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AEROSTRUCTURES, INC.

**FINAL REPORT**

# AERODYNAMIC CHARACTERISTICS OF TWO 20 PERCENT THICK, RECTANGULAR WINGS UP TO 90° ANGLE OF ATTACK AT SUBSONIC, TRANSONIC, AND SUPERSONIC SPEEDS

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PALO ALTO, CALIFORNIA

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Requirement of NASA

Contract No. NAS 2-3814

AEROSTRUCTURES, INC.

PALO ALTO, CALIFORNIA


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Prepared under Contract No. NAS2-3814 by
AEROSTRUCTURES, INC.
Menlo Park, California

for

Ames Research Center
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

# AERODYNAMIC CHARACTERISTICS OF TWO 20 PERCENT THICK, RECTANGULAR WINGS UP TO 90° ANGLE OF ATTACK AT SUBSONIC, TRANSONIC, AND SUPERSONIC SPEEDS

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## SUMMARY

Tests were conducted in four wind tunnels to obtain aerodynamic coefficients for two wall mounted, 20 percent thick, rectangular wings, one of a double wedge and the other of a modified elliptic profile. Angles of attack up to 90° were covered at ten Mach numbers ranging from 0.20 to 3.50.

Section data was obtained by attaching a large plate to the tip of each wing. Spanwise loading information was determined for each wing up to 214 percent chord from the free tip.

## INTRODUCTION

The Rotor Entry Vehicle Program under way at the NASA has generated requirements for airfoil section characteristics, essentially two dimensional and for the region near a free tip, for two proposed rotor blade sections. Of significance was the requirement for data for the wing angle of attack range of 0° to 90°, at Mach numbers both subsonic and supersonic.

Existing theories are based on a limited angle of attack range, thus do not allow for adequate predictions of characteristics at high angles. There has been some experimental work published for high angles of attack at subsonic Mach numbers, one such test done by Montgomery Knight and Oscar Loeser, Jr. (ref. 1),

but little or no data is available for wings at supersonic Mach numbers at these high angles. The alternative then was to conduct a wind tunnel test program. This report is a description of that test program and a presentation of the results.

Both a 20 percent thick, symmetrical, elliptic profile and a 20 percent thick, symmetrical, double-wedge profile were tested at ten Mach numbers from 0.20 to 3.50, and at Reynolds numbers ranging from 0.18 million at Mach number of 3.50, to 1.40 million at Mach number of 0.20. Data were taken in the form of chordwise static pressures and reduced by computer to standard section coefficients.

The author wishes to acknowledge the assistance of Mr. Kenneth C. Endicott who, as test project engineer for Ames Research Center, contributed substantially to the testing and data reduction phases of the program.

## SYMBOLS

$c$ airfoil chord length, inches

$c_c$ section chord-force coefficient, $\frac{\text{chord force per unit span}}{q_\infty c}$ (called C(A) in the electronic printer sheets reproduced in Table I)

$c_d$ section pressure-drag coefficient, $\frac{\text{pressure drag per unit span}}{q_\infty c}$ (called C(D) in the electronic printer sheets reproduced in Table I)

$\Delta c_d$ rise in section drag coefficient above minimum, $c_d - c_{d_{min}}$

$c_\ell$ section lift coefficient, $\frac{\text{lift per unit span}}{q_\infty c}$ (called C(L) in the electronic printer sheets reproduced in Table I)

$\Delta c_\ell$ change in section lift coefficient from value for minimum drag coefficient, $c_\ell - c_{\ell_{d = min}}$

$c_{m_{c/2}}$ section pitching-moment coefficient about half-chord location, $\frac{\text{pitching moment about half-chord per unit span}}{q_\infty c}$ (called C(M) in the electronic printer sheets reproduced in Table I)

$c_n$ section normal-force coefficient, $\frac{\text{section normal force per unit span}}{q_\infty c}$ (called C(N) in the electronic printer sheets reproduced in Table I)

$C_p$ pressure coefficient, $\frac{p-p_\infty}{q_\infty}$

$k_a$ angle ratio, $\cong \frac{\Delta c_d/\Delta c_\ell}{\alpha - \alpha_{d = min}}$

L.E. leading edge

$M_\infty$ free stream Mach number

p local static pressure at model surface, pounds/foot$^2$

$p_\infty$ free stream static pressure, pounds/foot$^2$

$q_\infty$ free stream dynamic pressure, pounds/foot$^2$

Re Reynolds number based on c (called R in the electronic printer sheets reproduced in Table I)

T.E. trailing edge

x,z rectangular coordinates

$\alpha$ angle of attack, degrees

## TEST EQUIPMENT

### Wind Tunnels

The tests were performed in the following four wind tunnels at the Ames Research Center, Moffett Field, California:

(1) 8- by 7- Foot Supersonic Wind Tunnel
(2) 9- by 7- Foot Supersonic Wind Tunnel
(3) 11- by 11- Foot Transonic Wind Tunnel
(4) 12- Foot Pressure Wind Tunnel

These four facilities will be discussed briefly.

8- by 7- Foot Supersonic Wind Tunnel. - This tunnel is of the closed-return, variable-density type with a rectangular test section 8.0 feet high by 7.0 feet wide. The nozzle has flexible side walls with fixed upper and lower surfaces. The Mach number range is 2.45 to 3.50, continuously variable by moving the flexible side walls. The Reynolds number per foot range is $1.0 \times 10^6$ to $5.0 \times 10^6$.

9- by 7- Foot Supersonic Wind Tunnel. - This tunnel is a closed-return, variable-density tunnel with a rectangular test section 7.0 feet high by 9.0 feet wide. The Mach number range is 1.55 to 2.50, variable by translating, in the streamwise direction, a fixed contour sliding block that forms the floor of the nozzle. The Reynolds number per foot range is $1.5 \times 10^6$ to $6.5 \times 10^6$.

11- by 11- Foot Transonic Wind Tunnel. - This tunnel is also of the closed-return, variable density type with an 11- foot-square test section. A Mach number range of 0.70 to 1.40, continuously variable, is obtained by adjusting the flexible side walls of the nozzle. The Reynolds number per foot range is $1.7 \times 10^6$ to $9.4 \times 10^6$. The test section is slotted to permit transonic testing.

12- Foot Pressure Wind Tunnel. - This tunnel is a variable-density, low-turbulence tunnel that operates at subsonic speeds up to slightly less than Mach number 1.00. Airspeed in the test section is controlled by variation of the rotational speed of the two stage, axial flow fan. The Reynolds number-per-foot range is 0 to $9.0 \times 10^6$.

More detailed information on all four of the wind tunnel facilities can be found in reference 2.

## Models

The models consisted of two wall mounted wing sections, one of a double wedge and the other of an elliptic configuration profile. The models were cantilevered from the test section wall in the 8- by 7- foot, 9- by 7- foot, and 12- foot tunnels. Due to the test section arrangement in the 11- foot tunnel, a floor mounted installation was necessary. A photograph of the model of the double-wedge profile, mounted in the 11- foot tunnel is shown in figure 1. A sketch of the model is presented in figure 2, showing the more important assembly dimensions. A common spindle support was used for all tunnels, with adapters to accommodate the various floor and window mountings. The wings were untapered in planform and had square tips. Each had a chord length of 2.630 inches, a thickness of 20 percent chord (0.526 inches) and a span variable from 6.00 to 11.50 inches. The profiles of both airfoil sections are shown in figure 3. The section chord of 2.630 inches was selected to obtain the required test Reynolds numbers within the operating ranges of the four wind tunnels. Added significance of this small chord size is that reliable data may be obtained at high angles of attack as the blockage generated does not restrict tunnel operation.

The same model was used to obtain both essentially two-dimensional airfoil section data, and spanwise loading information in the region of the tip. To obtain the spanwise pressure distribution a scheme of tip segments added to the basic wing was used. The basic semi-span was 6.00 inches long, with a chordwise row of 32 static pressure orifices located at 5 percent of chord (0.132 inch) from the tip. Four spanwise segments are provided; one 0.50, one 1.00, and two 2.00 inches long. By adding various combinations of these segments to the basic wing, semi-span lengths in 0.50 inch increments from 6.00 inches to 11.50 inches could be obtained. This allowed determination of chordwise pressure distributions at span intervals of 19 percent chord, from 5 to 214 percent chord from the tip. A photograph illustrating the breakdown of the elliptic profile wing into the basic span and additive segments is shown in figure 4.

The 32 static pressure orifices are mounted symmetrically top and bottom, fore and aft. The locations of the orifices for both airfoil configurations are shown in figure 3. To obtain essentially two-dimensional data unaffected by the tips, a large plate was attached to the tip with the same through-bolt which attaches the tip segments.

The spindle is integral with the basic wing. A faired transition section joins the spindle and airfoil section. At the juncture a boundary layer diverter plate was positioned, outboard from the tunnel wall such that it will accommodate the maximum boundary layer thickness of the four tunnels. Actuation of the model through an angle of attack range of $90^{\circ}$ was accomplished by a simple lever arm attached to the end of the spindle outboard of the tunnel wall, and driven by a 24 volt linear actuator. Angle of attack was measured by means of a precision ten turn potentiometer driven from the end of the spindle through a minimum back-lash speed reducer. Material for the elliptic wing was heat

treated AISI-4130 steel, and for the double wedge heat treated maraging steel.

## TEST PROCEDURE

The same test procedure was used for both wings in all four wind tunnels. The tunnel conditions were set to a given Reynolds number and Mach number, and the model pitched through the angle of attack range. The tunnel conditions were then reset to a different Mach number and/or Reynolds number, and the angle of attack schedule repeated. The basic test schedule followed in each tunnel is summarized in the following table:

| | | | | | |
|---|---|---|---|---|---|
| 12- Foot Tunnel | $M_\infty$ | 0.20 | 0.20 | 0.60 | 0.60 |
| | Re, millions | 0.49 | 1.40 | 0.44 | 0.64 |
| 11- Foot Tunnel | $M_\infty$ | 0.90 | 1.00 | 1.10 | 1.30 |
| | Re, millions | 0.53 | 0.53 | 0.53 | 0.53 |
| 9- by 7- Foot Tunnel | $M_\infty$ | 1.60 | 1.60 | 2.00 | 2.00 |
| | Re, millions | 0.32 | 0.49 | 0.27 | 0.48 |
| 8- by 7- Foot Tunnel | $M_\infty$ | 2.50 | 2.50 | 3.50 | 3.50 |
| | Re, millions | 0.22 | 0.47 | 0.18 | 0.46 |

The span length sequence was to start with the basic 6.00 inch span and add tip segments in increasing lengths with the last configuration being the 11.50 inch span with the tip plate attached. Intermediate span lengths tested were generally 6.50, 7.50, 9.50, and 10.50 inches; however, in order to stay within the allotted wind tunnel use time, not all of these intermediate

span lengths were tested for all of the Mach number and Reynolds number combinations.

The angle of attack schedule was generally from $-4^{\circ}$ to $92^{\circ}$ at $4^{\circ}$ intervals. In some runs in order to obtain more detail the interval was shortened to $1^{\circ}$ in the low angle region; also in some runs the interval was lengthened to $8^{\circ}$ or $16^{\circ}$ in the high angle region where data from early runs was relatively constant for small angle of attack changes. On some runs, specifically the double-wedge airfoil at transonic speeds, when the model with attached tip plate approached the high angles of attack excessive deflections and vibrations occurred, forcing a shutdown. Data recorded during these runs was therefore limited to low angles of attack. The $0^{\circ}$ to $90^{\circ}$ calibration for each wing was set when the wing was first installed, and checked periodically throughout the test. The angles were set by means of a bubble level placed upon a leveling bar attached, through alignment pins, to the wing tip. Error in the angle of attack settings due to backlash in the angle measurement and drive system was eliminated during the test runs (with the exception of one run as discussed in the section on results) by always approaching the setting from the lower side, that is to say from the negative direction.

At each test condition, the static pressure at each of the 32 orifices was measured by electric pressure transducers and recorded simultaneously, along with angle of attack and wind tunnel conditions, by an electronic recording system. This system would record the data on a punched tape, print it out on an electronic printer, and communicate it by teletype to the Ames Research Center's central computing facility. When "on line" computer time was available, the results would be computed and returned immediately to the tunnel facility by teletype. This "on line" computing was utilized to conserve test time by eliminating those test conditions which on earlier similar runs showed little variation, and to investigate more closely interesting test conditions.

## REDUCTION OF DATA

The data was reduced by computer to the aerodynamic section coefficients of normal force, $c_n$; chord force, $c_c$; lift, $c_\ell$; pressure drag, $c_d$; and pitching moment about the half-chord point, $c_{m_{c/2}}$.

The first step was to reduce the static pressure at each orifice to the standard coefficient of pressure

$$C_p = \frac{p-p_\infty}{q_\infty}$$

where p is the static pressure at the given orifice and $p_\infty$ and $q_\infty$ are the free stream static and dynamic pressures in the test section.

Normal-force, chord-force, and pitching-moment coefficients were determined by integrating the expressions

$$c_n = -\frac{1}{c}\int C_p dx$$

$$c_c = \frac{1}{c}\int C_p dz$$

$$c_{m_{c/2}} = \frac{1}{c^2}\int C_p x dx + \frac{1}{c^2}\int C_p z dz$$

where c is the section chord length and x and z define the coordinate system of the section as shown in figure 3. A positive $c_n$ is then in the upward direction, positive $c_c$ in the aft direction, and positive $c_m$ in the leading edge up direction.

The integrations were performed numerically, utilizing the Simpson's Rule method of curve fitting. Basically, this method replaces a given curve by a set of approximating parabolic arcs, each defined by three successive orifice locations. The integration, however, had to be treated differently for each model. The elliptic section fits in conveniently with the Simpson's

Rule procedure; however, for the double-wedge section there are no orifices at the leading and trailing edges and at the upper and lower shoulders so that dummy end-points had to be constructed, one for each side of each edge and shoulder. The dummy points were determined by extrapolating a parabola from the nearest three points on their respective surface.

The lift and pressure-drag coefficients at each angle of attack were computed from the expressions

$$c_\ell = c_n \cos \alpha - c_c \sin \alpha$$

$$c_d = c_n \sin \alpha + c_c \cos \alpha$$

In using the pressure distribution method of drag determination the skin friction drag, of course, is not measured.

## PRECISION OF RESULTS

High precision equipment was used for calibration, measurement, and recording, both for the model and tunnel conditions, so that the errors between recorded and actual test conditions are extremely small. The largest source for error is undoubtedly in the method for reducing the data to the coefficients.

The accuracies of the recorded pressures, and consequently the values of $C_p$, are considered to be within the range of the precision of the pressure transducers used, namely 0.1 percent of actual. There was no measurable backlash in the model support and angle of attack drive systems; and, as explained in the description of the test procedure, the backlash in the angle of attack readout system, which is in the order of $1^\circ$, was eliminated during the actual testing by approaching a desired setting always from

the negative direction. The errors in the recording potentiometer and electronic recorder being extremely small, the accuracy of the angle of attack measurement is then limited essentially to the $0^{\circ}$ and $90^{\circ}$ calibrations, which by bubble level measurement were found to be repeatable to true horizontal and vertical within 0.1 degree.

Because of the large volume of data recorded, a computer was used for the data reduction. The method of curve fitting used for the numerical integration of the plots of $C_p$ versus x/c or z/c was based on the technique of successive fairings between three consecutive orifices. To determine the error in the force and moment coefficients introduced by this integration method, comparisons were made of coefficients obtained from mechanical integration of hand faired plots with the computed results. It was found that the error in the curve fairing was small and at high angles of attack, where the differences in the values of $C_p$ between the top and bottom surfaces were relatively large, the inaccuracies in the coefficients from this small fairing error were negligible. However, at the low angles of attack, where the differences in the values of $C_p$ between the top and bottom surfaces are small, the small error in the curve fairing produces a significant error in the resulting coefficient when the top and bottom surface $C_p$ plots are subtracted in the integration process. The error then in the force and moment coefficients introduced by the numerical integration technique utilized in the computer program, is dependent upon the $C_p$ distribution and is estimated to be up to ± 4 percent.

## RESULTS AND DISCUSSION

The results of this wind tunnel test program, in the form of the aerodynamic coefficients of normal force, chord force, lift, pressure drag, and pitching moment about the half-chord point are tabulated in Table I. Due to computer restrictions, some of the symbols and nomenclature in Table I are different from that used in the remainder of the report. Capital letters are used for the coefficients, the Reynolds number is designated R, and the tip plate is designated endplate. The table is arranged in order of increasing Mach number, span length, and Reynolds number, with results for the elliptic profile listed first. Representative results are presented graphically in figures 6 through 24. Unless otherwise noted, the corresponding test Reynolds number for the Mach numbers specified in the figures is that given in the following table:

| | | | | | |
|---|---|---|---|---|---|
| $M_\infty$ | 0.20 | 0.60 | 0.90 | 1.00 | 1.10 |
| Re, millions | 0.49 | 0.43 | 0.53 | 0.53 | 0.53 |
| $M_\infty$ | 1.30 | 1.60 | 2.00 | 2.50 | 3.50 |
| Re, millions | 0.53 | 0.35 | 0.29 | 0.44 | 0.44 |

In figures 6 and 7 the chordwise distribution of coefficient of pressure is shown at four representative Mach numbers (0.20, 0.60, 1.60, and 2.50) at each of six representative angles of attack ($0^\circ$, $4^\circ$, $8^\circ$, $20^\circ$, $44^\circ$, and $84^\circ$) for both wings with tip plate attached. The figures are placed on the pages in the order of increasing angle of attack in the horizontal direction and increasing Mach number in the vertical direction. In this manner, the variation of distribution with increases in both Mach number and angle of attack is easily observed. The distribution across the chord is smooth on both wings, with the expected peaks at the

leading edge on the elliptic profile and at the midchord on the double-wedge profile.

In figures 8 through 17 the section coefficients of normal force, chord force, pitching moment about the half-chord point, lift, and pressure drag are plotted with respect to angle of attack. Curves are shown for both wings at each of the ten test Mach numbers. The behavior of the normal-force coefficient with changes in Mach number and angle of attack is similar for both airfoils, although the slopes of the curves at the lower angles of attack are steeper on the elliptic. Above $60^{\circ}$ angle of attack the slopes approach zero for every Mach number for both wings. At $90^{\circ}$ the normal-force coefficient increases with increasing Mach number up to Mach number 1.60 and then decreases with further increase of Mach number.

Above $20^{\circ}$ angle of attack, increases in Mach number above 0.90 appear to have little effect on the chord-force coefficient. A significantly large negative chord-force coefficient of -0.21 occurs for the elliptic airfoil at $16^{\circ}$ angle of attack and Mach number 0.20, which indicates a considerable amount of leading edge suction. One indication of the magnitude of leading edge suction for a wing is through the angle ratio, $k_a$, which from reference 3 is defined as the inclination of the change in resultant force divided by the accompanying change in angle of attack. The angle ratio for any section can then be expressed as

$$k_a \cong \frac{\Delta c_d / \Delta c_\ell}{\alpha - \alpha_{d = min}}$$

Utilizing section data for the elliptic wing with tip plate attached, the essentially two-dimensional $k_a$ for the oval airfoil at Mach number 0.20 and angle of attack of $16^{\circ}$ was found to be 0.36. Comparing with $k_a$ of unity for zero leading edge suction,

this permits a measure of the relative amount of leading edge suction realized.

To see how the free tip affects the leading edge suction the spanwise variation of $k_a$ was determined at a Mach number 0.20 at angles of attack of $8^{\circ}$, $12^{\circ}$, and $16^{\circ}$. The results as plotted in figure 25 show that the leading edge suction is near zero at the tip, as would be predicted, and increases rather rapidly but smoothly inboard approaching two-dimensional values within two chord lengths from the tip.

Above $40^{\circ}$ angle of attack the curves of pitching-moment coefficient are nearly overlapping at all Mach numbers for both airfoils. Below $40^{\circ}$ angle of attack the pitching-moment coefficient varies considerably and follows the same pattern with respect to effects of changes in Mach number as in the normal-force coefficient curves.

The curves of lift coefficient are similar for both airfoils, but are more regular and steeper with the elliptic. Above $60^{\circ}$ angle of attack, the lift coefficient is little affected by changes in Mach number. The curves smooth out to a constant slope and nearly overlap in this region. As Mach number increases to 3.50, the curves approach symmetry about the $45^{\circ}$ angle of attack point. The maximum lift coefficients are 1.4 for the elliptic and 1.3 for the double wedge, and occur at about $28^{\circ}$ angle of attack and Mach number 1.00 for both airfoils.

The maximum pressure-drag coefficients occur as expected at $90^{\circ}$ angle of attack, and are 1.72 for the elliptic airfoil and 1.77 for the double wedge. Both maximums are at Mach number 1.60.

In figures 6 through 17 the results are presented for only one Reynolds number; however, in the subsonic and supersonic tests, runs were made at two Reynolds numbers at each span length and Mach number condition. Figure 18 gives a comparison of the results of normal-force coefficient with respect to angle of attack at both

Reynolds numbers at each of three Mach numbers for the elliptic profile. Although the majority of the tests in the transonic range were conducted at only one Reynolds number, a sweep of Reynolds numbers was conducted for each profile at Mach number of 1.30 at the spanwise position 138 percent chord from the tip. Figure 19 shows the effects of the highest and lowest Reynolds numbers of these sweeps on the normal-force coefficient.

Returning to figure 9 (plots of the normal-force coefficients for the double-wedge airfoil), examination of the curve at Mach number 0.60 shows a negative slope between angles of attack $-4^{\circ}$ and $+4^{\circ}$. This phenomenon was further investigated, with the results shown in figures 20 and 21. Figure 20 shows the results of three repeat runs conducted at the same Mach number and Reynolds number, but at the spanwise position 138 percent chord from the tip. Data was recorded at $1^{\circ}$ intervals from $-4^{\circ}$ to $+8^{\circ}$. Two of the runs were conducted in a positive angle of attack direction and one in the reverse direction, or from $+90^{\circ}$ to $-4^{\circ}$. Due to the $1^{\circ}$ backlash in the angle of attack readout potentiometer, the reverse run curve must be corrected by shifting the curve $1^{\circ}$ in the negative direction. Taking this correction into account figure 20 shows that this phenomenon is indeed there, and repeatable when approached from either angle of attack direction. As this phenomenon does not appear at Mach number 0.20 nor 0.90, to determine the effects of Mach number three additional runs were conducted in the vicinity of 0.60, namely 0.40, 0.50, and 0.70. The results as shown in figure 21 indicate that the maximum effect is at Mach number 0.40 or below, and diminishes with increasing Mach number.

The semi-span loading is shown for the elliptic wing in figure 22 and for the double-wedge wing in figure 23, at four representative Mach numbers and at various angles of attack. For both wings the tip effects have generally disappeared within one chord length from the free tip, with the exception of low angles of attack at subsonic Mach numbers.

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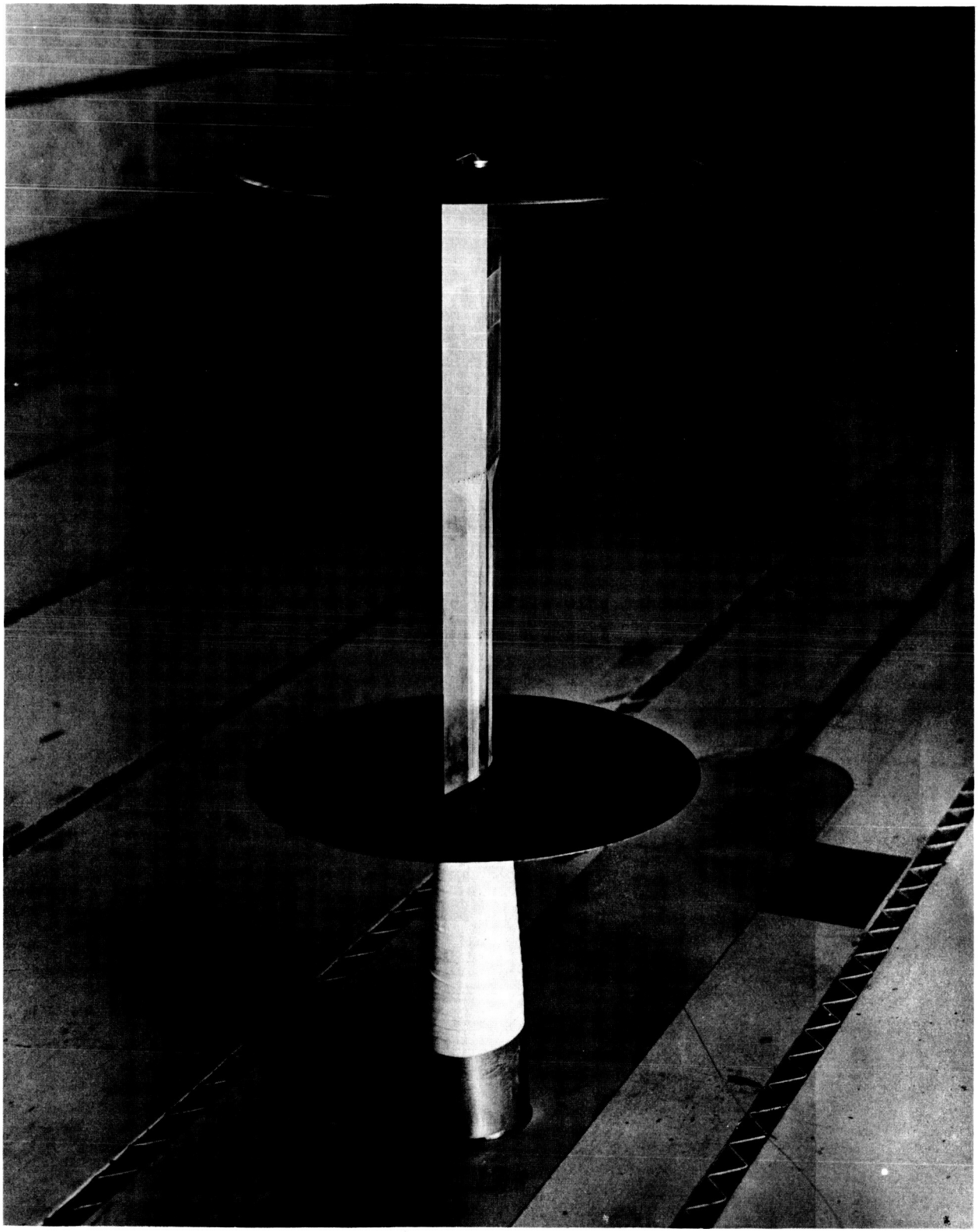


Figure 1.- Wing model of the double-wedge profile mounted in the Ames 11- by 11-Foot Transonic Wind Tunnel.

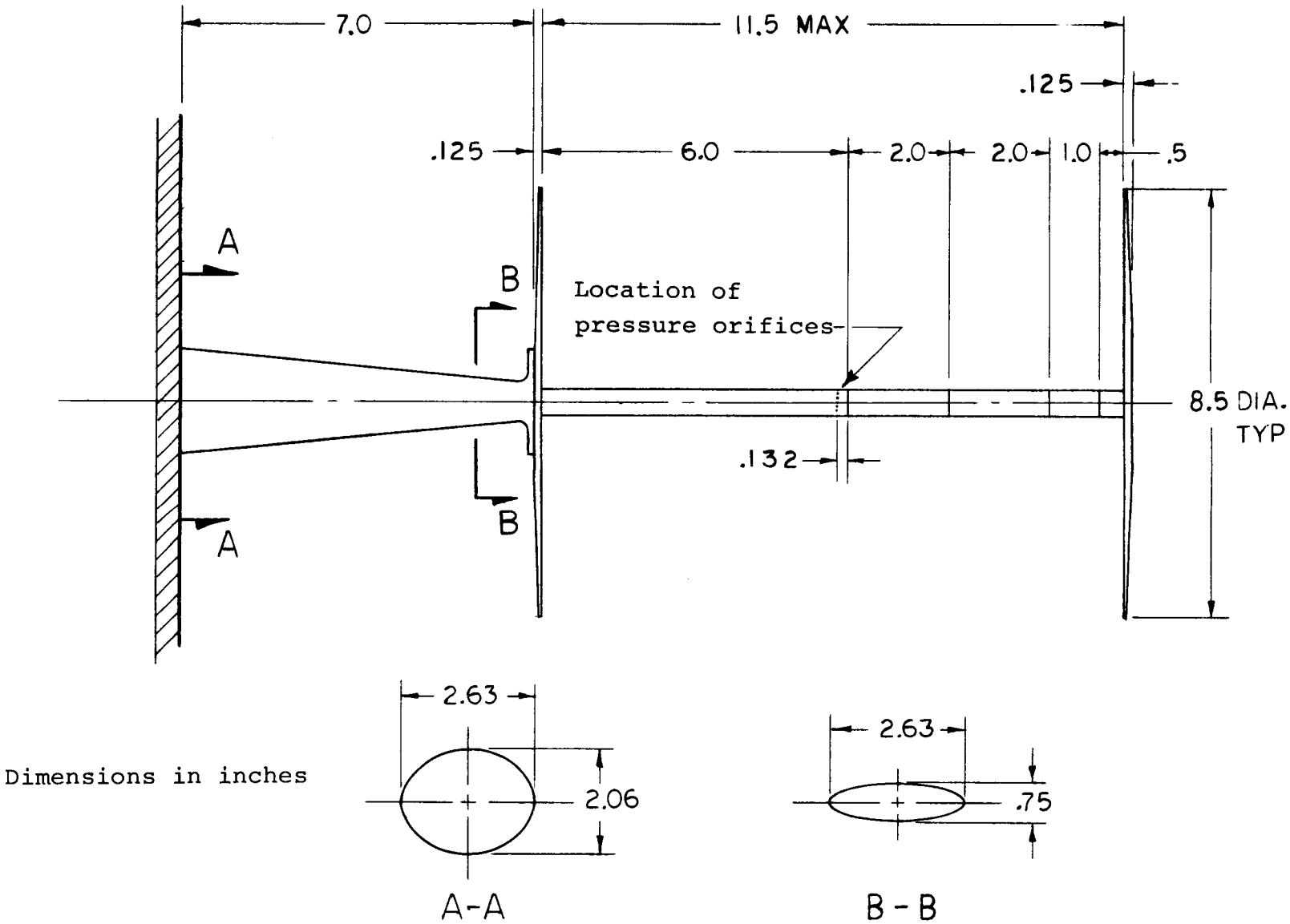
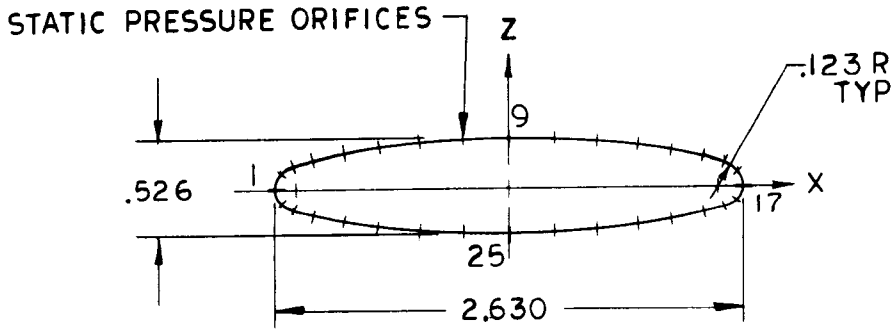
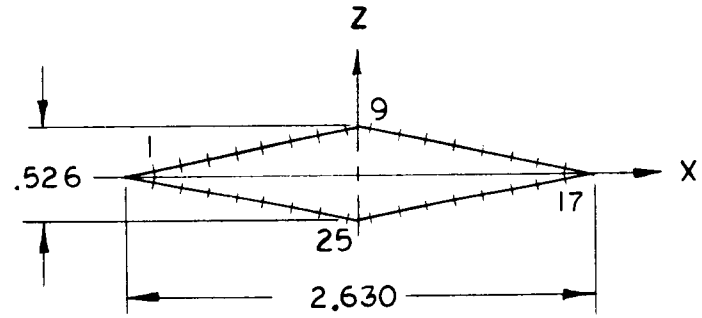



Figure 2.- Dimensions of assembled model, mounted in a typical wind tunnel test section.




| Coordinates of Surface, percent c | |
|---|---|
| ±X | ±Z |
| 0 | 10.00 |
| 4.17 | 9.94 |
| 8.34 | 9.85 |
| 12.50 | 9.69 |
| 16.67 | 9.50 |
| 20.83 | 9.25 |
| 25.00 | 8.90 |
| 29.17 | 8.40 |
| 33.33 | 7.77 |
| 37.50 | 7.02 |
| 41.67 | 6.06 |
| 45.83 | 4.81 |
| 46.88 | 4.40 |
| 47.92 | 3.88 |
| 48.96 | 2.99 |

| Orifice | Percent c from L.E. |
|---|---|
| 1 | 0 |
| 2,32 | 0.95 |
| 3,31 | 3.80 |
| 4,30 | 8.06 |
| 5,29 | 14.64 |
| 6,28 | 22.21 |
| 7,27 | 30.87 |
| 8,26 | 40.27 |
| 9,25 | 50.00 |
| 10,24 | 59.73 |
| 11,23 | 69.13 |
| 12,22 | 77.79 |
| 13,21 | 85.36 |
| 14,20 | 91.94 |
| 15,19 | 96.20 |
| 16,18 | 99.05 |
| 17 | 100.00 |

(a) Modified ellipse

| Orifice | Percent c from L.E. |
|---|---|
| 1,32 | 5.89 |
| 2,31 | 11.75 |
| 3,30 | 17.64 |
| 4,29 | 23.50 |
| 5,28 | 29.39 |
| 6,27 | 35.25 |
| 7,26 | 41.14 |
| 8,25 | 47.00 |
| 9,24 | 53.00 |
| 10,23 | 58.86 |
| 11,22 | 64.75 |
| 12,21 | 70.61 |
| 13,20 | 76.50 |
| 14,19 | 82.36 |
| 15,18 | 88.25 |
| 16,17 | 94.11 |

(b) Double-wedge

Figure 3. - Airfoil profiles, showing location of static pressure orifices.

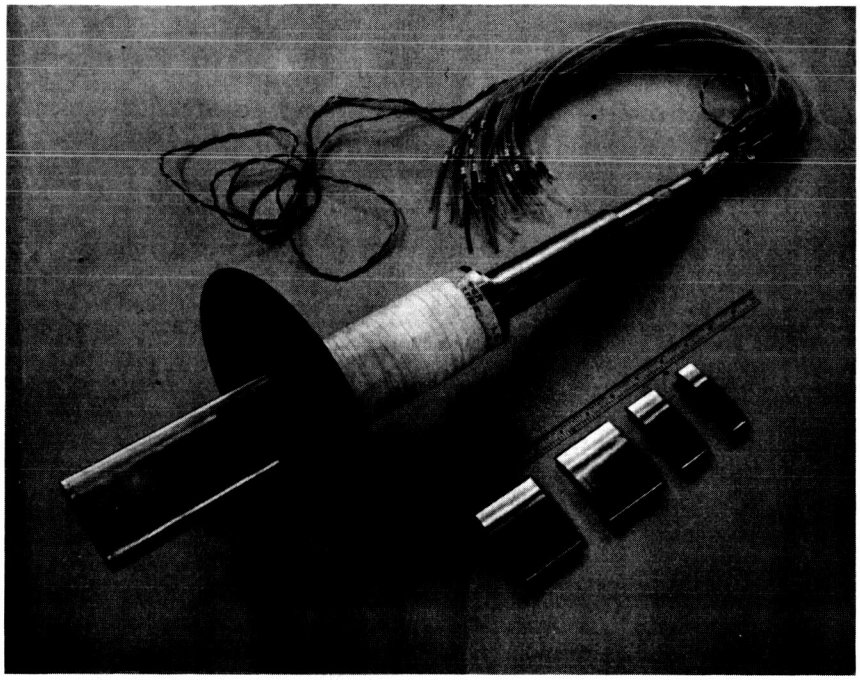


Figure 4.- Photograph of the elliptic profile wing, showing the basic span and additive segments.

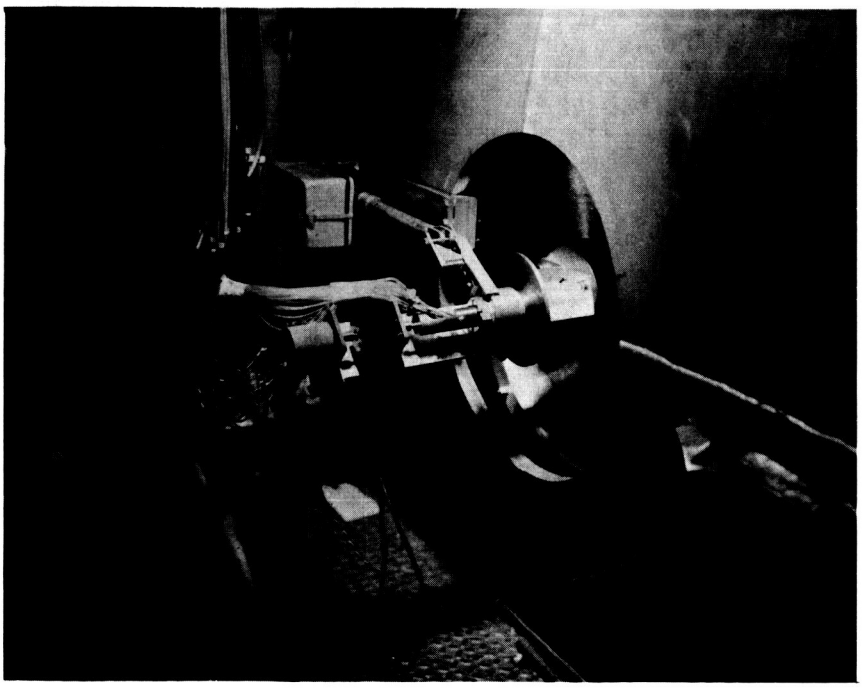


Figure 5.- Typical model support set-up.

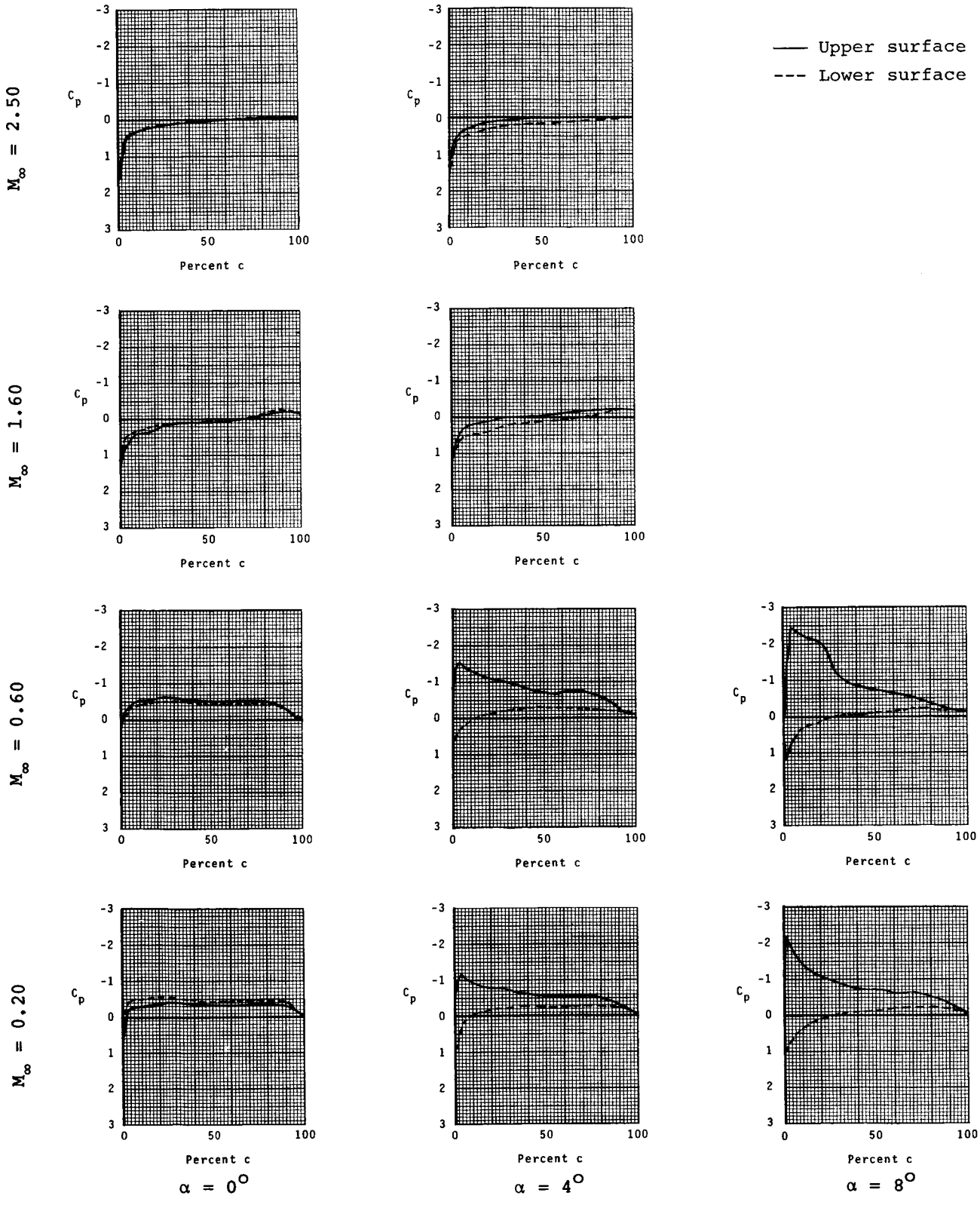



Figure 6.- Chordwise distribution of pressure coefficient for the elliptic airfoil with tip plate.

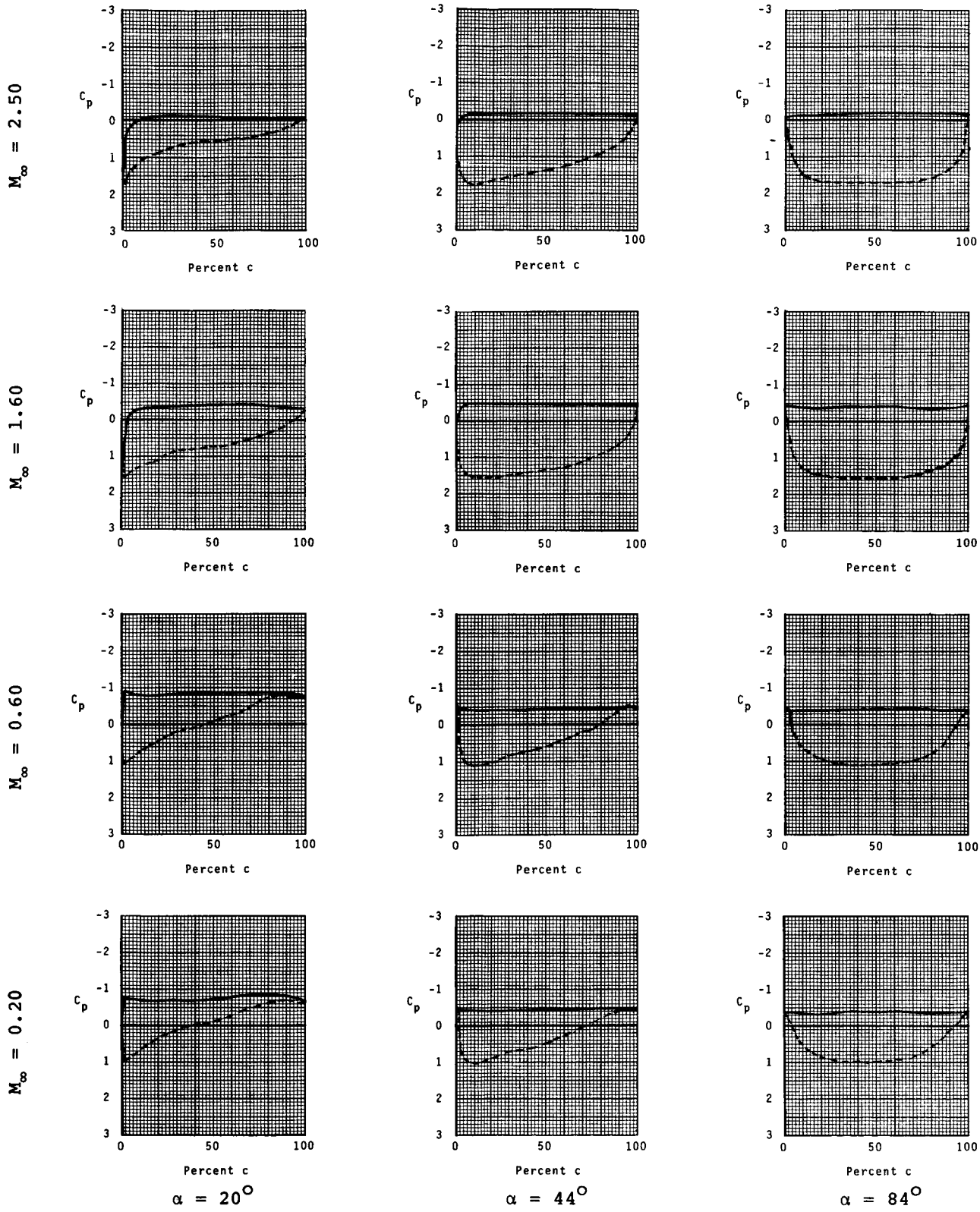



Figure 6.- Concluded.

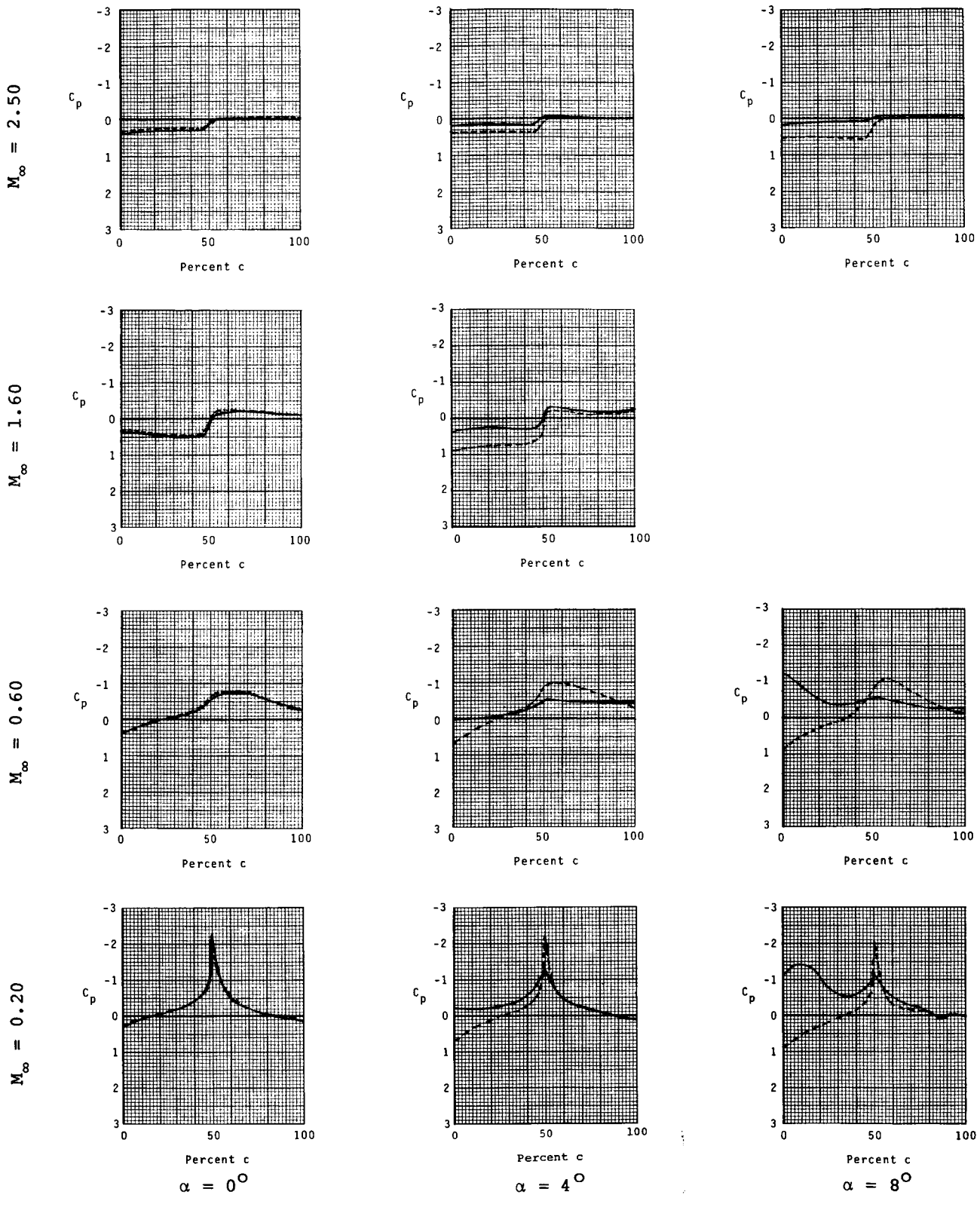



Figure 7.- Chordwise distribution of pressure coefficient for the double-wedge airfoil with tip plate.

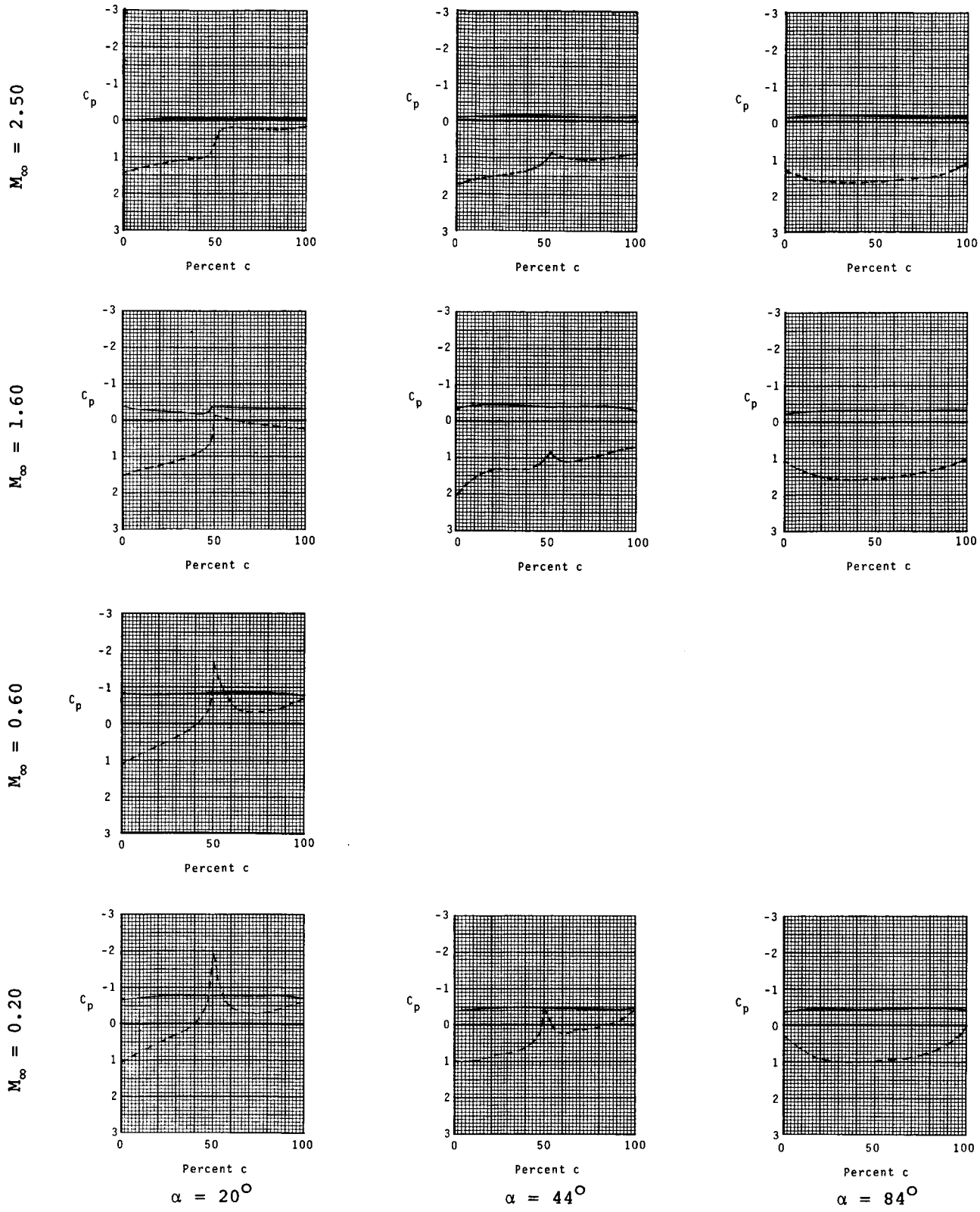



Figure 7.- Concluded.

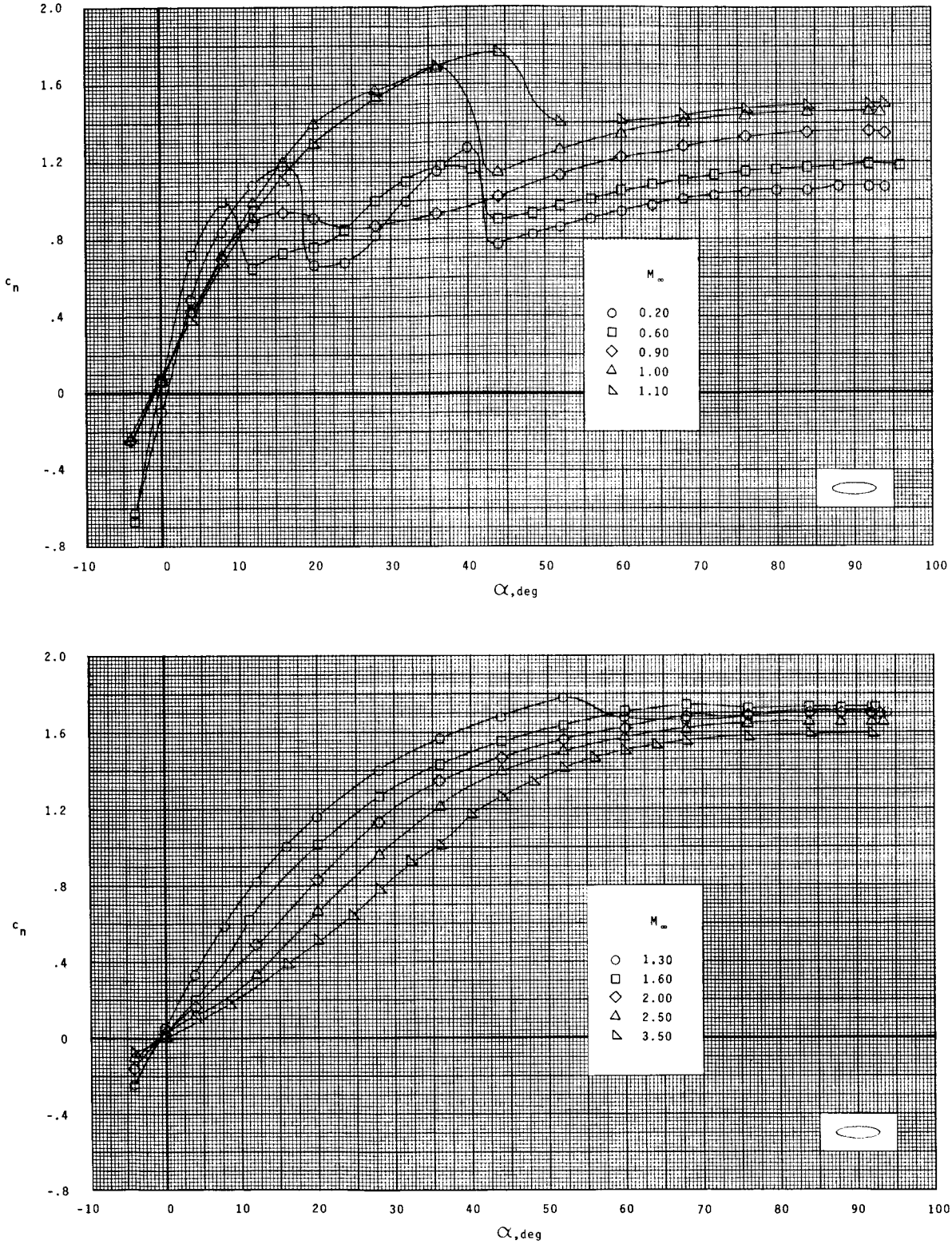



Figure 8.- Variation of section normal-force coefficient with angle of attack for the elliptic airfoil with tip plate.

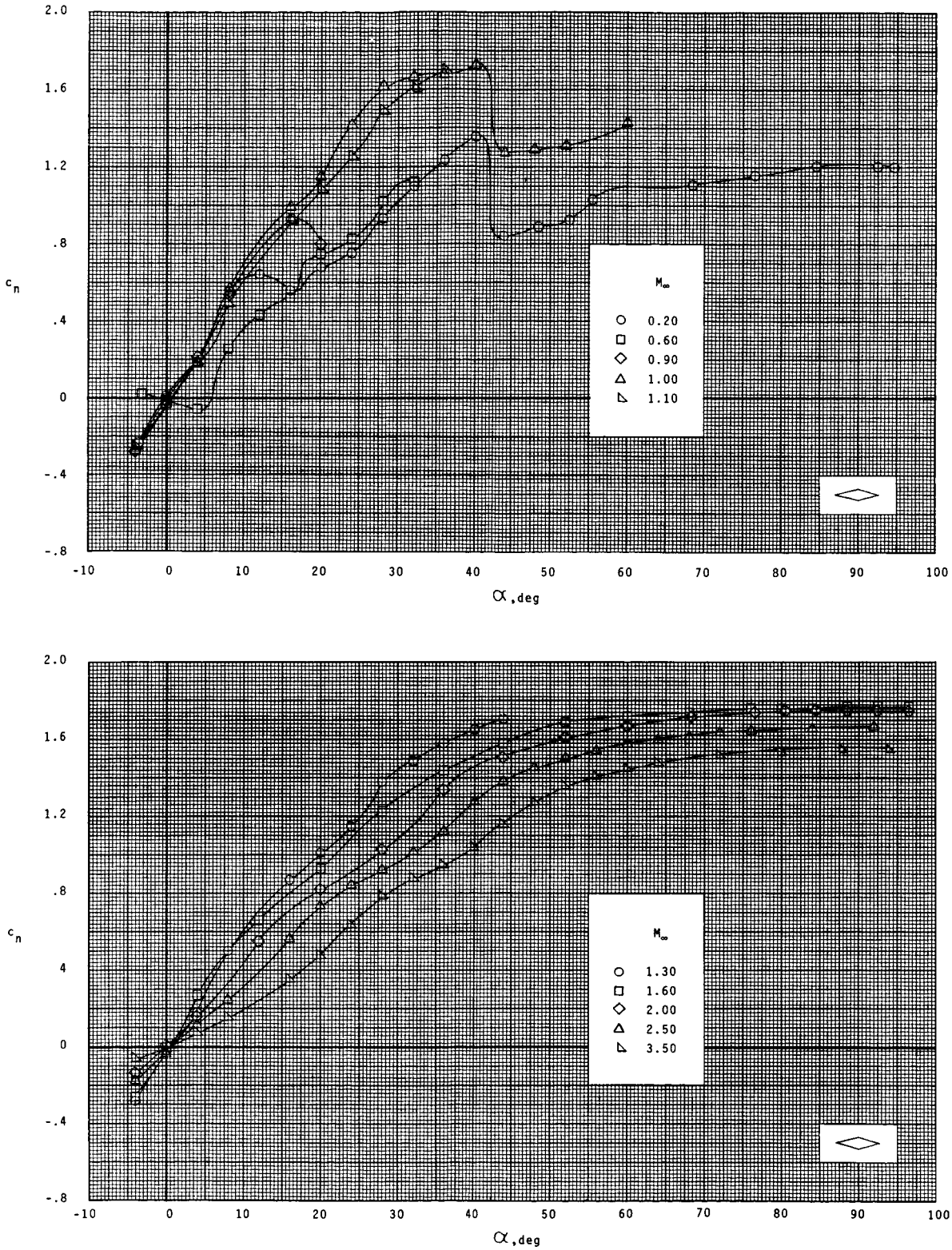
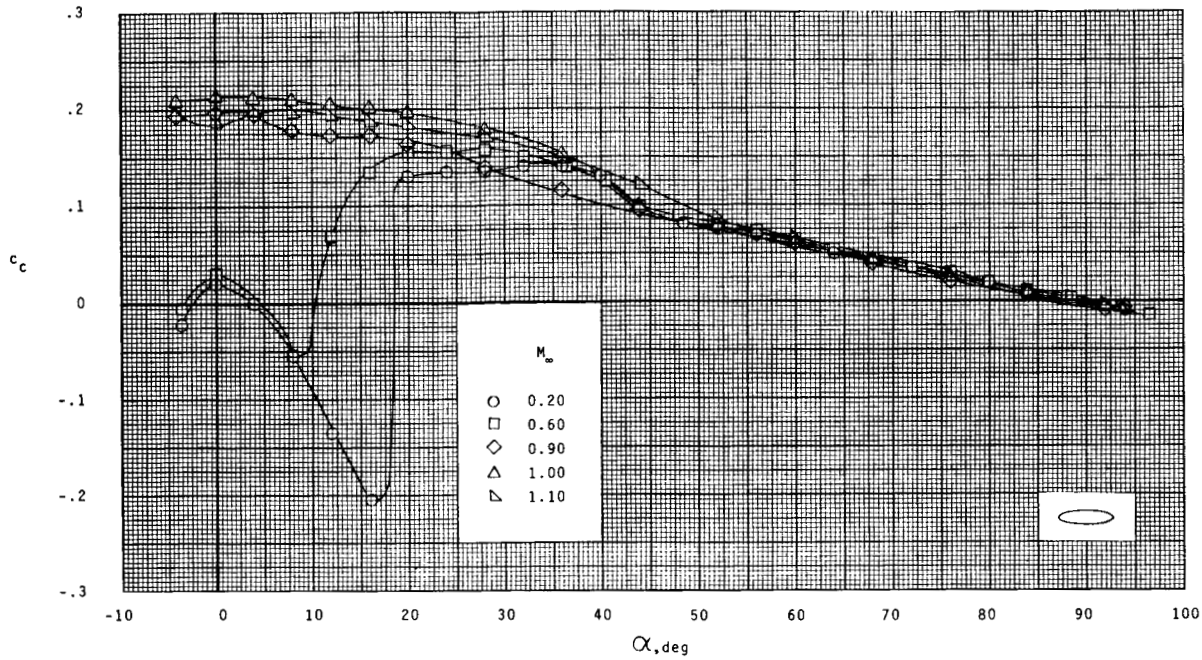



Figure 9.- Variation of section normal-force coefficient with angle of attack for the double-wedge airfoil with tip plate.



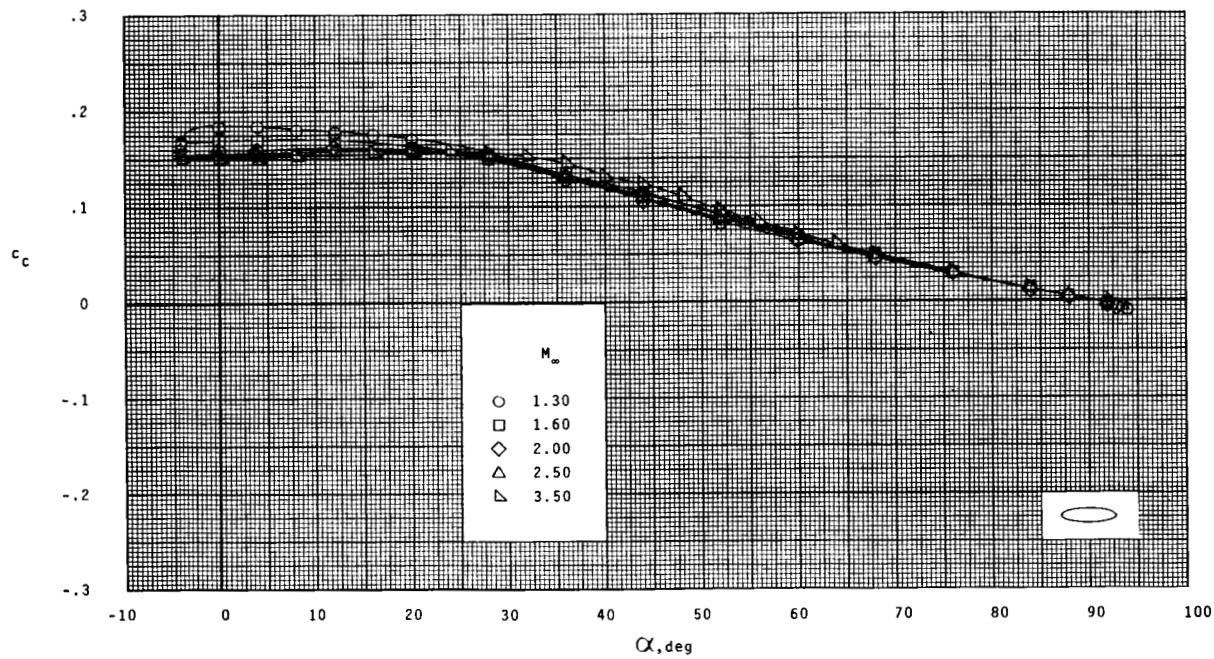
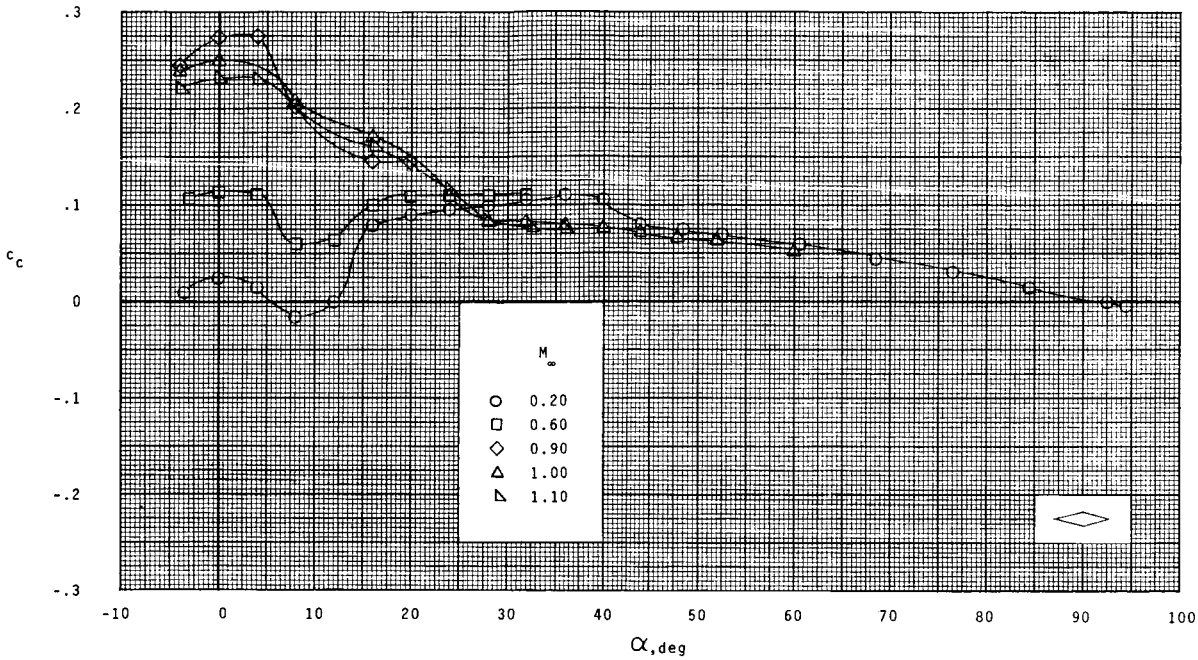




Figure 10.- Variation of section chord-force coefficient with angle of attack for the elliptic airfoil with tip plate.



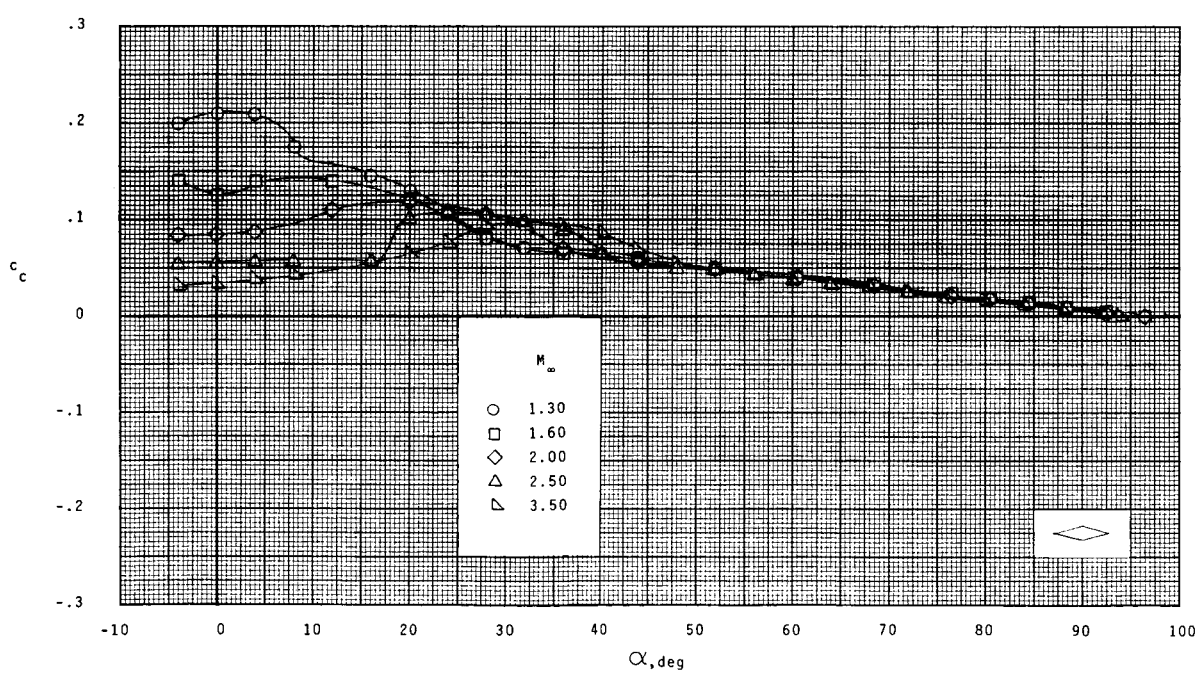
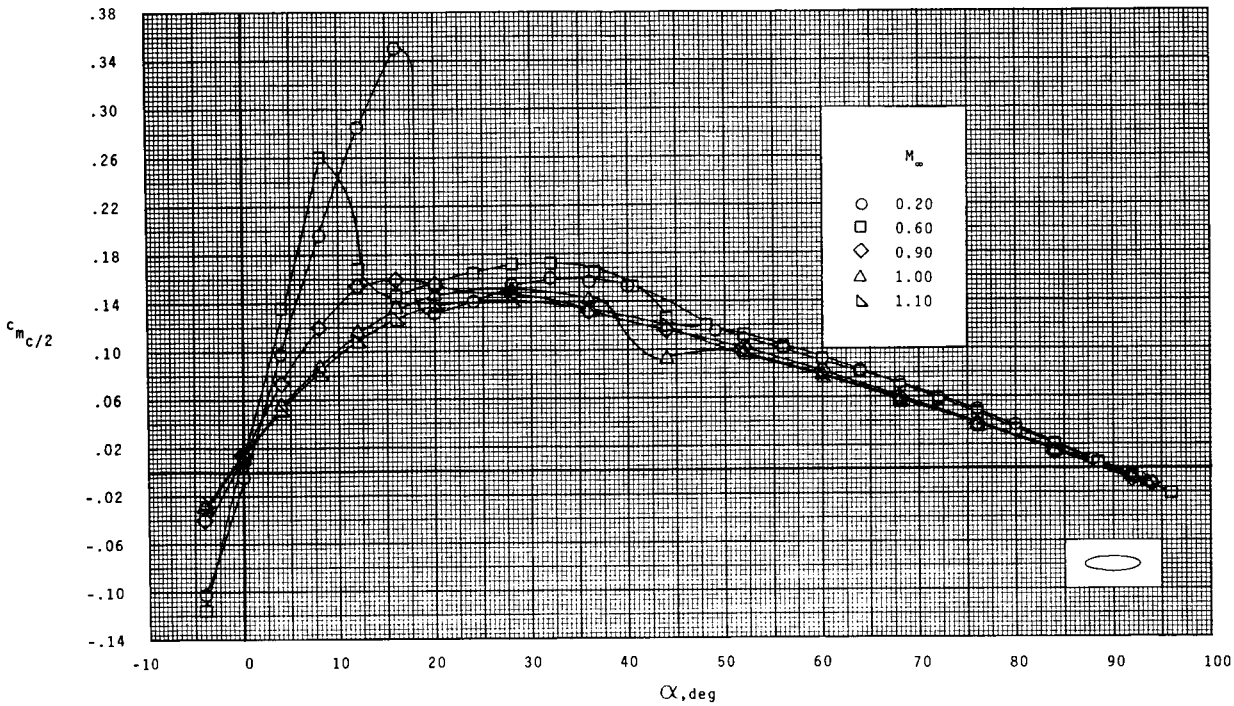




Figure 11.- Variation of section chord-force coefficient with angle of attack for the double-wedge airfoil with tip plate.



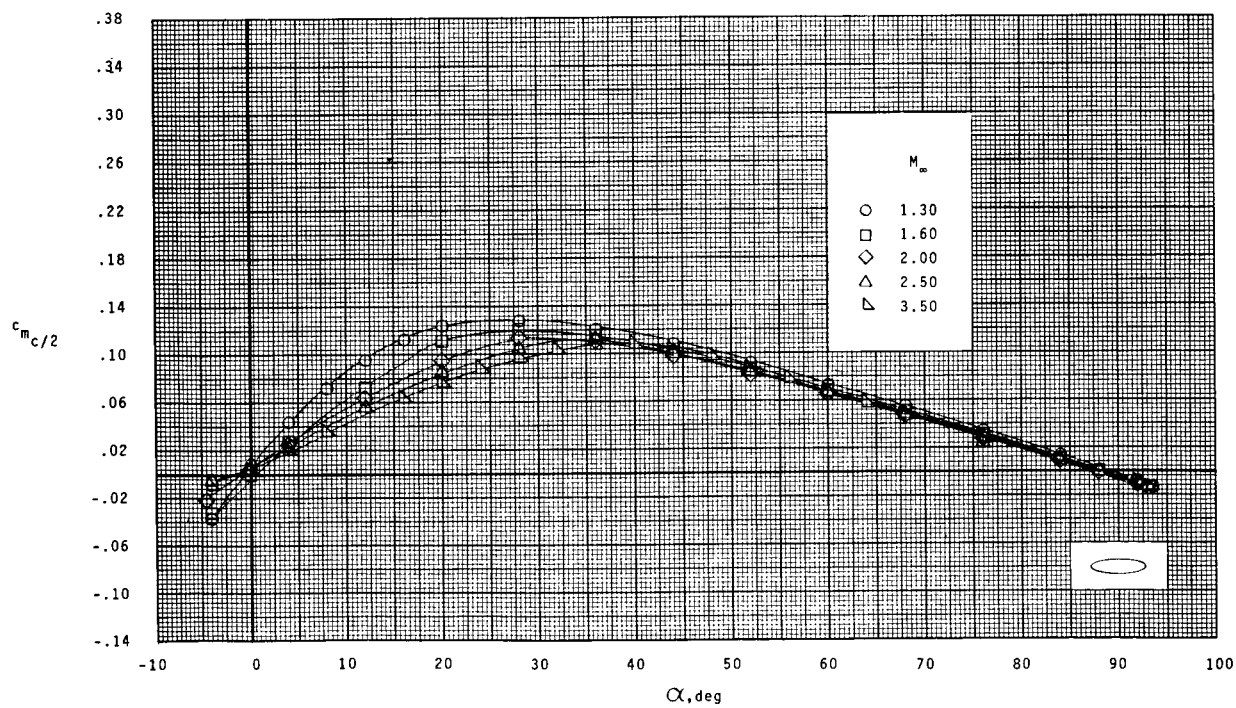




Figure 12.- Variation of section pitching moment coefficient with angle of attack for the elliptic airfoil with tip plate.

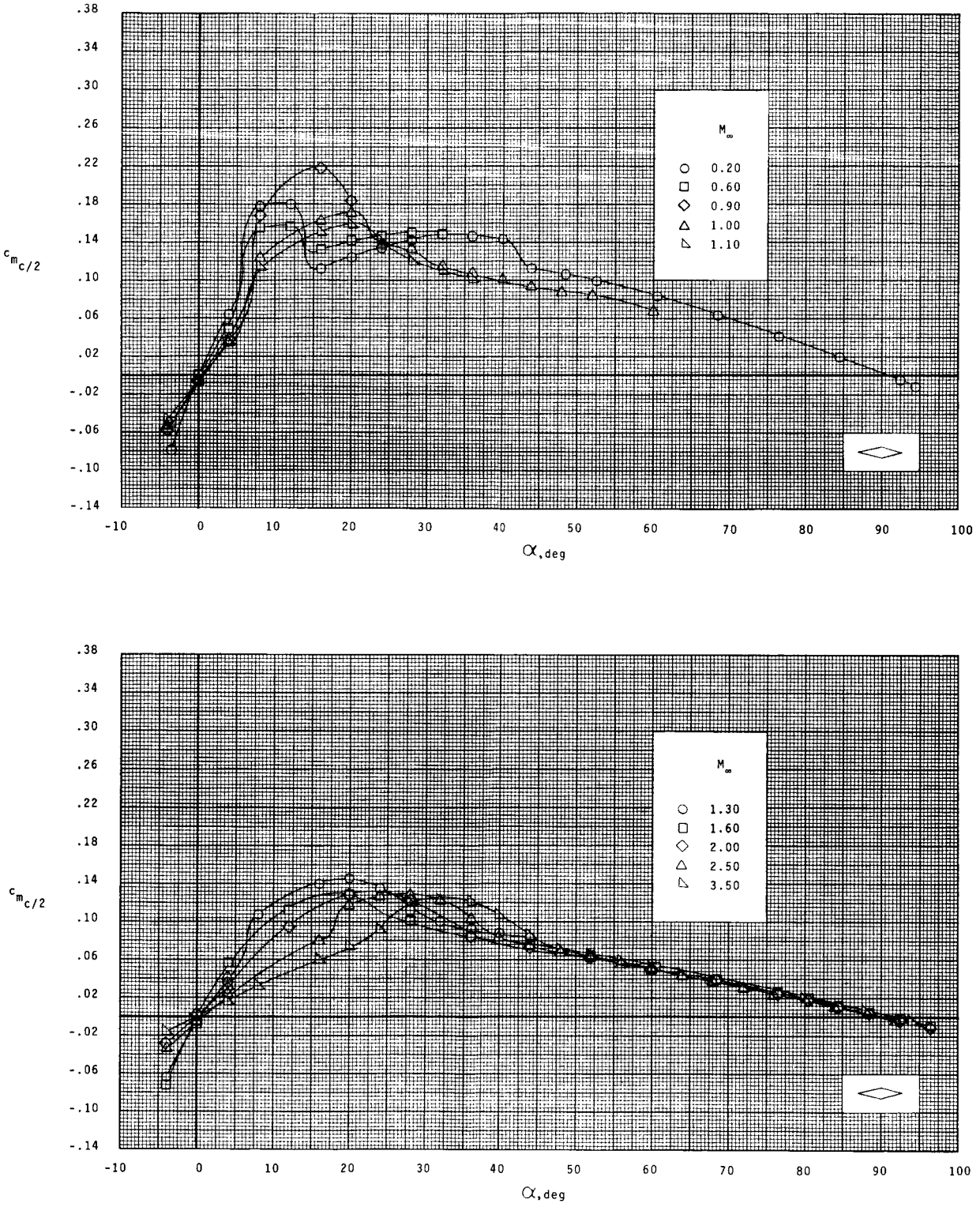



Figure 13.- Variation of section pitching-moment coefficient with angle of attack for the double-wedge airfoil with tip plate.

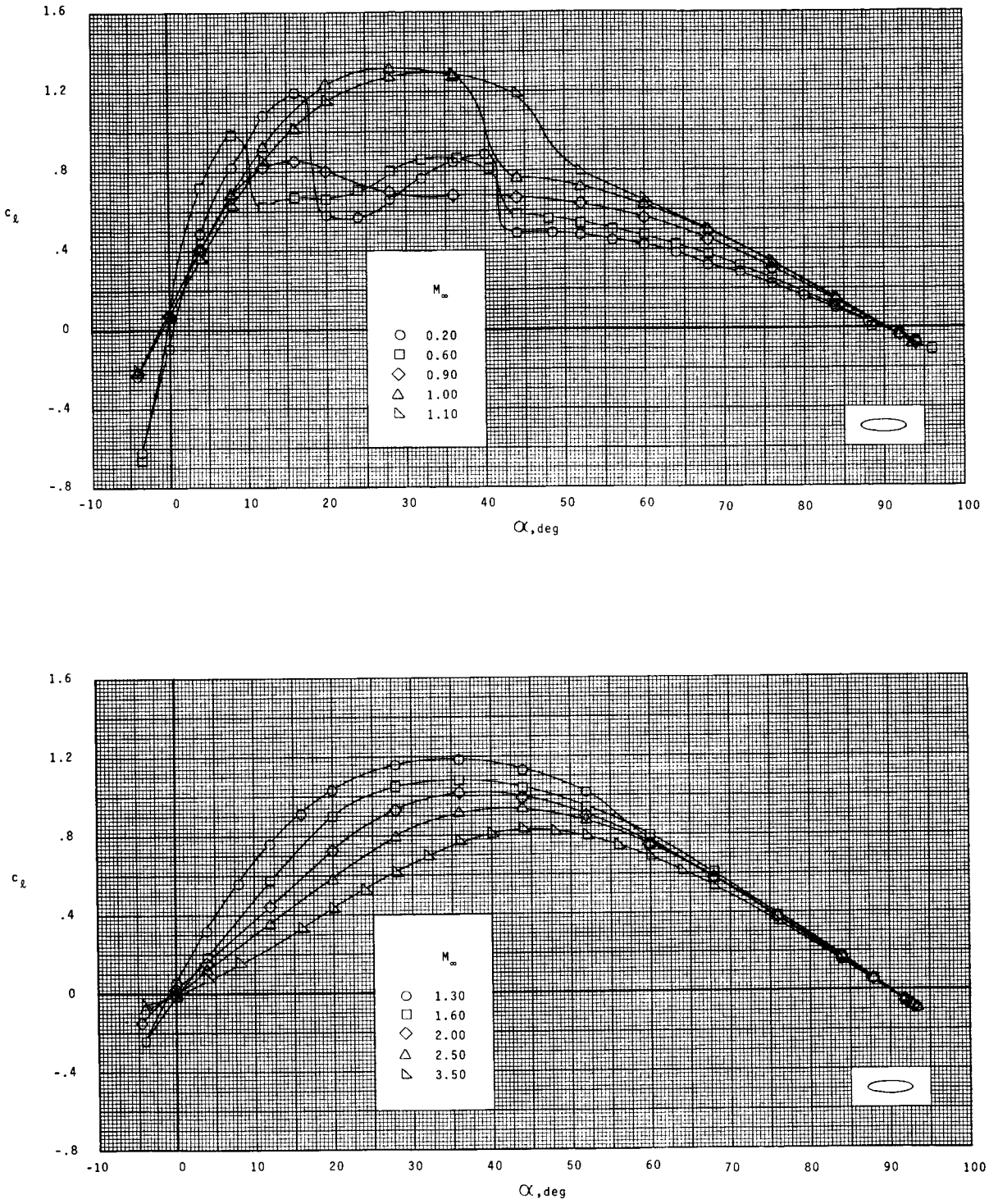
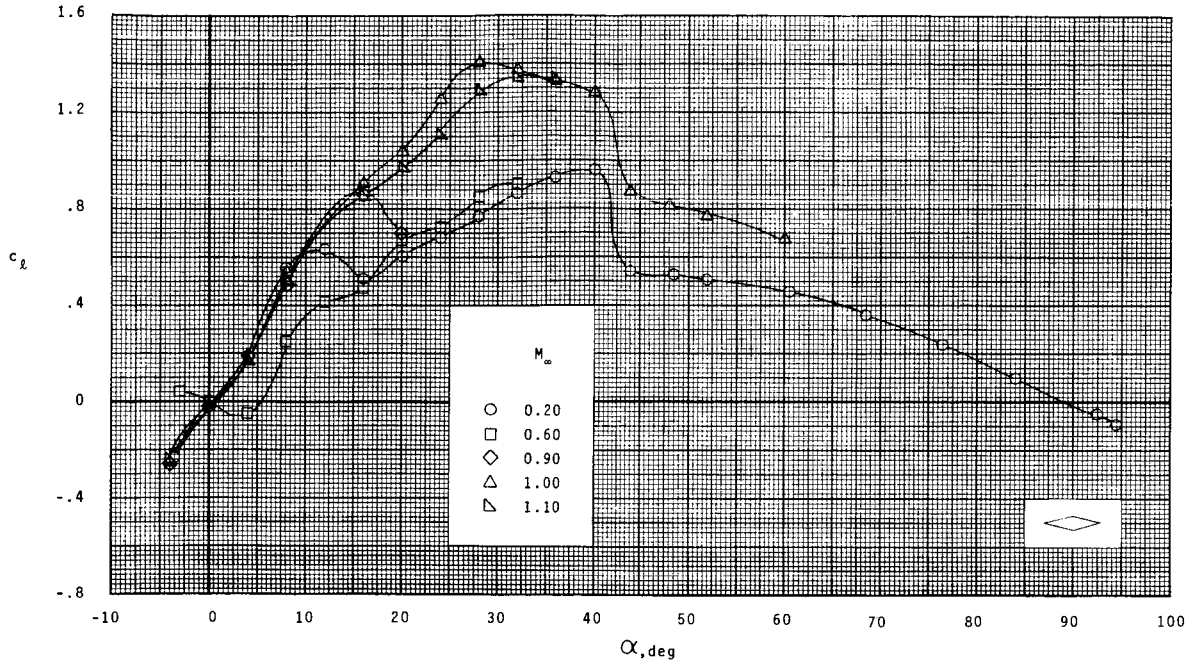



Figure 14.- Variation of section lift coefficient with angle of attack for the elliptic airfoil with tip plate.



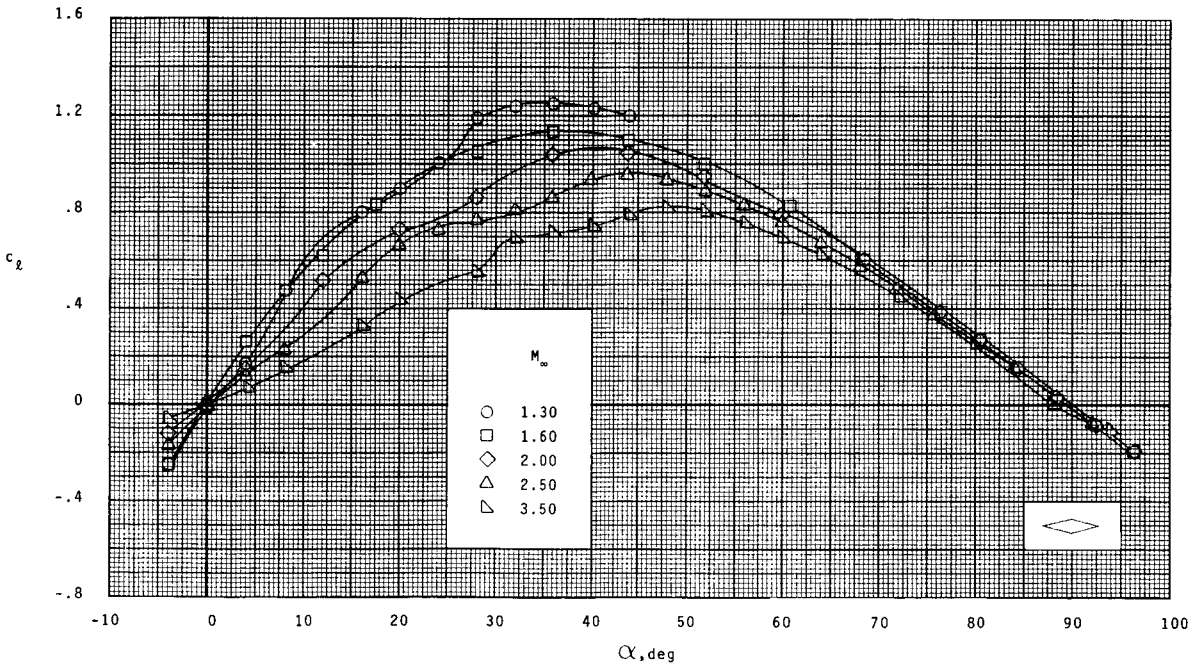
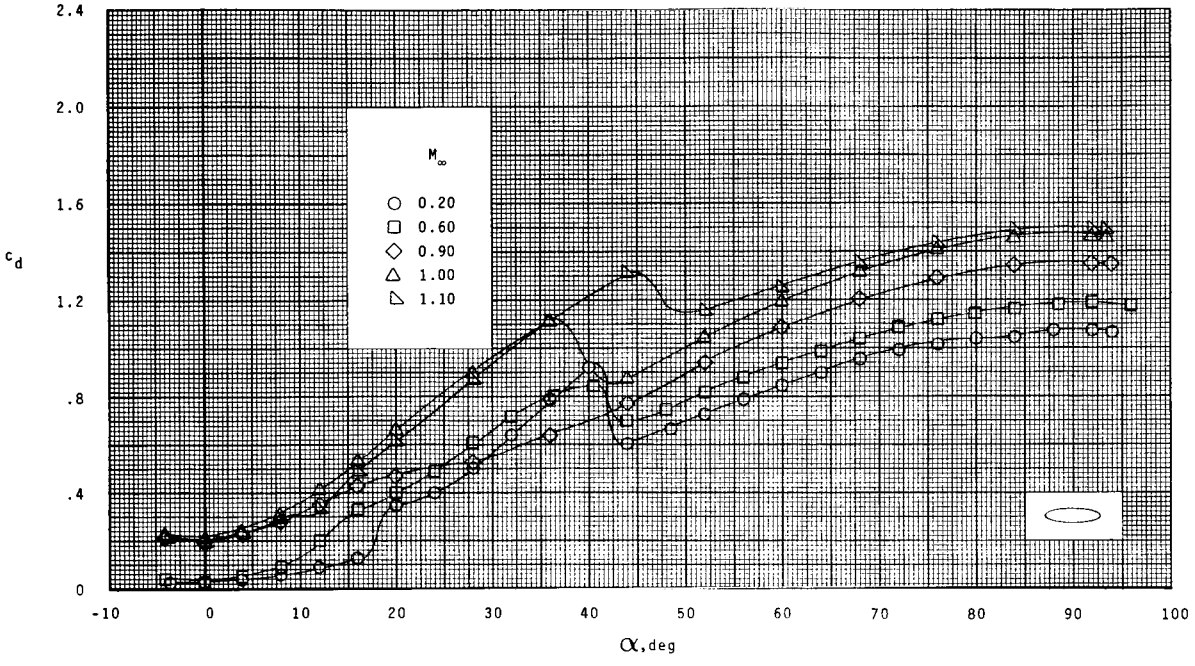




Figure 15.- Variation of section lift coefficient with angle of attack for the double-wedge airfoil with tip plate.



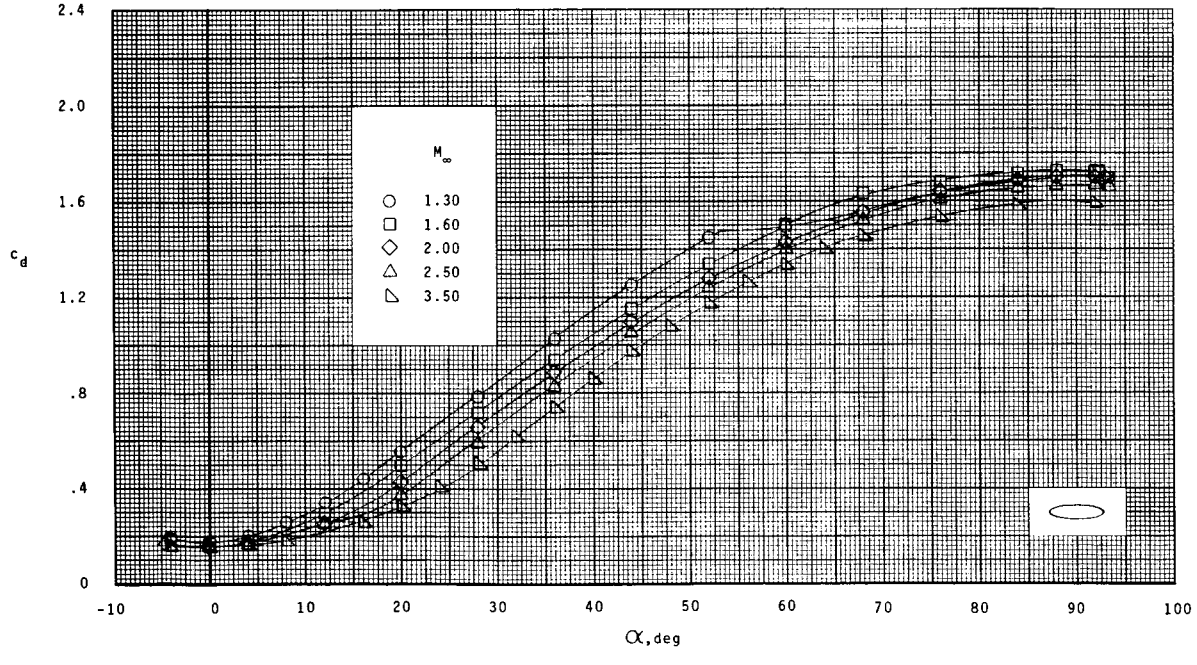
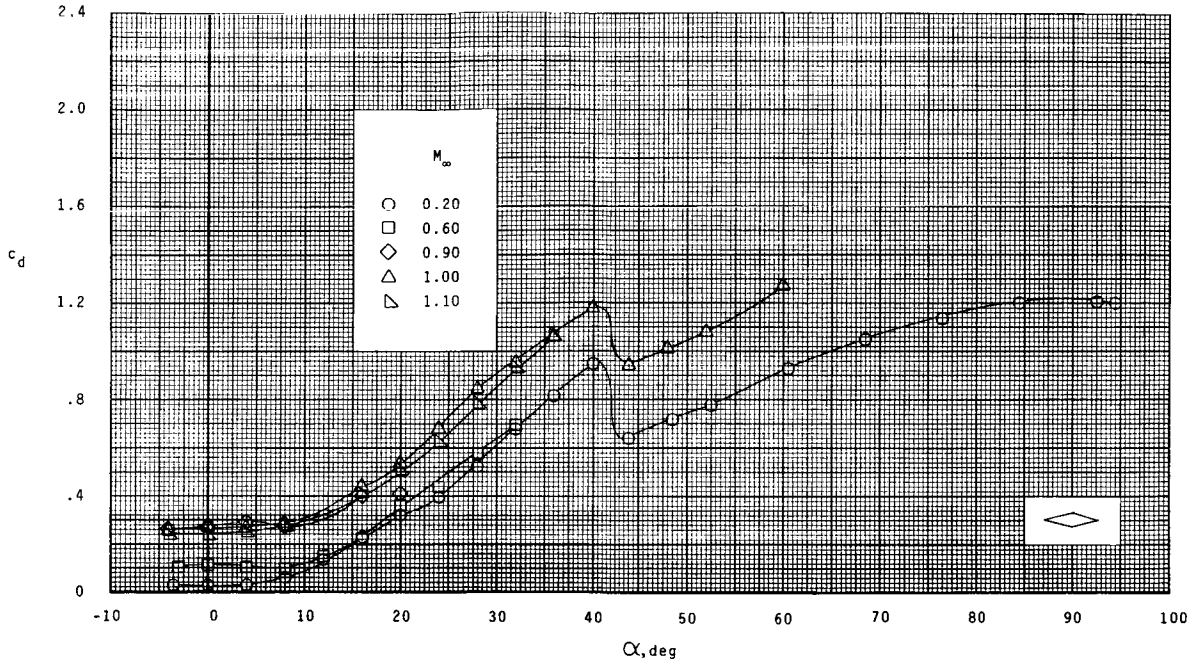




Figure 16.- Variation of section drag coefficient with angle of attack for the elliptic airfoil with tip plate.



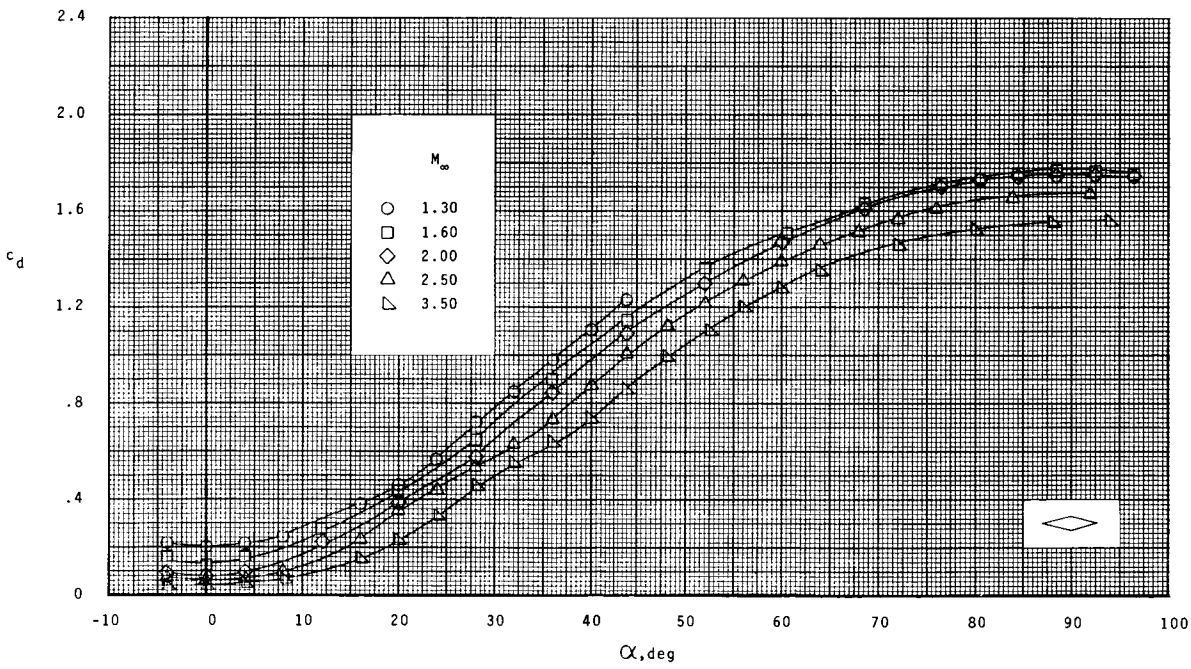




Figure 17.- Variation of section drag coefficient with angle of attack for the double-wedge airfoil with tip plate.

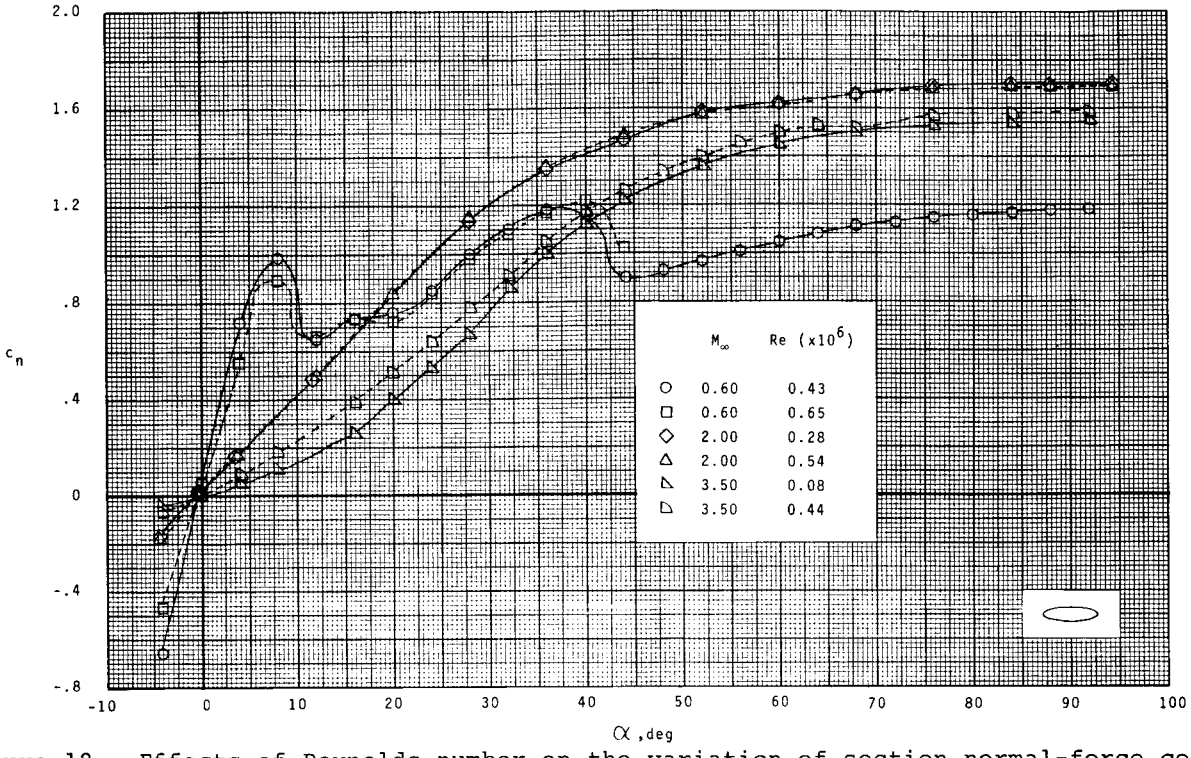



Figure 18.- Effects of Reynolds number on the variation of section normal-force coefficient with angle of attack for the elliptic airfoil with tip plate.

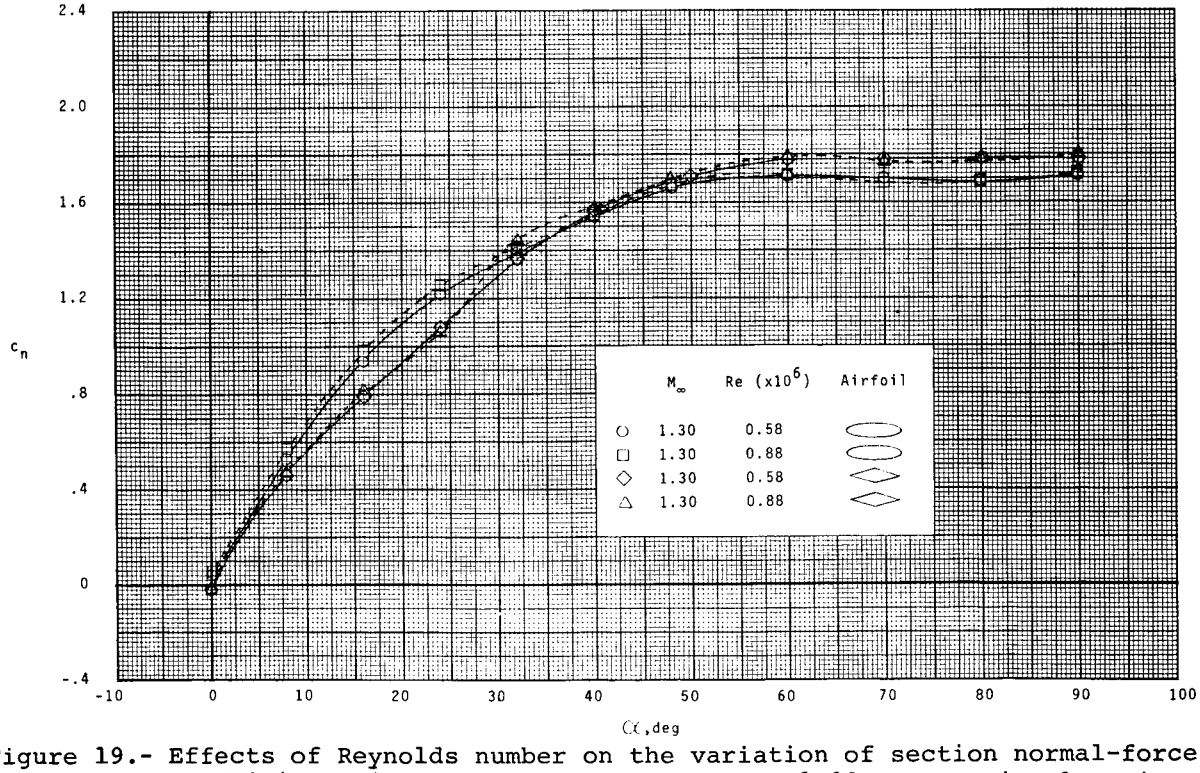



Figure 19.- Effects of Reynolds number on the variation of section normal-force coefficient with angle of attack at $M_\infty$ = 1.30 at spanwise location of 138 percent of chord from the free tip.

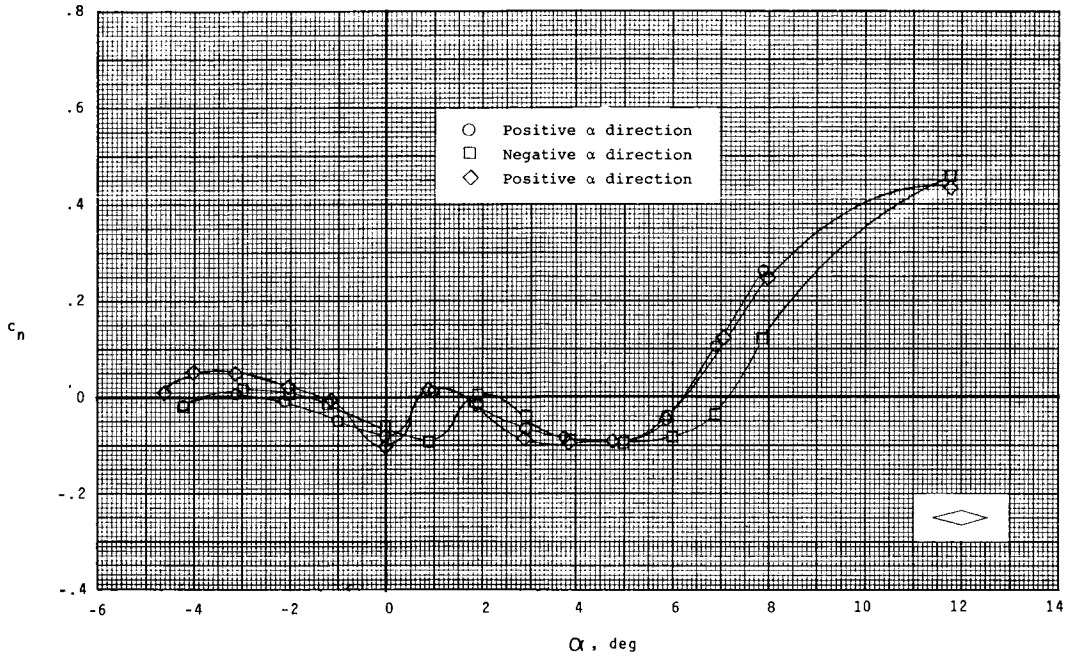



Figure 20.- Repeat runs of the variation of section normal-force coefficient with angle of attack at $M_\infty$ = 0.60 for the double-wedge airfoil at spanwise location of 138 percent of chord from the free tip.

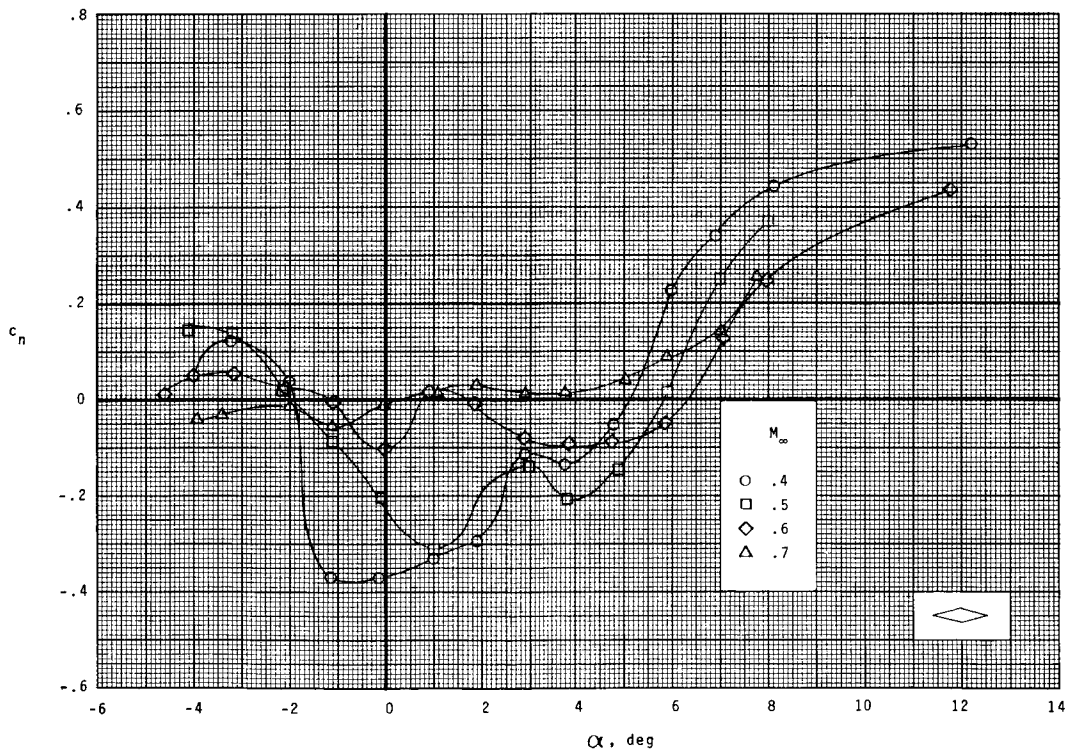
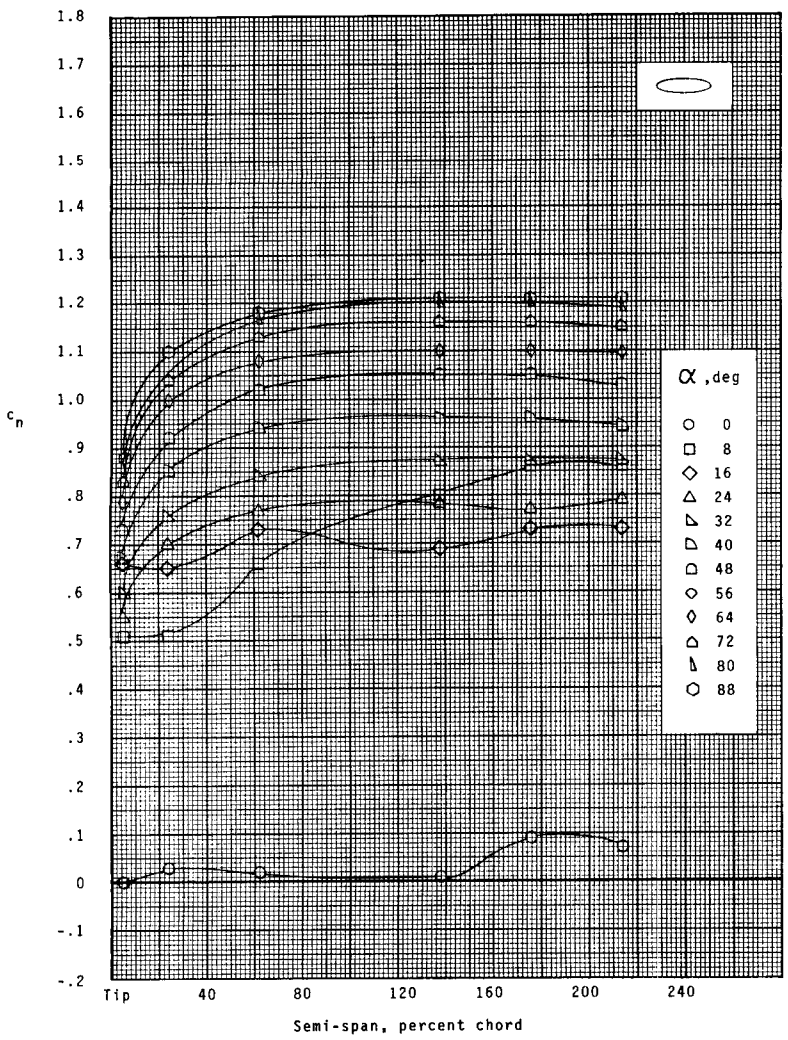
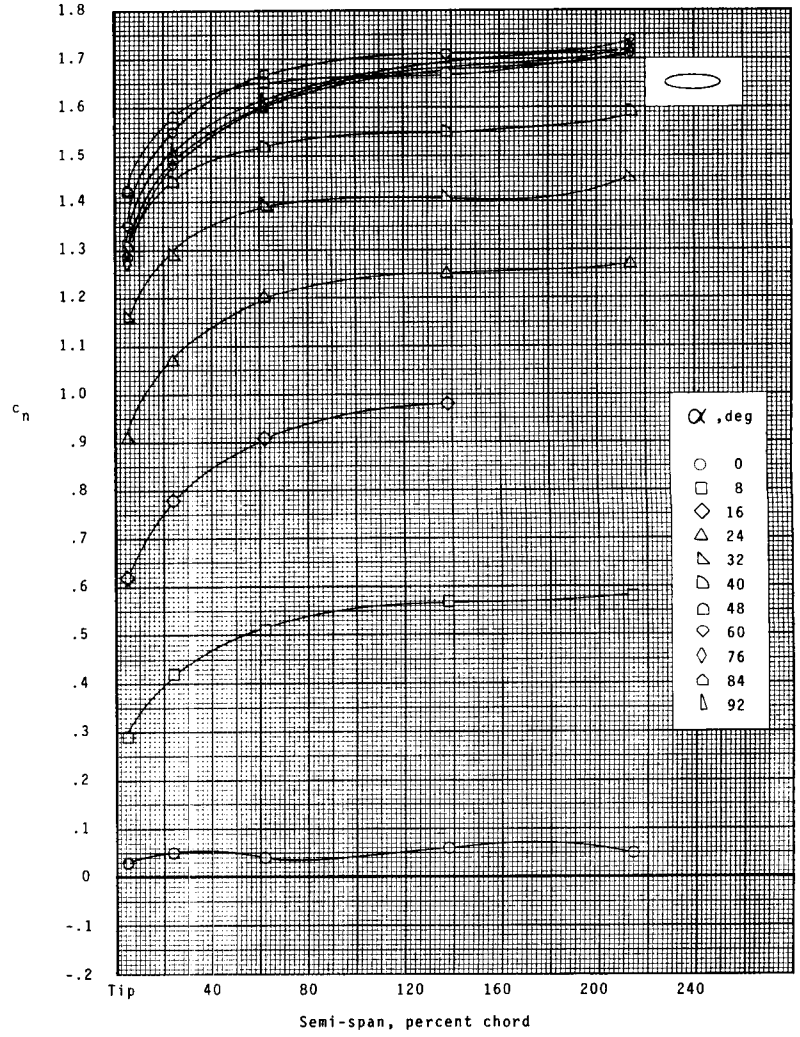



Figure 21.- Effects of Mach number on the variation of section normal-force coefficient with angle of attack in the region of $M_\infty$ = 0.60 for the double-wedge airfoil at spanwise location of 138 percent of chord from the free tip.

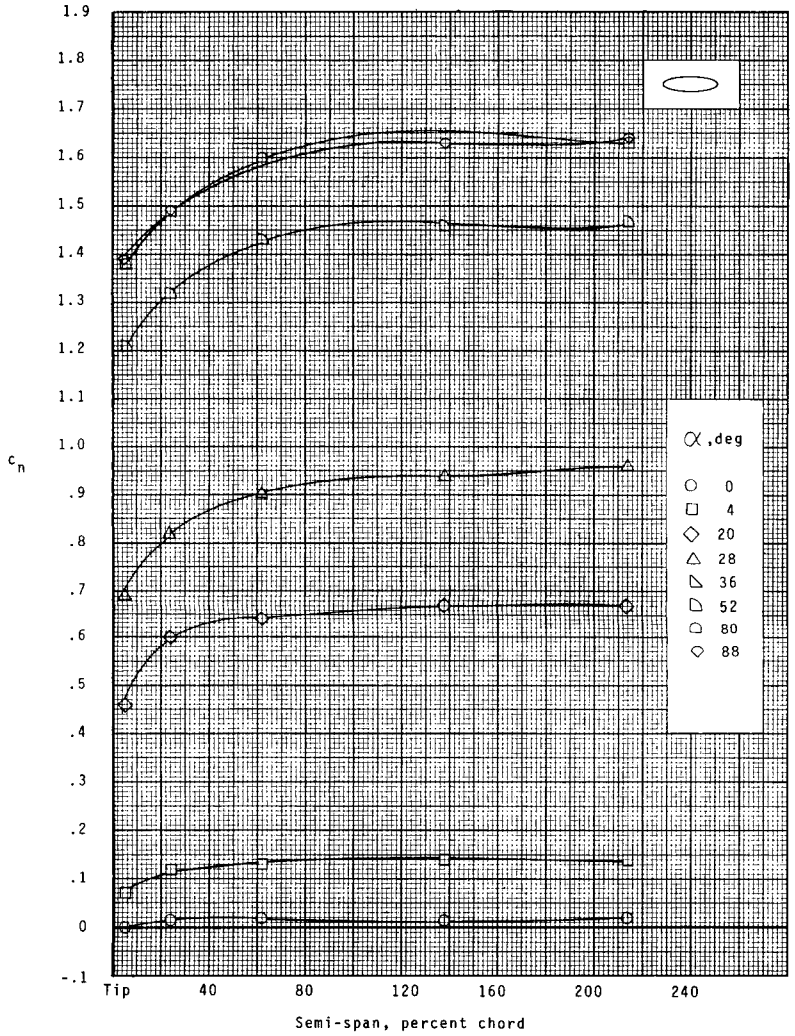



(a) $M_\infty = 0.60$

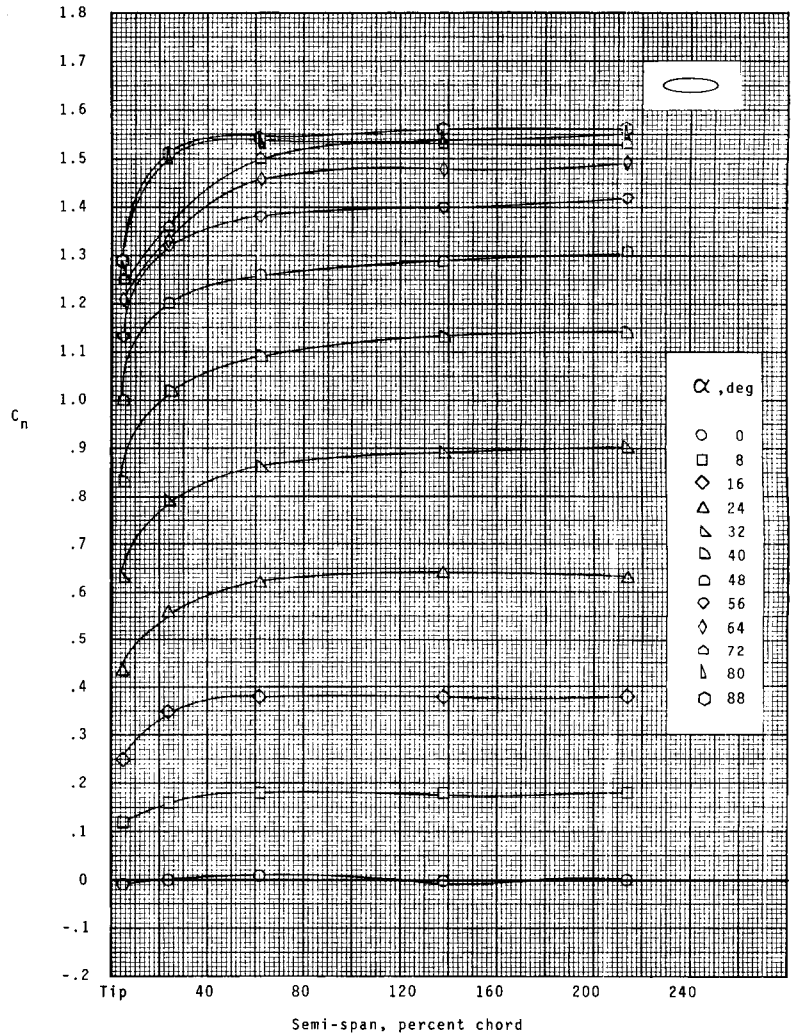



(b) $M_\infty = 1.30$

Figure 22.- Spanwise loading for the elliptic airfoil.

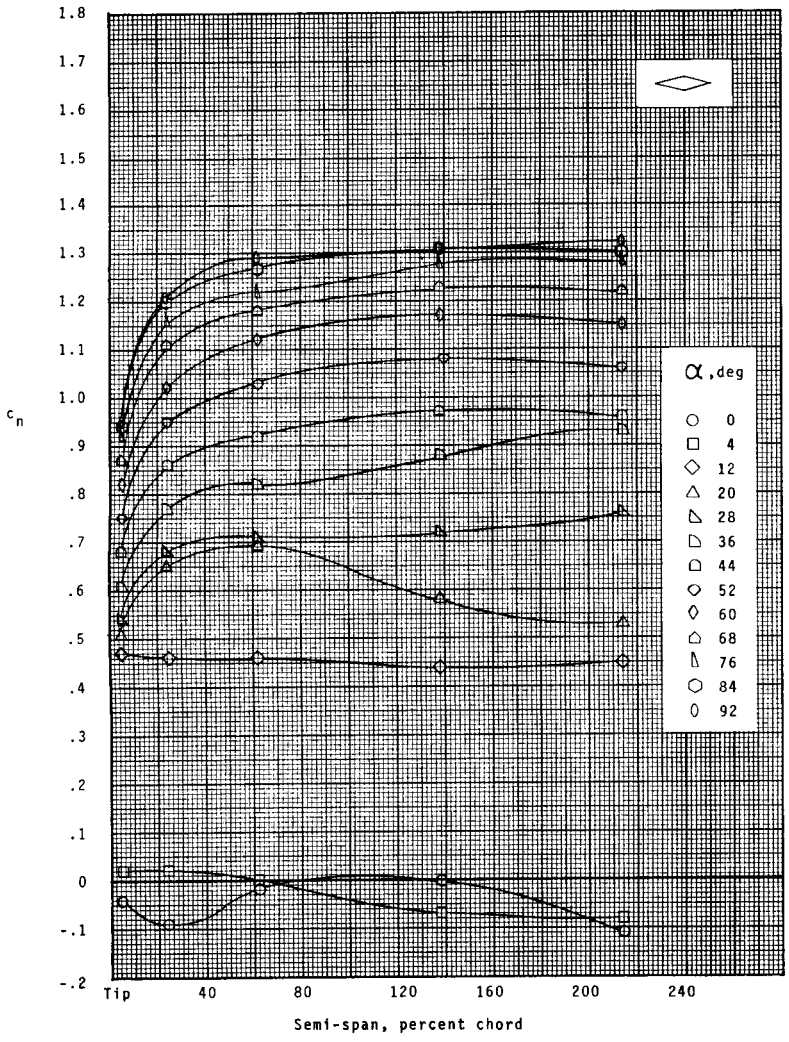



(c) $M_\infty = 2.50$

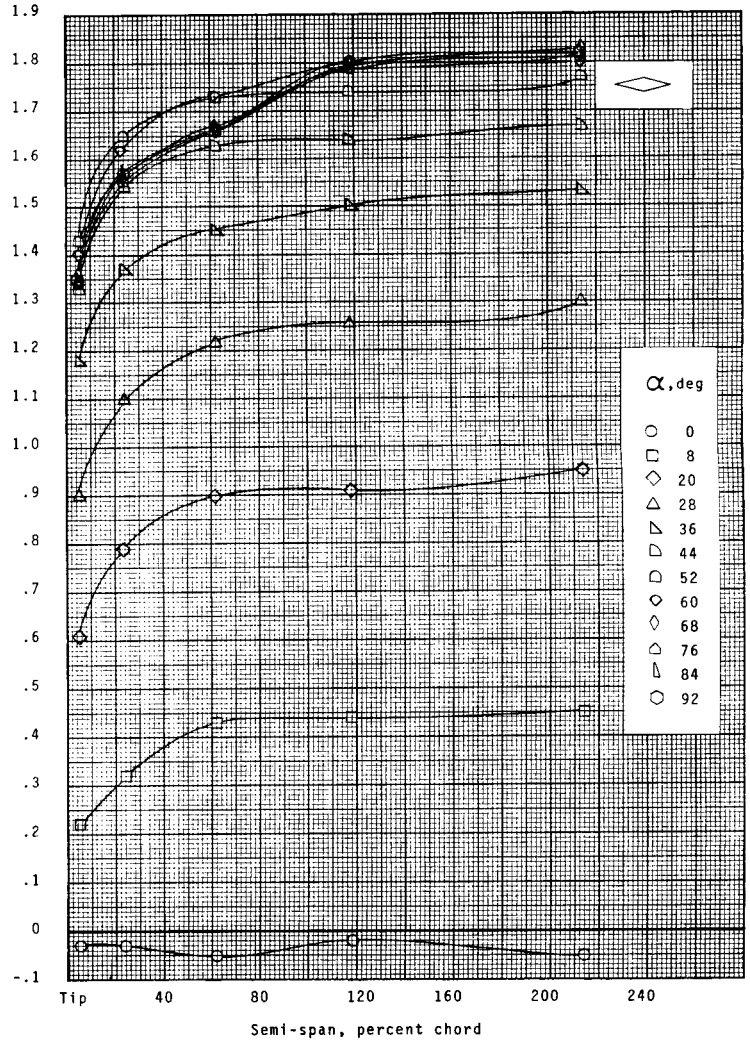



(d) $M_\infty = 3.50$

Figure 22.- Concluded.

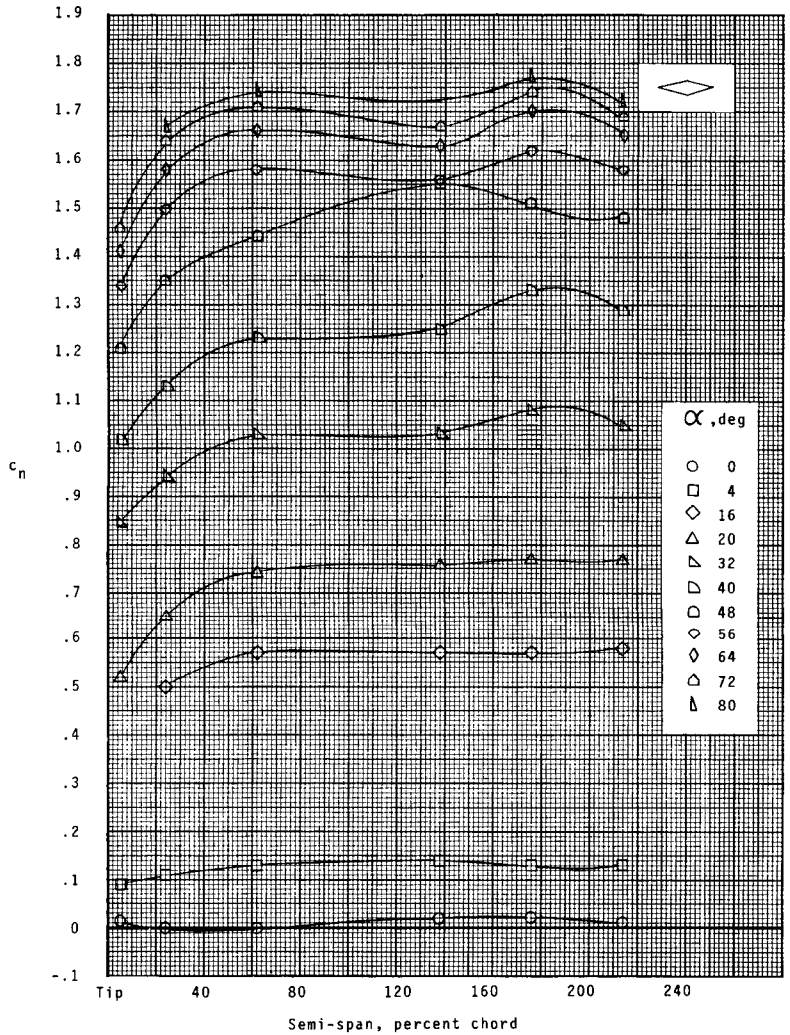



(a) $M_\infty = 0.60$

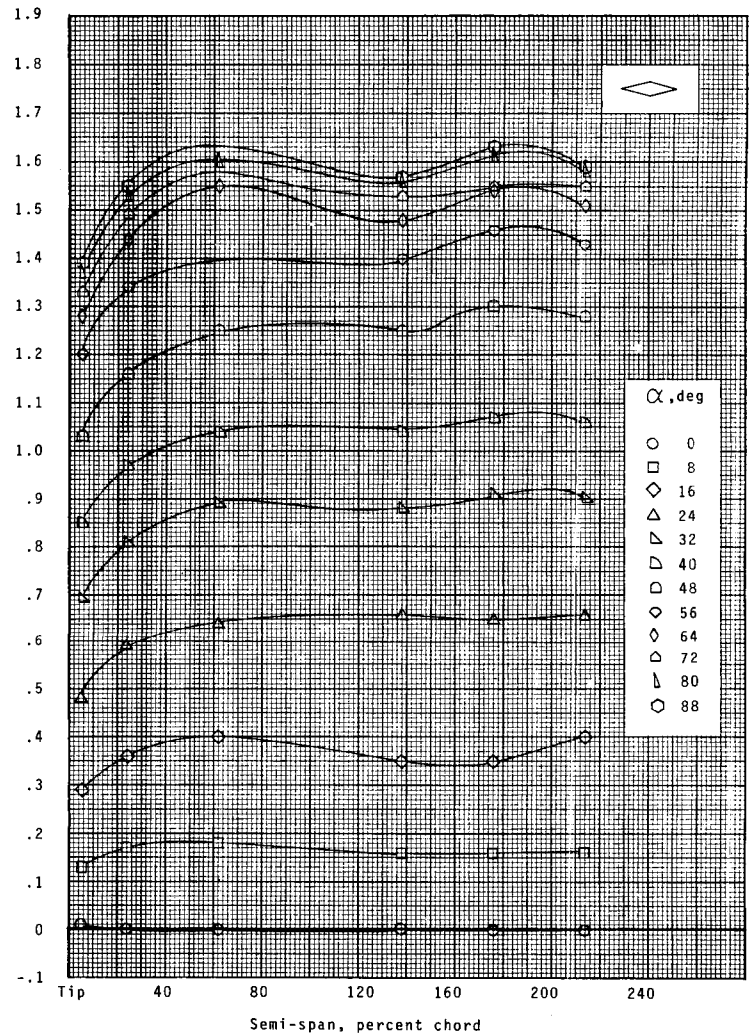



(b) $M_\infty = 1.30$

Figure 23.- Spanwise loading for the double-wedge airfoil.




(c) $M_\infty = 2.50$




(d) $M_\infty = 3.50$

Figure 23.- Concluded.

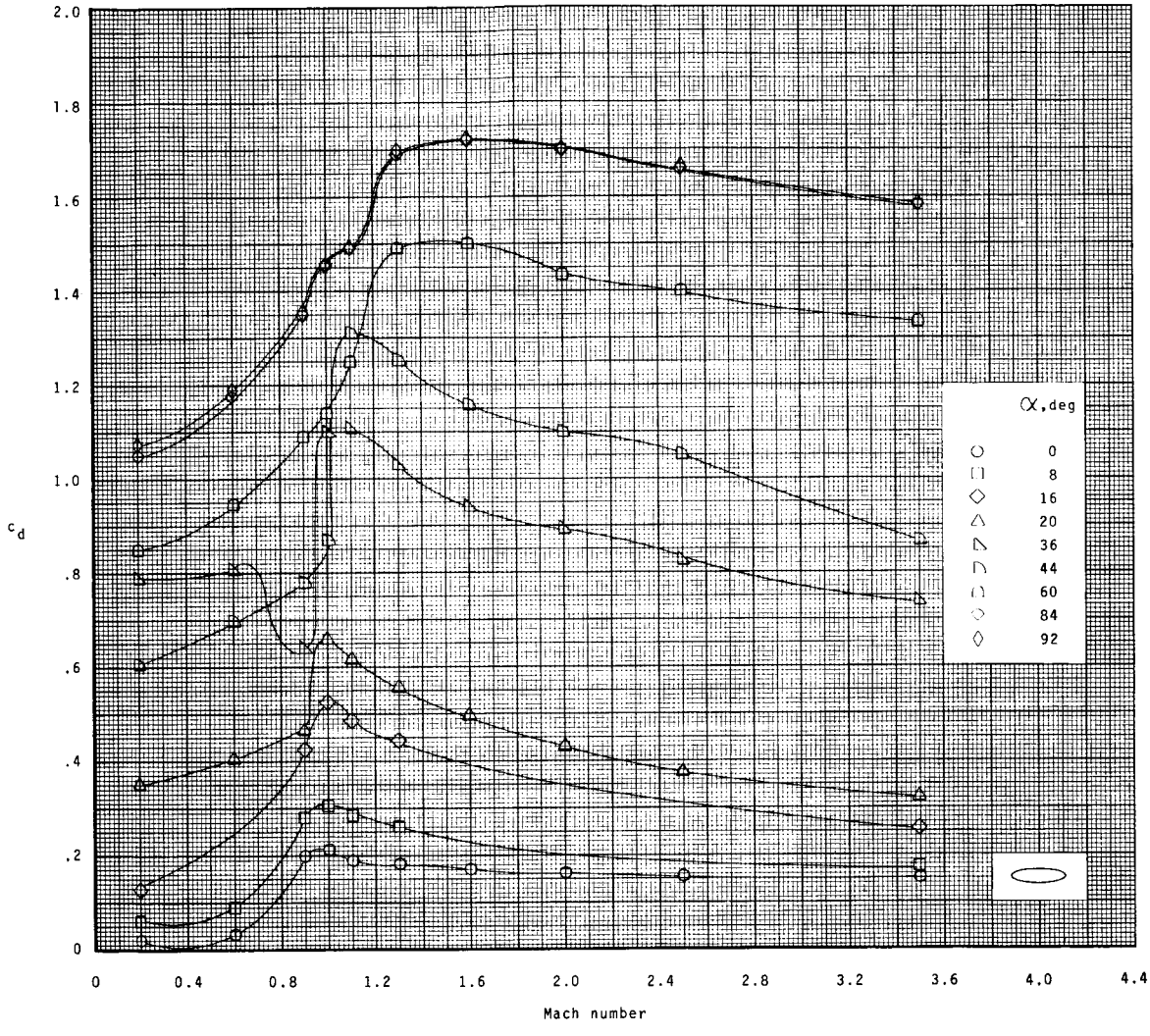



Figure 24.- Variation of section drag coefficient with Mach number for the elliptic airfoil with tip plate.

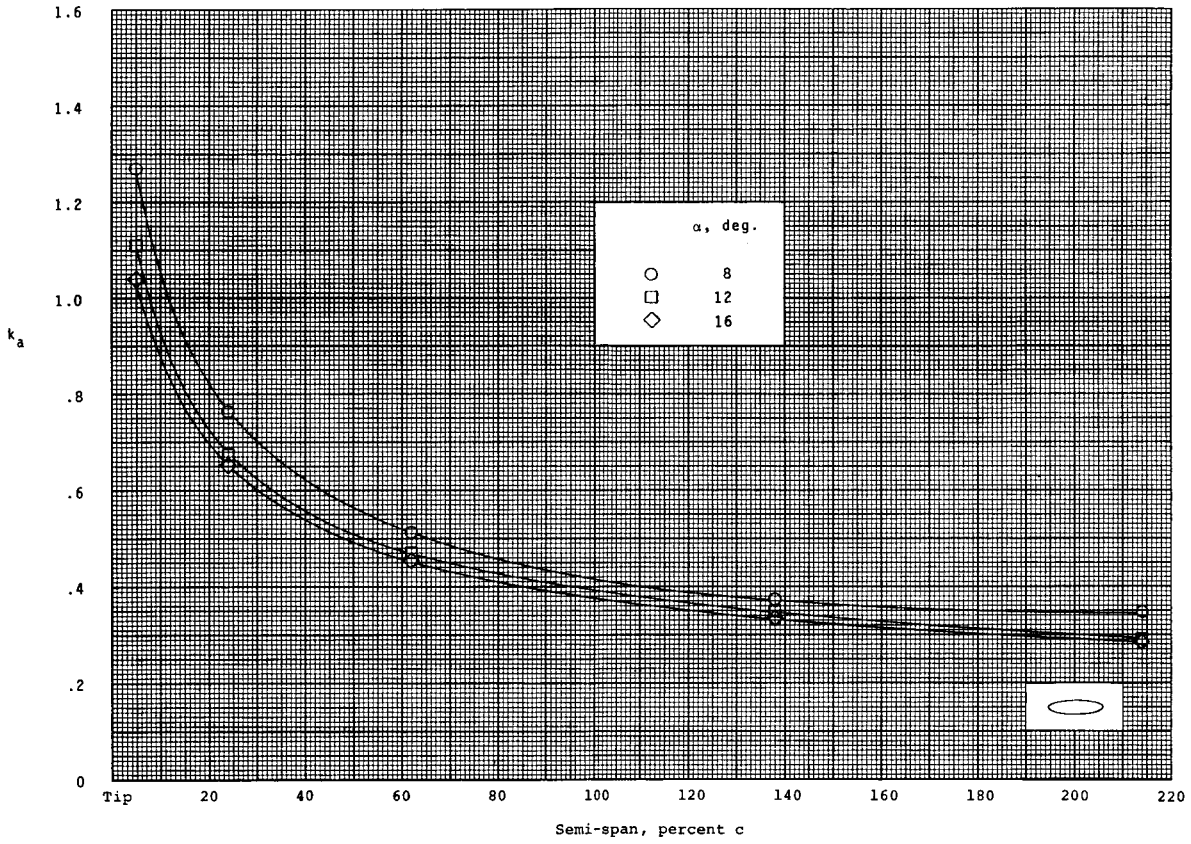



Figure 25.- Spanwise variation of the angle ratio for the elliptic wing at Mach number 0.20.

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 6.00 | 29 | 12 FT | 500 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.231 | 0.048 | -0.0061 | -0.227 | 0.064 |
| -0.03 | 0.025 | 0.041 | 0.0075 | 0.025 | 0.041 |
| 3.85 | 0.262 | 0.047 | 0.0208 | 0.258 | 0.065 |
| 7.97 | 0.492 | 0.057 | 0.0326 | 0.480 | 0.124 |
| 11.87 | 0.712 | 0.051 | 0.0590 | 0.686 | 0.196 |
| 15.97 | 0.893 | 0.036 | 0.0928 | 0.848 | 0.280 |
| 19.95 | 0.691 | 0.097 | 0.0673 | 0.617 | 0.327 |
| 23.86 | 0.488 | 0.108 | 0.0858 | 0.402 | 0.296 |
| 28.03 | 0.460 | 0.113 | 0.0816 | 0.353 | 0.316 |
| 32.02 | 0.463 | 0.114 | 0.0756 | 0.332 | 0.342 |
| 36.00 | 0.476 | 0.105 | 0.0737 | 0.323 | 0.364 |
| 40.15 | 0.561 | 0.095 | 0.0947 | 0.367 | 0.434 |
| 43.94 | 0.594 | 0.086 | 0.0911 | 0.368 | 0.474 |
| 48.10 | 0.623 | 0.076 | 0.0871 | 0.359 | 0.515 |
| 51.98 | 0.656 | 0.071 | 0.0842 | 0.348 | 0.561 |
| 55.95 | 0.683 | 0.062 | 0.0769 | 0.331 | 0.601 |
| 60.10 | 0.709 | 0.054 | 0.0702 | 0.306 | 0.642 |
| 64.02 | 0.731 | 0.046 | 0.0624 | 0.279 | 0.677 |
| 68.11 | 0.752 | 0.038 | 0.0533 | 0.245 | 0.712 |
| 72.02 | 0.769 | 0.030 | 0.0441 | 0.209 | 0.741 |
| 76.04 | 0.786 | 0.023 | 0.0346 | 0.168 | 0.768 |
| 80.01 | 0.795 | 0.015 | 0.0249 | 0.123 | 0.786 |
| 83.98 | 0.801 | 0.010 | 0.0145 | 0.074 | 0.798 |
| 88.25 | 0.802 | 0.002 | 0.0035 | 0.022 | 0.801 |
| 91.88 | 0.810 | -0.004 | -0.0069 | -0.022 | 0.810 |
| 94.02 | 0.803 | -0.008 | -0.0115 | -0.048 | 0.801 |
| -0.05 | 0.024 | 0.041 | 0.0074 | 0.024 | 0.041 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 6.50 | 31 | 12 FT | 500 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.22 | -0.315 | 0.013 | -0.0627 | -0.313 | 0.036 |
| -0.07 | 0.019 | 0.025 | 0.0081 | 0.019 | 0.025 |
| 3.94 | 0.312 | 0.020 | 0.0628 | 0.310 | 0.041 |
| 7.91 | 0.503 | 0.007 | 0.1178 | 0.497 | 0.076 |
| 11.95 | 0.706 | -0.025 | 0.1697 | 0.696 | 0.121 |
| 15.96 | 0.886 | -0.066 | 0.2132 | 0.870 | 0.180 |
| 19.87 | 0.636 | 0.094 | 0.1206 | 0.566 | 0.304 |
| 23.91 | 0.593 | 0.123 | 0.1195 | 0.492 | 0.353 |
| 28.05 | 0.597 | 0.128 | 0.1213 | 0.467 | 0.394 |
| 31.97 | 0.610 | 0.128 | 0.1191 | 0.449 | 0.431 |
| 36.00 | 0.643 | 0.121 | 0.1168 | 0.449 | 0.476 |
| 40.05 | 0.691 | 0.107 | 0.1151 | 0.460 | 0.526 |
| 43.96 | 0.749 | 0.099 | 0.1113 | 0.470 | 0.591 |
| 48.21 | 0.791 | 0.092 | 0.1079 | 0.459 | 0.651 |
| 52.06 | 0.830 | 0.085 | 0.1021 | 0.444 | 0.707 |
| 55.99 | 0.863 | 0.073 | 0.0932 | 0.422 | 0.756 |
| 60.12 | 0.898 | 0.064 | 0.0852 | 0.392 | 0.811 |
| 63.99 | 0.929 | 0.054 | 0.0762 | 0.359 | 0.859 |
| 68.00 | 0.960 | 0.046 | 0.0657 | 0.317 | 0.907 |
| 72.16 | 0.972 | 0.036 | 0.0543 | 0.263 | 0.936 |
| 76.15 | 0.986 | 0.028 | 0.0429 | 0.208 | 0.965 |
| 80.09 | 1.015 | 0.021 | 0.0310 | 0.154 | 1.004 |
| 83.99 | 1.028 | 0.014 | 0.0183 | 0.094 | 1.023 |
| 87.99 | 1.027 | 0.004 | 0.0057 | 0.032 | 1.027 |
| 91.94 | 1.016 | -0.005 | -0.0079 | -0.030 | 1.016 |
| 94.00 | 1.034 | -0.009 | -0.0140 | -0.063 | 1.032 |
| -0.07 | 0.018 | 0.025 | 0.0073 | 0.018 | 0.025 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 7.50 | 34 | 12 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.410 | -0.005 | -0.0862 | -0.409 | 0.023 |
| 0.04 | 0.017 | 0.018 | 0.0075 | 0.017 | 0.018 |
| 3.88 | 0.368 | 0.004 | 0.0837 | 0.367 | 0.029 |
| 7.97 | 0.601 | -0.024 | 0.1613 | 0.599 | 0.060 |
| 12.12 | 0.837 | -0.078 | 0.2340 | 0.835 | 0.099 |
| 15.97 | 1.007 | -0.138 | 0.2887 | 1.006 | 0.144 |
| 19.95 | 0.655 | 0.117 | 0.1282 | 0.575 | 0.334 |
| 24.00 | 0.630 | 0.124 | 0.1353 | 0.525 | 0.370 |
| 28.12 | 0.635 | 0.128 | 0.1355 | 0.499 | 0.412 |
| 31.91 | 0.667 | 0.127 | 0.1366 | 0.499 | 0.460 |
| 35.88 | 0.713 | 0.124 | 0.1362 | 0.505 | 0.518 |
| 39.99 | 0.763 | 0.117 | 0.1318 | 0.510 | 0.580 |
| 44.00 | 0.801 | 0.108 | 0.1265 | 0.501 | 0.634 |
| 48.02 | 0.850 | 0.100 | 0.1209 | 0.494 | 0.699 |
| 52.15 | 0.894 | 0.090 | 0.1136 | 0.478 | 0.761 |
| 56.01 | 0.935 | 0.080 | 0.1037 | 0.456 | 0.820 |
| 60.21 | 0.968 | 0.068 | 0.0932 | 0.422 | 0.873 |
| 63.99 | 0.988 | 0.058 | 0.0834 | 0.381 | 0.913 |
| 68.01 | 1.028 | 0.050 | 0.0715 | 0.339 | 0.972 |
| 72.09 | 1.040 | 0.039 | 0.0601 | 0.283 | 1.002 |
| 75.99 | 1.062 | 0.032 | 0.0492 | 0.227 | 1.038 |
| 80.08 | 1.069 | 0.022 | 0.0352 | 0.162 | 1.057 |
| 84.05 | 1.077 | 0.013 | 0.0214 | 0.099 | 1.073 |
| 88.05 | 1.084 | 0.004 | 0.0075 | 0.033 | 1.084 |
| 92.02 | 1.095 | -0.005 | -0.0063 | -0.034 | 1.095 |
| 94.08 | 1.086 | -0.009 | -0.0130 | -0.068 | 1.084 |
| -0.13 | 0.005 | 0.018 | 0.0050 | 0.005 | 0.018 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 7.50 | 62 | 12 FT | 1400 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.97 | -0.160 | -0.003 | -0.0640 | -0.160 | 0.008 |
| -0.04 | 0.072 | 0.005 | 0.0148 | 0.072 | 0.005 |
| 3.82 | 0.276 | -0.001 | 0.0887 | 0.276 | 0.017 |
| 7.99 | 0.508 | -0.029 | 0.1694 | 0.507 | 0.042 |
| 11.91 | 0.729 | -0.080 | 0.2423 | 0.729 | 0.072 |
| 16.06 | 0.957 | -0.147 | 0.3101 | 0.960 | 0.123 |
| 20.09 | 0.976 | -0.146 | 0.3148 | 0.966 | 0.198 |
| 24.01 | 1.114 | -0.206 | 0.3409 | 1.101 | 0.265 |
| 28.16 | 0.846 | 0.030 | 0.2173 | 0.731 | 0.426 |
| 32.01 | 0.908 | 0.009 | 0.2260 | 0.765 | 0.489 |
| 36.30 | 0.862 | 0.083 | 0.1676 | 0.646 | 0.577 |
| 40.04 | 0.889 | 0.082 | 0.1456 | 0.628 | 0.634 |
| 44.05 | 0.883 | 0.079 | 0.1334 | 0.580 | 0.671 |
| 48.16 | 0.922 | 0.081 | 0.1170 | 0.555 | 0.741 |
| 52.05 | 0.997 | 0.066 | 0.1160 | 0.561 | 0.827 |
| 55.95 | 1.016 | 0.057 | 0.1056 | 0.522 | 0.874 |
| 60.10 | 1.026 | 0.064 | 0.0942 | 0.456 | 0.921 |
| 64.00 | 1.048 | 0.055 | 0.0835 | 0.410 | 0.966 |
| 68.09 | 1.054 | 0.048 | 0.0690 | 0.349 | 0.995 |
| 71.97 | 1.053 | 0.037 | 0.0590 | 0.291 | 1.012 |
| 76.05 | 1.062 | 0.026 | 0.0429 | 0.231 | 1.037 |
| 80.10 | 1.086 | 0.017 | 0.0311 | 0.170 | 1.073 |
| 83.95 | 1.086 | 0.010 | 0.0204 | 0.105 | 1.081 |
| 88.08 | 1.094 | 0.001 | 0.0068 | 0.036 | 1.093 |
| 92.10 | 1.097 | -0.007 | -0.0077 | -0.034 | 1.097 |
| 95.99 | 1.083 | -0.012 | -0.0181 | -0.101 | 1.078 |
| -0.05 | 0.036 | 0.005 | 0.0122 | 0.036 | 0.005 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 9.50 | 36 | 12 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.70 | -0.531 | -0.015 | -0.1039 | -0.530 | 0.020 |
| -0.02 | -0.064 | 0.020 | -0.0007 | -0.064 | 0.020 |
| 3.86 | 0.421 | 0.003 | 0.0868 | 0.420 | 0.031 |
| 8.10 | 0.733 | -0.038 | 0.1744 | 0.731 | 0.066 |
| 12.01 | 0.991 | -0.108 | 0.2554 | 0.992 | 0.101 |
| 16.04 | 1.130 | -0.183 | 0.3260 | 1.136 | 0.136 |
| 19.89 | 0.650 | 0.124 | 0.1244 | 0.569 | 0.338 |
| 23.85 | 0.586 | 0.126 | 0.1338 | 0.485 | 0.353 |
| 27.88 | 0.651 | 0.121 | 0.1367 | 0.519 | 0.411 |
| 32.27 | 0.718 | 0.115 | 0.1378 | 0.546 | 0.481 |
| 36.00 | 0.733 | 0.112 | 0.1323 | 0.527 | 0.522 |
| 39.96 | 0.788 | 0.104 | 0.1315 | 0.537 | 0.586 |
| 43.94 | 0.804 | 0.094 | 0.1255 | 0.513 | 0.626 |
| 48.05 | 0.857 | 0.089 | 0.1208 | 0.507 | 0.697 |
| 51.97 | 0.911 | 0.082 | 0.1157 | 0.497 | 0.768 |
| 55.96 | 0.946 | 0.073 | 0.1054 | 0.469 | 0.825 |
| 59.97 | 0.987 | 0.065 | 0.0963 | 0.438 | 0.887 |
| 64.19 | 1.012 | 0.055 | 0.0854 | 0.391 | 0.935 |
| 67.96 | 1.035 | 0.048 | 0.0736 | 0.344 | 0.978 |
| 72.15 | 1.068 | 0.039 | 0.0626 | 0.290 | 1.028 |
| 75.88 | 1.078 | 0.033 | 0.0497 | 0.231 | 1.053 |
| 79.97 | 1.100 | 0.023 | 0.0377 | 0.169 | 1.087 |
| 83.91 | 1.099 | 0.016 | 0.0233 | 0.101 | 1.094 |
| 87.97 | 1.107 | 0.006 | 0.0101 | 0.033 | 1.106 |
| 92.19 | 1.099 | -0.005 | -0.0045 | -0.037 | 1.098 |
| 94.02 | 1.096 | -0.007 | -0.0125 | -0.070 | 1.094 |
| -0.04 | -0.088 | 0.020 | -0.0039 | -0.088 | 0.020 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 9.50 | 59 | 12 FT | 1460 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.15 | -0.243 | -0.008 | -0.0809 | -0.243 | 0.010 |
| -0.06 | 0.043 | 0.006 | 0.0121 | 0.043 | 0.006 |
| 3.79 | 0.304 | -0.004 | 0.0982 | 0.304 | 0.016 |
| 7.89 | 0.575 | -0.043 | 0.1901 | 0.576 | 0.036 |
| 11.94 | 0.846 | -0.111 | 0.2774 | 0.850 | 0.066 |
| 15.92 | 1.046 | -0.173 | 0.3355 | 1.054 | 0.121 |
| 20.13 | 1.121 | -0.206 | 0.3556 | 1.123 | 0.193 |
| 24.05 | 0.675 | 0.072 | 0.1712 | 0.587 | 0.341 |
| 28.00 | 0.694 | 0.075 | 0.1742 | 0.577 | 0.392 |
| 31.98 | 0.844 | 0.007 | 0.2225 | 0.712 | 0.453 |
| 36.14 | 0.769 | 0.096 | 0.1625 | 0.564 | 0.531 |
| 40.05 | 0.873 | 0.078 | 0.1621 | 0.618 | 0.622 |
| 44.16 | 0.893 | 0.079 | 0.1359 | 0.586 | 0.679 |
| 48.12 | 0.887 | 0.074 | 0.1117 | 0.537 | 0.710 |
| 52.09 | 0.922 | 0.065 | 0.1023 | 0.515 | 0.767 |
| 56.10 | 0.988 | 0.071 | 0.1038 | 0.493 | 0.860 |
| 59.99 | 1.015 | 0.071 | 0.0985 | 0.446 | 0.914 |
| 64.00 | 1.043 | 0.064 | 0.0891 | 0.399 | 0.966 |
| 68.00 | 1.067 | 0.055 | 0.0754 | 0.348 | 1.010 |
| 72.01 | 1.075 | 0.046 | 0.0630 | 0.288 | 1.037 |
| 76.02 | 1.099 | 0.039 | 0.0499 | 0.228 | 1.076 |
| 80.02 | 1.121 | 0.031 | 0.0363 | 0.163 | 1.110 |
| 84.22 | 1.146 | 0.018 | 0.0208 | 0.098 | 1.142 |
| 88.17 | 1.135 | 0.005 | 0.0062 | 0.031 | 1.135 |
| 92.02 | 1.148 | -0.006 | -0.0058 | -0.035 | 1.148 |
| 96.11 | 1.127 | -0.012 | -0.0156 | -0.108 | 1.122 |
| -0.06 | 0.050 | 0.005 | 0.0124 | 0.050 | 0.005 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 10.50 | 38 | 12 FT | 490 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.84 | -0.590 | -0.019 | -0.1119 | -0.590 | 0.021 |
| 0.10 | -0.082 | 0.018 | -0.0048 | -0.082 | 0.018 |
| 3.82 | 0.431 | 0.003 | 0.0897 | 0.430 | 0.032 |
| 8.04 | 0.764 | -0.041 | 0.1804 | 0.762 | 0.066 |
| 12.00 | 1.014 | -0.115 | 0.2628 | 1.016 | 0.098 |
| 15.91 | 1.142 | -0.187 | 0.3339 | 1.150 | 0.133 |
| 19.94 | 0.601 | 0.121 | 0.1271 | 0.523 | 0.319 |
| 23.97 | 0.561 | 0.124 | 0.1297 | 0.463 | 0.341 |
| 28.06 | 0.639 | 0.124 | 0.1363 | 0.506 | 0.410 |
| 32.03 | 0.744 | 0.118 | 0.1415 | 0.568 | 0.495 |
| 36.12 | 0.733 | 0.114 | 0.1345 | 0.525 | 0.525 |
| 40.16 | 0.733 | 0.096 | 0.1261 | 0.498 | 0.546 |
| 43.95 | 0.788 | 0.090 | 0.1242 | 0.505 | 0.612 |
| 47.96 | 0.839 | 0.086 | 0.1201 | 0.498 | 0.681 |
| 52.11 | 0.899 | 0.080 | 0.1152 | 0.490 | 0.759 |
| 56.08 | 0.933 | 0.072 | 0.1060 | 0.461 | 0.814 |
| 60.02 | 0.968 | 0.063 | 0.0966 | 0.429 | 0.870 |
| 64.00 | 1.001 | 0.055 | 0.0866 | 0.390 | 0.924 |
| 67.99 | 1.024 | 0.046 | 0.0749 | 0.341 | 0.967 |
| 72.09 | 1.060 | 0.038 | 0.0635 | 0.290 | 1.020 |
| 76.04 | 1.075 | 0.031 | 0.0514 | 0.229 | 1.051 |
| 80.02 | 1.085 | 0.024 | 0.0386 | 0.165 | 1.072 |
| 84.02 | 1.093 | 0.014 | 0.0251 | 0.100 | 1.089 |
| 88.24 | 1.104 | 0.005 | 0.0093 | 0.029 | 1.103 |
| 92.02 | 1.099 | -0.003 | -0.0037 | -0.035 | 1.099 |
| 94.01 | 1.091 | -0.007 | -0.0113 | -0.069 | 1.088 |
| 0.07 | -0.084 | 0.018 | -0.0053 | -0.084 | 0.018 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 61 | 12 FT | 490 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.09 | -0.477 | -0.009 | -0.0940 | -0.477 | 0.025 |
| -0.07 | 0.014 | 0.020 | 0.0113 | 0.014 | 0.020 |
| 3.81 | 0.561 | -0.005 | 0.1075 | 0.561 | 0.032 |
| 8.00 | 0.861 | -0.060 | 0.2000 | 0.861 | 0.061 |
| 11.88 | 1.090 | -0.141 | 0.2888 | 1.096 | 0.086 |
| 15.93 | 0.938 | 0.397 | 0.2431 | 0.793 | 0.639 |
| 20.02 | 0.544 | 0.124 | 0.1225 | 0.468 | 0.303 |
| 23.94 | 0.573 | 0.121 | 0.1295 | 0.474 | 0.343 |
| 28.34 | 0.679 | 0.122 | 0.1389 | 0.540 | 0.430 |
| 32.02 | 0.719 | 0.119 | 0.1382 | 0.546 | 0.482 |
| 35.90 | 0.715 | 0.105 | 0.1296 | 0.518 | 0.504 |
| 40.02 | 0.734 | 0.092 | 0.1224 | 0.503 | 0.542 |
| 43.94 | 0.795 | 0.088 | 0.1217 | 0.512 | 0.615 |
| 48.04 | 0.848 | 0.082 | 0.1161 | 0.506 | 0.686 |
| 51.95 | 0.899 | 0.076 | 0.1116 | 0.494 | 0.755 |
| 56.06 | 0.943 | 0.068 | 0.1023 | 0.470 | 0.821 |
| 59.97 | 0.969 | 0.059 | 0.0920 | 0.434 | 0.869 |
| 63.97 | 1.006 | 0.053 | 0.0823 | 0.394 | 0.927 |
| 68.15 | 1.042 | 0.043 | 0.0722 | 0.348 | 0.983 |
| 72.06 | 1.062 | 0.036 | 0.0592 | 0.293 | 1.022 |
| 75.95 | 1.067 | 0.029 | 0.0474 | 0.231 | 1.042 |
| 80.02 | 1.085 | 0.021 | 0.0339 | 0.167 | 1.072 |
| 83.98 | 1.101 | 0.012 | 0.0204 | 0.103 | 1.096 |
| 88.19 | 1.098 | 0.003 | 0.0058 | 0.032 | 1.098 |
| 91.97 | 1.101 | -0.006 | -0.0072 | -0.032 | 1.101 |
| 95.94 | 1.113 | -0.015 | -0.0220 | -0.100 | 1.108 |
| -0.07 | 0.022 | 0.021 | 0.0122 | 0.022 | 0.021 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 60 | 12 FT | 1400 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.08 | -0.228 | -0.007 | -0.0810 | -0.228 | 0.009 |
| -0.02 | 0.084 | 0.006 | 0.0159 | 0.084 | 0.006 |
| 3.69 | 0.342 | -0.004 | 0.1017 | 0.342 | 0.018 |
| 8.12 | 0.664 | -0.051 | 0.2105 | 0.665 | 0.043 |
| 11.95 | 0.925 | -0.119 | 0.2948 | 0.930 | 0.075 |
| 15.95 | 1.129 | -0.187 | 0.3510 | 1.137 | 0.130 |
| 20.02 | 1.172 | -0.186 | 0.3562 | 1.165 | 0.226 |
| 24.15 | 0.711 | 0.082 | 0.1735 | 0.615 | 0.366 |
| 28.05 | 0.850 | -0.016 | 0.2433 | 0.758 | 0.385 |
| 32.07 | 0.775 | 0.055 | 0.1939 | 0.628 | 0.458 |
| 36.29 | 0.794 | 0.098 | 0.1640 | 0.582 | 0.549 |
| 40.14 | 0.799 | 0.089 | 0.1414 | 0.554 | 0.584 |
| 43.87 | 0.834 | 0.091 | 0.1305 | 0.538 | 0.644 |
| 48.04 | 0.849 | 0.082 | 0.1185 | 0.507 | 0.687 |
| 52.05 | 0.883 | 0.073 | 0.1089 | 0.485 | 0.741 |
| 56.05 | 0.949 | 0.083 | 0.1116 | 0.461 | 0.833 |
| 60.02 | 0.984 | 0.075 | 0.1017 | 0.427 | 0.889 |
| 64.00 | 1.018 | 0.067 | 0.0912 | 0.386 | 0.944 |
| 67.98 | 1.050 | 0.059 | 0.0787 | 0.339 | 0.996 |
| 72.00 | 1.055 | 0.047 | 0.0651 | 0.281 | 1.018 |
| 75.99 | 1.076 | 0.035 | 0.0498 | 0.226 | 1.053 |
| 80.02 | 1.093 | 0.024 | 0.0356 | 0.165 | 1.081 |
| 84.11 | 1.106 | 0.015 | 0.0215 | 0.099 | 1.101 |
| 88.06 | 1.112 | 0.005 | 0.0096 | 0.033 | 1.111 |
| 91.95 | 1.118 | -0.005 | -0.0052 | -0.033 | 1.118 |
| 95.99 | 1.107 | -0.013 | -0.0214 | -0.103 | 1.102 |
| -0.05 | 0.066 | 0.004 | 0.0164 | 0.066 | 0.004 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 42 | 12 FT | 500 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.51 | -0.625 | -0.022 | -0.1212 | -0.625 | 0.017 |
| -0.05 | -0.095 | 0.020 | -0.0050 | -0.095 | 0.020 |
| 3.71 | 0.491 | -0.001 | 0.0979 | 0.490 | 0.031 |
| 7.85 | 0.822 | -0.054 | 0.1955 | 0.821 | 0.059 |
| 11.82 | 1.077 | -0.135 | 0.2848 | 1.081 | 0.089 |
| 15.92 | 1.182 | -0.205 | 0.3500 | 1.193 | 0.127 |
| 19.93 | 0.665 | 0.131 | 0.1310 | 0.580 | 0.349 |
| 23.92 | 0.678 | 0.134 | 0.1405 | 0.565 | 0.397 |
| 28.07 | 0.816 | 0.135 | 0.1535 | 0.657 | 0.503 |
| 31.97 | 0.986 | 0.139 | 0.1587 | 0.762 | 0.640 |
| 36.01 | 1.147 | 0.138 | 0.1563 | 0.846 | 0.786 |
| 40.06 | 1.266 | 0.131 | 0.1533 | 0.885 | 0.915 |
| 44.02 | 0.770 | 0.093 | 0.1172 | 0.489 | 0.602 |
| 48.36 | 0.819 | 0.081 | 0.1146 | 0.484 | 0.666 |
| 52.22 | 0.861 | 0.075 | 0.1081 | 0.468 | 0.726 |
| 56.15 | 0.904 | 0.068 | 0.1011 | 0.447 | 0.789 |
| 60.15 | 0.940 | 0.059 | 0.0918 | 0.417 | 0.845 |
| 64.12 | 0.972 | 0.051 | 0.0819 | 0.378 | 0.897 |
| 68.14 | 1.009 | 0.044 | 0.0705 | 0.335 | 0.953 |
| 72.06 | 1.030 | 0.036 | 0.0593 | 0.283 | 0.991 |
| 75.90 | 1.038 | 0.030 | 0.0486 | 0.224 | 1.014 |
| 80.21 | 1.048 | 0.021 | 0.0345 | 0.158 | 1.036 |
| 83.99 | 1.050 | 0.012 | 0.0213 | 0.098 | 1.045 |
| 88.21 | 1.073 | 0.004 | 0.0071 | 0.029 | 1.073 |
| 92.10 | 1.073 | -0.005 | -0.0052 | -0.035 | 1.072 |
| 94.09 | 1.068 | -0.009 | -0.0121 | -0.067 | 1.066 |
| -0.07 | -0.086 | 0.020 | -0.0067 | -0.086 | 0.020 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.00 | 44 | 12 FT | 450 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.259 | 0.049 | -0.0086 | -0.255 | 0.067 |
| -0.02 | 0.006 | 0.041 | 0.0074 | 0.007 | 0.041 |
| 4.25 | 0.273 | 0.048 | 0.0271 | 0.269 | 0.068 |
| 8.15 | 0.506 | 0.055 | 0.0459 | 0.493 | 0.126 |
| 12.32 | 0.527 | 0.055 | 0.0788 | 0.503 | 0.167 |
| 16.24 | 0.664 | 0.097 | 0.0743 | 0.611 | 0.279 |
| 20.09 | 0.506 | 0.113 | 0.0962 | 0.437 | 0.280 |
| 24.01 | 0.445 | 0.125 | 0.0968 | 0.356 | 0.296 |
| 28.08 | 0.511 | 0.133 | 0.0986 | 0.388 | 0.358 |
| 32.12 | 0.554 | 0.130 | 0.0973 | 0.400 | 0.405 |
| 36.08 | 0.579 | 0.114 | 0.1073 | 0.400 | 0.433 |
| 40.16 | 0.599 | 0.100 | 0.1040 | 0.393 | 0.463 |
| 44.02 | 0.630 | 0.090 | 0.1003 | 0.390 | 0.503 |
| 48.17 | 0.674 | 0.083 | 0.0964 | 0.388 | 0.557 |
| 52.06 | 0.705 | 0.076 | 0.0915 | 0.374 | 0.603 |
| 56.16 | 0.736 | 0.067 | 0.0844 | 0.354 | 0.649 |
| 60.39 | 0.766 | 0.058 | 0.0762 | 0.328 | 0.695 |
| 64.13 | 0.791 | 0.050 | 0.0678 | 0.300 | 0.734 |
| 68.11 | 0.818 | 0.041 | 0.0583 | 0.267 | 0.774 |
| 72.12 | 0.837 | 0.032 | 0.0480 | 0.226 | 0.806 |
| 76.08 | 0.852 | 0.024 | 0.0373 | 0.181 | 0.833 |
| 79.97 | 0.861 | 0.017 | 0.0266 | 0.133 | 0.851 |
| 84.01 | 0.873 | 0.010 | 0.0152 | 0.081 | 0.870 |
| 88.21 | 0.879 | 0.002 | 0.0037 | 0.026 | 0.878 |
| 92.01 | 0.879 | -0.006 | -0.0078 | -0.025 | 0.879 |
| 93.90 | 0.875 | -0.009 | -0.0135 | -0.050 | 0.874 |
| -0.04 | 0.009 | 0.043 | 0.0072 | 0.009 | 0.043 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.00 | 45 | 12 FT | 660 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.89 | -0.197 | 0.044 | -0.0144 | -0.193 | 0.058 |
| 0.09 | 0.024 | 0.037 | 0.0087 | 0.024 | 0.037 |
| 4.02 | 0.213 | 0.044 | 0.0326 | 0.210 | 0.059 |
| 8.21 | 0.473 | 0.049 | 0.0512 | 0.461 | 0.116 |
| 12.09 | 0.569 | 0.048 | 0.0789 | 0.546 | 0.166 |
| 16.11 | 0.656 | 0.091 | 0.0744 | 0.605 | 0.269 |
| 20.21 | 0.514 | 0.113 | 0.0964 | 0.443 | 0.283 |
| 24.05 | 0.458 | 0.125 | 0.1001 | 0.367 | 0.300 |
| 28.46 | 0.517 | 0.133 | 0.0995 | 0.392 | 0.363 |
| 32.24 | 0.574 | 0.133 | 0.0993 | 0.415 | 0.419 |
| 36.10 | 0.625 | 0.116 | 0.1053 | 0.437 | 0.462 |
| 40.36 | 0.625 | 0.104 | 0.1052 | 0.409 | 0.484 |
| 44.14 | 0.659 | 0.094 | 0.1021 | 0.407 | 0.526 |
| 48.11 | 0.678 | 0.083 | 0.0964 | 0.391 | 0.560 |
| 52.02 | 0.708 | 0.075 | 0.0915 | 0.377 | 0.604 |
| 56.21 | 0.743 | 0.068 | 0.0853 | 0.357 | 0.655 |
| 60.05 | 0.771 | 0.059 | 0.0772 | 0.334 | 0.697 |
| 64.01 | 0.789 | 0.050 | 0.0682 | 0.301 | 0.731 |
| 68.09 | 0.813 | 0.041 | 0.0579 | 0.265 | 0.770 |
| 71.86 | 0.833 | 0.033 | 0.0486 | 0.228 | 0.802 |
| 75.97 | 0.847 | 0.025 | 0.0374 | 0.181 | 0.827 |
| 80.15 | 0.865 | 0.018 | 0.0263 | 0.130 | 0.855 |
| 84.05 | 0.871 | 0.011 | 0.0152 | 0.080 | 0.868 |
| 88.32 | 0.878 | 0.002 | 0.0031 | 0.024 | 0.877 |
| 92.05 | 0.877 | -0.006 | -0.0078 | -0.026 | 0.877 |
| 93.91 | 0.875 | -0.009 | -0.0137 | -0.051 | 0.873 |
| -0.08 | 0.018 | 0.039 | 0.0057 | 0.018 | 0.039 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.50 | 46 | 12 FT | 410 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.83 | -0.346 | 0.026 | -0.0540 | -0.344 | 0.049 |
| 0.29 | 0.056 | 0.027 | 0.0135 | 0.056 | 0.028 |
| 3.94 | 0.359 | 0.027 | 0.0691 | 0.356 | 0.051 |
| 8.04 | 0.587 | 0.015 | 0.1337 | 0.579 | 0.097 |
| 12.14 | 0.547 | 0.042 | 0.1488 | 0.526 | 0.156 |
| 16.29 | 0.681 | 0.087 | 0.1374 | 0.629 | 0.275 |
| 20.20 | 0.541 | 0.131 | 0.1268 | 0.463 | 0.310 |
| 23.93 | 0.544 | 0.142 | 0.1278 | 0.440 | 0.351 |
| 28.32 | 0.617 | 0.144 | 0.1326 | 0.475 | 0.419 |
| 32.03 | 0.660 | 0.138 | 0.1318 | 0.487 | 0.467 |
| 36.10 | 0.702 | 0.122 | 0.1273 | 0.495 | 0.512 |
| 39.99 | 0.740 | 0.111 | 0.1222 | 0.496 | 0.561 |
| 44.14 | 0.790 | 0.100 | 0.1176 | 0.497 | 0.622 |
| 48.04 | 0.844 | 0.094 | 0.1132 | 0.495 | 0.690 |
| 51.98 | 0.888 | 0.086 | 0.1074 | 0.480 | 0.753 |
| 56.02 | 0.927 | 0.076 | 0.0988 | 0.455 | 0.812 |
| 60.04 | 0.967 | 0.065 | 0.0894 | 0.427 | 0.871 |
| 63.82 | 0.999 | 0.057 | 0.0794 | 0.390 | 0.921 |
| 68.04 | 1.027 | 0.046 | 0.0674 | 0.342 | 0.970 |
| 71.88 | 1.049 | 0.037 | 0.0562 | 0.291 | 1.008 |
| 76.28 | 1.076 | 0.028 | 0.0434 | 0.228 | 1.052 |
| 79.95 | 1.088 | 0.021 | 0.0315 | 0.170 | 1.075 |
| 84.22 | 1.101 | 0.011 | 0.0173 | 0.100 | 1.096 |
| 88.25 | 1.110 | 0.002 | 0.0042 | 0.032 | 1.109 |
| 92.35 | 1.111 | -0.007 | -0.0095 | -0.038 | 1.110 |
| 94.08 | 1.105 | -0.011 | -0.0154 | -0.067 | 1.103 |
| -0.02 | 0.025 | 0.028 | 0.0069 | 0.025 | 0.028 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.50 | 47 | 12 FT | 570 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.297 | 0.015 | -0.0635 | -0.295 | 0.036 |
| 0.14 | 0.027 | 0.014 | 0.0124 | 0.027 | 0.014 |
| 4.25 | 0.303 | 0.018 | 0.0788 | 0.301 | 0.041 |
| 8.00 | 0.514 | 0.010 | 0.1347 | 0.508 | 0.082 |
| 11.94 | 0.576 | 0.020 | 0.1659 | 0.559 | 0.138 |
| 16.15 | 0.647 | 0.079 | 0.1432 | 0.599 | 0.256 |
| 20.20 | 0.570 | 0.131 | 0.1284 | 0.489 | 0.319 |
| 23.92 | 0.570 | 0.141 | 0.1308 | 0.464 | 0.360 |
| 28.08 | 0.657 | 0.147 | 0.1368 | 0.510 | 0.438 |
| 32.12 | 0.704 | 0.142 | 0.1362 | 0.521 | 0.495 |
| 36.16 | 0.723 | 0.126 | 0.1300 | 0.509 | 0.528 |
| 40.33 | 0.765 | 0.114 | 0.1250 | 0.510 | 0.582 |
| 44.05 | 0.802 | 0.102 | 0.1190 | 0.505 | 0.631 |
| 48.28 | 0.855 | 0.093 | 0.1137 | 0.500 | 0.700 |
| 51.98 | 0.896 | 0.087 | 0.1085 | 0.483 | 0.759 |
| 56.14 | 0.937 | 0.077 | 0.0997 | 0.458 | 0.821 |
| 60.03 | 0.972 | 0.067 | 0.0899 | 0.428 | 0.876 |
| 63.93 | 1.002 | 0.057 | 0.0799 | 0.389 | 0.925 |
| 67.96 | 1.027 | 0.047 | 0.0682 | 0.342 | 0.970 |
| 72.02 | 1.048 | 0.037 | 0.0566 | 0.288 | 1.008 |
| 75.99 | 1.073 | 0.029 | 0.0448 | 0.231 | 1.048 |
| 81.98 | 1.095 | 0.017 | 0.0258 | 0.136 | 1.087 |
| 83.96 | 1.103 | 0.012 | 0.0193 | 0.104 | 1.098 |
| 88.24 | 1.106 | 0.003 | 0.0047 | 0.031 | 1.105 |
| 91.95 | 1.113 | -0.006 | -0.0077 | -0.032 | 1.113 |
| 94.05 | 1.113 | -0.011 | -0.0148 | -0.068 | 1.111 |
| 0.07 | 0.023 | 0.016 | 0.0084 | 0.023 | 0.016 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 7.50 | 48 | 12 FT | 460 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.09 | -0.420 | 0.008 | -0.0749 | -0.419 | 0.038 |
| 0.15 | 0.044 | 0.029 | 0.0115 | 0.044 | 0.029 |
| 3.88 | 0.451 | 0.012 | 0.0880 | 0.449 | 0.043 |
| 8.05 | 0.720 | -0.018 | 0.1838 | 0.716 | 0.083 |
| 11.81 | 0.646 | 0.025 | 0.1844 | 0.628 | 0.156 |
| 16.04 | 0.762 | 0.100 | 0.1351 | 0.705 | 0.306 |
| 20.25 | 0.635 | 0.137 | 0.1369 | 0.549 | 0.349 |
| 24.05 | 0.630 | 0.140 | 0.1404 | 0.518 | 0.384 |
| 27.94 | 0.698 | 0.141 | 0.1465 | 0.550 | 0.452 |
| 32.04 | 0.731 | 0.136 | 0.1433 | 0.548 | 0.503 |
| 36.01 | 0.769 | 0.123 | 0.1382 | 0.550 | 0.552 |
| 39.97 | 0.816 | 0.113 | 0.1321 | 0.553 | 0.611 |
| 43.95 | 0.864 | 0.105 | 0.1262 | 0.549 | 0.675 |
| 48.10 | 0.924 | 0.098 | 0.1207 | 0.544 | 0.753 |
| 52.19 | 0.968 | 0.088 | 0.1125 | 0.524 | 0.819 |
| 55.95 | 1.004 | 0.079 | 0.1039 | 0.497 | 0.876 |
| 60.24 | 1.044 | 0.067 | 0.0927 | 0.460 | 0.940 |
| 64.06 | 1.071 | 0.058 | 0.0822 | 0.416 | 0.988 |
| 68.02 | 1.099 | 0.048 | 0.0705 | 0.367 | 1.037 |
| 72.04 | 1.122 | 0.038 | 0.0580 | 0.310 | 1.079 |
| 76.05 | 1.145 | 0.030 | 0.0458 | 0.247 | 1.119 |
| 80.04 | 1.163 | 0.022 | 0.0328 | 0.180 | 1.149 |
| 83.92 | 1.171 | 0.012 | 0.0198 | 0.112 | 1.165 |
| 88.05 | 1.181 | 0.003 | 0.0052 | 0.037 | 1.181 |
| 92.06 | 1.178 | -0.007 | -0.0085 | -0.036 | 1.177 |
| 93.82 | 1.182 | -0.011 | -0.0148 | -0.068 | 1.180 |
| 97.29 | 1.170 | -0.019 | -0.0264 | -0.130 | 1.163 |
| -0.04 | -0.006 | 0.028 | 0.0066 | -0.006 | 0.028 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 7.50 | 49 | 12 FT | 600 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.347 | 0.004 | -0.0801 | -0.346 | 0.028 |
| -0.08 | 0.016 | 0.014 | 0.0068 | 0.016 | 0.014 |
| 3.86 | 0.364 | 0.009 | 0.0930 | 0.362 | 0.033 |
| 8.04 | 0.655 | -0.017 | 0.1845 | 0.651 | 0.074 |
| 11.92 | 0.665 | 0.008 | 0.2032 | 0.649 | 0.145 |
| 15.92 | 0.726 | 0.099 | 0.1366 | 0.671 | 0.294 |
| 19.89 | 0.630 | 0.137 | 0.1357 | 0.546 | 0.343 |
| 23.99 | 0.635 | 0.139 | 0.1407 | 0.523 | 0.385 |
| 28.02 | 0.749 | 0.140 | 0.1500 | 0.596 | 0.475 |
| 32.04 | 0.771 | 0.134 | 0.1448 | 0.582 | 0.523 |
| 35.99 | 0.816 | 0.126 | 0.1406 | 0.586 | 0.582 |
| 39.97 | 0.841 | 0.113 | 0.1329 | 0.572 | 0.627 |
| 44.08 | 0.904 | 0.104 | 0.1274 | 0.577 | 0.703 |
| 48.10 | 0.941 | 0.097 | 0.1205 | 0.556 | 0.765 |
| 51.98 | 0.978 | 0.089 | 0.1130 | 0.533 | 0.825 |
| 56.14 | 1.019 | 0.078 | 0.1031 | 0.503 | 0.890 |
| 59.98 | 1.059 | 0.069 | 0.0936 | 0.470 | 0.951 |
| 64.09 | 1.081 | 0.058 | 0.0820 | 0.420 | 0.997 |
| 68.02 | 1.107 | 0.048 | 0.0702 | 0.370 | 1.044 |
| 72.02 | 1.127 | 0.038 | 0.0580 | 0.312 | 1.084 |
| 75.94 | 1.148 | 0.031 | 0.0462 | 0.249 | 1.121 |
| 79.98 | 1.169 | 0.022 | 0.0322 | 0.182 | 1.155 |
| 83.97 | 1.179 | 0.012 | 0.0193 | 0.112 | 1.173 |
| 87.92 | 1.183 | 0.003 | 0.0054 | 0.040 | 1.182 |
| 92.08 | 1.190 | -0.007 | -0.0086 | -0.036 | 1.189 |
| 96.03 | 1.181 | -0.016 | -0.0220 | -0.108 | 1.177 |
| -0.03 | 0.012 | 0.015 | 0.0084 | 0.012 | 0.015 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 50 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.10 | -0.570 | -0.001 | -0.0955 | -0.569 | 0.040 |
| -0.02 | 0.011 | 0.030 | 0.0102 | 0.011 | 0.030 |
| 4.02 | 0.589 | 0.003 | 0.1142 | 0.587 | 0.044 |
| 7.97 | 0.880 | -0.038 | 0.2200 | 0.877 | 0.084 |
| 12.13 | 0.653 | 0.061 | 0.1632 | 0.626 | 0.197 |
| 16.09 | 0.649 | 0.115 | 0.1331 | 0.591 | 0.290 |
| 19.94 | 0.679 | 0.141 | 0.1405 | 0.590 | 0.364 |
| 23.98 | 0.653 | 0.140 | 0.1435 | 0.540 | 0.393 |
| 28.13 | 0.725 | 0.135 | 0.1484 | 0.576 | 0.461 |
| 32.04 | 0.770 | 0.129 | 0.1461 | 0.585 | 0.518 |
| 36.20 | 0.801 | 0.115 | 0.1394 | 0.578 | 0.566 |
| 40.05 | 0.849 | 0.105 | 0.1339 | 0.582 | 0.627 |
| 44.14 | 0.907 | 0.099 | 0.1281 | 0.582 | 0.703 |
| 48.04 | 0.957 | 0.093 | 0.1221 | 0.571 | 0.773 |
| 51.93 | 1.002 | 0.085 | 0.1142 | 0.551 | 0.841 |
| 56.08 | 1.040 | 0.075 | 0.1040 | 0.518 | 0.905 |
| 60.15 | 1.081 | 0.065 | 0.0928 | 0.482 | 0.969 |
| 64.01 | 1.103 | 0.056 | 0.0818 | 0.433 | 1.016 |
| 68.02 | 1.136 | 0.046 | 0.0701 | 0.382 | 1.071 |
| 72.05 | 1.160 | 0.037 | 0.0578 | 0.322 | 1.115 |
| 76.11 | 1.184 | 0.030 | 0.0449 | 0.255 | 1.157 |
| 79.95 | 1.200 | 0.021 | 0.0324 | 0.188 | 1.185 |
| 83.91 | 1.208 | 0.012 | 0.0189 | 0.116 | 1.203 |
| 87.97 | 1.214 | 0.002 | 0.0051 | 0.041 | 1.214 |
| 92.08 | 1.216 | -0.007 | -0.0089 | -0.037 | 1.216 |
| 95.95 | 1.210 | -0.016 | -0.0225 | -0.109 | 1.205 |
| -0.04 | 0.012 | 0.031 | 0.0090 | 0.012 | 0.031 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 51 | 12 FT | 610 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.450 | -0.004 | -0.0991 | -0.450 | 0.027 |
| -0.04 | 0.011 | 0.015 | 0.0099 | 0.011 | 0.015 |
| 3.95 | 0.473 | 0.001 | 0.1172 | 0.471 | 0.033 |
| 8.02 | 0.798 | -0.038 | 0.2269 | 0.796 | 0.074 |
| 11.97 | 0.674 | 0.043 | 0.1848 | 0.651 | 0.181 |
| 15.86 | 0.694 | 0.112 | 0.1385 | 0.637 | 0.297 |
| 20.17 | 0.648 | 0.145 | 0.1433 | 0.558 | 0.359 |
| 24.04 | 0.651 | 0.138 | 0.1467 | 0.538 | 0.391 |
| 28.06 | 0.731 | 0.136 | 0.1506 | 0.581 | 0.464 |
| 32.10 | 0.784 | 0.126 | 0.1492 | 0.597 | 0.524 |
| 36.12 | 0.818 | 0.117 | 0.1419 | 0.592 | 0.577 |
| 40.15 | 0.870 | 0.105 | 0.1345 | 0.597 | 0.641 |
| 43.95 | 0.924 | 0.097 | 0.1292 | 0.597 | 0.711 |
| 47.99 | 0.959 | 0.092 | 0.1225 | 0.574 | 0.774 |
| 51.92 | 1.007 | 0.085 | 0.1145 | 0.555 | 0.845 |
| 55.95 | 1.054 | 0.075 | 0.1043 | 0.528 | 0.916 |
| 59.91 | 1.087 | 0.065 | 0.0935 | 0.488 | 0.974 |
| 64.05 | 1.112 | 0.055 | 0.0814 | 0.437 | 1.024 |
| 68.08 | 1.133 | 0.046 | 0.0689 | 0.380 | 1.068 |
| 72.09 | 1.155 | 0.037 | 0.0568 | 0.320 | 1.111 |
| 75.89 | 1.182 | 0.030 | 0.0453 | 0.259 | 1.154 |
| 79.95 | 1.202 | 0.021 | 0.0319 | 0.189 | 1.187 |
| 84.04 | 1.210 | 0.012 | 0.0180 | 0.114 | 1.205 |
| 87.99 | 1.214 | 0.002 | 0.0045 | 0.040 | 1.214 |
| 92.00 | 1.216 | -0.007 | -0.0091 | -0.036 | 1.215 |
| 95.95 | 1.216 | -0.017 | -0.0227 | -0.109 | 1.211 |
| -0.05 | 0.034 | 0.016 | 0.0104 | 0.034 | 0.016 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 10.50 | 52 | 12 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.10 | -0.596 | 0.001 | -0.0949 | -0.594 | 0.043 |
| -0.15 | 0.041 | 0.031 | 0.0138 | 0.042 | 0.031 |
| 3.94 | 0.664 | 0. | 0.1262 | 0.662 | 0.046 |
| 7.91 | 0.944 | -0.045 | 0.2343 | 0.942 | 0.085 |
| 11.94 | 0.643 | 0.077 | 0.1528 | 0.613 | 0.209 |
| 16.16 | 0.573 | 0.121 | 0.1298 | 0.517 | 0.276 |
| 19.95 | 0.596 | 0.138 | 0.1378 | 0.513 | 0.333 |
| 24.05 | 0.617 | 0.133 | 0.1410 | 0.509 | 0.373 |
| 28.02 | 0.699 | 0.131 | 0.1452 | 0.556 | 0.444 |
| 32.08 | 0.756 | 0.124 | 0.1427 | 0.575 | 0.506 |
| 36.00 | 0.801 | 0.112 | 0.1378 | 0.582 | 0.562 |
| 40.05 | 0.844 | 0.102 | 0.1314 | 0.580 | 0.621 |
| 44.08 | 0.906 | 0.096 | 0.1268 | 0.584 | 0.699 |
| 48.09 | 0.956 | 0.090 | 0.1203 | 0.572 | 0.772 |
| 52.05 | 1.003 | 0.082 | 0.1123 | 0.552 | 0.841 |
| 56.01 | 1.041 | 0.072 | 0.1023 | 0.522 | 0.903 |
| 60.03 | 1.080 | 0.063 | 0.0917 | 0.485 | 0.967 |
| 63.99 | 1.108 | 0.054 | 0.0804 | 0.438 | 1.019 |
| 67.99 | 1.137 | 0.044 | 0.0683 | 0.385 | 1.071 |
| 71.96 | 1.164 | 0.036 | 0.0560 | 0.326 | 1.118 |
| 75.95 | 1.182 | 0.029 | 0.0435 | 0.259 | 1.154 |
| 80.09 | 1.203 | 0.019 | 0.0298 | 0.188 | 1.188 |
| 83.95 | 1.210 | 0.011 | 0.0168 | 0.117 | 1.205 |
| 88.04 | 1.220 | 0.001 | 0.0026 | 0.040 | 1.220 |
| 91.92 | 1.219 | -0.008 | -0.0103 | -0.033 | 1.219 |
| 96.01 | 1.213 | -0.017 | -0.0243 | -0.110 | 1.208 |
| -0.05 | 0.104 | 0.031 | 0.0216 | 0.104 | 0.031 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 10.50 | 53 | 12 FT | 600 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.84 | -0.438 | 0. | -0.0877 | -0.437 | 0.029 |
| 0.09 | 0.088 | 0.017 | 0.0231 | 0.088 | 0.017 |
| 3.99 | 0.529 | -0.002 | 0.1350 | 0.528 | 0.035 |
| 8.24 | 0.863 | -0.045 | 0.2505 | 0.860 | 0.079 |
| 12.25 | 0.656 | 0.066 | 0.1785 | 0.627 | 0.204 |
| 16.32 | 0.728 | 0.108 | 0.1688 | 0.669 | 0.308 |
| 20.14 | 0.608 | 0.145 | 0.1475 | 0.521 | 0.345 |
| 23.97 | 0.639 | 0.140 | 0.1469 | 0.527 | 0.388 |
| 28.17 | 0.715 | 0.134 | 0.1490 | 0.568 | 0.456 |
| 32.09 | 0.770 | 0.126 | 0.1462 | 0.586 | 0.516 |
| 36.25 | 0.842 | 0.116 | 0.1422 | 0.610 | 0.591 |
| 40.22 | 0.874 | 0.103 | 0.1344 | 0.601 | 0.643 |
| 44.08 | 0.926 | 0.095 | 0.1284 | 0.599 | 0.712 |
| 48.15 | 0.962 | 0.090 | 0.1212 | 0.575 | 0.776 |
| 51.96 | 1.008 | 0.083 | 0.1136 | 0.556 | 0.844 |
| 56.05 | 1.048 | 0.073 | 0.1036 | 0.525 | 0.910 |
| 60.15 | 1.083 | 0.063 | 0.0924 | 0.484 | 0.971 |
| 64.06 | 1.107 | 0.054 | 0.0813 | 0.435 | 1.019 |
| 68.11 | 1.133 | 0.045 | 0.0689 | 0.381 | 1.068 |
| 72.08 | 1.160 | 0.037 | 0.0573 | 0.321 | 1.116 |
| 76.09 | 1.179 | 0.029 | 0.0451 | 0.255 | 1.152 |
| 80.05 | 1.200 | 0.021 | 0.0320 | 0.187 | 1.186 |
| 84.01 | 1.209 | 0.012 | 0.0186 | 0.114 | 1.204 |
| 88.35 | 1.214 | 0.002 | 0.0037 | 0.033 | 1.214 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 54 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.15 | -0.634 | -0.003 | -0.1096 | -0.633 | 0.043 |
| -0.12 | -0.034 | 0.030 | 0.0085 | -0.034 | 0.030 |
| 4.26 | 0.694 | -0.001 | 0.1329 | 0.693 | 0.050 |
| 8.10 | 0.967 | -0.049 | 0.2416 | 0.964 | 0.088 |
| 12.25 | 0.622 | 0.068 | 0.1612 | 0.593 | 0.199 |
| 16.05 | 0.514 | 0.125 | 0.1292 | 0.460 | 0.262 |
| 20.14 | 0.588 | 0.139 | 0.1392 | 0.504 | 0.333 |
| 23.97 | 0.597 | 0.134 | 0.1408 | 0.491 | 0.365 |
| 28.14 | 0.680 | 0.130 | 0.1437 | 0.538 | 0.435 |
| 31.97 | 0.731 | 0.123 | 0.1426 | 0.555 | 0.491 |
| 36.32 | 0.799 | 0.112 | 0.1387 | 0.577 | 0.563 |
| 40.10 | 0.831 | 0.102 | 0.1325 | 0.570 | 0.613 |
| 44.02 | 0.892 | 0.096 | 0.1282 | 0.574 | 0.689 |
| 48.04 | 0.942 | 0.090 | 0.1217 | 0.563 | 0.761 |
| 51.99 | 0.985 | 0.082 | 0.1135 | 0.542 | 0.827 |
| 55.95 | 1.024 | 0.073 | 0.1043 | 0.513 | 0.889 |
| 60.11 | 1.067 | 0.063 | 0.0937 | 0.477 | 0.956 |
| 64.04 | 1.096 | 0.055 | 0.0828 | 0.431 | 1.009 |
| 68.05 | 1.122 | 0.045 | 0.0707 | 0.378 | 1.057 |
| 71.96 | 1.154 | 0.037 | 0.0590 | 0.322 | 1.108 |
| 75.94 | 1.176 | 0.030 | 0.0468 | 0.256 | 1.148 |
| 80.22 | 1.191 | 0.021 | 0.0327 | 0.181 | 1.178 |
| 83.97 | 1.203 | 0.013 | 0.0199 | 0.114 | 1.197 |
| 88.12 | 1.209 | 0.003 | 0.0055 | 0.037 | 1.208 |
| 91.95 | 1.212 | -0.006 | -0.0072 | -0.035 | 1.211 |
| 96.02 | 1.209 | -0.015 | -0.0216 | -0.112 | 1.204 |
| -0.05 | -0.019 | 0.030 | 0.0095 | -0.019 | 0.030 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 55 | 12 FT | 660 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.08 | -0.481 | -0.005 | -0.1073 | -0.480 | 0.030 |
| 0.22 | 0.065 | 0.016 | 0.0180 | 0.065 | 0.016 |
| 3.86 | 0.457 | -0.002 | 0.1332 | 0.456 | 0.029 |
| 7.97 | 0.858 | -0.048 | 0.2481 | 0.857 | 0.072 |
| 11.95 | 0.661 | 0.042 | 0.1964 | 0.638 | 0.178 |
| 16.09 | 0.727 | 0.101 | 0.1732 | 0.670 | 0.299 |
| 20.15 | 0.574 | 0.138 | 0.1414 | 0.491 | 0.327 |
| 23.96 | 0.628 | 0.138 | 0.1460 | 0.517 | 0.381 |
| 28.14 | 0.698 | 0.132 | 0.1485 | 0.553 | 0.446 |
| 32.10 | 0.742 | 0.124 | 0.1451 | 0.563 | 0.499 |
| 36.25 | 0.830 | 0.116 | 0.1436 | 0.601 | 0.584 |
| 40.24 | 0.877 | 0.104 | 0.1375 | 0.602 | 0.646 |
| 44.14 | 0.915 | 0.096 | 0.1299 | 0.590 | 0.706 |
| 48.29 | 0.945 | 0.089 | 0.1215 | 0.562 | 0.764 |
| 51.99 | 0.984 | 0.082 | 0.1144 | 0.542 | 0.826 |
| 56.14 | 1.031 | 0.073 | 0.1048 | 0.514 | 0.897 |
| 60.16 | 1.063 | 0.063 | 0.0934 | 0.474 | 0.953 |
| 64.11 | 1.097 | 0.054 | 0.0825 | 0.431 | 1.011 |
| 67.96 | 1.118 | 0.045 | 0.0708 | 0.378 | 1.053 |
| 71.95 | 1.150 | 0.038 | 0.0590 | 0.320 | 1.105 |
| 75.92 | 1.172 | 0.031 | 0.0465 | 0.255 | 1.144 |
| 80.08 | 1.193 | 0.021 | 0.0331 | 0.184 | 1.179 |
| 83.92 | 1.200 | 0.013 | 0.0196 | 0.114 | 1.195 |
| 88.17 | 1.210 | 0.003 | 0.0050 | 0.036 | 1.209 |
| 92.05 | 1.215 | -0.006 | -0.0079 | -0.037 | 1.214 |
| 96.05 | 1.208 | -0.015 | -0.0220 | -0.112 | 1.202 |
| -0.03 | 0.044 | 0.021 | 0.0104 | 0.044 | 0.021 |
| -4.18 | -0.498 | -0.005 | -0.1096 | -0.497 | 0.031 |
| -0.07 | 0.043 | 0.017 | 0.0106 | 0.043 | 0.017 |
| 3.85 | 0.514 | 0.001 | 0.1291 | 0.513 | 0.035 |
| 8.09 | 0.875 | -0.046 | 0.2454 | 0.872 | 0.078 |
| 11.93 | 0.674 | 0.042 | 0.1954 | 0.650 | 0.181 |
| 15.92 | 0.743 | 0.097 | 0.1765 | 0.688 | 0.298 |
| 20.01 | 0.580 | 0.138 | 0.1406 | 0.498 | 0.328 |
| -0.07 | 0.044 | 0.022 | 0.0097 | 0.044 | 0.022 |
| 4.06 | 0.529 | 0.001 | 0.1318 | 0.528 | 0.038 |
| 8.16 | 0.872 | -0.046 | 0.2467 | 0.870 | 0.078 |
| 12.00 | 0.667 | 0.044 | 0.1942 | 0.643 | 0.181 |
| 16.15 | 0.744 | 0.100 | 0.1755 | 0.687 | 0.303 |
| 20.19 | 0.582 | 0.137 | 0.1408 | 0.499 | 0.330 |
| -4.25 | -0.505 | -0.002 | -0.1118 | -0.504 | 0.036 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 56 | 12 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.17 | -0.666 | -0.006 | -0.1162 | -0.665 | 0.043 |
| 0. | 0.060 | 0.032 | 0.0143 | 0.060 | 0.032 |
| 3.93 | 0.724 | -0.001 | 0.1364 | 0.722 | 0.049 |
| 8.16 | 0.987 | -0.053 | 0.2612 | 0.985 | 0.088 |
| 12.08 | 0.652 | 0.068 | 0.1689 | 0.623 | 0.203 |
| 15.94 | 0.733 | 0.135 | 0.1456 | 0.668 | 0.331 |
| 19.96 | 0.757 | 0.154 | 0.1547 | 0.659 | 0.404 |
| 24.00 | 0.846 | 0.157 | 0.1634 | 0.709 | 0.487 |
| 28.27 | 0.998 | 0.157 | 0.1711 | 0.805 | 0.611 |
| 32.16 | 1.104 | 0.150 | 0.1709 | 0.855 | 0.715 |
| 36.32 | 1.175 | 0.139 | 0.1654 | 0.865 | 0.807 |
| 40.30 | 1.163 | 0.124 | 0.1522 | 0.807 | 0.847 |
| 44.10 | 0.898 | 0.096 | 0.1264 | 0.579 | 0.694 |
| 48.11 | 0.927 | 0.088 | 0.1189 | 0.554 | 0.749 |
| 52.09 | 0.971 | 0.080 | 0.1110 | 0.534 | 0.816 |
| 55.95 | 1.010 | 0.072 | 0.1018 | 0.506 | 0.877 |
| 60.05 | 1.053 | 0.063 | 0.0915 | 0.471 | 0.943 |
| 64.06 | 1.076 | 0.053 | 0.0803 | 0.423 | 0.991 |
| 67.98 | 1.106 | 0.044 | 0.0689 | 0.374 | 1.042 |
| 71.92 | 1.133 | 0.036 | 0.0573 | 0.317 | 1.088 |
| 76.12 | 1.150 | 0.029 | 0.0453 | 0.248 | 1.123 |
| 80.11 | 1.161 | 0.020 | 0.0319 | 0.179 | 1.147 |
| 83.87 | 1.173 | 0.012 | 0.0197 | 0.113 | 1.167 |
| 88.44 | 1.182 | 0.002 | 0.0044 | 0.030 | 1.182 |
| 91.91 | 1.190 | -0.006 | -0.0073 | -0.034 | 1.189 |
| 96.18 | 1.179 | -0.015 | -0.0220 | -0.112 | 1.174 |
| -0.13 | 0.027 | 0.033 | 0.0095 | 0.027 | 0.033 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 57 | 12 FT | 650 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.06 | -0.472 | -0.009 | -0.1213 | -0.471 | 0.025 |
| 0.01 | 0.045 | 0.015 | 0.0191 | 0.045 | 0.015 |
| 4.00 | 0.547 | -0.002 | 0.1408 | 0.546 | 0.036 |
| 8.05 | 0.893 | -0.050 | 0.2628 | 0.891 | 0.076 |
| 12.21 | 0.664 | 0.057 | 0.1943 | 0.637 | 0.196 |
| 15.85 | 0.737 | 0.138 | 0.1505 | 0.672 | 0.334 |
| 20.22 | 0.716 | 0.165 | 0.1584 | 0.615 | 0.402 |
| 24.25 | 0.839 | 0.159 | 0.1674 | 0.699 | 0.490 |
| 28.14 | 0.977 | 0.158 | 0.1732 | 0.787 | 0.600 |
| 32.17 | 1.083 | 0.152 | 0.1733 | 0.836 | 0.705 |
| 35.95 | 1.168 | 0.142 | 0.1689 | 0.862 | 0.801 |
| 40.29 | 1.222 | 0.129 | 0.1594 | 0.849 | 0.888 |
| 44.21 | 1.020 | 0.112 | 0.1294 | 0.653 | 0.791 |
| -0.03 | 0.042 | 0.016 | 0.0097 | 0.042 | 0.016 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 6.00 | 48 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.95 | -0.139 | 0.119 | -0.0033 | -0.130 | 0.128 |
| 0.12 | 0.052 | 0.138 | 0.0096 | 0.052 | 0.138 |
| 4.12 | 0.248 | 0.133 | 0.0320 | 0.237 | 0.151 |
| 8.07 | 0.419 | 0.146 | 0.0589 | 0.394 | 0.203 |
| 16.11 | 0.598 | 0.170 | 0.0935 | 0.528 | 0.330 |
| 20.04 | 0.517 | 0.152 | 0.1154 | 0.434 | 0.320 |
| 24.02 | 0.575 | 0.147 | 0.1234 | 0.465 | 0.368 |
| 27.98 | 0.659 | 0.146 | 0.1210 | 0.514 | 0.438 |
| 32.03 | 0.660 | 0.129 | 0.1216 | 0.491 | 0.460 |
| 36.04 | 0.658 | 0.116 | 0.1161 | 0.464 | 0.481 |
| 36.04 | 0.654 | 0.113 | 0.1152 | 0.462 | 0.476 |
| 40.04 | 0.682 | 0.102 | 0.1102 | 0.456 | 0.517 |
| 44.02 | 0.716 | 0.091 | 0.1043 | 0.452 | 0.563 |
| 47.99 | 0.748 | 0.082 | 0.0989 | 0.440 | 0.611 |
| 51.96 | 0.786 | 0.074 | 0.0931 | 0.426 | 0.665 |
| 55.98 | 0.823 | 0.068 | 0.0869 | 0.404 | 0.720 |
| 59.94 | 0.854 | 0.059 | 0.0786 | 0.376 | 0.768 |
| 63.87 | 0.885 | 0.049 | 0.0691 | 0.346 | 0.817 |
| 67.97 | 0.909 | 0.040 | 0.0589 | 0.303 | 0.857 |
| 71.91 | 0.929 | 0.031 | 0.0477 | 0.259 | 0.892 |
| 76.00 | 0.945 | 0.022 | 0.0364 | 0.207 | 0.922 |
| 79.93 | 0.961 | 0.015 | 0.0255 | 0.153 | 0.949 |
| 83.96 | 0.971 | 0.008 | 0.0141 | 0.094 | 0.966 |
| 87.91 | 0.976 | 0.001 | 0.0024 | 0.035 | 0.975 |
| 91.85 | 0.974 | -0.007 | -0.0093 | -0.024 | 0.973 |
| 93.84 | 0.970 | -0.010 | -0.0148 | -0.054 | 0.968 |
| 0.07 | 0.052 | 0.146 | 0.0107 | 0.052 | 0.146 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 6.50 | 52 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.05 | -0.248 | 0.146 | -0.0319 | -0.237 | 0.163 |
| -0.07 | 0.056 | 0.151 | 0.0116 | 0.056 | 0.151 |
| 3.93 | 0.316 | 0.149 | 0.0526 | 0.305 | 0.170 |
| 7.94 | 0.495 | 0.155 | 0.0984 | 0.468 | 0.222 |
| 16.00 | 0.658 | 0.168 | 0.1339 | 0.586 | 0.343 |
| 19.94 | 0.669 | 0.165 | 0.1378 | 0.573 | 0.383 |
| 23.91 | 0.737 | 0.158 | 0.1438 | 0.609 | 0.443 |
| 27.93 | 0.799 | 0.155 | 0.1422 | 0.633 | 0.511 |
| 31.85 | 0.821 | 0.142 | 0.1373 | 0.623 | 0.554 |
| 35.98 | 0.825 | 0.127 | 0.1308 | 0.593 | 0.588 |
| 39.87 | 0.854 | 0.112 | 0.1235 | 0.583 | 0.634 |
| 43.90 | 0.897 | 0.099 | 0.1162 | 0.578 | 0.693 |
| 47.89 | 0.930 | 0.089 | 0.1101 | 0.558 | 0.750 |
| 51.80 | 0.975 | 0.081 | 0.1034 | 0.539 | 0.816 |
| 55.86 | 1.018 | 0.073 | 0.0950 | 0.511 | 0.883 |
| 59.81 | 1.056 | 0.064 | 0.0857 | 0.476 | 0.945 |
| 63.77 | 1.090 | 0.053 | 0.0745 | 0.434 | 1.001 |
| 67.79 | 1.122 | 0.043 | 0.0635 | 0.384 | 1.055 |
| 71.79 | 1.146 | 0.033 | 0.0510 | 0.327 | 1.098 |
| 75.79 | 1.165 | 0.024 | 0.0395 | 0.263 | 1.136 |
| 79.71 | 1.178 | 0.017 | 0.0280 | 0.193 | 1.162 |
| 83.77 | 1.189 | 0.010 | 0.0159 | 0.120 | 1.183 |
| 87.74 | 1.192 | 0.001 | 0.0037 | 0.046 | 1.192 |
| 91.74 | 1.194 | -0.007 | -0.0089 | -0.029 | 1.193 |
| 93.71 | 1.191 | -0.011 | -0.0146 | -0.067 | 1.190 |
| -0.08 | 0.087 | 0.135 | 0.0174 | 0.087 | 0.135 |
| -0.09 | 0.072 | 0.143 | 0.0151 | 0.072 | 0.143 |
| -0.09 | 0.067 | 0.146 | 0.0139 | 0.067 | 0.146 |
| -0.07 | 0.066 | 0.148 | 0.0137 | 0.066 | 0.148 |
| -0.07 | 0.063 | 0.149 | 0.0133 | 0.064 | 0.149 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 7.50 | 56 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.222 | 0.144 | -0.0306 | -0.211 | 0.159 |
| 0.07 | 0.068 | 0.145 | 0.0151 | 0.067 | 0.145 |
| 4.02 | 0.351 | 0.150 | 0.0678 | 0.340 | 0.174 |
| 8.00 | 0.533 | 0.146 | 0.1154 | 0.507 | 0.219 |
| 12.04 | 0.701 | 0.153 | 0.1487 | 0.654 | 0.296 |
| 16.06 | 0.717 | 0.168 | 0.1433 | 0.643 | 0.360 |
| 20.01 | 0.798 | 0.158 | 0.1581 | 0.696 | 0.422 |
| 24.07 | 0.818 | 0.157 | 0.1515 | 0.683 | 0.477 |
| 28.08 | 0.894 | 0.153 | 0.1482 | 0.717 | 0.556 |
| 31.94 | 0.905 | 0.142 | 0.1423 | 0.693 | 0.599 |
| 36.06 | 0.912 | 0.127 | 0.1340 | 0.662 | 0.640 |
| 39.97 | 0.939 | 0.113 | 0.1263 | 0.647 | 0.689 |
| 43.91 | 0.970 | 0.099 | 0.1184 | 0.630 | 0.744 |
| 47.96 | 1.003 | 0.090 | 0.1119 | 0.605 | 0.805 |
| 51.91 | 1.049 | 0.081 | 0.1044 | 0.583 | 0.876 |
| 59.84 | 1.131 | 0.063 | 0.0854 | 0.514 | 1.010 |
| 67.99 | 1.193 | 0.043 | 0.0624 | 0.408 | 1.122 |
| 75.95 | 1.238 | 0.026 | 0.0391 | 0.276 | 1.207 |
| 83.85 | 1.264 | 0.010 | 0.0156 | 0.126 | 1.258 |
| 91.81 | 1.267 | -0.007 | -0.0089 | -0.033 | 1.267 |
| 93.64 | 1.268 | -0.011 | -0.0142 | -0.070 | 1.266 |
| 0.01 | 0.064 | 0.144 | 0.0145 | 0.064 | 0.144 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 9.50 | 60 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.02 | -0.216 | 0.144 | -0.0383 | -0.206 | 0.159 |
| 0.06 | 0.071 | 0.150 | 0.0168 | 0.071 | 0.150 |
| 3.97 | 0.358 | 0.144 | 0.0736 | 0.347 | 0.168 |
| 8.02 | 0.575 | 0.141 | 0.1221 | 0.549 | 0.220 |
| 11.91 | 0.743 | 0.151 | 0.1508 | 0.696 | 0.301 |
| 16.07 | 0.793 | 0.168 | 0.1463 | 0.715 | 0.381 |
| 20.10 | 0.817 | 0.159 | 0.1557 | 0.713 | 0.430 |
| 24.08 | 0.861 | 0.155 | 0.1504 | 0.722 | 0.493 |
| 28.09 | 0.908 | 0.146 | 0.1489 | 0.732 | 0.557 |
| 31.94 | 0.921 | 0.133 | 0.1416 | 0.711 | 0.601 |
| 36.02 | 0.952 | 0.121 | 0.1343 | 0.699 | 0.658 |
| 39.92 | 0.981 | 0.108 | 0.1258 | 0.683 | 0.712 |
| 44.00 | 1.016 | 0.097 | 0.1184 | 0.664 | 0.776 |
| 48.01 | 1.058 | 0.089 | 0.1114 | 0.642 | 0.846 |
| 51.98 | 1.107 | 0.081 | 0.1031 | 0.618 | 0.922 |
| 60.02 | 1.193 | 0.063 | 0.0837 | 0.542 | 1.065 |
| 68.07 | 1.256 | 0.043 | 0.0611 | 0.430 | 1.181 |
| 75.94 | 1.295 | 0.025 | 0.0382 | 0.290 | 1.262 |
| 84.00 | 1.317 | 0.009 | 0.0150 | 0.129 | 1.311 |
| 91.89 | 1.320 | -0.007 | -0.0082 | -0.036 | 1.319 |
| 93.96 | 1.321 | -0.011 | -0.0141 | -0.080 | 1.319 |
| -0.06 | 0.065 | 0.146 | 0.0161 | 0.065 | 0.146 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 11.50 | 69 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.96 | -0.223 | 0.161 | -0.0406 | -0.212 | 0.176 |
| 0.04 | 0.069 | 0.165 | 0.0175 | 0.069 | 0.165 |
| 4.03 | 0.388 | 0.163 | 0.0754 | 0.375 | 0.189 |
| 8.10 | 0.617 | 0.152 | 0.1275 | 0.589 | 0.237 |
| 16.10 | 0.797 | 0.165 | 0.1471 | 0.720 | 0.380 |
| 20.01 | 0.829 | 0.158 | 0.1522 | 0.725 | 0.432 |
| 28.11 | 0.902 | 0.143 | 0.1477 | 0.728 | 0.551 |
| 35.96 | 0.961 | 0.119 | 0.1341 | 0.708 | 0.661 |
| 43.90 | 1.042 | 0.097 | 0.1186 | 0.684 | 0.792 |
| 51.85 | 1.150 | 0.081 | 0.1027 | 0.647 | 0.954 |
| 59.82 | 1.235 | 0.062 | 0.0833 | 0.567 | 1.099 |
| 67.84 | 1.300 | 0.042 | 0.0608 | 0.451 | 1.220 |
| 75.84 | 1.344 | 0.024 | 0.0378 | 0.306 | 1.309 |
| 83.78 | 1.363 | 0.008 | 0.0148 | 0.140 | 1.356 |
| 91.67 | 1.366 | -0.008 | -0.0087 | -0.032 | 1.366 |
| 93.71 | 1.364 | -0.011 | -0.0143 | -0.077 | 1.362 |
| 0.03 | 0.066 | 0.158 | 0.0163 | 0.066 | 0.158 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 11.50 | 73 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.90 | -0.246 | 0.194 | -0.0403 | -0.233 | 0.210 |
| 0. | 0.074 | 0.197 | 0.0145 | 0.074 | 0.197 |
| 4.01 | 0.428 | 0.196 | 0.0725 | 0.413 | 0.226 |
| 8.14 | 0.701 | 0.181 | 0.1198 | 0.668 | 0.278 |
| 12.03 | 0.876 | 0.174 | 0.1537 | 0.821 | 0.353 |
| 16.05 | 0.936 | 0.173 | 0.1589 | 0.852 | 0.426 |
| 20.10 | 0.913 | 0.164 | 0.1558 | 0.801 | 0.467 |
| 27.96 | 0.865 | 0.140 | 0.1465 | 0.698 | 0.530 |
| 36.01 | 0.926 | 0.116 | 0.1322 | 0.680 | 0.638 |
| 43.98 | 1.016 | 0.094 | 0.1164 | 0.666 | 0.773 |
| 51.92 | 1.131 | 0.079 | 0.1012 | 0.635 | 0.939 |
| 59.97 | 1.222 | 0.061 | 0.0820 | 0.559 | 1.088 |
| 67.94 | 1.282 | 0.040 | 0.0599 | 0.444 | 1.204 |
| 75.97 | 1.325 | 0.022 | 0.0371 | 0.300 | 1.291 |
| 83.94 | 1.349 | 0.007 | 0.0143 | 0.136 | 1.343 |
| 91.93 | 1.355 | -0.008 | -0.0089 | -0.038 | 1.355 |
| 93.82 | 1.354 | -0.011 | -0.0141 | -0.079 | 1.352 |
| -0.07 | 0.071 | 0.191 | 0.0145 | 0.071 | 0.191 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 6.00 | 47 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0.03 | 0.034 | 0.146 | 0.0091 | 0.034 | 0.146 |
| -3.95 | -0.103 | 0.149 | -0.0127 | -0.092 | 0.156 |
| 0.05 | 0.044 | 0.161 | 0.0095 | 0.044 | 0.162 |
| 4.04 | 0.206 | 0.169 | 0.0317 | 0.193 | 0.183 |
| 8.00 | 0.396 | 0.178 | 0.0516 | 0.368 | 0.232 |
| 16.04 | 0.776 | 0.191 | 0.0899 | 0.693 | 0.398 |
| 20.07 | 0.965 | 0.195 | 0.1077 | 0.840 | 0.514 |
| 24.02 | 1.079 | 0.194 | 0.1128 | 0.907 | 0.616 |
| 28.05 | 1.236 | 0.193 | 0.1132 | 1.001 | 0.751 |
| 32.08 | 1.291 | 0.181 | 0.1170 | 0.997 | 0.839 |
| 36.09 | 1.044 | 0.145 | 0.1237 | 0.758 | 0.732 |
| 40.03 | 0.904 | 0.121 | 0.1180 | 0.615 | 0.674 |
| 43.99 | 0.882 | 0.103 | 0.1091 | 0.563 | 0.687 |
| 47.93 | 0.898 | 0.090 | 0.1011 | 0.535 | 0.727 |
| 51.95 | 0.926 | 0.079 | 0.0929 | 0.508 | 0.778 |
| 55.96 | 0.960 | 0.071 | 0.0858 | 0.478 | 0.835 |
| 59.99 | 0.989 | 0.063 | 0.0775 | 0.440 | 0.887 |
| 63.93 | 1.019 | 0.053 | 0.0678 | 0.401 | 0.938 |
| 67.97 | 1.040 | 0.043 | 0.0579 | 0.350 | 0.980 |
| 71.94 | 1.059 | 0.033 | 0.0467 | 0.297 | 1.017 |
| 75.89 | 1.071 | 0.023 | 0.0354 | 0.239 | 1.044 |
| 79.93 | 1.081 | 0.014 | 0.0241 | 0.175 | 1.067 |
| 83.88 | 1.087 | 0.008 | 0.0136 | 0.108 | 1.081 |
| 87.92 | 1.091 | 0.001 | 0.0024 | 0.039 | 1.090 |
| 91.87 | 1.087 | -0.006 | -0.0090 | -0.030 | 1.087 |
| 93.54 | 1.089 | -0.009 | -0.0132 | -0.059 | 1.087 |
| 0.06 | 0.050 | 0.160 | 0.0100 | 0.050 | 0.161 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 6.50 | 51 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.95 | -0.160 | 0.180 | -0.0252 | -0.147 | 0.191 |
| 0.01 | 0.058 | 0.184 | 0.0121 | 0.058 | 0.184 |
| 3.99 | 0.285 | 0.183 | 0.0520 | 0.271 | 0.203 |
| 7.94 | 0.508 | 0.186 | 0.0854 | 0.477 | 0.254 |
| 15.98 | 0.925 | 0.192 | 0.1341 | 0.837 | 0.439 |
| 19.93 | 1.100 | 0.190 | 0.1473 | 0.969 | 0.553 |
| 23.89 | 1.188 | 0.183 | 0.1505 | 1.012 | 0.649 |
| 27.96 | 1.288 | 0.178 | 0.1471 | 1.054 | 0.761 |
| 31.86 | 1.397 | 0.170 | 0.1404 | 1.097 | 0.882 |
| 35.92 | 1.312 | 0.154 | 0.1349 | 0.972 | 0.894 |
| 39.86 | 1.107 | 0.128 | 0.1260 | 0.767 | 0.808 |
| 43.91 | 1.064 | 0.106 | 0.1159 | 0.693 | 0.814 |
| 47.83 | 1.090 | 0.093 | 0.1075 | 0.662 | 0.870 |
| 51.86 | 1.123 | 0.083 | 0.0989 | 0.628 | 0.934 |
| 55.82 | 1.157 | 0.075 | 0.0913 | 0.588 | 0.999 |
| 59.81 | 1.193 | 0.065 | 0.0819 | 0.544 | 1.064 |
| 63.78 | 1.224 | 0.055 | 0.0715 | 0.491 | 1.123 |
| 67.79 | 1.247 | 0.045 | 0.0611 | 0.430 | 1.172 |
| 71.77 | 1.266 | 0.035 | 0.0493 | 0.363 | 1.213 |
| 75.78 | 1.279 | 0.025 | 0.0377 | 0.290 | 1.246 |
| 79.71 | 1.292 | 0.016 | 0.0260 | 0.215 | 1.274 |
| 83.80 | 1.302 | 0.009 | 0.0146 | 0.132 | 1.295 |
| 87.76 | 1.305 | 0.002 | 0.0034 | 0.049 | 1.304 |
| 91.74 | 1.302 | -0.005 | -0.0082 | -0.034 | 1.302 |
| 93.64 | 1.303 | -0.008 | -0.0132 | -0.075 | 1.301 |
| -0.10 | 0.059 | 0.178 | 0.0111 | 0.059 | 0.178 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 7.50 | 55 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.98 | -0.209 | 0.196 | -0.0273 | -0.195 | 0.210 |
| 0.02 | 0.063 | 0.200 | 0.0115 | 0.063 | 0.200 |
| 3.96 | 0.355 | 0.207 | 0.0495 | 0.340 | 0.231 |
| 7.98 | 0.638 | 0.209 | 0.0799 | 0.602 | 0.296 |
| 12.01 | 0.877 | 0.205 | 0.1078 | 0.815 | 0.383 |
| 16.01 | 1.088 | 0.202 | 0.1285 | 0.990 | 0.494 |
| 20.01 | 1.255 | 0.193 | 0.1448 | 1.113 | 0.611 |
| 23.97 | 1.310 | 0.180 | 0.1544 | 1.124 | 0.697 |
| 28.04 | 1.380 | 0.170 | 0.1536 | 1.138 | 0.799 |
| 32.12 | 1.491 | 0.161 | 0.1509 | 1.177 | 0.929 |
| 36.00 | 1.504 | 0.151 | 0.1431 | 1.128 | 1.006 |
| 39.94 | 1.214 | 0.129 | 0.1286 | 0.848 | 0.879 |
| 43.91 | 1.158 | 0.105 | 0.1165 | 0.762 | 0.878 |
| 47.90 | 1.176 | 0.092 | 0.1078 | 0.720 | 0.934 |
| 51.91 | 1.207 | 0.083 | 0.0991 | 0.680 | 1.001 |
| 59.83 | 1.266 | 0.065 | 0.0815 | 0.580 | 1.127 |
| 67.86 | 1.322 | 0.044 | 0.0598 | 0.457 | 1.242 |
| 75.85 | 1.358 | 0.025 | 0.0368 | 0.308 | 1.323 |
| 83.90 | 1.379 | 0.009 | 0.0141 | 0.138 | 1.373 |
| 91.83 | 1.379 | -0.005 | -0.0081 | -0.039 | 1.379 |
| 93.64 | 1.379 | -0.008 | -0.0129 | -0.079 | 1.377 |
| -0.04 | 0.064 | 0.197 | 0.0112 | 0.064 | 0.197 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 9.50 | 59 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.95 | -0.228 | 0.207 | -0.0291 | -0.213 | 0.222 |
| 0. | 0.073 | 0.213 | 0.0126 | 0.073 | 0.213 |
| 3.96 | 0.386 | 0.211 | 0.0525 | 0.370 | 0.238 |
| 8.02 | 0.676 | 0.210 | 0.0845 | 0.640 | 0.303 |
| 12.02 | 0.923 | 0.207 | 0.1133 | 0.860 | 0.395 |
| 15.99 | 1.131 | 0.202 | 0.1341 | 1.031 | 0.506 |
| 20.02 | 1.279 | 0.195 | 0.1454 | 1.136 | 0.621 |
| 23.99 | 1.348 | 0.184 | 0.1500 | 1.157 | 0.717 |
| 28.02 | 1.398 | 0.171 | 0.1504 | 1.153 | 0.808 |
| 32.06 | 1.504 | 0.160 | 0.1475 | 1.189 | 0.934 |
| 36.05 | 1.602 | 0.148 | 0.1424 | 1.208 | 1.062 |
| 39.98 | 1.394 | 0.131 | 0.1313 | 0.984 | 0.996 |
| 44.00 | 1.244 | 0.110 | 0.1186 | 0.818 | 0.943 |
| 47.95 | 1.238 | 0.093 | 0.1075 | 0.760 | 0.982 |
| 52.04 | 1.266 | 0.082 | 0.0981 | 0.714 | 1.048 |
| 59.97 | 1.321 | 0.064 | 0.0801 | 0.606 | 1.176 |
| 68.00 | 1.371 | 0.044 | 0.0585 | 0.473 | 1.288 |
| 76.04 | 1.407 | 0.026 | 0.0363 | 0.315 | 1.372 |
| 83.96 | 1.422 | 0.009 | 0.0144 | 0.140 | 1.415 |
| 91.93 | 1.429 | -0.005 | -0.0076 | -0.043 | 1.428 |
| 93.75 | 1.425 | -0.008 | -0.0121 | -0.085 | 1.423 |
| -0.07 | 0.091 | 0.194 | 0.0126 | 0.091 | 0.194 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 11.50 | 68 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -0.02 | 0.071 | 0.207 | 0.0122 | 0.071 | 0.207 |
| 4.08 | 0.399 | 0.208 | 0.0539 | 0.384 | 0.236 |
| 8.03 | 0.697 | 0.208 | 0.0867 | 0.661 | 0.303 |
| 15.98 | 1.180 | 0.200 | 0.1351 | 1.079 | 0.517 |
| 19.99 | 1.337 | 0.194 | 0.1464 | 1.190 | 0.639 |
| 27.98 | 1.438 | 0.171 | 0.1494 | 1.190 | 0.826 |
| 36.00 | 1.630 | 0.147 | 0.1416 | 1.233 | 1.077 |
| 43.91 | 1.374 | 0.114 | 0.1206 | 0.911 | 1.035 |
| 51.97 | 1.331 | 0.086 | 0.0993 | 0.752 | 1.102 |
| 59.92 | 1.375 | 0.064 | 0.0794 | 0.633 | 1.222 |
| 67.75 | 1.423 | 0.043 | 0.0579 | 0.499 | 1.334 |
| 75.83 | 1.452 | 0.025 | 0.0363 | 0.331 | 1.414 |
| 83.73 | 1.466 | 0.009 | 0.0145 | 0.151 | 1.458 |
| 91.69 | 1.467 | -0.005 | -0.0070 | -0.038 | 1.467 |
| 93.54 | 1.472 | -0.008 | -0.0118 | -0.083 | 1.469 |
| -0.03 | 0.069 | 0.205 | 0.0104 | 0.069 | 0.205 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 11.50 | 72 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.96 | -0.248 | 0.208 | -0.0295 | -0.233 | 0.224 |
| 0. | 0.056 | 0.212 | 0.0097 | 0.056 | 0.212 |
| 4.01 | 0.416 | 0.211 | 0.0546 | 0.400 | 0.239 |
| 7.96 | 0.719 | 0.209 | 0.0871 | 0.683 | 0.307 |
| 12.11 | 0.986 | 0.206 | 0.1160 | 0.920 | 0.409 |
| 16.06 | 1.203 | 0.201 | 0.1357 | 1.101 | 0.526 |
| 20.04 | 1.385 | 0.196 | 0.1458 | 1.234 | 0.659 |
| 28.01 | 1.571 | 0.178 | 0.1489 | 1.303 | 0.895 |
| 36.01 | 1.680 | 0.153 | 0.1405 | 1.269 | 1.111 |
| 43.98 | 1.152 | 0.098 | 0.0920 | 0.761 | 0.870 |
| 51.92 | 1.261 | 0.081 | 0.0966 | 0.714 | 1.042 |
| 59.90 | 1.341 | 0.061 | 0.0780 | 0.620 | 1.190 |
| 67.93 | 1.400 | 0.041 | 0.0571 | 0.488 | 1.313 |
| 76.10 | 1.439 | 0.024 | 0.0356 | 0.322 | 1.402 |
| 83.90 | 1.456 | 0.007 | 0.0135 | 0.148 | 1.449 |
| 92.01 | 1.458 | -0.006 | -0.0077 | -0.046 | 1.458 |
| 93.60 | 1.459 | -0.008 | -0.0119 | -0.084 | 1.457 |
| 0.03 | 0.082 | 0.203 | 0.0115 | 0.082 | 0.203 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 6.00 | 46 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.98 | -0.100 | 0.144 | -0.0132 | -0.089 | 0.150 |
| -3.96 | -0.097 | 0.156 | -0.0127 | -0.086 | 0.163 |
| 0.05 | 0.038 | 0.157 | 0.0086 | 0.038 | 0.157 |
| 4.04 | 0.166 | 0.136 | 0.0207 | 0.156 | 0.147 |
| 8.06 | 0.357 | 0.168 | 0.0493 | 0.330 | 0.217 |
| 16.03 | 0.691 | 0.178 | 0.0845 | 0.615 | 0.362 |
| 20.03 | 0.873 | 0.180 | 0.0992 | 0.758 | 0.468 |
| 23.99 | 1.022 | 0.178 | 0.1090 | 0.861 | 0.579 |
| 28.03 | 1.160 | 0.176 | 0.1109 | 0.941 | 0.701 |
| 31.94 | 1.259 | 0.171 | 0.1094 | 0.978 | 0.811 |
| 35.97 | 1.325 | 0.161 | 0.1110 | 0.978 | 0.908 |
| 39.98 | 1.355 | 0.144 | 0.1157 | 0.946 | 0.981 |
| 43.93 | 1.122 | 0.123 | 0.1103 | 0.723 | 0.867 |
| 47.99 | 1.041 | 0.101 | 0.1010 | 0.621 | 0.841 |
| 51.90 | 1.024 | 0.084 | 0.0916 | 0.566 | 0.858 |
| 55.99 | 1.041 | 0.072 | 0.0828 | 0.523 | 0.903 |
| 59.99 | 1.065 | 0.063 | 0.0747 | 0.478 | 0.954 |
| 63.95 | 1.089 | 0.054 | 0.0653 | 0.430 | 1.002 |
| 67.90 | 1.113 | 0.045 | 0.0556 | 0.377 | 1.048 |
| 71.92 | 1.129 | 0.036 | 0.0451 | 0.317 | 1.085 |
| 75.89 | 1.140 | 0.027 | 0.0345 | 0.252 | 1.112 |
| 79.92 | 1.149 | 0.017 | 0.0236 | 0.184 | 1.134 |
| 83.89 | 1.152 | 0.009 | 0.0129 | 0.114 | 1.147 |
| 87.89 | 1.154 | 0.002 | 0.0025 | 0.041 | 1.154 |
| 91.84 | 1.154 | -0.005 | -0.0078 | -0.032 | 1.153 |
| 93.72 | 1.152 | -0.008 | -0.0123 | -0.067 | 1.151 |
| 0. | 0.045 | 0.151 | 0.0082 | 0.045 | 0.151 |

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 6.50 | 50 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.03 | -0.147 | 0.171 | -0.0240 | -0.135 | 0.181 |
| 0. | 0.052 | 0.175 | 0.0111 | 0.052 | 0.175 |
| 3.93 | 0.263 | 0.175 | 0.0480 | 0.251 | 0.193 |
| 7.96 | 0.464 | 0.178 | 0.0788 | 0.435 | 0.240 |
| 15.98 | 0.842 | 0.181 | 0.1214 | 0.760 | 0.406 |
| 19.93 | 1.020 | 0.179 | 0.1357 | 0.898 | 0.516 |
| 23.92 | 1.178 | 0.176 | 0.1404 | 1.006 | 0.639 |
| 27.99 | 1.285 | 0.171 | 0.1413 | 1.055 | 0.754 |
| 31.93 | 1.362 | 0.165 | 0.1348 | 1.069 | 0.860 |
| 35.94 | 1.460 | 0.153 | 0.1289 | 1.092 | 0.980 |
| 39.88 | 1.541 | 0.141 | 0.1254 | 1.092 | 1.096 |
| 43.90 | 1.436 | 0.126 | 0.1180 | 0.947 | 1.086 |
| 47.91 | 1.241 | 0.100 | 0.1052 | 0.758 | 0.988 |
| 51.80 | 1.225 | 0.085 | 0.0954 | 0.691 | 1.015 |
| 55.89 | 1.244 | 0.075 | 0.0869 | 0.636 | 1.072 |
| 59.90 | 1.263 | 0.066 | 0.0782 | 0.576 | 1.126 |
| 63.85 | 1.287 | 0.056 | 0.0682 | 0.517 | 1.180 |
| 67.86 | 1.310 | 0.047 | 0.0579 | 0.451 | 1.231 |
| 71.83 | 1.326 | 0.037 | 0.0471 | 0.378 | 1.271 |
| 75.78 | 1.339 | 0.028 | 0.0358 | 0.302 | 1.305 |
| 79.77 | 1.350 | 0.019 | 0.0248 | 0.221 | 1.332 |
| 83.78 | 1.357 | 0.010 | 0.0139 | 0.137 | 1.350 |
| 87.80 | 1.359 | 0.002 | 0.0034 | 0.050 | 1.358 |
| 91.24 | 1.361 | -0.004 | -0.0061 | -0.026 | 1.361 |
| 93.72 | 1.358 | -0.008 | -0.0126 | -0.080 | 1.356 |
| -0.05 | 0.055 | 0.175 | 0.0108 | 0.055 | 0.175 |

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 7.50 | 54 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.02 | -0.300 | 0.184 | -0.0469 | -0.287 | 0.204 |
| 0.01 | 0.055 | 0.192 | 0.0105 | 0.055 | 0.192 |
| 3.98 | 0.327 | 0.198 | 0.0467 | 0.312 | 0.220 |
| 8.01 | 0.577 | 0.199 | 0.0738 | 0.543 | 0.277 |
| 12.03 | 0.800 | 0.195 | 0.0992 | 0.742 | 0.357 |
| 15.99 | 0.843 | 0.201 | 0.0861 | 0.755 | 0.425 |
| 19.98 | 1.172 | 0.186 | 0.1313 | 1.038 | 0.575 |
| 23.97 | 1.313 | 0.177 | 0.1392 | 1.128 | 0.695 |
| 27.99 | 1.388 | 0.168 | 0.1427 | 1.147 | 0.800 |
| 32.05 | 1.447 | 0.155 | 0.1425 | 1.144 | 0.899 |
| 35.99 | 1.535 | 0.147 | 0.1371 | 1.156 | 1.020 |
| 39.88 | 1.628 | 0.136 | 0.1307 | 1.162 | 1.149 |
| 43.96 | 1.600 | 0.124 | 0.1218 | 1.066 | 1.200 |
| 47.96 | 1.399 | 0.107 | 0.1084 | 0.857 | 1.111 |
| 51.85 | 1.327 | 0.088 | 0.0962 | 0.750 | 1.098 |
| 59.90 | 1.348 | 0.067 | 0.0777 | 0.618 | 1.200 |
| 67.87 | 1.382 | 0.048 | 0.0575 | 0.477 | 1.298 |
| 75.86 | 1.415 | 0.029 | 0.0355 | 0.318 | 1.379 |
| 83.83 | 1.433 | 0.010 | 0.0135 | 0.144 | 1.426 |
| 91.76 | 1.434 | -0.004 | -0.0071 | -0.040 | 1.434 |
| 93.77 | 1.430 | -0.008 | -0.0121 | -0.086 | 1.428 |
| -0.03 | 0.063 | 0.189 | 0.0095 | 0.063 | 0.189 |

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 9.50 | 58 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.92 | -0.209 | 0.194 | -0.0268 | -0.196 | 0.208 |
| 0.04 | -0.081 | 0.206 | -0.0165 | -0.081 | 0.206 |
| 3.97 | 0.349 | 0.198 | 0.0482 | 0.334 | 0.222 |
| 7.95 | 0.613 | 0.196 | 0.0772 | 0.580 | 0.279 |
| 11.93 | 0.853 | 0.195 | 0.1038 | 0.794 | 0.367 |
| 16.04 | 1.042 | 0.190 | 0.1228 | 0.949 | 0.470 |
| 20.02 | 1.206 | 0.185 | 0.1332 | 1.070 | 0.587 |
| 23.99 | 1.349 | 0.176 | 0.1402 | 1.161 | 0.709 |
| 27.99 | 1.420 | 0.168 | 0.1399 | 1.175 | 0.815 |
| 32.00 | 1.487 | 0.157 | 0.1383 | 1.178 | 0.921 |
| 36.09 | 1.563 | 0.146 | 0.1343 | 1.177 | 1.039 |
| 39.97 | 1.645 | 0.134 | 0.1282 | 1.174 | 1.159 |
| 43.99 | 1.700 | 0.122 | 0.1206 | 1.138 | 1.269 |
| 48.07 | 1.590 | 0.109 | 0.1103 | 0.982 | 1.256 |
| 52.04 | 1.445 | 0.090 | 0.0970 | 0.818 | 1.195 |
| 56.07 | 1.405 | 0.076 | 0.0867 | 0.721 | 1.208 |
| 59.97 | 1.403 | 0.063 | 0.0760 | 0.648 | 1.246 |
| 67.99 | 1.438 | 0.046 | 0.0567 | 0.496 | 1.350 |
| 76.03 | 1.466 | 0.028 | 0.0348 | 0.327 | 1.429 |
| 83.93 | 1.484 | 0.012 | 0.0143 | 0.145 | 1.477 |
| 92.01 | 1.486 | -0.004 | -0.0069 | -0.048 | 1.485 |
| 93.88 | 1.484 | -0.008 | -0.0120 | -0.093 | 1.481 |
| 0. | 0.078 | 0.195 | 0.0124 | 0.078 | 0.195 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 11.50 | 67 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.94 | -0.218 | 0.192 | -0.0269 | -0.204 | 0.206 |
| 0.12 | 0.065 | 0.197 | 0.0110 | 0.064 | 0.197 |
| 4.05 | 0.358 | 0.196 | 0.0488 | 0.343 | 0.221 |
| 8.04 | 0.643 | 0.196 | 0.0802 | 0.610 | 0.284 |
| 16.07 | 1.104 | 0.189 | 0.1260 | 1.008 | 0.487 |
| 19.99 | 1.253 | 0.185 | 0.1351 | 1.114 | 0.602 |
| 23.94 | 1.394 | 0.178 | 0.1391 | 1.202 | 0.728 |
| 28.03 | 1.425 | 0.155 | 0.1391 | 1.185 | 0.807 |
| 31.96 | 1.521 | 0.151 | 0.1376 | 1.210 | 0.934 |
| 35.95 | 1.590 | 0.143 | 0.1334 | 1.203 | 1.049 |
| 39.90 | 1.672 | 0.130 | 0.1271 | 1.199 | 1.173 |
| 43.93 | 1.723 | 0.119 | 0.1196 | 1.159 | 1.281 |
| 47.85 | 1.695 | 0.107 | 0.1110 | 1.058 | 1.328 |
| 52.05 | 1.573 | 0.087 | 0.0962 | 0.898 | 1.294 |
| 55.96 | 1.511 | 0.075 | 0.0860 | 0.784 | 1.294 |
| 59.83 | 1.481 | 0.062 | 0.0756 | 0.691 | 1.311 |
| 63.82 | 1.478 | 0.053 | 0.0654 | 0.605 | 1.349 |
| 67.84 | 1.491 | 0.044 | 0.0556 | 0.522 | 1.397 |
| 71.83 | 1.487 | 0.032 | 0.0393 | 0.433 | 1.423 |
| 75.83 | 1.517 | 0.027 | 0.0348 | 0.345 | 1.478 |
| 79.78 | 1.523 | 0.018 | 0.0244 | 0.252 | 1.502 |
| 83.74 | 1.525 | 0.011 | 0.0138 | 0.156 | 1.517 |
| 91.72 | 1.526 | -0.005 | -0.0076 | -0.041 | 1.525 |
| 93.48 | 1.525 | -0.009 | -0.0128 | -0.084 | 1.523 |
| -0.01 | 0.065 | 0.196 | 0.0099 | 0.065 | 0.196 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 11.50 | 71 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0. | 0.063 | 0.187 | 0.0112 | 0.063 | 0.187 |
| -4.03 | -0.226 | 0.194 | -0.0269 | -0.211 | 0.209 |
| 4.00 | 0.375 | 0.198 | 0.0499 | 0.361 | 0.223 |
| 7.95 | 0.656 | 0.196 | 0.0796 | 0.623 | 0.285 |
| 12.00 | 0.905 | 0.193 | 0.1068 | 0.845 | 0.377 |
| 16.01 | 1.104 | 0.188 | 0.1252 | 1.009 | 0.485 |
| 20.00 | 1.288 | 0.184 | 0.1366 | 1.147 | 0.613 |
| 28.09 | 1.532 | 0.169 | 0.1390 | 1.272 | 0.870 |
| 36.00 | 1.692 | 0.147 | 0.1311 | 1.283 | 1.113 |
| 43.97 | 1.763 | 0.120 | 0.1177 | 1.185 | 1.310 |
| 51.93 | 1.396 | 0.086 | 0.0947 | 0.793 | 1.152 |
| 59.97 | 1.407 | 0.064 | 0.0758 | 0.648 | 1.250 |
| 67.97 | 1.442 | 0.043 | 0.0553 | 0.501 | 1.353 |
| 75.98 | 1.474 | 0.025 | 0.0343 | 0.333 | 1.436 |
| 83.95 | 1.494 | 0.010 | 0.0140 | 0.148 | 1.487 |
| 91.92 | 1.495 | -0.005 | -0.0071 | -0.045 | 1.494 |
| 93.60 | 1.494 | -0.008 | -0.0116 | -0.086 | 1.492 |
| 0.08 | 0.074 | 0.199 | 0.0119 | 0.074 | 0.199 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 6.00 | 45 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.84 | -0.084 | 0.149 | -0.0128 | -0.074 | 0.154 |
| 0.05 | 0.033 | 0.148 | 0.0083 | 0.033 | 0.148 |
| 4.04 | 0.460 | 0.160 | 0.0503 | 0.305 | 0.145 |
| 8.01 | 0.288 | 0.156 | 0.0483 | 0.263 | 0.195 |
| 16.03 | 0.620 | 0.165 | 0.0845 | 0.550 | 0.330 |
| 20.05 | 0.776 | 0.167 | 0.0946 | 0.672 | 0.423 |
| 24.09 | 0.914 | 0.166 | 0.1008 | 0.766 | 0.525 |
| 27.95 | 1.045 | 0.161 | 0.1057 | 0.848 | 0.632 |
| 32.01 | 1.162 | 0.155 | 0.1075 | 0.903 | 0.747 |
| 36.04 | 1.247 | 0.147 | 0.1072 | 0.922 | 0.852 |
| 39.97 | 1.311 | 0.136 | 0.1047 | 0.917 | 0.946 |
| 43.94 | 1.374 | 0.121 | 0.1027 | 0.905 | 1.040 |
| 48.00 | 1.416 | 0.110 | 0.0987 | 0.866 | 1.126 |
| 51.94 | 1.413 | 0.099 | 0.0917 | 0.793 | 1.173 |
| 55.97 | 1.363 | 0.086 | 0.0829 | 0.692 | 1.178 |
| 59.99 | 1.345 | 0.074 | 0.0737 | 0.608 | 1.201 |
| 63.86 | 1.304 | 0.061 | 0.0640 | 0.519 | 1.197 |
| 67.96 | 1.280 | 0.050 | 0.0546 | 0.433 | 1.205 |
| 71.90 | 1.271 | 0.041 | 0.0447 | 0.356 | 1.221 |
| 75.89 | 1.274 | 0.032 | 0.0349 | 0.280 | 1.244 |
| 79.92 | 1.279 | 0.022 | 0.0241 | 0.202 | 1.263 |
| 83.86 | 1.290 | 0.012 | 0.0132 | 0.126 | 1.284 |
| 87.90 | 1.308 | 0.003 | 0.0019 | 0.045 | 1.307 |
| 91.84 | 1.287 | -0.007 | -0.0091 | -0.035 | 1.286 |
| 93.52 | 1.279 | -0.011 | -0.0138 | -0.067 | 1.277 |
| 0. | 0.038 | 0.146 | 0.0062 | 0.038 | 0.146 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 6.50 | 49 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.139 | 0.167 | -0.0213 | -0.126 | 0.176 |
| -0.05 | 0.046 | 0.169 | 0.0105 | 0.046 | 0.169 |
| 3.94 | 0.233 | 0.169 | 0.0424 | 0.220 | 0.185 |
| 7.96 | 0.421 | 0.170 | 0.0707 | 0.393 | 0.226 |
| 15.99 | 0.767 | 0.170 | 0.1093 | 0.690 | 0.374 |
| 19.96 | 0.931 | 0.168 | 0.1219 | 0.818 | 0.475 |
| 23.94 | 1.073 | 0.164 | 0.1296 | 0.915 | 0.585 |
| 27.96 | 1.192 | 0.159 | 0.1295 | 0.978 | 0.699 |
| 31.93 | 1.294 | 0.152 | 0.1261 | 1.017 | 0.813 |
| 35.93 | 1.372 | 0.143 | 0.1222 | 1.027 | 0.921 |
| 39.95 | 1.444 | 0.132 | 0.1173 | 1.022 | 1.028 |
| 43.90 | 1.514 | 0.120 | 0.1114 | 1.008 | 1.137 |
| 47.88 | 1.578 | 0.109 | 0.1044 | 0.977 | 1.243 |
| 51.87 | 1.602 | 0.098 | 0.0965 | 0.912 | 1.321 |
| 55.88 | 1.577 | 0.086 | 0.0871 | 0.814 | 1.353 |
| 59.89 | 1.554 | 0.075 | 0.0767 | 0.715 | 1.382 |
| 63.85 | 1.515 | 0.062 | 0.0655 | 0.612 | 1.387 |
| 67.87 | 1.489 | 0.051 | 0.0559 | 0.514 | 1.399 |
| 71.85 | 1.482 | 0.041 | 0.0459 | 0.422 | 1.421 |
| 75.80 | 1.479 | 0.032 | 0.0356 | 0.332 | 1.442 |
| 79.83 | 1.482 | 0.022 | 0.0246 | 0.240 | 1.463 |
| 83.80 | 1.492 | 0.012 | 0.0135 | 0.149 | 1.485 |
| 87.87 | 1.514 | 0.003 | 0.0021 | 0.053 | 1.513 |
| 91.74 | 1.496 | -0.006 | -0.0090 | -0.039 | 1.495 |
| 93.56 | 1.487 | -0.011 | -0.0141 | -0.081 | 1.484 |
| -0.05 | 0.054 | 0.169 | 0.0099 | 0.054 | 0.169 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 7.50 | | 53 | 11 FT | 530 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -4.03 | -0.178 | 0.178 | -0.0236 | -0.165 | 0.190 |
| -0.06 | 0.044 | 0.182 | 0.0089 | 0.044 | 0.182 |
| 3.95 | 0.285 | 0.184 | 0.0427 | 0.272 | 0.203 |
| 8.00 | 0.507 | 0.184 | 0.0675 | 0.476 | 0.253 |
| 11.95 | 0.715 | 0.182 | 0.0885 | 0.662 | 0.326 |
| 15.98 | 0.908 | 0.177 | 0.1068 | 0.825 | 0.420 |
| 19.89 | 1.054 | 0.172 | 0.1185 | 0.932 | 0.520 |
| 23.96 | 1.197 | 0.166 | 0.1264 | 1.026 | 0.638 |
| 27.99 | 1.303 | 0.157 | 0.1300 | 1.077 | 0.751 |
| 31.97 | 1.393 | 0.149 | 0.1288 | 1.103 | 0.864 |
| 36.03 | 1.466 | 0.138 | 0.1255 | 1.104 | 0.974 |
| 39.88 | 1.525 | 0.128 | 0.1195 | 1.088 | 1.076 |
| 43.89 | 1.589 | 0.117 | 0.1123 | 1.064 | 1.186 |
| 47.99 | 1.649 | 0.107 | 0.1049 | 1.024 | 1.297 |
| 51.85 | 1.695 | 0.095 | 0.0957 | 0.972 | 1.391 |
| 59.87 | 1.672 | 0.073 | 0.0771 | 0.776 | 1.483 |
| 67.91 | 1.625 | 0.054 | 0.0570 | 0.561 | 1.526 |
| 75.84 | 1.598 | 0.034 | 0.0355 | 0.358 | 1.558 |
| 83.82 | 1.598 | 0.015 | 0.0133 | 0.157 | 1.590 |
| 91.77 | 1.608 | -0.004 | -0.0086 | -0.046 | 1.607 |
| 93.56 | 1.602 | -0.010 | -0.0141 | -0.090 | 1.600 |
| -0.06 | 0.078 | 0.179 | 0.0063 | 0.078 | 0.179 |
| 0.01 | 0.055 | 0.184 | 0.0093 | 0.055 | 0.184 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 9.50 | | 57 | 11 FT | 530 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -4.02 | -0.192 | 0.171 | -0.0242 | -0.179 | 0.184 |
| 0.06 | 0.031 | 0.179 | 0.0074 | 0.031 | 0.179 |
| 3.99 | 0.297 | 0.181 | 0.0420 | 0.284 | 0.201 |
| 8.02 | 0.537 | 0.181 | 0.0683 | 0.507 | 0.254 |
| 11.91 | 0.755 | 0.179 | 0.0921 | 0.702 | 0.331 |
| 16.00 | 0.946 | 0.175 | 0.1106 | 0.861 | 0.429 |
| 20.00 | 1.092 | 0.171 | 0.1215 | 0.968 | 0.534 |
| 23.93 | 1.222 | 0.166 | 0.1268 | 1.050 | 0.648 |
| 27.94 | 1.322 | 0.159 | 0.1271 | 1.094 | 0.760 |
| 31.95 | 1.405 | 0.149 | 0.1251 | 1.114 | 0.870 |
| 36.09 | 1.478 | 0.138 | 0.1218 | 1.112 | 0.982 |
| 39.92 | 1.541 | 0.127 | 0.1168 | 1.100 | 1.086 |
| 44.00 | 1.609 | 0.116 | 0.1103 | 1.077 | 1.201 |
| 48.01 | 1.671 | 0.104 | 0.1030 | 1.040 | 1.312 |
| 51.92 | 1.717 | 0.092 | 0.0938 | 0.987 | 1.408 |
| 59.95 | 1.725 | 0.073 | 0.0760 | 0.801 | 1.529 |
| 68.00 | 1.703 | 0.052 | 0.0556 | 0.589 | 1.599 |
| 76.12 | 1.688 | 0.033 | 0.0345 | 0.373 | 1.647 |
| 83.93 | 1.704 | 0.015 | 0.0132 | 0.165 | 1.696 |
| 92.01 | 1.715 | -0.003 | -0.0089 | -0.057 | 1.714 |
| 93.74 | 1.718 | -0.009 | -0.0148 | -0.103 | 1.715 |
| -0.01 | 0.062 | 0.184 | 0.0075 | 0.062 | 0.184 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 9.50 | | 62 | 11 FT | 590 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -0.02 | 0.042 | 0.175 | 0.0086 | 0.042 | 0.175 |
| 7.96 | 0.531 | 0.179 | 0.0666 | 0.501 | 0.251 |
| 16.00 | 0.939 | 0.175 | 0.1087 | 0.854 | 0.427 |
| 23.99 | 1.215 | 0.166 | 0.1252 | 1.043 | 0.646 |
| 32.02 | 1.394 | 0.150 | 0.1244 | 1.103 | 0.866 |
| 39.90 | 1.535 | 0.128 | 0.1161 | 1.096 | 1.083 |
| 47.96 | 1.659 | 0.106 | 0.1028 | 1.032 | 1.303 |
| 59.90 | 1.710 | 0.075 | 0.0762 | 0.793 | 1.517 |
| 69.88 | 1.695 | 0.049 | 0.0510 | 0.537 | 1.608 |
| 79.92 | 1.694 | 0.025 | 0.0244 | 0.272 | 1.673 |
| 89.99 | 1.713 | 0.002 | -0.0032 | -0.002 | 1.713 |
| -0.09 | 0.049 | 0.185 | 0.0079 | 0.050 | 0.185 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 9.50 | | 61 | 11 FT | 680 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| 0.05 | 0.027 | 0.185 | 0.0060 | 0.027 | 0.185 |
| 8.07 | 0.547 | 0.184 | 0.0671 | 0.515 | 0.259 |
| 15.99 | 0.975 | 0.177 | 0.1117 | 0.888 | 0.439 |
| 24.06 | 1.256 | 0.166 | 0.1288 | 1.079 | 0.663 |
| 31.94 | 1.409 | 0.151 | 0.1257 | 1.116 | 0.873 |
| 39.93 | 1.551 | 0.125 | 0.1170 | 1.109 | 1.091 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 9.50 | | 63 | 11 FT | 690 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| 0.07 | 0.061 | 0.186 | 0.0107 | 0.061 | 0.187 |
| 8.02 | 0.567 | 0.185 | 0.0693 | 0.536 | 0.262 |
| 16.04 | 0.964 | 0.178 | 0.1101 | 0.878 | 0.437 |
| 24.01 | 1.238 | 0.167 | 0.1264 | 1.063 | 0.656 |
| 31.93 | 1.411 | 0.150 | 0.1254 | 1.118 | 0.873 |
| 40.01 | 1.547 | 0.128 | 0.1163 | 1.103 | 1.092 |
| 47.92 | 1.674 | 0.104 | 0.1023 | 1.045 | 1.313 |
| 79.82 | 1.690 | 0.023 | 0.0228 | 0.276 | 1.667 |
| 89.84 | 1.715 | 0. | -0.0046 | 0.005 | 1.715 |
| 59.97 | 1.687 | 0.063 | 0.0710 | 0.789 | 1.492 |
| 69.94 | 1.684 | 0.044 | 0.0486 | 0.536 | 1.597 |
| 0.05 | 0.061 | 0.187 | 0.0100 | 0.061 | 0.187 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 9.50 | | 64 | 11 FT | 770 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| 0.07 | 0.058 | 0.177 | 0.0107 | 0.057 | 0.177 |
| 8.03 | 0.568 | 0.186 | 0.0690 | 0.537 | 0.263 |
| 16.04 | 0.963 | 0.179 | 0.1091 | 0.876 | 0.438 |
| 24.00 | 1.242 | 0.166 | 0.1269 | 1.067 | 0.657 |
| 31.92 | 1.411 | 0.149 | 0.1257 | 1.118 | 0.873 |
| 40.06 | 1.547 | 0.126 | 0.1163 | 1.103 | 1.093 |
| 47.97 | 1.676 | 0.103 | 0.1025 | 1.045 | 1.314 |
| 59.87 | 1.708 | 0.071 | 0.0746 | 0.796 | 1.513 |
| 69.87 | 1.684 | 0.045 | 0.0483 | 0.537 | 1.596 |
| 79.96 | 1.694 | 0.023 | 0.0223 | 0.273 | 1.672 |
| 89.87 | 1.717 | 0. | -0.0048 | 0.004 | 1.717 |
| 0.09 | 0.061 | 0.189 | 0.0094 | 0.060 | 0.189 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 9.50 | | 65 | 11 FT | 880 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| 0.08 | 0.057 | 0.178 | 0.0100 | 0.057 | 0.178 |
| 7.98 | 0.568 | 0.187 | 0.0680 | 0.537 | 0.264 |
| 16.05 | 0.977 | 0.179 | 0.1099 | 0.890 | 0.442 |
| 24.01 | 1.251 | 0.166 | 0.1282 | 1.075 | 0.660 |
| 32.00 | 1.413 | 0.149 | 0.1259 | 1.119 | 0.875 |
| 39.96 | 1.548 | 0.126 | 0.1168 | 1.106 | 1.090 |
| 47.92 | 1.670 | 0.103 | 0.1022 | 1.043 | 1.308 |
| 59.94 | 1.707 | 0.070 | 0.0739 | 0.794 | 1.513 |
| 69.94 | 1.685 | 0.045 | 0.0481 | 0.536 | 1.598 |
| 79.85 | 1.693 | 0.021 | 0.0219 | 0.277 | 1.670 |
| 89.87 | 1.718 | -0.001 | -0.0051 | 0.005 | 1.718 |
| 0.02 | 0.059 | 0.191 | 0.0079 | 0.059 | 0.191 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | | RUN | TUNNEL | R |
| 1.30 | 11.50 | | 66 | 11 FT | 530 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -3.96 | -0.200 | 0.181 | -0.0245 | -0.187 | 0.194 |
| 0.02 | 0.055 | 0.183 | 0.0099 | 0.055 | 0.183 |
| 4.01 | 0.329 | 0.183 | 0.0447 | 0.315 | 0.206 |
| 8.02 | 0.579 | 0.182 | 0.0715 | 0.548 | 0.261 |
| 13.98 | 0.886 | 0.177 | 0.1041 | 0.817 | 0.386 |
| 19.97 | 1.125 | 0.171 | 0.1224 | 0.999 | 0.545 |
| 23.99 | 1.273 | 0.164 | 0.1284 | 1.097 | 0.667 |
| 28.00 | 1.358 | 0.156 | 0.1289 | 1.126 | 0.776 |
| 32.02 | 1.445 | 0.145 | 0.1271 | 1.148 | 0.889 |
| 35.95 | 1.522 | 0.136 | 0.1223 | 1.152 | 1.003 |
| 39.96 | 1.589 | 0.125 | 0.1164 | 1.138 | 1.116 |
| 43.84 | 1.649 | 0.114 | 0.1092 | 1.111 | 1.224 |
| 47.91 | 1.710 | 0.101 | 0.1011 | 1.071 | 1.337 |
| 51.34 | 1.746 | 0.092 | 0.0933 | 1.019 | 1.421 |
| 55.89 | 1.759 | 0.080 | 0.0831 | 0.920 | 1.501 |
| 59.84 | 1.742 | 0.069 | 0.0738 | 0.816 | 1.541 |
| 63.85 | 1.720 | 0.058 | 0.0634 | 0.706 | 1.569 |
| 67.80 | 1.712 | 0.047 | 0.0529 | 0.603 | 1.603 |
| 71.79 | 1.704 | 0.038 | 0.0419 | 0.497 | 1.631 |
| 75.86 | 1.707 | 0.029 | 0.0319 | 0.389 | 1.662 |
| 79.73 | 1.711 | 0.020 | 0.0215 | 0.285 | 1.687 |
| 83.74 | 1.717 | 0.011 | 0.0109 | 0.176 | 1.708 |
| 91.80 | 1.722 | -0.006 | -0.0107 | -0.048 | 1.721 |
| 93.44 | 1.723 | -0.010 | -0.0150 | -0.094 | 1.721 |
| 0.04 | 0.067 | 0.184 | 0.0085 | 0.067 | 0.184 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 11.50 | 70 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.253 | 0.172 | -0.0383 | -0.240 | 0.189 |
| -0.07 | 0.051 | 0.183 | 0.0088 | 0.052 | 0.183 |
| 4.03 | 0.330 | 0.183 | 0.0433 | 0.316 | 0.205 |
| 7.96 | 0.591 | 0.181 | 0.0709 | 0.560 | 0.261 |
| 12.00 | 0.815 | 0.178 | 0.0954 | 0.760 | 0.344 |
| 16.03 | 0.999 | 0.174 | 0.1129 | 0.912 | 0.443 |
| 20.07 | 1.159 | 0.169 | 0.1235 | 1.031 | 0.556 |
| 27.98 | 1.396 | 0.155 | 0.1276 | 1.160 | 0.792 |
| 36.03 | 1.564 | 0.137 | 0.1202 | 1.184 | 1.030 |
| 43.97 | 1.681 | 0.116 | 0.1077 | 1.129 | 1.251 |
| 51.99 | 1.767 | 0.093 | 0.0909 | 1.015 | 1.449 |
| 59.96 | 1.680 | 0.070 | 0.0732 | 0.780 | 1.489 |
| 67.95 | 1.657 | 0.050 | 0.0538 | 0.576 | 1.554 |
| 75.87 | 1.677 | 0.032 | 0.0338 | 0.378 | 1.634 |
| 83.88 | 1.695 | 0.014 | 0.0127 | 0.167 | 1.686 |
| 91.94 | 1.701 | -0.003 | -0.0088 | -0.055 | 1.700 |
| 93.45 | 1.703 | -0.008 | -0.0139 | -0.094 | 1.700 |
| 0.01 | 0.061 | 0.184 | 0.0086 | 0.061 | 0.184 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.00 | 155 | 9X7 FT | 340 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.89 | -0.129 | 0.152 | -0.0237 | -0.118 | 0.160 |
| 0.02 | -0.002 | 0.150 | -0.0018 | -0.002 | 0.150 |
| 4.01 | 0.101 | 0.153 | 0.0173 | 0.090 | 0.160 |
| 12.02 | 0.344 | 0.164 | 0.0533 | 0.303 | 0.232 |
| 19.98 | 0.655 | 0.171 | 0.0784 | 0.557 | 0.384 |
| 28.13 | 0.919 | 0.167 | 0.0930 | 0.732 | 0.580 |
| 36.14 | 1.117 | 0.154 | 0.0952 | 0.811 | 0.783 |
| 44.13 | 1.249 | 0.135 | 0.0891 | 0.803 | 0.967 |
| 52.18 | 1.331 | 0.113 | 0.0775 | 0.727 | 1.121 |
| 60.20 | 1.371 | 0.091 | 0.0596 | 0.603 | 1.235 |
| 68.29 | 1.399 | 0.069 | 0.0402 | 0.453 | 1.326 |
| 76.25 | 1.424 | 0.050 | 0.0205 | 0.290 | 1.395 |
| 84.16 | 1.434 | 0.030 | -0.0007 | 0.116 | 1.429 |
| 88.29 | 1.436 | 0.020 | -0.0118 | 0.023 | 1.436 |
| 92.23 | 1.438 | 0.011 | -0.0222 | -0.067 | 1.437 |
| 96.19 | 1.438 | 0.003 | -0.0327 | -0.158 | 1.429 |
| -0.04 | 0.001 | 0.150 | -0.0048 | 0.001 | 0.150 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.00 | 154 | 9X7 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.90 | -0.107 | 0.152 | -0.0190 | -0.097 | 0.159 |
| -0.04 | -0.002 | 0.150 | -0.0003 | -0.001 | 0.150 |
| 4.01 | 0.104 | 0.153 | 0.0190 | 0.093 | 0.160 |
| 11.96 | 0.346 | 0.162 | 0.0547 | 0.305 | 0.230 |
| 11.96 | 0.349 | 0.163 | 0.0546 | 0.307 | 0.231 |
| 11.98 | 0.349 | 0.163 | 0.0546 | 0.308 | 0.232 |
| 11.98 | 0.350 | 0.163 | 0.0546 | 0.308 | 0.232 |
| 20.07 | 0.662 | 0.168 | 0.0814 | 0.564 | 0.385 |
| 28.09 | 0.900 | 0.165 | 0.0965 | 0.716 | 0.569 |
| 28.10 | 0.936 | 0.164 | 0.0965 | 0.748 | 0.586 |
| 36.08 | 1.098 | 0.154 | 0.0995 | 0.797 | 0.771 |
| 36.08 | 1.119 | 0.151 | 0.0996 | 0.816 | 0.781 |
| 36.09 | 1.128 | 0.151 | 0.0997 | 0.823 | 0.786 |
| 36.10 | 1.135 | 0.151 | 0.0997 | 0.828 | 0.790 |
| 36.08 | 1.139 | 0.151 | 0.0998 | 0.832 | 0.792 |
| 44.20 | 1.275 | 0.129 | 0.0941 | 0.825 | 0.981 |
| 52.15 | 1.346 | 0.107 | 0.0822 | 0.741 | 1.128 |
| 60.14 | 1.377 | 0.085 | 0.0648 | 0.612 | 1.236 |
| 68.17 | 1.407 | 0.062 | 0.0457 | 0.465 | 1.329 |
| 76.25 | 1.432 | 0.042 | 0.0255 | 0.299 | 1.401 |
| 84.19 | 1.441 | 0.023 | 0.0041 | 0.123 | 1.436 |
| 88.13 | 1.444 | 0.014 | -0.0062 | 0.033 | 1.444 |
| 92.26 | 1.446 | 0.005 | -0.0172 | -0.062 | 1.445 |
| 96.20 | 1.446 | -0.004 | -0.0275 | -0.153 | 1.438 |
| -0.04 | 0.002 | 0.150 | -0.0011 | 0.002 | 0.150 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.50 | 158 | 9X7 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.03 | -0.170 | 0.168 | -0.0269 | -0.158 | 0.180 |
| 0.02 | -0.011 | 0.168 | -0.0011 | -0.011 | 0.168 |
| 3.95 | 0.140 | 0.170 | 0.0247 | 0.128 | 0.179 |
| 11.97 | 0.470 | 0.176 | 0.0666 | 0.433 | 0.270 |
| 19.98 | 0.809 | 0.174 | 0.0990 | 0.701 | 0.440 |
| 28.03 | 1.076 | 0.166 | 0.1163 | 0.872 | 0.652 |
| 36.07 | 1.256 | 0.151 | 0.1119 | 0.926 | 0.862 |
| 44.19 | 1.398 | 0.129 | 0.1014 | 0.912 | 1.067 |
| 52.13 | 1.511 | 0.108 | 0.0867 | 0.843 | 1.259 |
| 60.16 | 1.562 | 0.085 | 0.0682 | 0.703 | 1.397 |
| 68.20 | 1.595 | 0.063 | 0.0478 | 0.533 | 1.504 |
| 76.31 | 1.622 | 0.043 | 0.0265 | 0.342 | 1.586 |
| 84.17 | 1.630 | 0.024 | 0.0050 | 0.142 | 1.624 |
| 88.21 | 1.632 | 0.014 | -0.0057 | 0.037 | 1.632 |
| 92.16 | 1.635 | 0.006 | -0.0169 | -0.067 | 1.634 |
| 96.33 | 1.632 | -0.002 | -0.0275 | -0.178 | 1.623 |
| 0.07 | -0.006 | 0.168 | -0.0014 | -0.006 | 0.168 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | RUN | | TUNNEL | R |
| 1.60 | 7.50 | 175 | | 9X7 FT | 340 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -4.05 | -0.173 | 0.166 | -0.0259 | -0.161 | 0.178 |
| 0.08 | 0.011 | 0.166 | 0.0031 | 0.011 | 0.166 |
| 4.14 | 0.188 | 0.168 | 0.0310 | 0.176 | 0.181 |
| 12.12 | 0.544 | 0.170 | 0.0748 | 0.496 | 0.281 |
| 20.05 | 0.888 | 0.165 | 0.1052 | 0.778 | 0.459 |
| 28.13 | 1.148 | 0.154 | 0.1190 | 0.940 | 0.677 |
| 36.15 | 1.328 | 0.136 | 0.1163 | 0.993 | 0.893 |
| 44.23 | 1.455 | 0.115 | 0.1047 | 0.963 | 1.097 |
| 52.19 | 1.553 | 0.093 | 0.0900 | 0.879 | 1.284 |
| 60.34 | 1.618 | 0.071 | 0.0720 | 0.739 | 1.441 |
| 68.20 | 1.656 | 0.051 | 0.0523 | 0.568 | 1.557 |
| 76.39 | 1.676 | 0.032 | 0.0314 | 0.364 | 1.636 |
| 80.27 | 1.682 | 0.023 | 0.0212 | 0.262 | 1.662 |
| 84.31 | 1.684 | 0.014 | 0.0106 | 0.153 | 1.677 |
| 92.36 | 1.689 | -0.003 | -0.0104 | -0.067 | 1.688 |
| 95.77 | 1.687 | -0.010 | -0.0190 | -0.159 | 1.680 |
| 0.01 | 0.013 | 0.166 | -0.0007 | 0.012 | 0.166 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | RUN | | TUNNEL | R |
| 1.60 | 7.50 | 160 | | 9X7 FT | 530 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -4.13 | -0.201 | 0.174 | -0.0288 | -0.188 | 0.188 |
| -0.13 | -0.017 | 0.174 | -0.0017 | -0.017 | 0.174 |
| 3.93 | 0.166 | 0.176 | 0.0264 | 0.154 | 0.187 |
| 11.93 | 0.531 | 0.177 | 0.0712 | 0.483 | 0.283 |
| 19.99 | 0.893 | 0.173 | 0.1027 | 0.780 | 0.468 |
| 27.96 | 1.163 | 0.163 | 0.1179 | 0.951 | 0.689 |
| 36.10 | 1.333 | 0.145 | 0.1147 | 0.991 | 0.903 |
| 44.00 | 1.467 | 0.125 | 0.1019 | 0.969 | 1.109 |
| 52.04 | 1.569 | 0.103 | 0.0859 | 0.884 | 1.301 |
| 60.00 | 1.631 | 0.082 | 0.0668 | 0.745 | 1.454 |
| 68.11 | 1.669 | 0.061 | 0.0465 | 0.565 | 1.571 |
| 76.05 | 1.689 | 0.041 | 0.0260 | 0.367 | 1.649 |
| 84.12 | 1.697 | 0.023 | 0.0045 | 0.151 | 1.691 |
| 88.10 | 1.701 | 0.014 | -0.0060 | 0.042 | 1.701 |
| 92.10 | 1.702 | 0.005 | -0.0169 | -0.068 | 1.701 |
| 95.12 | 1.700 | 0.001 | -0.0241 | -0.152 | 1.693 |
| -0.12 | -0.013 | 0.174 | -0.0016 | -0.012 | 0.174 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | RUN | | TUNNEL | R |
| 1.60 | 9.50 | 162 | | 9X7 FT | 530 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -4.05 | -0.219 | 0.174 | -0.0267 | -0.206 | 0.189 |
| 0.02 | -0.012 | 0.174 | -0.0004 | -0.012 | 0.174 |
| 4.07 | 0.192 | 0.175 | 0.0259 | 0.179 | 0.188 |
| 12.09 | 0.586 | 0.175 | 0.0709 | 0.536 | 0.294 |
| 20.16 | 0.959 | 0.169 | 0.1055 | 0.842 | 0.489 |
| 28.08 | 1.207 | 0.158 | 0.1179 | 0.991 | 0.708 |
| 36.14 | 1.361 | 0.141 | 0.1111 | 1.016 | 0.917 |
| 44.14 | 1.494 | 0.121 | 0.0985 | 0.988 | 1.127 |
| 52.12 | 1.589 | 0.099 | 0.0831 | 0.898 | 1.315 |
| 60.15 | 1.638 | 0.078 | 0.0648 | 0.748 | 1.460 |
| 68.20 | 1.676 | 0.058 | 0.0449 | 0.569 | 1.577 |
| 76.22 | 1.699 | 0.039 | 0.0246 | 0.366 | 1.659 |
| 84.25 | 1.705 | 0.021 | 0.0044 | 0.150 | 1.699 |
| 88.16 | 1.711 | 0.013 | -0.0055 | 0.042 | 1.710 |
| 92.30 | 1.714 | 0.005 | -0.0159 | -0.074 | 1.712 |
| 95.69 | 1.711 | -0.002 | -0.0245 | -0.168 | 1.703 |
| 0.08 | -0.007 | 0.173 | -0.0006 | -0.008 | 0.173 |

| ELLIPSE | | | | | WITHOUT ENDPLATE |
|---|---|---|---|---|---|
| MACH NO. | SPAN | RUN | | TUNNEL | R |
| 1.60 | 11.50 | 171 | | 9X7 FT | 340 000 |
| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
| -4.22 | -0.189 | 0.165 | -0.0242 | -0.176 | 0.179 |
| -0.14 | 0.020 | 0.166 | 0.0040 | 0.021 | 0.166 |
| 3.75 | 0.216 | 0.167 | 0.0305 | 0.204 | 0.181 |
| 11.70 | 0.614 | 0.166 | 0.0748 | 0.567 | 0.287 |
| 19.94 | 0.980 | 0.160 | 0.1098 | 0.867 | 0.484 |
| 27.81 | 1.221 | 0.148 | 0.1193 | 1.011 | 0.700 |
| 35.82 | 1.382 | 0.130 | 0.1134 | 1.044 | 0.914 |
| 43.90 | 1.502 | 0.109 | 0.1012 | 1.007 | 1.120 |
| 51.89 | 1.592 | 0.087 | 0.0856 | 0.914 | 1.307 |
| 60.03 | 1.658 | 0.067 | 0.0680 | 0.770 | 1.470 |
| 67.90 | 1.692 | 0.049 | 0.0492 | 0.592 | 1.586 |
| 75.90 | 1.703 | 0.030 | 0.0293 | 0.386 | 1.659 |
| 79.92 | 1.697 | 0.021 | 0.0199 | 0.276 | 1.675 |
| 83.95 | 1.690 | 0.012 | 0.0099 | 0.166 | 1.682 |
| 87.98 | 1.695 | 0.004 | -0.0003 | 0.056 | 1.694 |
| 92.09 | 1.695 | -0.004 | -0.0106 | -0.058 | 1.694 |
| 95.47 | 1.694 | -0.010 | -0.0191 | -0.152 | 1.688 |
| -0.24 | 0.014 | 0.166 | 0.0026 | 0.015 | 0.166 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 164 | 9X7 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.96 | -0.223 | 0.173 | -0.0266 | -0.211 | 0.188 |
| -0.03 | -0.016 | 0.173 | -0.0009 | -0.016 | 0.173 |
| 3.95 | 0.182 | 0.174 | 0.0249 | 0.170 | 0.186 |
| 12.05 | 0.602 | 0.174 | 0.0702 | 0.553 | 0.296 |
| 20.00 | 0.981 | 0.167 | 0.1062 | 0.864 | 0.493 |
| 28.10 | 1.235 | 0.155 | 0.1182 | 1.016 | 0.719 |
| 36.12 | 1.393 | 0.138 | 0.1115 | 1.044 | 0.933 |
| 44.10 | 1.521 | 0.117 | 0.0988 | 1.011 | 1.142 |
| 52.15 | 1.609 | 0.096 | 0.0817 | 0.911 | 1.330 |
| 60.05 | 1.659 | 0.076 | 0.0638 | 0.762 | 1.476 |
| 68.10 | 1.691 | 0.057 | 0.0443 | 0.578 | 1.590 |
| 76.12 | 1.703 | 0.038 | 0.0250 | 0.372 | 1.662 |
| 84.13 | 1.698 | 0.020 | 0.0056 | 0.154 | 1.691 |
| 88.15 | 1.698 | 0.012 | -0.0045 | 0.043 | 1.697 |
| 92.16 | 1.701 | 0.006 | -0.0129 | -0.070 | 1.699 |
| 94.68 | 1.699 | 0.001 | -0.0206 | -0.140 | 1.694 |
| 0.02 | -0.007 | 0.173 | -0.0012 | -0.007 | 0.173 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 167 | 9X7 FT | 340 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.26 | -0.258 | 0.168 | -0.0318 | -0.245 | 0.187 |
| -0.25 | -0.014 | 0.169 | -0.0003 | -0.013 | 0.169 |
| 3.75 | 0.195 | 0.170 | 0.0271 | 0.184 | 0.182 |
| 11.75 | 0.620 | 0.169 | 0.0727 | 0.572 | 0.292 |
| 19.78 | 1.013 | 0.162 | 0.1112 | 0.898 | 0.495 |
| 27.81 | 1.263 | 0.149 | 0.1212 | 1.047 | 0.721 |
| 35.78 | 1.425 | 0.131 | 0.1146 | 1.079 | 0.939 |
| 43.84 | 1.550 | 0.109 | 0.1021 | 1.042 | 1.153 |
| 51.75 | 1.633 | 0.088 | 0.0864 | 0.942 | 1.337 |
| 59.87 | 1.697 | 0.067 | 0.0689 | 0.794 | 1.502 |
| 67.93 | 1.742 | 0.049 | 0.0499 | 0.610 | 1.633 |
| 76.01 | 1.723 | 0.030 | 0.0299 | 0.388 | 1.679 |
| 83.85 | 1.726 | 0.013 | 0.0106 | 0.172 | 1.717 |
| 87.95 | 1.725 | 0.005 | 0.0006 | 0.057 | 1.724 |
| 91.94 | 1.727 | -0.005 | -0.0096 | -0.056 | 1.726 |
| 92.56 | 1.728 | -0.004 | -0.0108 | -0.073 | 1.727 |
| -0.19 | 0.003 | 0.169 | -0.0014 | 0.004 | 0.169 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 166 | 9X7 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.12 | -0.214 | 0.170 | -0.0250 | -0.202 | 0.185 |
| -0.16 | -0.004 | 0.171 | 0.0012 | -0.004 | 0.171 |
| 3.82 | 0.204 | 0.172 | 0.0277 | 0.192 | 0.185 |
| 11.76 | 0.619 | 0.171 | 0.0717 | 0.571 | 0.294 |
| 19.69 | 1.021 | 0.163 | 0.1104 | 0.906 | 0.498 |
| 27.79 | 1.274 | 0.150 | 0.1212 | 1.057 | 0.727 |
| 35.79 | 1.436 | 0.131 | 0.1144 | 1.088 | 0.946 |
| 43.83 | 1.557 | 0.110 | 0.1017 | 1.047 | 1.157 |
| 51.89 | 1.649 | 0.087 | 0.0861 | 0.949 | 1.351 |
| 59.77 | 1.709 | 0.068 | 0.0689 | 0.802 | 1.511 |
| 67.88 | 1.699 | 0.047 | 0.0498 | 0.596 | 1.592 |
| 75.94 | 1.705 | 0.029 | 0.0302 | 0.386 | 1.661 |
| 79.87 | 1.709 | 0.020 | 0.0206 | 0.280 | 1.686 |
| 83.86 | 1.714 | 0.012 | 0.0106 | 0.171 | 1.706 |
| 87.94 | 1.718 | 0.005 | 0.0008 | 0.057 | 1.717 |
| 91.95 | 1.720 | -0.003 | -0.0096 | -0.056 | 1.720 |
| 93.58 | 1.721 | -0.005 | -0.0134 | -0.102 | 1.718 |
| -0.26 | -0.046 | 0.171 | -0.0056 | -0.045 | 0.171 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.00 | 156 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.82 | -0.080 | 0.151 | -0.0173 | -0.070 | 0.156 |
| 0.08 | 0.007 | 0.150 | -0.0007 | 0.007 | 0.150 |
| 4.02 | 0.095 | 0.152 | 0.0159 | 0.085 | 0.159 |
| 12.07 | 0.297 | 0.161 | 0.0489 | 0.257 | 0.219 |
| 19.99 | 0.555 | 0.169 | 0.0716 | 0.464 | 0.349 |
| 28.15 | 0.796 | 0.168 | 0.0890 | 0.623 | 0.524 |
| 36.13 | 1.002 | 0.158 | 0.0953 | 0.716 | 0.719 |
| 44.07 | 1.143 | 0.138 | 0.0860 | 0.726 | 0.894 |
| 52.10 | 1.257 | 0.118 | 0.0767 | 0.679 | 1.064 |
| 60.26 | 1.329 | 0.094 | 0.0579 | 0.577 | 1.201 |
| 68.23 | 1.361 | 0.073 | 0.0377 | 0.437 | 1.291 |
| 76.17 | 1.384 | 0.054 | 0.0164 | 0.278 | 1.356 |
| 84.23 | 1.396 | 0.035 | -0.0056 | 0.106 | 1.393 |
| 88.15 | 1.400 | 0.026 | -0.0164 | 0.020 | 1.400 |
| 92.36 | 1.400 | 0.015 | -0.0280 | -0.073 | 1.398 |
| 96.31 | 1.398 | 0.006 | -0.0388 | -0.160 | 1.389 |
| -0.03 | 0.039 | 0.149 | -0.0067 | 0.039 | 0.149 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.00 | 157 | 9X7 FT | 550 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.96 | -0.077 | 0.148 | -0.0143 | -0.066 | 0.153 |
| 0.02 | 0.013 | 0.148 | 0.0038 | 0.013 | 0.148 |
| 4.03 | 0.101 | 0.149 | 0.0211 | 0.090 | 0.156 |
| 12.02 | 0.311 | 0.158 | 0.0542 | 0.271 | 0.219 |
| 20.00 | 0.562 | 0.163 | 0.0778 | 0.472 | 0.346 |
| 28.04 | 0.822 | 0.161 | 0.0956 | 0.650 | 0.528 |
| 36.09 | 1.037 | 0.150 | 0.1032 | 0.750 | 0.732 |
| 44.05 | 1.189 | 0.129 | 0.0985 | 0.765 | 0.920 |
| 52.13 | 1.290 | 0.107 | 0.0855 | 0.707 | 1.084 |
| 60.09 | 1.353 | 0.084 | 0.0669 | 0.602 | 1.215 |
| 68.16 | 1.379 | 0.063 | 0.0465 | 0.455 | 1.303 |
| 76.13 | 1.398 | 0.042 | 0.0252 | 0.294 | 1.368 |
| 84.21 | 1.413 | 0.023 | 0.0030 | 0.120 | 1.408 |
| 88.25 | 1.416 | 0.014 | -0.0079 | 0.029 | 1.416 |
| 92.22 | 1.417 | 0.004 | -0.0191 | -0.059 | 1.416 |
| 96.22 | 1.415 | -0.005 | -0.0297 | -0.149 | 1.407 |
| 0.01 | 0.016 | 0.147 | 0.0027 | 0.016 | 0.147 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.50 | 159 | 9X7 FT | 540 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.113 | 0.164 | -0.0188 | -0.101 | 0.172 |
| -0.05 | 0.012 | 0.164 | 0.0033 | 0.012 | 0.164 |
| 4.00 | 0.138 | 0.165 | 0.0254 | 0.126 | 0.174 |
| 11.96 | 0.406 | 0.170 | 0.0611 | 0.362 | 0.251 |
| 19.97 | 0.686 | 0.172 | 0.0895 | 0.586 | 0.396 |
| 28.07 | 0.958 | 0.165 | 0.1081 | 0.767 | 0.596 |
| 36.17 | 1.182 | 0.151 | 0.1132 | 0.865 | 0.819 |
| 44.13 | 1.331 | 0.130 | 0.1043 | 0.865 | 1.020 |
| 52.01 | 1.442 | 0.108 | 0.0889 | 0.802 | 1.202 |
| 60.08 | 1.517 | 0.085 | 0.0690 | 0.683 | 1.357 |
| 68.19 | 1.552 | 0.063 | 0.0479 | 0.518 | 1.464 |
| 76.15 | 1.576 | 0.043 | 0.0262 | 0.336 | 1.541 |
| 84.21 | 1.591 | 0.024 | 0.0037 | 0.137 | 1.585 |
| 88.25 | 1.595 | 0.014 | -0.0075 | 0.034 | 1.595 |
| 92.31 | 1.595 | 0.006 | -0.0172 | -0.070 | 1.594 |
| 96.16 | 1.592 | -0.003 | -0.0296 | -0.168 | 1.583 |
| 0.03 | 0.019 | 0.164 | 0.0019 | 0.019 | 0.164 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 7.50 | 176 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.08 | -0.098 | 0.159 | -0.0145 | -0.087 | 0.165 |
| 0.01 | 0.040 | 0.158 | 0.0084 | 0.040 | 0.158 |
| 4.02 | 0.181 | 0.160 | 0.0301 | 0.169 | 0.172 |
| 12.06 | 0.464 | 0.163 | 0.0682 | 0.419 | 0.256 |
| 20.06 | 0.756 | 0.160 | 0.0970 | 0.655 | 0.410 |
| 28.17 | 1.020 | 0.152 | 0.1130 | 0.828 | 0.616 |
| 36.10 | 1.223 | 0.135 | 0.1144 | 0.909 | 0.830 |
| 44.18 | 1.371 | 0.113 | 0.1038 | 0.905 | 1.037 |
| 52.12 | 1.475 | 0.091 | 0.0888 | 0.834 | 1.220 |
| 60.20 | 1.547 | 0.069 | 0.0705 | 0.709 | 1.377 |
| 68.24 | 1.593 | 0.049 | 0.0509 | 0.545 | 1.498 |
| 76.24 | 1.621 | 0.030 | 0.0302 | 0.356 | 1.582 |
| 80.22 | 1.630 | 0.021 | 0.0196 | 0.256 | 1.610 |
| 84.42 | 1.635 | 0.012 | 0.0084 | 0.147 | 1.628 |
| 92.37 | 1.638 | -0.005 | -0.0120 | -0.063 | 1.636 |
| 95.03 | 1.636 | -0.011 | -0.0190 | -0.133 | 1.631 |
| 0.04 | 0.069 | 0.157 | 0.0012 | 0.069 | 0.157 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 7.50 | 161 | 9X7 FT | 540 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.11 | -0.135 | 0.167 | -0.0180 | -0.123 | 0.176 |
| 0. | 0.019 | 0.166 | 0.0040 | 0.019 | 0.166 |
| 3.92 | 0.161 | 0.167 | 0.0250 | 0.149 | 0.178 |
| 11.88 | 0.460 | 0.171 | 0.0640 | 0.415 | 0.262 |
| 19.93 | 0.758 | 0.169 | 0.0944 | 0.655 | 0.418 |
| 27.93 | 1.039 | 0.162 | 0.1122 | 0.842 | 0.630 |
| 36.16 | 1.252 | 0.146 | 0.1140 | 0.925 | 0.857 |
| 44.02 | 1.394 | 0.125 | 0.1025 | 0.915 | 1.059 |
| 52.07 | 1.505 | 0.102 | 0.0853 | 0.844 | 1.250 |
| 60.07 | 1.576 | 0.081 | 0.0657 | 0.716 | 1.406 |
| 68.07 | 1.611 | 0.060 | 0.0453 | 0.546 | 1.517 |
| 76.12 | 1.635 | 0.041 | 0.0243 | 0.353 | 1.597 |
| 84.06 | 1.647 | 0.023 | 0.0029 | 0.148 | 1.641 |
| 88.01 | 1.651 | 0.015 | -0.0083 | 0.043 | 1.650 |
| 92.02 | 1.652 | 0.005 | -0.0183 | -0.063 | 1.651 |
| 95.90 | 1.646 | -0.001 | -0.0282 | -0.168 | 1.637 |
| -0.07 | 0.020 | 0.166 | 0.0017 | 0.020 | 0.166 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 9.50 | 163 | 9X7 FT | 540 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.05 | -0.137 | 0.164 | -0.0170 | -0.125 | 0.173 |
| -0.04 | 0.016 | 0.164 | 0.0036 | 0.016 | 0.164 |
| 4.02 | 0.171 | 0.165 | 0.0238 | 0.159 | 0.176 |
| 11.96 | 0.491 | 0.168 | 0.0616 | 0.446 | 0.266 |
| 20.13 | 0.816 | 0.166 | 0.0933 | 0.709 | 0.437 |
| 28.10 | 1.092 | 0.157 | 0.1119 | 0.889 | 0.653 |
| 36.14 | 1.291 | 0.141 | 0.1112 | 0.960 | 0.875 |
| 44.30 | 1.429 | 0.119 | 0.0983 | 0.940 | 1.083 |
| 52.11 | 1.527 | 0.097 | 0.0815 | 0.862 | 1.264 |
| 60.30 | 1.592 | 0.076 | 0.0624 | 0.723 | 1.420 |
| 68.21 | 1.625 | 0.057 | 0.0433 | 0.551 | 1.530 |
| 76.22 | 1.644 | 0.038 | 0.0233 | 0.354 | 1.606 |
| 84.39 | 1.650 | 0.021 | 0.0025 | 0.141 | 1.644 |
| 88.41 | 1.648 | 0.013 | -0.0076 | 0.033 | 1.648 |
| 92.32 | 1.650 | 0.004 | -0.0173 | -0.071 | 1.648 |
| 96.07 | 1.650 | -0.003 | -0.0267 | -0.171 | 1.641 |
| 0. | 0.023 | 0.163 | 0.0021 | 0.023 | 0.163 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 172 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.16 | -0.109 | 0.157 | -0.0140 | -0.097 | 0.164 |
| -0.24 | 0.038 | 0.157 | 0.0074 | 0.039 | 0.157 |
| 3.73 | 0.191 | 0.158 | 0.0286 | 0.180 | 0.170 |
| 11.78 | 0.500 | 0.160 | 0.0658 | 0.456 | 0.259 |
| 19.80 | 0.822 | 0.158 | 0.0952 | 0.720 | 0.427 |
| 27.97 | 1.094 | 0.147 | 0.1124 | 0.897 | 0.643 |
| 35.89 | 1.286 | 0.129 | 0.1107 | 0.966 | 0.858 |
| 43.89 | 1.418 | 0.106 | 0.0989 | 0.949 | 1.060 |
| 51.92 | 1.511 | 0.084 | 0.0834 | 0.866 | 1.242 |
| 59.95 | 1.575 | 0.065 | 0.0662 | 0.733 | 1.396 |
| 67.97 | 1.621 | 0.046 | 0.0475 | 0.566 | 1.520 |
| 76.00 | 1.650 | 0.029 | 0.0284 | 0.371 | 1.608 |
| 79.90 | 1.656 | 0.020 | 0.0185 | 0.271 | 1.634 |
| 84.01 | 1.659 | 0.012 | 0.0085 | 0.162 | 1.651 |
| 87.97 | 1.661 | 0.004 | -0.0013 | 0.055 | 1.660 |
| 92.06 | 1.659 | -0.005 | -0.0116 | -0.055 | 1.658 |
| 94.50 | 1.658 | -0.009 | -0.0174 | -0.121 | 1.654 |
| -0.24 | 0.022 | 0.156 | 0.0023 | 0.023 | 0.156 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 165 | 9X7 FT | 550 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.90 | -0.138 | 0.163 | -0.0161 | -0.126 | 0.172 |
| 0.08 | 0.020 | 0.163 | 0.0042 | 0.020 | 0.163 |
| 4.00 | 0.171 | 0.164 | 0.0237 | 0.159 | 0.176 |
| 12.08 | 0.492 | 0.167 | 0.0618 | 0.446 | 0.266 |
| 20.11 | 0.828 | 0.165 | 0.0929 | 0.720 | 0.439 |
| 28.03 | 1.111 | 0.155 | 0.1118 | 0.908 | 0.659 |
| 36.06 | 1.309 | 0.138 | 0.1106 | 0.977 | 0.882 |
| 44.07 | 1.442 | 0.116 | 0.0975 | 0.955 | 1.086 |
| 52.18 | 1.541 | 0.094 | 0.0803 | 0.871 | 1.274 |
| 60.10 | 1.603 | 0.074 | 0.0620 | 0.735 | 1.426 |
| 68.20 | 1.642 | 0.055 | 0.0425 | 0.559 | 1.544 |
| 76.18 | 1.660 | 0.037 | 0.0231 | 0.360 | 1.621 |
| 84.22 | 1.668 | 0.021 | 0.0028 | 0.148 | 1.662 |
| 88.33 | 1.668 | 0.012 | -0.0071 | 0.036 | 1.667 |
| 92.23 | 1.668 | 0.004 | -0.0171 | -0.069 | 1.666 |
| 94.11 | 1.667 | 0. | -0.0215 | -0.120 | 1.663 |
| 0.04 | 0.022 | 0.163 | 0.0017 | 0.022 | 0.163 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 168 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.33 | -0.160 | 0.160 | -0.0211 | -0.148 | 0.172 |
| -0.26 | 0.021 | 0.160 | 0.0046 | 0.021 | 0.160 |
| 3.62 | 0.166 | 0.160 | 0.0256 | 0.156 | 0.170 |
| 11.61 | 0.486 | 0.163 | 0.0641 | 0.444 | 0.257 |
| 19.73 | 0.830 | 0.160 | 0.0945 | 0.727 | 0.431 |
| 27.82 | 1.132 | 0.149 | 0.1139 | 0.931 | 0.660 |
| 35.84 | 1.346 | 0.128 | 0.1113 | 1.016 | 0.891 |
| 43.87 | 1.474 | 0.105 | 0.0985 | 0.990 | 1.097 |
| 51.92 | 1.558 | 0.083 | 0.0827 | 0.896 | 1.277 |
| 60.00 | 1.617 | 0.064 | 0.0658 | 0.753 | 1.432 |
| 67.98 | 1.660 | 0.046 | 0.0476 | 0.580 | 1.556 |
| 76.07 | 1.686 | 0.029 | 0.0283 | 0.378 | 1.643 |
| 84.01 | 1.700 | 0.012 | 0.0090 | 0.165 | 1.692 |
| 87.95 | 1.702 | 0.004 | -0.0006 | 0.056 | 1.701 |
| 91.94 | 1.701 | -0.004 | -0.0108 | -0.054 | 1.701 |
| 92.96 | 1.702 | -0.006 | -0.0130 | -0.082 | 1.700 |
| -0.38 | 0.015 | 0.159 | -0.0058 | 0.016 | 0.159 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 169 | 9X7 FT | 540 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.36 | -0.168 | 0.162 | -0.0199 | -0.155 | 0.175 |
| -0.19 | 0.019 | 0.162 | 0.0051 | 0.020 | 0.162 |
| 3.72 | 0.172 | 0.163 | 0.0252 | 0.161 | 0.174 |
| 11.77 | 0.498 | 0.166 | 0.0632 | 0.454 | 0.264 |
| 19.82 | 0.843 | 0.162 | 0.0940 | 0.738 | 0.438 |
| 27.80 | 1.146 | 0.151 | 0.1141 | 0.943 | 0.668 |
| 35.88 | 1.355 | 0.130 | 0.1118 | 1.022 | 0.899 |
| 43.91 | 1.487 | 0.106 | 0.0988 | 0.998 | 1.107 |
| 51.89 | 1.566 | 0.083 | 0.0832 | 0.901 | 1.283 |
| 59.88 | 1.618 | 0.064 | 0.0663 | 0.757 | 1.432 |
| 68.05 | 1.656 | 0.045 | 0.0472 | 0.577 | 1.553 |
| 76.03 | 1.678 | 0.028 | 0.0282 | 0.378 | 1.635 |
| 84.02 | 1.686 | 0.012 | 0.0087 | 0.164 | 1.678 |
| 88.06 | 1.687 | 0.004 | -0.0012 | 0.053 | 1.686 |
| 92.20 | 1.687 | -0.004 | -0.0114 | -0.060 | 1.686 |
| 92.40 | 1.686 | -0.005 | -0.0119 | -0.066 | 1.685 |
| -0.25 | 0.021 | 0.162 | 0.0039 | 0.022 | 0.162 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.00 | 32 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.17 | -0.041 | 0.048 | -0.0044 | -0.037 | 0.051 |
| -0.16 | -0.008 | 0.083 | 0.0014 | -0.008 | 0.083 |
| 3.83 | 0.057 | 0.107 | 0.0153 | 0.050 | 0.110 |
| 7.90 | 0.129 | 0.120 | 0.0305 | 0.111 | 0.136 |
| 15.96 | 0.308 | 0.133 | 0.0583 | 0.260 | 0.213 |
| 20.03 | 0.433 | 0.139 | 0.0722 | 0.359 | 0.279 |
| 23.90 | 0.538 | 0.142 | 0.0825 | 0.435 | 0.348 |
| 27.94 | 0.652 | 0.143 | 0.0913 | 0.509 | 0.432 |
| 31.93 | 0.768 | 0.142 | 0.0985 | 0.576 | 0.527 |
| 36.03 | 0.895 | 0.136 | 0.1047 | 0.644 | 0.636 |
| 39.98 | 0.984 | 0.131 | 0.1057 | 0.670 | 0.732 |
| 39.99 | 0.990 | 0.129 | 0.1061 | 0.675 | 0.735 |
| 43.97 | 1.069 | 0.122 | 0.1044 | 0.684 | 0.830 |
| 48.05 | 1.131 | 0.115 | 0.1004 | 0.671 | 0.918 |
| 56.07 | 1.232 | 0.096 | 0.0863 | 0.609 | 1.076 |
| 64.09 | 1.294 | 0.073 | 0.0677 | 0.500 | 1.196 |
| 72.03 | 1.333 | 0.053 | 0.0465 | 0.361 | 1.284 |
| 80.31 | 1.360 | 0.033 | 0.0240 | 0.197 | 1.346 |
| 88.08 | 1.373 | 0.012 | 0.0016 | 0.033 | 1.372 |
| 96.05 | 1.369 | -0.006 | -0.0205 | -0.138 | 1.362 |
| -0.23 | 0.150 | 0.122 | -0.0035 | 0.151 | 0.121 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.00 | 31 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.11 | -0.052 | 0.100 | -0.0092 | -0.045 | 0.103 |
| -0.16 | -0.001 | 0.130 | 0.0024 | 0. | 0.130 |
| 3.84 | 0.075 | 0.135 | 0.0174 | 0.066 | 0.140 |
| 7.90 | 0.156 | 0.140 | 0.0338 | 0.135 | 0.160 |
| 15.91 | 0.347 | 0.146 | 0.0610 | 0.293 | 0.235 |
| 20.07 | 0.463 | 0.148 | 0.0730 | 0.384 | 0.298 |
| 23.90 | 0.572 | 0.149 | 0.0832 | 0.463 | 0.368 |
| 28.00 | 0.688 | 0.148 | 0.0920 | 0.538 | 0.453 |
| 31.98 | 0.805 | 0.144 | 0.0990 | 0.606 | 0.549 |
| 36.04 | 0.910 | 0.140 | 0.1036 | 0.654 | 0.649 |
| 39.98 | 1.002 | 0.133 | 0.1052 | 0.683 | 0.746 |
| 44.04 | 1.085 | 0.123 | 0.1034 | 0.695 | 0.843 |
| 48.11 | 1.154 | 0.112 | 0.0991 | 0.687 | 0.934 |
| 52.02 | 1.213 | 0.101 | 0.0923 | 0.667 | 1.018 |
| 56.15 | 1.259 | 0.089 | 0.0842 | 0.628 | 1.095 |
| 64.08 | 1.320 | 0.067 | 0.0659 | 0.516 | 1.216 |
| 72.17 | 1.359 | 0.045 | 0.0436 | 0.373 | 1.307 |
| 80.16 | 1.382 | 0.025 | 0.0216 | 0.212 | 1.366 |
| 88.23 | 1.390 | 0.004 | -0.0014 | 0.039 | 1.390 |
| 96.33 | 1.390 | -0.013 | -0.0233 | -0.140 | 1.383 |
| -0.15 | 0.024 | 0.137 | -0.0029 | 0.025 | 0.137 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.50 | 36 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.20 | -0.054 | 0.096 | -0.0073 | -0.047 | 0.100 |
| -0.34 | 0.108 | 0.119 | -0.0145 | 0.109 | 0.119 |
| 3.79 | 0.189 | 0.135 | 0.0066 | 0.180 | 0.147 |
| 7.77 | 0.288 | 0.146 | 0.0291 | 0.265 | 0.184 |
| 15.78 | 0.467 | 0.158 | 0.0639 | 0.406 | 0.279 |
| 19.82 | 0.609 | 0.161 | 0.0792 | 0.518 | 0.358 |
| 23.81 | 0.685 | 0.166 | 0.1017 | 0.560 | 0.428 |
| 27.88 | 0.845 | 0.163 | 0.1049 | 0.671 | 0.539 |
| 31.74 | 0.967 | 0.161 | 0.1138 | 0.738 | 0.645 |
| 35.89 | 1.061 | 0.157 | 0.1204 | 0.768 | 0.749 |
| 39.99 | 1.164 | 0.149 | 0.1208 | 0.796 | 0.862 |
| 43.97 | 1.245 | 0.138 | 0.1192 | 0.800 | 0.964 |
| 47.92 | 1.311 | 0.129 | 0.1153 | 0.783 | 1.059 |
| 55.95 | 1.407 | 0.110 | 0.1032 | 0.697 | 1.227 |
| 64.02 | 1.522 | 0.085 | 0.0758 | 0.591 | 1.405 |
| 71.93 | 1.568 | 0.062 | 0.0531 | 0.427 | 1.510 |
| 79.99 | 1.597 | 0.040 | 0.0291 | 0.238 | 1.580 |
| 88.09 | 1.612 | 0.019 | 0.0046 | 0.034 | 1.612 |
| 95.85 | 1.611 | 0.001 | -0.0181 | -0.165 | 1.603 |
| -0.27 | 0.092 | 0.155 | -0.0049 | 0.093 | 0.155 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.50 | 35 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.20 | -0.087 | 0.155 | -0.0137 | -0.075 | 0.161 |
| -0.26 | 0.015 | 0.160 | 0.0058 | 0.015 | 0.160 |
| 3.67 | 0.120 | 0.163 | 0.0255 | 0.110 | 0.170 |
| 7.71 | 0.236 | 0.165 | 0.0426 | 0.211 | 0.195 |
| 15.84 | 0.462 | 0.169 | 0.0775 | 0.398 | 0.289 |
| 19.83 | 0.599 | 0.168 | 0.0917 | 0.507 | 0.362 |
| 23.80 | 0.703 | 0.168 | 0.1076 | 0.575 | 0.438 |
| 27.89 | 0.820 | 0.166 | 0.1175 | 0.647 | 0.530 |
| 31.85 | 0.940 | 0.162 | 0.1254 | 0.713 | 0.633 |
| 36.02 | 1.049 | 0.155 | 0.1302 | 0.757 | 0.742 |
| 39.87 | 1.138 | 0.147 | 0.1311 | 0.779 | 0.842 |
| 43.96 | 1.218 | 0.136 | 0.1285 | 0.782 | 0.943 |
| 47.91 | 1.283 | 0.125 | 0.1241 | 0.767 | 1.036 |
| 51.88 | 1.339 | 0.113 | 0.1173 | 0.737 | 1.123 |
| 56.06 | 1.382 | 0.101 | 0.1093 | 0.688 | 1.203 |
| 63.89 | 1.439 | 0.078 | 0.0912 | 0.563 | 1.327 |
| 72.06 | 1.471 | 0.057 | 0.0700 | 0.399 | 1.417 |
| 79.97 | 1.489 | 0.036 | 0.0482 | 0.223 | 1.472 |
| 88.06 | 1.494 | 0.017 | 0.0254 | 0.034 | 1.493 |
| 95.69 | 1.489 | -0.001 | 0.0030 | -0.146 | 1.481 |
| -0.26 | 0.045 | 0.162 | -0.0006 | 0.046 | 0.162 |

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 7.50 | 177 | 9X7 FT | 250 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.03 | -0.075 | 0.149 | -0.0141 | -0.065 | 0.154 |
| 0.01 | 0.024 | 0.149 | 0.0050 | 0.024 | 0.149 |
| 4.01 | 0.138 | 0.151 | 0.0236 | 0.127 | 0.160 |
| 12.06 | 0.367 | 0.155 | 0.0576 | 0.327 | 0.228 |
| 20.12 | 0.625 | 0.157 | 0.0871 | 0.533 | 0.363 |
| 28.08 | 0.883 | 0.152 | 0.1054 | 0.708 | 0.550 |
| 36.19 | 1.122 | 0.139 | 0.1136 | 0.823 | 0.774 |
| 44.24 | 1.287 | 0.116 | 0.1061 | 0.841 | 0.981 |
| 52.23 | 1.408 | 0.094 | 0.0915 | 0.788 | 1.171 |
| 60.25 | 1.490 | 0.072 | 0.0733 | 0.677 | 1.329 |
| 68.26 | 1.542 | 0.051 | 0.0534 | 0.524 | 1.451 |
| 76.31 | 1.575 | 0.032 | 0.0324 | 0.342 | 1.537 |
| 80.27 | 1.588 | 0.022 | 0.0215 | 0.247 | 1.569 |
| 84.22 | 1.594 | 0.012 | 0.0105 | 0.148 | 1.587 |
| 92.36 | 1.601 | -0.004 | -0.0110 | -0.062 | 1.600 |
| 96.35 | 1.600 | -0.013 | -0.0220 | -0.164 | 1.592 |
| 0.10 | 0.104 | 0.145 | -0.0047 | 0.104 | 0.145 |

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 7.50 | 178 | 9X7 FT | 450 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.096 | 0.153 | -0.0135 | -0.085 | 0.160 |
| 0.09 | 0.021 | 0.153 | 0.0057 | 0.020 | 0.153 |
| 4.03 | 0.133 | 0.153 | 0.0232 | 0.122 | 0.162 |
| 11.97 | 0.375 | 0.155 | 0.0572 | 0.335 | 0.231 |
| 20.09 | 0.639 | 0.158 | 0.0879 | 0.546 | 0.368 |
| 28.16 | 0.896 | 0.153 | 0.1064 | 0.718 | 0.557 |
| 36.17 | 1.128 | 0.139 | 0.1140 | 0.828 | 0.778 |
| 44.17 | 1.302 | 0.118 | 0.1068 | 0.852 | 0.992 |
| 52.16 | 1.430 | 0.094 | 0.0923 | 0.804 | 1.187 |
| 60.19 | 1.515 | 0.072 | 0.0739 | 0.691 | 1.350 |
| 68.24 | 1.567 | 0.051 | 0.0534 | 0.534 | 1.474 |
| 76.31 | 1.597 | 0.032 | 0.0323 | 0.347 | 1.559 |
| 80.28 | 1.607 | 0.022 | 0.0216 | 0.250 | 1.588 |
| 84.30 | 1.614 | 0.013 | 0.0106 | 0.147 | 1.607 |
| 92.28 | 1.617 | -0.004 | -0.0108 | -0.060 | 1.615 |
| 96.34 | 1.614 | -0.013 | -0.0218 | -0.165 | 1.606 |
| 0.02 | 0.032 | 0.151 | 0.0008 | 0.032 | 0.151 |

ELLIPSE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 9.50 | 179 | 9X7 FT | 460 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.86 | -0.099 | 0.152 | -0.0127 | -0.088 | 0.158 |
| 0.04 | 0.015 | 0.152 | 0.0046 | 0.015 | 0.152 |
| 4.15 | 0.137 | 0.152 | 0.0229 | 0.126 | 0.162 |
| 11.93 | 0.384 | 0.155 | 0.0553 | 0.344 | 0.231 |
| 20.09 | 0.667 | 0.156 | 0.0852 | 0.573 | 0.376 |
| 28.13 | 0.945 | 0.150 | 0.1045 | 0.763 | 0.578 |
| 36.20 | 1.179 | 0.135 | 0.1122 | 0.872 | 0.806 |
| 44.32 | 1.344 | 0.112 | 0.1029 | 0.883 | 1.019 |
| 52.19 | 1.456 | 0.089 | 0.0876 | 0.823 | 1.205 |
| 60.27 | 1.536 | 0.067 | 0.0692 | 0.703 | 1.368 |
| 68.34 | 1.586 | 0.047 | 0.0496 | 0.542 | 1.491 |
| 76.43 | 1.614 | 0.030 | 0.0297 | 0.350 | 1.576 |
| 84.23 | 1.629 | 0.013 | 0.0099 | 0.151 | 1.623 |
| 88.33 | 1.633 | 0.004 | -0.0006 | 0.043 | 1.633 |
| 92.42 | 1.633 | -0.004 | -0.0112 | -0.065 | 1.632 |
| 95.86 | 1.632 | -0.011 | -0.0197 | -0.155 | 1.624 |
| 0.10 | 0.039 | 0.150 | 0.0001 | 0.039 | 0.150 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 173 | 9X7 FT | 250 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.14 | -0.088 | 0.150 | -0.0137 | -0.077 | 0.156 |
| -0.31 | 0.018 | 0.150 | 0.0048 | 0.019 | 0.150 |
| 3.74 | 0.135 | 0.151 | 0.0234 | 0.124 | 0.160 |
| 11.68 | 0.381 | 0.154 | 0.0567 | 0.342 | 0.228 |
| 19.82 | 0.667 | 0.155 | 0.0854 | 0.575 | 0.372 |
| 27.73 | 0.946 | 0.150 | 0.1033 | 0.768 | 0.573 |
| 35.86 | 1.177 | 0.135 | 0.1103 | 0.875 | 0.798 |
| 43.87 | 1.338 | 0.111 | 0.1014 | 0.888 | 1.007 |
| 51.84 | 1.448 | 0.087 | 0.0858 | 0.826 | 1.192 |
| 59.85 | 1.521 | 0.067 | 0.0684 | 0.706 | 1.349 |
| 67.87 | 1.571 | 0.047 | 0.0493 | 0.548 | 1.473 |
| 75.85 | 1.601 | 0.029 | 0.0298 | 0.363 | 1.560 |
| 79.95 | 1.611 | 0.021 | 0.0198 | 0.261 | 1.590 |
| 83.87 | 1.619 | 0.012 | 0.0097 | 0.161 | 1.611 |
| 88.08 | 1.622 | 0.003 | -0.0005 | 0.051 | 1.621 |
| 91.95 | 1.624 | -0.005 | -0.0103 | -0.051 | 1.624 |
| 93.17 | 1.625 | -0.007 | -0.0132 | -0.083 | 1.623 |
| -0.25 | 0.107 | 0.144 | -0.0061 | 0.108 | 0.144 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 174 | 9X7 FT | 450 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.16 | -0.097 | 0.152 | -0.0127 | -0.085 | 0.159 |
| -0.17 | 0.020 | 0.152 | 0.0056 | 0.020 | 0.151 |
| 3.69 | 0.137 | 0.152 | 0.0229 | 0.127 | 0.161 |
| 11.81 | 0.392 | 0.155 | 0.0563 | 0.352 | 0.231 |
| 19.79 | 0.671 | 0.155 | 0.0848 | 0.579 | 0.374 |
| 27.88 | 0.961 | 0.149 | 0.1035 | 0.780 | 0.582 |
| 35.91 | 1.198 | 0.134 | 0.1111 | 0.891 | 0.811 |
| 43.85 | 1.356 | 0.111 | 0.1017 | 0.901 | 1.020 |
| 51.84 | 1.468 | 0.087 | 0.0858 | 0.838 | 1.208 |
| 67.90 | 1.593 | 0.046 | 0.0486 | 0.557 | 1.493 |
| 75.97 | 1.620 | 0.029 | 0.0292 | 0.365 | 1.579 |
| 79.85 | 1.630 | 0.020 | 0.0195 | 0.267 | 1.608 |
| 83.85 | 1.634 | 0.012 | 0.0097 | 0.163 | 1.626 |
| 87.84 | 1.638 | 0.004 | -0.0003 | 0.058 | 1.637 |
| 91.77 | 1.638 | -0.004 | -0.0103 | -0.047 | 1.637 |
| 94.96 | 1.637 | -0.010 | -0.0181 | -0.131 | 1.631 |
| 59.90 | 1.551 | 0.064 | 0.0680 | 0.722 | 1.374 |
| -0.25 | 0.038 | 0.150 | 0.0009 | 0.039 | 0.150 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 170 | 9X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.73 | -0.095 | 0.154 | -0.0125 | -0.085 | 0.160 |
| -0.26 | 0.007 | 0.154 | 0.0040 | 0.008 | 0.154 |
| 3.73 | 0.129 | 0.155 | 0.0213 | 0.118 | 0.163 |
| 11.79 | 0.386 | 0.157 | 0.0559 | 0.346 | 0.232 |
| 19.78 | 0.668 | 0.158 | 0.0849 | 0.575 | 0.375 |
| 27.77 | 0.969 | 0.152 | 0.1040 | 0.787 | 0.586 |
| 35.71 | 1.222 | 0.136 | 0.1123 | 0.913 | 0.824 |
| 43.82 | 1.400 | 0.110 | 0.1013 | 0.933 | 1.049 |
| 51.73 | 1.510 | 0.086 | 0.0842 | 0.868 | 1.239 |
| 59.74 | 1.582 | 0.064 | 0.0658 | 0.742 | 1.398 |
| 67.81 | 1.623 | 0.045 | 0.0470 | 0.571 | 1.519 |
| 75.83 | 1.648 | 0.029 | 0.0284 | 0.376 | 1.605 |
| 83.85 | 1.661 | 0.013 | 0.0096 | 0.165 | 1.654 |
| 87.93 | 1.663 | 0.005 | -0.0001 | 0.055 | 1.662 |
| 91.95 | 1.663 | -0.003 | -0.0098 | -0.053 | 1.662 |
| 93.63 | 1.663 | -0.006 | -0.0135 | -0.099 | 1.660 |
| -0.20 | 0.026 | 0.153 | 0.0009 | 0.026 | 0.153 |
| -0.21 | 0.019 | 0.154 | 0.0029 | 0.019 | 0.154 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.00 | 30 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.09 | -0.034 | 0.051 | -0.0042 | -0.030 | 0.053 |
| -0.15 | -0.017 | 0.059 | -0.0017 | -0.016 | 0.059 |
| 3.81 | 0.006 | 0.068 | 0.0043 | 0.001 | 0.068 |
| 7.84 | 0.043 | 0.079 | 0.0140 | 0.032 | 0.084 |
| 15.91 | 0.135 | 0.093 | 0.0350 | 0.104 | 0.126 |
| 19.93 | 0.214 | 0.102 | 0.0499 | 0.166 | 0.169 |
| 23.93 | 0.303 | 0.109 | 0.0633 | 0.233 | 0.223 |
| 27.95 | 0.400 | 0.115 | 0.0748 | 0.299 | 0.289 |
| 31.92 | 0.513 | 0.119 | 0.0845 | 0.373 | 0.372 |
| 36.14 | 0.616 | 0.120 | 0.0911 | 0.427 | 0.461 |
| 39.98 | 0.726 | 0.119 | 0.0953 | 0.480 | 0.558 |
| 43.98 | 0.828 | 0.116 | 0.0976 | 0.515 | 0.658 |
| 48.05 | 0.912 | 0.109 | 0.0962 | 0.529 | 0.752 |
| 52.05 | 0.984 | 0.101 | 0.0924 | 0.525 | 0.839 |
| 56.13 | 1.043 | 0.092 | 0.0863 | 0.505 | 0.918 |
| 60.12 | 1.089 | 0.083 | 0.0789 | 0.471 | 0.986 |
| 64.08 | 1.123 | 0.073 | 0.0702 | 0.425 | 1.042 |
| 68.07 | 1.151 | 0.062 | 0.0599 | 0.372 | 1.091 |
| 72.07 | 1.171 | 0.052 | 0.0489 | 0.311 | 1.131 |
| 76.10 | 1.186 | 0.042 | 0.0384 | 0.244 | 1.161 |
| 80.10 | 1.200 | 0.032 | 0.0270 | 0.174 | 1.187 |
| 84.09 | 1.208 | 0.023 | 0.0155 | 0.102 | 1.204 |
| 88.18 | 1.214 | 0.015 | 0.0053 | 0.024 | 1.214 |
| 92.14 | 1.215 | 0.006 | -0.0054 | -0.052 | 1.214 |
| 96.18 | 1.214 | -0.003 | -0.0168 | -0.127 | 1.207 |
| -0.15 | 0.304 | 0.075 | 0.0016 | 0.304 | 0.074 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.00 | 29 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.33 | -0.045 | 0.099 | -0.0094 | -0.037 | 0.102 |
| -0.10 | -0.008 | 0.110 | 0.0011 | -0.007 | 0.110 |
| 3.85 | 0.045 | 0.117 | 0.0144 | 0.037 | 0.120 |
| 7.96 | 0.104 | 0.122 | 0.0276 | 0.086 | 0.135 |
| 15.94 | 0.252 | 0.128 | 0.0529 | 0.207 | 0.192 |
| 19.93 | 0.338 | 0.130 | 0.0642 | 0.273 | 0.237 |
| 23.97 | 0.431 | 0.132 | 0.0747 | 0.341 | 0.296 |
| 27.97 | 0.527 | 0.133 | 0.0835 | 0.403 | 0.365 |
| 31.98 | 0.627 | 0.133 | 0.0906 | 0.461 | 0.445 |
| 36.09 | 0.728 | 0.131 | 0.0955 | 0.511 | 0.535 |
| 39.97 | 0.827 | 0.127 | 0.0986 | 0.552 | 0.629 |
| 44.04 | 0.921 | 0.121 | 0.0994 | 0.578 | 0.727 |
| 48.05 | 1.003 | 0.112 | 0.0970 | 0.587 | 0.820 |
| 51.95 | 1.073 | 0.102 | 0.0921 | 0.581 | 0.908 |
| 51.95 | 1.075 | 0.101 | 0.0918 | 0.583 | 0.909 |
| 56.15 | 1.130 | 0.091 | 0.0855 | 0.554 | 0.989 |
| 60.06 | 1.175 | 0.079 | 0.0767 | 0.518 | 1.057 |
| 64.10 | 1.208 | 0.068 | 0.0680 | 0.466 | 1.117 |
| 68.14 | 1.231 | 0.057 | 0.0577 | 0.406 | 1.163 |
| 72.14 | 1.250 | 0.044 | 0.0458 | 0.341 | 1.203 |
| 76.19 | 1.263 | 0.036 | 0.0354 | 0.267 | 1.235 |
| 80.11 | 1.274 | 0.025 | 0.0241 | 0.194 | 1.259 |
| 84.15 | 1.282 | 0.017 | 0.0132 | 0.114 | 1.277 |
| 88.22 | 1.287 | 0.007 | 0.0020 | 0.033 | 1.287 |
| 92.13 | 1.289 | -0.001 | -0.0088 | -0.047 | 1.288 |
| 96.17 | 1.287 | -0.010 | -0.0200 | -0.128 | 1.281 |
| -0.17 | 0.050 | 0.119 | -0.0054 | 0.050 | 0.119 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.50 | 34 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.32 | -0.040 | 0.084 | -0.0058 | -0.034 | 0.087 |
| -0.20 | -0.018 | 0.095 | -0.0005 | -0.018 | 0.095 |
| 3.77 | 0.024 | 0.104 | 0.0103 | 0.017 | 0.106 |
| 7.90 | 0.079 | 0.113 | 0.0241 | 0.063 | 0.123 |
| 15.80 | 0.194 | 0.125 | 0.0483 | 0.153 | 0.173 |
| 19.84 | 0.497 | 0.122 | 0.0325 | 0.426 | 0.284 |
| 23.80 | 0.612 | 0.129 | 0.0478 | 0.508 | 0.365 |
| 27.94 | 0.718 | 0.134 | 0.0611 | 0.572 | 0.455 |
| 31.82 | 0.670 | 0.148 | 0.1032 | 0.492 | 0.479 |
| 35.88 | 0.791 | 0.147 | 0.1091 | 0.554 | 0.583 |
| 39.86 | 0.913 | 0.145 | 0.1125 | 0.608 | 0.696 |
| 44.01 | 1.023 | 0.139 | 0.1135 | 0.639 | 0.811 |
| 47.98 | 1.114 | 0.132 | 0.1111 | 0.648 | 0.915 |
| 55.94 | 1.330 | 0.110 | 0.0861 | 0.654 | 1.163 |
| 63.87 | 1.347 | 0.096 | 0.0831 | 0.507 | 1.252 |
| 71.96 | 1.404 | 0.072 | 0.0594 | 0.367 | 1.357 |
| 79.96 | 1.434 | 0.054 | 0.0385 | 0.197 | 1.421 |
| 88.08 | 1.452 | 0.035 | 0.0155 | 0.013 | 1.452 |
| 96.18 | 1.453 | 0.014 | -0.0100 | -0.170 | 1.443 |
| -0.20 | 0.307 | 0.103 | 0.0054 | 0.307 | 0.102 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.50 | 33 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.19 | -0.064 | 0.132 | -0.0111 | -0.054 | 0.136 |
| -0.28 | 0.003 | 0.139 | 0.0047 | 0.004 | 0.139 |
| 3.67 | 0.077 | 0.142 | 0.0204 | 0.067 | 0.147 |
| 7.89 | 0.165 | 0.145 | 0.0368 | 0.143 | 0.167 |
| 15.85 | 0.345 | 0.150 | 0.0645 | 0.290 | 0.239 |
| 19.87 | 0.449 | 0.152 | 0.0780 | 0.371 | 0.295 |
| 23.81 | 0.559 | 0.153 | 0.0896 | 0.450 | 0.366 |
| 27.85 | 0.673 | 0.152 | 0.0988 | 0.524 | 0.449 |
| 31.91 | 0.795 | 0.150 | 0.1055 | 0.596 | 0.547 |
| 35.94 | 0.910 | 0.145 | 0.1094 | 0.652 | 0.652 |
| 39.85 | 1.016 | 0.139 | 0.1110 | 0.690 | 0.758 |
| 43.97 | 1.119 | 0.130 | 0.1096 | 0.715 | 0.870 |
| 47.92 | 1.204 | 0.119 | 0.1056 | 0.718 | 0.974 |
| 51.84 | 1.277 | 0.108 | 0.0992 | 0.704 | 1.071 |
| 55.95 | 1.337 | 0.095 | 0.0906 | 0.670 | 1.161 |
| 64.02 | 1.329 | 0.079 | 0.0886 | 0.511 | 1.229 |
| 71.96 | 1.362 | 0.056 | 0.0677 | 0.368 | 1.313 |
| 79.94 | 1.494 | 0.030 | 0.0261 | 0.231 | 1.476 |
| 88.07 | 1.508 | 0.011 | 0.0022 | 0.040 | 1.508 |
| 95.92 | 1.507 | -0.009 | -0.0216 | -0.146 | 1.500 |
| -0.28 | 0.047 | 0.140 | -0.0041 | 0.048 | 0.140 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 7.50 | 38 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.12 | 0.043 | 0.056 | -0.0139 | 0.046 | 0.053 |
| 0. | -0.187 | 0.084 | 0.0367 | -0.187 | 0.084 |
| 3.94 | -0.152 | 0.093 | 0.0442 | -0.158 | 0.082 |
| 8.00 | -0.087 | 0.104 | 0.0580 | -0.101 | 0.091 |
| 16.08 | 0.069 | 0.120 | 0.0856 | 0.033 | 0.134 |
| 20.04 | 0.389 | 0.118 | 0.0687 | 0.325 | 0.244 |
| 24.06 | 0.505 | 0.126 | 0.0858 | 0.410 | 0.321 |
| 28.23 | 0.589 | 0.132 | 0.1028 | 0.457 | 0.395 |
| 32.22 | 0.734 | 0.133 | 0.1074 | 0.550 | 0.504 |
| 36.22 | 0.712 | 0.142 | 0.1423 | 0.491 | 0.535 |
| 40.26 | 0.822 | 0.138 | 0.1447 | 0.538 | 0.637 |
| 44.25 | 0.919 | 0.132 | 0.1440 | 0.566 | 0.736 |
| 48.23 | 0.998 | 0.124 | 0.1406 | 0.572 | 0.827 |
| 52.34 | 1.149 | 0.110 | 0.1198 | 0.615 | 0.976 |
| 56.28 | 1.134 | 0.102 | 0.1252 | 0.544 | 1.000 |
| 60.33 | 1.182 | 0.092 | 0.1164 | 0.505 | 1.072 |
| 64.30 | 1.288 | 0.077 | 0.0941 | 0.490 | 1.194 |
| 68.43 | 1.248 | 0.071 | 0.0965 | 0.393 | 1.186 |
| 72.39 | 1.270 | 0.061 | 0.0861 | 0.326 | 1.229 |
| 76.42 | 1.286 | 0.051 | 0.0749 | 0.252 | 1.262 |
| 80.43 | 1.300 | 0.041 | 0.0638 | 0.176 | 1.289 |
| 84.48 | 1.308 | 0.032 | 0.0532 | 0.094 | 1.305 |
| 88.56 | 1.328 | 0.023 | 0.0399 | 0.011 | 1.328 |
| 92.64 | 1.317 | 0.015 | 0.0311 | -0.075 | 1.315 |
| 96.16 | 1.354 | 0.005 | 0.0141 | -0.150 | 1.346 |
| -0.09 | 0.182 | 0.092 | 0.0376 | 0.183 | 0.091 |
| 32.19 | 0.633 | 0.142 | 0.1147 | 0.460 | 0.457 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 7.50 | 37 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.02 | -0.075 | 0.141 | -0.0102 | -0.065 | 0.146 |
| 0. | 0.006 | 0.141 | 0.0049 | 0.006 | 0.141 |
| 3.92 | 0.096 | 0.141 | 0.0196 | 0.086 | 0.148 |
| 8.05 | 0.184 | 0.143 | 0.0344 | 0.162 | 0.167 |
| 16.10 | 0.378 | 0.147 | 0.0615 | 0.323 | 0.246 |
| 20.08 | 0.496 | 0.147 | 0.0753 | 0.416 | 0.309 |
| 24.06 | 0.617 | 0.148 | 0.0874 | 0.503 | 0.387 |
| 28.23 | 0.740 | 0.147 | 0.0968 | 0.582 | 0.480 |
| 32.21 | 0.861 | 0.143 | 0.1036 | 0.653 | 0.580 |
| 36.20 | 0.982 | 0.138 | 0.1073 | 0.711 | 0.691 |
| 40.17 | 1.086 | 0.131 | 0.1084 | 0.745 | 0.800 |
| 44.16 | 1.177 | 0.121 | 0.1061 | 0.760 | 0.906 |
| 48.28 | 1.257 | 0.110 | 0.1010 | 0.754 | 1.011 |
| 52.33 | 1.325 | 0.097 | 0.0933 | 0.732 | 1.108 |
| 56.25 | 1.378 | 0.086 | 0.0851 | 0.694 | 1.194 |
| 60.35 | 1.426 | 0.074 | 0.0751 | 0.641 | 1.276 |
| 64.32 | 1.461 | 0.064 | 0.0656 | 0.576 | 1.344 |
| 68.42 | 1.486 | 0.053 | 0.0553 | 0.497 | 1.402 |
| 72.43 | 1.504 | 0.043 | 0.0444 | 0.413 | 1.447 |
| 76.42 | 1.509 | 0.046 | 0.0359 | 0.309 | 1.478 |
| 80.49 | 1.526 | 0.027 | 0.0227 | 0.226 | 1.510 |
| 84.43 | 1.535 | 0.017 | 0.0123 | 0.132 | 1.529 |
| 88.58 | 1.540 | 0.007 | 0.0012 | 0.031 | 1.540 |
| 92.67 | 1.541 | -0.002 | -0.0096 | -0.069 | 1.539 |
| 96.20 | 1.412 | -0.001 | 0.0040 | -0.151 | 1.404 |
| -0.01 | 0.145 | 0.124 | -0.0085 | 0.145 | 0.124 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 9.50 | 40 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.09 | -0.033 | 0.054 | -0.0014 | -0.029 | 0.056 |
| 0.01 | -0.004 | 0.049 | 0.0043 | -0.004 | 0.049 |
| 3.87 | 0.037 | 0.066 | 0.0118 | 0.033 | 0.069 |
| 7.99 | -0.039 | 0.055 | -0.0217 | -0.046 | 0.049 |
| 16.02 | 0.259 | 0.100 | 0.0505 | 0.221 | 0.168 |
| 20.03 | 0.381 | 0.111 | 0.0662 | 0.320 | 0.234 |
| 24.04 | 0.525 | 0.119 | 0.0804 | 0.431 | 0.323 |
| 28.06 | 0.663 | 0.124 | 0.0910 | 0.527 | 0.422 |
| 32.02 | 0.805 | 0.127 | 0.0991 | 0.615 | 0.534 |
| 36.07 | 0.947 | 0.126 | 0.1047 | 0.691 | 0.659 |
| 40.04 | 1.054 | 0.122 | 0.1073 | 0.728 | 0.772 |
| 44.07 | 1.149 | 0.115 | 0.1060 | 0.745 | 0.882 |
| 48.14 | 1.228 | 0.106 | 0.1014 | 0.744 | 0.986 |
| 52.12 | 1.295 | 0.095 | 0.0940 | 0.720 | 1.080 |
| 56.11 | 1.348 | 0.085 | 0.0858 | 0.681 | 1.167 |
| 60.11 | 1.392 | 0.075 | 0.0771 | 0.629 | 1.245 |
| 64.10 | 1.428 | 0.063 | 0.0661 | 0.567 | 1.312 |
| 68.12 | 1.454 | 0.053 | 0.0562 | 0.493 | 1.369 |
| 72.10 | 1.473 | 0.044 | 0.0464 | 0.411 | 1.416 |
| 76.09 | 1.487 | 0.036 | 0.0372 | 0.322 | 1.452 |
| 80.08 | 1.499 | 0.025 | 0.0256 | 0.233 | 1.481 |
| 84.18 | 1.507 | 0.018 | 0.0164 | 0.135 | 1.501 |
| 88.15 | 1.513 | 0.009 | 0.0056 | 0.040 | 1.512 |
| 92.14 | 1.513 | 0.001 | -0.0045 | -0.058 | 1.512 |
| 96.05 | 1.512 | -0.006 | -0.0139 | -0.153 | 1.504 |
| -0.06 | 0.095 | 0.076 | -0.0457 | 0.095 | 0.075 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 9.50 | 39 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.10 | -0.049 | 0.139 | -0.0158 | -0.039 | 0.142 |
| 0.01 | -0.001 | 0.140 | 0.0045 | -0.001 | 0.140 |
| 3.94 | 0.095 | 0.141 | 0.0200 | 0.085 | 0.147 |
| 7.99 | 0.182 | 0.143 | 0.0339 | 0.160 | 0.166 |
| 16.05 | 0.385 | 0.145 | 0.0610 | 0.330 | 0.246 |
| 20.05 | 0.505 | 0.146 | 0.0736 | 0.425 | 0.310 |
| 24.00 | 0.636 | 0.146 | 0.0854 | 0.522 | 0.392 |
| 28.06 | 0.766 | 0.145 | 0.0942 | 0.608 | 0.488 |
| 31.97 | 0.893 | 0.141 | 0.1007 | 0.683 | 0.593 |
| 36.13 | 1.024 | 0.136 | 0.1051 | 0.747 | 0.714 |
| 40.11 | 1.130 | 0.128 | 0.1063 | 0.782 | 0.825 |
| 44.08 | 1.183 | 0.110 | 0.0915 | 0.774 | 0.902 |
| 48.07 | 1.292 | 0.106 | 0.0979 | 0.785 | 1.032 |
| 52.09 | 1.355 | 0.093 | 0.0896 | 0.759 | 1.126 |
| 56.10 | 1.405 | 0.081 | 0.0808 | 0.716 | 1.212 |
| 60.13 | 1.448 | 0.070 | 0.0713 | 0.660 | 1.290 |
| 64.11 | 1.481 | 0.060 | 0.0616 | 0.593 | 1.358 |
| 68.13 | 1.502 | 0.050 | 0.0516 | 0.514 | 1.414 |
| 72.13 | 1.521 | 0.039 | 0.0412 | 0.429 | 1.460 |
| 76.18 | 1.534 | 0.031 | 0.0313 | 0.337 | 1.497 |
| 80.14 | 1.544 | 0.022 | 0.0214 | 0.242 | 1.525 |
| 84.10 | 1.551 | 0.014 | 0.0117 | 0.145 | 1.545 |
| 88.22 | 1.555 | 0.006 | 0.0012 | 0.042 | 1.555 |
| 92.10 | 1.557 | -0.002 | -0.0089 | -0.055 | 1.556 |
| 96.03 | 1.554 | -0.010 | -0.0189 | -0.153 | 1.547 |
| -0.06 | 0.041 | 0.134 | -0.0048 | 0.041 | 0.134 |

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 42 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.02 | -0.028 | 0.055 | -0.0001 | -0.024 | 0.057 |
| 0.01 | -0.004 | 0.066 | 0.0027 | -0.004 | 0.066 |
| 3.99 | 0.033 | 0.077 | 0.0102 | 0.028 | 0.079 |
| 8.10 | 0.086 | 0.087 | 0.0213 | 0.073 | 0.098 |
| 16.12 | 0.213 | 0.100 | 0.0436 | 0.177 | 0.156 |
| 20.06 | 0.380 | 0.114 | 0.0660 | 0.318 | 0.237 |
| 24.03 | 0.545 | 0.120 | 0.0841 | 0.449 | 0.331 |
| 28.13 | 0.677 | 0.127 | 0.0917 | 0.537 | 0.432 |
| 32.16 | 0.793 | 0.129 | 0.0987 | 0.602 | 0.531 |
| 36.19 | 0.934 | 0.129 | 0.1046 | 0.678 | 0.655 |
| 40.16 | 1.070 | 0.123 | 0.1062 | 0.738 | 0.784 |
| 44.11 | 1.161 | 0.115 | 0.1046 | 0.754 | 0.891 |
| 48.13 | 1.237 | 0.105 | 0.1000 | 0.747 | 0.991 |
| 52.12 | 1.301 | 0.094 | 0.0925 | 0.724 | 1.085 |
| 56.09 | 1.349 | 0.086 | 0.0857 | 0.682 | 1.168 |
| 60.11 | 1.396 | 0.075 | 0.0764 | 0.630 | 1.248 |
| 64.07 | 1.428 | 0.065 | 0.0663 | 0.566 | 1.313 |
| 68.16 | 1.453 | 0.055 | 0.0563 | 0.489 | 1.369 |
| 72.26 | 1.474 | 0.043 | 0.0447 | 0.408 | 1.416 |
| 76.23 | 1.488 | 0.034 | 0.0355 | 0.321 | 1.453 |
| 80.13 | 1.501 | 0.025 | 0.0250 | 0.232 | 1.483 |
| 84.11 | 1.508 | 0.018 | 0.0159 | 0.137 | 1.502 |
| 88.23 | 1.513 | 0.011 | 0.0071 | 0.035 | 1.512 |
| 92.21 | 1.513 | 0.003 | -0.0035 | -0.062 | 1.512 |
| 95.86 | 1.513 | -0.004 | -0.0125 | -0.150 | 1.505 |
| 0.04 | 0.417 | 0.074 | 0.0041 | 0.417 | 0.074 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

ELLIPSE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 41 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.077 | 0.141 | -0.0106 | -0.067 | 0.146 |
| 0.11 | 0.004 | 0.140 | 0.0052 | 0.004 | 0.140 |
| 4.02 | 0.089 | 0.141 | 0.0195 | 0.079 | 0.147 |
| 8.05 | 0.179 | 0.142 | 0.0338 | 0.158 | 0.166 |
| 16.07 | 0.382 | 0.145 | 0.0607 | 0.327 | 0.245 |
| 20.15 | 0.503 | 0.146 | 0.0737 | 0.422 | 0.310 |
| 24.01 | 0.633 | 0.145 | 0.0851 | 0.519 | 0.391 |
| 28.16 | 0.768 | 0.144 | 0.0941 | 0.609 | 0.490 |
| 32.04 | 0.898 | 0.141 | 0.1002 | 0.686 | 0.596 |
| 36.14 | 1.032 | 0.135 | 0.1043 | 0.754 | 0.718 |
| 40.17 | 1.141 | 0.127 | 0.1055 | 0.790 | 0.833 |
| 44.12 | 1.231 | 0.115 | 0.1023 | 0.803 | 0.940 |
| 48.13 | 1.308 | 0.103 | 0.0960 | 0.795 | 1.044 |
| 52.34 | 1.371 | 0.090 | 0.0877 | 0.766 | 1.140 |
| 56.16 | 1.416 | 0.079 | 0.0794 | 0.723 | 1.220 |
| 60.14 | 1.457 | 0.068 | 0.0693 | 0.667 | 1.298 |
| 64.11 | 1.489 | 0.057 | 0.0601 | 0.599 | 1.365 |
| 68.19 | 1.511 | 0.048 | 0.0504 | 0.517 | 1.421 |
| 72.20 | 1.528 | 0.037 | 0.0399 | 0.431 | 1.467 |
| 76.14 | 1.540 | 0.030 | 0.0307 | 0.340 | 1.502 |
| 80.24 | 1.550 | 0.022 | 0.0207 | 0.241 | 1.531 |
| 84.10 | 1.556 | 0.014 | 0.0115 | 0.146 | 1.549 |
| 88.16 | 1.561 | 0.005 | 0.0012 | 0.045 | 1.560 |
| 92.15 | 1.561 | -0.002 | -0.0086 | -0.057 | 1.560 |
| 95.94 | 1.559 | -0.009 | -0.0175 | -0.152 | 1.551 |
| 0.01 | 0.093 | 0.130 | -0.0057 | 0.083 | 0.130 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 44 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.040 | 0.069 | -0.0012 | -0.035 | 0.072 |
| -0.09 | 0.001 | 0.066 | 0.0040 | 0.001 | 0.066 |
| 3.97 | 0.048 | 0.078 | 0.0130 | 0.043 | 0.082 |
| 7.94 | 0.115 | 0.095 | 0.0267 | 0.101 | 0.110 |
| 15.94 | 0.262 | 0.114 | 0.0522 | 0.221 | 0.181 |
| 19.98 | 0.400 | 0.125 | 0.0700 | 0.333 | 0.254 |
| 23.98 | 0.531 | 0.134 | 0.0836 | 0.431 | 0.338 |
| 28.15 | 0.674 | 0.139 | 0.0953 | 0.529 | 0.441 |
| 32.03 | 0.855 | 0.142 | 0.1037 | 0.649 | 0.574 |
| 36.04 | 1.002 | 0.141 | 0.1105 | 0.727 | 0.704 |
| 40.10 | 1.117 | 0.138 | 0.1126 | 0.766 | 0.825 |
| 44.06 | 1.217 | 0.130 | 0.1103 | 0.784 | 0.939 |
| 52.08 | 1.359 | 0.111 | 0.0972 | 0.748 | 1.140 |
| 60.08 | 1.448 | 0.092 | 0.0799 | 0.643 | 1.301 |
| 68.33 | 1.504 | 0.072 | 0.0596 | 0.488 | 1.424 |
| 76.14 | 1.531 | 0.053 | 0.0388 | 0.315 | 1.499 |
| 84.15 | 1.544 | 0.040 | 0.0231 | 0.118 | 1.540 |
| 92.15 | 1.549 | 0.025 | 0.0053 | -0.083 | 1.547 |
| -0.20 | 0.410 | 0.097 | 0.0096 | 0.410 | 0.095 |

ELLIPSE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 43 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.10 | -0.075 | 0.151 | -0.0102 | -0.064 | 0.156 |
| -0.03 | -0.002 | 0.151 | 0.0044 | -0.002 | 0.151 |
| 3.97 | 0.086 | 0.151 | 0.0201 | 0.075 | 0.157 |
| 7.94 | 0.176 | 0.153 | 0.0346 | 0.154 | 0.176 |
| 16.03 | 0.386 | 0.156 | 0.0627 | 0.328 | 0.257 |
| 19.97 | 0.509 | 0.156 | 0.0759 | 0.425 | 0.321 |
| 23.96 | 0.640 | 0.157 | 0.0875 | 0.521 | 0.403 |
| 28.04 | 0.777 | 0.155 | 0.0969 | 0.612 | 0.502 |
| 32.10 | 0.915 | 0.152 | 0.1033 | 0.694 | 0.615 |
| 36.04 | 1.051 | 0.145 | 0.1072 | 0.765 | 0.736 |
| 40.05 | 1.167 | 0.136 | 0.1082 | 0.805 | 0.855 |
| 44.03 | 1.263 | 0.123 | 0.1042 | 0.823 | 0.967 |
| 48.23 | 1.344 | 0.110 | 0.0970 | 0.813 | 1.076 |
| 52.10 | 1.406 | 0.095 | 0.0876 | 0.789 | 1.168 |
| 56.26 | 1.456 | 0.083 | 0.0782 | 0.739 | 1.257 |
| 60.09 | 1.495 | 0.071 | 0.0678 | 0.684 | 1.331 |
| 64.09 | 1.525 | 0.059 | 0.0573 | 0.613 | 1.398 |
| 68.14 | 1.546 | 0.048 | 0.0467 | 0.532 | 1.452 |
| 75.16 | 1.570 | 0.031 | 0.0266 | 0.345 | 1.532 |
| 84.12 | 1.585 | 0.015 | 0.0092 | 0.146 | 1.578 |
| 92.09 | 1.587 | 0.002 | -0.0082 | -0.059 | 1.586 |
| -0.09 | 0.062 | 0.142 | -0.0043 | 0.062 | 0.142 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 6.00 | 14 | 12 FT | 500 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.44 | -0.117 | 0.023 | -0.0132 | -0.116 | 0.030 |
| -0.15 | -0.009 | 0.028 | 0.0026 | -0.009 | 0.028 |
| 3.87 | 0.089 | 0.023 | 0.0188 | 0.088 | 0.029 |
| 7.86 | 0.250 | 0.041 | 0.0170 | 0.242 | 0.075 |
| 11.89 | 0.427 | 0.064 | 0.0098 | 0.405 | 0.151 |
| 16.12 | 0.635 | 0.068 | 0.0463 | 0.591 | 0.241 |
| 20.22 | 0.555 | 0.056 | 0.0852 | 0.502 | 0.244 |
| 24.14 | 0.516 | 0.072 | 0.0879 | 0.441 | 0.276 |
| 28.12 | 0.546 | 0.076 | 0.0911 | 0.446 | 0.325 |
| 32.01 | 0.521 | 0.077 | 0.0907 | 0.401 | 0.342 |
| 35.92 | 0.549 | 0.076 | 0.0916 | 0.401 | 0.384 |
| 39.98 | 0.591 | 0.072 | 0.0904 | 0.406 | 0.435 |
| 44.20 | 0.619 | 0.068 | 0.0879 | 0.397 | 0.480 |
| 48.22 | 0.655 | 0.063 | 0.0838 | 0.389 | 0.530 |
| 52.06 | 0.691 | 0.058 | 0.0794 | 0.379 | 0.581 |
| 60.08 | 0.760 | 0.048 | 0.0673 | 0.338 | 0.683 |
| 68.22 | 0.804 | 0.037 | 0.0512 | 0.264 | 0.760 |
| 76.14 | 0.845 | 0.025 | 0.0341 | 0.178 | 0.826 |
| 83.97 | 0.861 | 0.012 | 0.0161 | 0.078 | 0.858 |
| 92.25 | 0.872 | -0.001 | -0.0041 | -0.034 | 0.871 |
| 94.29 | 0.864 | -0.004 | -0.0085 | -0.061 | 0.861 |
| -0.03 | 0. | 0.028 | 0.0037 | 0. | 0.028 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 6.00 | 15 | 12 FT | 1400 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.60 | -0.138 | 0.020 | -0.0114 | -0.137 | 0.029 |
| 0.10 | 0.008 | 0.018 | 0.0051 | 0.008 | 0.018 |
| 3.89 | 0.126 | 0.018 | 0.0198 | 0.124 | 0.026 |
| 7.86 | 0.292 | 0.038 | 0.0153 | 0.284 | 0.078 |
| 12.04 | 0.455 | 0.060 | 0.0110 | 0.433 | 0.153 |
| 15.89 | 0.667 | 0.058 | 0.0609 | 0.626 | 0.239 |
| 20.20 | 0.613 | 0.052 | 0.0816 | 0.557 | 0.261 |
| 23.96 | 0.555 | 0.066 | 0.0883 | 0.480 | 0.286 |
| 28.12 | 0.604 | 0.070 | 0.0964 | 0.500 | 0.346 |
| 32.00 | 0.589 | 0.072 | 0.0963 | 0.461 | 0.373 |
| 35.96 | 0.577 | 0.073 | 0.0905 | 0.424 | 0.398 |
| 40.09 | 0.620 | 0.070 | 0.0903 | 0.429 | 0.453 |
| 44.20 | 0.642 | 0.065 | 0.0864 | 0.414 | 0.494 |
| 48.09 | 0.669 | 0.062 | 0.0833 | 0.401 | 0.539 |
| 52.17 | 0.701 | 0.058 | 0.0780 | 0.384 | 0.589 |
| 60.12 | 0.770 | 0.049 | 0.0667 | 0.342 | 0.692 |
| 68.15 | 0.819 | 0.038 | 0.0515 | 0.270 | 0.775 |
| 76.25 | 0.854 | 0.026 | 0.0341 | 0.177 | 0.836 |
| 84.20 | 0.871 | 0.014 | 0.0150 | 0.074 | 0.868 |
| 92.35 | 0.881 | 0.001 | -0.0039 | -0.037 | 0.881 |
| 94.05 | 0.869 | -0.002 | -0.0076 | -0.059 | 0.867 |
| -0.05 | 0.007 | 0.019 | 0.0033 | 0.007 | 0.019 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 6.50 | 17 | 12 FT | 490 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.44 | -0.121 | 0.006 | -0.0511 | -0.121 | 0.013 |
| -0.05 | 0.001 | 0.010 | -0.0058 | 0.001 | 0.010 |
| 3.85 | 0.103 | 0.002 | 0.0332 | 0.103 | 0.009 |
| 7.97 | 0.274 | -0.003 | 0.0780 | 0.272 | 0.035 |
| 11.96 | 0.483 | -0.028 | 0.1439 | 0.478 | 0.073 |
| 16.95 | 0.607 | -0.002 | 0.1235 | 0.581 | 0.175 |
| 20.04 | 0.669 | 0.033 | 0.1012 | 0.617 | 0.260 |
| 23.89 | 0.620 | 0.060 | 0.0951 | 0.542 | 0.306 |
| 27.99 | 0.645 | 0.068 | 0.0964 | 0.538 | 0.363 |
| 31.95 | 0.685 | 0.066 | 0.1003 | 0.546 | 0.418 |
| 35.99 | 0.685 | 0.068 | 0.0965 | 0.515 | 0.457 |
| 40.05 | 0.736 | 0.065 | 0.0927 | 0.522 | 0.523 |
| 44.01 | 0.775 | 0.061 | 0.0890 | 0.515 | 0.582 |
| 48.20 | 0.834 | 0.056 | 0.0842 | 0.514 | 0.659 |
| 52.05 | 0.873 | 0.050 | 0.0794 | 0.497 | 0.719 |
| 60.21 | 0.955 | 0.037 | 0.0637 | 0.442 | 0.847 |
| 68.20 | 1.028 | 0.023 | 0.0460 | 0.360 | 0.963 |
| 76.20 | 1.090 | 0.009 | 0.0241 | 0.251 | 1.060 |
| 84.21 | 1.102 | -0.004 | 0.0056 | 0.115 | 1.096 |
| 92.06 | 1.127 | -0.021 | -0.0219 | -0.019 | 1.127 |
| 94.13 | 1.111 | -0.025 | -0.0276 | -0.055 | 1.110 |
| -0.07 | -0.043 | 0.009 | -0.0178 | -0.043 | 0.010 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 6.50 | 16 | 12 FT | 1400 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.36 | -0.143 | 0.008 | -0.0431 | -0.143 | 0.016 |
| -0.04 | -0.002 | 0.008 | -0.0001 | -0.002 | 0.008 |
| 3.75 | 0.120 | 0.009 | 0.0424 | 0.119 | 0.017 |
| 7.86 | 0.295 | 0.009 | 0.0855 | 0.291 | 0.049 |
| 11.95 | 0.472 | 0. | 0.1424 | 0.462 | 0.098 |
| 15.88 | 0.603 | 0.009 | 0.1510 | 0.578 | 0.173 |
| 20.04 | 0.692 | 0.051 | 0.1196 | 0.633 | 0.285 |
| 24.02 | 0.654 | 0.076 | 0.1139 | 0.566 | 0.336 |
| 27.97 | 0.742 | 0.082 | 0.1159 | 0.617 | 0.420 |
| 30.15 | 0.778 | 0.083 | 0.1221 | 0.631 | 0.462 |
| 32.02 | 0.750 | 0.084 | 0.1164 | 0.591 | 0.468 |
| 36.13 | 0.725 | 0.083 | 0.1107 | 0.537 | 0.495 |
| 40.05 | 0.768 | 0.081 | 0.1074 | 0.536 | 0.556 |
| 44.08 | 0.803 | 0.078 | 0.1030 | 0.523 | 0.615 |
| 48.25 | 0.856 | 0.073 | 0.0968 | 0.516 | 0.687 |
| 52.15 | 0.886 | 0.067 | 0.0921 | 0.491 | 0.741 |
| 60.26 | 0.979 | 0.056 | 0.0774 | 0.437 | 0.878 |
| 68.12 | 1.047 | 0.043 | 0.0588 | 0.350 | 0.987 |
| 76.15 | 1.101 | 0.029 | 0.0375 | 0.235 | 1.076 |
| 84.09 | 1.113 | 0.014 | 0.0142 | 0.101 | 1.108 |
| 92.22 | 1.133 | -0.002 | -0.0082 | -0.042 | 1.132 |
| 94.10 | 1.128 | -0.006 | -0.0152 | -0.075 | 1.125 |
| -0.08 | -0.028 | 0.007 | -0.0115 | -0.028 | 0.007 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 7.50 | 19 | 12 FT | 490 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.53 | -0.149 | 0.015 | -0.0571 | -0.148 | 0.024 |
| -0.04 | 0.003 | 0.024 | 0.0019 | 0.003 | 0.024 |
| 3.90 | 0.134 | 0.018 | 0.0534 | 0.133 | 0.027 |
| 7.85 | 0.372 | 0.006 | 0.1264 | 0.368 | 0.057 |
| 11.88 | 0.545 | -0.007 | 0.1805 | 0.535 | 0.105 |
| 15.88 | 0.637 | 0.046 | 0.1276 | 0.601 | 0.218 |
| 19.98 | 0.724 | 0.071 | 0.1217 | 0.656 | 0.315 |
| 23.90 | 0.661 | 0.090 | 0.1186 | 0.568 | 0.350 |
| 28.09 | 0.756 | 0.094 | 0.1268 | 0.623 | 0.439 |
| 31.96 | 0.760 | 0.102 | 0.1143 | 0.591 | 0.488 |
| 35.99 | 0.752 | 0.093 | 0.1174 | 0.554 | 0.517 |
| 40.05 | 0.815 | 0.090 | 0.1144 | 0.566 | 0.593 |
| 44.09 | 0.861 | 0.086 | 0.1089 | 0.558 | 0.661 |
| 48.20 | 0.756 | 0.055 | 0.0350 | 0.462 | 0.600 |
| 52.08 | 0.819 | 0.053 | 0.0356 | 0.462 | 0.678 |
| 60.15 | 1.030 | 0.060 | 0.0795 | 0.460 | 0.923 |
| 68.15 | 1.096 | 0.044 | 0.0598 | 0.367 | 1.033 |
| 76.08 | 1.152 | 0.030 | 0.0391 | 0.248 | 1.125 |
| 84.18 | 1.166 | 0.015 | 0.0153 | 0.104 | 1.162 |
| 92.15 | 1.182 | -0.001 | -0.0104 | -0.043 | 1.182 |
| 94.16 | 1.181 | -0.006 | -0.0164 | -0.080 | 1.179 |
| -0.22 | -0.053 | 0.022 | -0.0131 | -0.053 | 0.022 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 7.50 | 18 | 12 FT | 1410 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.58 | -0.191 | 0.006 | -0.0567 | -0.190 | 0.018 |
| -0.06 | -0.002 | 0.007 | -0.0001 | -0.002 | 0.007 |
| 3.87 | 0.026 | -0.014 | -0.0109 | 0.027 | -0.012 |
| 8.04 | 0.397 | -0.002 | 0.1244 | 0.393 | 0.053 |
| 11.99 | 0.549 | -0.012 | 0.1754 | 0.540 | 0.102 |
| 15.89 | 0.657 | 0.030 | 0.1369 | 0.624 | 0.209 |
| 19.97 | 0.757 | 0.064 | 0.1248 | 0.690 | 0.319 |
| 23.95 | 0.692 | 0.085 | 0.1198 | 0.598 | 0.358 |
| 28.11 | 0.798 | 0.087 | 0.1300 | 0.663 | 0.453 |
| 32.08 | 0.857 | 0.089 | 0.1328 | 0.679 | 0.530 |
| 36.14 | 0.794 | 0.088 | 0.1195 | 0.589 | 0.539 |
| 40.11 | 0.830 | 0.085 | 0.1165 | 0.580 | 0.600 |
| 43.97 | 0.879 | 0.082 | 0.1118 | 0.576 | 0.669 |
| 48.21 | 0.925 | 0.077 | 0.1052 | 0.559 | 0.741 |
| 52.12 | 0.970 | 0.072 | 0.0990 | 0.539 | 0.810 |
| 60.16 | 1.048 | 0.060 | 0.0810 | 0.469 | 0.939 |
| 68.16 | 1.112 | 0.045 | 0.0616 | 0.372 | 1.049 |
| 76.10 | 1.152 | 0.029 | 0.0395 | 0.249 | 1.126 |
| 84.17 | 1.192 | 0.014 | 0.0148 | 0.107 | 1.187 |
| 92.16 | 1.193 | -0.002 | -0.0100 | -0.043 | 1.192 |
| 94.15 | 1.201 | -0.007 | -0.0148 | -0.080 | 1.198 |
| -0.08 | -0.034 | 0.006 | -0.0130 | -0.034 | 0.006 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 9.50 | 21 | 12 FT | 490 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.58 | -0.195 | 0.013 | -0.0700 | -0.193 | 0.025 |
| -0.04 | 0.014 | 0.025 | 0.0038 | 0.014 | 0.025 |
| 3.81 | 0.170 | 0.018 | 0.0608 | 0.168 | 0.029 |
| 8.05 | 0.448 | -0.001 | 0.1496 | 0.444 | 0.061 |
| 12.04 | 0.589 | -0.004 | 0.1791 | 0.577 | 0.119 |
| 15.95 | 0.541 | 0.064 | 0.1206 | 0.503 | 0.210 |
| 20.04 | 0.537 | 0.088 | 0.1136 | 0.474 | 0.267 |
| 23.92 | 0.609 | 0.092 | 0.1221 | 0.520 | 0.332 |
| 28.08 | 0.752 | 0.097 | 0.1291 | 0.618 | 0.440 |
| 31.96 | 0.830 | 0.097 | 0.1314 | 0.653 | 0.522 |
| 35.99 | 0.775 | 0.091 | 0.1226 | 0.574 | 0.529 |
| 40.11 | 0.834 | 0.088 | 0.1185 | 0.581 | 0.605 |
| 44.02 | 0.873 | 0.085 | 0.1113 | 0.569 | 0.668 |
| 48.12 | 0.933 | 0.079 | 0.1062 | 0.564 | 0.748 |
| 52.09 | 0.985 | 0.074 | 0.0998 | 0.547 | 0.823 |
| 60.16 | 1.061 | 0.060 | 0.0811 | 0.476 | 0.950 |
| 68.12 | 1.126 | 0.045 | 0.0598 | 0.377 | 1.062 |
| 76.11 | 1.175 | 0.031 | 0.0370 | 0.252 | 1.148 |
| 84.15 | 1.207 | 0.016 | 0.0155 | 0.107 | 1.202 |
| 92.22 | 1.218 | -0.002 | -0.0113 | -0.045 | 1.217 |
| 94.08 | 1.203 | -0.006 | -0.0160 | -0.080 | 1.201 |
| -0.04 | -0.056 | 0.023 | -0.0135 | -0.056 | 0.023 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 9.50 | 20 | 12 FT | 1410 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.71 | -0.281 | -0.001 | -0.0824 | -0.280 | 0.018 |
| -0.04 | 0.003 | 0.007 | 0.0021 | 0.003 | 0.007 |
| 3.81 | 0.203 | 0.008 | 0.0595 | 0.202 | 0.021 |
| 8.05 | 0.529 | -0.016 | 0.1622 | 0.526 | 0.058 |
| 11.95 | 0.633 | -0.026 | 0.2043 | 0.625 | 0.105 |
| 15.99 | 0.607 | 0.048 | 0.1322 | 0.571 | 0.214 |
| 19.99 | 0.606 | 0.081 | 0.1163 | 0.542 | 0.283 |
| 24.08 | 0.632 | 0.086 | 0.1257 | 0.542 | 0.336 |
| 28.02 | 0.782 | 0.092 | 0.1301 | 0.647 | 0.449 |
| 32.09 | 0.896 | 0.091 | 0.1361 | 0.711 | 0.553 |
| 36.06 | 0.797 | 0.084 | 0.1262 | 0.595 | 0.537 |
| 40.23 | 0.846 | 0.083 | 0.1197 | 0.592 | 0.610 |
| 44.09 | 0.901 | 0.081 | 0.1143 | 0.591 | 0.685 |
| 48.18 | 0.952 | 0.077 | 0.1083 | 0.577 | 0.761 |
| 52.14 | 0.993 | 0.071 | 0.1013 | 0.554 | 0.828 |
| 60.28 | 1.080 | 0.059 | 0.0831 | 0.484 | 0.967 |
| 68.14 | 1.138 | 0.046 | 0.0621 | 0.381 | 1.073 |
| 76.11 | 1.180 | 0.031 | 0.0378 | 0.253 | 1.153 |
| 84.11 | 1.214 | 0.014 | 0.0144 | 0.110 | 1.209 |
| 92.12 | 1.207 | -0.003 | -0.0106 | -0.042 | 1.207 |
| 94.01 | 1.215 | -0.007 | -0.0152 | -0.078 | 1.213 |
| -0.07 | 0.001 | 0.007 | 0.0006 | 0.001 | 0.007 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 23 | 12 FT | 480 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.48 | -0.205 | 0.013 | -0.0700 | -0.203 | 0.025 |
| -0.05 | 0.015 | 0.024 | 0.0026 | 0.015 | 0.024 |
| 3.82 | 0.197 | 0.016 | 0.0670 | 0.195 | 0.030 |
| 8.10 | 0.536 | -0.012 | 0.1743 | 0.532 | 0.063 |
| 11.95 | 0.612 | 0.001 | 0.1789 | 0.598 | 0.128 |
| 15.96 | 0.440 | 0.076 | 0.1101 | 0.402 | 0.194 |
| 20.15 | 0.506 | 0.088 | 0.1183 | 0.444 | 0.257 |
| 24.20 | 0.590 | 0.091 | 0.1254 | 0.501 | 0.325 |
| 28.15 | 0.730 | 0.097 | 0.1329 | 0.598 | 0.430 |
| 32.25 | 0.845 | 0.098 | 0.1341 | 0.662 | 0.533 |
| 36.28 | 0.830 | 0.091 | 0.1257 | 0.615 | 0.564 |
| 40.29 | 0.805 | 0.087 | 0.1200 | 0.558 | 0.587 |
| 44.29 | 0.854 | 0.083 | 0.1157 | 0.554 | 0.656 |
| 48.44 | 0.914 | 0.078 | 0.1088 | 0.548 | 0.735 |
| 52.34 | 0.952 | 0.072 | 0.1009 | 0.525 | 0.798 |
| 60.51 | 1.053 | 0.060 | 0.0840 | 0.466 | 0.946 |
| 68.72 | 1.125 | 0.046 | 0.0646 | 0.366 | 1.065 |
| 76.45 | 1.172 | 0.031 | 0.0428 | 0.245 | 1.147 |
| 84.55 | 1.199 | 0.015 | 0.0189 | 0.099 | 1.195 |
| 92.55 | 1.210 | -0.001 | -0.0044 | -0.053 | 1.209 |
| 94.65 | 1.212 | -0.005 | -0.0101 | -0.093 | 1.209 |
| -0.07 | 0.010 | 0.024 | 0.0019 | 0.010 | 0.024 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 22 | 12 FT | 1400 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.26 | -0.234 | 0.004 | -0.0637 | -0.233 | 0.018 |
| 0.05 | 0.013 | 0.007 | 0.0050 | 0.013 | 0.007 |
| 4.02 | 0.269 | 0.004 | 0.0764 | 0.268 | 0.022 |
| 8.06 | 0.568 | -0.020 | 0.1773 | 0.565 | 0.059 |
| 12.01 | 0.604 | -0.006 | 0.1787 | 0.592 | 0.120 |
| 16.09 | 0.468 | 0.070 | 0.1096 | 0.430 | 0.197 |
| 20.00 | 0.521 | 0.079 | 0.1186 | 0.462 | 0.253 |
| 24.08 | 0.620 | 0.086 | 0.1265 | 0.531 | 0.332 |
| 28.24 | 0.757 | 0.090 | 0.1361 | 0.625 | 0.438 |
| 32.19 | 0.882 | 0.093 | 0.1384 | 0.697 | 0.548 |
| 36.28 | 0.859 | 0.096 | 0.1251 | 0.636 | 0.586 |
| 40.29 | 0.823 | 0.082 | 0.1206 | 0.575 | 0.595 |
| 44.29 | 0.884 | 0.080 | 0.1161 | 0.577 | 0.675 |
| 48.35 | 0.925 | 0.075 | 0.1102 | 0.559 | 0.741 |
| 52.27 | 0.972 | 0.070 | 0.1045 | 0.540 | 0.812 |
| 60.38 | 1.060 | 0.059 | 0.0869 | 0.473 | 0.951 |
| 68.55 | 1.127 | 0.046 | 0.0661 | 0.369 | 1.066 |
| 76.52 | 1.174 | 0.032 | 0.0430 | 0.242 | 1.149 |
| 84.53 | 1.202 | 0.016 | 0.0198 | 0.099 | 1.198 |
| 92.69 | 1.215 | -0.002 | -0.0033 | -0.055 | 1.214 |
| 94.59 | 1.211 | -0.006 | -0.0095 | -0.091 | 1.207 |
| -0.09 | 0.004 | 0.006 | 0.0013 | 0.004 | 0.006 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 24 | 12 FT | 490 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.43 | -0.234 | 0.010 | -0.0790 | -0.233 | 0.024 |
| -0.07 | 0.005 | 0.024 | -0.0003 | 0.005 | 0.024 |
| 3.83 | 0.188 | 0.017 | 0.0643 | 0.186 | 0.030 |
| 8.03 | 0.558 | -0.016 | 0.1783 | 0.555 | 0.062 |
| 12.02 | 0.644 | 0. | 0.1796 | 0.629 | 0.134 |
| 16.01 | 0.558 | 0.081 | 0.1118 | 0.514 | 0.232 |
| 20.14 | 0.677 | 0.092 | 0.1244 | 0.604 | 0.319 |
| 24.20 | 0.746 | 0.096 | 0.1339 | 0.641 | 0.394 |
| 28.21 | 0.926 | 0.102 | 0.1422 | 0.767 | 0.527 |
| 32.32 | 1.101 | 0.106 | 0.1486 | 0.874 | 0.679 |
| 36.23 | 1.234 | 0.109 | 0.1460 | 0.932 | 0.817 |
| 40.22 | 1.346 | 0.106 | 0.1431 | 0.959 | 0.950 |
| 44.24 | 0.837 | 0.081 | 0.1125 | 0.543 | 0.642 |
| 48.51 | 0.891 | 0.076 | 0.1064 | 0.533 | 0.717 |
| 52.32 | 0.926 | 0.070 | 0.0990 | 0.511 | 0.776 |
| 60.45 | 1.032 | 0.058 | 0.0833 | 0.458 | 0.927 |
| 68.52 | 1.111 | 0.045 | 0.0634 | 0.365 | 1.050 |
| 76.52 | 1.162 | 0.031 | 0.0411 | 0.240 | 1.137 |
| 84.65 | 1.205 | 0.015 | 0.0195 | 0.097 | 1.201 |
| 92.58 | 1.209 | 0. | -0.0054 | -0.054 | 1.208 |
| 94.57 | 1.203 | -0.004 | -0.0105 | -0.092 | 1.200 |
| -0.14 | 0.005 | 0.024 | -0.0005 | 0.005 | 0.024 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.20 | 11.50 | 25 | 12 FT | 1410 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.34 | -0.294 | -0.002 | -0.0835 | -0.294 | 0.015 |
| 0.08 | 0.009 | 0.006 | 0.0031 | 0.009 | 0.006 |
| 3.82 | 0.256 | 0.005 | 0.0716 | 0.255 | 0.022 |
| 8.08 | 0.589 | -0.025 | 0.1815 | 0.587 | 0.058 |
| 12.11 | 0.642 | -0.005 | 0.1813 | 0.628 | 0.129 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.40 | 9.50 | 66 | 12 FT | 470 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.00 | 0.048 | 0.066 | -0.0257 | 0.053 | 0.062 |
| -3.15 | 0.119 | 0.069 | -0.0162 | 0.123 | 0.063 |
| -2.01 | 0.038 | 0.070 | -0.0122 | 0.041 | 0.069 |
| -1.05 | -0.370 | 0.070 | -0.0452 | -0.369 | 0.077 |
| -0.07 | -0.368 | 0.072 | -0.0363 | -0.368 | 0.072 |
| 0.97 | -0.330 | 0.072 | -0.0265 | -0.331 | 0.066 |
| 1.85 | -0.298 | 0.075 | -0.0118 | -0.300 | 0.066 |
| 2.85 | -0.110 | 0.074 | -0.0029 | -0.113 | 0.068 |
| 3.82 | -0.135 | 0.070 | 0.0156 | -0.140 | 0.061 |
| 4.82 | -0.052 | 0.068 | 0.0310 | -0.057 | 0.063 |
| 5.99 | 0.227 | 0.045 | 0.0842 | 0.221 | 0.059 |
| 6.92 | 0.342 | 0.024 | 0.1245 | 0.336 | 0.065 |
| 8.11 | 0.441 | 0.004 | 0.1578 | 0.436 | 0.066 |
| 12.15 | 0.536 | 0.012 | 0.1673 | 0.522 | 0.125 |
| 15.99 | 0.486 | 0.071 | 0.1211 | 0.447 | 0.202 |
| 20.20 | 0.547 | 0.093 | 0.1202 | 0.481 | 0.277 |
| 24.01 | 0.614 | 0.097 | 0.1284 | 0.522 | 0.338 |
| 28.02 | 0.687 | 0.098 | 0.1323 | 0.560 | 0.409 |
| 32.15 | 0.772 | 0.097 | 0.1326 | 0.602 | 0.493 |
| 36.10 | 0.790 | 0.094 | 0.1270 | 0.583 | 0.541 |
| 40.09 | 0.853 | 0.091 | 0.1227 | 0.594 | 0.619 |
| 44.05 | 0.893 | 0.086 | 0.1171 | 0.582 | 0.683 |
| 48.11 | 0.948 | 0.082 | 0.1101 | 0.572 | 0.760 |
| 52.10 | 0.990 | 0.076 | 0.1025 | 0.548 | 0.828 |
| 55.94 | 1.029 | 0.069 | 0.0951 | 0.519 | 0.892 |
| 59.95 | 1.068 | 0.062 | 0.0865 | 0.481 | 0.955 |
| 64.17 | 1.118 | 0.055 | 0.0764 | 0.438 | 1.030 |
| 68.13 | 1.154 | 0.048 | 0.0661 | 0.385 | 1.088 |
| 71.99 | 1.176 | 0.041 | 0.0561 | 0.325 | 1.131 |
| 76.25 | 1.200 | 0.033 | 0.0439 | 0.254 | 1.174 |
| 80.21 | 1.218 | 0.025 | 0.0326 | 0.182 | 1.205 |
| 84.01 | 1.230 | 0.017 | 0.0217 | 0.111 | 1.225 |
| 88.07 | 1.234 | 0.010 | 0.0094 | 0.032 | 1.234 |
| 92.11 | 1.240 | 0.001 | -0.0026 | -0.047 | 1.239 |
| 95.92 | 1.234 | -0.006 | -0.0144 | -0.121 | 1.228 |
| 0.04 | -0.365 | 0.072 | -0.0353 | -0.365 | 0.071 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.50 | 9.50 | 67 | 12 FT | 570 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.06 | 0.141 | 0.085 | -0.0486 | 0.147 | 0.075 |
| -3.22 | 0.139 | 0.088 | -0.0372 | 0.143 | 0.080 |
| -2.13 | 0.011 | 0.092 | -0.0284 | 0.014 | 0.091 |
| -1.07 | -0.081 | 0.092 | -0.0233 | -0.079 | 0.093 |
| -0.07 | -0.209 | 0.091 | -0.0179 | -0.209 | 0.091 |
| 0.96 | -0.312 | 0.089 | -0.0060 | -0.314 | 0.084 |
| 1.91 | 0.020 | 0.092 | 0.0215 | 0.017 | 0.093 |
| 2.95 | -0.135 | 0.091 | 0.0312 | -0.140 | 0.084 |
| 3.75 | -0.203 | 0.088 | 0.0350 | -0.209 | 0.075 |
| 4.88 | -0.142 | 0.084 | 0.0445 | -0.149 | 0.072 |
| 5.90 | 0.015 | 0.076 | 0.0671 | 0.007 | 0.077 |
| 6.95 | 0.248 | 0.051 | 0.1133 | 0.240 | 0.081 |
| 8.04 | 0.372 | 0.030 | 0.1465 | 0.364 | 0.081 |
| 15.88 | 0.478 | 0.076 | 0.1252 | 0.439 | 0.204 |
| 24.14 | 0.645 | 0.101 | 0.1331 | 0.548 | 0.356 |
| 32.01 | 0.810 | 0.101 | 0.1368 | 0.633 | 0.515 |
| 40.04 | 0.881 | 0.092 | 0.1246 | 0.615 | 0.637 |
| 48.10 | 0.973 | 0.082 | 0.1105 | 0.589 | 0.779 |
| -0.07 | -0.197 | 0.091 | -0.0189 | -0.197 | 0.091 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.00 | 2 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.43 | -0.086 | 0.053 | -0.0121 | -0.082 | 0.059 |
| 0.54 | 0.011 | 0.056 | 0.0045 | 0.011 | 0.056 |
| 3.51 | 0.038 | 0.052 | 0.0195 | 0.035 | 0.055 |
| 7.91 | 0.157 | 0.056 | 0.0387 | 0.148 | 0.077 |
| 11.84 | 0.443 | 0.066 | 0.0620 | 0.420 | 0.155 |
| 15.90 | 0.545 | 0.075 | 0.0641 | 0.504 | 0.221 |
| 20.06 | 0.512 | 0.074 | 0.0953 | 0.456 | 0.245 |
| 27.99 | 0.534 | 0.085 | 0.1008 | 0.432 | 0.326 |
| 32.15 | 0.552 | 0.083 | 0.1010 | 0.423 | 0.364 |
| 36.04 | 0.581 | 0.079 | 0.0997 | 0.424 | 0.406 |
| 40.02 | 0.646 | 0.077 | 0.0997 | 0.445 | 0.475 |
| 44.04 | 0.675 | 0.073 | 0.0966 | 0.435 | 0.522 |
| 48.21 | 0.710 | 0.067 | 0.0914 | 0.423 | 0.574 |
| 52.07 | 0.747 | 0.063 | 0.0864 | 0.410 | 0.627 |
| 56.21 | 0.784 | 0.057 | 0.0795 | 0.388 | 0.683 |
| 60.12 | 0.819 | 0.052 | 0.0729 | 0.363 | 0.736 |
| 64.29 | 0.853 | 0.046 | 0.0647 | 0.329 | 0.788 |
| 68.22 | 0.882 | 0.040 | 0.0566 | 0.290 | 0.834 |
| 72.18 | 0.902 | 0.034 | 0.0477 | 0.244 | 0.869 |
| 76.22 | 0.919 | 0.027 | 0.0383 | 0.192 | 0.899 |
| 80.11 | 0.932 | 0.021 | 0.0287 | 0.139 | 0.922 |
| 84.09 | 0.941 | 0.014 | 0.0187 | 0.083 | 0.938 |
| 88.09 | 0.946 | 0.008 | 0.0080 | 0.024 | 0.946 |
| 92.19 | 0.948 | 0. | -0.0027 | -0.037 | 0.947 |
| 94.14 | 0.950 | -0.003 | -0.0078 | -0.065 | 0.948 |
| -0.22 | -0.027 | 0.057 | 0.0020 | -0.027 | 0.057 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.00 | 1 | 12 FT | 610 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.05 | -0.082 | 0.052 | -0.0109 | -0.078 | 0.058 |
| 0. | -0.044 | 0.060 | 0.0057 | -0.044 | 0.060 |
| 3.98 | 0.023 | 0.054 | 0.0210 | 0.019 | 0.056 |
| 7.55 | 0.162 | 0.057 | 0.0341 | 0.153 | 0.077 |
| 12.25 | 0.466 | 0.066 | 0.0665 | 0.442 | 0.164 |
| 15.99 | 0.563 | 0.076 | 0.0615 | 0.521 | 0.228 |
| 19.64 | 0.507 | 0.072 | 0.0938 | 0.453 | 0.239 |
| 23.88 | 0.517 | 0.084 | 0.0983 | 0.439 | 0.286 |
| 28.21 | 0.535 | 0.085 | 0.1008 | 0.431 | 0.328 |
| 31.89 | 0.605 | 0.086 | 0.1036 | 0.468 | 0.393 |
| 35.79 | 0.610 | 0.082 | 0.1024 | 0.447 | 0.423 |
| 39.85 | 0.651 | 0.078 | 0.1001 | 0.450 | 0.477 |
| 43.82 | 0.683 | 0.074 | 0.0968 | 0.442 | 0.526 |
| 48.11 | 0.713 | 0.067 | 0.0916 | 0.426 | 0.576 |
| 51.92 | 0.745 | 0.062 | 0.0864 | 0.411 | 0.625 |
| 56.28 | 0.783 | 0.056 | 0.0792 | 0.388 | 0.683 |
| 59.85 | 0.816 | 0.052 | 0.0733 | 0.365 | 0.732 |
| 64.02 | 0.845 | 0.046 | 0.0651 | 0.329 | 0.780 |
| 68.16 | 0.874 | 0.040 | 0.0562 | 0.288 | 0.826 |
| 72.02 | 0.898 | 0.034 | 0.0479 | 0.245 | 0.865 |
| 75.90 | 0.917 | 0.028 | 0.0387 | 0.196 | 0.896 |
| 79.79 | 0.930 | 0.021 | 0.0289 | 0.144 | 0.919 |
| 84.29 | 0.942 | 0.014 | 0.0173 | 0.080 | 0.938 |
| 88.42 | 0.947 | 0.007 | 0.0066 | 0.019 | 0.947 |
| 91.88 | 0.948 | 0.001 | -0.0023 | -0.032 | 0.948 |
| 93.94 | 0.946 | -0.003 | -0.0078 | -0.062 | 0.944 |
| -0.02 | -0.061 | 0.058 | 0.0026 | -0.061 | 0.058 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.50 | 3 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.88 | -0.077 | 0.079 | -0.0268 | -0.071 | 0.084 |
| 0.10 | 0.006 | 0.078 | 0.0029 | 0.006 | 0.078 |
| 3.90 | 0.061 | 0.083 | 0.0224 | 0.055 | 0.087 |
| 8.12 | 0.230 | 0.060 | 0.0995 | 0.219 | 0.092 |
| 11.88 | 0.460 | 0.033 | 0.1520 | 0.443 | 0.127 |
| 16.01 | 0.568 | 0.056 | 0.1307 | 0.531 | 0.211 |
| 20.23 | 0.646 | 0.091 | 0.1202 | 0.575 | 0.309 |
| 23.95 | 0.647 | 0.099 | 0.1223 | 0.551 | 0.353 |
| 28.22 | 0.664 | 0.100 | 0.1222 | 0.538 | 0.402 |
| 32.15 | 0.691 | 0.097 | 0.1205 | 0.534 | 0.450 |
| 35.98 | 0.751 | 0.094 | 0.1185 | 0.552 | 0.517 |
| 40.15 | 0.803 | 0.090 | 0.1152 | 0.556 | 0.586 |
| 44.12 | 0.849 | 0.085 | 0.1097 | 0.551 | 0.652 |
| 48.21 | 0.898 | 0.079 | 0.1043 | 0.540 | 0.722 |
| 52.05 | 0.951 | 0.074 | 0.0985 | 0.527 | 0.795 |
| 56.21 | 0.996 | 0.066 | 0.0900 | 0.499 | 0.864 |
| 60.09 | 1.042 | 0.060 | 0.0819 | 0.467 | 0.933 |
| 64.22 | 1.081 | 0.053 | 0.0727 | 0.423 | 0.997 |
| 68.29 | 1.117 | 0.046 | 0.0630 | 0.371 | 1.054 |
| 72.02 | 1.141 | 0.039 | 0.0532 | 0.315 | 1.097 |
| 76.02 | 1.167 | 0.032 | 0.0425 | 0.251 | 1.140 |
| 80.12 | 1.187 | 0.024 | 0.0309 | 0.180 | 1.173 |
| 84.28 | 1.198 | 0.016 | 0.0191 | 0.104 | 1.194 |
| 88.26 | 1.205 | 0.008 | 0.0074 | 0.028 | 1.205 |
| 92.15 | 1.208 | 0.001 | -0.0040 | -0.046 | 1.207 |
| 94.08 | 1.205 | -0.003 | -0.0095 | -0.083 | 1.202 |
| -0.15 | -0.014 | 0.078 | -0.0044 | -0.013 | 0.078 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 6.50 | 4 | 12 FT | 650 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.90 | -0.081 | 0.076 | -0.0308 | -0.076 | 0.082 |
| 0.10 | -0.086 | 0.076 | 0.0046 | -0.086 | 0.076 |
| 3.82 | 0.024 | 0.084 | 0.0243 | 0.019 | 0.085 |
| 8.00 | 0.244 | 0.057 | 0.1000 | 0.234 | 0.090 |
| 11.96 | 0.458 | 0.033 | 0.1530 | 0.441 | 0.127 |
| 15.93 | 0.561 | 0.055 | 0.1331 | 0.524 | 0.207 |
| 19.98 | 0.651 | 0.090 | 0.1212 | 0.581 | 0.307 |
| 23.81 | 0.645 | 0.100 | 0.1229 | 0.550 | 0.352 |
| 28.05 | 0.680 | 0.102 | 0.1236 | 0.552 | 0.409 |
| 32.02 | 0.738 | 0.100 | 0.1239 | 0.573 | 0.476 |
| 36.20 | 0.767 | 0.096 | 0.1205 | 0.562 | 0.530 |
| 39.93 | 0.813 | 0.092 | 0.1164 | 0.565 | 0.592 |
| 44.26 | 0.858 | 0.086 | 0.1111 | 0.555 | 0.661 |
| 48.15 | 0.897 | 0.080 | 0.1046 | 0.539 | 0.721 |
| 52.22 | 0.946 | 0.074 | 0.0982 | 0.522 | 0.793 |
| 56.15 | 0.992 | 0.067 | 0.0906 | 0.497 | 0.861 |
| 60.16 | 1.035 | 0.060 | 0.0824 | 0.462 | 0.927 |
| 64.15 | 1.075 | 0.053 | 0.0732 | 0.421 | 0.990 |
| 68.12 | 1.112 | 0.046 | 0.0633 | 0.372 | 1.049 |
| 72.08 | 1.139 | 0.039 | 0.0530 | 0.314 | 1.096 |
| 76.24 | 1.164 | 0.031 | 0.0419 | 0.247 | 1.138 |
| 80.21 | 1.183 | 0.024 | 0.0311 | 0.178 | 1.170 |
| 84.09 | 1.201 | 0.016 | 0.0198 | 0.107 | 1.196 |
| 88.25 | 1.204 | 0.009 | 0.0078 | 0.028 | 1.204 |
| 92.22 | 1.205 | 0.001 | -0.0043 | -0.047 | 1.204 |
| 94.28 | 1.205 | -0.003 | -0.0102 | -0.087 | 1.202 |
| -0.24 | -0.049 | 0.074 | -0.0094 | -0.048 | 0.075 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 7.50 | 5 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.34 | -0.019 | 0.096 | -0.0470 | -0.013 | 0.097 |
| -0.05 | -0.024 | 0.102 | -0.0036 | -0.024 | 0.102 |
| 4.08 | -0.002 | 0.100 | 0.0418 | -0.009 | 0.100 |
| 8.15 | 0.188 | 0.069 | 0.1254 | 0.176 | 0.095 |
| 12.02 | 0.456 | 0.041 | 0.1549 | 0.438 | 0.135 |
| 16.14 | 0.575 | 0.080 | 0.1291 | 0.530 | 0.237 |
| 20.10 | 0.687 | 0.097 | 0.1308 | 0.611 | 0.327 |
| 24.22 | 0.722 | 0.104 | 0.1347 | 0.616 | 0.391 |
| 28.05 | 0.705 | 0.103 | 0.1323 | 0.574 | 0.422 |
| 32.15 | 0.772 | 0.102 | 0.1302 | 0.599 | 0.497 |
| 36.12 | 0.823 | 0.098 | 0.1268 | 0.607 | 0.565 |
| 40.05 | 0.874 | 0.094 | 0.1216 | 0.608 | 0.634 |
| 44.12 | 0.922 | 0.089 | 0.1153 | 0.600 | 0.706 |
| 48.15 | 0.978 | 0.084 | 0.1091 | 0.590 | 0.784 |
| 52.12 | 1.026 | 0.077 | 0.1018 | 0.569 | 0.857 |
| 56.12 | 1.074 | 0.070 | 0.0939 | 0.540 | 0.931 |
| 60.20 | 1.123 | 0.063 | 0.0853 | 0.503 | 1.006 |
| 64.08 | 1.160 | 0.056 | 0.0762 | 0.457 | 1.068 |
| 68.02 | 1.184 | 0.048 | 0.0662 | 0.398 | 1.116 |
| 72.14 | 1.217 | 0.041 | 0.0558 | 0.335 | 1.171 |
| 76.12 | 1.239 | 0.033 | 0.0452 | 0.265 | 1.211 |
| 80.22 | 1.263 | 0.026 | 0.0337 | 0.189 | 1.249 |
| 84.02 | 1.273 | 0.018 | 0.0223 | 0.114 | 1.268 |
| 88.15 | 1.284 | 0.010 | 0.0105 | 0.031 | 1.283 |
| 92.09 | 1.287 | 0.003 | -0.0012 | -0.050 | 1.286 |
| 94.09 | 1.287 | -0.001 | -0.0072 | -0.091 | 1.284 |
| -0.14 | -0.063 | 0.099 | -0.0186 | -0.063 | 0.099 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 28 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.48 | 0.072 | 0.102 | -0.0555 | 0.079 | 0.098 |
| -0.03 | -0.007 | 0.108 | -0.0009 | -0.007 | 0.108 |
| 3.92 | -0.067 | 0.106 | 0.0508 | -0.074 | 0.101 |
| 8.02 | 0.247 | 0.062 | 0.1491 | 0.236 | 0.096 |
| 12.02 | 0.441 | 0.047 | 0.1678 | 0.422 | 0.138 |
| 16.14 | 0.442 | 0.094 | 0.1281 | 0.399 | 0.213 |
| 20.32 | 0.577 | 0.102 | 0.1329 | 0.506 | 0.297 |
| 24.15 | 0.672 | 0.104 | 0.1374 | 0.571 | 0.370 |
| 28.37 | 0.716 | 0.102 | 0.1361 | 0.582 | 0.430 |
| 32.22 | 0.835 | 0.101 | 0.1365 | 0.653 | 0.531 |
| 36.31 | 0.876 | 0.096 | 0.1306 | 0.649 | 0.596 |
| 40.32 | 0.916 | 0.091 | 0.1236 | 0.639 | 0.662 |
| 44.35 | 0.969 | 0.086 | 0.1167 | 0.633 | 0.739 |
| 48.41 | 1.026 | 0.081 | 0.1101 | 0.620 | 0.821 |
| 52.38 | 1.081 | 0.075 | 0.1023 | 0.600 | 0.902 |
| 60.44 | 1.165 | 0.061 | 0.0846 | 0.521 | 1.043 |
| 68.48 | 1.234 | 0.047 | 0.0640 | 0.409 | 1.165 |
| 76.55 | 1.277 | 0.032 | 0.0426 | 0.266 | 1.249 |
| 84.54 | 1.308 | 0.017 | 0.0199 | 0.108 | 1.304 |
| 92.63 | 1.315 | 0.001 | -0.0034 | -0.061 | 1.314 |
| 94.62 | 1.319 | -0.003 | -0.0093 | -0.104 | 1.315 |
| -0.05 | -0.014 | 0.108 | -0.0042 | -0.014 | 0.108 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 65 | 12 FT | 640 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.20 | -0.019 | 0.096 | -0.0764 | -0.012 | 0.098 |
| -3.14 | 0.007 | 0.103 | -0.0465 | 0.013 | 0.103 |
| -2.14 | -0.001 | 0.106 | -0.0310 | 0.003 | 0.106 |
| -1.03 | -0.049 | 0.108 | -0.0191 | -0.047 | 0.109 |
| -0.04 | -0.080 | 0.106 | -0.0008 | -0.080 | 0.106 |
| 0.96 | 0.012 | 0.108 | 0.0036 | 0.010 | 0.108 |
| 1.93 | -0.016 | 0.107 | 0.0251 | -0.019 | 0.107 |
| 2.93 | -0.065 | 0.107 | 0.0375 | -0.071 | 0.103 |
| 3.81 | -0.086 | 0.106 | 0.0522 | -0.093 | 0.100 |
| 4.95 | -0.088 | 0.103 | 0.0694 | -0.096 | 0.095 |
| 5.90 | -0.034 | 0.096 | 0.0921 | -0.044 | 0.092 |
| 6.91 | 0.106 | 0.082 | 0.1196 | 0.096 | 0.095 |
| 7.91 | 0.265 | 0.060 | 0.1483 | 0.255 | 0.095 |
| 0.06 | -0.095 | 0.107 | 0.0016 | -0.095 | 0.107 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 64 | 12 FT | 650 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 96.05 | 1.318 | -0.006 | -0.0134 | -0.133 | 1.311 |
| 92.06 | 1.322 | 0.004 | 0.0006 | -0.051 | 1.321 |
| 88.05 | 1.319 | 0.011 | 0.0122 | 0.034 | 1.318 |
| 83.95 | 1.305 | 0.019 | 0.0240 | 0.118 | 1.299 |
| 80.14 | 1.289 | 0.026 | 0.0352 | 0.195 | 1.274 |
| 76.02 | 1.272 | 0.034 | 0.0462 | 0.274 | 1.243 |
| 71.92 | 1.240 | 0.042 | 0.0573 | 0.345 | 1.191 |
| 68.09 | 1.214 | 0.049 | 0.0675 | 0.408 | 1.145 |
| 63.96 | 1.181 | 0.057 | 0.0783 | 0.467 | 1.086 |
| 60.14 | 1.149 | 0.064 | 0.0875 | 0.517 | 1.028 |
| 56.05 | 1.095 | 0.070 | 0.0963 | 0.553 | 0.948 |
| 52.04 | 1.053 | 0.077 | 0.1046 | 0.587 | 0.878 |
| 48.21 | 1.008 | 0.083 | 0.1119 | 0.610 | 0.807 |
| 44.00 | 0.955 | 0.089 | 0.1197 | 0.625 | 0.727 |
| 40.14 | 0.919 | 0.094 | 0.1273 | 0.642 | 0.664 |
| 36.09 | 0.884 | 0.099 | 0.1343 | 0.656 | 0.600 |
| 32.02 | 0.838 | 0.104 | 0.1392 | 0.655 | 0.532 |
| 27.76 | 0.713 | 0.104 | 0.1384 | 0.582 | 0.424 |
| 23.82 | 0.641 | 0.105 | 0.1370 | 0.544 | 0.355 |
| 19.95 | 0.527 | 0.104 | 0.1303 | 0.460 | 0.277 |
| 15.92 | 0.442 | 0.085 | 0.1372 | 0.402 | 0.203 |
| 11.84 | 0.461 | 0.028 | 0.1895 | 0.445 | 0.122 |
| 7.85 | 0.123 | 0.081 | 0.1237 | 0.111 | 0.097 |
| 6.91 | -0.032 | 0.096 | 0.0951 | -0.043 | 0.092 |
| 5.96 | -0.084 | 0.103 | 0.0733 | -0.094 | 0.093 |
| 5.01 | -0.094 | 0.105 | 0.0567 | -0.103 | 0.096 |
| 3.93 | -0.083 | 0.107 | 0.0398 | -0.090 | 0.101 |
| 2.92 | -0.036 | 0.107 | 0.0270 | -0.041 | 0.105 |
| 1.85 | 0.011 | 0.108 | 0.0065 | 0.008 | 0.108 |
| 0.91 | -0.089 | 0.107 | 0.0002 | -0.091 | 0.106 |
| -0.04 | -0.060 | 0.108 | -0.0186 | -0.060 | 0.108 |
| -1.22 | -0.012 | 0.106 | -0.0298 | -0.009 | 0.106 |
| -2.04 | 0.008 | 0.104 | -0.0415 | 0.012 | 0.104 |
| -3.04 | 0.017 | 0.102 | -0.0556 | 0.023 | 0.101 |
| -4.19 | -0.023 | 0.097 | -0.0767 | -0.015 | 0.098 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 63 | 12 FT | 650 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | 0.052 | 0.100 | -0.0599 | 0.059 | 0.096 |
| -4.57 | 0.013 | 0.096 | -0.0712 | 0.020 | 0.095 |
| -3.08 | 0.050 | 0.103 | -0.0460 | 0.055 | 0.100 |
| -1.95 | 0.024 | 0.106 | -0.0279 | 0.027 | 0.105 |
| -1.14 | -0.009 | 0.106 | -0.0163 | -0.007 | 0.107 |
| -0.03 | -0.105 | 0.105 | -0.0097 | -0.105 | 0.105 |
| 0.91 | 0.018 | 0.108 | 0.0018 | 0.017 | 0.108 |
| 1.94 | -0.011 | 0.107 | 0.0234 | -0.015 | 0.107 |
| 2.92 | -0.082 | 0.107 | 0.0345 | -0.087 | 0.103 |
| 3.92 | -0.091 | 0.106 | 0.0507 | -0.098 | 0.100 |
| 4.84 | -0.089 | 0.104 | 0.0659 | -0.097 | 0.096 |
| 5.85 | -0.047 | 0.098 | 0.0873 | -0.057 | 0.093 |
| 7.05 | 0.126 | 0.081 | 0.1235 | 0.115 | 0.096 |
| 7.98 | 0.249 | 0.063 | 0.1457 | 0.237 | 0.097 |
| 11.82 | 0.434 | 0.043 | 0.1724 | 0.416 | 0.131 |
| 16.08 | 0.443 | 0.091 | 0.1328 | 0.400 | 0.210 |
| 20.02 | 0.556 | 0.104 | 0.1321 | 0.487 | 0.288 |
| 24.15 | 0.662 | 0.105 | 0.1375 | 0.561 | 0.367 |
| 28.09 | 0.744 | 0.104 | 0.1385 | 0.607 | 0.442 |
| 32.00 | 0.851 | 0.103 | 0.1387 | 0.667 | 0.538 |
| 35.97 | 0.883 | 0.098 | 0.1328 | 0.657 | 0.598 |
| 40.02 | 0.927 | 0.093 | 0.1263 | 0.650 | 0.667 |
| 43.98 | 0.964 | 0.088 | 0.1183 | 0.633 | 0.733 |
| 48.11 | 1.019 | 0.082 | 0.1111 | 0.620 | 0.813 |
| 52.27 | 1.062 | 0.076 | 0.1028 | 0.590 | 0.886 |
| 55.99 | 1.106 | 0.069 | 0.0948 | 0.562 | 0.956 |
| 60.10 | 1.155 | 0.063 | 0.0856 | 0.522 | 1.033 |
| 63.97 | 1.187 | 0.055 | 0.0761 | 0.471 | 1.091 |
| 68.15 | 1.223 | 0.047 | 0.0654 | 0.411 | 1.153 |
| 72.15 | 1.249 | 0.040 | 0.0553 | 0.345 | 1.201 |
| 76.15 | 1.277 | 0.033 | 0.0439 | 0.274 | 1.247 |
| 80.17 | 1.297 | 0.025 | 0.0329 | 0.197 | 1.282 |
| 83.97 | 1.310 | 0.018 | 0.0221 | 0.120 | 1.305 |
| 88.45 | 1.316 | 0.009 | 0.0087 | 0.026 | 1.316 |
| 92.15 | 1.319 | 0.002 | -0.0020 | -0.052 | 1.318 |
| 96.05 | 1.316 | -0.006 | -0.0135 | -0.133 | 1.310 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 9.50 | 11 | 12 FT | 650 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.62 | -0.035 | 0.102 | -0.0583 | -0.029 | 0.104 |
| -0.07 | -0.080 | 0.106 | -0.0173 | -0.080 | 0.106 |
| 3.68 | -0.100 | 0.103 | 0.0455 | -0.107 | 0.097 |
| 7.98 | 0.273 | 0.057 | 0.1494 | 0.262 | 0.095 |
| 11.94 | 0.450 | 0.041 | 0.1700 | 0.432 | 0.133 |
| 16.05 | 0.492 | 0.088 | 0.1336 | 0.448 | 0.221 |
| 19.92 | 0.537 | 0.103 | 0.1302 | 0.470 | 0.280 |
| 23.95 | 0.656 | 0.105 | 0.1371 | 0.557 | 0.363 |
| 27.97 | 0.727 | 0.104 | 0.1379 | 0.593 | 0.433 |
| 31.98 | 0.855 | 0.102 | 0.1394 | 0.671 | 0.540 |
| 36.03 | 0.885 | 0.098 | 0.1330 | 0.658 | 0.599 |
| 40.06 | 0.930 | 0.093 | 0.1264 | 0.652 | 0.670 |
| 43.94 | 0.958 | 0.088 | 0.1178 | 0.629 | 0.728 |
| 48.09 | 1.018 | 0.082 | 0.1107 | 0.619 | 0.813 |
| 52.11 | 1.066 | 0.076 | 0.1030 | 0.595 | 0.888 |
| 56.15 | 1.111 | 0.069 | 0.0945 | 0.561 | 0.961 |
| 60.17 | 1.148 | 0.063 | 0.0852 | 0.517 | 1.027 |
| 64.15 | 1.183 | 0.055 | 0.0758 | 0.466 | 1.089 |
| 68.08 | 1.218 | 0.048 | 0.0655 | 0.411 | 1.148 |
| 71.99 | 1.242 | 0.040 | 0.0554 | 0.346 | 1.194 |
| 76.10 | 1.269 | 0.033 | 0.0441 | 0.273 | 1.240 |
| 80.05 | 1.288 | 0.025 | 0.0333 | 0.198 | 1.273 |
| 84.14 | 1.299 | 0.018 | 0.0212 | 0.115 | 1.294 |
| 88.15 | 1.313 | 0.010 | 0.0101 | 0.033 | 1.312 |
| 92.11 | 1.317 | 0.002 | -0.0017 | -0.051 | 1.316 |
| 94.02 | 1.319 | -0.001 | -0.0072 | -0.091 | 1.316 |
| -0.20 | -0.075 | 0.107 | -0.0178 | -0.075 | 0.107 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 26 | 12 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.60 | 0.045 | 0.105 | -0.0578 | 0.051 | 0.102 |
| 0.02 | -0.002 | 0.111 | -0.0001 | -0.002 | 0.111 |
| 3.84 | -0.048 | 0.109 | 0.0502 | -0.055 | 0.105 |
| 8.05 | 0.269 | 0.058 | 0.1574 | 0.258 | 0.095 |
| 11.95 | 0.428 | 0.056 | 0.1605 | 0.407 | 0.143 |
| 16.08 | 0.408 | 0.097 | 0.1268 | 0.365 | 0.206 |
| 20.29 | 0.552 | 0.102 | 0.1330 | 0.482 | 0.287 |
| 24.05 | 0.663 | 0.103 | 0.1371 | 0.563 | 0.365 |
| 28.31 | 0.745 | 0.102 | 0.1374 | 0.607 | 0.443 |
| 32.17 | 0.868 | 0.101 | 0.1389 | 0.681 | 0.547 |
| 36.36 | 0.912 | 0.096 | 0.1331 | 0.677 | 0.618 |
| 40.17 | 0.930 | 0.091 | 0.1250 | 0.652 | 0.669 |
| 44.42 | 0.961 | 0.084 | 0.1165 | 0.627 | 0.733 |
| 48.50 | 1.019 | 0.079 | 0.1096 | 0.616 | 0.815 |
| 52.39 | 1.065 | 0.073 | 0.1016 | 0.592 | 0.888 |
| 60.45 | 1.159 | 0.060 | 0.0838 | 0.519 | 1.037 |
| 68.68 | 1.232 | 0.045 | 0.0633 | 0.406 | 1.164 |
| 76.45 | 1.287 | 0.031 | 0.0424 | 0.271 | 1.259 |
| 84.54 | 1.316 | 0.016 | 0.0197 | 0.109 | 1.312 |
| 92.59 | 1.324 | 0.001 | -0.0038 | -0.060 | 1.323 |
| 94.64 | 1.324 | -0.003 | -0.0098 | -0.104 | 1.320 |
| -0.04 | -0.004 | 0.112 | -0.0016 | -0.004 | 0.112 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 27 | 12 FT | 640 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.41 | -0.014 | 0.105 | -0.0549 | -0.008 | 0.106 |
| 0.02 | -0.117 | 0.108 | -0.0085 | -0.117 | 0.107 |
| 4.05 | -0.079 | 0.108 | 0.0540 | -0.087 | 0.102 |
| 8.16 | 0.331 | 0.047 | 0.1670 | 0.321 | 0.094 |
| 11.95 | 0.450 | 0.053 | 0.1654 | 0.430 | 0.145 |
| 16.15 | 0.396 | 0.099 | 0.1271 | 0.353 | 0.205 |
| 20.21 | 0.533 | 0.103 | 0.1328 | 0.464 | 0.281 |
| 24.27 | 0.656 | 0.105 | 0.1374 | 0.555 | 0.365 |
| 28.26 | 0.762 | 0.103 | 0.1393 | 0.622 | 0.452 |
| 32.21 | 0.882 | 0.102 | 0.1394 | 0.692 | 0.557 |
| 36.35 | 0.933 | 0.097 | 0.1351 | 0.694 | 0.631 |
| 40.24 | 0.960 | 0.092 | 0.1270 | 0.673 | 0.690 |
| 44.29 | 0.959 | 0.085 | 0.1170 | 0.627 | 0.730 |
| 48.45 | 1.009 | 0.079 | 0.1090 | 0.610 | 0.807 |
| 52.65 | 1.057 | 0.073 | 0.1009 | 0.583 | 0.884 |
| 60.55 | 1.152 | 0.060 | 0.0839 | 0.514 | 1.033 |
| 68.69 | 1.227 | 0.045 | 0.0630 | 0.404 | 1.160 |
| 76.56 | 1.281 | 0.031 | 0.0419 | 0.267 | 1.253 |
| 84.55 | 1.308 | 0.016 | 0.0190 | 0.108 | 1.304 |
| 92.49 | 1.319 | 0.001 | -0.0039 | -0.058 | 1.318 |
| 94.57 | 1.318 | -0.003 | -0.0096 | -0.102 | 1.314 |
| 0. | -0.092 | 0.106 | -0.0115 | -0.092 | 0.106 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.60 | 11.50 | 12 | 12 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.24 | 0.032 | 0.108 | -0.0496 | 0.038 | 0.106 |
| 0.10 | -0.008 | 0.113 | 0.0002 | -0.008 | 0.113 |
| 3.94 | -0.046 | 0.112 | 0.0494 | -0.054 | 0.108 |
| 7.91 | 0.255 | 0.061 | 0.1555 | 0.245 | 0.095 |
| 12.02 | 0.431 | 0.063 | 0.1569 | 0.408 | 0.151 |
| 15.99 | 0.519 | 0.101 | 0.1331 | 0.471 | 0.240 |
| 20.09 | 0.754 | 0.108 | 0.1415 | 0.671 | 0.360 |
| 24.08 | 0.830 | 0.110 | 0.1463 | 0.713 | 0.439 |
| 27.97 | 1.018 | 0.111 | 0.1501 | 0.847 | 0.575 |
| 32.08 | 1.133 | 0.109 | 0.1495 | 0.902 | 0.694 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.68 | 9.50 | 68 | 12 FT | 540 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.91 | -0.041 | 0.119 | -0.0713 | -0.033 | 0.122 |
| -3.04 | -0.031 | 0.122 | -0.0548 | -0.024 | 0.124 |
| -1.97 | -0.018 | 0.124 | -0.0357 | -0.014 | 0.125 |
| -1.08 | -0.051 | 0.125 | -0.0210 | -0.048 | 0.126 |
| -0.03 | -0.012 | 0.126 | -0.0041 | -0.012 | 0.126 |
| 1.11 | 0.016 | 0.125 | 0.0116 | 0.013 | 0.126 |
| 1.85 | 0.033 | 0.125 | 0.0235 | 0.029 | 0.126 |
| 2.94 | 0.011 | 0.124 | 0.0392 | 0.005 | 0.125 |
| 3.79 | 0.019 | 0.124 | 0.0543 | 0.011 | 0.125 |
| 4.95 | 0.041 | 0.120 | 0.0776 | 0.031 | 0.123 |
| 5.94 | 0.090 | 0.113 | 0.1094 | 0.078 | 0.122 |
| 6.95 | 0.148 | 0.102 | 0.1349 | 0.135 | 0.119 |
| 7.84 | 0.255 | 0.085 | 0.1597 | 0.241 | 0.119 |
| 15.85 | 0.373 | 0.114 | 0.1494 | 0.328 | 0.211 |
| 24.02 | 0.683 | 0.110 | 0.1427 | 0.579 | 0.379 |
| 32.08 | 0.846 | 0.103 | 0.1373 | 0.663 | 0.537 |
| 40.03 | 0.968 | 0.094 | 0.1261 | 0.681 | 0.694 |
| 48.08 | 1.044 | 0.082 | 0.1096 | 0.637 | 0.832 |
| -0.05 | -0.008 | 0.124 | -0.0056 | -0.008 | 0.124 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 6.00 | 77 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.85 | -0.052 | 0.171 | -0.0330 | -0.041 | 0.175 |
| 0.04 | 0.008 | 0.171 | -0.0076 | 0.008 | 0.171 |
| 4.00 | 0.025 | 0.175 | 0.0286 | 0.012 | 0.177 |
| 8.08 | 0.142 | 0.165 | 0.0735 | 0.118 | 0.183 |
| 15.98 | 0.454 | 0.138 | 0.1452 | 0.399 | 0.258 |
| 19.99 | 0.472 | 0.129 | 0.1515 | 0.399 | 0.283 |
| 27.93 | 0.627 | 0.096 | 0.1147 | 0.509 | 0.378 |
| 35.94 | 0.681 | 0.080 | 0.1044 | 0.504 | 0.465 |
| 43.88 | 0.742 | 0.073 | 0.0979 | 0.484 | 0.567 |
| 51.77 | 0.822 | 0.063 | 0.0883 | 0.459 | 0.685 |
| 59.81 | 0.911 | 0.052 | 0.0753 | 0.413 | 0.814 |
| 67.83 | 0.977 | 0.040 | 0.0587 | 0.332 | 0.920 |
| 75.83 | 1.011 | 0.025 | 0.0369 | 0.223 | 0.987 |
| 83.77 | 1.045 | 0.014 | 0.0189 | 0.099 | 1.041 |
| 91.68 | 1.055 | 0.001 | -0.0024 | -0.032 | 1.054 |
| 93.69 | 1.050 | -0.002 | -0.0077 | -0.065 | 1.048 |
| 0.03 | 0.009 | 0.170 | -0.0079 | 0.009 | 0.170 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 6.50 | 81 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.88 | -0.039 | 0.195 | -0.0638 | -0.026 | 0.197 |
| 0.07 | 0.003 | 0.202 | -0.0098 | 0.003 | 0.202 |
| 4.11 | 0.016 | 0.208 | 0.0542 | 0.001 | 0.209 |
| 8.07 | 0.090 | 0.166 | 0.1056 | 0.066 | 0.177 |
| 12.03 | 0.432 | 0.166 | 0.1839 | 0.388 | 0.252 |
| 16.03 | 0.631 | 0.149 | 0.2134 | 0.566 | 0.318 |
| 20.11 | 0.556 | 0.145 | 0.1788 | 0.472 | 0.327 |
| 24.05 | 0.682 | 0.133 | 0.1463 | 0.569 | 0.399 |
| 28.09 | 0.771 | 0.109 | 0.1235 | 0.629 | 0.459 |
| 32.05 | 0.827 | 0.099 | 0.1179 | 0.649 | 0.523 |
| 36.06 | 0.849 | 0.090 | 0.1129 | 0.633 | 0.572 |
| 39.94 | 0.890 | 0.084 | 0.1085 | 0.628 | 0.636 |
| 43.96 | 0.936 | 0.079 | 0.1041 | 0.619 | 0.707 |
| 47.96 | 0.983 | 0.073 | 0.0989 | 0.604 | 0.779 |
| 52.03 | 1.036 | 0.067 | 0.0926 | 0.584 | 0.858 |
| 59.95 | 1.136 | 0.056 | 0.0774 | 0.521 | 1.011 |
| 67.93 | 1.214 | 0.042 | 0.0589 | 0.417 | 1.141 |
| 75.95 | 1.265 | 0.029 | 0.0390 | 0.279 | 1.234 |
| 83.93 | 1.292 | 0.015 | 0.0176 | 0.122 | 1.286 |
| 91.94 | 1.300 | 0.001 | -0.0039 | -0.045 | 1.300 |
| 94.85 | 1.293 | -0.004 | -0.0120 | -0.105 | 1.289 |
| 0.06 | 0.002 | 0.204 | -0.0115 | 0.002 | 0.204 |
| 0.06 | 0.002 | 0.203 | -0.0111 | 0.002 | 0.203 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 7.50 | 85 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.90 | -0.073 | 0.210 | -0.0897 | -0.059 | 0.214 |
| 0.06 | 0.034 | 0.211 | -0.0193 | 0.034 | 0.211 |
| 3.97 | 0.029 | 0.217 | 0.0597 | 0.014 | 0.219 |
| 8.03 | 0.240 | 0.191 | 0.1629 | 0.211 | 0.223 |
| 16.02 | 0.727 | 0.130 | 0.2426 | 0.663 | 0.325 |
| 21.93 | 0.655 | 0.149 | 0.1797 | 0.551 | 0.383 |
| 19.89 | 0.890 | 0.114 | 0.2383 | 0.798 | 0.410 |
| 23.90 | 0.734 | 0.137 | 0.1662 | 0.615 | 0.422 |
| 27.92 | 0.832 | 0.110 | 0.1296 | 0.683 | 0.487 |
| 31.84 | 0.908 | 0.099 | 0.1207 | 0.719 | 0.563 |
| 35.78 | 0.936 | 0.090 | 0.1148 | 0.706 | 0.620 |
| 39.76 | 0.972 | 0.085 | 0.1097 | 0.693 | 0.687 |
| 43.69 | 1.016 | 0.079 | 0.1048 | 0.680 | 0.759 |
| 47.70 | 1.059 | 0.073 | 0.0990 | 0.659 | 0.832 |
| 51.67 | 1.115 | 0.067 | 0.0922 | 0.639 | 0.916 |
| 59.61 | 1.219 | 0.055 | 0.0767 | 0.569 | 1.079 |
| 67.60 | 1.296 | 0.042 | 0.0585 | 0.455 | 1.214 |
| 75.55 | 1.345 | 0.029 | 0.0387 | 0.307 | 1.310 |
| 83.44 | 1.375 | 0.016 | 0.0185 | 0.142 | 1.368 |
| 91.35 | 1.381 | 0.002 | -0.0027 | -0.035 | 1.381 |
| 93.44 | 1.381 | -0.001 | -0.0081 | -0.081 | 1.378 |
| 0.07 | 0.039 | 0.210 | -0.0170 | 0.039 | 0.210 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 9.50 | 93 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.02 | -0.118 | 0.217 | -0.0990 | -0.102 | 0.225 |
| 0.08 | -0.003 | 0.248 | -0.0168 | -0.004 | 0.248 |
| 4.07 | 0.086 | 0.238 | 0.0585 | 0.069 | 0.243 |
| 7.96 | 0.337 | 0.186 | 0.1778 | 0.308 | 0.230 |
| 16.09 | 0.747 | 0.125 | 0.2451 | 0.683 | 0.327 |
| 20.15 | 0.672 | 0.148 | 0.1942 | 0.580 | 0.371 |
| 24.00 | 0.763 | 0.131 | 0.1521 | 0.643 | 0.430 |
| 28.13 | 0.864 | 0.105 | 0.1297 | 0.712 | 0.500 |
| 32.09 | 0.941 | 0.094 | 0.1210 | 0.747 | 0.579 |
| 36.05 | 0.985 | 0.087 | 0.1150 | 0.745 | 0.650 |
| 40.00 | 1.020 | 0.082 | 0.1096 | 0.729 | 0.719 |
| 44.03 | 1.069 | 0.077 | 0.1037 | 0.715 | 0.798 |
| 48.01 | 1.119 | 0.071 | 0.0973 | 0.695 | 0.879 |
| 52.07 | 1.181 | 0.066 | 0.0905 | 0.674 | 0.972 |
| 59.99 | 1.284 | 0.055 | 0.0743 | 0.595 | 1.139 |
| 68.03 | 1.358 | 0.042 | 0.0568 | 0.469 | 1.275 |
| 76.14 | 1.409 | 0.029 | 0.0379 | 0.309 | 1.375 |
| 84.06 | 1.436 | 0.016 | 0.0180 | 0.133 | 1.430 |
| 92.13 | 1.443 | 0.002 | -0.0019 | -0.056 | 1.442 |
| 93.97 | 1.441 | -0.001 | -0.0069 | -0.099 | 1.438 |
| -0.07 | 0.003 | 0.244 | -0.0158 | 0.004 | 0.244 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 10.50 | 105 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.96 | -0.163 | 0.201 | -0.0792 | -0.148 | 0.212 |
| 0.05 | -0.014 | 0.259 | -0.0100 | -0.015 | 0.259 |
| 3.96 | 0.093 | 0.243 | 0.0652 | 0.076 | 0.249 |
| 8.04 | 0.377 | 0.177 | 0.1926 | 0.348 | 0.228 |
| 15.93 | 0.798 | 0.125 | 0.2442 | 0.733 | 0.339 |
| 19.93 | 0.947 | 0.098 | 0.2585 | 0.857 | 0.416 |
| 27.98 | 0.882 | 0.100 | 0.1315 | 0.732 | 0.502 |
| 31.88 | 0.944 | 0.091 | 0.1198 | 0.754 | 0.576 |
| 35.90 | -0. | -0. | -0. | -0. | -0. |
| 39.85 | 1.034 | 0.081 | 0.1083 | 0.742 | 0.725 |
| 43.84 | 1.086 | 0.076 | 0.1028 | 0.730 | 0.807 |
| 47.96 | 1.147 | 0.071 | 0.0959 | 0.716 | 0.899 |
| 51.90 | 1.206 | 0.065 | 0.0888 | 0.693 | 0.989 |
| 59.81 | 1.310 | 0.054 | 0.0728 | 0.612 | 1.160 |
| 67.87 | 1.385 | 0.041 | 0.0552 | 0.483 | 1.298 |
| 75.83 | 1.430 | 0.029 | 0.0368 | 0.322 | 1.394 |
| 83.71 | 1.452 | 0.016 | 0.0175 | 0.144 | 1.445 |
| 91.85 | 1.458 | 0.002 | -0.0025 | -0.049 | 1.457 |
| 93.71 | 1.457 | -0.001 | -0.0073 | -0.093 | 1.454 |
| 0.05 | -0.013 | 0.259 | -0.0107 | -0.013 | 0.259 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 11.50 | 97 | 11 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.87 | -0.188 | 0.223 | -0.0780 | -0.173 | 0.235 |
| 0.06 | -0.008 | 0.266 | -0.0082 | -0.008 | 0.266 |
| 3.98 | 0.187 | 0.263 | 0.0469 | 0.168 | 0.275 |
| 8.00 | 0.412 | 0.176 | 0.1941 | 0.384 | 0.231 |
| 15.00 | 0.746 | 0.124 | 0.2488 | 0.688 | 0.312 |
| 19.95 | 0.608 | 0.147 | 0.1899 | 0.521 | 0.346 |
| 24.00 | 0.848 | 0.118 | 0.1368 | 0.727 | 0.453 |
| 28.07 | 0.898 | 0.100 | 0.1260 | 0.745 | 0.510 |
| 31.89 | 0.956 | 0.090 | 0.1188 | 0.764 | 0.582 |
| 35.86 | 0.997 | 0.084 | 0.1129 | 0.759 | 0.653 |
| 39.87 | 1.046 | 0.080 | 0.1076 | 0.751 | 0.732 |
| 43.81 | 1.105 | 0.076 | 0.1021 | 0.745 | 0.820 |
| 47.81 | 1.170 | 0.070 | 0.0954 | 0.733 | 0.914 |
| 51.78 | 1.225 | 0.065 | 0.0884 | 0.707 | 1.003 |
| 59.82 | 1.331 | 0.053 | 0.0725 | 0.623 | 1.177 |
| 67.76 | 1.406 | 0.041 | 0.0554 | 0.494 | 1.317 |
| 75.61 | 1.455 | 0.029 | 0.0365 | 0.334 | 1.417 |
| 83.64 | 1.476 | 0.015 | 0.0169 | 0.148 | 1.469 |
| 91.64 | 1.484 | 0.002 | -0.0026 | -0.045 | 1.483 |
| 93.63 | 1.479 | -0.001 | -0.0077 | -0.092 | 1.476 |
| 0.02 | -0.007 | 0.267 | -0.0095 | -0.007 | 0.267 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 0.90 | 11.50 | 101 | 11 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.85 | -0.279 | 0.245 | -0.0575 | -0.262 | 0.263 |
| 0.05 | -0.023 | 0.274 | -0.0053 | -0.024 | 0.274 |
| 4.04 | 0.210 | 0.276 | 0.0375 | 0.190 | 0.290 |
| 8.13 | 0.529 | 0.203 | 0.1691 | 0.495 | 0.276 |
| 16.05 | 0.934 | 0.147 | 0.2180 | 0.857 | 0.399 |
| 20.11 | 0.799 | 0.146 | 0.1844 | 0.700 | 0.412 |
| 0.13 | -0.011 | 0.274 | -0.0073 | -0.011 | 0.274 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 6.00 | 76 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.93 | -0.125 | 0.176 | -0.0082 | -0.113 | 0.184 |
| 0.08 | -0.026 | 0.179 | 0.0030 | -0.026 | 0.179 |
| 4.01 | 0.089 | 0.182 | 0.0077 | 0.076 | 0.187 |
| 8.04 | 0.261 | 0.172 | 0.0463 | 0.234 | 0.207 |
| 16.06 | 0.459 | 0.154 | 0.0673 | 0.399 | 0.275 |
| 19.97 | 0.736 | 0.168 | 0.1097 | 0.634 | 0.409 |
| 27.91 | 1.102 | 0.133 | 0.1024 | 0.911 | 0.633 |
| 35.93 | 1.185 | 0.088 | 0.1050 | 0.907 | 0.767 |
| 43.97 | 0.933 | 0.073 | 0.0947 | 0.621 | 0.701 |
| 51.79 | 0.984 | 0.063 | 0.0859 | 0.559 | 0.812 |
| 59.92 | 1.052 | 0.052 | 0.0730 | 0.482 | 0.936 |
| 67.91 | 1.109 | 0.040 | 0.0573 | 0.380 | 1.042 |
| 75.87 | 1.149 | 0.027 | 0.0389 | 0.254 | 1.121 |
| 83.70 | 1.169 | 0.015 | 0.0187 | 0.113 | 1.163 |
| 91.65 | 1.176 | 0.002 | -0.0020 | -0.036 | 1.176 |
| 93.68 | 1.175 | -0.001 | -0.0076 | -0.074 | 1.173 |
| 0.05 | -0.005 | 0.176 | -0.0030 | -0.005 | 0.176 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.01 | 6.50 | 80 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.88 | -0.155 | 0.216 | -0.0380 | -0.140 | 0.226 |
| 0.07 | -0.014 | 0.222 | -0.0043 | -0.014 | 0.222 |
| 4.05 | 0.125 | 0.223 | 0.0269 | 0.109 | 0.231 |
| 8.08 | 0.357 | 0.202 | 0.0938 | 0.325 | 0.250 |
| 12.04 | 0.557 | 0.185 | 0.1379 | 0.507 | 0.298 |
| 16.09 | 0.735 | 0.172 | 0.1579 | 0.658 | 0.369 |
| 20.07 | 0.956 | 0.160 | 0.1659 | 0.843 | 0.479 |
| 24.07 | 1.128 | 0.146 | 0.1658 | 0.970 | 0.593 |
| 28.15 | 1.263 | 0.104 | 0.1419 | 1.064 | 0.688 |
| 32.07 | 1.338 | 0.096 | 0.1214 | 1.083 | 0.791 |
| 36.05 | 1.415 | 0.089 | 0.1111 | 1.092 | 0.905 |
| 39.99 | 1.154 | 0.080 | 0.1032 | 0.833 | 0.804 |
| 43.96 | 1.122 | 0.076 | 0.0984 | 0.755 | 0.833 |
| 47.96 | 1.162 | 0.071 | 0.0932 | 0.725 | 0.910 |
| 52.04 | 1.200 | 0.065 | 0.0871 | 0.687 | 0.986 |
| 56.01 | 1.238 | 0.059 | 0.0803 | 0.643 | 1.060 |
| 59.95 | 1.275 | 0.053 | 0.0730 | 0.592 | 1.131 |
| 63.95 | 1.308 | 0.047 | 0.0646 | 0.532 | 1.196 |
| 68.00 | 1.340 | 0.041 | 0.0559 | 0.464 | 1.257 |
| 71.93 | 1.363 | 0.034 | 0.0469 | 0.390 | 1.306 |
| 75.94 | 1.383 | 0.028 | 0.0372 | 0.309 | 1.348 |
| 79.90 | 1.396 | 0.022 | 0.0275 | 0.224 | 1.378 |
| 83.93 | 1.407 | 0.015 | 0.0168 | 0.134 | 1.400 |
| 87.98 | 1.412 | 0.008 | 0.0067 | 0.041 | 1.411 |
| 91.90 | 1.413 | 0.002 | -0.0037 | -0.049 | 1.412 |
| 94.91 | 1.410 | -0.003 | -0.0116 | -0.118 | 1.406 |
| 0.01 | -0.012 | 0.221 | -0.0072 | -0.012 | 0.221 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 7.50 | 84 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.79 | -0.221 | 0.230 | -0.0503 | -0.205 | 0.244 |
| 0.07 | -0.030 | 0.239 | -0.0049 | -0.031 | 0.239 |
| 4.02 | 0.154 | 0.241 | 0.0322 | 0.137 | 0.251 |
| 8.03 | 0.427 | 0.214 | 0.1127 | 0.393 | 0.271 |
| 14.02 | 0.792 | 0.173 | 0.1710 | 0.727 | 0.360 |
| 19.94 | 1.043 | 0.152 | 0.1812 | 0.929 | 0.498 |
| 23.99 | 1.191 | 0.133 | 0.1789 | 1.034 | 0.605 |
| 27.85 | 1.346 | 0.105 | 0.1350 | 1.142 | 0.722 |
| 31.85 | 1.432 | 0.094 | 0.1199 | 1.167 | 0.835 |
| 35.84 | 1.540 | 0.087 | 0.1097 | 1.197 | 0.972 |
| 39.75 | 1.270 | 0.080 | 0.1024 | 0.926 | 0.874 |
| 43.75 | 1.206 | 0.074 | 0.0975 | 0.819 | 0.888 |
| 47.73 | 1.247 | 0.069 | 0.0923 | 0.787 | 0.970 |
| 51.58 | 1.280 | 0.064 | 0.0861 | 0.745 | 1.043 |
| 59.60 | 1.348 | 0.053 | 0.0721 | 0.637 | 1.189 |
| 67.56 | 1.414 | 0.040 | 0.0547 | 0.502 | 1.322 |
| 75.53 | 1.462 | 0.028 | 0.0361 | 0.338 | 1.422 |
| 83.40 | 1.488 | 0.016 | 0.0174 | 0.156 | 1.480 |
| 91.40 | 1.494 | 0.003 | -0.0026 | -0.039 | 1.494 |
| 93.34 | 1.495 | -0.001 | -0.0077 | -0.087 | 1.492 |
| 0.02 | -0.024 | 0.237 | -0.0071 | -0.024 | 0.237 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 9.50 | 92 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.89 | -0.260 | 0.232 | -0.0570 | -0.243 | 0.249 |
| 0. | -0.039 | 0.246 | -0.0094 | -0.039 | 0.246 |
| 3.99 | 0.163 | 0.248 | 0.0323 | 0.145 | 0.258 |
| 8.09 | 0.523 | 0.209 | 0.1180 | 0.488 | 0.281 |
| 16.01 | 0.913 | 0.170 | 0.1673 | 0.830 | 0.416 |
| 19.97 | 1.074 | 0.147 | 0.1783 | 0.959 | 0.505 |
| 24.09 | 1.247 | 0.125 | 0.1682 | 1.087 | 0.623 |
| 28.00 | 1.479 | 0.087 | 0.1464 | 1.265 | 0.771 |
| 32.04 | 1.505 | 0.086 | 0.1202 | 1.231 | 0.871 |
| 36.05 | 1.605 | 0.081 | 0.1109 | 1.250 | 1.010 |
| 40.06 | 1.668 | 0.078 | 0.1045 | 1.226 | 1.133 |
| 44.04 | 1.329 | 0.073 | 0.0963 | 0.905 | 0.976 |
| 47.99 | 1.331 | 0.068 | 0.0903 | 0.840 | 1.035 |
| 52.06 | 1.352 | 0.063 | 0.0840 | 0.782 | 1.105 |
| 60.01 | 1.412 | 0.052 | 0.0703 | 0.661 | 1.249 |
| 68.08 | 1.479 | 0.040 | 0.0533 | 0.515 | 1.387 |
| 75.99 | 1.520 | 0.028 | 0.0356 | 0.340 | 1.482 |
| 84.08 | 1.543 | 0.016 | 0.0168 | 0.143 | 1.536 |
| 92.05 | 1.547 | 0.003 | -0.0015 | -0.059 | 1.546 |
| 94.01 | 1.544 | 0. | -0.0065 | -0.108 | 1.540 |
| 0.09 | 0.025 | 0.232 | -0.0169 | 0.025 | 0.232 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 10.50 | 104 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.92 | -0.240 | 0.206 | -0.0484 | -0.226 | 0.222 |
| 0.05 | -0.016 | 0.247 | -0.0061 | -0.017 | 0.247 |
| 4.03 | 0.178 | 0.248 | 0.0346 | 0.160 | 0.260 |
| 7.99 | 0.545 | 0.209 | 0.1193 | 0.511 | 0.283 |
| 15.94 | 0.951 | 0.170 | 0.1665 | 0.867 | 0.424 |
| 20.00 | 1.117 | 0.142 | 0.1768 | 1.001 | 0.516 |
| 27.90 | 1.545 | 0.083 | 0.1430 | 1.327 | 0.797 |
| 31.90 | 1.528 | 0.115 | 0.1346 | 1.236 | 0.905 |
| 35.91 | 1.632 | 0.080 | 0.1078 | 1.275 | 1.022 |
| 39.88 | 1.694 | 0.077 | 0.1026 | 1.251 | 1.145 |
| 43.84 | 1.359 | 0.072 | 0.0948 | 0.930 | 0.993 |
| 47.90 | 1.347 | 0.067 | 0.0885 | 0.854 | 1.045 |
| 51.84 | 1.379 | 0.062 | 0.0822 | 0.804 | 1.123 |
| 59.82 | 1.442 | 0.051 | 0.0686 | 0.681 | 1.273 |
| 67.77 | 1.499 | 0.040 | 0.0520 | 0.530 | 1.403 |
| 75.71 | 1.543 | 0.028 | 0.0347 | 0.354 | 1.502 |
| 83.68 | 1.564 | 0.015 | 0.0163 | 0.157 | 1.556 |
| 91.70 | 1.568 | 0.003 | -0.0024 | -0.049 | 1.567 |
| 93.65 | 1.569 | 0. | -0.0068 | -0.100 | 1.566 |
| 0.04 | -0.010 | 0.247 | -0.0092 | -0.010 | 0.247 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.01 | 11.50 | 96 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.79 | -0.251 | 0.241 | -0.0477 | -0.234 | 0.257 |
| 0.07 | -0.008 | 0.248 | -0.0042 | -0.008 | 0.248 |
| 4.05 | 0.200 | 0.248 | 0.0389 | 0.182 | 0.262 |
| 8.05 | 0.571 | 0.208 | 0.1215 | 0.536 | 0.286 |
| 16.03 | 0.987 | 0.168 | 0.1653 | 0.902 | 0.434 |
| 20.01 | 1.139 | 0.141 | 0.1747 | 1.022 | 0.522 |
| 23.99 | 1.375 | 0.110 | 0.1498 | 1.212 | 0.660 |
| 28.00 | 1.583 | 0.080 | 0.1412 | 1.360 | 0.814 |
| 31.92 | 1.559 | 0.083 | 0.1165 | 1.279 | 0.895 |
| 35.94 | 1.660 | 0.080 | 0.1068 | 1.297 | 1.039 |
| 39.86 | 1.713 | 0.076 | 0.1016 | 1.266 | 1.156 |
| 43.87 | 1.613 | 0.072 | 0.0953 | 1.114 | 1.170 |
| 47.81 | 1.391 | 0.067 | 0.0878 | 0.885 | 1.076 |
| 51.79 | 1.409 | 0.062 | 0.0820 | 0.823 | 1.145 |
| 59.73 | 1.469 | 0.051 | 0.0676 | 0.696 | 1.294 |
| 67.75 | 1.528 | 0.039 | 0.0514 | 0.542 | 1.429 |
| 75.67 | 1.566 | 0.028 | 0.0340 | 0.361 | 1.524 |
| 83.61 | 1.587 | 0.015 | 0.0156 | 0.161 | 1.579 |
| 91.51 | 1.589 | 0.003 | -0.0025 | -0.045 | 1.589 |
| 93.53 | 1.589 | 0. | -0.0072 | -0.098 | 1.586 |
| 0.09 | -0.003 | 0.247 | -0.0078 | -0.003 | 0.247 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.00 | 11.50 | 100 | 11 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.84 | -0.273 | 0.238 | -0.0543 | -0.256 | 0.256 |
| 0.04 | -0.025 | 0.251 | -0.0056 | -0.025 | 0.251 |
| 4.04 | 0.187 | 0.250 | 0.0340 | 0.169 | 0.263 |
| 8.18 | 0.580 | 0.207 | 0.1234 | 0.544 | 0.287 |
| 16.09 | 0.995 | 0.171 | 0.1624 | 0.908 | 0.440 |
| 20.03 | 1.159 | 0.147 | 0.1698 | 1.038 | 0.535 |
| 24.11 | 1.423 | 0.110 | 0.1372 | 1.254 | 0.681 |
| 28.06 | 1.634 | 0.084 | 0.1328 | 1.402 | 0.843 |
| 32.01 | 1.666 | 0.082 | 0.1154 | 1.369 | 0.953 |
| 36.07 | 1.694 | 0.080 | 0.1068 | 1.322 | 1.062 |
| 40.01 | 1.741 | 0.076 | 0.1006 | 1.284 | 1.177 |
| 44.05 | 1.277 | 0.071 | 0.0927 | 0.868 | 0.939 |
| 48.05 | 1.295 | 0.066 | 0.0872 | 0.816 | 1.007 |
| 51.89 | 1.323 | 0.062 | 0.0827 | 0.767 | 1.079 |
| 59.92 | 1.437 | 0.051 | 0.0674 | 0.676 | 1.269 |
| 0.06 | -0.014 | 0.249 | -0.0069 | -0.014 | 0.249 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.11 | 6.00 | 75 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.97 | -0.111 | 0.163 | -0.0081 | -0.099 | 0.171 |
| 0.10 | -0.022 | 0.164 | 0.0007 | -0.022 | 0.164 |
| 4.02 | 0.065 | 0.166 | 0.0044 | 0.053 | 0.170 |
| 8.03 | 0.244 | 0.158 | 0.0491 | 0.220 | 0.190 |
| 16.02 | 0.521 | 0.161 | 0.0887 | 0.456 | 0.298 |
| 19.99 | 0.674 | 0.157 | 0.1050 | 0.580 | 0.378 |
| 27.94 | 1.004 | 0.128 | 0.1018 | 0.826 | 0.584 |
| 36.00 | 1.248 | 0.089 | 0.1006 | 0.957 | 0.806 |
| 43.87 | 1.335 | 0.075 | 0.0934 | 0.910 | 0.979 |
| 51.83 | 1.101 | 0.062 | 0.0813 | 0.632 | 0.904 |
| 59.80 | 1.135 | 0.051 | 0.0692 | 0.527 | 1.007 |
| 67.86 | 1.182 | 0.039 | 0.0535 | 0.409 | 1.110 |
| 75.79 | 1.215 | 0.027 | 0.0363 | 0.272 | 1.185 |
| 83.76 | 1.232 | 0.015 | 0.0171 | 0.119 | 1.226 |
| 91.72 | 1.237 | 0.002 | -0.0026 | -0.040 | 1.237 |
| 93.72 | 1.235 | -0.001 | -0.0076 | -0.079 | 1.232 |
| 0.04 | -0.009 | 0.164 | -0.0029 | -0.009 | 0.164 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 6.50 | 79 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.83 | -0.153 | 0.202 | -0.0379 | -0.139 | 0.212 |
| 0.11 | -0.013 | 0.208 | -0.0047 | -0.013 | 0.208 |
| 4.12 | 0.123 | 0.207 | 0.0253 | 0.108 | 0.216 |
| 8.15 | 0.331 | 0.189 | 0.0867 | 0.301 | 0.234 |
| 12.04 | 0.522 | 0.174 | 0.1264 | 0.475 | 0.279 |
| 16.11 | 0.696 | 0.161 | 0.1475 | 0.624 | 0.348 |
| 20.04 | 0.861 | 0.152 | 0.1552 | 0.757 | 0.438 |
| 24.08 | 1.039 | 0.140 | 0.1528 | 0.891 | 0.552 |
| 28.09 | 1.250 | 0.118 | 0.1280 | 1.047 | 0.693 |
| 32.04 | 1.345 | 0.091 | 0.1188 | 1.092 | 0.790 |
| 36.05 | 1.441 | 0.084 | 0.1089 | 1.115 | 0.916 |
| 40.02 | 1.532 | 0.079 | 0.1013 | 1.122 | 1.045 |
| 44.02 | 1.562 | 0.075 | 0.0952 | 1.071 | 1.139 |
| 48.02 | 1.320 | 0.068 | 0.0880 | 0.832 | 1.027 |
| 52.00 | 1.306 | 0.063 | 0.0819 | 0.754 | 1.068 |
| 56.01 | 1.327 | 0.057 | 0.0759 | 0.695 | 1.133 |
| 59.96 | 1.352 | 0.052 | 0.0690 | 0.632 | 1.196 |
| 63.97 | 1.379 | 0.046 | 0.0613 | 0.564 | 1.259 |
| 67.99 | 1.400 | 0.040 | 0.0529 | 0.488 | 1.313 |
| 72.01 | 1.422 | 0.034 | 0.0439 | 0.407 | 1.362 |
| 76.00 | 1.438 | 0.028 | 0.0349 | 0.321 | 1.402 |
| 79.90 | 1.450 | 0.022 | 0.0259 | 0.233 | 1.432 |
| 83.91 | 1.460 | 0.015 | 0.0159 | 0.140 | 1.454 |
| 87.99 | 1.463 | 0.009 | 0.0064 | 0.042 | 1.462 |
| 91.89 | 1.462 | 0.003 | -0.0032 | -0.051 | 1.461 |
| 94.94 | 1.462 | -0.002 | -0.0108 | -0.124 | 1.457 |
| 38.00 | 1.439 | 0.081 | 0.1026 | 1.084 | 0.949 |
| 40.00 | 1.520 | 0.079 | 0.1012 | 1.113 | 1.038 |
| 42.01 | 1.555 | 0.077 | 0.0982 | 1.104 | 1.098 |
| 44.03 | 1.559 | 0.075 | 0.0949 | 1.068 | 1.137 |
| 46.03 | 1.396 | 0.072 | 0.0906 | 0.918 | 1.055 |
| 0.07 | 0.004 | 0.206 | -0.0094 | 0.004 | 0.206 |
| 47.03 | 1.278 | 0.074 | 0.0873 | 0.817 | 0.985 |
| 48.02 | 1.278 | 0.069 | 0.0877 | 0.804 | 0.996 |
| 48.98 | 1.281 | 0.067 | 0.0866 | 0.790 | 1.010 |
| 50.03 | 1.287 | 0.066 | 0.0855 | 0.776 | 1.029 |
| 51.97 | 1.299 | 0.063 | 0.0824 | 0.751 | 1.062 |
| 0.07 | -0.012 | 0.208 | -0.0049 | -0.013 | 0.208 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.09 | 7.50 | 83 | 11 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.90 | -0.222 | 0.216 | -0.0492 | -0.207 | 0.231 |
| 0.06 | -0.035 | 0.223 | -0.0059 | -0.036 | 0.223 |
| 4.03 | 0.151 | 0.224 | 0.0272 | 0.135 | 0.234 |
| 8.04 | 0.428 | 0.196 | 0.1047 | 0.396 | 0.254 |
| 16.02 | 0.820 | 0.161 | 0.1588 | 0.744 | 0.381 |
| 19.90 | 0.982 | 0.146 | 0.1664 | 0.874 | 0.471 |
| 23.85 | 1.126 | 0.130 | 0.1613 | 0.977 | 0.574 |
| 27.85 | 1.337 | 0.102 | 0.1335 | 1.134 | 0.715 |
| 31.84 | 1.441 | 0.088 | 0.1185 | 1.177 | 0.835 |
| 35.82 | 1.535 | 0.081 | 0.1072 | 1.197 | 0.964 |
| 39.76 | 1.628 | 0.076 | 0.1004 | 1.202 | 1.100 |
| 43.74 | 1.683 | 0.072 | 0.0938 | 1.166 | 1.216 |
| 47.71 | 1.434 | 0.067 | 0.0855 | 0.915 | 1.106 |
| 51.60 | 1.398 | 0.061 | 0.0802 | 0.820 | 1.134 |
| 59.59 | 1.443 | 0.051 | 0.0672 | 0.687 | 1.270 |
| 67.56 | 1.484 | 0.039 | 0.0515 | 0.530 | 1.386 |
| 73.45 | 1.509 | 0.031 | 0.0385 | 0.400 | 1.455 |
| 83.45 | 1.538 | 0.016 | 0.0158 | 0.160 | 1.530 |
| 91.40 | 1.545 | 0.003 | -0.0023 | -0.041 | 1.545 |
| 93.33 | 1.544 | 0. | -0.0070 | -0.090 | 1.541 |
| 0.07 | -0.018 | 0.221 | -0.0077 | -0.018 | 0.221 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 9.50 | 91 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.89 | -0.268 | 0.220 | -0.0586 | -0.252 | 0.238 |
| -0.06 | -0.029 | 0.231 | -0.0084 | -0.029 | 0.231 |
| 3.98 | 0.150 | 0.231 | 0.0306 | 0.133 | 0.241 |
| 7.96 | 0.484 | 0.196 | 0.1088 | 0.452 | 0.261 |
| 15.93 | 0.883 | 0.160 | 0.1555 | 0.806 | 0.396 |
| 19.92 | 1.009 | 0.140 | 0.1654 | 0.900 | 0.475 |
| 24.15 | 1.169 | 0.122 | 0.1593 | 1.017 | 0.590 |
| 28.07 | 1.408 | 0.091 | 0.1328 | 1.199 | 0.742 |
| 32.08 | 1.500 | 0.081 | 0.1158 | 1.228 | 0.865 |
| 35.99 | 1.581 | 0.076 | 0.1058 | 1.234 | 0.991 |
| 39.94 | 1.667 | 0.073 | 0.0989 | 1.231 | 1.126 |
| 44.03 | 1.736 | 0.069 | 0.0932 | 1.200 | 1.257 |
| 48.03 | 1.663 | 0.065 | 0.0862 | 1.064 | 1.280 |
| 52.07 | 1.536 | 0.060 | 0.0785 | 0.897 | 1.248 |
| 59.99 | 1.505 | 0.049 | 0.0654 | 0.710 | 1.328 |
| 68.03 | 1.540 | 0.038 | 0.0506 | 0.540 | 1.443 |
| 76.08 | 1.572 | 0.028 | 0.0337 | 0.351 | 1.532 |
| 83.99 | 1.593 | 0.016 | 0.0155 | 0.151 | 1.586 |
| 92.07 | 1.598 | 0.004 | -0.0017 | -0.061 | 1.597 |
| 94.01 | 1.597 | 0.001 | -0.0062 | -0.112 | 1.593 |
| 0. | -0.006 | 0.226 | -0.0149 | -0.006 | 0.226 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 10.50 | 103 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.96 | -0.227 | 0.197 | -0.0494 | -0.212 | 0.212 |
| 0.03 | -0.022 | 0.227 | -0.0077 | -0.022 | 0.227 |
| 4.03 | 0.178 | 0.231 | 0.0327 | 0.161 | 0.242 |
| 8.04 | 0.527 | 0.193 | 0.1141 | 0.495 | 0.265 |
| 16.00 | 0.896 | 0.160 | 0.1532 | 0.817 | 0.401 |
| 20.01 | 1.045 | 0.137 | 0.1632 | 0.935 | 0.487 |
| 27.94 | 1.437 | 0.090 | 0.1269 | 1.227 | 0.752 |
| 31.95 | 1.525 | 0.081 | 0.1102 | 1.251 | 0.875 |
| 35.96 | 1.607 | 0.076 | 0.1019 | 1.256 | 1.005 |
| 39.91 | 1.687 | 0.072 | 0.0965 | 1.248 | 1.138 |
| 43.97 | 1.753 | 0.068 | 0.0913 | 1.214 | 1.266 |
| 47.90 | 1.717 | 0.064 | 0.0852 | 1.104 | 1.317 |
| 51.91 | 1.597 | 0.059 | 0.0779 | 0.939 | 1.294 |
| 59.86 | 1.545 | 0.049 | 0.0640 | 0.733 | 1.361 |
| 67.77 | 1.569 | 0.038 | 0.0491 | 0.558 | 1.466 |
| 75.84 | 1.597 | 0.027 | 0.0326 | 0.365 | 1.555 |
| 83.81 | 1.619 | 0.015 | 0.0147 | 0.159 | 1.611 |
| 91.80 | 1.618 | 0.003 | -0.0028 | -0.054 | 1.617 |
| 93.65 | 1.621 | 0.001 | -0.0068 | -0.104 | 1.617 |
| 0.07 | -0.008 | 0.230 | -0.0086 | -0.008 | 0.229 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 11.50 | 95 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.89 | -0.272 | 0.215 | -0.0618 | -0.256 | 0.233 |
| 0.14 | -0.017 | 0.232 | -0.0085 | -0.017 | 0.232 |
| 4.00 | 0.159 | 0.232 | 0.0303 | 0.142 | 0.242 |
| 8.04 | 0.480 | 0.199 | 0.1040 | 0.448 | 0.264 |
| 15.99 | 0.866 | 0.166 | 0.1474 | 0.787 | 0.398 |
| 20.06 | 1.024 | 0.143 | 0.1589 | 0.913 | 0.486 |
| 24.04 | 1.180 | 0.124 | 0.1500 | 1.027 | 0.594 |
| 28.08 | 1.438 | 0.090 | 0.1245 | 1.226 | 0.756 |
| 32.02 | 1.540 | 0.080 | 0.1111 | 1.263 | 0.885 |
| 36.00 | 1.623 | 0.076 | 0.1033 | 1.268 | 1.015 |
| 39.93 | 1.694 | 0.072 | 0.0972 | 1.252 | 1.143 |
| 44.02 | 1.762 | 0.069 | 0.0917 | 1.220 | 1.274 |
| 47.98 | 1.780 | 0.064 | 0.0856 | 1.144 | 1.365 |
| 51.99 | 1.703 | 0.059 | 0.0793 | 1.002 | 1.379 |
| 59.96 | 1.597 | 0.050 | 0.0648 | 0.756 | 1.407 |
| 67.99 | 1.610 | 0.039 | 0.0497 | 0.567 | 1.507 |
| 76.02 | 1.630 | 0.028 | 0.0331 | 0.367 | 1.588 |
| 83.92 | 1.644 | 0.016 | 0.0161 | 0.158 | 1.636 |
| 91.94 | 1.639 | 0.004 | -0.0020 | -0.060 | 1.638 |
| 93.86 | 1.641 | 0.001 | -0.0065 | -0.112 | 1.637 |
| 0. | -0.009 | 0.228 | -0.0134 | -0.009 | 0.228 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.10 | 11.50 | 99 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.92 | -0.253 | 0.219 | -0.0545 | -0.238 | 0.236 |
| 0.05 | -0.013 | 0.232 | -0.0059 | -0.013 | 0.232 |
| 4.04 | 0.184 | 0.231 | 0.0353 | 0.167 | 0.244 |
| 8.06 | 0.533 | 0.194 | 0.1131 | 0.500 | 0.267 |
| 16.08 | 0.926 | 0.161 | 0.1505 | 0.845 | 0.411 |
| 20.03 | 1.086 | 0.140 | 0.1576 | 0.972 | 0.504 |
| 23.98 | 1.258 | 0.117 | 0.1420 | 1.102 | 0.618 |
| 27.99 | 1.504 | 0.085 | 0.1202 | 1.288 | 0.781 |
| 31.99 | 1.623 | 0.077 | 0.1096 | 1.336 | 0.926 |
| 36.04 | 1.700 | 0.075 | 0.1012 | 1.331 | 1.060 |
| 0.05 | -0.009 | 0.233 | -0.0063 | -0.010 | 0.233 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 6.00 | 74 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.91 | -0.136 | 0.140 | -0.0243 | -0.126 | 0.149 |
| -0.07 | -0.027 | 0.145 | -0.0025 | -0.027 | 0.145 |
| 3.98 | 0.084 | 0.147 | 0.0086 | 0.073 | 0.153 |
| 8.02 | 0.219 | 0.141 | 0.0537 | 0.197 | 0.170 |
| 15.97 | 0.459 | 0.144 | 0.0925 | 0.402 | 0.265 |
| 19.90 | 0.609 | 0.143 | 0.1021 | 0.524 | 0.342 |
| 27.96 | 0.895 | 0.121 | 0.1034 | 0.733 | 0.527 |
| 35.93 | 1.180 | 0.084 | 0.0951 | 0.906 | 0.761 |
| 43.88 | 1.333 | 0.072 | 0.0880 | 0.911 | 0.976 |
| 51.76 | 1.427 | 0.061 | 0.0777 | 0.835 | 1.159 |
| 59.79 | 1.403 | 0.050 | 0.0638 | 0.662 | 1.237 |
| 67.80 | 1.361 | 0.039 | 0.0485 | 0.479 | 1.275 |
| 75.84 | 1.343 | 0.027 | 0.0321 | 0.302 | 1.309 |
| 83.71 | 1.351 | 0.015 | 0.0146 | 0.133 | 1.345 |
| 91.65 | 1.351 | 0.003 | -0.0017 | -0.042 | 1.351 |
| 93.63 | 1.345 | 0. | -0.0060 | -0.085 | 1.342 |
| -0.02 | -0.010 | 0.144 | -0.0051 | -0.010 | 0.144 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 6.50 | 78 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.97 | -0.201 | 0.176 | -0.0617 | -0.188 | 0.190 |
| 0. | -0.025 | 0.189 | -0.0066 | -0.025 | 0.189 |
| 3.97 | 0.117 | 0.188 | 0.0253 | 0.104 | 0.196 |
| 7.96 | 0.321 | 0.172 | 0.0819 | 0.294 | 0.214 |
| 12.00 | 0.495 | 0.159 | 0.1160 | 0.451 | 0.258 |
| 16.07 | 0.654 | 0.149 | 0.1354 | 0.587 | 0.324 |
| 19.99 | 0.792 | 0.140 | 0.1436 | 0.697 | 0.403 |
| 23.95 | 0.941 | 0.130 | 0.1437 | 0.807 | 0.501 |
| 28.02 | 1.095 | 0.116 | 0.1297 | 0.912 | 0.617 |
| 31.98 | 1.269 | 0.087 | 0.1146 | 1.030 | 0.746 |
| 35.97 | 1.370 | 0.079 | 0.1056 | 1.062 | 0.868 |
| 39.94 | 1.463 | 0.074 | 0.0975 | 1.074 | 0.996 |
| 43.90 | 1.544 | 0.070 | 0.0913 | 1.064 | 1.121 |
| 47.95 | 1.608 | 0.066 | 0.0851 | 1.028 | 1.238 |
| 51.98 | 1.646 | 0.061 | 0.0787 | 0.966 | 1.335 |
| 55.94 | 1.644 | 0.056 | 0.0713 | 0.875 | 1.394 |
| 59.90 | 1.619 | 0.051 | 0.0634 | 0.768 | 1.426 |
| 63.91 | 1.583 | 0.045 | 0.0550 | 0.656 | 1.442 |
| 67.87 | 1.563 | 0.039 | 0.0477 | 0.553 | 1.463 |
| 71.92 | 1.555 | 0.033 | 0.0398 | 0.451 | 1.488 |
| 75.89 | 1.552 | 0.027 | 0.0315 | 0.352 | 1.512 |
| 79.97 | 1.560 | 0.022 | 0.0231 | 0.251 | 1.540 |
| 83.92 | 1.568 | 0.016 | 0.0144 | 0.151 | 1.561 |
| 87.99 | 1.579 | 0.009 | 0.0058 | 0.046 | 1.579 |
| 91.94 | 1.569 | 0.003 | -0.0025 | -0.056 | 1.568 |
| 94.88 | 1.560 | -0.002 | -0.0090 | -0.131 | 1.555 |
| 0.08 | -0.010 | 0.188 | -0.0059 | -0.010 | 0.188 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 7.50 | 82 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.89 | -0.259 | 0.187 | -0.0675 | -0.246 | 0.204 |
| 0.06 | -0.045 | 0.200 | -0.0101 | -0.046 | 0.200 |
| 4.05 | 0.153 | 0.202 | 0.0310 | 0.139 | 0.213 |
| 8.03 | 0.431 | 0.174 | 0.0987 | 0.403 | 0.233 |
| 16.06 | 0.762 | 0.150 | 0.1405 | 0.691 | 0.355 |
| 20.02 | 0.903 | 0.137 | 0.1493 | 0.802 | 0.438 |
| 23.95 | 1.030 | 0.124 | 0.1487 | 0.891 | 0.531 |
| 28.16 | 1.217 | 0.100 | 0.1277 | 1.026 | 0.663 |
| 31.73 | 1.348 | 0.083 | 0.1134 | 1.103 | 0.779 |
| 35.84 | 1.453 | 0.076 | 0.1027 | 1.134 | 0.912 |
| 39.68 | 1.551 | 0.071 | 0.0932 | 1.148 | 1.045 |
| 43.71 | 1.626 | 0.067 | 0.0880 | 1.129 | 1.173 |
| 47.62 | 1.693 | 0.063 | 0.0824 | 1.094 | 1.293 |
| 51.61 | 1.728 | 0.058 | 0.0763 | 1.027 | 1.390 |
| 59.56 | 1.731 | 0.049 | 0.0626 | 0.835 | 1.517 |
| 67.51 | 1.672 | 0.038 | 0.0464 | 0.604 | 1.559 |
| 75.43 | 1.655 | 0.027 | 0.0304 | 0.390 | 1.608 |
| 83.31 | 1.657 | 0.016 | 0.0138 | 0.177 | 1.647 |
| 91.26 | 1.664 | 0.004 | -0.0019 | -0.040 | 1.664 |
| 93.25 | 1.659 | 0.001 | -0.0059 | -0.095 | 1.656 |
| 0.07 | -0.021 | 0.201 | -0.0067 | -0.021 | 0.201 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 9.50 | 86 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0.01 | -0.021 | 0.207 | -0.0093 | -0.021 | 0.207 |
| -3.98 | -0.260 | 0.193 | -0.0698 | -0.246 | 0.211 |
| 3.99 | 0.139 | 0.207 | 0.0312 | 0.125 | 0.216 |
| 8.02 | 0.439 | 0.180 | 0.0962 | 0.409 | 0.239 |
| 16.08 | 0.777 | 0.152 | 0.1360 | 0.704 | 0.362 |
| 20.03 | 0.908 | 0.136 | 0.1460 | 0.806 | 0.439 |
| 24.00 | 1.059 | 0.118 | 0.1441 | 0.919 | 0.539 |
| 27.97 | 1.257 | 0.092 | 0.1179 | 1.067 | 0.671 |
| 32.07 | 1.393 | 0.077 | 0.1079 | 1.140 | 0.805 |
| 35.97 | 1.499 | 0.073 | 0.0947 | 1.171 | 0.939 |
| 39.97 | 1.574 | 0.069 | 0.0901 | 1.162 | 1.064 |
| 44.01 | 1.645 | 0.065 | 0.0855 | 1.138 | 1.190 |
| 47.97 | 1.706 | 0.060 | 0.0800 | 1.098 | 1.307 |
| 51.97 | 1.744 | 0.056 | 0.0746 | 1.030 | 1.408 |
| 59.96 | 1.795 | 0.047 | 0.0624 | 0.858 | 1.578 |
| 68.00 | 1.796 | 0.038 | 0.0481 | 0.638 | 1.680 |
| 76.01 | 1.786 | 0.026 | 0.0313 | 0.406 | 1.740 |
| 83.95 | 1.790 | 0.016 | 0.0147 | 0.173 | 1.782 |
| 91.94 | 1.803 | 0.005 | -0.0013 | -0.066 | 1.802 |
| 93.96 | 1.803 | 0.002 | -0.0055 | -0.126 | 1.799 |
| 0.06 | 0.010 | 0.206 | -0.0172 | 0.010 | 0.206 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 9.50 | 90 | 11 FT | 580 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0. | -0.025 | 0.209 | -0.0100 | -0.025 | 0.209 |
| 8.01 | 0.462 | 0.178 | 0.0998 | 0.433 | 0.241 |
| 16.12 | 0.786 | 0.153 | 0.1367 | 0.713 | 0.365 |
| 23.96 | 1.077 | 0.116 | 0.1446 | 0.937 | 0.543 |
| 32.02 | 1.374 | 0.079 | 0.1101 | 1.123 | 0.796 |
| 39.98 | 1.567 | 0.068 | 0.0931 | 1.157 | 1.059 |
| 49.97 | 1.713 | 0.058 | 0.0792 | 1.057 | 1.349 |
| 59.92 | 1.782 | 0.047 | 0.0623 | 0.853 | 1.566 |
| 69.97 | 1.784 | 0.034 | 0.0437 | 0.579 | 1.687 |
| 79.93 | 1.779 | 0.021 | 0.0239 | 0.290 | 1.755 |
| 89.99 | 1.796 | 0.008 | 0.0030 | -0.008 | 1.796 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 9.50 | 89 | 11 FT | 680 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0.07 | -0.022 | 0.209 | -0.0079 | -0.022 | 0.209 |
| 8.01 | 0.433 | 0.181 | 0.0934 | 0.404 | 0.240 |
| 16.13 | 0.832 | 0.148 | 0.1401 | 0.758 | 0.374 |
| 23.98 | 1.069 | 0.117 | 0.1448 | 0.929 | 0.541 |
| 32.11 | 1.399 | 0.077 | 0.1118 | 1.144 | 0.809 |
| 40.05 | 1.573 | 0.067 | 0.0949 | 1.161 | 1.064 |
| 48.03 | 1.698 | 0.060 | 0.0821 | 1.091 | 1.302 |
| 59.98 | 1.789 | 0.047 | 0.0624 | 0.854 | 1.572 |
| 69.98 | 1.783 | 0.034 | 0.0432 | 0.578 | 1.686 |
| 79.93 | 1.781 | 0.021 | 0.0235 | 0.291 | 1.757 |
| 90.03 | 1.799 | 0.007 | 0.0024 | -0.008 | 1.799 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 9.50 | 88 | 11 FT | 780 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -0.06 | -0.029 | 0.210 | -0.0065 | -0.029 | 0.210 |
| 8.09 | 0.450 | 0.181 | 0.0964 | 0.420 | 0.242 |
| 16.11 | 0.813 | 0.151 | 0.1379 | 0.739 | 0.371 |
| 23.98 | 1.052 | 0.120 | 0.1440 | 0.912 | 0.537 |
| 31.99 | 1.403 | 0.077 | 0.1109 | 1.149 | 0.809 |
| 39.92 | 1.572 | 0.068 | 0.0941 | 1.162 | 1.061 |
| 48.10 | 1.695 | 0.060 | 0.0822 | 1.087 | 1.301 |
| 60.12 | 1.790 | 0.047 | 0.0625 | 0.851 | 1.576 |
| 70.15 | 1.780 | 0.034 | 0.0428 | 0.572 | 1.685 |
| 80.12 | 1.780 | 0.021 | 0.0229 | 0.285 | 1.758 |
| 90.02 | 1.799 | 0.008 | 0.0025 | -0.008 | 1.799 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 9.50 | 87 | 11 FT | 870 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0.07 | -0.024 | 0.205 | -0.0044 | -0.024 | 0.205 |
| 8.04 | 0.475 | 0.179 | 0.0991 | 0.445 | 0.243 |
| 16.12 | 0.821 | 0.151 | 0.1380 | 0.747 | 0.373 |
| 23.96 | 1.062 | 0.117 | 0.1447 | 0.923 | 0.538 |
| 31.99 | 1.440 | 0.073 | 0.1121 | 1.183 | 0.825 |
| 39.98 | 1.585 | 0.067 | 0.0940 | 1.172 | 1.070 |
| 48.07 | 1.703 | 0.059 | 0.0819 | 1.094 | 1.306 |
| 59.91 | 1.790 | 0.046 | 0.0618 | 0.857 | 1.572 |
| 70.02 | 1.773 | 0.034 | 0.0422 | 0.574 | 1.678 |
| 80.00 | 1.778 | 0.021 | 0.0226 | 0.288 | 1.755 |
| 89.93 | 1.801 | 0.008 | 0.0027 | -0.006 | 1.801 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 10.50 | 102 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.92 | -0.273 | 0.193 | -0.0743 | -0.259 | 0.211 |
| 0.05 | -0.024 | 0.208 | -0.0086 | -0.024 | 0.208 |
| 4.02 | 0.176 | 0.208 | 0.0384 | 0.161 | 0.219 |
| 8.03 | 0.477 | 0.177 | 0.1024 | 0.448 | 0.242 |
| 16.04 | 0.831 | 0.149 | 0.1378 | 0.758 | 0.372 |
| 19.99 | 0.958 | 0.131 | 0.1473 | 0.855 | 0.451 |
| 27.93 | 1.291 | 0.089 | 0.1150 | 1.099 | 0.683 |
| 32.00 | 1.419 | 0.076 | 0.1038 | 1.164 | 0.817 |
| 36.01 | 1.519 | 0.071 | 0.0954 | 1.187 | 0.950 |
| 39.92 | 1.598 | 0.067 | 0.0894 | 1.182 | 1.077 |
| 43.91 | 1.674 | 0.064 | 0.0842 | 1.161 | 1.207 |
| 47.89 | 1.735 | 0.060 | 0.0788 | 1.119 | 1.327 |
| 51.87 | 1.756 | 0.055 | 0.0732 | 1.041 | 1.415 |
| 59.87 | 1.798 | 0.046 | 0.0600 | 0.863 | 1.579 |
| 67.80 | 1.807 | 0.036 | 0.0451 | 0.646 | 1.687 |
| 75.84 | 1.799 | 0.026 | 0.0299 | 0.415 | 1.751 |
| 83.73 | 1.807 | 0.015 | 0.0141 | 0.182 | 1.798 |
| 91.76 | 1.816 | 0.005 | -0.0021 | -0.060 | 1.815 |
| 93.67 | 1.814 | 0.002 | -0.0059 | -0.118 | 1.810 |
| 0.04 | -0.011 | 0.209 | -0.0096 | -0.011 | 0.209 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 11.50 | 94 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.87 | -0.268 | 0.194 | -0.0711 | -0.254 | 0.212 |
| 0.07 | -0.047 | 0.208 | -0.0143 | -0.047 | 0.208 |
| 3.99 | 0.146 | 0.209 | 0.0310 | 0.132 | 0.219 |
| 8.14 | 0.455 | 0.180 | 0.0979 | 0.425 | 0.242 |
| 16.12 | 0.802 | 0.152 | 0.1347 | 0.728 | 0.369 |
| 20.11 | 0.946 | 0.136 | 0.1437 | 0.842 | 0.453 |
| 24.03 | 1.078 | 0.119 | 0.1393 | 0.936 | 0.548 |
| 28.03 | 1.298 | 0.088 | 0.1142 | 1.104 | 0.688 |
| 32.04 | 1.434 | 0.075 | 0.1029 | 1.175 | 0.824 |
| 35.98 | 1.526 | 0.070 | 0.0953 | 1.193 | 0.953 |
| 40.00 | 1.599 | 0.067 | 0.0898 | 1.182 | 1.079 |
| 44.13 | 1.669 | 0.063 | 0.0847 | 1.154 | 1.208 |
| 47.95 | 1.735 | 0.060 | 0.0791 | 1.118 | 1.328 |
| 51.93 | 1.768 | 0.055 | 0.0734 | 1.047 | 1.426 |
| 59.96 | 1.814 | 0.046 | 0.0611 | 0.868 | 1.594 |
| 67.93 | 1.826 | 0.037 | 0.0465 | 0.652 | 1.706 |
| 75.92 | 1.819 | 0.026 | 0.0311 | 0.417 | 1.770 |
| 83.91 | 1.821 | 0.016 | 0.0152 | 0.177 | 1.813 |
| 91.90 | 1.821 | 0.005 | -0.0011 | -0.066 | 1.820 |
| 93.97 | 1.820 | 0.003 | -0.0055 | -0.128 | 1.816 |
| 0.01 | 0.001 | 0.208 | -0.0175 | 0. | 0.208 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.30 | 11.50 | 98 | 11 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.92 | -0.275 | 0.197 | -0.0632 | -0.261 | 0.215 |
| 0.14 | -0.019 | 0.211 | -0.0051 | -0.020 | 0.211 |
| 4.11 | 0.181 | 0.210 | 0.0361 | 0.166 | 0.222 |
| 8.05 | 0.501 | 0.175 | 0.1072 | 0.472 | 0.243 |
| 16.08 | 0.869 | 0.145 | 0.1397 | 0.795 | 0.380 |
| 20.06 | 1.006 | 0.128 | 0.1460 | 0.901 | 0.466 |
| 24.02 | 1.146 | 0.110 | 0.1349 | 1.002 | 0.567 |
| 28.05 | 1.381 | 0.080 | 0.1125 | 1.181 | 0.720 |
| 32.00 | 1.491 | 0.072 | 0.1010 | 1.227 | 0.851 |
| 36.07 | 1.581 | 0.069 | 0.0930 | 1.237 | 0.986 |
| 39.96 | 1.648 | 0.066 | 0.0880 | 1.221 | 1.109 |
| 43.97 | 1.708 | 0.062 | 0.0831 | 1.186 | 1.231 |
| 0.07 | -0.006 | 0.211 | -0.0087 | -0.007 | 0.211 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.00 | 135 | 9X7 FT | 340 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.98 | -0.153 | 0.097 | -0.0228 | -0.146 | 0.108 |
| 0.06 | -0.013 | 0.090 | 0.0011 | -0.013 | 0.090 |
| 4.03 | 0.135 | 0.096 | 0.0219 | 0.128 | 0.106 |
| 8.07 | 0.265 | 0.113 | 0.0481 | 0.247 | 0.149 |
| 12.06 | 0.391 | 0.129 | 0.0704 | 0.355 | 0.208 |
| 16.03 | 0.497 | 0.135 | 0.0868 | 0.441 | 0.267 |
| 20.13 | 0.631 | 0.134 | 0.1005 | 0.547 | 0.343 |
| 24.11 | 0.755 | 0.126 | 0.1102 | 0.638 | 0.424 |
| 28.14 | 0.877 | 0.117 | 0.1122 | 0.718 | 0.517 |
| 31.10 | 0.978 | 0.108 | 0.1067 | 0.781 | 0.598 |
| 36.27 | 1.141 | 0.083 | 0.0961 | 0.871 | 0.742 |
| 40.13 | 1.227 | 0.075 | 0.0917 | 0.890 | 0.848 |
| 44.17 | 1.300 | 0.069 | 0.0865 | 0.885 | 0.955 |
| 48.31 | 1.368 | 0.064 | 0.0810 | 0.863 | 1.064 |
| 52.24 | 1.423 | 0.059 | 0.0755 | 0.825 | 1.161 |
| 56.30 | 1.442 | 0.054 | 0.0690 | 0.755 | 1.230 |
| 60.27 | 1.467 | 0.049 | 0.0622 | 0.685 | 1.299 |
| 64.35 | 1.496 | 0.044 | 0.0555 | 0.608 | 1.368 |
| 68.35 | 1.518 | 0.039 | 0.0482 | 0.524 | 1.425 |
| 72.34 | 1.535 | 0.033 | 0.0401 | 0.435 | 1.473 |
| 76.34 | 1.548 | 0.027 | 0.0327 | 0.339 | 1.510 |
| 80.34 | 1.557 | 0.022 | 0.0245 | 0.240 | 1.538 |
| 84.37 | 1.560 | 0.016 | 0.0161 | 0.137 | 1.554 |
| 88.41 | 1.564 | 0.010 | 0.0076 | 0.033 | 1.564 |
| 90.40 | 1.563 | 0.007 | 0.0035 | -0.018 | 1.563 |
| 92.42 | 1.563 | 0.004 | -0.0011 | -0.070 | 1.562 |
| 96.48 | 1.563 | -0.001 | -0.0090 | -0.175 | 1.553 |
| -0.04 | 0.004 | 0.089 | -0.0046 | 0.004 | 0.089 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.00 | 134 | 9X7 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.86 | -0.157 | 0.098 | -0.0214 | -0.150 | 0.108 |
| -0.04 | -0.018 | 0.091 | 0.0009 | -0.018 | 0.091 |
| 4.08 | 0.118 | 0.096 | 0.0206 | 0.111 | 0.105 |
| 8.14 | 0.262 | 0.113 | 0.0475 | 0.243 | 0.149 |
| 8.13 | 0.268 | 0.113 | 0.0478 | 0.249 | 0.150 |
| 8.13 | 0.270 | 0.114 | 0.0476 | 0.251 | 0.151 |
| 8.13 | 0.272 | 0.114 | 0.0476 | 0.253 | 0.151 |
| 8.14 | 0.273 | 0.114 | 0.0475 | 0.254 | 0.152 |
| 8.13 | 0.274 | 0.114 | 0.0468 | 0.255 | 0.152 |
| 12.10 | 0.400 | 0.130 | 0.0687 | 0.364 | 0.211 |
| 16.09 | 0.505 | 0.136 | 0.0873 | 0.447 | 0.271 |
| 20.15 | 0.642 | 0.134 | 0.1008 | 0.556 | 0.347 |
| 24.21 | 0.769 | 0.126 | 0.1111 | 0.650 | 0.430 |
| 28.22 | 0.884 | 0.117 | 0.1130 | 0.724 | 0.521 |
| 32.10 | 1.031 | 0.102 | 0.1023 | 0.819 | 0.634 |
| 36.21 | 1.134 | 0.082 | 0.0967 | 0.866 | 0.736 |
| 40.19 | 1.225 | 0.073 | 0.0911 | 0.888 | 0.847 |
| 44.29 | 1.296 | 0.069 | 0.0858 | 0.879 | 0.954 |
| 48.21 | 1.361 | 0.064 | 0.0807 | 0.859 | 1.057 |
| 52.18 | 1.405 | 0.059 | 0.0745 | 0.815 | 1.146 |
| 56.28 | 1.431 | 0.055 | 0.0687 | 0.749 | 1.221 |
| 60.33 | 1.462 | 0.049 | 0.0620 | 0.681 | 1.294 |
| 64.32 | 1.492 | 0.043 | 0.0551 | 0.607 | 1.363 |
| 68.33 | 1.516 | 0.038 | 0.0480 | 0.524 | 1.423 |
| 72.25 | 1.532 | 0.032 | 0.0397 | 0.436 | 1.468 |
| 76.32 | 1.543 | 0.027 | 0.0322 | 0.339 | 1.505 |
| 80.42 | 1.551 | 0.021 | 0.0239 | 0.237 | 1.533 |
| 84.38 | 1.555 | 0.016 | 0.0155 | 0.137 | 1.549 |
| 88.45 | 1.557 | 0.010 | 0.0069 | 0.032 | 1.557 |
| 90.44 | 1.558 | 0.007 | 0.0030 | -0.019 | 1.558 |
| 92.40 | 1.558 | 0.004 | -0.0018 | -0.069 | 1.557 |
| 96.49 | 1.556 | -0.002 | -0.0097 | -0.174 | 1.546 |
| -0.04 | -0.009 | 0.091 | 0. | -0.008 | 0.091 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.50 | 138 | 9X7 FT | 500 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.200 | 0.120 | -0.0435 | -0.192 | 0.134 |
| 0.01 | -0.023 | 0.115 | -0.0048 | -0.023 | 0.115 |
| 4.14 | 0.163 | 0.121 | 0.0366 | 0.154 | 0.132 |
| 12.06 | 0.483 | 0.130 | 0.0971 | 0.446 | 0.229 |
| 20.10 | 0.724 | 0.123 | 0.1250 | 0.638 | 0.365 |
| 28.13 | 0.948 | 0.107 | 0.1270 | 0.785 | 0.542 |
| 36.19 | 1.188 | 0.077 | 0.0943 | 0.914 | 0.763 |
| 44.28 | 1.362 | 0.064 | 0.0808 | 0.931 | 0.997 |
| 52.18 | 1.476 | 0.055 | 0.0696 | 0.862 | 1.199 |
| 60.26 | 1.532 | 0.046 | 0.0569 | 0.720 | 1.353 |
| 68.32 | 1.584 | 0.036 | 0.0434 | 0.552 | 1.485 |
| 76.39 | 1.611 | 0.025 | 0.0287 | 0.355 | 1.572 |
| 84.35 | 1.623 | 0.015 | 0.0134 | 0.145 | 1.616 |
| 88.45 | 1.623 | 0.009 | 0.0054 | 0.035 | 1.623 |
| 92.37 | 1.624 | 0.004 | -0.0029 | -0.071 | 1.622 |
| 96.49 | 1.620 | -0.001 | -0.0103 | -0.182 | 1.610 |
| 0.08 | -0.010 | 0.114 | -0.0076 | -0.011 | 0.114 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 6.50 | 139 | 9X7 FT | 350 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.02 | -0.197 | 0.119 | -0.0459 | -0.189 | 0.132 |
| 0.01 | -0.024 | 0.113 | -0.0054 | -0.024 | 0.113 |
| 4.02 | 0.151 | 0.119 | 0.0363 | 0.142 | 0.130 |
| 12.03 | 0.472 | 0.130 | 0.0955 | 0.434 | 0.226 |
| 20.06 | 0.719 | 0.123 | 0.1245 | 0.633 | 0.362 |
| 28.18 | 0.941 | 0.108 | 0.1256 | 0.779 | 0.540 |
| 36.27 | 1.188 | 0.077 | 0.0933 | 0.912 | 0.765 |
| 44.29 | 1.353 | 0.064 | 0.0810 | 0.924 | 0.990 |
| 52.18 | 1.486 | 0.054 | 0.0697 | 0.869 | 1.207 |
| 60.32 | 1.539 | 0.046 | 0.0570 | 0.722 | 1.359 |
| 68.33 | 1.584 | 0.036 | 0.0433 | 0.552 | 1.486 |
| 76.38 | 1.613 | 0.025 | 0.0287 | 0.355 | 1.573 |
| 84.38 | 1.624 | 0.015 | 0.0132 | 0.144 | 1.618 |
| 88.44 | 1.627 | 0.009 | 0.0054 | 0.035 | 1.627 |
| 92.37 | 1.626 | 0.004 | -0.0027 | -0.071 | 1.624 |
| 96.45 | 1.624 | -0.001 | -0.0103 | -0.181 | 1.614 |
| 0. | 0.002 | 0.111 | -0.0115 | 0.002 | 0.111 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 7.50 | 143 | 9X7 FT | 340 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.00 | -0.225 | 0.137 | -0.0562 | -0.215 | 0.153 |
| -0.12 | -0.004 | 0.133 | -0.0015 | -0.003 | 0.133 |
| 4.01 | 0.237 | 0.141 | 0.0555 | 0.227 | 0.158 |
| 11.91 | 0.597 | 0.142 | 0.1128 | 0.555 | 0.262 |
| 20.07 | 0.870 | 0.128 | 0.1375 | 0.773 | 0.419 |
| 28.15 | 1.100 | 0.107 | 0.1333 | 0.920 | 0.613 |
| 36.19 | 1.359 | 0.076 | 0.0958 | 1.051 | 0.864 |
| 44.17 | 1.534 | 0.064 | 0.0829 | 1.056 | 1.115 |
| 52.28 | 1.654 | 0.055 | 0.0711 | 0.969 | 1.342 |
| 60.26 | 1.721 | 0.046 | 0.0579 | 0.814 | 1.517 |
| 68.36 | 1.771 | 0.036 | 0.0436 | 0.620 | 1.660 |
| 76.49 | 1.799 | 0.026 | 0.0285 | 0.395 | 1.755 |
| 80.35 | 1.805 | 0.020 | 0.0209 | 0.282 | 1.783 |
| 84.37 | 1.808 | 0.015 | 0.0133 | 0.162 | 1.801 |
| 88.47 | 1.811 | 0.010 | 0.0051 | 0.039 | 1.811 |
| 92.42 | 1.812 | 0.004 | -0.0029 | -0.081 | 1.810 |
| 96.56 | 1.808 | -0.001 | -0.0110 | -0.205 | 1.796 |
| -0.05 | 0.013 | 0.132 | -0.0072 | 0.013 | 0.132 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 7.50 | 142 | 9X7 FT | 520 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.08 | -0.244 | 0.140 | -0.0552 | -0.234 | 0.157 |
| -0.12 | -0.042 | 0.133 | -0.0022 | -0.012 | 0.135 |
| 3.96 | 0.236 | 0.143 | 0.0517 | 0.226 | 0.159 |
| 12.11 | 0.619 | 0.144 | 0.1120 | 0.575 | 0.271 |
| 20.08 | 0.888 | 0.130 | 0.1374 | 0.790 | 0.427 |
| 28.12 | 1.102 | 0.106 | 0.1359 | 0.922 | 0.612 |
| 36.25 | 1.352 | 0.076 | 0.0970 | 1.046 | 0.861 |
| 44.37 | 1.530 | 0.064 | 0.0828 | 1.049 | 1.113 |
| 52.20 | 1.650 | 0.056 | 0.0715 | 0.967 | 1.338 |
| 60.26 | 1.712 | 0.046 | 0.0582 | 0.809 | 1.509 |
| 68.36 | 1.768 | 0.036 | 0.0438 | 0.619 | 1.656 |
| 76.34 | 1.793 | 0.026 | 0.0290 | 0.398 | 1.748 |
| 80.35 | 1.797 | 0.020 | 0.0211 | 0.281 | 1.775 |
| 84.45 | 1.800 | 0.015 | 0.0131 | 0.159 | 1.793 |
| 88.39 | 1.804 | 0.010 | 0.0052 | 0.041 | 1.804 |
| 90.38 | 1.805 | 0.007 | 0.0013 | -0.019 | 1.805 |
| 96.46 | 1.800 | -0.001 | -0.0107 | -0.202 | 1.789 |
| -0.01 | 0. | 0.134 | -0.0025 | 0. | 0.134 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 147 | 9X7 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.303 | 0.142 | -0.0594 | -0.292 | 0.163 |
| 0. | -0.027 | 0.130 | -0.0044 | -0.017 | 0.130 |
| 3.96 | 0.269 | 0.144 | 0.0540 | 0.258 | 0.162 |
| 12.04 | 0.672 | 0.145 | 0.1137 | 0.627 | 0.282 |
| 20.17 | 0.938 | 0.127 | 0.1328 | 0.837 | 0.443 |
| 28.16 | 1.180 | 0.095 | 0.1176 | 0.995 | 0.641 |
| 36.32 | 1.433 | 0.058 | 0.0886 | 1.115 | 0.904 |
| 44.30 | 1.578 | 0.060 | 0.0784 | 1.088 | 1.145 |
| 42.33 | 1.550 | 0.062 | 0.0803 | 1.104 | 1.089 |
| 44.30 | 1.582 | 0.060 | 0.0782 | 1.090 | 1.148 |
| 52.37 | 1.689 | 0.052 | 0.0676 | 0.990 | 1.369 |
| 60.47 | 1.736 | 0.043 | 0.0552 | 0.818 | 1.532 |
| 68.47 | 1.783 | 0.034 | 0.0418 | 0.623 | 1.671 |
| 76.57 | 1.801 | 0.024 | 0.0277 | 0.395 | 1.758 |
| 80.53 | 1.802 | 0.019 | 0.0204 | 0.278 | 1.781 |
| 84.49 | 1.802 | 0.014 | 0.0130 | 0.159 | 1.795 |
| 88.60 | 1.805 | 0.009 | 0.0053 | 0.035 | 1.805 |
| 92.01 | 1.805 | 0.004 | -0.0019 | -0.087 | 1.803 |
| 96.59 | 1.802 | 0. | -0.0094 | -0.207 | 1.790 |
| 0.06 | -0.015 | 0.130 | -0.0041 | -0.015 | 0.130 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 146 | 9X7 FT | 350 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.01 | -0.299 | 0.141 | -0.0627 | -0.288 | 0.161 |
| 0. | -0.017 | 0.128 | -0.0050 | -0.017 | 0.128 |
| 4.12 | 0.275 | 0.144 | 0.0578 | 0.264 | 0.163 |
| 12.00 | 0.650 | 0.143 | 0.1142 | 0.606 | 0.275 |
| 20.12 | 0.918 | 0.126 | 0.1329 | 0.819 | 0.434 |
| 28.20 | 1.173 | 0.096 | 0.1144 | 0.989 | 0.639 |
| 36.31 | 1.441 | 0.068 | 0.0882 | 1.121 | 0.908 |
| 44.34 | 1.591 | 0.059 | 0.0780 | 1.096 | 1.154 |
| 52.31 | 1.689 | 0.051 | 0.0673 | 0.992 | 1.368 |
| 60.27 | 1.743 | 0.043 | 0.0552 | 0.827 | 1.535 |
| 68.46 | 1.788 | 0.034 | 0.0416 | 0.625 | 1.676 |
| 76.61 | 1.802 | 0.024 | 0.0279 | 0.394 | 1.758 |
| 80.46 | 1.804 | 0.019 | 0.0207 | 0.280 | 1.783 |
| 84.49 | 1.808 | 0.014 | 0.0130 | 0.160 | 1.801 |
| 88.63 | 1.812 | 0.009 | 0.0053 | 0.034 | 1.812 |
| 92.52 | 1.812 | 0.005 | -0.0020 | -0.084 | 1.810 |
| 96.62 | 1.809 | 0. | -0.0097 | -0.208 | 1.797 |
| 0. | 0.022 | 0.126 | -0.0130 | 0.022 | 0.126 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 151 | 9X7 FT | 530 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.06 | -0.310 | 0.141 | -0.0612 | -0.300 | 0.163 |
| 0. | -0.017 | 0.128 | -0.0038 | -0.017 | 0.128 |
| 4.01 | 0.283 | 0.144 | 0.0556 | 0.272 | 0.163 |
| 11.92 | 0.673 | 0.143 | 0.1127 | 0.629 | 0.279 |
| 20.06 | 0.941 | 0.122 | 0.1306 | 0.842 | 0.437 |
| 28.07 | 1.229 | 0.081 | 0.1045 | 1.047 | 0.650 |
| 36.16 | 1.435 | 0.064 | 0.0853 | 1.120 | 0.899 |
| 44.18 | 1.570 | 0.058 | 0.0757 | 1.086 | 1.135 |
| 52.26 | 1.657 | 0.050 | 0.0650 | 0.975 | 1.341 |
| -0.07 | -0.010 | 0.128 | -0.0069 | -0.009 | 0.128 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 1.60 | 11.50 | 150 | 9X7 FT | 350 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.263 | 0.138 | -0.0715 | -0.253 | 0.156 |
| -0.13 | -0.017 | 0.126 | -0.0073 | -0.017 | 0.126 |
| 3.94 | 0.270 | 0.141 | 0.0568 | 0.260 | 0.160 |
| 11.93 | 0.659 | 0.141 | 0.1132 | 0.616 | 0.274 |
| 20.01 | 0.931 | 0.122 | 0.1289 | 0.833 | 0.433 |
| 28.16 | 1.225 | 0.082 | 0.1019 | 1.041 | 0.651 |
| 36.26 | 1.441 | 0.064 | 0.0852 | 1.124 | 0.904 |
| 44.18 | 1.584 | 0.057 | 0.0753 | 1.097 | 1.145 |
| 52.26 | 1.689 | 0.049 | 0.0647 | 0.994 | 1.366 |
| 60.30 | 1.718 | 0.041 | 0.0531 | 0.816 | 1.513 |
| 68.46 | 1.743 | 0.033 | 0.0401 | 0.609 | 1.633 |
| 76.57 | 1.756 | 0.023 | 0.0263 | 0.385 | 1.713 |
| 80.46 | 1.758 | 0.019 | 0.0197 | 0.273 | 1.737 |
| 84.45 | 1.763 | 0.014 | 0.0124 | 0.156 | 1.756 |
| 88.51 | 1.769 | 0.009 | 0.0052 | 0.037 | 1.769 |
| 92.59 | 1.769 | 0.005 | -0.0020 | -0.085 | 1.767 |
| 96.60 | 1.766 | 0. | -0.0092 | -0.203 | 1.754 |
| -0.14 | 0.009 | 0.124 | -0.0145 | 0.009 | 0.124 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.00 | 136 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.91 | -0.090 | 0.072 | -0.0162 | -0.085 | 0.078 |
| 0.11 | 0.005 | 0.069 | 0.0037 | 0.005 | 0.069 |
| 4.02 | 0.108 | 0.073 | 0.0222 | 0.103 | 0.080 |
| 12.06 | 0.354 | 0.093 | 0.0653 | 0.326 | 0.165 |
| 20.07 | 0.588 | 0.114 | 0.1018 | 0.514 | 0.309 |
| 28.22 | 0.808 | 0.113 | 0.1190 | 0.659 | 0.481 |
| 36.22 | 1.009 | 0.099 | 0.1107 | 0.756 | 0.676 |
| 44.22 | 1.216 | 0.075 | 0.0930 | 0.820 | 0.902 |
| 52.29 | 1.354 | 0.061 | 0.0802 | 0.780 | 1.108 |
| 60.38 | 1.434 | 0.050 | 0.0662 | 0.665 | 1.272 |
| 68.39 | 1.485 | 0.039 | 0.0497 | 0.511 | 1.395 |
| 76.40 | 1.514 | 0.027 | 0.0330 | 0.329 | 1.478 |
| 84.32 | 1.529 | 0.016 | 0.0159 | 0.136 | 1.523 |
| 88.35 | 1.531 | 0.010 | 0.0072 | 0.034 | 1.530 |
| 92.38 | 1.531 | 0.004 | -0.0019 | -0.067 | 1.530 |
| 96.53 | 1.527 | -0.002 | -0.0104 | -0.171 | 1.517 |
| 0.01 | 0.039 | 0.065 | -0.0094 | 0.039 | 0.065 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.00 | 137 | 9X7 FT | 540 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.04 | -0.094 | 0.072 | -0.0157 | -0.089 | 0.079 |
| 0. | 0.008 | 0.071 | 0.0028 | 0.008 | 0.071 |
| 4.07 | 0.119 | 0.074 | 0.0207 | 0.114 | 0.083 |
| 12.08 | 0.350 | 0.095 | 0.0606 | 0.323 | 0.166 |
| 12.07 | 0.364 | 0.095 | 0.0622 | 0.336 | 0.169 |
| 12.06 | 0.370 | 0.096 | 0.0627 | 0.342 | 0.171 |
| 12.08 | 0.373 | 0.096 | 0.0628 | 0.345 | 0.172 |
| 12.08 | 0.375 | 0.096 | 0.0628 | 0.346 | 0.172 |
| 12.10 | 0.378 | 0.096 | 0.0625 | 0.349 | 0.173 |
| 12.09 | 0.379 | 0.096 | 0.0623 | 0.351 | 0.173 |
| 20.22 | 0.605 | 0.116 | 0.0980 | 0.528 | 0.318 |
| 28.16 | 0.815 | 0.114 | 0.1164 | 0.665 | 0.485 |
| 36.17 | 1.027 | 0.097 | 0.1100 | 0.772 | 0.685 |
| 44.22 | 1.230 | 0.073 | 0.0913 | 0.831 | 0.911 |
| 52.18 | 1.354 | 0.061 | 0.0787 | 0.782 | 1.108 |
| 60.38 | 1.432 | 0.050 | 0.0641 | 0.664 | 1.269 |
| 68.31 | 1.476 | 0.038 | 0.0479 | 0.510 | 1.385 |
| 76.33 | 1.504 | 0.027 | 0.0312 | 0.329 | 1.468 |
| 84.31 | 1.519 | 0.016 | 0.0142 | 0.135 | 1.513 |
| 88.54 | 1.521 | 0.009 | 0.0052 | 0.030 | 1.521 |
| 92.41 | 1.521 | 0.003 | -0.0033 | -0.067 | 1.519 |
| 96.41 | 1.517 | -0.002 | -0.0114 | -0.167 | 1.507 |
| 0. | 0.011 | 0.070 | -0.0009 | 0.011 | 0.070 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.50 | 140 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| 0.08 | 0.004 | 0.080 | 0.0011 | 0.004 | 0.080 |
| -4.07 | -0.109 | 0.083 | -0.0296 | -0.103 | 0.090 |
| -0.07 | 0. | 0.081 | -0.0003 | 0. | 0.081 |
| 4.01 | 0.115 | 0.084 | 0.0288 | 0.109 | 0.092 |
| 12.05 | 0.418 | 0.099 | 0.0825 | 0.388 | 0.184 |
| 20.14 | 0.654 | 0.110 | 0.1176 | 0.576 | 0.329 |
| 28.18 | 0.849 | 0.108 | 0.1264 | 0.697 | 0.496 |
| 36.27 | 1.090 | 0.088 | 0.1049 | 0.827 | 0.716 |
| 44.14 | 1.279 | 0.067 | 0.0861 | 0.871 | 0.939 |
| 52.19 | 1.410 | 0.055 | 0.0727 | 0.821 | 1.148 |
| 60.32 | 1.488 | 0.045 | 0.0593 | 0.698 | 1.315 |
| 68.32 | 1.538 | 0.035 | 0.0444 | 0.535 | 1.442 |
| 76.50 | 1.570 | 0.024 | 0.0283 | 0.343 | 1.532 |
| 84.34 | 1.584 | 0.014 | 0.0126 | 0.142 | 1.578 |
| 88.39 | 1.584 | 0.008 | 0.0045 | 0.036 | 1.583 |
| 92.37 | 1.584 | 0.003 | -0.0041 | -0.068 | 1.583 |
| 96.54 | 1.581 | -0.003 | -0.0119 | -0.177 | 1.571 |
| -0.07 | 0.088 | 0.074 | -0.0098 | 0.088 | 0.074 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 6.50 | 141 | 9X7 FT | 550 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.06 | -0.120 | 0.085 | -0.0264 | -0.113 | 0.094 |
| 0.08 | 0.008 | 0.085 | 0.0016 | 0.008 | 0.085 |
| 4.30 | 0.136 | 0.088 | 0.0285 | 0.129 | 0.097 |
| 12.09 | 0.445 | 0.101 | 0.0812 | 0.414 | 0.191 |
| 20.14 | 0.684 | 0.111 | 0.1167 | 0.603 | 0.340 |
| 28.17 | 0.876 | 0.108 | 0.1273 | 0.721 | 0.509 |
| 36.14 | 1.080 | 0.092 | 0.1062 | 0.818 | 0.711 |
| 44.46 | 1.285 | 0.068 | 0.0853 | 0.873 | 0.945 |
| 52.19 | 1.412 | 0.057 | 0.0723 | 0.821 | 1.150 |
| 60.32 | 1.494 | 0.046 | 0.0592 | 0.700 | 1.321 |
| 68.34 | 1.541 | 0.036 | 0.0445 | 0.535 | 1.445 |
| 76.40 | 1.568 | 0.025 | 0.0287 | 0.345 | 1.530 |
| 84.41 | 1.581 | 0.014 | 0.0127 | 0.140 | 1.575 |
| 88.45 | 1.584 | 0.009 | 0.0047 | 0.034 | 1.584 |
| 92.36 | 1.583 | 0.003 | -0.0036 | -0.068 | 1.582 |
| 96.53 | 1.579 | -0.002 | -0.0112 | -0.177 | 1.569 |
| 0. | 0.023 | 0.083 | -0.0044 | 0.023 | 0.083 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 7.50 | 144 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.12 | -0.127 | 0.089 | -0.0278 | -0.121 | 0.098 |
| 0. | 0.015 | 0.090 | 0.0043 | 0.015 | 0.090 |
| 4.06 | 0.171 | 0.091 | 0.0330 | 0.164 | 0.103 |
| 11.96 | 0.530 | 0.112 | 0.0978 | 0.495 | 0.219 |
| 20.14 | 0.789 | 0.119 | 0.1330 | 0.700 | 0.384 |
| 28.22 | 0.988 | 0.113 | 0.1368 | 0.817 | 0.567 |
| 36.17 | 1.227 | 0.089 | 0.1046 | 0.937 | 0.796 |
| 44.17 | 1.437 | 0.067 | 0.0857 | 0.984 | 1.049 |
| 52.14 | 1.570 | 0.056 | 0.0729 | 0.919 | 1.274 |
| 68.27 | 1.710 | 0.036 | 0.0444 | 0.600 | 1.602 |
| 76.44 | 1.743 | 0.025 | 0.0283 | 0.384 | 1.700 |
| 80.35 | 1.753 | 0.020 | 0.0205 | 0.275 | 1.732 |
| 84.47 | 1.756 | 0.014 | 0.0121 | 0.155 | 1.749 |
| 88.45 | 1.757 | 0.009 | 0.0042 | 0.039 | 1.757 |
| 92.44 | 1.754 | 0.003 | -0.0036 | -0.078 | 1.752 |
| 92.42 | 1.756 | 0.003 | -0.0036 | -0.078 | 1.754 |
| 96.54 | 1.600 | 0.004 | 0.0065 | -0.209 | 1.788 |
| 60.28 | 1.659 | 0.046 | 0.0590 | 0.783 | 1.463 |
| 0. | 0.060 | 0.086 | -0.0037 | 0.060 | 0.086 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 7.50 | 145 | 9X7 FT | 550 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.144 | 0.092 | -0.0248 | -0.137 | 0.102 |
| -0.06 | 0.013 | 0.092 | 0.0042 | 0.014 | 0.092 |
| 3.94 | 0.183 | 0.094 | 0.0291 | 0.177 | 0.106 |
| 11.96 | 0.554 | 0.114 | 0.0937 | 0.518 | 0.226 |
| 20.07 | 0.805 | 0.122 | 0.1312 | 0.715 | 0.391 |
| 28.09 | 1.009 | 0.114 | 0.1375 | 0.836 | 0.576 |
| 36.11 | 1.241 | 0.091 | 0.1052 | 0.949 | 0.805 |
| 44.27 | 1.456 | 0.067 | 0.0858 | 0.996 | 1.064 |
| 52.28 | 1.576 | 0.057 | 0.0730 | 0.919 | 1.281 |
| 60.39 | 1.658 | 0.046 | 0.0591 | 0.779 | 1.464 |
| 68.40 | 1.711 | 0.036 | 0.0440 | 0.597 | 1.604 |
| 76.45 | 1.740 | 0.025 | 0.0283 | 0.383 | 1.697 |
| 80.35 | 1.747 | 0.020 | 0.0206 | 0.273 | 1.725 |
| 84.47 | 1.752 | 0.014 | 0.0123 | 0.155 | 1.745 |
| 88.53 | 1.755 | 0.009 | 0.0042 | 0.036 | 1.755 |
| 92.46 | 1.754 | 0.004 | -0.0035 | -0.079 | 1.752 |
| 96.58 | 1.750 | -0.002 | -0.0116 | -0.199 | 1.739 |
| -0.12 | 0.022 | 0.091 | 0.0004 | 0.022 | 0.091 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 148 | 9X7 FT | 280 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.03 | -0.134 | 0.087 | -0.0281 | -0.128 | 0.096 |
| 0.08 | 0.008 | 0.087 | 0.0036 | 0.008 | 0.087 |
| 4.02 | 0.160 | 0.089 | 0.0303 | 0.154 | 0.100 |
| 11.97 | 0.573 | 0.113 | 0.0992 | 0.537 | 0.230 |
| 20.11 | 0.841 | 0.118 | 0.1327 | 0.749 | 0.400 |
| 28.18 | 1.035 | 0.109 | 0.1306 | 0.861 | 0.584 |
| 36.28 | 1.312 | 0.075 | 0.0920 | 1.013 | 0.837 |
| 44.31 | 1.499 | 0.060 | 0.0781 | 1.031 | 1.090 |
| 52.33 | 1.611 | 0.051 | 0.0667 | 0.944 | 1.306 |
| 60.43 | 1.686 | 0.042 | 0.0543 | 0.795 | 1.487 |
| 68.47 | 1.737 | 0.033 | 0.0409 | 0.607 | 1.628 |
| 76.56 | 1.766 | 0.023 | 0.0266 | 0.388 | 1.723 |
| 80.48 | 1.773 | 0.018 | 0.0194 | 0.275 | 1.752 |
| 84.58 | 1.774 | 0.013 | 0.0118 | 0.154 | 1.767 |
| 88.54 | 1.774 | 0.009 | 0.0045 | 0.037 | 1.774 |
| 92.51 | 1.773 | 0.004 | -0.0030 | -0.081 | 1.771 |
| 96.62 | 1.769 | -0.001 | -0.0105 | -0.203 | 1.758 |
| 0.02 | 0.058 | 0.083 | -0.0048 | 0.058 | 0.083 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 149 | 9X7 FT | 550 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.00 | -0.146 | 0.090 | -0.0240 | -0.140 | 0.100 |
| 0.08 | 0.012 | 0.090 | 0.0053 | 0.012 | 0.090 |
| 3.97 | 0.181 | 0.092 | 0.0276 | 0.174 | 0.104 |
| 12.02 | 0.596 | 0.116 | 0.0958 | 0.559 | 0.238 |
| 20.12 | 0.856 | 0.123 | 0.1299 | 0.761 | 0.409 |
| 28.23 | 1.059 | 0.110 | 0.1293 | 0.881 | 0.598 |
| 36.34 | 1.334 | 0.076 | 0.0922 | 1.029 | 0.852 |
| 44.30 | 1.516 | 0.061 | 0.0782 | 1.043 | 1.103 |
| 52.33 | 1.626 | 0.052 | 0.0671 | 0.953 | 1.319 |
| 60.43 | 1.680 | 0.044 | 0.0516 | 0.791 | 1.483 |
| 68.47 | 1.731 | 0.034 | 0.0397 | 0.604 | 1.623 |
| 76.63 | 1.760 | 0.024 | 0.0259 | 0.384 | 1.718 |
| 80.47 | 1.764 | 0.019 | 0.0189 | 0.274 | 1.743 |
| 84.51 | 1.766 | 0.014 | 0.0116 | 0.156 | 1.759 |
| 88.57 | 1.768 | 0.009 | 0.0043 | 0.036 | 1.768 |
| 92.64 | 1.769 | 0.004 | -0.0031 | -0.085 | 1.767 |
| 96.65 | 1.764 | -0.001 | -0.0106 | -0.203 | 1.752 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 152 | 9X7 FT | 290 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.128 | 0.086 | -0.0276 | -0.122 | 0.095 |
| -0.06 | 0.010 | 0.085 | 0.0033 | 0.010 | 0.085 |
| 3.95 | 0.162 | 0.088 | 0.0301 | 0.156 | 0.099 |
| 11.92 | 0.553 | 0.111 | 0.0948 | 0.518 | 0.223 |
| 19.99 | 0.823 | 0.118 | 0.1290 | 0.733 | 0.392 |
| 28.12 | 1.031 | 0.107 | 0.1234 | 0.859 | 0.580 |
| 36.20 | 1.337 | 0.069 | 0.0846 | 1.039 | 0.845 |
| 44.25 | 1.506 | 0.057 | 0.0734 | 1.040 | 1.092 |
| 52.32 | 1.605 | 0.049 | 0.0628 | 0.943 | 1.300 |
| 60.28 | 1.670 | 0.040 | 0.0513 | 0.793 | 1.470 |
| 68.40 | 1.716 | 0.032 | 0.0386 | 0.602 | 1.607 |
| 76.49 | 1.743 | 0.022 | 0.0249 | 0.385 | 1.700 |
| 80.52 | 1.749 | 0.018 | 0.0178 | 0.271 | 1.728 |
| 84.59 | 1.751 | 0.013 | 0.0107 | 0.152 | 1.745 |
| 88.57 | 1.753 | 0.008 | 0.0035 | 0.035 | 1.753 |
| 92.52 | 1.751 | 0.004 | -0.0035 | -0.081 | 1.750 |
| 96.59 | 1.750 | -0.001 | -0.0107 | -0.200 | 1.739 |
| -0.01 | 0.068 | 0.081 | -0.0056 | 0.068 | 0.081 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.00 | 11.50 | 153 | 9X7 FT | 550 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.13 | -0.146 | 0.089 | -0.0236 | -0.139 | 0.099 |
| -0.07 | 0.009 | 0.088 | 0.0040 | 0.009 | 0.088 |
| 3.95 | 0.181 | 0.091 | 0.0273 | 0.175 | 0.103 |
| 12.04 | 0.595 | 0.116 | 0.0947 | 0.558 | 0.237 |
| 20.11 | 0.855 | 0.120 | 0.1275 | 0.762 | 0.407 |
| 28.06 | 1.062 | 0.107 | 0.1245 | 0.887 | 0.594 |
| 36.12 | 1.359 | 0.069 | 0.0856 | 1.057 | 0.857 |
| 44.23 | 1.510 | 0.057 | 0.0739 | 1.042 | 1.095 |
| 52.30 | 1.604 | 0.049 | 0.0632 | 0.942 | 1.299 |
| -0.06 | 0.023 | 0.088 | -0.0002 | 0.023 | 0.088 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.00 | 8 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.71 | -0.015 | 0.046 | -0.0175 | -0.012 | 0.047 |
| -1.78 | -0.001 | 0.045 | -0.0134 | 0.001 | 0.044 |
| -0.79 | 0.018 | 0.044 | -0.0089 | 0.019 | 0.044 |
| 0.19 | 0.033 | 0.044 | -0.0049 | 0.033 | 0.044 |
| 1.17 | 0.053 | 0.045 | 0.0013 | 0.052 | 0.046 |
| 2.15 | 0.067 | 0.045 | 0.0053 | 0.065 | 0.048 |
| 4.19 | 0.101 | 0.047 | 0.0138 | 0.097 | 0.054 |
| 8.23 | 0.172 | 0.053 | 0.0294 | 0.163 | 0.077 |
| 12.16 | 0.257 | 0.060 | 0.0477 | 0.238 | 0.113 |
| 17.13 | 0.406 | 0.074 | 0.0745 | 0.366 | 0.190 |
| 24.08 | 0.602 | 0.092 | 0.1078 | 0.512 | 0.330 |
| 28.12 | 0.692 | 0.098 | 0.1203 | 0.564 | 0.413 |
| 32.11 | 0.787 | 0.100 | 0.1262 | 0.614 | 0.503 |
| 36.09 | 0.878 | 0.097 | 0.1238 | 0.653 | 0.596 |
| 40.07 | 0.952 | 0.094 | 0.1205 | 0.668 | 0.685 |
| 43.98 | 1.057 | 0.083 | 0.1056 | 0.703 | 0.794 |
| 48.09 | 1.152 | 0.073 | 0.0945 | 0.715 | 0.906 |
| 51.97 | 1.231 | 0.064 | 0.0855 | 0.708 | 1.009 |
| 56.01 | 1.290 | 0.058 | 0.0778 | 0.673 | 1.102 |
| 59.99 | 1.334 | 0.052 | 0.0702 | 0.622 | 1.181 |
| 63.90 | 1.368 | 0.045 | 0.0609 | 0.561 | 1.248 |
| 67.96 | 1.396 | 0.040 | 0.0531 | 0.487 | 1.309 |
| 77.97 | 1.446 | 0.024 | 0.0297 | 0.278 | 1.419 |
| 0.20 | 0.303 | 0.033 | -0.0057 | 0.303 | 0.034 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.00 | 7 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.82 | -0.063 | 0.056 | -0.0178 | -0.059 | 0.060 |
| -1.76 | -0.027 | 0.055 | -0.0105 | -0.025 | 0.056 |
| -0.80 | -0.006 | 0.055 | -0.0055 | -0.006 | 0.055 |
| 0.18 | 0.014 | 0.056 | -0.0003 | 0.014 | 0.056 |
| 1.17 | 0.030 | 0.056 | 0.0054 | 0.029 | 0.056 |
| 2.22 | 0.048 | 0.055 | 0.0118 | 0.045 | 0.057 |
| 4.13 | 0.089 | 0.057 | 0.0204 | 0.085 | 0.063 |
| 10.14 | 0.235 | 0.066 | 0.0460 | 0.220 | 0.106 |
| 20.15 | 0.524 | 0.091 | 0.0899 | 0.460 | 0.266 |
| 30.13 | 0.769 | 0.106 | 0.1218 | 0.611 | 0.478 |
| 32.42 | 0.839 | 0.103 | 0.1222 | 0.656 | 0.533 |
| 36.09 | 0.917 | 0.102 | 0.1223 | 0.682 | 0.623 |
| 40.08 | 1.015 | 0.094 | 0.1123 | 0.716 | 0.725 |
| 44.05 | 1.131 | 0.080 | 0.0988 | 0.757 | 0.844 |
| 48.10 | 1.214 | 0.072 | 0.0917 | 0.757 | 0.952 |
| 52.01 | 1.286 | 0.065 | 0.0839 | 0.741 | 1.053 |
| 56.00 | 1.340 | 0.058 | 0.0763 | 0.701 | 1.144 |
| 59.93 | 1.381 | 0.052 | 0.0692 | 0.647 | 1.222 |
| 63.92 | 1.414 | 0.045 | 0.0598 | 0.581 | 1.290 |
| 68.02 | 1.442 | 0.038 | 0.0503 | 0.504 | 1.351 |
| 71.97 | 1.464 | 0.032 | 0.0405 | 0.423 | 1.402 |
| 75.89 | 1.480 | 0.026 | 0.0314 | 0.336 | 1.442 |
| 0.26 | 0.126 | 0.048 | -0.0078 | 0.126 | 0.049 |
| 25.18 | 0.686 | 0.098 | 0.1077 | 0.579 | 0.381 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.50 | 4 | 8X7 FT | 150 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.16 | -0.076 | 0.059 | -0.0259 | -0.071 | 0.065 |
| -2.09 | -0.026 | 0.059 | -0.0155 | -0.024 | 0.060 |
| -0.86 | 0.001 | 0.059 | -0.0080 | 0.002 | 0.059 |
| 0. | 0.023 | 0.059 | -0.0018 | 0.023 | 0.059 |
| 0.93 | 0.047 | 0.059 | 0.0050 | 0.046 | 0.060 |
| 1.91 | 0.067 | 0.060 | 0.0109 | 0.065 | 0.063 |
| 4.02 | 0.120 | 0.062 | 0.0240 | 0.115 | 0.071 |
| 7.95 | 0.225 | 0.068 | 0.0445 | 0.213 | 0.098 |
| 11.87 | 0.350 | 0.074 | 0.0666 | 0.327 | 0.144 |
| 16.15 | 0.499 | 0.083 | 0.0905 | 0.456 | 0.219 |
| 19.98 | 0.637 | 0.095 | 0.1144 | 0.566 | 0.307 |
| 24.06 | 0.748 | 0.104 | 0.1301 | 0.641 | 0.400 |
| 28.01 | 0.839 | 0.108 | 0.1378 | 0.690 | 0.489 |
| 32.17 | 0.952 | 0.105 | 0.1357 | 0.750 | 0.596 |
| 35.97 | 1.020 | 0.103 | 0.1359 | 0.765 | 0.683 |
| 39.95 | 1.122 | 0.096 | 0.1230 | 0.799 | 0.794 |
| 43.97 | 1.238 | 0.082 | 0.1040 | 0.834 | 0.919 |
| 47.96 | 1.337 | 0.071 | 0.0934 | 0.843 | 1.041 |
| 52.17 | 1.420 | 0.062 | 0.0846 | 0.822 | 1.160 |
| 55.99 | 1.480 | 0.057 | 0.0772 | 0.781 | 1.259 |
| 60.04 | 1.527 | 0.051 | 0.0696 | 0.719 | 1.349 |
| 63.80 | 1.562 | 0.045 | 0.0615 | 0.649 | 1.421 |
| 68.00 | 1.594 | 0.038 | 0.0513 | 0.562 | 1.493 |
| 72.07 | 1.618 | 0.032 | 0.0423 | 0.467 | 1.549 |
| -0.05 | 0.072 | 0.055 | -0.0104 | 0.072 | 0.055 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 6.50 | 3 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.09 | -0.101 | 0.067 | -0.0266 | -0.096 | 0.075 |
| -2.05 | -0.047 | 0.067 | -0.0152 | -0.045 | 0.068 |
| -1.10 | -0.023 | 0.067 | -0.0087 | -0.021 | 0.067 |
| -0.06 | 0.002 | 0.067 | -0.0019 | 0.002 | 0.067 |
| 0.86 | 0.027 | 0.067 | 0.0046 | 0.026 | 0.068 |
| 1.80 | 0.037 | 0.068 | 0.0077 | 0.035 | 0.069 |
| 3.91 | 0.106 | 0.069 | 0.0227 | 0.102 | 0.076 |
| 8.01 | 0.228 | 0.072 | 0.0446 | 0.216 | 0.104 |
| 12.04 | 0.359 | 0.077 | 0.0647 | 0.335 | 0.151 |
| 16.10 | 0.497 | 0.085 | 0.0847 | 0.454 | 0.220 |
| 19.87 | 0.646 | 0.097 | 0.1094 | 0.574 | 0.311 |
| 23.93 | 0.756 | 0.106 | 0.1259 | 0.648 | 0.403 |
| 28.20 | 0.856 | 0.110 | 0.1341 | 0.702 | 0.502 |
| 31.99 | 0.943 | 0.110 | 0.1360 | 0.742 | 0.592 |
| 35.96 | 1.027 | 0.107 | 0.1329 | 0.769 | 0.689 |
| 39.90 | 1.128 | 0.098 | 0.1163 | 0.803 | 0.799 |
| 44.03 | 1.252 | 0.084 | 0.1021 | 0.841 | 0.931 |
| 48.03 | 1.355 | 0.073 | 0.0919 | 0.852 | 1.056 |
| 52.11 | 1.431 | 0.065 | 0.0843 | 0.828 | 1.169 |
| 56.13 | 1.498 | 0.059 | 0.0762 | 0.787 | 1.277 |
| 59.82 | 1.540 | 0.054 | 0.0702 | 0.728 | 1.358 |
| 64.06 | 1.583 | 0.046 | 0.0606 | 0.651 | 1.444 |
| 68.05 | 1.615 | 0.040 | 0.0511 | 0.567 | 1.512 |
| 72.01 | 1.637 | 0.034 | 0.0427 | 0.473 | 1.567 |
| 76.32 | 1.657 | 0.027 | 0.0327 | 0.366 | 1.616 |
| 80.27 | 1.669 | 0.021 | 0.0238 | 0.261 | 1.649 |
| 84.15 | 1.676 | 0.016 | 0.0155 | 0.155 | 1.669 |
| 0.01 | 0.030 | 0.064 | -0.0118 | 0.030 | 0.064 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 7.50 | 12 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.87 | -0.101 | 0.037 | -0.0145 | -0.098 | 0.044 |
| 0.13 | -0.018 | 0.048 | 0.0031 | -0.018 | 0.048 |
| 4.10 | 0.087 | 0.056 | 0.0257 | 0.083 | 0.062 |
| 8.18 | 0.207 | 0.065 | 0.0476 | 0.195 | 0.093 |
| 12.21 | 0.354 | 0.074 | 0.0735 | 0.331 | 0.147 |
| 16.13 | 0.494 | 0.088 | 0.0962 | 0.450 | 0.222 |
| 20.19 | 0.661 | 0.104 | 0.1294 | 0.584 | 0.326 |
| 24.19 | 0.767 | 0.113 | 0.1456 | 0.653 | 0.417 |
| 28.19 | 0.859 | 0.114 | 0.1517 | 0.703 | 0.507 |
| 32.20 | 0.947 | 0.113 | 0.1506 | 0.741 | 0.600 |
| 36.13 | 1.031 | 0.108 | 0.1426 | 0.769 | 0.696 |
| 40.12 | 1.132 | 0.099 | 0.1297 | 0.802 | 0.805 |
| 44.31 | 1.268 | 0.082 | 0.1071 | 0.850 | 0.944 |
| 48.24 | 1.369 | 0.071 | 0.0964 | 0.858 | 1.068 |
| 52.18 | 1.449 | 0.064 | 0.0897 | 0.838 | 1.184 |
| 56.18 | 1.509 | 0.059 | 0.0818 | 0.791 | 1.286 |
| 60.11 | 1.557 | 0.053 | 0.0743 | 0.730 | 1.376 |
| 64.12 | 1.592 | 0.047 | 0.0657 | 0.652 | 1.453 |
| 68.17 | 1.620 | 0.042 | 0.0568 | 0.563 | 1.519 |
| 72.17 | 1.645 | 0.036 | 0.0487 | 0.469 | 1.577 |
| 76.11 | 1.664 | 0.030 | 0.0404 | 0.370 | 1.623 |
| 80.16 | 1.679 | 0.025 | 0.0320 | 0.262 | 1.658 |
| 90.17 | 1.693 | 0.011 | 0.0109 | -0.016 | 1.693 |
| 0.13 | 0.171 | 0.052 | -0.0051 | 0.171 | 0.052 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 7.50 | 11 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.83 | -0.112 | 0.067 | -0.0238 | -0.107 | 0.074 |
| 0.02 | 0.008 | 0.067 | 0.0003 | 0.008 | 0.067 |
| 4.15 | 0.133 | 0.068 | 0.0243 | 0.127 | 0.077 |
| 8.26 | 0.264 | 0.071 | 0.0440 | 0.251 | 0.109 |
| 12.14 | 0.412 | 0.077 | 0.0632 | 0.387 | 0.162 |
| 16.13 | 0.574 | 0.089 | 0.0870 | 0.527 | 0.245 |
| 20.19 | 0.744 | 0.105 | 0.1203 | 0.662 | 0.356 |
| 24.14 | 0.847 | 0.112 | 0.1338 | 0.727 | 0.448 |
| 28.20 | 0.942 | 0.113 | 0.1389 | 0.777 | 0.544 |
| 32.20 | 1.028 | 0.110 | 0.1376 | 0.812 | 0.641 |
| 36.12 | 1.109 | 0.105 | 0.1318 | 0.834 | 0.739 |
| 40.14 | 1.226 | 0.093 | 0.1106 | 0.877 | 0.861 |
| 44.18 | 1.348 | 0.076 | 0.0955 | 0.913 | 0.994 |
| 48.18 | 1.443 | 0.066 | 0.0863 | 0.913 | 1.120 |
| 52.18 | 1.521 | 0.059 | 0.0786 | 0.886 | 1.238 |
| 56.11 | 1.579 | 0.054 | 0.0716 | 0.835 | 1.341 |
| 60.16 | 1.626 | 0.049 | 0.0641 | 0.767 | 1.435 |
| 64.22 | 1.659 | 0.042 | 0.0566 | 0.683 | 1.513 |
| 68.15 | 1.687 | 0.037 | 0.0486 | 0.594 | 1.580 |
| 72.12 | 1.709 | 0.031 | 0.0405 | 0.495 | 1.636 |
| 76.16 | 1.726 | 0.025 | 0.0316 | 0.388 | 1.682 |
| 80.09 | 1.740 | 0.020 | 0.0234 | 0.280 | 1.717 |
| 90.10 | 1.753 | 0.006 | 0.0026 | -0.009 | 1.753 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 9.50 | 16 | 8X7 FT | 110 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.99 | -0.068 | 0.045 | -0.0260 | -0.065 | 0.050 |
| 0.06 | 0.020 | 0.047 | -0.0064 | 0.020 | 0.047 |
| 4.01 | 0.110 | 0.051 | 0.0128 | 0.106 | 0.059 |
| 8.03 | 0.231 | 0.057 | 0.0350 | 0.221 | 0.089 |
| 16.05 | 0.497 | 0.079 | 0.0772 | 0.455 | 0.213 |
| 20.08 | 0.692 | 0.096 | 0.1151 | 0.607 | 0.324 |
| 24.12 | 0.798 | 0.103 | 0.1305 | 0.687 | 0.420 |
| 28.12 | 0.887 | 0.103 | 0.1344 | 0.733 | 0.509 |
| 32.08 | 0.979 | 0.100 | 0.1308 | 0.777 | 0.604 |
| 36.15 | 1.064 | 0.094 | 0.1217 | 0.804 | 0.703 |
| 40.16 | 1.191 | 0.079 | 0.1015 | 0.860 | 0.828 |
| 44.04 | 1.309 | 0.064 | 0.0847 | 0.896 | 0.956 |
| 48.13 | 1.400 | 0.056 | 0.0764 | 0.893 | 1.080 |
| 52.11 | 1.466 | 0.050 | 0.0701 | 0.861 | 1.188 |
| 56.18 | 1.519 | 0.046 | 0.0635 | 0.808 | 1.287 |
| 60.17 | 1.557 | 0.041 | 0.0567 | 0.739 | 1.371 |
| 64.15 | 1.588 | 0.036 | 0.0496 | 0.660 | 1.445 |
| 68.20 | 1.612 | 0.031 | 0.0418 | 0.570 | 1.508 |
| 72.21 | 1.633 | 0.025 | 0.0339 | 0.475 | 1.562 |
| 76.28 | 1.649 | 0.020 | 0.0262 | 0.371 | 1.607 |
| 80.22 | 1.661 | 0.015 | 0.0185 | 0.267 | 1.639 |
| 90.26 | 1.674 | 0.003 | 0.0002 | -0.011 | 1.674 |
| 0.09 | 0.135 | 0.045 | -0.0131 | 0.135 | 0.045 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 9.50 | 15 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.93 | -0.085 | 0.062 | -0.0225 | -0.081 | 0.068 |
| 0.05 | 0.020 | 0.062 | 0.0007 | 0.020 | 0.062 |
| 4.06 | 0.138 | 0.064 | 0.0231 | 0.133 | 0.074 |
| 8.09 | 0.261 | 0.068 | 0.0430 | 0.249 | 0.104 |
| 16.18 | 0.571 | 0.084 | 0.0821 | 0.525 | 0.240 |
| 20.15 | 0.764 | 0.103 | 0.1175 | 0.682 | 0.358 |
| 24.06 | 0.851 | 0.108 | 0.1298 | 0.733 | 0.446 |
| 28.14 | 0.944 | 0.106 | 0.1328 | 0.782 | 0.540 |
| 32.10 | 1.030 | 0.104 | 0.1292 | 0.817 | 0.635 |
| 36.16 | 1.123 | 0.097 | 0.1172 | 0.850 | 0.741 |
| 40.21 | 1.253 | 0.079 | 0.0947 | 0.906 | 0.869 |
| 44.10 | 1.360 | 0.066 | 0.0843 | 0.931 | 0.994 |
| 48.24 | 1.449 | 0.058 | 0.0765 | 0.921 | 1.119 |
| 52.18 | 1.508 | 0.053 | 0.0703 | 0.883 | 1.224 |
| 56.11 | 1.559 | 0.049 | 0.0638 | 0.829 | 1.322 |
| 60.18 | 1.599 | 0.044 | 0.0574 | 0.757 | 1.409 |
| 64.18 | 1.629 | 0.039 | 0.0503 | 0.675 | 1.483 |
| 68.26 | 1.651 | 0.033 | 0.0427 | 0.580 | 1.546 |
| 72.21 | 1.668 | 0.028 | 0.0353 | 0.483 | 1.597 |
| 4.09 | 0.134 | 0.065 | 0.0243 | 0.129 | 0.074 |
| 20.11 | 0.744 | 0.105 | 0.1180 | 0.663 | 0.354 |
| 76.22 | 1.658 | 0.025 | 0.0253 | 0.371 | 1.616 |
| 80.27 | 1.679 | 0.019 | 0.0183 | 0.265 | 1.658 |
| 84.16 | 1.691 | 0.014 | 0.0115 | 0.158 | 1.684 |
| 88.28 | 1.698 | 0.009 | 0.0041 | 0.042 | 1.698 |
| 92.23 | 1.699 | 0.004 | -0.0029 | -0.070 | 1.698 |
| 94.27 | 1.699 | 0.001 | -0.0067 | -0.128 | 1.694 |
| 48.17 | 1.450 | 0.058 | 0.0762 | 0.924 | 1.120 |
| 0.06 | 0.050 | 0.061 | -0.0041 | 0.050 | 0.061 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 10.50 | 20 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -0.01 | -0.022 | 0.026 | -0.0115 | -0.022 | 0.026 |
| -0.01 | 0.009 | 0.037 | -0.0055 | 0.009 | 0.037 |
| -0.01 | 0.016 | 0.043 | -0.0036 | 0.016 | 0.043 |
| -0.01 | 0.079 | 0.037 | -0.0074 | 0.079 | 0.037 |
| 0. | 0.023 | 0.055 | -0.0017 | 0.023 | 0.055 |
| -3.99 | -0.015 | 0.051 | -0.0242 | -0.011 | 0.052 |
| -0.02 | 0.049 | 0.051 | -0.0112 | 0.049 | 0.051 |
| 4.00 | 0.109 | 0.061 | 0.0162 | 0.104 | 0.069 |
| 7.99 | 0.270 | 0.060 | 0.0337 | 0.259 | 0.097 |
| 7.99 | 0.290 | 0.060 | 0.0372 | 0.279 | 0.099 |
| 8.00 | 0.297 | 0.060 | 0.0387 | 0.286 | 0.100 |
| 16.00 | 0.547 | 0.082 | 0.0782 | 0.504 | 0.230 |
| 15.99 | 0.537 | 0.087 | 0.0849 | 0.493 | 0.232 |
| 15.99 | 0.593 | 0.080 | 0.0826 | 0.548 | 0.241 |
| 20.00 | 0.709 | 0.105 | 0.1194 | 0.630 | 0.341 |
| 20.00 | 0.770 | 0.099 | 0.1191 | 0.690 | 0.357 |
| 19.99 | 0.782 | 0.099 | 0.1202 | 0.701 | 0.360 |
| 23.99 | 0.827 | 0.112 | 0.1361 | 0.710 | 0.439 |
| 23.99 | 0.839 | 0.112 | 0.1369 | 0.721 | 0.443 |
| 23.99 | 0.846 | 0.111 | 0.1369 | 0.728 | 0.445 |
| 28.00 | 0.921 | 0.113 | 0.1402 | 0.760 | 0.532 |
| 27.98 | 0.976 | 0.106 | 0.1366 | 0.813 | 0.551 |
| 27.99 | 0.939 | 0.111 | 0.1393 | 0.777 | 0.538 |
| 31.96 | 1.050 | 0.104 | 0.1333 | 0.836 | 0.644 |
| 35.93 | 1.125 | 0.100 | 0.1287 | 0.852 | 0.741 |
| 35.92 | 1.135 | 0.099 | 0.1259 | 0.861 | 0.746 |
| 35.93 | 1.139 | 0.098 | 0.1254 | 0.864 | 0.748 |
| 35.93 | 1.140 | 0.098 | 0.1247 | 0.865 | 0.748 |
| 35.93 | 1.142 | 0.098 | 0.1244 | 0.867 | 0.749 |
| 35.98 | 1.143 | 0.098 | 0.1242 | 0.867 | 0.751 |
| 35.99 | 1.144 | 0.098 | 0.1240 | 0.868 | 0.751 |
| 35.98 | 1.144 | 0.098 | 0.1238 | 0.868 | 0.751 |
| 35.98 | 1.146 | 0.098 | 0.1236 | 0.870 | 0.752 |
| 36.01 | 1.146 | 0.098 | 0.1226 | 0.870 | 0.753 |
| 40.00 | 1.265 | 0.083 | 0.1044 | 0.916 | 0.877 |
| 43.92 | 1.388 | 0.068 | 0.0876 | 0.953 | 1.012 |
| 47.98 | 1.476 | 0.060 | 0.0802 | 0.943 | 1.137 |
| 51.93 | 1.542 | 0.055 | 0.0738 | 0.907 | 1.247 |
| 55.95 | 1.597 | 0.050 | 0.0666 | 0.853 | 1.351 |
| 59.96 | 1.634 | 0.045 | 0.0597 | 0.779 | 1.437 |
| 63.89 | 1.665 | 0.040 | 0.0526 | 0.697 | 1.513 |
| 67.96 | 1.693 | 0.035 | 0.0447 | 0.603 | 1.583 |
| 71.89 | 1.711 | 0.030 | 0.0370 | 0.503 | 1.635 |
| 75.96 | 1.726 | 0.024 | 0.0291 | 0.395 | 1.681 |
| 80.00 | 1.743 | 0.019 | 0.0213 | 0.284 | 1.719 |
| 83.94 | 1.752 | 0.014 | 0.0139 | 0.171 | 1.744 |
| 87.94 | 1.755 | 0.008 | 0.0056 | 0.055 | 1.755 |
| 91.87 | 1.756 | 0.003 | -0.0021 | -0.061 | 1.755 |
| 93.91 | 1.756 | 0. | -0.0063 | -0.120 | 1.752 |
| -0.01 | 0.172 | 0.049 | -0.0149 | 0.172 | 0.049 |

# TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 10.50 | 19 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.074 | 0.047 | -0.0224 | -0.071 | 0.052 |
| 0.06 | 0.018 | 0.063 | -0.0016 | 0.018 | 0.063 |
| 3.99 | 0.131 | 0.066 | 0.0211 | 0.126 | 0.075 |
| 8.00 | 0.260 | 0.070 | 0.0419 | 0.248 | 0.106 |
| 15.93 | 0.574 | 0.087 | 0.0836 | 0.528 | 0.241 |
| 20.01 | 0.773 | 0.108 | 0.1223 | 0.689 | 0.366 |
| 23.99 | 0.878 | 0.113 | 0.1342 | 0.756 | 0.460 |
| 28.00 | 0.971 | 0.112 | 0.1367 | 0.805 | 0.555 |
| 31.93 | 1.077 | 0.106 | 0.1318 | 0.858 | 0.660 |
| 35.94 | 1.184 | 0.096 | 0.1189 | 0.902 | 0.773 |
| 39.99 | 1.330 | 0.076 | 0.0945 | 0.970 | 0.913 |
| 43.91 | 1.435 | 0.064 | 0.0843 | 0.989 | 1.041 |
| 47.97 | 1.506 | 0.060 | 0.0781 | 0.964 | 1.158 |
| 51.96 | 1.566 | 0.055 | 0.0717 | 0.922 | 1.268 |
| 55.96 | 1.618 | 0.050 | 0.0652 | 0.864 | 1.369 |
| 60.02 | 1.659 | 0.045 | 0.0586 | 0.790 | 1.460 |
| 63.88 | 1.695 | 0.040 | 0.0514 | 0.711 | 1.539 |
| 67.95 | 1.712 | 0.035 | 0.0442 | 0.610 | 1.600 |
| 71.88 | 1.736 | 0.029 | 0.0362 | 0.512 | 1.659 |
| 75.95 | 1.745 | 0.025 | 0.0289 | 0.399 | 1.699 |
| 79.99 | 1.765 | 0.019 | 0.0203 | 0.288 | 1.742 |
| 83.93 | 1.767 | 0.015 | 0.0136 | 0.172 | 1.758 |
| 87.92 | 1.770 | 0.010 | 0.0058 | 0.055 | 1.769 |
| 91.91 | 1.777 | 0.004 | -0.0022 | -0.063 | 1.776 |
| 93.89 | 1.772 | 0.002 | -0.0055 | -0.122 | 1.768 |
| 0. | 0.010 | 0.066 | -0.0024 | 0.010 | 0.066 |
| 0.05 | 0.010 | 0.061 | 0.0002 | 0.010 | 0.061 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 24 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.82 | -0.076 | 0.047 | -0.0220 | -0.072 | 0.052 |
| 0.19 | -0.009 | 0.052 | -0.0075 | -0.009 | 0.052 |
| 4.21 | 0.078 | 0.055 | 0.0123 | 0.074 | 0.060 |
| 8.20 | 0.192 | 0.060 | 0.0341 | 0.181 | 0.086 |
| 16.17 | 0.450 | 0.078 | 0.0737 | 0.410 | 0.200 |
| 20.30 | 0.683 | 0.097 | 0.1163 | 0.606 | 0.328 |
| 24.17 | 0.795 | 0.104 | 0.1326 | 0.682 | 0.421 |
| 28.31 | 0.884 | 0.106 | 0.1378 | 0.728 | 0.512 |
| 32.25 | 0.981 | 0.101 | 0.1339 | 0.776 | 0.609 |
| 36.26 | 1.077 | 0.095 | 0.1230 | 0.812 | 0.713 |
| 40.21 | 1.196 | 0.081 | 0.1053 | 0.861 | 0.834 |
| 44.25 | 1.328 | 0.065 | 0.0870 | 0.906 | 0.973 |
| 48.34 | 1.418 | 0.057 | 0.0794 | 0.900 | 1.097 |
| 52.16 | 1.482 | 0.051 | 0.0729 | 0.869 | 1.202 |
| 56.22 | 1.539 | 0.047 | 0.0668 | 0.817 | 1.305 |
| 60.42 | 1.579 | 0.042 | 0.0599 | 0.743 | 1.394 |
| 64.24 | 1.610 | 0.038 | 0.0536 | 0.666 | 1.466 |
| 68.38 | 1.637 | 0.032 | 0.0461 | 0.573 | 1.534 |
| 76.38 | 1.672 | 0.023 | 0.0322 | 0.371 | 1.631 |
| 80.33 | 1.684 | 0.018 | 0.0239 | 0.266 | 1.663 |
| 88.33 | 1.700 | 0.008 | 0.0092 | 0.042 | 1.699 |
| 94.30 | 1.699 | 0.001 | -0.0016 | -0.128 | 1.694 |
| 0.12 | 0.187 | 0.044 | -0.0179 | 0.186 | 0.044 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 23 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.74 | -0.094 | 0.064 | -0.0205 | -0.090 | 0.070 |
| 0.18 | 0.009 | 0.064 | 0.0034 | 0.009 | 0.064 |
| 4.26 | 0.128 | 0.066 | 0.0252 | 0.123 | 0.075 |
| 8.27 | 0.260 | 0.069 | 0.0444 | 0.248 | 0.106 |
| 16.15 | 0.578 | 0.085 | 0.0840 | 0.532 | 0.242 |
| 20.25 | 0.766 | 0.105 | 0.1219 | 0.683 | 0.363 |
| 24.30 | 0.867 | 0.109 | 0.1324 | 0.745 | 0.456 |
| 28.24 | 0.961 | 0.108 | 0.1346 | 0.795 | 0.549 |
| 32.14 | 1.049 | 0.103 | 0.1299 | 0.834 | 0.646 |
| 36.20 | 1.147 | 0.095 | 0.1155 | 0.870 | 0.754 |
| 40.24 | 1.290 | 0.075 | 0.0932 | 0.936 | 0.891 |
| 44.30 | 1.396 | 0.063 | 0.0837 | 0.955 | 1.020 |
| 48.33 | 1.478 | 0.057 | 0.0765 | 0.940 | 1.142 |
| 52.21 | 1.537 | 0.052 | 0.0702 | 0.900 | 1.246 |
| 56.39 | 1.585 | 0.047 | 0.0637 | 0.838 | 1.346 |
| 60.24 | 1.625 | 0.043 | 0.0570 | 0.770 | 1.432 |
| 64.24 | 1.655 | 0.037 | 0.0500 | 0.685 | 1.506 |
| 72.30 | 1.693 | 0.028 | 0.0355 | 0.488 | 1.621 |
| 80.27 | 1.718 | 0.018 | 0.0203 | 0.273 | 1.696 |
| 88.38 | 1.728 | 0.008 | 0.0053 | 0.041 | 1.727 |
| 94.23 | 1.724 | 0.001 | -0.0054 | -0.128 | 1.719 |
| 0.19 | 0.069 | 0.060 | -0.0039 | 0.069 | 0.060 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 26 | 8X7 FT | 130 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.12 | -0.069 | 0.044 | -0.0206 | -0.066 | 0.049 |
| -0.06 | 0.004 | 0.047 | -0.0040 | 0.005 | 0.047 |
| 3.94 | 0.107 | 0.052 | 0.0186 | 0.104 | 0.059 |
| 7.97 | 0.227 | 0.058 | 0.0406 | 0.217 | 0.089 |
| 15.94 | 0.505 | 0.079 | 0.0830 | 0.464 | 0.215 |
| 19.96 | 0.696 | 0.097 | 0.1203 | 0.621 | 0.329 |
| 23.97 | 0.801 | 0.102 | 0.1321 | 0.691 | 0.419 |
| 28.11 | 0.899 | 0.101 | 0.1332 | 0.745 | 0.513 |
| 32.00 | 0.984 | 0.097 | 0.1281 | 0.783 | 0.603 |
| 36.00 | 1.086 | 0.088 | 0.1156 | 0.827 | 0.709 |
| 40.14 | 1.249 | 0.066 | 0.0879 | 0.912 | 0.856 |
| 44.08 | 1.355 | 0.056 | 0.0783 | 0.934 | 0.983 |
| 48.16 | 1.427 | 0.050 | 0.0716 | 0.914 | 1.096 |
| 56.11 | 1.525 | 0.041 | 0.0593 | 0.816 | 1.289 |
| 64.04 | 1.583 | 0.033 | 0.0465 | 0.663 | 1.438 |
| 72.10 | 1.618 | 0.024 | 0.0337 | 0.474 | 1.547 |
| 80.23 | 1.646 | 0.015 | 0.0193 | 0.265 | 1.624 |
| 88.19 | 1.655 | 0.006 | 0.0064 | 0.046 | 1.654 |
| 94.18 | 1.657 | -0.001 | -0.0049 | -0.119 | 1.653 |
| -0.20 | 0.220 | 0.042 | -0.0102 | 0.220 | 0.041 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 2.50 | 11.50 | 25 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.08 | -0.168 | 0.055 | -0.0353 | -0.163 | 0.067 |
| -0.13 | -0.026 | 0.062 | -0.0081 | -0.026 | 0.062 |
| 3.94 | 0.120 | 0.064 | 0.0239 | 0.115 | 0.072 |
| 7.97 | 0.246 | 0.067 | 0.0417 | 0.234 | 0.101 |
| 15.95 | 0.567 | 0.081 | 0.0799 | 0.523 | 0.233 |
| 20.00 | 0.742 | 0.101 | 0.1168 | 0.663 | 0.349 |
| 24.03 | 0.843 | 0.106 | 0.1264 | 0.727 | 0.440 |
| 28.01 | 0.930 | 0.105 | 0.1279 | 0.772 | 0.529 |
| 31.99 | 1.019 | 0.100 | 0.1221 | 0.811 | 0.625 |
| 35.98 | 1.128 | 0.089 | 0.1033 | 0.861 | 0.735 |
| 40.01 | 1.284 | 0.066 | 0.0826 | 0.941 | 0.877 |
| 44.07 | 1.387 | 0.057 | 0.0744 | 0.957 | 1.006 |
| 48.20 | 1.457 | 0.052 | 0.0681 | 0.932 | 1.121 |
| 51.98 | 1.508 | 0.047 | 0.0619 | 0.892 | 1.217 |
| 56.03 | 1.551 | 0.042 | 0.0555 | 0.832 | 1.310 |
| 60.10 | 1.582 | 0.037 | 0.0491 | 0.756 | 1.390 |
| 64.12 | 1.604 | 0.033 | 0.0430 | 0.670 | 1.458 |
| 68.18 | 1.622 | 0.029 | 0.0366 | 0.576 | 1.517 |
| 72.07 | 1.635 | 0.025 | 0.0303 | 0.480 | 1.564 |
| 76.28 | 1.648 | 0.020 | 0.0231 | 0.371 | 1.606 |
| 84.23 | 1.664 | 0.012 | 0.0098 | 0.156 | 1.657 |
| 92.19 | 1.667 | 0.003 | -0.0037 | -0.066 | 1.666 |
| -0.07 | 0.054 | 0.058 | -0.0058 | 0.054 | 0.058 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.00 | 6 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.76 | 0.054 | 0.006 | -0.0155 | 0.055 | 0.003 |
| -1.83 | 0.073 | 0.004 | -0.0077 | 0.073 | 0.002 |
| -0.84 | 0.077 | 0.003 | -0.0068 | 0.077 | 0.002 |
| 0.19 | 0.084 | 0.003 | -0.0052 | 0.084 | 0.004 |
| 1.17 | 0.095 | 0.002 | -0.0016 | 0.095 | 0.004 |
| 2.16 | 0.097 | 0.003 | -0.0026 | 0.096 | 0.007 |
| 4.16 | 0.111 | 0.004 | 0.0004 | 0.110 | 0.012 |
| 8.17 | 0.143 | 0.008 | 0.0078 | 0.141 | 0.028 |
| 12.09 | 0.186 | 0.013 | 0.0174 | 0.179 | 0.052 |
| 16.08 | 0.246 | 0.021 | 0.0319 | 0.231 | 0.088 |
| 20.16 | 0.317 | 0.033 | 0.0461 | 0.287 | 0.140 |
| 24.11 | 0.401 | 0.045 | 0.0635 | 0.348 | 0.206 |
| 28.12 | 0.514 | 0.060 | 0.0864 | 0.425 | 0.295 |
| 32.03 | 0.598 | 0.070 | 0.1032 | 0.470 | 0.377 |
| 36.09 | 0.669 | 0.077 | 0.1130 | 0.496 | 0.456 |
| 40.08 | 0.750 | 0.079 | 0.1231 | 0.523 | 0.543 |
| 44.05 | 0.820 | 0.080 | 0.1185 | 0.534 | 0.628 |
| 48.03 | 0.930 | 0.072 | 0.1097 | 0.568 | 0.740 |
| 52.03 | 1.009 | 0.064 | 0.0999 | 0.570 | 0.835 |
| 56.01 | 1.084 | 0.056 | 0.0875 | 0.559 | 0.930 |
| 59.98 | 1.136 | 0.050 | 0.0756 | 0.525 | 1.009 |
| 63.91 | 1.176 | 0.045 | 0.0704 | 0.477 | 1.076 |
| 67.97 | 1.217 | 0.037 | 0.0589 | 0.423 | 1.142 |
| 71.90 | 1.249 | 0.029 | 0.0528 | 0.360 | 1.197 |
| 75.93 | 1.260 | 0.024 | 0.0371 | 0.283 | 1.228 |
| 79.92 | 1.276 | 0.017 | 0.0274 | 0.206 | 1.259 |
| 83.92 | 1.296 | 0.009 | 0.0201 | 0.128 | 1.290 |
| 87.89 | 1.297 | 0.004 | 0.0075 | 0.044 | 1.296 |
| 91.81 | 1.299 | -0.002 | -0.0007 | -0.039 | 1.298 |
| 95.19 | 1.296 | -0.007 | -0.0104 | -0.110 | 1.291 |
| 0.25 | 0.511 | 0.001 | 0.0021 | 0.511 | 0.004 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.00 | 5 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.79 | -0.053 | 0.035 | -0.0168 | -0.050 | 0.038 |
| -1.70 | -0.032 | 0.034 | -0.0122 | -0.031 | 0.035 |
| -0.79 | -0.010 | 0.034 | -0.0069 | -0.010 | 0.034 |
| 0.20 | 0.008 | 0.034 | -0.0019 | 0.008 | 0.034 |
| 1.17 | 0.023 | 0.034 | 0.0022 | 0.023 | 0.034 |
| 2.16 | 0.038 | 0.034 | 0.0061 | 0.037 | 0.036 |
| 4.18 | 0.067 | 0.036 | 0.0127 | 0.064 | 0.040 |
| 8.17 | 0.127 | 0.041 | 0.0258 | 0.120 | 0.058 |
| 12.17 | 0.212 | 0.048 | 0.0447 | 0.197 | 0.092 |
| 16.16 | 0.290 | 0.056 | 0.0589 | 0.263 | 0.134 |
| 20.13 | 0.372 | 0.064 | 0.0726 | 0.327 | 0.188 |
| 24.06 | 0.477 | 0.073 | 0.0862 | 0.406 | 0.261 |
| 28.19 | 0.592 | 0.083 | 0.1032 | 0.482 | 0.353 |
| 32.09 | 0.689 | 0.091 | 0.1153 | 0.535 | 0.443 |
| 36.03 | 0.765 | 0.094 | 0.1205 | 0.563 | 0.526 |
| 40.07 | 0.849 | 0.094 | 0.1196 | 0.590 | 0.619 |
| 43.99 | 0.931 | 0.090 | 0.1128 | 0.608 | 0.711 |
| 48.05 | 1.033 | 0.078 | 0.0972 | 0.632 | 0.821 |
| 52.04 | 1.120 | 0.069 | 0.0885 | 0.635 | 0.925 |
| 56.01 | 1.198 | 0.060 | 0.0791 | 0.620 | 1.027 |
| 60.01 | 1.249 | 0.054 | 0.0713 | 0.578 | 1.109 |
| 63.99 | 1.284 | 0.047 | 0.0629 | 0.521 | 1.175 |
| 67.99 | 1.311 | 0.040 | 0.0529 | 0.454 | 1.231 |
| 72.03 | 1.334 | 0.033 | 0.0435 | 0.380 | 1.279 |
| 75.90 | 1.354 | 0.027 | 0.0344 | 0.304 | 1.320 |
| 79.99 | 1.371 | 0.021 | 0.0246 | 0.218 | 1.354 |
| 83.86 | 1.381 | 0.015 | 0.0162 | 0.133 | 1.374 |
| 87.96 | 1.387 | 0.009 | 0.0070 | 0.041 | 1.386 |
| 91.82 | 1.387 | 0.003 | -0.0013 | -0.047 | 1.386 |
| 95.04 | 1.383 | -0.002 | -0.0093 | -0.119 | 1.378 |
| 0.20 | 0.104 | 0.026 | -0.0072 | 0.104 | 0.026 |

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.50 | 2 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.23 | 0.050 | 0.011 | -0.0132 | 0.050 | 0.008 |
| -2.08 | 0.057 | 0.009 | -0.0090 | 0.057 | 0.007 |
| -0.90 | 0.072 | 0.008 | -0.0043 | 0.072 | 0.007 |
| -0.01 | 0.078 | 0.007 | -0.0026 | 0.078 | 0.007 |
| 0.50 | 0.088 | 0.007 | 0.0006 | 0.088 | 0.008 |
| 1.73 | 0.097 | 0.008 | 0.0020 | 0.097 | 0.011 |
| 3.53 | 0.118 | 0.009 | 0.0078 | 0.118 | 0.016 |
| 7.82 | 0.177 | 0.015 | 0.0203 | 0.174 | 0.039 |
| 12.05 | 0.250 | 0.025 | 0.0352 | 0.239 | 0.077 |
| 16.17 | 0.340 | 0.037 | 0.0557 | 0.316 | 0.130 |
| 19.88 | 0.445 | 0.051 | 0.0767 | 0.401 | 0.199 |
| 24.12 | 0.541 | 0.062 | 0.0947 | 0.468 | 0.278 |
| 28.01 | 0.660 | 0.077 | 0.1153 | 0.547 | 0.379 |
| 32.04 | 0.753 | 0.086 | 0.1290 | 0.593 | 0.472 |
| 35.83 | 0.825 | 0.090 | 0.1349 | 0.617 | 0.556 |
| 39.96 | 0.900 | 0.090 | 0.1332 | 0.632 | 0.647 |
| 44.22 | 0.990 | 0.084 | 0.1227 | 0.651 | 0.751 |
| 48.21 | 1.087 | 0.074 | 0.1094 | 0.669 | 0.860 |
| 51.98 | 1.180 | 0.063 | 0.0949 | 0.677 | 0.969 |
| 55.99 | 1.274 | 0.053 | 0.0825 | 0.668 | 1.086 |
| 59.89 | 1.330 | 0.048 | 0.0756 | 0.626 | 1.175 |
| 63.98 | 1.379 | 0.041 | 0.0656 | 0.568 | 1.258 |
| 67.89 | 1.416 | 0.034 | 0.0528 | 0.502 | 1.325 |
| 72.08 | 1.445 | 0.028 | 0.0468 | 0.418 | 1.384 |
| 75.87 | 1.466 | 0.022 | 0.0353 | 0.337 | 1.427 |
| 79.96 | 1.484 | 0.016 | 0.0268 | 0.243 | 1.464 |
| 84.18 | 1.497 | 0.010 | 0.0166 | 0.142 | 1.490 |
| 88.18 | 1.503 | 0.004 | 0.0080 | 0.044 | 1.502 |
| 92.28 | 1.505 | -0.002 | -0.0004 | -0.058 | 1.504 |
| 96.11 | 1.504 | -0.009 | -0.0111 | -0.151 | 1.496 |
| -0.01 | 0.342 | 0.009 | -0.0063 | 0.342 | 0.009 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 6.50 | 1 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.13 | -0.076 | 0.041 | -0.0200 | -0.073 | 0.046 |
| -2.04 | -0.037 | 0.040 | -0.0117 | -0.035 | 0.041 |
| -1.10 | -0.014 | 0.040 | -0.0066 | -0.013 | 0.040 |
| 0.12 | 0.006 | 0.040 | -0.0017 | 0.006 | 0.040 |
| 1.06 | 0.028 | 0.041 | 0.0038 | 0.027 | 0.041 |
| 1.91 | 0.043 | 0.041 | 0.0078 | 0.042 | 0.042 |
| 3.89 | 0.083 | 0.042 | 0.0166 | 0.080 | 0.048 |
| 7.90 | 0.166 | 0.047 | 0.0330 | 0.158 | 0.069 |
| 12.04 | 0.263 | 0.053 | 0.0498 | 0.246 | 0.107 |
| 16.04 | 0.364 | 0.060 | 0.0649 | 0.333 | 0.159 |
| 19.94 | 0.471 | 0.070 | 0.0800 | 0.419 | 0.226 |
| 23.87 | 0.587 | 0.080 | 0.0959 | 0.505 | 0.310 |
| 28.07 | 0.726 | 0.093 | 0.1172 | 0.597 | 0.423 |
| 32.03 | 0.814 | 0.098 | 0.1257 | 0.638 | 0.515 |
| 35.96 | 0.892 | 0.100 | 0.1280 | 0.663 | 0.605 |
| 40.16 | 0.972 | 0.098 | 0.1242 | 0.679 | 0.702 |
| 44.03 | 1.053 | 0.093 | 0.1140 | 0.693 | 0.799 |
| 48.10 | 1.156 | 0.081 | 0.0979 | 0.712 | 0.914 |
| 52.18 | 1.257 | 0.068 | 0.0854 | 0.717 | 1.035 |
| 55.93 | 1.339 | 0.059 | 0.0760 | 0.701 | 1.142 |
| 60.05 | 1.398 | 0.053 | 0.0686 | 0.652 | 1.238 |
| 63.94 | 1.438 | 0.047 | 0.0610 | 0.590 | 1.312 |
| 68.11 | 1.469 | 0.040 | 0.0519 | 0.510 | 1.378 |
| 72.02 | 1.494 | 0.034 | 0.0430 | 0.429 | 1.431 |
| 76.14 | 1.516 | 0.027 | 0.0329 | 0.337 | 1.479 |
| 80.07 | 1.533 | 0.021 | 0.0236 | 0.244 | 1.514 |
| 83.89 | 1.544 | 0.015 | 0.0149 | 0.149 | 1.537 |
| 88.27 | 1.550 | 0.009 | 0.0057 | 0.038 | 1.549 |
| 92.10 | 1.550 | 0.004 | -0.0020 | -0.060 | 1.549 |
| 96.06 | 1.545 | -0.002 | -0.0103 | -0.161 | 1.537 |
| 0.07 | 0.037 | 0.036 | -0.0076 | 0.037 | 0.036 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 7.50 | 10 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.78 | 0.052 | 0.003 | -0.0076 | 0.052 | -0.001 |
| 0.26 | 0.085 | 0.002 | 0.0001 | 0.085 | 0.003 |
| 4.14 | 0.138 | 0.005 | 0.0106 | 0.137 | 0.015 |
| 8.26 | 0.208 | 0.011 | 0.0244 | 0.204 | 0.040 |
| 12.21 | 0.280 | 0.019 | 0.0385 | 0.270 | 0.078 |
| 16.16 | 0.382 | 0.032 | 0.0579 | 0.358 | 0.137 |
| 20.15 | 0.516 | 0.046 | 0.0809 | 0.469 | 0.221 |
| 24.16 | 0.676 | 0.063 | 0.1054 | 0.591 | 0.335 |
| 28.20 | 0.775 | 0.075 | 0.1289 | 0.647 | 0.433 |
| 32.16 | 0.861 | 0.084 | 0.1414 | 0.684 | 0.529 |
| 36.13 | 0.930 | 0.086 | 0.1446 | 0.700 | 0.617 |
| 40.20 | 1.025 | 0.081 | 0.1357 | 0.731 | 0.724 |
| 44.19 | 1.112 | 0.074 | 0.1242 | 0.745 | 0.828 |
| 48.15 | 1.212 | 0.062 | 0.1084 | 0.763 | 0.944 |
| 52.15 | 1.306 | 0.051 | 0.0955 | 0.761 | 1.063 |
| 56.24 | 1.385 | 0.044 | 0.0859 | 0.733 | 1.176 |
| 60.16 | 1.440 | 0.039 | 0.0782 | 0.683 | 1.269 |
| 64.16 | 1.481 | 0.033 | 0.0710 | 0.616 | 1.348 |
| 68.21 | 1.513 | 0.027 | 0.0608 | 0.536 | 1.415 |
| 72.17 | 1.535 | 0.022 | 0.0522 | 0.449 | 1.468 |
| 76.17 | 1.558 | 0.016 | 0.0444 | 0.357 | 1.516 |
| 80.22 | 1.573 | 0.010 | 0.0359 | 0.257 | 1.552 |
| 84.15 | 1.585 | 0.004 | 0.0268 | 0.157 | 1.577 |
| 88.16 | 1.589 | -0.002 | 0.0181 | 0.053 | 1.588 |
| 92.10 | 1.592 | -0.007 | 0.0098 | -0.051 | 1.591 |
| 94.16 | 1.590 | -0.010 | 0.0051 | -0.105 | 1.587 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 7.50 | 9 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.73 | -0.067 | 0.041 | -0.0183 | -0.064 | 0.046 |
| -1.84 | -0.030 | 0.041 | -0.0111 | -0.029 | 0.041 |
| -0.79 | -0.007 | 0.041 | -0.0061 | -0.007 | 0.041 |
| 0.14 | 0.012 | 0.041 | -0.0015 | 0.012 | 0.041 |
| 1.12 | 0.032 | 0.041 | 0.0034 | 0.031 | 0.042 |
| 2.30 | 0.055 | 0.042 | 0.0087 | 0.053 | 0.044 |
| 4.10 | 0.092 | 0.043 | 0.0165 | 0.089 | 0.049 |
| 8.19 | 0.181 | 0.047 | 0.0326 | 0.172 | 0.073 |
| 12.16 | 0.286 | 0.053 | 0.0484 | 0.269 | 0.112 |
| 16.14 | 0.399 | 0.060 | 0.0622 | 0.367 | 0.168 |
| 20.18 | 0.523 | 0.069 | 0.0764 | 0.467 | 0.245 |
| 24.14 | 0.672 | 0.082 | 0.0951 | 0.580 | 0.350 |
| 28.16 | 0.808 | 0.098 | 0.1221 | 0.666 | 0.468 |
| 32.22 | 0.894 | 0.102 | 0.1282 | 0.702 | 0.563 |
| 36.20 | 0.964 | 0.102 | 0.1281 | 0.718 | 0.651 |
| 40.20 | 1.043 | 0.098 | 0.1208 | 0.734 | 0.748 |
| 44.11 | 1.135 | 0.088 | 0.1057 | 0.753 | 0.853 |
| 48.18 | 1.249 | 0.073 | 0.0886 | 0.779 | 0.979 |
| 52.17 | 1.344 | 0.061 | 0.0776 | 0.776 | 1.099 |
| 60.17 | 1.475 | 0.048 | 0.0620 | 0.692 | 1.304 |
| 70.20 | 1.555 | 0.034 | 0.0422 | 0.495 | 1.475 |
| 80.15 | 1.601 | 0.020 | 0.0212 | 0.254 | 1.581 |
| 90.12 | 1.616 | 0.006 | 0.0011 | -0.010 | 1.616 |
| 0.26 | 0.072 | 0.035 | -0.0081 | 0.072 | 0.035 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 9.50 | 14 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.80 | 0.001 | 0.003 | -0.0217 | 0.001 | 0.003 |
| -0.01 | 0.036 | 0.002 | -0.0142 | 0.036 | 0.002 |
| 4.15 | 0.101 | 0.005 | -0.0018 | 0.101 | 0.013 |
| 8.14 | 0.168 | 0.010 | 0.0117 | 0.165 | 0.034 |
| 16.04 | 0.400 | 0.012 | 0.0282 | 0.381 | 0.122 |
| 20.12 | 0.524 | 0.027 | 0.0497 | 0.483 | 0.205 |
| 24.12 | 0.570 | 0.057 | 0.0809 | 0.496 | 0.285 |
| 28.06 | 0.721 | 0.075 | 0.1109 | 0.601 | 0.405 |
| 32.16 | 0.806 | 0.081 | 0.1213 | 0.639 | 0.498 |
| 36.15 | 0.883 | 0.082 | 0.1233 | 0.665 | 0.587 |
| 40.16 | 1.060 | 0.064 | 0.1106 | 0.769 | 0.733 |
| 44.09 | 1.062 | 0.068 | 0.1021 | 0.716 | 0.787 |
| 48.17 | 1.171 | 0.055 | 0.0860 | 0.740 | 0.909 |
| 52.18 | 1.259 | 0.046 | 0.0752 | 0.736 | 1.023 |
| 56.19 | 1.327 | 0.039 | 0.0647 | 0.706 | 1.125 |
| 60.19 | 1.382 | 0.034 | 0.0568 | 0.658 | 1.216 |
| 64.12 | 1.499 | 0.017 | 0.0433 | 0.639 | 1.356 |
| 68.20 | 1.442 | 0.024 | 0.0418 | 0.513 | 1.348 |
| 72.22 | 1.547 | 0.007 | 0.0273 | 0.465 | 1.475 |
| 76.18 | 1.563 | 0.002 | 0.0194 | 0.371 | 1.519 |
| 80.23 | 1.580 | -0.003 | 0.0125 | 0.271 | 1.557 |
| 84.17 | 1.506 | 0.003 | 0.0101 | 0.150 | 1.498 |
| 88.29 | 1.511 | -0.002 | 0.0025 | 0.047 | 1.510 |
| 92.24 | 1.510 | -0.006 | -0.0050 | -0.052 | 1.509 |
| 94.28 | 1.512 | -0.010 | -0.0092 | -0.103 | 1.509 |
| 0. | 0.384 | 0.001 | -0.0094 | 0.384 | 0.001 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Continued

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 9.50 | 13 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.94 | -0.087 | 0.035 | -0.0224 | -0.084 | 0.041 |
| 0.05 | 0.001 | 0.036 | -0.0032 | 0.001 | 0.036 |
| 4.04 | 0.077 | 0.039 | 0.0133 | 0.074 | 0.045 |
| 8.21 | 0.164 | 0.045 | 0.0300 | 0.156 | 0.068 |
| 16.04 | 0.355 | 0.060 | 0.0583 | 0.325 | 0.155 |
| 20.11 | 0.496 | 0.067 | 0.0728 | 0.443 | 0.233 |
| 24.19 | 0.658 | 0.077 | 0.0887 | 0.569 | 0.340 |
| 28.12 | 0.805 | 0.095 | 0.1187 | 0.665 | 0.464 |
| 32.08 | 0.886 | 0.098 | 0.1235 | 0.698 | 0.554 |
| 36.10 | 0.958 | 0.097 | 0.1206 | 0.717 | 0.642 |
| 40.22 | 1.036 | 0.092 | 0.1118 | 0.732 | 0.739 |
| 44.10 | 1.137 | 0.079 | 0.0931 | 0.761 | 0.848 |
| 48.22 | 1.250 | 0.063 | 0.0787 | 0.785 | 0.974 |
| 52.11 | 1.335 | 0.055 | 0.0698 | 0.777 | 1.087 |
| 56.16 | 1.402 | 0.049 | 0.0626 | 0.741 | 1.192 |
| 60.17 | 1.449 | 0.044 | 0.0557 | 0.683 | 1.279 |
| 64.12 | 1.483 | 0.039 | 0.0487 | 0.613 | 1.351 |
| 68.19 | 1.508 | 0.033 | 0.0414 | 0.529 | 1.412 |
| 72.13 | 1.528 | 0.029 | 0.0342 | 0.442 | 1.463 |
| 76.16 | 1.545 | 0.024 | 0.0267 | 0.347 | 1.506 |
| 80.22 | 1.559 | 0.019 | 0.0189 | 0.247 | 1.539 |
| 84.16 | 1.568 | 0.014 | 0.0116 | 0.146 | 1.561 |
| 88.16 | 1.573 | 0.009 | 0.0043 | 0.042 | 1.572 |
| 92.24 | 1.573 | 0.004 | -0.0027 | -0.065 | 1.572 |
| 94.20 | 1.571 | 0.002 | -0.0062 | -0.117 | 1.567 |
| 0.01 | 0.076 | 0.033 | -0.0105 | 0.076 | 0.033 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 10.50 | 18 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.06 | 0.012 | 0. | -0.0155 | 0.012 | -0.001 |
| 0.05 | 0.049 | -0.002 | -0.0067 | 0.049 | -0.002 |
| 4.00 | 0.087 | -0.001 | 0.0032 | 0.087 | 0.005 |
| 7.99 | 0.132 | 0.003 | 0.0128 | 0.130 | 0.021 |
| 15.93 | 0.233 | 0.015 | 0.0319 | 0.220 | 0.078 |
| 20.05 | 0.359 | 0.031 | 0.0553 | 0.327 | 0.153 |
| 23.95 | 0.503 | 0.049 | 0.0798 | 0.439 | 0.249 |
| 28.00 | 0.671 | 0.070 | 0.1133 | 0.560 | 0.377 |
| 31.93 | 0.755 | 0.078 | 0.1275 | 0.600 | 0.466 |
| 36.00 | 0.848 | 0.083 | 0.1358 | 0.637 | 0.566 |
| 40.00 | 0.947 | 0.082 | 0.1343 | 0.672 | 0.672 |
| 43.92 | 1.032 | 0.076 | 0.1269 | 0.691 | 0.771 |
| 48.05 | 1.148 | 0.064 | 0.1130 | 0.720 | 0.897 |
| 52.04 | 1.250 | 0.054 | 0.1003 | 0.726 | 1.019 |
| 55.97 | 1.344 | 0.045 | 0.0887 | 0.714 | 1.139 |
| 59.97 | 1.410 | 0.038 | 0.0780 | 0.673 | 1.240 |
| 63.96 | 1.455 | 0.033 | 0.0701 | 0.609 | 1.322 |
| 68.02 | 1.483 | 0.028 | 0.0627 | 0.529 | 1.386 |
| 72.02 | 1.511 | 0.023 | 0.0546 | 0.445 | 1.445 |
| 75.89 | 1.530 | 0.018 | 0.0473 | 0.355 | 1.488 |
| 79.99 | 1.547 | 0.012 | 0.0384 | 0.257 | 1.526 |
| 83.89 | 1.559 | 0.007 | 0.0306 | 0.159 | 1.551 |
| 87.94 | 1.569 | 0.002 | 0.0226 | 0.055 | 1.568 |
| 91.93 | 1.571 | -0.004 | 0.0150 | -0.049 | 1.571 |
| 93.84 | 1.642 | -0.017 | 0.0041 | -0.093 | 1.639 |
| -0.01 | 0.703 | 0.004 | 0.0165 | 0.703 | 0.004 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 10.50 | 17 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.01 | -0.078 | 0.042 | -0.0207 | -0.075 | 0.047 |
| 0. | -0.002 | 0.041 | -0.0041 | -0.002 | 0.041 |
| 3.99 | 0.066 | 0.043 | 0.0105 | 0.063 | 0.048 |
| 7.93 | 0.164 | 0.048 | 0.0299 | 0.156 | 0.070 |
| 16.00 | 0.355 | 0.063 | 0.0588 | 0.324 | 0.159 |
| 20.00 | 0.501 | 0.071 | 0.0744 | 0.446 | 0.238 |
| 23.99 | 0.654 | 0.083 | 0.0918 | 0.564 | 0.342 |
| 28.00 | 0.826 | 0.101 | 0.1226 | 0.682 | 0.477 |
| 31.93 | 0.912 | 0.103 | 0.1275 | 0.719 | 0.570 |
| 35.99 | 0.985 | 0.102 | 0.1251 | 0.737 | 0.661 |
| 39.99 | 1.065 | 0.097 | 0.1159 | 0.754 | 0.759 |
| 43.93 | 1.181 | 0.082 | 0.0940 | 0.794 | 0.878 |
| 47.98 | 1.298 | 0.065 | 0.0801 | 0.821 | 1.008 |
| 52.03 | 1.389 | 0.056 | 0.0711 | 0.810 | 1.130 |
| 55.96 | 1.455 | 0.050 | 0.0637 | 0.773 | 1.234 |
| 60.02 | 1.504 | 0.045 | 0.0568 | 0.712 | 1.325 |
| 63.96 | 1.539 | 0.040 | 0.0492 | 0.640 | 1.400 |
| 67.95 | 1.565 | 0.035 | 0.0422 | 0.555 | 1.463 |
| 71.89 | 1.551 | 0.023 | 0.0268 | 0.460 | 1.481 |
| 75.95 | 1.602 | 0.025 | 0.0276 | 0.365 | 1.560 |
| 79.94 | 1.615 | 0.019 | 0.0200 | 0.263 | 1.594 |
| 83.99 | 1.625 | 0.014 | 0.0121 | 0.156 | 1.618 |
| 87.98 | 1.630 | 0.009 | 0.0046 | 0.048 | 1.629 |
| 91.86 | 1.631 | 0.005 | -0.0020 | -0.058 | 1.630 |
| 93.89 | 1.629 | 0.002 | -0.0057 | -0.112 | 1.625 |
| 0. | 0.166 | 0.030 | -0.0095 | 0.166 | 0.030 |

DOUBLE-WEDGE WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 22 | 8X7 FT | 70 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.84 | -0.059 | -0.002 | -0.0243 | -0.059 | 0.002 |
| 0.18 | -0.012 | -0.003 | -0.0168 | -0.012 | -0.003 |
| 4.08 | 0.032 | 0. | -0.0073 | 0.032 | 0.002 |
| 8.20 | 0.093 | 0.006 | 0.0049 | 0.091 | 0.019 |
| 16.29 | 0.225 | 0.023 | 0.0293 | 0.209 | 0.085 |
| 20.24 | 0.351 | 0.039 | 0.0515 | 0.316 | 0.158 |
| 24.25 | 0.502 | 0.057 | 0.0759 | 0.434 | 0.258 |
| 28.23 | 0.658 | 0.074 | 0.1059 | 0.545 | 0.376 |
| 32.18 | 0.748 | 0.081 | 0.1181 | 0.590 | 0.467 |
| 36.20 | 0.826 | 0.083 | 0.1215 | 0.618 | 0.555 |
| 40.21 | 0.908 | 0.080 | 0.1170 | 0.642 | 0.647 |
| 44.19 | 1.010 | 0.070 | 0.1051 | 0.675 | 0.754 |
| 48.30 | 1.137 | 0.055 | 0.0859 | 0.715 | 0.885 |
| 52.22 | 1.241 | 0.045 | 0.0723 | 0.724 | 1.008 |
| 56.28 | 1.300 | 0.040 | 0.0661 | 0.688 | 1.103 |
| 64.20 | 1.385 | 0.030 | 0.0509 | 0.575 | 1.260 |
| 72.32 | 1.434 | 0.021 | 0.0365 | 0.415 | 1.372 |
| 80.38 | 1.464 | 0.012 | 0.0222 | 0.233 | 1.445 |
| 88.45 | 1.480 | 0.002 | 0.0071 | 0.038 | 1.480 |
| 94.24 | 1.480 | -0.007 | -0.0066 | -0.103 | 1.477 |
| 0.13 | 0.425 | 0.002 | -0.0071 | 0.425 | 0.003 |

TABLE I. - SUMMARY OF FORCE AND MOMENT COEFFICIENTS - Concluded

DOUBLE-WEDGE — WITHOUT ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 21 | 8X7 FT | 430 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -3.81 | -0.075 | 0.037 | -0.0188 | -0.073 | 0.042 |
| 0.19 | -0.004 | 0.037 | -0.0031 | -0.004 | 0.037 |
| 4.21 | 0.074 | 0.040 | 0.0139 | 0.071 | 0.045 |
| 8.21 | 0.161 | 0.045 | 0.0307 | 0.153 | 0.067 |
| 16.26 | 0.396 | 0.056 | 0.0616 | 0.364 | 0.164 |
| 20.24 | 0.510 | 0.066 | 0.0750 | 0.455 | 0.238 |
| 24.25 | 0.664 | 0.078 | 0.0917 | 0.573 | 0.344 |
| 28.26 | 0.820 | 0.096 | 0.1220 | 0.677 | 0.473 |
| 32.26 | 0.903 | 0.099 | 0.1255 | 0.711 | 0.566 |
| 36.20 | 0.975 | 0.097 | 0.1219 | 0.730 | 0.654 |
| 40.33 | 1.060 | 0.091 | 0.1108 | 0.749 | 0.755 |
| 44.26 | 1.165 | 0.077 | 0.0919 | 0.780 | 0.868 |
| 48.28 | 1.281 | 0.061 | 0.0777 | 0.807 | 0.997 |
| 52.21 | 1.365 | 0.053 | 0.0695 | 0.795 | 1.111 |
| 56.29 | 1.428 | 0.047 | 0.0624 | 0.753 | 1.214 |
| 60.21 | 1.473 | 0.042 | 0.0556 | 0.695 | 1.299 |
| 64.31 | 1.505 | 0.037 | 0.0486 | 0.619 | 1.373 |
| 68.29 | 1.529 | 0.033 | 0.0416 | 0.535 | 1.432 |
| 72.30 | 1.547 | 0.028 | 0.0346 | 0.444 | 1.482 |
| 76.31 | 1.563 | 0.023 | 0.0273 | 0.348 | 1.524 |
| 80.26 | 1.576 | 0.018 | 0.0194 | 0.249 | 1.557 |
| 84.32 | 1.585 | 0.013 | 0.0125 | 0.144 | 1.578 |
| 88.32 | 1.590 | 0.008 | 0.0053 | 0.039 | 1.589 |
| 92.31 | 1.589 | 0.004 | -0.0016 | -0.068 | 1.588 |
| 94.30 | 1.587 | 0.001 | -0.0051 | -0.120 | 1.583 |
| 0.18 | 0.098 | 0.032 | -0.0087 | 0.098 | 0.032 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 28 | 8X7 FT | 80 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.14 | 0.006 | -0.003 | -0.0058 | 0.006 | -0.003 |
| -0.12 | 0.038 | -0.004 | -0.0026 | 0.038 | -0.004 |
| 3.95 | 0.076 | -0.002 | 0.0049 | 0.076 | 0.003 |
| 7.91 | 0.122 | 0.002 | 0.0139 | 0.121 | 0.019 |

DOUBLE-WEDGE — WITH ENDPLATE

| MACH NO. | SPAN | RUN | TUNNEL | R |
|---|---|---|---|---|
| 3.50 | 11.50 | 27 | 8X7 FT | 440 000 |

| ALPHA | C(N) | C(A) | C(M) | C(L) | C(D) |
|---|---|---|---|---|---|
| -4.07 | -0.061 | 0.032 | -0.0155 | -0.059 | 0.037 |
| -0.06 | 0.004 | 0.034 | -0.0011 | 0.004 | 0.034 |
| 3.96 | 0.079 | 0.038 | 0.0156 | 0.076 | 0.043 |
| 7.97 | 0.164 | 0.043 | 0.0320 | 0.157 | 0.065 |
| 15.99 | 0.359 | 0.057 | 0.0601 | 0.329 | 0.154 |
| 19.96 | 0.483 | 0.065 | 0.0742 | 0.432 | 0.227 |
| 24.08 | 0.642 | 0.077 | 0.0916 | 0.554 | 0.333 |
| 28.04 | 0.794 | 0.094 | 0.1196 | 0.657 | 0.456 |
| 31.99 | 0.875 | 0.096 | 0.1229 | 0.692 | 0.545 |
| 36.06 | 0.950 | 0.093 | 0.1186 | 0.713 | 0.635 |
| 40.08 | 1.037 | 0.086 | 0.1064 | 0.738 | 0.734 |
| 44.07 | 1.159 | 0.069 | 0.0845 | 0.784 | 0.856 |
| 48.20 | 1.278 | 0.054 | 0.0719 | 0.812 | 0.989 |
| 52.11 | 1.356 | 0.048 | 0.0646 | 0.796 | 1.100 |
| 56.11 | 1.412 | 0.042 | 0.0580 | 0.752 | 1.196 |
| 60.11 | 1.454 | 0.037 | 0.0508 | 0.692 | 1.279 |
| 64.09 | 1.482 | 0.032 | 0.0435 | 0.619 | 1.347 |
| 72.15 | 1.521 | 0.024 | 0.0303 | 0.444 | 1.455 |
| 80.18 | 1.541 | 0.016 | 0.0191 | 0.247 | 1.521 |
| 88.19 | 1.552 | 0.007 | 0.0059 | 0.042 | 1.552 |
| 94.17 | 1.550 | 0. | -0.0041 | -0.113 | 1.546 |
| -0.11 | 0.127 | 0.028 | -0.0066 | 0.127 | 0.028 |

ABSTRACT

AERODYNAMIC CHARACTERISTICS OF TWO 20 PERCENT THICK, RECTANGULAR WINGS UP TO 90° ANGLE OF ATTACK AT SUBSONIC, TRANSONIC, AND SUPERSONIC SPEEDS. Greenfield A. Randall, Jr.

Tests were conducted in four wind tunnels to obtain aerodynamic coefficients for two wall mounted, 20 percent thick, rectangular wings, one of a double wedge and the other of an elliptic profile. Angles of attack up to 90° were covered at ten Mach numbers ranging from 0.20 to 3.50. Section data were obtained by attaching a large plate to the tip of each wing. Spanwise loading information was determined for each wing up to 214 percent chord from the free tip.