

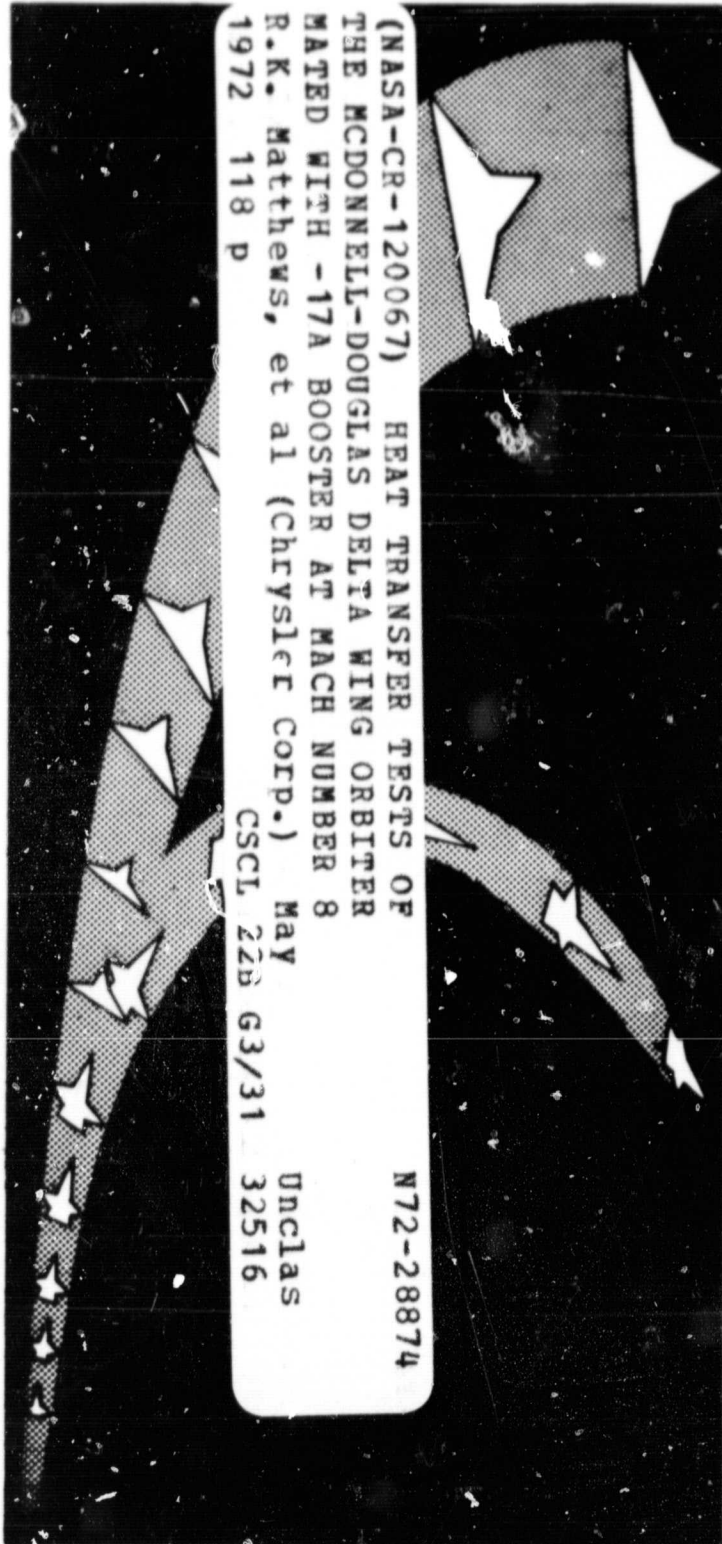
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DMS-DR-1262
CR-120,067
VOLUME I
MAY 1972



—SPACE SHUTTLE—

**HEAT TRANSFER TESTS OF
THE MCDONNELL-DOUGLAS
DELTA WING ORBITER
MATED WITH -17A BOOSTER
AT MACH NUMBER 8**

by

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

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HYPERSONIC
JUL 1972
RECEIVED
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INPUT BRANCH

Arnold Engineering
Development Center

SADSAC SPACE SHUTTLE
AEROTHERMODYNAMIC
DATA MANAGEMENT SYSTEM

CONTRACT NAS8-4016
MARSHALL SPACE FLIGHT CENTER



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May, 1972

SADSAC/SPACE SHUTTLE

WIND TUNNEL TEST DATA REPORT

CONFIGURATION: McDonnell-Douglas Delta Wing Orbiter Mated With
the - 17A Booster

TEST PURPOSE: To Determine Interference Heating at Mach Number of 8

TEST FACILITY: AEDC VKF 50-Inch Hypersonic Tunnel B

TESTING AGENCY: AEDC - MSFC

TEST NO. & DATE: VT 1162-9; June, 1971

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

PROJECT ENGINEER(S): R. K. Matthews, W. R. Martindale, ARO, Inc.
J. D. Warmbrod, MSFC

DATA MANAGEMENT SERVICES

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Aero Thermo Data Group

CONTRACT NAS 8-4016

AMENDMENT 158

DRL 297 - 84a

This report has been prepared by Chrysler Corporation Space Division under a Data Management Contract to the NASA. Chrysler assumes no responsibility for the data presented herein other than its display characteristics.

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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 and Parcel & Associates, Inc.), contract operator of the Arnold Engineering Development Center (AEDC), AFSC, Arnold Air Force Station, Tennessee. Ascent and reentry conditions were simulated on shuttle models designed by McDonnell Douglas (MDAC), North American Rockwell (NAR) and General Dynamics Convair (GDC). In addition a limited amount of data were obtained on two research models provided by the Langley Research Center (LRC). Because of the broad scope of these tests the data will be presented in a series of SADSAC reports. This report presents the results of the phase-change paint test conducted at Mach 8 in Tunnel B on the McDonnell Douglas Delta Wing Orbiter mated with the -17A Booster. This volume (Volume I) contains the mated data and Volume II contains the interference-free data for the orbiter and booster alone.

CONTENTS

<u>Section</u>	<u>Page</u>
LIST OF FIGURES	iv
LIST OF TABLES	iv
NOMENCLATURE	v - vi
1. INTRODUCTION	1
2. MODELS AND APPARATUS	2
2.1 Model Description	2
2.2 Facility Description	2
3. PROCEDURES	3
3.1 Test Techniques	3
3.2 Test Conditions	3
3.3 Data Reduction	4
4. DATA PRESENTATION	4 - 5
REFERENCES	5

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. McDonnell Douglas Delta Wing Orbiter Model Sketch (0.011 Scale)	6
2. McDonnell Douglas -17A Booster Model Sketch (0.011 Scale)	7
3. Photograph of Mated Configurations	7a

LIST OF TABLES

<u>Table</u>	
1. Configuration Description Details	8 - 18
2. Tabulated Model Coordinates	19 - 35
3. Phase-Change Coating Test Data Summary Sheets	36 - 37
4. Summary Data Index	38

NOMENCLATURE

ALPHA-MODEL (α)	Model angle of attack, deg
ALPHA-PREBEND	Sting prebend angle, deg
ALPHA-SECTOR	Tunnel sector pitch angle, deg
H(T ₀) or H	Heat-transfer coefficient based on T _{aw} = T ₀ , BTU/ft ² - sec - °R, and

$$H(T_0) = \frac{\beta \sqrt{\rho c k}}{\sqrt{\Delta t}}$$

where β is obtained from

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

and $\Delta t \sim$ del time

T_{pc} ~ phase-change point temperature, °R

T_i ~ initial model temperature, °R

T_{aw} ~ adiabatic wall temperature, °R

$\sqrt{\rho c k} \sim$ model material properties = 0.11-0.008 $\sqrt{(\Delta t)}$
BTU/ft²-sec^{1/2} - °R

H(.9T ₀)	Heat transfer coefficient based on T _{aw} = 0.9T ₀
H(.85T ₀)	Heat transfer coefficient based on T _{aw} = .85T ₀
HREF	Reference heat transfer coefficient based on Fay-Riddell theory, BTU/ft ² -sec °R

$$HREF = \left[\frac{8.139(P01)^{0.5} (\mu_0)^{0.4} (1-P-INF/P01)^{0.25}}{(RN)^{0.5} (T_0)^{0.15}} \right] \times [0.2235 + 0.0000135 (T_0 + 760)]$$

where P01 ~ stagnation pressure downstream of a normal shock, psia

$\mu_0 \sim$ air viscosity based on T₀, lbf sec/ft²

RN ~ reference nose radius, (0.011 ft)

MU-INF	Free-stream viscosity, lb-sec/ft ²
P-INF	Free-stream static pressure, psia
P0	Tunnel stilling chamber pressure, psia
Q-INF	Free-stream dynamic pressure, psia
RE/FT	Free-stream unit Reynolds number, ft ⁻¹
ROLL-MODEL	Model roll angle, deg
ST(T0)	Stanton number based on T ₀ ,
	$ST(T_0) = \frac{H(T_0)}{\rho_{\infty} V_{\infty} [0.2235 + 0.0000135 (T_0 + T_{pc})] \times (32.17)}$
STREF	Reference Stanton number
	$STREF = \frac{HREF}{\rho_{\infty} V_{\infty} [0.2235 + 0.0000135 (T_0 + T_{pc})] \times (32.17)}$
T-INF	Free-stream static temperature, °R
T0	Tunnel stilling chamber temperature, °R
TW	Model wall temperature, °R
TIME	Time from start of model injection, sec
DEL TIME (Δt)	Time model exposed to airstream, sec
V-INF (V _∞)	Free-stream velocity, ft/sec
YAW	Model yaw angle, deg
X	Axial distance from booster nose to orbiter nose (1.86 in., see Fig. 3)

SECTION 1
INTRODUCTION

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

Heat-transfer rates were determined by the phase-change paint technique on 0.011-scale Stycast[®] models using Tempilaq[®] as the surface temperature indicator. The nominal test conditions were; Mach 8, free-stream unit Reynolds numbers of 0.8×10^6 , 2.5×10^6 , and 3.7×10^6 , and angles of attack of -5, 0, +5 deg. Model details, test conditions, phase-change paint photographs and reduced heat-transfer coefficients are presented in this report.

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 models was subcontracted to the Grumman Aircraft Corporation. Sketches showing the overall model dimensions of the orbiter and booster are presented in Figs. 1 and 2, respectively, and a photograph of the mated configuration is shown in Fig. 3. Table 1 provides additional configuration description details but it should be pointed out that the models were cast as one smooth surface without moveable control surfaces. Presented in Table 2 are model coordinate measurements referenced to the axis system illustrated in Figs. 1 and 2.

Six-in.-diam hemispheres were cast from the same batch of Stycast used to cast the models so that the Stycast thermal properties could be determined from calibration runs on the hemispheres. Also Chromel-Alumel thermocouples were cast into the models approximately 1/8-in. from the surface to measure the initial model temperature.

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

SECTION 3

PROCEDURES

3.1 TEST TECHNIQUE

Prior to each run the models were cleaned and cooled with alcohol and then spray painted with Tempilaq. In some cases the local interference region between the models was sprayed with a higher temperature paint since the surface temperatures were generally higher in this region (see group 206 for example). The models were installed on the model injection mechanism at the desired test attitude and the initial temperature of each model was measured with a thermocouple probe or with the model-embedded thermocouples. During the course of the test many of the embedded thermocouples became inoperative and the probe temperature was generally used to determine the initial temperatures of the models. The models were then injected into the airstream for approximately 20 seconds and during this time the model surface temperature rise produced isotherm melt lines. The progression of the melt lines was photographed with 70-mm sequenced cameras operating at 2 frames per second.

3.2 TEST CONDITIONS

Nominal test conditions are presented in the data summary sheets (Table 2). As mentioned in the foreword this test was part of a comprehensive Space Shuttle investigation and as a result the run numbers are not consecutive. The specific test conditions for each run (or group) are provided on the data tabulation sheets preceding each set of melt line photographs.

During each run the tunnel conditions and time of each picture were recorded on magnetic tape. The heat transfer coefficient for each picture was calculated from the semi-infinite slab transient heat conduction equation.

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

where $\beta = \frac{h\sqrt{\Delta t}}{\sqrt{\rho ck}}$ and $\sqrt{\rho ck} = 0.11 - 0.008 \sqrt{\Delta t}$.

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

Heat-transfer coefficients were calculated for assumed adiabatic wall temperatures of T_0 , $0.9T_0$, and $0.85T_0$ (see tabulated data sheets). The use of three values of T_{aw} provides an indication of the sensitivity of the heat-transfer coefficient (h) to the values of T_{aw} assumed. For the sake of consistency all heat-transfer coefficients shown on the photographs are based on $T_{aw} = T_0$.

All heat-transfer coefficients were non-dimensionalized by dividing by the stagnation point heat-transfer coefficient (Ref. 1) on a 0.011-ft radius sphere (a 1-ft radius sphere scaled down by the model scale).

SECTION 4

DATA PRESENTATION

The test results are presented as a series of four photographs obtained during each run and a post-test photograph of the interference

region when two paints were used. The photographs are grouped as follows:

<u>Model Surface</u>	<u>Re/ft</u>	<u>α</u>
Side view of mated configuration*	0.8×10^6	-5, 0, +5
	2.5×10^6	"
	3.7×10^6	0

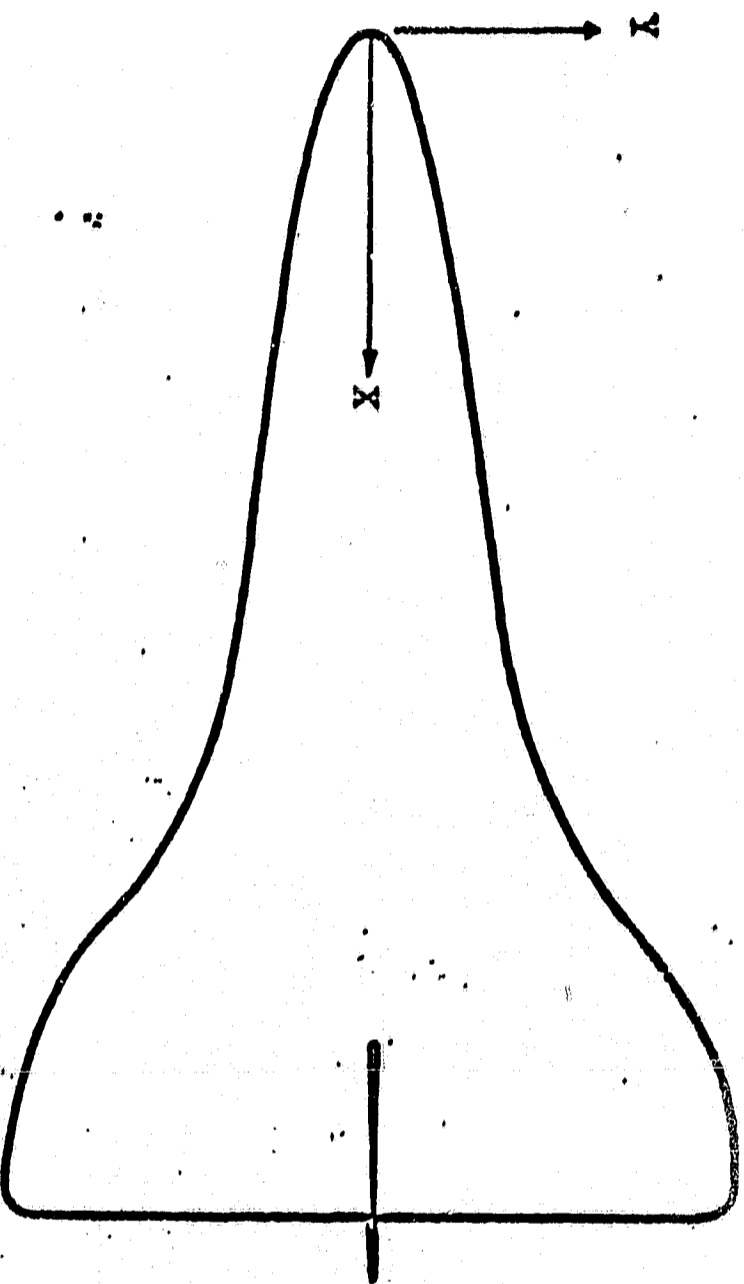
*The corresponding data for the orbiter and booster alone (non-interference) are presented in Volume II.

Preceding each set of photographs is a tabulated data sheet which lists the specific test conditions and the time of each picture with the corresponding heat-transfer parameters. Of course, the heat-transfer parameters apply only to the melt lines of the corresponding picture. Body coordinates of the melt lines may be obtained by use of the grid overlay provided with this report.

The post-test photographs give an indication of the severe heating which can occur between mated configurations if some type of wind shield or seal is not provided along the mating line. The heat-transfer ratios associated with the melt lines in these photographs are approximate because of the uncertainties in time and flow conditions which occur when the model is retracted from the airstream. Table 4, Page 38, presents a Summary Index for these data.

REFERENCES

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



Pressure Orifice	X/L
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.916
10	0.970

All Dimensions in Inches

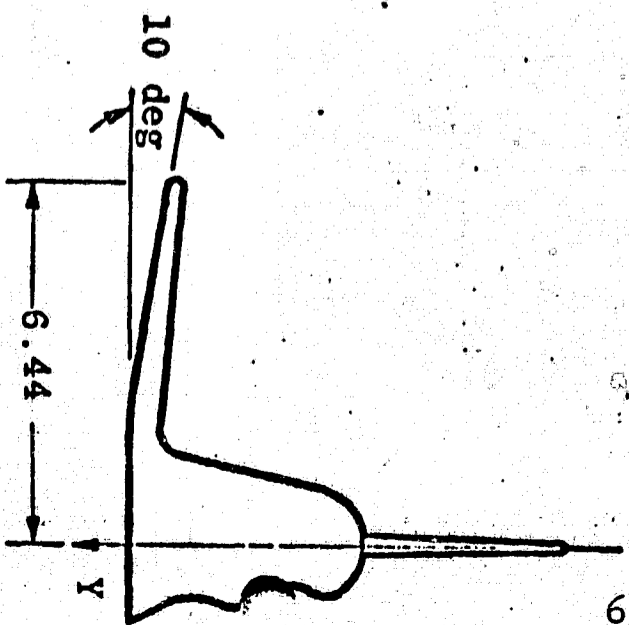
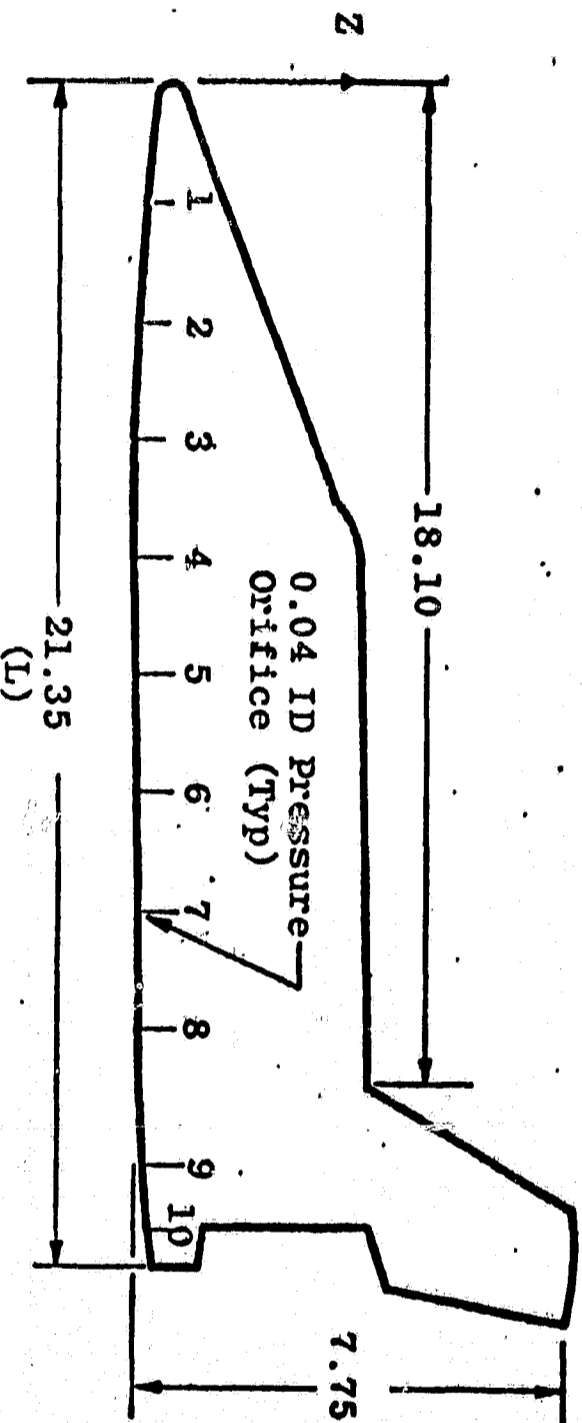
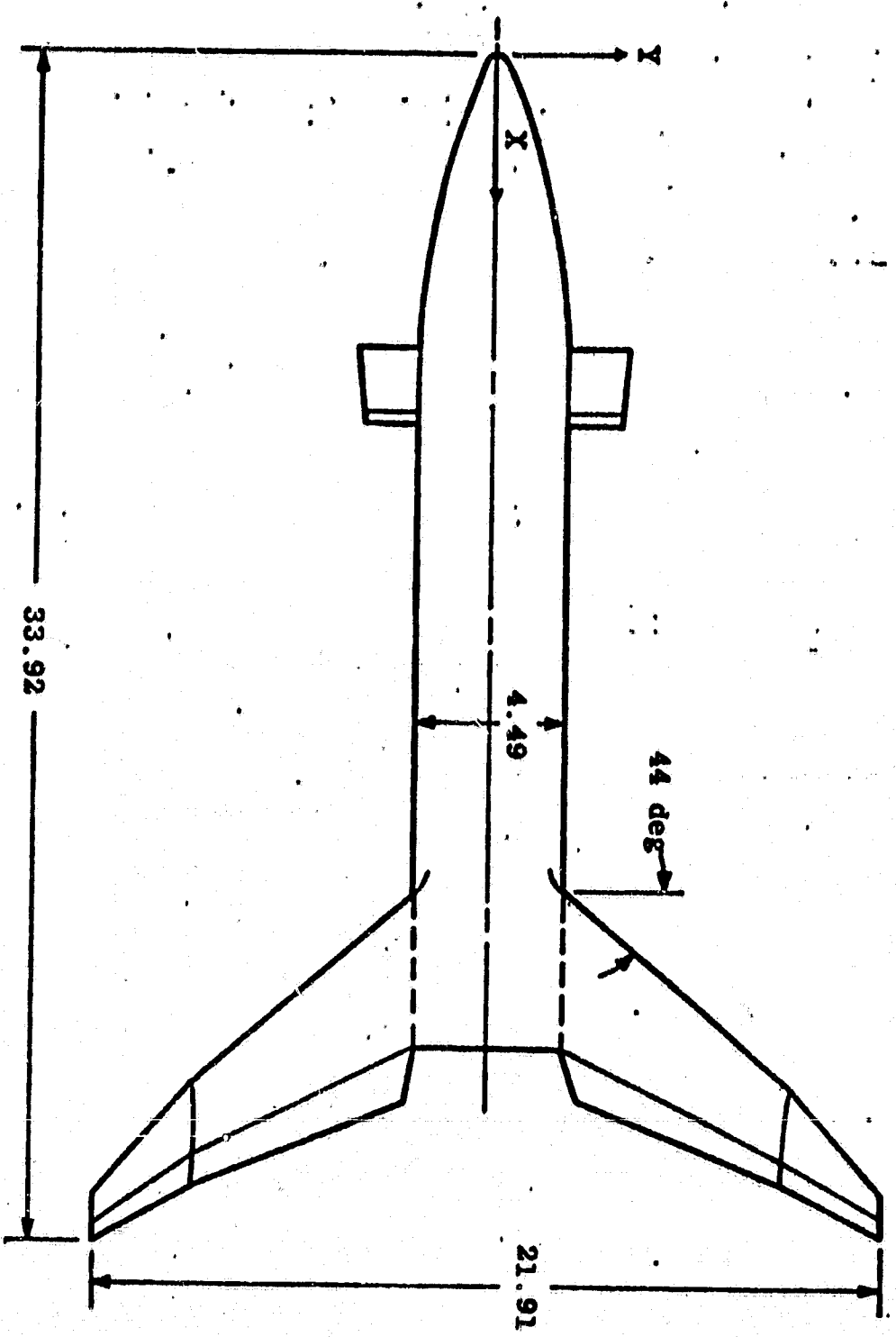
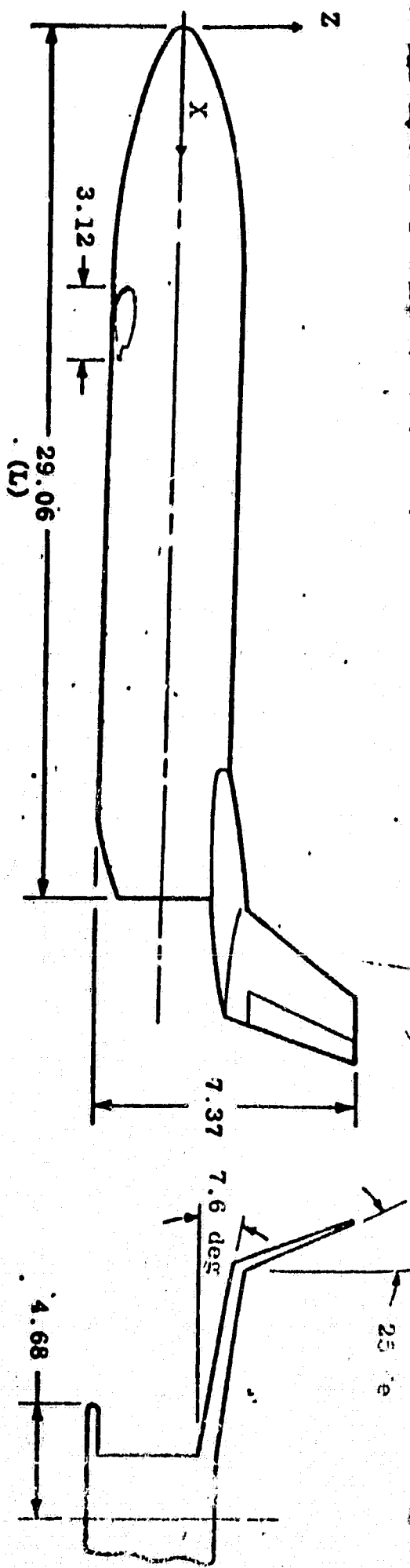


Fig. 1 McDonnell Douglas Delta Wing Orbiter Model Sketch (0.011 Scale)



All Dimensions in Inches
 Model Scale 0.011

Fig. 2 McDonnell-Douglas Booster (MDAC-B)

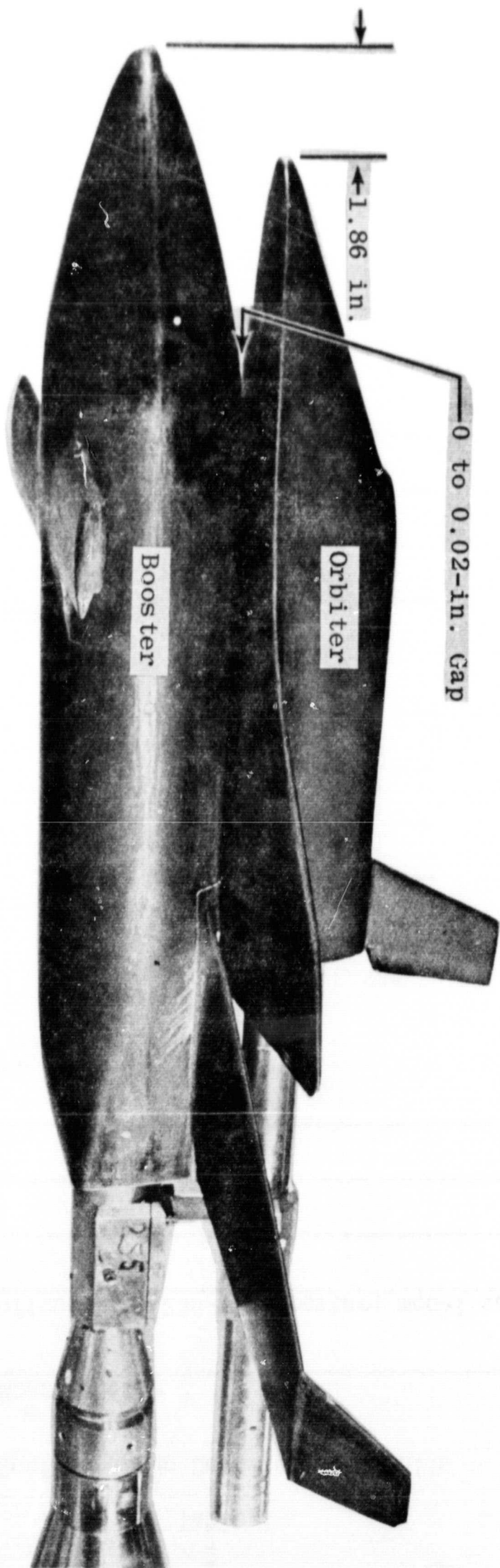


Fig. 3 Photograph of Mated Configurations

Table 1

Configuration Description Details

MODEL COMPONENT: BODY - MDAC Booster

GENERAL DESCRIPTION: Configuration 256-17A booster; model scale 0.011

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

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Length (ft)	<u>220.17</u>	<u>2.42</u>
Max. Width (ft)	<u>34.0</u>	<u>0.374</u>
Max. Depth (ft)	<u>34.0</u>	<u>0.374</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>

MODEL COMPONENT: Wing - MDAC Booster

GENERAL DESCRIPTION: Configuration 17A Wing

Model Scale 0.011

DRAWING NUMBER: _____

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area, ft²

Planform
Wetted

6020.0

.729

Span (equivalent), ft.

146.0

1.606

Aspect Ratio

3.54

3.54

Rate of Taper

Taper Ratio

.435

.435

Dihedral 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

7.59

Tip, (equivalent)

300.0

3.30

MAC, inches

520.0

5.72

Fus. Sta. of .25 MAC

W.P. of .25 MAC

Airfoil Section

Root

0010-64

0010-64

Tip

0010-64

0010-64

EXPOSED DATA

Area, ft²

4190.0

.506

Span, (equivalent)

Aspect Ratio

Taper Ratio

Chords

Root, inches

594.0

6.54

Tip, inches

300.0

3.30

MAC

Fus. Sta. of .25 MAC

W.P. of .25 MAC

MODEL COMPONENT: Elevon - MDAC Booster

GENERAL DESCRIPTION: Configuration 17A Elevons
Model Scale 0.011

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

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area	<u>617 ft²</u>	<u>.0745 ft²</u>
Span (equivalent)	<u>650 in.</u>	<u>7.15 in.</u>
Inb'd equivalent chord	<u>180 in.</u>	<u>1.98 in.</u>
Outb'd equivalent chord	<u>93 in.</u>	<u>1.02 in.</u>
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	<u>.3</u>	<u>.3</u>
At Outb'd equiv. chord	<u>.3</u>	<u>.3</u>
Sweep Back Angles, degrees		
Leading Edge	<u>33</u>	<u>33</u>
Trailing Edge	<u>27</u>	<u>27</u>
Hingeline	<u>33</u>	<u>33</u>
Area Moment (Normal to hinge line), ft ³	<u>2998</u>	<u></u>

MODEL COMPONENT: Vertical Tails - MDAC Booster

GENERAL DESCRIPTION: Configuration 17 Vertical Tails

Model Scale 0.011

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

DIMENSIONS:

TOTAL DATA (Values for one)

FULL-SCALE

MODEL SCALE

Area

Planform (True)
(Side Projection)

438

.0523

Span (equivalent), inches

397

.0478

Aspect Ratio

276

3.03

Rate of Taper

1.21

1.21

Taper Ratio

.520

.520

Diehedral 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

3.30

Tip, (equivalent), inches

156

1.71

MAC, inches

236

2.59

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

MODEL COMPONENT: Canard - MDAC Booster

GENERAL DESCRIPTION: Configuration 17A Canard

Model Scale 0.011

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

DIMENSIONS:

Theo. Area, ft²
Exp Area, ft²
Aspect Ratio
Chord (Incl. Flap), ft
Airfoil (360 In. Theo Chord)

FULL-SCALE

MODEL SCALE

<u>1660</u>	<u>.200</u>
<u>1215</u>	<u>.146</u>
<u>3.0</u>	<u>3.0</u>
<u>23.625</u>	<u>.260</u>
<u>63-018</u>	<u>NACA 63-018</u>

NACA

Table 1

Configuration Description Details

MODEL COMPONENT: BODY - MDAC Orbiter

GENERAL DESCRIPTION: Basic fuselage contours including canopy.

Model scale: 0.011.

DRAWING NUMBER: 255 BJ 00050, Rev. B

DIMENSIONS:

FULL-SCALE

MODEL SCALE

Length. (ft.)

156.4

1.720

Max. Width

27.1

.298

Max. Depth

30.3

.333

Fineness Ratio

Area (ft.²)

Max. Cross-Sectional

627.4

.0759

Planform

3790.0

.459

Wetted

12520.0

1.515

Base

447.0

.0541

Note: All units are ft. or sq. ft.
These data include both sides of the vehicle.

Table 1 - continued

MODEL COMPONENT: Elevon - MDAC Orbiter

GENERAL DESCRIPTION: Model Scale: 0.011

DRAWING NUMBER: 255 BJ 00050, Rev. B

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area, ft ²	<u>963.</u>	<u>.117</u>
Span (equivalent), ft.	<u>73.7</u>	<u>.811</u>
Inb'd equivalent chord, ft.	<u>12.8</u>	<u>.141</u>
Outb'd equivalent chord, ft.	<u>12.8</u>	<u>.141</u>
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord		
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge	<u>0.0</u>	<u>0.0</u>
Tailing Edge	<u>0.0</u>	<u>0.0</u>
Hingeline	<u>0.0</u>	<u>0.0</u>
Area Moment (Normal to hinge line)		

Note: All units are ft., sq. ft., or degrees.
These data include both sides of vehicle.

Table 1 - continued

MODEL COMPONENT: Body Flap - MDAC Orbiter

GENERAL DESCRIPTION: Model Scale: 0.011

DRAWING NUMBER: 255 BJ 00050, Rev. B

<u>DIMENSIONS:</u>	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area, ft ²	<u>140.88</u>	<u>.0170</u>
Span (equivalent), ft.	<u>23.81</u>	<u>.262</u>
Inb'd equivalent chord, ft.	<u>5.333</u>	<u>.0587</u>
Outb'd equivalent chord, ft.	<u>12.80</u>	<u>.141</u>
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord		
At Outb'd equiv. chord		
Sweep Back Angles, degrees		
Leading Edge	<u>0.0</u>	<u>0.0</u>
Tailing Edge	<u>0.0</u>	<u>0.0</u>
Hingeline	<u>0.0</u>	<u>0.0</u>
Area Moment (Normal to hinge line)		

Note: All dimensions in ft., sq. ft., or degrees.
These data include both sides of vehicle.

MODEL COMPONENT: Wing - MDAC Orbiter

GENERAL DESCRIPTION: Model Scale: 0.011

DRAWING NUMBER: 255 BJ 00050, Rev. B

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area, ft ² Planform	5330.	.645
Wetted		
Span (equivalent), ft.	97.5	1.073
Aspect Ratio	1.68	1.68
Rate of Taper		
Taper Ratio	0.230	.230
Dihedral Angle, degrees	10.0	10.0
Incidence Angle, degrees	2.0	2.0
Aerodynamic Twist, degrees	0	0
Toe-In Angle	0	0
Cant Angle	0	0
Sweep Back Angles, degrees		
Leading Edge	55.0	55.0
Trailing Edge	0	0
0.25 Element Line	47.0	47.0
Chords: (ft.)		
Root (Wing Sta. 0.0)	90.43	.995
Tip, (equivalent)	20.80	.229
MAC	63.30	.696
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		
Airfoil Section		
Root	0010-64	0010-64
Tip	0012-64	0012-64

EXPOSED DATA

Area, ft ²	3147.3	.381
Span, (equivalent), ft.	70.5	.776
Aspect Ratio	1.47	1.47
Taper Ratio		
Chords (ft.)		
Root	71.25	.784
Tip	20.80	.229
MAC	52.20	.574
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		

Note: All units are ft., sq. ft. or degrees.

Table 1 - continued

MODEL COMPONENT: Rudder - MDAC Delta Wing Orbiter

GENERAL DESCRIPTION: Model Scale: 0.011

DRAWING NUMBER: 255 BJ 00050, Rev. B

DIMENSIONS:

	<u>FULL-SCALE</u>	<u>MODEL SCALE</u>
Area, ft. ²	<u>.213.9</u>	<u>.0259</u>
Span (equivalent), ft.	<u>27.5</u>	<u>.303</u>
Inb'd equivalent chord, ft.	<u>9.50</u>	<u>.105</u>
Outb'd equivalent chord, ft.	<u>6.10</u>	<u>.0671</u>
Ratio Elevator chord/horizontal tail chord		
At Inb'd equiv. chord	<u>.369</u>	<u>.369</u>
At Outb'd equiv. chord	<u>.369</u>	<u>.369</u>
Sweep Back Angles, degrees		
Leading Edge	<u>30.0</u>	<u>30.0</u>
Tailing Edge	<u>13.38</u>	<u>13.38</u>
Hingeline	<u>19.95</u>	<u>19.95</u>
Area Moment (Normal to hinge line)	<u></u>	<u></u>

Note: All units are ft., sq. ft., or degrees.

MODEL COMPONENT: Vertical Tail - MDAC Orbiter

GENERAL DESCRIPTION: Model Scale: 0.011

DRAWING NUMBER: 255 BJ 00050, Rev. B

DIMENSIONS:

FULL-SCALE

MODEL SCALE

TOTAL DATA

Area, ft. ² Planform Wetted	580.0	.702
Span (equivalent), ft.	27.5	.303
Aspect Ratio	1.30	1.30
Rate of Taper		
Taper Ratio	.638	.638
Dihedral Angle, degrees	0	0
Incidence Angle, degrees	0	0
Aerodynamic Twist, degrees	0	0
Toe-In Angle	0	0
Cant Angle	0	0
Sweep Back Angles, degrees		
Leading Edge	30.0	30.0
Trailing Edge	13.4	13.4
0.25 Element Line	26.2	26.2
Chords: (ft.)		
Root (Wing Sta. 0.0)	25.75	.283
Tip, (equivalent)	16.42	.181
MAC	21.43	.236
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		
Airfoil Section		
Root	0009-64	0009-64
Tip	0009-64	0009-64

EXPOSED DATA

Area, ft. ²	580	.702
Span, (equivalent), ft.	27.5	.303
Aspect Ratio	1.30	1.30
Taper Ratio	.638	.638
Chords (ft.)		
Root	25.75	.283
Tip	16.42	.181
MAC	21.43	.236
Fus. Sta. of .25 MAC		
W.P. of .25 MAC		

Table 2

AECIARO, INC.) ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 Y11162 B00

MODEL GEOMETRY OF MDAC-8 SIDE SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	
1	0	0																			
2	.12																				
3	.24																				
4	.37																				
5	.49																				
6	.61																				
7	.73																				
8	.86																				
9	.98																				
10	1.22																				
11	1.83																				
12	2.44																				
13	3.06																				

AEDCTARO, INC.) ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 V11162 B00

MODEL GEOMETRY OF MDAC-B SIDE SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
24	12.47																		
331	0	-2.15	.32	-2.13	.72	-2.04	1.03	-1.97	1.38	-1.96	1.59	-1.94	1.60	-1.93	1.55	-1.86			
	1.52	-1.81	1.58	-1.76	1.52	-1.67	1.58	-1.55	1.80	-1.25	1.99	-0.98	2.14	-0.44	2.20	0			
	2.20	.01	2.18	.37	2.03	.88	1.78	1.34	1.63	1.61	1.45	1.91	1.32	2.07	1.19	2.15			
	.93	2.21																	
25	12.83																		
356	.13	-2.15	0	-2.15	.55	-2.09	.98	-1.94	1.41	-1.89	1.26	-1.89	1.42	-1.80	1.44	-1.70			
	1.53	-1.56	1.85	-1.14	2.11	-0.49	2.20	0	2.20	.01	2.18	.40	2.02	.90	1.78	1.36			
	1.54	1.75	1.41	1.97	1.32	2.07	1.19	2.15	1.03	2.20	.81	2.21							
26	13.44																		
378	0	-2.14	.20	-2.13	.44	-2.11	.86	-1.97	1.16	-1.82	1.25	-1.81	1.37	-1.70	1.50	-1.54			
	1.75	-1.26	2.00	-0.83	2.14	-0.38	2.20	0	2.20	.01	2.18	.38	1.96	1.04	1.65	1.58			
	1.50	1.82	1.38	2.02	1.29	2.09	1.17	2.16	1.03	2.20	.83	2.21							
27	15.89																		
400	0	-2.15	.35	-2.11	1.01	-1.89	1.53	-1.53	1.91	-1.03	2.15	-0.39	2.20	0	2.20	.01			
	2.16	.40	1.97	1.00	1.72	1.43	1.55	1.74	1.39	1.98	1.26	2.11	1.08	2.20	.89	2.21			
28	18.33																		
416	0	-2.15	0	-2.14	.28	-2.11	.45	-2.10	.72	-2.02	.79	-2.00	1.23	-1.76	1.31	-1.74			
	1.81	-1.20	1.85	-1.16	2.13	-0.53	2.15	-0.44	2.21	0	2.20	0	2.20	.01	2.21	.01			
	2.18	.40	2.15	.50	2.09	.72	1.99	.95	1.86	1.23	1.72	1.44	1.74	1.45	1.56	1.71			
	1.52	1.80	1.41	1.96	1.37	2.02	1.32	2.08	1.23	2.14	1.16	2.16	1.08	2.20	.83	2.21			
	.88	2.21																	
29	18.94																		
449	0	-2.18	.40	-2.13	1.00	-1.92	1.52	-1.56	1.94	-1.00	2.15	-0.48	2.21	0	2.21	.01			
	2.19	.35	2.05	.83	1.93	1.23	1.85	1.43	1.75	1.67	1.63	1.80	1.50	1.91	1.37	2.03			
	1.21	2.14	.97	2.20															
30	19.56																		
467	0	-2.16	.33	-2.14	.81	-2.00	1.38	-1.67	1.75	-1.28	2.14	-0.51	2.21	0	2.21	.01			
	2.19	.35	2.11	.75	2.05	1.93	2.03	1.22	2.00	1.37	1.96	1.51	1.97	1.71	1.93	1.83			
	1.86	1.93	1.70	1.99	1.47	2.03	1.30	2.09	1.10	2.19	.83	2.21							
31	20.78																		
489	0	-2.15	.32	-2.13	.75	-2.02	1.20	-1.80	1.65	-1.42	1.91	-1.06	2.13	-0.53	2.21	0			
	2.21	.01	2.20	.29	2.18	.64	2.14	1.05	2.13	1.38	2.13	1.50	2.16	1.63	2.25	1.74			
	2.46	1.81	2.71	1.89	2.91	1.97	3.01	1.99	2.99	2.00	2.99	2.08	2.88	2.14	2.40	2.19			
32	25.27																		
513	0	-2.14	.53	-2.08	.98	-1.96	1.39	-1.78	1.70	-1.60	1.91	-1.42	2.05	-1.21	2.15	-0.94			
	2.20	-0.49	2.21	0	2.21	.01	2.21	.51	2.21	.88	2.21	1.31	2.21	1.42	2.25	1.53			
	2.33	1.55	3.02	1.63	3.75	1.74	4.40	1.87	4.97	2.00	5.34	2.13	5.48	2.20	5.54	2.22			
	5.50	2.30	5.29	2.35	4.91	2.37													

AEDC(ARO-INC.) ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 VIII62 B00

MODEL GEOMETRY OF MDAC-B SIDE SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
POINT NO.																				
33	28.11																			
540	0	-1.75	.64	-1.72	1.30	-1.67	1.72	-1.63	1.93	-1.55	2.07	-1.44	2.14	-1.31	2.18	-1.17	2.24	-1.03	2.24	1.50
	2.19	-.93	2.20	-.46	2.21	0	2.21	.01	2.24	.48	2.24	.97	2.25	1.30	2.18	1.50	2.24	1.30	2.24	1.50
	2.24	1.60	2.29	1.66	3.10	1.70	4.03	1.76	5.78	1.91	6.97	2.08	7.65	2.24	7.93	2.32	8.04	2.42	8.03	2.46
	8.04	2.42	8.03	2.46	7.92	2.48	7.72	2.49	7.46	2.51	7.15	2.51	6.85	2.51	6.55	2.51	6.25	5.95	5.65	5.35
34	28.97																			
570	0	-1.61	.92	-1.59	1.69	-1.58	1.92	-1.55	2.13	-1.39	2.18	-1.19	2.19	-1.03	2.19	-.60	2.20	1.50	2.22	1.72
	2.20	0	2.20	.01	2.21	.50	2.22	1.11	2.22	1.33	2.20	1.50	2.21	1.67	2.22	1.72	2.21	1.67	2.22	1.72
	2.81	1.75	4.12	1.82	5.40	1.89	6.61	1.99	7.69	2.14	8.38	2.27	8.69	2.40	8.85	2.44	8.92	2.54	8.85	2.54
	8.92	2.54	8.85	2.54	8.67	2.55	8.30	2.57	7.95	2.57	7.55	2.57	7.15	2.57	6.75	2.57	6.35	5.95	5.55	5.15
35	29.58																			
598	3.29	1.85	4.36	1.87	6.03	1.96	7.59	2.09	8.75	2.27	9.33	2.41	9.48	2.47	9.55	2.58	9.53	2.64	9.53	2.64
	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64	9.53	2.64
36	30.56																			
607	3.23	1.98	6.49	2.03	8.10	2.15	9.24	2.26	9.41	2.29	9.51	2.32	9.59	2.38	9.69	2.57	9.85	2.90	10.00	3.26
	9.85	2.90	10.00	3.26	10.07	3.40	10.08	3.56	10.08	3.56	10.08	3.56	10.08	3.56	10.08	3.56	10.08	3.56	10.08	3.56
37	31.78																			
619	7.58	2.15	8.41	2.19	9.25	2.25	9.39	2.26	9.52	2.30	9.62	2.42	9.75	2.68	10.02	3.15	10.28	3.62	10.52	4.12
	10.28	3.62	10.52	4.12	10.71	4.57	10.73	4.68	10.74	4.75	10.74	4.75	10.74	4.75	10.74	4.75	10.74	4.75	10.74	4.75
38	32.08																			
632	8.14	2.20	8.64	2.22	9.15	2.25	9.36	2.26	9.52	2.30	9.62	2.42	9.75	2.68	10.02	3.15	10.39	3.84	10.68	4.42
	10.39	3.84	10.68	4.42	10.84	4.83	10.89	4.95	10.90	5.04	10.90	5.04	10.90	5.04	10.90	5.04	10.90	5.04	10.90	5.04
39	32.69																			
645	9.44	2.33	9.53	2.40	9.62	2.53	9.95	3.10	10.27	3.67	10.62	4.31	10.89	4.83	10.95	4.93	10.95	4.99	10.95	4.99
	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99	10.95	4.99
40	33.00																			
654	9.84	2.95	10.08	3.36	10.35	3.85	10.61	4.31	10.83	4.73	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94
	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94	10.95	4.94
41	33.37																			
660	10.34	3.86	10.57	4.28	10.78	4.64	10.88	4.84	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94
	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94	10.93	4.94
42	33.73																			
665	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99
	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99	10.90	4.99

AEDCLARO-INC-T ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 VTI162 800

MODEL GEOMETRY OF WAC-000 BOTTOM SURFACE - DIMENSIONS IN INCHES - 97 JAN 72

STA NO.	X	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
1	.30	-.18	-.29	-.21	-.20	-.23	-.09	-.24	0	-.24	.10	-.23	.20	-.20
2	.40	-.19	-.29	-.23	-.19	-.25	-.09	-.26	0	-.26	.09	-.25	.19	-.23
3	.50	-.19	-.29	-.23	-.19	-.25	-.09	-.26	0	-.26	.09	-.25	.19	-.23
4	.60	-.19	-.29	-.23	-.19	-.25	-.09	-.26	0	-.26	.09	-.25	.19	-.23
5	.70	-.18	-.28	-.22	-.18	-.25	-.09	-.26	0	-.26	.09	-.25	.19	-.23
6	.80	-.18	-.28	-.22	-.18	-.25	-.09	-.26	0	-.26	.09	-.25	.19	-.23
7	1.00	-.18	-.28	-.22	-.18	-.25	-.09	-.26	0	-.26	.09	-.25	.19	-.23
8	1.60	-.21	-.34	-.25	-.21	-.28	-.10	-.29	0	-.29	.10	-.28	.20	-.26
9	2.26	-.23	-.40	-.27	-.23	-.31	-.11	-.30	0	-.30	.11	-.29	.20	-.26
10	2.80	-.27	-.46	-.31	-.27	-.35	-.12	-.31	0	-.31	.12	-.30	.20	-.26
11	3.40	-.31	-.52	-.35	-.31	-.39	-.13	-.32	0	-.32	.13	-.31	.20	-.26
12	4.00	-.35	-.58	-.39	-.35	-.43	-.14	-.33	0	-.33	.14	-.32	.20	-.26
13	4.60	-.39	-.64	-.43	-.39	-.47	-.15	-.34	0	-.34	.15	-.33	.20	-.26
14	5.20	-.43	-.70	-.47	-.43	-.51	-.16	-.35	0	-.35	.16	-.34	.20	-.26
15	5.80	-.47	-.76	-.51	-.47	-.55	-.17	-.36	0	-.36	.17	-.35	.20	-.26
16	6.40	-.51	-.82	-.55	-.51	-.59	-.18	-.37	0	-.37	.18	-.36	.20	-.26
17	7.00	-.55	-.88	-.59	-.55	-.63	-.19	-.38	0	-.38	.19	-.37	.20	-.26
18	7.60	-.59	-.94	-.63	-.59	-.67	-.20	-.39	0	-.39	.20	-.38	.20	-.26
19	8.20	-.63	-.1.00	-.67	-.63	-.71	-.21	-.40	0	-.40	.21	-.39	.20	-.26
20	8.80	-.67	-.1.06	-.71	-.67	-.75	-.22	-.41	0	-.41	.22	-.40	.20	-.26
21	9.40	-.71	-.1.12	-.75	-.71	-.79	-.23	-.42	0	-.42	.23	-.41	.20	-.26
22	10.00	-.75	-.1.18	-.79	-.75	-.83	-.24	-.43	0	-.43	.24	-.42	.20	-.26
23	10.60	-.79	-.1.24	-.83	-.79	-.87	-.25	-.44	0	-.44	.25	-.43	.20	-.26
24	11.20	-.83	-.1.30	-.87	-.83	-.91	-.26	-.45	0	-.45	.26	-.44	.20	-.26
25	11.80	-.87	-.1.36	-.91	-.87	-.95	-.27	-.46	0	-.46	.27	-.45	.20	-.26
26	12.40	-.91	-.1.42	-.95	-.91	-.99	-.28	-.47	0	-.47	.28	-.46	.20	-.26
27	13.00	-.95	-.1.48	-.99	-.95	-.1.03	-.29	-.48	0	-.48	.29	-.47	.20	-.26
28	13.60	-.99	-.1.54	-.1.03	-.99	-.1.07	-.30	-.49	0	-.49	.30	-.48	.20	-.26
29	14.20	-.1.03	-.1.60	-.1.07	-.1.03	-.1.11	-.31	-.50	0	-.50	.31	-.49	.20	-.26
30	14.80	-.1.07	-.1.66	-.1.11	-.1.07	-.1.15	-.32	-.51	0	-.51	.32	-.50	.20	-.26
31	15.40	-.1.11	-.1.72	-.1.15	-.1.11	-.1.19	-.33	-.52	0	-.52	.33	-.51	.20	-.26
32	16.00	-.1.15	-.1.78	-.1.19	-.1.15	-.1.23	-.34	-.53	0	-.53	.34	-.52	.20	-.26
33	16.60	-.1.19	-.1.84	-.1.23	-.1.19	-.1.27	-.35	-.54	0	-.54	.35	-.53	.20	-.26
34	17.20	-.1.23	-.1.90	-.1.27	-.1.23	-.1.31	-.36	-.55	0	-.55	.36	-.54	.20	-.26
35	17.80	-.1.27	-.1.96	-.1.31	-.1.27	-.1.35	-.37	-.56	0	-.56	.37	-.55	.20	-.26
36	18.40	-.1.31	-.2.02	-.1.35	-.1.31	-.1.39	-.38	-.57	0	-.57	.38	-.56	.20	-.26
37	19.00	-.1.35	-.2.08	-.1.39	-.1.35	-.1.43	-.39	-.58	0	-.58	.39	-.57	.20	-.26
38	19.60	-.1.39	-.2.14	-.1.43	-.1.39	-.1.47	-.40	-.59	0	-.59	.40	-.58	.20	-.26
39	20.20	-.1.43	-.2.20	-.1.47	-.1.43	-.1.51	-.41	-.60	0	-.60	.41	-.59	.20	-.26
40	20.80	-.1.47	-.2.26	-.1.51	-.1.47	-.1.55	-.42	-.61	0	-.61	.42	-.60	.20	-.26
41	21.40	-.1.51	-.2.32	-.1.55	-.1.51	-.1.59	-.43	-.62	0	-.62	.43	-.61	.20	-.26
42	22.00	-.1.55	-.2.38	-.1.59	-.1.55	-.1.63	-.44	-.63	0	-.63	.44	-.62	.20	-.26
43	22.60	-.1.59	-.2.44	-.1.63	-.1.59	-.1.67	-.45	-.64	0	-.64	.45	-.63	.20	-.26
44	23.20	-.1.63	-.2.50	-.1.67	-.1.63	-.1.71	-.46	-.65	0	-.65	.46	-.64	.20	-.26
45	23.80	-.1.67	-.2.56	-.1.71	-.1.67	-.1.75	-.47	-.66	0	-.66	.47	-.65	.20	-.26
46	24.40	-.1.71	-.2.62	-.1.75	-.1.71	-.1.79	-.48	-.67	0	-.67	.48	-.66	.20	-.26
47	25.00	-.1.75	-.2.68	-.1.79	-.1.75	-.1.83	-.49	-.68	0	-.68	.49	-.67	.20	-.26
48	25.60	-.1.79	-.2.74	-.1.83	-.1.79	-.1.87	-.50	-.69	0	-.69	.50	-.68	.20	-.26
49	26.20	-.1.83	-.2.80	-.1.87	-.1.83	-.1.91	-.51	-.70	0	-.70	.51	-.69	.20	-.26
50	26.80	-.1.87	-.2.86	-.1.91	-.1.87	-.1.95	-.52	-.71	0	-.71	.52	-.70	.20	-.26
51	27.40	-.1.91	-.2.92	-.1.95	-.1.91	-.1.99	-.53	-.72	0	-.72	.53	-.71	.20	-.26
52	28.00	-.1.95	-.2.98	-.1.99	-.1.95	-.2.03	-.54	-.73	0	-.73	.54	-.72	.20	-.26
53	28.60	-.1.99	-.3.04	-.2.03	-.1.99	-.2.07	-.55	-.74	0	-.74	.55	-.73	.20	-.26
54	29.20	-.2.03	-.3.10	-.2.07	-.2.03	-.2.11	-.56	-.75	0	-.75	.56	-.74	.20	-.26
55	29.80	-.2.07	-.3.16	-.2.11	-.2.07	-.2.15	-.57	-.76	0	-.76	.57	-.75	.20	-.26
56	30.40	-.2.11	-.3.22	-.2.15	-.2.11	-.2.19	-.58	-.77	0	-.77	.58	-.76	.20	-.26
57	31.00	-.2.15	-.3.28	-.2.19	-.2.15	-.2.23	-.59	-.78	0	-.78	.59	-.77	.20	-.26
58	31.60	-.2.19	-.3.34	-.2.23	-.2.19	-.2.27	-.60	-.79	0	-.79	.60	-.78	.20	-.26
59	32.20	-.2.23	-.3.40	-.2.27	-.2.23	-.2.31	-.61	-.80	0	-.80	.61	-.79	.20	-.26
60	32.80	-.2.27	-.3.46	-.2.31	-.2.27	-.2.35	-.62	-.81	0	-.81	.62	-.80	.20	-.26
61	33.40	-.2.31	-.3.52	-.2.35	-.2.31	-.2.39	-.63	-.82	0	-.82	.63	-.81	.20	-.26
62	34.00	-.2.35	-.3.58	-.2.39	-.2.35	-.2.43	-.64	-.83	0	-.83	.64	-.82	.20	-.26
63	34.60	-.2.39	-.3.64	-.2.43	-.2.39	-.2.47	-.65	-.84	0	-.84	.65	-.83	.20	-.26
64	35.20	-.2.43	-.3.70	-.2.47	-.2.43	-.2.51	-.66	-.85	0	-.85	.66	-.84	.20	-.26
65	35.80	-.2.47	-.3.76	-.2.51	-.2.47	-.2.55	-.67	-.86	0	-.86	.67	-.85	.20	-.26
66	36.40	-.2.51	-.3.82	-.2.55	-.2.51	-.2.59	-.68	-.87	0	-.87	.68	-.86	.20	-.26
67	37.00	-.2.55	-.3.88	-.2.59	-.2.55	-.2.63	-.69	-.88	0	-.88	.69	-.87	.20	-.26
68	37.60	-.2.59	-.3.94	-.2.63	-.2.59	-.2.67	-.70	-.89	0	-.89	.70	-.88	.20	-.26
69	38.20	-.2.63	-.4.00	-.2.67	-.2.63	-.2.71	-.71	-.90	0	-.90	.71	-.89	.20	-.26
70	38.80	-.2.67	-.4.06	-.2.71	-.2.67	-.2.75	-.72	-.91	0	-.91	.72	-.90	.20	-.26
71	39.40	-.2.71	-.4.12	-.2.75	-.2.71	-.2.79	-.73	-.92	0	-.92	.73	-.91	.20	-.26
72	40.00	-.2.75	-.4.18	-.2.79	-.2.75	-.2.83	-.74	-.93	0	-.93	.74	-.92	.20	-.26
73	40.60	-.2.79	-.4.24	-.2.83	-.2.79	-.2.87	-.75	-.94	0	-.94	.75	-.93	.20	-.26
74	41.20	-.2.83	-.4.30	-.2.87	-.2.83	-.2.91	-.76	-.95	0	-.95	.76	-.94	.20	-.26
75	41.80	-.2.87	-.4.36	-.2.91	-.2.87	-.2.95	-.77	-.96	0	-.96	.77	-.95	.20	-.26
76	42.40	-.2.91	-.4.42	-.2.95	-.2.91	-.2.99	-.78	-.97	0	-.97	.78	-.96	.20	-.26
77	43.00	-.2.95	-.4.48	-.2.99	-.2.95	-.3.03	-.79	-.98	0	-.98	.79	-.97	.20	-.26
78	43.60	-.2.99	-.4.54	-.3.03	-.2.99	-.3.07	-.80	-.99	0	-.99	.80	-.98	.20	-.26
79	44.20	-.3.03	-.4.60	-.3.07	-.3.03	-.3.11	-.81	-.1.00	0	-.1.00	.81	-.99	.20	-.26
80	44.80	-.3.07	-.4.66	-.3.11	-.3.07	-.3.15	-.82	-.1.01	0	-.1.01	.82	-.99	.20	-.26
81	45.40	-.3.11	-.4.72	-.3.15	-.3.11	-.3.19	-.83	-.1.02	0	-.1.02	.83	-.99	.20	-.26
82	46.00	-.3.15	-.4.78	-.3.19	-.3.15	-.3.23	-.84	-.1.03	0	-.1.03	.84	-.99	.20	-.26
83	46.60	-.3.19	-.4.84	-.3.23	-.3.19	-.3.27	-.85	-.1.04	0	-.1.04	.85			

AECTAROT-INCEJ ARMOED OFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 V11162 R00

MODEL GEOMETRY OF NOAC-000 BOTTOM SURFACE - DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
13	4.40	-0.29	-1.34	-0.33	-1.25	-0.30	-1.00	-0.68	-0.49	-0.59	0	-0.62	.56	-0.59	1.00	-0.48		
127	1.25	-0.38	1.34	-0.32	1.40	-0.29												
14	5.70	-0.29	-1.24	-0.43	-1.00	-0.52	-0.49	-0.63	0	-0.66	.50	-0.63	1.00	-0.52	1.25	-0.43		
139	1.50	-0.38																
15	4.80	-0.30	-1.50	-0.37	-1.00	-0.56	-0.49	-0.67	0	-0.69	.50	-0.66	1.00	-0.56	1.50	-0.38		
147	1.50	-0.31																
16	4.40	-0.35	-1.44	-0.43	-0.99	-0.68	-0.50	-0.70	0	-0.72	.50	-0.69	1.00	-0.60	1.50	-0.43		
156	1.65	-0.34																
17	7.90	-0.35	-1.54	-0.48	-0.99	-0.63	-0.49	-0.72	0	-0.74	.50	-0.71	1.00	-0.63	1.50	-0.48		
165	1.75	-0.35																
18	4.40	-0.37	-1.74	-0.43	-1.40	-0.53	-0.99	-0.67	-0.50	-0.74	0	-0.75	.50	-0.76	1.00	-0.67		
174	1.75	-0.54	1.74	-0.43	1.85	-0.37												
19	4.60	-0.34	-1.04	-0.40	-1.74	-0.45	-1.50	-0.56	-1.00	-0.60	-0.49	-0.74	0	-0.75	.50	-0.74		
185	1.00	-0.69	1.52	-0.56	1.75	-0.46	1.85	-0.41	1.95	-0.34								
20	0.70	-0.34	-1.74	-0.47	-1.49	-0.57	-1.24	-0.65	-1.04	-0.70	-0.94	-0.71	-0.85	-0.73	-0.75	-0.73		
190	1.40	-0.74	0	-0.74	.50	-0.74	.75	-0.73	.85	-0.72	.95	-0.71	1.05	-0.70	1.25	-0.65		
21	9.00	-0.29	-2.00	-0.36	-1.75	-0.49	-1.49	-0.59	-1.30	-0.65	-1.10	-0.67	-1.00	-0.70	-1.04	-0.70		
217	1.94	-0.72	1.04	-0.73	1.10	-0.70	-0.50	-0.74	0	-0.74	.50	-0.73	.75	-0.73	.85	-0.72		
218	2.09	-0.31																
22	10.40	-0.34	-2.04	-0.39	-1.74	-0.51	-1.50	-0.60	-1.34	-0.65	-1.14	-0.67	-1.04	-0.69	-1.04	-0.71		
242	1.94	-0.72	1.04	-0.73	1.15	-0.70	-0.49	-0.73	0	-0.73	.50	-0.73	.75	-0.73	.85	-0.72		
23	11.00	-0.32																
267	1.25	-0.27	-2.00	-0.43	-1.74	-0.54	-1.50	-0.63	-1.30	-0.68	-1.10	-0.70	-1.00	-0.71	-1.00	-0.72		
268	1.29	-0.68	1.54	-0.64	1.75	-0.56	2.00	-0.45	2.25	-0.30								

RECTARO-INC.7 ARMOED AFS. TENNESSEE
 NON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL 8
 V1162 B00

MODEL GEOMETRY OF WAC-DWG BOTTOM SURFACE - DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	
24	19.00																		
	-2.00	-0.10	-2.20	-0.30	-2.00	-0.40	-1.70	-0.50	-1.60	-0.60	-1.50	-0.70	-1.40	-0.80	-1.30	-0.90	-1.20	-1.00	-1.10
	-1.20	-0.70	-1.00	-0.70	-0.50	-0.70	0	-0.70	0.50	-0.70	0.50	-0.70	0.50	-0.70	0.50	-0.70	0.50	-0.70	0.50
	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00	-0.60	1.00
25	13.00																		
	-2.00	-0.10	-2.00	-0.30	-2.00	-0.40	-2.00	-0.50	-2.00	-0.60	-1.75	-0.64	-1.64	-0.67	-1.54	-0.69	-1.44	-0.71	-1.34
	-1.20	-0.70	-1.20	-0.70	-0.90	-0.70	0	-0.70	0	-0.70	0	-0.70	0	-0.70	0	-0.70	0	-0.70	0
	1.20	-0.70	1.20	-0.70	1.00	-0.69	1.00	-0.67	1.00	-0.64	1.00	-0.56	1.00	-0.54	1.00	-0.46	1.00	-0.44	1.00
	2.20	-0.10	2.20	-0.30	2.20	-0.40	2.20	-0.50	2.20	-0.60	2.20	-0.64	2.20	-0.67	2.20	-0.69	2.20	-0.71	2.20
26	14.00																		
	-2.20	-0.30	-3.00	-0.50	-2.70	-0.70	-2.40	-0.90	-2.10	-1.10	-1.80	-1.30	-1.50	-1.60	-1.70	-1.80	-1.90	-2.00	-2.10
	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00
	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00
	2.20	-0.30	2.50	-0.40	2.75	-0.50	3.00	-0.60	3.25	-0.70	3.50	-0.80	3.75	-0.90	4.00	-1.00	4.25	-1.10	4.50
27	14.00																		
	-2.20	-0.30	-3.00	-0.50	-2.70	-0.70	-2.40	-0.90	-2.10	-1.10	-1.80	-1.30	-1.50	-1.60	-1.70	-1.80	-1.90	-2.00	-2.10
	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00
	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00
	2.20	-0.30	2.50	-0.40	2.75	-0.50	3.00	-0.60	3.25	-0.70	3.50	-0.80	3.75	-0.90	4.00	-1.00	4.25	-1.10	4.50
28	14.00																		
	-2.20	-0.30	-3.00	-0.50	-2.70	-0.70	-2.40	-0.90	-2.10	-1.10	-1.80	-1.30	-1.50	-1.60	-1.70	-1.80	-1.90	-2.00	-2.10
	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00
	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00
	2.20	-0.30	2.50	-0.40	2.75	-0.50	3.00	-0.60	3.25	-0.70	3.50	-0.80	3.75	-0.90	4.00	-1.00	4.25	-1.10	4.50
29	17.00																		
	-2.20	-0.30	-3.00	-0.50	-2.70	-0.70	-2.40	-0.90	-2.10	-1.10	-1.80	-1.30	-1.50	-1.60	-1.70	-1.80	-1.90	-2.00	-2.10
	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00
	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00
	2.20	-0.30	2.50	-0.40	2.75	-0.50	3.00	-0.60	3.25	-0.70	3.50	-0.80	3.75	-0.90	4.00	-1.00	4.25	-1.10	4.50
30	18.00																		
	-2.20	-0.30	-3.00	-0.50	-2.70	-0.70	-2.40	-0.90	-2.10	-1.10	-1.80	-1.30	-1.50	-1.60	-1.70	-1.80	-1.90	-2.00	-2.10
	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00
	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00
	2.20	-0.30	2.50	-0.40	2.75	-0.50	3.00	-0.60	3.25	-0.70	3.50	-0.80	3.75	-0.90	4.00	-1.00	4.25	-1.10	4.50
31	19.00																		
	-2.20	-0.30	-3.00	-0.50	-2.70	-0.70	-2.40	-0.90	-2.10	-1.10	-1.80	-1.30	-1.50	-1.60	-1.70	-1.80	-1.90	-2.00	-2.10
	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00	-0.70	-1.00
	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00	-0.70	1.00
	2.20	-0.30	2.50	-0.40	2.75	-0.50	3.00	-0.60	3.25	-0.70	3.50	-0.80	3.75	-0.90	4.00	-1.00	4.25	-1.10	4.50

AEDC TARD-IN-CT ARNOLD AFB, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 V11162 808

MODEL GEOMETRY OF NOAC-DWD BOTTOM SURFACE - DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X			Y			Z			X			Y			Z		
	POINT NO.	X	Y	Z	POINT NO.	X	Y	Z	POINT NO.	X	Y	Z	POINT NO.	X	Y	Z		
32	20.00																	
	524	-6.20	0.18	-6.12	0.14	-6.00	0.10	-5.50	0.01	-5.00	0.06	-4.50	0.14	-4.00	0.22	-3.50	0.30	
		-7.00	-0.37	-2.50	-0.45	-2.00	-0.53	-1.50	-0.60	-1.25	-0.61	-1.00	-0.61	-0.50	-0.61	0	0	-0.61
		0.50	-0.61	1.00	-0.62	1.25	-0.62	1.50	-0.61	2.00	-0.54	2.50	-0.45	3.00	-0.37	3.50	0	-0.29
33	21.00																	
	555	-6.25	0.22	-6.00	0.19	-5.50	0.11	-5.00	0.04	-4.50	0.02	-4.00	0.10	-3.50	0.17	-3.00	0.25	
		-2.50	-0.32	-2.00	-0.40	-1.50	-0.48	-1.25	-0.51	-1.00	-0.53	-0.50	-0.53	0	-0.53	0.50	0	-0.53
		1.00	-0.53	1.25	-0.53	1.50	-0.49	2.00	-0.41	2.50	-0.33	3.00	-0.26	3.50	-0.18	4.00	0	-0.10
34	21.25																	
	564	-6.00	0.22	-5.50	0.14	-5.00	0.07	-4.50	0	-4.00	0	-3.50	0.07	-3.00	0.14	-2.50	0.29	
		-2.00	-0.36	-1.50	-0.44	-1.25	-0.47	-1.00	-0.49	-0.50	-0.49	0	-0.49	0.50	-0.50	1.00	0	-0.50
		1.25	-0.48	1.50	-0.45	2.00	-0.38	2.50	-0.30	3.00	-0.23	3.50	-0.15	4.00	-0.07	4.50	0	0

AELCIANO INCO 1 ARNOLD AFB, TENNESSEE
 WIND KAMPAN GAS DYNAMICS FACILITY
 30 INCH HYPERSONIC TUNNEL H
 W1162 H00

MODEL GEOMETRY OF WVAL-UWU - SIDE SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
1	0	0	0												
2	0	0	0												
3	0.20	0	0												
4	0.30	0	0												
5	0.40	0	0												
6	0.50	0	0												
7	0.60	0	0												
8	0.70	0	0												
9	0.80	0	0												
10	0.90	0	0												
11	1.00	0	0												
12	1.10	0	0												
13	1.20	0	0												
14	1.30	0	0												
15	1.40	0	0												
16	1.50	0	0												
17	1.60	0	0												
18	1.70	0	0												
19	1.80	0	0												
20	1.90	0	0												
21	2.00	0	0												
22	2.10	0	0												
23	2.20	0	0												
24	2.30	0	0												
25	2.40	0	0												
26	2.50	0	0												
27	2.60	0	0												
28	2.70	0	0												
29	2.80	0	0												
30	2.90	0	0												
31	3.00	0	0												
32	3.10	0	0												
33	3.20	0	0												
34	3.30	0	0												
35	3.40	0	0												
36	3.50	0	0												
37	3.60	0	0												
38	3.70	0	0												
39	3.80	0	0												
40	3.90	0	0												
41	4.00	0	0												
42	4.10	0	0												
43	4.20	0	0												
44	4.30	0	0												
45	4.40	0	0												
46	4.50	0	0												
47	4.60	0	0												
48	4.70	0	0												
49	4.80	0	0												
50	4.90	0	0												
51	5.00	0	0												
52	5.10	0	0												
53	5.20	0	0												
54	5.30	0	0												
55	5.40	0	0												
56	5.50	0	0												
57	5.60	0	0												
58	5.70	0	0												
59	5.80	0	0												
60	5.90	0	0												
61	6.00	0	0												
62	6.10	0	0												
63	6.20	0	0												
64	6.30	0	0												
65	6.40	0	0												
66	6.50	0	0												
67	6.60	0	0												
68	6.70	0	0												
69	6.80	0	0												
70	6.90	0	0												
71	7.00	0	0												
72	7.10	0	0												
73	7.20	0	0												
74	7.30	0	0												
75	7.40	0	0												
76	7.50	0	0												
77	7.60	0	0												
78	7.70	0	0												
79	7.80	0	0												
80	7.90	0	0												
81	8.00	0	0												
82	8.10	0	0												
83	8.20	0	0												
84	8.30	0	0												
85	8.40	0	0												
86	8.50	0	0												
87	8.60	0	0												
88	8.70	0	0												
89	8.80	0	0												
90	8.90	0	0												
91	9.00	0	0												
92	9.10	0	0												
93	9.20	0	0												
94	9.30	0	0												
95	9.40	0	0												
96	9.50	0	0												
97	9.60	0	0												
98	9.70	0	0												
99	9.80	0	0												
100	9.90	0	0												

ACUTIAMO (INC.) AMNOLD AFB, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 30 INCH HYPERSONIC TUNNEL #
 V11102 HQJ

MODEL GEOMETRY OF NOAC-CWC - SIDE SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
13	3.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
65	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
66	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
67	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
68	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
70	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
71	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
72	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
73	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
74	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
76	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
78	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
82	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
84	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
85	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
86	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
87	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
88	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
89	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
91	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
92	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
93	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
94	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
97	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
99	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	4.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ACCIDENT INVESTIGATION REPORT
 WIND TUNNEL TESTS
 BY INCH PYRENSONIC TUNNEL #

MODEL GEOMETRY OF WING-PROP - SIDE SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	POINT NO.	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
34	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
35	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
36	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
37	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
38	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
39	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
40	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
41	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
42	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
43	1400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
		0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17

AEUC (AND INC.) ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL M
 W11b2 HQ

MODEL GEOMETRY OF NUAC-D-00 TOP SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	4	7	1	2	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
POINT NO.	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
1	0	0	0	0												
2	.10	.10	.10	.10	.06	.13	.11	.09	.16	0	.21	.15	.16	.20	.09	.23
3	.20	.20	.25	.07	.19	.10	.10	.10	.23	0	.26	.14	.23	.22	.17	.20
4	.30	.30	.35	.03	.27	.17	.15	.27	0	.30	.17	.26	.27	.19	.34	.10
5	.40	.40	.40	.12	.44	.02	.33	.13	.26	.12	.32	0	.34	.18	.30	.31
6	.50	.50	.43	.06	.37	.10	.27	.25	.13	.35	0	.38	.20	.33	.36	.22
7	.60	.60	.47	.38	.51	.27	.60	.15	.63	.09	.67	0	.68	.07	.53	.53
8	.70	.70	.67	.64	.60	.54	.14	.44	.30	.33	.40	.19	.49	0	.53	.53
9	.80	.80	.77	.67	.64	.64	.25	.62	.42	.48	.57	.25	.78	0	.88	.88
10	.90	.90	.82	.71	.71	.71	.24	.91	.03	.95	.10	.25	.78	0	.88	.88
11	1.00	1.00	1.02	.62	.62	.62	.24	.91	.03	.95	.10	.25	.78	0	.88	.88
12	1.10	1.10	1.07	.57	.57	.57	.24	.91	.03	.95	.10	.25	.78	0	.88	.88
107	1.12	1.12	1.07	.57	.57	.57	.24	.91	.03	.95	.10	.25	.78	0	.88	.88
127	1.12	1.12	1.07	.57	.57	.57	.24	.91	.03	.95	.10	.25	.78	0	.88	.88

ACCTIAO-INC.) ARNOLD AFB, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL H
WILB2 H09

TUNNEL GEOMETRY OF WUAC-U00 TOP SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

SIA NO.	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
13	3.00	-0.22	-1.45	-0.13	-1.39	0	-1.31	.17	-1.17	.50	-1.00	.89	-.88	1.14	-.70	1.43						
14	-1.48	1.70	-0.21	1.97	0	1.93	.25	1.87	.50	1.71	.70	1.50	-.94	1.14	1.13	.73						
	1.27	.39	1.44	0	1.52	-.22																
14	1.43	-.22	-1.57	-0.11	-1.50	0	-1.45	.11	-1.39	.27	-1.31	.51	-1.20	.79	-1.06	1.17						
17	-0.27	1.55	-0.26	1.87	0	1.82	.23	1.77	.41	1.61	.24	1.48	-.24	1.05	.75	1.78						
	.95	1.37	1.13	1.09	1.24	.70	1.39	.41	1.51	.09	1.55	0	1.63	-.16	1.06	-.25						
15	2.60	-.22	-1.04	-0.09	-1.02	0	-1.01	.25	-1.04	.45	-1.08	.67	-1.30	.91	-1.15	1.35						
191	-1.17	1.79	-0.25	2.00	0	1.95	.19	1.90	.24	1.80	.24	1.69	-.47	1.24	.69	2.26						
	.50	1.34	1.08	1.62	1.20	1.33	1.30	1.02	1.40	.70	1.47	.49	1.53	.29	1.67	0						
	1.16	-.12	1.40	-.26																		
16	2.44	-.22	-1.77	-0.13	-1.69	0	-1.56	.25	-1.47	.52	-1.37	.85	-1.22	1.38	-1.06	1.81						
217	-0.23	2.21	-0.20	2.32	0	2.30	.14	2.20	.37	2.09	.41	1.99	-.29	1.09	1.78	1.27	1.29					
	1.40	.24	1.53	.41	1.65	.11	1.71	0	1.82	-.15	1.86	-.25										
17	1.20	-.22	-1.74	-0.14	-1.69	0	-1.62	.13	-1.53	.36	-1.43	.68	-1.31	1.12	-1.16	1.62						
239	-0.24	2.09	-0.13	2.40	0	2.31	.27	2.17	.25	2.04	.14	1.91	-.29	1.12	.19	2.92						
	.26	2.21	.32	2.32	.60	2.54	.23	2.33	.37	2.20	.41	2.09	-.41	1.09	1.78	1.27	1.29					
	1.45	.11	1.33	.43	1.62	.19	1.72	0	1.82	-.14	1.87	-.25										
18	1.20	-.22	-1.43	-0.10	-1.34	0	-1.25	.11	-1.16	.32	-1.08	.59	-1.00	1.00	-1.27	1.30						
269	-1.27	1.64	-1.01	2.05	0	1.94	.23	1.80	.42	1.69	.46	1.58	-.46	1.00	2.92	-.25	2.98					
	.15	2.05	0	3.02	.14	3.02	.34	2.94	.42	2.80	.46	2.72	-.53	2.71	.73	2.53						
	.55	2.23	1.12	1.45	1.24	1.45	1.37	1.04	1.47	.72	1.55	.45	1.64	.19	1.76	-.01						
	1.24	-.13	1.39	-.24																		
19	1.30	-.22	-1.40	-0.14	-1.30	0	-1.20	.11	-1.10	.32	-1.02	.59	-1.00	1.00	-1.27	1.30						
303	-1.29	1.34	-1.16	1.75	0	1.70	.27	1.58	.42	1.47	.46	1.36	-.41	1.00	2.84	-.35	2.96					
	-1.27	1.03	-1.15	3.10	0	3.13	.15	3.09	.32	3.01	.44	2.90	-.48	2.82	.54	2.76						
	.24	2.03	.25	2.31	1.11	1.74	1.24	1.51	1.39	1.06	1.51	.62	1.62	.29	1.75	.02						
	1.27	-.14	1.32	-.24																		
20	1.20	-.22	-1.40	-0.13	-1.30	0	-1.20	.11	-1.10	.32	-1.02	.59	-1.00	1.00	-1.27	1.30						
337	-1.25	1.31	-1.17	1.61	0	1.61	.27	1.50	.42	1.40	.46	1.30	-.41	1.00	2.84	-.35	2.96					
	-1.22	1.12	-1.14	3.17	0	3.17	.20	3.15	.20	3.15	.48	2.97	-.48	2.86	.82	2.65						
	.24	2.31	1.15	2.05	1.24	1.37	1.37	1.24	1.45	.94	1.45	.66	1.62	.37	1.76	.08						
	1.20	-.17	1.30	-.23																		

AEUCIAMO, INC. ANNULD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL #
 WILCOX HALL

MULTI GEOMETRY OF MONO-CURVED TOP SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
21	9.00																	
	-2.02	0.06	-1.97	-0.15	-1.04	-0.06	-1.79	0.00	-1.64	0.24	-1.60	0.40	-1.52	0.64	-1.44	0.94		
	-1.03	1.05	-1.25	1.07	-1.13	1.02	-1.07	2.29	-0.83	2.14	-0.63	2.95	-0.44	3.10	-0.17	3.21		
	0	3.22	0.26	3.19	0.54	3.04	0.24	2.74	1.11	2.35	1.28	1.77	1.41	1.26	1.50	0.83		
22	10.00																	
	-2.13	-0.03	-2.10	-0.15	-1.95	0	-1.83	0.13	-1.74	0.25	-1.63	0.44	-1.54	0.66	-1.44	1.03		
	-1.00	1.03	-1.24	1.06	-1.11	1.04	-0.95	2.71	-0.72	2.59	-0.48	3.14	-0.22	3.22	0	3.24		
	0	3.00	0.00	3.00	0.00	2.00	1.00	2.52	1.19	2.23	1.31	1.74	1.40	1.37	1.48	1.03		
23	11.00																	
	-2.00	-0.12	-2.20	-0.04	-2.07	0.04	-1.95	0.13	-1.78	0.29	-1.66	0.44	-1.57	0.61	-1.51	0.79		
	-1.04	1.05	-1.25	1.03	-1.24	1.07	-1.13	2.32	-1.00	2.05	-0.77	2.95	-0.50	3.13	-0.25	3.22		
	0	3.00	0.34	3.20	0.74	3.00	1.01	2.69	1.18	2.24	1.31	1.74	1.40	1.33	1.46	1.08		
24	12.00																	
	-2.00	-0.12	-2.51	-0.06	-2.46	0	-2.35	0.06	-2.21	0.11	-2.04	0.16	-1.89	0.27	-1.77	0.37		
	-1.00	0.00	-1.24	0.71	-1.05	1.00	-1.27	1.34	-1.29	1.70	-1.21	2.03	-1.11	2.38	-1.00	2.65		
	0	3.00	0.00	3.00	0.00	2.00	0	3.25	0.35	3.20	0.68	3.04	0.90	2.83	1.09	2.52		
25	13.00																	
	-2.00	-0.05	-2.91	0.05	-2.71	0.11	-2.61	0.14	-2.41	0.18	-2.26	0.21	-2.10	0.24	-1.92	0.30		
	-1.00	0.00	-1.72	0.44	-1.03	1.00	-1.49	0.85	-1.42	1.15	-1.29	1.68	-1.20	2.08	-1.07	2.50		
	0	3.00	0.00	3.00	0.00	2.00	0	3.26	0.32	3.20	0.72	3.21	0.54	3.07	0.91	2.82		
26	14.00																	
	-2.00	-0.05	-3.24	0.12	-3.12	0.23	-2.65	0.27	-2.62	0.28	-2.40	0.29	-2.17	0.30	-1.99	0.32		
	-1.00	0.00	-1.73	0.43	-1.04	1.00	-1.54	0.81	-1.52	1.15	-1.45	1.03	-1.38	1.36	-1.31	1.67		
	0	3.00	0.00	3.00	0.00	2.00	0	3.27	0.27	3.24	0.72	3.23	0.54	3.26	0.41	3.19		
27	15.00																	
	-2.00	-0.05	-3.24	0.12	-3.12	0.23	-2.65	0.27	-2.62	0.28	-2.40	0.29	-2.17	0.30	-1.99	0.32		
	-1.00	0.00	-1.73	0.43	-1.04	1.00	-1.54	0.81	-1.52	1.15	-1.45	1.03	-1.38	1.36	-1.31	1.67		
	0	3.00	0.00	3.00	0.00	2.00	0	3.27	0.27	3.24	0.72	3.23	0.54	3.26	0.41	3.19		

ACCIAQUA, INC. 1 ANNOLD AFS, TENNESSEE
 VCU KAMMAN GAS DYNAMICS FACILITY
 50 INCH PNEUMATIC TUNNEL B
 W1162 H00

MODEL GEOMETRY OF QUAC-D00 TOP SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO.	A	L	T	L	Y	Z	Y	Z	Y	Z	Y	Z	Y	Z
28	1.000	.24	-4.53	.34	-4.49	.34	-4.31	.41	-4.03	.42	-3.47	.40	-3.01	.37
	2.000	.21	-1.96	.29	-1.82	.30	-1.73	.33	-1.66	.39	-1.61	.49	-1.57	.41
	3.000	.21	-1.21	2.06	-1.11	2.43	-1.01	2.64	-.82	2.93	-.52	3.14	-.23	3.25
	4.000	.22	.44	3.04	.44	2.40	1.13	2.41	1.29	1.00	1.40	1.32	1.53	.80
	5.000	.34	1.72	.33	1.87	.33	2.20	.29	2.68	.34	3.28	.39	3.74	.42
29	1.000	.31	-5.25	.39	-5.19	.42	-5.05	.47	-4.88	.49	-4.49	.48	-3.94	.43
	2.000	.31	-2.38	.26	-2.01	.22	-1.78	.21	-1.72	.24	-1.67	.28	-1.60	.28
	3.000	1.02	-1.16	2.24	-1.02	2.00	-.78	2.97	-.53	3.14	-.23	3.26	.0	3.28
	4.000	.38	.89	2.85	1.09	2.01	1.23	2.03	1.37	1.45	1.40	.22	1.49	.95
	5.000	.38	1.89	.27	1.97	.22	2.54	.29	3.20	.36	3.71	.41	4.22	.46
30	1.000	.33	-5.75	.43	-5.66	.44	-5.37	.52	-5.14	.51	-4.81	.48	-4.11	.39
	2.000	.28	-1.76	.10	-1.61	.04	-1.72	.08	-1.66	.09	-1.64	.12	-1.58	.28
	3.000	.31	-1.33	1.44	-1.22	1.93	-1.10	2.37	-.94	2.74	-.68	3.03	-.41	3.20
	4.000	.21	.27	3.25	.40	3.07	.85	2.87	1.05	2.52	1.22	1.96	1.14	1.43
	5.000	.29	1.29	.22	1.82	.14	1.67	.11	1.77	.10	2.15	.14	2.73	.22
31	1.000	.34	-5.79	.42	-5.67	.49	-5.54	.51	-5.32	.52	-4.81	.50	-4.57	.44
	2.000	.31	-2.98	.24	-2.35	.15	-1.92	.09	-1.71	.06	-1.65	.04	-1.63	.11
	3.000	.32	-1.40	.74	-1.36	1.30	-1.24	1.84	-1.12	2.30	-.97	2.68	-.77	2.95
	4.000	.28	.28	3.30	.24	3.14	.24	3.30	.28	3.24	.42	3.07	.41	2.77
	5.000	.25	1.29	1.11	1.44	.62	1.55	.32	1.60	.15	1.67	.09	1.75	.09
32	1.000	.35	-6.06	.41	-5.96	.47	-5.80	.51	-5.55	.50	-5.14	.45	-4.42	.35
	2.000	.32	-2.11	.01	-1.70	-.05	-1.58	-.05	-1.53	-.04	-1.50	.04	-1.45	.26
	3.000	1.16	-1.18	1.76	-1.02	2.43	-.81	2.85	-.59	3.08	-.37	3.21	-.22	3.26
	4.000	.34	3.42	.12	3.87	.10	4.32	.07	4.64	-.04	4.80	.06	4.87	.06
	5.000	.16	4.24	.16	3.44	.14	3.83	.17	3.31	.20	3.27	.30	3.24	.58
33	1.000	.34	-6.27	.46	-6.14	.51	-5.94	.52	-5.47	.45	-4.82	.34	-3.89	.20
	2.000	.32	-1.34	.17	-1.42	.17	-1.38	.12	-1.33	.13	-1.25	.13	-1.13	.30
	3.000	.35	3.13	.31	3.60	.31	4.17	.32	4.76	.31	5.34	.34	5.91	.34
	4.000	.21	6.24	.24	6.34	.24	6.45	.24	6.56	.24	6.67	.24	6.78	.24
	5.000	.14	4.02	.15	4.07	.14	4.07	.14	4.07	.14	4.07	.14	4.07	.14

AEUC (AMU) INC. 1 AMPHOLITE AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 20 INCH HYPERSONIC TUNNEL #
 V11162 440

MODEL GEOMETRY OF PHAC-040 TOP SURFACE - ALL DIMENSIONS IN INCHES - 27 JAN 72

STA NO. POINT NO.	X		Y		Z		Y		Z		Y		Z		Y		Z		
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
34	20.24																		
920	-6.46	.02	-2.09	.49	-6.19	.51	-6.06	.51	-1.02	.19	-5.78	.47	-5.33	.40	-4.92	.33	-4.38	.25	
	-3.14	.14	-1.29	0	-2.21	-.07	-1.00	1.44	-1.00	1.44	-.91	2.35	-1.38	-.18	-1.35	-.10	-1.33	.03	
	-1.29	.27	-1.29	.41	-1.07	1.44	-1.00	1.44	-1.00	1.44	-.91	2.35	-1.38	-.18	-1.35	-.10	-1.33	.03	
	.18	.43	-.13	3.35	-.12	5.01	-.12	4.34	-.12	4.34	-.12	3.73	-.12	3.40	-.11	5.73	-.09	6.34	
	-.05	6.02	-.63	6.93	0	6.93	.05	6.94	.05	6.94	.09	6.79	.12	3.38	.12	3.60	.13	4.03	
	.13	4.03	.13	5.22	.13	5.03	.13	6.36	.13	6.36	.14	3.35	.21	3.32	.40	3.25	.61	3.09	
	.23	2.13	.93	2.34	1.02	1.02	1.10	1.33	1.10	1.33	1.20	.73	1.27	.29	1.34	-.12	1.40	-.17	
	1.47	-.17	2.17	-.07	2.99	.03	4.07	.22	4.07	.22	5.01	.37	5.54	.46	5.95	.50	6.12	.51	
	6.23	.44	6.28	.44	6.31	.39													
35	20.50																		
927	-4.44	.41	-1.49	.44	-6.31	.30	-6.12	.44	-1.35	.22	-5.69	.41	-5.04	.31	-4.10	.16	-3.19	.01	
	-2.21	.13	-1.49	-.25	-1.34	-.25	-1.35	-.22	-.34	3.25	-.14	3.31	-.12	5.94	-.12	5.25	-.12	4.62	
	-.94	2.64	-.41	2.64	-.64	3.03	-.34	3.25	-.34	3.25	-.14	3.31	-.12	5.94	-.12	5.25	-.12	4.62	
	-.12	4.17	-.12	3.32	-.11	6.40	-.11	3.73	-.11	3.73	-.10	6.05	-.09	3.33	-.08	6.97	-.12	7.04	
	.04	6.59	.10	3.35	.10	3.40	.11	4.02	.11	4.02	.12	4.71	.12	5.54	.12	6.29	.12	6.76	
	.20	3.11	.29	3.21	.29	3.09	.27	2.40	.27	2.40	.28	2.70	.27	1.80	1.06	1.29	1.16	.66	
	1.24	.15	1.29	-.13	1.33	-.19	1.47	-.22	1.47	-.22	1.94	-.14	2.77	-.02	3.81	.14	4.64	.27	
	5.40	.39	5.45	.45	6.11	.44	6.24	.44	6.24	.44	6.32	.46	6.37	.39					
36	21.00																		
1049	-6.48	.39	-6.32	.44	-6.25	.44	-6.05	.41	-1.10	5.45	-.09	6.06	-.09	6.32	-.09	4.63	-.07	6.97	
	-2.29	.13	-1.75	-.26	-1.29	-.31	-.10	5.45	.04	3.47	.04	3.59	.08	3.93	.08	6.97	.09	4.45	
	-.07	3.79	-.04	3.44	0	7.03	.04	3.47	.04	3.47	.04	3.59	.08	3.93	.08	6.97	.09	4.45	
	.09	5.42	.10	6.07	.10	6.03	1.35	-.24	1.95	-.20	3.15	-.11	4.29	.16	5.15	.30			
	5.15	.37	6.11	.41	6.27	.44	6.37	.39											
37	21.50																		
1025	-0.04	.34	-5.47	.32	-5.24	.23	-4.96	.10	-3.77	-.01	-3.05	-.12	-2.33	-.23	-1.74	-.32			
	-1.25	-.37	-.04	6.73	-.04	5.34	-.04	6.94	-.06	4.21	-.03	3.54	-.08	3.54	-.08	6.98	.05	3.53	
	.06	3.17	.06	4.19	.07	4.01	.07	5.42	.07	6.93	.08	6.16	.08	6.16	.08	1.29	-.37		
	1.58	-.24	2.71	-.17	3.33	-.00	4.34	.07	5.13	.20	5.45	.28							
38	21.50																		
1115	-.04	4.08	-.04	0.51	-.04	3.00	-.04	4.92	-.05	6.94	-.04	4.15	-.01	3.60	0	6.96			
	.02	3.61	.03	3.73	.07	4.00	.05	4.16	.05	5.53	.06	6.91	.07	6.74	.07	6.26			
39	21.50																		
1131	0	4.44																	

Table 3

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of the MDAC Configurations

TEST NUMBER: VT1162-9 TEST FACILITY: VKF Tunnel B

TEST DATE: June 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)	T _{aw} * / Total	RNX106 / Ft	Phase Change Temp. (°F)	Model Position (degrees)			Model Surface
									α	β	φ	
194	MDAC-B + DMO	0.011	8.0	150	1180	1.0	0.8	400	0	0	0	Side
195								250	0			
196								150	0			
+	201							113/400	0			
+	197							250	-5			
+	198							113/500	-5			
+	199							250/400	5			
+	200							113	5			
+	202		0.011	8.0	555	1310	1.0	2.5	300/500	0		
+	203							125/500	0			
+	208							200	0			
+	204							250/500	5			
+	205							150	5			

* T_{aw} :: adiabatic wall temperature

+ Post-test photograph

PHASE CHANGE COATING TEST DATA SUMMARY SHEET

TEST TITLE: Ascent Heat Transfer Test of the MDAC Configurations

TEST NUMBER: VT1162-9 TEST FACILITY: VKF Tunnel B

TEST DATE: June 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)	T _{aw} / Total	RNX106 Ft	Phase Change Temp. (°F)	Model Position (degrees)			Model Surface
									α	β	φ	
206	MDAC-8 + DMO	0.011	8.0	555	1310	1.0	2.5	250/500	-5	0	0	Side
207		"	"	"	"	"	"	150	-5			
209		0.011	8.0	860	1340	1.0	3.7	300/500	0			
210		"	"	"	"	"	"	200	0			
222		0.011	8.0	555	1310	N/A	2.5	01 Flow	0			Top/Side
221												
220												
224												
227								Shado	0	0	0	N/A
225									0	0	90	
226									5		0	
									-5			

* T_{aw} = adiabatic wall temperature

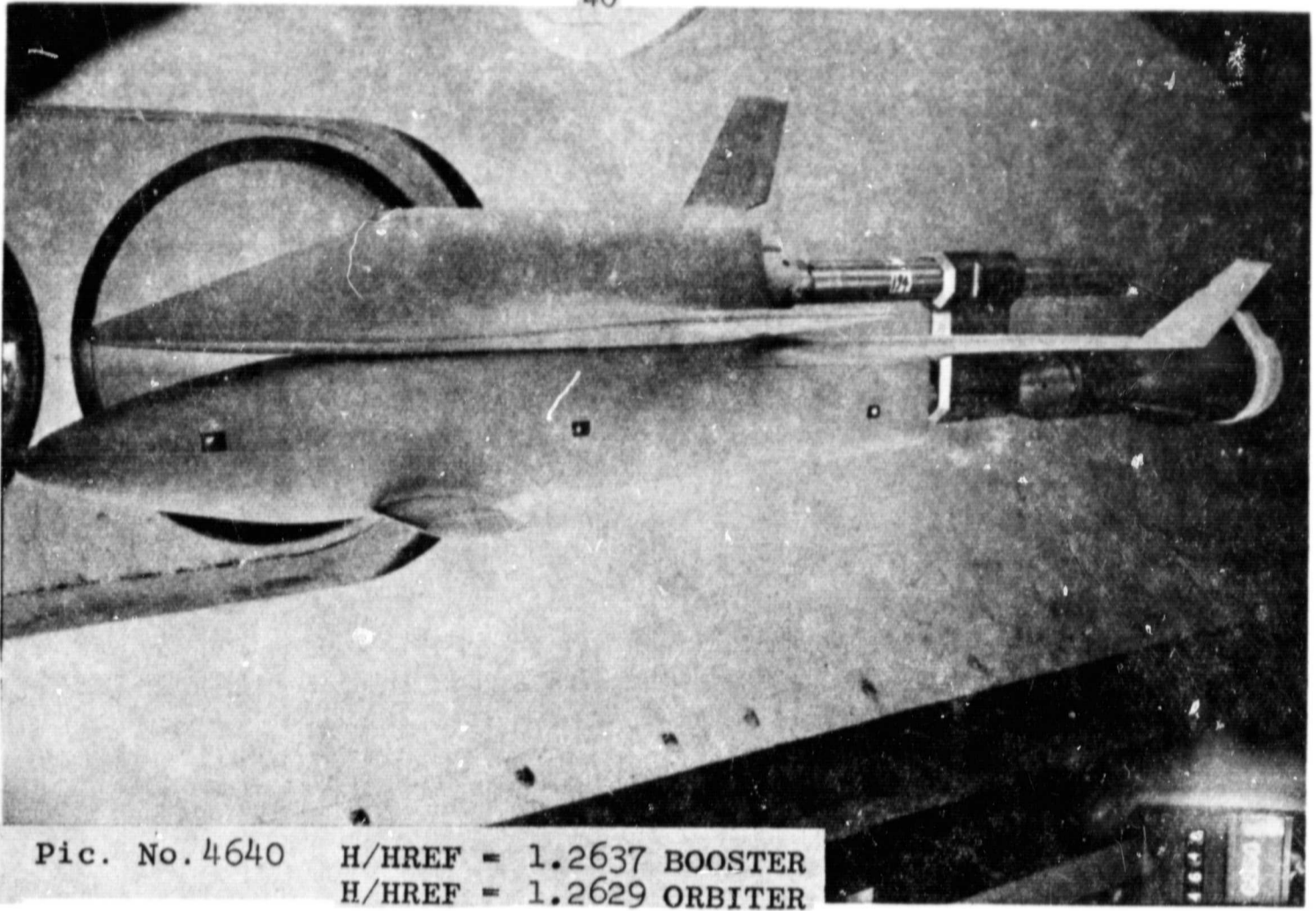
+ Post-test photograph

TABLE 4. SUMMARY DATA INDEX

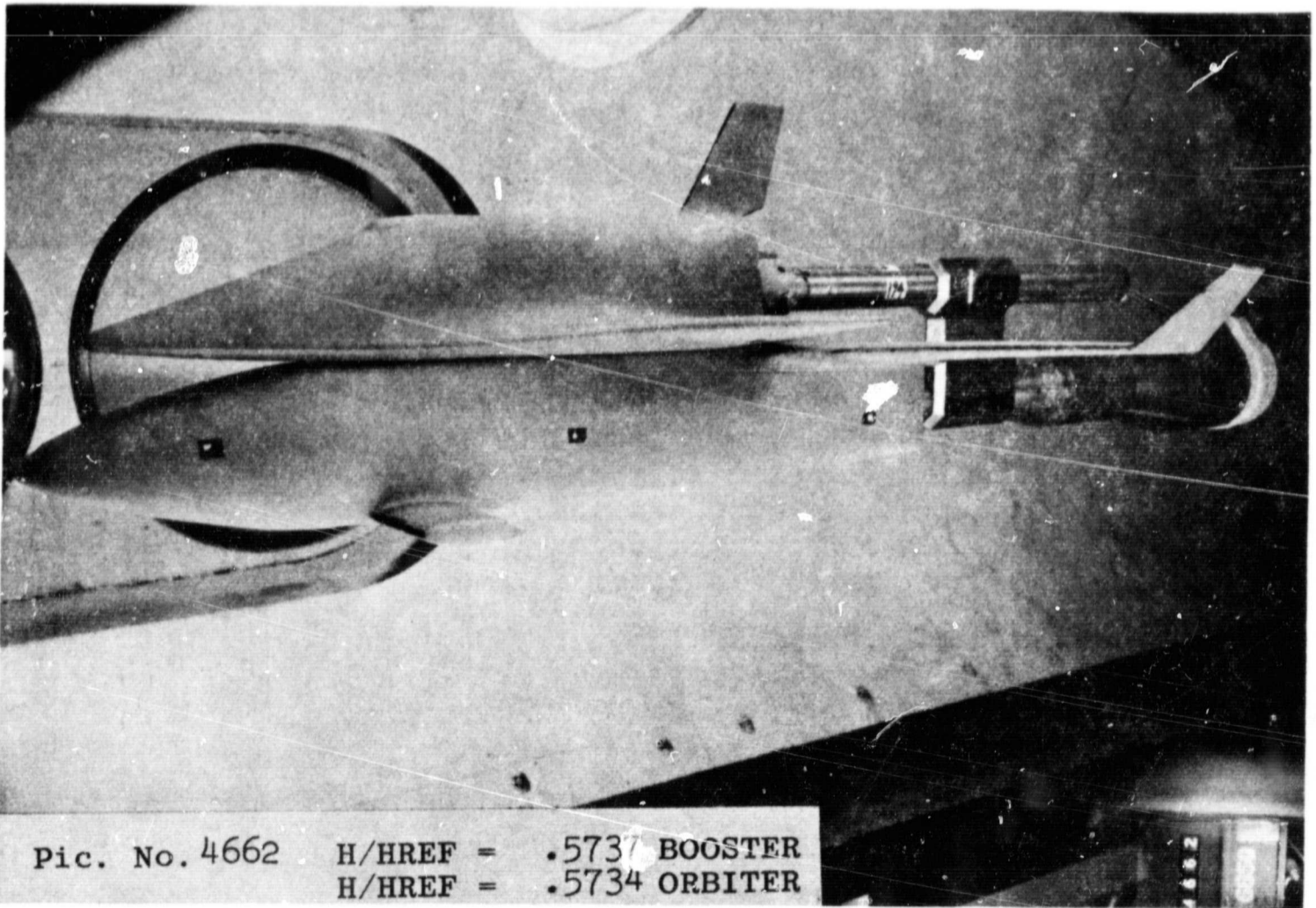
CONFIGURATION	MODEL SURFACE	DATA PRESERVED	PAGES	REYNOLDS NUMBER $\times 10^6$ / FT			ANGLE OF ATTACK - DEGREES			
				0.8	2.5	3.7	-5	0	5	
BOOSTER - ORB	SIDE	A	40 - 41	X						
			43 - 44	X				X		
			46 - 47	X				X		
			48	X				X		
			50 - 51	X				X		
			52	X				X		
			54 - 55	X				X		
			57 - 58	X				X		
			59	X				X		
			61 - 62	X				X		
			64 - 65	X				X		
			67 - 68	X				X		
			69	X				X		
			71 - 72	X				X		
		73	X				X			
		75 - 76	X				X			
		78 - 79	X				X			
		81 - 82	X				X			
		84 - 85	X				X			
		86	X				X			
		88 - 89	X				X			
91 - 92	X				X					
93	X				X					
95 - 96	X				X					
	SIDE	A			X					
					X					
					X					
					X					
					X					
					X					
					X					
					X					
					X					
					X					
					X					
					X					
					X					
	TOP SIDE	C	98	X						
			99	X				X		
			101	X				X		
			102	X				X		
			104	X				X		
			105	X				X		
	SIDE	B	106	X						
			107	X			X			
			108	X			X			
109	X				X					

PRESERVED DATA SCHEDULE

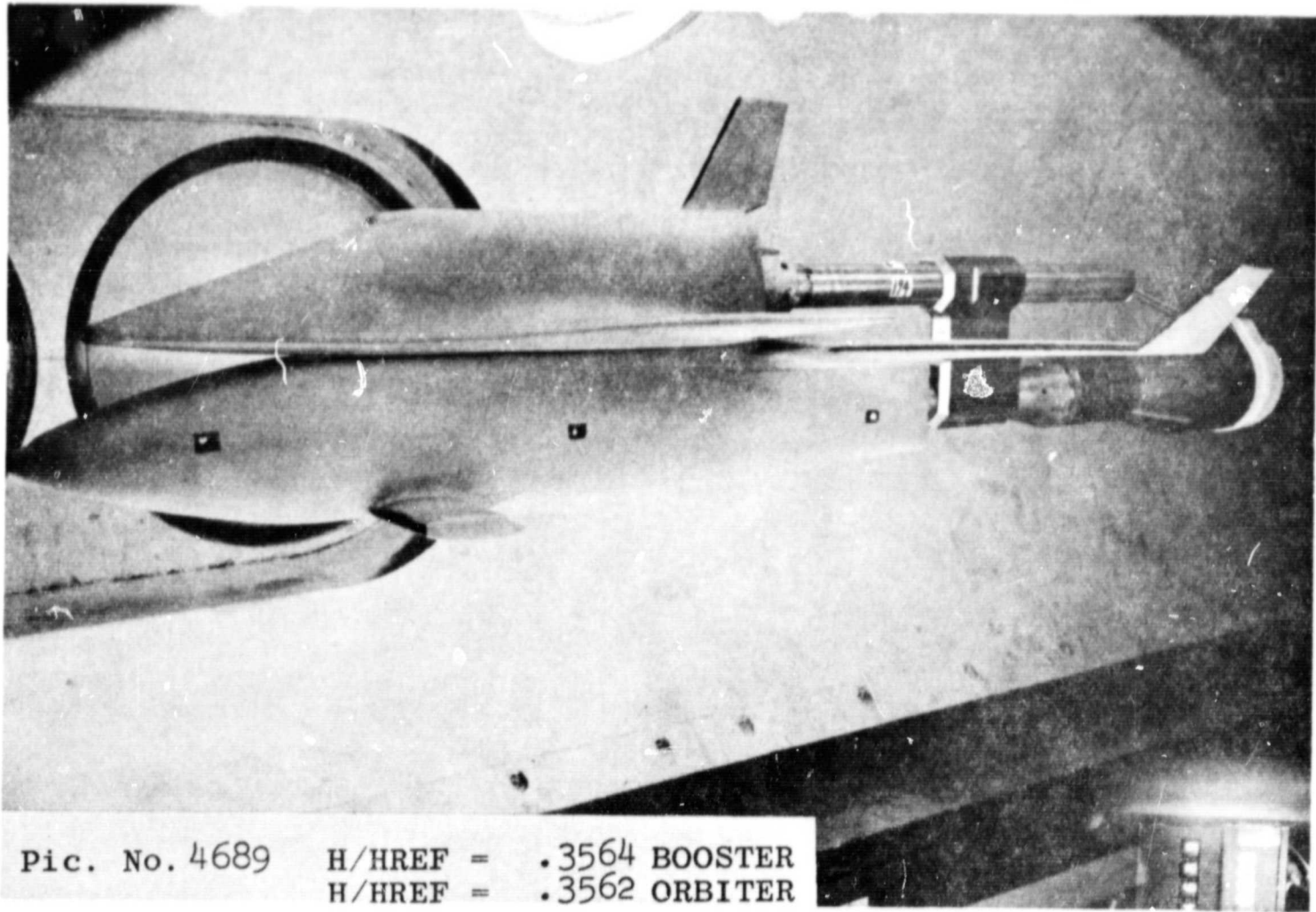
A: PHASE - CHANGE PAINT PHOTOGRAPHS
 B: SHADOWGRAPH PHOTOGRAPHS
 C: OIL FLOW PHOTOGRAPHS



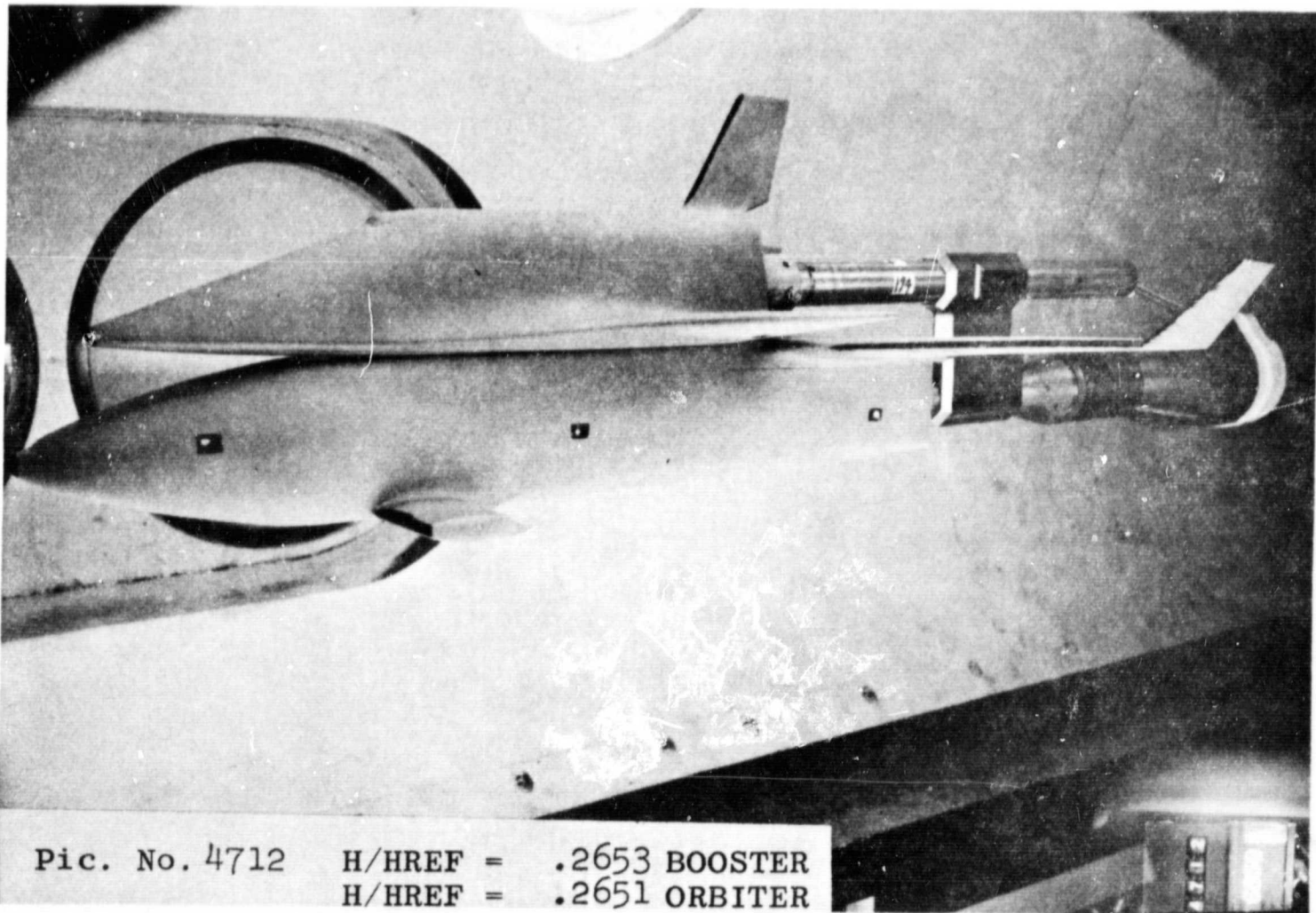
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H/HREF = 1.2629 ORBITER



Pic. No. 4662 H/HREF = .5737 BOOSTER
H/HREF = .5734 ORBITER



Pic. No. 4689 H/HREF = .3564 BOOSTER
H/HREF = .3562 ORBITER



Pic. No. 4712 H/HREF = .2653 BOOSTER
H/HREF = .2651 ORBITER

6/ 3/77

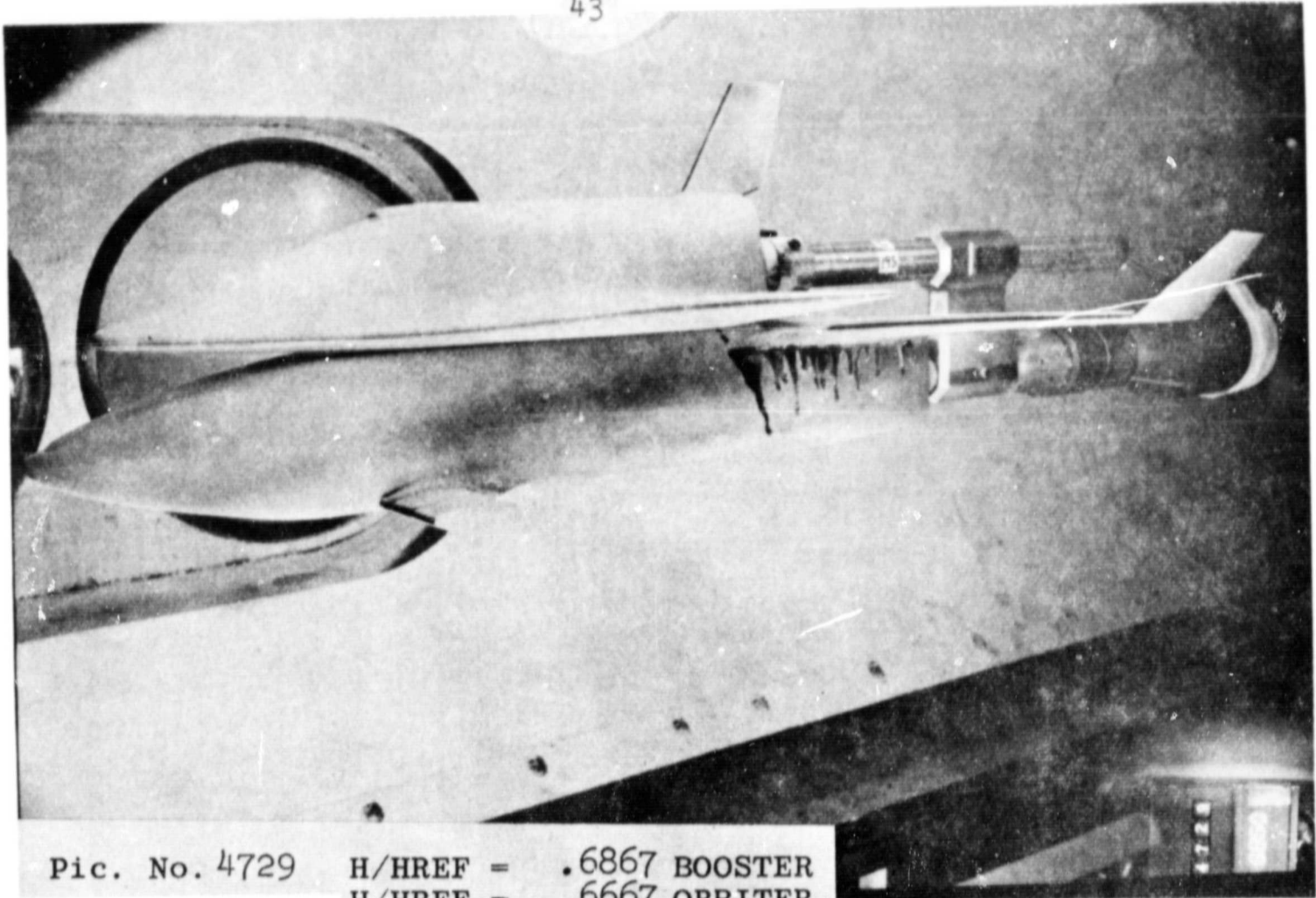
AEDC(ARO-INC.) ARNOLD AFB, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
58 INCH HYPERSONIC TUNNEL B
V11162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-RODL	ALPHA-SECTOR	ALPHA-PREREND	ROLL-MOEL	YAW
195	3122	P0AC-8+DWC	7.93	152.6	1191	.80	.80	0	0	0

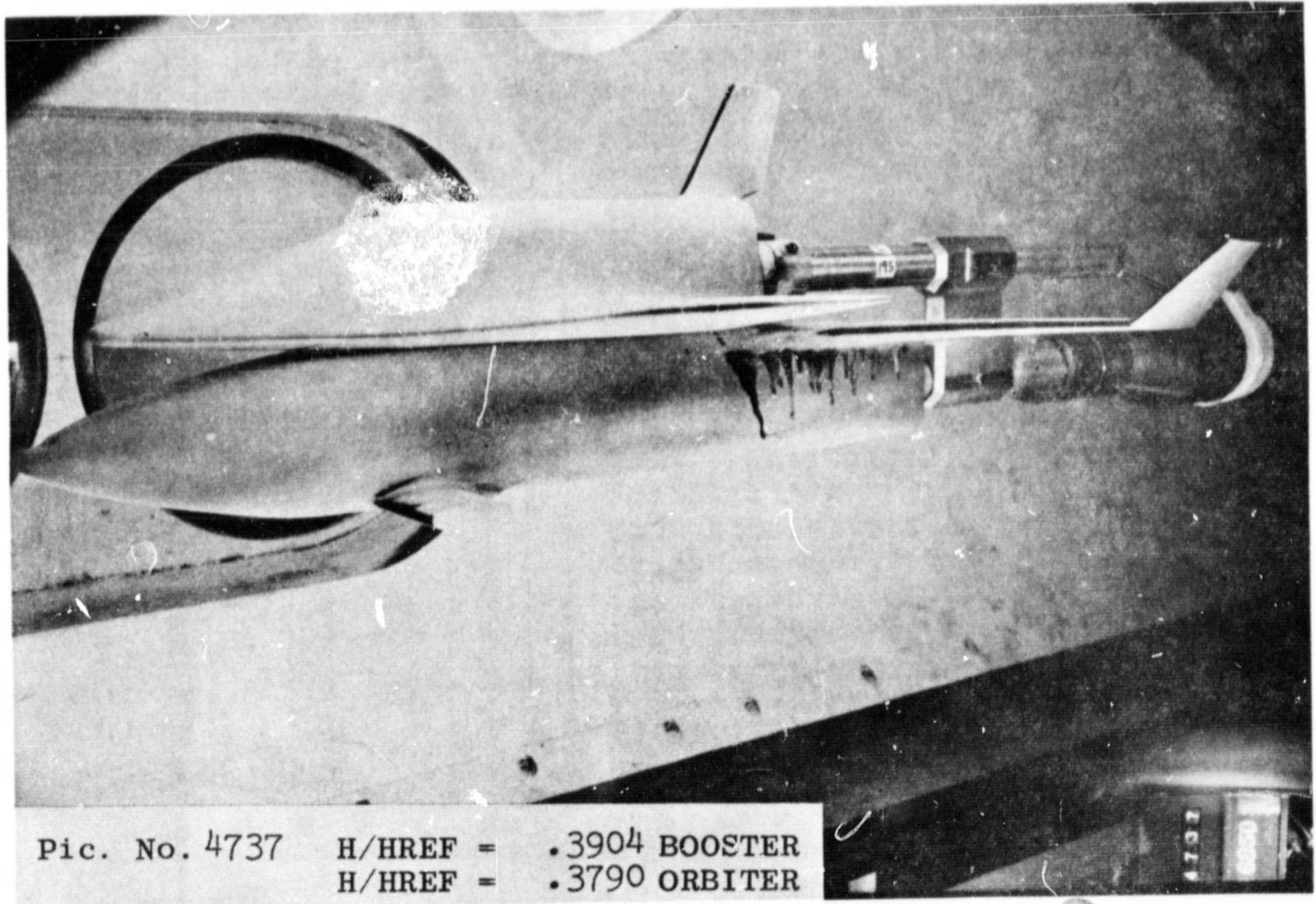
I-IMP	P-IMP	Q-IMP	V-IMP	RHO-IMP	PU-IMP	RE/FT	WREF	STREF
(DEG R)	(PSIA)	(PSIA)	(FT/SEC)	(SLUGS/FT3)	(LB-SEC/FT2)	(FT-1)	(R. .01FT)	(R. .01FT)
87.0	.017	.728	3424	1.596E-05	7.002E-08	P.26E 05	2.630E-02	5.697E-02

CAVITA	PAINT TEMP (DEG F)	INITIAL TEMP (DEG F)	SQUARE ROOT (RMOACIK)
TOP(T)	254		
SIDE(U)	254	AVERAGE TW = 80 (P)	-.008(SQUARE ROOT DEL TIME) = 0.11
SIDE(L)	258	AVERAGE TW = 85 (C)	

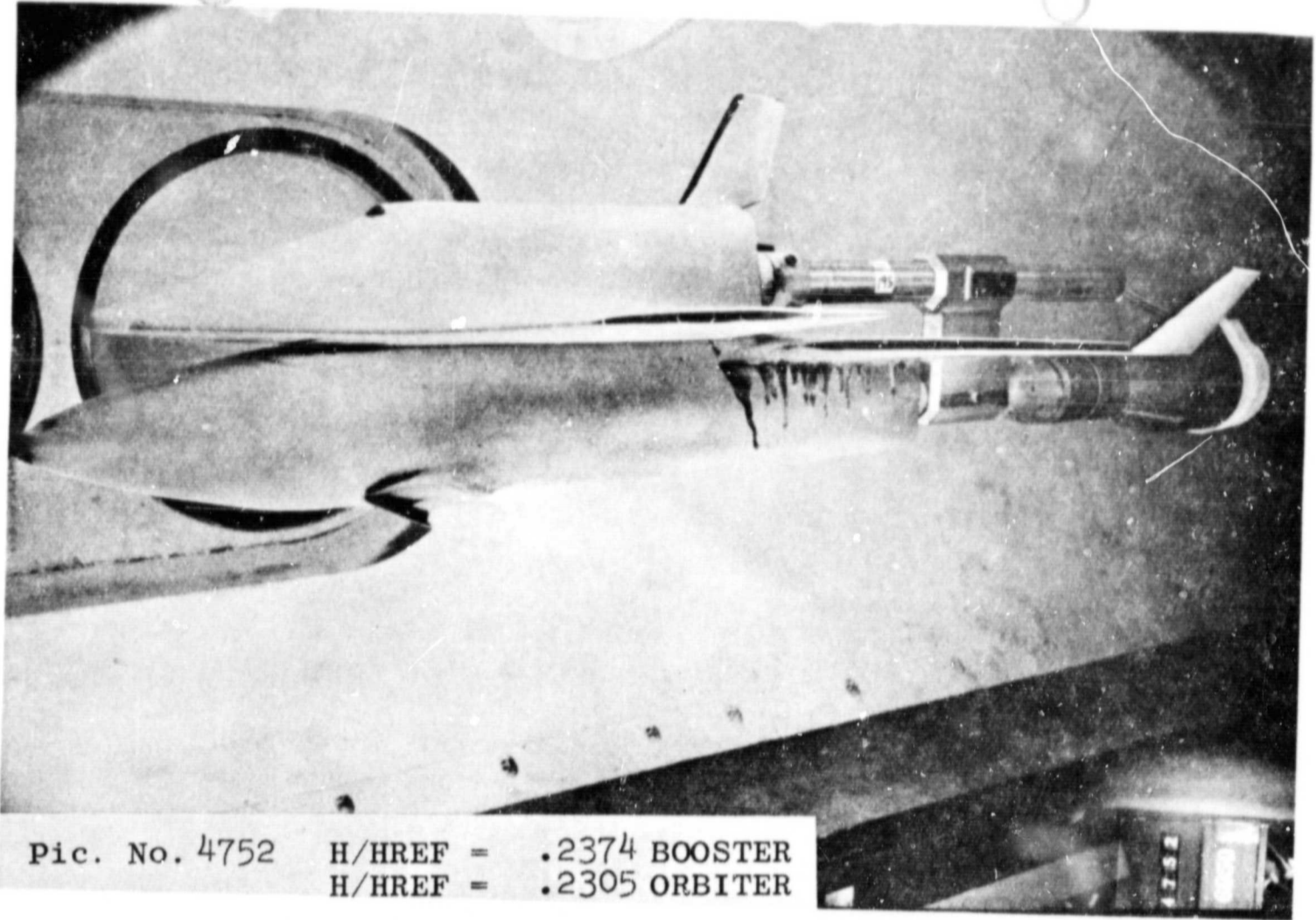
PIC NO	TIME DELTME	M(TO)	M(TO)/WREF	M(.9TO)	M(.5TC)/WREF	M(.85TO)	M(.85TO)/WREF	ST(TO)	MODEL	TEMP F
US 4726 (250)	3.65	2.61	0 1.75E-02	.6667	2.308E-02	.8748	2.728E-02	3.760E-02	01	77 85 03
US 4726 (250)	3.65	2.61	0 1.75E-02	.6667	2.308E-02	.9007	2.808E-02	3.894E-02	01	77 85 03
US 4726 (250)	3.65	2.61	0 1.75E-02	.6667	2.308E-02	.9007	2.708E-02	3.894E-02	01	77 85 03
US 4726 (250)	3.65	2.61	0 1.75E-02	.6667	2.308E-02	.8748	2.728E-02	3.760E-02	01	77 85 03
US 4737 (250)	7.85	6.81	0 9.07E-03	.3794	1.308E-02	.5120	1.596E-02	2.133E-02	01	77 88 03
US 4737 (250)	7.85	6.81	0 9.07E-03	.3794	1.308E-02	.5120	1.596E-02	2.133E-02	01	77 88 03
US 4737 (250)	7.85	6.81	0 9.07E-03	.3794	1.308E-02	.4973	1.551E-02	2.192E-02	01	77 88 03
US 4752 (250)	15.65	14.61	0 0.66E-03	.2305	7.957E-03	.3024	9.437E-03	1.366E-02	03	76 98 02
US 4752 (250)	15.65	14.61	0 0.66E-03	.2305	7.957E-03	.3113	9.714E-03	1.345E-02	03	76 98 02
US 4752 (250)	15.65	14.61	0 0.66E-03	.2305	7.957E-03	.3113	9.714E-03	1.345E-02	03	76 98 02
US 4752 (250)	15.65	14.61	0 0.66E-03	.2305	7.957E-03	.3024	9.437E-03	1.366E-02	03	76 98 02
US 4769 (250)	30.74	29.74	0 3.46E-03	.1392	4.804E-03	.1774	5.534E-03	7.683E-03	08	76 119 01
US 4769 (250)	30.74	29.74	0 3.46E-03	.1392	4.804E-03	.1826	5.696E-03	7.893E-03	08	76 119 01
US 4769 (250)	30.74	29.74	0 3.46E-03	.1392	4.804E-03	.1826	5.696E-03	7.893E-03	08	76 119 01
US 4769 (250)	30.74	29.74	0 3.46E-03	.1392	4.804E-03	.1774	5.534E-03	7.683E-03	08	76 119 01



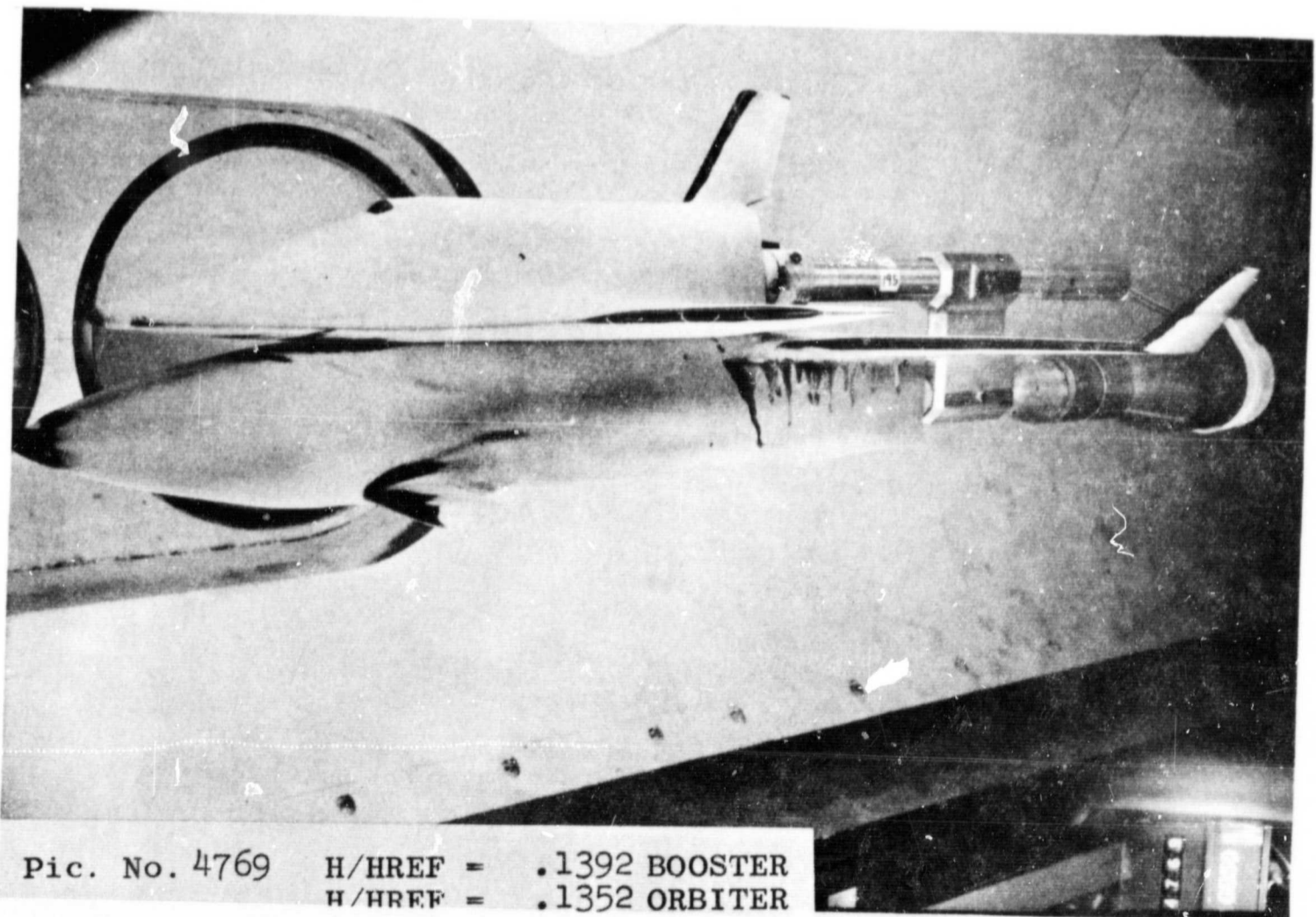
Pic. No. 4729 H/HREF = .6867 BOOSTER
H/HREF = .6667 ORBITER



Pic. No. 4737 H/HREF = .3904 BOOSTER
H/HREF = .3790 ORBITER



Pic. No. 4752 H/HREF = .2374 BOOSTER
 H/HREF = .2305 ORBITER



Pic. No. 4769 H/HREF = .1392 BOOSTER
 H/HREF = .1352 ORBITER

6/ 3/71

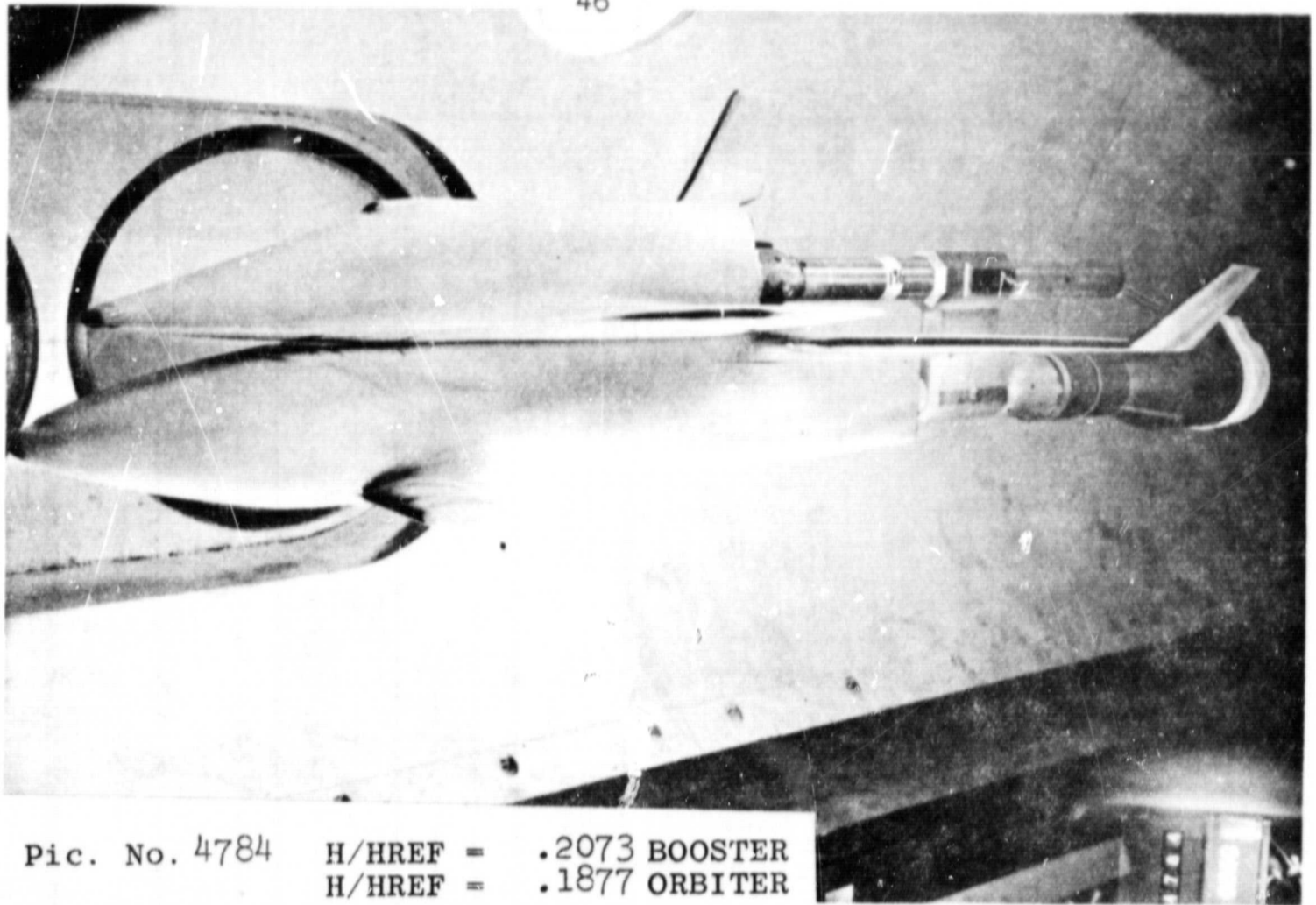
AEDCLARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
58 INCH HYPERSONIC TUNNEL B
V11162

GRUPP CONFID MODEL MACH NO PO PSIA TO DEG R ALPHA-MODEL ALPHA-SECTOR ALPHA-PREBEND ROLL-MODEL VAR
195 1121 PDAC-B-04C 7.93 147.7 1187 .01 .01 0 0

T-Inf P-Inf G-Inf V-Inf RHO-Inf MU-Inf FE/FT WREF STREF
(DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT³) (LB-SEC/FT²) (FT-1) (Ra .01/FT) (Ra .01/FT)
87.4 .816 .705 2673 1.537E-05 7.039E-08 7.93E 05 2.589E-02 5.889E-02

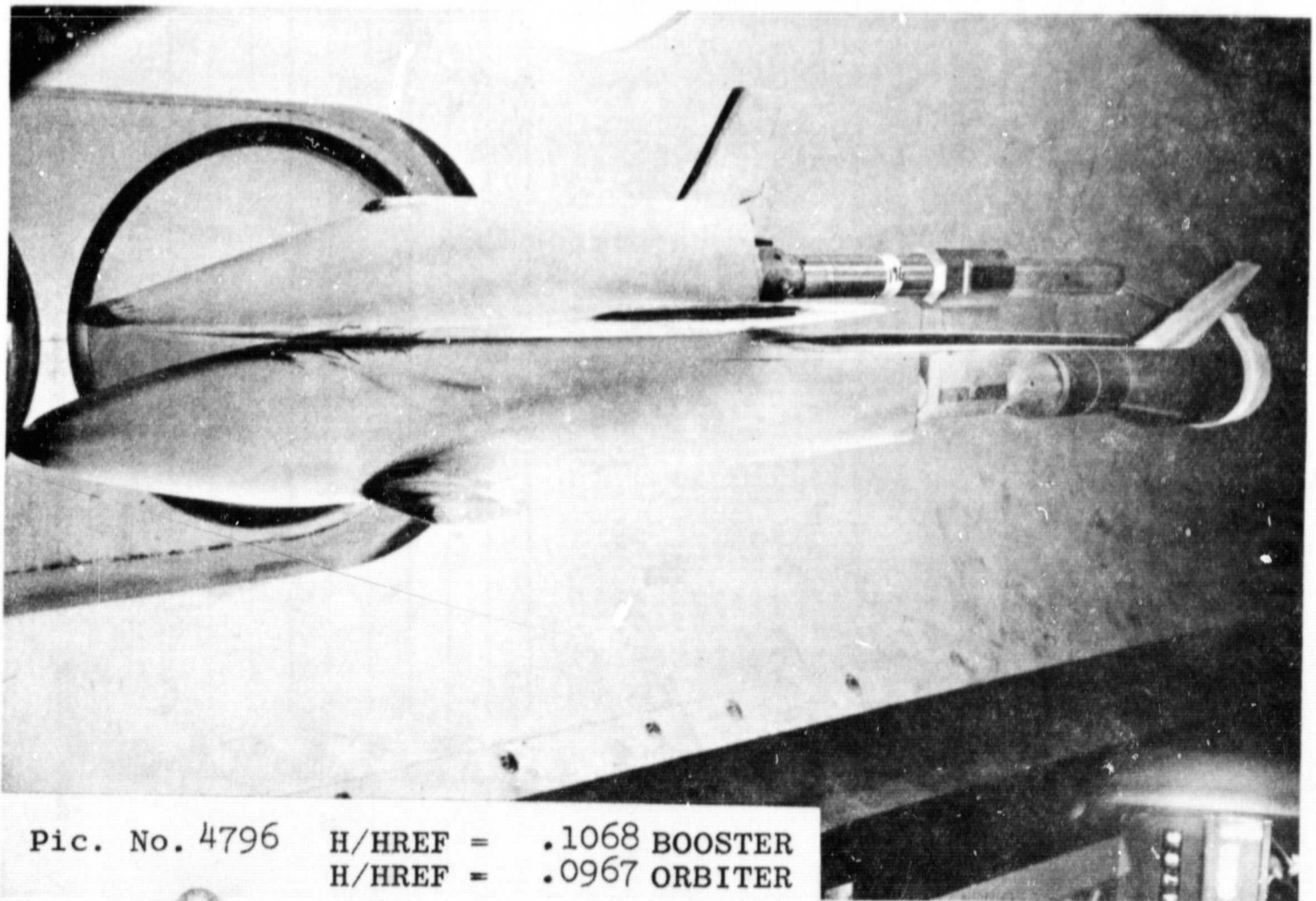
CAVEEA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (RHODICAKI)
TOP (I) 154
SIDE (US) 154 AVERAGE Tm = 84 (R)
SIDE (LS) 154 AVERAGE Tw = 90 (O) --.00815 SQUARE ROOT DEL TIME) * 0.11

PIC MC	TIME	NET TIME	M(TO)	M(TO)/WREF	M(.910)	M(.910)/WREF	M(.8510)	M(.8510)/WREF	ST(TU)	MODEL	TEMP F	
US 4784 (150)	4.20	3.13	0 9.84E-03	.1877	6.068E-03	.2352	6.966E-03	.2401	1.091E-02	86	81	98
US 4784 (150)	4.20	3.13	8 5.77E-03	.2073	6.718E-03	.2594	7.688E-03	.2649	1.205E-02	86	81	98
US 4784 (150)	4.20	3.13	8 5.77E-03	.2073	6.718E-03	.2594	7.688E-03	.2649	1.205E-02	86	81	98
US 4784 (150)	4.20	3.13	0 4.86E-03	.1877	6.089E-03	.2352	6.966E-03	.2401	1.091E-02	86	81	98
US 4796 (150)	10.45	9.38	0 2.50E-03	.0947	3.139E-03	.1211	3.592E-03	.1346	5.616E-03	86	80	98
US 4796 (150)	10.45	9.38	8 2.77E-03	.1048	3.463E-03	.1337	3.963E-03	.1529	6.203E-03	86	80	98
US 4796 (150)	10.45	9.38	8 2.77E-03	.1048	3.463E-03	.1337	3.963E-03	.1529	6.203E-03	86	80	98
US 4796 (150)	10.45	9.38	0 2.50E-03	.0947	3.139E-03	.1211	3.592E-03	.1346	5.616E-03	86	80	98
US 4812 (150)	21.30	20.23	0 1.48E-03	.0569	1.851E-03	.0713	2.118E-03	.0816	3.298E-03	89	79	116
US 4812 (150)	21.30	20.23	8 1.43E-03	.0628	2.042E-03	.0746	2.336E-03	.0940	3.642E-03	89	79	116
US 4812 (150)	21.30	20.23	8 1.43E-03	.0628	2.042E-03	.0746	2.336E-03	.0940	3.642E-03	89	79	116
US 4812 (150)	21.30	20.23	0 1.48E-03	.0569	1.851E-03	.0713	2.118E-03	.0816	3.298E-03	89	79	116
US 4824 (150)	32.89	31.82	0 1.03E-03	.0397	1.293E-03	.0498	1.480E-03	.0549	2.300E-03	93	79	132
US 4824 (150)	32.89	31.82	8 1.04E-03	.0439	1.427E-03	.0549	1.633E-03	.0628	2.541E-03	93	79	132
US 4824 (150)	32.89	31.82	8 1.04E-03	.0439	1.427E-03	.0549	1.633E-03	.0628	2.541E-03	93	79	132
US 4824 (150)	32.89	31.82	0 1.04E-03	.0397	1.293E-03	.0498	1.480E-03	.0549	2.300E-03	93	79	132



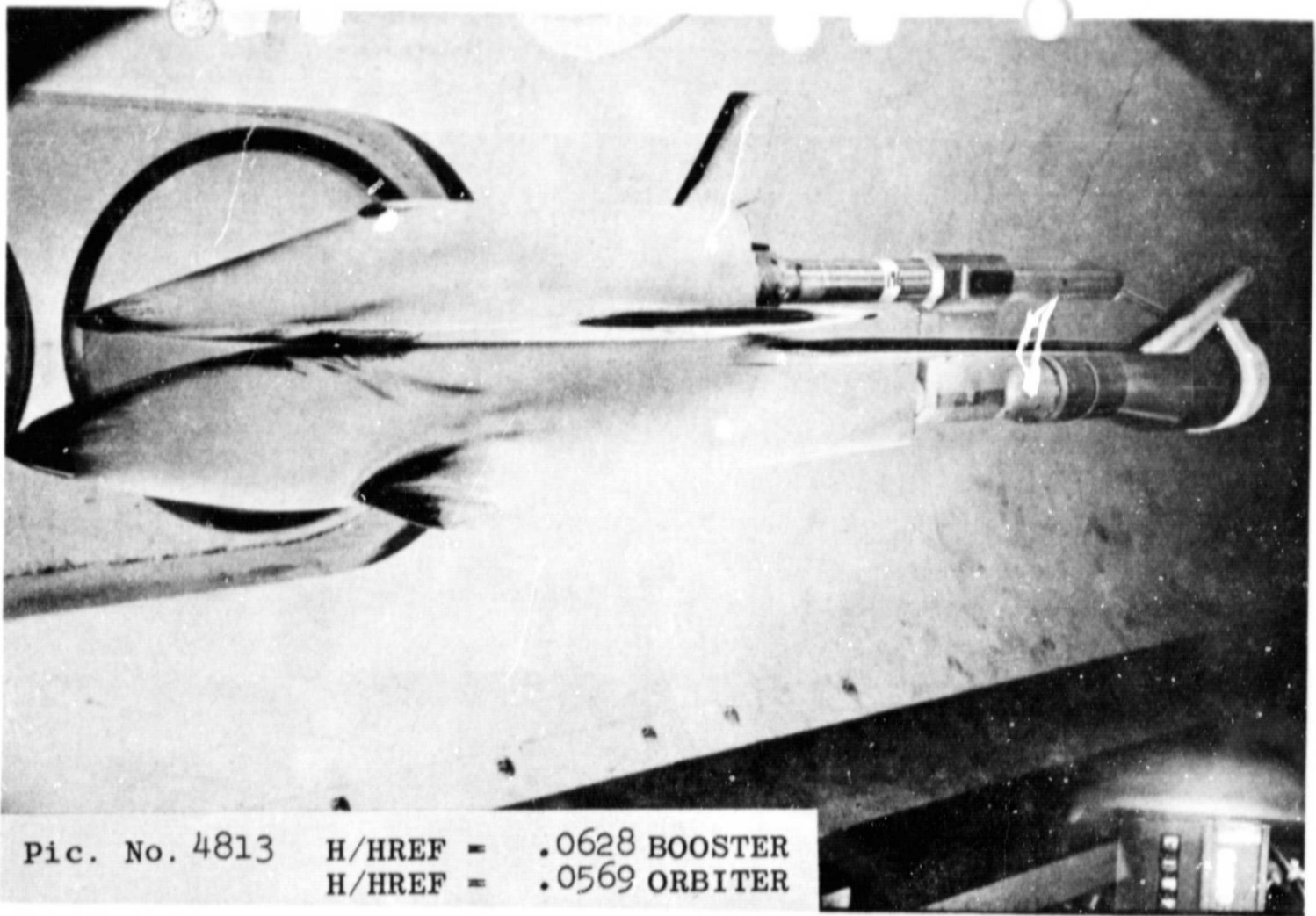
Pic. No. 4784

H/HREF = .2073 BOOSTER
H/HREF = .1877 ORBITER

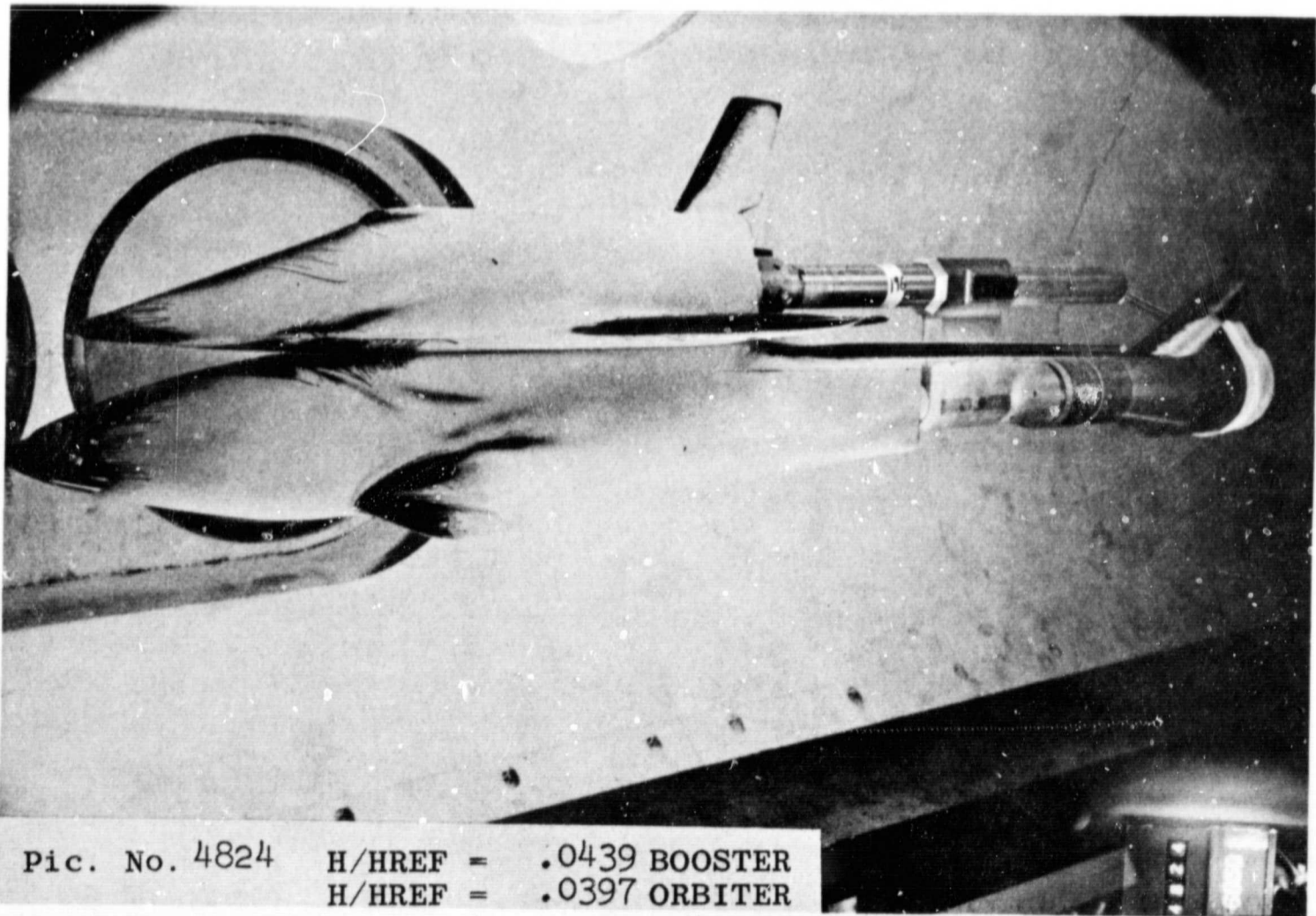


Pic. No. 4796

H/HREF = .1068 BOOSTER
H/HREF = .0967 ORBITER



Pic. No. 4813 H/HREF = .0628 BOOSTER
H/HREF = .0569 ORBITER



Pic. No. 4824 H/HREF = .0439 BOOSTER
H/HREF = .0397 ORBITER



196

Group 196 Re/ft 0.8x10⁶ ALPHA 0
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION

SYM	H/H _{REF}
.....	N/A
-----	~0.035

6/ 3/71

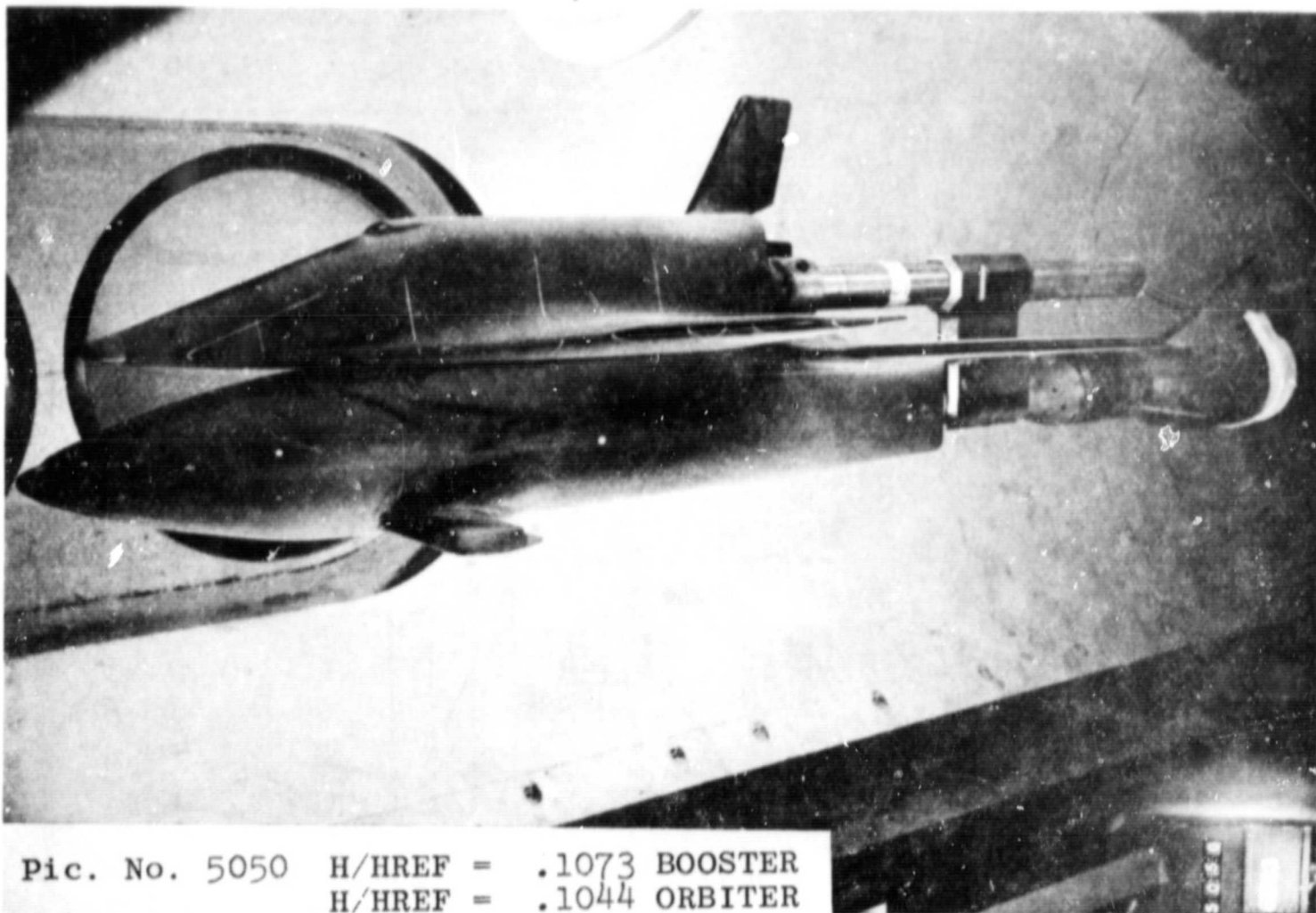
AEDC(ARO, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11169

GROUP	CONFID	MODEL	MACH NN	PO PSIA	TO DEG R	ALPHA-ROOF	ALPHA-SECTION	ALPHA-PREBEND	ROLL-MODEL	YAW
201	1272	POAC-8-7MC	7.93	148.1	1185	.03	.03	0	0	0

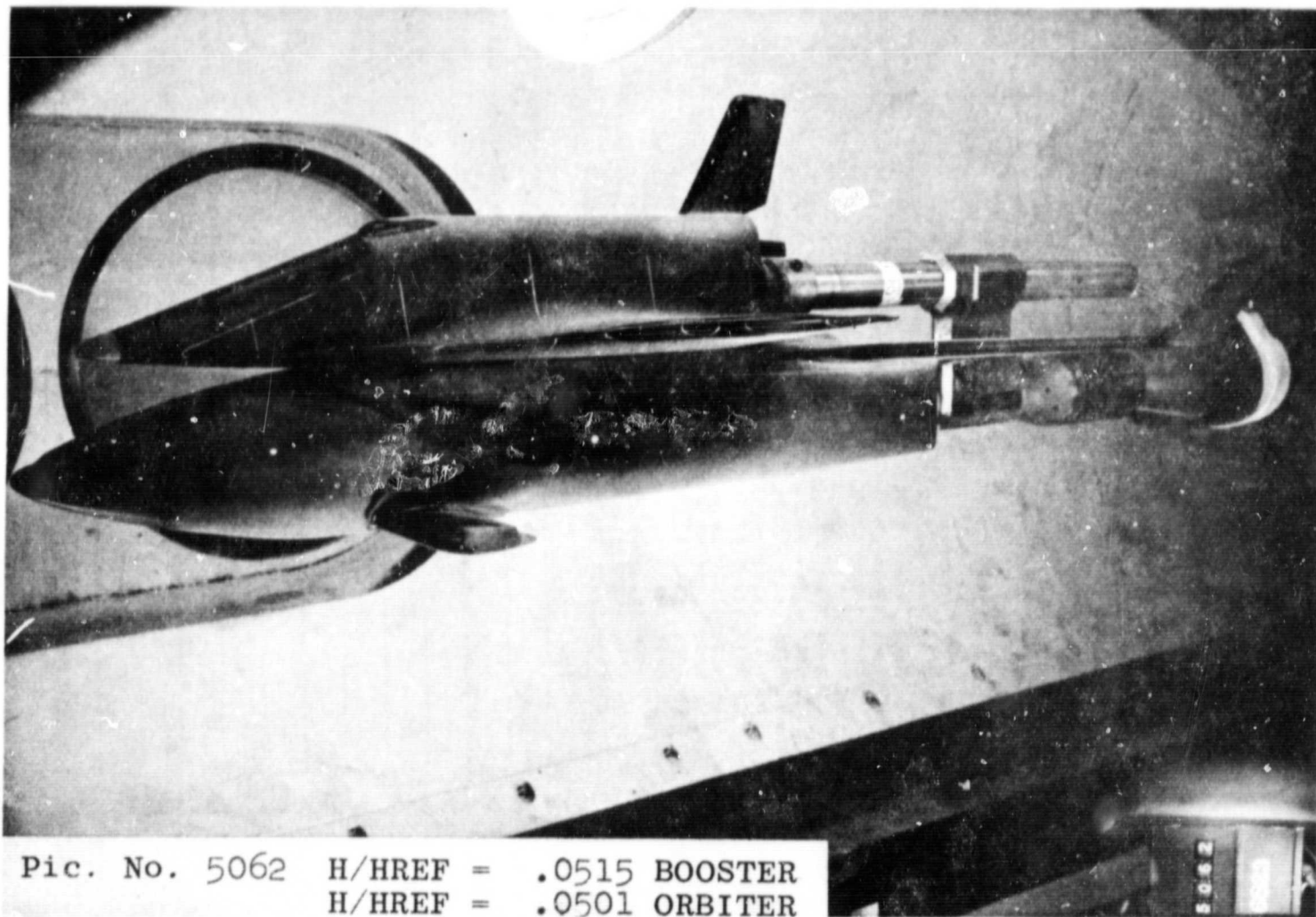
T-1NF P-1NF Q-1NF V-1NF RHO-1NF MU-1NF REFTT MREF STREF
 (DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT³) (LB-SEC/FT²) (FT-1) (R= .01FT) (R= .01FT)
 #7.3 .816 .787 3638 1.543E-05 7.827E-08 7.97E 05 2.591E-02 5.796E-02

CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (IN/INCH)
 (FEET) 117
 SIZE (US) 408
 SIZE (LS) 408
 AVERAGE TW = 81 (R)
 AVERAGE TW = 82 (O) * .00815 SQUARE ROOT DEL TIME) * 0.11

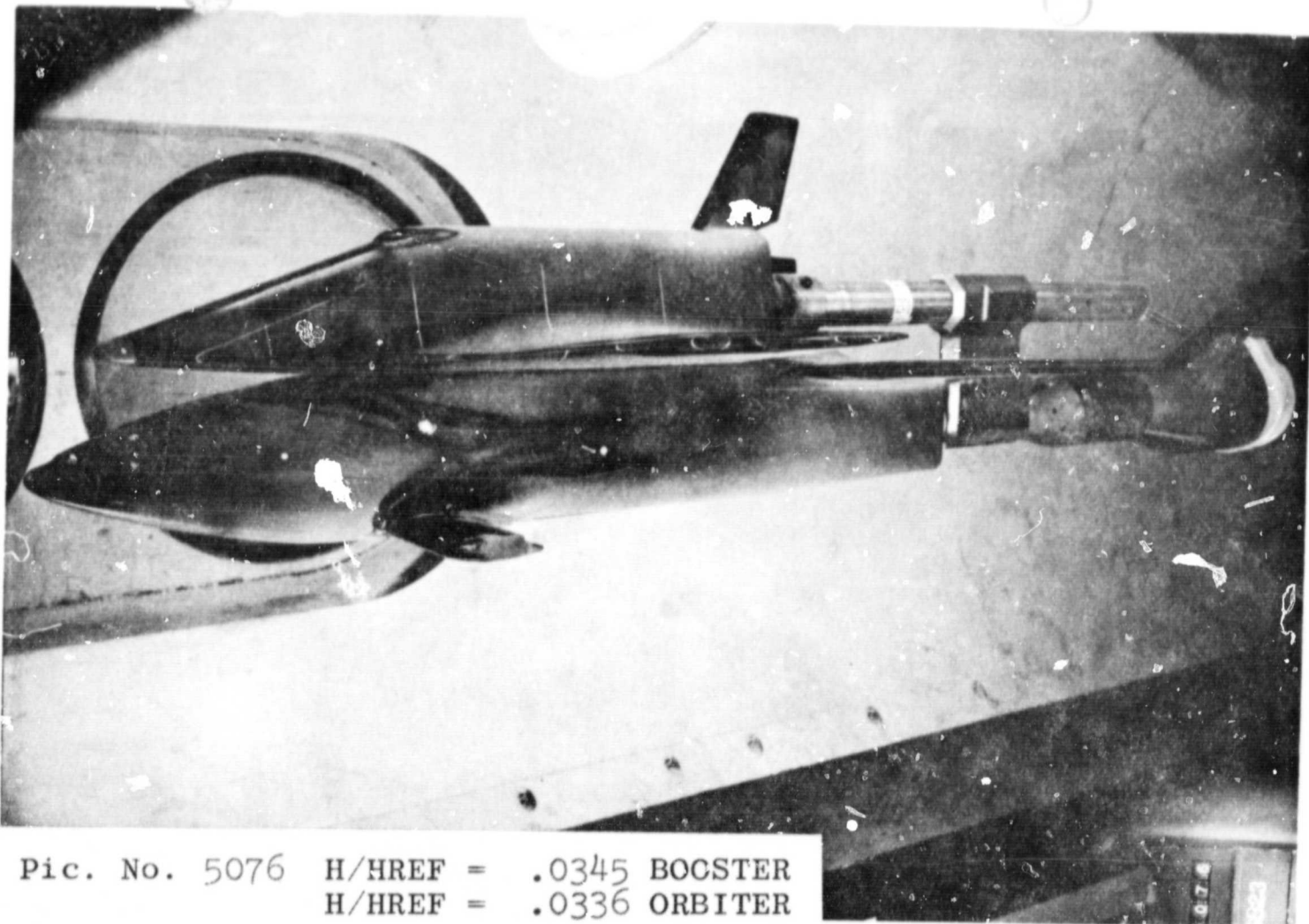
PIC MC	TIME DELTIVE	M(TO)	M(TO)/MREF	M(.910)	M(.910)/MREF	M(.8510)	M(.8510)/MREF	ST(TO)	MODEL	TEMP F		
US 505C (400)	3.65	2.61	0.443E-02	1.7464	6.808E-02	1.195E-02	3.5540	1.002E-01	82	79	85	78
US 505C (117)	3.65	2.61	8.278E-03	.1073	3.430E-03	1.1376	3.900E-03	6.741E-07	82	79	85	78
US 505C (400)	3.65	2.61	8.444E-02	1.7536	6.824E-02	2.6346	9.217E-02	1.004E-01	82	79	85	78
US 505C (113)	3.65	2.61	0.270E-03	.1044	3.366E-03	.1292	3.796E-03	6.071E-07	82	79	85	78
US 5062 (400)	9.95	8.91	0.219E-02	.0404	3.269E-02	1.2626	4.416E-02	4.015E-02	82	79	91	78
US 5062 (117)	9.95	8.91	8.173E-03	.0515	1.650E-03	.0637	1.813E-03	2.999E-07	82	79	91	78
US 5062 (400)	9.95	8.91	8.219E-02	.8474	3.277E-02	1.2656	4.427E-02	4.827E-02	82	79	91	78
US 5062 (117)	9.95	8.91	0.170E-03	.0501	1.607E-03	.0621	1.823E-03	2.918E-07	82	79	91	78
US 5076 (400)	17.25	16.21	0.144E-02	.0526	2.100E-02	.0452	2.957E-02	3.273E-07	82	80	103	78
US 5076 (117)	17.25	16.21	8.894E-04	.0345	1.105E-03	.0427	1.254E-03	2.008E-07	82	80	103	78
US 5076 (400)	17.25	16.21	8.144E-02	.0548	2.195E-02	.0473	2.965E-02	3.231E-02	82	80	103	78
US 5076 (117)	17.25	16.21	0.849E-04	.0336	1.076E-03	.0415	1.221E-03	1.953E-07	82	80	103	78
US 509C (400)	31.24	30.24	0.946E-03	.3498	1.162E-02	.5255	1.839E-02	2.003E-07	82	81	124	80
US 509C (113)	31.24	30.24	8.546E-04	.0215	6.872E-04	.0265	7.800E-04	1.248E-07	82	81	124	80
US 509C (400)	31.24	30.24	9.49E-03	.3506	1.165E-02	.5268	1.844E-02	2.008E-07	82	81	124	80
US 509C (113)	31.24	30.24	0.541E-04	.0209	6.603E-04	.0258	7.594E-04	1.214E-07	82	81	124	80



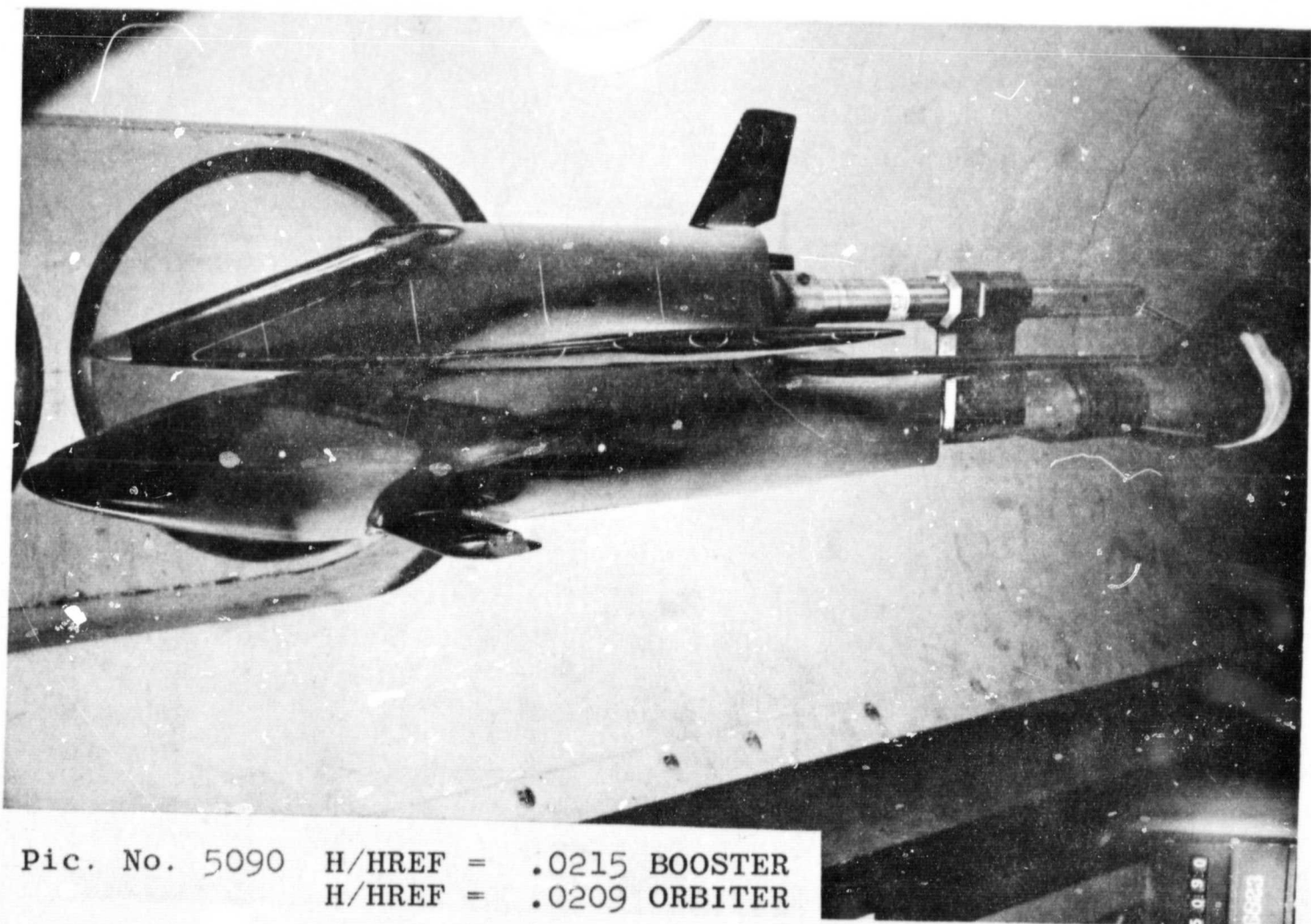
Pic. No. 5050 H/HREF = .1073 BOOSTER
H/HREF = .1044 ORBITER



Pic. No. 5062 H/HREF = .0515 BOOSTER
H/HREF = .0501 ORBITER

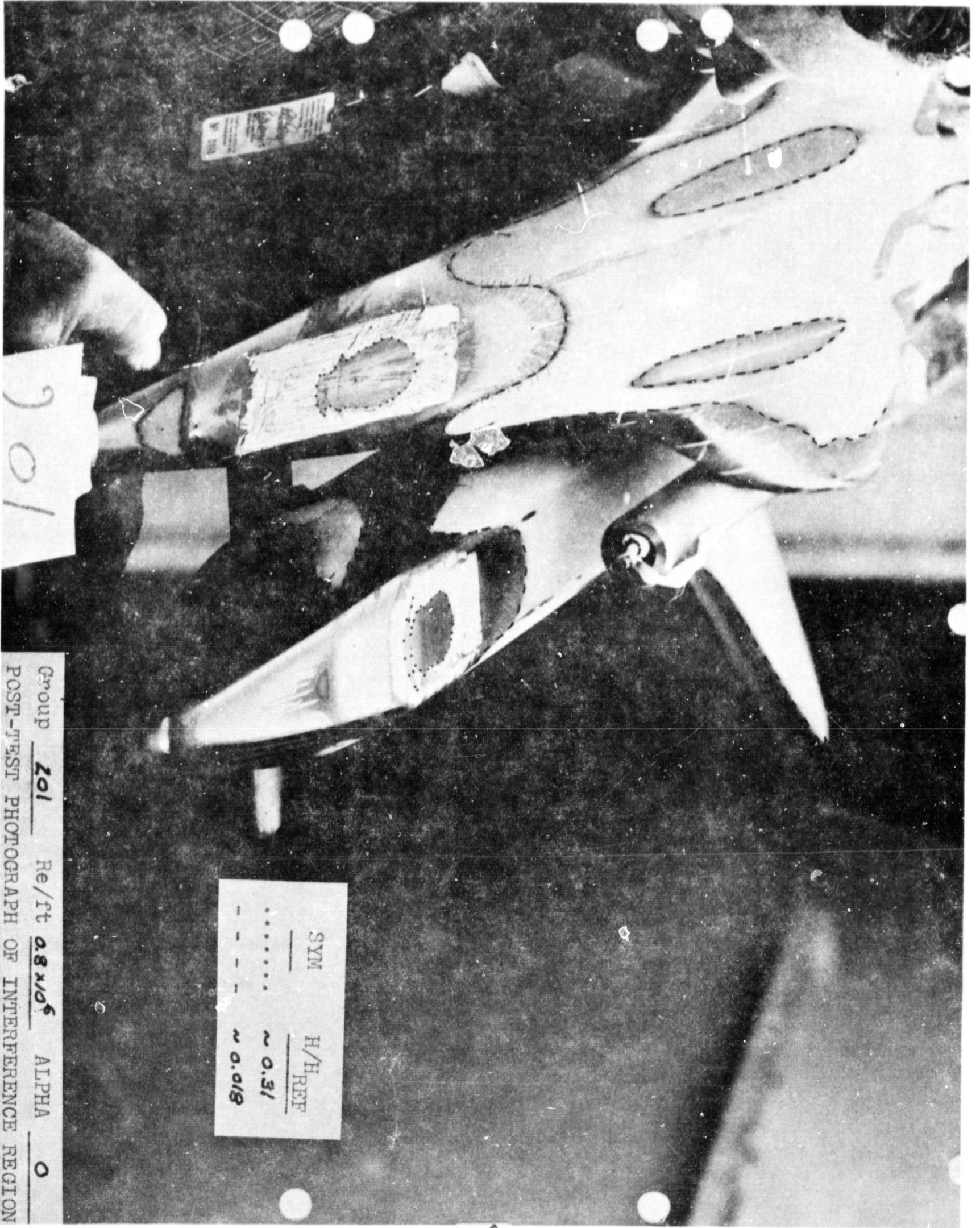


Pic. No. 5076 H/HREF = .0345 BOOSTER
H/HREF = .0336 ORBITER



Pic. No. 5090 H/HREF = .0215 BOOSTER
H/HREF = .0209 ORBITER

C.2



Group 201 Re/ft 0.8 x 10⁶ ALPHA 0
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION

SYM ----- H/H_{REF}
..... ~ 0.31
- - - - ~ 0.018

6/ 3/71

AEDICARD, INC.) ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 VIII62

GROUP CONF16 MODEL WACM KN PO PSIA TO DEG R ALPHA-MODEL ALPHA-SECTION ALPHA-PREBEND ROLL-MODEL VAW
 151 3222 PDAC-8-DWC 7.93 152.5 1195 -5.00 0 0 0 0

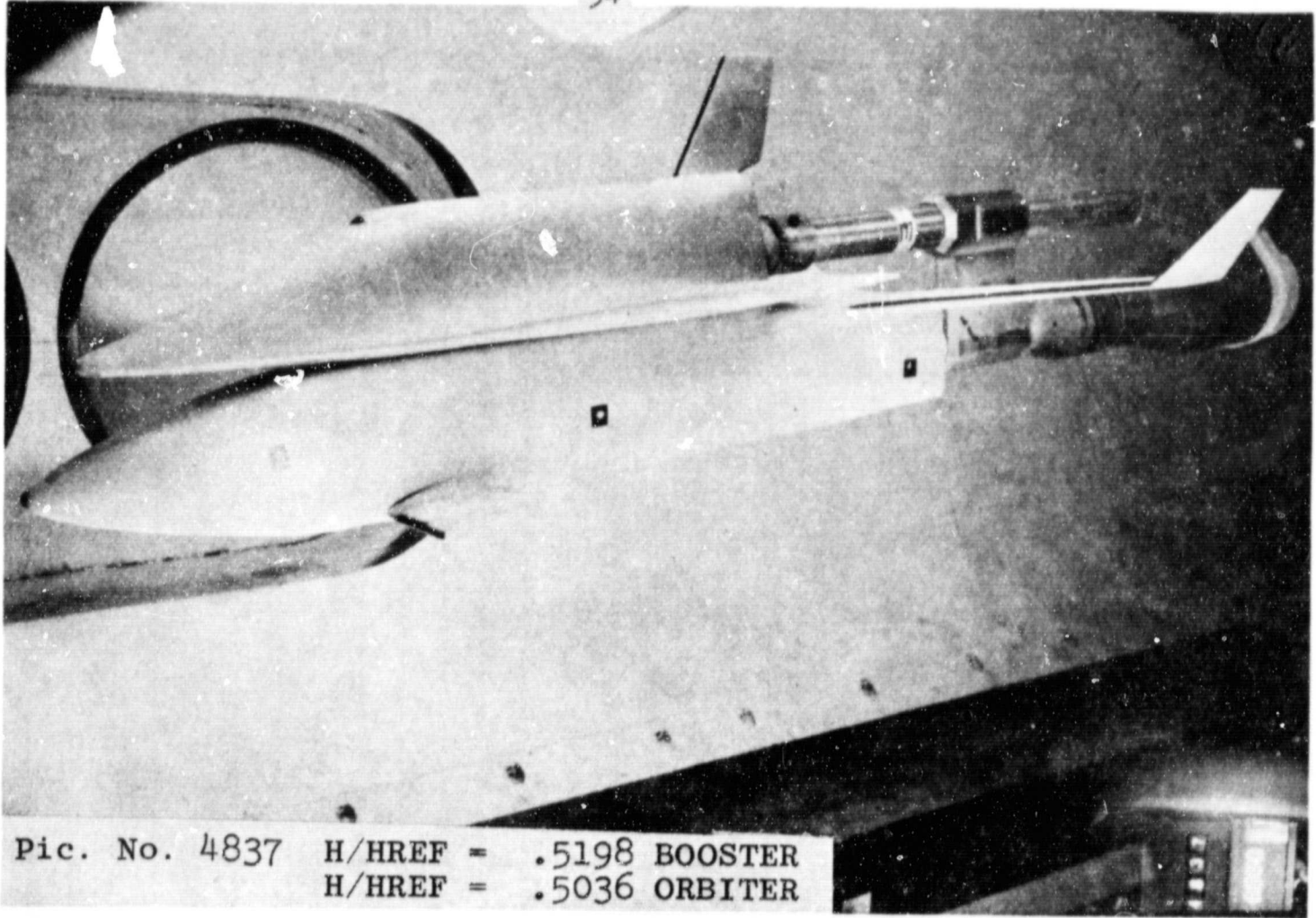
T-1-F P-IMP 0-IMP V-IMP RMO-IMP MU-IMP REF/T MREF STREF
 (OEG M) (PSIA) (PSIA) (FI/SEC) (SLUGS/FI3) (LB-SEC/FI2) (FI-1) (R= .01FT) (R= .01FT)
 #0.0 #017 *728 3445 1.577E-05 7.888E-08 P.11E 05 2.633E-02 5.739E-02

CAVEMA PAINT TEMP (OEG F) INITIAL TEMP (OEG F) SQUARE ROOT (RMO/CXK)

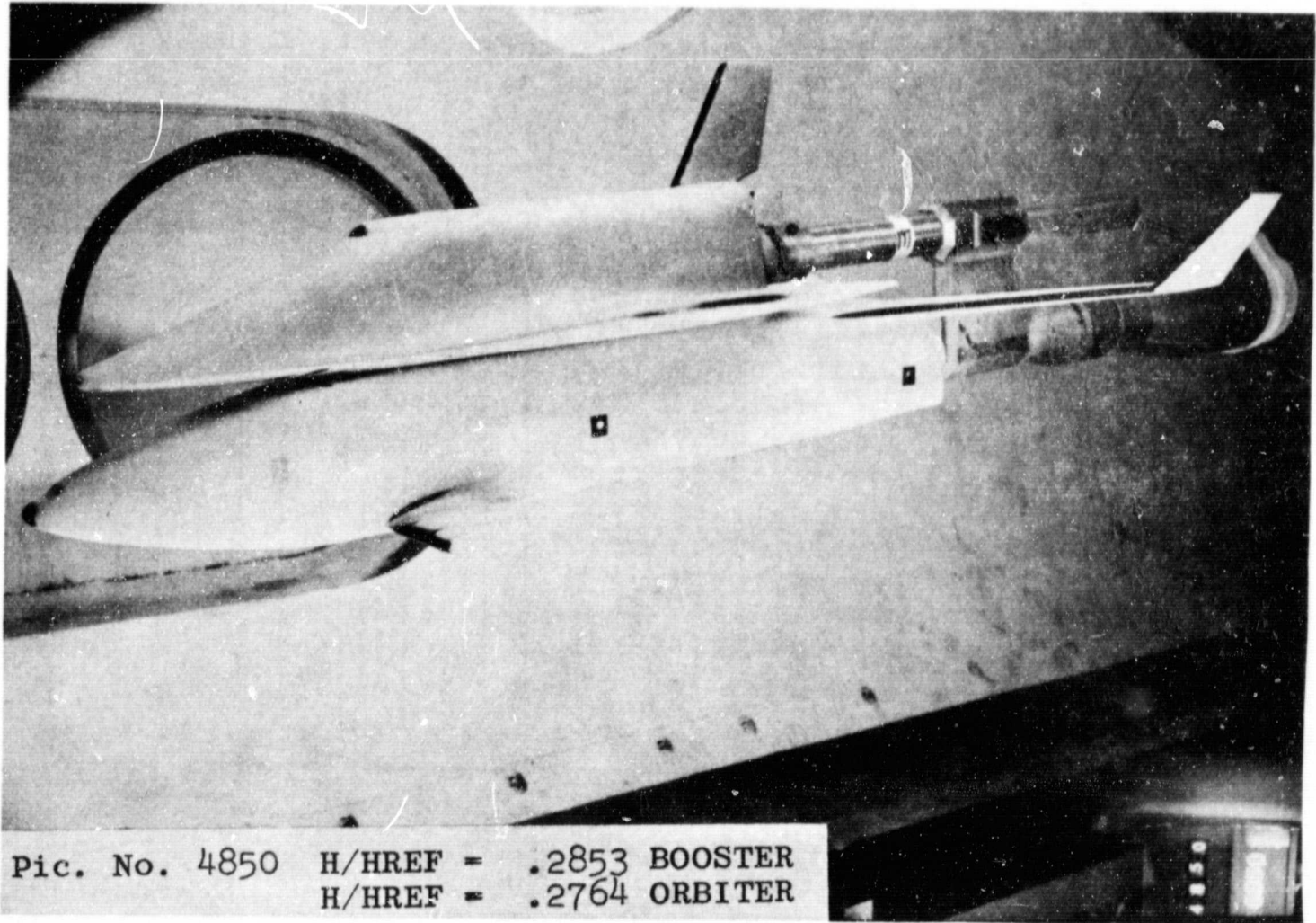
TOP(13) 250
 SICE(US) 250
 SICE(US) 250

AVERAGE TW = 76 (R)
 AVERAGE TW = 82 (O) --.0081 SQUARE ROOT DEL TIME) * 0.11

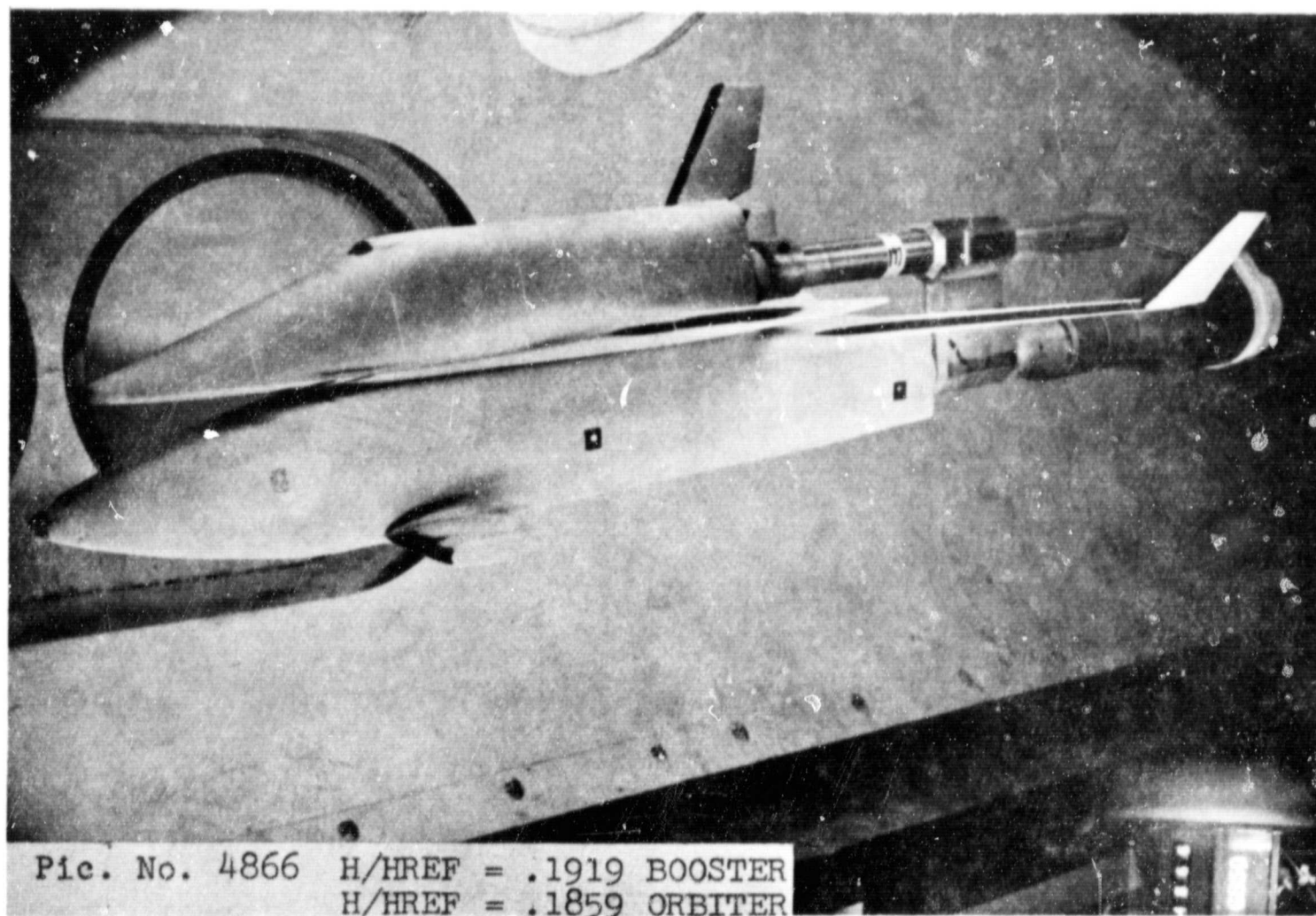
PIC MC	TIME	DEL TIME	M(TO)	M(TO)/MREF	M(.910)	M(.5TCI)/MREF	M(.85TO)	M(.85TO)/MREF	ST(TO)	MODEL	TEMP F
US 4837 (250)	5.20	4.14	0 1.33E-02	5036	1.732E-02	6573	2.065E-02	7742	2.876E-02	76	84
US 4837 (250)	5.20	4.14	R 1.37E-02	5198	1.787E-02	6782	2.110E-02	8008	2.969E-02	76	84
US 4837 (250)	5.20	4.14	R 1.37E-02	5198	1.787E-02	6782	2.110E-02	8008	2.969E-02	76	84
US 4837 (250)	5.20	4.14	0 1.37E-02	5036	1.732E-02	6573	2.065E-02	7742	2.876E-02	76	84
US 4855 (250)	12.00	10.94	0 7.59E-03	2764	9.512E-03	3123	1.123E-02	4396	1.578E-02	76	94
US 4855 (250)	12.00	10.94	R 7.52E-03	2853	9.810E-03	3123	1.159E-02	4396	1.629E-02	76	94
US 4855 (250)	12.00	10.94	0 7.59E-03	2764	9.512E-03	3123	1.123E-02	4396	1.629E-02	76	94
US 4866 (250)	20.45	19.41	0 4.90E-03	1859	6.398E-03	2227	7.557E-03	2846	1.578E-02	76	80
US 4866 (250)	20.45	19.41	R 4.90E-03	1859	6.398E-03	2227	7.557E-03	2846	1.578E-02	76	80
US 4866 (250)	20.45	19.41	0 4.90E-03	1859	6.398E-03	2227	7.557E-03	2846	1.578E-02	76	80
US 4866 (250)	20.45	19.41	R 5.06E-03	1919	6.602E-03	2504	7.795E-03	2947	1.605E-02	76	80
US 4866 (250)	20.45	19.41	R 5.06E-03	1919	6.602E-03	2504	7.795E-03	2947	1.605E-02	76	80
US 4866 (250)	20.45	19.41	0 4.90E-03	1859	6.398E-03	2227	7.557E-03	2846	1.578E-02	76	80
US 4877 (250)	30.84	29.84	0 3.42E-03	1374	4.728E-03	1792	5.582E-03	2116	7.841E-03	76	82
US 4877 (250)	30.84	29.84	R 3.42E-03	1374	4.728E-03	1792	5.582E-03	2116	7.841E-03	76	82
US 4877 (250)	30.84	29.84	0 3.42E-03	1374	4.728E-03	1792	5.582E-03	2116	7.841E-03	76	82
US 4877 (250)	30.84	29.84	R 3.42E-03	1331	4.582E-03	1737	5.411E-03	2052	7.596E-03	76	82



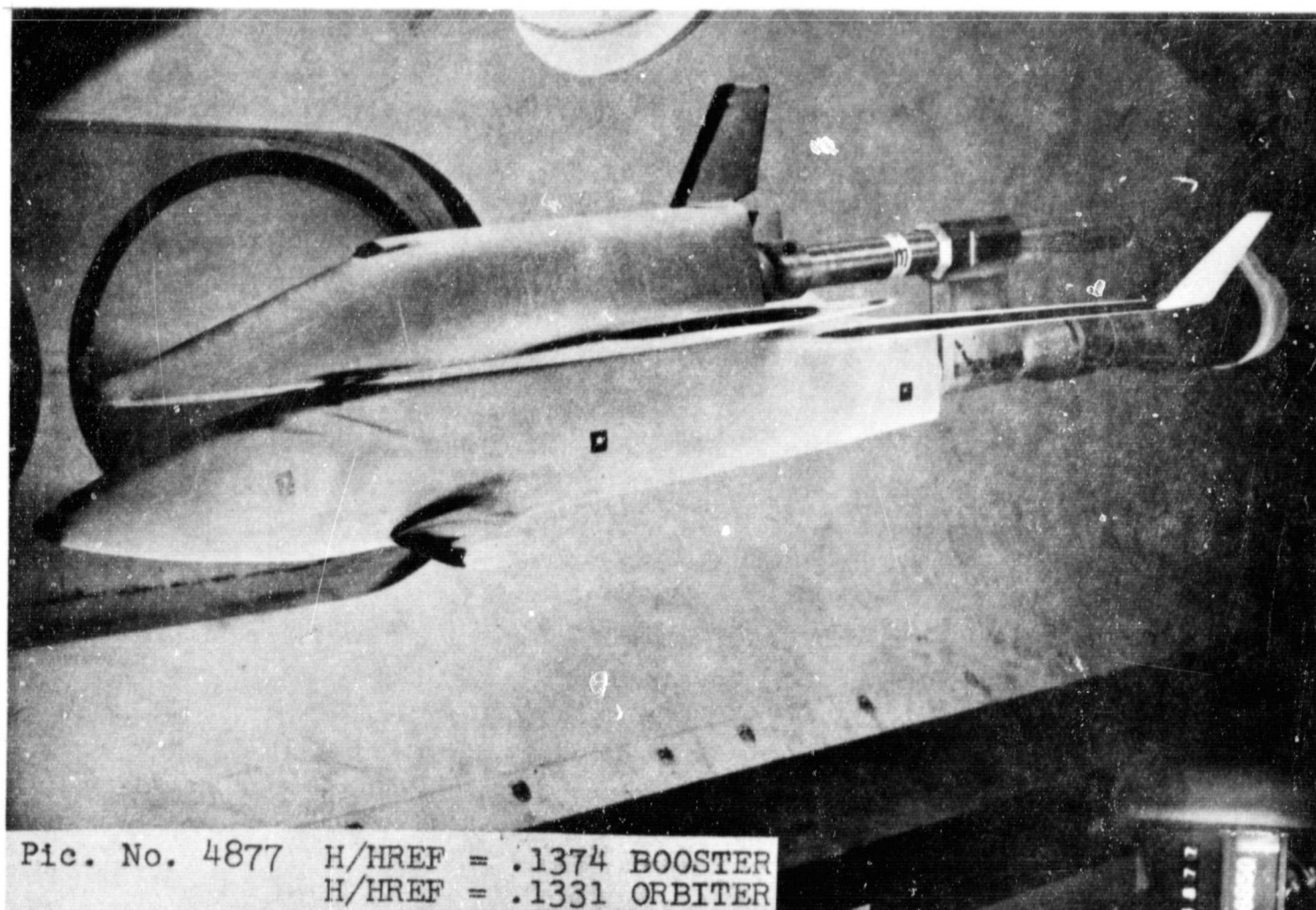
Pic. No. 4837 H/HREF = .5198 BOOSTER
H/HREF = .5036 ORBITER



Pic. No. 4850 H/HREF = .2853 BOOSTER
H/HREF = .2764 ORBITER



Pic. No. 4866 H/HREF = .1919 BOOSTER
H/HREF = .1859 ORBITER



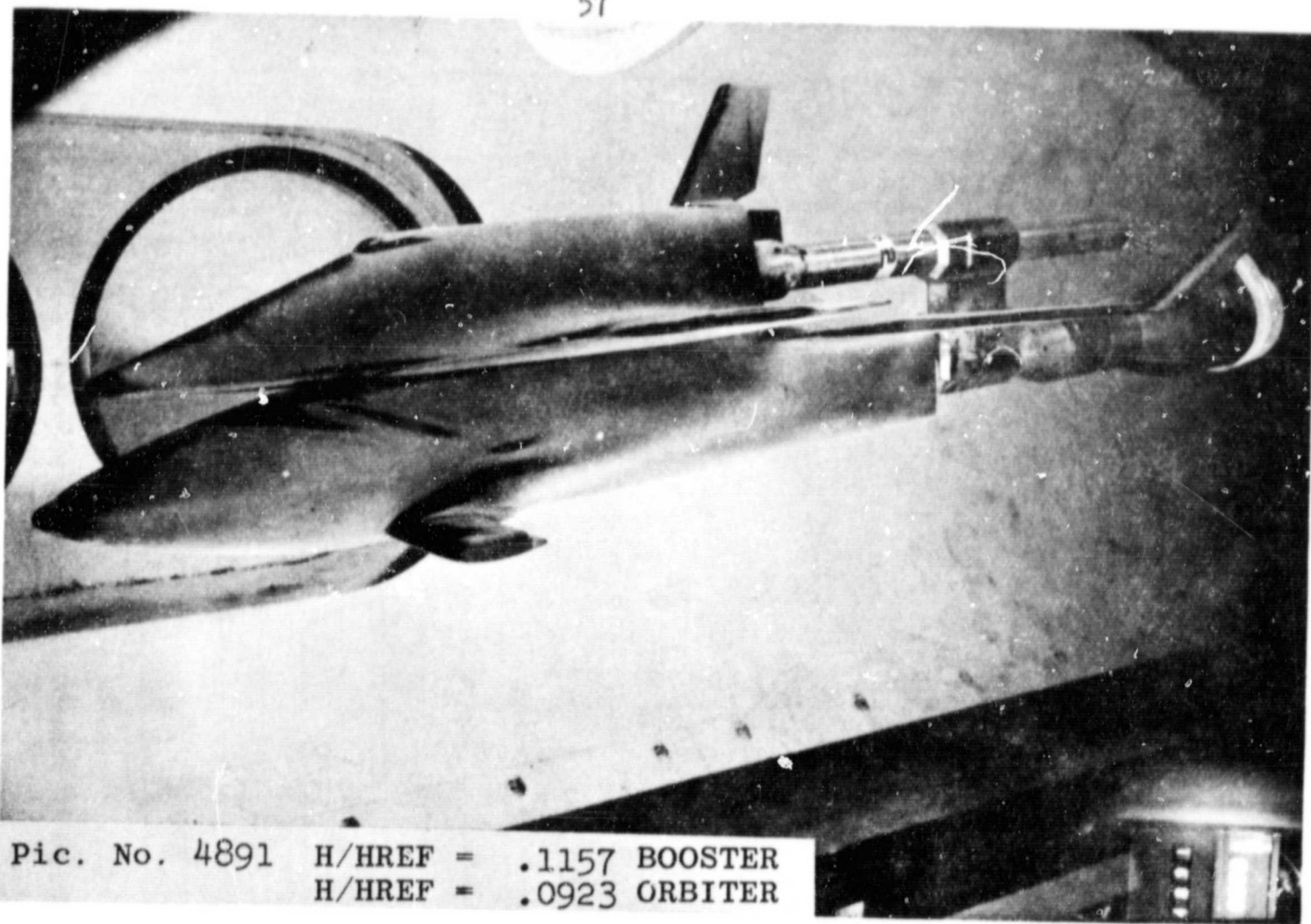
Pic. No. 4877 H/HREF = .1374 BOOSTER
H/HREF = .1331 ORBITER

6/ 3/71

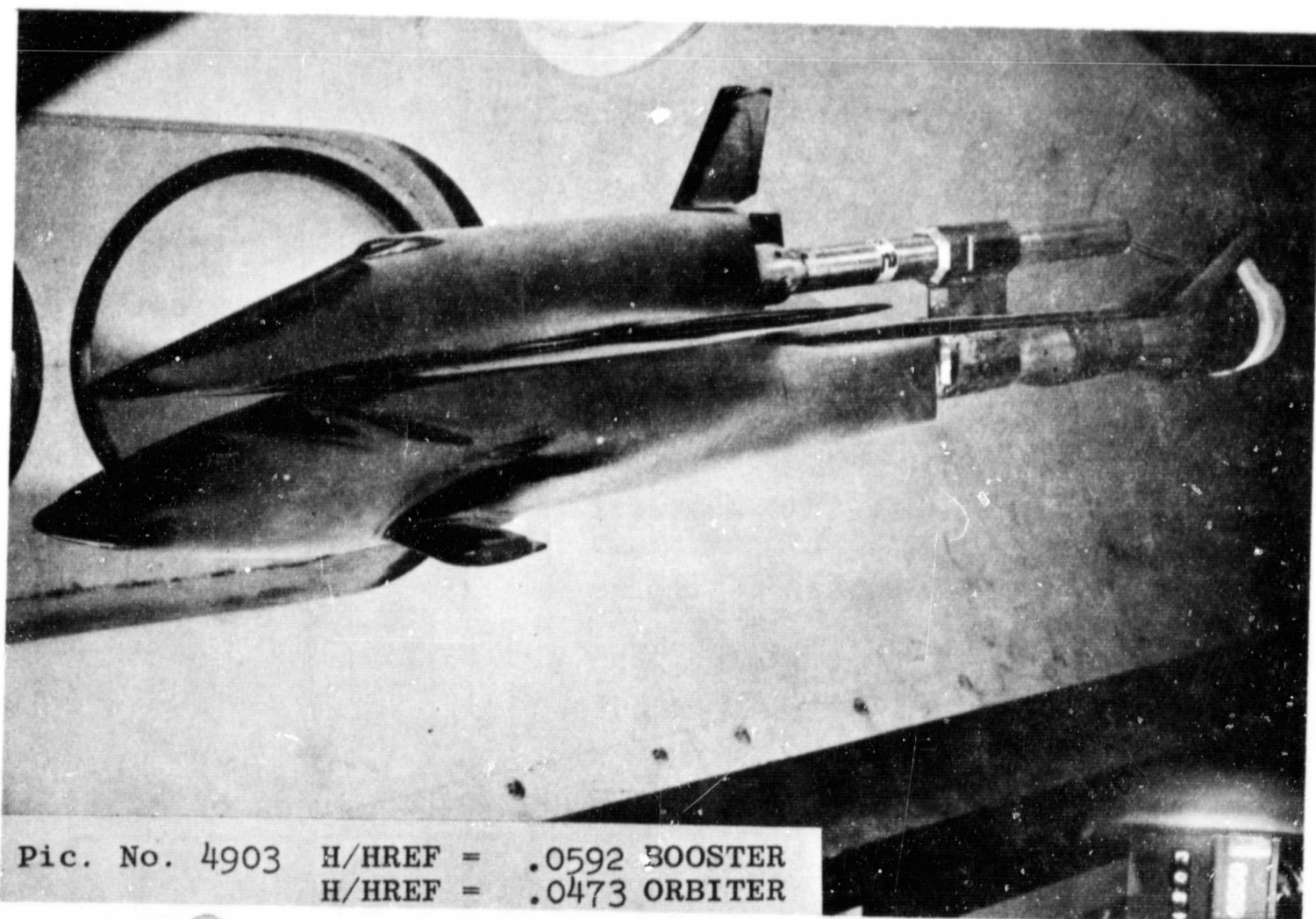
AEDCIARON, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11162

GROUP CONFIG MODEL MACH NO PO PSIA TO DEG R ALPHA-MODEL ALPHA-SECTOR ALPHA-PREBEND ROLL-MODEL YAW
198 3221 HOAC-6-DWC 7.93 152.4 1192 -5.00 0 0 0
T-Inf P-Inf O-Inf V-Inf RHO-Inf MU-Inf RE/FT HREF STREF
(DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R= .011FT) (R= .011FT)
87.8 .017 .277 3641 1.579E-05 7.009E-08 0.13E 05 2.633E-02 5.733E-02
CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (AMODACK)
TOP(T) 117
SIDE(US) 500 AVERAGE TW = 73 (R) --.00815 SQUARE ROOT DEL TIME) = 0.11
SIDE(LS) 500 AVERAGE TW = 81 (O)

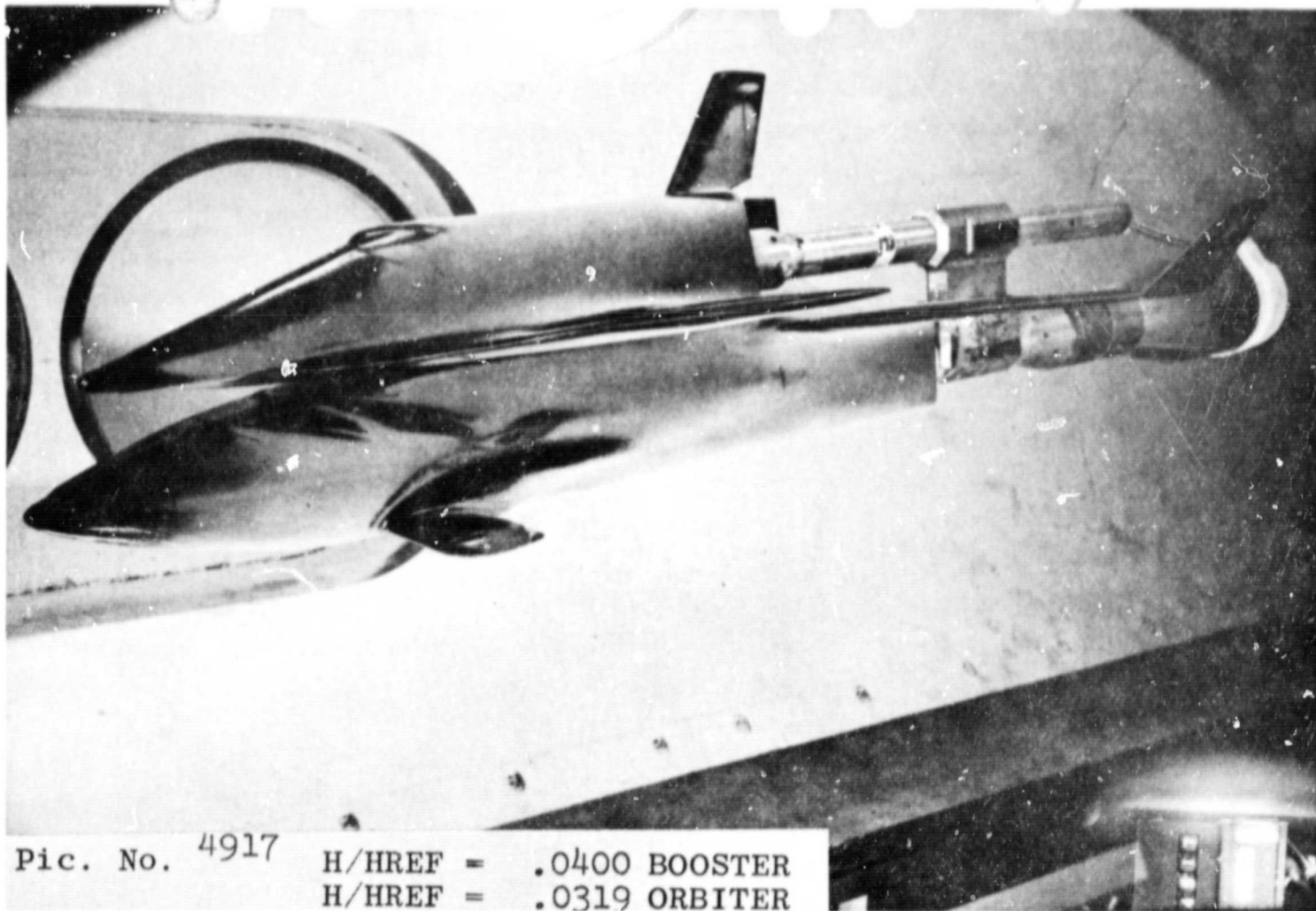
PIC MC	TIME DELTIME	M(TO)	M(TO)/MREF	M(.9TO)	M(.5TO)/MREF	M(.85TO)	M(.85TO)/MREF	ST(TO)	MODEL TEMP F				
US 4991 (500)	4.20	3.13	0.747E-02	2.695A	1.348E-01	5.1052	2.524E-01	9.5842	1.511E-01	72	73	84	88
US 4991 (113)	4.20	3.13	8.305E-03	.1157	3.760E-03	.1428	4.276E-03	.1519	6.451E-02	72	73	84	88
US 4991 (500)	4.20	3.13	8.719E-02	2.7318	1.368E-01	5.1943	2.524E-01	9.5852	1.531E-01	72	73	84	88
US 4991 (113)	4.20	3.13	0.243E-03	.0923	3.000E-03	.1140	3.403E-03	.1203	5.305E-02	72	73	84	88
US 4903 (500)	10.55	9.44	0.342E-02	1.3749	6.882E-02	2.6138	1.292E-01	4.0074	7.738E-02	73	74	94	81
US 4903 (113)	10.55	9.44	8.156E-03	.0592	1.925E-03	.0731	2.182E-03	.0879	3.405E-03	73	74	94	81
US 4903 (500)	10.55	9.44	8.368E-02	1.3987	7.002E-02	2.6594	1.292E-01	4.0074	7.871E-02	73	74	94	81
US 4903 (113)	10.55	9.44	0.124E-03	.0473	1.533E-03	.0593	1.742E-03	.0642	2.716E-02	73	74	94	81
US 4917 (500)	18.05	16.94	0.244E-02	.9277	4.640E-02	.1637	8.713E-02	.0959	5.274E-02	74	75	109	86
US 4917 (113)	18.05	16.94	8.105E-03	.0408	1.299E-03	.0403	1.471E-03	.0559	2.299E-02	74	75	109	86
US 4917 (500)	18.05	16.94	8.248E-02	.9438	4.721E-02	1.1964	8.713E-02	3.2114	5.315E-02	74	75	109	86
US 4917 (113)	18.05	16.94	0.879E-04	.0319	1.036E-03	.0394	1.175E-03	.0447	1.834E-01	74	75	109	86
US 4931 (500)	32.89	31.82	0.140E-02	.5719	2.855E-02	1.0872	5.369E-02	2.0412	3.226E-02	76	77	132	87
US 4931 (113)	32.89	31.82	8.647E-04	.0246	7.985E-04	.0304	9.051E-04	.0345	1.429E-02	76	77	132	87
US 4931 (500)	32.89	31.82	8.153E-02	.5818	2.995E-02	1.1061	5.368E-02	2.0412	3.282E-02	76	77	132	87
US 4931 (113)	32.89	31.82	0.516E-04	.0197	6.373E-04	.0263	7.228E-04	.0275	1.133E-03	76	77	132	87



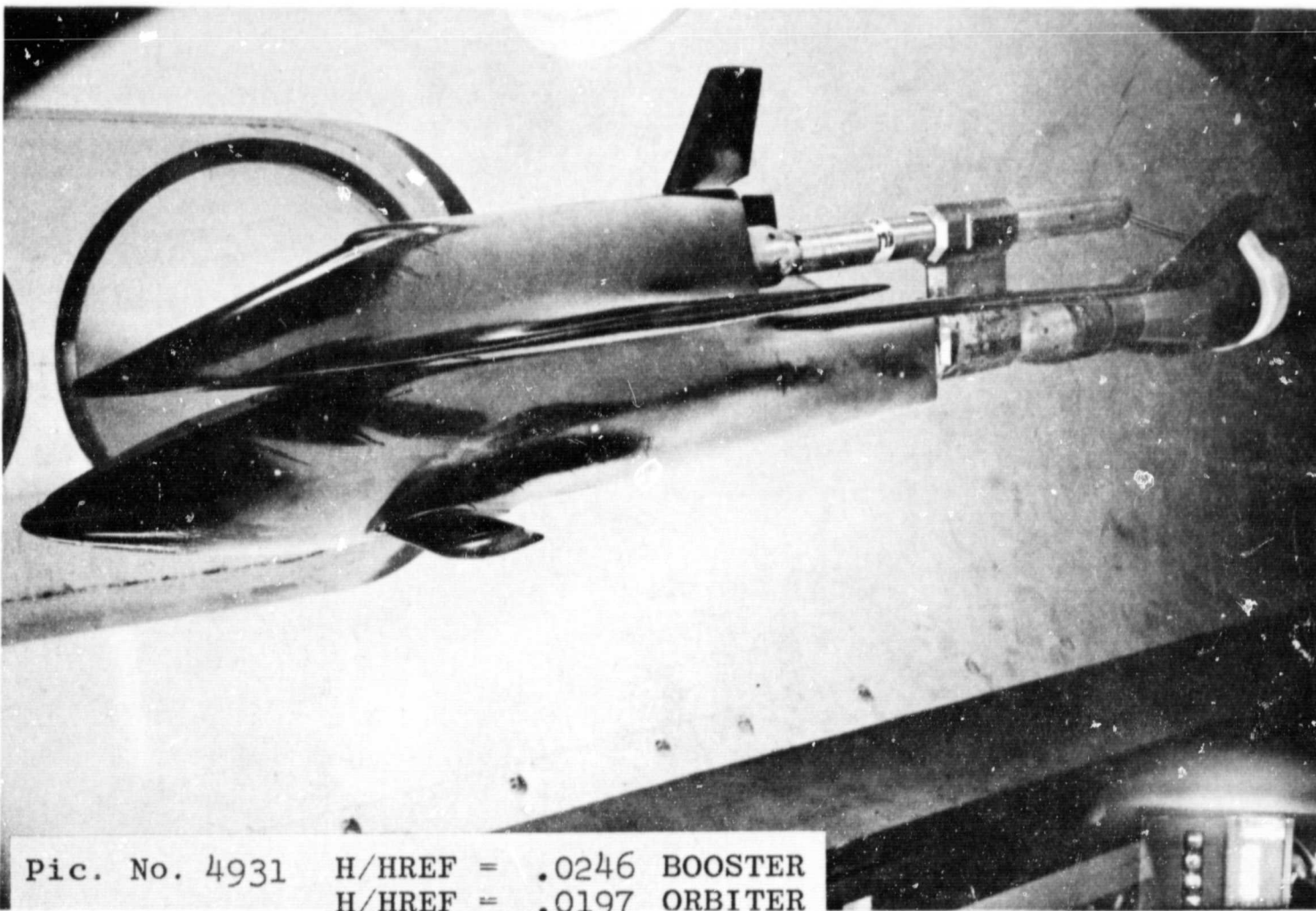
Pic. No. 4891 H/HREF = .1157 BOOSTER
H/HREF = .0923 ORBITER



Pic. No. 4903 H/HREF = .0592 BOOSTER
H/HREF = .0473 ORBITER



Pic. No. 4917 H/HREF = .0400 BOOSTER
H/HREF = .0319 ORBITER



Pic. No. 4931 H/HREF = .0246 BOOSTER
H/HREF = .0197 ORBITER

Group 198 Re/ft 0.8x10⁶ ALPHA -5
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION

198

SYM	H/H _{REF}
—	< 0.54
.....	No Melt
- - - -	~ 0.018

AEDC(IAPD-INC.) ARNOLD AFB, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11102

GROUP 199 CONFID 1277 MODEL 70AC-B-INC MACW No 7.93 PO PSIA 149.9 TO DEG R 1186 ALPHA-NODEL 4.99 ALPHA-SECTOR 4.99 ALPHA-PREEMO 0 ROLL-MODEL 0 YAW 0

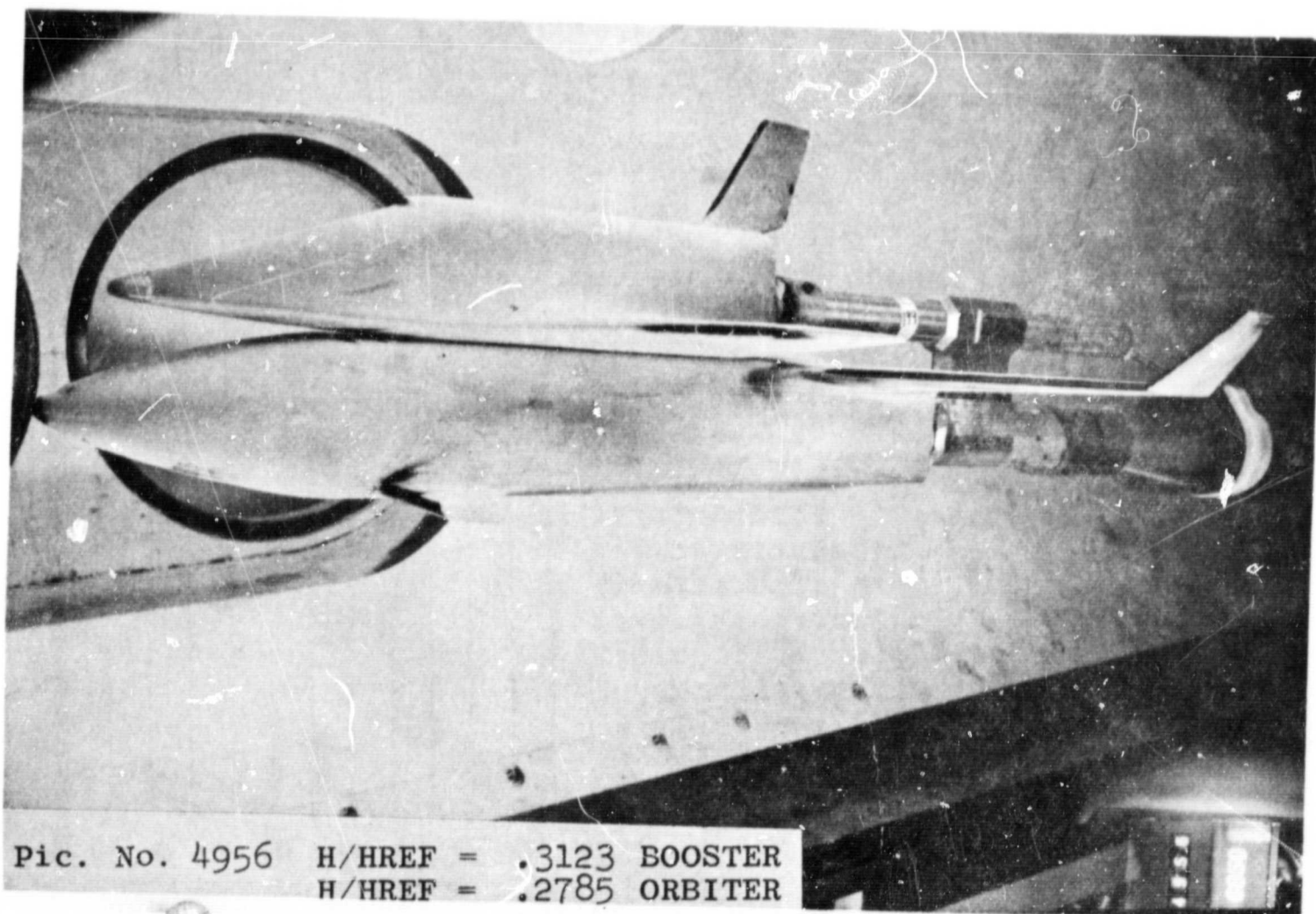
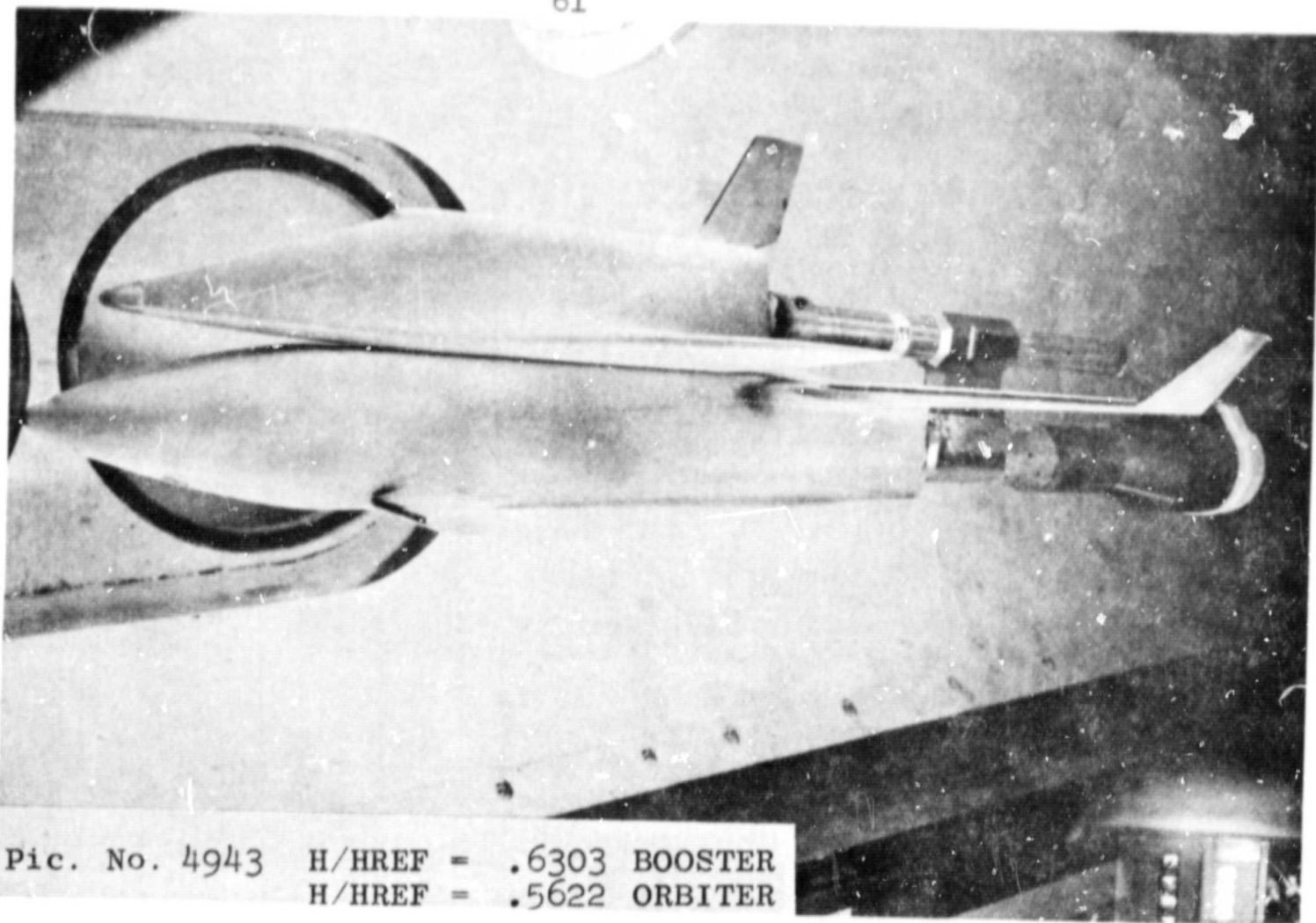
T-1NF P-1NF Q-1NF V-1NF RHO-1NF MU-1NF REF/F PREF STREF
 (DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R-01FT) (R-01FT)
 #7.4 #16 #716 3432 1.561E-05 7.035E-08 0.00E 05 2.600E-02 5.764E-02

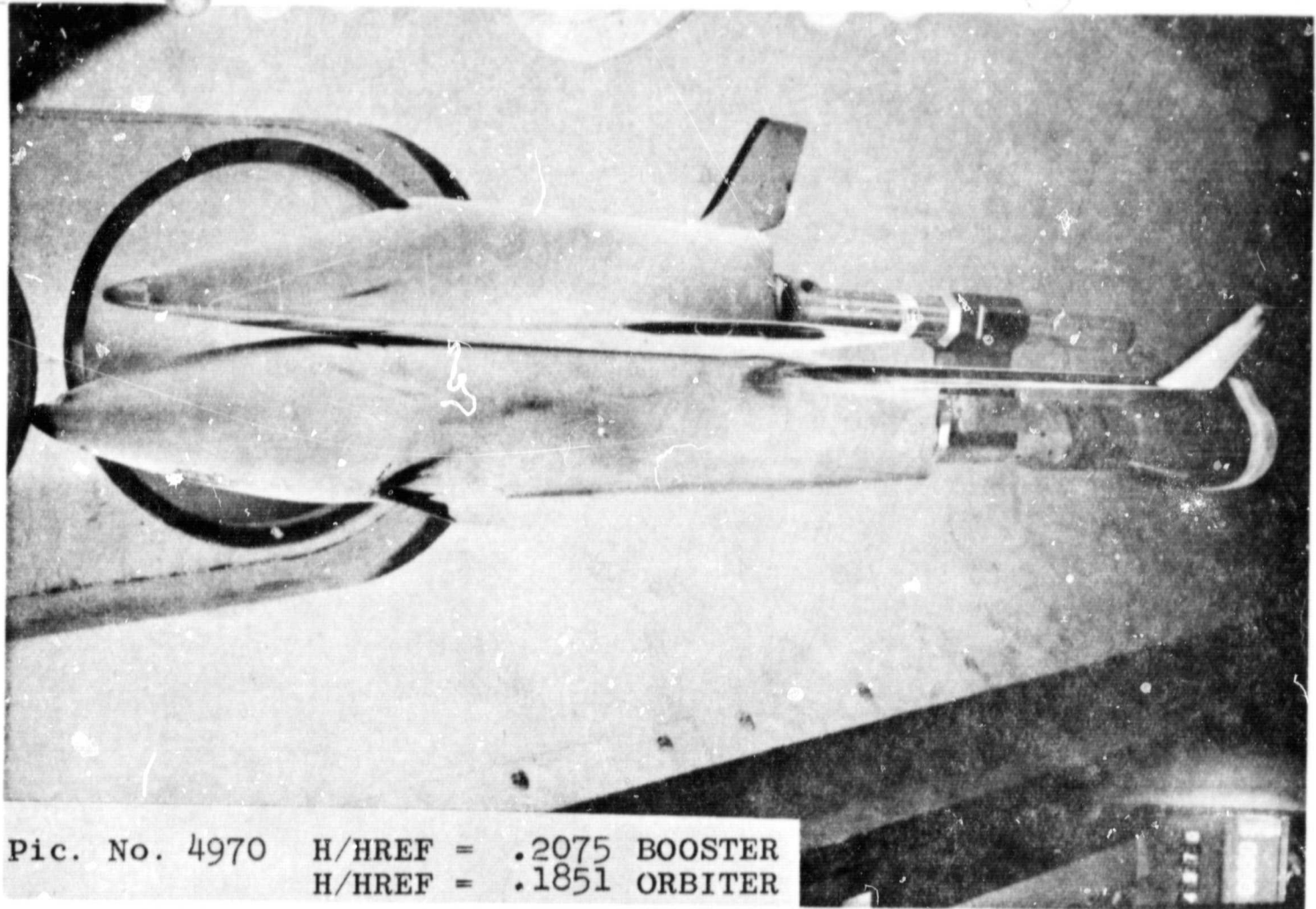
CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (INCHES)

TOP(T) 250
 SIDE(U) 400
 SIDE(L) 400

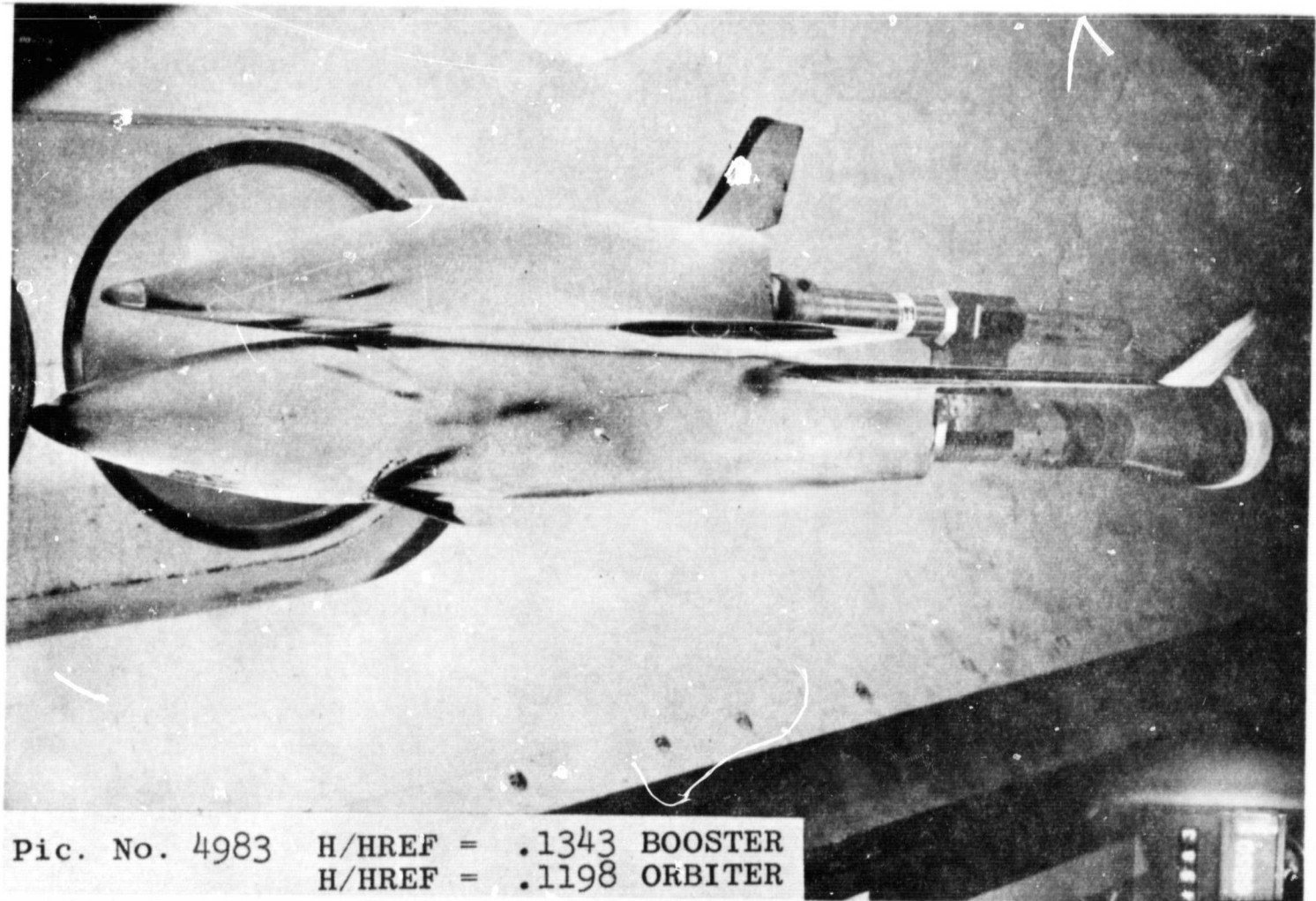
AVERAGE Tm = 75 (R)
 AVERAGE Tm = 95 (C) --408(SQUARE ROOT DEL TIME) = 0.11

PIC NO	TIME DELT	MITO1	MITO1/REF	M1.9701	M1.9701/REF	M1.85101	M1.85101/REF	ST1(TO1)	MODEL	TEMP F
US 4943 (400)	4.20	3.14	0.390E-02	1.4949	5.854E-02	2.7444	7.090E-02	3.0290	74	98
US 4943 (250)	4.20	3.14	8.144E-02	6.3703	2.151E-02	0.824	2.546E-02	0.9740	74	90
US 4943 (400)	4.20	3.14	8.413E-02	1.5832	6.195E-02	2.3758	8.355E-02	3.2073	74	98
US 4943 (250)	4.20	3.14	0.144E-02	5.622	1.921E-02	0.765	2.276E-02	0.8725	74	98
US 4954 (400)	11.10	10.04	0.193E-02	7.406	2.099E-02	1.1120	3.912E-02	1.5062	75	108
US 4954 (250)	11.10	10.04	8.614E-03	3.123	1.065E-02	0.088	1.261E-02	0.096	75	108
US 4954 (400)	11.10	10.04	8.205E-02	7.844	3.069E-02	1.1767	4.138E-02	1.5978	75	108
US 4954 (250)	11.10	10.04	0.726E-03	2.785	9.514E-03	0.349	1.127E-02	0.4323	75	108
US 4970 (400)	19.30	18.24	0.129E-02	0.922	1.920E-02	0.398	2.601E-02	0.9978	75	120
US 4970 (250)	19.30	18.24	8.541E-03	2.075	7.084E-03	0.2715	8.305E-03	0.3714	75	120
US 4970 (400)	19.30	18.24	1.206E-02	5.213	2.848E-02	0.7028	2.752E-02	1.0547	75	120
US 4970 (250)	19.30	18.24	0.4893E-03	1.851	6.372E-03	0.2425	7.495E-03	0.2873	75	120
US 4983 (400)	32.94	31.94	0.871E-03	0.3185	1.247E-02	0.4781	1.683E-02	0.6451	75	136
US 4983 (250)	32.94	31.94	8.350E-03	0.3343	4.502E-03	0.1757	5.423E-03	0.2079	75	136
US 4983 (400)	32.94	31.94	8.890E-03	0.3373	1.320E-02	0.5668	1.700E-02	0.6024	75	136
US 4983 (250)	32.94	31.94	0.312E-03	0.1198	4.892E-03	0.1569	4.840E-03	0.1859	75	136





Pic. No. 4970 H/HREF = .2075 BOOSTER
H/HREF = .1851 ORBITER



Pic. No. 4983 H/HREF = .1343 BOOSTER
H/HREF = .1198 ORBITER

6/ 3/71

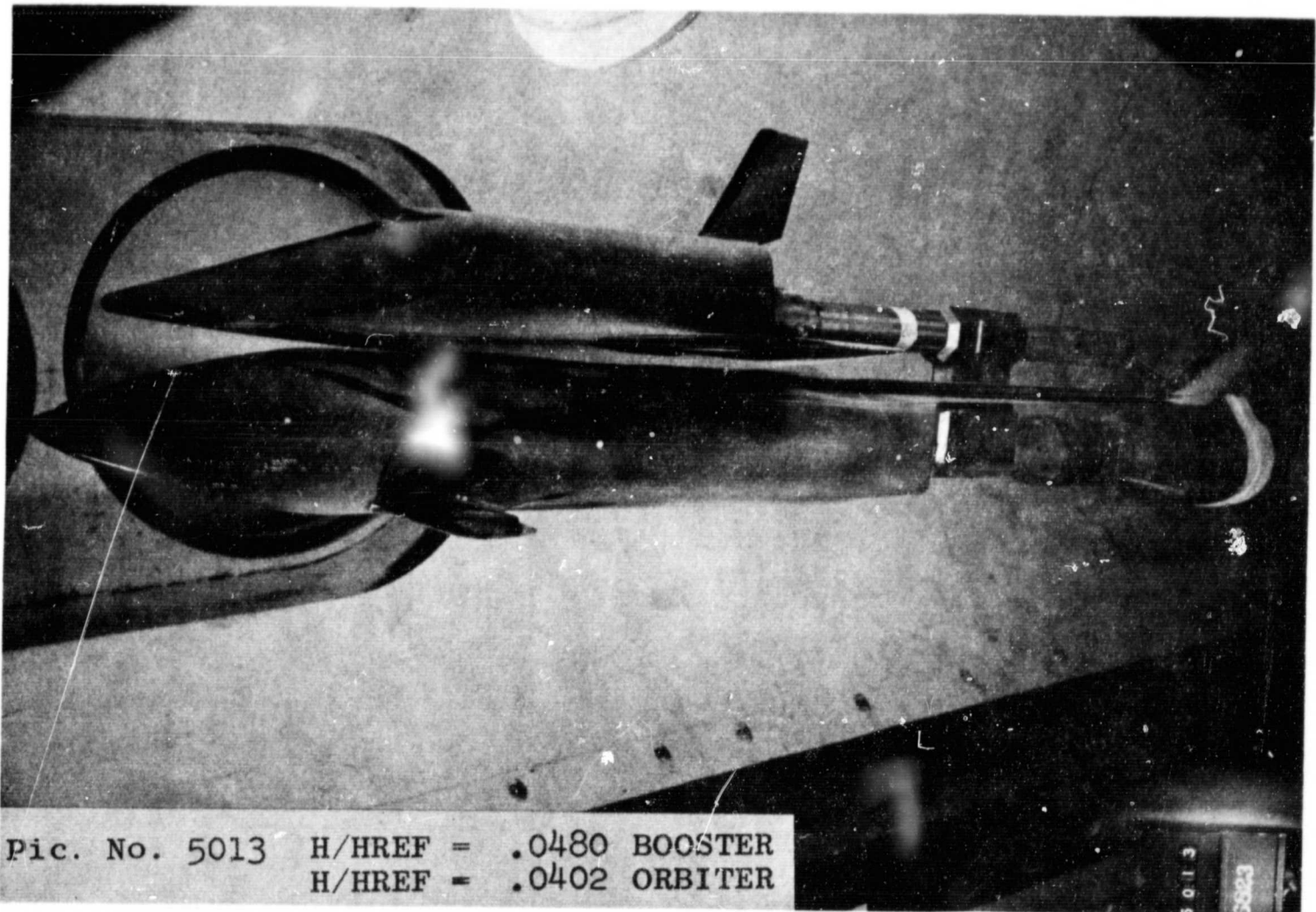
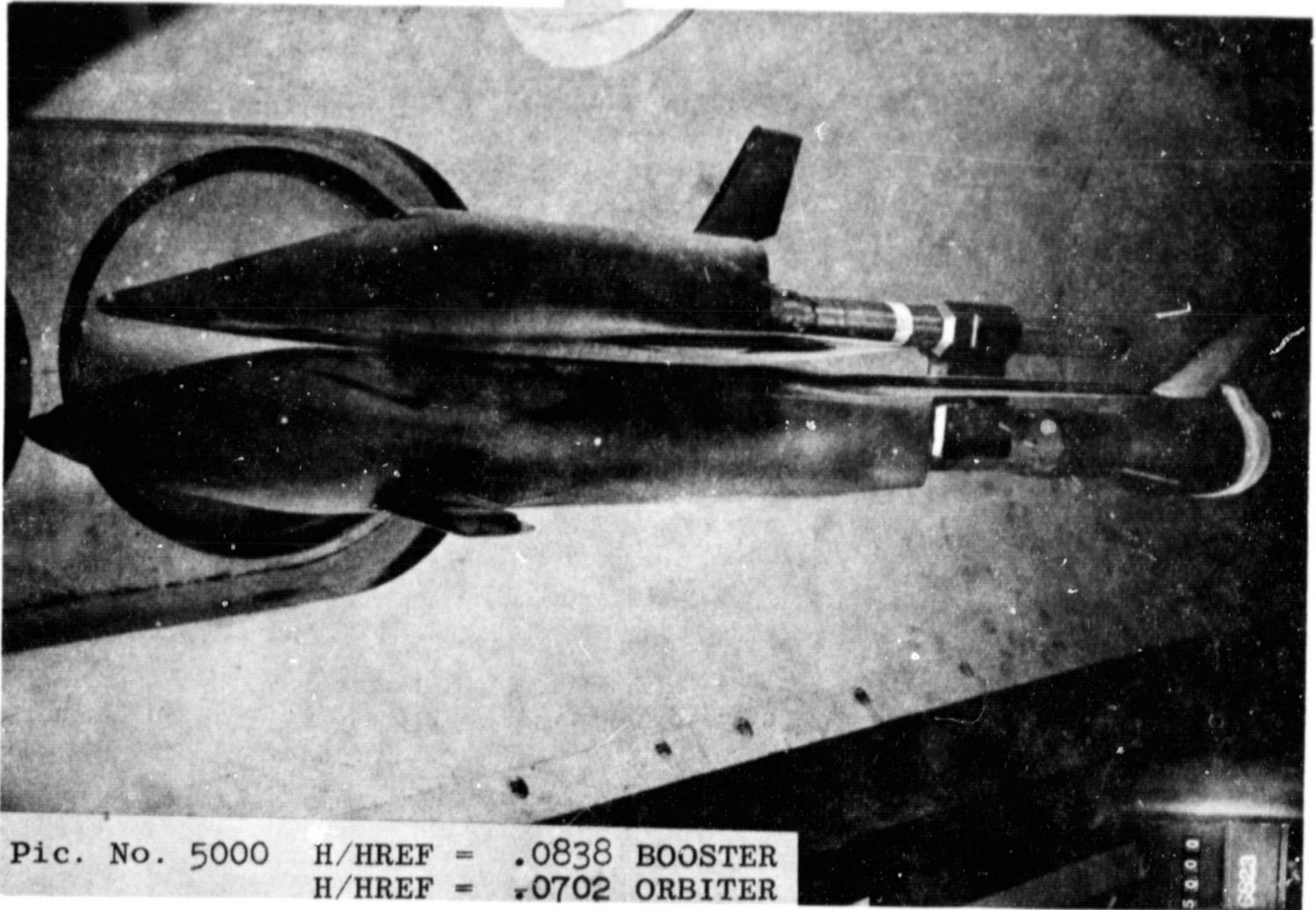
AEDCIAR01 INC 1 ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH WPERSONIC TUNNEL B
V11162

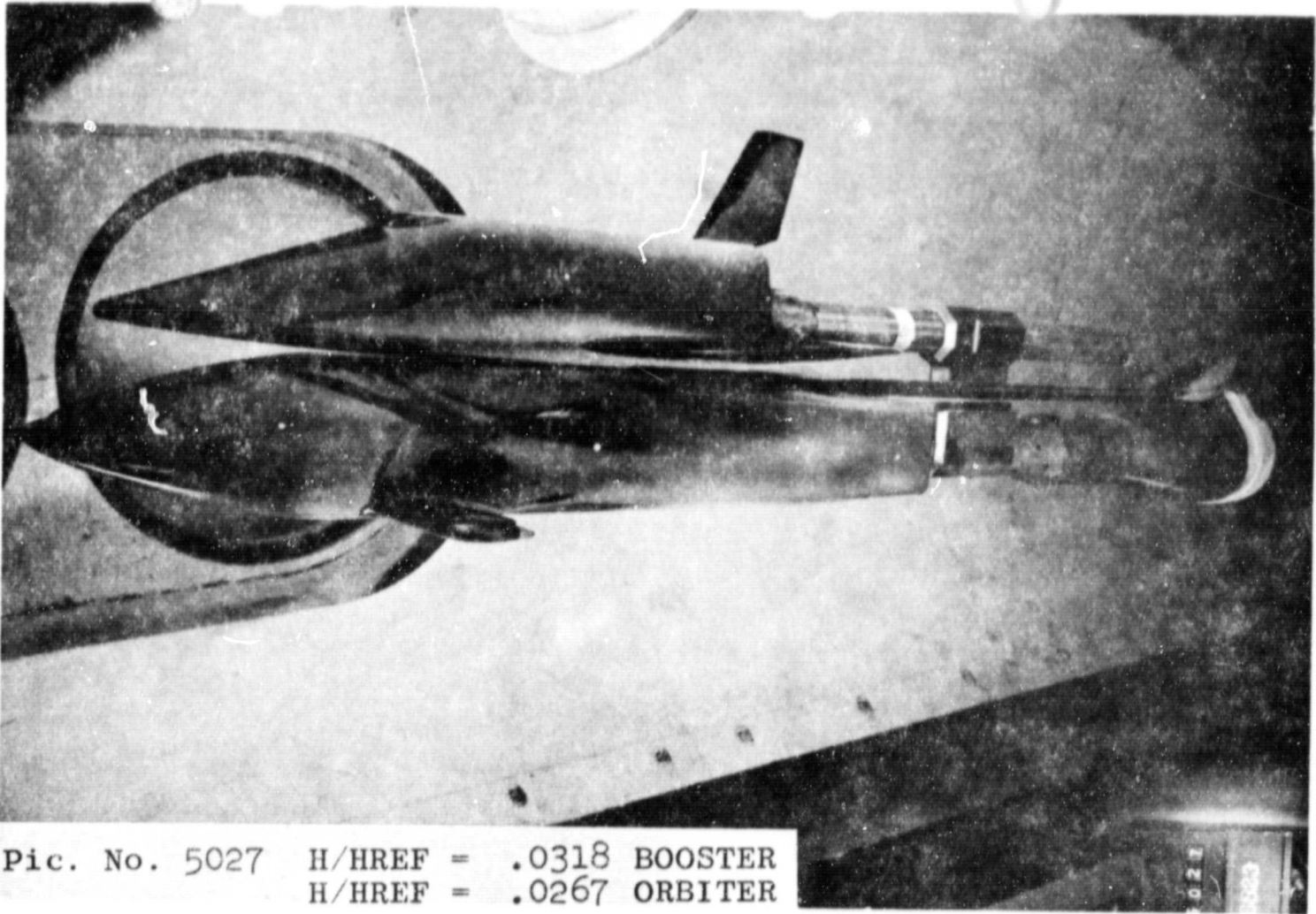
GROUP CONFIG MODEL MACH NO PO PSIA TO DEG R ALPHA-PODEL ALPHA-SECTOR ALPHA-PREBEND ROLL-MODEL VAW
200 1221 W0AC-R-0NC 7.93 146.8 1103 5.02 5.02 0 0

T-Inf P-Inf Q-Inf V-Inf RHO-Inf MU-Inf RE/FT HREF STREF
(DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R= .01FT) (R= .01FT)
87.1 .816 .701 3657 1.533E-05 7.013E-08 7.93E 05 2.519E-02 5.014E-02

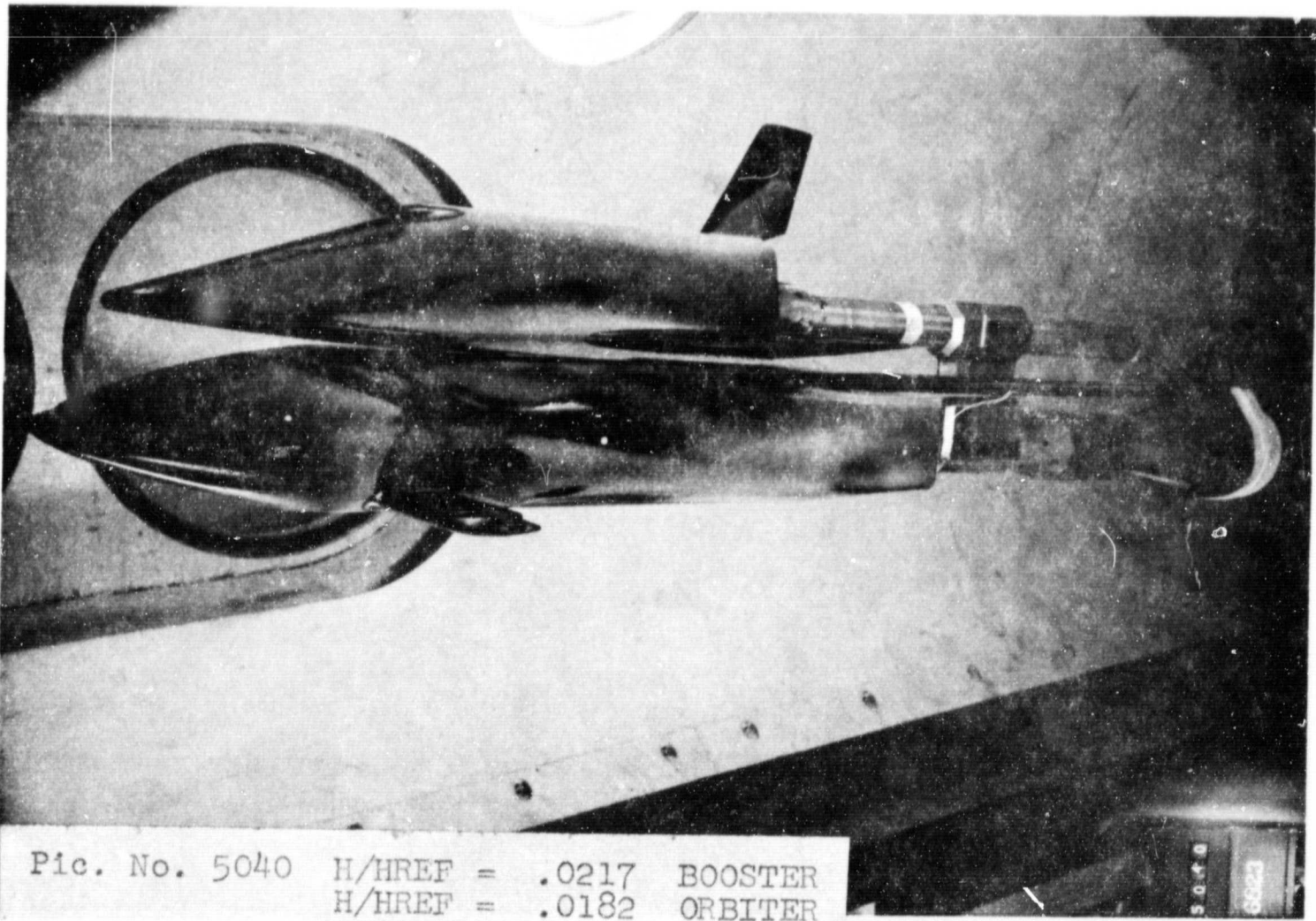
CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (RHO/CXK)
TOP(T) 113
SIDE(US) 113 AVERAGE TM = 78 (P)
SIDE(LS) 113 AVERAGE TW = 84 (O) --.0081(SQUARE ROOT DEL TIME) = 0.11

PIC MC	TIME	DELTIME	MITO1	MITO1/HREF	MI.9TO1	MI.9TC1/HREF	MI.85TO1	MI.85TO1/HREF	SI(TO1)	MODEL	TEMP F
US 4000 (113)	5.75	4.71	0 1.81E-03	.0702	2.241E-03	.0869	2.543E-03	.0906	4.093E-03	77	85
US 4000 (113)	5.75	4.71	0 2.14E-03	.0818	2.675E-03	.1037	3.034E-03	.1176	4.888E-03	77	85
US 4000 (113)	5.75	4.71	0 2.16E-03	.0838	2.675E-03	.1037	3.034E-03	.1176	4.888E-03	77	85
US 4000 (113)	5.75	4.71	0 1.81E-03	.0702	2.241E-03	.0869	2.543E-03	.0906	4.093E-03	77	85
US 4013 (113)	12.55	11.51	0 1.04E-03	.0402	1.282E-03	.0497	1.455E-03	.0544	2.342E-03	80	96
US 4013 (113)	12.55	11.51	0 1.04E-03	.0402	1.282E-03	.0497	1.455E-03	.0544	2.342E-03	80	96
US 4013 (113)	12.55	11.51	0 1.04E-03	.0402	1.282E-03	.0497	1.455E-03	.0544	2.342E-03	80	96
US 4027 (113)	21.65	20.61	0 6.89E-04	.0267	8.520E-04	.0330	9.672E-04	.0375	1.553E-03	85	111
US 4027 (113)	21.65	20.61	0 6.89E-04	.0267	8.520E-04	.0330	9.672E-04	.0375	1.553E-03	85	111
US 4027 (113)	21.65	20.61	0 6.89E-04	.0267	8.520E-04	.0330	9.672E-04	.0375	1.553E-03	85	111
US 4027 (113)	21.65	20.61	0 6.89E-04	.0267	8.520E-04	.0330	9.672E-04	.0375	1.553E-03	85	111
US 4039 (113)	34.29	33.25	0 5.41E-04	.0217	6.943E-04	.0269	7.875E-04	.0305	1.266E-03	92	130
US 4039 (113)	34.29	33.25	0 5.41E-04	.0217	6.943E-04	.0269	7.875E-04	.0305	1.266E-03	92	130
US 4039 (113)	34.29	33.25	0 5.41E-04	.0217	6.943E-04	.0269	7.875E-04	.0305	1.266E-03	92	130
US 4039 (113)	34.29	33.25	0 5.41E-04	.0217	6.943E-04	.0269	7.875E-04	.0305	1.266E-03	92	130





Pic. No. 5027 H/HREF = .0318 BOOSTER
H/HREF = .0267 ORBITER



Pic. No. 5040 H/HREF = .0217 BOOSTER
H/HREF = .0182 ORBITER

6/ 3/71

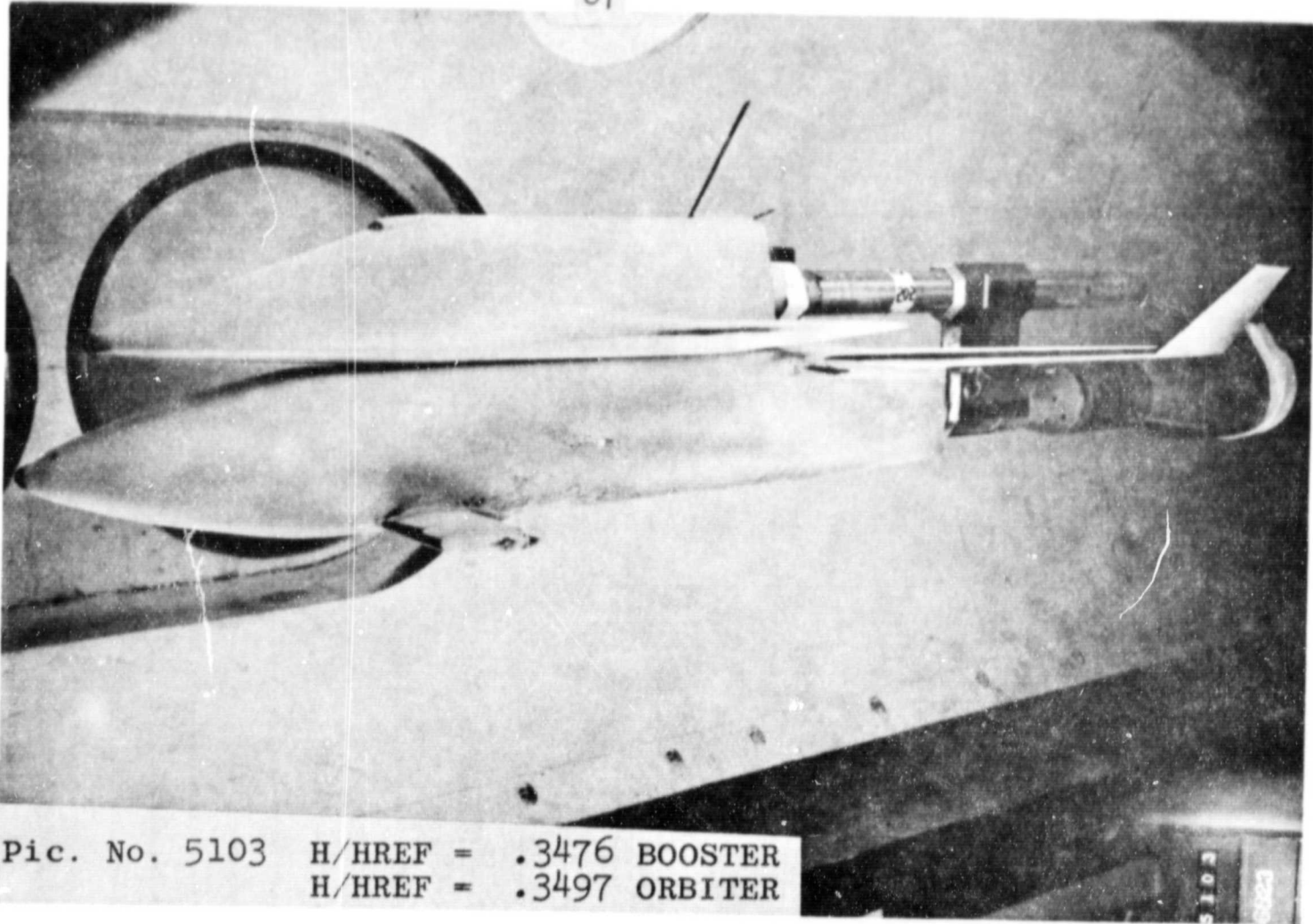
AFCIARON, INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
WT1162

GROUP CONFID MODEL MACW NO PO PSIA TO DEG R ALPHA-MODEL ALPHA-SECTOR ALPHA-PRENOV ROLL-MODEL YAW
202 1221 PDAC-B-DWG 8.00 550.6 1326 .03 .03 0 0

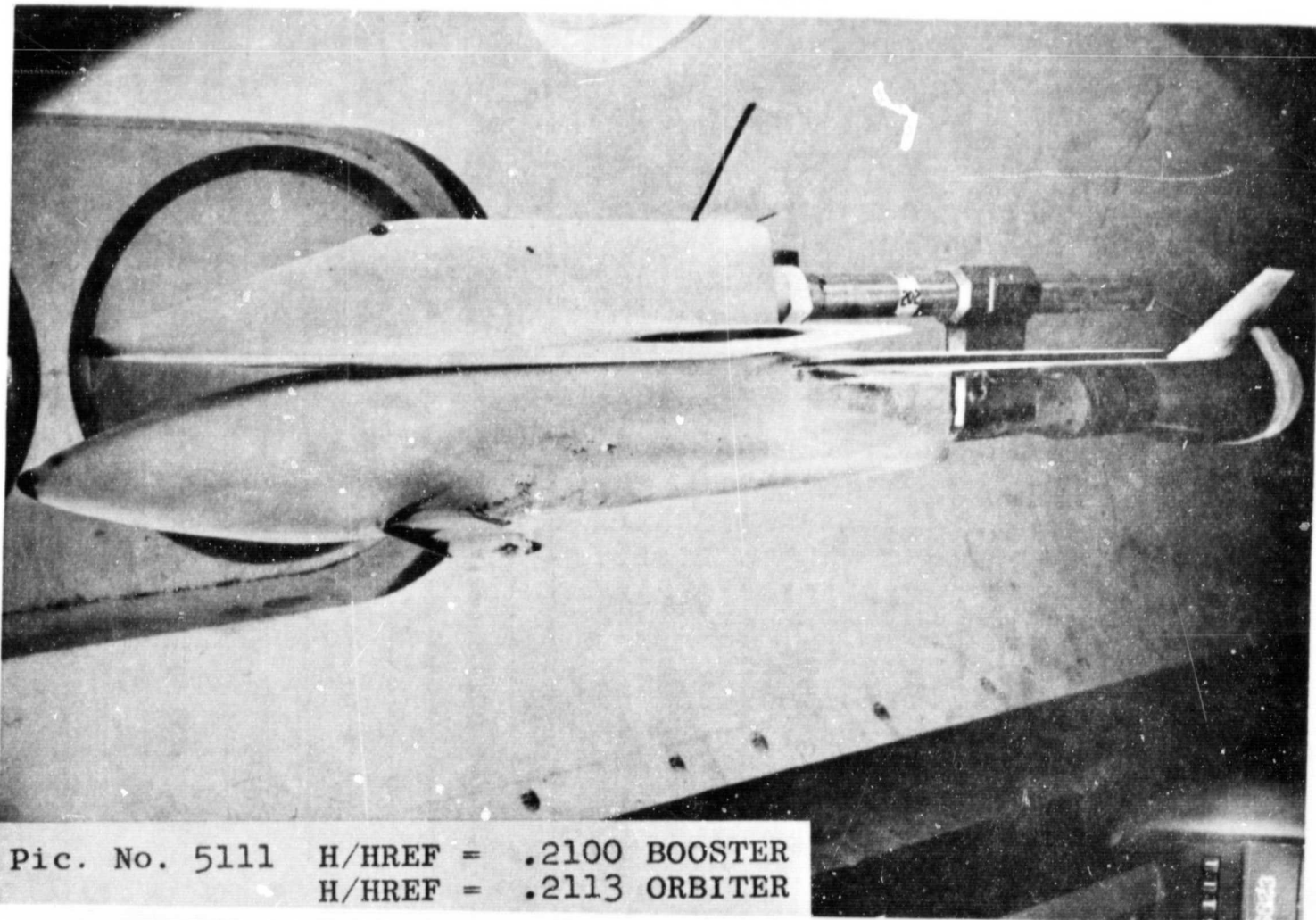
T-1NF 9-1NF 0-1NF V-1NF RMO-1NF PU-1NF RE/FT HREF STREF
(DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R=.011FT) (R=.011FT)
96.1 .056 2.527 3942 4.926E-05 7.734E-08 2.45E 96 4.996E-02 3.232E-02

CAVEA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (RMOXCN)
TOP(T) 369
SIDE(US) 508 AVERAGE TW = 80 (P)
SIDE(LS) 508 AVERAGE TW = 76 (C) --.00(SQUARE ROOT DEL TIME) + 0.11

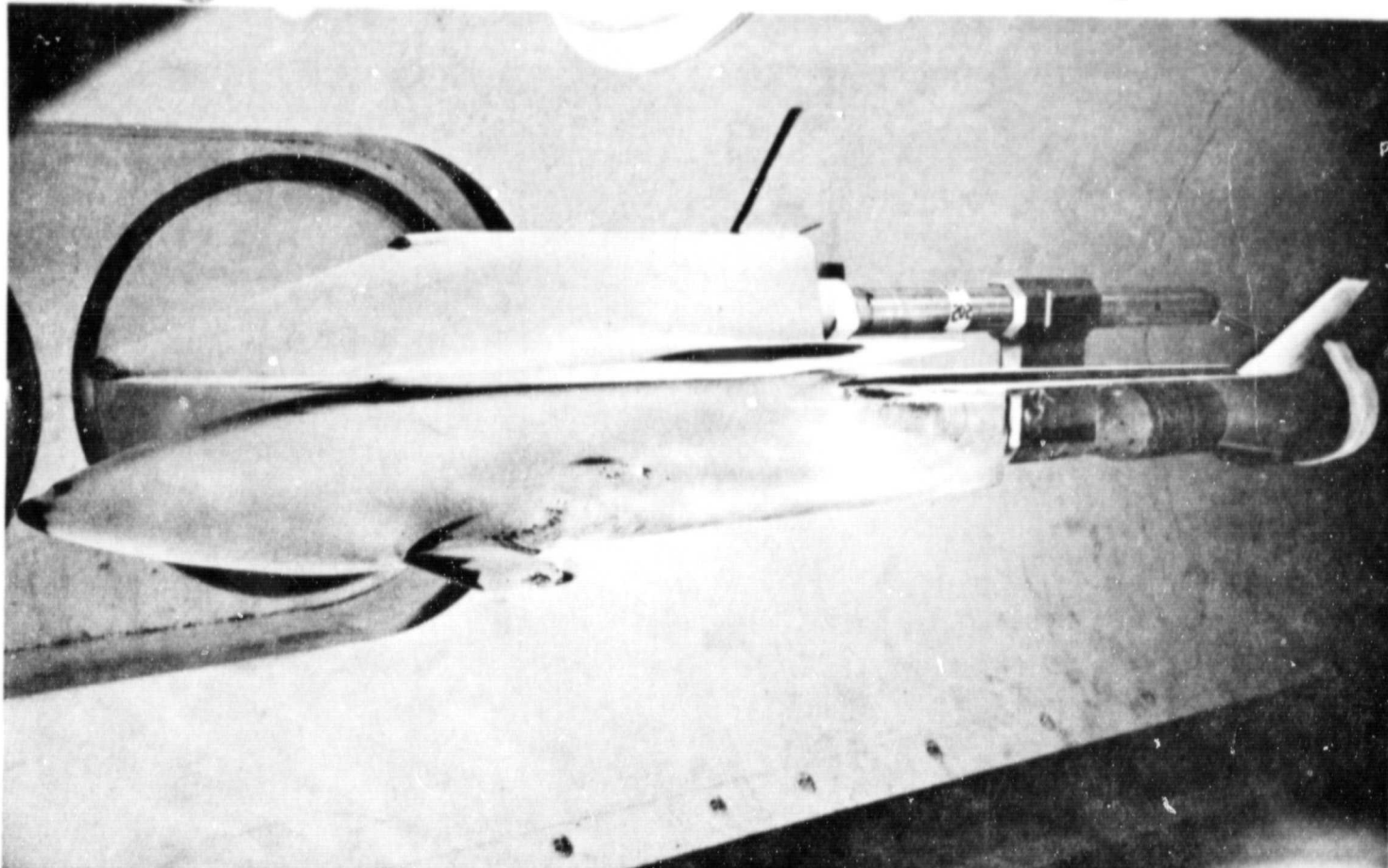
PIC MC	TIME DELTME	HITOI	HITOI/REF	M(.910)	M(.910)/REF	M(.8510)	M(.8510)/REF	ST(ITOI)	MODEL	TEMP F
US 5103 (500)	4.20	3.14	0 4.72E-02	.9451	7.05E-02	1.4150	9.527E-02	1.9271	80	79 82
US 5103 (300)	4.20	3.14	R 1.74E-02	.3476	2.231E-02	.1466	2.603E-02	3.047E-02	80	79 82
US 5103 (500)	4.20	3.14	B 4.71E-02	.9423	7.04E-02	1.4108	9.499E-02	1.9016	80	79 82
US 5103 (300)	4.20	3.14	O 1.75E-02	.3497	2.244E-02	.1492	2.618E-02	3.078E-02	80	79 82
US 5111 (500)	8.40	7.34	O 2.95E-02	.5710	4.270E-02	.8549	5.755E-02	1.1573	83	80 94
US 5111 (300)	8.40	7.34	R 1.49E-02	.2108	1.348E-02	.2698	1.572E-02	.3148	83	80 94
US 5111 (500)	8.40	7.34	R 2.94E-02	.5693	4.250E-02	.8524	5.739E-02	1.1449	83	80 94
US 5111 (300)	8.40	7.34	O 1.46E-02	.2113	1.356E-02	.2714	1.582E-02	.3146	83	80 94
US 5119 (500)	12.60	11.54	O 2.13E-02	.4273	3.195E-02	.6397	4.307E-02	6.885E-03	89	80 109
US 5119 (300)	12.60	11.54	R 7.45E-03	.1571	1.008E-02	.2019	1.177E-02	8.672	89	80 109
US 5119 (500)	12.60	11.54	O 2.13E-02	.4268	3.186E-02	.6378	4.294E-02	5.121E-03	89	80 109
US 5119 (300)	12.60	11.54	R 7.40E-03	.1591	1.014E-02	.2031	1.183E-02	1.374E-03	89	80 109
US 5128 (500)	17.30	16.24	O 1.49E-02	.3194	2.530E-02	.5066	3.410E-02	6.628	97	81 125
US 5128 (300)	17.30	16.24	R 6.21E-03	.1245	7.984E-03	.1599	9.315E-03	1.091E-02	97	81 125
US 5128 (500)	17.30	16.24	R 1.48E-02	.3374	2.522E-02	.5052	3.408E-02	4.057E-03	97	81 125
US 5128 (300)	17.30	16.24	O 6.25E-03	.1252	8.030E-03	.1608	9.369E-03	1.088E-02	97	81 125



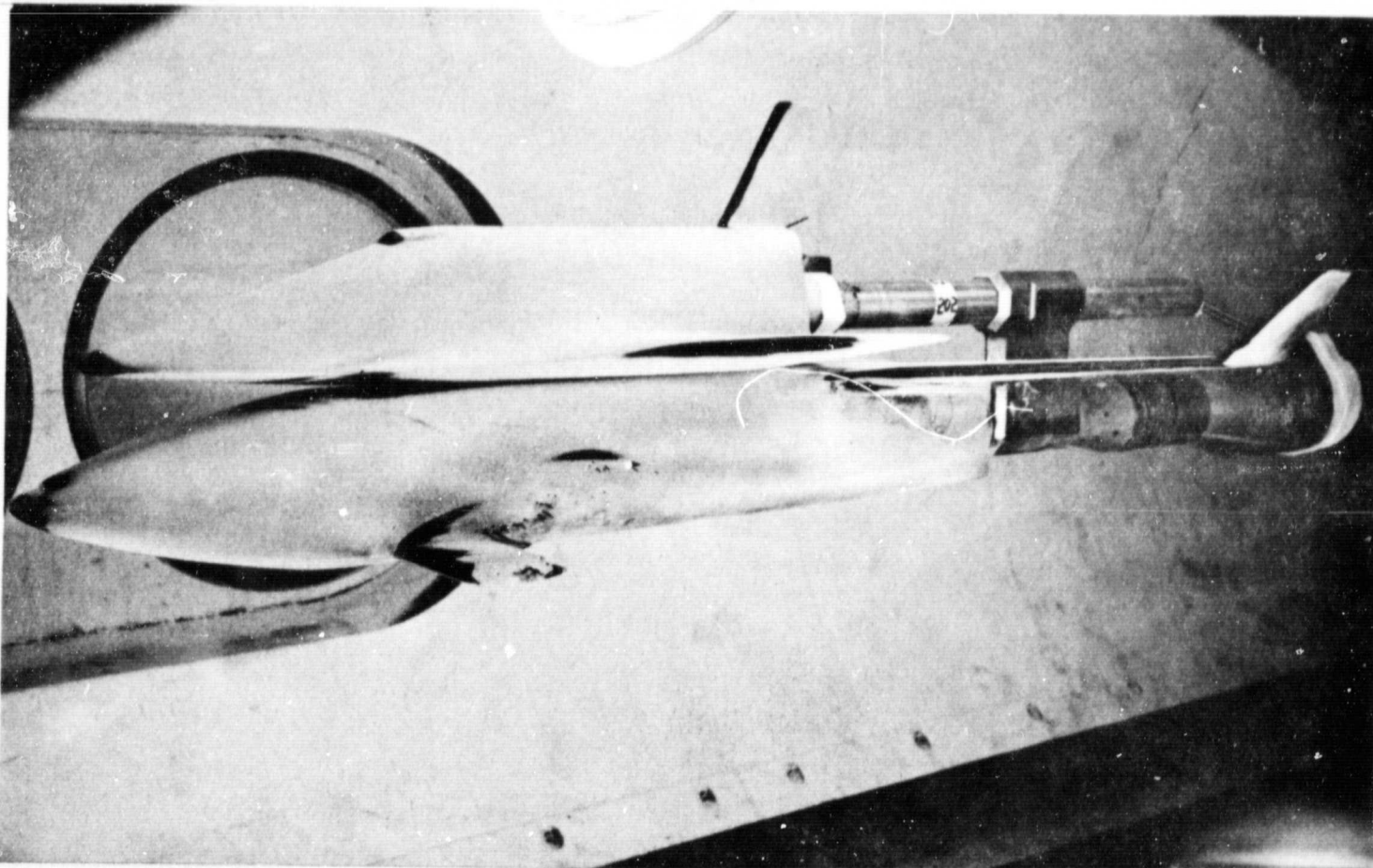
Pic. No. 5103 H/HREF = .3476 BOOSTER
H/HREF = .3497 ORBITER



Pic. No. 5111 H/HREF = .2100 BOOSTER
H/HREF = .2113 ORBITER

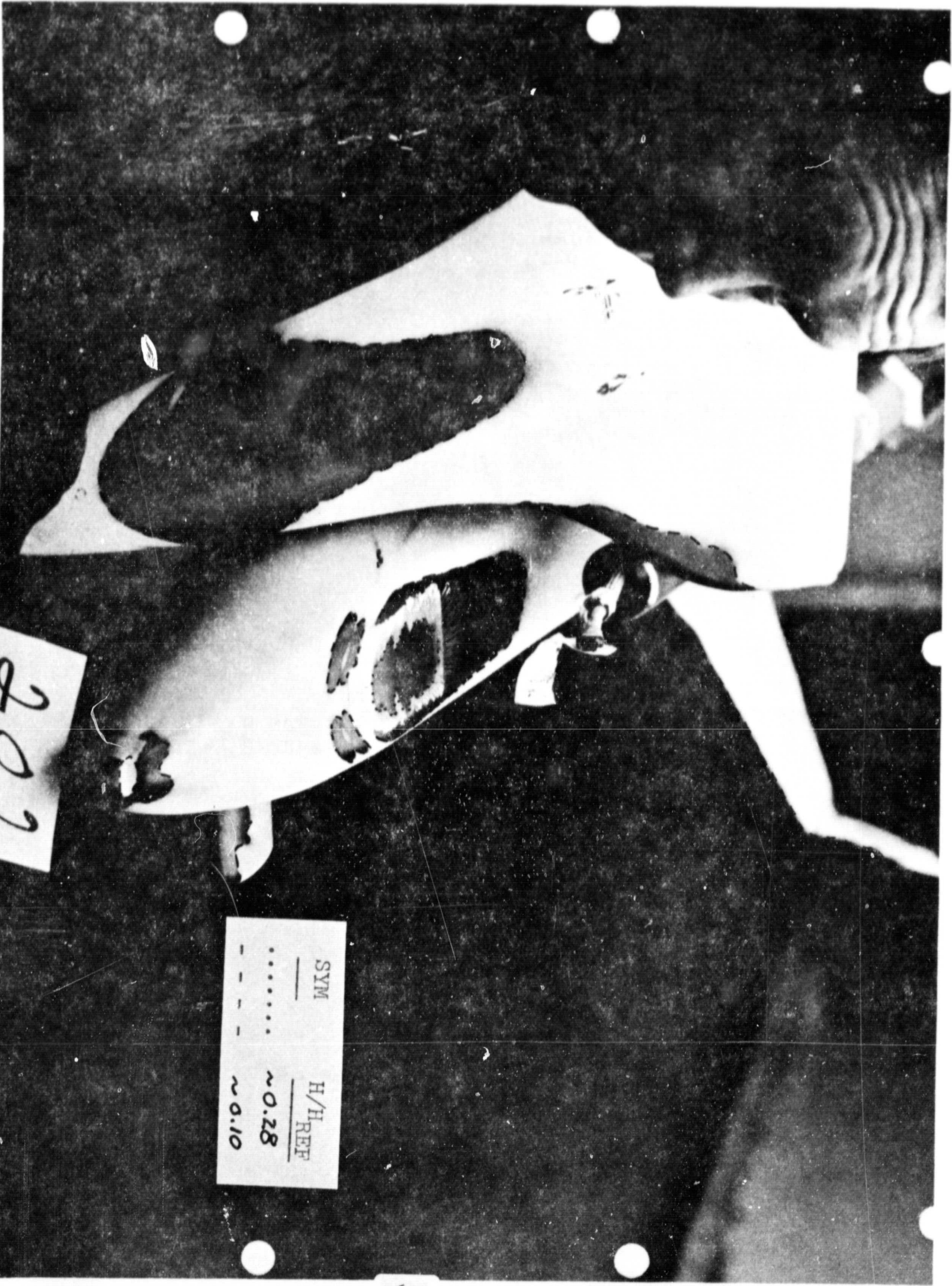


Pic. No. 5119 H/HREF = .1571 BOOSTER
H/HREF = .1581 ORBITER



Pic. No. 5128 H/HREF = .1245 BOOSTER
H/HREF = .1252 ORBITER

Group 202 Re/ft 2.5x10⁶ ALPHA 0
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION



202

SYM

.....

H/H_{REF}
~0.28
~0.10

6/ 3/71

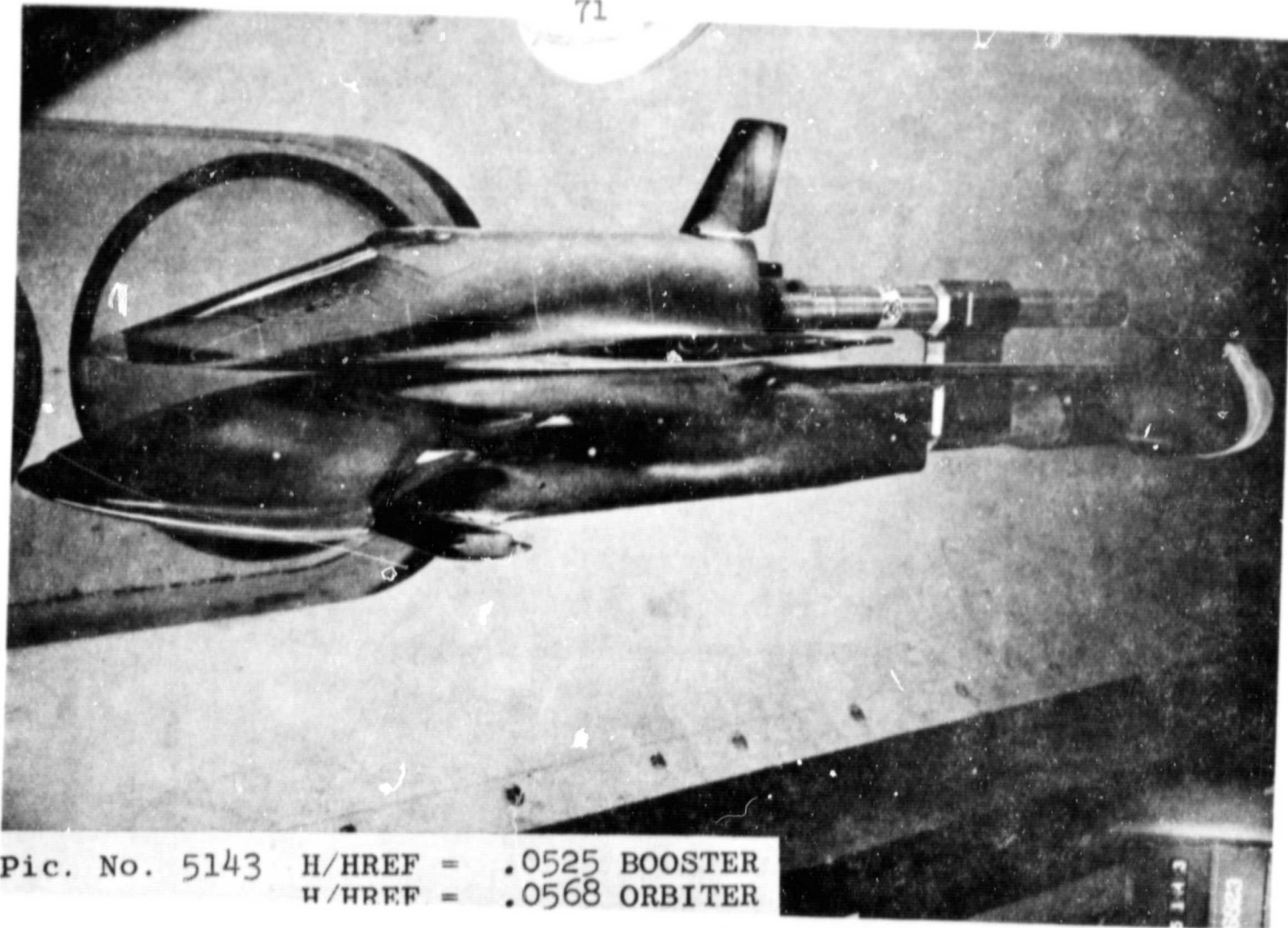
AFDCIAR01INC1 ADNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11162

GROUP CONFIG MODEL MACW NU PO PSIA TO DEG R ALPHA-RODEL ALPHA-SECTOR ALPHA-PREBEND ROLL-MODEL YAW
 203 1222 *0AC-8*0AC R.08 549.5 1329 *03 *03 *0
 T-1/F P-1/F Q-1/F V-1/F QMO-1/F MU-1/F RE/FT HREF STREF
 (DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R-01/FT) (R-01/FT)
 46.3 *056 2.522 3#66 4.985E-05 7.751E-08 2.43E 06 4.992E-02 3.290E-02

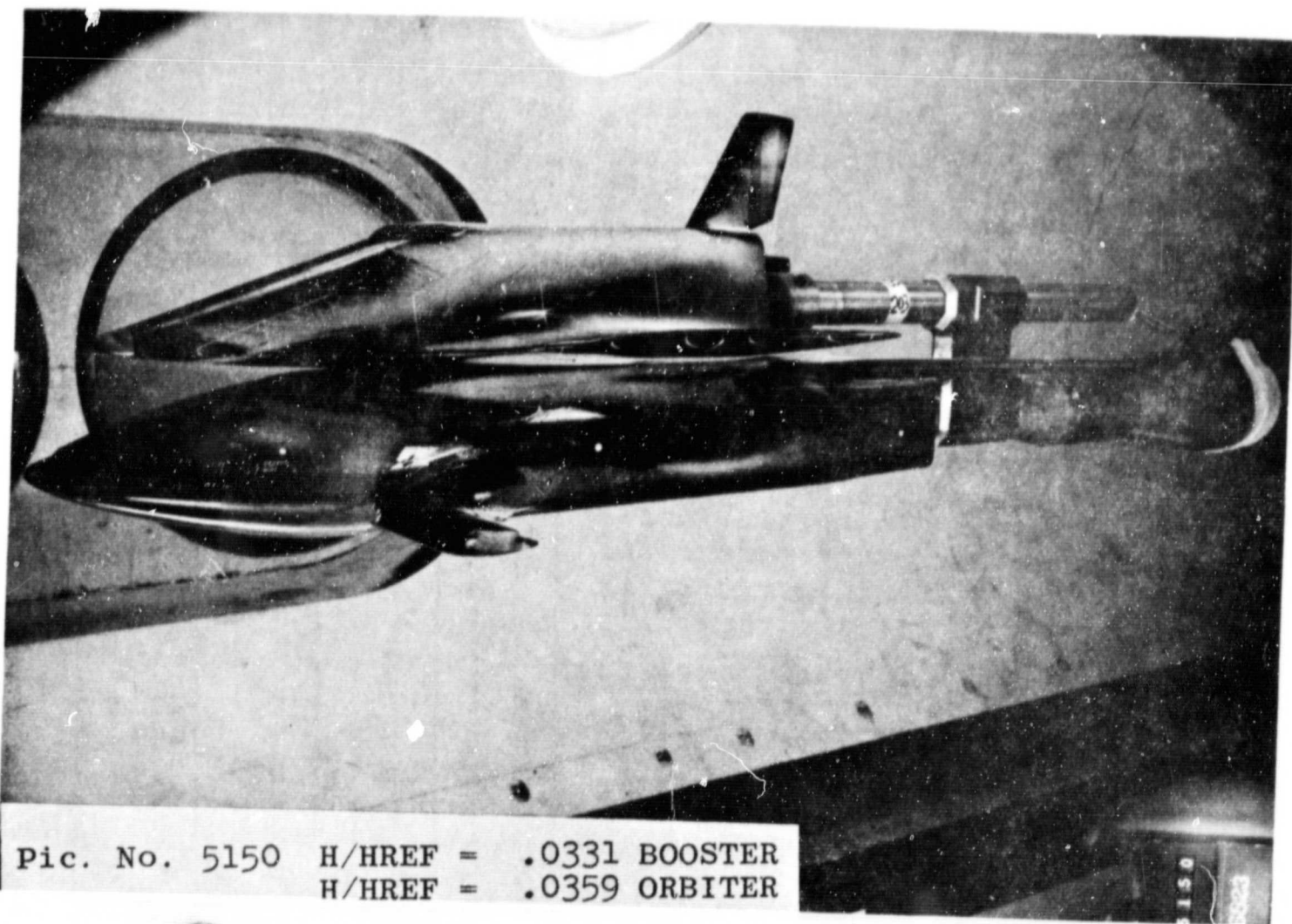
CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (INCH/SEC)
 122
 500
 500
 500

AVERAGE TW = 84 (R) *0001SQUARE ROOT DEL TIME) = 0.11
 AVERAGE TW = 80 (C)

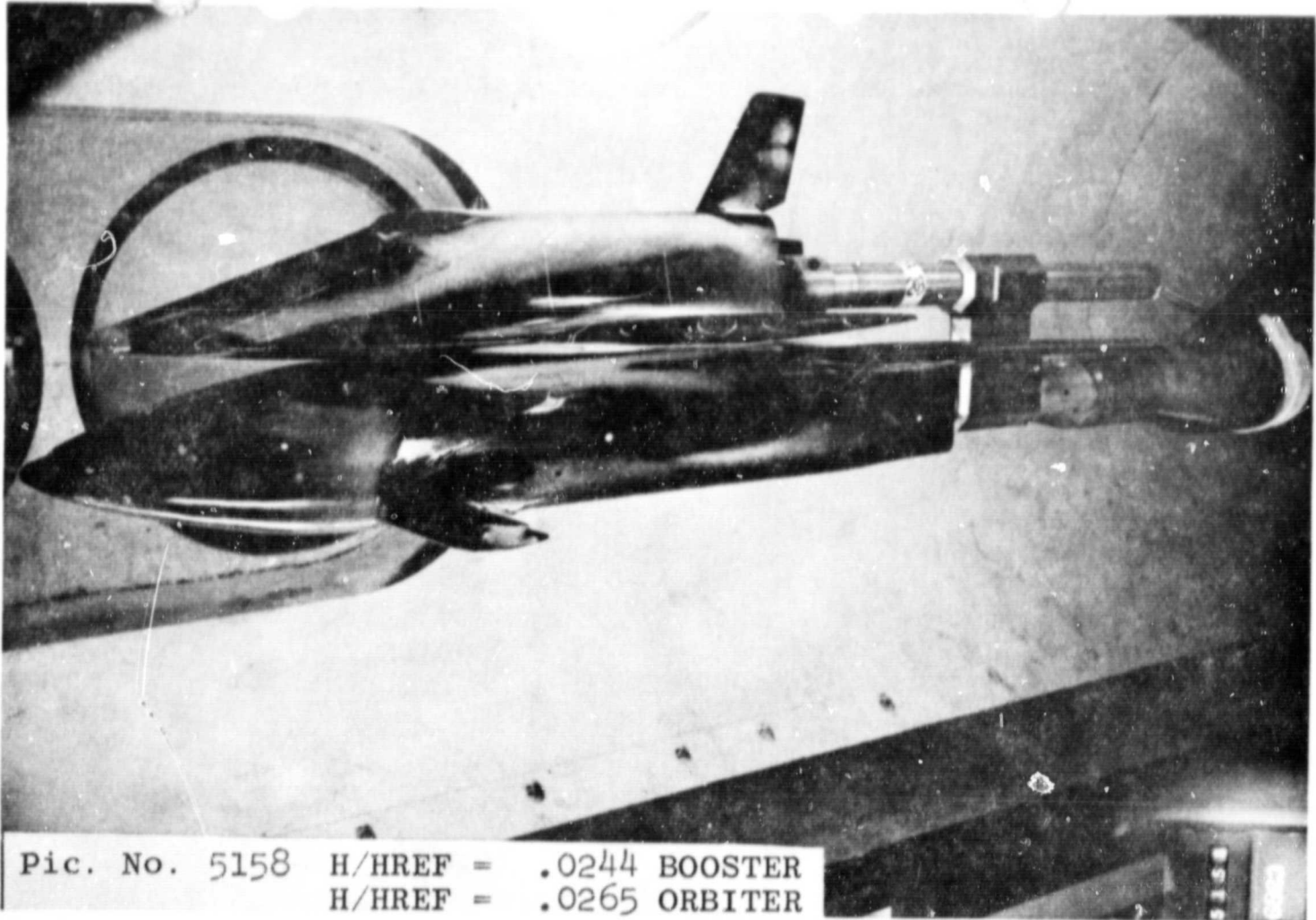
PIC NO	TIME	DELTIME	MIT01	MIT01/MPREF	M1.9101	M1.9101/MPREF	M1.85101	M1.85101/MPREF	ST101	MODEL	TEMP F	
US 5143 (1251)	4.20	3.14	0 4.46E-02	.9135	6.952E-02	1.3927	9.332E-02	1.8495	3.018E-02	86	82	84
US 5143 (1251)	4.20	3.14	0 2.47E-03	.0525	3.182E-03	.0638	3.565E-03	.0714	1.730E-03	86	82	84
US 5143 (1251)	4.20	3.14	R 4.43E-02	.9265	6.901E-02	1.3824	9.264E-02	1.8548	2.995E-02	86	82	84
US 5143 (1251)	4.20	3.16	0 2.84E-03	.0568	3.444E-03	.0660	3.861E-03	.0773	1.875E-03	86	82	84
US 5156 (1251)	7.90	6.86	0 2.04E-02	.5891	4.387E-02	.0760	5.889E-02	1.1797	1.984E-02	87	82	93
US 5156 (1251)	7.90	6.86	R 1.45E-03	.0731	2.009E-03	.0442	2.250E-03	.0441	1.092E-03	87	82	93
US 5156 (1251)	7.90	6.86	0 2.02E-02	.5847	4.355E-02	.0723	5.846E-02	1.1710	1.890E-02	87	82	93
US 5156 (1251)	7.90	6.86	0 1.79E-03	.0349	2.174E-03	.0435	2.436E-03	.0488	1.183E-03	87	82	93
US 5156 (1251)	12.10	11.04	0 2.17E-02	.4347	3.236E-02	.0644	4.344E-02	.0765	1.405E-02	92	83	109
US 5156 (1251)	12.10	11.04	R 1.27E-03	.0244	1.481E-03	.0297	1.659E-03	.0372	8.057E-04	92	83	109
US 5156 (1251)	12.10	11.04	0 2.15E-02	.4314	3.212E-02	.0637	4.312E-02	.0741	1.395E-02	92	83	109
US 5156 (1251)	12.10	11.04	0 1.72E-03	.0265	1.603E-03	.0321	1.797E-03	.0368	8.731E-04	92	83	109
US 5165 (1251)	16.00	14.94	0 1.77E-02	.3542	2.638E-02	.5284	3.541E-02	.7044	1.145E-02	98	83	123
US 5165 (1251)	16.00	14.94	0 9.03E-04	.0199	1.100E-03	.0242	1.353E-03	.0271	6.564E-04	98	83	123
US 5165 (1251)	16.00	14.94	0 1.75E-02	.3516	2.619E-02	.5245	3.515E-02	.7041	1.136E-02	98	83	123
US 5165 (1251)	16.00	14.94	0 1.08E-03	.0216	1.387E-03	.0262	1.465E-03	.0293	7.113E-04	98	83	123



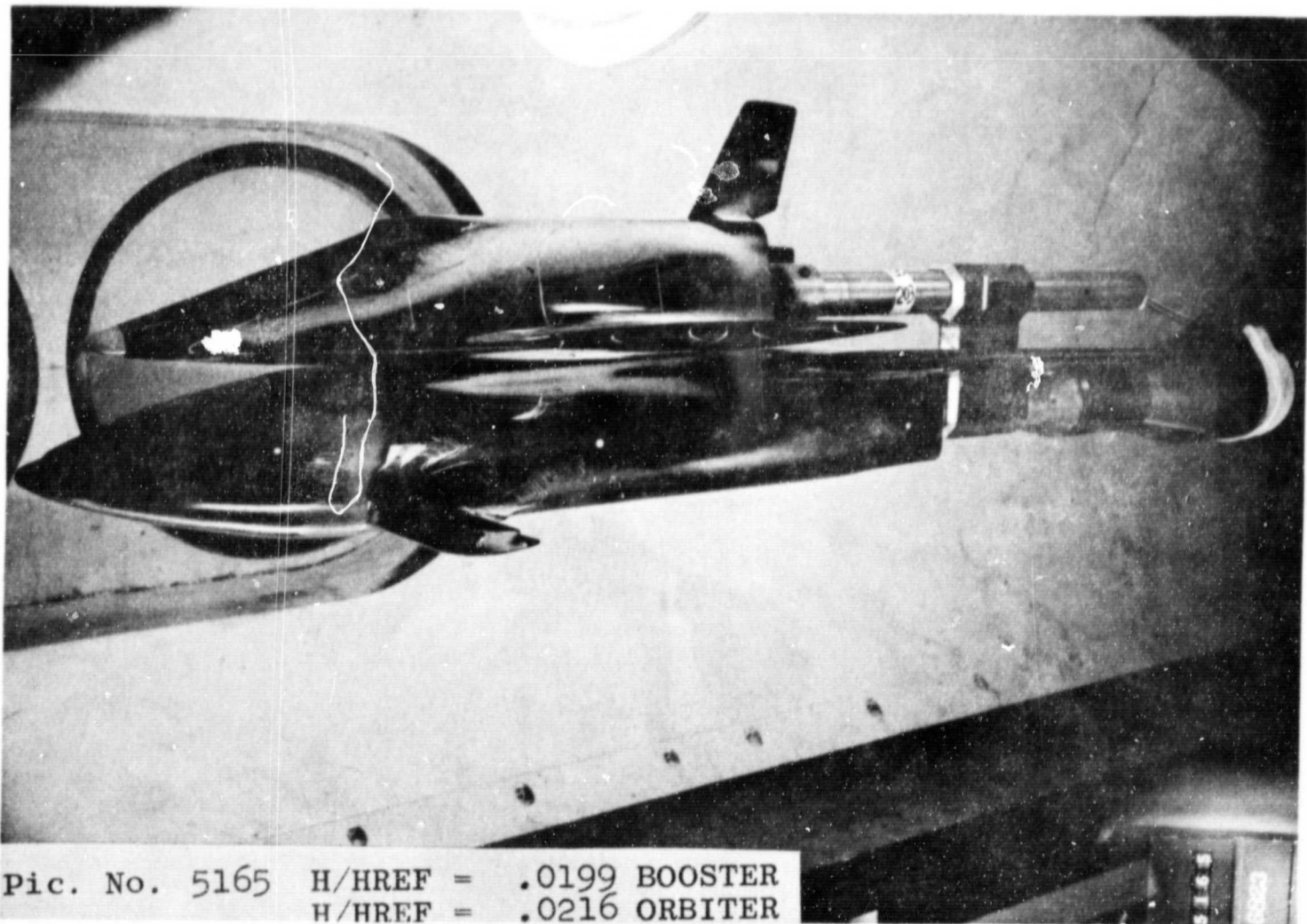
Pic. No. 5143 H/HREF = .0525 BOOSTER
H/HREF = .0568 ORBITER



Pic. No. 5150 H/HREF = .0331 BOOSTER
H/HREF = .0359 ORBITER



Pic. No. 5158 H/HREF = .0244 BOOSTER
H/HREF = .0265 ORBITER



Pic. No. 5165 H/HREF = .0199 BOOSTER
H/HREF = .0216 ORBITER



Group 203 Re/Jt Z.Syio ALPHA 0
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION

203

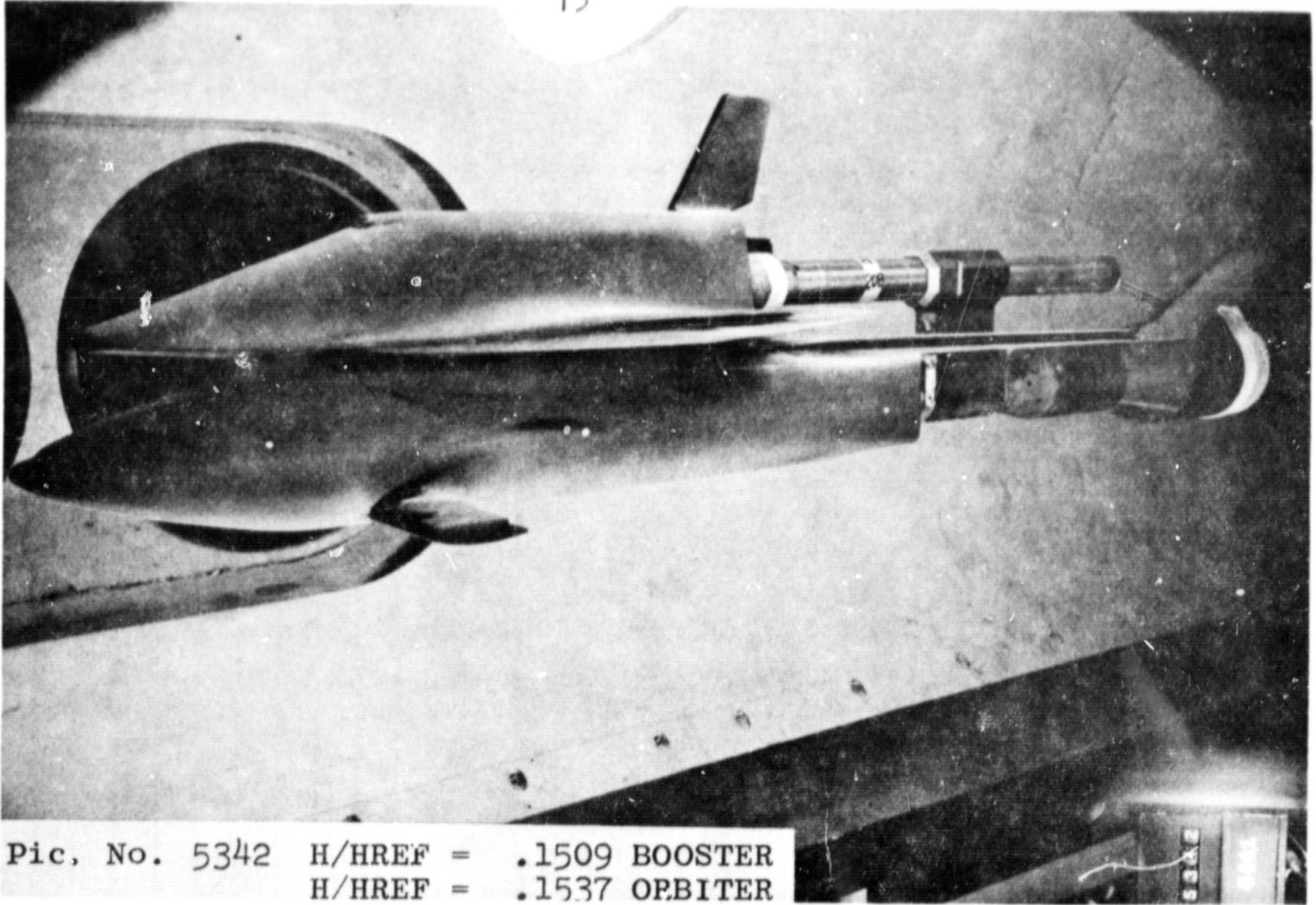
SYM H/H_{REF}
— ~0.3
..... ~0.02
- - - - -

6/ 3/71

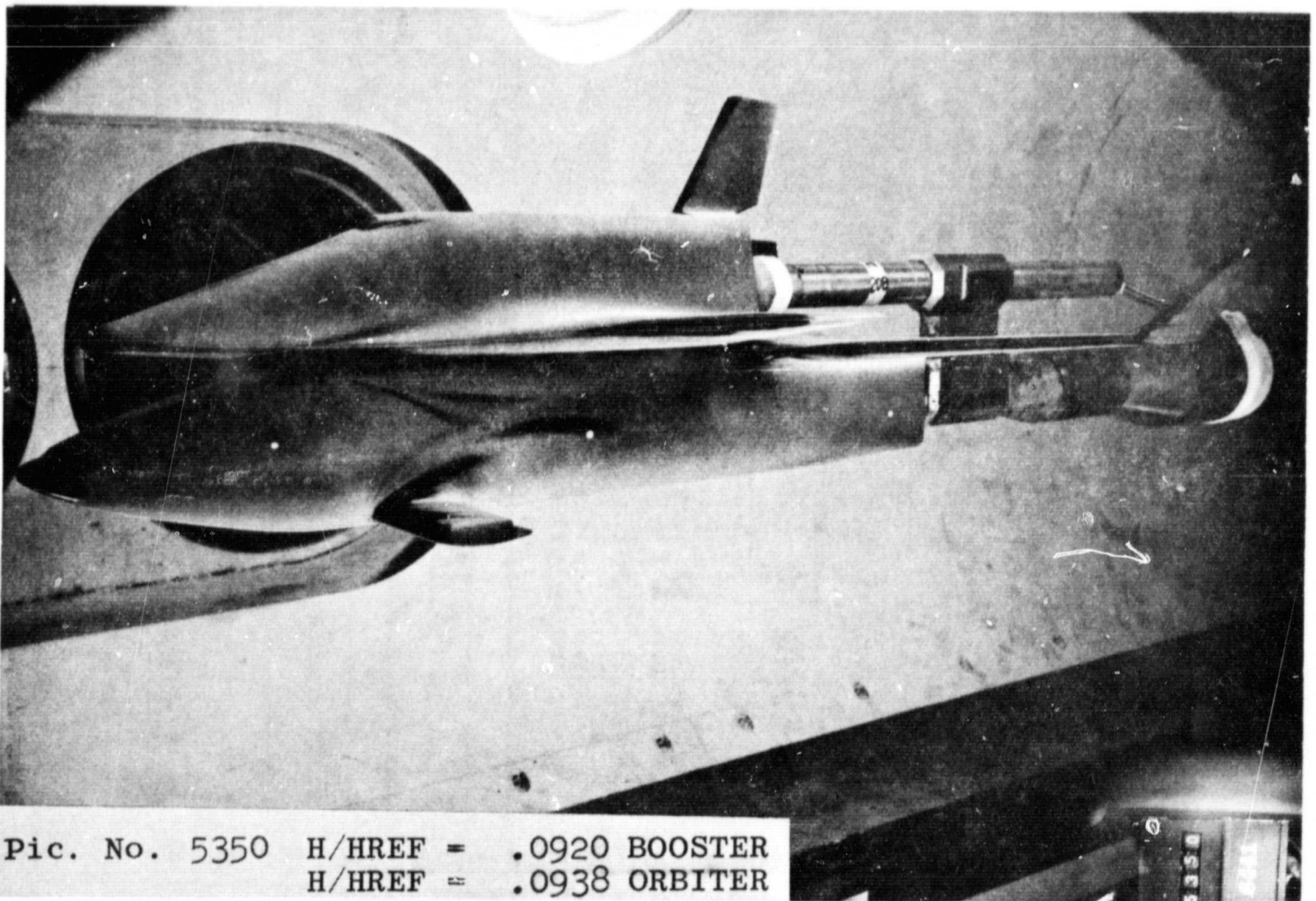
AEDCIANO, INC. 1 ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11162

GROUP CONFIG 3221 MODEL MACH NO 8.88 PO PSIA 555.0 TU DEG R 1327 ALPHA-POCEL ALPHA-SECTOR ALPHA-PREEND ROLL-MOOL YAW
 209 3221 PDAC-R+DWC 8.88 555.0
 T-1NF P-1NF O-1NF V-1NF R-0-1NF MU-1NF RE/FT P-REF S-REF
 (DEG R) (PSIA) (PSIA) (FI/SEC) (SLUGS/FI3) (LB-SEC/FI2) (FT-1) (R-01) (FI) (R-01) (FI)
 9642 .057 2.547 3945 4.959E-05 7.744E-08 2.46E 06 5.015E-02 3.272E-02
 CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (RHO/CXK)
 TOP(TI) 200 AVERAGE Tm = 89 (0)
 SICE(U/S) 200 AVERAGE Tm = 87 (0) --008(SQUARE ROOT DEL TIME) = 0.11
 SICE(L/S) 200 AVERAGE Tm = 87 (0)

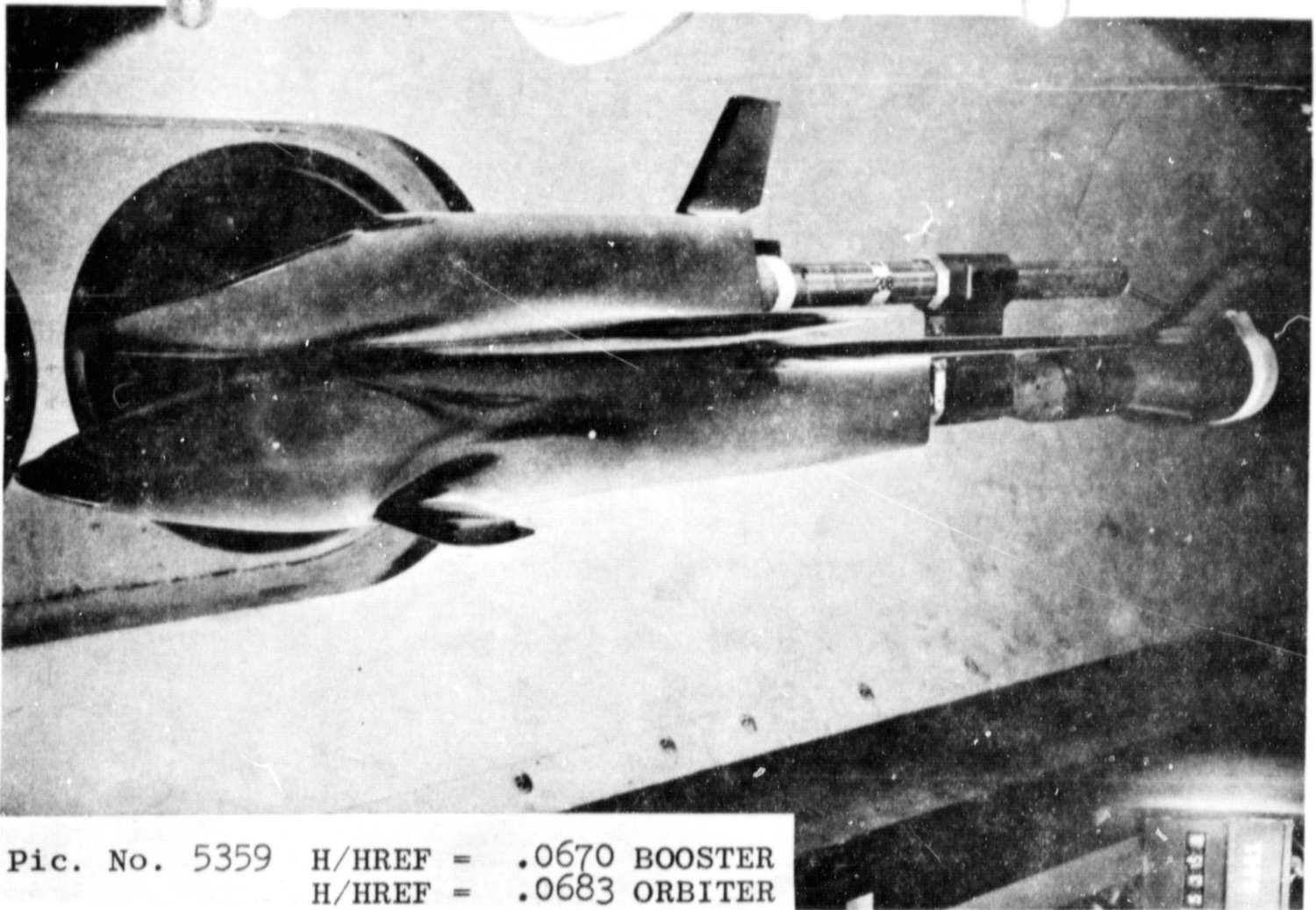
PIC NO	TIME	DELTIME	M(TO)	M(TO)/MREF	M(.910)	M(.970)/MREF	M(.8510)	M(.8510)/MREF	S(TO)	MODEL	TEMP F
US 5342 (200)	4.30	3.26	0 7.70E-03	.1537	9.544E-03	.1904	1.084E-02	.2164	5.024E-03	91	87
US 5342 (200)	4.30	3.26	8 7.56E-03	.1509	9.364E-03	.1869	1.064E-02	.2124	4.931E-03	91	87
US 5342 (200)	4.30	3.26	8 7.56E-03	.1509	9.364E-03	.1869	1.064E-02	.2124	4.931E-03	91	87
US 5342 (200)	4.30	3.26	0 7.70E-03	.1537	9.544E-03	.1904	1.084E-02	.2164	5.024E-03	91	87
US 535C (200)	8.50	7.46	0 4.70E-03	.0930	5.821E-03	.1162	6.613E-03	.1320	3.066E-03	94	87
US 535C (200)	8.50	7.46	8 4.61E-03	.0920	5.714E-03	.1141	6.491E-03	.1296	3.010E-03	94	87
US 535C (200)	8.50	7.46	8 4.61E-03	.0920	5.714E-03	.1141	6.491E-03	.1296	3.010E-03	94	87
US 535C (200)	8.50	7.46	0 4.70E-03	.0930	5.821E-03	.1162	6.613E-03	.1320	3.066E-03	94	87
US 5355 (200)	13.25	12.21	0 3.42E-03	.0683	4.235E-03	.0846	4.812E-03	.0943	2.192E-03	101	88
US 5355 (200)	13.25	12.21	8 3.36E-03	.0670	4.157E-03	.0830	4.723E-03	.0943	2.192E-03	101	88
US 5355 (200)	13.25	12.21	8 3.36E-03	.0670	4.157E-03	.0830	4.723E-03	.0943	2.192E-03	101	88
US 5355 (200)	13.25	12.21	0 3.42E-03	.0683	4.235E-03	.0846	4.812E-03	.0961	2.234E-03	101	88
US 5366 (200)	16.90	15.86	0 2.86E-03	.0571	3.539E-03	.0707	4.021E-03	.0804	1.870E-03	107	89
US 5366 (200)	16.90	15.86	8 2.80E-03	.0560	3.474E-03	.0694	3.947E-03	.0749	1.835E-03	107	89
US 5366 (200)	16.90	15.86	8 2.80E-03	.0560	3.474E-03	.0694	3.947E-03	.0749	1.835E-03	107	89
US 5366 (200)	16.90	15.86	0 2.86E-03	.0571	3.539E-03	.0707	4.021E-03	.0804	1.870E-03	107	89



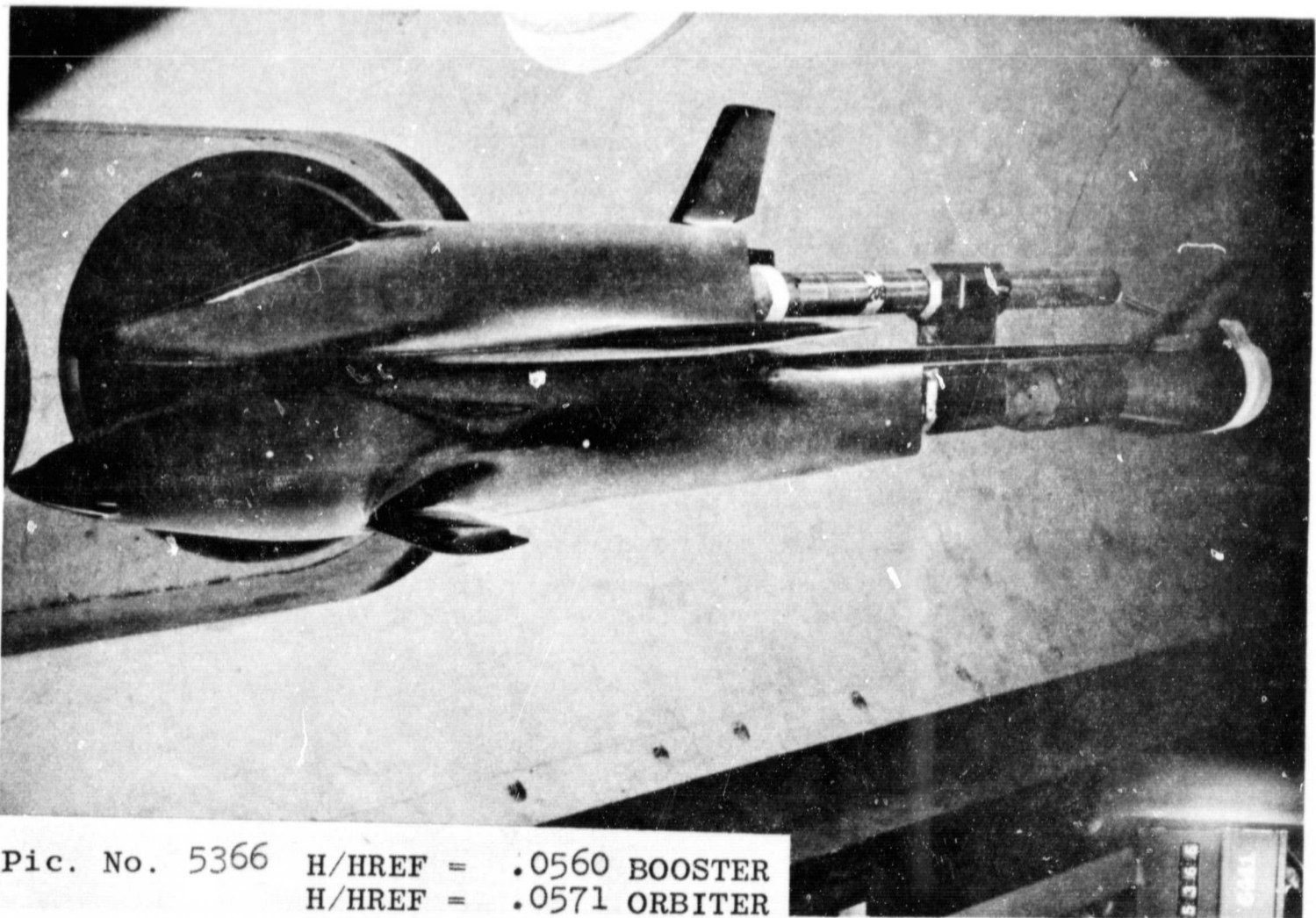
Pic. No. 5342 H/HREF = .1509 BOOSTER
H/HREF = .1537 ORBITER



Pic. No. 5350 H/HREF = .0920 BOOSTER
H/HREF = .0938 ORBITER



Pic. No. 5359 H/HREF = .0670 BOOSTER
H/HREF = .0683 ORBITER



Pic. No. 5366 H/HREF = .0560 BOOSTER
H/HREF = .0571 ORBITER

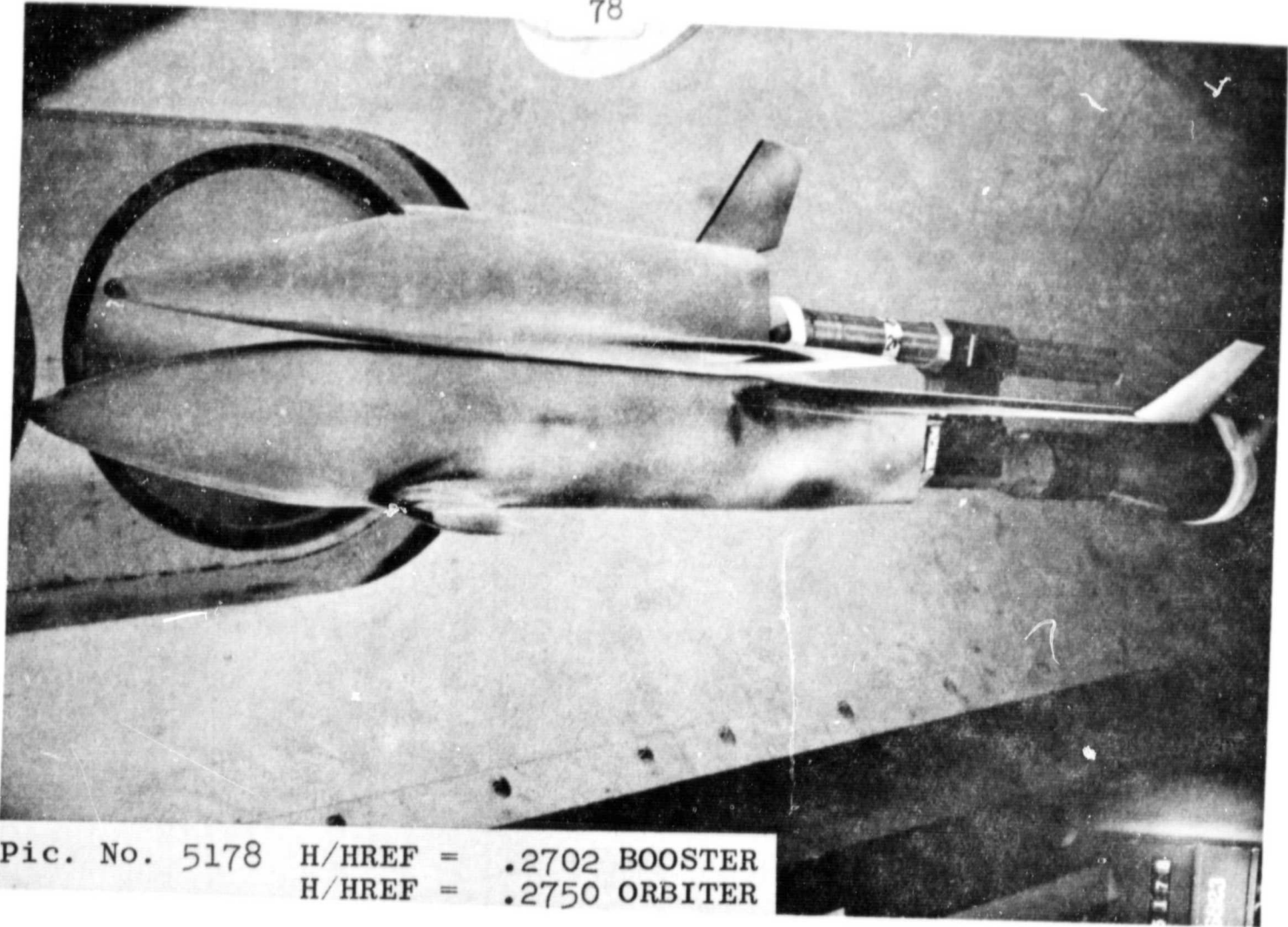
6/ 3/71

AFDC(ARO,IMC,1) ARNOLD P/S, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL 8
VT1162

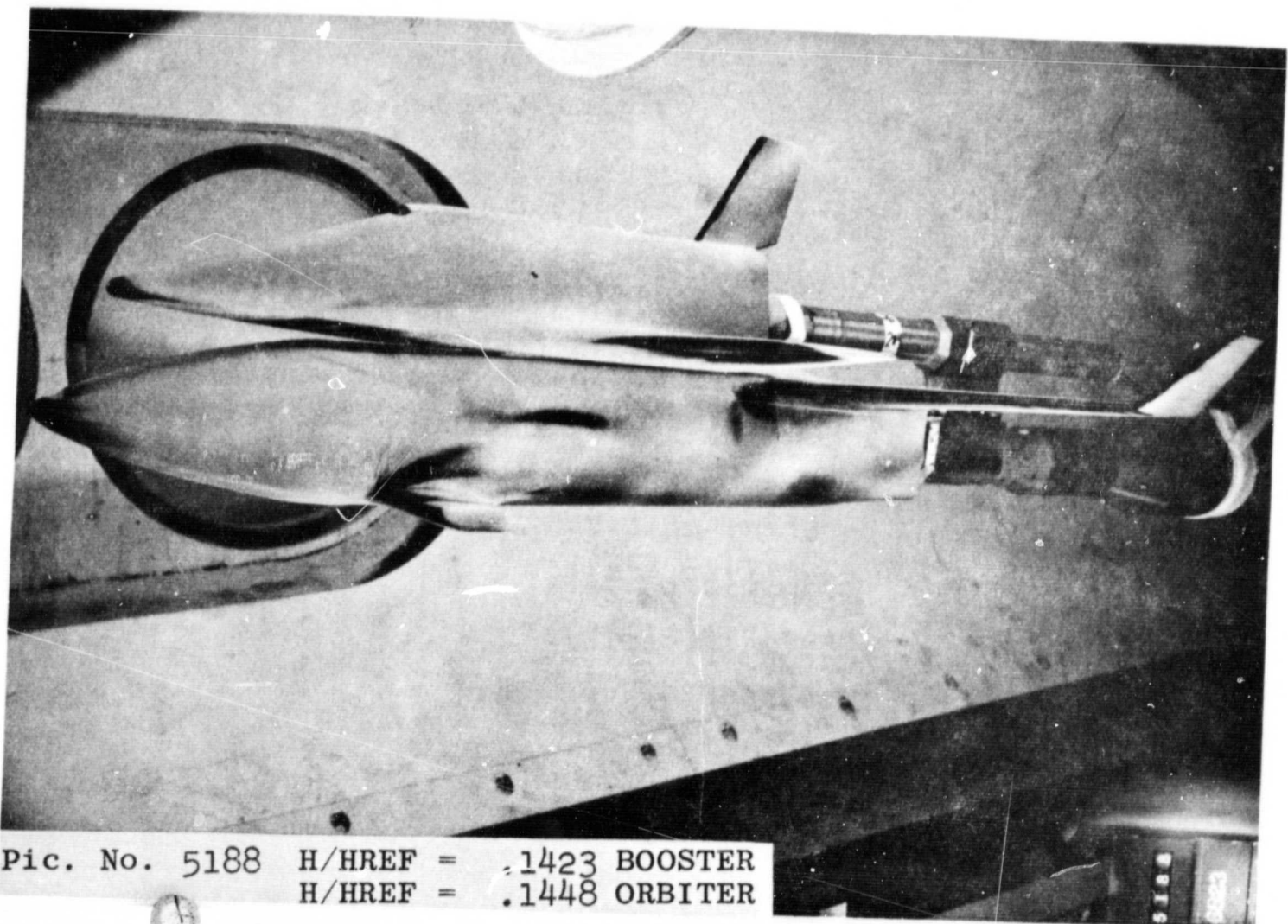
GROUP CONFID MODEL MACH NO PO PSIA TO DEG IR ALPHA-DOEL ALPHA-SECTION ALPHA-PREBEND ROLL-MODEL VAW
 264 1221 PDAC-8-DWC A.88 5A9.4 1326 5.02 5.02 0 0
 T-1AF P-1MF O-1MF V-1MF RHO-1MF MU-1MF RE/FT WREF STREF
 (DEG R) (PSIA) (PSIA) (FT/SECT) (SLUGS/FT³) (LB-SEC/FT²) (FT-1) (R= .01FT) (R= .01FT)
 96.1 .056 2.521 3A43 4.912E-05 7.738E-08 2.44E 06 4.909E-02 3.287E-02
 CAMERA PAINT TRUP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (IN/INCH)
 TOP(T) 25
 SIDE(U) 509 AVERAGE TR = 87 (R)
 SIDE(L) 500 AVERAGE TR = 84 (L) --000(SQUARE ROOT DEL TIME) = 0.11

PIC MC	TIME DELTIME	M(TO)	M(TO)/MREF	M(.910)	M(.910)/MREF	M(.8510)	M(.8510)/MREF	ST(TO)	MODEL	TEMP F
US 417E (503)	3.65	2.50	0.521E-02	1.0451	7.195E-02	1.55625	1.049E-01	3.375E-02	90	84
US 417F (251)	3.65	2.50	8.175E-02	.2702	1.698E-02	.3494	1.952E-02	8.244E-07	90	84
US 417G (500)	3.65	2.50	8.518E-02	1.0383	7.745E-02	1.5525	1.042E-01	3.353E-02	90	84
US 417H (250)	3.65	2.50	0.137E-02	.2750	1.728E-02	.3463	1.964E-02	9.000E-07	90	84
US 418E (509)	8.70	7.63	0.274E-02	.5502	4.103E-02	.8226	5.521E-02	1.777E-02	93	84
US 418F (251)	8.70	7.63	9.710E-03	.1423	8.939E-03	.1792	1.028E-02	4.657E-07	93	84
US 418G (500)	8.70	7.63	8.273E-02	.5466	4.877E-02	.8176	5.486E-02	1.0997	93	84
US 418H (250)	8.70	7.63	0.722E-03	.1448	9.004E-03	.1823	1.045E-02	4.739E-07	93	84
US 419E (503)	13.80	12.73	0.197E-02	.3947	2.904E-02	.5902	3.961E-02	1.275E-02	102	85
US 419F (251)	13.80	12.73	8.518E-03	.1021	4.014E-03	.1286	7.372E-03	3.391E-07	102	85
US 419G (500)	13.80	12.73	8.196E-02	.3922	2.925E-02	.5864	3.936E-02	1.206E-02	102	85
US 419H (251)	13.80	12.73	0.518E-03	.1070	6.625E-03	.1308	7.508E-03	1.206E-02	102	85
US 420E (500)	18.90	17.83	0.166E-02	.3121	2.328E-02	.4667	3.132E-02	6.279	110	86
US 420F (251)	18.90	17.83	8.403E-03	.8807	5.071E-02	.1617	5.829E-03	1.008E-02	110	86
US 420G (500)	18.90	17.83	8.196E-02	.3101	2.913E-02	.4937	3.112E-02	2.692E-02	110	86
US 420H (251)	18.90	17.83	0.410E-03	.8821	5.159E-03	.1034	5.938E-03	2.689E-03	110	86

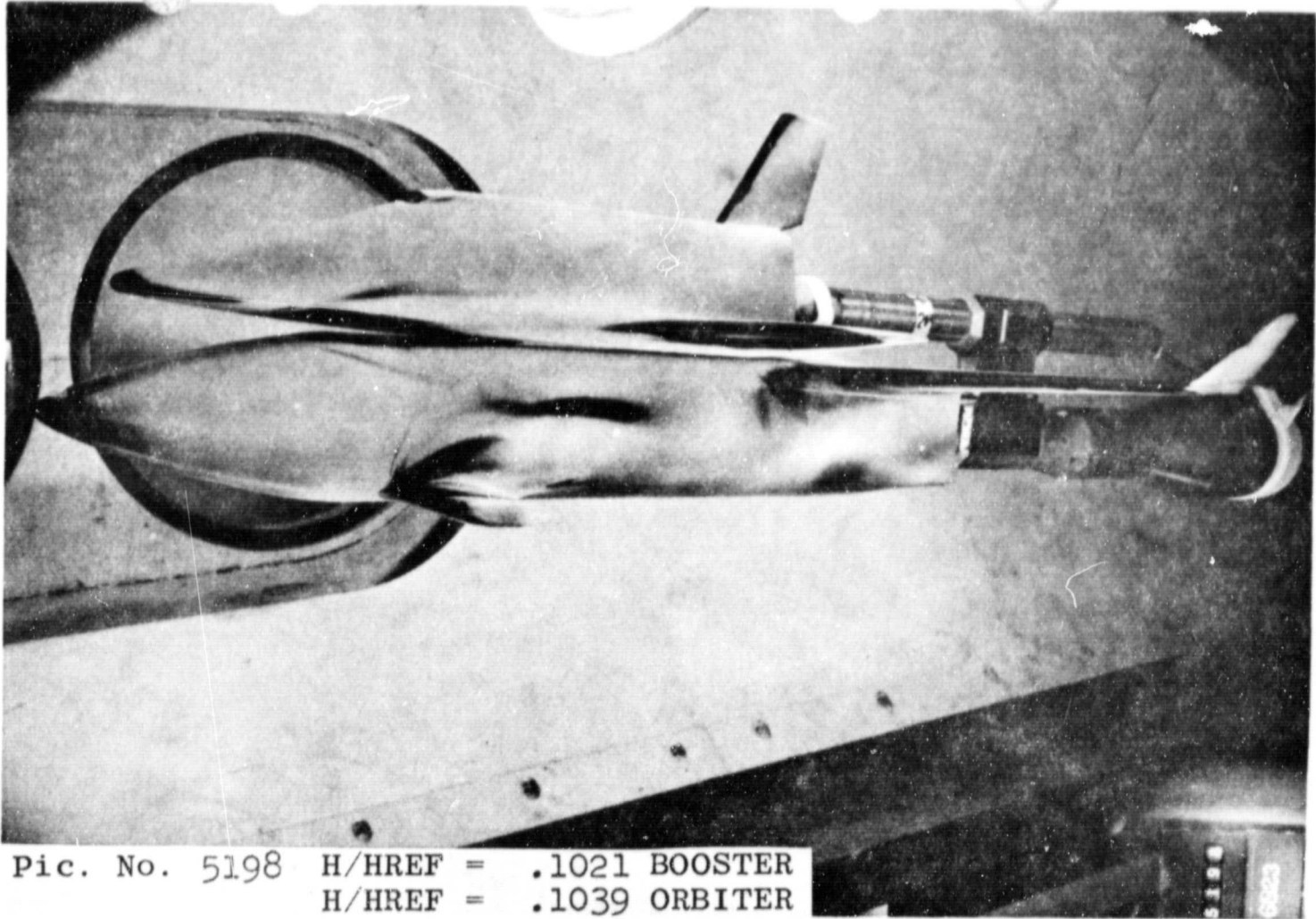
78



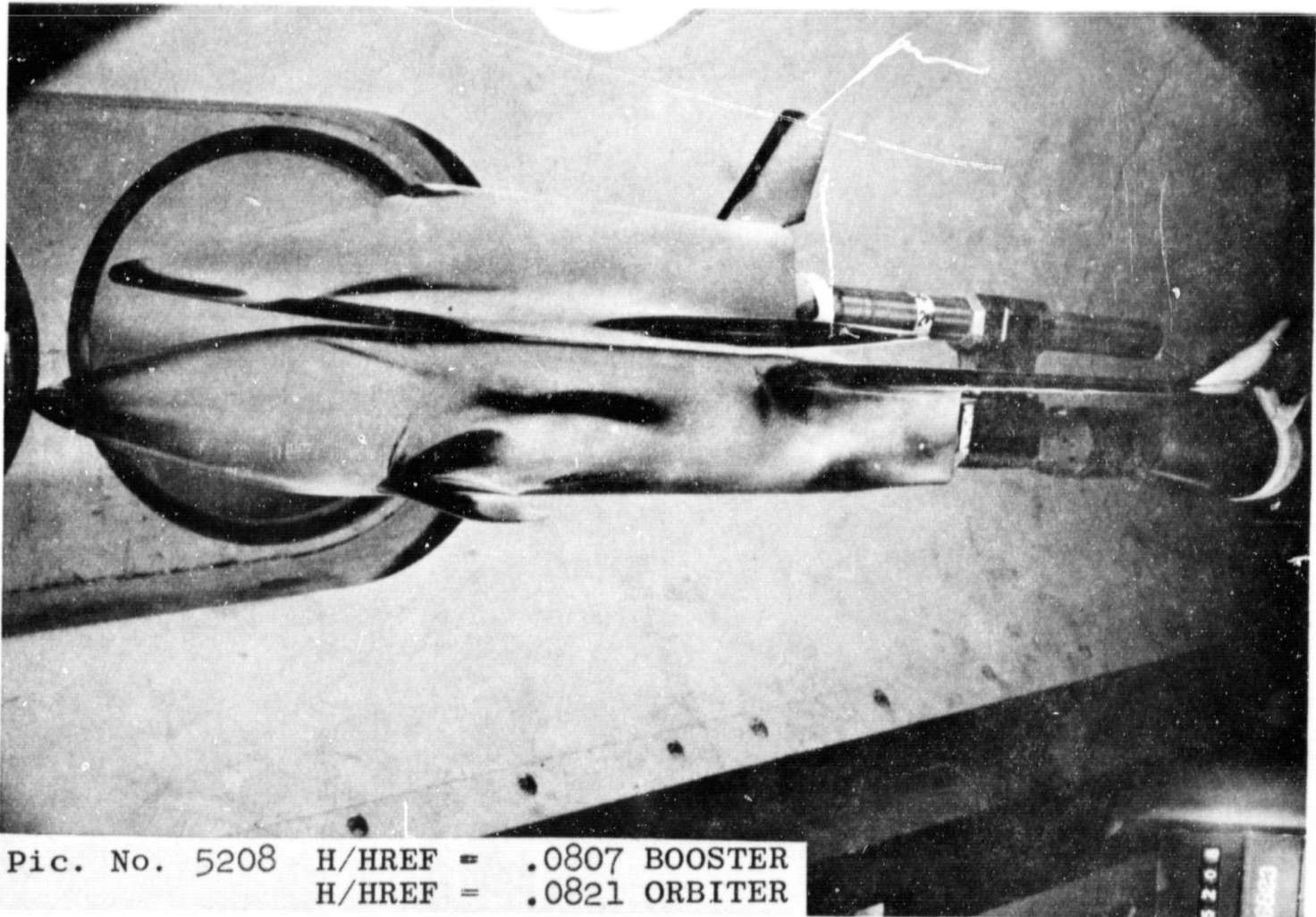
Pic. No. 5178 H/HREF = .2702 BOOSTER
H/HREF = .2750 ORBITER



Pic. No. 5188 H/HREF = .1423 BOOSTER
H/HREF = .1448 ORBITER



Pic. No. 5198 H/HREF = .1021 BOOSTER
H/HREF = .1039 ORBITER



Pic. No. 5208 H/HREF = .0807 BOOSTER
H/HREF = .0821 ORBITER

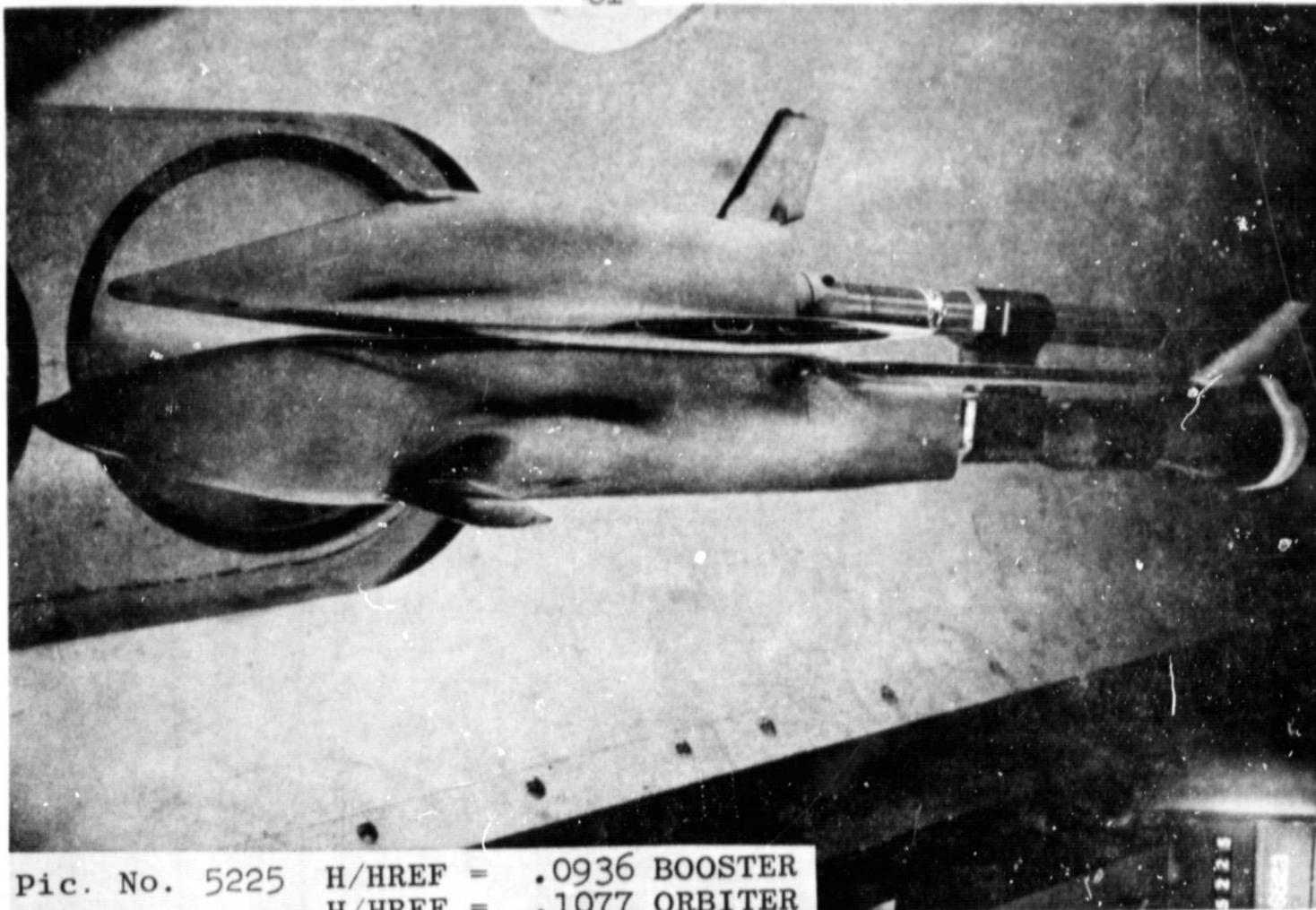
6/ 3/71

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

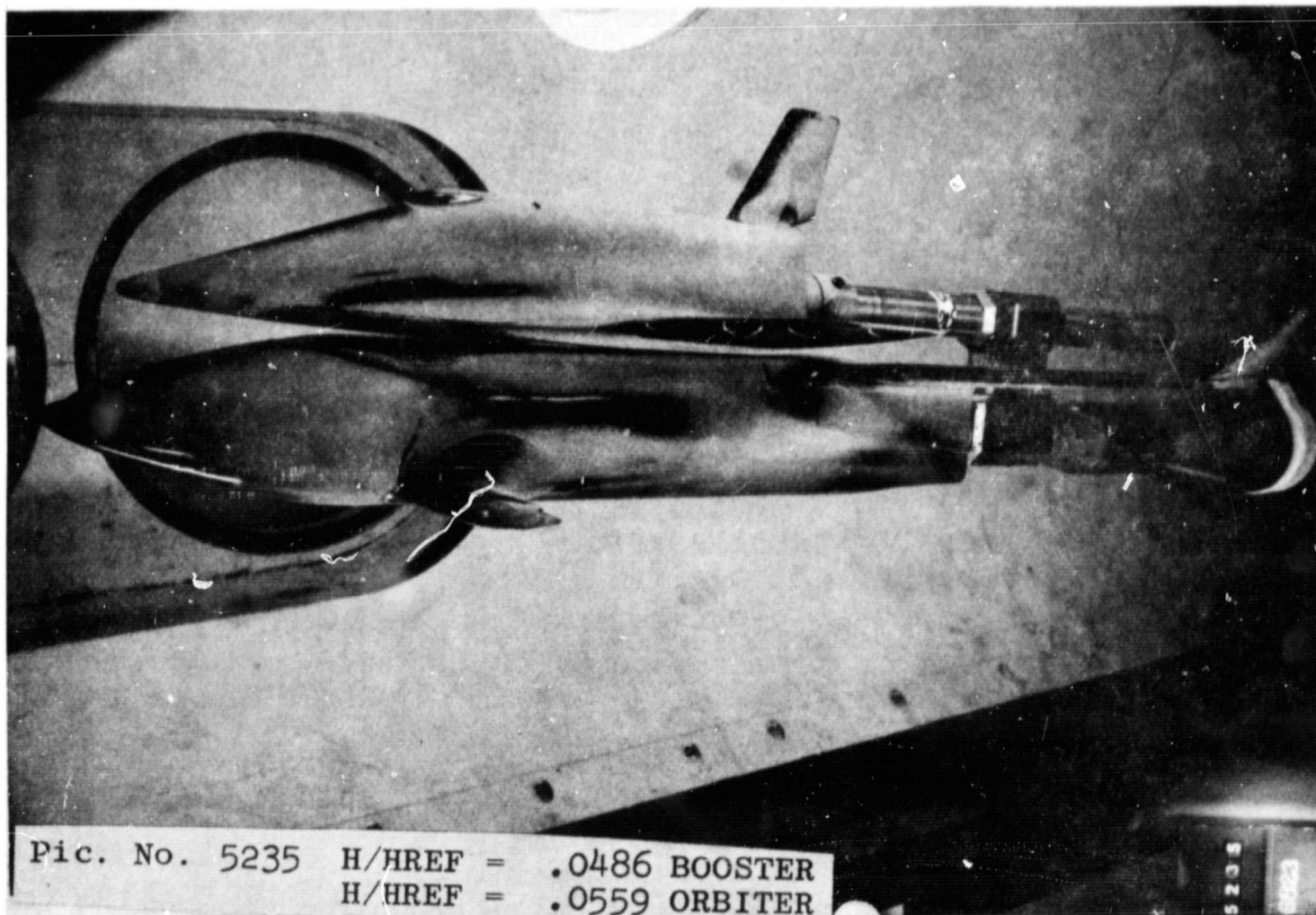
GROUP CONFIG MODEL MACH NO PO PSIA TO DCG R ALPHA-MODEL ALPHA-SECTOR ALPHA-PREREND RO/L-MODEL YAW
 265 1272 P0AC-9-DW0 R.00 553.2 1320 5.04 5.04 0 0
 T-1NF P-1NF G-1NF V-1NF RMO-1NF PU-1NF RE/FT HREF STMEP
 (DFG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R= .01FT) (R= .01FT)
 95.7 .957 2.520 3074 4.968E-05 7.703E-08 2.47E 06 5.002E-02 3.267E-02

CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (MPO/CKX)
 150
 150
 150
 AVERAGE TW = 80 (P) - .008(SQUARE ROOT DEL TIME) + 0.11
 AVERAGE TW = 70 (O)

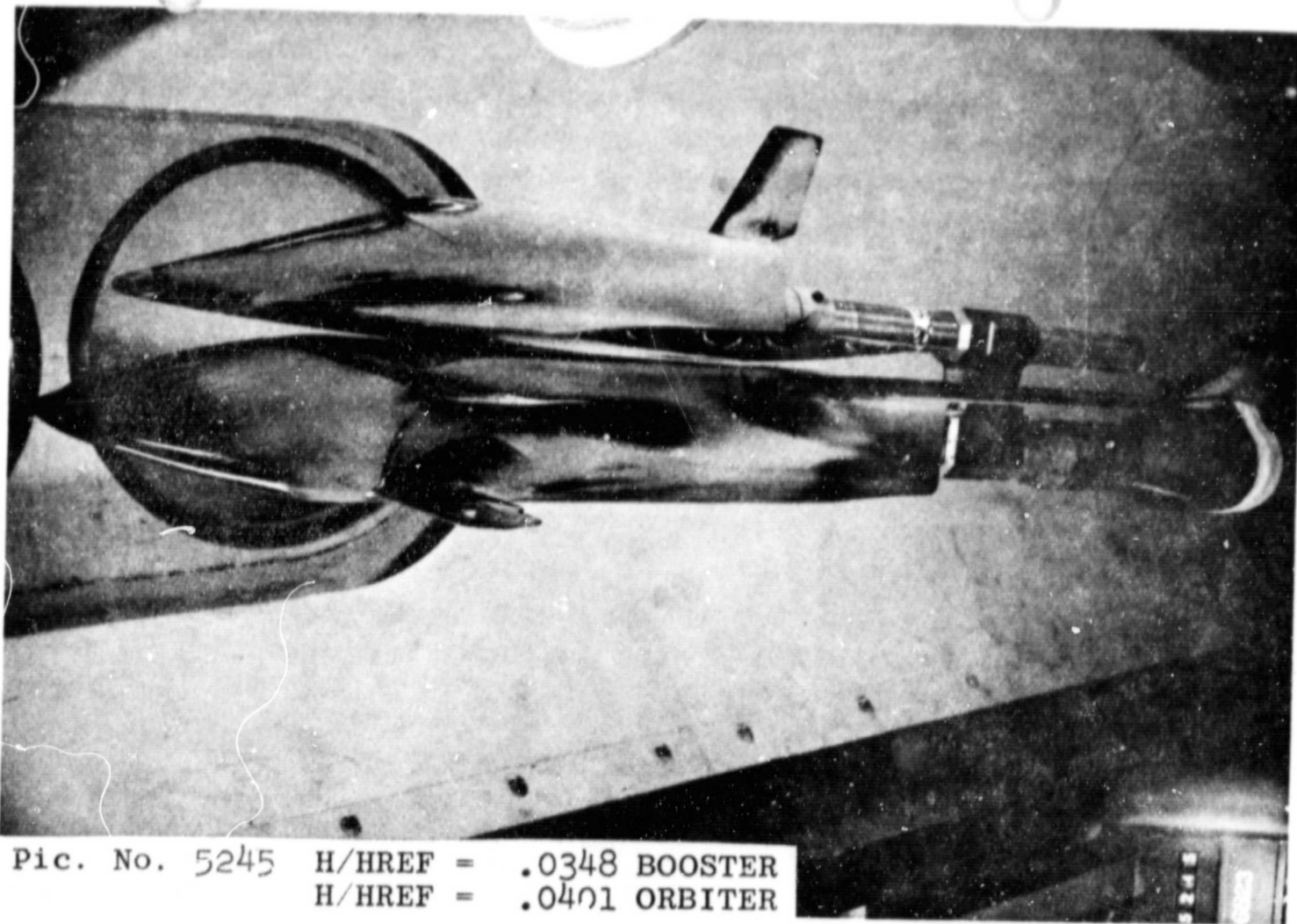
PIC MC	TIME	DELTIME	HIT01	HIT01/WREF	HI.9101	HI.85101	HI.85101/WREF	ST(IT01)	MODEL	TEMP F
US 522E (1501)	3.55	2.51	0 5.39E-03	.1877	6.587E-03	7.413E-03	.1317	3.521E-03	91	84
US 522E (1501)	3.55	2.51	0 4.69E-03	.0936	5.726E-03	6.450E-03	.1145	3.062E-03	91	84
US 522E (1501)	3.55	2.51	0 4.69E-03	.0936	5.726E-03	6.450E-03	.1145	3.062E-03	91	84
US 522E (1501)	3.55	2.51	0 5.29E-03	.1077	6.587E-03	7.413E-03	.1317	3.521E-03	91	84
US 523E (1501)	8.65	7.61	0 2.79E-03	.0559	3.419E-03	3.847E-03	.0683	1.820E-03	95	85
US 523E (1501)	8.65	7.61	0 2.43E-03	.0496	2.972E-03	3.347E-03	.0594	1.589E-03	95	85
US 523E (1501)	8.65	7.61	0 2.43E-03	.0496	2.972E-03	3.347E-03	.0594	1.589E-03	95	85
US 523E (1501)	8.65	7.61	0 2.79E-03	.0559	3.419E-03	3.847E-03	.0683	1.820E-03	95	85
US 524E (1501)	13.75	12.71	0 2.00E-03	.0401	2.451E-03	2.750E-03	.0490	1.39E-03	101	86
US 524E (1501)	13.75	12.71	0 1.74E-03	.0348	2.131E-03	2.400E-03	.0426	1.139E-03	101	86
US 524E (1501)	13.75	12.71	0 1.74E-03	.0348	2.131E-03	2.400E-03	.0426	1.139E-03	101	86
US 524E (1501)	13.75	12.71	0 2.00E-03	.0401	2.451E-03	2.750E-03	.0490	1.39E-03	101	86
US 525E (1501)	18.05	17.01	0 1.50E-03	.0317	1.938E-03	2.180E-03	.0387	1.180E-03	101	86
US 525E (1501)	18.05	17.01	0 1.30E-03	.0275	1.684E-03	1.897E-03	.0337	9.004E-04	110	87
US 525E (1501)	18.05	17.01	0 1.30E-03	.0275	1.684E-03	1.897E-03	.0337	9.004E-04	110	87
US 525E (1501)	18.05	17.01	0 1.68E-03	.0317	1.938E-03	2.180E-03	.0387	1.180E-03	110	87



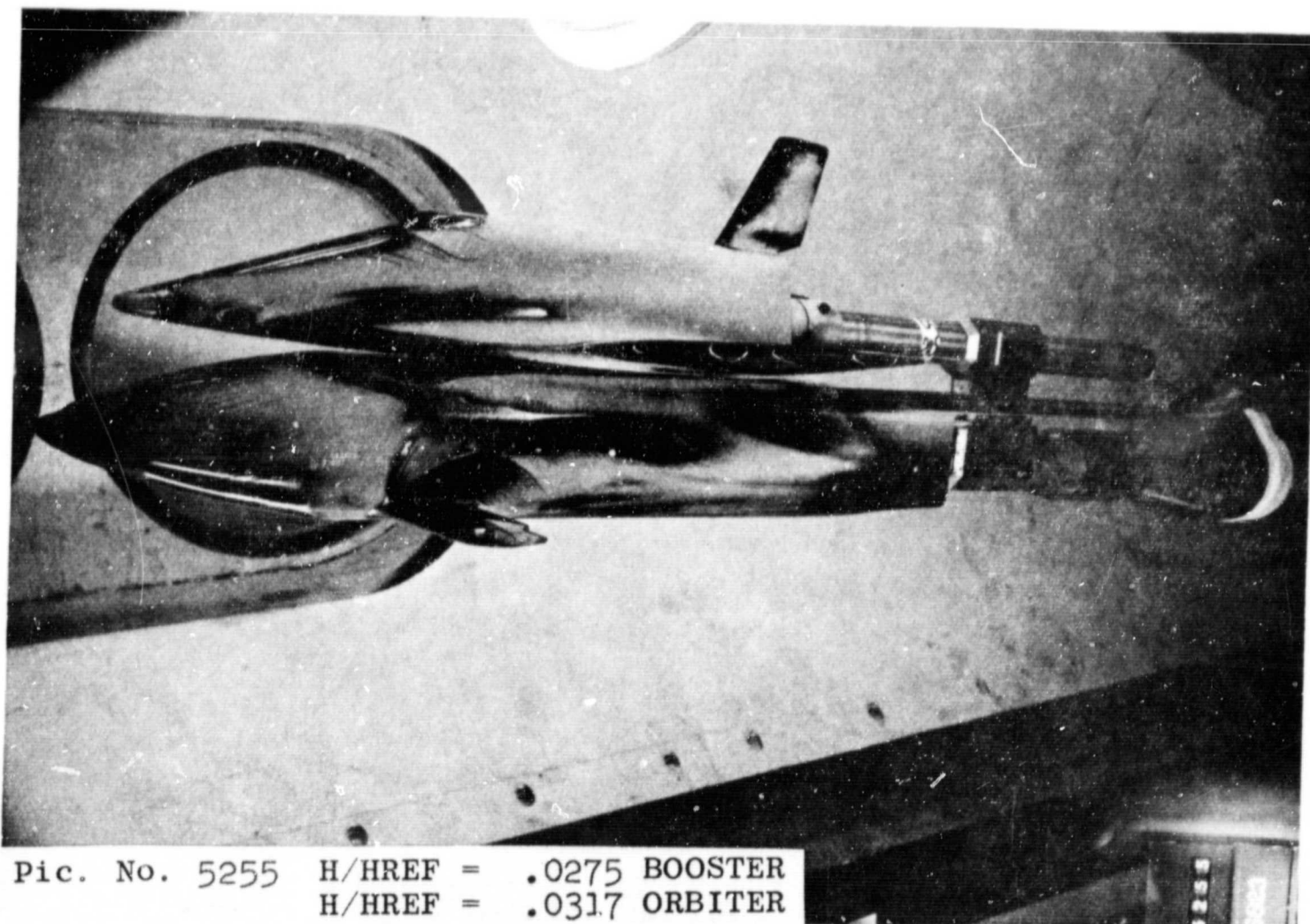
Pic. No. 5225 H/HREF = .0936 BOOSTER
H/HREF = .1077 ORBITER



Pic. No. 5235 H/HREF = .0486 BOOSTER
H/HREF = .0559 ORBITER



Pic. No. 5245 H/HREF = .0348 BOOSTER
H/HREF = .0401 ORBITER



Pic. No. 5255 H/HREF = .0275 BOOSTER
H/HREF = .0317 ORBITER

6/ 3/71

AEDCIARO, INC. 1 ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
W1162

GROUP COMPIC MODEL MACH NC PO PSIA TO DEG R ALPHA-W/OEL ALPHA-SECTOR ALPHA-PREBEND ROLL-MODEL YAW
 286 1221 PDAC-B-DWD 8.88 548.9 1326 -1.98 -4.98 0 0

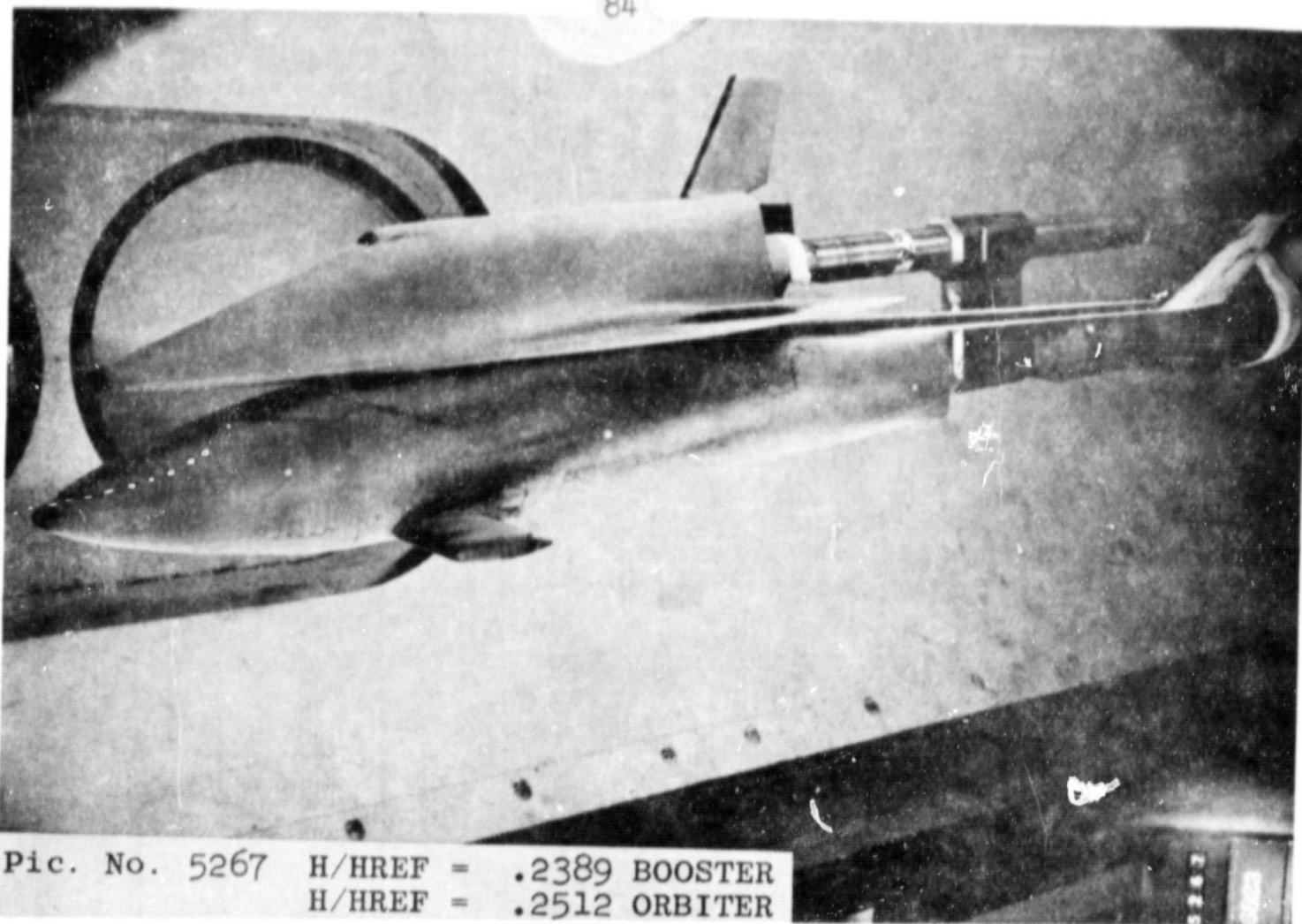
T-1AF P-1NF 3-1NF V-1NF RND-1NF M-1NF RE/FT WREF STREF
 (DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (R-01FT) (R-01FT)
 96.1 .056 2.519 3842 4.911E-05 7.734E-08 2.44E 06 4.987E-02 3.287E-02

CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (RHO/CXK)

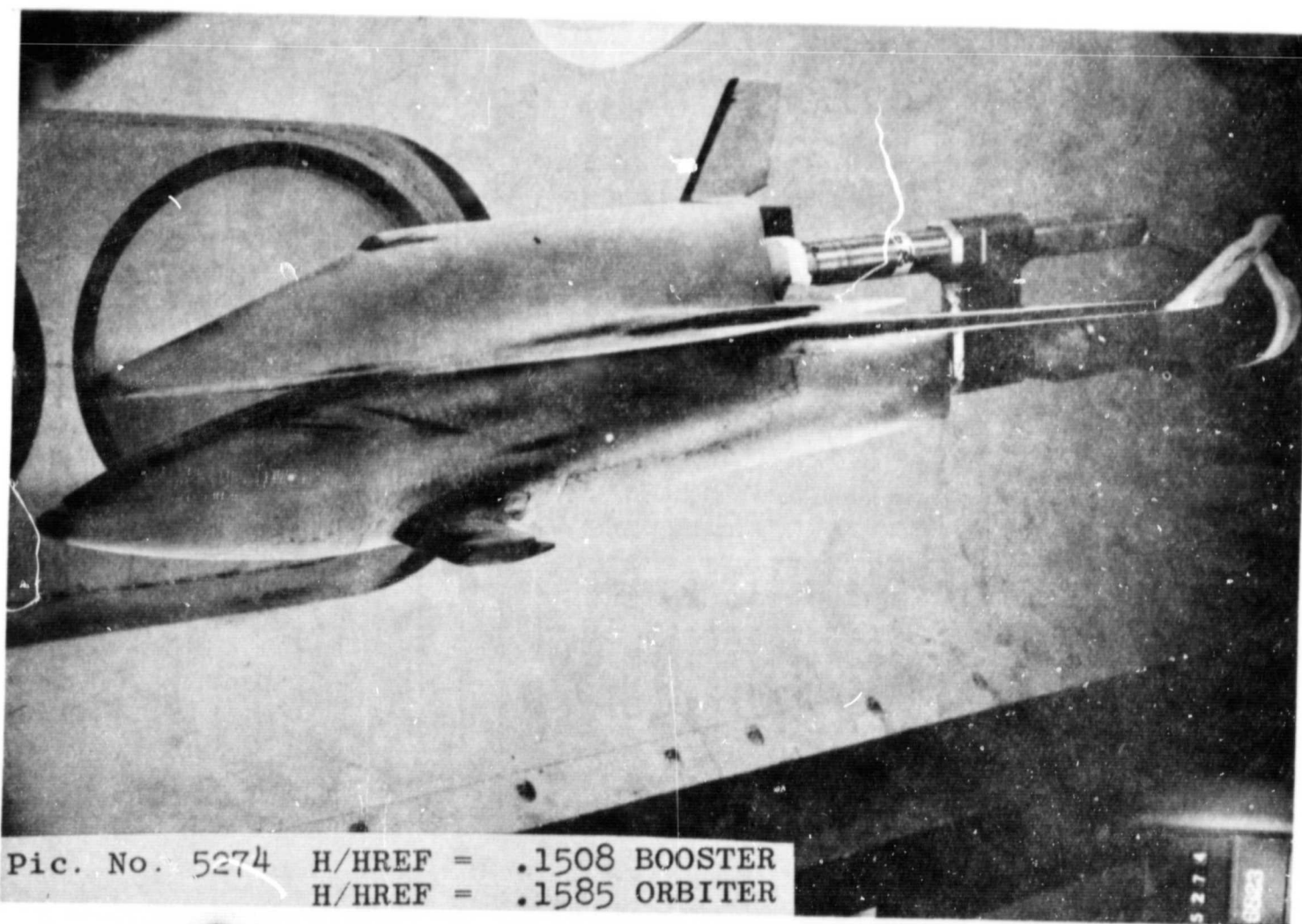
TOP(T) 257
 SIDE(LS) 508

AVERAGE TW = 89 (R) --.008(SQUARE ROOT DEL TIME) * 0.11
 AVERAGE TR = 88 (O)

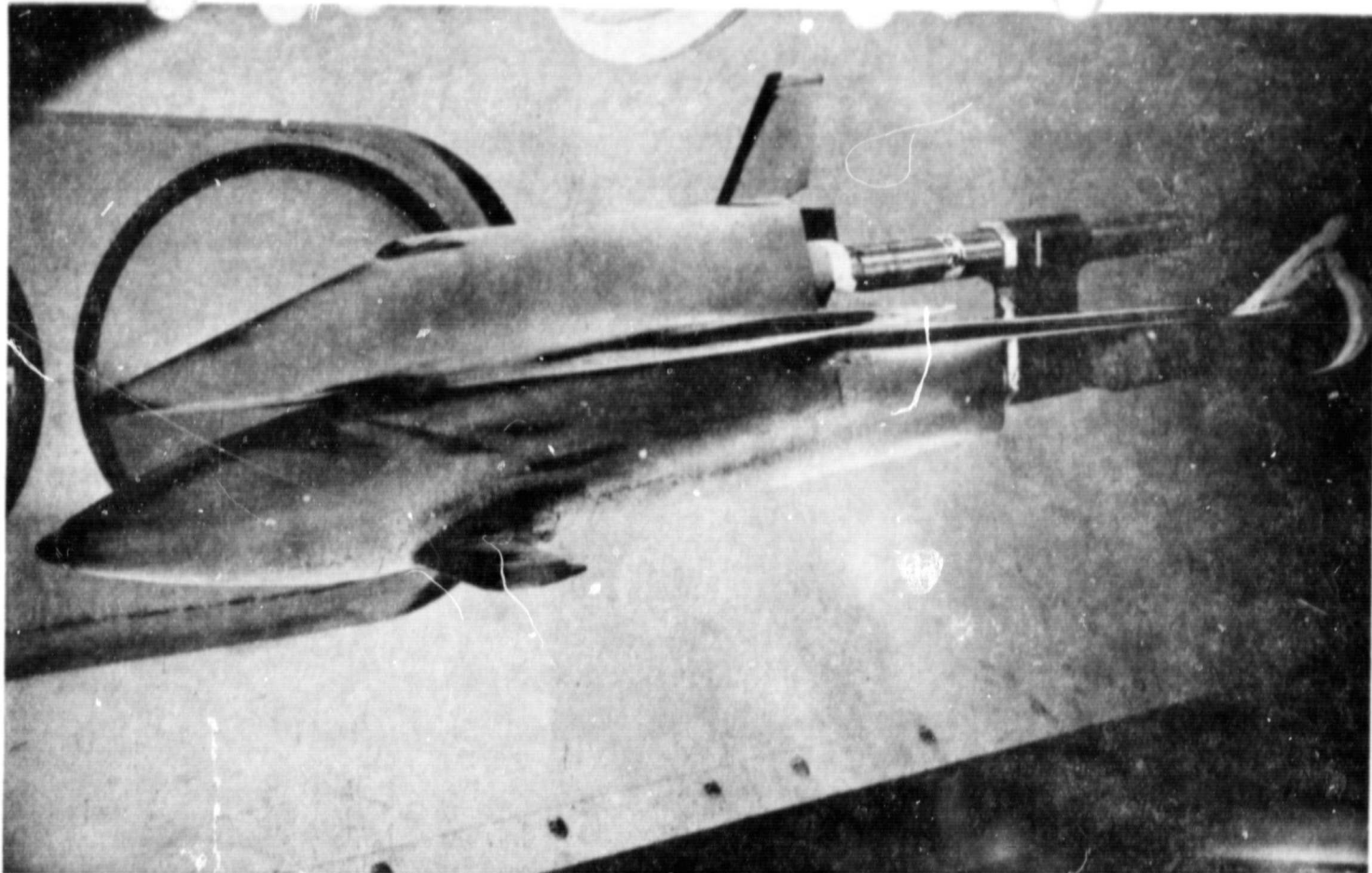
PIC NC	TIME DELTIME	M(TO)	M(TO)/WREF	M(.9TO)	M(.9TO)/WREF	M(.85TO)	M(.85TO)/WREF	ST(TO)	MODEL TEMP F			
US 5267 (508)	4.20	3.14	0 4.70E-02	.9418	7.026E-02	1.4089	1.726E-02	1.8972	3.041E-02	91	86	79
US 5267 (250)	4.20	3.14	0 1.10E-02	.2309	1.501E-02	.3039	1.726E-02	1.8972	7.018E-03	91	86	79
US 5267 (508)	4.20	3.16	0 4.41E-02	.9211	6.896E-02	1.3828	9.287E-02	1.8671	2.984E-02	91	86	79
US 5267 (250)	4.20	3.16	0 1.75E-02	.2512	1.578E-02	.3163	1.813E-02	1.8671	8.220E-03	91	86	79
US 5274 (508)	7.90	6.88	0 2.06E-02	.5944	4.434E-02	.8892	5.971E-02	1.1974	1.928E-02	93	86	79
US 5274 (250)	7.90	6.88	0 7.42E-03	.1508	9.472E-03	.1899	1.089E-02	1.1974	4.936E-03	93	86	79
US 5274 (508)	7.90	6.88	0 2.91E-02	.5833	4.352E-02	.8728	5.861E-02	1.1753	1.884E-02	93	86	79
US 5274 (250)	7.90	6.88	0 7.91E-03	.1565	9.956E-03	.1997	1.144E-02	1.1753	1.684E-02	93	86	79
US 5282 (509)	12.10	11.04	0 2.19E-02	.4394	3.271E-02	.6558	4.404E-02	.2295	5.190E-03	93	86	79
US 5282 (250)	12.10	11.04	0 5.45E-03	.1112	6.987E-03	.1461	8.032E-03	.8031	1.416E-02	96	87	79
US 5282 (509)	12.10	11.04	0 2.15E-02	.4302	3.218E-02	.6437	4.323E-02	.1611	3.448E-03	96	87	79
US 5282 (250)	12.10	11.04	0 5.43E-03	.1169	7.344E-03	.1473	8.441E-03	.8448	1.389E-02	96	87	79
US 5290 (508)	16.30	15.24	0 1.76E-02	.3525	2.629E-02	.5273	3.541E-02	.1693	3.828E-03	96	87	79
US 5290 (250)	16.30	15.24	0 4.46E-03	.0884	5.617E-03	.1126	6.457E-03	.7191	1.139E-02	101	89	79
US 5290 (508)	16.30	15.24	0 1.72E-02	.3459	2.581E-02	.5176	3.475E-02	.1295	2.928E-03	101	89	79
US 5290 (250)	16.30	15.24	0 4.49E-03	.0948	5.904E-03	.1186	6.786E-03	.6949	1.119E-02	101	89	79
US 5290 (508)	16.30	15.24	0 1.76E-02	.3525	2.629E-02	.5273	3.541E-02	.1693	3.828E-03	101	89	79
US 5290 (250)	16.30	15.24	0 4.46E-03	.0884	5.617E-03	.1126	6.457E-03	.7191	1.139E-02	101	89	79



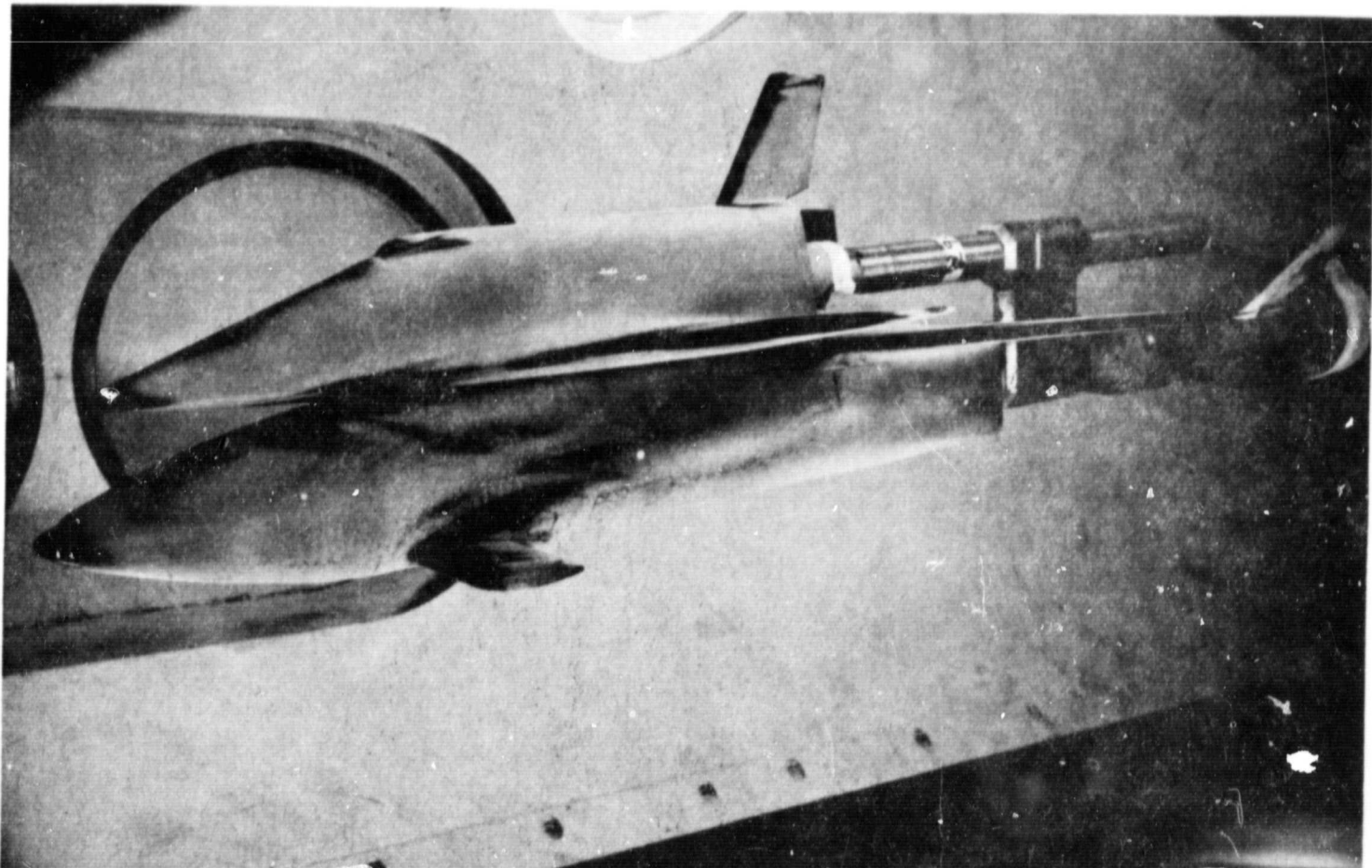
Pic. No. 5267 H/HREF = .2389 BOOSTER
H/HREF = .2512 ORBITER



Pic. No. 5274 H/HREF = .1508 BOOSTER
H/HREF = .1585 ORBITER



Pic. No. 5282 H/HREF = .1112 BOOSTER
H/HREF = .1169 ORBITER



Pic. No. 5290 H/HREF = .0894 BOOSTER
.0940 ORBITER



206

SYM	H/H _{REF}
.....	~ 0.28
---	~ 0.08

Group 206 Re/ft 2.5 x 10⁶ ALPHA -5
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION

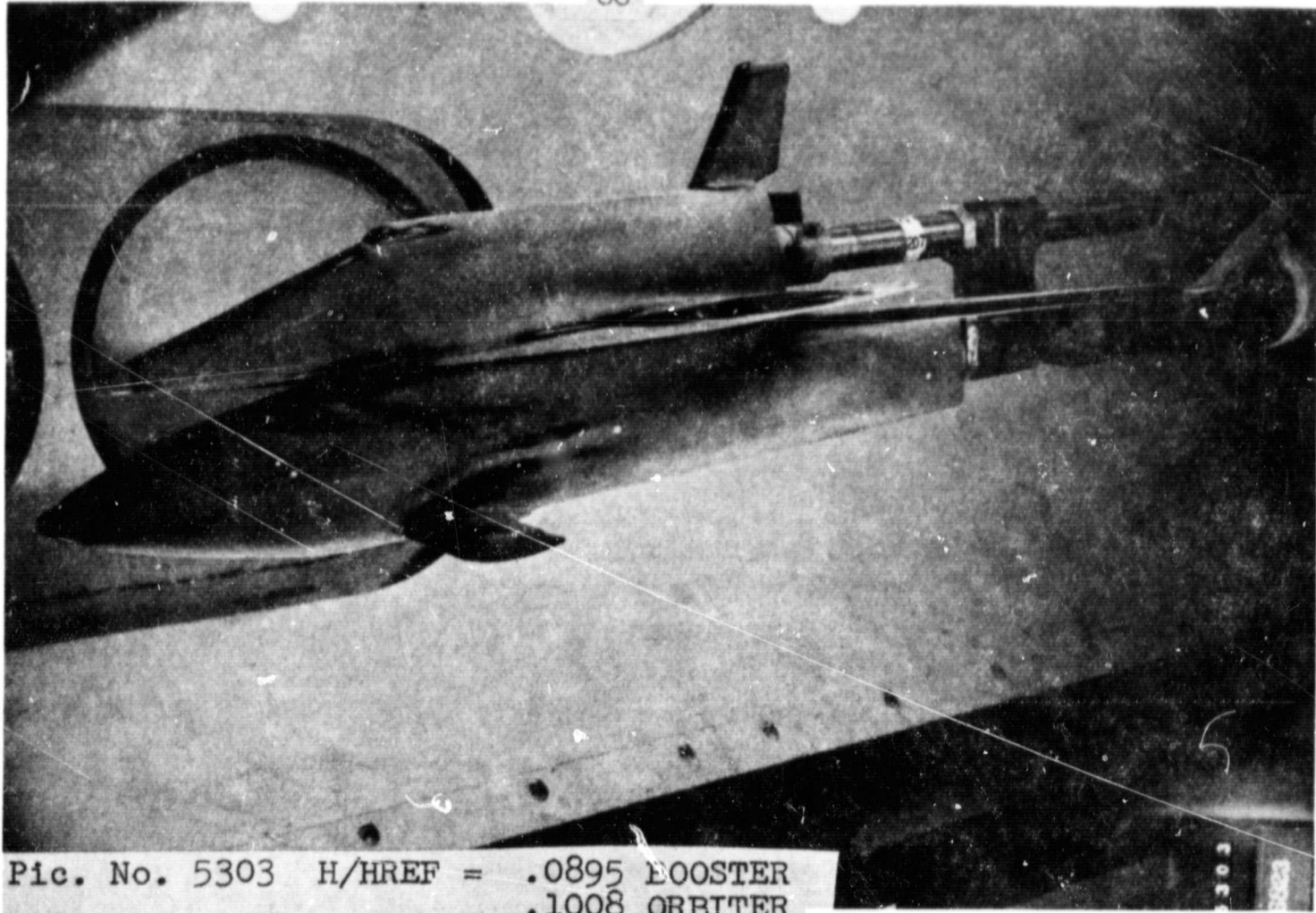
6 / 3/71
 AFDIARO, INC.) ARNOLD AFS, TENNESSEE
 VON KARMAN GAS DYNAMICS FACILITY
 50 INCH HYPERSONIC TUNNEL B
 VII162

GROUP 207 CONFIG 1222 MODEL P04C-B-DWC MACH NO 8.08 PO PSIA 551.1 TO DEG R 1328 ALPHA-MODEL -4.99 ALPHA-SECTOR -4.99 ALPHA-PRECRG 0 ROLL-MODEL 0 VAR 0

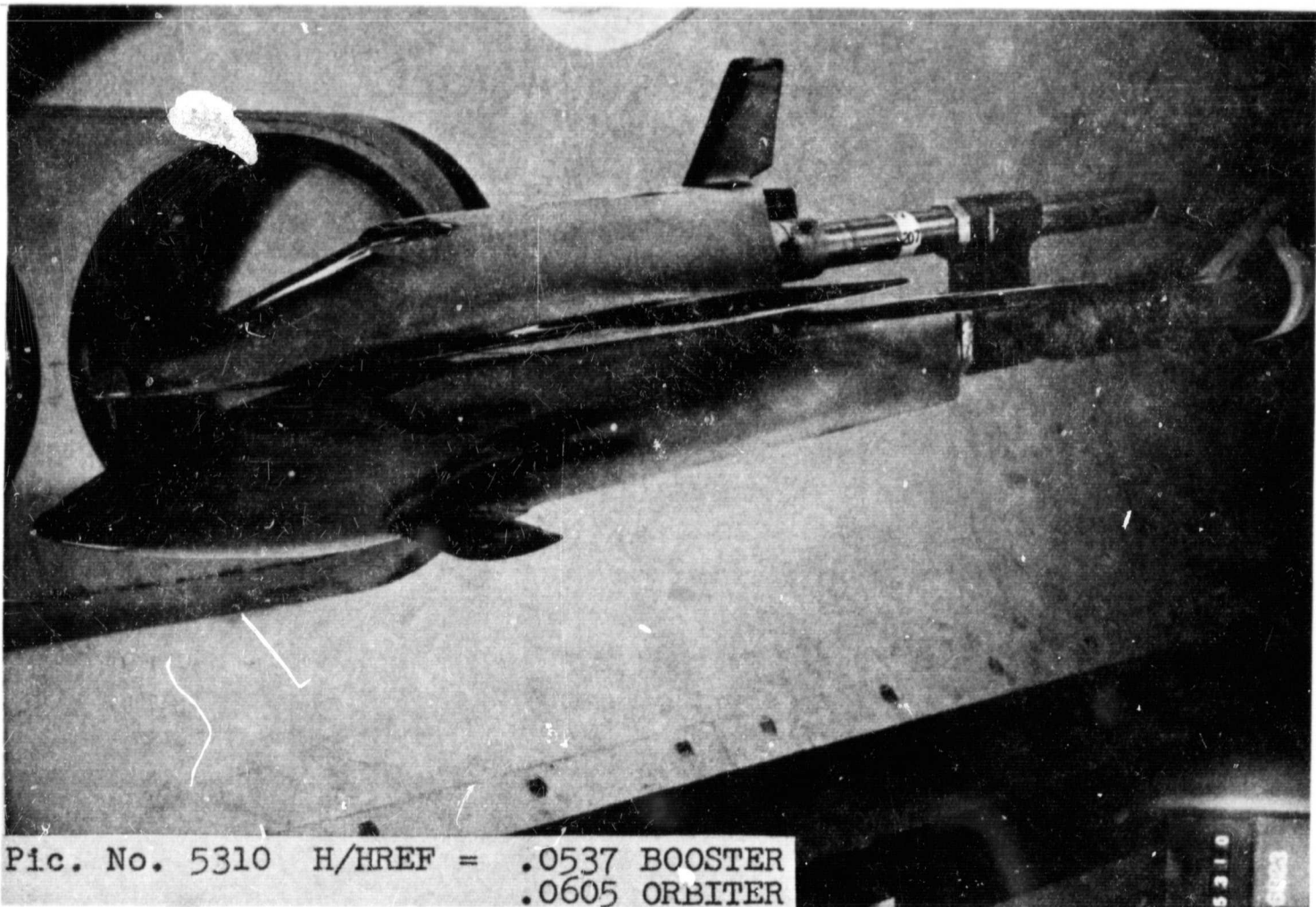
T-14F P-14F Q-14F V-14F RW-14F PU-14F RE/FT HREF STREF
 (DEG M) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT³) (LB-SEC/FT²) (FT-1) (IN-OILFT) (IN-OILFT)
 96.2 .055 2.529 3845 4.923E-05 7.745E-08 2.44E 06 4.997E-82 3.284E-82

CAVECA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (MMOXCXK)
 TOP(T) 150
 SIZE(US) 150
 SIDE(US) 150
 AVERAGE TW = 88 (R)
 AVERAGE TW = 88 (O)
 --008(SQUARE ROOT DEL TIME) = 0.11

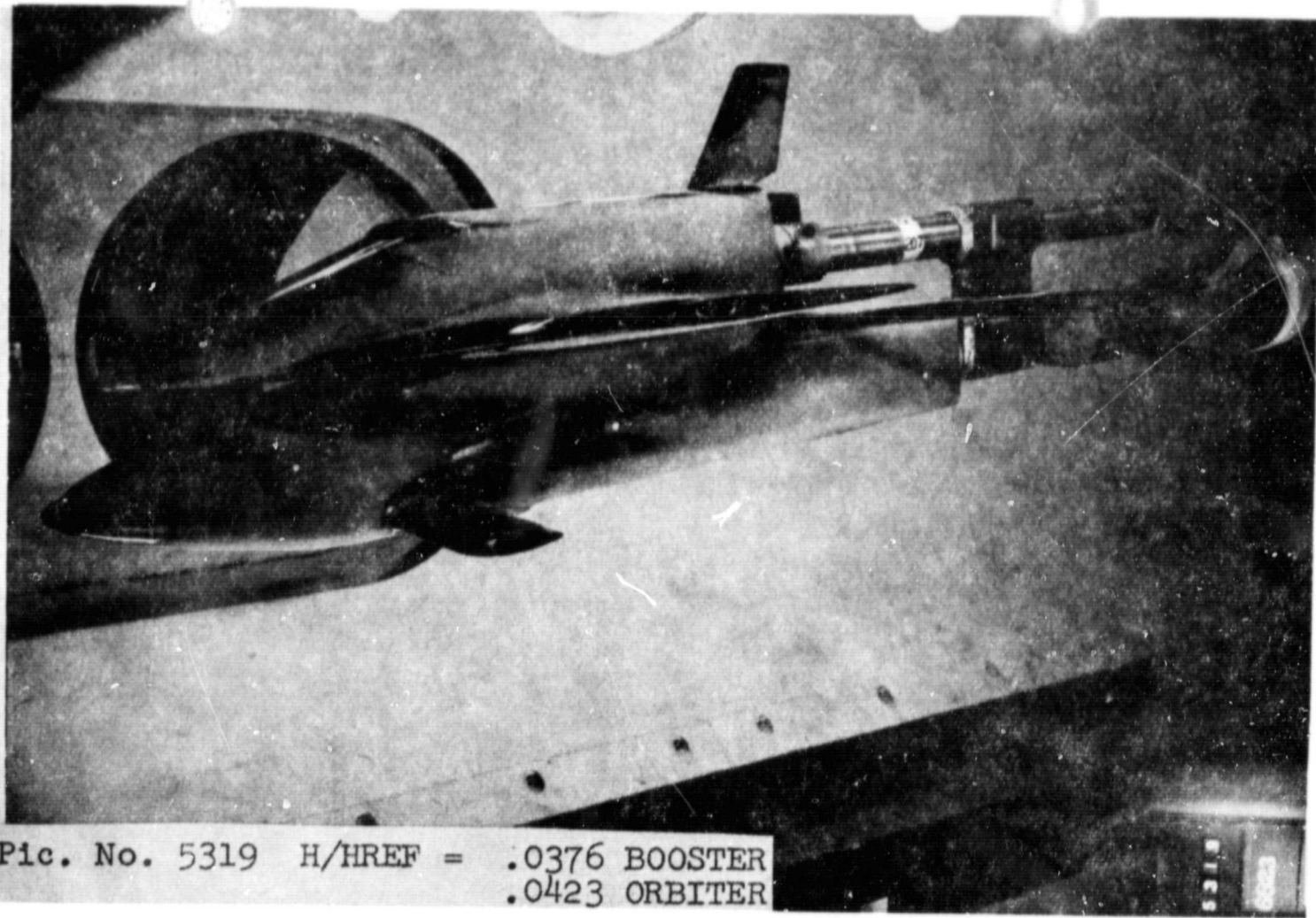
PIC NO	TIME	DELTIME	HIT0	HIT0/REF	H(.910)	H(.5TC)/REF	H(.85T0)	H(.85T0)/REF	ST(T0)	MODEL	TEMP	F
US 5303 (159)	3.70	2.63	0	5.14E-03	.1008	6.153E-03	.1232	6.922E-03	.1346	91	86	0
US 5302 (150)	3.70	2.63	8	4.47E-03	.0895	5.445E-03	.1094	6.149E-03	.1271	91	86	0
US 5302 (150)	3.70	2.63	8	4.47E-03	.0895	5.445E-03	.1094	6.149E-03	.1271	91	86	0
US 5302 (150)	3.70	2.63	0	5.44E-03	-1.008	6.153E-03	.1232	6.922E-03	.1346	91	86	0
US 5310 (150)	7.35	6.28	0	3.62E-03	.0695	3.693E-03	.0739	4.155E-03	.0871	91	86	0
US 5310 (150)	7.35	6.28	8	2.48E-03	.0537	3.280E-03	.0656	3.691E-03	.0778	91	86	0
US 5310 (150)	7.35	6.28	8	2.48E-03	.0537	3.280E-03	.0656	3.691E-03	.0778	91	86	0
US 5310 (150)	7.35	6.28	0	3.62E-03	.0695	3.693E-03	.0739	4.155E-03	.0871	91	86	0
US 5319 (150)	12.10	11.07	8	1.89E-02	.0423	2.585E-03	.0517	2.909E-03	.0542	91	86	0
US 5319 (150)	12.10	11.07	8	1.89E-02	.0423	2.585E-03	.0517	2.909E-03	.0542	91	86	0
US 5319 (150)	12.10	11.07	8	1.89E-02	.0423	2.585E-03	.0517	2.909E-03	.0542	91	86	0
US 5319 (150)	12.10	11.07	0	2.12E-03	.0376	2.296E-03	.0459	2.583E-03	.0517	95	88	0
US 5325 (159)	17.35	16.28	0	1.42E-03	.0325	1.982E-03	.0397	2.230E-03	.0446	99	89	0
US 5325 (159)	17.35	16.28	8	1.44E-03	.0288	1.761E-03	.0352	1.981E-03	.0396	99	89	0
US 5325 (159)	17.35	16.28	8	1.44E-03	.0288	1.761E-03	.0352	1.981E-03	.0396	99	89	0
US 5325 (159)	17.35	16.28	0	1.42E-03	.0325	1.982E-03	.0397	2.230E-03	.0446	99	89	0



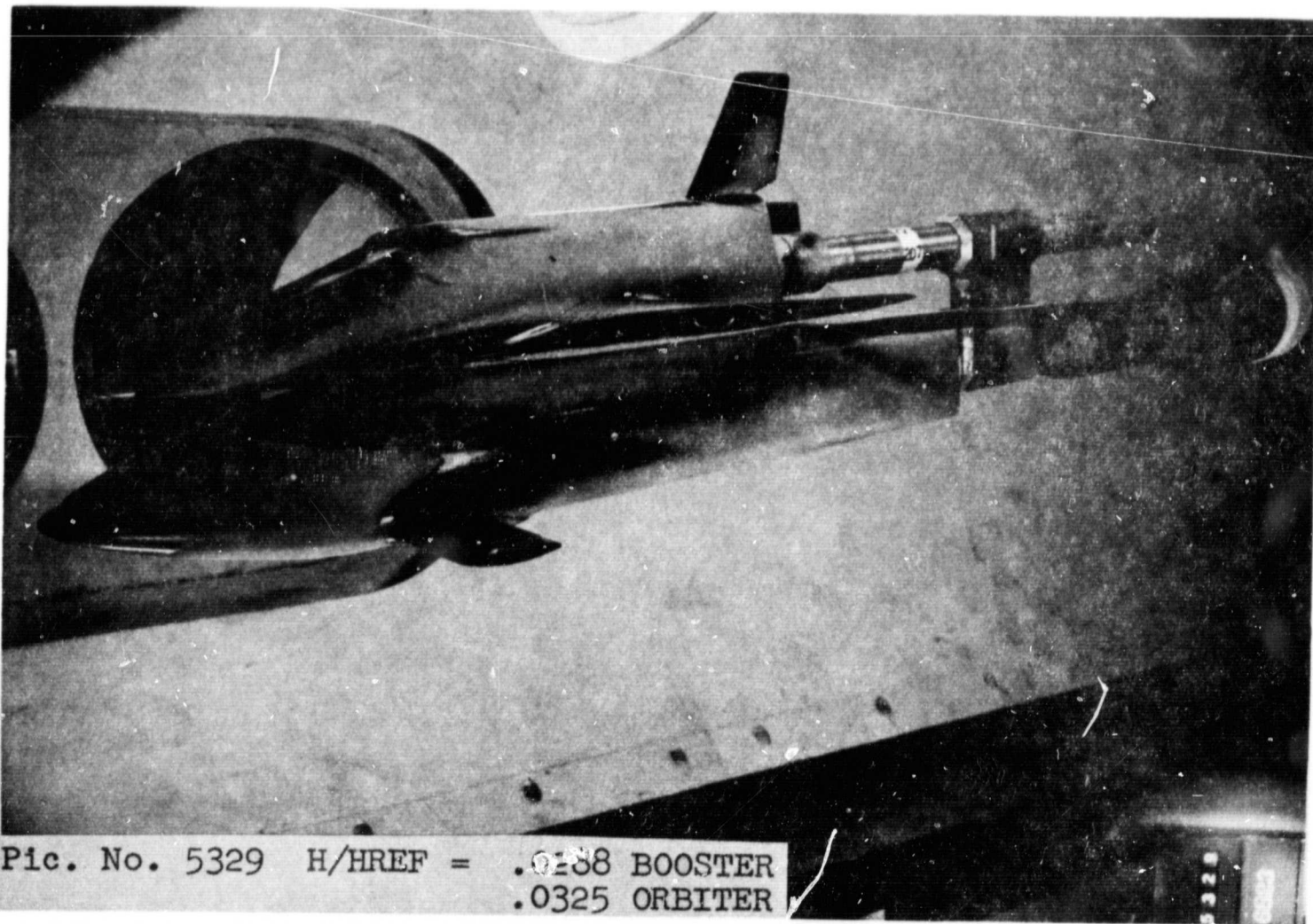
Pic. No. 5303 H/HREF = .0895 BOOSTER
.1008 ORBITER



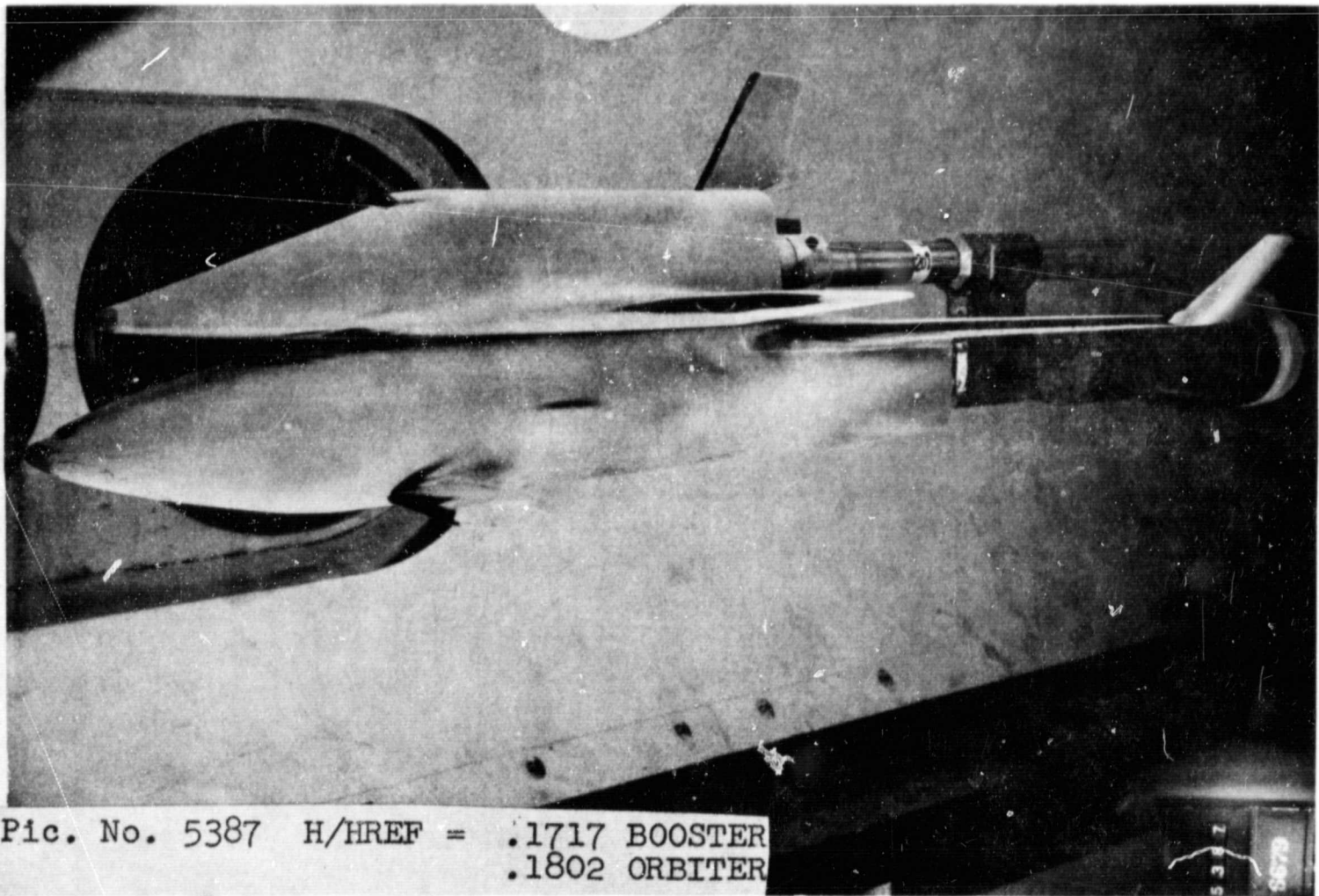
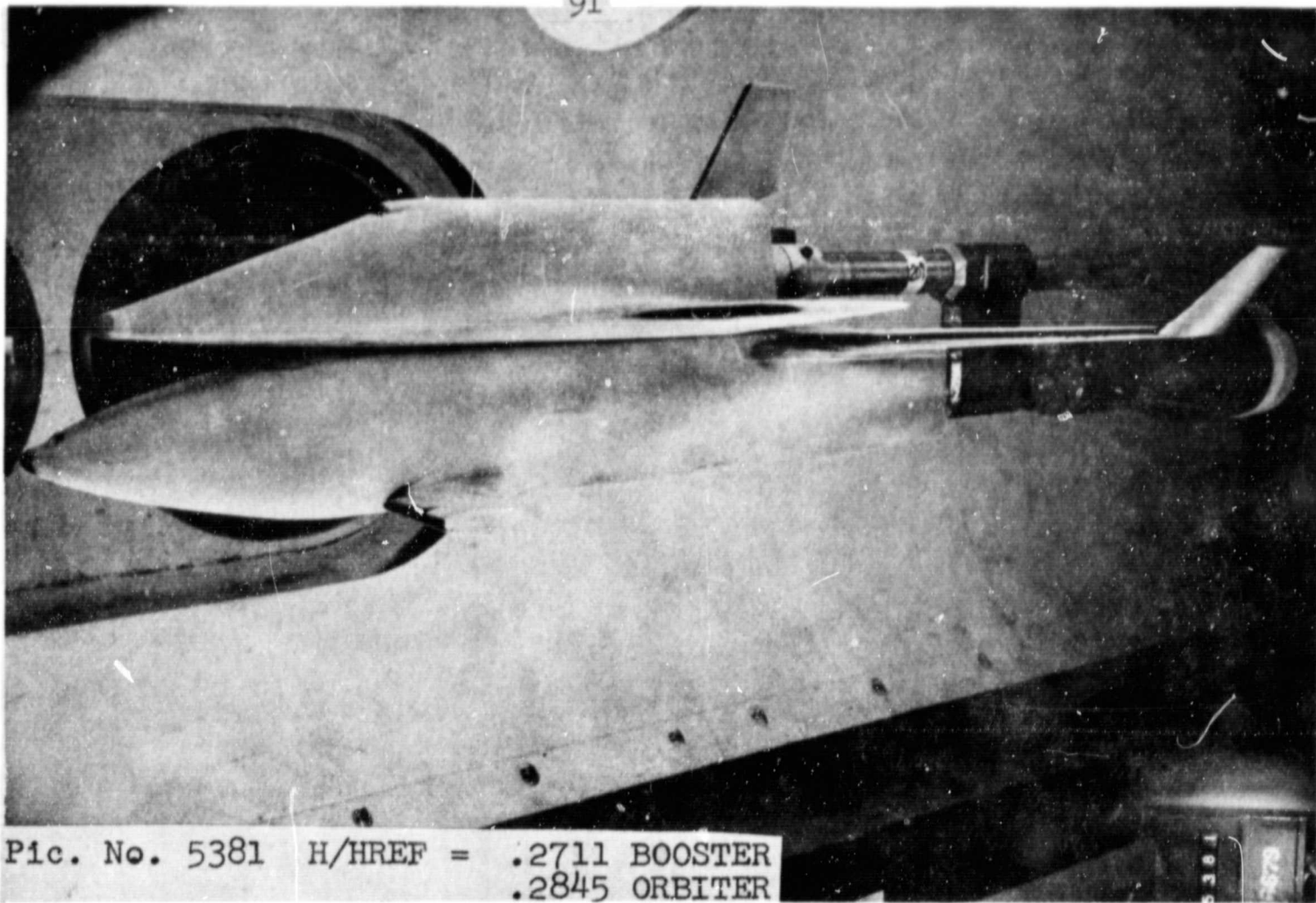
Pic. No. 5310 H/HREF = .0537 BOOSTER
.0605 ORBITER

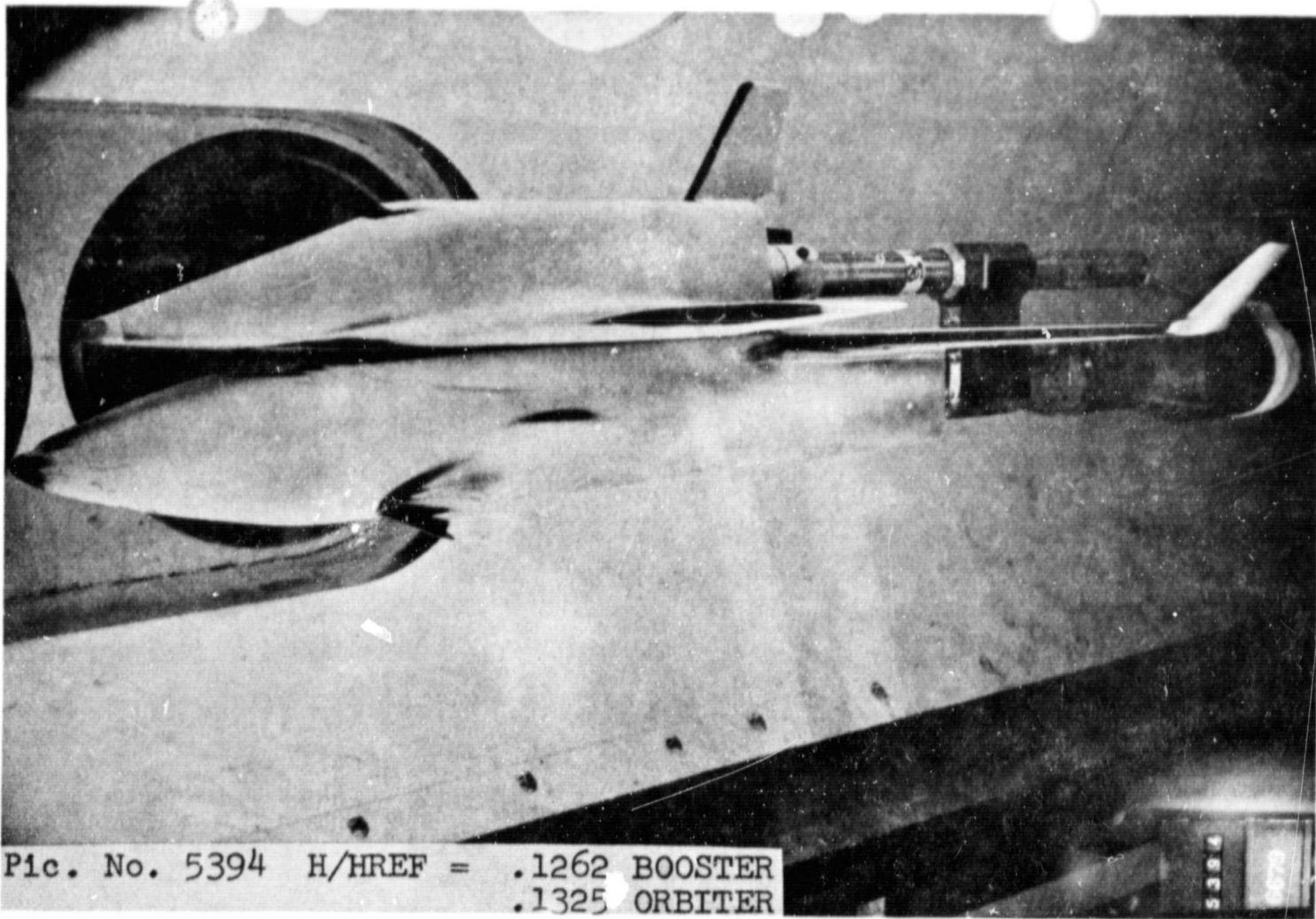


Pic. No. 5319 H/HREF = .0376 BOOSTER
.0423 ORBITER

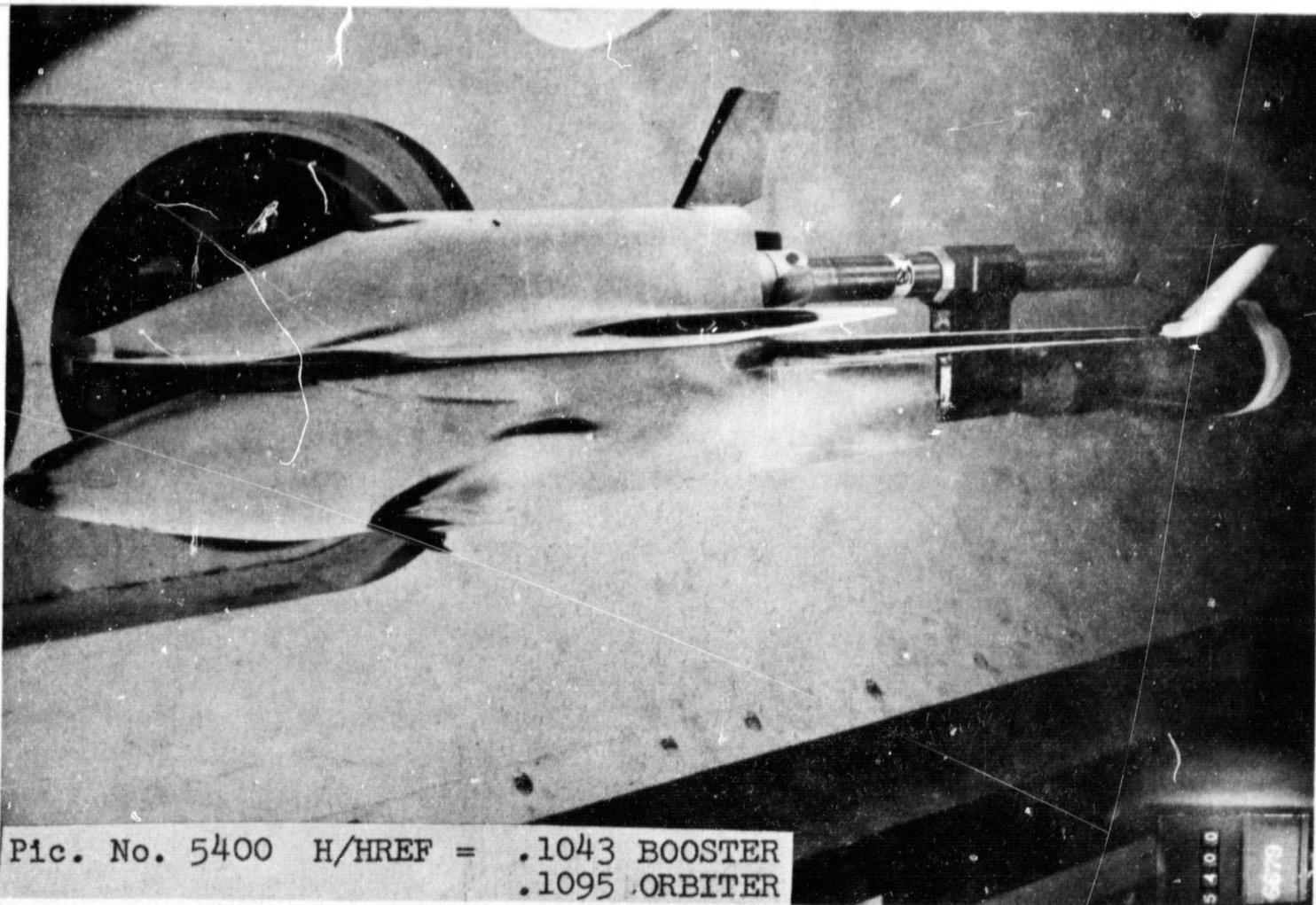


Pic. No. 5329 H/HREF = .0288 BOOSTER
.0325 ORBITER





Pic. No. 5394 H/HREF = .1262 BOOSTER
.1325 ORBITER



Pic. No. 5400 H/HREF = .1043 BOOSTER
.1095 ORBITER

Group 209 Re/ft 3.7x10⁶ ALPHA 0
POST-TEST PHOTOGRAPH OF INTERFERENCE REGION



SYM	H/H _{REF}
.....	~0.32
---	~0.1

6/ 3/71

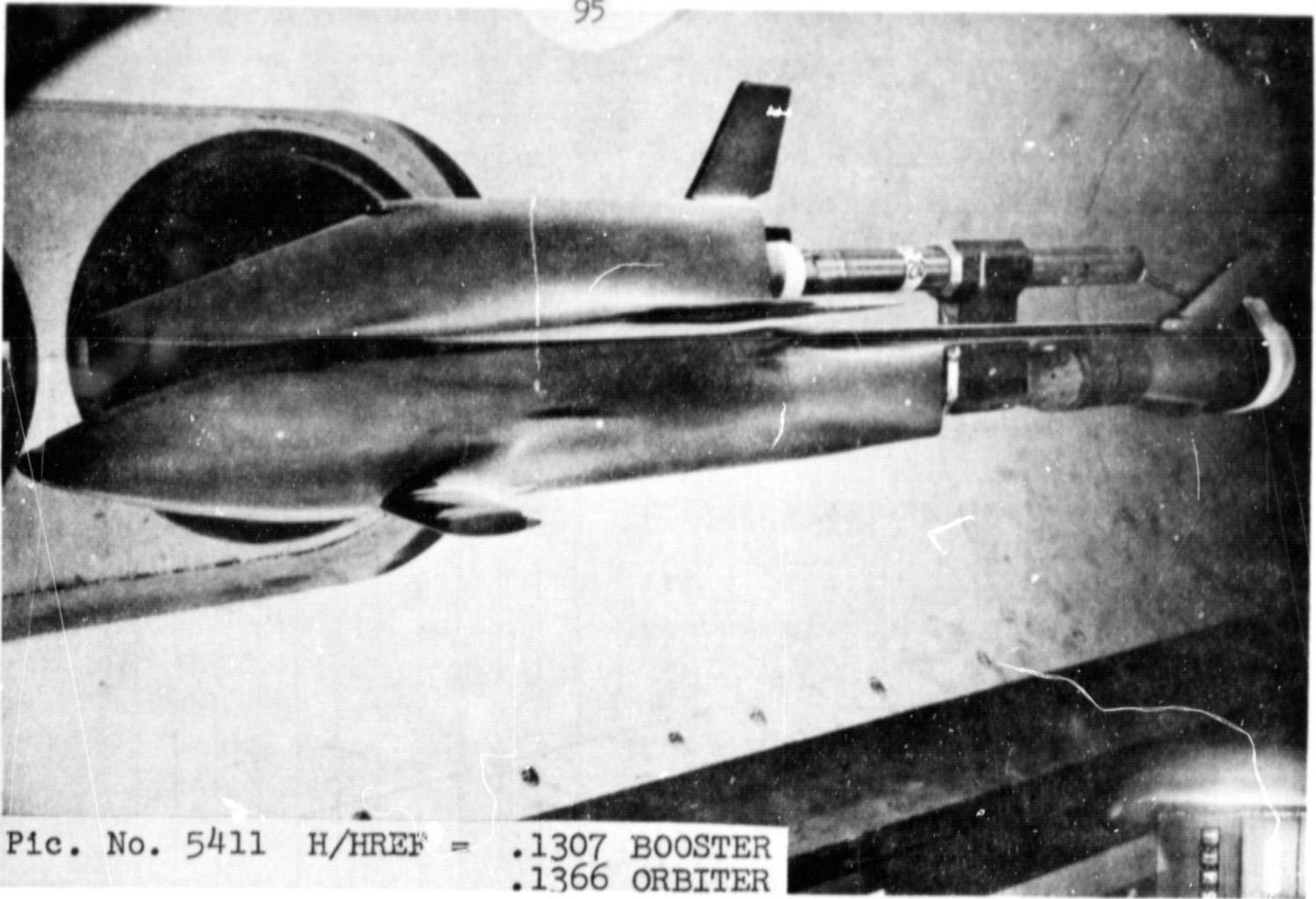
AEDCIARO-INC-1 ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH WEPERSONIC TUNNEL 8
V11162

GROUP CONF16 MODEL MACH NO PO PSIA TV DEG R ALPHA-MODEL ALPHA-SECTOR ALPHA-PREBEND ROLL-MODEL YAW
 210 1121 P0AC-R+DWC 8.80 855.9 1333 --.00 0 0 0 0 0 0

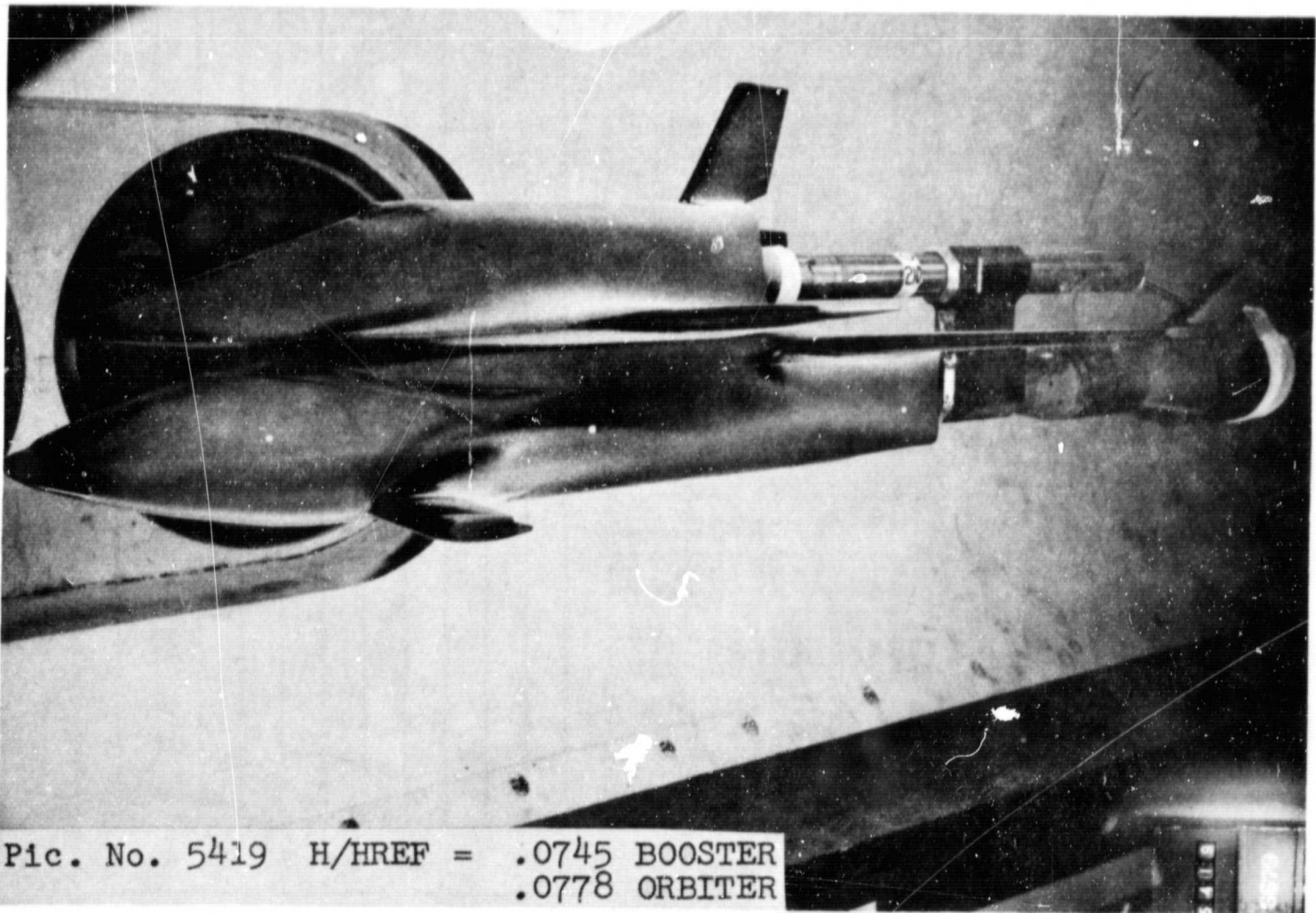
T-INV P-INV Q-INV V-INV PNO-INV MU-INV RE/FT MREF STREF
 (DEG R) (PSIA) (PSIA) (FT/SEC) (SLUGS/FT3) (LB-SEC/FT2) (FT-1) (M-011FT) (M-011FT)
 94.6 0.00 3.920 J853 7.013E-05 7.779E-08 3.77E 06 6.234E-02 2.042E-02

CAMERA PAINT TEMP (DEG F) INITIAL TEMP (DEG F) SQUARE ROOT (RHO/CXK)
 TOP(I) 200
 SIDE(U) 200 AVERAGE Tm 93 (0)
 SIDE(L) 200 AVERAGE Im 08 (0) --.000(SQUARE ROOT DEL TIME) + 0.11

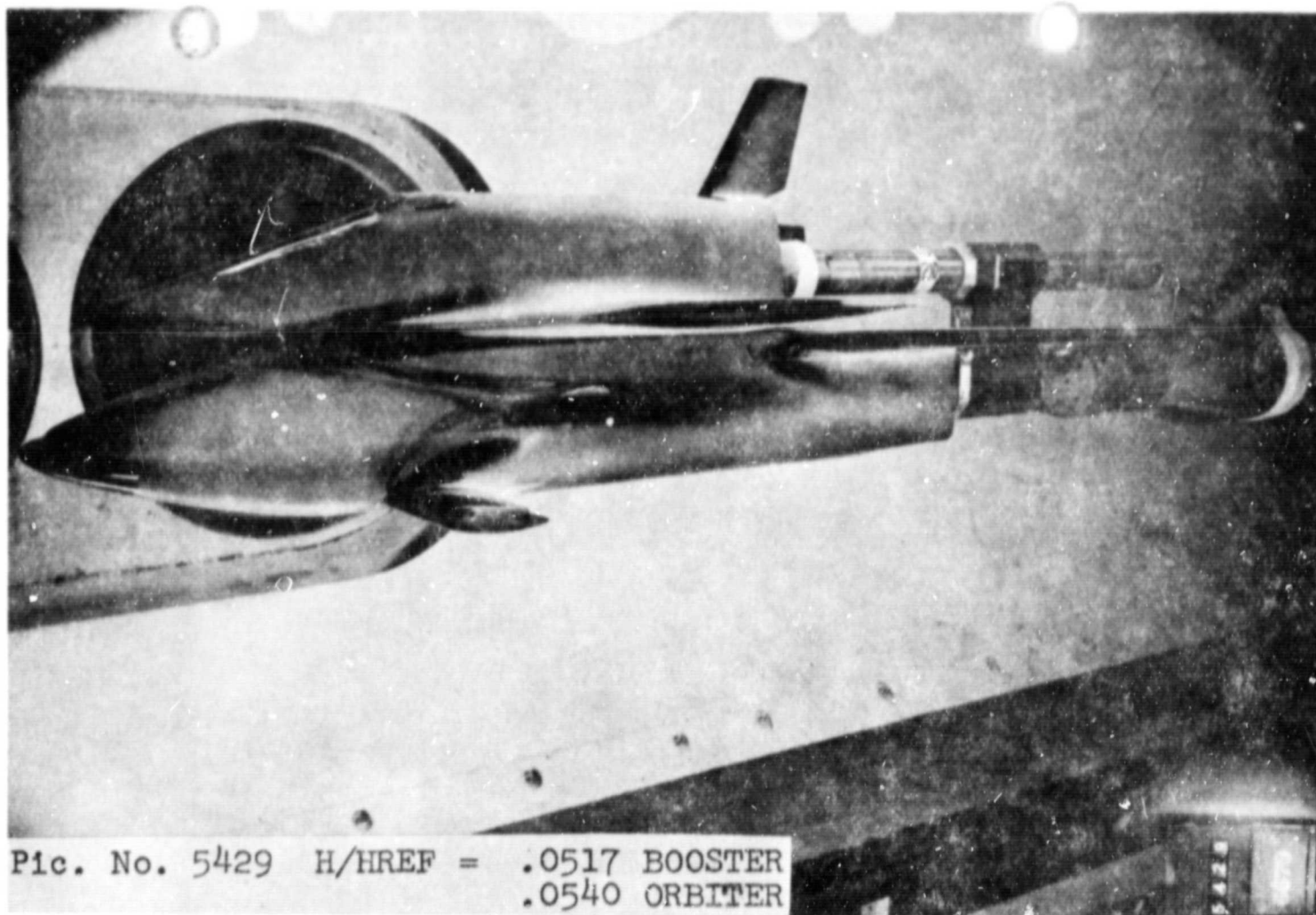
PIC NO	TIME	DELTIME	H(TO)	H(TO)/MREF	H(.910)	H(.910)/MREF	H(.8510)	H(.8510)/MREF	ST(TO)	MODEL	TEMP F
US 5411 (200)	3.70	2.66	0 8.51E-03	.1266	1.053E-02	.1690	1.196E-02	.1919	3.602E-03	95	98
US 5411 (200)	3.70	2.66	8 0.15E-03	.1307	1.007E-02	.1619	1.145E-02	.1838	3.448E-03	95	90
US 5411 (200)	3.70	2.66	8 0.15E-03	.1307	1.007E-02	.1619	1.145E-02	.1838	3.448E-03	95	90
US 5411 (200)	3.70	2.66	0 8.51E-03	.1366	1.053E-02	.1690	1.196E-02	.1919	3.602E-03	95	90
US 5415 (200)	7.95	6.91	0 4.68E-03	.0778	5.990E-03	.0963	6.809E-03	.1093	2.052E-03	99	90
US 5415 (222)	7.95	6.91	8 4.68E-03	.0745	5.744E-03	.0922	6.521E-03	.1047	1.965E-03	99	90
US 5415 (200)	7.95	6.91	8 4.68E-03	.0745	5.744E-03	.0922	6.521E-03	.1047	1.965E-03	99	90
US 5415 (200)	7.95	6.91	0 4.68E-03	.0778	5.990E-03	.0963	6.809E-03	.1093	2.052E-03	99	90
US 5425 (200)	13.25	12.21	0 3.38E-03	.0540	4.161E-03	.0666	4.724E-03	.0759	1.425E-03	110	92
US 5425 (200)	13.25	12.21	8 3.22E-03	.0517	3.982E-03	.0646	4.524E-03	.0726	1.364E-03	110	92
US 5425 (200)	13.25	12.21	8 3.22E-03	.0517	3.982E-03	.0646	4.524E-03	.0726	1.364E-03	110	92
US 5425 (200)	13.25	12.21	0 3.38E-03	.0540	4.161E-03	.0666	4.724E-03	.0759	1.425E-03	110	92
US 5435 (200)	18.55	17.51	0 2.62E-03	.0421	3.241E-03	.0521	3.680E-03	.0591	1.110E-03	122	93
US 5435 (200)	18.55	17.51	8 2.51E-03	.0403	3.104E-03	.0499	3.524E-03	.0566	1.063E-03	122	93
US 5435 (200)	18.55	17.51	8 2.51E-03	.0403	3.104E-03	.0499	3.524E-03	.0566	1.063E-03	122	93
US 5439 (200)	18.55	17.51	0 2.62E-03	.0421	3.241E-03	.0521	3.680E-03	.0591	1.110E-03	122	93



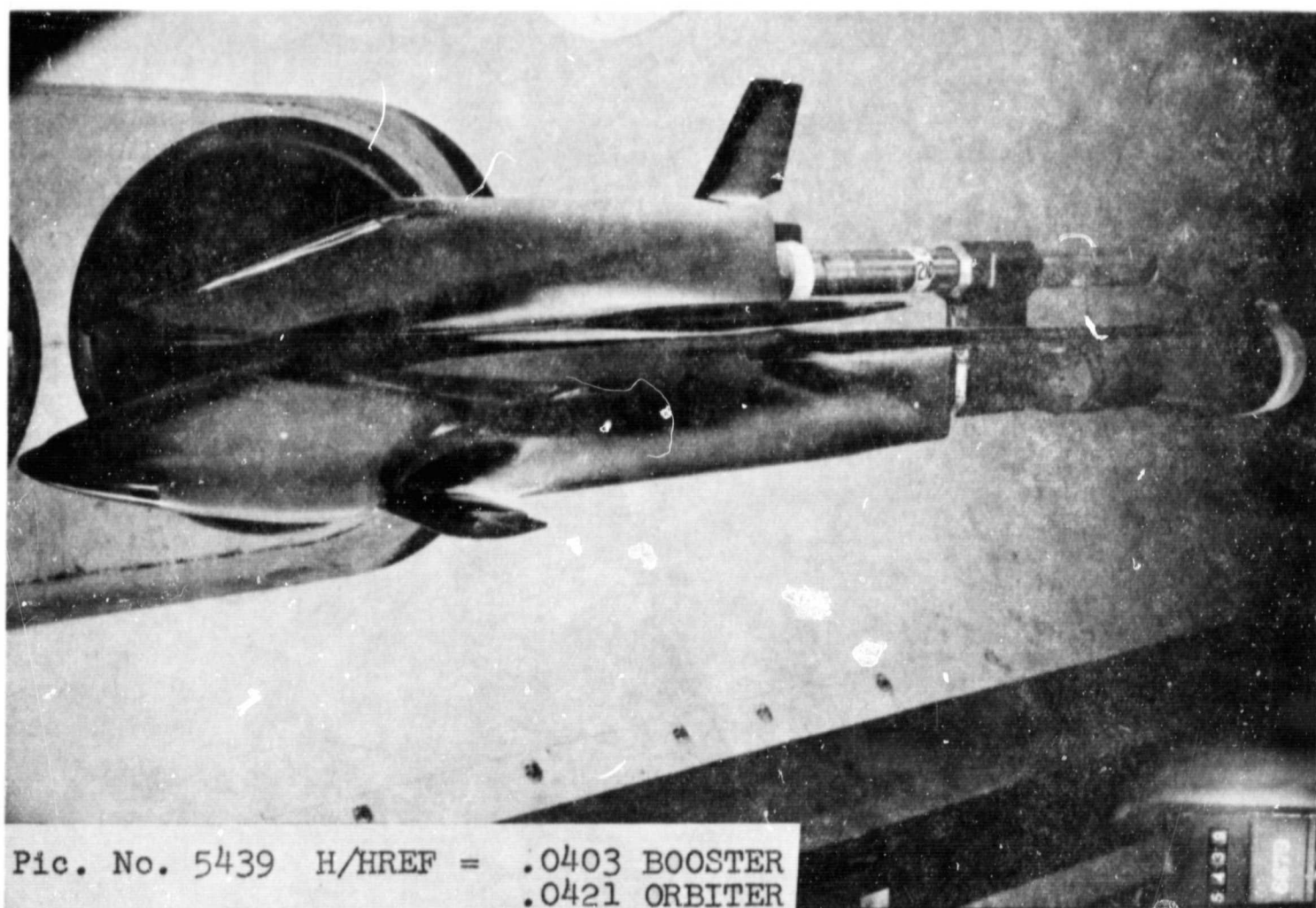
Pic. No. 5411 H/HREF = .1307 BOOSTER
.1366 ORBITER



Pic. No. 5419 H/HREF = .0745 BOOSTER
.0778 ORBITER



Pic. No. 5429 H/HREF = .0517 BOOSTER
.0540 ORBITER



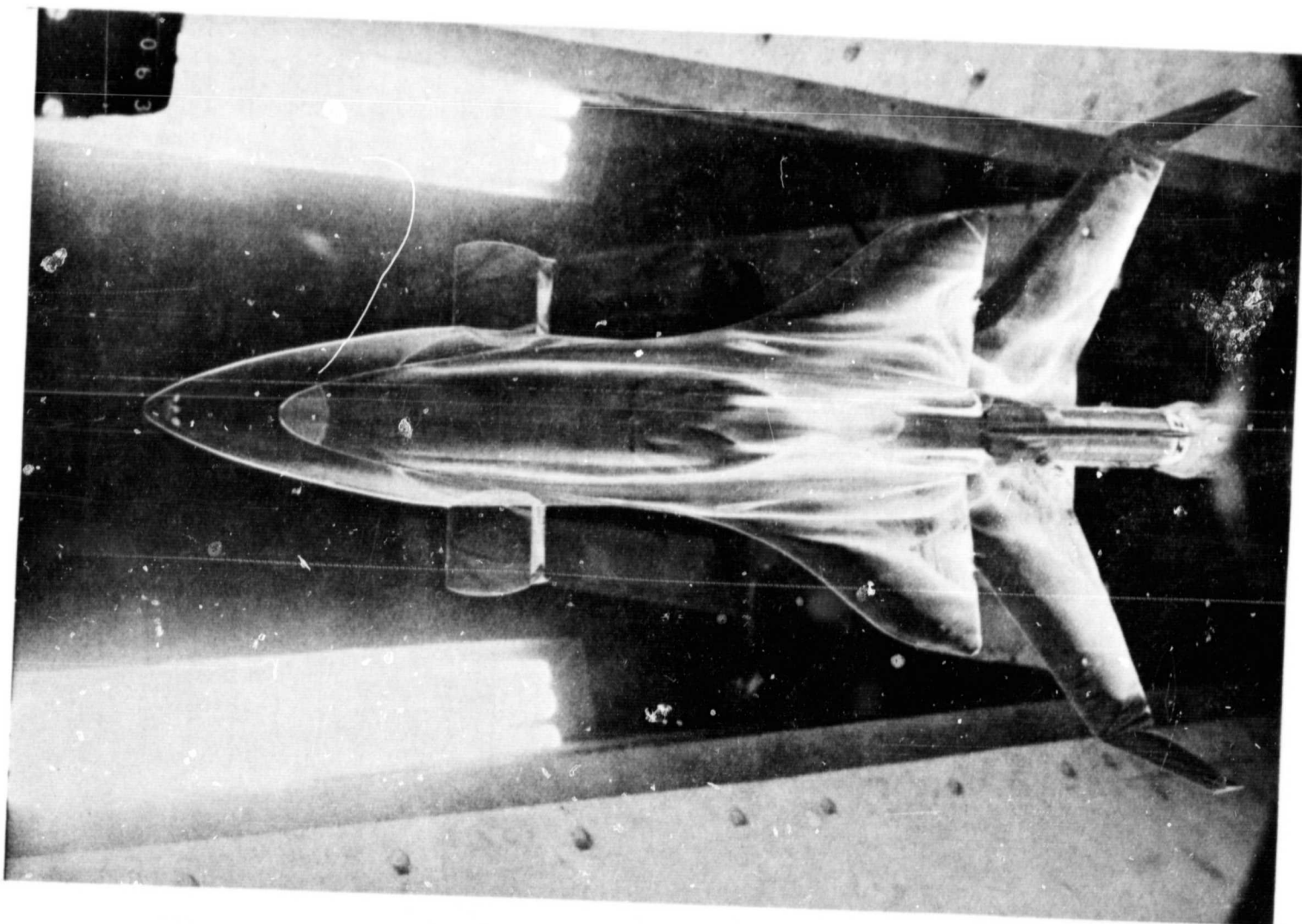
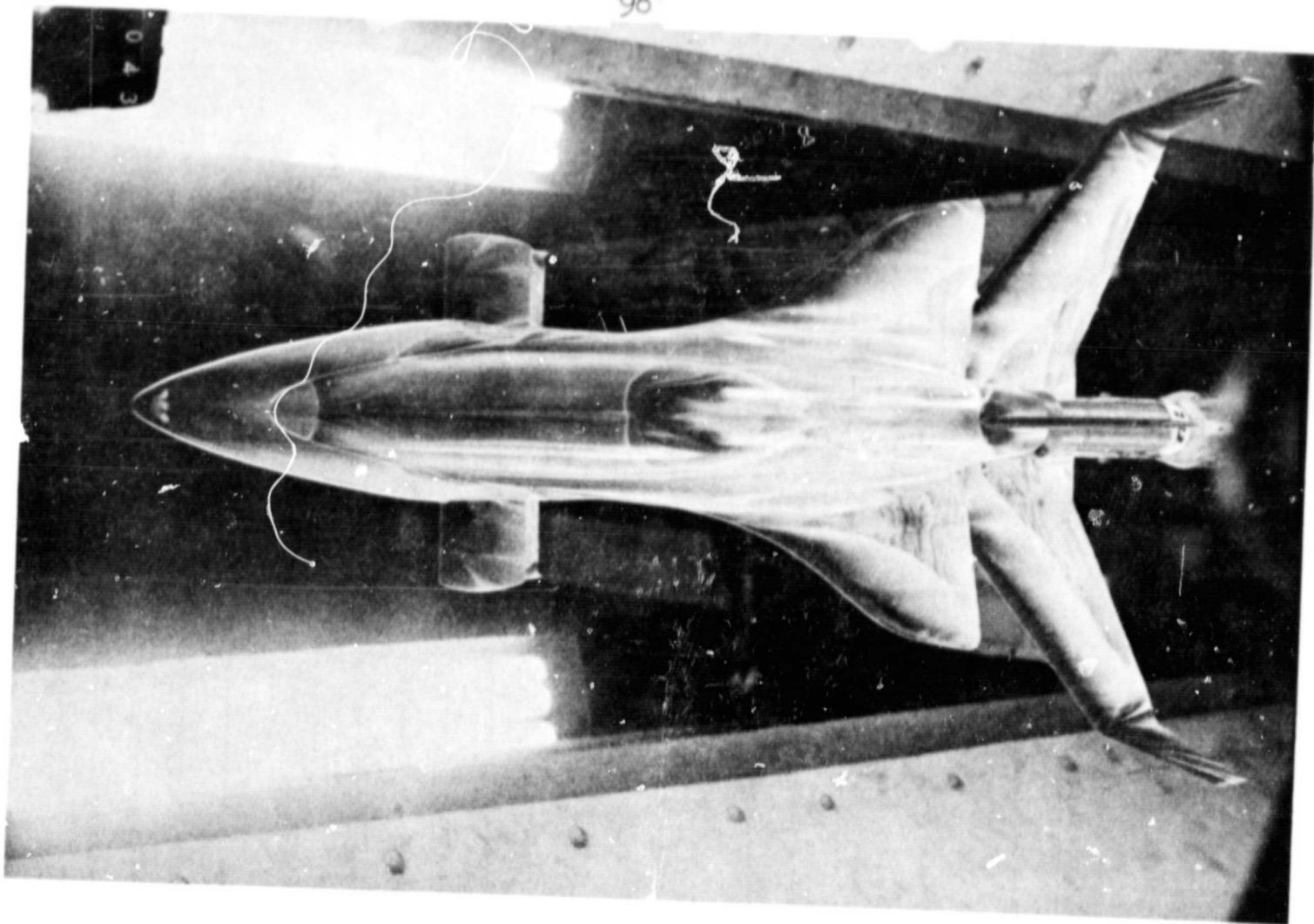
Pic. No. 5439 H/HREF = .0403 BOOSTER
.0421 ORBITER

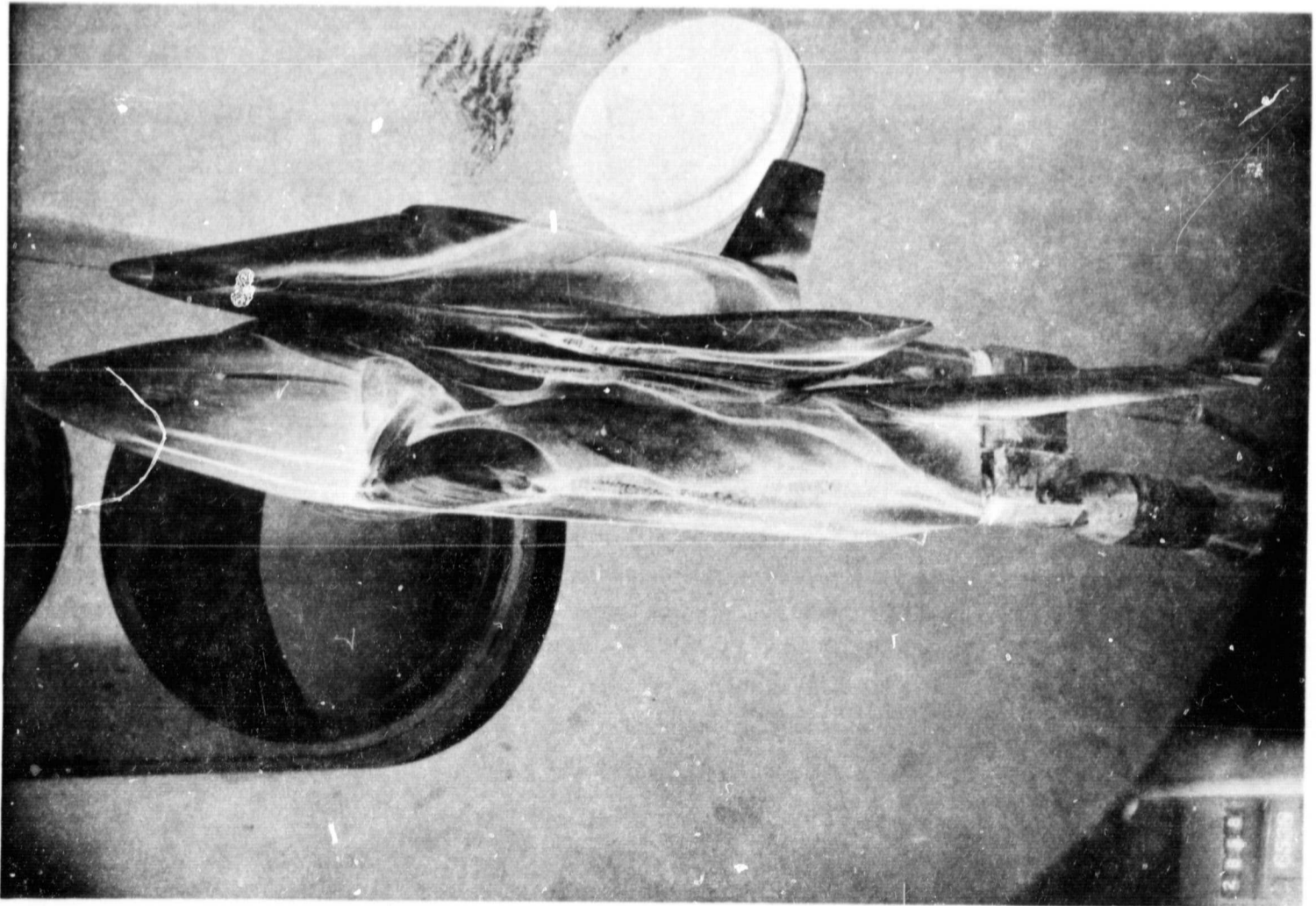
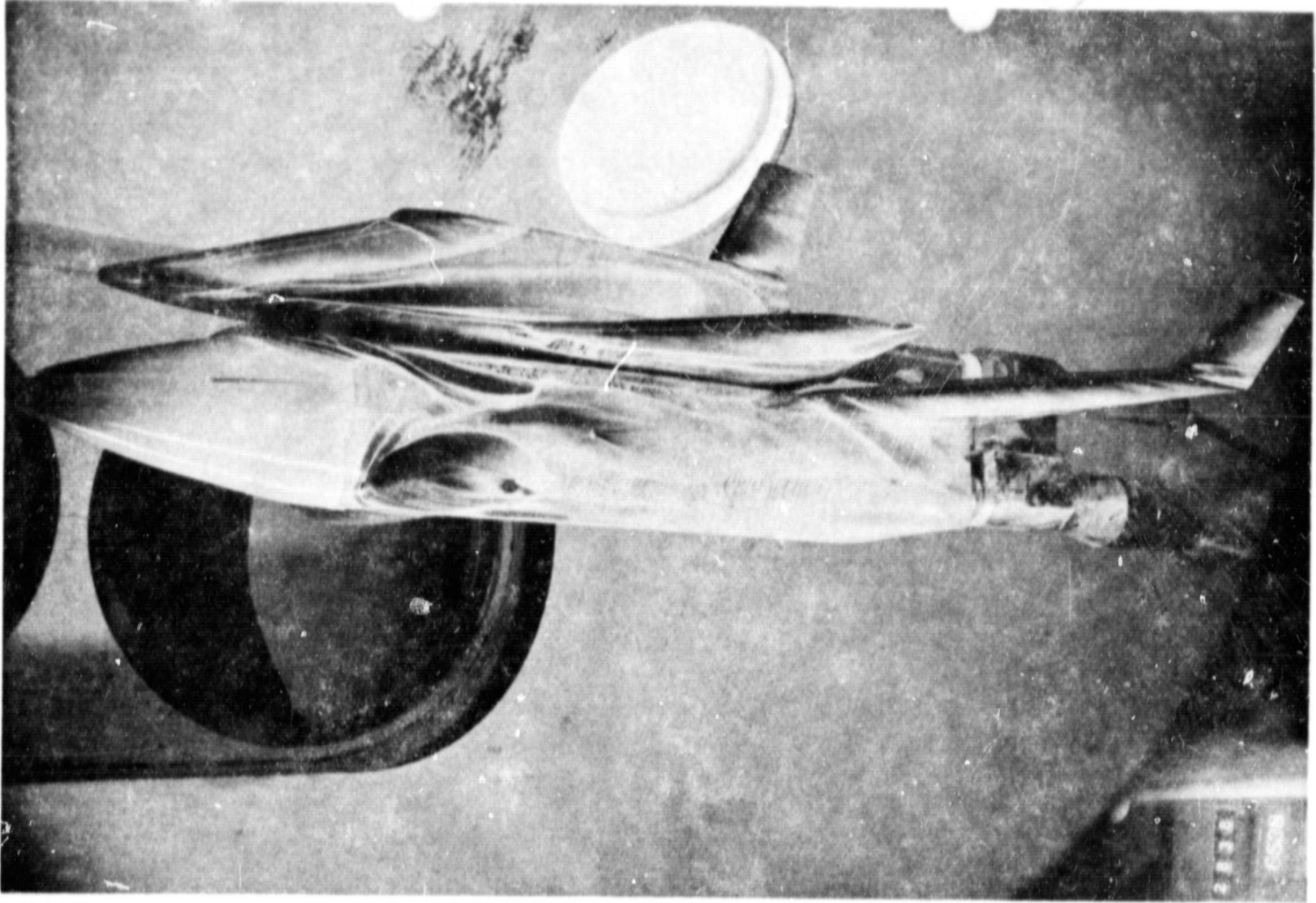
6/3/71

AEDC(AHQ-INC.) ARNOLD AFS, TENNESSEE
VUM KANBAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
VIL162

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TD DEG H	ALPHA=PODEL	ALPHA=SECTOR	ALPHA=PREBEND	ROLL=MODEL	YAW
222	1222	PUAC-B+D+C	M.08	550.1	1305	.01	.01	0	0	0
	I-IAF	P-IAF	U-IAF	V-IAF	MNO-IAF	MU-IAF	HE/FT	MREF	SREF	
	(DEG H)	(PSIA)	(PSIA)	(FT/SEC)	(SLUGS/FT ³)	(LB-SLUG/FT ²)	(FT-L)	(R=.011FT)	(R=.011FT)	
	94.6	.056	2.527	3812	5.003E-05	7.015E-06	2.50E 06	4.981E-02	3.452E-02	

OIL FLOW





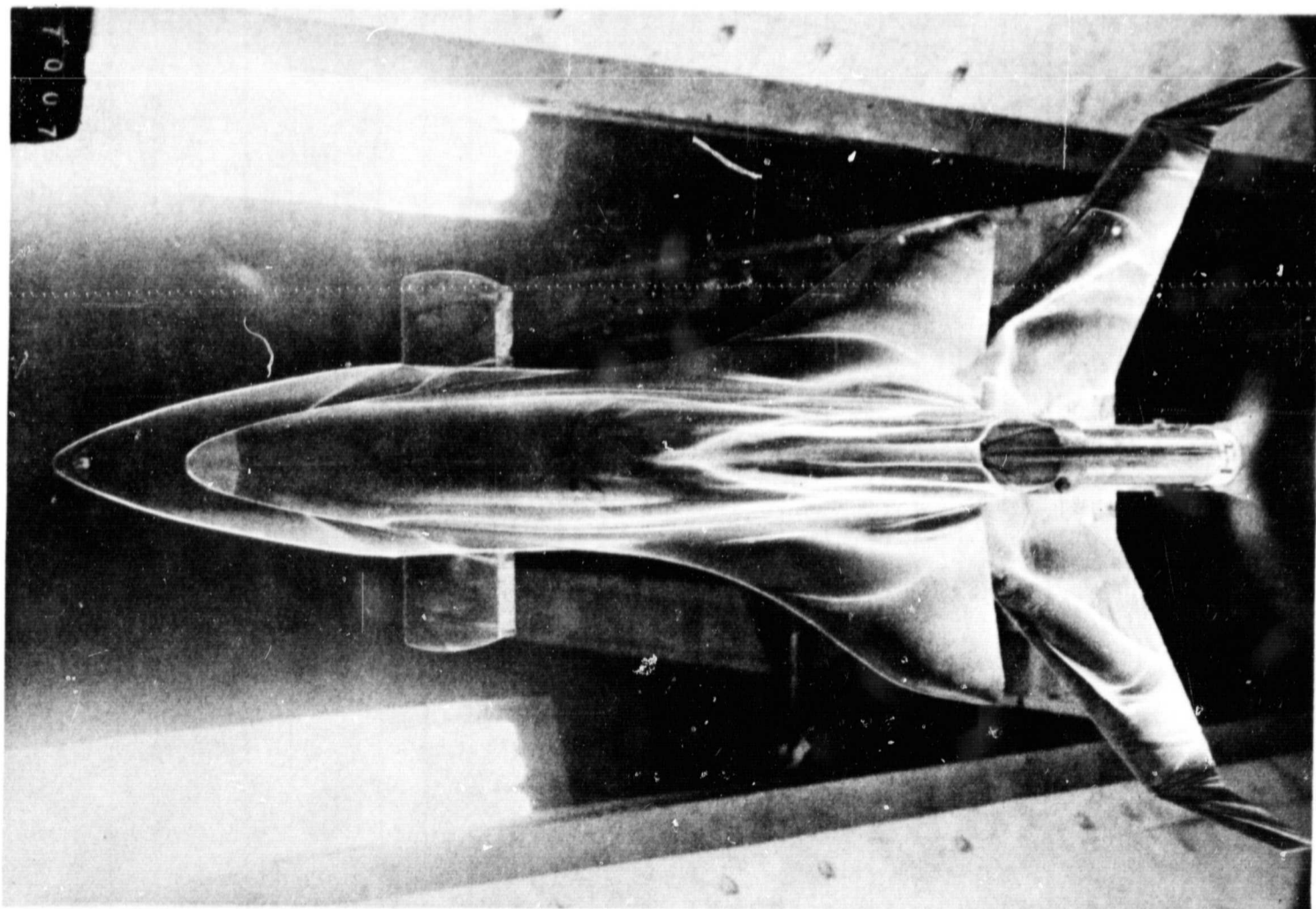
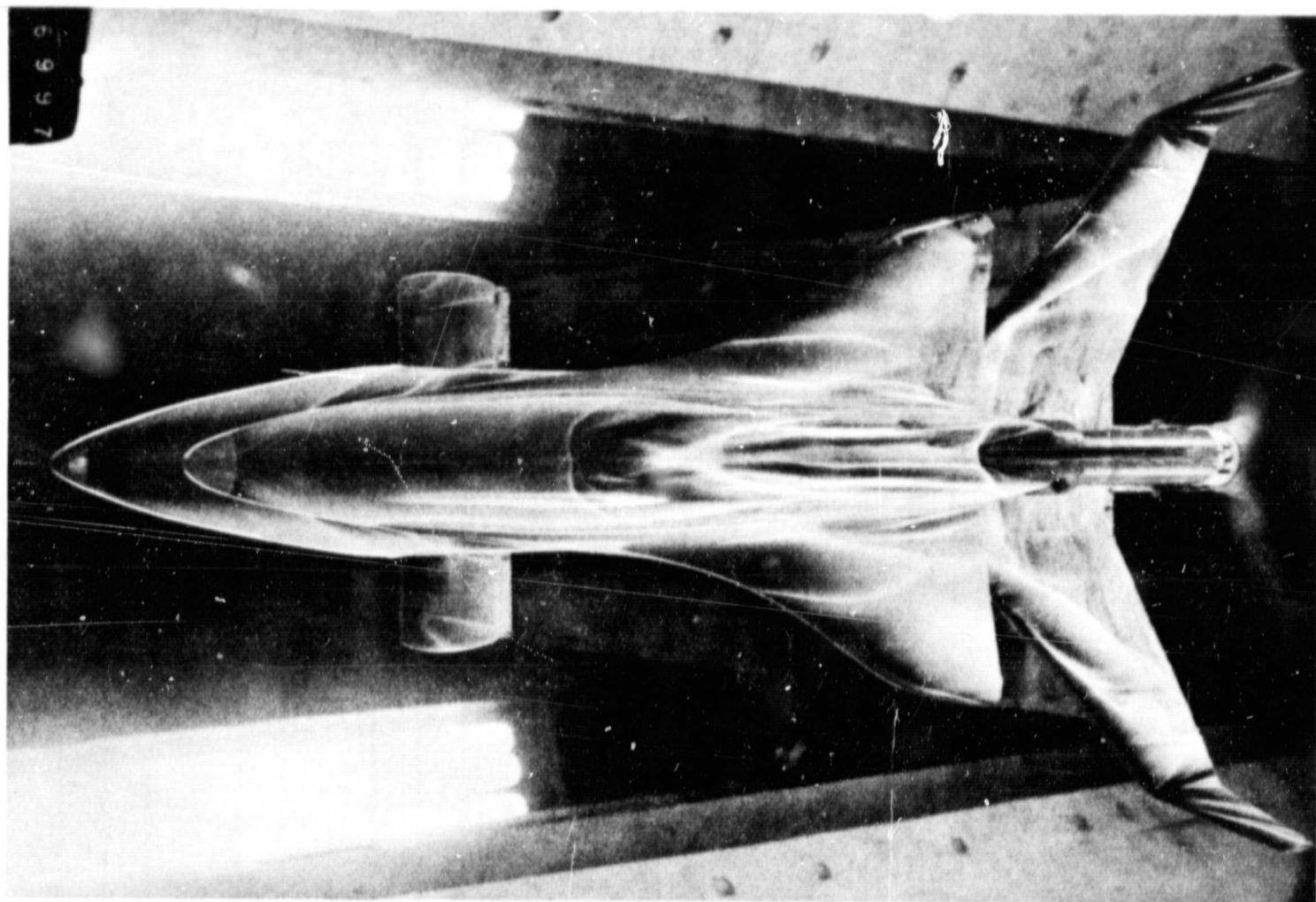
Group 222 Re/ft 2.50E 06 ALPHA 0

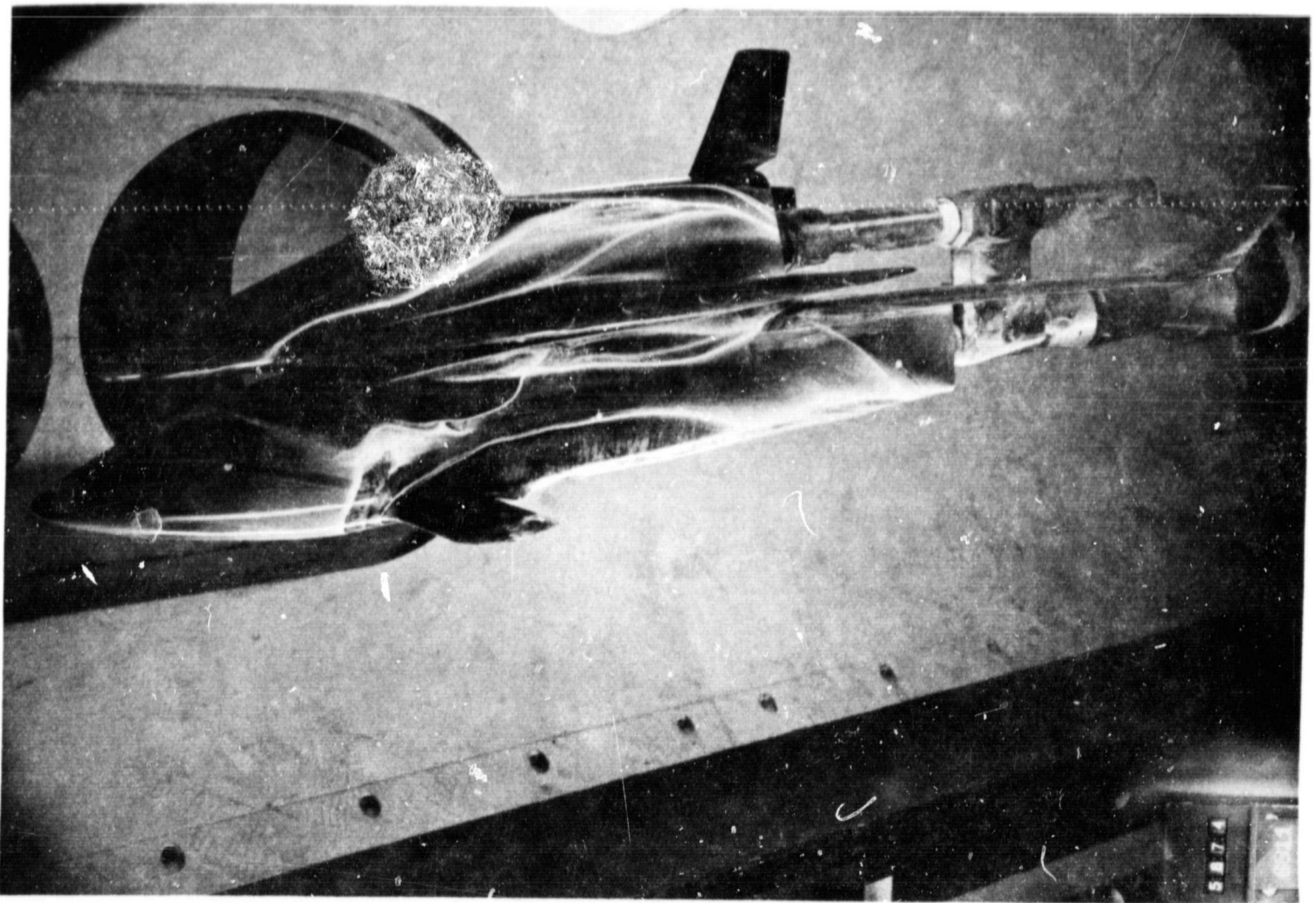
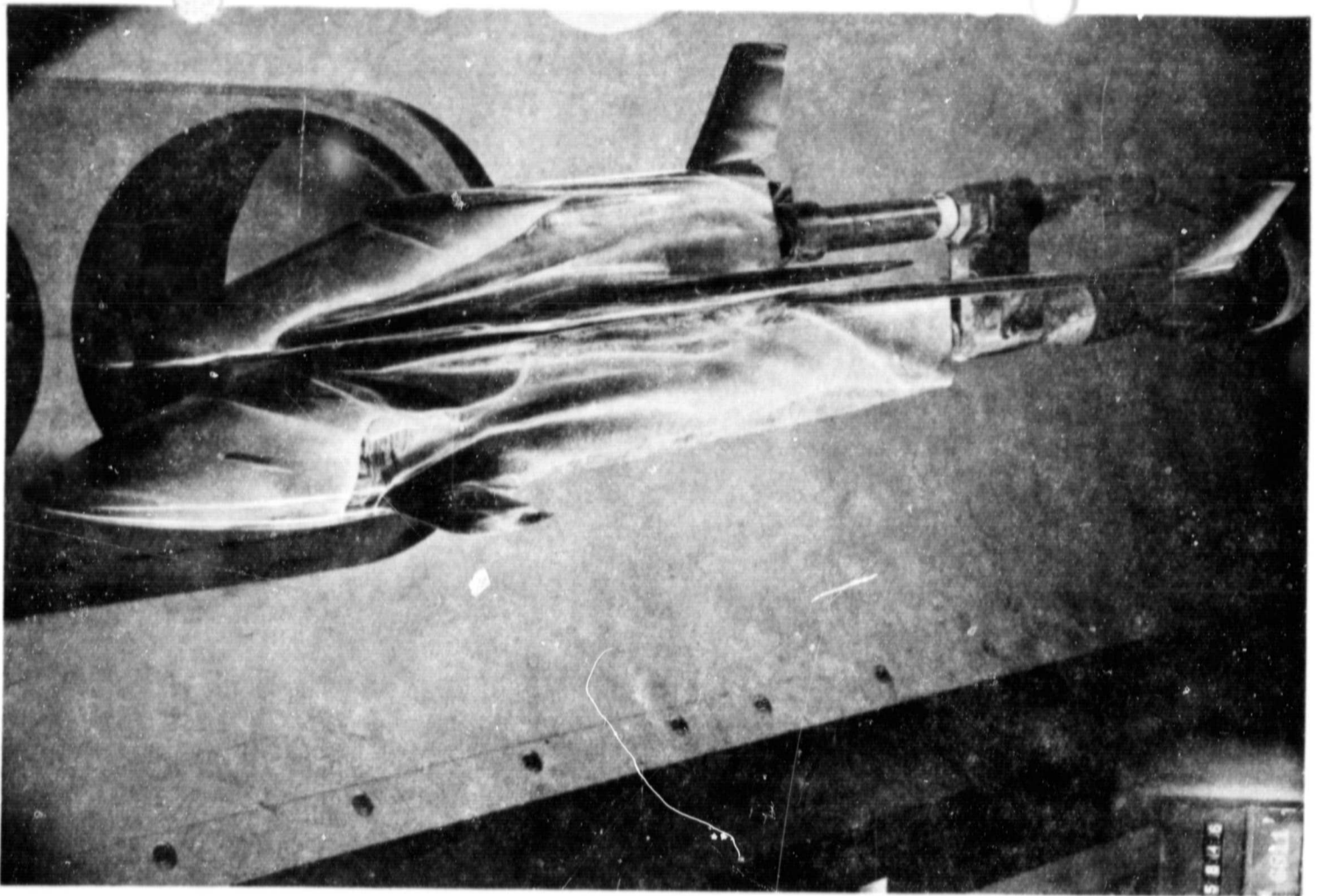
6/ 3/71

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

GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TO DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
221	3222	FDAC-R+DWC	8.00	548.7	1310	-5.02	-5.02	0	0	0
	T-1NF	P-1NF	Q-1NF	V-1NF	RHO-1NF	MU-1NF	RE/FT	HREF	STREF	
	(UEG R)	(PSIA)	(PSIA)	(FT/SEC)	(SLUGS/FT ³)	(LB-SEC/FT ²)	(FT-1)	(R= .01FT)	(R= .01FT)	
	94.9	.056	2.51A	3819	4.969E-05	7.640E-08	2.48E 06	4.976E-02	3.264E-02	

OIL FLOW





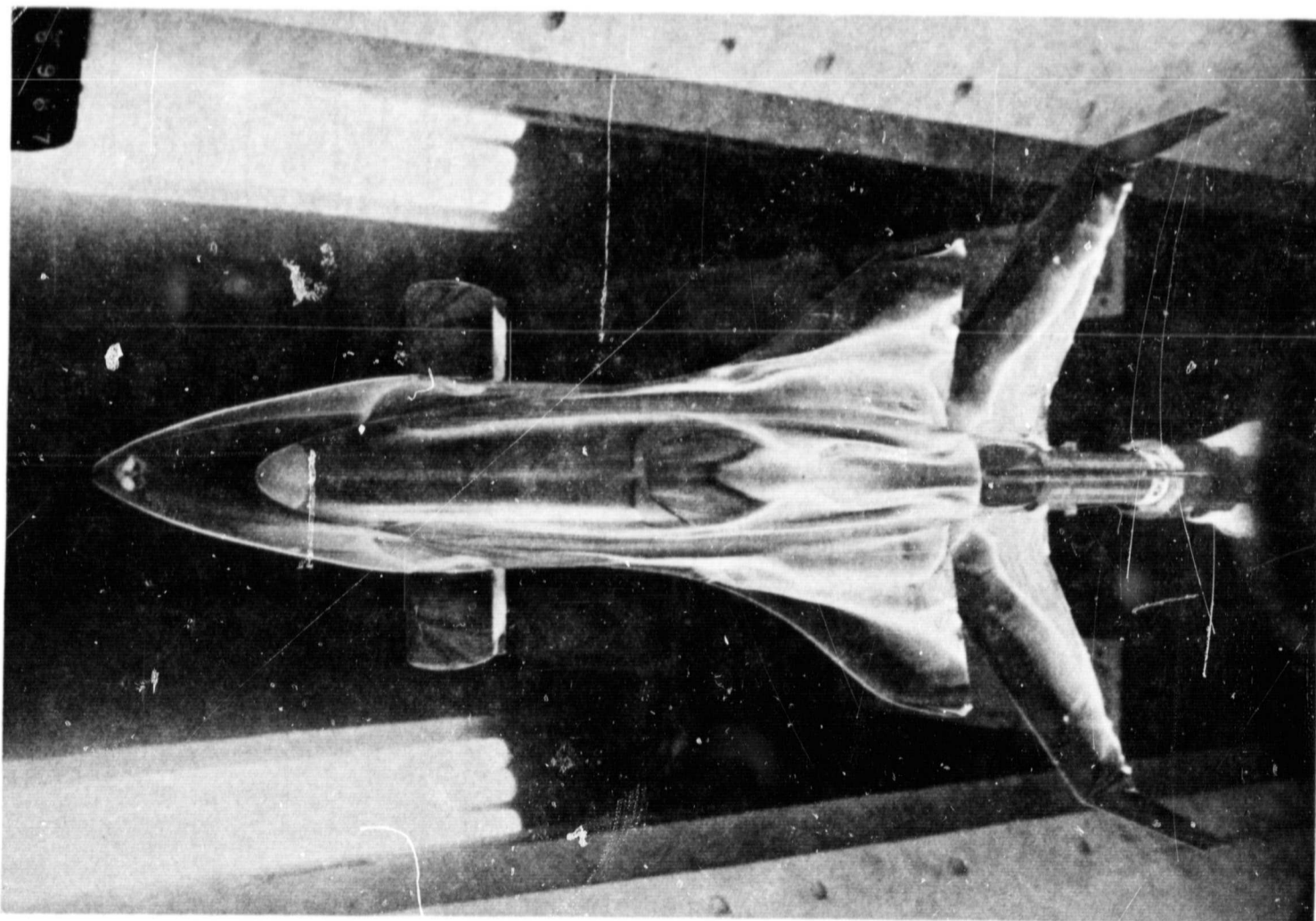
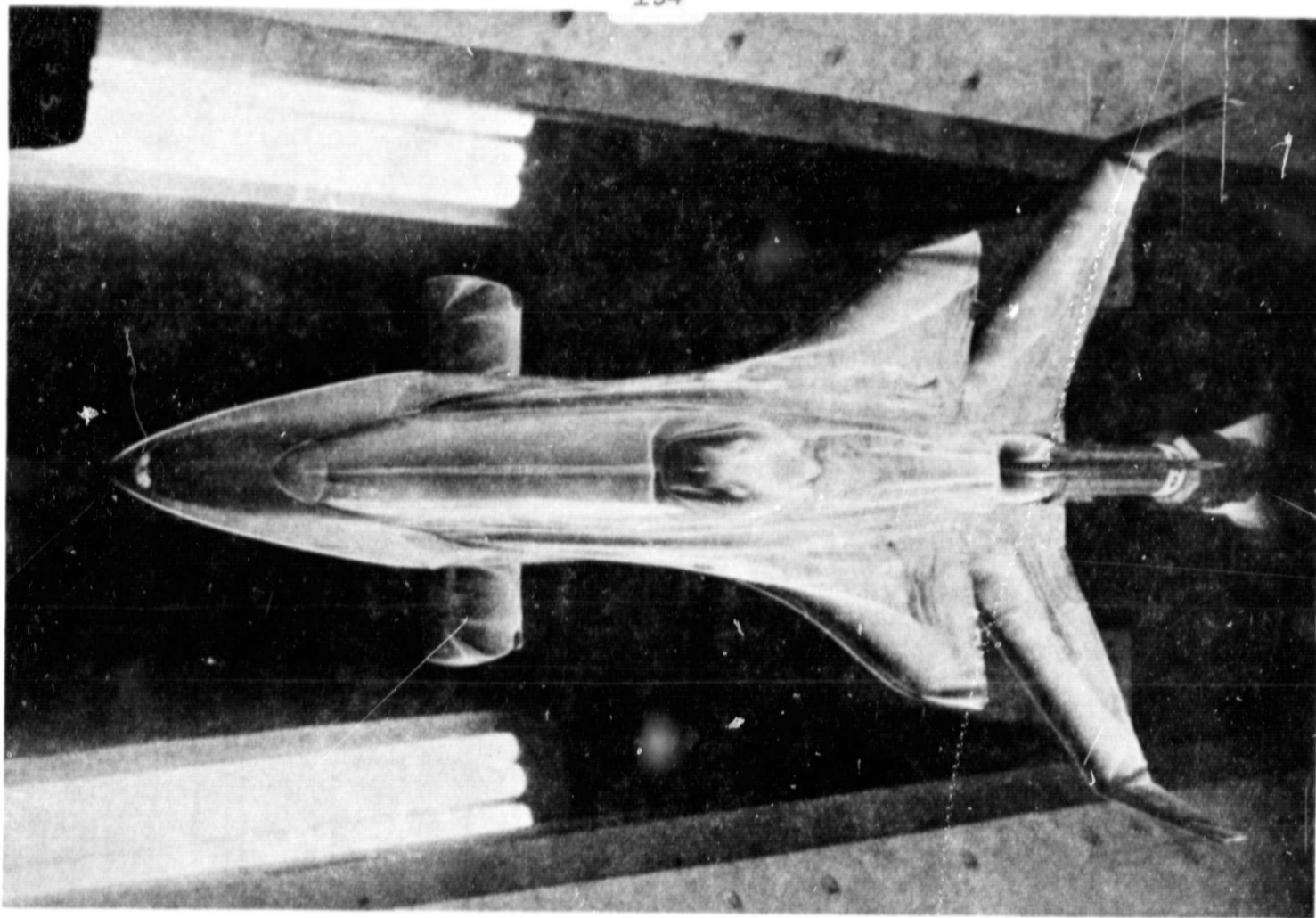
6/ 3/71

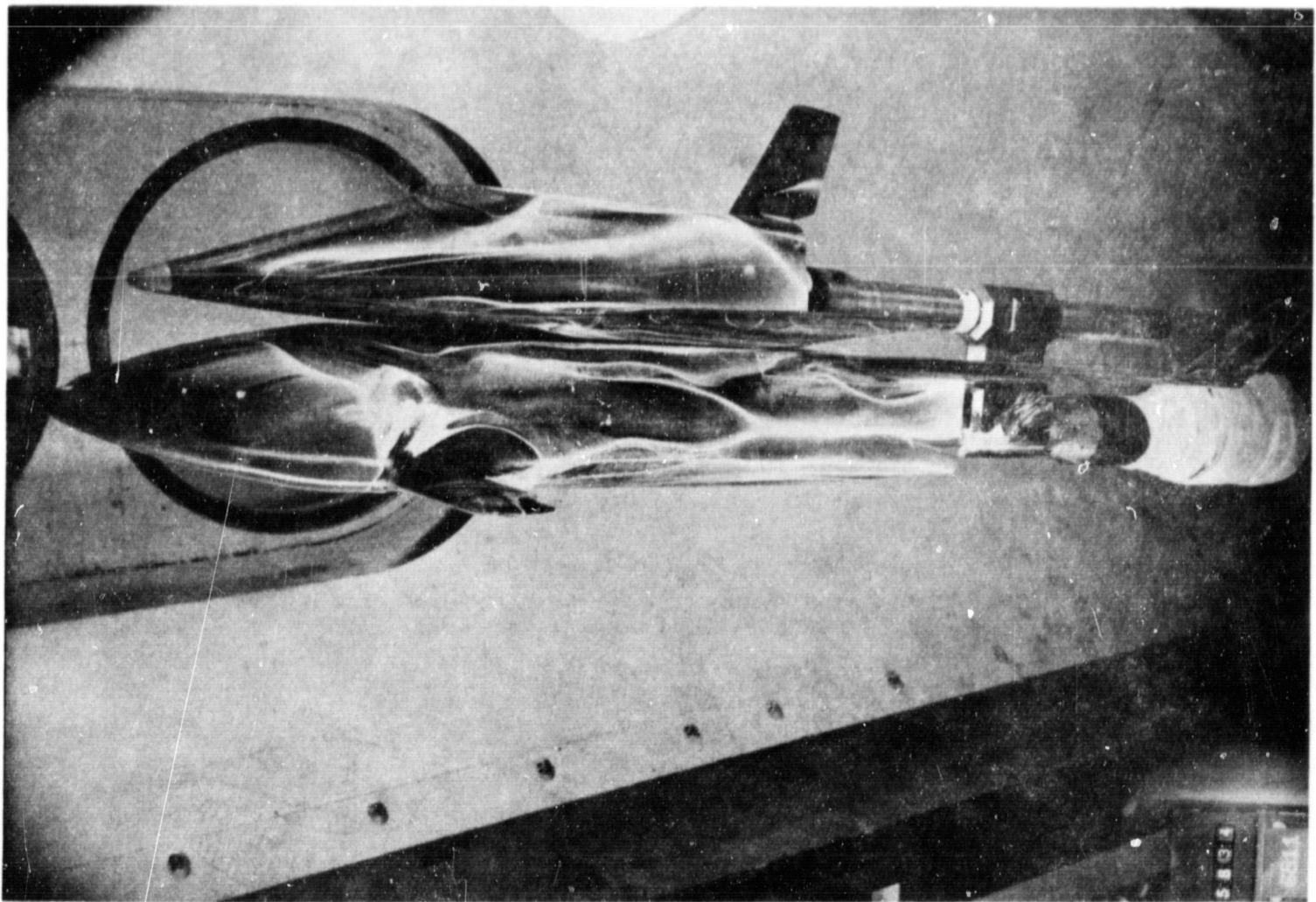
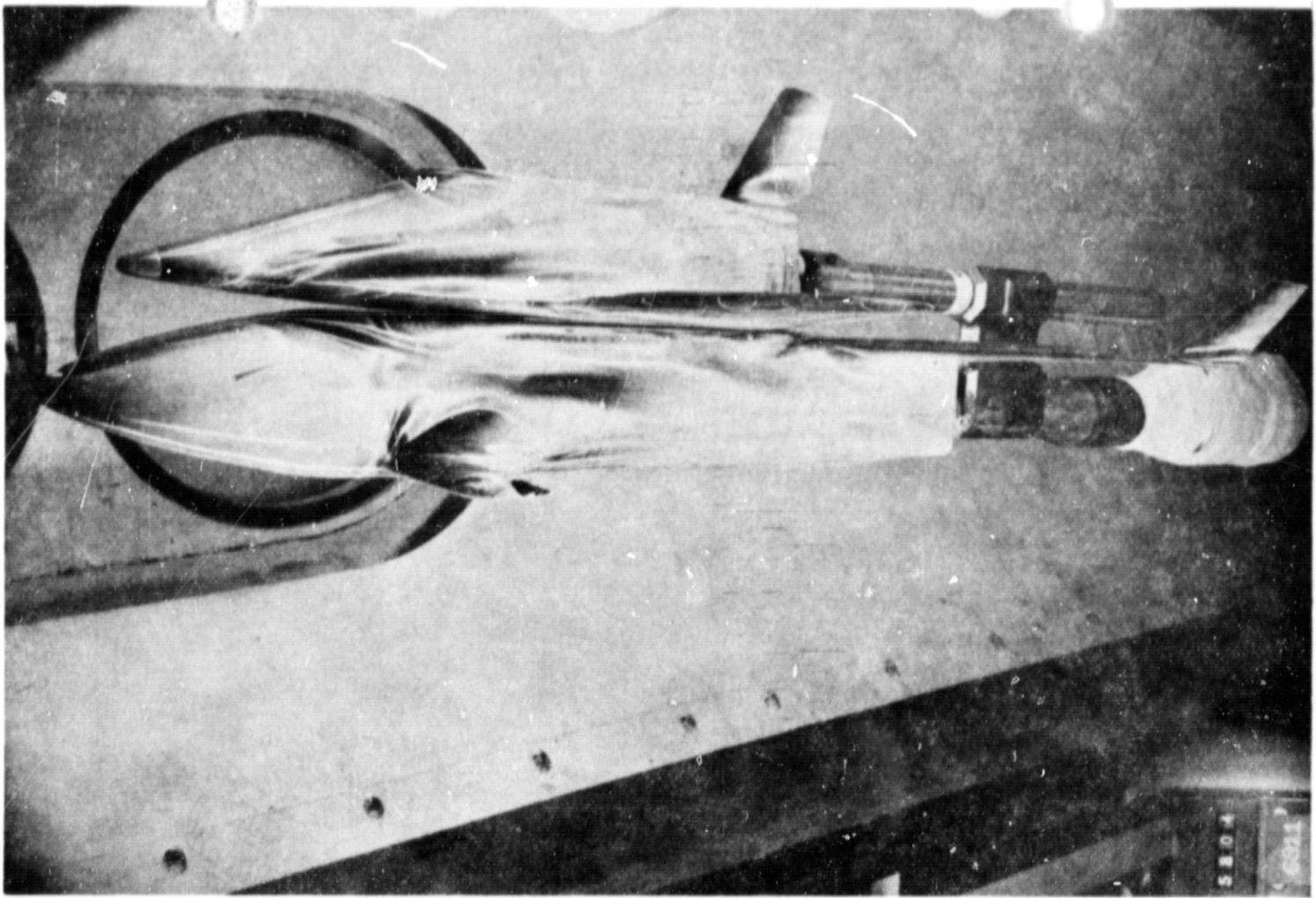
AEDC(ARO,INC.) ARNOLD AFS, TENNESSEE
VON KARMAN GAS DYNAMICS FACILITY
50 INCH HYPERSONIC TUNNEL B
V11162

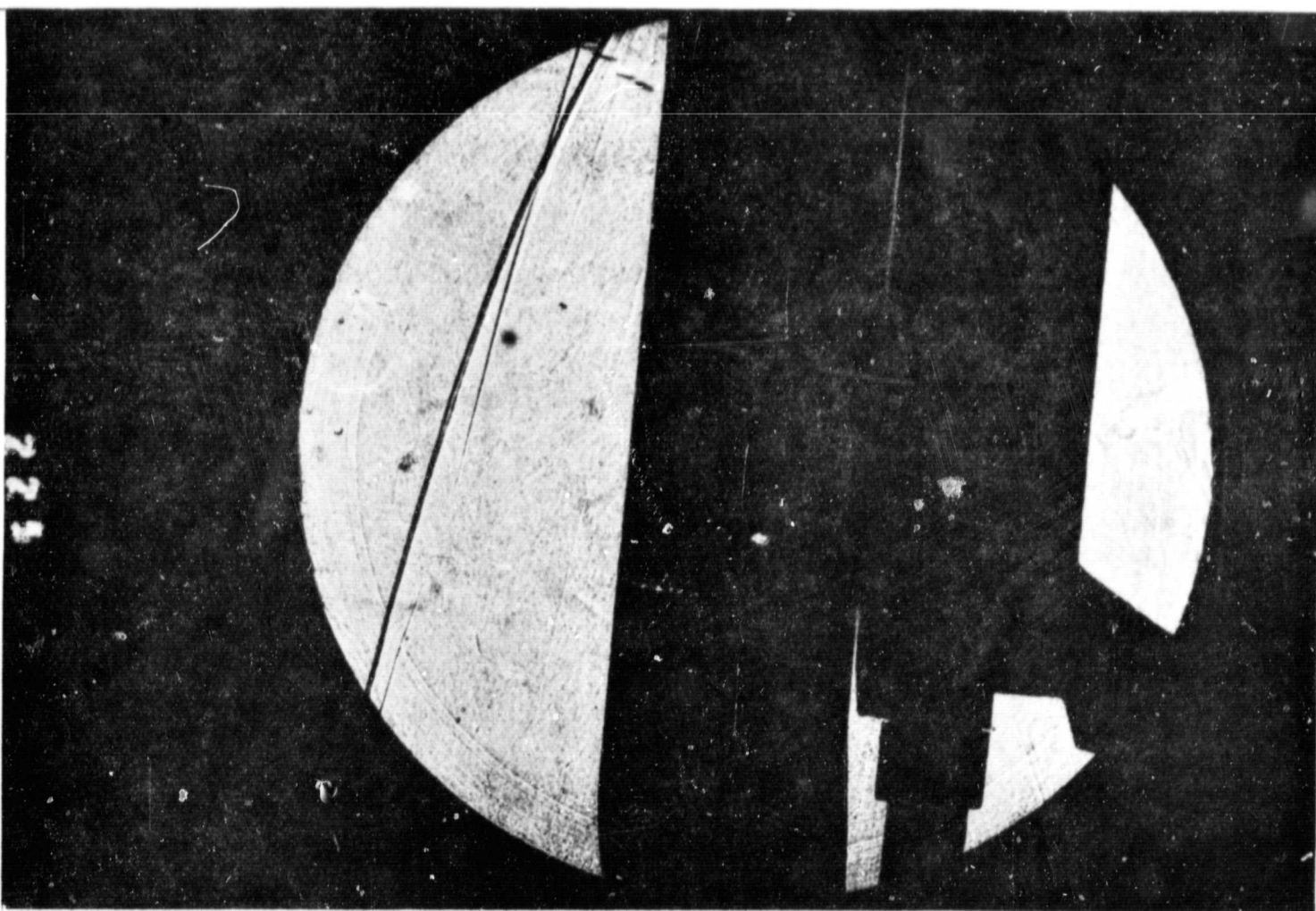
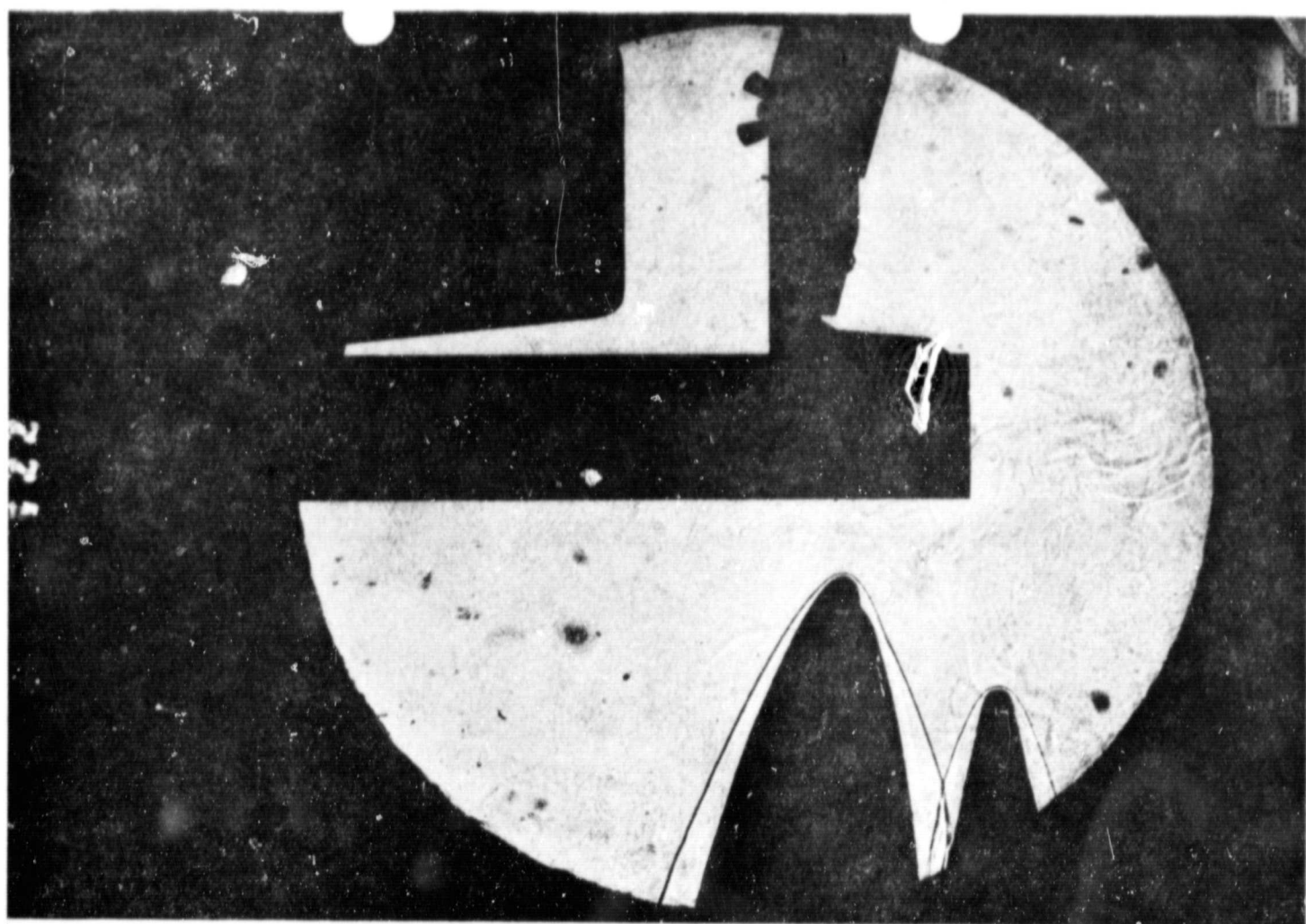
GROUP	CONFIG	MODEL	MACH NO	PO PSIA	TU DEG R	ALPHA-MODEL	ALPHA-SECTOR	ALPHA-PREBEND	ROLL-MODEL	YAW
220	3222	WVAC-R+DQC	8.00	549.5	1308	5.01	5.01	0	0	0
	T-INF	P-INF	Q-INF	V-INF	RHO-INF	MU-INF	REF/FT	HREF	SIDEF	
	(OEG R)	(PSIA)	(PSIA)	(FT/SEC)	(SLUGS/FT ³)	(LB-SEC/FT ²)	(FT-1)	(R= .01FT)	(R= .01FT)	
	94.8	.056	2.522	3817	4.980E-05	7.634E-08	2.49E 06	4.978E-02	3.268E-02	

OIL FLOW

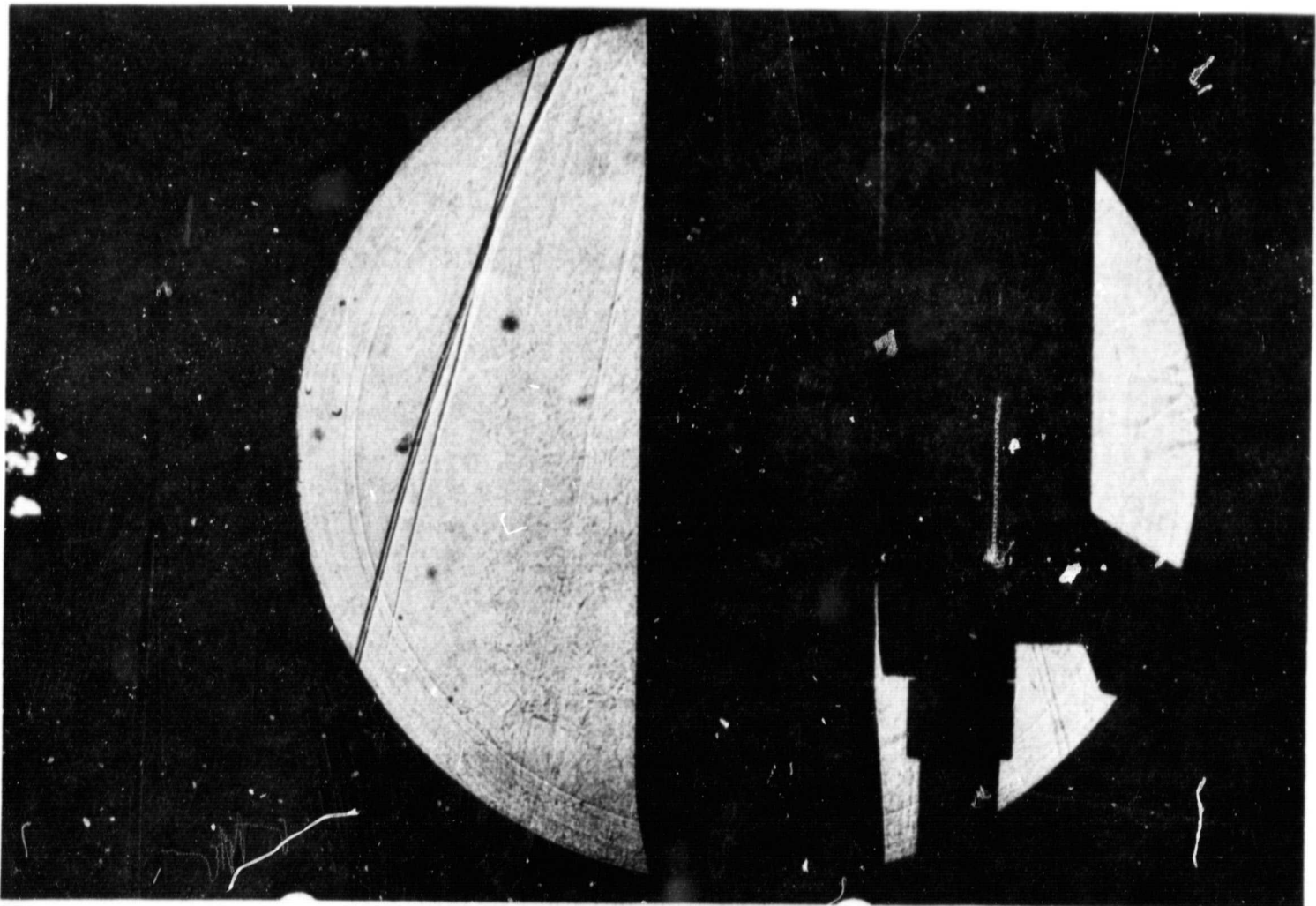
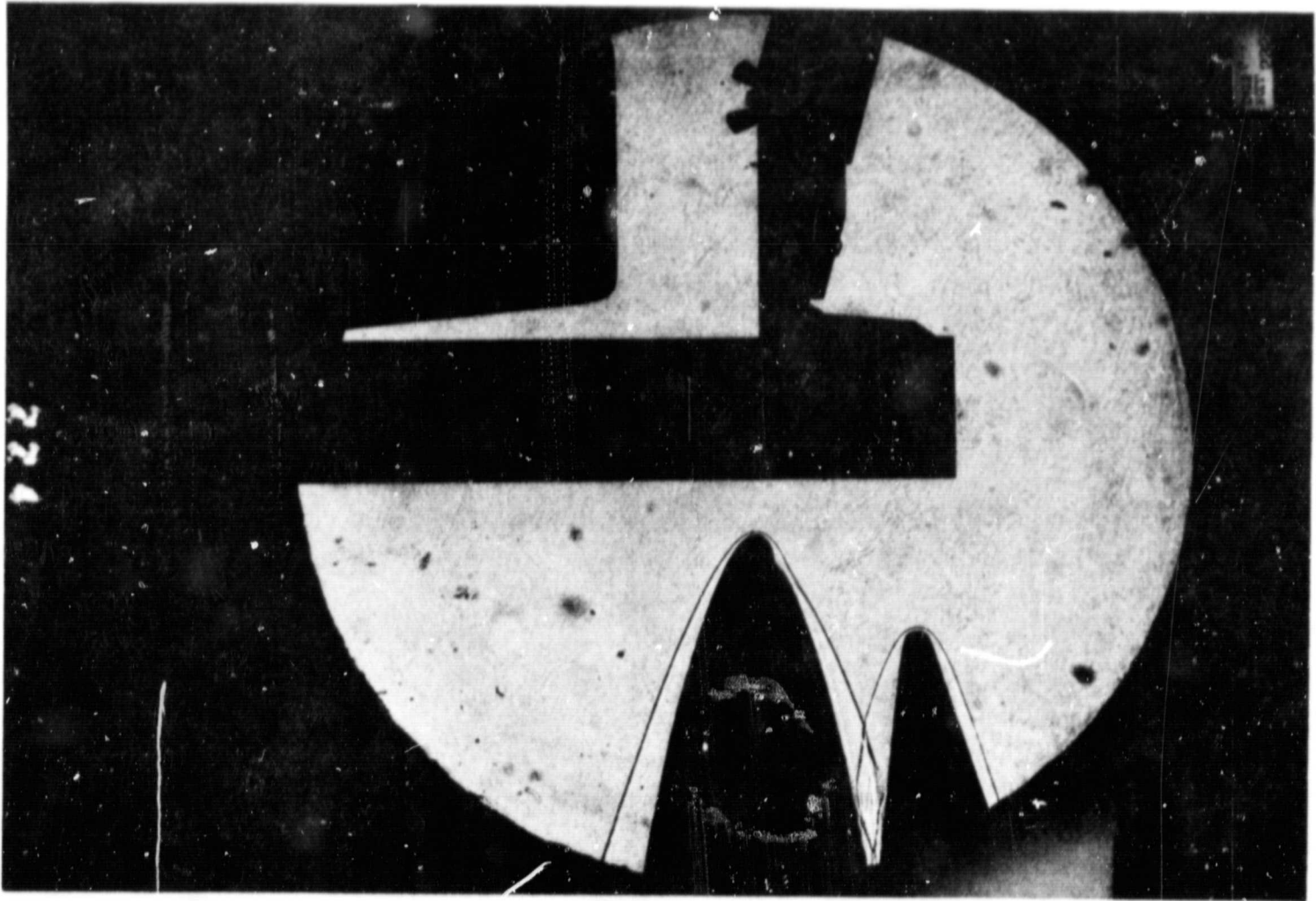
104



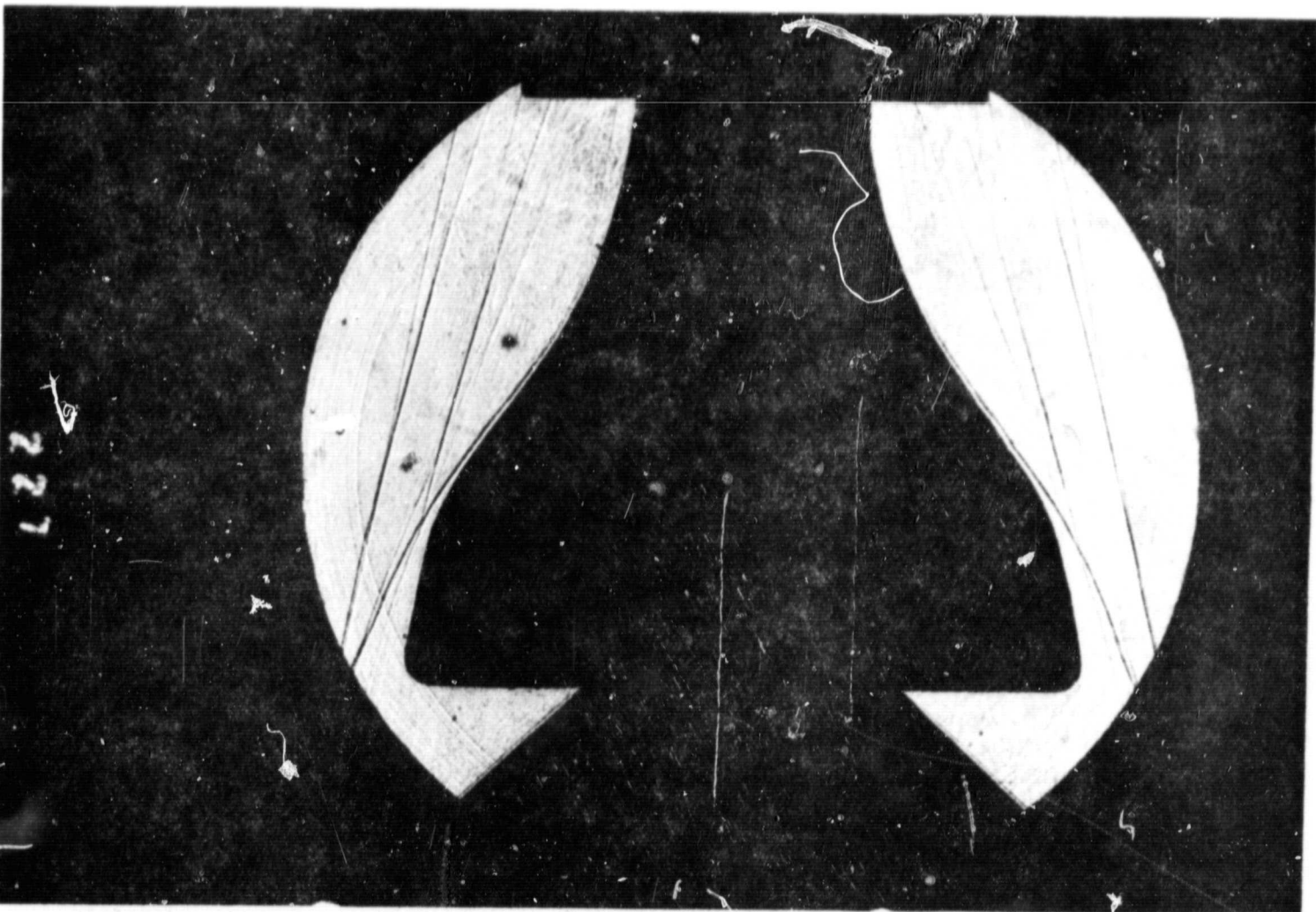
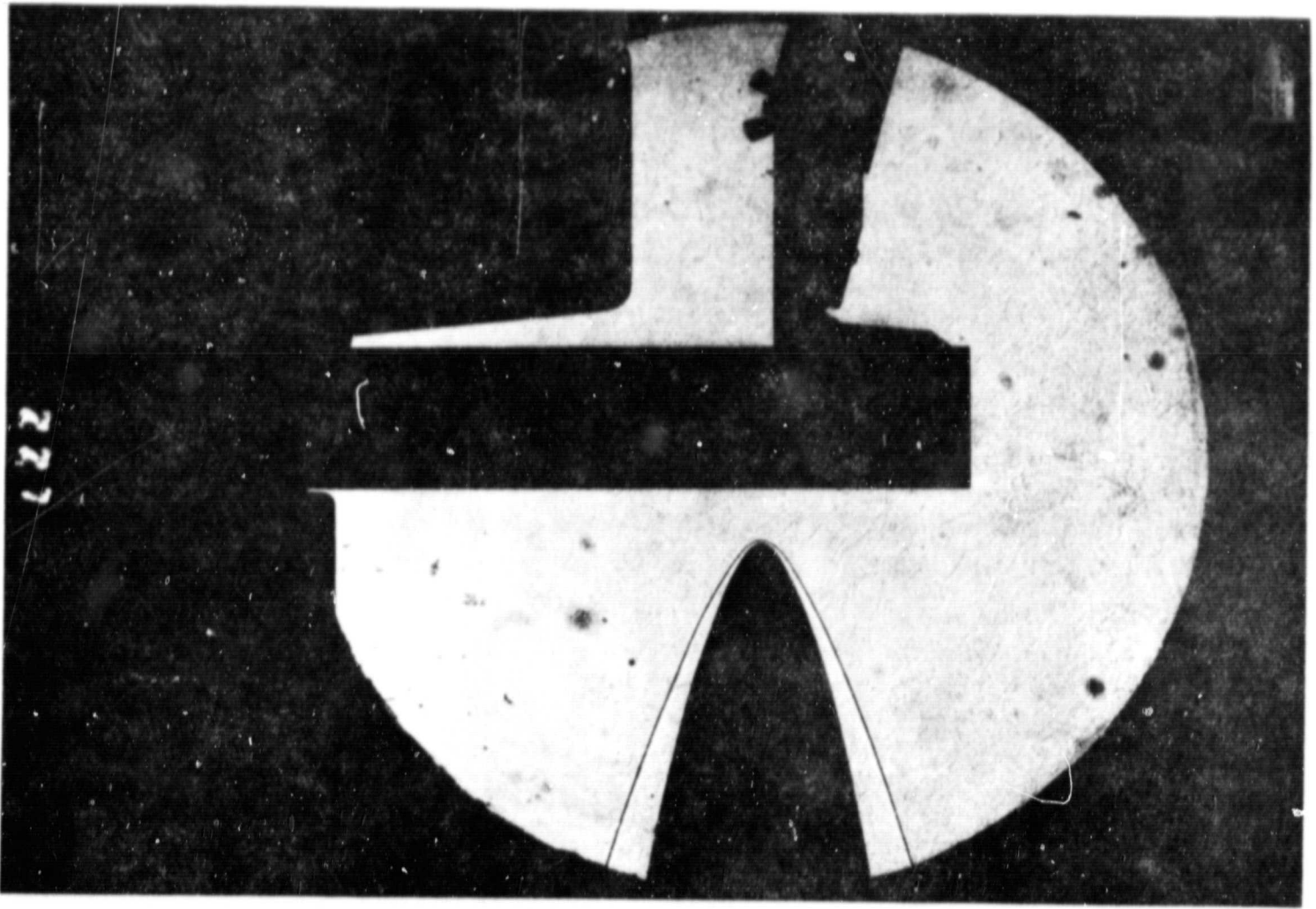




Shadowgraph Photograph at $\alpha = +5$, $\phi = 0$, $Re/ft = 2.5 \times 10^6$

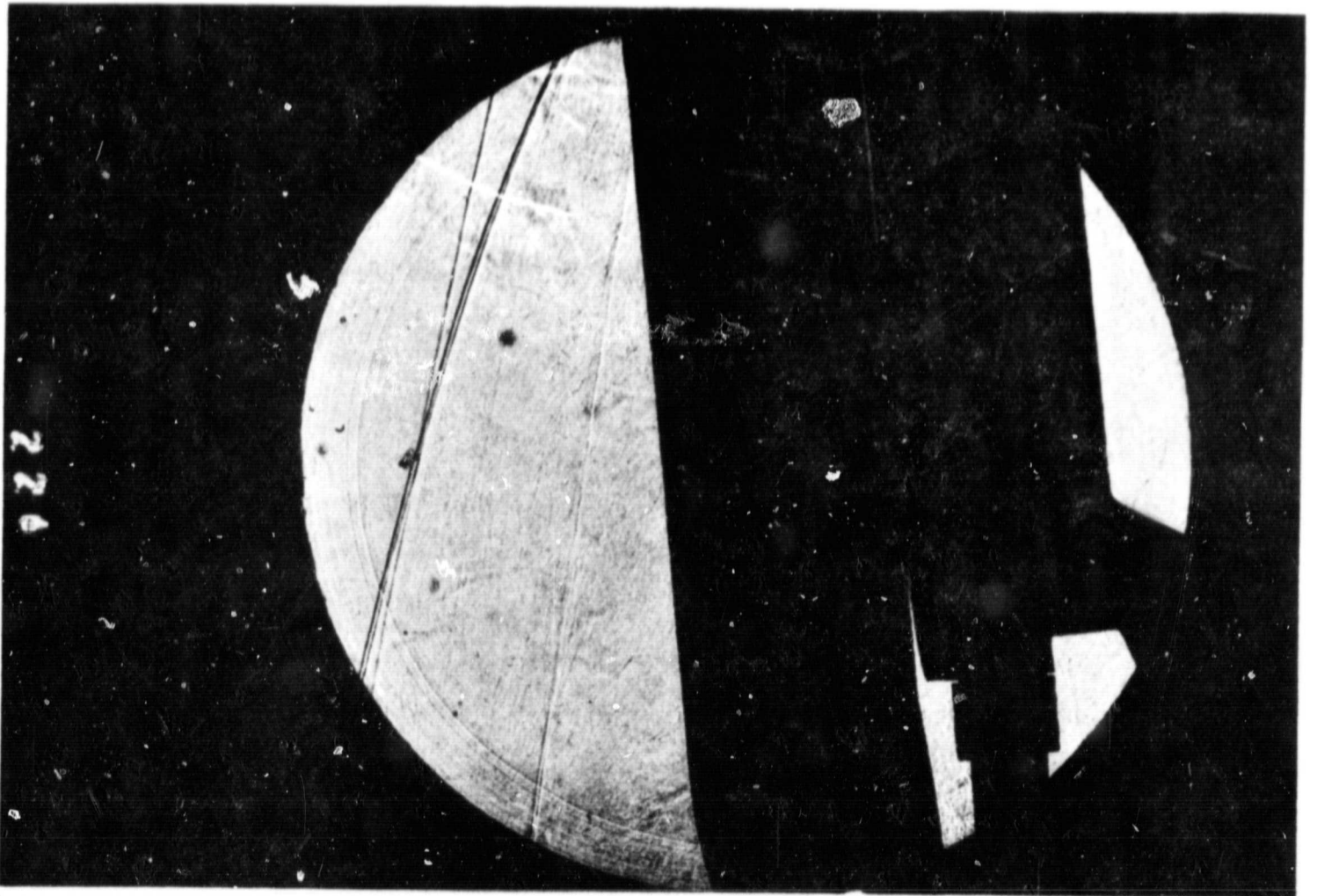
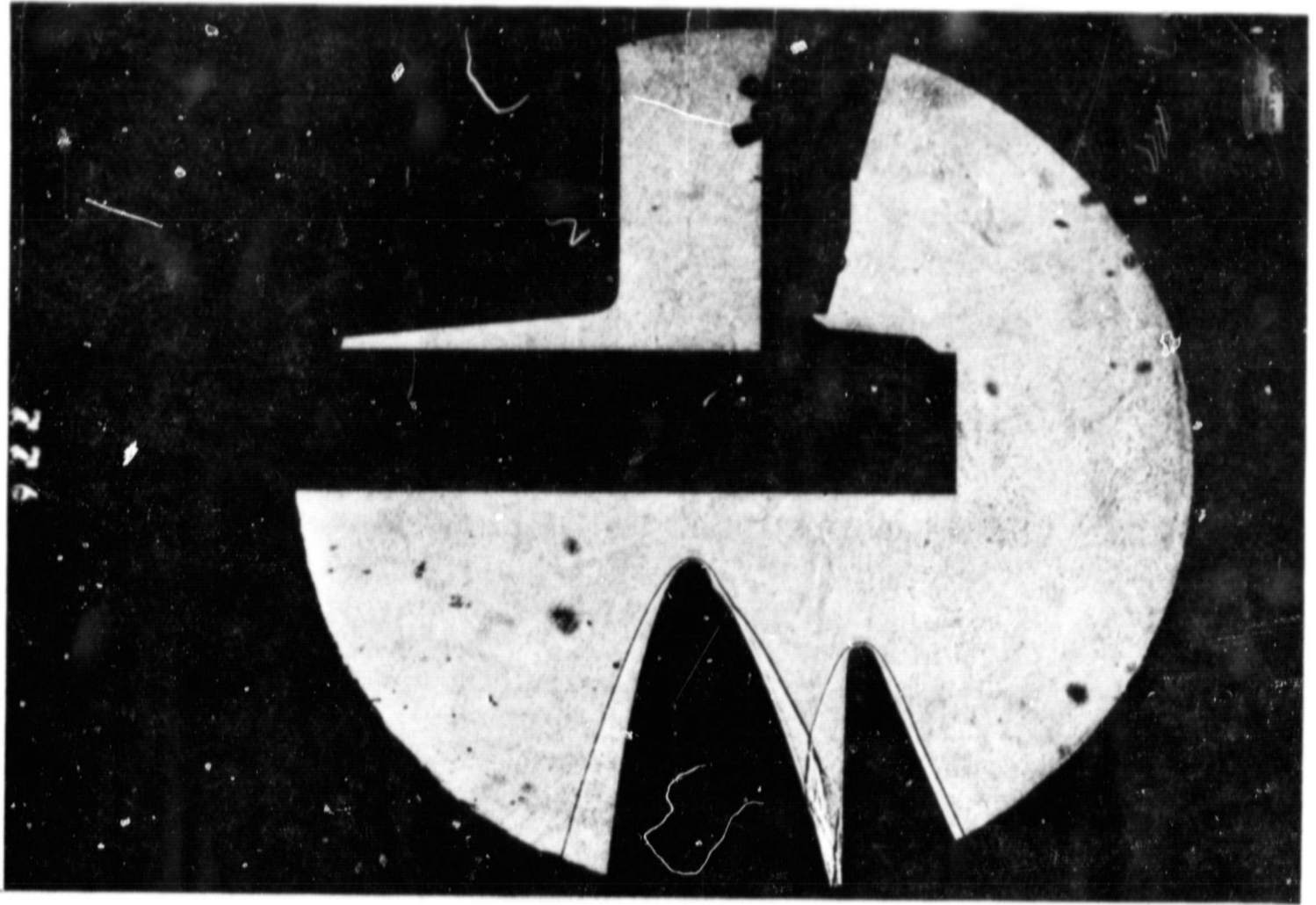


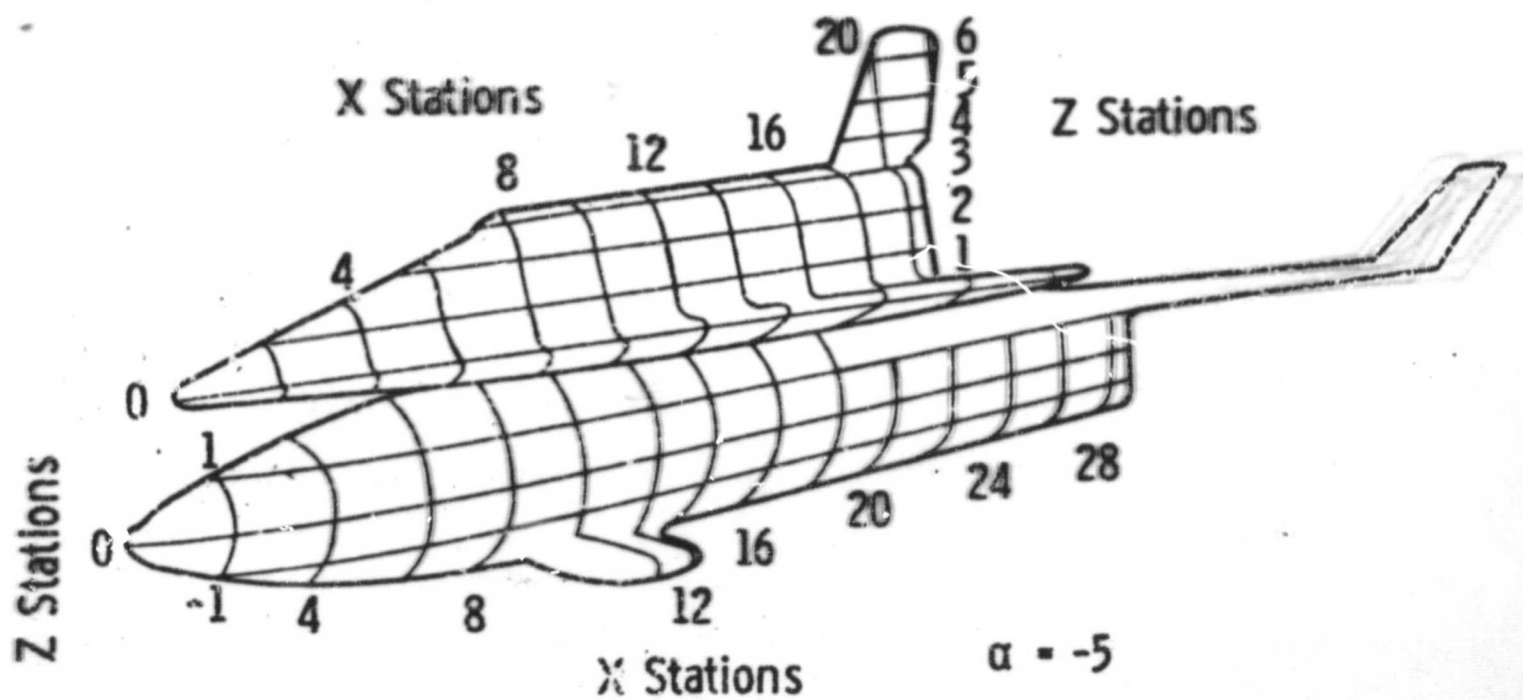
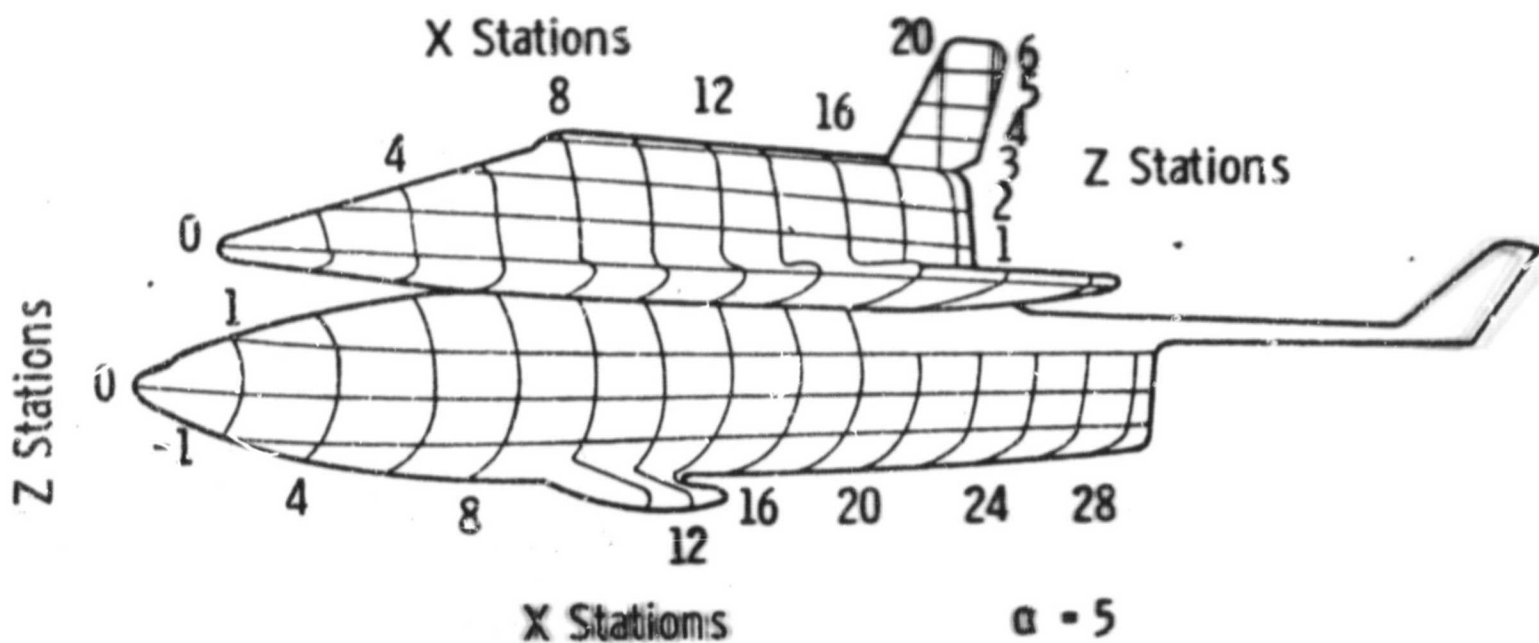
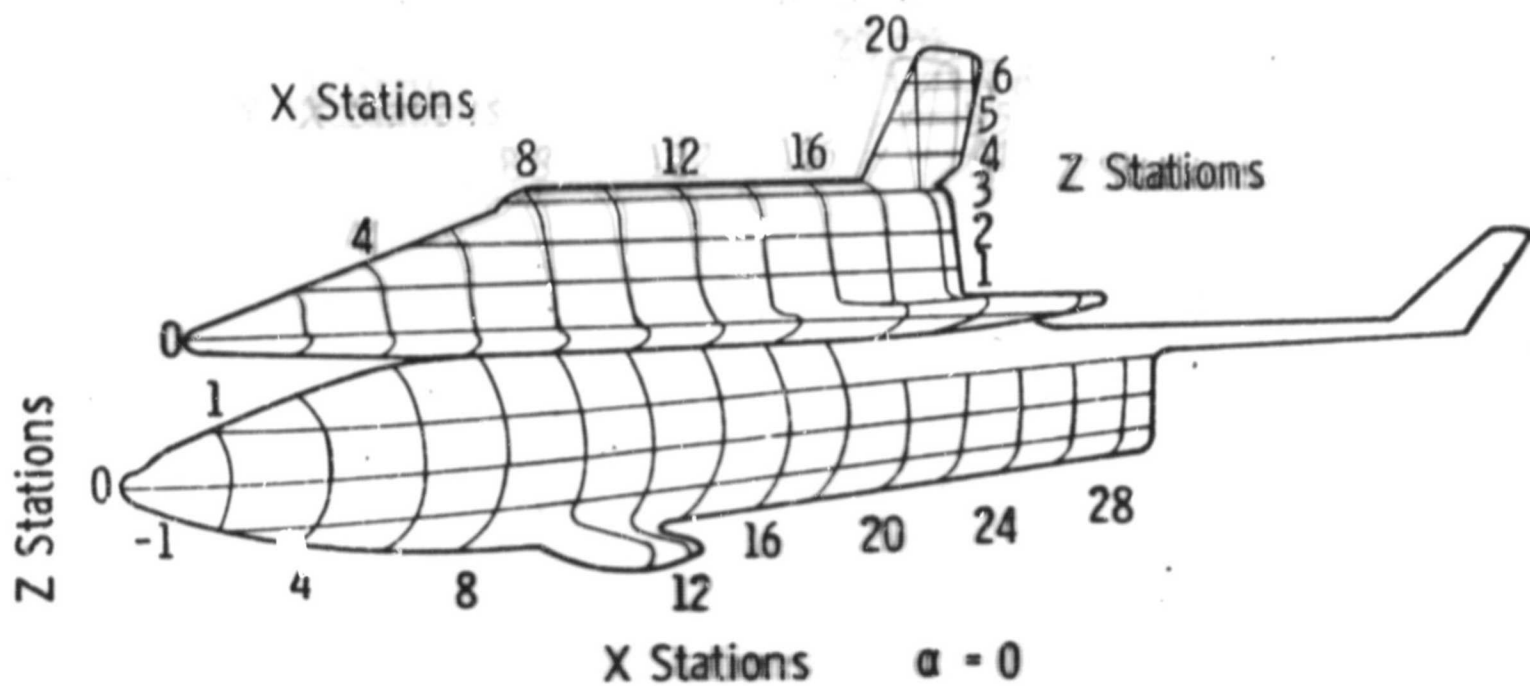
Shadowgraph Photograph at $\alpha = 0$, $\phi = 0$, $\text{Re}/\text{ft} = 2.5 \times 10^6$



Shadowgraph Photograph at $\alpha = 0$, $\phi = 90$, $Re/ft = 2.5 \times 10^6$

Shadowgraph Photograph at $\alpha = -5$, $\phi = 0$, $Re/rt = 2.5 \times 10^6$





Grid Overlay for Mated Configurations