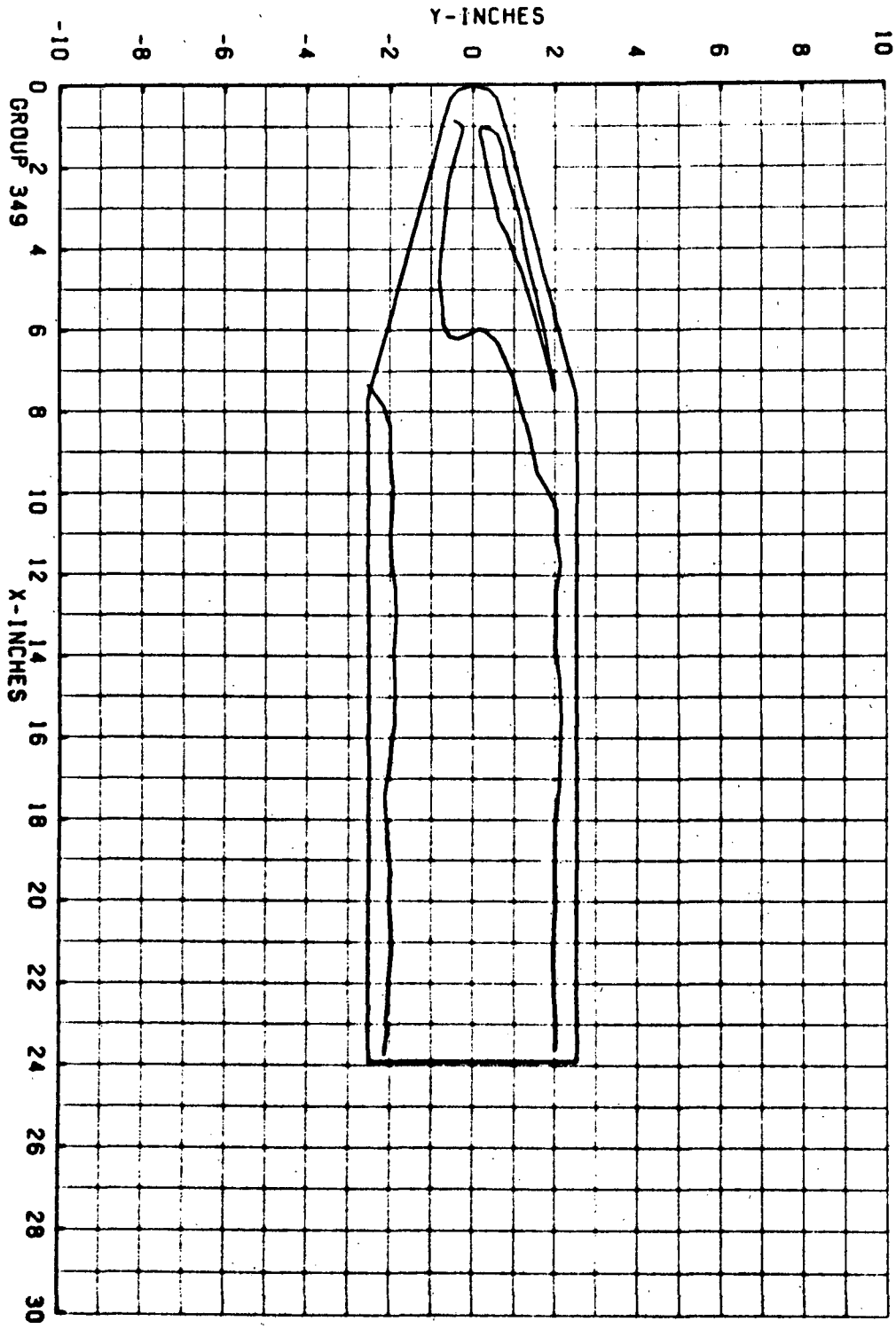
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.768E-02 RE/FT 3.760E 06 CONF LRC-SB



GROUP 349 PIC. NO. 872 H/HREF 5.566E-01 MODEL SURFACE - BOTTOM

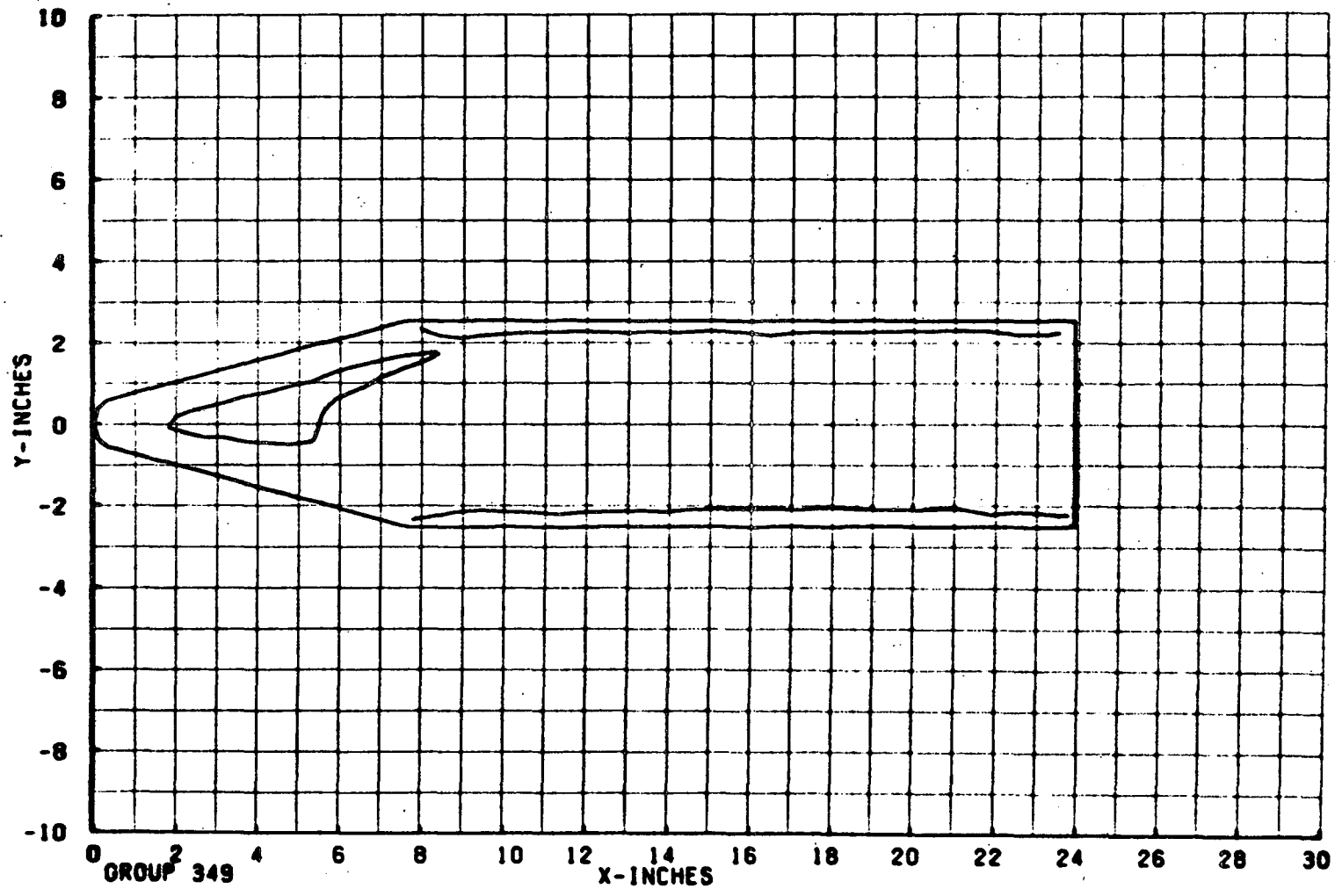
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.768E-02 RE/FT 3.760E 06 CONF LRC-SB



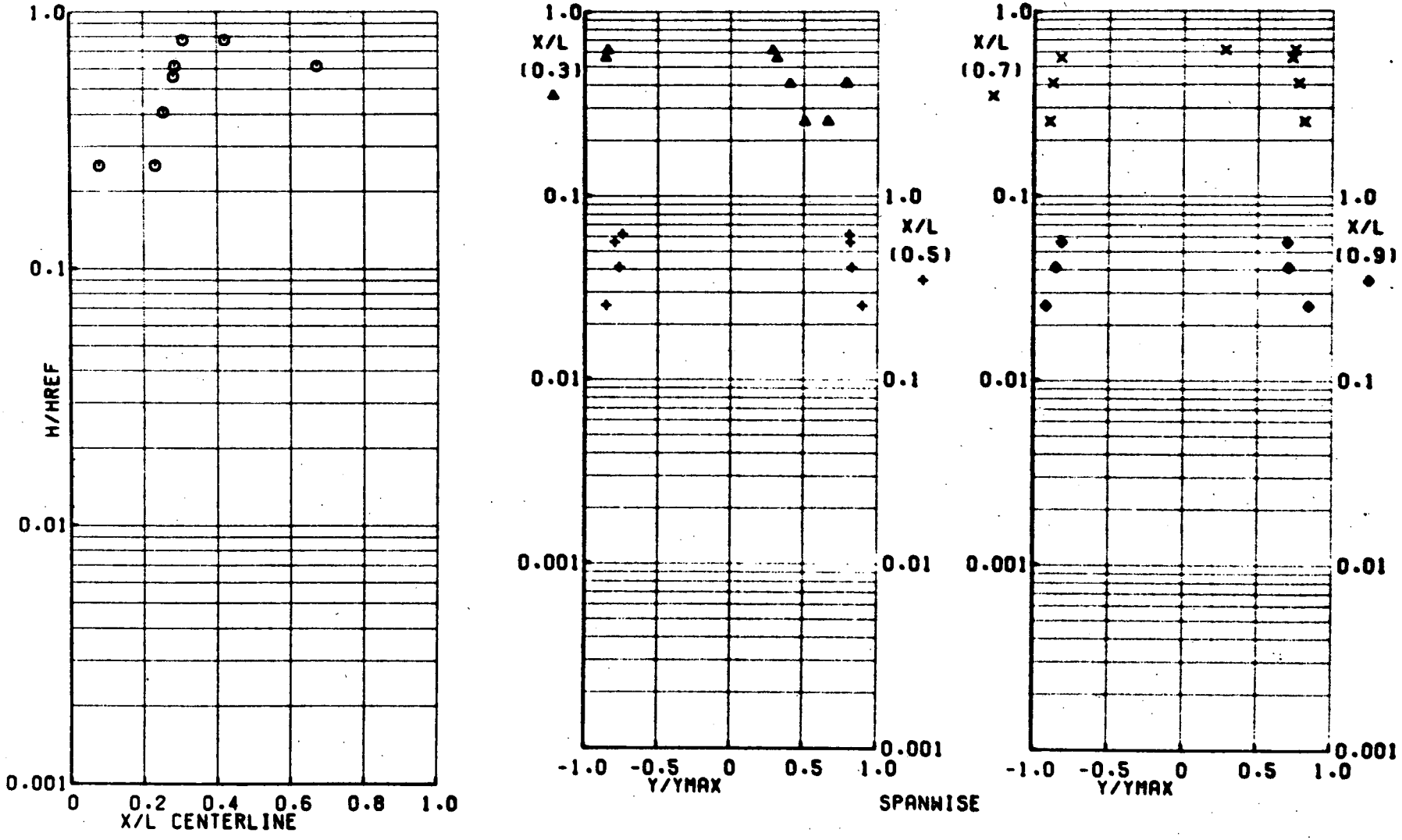

GROUP 349 PIC. NO. 877 M/MREF 4.036E-01 MODEL SURFACE - BOTTOM
MACH 8.00 ALPHA (DEG) 40.0 MREF 2.768E-02 RE/FT 3.760E 06 CONF LRC-SB
Y-INCHES
10
8
6
4
2
0
-2
-4
-6
-8
-10
GROUP 349
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
X-INCHES

GROUP 349 PIC. NO. 890 H/HREF 2.507E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.768E-02 RE/FT 3.760E 06 CONF LRC-SB



GROUP 349 ALPHA (DEG) 40.0 HREF 2.768E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.760E 06 CONF LRC-SB



9/17/71

AEDC(AHO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL R
V11162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREHEND	ROLL-MODEL	YAW
351	12	LRC-SB	8.00	863.0	1342	40.00	10.00	50.00	180.00	-.0

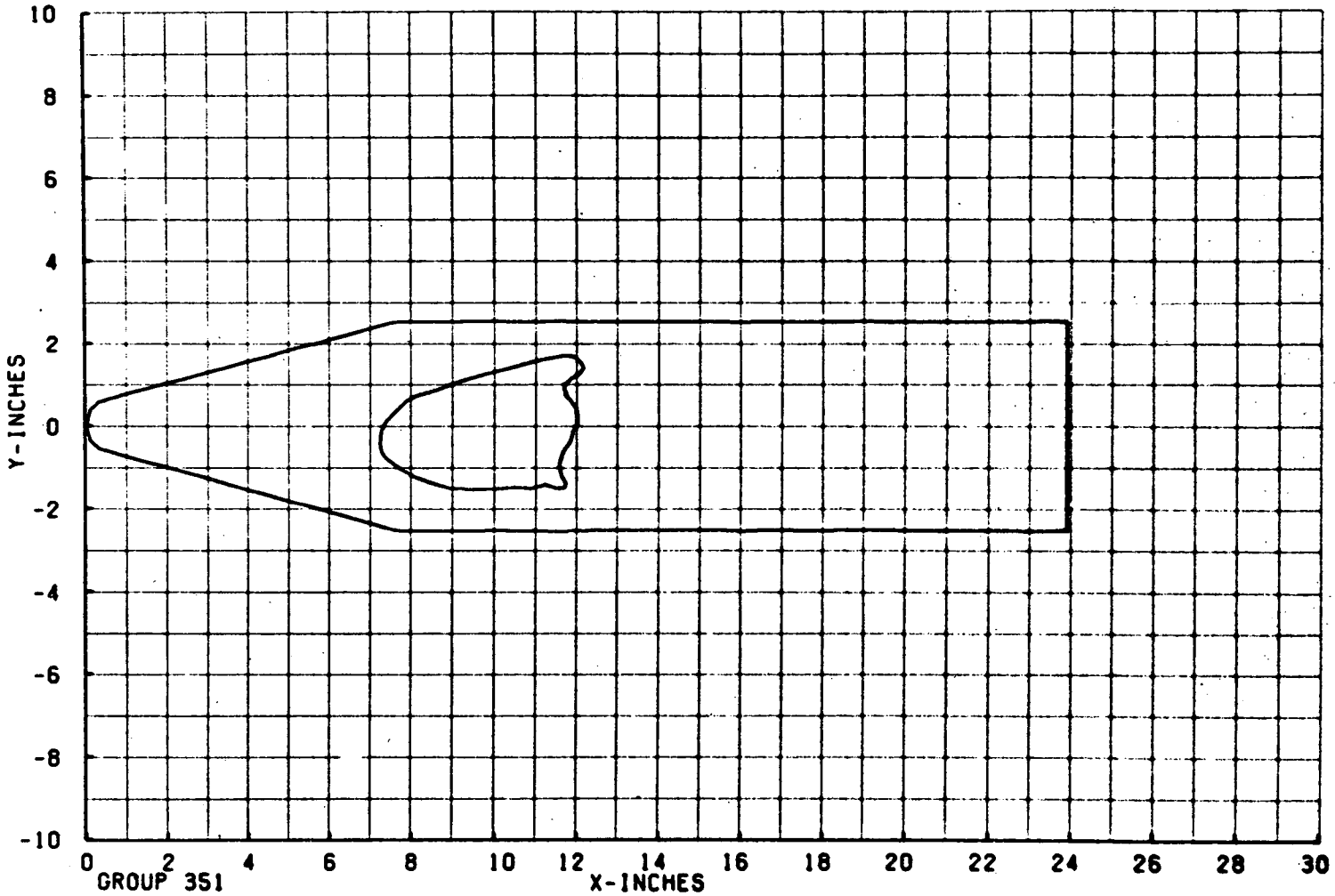
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (R= .056FT)	STREF (R= .056FT)
97.3	.088	3.960	3866	7.624E-05	7.832E-08	3.76E 06	2.771E-02	1.168E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	300		
SIDE(S)	300	AVERAGE TW = 96	-0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	300		

PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL	TEMP F		
T 938 (300)	3.20	2.08	1.99E-02	.7196	2.552E-02	.9210	2.969E-02	1.0717	8.346E-03	94	85	0	81
T 939 (300)	3.70	2.58	1.77E-02	.6373	2.260E-02	.8157	2.630E-02	.9492	7.391E-03	94	85	0	81
T 940 (300)	4.25	3.13	1.58E-02	.5709	2.024E-02	.7306	2.355E-02	.8502	6.620E-03	94	85	0	81
T 947 (300)	7.95	6.83	9.95E-03	.3591	1.273E-02	.4595	1.482E-02	.5348	4.164E-03	98	87	0	82
T 952 (300)	10.60	9.48	8.09E-03	.2921	1.036E-02	.3738	1.205E-02	.4350	3.387E-03	105	91	0	84

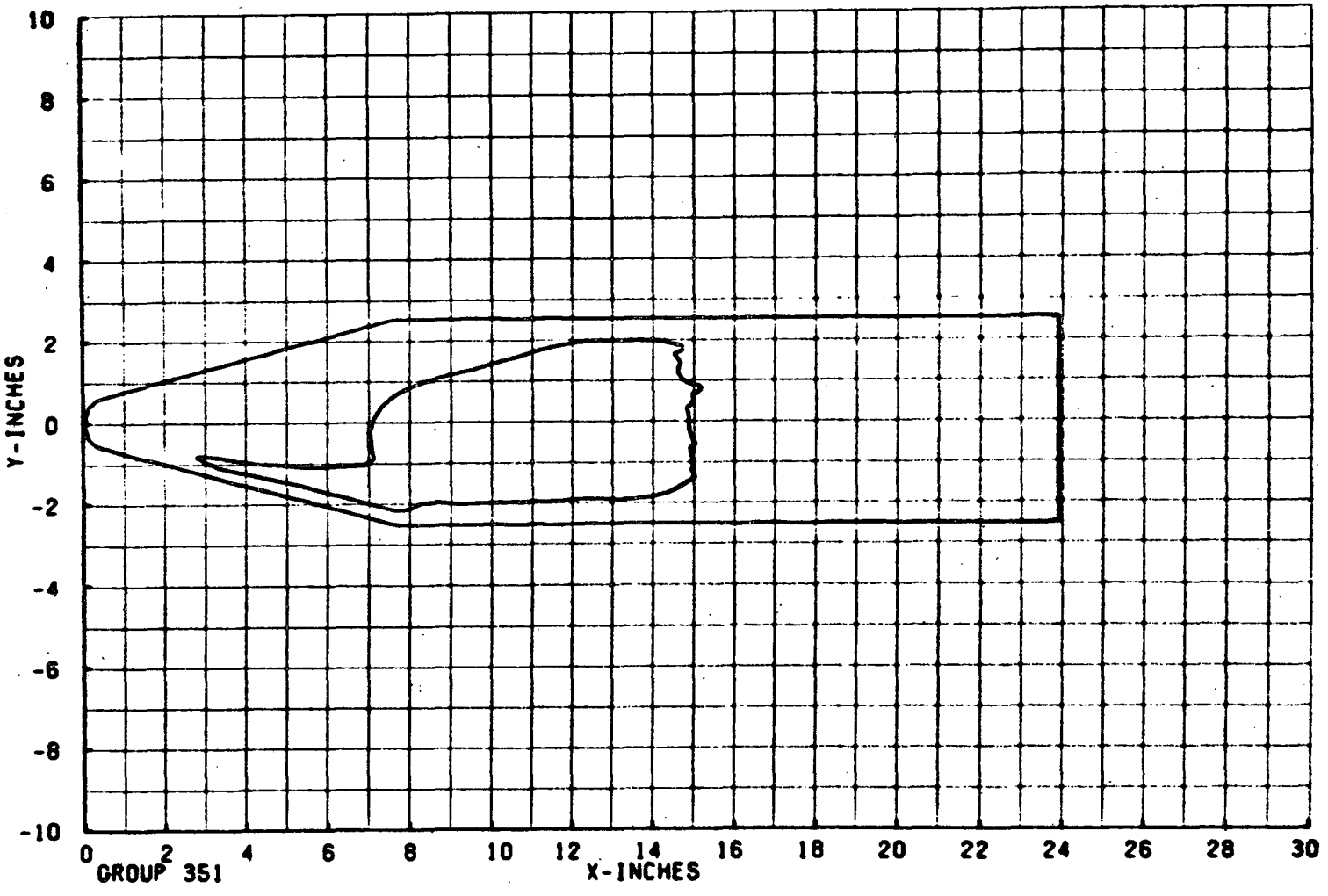
GROUP 351 PIC. NO. 938 H/HREF 7.196E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.771E-02 RE/FT 3.760E 06 CONF LRC-SB



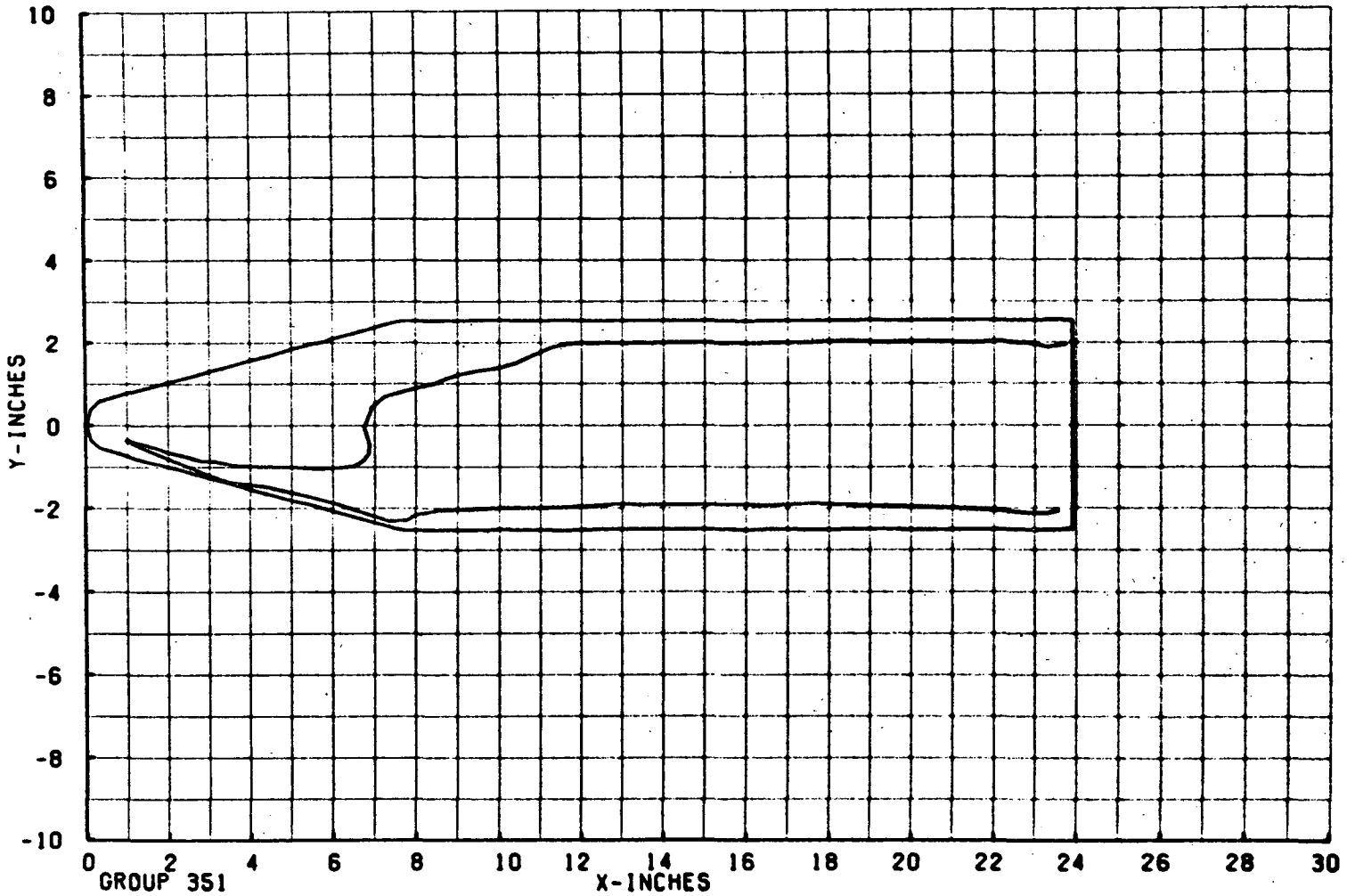
GROUP 351 PIC. NO. 939 H/HREF 6.373E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.771E-02 RE/FT 3.760E 06 CONF LRC-SB



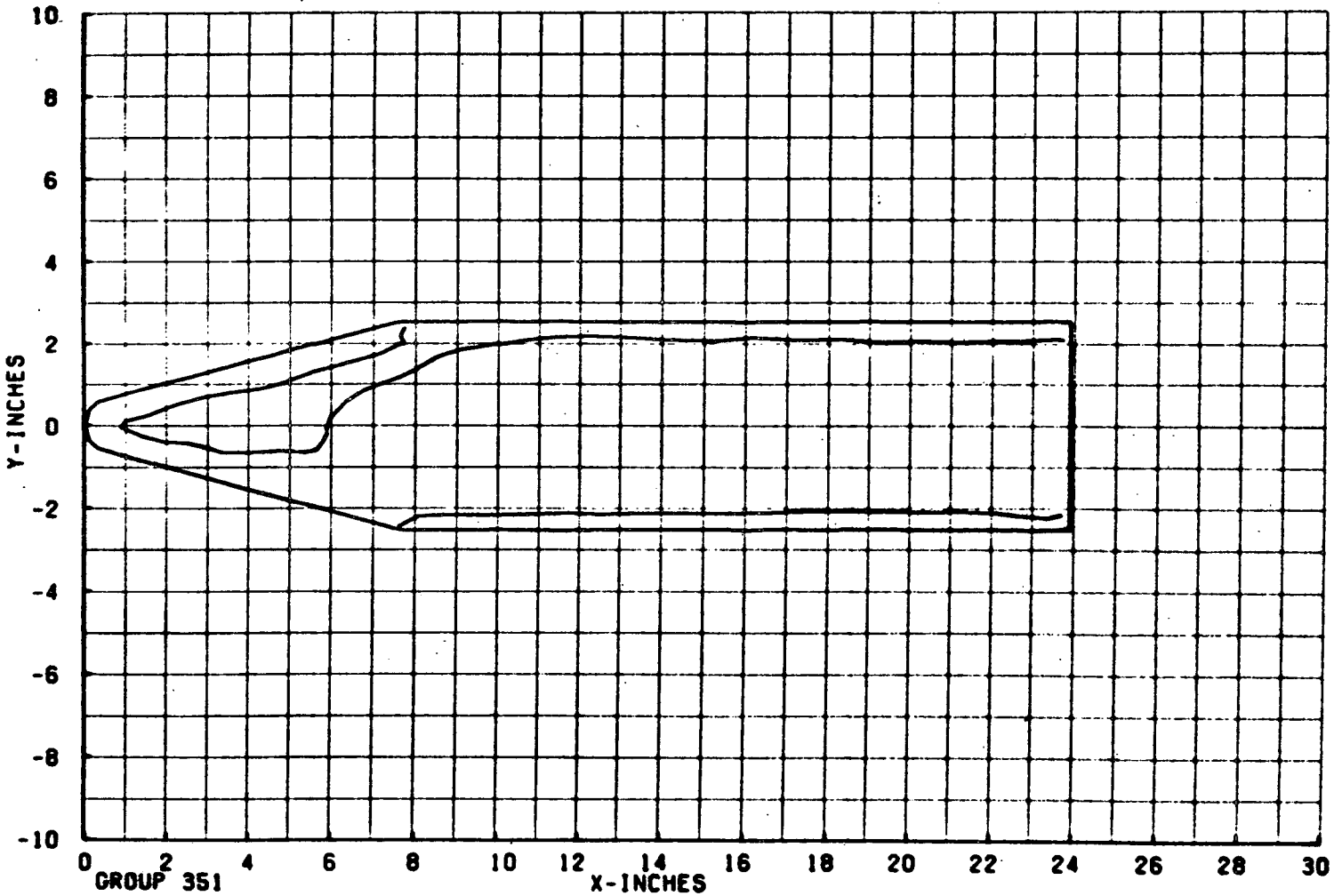
GROUP 351 PIC. NO. 940 H/HREF 5.709E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.771E-02 RE/FT 3.760E 06 CONF LRC-SB



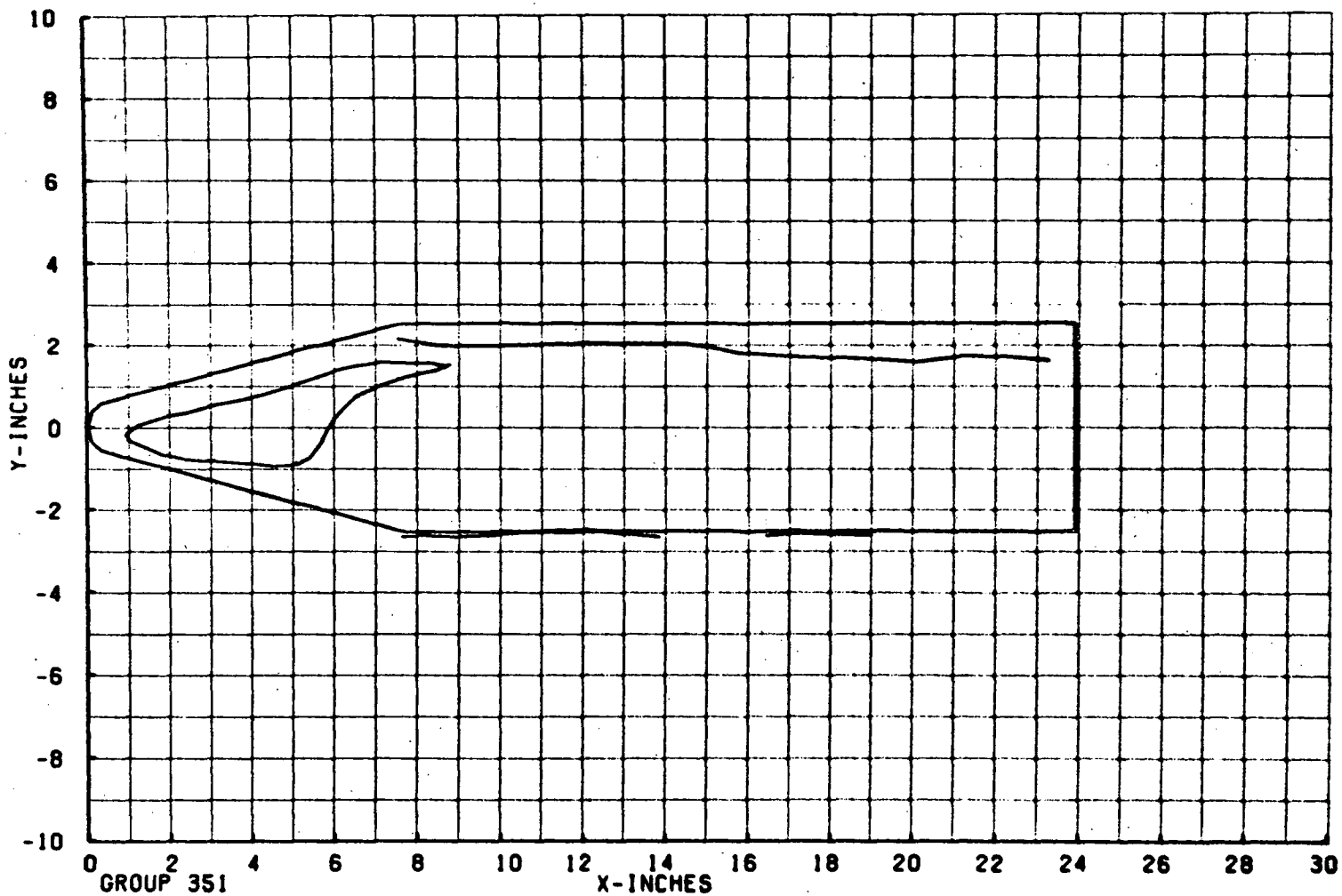
GROUP 351 PIC. NO. 947 H/HREF 3.591E-01 MODEL SURFACE - BOTTOM

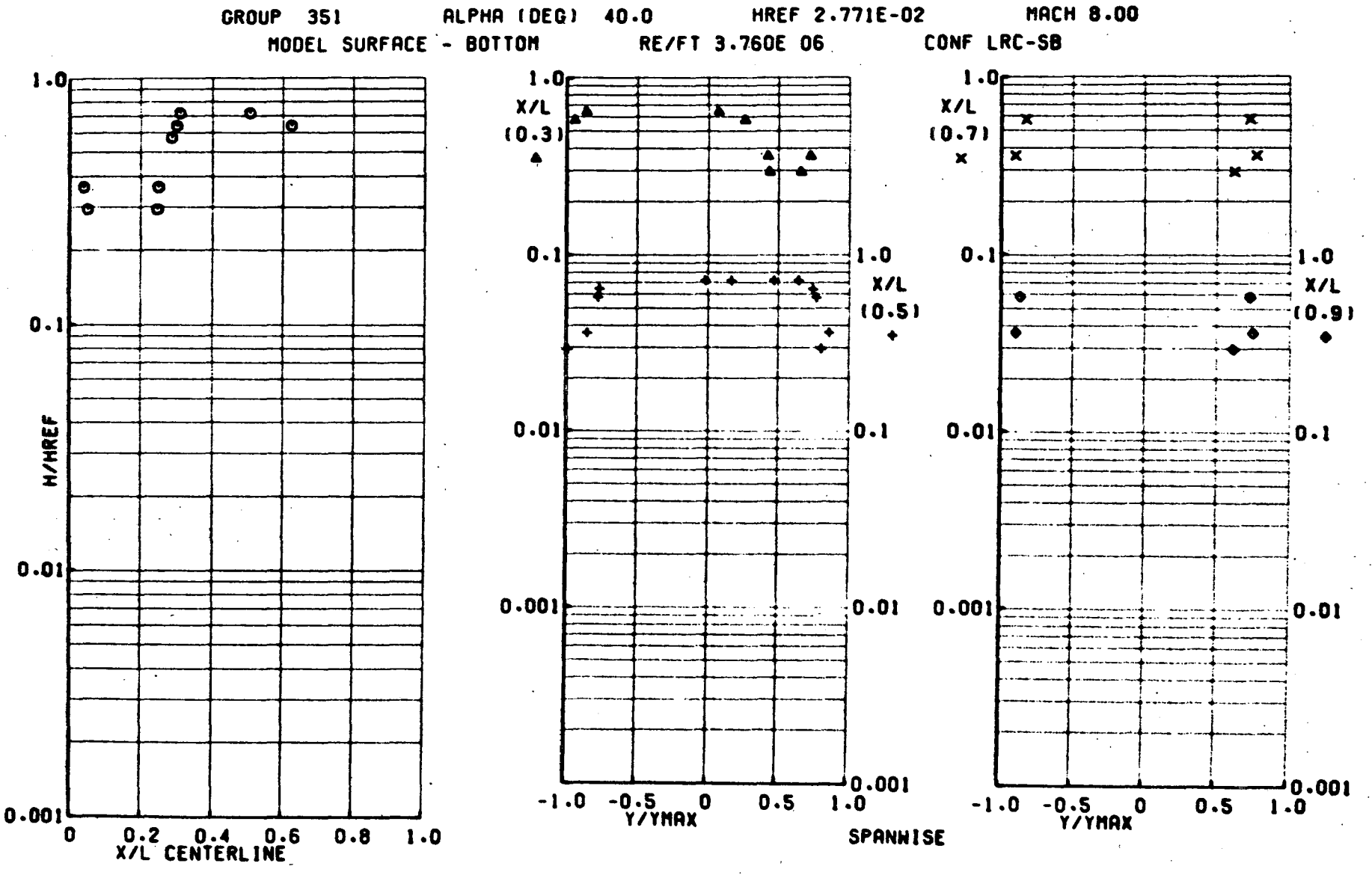
MACH 8.00 ALPHA (DEG) 40.0 HREF 2.771E-02 RE/FT 3.760E 06 CONF LRC-SB



GROUP 351 PIC. NO. 952 H/HREF 2.921E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 40.0 HREF 2.771E-02 RE/FT 3.760E 06 CONF LRC-SB




GROUP 351 ALPHA (DEG) 40.0 HREF 2.771E-02 MACH 8.00
MODEL SURFACE - BOTTOM RE/FT 3.760E 06 CONF LRC-SB
1.0
0.1
0.01
0.001
H/HREF
0 0.2 0.4 0.6 0.8 1.0
X/L CENTERLINE
X/L (0.3)
X/L (0.5)
X/L (0.7)
X/L (0.9)
-1.0 -0.5 0 0.5 1.0
Y/YMAX
SPANWISE

6/ 2/71

AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL A
V11162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
178	12	LRC-SB	8.00	857.8	1349	59.98	-9.98	-50.00	180.00	.0

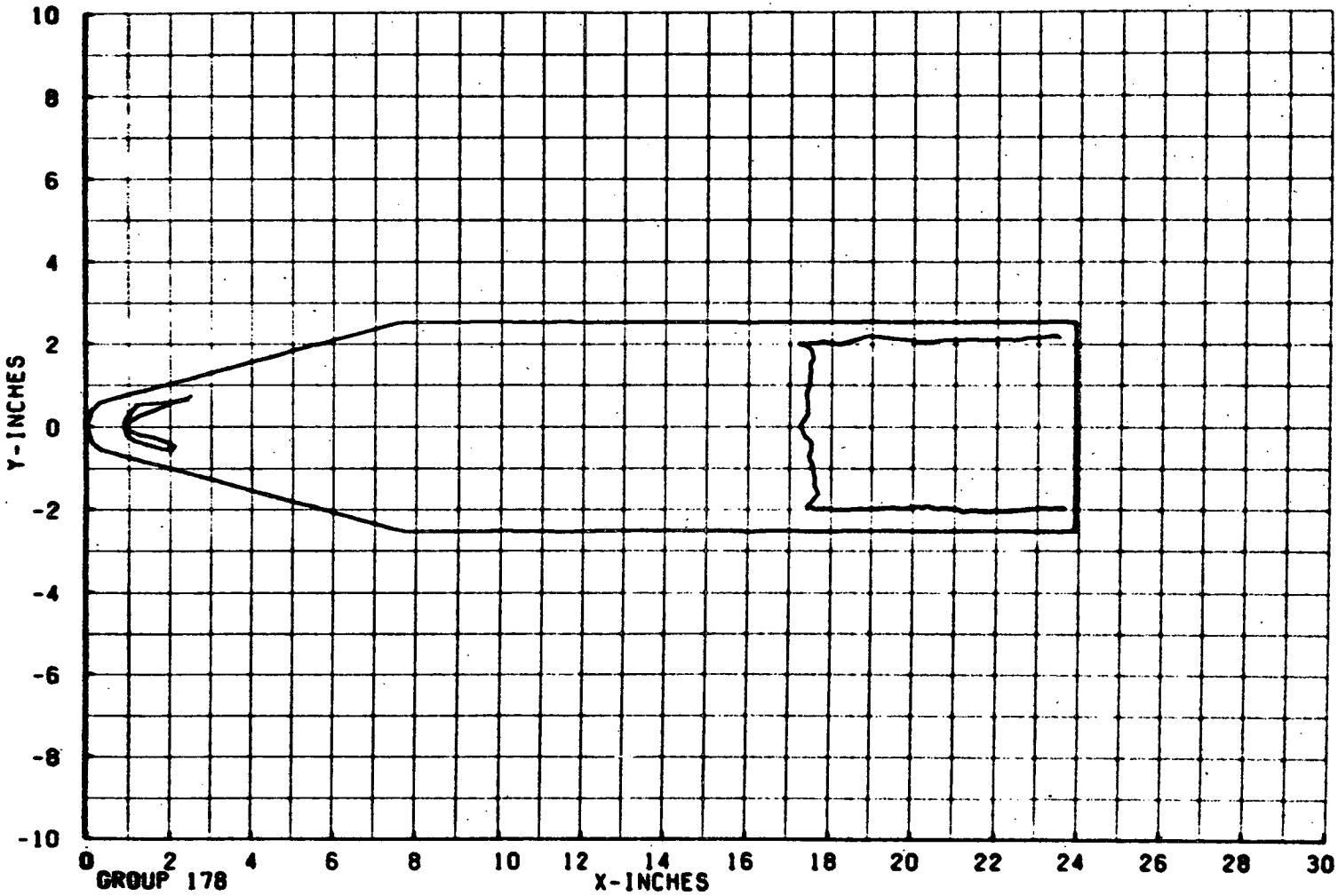
T-INF (DEG R)	P-INF (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	HREF (H= .056FT)	STREF (H= .056FT)
97.7	.048	3.936	3875	7.593E-05	7.868E-08	3.72E 06	2.765E-02	1.175E-02

CAMERA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RHOXCXK)
TOP(T)	300		
SIDE(S)	300	AVERAGE TW = 91	=0.008(SQUARE ROOT DEL TIME) + 0.11
BOTTOM(B)	300		

	PIC NO	TIME	DELTIME	H(TO)	H(TO)/HREF	H(.9TO)	H(.9TO)/HREF	H(.85TO)	H(.85TO)/HREF	ST(TO)	MODEL TEMP F			
T	3723	(300)	3.70	2.63	1.76E-02	.6371	2.250E-02	.8139	2.614E-02	.9456	7.435E-03	97	86	0	0
T	3726	(300)	5.30	4.23	1.34E-02	.4844	1.711E-02	.6189	1.988E-02	.7190	5.653E-03	97	87	0	0
T	3731	(300)	7.95	6.88	9.99E-03	.3615	1.277E-02	.4618	1.483E-02	.5365	4.218E-03	101	89	0	0
T	3736	(300)	10.60	9.53	8.14E-03	.2945	1.040E-02	.3762	1.208E-02	.4371	3.438E-03	108	92	0	0

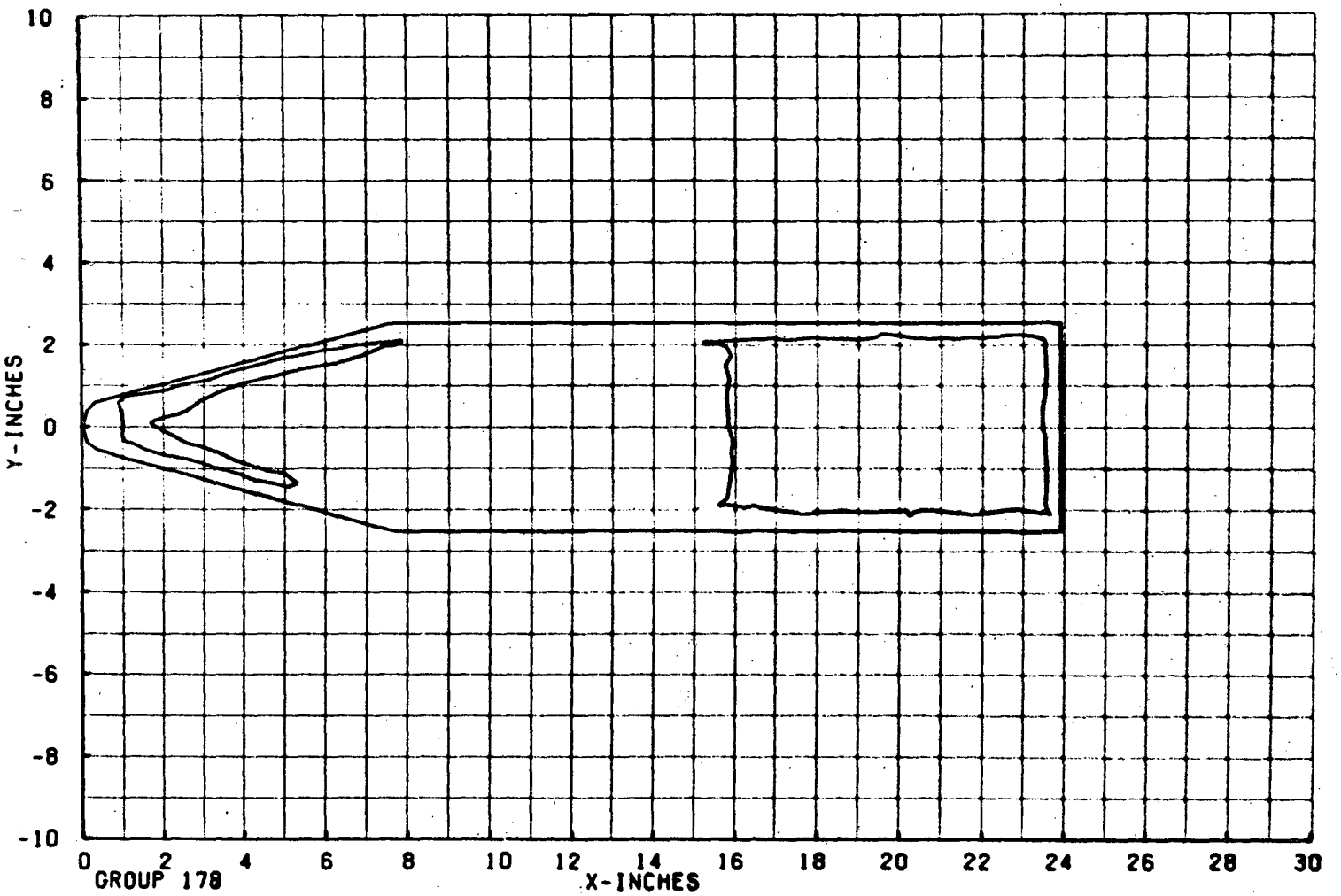
GROUP 178 PIC. NO. 3723 H/HREF 6.371E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.765E-02 RE/FT 3.720E 06 CONF LRC-SB



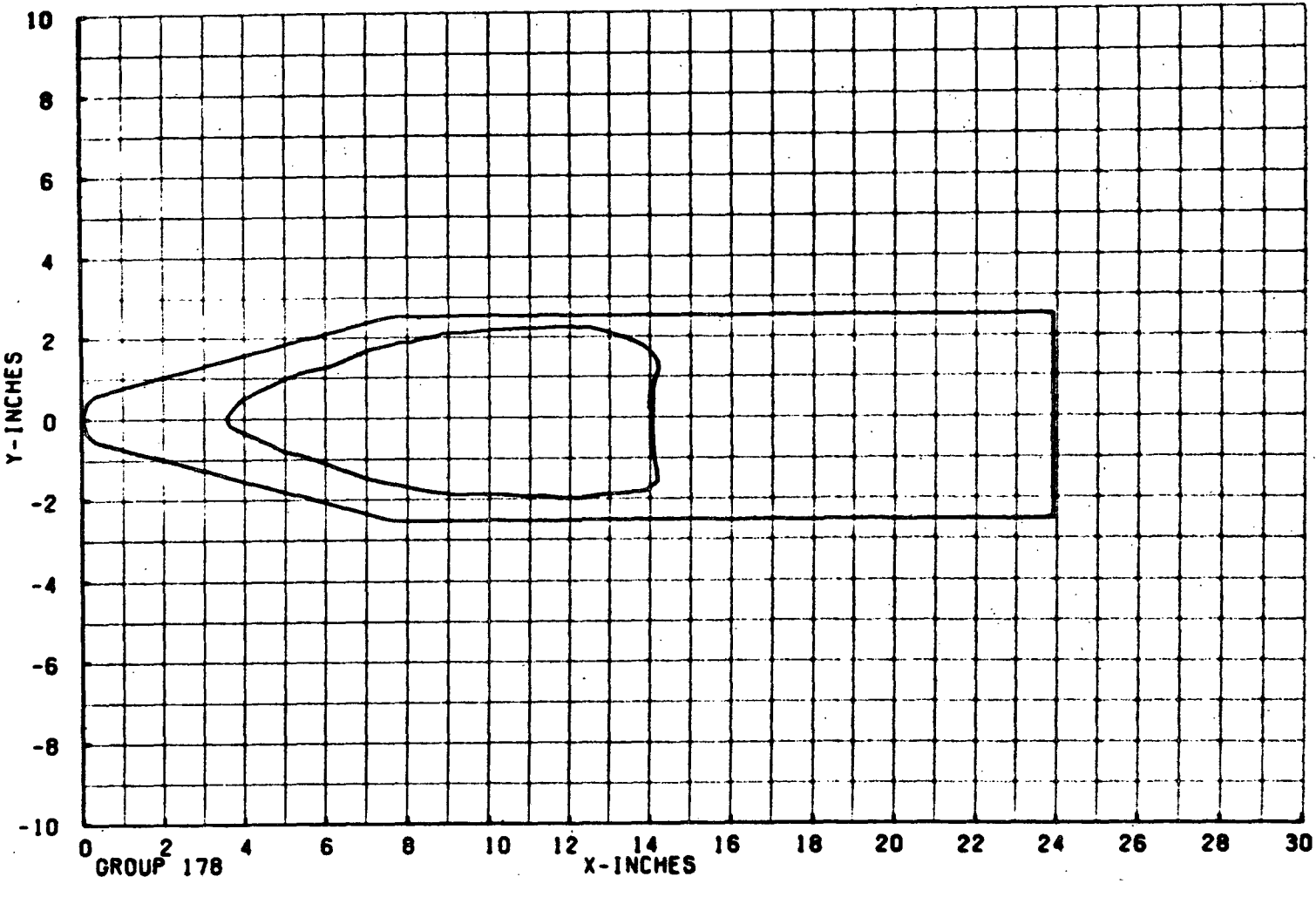
GROUP 178 PIC. NO. 3726 H/HREF 4.844E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.765E-02 RE/FT 3.720E 06 CONF LRC-SB



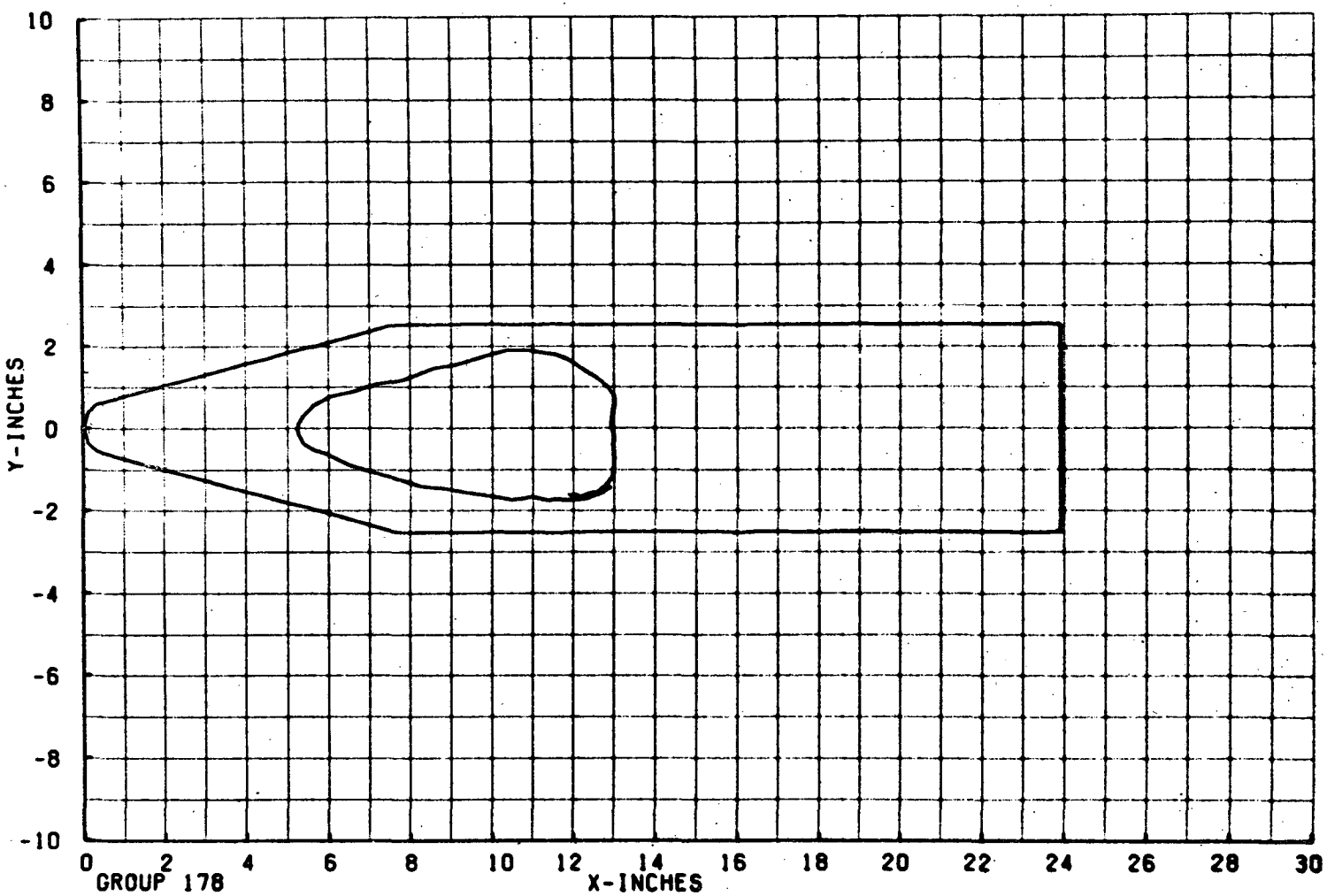
GROUP 178 PIC. NO. 3731 H/HREF 3.615E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.765E-02 RE/FT 3.720E 06 CONF LRC-SB



GROUP 178 PIC. NO. 3736 H/HREF 2.945E-01 MODEL SURFACE - BOTTOM

MACH 8.00 ALPHA (DEG) 60.0 HREF 2.765E-02 RE/FT 3.720E 06 CONF LRC-SB



GROUP 178 ALPHA (DEG) 60.0 HREF 2.765E-02 MACH 8.00

MODEL SURFACE - BOTTOM RE/FT 3.720E 06 CONF LRC-SB