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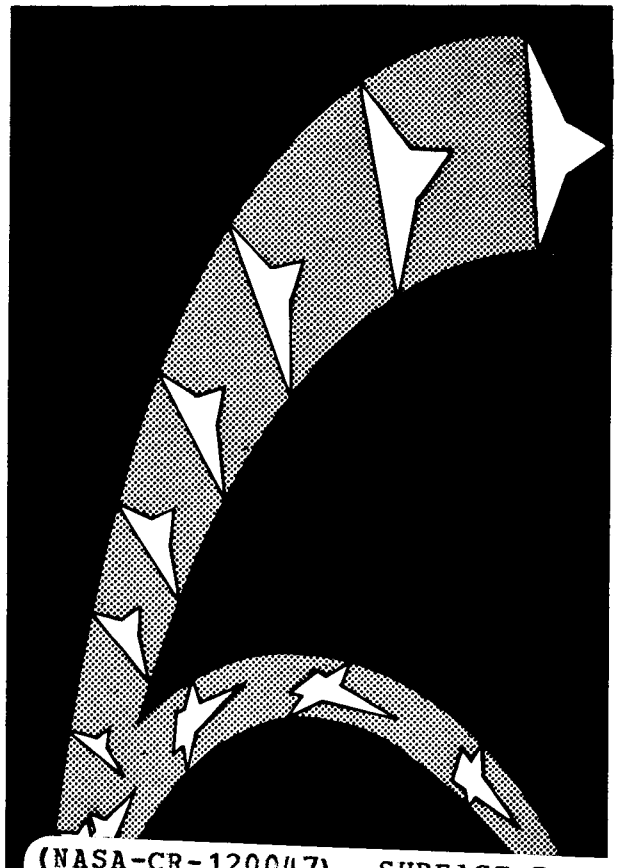

—SPACE SHUTTLE—

SURFACE PRESSURE AND INVISCID FLOW FIELD PROPERTIES MCDONNELL-DOUGLAS BOOSTER NOMINAL MACH NUMBER OF 8

by

R.K. Matthews, ARO, INC.
W.R. Martindale, ARO, INC.
J.D. Warmbrod, MSFC

VKF 50-INCH
HYPERSONIC TUNNEL B

Arnold Engineering
Development Center

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER

SPACE DIVISION CHRYSLER CORPORATION

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VOLUME III
March, 1972

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION: McDonnell-Douglas Booster

TEST PURPOSE: To Determine Surface Pressures and Inviscid Flow Field Properties at Mach Number 8

TEST FACILITY: AEDC VKF 50-Inch Hypersonic Tunnel B

TESTING AGENCY: AEDC-MSFC

TEST NO. & DATE: VT-1162-8; September, 1971

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

PROJECT ENGINEER(S): Mr. R. K. Matthews, ARO, INC.
Mr. W. R. Martindale, ARO, INC.
Mr. J. D. Warmbrod, NASA-MSFC

DATA MANAGEMENT SERVICES

LIAISON: J. E. Vaughn DATA OPERATIONS: J. R. Ziler

RELEASE APPROVAL: N. D. Kemp, Supervisor
Aero Thermo Data Group

CONTRACT NAS 8-4016 AMENDMENT 153 DRL 184 - 58

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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 & 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 surface pressure and flow field tests conducted at Mach 8 in Tunnel B on the McDonnell Douglas Booster.

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 angle, deg
CP	Pressure coefficient, (PM-(P-INF))/Q-INF
CP-MAX	Pressure coefficient based on POl, (POl - (P-INF))/Q-INF
L	Model length (23.78 in.)
MACH NO.	Free-stream Mach number
ML	Local Mach number
MU-INF	Free-stream viscosity, lb-sec/ft^2
MUL	Local viscosity, lb-sec/ft^2
P-INF	Free-stream pressure, psia
PM	Model surface pressure, psia
PML	Local model surface pressure, psia
PO	Tunnel stilling chamber pressure, psia
POl	Stagnation pressure downstream of a normal shock, psia
PR	Rake probe stagnation pressure, psia
Q-INF	Free-stream dynamic pressure, psia
RE/FT	Free-stream unit Reynolds number, ft^{-1}
REL	Local unit Reynolds number, ft^{-1}
RHO-INF	Free-stream density, LBM/ft^3
RHOL	Local density, LBM/ft^3
RHOUL	Local density-velocity product, LBM/ft^2-sec
ROLL-MODEL (ϕ)	Model roll angle, deg
T-INF	Free-stream temperature, °R
TL	Local temperature, °R
TO	Tunnel stilling chamber temperature, °R

TTR	Total temperature measured by rake probes, °R
U-INF	Free-stream velocity, ft/sec
UL	Local velocity, ft/sec
X	Axial coordinate (see Fig. 1), in.
Y	Distance from model surface or probe height (see Figs. 1 and 3), in.
YAW	Model yaw angle, deg.

SECTION 1

INTRODUCTION

This report presents the results of a wind tunnel test program to determine surface pressures and flow field properties on the McDonnell Douglas Booster configuration. The tests were conducted at the Arnold Engineering Development Center (AEDC) in Tunnel B of the von Karman Gas Dynamics Facility (VKF). The tests were conducted in September 1971.

Data were obtained at a nominal Mach number of 8 at angles of attack of 40- and 50-deg and at a free-stream unit Reynolds number of 3.7×10^6 per foot.

SECTION 2

MODELS AND APPARATUS

2.1 MODEL DESCRIPTION

Model drawings were provided ARO, Inc. by the McDonnell Douglas Corporation and fabrication of the Stycast model was subcontracted to the Grumman Aircraft Corporation. The model had 10 windward centerline orifices. A sketch showing the overall model dimensions is presented in Fig. 1 and a photograph of the configuration is shown in Fig. 2. Table 1 provides additional configuration description details but it should be pointed out that the model was cast as one smooth surface without moveable control surfaces.

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 to 900 psia, respectively, and at stagnation temperatures up to 1350°R. The model can be injected into the tunnel for a test run and then retracted for model cooling or model changes without interrupting the tunnel flow.

2.3 INSTRUMENTATION

The model flow field was surveyed with pitot-pressure and single shield total temperature probe rakes. The rakes were mounted so that pressure and temperature measurements could be made simultaneously. The rakes, support mechanism, and spacing of the probes are shown in Fig. 3.

Static and pitot-probe pressures were measured with 15 psid transducers referenced to a near vacuum for pressures less than 15 psia and to atmospheric pressure for pressures greater than 15 psia. The atmospheric reference pressure was also measured with a 15 psid transducer.

SECTION 3
PROCEDURE

3.1 TEST CONDITIONS

Nominal test conditions are presented in the data summary sheets (Table 2) and the specific test conditions for each run (or group) are provided at the top of the data tabulation sheet for that run.

3.2 DATA REDUCTION

By assuming the flow-field static pressure equal to the wall static pressure, the local Mach number (ML) was calculated from the Rayleigh pitot formula,

$$\frac{PR}{PML} = \left(\frac{6ML}{5}\right)^{7/2}\left(\frac{6}{7ML^2-1}\right)^{5/2} \quad \text{, for } ML \geq 1$$

or from the compressible Bernoulli equation,

$$\frac{PR}{PML} = (1 + 0.2\ ML^2)^{7/2}, \text{ for } ML < 1.$$

The assumption of constant static pressure becomes less valid as the distance from the model surface increases.

The equations for the other flow field parameters are:

Parameter	Equation	Units
TL	$TL = \frac{TO}{(1 + 0.2\ ML^2)}$	°R
UL	$UL = (49.02)(ML)\sqrt{TL}$	ft/sec
RHOL	$RHOL = \frac{(2.70)(PML)}{TL}$	LBM/ft^3
MUL	$MUL = \frac{2.27\ (TL)^{3/2}}{TL + 198.6} \times 10^{-8}$	$lb\text{-}sec/ft^2$
REL	$REL = \frac{(RHOL)(UL)}{(32.17)(MUL)}$	ft^{-1}

The quantities calculated using TL are not valid in the model boundary layer since TTR is less than TO and, of course, none of the calculated parameters are meaningful outside the model shock layer.

3.3 DATA PRECISION

Estimated uncertainties of the primary measurements are given below:

Parameter	Uncertainty
PML	±0.015 psia
PO	±1.8 psia
PO1	±0.021 psia
PR	±0.015 psia (for PR ≤ 15 psia)
	±0.021 psia (for PR > 15 psia)
TO	±10°R
TTR	±25°R

SECTION 4

DATA PRESENTATION

The test data are presented in tabulated and plotted form in Appendix A with the corresponding shadowgraph picture following the plotted data. The data are presented in the following order.

Appendix	Type Data	α	X/L
A	Surface	40	0.1 → 0.97
↓	Pressure	50	↓
	Flow	40	0.3,0.5,0.7,0.9
↓	Field	50	↓

Table 3, Page 15, presents a summary of these data.

Pitot pressure and total temperature measurements were attempted at 60 degrees angle of attack; however, the rakes and support distorted the flow field as observed in shadowgraph photographs and therefore these measurements are not presented.

The total temperature probes were quite delicate and subject to failure. In cases where the probes failed and could not be replaced immediately the measurement does not appear in the data tabulation or on the plot.

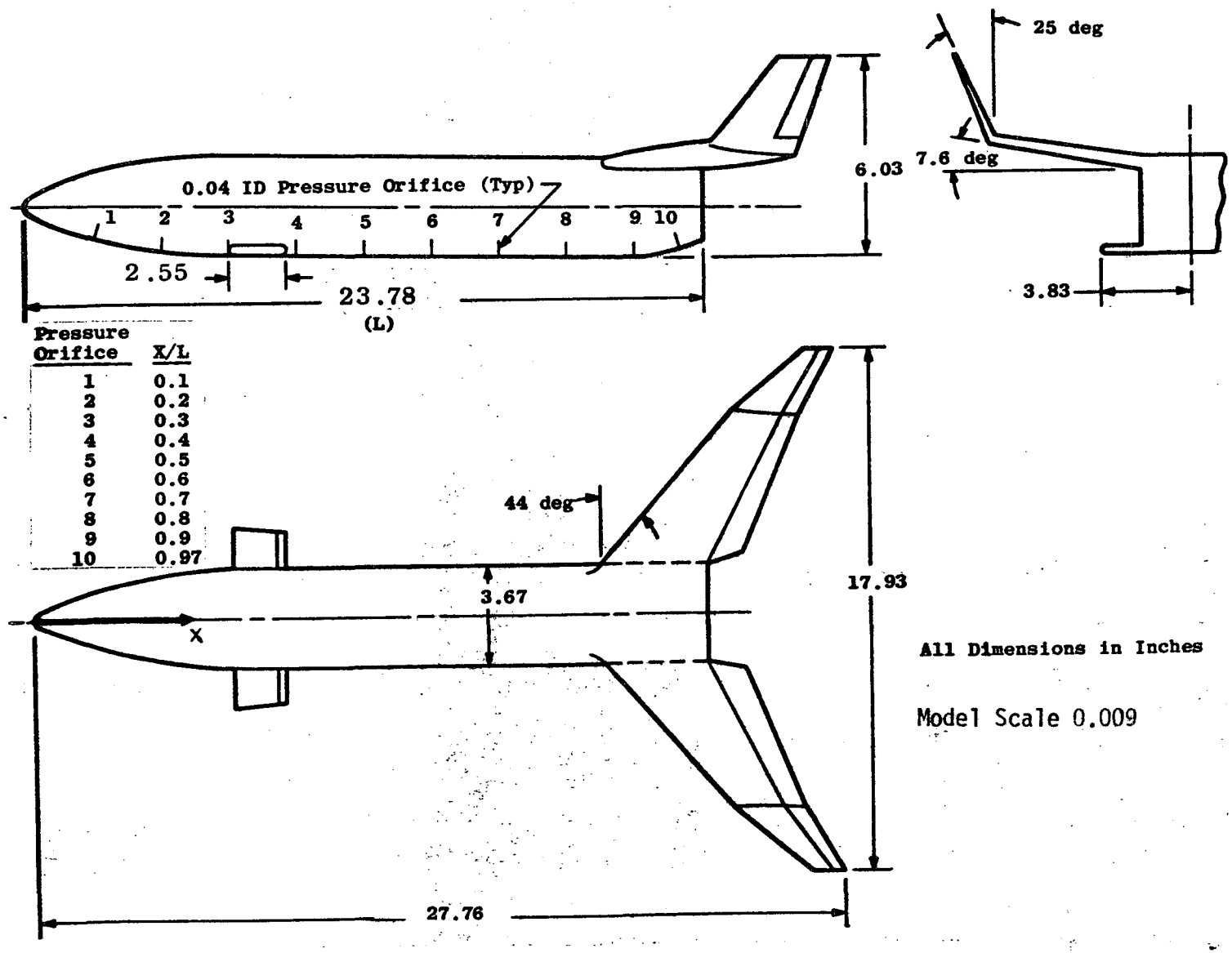


Figure 1. McDonnell-Douglas Booster Model Sketch (0.009 Scale)

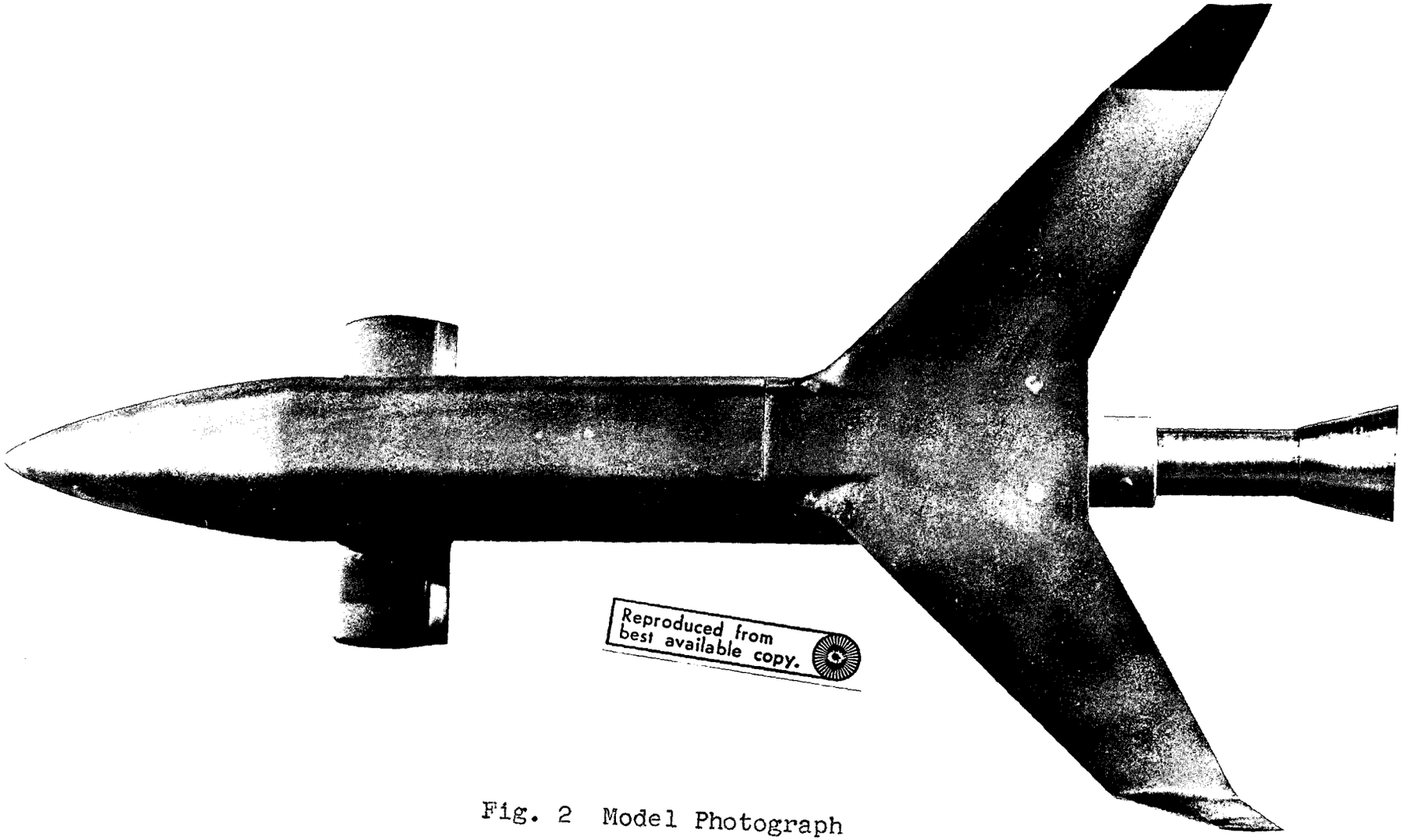


Fig. 2 Model Photograph

Probe Height, Y, in.		
No.	Pressure Probes	Temperature Probes
1	0.014	0.051
2	0.066	0.131
3	0.112	0.202
4	0.163	0.303
5	0.216	0.402
6	0.258	0.599
7	0.313	
8	0.365	
9	0.415	
10	0.499	
11	0.606	
12	0.702	
13	0.802	
14	0.892	
15	0.981	

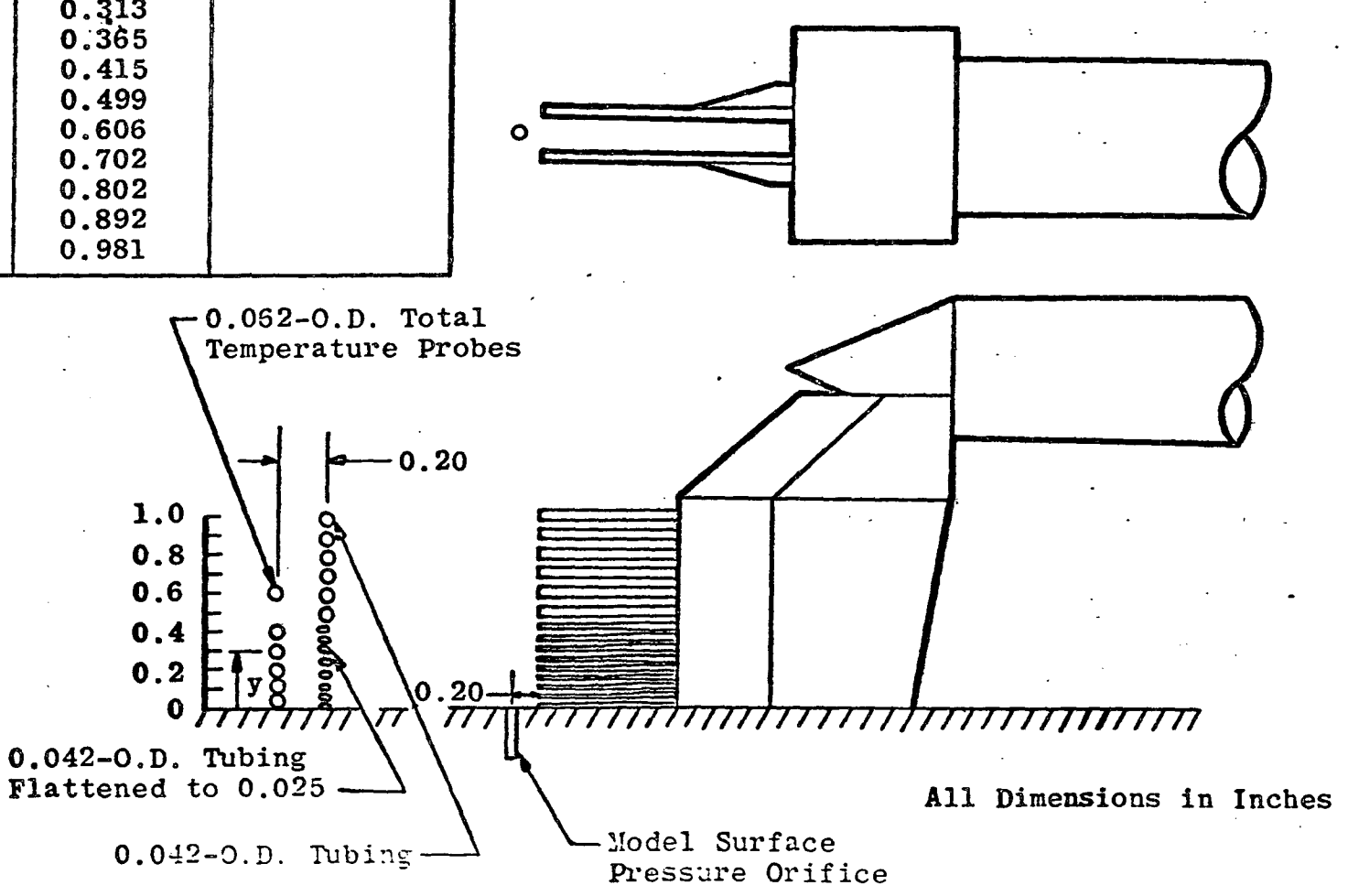


Fig. 3 Probe-Rakes and Support

Table 1

Configuration Description Details

MODEL COMPONENT: BODY - MDAC Booster

GENERAL DESCRIPTION: Configuration 256-17A booster; model scale 0.009

DRAWING NUMBER: 256-17-0001, Rev. A

DIMENSIONS:	FULL-SCALE	MODEL SCALE
Length (ft)	220.17	1.98
Max. Width (ft)	34.0	0.306
Max. Depth (ft)	34.0	0.306
Fineness Ratio		
Area		
Max. Cross-Sectional		
Planform		
Wetted		
Base		

TABLE 1 - CONTINUED

MODEL COMPONENT: Wing - MDAC Booster

GENERAL DESCRIPTION: Configuration 17A Wing
Model Scale 0.009

DRAWING NUMBER:

DIMENSIONS:	FULL-SCALE	MODEL SCALE
TOTAL DATA		
Area, ft^2		
Planform	6020.0	.488
Wetted		
Span (equivalent), ft.	146.0	1.314
Aspect Ratio	3.54	3.54
Rate of Taper		
Taper Ratio	.435	.435
Diehedral Angle, degrees	7.67	7.67
Incidence Angle, degrees	3.0	3.0
Aerodynamic Twist, degrees	0	0
Toe-In Angle		
Cant Angle		
Sweep Back Angles, degrees		
Leading Edge	44.0	44.0
Trailing Edge		
0.25 Element Line		
Chords:		
Root (Wing Sta. 0.0), inches	690.0	6.21
Tip, (equivalent)	300.0	2.70
MAC, inches	520.0	4.68
Fus. Sta. of .25 MAC, inches		
W.P. of .25 MAC, inches		
Airfoil Section		
Root	0010-64	0010-64
Tip	0010-64	0010-64
EXPOSED DATA		
Area, ft^2	4190.0	.339
Span, (equivalent), ft.		
Aspect Ratio		
Taper Ratio		
Chords		
Root, inches	594.0	5.35
Tip, inches	300.0	2.70
MAC		
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		

TABLE 1 - CONTINUED

MODEL COMPONENT: Vertical Tails - MDAC Booster

GENERAL DESCRIPTION: Configuration 17 Vertical Tails

Model Scale 0.009

DRAWING NUMBER: 256-17-0001, Rev. A

DIMENSIONS:	FULL-SCALE	MODEL SCALE
TOTAL DATA (Values for one)		
Area		
Planform (True)	438	.035
(Side Projection)	397	.032
Span (equivalent), inches	276	2.48
Aspect Ratio	1.21	1.21
Rate of Taper		
Taper Ratio	.520	.520
Dihedral Angle, degrees		
Incidence Angle, degrees		
Aerodynamic Twist, degrees		
Toe-In Angle	0	0
Cant Angle	25	25
Sweep Back Angles, degrees		
Leading Edge	40	40
Trailing Edge		
0.25 Element Line		
Chords:		
Root (Wing Sta. 0.0)	300	2.70
Tip, (equivalent), inches	156	1.40
MAC, inches	236	2.12
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		
Airfoil Section		
Root	NACA 64A-009	NACA 64A-009
Tip	NACA 64A-009	NACA 64A-009
EXPOSED DATA		
Area		
Span, (equivalent)		
Aspect Ratio		
Taper Ratio		
Chords		
Root		
Tip		
MAC		
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		

TABLE 1 - CONTINUED

MODEL COMPONENT: Elevon - MDAC Booster

GENERAL DESCRIPTION: Configuration 17A Elevons
Model Scale 0.009

DRAWING NUMBER: 256-17-0001, Rev. A

DIMENSIONS:	FULL-SCALE	MODEL SCALE
Area	617 ft^2	.0499 ft^2
Span (equivalent)	650 in.	5.85 in.
Inb'd equivalent chord	180 in.	1.62 in.
Outb'd equivalent chord	93 in.	.837 in.
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	.3	.3
At Outb'd equiv. chord	.3	.3
Sweep Back Angles, degrees		
Leading Edge	33	33
Tailing Edge	27	27
Hingeline	33	33
Area Moment (Normal to hinge line), ft^3	2998	

TABLE 1 - CONCLUDED

MODEL COMPONENT: Canard - MDAC Booster

GENERAL DESCRIPTION: Configuration 17A Canard

Model Scale 0.009

DRAWING NUMBER: 256-17-001, Rev. A

DIMENSIONS:	FULL-SCALE	MODEL SCALE
Theo. Area, ft^2	1660	.134
Exp Area, ft^2	1215	.098
Aspect Ratio	3.0	3.0
Chord (Incl. Flap), ft	23.625	.213
Airfoil (360 In. Theo Chord)	NACA 63-018	NACA 63-018

Table 2

Test Data Summary Sheet

TEST TITLE: MDAC-Booster Flow Field Tests

TEST NUMBER: VT1162 **TEST FACILITY:** AEDC Tunnel B

TEST DATE: September 1971 **TEST ENGINEER:** R. K. Matthews & W. R. Martindale

Run No.	Model Configuration Identification	Model Scale	Free Stream Mach Number	Total Pressure (psia)	Total Temp. (°R)	Re/ft x 10^{-6}	Flow Field Survey Station X/L	Type Data*	Model Position (degrees)			Remarks
									α	β	Φ	
335	MDAC-B	0.009	8	860	1345	3.7	N/A	SP	40	0	180	
336							N/A	"	50			
339							.3	FF	40			
337							.5					
333							.7					
331							.9					
340							.3		50			
338							.5					
334							.7					
332							.9					

*SP - Surface Pressure
FF - Flow Field

TABLE 3

SUMMARY DATA PLOT INDEX

TYPE OF DATA	PAGES	ANGLE OF ATTACK - DEGREES		FLOW FIELD SURVEY STATION (X/L)			
		40	50	0.3	0.5	0.7	0.9
SURFACE PRESSURE	18	X		N/A			
	21		X				
FLOW FIELD	24	X		X			
	27	X			X		
	30	X				X	
	33	X					X
	36		X	X			
	39		X		X		
	42		X			X	
	45		X				X

SURFACE PRESSURE

PM/P01 vs. X/L

FLOW FIELD

PR/P01 vs. Y
TTR/TO vs. Y
ML vs. Y

UL/U-INF vs. Y
RHOUL/RHOU-INF vs. Y

APPENDIX A

SURFACE PRESSURE AND FLOW FIELD DATA

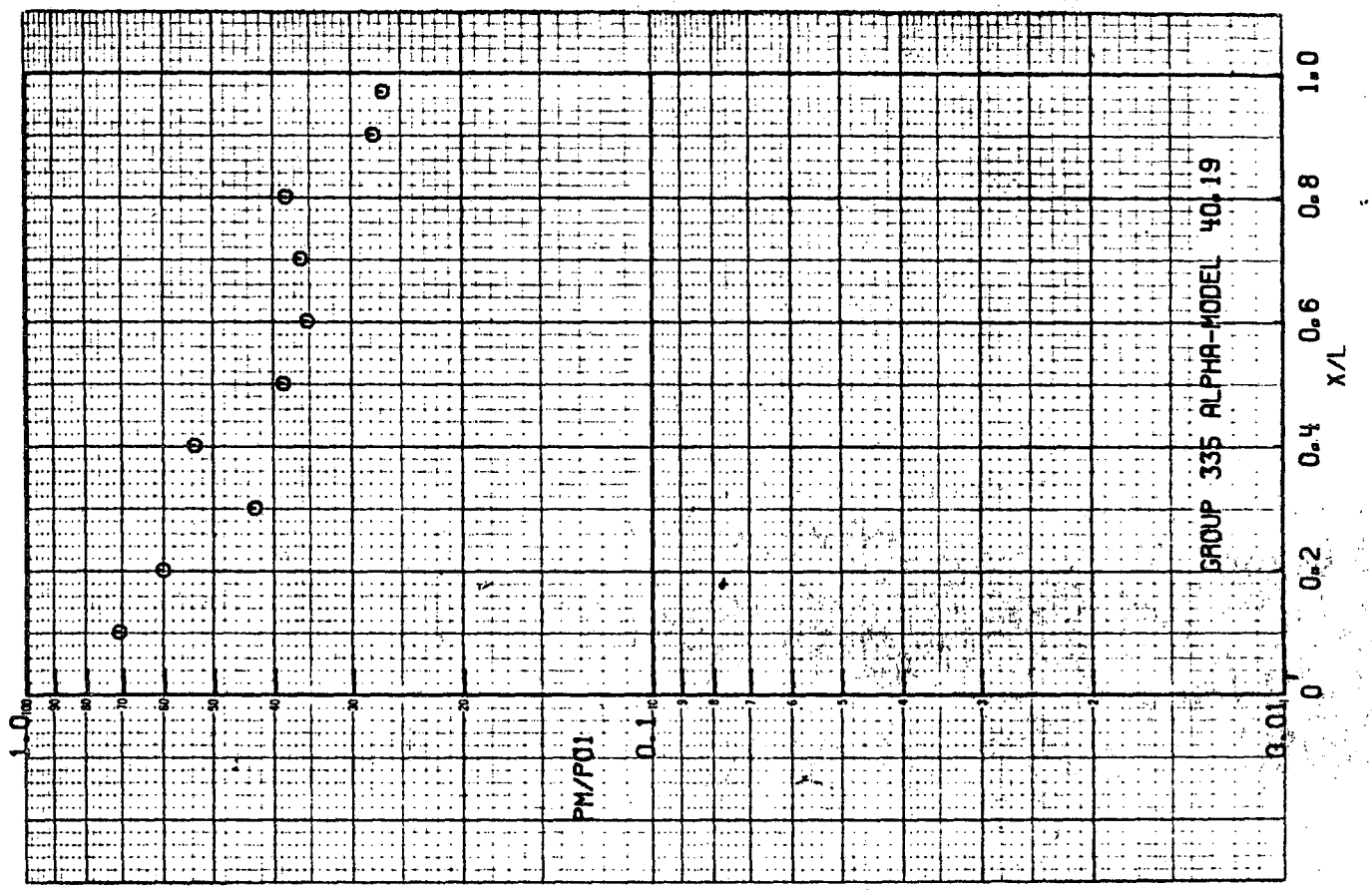
AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
335	42	MDAC-B	8.00	860.8	1344	40.19	9.81	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	PO1 (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	L (IN)
97	8.82E-02	7.307	3.950	3870	2.444E-03	7.841E-08	3.750E 06	23.78

CH	POS	TAP	PM (PSIA)	PM/PO	PM/PO1	PM/P-INF	CP	CP/CP-MAX	X/L
1	2	1	5.191E 00	6.030E-03	7.105E-01	5.887E 01	1.292E 00	7.069E-01	.100
2	2	2	4.417E 00	5.131E-03	6.045E-01	5.010E 01	1.096E 00	5.997E-01	.200
3	2	3	3.149E 00	3.657E-03	4.309E-01	3.571E 01	7.747E-01	4.240E-01	.300
4	2	4	3.930E 00	4.566E-03	5.379E-01	4.457E 01	9.727E-01	5.323E-01	.400
5	2	5	2.829E 00	3.286E-03	3.871E-01	3.208E 01	6.937E-01	3.796E-01	.500
6	2	6	2.589E 00	3.007E-03	3.543E-01	2.936E 01	6.330E-01	3.464E-01	.600
7	2	7	2.651E 00	3.079E-03	3.628E-01	3.006E 01	6.487E-01	3.550E-01	.700
8	2	8	2.800E 00	3.253E-03	3.833E-01	3.176E 01	6.866E-01	3.757E-01	.800
9	2	9	2.033E 00	2.361E-03	2.782E-01	2.305E 01	4.923E-01	2.694E-01	.900
10	2	10	1.961E 00	2.278E-03	2.684E-01	2.224E 01	4.742E-01	2.595E-01	.970

GROUP
335


GROUP 335 ALPHA-MODEL 40.19
PM/P01
X/L
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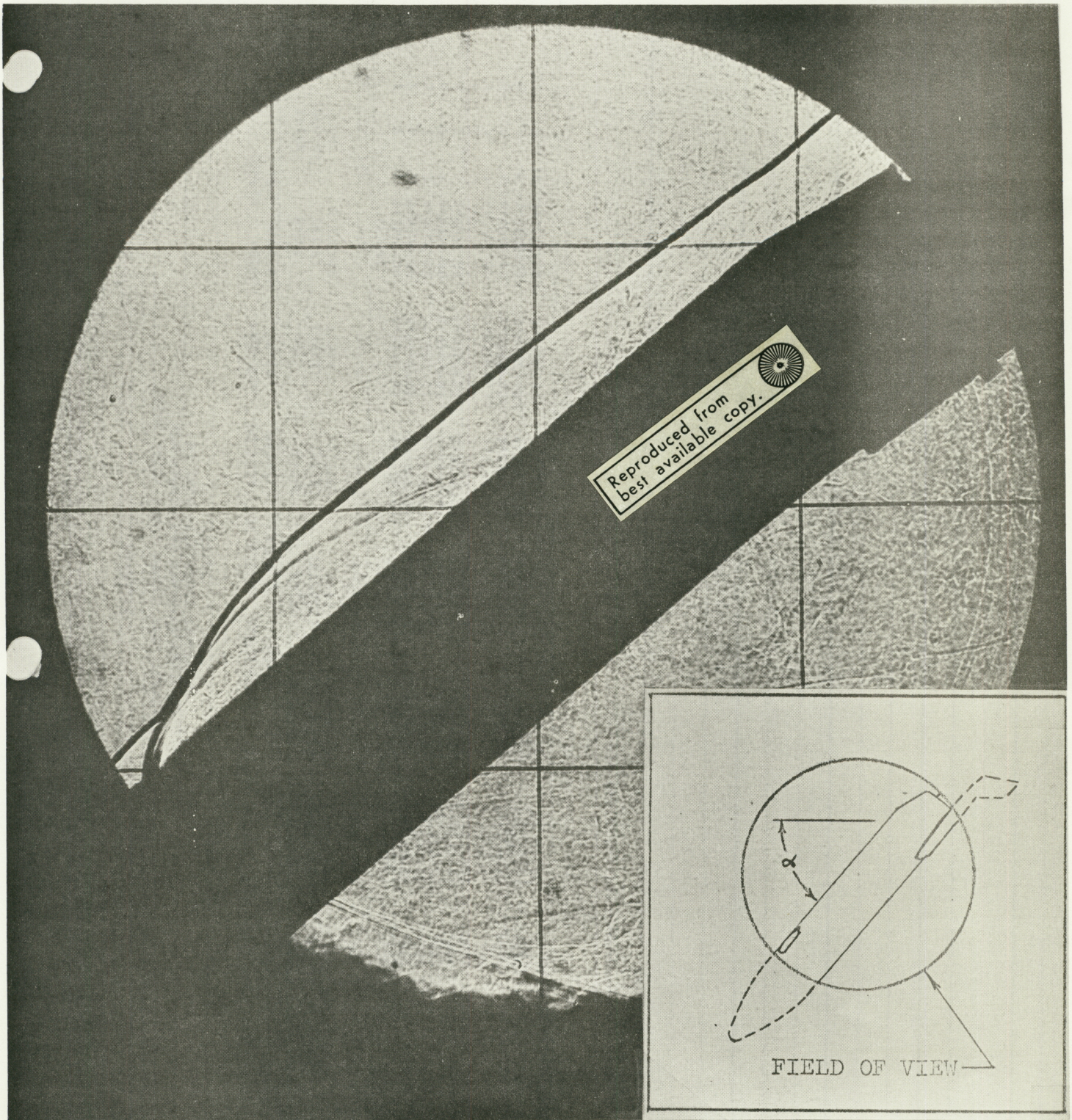
0.1
0.01
0
0.2
0.4
0.6
0.8
1.0



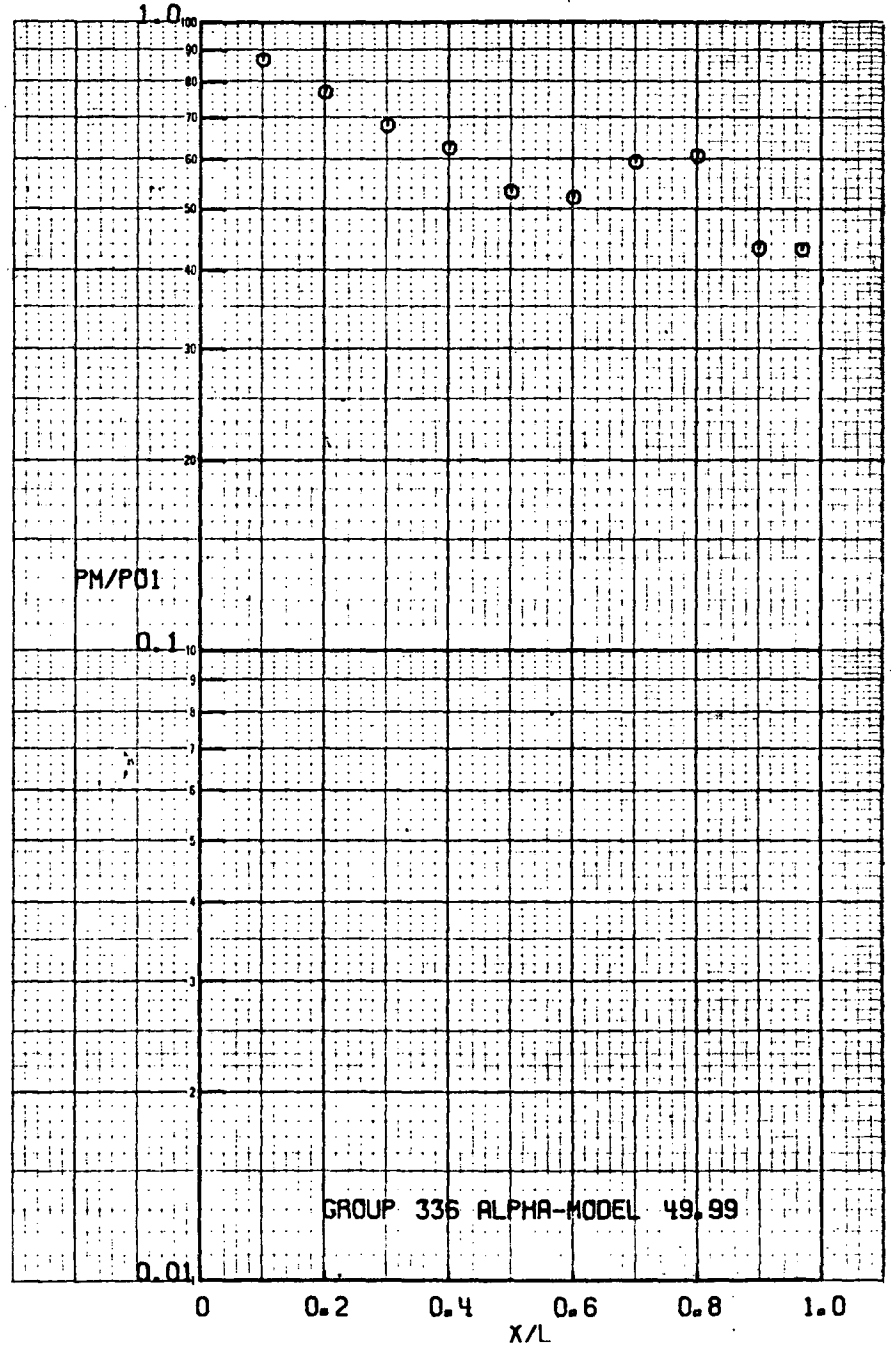
Group 335, $\alpha = 40$

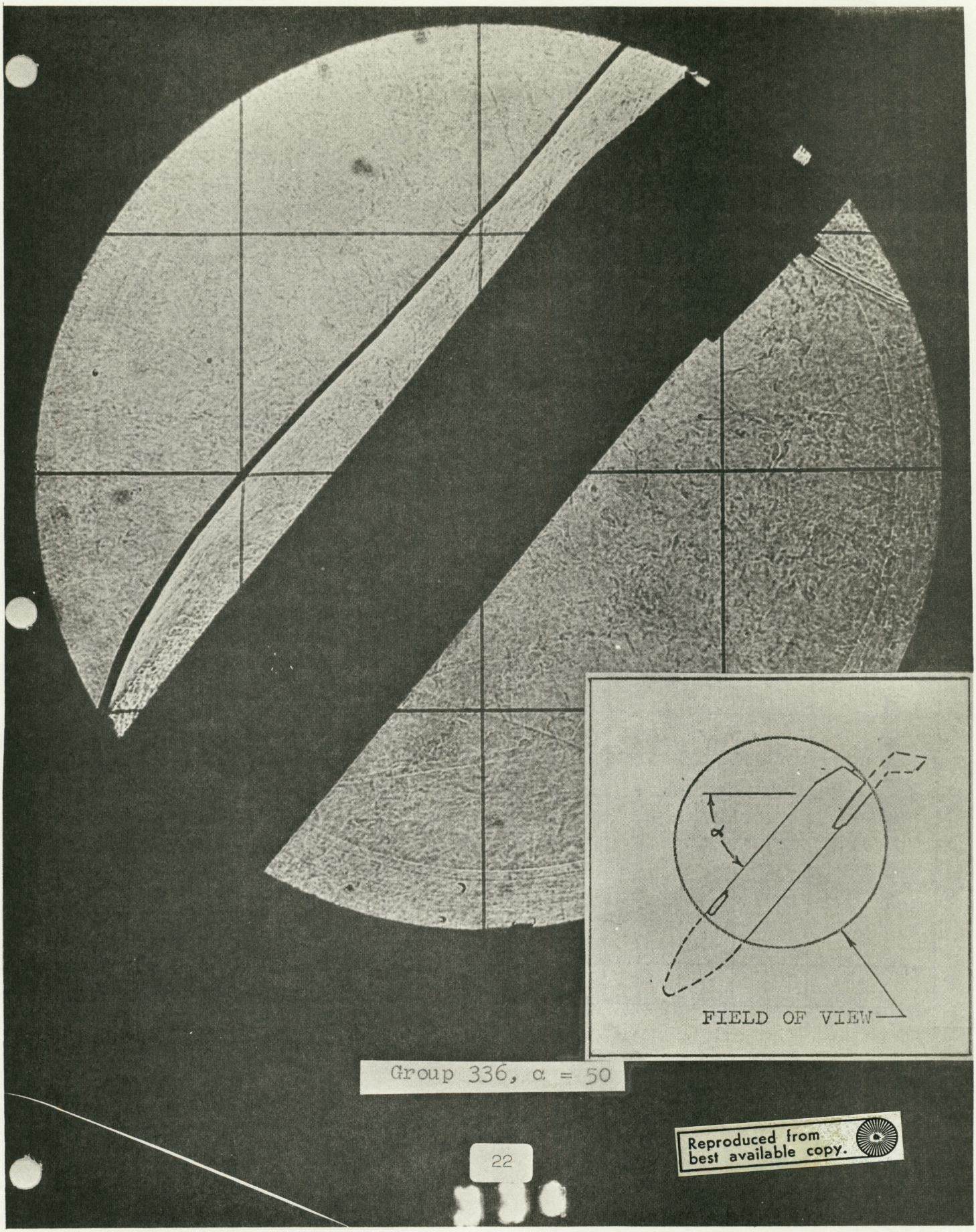
AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VT1162

GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
336	42	MDAC-8	8.00	861.7	1346	50.00	.00	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	PO1 (PSIA)	Q-INF (PSIA)	V-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	L (IN)
98	8.83E-02	7.314	3.954	3873	2.443E-03	7.853E-08	3.746E 06	23.78

CH	POS	TAP	PM (PSIA)	PM/PO	PM/PO1	PM/P-INF	CP	CP/CP-MAX	X/L
1	2	1	6.358E 00	7.378E-03	8.693E-01	7.203E 01	1.586E 00	8.677E-01	.100
2	2	2	5.636E 00	6.540E-03	7.705E-01	6.385E 01	1.403E 00	7.677E-01	.200
3	2	3	4.988E 00	5.788E-03	6.819E-01	5.650E 01	1.239E 00	6.780E-01	.300
4	2	4	4.584E 00	5.320E-03	6.268E-01	5.194E 01	1.137E 00	6.222E-01	.400
5	2	5	3.899E 00	4.524E-03	5.330E-01	4.417E 01	9.636E-01	5.273E-01	.500
6	2	6	3.814E 00	4.426E-03	5.214E-01	4.321E 01	9.422E-01	5.156E-01	.600
7	2	7	4.356E 00	5.055E-03	5.956E-01	4.935E 01	1.079E 00	5.906E-01	.700
8	2	8	4.454E 00	5.168E-03	6.089E-01	5.046E 01	1.104E 00	6.041E-01	.800
9	2	9	3.169E 00	3.678E-03	4.333E-01	3.590E 01	7.791E-01	4.264E-01	.900
10	2	10	3.157E 00	3.663E-03	4.316E-01	3.576E 01	7.759E-01	4.246E-01	.970


1.0
0.1
0.01
PM/P01
0
0.2
0.4
0.6
0.8
1.0
X/L
GROUP 336 ALPHA-MODEL 49.99



Group 336, $\alpha = 50$

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

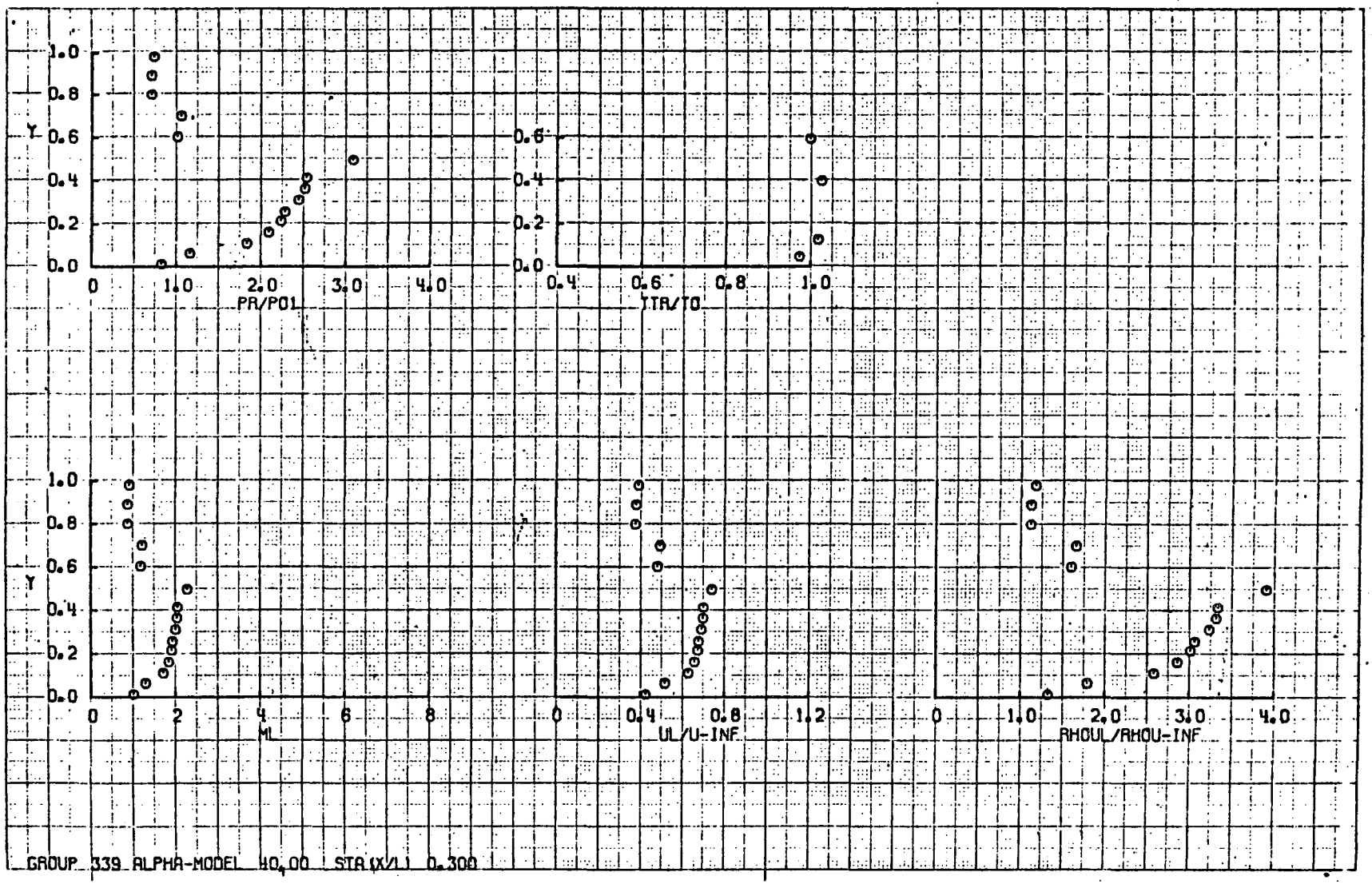
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
339	42	MDAC-B	8.00	860.5	1343	40.01	9.99	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	P01 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.81E-02	7.304	3.949	3868	2.445E-03	7.835E-08	3.753E 06	.300	23.78

CH	POS	TAP	PR (PSIA)	PR/P01	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	6.019E 00	8.241E-01	.014	5.230E-01	1.009	6.076E 05	11.466	.627	3.1147	1.3301	8.216
2	3	2	8.479E 00	1.161E 00	.066	3.713E-01	1.294	8.786E 05	10.338	.520	3.4546	1.7968	7.675
3	3	3	1.340E 01	1.835E 00	.112	2.349E-01	1.708	1.418E 06	8.715	.630	4.0980	2.5832	6.837
4	3	4	1.527E 01	2.091E 00	.163	2.062E-01	1.839	1.634E 06	8.232	.660	4.3382	2.8615	6.572
5	3	5	1.632E 01	2.234E 00	.216	1.929E-01	1.909	1.761E 06	7.982	.674	4.4746	3.0172	6.430
6	3	6	1.667E 01	2.282E 00	.258	1.889E-01	1.931	1.801E 06	7.906	.679	4.5173	3.0657	6.388
7	3	7	1.785E 01	2.444E 00	.313	1.764E-01	2.005	1.966E 06	7.650	.693	4.6685	3.2364	6.240
8	3	8	1.846E 01	2.528E 00	.365	1.711E-01	2.040	2.018E 06	7.531	.700	4.7421	3.3190	6.171
9	3	9	1.855E 01	2.540E 00	.415	1.697E-01	2.048	2.035E 06	7.505	.701	4.7586	3.3375	6.156
10	3	10	2.256E 01	3.089E 00	.499	1.395E-01	2.278	2.567E 06	6.771	.741	5.2747	3.9093	5.715
11	3	11	7.384E 01	1.011E 00	.606	4.263E-01	1.179	7.608E 05	10.799	.484	3.3071	1.6015	7.900
12	3	12	7.713E 00	1.056E 00	.702	4.042E-01	1.214	7.955E 05	10.659	.495	3.3507	1.6600	7.832
13	3	13	5.156E 00	7.059E-01	.802	6.106E-01	.870	4.980E 05	11.986	.377	2.9798	1.1220	8.455
14	3	14	5.169E 00	7.077E-01	.892	6.090E-01	.872	4.999E 05	11.977	.377	2.9820	1.1256	8.451
15	3	15	5.360E 00	7.339E-01	.981	5.873E-01	.906	5.254E 05	11.853	.390	3.0131	1.1752	8.395

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/P01
1	1	1308	.9739	.051	4.310E-01
2	2	1367	1.0179	.131	
5	5	1377	1.0253	.402	
6	6	1341	.9985	.599	

GROUP
339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0.2
0.0
0.4
0.6
0.8
1.0
TTR/T0
Y
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0.6
0.4
0.2
0.0
0
2
4
6
8
ML
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0.8
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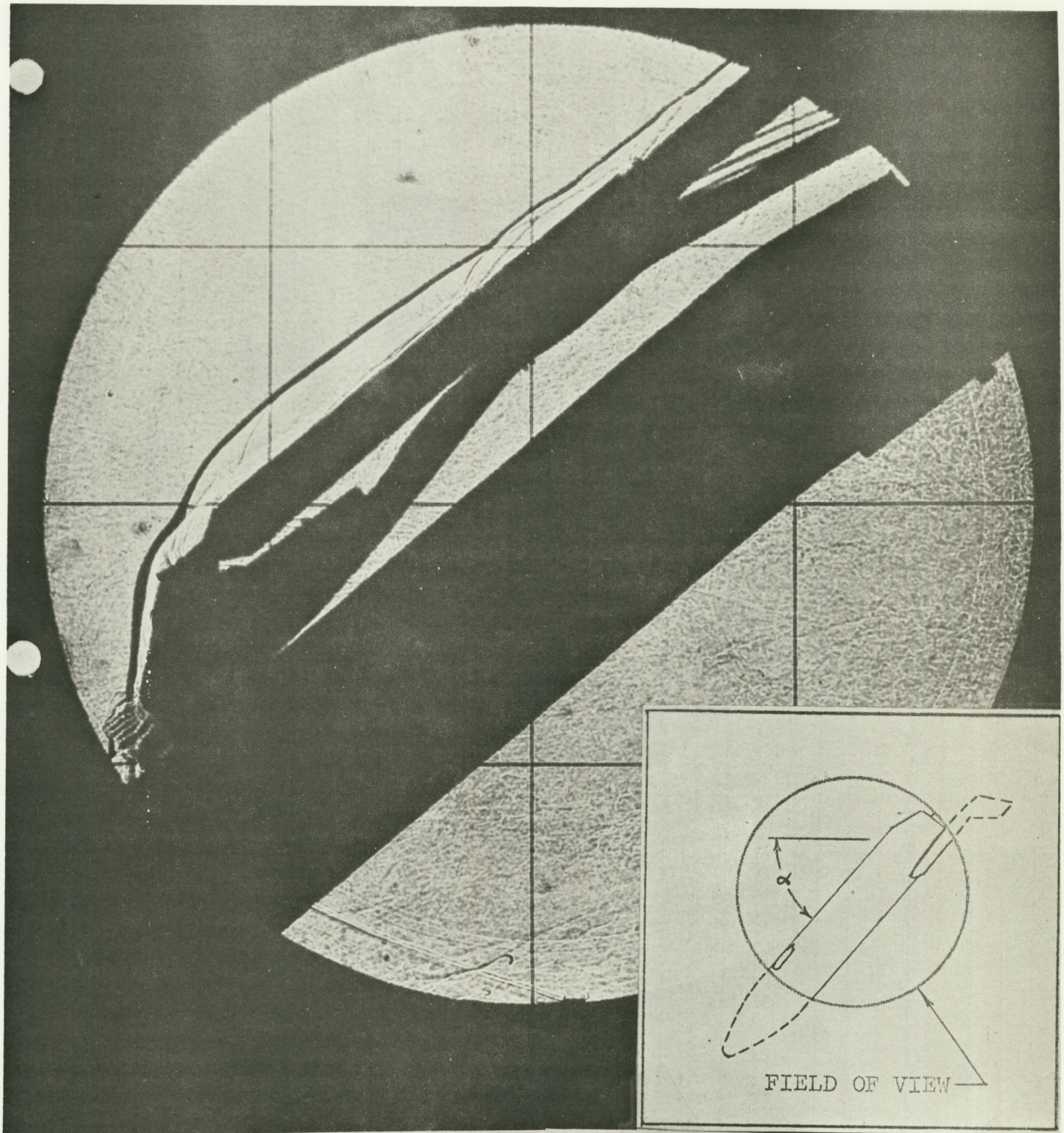
3.0
4.0
RHOUL/RHOU-INF
GROUP 339 ALPHA-MODEL 40.00 STA(X/L) 0.300



Group 339, α = 40, RAKE STA (X/L) 0.3

AEDC (ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
AT1162

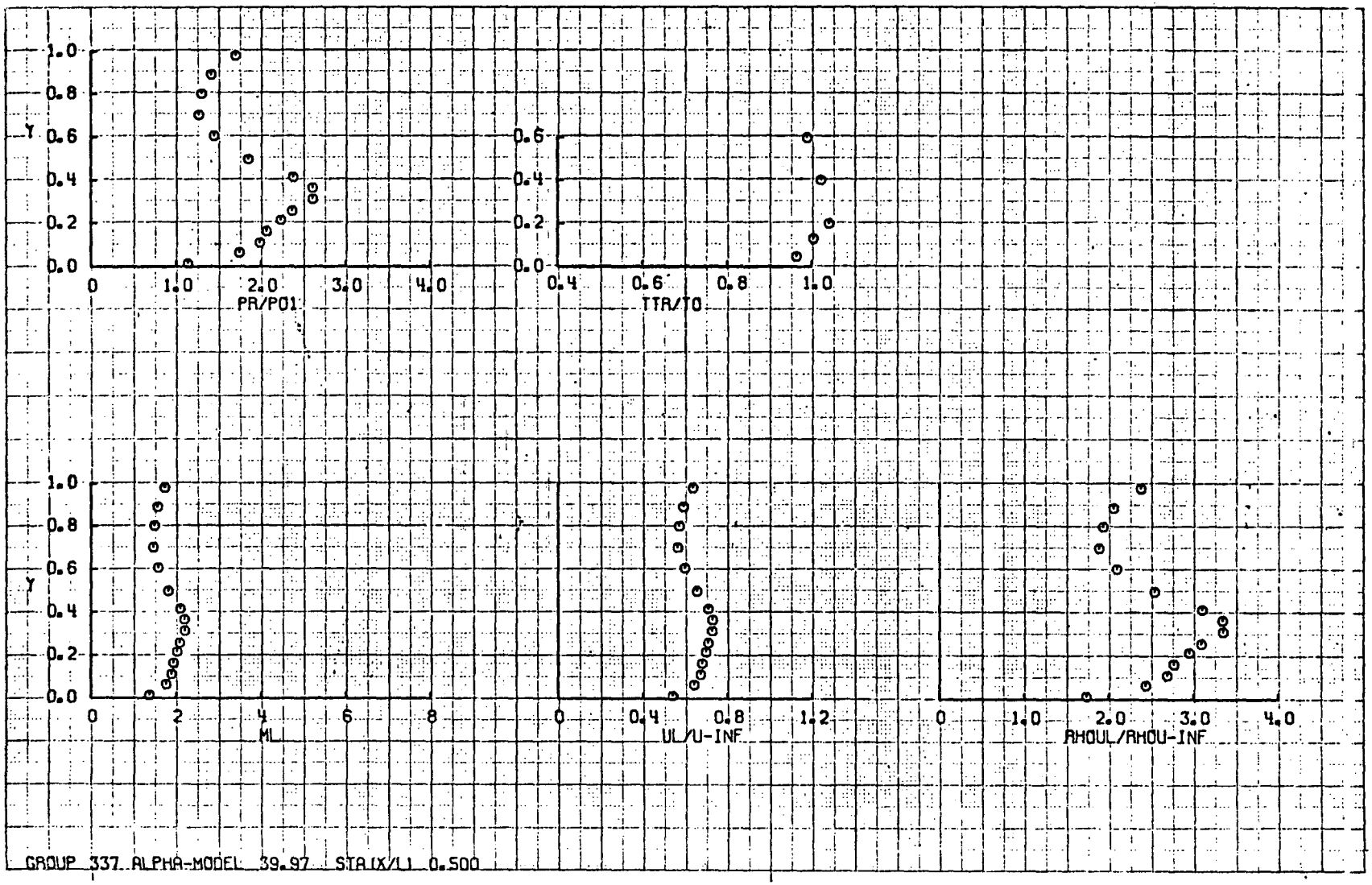
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
337	42	MDAC-B	8.00	862.3	1384	39.97	10.03	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	PO1 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.83E-02	7.319	3.957	3870	2.448E-03	7.841E-08	3.757E 06	.500	23.78

CH	POS	TAP	PR (PSIA)	PR/PO1	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	8.358E 00	1.142E 00	.014	3.389E-01	1.372	8.682E 05	10.025	.563	3.1987	1.7373	7.517
2	3	2	1.281E 01	1.751E 00	.066	2.211E-01	1.769	1.362E 06	8.489	.644	3.7775	2.4334	6.712
3	3	3	1.455E 01	1.987E 00	.112	1.947E-01	1.899	1.567E 06	8.016	.672	4.0005	2.6895	6.449
4	3	4	1.514E 01	2.068E 00	.163	1.871E-01	1.940	1.636E 06	7.872	.681	4.0737	2.7726	6.367
5	3	5	1.636E 01	2.235E 00	.216	1.732E-01	2.026	1.789E 06	7.577	.697	4.2322	2.9512	6.197
6	3	6	1.734E 01	2.369E 00	.258	1.636E-01	2.093	1.915E 06	7.356	.710	4.3593	3.0934	6.067
7	3	7	1.915E 01	2.616E 00	.313	1.480E-01	2.208	2.152E 06	6.987	.730	4.5896	3.3488	5.846
8	3	8	1.912E 01	2.612E 00	.365	1.482E-01	2.206	2.148E 06	6.993	.729	4.5856	3.3444	5.850
9	3	9	1.746E 01	2.385E 00	.415	1.623E-01	2.099	1.927E 06	7.337	.711	4.3707	3.1061	6.056
10	3	10	1.355E 01	1.851E 00	.499	2.090E-01	1.825	1.448E 06	8.282	.657	3.8721	2.5426	6.598
11	3	11	1.059E 01	1.447E 00	.606	2.675E-01	1.583	1.109E 06	9.193	.600	3.4884	2.0931	7.090
12	3	12	9.266E 00	1.266E 00	.702	3.057E-01	1.462	9.652E 05	9.668	.568	3.3171	1.8849	7.336
13	3	13	9.554E 00	1.305E 00	.802	2.965E-01	1.489	9.764E 05	9.560	.576	3.3546	1.9310	7.281
14	3	14	1.037E 01	1.417E 00	.892	2.731E-01	1.563	1.085E 06	9.269	.595	3.4599	2.0588	7.130
15	3	15	1.248E 01	1.705E 00	.981	2.269E-01	1.741	1.322E 06	8.591	.638	3.7329	2.3816	6.768

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/PO1
1	1	1294	.9628	.051	3.870E-01
2	2	1349	1.0037	.131	
3	3	1398	1.0402	.202	
5	5	1373	1.0216	.402	
6	6	1329	.9888	.599	

GROUP
337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0.4
0.2
0.0
0.4
0.6
0.8
1.0
TTR/T0
Y
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
ML
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0.4
0.8
1.2
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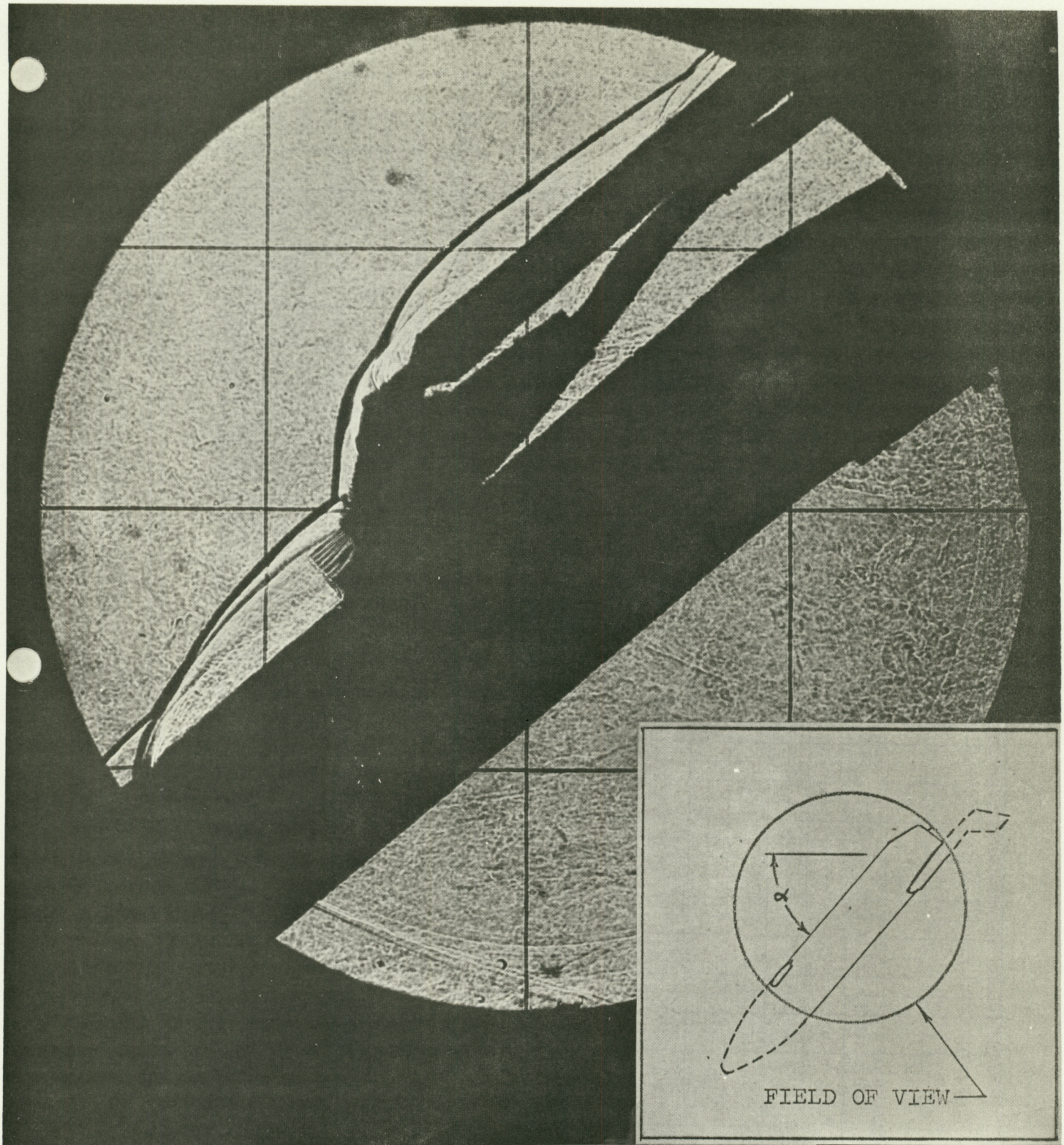
4.0
RHOUL/RHOU-INF
GROUP 337 ALPHA-MODEL 39.97 STA(X/L) 0.500



Group 337, α = 40, RAKE STA (X/L) 0.5

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

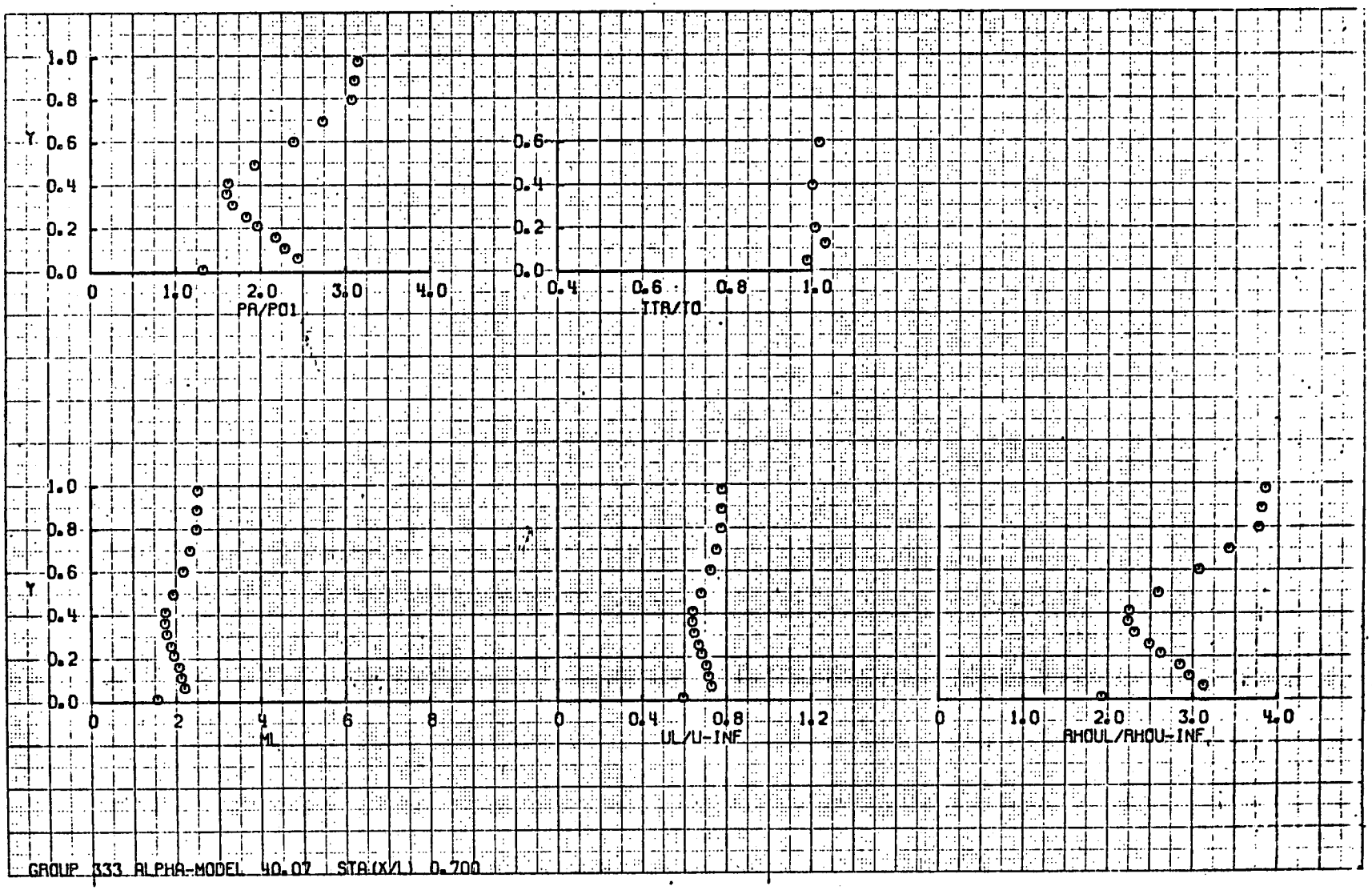
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
333	42	MDAC-B	8.00	861.0	1342	40.07	9.93	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	P01 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.82E-02	7.308	3.951	3867	2.448E-03	7.829E-08	3.759E 06	.700	23.78

CH	POS	TAP	PR (PSIA)	PR/P01	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	9.683E 00	1.325E 00	.014	2.740E-01	1.562	1.016E 06	9.276	.595	3.2426	1.9279	7.137
2	3	2	1.784E 01	2.441E 00	.066	1.487E-01	2.202	2.007E 06	7.005	.729	4.2937	3.1287	5.859
3	3	3	1.671E 01	2.286E 00	.112	1.589E-01	2.124	1.855E 06	7.254	.715	4.1464	2.9655	6.009
4	3	4	1.592E 01	2.178E 00	.163	1.666E-01	2.069	1.756E 06	7.434	.705	4.0464	2.8541	6.115
5	3	5	1.435E 01	1.964E 00	.216	1.848E-01	1.954	1.557E 06	7.824	.683	3.8443	2.6270	6.342
6	3	6	1.340E 01	1.834E 00	.258	1.979E-01	1.882	1.443E 06	8.078	.669	3.7235	2.4897	6.487
7	3	7	1.221E 01	1.671E 00	.313	2.173E-01	1.786	1.302E 06	8.425	.648	3.5704	2.3140	6.680
8	3	8	1.170E 01	1.601E 00	.365	2.267E-01	1.743	1.243E 06	8.584	.638	3.5043	2.2374	6.767
9	3	9	1.183E 01	1.619E 00	.415	2.243E-01	1.753	1.256E 06	8.547	.641	3.5192	2.2547	6.747
10	3	10	1.412E 01	1.931E 00	.499	1.879E-01	1.937	1.529E 06	7.886	.680	3.8145	2.5932	6.377
11	3	11	1.748E 01	2.392E 00	.606	1.518E-01	2.177	1.957E 06	7.085	.724	4.2453	3.0751	5.908
12	3	12	1.997E 01	2.733E 00	.702	1.328E-01	2.339	2.299E 06	6.590	.751	4.5644	3.4260	5.603
13	3	13	2.246E 01	3.074E 00	.802	1.181E-01	2.491	2.664E 06	6.157	.773	4.8852	3.7753	5.328
14	3	14	2.270E 01	3.106E 00	.892	1.169E-01	2.505	2.699E 06	6.120	.775	4.9149	3.8075	5.303
15	3	15	2.300E 01	3.147E 00	.981	1.153E-01	2.522	2.745E 06	6.072	.777	4.9535	3.8492	5.272

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/P01
1	1	1327	.9888	.051	3.630E-01
2	2	1394	1.0313	.131	
3	3	1352	1.0075	.202	
5	5	1344	1.0015	.402	
6	6	1366	1.0179	.599	

GROUP
333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0.4
0.2
0.0
0.4
0.6
0.8
1.0
TTR/TO
Y
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0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
ML
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0.4
0.8
1.2
UL/U-INF
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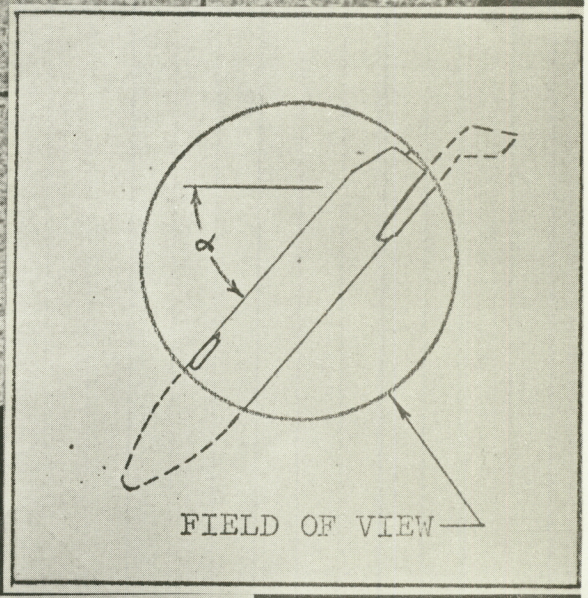
RHOUL/RHOU-INF
GROUP 333 ALPHA-MODEL 40.07 STA(X/L) 0.700



Group 333, α = 40, RAKE STA (X/L) 0.7

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

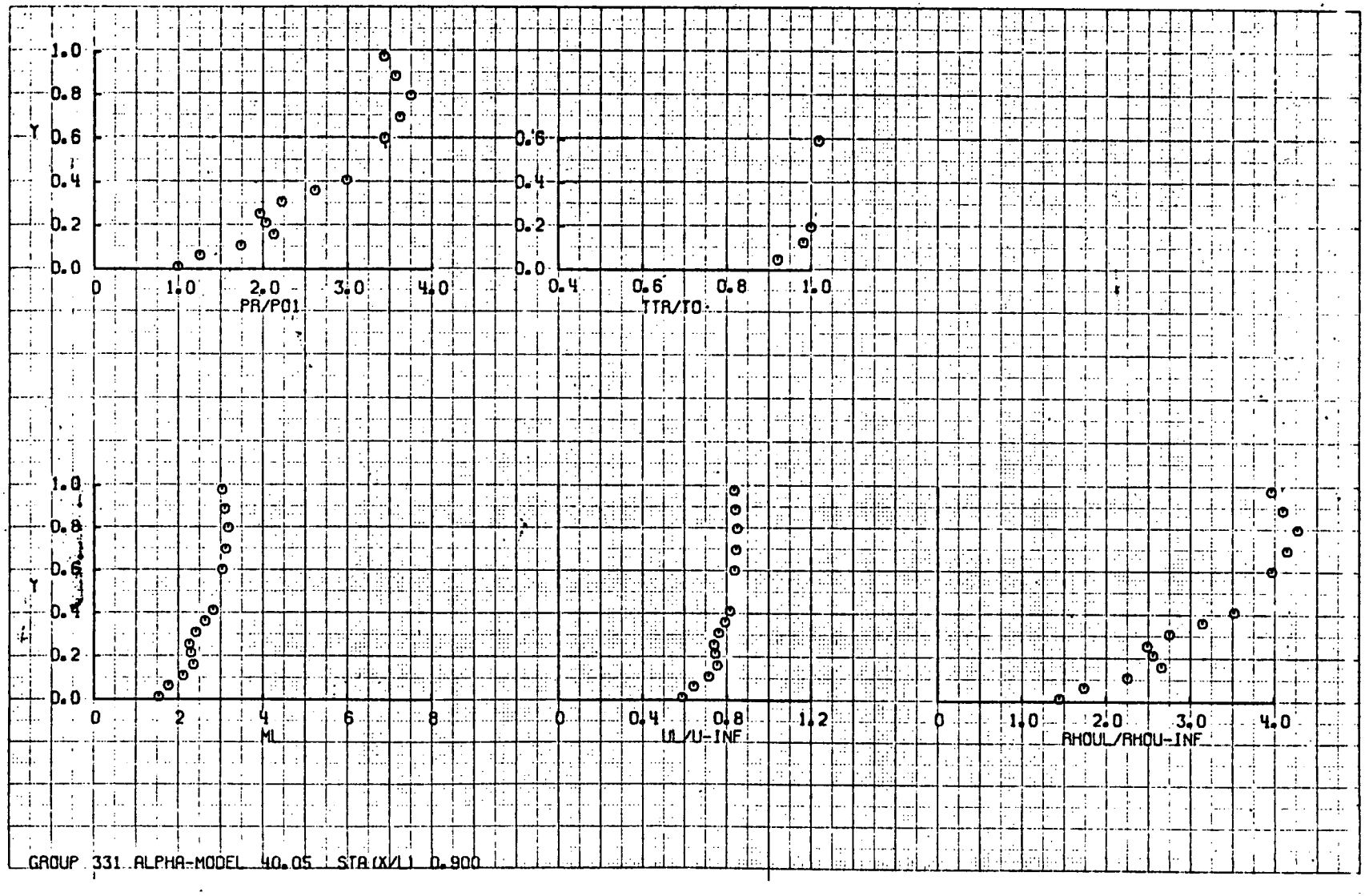
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
331	42	MDAC-H	8.00	858.0	1342	40.05	9.95	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	P01 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.79E-02	7.283	3.937	3867	2.439E-03	7.829E-08	3.746E 06	.900	23.78

CH	POS	TAP	PR (PSIA)	PR/P01	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	7.204E 00	9.892E-01	.014	2.810E-01	1.538	7.944E 05	9.369	.589	2.4591	1.4472	7.185
2	3	2	9.112E 00	1.251E 00	.066	2.222E-01	1.763	9.090E 05	8.511	.643	2.7066	1.7400	6.727
3	3	3	1.264E 01	1.736E 00	.112	1.602E-01	2.114	1.402E 06	7.296	.713	3.1617	2.2557	6.028
4	3	4	1.549E 01	2.127E 00	.163	1.307E-01	2.360	1.791E 06	6.527	.754	3.5293	2.6606	5.564
5	3	5	1.479E 01	2.031E 00	.216	1.369E-01	2.302	1.691E 06	6.700	.745	3.4381	2.5609	5.672
6	3	6	1.429E 01	1.963E 00	.258	1.416E-01	2.261	1.624E 06	6.824	.738	3.3756	2.4923	5.749
7	3	7	1.617E 01	2.220E 00	.313	1.252E-01	2.415	1.888E 06	6.370	.762	3.6165	2.7557	5.464
8	3	8	1.903E 01	2.613E 00	.365	1.064E-01	2.632	2.322E 06	5.785	.791	3.9818	3.1511	5.083
9	3	9	2.177E 01	2.990E 00	.415	9.298E-02	2.825	2.776E 06	5.315	.814	4.3340	3.5291	4.762
11	3	11	2.504E 01	3.438E 00	.509	8.047E-02	3.040	3.366E 06	4.845	.837	4.7547	3.9775	4.427
12	3	12	2.536E 01	3.619E 00	.702	7.682E-02	3.122	3.617E 06	4.679	.844	4.9235	4.1567	4.305
13	3	13	2.730E 01	3.749E 00	.902	7.416E-02	3.179	3.799E 06	4.568	.849	5.0427	4.2830	4.223
14	3	14	2.594E 01	3.567E 00	.992	7.794E-02	3.099	3.544E 06	4.726	.842	4.8748	4.1050	4.340
15	3	15	2.498E 01	3.430E 00	.981	8.104E-02	3.036	3.354E 06	4.853	.836	4.7468	3.9691	4.433

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/P01
1	1	1235	.9203	.051	2.780E-01
2	2	1317	.9814	.131	
3	3	1341	.9993	.202	
6	6	1366	1.0179	.599	

GROUP
331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3.0
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PR/P01
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0.4
0.2
0.0
0.4
0.6
0.8
1.0
TTR/TO
Y
1.0
0.8
0.6
0.4
0.2
0.0
0
2
4
6
8
ML
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0.4
0.8
1.2
UL/U-INF
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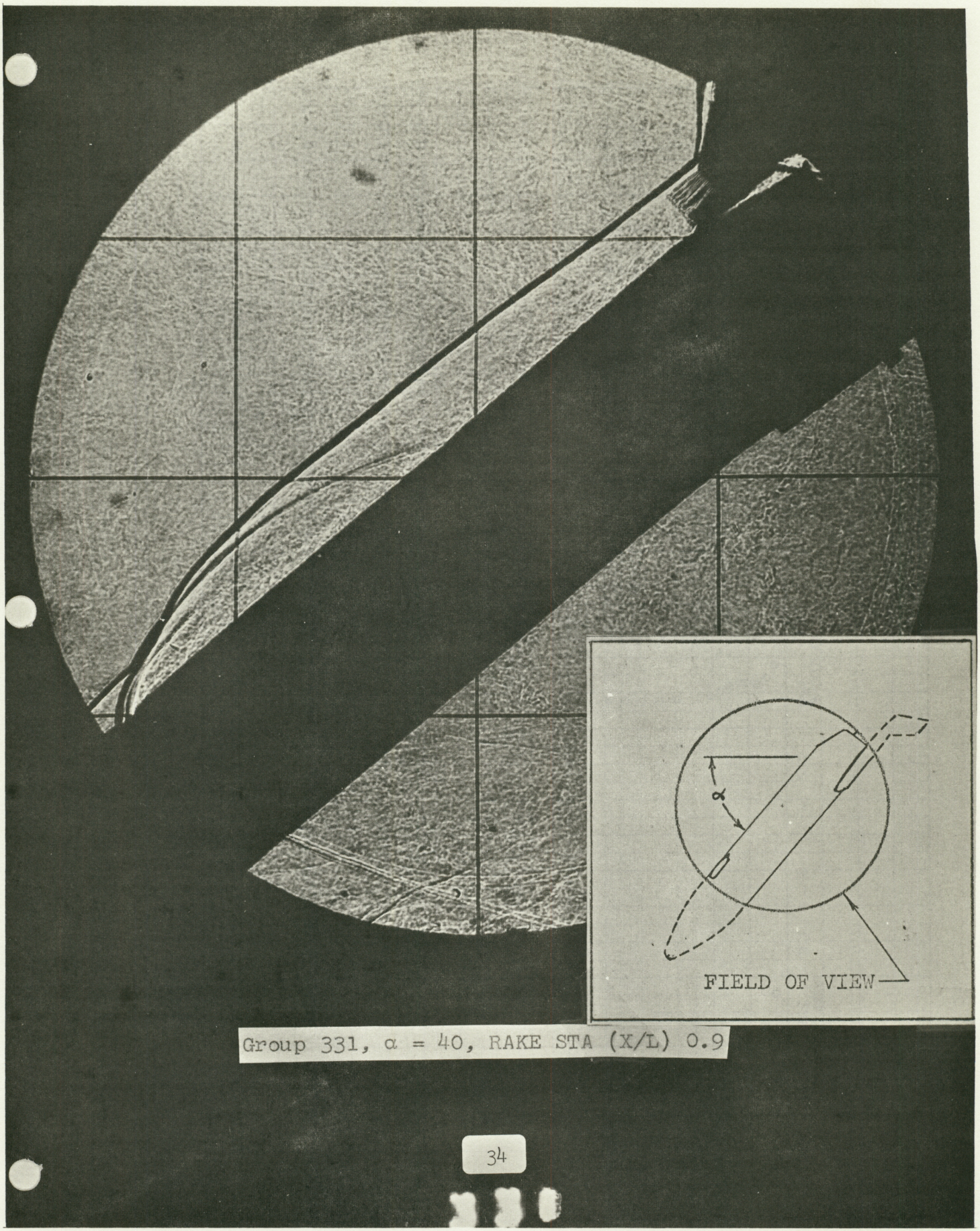
3.0
4.0
RHOUL/RHOU-INF
GROUP 331 ALPHA-MODEL 40.05 STA(X/L) 0.900



Group 331, α = 40, RAKE STA (X/L) 0.9

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

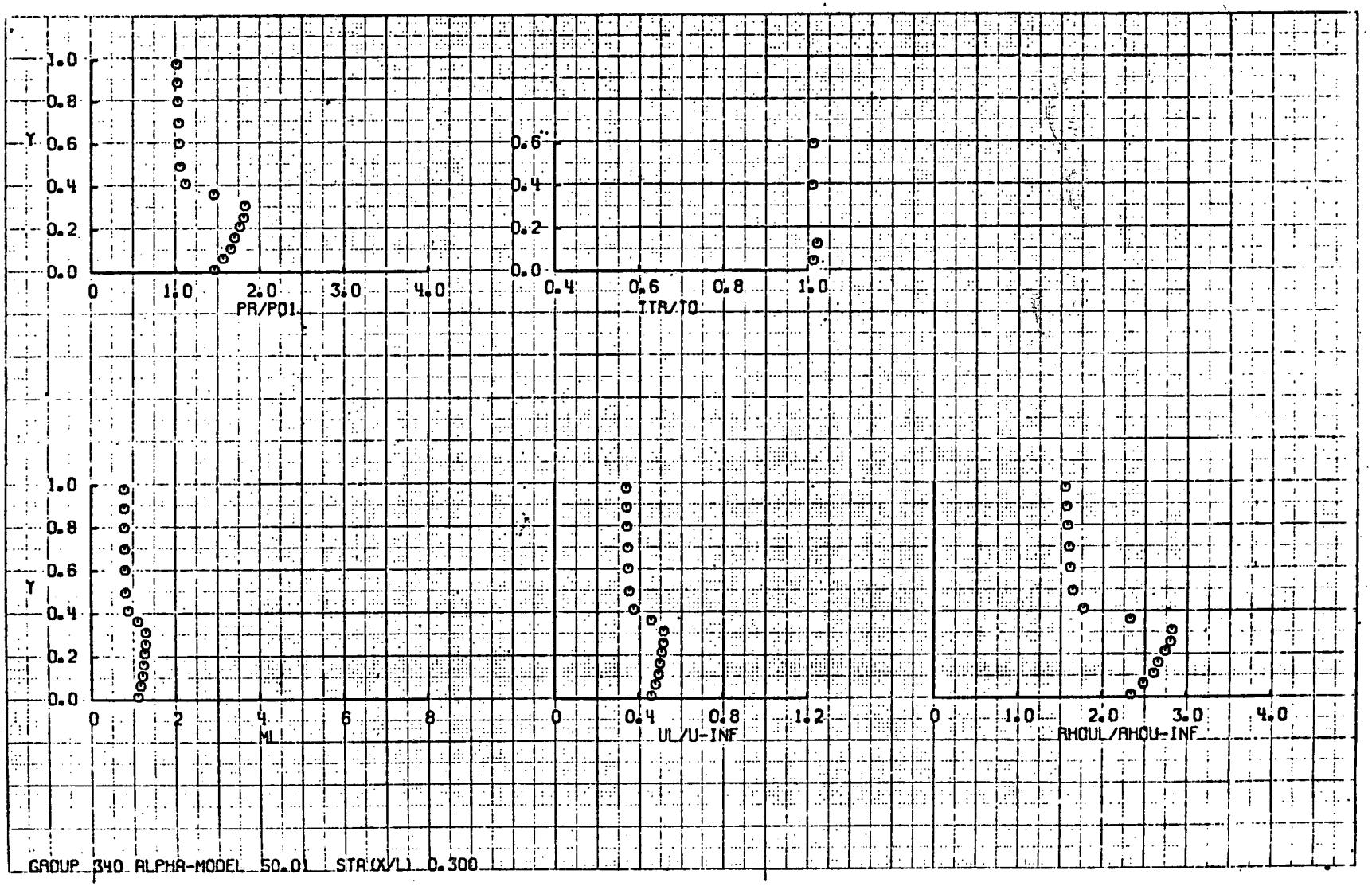
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
340	42	MDAC-B	8.00	860.2	1344	50.01	-.01	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	P01 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.81E-02	7.302	3.947	3870	2.442E-03	7.841E-08	3.747E 06	.300	23.78

CH	POS	TAP	PR (PSIA)	PR/P01	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	1.068E 01	1.462E 00	.014	4.864E-01	1.104	1.092E 06	11.093	.460	5.0943	2.3428	8.038
2	3	2	1.143E 01	1.566E 00	.066	4.356E-01	1.161	1.176E 06	10.869	.479	5.1994	2.4883	7.931
3	3	3	1.211E 01	1.658E 00	.112	4.114E-01	1.208	1.248E 06	10.682	.494	5.2904	2.6112	7.841
4	3	4	1.241E 01	1.699E 00	.163	4.014E-01	1.228	1.279E 06	10.604	.500	5.3293	2.6632	7.803
5	3	5	1.287E 01	1.763E 00	.216	3.868E-01	1.259	1.330E 06	10.479	.509	5.3930	2.7473	7.742
6	3	6	1.323E 01	1.812E 00	.258	3.763E-01	1.282	1.369E 06	10.385	.517	5.4417	2.8111	7.696
7	3	7	1.333E 01	1.825E 00	.313	3.736E-01	1.288	1.379E 06	10.362	.518	5.4541	2.8271	7.684
8	3	8	1.002E 01	1.455E 00	.365	4.687E-01	1.101	1.087E 06	11.109	.459	5.0872	2.3329	8.046
9	3	9	8.156E 00	1.117E 00	.415	6.104E-01	.870	7.874E 05	11.985	.377	4.7155	1.7760	8.453
10	3	10	7.688E 00	1.053E 00	.499	6.477E-01	.813	7.213E 05	12.190	.355	4.6362	1.6447	8.545
11	3	11	7.585E 00	1.039E 00	.600	6.566E-01	.799	7.061E 05	12.237	.349	4.6183	1.6141	8.567
12	3	12	7.545E 00	1.033E 00	.702	6.600E-01	.794	7.002E 05	12.255	.347	4.6114	1.6022	8.575
13	3	13	7.484E 00	1.025E 00	.802	6.654E-01	.786	6.911E 05	12.284	.344	4.6007	1.5838	8.588
14	3	14	7.445E 00	1.020E 00	.892	6.689E-01	.780	6.851E 05	12.302	.342	4.5937	1.5716	8.596
15	3	15	7.394E 00	1.013E 00	.981	6.734E-01	.773	6.775E 05	12.326	.339	4.5849	1.5561	8.607

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/P01
1	1	1362	1.0134	.051	6.820E-01
2	2	1374	1.0223	.113	
5	5	1359	1.0112	.402	
6	6	1362	1.0134	.599	

GROUP
340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TTR/TO
Y
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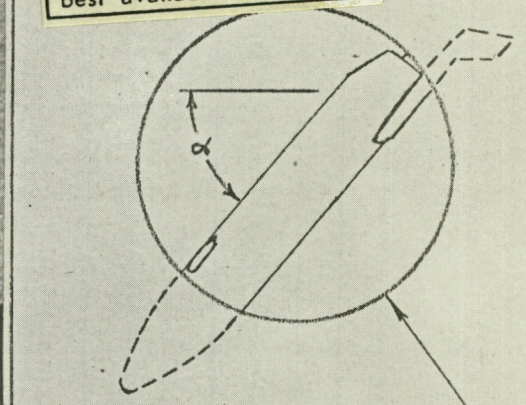
RHOUL/RHOU-INF
GROUP 340 ALPHA-MODEL 50.01 STA(X/L) 0.300



Group 340, α = 50, RAKE STA (X/L) 0.3

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

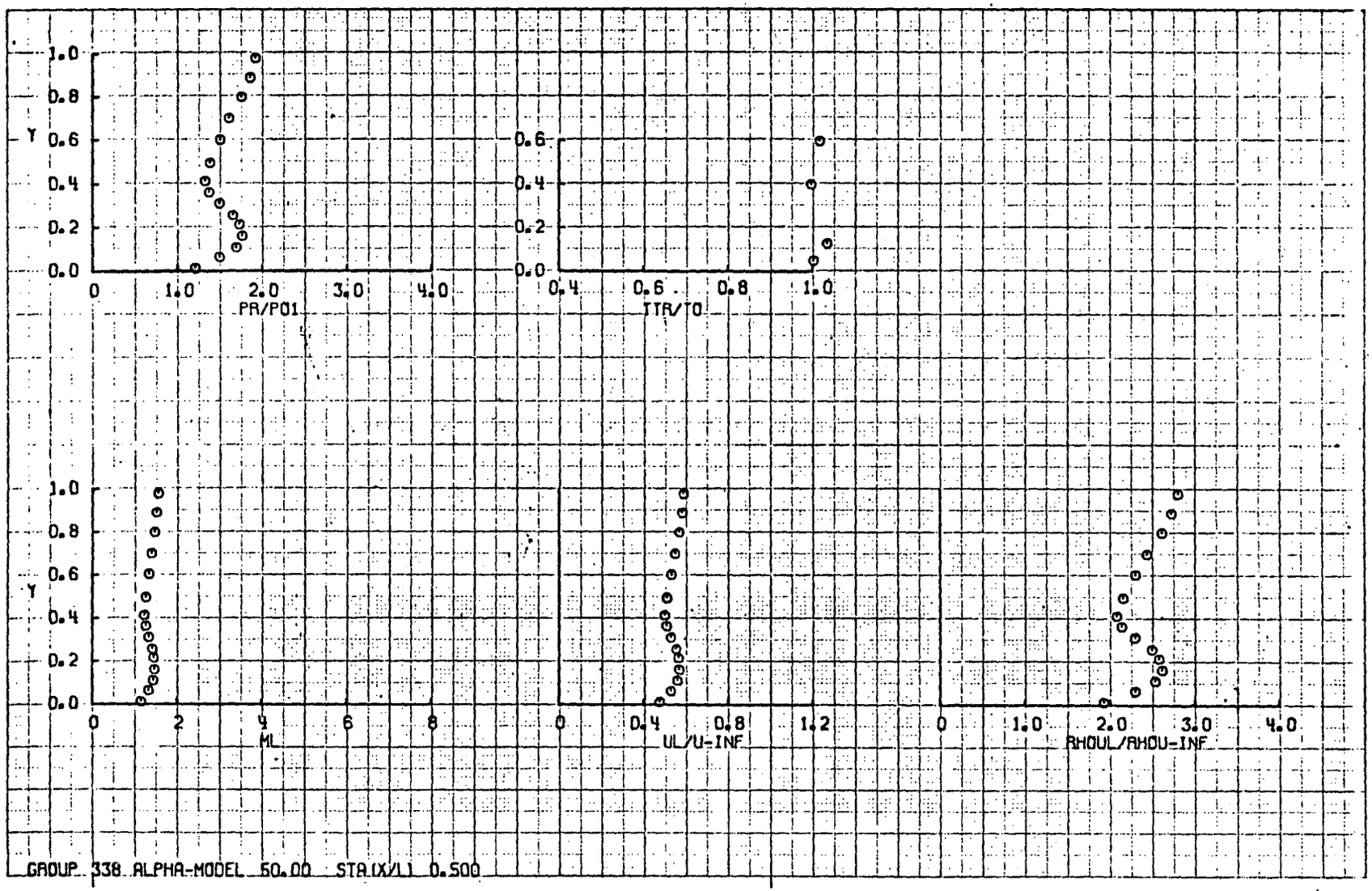
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
33A	42	MDAC-B	8.00	862.6	1343	50.00	0	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	P01 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.84E-02	7.322	3.958	3868	2.451E-03	7.835E-08	3.762E 06	.500	23.78

CH	POS	TAP	PR (PSIA)	PR/P01	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	8.871E 00	1.212E 00	.014	4.399E-01	1.153	9.130E 05	10.900	.476	4.0519	1.9288	7.948
2	3	2	1.096E 01	1.497E 00	.066	3.559E-01	1.329	1.137E 06	10.197	.531	4.3312	2.2981	7.605
3	3	3	1.241E 01	1.695E 00	.112	3.144E-01	1.437	1.292E 06	9.768	.561	4.5214	2.5378	7.389
4	3	4	1.291E 01	1.763E 00	.163	3.022E-01	1.472	1.346E 06	9.629	.571	4.5868	2.6186	7.318
5	3	5	1.269E 01	1.733E 00	.210	3.075E-01	1.456	1.322E 06	9.691	.567	4.5575	2.5826	7.350
6	3	6	1.213E 01	1.656E 00	.258	3.218E-01	1.417	1.263E 06	9.846	.556	4.4857	2.4934	7.429
7	3	7	1.097E 01	1.498E 00	.313	3.559E-01	1.329	1.137E 06	10.197	.531	4.3312	2.2981	7.605
8	3	8	1.006E 01	1.375E 00	.365	3.877E-01	1.257	1.041E 06	10.487	.509	4.2116	2.1429	7.748
9	3	9	9.705E 00	1.325E 00	.415	4.021E-01	1.228	1.003E 06	10.604	.500	4.1650	2.0814	7.805
10	3	10	1.013E 01	1.384E 00	.469	3.852E-01	1.263	1.049E 06	10.463	.511	4.2210	2.1553	7.736
11	3	11	1.102E 01	1.505E 00	.520	3.542E-01	1.343	1.142E 06	10.182	.532	4.3379	2.3066	7.597
12	3	12	1.180E 01	1.612E 00	.702	3.306E-01	1.394	1.228E 06	9.940	.549	4.4435	2.4406	7.476
13	3	13	1.208E 01	1.650E 00	.702	3.030E-01	1.470	1.343E 06	9.637	.570	4.5831	2.6141	7.322
14	3	14	1.362E 01	1.861E 00	.792	2.865E-01	1.521	1.424E 06	9.437	.584	4.6803	2.7330	7.219
15	3	15	1.411E 01	1.927E 00	.881	2.769E-01	1.552	1.476E 06	9.314	.592	4.7418	2.8074	7.155

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/P01
1	1	1346	1.0022	.051	5.330E-01
2	2	1349	1.0043	.131	
5	5	1339	.9970	.402	
6	6	1366	1.0171	.599	

GROUP
33A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TTR/TO
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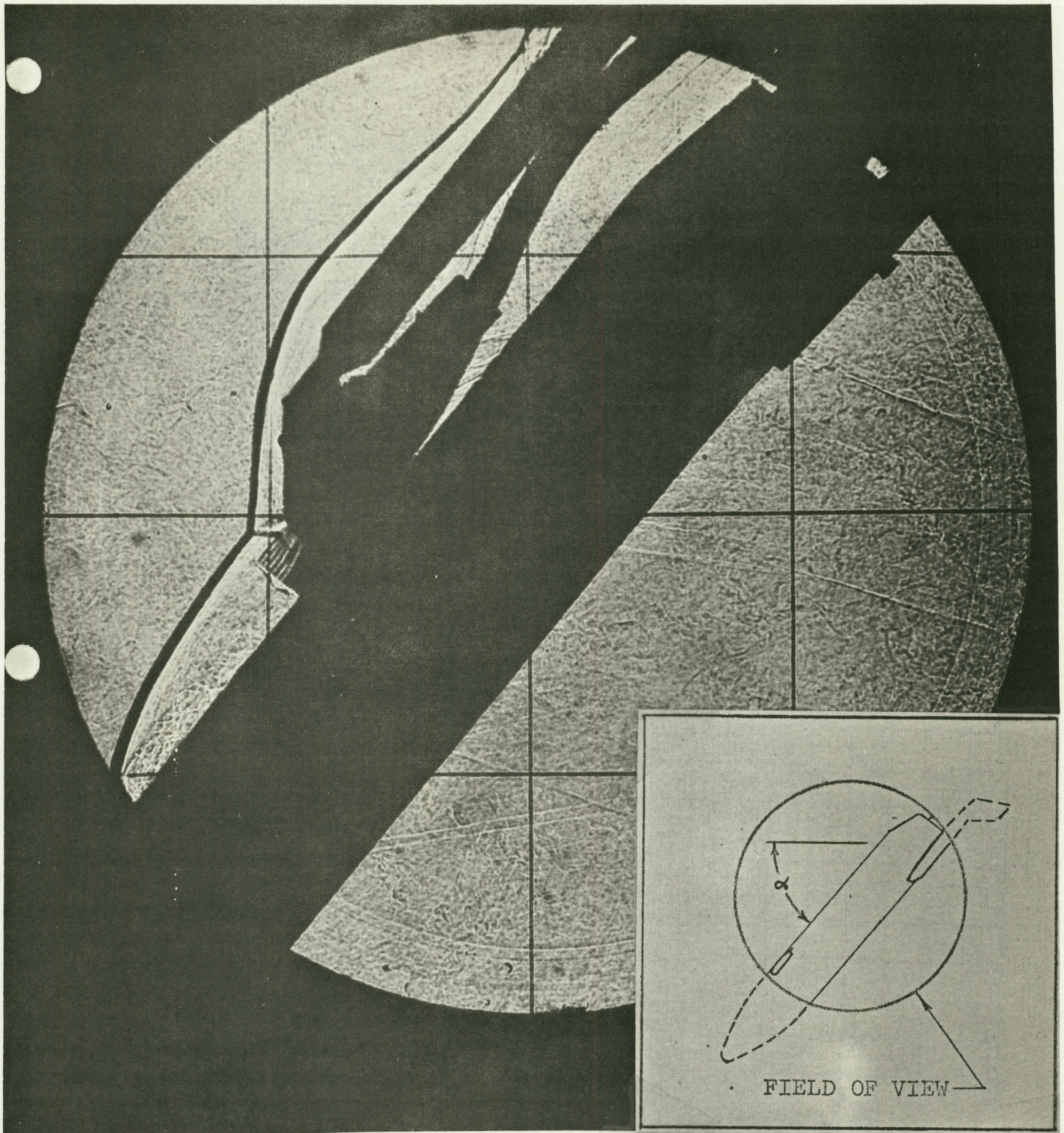
RHOUL/RHOU-INF
GROUP 338 ALPHA-MODEL 50.00 STA(X/L) 0.500



Group 338, α = 50, RAKE STA (X/L) 0.5

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

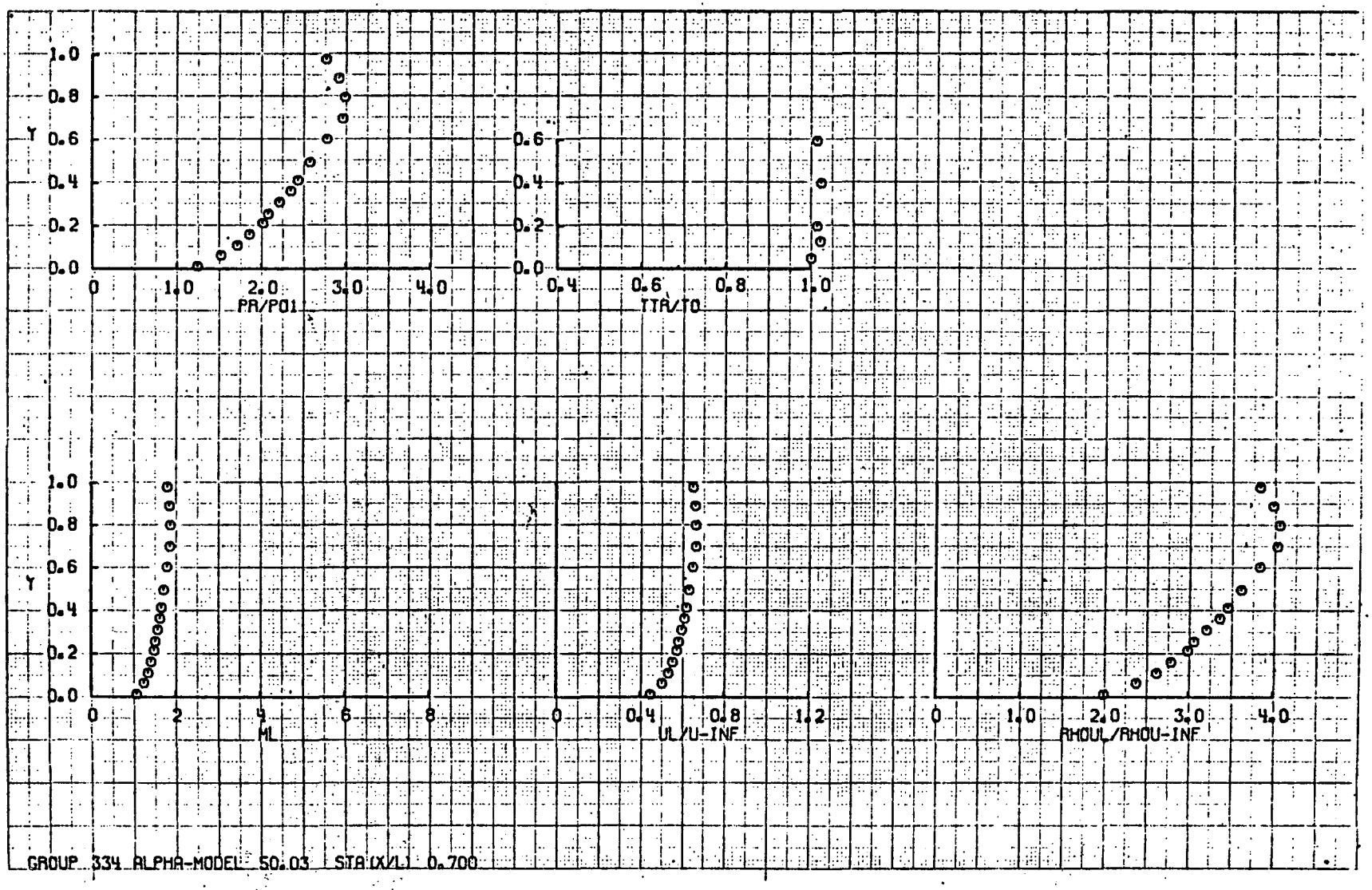
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
334	42	MDAC-B	8.00	861.3	1341	50.03	-.03	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	PO1 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.82E-02	7,311	3,953	3865	2,451E-03	7,823E-08	3,765E 06	.700	23,78

CH	POS	TAP	PR (PSIA)	PR/PO1	Y(IN)	PML/PR	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	9.093E 00	1.244E 00	.014	4.792E-01	1.081	9.289E 05	11.186	.452	4.4152	1.9957	8.088
2	3	2	1.115E 01	1.526E 00	.066	3.907E-01	1.251	1.155E 06	10.510	.507	4.6989	2.3824	7.763
3	3	3	1.255E 01	1.717E 00	.112	3.472E-01	1.351	1.305E 06	10.111	.537	4.8843	2.6224	7.566
4	3	4	1.355E 01	1.854E 00	.163	3.207E-01	1.419	1.416E 06	9.838	.556	5.0199	2.7930	7.428
5	3	5	1.478E 01	2.022E 00	.216	2.948E-01	1.495	1.547E 06	9.536	.577	5.1787	2.9892	7.274
6	3	6	1.525E 01	2.086E 00	.258	2.857E-01	1.522	1.597E 06	9.429	.584	5.2378	3.0612	7.218
7	3	7	1.623E 01	2.219E 00	.313	2.685E-01	1.579	1.703E 06	9.208	.599	5.3635	3.2129	7.103
8	3	8	1.720E 01	2.353E 00	.365	2.533E-01	1.636	1.815E 06	8.989	.613	5.4939	3.3684	6.987
9	3	9	1.784E 01	2.441E 00	.415	2.442E-01	1.669	1.883E 06	8.863	.621	5.5724	3.4612	6.919
10	3	10	1.887E 01	2.581E 00	.499	2.310E-01	1.724	2.000E 06	8.656	.634	5.7052	3.6170	6.808
11	3	11	2.032E 01	2.779E 00	.606	2.145E-01	1.798	2.168E 06	8.392	.651	5.8923	3.8341	6.657
12	3	12	2.168E 01	2.966E 00	.702	2.010E-01	1.866	2.333E 06	8.134	.665	6.0715	4.0400	6.519
13	3	13	2.186E 01	2.991E 00	.802	1.993E-01	1.874	2.352E 06	8.106	.667	6.0925	4.0638	6.504
14	3	14	2.135E 01	2.920E 00	.792	2.041E-01	1.849	2.290E 06	8.197	.662	6.0248	3.9865	6.555
15	3	15	2.025E 01	2.770E 00	.981	2.152E-01	1.796	2.164E 06	8.389	.650	5.8872	3.8283	6.661

CH	TC	TTR (DEG R)	TTR/TC (DEG R)	Y(IN)	PML/PO1
1	1	1343	1.0015	.051	5.960E-01
2	2	1372	1.0231	.131	
3	3	1363	1.0164	.202	
5	5	1376	1.0261	.402	
6	6	1362	1.0157	.599	

GROUP
334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TTR/TO
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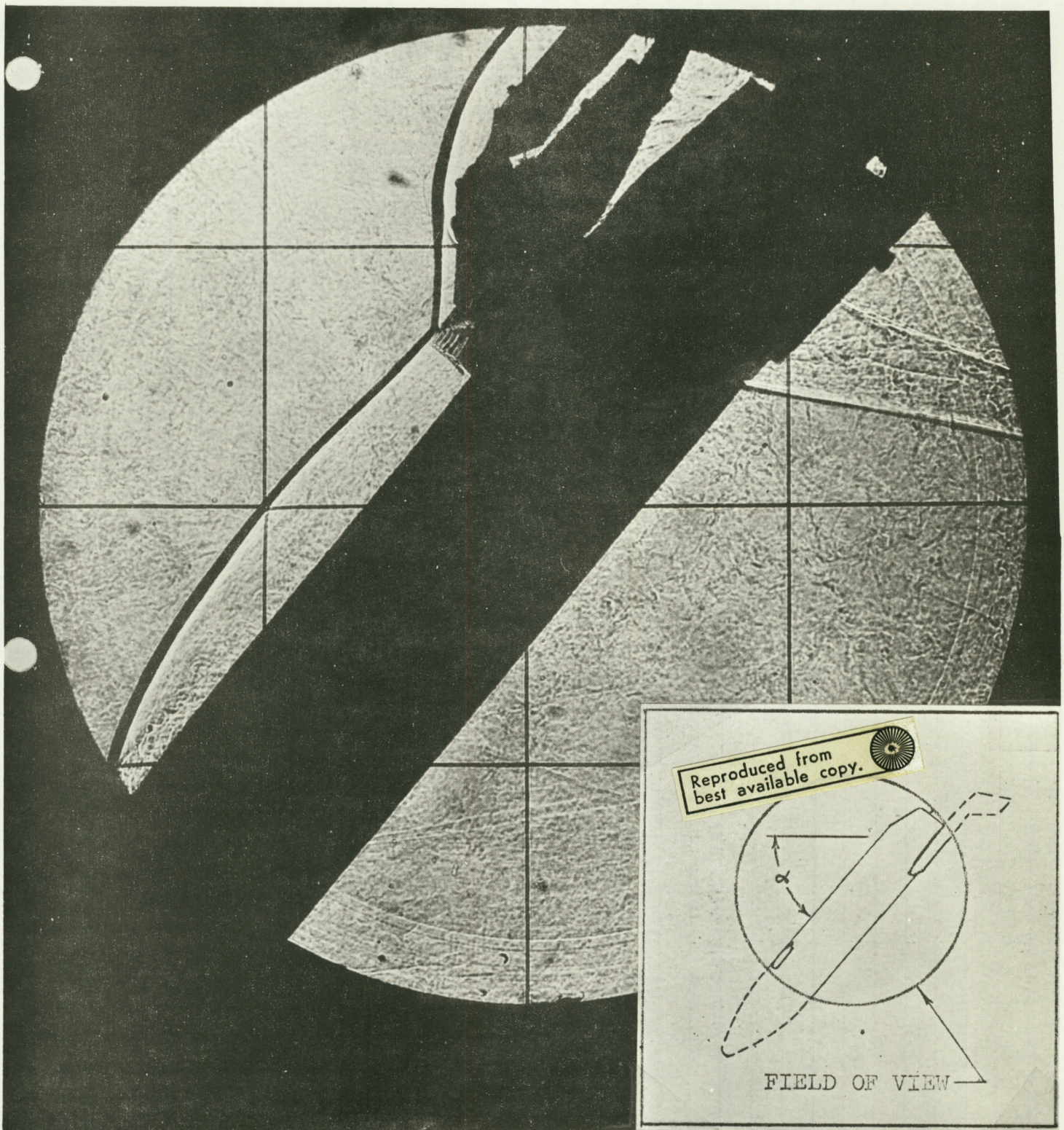
RHOUL/RHOU-INF
GROUP 334 ALPHA-MODEL 50.03 STA(X/L) 0.700



Group 334, α = 50, RAKE STA (X/L) 0.7

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

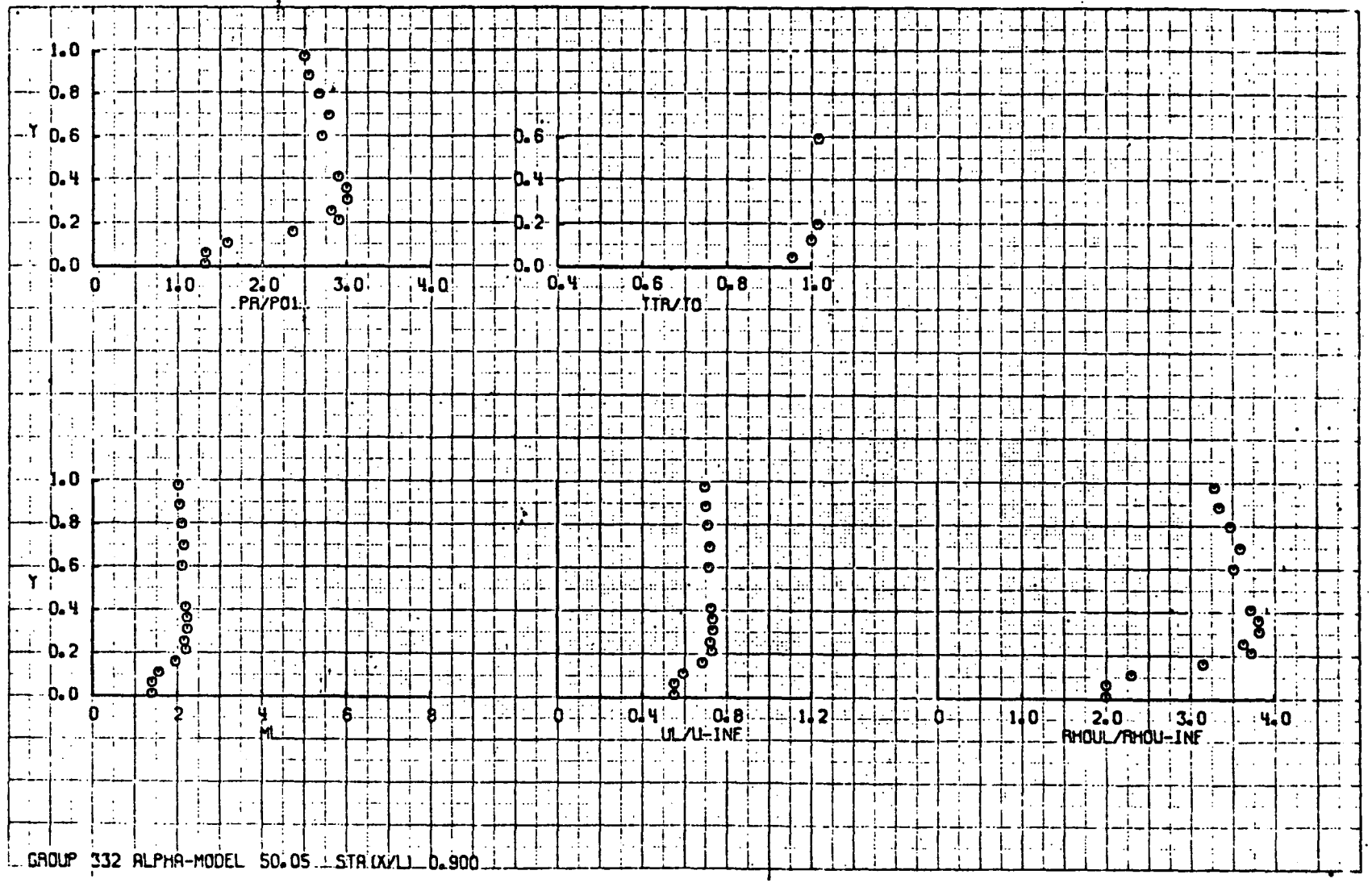
GROUP	CONFIG	MODEL	MACH NO.	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
332	42	MDAC-B	8.00	860.8	1341	50.06	-.06	-50.00	180.00	.0

T-INF (DEG R)	P-INF (PSIA)	PO1 (PSIA)	Q-INF (PSIA)	U-INF (FT/SEC)	RHO-INF (SLUGS/FT3)	MU-INF (LB-SEC/FT2)	RE/FT (FT-1)	MODEL STA (X/L)	L (IN)
97	8.82E-02	7.307	3.950	3865	2.449E-03	7.823E-08	3.763E 06	.900	23.78

CH	POS	TAP	PH (PSIA)	PH/PO1	Y(IN)	PML/PH	ML	REL (FT-1)	TL/T-INF	UL/U-INF	RHOL/RHO-INF	RHOUL/RHOU-INF	MUL/MU-INF
1	3	1	9.678E 00	1.325E 00	.014	3.269E-01	1.403	1.009E 06	9.901	.552	3.6240	2.0005	7.460
2	3	2	9.708E 00	1.329E 00	.066	3.259E-01	1.405	1.011E 06	9.893	.553	3.6269	2.0041	7.456
3	3	3	1.158E 01	1.586E 00	.112	2.733E-01	1.563	1.215E 06	9.269	.595	3.8711	2.3035	7.135
4	3	4	1.725E 01	2.361E 00	.163	1.834E-01	1.964	1.678E 06	7.791	.685	4.6055	3.1560	6.324
5	3	5	2.126E 01	2.910E 00	.216	1.488E-01	2.200	2.391E 06	7.012	.728	5.1173	3.7271	5.864
6	3	6	2.061E 01	2.821E 00	.258	1.535E-01	2.163	2.304E 06	7.129	.722	5.0331	3.6339	5.935
7	3	7	2.195E 01	3.005E 00	.313	1.441E-01	2.239	2.487E 06	6.890	.735	5.2074	3.8265	5.790
8	3	8	2.193E 01	3.003E 00	.365	1.445E-01	2.235	2.477E 06	6.902	.734	5.1983	3.8165	5.798
9	3	9	2.122E 01	2.906E 00	.415	1.491E-01	2.198	2.367E 06	7.018	.728	5.1128	3.7221	5.868
11	3	11	1.977E 01	2.706E 00	.506	1.600E-01	2.116	2.197E 06	7.280	.714	4.9288	3.5182	6.026
12	3	12	2.037E 01	2.788E 00	.702	1.553E-01	2.149	2.272E 06	7.173	.720	5.0024	3.6000	5.961
13	3	13	1.953E 01	2.673E 00	.802	1.620E-01	2.103	2.167E 06	7.324	.711	4.8988	3.4848	6.052
14	3	14	1.861E 01	2.546E 00	.892	1.700E-01	2.046	2.044E 06	7.512	.701	4.7766	3.3483	6.162
15	3	15	1.826E 01	2.499E 00	.981	1.733E-01	2.024	2.000E 06	7.594	.697	4.7311	3.2974	6.205

CH	TC	TTH (DEG R)	TTH/TC (DEG R)	Y(IN)	PML/PO1
1	1	1279	.9538	.051	4.330E-01
2	2	1340	.9993	.131	
3	3	1361	1.0149	.202	
6	6	1364	1.0172	.599	

GROUP
332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PR/P01
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TTR/TO
ML
0.4
0.8
1.2
UL/U-INF
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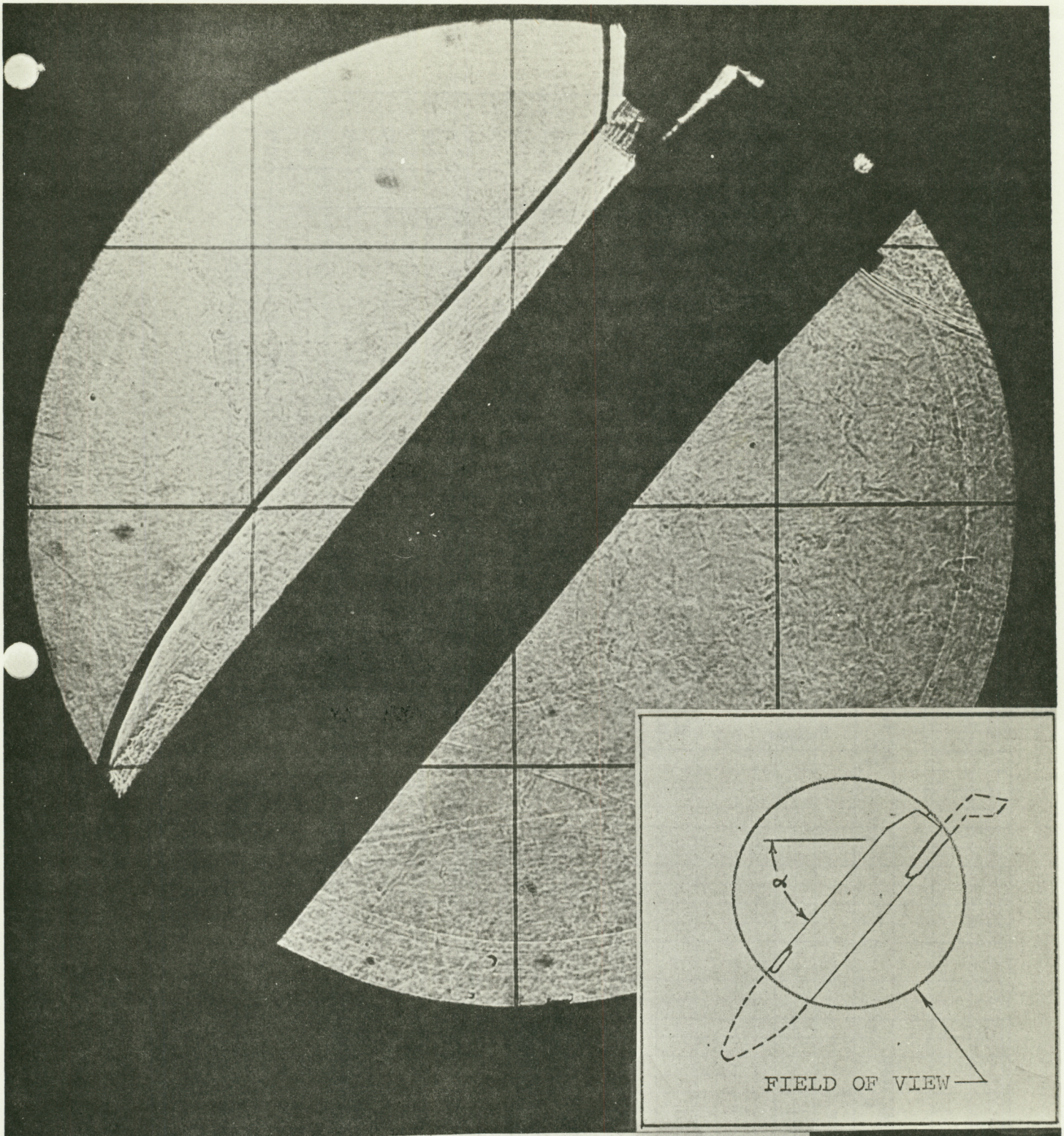
4.0
RHOUL/RHOU-INF
GROUP 332 ALPHA-MODEL 50.05 STA(X/L) 0.900



Group 332, α = 50, RAKE STA (X/L) 0.9