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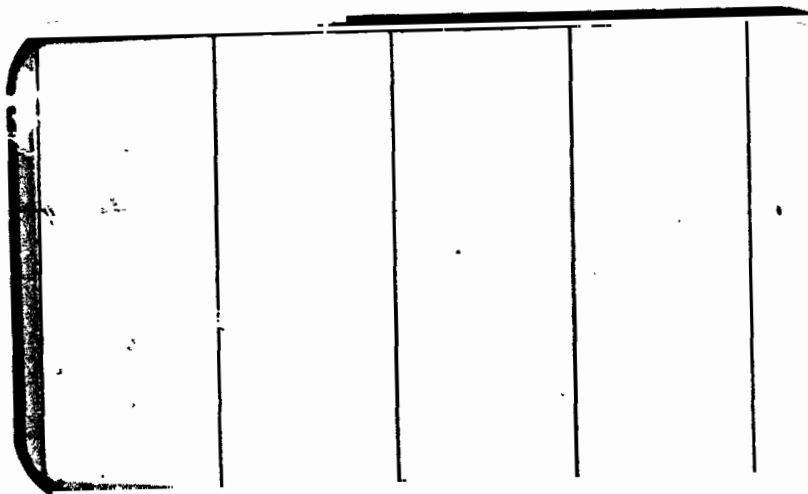
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(NASA-CR-134409) RESULTS OF  
INVESTIGATIONS ON AN 0.004-SCALE 140A/B  
CONFIGURATION SPACE SHUTTLE VEHICLE  
ORBITER MODEL (34-0) IN THE NASA/LANGLEY  
(Chrysler Corp.) 75 p HC \$4.75 CSCL 22E

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**SPACE SHUTTLE**

**AEROTHERMODYNAMIC DATA REPORT**



**JOHNSON SPACE CENTER**

**HOUSTON, TEXAS**

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# PUBLICATION CHANGE

THE FOLLOWING CHANGES APPLY TO PUBLICATION: DMS-DR-2125

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Center Hypersonic Helium Tunnel (0A88)

NUMBER: DR 2125 DATE: September, 1974 BRANCH: Flight Technology

Change is made to substitute the term "Reynolds number per body length" for Reynolds number per foot." Affected pages are iii, 3, 11, and 12.

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SPACE DIVISION



CHRYSLER  
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September, 1974

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NASA-CR-134,409

RESULTS OF INVESTIGATIONS ON AN 0.004-SCALE  
140A/B CONFIGURATION SPACE SHUTTLE VEHICLE  
ORBITER MODEL (34-0)  
IN THE NASA/LANGLEY RESEARCH CENTER  
HYPERSONIC HELIUM TUNNEL (0A88)

By

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Prepared under NASA Contract Number NAS9-13247

By

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Chrysler Corporation Space Division  
New Orleans, La. 70189

for

Engineering Analysis Division

Johnson Space Center  
National Aeronautics and Space Administration  
Houston, Texas

WIND TUNNEL TEST SPECIFICS:

Test Number: LaRC 22" He 7422  
NASA Series Number: OA88  
Model Number: 34-0  
Test Dates: 12 through 28 December 1973  
Occupancy Hours: 60

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

RESULTS OF INVESTIGATIONS ON AN 0.004-SCALE  
140A/B CONFIGURATION SPACE SHUTTLE VEHICLE  
ORBITER MODEL (34-0)  
IN THE NASA/LANGLEY RESEARCH CENTER  
HYPERSONIC HELIUM TUNNEL (0A88)

By

P. J. Hawthorne, Rockwell International Space Division

ABSTRACT

This report documents data obtained during a wind tunnel test of an 0.004-scale 140A/B configuration SSV Orbiter in the NASA/Langley Research Center 22-inch Hypersonic Helium Tunnel. The test was conducted during December 1973; 60 occupancy hours were charged. All runs were conducted at a nominal Mach number of 20 and at Reynolds numbers of 0.7, 1.1, 2.0, and  $4.0 \times 10^6$  per body length.

The complete 140A/B model was tested with various elevon settings and additionally in wing off/bodyflap off configuration at angles of attack from 18 to 54 degrees at zero yaw.

Purpose of this test was to obtain high hypersonic longitudinal and lateral-directional stability and control characteristics of the updated SSV configuration.

## TABLE OF CONTENTS

	Page
ABSTRACT	111
INDEX OF MODEL FIGURES	2
INDEX OF DATA FIGURES	2
NOMENCLATURE	3
REMARKS	6
CONFIGURATIONS INVESTIGATED	8
TEST FACILITY DESCRIPTION	9
DATA REDUCTION	10
TABLES	
I. TEST CONDITIONS	11
II. DATASET/RUN NUMBER COLLATION SUMMARY	13
III. MODEL DIMENSIONAL DATA	14
IV. HYPERSONIC VISCOUS INTERACTION PARAMETERS	22
FIGURES	
MODEL	23
DATA	25
APPENDIX	
TABULATED SOURCE DATA	

## INDEX OF MODEL FIGURES

Figure	Title	Page
1.	Axis systems.	23
2.	140A/B Orbiter for test OA88.	24

## INDEX OF DATA FIGURES

<u>Title</u>	<u>Schedule of Coefficients Plotted</u>	<u>Pages</u>
<b>Effect of Reynolds Number on Configuration</b>		
Elevon = 0, HH-20 Balance	A	1-5
Elevon = -5, HH-20 Balance	A	6-10
Elevon = -5, HH-19 Balance	A	11-15
Elevon = 15, HH-20 Balance	A	16-20
<b>Elevon Effectiveness, Re,L = 2.0 million</b>		
HH-20 Balance	A	21-25
<b>Effect of Reynolds Number on Body Alone</b>		
HH-20 Balance	A	26-30

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**Schedule of Coefficients Plotted:**

- A) CAF, CAB, CN, CL, XCP/L, CLM, CDF, L/DF vs. ALPHA  
 CN vs. CLM  
 CL vs. CLM

NOMENCLATURE  
General

<u>SYMBOL</u>	<u>PLOT SYMBOL</u>	<u>DEFINITION</u>
$a$		speed of sound; m/sec, ft/sec
$C_p$	CP	pressure coefficient; $(p_1 - p_\infty)/q$
$M$	MACH	Mach number; $V/a$
$p$		pressure; $N/m^2$ , psf
$q$	Q(NSM) Q(PSF)	dynamic pressure; $1/2\rho V^2$ , $N/m^2$ , psf
$Re, L$	RE, L	unit Reynolds number; based on body length
$V$		velocity; m/sec, ft/sec
$\alpha$	ALPHA	angle of attack, degrees
$\beta$	BETA	angle of sideslip, degrees
$\psi$	PSI	angle of yaw, degrees
$\phi$	PHI	angle of roll, degrees
$\rho$		mass density; $kg/m^3$ , slugs/ft <sup>3</sup>

Reference & C.G. Definitions

$A_b$		base area; $m^2$ , $ft^2$
$b$	BREF	wing span or reference span; m, ft
c.g.		center of gravity
$\frac{l}{c}$ <sub>REF</sub>	LREF	reference length or wing mean aerodynamic chord; m, ft
$S$	SREF	wing area or reference area; $m^2$ , $ft^2$
	MRP	moment reference point
	XMRP	moment reference point on X axis
	YMRP	moment reference point on Y axis
	ZMRP	moment reference point on Z axis

SUBSCRIPTS

b	base
l	local
s	static conditions
t	total conditions
$\infty$	free stream



NOMENCLATURE (Continued)

Body-Axis System

<u>SYMBOL</u>	<u>PLOT SYMBOL</u>	<u>DEFINITION</u>
$C_N$	CN	normal-force coefficient; $\frac{\text{normal force}}{qS}$
$C_A$	CA	axial-force coefficient; $\frac{\text{axial force}}{qS}$
$C_Y$	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
$C_{A_b}$	CAB	base-force coefficient; $\frac{\text{base force}}{qS}$ $-A_b(p_b - p_\infty)/qS$
$C_{A_f}$	CAF	forebody axial force coefficient, $C_A - C_{A_b}$
$C_m$	CLM	pitching-moment coefficient; $\frac{\text{pitching moment}}{qS l_{REF}}$
$C_n$	CYN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qS b}$
$C_l$	CBL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qS b}$

Stability-Axis System

$C_L$	CL	lift coefficient; $\frac{\text{lift}}{qS}$
$C_D$	CD	drag coefficient; $\frac{\text{drag}}{qS}$
$C_{D_b}$	CDB	base-drag coefficient; $\frac{\text{base drag}}{qS}$
$C_{D_f}$	CDF	forebody drag coefficient; $C_D - C_{D_b}$
$C_Y$	CY	side-force coefficient; $\frac{\text{side force}}{qS}$
$C_m$	CLM	pitching-moment coefficient; $\frac{\text{pitching moment}}{qS l_{REF}}$
$C_n$	CLN	yawing-moment coefficient; $\frac{\text{yawing moment}}{qS b}$
$C_l$	CSL	rolling-moment coefficient; $\frac{\text{rolling moment}}{qS b}$
L/D	L/D	lift-to-drag ratio; $C_L/C_D$
L/D <sub>f</sub>	L/DF	lift to forebody drag ratio; $C_L/C_{D_f}$

NOMENCLATURE (Continued)  
Additional Nomenclature

<u>Symbol</u>	<u>Plot Symbol</u>	<u>Definition</u>
$X_{cp}/l_B$	XCP/L	longitudinal center of pressure location, fraction of body length
$\alpha_1$		wing incidence angle, degrees
$\delta_{BF}$	BDFLAP	bodyflap deflection angle, degrees
$\delta_e$	ELEVON	elevon deflection angle, degrees
$\delta_R$	RUDDER	rudder deflection angle, degrees
$\delta_{SB}$	SPDBRK	speedbrake deflection angle, degrees
$\delta_a$	AILRON	aileron, total aileron deflection angle, degrees, (left aileron - right aileron)/2.
$\delta_e$	ELEVTR	elevator, surface deflection angle, positive deflection trailing edge down, degrees.
	BALANC	parameter name to document balance utilized in testing, BALANC = 19 (LaRC HH-19), BALANC = 20 (LaRC HH-20), see table 1.

## REMARKS

Measurement of the 34-0 model at the Los Angeles Division of Rockwell International revealed inaccuracies in the configuration, which dictated the use of unique reference dimensions and areas to reduce the raw data to coefficient form.

Significant model errors revealed were as follows:

1. The overall length of the model was 5.5 inches full scale (FS) too long. This error is distributed with 1.0 inch at the nose and 4.5 inches at the rear of the fuselage.

2. The elevon hinge line was located too far aft, being 2.875 inches FS in error at the left hand tip and 1.0 inch FS at the right hand tip for a net error of approximately 2.0 inches.

3. The leading edge cuffs were staggered; the left hand cuff was 10 to 20 inches full scale aft of the correct station measured parallel to the FRL and the right hand cuff was nearly correct.

4. The elevon trailing edges were located too far aft, 6.56 inches FS on the left side and 8.46 inches FS on the right hand. When combined with a properly located leading edge, this yields an oversized planform.

5. The balance center was located 3.0 inches FS forward from its nominal location at station 1073.7 instead of 1076.7.

Analysis of the errors by the Rockwell Space Division Aerodynamics Group has led to the generation of non-standard constants to yield data which is in reasonable accord with those obtained in other testing programs. These values and those of the nominal Orbiter are presented below:

REMARKS (Concluded)

<u>Dimension</u>	<u>Nominal Orhiter (full scale)</u>	<u>Used for 34-0 model (full scale)</u>
Wing area (S)	2690. ft <sup>2</sup>	2741.8 ft <sup>2</sup>
Wing span (b)	936.68 in	936.68 in
Mean aerodynamic chord ( $\bar{c}$ )	474.81 in	481.648 in
MRC, $X_0$ station	1076.7 in	1081.39 in
Elevon area, per side	210.00 ft <sup>2</sup>	238.93 ft <sup>2</sup>
Elevon moment arm, for application to incremental data only (distance from MRC to 0.25 elevon M.A.C.)	328.45 in	331.89 in

Additionally, the elevon deflections were measured and a list of  $\delta_{e\text{TRUE}}$  was obtained. Utilizing these values for plotting also improves the agreement of the data with those obtained from other sources.

<u>Elevon Panel</u>	<u>Nominal <math>\delta_e</math></u>	<u><math>\delta_{e\text{TRUE}}</math> (34-0)</u>
left	-0	+3.40°
right	-0	+4
left	-5°	-
right	-5°	-
left	-40°	-33.33°
right	-40°	-33.96°
left	10°	+13.77°
right	15°	+15.11°

## CONFIGURATIONS INVESTIGATED

During test OA88, the 140A/B vehicle was tested in full up and wing off configurations.

The following letter designations were used to denote components of the 140A/B configuration:

- B26 Fuselage to the outer mold line contours of drawing VL70-000143 incorporating an integral canopy and blended into the 140B wing by drawing VL70-000200 revised
- C9 Canopy to VL70-000143 lines
- E26 Elevon of planform and section of VL70-000200 wing with hinge line at  $X_0 = 13.87$ . The elevon gaps are not simulated
- F7 Center pivot bodyflap with hinge line at  $X = 1528.3$  and planform as denoted on VL70-000145 drawing
- M7 Orbital maneuvering system pods mounted on the upper rear of the fuselage with rocket engine nozzles simulated, lines per VL70-000145
- R5 Rudder utilized with V8 vertical tail and shown on VL70-000146A
- V8 45° sweep leading edge single center lines mounted vertical tail of modified diamond section as per VL70-000146A
- W116 VL70-000200 revised wing: 140B wing blended to 140A body; wing is of 81°/45° sweep leading edge and is 6 inches FS thicker at the body than 140A; airfoil is modified NASA 0011.3 at  $Y = 199$ , 0012.64 at theoretical tip;  $\alpha_i = +0^\circ 30'$ , dihedral =  $3^\circ 30'$  at TE; tip is defined by VL70-000092

The tested configurations were denoted as:

140A/B = B26 C9 E26 F7 M7 R5 V8 W116

Body alone = B26 C9 M7 R5 V8

See the Remarks section for model anomalies.

## TEST FACILITY DESCRIPTION

The NASA/Langley Research Center 22-inch Hypersonic Helium Tunnel is a blowdown facility with a normal operational time of 30 seconds for aerodynamic force and moment tests. Studies are conducted in the 22" diameter test section at Mach numbers of 18 to 22 at stagnation pressures from 300 to 2000 psi and at total temperatures from 480°R to 960°R; these test conditions allow for a Reynolds number variation of  $0.7 \times 10^6$  to  $11.5 \times 10^6$  per foot.

The tunnel is also equipped with an Electron Beam Flow Visualization System which allows color photographs with depth of field to be made of the shock system.

Operational parameters of the contoured nozzle flow characteristics are available in NASA TN D-2489, 1964, Longitudinal Characteristics of Several Configurations at Hypersonic Mach Numbers in Conical and Contoured Nozzles, by Arrington, Joiner and Henderson.

## DATA REDUCTION

The LaRC HH-19 and HH-20 balances were used to measure Orbiter forces and moments at four Reynolds numbers. Data were converted to standard NASA force and moment coefficients and are presented about a nominal moment reference center in both stability and body axis systems.

Additionally, the normal force center of pressure is presented as

$$X_{cp}/\ell_B = \frac{X_{CG}}{\ell_B} - \frac{C_m (C_w)}{C_N \ell_B}$$

where  $X_{cp}$  is the longitudinal distance from the inner mold line nose station ( $X_0 = 238$  inches full scale) to the center of pressure.

Reference dimensions for this test were distinctly non-standard and may be found with an explanation as to their origin in the Remarks section.









\*REVISED 4/24/74

TABLE III. -MODEL DIMENSIONAL DATA

MODEL COMPONENT : BODY - B<sub>26</sub>

GENERAL DESCRIPTION : Configuration 140A/B orbiter fuselage

NOTE: B<sub>26</sub> is identical to B<sub>24</sub>, except underside of fuselage has been  
refaired to accept W<sub>116</sub>.

MODEL SCALE: 0.0040      MODEL DRAWING: SS-A00147, RELEASE 12

DRAWING NUMBER VL70-000143B, -000200, -000205, -006089, -000145  
VL70-000140A, -000140B

DIMENSIONS	FULL SCALE	MODEL SCALE
*Length (OML: Fwd Sta X <sub>0</sub> =235), In.	1293.3	5.173
*Length (IML: Fwd Sta. X <sub>0</sub> =238), In.	1290.3	5.161
Max Width (@ X <sub>0</sub> =1528.3), In.	264.0	1.056
Max Depth (@ X <sub>0</sub> = 1464), In.	250.00	1.000
Fineness Ratio	0.26357	0.26357
Area - Ft <sup>2</sup>		
Max. Cross-Sectional	340.88	0.005
Planform		
Wetted		
Base		

\*REVISED 4/24/74

TABLE III. - MODEL DIMENSIONAL DATA - Continued.

MODEL COMPONENT : CANOPY - C<sub>9</sub>

GENERAL DESCRIPTION : Configuration 3A. Canopy used with fuselage B<sub>26</sub>.

MODEL SCALE: 0.0040 MODEL DRAWING: SS-A00147, RELEASE 12

DRAWING NUMBER : VL70-000143A

DIMENSIONS :	FULL SCALE	MODEL SCALE
* Length ( $x_0 = 434.643$ to 578)	<u>143.357</u>	<u>0.573</u>
Max Width (@ $x_0 = 513.127$ )	<u>152.412</u>	<u>0.610</u>
Max Depth (@ $x_0 = 483.0$ )	<u>25.000</u>	<u>0.100</u>
Fineness Ratio	<u>                    </u>	<u>                    </u>
Area	<u>                    </u>	<u>                    </u>
Max. Cross-Sectional	<u>                    </u>	<u>                    </u>
Planform	<u>                    </u>	<u>                    </u>
Wetted	<u>                    </u>	<u>                    </u>
Base	<u>                    </u>	<u>                    </u>

TABLE III. - MODEL DIMENSIONAL DATA - Continued.

\*REVISED 4/24/74

MODEL COMPONENT: ELEVON - E<sub>26</sub>

GENERAL DESCRIPTION: Configuration 140A/B Orbiter elevons

Data are for one side.

MODEL SCALE: 0.0040 MODEL DRAWING: SS-A00148, RELEASE 6

DRAWING NUMBER: VL70-000200, -006089, -006092

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area - Ft <sup>2</sup>	<u>210.0</u>	<u>0.003</u>
Span (equivalent), In.	<u>349.2</u>	<u>1.397</u>
Inb'd equivalent chord, In.	<u>118.004</u>	<u>0.472</u>
Outb'd equivalent chord, In.	<u>55.192</u>	<u>0.221</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u>0.2096</u>	<u>0.2096</u>
At Outb'd equiv. chord	<u>0.4004</u>	<u>0.4004</u>
Sweep Back Angles, degrees		
Leading Edge	<u>0.00</u>	<u>0.00</u>
Trailing edge	<u>-10.056</u>	<u>-10.056</u>
Hingeline	<u>0.00</u>	<u>0.00</u>
* Area Moment ( Product of area & $\bar{c}$ ), Ft <sup>3</sup>	<u>1587.25</u>	<u>0.001</u>
*Mean Aerodynamic Chord, In.	<u>90.7</u>	<u>0.363</u>

TABLE III. - MODEL DIMENSIONAL DATA - Continued.

MODEL COMPONENT : BODY FLAP - F<sub>7</sub>

GENERAL DESCRIPTION : Configuration 140A/B Orbiter Body Flap

MODEL SCALE: 0.004 MODEL DRAWING: SS-A00147. RELEASE 12

DRAWING NUMBER : VL70-000140A, VL70-000145

DIMENSIONS :	FULL SCALE	MODEL SCALE
Length ( $X_0 = 1520$ to $X_0 = 1613$ ), In.	<u>93.000*</u>	<u>0.372</u>
Max Width, In.	<u>262.000</u>	<u>1.048</u>
Max Depth (@ $X_0 = 1520$ ), In.	<u>23.000</u>	<u>0.092</u>
Fineness Ratio	<u>                    </u>	<u>                    </u>
Area - Ft <sup>2</sup>	<u>                    </u>	<u>                    </u>
Max. Cross-Sectional	<u>                    </u>	<u>                    </u>
Planform	<u>142.6</u>	<u>0.0023</u>
Wetted	<u>                    </u>	<u>                    </u>
Base	<u>41.847</u>	<u>0.00067</u>

\*Model dim. measured from model sta. 15.20

TABLE III. - MODEL DIMENSIONAL DATA - Continued.

MODEL COMPONENT : OMS/RCS PODS - M

GENERAL DESCRIPTION : Configuration 140A/B Orbiter OMS/RCS pods

MODEL SCALE: 0.0040 MODEL DRAWING: SS-A00147, RELEASE 12

DRAWING NUMBER : VI70-000145

DIMENSIONS	FULL SCALE	MODEL SCALE
Length (OMS Fwd Sta. $X_0 = 1233.0$ ), In.	<u>327.000</u>	<u>1.308</u>
Max Width (@ $X_0 = 1450.0$ ), In.	<u>94.5</u>	<u>0.378</u>
Max Depth (@ $X_0 = 1493.0$ ), In.	<u>109.000</u>	<u>0.436</u>
Fineness Ratio	<u>                    </u>	<u>                    </u>
Area	<u>                    </u>	<u>                    </u>
Max. Cross-Sectional	<u>                    </u>	<u>                    </u>
Planform	<u>                    </u>	<u>                    </u>
Wetted	<u>                    </u>	<u>                    </u>
Base	<u>                    </u>	<u>                    </u>

TABLE III. - MODEL DIMENSIONAL DATA - Continued.

MODEL COMPONENT: RUDDER - R<sub>5</sub>

GENERAL DESCRIPTION: Configuration 140C/D orbiter rudder (identical to configuration 140A/B rudder).

MODEL SCALE: 0.0040

DRAWING NUMBER: VL70-000146B, -000095

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area - Ft <sup>2</sup>	<u>100.15</u>	<u>0.0016</u>
Span (equivalent) , In.	<u>201.00</u>	<u>0.804</u>
Inb'd equivalent chord , In.	<u>91.585</u>	<u>0.366</u>
Outb'd equivalent chord , In.	<u>50.833</u>	<u>0.203</u>
Ratio movable surface chord/ total surface chord		
At Inb'd equiv. chord	<u>0.400</u>	<u>0.400</u>
At Outb'd equiv. chord	<u>0.400</u>	<u>0.400</u>
Sweep Back Angles, degrees		
Leading Edge	<u>34.83</u>	<u>34.83</u>
Trailing Edge	<u>26.25</u>	<u>26.25</u>
Hingeline	<u>34.83</u>	<u>34.83</u>
Area Moment ( Product of Area and $\bar{c}$ ), Ft <sup>3</sup>	<u>610.92</u>	<u>0.000039</u>
Mean Aerodynamic Chord	<u>73.2</u>	<u>0.293</u>



TABLE III. - MODEL DIMENSIONAL DATA- Continued.

MODEL COMPONENT: VERTICAL - V<sub>8</sub>GENERAL DESCRIPTION: Configuration 140C/D orbiter vertical tail(identical to configuration 140A/B vertical tail).MODEL SCALE: 0.0040DRAWING NUMBER: VL70-000140C, -000146B

DIMENSIONS:	<u>FULL SCALE</u>	<u>MODEL SCALE</u>
TOTAL DATA		
Area (Theo) - Ft <sup>2</sup>		
Planform	<u>413.253</u>	<u>0.0068</u>
Span (Theo) - In.	<u>315.720</u>	<u>1.263</u>
Aspect Ratio	<u>1.675</u>	<u>1.675</u>
Rate of Taper	<u>0.507</u>	<u>0.507</u>
Taper Ratio	<u>0.404</u>	<u>0.404</u>
Sweep-Back Angles, Degrees.		
Leading Edge	<u>45.000</u>	<u>45.000</u>
* Trailing Edge	<u>26.2</u>	<u>26.2</u>
0.25 Element Line	<u>41.130</u>	<u>41.130</u>
Chords:		
Root (Theo) WP	<u>268.500</u>	<u>1.074</u>
Tip (Theo) WP	<u>108.470</u>	<u>0.434</u>
MAC	<u>199.808</u>	<u>0.799</u>
Fus. Sta. of .25 MAC	<u>1463.50</u>	<u>5.854</u>
W.P. of .25 MAC	<u>635.522</u>	<u>2.542</u>
B.L. of .25 MAC	<u>0.000</u>	<u>0.000</u>
Airfoil Section		
Leading Wedge Angle - Deg.	<u>10.000</u>	<u>10.000</u>
Trailing Wedge Angle - Deg.	<u>14.920</u>	<u>14.920</u>
Leading Edge Radius	<u>2.00</u>	<u>0.008</u>
Void Area	<u>13.17</u>	<u>0.00021</u>
Blanketed Area	<u>0.00</u>	<u>0.000</u>

TABLE III. MODEL DIMENSIONAL DATA - Concluded.

\*REVISED 4/24/74

MODEL COMPONENT: WING-W<sub>116</sub>

GENERAL DESCRIPTION: Configuration 4

NOTE: Identical to W<sub>116</sub> except airfoil thickness. Dihedral angle is along trailing edge of wing.

TEST NO.

DWG. NO. VI.70-000140A -000200

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area (Theo.) Ft<sup>2</sup>

Planform

Span (Theo) In.

Aspect Ratio

Rate of Taper

Taper Ratio

Dihedral Angle, degrees

Incidence Angle, degrees

Aerodynamic Twist, degrees

Sweep Back Angles, degrees

Leading Edge

Trailing Edge

0.25 Element Line

Chords:

Root (Theo) B.P.O.O.

Tip, (Theo) B.P.

MAC

\*Fus. Sta. of .25 MAC

\* W.P. of .25 MAC

\* B.L. of .25 MAC

EXPOSED DATA

\* Area (Theo) Ft<sup>2</sup>

\* Span, (Theo) In. BP108

\* Aspect Ratio

Taper Ratio

Chords

\* Root BP108

\* Tip  $1.00 \frac{b}{2}$

\* MAC

\* Fus. Sta. of .25 MAC

\* W.P. of .25 MAC

\* B.L. of .25 MAC

Airfoil Section (Rockwell Mod NASA)

XXXX-64

Root  $\frac{b}{2} =$

Tip  $\frac{b}{2} =$

Data for (1) of (2) Sides

Leading Edge Cuff

Planform Area Ft<sup>2</sup>

\* Leading Edge Intersects Fus M. L. @ Sta

\* Leading Edge Intersects Wing @ Sta

2691.00

0.043

936.68

3.747

2.265

2.265

1.177

1.177

0.200

0.200

3.500

3.500

0.500

0.500

+ 3.000

+ 3.000

45.000

45.000

- 10.056

- 10.056

35.209

35.209

689.24

2.757

137.85

0.551

474.81

1.899

1136.83

4.547

290.58

1.162

182.13

0.729

1751.50

0.028

720.68

2.883

2.059

2.059

0.245

0.245

562.09

2.248

137.85

0.551

392.83

1.571

1185.98

4.744

294.30

1.177

251.77

1.007

0.113

0.113

0.120

0.120

113.18

0.0018

500.00

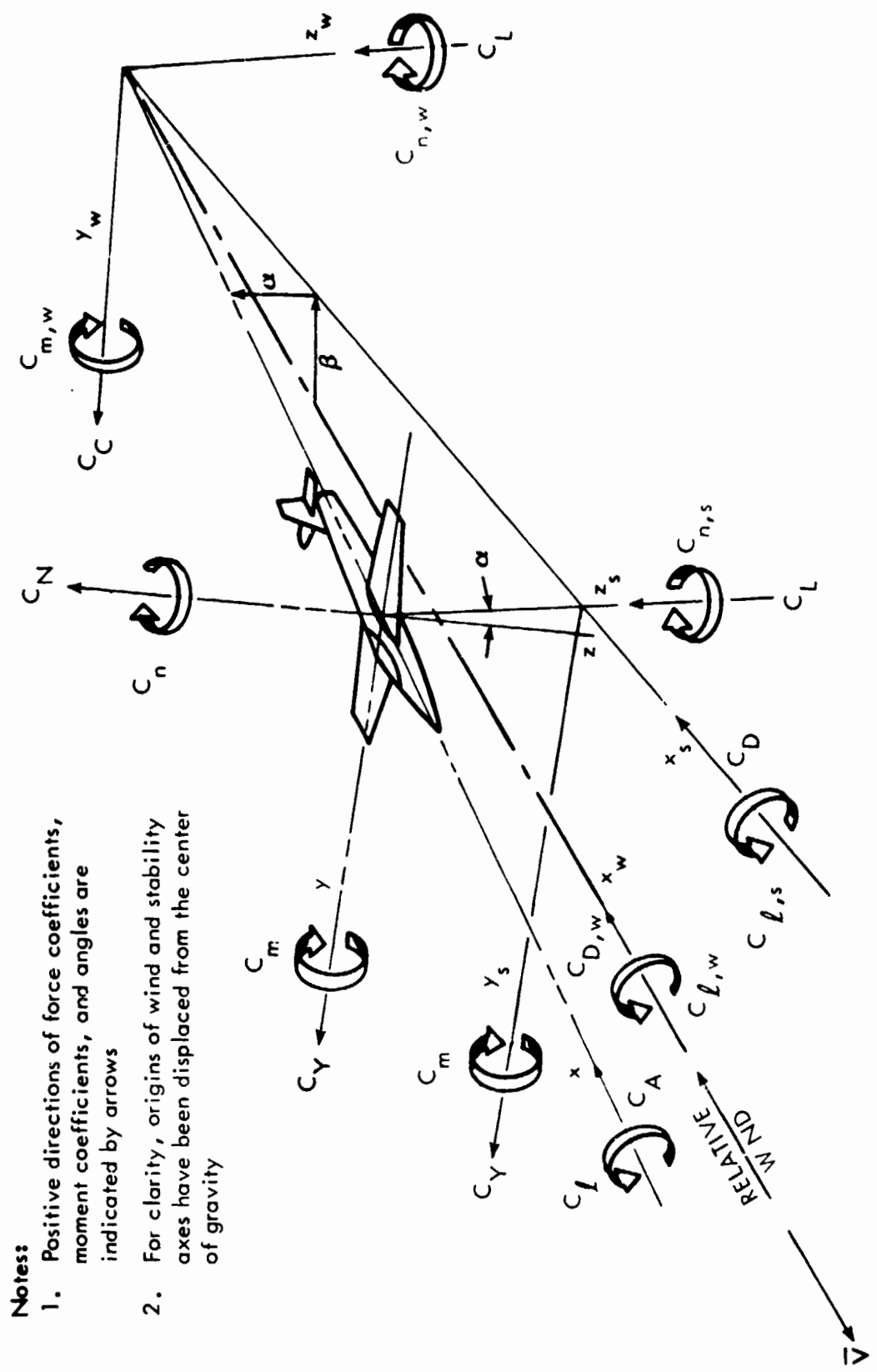
2.000

1024.00

4.096

TABLE IV. HYPERSONIC VISCOUS INTERACTION PARAMETERS

RUN NUMBER	MACH NO.	$Re_g$ $\times 10^{-6}$	DYNAMIC PRESSURE (psig)	$T_\infty$ ( $^{\circ}F$ )	$\nabla'_\infty$
1	20.3	2.076	1.5813	43	.00622
2	21.6	3.945	2.6170	14	.00470
3	19.0	1.163	0.9623	48	.00796
4	-	-	-	-	-
5	-	-	-	-	-
6	20.3	1.971	1.5703	63	.00638
7	21.6	4.049	2.6275	5	.00464
8	20.3	2.111	1.5977	40	.00617
9	19.0	1.172	0.9567	42	.00793
10	19.0	1.172	0.9614	44	.00793
11	20.3	2.012	1.5782	56	.00632
12	21.6	3.994	2.6236	10	.00467
13	20.3	2.026	1.5821	54	.00629
14	19.0	1.147	0.9708	58	.00801
15					
16	18.1	0.751	0.6785	62	.00959
17	19.0	1.162	0.9792	56	.00796
18	20.3	1.961	1.5864	70	.00640
19	21.6	3.548	2.6466	65	.00495



- Notes:**
1. Positive directions of force coefficients, moment coefficients, and angles are indicated by arrows
  2. For clarity, origins of wind and stability axes have been displaced from the center of gravity

Figure 1. - Axis systems.

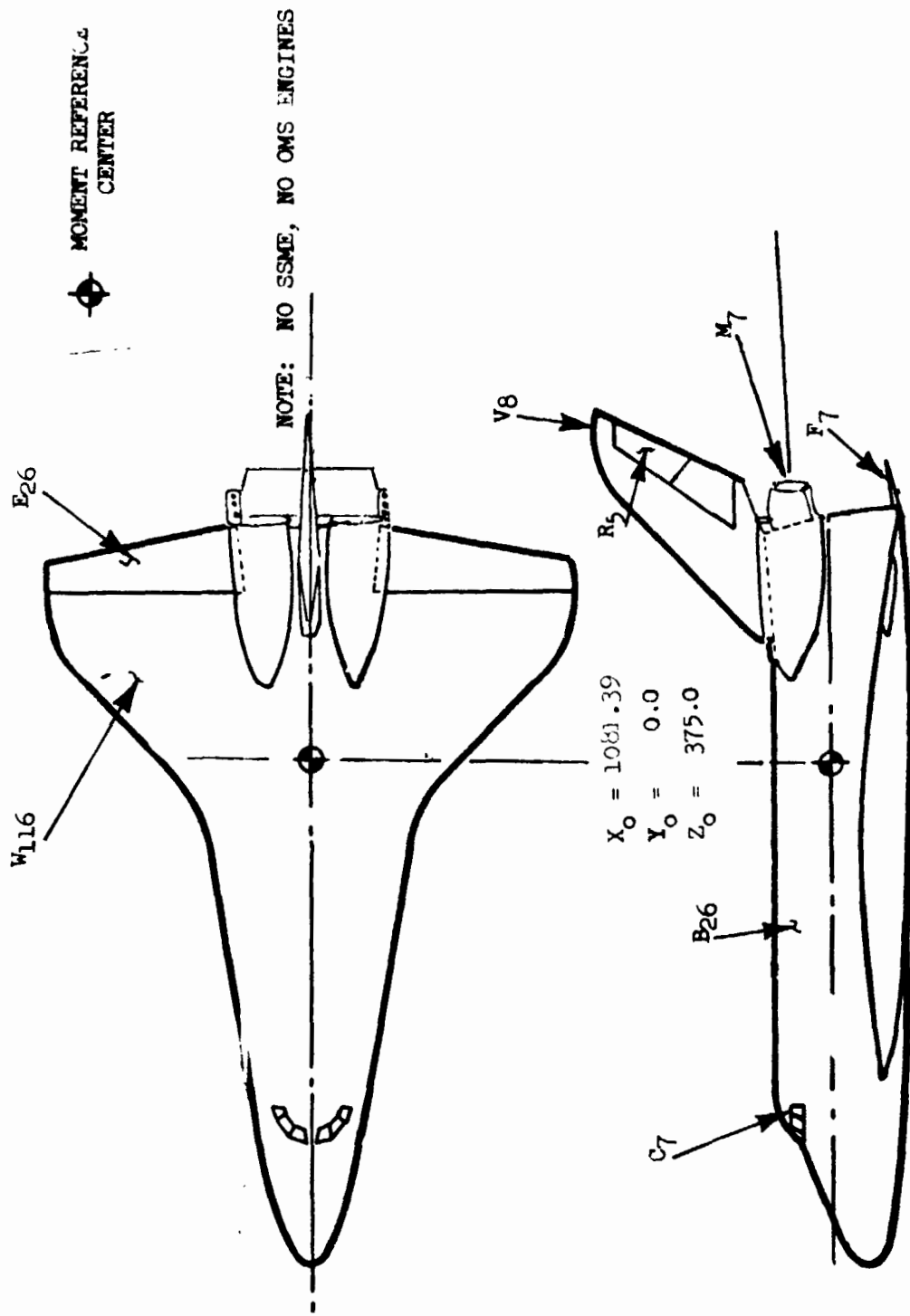
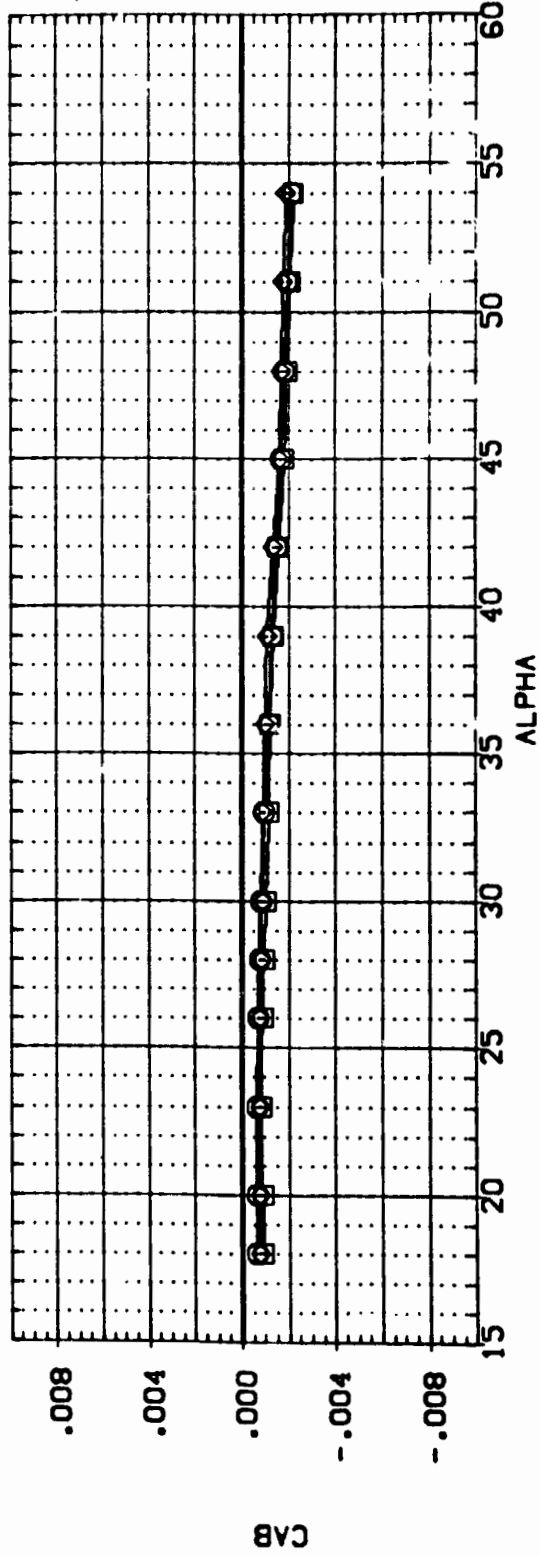
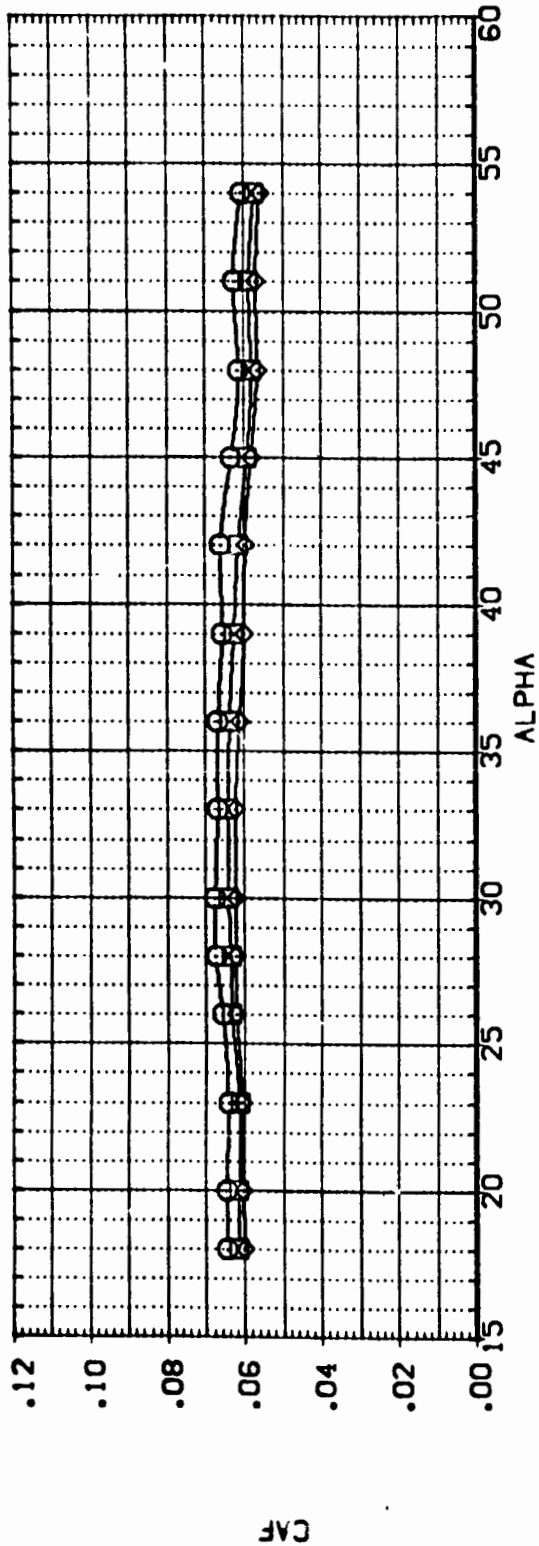


Figure 2 140A/B Orbiter for Test OA88

DATA FIGURES

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	RE.L	ELEVTR	BOFLAP	SPOBRK	REFERENCE INFORMATION
{BOC001}	OA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	1.163	.000	.000	55.000	SREF 6.3170 50.IN
{BOC002}	OA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	2.076	.000	.000	55.000	LREF 1.9266 INCHES
{BOC003}	OA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	3.945	.000	.000	55.000	BREF 3.7470 INCHES
						XMRP 3.3736 INCHES
						YMRP .0000 INCHES
						ZMRP .0000 INCHES
						SCALE .0040 SCALE

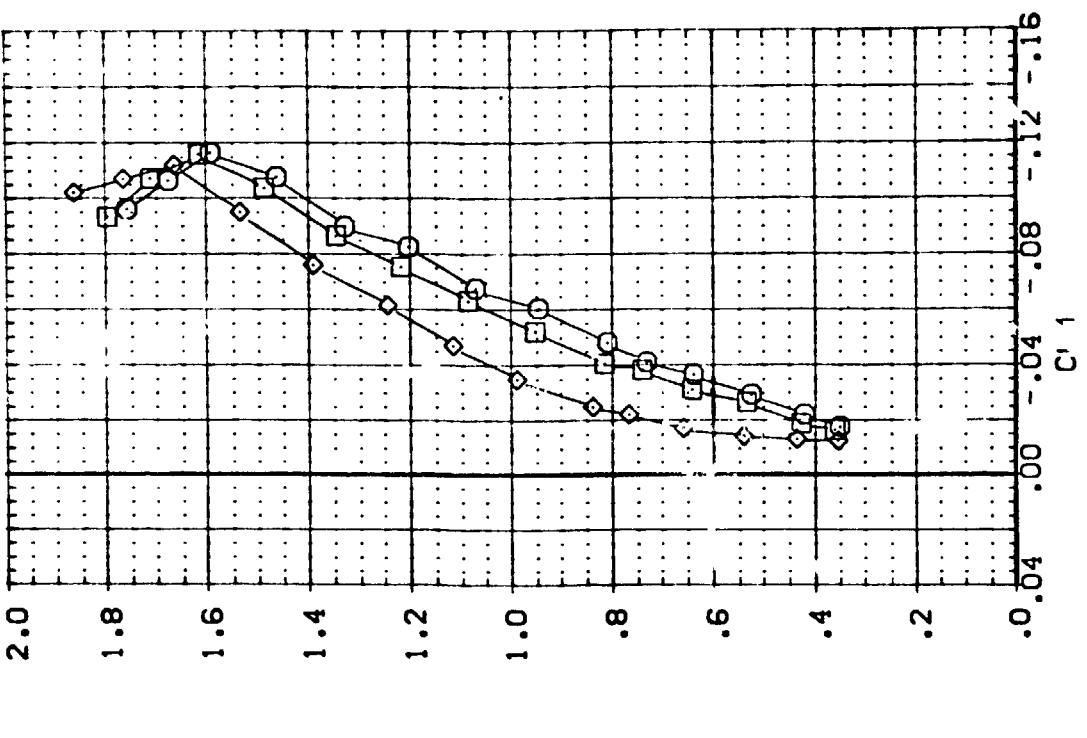
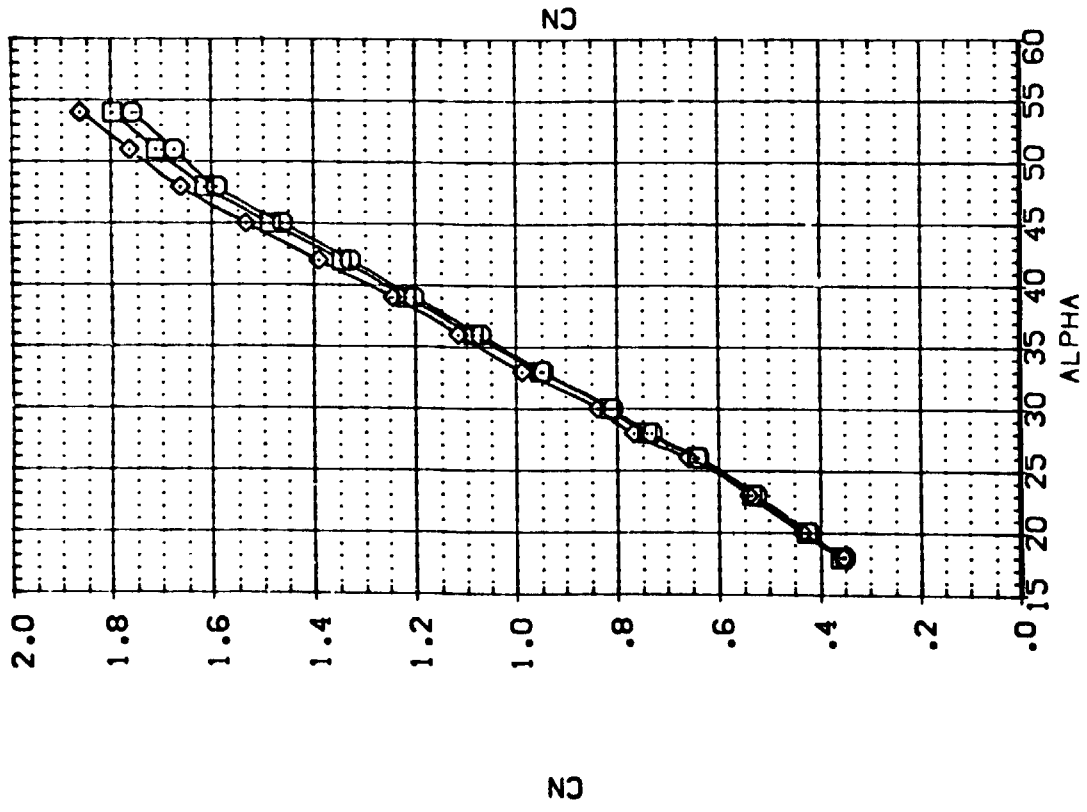


EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 0, HH-20 BALANCE

DATA SET SYMBOL    CONFIGURATION DESCRIPTION  
 (B00001)    ○    DA-88 LARC 22-INCH ME.TU. 7422 RI-140A/BI(HH-20)  
 (B00002)    ◇    DA-88 LARC 22-INCH ME.TU. 7422 RI-140A/BI(HH-20)  
 (B00003)    ○    DA-88 LARC 22-INCH ME.TU. 7422 RI-140A/BI(HH-20)

REIL    ELEVTR    BOFLAF    SPOBRK  
 1.163    .000    .000    55.000  
 2.076    .000    .000    55.000  
 3.945    .000    .000    55.000

REFERENCE INFORMATION  
 SREF    6.3170    50. IN.  
 LREF    1.9766    INCHES  
 BREF    3.7470    INCHES  
 XMRP    3.3736    INCHES  
 YMRP    .0000    INCHES  
 ZMRP    .0000    INCHES  
 SCALE    .0040    SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 0, HH-20 BAL NCE

(AJMACH = 19.00



DATA SET SYMBOL: (B00001) (B00002) (B00003)

CONFIGURATION DESCRIPTION:  
 DA-88 LARC 22-INCH KE.TU. 7422 RI-14DA/B(HH-20)  
 DA-88 LARC 22-INCH KE.TU. 7422 RI-14DA/B(HH-20)  
 DA-88 LARC 22-INCH KE.TU. 7422 RI-14DA/B(HH-20)

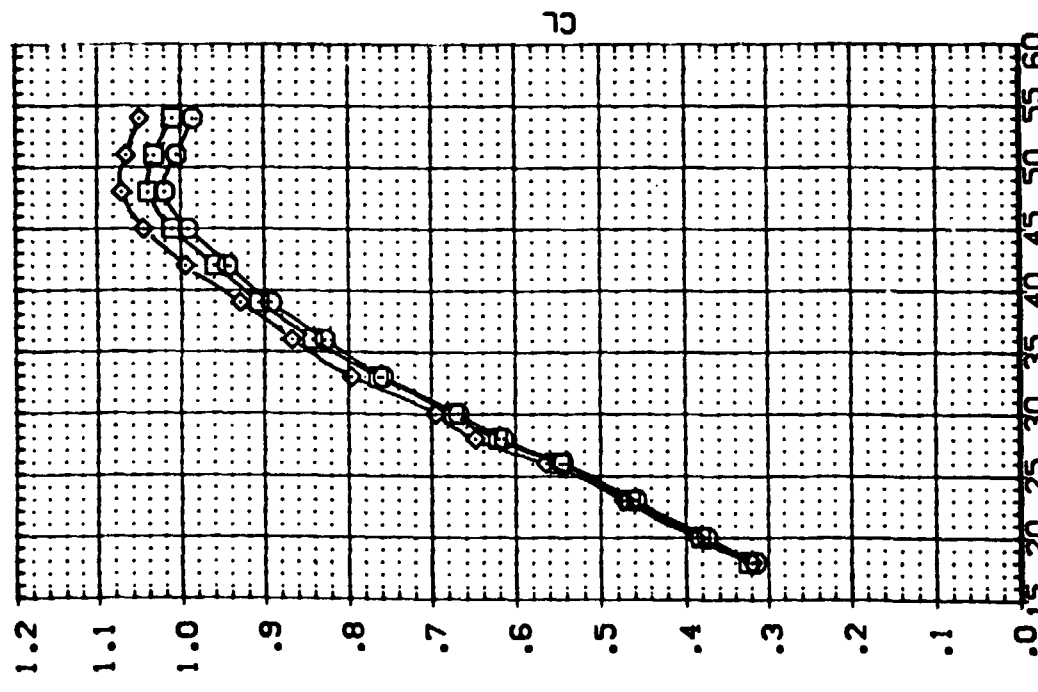
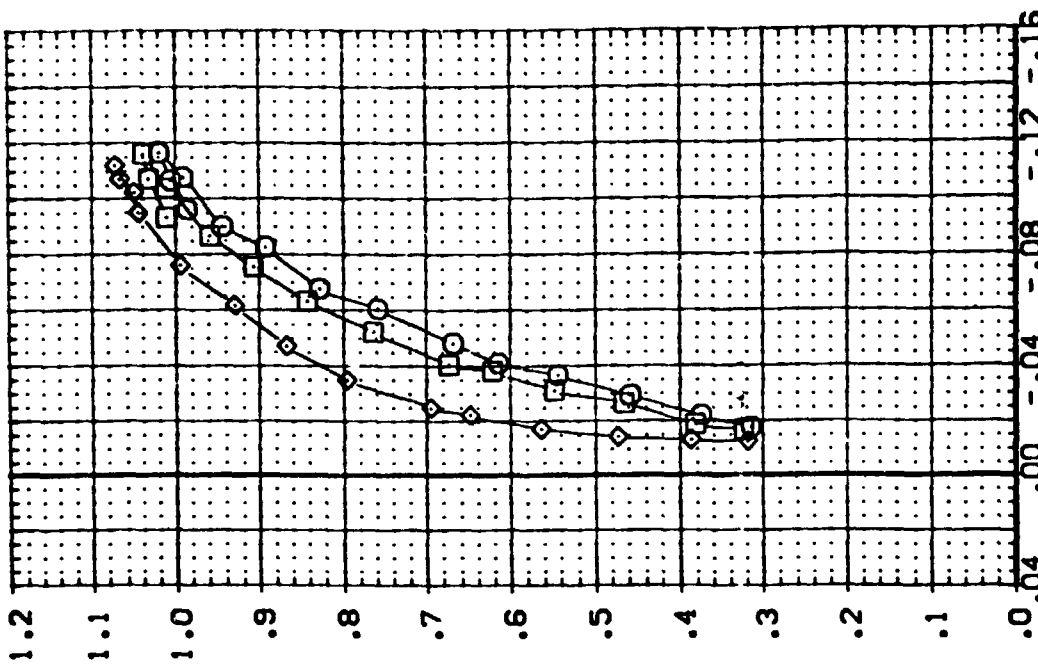
RE.L: 1.163, 2.076, 3.945

ELEVTR: .000, .000, .000

BDFLAP: .000, .000, .000

SFOBRK: 55.000, 55.000, 55.000

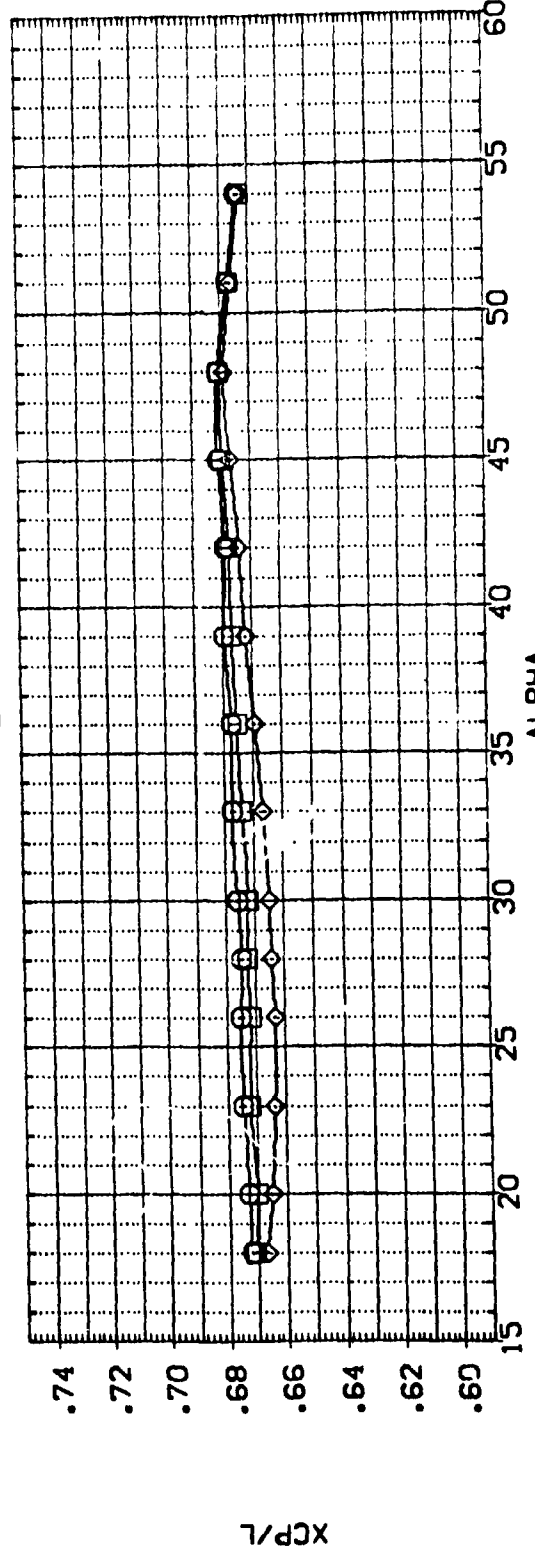
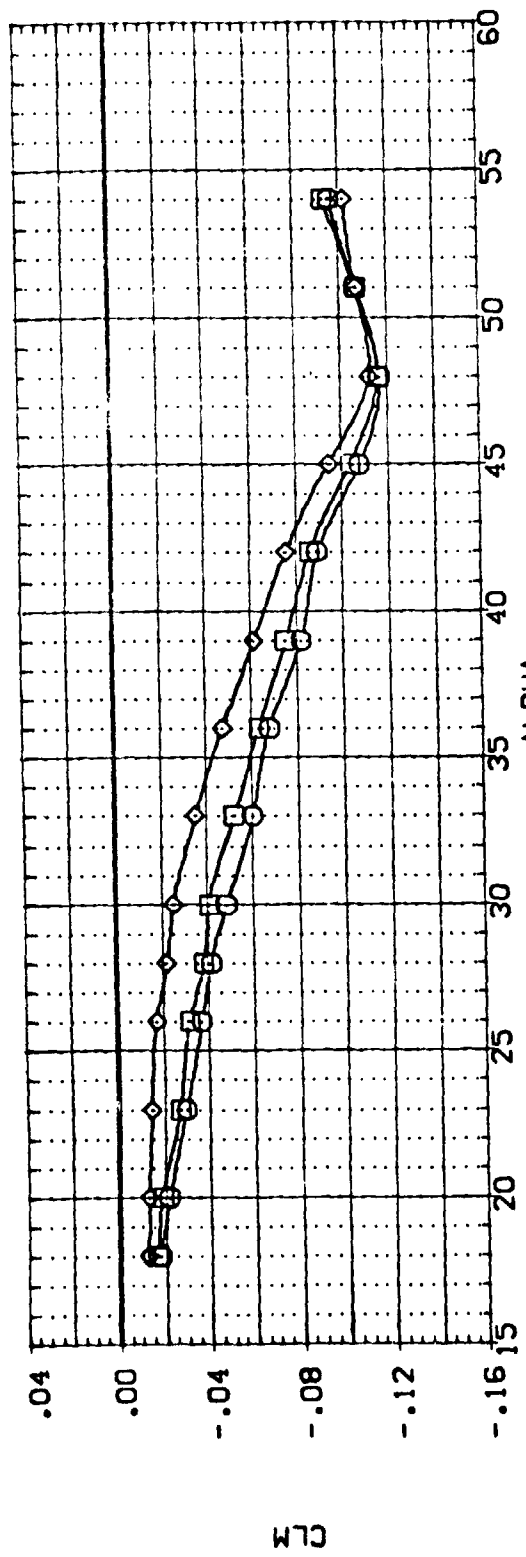
REFERENCE INFORMATION:  
 SREF: 6.3170 SQ. IN.  
 LREF: 1.9766 INCHES  
 BREF: 3.7470 INCHES  
 XMRP: 3.3736 INCHES  
 YMRP: .0000 INCHES  
 ZMRP: .0000 INCHES  
 SCALE: .0010 SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 0, HH-20 BALANCE

(A)MACH = 19.00

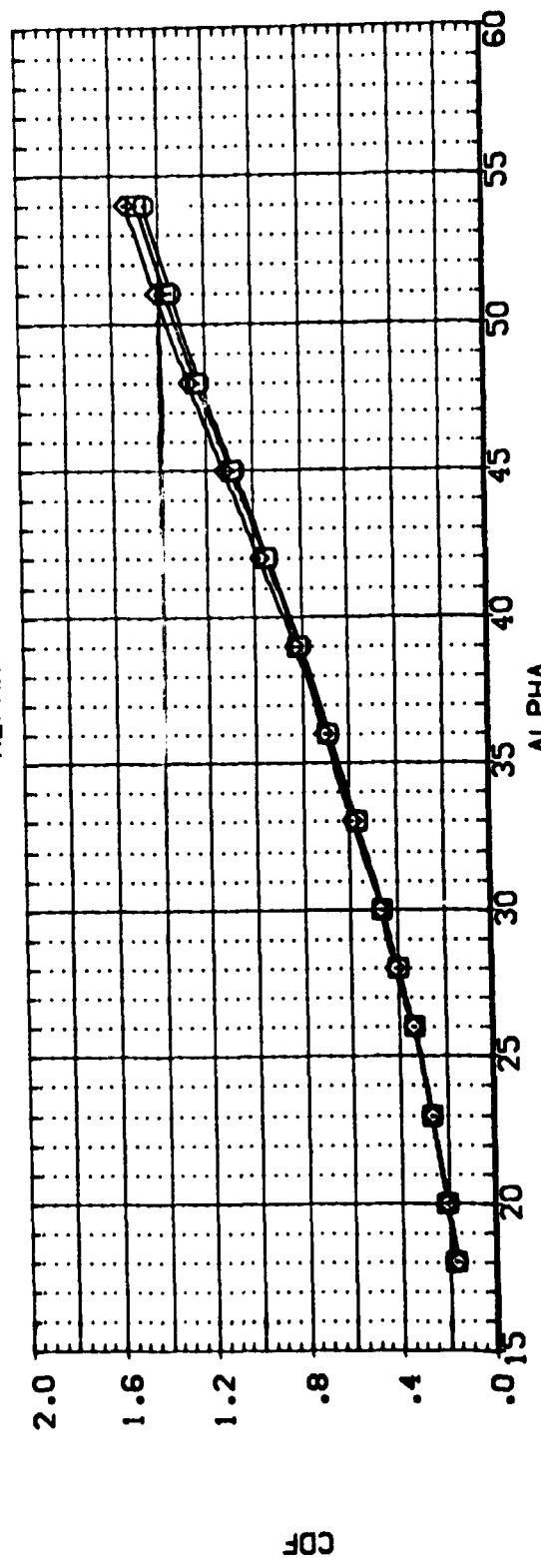
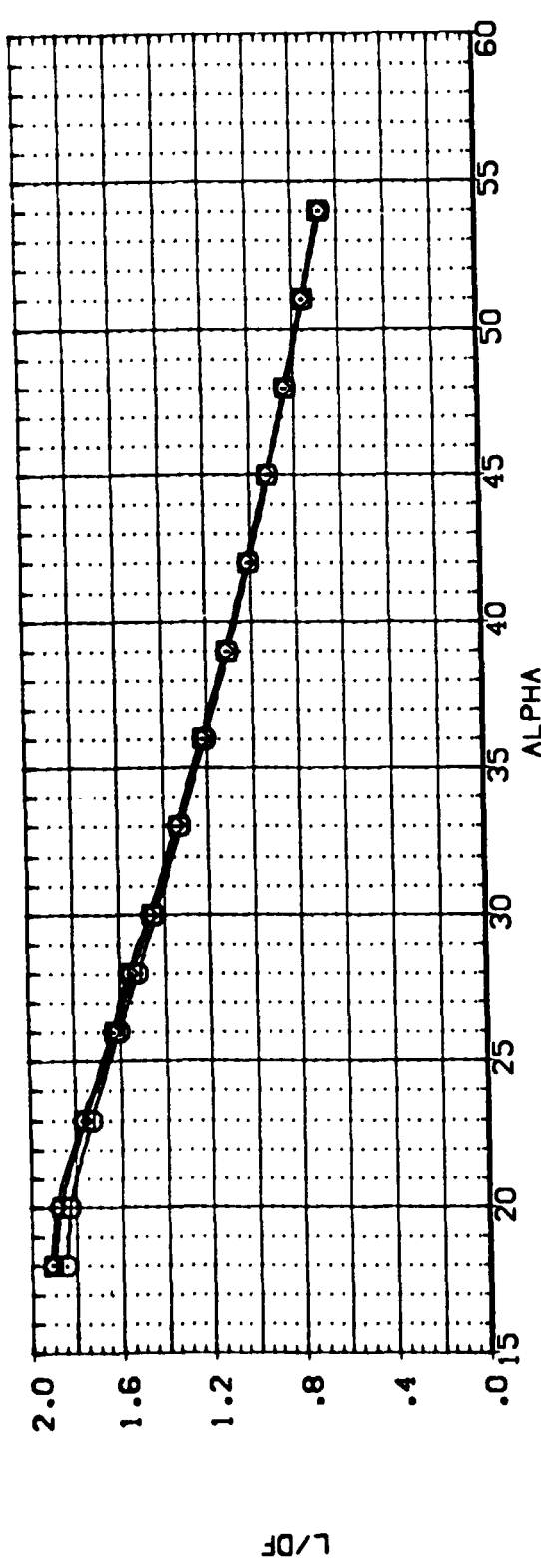
DATA SET SYMBOL: (B00001) □ (920007) ◇ (B00003)  
 CONFIGURATION DESCRIPTION:  
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 GA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)  
 GA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)  
 RE.L: 1.163, 2.076, 3.945  
 ELEVTR: .000, .000, .000  
 BOFLAP: .000, .000, .000  
 SPDBRK: 55.000, 55.000, 55.000  
 REFERENCE INFORMATION:  
 SREF: 6.3170 SQ. IN.  
 LREF: 1.9266 INCHES  
 XREF: 3.7470 INCHES  
 YMRP: 3.3736 INCHES  
 ZMRP: .0000 INCHES  
 SCALE: .0040 INCHES



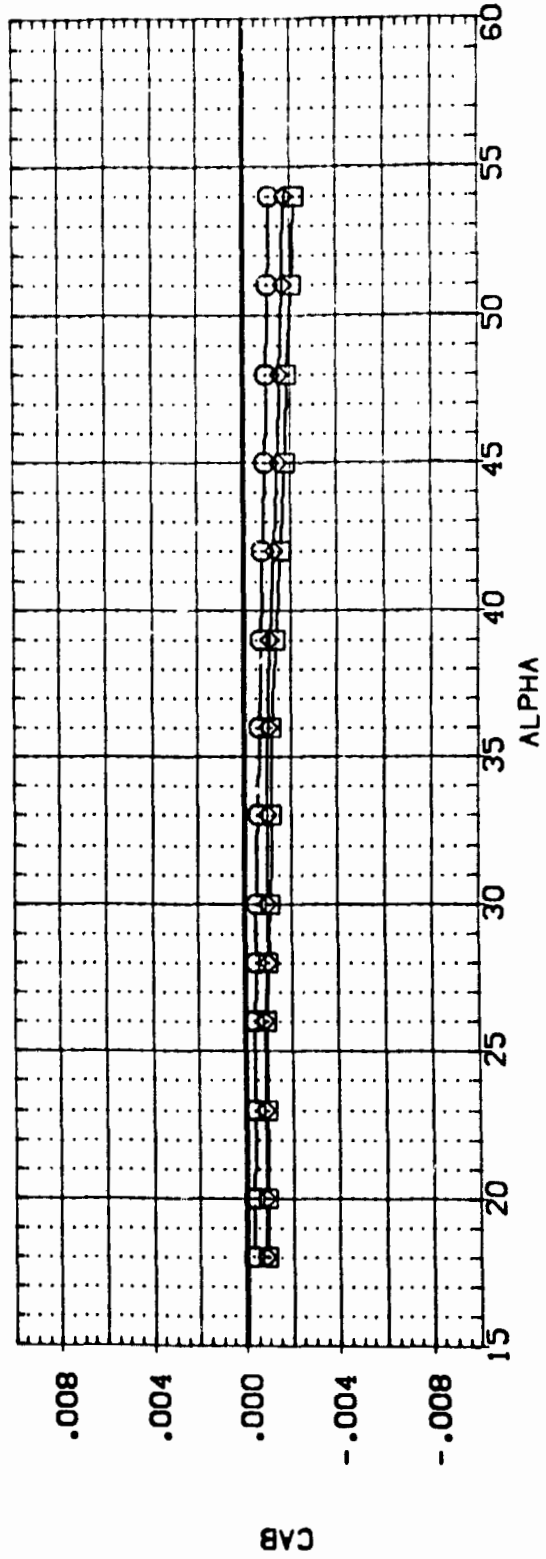
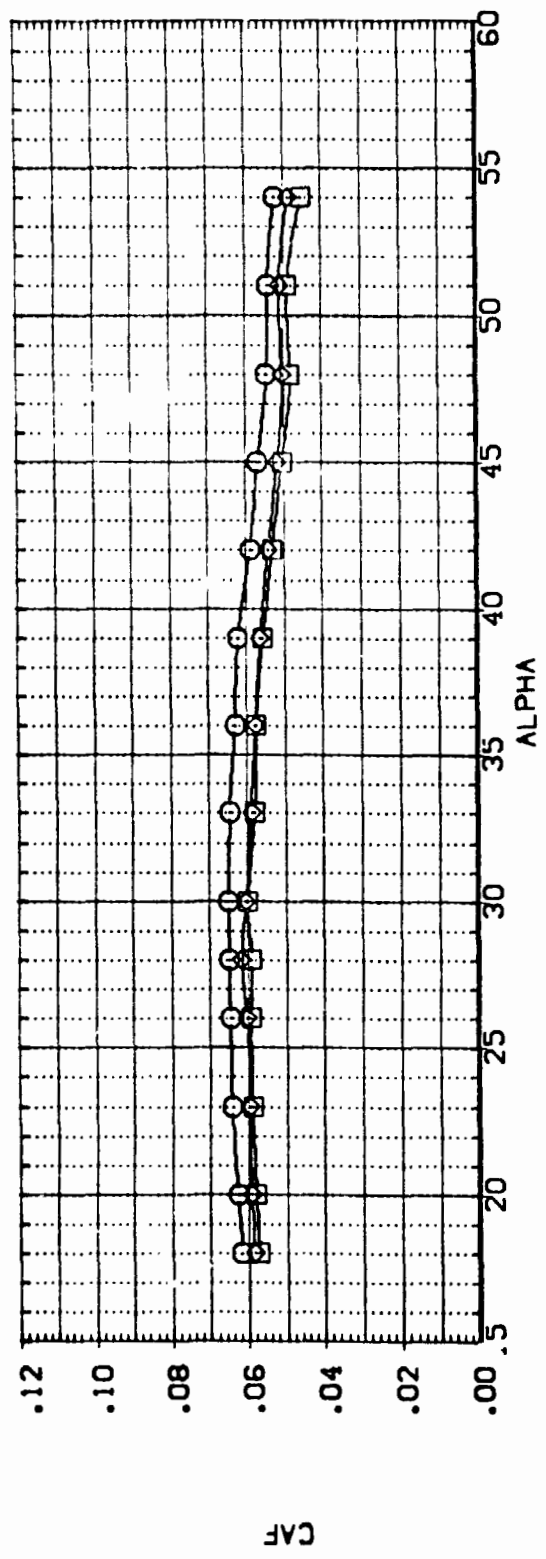
EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 0, HH-20 BALANCE



DATA SET SYMBOL: (B0C001) (B0C002) (B0C003)  
 CONFIGURATION DESCRIPTION: DA-88 LARC 22-INCH HE.TU. 7422 RI-140A/BI(HH-20) (3)  
 RE.L: 1.163 2.076 3.945  
 ELEVTR: .000 .000 .000  
 BOFLAP: .000 .000 .000  
 SPOBRK: 55.000 55.000 55.000  
 REFERENCE INFORMATION: 6.3170 SO.IN 6.3170 SO.IN  
 L.REF: 1.9266 INCHES 1.9266 INCHES  
 B.REF: 3.7470 INCHES 3.7470 INCHES  
 Y.MRP: .0000 INCHES .0000 INCHES  
 Z.MRP: .0000 INCHES .0000 INCHES  
 SCALE: .0040 SCALE .0040 SCALE



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	REL	ELEVTR	BOFLAP	SPOBRK	REFERENCE INFORMATION
(B00004)	GA-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(HH-20)	1.172	-5.000	.000	55.000	6.3170 50.1N.
(B00005)	GA-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(HH-20)	2.111	-5.000	.000	55.000	1.9766 INCHES
(B00006)	GA-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(HH-20)	4.049	-5.000	.000	55.000	3.7470 INCHES
						3.3736 INCHES
						.0000 INCHES
						.0000 INCHES
						.0040 SCALE

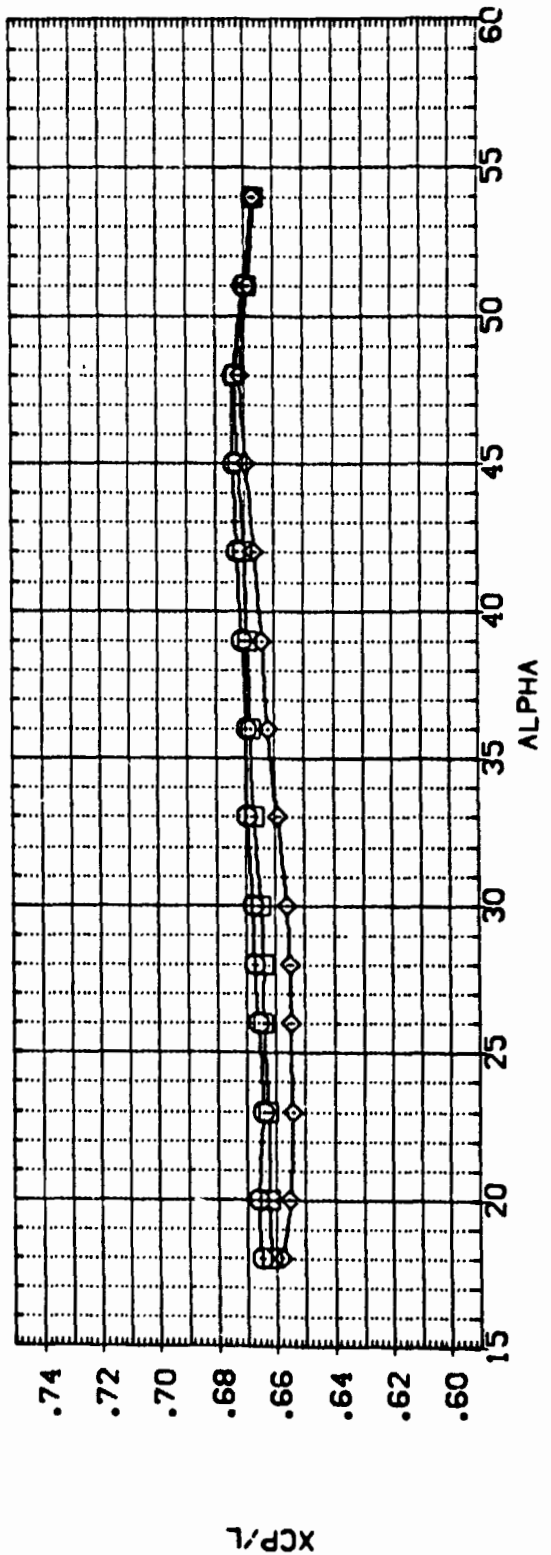
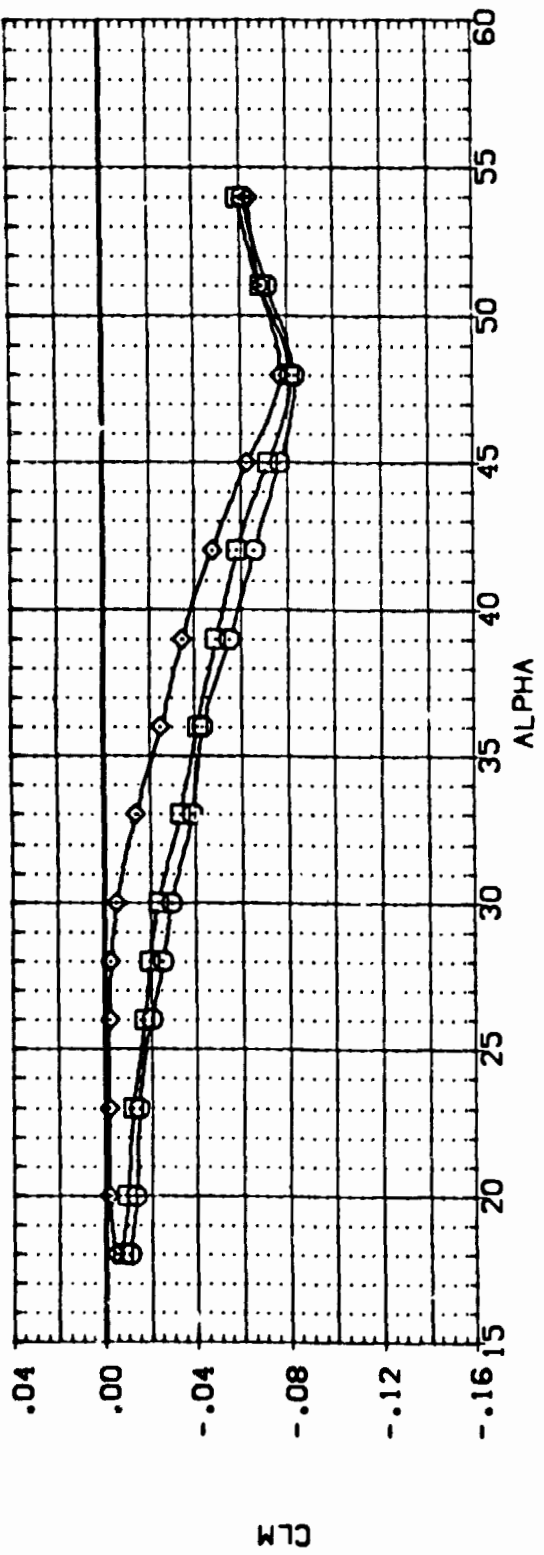


EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = -5, HH-20 BALANCE





DATA SET SYMBOL	CONFIGURATION DESCRIPTION	RE-L	ELEVTR	BDFLAP	SFOBRK	REFERENCE INFORMATION
(B0C004)	DA-88 LARC 22-INCH ME.TU. 7422 RI-140A/8(HH-20)	1.172	-5.000	.000	55.000	SREF 6.3170
(B0C005)	DA-88 LARC 22-INCH ME.TU. 7422 RI-140A/8(HH-20)	2.111	-5.000	.000	55.000	LREF 1.9266
(B0C006)	DA-88 LARC 22-INCH ME.TU. 7422 RI-140A/8(HH-20)	4.049	-5.000	.000	55.000	BREF 3.7470
						XMRP 3.3736
						VMRP .0000
						ZMRP .0000
						SCALE .0010
						SO, IN.
						INCHES
						INCHES
						INCHES
						INCHES
						SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = -5, HH-20 BALANCE

(A)MACH = 19.00

DATA SET SYMBOL  
 (B0C004)  
 (B0C005)  
 (B0C006)

CONFIGURATION DESCRIPTION  
 OA-88 LARC 22-INCH HE.TU. 7422 R1-140A/B(HH-20)  
 OA-88 LARC 22-INCH HE.TU. 7422 R1-140A/B(HH-20)  
 OA-88 LARC 22-INCH HE.TU. 7422 R1-140A/B(HH-20)

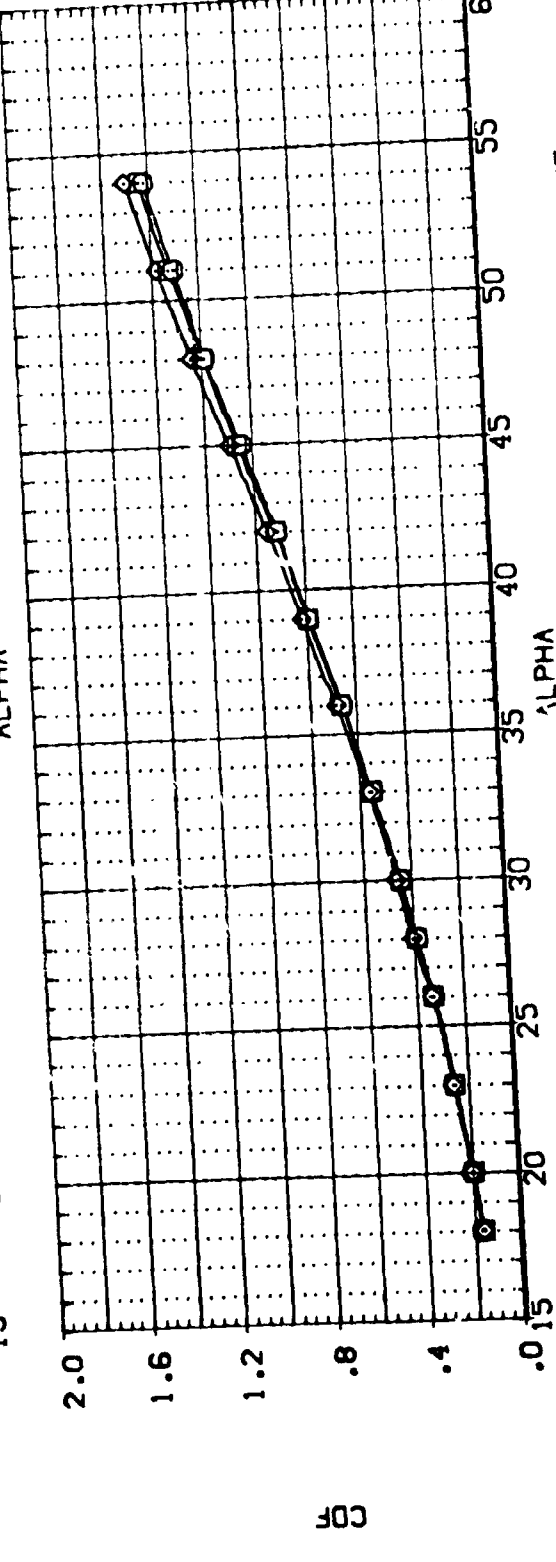
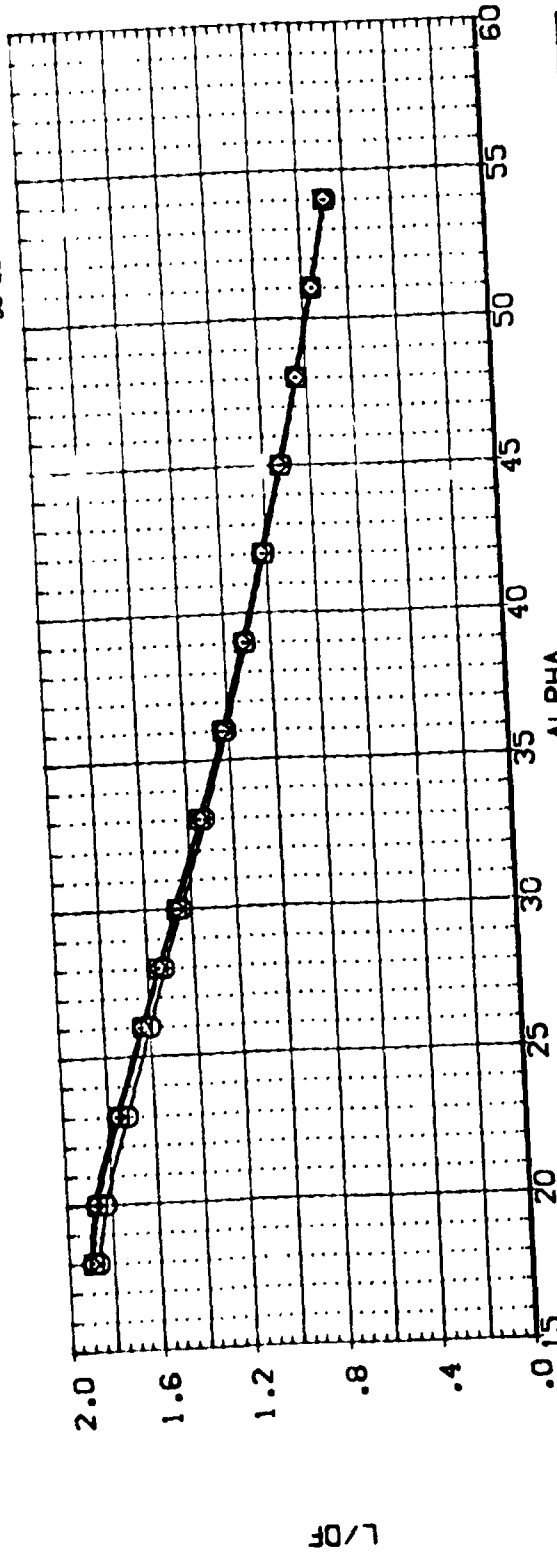
RE.L. 1.172  
 2.111  
 4.049

ELEVTR -5.000  
 -5.000  
 -5.000

BDLAP .000  
 .000  
 .000

SPDBRK 55.000  
 55.000  
 55.000

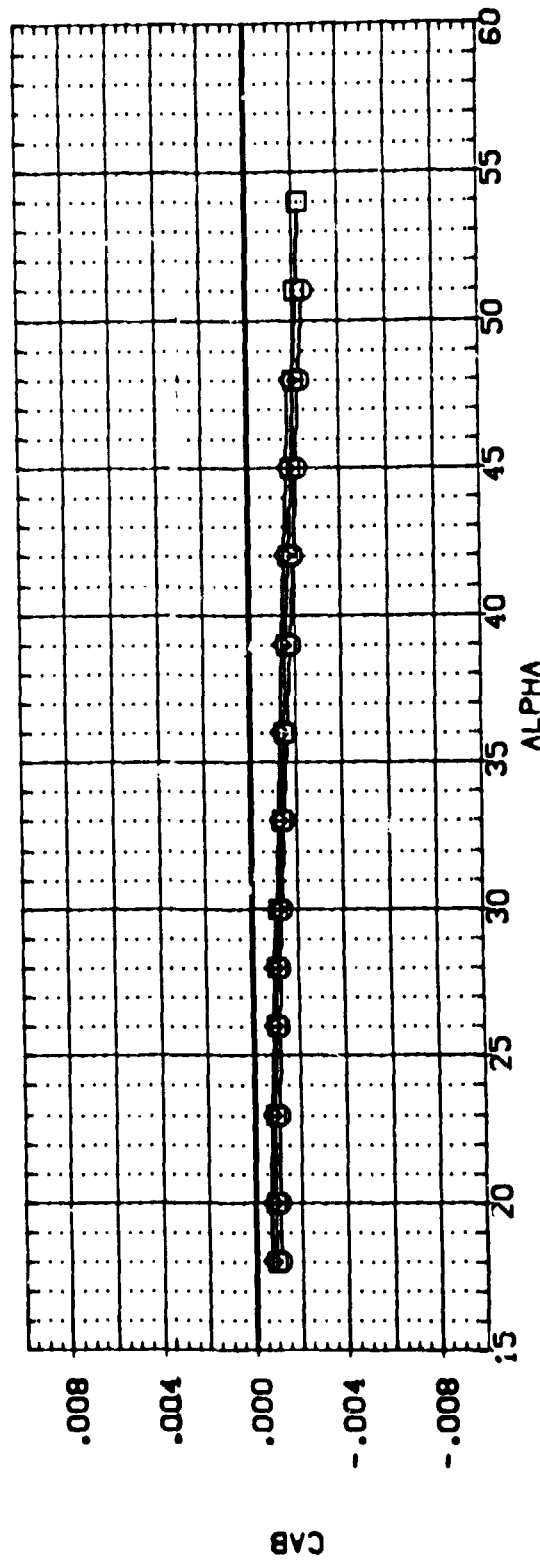
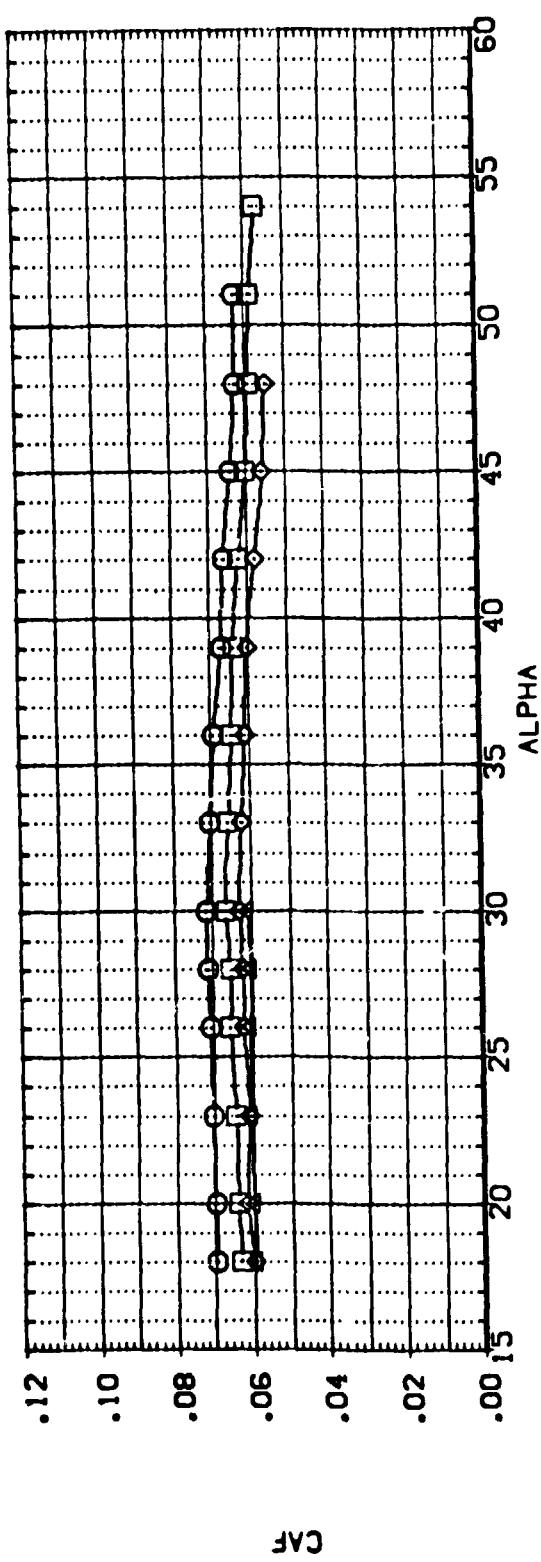
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 3.3736 INCHES  
 .0000 INCHES  
 .0000 INCHES  
 .0040 SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = -5, HH-20 BALANCE  
 (A)MACH = 19.00



DATA SET SYMBOL	CONFIGURATION DESCRIPTION	RE-L	ELEVTR	BDFLAP	SPOBRK	REFERENCE INFORMATION
(B000:3)	0A-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(MH-19)	.751	-5.000	.000	55.000	SREF 6.3170 50. IN.
(B000:4)	0A-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(MH-19)	1.162	-5.000	.000	55.000	LREF 1.9266 INCHES
(B000:5)	0A-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(MH-19)	1.561	-5.000	.000	55.000	BREF 3.7470 INCHES
(B000:6)	0A-88 LARC 22-INCH ME.TU. 7422 RI-140A/B(MH-19)	3.548	-5.000	.000	55.000	XPRP 3.3736 INCHES
						ZPRP .0000 INCHES
						SCALE .0010 SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = -5, HH-19 BALANCE

(A)MACH = 18.10

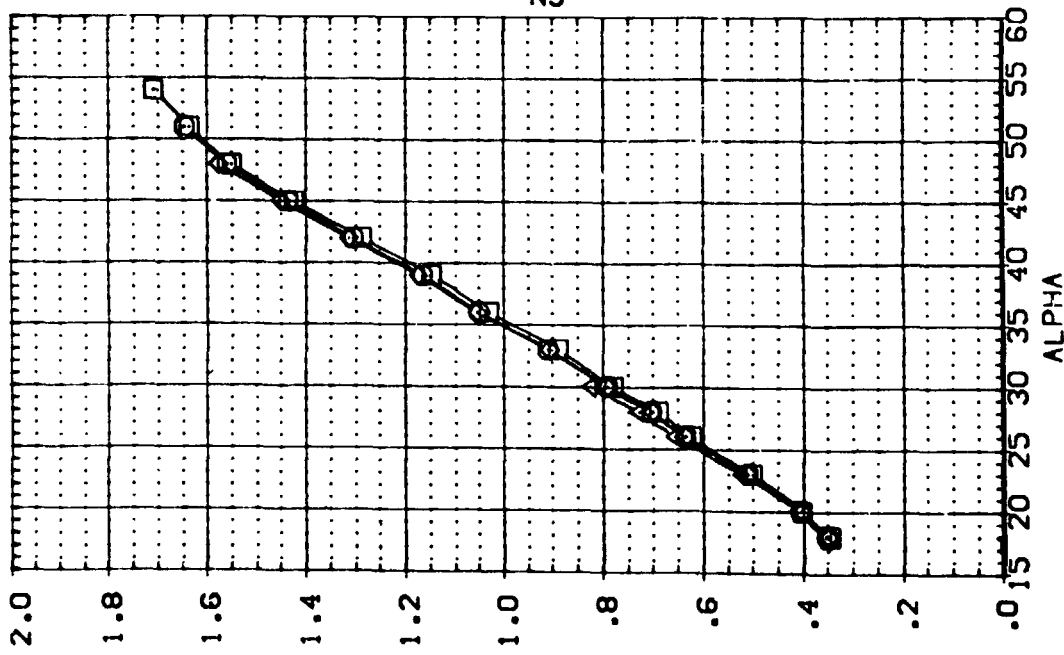
DATA SET SYMBOL  
 (BCC013) □  
 (BCC014) ⊗  
 (BCC015) ⊗  
 (BCC016) ⊗

CONFIGURATION DESCRIPTION  
 DA-88 LARC 22-INCH HE.TU. 7422 R|-140A/B(HH-19)  
 DA-88 LARC 22-INCH HE.TU. 7422 R|-140A/B(HH-19)  
 DA-88 LARC 22-INCH HE.TU. 7422 R|-140A/B(HH-19)  
 DA-88 LARC 22-INCH HE.TU. 7422 R|-140A/B(HH-19)

RE.L  
 .751  
 1.162  
 1.961  
 3.548

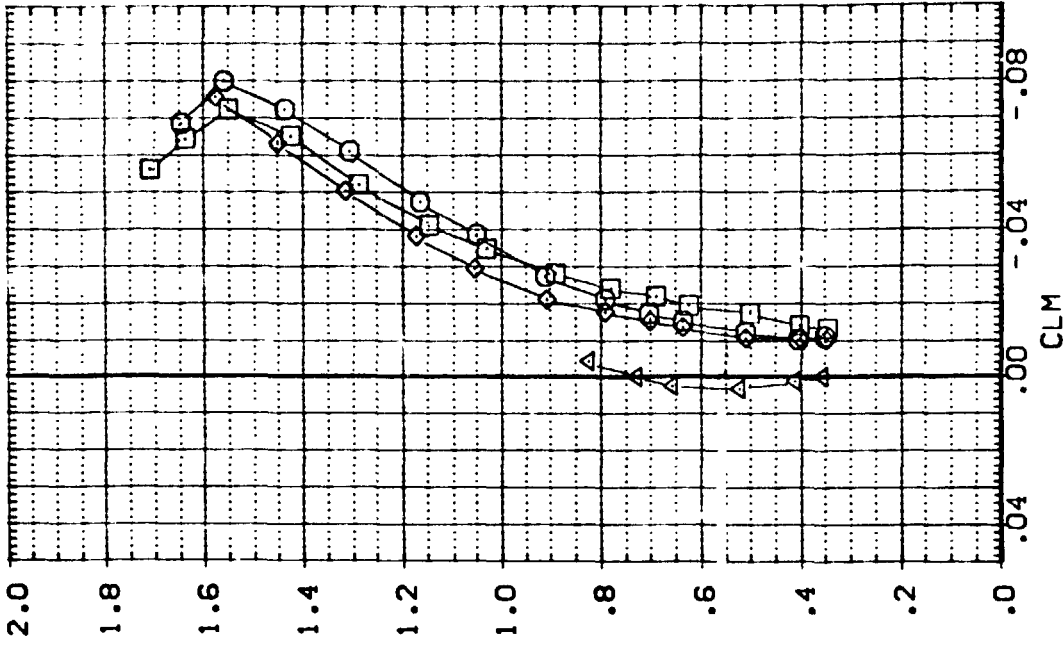
ELEVTR BOFLAP SPOBRK  
 -5.000 .000 55.000  
 -5.000 .000 55.000  
 -5.000 .000 55.000  
 -5.000 .000 55.000

REFERENCE INFORMATION  
 SREF 6.3170 50.IN  
 LREF 1.9266 INCHES  
 BREF 3.7470 INCHES  
 XMRP 3.3736 INCHES  
 YMRP .0000 INCHES  
 ZMRP .0000 INCHES  
 SCALE .0040 SCALE



Z

Z



ALPHA

CLM

EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON =-5, HH-19 BALANCE

(A)MACH = 18.10

DATA SET SYM: (B0C013) (B0C014) (B0C015) (B0C016)

CONFIGURATION DESCRIPTION:  
 GA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-19)  
 GA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-19)  
 GA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-19)  
 GA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-19)

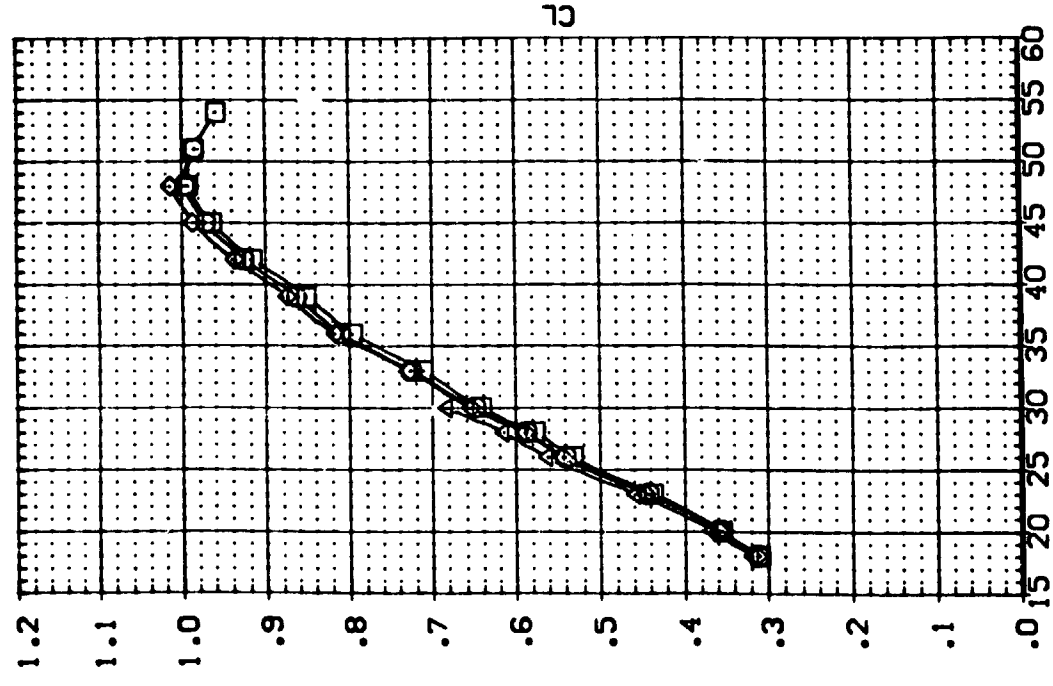
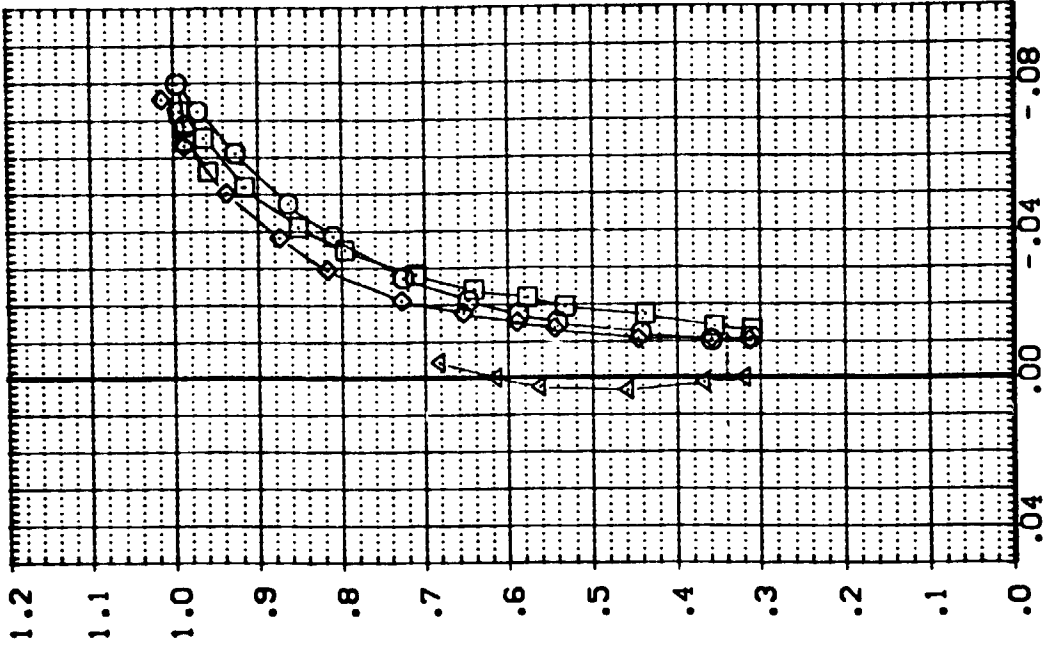
RE.L: .751 1.162 1.961 3.518

ELEVTR: -5.000 -5.000 -5.000 -5.000

BOFLAP: .000 .000 .000 .000

SPOBRK: 55.000 55.000 55.000 55.000

REFERENCE INFORMATION:  
 SREF: 6.3170 INCHES  
 LREF: 1.9266 INCHES  
 XMRP: 3.7470 INCHES  
 YMRP: 3.3736 INCHES  
 ZMRP: .0000 INCHES  
 SCALE: .0010 INCHES



CLM

ALPHA

EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON =-5, HH-19 BALANCE

(A)MACH = 18.10

DATA SET SYMBOL  
 (R0C013)  
 (R0C014)  
 (R0C015)  
 (R0C016)

CONFIGURATION DESCRIPTION  
 OA-88 LARC 22-INCH HE.TU: 7422 RI-140A/B(HH-19)  
 OA-88 LARC 22-INCH HE.TU: 7422 RI-140A/B(HH-19)  
 OA-88 LARC 22-INCH HE.TU: 7422 RI-140A/B(HH-19)  
 OA-88 LARC 22-INCH HE.TU: 7422 RI-140A/B(HH-19)

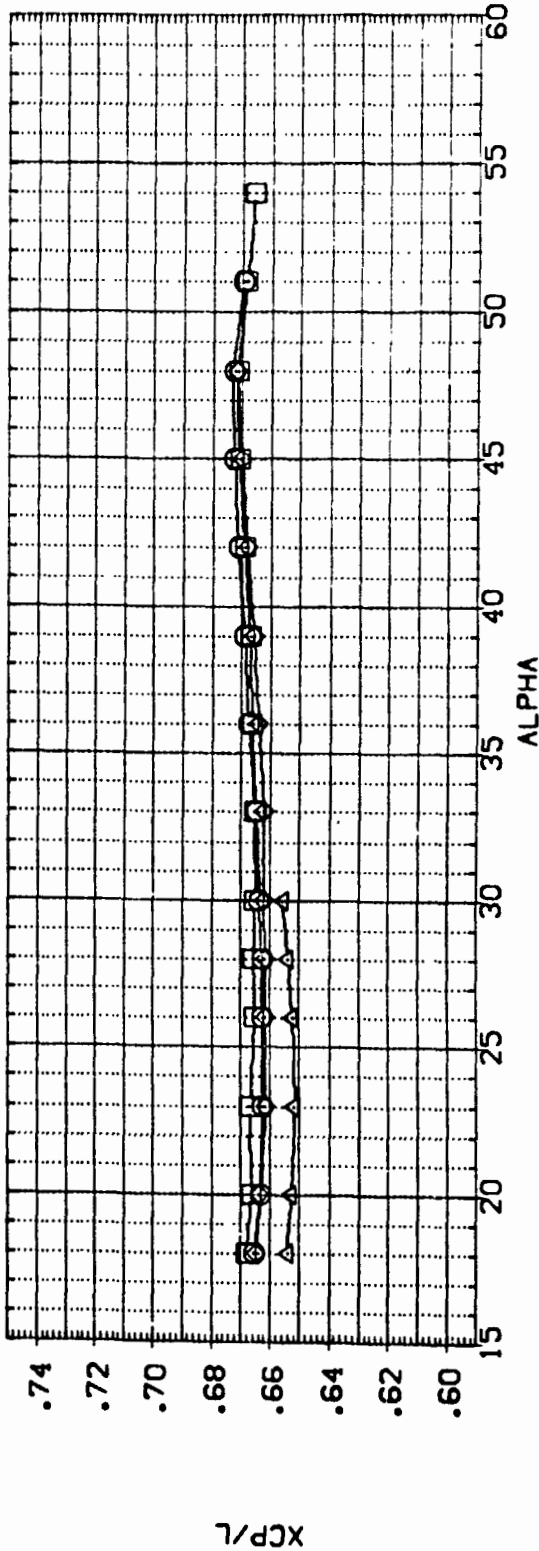
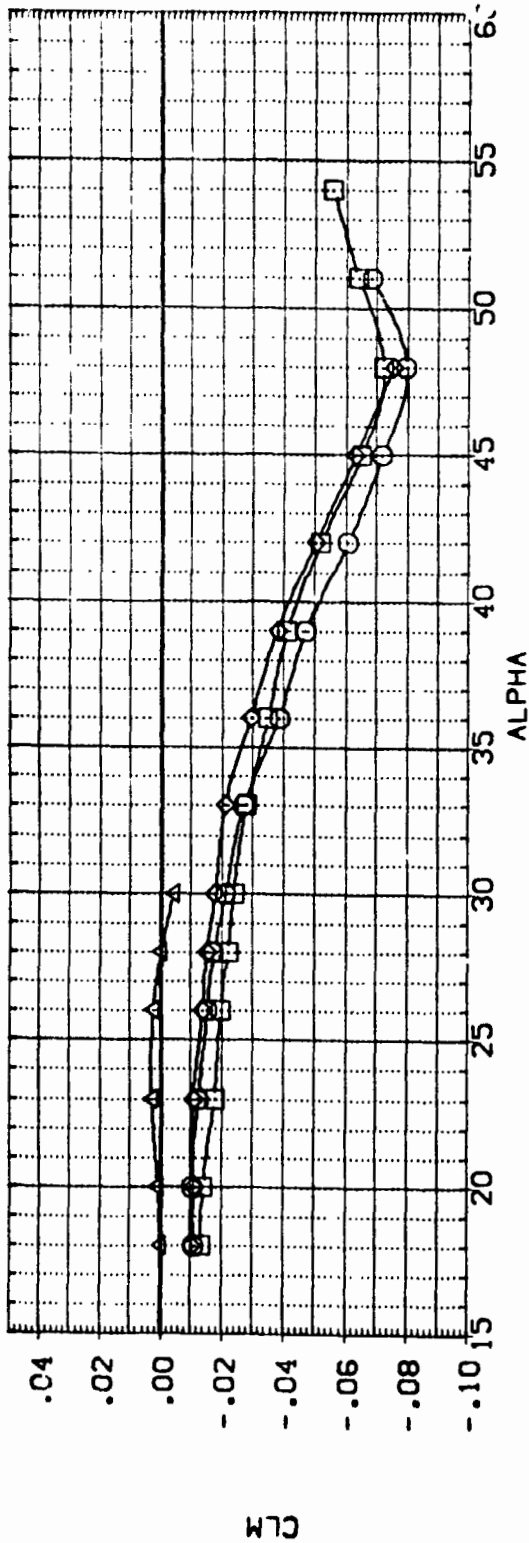
RE.L  
 .751  
 1.162  
 1.961  
 3.548

ELEVTR  
 -5.000  
 -5.000  
 -5.000  
 -5.000

BOFL AND  
 .000  
 .000  
 .000  
 .000

SPOBRK  
 55.000  
 55.000  
 55.000  
 55.000

REFERENCE INFORMATION  
 6.3170 SQ.IN.  
 1.9266 INCHES  
 3.7470 INCHES  
 3.3736 INCHES  
 .0000 INCHES  
 .0000 INCHES  
 .0040 SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = -5, HH-19 BALANCE

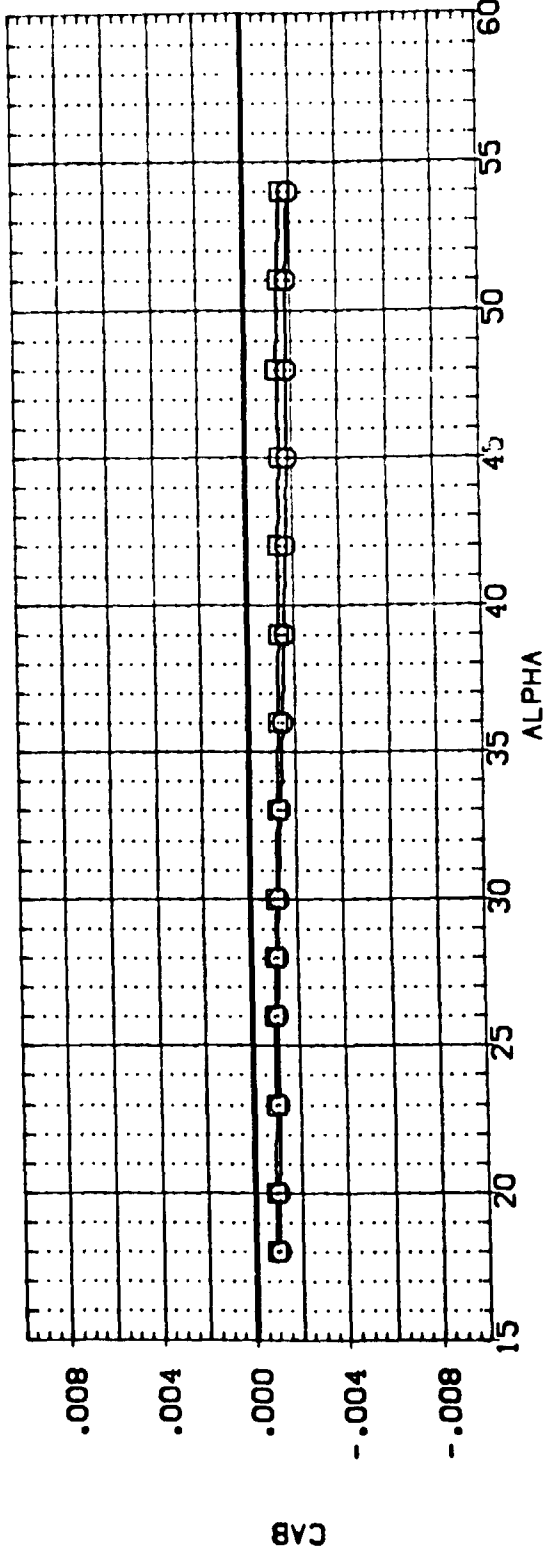
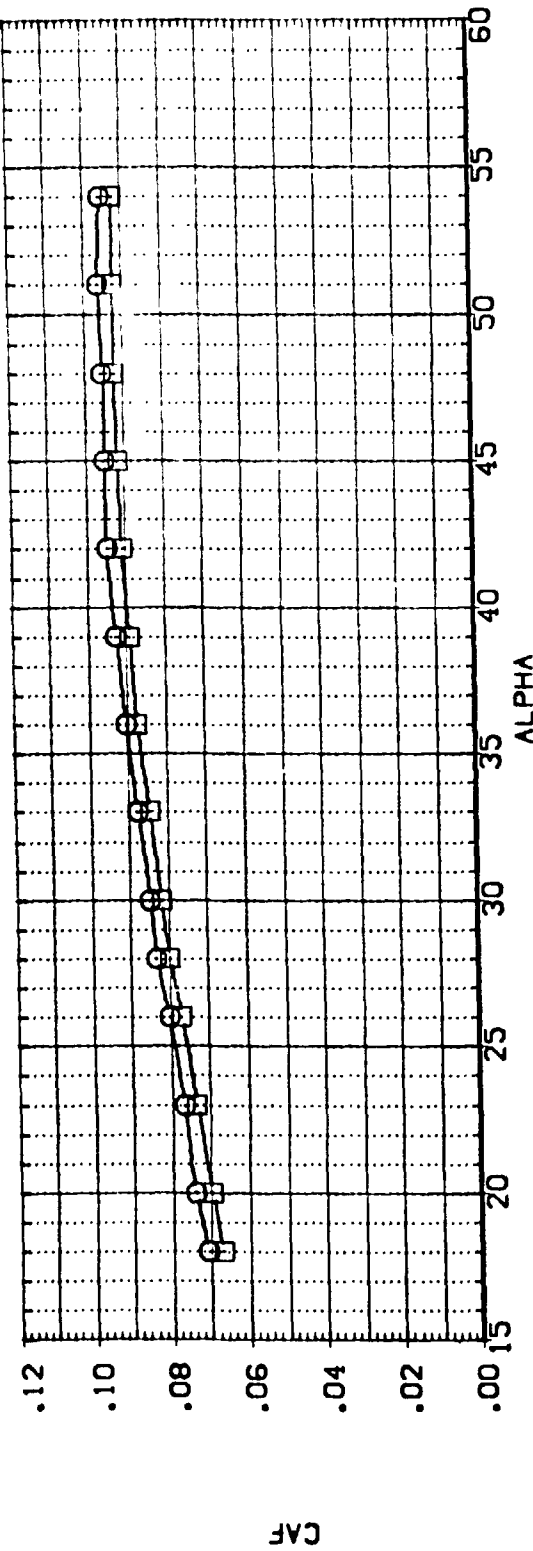
(A)MACH = 18.10

PAGE

14



DATA SET SYMBOL (B0C008) □ (B0C009) □  
 CONFIGURATION DESCRIPTION DA-88 LARC 22-INCH HE, TU, 7422 RI-140A/B(HH-20) RE, L 1.172 15.000 SPOBRK 6.3170 SQ, IN.  
 DA-88 LARC 22-INCH HE, TU, 7422 RI-140A/B(HH-20) 2.012 15.000 .000 .000 REF 1.9766 INCHES  
 REF 3.7470 INCHES  
 XMRP 3.3736 INCHES  
 YMRP .0000 INCHES  
 ZMRP .0000 INCHES  
 SCALE .0010 SCALE

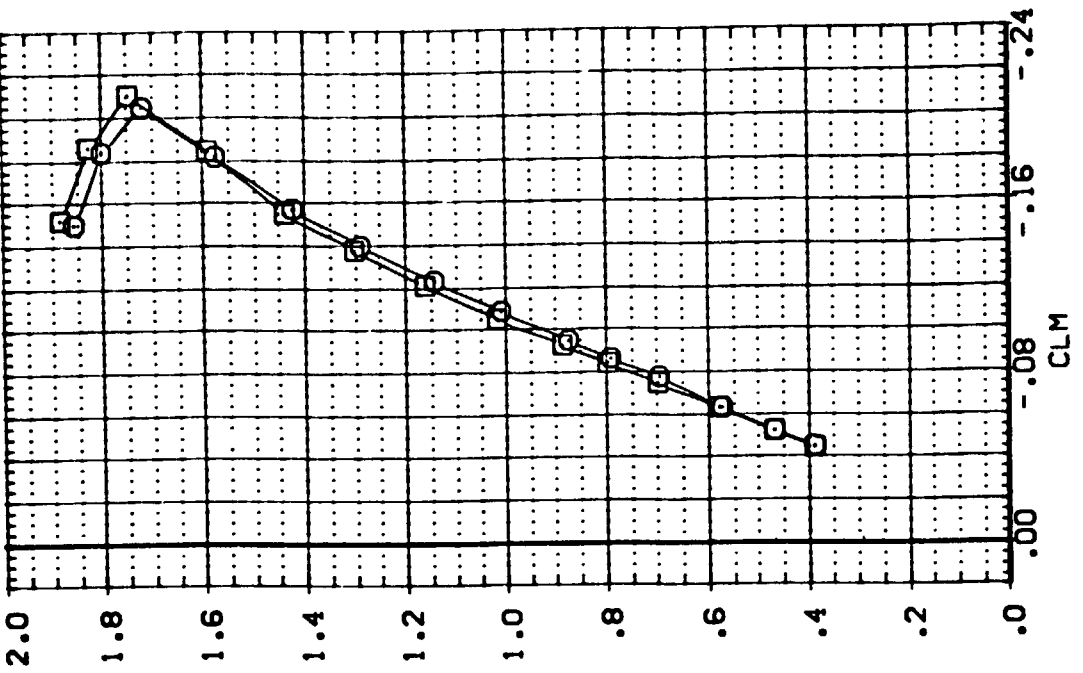
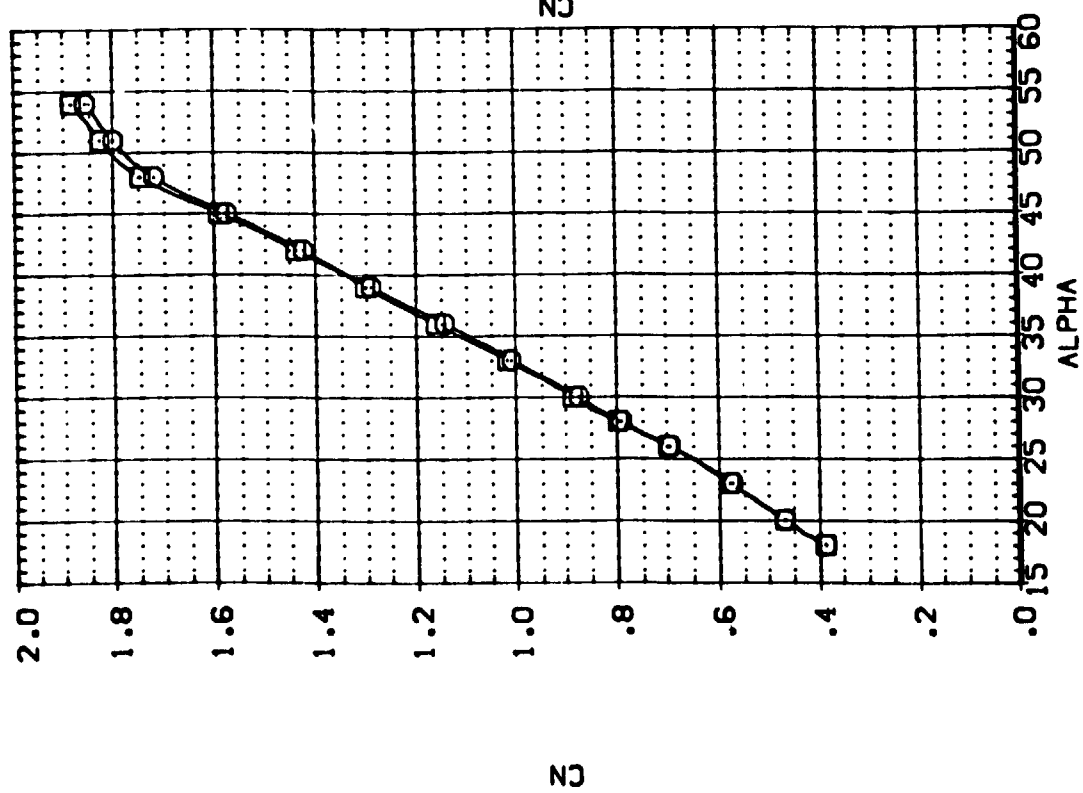


EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 15, HH-20 BALANCE

DATA SET SYMBOL: (B00008) (B00009)  
 CONFIGURATION DESCRIPTION: DA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20) DA-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)

RE-IL 1.172 2.012  
 ELEVTR 15.000 15.000  
 BOFLAP .000 .000  
 SPOBRK 55.000 55.000  
 SREF 6.3170  
 LREF 1.9266  
 BREF 3.7470  
 YMRP .0000  
 ZMRP .0000  
 SCALE .0040

REFERENCE INFORMATION  
 SO, IN. 6.3170  
 INCHES 1.9266  
 INCHES 3.7470  
 INCHES .0000  
 INCHES .0000  
 SCALE .0040



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 15, HH-20 BALANCE

(A)MACH = 19.00

DATA SET SYMBOL: (B00008) (S00009)

CONFIGURATION DESCRIPTION:  
 OA-88 LARC 22-INCH HE.TU. 7422 RI-140A/BI(HH-20)  
 OA-88 LARC 22-INCH HE.TU. 7422 RI-140A/BI(HH-20)

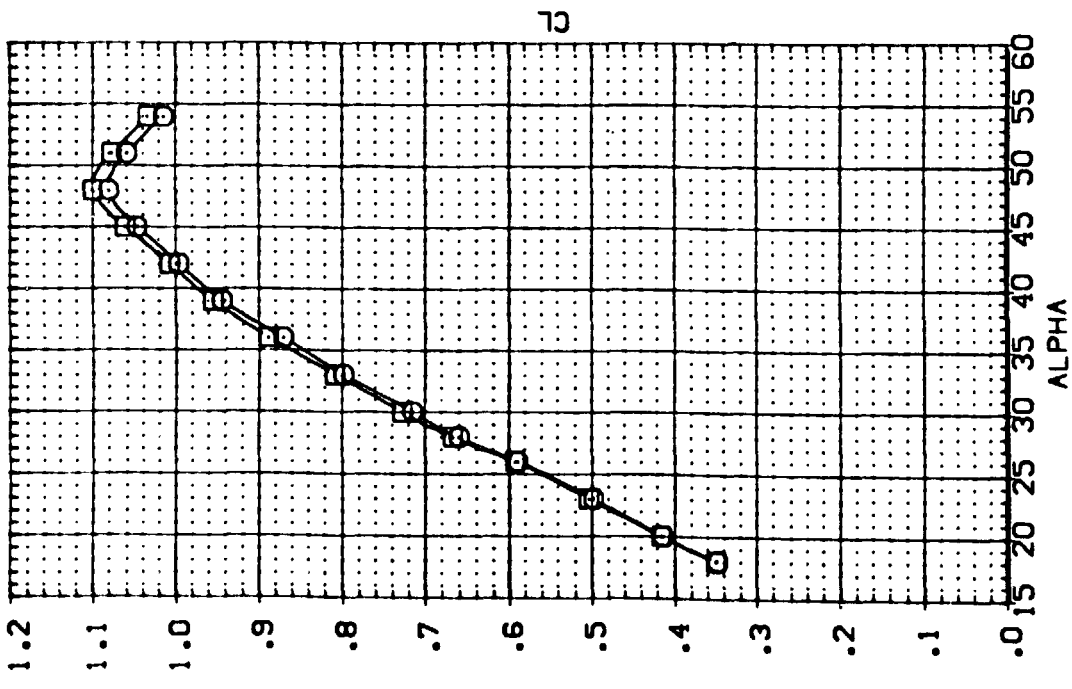
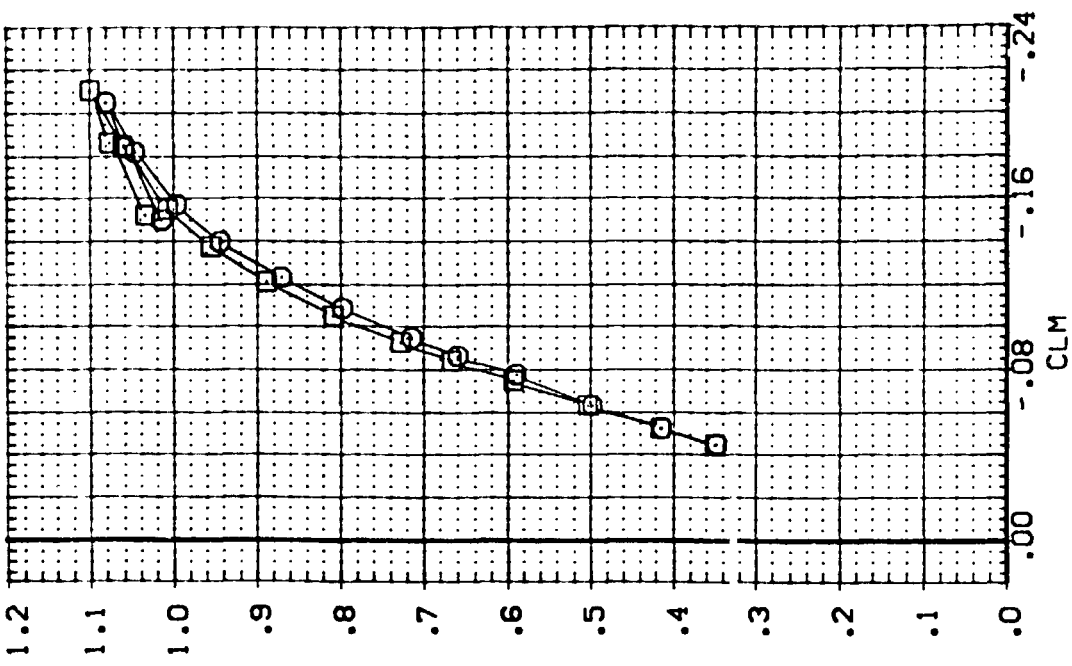
REIL: 1.172  
 2.012

ELEVTR: 15.000  
 15.000

BDFLAP: .000  
 .000

SFOBRK: 55.000  
 55.000

REFERENCE INFORMATION:  
 SREF: 6.3170 SQ. IN.  
 LREF: 1.5266 INCHES  
 BREF: 3.7470 INCHES  
 XMRP: 3.3736 INCHES  
 YMRP: .0000 INCHES  
 ZMRP: .0000 INCHES  
 SCALE: .0040 SCALE

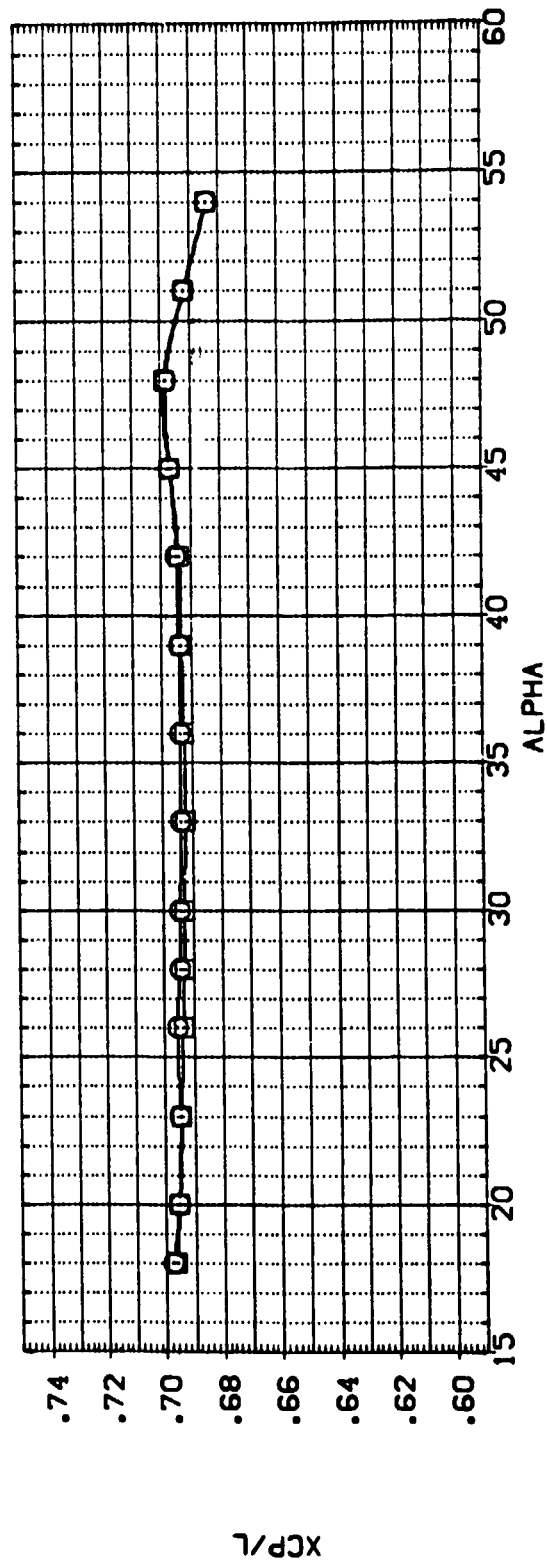
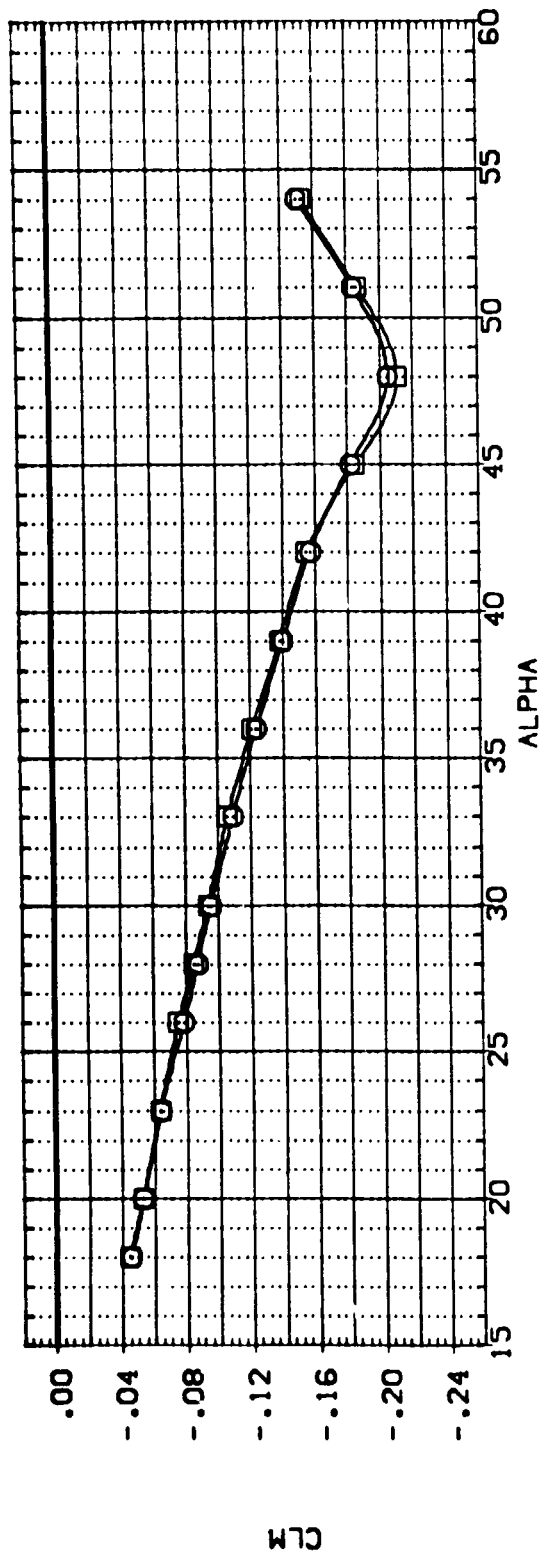


EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 15, HH-20 BALANCE

(AJMACH = 19.00



DATA SET SYMBOL: (B00008) □ (B00009) □  
 CONFIGURATION DESCRIPTION: DA-88 LARC 22-INCH RE.TU: 7422 RI-140A/B(HH-20) DA-88 LARC 22-INCH RE.TU: 7422 RI-140A/B(HH-20)  
 RE.L: 1.172 2.012  
 ELEVTR: 15.000 15.000  
 BDFLAP: .000 .000  
 SPOBRK: 55.000 55.000  
 REFERENCE INFORMATION: SREF: 6.3170 SQ.IN: 50.000 LREF: 1.9266 INCHES: XREF: 3.7470 INCHES: YMRP: 3.3736 INCHES: ZMRP: .0000 INCHES: SCALE: .0040 SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 15, HH-20 BALANCE

(A)MACH = 19.00

DATA SET SYMBOL: (900008)  
 (BCC009)

CONFIGURATION DESCRIPTION  
 OA-88 LARC 22-INCH HE-TU, 7422 RI-140A/B/HH-20)  
 OA-88 LARC 22-INCH HE-TU, 7422 RI-140A/B/HH-20)

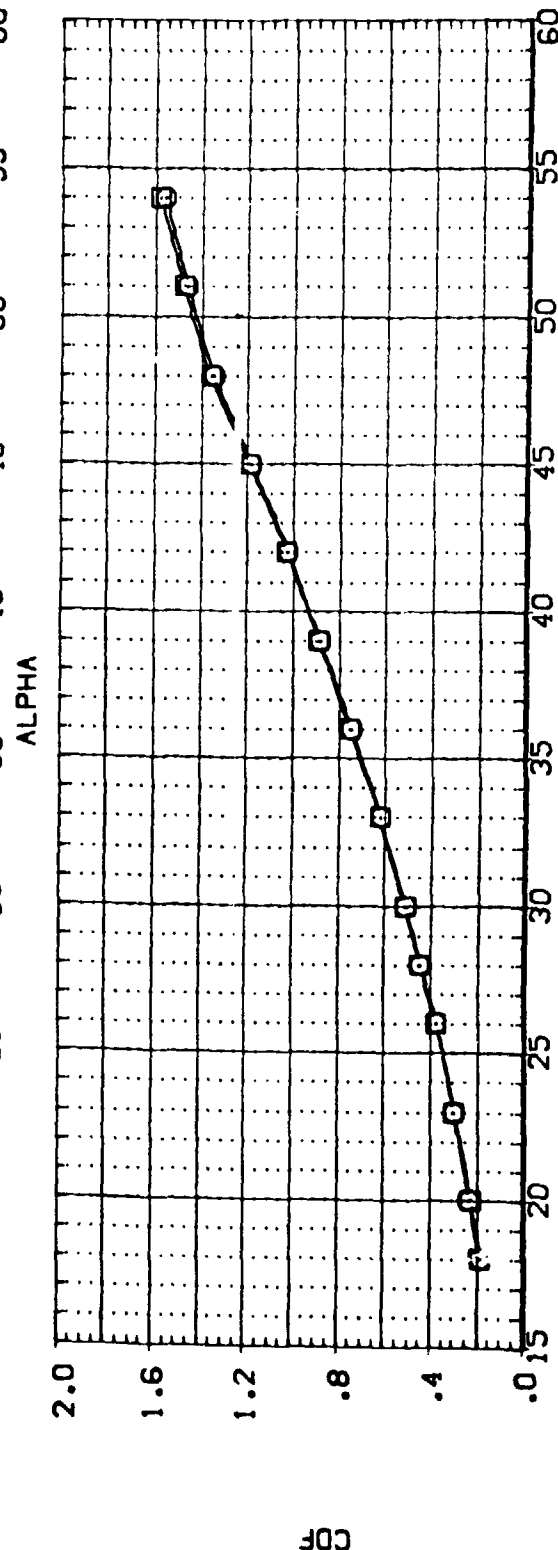
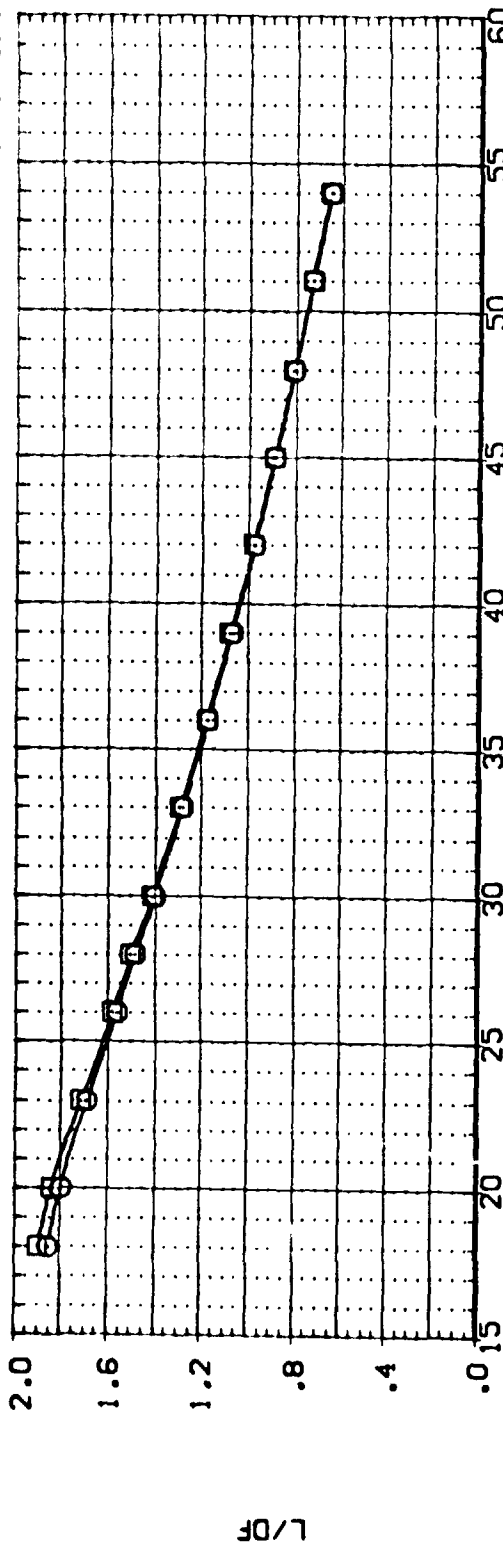
REL. 1.172  
 2.012

ELEVTR 15.000  
 15.000

BDF LAP 0.000  
 .000

SPOBRK 55.000  
 55.000

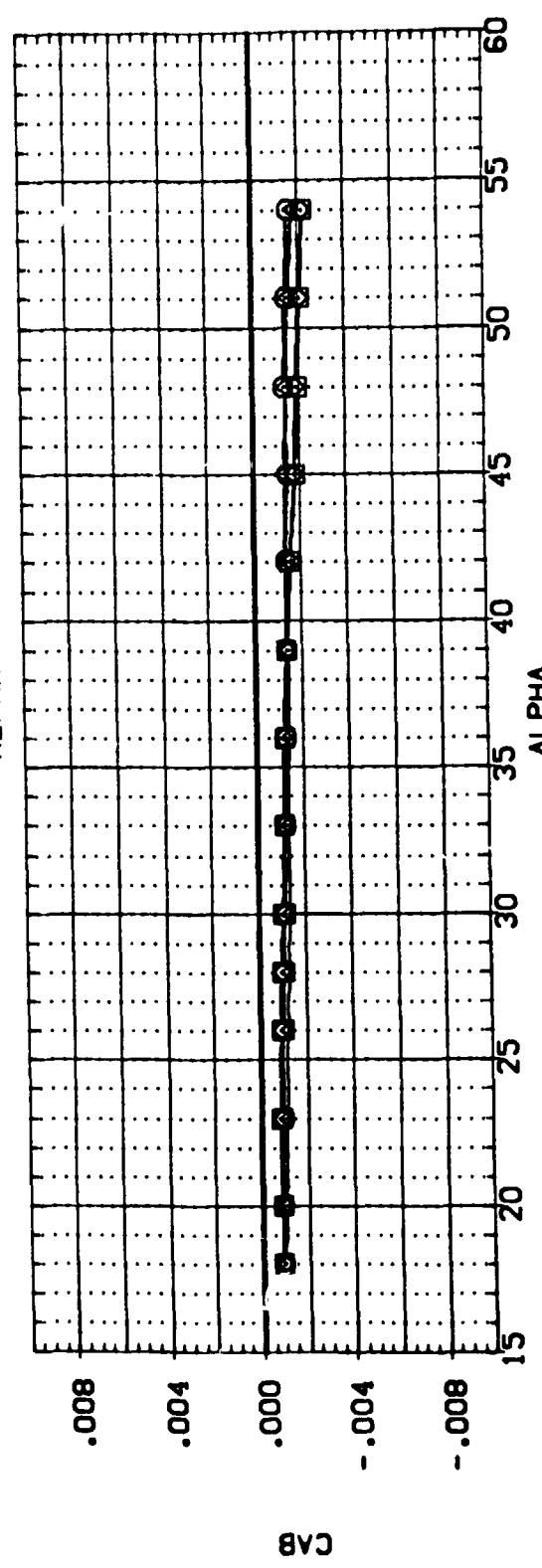
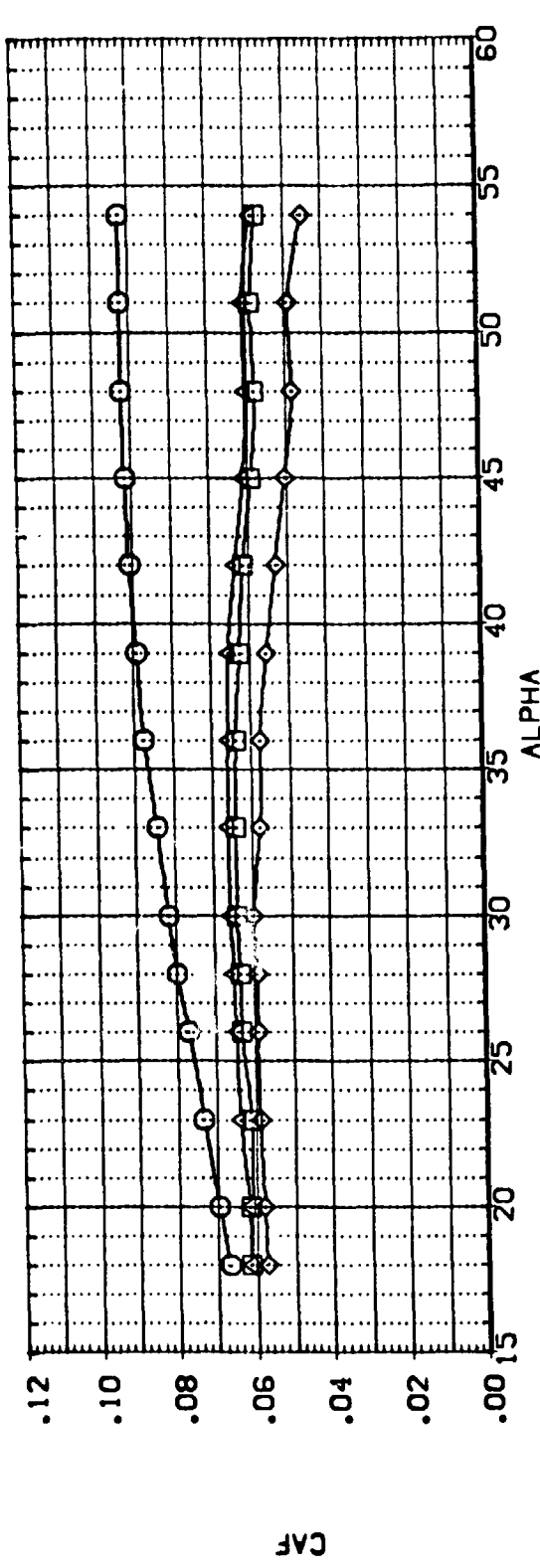
REFERENCE INFORMATION  
 SREF 6.3170 50 IN.  
 LREF 1.5766 INCHES  
 XREF 3.7470 INCHES  
 YMRP 3.3736 INCHES  
 ZMRP .0000 INCHES  
 SCALE .0040 INCHES  
 SCALE



EFFECT OF REYNOLDS NUMBER ON CONFIGURATION, ELEVON = 15, HH-20 BALANCE

(A)MACH = 19.00

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	RE•L	ELEVTR	BDFLAP	SFOBRK	REFERENCE INFORMATION
(B00009)	0A-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	2.012	15.000	.000	55.000	6.3170 SQ. FT.
(B00002)	0A-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	2.076	.000	.000	55.000	1.9766 INCHES
(B00005)	0A-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	2.111	-5.000	.000	55.000	3.7470 INCHES
(B00007)	0A-88 LARC 22-INCH HE.TU. 7422 RI-140A/B(HH-20)	1.971	-40.000	.000	55.000	3.3736 INCHES
						.0000 INCHES
						.0000 INCHES
						.0010 SCALE



ELEVON EFFECTIVENESS, RE•L = 2.0 MILLION, HH-20 BALANCE

(A)MACH = 20.30



DATA SET SYMBOL CONFIGURATION DESCRIPTION

(800009)	□	DA-88 LARC 22-INCH ME.TU. 7422 RI-14DA/B(HH-20)
(800007)	◇	DA-88 LARC 22-INCH ME.TU. 7422 RI-14DA/B(HH-20)
(800005)	△	DA-88 LARC 22-INCH ME.TU. 7422 RI-14DA/B(HH-20)
(800007)	◇	DA-88 LARC 22-INCH ME.TU. 7422 RI-14DA/B(HH-20)

ME.L 2.012  
 2.076  
 2.111  
 1.971

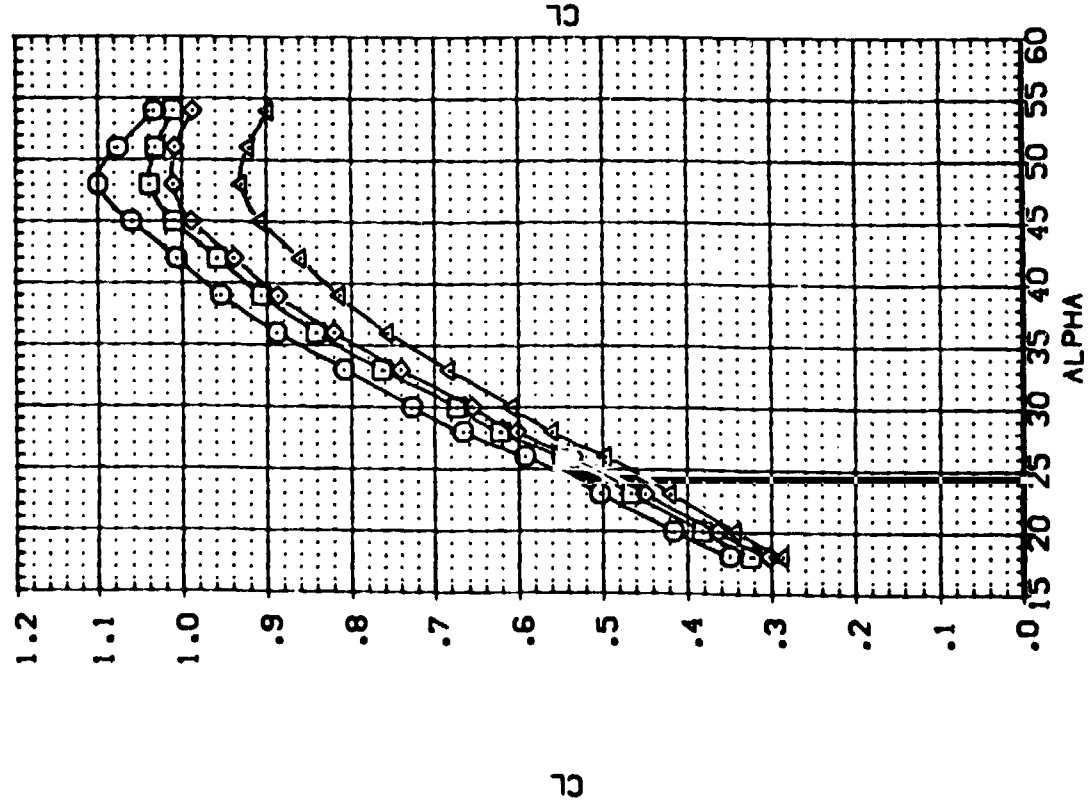
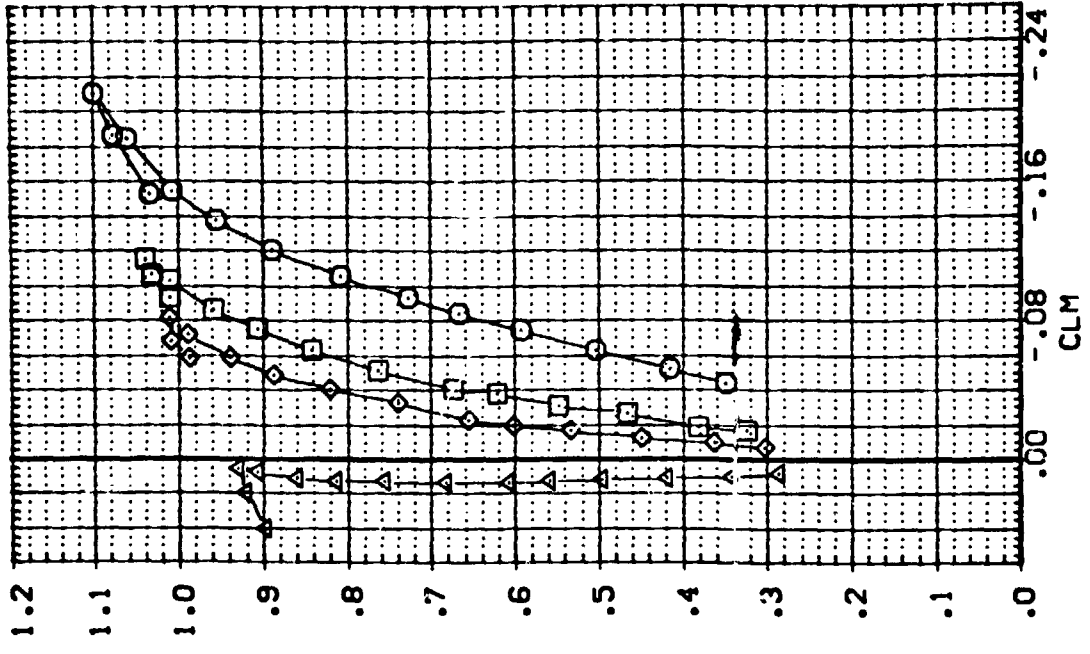
ELEVTR 15.000  
 .000  
 .000  
 -5.000  
 -40.000

BDFLAP .000  
 .000  
 .000  
 .000

SPOBRK 55.000  
 55.000  
 55.000  
 55.000

REFERENCE INFORMATION

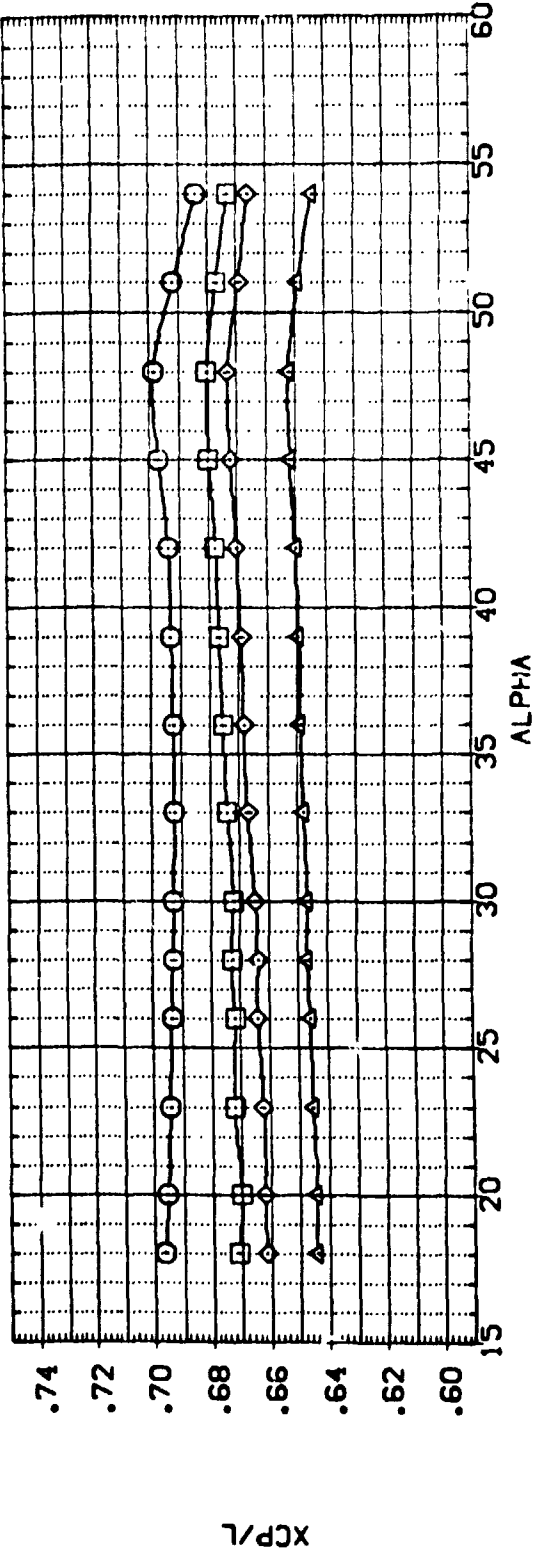
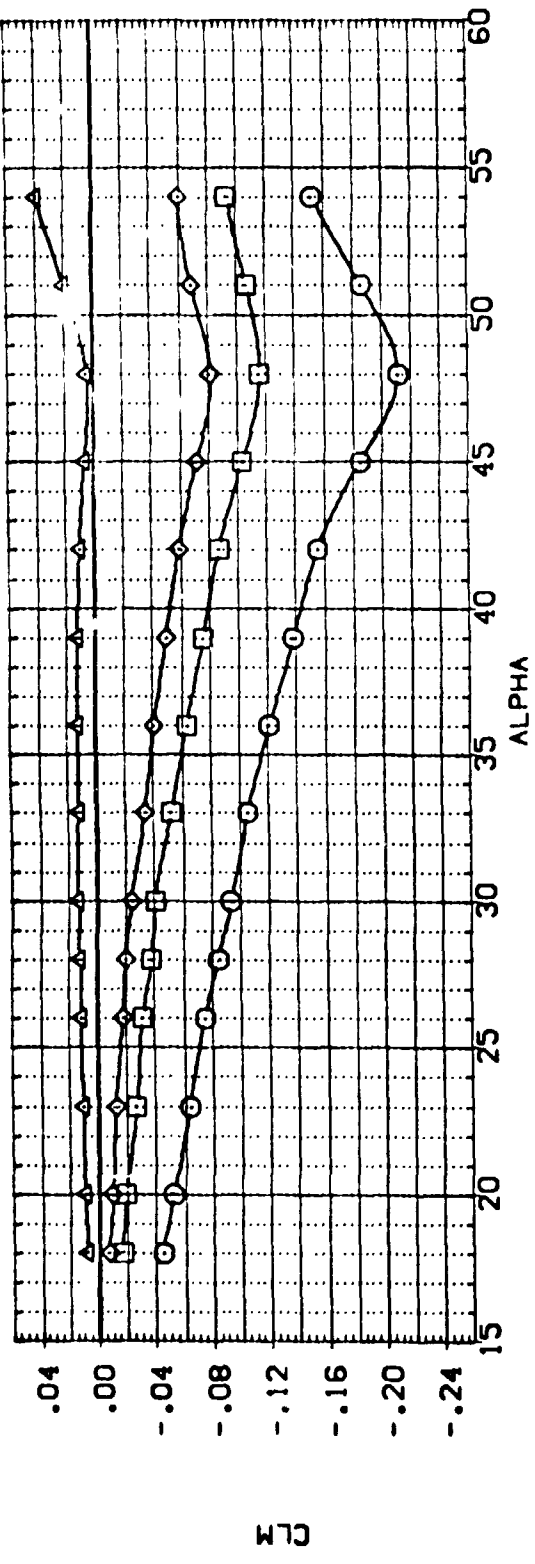
SREF	6.3170	50. IN.
LREF	1.9266	INCHES
BREF	3.7470	INCHES
XMRP	3.3736	INCHES
YMRP	.0000	INCHES
ZMRP	.0000	INCHES
SCALE	.0040	SCALE



ELEVON EFFECTIVENESS, RE.L = 2.0 MILLION, HH-20 BALANCE

(A)MACH = 20.30

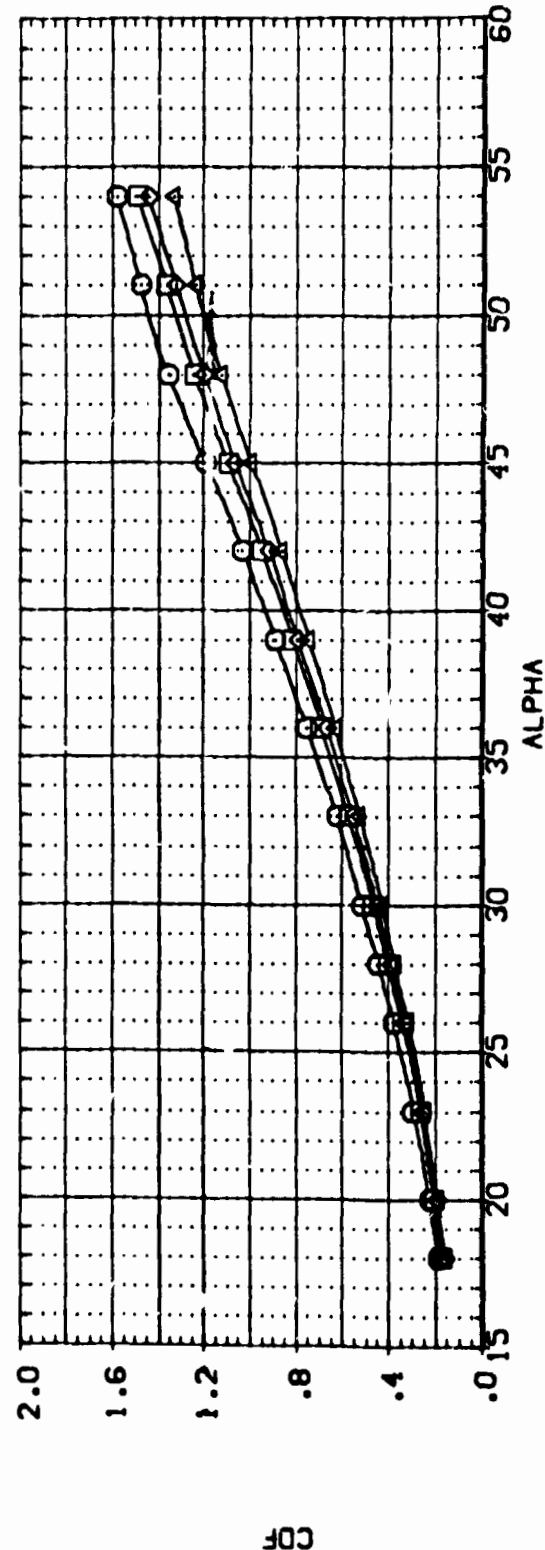
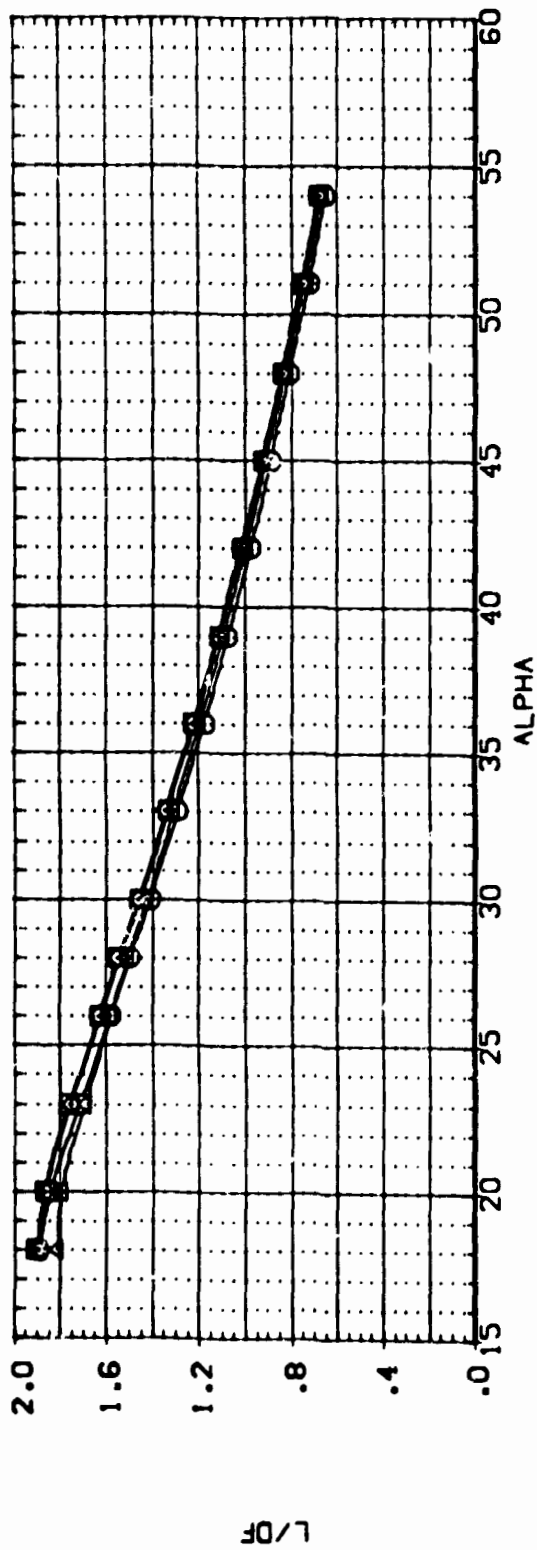
DATA SET SYMBOL: (BCC009) □ (BCC007) ∅  
 CONFIGURATION DESCRIPTION: DA-88 LARC 22-INCH ME, TU. 7422 RI-140A/B(HH-20); DA-88 LARC 22-INCH ME, TU. 7422 RI-140A/B(HH-20); DA-88 LARC 22-INCH ME, TU. 7422 RI-140A/B(HH-20); DA-88 LARC 22-INCH ME, TU. 7422 RI-140A/B(HH-20)  
 REAL: 2.012, 2.076, 2.111, 1.971  
 ELEVTR: 15.000, .000, .000, -5.000, -40.000  
 BDF LAP: .000, .000, .000, .000  
 SPOBRK: 55.000, 55.000, 55.000, 55.000  
 REFERENCE INFORMATION: SREF 6.3170 50. IN.; LREF 1.9266 INCHES; BREF 3.7470 INCHES; XMRP 3.3736 INCHES; YMRP .0000 INCHES; ZMRP .0000 INCHES; SCALE .0040 SCALE



ELEVON EFFECTIVENESS, RE,L = 2.0 MILLION, HH-20 BALANCE

(A)MACH = 20.30

DATA SET SYMBOL	CONFIGURATION DESCRIPTION	RE, L	ELEVTR	BDFLAP	SFOBRK	REFERENCE INFORMATION
(BDC009)	DA-88 LARC 22-INCH ME, TU, 7422 RI-140A/BI(HH-20)	2.012	15.000	.000	55.000	6.3170 SQ. IN.
(BDC007)	CA-88 LARC 22-INCH ME, TU, 7422 RI-140A/BI(HH-20)	2.076	.000	.000	55.000	1.9266 INCHES
(BDC003)	CA-8R LARC 22-INCH ME, TU, 7422 RI-140A/BI(HH-20)	2.111	-5.000	.000	55.000	3.7470 INCHES
(BDC007)	CA-88 LARC 22-INCH ME, TU, 7422 RI-140A/BI(HH-20)	1.571	-40.000	.000	55.000	3.3736 INCHES
						.0000 INCHES
						.0000 INCHES
						.0010 SCALE



ELLVON EFFECTIVENESS, RE, L = 2.0 MILLION, HH-20 BALANCE

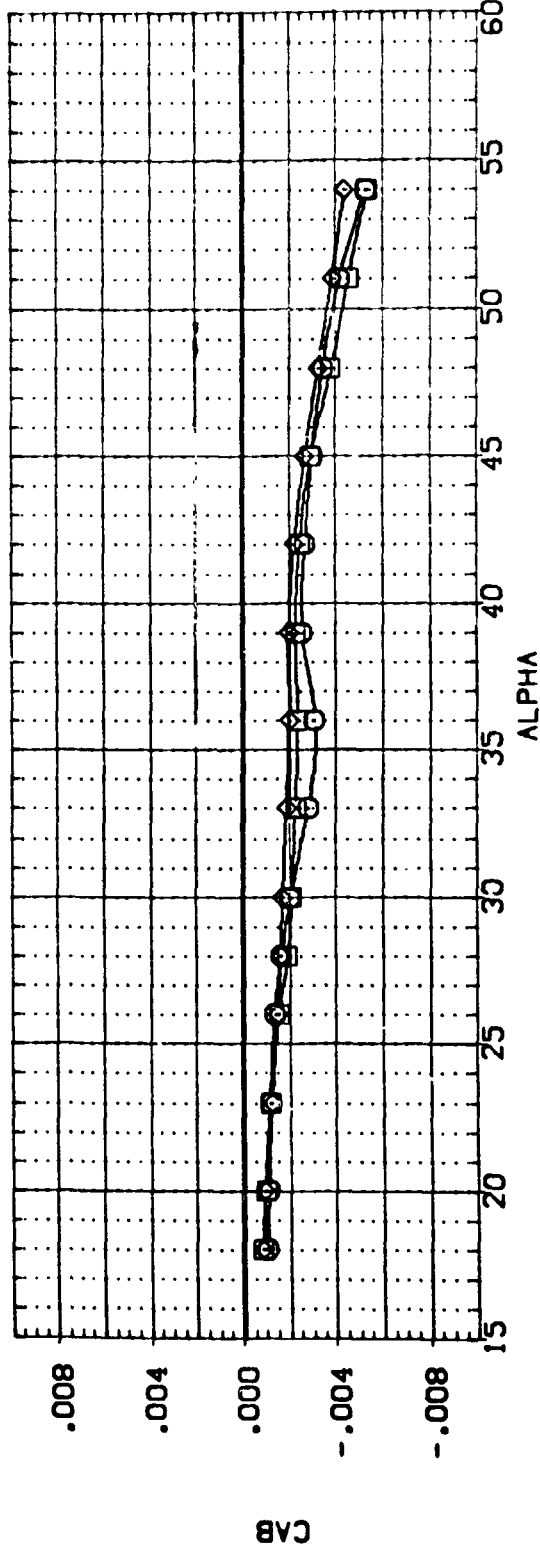
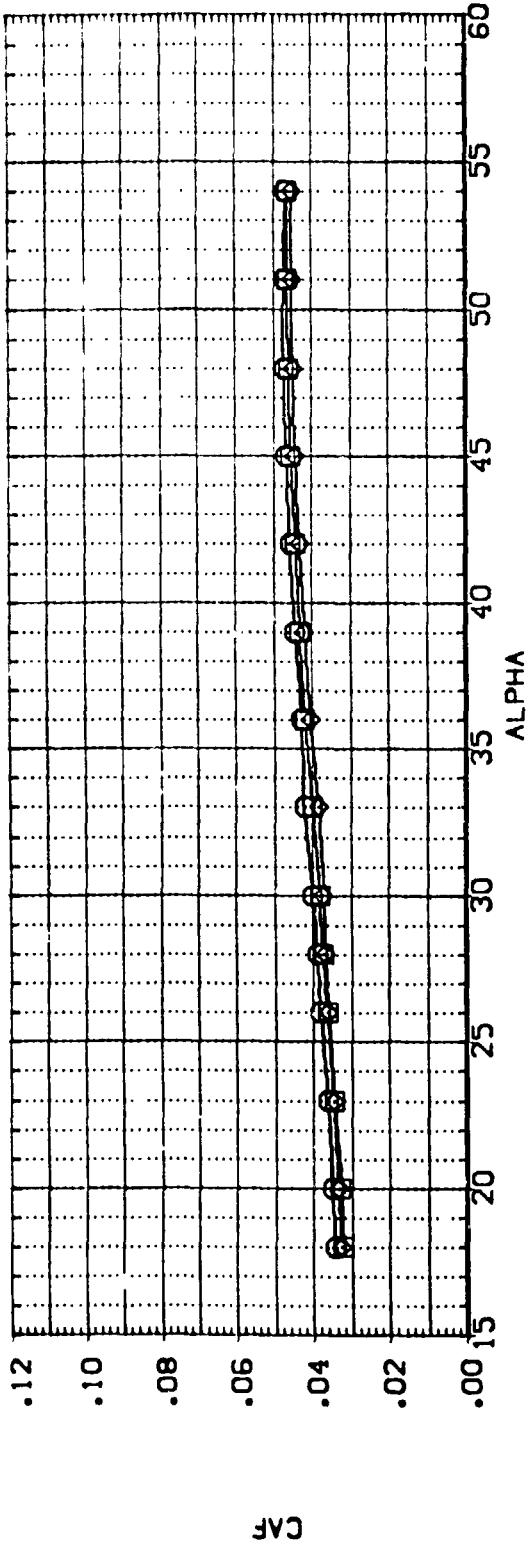
CAJ MACH = 20.30

DATA SET SYMBOL: (BCC010) □ (BCC011) ◇ (BCC012) ⊗

CONFIGURATION DESCRIPTION:  
 OA-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (HH-20)  
 OA-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (HH-20)  
 OA-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (HH-20)

RE.L  
 1.147  
 2.026  
 3.994

REFERENCE INFORMATION:  
 REF 6.3170 SQ. IN.  
 LREF 1.9266 INCHES  
 BREF 3.7472 INCHES  
 XMRP 3.3736 INCHES  
 YMRP .0000 INCHES  
 ZMRP .0000 INCHES  
 SCALE .0040 INCHES



EFFECT OF REYNOLDS NUMBER ON BODY ALONE, HH-20 BALANCE

(A)MACH = 19.00



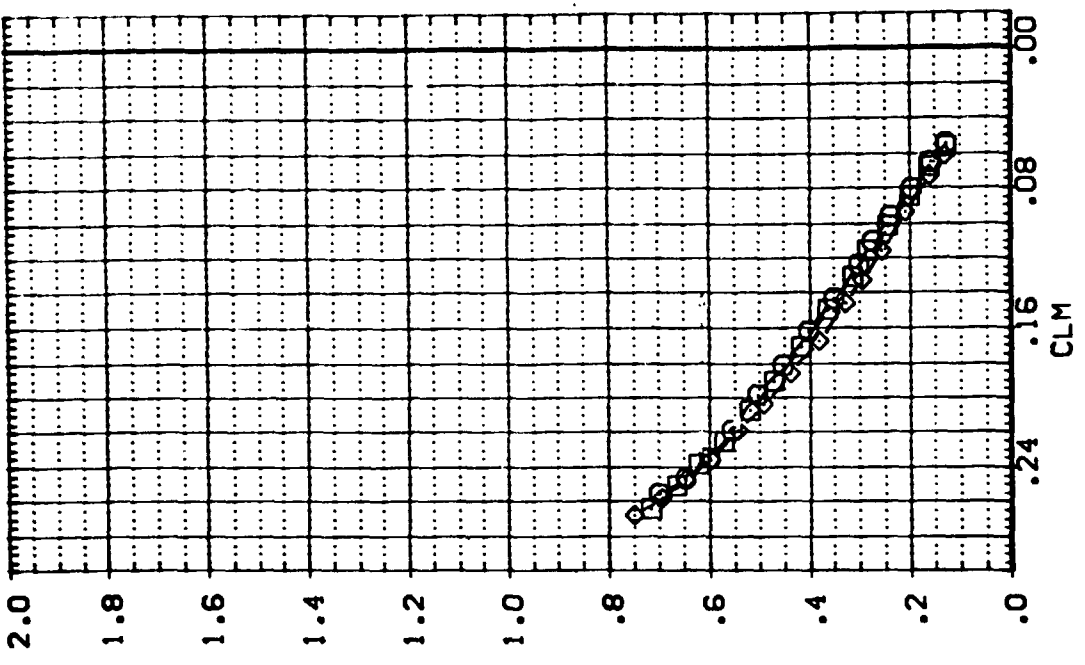
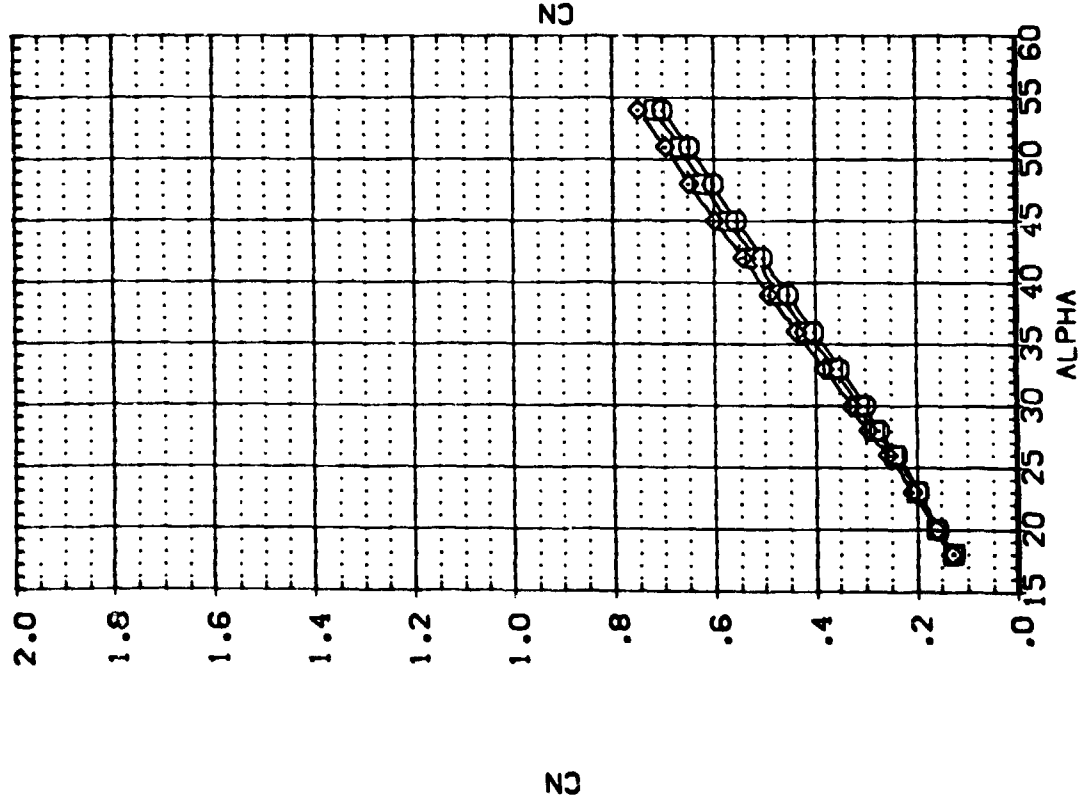


DATA SET SYMBOL  
 (BCC010) □  
 (BCC011) ○  
 (BCC012) ◇

CONFIGURATION DESCRIPTION  
 QA-88 LARC 22-INCH F.S.TU. 7422 BODY ALONE (HH-20)  
 QA-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (HH-20)  
 QA-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (HH-20)

RE- $\lambda$   
 1.147  
 2.026  
 3.994

REFERENCE INFORMATION  
 SREF 6.3170 SQ. IN.  
 LREF 1.9266 INCHES  
 BREF 3.7470 INCHES  
 XMRP 3.3736 INCHES  
 YMRP .0000 INCHES  
 ZMRP .0000 INCHES  
 SCALE .0040 SCALE



EFFECT OF REYNOLDS NUMBER ON BODY ALONE, HH-20 BALANCE

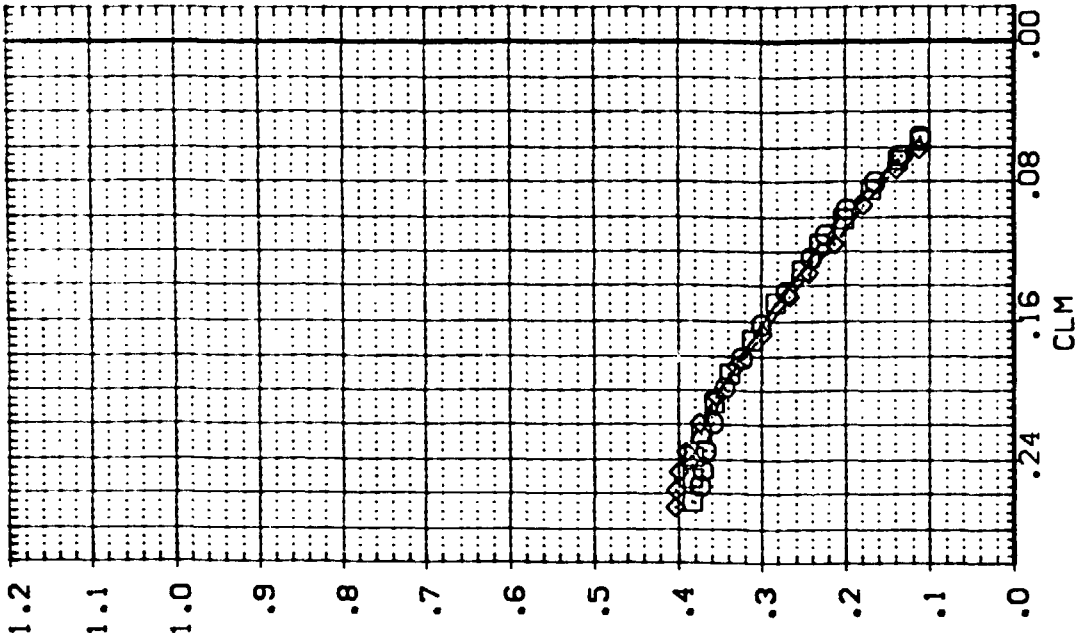
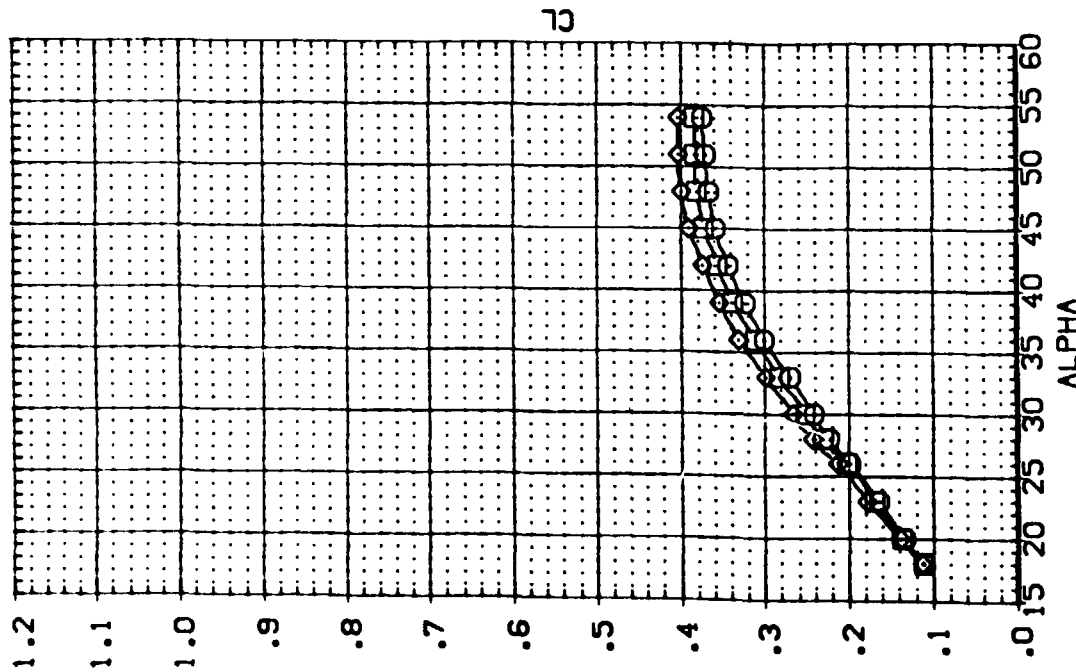
(A)MACH = 19.00

DATA SET SYMBOL  
 (BCC010)  
 (BCC011)  
 (BCC012)

CONFIGURATION DESCRIPTION  
 DA-88 LARC 22-INCH ME.TU. 7422 BODY ALONE (HH-20)  
 DA-88 LARC 22-INCH ME.TU. 7422 BODY ALONE (HH-20)  
 DA-88 LARC 22-INCH ME.TU. 7422 BODY ALONE (HH-20)

RE=L  
 1.147  
 2.026  
 3.994

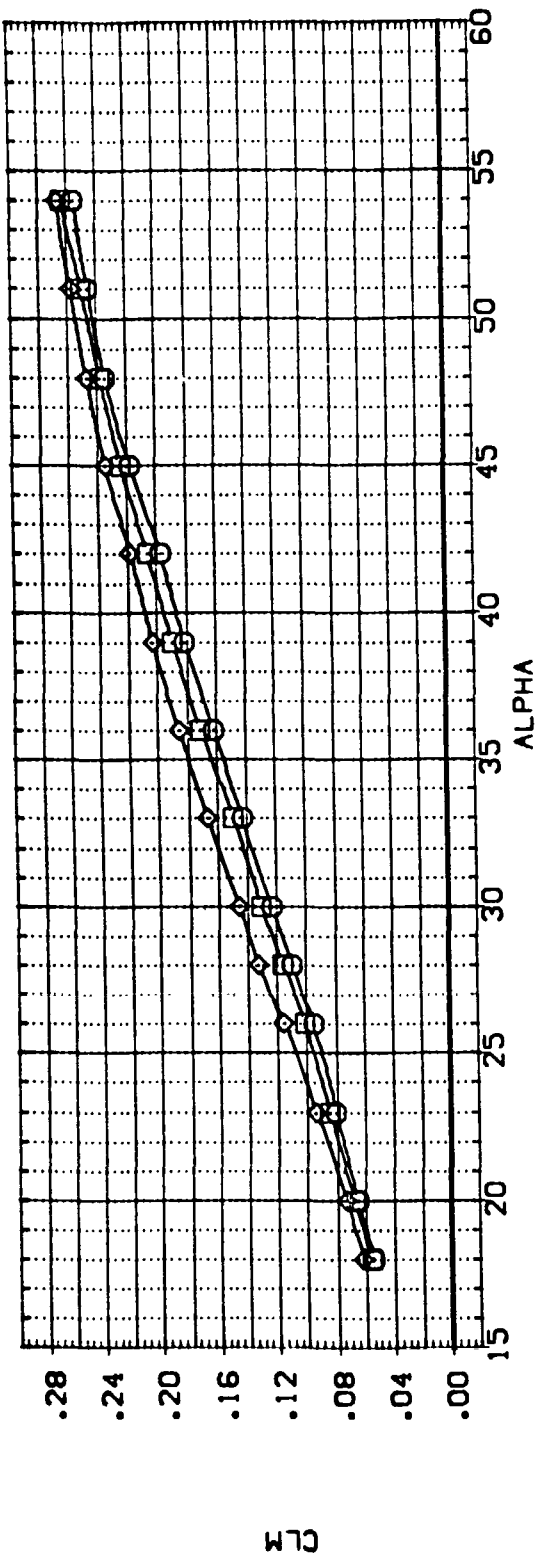
REFERENCE INFORMATION  
 SREF 6.3170 SQ.IN.  
 LREF 1.9266 INCHES  
 PREF 3.7470 INCHES  
 YMRP 3.3736 INCHES  
 ZMRP .0000 INCHES  
 SCALE .0040 INCHES



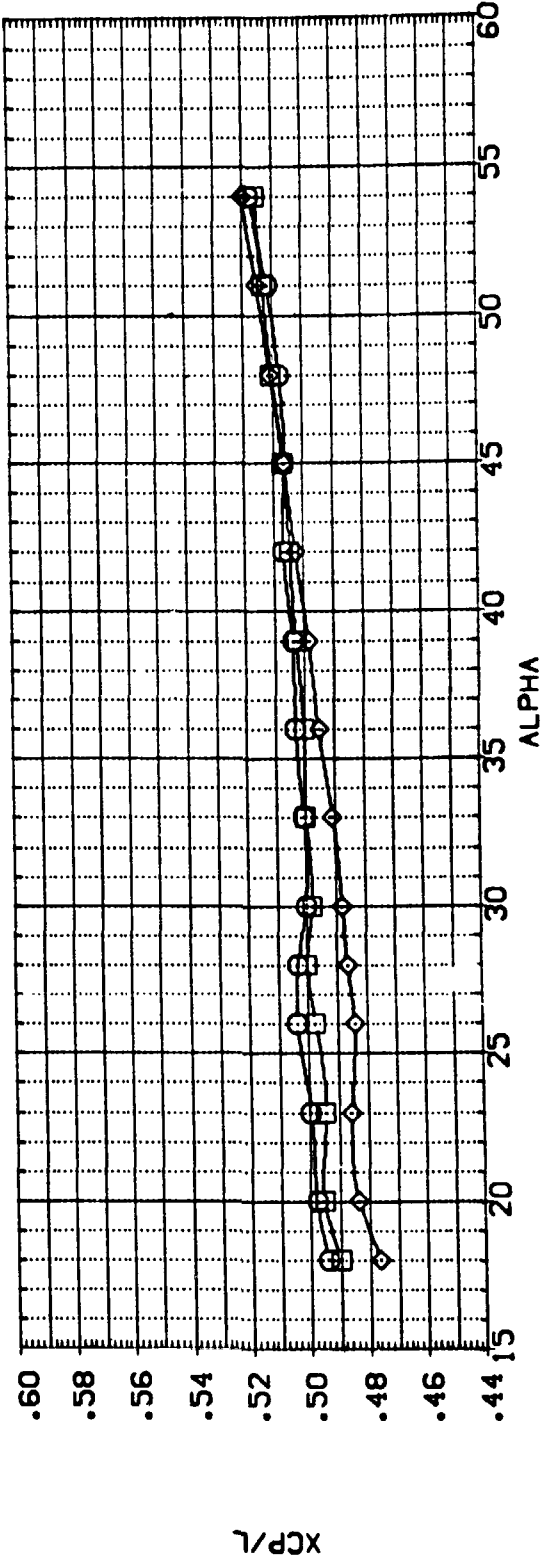
EFFECT OF REYNOLDS NUMBER ON BODY ALONE, HH-20 BALANCE

(A)MACH = 19.00

DATA SET SYMBOL: (BOC010) (BOC011) (BOC012)  
 CONFIGURATION DESCRIPTION: OA-88 LARC 22-INCH PE.TU. 7422 BODY ALONE (HH-20) OA-88 LARC 22-INCH PE.TU. 7422 BODY ALONE (HH-20) OA-88 LARC 22-INCH PE.TU. 7422 BODY ALONE (HH-20)  
 RE..L: 1.147 2.026 3.994  
 REFERENCE INFORMATION: SREF 6.3170 SO.IN. INCHES LREF 1.9266 INCHES BREF 3.7470 INCHES XMRP 3.3736 INCHES YMRP .0000 INCHES ZMRP .0000 INCHES SCALE .0040



CLM



XCP/L

EFFECT OF REYNOLDS NUMBER ON BODY ALONE, HH-20 BALANCE

(A)MACH = 19.00

DATA SET SYMBOL  
 (B00010) ○  
 (B00011) ◇  
 (B00012)

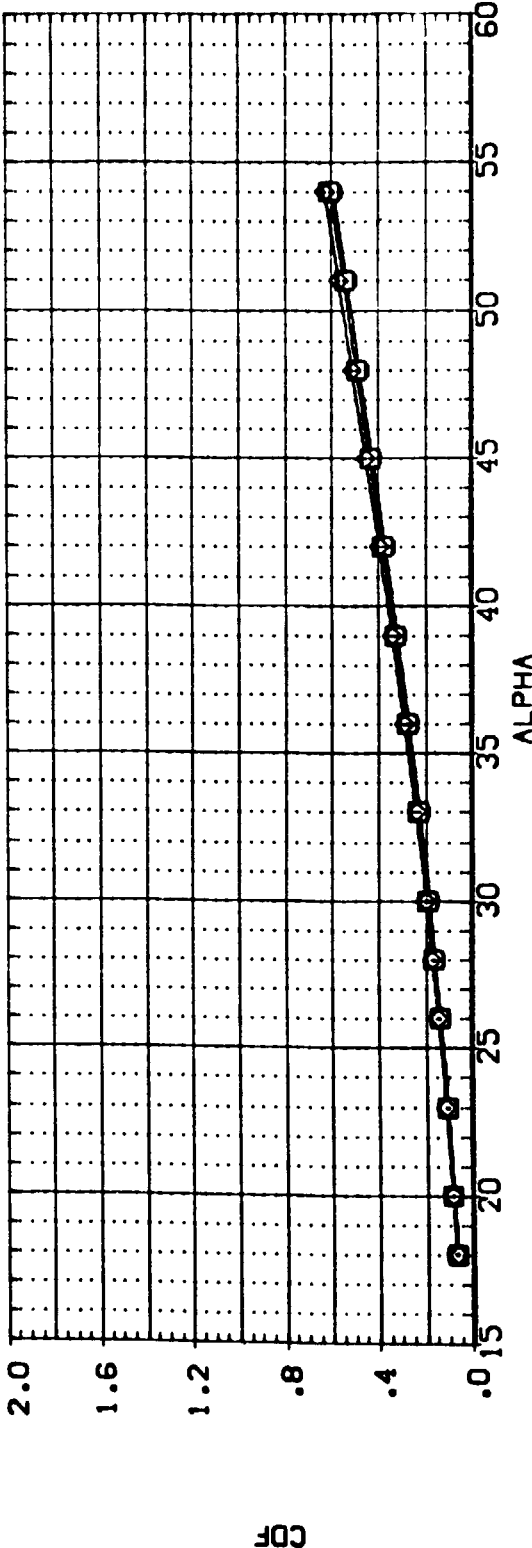
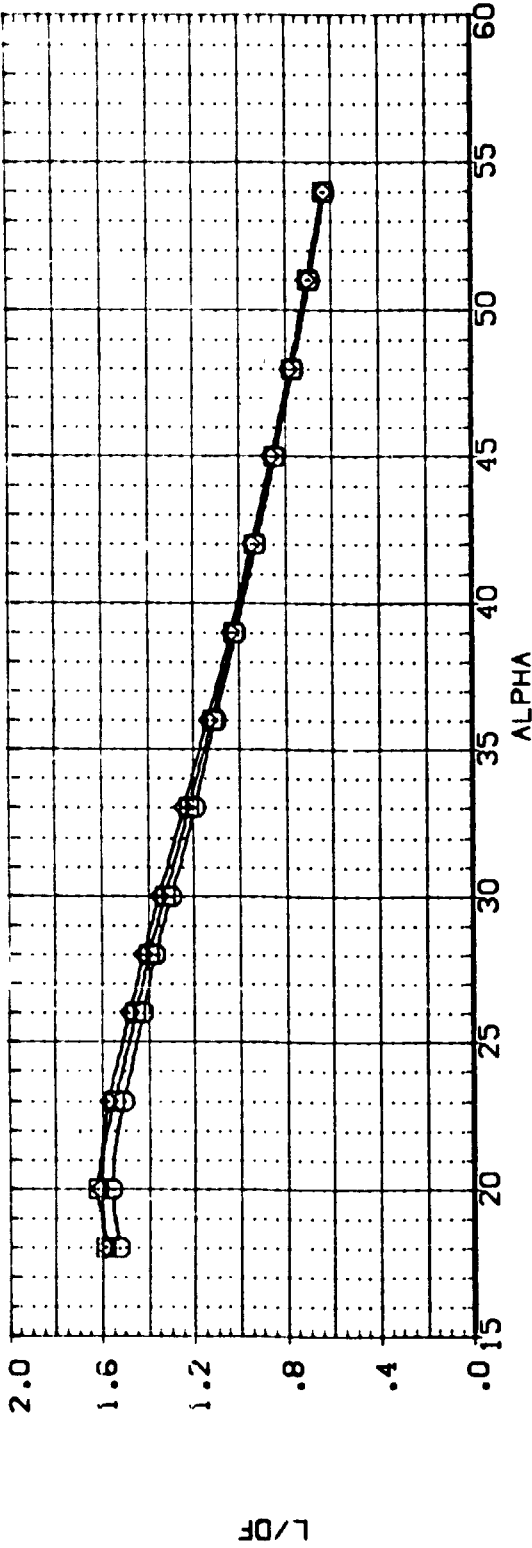
CONFIGURATION DESCRIPTION

DA-88 LARC 22-INCH ME.TU. 7422 BODY ALONE (HH-20)  
 DA-88 LARC 22-INCH ME.TU. 7422 BODY ALONE (HH-20)  
 DA-88 LARC 22-INCH ME.TU. 7422 BODY ALONE (HH-20)

REPL

1.147  
 2.026  
 3.994

REFERENCE INFORMATION  
 SREF 6.317L 50. IN.  
 LREF 1.9265 INCHES  
 BREF 3.7410 INCHES  
 X:RP 3.3736 INCHES  
 Y:RP .0000 INCHES  
 Z:RP .0000 INCHES  
 SCALE .0040



EFFECT OF REYNOLDS NUMBER ON BODY ALONE, HH-20 BALANCE

(A)MACH = 19.00

APPENDIX  
TABULATED SOURCE DATA

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

REFERENCE DATA  
 SREF = 6.3175 SQ. IN. YMRP = 3.3736 INCHES  
 LRIF = 1.9208 INCHES YMRP = .0000 INCHES  
 BRIF = 3.7475 INCHES ZMRP = .0000 INCHES  
 SCALE = .0001 SCALE

PARAMETRIC DATA  
 BETA = .0000 RE, L = 1.163  
 BALANC = 20.0000 ELEVTR = .0000  
 ALLRON = .0000 RUDDER = .0000  
 BDFLAP = .0000 SFDORK = 95.0000

RUN NO. 3/ 5 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	COF	L/DF	CAB
19.000	18.000	.35123	.06472	-.01747	-.00032	.00042	-.00735	.31404	.17019	1.04636	-.00066
19.000	20.000	.42122	.06464	-.02176	-.00098	.00056	-.00840	.37371	.20461	1.02467	-.00066
19.000	23.000	.52593	.06447	-.02922	-.00162	.00066	-.01056	.45094	.26464	1.73280	-.00067
19.000	26.000	.63726	.06593	-.03465	-.00239	.00071	-.01224	.54366	.33662	1.61613	-.00071
19.000	28.000	.75091	.06757	-.04116	-.00329	.00066	-.01368	.61363	.40260	1.52343	-.00076
19.000	30.000	.81008	.06769	-.04766	-.00401	.00090	-.01526	.66771	.46366	1.44008	-.00083
19.000	33.000	.94731	.06711	-.05612	-.00444	.00088	-.01766	.75793	.57223	1.32452	-.00099
19.000	36.000	1.07157	.06700	-.06772	-.00523	.00094	-.02024	.82753	.69406	1.21974	-.00116
19.000	39.000	1.20187	.06588	-.08223	-.00612	.00114	-.02369	.89257	.80756	1.10527	-.00130
19.000	42.000	1.32930	.06619	-.09959	-.00725	.00105	-.02466	.94337	.93667	1.00323	-.00148
19.000	45.000	1.46407	.06352	-.11769	-.00875	.00123	-.02707	.99034	1.08017	.91683	-.00169
19.000	48.000	1.59311	.06144	-.11660	-.01036	.00122	-.02930	1.02194	1.22502	.83292	-.00181
19.000	51.000	1.67650	.06281	-.11649	-.01127	.00112	-.02986	1.04624	1.34242	.74957	-.00196
19.000	54.000	1.75927	.06072	-.09372	-.01128	.00129	-.03259	.98495	1.45897	.67310	-.00216
GRADIENT		.04067	-.00011	-.00282	.00002	.00002	-.00073	.02051	.03721	-.03441	-.00004

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DATE 19 MAR 74

TABULATED SOURCE DATA, LARC 22ME 7422 (0888)

PAGE 2

0A-88 LARC 22-INCH ME.TU. 7422 RI-14DA/B (MH-20)

(R00002) ( 25 JAN 74 )

REFERENCE DATA

SREF = 6.3175 SQ. IN. YMRP = 3.3736 INCHES  
 LREF = 1.9260 INCHES YMRP = .0000 INCHES  
 BREF = 3.7475 INCHES ZMRP = .0000 INCHES  
 SCALE = .0001 SCALE

BETA = .0000 RE.L = 2.076  
 BALANC = 20.0000 ELEVTR = .0000  
 AIRCON = .0000 RUDDER = .0000  
 BOTLAP = .0000 SPOBRK = 55.0000

PARAMETRIC DATA

RUN NO. 1 / 5 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDF	L/DF	CAB
21.300	1.0000	.35956	.06162	-.01666	-.00011	.00025	-.00741	.32294	.16972	1.90280	-.00090
21.300	20.0000	.42729	.06136	-.01672	-.00035	.00041	-.00855	.38053	.20383	1.86694	-.00086
21.300	23.0000	.53266	.06135	-.02647	-.00074	.00033	-.01060	.46634	.26480	1.76243	-.00086
21.300	26.0000	.64030	.06334	-.03104	-.00104	.00055	-.01321	.54773	.33762	1.62234	-.00089
21.300	28.0000	.73657	.06359	-.03781	-.00109	.00055	-.01491	.62227	.40289	1.54452	-.00096
21.300	30.0000	.81496	.06429	-.04154	-.00126	.00064	-.01575	.67363	.46316	1.45444	-.00105
21.300	33.0000	.95260	.06396	-.03177	-.00059	.00070	-.01904	.76393	.57271	1.33386	-.00117
21.300	36.0000	1.10701	.06310	-.06310	-.00036	.00080	-.02105	.84181	.69067	1.21883	-.00123
21.300	39.0000	1.21698	.06271	-.07525	-.00116	.00096	-.02378	.91631	.81460	1.11258	-.00137
21.300	42.0000	1.34641	.06154	-.08626	-.00050	.00099	-.02559	.95940	.94666	1.01346	-.00159
21.300	45.0000	1.48760	.05919	-.10336	-.00039	.00108	-.02864	1.01004	1.09374	.92347	-.00183
21.300	48.0000	1.61666	.05806	-.11573	-.00036	.00129	-.03077	1.03861	1.24027	.83741	-.00193
21.300	51.0000	1.71191	.05669	-.11692	-.00030	.00109	-.03197	1.03173	1.36734	.75455	-.00207
21.300	34.0000	1.79942	.05719	-.09322	.00034	.00127	-.03426	1.01141	1.48938	.67908	-.00224
GRADIENT		.04177	-.00013	-.00267	.00042	.00003	-.00077	.02107	.03851	-.03555	-.00004

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REF = 6.31% 50.1M, YMRP = 3.3756 INCHES  
 LREF = 1.9266 INCHES, YMRP = .0000 INCHES  
 BRCP = 3.747% INCHES, ZMRP = .0000 INCHES  
 SCALE = .0040 SCALE

BETA = .000 RE.L = 3.945  
 BALANC = 20.000 ELEVTR = .000  
 AIRCON = .000 RUDDER = .000  
 BOFLAP = .000 SPDRK = 55.000

PARAMETRIC DATA

RUN NO. 27 5 RML = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDP	L/DF	CAB
21.000	18.000	.35497	.05988	-.01281	-.00084	.00004	-.00054	.31909	.16664	1.91482	-.00081
21.000	20.000	.43412	.08037	-.01311	-.00095	.00001	-.00093	.38729	.20321	1.88729	-.00080
21.000	23.000	.53971	.08563	-.01432	-.00100	-.00011	-.01130	.47312	.26669	1.77402	-.00079
21.000	26.000	.63796	.08218	-.01693	-.00106	.00008	-.01418	.56411	.34432	1.63833	-.00078
21.000	28.000	.76812	.08251	-.02178	-.00180	.00018	-.01524	.64886	.41500	1.56349	-.00085
21.000	30.000	.83782	.08217	-.02493	-.00144	.00029	-.01734	.69449	.47275	1.46904	-.00088
21.000	33.000	.90898	.08230	-.03480	-.00136	.00062	-.01924	.79550	.59089	1.34628	-.00094
21.000	36.000	1.11617	.08125	-.04685	-.00146	.00072	-.02193	.86700	.70362	1.22870	-.00102
21.000	39.000	1.24433	.05992	-.06150	-.00096	.00085	-.02333	.92932	.82965	1.12014	-.00111
21.000	42.000	1.39310	.05971	-.07562	-.00185	.00122	-.02684	.99532	.97654	1.01924	-.00137
21.000	45.000	1.53535	.05811	-.09447	-.00153	.00147	-.02897	1.04457	1.12674	.92707	-.00169
21.000	48.000	1.66505	.05648	-.11201	-.00177	.00174	-.03102	1.07217	1.27516	.84081	-.00189
21.000	51.000	1.78343	.05680	-.12677	-.00117	.00163	-.03239	1.06688	1.40774	.75786	-.00178
21.000	54.000	1.88254	.05576	-.14196	-.00152	.00172	-.03427	1.04966	1.53960	.68177	-.00192
GRADIENT		.04340	-.00015	-.00318	-.00002	.00006	-.00074	.02206	.03936	-.03936	-.00003

REFERENCE DATA

ORIGINAL PAGE IS  
OF POOR QUALITY



OA-66 LARC 22-INCH ME.TU. 7422 RI-14DA/B (HH-20)

(RQCIV.4) ( 29 JAN 74 )

REFERENCE DATA

SREF = 6.3170 30-IN. YMRP = 3.3736 INCHES  
 LREF = 1.9266 INCHES YMRP = .0000 INCHES  
 BREF = 3.7470 INCHES ZMRP = .0000 INCHES  
 SCALE = .0000 SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = 1.172  
 BALANC = 20.0000 ELEVTR = -5.0000  
 AIRLON = .0000 RUDDER = .0000  
 BOFLAP = .0000 SPOBRK = 95.0000

RUN NO. 9/ 0 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	COF	L/DF	CAB
19.000	16.000	.34401	.06177	-.01045	-.00107	.00057	-.00703	.30808	.16505	1.86662	-.00034
19.000	20.000	.41219	.06293	-.01328	-.00098	.00059	-.00772	.36580	.25411	1.82801	-.00035
19.000	23.000	.50919	.06439	-.01455	-.00087	.00052	-.01007	.44355	.25823	1.71769	-.00038
19.000	26.000	.61669	.06486	-.02012	-.00155	.00066	-.01209	.52584	.32863	1.60011	-.00041
19.000	28.000	.70648	.06495	-.02536	-.00078	.00082	-.01373	.59329	.38952	1.52508	-.00045
19.000	30.000	.78544	.06493	-.02933	-.00103	.00075	-.01478	.64775	.44895	1.44280	-.00049
19.000	33.000	.81233	.06471	-.03028	-.00101	.00053	-.01732	.72991	.55116	1.32431	-.00057
19.000	36.000	1.03855	.06328	-.04336	-.00114	.00082	-.01940	.83301	.66164	1.21366	-.00067
19.000	39.000	1.17827	.06222	-.05475	-.00090	.00087	-.02218	.87498	.78861	1.10932	-.00073
19.000	42.000	1.29591	.05998	-.06579	-.00069	.00089	-.02455	.92338	.91097	1.01385	-.00081
19.000	45.000	1.42801	.05675	-.07895	-.00030	.00082	-.02674	.96822	1.04847	.92346	-.00092
19.000	48.000	1.59025	.05444	-.08322	-.00036	.00116	-.02921	.99673	1.18834	.83876	-.00099
19.000	51.000	1.83837	.05415	-.07159	-.00044	.00112	-.03087	.98898	1.30733	.75648	-.00106
19.000	54.000	1.71592	.05223	-.06119	-.00040	.00068	-.03262	.96634	1.41891	.68105	-.00114
GRADIENT		.03994	-.00033	-.04205	.00003	.00001	-.00074	.02024	.03619	-.03427	-.00062

ORIGINAL PAGE IS OF POOR QUALITY



REFERENCE DATA

SREF = 0.3170 SQ.IN. XMRP = 3.3736 INCHES  
 LREF = 1.3068 INCHES YMRP = .0000 INCHES  
 BREF = 3.7475 INCHES ZMRP = .0000 INCHES  
 SCALE = .0040 SCALE

PARAMETRIC DATA

BETA = .0000 RE,L = 2.111  
 BALANC = 20.0000 ELEVTR = -5.0000  
 AIRLOW = .0000 RUDDER = .0000  
 BOPLAP = .0000 SPOBRK = 55.0000

RUN NO. 87 0 RM/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	COL	CYN	CY	CL	COF	L/DF	CAB
27.300	.33659	.05731	-.05714	-.00090	-.00044	-.00039	.30213	.15937	1.89575	-0.00090	
28.300	.40694	.05805	-.00949	-.00066	-.00191	-.01027	.36411	.19526	1.86475	-0.00090	
29.300	.51335	.05901	-.01204	-.00082	-.00031	-.01090	.44914	.25573	1.79632	-0.00090	
30.300	.62292	.05936	-.01731	-.00122	-.00039	-.01232	.53347	.32723	1.63025	-0.00090	
31.300	.71391	.05914	-.01965	-.00137	-.00090	-.01535	.60211	.38826	1.55080	-0.00110	
32.300	.79176	.05926	-.02349	-.00085	-.00041	-.01631	.65515	.44876	1.45991	-0.00120	
33.300	.82132	.05800	-.03310	-.00145	-.00069	-.01914	.74044	.55144	1.34274	-0.00120	
34.300	.81876	.05770	-.04182	-.00182	-.00089	-.02139	.82033	.66681	1.22655	-0.00140	
35.300	.78766	.05562	-.04918	-.00133	-.00064	-.02385	.88710	.79173	1.12046	-0.00160	
36.300	.71176	.05309	-.05627	-.00046	-.00120	-.02590	.93824	.91836	1.02162	-0.00180	
37.300	.55185	.05036	-.07170	-.00035	-.00096	-.02807	.98959	1.06335	.93063	-0.00190	
38.300	.44630	.04630	-.08159	-.00099	-.00119	-.03097	1.01122	1.19809	.84402	-0.00210	
39.300	.30689	.04687	-.08681	-.00082	-.00082	-.03274	1.00858	1.32649	.76134	-0.00220	
40.300	.16656	.04510	-.08996	-.00068	-.00105	-.03441	.98698	.43893	.68591	-0.00220	
41.300	.04510	.04510	-.09000	-.00062	-.00075	-.03607	.92087	.03689	-.03525	-0.00204	

ORIGINAL PAGE IS  
 OF POOR QUALITY

0A-00 LARC 22-INCH MC.TU. 7422 R1-140A/B (MM-20)

(R0C0M6) ( 25 JAN 74 )

REFERENCE DATA

SREF = 6.3170 SQ.IN. XMRP = 3.3736 INCHES  
 LRFP = 1.9966 INCHES YMRP = 1.6674 INCHES  
 BRFP = 3.7474 INCHES ZMRP = 1.6674 INCHES  
 SCALE = 1/1000 SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = 4.049  
 BALANC = 24.0000 ELEVTR = -5.000  
 AIRLON = .0000 RUDDER = .000  
 BDFLAP = .0000 SPDRBK = 55.000

RUN NO. 7 / 0 RM/L = .00 GRADIENT INTERVAL = -9.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CLN	CR	CYN	CY	CL	COF	L/Df	CAB
21.000	18.000	.34363	.05857	-.00374	-.000371	.00005	-.00030	.30671	.16169	1.90697	-.00002	-.00002
21.000	20.000	.41924	.05919	-.00168	-.00001	-.00002	-.00097	.37566	.19899	1.87784	-.00002	-.00002
21.000	23.000	.52826	.05972	-.00118	-.00115	-.00004	-.01168	.48294	.26136	1.77112	-.00003	-.00003
21.000	26.000	.63851	.06035	-.00180	-.00124	-.00007	-.01373	.54743	.33414	1.63832	-.00006	-.00006
21.000	28.000	.74661	.06100	-.00275	-.00105	-.00004	-.01442	.63038	.40518	1.55382	-.00009	-.00009
21.000	30.000	.82325	.06224	-.00356	-.00172	.00011	-.01638	.69283	.48380	1.47227	-.00006	-.00006
21.000	33.000	.94412	.06398	-.00370	-.00127	.00039	-.02002	.75966	.56367	1.34775	-.00007	-.00007
21.000	36.000	1.09294	.06768	-.00369	-.00210	.00060	-.02205	.85030	.68978	1.23398	-.00101	-.00101
21.000	39.000	1.23253	.06830	-.00480	-.00184	.00078	-.02441	.92243	.81941	1.12372	-.00112	-.00112
21.000	42.000	1.36165	.05411	-.04756	-.00192	.00101	-.02720	.97570	.95134	1.02561	-.00129	-.00129
21.000	45.000	1.50132	.05163	-.06287	-.00196	.00112	-.02966	1.02508	1.09810	.93350	-.00147	-.00147
21.000	48.000	1.63416	.05030	-.07710	-.00229	.00148	-.03257	1.05658	1.24807	.84617	-.00158	-.00158
21.000	51.000	1.72890	.05105	-.06888	-.00181	.00126	-.03378	1.04835	1.37573	.76203	-.00168	-.00168
21.000	54.000	1.81765	.04858	-.06378	-.00186	.00145	-.03513	1.02908	1.49907	.68648	-.00175	-.00175
GRADIENT		.04283	-.00033	-.00235	-.00004	.00005	-.00079	.02189	.03046	-.03559	-.00003	-.00003

ORIGINAL PAGE IS OF POOR QUALITY



(RECORD) ( 23 JAN 74 )

DATE 19 MAR 74

TABULATED SOURCE DATA, LARC 22ME 7422 (0A66)

ON-68 LARC 22-INCH ME.TU. 7422 RI-10DA/B (M-2.)

PARAMETRIC DATA

BETA = .000 RE.L = 1.971  
 BALANC = 20.000 ELEVTR = -40.000  
 AILPON = .000 RUDDER = .000  
 BOFLAP = .000 SPOBRK = 33.000

REFERENCE DATA

MACH = 0.3170 50-IN. WRP = 3.3736 INCHES  
 LREF = 1.9266 INCHES WRP = .0000 INCHES  
 WREF = 3.7470 INCHES WRP = .0000 INCHES  
 SCALE = .0001 SCALE

GRADIENT INTERVAL = -5.00/ 5.00

ALPHA	CN	CAF	CLM	CBL	CYN	CV	CL	CDP	L/OF	CAS
20.300	.32206	.06158	.00792	-.00093	.00024	-.00855	.29537	.15747	1.81217	-.00098
21.300	.36531	.06195	.00967	-.00096	.00030	-.00890	.34069	.19700	1.79411	-.00106
22.300	.40128	.06213	.01066	-.00106	.00031	-.00964	.41796	.24709	1.69196	-.00113
23.300	.43265	.06484	.01184	-.00119	.00029	-.01106	.49326	.31369	1.57860	-.00122
24.300	.46792	.06559	.01213	-.00116	.00028	-.01212	.55699	.37117	1.50603	-.00130
25.300	.50166	.06597	.01319	-.00144	.00026	-.01359	.60706	.42666	1.42282	-.00136
26.300	.53466	.06629	.01390	-.00133	.00013	-.01555	.65249	.47249	1.37693	-.00141
27.300	.56727	.06601	.01246	-.00170	.00016	-.01765	.75521	.53029	1.19619	-.00143
28.300	.60146	.06557	.01242	-.00164	.00018	-.01977	.81409	.60332	1.09478	-.00141
29.300	.63666	.06570	.01073	-.00187	.00017	-.02227	.86132	.68253	1.00003	-.00136
30.300	.67131	.06366	.00870	-.00187	.00042	-.02387	.90563	.76219	.91264	-.00146
31.300	.70607	.06335	.00970	-.00205	.00047	-.02661	.93079	.84639	.82819	-.00158
32.300	.74001	.06365	.01944	-.00192	.00032	-.02821	.92187	1.12310	.74639	-.00183
33.300	.77499	.05659	.03993	-.00179	.00023	-.02846	.89775	1.33332	.67231	-.00202
34.300	.80976	.05600	.05034	-.00000	.00000	-.00065	.01678	.03407	-.03341	-.00002
35.300	.83749	-.00010								

ORIGINAL PAGE IS OF POOR QUALITY

(R00000) ( 25 JAN 74 )

04-88 LARC 22-INCH HE.TU. 7422 R1-100A/B (NH-20)

REFERENCE DATA

SREF = 6.31% 50.1N. YMRP = 3.736 INCHES  
 LREF = 1.9266 INCHES YMRP = .5476 INCHES  
 BRCP = 3.74% INCHES ZMRP = .5476 INCHES  
 SCALE = .144% SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = 1.172  
 SALANC = 20.000 ELEVTR = 15.000  
 AIRLON = .0000 RUDDER = .0000  
 BOFLAP = .0000 SPOBRK = 55.000

RUN NO. 10/ 5 RNL = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	COL	CYN	CV	CL	COF	L/DF	CAB
19.000	16.000	.30729	.07075	-.14542	.07003	.00051	-.00061	.34647	.18697	1.95312	-.00106
19.000	20.000	.48716	.07399	-.05243	.00127	.00035	-.00029	.41370	.22931	1.81410	-.00107
19.000	23.000	.57392	.07690	-.06316	.00141	.00028	-.01181	.49825	.29514	1.68077	-.00110
19.000	26.000	.69395	.08148	-.07874	.00134	.00025	-.01329	.58844	.37655	1.56274	-.00113
19.000	29.000	.79161	.08331	-.09663	.00197	.00049	-.01870	.65895	.44473	1.46169	-.00117
19.000	30.000	.87429	.08485	-.09525	.00199	.00027	-.01721	.71473	.51163	1.39971	-.00123
19.000	33.000	1.07021	.08767	-.10874	.00242	.00035	-.02149	.79770	.62261	1.28748	-.00136
19.000	36.000	1.14339	.09166	-.12336	.00216	.00016	-.02233	.87173	.74541	1.16946	-.00149
19.000	39.000	1.29059	.09271	-.14012	.00241	.00003	-.02473	.94464	.88424	1.10030	-.00161
19.000	42.000	1.42520	.09495	-.15695	.00333	-.00015	-.02676	.99540	1.02421	.97207	-.00171
19.000	45.000	1.57971	.09519	-.16214	.00401	-.00009	-.02973	1.04689	1.18150	.88617	-.00180
19.000	48.000	1.72116	.09341	-.21474	.00401	.00040	-.03322	1.08072	1.34285	.81479	-.00180
19.000	51.000	1.80233	.09619	-.18416	.00335	.00043	-.03487	1.05961	1.46136	.72518	-.00184
19.000	54.000	1.89734	.09560	-.19223	.00322	.00054	-.03668	1.01437	1.55861	.65074	-.00194
GRADIENT		.04329	.00072	-.00416	.00009	-.00000	-.00001	.00004	.04011	-.03450	-.00003

ORIGINAL PAGE IS  
OF POOR QUALITY



DATE 09 MAR 74  
 TABULATED SOURCE DATA, LARC 22ME 7422 (0A00)  
 0A-03 LARC 22 CM WE.TU. 7422 RI-140A/B (WH-20)  
 PAGE 9  
 (RECORDS) ( 25 JAN 74 )

REFERENCE DATA

SREF = 6.3170 SQ. IN. YMRP = 3.3736 INCHES  
 LREF = 1.9266 INCHES YMRP = .0000 INCHES  
 BREF = 3.7470 INCHES ZMRP = .0000 INCHES  
 SCALE = .0000 SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = 2.012  
 BALANC = PD.0000 ELEVTR = 15.000  
 AIRCON = .0000 RUDDER = .0000  
 BOFLAP = .0000 SPODRK = 55.000

RUN NO. 117 GR RNL = .00 GRADIENT INTERVAL = -9.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	COF	L/DF	CAB
20.300	18.000	.38853	.06708	-.14440	.00128	.00008	-.00912	.34879	.18386	1.89707	-.00091
20.300	20.000	.48721	.06978	-.15224	.00125	-.00011	-.00956	.41517	.22537	1.84216	-.00092
20.300	23.000	.57823	.07362	-.16321	.00172	-.00013	-.01186	.30350	.29370	1.71433	-.00096
20.300	26.000	.69732	.07734	-.17471	.00173	-.00001	-.01471	.59297	.37493	1.56157	-.00100
20.300	28.000	.79776	.07988	-.18426	.00214	.00004	-.01665	.66688	.44506	1.49841	-.00107
20.300	30.000	.88646	.08204	-.19317	.00230	-.00002	-.01854	.72668	.51428	1.41301	-.00114
20.300	33.000	1.01767	.08478	-.19594	.00229	-.00011	-.02084	.80731	.62537	1.29694	-.00122
20.300	36.000	1.18220	.08767	-.12112	.00284	-.00011	-.02362	.88671	.75406	1.17857	-.00129
20.300	39.000	1.35174	.08932	-.13800	.00279	-.00024	-.02581	.95543	.88662	1.07518	-.00134
20.300	42.000	1.43843	.09100	-.15496	.00367	-.00013	-.02849	1.00807	1.03013	.97859	-.00137
20.300	45.000	1.59239	.09178	-.18503	.00496	.00002	-.03175	1.06109	1.19088	.89101	-.00148
20.300	48.000	1.74796	.09251	-.21103	.00369	.00044	-.03503	1.10787	1.36189	.80893	-.00140
20.300	51.000	1.82706	.09257	-.18633	.00325	.00046	-.03590	1.07786	1.47815	.72920	-.00147
20.300	54.000	1.88529	.09235	-.15233	.00281	.00035	-.03727	1.03344	1.57951	.65427	-.00161
	GRADIENT	.04404	.00073	-.10432	.00007	.00001	-.00084	.02133	.04077	-.03547	-.00082

ORIGINAL PAGE IS  
 OF POOR QUALITY

(REC'D) ( 23 JAN 74 )

OK-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (HM-20)

PARAMETRIC DATA

BETA = .000 RE.L = 1.147  
BALANC = 20.000

REFERENCE DATA

SREF = 0.3170 50-IN. XMRP = 3.3736 INCHES  
LREF = 1.9266 INCHES YMRP = .0000 INCHES  
DREF = 3.7470 INCHES ZMRP = .0000 INCHES  
SCALE = .0000 SCALE

RUN NO. 14/ 0 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDF	L/DF	CAB
19.000	18.000	.12846	.03437	.05406	.00051	-.00050	-.00028	.10965	.07177	1.52782	-.00103
19.000	20.000	.15368	.03508	.06505	.00032	-.00041	-.00022	.13429	.06621	1.55767	-.00109
19.000	23.000	.19453	.03623	.08033	.00044	-.00074	-.00026	.16491	.10935	1.56802	-.00118
19.000	26.000	.23838	.03805	.09567	.00034	-.00057	-.00038	.19757	.13870	1.42441	-.00136
19.000	28.000	.27287	.03948	.11003	.00037	-.00064	-.00052	.22263	.16252	1.36989	-.00165
19.000	30.000	.30111	.04000	.12373	.00034	-.00067	-.00062	.24077	.18520	1.30009	-.00205
19.000	33.000	.34990	.04214	.14340	.00039	-.00094	-.00070	.27030	.22591	1.19738	-.00280
19.000	36.000	.40215	.04286	.16205	.00028	-.00140	-.00096	.30016	.27006	1.10736	-.00309
19.000	39.000	.45345	.04435	.18176	.00002	-.00107	-.00088	.32449	.31984	1.01455	-.00257
19.000	42.000	.50323	.04570	.19785	.00003	-.00126	-.00073	.34359	.37069	.92635	-.00289
19.000	45.000	.55357	.04657	.21845	-.00029	-.00159	-.00058	.35850	.42436	.84480	-.00299
19.000	48.000	.60455	.04726	.23457	.00000	-.00188	-.00098	.36672	.47792	.76733	-.00343
19.000	51.000	.64789	.04721	.24618	-.00021	-.00162	-.00108	.37104	.53321	.69586	-.00417
19.000	54.000	.70068	.04660	.25538	-.00014	-.00194	-.00101	.37426	.59441	.62964	-.00530
	GRADIENT	.01612	.00039	.00590	-.00002	-.00004	-.00002	-.00772	.01470	-.02769	-.00000

ORIGINAL PAGE IS  
OF POOR QUALITY



PARAMETRIC DATA

REF = 0.3175 SQ. IN. YMRP = 5.3736 INCHES BETA = .000 RE.L = 2.026  
 LREF = 1.9266 INCHES YMRP = .0000 INCHES BALANC = 20.000  
 BREF = 3.7470 INCHES ZMRP = .0000 INCHES  
 SCALE = 10.40 SCALE

RUN NO. 13/ 5 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDP	L/DF	CAB
20.300	.12732	.03230	.05594	.00010	-.00059	-.00337	.11109	.07014	1.96301	-.00087	
20.300	.13062	.03206	.06739	-.00001	-.00046	-.00350	.13781	.08513	1.61079	-.00095	
20.300	.19846	.03453	.06472	.00011	-.00054	-.00303	.16920	.10933	1.94762	-.00116	
20.300	.24233	.03627	.10147	-.00015	-.00061	-.00362	.20191	.13663	1.45439	-.00154	
20.300	.28106	.03746	.11570	-.00013	-.00068	-.00361	.23057	.16502	1.39721	-.00191	
20.300	.31269	.03830	.13029	-.00018	-.00098	-.00379	.25182	.18961	1.32808	-.00210	
20.300	.36268	.03997	.14939	-.00028	-.00115	-.00379	.26240	.23105	1.22225	-.00226	
20.300	.41570	.04200	.17085	-.00017	-.00129	-.00371	.31163	.27632	1.11967	-.00235	
20.300	.47029	.04322	.18988	-.00025	-.00144	-.00391	.33628	.32955	1.02649	-.00226	
20.300	.51859	.04418	.21692	-.00032	-.00138	-.00396	.35962	.37984	.93677	-.00247	
20.300	.57090	.04539	.22445	-.00030	-.00169	-.00391	.37159	.43578	.85271	-.00294	
20.300	.62157	.04631	.23817	-.00032	-.00173	-.00398	.38105	.49196	.77454	-.00381	
20.300	.66643	.04630	.25054	-.00032	-.00183	-.00394	.38342	.54705	.70006	-.00455	
20.300	.71592	.04642	.26417	-.00031	-.00195	-.00394	.38325	.60648	.63193	-.00536	
20.300	.01662	.00043	.00600	-.00000	-.00004	-.00019	.00801	.01517	-.02918	-.00011	

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(RQC012) ( 25 JAN 74 )

0A-88 LARC 22-INCH HE.TU. 7422 BODY ALONE (MH-20)

PARAMETRIC DATA

BETA = .000 REIL = 3.994  
BALANC = 20.500

REFERENCE DATA

SREF = 0.3170 50. IN. YMRP = 3.3736 INCHES  
LREF = 1.9266 INCHES YMRP = .0000 INCHES  
BREF = 3.7470 INCHES ZMRP = .0000 INCHES  
SCALE = .0001 SCALE

RUN NO. 12/ 0 RM/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDF	L/DF	CAB
21.000	10.000	.12927	.03275	.06149	.00012	-.00098	-.00328	.11282	.07109	1.58700	-.00003
21.000	20.000	.16067	.03360	.07333	.00003	-.00099	-.00507	.13949	.06652	1.61219	-.00003
21.000	23.000	.20805	.03468	.09377	.00024	-.00118	-.00586	.17796	.11322	1.57183	-.00122
21.000	26.000	.25505	.03604	.11577	-.00014	-.00128	-.00538	.21344	.14420	1.48014	-.00148
21.000	28.000	.29930	.03888	.13256	-.00014	-.00128	-.00579	.24342	.17120	1.42185	-.00161
21.000	30.000	.32809	.03720	.14588	-.00020	-.00110	-.00670	.26954	.19626	1.35298	-.00170
21.000	33.000	.38171	.03845	.16682	-.00020	-.00115	-.00714	.29918	.24014	1.24588	-.00187
21.000	36.000	.43778	.04057	.18594	-.00023	-.00112	-.00804	.33032	.29015	1.13847	-.00199
21.000	39.000	.49041	.04194	.20365	-.00021	-.00114	-.00866	.35473	.34122	1.03959	-.00199
21.000	42.000	.54134	.04325	.21872	-.00011	-.00120	-.00869	.37336	.39437	.94672	-.00223
21.000	45.000	.59549	.04429	.23513	-.00029	-.00119	-.00882	.38976	.45239	.86154	-.00269
21.000	48.000	.64738	.04490	.24749	-.00040	-.00114	-.00966	.39982	.51114	.78221	-.00323
21.000	51.000	.69804	.04513	.25813	-.00052	-.00127	-.01010	.40296	.56933	.70779	-.00384
21.000	54.000	.74774	.04504	.26732	-.00056	-.00129	-.00985	.40307	.63141	.63836	-.00439
21.000		.01740	.00038	.00593	-.00002	-.00000	-.00017	.00848	.01581	-.02933	-.00009

GRADIENT

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DATE '79 MAR 74

TABULATED SOURCE DATA, LARC 28ME 7422 (0A08)

PAGE 13

QA-88 LARC 22-INCH ME.TU. 7422 R1-140A/B (MH-19)

(R0C013) ( 29 JAN 74 )

REFERENCE DATA

SREF = 0.3170 SQ.IN. YMRP = 3.3736 INCHES  
 LREF = 1.9286 INCHES YMRP = .0000 INCHES  
 BREF = 3.7475 INCHES ZMRP = .0000 INCHES  
 SCALE = .0040 SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = .791  
 BALANC = 19.0000 ELEVTR = -5.0000  
 AILRON = .0000 RUDDER = .0000  
 BOFLAP = .0000 SPDBRK = 55.0000

RUN NO. 16/ 0 RM/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDF	L/DF	CAB
18.100	18.000	.35025	.06960	-.01103	-.00050	.00000	-.00220	.31157	.17450	1.78548	-.00112
18.100	20.000	.40537	.06990	-.01031	-.00053	-.00001	-.00236	.35702	.20433	1.74727	-.00109
18.100	23.000	.51026	.07060	-.01230	-.00076	-.00005	-.00245	.44211	.26436	1.67236	-.00111
18.100	26.000	.63665	.07102	-.01520	-.00077	-.00012	-.00298	.54108	.34292	1.57785	-.00119
18.100	28.000	.70372	.07150	-.01741	-.00077	-.00017	-.00318	.58778	.39350	1.49371	-.00124
18.100	30.000	.79012	.07160	-.02124	-.00073	-.00011	-.00280	.64847	.45707	1.41875	-.00134
18.100	33.000	.91038	.07055	-.02716	-.00068	-.00028	-.00200	.72525	.55511	1.34650	-.00147
18.100	36.000	1.05032	.06925	-.03848	-.00070	-.00046	-.00261	.80951	.67374	1.28152	-.00165
18.100	39.000	1.16547	.06719	-.04722	-.00048	-.00058	-.00261	.86346	.78567	1.09900	-.00182
18.100	42.000	1.30534	.06637	-.06084	-.00053	-.00054	-.00297	.92565	.92276	1.00313	-.00198
18.100	45.000	1.43730	.06415	-.07211	-.00036	-.00047	-.00292	.97110	1.06183	.91456	-.00213
18.100	48.000	1.55860	.06293	-.07985	-.00001	-.00044	-.00343	.99614	1.20037	.82986	-.00226
18.100	51.000	1.64449	.06292	-.06849	.00072	-.00041	-.00275	.98601	1.31761	.74833	-.00247
	GRADIENT	.04074	-.00026	-.00230	.00003	-.00002	-.00002	.02220	.03560	-.03298	-.00004

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ON-88 LARC 22-INCH ME.TU. 7422 RI-140A/B (MH-19)

(RQC014) ( 25 JAN 74 )

REFERENCE DATA

MREF = 6.3170 SQ. IN. XMRP = 3.3736 INCHES
LREF = 1.9266 INCHES YMRP = .0000 INCHES
DREF = 3.7475 INCHES ZMRP = .0000 INCHES
SCALE = .0000 SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = 1.162
BALLANC = 19.0000 ELEVR = -5.0000
ALLRON = .0000 RUDDER = .0000
BDFLAP = .0000 SPOBRK = 55.0000

RUN NO. 17/ 0 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

Table with columns: MACH, ALPHA, CN, CAF, CLM, CBL, CYN, CY, CL, CDF, L/DF, CAB. Rows 19.0000 to 19.0000.

REFERENCE DATA

MREF = 6.3170 SQ. IN. XMRP = 3.3736 INCHES
LREF = 1.9266 INCHES YMRP = .0000 INCHES
DREF = 3.7475 INCHES ZMRP = .0000 INCHES
SCALE = .0000 SCALE

PARAMETRIC DATA

BETA = .0000 RE.L = 1.961
BALLANC = 19.0000 ELEVR = -5.0000
ALLRON = .0000 RUDDER = .0000
BDFLAP = .0000 SPOBRK = 55.0000

ON-88 LARC 22-INCH ME.TU. 7422 RI-140A/B (MH-19)

(RQC015) ( 25 JAN 74 )

RUN NO. 18/ 0 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

Table with columns: MACH, ALPHA, CN, CAF, CLM, CBL, CYN, CY, CL, CDF, L/DF, CAB. Rows 20.0000 to 20.0000.

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PARAMETRIC DATA

BETA = .0000 RE.L = 3.548  
 BALANC = 19.0000 ELEVTB = -5.000  
 ALLCON = .0000 RUDDER = .000  
 BOFLAP = .0000 SPOBRK = 55.000

REFERENCE DATA

SREF = 6.3170 SQ.IN. XMRP = 3.3736 INCHES  
 LREF = 1.9266 INCHES YMRP = .0000 INCHES  
 BREF = 3.7470 INCHES ZMRP = .0000 INCHES  
 SCALE = .0040 SCALE

RUN NO. 19/ 5 RN/L = .00 GRADIENT INTERVAL = -5.00/ 5.00

MACH	ALPHA	CN	CAF	CLM	CBL	CYN	CY	CL	CDF	L/DF	CAB
21.000	18.000	.35349	.05975	-.00029	-.00063	-.00055	-.00281	-.31773	.16606	1.91330	-.00071
21.000	20.000	-.41172	.05987	.00101	-.00062	-.00061	-.00286	.36641	.19708	1.85924	-.00072
21.000	23.000	.52312	.06080	.00306	-.00085	-.00082	-.00316	-.45778	.28036	1.75824	-.00079
21.000	26.000	.65610	.06166	.00248	-.00100	-.00044	-.00309	.56311	.34213	1.64588	-.00091
21.000	28.000	.72765	.06149	-.00007	-.00099	-.00033	-.00294	-.61408	.39503	1.55453	-.00097
21.000	30.000	.82932	.06100	-.00028	-.00103	-.00045	-.00285	-.68225	.46434	1.46929	-.00106
	GRADIENT	.05939	.06079	-.00025	-.00004	.00002	-.00001	.03074	.02482	-.03721	-.00003

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