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DATA REPORT FOR LANGLEY UNITARY PLAN WIND TUNNEL TESTS (PROJECT 349) OF APOLLO MODEL (FD-2) NAS 9-150

(U)

28 May 1962

CLASSIFICATION CHANGE
To UNCLASSIFIED
By authority of GDS-E0 11652 Date 12/31/72
Changed by L. Shirley
Classified Document Master Control Station, NASA
Scientific and Technical Information Facility

Approved by

D. J. Gildea - Manager
Flight Technology

[redacted]

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NORTH AMERICAN AVIATION, INC.
SPACE and INFORMATION SYSTEMS DIVISION

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FOREWORD

The tests described herein were conducted under NASA Apollo contract NAS 9-150, during the period from March 15 to March 19, 1962.

This report was prepared by C. L. Berthold of the Wind Tunnel Projects Group, Los Angeles Division of North American Aviation, Inc.

E. C. Allen - Supervisor
Wind Tunnel Test, S.I.D.

J. Van Camp - Supervisor
Wind Tunnel Projects, L.A.D.

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ABSTRACT

This report presents dynamic stability data from tests of command module configurations of a 0.055-scale Apollo model (FD-2) in the high Mach number test section of the Langley Unitary Plan Wind Tunnel. Tests were conducted from 2.4 to 4.65 Mach number and at angles of attack near proposed flight attitudes.

The dynamic stability parameters are presented as standard NASA coefficients in both tabular and plotted form for all configurations tested. In addition, tunnel operating conditions, configuration description, computation equations, tabular data identifying key and typical schlieren photographs are included.

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I. INTRODUCTION

Dynamic stability tests were conducted on 0.055-scale Apollo (FD-2) models in the high speed test section of the 4 ft. x 4 ft. Langley Unitary Plan Wind Tunnel from March 15, 1962 to March 19, 1962. Dynamic stability parameters were obtained for command module entry and launch escape configurations with oscillation in pitch and for the entry configuration only with oscillation in yaw.

The tests were conducted at 2.40, 2.98, 3.96 and 4.65 Mach number for each configuration at angles of attack near proposed flight attitudes. Runs were made to investigate the effect of Reynolds number at several different Mach numbers on, primarily, the entry configuration. Reynolds numbers, based on the maximum model diameter, varied from 1.05×10^6 to 3.39×10^6. All dynamic stability derivatives were measured during forced oscillation of the model in pitch or yaw over an amplitude of approximately ±2° about the oscillation center.

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II. REMARKS

Several techniques are currently available for measuring dynamic stability derivatives of models in wind tunnels. This test was performed utilizing what has been termed the inexorable method in which the model is mechanically forced to oscillate in a single degree of freedom at known angular frequency and amplitude while measurements are made of the moment required to sustain the motion.

The support and attached model were forced to perform a constant-amplitude, essentially sinusoidal motion about the oscillation axis by a mechanical scotch yoke and crank arrangement. The crank was connected by a driveshaft to an electric motor mounted in the downstream end of the sting and the drive motor speed was set at various constant values to provide a range of oscillating frequencies. (For maximum accuracy, most test points were recorded at or near the natural frequency of the oscillating model system).

Springs of different stiffness were provided to cover a range of resonant frequencies within the range of operating frequencies. These springs were equipped with calibrated strain gages to provide a signal proportional to the displacement.

A stiff strain gage beam, located between the model mounting point and the pivot axis, gave a signal proportional to the moment applied to oscillate the model. It was located so as to be uninfluenced by any friction or mechanical play in the system.

The model was rigidly forced to oscillate with an amplitude of approximately ±2° at known angular frequency and the pivot axis could be rotated 90°, therefore, tests could be made with the model oscillating in pitch or yaw.

By resolving the moment and amplitude functions into orthogonal components the resultant applied moment and displacement and the phase angle between them may be found. With the known oscillation frequency, the aerodynamic-damping and oscillatory-stability moments can be computed.

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II. REMARKS - continued

The tabular and plotted data are presented in Appendices A and B in NASA standard coefficient form referred to the body system of axes originating at the oscillation center. Dynamic stability parameters are utilized to indicate aerodynamic damping-in-pitch $(C_{m_q} + C_{m_{\dot{\alpha}}})$, oscillatory longitudinal stability $(C_{m_\alpha} - \kappa^2 C_{m_{\dot{q}}})$, and the reduced frequency parameter $(\frac{\omega \ell}{V})$ for tests with oscillations in pitch for the entry, launch escape (2 config.), and command module exit configurations. In addition, coefficients are given for aerodynamic damping-in-yaw $(C_{n_r} - C_{n_{\dot{\beta}}} \cos \alpha)$, oscillatory directional stability $(C_{n_\beta} \cos \alpha + \kappa^2 C_{n_{\dot{r}}})$ and the reduced frequency parameter $(\frac{\omega \ell}{V})$ for the entry configuration only, with oscillations in yaw. The plotted data presents these parameters as a function of angle of attack.

Each configuration was tested at Mach numbers of 2.40, 2.98, 3.96 and 4.65 at angles of attack near the proposed flight attitudes. The nominal angles of attack ranges were: Command Module (entry) 134° to 158°, Command Module (exit) -16° to +8°, Launch Escape Configuration +8° to -8°. The majority of data was recorded at nominal 2° increments of set angle of attack throughout these ranges while the model was being rigidly forced to oscillate ±2° in pitch about the set angle. In addition the model was forced to oscillate in yaw (±2°) during one Mach number series for the entry configuration. Smaller increments of set angle of attack were used in areas where large changes in stability parameters were observed.

The launch escape system was tested with two rocket motor configurations (toroid tanks on and off) throughout the standard Mach No. range. A limited Reynolds No. investigation was conducted on the command module in entry attitude and with the launch escape system although power limitations, imposed by a defective compressor coupling, prevented attainment of a wider range of values.

Erroneous data, due to interference from shock wave reflection on the model from the tunnel walls, have been deleted from the tabulated sheets and eliminated from the plots.

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[redacted]

III. MODEL DESCRIPTION

A. General

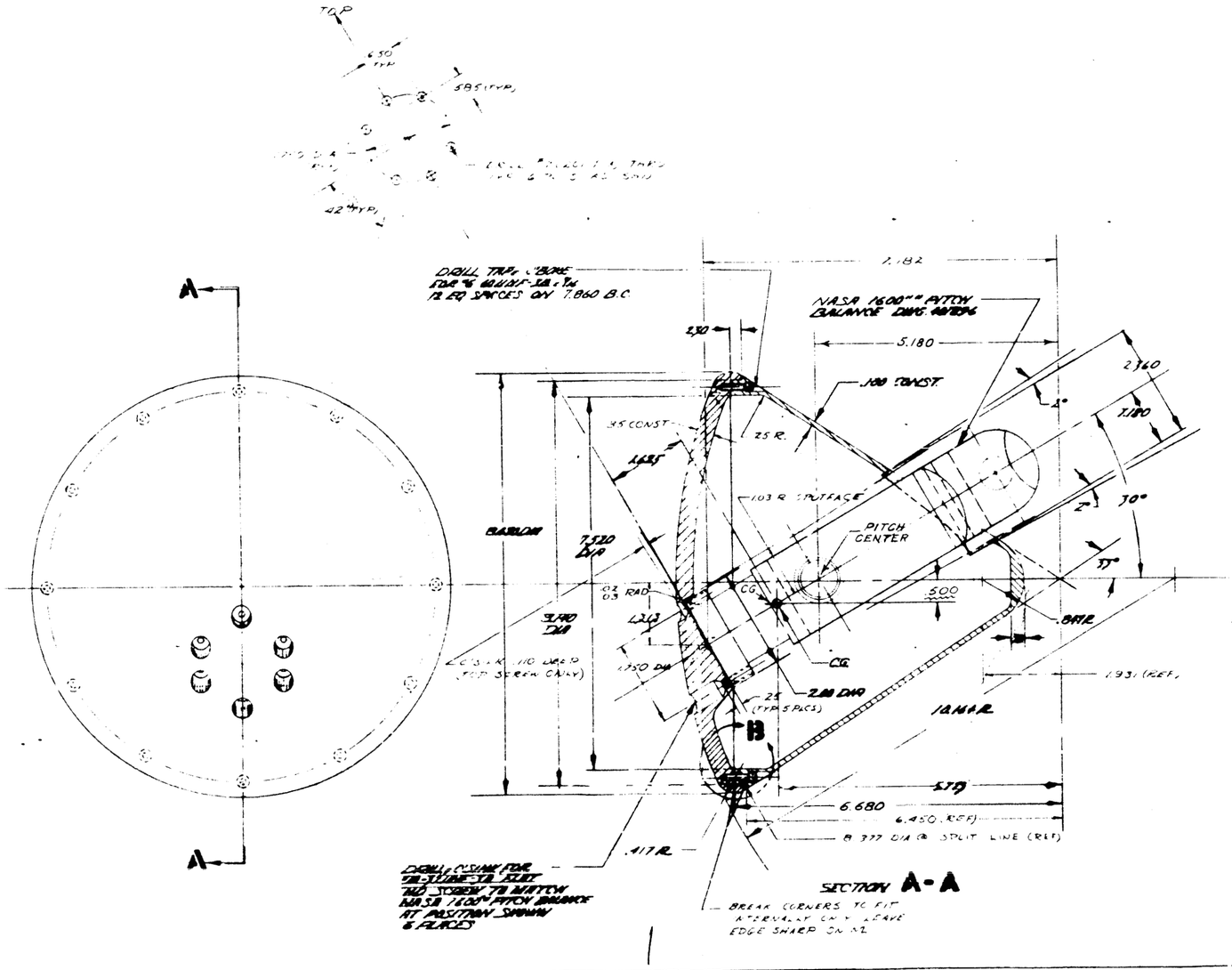
The FD-2 Dynamic Stability Model tested in the high speed test section of the Langley Unitary Plan Wind Tunnel from March 15 to March 19, 1962 was a 0.055-scale representation of the current Apollo command module and launch escape system configurations.

The configurations tested were aerodynamically smooth for all test conditions. Lightweight materials were utilized in construction of the model, to reduce moment-of-inertia effects, whenever consistent with the structural integrity as established in Reference (a). The command modules were constructed of aluminum alloy (7075-T6), escape tower of Armco steel (17-4 PH SST) and escape rocket of magnesium (QQ-M-31).

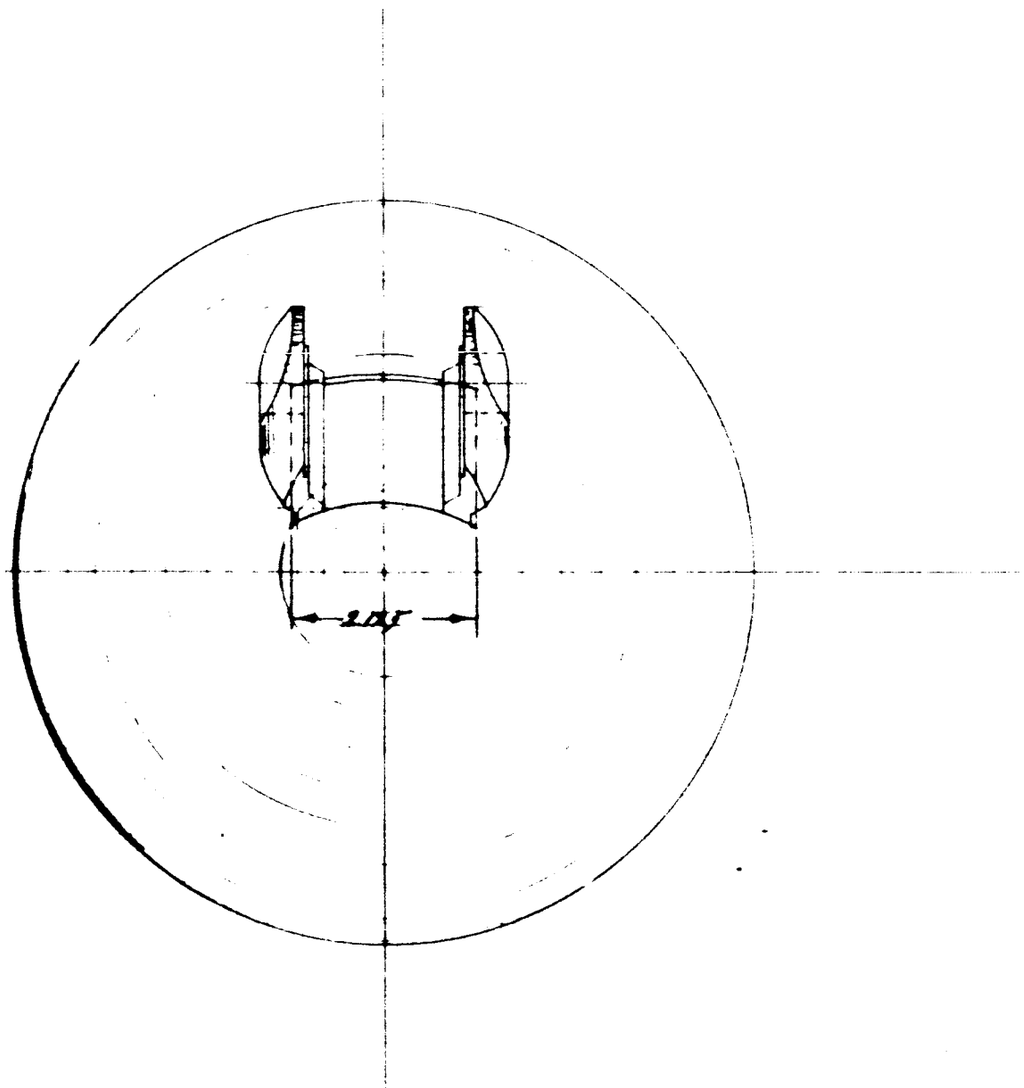
The oscillation axis was located as close as possible to the center of gravity of the full scale Apollo vehicle within the physical limits imposed by the model size, chosen to avoid reflected shock waves, and the balance dimensions.

The models were sting mounted with the balance contained within the model to minimize support interference. To allow pitching through angles of attack near the proposed flight attitudes, the models were constructed so that the module axis of symmetry and balance center line formed an angle of 30° for the entry configuration and 8° for the launch escape system.

[redacted]


TOP
.650 TYP
.585 (TYP)
.42 (TYP)
DRILL TAP & C'BORE
12 EQ SPACES ON 7.860 B.C.
7.182
NASA 1600"" PITCH
BALANCE DWG.
5.180
.100 CONST.
2.360
7.180
.35 CONST
.25 R.
1.625
1.03 R SPOTFACE
PITCH CENTER
30°
7.520 DIA
.02 .03 RAD
CG
.500
.847 R
1.750 DIA
2.00 DIA
(TYP 5 PLCS)
1.931 (REF)
10.164 R
6.680
6.450 (REF)
8.377 DIA @ SPLIT LINE (REF)
.417 R
A
A
B
SECTION A-A
BREAK CORNERS TO FIT
EDGE SHARP ON M

[redacted]



2 MAT'L 7075-T6 ALUM
1 MODEL FACTOR: .055
NOTES UNLESS OTHERWISE SPECIFIED

2

REL No 2
DATE 7 3 62
JOB No 242 5 8

[redacted]

REQD	REQD	PART NO	DESC	MATERIAL	SIZE	ZONE	MATL SPEC	QTY PER END ITEM	USED ON	NEXT ASSY
				LIST OF MATERIAL					APPLICATION	

DRILLED HOLE TOLERANCES

.040	TO	1.286 + .002 - .001	
.136	TO	.238 + .003 - .001	
.234	TO	1.2 + .004 - .001	
.33-.64	TO	3.4 + .005 - .001	
.49-.64	TO	1 + .007 - .001	
1 1/64	TO	2 + .010 - .001	

TOLERANCES EXCEPT AS NOTED
ANGLES ±1/2°
DECIMALS XX = ±.08 XXX = ±.010
√ SURFACE ROUGHNESS PER MIL-STD-10
HEAT TREAT
FINISH

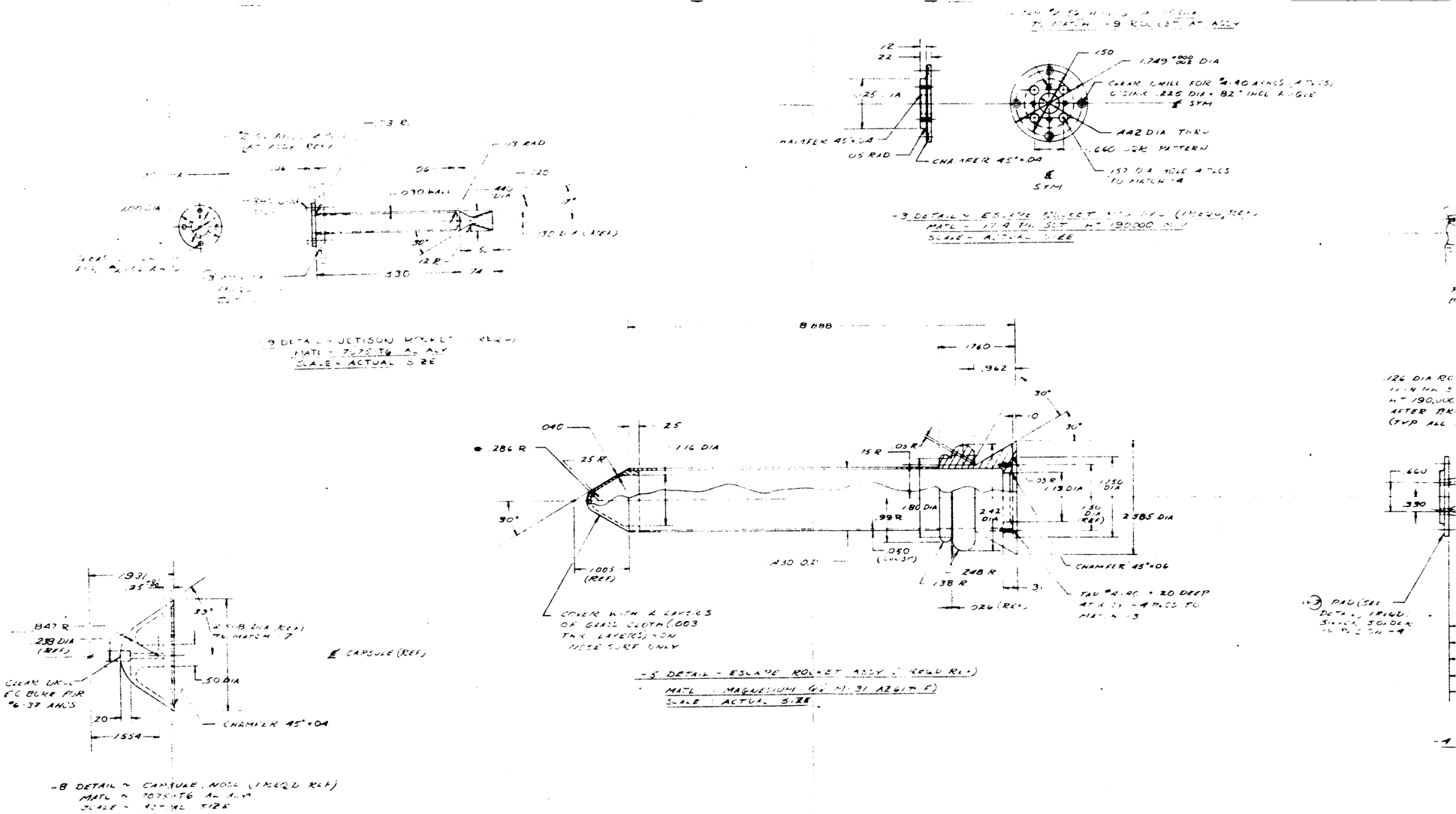
DATE	
DR BY	PRYOR
CHK BY	
APPD BY	
APPD BY	

MODEL ASSY-APOLLO
FD-2 RE-ENTRY CONFIG
(LANGLEY U.P.W.T.)

SCALE FULL
WT

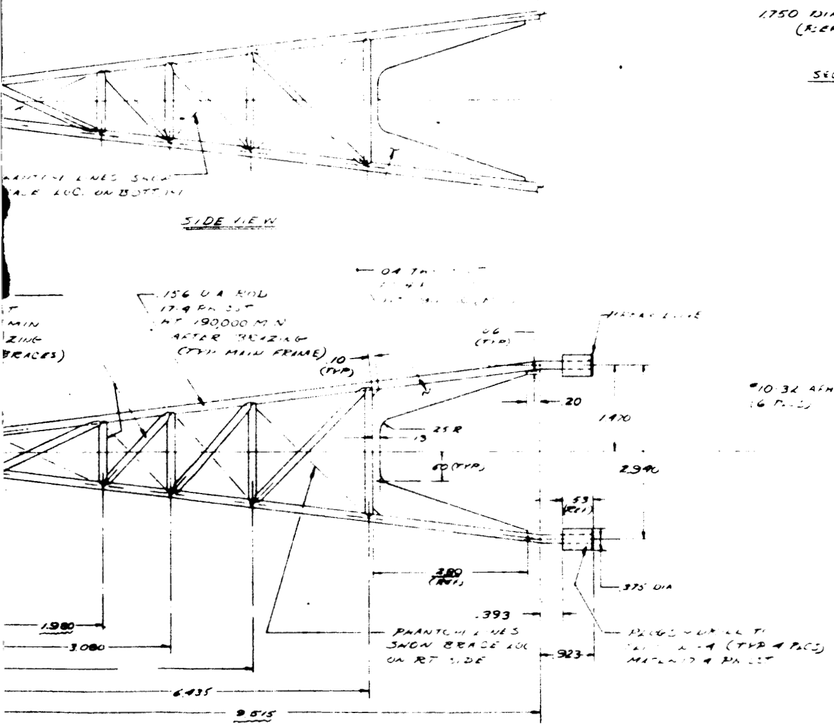
NORTH AMERICAN AVIATION INC
SPACE and INFORMATION SYSTEMS DIVISION
1001 LAKEWOOD BLVD DOWNEY CALIFORNIA

DWG SIZE
7121-01059

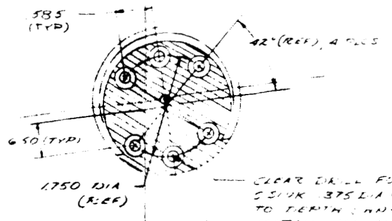


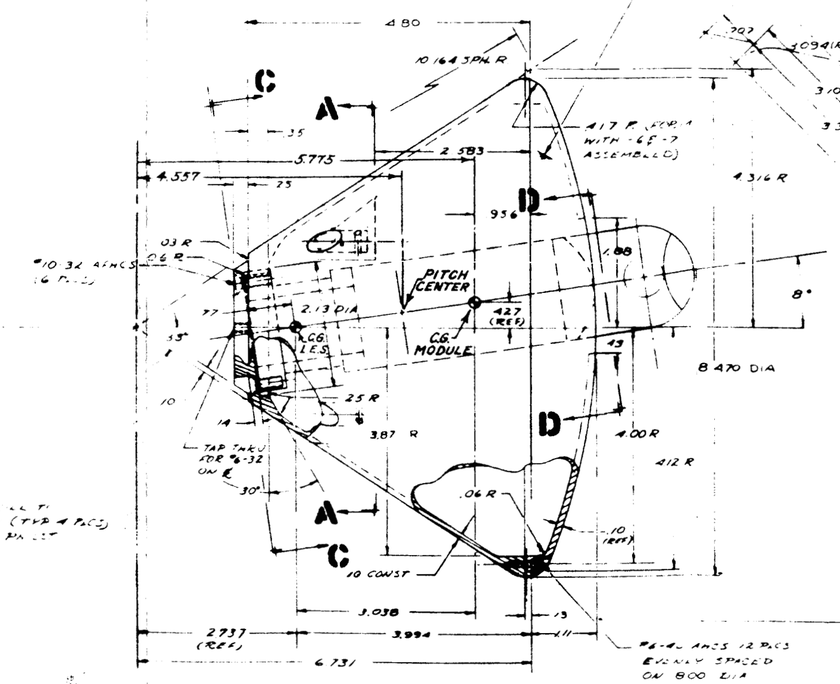
-3 DETAIL ~ ESCAPE ROCKET ASSY (1 REQD REF)
MATL ~ 17-4 PH SST HT 190,000 MIN
SCALE ~ ACTUAL SIZE
-9 DETAIL ~ JETISON ROCKET (1 REQD)
MATL ~ 7075-T6 AL ALY
SCALE ~ ACTUAL SIZE
-5 DETAIL ~ ESCAPE ROCKET ASSY (1 REQD REF)
MATL ~ MAGNESIUM (QQ M-31 AZ61A-F)
SCALE ~ ACTUAL SIZE
-8 DETAIL ~ CAPSULE, NOSE (1 REQD REF)
MATL ~ 7075-T6 AL ALY
SCALE ~ ACTUAL SIZE
CAPSULE (REF)
CHAMFER 45° x .04
CHAMFER 45° x .06
COVER WITH 2 LAYERS OF GLASS CLOTH (.003 THK LAYERS) ON NOSE SURF ONLY

[redacted]

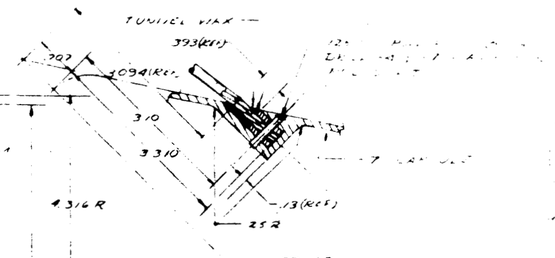


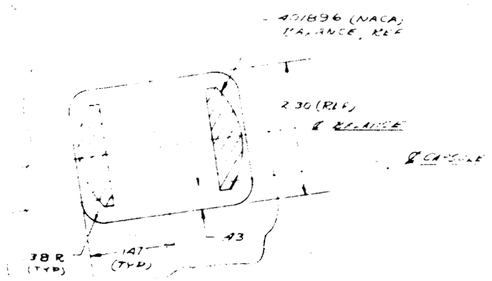
DETAIL - ESCAPE TOWER ASSY (1 REQD)
MATL AS NOTED - SILVER SOLDER ALL JOINTS
SCALE APPROX ACTUAL SIZE



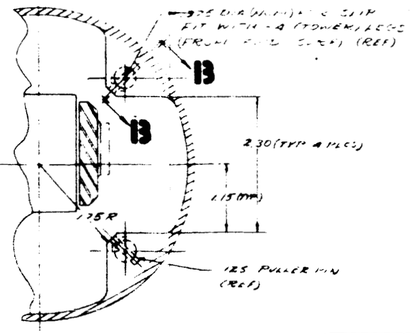


-7 DETAIL - CAPSULE SUB-ASSY 1 REQD
MATL - 7075-T6 AL ALY
SCALE - ACTUAL SIZE





DIMEN IN THIS VIEW ARE TO NOT ON CURVED SURF



[redacted]

REL 3	ADDED -8 (NOSE)		
REL 2	REDRAWN & REVISED		
REL # 2	DRN BY	1 FEB 62	MODEL ASSY - APOLLO FD-2, LAUNCH ESCAPE DEVICE (LANGLEY UPWT)
DATE 2-14-62	DR BY	T.G. ANDER	
JOB # 242-518	CHK BY		
	APPD BY		
	APPD BY		
	Model Fig. 055		

NORTH AMERICAN AVIATION, INC. SPACE AND INFORMATION SYSTEMS DIVISION 12214 LAKEWOOD BLVD. DOWNEY, CALIFORNIA

SCALE ALL # APPROX | WT | DWG SIZE B | 7121-01058

7121-01058

7121-01058

Dwg No
7121-01058
2-12-62 4:30

2

[redacted]

III. MODEL DESCRIPTION - continued

B. Nomenclature

	Dimensions Full Scale
E, Escape Rocket Motor (7121-01058-5)	
Total Length (including jettison motor)	248.40 in.
Diameter of Escape Rocket	26.00 in.
Diameter of Escape Rocket Base	47.00 in.
Skirt Flare Angle	30.00°
Nose Radius	5.20 in.
Toroid Tanks-located fwd. of flared skirt	
Diameter of Section of Fwd. Tank	5.02 in.
Diameter of Section of Aft Tank	9.02 in.
Jettison Motor-located aft of rocket motor	
Length of Jettison Motor	69.50 in.
Diameter of Jettison Motor	8.00 in.
Jettison Motor-nozzle exit half angle	17.00°
E4, Same as "E" except no toroid tanks	
T12, Escape Tower Structure (7121-01058-4)	
Total Length	175.00 in.
Number of Longitudinal Members	4
Diameter of Longitudinal Members	2.84 in.
Diameter of Cross Braces	2.29 in.
Distance Between Attachment Points	53.45 in.
C, Command Module (7121-01059)	
Maximum Diameter	154.00 in.
Radius of Spherical Blunt End	184.80 in.
Corner Radius	7.58 in.
Nose Cone Semi-angle	33.00°
Nose Cone Vertex Radius	15.40 in.

[redacted]

[redacted]

IV. TEST PROCEDURE

A. Test Nomenclature

A maximum cross-sectional area, sq. ft., $\frac{\pi \ell^2}{4}$

ℓ maximum body diameter, ft.

q_∞ free stream dynamic pressure, lb/sq. ft.

α angle of attack of model center line, deg. or radians

$\dot{\alpha}$ rate of change of angle of attack, radians/sec.

V free stream velocity, ft/sec.

ω angular frequency of oscillation, radians/sec.

K reduced frequency parameter, $\frac{\omega \ell}{V}$

R Reynolds number based on ℓ

q angular velocity in pitch, radians/sec.

$\dot{q}$ rate of change of pitching angular velocity, radians/sec.

r angular velocity in yaw, radians/sec.

$\dot{r}$ rate of change of yawing angular velocity, radians/sec.

β angle of sideslip of model center line, radians

$\dot{\beta}$ rate of change of angle of sideslip, radians/sec.

C_m pitching-moment coefficient, $\frac{\text{Pitching Moment}}{q_\infty A \ell}$

C_n yawing-moment, coefficient, $\frac{\text{Yawing Moment}}{q_\infty A \ell}$

I moment of inertia, slug-ft^2

Note: A dot above a symbol represents the derivative with respect to time

[redacted]

[redacted]

IV. TEST PROCEDURE - continued

A. Test Nomenclature - continued

The data presented are referred to the body system of axes and all moments are referred to the intersection of the oscillation axes. Additional coefficients and symbols used in the equations for data reduction are defined as follows:

C system damping moment, in-lb/radian

K system spring constant, in-lb/radian

$C_{aero} = C_{run} - C_{tare}$ where C_{tare} = constant

$(K-I\omega^2)_{aero} = (K-I\omega^2)_{run} - (K-I\omega^2)_{tare}$

For data of type 2 (oscillation in pitch, wingless bodies)

$$C_{m_q} + C_{m_{\dot{\alpha}}} = - \frac{VC_{aero}}{12\, q_\infty A\ell^2}$$

$\ell = 0.7058$ ft.

$$C_{m_\alpha} - \kappa^2 C_{m_{\dot{q}}} = - \frac{(K-I\omega^2)_{aero}}{12\, q_\infty A\ell}$$

$A = 0.3912$ ft.^{2}

$$\kappa = \frac{\omega\ell}{V}$$

For data of type 4 (oscillation in yaw, wingless bodies)

$$C_{n_r} - C_{n_{\dot{\beta}}} \cos \quad = - \frac{VC_{aero}}{12 q_\infty A\ell^2}$$

$$C_{n_\beta} \cos\alpha + \kappa^2 C_{n_{\dot{r}}} = + \frac{(K-I\omega^2)_{aero}}{12 q_\infty A\ell}$$

$$\kappa = \frac{\omega\ell}{V}$$

[redacted]

[redacted]

IV. TEST PROCEDURE - continued

A. Test Nomenclature - continued

$q_\infty = 0.7\, p M^2$

$p = \dfrac{\text{Stagnation pressure}}{(1 + .2M^2)^{3.5}}$

$V = \dfrac{(49.0236)\sqrt{T_t}\; M}{(1 + .2M^2)^{1/2}}$ (where T_t is tunnel total temperature in °R)

Reynolds number $= 2\ell\, q_\infty / \mu V$ (where μ = viscosity, $\frac{\text{lb-sec.}}{\text{ft}^2}$,

[redacted]

[redacted]

IV. TEST PROCEDURE - continued

B. Model Installation

The FD-2 model was installed on the NASA 1600 in-lb. dynamic pitch balance (Dwg. 401896) which was mounted on a straight sting containing the oscillating mechanism. The drive motor, clutch resolvers, and frequency generator were all contained in the downstream end of the sting which was stiffened to provide a resonant frequency above the maximum oscillating frequency of the model. The oscillating mechanism was designed to provide maximum stiffness of all drive linkages so that the model responded only to the essentially sinusoidal forcing input of the crank and Scotch yoke.

The models were mounted so that the sting center line and command module axis of symmetry formed an angle of 30° for the entry configuration and 8° for the launch escape configuration to allow testing through angles of attack of 134° to 158° and -16 to +8° respectively. The Unitary tunnels basic sting-type support system, which is mounted on a horizontal support strut extending from wall to wall, allowed the model to be traversed across the tunnel to minimize interference from reflected shock waves on the model at higher angles of attack.

C. Instrumentation

The NASA 1600 in.-lb. dynamic pitch balance was used to measure the moment and displacement functions as the model was mechanically forced to oscillate in a single degree of freedom.

In operation of the system, calibrated outputs of the moment and displacement strain gages are passed through coupled electrical sine-cosine resolvers which rotate at the frequency of oscillation. The resolvers transformed the outputs into orthogonal components from which the resultant applied moment and displacement and the phase angle between them were found. With the known oscillation frequency, the aerodynamic-damping and oscillatory stability moments were then computed.

All data were computed on a remotely located IBM 7090 computer.

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[redacted]

IV. TEST PROCEDURE

D. Data Reduction Constants

All data were reduced and presented in standard NASA coefficient form referred to the body system of axes originating at the oscillation center.

Reference area = A = 0.3912 ft.^{2}

Reference length = ℓ = 0.7058 ft. (Diam.)

[redacted]

[redacted]

V. REFERENCES

(a) SID-62-103, "Structural Analysis of the .055-scale Apollo Wind Tunnel Models", 16 February 1962.

(b) NACA RM L58A28 "Dynamic Directional Stability Derivatives for a 45° Swept-Wing-Vertical-Tail Airplane Model at Transonic Speeds and Angles of Attack, with a Description of the Mechanism and Instrumentation Employed" by Albert L. Braslow, Harleth G. Wiley and Cullen Q. Lee, April 21, 1958.

(c) NASA TM X-39 "Dynamic-Longitudinal and Directional Stability Derivatives for a 45° Sweptback-Wing Airplane Model at Transonic Speeds" by Ralph P. Bielat and Harleth G. Wiley, August 1959.

(d) NASA TM X-285 "Wind Tunnel Investigation at Low Subsonic Speeds of the Static and Oscillatory Stability Characteristics of Models of Several Space Capsule Configurations" by Joseph L. Johnson, Jr., May 1960.

[redacted]

[redacted]

APPENDIX "A"

[redacted]

[redacted]

A. TABULATED DATA FORMAT

Column Heading	Item	Definition or Remarks
PRJ	Project No.	From project No. 349 of LUPWT.
RUN	Run No.	Each Mach number considered separate run.
POINT	Point No.	Sequence in which data were taken.
CONF	Configuration No.	1. Command Module, entry (C) 3. Command Module, exit (C) 2. Launch Escape Config., toroid tanks on (ETC) 12. Launch Escape Config., toroid tanks off (E4TC)
T	Type of Data	2. Wingless body in pitch 4. Wingless body in yaw
B	Batch No.	This number designates a group of data which requires a given set of constants and tares in order to compute.
Q	Dynamic Pressure	Free-stream dynamic pressure lb/ft^2
V	Velocity	Free-stream velocity ft/sec
RN	Reynolds No.	Reynolds No. x 10^{-6} based on a reference length of 0.7058 ft. (This is the maximum diameter of the command module model)
TP	--	Corrected phase angle between driving torque and model displacement. Values near 90° and 270° indicate velocity resonance.
MACH	Mach No.	Free-stream Mach number

[redacted]

[redacted]

A. TABULATED DATA FORMAT - continued

Column Heading	Item	Definition or Remarks
AOS	Angle of Sideslip	Mean angle of sideslip, degrees.
AOA	Angle of Attack	Angle of attack of the sting mechanism, degrees.
FREQ	Frequency	Frequency of the forced oscillation cycles/sec.
K	Reduced Frequency Parameter	Reduced-frequency parameter.
CMQ	$C_{m_q} + C_{m_{\dot{\alpha}}}$	Damping-in-pitch parameter
CMA	$C_{m_\alpha} - k^2 C_{m_{\dot{q}}}$	Oscillatory longitudinal stability parameter
CNR	$C_{n_r} - C_{n_{\dot{\beta}}} \cos \alpha_o$	Damping-in-yaw parameter
CNB	$C_{n_\beta} \cos \alpha_o + k^2 C_{n_{\dot{r}}}$	Oscillatory directional stability parameter

Note: See Test Nomenclature for definition of stability parameters.

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[redacted]

B. RUN INDEX

Run No.	Configuration	Mach No.	Angle Range *	$RNx10^{-6}$	q_∞ PSF
1.	C - Entry (Command Module)	2.40	158° to 134°	1.58	498
2.	↓	3.96	158° to 134°	2.09	439
3.		4.65	158° to 134°	2.69	441
4.		2.98	158° to 134°	1.68	454
5.		3.96	158° to 134°	1.08	226
6.		4.65	158° to 135°	1.07	175
7.		4.65	158° to 134°	3.39	556
8.		2.40	158° to 134°	1.05	331
9.	$ET_{1/2}C$-Tanks On (Launch Escape Sys.)	2.40	-16° to +8°	1.58	497
10.	↓	2.98	-16° to +8°	1.67	452
11.		3.96	-16° to +8°	2.09	439
12.		4.65	-16° to +8°	2.69	441
13.	$E_4T_{1/2}C$- Tanks Off (Launch Escape Sys.)	2.40	-4° to +4°	1.58	498
14.	↓	2.98	-8° to +8°	1.67	452
15.		3.96	-8° to +8°	2.09	439
16.		4.65	-8° to +8°	2.69	441
17.		4.65	-8° to +8°	1.07	175
18.	C - Exit (Command Module)	2.40	-16° to +8°	1.58	498
19.	↓	2.98	-16° to +8°	1.67	452
20.		3.96	-16° to +8°	1.73	363
21.		4.65	-16° to +8°	2.29	375
22.	C - Entry (Command Module)	3.96	158° to 134°	2.09	439
23.	↓	4.65	158° to 134°	2.69	441
24.		2.98	158° to 134°	1.67	452
25.		2.40	158° to 134°	1.58	498

Note:
1. Runs 1-21 oscillated in pitch
2. Runs 22-25 oscillated in yaw
3. Reynolds numbers based on maximum model diameter
4. All quoted values are nominal

* α_{model} = 150° - AOA (Data Column) for Run Nos. 1 to 8 and 22 to 25

α_{model} = AOA (Data Column) - 8° for Run Nos. 9 to 21

[redacted]

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	001	0021	1	2	01	497.51	1980.8	1.582	104.01	2.[illegible]	.00	.02	13.04	.0291	.11-	.048-
349	001	0022	1	2	01	498.89	1980.8	1.587	68.33	2.[illegible]	.00	7.98-	13.92	.0311	.01-	.101-
349	001	0023	1	2	01	498.75	1980.8	1.586	97.07	2.[illegible]	.00	4.97-	13.53	.0302	.10-	.076-
349	001	0025	1	2	01	498.75	1980.8	1.586	93.27	2.[illegible]	.00	.02	13.00	.0291	.12-	.046-
349	001	0026	1	2	01	498.45	1980.8	1.585	89.92	2.[illegible]	.00	3.03	12.58	.0281	.13-	.023-
349	001	0028	1	2	01	498.78	1980.8	1.586	89.92	2.[illegible]	.00	6.01	12.40	.0277	.07-	.013-
349	001	0029	1	2	01	496.05	1980.8	1.578	89.92	2.[illegible]	.00	9.02	12.02	.0269	.06-	.006
349	001	0030	1	2	01	498.59	1980.8	1.586	90.00	2.[illegible]	.00	12.01	11.47	[redacted]	[redacted]	[redacted]
349	001	0031	1	2	01	498.06	1980.8	1.584	83.30	2.[illegible]	.00	15.01	10.30			
349	001	0032	1	2	01	497.76	1980.8	1.583	81.63	2.[illegible]	.00	16.67	10.35			
349	001	0033	1	2	01	497.76	1980.8	1.583	86.21	2.[illegible]	.00	.02	12.94	.0289	.10-	.043-
349	001	0034	1	2	01	497.90	1980.8	1.583	87.08	2.[illegible]	.00	1.99-	13.13	.0293	.14-	.054-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	002	0036	1	2	01	437.85	2405.3	2.089	90.00	3.960	.00	.02	13.13	.0242	.04-	.061-
349	002	0037	1	2	01	438.38	2405.3	2.091	83.70	3.960	.00	7.98-	13.65	.0251	.06-	.096-
349	002	0038	1	2	01	438.46	2405.3	2.091	90.00	3.960	.00	5.98-	13.55	.0249	.05-	.089-
349	002	0039	1	2	01	439.75	2405.3	2.098	90.00	3.960	.00	3.98-	13.42	.0247	.05-	.080-
349	002	0040	1	2	01	438.69	2405.3	2.093	90.07	3.960	.00	1.99-	13.29	.0245	.05-	.072-
349	002	0042	1	2	01	439.14	2405.3	2.095	90.00	3.960	.00	.98-	13.20	.0243	.03-	.066-
349	002	0043	1	2	01	439.91	2405.3	2.098	90.00	3.960	.00	.02	13.11	.0241	.04-	.060-
349	002	0044	1	2	01	438.07	2405.3	2.090	99.39	3.960	.00	1.03	13.02	.0240	.03-	.054-
349	002	0045	1	2	01	438.84	2405.3	2.093	90.00	3.960	.00	2.03	12.90	.0237	.04-	.046-
349	002	0046	1	2	01	438.00	2405.3	2.089	96.29	3.960	.00	3.03	12.83	.0236	.07-	.042-
349	002	0047	1	2	01	439.07	2405.3	2.094	90.07	3.960	.00	4.01	12.71	.0234	.08-	.034-
349	002	0048	1	2	01	438.61	2405.3	2.092	81.92	3.960	.00	5.01	12.62	.0232	.05-	.029-
349	002	0049	1	2	01	437.92	2405.3	2.089	90.00	3.960	.00	6.01	12.54	.0231	.07-	.024-
349	002	0050	1	2	01	438.84	2405.3	2.093	90.07	3.960	.00	7.00	12.44	.0229	.07-	.018-
349	002	0051	1	2	01	439.14	2405.3	2.095	90.00	3.960	.00	8.02	12.33	.0227	.11-	.011-
349	002	0052	1	2	01	437.69	2405.3	2.088	85.26	3.960	.00	10.02	12.10	.0223	.11-	.002
349	002	0053	1	2	01	438.15	2405.3	2.090	94.80	3.960	.00	12.01	11.85	.0218	.12-	.017
349	002	0055	1	2	01	439.52	2405.3	2.097	90.00	3.960	.00	14.01	11.51	.0212	.11-	.036
349	002	0056	1	2	01	438.69	2405.3	2.093	287.80	3.960	.00	16.67	12.00	[redacted]	[redacted]	[redacted]
349	002	0058	1	2	01	438.38	2405.3	2.091	90.07	3.960	.00	15.01	11.47	.0211	.11-	.039
349	002	0059	1	2	01	439.37	2405.3	2.096	90.07	3.960	.00	13.02	11.73	.0216	.09-	.024
349	002	0060	1	2	01	438.30	2405.3	2.091	81.99	3.960	.00	.02	13.10	.0241	.04-	.060-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	003	0063	1	2	01	440.75	2489.4	2.687	101.23	4.650	.00	.02	13.16	.0234	.05-	.062-
349	003	0064	1	2	01	440.92	2489.4	2.688	89.93	4.650	.00	7.98-	13.69	.0243	.03-	.098-
349	003	0065	1	2	01	440.75	2489.4	2.687	89.93	4.650	.00	5.98-	13.59	.0242	.05-	.091-
349	003	0066	1	2	01	441.01	2489.4	2.688	90.00	4.650	.00	3.98-	13.45	.0239	.05-	.082-
349	003	0067	1	2	01	440.70	2489.4	2.687	76.05	4.650	.00	1.99-	13.30	.0236	.03-	.072-
349	003	0068	1	2	01	440.75	2489.4	2.687	101.16	4.650	.00	.98-	13.22	.0235	.05-	.066-
349	003	0069	1	2	01	441.31	2489.4	2.690	78.76	4.650	.00	.02	13.13	.0233	.05-	.061-
349	003	0070	1	2	01	440.88	2489.4	2.688	89.93	4.650	.00	1.03	13.05	.0232	.05-	.056-
349	003	0071	1	2	01	441.40	2489.4	2.691	90.00	4.650	.00	2.03	12.98	.0231	.05-	.051-
349	003	0072	1	2	01	440.96	2489.4	2.688	89.93	4.650	.00	3.03	12.86	.0229	.05-	.044-
349	003	0073	1	2	01	440.96	2489.4	2.688	90.00	4.650	.00	4.01	12.80	.0228	.03-	.040-
349	003	0074	1	2	01	440.96	2489.4	2.688	89.93	4.650	.00	5.01	12.71	.0226	.02-	.034-
349	003	0075	1	2	01	441.01	2489.4	2.688	108.24	4.650	.00	6.01	12.58	.0224	.02-	.026-
349	003	0076	1	2	01	441.05	2489.4	2.689	108.24	4.650	.00	7.00	12.44	.0221	.02-	.017-
349	003	0078	1	2	01	440.88	2489.4	2.688	90.00	4.650	.00	8.02	12.34	.0219	.06-	.011-
349	003	0079	1	2	01	440.79	2489.4	2.687	90.00	4.650	.00	10.02	12.09	.0215	.03-	.003
349	003	0080	1	2	01	441.01	2489.4	2.688	90.00	4.650	.00	12.01	11.90	.0211	.05-	.014
349	003	0081	1	2	01	441.27	2489.4	2.690	90.00	4.650	.00	14.01	11.55	.0205	.06-	.034
349	003	0083	1	2	01	440.96	2489.4	2.688	90.00	4.650	.00	16.67	11.16	.0198	.07-	.056
349	003	0084	1	2	01	441.05	2489.4	2.689	93.34	4.650	.00	.04	13.14	[redacted]	[redacted]	[redacted]

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	004	0087	1	2	01	452.03	2165.5	1.674	90.00	2.980	.00	.04	12.98	.0265	.05-	.050-
349	004	0088	1	2	01	452.76	2165.5	1.676	90.06	2.980	.00	7.98-	13.59	.0278	.04-	.089-
349	004	0089	1	2	01	452.80	2165.5	1.677	91.96	2.980	.00	5.98-	13.45	.0275	.06-	.080-
349	004	0090	1	2	01	453.07	2165.5	1.678	90.06	2.980	.00	3.98-	13.28	.0271	.08-	.069-
349	004	0091	1	2	01	453.53	2165.5	1.679	92.36	2.980	.00	1.99-	13.15	.0269	.05-	.060-
349	004	0092	1	2	01	453.68	2165.5	1.680	90.00	2.980	.00	.98-	13.08	.0267	.05-	.056-
349	004	0093	1	2	01	453.67	2165.5	1.680	92.34	2.980	.00	.02	12.99	.0266	.05-	.050-
349	004	0094	1	2	01	453.44	2165.5	1.679	90.00	2.980	.00	1.03	12.89	.0263	.05-	.044-
349	004	0095	1	2	01	453.82	2165.5	1.680	90.13	2.980	.00	2.03	12.76	.0261	.05-	.036-
349	004	0096	1	2	01	453.68	2165.5	1.680	87.81	2.980	.00	3.03	12.63	.0258	.06-	.028-
349	004	0097	1	2	01	453.89	2165.5	1.681	87.95	2.980	.00	4.01	12.54	.0256	.06-	.023-
349	004	0098	1	2	01	453.70	2165.5	1.680	87.72	2.980	.00	5.01	12.49	.0255	.05-	.020-
349	004	0099	1	2	01	453.74	2165.5	1.680	90.06	2.980	.00	6.01	12.44	.0254	.05-	.017-
349	004	0100	1	2	01	454.02	2165.5	1.681	87.79	2.980	.00	7.00	12.31	.0252	.06-	.009-
349	004	0101	1	2	01	454.12	2165.5	1.681	92.34	2.980	.00	8.02	12.21	.0250	.06-	.003-
349	004	0102	1	2	01	454.03	2165.5	1.681	86.40	2.980	.00	10.02	11.95	.0244	.08-	.010
349	004	0103	1	2	01	454.12	2165.5	1.681	95.00	2.980	.00	12.01	11.65	.0238	.14-	.028
349	004	0104	1	2	01	454.05	2165.5	1.681	267.94	2.980	.00	14.01	14.27	[redacted]	[redacted]	[redacted]
349	004	0105	1	2	01	454.17	2165.5	1.682	266.70	2.980	.00	15.01	13.22			
349	004	0106	1	2	01	452.27	2165.5	1.675	80.79	2.980	.00	16.67	10.03			
349	004	0107	1	2	01	452.64	2165.5	1.676	90.00	2.980	.00	13.02	11.53			
349	004	0108	1	2	01	452.48	2165.5	1.675	94.61	2.980	.00	.04	12.98	.0265	.05-	.050-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	005	0017	1	2	02	225.46	2405.3	1.075	90.06	3.960	.00	.04	12.71	.0234	.01-	.067-
349	005	0018	1	2	02	225.57	2405.3	1.076	90.06	3.960	.00	7.98-	13.00	.0239	.04-	.103-
349	005	0019	1	2	02	225.60	2405.3	1.076	103.98	3.960	.00	5.98-	12.96	.0238	.04-	.097-
349	005	0020	1	2	02	225.66	2405.3	1.076	103.98	3.960	.00	3.98-	12.88	.0237	.04-	.087-
349	005	0021	1	2	02	225.55	2405.3	1.076	90.00	3.960	.00	1.99-	12.80	.0235	.01-	.078-
349	005	0022	1	2	02	225.69	2405.3	1.076	71.71	3.960	.00	.98-	12.77	.0235	.01-	.075-
349	005	0023	1	2	02	225.72	2405.3	1.076	108.35	3.960	.00	.02	12.72	.0234	.01-	.067-
349	005	0024	1	2	02	225.76	2405.3	1.077	90.06	3.960	.00	1.03	12.68	.0233	.01-	.063-
349	005	0025	1	2	02	225.76	2405.3	1.077	90.06	3.960	.00	2.03	12.62	.0232	.01-	.056-
349	005	0026	1	2	02	225.81	2405.3	1.077	90.06	3.960	.00	3.03	12.58	.0231	.00-	.051-
349	005	0027	1	2	02	225.83	2405.3	1.077	90.06	3.960	.00	4.01	12.53	.0231	.00-	.045-
349	005	0028	1	2	02	225.75	2405.3	1.077	90.00	3.960	.00	5.01	12.50	.0230	.00-	.042-
349	005	0029	1	2	02	225.62	2405.3	1.076	90.00	3.960	.00	6.01	12.43	.0229	.01	.033-
349	005	0030	1	2	02	225.74	2405.3	1.077	103.91	3.960	.00	7.00	12.38	.0228	.00-	.027-
349	005	0031	1	2	02	225.73	2405.3	1.077	90.06	3.960	.00	8.02	12.32	.0227	.00-	.020-
349	005	0033	1	2	02	225.70	2405.3	1.076	90.00	3.960	.00	10.02	12.22	.0225	.00-	.009-
349	005	0034	1	2	02	225.56	2405.3	1.076	101.21	3.960	.00	12.01	12.07	.0222	.03-	.008
349	005	0035	1	2	02	225.57	2405.3	1.076	90.00	3.960	.00	14.01	11.92	.0219	.01	.025
349	005	0036	1	2	02	225.55	2405.3	1.076	270.00	3.960	.00	16.67	12.03	[redacted]	[redacted]	[redacted]
349	005	0037	1	2	02	225.62	2405.3	1.076	90.00	3.960	.00	15.01	11.89	.0219	.01	.028
349	005	0038	1	2	02	225.63	2405.3	1.076	90.00	3.960	.00	13.02	12.00	.0221	.01	.016
349	005	0039	1	2	02	225.66	2405.3	1.076	90.00	3.960	.00	12.01	12.08	.0222	.01	.006
349	005	0040	1	2	02	225.69	2405.3	1.076	63.70	3.960	.00	11.01	12.11	.0223	.04	.002
349	005	0041	1	2	02	225.66	2405.3	1.076	71.71	3.960	.00	10.02	12.18	.0224	.01	.005-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	006	0045	1	2	02	175.17	2489.4	1.068	90.06	4.650	.00	.02	12.60	.0224	.02	.069-
349	006	0046	1	2	02	175.21	2489.4	1.068	90.00	4.650	.00	7.96-	12.83	[redacted]	[redacted]	[redacted]
349	006	0047	1	2	02	175.20	2489.4	1.068	90.06	4.650	.00	5.98-	12.80	.0228	.02	.101-
349	006	0048	1	2	02	175.17	2489.4	1.068	90.06	4.650	.00	3.98-	12.75	.0227	.02	.093-
349	006	0049	1	2	02	175.16	2489.4	1.067	108.35	4.650	.00	1.99-	12.69	.0226	.02	.083-
349	006	0050	1	2	02	175.15	2489.4	1.067	90.06	4.650	.00	.98-	12.64	.0225	.02	.076-
349	006	0051	1	2	02	175.09	2489.4	1.067	63.70	4.650	.00	.02	12.60	.0224	.05	.070-
349	006	0052	1	2	02	175.21	2489.4	1.068	103.98	4.650	.00	1.03	12.58	.0224	.00-	.066-
349	006	0053	1	2	02	175.25	2489.4	1.068	108.35	4.650	.00	2.03	12.53	.0223	.02	.058-
349	006	0054	1	2	02	175.21	2489.4	1.068	90.06	4.650	.00	3.03	12.50	.0222	.02	.054-
349	006	0055	1	2	02	175.20	2489.4	1.068	108.35	4.650	.00	4.01	12.45	.0221	.02	.046-
349	006	0056	1	2	02	175.29	2489.4	1.068	90.06	4.650	.00	5.01	12.42	.0221	.05	.042-
349	006	0057	1	2	02	175.24	2489.4	1.068	90.06	4.650	.00	6.01	12.38	.0220	.02	.036-
349	006	0058	1	2	02	175.15	2489.4	1.067	63.70	4.650	.00	7.00	12.34	.0219	.05	.030-
349	006	0059	1	2	02	175.27	2489.4	1.068	90.06	4.650	.00	8.02	12.30	.0219	.05	.023-
349	006	0060	1	2	02	175.24	2489.4	1.068	134.81	4.650	.00	10.00	12.20	.0217	.08	.008-
349	006	0061	1	2	02	175.17	2489.4	1.068	90.06	4.650	.00	12.01	12.10	.0215	.08	.006
349	006	0062	1	2	02	175.17	2489.4	1.068	90.06	4.650	.00	13.99	11.99	.0213	.05	.022
349	006	0063	1	2	02	175.17	2489.4	1.068	134.74	4.650	.00	14.99	11.96	.0213	.05	.028
349	006	0064	1	2	02	175.31	2489.4	1.068	90.00	4.650	.00	.02	12.60	.0224	.02	.069-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	007	0068	1	2	02	556.60	2489.4	3.393	97.13	4.650	.00	.02	13.35	.0237	.01-	.059-
349	007	0070	1	2	02	556.55	2489.4	3.393	66.22	4.650	.00	7.98-	13.96	.0248	.01-	.092-
349	007	0071	1	2	02	556.64	2489.4	3.393	95.66	4.650	.00	5.98-	13.87	.0247	.02-	.086-
349	007	0072	1	2	02	556.55	2489.4	3.393	90.00	4.650	.00	3.98-	13.70	.0244	.06-	.078-
349	007	0073	1	2	02	556.77	2489.4	3.394	84.40	4.650	.00	1.99-	13.54	.0241	.02-	.069-
349	007	0074	1	2	02	556.64	2489.4	3.393	100.28	4.650	.00	.98-	13.45	.0239	.03-	.064-
349	007	0075	1	2	02	556.51	2489.4	3.393	90.06	4.650	.00	.02	13.34	.0237	.02-	.059-
349	007	0076	1	2	02	556.64	2489.4	3.393	90.06	4.650	.00	1.03	13.23	.0235	.02-	.053-
349	007	0077	1	2	02	556.68	2489.4	3.394	90.06	4.650	.00	2.03	13.12	.0233	.04-	.047-
349	007	0078	1	2	02	556.55	2489.4	3.393	90.06	4.650	.00	3.03	13.00	.0231	.03-	.041-
349	007	0079	1	2	02	556.68	2489.4	3.394	85.70	4.650	.00	4.01	12.86	.0229	.04-	.034-
349	007	0080	1	2	02	556.51	2489.4	3.393	90.06	4.650	.00	5.03	12.78	.0227	.05-	.030-
349	007	0081	1	2	02	556.86	2489.4	3.395	97.98	4.650	.00	6.01	12.66	.0225	.00-	.024-
349	007	0082	1	2	02	556.38	2489.4	3.392	103.98	4.650	.00	7.02	12.51	.0222	.01-	.017-
349	007	0083	1	2	02	556.33	2489.4	3.392	97.13	4.650	.00	8.02	12.33	.0219	.01-	.008-
349	007	0084	1	2	02	556.46	2489.4	3.392	85.70	4.650	.00	10.02	12.04	.0214	.05-	.004
349	007	0085	1	2	02	556.38	2489.4	3.392	97.20	4.650	.00	11.99	11.80	.0210	.07-	.016
349	007	0086	1	2	02	556.51	2489.4	3.393	99.51	4.650	.00	14.07	11.44	.0203	.04-	.032
349	007	0088	1	2	02	556.38	2489.4	3.392	86.08	4.650	.00	16.54	10.90	.0194	.06-	.055
349	007	0089	1	2	02	556.46	2489.4	3.392	90.13	4.650	.00	16.69	10.90	.0194	.08-	.055
349	007	0090	1	2	02	556.33	2489.4	3.392	90.00	4.650	.00	.04	13.35	.0237	.03-	.059-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	008	0093	1	2	02	331.08	1980.8	1.053	86.84	2.400	.00	.04	12.75	.0285	.10-	.049-
349	008	0094	1	2	02	330.66	1980.8	1.051	88.46	2.400	.00	7.98-	13.27	.0297	.10-	.093-
349	008	0095	1	2	02	330.94	1980.8	1.052	88.11	2.400	.00	5.98-	13.14	.0294	.07-	.082-
349	008	0096	1	2	02	331.13	1980.8	1.053	95.46	2.400	.00	4.02-	12.93	.0289	.13-	.063-
349	008	0097	1	2	02	331.27	1980.8	1.053	86.16	[illegible]	.00	2.03-	12.84	.0287	.14-	.057-
349	008	0098	1	2	02	331.43	1980.8	1.054	94.04	[illegible]	.00	1.02-	12.79	.0286	.12-	.052-
349	008	0099	1	2	02	331.74	1980.8	1.055	72.65	[illegible]	.00	.01-	12.71	.0284	.08-	.047-
349	008	0100	1	2	02	332.23	1980.8	1.056	79.24	[illegible]	.00	1.01	12.60	.0282	.11-	.037-
349	008	0101	1	2	02	331.38	1980.8	1.054	89.86	[illegible]	.00	2.01	12.51	.0280	.14-	.029-
349	008	0102	1	2	02	331.13	1980.8	1.053	93.56	[illegible]	.00	2.99	12.42	.0278	.15-	.021-
349	008	0103	1	2	02	331.66	1980.8	1.055	87.22	[illegible]	.00	3.81	12.36	.0276	.14-	.017-
349	008	0104	1	2	02	331.60	1980.8	1.054	88.36	[illegible]	.00	4.99	12.33	.0276	.12-	.015-
349	008	0105	1	2	02	332.01	1980.8	1.056	88.03	[illegible]	.00	5.97	12.30	.0275	.08-	.012-
349	008	0106	1	2	02	331.85	1980.8	1.055	97.39	[illegible]	.00	6.98	12.23	.0273	.08-	.006-
349	008	0107	1	2	02	332.43	1980.8	1.057	79.94	[illegible]	.00	7.99	12.13	.0271	.10-	.000
349	008	0108	1	2	02	332.68	1980.8	1.058	85.95	2.400	.00	10.00	11.91	.0266	.08-	.017
349	008	0109	1	2	02	332.79	1980.8	1.058	83.80	2.400	.00	11.97	11.75	.0263	.08-	.029
349	008	0110	1	2	02	330.83	1980.8	1.052	83.57	2.400	.00	13.99	11.54	.0258	.07-	.045
349	008	0111	1	2	02	330.69	1980.8	1.052	112.56	2.400	.00	16.63	10.79	[redacted]	[redacted]	[redacted]
349	008	0112	1	2	02	330.86	1980.8	1.052	88.40	2.400	.00	.01	12.69	.0284	.12-	.044-

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	009	0034	2	2	04	498.01	1980.8	1.584	163.28	2.400	.00	.01	2.50	.0055	3.09-	.313
349	009	0035	2	2	04	498.23	1980.8	1.585	171.76	2.400	.00	.01	6.00	.0134	3.15-	.306
349	009	0036	2	2	04	498.51	1980.8	1.585	175.60	2.400	.00	8.01-	2.00	[redacted]	[redacted]	[redacted]
349	009	0037	2	2	04	498.23	1980.8	1.585	177.13	2.400	.00	6.00-	6.00			
349	009	0039	2	2	04	498.45	1980.8	1.585	177.14	2.400	.00	4.02-	6.00	.0134	1.24-	.362
349	009	0040	2	2	04	497.62	1980.8	1.583	173.82	2.400	.00	4.02-	2.00	.0044	1.78-	.351
349	009	0041	2	2	04	497.57	1980.8	1.582	174.33	2.400	.00	2.01-	6.00	.0134	2.49-	.355
349	009	0042	2	2	04	497.16	1980.8	1.581	168.98	2.400	.00	2.01-	2.00	.0044	3.28-	.351
349	009	0043	2	2	04	497.32	1980.8	1.582	171.98	2.400	.00	.01	6.00	.0134	3.05-	.305
349	009	0044	2	2	04	497.38	1980.8	1.582	161.08	2.400	.00	.01	2.00	.0044	2.03-	.301
349	009	0045	2	2	04	497.46	1980.8	1.582	91.81	2.400	.00	2.01	4.82	.0107	2.06-	.113
349	009	0046	2	2	04	497.65	1980.8	1.583	79.92	2.400	.00	3.99	7.08	.0158	.27-	.112-
349	009	0047	2	2	04	497.21	1980.8	1.581	69.76	2.400	.00	5.01	7.79	.0174	.17-	.201-
349	009	0048	2	2	04	496.99	1980.8	1.581	89.85	2.400	.00	6.01	8.42	.0188	.34-	.285-
349	009	0049	2	2	04	497.18	1980.8	1.581	102.68	2.400	.00	6.96	8.85	.0198	.28-	.346-
349	009	0050	2	2	04	496.93	1980.8	1.580	72.95	2.400	.00	7.99	8.98	.0201	.16-	.368-
349	009	0051	2	2	04	496.77	1980.8	1.580	83.39	2.400	.00	8.99	8.81	.0197	.36-	.343-
349	009	0052	2	2	04	496.69	1980.8	1.580	104.83	2.400	.00	10.00	8.37	.0187	.49-	.276-
349	009	0053	2	2	04	497.04	1980.8	1.581	91.91	2.400	.00	10.98	7.65	.0171	.76-	.181-
349	009	0054	2	2	04	496.77	1980.8	1.580	83.97	2.400	.00	11.97	6.60	.0147	.99-	.058-
349	009	0055	2	2	04	497.10	1980.8	1.581	89.92	2.400	.00	13.98	3.81	.0085	2.39-	.185
349	009	0056	2	2	04	497.02	1980.8	1.581	170.03	2.400	.00	-916.65	2.06	[redacted]	[redacted]	[redacted]
349	009	0058	2	2	04	496.91	1980.8	1.580	86.36	2.400	.00	8.01	9.02	.0201	.19-	.373-
349	009	0059	2	2	04	496.58	1980.8	1.579	77.17	2.400	.00	8.01	8.98	.0201	.24-	.369-
349	009	0060	2	2	04	496.77	1980.8	1.580	87.59	2.400	.00	6.98	8.88	.0198	.21-	.352-
349	009	0061	2	2	04	496.91	1980.8	1.580	101.36	2.400	.00	6.01	8.48	.0189	.31-	.292-
349	009	0062	2	2	04	497.24	1980.8	1.581	86.58	2.400	.00	4.97	7.87	.0176	.65-	.211-
349	009	0063	2	2	04	496.93	1980.8	1.580	92.04	2.400	.00	3.99	7.13	.0159	.74-	.117-
349	009	0064	2	2	04	496.96	1980.8	1.580	93.08	2.400	.00	2.01	4.95	.0110	1.58-	.103
349	009	0065	2	2	04	496.69	1980.8	1.580	154.82	2.400	.00	.01-	2.00	.0044	2.81-	.301
349	009	0066	2	2	04	497.24	1980.8	1.581	172.32	2.400	.00	.01-	6.00	.0134	2.92-	.306

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	010	0069	2	2	04	452.10	2165.5	1.674	87.08	2.980	.00	.01-	3.33	.0068	3.64-	.234
349	010	0070	2	2	04	452.22	2165.5	1.674	166.32	2.980	.00	8.00-	2.00	[redacted]	[redacted]	[redacted]
349	010	0071	2	2	04	452.43	2165.5	1.675	176.70	2.980	.00	8.00-	6.00	[redacted]	[redacted]	[redacted]
349	010	0072	2	2	04	452.32	2165.5	1.675	177.35	2.980	.00	6.02-	6.00	[redacted]	[redacted]	[redacted]
349	010	0075	2	2	04	452.32	2165.5	1.675	172.59	2.980	.00	6.02-	2.00	[redacted]	[redacted]	[redacted]
349	010	0076	2	2	04	452.24	2165.5	1.674	90.13	2.980	.00	4.02-	2.20	.0045	1.14-	.293
349	010	0077	2	2	04	452.25	2165.5	1.675	162.18	2.980	.00	1.99-	2.00	.0040	2.86-	.338
349	010	0078	2	2	04	452.27	2165.5	1.675	172.83	2.980	.00	1.99-	6.00	.0122	3.35-	.344
349	010	0079	2	2	04	452.25	2165.5	1.675	88.63	2.980	.00	.01-	3.45	.0070	3.19-	.227
349	010	0080	2	2	04	452.08	2165.5	1.674	87.84	2.980	.00	1.99	6.09	.0124	.77-	.003-
349	010	0081	2	2	04	451.84	2165.5	1.673	90.06	2.980	.00	4.01	7.00	.0143	.50-	.112-
349	010	0082	2	2	04	452.48	2165.5	1.675	86.91	2.980	.00	4.99	7.52	.0153	.55-	.182-
349	010	0083	2	2	04	452.12	2165.5	1.674	92.70	2.980	.00	5.99	8.01	.0164	.61-	.251-
349	010	0084	2	2	04	452.25	2165.5	1.675	88.57	2.980	.00	6.98	8.54	.0174	.56-	.333-
349	010	0085	2	2	04	452.39	2165.5	1.675	86.55	2.980	.00	8.01	8.70	.0178	.41-	.358-
349	010	0086	2	2	04	452.03	2165.5	1.674	90.00	2.980	.00	9.01	8.48	.0173	.62-	.323-
349	010	0087	2	2	04	452.41	2165.5	1.675	96.65	2.980	.00	10.00	7.98	.0163	.63-	.246-
349	010	0088	2	2	04	452.17	2165.5	1.674	91.67	2.980	.00	10.98	7.43	.0152	.52-	.169-
349	010	0089	2	2	04	452.10	2165.5	1.674	90.13	2.980	.00	11.97	7.01	.0143	.48-	.114-
349	010	0090	2	2	04	452.48	2165.5	1.675	87.88	2.980	.00	13.99	5.63	.0115	1.15-	.045
349	010	0091	2	2	04	452.24	2165.5	1.674	168.88	2.980	.00	16.63	2.00	[redacted]	[redacted]	[redacted]
349	010	0092	2	2	04	452.50	2165.5	1.675	171.72	2.980	.00	16.63	6.00	[redacted]	[redacted]	[redacted]
349	010	0093	2	2	04	452.24	2165.5	1.674	83.61	2.980	.00	14.99	4.06	[redacted]	[redacted]	[redacted]
349	010	0094	2	2	04	452.73	2165.5	1.676	92.77	2.980	.00	.01	3.57	.0073	3.92-	.221

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	011	0097	2	2	04	439.37	2405.3	2.096	89.46	3.960	.00	.01	5.16	.0095	2.05-	.095
349	011	0098	2	2	04	439.60	2405.3	2.097	178.02	3.960	.00	8.01-	2.00	[redacted]	[redacted]	[redacted]
349	011	0099	2	2	04	439.14	2405.3	2.095	177.47	3.960	.00	8.01-	6.00			
349	011	0100	2	2	04	438.99	2405.3	2.094	176.48	3.960	.00	6.00-	6.00			
349	011	0101	2	2	04	439.98	2405.3	2.099	163.12	3.960	.00	6.00-	2.00			
349	011	0102	2	2	04	438.76	2405.3	2.093	90.00	3.960	.00	4.02-	3.44	.0063	1.34-	.235
349	011	0104	2	2	04	438.99	2405.3	2.094	88.90	3.960	.00	2.01-	4.03	.0074	1.92-	.193
349	011	0105	2	2	04	440.13	2405.3	2.099	89.85	3.960	.00	.01	5.15	.0094	1.99-	.096
349	011	0106	2	2	04	440.13	2405.3	2.099	91.89	3.960	.00	1.99	5.73	.0105	1.67-	.037
349	011	0107	2	2	04	439.07	2405.3	2.094	88.79	3.960	.00	3.99	7.44	.0137	.87-	.176-
349	011	0108	2	2	04	439.07	2405.3	2.094	89.92	3.960	.00	5.01	8.27	.0152	.00	.299-
349	011	0109	2	2	04	438.23	2405.3	2.090	116.31	3.960	.00	5.99	8.62	.0158	.09	.356-
349	011	0110	2	2	04	438.23	2405.3	2.090	251.55	3.960	.00	6.96	8.90	.0164	.13	.402-
349	011	0111	2	2	04	438.46	2405.3	2.091	274.86	3.960	.00	8.02	9.08	.0167	.24	.433-
349	011	0112	2	2	04	439.14	2405.3	2.095	269.06	3.960	.00	8.99	9.14	.0168	.87	.442-
349	011	0113	2	2	04	438.53	2405.3	2.092	270.62	3.960	.00	10.02	8.86	.0163	.65	.396-
349	011	0114	2	2	04	439.07	2405.3	2.094	265.87	3.960	.00	10.98	8.41	.0155	.20	.321-
349	011	0115	2	2	04	439.22	2405.3	2.095	87.98	3.960	.00	11.99	7.43	.0136	.67-	.175-
349	011	0116	2	2	04	438.91	2405.3	2.094	88.18	3.960	.00	13.99	4.85	.0089	2.25-	.124
349	011	0117	2	2	04	438.99	2405.3	2.094	91.84	3.960	.00	13.00	6.05	.0111	1.54-	.001
349	011	0118	2	2	04	438.76	2405.3	2.093	90.53	3.960	.00	14.99	4.64	[redacted]		
349	011	0119	2	2	04	438.23	2405.3	2.090	89.25	3.960	.00	16.65	4.21			
349	011	0120	2	2	04	438.91	2405.3	2.094	89.52	3.960	.00	.01	5.14	.0094	2.00-	.097

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	REG	K	CMQ	CMA
349	012	0123	2	2	04	441.23	2489.4	2.690	89.92	4.650	.00	.01	5.82	.0103	1.43-	.026
349	012	0124	2	2	04	440.49	2489.4	2.685	178.73	4.650	.00	8.00-	2.00			
349	012	0125	2	2	04	440.83	2489.4	2.687	178.37	4.650	.00	8.00-	6.00			
349	012	0126	2	2	04	440.83	2489.4	2.687	177.69	4.650	.00	6.00-	6.0			
349	012	0127	2	2	04	440.83	2489.4	2.687	178.50	[illegible]	.00	6.00-	2.0			
349	012	0128	2	2	04	440.79	2489.4	2.687	71.83	[illegible]	.00	4.02-	2.00	.0035	1.08-	.307
349	012	0129	2	2	04	440.88	2489.4	2.688	176.55	[illegible]	.00	4.00-	6.00	.0106	1.61-	.315
349	012	0130	2	2	04	440.75	2489.4	2.687	89.29	[illegible]	.00	2.01-	4.87	.0086	1.37-	.122
349	012	0131	2	2	04	440.66	2489.4	2.686	89.45	[illegible]	.00	.01	5.83	.0103	1.55-	.025
349	012	0132	2	2	04	441.05	2489.4	2.689	89.92	[illegible]	.00	1.99	5.87	.0104	1.77-	.021
349	012	0133	2	2	04	440.62	2489.4	2.686	90.36	[illegible]	.00	3.99	7.47	.0133	1.10-	.179-
349	012	0134	2	2	04	440.53	2489.4	2.685	109.51	[illegible]	.00	4.97	8.40	.0149	.14-	.317-
349	012	0135	2	2	04	440.66	2489.4	2.686	269.93	[illegible]	.00	5.99	9.04	.0161	.66	.424-
349	012	0136	2	2	04	440.66	2489.4	2.686	270.80	[illegible]	.00	7.00	9.45	.0168	.67	.496-
349	012	0137	2	2	04	441.14	2489.4	2.689	270.32	[illegible]	.00	8.02	9.79	.0174	1.11	.557-
349	012	0138	2	2	04	440.79	2489.4	2.687	270.65	[illegible]	.00	9.02	9.83	.0175	1.40	.565-
349	012	0139	2	2	04	441.01	2489.4	2.688	267.04	4.650	.00	10.00	9.41	.0167	.93	.487-
349	012	0140	2	2	04	441.23	2489.4	2.690	74.30	4.650	.00	11.00	8.47	.0150	.21-	.331-
349	012	0141	2	2	04	441.09	2489.4	2.689	89.93	4.650	.00	11.99	7.16	.0127	1.49-	.136-
349	012	0142	2	2	04	440.70	2489.4	2.687	90.96	4.650	.00	14.01	5.02	.0089	2.53-	.109
349	012	0143	2	2	04	441.23	2489.4	2.690	89.35	4.650	.00	16.65	4.84			
349	012	0144	2	2	04	441.09	2489.4	2.689	94.12	4.650	.00	.01	5.81	.0103	1.43-	.029

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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	013	0007	12	2	05	498.56	1980.8	1.586	87.05	2.400	.00	3.99	7.39	.0165	1.11-	.090-
349	013	0008	12	2	05	497.90	1980.8	1.583	86.05	2.400	.00	5.99	8.25	.0184	.30-	.187-
349	013	0009	12	2	05	497.65	1980.8	1.583	87.49	2.400	.00	8.01	8.05	.0180	.56-	.163-
349	013	0010	12	2	05	498.15	1980.8	1.584	116.99	2.400	.00	10.00	8.39	.0187	.15-	.201-
349	013	0011	12	2	05	498.45	1980.8	1.585	84.25	2.400	.00	11.97	7.02	.0157	1.07-	.052-
349	013	0012	12	2	05	497.07	1980.8	1.58[illegible]	[illegible]	2.400	.00	.01	4.83	.0108	1.28-	.143

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SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	ACS	AOA	FREQ	K	CMQ	CMA
349	014	0014	12	2	05	451.52	2165.5	1.672	90.13	2.980	.00	.01	4.85	.0099	2.01-	.150
349	014	0015	12	2	05	451.49	2165.5	1.672	74.47	2.980	.00	3.99	7.18	.0147	.37-	.075-
349	014	0016	12	2	05	451.87	2165.5	1.673	72.29	2.980	.00	5.97	7.67	.0157	.13-	.133-
349	014	0017	12	2	05	452.15	2165.5	1.674	88.58	2.980	.00	8.01	7.15	.0146	.84-	.070-
349	014	0018	12	2	05	451.56	2165.5	1.672	261.57	2.980	.00	10.00	7.73	.0158	.10	.139-
349	014	0019	12	2	05	451.85	2165.5	1.673	89.09	2.980	.00	11.97	7.37	.0150	.46-	.096-
349	014	0020	12	2	05	452.17	2165.5	1.674	95.48	2.980	.00	16.65	3.86	[redacted]	[redacted]	[redacted]
349	014	0021	12	2	05	452.03	2165.5	1.674	89.36	2.980	.00	8.01	7.12	.0145	.88-	.067-

[redacted]

PRELIMINARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	015	0024	12	2	05	438.30	2405.3	2.091	95.42	.960	.00	.01	6.09	.0112	1.40-	.044
349	015	0025	12	2	05	438.91	2405.3	2.094	159.52	.960	.00	3.99	8.65	.0159	.04	.266-
349	015	0026	12	2	05	438.69	2405.3	2.093	106.60	.960	.00	5.99	7.34	.0135	.31-	.093-
349	015	0027	12	2	05	439.07	2405.3	2.094	86.74	.960	.00	8.01	5.32	.0098	1.35-	.114
349	015	0028	12	2	05	438.99	2405.3	2.094	141.72	.960	.00	10.00	7.88	.0145	.02	.161-
349	015	0029	12	2	05	438.84	2405.3	2.093	81.00	.960	.00	11.99	8.55	.0157	.58-	.255-
349	015	0030	12	2	05	438.84	2405.3	2.093	99.49	.960	.00	16.63	4.98	[redacted]	[redacted]	[redacted]
349	015	0031	12	2	05	438.30	2405.3	2.091	95.89	.960	.00	8.01	5.36	.0098	1.32-	.113

PRELIMINARY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	016	0034	12	2	05	440.75	2489.4	2.687	91.22	4.650	.00	.01	6.33	.0112	1.36-	.018
349	016	0035	12	2	05	440.70	2489.4	2.687	287.74	4.650	.00	3.97	9.48	.0168	.30	.390-
349	016	0036	12	2	05	440.96	2489.4	2.688	93.26	4.650	.00	5.99	7.97	.0141	.32-	.173-
349	016	0037	12	2	05	440.62	2489.4	2.686	91.37	4.650	.00	8.01	5.21	.0092	1.56-	.124
349	016	0039	12	2	05	441.05	2489.4	2.689	279.93	4.650	.00	10.00	8.91	.0158	.47	.304-
349	016	0040	12	2	05	441.27	2489.4	2.690	61.40	4.650	.00	11.97	9.34	.0166	.22-	.370-
349	016	0041	12	2	05	440.83	2489.4	2.687	88.95	4.650	.00	16.65	5.22	[redacted]	[redacted]	[redacted]
349	016	0042	12	2	05	440.75	2489.4	2.687	94.11	4.650	.00	7.99	5.22	.0092	1.56-	.124

[redacted]

PRELIMINARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	017	0045	12	2	05	175.04	2489.4	1.067	72.30	4.650	.00	.01	6.69	.0119	.98-	.055-
349	017	0046	12	2	05	175.25	2489.4	1.068	85.28	4.650	.00	3.99	7.78	.0138	.03-	.375-
349	017	0047	12	2	05	175.25	2489.4	1.068	72.77	4.650	.00	5.99	7.08	.0126	.89-	.165-
349	017	0048	12	2	05	175.25	2489.4	1.068	91.85	[illegible]	.00	7.88	6.14	.0109	2.15-	.095
349	017	0049	12	2	05	175.14	2489.4	1.067	85.73	[illegible]	.00	10.00	7.30	.0130	.80-	.227-
349	017	0050	12	2	05	175.12	2489.4	1.067	78.03	[illegible]	.00	11.99	7.71	.0137	.45-	.355-
349	017	0051	12	2	05	175.16	2489.4	1.068	83.48	[illegible]	.00	16.63	6.44			
349	017	0052	12	2	05	175.21	2489.4	1.068	90.00	[illegible]	.00	8.01	6.15	.0109	2.07-	.092

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PRELIMINARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	018	0037	3	2	06	497.65	1980.8	1.583	90.06	2.400	.00	.01	19.46	.0435	.18-	.282-
349	018	0038	3	2	06	496.58	1980.8	1.579	83.07	2.400	.00	8.00-	17.44	[redacted]	[redacted]	[redacted]
349	018	0039	3	2	06	498.12	1980.8	1.584	89.32	2.400	.00	6.02-	18.06	.0404	.28-	.199-
349	018	0040	3	2	06	498.18	1980.8	1.584	90.54	2.400	.00	4.02-	18.74	.0419	.27-	.238-
349	018	0041	3	2	06	498.31	1980.8	1.585	89.93	2.400	.00	2.01-	19.20	.0429	.25-	.266-
349	018	0042	3	2	06	497.62	1980.8	1.583	95.32	2.400	.00	.01	19.44	.0435	.17-	.280-
349	018	0043	3	2	06	496.69	1980.8	1.580	92.11	2.400	.00	1.99	19.46	.0435	.22-	.282-
349	018	0044	3	2	06	497.21	1980.8	1.581	90.00	2.400	.00	3.99	19.56	.0437	.22-	.288-
349	018	0045	3	2	06	497.84	1980.8	1.583	92.07	2.400	.00	4.99	19.62	.0439	.23-	.291-
349	018	0046	3	2	06	497.98	1980.8	1.584	89.28	2.400	.00	5.97	19.67	.0440	.22-	.294-
349	018	0047	3	2	06	497.93	1980.8	1.584	90.00	2.400	.00	6.98	19.72	.0441	.22-	.297-
349	018	0048	3	2	06	497.87	1980.8	1.583	90.00	2.400	.00	8.01	19.72	.0441	.22-	.297-
349	018	0049	3	2	06	498.04	1980.8	1.584	89.28	2.400	.00	9.01	19.70	.0441	.22-	.296-
349	018	0050	3	2	06	497.62	1980.8	1.583	90.71	2.400	.00	9.99	19.61	.0439	.24-	.291-
349	018	0051	3	2	06	498.12	1980.8	1.584	90.13	2.400	.00	11.01	19.53	.0437	.23-	.286-
349	018	0052	3	2	06	497.68	1980.8	1.583	92.70	2.400	.00	11.99	19.52	.0436	.19-	.285-
349	018	0053	3	2	06	497.95	1980.8	1.584	90.67	2.400	.00	13.98	19.46	.0435	.26-	.281-
349	018	0054	3	2	06	497.29	1980.8	1.582	86.01	2.400	.00	16.63	19.40	[redacted]	[redacted]	[redacted]
349	018	0055	3	2	06	497.46	1980.8	1.582	94.74	2.400	.00	.01-	19.42	.0434	.17-	.279-

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PRELIMINARY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	019	0058	3	2	06	451.87	2165.5	1.673	88.69	2.980	.00	.01-	19.19	.0392	.23-	.292-
349	019	0059	3	2	06	452.08	2165.5	1.674	89.38	2.980	.00	8.01-	19.41	.0397	.26-	.307-
349	019	0060	3	2	06	452.01	2165.5	1.674	90.30	2.980	.00	5.99-	19.35	.0396	.29-	.303-
349	019	0061	3	2	06	452.31	2165.5	1.675	89.00	2.980	.00	3.99-	19.24	.0393	.28-	.295-
349	019	0062	3	2	06	452.55	2165.5	1.676	89.31	2.980	.00	1.99-	19.19	.0392	.27-	.292-
349	019	0063	3	2	06	452.48	2165.5	1.675	89.38	2.980	.00	.01-	19.19	.0392	.23-	.292-
349	019	0064	3	2	06	452.20	2165.5	1.674	89.28	2.980	.00	2.01-	19.12	.0391	.25-	.287-
349	019	0065	3	2	06	452.06	2165.5	1.674	89.04	2.980	.00	4.00-	19.01	.0389	.17-	.280-
349	019	0066	3	2	06	452.53	2165.5	1.676	88.26	2.980	.00	4.99-	18.92	.0387	.16-	.274-
349	019	0067	3	2	06	452.15	2165.5	1.674	89.21	2.980	.00	5.98-	18.81	.0385	.20-	.267-
349	019	0068	3	2	06	452.36	2165.5	1.675	89.86	2.980	.00	8.01-	18.46	[redacted]	[redacted]	[redacted]
349	019	0069	3	2	06	451.82	2165.5	1.673	88.95	2.980	.00	4.99	19.27	.0394	.28-	.298-
349	019	0070	3	2	06	452.22	2165.5	1.674	89.86	2.980	.00	6.98	19.40	.0397	.27-	.306-
349	019	0071	3	2	06	452.25	2165.5	1.675	88.44	2.980	.00	9.02	19.38	.0396	.27-	.305-
349	019	0072	3	2	06	452.55	2165.5	1.676	89.86	2.980	.00	10.02	19.39	.0397	.26-	.305-
349	019	0073	3	2	06	452.31	2165.5	1.675	88.84	2.980	.00	10.96	19.33	.0395	.26-	.301-
349	019	0074	3	2	06	452.36	2165.5	1.675	89.79	2.980	.00	12.01	19.28	.0394	.26-	.298-
349	019	0075	3	2	06	452.62	2165.5	1.676	90.33	2.980	.00	13.99	19.22	.0393	.23-	.294-
349	019	0076	3	2	06	452.48	2165.5	1.675	84.57	2.980	.00	16.63	19.15	[redacted]	[redacted]	[redacted]
349	019	0077	3	2	06	452.60	2165.5	1.676	90.36	2.980	.00	.02	19.18	.0392	.22-	.291-

PRELIMINARY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	020	0080	3	2	06	362.76	2405.3	1.730	89.28	3.960	.00	.02	18.37	.0338	.26-	.298-
349	020	0081	3	2	06	362.87	2405.3	1.731	89.18	3.960	.00	8.00-	18.01	[redacted]	[redacted]	[redacted]
349	020	0082	3	2	06	362.84	2405.3	1.731	88.52	3.960	.00	6.02-	18.18	.0335	.26-	.283-
349	020	0083	3	2	06	362.62	2405.3	1.730	90.72	3.960	.00	4.02-	18.29	.0337	.26-	.292-
349	020	0084	3	2	06	362.72	2405.3	1.730	90.73	3.960	.00	2.01-	18.36	.0338	.25-	.297-
349	020	0085	3	2	06	362.82	2405.3	1.731	89.93	3.960	.00	.01	18.37	.0338	.28-	.298-
349	020	0086	3	2	06	362.63	2405.3	1.730	91.61	3.960	.00	2.03	18.39	.0339	.33-	.299-
349	020	0087	3	2	06	362.77	2405.3	1.730	89.93	3.960	.00	4.01	18.49	.0340	.31-	.307-
349	020	0088	3	2	06	362.37	2405.3	1.728	89.37	3.960	.00	4.99	18.50	.0341	.33-	.309-
349	020	0089	3	2	06	362.30	2405.3	1.728	91.05	3.960	.00	5.99	18.50	.0341	.33-	.308-
349	020	0090	3	2	06	362.44	2405.3	1.729	90.52	3.960	.00	6.98	18.50	.0341	.31-	.308-
349	020	0091	3	2	06	362.59	2405.3	1.729	90.51	3.960	.00	8.01	18.53	.0341	.32-	.311-
349	020	0092	3	2	06	362.77	2405.3	1.730	90.52	3.960	.00	8.99	18.54	.0341	.31-	.311-
349	020	0093	3	2	06	362.70	2405.3	1.730	89.38	3.960	.00	10.00	18.56	.0342	.30-	.313-
349	020	0094	3	2	06	362.70	2405.3	1.730	90.13	3.960	.00	11.01	18.56	.0342	.31-	.313-
349	020	0095	3	2	06	362.84	2405.3	1.731	89.31	3.960	.00	11.99	18.51	.0341	.30-	.309-
349	020	0096	3	2	06	362.83	2405.3	1.731	89.32	3.960	.00	13.98	18.40	.0339	.30-	.300-
349	020	0097	3	2	06	362.62	2405.3	1.730	90.44	3.960	.00	16.63	18.33	[redacted]	[redacted]	[redacted]
349	020	0098	3	2	06	362.66	2405.3	1.730	89.23	3.960	.00	.01	18.35	.0338	.27-	.296-

PRELIMINARY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CMQ	CMA
349	021	0101	3	2	06	374.96	2489.4	2.286	90.00	4.650	.00	.01	18.56	.0330	.24-	.303-
349	021	0102	3	2	06	374.96	2489.4	2.286	92.30	4.650	.00	8.01-	18.18	[redacted]	[redacted]	[redacted]
349	021	0103	3	2	06	375.04	2489.4	2.286	92.80	4.650	.00	6.02-	18.36	.0327	.27-	.287-
349	021	0104	3	2	06	375.39	2489.4	2.288	90.00	4.650	.00	4.02-	18.48	.0329	.27-	.296-
349	021	0105	3	2	06	375.52	2489.4	2.289	88.01	4.650	.00	2.03-	18.53	.0330	.28-	.300-
349	021	0106	3	2	06	374.96	2489.4	2.286	91.47	4.650	.00	.01	18.55	.0330	.25-	.302-
349	021	0107	3	2	06	375.48	2489.4	2.289	91.43	4.650	.00	2.01	18.56	.0330	.26-	.302-
349	021	0108	3	2	06	375.18	2489.4	2.287	92.34	4.650	.00	3.99	18.66	.0332	.31-	.310-
349	021	0109	3	2	06	374.96	2489.4	2.286	91.14	4.650	.00	5.01	18.67	.0332	.32-	.311-
349	021	0110	3	2	06	374.96	2489.4	2.286	91.11	4.650	.00	5.99	18.67	.0332	.33-	.311-
349	021	0111	3	2	06	374.83	2489.4	2.285	91.65	4.650	.00	6.98	18.69	.0332	.33-	.313-
349	021	0112	3	2	06	374.96	2489.4	2.286	90.54	4.650	.00	8.01	18.69	.0332	.34-	.313-
349	021	0113	3	2	06	377.48	2489.4	2.301	89.43	4.650	.00	8.99	18.70	.0333	.32-	.312-
349	021	0114	3	2	06	375.35	2489.4	2.288	91.91	4.650	.00	10.00	18.71	.0333	.31-	.314-
349	021	0115	3	2	06	374.83	2489.4	2.285	90.00	4.650	.00	11.00	18.69	.0332	.32-	.313-
349	021	0116	3	2	06	375.31	2489.4	2.288	90.48	4.650	.00	11.97	18.64	.0332	.33-	.309-
349	021	0117	3	2	06	374.61	2489.4	2.284	90.48	4.650	.00	13.99	18.55	.0330	.33-	.302-
349	021	0118	3	2	06	375.00	2489.4	2.286	90.59	4.650	.00	16.65	18.54	[redacted]	[redacted]	[redacted]
349	021	0120	3	2	06	374.74	2489.4	2.284	90.78	4.650	.00	.01	18.56	.0330	.26-	.303-

PRELIMINARY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CNR	CNB
349	022	0025	1	4	07	438.61	2405.3	2.092	84.66	3.960	.00	.01	13.69	.0252	.11-	.098
349	022	0026	1	4	07	438.69	2405.3	2.093	82.49	3.960	.00	8.00-	13.75	.0253	.11-	.102
349	022	0028	1	4	07	438.69	2405.3	2.093	88.99	3.960	.00	6.00-	13.75	.0253	.12-	.102
349	022	0029	1	4	07	439.45	2405.3	2.096	90.20	3.960	.00	4.00-	13.74	.0253	.12-	.101
349	022	0030	1	4	07	438.38	2405.3	2.091	90.20	3.960	.00	2.03-	13.72	.0252	.12-	.100
349	022	0031	1	4	07	439.37	2405.3	2.096	92.79	3.960	.00	.01	13.70	.0252	.11-	.098
349	022	0032	1	4	07	439.14	2405.3	2.095	87.55	3.960	.00	1.99	13.66	.0251	.11-	.096
349	022	0033	1	4	07	438.53	2405.3	2.092	82.24	3.960	.00	3.99	13.63	.0251	.11-	.094
349	022	0034	1	4	07	438.91	2405.3	2.094	88.67	3.960	.00	5.99	13.58	.0250	.09-	.090
349	022	0035	1	4	07	438.84	2405.3	2.093	90.13	3.960	.00	8.01	13.54	.0249	.07-	.088
349	022	0036	1	4	07	439.22	2405.3	2.095	86.69	3.960	.00	10.00	13.50	.0248	.07-	.085
349	022	0037	1	4	07	439.22	2405.3	2.095	88.46	3.960	.00	11.97	13.44	.0247	.08-	.081
349	022	0038	1	4	07	438.99	2405.3	2.094	83.47	3.960	.00	13.99	13.38	.0246	.08-	.078
349	022	0039	1	4	07	438.99	2405.3	2.094	78.83	3.960	.00	16.65	13.24	[redacted]	[redacted]	[redacted]
349	022	0040	1	4	07	438.07	2405.3	2.090	94.01	3.960	.00	.01	13.69	.0252	.11-	.098

PRELIMINARY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PRJ	RUN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CNR	CNB
349	023	0043	1	4	07	440.92	2489.4	2.688	94.05	4.650	.00	.01	13.69	.0243	.11-	.097
349	023	0044	1	4	07	441.05	2489.4	2.689	92.58	4.650	.00	8.00-	13.74	.0244	.12-	.100
349	023	0045	1	4	07	440.62	2489.4	2.686	88.83	4.650	.00	4.02-	13.73	.0244	.14-	.100
349	023	0046	1	4	07	440.62	2489.4	2.686	88.64	4.650	.00	2.03-	13.71	.0244	.11-	.099
349	023	0047	1	4	07	440.62	2489.4	2.686	89.93	4.650	.00	.01	13.69	.0243	.11-	.097
349	023	0048	1	4	07	441.01	2489.4	2.688	84.95	4.650	.00	2.01	13.66	.0243	.12-	.096
349	023	0049	1	4	07	440.62	2489.4	2.686	85.84	4.650	.00	3.99	13.62	.0242	.11-	.093
349	023	0050	1	4	07	440.49	2489.4	2.685	97.30	4.650	.00	7.99	13.54	.0241	.07-	.087
349	023	0051	1	4	07	440.66	2489.4	2.686	91.51	4.650	.00	11.97	13.43	.0239	.09-	.080
349	023	0052	1	4	07	440.66	2489.4	2.686	88.25	4.650	.00	16.63	13.24	.0235	.08-	.068
349	023	0053	1	4	07	440.75	2489.4	2.687	92.40	4.650	.00	.01	13.68	.0243	.12-	.096

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PRJ	RUN	POINT	CONF	I	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CNR	CNB
349	024	0056	1	4	07	451.99	2165.5	1.674	93.12	2.980	.00	.01	13.56	.0277	.10-	.086
349	024	0057	1	4	07	452.19	2165.5	1.674	90.95	2.980	.00	8.00-	13.71	.0280	.09-	.096
349	024	0058	1	4	07	452.60	2165.5	1.676	94.44	2.980	.00	4.02-	13.64	.0279	.11-	.091
349	024	0059	1	4	07	452.17	2165.5	1.674	104.07	2.980	.00	2.01-	13.61	.0278	.11-	.089
349	024	0060	1	4	07	452.71	2165.5	1.676	84.46	2.980	.00	.01	13.56	.0277	.11-	.087
349	024	0061	1	4	07	452.13	2165.5	1.674	92.44	2.980	.00	1.99	13.56	.0277	.10-	.086
349	024	0062	1	4	07	452.48	2165.5	1.675	88.50	2.980	.00	3.99	13.51	.0276	.09-	.083
349	024	0064	1	4	07	452.31	2165.5	1.675	96.72	2.980	.00	8.01	13.42	.0274	.04-	.077
349	024	0065	1	4	07	452.25	2165.5	1.675	99.82	2.980	.00	8.01	13.42	.0274	.08-	.077
349	024	0066	1	4	07	452.36	2165.5	1.675	103.28	2.980	.00	11.99	13.32	.0272	.05-	.071
349	024	0067	1	4	07	452.60	2165.5	1.676	101.43	2.980	.00	16.63	13.06			
349	024	0068	1	4	07	452.43	2165.5	1.675	95.60	2.980	.00	16.63	13.06			
349	024	0069	1	4	07	452.64	2165.5	1.676	91.49	2.980	.00	16.63	13.06			
349	024	0070	1	4	07	452.64	2165.5	1.676	90.92	2.980	.00	.01	13.55	.0277	.11-	.086

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PRJ	RLN	POINT	CONF	T	B	Q	V	RN	TP	MACH	AOS	AOA	FREQ	K	CNR	CNB
349	025	0073	1	4	07	496.47	1980.8	1.579	86.41	2.400	.00	.01	13.63	.0305	.08-	.083
349	025	0074	1	4	07	497.02	1980.8	1.581	85.04	[illegible]	.00	8.00-	13.88	.0310	.07-	.098
349	025	0075	1	4	07	497.35	1980.8	1.582	82.45	[illegible]	.00	4.00-	13.75	.0307	.08-	.090
349	025	0076	1	4	07	498.40	1980.8	1.585	81.64	[illegible]	.00	2.03-	13.71	.0306	.07-	.088
349	025	0077	1	4	07	498.18	1980.8	1.584	90.96	[illegible]	.00	.01	13.62	.0304	.08-	.082
349	025	0078	1	4	07	498.20	1980.8	1.584	89.29	[illegible]	.00	1.99	13.65	.0305	.07-	.084
349	025	0079	1	4	07	498.40	1980.8	1.585	72.65	[illegible]	.00	3.99	13.66	.0305	.03-	.085
349	025	0080	1	4	07	498.84	1980.8	1.586	91.16	[illegible]	.00	8.01	13.47	.0301	.05-	.073
349	025	0081	1	4	07	498.23	1980.8	1.585	94.86	[illegible]	.00	11.99	13.44	.0300	.00-	.071
349	025	0082	1	4	07	498.78	1980.8	1.586	139.13	[illegible]	.00	16.65	13.23			
349	025	0083	1	4	07	499.00	1980.8	1.587	78.93	[illegible]	.00	16.65	13.23			
349	025	0084	1	4	07	499.03	1980.8	1.587	90.80	[illegible]	.00	.01	13.64	.0305	.07-	.083

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[redacted]

APPENDIX "B"

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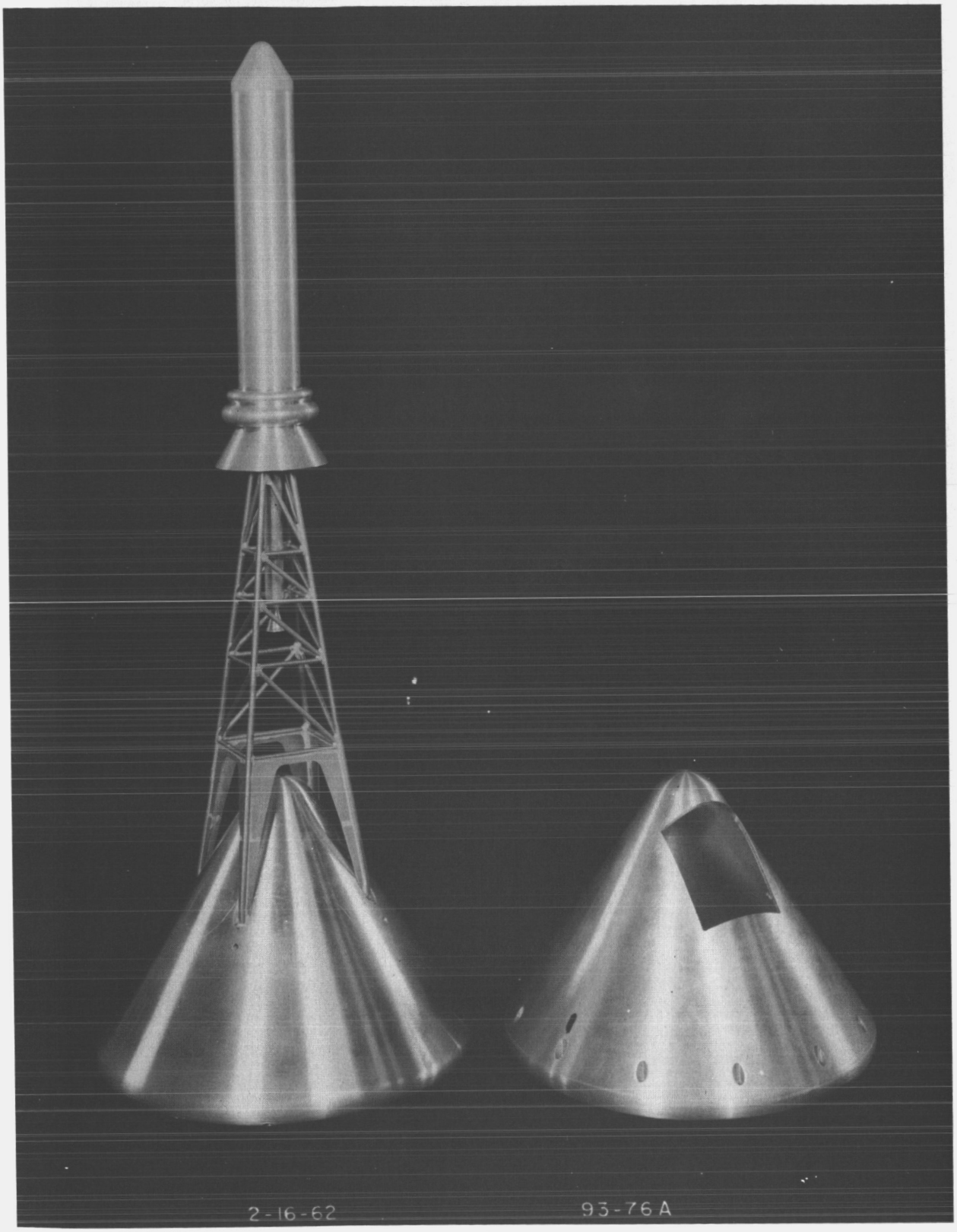

Fig. 1 Launch Escape Sys. ($ET_{12}C$) & Command Module (C)

Fig. 2 Launch Escape System (ET12C), Model Assembly

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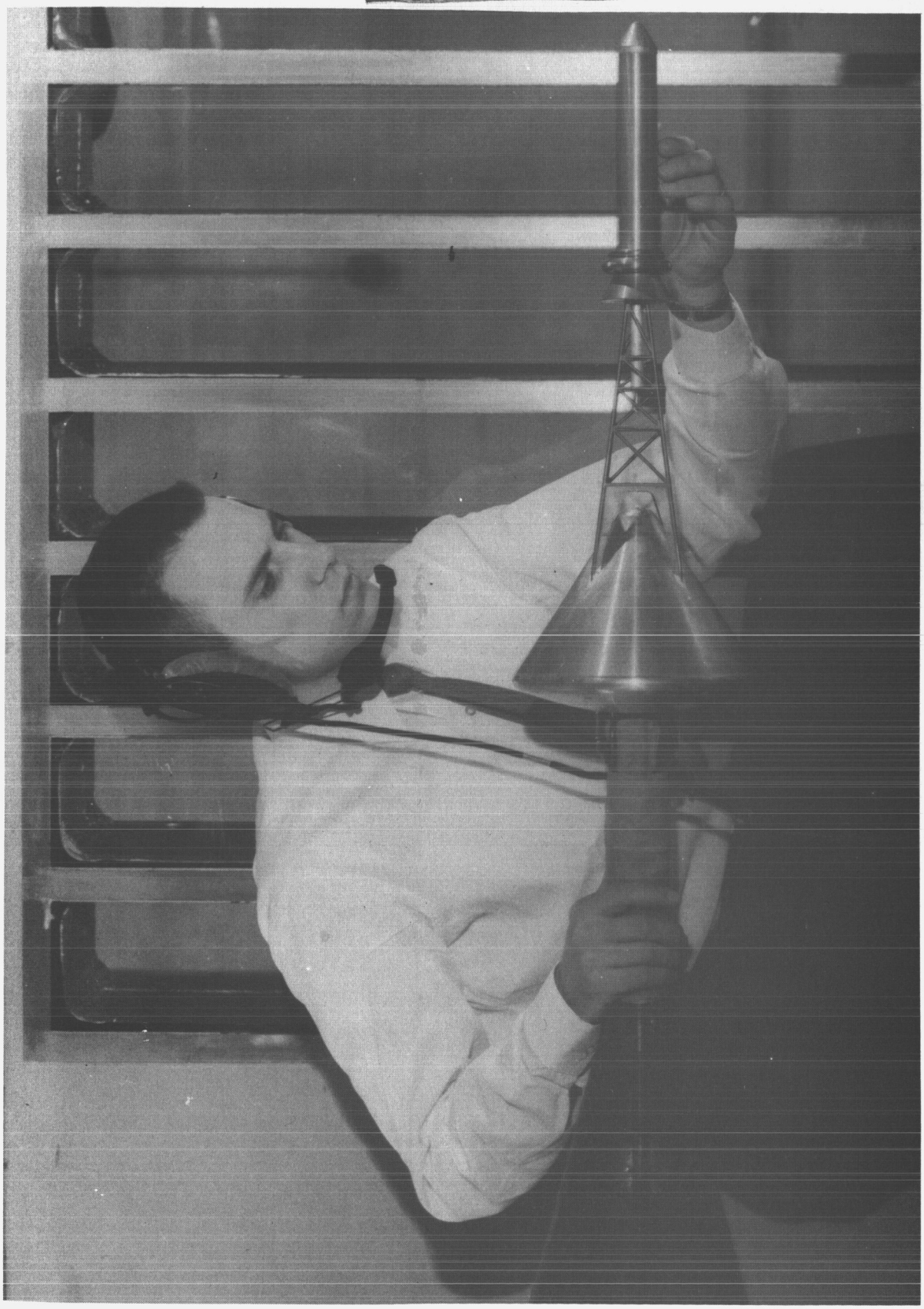

Fig. 3 Tunnel Installation-Launch Escape System ($ET_{12}C$)

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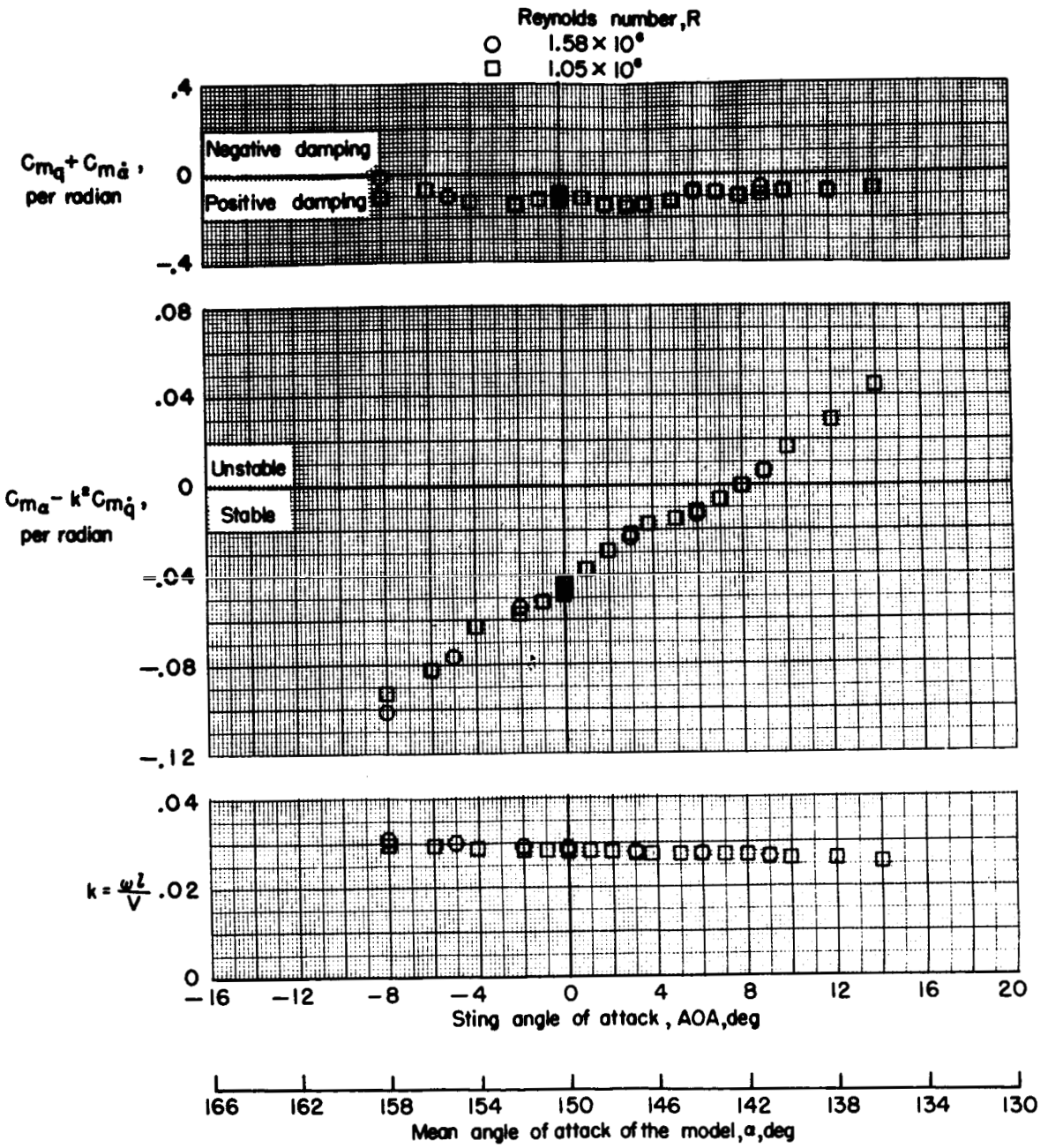
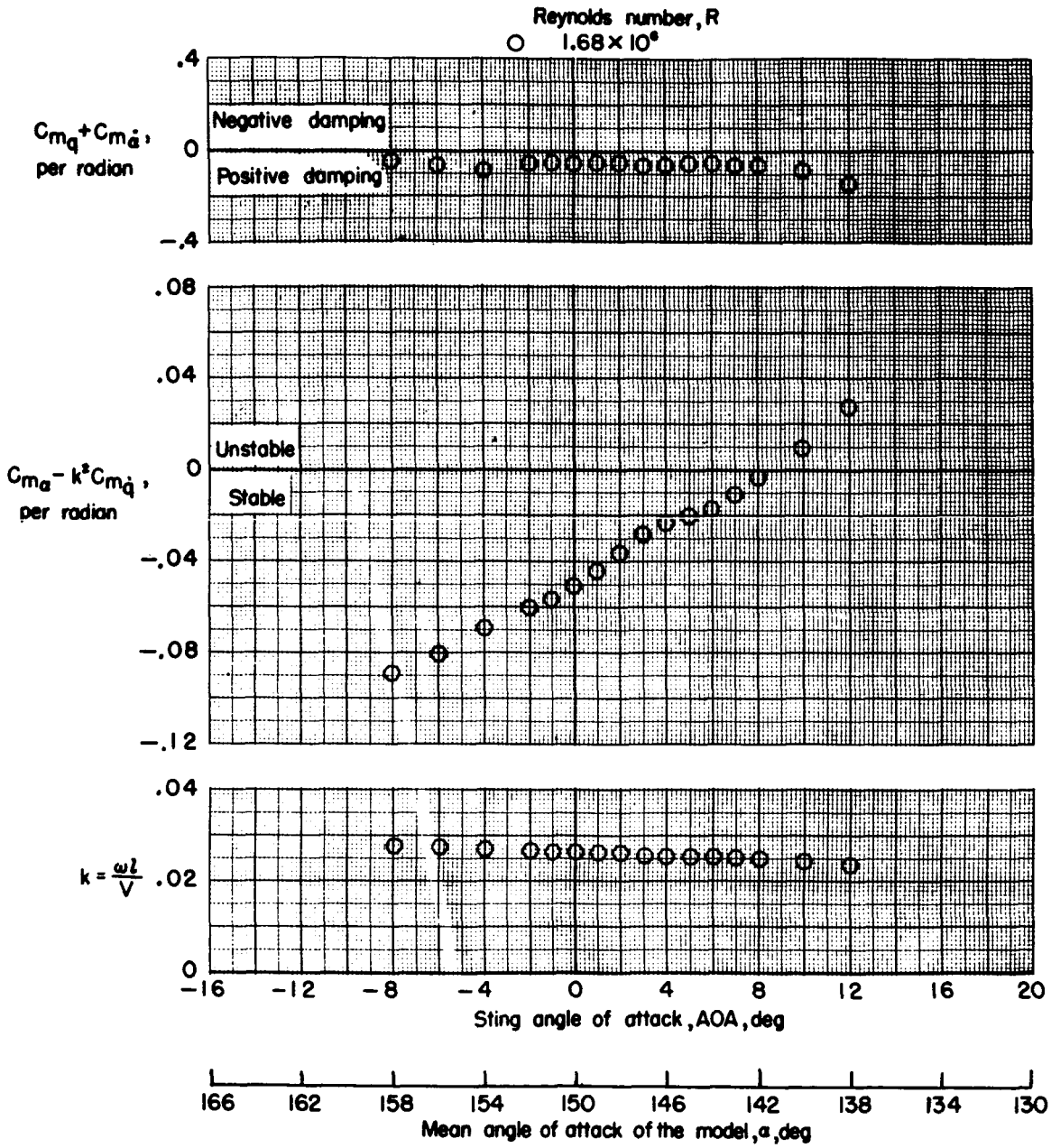


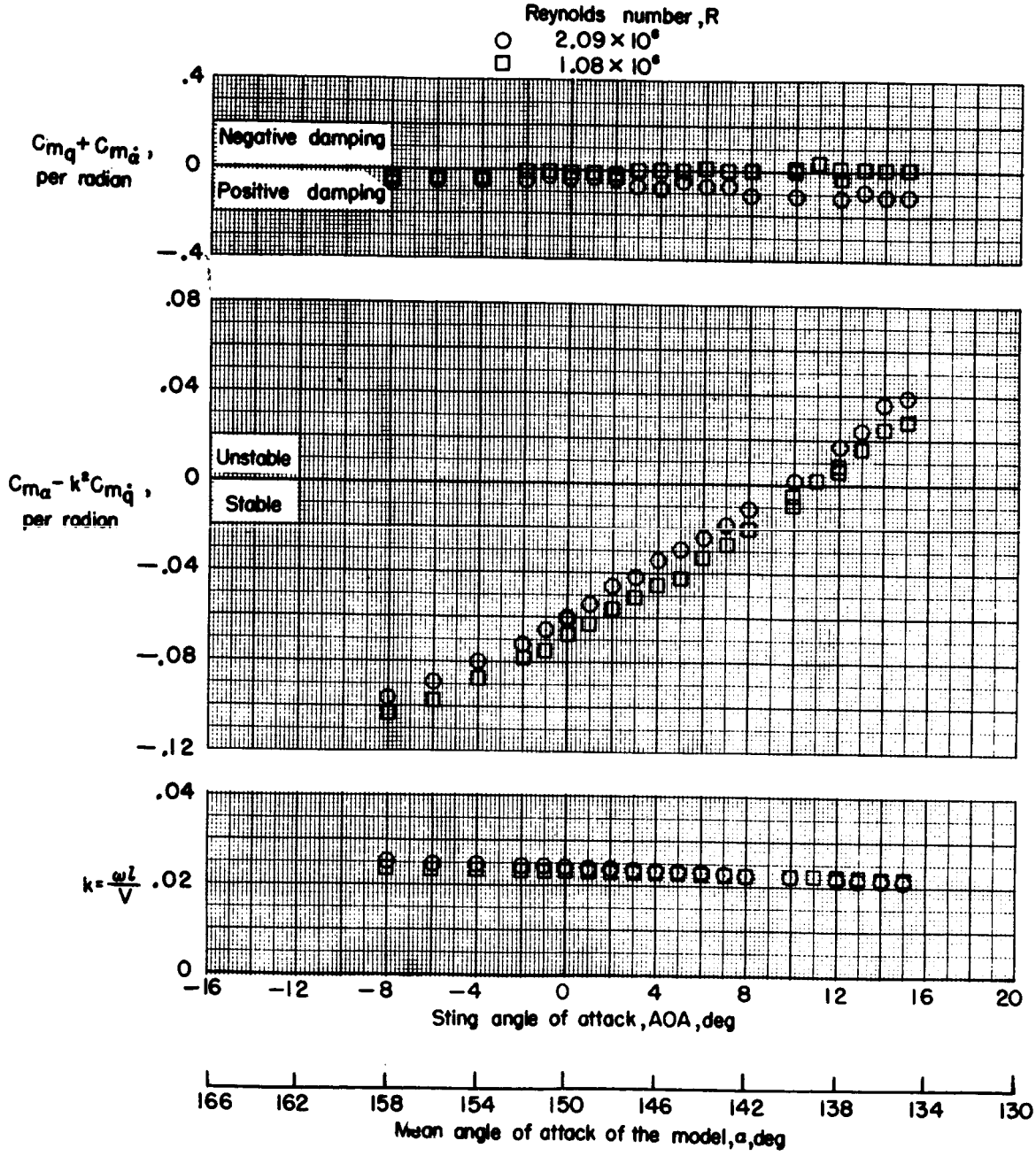
(a) M = 2.40. (Runs 1 and 8.)

Figure 4.- Variation of the damping-in-pitch parameter, the oscillatory longitudinal stability parameter, and the reduced frequency parameter with angle of attack for the entry configuration. (Data from runs 1 through 8.)



(b) M = 2.98. (Run 4.)

Figure 4 .- Continued.



(c) M = 3.96. (Runs 2 and 5.)

Figure 4 .- Continued.

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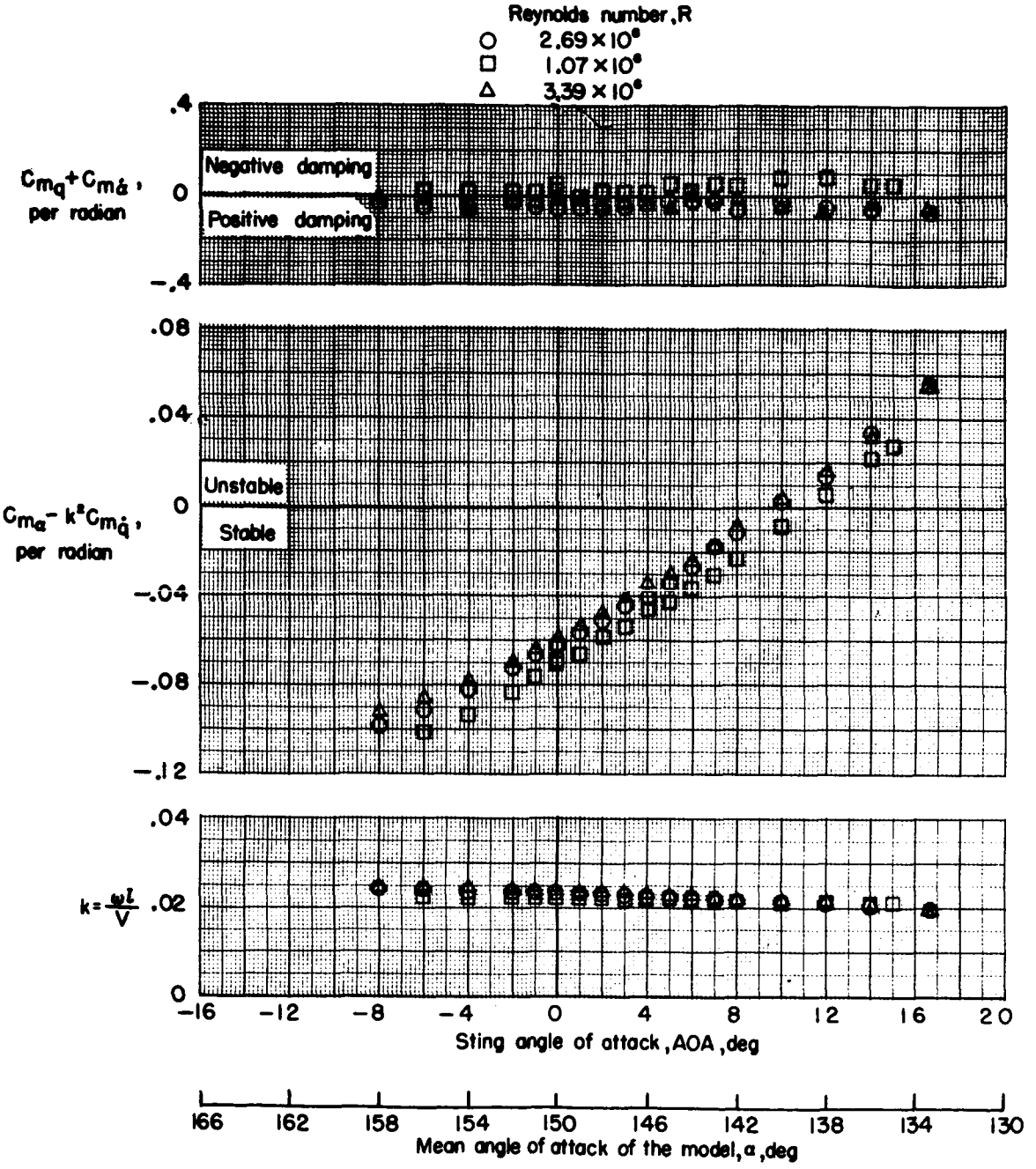
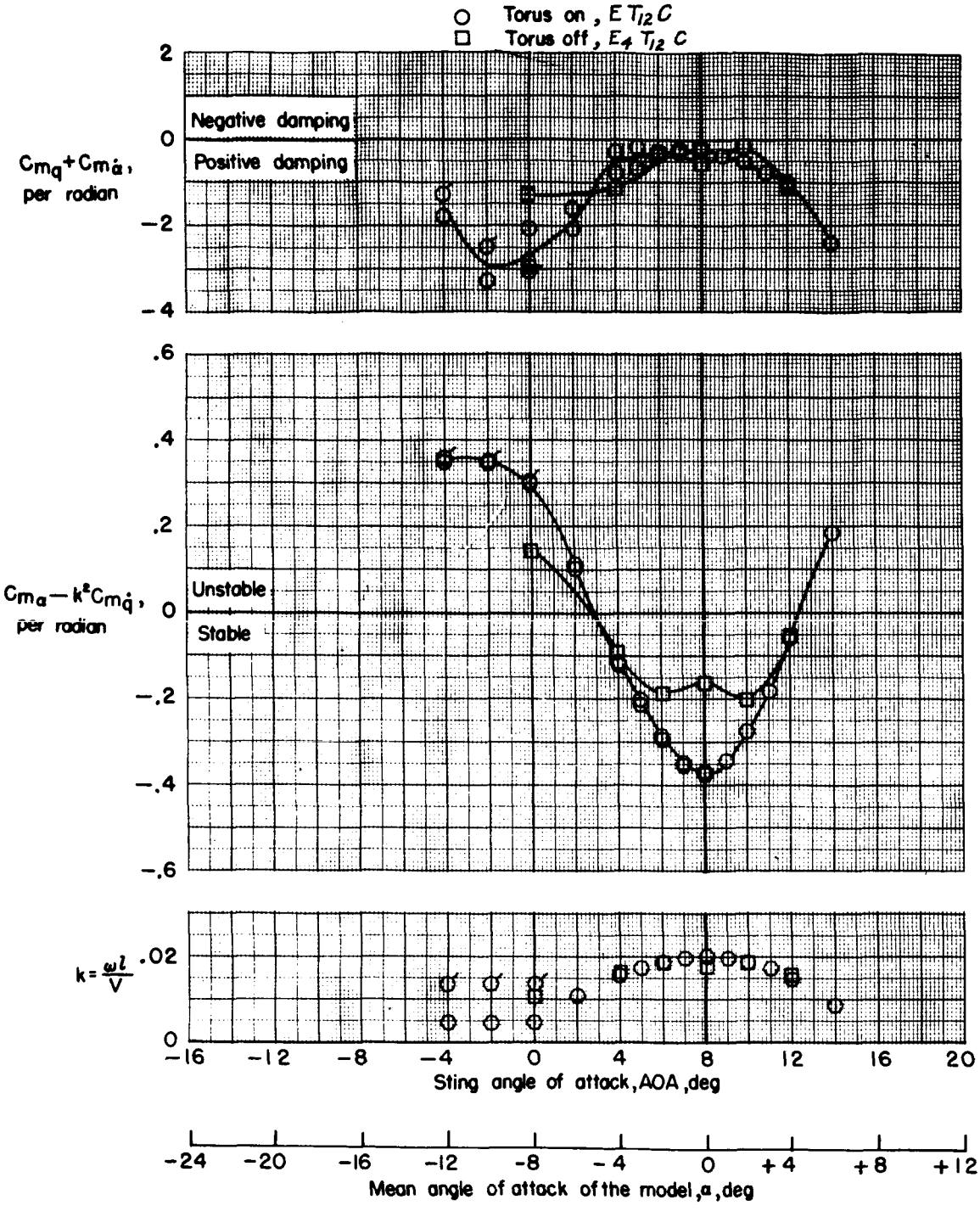


(d) M = 4.65. (Runs 3, 6, and 7.)

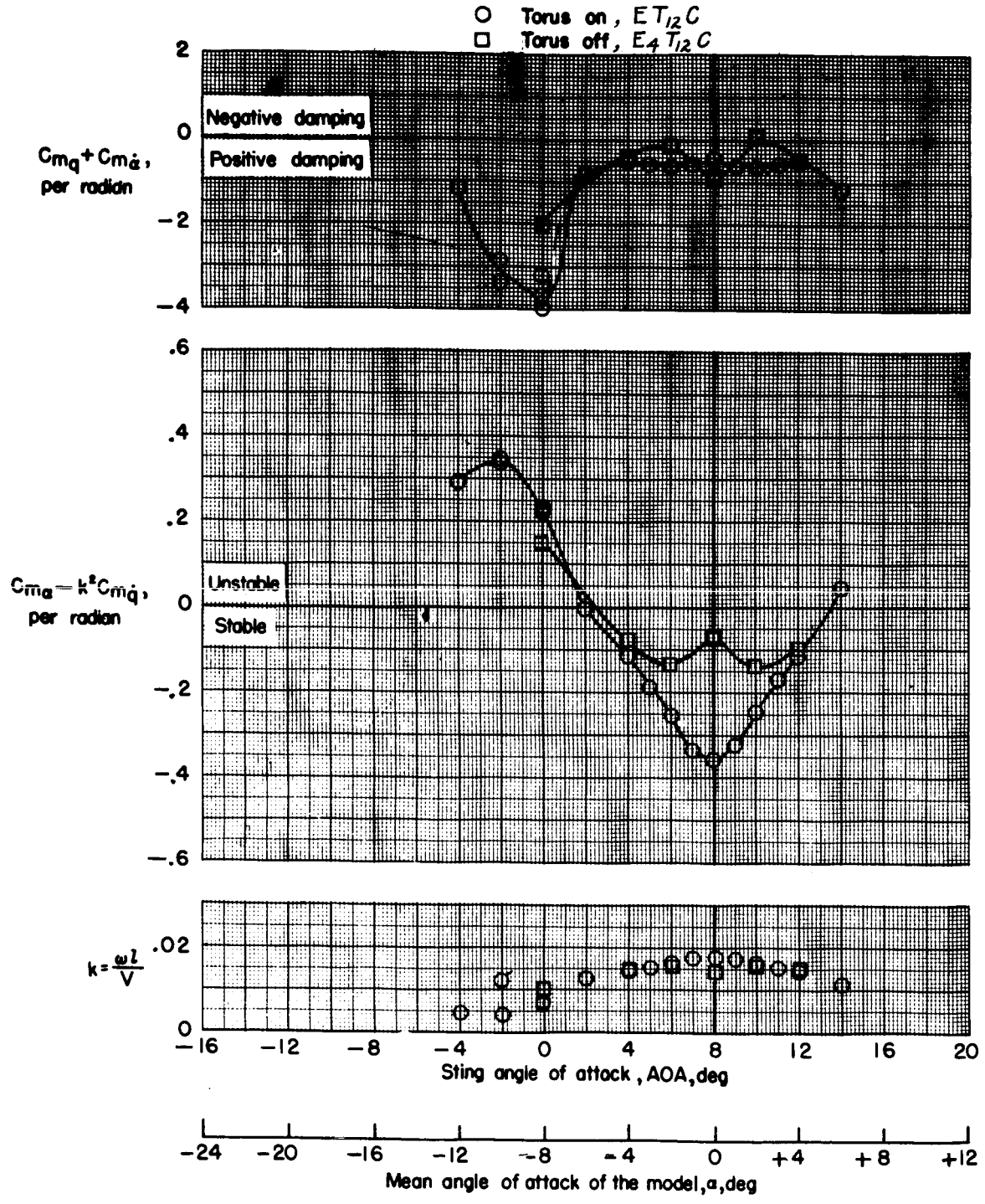
Figure 4 .- Concluded.



(a) M = 2.40; R = 1.58 x 10^6. (Runs 9 and 13.)

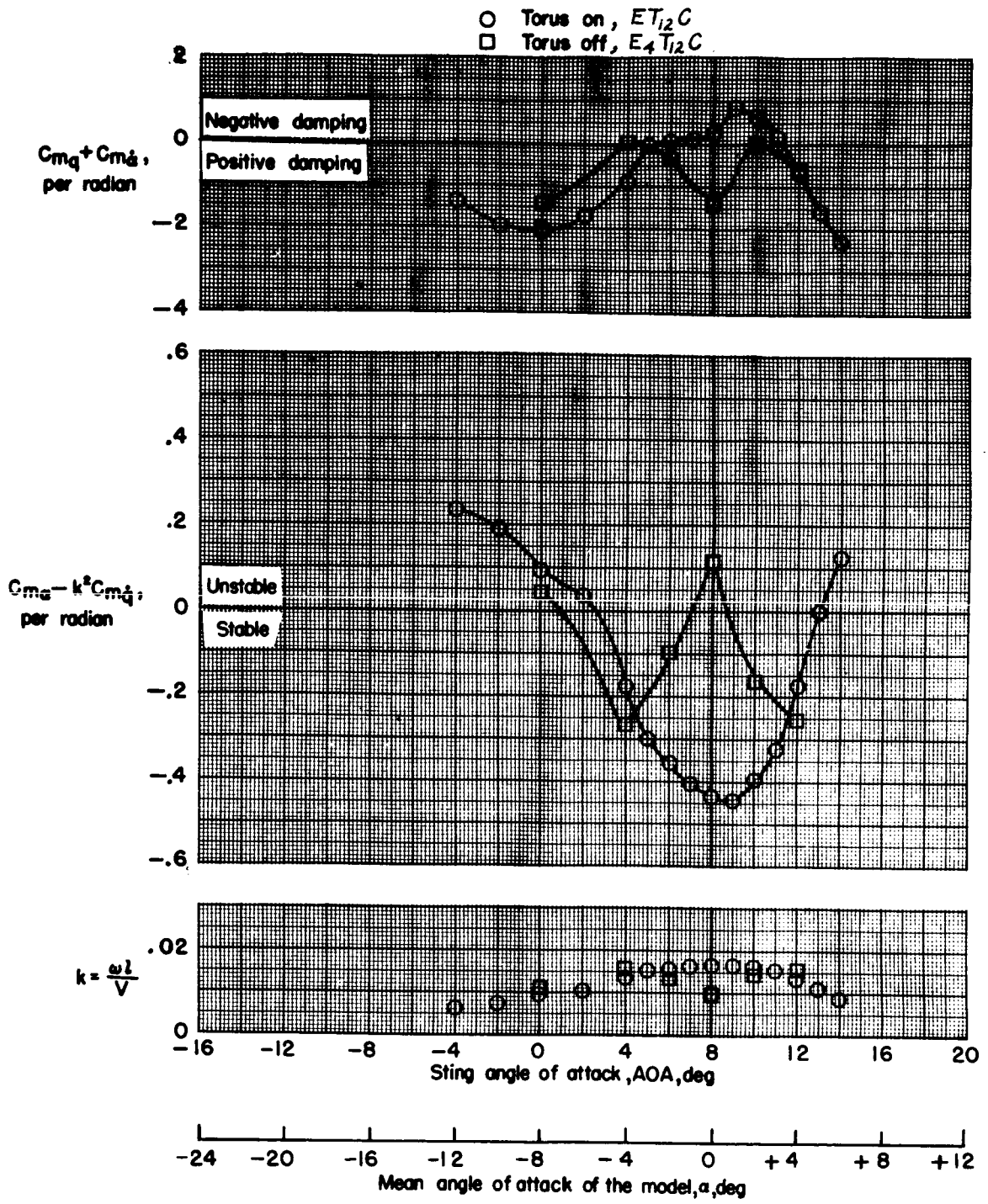
Figure 5.- Variation of the damping-in-pitch parameter, the oscillatory longitudinal stability parameter, and the reduced frequency parameter with angle of attack for the launch escape configuration. (Data from runs 9 through 17.) ~~CONFIDENTIAL~~

The flagged symbols indicate data taken at f = 6.00 cps.



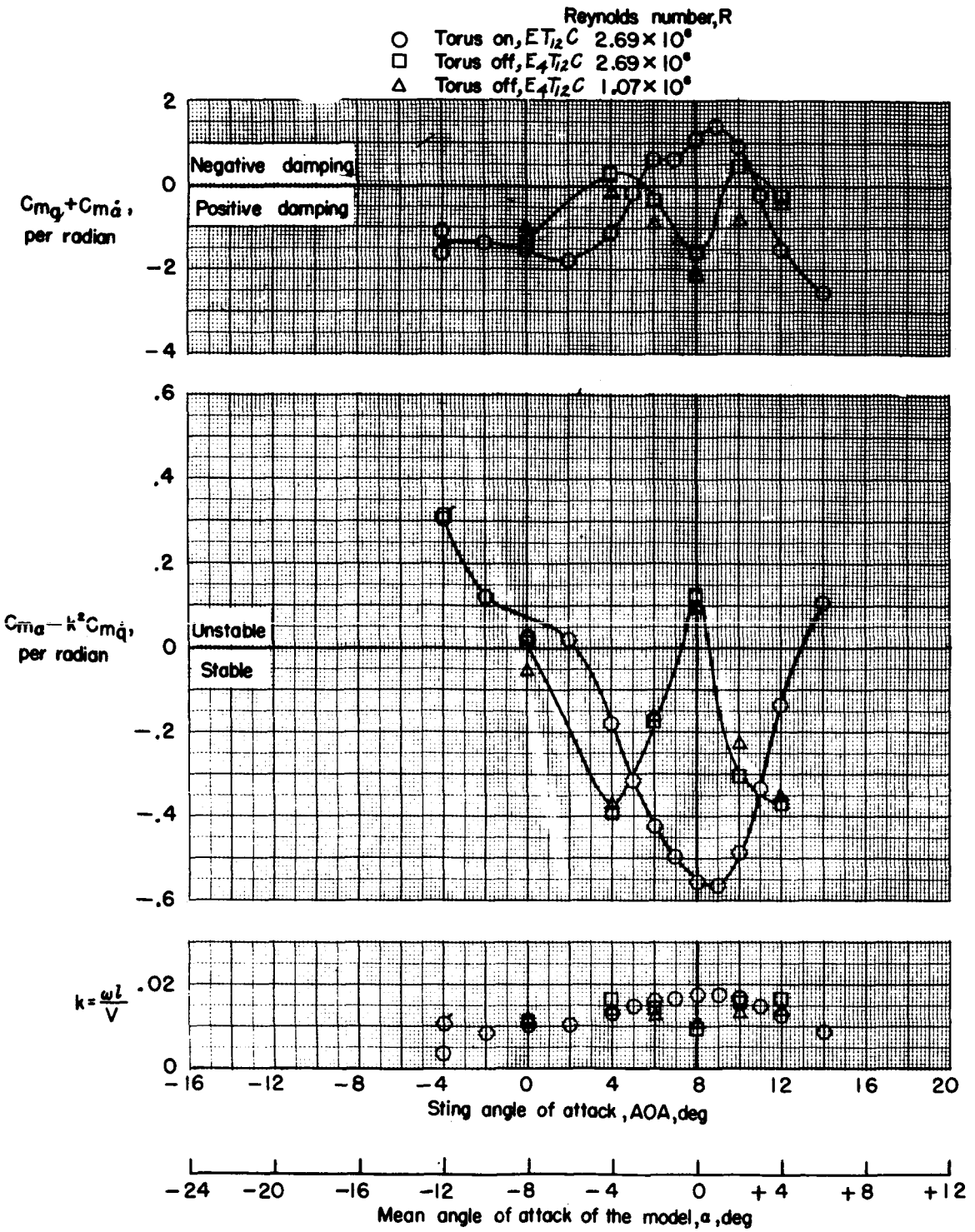
(b) M = 2.98; R = 1.67 x 10^6. (Runs 10 and 14.)

Figure 5 .- Continued.



(c) M = 3.96; R = 2.09 x 10^6. (Runs 11 and 15.)

Figure 5.- Continued.



(d) M = 4.65. (Runs 12, 16, and 17.)

Figure 5.- Concluded.

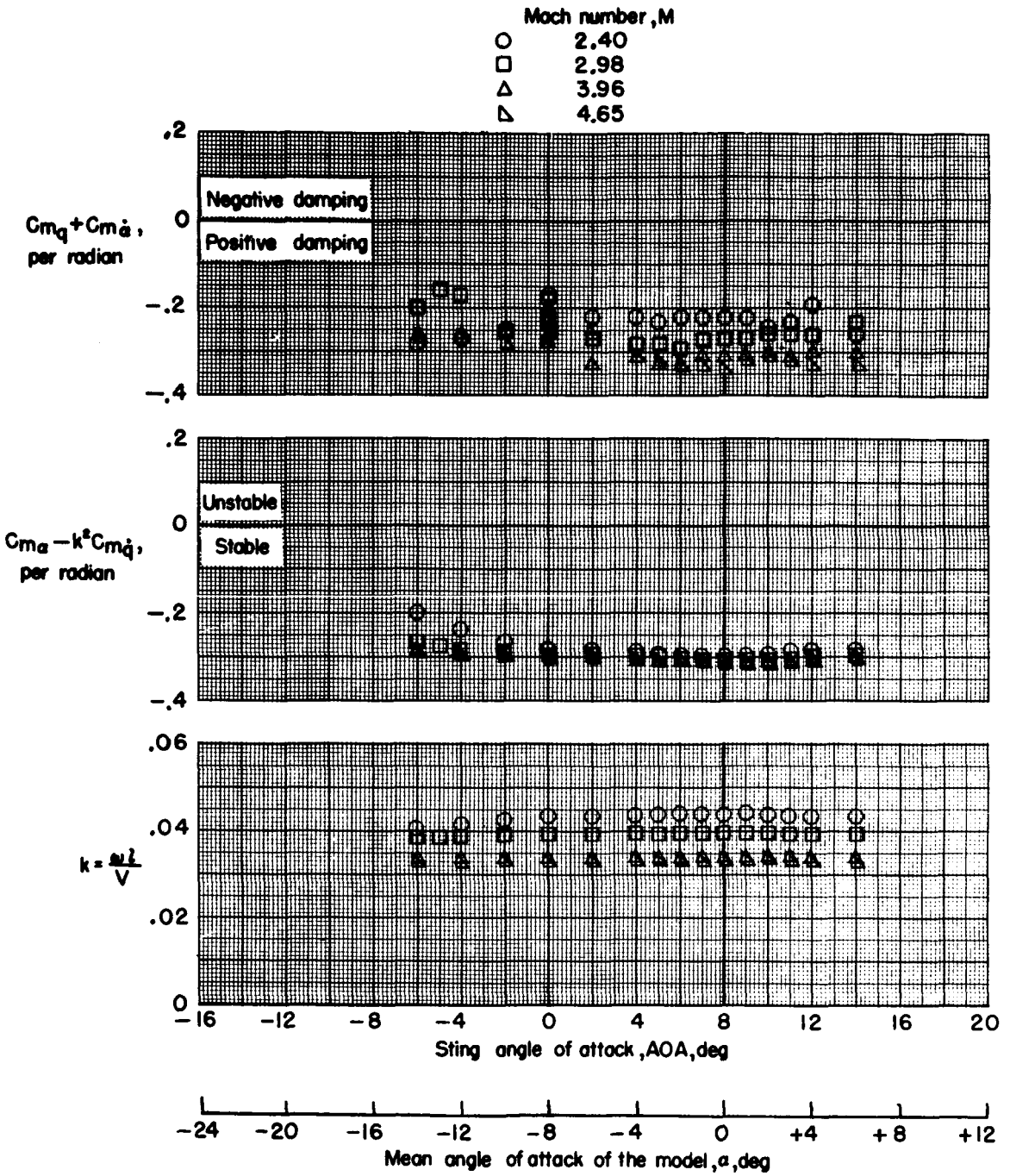


Figure 6 .- Variation of the damping-in-pitch parameter, the oscillatory longitudinal stability parameter, and the reduced frequency parameter with angle of attack for the command module with pointed end forward. "C" (Data from runs 18 through 21.)

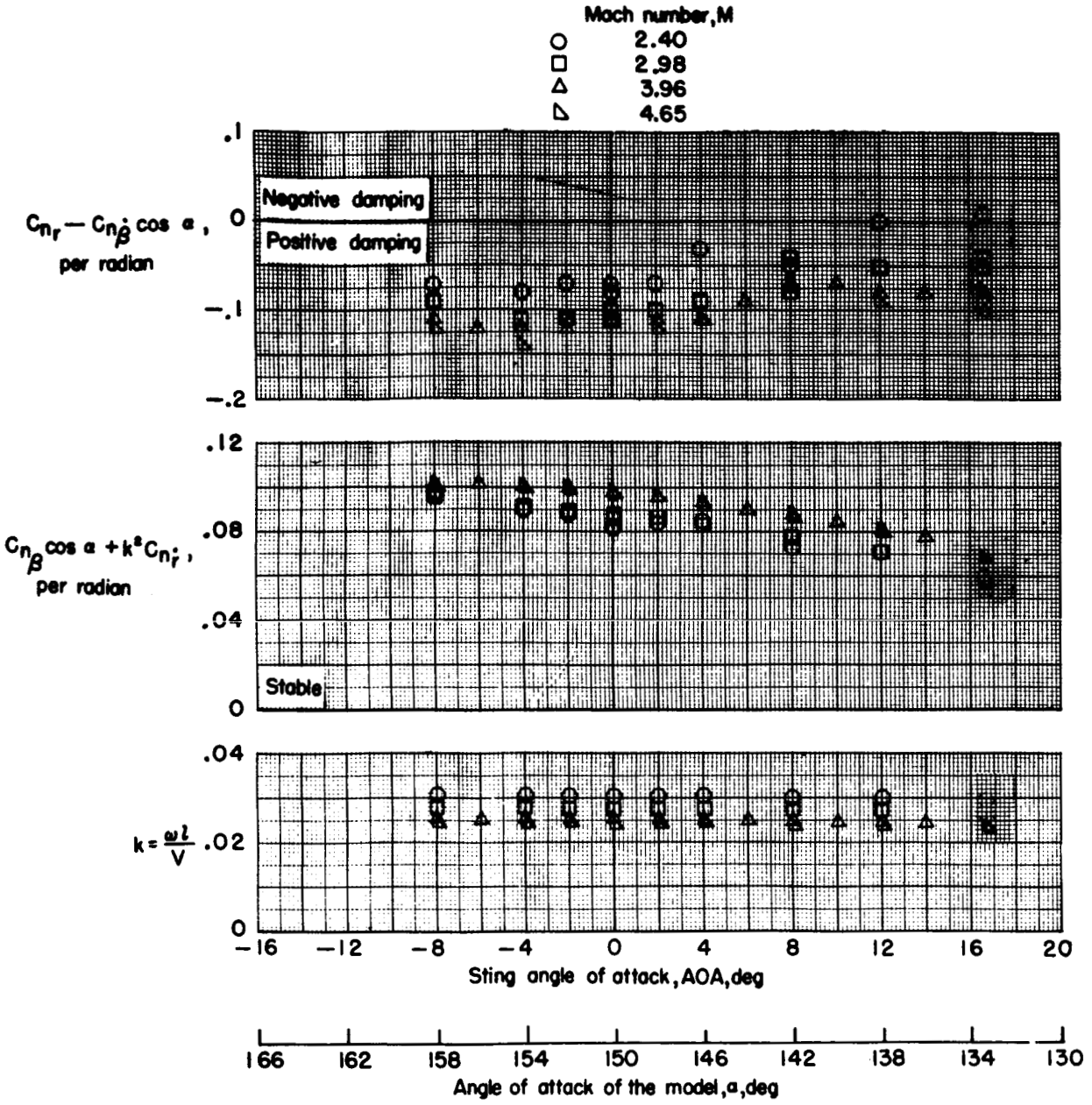


Figure 7 .- Variation of the damping-in-yaw parameter, the oscillatory directional stability parameter, and the reduced frequency parameter with angle of attack for the "C" entry configuration. (Data from runs 22 through 25.)

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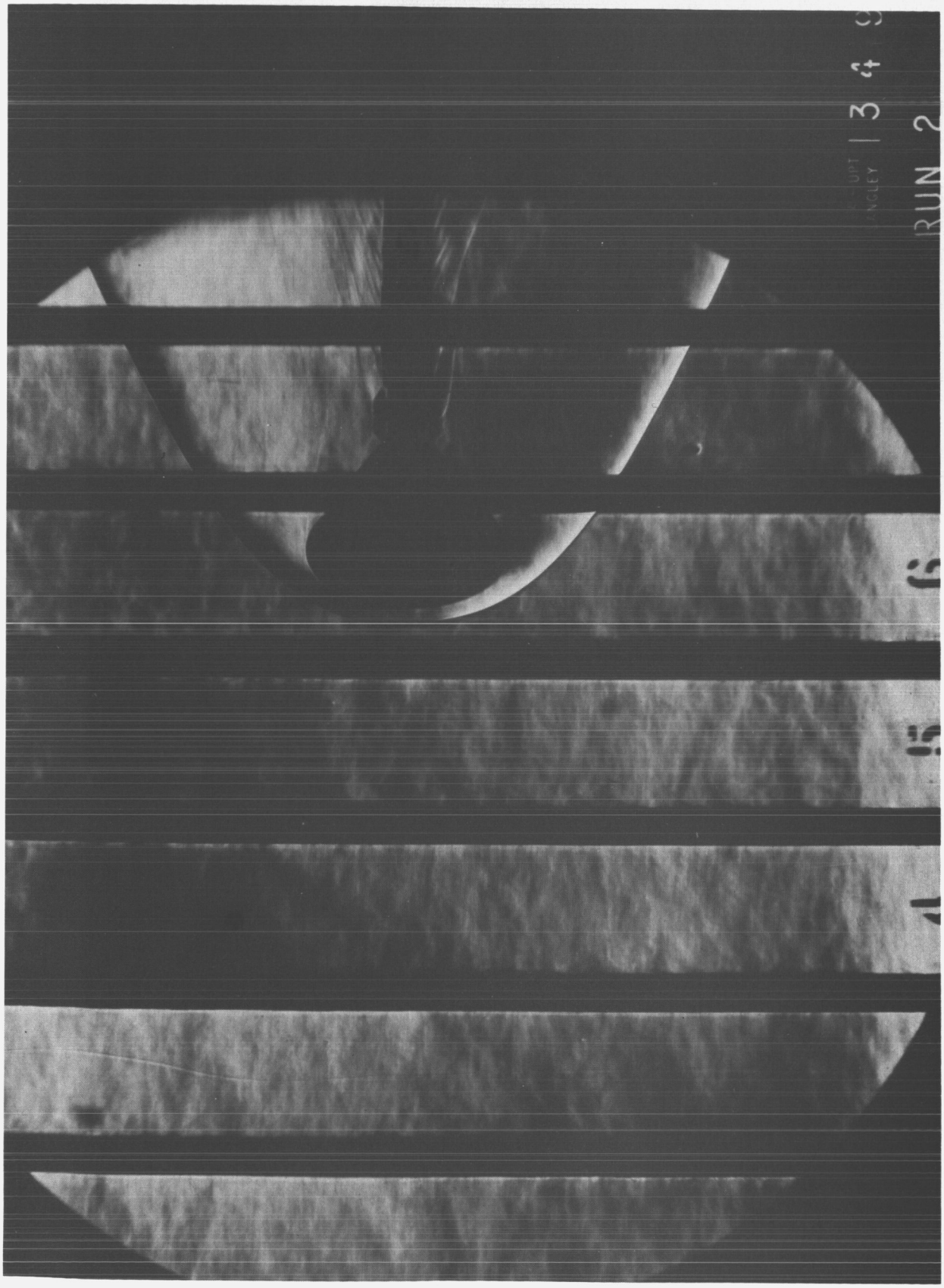

Fig. 8a Schlieren Photo at M = 3.96 Command Module (C) - Entry Attitude, α = 150°

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Fig. 8b Schlieren Photo at M = 3.96 Launch Escape Config.(ET12C), Tanks On, $\alpha = 0°$

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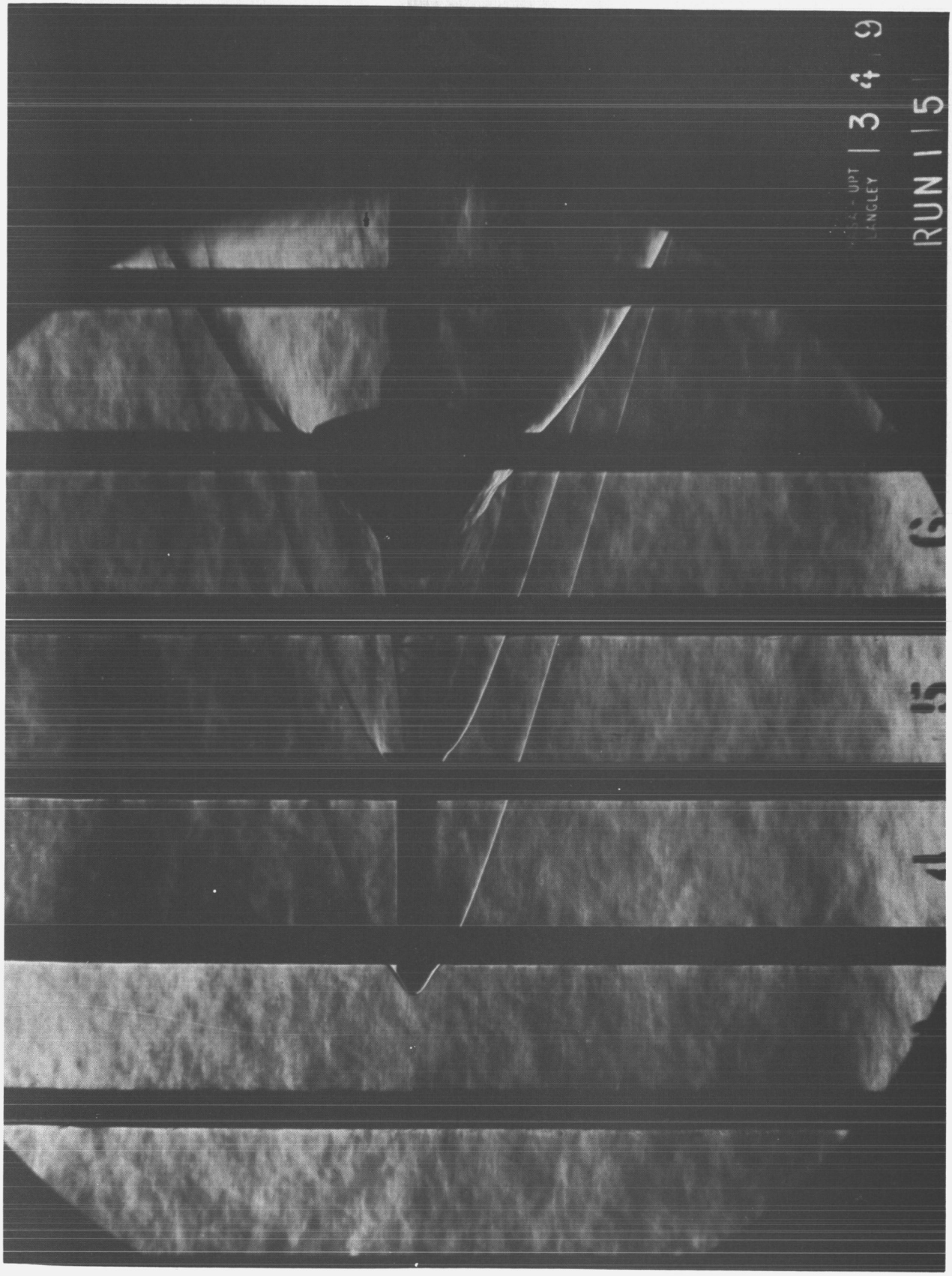

Fig. 8c Schlieren Photo at M = 3.96 Launch Escape Config. ($E_4T_{12}C$), Tanks Off, $\alpha = 0°$

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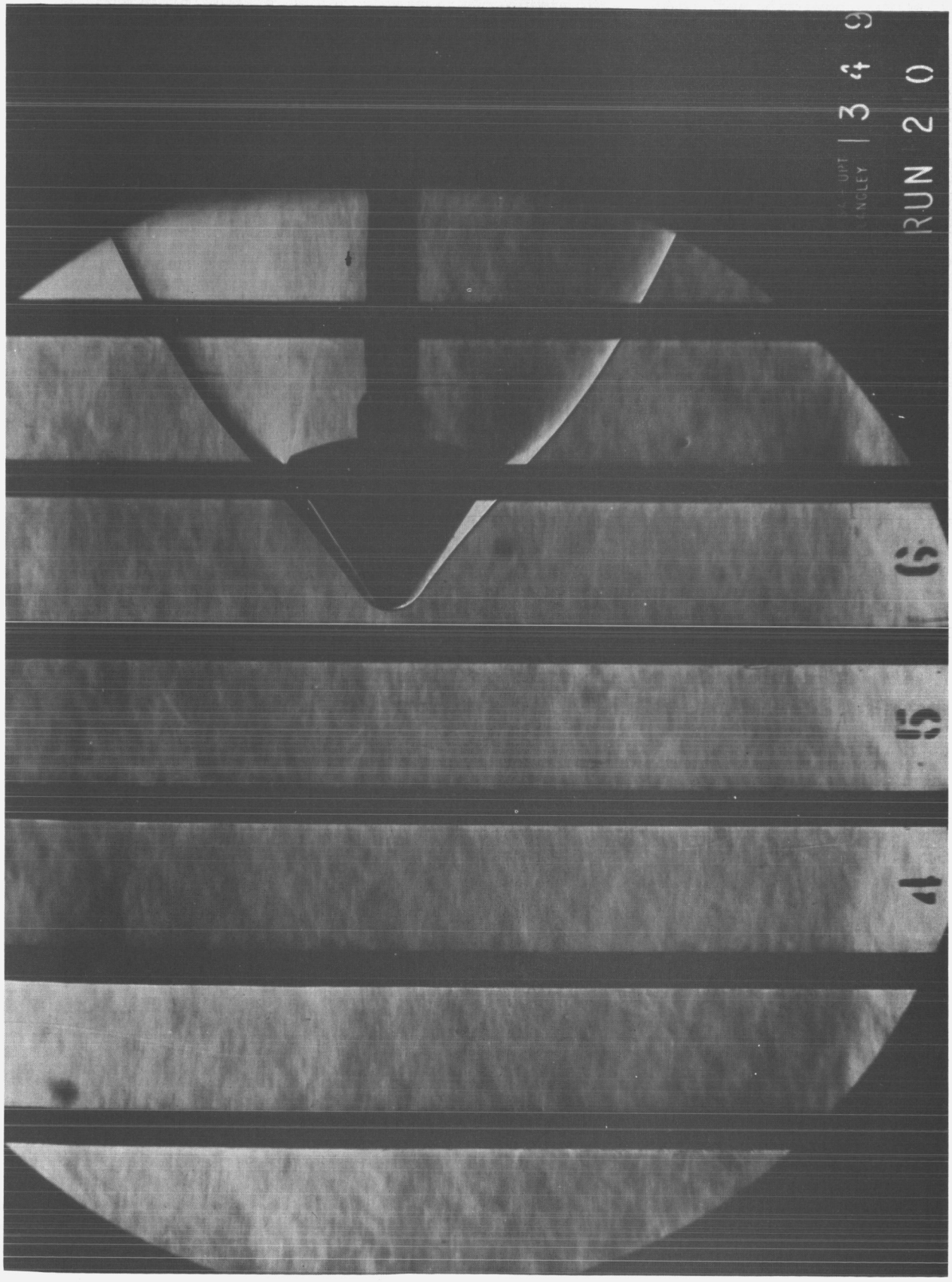

Fig. 8d Schlieren Photo at M = 3.96 Command Module (C) - Exit Attitude, $\alpha = 0°$

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