## RESEARCH MEMORANDUM <br> 回 <br> 

THE FORCES AND PRESSURE DISTRIBUTION AT SUBSONIC SPEEDS
ON A PLANE WING HAVING $45^{\circ}$ OF SWEEPBACK, AN ASPECT
$\therefore$ RATIO OF 3, AND A TAPER RATIO OF 0.5
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# NATIONAL ADVISORY COMMITTEHE FOR AEROITAUTICS 

## RESEARCH MHMORANDCM

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SUMMARY

An investigetion was conducted to determine the effects of scale and compressibility on the forces, moments, and pressure distribution on a wing having an aspect ratio of 3 and a taper ratio of 0.5 . The line joining the quarter-chord points of the airfoil sections was swept back $45^{\circ}$ and the airfoil sections perpendicular to this line were the NACA $24 A O 10$.

Ifft, drag, and pitching-moment data and the chordwise distribution of static pressure at seven spanwise stations are presented for Reynolds numbers up to $18,000,000$ at a constant Mach number of 0.25 ; for Mach numbers ranging from 0.08 to 0.96 at a constant Reynolds number of $4,000,000$; and for Mach numbers of $0.08,0.25$, and 0.60 at a constant Reynolds number of $8,000,000$.

It was indicated from the force and moment data that, for all Mach numbers and Reynolds numbers in the test renge, no apparant flow separation existed near the leading edge of the wing for lift coefficients less than 0.3. At higher lift coefficients, the initiation of flow separation and reattachment near the leading edge of the outer sections of the wing was generally accompanied by ai increase in the lift-curve slope, a rearward movement of the aerodynamic center, and an increase in the rate of drag rise.

The effect of increasing the Reynolds mumber was to delay to higher Ifft coefficients the onset of leading-edge flow separation and the concomitant effecta on the lift, drag, and pitching moment.

Increasing the Mach number to approximately that for drag divergence at a Reynolds number of $4,000,000$ resulted in a rearward movement of
the wing aerodynamic center of about 6 percent at the mean aerodynamic chord at zero lift.

The effecte of compressibility on the force and mament characterIstics up to a Mach number of 0.60 were influenced by an increase in Reynolds number from 4,000,000 to 8,000,000. At the lower Reynolds number, the angle-of-ittack range for which the lift and pitching-moment curves were nearly linear was reduced by the increase in Mach number, whereas this angle-of-attack range was increased at the higher Regnolds number.

An investigation of several types of Juncture arrangements between the model and the turntable indicated that varying the type of aeal caused but ifttie change in the forces, moments, and pressure distribution on the model.

## INTRODUCIION

Wings having moderately high degrees of sweepback offer the possibility of flight at transonic speeds without serious compressibility effects. Studies of the pressure distributions on such wings have shown that simple sweep theory does not offer an adequate method of predicting the chordwise distribution of pressure near the roota or the tips of the wings. For swept-back wings of low aspect ratio, a subatantial part of the wing surface is subjected to flow characteristics which result from the so-called root and tip effects. Frperimental determination of the pressure distribution on such wings will provide not only detailed information concerning the aerodynamic characteriatice, but also will furnish data for evaluating and extending the theoretical methods for computing surfece pressures.

An investigation has been conducted in the Ames 12-foot pressure wind tunnel throughout a wide range of Reynolds numbers and subsonic Mach numbers to obtain experimentally the pressure diatribution and the total iift, drag, and pitching moment on a wing having $45^{\circ}$ of sweepback and an aspect ratio of 3. To determine the effects of both Mach number and Reynolds number, the wing was tested at constant Reynolds numbers over a range of Mach numbers and at a constant Mach number over a range of Reynolds numbers. The force data and a representative portion of the pressure data are presented in graphic form along with a limited analysia of the data. The complete pressure data for the wing are pre sented in tabular form.

NOTATION

$$
\begin{aligned}
& \text { a speed of sound in Pree stream, feet per second } \\
& \frac{6}{2} \text { semispan, measured perpendicular to plane of symmetry, feet } \\
& \sigma_{D} \quad \text { drag coefficient }\left(\frac{\partial_{\text {mg }}}{q_{0} 5}\right) \\
& \mathrm{C}_{\mathrm{D}_{\mathrm{t}}} \quad \text { tare drag coefficient }\left(\frac{\operatorname{tare} \mathrm{drag}}{q_{0} S}\right) \\
& \sigma_{I} \quad \text { Iff coefficient }\left(\frac{\text { ifft }}{q_{0} S}\right)
\end{aligned}
$$

$C_{m}$. pitching-moment coefficient about the querter point of the
A

$$
\text { wing mean aerodynamic ahord }\left(\frac{p 1 t c h i n g ~ m o m e n t ~}{q_{0} S \bar{c}}\right)
$$

$C_{N} \quad$ normal-force coefficient $\left(\frac{1}{5} \int_{0}^{b / 2} c_{n} c d y\right)$
c local wing chord parallel to plane of aymetry, feet
$C_{a v}$ average wing chord parallel to plane of symmetry, feet $c_{n}$ section normal-force coefficient $\left(\frac{\text { section normal force }}{q_{0} c}\right)$ $\overline{\mathrm{C}} \quad \begin{array}{r}\text { mean aerodynamic wing } \\ \text { theoretioal tip ohord }\end{array}$
$\frac{I}{\bar{D}} \quad$ ratio of lift to drag
$\left(\frac{L}{D}\right)_{\text {max }} \quad$ maximum lift-to-drag ratio
$M_{D}$ drag-divergence Mach number (free-atream Mach number at which $\left.\left(\frac{\partial C_{D}}{\partial M_{0}}\right)_{C_{L}}=0.10\right)$
$M_{0} \quad$ free-stream Mach number $\left(\frac{V_{0}}{a_{0}}\right)$
P
local pressure coefficient $\left(\frac{p-p_{0}}{q_{0}}\right)$
p local static pressure, pounds per equare foot
$p_{0} \quad$ free-stream static pressure, pounds per square foot
$q_{0} \quad$ Preestream dynamic pressure $\left(\frac{1}{2} \rho_{0} V_{0}^{2}\right)$, pounds per square foot
R Reynolds number $\left(\frac{\rho_{0} \nabla_{0} \bar{c}}{\mu_{0}}\right)$
S semispan wing area, aquare feet (using theoretical tip chora)
$\nabla_{0} \quad$ freestreall velocity, feet per second
I lateral distance perpendicular to the plane of eymetry, feet
$\alpha \quad$ angle of attack, degrees
$\alpha_{1}$ angle of attack unoorrected for tunnel-wall interference and angle-of-attack counter correction, degree日
$\eta$. fraction of eemispan $\left(\frac{y}{b / 2}\right)$
$\mu_{0} \quad$ coefficient of Viscosity of air, slugs per foot-second
$\rho_{0}$ free-atream mass density of air, slugs per cubic foot

## MODEI AND APPARATUS

The model wing used in this investigation had the leading edge swept back 48.540, an aspect ratio of 3.0, and a taper ratio of 0.5 . The wing had no twist and the sections were the KACA 64AOl0 in planes inclined $45^{\circ}$ to the plane of gymmetry. The locus of the quarter-chord points of these sections was swept back $45^{\circ}$. This line was at 29.63 percent of the chord parallel to the plane of symmetry. The tip of the wing was formed by a half body having a radius equal to the corresponding half thickness of the tip section. Coordinates of the NACA 64AOLO section and of the sections parallel to the plane of symmetry are presented in tables I and II, respectively.

The model, which had a semispan of 46.67 inches, was constructed of a tin-bismath allof bonded to a laminated steel spar. Pressure orifices were installed in seven rows in planes parallel to the plane of symmetry. The orifices were distributed along the chord on bath the upper and lower surfaces from the leading edge to the 91-percent-chord point and were staggered $1 / 4$ inch on either side of the station planes. A sketch of the plan form of the wing showing the locations of the seven orifice rows and the manner in which the orifices were staggered is given in figure 1. The locations of the orifices along the chord at each station are given with the tabulated pressure-coefficient data (tables III through XXII).

Figure 2 shows the model mounted in the wind-tunnel test section. The test-section floor served as a reflection plane. The forces and moments were transmitted directily to the balance system through the turntable upon which the model was mounted. Pressures were measured by means of multiple-tube manometers and were recoried photographically.

Twenty-aix flush orifices were installed in the wind-tunnel test section for the purpose of investigating the onset and the extent of supersonic flow along the tunnel wall opposite the upper surface of the model. The location of these orifices with respect to the model is illustrated in figure 3.

Cross-sectional views of the juncture arrangemente between the molel and the turntable that were used in the investigation of various seals are shown in figure 4. It is to be noted that the configurationa shown in figure 4 extended completely around the root section of the model.

The chordwise đistributions of prossure at seven sparmise stations on the wing were measured aimulaneously with the total lift, drag, ard
pitching moment at Reynolds numbers of $4,000,000,6,000,000,8,000,000$, $12,000,000$, and $18,000,000$ for a Mach number of 0.25 . Similar measurements were made at a Reynolds number of 4,000,000 for Mach numbers rangIng from 0.08 to 0.96 and at a Reynolds number of $8,000,000$ for Mach numbers of 0.08 and 0.60 . The angle of attack was varied from $-2^{\circ}$ to $30^{\circ}$ during the low-speed tests, but this range was reduced at the higher Mach numbers where wind-tumel power limitations prevented teating at the higher angles of attack. At Reynolds numbers of 12,000,000 and 18,000,000, the capacity of the wind-tunnel balance system limited the force measurements to angles of attack of $28^{\circ}$ and $16^{\circ}$, respectively.

Surface pressures on the tunnel wall were measured in the vicinity of the model to ascertain the test conditions at which the data may have been affected by wind-tumel choking.

As an adjunct to the basic teste, an investigation was made to determine the effect of various seals at the model-turntable juncture on the measured forces, moments, and pressures on the model. For each of the six arrangemente shown in ifgure 4, measurementa of the lift, drag, pitching moment, and static pressures on the wing were obtained for Mach numbers of 0.25 and 0.80 at a constant Reynolds number of 4,000,000. The seal arrangement denoted as "original" was used throughout the general investigation of the wing aerodynamic characteristics.

Corrections to the data for tunnel-wall interference resulting from lift on the model were evaluated by the method of reference 1 using the theoretical span loading derived from the charte of reference 2. The following increments were added to the angle of attack and drag coefficient:

$$
\begin{aligned}
& \Delta a=0.769 C_{L}, \text { degrees } \\
& \Delta C_{D}=0.0109 C_{L}{ }^{2}
\end{aligned}
$$

No corrections were applied to the pitching-moment data.
The pressure data and the coefficients derived therefrom are presented in this report for values of uncorrected angle of attack our. The relation between the corrected and uncorrected angles of attack is as follows:

$$
\alpha=0.99 \alpha_{i I}+\Delta \alpha
$$

Corrections for the effecte of constriction were evaluated by the method of reference 3. This method, while not accounting for sweepback and belng strictly applicable only to full-span models centrally located in the tunnel, has been used as the best available estimate of the constriction effects. The magnitude of the corrections applied to the freestream Mach number and to the dynamio pressure is 11justrated in the following table:

| Corrected <br> Mech number | Uncorreoted <br> Mhach number |  |
| :---: | :---: | :---: | | Correoted $q_{0}$ |
| :---: |$\quad$| Uncorreoted $q_{0}$ |
| :---: | :---: | :---: |

The following corrections were subtracted from the drag coefficients to compensate for the forces on the exposed surface of the turntable:

| $\underline{R} \times 10^{-8}$ | $\mathrm{M}_{0}$ | $\mathrm{C}_{\mathrm{D}_{t}}$ |
| :---: | :---: | :---: |
| 4.0 | 0.08 | 0.0027 |
| 1 | . 25 | . 0028 |
|  | . 60 | . 0030 |
|  | . 80 | . 0033 |
|  | . 90 | . 0036 |
|  | . 92 | . 0037 |
|  | . 94 | . 0038 |
| $\downarrow$ | . 96 | . 0040 |
| 6.0 | . 25 | . 0026 |
| 8.0 | . 08 | . 0023 |
| $\downarrow$ | . 25 | . 0024 |
| $\downarrow$ | . 60 | . 0025 |
| 12.0 | . 25 | . 0023 |
| 18.0 | . 25 | . 0022 |

No attempt wes made to evaluete the tares due to possible interference between the model and the turntable or to compensate for the tunnelfloor boundary layer which, at the models had a displacement thickness of $I / 2$ inch. The magnitude of these effects is belfeved to be small.

Through consideration of the resulte of the static loading tests on a model of moderate aspect ratio presented in reference 4 and the greater
structural rigidity of the subject model, it was assumed that the effectg of aeroelasticity on the aerodynamic characteriatice of the model were negligible.

## RESUUTS AND DISCUSSION


#### Abstract

The aurface preasures on the model, measured for the complete range of Mach numbers and Reynolds numbers at gelected anglea of attack, are presented as pressure coefficients in tabular form immediately following the figures. Table III ia an index to these data which are presented in tables IV through XXII. A representative portion of the pressurediatribution data has been presented graphically in the figures of this report to facilitate the analyais of the force and moment characteriatics of the model. Due to the staggering of the orificea (as explained. in the section "Model and Apparatus"), a slight "saw-tooth" variation is present in the plotted values of the chordwise preseure distributions, particularly in regions where the apanwise presaure gradients were large. A mean fairing through the plotted values of pressure coefficient was therefore used to represent the pressure diatribution at the apanwise atations indicated in figure 1.

The reaults of an investigation that was made to ascertain the effect of model-turntable functure seals are presented in the appendix. These data indicate that the various alterations to the seal, in the model-turntable functure, produced no significant ohanges in the aerodynamic characteristics of the wing.


The lift, drag, and pitching-moment characteristics of the model are presented in figure 5 for Reynolds numbers of $4,000,000,8,000,000$, 12,000,000, and 18,000,000. Figure 6 presents the chordwise diatributions of pressure coefficient at the seven spanwise stations for several angles of attack at Reynolds numbers of 4,000,000, 8,000,000, and 18,000,000. Inspection of figure $5(a)$ reveala that at low to moderate values of lift coefficient the variation of lift coefficient with angle of attack was linear and the lift-curve alope was little affected by the increase in Reynolds nimber. At a Reynoide mumber of 4,000,000 the IIftcurve slope increased beyond a lift coefficient of about 0.4 and decreased at lift coefficients greater than about 0.75. A comparison of these data with the pre日sure data in figure 6 indicater that the increase in lift-curve slope was due to separation and reattachment of the flow near the leading edge of the outer sections (indicated by a reduction in the peak pressure coefficients). Further comparison of the

## Effecte of Reynolds Number at a Mach Number of 0.25

 data shows that the reduction in the Ifft-curve slope occurred when the.separated flow failed to reattach over the outer sections (indicated by a chordwise distribution of nearly constant pressure). Increasing the Reynolds number above 4,000,000 resulted in an increase in the lift coefficient at which the lift-curve slope increased and an increase in the lift ocefficient at which complete flow separation over the outer sections resulted in a decrease in the lift-curve slope. The maximum lift coefficient increased only slightly as the Reynolds number was increased from 4,000,000 to 12,000,000.

The increase in lift-curve slope at moderate angles of attack was accompanied by a rearward movement of the wing center of pressure (fig. 5(b)) which was followed by a forward movement as the lift-curve slope decreased. Beyond maximum lift the wing center of pressure moved rearward. With increasing Reynolds number the initiation of flow separation over the outer sections had a more pronounced effect on the rearward movement of the wing center of pressure.

Inspection of the drag data in figure 5(c) In conjunction with the lift and moment data in figures $5(a)$ and $5(b)$ shows that an additional increase in the rate of change of drag coefficient with lift coefficient occurred simultaneously with the increase in Ifft-curve siope and longitudinal stability.

In figure 7 the section normal-force coefficients, derived from integration of the pressure data, are presented as functions of the uncorrected angle of attack. With increasing Reynolds number there was an increase in the maximum section normal-force coelficients at the outer sections. A comparison of the data of figure 7 with that preaented in ifgure 5 indicates that the increase in the lift-curve slope, the increase in longitudinal stability, and the more rapid rate of drag rise of the wing coincided with the increase in the section normal-force curve slope of thie tip sections. Attendant upon this increase in the section normal-force-curve slope at the higher Reynolds number was a rapid expension of the chordwise extent of the region of flow separation starting Prom just behind the leading edge. The resultant redistribution of pressure caused a rearward movement of the centers of pressure of the outer sections as shown in figure 8.

Effects of Reynolds Number at a Mach Number of 0.60

The Ifft, drag, and pitching-moment characteristics of the wing are compared in figure 9 for Reynolds numbers of 4,000,000 and 8,000,000. The corresponding chordwise distributions of static pressure coefficient at the seven spanfise stations are presented in figure 10 for several angles of attack. From figure 9 it is evident that increasing the Reynolds number from $4,000,000$ to $8,000,000$ extended the Ifnear portion of the lift curve, caused a more nearly linear variation of the pitchingmoment coefficient with the lift coefficient, and resulted in a reduction

In the drag coefficients for lift coefficients greater than about 0.2. The pressure data in Iigure 10 reveal thet at the higher Reynolde number there was an increase in the angle of attack at which the reduction in the peok pressure coefficients began at the outer eections. These data also show that at the higher Reynolds inumer there was a more gradual reduction in the peak pressure coefficients near the leading edge of the wing with increasing angle of attack, probably the result of a more gradual growth of the chordwise extent of the region of.separation.

In figure II the section normal-force coefficients at the two Reynolds numbers are presented as functions of the uncorrected angle of attack. The effect of increasing the Reynolds number was to delay to higher angles of attack the rapid increase in section normal-force coefficient and also to increase the meximum values of section normalforce coefficient at the outer sections. A comparison of figures 10 and Il reveals that at a Reynolde number of 4,000,000 the large increase in slope of the section normal-force curves was the result of the region of separation extending a considerable distance rearward from the leading edge.. At a Reynolds number of $8,000,000$ the onset of separation and reattachment of the flow near the leading edge was, for most sections, at first accompenied by a decrease in the slope of the section normal-force curves followed by an increase in the slope as the region of separation extended rearward from the leading edge.

In adition to the changes in the section normal-force coefficients With the increuse in Reynolde number, the positions of the section centers of pressure were also changed. The variations of the locations of the section centers of pressure and of the pitching-moment coefficient of the wing with angle of attack at Reynolds numbers of 4,000,000 and $8,000,000$ are shown in figure 12. It is to be noted that the rearward movement of the section centers of pressure was considerably more abrupt and of greater magnitude at a Reynolde number of 4,000,000 than at a Reynolds number of $8,000,000$. Thus, it appears that changes in the section centers of pressure as well as changes in the spanwise distribution of the section normal-force coefficient were responsible for the differences noted in the pitching-moment characteristics at these two Reynolde numbers.

Effecte of Mack Number at a Reynolds Number of 4,000,000

Iimitations of the data due to wind-tunnel choking. - Before the effecte of Mach number on the aerodynamic characteristice are discussed, It is necessary to explain the possible limitations of portions of the data obtained at Mach numbers near those at which choking occurred in the wind tunnel. In order to ascertain the degree of wind-tumel choking, static pressures were measiured along the wind-tunnel wall
opposite the upper surface of the model. From these pressure surveys the approximate extent of supereonic flow on the tunnel wall was determined.

As an illustration of the results of the gurveys, figure i3 is presented. This figure shows the development of a region of supersonic flow on the upper surfesce of the model and on the tunnel well with increasing angle of attack at a Mach number of 0.92 . It is apparent that, at angles of attack of 40 or less, the extent of supersonic flow on the tunnel wall was small and, consequently, any alteration to the supersonic flow field about the model due to the presence of the tunnel walls was probably slight. However, as the angle of attack was increased to $6^{\circ}$ and beyond, the region of aupersonic flow on the tunnel wall increased, resulting in a "partially chokea" condition. The data obtained under these conditions are represented by the dotted portions of the curves in the figures.

Force and moment oharacteristics. - In figure 14 the aerodynamic characteristics of the wing at Macil numers ranging from 0.08 to 0.96 are presented for a constant Reynolds number of 4,000,000. Included in this figure are the data obtained at Mach numbers of $0.08,0.25$, and 0.60 for a constant Reynolds number of 8,000,000. These data will be discussed under the heading "Influence of Reynolds Fumber on the Effects of Compressibility." The effects of Mach number on the lift, drag, and pitching-moment coefficients at a Reynolds number of 4,000,000 are summarized in figures 15 and 16 wherein the coefficients are plotted as functions of Mach number. The variation with Mach number of the liftcurve slope and the locations of the aerodynamic center for several angles of attack are shown in figures 17 and 18, respectively. The maximum lift-arag ratio and the lift coefficient for marimum lift-arag ratio are presented in figure 19.

With reference to figure 14 (a), it may be seen that the lift-curve slope increased at lift coefficienta of 0.6 ana 0.4 for Mach numbers of 0.08 and 0.25 , respectively, whereas the increase in lift-curve slope began at a lift coefficient of about 0.3 for Mach mabers from 0.40 to 0.90. In figure 17 the theoretical velue of lift-curve slope computed by the method of reference 2 is shown in comparison with the experimental values for lift coefficients of 0, 0.2, and 0.4. The agreement between the experimental and theoretical values is good for lift coefficients of 0 and 0.2 . The mariked increase in the experimental values at a lift coefficient of 0.4 is believed to have resulted from separation and reattachment of the flow near the leading edge of the tip of the wing.

In figure 15, the pitching-moment coefficients for constant values of lift coefficient at a Reynolds number of 4;000,000, obtained from figure 14(b), are shown to have gradually become more negative with increasing Mach number. At Mach numbers slightly below those where the
tunnel became partially ahoked the pitching-moment coefficients increased rapialy in absolute value.

The effect of Mach number on the location of the aerodynamio center at angles of attack of $0^{\circ}, 2^{\circ}, 4^{\circ}$, and $6^{\circ}$, is shown in figure 18. The aerodynamic center at an angle of attack of $0^{\circ}$ moved rearward approximately 6 percent of the mean aerodynamic chord as the Mach number was increased from 0.08 to 0.92 and then moved rapidiy rearward as the Mach number was further increased. At anglee of attack of $2^{\circ}$ and $4^{\circ}$, the poaition of the aerodynamic center varied only allightly up to Mach numbers of 0.91 and 0.90 , respectively, beyond which it moved rapidiy rearward. At an angle of attack of $6^{\circ}$, the aerodynamic center moved aft approximately 9 percent of the mean aerodynamic chord as the Mach number was increased from 0.08 to 0.85 and then contimed rearward more rapidly with increasing Mach number.

In figure 24(c), the familiar low-drag range is discernible at low lift coefficients at Mach numbers up to 0.83 . The loss of this low-drag region is reflected in the lower two curves shown in figure 16 wherein the drag coefficient is presented as a function of Mach number for constant values of lift coefficient. At a Mach number of 0.83 the drag coefficient may be seen to have increased only slightly over its low-epeed value for lift coefficients of 0 and 0.1 . Between a Mach number of 0.83 and that for drag divergence the drag incieased roughly 50 percent. A similar variation of the drag coefficient with Mach number may be noted for a lift coefficient of 0.2 although this was outside the low-drag range. At higher lift coefficients the gradual drag rise commenced at considerably lower Mach mumbers. The Mach mumber for drag divergence, defined as the point at which ( $\left.\partial C_{D} / \partial M_{0}\right)_{C_{L}}=0.10$, decreased from about 0.94 at a lift coefficient of 0 to 0.875 at a lift coefficient of 0.5 . The suden reduction in drag coefficient just prior to drag divergence for lift coepficients of 0.4 and 0.5 may be due to a reduction in the region of separated flow over the forward part of the airfoil as explained in reference 5.

In figure 19 the maximm lift-drag ratio is ehown to have been about 19 between Mach numbers of 0.08 and 0.45 , thereafter decreasing gradually to about 16 at a Mach mumber of 0.92 . Further increase in Mach number up to 0.96 resulted in a decrease in the maximum lift-drag ratio to about 9. The lift coefficient for maximum lift-drag ratio deriated only slightly from 0.2 throughout the Mach number range.

Pressure-diatribution characteriatice:- The chordwise diatribution of pressure coefficient at the seven spanwise atations is presented in figure 20 for angles of attack of $2^{\circ}, 4^{\circ}$, and $6^{\circ}$ at several selected Mach numbers. The pressure distributions for an angle of attack of $2^{\circ}$ were used in locating the isobars, or lines of constant pressure coefficient, on the upper and lower aurfaces of the model as shown in figure 21. It can be seen that, in general, the isobars curve rearward near the root of the wing so as to approach the plane of symmetry
perpendicularly. Conversely, the isobars at the tip of the wing tend to curve forward. From the isobar plots it may be seen that the points of minimum pressure, exclusive of those at or near the leading edge, were displaced rearward at seotions near the root and forward at sections near the tip. The crest lines (Ifnes defining the locus of points at which the surfece of the wing is tangent to the undiaturbed free stream) are indicated in figure 21 to provide a reference from which to gage the variance in the isobars. A discussion of an interpretation of isobars is given in reference 4.

The spanwise distributions of section normal-force coefficient at several Mach numbers are presented in figure 22 for angles of attack of $2^{\circ}, 4^{\circ}$, and $6^{\circ}$. As previously noted, the dotted curves represent data obtained with the supersonic flow field of the model extending to the tunnel wall. It may be observed that the maximum value of section normal-force coefficient occurred at about 70 percent of the semispan. As the Mach number was increased from 0.60 to 0.90 at an angle of attack of $6^{\circ}$, the section normal-force coefficient showed a greater increase at the tip stations than at stations nearer the root. This greater increase in the section normal-force coefficient of the tip sections was accompanied by an increase in the Iift-curve siope, an increase in stability, and an increase in the rate of drag rise. (See iig. 14.)

In figure 23 the spanwise distribution of loading coefficient $c_{n} c / C_{N} c_{a v}$ at several Mach numbers is presented in comparison with the theoretical distribution. The theoretical distribution is practically invariant throughout the range of Mach numbers for which experimental data are presented. Similarly, the experimental values of loading coefficient show only small variations with Mach number and are in good agreement with the theoretical values. The experimentel loading coefficients are based upon the slopes of the section normal-force curves measured through an angle of attack of $0^{\circ}$.

The effects of compressibility on the lacstions of the section centers of preseure at the seven spanwise stations for angles of attack of $2^{\circ}, 4^{\circ}$, and $6^{\circ}$ are shown in figure 24. The effect of increasing Mach number was, generally, to cause a rearward movement of the section centers of pressure near the root and a forward movement near the tip up to approrimately the Mach number for drag divergence. An exception to this variation with Mach number is shown for an angle of attack of $6^{\circ}$ at 0.924 semispan where the center of pressure moved reerward with increasing Mach number. The over-all effect of the movementa of the section centers of pressure, together with the changes in the spanwise distribution of load (fig. 22), on the location of the wing aerodynamic center at angles of attack of $2^{\circ}, 4^{\circ}$, and $6^{\circ}$ may be seen by reference to figure 18.

Influence of Reynolds Number on the Effecte of Compreasibility

In figure 14, the data obtained at several Mach numbers for a Reynolds number of $8,000,000$ have been included with the data for a Reynolds number of $4,000,000$ to show, insofar as is possible, the influence of Reynolds number on the compreseibility effects encountered up to a Mach number of 0.60 .

With an increase in Mach number to 0.60 , the linear portion of the lift curve (fig. 14(a)) was extended to higher lift coefficients at a Reynolds number of $8,000,000$, whereas at a Reynolds number of 4,000,000 it was reduced. This same trend may be seen in the pitching-moment characteristics (fig. 14(b)) where changes in stability with an Increase in Mach number to 0.60 were delayed to higher lift coefficients at a Reynolds number of $8,000,000$, whereas at a Reynolds number of $4,000,000$ increasing the Mach number to 0.60 reduced the lift coefficient at which changes in stability occurred. Thus, the offect of increasing Mach number on the lift coefficient at which tip stalling occurred was apparently reversed by Increasing the Reynolds number from 4,000,000 to 8,000,000. The drag data (fig. I4(c)) indicate, however, that an increase in the rate of ohange of drag coefficient with lift coefficient occurred at about the same lift coefficient for Reynolds numbers of 4,000,000 and 8,000,000 at a Mach number of 0.60 . The explanation of this effect of Reynolds number is provided in the pressure data of figure 10. These data show that at a Reynolde number of $8,000,000$, leading-edge flow separation with reattachment near the tip of the wing actually began at an angle of attack between $6^{\circ}$ and $8^{\circ}$ although the flow did not separate completely over the outer sections until the angle of attack was increased beyond $12^{\circ}$. At a Reynolda mumber of $4,000,000$ the flow had separated completely over the outer sections at an angle of attack of 8 . Thus, due to the more gradual spreading of the stall near the tip at a Reynolds number of $8,000,000$, there was no sudden change in the slope of elther the lift curve or the pitching-moment curve although the drag rise was similar to that at a Rejnolde number of $4,000,000$.

It is important to note that the favorable effects of increasing the Reynolds number may persist at still higher. Mach numbers. In this event, the effect of Increasing Mach number at higher Reynolds numbers would differ from that shown at a Reynolds number of 4,000,000.

CONCLUSIONS

An investigation has been made of the effecta of scale and compreasibility on the aerodynamic characteristics of a wing having the quarter-chord line swept back $45^{\circ}$ and an aspect ratio of 3.0. Force, moment, and surface pressuree were masaured for Reynolds numbers up
to 18,000,000 at a constant Mach number of 0.25 ; for Mach numbers up to 0.96 at a constant Reynolds number of 4,000,000; and for Mach numbers up to 0.60 at a constant Reynolds number of $8,000,000$. The results of the tests indicate the following conclusions:

1. For all Mach numbers and Reynolds numbers in the test range, no flow separation appeared to exist near the leading edge of the wing for lift coefficients less than 0.3. At higher lift coefficients the initiation of leading-edge flow separation with reattachment, over the outer portions of the wing, was accompanied in nearly every case by an increase in the lift-curve slope, an increase in static longitudinal stability, and an increase in the rate of drag rise.
2. The effect of increasing the Reynolds number at Mach numbers of 0.25 and 0.60 was to delay to higher lift coefficients the onset of flow separation near the leading edge and the concomitent effects on the lift, drag, and pitching moment.
3. Increasing the Mach number to approximately that for drag divergence at a Reynolds number of 4,000,000 resulted in a rearward movement of the wing aerodynamic center of about 6 percent of the mean aerodyamic ohord at zero lift. (The Mach number for drag divergence was found to vary from about 0.94 at a lift coofficient of 0 to abuut 0.875 at a lift coefficient of 0.5.) Further increase in Mach number resulted in a rapid rearward movement of the eerodynamic center.
4. The spanmise distribution of loading coefficient at low lift coefficients showed good agreement with theory, being practically unsffected by compressibility. The increase in lift-curve slope with Mach number also was in good agreement with that predicted by theory.
5. The effects of compressibility on the force and moment characteristics up to a Mach number of 0.60 were influenced by an increase In Reynolds number from 4,000,000 to 8,000,000. At the lower Regnolds number the angle-of-attack range for which the lift and pitching-moment curves were nearly linear was reduced by the increase in Mach number, whereas this angle-of-attack renge wes increesed at the higher Reynolds number.
6. Various alterations to the seal at the model-turntable juncture produced no sienificant changes in the aerodynamic characteristics of the wing.

Ames Aeronautical Laboratory<br>National Advisory Committee for Aeronautics Moffett Field, Calif.

## APPERDIX

## MODET-MURNTABLE SFAL IMVESTIGATICN

In wind-tunnel teating with semispan models it would be deairable to isolate the reflection-plane turntable from the force-measuring apparatus. Such an arrangement poaes the problem of minimizing air flow through the model-turntable juncture in such a manner that the flow over the model is not disturbed and the turntable acts as a true reflection plane. To ascertain the effects of various model-tumatable-juncture seal arrangements on the measured forces, moments, and pressuree, six seals were tested. These seal arrangements are illustrated in figure 4.

In ilgure 25 the lift, drag, and pitching-moment data for each of the five modified seal arrangementa have been superimposed on the corresponding data for the original seel arrangement. Data are shown for Mach numbers of 0.25 and 0.80 at a constant Reynolds number of 4,000,000.

From the nature of the different configurations, it might be expected that the greatest difference in the force characteristics of the model would appear in changing from seal A to seal B. (See ifg. 4). However, the data presented in figure 25 indicate that only small changes In the forces and moments resulted in changing from any one arrangement to any other. The slight differenoes which do exist in the force and moment data could be attributable to experimental scatter rather than to changes in the flow at the root of the wing.

Further evidence of the negligible effect of the various seal modifications is indicated in figure 26 wherein is shown a comparison of the chordwise diatribution of pressure coefficient for an angle of attack of $16^{\circ}$ at 0.086 semispan for seals $A$ and B. The data for a rerun with seal A are inciuded to indicate the variation in pressures which might be expected from the experimental variations. From the data in figure 26, it was found that in changing from eeal $A$ to seal $B$ the section normal-foroe coefficient at 0.086 semfspan decreased about 1 percent at a Mach number of 0.25 and about 3 percent at a Mach number of 0.80 . The decrease in section normal-force coefficient was smaller at the remaining semfapan stations so that the over-all effect was considered negligible.

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TABLIF I. COORDINATES FOR THE NACA 64A010 AIRFOIL SECTION
[All dimensions in percent of chord]

| Upper and Lower Surfaces |  |
| :---: | ---: |
| Station | Ordinate |
| 0 | 0 |
| .50 | .804 |
| .75 | .969 |
| 1.25 | 1.225 |
| 2.50 | 1.688 |
| 5 | 2.327 |
| 7.50 | 2.805 |
| 10 | 3.199 |
| 15 | 3.813 |
| 20 | 4.272 |
| 25 | 4.606 |
| 30 | 4.837 |
| 35 | 4.968 |
| 40 | 4.995 |
| 45 | 4.894 |
| 50 | 4.684 |
| 55 | 4.388 |
| 60 | 4.021 |
| 65 | 3.597 |
| 70 | 3.127 |
| 75 | 2.623 |
| 80 | 2.103 |
| 85 | $1 . .582$ |
| 90 | 1.062 |
| 95 | . .041 |
| IO0 | .021 |
| I. F. radius, | 0.687 |
| T. E. radius, 0.023 |  |

TABTH II. - COORDINATPS FOR SECTIONS PARAT工BL
TO THPE FLANE OF SYMMETRY
[All aimensions in percent of chord]


TABLE III. - INDEX OF TABULATED PRESSURE COEFFICIENSS

| Table No. | $\mathrm{R} \times 10^{-8}$ | $\mathrm{M}_{0}$ | $\alpha_{u 1}$ Range |
| :---: | :---: | :---: | :---: |
| IV | 4.0 | 0.25 | $0^{\circ}$ to $24^{\circ}$ |
| V |  | .40 | 1 |
| VI |  | . 60 |  |
| VII |  | . 80 | $0^{\circ}$ to $16^{\circ}$ |
| VIII |  | . 83 | $0^{\circ}$ to $14^{\circ}$ |
| IX |  | . 86 | $0^{\circ}$ to $12^{\circ}$ |
| X |  | . 88 | $0^{\circ}$ to $12^{\circ}$ |
| XI |  | .90 | $0^{\circ} 0^{\circ}$ to $12^{\circ}\left(10^{\circ} \& 12^{\circ}\right)$ |
| XII |  | . 92 | $0^{\circ}$ to $10^{\circ}\left(6^{\circ}, 8^{\circ}, \& 10^{\circ}\right)$ |
| XIIII |  | -93 | $0^{\circ}$ to $8^{\circ}\left(4^{\circ}, 6^{\circ}, \& 8^{\circ}\right)$ |
| XIV |  | .94 | $0^{\circ}$ to $6^{\circ}\left(3^{\circ}, 4^{\circ}, \& 6^{\circ}\right)$ |
| XV |  | -95 | $0^{\circ}$ to $6^{\circ}\left(2^{0}, 3^{\circ}, 4^{\circ}, \& 6^{\circ}\right)$ |
| XVI | $\downarrow$ | -96 | $0^{\circ}$ to $4^{\circ}\left(1^{\circ}, 2^{\circ}, 3^{\circ}, \& 4^{\circ}\right)$ |
| XVII | 6.0 | . 25 | $0^{\circ}$ to $24^{\circ}$ |
| XVIII | 8.0 | . 08 | + |
| XIX | 1 | . 25 | $\downarrow$ |
| XX | $\downarrow$ | . 60 | $0^{\circ}$ to $14^{\circ}$ |
| XXI | 12.0 | . 25 | $0^{\circ}$ to $24^{\circ}$ - Mach |
| XXII | 18.0 | .25 | $0^{\circ}$ to $20^{\circ}$ |

${ }^{\text {E Parentheses }}$ indicate angles of attack for which the pressure data may have been affected by wind-tunnel choking.
table iv.- phessure ccerficients at seven semispan stations of the uimg. $H_{0}, 0.25 ; 1,4,000,000$.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$.

| Seniepan Bta. | Percent chord | UPPER SURFICE |  |  |  | LOTER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | sugle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2{ }^{\circ}$ | $3^{0}$ | $0^{\circ}$ | $1{ }^{\circ}$ | 20 | 30 |
| $0.086 \mathrm{~b} / 2$ | ${ }^{\circ}$ | 0.479 | 0.476 | 0.444 | 0.407 |  |  |  |  |
|  | 1. 5 | . 026 | -. 065 | -. 190 | -. 313 | 0.004 | 0.079 | 0.170 | 0.225 |
|  |  | -. 035 | -.082 | -. 140 | -. 198 | -. 037 | . 006 | . 0.06 | . 103 |
|  | 6. ${ }^{11}$ | -. 054 | -. 101 | -. 152 | -. 213 | -. 060 | .. 01.0 | . 038 | . 074 |
|  | 11.0 | -. 080 | -. 102 | -. 148 | -. 189 | -. 067 | -. 036 | .007 | .037 |
|  | 21. 2 | =.076 | -. 113 | -. 150 | -. 1.181 | -. 0.092 | -.049 | -. 01.935 | -.017 |
|  | 24.5 | -. 0.096 | -. 124 | -. 157 | -. 189 | -. 109 | -. 0.084 | -. 0.04 | -. 0.024 |
|  | 31.6 | -. 098 | -. 123 | -. 152 | -. 180 | -. 112 | -. 097 | -. 060 | -. 0.042 |
|  | 34.5 | -. 117 | -. 141 | -. 169 | -. 198 | -. 134 | -. 106 | -. 077 | -. 060 |
|  | 47.6 | -. 140 | -. 161 | -. 188 | -. 215 | -. 236 | -. 119 | -. 092 | -. 075 |
|  | 44.5 51.6 | -.150 -.150 | -. 178 | - | -. 221 -.217 | -. 25 | $-.130$ | -. -111 | -. 0.092 |
|  | 59.5 | -. 13 | -. 173 | -. 189 | -. 2172 | -. 132 | -. 130 | -. -.096 | -.098 |
|  | 71.0 | -. 098 | -. 115 | -. 125 | -. 143 | -. 102 | -. 0.05 |  |  |
|  | 79.5 | -.056 | -. 0668 $=.011$ | -. $\mathrm{-}$ | -.088 -.024 | -. 0.056 | -. 051 | -.037 | $\begin{aligned} & -.033 \\ & -.004 \end{aligned}$ |
| $0.195 \mathrm{~b} / 2$ | 0 | 0.427 | 0.417 | 0.34 | 0. |  |  |  |  |
|  | 1.5 | -. 005 | -. 123 | -. 286 | -. 434 | 0.025 | 0.238 | 0.249 | 0.319 |
|  | $5 \cdot 5$ | -. 078 | -. 126 | -. 209 | -. 279 | -. 0.06 | -. 0.17 | . 059 | . 114 |
|  |  | -. 085 | -. 143 | -. 212 | -. 279 | -. 088 | -. 014 | . 023 | . $07 \%$ |
|  | 11.0 | -. 098 | -. 141 | -. 196 | -. 248 | -. 102 | -. 062 | -. 01014 | . 030 |
|  | $\underline{14.5}$ | -. 111 | -. 150 | -. 192 | -. 233 | -. -112 | -. 080 | -. 035 $=.056$ | -.004 |
|  | 24.5 | -. -127 | - $=154$ | -. 190 | -. 2217 | -. 0.125 | -. 201 | -. 0.073 | -. 0.029 |
|  | 31.0 | -. 130 | -. 156 | -. 188 | -. 215 | -. 142 | -. 121 | -. 0.09 | -. 0.056 |
|  |  | -. 138 | -. 178 | -. 194 | -. 215 | -. 150 | -. 125 | -. 095 | -. 075 |
|  | 41.0 | -. 153 | - | -. 205 | -. 230 | -. 153 | -. 137 | -. 123 | -. 084 |
|  | 44.5 51.8 | -. 157 $=.140$ | - $=.285$ | - 209 | -. 232 | -. 150 -.152 | -. 136 | -. 113 | -. 08.086 |
|  | 59.5 | -. 127 | -. -150 | =. 252 | -. 178 | -. 13.12 | -. 104 | -. 0.09 | -. 0.086 |
|  | ¢1.0 | -. 082 | -. 095 | -. 113 | -. 123 | -. 083 | -. 069 | -. 0.065 | -.059 |
|  | 79.5 91.0 | -.035 | -.049 | -. 0.011 | -. 0606 | -.035 .013 | -. 031 | -.019 | -.020 |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 0 | 0.408 | 0.390 |  |  |  |  |  |  |
|  | 1.5 | -. 035 | -. 1187 | $\begin{aligned} & =.362 \\ & =-266 \end{aligned}$ | $-.565$ | -0.056 -.104 -.17 | 0.050 -.037 | 0.153 .040 | 0.236 .100 |
|  | 8.5 | -. 113 | -. 198 | =. 2666 | -. 353 | -. 117 | -. 0.049 | . 017 | . .1076 |
|  | 11.6 | -. 121 | -. 178 | -. 226 | -. 260 | -. 129 | -. 079 | -.019 | . 024 |
|  | $14 \cdot 5$ | -. 129 | - 1778 | -. 226 | -. 270 | -. 134 | -. 091 | -. 040 | -. 003 |
|  | ${ }^{21} \times$ | -. 1336 | -. 2788 | -. 213 $=.205$ | -. 265 | - 140 | -. 106 | -. 073 | -. 0331 |
|  | 24.5 31.0 | -. 1440 | $=-178$ -.178 | -. 209 | $=.254$ | -. 140 | -. 113 | -. 077 | -. 0.039 |
|  | 34.5 | -. 140 | -. 176 | -. 296 | -. 233 | -. 165 | -. 139 | -. 111 | -. 0.077 |
|  | 41.0 | -. 163 | -. 2192 | -. 209 | -. 239 | -. 155 | -. 137 | -. 1113 | -. 0.08 |
|  | 44.5 | -. 165 | -. 191 | -. 209 | -. 233 | -. 153 | -. 137 | -. 113 | -. 086 |
|  | 51.0 | -. 1480 | -. 176 | - 286 | $=-211$ | -. 150 | -. 117 | -. 113 | -. 090 |
|  | 71.0 | -. 0.33 | $=.1446$ | - -15 | -. 178 | -. 1273 | =-119 | -. 095 | -. 0804 |
|  | 79.5 | -. 033 | -. 038 | -. 044 | -. 059 | -. 033 | -. 027 | -. 017 | -. 0102 |
|  | 91.0 | . 025 | . 0.24 | . 019 | . 015 | . 023 | . 026 | . 029 | . 035 |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | $\begin{aligned} & =.023 \\ & =.098 \end{aligned}$ | $\begin{array}{r} -.207 \\ -198 \end{array}$ | $\begin{aligned} & =.595 \\ & =.286 \end{aligned}$ | $-629$ | -0.065 -.098 | 0.059 -.025 | 0.165 | 0.260 .120 |
|  | S.5 | -. 111 | -: 208 | -. 286 | 二. 386 | -. 109 | -. 0.05 | . 032 | . 120 |
|  | 11.0 | -. 115 | -. 185 | -. 244 | -. 307 | -. 129 | -. 0.06 | -. 012 | . 041 |
|  | 14.5 | -. 121 | -. 181 | -. 232 | -. 289 | -. 129 | -. 0.079 | -. 0.03 | .017 |
|  | 21.0 | -. 134 | -. 180 | - 2224 | -. 270 | -. 136 | -. 099 | -. 05 | -. 918 |
|  | 24.5 37.0 | -. 129 | - -178 | -. 217 $=-201$ | -. 252 | - 1.144 | -. 106 | -. 069 | -. 027 |
|  | 37.0 | -. 1314 | -. 178 | $=.201$ $=.205$ | =. 243 | -. 148 | -. 121 | -. 090 | -. 0517 |
|  | 41.5 | -. 2153 | -. 1189 | -. 205 | -. 239 | -. 153 | -. 13 | -. 0.96 | -. 0.075 |
|  | 47.5 | -. 15 | -. 285 | -. 198 | -. 232 | -. 148 | -. -134 | -.102 | -.061 |
|  | 51.0 | -. 114 | -. 172 | -. 176 | -. 208 | -. 144 | -. 130 | -. 106 | -. 084 |
|  | 59.5 | =. 117 | -. 126 | -. 134 | -. 160 | - 2129 | -. 117 | -. 090 | -. 079 |
|  | 71.0 | -. 0.060 | -. 084 | -. -.092 | -. 0.099 | -.054 | -. 0.017 | -. 04008 | -. 0.033 |
|  | 91.6 | . 038 | -. 032 | -. 0.029 | -.024 | -. 038 | -:041 | -.0064 | . 0.043 |

TABLE IV.- CONTINUED.
(a) $a_{u}, 0^{\circ}, 2^{\circ}, 2^{\circ}, 3^{\circ}$ - Concluded.


IABLE IV．－CONTIMUED．
（b）$a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ ．

| Seri－ sta． | Peragntohord ohord | upper sugraot |  |  |  | Lower surame |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attaok |  |  |  | Angle or attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | － | 0.328 | 0.073 | －0．295 | －0．784 |  |  |  |  |
|  | 1.5 | －． 453 | －． 786 | －-.1507 | － | 0.293 | 0.400 | 0.465 | 0.500 |
|  | 6．5 | －：246 | －： 376 | 二：-595 | －：645 | － 125 | ：246 | ． 385 | － 394 |
|  | 17．0． | － 227 | －． 312 | － 396 | －： 498 | ：051 | －151 | ． 236 | ． 35 |
|  | 21．5 | －． 225 | －： 378 | －： 377 | －$=145$ | ．058 | ．128 | ． 134 | ． 2156 |
|  | 24.5 31.0 | －． 215 | －：． 276 | 二． 335 | －． 397 | ． 012 | －071 | ． 13 | ． 184 |
|  | 31．0 | －． 206 | －－258 | －． 310 | － 3 －362 | －． 012 | －040 | －108 | ． 153 |
|  | 41.8 | －．-227 | －：274 | －． 309 | －． 360 | －． 045 | ：018 | ：059 | －103 |
|  | 51.6 | －．235 | －： 274 | －． 3121 | －-336 | －064 | －024 | －． 020 | －071 |
|  | 599．6 | －$=128$ | －：218 | $=-24$ $=-286$ $=186$ | －： 720 | －：094 | －：024 | －．020 | ：077 |
|  | 71.5 91.5 | －． 218 $=093$ -.0023 | －． 172 | －． 186 | －． 209 | ＝．045 | －．022 | －．022 | ． 051 |
|  |  |  | －． 0.035 | －：034 | －． 0.040 | －． 0202 | ．032 | －：047 | ． 057 |
| $0.195 \mathrm{~b} / 2$ | 0 | 0.083 | －0．370 | 1.017 | －2． 651 |  |  |  |  |
|  | 1．5 | －．6088 | －1． 637 | －1． 710 | －2．186 | 0． 385 | 0.442 | 0.425 | 0.345 |
|  | 5 | 二． 332 | －：-187 | －：-645 | －： F 807 | ． 173 | ：269 | ． 305 | －425 |
|  | 11.8 |  | －． 404 | －． 435 | －． 626 | ． 077 | ． 157 | ：23 | －308 |
|  | 14.5 | －． 268 | －． 366 | －． 465 | －． 554 | ：041 | －117 | ． 192 | ． 366 |
|  | 24.5 | －： 246 | $=-329$ | －$=.488$ | －．477 | ． 012 | ． 078 | －127 | ． 212 |
|  | 32.6 | ＝：236 | －－314 | －：${ }^{\text {－}}$ | －． 401 | －003 | －065 | ． 128 | ． 189 |
|  | 34.5 | －．244 | －． 295 | －． 349 | －． 398 | －．045 | ． 007 | ． 068 | ． 126 |
|  | 4. | －：242 | － 291 | －：338 | －． 36 | －057 | －．006 | ． 041 | ． 097 |
|  | 51.8 | －：213 | －． 25 | －． 291 | －－ 324 | $\therefore \mathrm{Z}$ | －．025 | ：0두 | ．063 |
|  | 79 | －． 177 | －． 214 | －． 236 | －． 263 | －．070 | －． 035 | ：07 | －0．0 |
|  | 79.5 | －：064 | －$=.075$ | $\because$ | －：－096 | $=-.037$ | －． 015 | ．014 | ：053 |
|  | 91.0 | －．003 | ${ }_{0}$ | －． 005 | －．002 | －．026 | ：040 | ：c51 | ：074 |
| $0.382 \mathrm{~b} / 2$ | $\bigcirc$ | －0．074 | －0．756 | － 7.720 | －2．960 | － |  |  |  |
|  | 1．5 | －． 75 |  | －2．810 | －2．240 | 0.303 | 0.400 | 0.438 | 0.438 |
|  | 6．5 | －． 234 | －＝ 641 | －． 808 | －1．096 | ． 156 | ${ }^{2} 261$ | － 341 | ． 410 |
|  | 11.6 | －． 34 | －： 4179 | －． 618 | －1．-.76 | － 073 | － 128 | －306 | ． 383 |
|  | 14.5 | －：323 | －： 439 | －． 555 | －． 673 | ：049 | ：126 | ：280 | － 172 |
|  | 24.5 | －． 298 | －． 365 | －$=4.4$ | －． 515 | ． 087 | ． 078 | ． 150 | ．214 |
|  | 31.6 | －． 263 | －： 369 | －-3.39 | －．${ }^{-58}$ | ．003 | ：029 | ． 129 | ． 193 |
|  | 等． 5 | －． 250 | －． 314 | －． 372 | －－424 | －． 045 | ：013 | ．066 | ．128 |
|  | 41.8 | －． 24.4 | －． 310 | －． 35 | －． 4016 | －． 055 | －． 004 | ． 049 | ：097 |
|  | 51.0 | －． 219 | －： 25 |  | －． 324 | 二－062 | －． 085 | ：012 | －064 |
|  | 59.5 | －．187 | －． 214 | － $\begin{aligned} & \text {－．} 236 \\ & -144\end{aligned}$ | － 257 | －． 057 | －． 024 | ． 017 | ．051 |
|  | 71.5 | －．055 | －：064 | －． 01079 | －．003 | －0．032 | －017 | ：034 | ．053 |
|  | 91.0 | ． 018 | ．013 | －．．916 | 006 | \％61 | ．051 | ：058 | ：069 |
| $0.555 \mathrm{~b} / 2$ | 0 | －0．089 | －0． 885 |  |  |  |  | － |  |
|  | 1.5 | － 632 | －1．605 | －3．514 | －2．638 | 0.345 | － 421 | 0.440 | 0.396 |
|  | 6．5 | －： 4.48 | －． 670 | －． 25 | －1．3 3 | ． 175 | ． 286 | －366 | －425 |
|  | 11.0 | － C 永5 |  | －． 660 | －． 849 | $: 067$ | ． 190 | ： 268 | － 347 |
|  | 17．5 | － 3 － 325 | 二．472 | － 6061 $=-477$ | －．742 | ：064 | ． 151 | ． 230 | － 62 |
|  | 24.5 | －． 280 | －． 368 | －：－750 | －． 550 | ：012 | ．064 | ．143 | ． 23 |
|  | 37.6 | －． 267 | － 33 | －． 402 | －${ }^{\text {d }}$ | －．015 | ． 046 | ． 106 | ． 157 |
|  | 4200 | －．257 | －． 3 208 | －． 381 | －． 4.404 | －．036 | ．028 | ．081 | ． 178 |
|  | 44.5 | －240 | －： 291 | －-33 | －． 375 | －．051 | －002 | －049 | ． 099 |
|  | 51.0 | －． 217 | －． 252 | － $\mathrm{-}$－ 2096 | － 3 － 30 | －．05 | －018 | －088 | －071 |
|  | 71.0 | － 102 | －－115 | － 135 | －． 150 | －：018 | ． 000 | ：030 | ：046 |
|  | 79．5 | －． 0.047 | －．050 | －．056 | －． 073 | ：010 | ．026 | －039 | －053 |
|  |  |  |  |  |  |  |  |  |  |
| － |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 1 |  |  |  |  |  |  |  |  |  |

TABLE IV.- CONTINUED.
(b) $\alpha_{11}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Semispan sta. | Percent chord | UPPER SUEPACE |  |  |  | LONER SURPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & -0.248 \\ & =.906 \\ & =.514 \\ & -.497 \\ & -.372 \\ & -.351 \\ & =.311 \\ & =.294 \\ & =.275 \\ & -.265 \\ & =.250 \\ & =.242 \\ & =.210 \\ & =.162 \\ & =.093 \\ & -.037 \\ & .037 \end{aligned}$ | $\begin{array}{r} -1.195 \\ -1.762 \\ -.764 \\ -.733 \\ -.539 \\ -.489 \\ -.410 \\ -.383 \\ -.343 \\ -.329 \\ -.301 \\ -.283 \\ -.241 \\ -.185 \\ -.108 \\ -.041 \\ .036 \end{array}$ | $\begin{aligned} & -2.539 \\ & -2.813 \\ & -1.040 \\ & -.981 \\ & =.692 \\ & -.629 \\ & -.509 \\ & =.473 \\ & -.414 \\ & -.391 \\ & -.352 \\ & -.324 \\ & -.276 \\ & =.205 \\ & -.114 \\ & -.049 \\ & . .030 \end{aligned}$ | -4.1 .86 -2.801 -1.335 -1.251 -.895 -.797 -.646 $=.590$ -.476 -.408 -.383 -.320 -.238 -.138 -.071 .004 | 0.370 .192 .169 .095 .070 .030 -.010 -.028 -.047 -.051 -.064 -.057 -.018 .009 .053 | . .428 0.305 .276 .190 .157 .107 .084 .046 .032 . .004 -.024 -.024 -.002 .026 .055 | $\begin{array}{r} 0.391 \\ .383 \\ .360 \\ .274 \\ .240 \\ .175 \\ .152 \\ .104 \\ .083 \\ .052 \\ .039 \\ .020 \\ .007 \\ .030 \\ .058 \end{array}$ | 0.264 .431 .417 .311 .312 .217 .159 .140 .099 .0853 .0038 .034 .053 .053 |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{array}{r} -0.041 \\ -.889 \\ -.510 \\ -.479 \\ -.365 \\ -.347 \\ -.300 \\ -.282 \\ -.250 \\ -.242 \\ -.236 \\ -.210 \\ -.192 \\ -.137 \\ -.078 \\ -.020 \\ .045 \end{array}$ | $\begin{array}{r} -0.906 \\ -1.714 \\ -.762 \\ -.716 \\ -.526 \\ -.483 \\ -.416 \\ -.368 \\ -.320 \\ -.301 \\ -.285 \\ -.262 \\ -.229 \\ =.160 \\ =.093 \\ -.031 \\ .034 \end{array}$ | $\begin{aligned} & -1.852 \\ & -1.942 \\ & -1.107 \\ & -.962 \\ & -.713 \\ & -.633 \\ & -.498 \\ & -.456 \\ & =.353 \\ & =.354 \\ & =.322 \\ & =.297 \\ & -.849 \\ & -.179 \\ & =.102 \\ & =.043 \\ & .028 \end{aligned}$ | $\begin{aligned} & -2.148 \\ & -1.929 \\ & -1.502 \\ & -1.240 \\ & -1.000 \\ & -.843 \\ & -.648 \\ & -.585 \\ & -.400 \\ & -.443 \\ & -.378 \\ & -.347 \\ & -.286 \\ & -.217 \\ & -.132 \\ & =.081 \\ & -.010 \end{aligned}$ | $\begin{array}{r} 0.764 \\ 0.177 \\ .106 \\ .083 \\ . .010 \\ -.003 \\ -.034 \\ -.045 \\ -.066 \\ -.068 \\ -.060 \\ -.032 \\ -.0065 \\ .045 \end{array}$ | $-.0-$ 0.417 .276 .263 .173 . .078 .057 .021 . .003 -.027 $=.043$ $=.050$ -.025 -.002 .036 | $\begin{array}{r} .-.779 \\ .352 \\ .341 \\ .251 \\ .144 \\ .119 \\ .072 \\ .051 \\ .018 \\ .001 \\ . .012 \\ -.035 \\ -.016 \\ .031 \end{array}$ | $\begin{array}{r} 0.308 \\ .412 \\ .402 \\ .316 \\ . .207 \\ .178 \\ .124 \\ .097 \\ .063 \\ .038 \\ . .0004 \\ .002 \\ .011 \\ .025 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & -0.455 \\ & -.902 \\ & -.501 \\ & =.464 \\ & -.347 \\ & -.315 \\ & -.269 \\ & -.242 \\ & -.213 \\ & -.200 \\ & -.198 \\ & -.185 \\ & =.154 \\ & -.108 \\ & =.051 \\ & -.009 \end{aligned}$ | $\begin{array}{r} -1.526 \\ -1.558 \\ -.737 \\ -.695 \\ -.487 \\ -.429 \\ -.349 \\ -.310 \\ -.272 \\ -.251 \\ -.239 \\ -.2493 \\ -.193 \\ -.1357 \\ -.035 \\ -.015 \end{array}$ | $\begin{aligned} & -2.721 \\ & -2.664 \\ & -.994 \\ & -.794 \\ & -.633 \\ & -.542 \\ & -.455 \\ & -.373 \\ & -.325 \\ & -.297 \\ & -.274 \\ & -.259 \\ & -.217 \\ & -.169 \\ & -.066 \\ & -.074 \\ & -.030 \end{aligned}$ | $\begin{aligned} & -1.820 \\ & -2.111 \\ & -1.192 \\ & -1.044 \\ & -.924 \\ & -.780 \\ & -.608 \\ & -.550 \\ & -.429 \\ & -.412 \\ & =.347 \\ & -.347 \\ & -.314 \\ & -.282 \\ & -.211 \\ & -.232 \\ & -.248 \end{aligned}$ | $\begin{array}{r} 0.332 \\ .1150 \\ .064 \\ .024 \\ -.028 \\ . .047 \\ -.064 \\ -.0747 \\ -.0899 \\ -.091 \\ -.073 \\ -.005 \\ .039 \end{array}$ | 0.400 <br> .246 <br> .140 .090 <br> .023 -.006 <br> . .031 -.050 <br> -.064 -.077 <br> -.077 $=.079$ -.068 <br> $=.041$ $.017$ | $\begin{array}{r} 0.375 \\ .327 \\ .314 \\ .309 \\ .152 \\ .073 \\ .031 \\ .003 \\ -.024 \\ -.056 \\ -.060 \\ -.060 \\ =.041 \\ -.035 \\ .003 \end{array}$ |  |

TABLE IV.- CORTIKUED.
(c) $\alpha_{12}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.


TABLE IV.- CONCIUDED.
(0) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluaed.

| Sem1span sta. | Percent chord | UPPER gURFACE |  |  |  | LOWER SUAPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | -1.679 | -1.089 | -0. 551 | -0.847 |  |  |  |  |
|  | 1.5 | -1.455 | -1.020 | -. 8.81 | -. 813 | 0.264 | 0.267 | 0.240 | 0.152 |
|  | 5.5 | -1.285 | -1.036 | -. 526 | -. 809 | . 447 | . 491 | . 495 | . 493 |
|  | 6. ${ }^{12} 5$ | -1.208 | -1.994 | -.786 -.786 | -. 792 | .436 | . 4490 | . 493 | . 499 |
|  | 24.5 | -1.078 | -1.946 | -.786 | -. 768 | -340 | . 408 | . 431 | 463 |
|  | 21.0 | --. 922 | -. 933 | -. 756 | -. 752 | -275 | - 339 | .371 | . 408 |
|  | 24.5 | -. 788 | -. 888 | -. 731 | -. 733 | . 245 | -309 | -337 | - 370 |
|  | 37.0 | -. 689 | -. 880 -.830 | -. 737 -.714 | -. 7306 | . 195 | . 250 | . 278 | - 312 |
|  | 41.0 | $=.604$ $=.512$ | -. $\mathrm{-}$ - 523 | -: 714 | -.706 | . 1370 | . 170 | .241 | . 282 |
|  | 44.5 | -. 470 | -. 777 | -. 695 | -. 695 | . 111 | . 147 | .160 | . 283 |
|  | 51.0 | -. 394 | -. 750 | -. 701 | -. 704 | . 076 | .101 | .107 | . 124 |
|  | 59.5 | -. 310 | -. 678 | -. 6681 | -. 676 | . 048 | . 053 | -. 038 | . 050 |
|  | 79.5 | -. 251 | -. -.556 | -. 621 | -. 6627 | . 036 | ..023 | -. 076 | -.076 |
|  | 91.0 | -. 0.071 | -. 495 | -. 592 | -. 584 | . 034 | -. 112 | -. 190 | -. 194 |
| $0.831 \mathrm{~b} / \mathrm{c}$ | 0 | -1.851 | -0.948 | -0.714 | $-0.662$ | $0.2 \overline{2} 2$ | - $-3 \overline{2} 2$ | 0.276 | 0.2006 |
|  |  | - -2.325 | -. 725 | -. -638 | -. 6.68 | 0.262 |  | 0.263 | . .467 |
|  | 6.5 | -1.111 | -. 697 | -. 619 | -. 609 | . 415 | . 446 | .457 | . 461 |
|  | 11.0 | -1.128 | -. 685 | -. 619 | -. 609 | . 348 | . 383 | .420 | .436 |
|  | 14.5 21.0 | -. 933 | -. 653 | -.600 -.586 | -. 590 | . 24 | -274 |  | - 337 |
|  | 24.5 | -: 283 | -:. 605 | -. 5867 | -: 567 | .214 | . 246 | - 272 | . 337 |
|  | $31 . \mathrm{c}$ | -. 627 | -. 592 | -. 565 | -. 567 | . 157 | . 185 | . 210 | -250 |
|  | 34.5 | -. 535 | -. 563 | -. 543 | -. 552 | . 128 | . 154 | . 175 | - 202 |
|  | 41.8 | -. 459 | -. 565 | -. 554 | -. 565 | . 090 | . 105 | . 122 | . 114 |
|  | 51.0 | -. 346 | -. 5333 | -. 543 | -. 562 | . 042 | . 042 | . 048 | . 067 |
|  | 59.5 | -. 283 | -. 495 | -. 512 | -. 543 | . 004 | -. 015 | -. 019 | . 105 |
|  | 71.0 79.5 | -. 212 | -. 48.482 | -. 510 -.476 | -. 229 | . 002 | -. 0.051 | -.066 -.105 | . 1286 |
|  | $91 . \mathrm{C}$ | -. 115 | -. 432 | -. -455 | -. 2.466 | -.012 | -.158 | -. 181 | -.186 |
| $0.924 \mathrm{~b} / 2$ |  | -1.6888 | -.583 -.54 | -. 546 | -. 533 | 0.321 |  |  |  |
|  | 1.5 | -1.749 | -. 5.544 | -. 523 -.520 | -. 514 | 0.321 | 0.335 .402 | 0.286 .406 | $\begin{array}{r}0.229 \\ .408 \\ \hline\end{array}$ |
|  | 6.5 | -1. 222 | -. 5.525 | -. 504 | -. -499 | . 386 | . 383 | . 387 | . 391 |
|  | 11.0 | -1.545 | -. 516 | -. 504 | -. 501 | . 302 | . 312 | . 333 | . 354 |
|  | 14.5 | -1.296 | -. 493 | -. 485 | -. 485 | . 233 | . 253 | . 276 | . 295 |
|  | 21.6 | -. 862 | -. 484 | -. 482 | -. 485 | . 153 | . 177 | . 200 | . 231 |
|  | 24.5 31.5 | -. 815 | -. 448 | -. 459 | -. 470 | . 103 | . 126 | . 152 | . 175 |
|  | 31.5 | -. 5153 | -. 438 | -. $\mathrm{-} 425$ | -. 476 | . 071 | . 046 | . 1067 | . 086 |
|  | 41.0 | -. 398 | -. 405 | -. 428 | -. 466 | .009 | . 019 | .029 | . 042 |
|  | bll 5 | -. 436 | -. 379 | -. 409 | -. 453 | -. 012 | -. 007 | . 004 | . 010 |
|  | 51.0 | -. 354 | -. 377 | -. 409 | -. 457 | -. 017 | -. 027 | -. 019 | -. 013 |
|  | 71.0 | -. 293 | -. 339 | -. 371 | -. 428 | -. 035 | -. 076 | -. 086 | -. 095 |
|  | 79.5 | -. 283 | -. 315 | -. 339 | -. 400 | -. 035 | -. 095 | -. 105 | -. 124 |
|  | 91.6 | -. 207 | -. 316 | -. 335 | -. 381 | -. 040 | -. 239 | -. 148 | -. 1.57 |

TARLE V.- PRESSURE COEFFICIENTS AT SIYEN SEKISPAN SEATIONS OF THE WINQ. MO; 0.40; R, 4,000,000.
(a) $\pi_{u}, 0^{0}, I^{0}, 2^{0}, 3^{0}$.

| Berispan star | Percent chord | UPPER SURFACE |  |  |  | LOMER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{0}$ | $3^{\circ}$ | $0^{0}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  | 0.473 -.030 -.069 $=.075$ $=.092$ $=.104$ $=.114$ $=.117$ $=.136$ -.156 $=.161$ -.166 -.148 $=.118$ $=.069$ -.016 | 0.478 -.066 -.087 $=.107$ $=.111$ $=.123$ $=.125$ $=.138$ $=.136$ $=.152$ $=.172$ $=.176$ $=.178$ $=.156$ $=.075$ -.014 |  |  |  |  | $\begin{array}{r} -.763 \\ 0.062 \\ .03 I \\ . .0054 \\ =.034 \\ -.056 \\ =.068 \\ =.090 \\ -.104 \\ -.127 \\ =.106 \\ -.086 \\ -.044 \\ .003 \end{array}$ |  |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.426 $=.015$ $=.079$ $=.096$ $=.111$ $=.120$ $=.138$ $=.173$ $=.157$ $=.173$ $=.1765$ $=.143$ $=.104$ $=.049$ .011 | 0.414 $=.139$ $=.140$ $=.155$ $=.165$ $=.165$ $=.168$ $=.172$ $=.187$ $=.202$ $=.180$ $=.156$ $=.1155$ .008 | 0.352 $=.251$ $=-.214$ $=-203$ $=.203$ $=.201$ $=.201$ $=.201$ $=.212$ $=.214$ $=.2191$ $=.159$ $=.117$ $=.057$ .005 | $\begin{aligned} & 0.251 \\ & . .443 \\ & =.285 \\ & . .285 \\ & . .249 \\ & . .236 \\ & . .288 \\ & . .224 \\ & . .224 \\ & . .229 \\ & . .236 \\ & =.238 \\ & . .212 \\ & =.178 \\ & . .128 \\ & -.066 \\ & .006 \end{aligned}$ | -.020 0.020 $=.100$ $=.114$ $=.128$ $=.139$ $=.144$ $=.162$ $=.172$ $=.175$ $=.175$ $=.172$ $=.062$ $=.047$ .008 |  |  |  |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 24.5 41.0 41.5 51.0 59.5 71.0 79.5 91.0 |  | $\begin{aligned} & 0.389 \\ & =.191 \\ & =.189 \\ & =.1989 \\ & =.189 \\ & =.189 \\ & =.198 \\ & =.188 \\ & -.203 \\ & =.203 \\ & =.186 \\ & =.162 \\ & =.1017 \\ & \hline .047 \end{aligned}$ | $\begin{aligned} & 0.300 \\ & -.370 \\ & =.275 \\ & =. .240 \\ & =.238 \\ & =.227 \\ & =.226 \\ & . .216 \\ & . .2125 \\ & =.216 \\ & . .199 \\ & -.769 \\ & -. .056 \end{aligned}$ | 0.152 $=.566$ $=.358$ $=.397$ $=.244$ $=.266$ $=.261$ $=.249$ $=.238$ $=.247$ $=.213$ $=.282$ $=.115$ -.055 .017 | $\begin{array}{r} -0.072 \\ -.117 \\ -.170 \\ =.141 \\ -.151 \\ -.162 \\ -.165 \\ =.176 \\ -.181 \\ -.175 \\ -.175 \\ -.173 \\ -.144 \\ -.085 \\ -.046 \end{array}$ | 0.042 <br> -.043 -.060 <br> $-.086$ <br> $-.103$ <br> $-.124$ <br> -.140 -.150 <br> -.147 $=-152$ <br> -. 1.152 <br> $=.127$ <br> -. 0292 | $\begin{array}{r} 0.148 \\ .029 \\ .008 \\ . .031 \\ =.074 \\ =.083 \\ -.106 \\ =.115 \\ -.115 \\ =.117 \\ -.098 \\ =.061 \\ -.019 \end{array}$ |  |
| $0.555 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 61.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 21.6 \\ 31.5 \\ 41.0 \\ 61.0 \\ 51.5 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ |  |  |  | 0.163 $=.629$ $=.396$ $=.385$ $=-311$ $=.299$ $=.262$ $=.250$ $=.247$ $=.246$ $=-238$ $=.211$ $=.165$ $=.105$ $=.044$ .028 | $\begin{array}{r} -0.079 \\ -.114 \\ -.124 \\ -.143 \\ -.146 \\ -.156 \\ -.160 \\ -.167 \\ -.171 \\ -.167 \\ -.160 \\ -.143 \\ -.069 \\ -.029 \\ .032 \end{array}$ | $\begin{aligned} & 0.052 \\ & =.052 \\ & =.047 \\ & =.081 \\ & -.092 \\ & =.111 \\ & =.118 \\ & =.234 \\ & =.141 \\ & =.141 \\ & =.141 \\ & =.140 \\ & =.124 \\ & =.056 \\ & -.019 \end{aligned}$ | $\begin{array}{r} 0.163 \\ .045 \\ .027 \\ =.026 \\ -.069 \\ =.076 \\ =.095 \\ =.106 \\ =.107 \\ =.105 \\ -.109 \\ -.096 \\ -.047 \\ -.039 \end{array}$ | $\begin{array}{r} 0.256 \\ .115 \\ .094 \\ .035 \\ .015 \\ -.025 \\ =.032 \\ =.055 \\ =.070 \\ =.089 \\ =.090 \\ =.081 \\ =.040 \\ -.006 \end{array}$ |

TABLE Y.- CONTINUED.
(a) $\alpha_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - Concluded.

| Bem1--apan sta. | Percent chord | UPPSR BURPAOE |  |  |  | LOWER SURPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angla of ettack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.418 <br> $-.048$ <br> -127 -.133 <br> $-.130$ <br> $-.144$ <br> -.155 -.155 <br> $-.161$ <br> -164 -.173 <br> $-.172$ <br> -.159 -.135 <br> . .069 -.027 .034 | $\begin{aligned} & 0.368 \\ & -.228 \\ & =.221 \\ & =.225 \\ & =.193 \\ & =.203 \\ & =.197 \\ & =.194 \\ & =.193 \\ & =.192 \\ & =.197 \\ & =.194 \\ & =.178 \\ & -.151 \\ & =.080 \\ & =.030 \\ & .031 \end{aligned}$ | 0.269 <br> $-.448$ <br> $-324$ <br> -.320 -.259 <br> $-.258$ <br> $-.241$ <br> -.231 -.218 <br> $-.216$ <br> -.216 -.210 <br> $-.186$ <br> $-.154$ <br> -.089 -.034 <br> .033 | $\begin{aligned} & 0.055 \\ & =.668 \\ & =.433 \\ & =.422 \\ & =.322 \\ & =.311 \\ & =.254 \\ & =.273 \\ & =.256 \\ & =.250 \\ & =.246 \\ & =.236 \\ & =.204 \\ & =.165 \\ & =.092 \\ & =.037 \\ & .033 \end{aligned}$ | $\begin{array}{r} -0.065 \\ =.120 \\ =.130 \\ -.148 \\ =.149 \\ =.155 \\ =.160 \\ =.166 \\ =.166 \\ =.164 \\ =.161 \\ =.159 \\ =.134 \\ =.059 \\ =.019 \\ .042 \end{array}$ | 0.064 <br> $-.032$ <br> -.045 -.052 <br> -. 092 <br> -. 108 <br> -.117 -.129 <br> $=.133$ <br> $=.140$ <br> $-.141$ <br> -.119 $=.055$ <br> .053 .043 | 0.010 .051 .033 $=.023$ $=.034$ . .062 . .073 $=.092$ $=.095$ $=.107$ $=.113$ $=.095$ $=.046$ -.009 .042 | 0.304 <br> .103 <br> .018 <br> -. 018 <br> .033 -.055 <br> $-.061$ <br> $-.076$ <br> -. 081 <br> -. 092 <br> -. 079 <br> $-.039$ <br> .042 |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.394 \\ & =.048 \\ & =.122 \\ & =.125 \\ & =.128 \\ & =.138 \\ & =.146 \\ & =.148 \\ & =.148 \\ & =.151 \\ & =.168 \\ & =.159 \\ & =.150 \\ & =.113 \\ & =.054 \\ & =.008 \\ & .052 \end{aligned}$ | $\begin{aligned} & 0.424 \\ & =.229 \\ & =.218 \\ & =.217 \\ & =.191 \\ & =.192 \\ & =.182 \\ & =.181 \\ & =.177 \\ & =.189 \\ & =.178 \\ & =.167 \\ & =.124 \\ & =.061 \\ & =.011 \\ & .050 \end{aligned}$ | 0.358 $=.447$ <br> -327 -.322 <br> -. 263 <br> -.259 -.236 <br> $-.227$ <br> -208 -.206 <br> $-.213$ <br> -. 199 <br> $=.178$ -.129 <br> -. 080 <br> -.019 .042 | $\begin{aligned} & 0.202 \\ & =.647 \\ & =.433 \\ & =.419 \\ & =.322 \\ & =.310 \\ & =.274 \\ & =.261 \\ & =.239 \\ & =.235 \\ & =.235 \\ & =.217 \\ & =.190 \\ & =.139 \\ & =.078 \\ & =.022 \\ & .044 \end{aligned}$ | $\begin{array}{r} -0.059 \\ -.127 \\ -.132 \\ -.143 \\ -.154 \\ -.155 \\ -.157 \\ . .157 \\ . .156 \\ . .155 \\ -.143 \\ . .119 \\ -.044 \\ .003 \\ .054 \end{array}$ | $\begin{aligned} & =.091 \\ & 0.093 \\ & =.047 \\ & =.080 \\ & =.107 \\ & =.113 \\ & =.129 \\ & =.130 \\ & =.136 \\ & =.138 \\ & =.128 \\ & =.107 \\ & -.043 \\ & .004 \\ & .054 \end{aligned}$ | $\begin{array}{r} 0.201 \\ .157 \\ .028 \\ -.025 \\ =.074 \\ =.081 \\ =.103 \\ =.107 \\ =.115 \\ -.117 \\ =.111 \\ =.098 \\ =.048 \\ =.006 \\ .044 \end{array}$ | 0.299 <br> $\begin{array}{r}.095 \\ .030 \\ \hline\end{array}$ <br> . .032 <br> $-.045$ <br> $-.074$ <br> -. 090 <br> . . 096 <br> $-.093$ <br> $-.090$ <br> $-.044$ <br> $-.005$ <br> .044 |
| $0.924 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 39.5 \\ 71.0 \\ 79.0 \\ 91.0 \end{gathered}$ | $\begin{aligned} & 0.412 \\ & =.007 \\ & . .139 \\ & . .145 \\ & =.139 \\ & =.146 \\ & . .150 \\ & . .144 \\ & =.144 \\ & =.136 \\ & =.152 \\ & . .144 \\ & . .125 \\ & =.085 \\ & -.033 \\ & .008 \\ & .054 \end{aligned}$ | $\begin{aligned} & 0.343 \\ & =.186 \\ & =.226 \\ & =.228 \\ & =.192 \\ & -.192 \\ & =.180 \\ & =.167 \\ & =.161 \\ & =.154 \\ & =.166 \\ & =.156 \\ & -.143 \\ & -.081 \\ & -.033 \\ & .068 \\ & .058 \end{aligned}$ | $\begin{aligned} & 0.159 \\ & =.421 \\ & =.330 \\ & =.324 \\ & -.262 \\ & =.248 \\ & =.218 \\ & =.202 \\ & =.180 \\ & =.176 \\ & =.176 \\ & =.167 \\ & =.246 \\ & =.100 \\ & -.045 \\ & .003 \\ & .053 \end{aligned}$ | $\begin{aligned} & -0.115 \\ & =.676 \\ & =.433 \\ & =.419 \\ & =.306 \\ & =.250 \\ & =.225 \\ & =.206 \\ & =.194 \\ & =.200 \\ & =.180 \\ & =.757 \\ & =.050 \\ & =.005 \\ & .046 \end{aligned}$ | $\begin{array}{r} -0.079 \\ -.132 \\ =.133 \\ -.145 \\ =.151 \\ =.156 \\ =.154 \\ =.149 \\ =.144 \\ =.144 \\ -.136 \\ =.136 \\ =.095 \\ =.245 \\ .016 \\ .066 \end{array}$ |  | $\begin{aligned} & . .176 \\ & 0.028 \\ & .017 \\ & -.044 \\ & =.067 \\ & =.096 \\ & =.104 \\ & =.111 \\ & =.114 \\ & =.117 \\ & =.117 \\ & =.117 \\ & =.087 \\ & =.031 \\ & .064 \\ & .049 \end{aligned}$ | $\begin{array}{r} 0.270 \\ .101 \\ .086 \\ .008 \\ =.022 \\ =.066 \\ =.078 \\ =.092 \\ =.098 \\ =.105 \\ =.106 \\ =.066 \\ .0 .042 \\ -.005 \\ .044 \end{array}$ |

TABLE V.- COMTIMUED.
(b) $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| $\begin{aligned} & \text { Bean- } \\ & \text { epan } \\ & \text { sta. } \end{aligned}$ | Percent | UPPER SURFACE |  |  |  | LokEs surnice |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of sttaok |  |  |  | angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\text {a }}$ | $10^{\circ}$ | $4{ }^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  |  |  |  |  |  | $\begin{gathered} 0.467 \\ 0.317 \\ .279 \\ .220 \\ .190 \\ .146 \\ .124 \\ .092 \\ .072 \\ .045 \\ .014 \\ .009 \\ .011 \\ .026 \\ .039 \end{gathered}$ |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.555 \mathrm{~g} / 2$ | 0 1.5 56.5 61.5 11 |  |  |  |  |  |  |  |  |

TABLE V.- CONTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Bem span sta. | Percent chord. | UPPER SURFACE |  |  |  | LONER SURFAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | -0.249 | -1.148 | -1.402 | -1.626 |  |  |  |  |
|  | 1.5 | -. 955 | -1.832 | -1. 295 | -1.601 | 0.368 | 0.062 | 0.418 | 0.380 |
|  | 5.5 | -. 541 | -. 797 | -1.234 | -1.257 | . 191 | . 299 | . 367 | . 420 |
|  | 6.5 | -. 525 | -. 761 | -1. 138 | -1.163 | . 167 | . 274 | . 342 | . 398 |
|  | $\frac{11.0}{14.5}$ | -.398 -.376 | -. 556 $=.516$ | -1.032 -.814 | -1.139 | .089 | . 184 | . 256 | - 320 |
|  | 24.5 21.0 | -.376 -.332 | -. 51.46 | -.814 -.632 | -. 2.983 | . 063 | . 1.093 | . 224 | . 284 |
|  | 24.5 | - -315 -.35 | -. 406 | -. 538 | -. 755 | .002 | . 078 | . 137 | . 191 |
|  | 31.0 | -. 291 | -. 363 | -. 451 | -. 635 | -.026 | .038 | . 090 | . 142 |
|  | 34.5 | -. 284 | -. 346 | -. 419 | - 5 ¢5I | -. 035 | .025 | . 073 | . 122 |
|  | 41.0 | -. 273 | -. 327 | -. 367 | -. 444 | -. 054 | -. 005 | . 039 | . 084 |
|  | 44.5 | -. 266 | -. 302 | -. 347 | -. 406 | . .061 | -. 017 | .146 | . 062 |
|  | 51.0 | -. 223 | -. 260 | -. 292 | -. 322 | -. 0.72 | -. 029 | -. 001 | . 038 |
|  | 59.5 | -. 177 | -. 200 | -. 228 | -. 252 | -. 067 | -. 040 | -. 013 | . 012 |
|  | 71.0 | -.100 -.041 | -. 3144 | -. 1440 -.080 | =.148 | -. 031 | -. 015 | .002 | .014 |
|  | 93.0 | -. .033 | -. 0.032 | -. .004 | -. 0.010 | . 045 | . 044 | . 042 | . 038 |
| $0.831 \mathrm{~b} / 2$ | 0 | -0.050 | -0.903 | -1.069 | -1.387 |  |  |  |  |
|  | 2.5 | $-.943$ | -1.810 | -1.349 | -2.377 |  | 0.412 | 0.416 | 0.141 |
|  | 5.5 | -. 547 | -. 747 | -1.230 | -1.247 | . 174 | . 275 | - 340 | . 395 |
|  | 17.5 | -. 517 | -. 747 | - 1.1 .119 | -1.149 | . 163 | . 261 | -313 | - 386 |
|  | 11.6 | -. 396 | -. 552 | -1.116 | -1.145 | .081 | .167 | . 239 | . 296 |
|  | 14.5 | -. 371 | -. 419 | -. 9745 | -. 999 | $-007$ | 072 | $-73$ | - 7 \% |
|  | 24.5 | -: 295 | -. 4186 | - $=.645$ | -: 953 | -.007 | . 072 | -137 | .188 |
|  | 31.0 | -. 270 | -. 336 | -. 439 | -. 689 | -. 0.041 | . 013 | . 060 | . 108 |
|  | 34.5 | -. 259 | -. 320 | -. 269 | -. 606 | -. 052 | -. 005 | . 034 | . 080 |
|  | 41.0 | -. 251 | -. 297 | -. 313 | -. 473 |  | -. 029 | . 009 | . 044 |
|  | 44.5 | -. 236 | -. 273 | -. 295 | -. 438 | -. 078 | -. 044 | -. 012 | . 022 |
|  | 51.0 | -. 203 | -. 236 | -. 245 | -. 3288 | -. 078 | -. 056 | -.026 -.042 | -.008 |
|  | 79.5 | -. -147 | -. | -. 1197 | -.270 -.172 | -. 0.075 | -. 063 | -. 0.022 | -. 017 |
|  | 79.5 | -. 0.024 | -. 034 | -. 073 | -. $\mathrm{-} .130$ | -.005 | ..005 | -.,002 | -.002 |
|  | 91.0 | 244 | . 034 | -.002 | -. 064 | . 044 | . 032 | . 023 |  |
| $0.924 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | $\begin{aligned} & =.960 \\ & =.533 \end{aligned}$ | $\begin{array}{r} -1.756 \\ -.772 \end{array}$ | $\begin{array}{r} -1.067 \\ -.963 \end{array}$ | -1.184 -.969 | 0.337 | 0.395 | 0.399 | 0.378 |
|  | 5.5 | -. 495 | -.723 | -:965 | -..969 | . 150 | . 238 | . 290 | - 35 |
|  | 21.0 | -. 371 | -. 525 | -. 850 | -. 8175 | . 058 | . 237 | . 192 | - 245 |
|  | 14.5 | -. 336 | -. 454 | -. 779 | -. 764 | . 018 | . 080 | . 131 | . 182 |
|  | 21.2 | -. 286 | -. 364 | -. 674 | -. 692 | -. 032 | . 017 | . 059 | . 105 |
|  | 24.5 | -. 254 | -. 321 | -. 571 | -. 599 | -.054 | -. 017 | . 022 | .058 |
|  | 31.0 | -. 225 | -. 285 | -. 472 | -. 529 | -. 072 | -. 041 | -. 007 | . 030 |
|  | 34.5 47 | -. 213 | - 260 | -. 415 | =.474 | -. 080 | -. 060 | -. 032 | -. 004 |
|  | 47.0 | -. 2194 | -. 249 | $=.343$ | =. 4100 | -. 0909 | -. 076 | -. 0.061 | -. 022 |
|  | 51.0 | -. 165 | -. 202 | -. 262 | -. 352 | -. 099 | .. 089 | -. 066 | -. 046 |
|  | 59.5 | -. 214 | -. 141 | -. 257 | -. 337 | -. 078 | -. 078 | -. 0.04 | -. 053 |
|  | 71.0 | -. 054 | -.078 | -. 1975 | -. 280 | -. 041 | -. 057 | -. 040 | -. 039 |
|  | 79.5 91.0 | -. 0.041 | -.038 | -. 077 | $=.274$ $=.208$ | -. 0.039 | -.031 | -.026 -.003 | -.034 |

TABLE F. - CONTIMUED. $^{\text {COM }}$
(c) $c_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| Seni8 Es. | ( Percent | UPPER SURFACE |  |  |  | Lower surfice |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $15^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  | -1.256 | -2.628 | -3.345 | -2. |  |  |  |  |
|  | 1.5 | -2.384 | -3.543 |  | - 2.551 | . 518 | 0.483 | . 6.438 |  |
|  | 6.5 | -. 89 | -1.093 | -3.037 | -2.469 | . 416 |  | . 621 | :692 |
|  | 11.0 | - 6827 | --886 | -. 801 | - 2.125 | . 33 | - 45 | . 567 | . 638 |
|  | 14.5 | -. 321 | -. 719 | -. 7.75 | -1.823 | . 318 | . 4376 | : 467 | -688 |
|  | 24.5 | -. 505 | -. 679 | -. 747 | -1.155 | :239 | . 34 | - 441 | - 569 |
|  | 33.0. | - -.463 | - -606 | -.705 | -: 920 | -202 | - 306 | . 392 | -455 |
|  | 41.5 | -.454 | - -578 | -. -768 | -. 815 | .1149 | :240 | . 321 | . 376 |
|  | 告. 5 | - $=.439$ | --547 | -.677 | -. 862 | - 104 | -180 | 25 | -- |
|  | 59.5 | -. 415 | -. 2126 | -. 0.568 | -. $\mathrm{}$. \% 85 | . 086 | .159 | . 215 | - 35 |
|  | 71.0 | -. 275 | -:333 | -. -778 | - -7.807 | :077 | . 2135 | . 178 | . 1446 |
|  | 99.5 | -. 28.76 | -. -131 | -: 215 | -. 80.428 | :073 | :1294 | . 094 |  |
| $0.195 \mathrm{~b} / 2$ | 0 | -2.247 | -2.776 | -2.522 | -1.677 |  |  |  |  |
|  | 1.5 | -2.666 | -2.751 | -2.445 | -1:603 | -0.250 | 0.015 | . 669 | . 136 |
|  | 6.5 | -2. 269 | -2. 307 | -2.471 | -1.539 | . 47 | - 577 | -604 | -646 |
|  | 11.0 | -. 874 | -2.150 | -2.672 | -1.569 | . 376 | -447 | -573 | . 631 |
|  | $\underline{12.5}$ | -. 635 | -1.653 | - 2.350 | -1:564 | - 62 | - 352 | : 475 | :376 |
|  | 24.5 | -.578 | -.57 | -1.527 | -1. 386 | :249 | - 351 | . 437 |  |
|  | 31.0 | -.522 | -. 59 | -:.963 | -1. 204 | . 1724 | -369 | - 384 | . 400 |
|  | 41.8 | -. 478 | -.50\% | -. 710 | -1.161 | -138 | -230 | -305 | ${ }^{5}$ |
|  | 4.5 | -. 405 | -. 482 | -. $\mathrm{C}_{27} 21$ | -1.125 | . 135 | - 116 | -282 | 77 |
|  | 59:5 | -. 332 | -. 361 | -. -625 | --. 966 | .078 | - 146 | :188 | -217 |
|  | 71.8 | - | -. 274 | -. 8.450 | -. 845 | :072 | . 121 | . 1146 | . 149 |
|  | 91.0 | -. 0.054 | -. 046 | -.:196 | -. 578 | :075 | :086 | :066 | -.015 |
| $0.382 \mathrm{~b} / 2$ | $\bigcirc$ | -1.701 | -1.965 | - -1.384 | -1.749 | - | -20] |  |  |
|  | 1.5 | -1. ${ }^{1} 29$ | -1.718 | - $=1.348$ | -1.126 | : 417 | . 519 | . 575 |  |
|  | 6.5 | -1.287 | -1.720 | -1. 345 | -1.106 | - 1423 | - 07 | : 51 | . 573 |
|  | 11.0 | -1.178 | -1.740 | -1.354 | -1.105 | . 363 | - 439 | - 517 | - 55 |
|  | 14.5 21.5 | -1.021 | -1.694 | -1.300 | -1.076 | - 368 | : 363 | . 437 | . 578 |
|  | 24.5 | - 800 | -1.674 | -1. 28 | -1.053 | -240 | - 336 | -400 | :442 |
|  | 31.2 | -. 704 | -1.526 | -1.281 | -1.053 | - 191 | - 278 | - 342 | - 386 |
|  | 34.5 | - -.635 | -1.382 | -1.232 | -1.033 | . 1268 | -254 | - 312 | - 356 |
|  | 41.5 | -:50\% | -1.022 | -1.148 | -1:009 | . 137 | .192 | . 263 | - ${ }^{2} 1$ |
|  | 51.0 | -. 416 | -. 500 | -1.097 | -. 998 | . 090 | -15 | - 196 | . 219 |
|  | 59.5 | -. 35 | -. 2129 | -: 973 | -:958 | -061 | . 296 | . 143 | :157 |
|  | 79.5 91.0 | -.152 | -. 19.94 | - 7.73 | -: $15{ }^{5}$ | :065 | :081 | -044 | - 0.266 |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 0 | -2. 330 | -1.500 | -1.052 | -0.980 |  |  |  |  |
|  | 5.5 | -2.28 | -1.386 | -1.022 | -. 945 | -. 3 多 | 0.388 | -. 35 | 0.299 .525 |
|  | 6.5 | -1.509 | -1. ${ }^{1}$ | --.986 | -. 933 | - 412 | - 502 | -523 | - ${ }^{2}$ |
|  | 11.8 | -1.472 | - | -.988 | - $=.9312$ | .381 | -459 | . 491 | - 220 |
|  | 21.2 | - -.529 | -1.236 | -. 933 | -:908 | - 579 | - 35 | .400 | -435 |
|  | 24.5 | -. 732 | -1.158 | -.914 | -.888 | . 249 | - 319 | - 380 | . 406 |
|  | 34.5 | -. 53 | -1.071 | -1.915 | -:869 | -173 | : 235 | : 276 | - 312 |
|  | 42.0 | - $=143$ | -1.028 | -1.917 | - 864 | - $12{ }^{2}$ | -192 | . 227 | . 256 |
|  | 51.6 | -. 383 | -.912 | -1.875 | -:845 | . 086 | . 131 | . 145 | . 169 |
|  | 59.5 | -. 295 | -. 793 | -1.826 | -. 813 | . 056 | -079 | -081 | -086 |
|  | 79.5 | -. 215 | -. -610 | -1.735 | -. 757 | -05 | .051 | . 014 | O6\% |
|  | 91.0 | -. 082 | -. 485 | -1.655 | -. 705 | . 029 | -.057 | -. 125 | -. 222 |

TABLE Y. - CONCLUDED.
(c) $\alpha_{u}, 12^{\circ}, 26^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluced.

| Bem1span sta. | Percent ohord | UPPER SURFACE |  |  |  | LOWER SURFAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attaok |  |  |  |
|  |  | $12^{0}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & -1.647 \\ & -1.453 \\ & -1.376 \\ & -1.302 \\ & -1.297 \\ & -1.177 \\ & -1.141 \\ & -1.023 \\ & -.911 \\ & -.822 \\ & -.632 \\ & -.588 \\ & -.423 \\ & =.323 \\ & =.202 \\ & -.154 \\ & -.082 \end{aligned}$ | $\begin{array}{r} -0.850 \\ =.796 \\ -.800 \\ =.778 \\ =.784 \\ =.755 \\ =.749 \\ =.719 \\ -.724 \\ -.687 \\ -.663 \\ -.664 \\ =.625 \\ =.597 \\ =.553 \\ -.519 \end{array}$ | $\begin{array}{r} -0.809 \\ -.788 \\ -.789 \\ -.768 \\ -.766 \\ =.741 \\ =.736 \\ -.716 \\ -.711 \\ -.695 \\ -.695 \\ -.678 \\ -.678 \\ -.655 \\ =.647 \\ =.614 \\ =.580 \end{array}$ | $\begin{array}{r} -0.827 \\ -.802 \\ =.800 \\ =.781 \\ -.780 \\ =.756 \\ =.750 \\ =.726 \\ -.724 \\ -.709 \\ -.710 \\ -.693 \\ =.697 \\ =.667 \\ =.651 \\ -.611 \end{array}$ | 0.330 <br> .435 <br> .358 <br> .267 <br> .264 <br> .164 <br> .097 <br> . 062 <br> . 019 <br> .004 | 0.340 <br> .484 <br> .472 <br> .419 <br> .316 <br> .227 <br> .197 <br> .117 <br> .015 <br> -.027 -.075 <br> $-.167$ | $\begin{array}{r} 0.262 \\ .488 \\ .487 \\ .453 \\ .423 \\ .359 \\ .364 \\ .234 \\ .177 \\ .142 \\ .090 \\ .018 \\ =.044 \\ =.099 \\ =.208 \end{array}$ | 0.181 .490 <br> .495 .478 <br> .453 <br> .395 <br> .300 <br> .205 <br> .272 <br> .033 <br> -.036 -.100 -.210 <br> $-.210$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 92.0 \end{array}$ | $\begin{aligned} & -1.346 \\ & -1.136 \\ & -1.145 \\ & -1.082 \\ & -1.112 \\ & -1.040 \\ & -2.000 \\ & -.919 \\ & -.811 \\ & -.751 \\ & =.644 \\ & =.607 \\ & =.516 \\ & =.438 \\ & -.332 \\ & -.293 \\ & -.210 \end{aligned}$ | $\begin{array}{r} -0.796 \\ =.628 \\ =.618 \\ =.604 \\ -.606 \\ =.583 \\ =.579 \\ =.550 \\ =.550 \\ =.532 \\ =.532 \\ =.515 \\ =.511 \\ =.472 \\ =.442 \\ =.425 \end{array}$ | $\begin{array}{r} -0.690 \\ -.627 \\ -.625 \\ -.609 \\ -.606 \\ -.591 \\ -.579 \\ -.565 \\ -.556 \\ -.544 \\ -.548 \\ =.531 \\ =.532 \\ =.508 \\ =.505 \\ =.471 \end{array}$ | $\begin{array}{r} -0.662 \\ =.634 \\ =.630 \\ -.619 \\ -.619 \\ . .596 \\ . .595 \\ =.577 \\ -.577 \\ . .564 \\ . .577 \\ =.564 \\ =.571 \\ =.547 \\ . .534 \\ =.500 \\ =.476 \end{array}$ | $\begin{array}{r} 0.365 \\ .428 \\ .425 \\ .335 \\ . .223 \\ .193 \\ .138 \\ .104 \\ .067 \\ .043 \\ .019 \\ -.018 \\ -.020 \\ -.027 \\ .016 \end{array}$ | $\begin{array}{r} 0.349 \\ .441 \\ .422 \\ .360 \\ .251 \\ .216 \\ .159 \\ .1276 \\ .0744 \\ .008 \\ =.052 \\ -.087 \\ =.116 \\ -.185 \end{array}$ | $\begin{array}{r} -.29 \\ 0.290 \\ .457 \\ .448 \\ .400 \\ .299 \\ .264 \\ .298 \\ .161 \\ .170 \\ .074 \\ .030 \\ -.026 \\ =.081 \\ =.117 \\ =.196 \end{array}$ | $\begin{aligned} & . .250 \\ & 0.461 \\ & .459 \\ & .428 \\ & .43 \\ & .322 \\ & .236 \\ & .195 \\ & .140 \\ & .102 \\ & .053 \\ & =.025 \\ & =.075 \\ & =.120 \\ & -.203 \end{aligned}$ |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.0 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.837 \\ -.775 \\ -.776 \\ -.749 \\ -.740 \\ -.685 \\ -.661 \\ =.601 \\ =.582 \\ =.522 \\ -.520 \\ -.474 \\ =.463 \\ =.372 \\ =.320 \\ =.291 \end{array}$ | $\begin{array}{r} -0.544 \\ =.523 \\ -.520 \\ =.508 \\ =.507 \\ =.489 \\ =.464 \\ =.455 \\ =.436 \\ =.428 \\ =.407 \\ =.400 \\ =.364 \\ =.352 \\ =.316 \\ -.310 \end{array}$ | $\begin{aligned} & =.534 \\ & =.539 \\ & =.517 \\ & =.501 \\ & =.501 \\ & =.483 \\ & =.482 \\ & =.463 \\ & =.459 \\ & =.437 \\ & =.436 \\ & =.413 \\ & =.382 \\ & =.376 \\ & =.348 \\ & =.340 \end{aligned}$ | $\begin{array}{r} -0.541 \\ -.525 \\ -.524 \\ -.513 \\ -.517 \\ =.501 \\ =.506 \\ =.494 \\ =.500 \\ =.488 \\ -.492 \\ -.483 \\ =.486 \\ =.464 \\ =.447 \\ -.398 \end{array}$ | $\begin{array}{r} -.379 \\ 0.379 \\ .356 \\ .271 \\ .209 \\ .128 \\ .081 \\ .045 \\ .012 \\ =.009 \\ =.030 \\ -.042 \\ =.059 \\ =.053 \\ =.063 \\ =.053 \end{array}$ | $\begin{array}{r} -.370 \\ 0.3481 \\ .359 \\ .292 \\ .227 \\ .150 \\ .099 \\ .056 \\ .011 \\ =.015 \\ =.040 \\ =.064 \\ =.085 \\ =.108 \\ =.122 \\ =.151 \end{array}$ $2$ | $\begin{array}{r} 0.293 \\ .400 \\ .383 \\ .328 \\ .269 \\ .194 \\ .137 \\ .092 \\ .048 \\ .014 \\ . .018 \\ =.042 \\ =.079 \\ =.103 \\ =.125 \\ -.162 \end{array}$ |  |

table vi. - pressure coefficiznts af seven semispan stattons of the ving. $K_{0}, 0.60 ; \mathrm{R}, 4,000,000$. (a) $a_{u}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Semispan sta. | Percent chord | UPPRR GUREAGE |  |  |  | LOKER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1{ }^{\circ}$ | 20 | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.500 | 0.505 | 0.456 | 0.446 |  |  |  |  |
|  | 1.5 | . 059 | -. 0.40 | -. 152 | -. 283 | 0.013 | 0.099 | 0.174 | 0.240 |
|  |  | -. 019 | -. 068 | -. 124 | -. 187 | -. 035 | . 023 | . 070 | . 112 |
|  | 6.5 | -. 041 | -. 088 | -. 143 | -. 200 | -. 0.05 | -.004 | . 040 | $0.082$ |
|  | 11.0 | -. 060 | -. 097 | =.140 | -. 183 | -.071 | =.026 | -.013 | -045 |
|  | 14.5 21.6 | -. 0.081 -.092 | -. 113 | -. $=.154$ | -.195 $=.190$ | -. 086 $=.097$ | -. 0.044 | -.008 -.027 | .027 |
|  | 21.5 | -. 0.107 | -. 213 | -. 1.15 | -. 2000 | -. 0.112 | $=.057$ | -.027 | -. 020 |
|  | 31.6 | -. 213 | -. .139 | -. 169 | -. 197 | -. 125 | -.088 | -. 060 | -. .038 |
|  | 34.5 | -. 138 | -. 160 | -. 190 | -. 218 | -. 143 | -. 109 | -. 082 | -. 058 |
|  | 41.0 | -. 158 | -. 178 | -. 206 | -. 232 | -. 155 | -. 123 | -. 099 | -. 072 |
|  | 44.5 | -. 170 -.173 | - | -. 216 $=.212$ | -. 241 -.235 | -. .177 | -. -145 | -. -126 | -. -104 |
|  | 59.5 | -. $=.150$ | $=.164$ | -. 180 | -. 205 | -. 159 | -. 131 | -. -1215 | -. 100 |
|  | 71.0 | -. 120 | -. 128 | -. 147 | -. 160 | -. 127 | -. 0.05 | -.083 | -. 077 |
|  | 79.5 | -. 0666 | -. 070 | -. 0.052 | -. 096 | -. 070 | -. 052 | -. 0.44 | -. 036 |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 0 | 0.445 | 0.736 | 0.356 | 0.294 |  |  |  |  |
|  | 1.5 | . 010 |  | -. 254 | $-.420$ | 0.027 | 0.152 | 0.247 | 0.324 |
|  |  | -. 0.086 | -. 129 | - 201 | -. 280 | -. 070 | -. 001 | . 061 | - 116 |
|  | 11.0 | -. 102 | -. 1146 | -. 200 | -. 285 | -. 107 | -. 0.054 | -0\%5 | . 031 |
|  | 14.5 | -.116 | -. 153 | -. 200 | -. 249 | -. 124 | -. 0.04 | -.031 | .ac6 |
|  | 21.0 | -. 132 | -. 154 | -. 202 | -. 234 | -. 138 | -. 0.93 | -. 0.05 | -. 024 |
|  | 24.5 | -. 145 | -. 170 |  | -. 234 | -. 145 |  | -. 068 | -. 0.034 |
|  | 31.8 | -. 151 | -. 175 | -. 208 | -. 234 | -. 176 | -. 126 | -. 095 |  |
|  | 44.5 | -.162 -.182 | -. 2868 $=-204$ | -. 219 $=.230$ | $=.249$ -.257 | -. 176 | -. 141 | - -110 -218 | -. 0.082 |
|  | 44.5 | -. 185 | =-208 | -. 231 | -. 257 | -. $\mathrm{-}$. 182 | -. 151 | -. -120 | -. 100 |
|  | 51.0 | -. 176 | -. 190 | -. 215 | -. 237 | -. 185 | -. 160 | -. 133 | -. 115 |
|  |  |  | -. 170 |  |  | -. 160 | -. 137 |  | -. 0.095 |
|  | 71.0 | -. 101 | -. 111 | -. 127 | -. 145 | -. 0.09 | -. 079 | -. 075 | -. 0.046 |
|  | 99.5 | .049 .015 | -.054 | -.06\% | -. 0.078 | -.049 | -.037 | -. 0.024 | -..026 |
| $0.382 \mathrm{~b} / 2$ | ${ }^{\circ}$ | 0.422 | 0.404 |  |  |  |  |  |  |
|  | 1.5 | -. 037 | -. 185 | $\begin{aligned} & =.365 \end{aligned}$ | $-.577$ | -0.061 | 0.057 | 0.155 | 0.235 |
|  | 5.5 | -. 107 | -. 186 | -. 276 | =. 373 | -. 2111 | -. 033 | . 038 | . 079 |
|  | 12.0 | -. 120 | - $=198$ | -. 284 | =. 3709 | -. 125 | -. 0.078 | -.015 | . 072 |
|  | 14.5 | -. 143 | -. 190 | -.245 | -. 294 | -. 149 | -. 094 | -.045 | -. 004 |
|  | 27.0 | -. 15 | -. 197 | -. 238 | -. 287 | -. 160 | -. 114 | -. 074 | -. 033 |
|  | 24.5 | -. 164 | -. 198 | -. 237 | -. 280 | -. 167 | -. 123 | -.082 | -. 042 |
|  | 31.0 |  |  |  |  | -. 181 | -. 141 | -. 104 |  |
|  | 214.5 | -. 170 | -. 197 | -. 225 | -. 264 | -. 186 | -. 149 | -. 113 | -. 086 |
|  | 41.0 | -. 190 | -. 212 | -. 233 | -272 -.264 -8.23 | -.181 -.182 | -. 1477 | $=113$ $=-122$ | -.093 $=-100$ |
|  | 51.0 | -. 174 | -. 2191 | -.234 | -. 264 | -. 182 | -. -153 | -. -122 | =.100 |
|  | 59.5 | -. 1156 | -. 367 | -. 178 | -. 205 | -. 152 | -. 116 | -. 107 | -. 087 |
|  | 71.0 | -. 076 | -. 0.04 | -. 211 | -. 123 | -. 056 | -. 077 | -. 060 | -. 0.052 |
|  | 79.5 91.0 | .037 -.039 | -. 0.028 | - -.052 .053 | -. 057 .019 | -. -.031 .030 | -.021 | -. | -. 0.017 |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  |  | 0.428 | 0.423 | 0.341 | 0.183 |  |  |  |  |
|  | 1.5 | -. 0.116 | -.214 | - $=.428$ | -. 9.412 | -0.067 | 0.065 | -0.172 | 0.261 |
|  | 6.5 | -. 131 | -.214 | -. 313 | -. 412 | -. 124 | -. 0.039 | . 030 | . .0 .98 |
|  | 11.0 | -. 243 | -. 198 | -. 274 | -. 338 | -. 146 | -. 071 | -.020 | .035 |
|  | 14.5 | $-150$ | -. 200 | -. 267 | -. 324 | -. 150 | -. 0.01 | -. 037 | .020 |
|  | 23.0 | - -168 | -. 203 | -233 | -. 301 | -. 168 | -. 110 | -. 0.087 | -. 023 |
|  | 31.8 | -. 165 | -. 196 | -. 230 | -.271 | -. 176 | -. 136 | -. 102 | -. 0.063 |
|  | 34.5 | -. 169 | -. 126 | -. 230 | -. 265 | -. 180 | -. 241 | -. 104 | -. 077 |
|  | 47.0 44.5 | -. 184 | -. 209 -.204 | -. 277 | -.266 -.257 | -.276 -.173 | -.141 -.142 | -. -112 | -. 085 -.092 |
|  | 44. 51.8 | -. 186 | $=.204$ -.189 | -. 212 | -. 251 | -. 2.169 | -.142 -.139 | -. 1117 | -. 0.096 |
|  | 59.5 | -. 243 | -. 151 | -. 159 | -. 175 | -. 150 | -. 123 | -. 104 | -.091 |
|  | 71.0 | -. 076 | -. 085 | -.104 | -. 112 | -. 057 | -. 055 | -. 052 | -.043 |
|  | 79.5 | -. 0236 | -. 032 | -. 044 | -. 047 | -. 023 | -. 013 | -. 017 | -. 005 |
|  | 91.6 | . 038 | . 039 | . 030 | . 029 | . 038 | . 046 | . 045 | . 043 |

nNGCA

TABLE VI. - CONTENUED.
(a) $a_{u}, 0^{\circ}, 2^{\circ}, 2^{\circ}, 3^{\circ}$ - concluded.

| Semispan sta. | Percent chord | UPPER SURFAOE |  |  |  | LONER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.424 | 0.400 | 0.282 | 0.079 |  |  |  |  |
|  | 1.5 | -. 049 | -. 235 | -. 471 | -. 732 | -0.056 | 0.100 | 0.222 | 0.310 |
|  | 5.5 | -. 131 | - 228 | -. 342 | -. 442 | -. 120 | -. 024 | . 060 | . 131 |
|  | 6.5 | -. 139 | -. 233 | -. 341 | -. 444 | -. 128 | -. 039 | . 038 | . 109 |
|  | 11.0 | -. 131 | -. 197 | -. 276 | -. 345 | -. 150 | -. 077 | -. 017 | . 041 |
|  | 14.5 | -. 150 | -. 207 | -. 274 | -. 338 | -. 154 | -. 085 | -. 034 | . 020 |
|  | 21.0 | -. 158 | -. 203 | -. 253 | -. 308 | -. 158 | -. 106 | -. 065 | -. 0231 |
|  | 24.5 | 0.166 | -. 201 | -. 251 | -. 294 | -. 168 | -. 116 | -. 075 | -. 036 |
|  | 37.0 | - -169 | - 200 -2000 | -. 2337 | -. 277 | -. 1173 | -. 139 | -. 0.097 | -. 0.06 |
|  | 41.5 | -. 184 | -. 204 | -. 237 | -. 264 | -. 169 | -. 136 | -. 104 | -. 0.083 |
|  |  | -. 180 | -. 199 | -. 230 | -. 260 | -. 169 | -. 137 | -. 112 | -. 092 |
|  | 51.0 | -. 161 | -. 182 | -. 200 | -. 219 | -. 165 | -. 138 | -. 118 | -. 100 |
|  | 59.5 71.5 | - -136 | -.151 -.074 | -.163 -.086 | -. 1789 | -. .1356 | -. 118 | -. 104 | -. 0.042 |
|  | 79.5 | -. 0.019 | -:.021 | -.,030 | -. 0.034 | -.,011 | -.002 | -.007 | -.,004 |
|  | 91.0 | . 045 | . 049 | . 044 | . 042 | . 053 | .05\% | . 052 | . 049 |
| $0.331 \mathrm{~b} / 2$ | $\bigcirc$ | 0.399 | 0.436 | 0.373 | 0.222 |  |  |  |  |
|  | 1.5 |  |  | -. 475 |  |  |  |  |  |
|  |  | -. 138 | -. 233 | -. 347 | =. 4438 | -. -133 | . 037 | . 043 | . 112 |
|  | 6.5 | -. 139 | -. 232 | -. 337 | -. 442 | -. 137 | -. 045 | . 033 | . 101 |
|  | 11.0 | -. 140 | -. 203 | -. 280 | -. 350 | -. 250 | -. 077 | -. 020 | .033 |
|  | 14.5 | -. 150 | -. 206 | -. 274 | -. 337 | -76 | -17 | -072 | -024 |
|  |  |  |  |  | -. 301 |  | -. 112 |  |  |
|  | 24.5 31.0 | -.164 -.166 | -. 197 | -. 244 | -. 271 | -. 1.173 | -. 119 | -. 081 | -. 0.047 |
|  | 34.5 | -. 170 | -. 192 | -. 214 | -. 252 | -. 173 | -. 136 | -. 110 | -. 0.084 |
|  | 41.0 | -. 182 | -. 197 | -. 219 | -. 248 | -. 170 | -. 142 | -. 218 | -. 0.096 |
|  | 44.5 | -. 175 | -. 188 | -. 207 | -. 232 | -. 169 | -. 143 | -. 122 | -. 108 |
|  | 51.0 |  |  |  |  | -. 155 |  | -. 115 | -. 106 |
|  | 59.5 | -.125 -.057 | -. -.128 | -. 132 | -. 143 | -.132 -.045 | -. 113 | -.101 | -. 0.094 |
|  | 79.5 | -..008 | -.007 | -. 0.015 | -.018 | -.001 | . 012 | -. 0 | -.004 |
|  | 91.0 | . 056 | . 060 | . 055 | . 052 | 060 | . 056 | . 057 | . 050 |
| $0.924 \mathrm{~b} / 2$ | 0 | 0.418 | 0.343 | 0.165 | -0.105 |  |  |  |  |
|  | 1.5 | $\begin{aligned} & =013 \\ & =151 \end{aligned}$ | -. 203 | - 455 -.355 | $\begin{aligned} & -.746 \\ & =.480 \end{aligned}$ | -0.080 -140 | 0.073 |  |  |
|  | 5.5 | -. 151 | -. 244 | --. 345 | -.480 -.458 | -.140 -.143 | -. 045 | . 036 | . 104 |
|  | 13.0 | -. 155 | -. 212 | -. 288 | -. 3.336 | -. 148 | -.092 | -.037 | .013 |
|  | 14.5 | -. 166 | - 209 | -. 262 | -. 307 | -. 166 | -. 111 | -. 067 | -. 025 |
|  | 22.0 | -. 169 | -. 196 |  | -. 272 |  |  | -. 098 | -. 071 |
|  | 24.5 | -. 162 | -. 181 | -. 214 | -. 242 | -. 166 | -. 132 | - 1178 | -. 088 |
|  |  | -. 157 |  |  |  | -.162 | -. 135 | -. 118 |  |
|  | 34.5 41.0 | -. 1751 | $=.184$ | -. 176 $=.189$ | -:207 | -. 155 | -. 1.130. | -.118 | -. 1187 |
|  | 44.5 | -. -156 | -. 1.165 | -. 175 | -. 193 | -. 147 | -. 128 | -. 121 | -. 217 |
|  | 51.0 | -. 135 | -. 137 | -. 152 | -. 164 | -. 140 | -. 122 | -. 1188 | -. 114 |
|  | 59.5 | -. 080 | -. 077 | -. 0.096 | -. 107 | -. 091 | -. 085 | -. 084 | -. 084 |
|  | 71.0 | -. 025 | -. 031 | -. 038 | -. 046 | -. 024 | -. 015 | -. 016 | -. 033 |
|  | 91.0 | .062 | .071 | .064 | .055 | .072 | . 073 | .061 | -. 049 |

TABLE YI.- COMTINURD.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Bentapan sta. | Percent chord | UPPER STRFACE |  |  |  | LOMER BURPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | ancle of attack |  |  |  |
|  |  | $4{ }^{0}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ | $4^{0}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| 0,086 b/2 | 0 2.5 5.5 6.5 11.5 14.0 21.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 $99^{\circ} .5$ |  |  | $-0.067$ <br> -1.097 -.499 <br> -490 -.412 <br> $-.400$ <br> $=.370$ -.369 <br> $=.350$ -.366 <br> $=.366$ $=-366$ $=-346$ <br> $=-366$ $=346$ $=-295$ <br> $=.292$ $=.227$ -.145 -.050 | $=0.403$ -1.764 $=.660$ $=.643$ $=.535$ $=.710$ $=.465$ $=.450$ $=.482$ $=.433$ $=.436$ $=.405$ $=.343$ $=.174$ -.070 |  | -.401 0.445 .210 .157 .130 .097 .045 .045 .003 -.037 -.040 -.027 -.001 -.024 | $\begin{array}{r} -.182 \\ 0.331 \\ .394 \\ .233 \\ .203 \\ .162 \\ .140 \\ .107 \\ .082 \\ .059 \\ .020 \\ .012 \\ .018 \\ .035 \end{array}$ | $\begin{array}{r} -.531 \\ .403 \\ .365 \\ .300 \\ .268 \\ .220 \\ .195 \\ .159 \\ .135 \\ .107 \\ .060 \\ .050 \\ .046 \\ .054 \\ .059 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 21.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  |  | $\begin{aligned} & -0.615 \\ & -1.549 \\ & =.702 \\ & -.656 \\ & =.543 \\ & =.500 \\ & =.448 \\ & =.433 \\ & =.406 \\ & =.403 \\ & -.392 \\ & -.363 \\ & -.345 \\ & =.263 \\ & =.275 \\ & =.119 \\ & =.015 \end{aligned}$ | $=0.991$ $=-1.717$ -1.403 -1.177 $=.667$ $=.579$ $=.505$ $=.505$ $=.476$ $=.451$ $=.451$ $=.396$ $=.321$ $=.232$ $=.135$ $=.027$ | $\begin{array}{r} 0.386 \\ .174 \\ .135 \\ .082 \\ .052 \\ .015 \\ . .021 \\ -.028 \\ =.066 \\ =.072 \\ =.087 \\ =.078 \\ =.049 \\ -.013 \\ .032 \end{array}$ | 0.452 .263 .223 .157 .119 .076 .060 .022 .001 -.027 $=.027$ -.049 $=.043$ -.026 .002 .036 | $\begin{array}{r} -.465 \\ 0.355 \\ .312 \\ .230 \\ .200 \\ .120 \\ .086 \\ .067 \\ .0642 \\ .061 \\ .007 \\ .004 \\ .012 \\ .033 \\ .055 \end{array}$ |  |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 31.5 11.0 14.5 21.0 24.5 31.5 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{array}{r} -0.005 \\ -.798 \\ =.462 \\ =.452 \\ =.375 \\ =.353 \\ =.330 \\ =.319 \\ =.391 \\ =.292 \\ =.284 \\ =.250 \\ =.208 \\ =.130 \\ =.061 \end{array}$ |  | $\begin{aligned} & -0.915 \\ & -1.574 \\ & -1.073 \\ & -.896 \\ & -.774 \\ & -.652 \\ & -.558 \\ & =.522 \\ & -.469 \\ & -.442 \\ & -.411 \\ & -.387 \\ & -.339 \\ & -.266 \\ & -.151 \\ & -.091 \\ & .002 \end{aligned}$ | $\begin{aligned} & -1.192 \\ & -1.510 \\ & -1.141 \\ & -1.057 \\ & -1.028 \\ & -.861 \\ & -.813 \\ & -.706 \\ & -.829 \\ & -.555 \\ & -.497 \\ & -.453 \\ & -.389 \\ & -.306 \\ & -.303 \\ & -.127 \\ & -.027 \end{aligned}$ |  | $\begin{array}{r} 0.394 \\ 0.254 \\ .224 \\ .158 \\ .124 \\ .078 \\ .059 \\ .017 \\ .002 \\ =.015 \\ =.041 \\ -.048 \\ =.090 \\ -.010 \\ .044 \end{array}$ | 0.448 0.340 .313 .243 .214 .155 .136 .057 .069 .045 .029 .005 .014 .034 .055 | -.77 0.470 .393 .375 .368 .219 .185 .145 .118 .097 .047 .038 .044 .048 .061 |
| $0.555 \mathrm{k} / 2$ | 0 1.5 56.5 61.5 11.0 14.5 21.0 24.5 31.6 34.5 41.6 44.5 51.0 59.5 71.0 79.5 |  |  | -0.960 -1.317 -1.346 -1.319 -1.390 -1.207 -.765 $=.619$ $=.357$ $=.327$ $=.306$ $=.283$ $=.203$ $=.131$ -.057 .026 | $\begin{aligned} & -1.368 \\ & -1.526 \\ & -1.406 \\ & -1.389 \\ & -1.559 \\ & -1.321 \\ & -1.227 \\ & -1.088 \\ & -.807 \\ & -.694 \\ & -.412 \\ & -.375 \\ & -.260 \\ & -.188 \\ & -.117 \\ & -.056 \\ & .068 \end{aligned}$ |  |  | - 0.459 .358 .339 .263 .225 .164 .1540 .094 .075 .048 .035 .015 -.001 .015 .032 .058 | 0.460 .415 $-367$ . 219 $-1.195$ .c9i .074 .026 $\begin{array}{r}058 \\ .04 \mathrm{a} \\ \hline\end{array}$ |

TABLE VI. - CONTINUED.
(b) $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Semiepan ote. | Percent chord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / \mathrm{c}$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 24.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.188 \\ -1.024 \\ -.572 \\ -.557 \\ =.425 \\ -.403 \\ -.353 \\ =.337 \\ =.311 \\ =.299 \\ =.286 \\ =.272 \\ =.234 \\ =.181 \\ =.300 \\ =.034 \\ .045 \end{array}$ | $\begin{array}{r} -0.773 \\ -1.430 \\ -1.084 \\ -.923 \\ =.619 \\ -.542 \\ -.462 \\ =.432 \\ =.388 \\ -.367 \\ -.336 \\ =.316 \\ =.270 \\ =.218 \\ =.114 \\ =.048 \\ .024 \end{array}$ | $\begin{aligned} & -0.979 \\ & -1.091 \\ & -1.089 \\ & -1.074 \\ & -1.089 \\ & -1.077 \\ & -1.055 \\ & -1.016 \\ & -.856 \\ & -.797 \\ & -.511 \\ & -.467 \\ & -.246 \\ & -.158 \\ & -.084 \\ & -.030 \\ & .034 \end{aligned}$ | $\begin{aligned} & -1.256 \\ & -1.163 \\ & -1.140 \\ & -1.117 \\ & -1.124 \\ & -1.091 \\ & -1.102 \\ & -1.056 \\ & -1.027 \\ & =.977 \\ & =.888 \\ & -.839 \\ & =.686 \\ & =.528 \\ & =.260 \\ & =.173 \\ & =.030 \end{aligned}$ | $\begin{array}{r} .0-379 \\ .201 \\ .172 \\ .097 \\ .069 \\ .024 \\ .004 \\ . .021 \\ =.034 \\ =.055 \\ -.063 \\ =.075 \\ =.071 \\ =.034 \\ .0053 \\ .052 \end{array}$ | 0.432 $\begin{array}{r} 297 \\ -270 \end{array}$ <br> .270 .183 <br> .152 .095 <br> .076 <br> .033 .019 <br> $-.011$ <br> $-.025$ <br> -.041 -.049 <br> -.022 <br> .003 | $\begin{array}{r} 0.254 \\ .369 \\ .345 \\ .259 \\ .227 \\ .164 \\ .141 \\ .093 \\ .076 \\ .043 \\ .025 \\ .001 \\ -.012 \\ =.004 \\ .025 \\ .061 \end{array}$ | $\begin{array}{r} 0.426 \\ .420 \\ .398 \\ .319 \\ .283 \\ .215 \\ .186 \\ .136 \\ .177 \\ .079 \\ .039 \\ .064 \\ .012 \\ .019 \\ .037 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} 0.004 \\ -1.024 \\ -.576 \\ =.547 \\ =.422 \\ -.399 \\ -.340 \\ -.319 \\ -.286 \\ -.272 \\ -.261 \\ =.241 \\ -.207 \\ -.245 \\ =.075 \\ -.013 \\ .057 \end{array}$ | $\begin{array}{r} -0.496 \\ -1.310 \\ -1.086 \\ -.979 \\ -.719 \\ -.575 \\ -.444 \\ =.401 \\ -.349 \\ -.326 \\ =.298 \\ =.275 \\ -.239 \\ -.157 \\ =.092 \\ =.038 \end{array}$ | $\begin{array}{r} -0.587 \\ -.858 \\ -.857 \\ -.826 \\ =.826 \\ -.789 \\ -.796 \\ =.761 \\ =.760 \\ =.710 \\ =.672 \\ =.627 \\ -.540 \\ -.440 \\ =.293 \\ -.228 \\ -.096 \end{array}$ | $\begin{array}{r} -0.816 \\ -.844 \\ -.842 \\ -.809 \\ -.804 \\ -.765 \\ . .747 \\ -.705 \\ -.697 \\ . .655 \\ . .654 \\ =.611 \\ -.592 \\ -.523 \\ -.167 \\ -.403 \\ -.313 \end{array}$ | $\begin{array}{r} . .37 \\ 0.375 \\ .172 \\ .092 \\ .07 \\ .013 \\ . .002 \\ . .034 \\ =.051 \\ =.068 \\ =.050 \\ =.081 \\ . .078 \\ -.034 \\ .003 \\ .053 \end{array}$ | 0.423 <br> .274 .262 <br> .271 <br> .077 <br> .057 .011 . .009 <br> $-.038$ <br> . .053 -.053 <br> -. .069 <br> $-.034$ <br> -.002 .036 | 0.443 <br> $\cdot 325$ <br> .238 <br> .139 <br> .113 <br> .062 <br> .038 <br> .006 <br> $-.013$ <br> $-.025$ <br> $-.045$ <br> $-.018$ <br> .002 .026 | $\begin{aligned} & -.473 \\ & .384 \\ & .371 \\ & .290 \\ & .180 \\ & .149 \\ & .096 \\ & .068 \\ & .031 \\ & .010 \\ & -.010 \\ & =.040 \\ & =.031 \\ & =.032 \\ & -.053 \end{aligned}$ |
| $0.924 \mathrm{~b} / 2$ | $\begin{aligned} & 10 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.5 \\ & 21.5 \\ & 24.5 \\ & 31.5 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.5 \end{aligned}$ | $\begin{array}{r} -0.459 \\ -1.055 \\ -.577 \\ -.546 \\ -.400 \\ -.361 \\ -.301 \\ -.267 \\ -.238 \\ -.221 \\ -.220 \\ -.200 \\ =.170 \\ =.171 \\ =.046 \\ -.001 \\ .050 \end{array}$ | $\begin{array}{r} -1.012 \\ -1.167 \\ -1.024 \\ =.959 \\ . .726 \\ =.593 \\ =.408 \\ =.350 \\ =.292 \\ =.274 \\ =.239 \\ =.239 \\ =.204 \\ =.161 \\ =.097 \\ =.072 \\ .012 \end{array}$ | $\begin{array}{r} -0.762 \\ -.649 \\ -.632 \\ -.608 \\ -.596 \\ -.561 \\ -.535 \\ -.491 \\ =.466 \\ =.422 \\ -.410 \\ -.370 \\ =.370 \\ =.315 \\ -.309 \\ =.276 \\ -.257 \end{array}$ | $\begin{array}{r} -0.792 \\ =.651 \\ =.636 \\ =.513 \\ =.605 \\ =.567 \\ =.541 \\ =.497 \\ =.471 \\ =.429 \\ =.411 \\ =.377 \\ =.373 \\ =.325 \\ =.329 \\ =.293 \\ -.304 \end{array}$ | $\begin{array}{r} 0.350 \\ .173 \\ .161 \\ .069 \\ .021 \\ =.031 \\ -.057 \\ =.075 \\ =.084 \\ -.094 \\ =.098 \\ =.097 \\ =.070 \\ =.031 \\ -.002 \\ .045 \end{array}$ | 0.402 <br> .257 <br> .137 <br> .082 <br> .013 . .017 <br> $-.049$ <br> -. 069 <br> -.078 -.090 <br> $-.091$ <br> . .077 -.040 <br> .019 . .022 | $\begin{array}{r} -.415 \\ 0.307 \\ .289 \\ .193 \\ .130 \\ .059 \\ .018 \\ -.011 \\ =.035 \\ =.052 \\ =.064 \\ =.070 \\ =.064 \\ -.043 \\ =.038 \\ -.047 \end{array}$ | .071 0.411 .345 .234 .170 .093 .046 .011 $=.020$ $=.042$ $=.056$ $=.067$ $=.069$ $=.077$ -.115 |

sable vi. - comtinued.
(c) $\mathrm{a}_{\mathrm{u}}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| Serlspan Bta. | Percent chord | UPPER GURFACE |  |  |  | LONER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attack |  |  |  | Angle of atteot |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 47.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 91.5 \end{gathered}$ |  | -1.311 -2.198 -2.157 -2.167 -.660 -.640 -.681 $=.648$ -.615 -.607 -.590 $=.572$ -.748 $=.475$ -.374 $=.270$ -.147 |  | -1.973 -1.771 -1.840 -1.726 -1.660 -1.503 -1.256 -1.178 $=.960$ -.962 $=.857$ $=.855$ $=.780$ $=.740$ $=.890$ -.556 | $\begin{array}{r} 0.566 \\ .473 \\ .435 \\ .338 \\ .356 \\ .254 \\ .215 \\ .190 \\ .158 \\ .110 \\ .094 \\ .067 \\ .080 \\ .074 \end{array}$ | $\begin{array}{r} 0.590 \\ .590 \\ .547 \\ .478 \\ .440 \\ .379 \\ .354 \\ .309 \\ .280 \\ =.245 \\ .185 \\ .157 \\ .130 \\ .114 \\ .080 \end{array}$ | 0.588 <br> .641 <br> - 575 <br> .475 <br> .443 <br> .356 <br> - 318 <br> . 249 <br> - 208 <br> .165 .126 .061 | $\begin{aligned} & 0.596 \\ & 0.733 \\ & .753 \\ & .651 \\ & .558 \\ & .517 \\ & .460 \\ & .430 \\ & .380 \\ & .30 \\ & .350 \\ & .192 \\ & .198 \\ & .013 \end{aligned}$ |
| $0.195 \mathrm{~b} / 2$ | $0-$ 3.5 5.5 21.5 214.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | -7.363 -1.848 -1.849 -1.876 -1.422 -.752 $=.511$ $=.499$ $=.512$ $=.503$ $=.497$ $=.452$ $=.438$ $=.353$ $=.146$ $=.029$ | -1.977 -2.028 -2.121 -2.142 -2.307 -2.399 -1.066 -.530 $=.415$ -.426 $=.514$ $=.540$ $=.534$ $=.453$ $=.349$ $=.103$ | -1.846 -1.740 -1.799 -1.757 -1.842 -1.722 -1.517 -1.504 -1.335 -1.241 -1.042 -1.020 -.842 -.742 -.600 -.519 -.355 | -1.341 -1.280 -1.266 -1.231 -2.233 -1.199 -1.192 -1.151 -1.113 -1.070 -1.031 -1.002 -.961 $=.919$ -.876 $=.838$ -.731 | 0.395 <br> .2484 <br> - 370 <br> .329 <br> .241 .196 <br> .156 <br> .138 .154 <br> .093 <br> .102 .106 .106 | 0.266 <br> .567 .535 .481 .437 .373 .34 .293 .263 .222 .202 .166 .132 .105 .092 .067 | $\begin{aligned} & . .77 \\ & 0.171 \\ & .628 \\ & .609 \\ & .568 \\ & .463 \\ & .427 \\ & .371 \\ & .336 \\ & .292 \\ & .267 \\ & .1771 \\ & .1722 \\ & .082 \\ & .016 \end{aligned}$ | $\begin{aligned} & . .727 \\ & 0.677 \\ & .662 \\ & .636 \\ & .555 \\ & .559 \\ & .440 \\ & .404 \\ & .353 \\ & .324 \\ & .277 \\ & .133 \\ & .061 \\ & . .071 \end{aligned}$ |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 61.5 12.0 24.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 79.0 79.5 91.0 | -1.590 -1.617 -1.442 -1.433 -1.445 -1.406 -1.443 -1.327 -1.129 $=.974$ $=.623$ $=.525$ $=.300$ $=.229$ $=.154$ $=.086$ -.002 | -1.560 -1.415 -1.402 -1.367 -1.422 -1.446 -1.513 -1.445 -1.402 -1.317 -1.210 -1.134 -1.016 -.872 $=.603$ -.465 -.240 | -1.190 -1.154 -1.153 -1.124 -1.127 -1.097 -1.096 -1.067 -1.071 -1.045 -1.038 -1.000 -.978 -.919 -.859 -.799 -.707 | $\begin{array}{r} -0.996 \\ -.981 \\ -.980 \\ -.968 \\ -.967 \\ -.949 \\ -.946 \\ -.931 \\ -.927 \\ -.915 \\ -.914 \\ -.902 \\ -.899 \\ -.879 \\ -.860 \\ -.836 \\ -.834 \end{array}$ | $\begin{array}{r} 0.478 \\ .453 \\ .487 \\ .365 \\ .367 \\ .234 \\ .189 \\ .165 \\ .135 \\ .085 \\ .068 \\ .058 \\ .0664 \end{array}$ | $\begin{array}{r} 0.466 \\ .526 \\ .506 \\ .454 \\ .418 \\ .357 \\ .324 \\ .271 \\ .204 \\ .178 \\ .138 \\ .107 \\ .073 \\ .056 \end{array}$ | $0.4 \overline{4} 6$ 0.54 .564 .552 .514 .478 .420 .367 .329 .298 .251 .220 .174 .115 .057 0 -.121 |  |
| $0.555 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 37.0 34.5 41.0 44.5 51.0 59.5 71.5 79.5 | -1.402 -1.311 -1.210 -1.222 -1.204 -1.192 -1.189 -1.153 -1.139 -1.035 -1.044 -.992 -.906 $=.736$ -.468 $=.340$ -.127 | -1.131 -1.026 -1.014 -.992 -1.001 -.971 $=.963$ $=.935$ $=.944$ $=.920$ -.927 $=.898$ -.891 $=.826$ $=.768$ $=.699$ -.617 | $\begin{array}{r} -0.945 \\ -.910 \\ =.910 \\ =.885 \\ =.691 \\ =.871 \\ =.862 \\ =.845 \\ =.840 \\ =.824 \\ =.819 \\ =.805 \\ =.504 \\ =.774 \\ =.755 \\ =.721 \\ -.690 \end{array}$ | -0.894 -.866 -.867 $=.859$ -.866 $=.859$ -.853 $=.845$ $=.840$ -.826 -.816 $=.811$ $=.788$ $=.769$ $=.740$ -.721 | $\begin{array}{r} 0.466 \\ .455 \\ .447 \\ .376 \\ .365 \\ .241 \\ .189 \\ .165 \\ .130 \\ .151 \\ .082 \\ .051 \\ .049 \\ .046 \end{array}$ | $\begin{array}{r} 0.444 \\ .503 \\ .492 \\ .4423 \\ .337 \\ .307 \\ .250 \\ .227 \\ .176 \\ .151 \\ .110 \\ .058 \\ .020 \\ \hline . .127 \end{array}$ | 0.402 $\begin{aligned} & .522 \\ & .516 \\ & .481 \\ & .448 \\ & .354 \\ & .351 \\ & .254 \\ & .258 \\ & .174 \\ & .124 \\ & .052 \\ & -.017 \\ & -.992 \\ & -.226 \end{aligned}$ | 0.354 <br> .532 .532 .516 .500 .430 .396 .337 .301 .245 .212 .061 -.915 -.094 -.242 |

TABLE VI. - CONCLUDED.
(c) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Semispan ata. | Percent chord | UPPER SURFACE |  |  |  | LOWER BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -1.095 \\ -.914 \\ -.909 \\ =.884 \\ =.885 \\ =.849 \\ -.837 \\ =.803 \\ =.792 \\ =.756 \\ =.756 \\ -.716 \\ =.705 \\ =.636 \\ =.562 \\ =.518 \\ -.445 \end{array}$ | $\begin{aligned} & -0.864 \\ & =.794 \\ & =.798 \\ & =.771 \\ & =.770 \\ & =.739 \\ & =.703 \\ & =.697 \\ & =.676 \\ & =.676 \\ & =.658 \\ & =.661 \\ & =.635 \\ & =.591 \\ & =.560 \end{aligned}$ | $\begin{aligned} & -0.789 \\ & =.761 \\ & =.763 \\ & =.753 \\ & =.752 \\ & =.733 \\ & =.727 \\ & =.710 \\ & =.705 \\ & =.690 \\ & =.679 \\ & =.675 \\ & =.647 \\ & =.635 \\ & =.598 \\ & =. \end{aligned}$ | $\begin{array}{r} -0.752 \\ =.775 \\ =.776 \\ -.774 \\ -.760 \\ =.754 \\ =.739 \\ =.737 \\ =.755 \\ =.721 \\ =.710 \\ =.707 \\ =.683 \\ =.635 \\ =.608 \end{array}$ |  | .0 .367 .476 .467 .409 .373 .304 .273 .214 .185 .130 .101 .052 .012 .059 .2120 | 0.302 <br> .487 .482 <br> .443 .409 <br> .345 .309 <br> .248 .216 <br> .156 .122 .066 <br> $-.012$ <br> $=.133$ -.233 |  |
| $0.832 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.803 \\ =.701 \\ =.696 \\ -.678 \\ =.671 \\ =.636 \\ =.621 \\ =.586 \\ =.535 \\ -.528 \\ =.499 \\ =.492 \\ =.451 \\ =.438 \\ =.412 \\ =.395 \end{array}$ |  | $\begin{aligned} & -0.705 \\ & =.636 \\ & =.639 \\ & =.626 \\ & =.607 \\ & =.600 \\ & =.584 \\ & =.581 \\ & =.563 \\ & =.565 \\ & =.551 \\ & =.551 \\ & =.525 \\ & =.474 \\ & =.457 \end{aligned}$ | $\begin{array}{r} -0.697 \\ =.670 \\ =.672 \\ =.661 \\ =.661 \\ =.643 \\ =.636 \\ =.631 \\ =.620 \\ =.626 \\ =.615 \\ =.517 \\ =.579 \\ =.548 \\ =.520 \end{array}$ |  | 0.406 .425 $-358$ .248 .212 .212 .148 .126 .057 .020 <br> -. 018 <br> $-.080$ <br> -.117 -.144 -.205 |  | $0.2 \overline{2} 9$ <br> .489 <br> .483 <br> .421 <br> .322 <br> .288 -2.20 <br> .178 <br> .116 <br> .073 <br> $-.062$ <br> $-.123$ <br> -.168 -.252 |
| 0.924 b/2 | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 61.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & -0.600 \\ & -.527 \\ & -.520 \\ & -.498 \\ & -.491 \\ & -.459 \\ & -.445 \\ & =.411 \\ & -.394 \\ & =.361 \\ & =.355 \\ & =.326 \\ & =.396 \\ & =.303 \\ & =.279 \\ & -.295 \end{aligned}$ | $-0.537$ <br> $-.520$ <br> $-518$ <br> $-504$ <br> $-484$ <br> $=.479$ $=.461$ <br> $=.453$ $=.432$ <br> $-.422$ <br> $-.398$ <br> -.363 -.361 <br> $=.335$ -.335 -.339 | $\begin{aligned} & -0.550 \\ & =.536 \\ & -.535 \\ & -.529 \\ & -.530 \\ & -.504 \\ & -.505 \\ & -.490 \\ & -.489 \\ & -.477 \\ & =.472 \\ & -.457 \\ & -.429 \\ & =.419 \\ & =.390 \\ & -.372 \end{aligned}$ | $\begin{array}{r} -0.603 \\ -.591 \\ -.591 \\ -.582 \\ =.582 \\ -.570 \\ -.573 \\ -.566 \\ =.574 \\ =.569 \\ =.570 \\ =.563 \\ =.562 \\ =.541 \\ =.518 \\ =.485 \\ =.455 \end{array}$ | $\begin{array}{r} . .407 \\ .403 \\ .365 \\ .3459 \\ .195 \\ .114 \\ .066 \\ .028 \\ . .010 \\ =.037 \\ =.0597 \\ =.097 \\ -.105 \\ =.117 \\ -.146 \end{array}$ | 0.351 .383 .397 .297 .227 .143 .089 .040 . .037 . .068 . .092 . .119 . .133 . .148 . .183 | . .07 0.299 .394 .378 .323 .261 .178 .118 .066 .012 -.025 $=.059$ $=.087$ $=.129$ $=.149$ $=.271$ -.206 | $\begin{array}{r} . .222 \\ 0.229 \\ .3977 \\ .374 \\ .346 \\ .2866 \\ .141 \\ .088 \\ .024 \\ =.016 \\ =.060 \\ =.089 \\ =.146 \\ =.189 \\ =.201 \\ -.240 \end{array}$ |

TABLE VII. - PROSSURE CCEFPICIENTS AT SEVEA SEKISPAN STATIONS OF THE WIMG. $\mathrm{K}_{0}, 0.60 ; \mathrm{A}, 4,000,000$.
(a) $a_{u}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Semiepar sta. | Fercent ohord | UPPER SURIACE |  |  |  | LOWEA BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{0}$ | $3^{0}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{0}$ | $3^{0}$ |
| c.086 b/2 | $\begin{gathered} 0 \\ 3.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 31.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.530 .088 -.004 $=.056$ $=.075$ -.091 $=.106$ $=.1180$ $=.175$ -.195 $=.206$ $=.190$ $=.155$ $=.090$ -.022 | 0.539 .0 .040 -.065 -.080 $=.109$ .120 $=.135$ $=.181$ $=.200$ -.219 -.229 $=.204$ -.168 -.095 | 0.524 $=.101$ $=.095$ $=.120$ $=.129$ $=.150$ $=.160$ $=.171$ $=.179$ $=.210$ $=.232$ $=.251$ $=.230$ $=.230$ $=.111$ -.031 | 0.496 $=.220$ $=.152$ $=.1776$ $=.179$ $=.194$ $=.209$ $=.210$ $=.2465$ $=.280$ $=.289$ $=.250$ $=.202$ $=.126$ $=.040$ | $\begin{aligned} & 0.050 \\ & =.010 \\ & =.036 \\ & =.054 \\ & -.072 \\ & =.089 \\ & -.110 \\ & =.130 \\ & -.153 \\ & -.184 \\ & -.205 \\ & =.191 \\ & =.160 \\ & -.095 \\ & -.022 \end{aligned}$ | 0.129 0.045 .019 $=.010$ $=.030$ $=.070$ $=.090$ $=.218$ -.140 -.171 $=.163$ $=.132$ -.071 -.010 | -.192 .089 .060 .027 .004 -.020 -.040 -.090 -.111 -.150 -.142 -.115 $=.062$ -.008 | -.259 .133 .106 .061 .040 .013 .010 -.032 -.060 -.081 -.120 $=.120$ $=.097$ .050 .0 |
| $0.195 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.0 \\ & 21.5 \\ & 24.5 \\ & 31.0 \\ & 31.0 \\ & 41.5 \\ & 41.0 \\ & 41.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \end{aligned}$ | 0.467 -.025 -.055 $=.100$ $=.115$ $=.140$ $=.152$ -.168 $=.185$ $=.220$ $=.203$ $=.1148$ $=. .060$ -.012 | 0.453 $=.089$ $=.180$ $=.141$ $=.160$ $=.180$ $=.193$ $=.203$ $=.244$ -.256 -.238 $=.210$ $=.152$ -.072 .007 | 0.416 -.223 $=.290$ $=.206$ $=.200$ $=.220$ $=.230$ $=.240$ $=.256$ $=.278$ $=.285$ $=.265$ $=.237$ $=.1545$ -.001 | 0.357 $=.3763$ $=.275$ $=.250$ $=.255$ $=.259$ $=.266$ $=.262$ $=.2800$ $=.310$ $=.283$ $=.241$ $=$. | $\begin{aligned} & 0.005 \\ & 0.060 \\ & =.083 \\ & =.100 \\ & =.121 \\ & =.141 \\ & =.157 \\ & =.180 \\ & =.200 \\ & =.210 \\ & =.213 \\ & =.229 \\ & =.190 \\ & =.065 \\ & .010 \end{aligned}$ | $\begin{aligned} & -.160 \\ & 0.007 \\ & =.023 \\ & =.052 \\ & =.050 \\ & =.105 \\ & -.120 \\ & =.150 \\ & =.170 \\ & =.185 \\ & -.290 \\ & =.200 \\ & =.170 \\ & -.057 \\ & -.012 \end{aligned}$ | -.253 0.065 .035 $=.005$ $=.035$ $=.062$ -.080 $=.110$ $=.137$ $=.144$ $=.150$ $=.167$ $=.1400$ $=.045$ .020 | 0.330 .153 .089 .042 .010 -.020 -.039 -.070 $=.093$ -.110 $=.139$ $=.137$ $=.080$ $=.030$ -.027 |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 61.5 14.0 21.5 24.0 31.5 31.0 31.6 44.5 51.0 59.0 71.6 79.5 91.0 | 0.425 $=.033$ $=.1175$ $=.253$ $=.182$ $=.182$ $=.204$ $=.203$ $=.227$ $=.230$ $=.210$ $=.283$ $=.091$ -.032 | 0.410 -.186 $=.203$ $=.219$ -.220 $=.232$ -.247 $=.244$ $=.240$ -.262 $=.261$ $=.210$ $=.112$ -.052 .028 | 0.350 $=.365$ $=.295$ $=.306$ $=.280$ $=.278$ $=.284$ $=.278$ $=.273$ $=.291$ $=.289$ $=.258$ $=.215$ $=.236$ -.060 .021 | 0.241 $=.573$ $=.393$ $=.336$ $=.322$ $=.320$ $=.322$ $=.315$ $=.309$ $=.314$ $=.280$ $=.231$ $=.143$ -.065 .025 | $-0.060$ <br> $=.121$ <br> $=.151$ $=.170$ -.170 <br> -.185 -.192 <br> -.211 -.220 <br> $-.217$ <br> .220 -.180 <br> -. 0961 -. 037 -.035 | $\begin{aligned} & 0.050 \\ & =.046 \\ & =.063 \\ & =.095 \\ & =.115 \\ & =.140 \\ & =.175 \\ & =.187 \\ & =.183 \\ & =.189 \\ & =.193 \\ & =.150 \\ & =.051 \\ & -.030 \end{aligned}$ | $\begin{array}{r} 0.145 \\ .025 \\ . .005 \\ =.062 \\ -.092 \\ -.105 \\ =.130 \\ =.145 \\ -.145 \\ =.155 \\ -.164 \\ =.127 \\ =.075 \\ -.020 \\ .042 \end{array}$ | 0.230 .095 .069 .019 $=.010$ $=.046$ $=.057$ -.103 $=.110$ $=.120$ $=.135$ $=.106$ $=.063$ -.017 .042 |
| $0.555 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.0 31.0 34.0 41.0 44.5 51.0 79.5 71.0 79.5 91.0 |  | $\begin{aligned} & 0.430 \\ & -.225 \\ & -.231 \\ & -.249 \\ & -.232 \\ & -.237 \\ & -.247 \\ & -.236 \\ & -.235 \\ & -.239 \\ & -.248 \\ & -.225 \\ & -.160 \\ & -.999 \\ & -.345 \end{aligned}$ | $\begin{aligned} & 0.361 \\ & =.450 \\ & =.349 \\ & =.354 \\ & =.312 \\ & =.309 \\ & -.301 \\ & =.290 \\ & -.280 \\ & =.280 \\ & =.286 \\ & =.271 \\ & =.246 \\ & =.185 \\ & =.115 \\ & -.242 \end{aligned}$ | 0.240 $=.708$ $=.462$ $=.460$ $=.379$ $=.371$ $=.350$ $=.330$ $=.330$ $=.311$ $=.300$ $=.270$ $=.2011$ $=.120$ -.044 | $\begin{aligned} & -0.080 \\ & -.130 \\ & -.143 \\ & -.170 \\ & -.177 \\ & =.190 \\ & =.200 \\ & =.210 \\ & -.214 \\ & =.211 \\ & =.207 \\ & -.199 \\ & -.171 \\ & =.075 \\ & -.024 \end{aligned}$ | 0.057 $=.011$ $=.060$ $=.101$ $=.113$ $=.139$ $=.156$ $=.175$ $=.173$ $=.173$ $=.171$ $=.349$ -.071 -.017 .052 | $\begin{array}{r} -.769 \\ 0.040 \\ .020 \\ -.033 \\ -.053 \\ -.008 \\ -.102 \\ =.122 \\ -.129 \\ -.136 \\ -.146 \\ -.140 \\ -.126 \\ -.060 \\ -.010 \\ .953 \end{array}$ | $\begin{array}{r} -.250 \\ 0.110 \\ .089 \\ .027 \\ 0.040 \\ -.051 \\ -.051 \\ -.090 \\ -.103 \\ -.110 \\ =.115 \\ -.1050 \\ -.050 \\ -.010 \\ .050 \end{array}$ |

TABLE VII.- CONTINUED.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{0}, 3^{\circ}$ - Conoluded.

| Sem1epan pta. | Percent chord | UPPER SURFACE |  |  |  | LOMER surface |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.429 | 0.408 | 0.306 | 0.141 |  |  |  |  |
|  | 1.5 | -. 0.159 | -. 259 | -. 516 | -. 801 | -0.067 | 0.091 | 0.219 | 0.309 |
|  | 5.5 | -. 152 | -. 264 | -. 3,90 | -. 486 | -. 141 | -. 041 | . 051 | . 128 |
|  | 6.5 | - 1160 | -. 270 | -. 389 -.319 | $=.510$ $=.390$ | -. 151 | $\begin{array}{r}-.059 \\ -802 \\ \hline .81\end{array}$ | .030 -030 | . 103 |
|  | $11 . c$ 14.5 | -.159 -.178 | -.231 -.243 | -.319 -.320 | -. 390 | -. 180 | -. -102 | -.030 -.049 | . 030 |
|  | 21.0 | -. 1190 | -. 243 | -. 200 | -. 356 | -. 1190 | -. .136 | -.080 | -.032 |
|  | 24.5 | -. 191 | -. 242 | -. 292 | -. 342 | -. 199 | -. 148 | -. 094 | -. 050 |
|  | 31.0 | -. 200 | -. 241 | -. 280 | -. 321 | -. 206 | -. 161 | -. 114 | -. 072 |
|  | 34.5 | -. 202 | -. 241 | -. 271 | -. 315 | -. 208 | -. 168 | -. 119 | -. 082 |
|  | 41.0 | -. 213 | -. 248 | -. 279 | -. 307 | -. 201 | -. 170 | -. 129 | -. 100 |
|  | 44.5 | -. 212 | -. 240 | -267 -.231 | - 290 $=.250$ | -. 201 | -. 1711 | r -.138 -.241 | -. 1120 |
|  | 51.0 | -. 192 | -. 219 | -.231 -.187 | -. 250 | -. 198 | -.171 -.149 | -. 1241 | - $\mathrm{-} .1120$ |
|  | 71.0 | -. 0.070 | -. 080 | -. 095 | -. 095 | -. 060 | -. .061 | -.058 | -. 050 |
|  | 79.5 | -. 0188 | -. 020 | -. 0258 | -. 0222 | -. 017 | -. 008 | -.003 | -. 009 |
|  | 91.0 | . 058 | . 059 | . 059 | . 059 | . 061 | . 063 | . 060 | . 057 |
| $2.831 \mathrm{~b} / 2$ | 0 | 0.409 | 0.448 | 0.390 | 0.266 | $\bigcirc$ |  |  |  |
|  | 1.5 | -. 064 | -. 268 | -. 530 |  | -. 072 | . 0902 | . 220 | . 310 |
|  | 5.5 | -. 159 |  | -. 403 | -. 484 | -. 154 |  | . 040 | . 114 |
|  | 12.5 | -.161 -.164 | -. 2688 | -.394 -.331 | -.500 -.400 | .156 -.185 | -.058 -.095 | . 030 | .104 |
|  | 13.0 | -. 164 | -.237 -.243 | -.331 -.325 | -.400 -.390 | $-.185$ | -. 09 | -.030 | $\bigcirc$ |
|  | 21.0 | -. 190 | -. 242 | -. 297 | -. 350 | -. 192 | -. 139 | -. 086 | -. 037 |
|  | 24.5 | -. 199 | -. 240 | -. 290 | -. 330 | -. 295 | -. 149 | -. 100 | -. 050 |
|  | 31.0 | -. 200 | -. 233 | -. 265 | -. 300 | -. 205 | -. 165 | -. 1288 | -. 090 |
|  |  | -. 202 |  | -. 253 | -. 280 | -. 207 | -. 173 | -. 240 | -. 102 |
|  | 41.0 | -. 209 | -. 230 | -. 256 | -. 270 | -. 200 | -. 177 | -. 146 | -. 120 |
|  | 44.5 | -. 202 | -. 218 | -. 236 | -. 246 | -. 197 | -. 177 | -. 153 | . 132 |
|  | 51.0 | -. 182 | -. 200 | -. 208 | -. 215 | -. 178 | -. 159 | -. 140 | -. 127 |
|  | 59.5 | -. 141 | -. 145 | -. 139 | -. 139 | -. 147 | -. 134 | -. 115 | -. 106 |
|  |  | -. 0.004 | -.055 | -. 0.67 | . .063 .003 | -. 0.015 | -.041 | -. 0.008 | -. 045 |
|  | 91.0 | . 075 | . 075 | . 075 | . 077 | . 080 | -.880 | .072 | . 058 |
| $0.924 \mathrm{~b} / 2$ | 0 | 0.428 | 0.352 | 0.182 | -0.059 |  |  |  |  |
|  | 1.5 | -. 0172 | -. 230 | - 508 | -. 856 | -0.090 | 0.070 | 0.200 | 0.289 |
|  |  | -.175 -.189 | -. 287 -.294 | -. 4149 |  | - .164 |  | . 030 | . 108 |
|  | 11.5 | -. 189 | -.294 -.258 | -. 413 | -. 500 | -. 1790 | -. 0.117 | -.020 | .097 |
|  | 24.5 | -. 204 | -. 260 | -. 324 | -. 361 | -. 205 | -. 145 | -. -.089 | -.039 |
|  | 21.0 | -. 204 | -. 241 | -. 273 | -. 303 | -. 212 | -. 170 | -. 132 | -. 096 |
|  | 24.5 31.0 | -. 190 | -.220 -.203 | -. 240 -.219 | -. 270 -247 | -. 200 | . .174 -.169 | -. 1445 -.148 | -. 118 |
|  | 34.5 | -. 172 | -. 290 | -. 206 | -. 227 | -. 180 | -. 160 | -. 146 | $\rightarrow \square 130$ |
|  | 41.0 | -. 385 | -. 200 | -. 215 | -. 227 | -. 172 | -. 159 | -. 249 | -. 135 |
|  | 44.5 | -. 270 | -. 187 | -. 194 | -. 203 | -. 162 | -. 152 | -. 145 | -. 135 |
|  | 51.0 | -. 150 | -. 160 | -. 162 | - 170 | -. 15 | -. 142 | -. 136 -.090 | -. 130 |
|  | 71.0 | -. 022 | -. 0.025 | -. 030 | -. .030 | -. 012 | -. 0.017 | -..008 | -.028 |
|  | 79.0 | . 025 | . 031 | . 027 | . 021 | . 034 | . 030 | . 021 | . 011 |
|  | 91.0 | . 080 | . 085 | . 081 | . 075 | . 092 | . 089 | . 079 | . 068 |


table Vif. - CONTIMUED.
(b) $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Senispan sta. | Fercent chord | UPPER SURFACE |  |  |  | LOWER SURFMES |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.5 \\ 59.5 \\ 71.5 \\ 79.5 \\ 91.0 \end{array}$ | 0.459 $=.210$ -.210 -.226 -.210 $=.230$ -.2239 $=.241$ $=.278$ -.259 $=.315$ -.320 $=.280$ -.140 -.245 | 0.339 $=.309$ $=.219$ $=.330$ $=.318$ $=.309$ $=.330$ $=.319$ $=.371$ $=.376$ $=.386$ $=.337$ $=.360$ -.167 | 0.179 $=.946$ $=.445$ $=.449$ $=.396$ $=.411$ $=.390$ $=.498$ $=$. | $\begin{array}{r} 0.910 \\ -1.720 \\ =.580 \\ =.547 \\ -.197 \\ =.510 \\ -.550 \\ =.497 \\ =.485 \\ =.530 \\ =.552 \\ -.560 \\ -.555 \\ =.40 \\ =.344 \\ =.220 \\ =.299 \end{array}$ | $\begin{array}{r} -.77 \\ 0.3170 \\ .140 \\ .100 \\ .069 \\ .046 \\ .025 \\ -.001 \\ -.030 \\ -.054 \\ -.095 \\ -.100 \\ =.0030 \\ -.039 \end{array}$ | $\begin{array}{r} -.70 \\ 0.410 \\ .259 \\ .270 \\ .170 \\ .177 \\ .082 \\ .051 \\ .025 \\ .0 \\ -.041 \\ -.052 \\ =.040 \\ -.010 \\ .020 \end{array}$ | $\begin{array}{r} -.492 \\ 0.340 \\ .301 \\ .5014 \\ .211 \\ .170 \\ .146 \\ .210 \\ .085 \\ . .958 \\ .00 \\ .012 \\ .001 \\ .020 \\ .038 \end{array}$ | $\begin{array}{r} 0.557 \\ .411 \\ .371 \\ .310 \\ .278 \\ .230 \\ .201 \\ .167 \\ .140 \\ . .069 \\ .069 \\ .039 \\ .045 \\ .049 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.5 24.5 31.2 34.5 41.0 44.5 53.5 59.5 71.0 79.5 91.0 | 0.259 $=.545$ $=.349$ $=.350$ $=-3000$ $=.303$ $=.310$ $=.312$ $=.329$ $=.345$ $=.319$ $=.366$ $=.198$ $=.1066$ -.007 | 0.038 $=.927$ $=.478$ $=.491$ $=.423$ $=.409$ $=.395$ $=.398$ $=.389$ $=.417$ $=.418$ $=.379$ $=.310$ $=.223$ $=.223$ $=.013$ | $\begin{array}{r} -0.201 \\ -1.247 \\ -.820 \\ =.652 \\ -.567 \\ =.543 \\ =.509 \\ =.513 \\ -.491 \\ -.502 \\ -.513 \\ -.509 \\ -.453 \\ -.369 \\ -.265 \\ -.257 \\ -.033 \end{array}$ | $\begin{array}{r} 0.397 \\ -1.345 \\ -1.230 \\ -1.150 \\ -.700 \\ -.757 \\ -.617 \\ -.577 \\ -.597 \\ -.608 \\ -.510 \\ -.518 \\ -.403 \\ -.275 \\ -.163 \\ -.037 \end{array}$ | $\begin{array}{r} -.383 \\ 0.173 \\ .140 \\ .080 \\ .043 \\ . .010 \\ =.044 \\ -.770 \\ -.088 \\ -.097 \\ -.100 \\ -.070 \\ -.070 \\ .020 \end{array}$ | -.762 <br> 0.4669 <br> .226 <br> .163 <br> .125 <br> .062 <br> .021 <br> . .002 <br> -.028 <br> -.039 <br> . .052 <br> -.053 <br> .001 <br> .034 | .--7 0.497 .342 .302 .237 .101 .146 .121 .077 .051 .025 -012 -.012 -.014 -.007 .016 .041 | $\begin{array}{r} 0.509 \\ .317 \\ .374 \\ .365 \\ .210 \\ .182 \\ .150 \\ .109 \\ .059 \\ .0676 \\ .036 \\ .022 \\ .378 \\ .079 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.5 41.5 51.0 59.5 71.0 79.5 91.0 | 0.099 $=.816$ $=.479$ $=.418$ $=.4022$ $=.388$ $=.360$ $=.354$ $=.361$ $=.350$ -.309 $=.356$ $=.1577$ .025 |  | -0.468 -1.360 -1.320 -1.077 $=.933$ $=.752$ $=.695$ $=.638$ $=.550$ $=.517$ $=.482$ -.429 -.385 -.207 $=.112$ -.010 | -0.713 -1.390 -1.288 -1.763 -1.257 -1.254 -1.156 -1.061 -.856 -.750 -.580 -.502 -.399 -.305 -.192 -.120 -.010 | $\begin{array}{r} 0.289 \\ .142 \\ .120 \\ .060 \\ . .0009 \\ -.023 \\ -.063 \\ -.080 \\ -.090 \\ -.1102 \\ -.091 \\ =.059 \\ -.012 \\ .039 \end{array}$ | -.38 0.35 .245 .115 .118 .075 .049 . .008 $=.028$ $=.041$ -.008 -.050 -.027 .010 .047 | -.471 0.320 .299 .223 .187 .146 .151 .044 .044 .022 .044 -.020 -.019 -.019 .019 .043 | 0.479 <br> .365 .358 <br> .29 <br> .252 <br> $-200$ <br> $-125$ <br> .132 <br> - 277 <br> .529 <br> .735 |
| $0.555 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 56.5 \\ 61.5 \\ 31.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ |  |  | -0.309 -1.321 -1.340 -1.318 -1.269 -1.230 -1.091 -1.016 -.740 -.621 -.390 -.345 -.300 -.270 -.139 -.052 .028 | -0.747 -2.291 -1.297 -1.270 -1.285 -1.256 $-1.26 I$ -1.223 -1.193 -1.150 -1.024 -.960 -.710 -.479 -.253 -.145 -.040 | $\begin{array}{r} 0.320 \\ .169 \\ .150 \\ .079 \\ .050 \\ . .001 \\ -.016 \\ -.050 \\ -.062 \\ -.087 \\ -.083 \\ -.093 \\ -.090 \\ -.041 \\ -.002 \\ .049 \end{array}$ | -.100 0.1069 .246 .171 .178 .082 .060 .018 .001 -.020 -.036 -.051 -.000 -.010 .050 |  | $\begin{array}{r} -.450 \\ : 4=9 \\ .752 \\ .211 \\ .251 \\ .215 \\ .152 \\ .112 \\ .080 \\ .061 \\ .075 \\ .015 \\ .020 \\ .056 \\ .055 \end{array}$ |

TABLE VII.- CONTINUED.
(b) $\alpha_{L 1}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$. Concluded.

table vit.- continued.
(c) $a_{11}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| $\begin{aligned} & \text { Beana } \\ & \text { sempan } \\ & \text { sta, } \end{aligned}$ | Pereent | UPPER SUREICL |  |  |  | Lover surace |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.0 24.5 31.5 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  |  |  |  |  |  |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  | 0.506 .480 .439 .370 .368 .238 .191 .168 .130 .112 .0780 .050 .050 .05 .043 | $\begin{array}{r} -.471 \\ 0.778 \\ : 541 \\ : 480 \\ : 436 \\ : 344 \\ : 392 \\ : 259 \\ : 219 \\ : 196 \\ : 152 \\ : 016 \\ : 080 \\ .850 \end{array}$ |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  | 0.504 <br>  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |

TABLE VII. - CONCLUDED.
(c) $a_{1}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Sem1врал sta. | Percent ohord | UPPER SURFACE |  |  |  | LOHER BURTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.0 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ |  | $\begin{aligned} & -0.871 \\ & -.76 I \\ & -.759 \\ & =.745 \\ & -.750 \\ & -.730 \\ & -.730 \\ & -.711 \\ & -.708 \\ & =.680 \\ & -.668 \\ & -.665 \\ & -.640 \\ & -.629 \\ & =.599 \\ & -.559 \end{aligned}$ |  |  | $\begin{array}{r} . .452 \\ 0.452 \\ .418 \\ .341 \\ .308 \\ .239 \\ .206 \\ .151 \\ .1078 \\ .0791 \\ .012 \\ -.040 \\ \hline .070 \\ \hline .110 \\ \hline .181 \end{array}$ | $\begin{array}{r} -.407 \\ 0.464 \\ .450 \\ .388 \\ .350 \\ .281 \\ .249 \\ .183 \\ .159 \\ .1060 \\ .013 \\ -.061 \\ -.119 \\ -.173 \\ -.260 \end{array}$ |  |  |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.641 \\ -.665 \\ -.660 \\ -.641 \\ -.639 \\ -.615 \\ -.605 \\ -.576 \\ -.57 \\ =.548 \\ -.544 \\ =.521 \\ -.519 \\ -.483 \\ -.470 \\ -.419 \end{array}$ | $-0.761$ <br> $-.651$ <br> $-.622$ <br> -.606 -.600 <br> $-.580$ <br> -.560 -.560 <br> $-.560$ <br> $-: 549$ <br> -. 526 <br> -. 780 |  |  | $\begin{array}{r} -.435 \\ 0.399 \\ .388 \\ .310 \\ . .195 \\ .170 \\ .099 \\ .060 \\ . .010 \\ -.065 \\ -.121 \\ =.142 \\ =.159 \\ -.210 \end{array}$ | $\begin{array}{r} -.796 \\ .422 \\ .412 \\ .343 \\ -.230 \\ .188 \\ .126 \\ .081 \\ .021 \\ -.021 \\ -.071 \\ -.149 \\ -.189 \\ -.216 \\ -.274 \end{array}$ |  |  |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & -0.612 \\ & -.528 \\ & -.525 \\ & -.510 \\ & -.507 \\ & =.482 \\ & =.476 \\ & =.455 \\ & =.445 \\ & =.415 \\ & -.391 \\ & =.390 \\ & =.350 \\ & -.355 \\ & =.331 \\ & -.341 \end{aligned}$ |  |  |  | $\begin{array}{r} -.407 \\ 0.357 \\ .340 \\ .184 \\ .091 \\ .030 \\ -.020 \\ . .067 \\ =.100 \\ =.129 \\ =.149 \\ -.160 \\ =.164 \\ -.193 \end{array}$ | $\begin{array}{r} -.360 \\ 0.373 \\ .359 \\ .282 \\ .219 \\ .122 \\ .058 \\ -.001 \\ -.062 \\ -.104 \\ -.145 \\ -.270 \\ -.204 \\ -.219 \\ -.231 \\ -.260 \end{array}$ |  |  |


(a) $c_{u}, 0^{0}, 2^{0}, 2^{0}, 3^{0}$.

|  | ( Percent | UPPER SURFACE |  |  |  | LCTEA SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of ettack |  |  |  | Angle of attaok |  |  |  |
|  |  | $0^{\circ}$ | $\mathrm{I}^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  | $-0.072$ -.133 -.148 -.159 -. 1.169 -. 203 $-: 235$ -23 $=-234$ $=: 246$ $=239$ $=.240$ -242 $=242$ $=: 104$ $=: 047$ -.29 $-029$ |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |

TABLE VIII.- CONTINUED.
(a) $\alpha_{u}, 0^{\circ}, 1^{\circ}, 2^{0}, 3^{\circ}$ - Concluded.

| Sem1- <br> span sta. | Percent ohord | UPPER SUETACE |  |  |  | LOWER SURFAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1^{\circ}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.427 \\ & =.062 \\ & =.161 \\ & =.271 \\ & =.165 \\ & =.189 \\ & =.202 \\ & =.204 \\ & =.212 \\ & =.215 \\ & =.229 \\ & =.222 \\ & =.201 \\ & =.171 \\ & =.071 \\ & =.015 \\ & .060 \end{aligned}$ |  | 0.301 <br> $-.530$ <br> -. 408 <br> $-.409$ <br> $-.330$ <br> -. 337 <br> $-.318$ <br> -. 309 <br> $-.290$ <br> -. 288 <br> $-.291$ <br> $-.278$ <br> $-.241$ <br> $-.190$ <br> -. 098 <br> -. 026 <br> .057 | $\begin{aligned} & 0.150 \\ & =.828 \\ & =.530 \\ & =.531 \\ & =.409 \\ & =.411 \\ & =.378 \\ & =.361 \\ & =.345 \\ & =.321 \\ & =.324 \\ & =.308 \\ & =.260 \\ & =.200 \\ & =.098 \\ & =.082 \\ & .060 \end{aligned}$ | $\begin{array}{r} -0.072 \\ -.151 \\ =.162 \\ -.190 \\ -.193 \\ -.200 \\ -.809 \\ =.218 \\ =.218 \\ -.211 \\ -.211 \\ -.208 \\ =.173 \\ =.060 \\ =.010 \\ .067 \end{array}$ |  | $\begin{array}{r} 0.214 \\ .049 \\ .028 \\ -.036 \\ -.051 \\ -.085 \\ -.100 \\ =.120 \\ =.123 \\ =.132 \\ =.141 \\ -.149 \\ =.124 \\ =.059 \\ -.005 \\ .063 \end{array}$ | $\begin{array}{r} 0.301 \\ .121 \\ .097 \\ .027 \\ .001 \\ -.040 \\ =.059 \\ =.081 \\ =.091 \\ -.110 \\ -.120 \\ -.129 \\ =.115 \\ =.057 \\ -.010 \\ .057 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.406 \\ & =.065 \\ & =.163 \\ & =.166 \\ & =.170 \\ & =.186 \\ & =.199 \\ & =.207 \\ & =.209 \\ & =.215 \\ & =.223 \\ & -.192 \\ & =.149 \\ & =.050 \\ & .028 \\ & .078 \end{aligned}$ |  | $\begin{aligned} & 0.386 \\ & =.549 \\ & =.420 \\ & =.406 \\ & =.345 \\ & =.338 \\ & =.310 \\ & =.307 \\ & =.276 \\ & =.265 \\ & =.240 \\ & =.211 \\ & =.140 \\ & =.064 \\ & .003 \end{aligned}$ | $0.27^{\circ}$ <br> $-.844$ <br> $=.571$ $=.525$ <br> $-.429$ <br> $-.412$ <br> -.373 $=.352$ <br> -.317 -.295 <br> $-.280$ <br> -256 $=.219$ <br> $-.143$ <br> -.064 .003 .084 | $\begin{array}{r} -0.077 \\ -.165 \\ =.167 \\ =.181 \\ =.193 \\ =.200 \\ =.207 \\ =.217 \\ =.219 \\ =.211 \\ =.203 \\ =.183 \\ =.151 \\ -.038 \\ .015 \\ .056 \end{array}$ |  | .0 .218 .037 .029 -.032 -.090 $=.102$ $=.131$ $=.142$ $=.150$ $=.158$ $=.119$ -.048 .010 .076 | $\begin{array}{r} -0.307 \\ .217 \\ .102 \\ .030 \\ =.043 \\ =.057 \\ =.097 \\ =.112 \\ =.131 \\ =.142 \\ =.132 \\ =.112 \\ =.047 \\ .005 \\ .067 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.425 \\ & =.018 \\ & =.183 \\ & =.197 \\ & =.199 \\ & =.220 \\ & =.219 \\ & =.207 \\ & =.193 \\ & =.180 \\ & -.191 \\ & =.180 \\ & =.155 \\ & =.080 \\ & -.022 \\ & .030 \\ & .083 \end{aligned}$ |  | $\begin{aligned} & 0.379 \\ & -.525 \\ & =.438 \\ & =.433 \\ & =.360 \\ & =.344 \\ & =.282 \\ & =.239 \\ & =.2127 \\ & -.220 \\ & =.198 \\ & =.162 \\ & -.099 \\ & =.026 \\ & .030 \\ & .089 \end{aligned}$ | $\begin{array}{r} -0.056 \\ -.891 \\ -.627 \\ =.584 \\ . .433 \\ . .383 \\ -.318 \\ =.278 \\ . .252 \\ =.232 \\ . .233 \\ . .209 \\ -.170 \\ =.101 \\ =.030 \\ .027 \\ . .079 \end{array}$ | $\begin{array}{r} -0.100 \\ -.172 \\ =.178 \\ =.200 \\ =.221 \\ =.225 \\ =.214 \\ =.201 \\ =.187 \\ =.180 \\ =.170 \\ =.160 \\ =.097 \\ =.012 \\ .034 \\ .095 \end{array}$ |  | $\begin{array}{r} -.199 \\ .032 \\ .022 \\ -.051 \\ =.093 \\ =.140 \\ =.153 \\ =.158 \\ =.150 \\ -.153 \\ =.148 \\ =.138 \\ =.092 \\ =.003 \\ .025 \\ .081 \end{array}$ | $\begin{array}{r} -.077 \\ 0.107 \\ .096 \\ .006 \\ -.036 \\ =.163 \\ =.130 \\ =.137 \\ =.139 \\ -.147 \\ =.144 \\ =.137 \\ =.090 \\ =.029 \\ .018 \\ .070 \end{array}$ |

table vili.- CONTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| $\begin{aligned} & \text { semi- } \\ & \text { span } \\ & p a n \end{aligned}$ete. | Percent chord | UPPER surimag |  |  |  | LOYER SURFAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angie of attack |  |  |  |
|  |  | 6 | $8^{\circ}$ | $10^{\circ}$ | $12^{\circ}$ | 6 | $8^{\circ}$ | $10^{\circ}$ | $12^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.360 | 0.213 | 0.067 | -0.081 |  |  |  |  |
|  | 1.5 | -. 598 | -. 912 | -1.269 | -1.342 | 0.414 | 0.494 | 0.559 |  |
|  | 6:5 | -. 3 ¢22 | -: -140 | -: 221 | -:.734 | -264 | . 34 | - 375 | :449 |
|  | 11.0 | -.293 | -. 387 | -. 462 | -. 550 | . 173 | . 247 | - 313 | . 372 |
|  | $\frac{14}{21.5}$ | - 306 | -. 397 | -. 4.459 | -. -.550 | . 1140 | . 2172 | . 279 | : 377 |
|  | 24.5 | -. 316 | -. 397 | -. 46 | -:.544 | :088 | . 145 | . 205 | :257 |
|  | 31.0 | -. 318 | -. 3 , | - 0.471 | --540 | .055 | . 110 | . 167 | . 215 |
|  | 34.5 | -. 363 | -: 478 | -. 5 564 | -:603 | .006 | .886 | . 1140 | . 187 |
|  | 41.5 | -: 410 | -. 498 | - 795 | -.668 | --142 | - | - |  |
|  | 51.8 | -. 317 | -. 512 | -. 6000 | -. -667 | -. -.042 | . 087 | . 05 | . 0976 |
|  | 73. | -. 279 | -. 3 36 | -- 380 | -:400 | -. 045 | 0 | :037 | -059 |
|  | 79.5 91.6 | -. 1778 | - 2068 | -. 227 -.100 | - -.253 | -. 018 | .018 | :043 | -0.07 |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | . 5 | -. 970 | -2.139 | - 0.3190 | -0.494 | 0.465 | 0.506 | $0.52 \overline{3}$ | 0.522 |
|  | 5.5 | -. 455 | -. 803 | -1.152 | - |  | - 350 | . 4180 | .483 |
|  | ${ }_{13} 6$ | -: 4 415 | -. 7502 | -1.068 | -1.350 | . 2172 | - 312 | . 380 | . 3472 |
|  | $\frac{14.5}{14.5}$ | -. 4105 | -: 5 52 | -. 721 | -1.160 | -130 | . 198 | - 265 | - 327 |
|  |  | -=. 493 | --.500 | -: 817 | -. -695 | .086 | -153 | . 112 | . 240 |
|  | 31.0 | -. 398 | -. 500 | -. 580 | -:620 | -034 | :085 | . 140 | . 191 |
|  | 34.5 | -.4.450 | -. 5.55 | -. 6.649 | -. 575 | -.002 | :026 | . 1115 | . 129 |
|  | 44.5 | -. 458 | -. 570 | -. 670 | -.750 | -.039 | :018 | :063 | . 110 |
|  | 51.6 | -. 427 | -. 510 | -. 548 | -. 714 | -. 0 -065 | -. 017 | -035 | -075 |
|  | 73.5 | -: 23 | -. 265 | -. 265 | -. 295 | -. 0.03 | -:002 | -023 | :045 |
|  | 79.5 | -:. 2213 | -:. 152 | -. 1639 | -. -219 | .039 | :020 | .037 | :043 |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | -1.273 | -0.390 | - 0.613 | -1.419 | 0.38 | - 0.44 | 0.484 |  |
|  | 5.5 | -. 655 | -1.059 | - 1.240 | -1.334 | . 248 | - 322 | . 255 | . 438 |
|  | 6.5 | -. 645 | -1.093 | - -1.332 | - 1.300 -1.34 | . 2167 | :297 | - 351 | . 443 |
|  | $\frac{14.5}{24}$ | -:562 | -:767 | -1. 127 | -1. 385 | .120 | - 188 | :251 | - 310 |
|  | 21.6 24.5 | -. 531 | -. 7861 | -1.090 | -1.370 | . 977 | - 1140 | . 170 | . 251 |
|  | <1.0 | -. 485 | -. 544 | -. 293 | -1.220 | :008 | :070 | . 126 | . 270 |
|  | 34.5 | - 45 | -. 610 | -. 85 | -1.140 | -. 017 | . 050 | . 191 | . 145 |
|  | 44.5 | -:439 | -:499 | -. 75 | - 990 | - $\because 045$ | : 010 | :774 | :1095 |
|  | 51.0 | -. 372 | -. 425 | -. 440 | -.709 | -. 062 | -. 015 | . 025 | . 056 |
|  | 71.6 | -. 2878 | -. 320 | -. 33 | -. 524 | -:031 | $\because: 002$ | :017 | .038 |
|  | 79 | -. 0821 | -. 0.105 | -. 1235 | -. 5 K18 | :015 | :023 | :030 | :028 |
| $0.555 \mathrm{~b} / 2$ | 0 | -0.179 |  |  |  |  |  |  |  |
|  | 1.5 | -1.411 | -1.353 | - 1.373 | -1.156 | 0.455 | 0.450 | 0.474 |  |
|  | 5.5 | 1:069 | -1.306 | -1. ${ }^{1}$. 38 | -1.145 | .245 | -326 | - 397 | . 433 |
|  | 11.0 | -. 740 | -1.288 | -1.080 | -1.110 | . 164 | -242 | :299 | . 347 |
|  |  | -. 634 | -1.235 | - -1.380 | -1.072 | -133 | $\cdot \underline{204}$ | . 2600 | - 307 |
|  | 24.5 | -.535 | -1.001 | -1.209 | -1:016 | .060 | :131 | .170 | . 110 |
|  | 37.0 | -. 4.456 | -. 75 | -1.149 | -. 9830 | -019 | . 075 | ${ }^{1} 122$ | . 158 |
|  | 41.0 | -:4P9 | - 4 4 4 | -1.968 | - | -. 020 | :057 | . 069 | -1099 |
|  | 44.5 | --398 | -- 382 | -. 8127 | =-860 | -. 030 | -015 | - 051 | -075 |
|  | 59.5 | -. 239 | -:230 | -. 5.57 | -. 762 | -.056 | -:024 | -003 | 0 |
|  | 71.0 | -. 140 | -. 147 | -. 242 | - 690 | -.ceso | -. 002 | . 002 | . 013 |
|  | 91.8 | -.033 | -. 023 | -. $=.065$ | -.50\% | :049 | :040 | .012 | -:060 |

TABLE VIII.- CONCLUDED.
(b)* $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Semispan cta. | Percent chord | UPPER SURFACE |  |  |  | LOFER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle or attack |  |  |  |
|  |  | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $12^{0}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ | $12^{0}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.0 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ | $\begin{array}{r} -0.334 \\ -1.249 \\ -1.205 \\ -1.200 \\ -1.003 \\ -.901 \\ -.700 \\ -.611 \\ -.481 \\ -.439 \\ -.377 \\ -.346 \\ -.289 \\ =.211 \\ -.110 \\ -.038 \\ .046 \end{array}$ | $\begin{aligned} & -0.601 \\ & -1.150 \\ & -1.163 \\ & -1.120 \\ & -1.128 \\ & -1.077 \\ & -1.064 \\ & -1.021 \\ & -.963 \\ & -.918 \\ & -.807 \\ & -.771 \\ & -.621 \\ & -.490 \\ & -.249 \\ & -.167 \\ & -.011 \end{aligned}$ | $\begin{array}{r} -0.818 \\ -.983 \\ -.990 \\ -.952 \\ -.947 \\ -.891 \\ -.880 \\ -.832 \\ =.820 \\ -.781 \\ -.766 \\ =.731 \\ =.721 \\ =.655 \\ =.597 \\ =.532 \\ -.425 \end{array}$ | $\begin{aligned} & -0.907 \\ & =.825 \\ & -.820 \\ & -.798 \\ & -.797 \\ & -.773 \\ & -.765 \\ & -.749 \\ & -.739 \\ & -.717 \\ & -.704 \\ & -.681 \\ & -.670 \\ & -.630 \\ & -.607 \\ & -.567 \\ & -.524 \end{aligned}$ | $\begin{array}{r} 0.431 \\ .285 \\ .260 \\ .177 \\ .144 \\ .090 \\ .070 \\ .023 \\ .010 \\ .021 \\ . .040 \\ =.060 \\ . .070 \\ =.035 \\ -.001 \\ .050 \end{array}$ |  | $0.4 \overrightarrow{56}$ .398 . 297 <br> .260 .198 <br> .160 .119 .094 <br> .094 .052 <br> .028 -.007 <br> $-.045$ <br> $-.048$ <br> -.058 -.083 <br> $-.083$ | 0.448 .424 <br> .403 <br> .330 <br> .223 <br> .192 <br> .112 <br> .067 <br> .038 <br> $=.007$ $=.063$ <br> $-.192$ <br> -.136 -.208 <br> $-.208$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.159 \\ -1.110 \\ -1.117 \\ -1.057 \\ -1.013 \\ -.960 \\ -.815 \\ -.743 \\ -.570 \\ -.506 \\ -.357 \\ -.324 \\ =.240 \\ =.165 \\ -.079 \\ -.021 \\ . .049 \end{array}$ | $\begin{array}{r} -0.345 \\ -.810 \\ -.810 \\ -.785 \\ -.776 \\ =.743 \\ -.722 \\ -.689 \\ -.670 \\ -.630 \\ =.615 \\ =.579 \\ =.559 \\ =.492 \\ =.430 \\ -.368 \\ -.277 \end{array}$ | $\begin{array}{r} -0.485 \\ -.675 \\ -.680 \\ =.660 \\ -.659 \\ -.635 \\ -.622 \\ -.594 \\ -.581 \\ -.557 \\ -.550 \\ =.527 \\ =.520 \\ =.487 \\ -.475 \\ -.418 \end{array}$ | $\begin{array}{r} -0.614 \\ =.653 \\ -.650 \\ -.634 \\ -.634 \\ =.609 \\ -.580 \\ -.569 \\ -.548 \\ -.545 \\ -.525 \\ -.521 \\ -.495 \\ -.488 \\ -.467 \\ -.446 \end{array}$ | $\begin{array}{r} 0.424 \\ .267 \\ .027 \\ .169 \\ .072 \\ .051 \\ -.002 \\ =.029 \\ -.062 \\ -.081 \\ -.092 \\ =.095 \\ =.042 \\ .049 \end{array}$ | $0.4 \overline{4} 6$ <br> .325 .315 .230 <br> . .2 <br> .1093 .040 <br> .008 <br> $-.027$ <br> $=.060$ -.074 <br> -. 090 <br> $-.110$ <br> $=.040$ -.048 <br> $-.048$ | $\begin{array}{r} 0.447 \\ .370 \\ .360 \\ .378 \\ .170 \\ .140 \\ .080 \\ .043 \\ =.005 \\ -.037 \\ -.064 \\ =.108 \\ =.110 \\ =.125 \\ =.172 \end{array}$ | $\begin{array}{r} . .430 \\ .390 \\ .380 \\ .301 \\ .189 \\ .154 \\ .090 \\ .050 \\ -.004 \\ -.044 \\ =.083 \\ =.146 \\ =.170 \\ -.187 \\ -.235 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 44.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.601 \\ -.854 \\ -.843 \\ -.801 \\ =.778 \\ -.720 \\ -.695 \\ =.628 \\ -.571 \\ =.504 \\ -.425 \\ -.380 \\ -.308 \\ -.250 \\ -.158 \\ . .150 \\ -.077 \end{array}$ | $\begin{array}{r} -0.693 \\ -.639 \\ -.645 \\ -.625 \\ =.633 \\ =.580 \\ =.564 \\ =.530 \\ =.505 \\ =.472 \\ =.453 \\ =.418 \\ =.406 \\ -.355 \\ =.338 \\ -.305 \\ -.303 \end{array}$ | $\begin{array}{r} -0.670 \\ =.549 \\ -.550 \\ =.530 \\ =.527 \\ =.503 \\ =.495 \\ =.474 \\ =.460 \\ =.440 \\ -.430 \\ =.400 \\ =.355 \\ =.348 \\ =.317 \\ =.330 \end{array}$ | $\begin{array}{r} -0.616 \\ -.528 \\ -.523 \\ -.511 \\ -.506 \\ -.487 \\ -.481 \\ -.462 \\ =.459 \\ -.435 \\ -.410 \\ -.410 \\ -.379 \\ -.382 \\ -.362 \\ -.365 \end{array}$ | 0.402 <br> .255 <br> .240 <br> .136 <br> $-.013$ <br> $-.063$ <br> $-.090$ <br> -.107 -.120 <br> $-.125$ <br> $-.122$ <br> $-.085$ <br> -.040 -.007 <br> .030 |  | $\begin{aligned} & -.420 \\ & .339 \\ & .322 \\ & .228 \\ & .162 \\ & .073 \\ & .013 \\ & =.033 \\ & =.077 \\ & =.104 \\ & -.131 \\ & =.143 \\ & =.152 \\ & =.141 \\ & -.144 \\ & -.168 \end{aligned}$ | .40 .442 .332 .243 .175 .065 .017 $=.039$ $=.086$ $=.125$ $=.154$ $=.171$ -.190 $=.198$ -.221 |


(d) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$.

| Serilapan eta. | Percent chord | UPPEA SURTAOE |  |  |  | LCIER SURFAGE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | magle of nttack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{0}$ | $1{ }^{0}$ | $2^{0}$ | $3^{\circ}$ | $0^{0}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{0}$ |
| $0.056 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 105 \\ 5.5 \\ 5.5 \\ 11: 0 \\ 14.0 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.0 \\ 51.5 \\ 79.0 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ |  | 0.550 .015 -.032 -.080 -.075 -.105 -.118 $=.135$ -.145 -.182 -.214 -.240 -.254 $=.240$ $=.197$ -.117 -.036 |  |  | -.069 0.007 -.020 -.039 $=.061$ -.078 -.099 -.122 -.150 -.173 -.208 -.220 -.185 -.109 -.029 | -.740 0.055 .022 -.005 -.027 -.046 -.070 $=.094$ -.120 -.145 -.180 -.198 $=.166$ -.093 -.023 | -.006 0.206 .1070 .035 .011 -.011 $=.085$ $=.060$ $=.089$ -.112 -.154 $=.170$ -.139 -.078 -.016 | .--72 0.261 .1409 .070 .045 .0199 -.004 $=.037$ -.081 -.81 -.126 -.146 -.1067 -.0611 |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  | $\begin{aligned} & 0.464 \\ & =.072 \\ & =.106 \\ & =.129 \\ & =.152 \\ & =.173 \\ & =.192 \\ & =.203 \\ & =.2282 \\ & =.2626 \\ & =.261 \\ & =.235 \\ & =.179 \\ & =.081 \end{aligned}$ | 0.433 -.200 $=.175$ $=.193$ $=.187$ -.203 $=.217$ $=.234$ $=.246$ -.270 $=.301$ $=.314$ -.296 $=.266$ -.179 -.090 .001 | 0.373 -.347 $=.250$ $=.264$ -.246 $=.253$ -.262 -.279 -.285 $=.310$ $=.340$ $=.351$ -.350 $=.289$ $=.199$ $=$. | $\begin{array}{r} 0.074 \\ -.048 \\ -.070 \\ =.090 \\ -.1112 \\ =.132 \\ -.151 \\ -.206 \\ -.200 \\ -.224 \\ -.242 \\ -.1170 \\ -.068 \\ -.012 \end{array}$ | -.174 0.015 -.013 -.045 $=.072$ -.094 $=.116$ -.148 $=.270$ -.190 $=.217$ -.217 $=.189$ -.063 -.013 | -.079 0.259 .045 .042 -.029 -.059 -.085 -.110 -.132 -.151 -.162 -.185 -.159 -.110 -.052 .018 |  |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.5 59.5 71.6 79.5 91.0 | 0.437 $=.0029$ $=.110$ $=.137$ $=.155$ $=.190$ $=.203$ -.214 -.220 -.247 $=.250$ $=.229$ $=.097$ $=.029$ $=.041$ |  |  | $\begin{aligned} & 0.266 \\ & =.5661 \\ & =.395 \\ & =.398 \\ & =-.3698 \\ & =.546 \\ & =.3449 \\ & =.355 \\ & =.350 \\ & =-.367 \\ & =.320 \\ & =.363 \\ & =.160 \\ & =.075 \\ & . .923 \end{aligned}$ | $\begin{array}{r} -0.056 \\ -.120 \\ -.132 \\ -.155 \\ =.172 \\ -.191 \\ -.202 \\ -.230 \\ -.241 \\ -.236 \\ . .279 \\ -.240 \\ . .196 \\ -.092 \\ -.074 \\ .043 \end{array}$ |  |  | 0.224 0.087 .006 .014 $=.018$ $=.054$ $=.067$ $=.132$ $=.120$ -.127 $=.238$ $=.153$ $=.119$ $=.071$ -.015 .044 |
| $0.555 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.0 24.5 31.5 34.5 41.0 44.5 51.0 59.5 79.0 79.5 91.0 |  |  |  | $\begin{aligned} & 0.260 \\ & =.573 \\ & =.494 \\ & =.498 \\ & -.405 \\ & =.405 \\ & -.389 \\ & =.378 \\ & -.358 \\ & =.359 \\ & =.355 \\ & =.359 \\ & =.320 \\ & =.128 \\ & -.041 \\ & .049 \end{aligned}$ | $\begin{array}{r} -0.077 \\ -.133 \\ -.150 \\ -.175 \\ -.165 \\ -.200 \\ -.210 \\ -.222 \\ -.230 \\ -.220 \\ -.215 \\ -.203 \\ -.179 \\ -.070 \\ -.012 \\ .066 \end{array}$ | 0.050 -.052 $=.070$ $=.114$ $=.129$ $=.153$ $=.168$ -.192 -.193 $=.191$ $=.154$ $=.080$ -.020 .060 |  | $\begin{array}{r} 0.248 \\ .101 \\ .079 \\ .017 \\ -.010 \\ =.067 \\ =.097 \\ =.119 \\ -.120 \\ =.124 \\ =.130 \\ -.116 \\ -.058 \\ -.012 \\ .053 \end{array}$ |

TABLE IX. - CONTINUED.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{0}, 3^{\circ}$ - Concluded.

| Semi--pan eta. | Percent chord | UPPER SURTACE |  |  |  | LOWSR SUREAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1^{\circ}$ | $2^{\mathbf{o}}$ | $3^{6}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & 0.432 \\ & =.055 \\ & =.156 \\ & -.160 \\ & =.160 \\ & =.180 \\ & =.199 \\ & =.200 \\ & =.209 \\ & =.225 \\ & =.220 \\ & -.195 \\ & =.1760 \\ & =.060 \\ & .077 \end{aligned}$ | 0.406 -.271 -.286 -.290 -.251 $=.270$ -.276 $=.265$ -.267 -.270 $=.268$ $=.239$ $=.200$ $=.080$ -.018 .067 | $\begin{aligned} & 0.310 \\ & =.340 \\ & =.419 \\ & =.421 \\ & =.345 \\ & =.349 \\ & =.330 \\ & =.321 \\ & =.310 \\ & =.303 \\ & =.300 \\ & =.286 \\ & =.250 \\ & =.193 \\ & =.092 \\ & =.018 \\ & .067 \end{aligned}$ | 0.161 <br> -.853 -.574 <br> $-.554$ <br> $=.434$ $=.423$ <br> $-.394$ <br> $=.363$ -.368 <br> -.353 $=.340$ <br> -. 320 <br> $=.269$ -.199 <br> -. 092 <br> -.020 .068 | $\begin{array}{r} -0.065 \\ -.144 \\ -.156 \\ =.185 \\ =.196 \\ -.195 \\ -.203 \\ . .209 \\ -.209 \\ . .205 \\ -.205 \\ -.200 \\ =.178 \\ -.053 \\ .007 \\ .080 \end{array}$ | 0.090 <br> $-.050$ <br> . .065 <br> $=.115$ $=.125$ <br> $-.150$ <br> $=.161$ <br> $-.179$ <br> -.181 -.189 <br> $-.187$ <br> -159 -.069 <br> $-.002$ <br> .071 | $\begin{array}{r} . .013 \\ 0.045 \\ .027 \\ =.038 \\ =.053 \\ =.090 \\ =.103 \\ =.125 \\ =.186 \\ =.137 \\ =.149 \\ =.152 \\ =.130 \\ =.060 \\ =.001 \\ .070 \end{array}$ | 0.300 <br> .120 <br> .021 <br> $-.041$ <br> $-.060$ <br> -. 085 <br> $-.091$ <br> $-.112$ <br> $-124$ <br> $-.122$ <br> -.058 -.005 .060 |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.8 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.413 \\ & =.060 \\ & =.162 \\ & =.164 \\ & =.170 \\ & =.182 \\ & =.201 \\ & =.210 \\ & =.212 \\ & =.217 \\ & =.222 \\ & =.209 \\ & =.189 \\ & =.140 \\ & -.038 \\ & .054 \\ & .090 \end{aligned}$ | $\begin{aligned} & 0.447 \\ & -.279 \\ & =.287 \\ & =.280 \\ & -.255 \\ & =.261 \\ & -.262 \\ & =.260 \\ & =.251 \\ & =.250 \\ & =.240 \\ & =.229 \\ & =.210 \\ & =.132 \\ & -.048 \\ & .016 \\ & .090 \end{aligned}$ | $\begin{aligned} & 0.390 \\ & =.361 \\ & =.437 \\ & =.422 \\ & =.360 \\ & =.350 \\ & =.329 \\ & =.390 \\ & =.284 \\ & =.265 \\ & =.245 \\ & =.214 \\ & =.137 \\ & =.060 \\ & .010 \\ & .090 \end{aligned}$ | $\begin{aligned} & 0.279 \\ & -.872 \\ & =.616 \\ & =.570 \\ & =.441 \\ & =.433 \\ & =.385 \\ & =.378 \\ & =.337 \\ & =.380 \\ & =.255 \\ & =.280 \\ & =.140 \\ & =.058 \\ & .012 \\ & .087 \end{aligned}$ | $\begin{array}{r} -0.070 \\ -.162 \\ =.262 \\ -.181 \\ -.200 \\ -.205 \\ =.218 \\ =.220 \\ -.211 \\ -.200 \\ . .180 \\ . .143 \\ -.025 \\ .030 \\ .098 \end{array}$ | 0.094 <br> .051 -.059 <br> -.059 -.101 <br> $-2.148$ <br> $-.151$ <br> $-.175$ <br> -.185 -.187 <br> $-.285$ <br> -.164 -.130 <br> $-.032$ <br> .030 .092 | $\begin{array}{r} 0.221 \\ .037 \\ .030 \\ -.030 \\ -.093 \\ -.103 \\ =.139 \\ -.150 \\ -.160 \\ =.165 \\ -.150 \\ -.115 \\ -.040 \\ .020 \\ .085 \end{array}$ | $\begin{array}{r} 0.307 \\ .110 \\ .101 \\ .030 \\ =.045 \\ =.060 \\ =.103 \\ =.123 \\ =.140 \\ =.153 \\ =.141 \\ =.055 \\ .010 \\ .075 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.434 \\ & =.006 \\ & =.179 \\ & =.192 \\ & =.197 \\ & =.223 \\ & =.223 \\ & =.204 \\ & =.191 \\ & =.187 \\ & =.173 \\ & =.1461 \\ & =.0699 \\ & .043 \\ & .099 \end{aligned}$ | $\begin{aligned} & 0.352 \\ & =.236 \\ & =.303 \\ & =.312 \\ & =.279 \\ & =.295 \\ & =.260 \\ & =.230 \\ & =.214 \\ & =.195 \\ & =.201 \\ & =.186 \\ & =.349 \\ & =.077 \\ & =.013 \\ & .046 \\ & .102 \end{aligned}$ | 0.183 <br> $-.545$ <br> $-.460$ <br> $-.454$ <br> $-.383$ <br> $-.380$ <br> $-.303$ <br> $-.236$ <br> $-.230$ <br> $-.217$ <br> $-.224$ <br> $-.200$ <br> -. 160 <br> $-.090$ <br> -. 018 <br> .042 <br> .098 | -0.037 -.927 $=.658$ -.635 -.460 $=.453$ $=.297$ -.278 $=.256$ $=.236$ $=.237$ $=.172$ $=.100$ -.025 .031 .085 | -.097 0.171 .179 -.200 $=.225$ $=.230$ $=.194$ $=.182$ $=.176$ $=.265$ $=.151$ $=.072$ .003 .049 .111 | $\begin{aligned} & =.077 \\ & 0.078 \\ & =.068 \\ & =.120 \\ & =.157 \\ & =.189 \\ & =.189 \\ & =.178 \\ & =.165 \\ & =.152 \\ & =.140 \\ & =.095 \\ & .001 \\ & .042 \\ & .101 \end{aligned}$ | $\begin{array}{r} -.207 \\ 0.075 \\ .054 \\ . .010 \\ =.095 \\ =.150 \\ =.167 \\ =.165 \\ =.160 \\ =.160 \\ =.155 \\ -.142 \\ =.097 \\ -.005 \\ .030 \\ .090 \end{array}$ | $\begin{array}{r} 0.290 \\ .107 \\ .097 \\ .0049 \\ =.048 \\ =.113 \\ =.146 \\ =.146 \\ =.149 \\ =.148 \\ =.140 \\ =.090 \\ -.025 \\ .020 \\ .076 \end{array}$ |

thele ix.- contikued.
(b) $a_{1}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Serispan ata. | Percent chord | UPPER SURFAGE |  |  |  | LOWER SURTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attaok |  |  |  | Angle or attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{6}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.452 $=.309$ $=.210$ $=.297$ $=.280$ $=.221$ $=.237$ $=.239$ $=.288$ $=.318$ $=.360$ $=.335$ $=.260$ $=.163$ $=.062$ | 0.385 -.560 <br> $=.291$ <br> $=.278$ $=-296$ <br> -. 269 -.310 <br> $-.309$ <br> $=.369$ <br> $=.423$ $=.450$ <br> $-.425$ <br> -.195 -.078 |  | $\begin{array}{r} 0.120 \\ -1.220 \\ =.493 \\ =.503 \\ -.460 \\ =.472 \\ =.453 \\ =.453 \\ =.510 \\ =.550 \\ =.584 \\ =.601 \\ -.617 \\ =.602 \\ =.295 \\ -.123 \end{array}$ | $\begin{array}{r} -. \\ 0.318 \\ .180 \\ .150 \\ .109 \\ .080 \\ .051 \\ .028 \\ -.002 \\ -.030 \\ -.054 \\ -.101 \\ -.120 \\ -.100 \\ =.050 \\ -.007 \end{array}$ | $0.42 \overline{16}$ <br> .266 .230 <br> .250 <br> .150 <br> .089 .059 <br> .059 <br> .03 <br> $-.076$ <br> $-.069$ <br> $=.052$ $=.019$ <br> .009 |  | $\begin{array}{r} 0.560 \\ .577 \\ .374 \\ .280 \\ .230 \\ .201 \\ .166 \\ .136 \\ .051 \\ .049 \\ .035 \\ .006 \\ .031 \\ .050 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 5.5 11.0 14.5 21.0 21.5 31.0 34.5 41.0 41.5 51.0 59.5 71.0 79.5 91.0 | 0.295 -.510 <br> - $=328$ <br> -. 339 -.293 <br> -.255 $=.305$ <br> -. 321 =. 319 <br> - 353 <br> $=.398$ $=-370$ <br> $=-306$ $=-523$ <br> $=.225$ $=-1222$ -.012 | 0.106 $=.872$ -.455 $=.478$ $=.4187$ $=.410$ $=.393$ $=.418$ $=.470$ $=.470$ $=.484$ $=.390$ $=.854$ $=.139$ -.056 | -0.083 -1.167 $=.746$ $=.860$ $=.720$ $=.497$ $=.590$ $=.512$ $=.527$ $=.570$ $=.800$ $=.606$ $=.573$ -.291 $=.160$ -.030 | $\begin{aligned} & -0.245 \\ & -1.296 \\ & -1.078 \\ & -.975 \\ & -.780 \\ & -.680 \\ & =.550 \\ & -.588 \\ & =.773 \\ & =.607 \\ & -.639 \\ & =.675 \\ & =.673 \\ & =.760 \\ & -.362 \\ & =.166 \\ & -.050 \end{aligned}$ | $\begin{array}{r} 0.357 \\ .175 \\ .136 \\ .084 \\ .049 \\ .012 \\ -.006 \\ =.043 \\ -.069 \\ -.093 \\ =.105 \\ =.129 \\ -.015 \\ -.087 \\ -.017 \end{array}$ | $\begin{array}{r} 0.465 \\ .270 \\ .225 \\ .165 \\ .1285 \\ .0660 \\ .017 \\ =.012 \\ =.039 \\ =.050 \\ =.078 \\ =.069 \\ =.047 \\ -.012 \end{array}$ | -.57 0.551 .307 .240 .197 .150 .125 .080 .050 .000 .020 $=.022$ -.010 .010 .040 | $\begin{array}{r} 0.535 \\ .380 \\ .310 \\ .365 \\ .211 \\ .1186 \\ .110 \\ .050 \\ .060 \\ .028 \\ .0000 \\ .014 \\ .0088 \\ .040 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.6 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  | $\begin{aligned} & -0.100 \\ & -1.204 \\ & -.825 \\ & -.560 \\ & =.600 \\ & =.572 \\ & =.532 \\ & =.545 \\ & =.555 \\ & =.550 \\ & =.571 \\ & =.522 \\ & =.410 \\ & =.300 \\ & =.175 \\ & =.020 \end{aligned}$ |  | -0.524 -1.322 -1.180 -1.300 -1.093 -1.050 -1.020 -.950 -.915 -.861 -.845 -.820 -.770 $=.355$ -.237 -.270 -.050 | $\begin{array}{r} 0.287 \\ .142 \\ .117 \\ .060 \\ .029 \\ -.010 \\ -.030 \\ -.070 \\ =.087 \\ -.099 \\ =.115 \\ -.128 \\ -.100 \\ -.067 \\ -.012 \end{array}$ | $\begin{array}{r} 0.382 \\ .540 \\ -210 \\ -.148 \\ .110 \\ .069 \\ -.043 \\ =.020 \\ =.040 \\ =.055 \\ -.073 \\ =.062 \\ -.033 \\ .006 \\ .042 \end{array}$ | -.17 0.443 .315 .290 .220 .182 .132 .165 .060 .040 .015 -.002 $=.030$ -.030 -.011 .012 .039 | $\begin{array}{r} 0.485 \\ .378 \\ .355 \\ .248 \\ .192 \\ .185 \\ .117 \\ .096 \\ .045 \\ .014 \\ .003 \\ .007 \\ .020 \\ .033 \end{array}$ |
| $0.555 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 24.5 \\ 41.0 \\ 44.5 \\ 51.5 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ |  | $\begin{aligned} & -0.122 \\ & -1.452 \\ & -1.263 \\ & -1.258 \\ & -.713 \\ & -.637 \\ & -.647 \\ & -.623 \\ & -.556 \\ & =.574 \\ & -.437 \\ & -.347 \\ & -.340 \\ & =.232 \\ & -.133 \\ & -.050 \\ & .034 \end{aligned}$ |  | -0.554 -1.395 -1.400 -1.380 -1.380 -1.320 -1.277 -1.219 -1.158 -1.080 -.967 -.908 -.787 -.624 -.350 -.239 -.074 | $\begin{array}{r} -.310 \\ 0.160 \\ .139 \\ .0070 \\ . .099 \\ . .006 \\ =.061 \\ . .072 \\ .089 \\ . .094 \\ =.094 \\ . .099 \\ =.0000 \\ -.0079 \end{array}$ | $\begin{array}{r} -.396 \\ 0.252 \\ .230 \\ -158 \\ .1270 \\ .040 \\ .005 \\ -.010 \\ -.010 \\ -.043 \\ -.060 \\ -.068 \\ -.030 \\ .043 \end{array}$ | 0.449 <br> .329 <br> .307 .232 .157 <br> .197 .140 <br> .111 .067 .047 .019 .005 -.018 $=.034$ -.012 .008 .030 | $\begin{array}{r} -.879 \\ 0.478 \\ .366 \\ .396 \\ .256 \\ .198 \\ .168 \\ .119 \\ .096 \\ .067 \\ .049 \\ .019 \\ -.004 \\ .004 \\ .004 \end{array}$ |

TABLE IX. - CONTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Sem1span sta. | Percent chord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.007 | -0. 270 | -0. 524 | -0.740 |  |  |  |  |
|  | 1.5 | -1.175 | -1.517 | -1.631 | -1.100 | 0.360 | 0.422 | 0.449 | 0.458 |
|  | 5.5 | -. 880 | -1.413 | -1.570 | -1.104 | . 181 | . 270 | . 340 | - 390 |
|  | 6.5 11.0 | -. 850 | -1.417 | -1.570 -1.500 | -1.069 | . 157 | . 247 | . 316 | -369 |
|  | 14.5 | -. 504 | -1.133 | -1.323 | -. .995 | . 051 | .133 | . 200 | . 254 |
|  | 21.0 | -. 463 | -. 582 | -1.151 | -. 968 | 0 | . 081 | . 142 | . 191 |
|  | 84.5 | - 45 | -. 490 | -1.115 | -. 918 | -. 017 | . 056 | . 112 | . 162 |
|  | 37.0 | -. 4.408 | -.429 $=.390$ | -. 950 | $=.875$ -.834 | -. 0.050 | ${ }^{-013}$ | . 050 | . 090 |
|  | 41.0 | -. 366 | -. 362 | -. 642 | -. 793 | -. 0.082 | -. 031 | .013 | . 049 |
|  | 44.5 | -. 343 | -. 340 | -. 616 | -. 750 | -. 0.09 | -. 050 | -. 008 | . 023 |
|  | 51.0 | -. 279 | -. 291 | -. 393 | -. 718 | -. 112 | -. 070 | -. 036 -.060 | -. 012 |
|  | 59.5 | -. 2000 | -.215 -.106 | -. 297 | -. 660 .590 | . .109 -.052 | -.080 -.040 | -. 0660 -.039 | . .050 -.053 |
|  | 79.5 | -. 010 | -. 208 | -. 082 | -. 529 | -. 010 | -. 010 | -. 018 | -. 065 |
|  | 91.0 | . 067 | . 053 | . 010 | -. 425 | . 052 | . 044 | . 022 | -. 093 |
| $0.831 \mathrm{~b} / 2$ | 0 | 0.142 | -0.125 | -0.360 | -0. 501 |  |  |  |  |
|  | 1.5 | -1.211 | -1.492 | -1.069 | -. 749 | 0.363 | 0.416 .260 | 0.432 | 0.439 |
|  | 5.5 | -. 945 | -1.394 | -1.036 | -. 725 | . 162 | .250 | . 318 | -352 |
|  | 11.0 | -. 536 | -1.281 | -1.010 | -. 719 | . 080 | . 160 | . 221 | . 270 |
|  | 14.5 | -. 495 | -1.067 | -. 920 | - -680 | - $-\frac{0}{4}$ | -070 | - 121 | - 263 |
|  | 27.0 | -.451 $=.430$ | -. 7440 | -. 884 -.822 | -. 672 | -.004 $=.023$ | . 076 | . 121 | . 163 |
|  | 31.0 | -. 363 | -. 371 | -:776 | -. -637 | -. 0.063 | -.007 | . 035 | . 071 |
|  | 34.5 | -. 322 | -. 346 | -. 736 | -. 598 | -.090 | -. 038 | .004 | . 036 |
|  | 41.0 | -. 282 | -. 305 | -. 695 | -. 596 | -. 214 | -. 070 | -. 037 | -. 012 |
|  | 44.5 | -. 259 | -. 280 | -. 657 | -. 579 | -. 130 | -. 296 | -. 067 | -. 048 |
|  | 51.0 | - 2220 | -. 235 | - 6097 | -. 569 | -.127 -.106 | -. 105 | -. 085 | . 079 |
|  | 79.5 | . .143 -.058 | -. 147 | -. 527 | -. 538 | -. 105 | -.105 -.047 | -.104 -.067 | -. 124 |
|  | 79.5 | . 010 | -. 003 | -. 333 | -. 4788 | . .006 | 0 | -. 031 | . 140 |
|  | 91.0 | . 080 | . 065 | -. 194 | -. 443 | . 063 | . 055 | -. 009 | . 187 |
| $0.924 \mathrm{~b} / 2$ |  | -0.247 | $=0.510$ -1.083 | -0.790 | -0.694 -.567 |  |  |  |  |
|  | $\frac{1}{5} \cdot 5$ | -1.173 -.936 | -1.083 -1.060 | $=.730$ -.735 | -.567 -.570 | 0.343 .165 | $\begin{array}{r}0.395 \\ .250 \\ \hline\end{array}$ | 0.411 .302 | 0.417 .34 |
|  | 6.5 | -. 968 | -1.960 | -. 7.75 | -. 575 | . 155 | . 240 | - 270 | -320 |
|  | 11.0 | -. 576 | -. 905 | -. 703 | -. 548 | . 055 | . 133 | -190 | . 225 |
|  | 14.5 | -. 490 | -. 828 | . .675 | -. 517 | -. 003 | . 275 | . 103 | . 160 |
|  | 21.6 | -. 343 | -. 750 | -. 657 | -. 512 | -. 085 | -. 017 | -. 030 | . 068 |
|  | 31.5 | -. 286 | -. 689 | -. 629 | -. 478 | -. 125 | -. 0107 | -. 030 $=.070$ | . 002 |
|  | 34.5 | -. 247 | -. 520 | -. 560 | -. 458 | -. 140 | -. 229 | -. 106 | ..090 |
|  | 41.0 | -. 244 | -. 415 | -. 540 | -. 450 | -. 1446 | $=.132$ | -. 125 | -. 120 |
|  | 54.6 | -. 2.283 | -. 382 | -=58 | -. 423 | -. 1136 | -. 139 | -. 140 -.140 | -. 146 |
|  | 59.5 | -. 212 | -. 230 | -. 429 | -. 380 | -. 087 | -. 089 | -. 114 | . .165 |
|  | 71.0 | -. 037 | -.135 -.140 | -.406 -.373 | -. 383 $=.358$ | -. 035 | -. 040 | -. 076 -.067 | .156 .160 |
|  | 91.0 | . 060 | -. 056 | -. 342 | -. 371 | . 064 | . 044 | -..079 | . 190 |

TABLE IX.- GGNIINUED.
(c) $a_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| $\begin{aligned} & \text { Seri- } \\ & \text { Bpani- } \\ & \text { sta. } \end{aligned}$ | Parcent ohora | UPPER SUAFACE |  |  |  | LOHER Streace |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angile of attack |  |  |  | Anfle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  | $-0.014$ -1.347 -.601 $=$. =. 530 $=: 555$ $=.535$ $=$. <br>  -. 657 - 655 $=-65$ <br>  $-.177$ |  |  |  | 0.615 <br>  |  |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  | 0.459 <br> .421 .405 .339 <br> .297 .231 .200 .149 .122 .084 .004 .029 -.015 <br> -.030 $=.053$ -.118 <br> -. 110 |  |  |  |

TABLE IX. - CONCLJDED.
(c) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Semispan sta. | Fercent ohord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $26^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 414.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & -0.862 \\ & -.847 \\ & -.837 \\ & -.812 \\ & -.810 \\ & -.785 \\ & -.780 \\ & -.761 \\ & -.754 \\ & -.739 \\ & -.709 \\ & -.699 \\ & -.657 \\ & -.630 \\ & -.593 \\ & -.538 \end{aligned}$ |  |  |  | $\begin{array}{r} -.147 \\ 0.417 \\ .415 \\ .318 \\ .381 \\ .212 \\ .181 \\ .129 \\ .101 \\ .051 \\ .024 \\ -.080 \\ -.080 \\ -.114 \\ =.160 \\ \hline .231 \end{array}$ |  |  |  |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11: 0 \\ 14: 0 \\ 21: 5 \\ 24: 5 \\ 31: 0 \\ 34: 5 \\ 41: 0 \\ 44: 5 \\ 51: 0 \\ 59 \\ \hline 1: 5 \\ 79.5 \\ 91: 8 \end{array}$ | $\begin{aligned} & -0.610 \\ & -.677 \\ & -.673 \\ & -.658 \\ & -.658 \\ & =.638 \\ & -.630 \\ & =.608 \\ & =.681 \\ & =.578 \\ & =.557 \\ & -.552 \\ & =.525 \\ & -.522 \\ & -.501 \end{aligned}$ |  |  |  |  |  |  |  |
| $0.924 \mathrm{~b} / 2$ | 0 3.5 5.5 61.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 | $\begin{aligned} & -0.641 \\ & -.552 \\ & -.547 \\ & -.533 \\ & -.555 \\ & -.512 \\ & -.505 \\ & -.483 \\ & -.480 \\ & =.460 \\ & . .456 \\ & . .436 \\ & . .436 \\ & . .420 \\ & =.406 \\ & -.402 \end{aligned}$ |  |  |  | $\begin{array}{r} -.395 \\ 0.335 \\ .334 \\ .230 \\ .1668 \\ .069 \\ -.059 \\ =.110 \\ =.151 \\ =. .283 \\ -.218 \\ -.2218 \\ -.230 \\ -.258 \end{array}$ |  |  |  |


(a) $a_{u}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Serispan sta. | Percent chard | UPPER SURFACE |  |  |  | LOKIR SURFMOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle or attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{0}$ | $2^{0}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.557 .111 .026 $=.002$ $=.028$ $=.055$ $=.073$ $=.091$ $=.105$ $=.145$ $=.178$ $=.205$ $=.224$ $=.217$ $=.180$ $=.105$ -.029 | 0.561 .029 .021 .045 .062 .090 .106 .125 . .337 . .178 . .239 . .235 . .245 . .200 . .119 . .034 | 0.540 $=.072$ $=.079$ $=.201$ $=.110$ $=.134$ $=.145$ $=.163$ $=.172$ $=.213$ $=.247$ $=.278$ $=.294$ $=.2828$ $=.141$ $=.049$ | 0.528 $=.172$ $=.122$ $=.147$ $=.149$ $=.178$ $=.196$ $=.202$ $=.249$ $=.280$ $=.312$ $=.318$ $=.352$ $=.151$ $=.053$ | $\begin{aligned} & 0.078 \\ & .018 \\ & =.012 \\ & =.030 \\ & -.052 \\ & -.069 \\ & =.092 \\ & =.118 \\ & =.147 \\ & -.172 \\ & -.270 \\ & =.231 \\ & =.157 \\ & =.175 \\ & -.030 \end{aligned}$ | $\begin{array}{r} -.150 \\ 0.065 \\ .035 \\ .0055 \\ -.018 \\ -.037 \\ =.060 \\ =.087 \\ -.113 \\ -.140 \\ -.180 \\ -.202 \\ -.169 \\ -.097 \\ -.021 \end{array}$ | $.0-$ 0.208 .0717 .040 .015 $=.006$ $=.032$ $=.058$ $=.055$ $=.111$ $=.154$ $=.177$ $=.145$ $=.082$ | -.73 0.273 .118 .079 .052 .027 .001 $=.024$ $=.052$ -.080 -.126 $=.148$ $=.326$ $=.066$ -.010 |
| $0.195 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 3.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.8 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.463 -.044 -.037 -.067 -.089 -.110 -.137 -.156 -.173 -.200 $=.238$ -.252 -.242 $=.820$ -.279 -.011 | 0.472 $=.062$ $=.102$ $=.127$ $=.136$ $=.173$ $=.154$ $=.209$ $=.230$ $=.250$ $=.278$ $=.250$ $=.2035$ $=.005$ | 0.440 $=.191$ $=.170$ $=.190$ -.286 $=.202$ $=.220$ $=.238$ $=.250$ $=.279$ -.316 $=.334$ -.319 $=.285$ -.207 $=.100$ -.003 | 0.383 $=-344$ $=.243$ $=.258$ $=.235$ $=.250$ $=.261$ $=.280$ $=.285$ $=.360$ $=.361$ $=.367$ $=.366$ $=.301$ $=.180$ $=.010$ | -0.050 0.041 $=.068$ $=.090$ $=.115$ $=.135$ $=.156$ $=.215$ -.210 -.240 -.261 $=.230$ $=.185$ $=.071$ .009 | $\begin{aligned} & -. .179 \\ & 0.020 \\ & -.010 \\ & =.040 \\ & -.070 \\ & -.096 \\ & =.115 \\ & =.150 \\ & =.175 \\ & =.298 \\ & -.206 \\ & =.230 \\ & =.200 \\ & =.140 \\ & =.069 \end{aligned}$ |  | -.730 0.130 .098 .047 .013 $=.021$ $=.070$ $=.105$ $=.129$ $=.147$ $=.169$ $=.1486$ $=.1061$ .016 |
| $0.382 \mathrm{~b} / 2$ |  | 0.437 $=.028$ $=.118$ $=.1400$ $=.160$ $=.1700$ $=.200$ $=.229$ $=.231$ $=.260$ $=.265$ $=.241$ $=.2103$ $=.0455$ .040 | 0.421 -.170 -.200 -.217 $=.227$ $=.232$ $=.264$ $=.271$ $=.271$ $=.300$ $=.301$ $=.274$ $=.240$ $=.118$ $=.052$ .035 | 0.368 $=.347$ -.391 $=.302$ $=.291$ $=.300$ $=.304$ $=.323$ $=-327$ $=.321$ $=-3450$ $=.350$ $=.376$ $=.340$ $=.066$ .028 |  | $\begin{array}{r} -0.056 \\ =.120 \\ -.136 \\ -.159 \\ -.179 \\ -.200 \\ -.211 \\ -.240 \\ -.255 \\ -.250 \\ -.251 \\ =.254 \\ =.210 \\ -.100 \\ -.035 \end{array}$ | $\begin{array}{r} 0.052 \\ -.048 \\ =.066 \\ -.100 \\ =.122 \\ -.150 \\ =.166 \\ =.197 \\ =.211 \\ =.210 \\ =.223 \\ =.173 \\ =.100 \\ .031 \end{array}$ | -.146 0.022 .001 $=.042$ $=.070$ $=.101$ $=.120$ $=.151$ $=.169$ $=.178$ $=.189$ -.150 $=.090$ -.026 .050 | -.07 0.220 .087 .067 .009 $=.021$ $=.060$ -.077 $=.109$ -.130 $=.159$ $=.150$ $=.367$ -.130 $=.005$ -.027 .047 |
| $0.555 \mathrm{~b} / 2$ |  |  | 0.431 $=.222$ $=.245$ $=.267$ $=.247$ $=-260$ $=.270$ $=.266$ $=.266$ $=.267$ $=.287$ $=.273$ $=.251$ $=.095$ $=.029$ $=.058$ | 0.371 $=.357$ $=.367$ $=.340$ $=.343$ $=.340$ $=.337$ $=-324$ $=.331$ $=.354$ $=.292$ $=.180$ $=$. |  | $\begin{array}{r} -0.087 \\ =.140 \\ -.155 \\ -.189 \\ -.197 \\ -.213 \\ -.225 \\ -.235 \\ -.245 \\ =.237 \\ -.230 \\ -.220 \\ -.386 \\ -.077 \\ -.020 \\ .063 \end{array}$ |  | $\begin{array}{r} -.155 \\ 0.027 \\ .006 \\ . .049 \\ -.070 \\ -.104 \\ -.120 \\ -.143 \\ -.145 \\ -.153 \\ -.153 \\ -.158 \\ -.137 \\ -.018 \\ -.061 \end{array}$ | -.079 0.039 .077 .017 -.017 -.057 $=.070$ $=.101$ $=.126$ $=.129$ $=.134$ $=.119$ $=.059$ -.010 .052 |

TABLE X. - CONTINUED.

$$
\text { (a) } a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ} \text { - Concluded. }
$$

| Senispan sta. | Percent chard | UPPER SURFACE |  |  |  | LONER SURFAGE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{0}$ | $1{ }^{0}$ | 20 | $3^{\circ}$ | $5^{\circ}$ | $2^{0}$ | $2^{\circ}$ | $3^{0}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 11.0 \\ 44.5 \\ 51.0 \\ 79.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.427 \\ & -.060 \\ & -.120 \\ & -.179 \\ & -.173 \\ & -.195 \\ & -.212 \\ & -.215 \\ & -.223 \\ & -.225 \\ & -.239 \\ & -.235 \\ & -.209 \\ & -.180 \\ & =.067 \\ & -.002 \\ & .075 \end{aligned}$ | 0.407 <br> $-.263$ <br> -.285 -.291 <br> -.250 -.259 <br> $-.270$ <br> $-.269$ <br> $-.268$ <br> -.273 -.265 <br> $-.238$ <br> -.193 -.772 <br> .006 . .075 | 0.313 -.541 -.430 $=.436$ $=.354$ $=.360$ $=.346$ $=.340$ $=.327$ -.317 -.306 $=.293$ -.253 $=.095$ $=.020$ .069 | $\begin{aligned} & 0.171 \\ & -.866 \\ & -.607 \\ & -.563 \\ & -.450 \\ & -.452 \\ & -.387 \\ & -.398 \\ & -.386 \\ & -.376 \\ & -.350 \\ & -.325 \\ & -.272 \\ & -.195 \\ & -.088 \\ & -.012 \\ & .070 \end{aligned}$ | $\begin{array}{r} -. .072 \\ -. .160 \\ -.170 \\ -.200 \\ -.203 \\ -.214 \\ -.220 \\ -.225 \\ -.225 \\ -.222 \\ -.222 \\ -.214 \\ -.180 \\ -.056 \\ 0 \\ .080 \end{array}$ | $\begin{aligned} & -.090 \\ & 0.049 \\ & =.067 \\ & =.113 \\ & -.126 \\ & =.148 \\ & -.158 \\ & -.173 \\ & -.176 \\ & -.180 \\ & =.186 \\ & =.187 \\ & =.157 \\ & -.061 \\ & .001 \\ & .079 \end{aligned}$ | 0.210 <br> .037 <br> $-.041$ <br> $-.060$ <br> $-.093$ <br> $-.306$ <br> $-.128$ <br> $-.140$ <br> -.152 -.157 <br> .133 -.060 <br> $-.001$ | $\begin{array}{r} 0.296 \\ .113 \\ .090 \\ .019 \\ -.004 \\ -.047 \\ -.062 \\ -.087 \\ -.096 \\ -.115 \\ -.228 \\ -.139 \\ -.226 \\ -.058 \\ -.008 \\ .060 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.411 \\ & -.070 \\ & =.171 \\ & =.173 \\ & -.179 \\ & -.190 \\ & -.213 \\ & -.220 \\ & =.224 \\ & =.233 \\ & -.237 \\ & -.221 \\ & =.198 \\ & =.144 \\ & -.040 \\ & .020 \\ & .096 \end{aligned}$ | 0.448 <br> -. 280 <br> -. 290 <br> $-.266$ <br> - 270 <br> $-.271$ <br> $-.265$ <br> $-.269$ <br> $-.260$ <br> -. 240 <br> -.217 -.122 <br> $-.043$ <br> .095 | $\begin{aligned} & 0.389 \\ & -.377 \\ & -.450 \\ & -.435 \\ & -.361 \\ & -.368 \\ & -.338 \\ & -.390 \\ & =.300 \\ & -.299 \\ & -.269 \\ & -.240 \\ & =.210 \\ & -.133 \\ & -.055 \\ & .015 \\ & .094 \end{aligned}$ | 0.282 <br> -. 909 <br> -.690 -.611 <br> $-.454$ <br> $-.469$ <br> $-.413$ <br> -.393 -.350 <br> -.333 -.277 <br> -. 250 <br> $-.214$ <br> -.132 -.053 <br> .017 | $\begin{array}{r} -.07 \\ -0.078 \\ -.170 \\ -.171 \\ -.191 \\ -.212 \\ -.217 \\ -.230 \\ -.238 \\ -.229 \\ -.214 \\ -.190 \\ -.150 \\ -.029 \\ .032 \\ .101 \end{array}$ | $\begin{aligned} & -.091 \\ & -.061 \\ & -.064 \\ & -.109 \\ & -.151 \\ & =.151 \\ & =.186 \\ & =.199 \\ & =.200 \\ & -.194 \\ & =.170 \\ & =.135 \\ & -.032 \\ & .030 \\ & .099 \end{aligned}$ | 0.221 .039 .030 -.032 <br> $-.091$ <br> $-.109$ <br> -.140 -.157 <br> $-.165$ <br> $-.170$ <br> -.151 -.220 <br> $-.040$ <br> .025 .090 | $\begin{array}{r} -.307 \\ .110 \\ .102 \\ .029 \\ -.047 \\ -.058 \\ -.101 \\ =.125 \\ -.145 \\ -.156 \\ =.141 \\ =.118 \\ -.044 \\ .012 \\ .081 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.436 \\ & -.011 \\ & =.188 \\ & -.201 \\ & -.210 \\ & -.243 \\ & =.244 \\ & . .222 \\ & -.201 \\ & -.188 \\ & -.394 \\ & -.182 \\ & =.155 \\ & -.060 \\ & -.011 \\ & .042 \\ & .105 \end{aligned}$ | 0.358 <br> $-.232$ <br> $-311$ <br> -.319 -.288 <br> $-.314$ <br> $-.281$ <br> -. 248 <br> -. 220 <br> -.199 -.205 <br> -.205 -.189 <br> -.147 -.079 <br> -.010 .049 <br> .108 | $\begin{aligned} & 0.185 \\ & =.350 \\ & =.474 \\ & -.165 \\ & =.398 \\ & =.396 \\ & =.339 \\ & =.222 \\ & -.232 \\ & =.212 \\ & =.225 \\ & -.196 \\ & -.260 \\ & =.087 \\ & =.012 \\ & .047 \\ & .101 \end{aligned}$ | $\begin{array}{r} -0.028 \\ -.959 \\ -.719 \\ -.697 \\ -.177 \\ -.474 \\ =.363 \\ =.246 \\ -.250 \\ -.230 \\ -.234 \\ -.209 \\ -.168 \\ . .093 \\ -.019 \\ .039 \\ .091 \end{array}$ | -.09 -0.099 -.177 -.182 -.210 -.240 -.254 -.230 -.210 -.190 -.184 -.170 -.159 -.065 .001 .053 .116 | -.071 0.063 -.071 -.129 -.169 $=.205$ $=.200$ $=.187$ $=.174$ -.169 $=.159$ $=.145$ -.092 .008 .049 .110 | $\begin{array}{r} 0.207 \\ .038 \\ .029 \\ -.051 \\ -.101 \\ -.160 \\ -.175 \\ -.167 \\ -.160 \\ -.159 \\ -.150 \\ -.137 \\ -.091 \\ .039 \\ .096 \end{array}$ | $\begin{array}{r} 0.292 \\ .110 \\ .099 \\ .009 \\ -.050 \\ -.122 \\ -.155 \\ -.155 \\ -.150 \\ -.152 \\ -.149 \\ -.139 \\ -.086 \\ -.019 \\ .022 \\ .082 \end{array}$ |

TABLE X．－OONTINUED．
（b）$\pi_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ ．

| $\begin{aligned} & \text { Sent1- } \\ & \text { spana } \\ & \text { sta. } \end{aligned}$ | Percent chord | UPPER Strrace |  |  |  | LONER SURFIGE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  | 0.495 | 0.405 | 0.283 |  |  |  |  |  |
|  | 1.5 | －：． 287 | －． 231 | －－． 817 | －1． 172 -.459 | 0.324 .190 | 0.422 | 0．500 |  |
|  | 6．5 | －． 195 | －． 285 | －-36 | －：469 | ． 157 | －274 | － 307 | － 377 |
|  | 17．0 | －－． 281 | －． 2579 | －． 346 | ＝－439 | ． 113 | ． 2154 | ： 348 | ：312 |
|  | 21.0 | －． 210 | －． 272 | －． 351 | －． H ＋49 | －057 | －119 | ． 180 | ． 230 |
|  | 24.5 31.0 | －． 228 | －． 2982 | －－352 | －． 4.425 | ． 033 | ． 096 | ． 1112 | ． 201 |
|  |  | －． 277 | －． 355 | －． 417 | －－482 | －．021 | ． 037 | －088 | ． 135 |
|  | ${ }_{41} 4.0$ | －． 313 | －． $\mathrm{Hex}^{\text {¢ }}$ | －－460 | －． 52 | －．050 | ．$\times 8$ | ． 056 | .100 |
|  | 51．${ }^{44}$ | －： 365 | －． 413 | －． 593 | －． 5851 | －．099 | －． 0.045 | －001 | －． 042 |
|  | 59．05 | －． 357 | . .456 -.393 | －．53］ | － F － 6896 | －． 121 | －-.069 | －．018 | ．027 |
|  | 71.5 91.5 | －280 $=-170$ -.064 | －：320 | －．-349 $=-130$ -130 | ＝－472 $=-191$ | $=-100$ $=.005$ -.05 | －$=.054$ | －．017 | －．015 |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 0 | 0.312 | 0.138 | －0．039 | －0．190 |  |  |  |  |
|  | 5：5 | －． 314 | －： 420 | －1．705 | －1．895 | ． 185 | ． 273 | ． 35 | －． 416 |
|  | ${ }^{6} 5$ | －． 325 | －． 437 | －． 520 | －． 920 | ． 149 | ． 230 | － 313 | ． 377 |
|  | 11.5 | －． 278 | －： 380 | －：-775 | －： 810 | ． 055 | ． 130 | －200 | ： 261 |
|  | 21.0 |  | －． 278 | － 4.45 | － 545 | ． 020 | ． 035 | － 156 | － 217 |
|  | 24.5 31.6 | －． 319 | －． 3888 | －．-486 | －． 559 | $\stackrel{0}{-.041}$ | ． 063 | ． 125 | ． 176 |
|  | 御． 5 | －． 342 | －． 428 | －． 514 | －－ | －． 070 | $\therefore 009$ | ． 53 | ． 102 |
|  | 41.8 | ＝－401 | －． 480 | －．560 | －． 625 | －． 092 | $=.035$ -0.052 | ． 020 | －072 |
|  | 51.0 | －． 403 | －． 514 | －． 600 | －． 667 | －． 136 | －．083 | －．025 | －917 |
|  | 59．5 | －$=3.345$ | －． 503 | －． 620 | －． 667 -.670 | －． 1200 | －．-071 | －．-.018 | ． 005 |
|  | 79.5 | －．-123 | －． 150 | －．-172 | －． 252 | －． 040 | －． 220 | －0 0 | －cos |
|  | 91.0 | －．011 | －． 021 | －． 046 | －． 278 | ． 016 | ． 320 | ． 023 |  |
| $0.382 \mathrm{~b} / \mathrm{z}$ | ${ }^{0}$ | 0．170 | －0．050 | －0．265 | －0．455 |  |  | 0.4444 |  |
|  | 5.5 | －． 493 | －．803 | －1．067 | －1． 150 | ． 143 | 0.337 | ． 316 | ． 375 |
|  | 6.5 | － 4.45 | －． 651 | －1．023 | －1．277 | －119 | － 210 | ． 288 | －${ }^{166}$ |
|  | $\xrightarrow{12 .} 14.8$ | －：．421 | －． 595 | －： 8720 | $-1.035$ | ． 0261 | ． 1145 | ． 2180 | ． 2799 |
|  | 21.0 | －． 4145 | －： 530 | －． 65 | －1．962 | －．012 | － 65 | －132 | ． 115 |
|  | 24.5 | －． 427 | －． 535 | －． 66 | －． 897 | －． 080 | ． 040 | ． 105 | ． 157 |
|  | 31.5 | こ：450 | －． 575 | －． 6.68 | －．880 | －．-990 | －．827 | － 63 | ． 080 |
|  | 42.8 | －－465 | －． 62 | －． 700 | －． 8 53 | －． 103 | －．chis | ． 015 | ． 253 |
|  | 44．5 | －． 4.47 | －． 620 | －． 7177 | －-805 | －．116 | －．960 | －-.220 | －0\％ |
|  | 59.5 | －． 280 | －． 315 | －． 496 | －－640 | －． 111 | －．069 | －．035 | －． 015 |
|  | 71.0 | －－． 1670 | －－． 167 | －． 1193 | －． 200 | －． 0.018 | －． 0.002 | －． 0.017 | ． 0188 |
|  | 91.0 | ． 030 | ：．928 | －． 315 | －． 396 | ． 041 | ． 042 | ：200 | ：066 |
| $0.555 \mathrm{~b} / \mathrm{c}$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | －1．007 | －1．365 | －1．4928 | －1．373 | 0.303 | 0.292 | 0.4450 | 0.473 |
|  | 6.5 | －：552 | －1．201 | －1．402 | －1．354 | ：1317 | ：227 | －300 | － 372 |
|  | $11 .{ }^{17}$ | －． 515 | －646 | －1．389 | －1．285 | －062 | －156 | ． 266 | －250 |
|  | 21．5 | －．521 | －． 68 | －1． 329 | －1．256 | －：912 | ． 1275 | ． 139 | ．189 |
|  | $24: 5$ 31.0 | －．489 | － 595 | －． 710 | －1．124 | 二－972 | －050 | －105 | ． 151 |
|  | 31．5 | －．428 | －． 699 | －． 701 | －1．037 | －．c78 | －011 | －0\％ | －078 |
|  | 41.0 44.5 | －． 3.367 | －． 681 | －．739 | －97\％ | －： 20 | －$=0.0{ }^{\text {za }}$ | ． 012 | － 342 |
|  | 52.0 | －． 330 | －． 520 | －． 473 | －${ }^{2} 24$ | －． 113 | －． 0.06 | －．028 | －．001 |
|  | 79：5 | －． 236 | －． 201 | －． 2170 | －． 7 \％ 4 ？ | －． 105 | －．066 | －．047 | －． 0.032 |
|  | 79.5 | －．040 | －．032 | －．087 | －-4.4 | －． 0.079 | ．002 | －．00x | － 0.029 $=-053$ |
|  |  |  |  |  |  |  |  |  |  |



TABLE X.- CONTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Conoluded.

| Serispan ata. | Percent ohord | UPPER BURFACE |  |  |  | LONTR GURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of sttack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ | $4^{0}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.029 | -0.215 | -0.450 | -0.660 |  |  |  |  |
|  | 1.5 | -1.187 | -1.414 | -1.445 | -1.013 | 0.352 | 0.421 | 0.446 | 0.450 |
|  | 5.5 | -1.001 | -1.309 | -1.444 | -1.015 | . 173 | . 273 | - 330 | . 372 |
|  | 11.0 | -. 563 | -1.280 | -1.246 | -1.010 | . 071 | . 161 | - 222 | . 271 |
|  | 14.5 | -. 544 | -1.223 | -1.186 | -. 991 | . 045 | . 132 | - 192 | . 236 |
|  | 21.0 | -. 473 | -. 645 | -1.134 | -.973 -.930 | -. 0.003 | . 073 | . 133 | . 174 |
|  | 24.5 31.0 | -. 412 | -. 6.669 | -1.078 | -. 894 | -. 0.052 | . 013 | . 062 | . 095 |
|  | 34.5 | -. 414 | -. 585 | -. 908 | -. 847 | -.064 | . 002 | . 044 | . 072 |
|  | 41.0 | -. 381 | -. 305 | -. 818 | -. 805 | -. 058 | -. 034 | . 006 | . 029 |
|  | 44.5 | -. 355 | -. 2621 | -. 751 | $=.761$ $=.720$ | -. 1018 | -. 052 | -. 01014 | . 002 |
|  | 59.5 | -. 2194 | -. 2188 | -. 5.533 | -. 6.653 | -. $\mathrm{-} .112$ | -. 083 | -..068 | -. 0.078 |
|  | 71.0 | -. 087 | -. 090 | -. 293 | -. 580 | -. 060 | -. 045 | -. 050 | -. 084 |
|  | 79.5 | -. 014 | -. 020 | -. 198 | -. 520 | -. 012 | -. 009 | -. 0288 | -. 100 |
|  | 91.0 | . 068 | . 058 | -. 020 | -. 433 | . 053 | . 047 | . 013 | -. 135 |
| 0.83 Ib b | 5 | 0.155 | $-0.081$ | -0.294 | $\begin{array}{\|c} -0.461 \\ -767 \end{array}$ |  |  |  |  |
|  | 1.5 | -1.217 | -1.420 | -. 938 | $\begin{aligned} & -.787 \\ & -790 \end{aligned}$ | 0.359 | 0.412 | 0.431 | 0.431 .349 |
|  | 6.5 | -1.062 | -1.374 | -. 965 | -. 788 | .158 | . 244 | . 3122 | . 338 |
|  | 11.0 | . 532 | -1.281 | -. 958 | -. 789 | . 079 | . 156 | . 218 | . 253 |
|  | 14.5 | -. 460 | -1.260 | -. 928 | -. 762 | - |  | - |  |
|  | 21.0 | -. 465 | -1.118 | -. 887 | -. 745 | -. .003 | . 065 | . 116 | . 148 |
|  | 24.5 | -. 447 | -. 769 | -. 821 | -. 707 | -. 027 | -. 010 | . 090 | . 250 |
|  | 31.0 | --393 | -. 203 | -.770 -.705 | -. -665 | -. 0.096 | -. 041 | -.001 | . 17 |
|  | 41.0 | -. 276 | -. 262 | -. 660 | -. 657 | -. 123 | -. 077 | -. 043 | -. 031 |
|  | 44.5 | -. 246 | -. 240 | -. 617 | .630 -.656 | -. 141 | -. 102 | -. 076 | -. 0.103 |
|  | 51.0 59.5 | -. 212 -.139 | -. 218 -.133 | -. 5796 | -.626 -.571 | -.132 -.113 | -. 109 | -. 0.94 | -. 103 |
|  | 71.0 | -. 0.063 | -. 0.052 | -. 404 | -.531 | -. 048 | -. 0479 | -..075 | -. 157 |
|  | 79.5 | .011 | . 010 | -. 2359 | -. 491 | . 009 | . 060 | -. 0.049 | -.160 -.3 .95 |
| $2.924 \mathrm{~b} / \mathrm{c}$ |  |  |  |  |  |  |  |  |  |
|  | 0 | -0.227 | -0.550 | -0.762 | -0.752 |  |  |  |  |
|  | 1.5 | - 3.151 | -1. 211 | -. 743 | -. 622 | 0.341 | 0.390 | 0.408 | 0.405 |
|  | 5.5 | -1.011 | - -1.234 |  | -. 632 | . 165 | - 247 | . 2973 | . 322 |
|  | 6.5 11.6 | -1.020 | -1.199 | -.739 -.730 | -. 612 | . 155 | . 232 | . 283 | - 212 |
|  | 14.5 | -. 533 | -1.024 | -. 688 | -. 569 | -.c04 | . 068 | . 119 | . 149 |
|  | 21.0 | -. 390 | -. 795 | -. 671 | -. 561 | -.c90 | -. 023 | . 025 | . 050 |
|  | 24.5 | -. 260 | -. 710 | -. 627 | -. 533 | -. 140 | -. 088 | -. 040 | -. 018 |
|  | 31.0 | -. 247 | -. 593 | -. 607 | -. 531 | -. 148 | -. 120 | -. 073 | -. 0.118 |
|  | $4{ }^{34} 4.5$ | -.232 $=.240$ | -. 533 | -. 571 | -. 508 | -. 1444 | -. 139 | -. 123 | -.1150 |
|  | 44.5 | -. 220 | -. 362 | -. 510 | -. 480 | -. 147 | -. 142 | -. 152 | -. 174 |
|  | 51.0 | -. 179 | -. 250 | -. 483 | -. 481 | -. 136 | -. 231 | -. 349 | -. 187 |
|  | 59.5 | -. 110 | -. 203 | -. 429 | -. 428 | -. 088 | -. 085 | -. 122 | -. 181 |
|  | 71.0 | -.036 .009 | -. 100 | -.387 -.352 | -.425 -.390 | -. 0.012 | -. 0.085 | -. 0.070 | -. 178 |
|  | 91.0 | . 061 | -. 036 | -. 322 | -. 391 | . 070 | . 055 | -. 092 | -. 399 |

TABLE $X_{.}$- CONTIMUED.
(o) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| $\begin{aligned} & \text { Seni- } \\ & \text { spant } \end{aligned}$Eta. | ( Percent | upper eurice |  |  |  | LOUTR SURPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of atteck |  |  |  | Angle or attack |  |  |  |
|  |  | $12^{0}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| 0.086 \%/2 | 0 1.5 5.5 5.5 11.5 14.5 21.0 24.0 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  |  |  |  | -679 0.619 $: 451$ .375 .340 $: 288$ .258 .215 .155 -148 -090 $: 069$ .046 .032 .005 |  |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  | $\begin{array}{r} -.547 \\ 0.479 \\ .477 \\ .370 \\ .320 \\ .366 \\ .132 \\ .155 \\ .155 \\ .157 \\ .097 \\ .050 \\ .050 \\ .009 \\ \hline .009 \end{array}$ |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  | $\begin{array}{r} -.751 \\ 0.429 \\ .403 \\ .337 \\ .298 \\ .239 \\ .159 \\ .128 \\ .094 \\ .069 \\ .030 \\ .005 \\ -.017 \\ \hline-.017 \end{array}$ |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |

TABLE X.- CONCLUDED.
(0) $a_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Semispan sta. | Percent chord | UPPER SURTMACE |  |  |  | LOVER SORTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.0 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.0 \\ 41.0 \\ 44.0 \\ 51.0 \\ 59.0 \\ 71.0 \\ 79.0 \\ 91.6 \end{array}$ | $\begin{aligned} & -0.810 \\ & -.923 \\ & -.910 \\ & -.887 \\ & -.882 \\ & -.855 \\ & -.845 \\ & -.819 \\ & -.708 \\ & -.779 \\ & -.757 \\ & -.745 \\ & -.707 \\ & -.672 \\ & -.630 \\ & -.585 \end{aligned}$ |  |  |  | -.470 0.440 .380 .304 .369 .200 .169 .115 .090 .010 -.030 -.099 -.135 -.183 -.259 |  |  |  |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.5 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{array}{r} -0.610 \\ =.730 \\ =.728 \\ =.716 \\ -.716 \\ -.696 \\ -.690 \\ -.675 \\ -.648 \\ -.645 \\ -.625 \\ -.622 \\ -.593 \\ =.575 \\ =.546 \\ -.520 \end{array}$ |  |  |  | -.411 0.362 .353 $\because-280$ -.160 .128 .059 .016 -.042 -.082 -.215 -.247 -.260 -.305 |  |  |  |
| $0.924 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 5.5 \\ & 11.0 \\ & 14.5 \\ & 21.5 \\ & 24.5 \\ & 32.5 \\ & 34.0 \\ & 41.5 \\ & 44.5 \\ & 51.5 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 92.0 \end{aligned}$ | $\begin{aligned} & -0.715 \\ & =.613 \\ & =.610 \\ & -.593 \\ & -.598 \\ & =.580 \\ & -.555 \\ & -.555 \\ & =.552 \\ & =.532 \\ & =.50 \\ & =.508 \\ & =.475 \\ & -.478 \\ & =.458 \\ & -.447 \end{aligned}$ |  |  |  | $\begin{array}{r} 0.350 \\ .328 \\ .312 \\ .155 \\ .053 \\ -.021 \\ -.085 \\ -.146 \\ -.190 \\ -.231 \\ -.252 \\ -.268 \\ -.262 \\ -.270 \\ -.298 \end{array}$ |  |  |  |

TABLE XI.- PRESSURE CCEFFIGIENTS AT SEVER SEXTBPAK STATICNS OF THE WIMG. $K_{0}, 0.90 ; R, 4,000,000$.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{0}, 3^{\circ}$.

| Semista. | Percent chord | UPPER BURFACE |  |  |  | IONITR SORIPres |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle or attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | ${ }^{0}$ | $3^{\circ}$ |
| 0.086 b/2 | 5 | 0.565 | 0.565 | 0.559 | 0.537 |  |  |  |  |
|  | $\frac{1}{5} .5$ | $\bigcirc$ | -.036 | -. 0.050 | -. 115 | 0.0828 | 0.150 | 0.222 |  |
|  | 11 | -007 | -:041 | -:c81 | - $=1314$ | -0.0.0 | :065 | .0866 | . 122 |
|  | 14 | -. 0.50 | -.08 | -.121 | -. 16 | -. -.049 | -.011 | :030 | .059 |
|  | 21 | -. 0.689 | - | -. 130 | - 1169 | -. 0.04 | -. 0.037 | .006 | .032 |
|  | 31.5 | -. 101 | -.136 | -. 160 | -. 193 | -. 113 | -. 089 | -. 0.05 | -0.07 |
|  | 34.5 | -. 140 | -. 176 | -. 202 | -. 240 | -. 114 | -. 118 | -. 077 | -.0.50 |
|  | $4{ }^{4} 4.8$ | - -209 | -.249 | -. 269 | - -379 | $\because 172$ | - 146 | 105 | -. |
|  | 51.0 | -. 219 | -. 269 | -. 292 | -. 3 行 | -. 215 | -. 189 | -. 150 | -. 125 |
|  | 59 | -. 2195 | -271 | -. 297 | -. 394 | -.240 | - 221 | -. -179 | -.157 |
|  | 79.5 91.5 | - $=.111$ | $=-146$ $=-.045$ | $=-151$ $=-049$ | -. 271 -.060 | -. $=-.121$ -.030 | - $=.1090$ | - | $=.07 \mathrm{C}$ $=016$ |
| 0.195 b/2 | 0 | 0.455 | 0.477 | 0.450 | 0.394 |  |  |  |  |
|  | 1.5 | . 055 | -. 0.056 | -. 173 | - 315 | 0.090 | 0.185 | 0.279 | 0.337 |
|  | 6. ${ }^{5}$ | -:055 | -. 112 | -. 1746 | -. 245 | -. -.056 | -.007 | :051 | . 100 |
|  | 12.0 | - 077 | - 1127 | -. 173 | - 223 | -. 0.77 | -. 037 | -010 | .051 |
|  | 14.5 21.0 | -. 126 | -. $\mathrm{-}$ - 170 | -. 207 | -. 251 | -. -.124 | -..092 | -. 0.51 | -018 |
|  | 24.5 | -. 147 | -. 190 | -. 225 | -. 273 | -. 147 | -. 117 | -. 075 | -. 039 |
|  | 33.8 | --. 164 | -.205 | -:239 | =. 3058 | -. 2804 | -. 175 | -.134 | -. 1075 |
|  | 41.6 | -. 234 | -. 280 | -. 311 | -. 362 | -. 227 | -. 203 | -. 155 | -. 128 |
|  | 44.5 51.6 | -. 225 | -. 302 | -: 337 | -. 390 | - F - 24.240 | - -2243 | - -178 | -. 172 |
|  |  |  |  |  |  | -. 240 | -. 214 | -. 173 | -. 152 |
|  | 71.0 | - $=1.150$ | -. 21090 | -. 327 | - -174 | - | - $\quad .075$ | -. 124 | -. 111 |
|  | 91.0 | -. 010 | -. 0 | -.0\% | -.009 | -. 011 | .006 | -. 012 | .0i3 |
| $0.382 \mathrm{~b} / 2$ | 0 | 0.440 | 0.422 | 0.375 | 0.289 |  |  |  |  |
|  | 1.5 | --. 109 | -. 1.153 | -: 3275 | -. 385 | -0.052 | - 2.054 |  |  |
|  | 6.5 | -. 131 | -. 213 | -. 287 | -. 379 | -. 132 | -.065 | .006 | . 050 |
|  | 11.0 | --. 153 | -.221 | -. 230 | -. 346 | - -175 | -. 298 | -. 0.067 | -088 |
|  | 21.6 | -. 197 | -. 253 | -. 291 | -. 357 | -.200 | -. 153 | -. 102 | -. 066 |
|  | 24.5 | -. 212 | - -275 | -. 322 | - -377 | -.210 | -- 2170 | - 115 | -. 079 |
|  | 34.5 | -.232 | -. 287 | -. 34 | --. ${ }^{\text {¢ }}$ | -269 | -. 220 | -. 1170 | -. 134 |
|  | 41.0 | - 2628 | - -317 | -. 350 | - | -. 25 | -.220 | -. 267 | - $=124$ |
|  | 44.5 | -.:245 | -. 292 | -. 3 30 | -:400 | -.262 | -. 234 | -.179 | - 120 |
|  | 59.5 | - $=125$ | -. 235 | -. 387 | - -1270 | -. 215 | -. 180 | - -149 | - $=135$ |
|  | 79.5 | -.049 | -: 053 | -.055 | -.074 | -.033 | -. 032 | -. 020 | -. 0.02 |
|  | 92.0 | . 043 | . 35 | . 033 | .025 | -.647 | . 047 | . 055 | . 049 |
| 0.555 b/2 |  | -0.433 |  | -0. 375 | - 2.279 |  |  |  |  |
|  | 1.5 | - -145 | -. 235 | $\because \mathrm{CH}$ | -. 689 | -0. 184 | -0.041 | 0.153 |  |
|  | 5.5 | --16 | -. 275 | -. 375 | -. 500 | -. 160 | -.0.0 | .005 | . 070 |
|  | 11.0 | -. 175 | -. 260 | -. 346 | -. 456 | - -1974 | -. 122 | -. 050 | . 005 |
|  | 21.5 | -. 2125 | -. 2.25 | $\because$ | -. 4 +175 | -.220 | -. 167 | -. 107 | -.060 |
|  | 24.5 | --222 | -.299 | - -251 | - 420 | - -231 | - -180 | - $=145$ | - 0.70 |
|  | 31.0 | -. 232 | -.285 | -. 337 | -. 425 | -: 2.25 | -.210 | -. -152 | -. 120 |
|  | 41.0 | -.253 | -. 304 | -. 343 | -. 415 | -. 247 | -. 210 | -. 157 | -. 132 |
|  | 44.5 51.0 | -. 2227 | -. 29.275 | -. 3 35 | -. 3 - 307 | -. 237 | -. 203 | -. -15 | -. 135 |
|  | 59.5 | -. 188 | -. 218 | -. 186 | -. 224 | -. 197 | -. 159 | $-.137$ | -. 124 |
|  | $71 .{ }^{\text {7 }}$ | -.084 | -.:032 | --. 118 | -. -123 | --.075 | -.082 | --.007 | 61 |
|  | 79 | -.089 | -. 053 | -. 0.05 | -. 0.53 | -. 0.065 | -. 050 | -. 070 | . 015 |

table xi.- Continued.
(a) $a_{u}, 0^{\circ}, 1^{0}, 2^{0}, 3^{0}$ - Concluded.

| Seansta. | Percent <br> chord | UPPER StRFACE |  |  |  | Lowir surface |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1^{\circ}$ | ${ }^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | 20 | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.429 | 0.402 | 0.315 | 0.180 |  |  |  |  |
|  | 1.5 | -. | -. 2744 | -: 3346 | -. 880 | -0.075 | -0.080 | 0.205 |  |
|  |  | -.170 | -. 309 | -. 44 | -. 603 | -. 170 | $\bigcirc$ | .020 | . 086 |
|  | 11.10 | -.174 | - 2.267 | -:367 | $=.481$ $=.482$ | - 202 -206 | - 123 | - -.042 | -012 |
|  | 21.8 | -. 215 | -.289 | -. 352 | -. 478 | -:217 | -. 137 | -.095 | -:046 |
|  | 24.5 | -. 212 | -. 289 | - 3 30 | -. 437 | -. 225 | -. $17{ }^{\circ}$ | -. 110 | -. 068 |
|  | 31.8 | -.225 | -.284 | -: 343 | -. 363 | -:.237 | -.189 | - 1130 | -. 102 |
|  | 41.8 | -. 240 | -. 284 | -. 320 | -. 35 | -. 223 | -. 192 | -. 143 | - 2120 |
|  | 44.5 | -. 238 | -. 280 | -: 297 | -. 2458 | -. 2225 | -. 3194 | --. 150 | -. 1141 |
|  | 59, ${ }^{5}$ | -.183 | - 20098 | -. 185 | - $\mathrm{-} .1985$ | -. 185 | - $=1650$ | - -135 | - $\mathrm{-}$ - 130 |
|  | 719 | -:002 | -:007 | -:.007 | -:007 | -065 | -O\%02 | -.003 | -:008 |
|  | 91.6 | . 080 | . 076 | . 077 | . 077 | . 086 | . 080 | .080 |  |
| $0.831 \mathrm{~b} / 2$ | 0 | 0.410 | 0.443 | 0.391 | 0.284 |  |  |  |  |
|  | 1.5 | -. 0.15 | -. 310 | -. 2657 | -:928 | -0.081 | -0.086 | -. 2.235 | 0.305 |
|  | $5 \cdot 5$ | -.163 | -. 302 | -. 476 | - 690 | - -173 | - | -030 | -099 |
|  | 114:0 | -.174 | -. 214 | -: 379 | -. 4.479 | -. ${ }^{-91}$ | -. 110 | -0 | $\bigcirc$ |
|  | 21:8 | -.207 | -. 279 | -. 34 | -.405 | -. 211 | -. 15 | -. 090 | . 050 |
|  | 34.5 | -:216 | -:285 | -: 309 | -: -736 | -:.216 | -. 164 | -.132 | -:.062 |
|  | 34.5 | -. 233 | -. 284 | -. 310 | -. 368 | -. 239 | --204 | -. 157 | -. 130 |
|  | 41.0 | -.238 | - 275 | - 287 | -. 3202 | -. 230 | - 209 | -. 2173 | - -1.15 |
|  | ${ }_{51}{ }^{4.5}$ | -: | -.250 | -:201 | -:202 | -:.187 | - -175 | - -175 | -. 145 |
|  | 59:5 | -. 132 | -. 107 | -. 126 | --129 | -. 140 | -. 134 | -. 112 | -. 118 |
|  | 71.0 | -. 030 | -. 047 |  |  | -. 027 | -. 032 | -. 032 | -. 043 |
|  | 79.5 | . 1031 | . 0292 | : 027 | .022 | . 0411 | .034 | . 100 | . 01085 |
| $0.924 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  |  |  |  | 0. |  |  |  |  |  |
|  | 5.5 | -:171 | -. 320 | -. 475 | -. 764 | -. 185 | -. 066 | . 040 | . 110 |
|  |  | -. 186 | -. 328 | -. 470 | -. 740 | -. 188 | -. 071 | . 037 | . 100 |
|  | 11.0 | - O .195 | - O - 375 | -. 394 | - -.443 | -. 2122 | - -1.127 | -:.046 | - 010 |
|  | ${ }^{14.5}$ | -:253 | -. 32 | -. 380 | -. 46 | -. 271 | -. 212 | -. 163 | -:132 |
|  | 24.5 | -. 219 | -. 269 | -. 230 | -. 223 | -. 233 | -. 213 | -. 180 | -. 177 |
|  | 31.0 | -. 197 | -. 218 | -:207 | -:220 | -. -184 | - -176 | - $\because 156$ | -. 156 |
|  | 41.6 | -.184 | -. 202 | -. 218 | -: 232 | -. -175 | -. 168 | -. 155 | -. 215 |
|  | 44.5 | - 172 | -. 180 | - 180 | -. 206 | -. 166 | --158 | -. 145 | - -159 |
|  | 51.5 | -. 050 | -. 0.076 | -. 078 | -.688 | -. 0.05 | - -.076 | -:084 | -. 0.79 |
|  | 71.0 | . 002 | -.006 | -. 002 | -. 012 | . 016 | . 07 | . 006 | -. 016 |
|  | 91.0. | :113 | .150 | :109 | .093 | . 126 | :112 | . 104 | . 087 |

fable Xi.- continued.
(b) $\mathrm{a}_{\mathrm{u}}, 4^{\circ}, 6^{\circ}, \varepsilon^{\circ}, 10^{\circ}$.

| Soniepan te. | Percent cbord | UPPER SURTACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angie of attack |  |  |  | Argio of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4{ }^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.5 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.5 \\ & 34.5 \\ & 41.0 \\ & 44.0 \\ & 51.5 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ |  | $\begin{aligned} & 0.418 \\ & =.516 \\ & =.262 \\ & =.281 \\ & =.271 \\ & =.270 \\ & =.285 \\ & -.288 \\ & =.343 \\ & -.382 \\ & =.411 \\ & =.459 \\ & -.465 \\ & .-.290 \\ & -.114 \end{aligned}$ | $\begin{aligned} & 0.307 \\ & =.760 \\ & =.355 \\ & =.323 \\ & =.350 \\ & =.332 \\ & =.340 \\ & =.3797 \\ & =. .440 \\ & =.499 \\ & =.514 \\ & =.760 \\ & =.422 \end{aligned}$ |  | .0 .332 0.000 .161 .1200 .092 .061 .040 .008 -.050 -.050 -.097 -.130 . .056 -.012 | $\begin{array}{r} -.420 \\ 0.278 \\ .23 I \\ .190 \\ .148 \\ .121 \\ .095 \\ .061 \\ .034 \\ .006 \\ -.050 \\ =.075 \\ =.064 \\ -.027 \\ -.001 \end{array}$ | $\begin{array}{r} -.50 \\ 0.501 \\ .354 \\ .359 \\ .223 \\ .182 \\ .154 \\ .118 \\ .090 \\ .050 \\ .002 \\ .021 \\ -.025 \\ -.002 \\ .001 \end{array}$ | 0.570 . .385 .321 .286 .240 .210 $.170^{\circ}$ .104 .044 .0218 .0099 .0011 . .007 |
| $0.195 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 5.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.5 \\ 44.5 \\ 51.6 \\ 59.5 \\ 71.5 \\ 79.5 \\ 91.0 \end{array}$ |  | 0.159 -.755 <br> $-.410$ <br> -.449 -.374 <br> $=.375$ <br> $=380$ -398 -38 <br> -.421 $=.467$ <br> -.499 -.505 <br> $-528$ <br> $=.408$ $=. .180$ -.033 | $\begin{aligned} & -0.003 \\ & -1.076 \\ & -.651 \\ & -.579 \\ & =.489 \\ & -.457 \\ & -.438 \\ & -.457 \\ & -.472 \\ & -.493 \\ & -.538 \\ & -.569 \\ & -.575 \\ & -.581 \\ & -.267 \\ & -.075 \end{aligned}$ | $\begin{aligned} & -0.150 \\ & -1.208 \\ & -.941 \\ & -.752 \\ & -.678 \\ & =.584 \\ & -.537 \\ & -.536 \\ & -.576 \\ & -.560 \\ & -.601 \\ & -.635 \\ & -.640 \\ & =.661 \\ & =.687 \\ & =.400 \\ & -.132 \end{aligned}$ | $\begin{array}{r} -.0 \\ 0.393 \\ .185 \\ .149 \\ .094 \\ .058 \\ .021 \\ .038 \\ -.067 \\ -.092 \\ -.108 \\ -.339 \\ -.125 \\ -.091 \\ -.045 \\ .013 \end{array}$ | $\begin{array}{r} -.476 \\ 0.278 \\ .237 \\ .173 \\ .134 \\ .092 \\ .070 \\ .024 \\ -.005 \\ -.035 \\ -.049 \\ -.082 \\ -.075 \\ -.055 \\ -.023 \\ .015 \end{array}$ | $\begin{array}{r} 0.580 \\ .356 \\ .307 \\ .274 \\ .203 \\ .153 \\ .126 \\ .087 \\ .050 \\ .020 \\ .004 \\ -.030 \\ -.027 \\ -.010 \\ -.009 \end{array}$ | $\begin{array}{r} 0.576 \\ .421 \\ .779 \\ .262 \\ .212 \\ .181 \\ .132 \\ .1070 \\ .051 \\ .017 \\ .017 \\ .010 \\ \hline .013 \\ \hline .013 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 27.0 \\ 24.0 \\ 31.5 \\ 34.5 \\ 41.0 \\ 44.0 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.8 \end{array}$ |  |  |  | $\begin{aligned} & -0.403 \\ & -1.252 \\ & -1.134 \\ & -1.230 \\ & -.982 \\ & -.962 \\ & -.896 \\ & =.850 \\ & =.815 \\ & -.767 \\ & -.788 \\ & -.764 \\ & -.767 \\ & -.745 \\ & -.423 \\ & -.238 \\ & -.137 \end{aligned}$ | -.083 0.1417 .117 .059 .025 -.013 -.032 -.078 -.096 -.1080 -.130 -.113 $=.076$ -.016 .042 | $\begin{array}{r} 0.350 \\ .238 \\ .210 \\ .145 \\ .111 \\ .062 \\ .035 \\ -.010 \\ -.025 \\ -.047 \\ -.063 \\ -.087 \\ -.073 \\ -.047 \\ -.008 \\ .038 \end{array}$ | $\begin{array}{r} .-.742 \\ 0.313 \\ .284 \\ .217 \\ .179 \\ .129 \\ .100 \\ .052 \\ .000 \\ . .014 \\ -.040 \\ -.043 \\ -.032 \\ -.005 \end{array}$ | $\begin{array}{r} . .486 \\ 0.373 \\ .348 \\ .279 \\ .1485 \\ .155 \\ .102 \\ .078 \\ .049 \\ . .025 \\ -.028 \\ =.035 \\ -.0011 \\ -.019 \end{array}$ |
| $0.555 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 31.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.174 $=.9817$ $=.512$ $=.509$ $=.507$ $=.510$ $=.504$ $=.511$ $=.525$ -.547 $=.457$ $=.210$ $=.713$ -.027 .060 | -0.043 -1.315 -1.217 -1.156 $=.855$ -.577 -.602 $=.601$ -.612 -.620 -.684 -.715 -.675 -.197 -.080 -.012 .062 |  | $\begin{aligned} & -0.420 \\ & -1.340 \\ & -1.332 \\ & -1.314 \\ & -1.217 \\ & -1.159 \\ & -1.081 \\ & -1.044 \\ & -.998 \\ & -.995 \\ & -.916 \\ & -.867 \\ & -.629 \\ & -.729 \\ & =.613 \\ & =.520 \\ & -.345 \end{aligned}$ | -.303 0.153 .133 .065 .035 -.012 -.033 -.070 -.082 -.097 -.100 -.112 -.03 -.000 -.006 | 0.392 0.251 .230 .156 .123 .074 .047 -.303 -.076 -.047 -.067 -.069 -.076 .005 .048 | $\begin{array}{r} 0.442 \\ .317 \\ .297 \\ .223 \\ .185 \\ .130 \\ .102 \\ .054 \\ .003 \\ -.010 \\ -.035 \\ -.052 \\ -.030 \\ -.013 \\ .315 \end{array}$ |  |

TABLE XI.- CONTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Sem1span Bta. | Percent ehord | UPPER SURFACE |  |  |  | LOWER SURTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | 80 | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.060 | -0.177 | -0.384 | -0.58 |  |  |  |  |
|  | 1.5 | $-1.137$ | -1.355 | -1.454 | -. 9.950 | 0.3488 | 0.426 | 0.446 | 0.450 |
|  | 5.5 | - -.963 | -1.280 | -1.402 | -. F .945 | . 1746 | .266 .240 | . 323 | . 366 |
|  | 11.0 | -. 550 | -1.225 | -1.250 | -. 932 | . 070 | . 156 | . 218 | . 261 |
|  | 14.5 | -. 575 | -1.185 | $-1.163$ | -. 934 | -.041 | . 130 | . 185 | - 226 |
|  | 21.0 | .565 -.560 | -. 634 | -1.091 | -. 922 | -.004 -.020 | . 870 | . 126 | $\begin{aligned} & 160 \\ & .131 \end{aligned}$ |
|  | 24.5 31.0 | -. 560 -.530 | -.629 | -1.020 | -. 8.98 | -.020 -.054 | . 050 | . 0950 | $\text { . } 131$ |
|  | 34.5 | -. 444 | -. 685 | -. 851 | -. 837 | -. 065 | -. 005 | .031 | . 055 |
|  | 41.8 | -. 330 | -. 727 | -. $77{ }^{\circ}$ | -. 796 | -. 090 | -. 035 | -. 005 | . 012 |
|  | 44.5 | -. 312 | -. 464 | -. 718 | -. 762 | -. 102 | -. 053 | -. 026 | -. 016 |
|  | 51.0 | -. 263 -.177 | -. 176 | -. 640 | -. 27.65 | -. 2117 | -. 0.085 | -. 0.55 | . .054 -.100 |
|  | 71.0 | -. 070 | -. -.074 | -. 380 | -. 582 | -. 0.05 | -. 0.046 | -. 065 | -. 117 |
|  | 79.5 | 01 | -. 007 | -. 270 | -. 525 | -. 0.05 | -. 0009 | -. 045 | -. 140 |
|  | 91.0 | . 080 | . 075 | -. 090 | -. 443 | . 061 | . 049 | -. 005 | -. 179 |
| $0.831 \mathrm{~b} / 2$ | 0 | 0.170 | -0.050 | -0.244 | -0.408 |  |  |  |  |
|  | 1.5 | -1.167 | -1.358 | -. 922 | -. 788 | 0.350 | 0.407 | 0.426 | 0.427 |
|  | 5.5 | -1.032 | -1.330 | -. 927 | -. 790 | . 161 | . 237 | . 300 | - 335 |
|  | 21.0 | -1.043 | -1.351 | -. 9337 | -. 796 | . 071 | . 149 | . 205 | . 239 |
|  | 14.5 |  | -1.236 | -. 923 | -. 787 | - -1 | - - | - -7 | - |
|  | 21.5 | -. 548 | -1.172 | -.890 | -. 767 | -. 013 | . 058 | . 103 | . $1 \times 2$ |
|  | 24.5 | -. 449 | -1.029 | -. 818 | -. 727 | -. 030 | . 034 | . 081 | . 102 |
|  | 31.0 | -- 330 | -. 578 | -. 7710 | -. 684 | -. 0.102 | -..018 | -.018 | .038 |
|  | 41.0 | -. 269 | -. 280 | -. 6.651 | -. 6.673 | -. 231 | -. 090 | -..059 | -.056 |
|  | 44.5 | -. 230 | -. 310 | -. 615 | -. 649 | -. 154 | -. 121 | -. 092 | -. 098 |
|  | 51.0 | -. 200 | -. 223 | -. 570 | -. 633 | -. 143 | -. 128 | -. 117 | -. 134 |
|  | 59.5 | -. 128 | -. 125 | -. 507 | -.589 | -. 218 | $=.121$ | -. 140 | -. 199 |
|  | 711.0 | -. 0.018 | -. 0.020 | -.412 -.339 | -. 5488 $=.507$ | -.048 .009 | -.057 -.002 | -. 098 | -.199 -.195 |
|  | 91.0 | . 090 | . .883 | -. 246 | -. 446 | . 073 | . 058 | -. 065 | -. 223 |
| $0.924 \mathrm{~b} / \mathrm{c}$ |  | -0.200 | -0.510 | -0.720 |  |  |  |  |  |
|  | 1.5 | -1. 133 | -1.232 | -. 753 | -. 652 | 0.335 | 0.381 | 0.401 | 0.402 |
|  |  | -1.066 | -1.182 | -. 759 | -. 660 | . 161 | . 235 |  | . 308 |
|  |  | -1.066 | -1.141 | -. 755 | $\begin{array}{r} -.641 \\ -.636 \end{array}$ | . 151 | - 223 | .270 .170 | - 291 |
|  | 11.0 | -1.011 -.781 | -1.021 -.932 | . .751 -.719 | -. 636 | .050 -.010 | . 121 | . 1708 | . 198 |
|  | 14.5 21.0 | -.781 -.331 | -. -851 | -. 6.198 | -. -.595 | -. 100 | -. 040 | . 010 | . 030 |
|  | 24.5 | - | -: 75 | -. 655 | -. 270 | -.160 | -. 109 | -. 061 | -. 043 |
|  | 31.0 | -. 215 | -. 669 | -. 627 | -. 568 | -. 170 | -. 145 | -. 110 | -. 100 |
|  | 34.5 | $\text { -. } 191$ | -. 589 | -. 587 | -. 547 | -. 156 | -. 170 | -. 149 | -. 156 |
|  | 41.5 | $-.220$ | -. 490 | - 560 $=.530$ | -. 549 | -. 153 | . .169 -.164 | - $=.1780$ | -. 325 |
|  | 4.4 | -. 203 | -. 428 | -.530 -.508 | -. 522 | -. 1150 | =.164 | -. 180 | -.225 -.239 |
|  | 59.5 | -. 109 | -. 2330 | -. 450 | -. 475 | -. 088 | -. 098 | -. 148 | -. 227 |
|  | 72.0 | -. 039 | -. 116 | -. 404 | -. 463 | -. 030 | -. 040 | -. 110 | -. 203 |
|  | 79.5 91.0 | .0018 | -.131 -.051 | -.367 -.329 | -.420 -.407 | . 073 | . 050 | -. 0.101 | -. 2280 |

TASEE XI.- ECNTIMUED.
(c) $0_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| Soxisean eta. | ( $\begin{aligned} & \text { Percent } \\ & \text { chord }\end{aligned}$ | पPPER SURFACE |  |  |  | LOWER subrace |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angie of attack |  |  |  | Angle of attaok |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| 0.086 b/2 |  |  |  |  |  | $\begin{array}{r} 0.121 \\ .481 \\ .446 \\ .380 \\ .390 \\ .290 \\ .261 \\ .210 \\ .147 \\ .147 \\ .080 \\ .055 \\ .029 \\ -.016 \\ -.024 \end{array}$ |  |  |  |
| 0.195 b/2 |  |  |  |  |  | - 0.5 <br>  <br> . 326 <br> . C 235 <br> 1419 : 1750 050 0 : 025 $\begin{array}{r} 0.017 \\ -.055 \\ -=0.0 \end{array}$ |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  | $\begin{array}{r}0.71 \\ .425 \\ \hline\end{array}$ <br>  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  | 0.450 .484 $\begin{array}{r}-315 \\ .274 \\ \hline 27\end{array}$ .210 .0159 .051 .051 .027 -.015 -.060 -.098 -.058 $-.158$ |  |  |  |

table XI.- Concluded.
(c) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| $\begin{aligned} & \text { Semi- } \\ & \text { epan. } \\ & \text { eta. } \\ & \hline \end{aligned}$ | ${ }_{\text {Peroent }}^{\text {Phord }}$ | UPPER SURFACE |  |  |  | LOTER sURPage |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 5.5 \\ 5.5 \\ 1.5 \\ 11.0 \\ 14.0 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.0 \\ 34.5 \\ 44.0 \\ \hline 41: 5 \\ 51.0 \\ 71.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ |  |  |  |  |  |  |  |  |
| $0.831 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.924 \mathrm{~b} / 2$ |  | -.902 -0.983 -.786 -.762 -.662 -.742 -.742 -.720 -.718 -.697 -.695 -.665 -.622 -.620 -.758 -.562 |  |  |  |  |  |  |  |


(a) $a_{2}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$.

| Seriepan ta. | Peraent ohord | UPPER SURFACE |  |  |  | LOTER BURYMCE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attaok |  |  |  | sagle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | 20 | $3^{\circ}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 44.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 72.5 \\ 79.5 \\ 91.0 \end{array}$ | 0.576 .137 .051 .021 -.003 $=.034$ -.072 -.088 -.132 -.167 $=.202$ -.228 -.237 -.205 $=.116$ -.033 | 0.577 .052 .002 -.025 $=.043$ $=.073$ -.088 -.109 $=.120$ $=.167$ $=.200$ $=.236$ $=.263$ -.280 -.251 -.149 -.047 | $\begin{aligned} & 0.568 \\ & =.036 \\ & =.043 \\ & =.070 \\ & =.061 \\ & =.109 \\ & =.180 \\ & =.141 \\ & =.149 \\ & =.196 \\ & =.265 \\ & =.2653 \\ & =.319 \\ & =.899 \\ & =.180 \\ & =.059 \end{aligned}$ |  | $\begin{array}{r} . .702 \\ .041 \\ .012 \\ -.010 \\ =.032 \\ =.050 \\ -.075 \\ -.151 \\ -.133 \\ -.162 \\ -.007 \\ -.246 \\ =.229 \\ -.130 \\ -.034 \end{array}$ | $\begin{array}{r} -.169 \\ .085 \\ .050 \\ .024 \\ -.001 \\ -.021 \\ -.049 \\ -.075 \\ -.107 \\ -.135 \\ -.182 \\ -.223 \\ -.004 \\ -.113 \\ -.031 \end{array}$ | $\begin{array}{r} -.231 \\ .127 \\ .093 \\ .060 \\ .036 \\ -.019 \\ -.045 \\ -.075 \\ -.105 \\ -.153 \\ -.192 \\ -.170 \\ -.094 \\ -.028 \end{array}$ | -0.287 0.167 .131 .093 .067 .040 .013 $=.018$ -.046 $=.077$ -.128 $=.168$ $=.244$ $=.082$ -.026 |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 13.0 14.5 21.5 24.0 31.5 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  | 0.485 $=.038$ $=.080$ $=.102$ $=.113$ $=.135$ $=.158$ $=.196$ $=.230$ $=.279$ $=.304$ $=.308$ $=.293$ $=.230$ -.086 .006 | $\begin{aligned} & 0.459 \\ & =.155 \\ & =.146 \\ & =.164 \\ & =.160 \\ & =.198 \\ & =.219 \\ & =.255 \\ & =.232 \\ & =.345 \\ & =.357 \\ & =.359 \\ & =.269 \\ & =.100 \end{aligned}$ | 0.420 $=.289$ -.211 $=.228$ $=.208$ -.223 $=-238$ $=.280$ $=.271$ $=.298$ $=.343$ $=.350$ $=.395$ $=.410$ $=.350$ $=$. | $\begin{aligned} & 0.103 \\ & =.021 \\ & =.045 \\ & =.0660 \\ & =.093 \\ & =.116 \\ & =.138 \\ & =.171 \\ & -.201 \\ & =.227 \\ & -.231 \\ & -.268 \\ & =.260 \\ & -.068 \\ & . .009 \end{aligned}$ | $\begin{array}{r} -.197 \\ .038 \\ .009 \\ -.023 \\ -.054 \\ =.081 \\ =.104 \\ =.141 \\ -.170 \\ =.196 \\ -.210 \\ -.243 \\ -.231 \\ -.157 \\ -.072 \\ .009 \end{array}$ | -.274 0.000 .057 .018 -.017 $=.047$ $=.108$ -.137 -.187 -.176 $=.2150$ -.130 -.070 .008 | $\begin{array}{r} -.79 \\ 0.342 \\ .142 \\ .106 \\ .060 \\ -.025 \\ -.009 \\ -.070 \\ -.100 \\ -.127 \\ -.142 \\ -.180 \\ -.162 \\ =.118 \\ -.060 \\ .009 \end{array}$ |
| $0.352 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.8 14.5 21.6 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 | 0.445 $=.010$ $=.100$ $=.124$ $=.146$ $=.169$ $=.217$ $=.238$ $=.242$ -.279 -.2651 -.224 $=.106$ -.033 .049 | 0.431 $=.151$ -.184 $=.202$ -.212 -.232 -.243 -.275 $=.298$ -.305 -.345 $=.350$ -.319 -.274 -.113 -.049 .041 | $\begin{aligned} & 0.383 \\ & =.310 \\ & =.270 \\ & =.277 \\ & =.279 \\ & =.295 \\ & =.322 \\ & =.350 \\ & =.360 \\ & =.412 \\ & =.4000 \\ & =. .750 \\ & =.110 \\ & =.051 \end{aligned}$ | 0.308 $=.492$ $=.366$ $=.333$ $=.349$ $=.345$ $=.362$ $=.383$ $=.393$ -.476 $=.471$ $=.448$ $=.154$ -.959 .036 | $\begin{array}{r} -0.039 \\ -.106 \\ -.129 \\ -.147 \\ -.199 \\ -.210 \\ -.242 \\ -.270 \\ =.283 \\ -.275 \\ -.270 \\ -.105 \\ -.101 \\ -.029 \end{array}$ | $\begin{aligned} & 0.060 \\ & 0.060 \\ & =.058 \\ & =.092 \\ & -.120 \\ & -.150 \\ & -.171 \\ & -.208 \\ & -.235 \\ & -.240 \\ & -.231 \\ & -.248 \\ & -.192 \\ & -.103 \\ & -.031 \end{aligned}$ | -.7 0.142 .025 .001 -.042 -.071 -.107 -.130 -.184 -.190 -.187 -.192 -.210 -.169 -.099 -.026 .053 | -.821 0.089 .065 .011 -.020 $=.061$ $=.080$ $=.120$ $=.140$ $=.150$ $=.176$ $=.142$ -.083 -.019 .055 |
| $0.555 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 44.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.433 $=.054$ $=.153$ $=.174$ $=.184$ $=.236$ $=.239$ $=.243$ $=.240$ $=.269$ $=.266$ $=.240$ $=.278$ $=.020$ .070 | 0.427 -.229 -.259 -.280 $=.271$ $=.288$ -.308 $=.312$ -.326 -.320 $=.310$ $=.284$ $=.224$ $=.101$ -.029 .065 |  | 0.298 $=.654$ $=.475$ $=.481$ $=.440$ $=.446$ $=.436$ $=.456$ $=.471$ $=.528$ $=.542$ $=.480$ $=.191$ -.104 -.024 .066 | $\begin{array}{r} -0.079 \\ =.139 \\ =.196 \\ -.210 \\ -.235 \\ -.240 \\ =.254 \\ =.262 \\ =.260 \\ =.250 \\ =.194 \\ -.075 \\ -.011 \\ .072 \end{array}$ | $\begin{aligned} & 0.040 \\ & -.060 \\ & -.080 \\ & -.130 \\ & -.149 \\ & -.177 \\ & -.150 \\ & -.210 \\ & -.220 \\ & -.221 \\ & -.214 \\ & -.200 \\ & -.160 \\ & -.081 \\ & -.015 \\ & .070 \end{aligned}$ | $\begin{array}{r} 0.140 \\ .018 \\ -.004 \\ -.061 \\ -.082 \\ -.120 \\ -.136 \\ =.180 \\ -.170 \\ -.1767 \\ =.167 \\ -.244 \\ -.070 \\ -.010 \\ .070 \end{array}$ | .--7 0.085 .061 -.001 -.029 -.070 -.087 $=.118$ -.137 $=.143$ $=.145$ $=.143$ $=.068$ -.010 .060 |

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TABLE XII. - CONTINUED.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - Concluded.

| Sem1span sta. | Percent chord | UPPER SURFACE |  |  |  | LOMER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attaok |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.428 | 0.400 | 0.320 | 0.204 |  |  |  |  |
|  | 1.5 | -. 067 | -. 263 | -. 379 | -. 878 | -0.072 | 0.077 | 0.191 | 0.277 |
|  | 5.5 | -. 176 | -. 335 | -. 460 | -. 635 | -. 164 | -. 066 | . 022 | . 099 |
|  |  | -. 189 | -. 380 | -. 479 | -. 639 | -. 174 | -. 081 | . 004 | . 073 |
|  | 11.0 14.5 | -.180 -.204 | .389 $=.305$ | $=.402$ $=.413$ | . .487 -.486 | - 2.208 $=.216$ | -.130 -.143 | .059 -.074 | $.00 E$ -.020 |
|  | 21.0 | -. 222 | -. 301 | -. .418 | -. 494 | -.224 | -. .16 | -. 108 | -. 0.058 |
|  | 24.5 | -. 227 | -. 299 | -. 423 | -. 500 | -. 230 | -.17\% | -. 120 | -. 077 |
|  | 31.0 | -. 233 | -. 299 | -. 391 | -. 512 | -. 237 | -. 189 | -. 140 | -. 0.096 |
|  | 34.5 | -. 234 | -. 299 | -. 374 | -. 524 | -. 230 | -. 190 | -. 141 | -. 108 |
|  | 41.0 | -. 243 | -. 298 | -. 343 | -. 512 | -. 228 | -. 193 | -. 150 | -. 125 |
|  | 44.5 | -. 240 | -. 291 | -. 308 | -. 379 | -. 230 | - 201 | -. 162 | -. 139 |
|  | 51.0 | -.219 -.190 | -.262 -.223 | -. 234 -.211 | -.230 -.168 | -. 2200 | -. 201 | -.165 -.148 | -. 1446 |
|  | 71.0 | -. 0.057 | -. 0.068 | -. .079 | -. -.067 | -..042 | -. 066 | -. 0.060 | -. 0.065 |
|  | 79.5 | . 012 | .003 | -.004 | -.003 | . 019 | . 008 | . 005 | -.001 |
|  | 91.0 | . 092 | . 086 | . 081 | . 086 | . 097 | . 089 | . 087 | . 072 |
| $0.831 \mathrm{~b} / 2$ | 0 | 0.412 | 0.443 | 0.388 | 0.297 |  |  |  |  |
|  | 1.5 | -. 0665 | -. 300 | -. 604 | -. 950 | -0.077 |  | 0.213 | 0.291 |
|  | 5.5 | -.174 -.174 | -. 320 -.313 | -.509 -.503 | -.740 -.719 | -. 1772 | -. 0.062 | . 030 | . 0991 |
|  | 11.0 | -. 183 | -. 28 年 | -. 434 | -. 513 | -. 190 | -. 110 | -. 037 | .018 |
|  | 14.5 | -. 196 | -. 292 | -. 420 | -. 541 |  |  | - - |  |
|  | 21.0 | -. 213 | -. 290 |  |  | -. 213 | -. 151 | -. 098 | -. 0.054 |
|  | 24.5 | -. 223 | -. 294 | -. 368 | -. 546 | -. 219 | -. 162 | -. 111 | -. 068 |
|  | 37.8 | . .227 -.245 | . .282 -.294 | -.316 $=.303$ | -. 474 | -. 234 $=.244$ | -. 190 | -. 143 | -. 108 |
|  | 42.0 | -. 245 -.260 | -. 294 | -.303 -.322 | $=.363$ -.257 | -. 244 | -. 2129 | -. 169 | -.140 -.170 |
|  | 44.5 | -. 232 | -. 267 | -. 270 | -. -134 | -. 230 | -. 2218 | -. 203 | -. 270 |
|  | 51.8 | -. 202 | -. 232 | -. 178 | -. 165 | -. 193 | -. 176 | -. 160 | -. 270 |
|  | 59.5 | -. 114 | -. 084 | -. 118 | -. 115 | -. 126 | -. 121 | -. 113 | -. 115 |
|  | 71.0 | -. 024 | -. 035 | -. 040 | -. 039 | -. 016 | -. 023 | -. 030 | -. 038 |
|  | 79.5 | . 037 | . 035 | . 032 | .030 .107 | . 1176 | . 042 | . 1034 | . 024 |
| $0.924 \mathrm{~b} / 2$ | 0 | 0.439 | 0.355 | 0.180 |  |  |  |  |  |
|  | 2.5 | -. 0022 | -. 249 | -. 585 | -. 918 | -0.093 | 0.082 | 0.212 | 0.287 |
|  | 5.5 | -. 181 | -. 330 | -. 527 | -. 800 | -. 177 | -. 059 | . 040 | . 109 |
|  |  | -. 192 | =. 336 | -. 518 | -. 799 | -. 180 | -. 064 | . 032 | . 100 |
|  | 12.0 | -. 201 -.245 | -. 302 | -. 438 $=.430$ | .6614 -.531 | -. 206 -.240 | -. 122 | -. 0.048 | .009 -.049 |
|  | 21.0 | -. 290 | -. 359 | -. 413 | -. 572 | -. 291 | -. 239 | -.182 | -. 141 |
|  | 24.5 | -. 250 | -. 308 | -. 332 | -. 225 | -. 274 | -. 260 | -. 232 | -. 212 |
|  | 31.0 | -. 213 | -. 250 | -. 185 | -. 115 | -. 223 | -. 208 | -. 197 | -. 228 |
|  | 34.5 | -. 176 | -. 166 | -.182 | -. 144 | -. 185 | -. 178 | -. 164 | -. 185 |
|  | 41.8 | -.182 -.170 | -. 186 | -. 217 -.198 | -. 2000 | -. 170 | -. 165 | -. 157 | -. 151 |
|  | 51.5 | -. 131 | -. 137 | -. 144 | -. 152 | -. 140 | -. 140 | -. 133 | -. 126 |
|  | 59.5 | -. 054 | -. 066 | -. 0.074 | -. 081 | -. 054 | -. 060 | -. 012 | -. 071 |
|  | 73.0 | . 005 | . 003 | $\bigcirc$ | -. 010 | . 015 | . 010 | . 007 | -. 010 |
|  | 91.0 | .120 | . 122 | . 117 | . 097 | . 131 | .121 | . 110 | . 093 |

TABLE XII. - CONTIHUED.
(b) $a_{u,} 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Sealspan sta | Rereent chord | UPPER SURFACE |  |  |  | LCTER GURPMCE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attaok |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ | $4{ }^{\circ}$ | $6{ }^{\circ}$ | 8 | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.521 | 0.442 | 0.338 | 0.231 |  |  |  |  |
|  | 1.5 | -. 238 | -. 4772 | -. 734 | -2.047 | 0.340 | 0.430 | 0.510 | 0.572 |
|  | 5.5 | -. 141 | -. 237 | -. 335 | -. 407 | . 209 | . 282 | . 359 | . 426 |
|  | $1{ }^{6.5}$ | -. -162 | -. 252 -.230 | -. 347 | -. 404 $=.369$ | . 121 | . 2496 | . 26 | - 385 |
|  | 14.5 | -. 178 | -. 238 | -. 322 | -. 398 | .101 | -163 | .224 | . 287 |
|  | 21.0 | -. 183 | -. 214 | -. 317 | -. 381 | . 070 | . 127 | . 188 | . 240 |
|  | 24.5 | -. 200 | -. 263 | -. 326 | -. 369 | . 043 | . 102 | . 159 | . 209 |
|  | 31.0 | -. 201 | -. 260 | -- 314 | - 380 | . 012 | . 068 | . 120 | . 165 |
|  | 34.5 | -. 260 | -. 320 | -. 373 | -. 435 | -. 014 | . 040 | . 090 | . 135 |
|  | 41.0 | -. 289 | - 360 | -. 420 | -. 470 | -. 0.46 | . 008 | . 0.56 | . 098 |
|  | 44.5 51.0 | -. 325 | -. 390 | -. 4.50 | -. 508 | -. 127 | -. -.050 | -. -.002 | . .070 |
|  | 51.5 | -. 2 Eb | 二. F 40 | -. 492 | -. 550 | -. 140 | -..085 | -. 0.03 | .063 |
|  | 11.0 | -. 404 | -. 475 | -. 541 | -. 600 | -. 122 | -. 080 | -. 0.5 | -. 015 |
|  | 79.5 | -. 291 | -. 395 -.175 | -. 4924 | =. 579 | -. 0.071 | -.045 -.028 | -. 024 | -. 022 |
|  |  | -. 0.15 | -. 175 | -. 255 |  | -. 030 |  | -.031 | 05 |
| 0.195 b/2 | 0 | 0.350 | 0.197 | 0.045 | -0.090 |  |  |  |  |
|  | 1.5 | -. 430 | -. 730 | -1.021 | -1.100 | 0.397 | 0.478 | 0.530 | 0.556 |
|  | 5.5 | -. 277 | $=-373$ | -. 607 | -. 880 | . 191 | - 286 | - 315 | . 423 |
|  | 11.0 | -. 255 | -. 3158 | -. 460 | -. 640 | . 100 | .177 | - 247 | - 309 |
|  | 14.5 | -. 269 | -. 543 | -. 470 | -. 550 | . 068 | . 135 | . 203 | . 261 |
|  | 21.0 | -. 265 | -. 35 | -. 417 | -. 517 | . 024 | . 0.6 | . 157 | . 210 |
|  | 24.5 | -. 275 | -. 39 | -. 420 | -. 505 | . 002 | . 067 | . 137 | . 177 |
|  | 37.0 | -. 289 | -. 367 | -. 414 | -. 507 | -. 039 | . 025 | -080 | . 127 |
|  | 34.5 42 4 | -. 325 | -. 397 | -. 4.513 | -. 589 | -. 0.097 | -. 0.037 | . 049 | . 0.097 |
|  | 44.5 | -. 410 | =. 480 | -. 54 | -. 605 | -. 115 | -. -.056 | -.002 | . 037 |
|  | 51.0 | -. 425 | -. 485 | -. 550 | -. 613 | -. 115 | -. 092 | -. 035 | -. 002 |
|  | 59.5 | -. 457 | - 515 | -. 513 | -. 627 | -. 140 | -. 090 | -. 049 | -. 025 |
|  | 71.0 | -. 804 | -. 509 -.287 | -.594 -.434 | -.660 -.604 | -.108 -.060 | -. 075 -.047 | -. 050 -.040 | -. 0.058 |
|  | 91.0 | -. 0.036 | -. 096 | -. 104 | -. -307 | -. 0.004 | -. 018 | -. 039 | -. 0.097 |
| $0.382 \mathrm{~b} / 2$ | ${ }^{0}$ | 0.213 | -0.020 | - -1.168 | -0.323 | 0.281 | 0.377 | 0.451 | 0.480 |
|  |  | -. 454 | - $=.740$ | -1.107 | -1. 226 | 0.141 | 0.377 | 0.313 | -. 367 |
|  | 6.5 | -. 440 | -. 590 | -1.163 | -1.266 | . 113 | .267 | . 28 | -340 |
|  | 11.0 | -. 380 | -. 5 22 | - 2697 | . 954 | . 057 | . 143 | . 216 | . 270 |
|  | 14.5 | -. 407 | -. 510 | -. 596 | -. 885 | . 020 | . 103 | . 175 | . 226 |
|  | 21.0 | -. 390 | -.501 | -. 589 | -. 2675 | -. 0200 | . 057 | . 126 | . 173 |
|  | 31.0 | -. 432 | -. 511 | =. 590 | -. 680 | -. 0.08 | -.019 | .045 | . 086 |
|  | 34.5 | - -4.41 | - 520 | - 595 | -. 668 | - 109 | -. 040 | .020 | . 057 |
|  | 41.0 | - 500 | -. 668 | =. 650 | -. 714 | $=220$ | -. 059 | -. 007 | -036 |
|  | 51.0 | -.528 | $=.603$ | -. 670 | -. 737 | $=.175$ | -. 103 | -. 0.060 | -. 040 |
|  | 59.5 | -. 555 | -. 642 | -. 707 | -. 770 | -. 135 | -. 097 | -. 072 | -. 070 |
|  | 719 | -. 211 | -. 353 | -. 517 -.210 | -. 750 -.510 | -.086 | -.071 -.030 | .067 -.042 -.012 | -.092 -.097 |
|  | 91.0 | -. 0.034 | -. 003 | -. 0.047 | -. 280 | -. .034 | -. 016 | -. 016 | -. 116 |
| $0.555 \mathrm{~b} / 2$ | 0 | 0.202 | 0.012 | -0.172 | -0.335 |  |  |  |  |
|  | 1.5 | -. 936 | -1. 224 | -1.362 | -1.417 | 0.287 | 0.380 | 0.434 | 0.459 |
|  | 5.5 | -. 5000 | -I. 1.17 | -1.270 | -2. 355 | . 1148 | . 237 | - 306 | . 350 |
|  | 11.0 | -. 490 | -. 737 | -1.271 | -1.350 | . 049 | . 146 | . 208 | . 52 |
|  | 14.5 | -. 502 | -. 566 | -1.289 | -1.317 | .018 | . 105 | . 169 | . 211 |
|  | 21.0 | -. 508 | -. 586 | -. 760 | -1.239 | -. 030 | . 048 | . 210 | . 146 |
|  | 24.5 31.0 | -. 507 $=.518$ | - 5 . 598 $=-598$ | -. 695 $=.650$ | -1.180 | -. 050 | .029 -.020 | . 081 | . 113 |
|  | 314.5 | =.518 | -. 898 | -.660 | -. 8.50 | -. 0.102 | -. 0.038 | .031 | .050 |
|  | 41.0 | -. 590 | -. 662 | -. 728 | -.76\% | -. 120 | -. 067 | -. 024 | -. 010 |
|  | 44.5 | -. 619 | -. 702 | -. 763 | -. 780 | -. 125 | -. .972 | -. 040 | -. 032 |
|  | 51.0 | -. 606 | -.700 | -. 767 | -. 818 | -. 131 | -. 090 | -. 0.065 | -. 077 |
|  | 59.5 | -. 270 | -.568 <br> -.148 | -. 707 | -.849 | -. 1.125 | - $=100$ | -. 090 | -. 112 |
|  | 719.5 | -. 099 -.011 |  | -.207 -.143 | -.800 -.458 | -. 0.067 | -.060 -.024 | -. 070 | -.125 -.132 |
|  | 91.0 | -. 0.070 | -. 040 | -. 0.085 | -. 241 | -.047 | -..022 | -.,034 | -. 148 |

TABLE XII.- CONCLJDED.
(b) $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluced.

| Semiapan sta. | Percent chord | UPPER SURFACE |  |  |  | LOMER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4{ }^{\circ}$ | $6^{\circ}$ | $5^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.095 | -0.114 | -0.311 | -0.487 |  |  |  |  |
|  | 1.5 | -1.070 | -1.263 | -1.390 | -1.379 | 0.331 | 0.401 | 0.434 | 0.437 |
|  | 5.5 | -. 898 | -1.180 | -1.358 | -1.360 | . 150 | . 242 | - 305 | . 335 |
|  | 12.5 | -. 880 | -1.189 | - 1.360 | -1.357 | . 124 | . 213 | . 279 | - 325 |
|  | 14.5 | -. 566 | -1.102 | -1.273 | -1.325 | . 023 | .102 | . 160 | . 188 |
|  | 21.0 | -. 580 | -. 670 | -1.208 | -1.269 | -. 022 | . 046 | . 100 | . 120 |
|  | 24.5 | -. 582 | -. 630 | -1.068 | -1.276 | -. 040 | . 022 | . 071 | . 088 |
|  | 31.6 | -. 584 | -. 650 | -. 823 | -1.247 | -. 073 | -. 017 | . 025 | . 035 |
|  | 34.5 | -. 600 | -. 667 | -. 761 | -1.221 | -. 088 | -. 032 | . 02 | . 010 |
|  | 41.0 | -. 654 | -. 720 | -. 693 | -1.165 | -. 112 | -. 064 | -. 036 | -. 040 |
|  | 44.5 | -. 683 | -. 773 | -. 715 | -1.162 | -. 124 | -. 088 | -. 0.59 | -. 070 |
|  | 51.6 | -. 323 | -. 721 | -.685 | -1.030 | -. 137 | -. 106 | -. 098 | -. 113 |
|  | 79.5 | -. 0.040 | -. 1874 | -. 6.487 | -. 0.681 | -. 1479 | -. 122 | -. 128 | -. 169 |
|  | 79.5 | . 019 | -. 0.03 | -. 390 | -. 368 | -. 0.016 | -. 0.045 | -. 2115 | -. 214 |
|  | 91.0 | . 086 | . 0.04 | -. 222 | -. 259 | . 060 | . 020 | -. 085 | .. 191 |
| $0.831 \mathrm{~b} / 2$ | 0 | 0.203 | 0.014 | -0.169 | -0.327 |  |  |  |  |
|  | 1.5 | -1.095 | -1.280 | -. 904 | -1.240 | 0.335 | 0.393 | 0.416 | 0.409 |
|  | 5.5 | -. 978 | -1.250 | -. 917 | -1.251 | . 149 | . 228 | . 280 | . 301 |
|  | 6.5 |  | $-1.257$ | -. 921 | -1.257 | . 138 | . 218 | . 273 | . 290 |
|  | 11.0 | -. 817 | -1.188 | -. 918 | -1.247 | . 059 | . 131 | . 185 | . 204 |
|  | 14.5 21.6 |  | -1.160 |  |  |  |  |  | -092 |
|  | 21.0 | -. 6.618 | -1.099 | -. 877 | -1.183 | -. 0.045 | . 035 | . 080 | . 0952 |
|  | 31.0' | -. 6.630 | -1.018 | -. 804 | -1.218 | -..083 | -. 039 | -. 007 | . 004 |
|  | 34.5 | -. 637 | -. 629 | -. 745 | -1.136 | -. 120 | --.074 | -. 042 | -. -.047 |
|  | 41.0 | -. 370 | -. 610 | -. 706 | -1.134 | -. 156 | -. 119 | -. 091 | -. 103 |
|  | 44.5 | -. 151 | -. 530 | -. 689 | -1.118 | -. 193 |  | -. 137 | -. 157 |
|  | 51.0 | -. 100 | -. 358 | -. 652 | -1.099 | -. 187 | -. 169 | -. 164 | -. 198 |
|  |  | -. 070 | -. 268 |  | -. 980 | -. 131 | -. 172 | -. 220 | -. 298 |
|  | 71.0 | -. 0.021 | -. 088 | -. 491 -.412 | -. 825 | -. 014 | -. 081 | -. 175 |  |
|  | 79.5 91.0 | . 031 | . 010 | -.412 -.312 | -.796 | . 0175 | -. 020 | -.129 -.120 | . .287 -.240 |
| $0.924 \mathrm{~b} / 2$ | 0 |  |  |  |  |  |  |  |  |
|  | 1.5 | -1.062 | -0.165 | -0.625 | -0.176 | $0.3 \overline{2} 6$ |  | 391 |  |
|  | 5.5 | -1.050 | -1.115 | -. 771 | -1.157 | . 150 | . 222 | . 270 | . 279 |
|  | 6.5 | -1.039 | -1.082 | -. 772 | -1.147 | .140 | . 210 | . 258 | -268 |
|  | 11. 14.5 | -1.003 |  |  | -1.130 |  | . 110 | .147 | . 168 |
|  | 14.5 21.0 | -.876 -.630 | -. 9.934 | -. 750 | -1.145 | -. 016 | .050 .054 | .092 -.010 | . 101 |
|  | 24.5 | -. 612 | -. 783 | -. 688 | -1.079 | -. 190 | -. 133 | -. 090 | -. 0.090 |
|  | 31.0 | -. 200 | -. 730 | -. 659 | -1.058 | -. 233 | -. 185 | -. 149 | -. 164 |
|  |  | -. 070 |  |  | -1.048 |  | -. 226 | -. 201 | -.234 |
|  | 44.0 | -. 099 | -. 607 | -. 608 | -1.024 | -. 222 | -. 240 | -. 235 | -. 287 |
|  | 44.5 | -. 119 | -. 551 | . 582 | -1.021 | -. 167 | -. 245 | -. 270 | -. 344 |
|  | 59.5 | -. 0.090 | -. 3.34 | -. 359 | -1.011 | -. 121 | -. 197 | -. 272 | -. 373 |
|  | 71.0 | -. 026 | -. 161 | -. 442 | -. 993 | -. 020 | . .046 | -. 154 | -. 374 |
|  | 79.5 | . 008 | -. 159 | -. 390 | -. 959 | . 021 | . 001 | -. 131 | 362 |
|  | 91.0 | . 064 | -. 064 | -. 345 | -. 805 | . 081 | . 048 | -. 130 | -. 352 |


(a) $a_{u}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Senispan Eta. | Percent ahord | UPPER SLRFACE |  |  |  | LOTIER 80RPAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angie of attack |  |  |  | uncle of attacr |  |  |  |
|  |  | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{0}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{0}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.578 | 0.580 | 0.572 | 0.555 |  |  |  |  |
|  | 1.5 | . 2140 | . 057 | -. 0.030 | -. 125 | 0.107 | 0.169 | 0.232 | 0.288 |
|  | 5.5 | . 051 | -.005 | -. 0.040 | -.085 | . 015 | . 0750 | . 135 | . 173 |
|  | 11.0 | -.002 | -. 0.040 | $=.076$ | -. 178 | -.007 | . 020 | . 063 | . 048 |
|  | 114.5 | -. 034 | -. 070 | -. 103 | -. 142 | -. 030 | -. 001 | . 035 | . 070 |
|  | 21.0 | -. 052 | $=.078$ $=.106$ | - -113 | $=.149$ $=.168$ | -. 0.00 | -. 0.023 | . 010 | . 015 |
|  | 31.0 | -.08E | -. 120 | 0.143 | -. 171 | -. 103 | -. 080 | -. 046 | -. 016 |
|  | 34.5 | -. 134 | -. 167 | -. 193 | -. 226 | -. 126 | -. 112 | -. 075 | -. 048 |
|  | 41.8 | -. 368 | -. 203 | -. 236 | -. 265 | -. 170 | -. 274 | -. 105 | -.080 |
|  | 44.5 | - 202 $=-270$ | -. 235 | -. 260 | -.392 -.320 | -. 230 | -. 204 | -. -176 | -. 238 |
|  | 59.5 | -. 230 | -. 268 | -. 314 | -. 350 | $=.240$ | -. 220 | -. 184 | -. 159 |
|  | 73.8 | -8834 | -. 285 | -. 310 | -. 385 | - 250 | -. 223 | -. 170 | -.147 -.088 |
|  | 79.0 9 | -. 136 -.042 | -. 172 | $=.200$ -.070 | -. 252 | -. 0.149 | -. 227 | -. 0937 | -. 0888 |
| $0.195 \mathrm{~b} / 2$ |  | 0.499 | 0.487 | 0.462 | 0.418 |  |  | - - |  |
|  | 1.5 | . 0.40 | -. 040 | -. 151 | -. 280 | 0.105 | 0.193 | 0.278 | 0.344 |
|  | 5.5 | -.015 | -. 082 | -. 159 | -. 201 | -. 019 | . 037 | . 096 | - 1146 |
|  | 6.5 | -. 042 | -. 108 | -. 160 | -. 220 | -. 042 | -.027 | .062 | . 1106 |
|  | 11.8 14.5 | -. 0682 $=.090$ | -. 116 | -. 156 | -.200 -.217 | -.066 -.095 | -. 0.059 | -.020 | . 0630 |
|  | $\frac{14.5}{21.0}$ | -. 090 -119 | -. 140 | -. 175 | -.217 -.225 | -. 095 | -. 0.07 | -.013 | -.009 |
|  | 24.5 | -. 140 | -. 184 | -. 217 | -. 254 | -. 142 | -. 110 | -. 070 | -. 030 |
|  | 31.0 | -. 160 | -. 200 | -. 233 | -. 288 | -. 279 | -. 1151 | -. 113 | -. 070 |
|  | 34.5 | -. 197 | --237 | -. 259 | -. 296 | -. 2121 | -.184 -.215 | -. 139 | - $=.102$ |
|  | 41.0 | -. 270 | -. 289 | -.310 -.34 | -. 337 | -.253 | -. 222 | -. 179 | -. 215 |
|  | 51.8 | -. 275 | -. 324 | -. 359 | -. 350 | -. 230 | -. 250 | -. 208 | -. 176 |
|  | 59.5 | -. 271 | -. 374 | -. 371 | -. 411 | -. 287 | -. 267 | -. 195 | -. 166 |
|  | 79.5 | -. -.219 | -. 0.099 | -. $\mathrm{-} 114$ | -. F - 166 | -. 0.068 | -. 085 | -. 0.074 | -. 0.06 |
|  | 91.0 | . .007 | -.002 | -.,001 | -. 010 | . 007 | -.002 | .008 | . 007 |
| $0.382 \mathrm{k} / 2$ |  | 0.442 | 0.429 |  |  |  |  |  |  |
|  | 1.5 | -. 012 -.102 | -.151 -.189 | -. 303 -.268 | $\begin{aligned} & =.479 \\ & -.361 \end{aligned}$ | -0.038 -110 | 0.054 -.043 | 0.146 .030 | 0.221. |
|  | 5.5 | -. 102 | -. 180 | -. 268 | $\begin{aligned} & -.361 \\ & -.357 \end{aligned}$ | -. 1128 | -. -.065 | . 005 | . $06 \%$ |
|  | 11.0 | -. 151 | -. 219 | -. 273 | -. 330 | -. 152 | -. 101 | -. 040 | . 011 |
|  | 14.5 |  | -.239 | -. 286 |  | -. 176 | -. 189 | -. 070 | -. 080 |
|  | 21.0 | -. 197 | -.24\% | -. 293 | -. 340 | -. 202 | -. 161 | -. 109 | -. 060 |
|  | 24.5 | -. 227 | -. 282 | -. 317 | - 357 | =-223 | -. 180 | -. 130 | -.080 |
|  | 31.5 | -. 2.20 | -:320 | -. 345 | -. 310 | -. 274 | -. 2124 | -. 190 | -. 141 |
|  | 41. ${ }^{\text {d }}$ | -. 301 | -. 367 | -. 411 | -. 450 | -. 295 | -. 267 | -. 193 | -. 151 |
|  | 47. 5 | -. 315 | -- 380 | -. 426 | -. 472 | -. 312 | -. 267 | -. 192 | -. 168 |
|  | 51.0 | -. 290 | $=.369$ $=.317$ | -.480 | $=.469$ $=.488$ | -. 306 | -. 268 | -. 217 | -. 149 |
|  | 71.0 | -. 110 | -.106 | -. 115 | $-.181$ | -. 108 | -. 116 | -. 099 | -.087 |
|  | 79.5 91.0 | -. 036 | -. 04059 | -. 036 | -. 055 | -. 032 | - $\begin{array}{r}.036 \\ .047\end{array}$ | -.021 .060 | -.018 .059 |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  |  | 0.429 | 0.423 | -. 413 | 0.31 | -0.086 | 0.030 | 0.140 | 0.225 |
|  | 5.5 | -. 154 | -. 258 | -. 350 | -. 463 | -. 143 | -.068 | . 017 | . 085 |
|  | 6.5 | -. 218 | -. 261 | -. 378 | -. 475 | -. 167 | -. 089 | -. 009 | . 062 |
|  | 11.0 | -. 192 | -. 274 | -. 350 | -. 435 | -. 200 | -. 140 | -. 065 | -. 001 |
|  | 24.5 | -. 215 | -. 291 | -. 359 | -.433 | =. 215 | -. 160 | -. 018 | -. 030 |
|  | 21.0 | -. 241 $=.255$ | -. 330 | -. 380 | -. 4.425 | -. 249 | -. 193 | -.12 | -.091 |
|  | 31.6 | -. 276 | -. 350 | -. 509 | -. 441 | -. 262 | -. 227 | -. 170 | -. 222 |
|  | 34.5 | -. 264 | -. 354 | -. 418 | -. 465 | -. 267 | -.238 | -. 178 | -. 137 |
|  | 41.6 | -. 200 | -. 373 | -. 455 | -. 525 | -. 276 | -. 240 | -. 161 | -. 147 |
|  | 44.5 | -. 275 | -. 345 | -. 440 | - 543 $=-53$ | -. 269 | -. 231 | -. 174 | -. 147 |
|  | 51.5 | -. 201 | -. 312 | -. 789 | -. 227 | -. 2198 | -. 2166 | -. 149 | -. 131 |
|  | 71.0 | -. 0.088 | -. 109 | -. 092 | -. 093 | -. 080 | -. 088 | -. 070 | -. 0.013 |
|  | 79.5 | -. 021 | -. 031 | -. 0.025 | -. 011 | -. 019 | -. 026 | -. 0.073 | -. 0106 |
|  | 91.0 | . 070 | . 061 | . 063 | . 013 | - 0 |  |  |  |

TABLE XIII. - CCNTINUED.
(a) $a_{u}, 0^{\circ}, 2^{\circ}, 2^{0}, 3^{\circ}$ - Concluded.

| Semispan sta. | Percent chord | UPPER SURFACE |  |  |  | LOMER SURTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1^{0}$ | $2^{\circ}$ | $3^{0}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.418 | 0.394 | 0.322 | 0.215 |  |  |  |  |
|  | 1.5 | -. 0.79 | -. 2888 | -. 530 | -. 838 | -0.085 | 0.062 | 0.187 | 0.272 |
|  | 5.5 | -. 191 | -. 327 | -. 459 | -. 595 | -. 181 | -. 080 | . 020 | . 093 |
|  | 6.5 11.0 | -. 207 | -.342 -.304 | -. 477 | -.622 -.487 | -. 190 | -.097 -.149 | 0.6 | . 070 |
|  | 14.5 | -. 2221 | -. 330 | -. 419 | -. 474 | -. 232 | -. 1.160 | -. 0.081 | -.,024 |
|  | 21.0 | -. 235 | -. 341 | -. 428 | -. 485 | -. 240 | -. 180 | -. 112 | -. 0.06 |
|  | 21.5 | -. 2440 | -. 3.36 | -. 431 | -. 494 | -. 247 | -. 190 | -. 129 | -. 080 |
|  | 31.0 | -. 249 | -. 323 | -. 433 | -. 510 | -. 250 | -. 201 | -. 243 | -. 101 |
|  | 34.5 | -. 250 | -. 312 | -. 433 | -. 527 | -. 247 | -. 200 | -. 144 | -. 1111 |
|  | 41.0 | -. 255 | -. 301 | -. 392 | -. 574 | -. 2371 | -.202 -.210 | -. 153 | - -130 |
|  | 51.0 | -. 2229 | -. 260 | -. 325 | -. 262 | -. 234 | -. 206 | -. 1.170 | -. 1142 |
|  | 59.5 | -. 200 | -. 220 | -. 192 | -. 141 | -. 200 | -. 181 | -. 153 | -. 145 |
|  | 71.0 | -. 0.063 | -. 070 | .070 . .002 | -. 049 | -. 050 | -. 070 | -. 060 | -. 066 |
|  | 91.8 | . 0972 | .086 | .088 | . 0991 | .099 | . 0806 | . 0910 | . 079 |
| $0.831 \mathrm{~b} / 2$ |  | 0.408 | 0.433 | 0.387 | 0.302 | -- |  | - ${ }^{-7}$ |  |
|  | 1.5 | -. 0.79 | -. 322 | -. 603 | -. 921 | -0.088 | 0.080 | 0.207 | 0.285 |
|  |  | -. 191 | -. 349 | -. 512 | -. 720 | -. 189 | -. 0.074 | . 022 | . 092 |
|  | 6.5 | -. 189 | -. 342 | =. 514 | -.705 -.499 | -. 187 | -.077 -.120 | .018 -042 | . 087 |
|  | 11.0 14.5 | -. 198 | $=.308$ $=.312$ | -. 454 | -. 499 | -. 208 | -. 120 | -. 042 | . 015 |
|  | 21.0 | -. 228 | -. 302 | -. 436 | -. 5440 | -. 221 | -. 160 | -. 101 | -. 0.057 |
|  | 24.5 | -. 235 | -. 302 | -. 420 | -. 551 | -. 229 | -. 170 | -. 116 | -. 069 |
|  |  |  |  |  |  | -. 248 | -. 196 |  |  |
|  | 34.5 | -.258 -254 | - 301 | -. 317 | -. 505 | -. 254 | -217 $-\quad 249$ | -. 169 -.200 | -. 143 |
|  | 41.0 | -. 284 | -. 321 | -. 282 | -.303 -.163 | -. 274 -.264 | -.249 -.253 | -. 200 | -. 273 |
|  | 51.0 | -. 223 | -. 258 | -. 168 | -.12\% | -. 218 | -. 195 | -. 172 | -. 190 |
|  | 59.5 | -. 080 | -. 067 | -. 1177 | -. 094 | -. 096 | -. 108 | -. 110 | -. 111 |
|  | 71.0 | -. 0.028 | -. 0336 | -. 0.030 .033 | -. 0288 | -. 019 | -. 0.044 | -. 0288 | -. 032 |
|  | 91.0 | .110 | . 110 | . 109 | . 109 | .118 | . 111 | . 107 | . 093 |
| $0.924 \mathrm{~b} / 2$ | 0 | 0.437 |  |  |  |  |  |  |  |
|  | 1.5 | -. 013 | -. 266 | -. 599 | -. 880 | -0.091 | 0.081 | 0.210 | 0.281 |
|  |  | -. 193 | -. 350 | -. 564 | -.788 |  |  | . 038 | . 103 |
|  | 6.5 11.0 | -. 206 -.211 | -. 351 -.311 | - 568 $=-.474$ | $=.788$ $=.670$ | -. 161 -.209 | -. 065 -.123 | .031 -.049 | . 097 |
|  | 14.5 | -. 212 | -. 331 | -. -.468 | -. 553 | -. 240 | -. 123 | -. 0.098 | -.049 |
|  | 21. ${ }^{21.0}$ | -. 306 | -. 371 | -. 441 | -. 608 | -. 293 | -. 242 | -. 186 | -. 141 |
|  | 24.5 | -. 301 | -. 349 | -. 362 | -. 550 | -. 324 | -. 298 | -. 250 | -. 219 |
|  |  | -. 248 | -. 291 | -. 160 | -. 147 |  |  |  |  |
|  | 34.5 | -.194 $=.175$ | -.199 -.159 | $=.157$ $=.205$ | . .087 -.150 | -. 210 | -. 195 <br> -.165 <br> .15 | -. -.175 | -. 228 |
|  | 44.5 | -. 1.168 | -. 1.16 | -. 201 | -. 169 | -. 2148 | -. 147 | -. -141 | -. 136 |
|  | 51.0 | -. 121 | -. 128 | -. 143 | -. 140 | -. 331 | -. 3.35 | -. 130 | -. 112 |
|  | 59.5 | -. 056 | -. 069 | -. 075 | -. 079 | -. 057 | -. 050 | -. 065 | -. 070 |
|  | 71.0 | . 008 | . 004 | . 001 | -. 003 | . 019 | . 010 | . 003 | -. 009 |
|  | 79.5 91.0 | . 122 | . 120 | . 1124 | . 048 | . 231 | . 121 | . 112 | . 098 |

table Xili．－contikued．
（b）$\alpha_{n}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ ．

| Seni－ sta． | Porent | UPPER BURTAOE |  |  |  | Levith surfiox |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Argie of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.528 | 0.452 | 0.348 |  |  |  |  |  |
|  | 1.5 | － 2.227 | －． 2525 | 0.614 $=328$ |  | 0．340 | 0．431 |  |  |
|  | 5．5 | －． 137 | －． 245 | －． 3 － 35 |  | ． 170 | ． 247 | ． 319 |  |
|  | 11.0 | －． 150 | －-220 | －． 2 St |  | ．128 | ． 2198 | －264 |  |
|  | $\frac{14.5}{21.5}$ | －． 174 | －． 233 | －． 315 |  | ． 1070 | ． 1267 | ． 185 |  |
|  | 21.5 | －． 193 | －． 251 | －． 318 |  | －094 | ． 102 | －154 |  |
|  | 31.8 | －． 196 | －-235 | －． 205 |  | －．010 | ． 063 | ． 188 |  |
|  | 41.0 | －． 2286 | －－ 351 | －． |  | －．051 | ．006 | ．057 |  |
|  | 41．5 | －． 315 | －． 370 | ＝．442 |  | －．710 | －． 056 | －－008 |  |
|  | 519：5 | 二． 372 | －-134 | ＝－484 |  | －$=1374$ | －．086 | －-0.40 |  |
|  | 79.5 | －． 312 | －． 415 | －． 4.59 |  | －． 079 | －． 0.05 | －． 0.40 |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | － 0.355 | －0．210 | －0．057 |  | 0.400 | 0.479 | 0.530 |  |
|  | 5．5 | －：223 | －－-770 | －1．600 |  | ． 191 | ． 280 | ． 350 |  |
|  | 11.5 | 二－284 | －． 341 | －． 5 5 5 |  | － 2151 | ． 238 | ： 348 |  |
|  | 12．5 | ＝－264 | －： 315 | －． 4.9 |  | ． 0.063 | ． 135 | － 201 |  |
|  | 21．0 | －． 263 | －． 3300 | －． 4141 |  | －．022 | ：066 | －151 |  |
|  | 31.6 | －：891 | －－363 | －－． 8134 |  | －：．041 | －021 | －076 |  |
|  | 34．5 | －． 320 | －． 34 | －．-.557 |  | -.072 -.100 | －． 012 | ． 010 |  |
|  | 4.5 | －． 103 | －：472 | －：54t |  | －． 119 | －：．066 | －．010 |  |
|  | 51.0 | －． 421 | －．-507 | －． 543 |  | －-150 | －． 096 | －． 0.046 |  |
|  |  | －． 420 | －． 515 | －． 388 |  | －． 113 | －． 089 | －． 064 |  |
|  | 79.5 | －． 282 | －． 3.147 | －． 2.235 |  | －．：078 | －．068 | －．062 |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | －． 688 | －1．020 | － |  | 0.282 | 0.376 | 0.940 |  |
|  | 5.5 | －． 45 | －． 720 | －1．129 |  | ． 140 | ． 233 | 509 |  |
|  | 11.0 | －． 710 | －．${ }^{\text {cog }}$ | －1．-6.65 |  | ． 058 | －140 | －210 |  |
|  | 21.5 | －． 388 | －． 496 | －． 559 |  | ．050 | ． 100 | －170 |  |
|  | 21.5 | －． 3804 | －．-490 | －． 575 |  | －．080 | ．057 | ． 320 |  |
|  | 31.8 | －． 424 | －．-.456 | －． 585 |  | －．089 | －．023 | ． 035 |  |
|  | 34.5 | －． 438 | －． 5151 | －-840 |  | －．-112 | －． 0.078 | －020 |  |
|  | 41.5 | －． $\mathrm{F}^{2} 20$ | －．-290 | －． 667 |  | －． 141 | －．：090 | －．0．041 |  |
|  | 52.0 | －－512 | －－989 | － 6.65 |  | － 2161 | － 1116 | － 078 |  |
|  | 71：0 | －： 2667 | －． 7.750 | －． 663 |  | －． 0.092 | こ－． 09 | －．099 |  |
|  | 79．5 | －． 086 | －． 201 | －-330 |  | －． 031 | －． 050 -.006 | －． |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | －． 2.816 | －1．159 | －0．147 |  | 0.289 |  | 0.430 |  |
|  | 5.5 | － 57 | －1．069 | －1． 25 |  | ． 139 | ． 23.236 | － 303 |  |
|  | 11．5 | －． 478 | －1． 073 | －1．213 |  | ：149 | ： 130 | ：2073 |  |
|  | 14.5 | －． 485 | －． 545 | －1．210 |  | ． 016 | ． 093 | －161 |  |
|  | 21.0 24.5 | －．-494 | －． 88 | $\square \mathrm{Z}$. |  | －．030 | ：033 | ． 0.70 |  |
|  | 31.0 | －． 504 | －． 592 | －． 657 |  | －． 090 | －． 037 | ． 027 |  |
|  | 34.5 | －． 519 | －． 95 | －． 665 |  | －． 110 | －． 055 | －． 009 |  |
|  | 41.0 | －． 769 | －． 643 | －． 715 |  | －． | －． 0.04 | －． 0.64 |  |
|  | 51.0 | －． 595 | －． 676 | －．764 |  | － 13 | －． 114 | －． 090 |  |
|  | 59.5 | －． 382 | －． $\mathrm{-} .216$ | -784 -.776 |  | －． $\mathrm{-}$－ 067 | －＝．124 | －． $\mathrm{-} 1100$ |  |
|  | 79.5 | －． 011 | －． 0.097 | －． 182 |  | －．020 | －． 047 | －． 088 |  |
|  | 91.0 | ． 075 | ． 005 | －． 099 |  | ． 048 | ． 02 | －． 066 |  |

TABLE XIII. - CONCLUDED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 5^{\circ}, 10^{\circ}$ - Conoluded.

| Beralepan eta. | Percent chord | UPPER SUEFACE |  |  |  | LOMER BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attaoz |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} 0.111 \\ -1.024 \\ -.857 \\ -.838 \\ -.532 \\ -.553 \\ -.566 \\ -.568 \\ -.570 \\ -.589 \\ -.642 \\ =.690 \\ -.488 \\ -.141 \\ -.033 \\ .031 \\ .093 \end{array}$ | $\begin{array}{r} -0.088 \\ -1.206 \\ -1.120 \\ -1.132 \\ -1.077 \\ -1.043 \\ -.632 \\ -.613 \\ -.640 \\ -.657 \\ -.705 \\ -.757 \\ -.750 \\ -.326 \\ -.133 \\ -.035 \\ .055 \end{array}$ | $\begin{aligned} & -0.277 \\ & -1.352 \\ & -1.314 \\ & -1.311 \\ & -1.258 \\ & -1.245 \\ & -1.208 \\ & -1.163 \\ & -.965 \\ & -.891 \\ & -.836 \\ & =.698 \\ & =.715 \\ & =.639 \\ & -.423 \\ & =.382 \\ & -.848 \end{aligned}$ |  | 0.325 .147 .123 .046 .020 <br> $-.027$ <br> $-.046$ <br> -.076 -.090 <br> $-.113$ <br> $-.127$ <br> $-.142$ <br> -.147 -.084 <br> . .017 .063 | 0.395 <br> .233 .207 <br> .123 .093 <br> .033 <br> .008 <br> $-.047$ <br> $-.080$ <br> $-.100$ <br> $-.124$ <br> $-.144$ <br> -.111 -.067 .014 | $\begin{array}{r} -.430 \\ . .295 \\ . .270 \\ .183 \\ .147 \\ .086 \\ .057 \\ .007 \\ =.015 \\ =.065 \\ =.081 \\ =.117 \\ =.152 \\ =.148 \\ =.153 \\ -.130 \end{array}$ |  |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} 0.217 \\ -1.050 \\ -.930 \\ =.937 \\ =.873 \\ -.706 \\ -.604 \\ =.616 \\ =.622 \\ =.635 \\ =.594 \\ =.265 \\ =.098 \\ =.040 \\ =.001 \\ . .043 \\ . .102 \end{array}$ | $\begin{array}{r} 0.043 \\ -1.201 \\ -1.169 \\ -1.172 \\ -1.105 \\ -1.075 \\ -1.010 \\ -1.023 \\ -.833 \\ -.719 \\ -.708 \\ -.710 \\ -.253 \\ -.111 \\ -.020 \\ .039 \\ .086 \end{array}$ | $\begin{aligned} & -0.133 \\ & -1.148 \\ & -1.140 \\ & -1.138 \\ & -1.113 \\ & -1.054 \\ & -.985 \\ & -.955 \\ & -.908 \\ & -.815 \\ & -.760 \\ & -.740 \\ & =.708 \\ & -.640 \\ & =.551 \\ & =.478 \\ & -.365 \end{aligned}$ | - | $\begin{array}{r} 0.330 \\ .141 \\ .132 \\ .055 \\ -.028 \\ -.043 \\ -.085 \\ =.121 \\ =.159 \\ -.198 \\ -.200 \\ -.144 \\ -.040 \\ .020 \\ .081 \end{array}$ | $\begin{array}{r} -.385 \\ .217 \\ .208 \\ .121 \\ .028 \\ .008 \\ . .048 \\ -.085 \\ =.128 \\ =.172 \\ -.192 \\ -.224 \\ =.112 \\ -.020 \\ .041 \end{array}$ | 0.4006 .265 .254 .166 <br> .060 <br> .037 <br> -. 024 <br> $-.063$ <br> $-.115$ <br> $-.163$ <br> $-.196$ <br> $-.270$ <br> -. 245 <br> $-.200$ <br> $-.166$ |  |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.127 \\ -1.015 \\ -1.001 \\ -.991 \\ -.935 \\ -.920 \\ -.613 \\ -.640 \\ -.441 \\ -.131 \\ . .065 \\ . .080 \\ =.089 \\ -.071 \\ -.013 \\ .017 \\ .070 \end{array}$ | $\begin{aligned} & -0.361 \\ & -1.162 \\ & -1.176 \\ & -1.169 \\ & -1.101 \\ & -1.098 \\ & -1.040 \\ & -1.006 \\ & -.853 \\ & -.743 \\ & -.559 \\ & -.540 \\ & =.368 \\ & -.170 \\ & -.008 \\ & -.020 \\ & .018 \end{aligned}$ | $\begin{array}{r} -0.588 \\ -.902 \\ -.903 \\ -.900 \\ -.873 \\ -.850 \\ -.819 \\ -.761 \\ -.732 \\ -.712 \\ -.697 \\ -.673 \\ -.652 \\ -.583 \\ -.523 \\ -.459 \\ -.390 \end{array}$ |  | $\begin{array}{r} -.326 \\ 0.148 \\ .139 \\ .042 \\ =.016 \\ -.123 \\ =.192 \\ -.240 \\ =.269 \\ -.253 \\ =.207 \\ =.127 \\ -.070 \\ -.013 \\ .027 \\ .085 \end{array}$ | 0.365 .211 <br> 201 <br> .201 <br> .040 <br> $-.062$ <br> -.148 -.206 <br> $-.253$ <br> $-.278$ <br> -.310 -.289 <br> $-.128$ <br> -. 044 <br> .058 | $\begin{array}{r} -.360 \\ 0.351 \\ .241 \\ .140 \\ .077 \\ -.029 \\ -.113 \\ =.177 \\ -.236 \\ =.273 \\ =.321 \\ -.340 \\ -.311 \\ =.229 \\ -.192 \\ -.170 \end{array}$ |  |


(a) $a_{1}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$.

| Sen 1epaln sta. | Percent ohord | UPPER SURPICE |  |  |  | LOMER Butsios |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attadr |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 17.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.5 \\ 34.5 \\ 41.5 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 92.0 \end{gathered}$ | 0.584 .146 .060 .031 .005 -.027 -.046 $=.065$ -.081 $=.125$ -.197 $=.289$ $=.257$ $=.253$ $=.149$ -.049 | 0.589 .069 .017 -.010 -.030 $=.059$ -.075 $=.095$ $=.106$ $=.151$ -.220 $=.255$ -.250 -.282 -.175 -.057 | 0.578 $=.021$ $=.032$ $=.057$ $=.069$ $=.097$ -.108 $=.128$ $=.1356$ $=.224$ $=.253$ -.283 $=.317$ $=.525$ $=.298$ | 0.562 $=.111$ $=.076$ $=.099$ $=.106$ $=.131$ $=.136$ $=.154$ $=.215$ $=.251$ $=.255$ $=.311$ $=.367$ $=.287$ $=.121$ | $\begin{array}{r} -.111 \\ 0.050 \\ .021 \\ -.002 \\ =.025 \\ =.047 \\ =.070 \\ =.059 \\ -.132 \\ =.165 \\ -.23 \\ -.23 \\ =.236 \\ =.262 \\ =.164 \\ -.051 \end{array}$ | $\begin{array}{r} . .779 \\ .095 \\ .064 \\ .036 \\ .051 \\ . .021 \\ -.037 \\ =.066 \\ -.099 \\ -.134 \\ -.196 \\ =.202 \\ =.218 \\ =.121 \\ -.034 \end{array}$ | -.213 .136 .107 .068 .042 .018 -.009 -.039 -.096 -.105 -.164 $=.182$ $=.185$ $=.157$ -.035 | -.75 0.296 .177 .142 .105 .076 .050 .023 -.003 -.039 -.073 $=.133$ $=.155$ $=.254$ -.094 -.038 |
| $0.195 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11: 0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31: 0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.505 .076 -.008 $=.035$ -.057 -.082 -.111 -.134 -.154 -.230 -.270 -.280 -.287 -.227 -.084 .005 | 0.498 $=.022$ -.066 $=.089$ -.100 -.122 -.146 $=.166$ -.184 $=.279$ -.370 $=.315$ $=.327$ -.268 -.097 .007 | 0.469 $=.140$ $=-130$ $=.150$ $=-146$ $=.186$ $=-.207$ $=.223$ $=.249$ $=.299$ $=.35$ $=.355$ $=.374$ $=-167$ $=.070$ |  | $\begin{array}{r} 0.171 \\ =.011 \\ =.036 \\ =.059 \\ =.018 \\ =.111 \\ =.177 \\ -.200 \\ -.244 \\ -.259 \\ -.277 \\ -.293 \\ -.248 \\ -.087 \end{array}$ | -.207 0.049 .018 $=.014$ $=.046$ $=.073$ -.096 $=.138$ -.171 $=.217$ $=.234$ -.259 $=.169$ -.076 .008 | -.07 0.282 .099 .067 .026 -.008 -.040 -.066 -.105 -.134 -.165 -.175 -.204 -.219 $=.147$ -.083 .001 | $\begin{array}{r} 0.349 \\ .152 \\ .115 \\ .069 \\ .033 \\ -.009 \\ =.065 \\ -.095 \\ -.125 \\ -.141 \\ -.177 \\ =.172 \\ -.132 \\ -.077 \\ \hline .004 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.0 24.5 31.8 34.5 41.0 44.5 51.8 59.5 71.8 79.5 91.0 |  |  |  | 0.326 $=.456$ $=.338$ $=.346$ $=-332$ $=-329$ $=.347$ $=.367$ $=.360$ $=-462$ $=.464$ $=.501$ $=.312$ $=.074$ .043 | $\begin{aligned} & -0.034 \\ & =.104 \\ & -.121 \\ & -.147 \\ & -.173 \\ & -.201 \\ & -.224 \\ & -.253 \\ & -.278 \\ & -.289 \\ & -.313 \\ & -.340 \\ & -.102 \\ & -.099 \\ & -.023 \\ & -.053 \end{aligned}$ |  |  | -.224 0.093 .0677 .014 -.0189 -.079 -.121 -.147 . .157 -.179 -.1964 -.096 -.024 .054 |
| $0.555 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.5 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ | 0.429 -.052 -.153 -.182 -.192 -.216 -.249 -.280 -.286 -.392 -.292 -.265 $=.184$ -.690 -.022 .070 |  |  | 0.316 -.612 $=.448$ $=.459$ $=.420$ $=.421$ $=.429$ $=.434$ $=.453$ $=.522$ $=.547$ $=.541$ $=.146$ $=.006$ -.082 | $\begin{array}{r} -0.086 \\ -.145 \\ -.166 \\ -.207 \\ -.218 \\ -.249 \\ -.267 \\ -.295 \\ -.316 \\ -.315 \\ -.297 \\ -.264 \\ -.176 \\ -.083 \\ -.018 \\ .073 \end{array}$ |  | $\begin{aligned} & -.139 \\ & 0.007 \\ & -.069 \\ & -.099 \\ & -.790 \\ & -.178 \\ & -.173 \\ & -.185 \\ & -.1986 \\ & -.177 \\ & -.150 \\ & =. .009 \\ & -.075 \end{aligned}$ | -.227 0.082 .059 -.006 $=.033$ -.096 -.097 -.127 -.143 -.161 -.157 -.157 $=.0668$ -.013 .063 |

TABLE XIV.- GONTINUED.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - concluded.

| Semispan sta. | Percent ohord | UPPER SURFAGE |  |  |  | LOWER SURFAGE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{\circ}$ | $3^{0}$ | $0^{\circ}$ | $2^{\circ}$ | $2^{\circ}$ | $3^{0}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.415 \\ & -.082 \\ & -.197 \\ & =.214 \\ & -.211 \\ & -.241 \\ & -.254 \\ & -.252 \\ & =.255 \\ & -.254 \\ & -.256 \\ & -.251 \\ & -.226 \\ & =.200 \\ & -.072 \\ & .021 \\ & .097 \end{aligned}$ | $\begin{aligned} & 0.401 \\ & -.273 \\ & -.315 \\ & -.334 \\ & -.298 \\ & -.321 \\ & -.337 \\ & -.341 \\ & -.339 \\ & -.322 \\ & -.299 \\ & -.280 \\ & -.232 \\ & =.206 \\ & -.061 \\ & .018 \\ & .098 \end{aligned}$ | 0.330 -.506 $=.449$ $=.467$ -.401 $=.424$ -.436 $=.447$ $=.461$ $=.462$ -.433 $=.355$ $=.119$ -.044 .014 .093 | 0.230 <br> -.803 -.576 <br> -.576 -.601 <br> . .498 <br> $-.481$ <br> $-.486$ <br> $-.504$ <br> $-.519$ <br> -.519 -.618 <br> -.509 -.147 <br> -.147 -.029 <br> .034 .103 | $\begin{array}{r} -.058 \\ -0.088 \\ -.187 \\ -.196 \\ -.231 \\ -.249 \\ -.267 \\ -.269 \\ -.267 \\ -.249 \\ -.231 \\ -.227 \\ -.222 \\ -.205 \\ -.062 \\ .026 \\ .103 \end{array}$ | $\begin{aligned} & 0.066 \\ & -.074 \\ & -.088 \\ & -.138 \\ & -.152 \\ & -.173 \\ & -.182 \\ & -.191 \\ & -.189 \\ & =.191 \\ & -.199 \\ & -.197 \\ & -.174 \\ & -.059 \\ & .018 \\ & .100 \end{aligned}$ | $\begin{array}{r} -.178 \\ .013 \\ =.007 \\ -.069 \\ =.088 \\ -.120 \\ -.133 \\ -.148 \\ =.150 \\ -.154 \\ -.171 \\ =.171 \\ =.160 \\ -.065 \\ .013 \\ .096 \end{array}$ | $\begin{array}{r} -.064 \\ 0.087 \\ .064 \\ -.008 \\ -.031 \\ -.068 \\ -.085 \\ -.106 \\ -.117 \\ -.134 \\ -.175 \\ -.152 \\ -.152 \\ -.080 \\ -.083 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 15.5 \\ 5.5 \\ 61.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.402 \\ & -.085 \\ & -.196 \\ & =.199 \\ & -.200 \\ & -.212 \\ & =.224 \\ & -.231 \\ & -.231 \\ & -.248 \\ & -.284 \\ & -.286 \\ & -.238 \\ & =.053 \\ & -.019 \\ & .042 \\ & .118 \end{aligned}$ | $\begin{aligned} & 0.437 \\ & -.314 \\ & -.346 \\ & -.345 \\ & -.314 \\ & -.319 \\ & -.307 \\ & -.297 \\ & -.279 \\ & -.282 \\ & -.304 \\ & -.302 \\ & -.254 \\ & -.055 \\ & -.026 \\ & .042 \\ & .119 \end{aligned}$ | $\begin{aligned} & 0.392 \\ & -.586 \\ & -.505 \\ & =.508 \\ & =.451 \\ & -.459 \\ & -.457 \\ & -.459 \\ & -.439 \\ & =.405 \\ & -.339 \\ & -.255 \\ & -.113 \\ & -.089 \\ & -.027 \\ & .040 \\ & .114 \end{aligned}$ | 0.315 -.385 <br> -.658 -.686 <br> $-.525$ <br> -.509 -.530 <br> $-.543$ <br> -.553 -.560 <br> $-.568$ <br> . .354 -.116 <br> $-.047$ <br> -.003 .049 <br> .139 | $\begin{array}{r} -0.098 \\ -.199 \\ -.197 \\ . .217 \\ -.221 \\ -.223 \\ -.238 \\ -.247 \\ -.275 \\ -.287 \\ . .234 \\ -.068 \\ -.211 \\ .052 \\ .124 \end{array}$ | $\begin{aligned} & -.083 \\ & -.070 \\ & -.072 \\ & -.115 \\ & -.155 \\ & -.182 \\ & -.187 \\ & -.205 \\ & -.239 \\ & -.260 \\ & -.199 \\ & -.089 \\ & -.017 \\ & .049 \\ & .120 \end{aligned}$ | $\begin{array}{r} -.19 \\ .017 \\ .013 \\ -.046 \\ -.098 \\ -.114 \\ -.144 \\ -.166 \\ -.202 \\ -.233 \\ -.206 \\ -.095 \\ -.019 \\ .044 \\ .114 \end{array}$ | $\begin{array}{r} 0.275 \\ .084 \\ .079 \\ .008 \\ -.062 \\ -.072 \\ -.110 \\ -.143 \\ -.178 \\ -.218 \\ -.219 \\ -.120 \\ -.025 \\ .035 \\ .101 \end{array}$ |
| 2. $924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.5 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.439 \\ & -.006 \\ & -.187 \\ & -.199 \\ & -.205 \\ & -.241 \\ & -.297 \\ & =.327 \\ & -.278 \\ & -.223 \\ & -.184 \\ & -.249 \\ & -.099 \\ & -.053 \\ & .012 \\ & .069 \\ & .129 \end{aligned}$ | $\begin{aligned} & 0.352 \\ & -.265 \\ & -.351 \\ & -.351 \\ & -.308 \\ & -.329 \\ & -.355 \\ & -.349 \\ & -.292 \\ & -.806 \\ & -.150 \\ & -.151 \\ & -.114 \\ & -.058 \\ & .019 \\ & .073 \\ & .130 \end{aligned}$ | $\begin{aligned} & 0.187 \\ & -.585 \\ & -.571 \\ & -.573 \\ & -.490 \\ & -.493 \\ & -.494 \\ & -.430 \\ & -.245 \\ & -.127 \\ & -.138 \\ & -.159 \\ & =.124 \\ & -.064 \\ & .009 \\ & .064 \\ & .118 \end{aligned}$ | $\begin{aligned} & 0.030 \\ & -.857 \\ & =.769 \\ & =.771 \\ & -.659 \\ & -.616 \\ & -.501 \\ & =.631 \\ & =.463 \\ & =.203 \\ & -.081 \\ & =.091 \\ & =.091 \\ & -.057 \\ & .007 \\ & .052 \\ & .103 \end{aligned}$ | $\begin{array}{r} -0.097 \\ -.181 \\ -.182 \\ -.206 \\ -.236 \\ -.292 \\ -.340 \\ -.294 \\ -.236 \\ -.181 \\ -.122 \\ -.108 \\ -.052 \\ .022 \\ .076 \\ .139 \end{array}$ | $\begin{aligned} & 0.091 \\ & -.052 \\ & -.056 \\ & -.114 \\ & -.155 \\ & -.229 \\ & -.294 \\ & -.263 \\ & -.200 \\ & -.162 \\ & -.124 \\ & =.116 \\ & -.053 \\ & .018 \\ & .069 \\ & .132 \end{aligned}$ |  | 0.275 .100 .094 .006 -.047 -.240 -.200 -.261 -.282 -.238 -.173 -.091 -.057 .003 .044 .104 |

TABLE XIY.- COHTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{0}, 10^{\circ}$.

| $\begin{aligned} & \text { Sens- } \\ & \text { spana } \\ & \text { sta. } \end{aligned}$ | ${ }_{\text {Pareent }}$ | UPPER BURFAOE |  |  |  | Lerer surface |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |

TABLE XIV. - CONCLDDED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}-$ Concluded.

| Sem1span stan. | Percent chord | UPPER SUAPACE |  |  |  | LOMER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6{ }^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.0 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.0 \\ 31.5 \\ 34.0 \\ 41.5 \\ 44.0 \\ 51.5 \\ 59.0 \\ 71.5 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} 0.124 \\ -1.008 \\ -.033 \\ -.814 \\ -.522 \\ -.549 \\ -.560 \\ -.559 \\ -.561 \\ -.078 \\ -.632 \\ -.683 \\ -.660 \\ -.200 \\ -.054 \\ .098 \\ \hline \end{array}$ | $\begin{array}{r} -0.062 \\ -1.192 \\ -1.110 \\ -1.120 \\ -1.077 \\ -1.037 \\ -.604 \\ -.597 \\ =.629 \\ -.650 \\ -.697 \\ -.740 \\ -.755 \\ -.603 \\ -.286 \\ -.121 \\ .013 \end{array}$ |  |  | 0.321 .1144 . .049 .015 -.032 -.057 -.083 -.094 -.117 -.132 -.146 -.044 -.097 -.0284 .064 | $\begin{array}{r} 0.386 \\ .225 \\ .198 \\ .082 \\ .022 \\ -.004 \\ -.045 \\ -.063 \\ -.097 \\ -.117 \\ -.1427 \\ -.142 \\ -.109 \\ -.019 \end{array}$ |  |  |
| $0.831 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.5 \\ & 21.0 \\ & 24.0 \\ & 31.5 \\ & 34.5 \\ & 41.5 \\ & 44.0 \\ & 51.5 \\ & 59.5 \\ & 71.0 \\ & 79.0 \\ & 91.0 \end{aligned}$ | $\begin{array}{r} 0.232 \\ -1.030 \\ -.917 \\ -.923 \\ -.762 \\ -.697 \\ -.597 \\ -.602 \\ -.611 \\ -.631 \\ =.659 \\ -.592 \\ =.169 \\ -.037 \\ .017 \\ .057 \end{array}$ | $\begin{array}{r} 0.069 \\ -1.199 \\ -1.177 \\ -1.181 \\ -1.119 \\ -1.099 \\ -1.041 \\ -1.037 \\ -.843 \\ -.705 \\ -.721 \\ -.799 \\ -.659 \\ -.1084 \\ -.081 \\ -.016 \end{array}$ |  |  | .--22 0.324 .132 .048 .090 -.032 -.046 -.120 -.164 -.206 -.219 -.191 -.043 .024 .084 | $\begin{array}{r} .-.374 \\ .202 \\ .192 \\ .1053 \\ .013 \\ -.051 \\ . .065 \\ -.103 \\ -.147 \\ -.196 \\ -.279 \\ -.180 \\ -.064 \\ .022 \end{array}$ |  |  |
| $0.924 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.5 \\ & 14.5 \\ & 21.5 \\ & 24.5 \\ & 31.5 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \end{aligned}$ | $\begin{array}{r} -0.102 \\ -. .998 \\ -1.007 \\ -.996 \\ -.927 \\ -.593 \\ -.637 \\ -.623 \\ -.475 \\ -.100 \\ -.052 \\ -.046 \\ -.039 \\ .006 \\ .028 \\ .090 \end{array}$ | $\begin{aligned} & -0.329 \\ & -1.169 \\ & -1.199 \\ & -1.201 \\ & -1.129 \\ & -1.126 \\ & -1.115 \\ & -1.103 \\ & -1.074 \\ & -.952 \\ & -.587 \\ & -.567 \\ & -.382 \\ & -.230 \\ & -.052 \\ & -.025 \\ & -.007 \end{aligned}$ |  |  | 0.316 .142 .045 -.017 -.113 -.195 -.246 -.286 -.293 -.189 -.054 -.007 .031 .086 | $\begin{array}{r} 0.377 \\ 0.199 \\ .189 \\ .086 \\ -.074 \\ -.159 \\ -.224 \\ -.279 \\ -.307 \\ -.357 \\ -.363 \\ -.249 \\ -.072 \\ -.009 \\ .044 \end{array}$ |  |  |


(a) $\alpha_{12}, 0^{0}, 1^{0}, 2^{0}, 3^{\circ}$.

| Senispan ta. | Percent chord | UPPER SURTSACE |  |  |  | LOMER Buarace |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attaok |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\text {a }}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.594 | 0.596 | 0.590 | 0.574 |  |  |  |  |
|  | 1.5 | . 154 | . 080 | 0.50 | -. 089 | 0.122 | 0.387 | 0.257 | 0.306 |
|  |  | . 068 | . 025 | -. 015 | -. 0.05 | . 060 | . 104 | . 149 | . 190 |
|  |  | . 039 | 0 | -. 040 | -. 085 | . 037 | . 070 | . 115 | . 173 |
|  | 17.0 | . 014 | -. 017 | -. 054 | -. 096 | . 007 | . 043 | . 055 | . 115 |
|  | 14.5 | -. 016 | .047 . .063 | -. 080 | -.118 -.120 | -. 016 | . 017 | . 055 | . 087 |
|  | 21.0 24.5 | $=.036$ $=.058$ | -. 068 | -.090 -.110 | -.120 -.137 | -. 031 | -.003 -.030 | . 036 | . 053 |
|  | 31.6 | -. 0.07 | -. 0.096 | -. 119 | -. 134 | -. -.090 | -.060 | -.027 | -.002 |
|  | 34.5 | -. 120 | -. 148 | -. 170 | -. 200 | -. 125 | -. 095 | -. 0.60 | -. 0.034 |
|  |  | -. 158 | -. 190 | -. 214 | -. 237 | -. 160 | -. 132 | -.098 | -. 070 |
|  | 44.5 | -. 189 | - 278 | -. 245 | -. 272 |  |  |  | - ${ }^{-14}$ |
|  | 51.0 59.5 | -. 224 -.250 | -. 246 | -. 270 | -. 296 | -. 234 | -. 200 | -. 163 | -. 134 |
|  | 71.0 | -. 274 | -. 297 | -. 329 | -. 36 | -. 270 | -. $25 \frac{7}{}$ | -. 2.804 | -. -134 |
|  | 79.5 | -. 188 | -. 215 | -. 260 | -. 303 | -. 190 | -. 160 | -. 118 | -. 107 |
|  |  | -. 077 | -. 067 |  |  |  | -. 057 |  |  |
| 0.195 b/2 | 15 | 0.512 | 0.506 | 0.481 | 0.436 |  |  |  |  |
|  | 1.5 | . 056 | -. 017 | -. 123 | -. 247 | 0.120 | 0.211 | 0.290 | 0.354 |
|  |  |  | -. 0.054 | -. 115 | - -180 | -. 002 | . 0.055 | . 110 | -157 |
|  | 6.5 11.0 | -. 028 | -.080 | -.138 -.132 | -.396 -.378 | -.029 -.050 | -. 057 | .078 | . 127 |
|  | 14.5 | -. 074 | -. 113 | -. 153 | -. 194 | -. 0.00 | -. 040 | . 001 | 037 |
|  | 21.0 | -. 103 | -. 113 | -. 176 | -. 201 | -. 103 | -. 070 | -.032 | 07 |
|  | 24.5 | -. 129 | -. 162 | -. 199 | -. 230 | -. 130 | -. 095 | -. 060 | -. 023 |
|  | 31.0 | -. 149 | -. 183 | -. 215 | -. 249 | -. 110 | -. 135 | -. 100 | -. 064 |
|  | 34.5 | -. 182 | -. 216 | - 244 | -. 279 | -. 206 | -. 170 | -. 133 | -. 100 |
|  | 41.0 | $=.235$ $=.267$ | -. 261 | -. 289 | -. 320 | -. 243 | -. 207 | -. 1168 | -. 132 |
|  | 51.0 | -. 279 | -. 313 | -. $=34$ | -. 375 | -. 292 | -. 240 | -. 200 | -. 2.179 |
|  | 59.5 | -. 309 | -. 340 | -. 370 | -. 397 | -. 313 | -. 272 | -. 241 | -. 204 |
|  | 71.0 | - 262 | - 301 | -. 348 | -. 392 | - 267 | - 222 | -. 7.76 | -. 151 |
|  | 79.5 91.0 | $=.150$ -.003 | -. 184 -.010 | -. 24. | -. 319 | -.149 -.007 | - -1110 | -. 0988 -.012 | -.103 -.032 |
| $0.382 \mathrm{~b} / 2$ |  | 0.452 |  |  |  |  |  |  |  |
|  | 1.5 | . 001 | -. 12 | -. 271 | -. 430 | -0.027 | 0.065 | $0.15{ }^{\text {P }}$ | 0.223 |
|  | 5 | -. 090 | -. 162 | -. 243 | -. 322 | -. 098 | -. 029 | . 036 | . 090 |
|  | 6.5 | -. 112 | -. 180 | -. 250 | -. 336 | -. 116 | -. 050 | . 011 | . 065 |
|  | 11.0 | $=.140$ | -. 196 | -. 25 | - 307 | -. 141 | -. 089 | -. 035 | . 018 |
|  | 21.5 | =.161 | -. 217 | -. 268 | -. 319 | -. 169 | -. 118 | -. 0.104 | -. 021 -.062 |
|  | 21.5 | -. 220 | -. 259 | -. 296 | -. 340 | -. 2025 | -. 174 | -.128 | -.009 |
|  | 31.0 | -. 250 | -. 250 | -. 321 | -. 359 | -. 259 | -. 209 | -. 159 | -. 127 |
|  | 34.5 | -. 265 | -. 302 | -. 340 | -. 369 | -. 285 | -. 235 | -. 192 | -. 158 |
|  |  | -. 319 | -. 362 | -. 400 | -. 434 | -. 309 | -. 257 | -. 220 | -. 184 |
|  | 44.5 | - 338 | -. 580 | -. 425 | -. 468 | -. 328 | -. 278 | -. 240 | -. 192 |
|  | 51.0 | - $=351$ | -. 390 | -. 428 | -. 455 | -. 361 | -. 327 | -. 260 | -.209 -.193 |
|  | 71.0 | -. 210 | -. 301 | -. 395 | -: 435 | -. 213 | -. 206 | -. 113 | -. 124 |
|  | 79.5 91.0 | -.014 .060 | -.017 | -. 042 | -. 165 | -. 0.067 | . .020 .060 | . .029 .060 | -. 042 .040 |
| $0.924 \mathrm{~b} / 2$ |  | 0.429 |  | 0.400 |  |  |  |  |  |
|  | 1.5 | -. 0.050 | -. 194 | -. 369 | -. 579 | -0.088 | 0.054 | 0.138 | 0.2I9 |
|  |  | - 151 | -. 236 | -. 332 | -. 429 | -. 176 | -. 0.03 | . 017 | . 079 |
|  | 6.5 | - 180 | -. 260 | -. 351 | -. 440 | -. 170 | -. 0.05 | -. 009 | . 05 |
|  | 11.0 | - 192 | -. 259 | -. 329 | - 401 | -. 207 | -. 133 | -. 0.06 | -. 012 |
|  | $\frac{14.5}{21.6}$ | -. 218 | -. 273 | -. 340 | -. 403 | -.222 -.260 | . .154 -.196 | -. 095 $=.142$ | -. 0.043 |
|  | 24.5 | -. 278 | -. 300 | -. 370 | -:419 | -. 261 | -. 220 | -. -163 | -. 111 |
|  | 31.6 | -. 298 | -. 350 | -. 392 | -. 427 | -. 306 | -. 253 | -. 193 | -. 142 |
|  | 34.5 | -. 312 | -. 361 | -. 414 | -. 4.42 | -. 330 | -.280 | -. 207 | -. 160 |
|  |  | -. 369 | -. 433 | -. 466 | -. 508 | -. 352 | -.302 | -. 211 | -. 189 |
|  | 44.5 | - -373 | -.436 | -. 486 | -. 543 | -. 364 | -. 298 | -. 211 | -. 200 |
|  | 51.0 | -.338 -.237 | . .405 . .341 | -. 482 | -.528 -.581 | -. 336 $=.250$ | -.257 -.138 | -189 -.153 | $=.180$ $=.152$ |
|  | 79.5 | -. 235 | -. 341 | -. 947 | -. 581 | =. 250 | -. 1376 | -. 153 | -. 158 |
|  | 79.5 | -. 017 | -. 006 | . 032 | -. 032 | -. 005 | -. 014 | -. 010 | -. 023 |
|  | 91.0 | . 073 | . 081 | . 093 | . 081 | . 079 | . 078 | . 080 | . 060 |

TABLE XY.- CONTINUED.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - Concluded.

| Sem1span sta. | Percent chord | UPPER SURPACE |  |  |  | LONER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{0}$ | $0^{\circ}$ | $1{ }^{0}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 | 0.408 | 0.396 | 0.341 | 0.250 |  |  |  |  |
|  | 1.5 | -. 0888 | -. 268 | -. 4740 | -. 742 | -0.097 | 0.046 | 0.163 | 0.248 |
|  | 5.5 | -. 206 | -. 311 | -. 430 | -.550 -.575 | -. 200 | -. 0978 | 0.002 -.022 | . 070 |
|  | 11.0 | -. 223 | -. 303 | -. 359 | -. 484 | -. 250 | -. 168 | -. 088 | -. 027 |
|  | 14.5 | -. 257 | -. 330 | -. 403 | -. 490 | -. 264 | -.189 | -. 105 | -. 051 |
|  | 21.0 | -: 289 | -. 355 | -. 418 | -. 46471 | - 2.290 | -. 221 -.232 | -. 140 | -. 094 |
|  | 31.5 | -. 322 | -. 387 | -. 44.45 | -. 4490 | -. 337 | -. 241 | -. 166 | -. 130 |
|  | 34.5 | -. 322 | -. 409 | -. 464 | -. 512 | -. 330 | -. 219 | -. 161 | -. 139 |
|  | 41.0 | -. 308 | -. 416 | -. 510 | -. 571 | -. 299 | -. 195 | -. 161 | -. 150 |
|  | 44.5 | -. 278 | -. 384 | -. 515 | -. 618 | -. 268 | -. 184 | -. 175 | -. 165 |
|  | 52.0 | -.223 -.167 | -. 334 | -. 470 -.270 | -.601 -.379 | -. 215 | -. 195 | -. 184 | $\underline{-.171}$ |
|  | 71.0 | -. 081 | -. 0.049 | -. 010 | -. 068 | -. 071 | -. 080 | -. 081 | -. 106 |
|  | 79.5 | .021 | . 026 | . 054 | . 036 | . 027 | . 022 | . 018 | -. 019 |
|  | 91.0 | . 102 | . 103 | . 112 | . 120 | .107 | . 106 | . 108 | . 088 |
| $0.831 \mathrm{~b} / 2$ | ${ }^{0}$ | 0.386 -.109 | 0.421 -.299 | 0.398 | 0.342 -.819 | -0. 219 | 0.074 | 0.178 | 0.253 |
|  |  | -. 229 | -:.352 | -. 49 | -. 0.643 | -0.219 | -. 0.109 | -. 0.001 | -. 0623 |
|  | 6.5 | -. 231 | -. 359 | -. 492 | -. 642 | -. 227 | -. 110 | -. 007 | . 058 |
|  | 11.2 | -. 240 | -. 340 | -. 442 | -. 561 | -. 259 | -. 150 | -. 0.065 | -. 012 |
|  | 14.5 | -. 260 |  |  |  |  |  |  | -. -8. |
|  | 21.0 24.5 | -. 270 | -.372 -.381 | -. 463 | -. 51.528 | -. 274 | -. 170 | -. 1118 | -. 0.081 |
|  | 34.5 | -. 246 | -. 369 | -. 4.456 | -.542 | -. 254 | -. 189 | -. 153 | -. 123 |
|  | 34.5 | -. 241 | -. 346 | -. 493 | -. 556 | -. 241 | -. 201 | -. 169 | -. 150 |
|  | 41.5 |  | -. 313 |  |  | -. 245 |  | -. 208 | -. 191 |
|  | 44.5 | -. 278 | -. 296 | -. 436 | -. 650 | -. 276 | $\begin{array}{r}-278 \\ -.267 \\ \hline-.050\end{array}$ | -. 250 | -. 235 |
|  | 51.0 | -. 260 -.072 | -. 206 | -. 284 | -. 392 | -.249 -.087 | -. 267 | -. 254 -.100 | -. 249 |
|  | 71. 3 | -.007 | -. 0.014 | . 019 | . 025 | -0 | -0 | -. 001 | -. 0221 |
|  | 79.5 | . 050 | . 051 | . 068 | . 077 | . 060 | . 059 | . 059 | . 050 |
|  | 91.0 | .126 | . 127 | . 128 | . 131 | . 131 | . 126 | . 124 | . 112 |
| $0.924 \mathrm{~b} / 2$ |  | 0.422 | 0.349 | -0.210 | 0.069 |  |  |  |  |
|  | 1.5 | -. 029 | -. 269 | -. 535 | -. 793 | -0.121 | 0.068 | 0.188 | 0.256 |
|  | 5.5 | -. 218 | -. 381 | -. 559 | -. 727 | -. 211 | -. 071 | . 020 | . 080 |
|  | 6.5 | -. 2222 | -390 $=-358$ | -. 56 | -. 229 | -- 208 | -.071 -.123 | -.017 | -.076 |
|  | 314.5 | -. 250 | -. 380 | -. 500 | -. 630 | -. 242 | -. 159 | -. 0.09 | -. 056 |
|  | 21.0 | -. 291 | -. 406 | -. 527 | -. 577 | -. 284 | -. 227 | -. 180 | -. 149 |
|  | 24.5 | -. 324 | -. 393 | -. 549 | -. 6181 | -. 332 | -. 299 | -. 262 | -. 230 |
|  | 31.0 | -. 295 | -. 337 | -. 465 | -. 581 | -. 307 | -. 314 | --299 | - 273 |
|  | 34.5 | -. 246 | -. 220 | -. 353 | -. 553 | -. 253 | -. 270 -.226 | -. 302 | -. 313 |
|  | 41.2 | -. 208 | -. 1119 | -. 0.05 | -. 4171 | -. 2141 | -:226 | -.203 | -: 304 |
|  | 51.8 | -. 078 | -. 092 | -.045 | -. 043 | -. 084 | -. 067 | -. 083 | -. 232 |
|  | 59.5 | -. 042 | -. 050 | -. 031 | -.006 | -. 041 | -. 046 | -. 037 | -. 012 |
|  | 71.0 | . 021 | . 021 | . 027 | . 039 | . 030 | . 022 | . 021 | . 020 |
|  | 91:0 | . 135 | . 135 | . 126 | .112 | . 147 | .136 | . 127 | .110 |

TABLE XY.- CORTINUED.
(b) $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Seniepan cta. | Parcent chord | UPPER BURFACE |  |  |  | LOMES SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ \hline 1.5 \\ 56.5 \\ 11.5 \\ 11.0 \\ 21.5 \\ 24.0 \\ 31.8 \\ 31.0 \\ \hline 41.5 \\ 44.0 \\ 54.5 \\ 51.0 \\ \hline 99.5 \\ 71.0 \\ 99.5 \end{array}$ | $\begin{aligned} & 0.548 \\ & =.194 \\ & -.309 \\ & =-.129 \\ & -.125 \\ & =-150 \\ & =.177 \\ & =.170 \\ & =.230 \\ & -.250 \\ & =.292 \\ & -.322 \\ & =.345 \\ & =.340 \\ & =.345 \\ & -.171 \end{aligned}$ | $\begin{aligned} & 0.477 \\ & -.414 \\ & -.194 \\ & -.210 \\ & -.185 \\ & -.211 \\ & -.220 \\ & =.225 \\ & -.225 \\ & -.276 \\ & -.319 \\ & =.354 \\ & =.373 \\ & =.401 \\ & -.450 \\ & =.414 \\ & -.244 \end{aligned}$ |  |  | $\begin{array}{r} 0.37 \\ .555 \\ .190 \\ .147 \\ .087 \\ .060 \\ .026 \\ -.005 \\ -.042 \\ -.104 \\ -.130 \\ =.137 \\ -.054 \\ -.059 \end{array}$ | -.477 0.4401 .263 .253 .161 .143 .117 .080 .050 .016 -.050 -.084 -.097 -.076 -.066 |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  | 0.241 $=.667$ $=.330$ $=.350$ $=.305$ $=.303$ $=.320$ $=.340$ $=.360$ $=.408$ $=.441$ $=.479$ $=.497$ $=.419$ $=.208$ |  |  | $\begin{array}{r} 0.423 \\ .209 \\ .170 \\ .179 \\ .075 \\ .010 \\ .011 \\ -.060 \\ -.061 \\ -.091 \\ -.110 \\ -.151 \\ -.150 \\ -.097 \\ -.047 \end{array}$ | -.47 0.491 .294 .250 .189 .107 .1076 .070 -.007 -.040 -.060 -.098 -.109 -.102 -.094 -.100 |  |  |
| $0.382 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.5 \\ & 34.0 \\ & 41.5 \\ & 44.5 \\ & 51.5 \\ & 59.5 \\ & 71.0 \\ & 91.5 \end{aligned}$ | 0.252 <br> $-640$ <br> -. 423 <br> $=.334$ $=-361$ -.352 <br> $-371$ <br> $\begin{array}{r}\text {-. } 493 \\ = \\ \hline\end{array}$ <br> $=.461$ <br> -.498 -.544 <br> $=.465$ $=.189$ $=.013$ <br> $-.013$ |  |  |  |  | .--780 0.339 .239 .147 .103 .059 .030 -.026 -.050 -.073 -.100 -.132 -.147 -.142 $=.110$ -.077 |  |  |
| $0.555 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 11.0 \\ 21.5 \\ 24.0 \\ 31.5 \\ 31.0 \\ 41.5 \\ 41.0 \\ 41.5 \\ 51.0 \\ 79.5 \\ 71.0 \\ 79.5 \end{array}$ |  |  |  |  | 0.287 .139 .113 .045 .012 -.035 $=.059$ -.105 -.152 -.157 -.189 $=.154$ -.092 -.046 .023 | 0.372 .226 .202 .127 .090 .027 .002 -.047 -.071 -.105 -.122 -.149 -.170 -.139 -.112 -.087 |  |  |

TABLE XY.- CONCLUDED.
(b) $a, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Benispan sta. | Peroent chord | UPPER SURFACE |  |  |  | LOWER SURFACT |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angie of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \end{array}$ |  | $\begin{aligned} & -0.030 \\ & -1.142 \\ & -1.060 \\ & -1.070 \\ & -1.032 \\ & -.991 \\ & -.577 \\ & -.567 \\ & -.605 \\ & -.629 \\ & -.670 \\ & -.713 \\ & -.742 \\ & -.791 \\ & -.364 \\ & -. .230 \end{aligned}$ |  |  | . .313 0.135 .108 .030 -049 -.068 -.099 -.111 -.132 -.150 -.175 -.125 -.066 .052 | -.81 0.386 .219 .191 .106 .010 .010 -.016 -.060 $=.118$ -.140 -.172 -.201 $=.182$ -.182 -.107 |  |  |
| $0.531 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 5.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.0 \\ 31.5 \\ 31.0 \\ 41.5 \\ 44.0 \\ 51.5 \\ 59.5 \\ 71.0 \\ 79.0 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.254 \\ & -.970 \\ & -.864 \\ & -.869 \\ & -.7250 \\ & -.585 \\ & -.590 \\ & -.595 \\ & -.610 \\ & -.670 \\ & -.698 \\ & -.340 \\ & -.1220 \\ & -.030 \\ & .033 \end{aligned}$ | $\begin{array}{r} 0.101 \\ -1.149 \\ -1.131 \\ -1.137 \\ -1.076 \\ -1.058 \\ -1.000 \\ -.993 \\ -.800 \\ -.659 \\ -.690 \\ -.719 \\ -.810 \\ -.440 \\ -.202 \\ -.149 \\ -.079 \end{array}$ |  |  | 0.312 .121 .113 $=.35$ -.047 $=.060$ -.100 -.136 -.280 $=.240$ -.070 -.079 .088 | -.367 .190 .180 -.091 -.010 -.027 -.080 $=.120$ -.160 $=.2170$ -.250 -.330 $=.297$ -.060 |  |  |
| $0.924 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.5 \\ 44.0 \\ 51.5 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.059 \\ -.931 \\ -.940 \\ -.986 \\ -.868 \\ -. .882 \\ -. .667 \\ -.580 \\ -.495 \\ -.920 \\ -.076 \\ -.011 \\ .030 \\ .050 \\ .085 \end{array}$ | $\begin{aligned} & -0.272 \\ & -1.116 \\ & -1.151 \\ & -1.155 \\ & -1.090 \\ & -1.000 \\ & -1.070 \\ & -1.072 \\ & -1.060 \\ & -.078 \\ & -.600 \\ & -.657 \\ & -.551 \\ & -.259 \\ & -.160 \\ & -.110 \\ & -.063 \end{aligned}$ |  |  | -.7 0.304 .131 .124 .030 -.021 -.120 -.201 -.354 -.322 -.352 -.351 -.342 .010 .042 .085 | -.07 0.347 .187 .180 .079 -.080 -.170 -.239 -.300 -.330 -.376 -.410 -.411 -.261 -.099 -.009 |  |  |


(a) $a_{u}, 0^{\circ}, 1^{0}, 2^{\circ}, 3^{\circ}$.

| Sen:epan sta. | Percent ahored | UPPER SGRTACE |  |  |  | LOTER SURYACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of ettack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{0}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.8 \end{array}$ | 0.606 .172 .087 .059 .033 .0018 $=.040$ $=.001$ $=.098$ $=.135$ $=.201$ $=.201$ $=.265$ $=.197$ -.096 | 0.606 .091 .039 .013 -.003 $=.034$ $=.050$ $=.071$ -.081 $=.136$ $=.260$ $=.202$ -.236 $=.268$ -.295 -.241 -.117 | $\begin{array}{r} 0.603 \\ .014 \\ .003 \\ -.023 \\ -.033 \\ -.067 \\ -.077 \\ =.095 \\ -.100 \\ -.156 \\ -.195 \\ -.226 \\ -.253 \\ =.293 \\ =.335 \\ =.149 \\ -.149 \end{array}$ | 0.587 $=.074$ $=.043$ $=.064$ $=.070$ $=.097$ $=.106$ $=.123$ $=.126$ $=.287$ $=.258$ $=.252$ $=.304$ $=.351$ $=.366$ -.164 | $\begin{array}{r} -.-7 \\ 0.137 \\ .076 \\ .046 \\ .024 \\ .001 \\ -.018 \\ -.044 \\ =.071 \\ -.105 \\ -.136 \\ -.186 \\ -.238 \\ -.301 \\ =.212 \\ -.101 \end{array}$ | -.07 0.200 .117 .085 .057 .031 .010 -.017 -.046 -.076 -.111 -.160 -.219 -.273 -.185 -.091 | $\begin{array}{r} -.0-7 \\ 0.264 \\ .128 \\ .1296 \\ .069 \\ .044 \\ .019 \\ -.012 \\ -.043 \\ -.078 \\ -.131 \\ -.162 \\ -.234 \\ =.151 \\ -.082 \end{array}$ | $\begin{aligned} & -.316 \\ & .200 \\ & .165 \\ & .126 \\ & .104 \\ & .070 \\ & .044 \\ & . .013 \\ & =.015 \\ & -.072 \\ & -.108 \\ & -.166 \\ & =.197 \\ & -.124 \\ & -.076 \end{aligned}$ |
| $0.195 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 41.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ |  | 0.490 .001 -.047 -.066 -.074 $=.099$ -.122 $=.145$ $=.165$ -.191 -.242 $=.279$ -.301 $=.332$ -.316 $=.083$ | 0.534 $=.103$ $=.097$ $=.118$ $=.134$ $=.135$ $=.1480$ $=.195$ $=.221$ $=.267$ $=.528$ $=.354$ $=.551$ $=.299$ | 0.452 $=.220$ $=.159$ $=.175$ $=.158$ $=.175$ $=.155$ $=.206$ $=.230$ $=.259$ $=.233$ $=.350$ $=.379$ $=.364$ $=.533$ -.149 |  | -.284 0.288 .068 .036 -.025 -.052 -.078 -.375 -.146 -.177 -.194 -.234 -.285 -.250 -.156 -.052 | -.302 0.123 .091 .051 .015 $=.016$ $=.042$ $=.080$ $=.113$ $=.145$ $=.202$ $=.254$ $=.204$ $=.234$ -.075 |  |
| $0.382 \mathrm{~b} / 2$ | 0 35.5 56.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.461 -.020 -.070 -.092 $=.122$ $=.149$ $=.164$ $=.201$ -.233 $=.305$ -.323 $=.343$ $=.352$ $=.295$ -.048 .067 | $\begin{aligned} & 0.453 \\ & =.106 \\ & =.246 \\ & =.162 \\ & =.2781 \\ & =.212 \\ & =.2400 \\ & =.272 \\ & =.347 \\ & =.368 \\ & -.350 \\ & =.398 \\ & =.350 \\ & -.054 \\ & .057 \end{aligned}$ |  | 0.355 $=.402$ $=.309$ $=.381$ $=.302$ $=.300$ $=.319$ $=.340$ $=$. | $\begin{array}{r} -0.017 \\ -.082 \\ -.102 \\ -.126 \\ -.150 \\ -.175 \\ -.201 \\ =.232 \\ -.259 \\ -.289 \\ -.316 \\ -.371 \\ -.355 \\ -.310 \\ -.044 \\ .071 \end{array}$ |  |  |  |
| $0.555 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.6 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.439 $=.036$ $=.375$ $=.1767$ $=.201$ $=.240$ $=.256$ -.290 $=.301$ $=.363$ $=.389$ $=.341$ $=.064$ .021 .097 |  | $\begin{aligned} & 0.410 \\ & =.341 \\ & =.310 \\ & =.310 \\ & =.321 \\ & =.345 \\ & =.348 \\ & =.373 \\ & =.455 \\ & =.475 \\ & =.485 \\ & =.488 \\ & =.022 \\ & =.087 \end{aligned}$ | 0.345 $=.550$ $=.406$ $=.414$ $=.381$ $=.587$ $=.598$ $=.405$ $=.412$ $=.429$ $=.459$ $=.521$ $=.509$ $=.476$ -.129 $=.036$ | $\begin{array}{r} -0.069 \\ -.187 \\ -.148 \\ =.186 \\ -.205 \\ -.240 \\ -.293 \\ -.296 \\ =.326 \\ -.356 \\ -.384 \\ =.404 \\ =.356 \\ -.071 \\ .031 \\ .162 \end{array}$ |  | $\begin{aligned} & 0.143 \\ & . .029 \\ & -.065 \\ & -.063 \\ & -.094 \\ & -.170 \\ & -.211 \\ & -.24 I \\ & -.264 \\ & -.285 \\ & -.258 \\ & -.2057 \\ & -.021 \\ & =.066 \end{aligned}$ |  |

table xyi.- continued.
(a) $a_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - ConcIuded.

| Semispan sta。 | Percent chord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ |  | $\begin{aligned} & 0.400 \\ & -.247 \\ & -.301 \\ & -.327 \\ & -.294 \\ & =.318 \\ & -.349 \\ & -.364 \\ & -.384 \\ & -.408 \\ & -.462 \\ & -.475 \\ & -.434 \\ & -.313 \\ & -.0068 \\ & .128 \end{aligned}$ | 0.351 -.434 $=.409$ $=.429$ -.372 $=.389$ -.407 $=.413$ -.434 $=.506$ $=.542$ -.530 $=.500$ -.206 .058 .143 |  | $\begin{array}{r} -0.083 \\ -.186 \\ -.200 \\ -.237 \\ -.258 \\ -.288 \\ -.311 \\ -.352 \\ -.373 \\ -.388 \\ -.384 \\ -.347 \\ -.174 \\ -.022 \\ .050 \\ .125 \end{array}$ | $\begin{array}{r} 0.046 \\ 0.096 \\ -.115 \\ =.167 \\ -.193 \\ -.234 \\ -.258 \\ =.298 \\ =.307 \\ =.302 \\ -.272 \\ -.151 \\ -.088 \\ -.026 \\ .120 \end{array}$ | $\begin{aligned} & -.152 \\ & -.012 \\ & -.037 \\ & -.103 \\ & -.133 \\ & -.37 \\ & -.39 \\ & -.234 \\ & -.233 \\ & -.217 \\ & -.215 \\ & -.218 \\ & -.176 \\ & -.115 \\ & -.015 \\ & .109 \end{aligned}$ | 0.240 0.0622 .033 -.046 -.110 -.132 -.179 -.184 -.208 -.2196 $=.190$ $=.142$ -.081 .058 |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.5 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 |  | 0.414 $=.281$ $=.345$ $=.352$ -.337 $=.357$ $=.393$ $=.414$ -.423 -.428 $=.301$ $=.344$ -.046 .0454 .144 | 0.397 -.485 -.464 $=.467$ $=.423$ $=.437$ -.447 $=.473$ $=.480$ -.541 $=.421$ $=.495$ -.292 .022 .110 .162 | 0.347 $=.744$ $=-.604$ $=.529$ $=.525$ $=.507$ $=.500$ $=-522$ $=.538$ $=.643$ $=.640$ $=.260$ $=.099$ -.006 .122 | $\begin{array}{r} 0.125 \\ =.239 \\ =.238 \\ -.274 \\ -.324 \\ =.335 \\ -.369 \\ =.355 \\ =.352 \\ =.347 \\ -.044 \\ .024 \\ .081 \\ .146 \end{array}$ | $\begin{array}{r} 0.023 \\ -.134 \\ =.138 \\ -.190 \\ -.238 \\ -.232 \\ -.242 \\ -.221 \\ -.225 \\ -.253 \\ -.258 \\ -.107 \\ .018 \\ .146 \end{array}$ | $\begin{aligned} & 0.135 \\ & -.046 \\ & -.052 \\ & -.114 \\ & -.165 \\ & -.165 \\ & -.165 \\ & \hline .186 \\ & -.219 \\ & -.254 \\ & -.270 \\ & -.210 \\ & -.010 \\ & .076 \\ & .143 \end{aligned}$ | $\begin{array}{r} 0.229 \\ .035 \\ .028 \\ -.057 \\ -.131 \\ -.140 \\ =.173 \\ -.1929 \\ -.2655 \\ -.287 \\ -.129 \\ -.117 \\ .039 \\ .121 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | 0 3.5 5.5 6.5 11.0 14.0 21.0 24.05 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 |  | 0.351 $=.237$ -.372 $=.380$ $=.356$ $=.380$ $=.429$ $=.467$ $=.424$ $=.378$ $=.2482$ $=.038$ -.002 .052 .098 .151 |  |  | $\begin{array}{r} -0.165 \\ -.261 \\ -.261 \\ -.292 \\ -.307 \\ -.355 \\ -.409 \\ -.380 \\ -.327 \\ -.213 \\ -.115 \\ -.057 \\ -.013 \\ .049 \\ .101 \\ .159 \end{array}$ | $\begin{aligned} & 0.018 \\ & -.122 \\ & -.120 \\ & -.168 \\ & -.189 \\ & -.242 \\ & -.310 \\ & -.315 \\ & -.305 \\ & -.267 \\ & -.216 \\ & -.101 \\ & -.008 \\ & .044 \\ & .091 \\ & .149 \end{aligned}$ | $\begin{aligned} & 0.138 \\ & -.022 \\ & -.022 \\ & -.089 \\ & -.120 \\ & -.191 \\ & -.270 \\ & -.310 \\ & -.325 \\ & -.329 \\ & -.317 \\ & -.283 \\ & .020 \\ & .052 \\ & .090 \\ & .143 \end{aligned}$ | 0.224 .049 .046 -.057 -.098 -.284 -.246 -.396 -.345 -.351 -.365 -.104 .032 .113 .117 |

table xyi. - CCNTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| $\begin{aligned} & \text { Seri-1 } \\ & \text { spant } \\ & \text { sta. } \\ & \hline \end{aligned}$ | Percent chord | UPPER SORFACE |  |  |  | Lever burace |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | nugle of attack |  |  |  | Angle of attuek |  |  |  |
|  |  | $4{ }^{\circ}$ | 6 | $8{ }^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |

TABLE XVI. - CONCLUDED.
(b) $\alpha_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}-$ Concluded.

| Sem1span ata. | Percent chord | UPPER StPrace |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.6 \end{array}$ | $\begin{aligned} & 0.172 \\ & -.898 \\ & =.724 \\ & =.722 \\ & =.483 \\ & =.514 \\ & =.530 \\ & =.534 \\ & =.533 \\ & =.500 \\ & =.644 \\ & =.662 \\ & =.688 \\ & -.545 \\ & =.294 \end{aligned}$ |  |  |  | $\begin{array}{r} .0 .295 \\ 0.215 \\ . .088 \\ . .008 \\ -.027 \\ -.085 \\ -.115 \\ -.157 \\ -.166 \\ -.207 \\ -.237 \\ . .281 \\ -.310 \\ -.205 \\ -.227 \\ -.192 \end{array}$ |  |  |  |
| $0.833 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.5 \\ 21.5 \\ 24.5 \\ 32.5 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 72.0 \\ 79.5 \end{array}$ |  |  |  |  | $\begin{array}{r} -.274 \\ 0.076 \\ .068 \\ -.013 \\ -.105 \\ =.105 \\ =.120 \\ -.197 \\ =.262 \\ =.306 \\ =.352 \\ -.361 \\ =.351 \\ =.302 \\ -.154 \end{array}$ |  |  |  |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.5 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & -0.003 \\ & -.848 \\ & -.853 \\ & -.853 \\ & -.790 \\ & -.781 \\ & -.576 \\ & =.624 \\ & -.624 \\ & =.517 \\ & =.662 \\ & -.674 \\ & =.661 \\ & -.261 \\ & -.200 \\ & -.122 \end{aligned}$ |  |  |  | -.058 0.079 -.074 $=.072$ $=.165$ $=.254$ $=.325$ $=.376$ $=.416$ $=.457$ $=.450$ $=.477$ -.352 -.117 |  |  |  |


(a) $\pi_{1}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Serispar $s$ ta. | Percent chord | UPPER SURTEAE |  |  |  | LOTMR SURPLCE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angie of attack |  |  |  | Angle of attacis |  |  |  |
|  |  | $0^{\circ}$ | $1^{0}$ | $2^{\text {c }}$ | $3^{\circ}$ | $0^{\circ}$ | $1{ }^{\text {b }}$ | $2^{\text {d }}$ | $3^{\text {a }}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{aligned} & 0.5 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.0 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ | 0.491 .050 $=.041$ $=.047$ $=.069$ $=.086$ $=.098$ $=.103$ $=.105$ $=.109$ $=.160$ $=.154$ $=.155$ $=.133$ -.1058 $=.054$ |  | $\begin{aligned} & 0.457 \\ & =.151 \\ & =.150 \\ & =.150 \\ & =.150 \\ & =.160 \\ & =.161 \\ & =.1667 \\ & =.189 \\ & =.201 \\ & =.1996 \\ & =.130 \\ & =.079 \\ & -.023 \end{aligned}$ |  | $\begin{aligned} & 0.073 \\ & 0.016 \\ & =.057 \\ & =.045 \\ & =.068 \\ & =.076 \\ & =.096 \\ & =.107 \\ & =.125 \\ & -.136 \\ & -.148 \\ & =.127 \\ & =.104 \\ & -.069 \\ & -.016 \end{aligned}$ | $\begin{array}{r} 0.103 \\ .030 \\ .004 \\ =.0079 \\ =.047 \\ =.069 \\ =.0011 \\ =.0916 \\ =-.161 \\ =.111 \\ =.0991 \\ =.005 \\ =.010 \end{array}$ | .770 0.170 .043 .043 $=.006$ $=.026$ $=.047$ $=.056$ $=.090$ -.710 $=.099$ $=.095$ $=.054$ $=.008$ | $\begin{array}{r} 0.237 \\ .116 \\ .085 \\ .054 \\ .004 \\ -.014 \\ =.028 \\ =.017 \\ -.061 \\ -.085 \\ =.007 \\ =.065 \\ =.040 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.6 \\ 34.0 \\ 41.5 \\ 44.0 \\ 51.0 \\ 59.5 \\ 71.5 \\ 79.0 \\ 91.5 \end{array}$ | 0.423 -.013 -.064 $=.098$ $=.103$ $=.136$ $=.103$ $=.120$ $=.160$ -.182 $=.162$ $=.157$ $=.1098$ $=.044$ .014 | 0.406 -.155 -.155 $=.161$ $=.161$ $=.161$ $=.167$ $=.167$ $=.167$ $=.201$ $=.186$ $=.173$ $=.148$ $=.107$ $=.055$ . .054 | 0.349 $=.288$ $=-218$ $=.218$ $=.288$ $=.206$ $=.178$ $=.212$ $=.283$ $=-.211$ $=.194$ $=.1262$ $=.1262$ $=.003$ |  |  | $\begin{aligned} & 0.150 \\ & =.007 \\ & =.027 \\ & =.0570 \\ & =.008 \\ & =.090 \\ & =.116 \\ & =.126 \\ & =.1729 \\ & =.138 \\ & =.117 \\ & =.082 \\ & =.089 \end{aligned}$ | $.0-245$ 0.055 .026 $=.010$ $=.035$ $=.068$ $=.0077$ $=.102$ $=.110$ $=.113$ $=.120$ $=.073$ $=.032$ .015 | $\begin{array}{r} 0.321 \\ .075 \\ .075 \\ .009 \\ =.014 \\ =.028 \\ =.056 \\ =.014 \\ =.085 \\ =.099 \\ =.086 \\ =.060 \\ =.023 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.355 -.047 -.098 -.143 -.115 -.154 -.154 $=.160$ -.160 $=.166$ -.182 -.166 $=.146$ $=.127$ $=.079$ -.051 .026 |  |  |  | $\begin{array}{r} -0.063 \\ -.104 \\ -.115 \\ =.127 \\ -.135 \\ -.141 \\ -.148 \\ =.160 \\ -.162 \\ -.160 \\ -.155 \\ =.152 \\ -.123 \\ =.080 \\ -.371 \end{array}$ |  |  |  |
| $0.555 \mathrm{~b} / 2$ | 0 3.5 5.5 6.5 11.0 14.5 21.5 24.5 37.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.6 | 0.406 $=.052$ -.137 $=.145$ $=.144$ $=.154$ $=.154$ $=.160$ $=.166$ $=.196$ $=.1441$ $=.107$ $=.075$ -.027 .030 | 0.400 $=.2146$ $=.2183$ $=.218$ $=.2226$ $=.206$ $=.206$ $=.218$ -.218 $=.164$ $=.163$ $=.1085$ -.039 .061 | 0.304 $=.435$ $=.31$ $=.274$ $=.257$ $=.277$ $=.229$ $=.235$ $=.263$ $=.217$ $=.189$ $=.142$ $=.099$ $=.014$ .018 | $\begin{aligned} & 0.134 \\ & =.650 \\ & =.409 \\ & =.390 \\ & =.295 \\ & =.275 \\ & =.252 \\ & =.255 \\ & =.258 \\ & =.258 \\ & =.282 \\ & =.157 \\ & =.104 \\ & -.049 \\ & =.019 \end{aligned}$ |  | $\begin{aligned} & 0.056 \\ & -.026 \\ & =- \\ & =- \\ & =- \\ & -. \\ & -.133 \\ & . .133 \\ & . .126 \\ & . .1126 \\ & . .062 \\ & -.016 \\ & .036 \end{aligned}$ |  |  |

TABLE XVII.- CONTINUED.
(a) $\alpha_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - OoncIuded.

| Semispan eta. | Percent chord | UPFER SURPACE |  |  |  | LOHER GURPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{0}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $2^{\circ}$ | $2^{0}$ | $3^{7}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.355 $=.064$ -.149 $=.154$ -.143 $=.154$ $=.166$ -.171 -.182 $=.209$ $=.164$ $=.148$ $=.119$ $=.073$ -.027 .033 | 0.349 -.252 -.240 $=.229$ -.212 $=.212$ $=.218$ $=.218$ -.228 $=.223$ $=.178$ $=.161$ $=.078$ -.028 .033 | 0.236 0.484 -.342 $=.348$ -.263 $=.274$ -.257 $=.269$ -.229 -.240 $=.257$ $=.206$ $=.184$ $=.150$ $=.097$ -.039 .027 | 0.022 $=.706$ $=.437$ $=.426$ $=.325$ $=.314$ -.303 $=.303$ $=.275$ $=.275$ $=.275$ $=.199$ $=.159$ $=.094$ -.037 .031 | $\begin{aligned} & -0.062 \\ & -.113 \\ & -.121 \\ & -.138 \\ & -.138 \\ & -.146 \\ & -.151 \\ & -.158 \\ & -.180 \\ & -.158 \\ & -.358 \\ & -.148 \\ & =.120 \\ & -.064 \\ & -.017 \\ & .043 \end{aligned}$ | -0.0 0.084 -.024 $=.039$ -.076 -.084 -.100 -.109 $=.122$ -.125 $=.126$ $=.126$ $=.125$ -.053 -.018 .048 | $\begin{array}{r} 0.203 \\ .054 \\ .033 \\ -.019 \\ -.033 \\ -.056 \\ -.067 \\ =.092 \\ -.103 \\ =.104 \\ =.097 \\ =.097 \\ -.050 \\ -.046 \end{array}$ | -.301 0.130 .1004 .042 .020 -.002 -.024 . .066 -.074 .079 -.0069 -.077 -.035 .051 |
| $0.831 \mathrm{~b} / 2$ | 0 31.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.355 \\ & -.086 \\ & -.154 \\ & -.154 \\ & . .154 \\ & -.166 \\ & -.194 \\ & -. .205 \\ & -.199 \\ & . .215 \\ & -.160 \\ & -.151 \\ & -.069 \\ & -.063 \\ & .045 \end{aligned}$ | 0.394 0.274 -.263 -.246 -.218 -.229 -.223 -.229 -.229 -.228 -.169 $=.157$ $=.111$ $=.169$ $=.014$ .044 | 0.343 -.496 $=.348$ $=.291$ -.274 -.274 -.274 -.269 -.263 -.229 -.263 $=.190$ -.173 $=.1258$ $=.023$ -.039 | 0.179 $=.689$ -.426 $=.426$ $=.321$ $=.321$ -.308 -.286 -.264 $=.264$ -.264 $=.207$ -.185 $=.130$ -.079 -.021 .044 | $\begin{array}{r} -0.061 \\ -.123 \\ -.121 \\ -.131 \\ -.143 \\ -.141 \\ -.150 \\ -.149 \\ -.148 \\ -.146 \\ -.135 \\ -.108 \\ -.051 \\ -.005 \\ .049 \end{array}$ | -.085 0.038 $=.040$ -.073 -.107 -.109 -.123 -.127 -.129 -.132 -.120 $=.094$ -.002 -.050 | $\begin{array}{r} 0.082 \\ .037 \\ -.032 \\ -.017 \\ -.066 \\ -.066 \\ -.090 \\ -.102 \\ -.106 \\ -.109 \\ -.090 \\ -.040 \\ -.003 \\ -.047 \end{array}$ | $\begin{array}{r} 0.299 \\ .110 \\ .1041 \\ .041 \\ -.024 \\ -.030 \\ -.058 \\ -.069 \\ -.080 \\ -.087 \\ -.088 \\ -.076 \\ -.003 \\ .0031 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.355 $=.045$ -.166 $=.166$ -.171 $=.205$ -.205 $=.377$ -.199 -.166 -.199 -.139 -.079 -.039 -.003 .051 | 0.298 $=.229$ -.269 -.246 -.246 $=.218$ -.218 $=.212$ $=.206$ $=.218$ $=.145$ $=.085$ -.038 -.008 .056 | $\begin{array}{r} 0.122 \\ -.456 \\ -.348 \\ -.342 \\ -.291 \\ -.286 \\ -.246 \\ -.240 \\ -.218 \\ -.212 \\ -.218 \\ -.162 \\ -.143 \\ -.093 \\ -.044 \\ .001 \\ .049 \end{array}$ | $\begin{aligned} & -0.146 \\ & -.706 \\ & -.734 \\ & -.711 \\ & -.342 \\ & -.320 \\ & -.286 \\ & -.264 \\ & -.258 \\ & -.244 \\ & -.224 \\ & -.173 \\ & -.352 \\ & -.098 \\ & -.047 \\ & -.003 \\ & .048 \end{aligned}$ | $\begin{array}{r} -0.075 \\ -.123 \\ -.126 \\ -.139 \\ -.146 \\ -.150 \\ -.146 \\ -.1436 \\ -.140 \\ -.135 \\ -.135 \\ -.075 \\ -.031 \\ .0069 \end{array}$ | $\begin{aligned} & 0.067 \\ & -.039 \\ & -.049 \\ & -.085 \\ & -.100 \\ & =.115 \\ & -.117 \\ & -.122 \\ & -.121 \\ & -.123 \\ & -.1219 \\ & -.069 \\ & -.028 \\ & .008 \end{aligned}$ | 0.178 .033 .021 -.035 $=.067$ $=.095$ -.104 $=.107$ -.113 -.112 -.112 $=.070$ -.031 .001 .054 | $\begin{array}{r} 0.273 \\ .104 \\ .090 \\ . .018 \\ -.056 \\ -.067 \\ -.051 \\ -.081 \\ -.091 \\ -.093 \\ -.093 \\ -.067 \\ -.029 \\ .051 \end{array}$ |

TABLE XVII．－CONTIMUED．
（b）$a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ ．

| Semi－ ${ }^{\text {span }}$ sta | ${ }_{\text {Percent }}^{\substack{\text { Phora }}}$ | UPPER Buafice |  |  |  | LOVER BUREACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angre or attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{0}$ | 6 | $8{ }^{\text {8 }}$ | $10^{\circ}$ |
| $0.086 \mathrm{k} / 2$ | 0 | 0.342 | 0.099 | －0．236 |  |  |  |  |  |
|  | 2.5 | －． 436 | －． 713 | －1．087 | －3．555 | －0．295 | 0.396 |  |  |
|  | 6 | －：239 | －－． 349 | －： 459 | $\mathrm{F}=\mathrm{F}$－ 54 | ．128 | －209 | －${ }^{287}$ | － 3 5 ${ }^{5}$ |
|  | $\frac{11.0}{14.5}$ | －． 238 | －． 2823 | －． 381 | $=-.454$ | ．089 |  | ． 230 | ．292 |
|  | 14.5 21.0 24.5 | －$=2228$ | －2266 | 二－：366 | －$=$－ 409 | ：033 | －091 | ． 125 | －209 |
|  | 31．5 | －． 21216 | －． 25 | －：-292 | －-35 | $\therefore 004$ | ：086 | －1097 | ．155 |
|  | 34.5 | －． 216 | －． 265 | －． 29 | $\therefore$－ 3 年 | －．020 | ：025 | ． 079 | ． 172 |
|  | 41．0 | －． 233 | －． 2171 | 二：314 | －． 3 64 | －． 037 | ． 08 | ．055 | － 104 |
|  | 51.0 | －．234 | －． 269 | －． 302 | －． 35 | －． 057 | －． 019 | －024 | －067 |
|  | 79.5 | －-185 | －． 223 | －． 250 | －：276 | －$\because .05$ | －． 016 | ．022 | ．061 |
|  | 79.5 | －：092 | －． 1036 | －：015 | －： 1288 | －．025 | ：026 | ． 0357 | ：065 |
| 0.195 d／2 | 0 | 0.105 | －0．338 | －0．991 | －1．808 |  |  |  |  |
|  | 1.5 | － 617 | －1．032 | －1．665 | －1．814 | 0.362 | 0.445 | 0.435 | 0.354 |
|  | 6.5 | －． 3 － 351 | －． 478 | －． 687 | －．-790 | ：131 | ． 221 | － 302 | ． 375 |
|  | 11.6 | －． 612 | －． 405 | －．429 | －． 616 | － 07 | ． 152 | ． 236 | \％ |
|  | 2 | －．284 | －． 338 | －－． 392 |  | ． 09 | －061 | －1．14 | －202 |
|  | 24.5 | －． 250 | －． 310 | －． 376 | －． 454 | ：011 | ． 061 | ． 123 | ． 183 |
|  | 31.0 | －． 250 | － 29.29 | －． 348 | －． 398 | －． 0807 | ． 027 | ． 085 | －138 |
|  | 41．0 | －： 278 | －． 321 | －． 336 | $\because \cdot .387$ | $\because .057$ | －．009 | －044 | ：092 |
|  | 44．5 | －． 251 | －． 290 | －． 329 | －． 369 | －． 0.062 | $-.014$ | ． 034 | ． 085 |
|  | 51．0 | －： | －：225 | －：24 | －： 262 | －． 066 | －． 0.018 | ．012 | ：050 |
|  | 71.0 | －． 135 | －． 156 | －． 170 | －． 187 | －． 045 | －． 012 | －020 | ． 05 |
|  | 791：5 | －．073 | －：－085 | －． 0095 | $\because$ | －． 0.029 | ：012 | ：057 |  |
| $0.382 \mathrm{~b} / 2$ | 0 | －0．098 | －0．769 | －-1.719 | －2．956 |  |  |  |  |
|  | 1．5 | －． 9.464 | －1． 657 | －-8.86 | －1：363 | 0.153 | 0.356 | 0.639 | ． 397 |
|  | 50， | －． 442 | －． 618 | －．823 | －2．081 | ．1029 | ． 26 | － 313 | ． 375 |
|  | 11.8 | －． 357 | －． 48 | － 6.615 | －．750 | ．072 | ． 176 | ． 2417 | － 307 |
|  | ${ }^{14}$ | －． 306 | $=:=348$ | －： 471 | －：．560 | ：013 | ：084 | ． 153 | ：215 |
|  | ${ }^{24} \cdot 5$ | －． 306 | －． 383 | －-145 | －． 510 | －． 003 | －064 | ． 130 | － 119 |
|  | 31.0 | －： 295 | －． 349 | －． 398 | －－465 | －． 033 | －27 | －079 | －146 |
|  | $4{ }^{4}$ | －． 295 | －．-32 | －． 364 | －：420 | －：005 | －002 | ：056 | ． 102 |
|  | 44.5 | －． 25 | －． 298 | －－373 | － 377 | －．062 | －． 012 | ． 037 | ． 086 |
|  | 51．0 | －． 255 | －$=2814$ | －． 293 | －$=253$ | －．075 | －． 0.025 | ： 1123 | ：057 |
|  | 71.0 | － | － | －． 145 | － 1 － 159 | －． 037 | －．008 | ． 024 | －050 |
|  | 79.5 | －． 0107 | －． 017 | －． 0.015 | －． 0.014 | ． 043 | ：025 | ：062 | ：074 |
| $0.555 \mathrm{~b} / 2$ |  | －0．154 | －0．385 | －2．066 | －3．526 |  |  |  |  |
|  | 1.5 | －： 205 | －1．660 | －2．021 |  |  |  |  | ． 314 |
|  | 6.5 | －． 504 | －． 702 | －． 207 | －1．165 | ． 15 | ． 256 | ． 346 | － 399 |
|  | 11．0 | －． 836 | －： 545 | －-665 | － 644 | ．065 | ． 181 | ．266 | －${ }^{39}$ |
|  | 21：\％ | －： 329 | － | －．-1710 | Z． 605 | ：020 | ：094 | ． 162 | －225 |
|  | 24.5 | －． 595 |  | －． 46 | －． $7^{71}$ | ． 211 | ． 075 | ． 147 | ． 204 |
|  | 新．${ }^{\text {a }}$ | 二： 306 | －． 36 | －-.464 | －． 4.465 | －．024 | ．035 | ：1079 | － 138 |
|  | $4{ }^{4}$ ： 8 | $=-.306$ |  | － F \％ 81 | －$=143$ | －：051 | －002 | －051 | －105 |
|  | 44.5 51.5 | －：554 | －－260 | －． 342 | －． 381 | －．056 | －．008 | ． 019 | ．069 |
|  | 51.5 | －． $\mathrm{-} .170$ | －． 197 | －． 22 | －： 242 | －． 063 | －-016 | ． 005 | ． 042 |
|  | 71．0 | －． 109 -.052 | －．-061 | －．-136 | －． 0.748 | －．027 | －． 0.02 |  | －247 |
|  | 91：\％ | 019 | ．019 | ． 015 | ． 015 | ． 047 | ．053 | ． 061 | ． 071 |

TABLS XVII. - COMTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

sable XYit. - CONTIMUED.
(c) $a_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| Senispan sta. | Percent ohora | UPPER SURFACS |  |  |  | LOUER SURFACs |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6 . .5 \\ 11.5 \\ 14.5 \\ 21.5 \\ 24.5 \\ 31.5 \\ 34.0 \\ 41.5 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & -1.301 \\ & -1.306 \\ & -.730 \\ & -.724 \\ & -.534 \\ & -.517 \\ & -.461 \\ & -.444 \\ & =.416 \\ & -.394 \\ & =.394 \\ & =.398 \\ & =.370 \\ & =.303 \\ & =.227 \\ & -.741 \\ & -.050 \end{aligned}$ | -2.917 -2.748 -1.077 -1.014 -.738 -.699 $=.506$ -.575 $=.515$ $=.513$ $=.508$ $=.514$ $=.4784$ $=.390$ $=.201$ -.093 | -4.977 -3.862 -1.464 -1.402 -1.016 -.948 -.792 -.780 $=.702$ $=.680$ $=.665$ $=.845$ $=.605$ $=.412$ $=.404$ $=.291$ | -7.010 -5.206 -1.957 -1.906 -1.341 -1.299 -1.060 -1.004 -.920 -.898 -.887 -.869 $=.826$ -.725 -.601 -.469 -.301 | $\begin{array}{r} 0.517 \\ .449 \\ .414 \\ .353 \\ .563 \\ .238 \\ .201 \\ .1800 \\ .149 \\ .108 \\ . .998 \\ .090 \\ .088 \end{array}$ | -.444 0.445 .528 .472 .434 .380 .352 .382 .254 -.202 .180 .159 .143 .118 | $0.2 \overline{6}$ $\begin{aligned} & .617 \\ & .618 \\ & .570 \\ & .537 \\ & .478 \\ & .453 \\ & .377 \\ & .334 \\ & .370 \\ & .270 \\ & .238 \\ & .203 \\ & .170 \end{aligned}$ | 0.089 <br> .671 <br> .65 <br> .623 <br> .527 <br> . .444 <br> . 323 <br> .276 <br> .178 |
| $0.195 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5 \\ & 5.5 \\ & 11.5 \\ & 14.0 \\ & 21.5 \\ & 24.0 \\ & 31.5 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.8 \end{aligned}$ | -2.808 -2.450 -1.066 -.988 -.730 -.668 $=.556$ $=.528$ $=.455$ $=.451$ -.411 $=.411$ -.364 $=.291$ $=.717$ $=.013$ | -5.613 -3.857 -1.572 -1.403 -1.071 $=.924$ $=.761$ $=.699$ $=.631$ $=.615$ $=.564$ $=.541$ $=.478$ $=.382$ $=.277$ $=.177$ -.052 | -5.380 -4.764 -2.786 -2.315 -1.652 -1.341 -1.016 -.726 $=.780$ $=.747$ $=.674$ $=.648$ -.550 -.378 $=.375$ -.140 | -2.795 -2.461 -2.405 -2.293 -2.248 -2.058 -1.800 -1.677 -1.425 -1.357 -1.161 -1.114 -.959 -.833 -.666 -.562 -.379 | $\begin{array}{r} -.796 \\ 0.1962 \\ .429 \\ .365 \\ .326 \\ . .63 \\ .192 \\ .1667 \\ .179 \\ .100 \\ .1085 \\ .079 \\ .085 \\ .058 \end{array}$ | $\begin{aligned} & .332 \\ & .526 \\ & .527 \\ & .485 \\ & .4459 \\ & .459 \\ & .357 \\ & .309 \\ & .250 \\ & .244 \\ & .228 \\ & .189 \\ & .160 \\ & .136 \\ & .124 \\ & .108 \end{aligned}$ |  |  |
| $0.382 \mathrm{t} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.0 \\ 31.5 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.6 \end{array}$ | -4.366 -3.111 -1.374 -1.545 $=.920$ $=.808$ $=.651$ $=.612$ $=.528$ $=.506$ $=.472$ $=.421$ $=.362$ $=.283$ $=.178$ -.093 .003 | $\begin{aligned} & -3.542 \\ & -2.833 \\ & -2.415 \\ & -2.078 \\ & -1.853 \\ & -\frac{1}{2} .535 \\ & -\frac{1}{2} .239 \\ & -2.082 \\ & -.840 \\ & =.778 \\ & -.620 \\ & -.562 \\ & -.454 \\ & -.356 \\ & -.258 \\ & -.141 \\ & -.033 \end{aligned}$ | -2.125 -1.901 -1.957 -1.917 -1.901 -1.789 -1.753 -1.846 -1.537 -1.453 -1.257 -1.176 -1.014 -.854 -.633 -.539 -.332 | -1.565 -1.397 -1.305 -1.341 -1.369 -1.313 -1.341 -3.273 -1.296 -1.229 -1.289 -1.141 -1.314 -1.026 -.931 -.844 -.721 | 0.365 <br> .424 <br> - 365 <br> - 329 <br> .241 <br> .197 <br> . .148 <br> .084 <br> .075 .081 .083 | 0.238 .519 .510 .475 .446 .355 .354 .377 .238 .215 .173 .143 .113 .084 .084 | 0.27 .55 .537 .449 .363 .336 .261 .167 .120 .085 | $\begin{array}{r} -.261 \\ 0.564 \\ .573 \\ .564 \\ .545 \\ .45 \\ .467 \\ .378 \\ .3266 \\ .296 \\ . .778 \\ .1066 \\ .035 \\ .096 \end{array}$ |
| $0.555 \mathrm{~b} / 2$ | 0 3.5 56.5 31.5 14.5 21.5 24.5 31.5 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.8 | -5.318 -3.481 -1.537 -1.397 -1.060 -.915 $=.730$ $=.688$ $=.567$ $=.528$ $=.700$ $=.327$ $=.364$ $=.264$ $=.166$ -.084 .001 | $\begin{aligned} & -2.821 \\ & -2.613 \\ & -2.022 \\ & -1.853 \\ & -1.835 \\ & -1.684 \\ & -1.510 \\ & -1.391 \\ & -1.211 \\ & -1.132 \\ & -.969 \\ & -.891 \\ & -.751 \\ & -.624 \\ & -.456 \\ & -.360 \\ & -.236 \end{aligned}$ | -1.290 -1.217 -1.173 -1.173 -1.133 -1.116 -1.083 -1.094 -1.067 -1.060 -1.038 -.971 -.949 -.875 -.803 -.729 -.845 | $\begin{aligned} & -1.229 \\ & -1.116 \\ & -1.060 \\ & -1.072 \\ & -1.049 \\ & -3.027 \\ & -.999 \\ & -1.004 \\ & -.989 \\ & -.993 \\ & -.951 \\ & -.909 \\ & -.907 \\ & -.859 \\ & -.831 \\ & -.755 \\ & -.747 \end{aligned}$ | $\begin{array}{r} -.089 \\ 0.447 \\ .437 \\ .386 \\ .347 \\ .280 \\ .257 \\ .187 \\ .150 \\ .135 \\ .205 \\ .077 \\ .074 \\ .074 \end{array}$ | $\begin{array}{r} -.250 \\ 0.508 \\ .509 \\ .479 \\ .443 \\ .374 \\ .344 \\ .291 \\ .259 \\ .218 \\ .955 \\ .950 \\ .109 \\ .069 \\ .026 \end{array}$ | $\begin{array}{r} 0.315 \\ .527 \\ .525 \\ .547 \\ .412 \\ .386 \\ .529 \\ .296 \\ .247 \\ .720 \\ .173 \\ .058 \\ . .005 \\ \hline .125 \end{array}$ | $\begin{aligned} & 0.278 \\ & .520 \\ & .527 \\ & .527 \\ & .505 \\ & .4421 \\ & .3662 \\ & .338 \\ & .281 \\ & .248 \\ & .186 \\ & .031 \\ & -.041 \\ & -.207 \end{aligned}$ |

TABLE XVII.- CONCLUDED.
(o) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Serispan eta. | Percent chord | UPPER SURFACE |  |  |  | LOWEA SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 1.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -6.568 \\ -3.772 \\ -1.649 \\ -1.553 \\ -1.088 \\ -.999 \\ -.752 \\ -.708 \\ -.584 \\ -.556 \\ -.472 \\ =.415 \\ =.340 \\ =.256 \\ =.146 \\ -.075 \\ .005 \end{array}$ | $\begin{aligned} & -1.386 \\ & -1.183 \\ & -1.234 \\ & -1.132 \\ & -1.149 \\ & -1.054 \\ & -1.071 \\ & -1.009 \\ & -1.009 \\ & -.941 \\ & =.958 \\ & =.818 \\ & -.755 \\ & -.704 \\ & =.622 \\ & =.550 \\ & =.466 \end{aligned}$ | $\begin{array}{r} -1.027 \\ -.892 \\ -.943 \\ -.892 \\ -.892 \\ -.836 \\ -.881 \\ -.792 \\ -.836 \\ -.780 \\ -.836 \\ =.723 \\ -.723 \\ -.692 \\ -.677 \\ -.631 \\ -.502 \end{array}$ | $\begin{array}{r} -0.971 \\ -.857 \\ -.892 \\ -.836 \\ -.842 \\ . .792 \\ -.808 \\ -.780 \\ -.808 \\ -.769 \\ -.786 \\ -.716 \\ -.721 \\ -.691 \\ -.678 \\ -.633 \\ -.596 \end{array}$ | 0.053 <br> .441 <br> . 389 <br> .291 <br> .258 <br> . 204 <br> 280 .139 <br> .139 <br> .088 <br> .056 <br> .053 <br> .053 .058 | $\begin{array}{r} 0.268 \\ .499 \\ .495 \\ .447 \\ .413 \\ .342 \\ .307 \\ .254 \\ .221 \\ .173 \\ .109 \\ .1074 \\ .054 \\ .019 \\ . .019 \\ . .092 \end{array}$ |  | 0.139 <br> - 500 <br> .498 <br> .415 <br> .319 .224 .194 .139 <br> .159 -.017 .057 <br> -.077 -.196 |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 11.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.6 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -5.539 \\ -3.582 \\ -1.570 \\ -1.441 \\ -1.173 \\ -1.080 \\ -.786 \\ -.702 \\ -.556 \\ -.511 \\ -.444 \\ -.370 \\ -.310 \\ -.226 \\ -.142 \\ -.082 \\ -.016 \end{array}$ | $\begin{aligned} & -1.194 \\ & -.952 \\ & =.851 \\ & -.840 \\ & =.761 \\ & =.783 \\ & =.727 \\ & =.738 \\ & =.688 \\ & =.693 \\ & =.590 \\ & =.586 \\ & =.539 \\ & =.515 \\ & =.477 \\ & -.446 \end{aligned}$ | $\begin{array}{r} -0.904 \\ -.741 \\ -.696 \\ -.724 \\ -.674 \\ -.696 \\ -.668 \\ -.668 \\ -.640 \\ =.663 \\ -.678 \\ -.561 \\ -.569 \\ =.536 \\ =.535 \\ -.498 \\ -.476 \end{array}$ | $\begin{array}{r} -0.780 \\ -.724 \\ -.696 \\ -.680 \\ -.668 \\ -.664 \\ -.640 \\ -.651 \\ -.629 \\ -.635 \\ -.618 \\ =.565 \\ -.571 \\ -.547 \\ -.544 \\ -.504 \\ -.474 \end{array}$ | 0.058 <br> .431 .430 <br> . 371 <br> .258 <br> .227 <br> .167 <br> .137 <br> .072 <br> .047 <br> .016 <br> .017 |  |  | 0.198 .464 <br> .464 <br> .450 <br> . 356 <br> - 319 <br> - 260 <br> - 212 <br> .121 <br> .079 <br> .006 <br> -.053 -.090 <br> . .186 |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 2 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.6 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & -7.038 \\ & -3.806 \\ & -1.419 \\ & -1.296 \\ & -1.128 \\ & -1.027 \\ & -.797 \\ & -.713 \\ & -.523 \\ & -.506 \\ & =.444 \\ & =.406 \\ & -.341 \\ & =.327 \\ & -.255 \\ & =.296 \\ & =.197 \end{aligned}$ | $\begin{array}{r} -0.783 \\ -.676 \\ -.682 \\ -.620 \\ -.643 \\ -.615 \\ =.626 \\ =.569 \\ =.502 \\ -.530 \\ =.427 \\ =.424 \\ =.370 \\ =.369 \\ =.323 \\ -.323 \end{array}$ | $\begin{array}{r} -0.568 \\ -.615 \\ -.512 \\ -.556 \\ -.601 \\ -.556 \\ =.556 \\ -.539 \\ -.545 \\ -.500 \\ -.511 \\ -.424 \\ -.424 \\ -.385 \\ -.390 \\ -.354 \\ -.352 \end{array}$ | $\begin{array}{r} -0.629 \\ -.612 \\ -.590 \\ -.556 \\ -.573 \\ -.556 \\ -.573 \\ -.528 \\ -.556 \\ =.506 \\ -.523 \\ -.450 \\ =.453 \\ -.426 \\ -.425 \\ =.391 \\ -.378 \end{array}$ | 0.107 <br> .405 <br> .315 <br> .160 <br> .104 <br> .065 <br> . 020 <br> -. 028 <br> $-.030$ <br> $-.054$ <br> $-.040$ <br> $-.042$ <br> $-.022$ | 0.330 . 405 <br> .382 <br> .256 <br> .183 <br> .089 <br> .051 .022 <br> $-.006$ <br> $-.021$ <br> $-.056$ <br> $-.068$ <br> . .090 -.128 <br> $-.128$ | $\begin{array}{r} 0.284 \\ .415 \\ .392 \\ .343 \\ .285 \\ .212 \\ .154 \\ .115 \\ .067 \\ .034 \\ .007 \\ -.017 \\ =.056 \\ =.077 \\ -.149 \end{array}$ | $\begin{array}{r} 0.221 \\ .416 \\ .392 \\ .367 \\ .308 \\ .236 \\ .188 \\ .139 \\ .091 \\ .055 \\ .019 \\ -.005 \\ -.041 \\ =.077 \\ =.115 \\ -.260 \end{array}$ |


(a) $a_{u}, 0^{\circ}, 1^{0}, 2^{0}, 3^{\circ}$.

| Serispan sta. | ( Percent | UPPER SURFACE |  |  |  | Lotrer surface |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angio of attaok |  |  |  | Angie of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | ${ }^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  | 0.455 | 0.455 | 0.435 | 0.395 |  |  |  |  |
|  | $\frac{1}{5.5}$ | . 0.035 | -. 0.089 | --. 133 | -. 308 | -0.019 | 0.061 | -. 0.151 | 0.208 |
|  | 6.5 | -.056 | -. 106 | -. 151 | - 203 | -.068 | -. 229 | -027 | -064 |
|  | 11.0 14.5 | -.068 | -. 129 | -- 145 | -. 185 | -.082 | -. 0.059 | -. 002 | :027 |
|  | 21.0 | -. 096 | -. 129 | -:157 | -. 185 | -. 102 | -.077 | -. 035 | $\therefore 016$ |
|  | 24.5 3.5 | -. 0.09 | -. 138 | --. 151 | -. 191 | -. 119 | -. 0.100 | -.053 | -. 0.045 |
|  | 34.5 | -:119 | -. 152 | -:168 | -:200 | -:142 | - 2121 | -:088 | -:.06\% |
|  | 41.0 | -148 | - 169 | $\because 158$ | -206 | $\because 148$ | $\underline{-129}$ | -. 096 | -. 073 |
|  | 51.5 | -. 16 | --187 | --297 | -. 220 | - 160 | -. 135 | -. 108 | -093 |
|  | 19:5 | -. 112 | -. 164 | -. 180 | -. 188 | - $=1514$ | -. -103 | -. 102 | - -.068 |
|  | 79.5 91.8 | -.062 | -:075 | -:.076 | -.088 | -:065 | -. 0.014 | -.042 | -:.033 |
| $0.195 \mathrm{~b} / 2$ | 0 | 0.427 | 0.406 | 0.352 | 0.257 |  |  |  |  |
|  | 1.5 | -. 004 | -. 132 | --269 | -. 264 | 0.005 | 0.127 | 0.228 |  |
|  | 6.5 | -..090 | - -132 | --203 | --263 | --.09\% | -. 040 | -021 | :070 |
|  | 17.0 | -. 099 | - -144 | - 7178 | -. 234 | -. 113 | -. 075 | -. 025 | -019 |
|  | 21.5 | -. 119 | -. 145 | -. 1788 | --231 | -. 128 | -.089 | -:053 | -:.030 |
|  | 24.5 | - 112 | -. 155 | -. 177 | -. 212 | -. 133 | -. 098 | -. 068 | -. 03 |
|  | 31.5 | -. 142 | -. 164 | -. 178 | -.208 | -. 151 | -. 132 | -:102 | -:082 |
|  | 41.5 | - 1148 | -. 172 | - -197 | -.217 | -. 159 | - -138 | -. 1111 | -. 0.98 |
|  | 51.5 | -. 148 | - -167 | -. 183 | -. 203 | -:153 | - -135 | -:111 | -. 0.093 |
|  | 515 | - | - | - -154 | - -.174 | - $\because 133$ | -. $\mathrm{-} .118$ | -. 0974 | -:088 |
|  | 79.5 | -. 041 | - 054 $=050$ | -. 059 | -. 059 | -.047 | -.940 | -.030 | -.065 |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | , | 0.398 | 0.377 | 0.300 | 0.145 |  |  |  |  |
|  | 5.5 | -.096 | -: 175 | - -352 | $\because$ | -0.119 | 0.032 <br> -.040 | 0.142 |  |
|  | 6.5 | -. 119 | $\cdots$ |  | -. 329 | -. 128 | -. 080 | -007 | . 062 |
|  | 11.5 | - | -. 184 | - 2203 | -. 263 | - -142 | -. 0.089 | -.033 | .021 |
|  | 21. 21 | -. 142 | -. 175 | -.208 | - -265 | - $\because 151$ | -.109 | -:.045 | -:.0.076 |
|  | 24.5 | -. 148 | -. 175 | -. 206 | -. 251 | -. 153 | -. 118 | -. 075 | -. 045 |
|  | 31.0. | -. 1148 | -. 2169 | -. 188 | -. 232 | -. 1717 | -. 132 | -. 0.108 | -:.073 |
|  | 42.8 | -. 162 | -. 181 | $\therefore 203$ | -. 231 | -. 168 | -. 138 | -. 111 | -.088 |
|  | 44.5 | -. 156 | $\square$ | -. 203 | --. 231 | $\square$ | -. 18.184 | =. 1121 | -. 0.093 |
|  | 59.5 | - -133 | -. 146 | - -160 | - -174 | -. 128 | -. 145 | -.094 | -.088 |
|  | 71.8 | -. -041 | -. 0848 | - -1.102 | -. 0.052 | -. 080 | -. O | -. 059 | -. 0.059 |
|  | 91.8 | -. 019 | -.022 | -. 013 | -.004 | :016 | .026 | .028 |  |
| $0.555 \mathrm{~b} / 2$ |  | 0.424 | 0.426 | 0.329 | 0.162 |  |  |  |  |
|  | 1.5 | -. 016 | -. 187 | -.381 | -.590 | -0.073 | 0.052 | 0.165 | 0.251 |
|  | \%.5 | -:996 | - -190 | -. 2866 | -. 367 | -. 105 | -:040 | 0.047 | . 119 |
|  | 11.0 | -. 111 | -.164 | -.229 | -. 292 | -. 119 | -. 072 | -.013 | .044 |
|  | 714.5 | - -117 | --161 | -. 220 | -. 2277 | -- 1128 | -. 075 | -. 014 | -.030 |
|  | 24.5 | -. -125 | -. 155 | -. 191 | -. 234 | -. 131 | -. 103 | -.062 | -.022 |
|  | 31.8 | -. 131 | - -15 | --191 | -229 | -. 139 | -. 112 | -. 073 | -. 045 |
|  | 34, | -. 151 | $\because \mathrm{O} .167$ | -. 197 | -.217 | -. 145 | -. 2123 | -.093 | -. -.068 |
|  | 44.5 | -. 148 | -. 164 | - 191 | -. 214 | -. 142 | -. 126 | -. 099 | -. 0.075 |
|  | 51.0 | -. -131 | -. 3149 | -. -180 | -. 2148 | -:.134 | -. 2121 | -:105 | -.076 |
|  | 71: ${ }^{\text {a }}$ | -. 065 | -. 075 | -. 034 | -. 003 | -. 066 | -. 046 | -. 037 | --033 |
|  | ${ }_{91} 7$ | -.036 | -.026 | -.026 | -.024 | -. 042 | -.041 | -042 | . 064 |

TABLE XVIII.- CONTINUED.
(a) $\alpha_{1}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}$ - ooncluded.

| Semispan eta. | Percent ohord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of ettack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{0}$ | $3^{0}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{0}$ | $3^{0}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.421 -.036 <br> $-.262$ <br> $-.114$ <br> $-.108$ <br> $-.219$ <br> $-.128$ <br> $-.139$ <br> $=.145$ -148 <br> $-.148$ <br> $-.137$ <br> $-.062$ <br> $-.016$ <br> .042 | $\begin{aligned} & 0.391 \\ & =.213 \\ & =.210 \\ & =.213 \\ & =.172 \\ & =.178 \\ & =.181 \\ & =.175 \\ & =.178 \\ & =.176 \\ & =.164 \\ & =.149 \\ & =.121 \\ & =.075 \\ & =.020 \\ & .038 \end{aligned}$ | 0.268 <br> $-.421$ <br> -.297 .303 <br> $=.231$ <br> -. 229 <br> -. 220 <br> -211 -.206 <br> $-.206$ <br> $-200$ <br> $-191$ <br> -.165 -.137 <br> $-.079$ <br> .033 .039 | 0.047 -.654 <br> -. 389 <br> -.384 -.295 <br> $-.292$ <br> -.263 -.246 <br> $-.234$ <br> -.234 -.220 <br> $-.217$ <br> -.188 -.148 <br> $-.085$ <br> -.033 .036 | $\left\{\begin{array}{r} -.07 \\ -0.062 \\ -.114 \\ =.119 \\ -.131 \\ -.134 \\ -.137 \\ =.142 \\ -.148 \\ -.151 \\ -.148 \\ -.145 \\ -.134 \\ =.108 \\ -.050 \\ -.007 \\ .044 \end{array}\right.$ | $\begin{aligned} & -.075 \\ & 0.075 \\ & =.034 \\ & -.072 \\ & -.077 \\ & -.092 \\ & -.103 \\ & -.118 \\ & =.106 \\ & -.122 \\ & -.115 \\ & =.123 \\ & =.075 \\ & =.046 \\ & -.006 \\ & .052 \end{aligned}$ | $\begin{array}{r} .0 .211 \\ .056 \\ .039 \\ . .007 \\ -.022 \\ -.048 \\ =.056 \\ -.076 \\ -.079 \\ =.094 \\ =.096 \\ =.102 \\ =.079 \\ =.036 \\ .001 \\ .050 \end{array}$ | $\begin{array}{r} 0.300 \\ .131 \\ .1005 \\ .044 \\ . .027 \\ -.010 \\ =.019 \\ -.045 \\ =.071 \\ =.076 \\ =.099 \\ =.071 \\ -.033 \\ .007 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} 0.369 \\ -.033 \\ =.108 \\ -.102 \\ -.105 \\ =.116 \\ =.122 \\ -.125 \\ =.125 \\ =.128 \\ =.151 \\ =.142 \\ -.131 \\ -.088 \\ -.050 \\ -.007 \\ .047 \end{array}$ | $\begin{aligned} & 0.420 \\ & =.215 \\ & -.210 \\ & =.192 \\ & =.178 \\ & =.172 \\ & =.161 \\ & =.161 \\ & =.158 \\ & =.158 \\ & =.161 \\ & =.155 \\ & =.152 \\ & =.103 \\ & =.014 \\ & =.046 \end{aligned}$ | $\begin{aligned} & 0.360 \\ & =.415 \\ & -.306 \\ & -.289 \\ & =.220 \\ & -.220 \\ & =.197 \\ & -.188 \\ & =.177 \\ & -.168 \\ & =.185 \\ & =.160 \\ & =.114 \\ & =.068 \\ & =.016 \\ & .053 \end{aligned}$ | 0.211 <br> $-.645$ <br> -.392 -.364 <br> -. 292 <br> -.280 -.246 <br> .237 -.214 <br> -. 208 <br> $=.214$ $=.194$ <br> $-.171$ <br> $-.125$ <br> -.073 -.019 .044 | $\begin{array}{r} -0.062 \\ -.114 \\ -.119 \\ -.125 \\ -.131 \\ -.131 \\ -.128 \\ -.131 \\ -.128 \\ -.128 \\ -.116 \\ -.099 \\ -.042 \\ -.002 \\ .056 \end{array}$ | $\begin{aligned} & -.057 \\ & 0.0029 \\ & =.043 \\ & -.069 \\ & -.100 \\ & =.100 \\ & =.103 \\ & =.106 \\ & =.121 \\ & =.115 \\ & =.100 \\ & =.096 \\ & -.043 \\ & -.003 \\ & .055 \end{aligned}$ | $\begin{array}{r} -.074 \\ 0.044 \\ .042 \\ -.013 \\ -.053 \\ -.065 \\ -.073 \\ -.082 \\ =.091 \\ -.094 \\ -.082 \\ =.076 \\ -.036 \\ -.010 \\ .053 \end{array}$ | $\begin{aligned} & -.300 \\ & 0.116 \\ & .113 \\ & .039 \\ & =.027 \\ & =.036 \\ & =.053 \\ & -.062 \\ & =.071 \\ & =.073 \\ & =.073 \\ & =.073 \\ & =.039 \\ & .053 \end{aligned}$ |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.8 34.5 41.0 44.5 52.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.415 \\ & .007 \\ & =.116 \\ & -.125 \\ & -.119 \\ & -.128 \\ & -.128 \\ & =.125 \\ & =.122 \\ & -.116 \\ & -.131 \\ & -.131 \\ & -.108 \\ & -.073 \\ & -.036 \\ & .007 \\ & .056 \end{aligned}$ | $\begin{aligned} & 0.334 \\ & =.175 \\ & =.213 \\ & =.215 \\ & =.175 \\ & =.176 \\ & =.161 \\ & =.155 \\ & =.146 \\ & =.129 \\ & =.129 \\ & =.132 \\ & =.116 \\ & =.080 \\ & -.031 \\ & .003 \\ & .049 \end{aligned}$ | $\begin{aligned} & 0.162 \\ & -.389 \\ & -.303 \\ & -.292 \\ & -.220 \\ & -.280 \\ & =.188 \\ & -.162 \\ & =.157 \\ & =.151 \\ & -.157 \\ & -.154 \\ & -.128 \\ & =.096 \\ & =.042 \\ & .001 \\ & .044 \end{aligned}$ | $\begin{aligned} & 0.108 \\ & =.636 \\ & =.392 \\ & =.389 \\ & -.277 \\ & =.266 \\ & =.220 \\ & =.206 \\ & =.185 \\ & =.165 \\ & =.168 \\ & =.162 \\ & =.139 \\ & =.099 \\ & =.045 \\ & -.010 \\ & .044 \end{aligned}$ | $\begin{array}{r} -0.071 \\ -.116 \\ -.119 \\ -.128 \\ -.131 \\ -.139 \\ -.137 \\ -.131 \\ . .128 \\ -.128 \\ -.116 \\ -.108 \\ -.071 \\ -.033 \\ .013 \\ .067 \end{array}$ | -.072 0.0740 $=.0443$ -.077 $=.089$ $=.107$ -.106 $=.109$ -.109 -.112 -.109 $=.106$ $=.069$ -.037 .015 .061 | 0.300 .042 <br> .030 <br> -.025 -.045 <br> -.043 -.075 <br> $-.091$ <br> -.102 -.096 <br> $-.099$ <br> $-.099$ <br> -.102 -.065 <br> $-.036$ <br> .047 | 0.271 <br> .102 .090 <br> .016 <br> -.013 -.045 <br> $-.065$ <br> $=.073$ -.076 <br> $-.088$ <br> -. 088 <br> -. 091 <br> $-.062$ <br> $-.030$ <br> .044 |

TABLE XVIII. - COMTIMUED.
(b) $\alpha_{a}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.


TABLE XVIII.- CONTINUED.
(b) $x_{u}, 4^{\circ}, 6^{\circ}, 5^{\circ}, 10^{\circ}$ - Ooncluded.

| Sem1span sta. | Percent chord | UPPER SUETAOS |  |  |  | LOWIER SURFACTS |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle or attaok |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.9 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.6 \end{array}$ | $\begin{array}{r} -0.274 \\ =.932 \\ -.504 \\ =.493 \\ =.369 \\ =.349 \\ =.303 \\ =.289 \\ =.272 \\ -.263 \\ -.249 \\ -.234 \\ =.206 \\ =.016 \\ =.091 \\ -.033 \\ .036 \end{array}$ | $\begin{array}{r} -1.268 \\ -1.679 \\ -.763 \\ -.723 \\ -.528 \\ . .476 \\ -.407 \\ -.378 \\ =.338 \\ -.329 \\ -.303 \\ =.283 \\ . .246 \\ -.188 \\ -.108 \\ .045 \\ .010 \end{array}$ | $\begin{array}{r} -2.726 \\ -2.139 \\ -1.044 \\ -.992 \\ =.693 \\ =.627 \\ -.512 \\ =.471 \\ =.424 \\ =.397 \\ -.359 \\ -.336 \\ =.282 \\ =.215 \\ =.126 \\ -.054 \\ .032 \end{array}$ | $\begin{array}{r} -4.529 \\ -2.976 \\ -1.325 \\ -1.256 \\ -.860 \\ =.762 \\ =.612 \\ =.562 \\ =.483 \\ =.454 \\ -.402 \\ =.374 \\ =.313 \\ =.236 \\ -.138 \\ -.054 \\ .029 \end{array}$ | 0.369 <br> .165 <br> .099 <br> .082 <br> .016 <br> $-.016$ <br> -. 019 <br> -.045 -.045 <br> $-.066$ <br> $-.053$ <br> -. 019 <br> .050 | 0.421 <br> .300 <br> .283 <br> .197 <br> .105 .085 <br> .044 <br> .036 .004 <br> $-.007$ <br> -. 019 <br> -.019 .004 <br> .016 <br> .056 | 0.380 <br> .377 .363 <br> .268 <br> 236 .179 <br> .147 <br> .104 .092 <br> .055 <br> .040 <br> .003 <br> .020 <br> .035 .061 <br> .061 | 0.233 <br> .420 <br> .409 <br> - 331 <br> .233 <br> .207 <br> $.15 \%$ <br> .095 <br> .084 <br> .058 <br> .043 <br> .049 .064 |
| $0.831 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.065 \\ -.892 \\ -.501 \\ =.473 \\ -.358 \\ -.343 \\ -.289 \\ =.272 \\ =.240 \\ -.231 \\ -.226 \\ -.214 \\ -.188 \\ =.131 \\ -.073 \\ -.016 \\ .044 \end{array}$ | $\begin{array}{r} -0.949 \\ -1.510 \\ -.748 \\ -.691 \\ -.504 \\ -.470 \\ -.375 \\ -.355 \\ -.303 \\ -.289 \\ -.272 \\ -.251 \\ =.217 \\ -.157 \\ -.088 \\ -.027 \\ .042 \end{array}$ | $\begin{array}{r} -2.286 \\ -2.090 \\ -1.024 \\ -.955 \\ -.667 \\ -.609 \\ -.480 \\ -.437 \\ -.365 \\ -.351 \\ -.330 \\ -.293 \\ -.250 \\ -.178 \\ -.103 \\ -.043 \\ .035 \end{array}$ | $\begin{array}{r} -3.974 \\ -2.873 \\ -1.314 \\ -1.196 \\ -.839 \\ -.739 \\ -.566 \\ -.512 \\ =.431 \\ =.420 \\ -.359 \\ =.330 \\ =.276 \\ =.204 \\ =.115 \\ =.052 \\ .023 \end{array}$ | 0.363 <br> .188 <br> .102 <br> .076 .007 -.0055 . .030 -.050 -.059 -.066 $=.027$ .007 .056 | 0.429 <br> .294 <br> .274 .288 <br> .085 <br> .073 .030 <br> .016 -.013 <br> $-.016$ <br> $-.030$ <br> -.045 -.013 <br> .010 <br> .050 | $\begin{array}{r} .0 .386 \\ .360 \\ .351 \\ .266 \\ .156 \\ .150 \\ .081 \\ .058 \\ .029 \\ .015 \\ .003 \\ . .020 \\ . .006 \\ .012 \\ .052 \end{array}$ | 0.242 <br> .417 <br> .409 <br> . 328 <br> .213 <br> .196 <br> 138 .110 <br> .072 <br> .049 <br> .040 <br> .006 <br> .015 <br> .022 |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 24.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.478 \\ =.904 \\ =.490 \\ =.461 \\ =.343 \\ =.309 \\ =.260 \\ =.231 \\ =.203 \\ =.185 \\ =.185 \\ -.174 \\ =.145 \\ =.102 \\ =.045 \\ -.013 \\ .045 \end{array}$ | $\begin{array}{r} -1.584 \\ -1.656 \\ -.720 \\ =.677 \\ -.473 \\ -.415 \\ -.335 \\ -.297 \\ -.257 \\ -.237 \\ -.231 \\ =.214 \\ =.185 \\ =.128 \\ =.073 \\ -.042 \\ . .004 \end{array}$ | $\begin{array}{r} -3.074 \\ -2.246 \\ =.980 \\ -.908 \\ =.621 \\ -.535 \\ =.417 \\ =.368 \\ =.310 \\ =.302 \\ =.276 \\ =.267 \\ =.224 \\ =.178 \\ =.112 \\ =.092 \\ =.040 \end{array}$ | $\begin{aligned} & -4.949 \\ & -3.094 \\ & -1.242 \\ & -1.139 \\ & -.762 \\ & -.650 \\ & -.494 \\ & =.437 \\ & =.365 \\ & -.351 \\ & -.322 \\ & -.307 \\ & -.270 \\ & =.221 \\ & =.158 \\ & -.149 \\ & -.092 \end{aligned}$ | 0.343 <br> .171 <br> .156 <br> .067 <br> .036 .016 <br> .030 -.050 <br> $-.059$ <br> $-.073$ <br> -.073 -.076 <br> -. 062 <br> .030 -.004 <br> .044 | $\begin{array}{r} . .41 \\ 0.415 \\ .276 \\ .260 \\ .159 \\ .102 \\ .039 \\ .004 \\ . .016 \\ -.033 \\ =.046 \\ . .059 \\ . .068 \\ . .059 \\ . .039 \\ -.013 \\ .035 \end{array}$ | 0.386 <br> . 340 <br> - 328 <br> . 225 <br> .167 <br> .047 <br> .012 <br> -. 017 <br> $-.034$ <br> $-.046$ <br> $-.052$ <br> -.049 -.034 <br> $-.020$ <br> .012 | $\begin{array}{r} -.068 \\ 0.388 \\ .377 \\ .282 \\ .219 \\ .127 \\ .078 \\ .043 \\ .009 \\ -.014 \\ -.020 \\ =.043 \\ =.049 \\ -.034 \\ -.031 \\ .006 \end{array}$ |

TABLE XVIII. - GOMPIMUED.
(a) $a_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| Senfspan ta. | Parcent chord | UPPER SURTACE |  |  |  | LOUTR SURFsics |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attmox |  |  |  | Angle of attaok |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 34.5 \\ 21.0 \\ 24.5 \\ 31.8 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.8 \\ 79.5 \\ 91.0 \end{gathered}$ | -1.418 -1.886 -.785 -.745 $=.549$ -.529 -.492 $=.348$ $=.399$ -.395 -.391 $=.368$ $=.305$ -.39 -.146 -.046 | $\begin{aligned} & -3.022 \\ & -2.87 \\ & -1.095 \\ & -1.021 \\ & -.765 \\ & -.693 \\ & -.586 \\ & -.563 \\ & =.497 \\ & =.422 \\ & -.469 \\ & -.428 \\ & =.351 \\ & -.269 \\ & =.169 \\ & -.054 \end{aligned}$ | $\begin{aligned} & -5.147 \\ & -1.026 \\ & -1.435 \\ & -1.369 \\ & -.861 \\ & -.869 \\ & -.723 \\ & -.694 \\ & -.616 \\ & -.513 \\ & -.588 \\ & -.536 \\ & -.437 \\ & =.364 \\ & -.266 \\ & -.125 \end{aligned}$ | $\begin{aligned} & -7.566 \\ & -5.477 \\ & -1.797 \\ & -1.670 \\ & -1.207 \\ & -2.141 \\ & -1.016 \\ & -1.034 \\ & -.930 \\ & -.937 \\ & -.681 \\ & -.823 \\ & =.733 \\ & =.606 \\ & =.476 \\ & -.314 \end{aligned}$ | 0.495 <br> .437 <br> . 337 <br> .253 <br> .221 <br> $-170$ <br> $-170$ <br> .084 <br> .081 | $\begin{array}{r} .0-7 \\ 0.406 \\ .509 \\ .506 \\ .417 \\ .414 \\ .357 \\ .334 \\ .299 \\ .265 \\ .235 \\ .199 \\ .176 \\ .177 \\ .141 \\ .121 \end{array}$ | $\begin{array}{r} -.777 \\ 0.504 \\ .544 \\ .541 \\ .576 \\ .464 \\ .435 \\ .369 \\ .335 \\ .35 \\ .283 \\ .246 \\ .205 \\ .182 \\ .139 \end{array}$ |  |
| $0.195 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 34.5 \\ 21.5 \\ 24.5 \\ 31.5 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 11.0 \\ 79.5 \\ 91.0 \end{gathered}$ | -2.924 -2.545 -1.064 $=.975$ -.733 $=.644$ $=.546$ $=.509$ $=.448$ $=.437$ $=.408$ $=.402$ $=.351$ $=.799$ $=.198$ $=.1006$ -.006 |  | $\begin{array}{r} -9.097 \\ -5.428 \\ -2.044 \\ -1.814 \\ -1.297 \\ -1.110 \\ -.909 \\ -.846 \\ =.743 \\ -.726 \\ -.674 \\ =.665 \\ -.586 \\ =.493 \\ =.364 \\ =.099 \\ -.099 \end{array}$ |  | 0.156 <br> .469 <br> .354 <br> - 259 <br> .190 <br> .167 <br> .133 <br> .087 <br> .081 | $\begin{array}{r} -.77 \\ 0.437 \\ .508 \\ .466 \\ .426 \\ .377 \\ .299 \\ .276 \\ .245 \\ .159 \\ .178 \\ .147 \\ .147 \\ .130 \end{array}$ |  |  |
| $0.382 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.8 \\ 24.5 \\ 31.6 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | -4.536 -3.117 -1.343 -1.528 -.897 -.782 -.638 $=.508$ -.509 -.474 $=.437$ $=.45$ -.353 $=.279$ $=.169$ -.092 .009 | -6.532 -4.765 -1.924 -1.717 -1.242 -1.070 $=.634$ $=.759$ $=.538$ $=.509$ $=.529$ $=.417$ $=.317$ $=.328$ $=.112$ $=.008$ |  | .--7 -1.499 -1.499 -1.456 -1.461 -1.412 -1.427 -1.375 -1.357 -1.317 -1.282 -1.227 -1.161 -1.080 $=.938$ -.834 -.670 | -.774 0.354 .420 .357 .317 .268 .245 .193 .175 .144 .130 .104 .052 .052 .052 .052 | $\begin{array}{r} 0.043 \\ .478 \\ .478 \\ .455 \\ .466 \\ .354 \\ .302 \\ .279 \\ .245 \\ .256 \\ .1567 \\ .1358 \\ .130 \\ .110 \end{array}$ | -0.280 -.488 .535 .547 .540 .470 .437 .355 .350 .283 .245 .197 .154 .128 .067 | $\begin{array}{r} -.719 \\ 0.562 \\ .567 \\ .576 \\ .553 \\ .575 \\ .420 \\ .355 \\ .336 \\ .577 \\ .206 \\ .134 \\ .082 \\ -.054 \end{array}$ |
| $0.555 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.8 79.5 91.0 | -5.464 -3.554 -1.512 -1.350 -.595 -.857 $=.690$ $=.578$ -.535 $=.506$ -.443 -.420 -.351 -.256 -.155 -.072 .012 | $\begin{array}{\|} -10.306 \\ -5.464 \\ -2.159 \\ -1.961 \\ -1.415 \\ -1.231 \\ -.911 \\ -.622 \\ -.681 \\ -.635 \\ -.549 \\ -.512 \\ -.523 \\ -.307 \\ -.104 \\ -.106 \\ -.020 \end{array}$ | $\begin{array}{r} -4.285 \\ -1.615 \\ -1.570 \\ -1.518 \\ -1.498 \\ -1.426 \\ -1.435 \\ -1.355 \\ -1.358 \\ -1.383 \\ -1.237 \\ -1.179 \\ -1.716 \\ -.967 \\ -.603 \\ -.662 \\ .490 \end{array}$ | -2.034 -1.144 -1.109 -1.090 -1.083 -1.037 -1.034 -1.002 -1.011 -.999 -.993 -.973 -.973 $=.936$ -.860 -.803 -.743 | $\begin{array}{r} 0.269 \\ .449 \\ .446 \\ .394 \\ .351 \\ .291 \\ .218 \\ .184 \\ .153 \\ .138 \\ .115 \\ .084 \\ .087 \\ .089 \\ .089 \end{array}$ | $\begin{array}{r} -. .192 \\ .440 \\ .455 \\ .465 \\ .499 \\ .377 \\ .317 \\ .294 \\ .257 \\ .1995 \\ .150 \\ .115 \\ .058 \end{array}$ | $\begin{array}{r} -.710 \\ 0.524 \\ .541 \\ .524 \\ .507 \\ .4406 \\ .367 \\ .326 \\ . .277 \\ .257 \\ .1745 \\ .1145 \\ . .055 \\ -.027 \end{array}$ | $\begin{array}{r} 0.154 \\ .527 \\ .579 \\ .527 \\ .572 \\ .447 \\ .385 \\ .354 \\ .302 \\ .567 \\ .212 \\ .125 \\ .065 \\ -.002 \\ -.172 \end{array}$ |

TABLE XYIII. - CONCLDDED.
(o) $\alpha_{2}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Oonoluded.

| Semiapan sta. | Peroent ohord | UPPIER BURTMCE |  |  |  | LOINR SURTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | angle or attaok |  |  |  |
|  |  | $12^{0}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.5 \\ 14.0 \\ 21.5 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.5 \\ 44.5 \\ 51.5 \\ 59.5 \\ 71.5 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & -6.810 \\ & -3.908 \\ & -1.662 \\ & -1.541 \\ & -1.041 \\ & -.917 \\ & -.716 \\ & -.658 \\ & -.549 \\ & -.514 \\ & -.746 \\ & -.423 \\ & -.342 \\ & -.256 \\ & -.141 \\ & -.063 \\ & -.023 \end{aligned}$ | 12.544 -5.372 -2.427 -2.329 -1.469 -1.277 -.934 -.851 -.710 -.664 -.569 -.520 -.428 -.307 $=.187$ -.306 -.049 | $\begin{aligned} & -1.696 \\ & -1.208 \\ & -1.064 \\ & -1.030 \\ & -1.024 \\ & -.978 \\ & -.975 \\ & -.935 \\ & -.950 \\ & -.921 \\ & -.941 \\ & -.912 \\ & -.901 \\ & -.832 \\ & -.771 \\ & -.978 \\ & -.912 \end{aligned}$ | $\begin{aligned} & -1.323 \\ & -.886 \\ & -.860 \\ & -.849 \\ & -.831 \\ & -.803 \\ & -.797 \\ & -.771 \\ & -.748 \\ & -.768 \\ & =.748 \\ & -.765 \\ & =.733 \\ & -.716 \\ & -.667 \\ & -.626 \end{aligned}$ | $\begin{array}{r} -0.011 \\ .443 \\ .446 \\ .391 \\ .360 \\ .291 \\ .265 \\ .210 \\ .190 \\ .147 \\ .090 \\ .062 \\ .061 \\ .061 \\ .064 \end{array}$ | $\begin{array}{r} -0.785 \\ .397 \\ .440 \\ .463 \\ .446 \\ .397 \\ .314 \\ .314 \\ .231 \\ .231 \\ .167 \\ .138 \\ .1070 \\ .051 \\ .055 \end{array}$ | 0.062 <br> .490 .493 <br> .487 <br> .403 <br> .312 <br> .228 <br> .142 <br> .027 .033 .148 <br> .148 |  |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 5.5 61.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & -6.142 \\ & -3.73 \\ & -1.604 \\ & -1.451 \\ & -1.015 \\ & -.900 \\ & -.678 \\ & -.615 \\ & -.797 \\ & -.454 \\ & -.399 \\ & -.365 \\ & -.307 \\ & -.224 \\ & -.123 \\ & -.075 \\ & . .009 \end{aligned}$ | $\begin{aligned} & -11.083 \\ & -4.336 \\ & -2.958 \\ & -2.976 \\ & -1.967 \\ & -1.765 \\ & -1.975 \\ & -1.003 \\ & =.736 \\ & -.670 \\ & -.520 \\ & -.437 \\ & -.339 \\ & -.2121 \\ & =.126 \\ & -.080 \\ & -.049 \end{aligned}$ | $\begin{aligned} & -1.369 \\ & =.792 \\ & =.777 \\ & -.736 \\ & -.777 \\ & =.691 \\ & =.674 \\ & =.677 \\ & -.651 \\ & -.680 \\ & -.662 \\ & -.644 \\ & -.645 \\ & -.588 \\ & -.536 \end{aligned}$ |  | $-0-$ .443 .432 .53 -.265 .239 .184 .153 .107 .089 .066 .023 .029 .032 .040 |  | $\begin{array}{r} 0.797 \\ .475 \\ .472 \\ .447 \\ .340 \\ .306 \\ .248 \\ .217 \\ .165 \\ .128 \\ .093 \\ -.013 \\ -.036 \\ -.177 \end{array}$ | 0.310 .447 .472 .455 -.356 .330 .370 . .385 .137 .099 .013 -.045 -.187 |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 12.0 14.0 21.5 24.0 31.5 34.5 41.5 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{array}{r} -7.212 \\ -4.100 \\ -1.527 \\ -1.397 \\ =.929 \\ -.765 \\ =.595 \\ =.532 \\ =.440 \\ =.417 \\ =.374 \\ =.368 \\ =.316 \\ =.284 \\ =.218 \\ =.248 \end{array}$ | $\begin{aligned} & -2.398 \\ & -2.062 \\ & -2.021 \\ & -1.872 \\ & -1.895 \\ & -1.719 \\ & -1.659 \\ & -1.561 \\ & -1.517 \\ & -1.320 \\ & -1.940 \\ & -1.044 \\ & =.713 \\ & -.800 \\ & =.538 \\ & -.589 \\ & -.372 \end{aligned}$ | $\begin{aligned} & -0.789 \\ & -.562 \\ & -.508 \\ & -.588 \\ & -.576 \\ & -.550 \\ & -.539 \\ & =.513 \\ & -.504 \\ & =.490 \\ & -.501 \\ & -.476 \\ & =.499 \\ & -.493 \\ & =.455 \\ & -.435 \end{aligned}$ | $\begin{aligned} & -0.655 \\ & -.566 \\ & -.534 \\ & -.511 \\ & -.508 \\ & -.490 \\ & -.487 \\ & =.479 \\ & -.470 \\ & =.476 \\ & -.456 \\ & -.473 \\ & -.453 \\ & -.453 \\ & -.412 \\ & -.395 \end{aligned}$ | 0.055 .411 .386 .322 .356 .161 .110 .078 .009 -.020 -.023 $=.052$ $=.037$ -.046 -.020 | -.066 0.0449 .423 .383 .3176 .176 .127 .084 .061 .0026 .0017 . .011 .0066 -.043 | -.754 0.254 .426 .406 .35 .325 .125 .182 .1396 .093 .027 .001 -.045 -.076 $=.182$ -.160 | $\begin{array}{r} -.212 \\ 0.417 \\ .394 \\ .362 \\ .310 \\ .1145 \\ .151 \\ .108 \\ .067 \\ .036 \\ -.045 \\ -.050 \\ -.106 \\ -.164 \end{array}$ |


(a) $a_{\text {u }}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{0}$.

| Serispan ata. | Percent ohord | UPPER BLIFACE |  |  |  | LOTEH SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angie of attmok |  |  |  |
|  |  | $0^{\circ}$ | $1^{\text {a }}$ | $2{ }^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{\circ}$ | $2^{0}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{aligned} & 0.5 \\ & 5.5 \\ & 5.5 \\ & 11.5 \\ & 14.0 \\ & 21.5 \\ & 21.0 \\ & 31.5 \\ & 31.0 \\ & 41.5 \\ & 41.0 \\ & 51.5 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ | 0.484 .038 -.027 $=.031$ $=.057$ $=.074$ $=.108$ $=.104$ $=.113$ $=.130$ $=.155$ $=.132$ $=.164$ $=.068$ -.010 | $\begin{aligned} & 0.475 \\ & =.067 \\ & =.071 \\ & -.079 \\ & -.085 \\ & -.110 \\ & -.110 \\ & -.115 \\ & =.116 \\ & -.146 \\ & -.170 \\ & -.181 \\ & =.179 \\ & =.153 \\ & -.117 \\ & =.067 \\ & -.015 \end{aligned}$ |  | 0.402 $=.284$ $=.160$ $=.164$ $=.156$ $=.160$ $=.168$ $=.173$ $=.181$ $=.194$ $=.220$ $=.215$ $=.181$ $=.142$ $=.024$ | -.071 -.045 $=.036$ $=.047$ $=.068$ $=.076$ -.094 $=.109$ $=.123$ -.130 -.150 $=.129$ -.107 $=.070$ | $\begin{array}{r} -.106 \\ 0.033 \\ .008 \\ =.008 \\ =.032 \\ =.044 \\ -.062 \\ =.076 \\ -.086 \\ -.111 \\ -. .327 \\ -.112 \\ -.090 \\ -.057 \\ -.011 \end{array}$ | $\begin{array}{r} 0.273 \\ .078 \\ .047 \\ .021 \\ -.004 \\ -.019 \\ -.037 \\ -.051 \\ -.069 \\ -.084 \\ -.108 \\ -.093 \\ -.076 \\ -.049 \\ -.005 \end{array}$ | $\begin{array}{r} 0.239 \\ .123 \\ .090 \\ .059 \\ .030 \\ -.009 \\ -.025 \\ -.041 \\ -.059 \\ -.055 \\ -.075 \\ -.067 \\ -.037 \\ .003 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | 0 3.5 56.5 11.5 14.5 21.6 24.5 31.0 34.5 41.6 44.5 51.0 39.5 79.8 91.5 |  | 0.402 $=.165$ -.153 -.157 -.153 -.153 $=.157$ $=.157$ -.157 $=.197$ -.191 $=.173$ $=.145$ $=.1082$ -.055 .005 |  |  | 0.032 $=.067$ $=.086$ $=.095$ $=.123$ $=.134$ $=.147$ $=.155$ $=.157$ $=.155$ $=.135$ $=.045$ .041 | $\begin{array}{r} 0.155 \\ .007 \\ -.024 \\ =.051 \\ =.095 \\ -.096 \\ -.086 \\ =.1066 \\ -.127 \\ -.127 \\ -.136 \\ -.117 \\ -.080 \\ -.017 \end{array}$ | -.240 0.057 .025 -.010 $=.019$ $=.045$ -.061 $=.087$ $=.097$ $=.107$ $=.110$ $=.120$ $=.069$ -.028 .019 |  |
| $0.382 \mathrm{~m} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 21.0 \\ 31.5 \\ 34.0 \\ 59.5 \\ 44.0 \\ 51.5 \\ 59.5 \\ 71.5 \\ 79.5 \\ 91.0 \end{gathered}$ |  |  | 0.252 -.370 $=.276$ -.280 $=.229$ $=.217$ $=.203$ $=.198$ $=.198$ $=.203$ $=.209$ $=.187$ $=.160$ $=.030$ -.017 | 0.145 $=.550$ $=.327$ $=.227$ $=.276$ $=.241$ $=.242$ $=.233$ $=.237$ $=-237$ $=.265$ $=.175$ $=.112$ $=.051$ .015 |  | -.107 0.028 -.041 $=.067$ -.080 -.100 -.117 -.123 $=.128$ $=.137$ $=.108$ -.067 -.020 .031 | -.744 0.032 .017 -.022 $=.075$ $=.060$ -.071 $=.093$ -.100 $=.105$ $=.116$ $=.093$ $=.057$ -.014 .033 |  |
| $0.555 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 31.0 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.0 \\ & 34.5 \\ & 41.0 \\ & 41.5 \\ & 51.0 \\ & 39.5 \\ & 11.0 \\ & 91.5 \end{aligned}$ | 0.407 $=.053$ $=.133$ $=.130$ $=.143$ $=.151$ $=.151$ $=.151$ $=.180$ $=.155$ -.145 $=.073$ -.008 .030 | $\begin{aligned} & 0.393 \\ & -.271 \\ & -.27 \\ & -.238 \\ & -.195 \\ & -.195 \\ & -.195 \\ & -.195 \\ & -.195 \\ & -.200 \\ & -.164 \\ & -.167 \\ & -.127 \\ & -.034 \\ & -.035 \end{aligned}$ | 0.316 <br> -. 417 <br> $-.284$ <br> -. 241 -.235 <br> -.224 -.203 <br> -.224 -.207 <br> -.229 -.206 <br> -.184 -.140 <br> -.103 -.041 -.020 |  | $-0.062$ <br> -.107 -.109 <br> $=.107$ $=.127$ <br> $-.140$ <br> -.137 -.149 <br> -.153 -.149 <br> -.148 $=.145$ <br> $=.125$ -.066 $=.020$ <br> -. 02020 | $\begin{aligned} & 0.070 \\ & =.015 \\ & =.033 \\ & =.0646 \\ & =.097 \\ & -.100 \\ & =.108 \\ & =. .1183 \\ & -. .124 \\ & -.110 \\ & -.060 \\ & -.016 \end{aligned}$ | $\begin{array}{r} .-.162 \\ .043 \\ .025 \\ -.018 \\ -.068 \\ =.066 \\ =.067 \\ -.098 \\ -.106 \\ -.107 \\ -.009 \\ -.005 \\ -.017 \\ -.0136 \end{array}$ | $\begin{array}{r} -.251 \\ . .109 \\ .091 \\ .034 \\ . .020 \\ -.021 \\ -.055 \\ -.067 \\ -.085 \\ -.078 \\ -.087 \\ -.075 \\ -.040 \\ -.004 \\ .041 \end{array}$ |

TABLE XIX. - CONTIMUED.
(a) $\alpha_{1}, 0^{\circ}, 1^{0}, 2^{0}, 3^{\circ}-$ Conoluded.

| Semispan eta. | Percent ohord | UPPER SURTACE |  |  |  | LOMER SURPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaor |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{0}$ | $1^{\circ}$ | $2^{0}$ | $3^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 47.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & 0.359 \\ & =.061 \\ & -.126 \\ & -.126 \\ & -.113 \\ & -.130 \\ & -.156 \\ & -.156 \\ & -.160 \\ & -.164 \\ & -.173 \\ & -.149 \\ & -.132 \\ & -.113 \\ & -.065 \\ & -.019 \\ & .040 \end{aligned}$ | $\begin{aligned} & 0.324 \\ & -.264 \\ & =.251 \\ & -.238 \\ & =.204 \\ & -.200 \\ & -.230 \\ & -.204 \\ & -.208 \\ & -.200 \\ & -.204 \\ & -.184 \\ & -.165 \\ & =.135 \\ & -.080 \\ & -.030 \\ & .032 \end{aligned}$ | 0.261 <br> $-.452$ <br> $-.301$ <br> -. 319 <br> $-.250$ <br> $-.241$ <br> $-.233$ <br> $-.237$ <br> $-.224$ <br> $-.237$ <br> -. 229 <br> $-.206$ <br> -. 182 <br> $-.150$ <br> $-.089$ <br> $-.036$ <br> . O28 | 0.029 <br> 0.675 -.409 <br> -.499 -.392 <br> - 310 <br> -.293 -.280 <br> -. 271 <br> -.250 -.246 <br> $-.241$ <br> $-.225$ <br> -.198 -.161 <br> $-.094$ <br> -.039 .031 | $\begin{array}{r} -0.057 \\ -.108 \\ =.118 \\ =.134 \\ =.134 \\ =.140 \\ =.146 \\ =.151 \\ =.153 \\ =.143 \\ =.140 \\ =.114 \\ =.057 \\ =.011 \\ .047 \end{array}$ | $\begin{aligned} & -.107 \\ & 0.010 \\ & =.025 \\ & -.067 \\ & =.072 \\ & -.091 \\ & =.101 \\ & =.114 \\ & -.112 \\ & =.118 \\ & -.117 \\ & -.124 \\ & =.105 \\ & -.052 \\ & =.011 \\ & .046 \end{aligned}$ | $\begin{array}{r} 0.201 \\ .051 \\ .033 \\ -.019 \\ -.031 \\ -.053 \\ -.068 \\ -.088 \\ -.092 \\ -.102 \\ -.104 \\ -.109 \\ -.094 \\ -.047 \\ -.010 \\ .044 \end{array}$ | $\begin{array}{r} -.297 \\ .127 \\ .110 \\ .040 \\ .026 \\ =.012 \\ =.052 \\ =.060 \\ =.073 \\ -.077 \\ -.088 \\ =.077 \\ =.034 \\ -.002 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & 0.355 \\ & -.065 \\ & -.147 \\ & -.143 \\ & -.138 \\ & -.157 \\ & -.156 \\ & -.164 \\ & -.164 \\ & -.181 \\ & -.194 \\ & -.146 \\ & -.132 \\ & -.094 \\ & -.065 \\ & -.009 \\ & .047 \end{aligned}$ | $\begin{aligned} & 0.384 \\ & =.299 \\ & =.247 \\ & -.247 \\ & -.200 \\ & -.230 \\ & -.281 \\ & =.221 \\ & -.195 \\ & -.204 \\ & -.208 \\ & -.173 \\ & -.158 \\ & -.114 \\ & -.077 \\ & -.017 \\ & .042 \end{aligned}$ | 0.347 <br> $-.452$ <br> $-.323$ <br> $-.323$ <br> $-.241$ <br> $-.237$ <br> $-.241$ <br> $-.233$ <br> $-.237$ <br> $-.216$ <br> $-.229$ <br> $-.190$ <br> $-.173$ <br> $-.126$ <br> $-.077$ <br> -. 022 <br> .037 | $\begin{aligned} & 0.192 \\ & -.696 \\ & -.413 \\ & -.383 \\ & -.519 \\ & -.214 \\ & -.280 \\ & -.271 \\ & -.246 \\ & -.237 \\ & -.237 \\ & =.207 \\ & -.183 \\ & -.132 \\ & -.075 \\ & -.022 \\ & .041 \end{aligned}$ | $\begin{array}{r} -0.057 \\ -.120 \\ -.111 \\ -.128 \\ =.136 \\ =.133 \\ =.141 \\ -.140 \\ =.140 \\ =.138 \\ =.129 \\ =.103 \\ -.047 \\ .046 \\ .056 \end{array}$ | $\begin{aligned} & -.104 \\ & -.024 \\ & -.027 \\ & -.061 \\ & -.096 \\ & =.098 \\ & =.089 \\ & -.113 \\ & -.118 \\ & -.118 \\ & =.113 \\ & =.096 \\ & =.043 \\ & -.001 \\ & .051 \end{aligned}$ | 0.201 .036 .031 . .021 <br> $-.061$ <br> $-.069$ <br> -.089 -.097 <br> $-.105$ <br> -.108 -.106 <br> $-.089$ <br> $-.042$ <br> $-.005$ <br> .047 | 0.295 <br> .109 .100 <br> .037 <br> $-.020$ <br> $-.032$ <br> $-.060$ <br> -. 069 <br> -. 079 <br> -. 087 <br> $-.088$ <br> $-.077$ <br> -.036 .052 <br> .050 |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.359 -.031 -.151 -.151 -.156 -.160 -.173 -.160 -.160 -.156 -.151 -.123 -.113 -.073 -.033 .012 .056 | $\begin{aligned} & 0.256 \\ & =.251 \\ & -.273 \\ & -.247 \\ & -.238 \\ & -.234 \\ & -.230 \\ & =.195 \\ & -.195 \\ & =.170 \\ & =.187 \\ & =.146 \\ & =.134 \\ & =.087 \\ & -.040 \\ & .006 \\ & .052 \end{aligned}$ | $\begin{aligned} & 0.149 \\ & -.422 \\ & =.327 \\ & -.323 \\ & -.245 \\ & -.250 \\ & -.229 \\ & -.203 \\ & -.194 \\ & =.190 \\ & =.186 \\ & -.160 \\ & -.142 \\ & -.093 \\ & -.045 \\ & .002 \\ & .048 \end{aligned}$ | $\begin{array}{r} -0.138 \\ -.671 \\ -.443 \\ -.409 \\ -.314 \\ -.284 \\ -.259 \\ -.241 \\ -.220 \\ -.203 \\ -.205 \\ -.171 \\ -.151 \\ -.097 \\ -.046 \\ -.002 \\ .045 \end{array}$ | $\begin{array}{r} -0.066 \\ -.120 \\ =.123 \\ -.135 \\ -.137 \\ -.143 \\ -.140 \\ -.139 \\ -.132 \\ -.124 \\ -.114 \\ -.113 \\ -.118 \\ -.023 \\ .018 \\ .069 \end{array}$ | 0.090 <br> $-.024$ <br> -.033 -.072 <br> .. 089 <br> -.109 -.109 <br> . .114 <br> $-1115$ <br> $-.116$ <br> $-.104$ <br> -.071 -.026 <br> .007 .060 | 0.174 <br> .020 <br> $-.037$ <br> -.058 -.086 <br> $-.086$ <br> $-.096$ <br> $-.099$ <br> $-.108$ <br> -.107 . .106 <br> $-.073$ <br> -.030 .005 .052 <br> .052 | 0.270 <br> .101 <br> .015 <br> $-.016$ <br> $-.060$ <br> $-.077$ <br> $-.080$ <br> $-.091$ <br> -.092 -.094 <br> -. 0.069 <br> $-.030$ <br> .051 |

TABLE XIX. - CONTIMUED.
(b) $a_{a}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Semispan ste. | Parcent chord | UPPER SURIACE |  |  |  | LOXER Butface |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8{ }^{\circ}$ | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 44.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.6 \end{array}$ | 0.338 -.413 -.229 -.298 -.203 -.194 $=.198$ $=.194$ -.23 -.245 -.236 -.1353 -.792 -.031 | 0.319 -.711 -.339 -.331 -.284 $=.284$ -.262 -.258 -.245 -.245 -.254 $=.279$ -.269 $=.223$ -.168 -.102 -.031 |  | $\begin{array}{r} -0.713 \\ -1.489 \\ -.535 \\ -.588 \\ -.484 \\ -.428 \\ -.415 \\ -.372 \\ -.376 \\ -.342 \\ -.355 \\ -.359 \\ -.376 \\ -.276 \\ -.127 \\ -.041 \end{array}$ | $\begin{array}{r} . .296 \\ .163 \\ .128 \\ .088 \\ .060 \\ .013 \\ . .005 \\ -.021 \\ -.036 \\ -.060 \\ =.059 \\ =.049 \\ -.030 \\ .008 \end{array}$ | .396 .350 .210 .159 .126 .092 .047 .029 .010 .017 .017 . .005 .005 .029 | 0.465 .326 .286 .227 .190 .152 .125 .097 .020 .058 .024 .024 .027 .038 .050 | $\begin{array}{r} 0.503 \\ .391 \\ .356 \\ .290 \\ .207 \\ .184 \\ .149 \\ .128 \\ .101 \\ .067 \\ .067 \\ .060 \\ .063 \\ .071 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.5 \\ 24.5 \\ 37.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 11.0 \\ 79.5 \\ 91.0 \end{array}$ |  | $\begin{aligned} & -0.321 \\ & -. .659 \\ & -.497 \\ & -.46 \pi \\ & -.378 \\ & -.399 \\ & -.322 \\ & -.2928 \\ & -.292 \\ & -.288 \\ & -.289 \\ & -.261 \\ & -.213 \\ & -.152 \\ & -.063 \\ & 0 \end{aligned}$ | $\begin{array}{r} -0.984 \\ -1.529 \\ -.675 \\ -.641 \\ -.516 \\ -.460 \\ -.409 \\ -.396 \\ -.366 \\ -.374 \\ -.366 \\ -.396 \\ -.293 \\ -.237 \\ -.168 \\ -.091 \\ -.004 \end{array}$ | -1.769 -1.842 -.646 -.799 -.622 -.749 $=.448$ -.398 -.411 -.372 -.366 -.328 -.265 -.187 -.103 -.006 | -.378 .165 .1277 .050 .016 .001 . .027 .0036 . .060 .0 .078 . .068 . .046 -.012 .029 | $.0-75$ .266 .224 .160 .126 .080 .067 .029 . .010 -.015 -.031 -.028 -.014 .014 .042 | -.43 0.433 .350 .307 .195 .198 .146 .123 .085 .066 .043 .034 .012 .010 .021 .038 .062 | $\begin{array}{r} 0.353 \\ .418 \\ .372 \\ .306 \\ .204 \\ .184 \\ .181 \\ .118 \\ .094 \\ .081 \\ .059 \\ .050 \\ .051 \\ .062 \\ .075 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ |  | $\begin{aligned} & -0.754 \\ & -1.343 \\ & -.626 \\ & -.591 \\ & -.459 \\ & -.446 \\ & -.369 \\ & -.347 \\ & -.327 \\ & -.322 \\ & -.292 \\ & -.293 \\ & -.260 \\ & -.212 \\ & -.135 \\ & -.066 \\ & .014 \end{aligned}$ | $\begin{array}{r} -1.701 \\ -1.726 \\ -.868 \\ -.808 \\ -.628 \\ -.755 \\ -.455 \\ -.456 \\ -.437 \\ -.370 \\ -.376 \\ -.359 \\ -.238 \\ -.147 \\ -.073 \\ .015 \end{array}$ | $\begin{aligned} & -2.911 \\ & -2.381 \\ & -1.105 \\ & -1.014 \\ & -.760 \\ & -.674 \\ & -.570 \\ & -.523 \\ & -.463 \\ & -.432 \\ & -.398 \\ & -.375 \\ & -.325 \\ & -.257 \\ & -.160 \\ & -.079 \end{aligned}$ | 0.294 .147 .122 .076 .045 .010 -.006 -.036 -.046 -.057 -.065 -.078 $=.036$ -.001 .037 | $\begin{array}{r} 0.396 \\ .255 \\ .209 \\ .163 \\ .131 \\ .083 \\ .065 \\ .029 \\ . .013 \\ -.010 \\ -.030 \\ -.024 \\ -.004 \\ .022 \\ .051 \end{array}$ | $.0-490$ 0.336 .312 .239 .253 .151 .087 .069 .049 .034 .015 .015 .021 .043 | 0.474 .400 .378 .310 .216 .190 .146 .127 .099 .058 .050 .050 .063 |
| $0.555 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -0.113 \\ -.581 \\ -.495 \\ -.486 \\ -.370 \\ -.357 \\ -.297 \\ -.293 \\ -.280 \\ -.260 \\ -.263 \\ -.255 \\ -.227 \\ -.173 \\ -.35 \\ -.355 \\ .015 \end{array}$ | $\begin{aligned} & -0.890 \\ & -1.508 \\ & -.711 \\ & -.677 \\ & -.510 \\ & -.46 \pi \\ & -.408 \\ & -.369 \\ & -.339 \\ & -.327 \\ & -.322 \\ & -.296 \\ & -.260 \\ & -.195 \\ & -.127 \\ & -.062 \\ & .019 \end{aligned}$ |  | $\begin{array}{r} -3.450 \\ -2.696 \\ -1.234 \\ -1.152 \\ -.842 \\ -.760 \\ -.609 \\ -.570 \\ -.497 \\ -.467 \\ -.415 \\ -.385 \\ -.327 \\ -.244 \\ -.153 \\ -.072 \\ .015 \end{array}$ | $\begin{array}{r} -.319 \\ .156 \\ .147 \\ .090 \\ .063 \\ .014 \\ . .006 \\ -.047 \\ -.052 \\ -.059 \\ -.069 \\ -.066 \\ -.031 \\ .053 \\ .042 \end{array}$ | -.421 0.4280 .261 .165 -1850 .053 .076 .039 .022 .002 -.006 -.019 -.027 -.002 .023 .056 | 0.440 <br> .357 .337 .262 .225 .160 .141 .099 .078 .052 .041 .029 .009 .021 .065 .063 | 0. 400 .416 .400 .333 .294 .222 .303 .156 .134 .100 .088 .068 .047 .047 .059 |

table xix.- Continued.
(b) $\alpha_{1}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.


TABLE XIX．－CORFIMUED．
（c）$\sigma_{12}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$.

| Beal－ span | Percent chard | UPPER BURFACE |  |  |  | LONER BUBPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | mirese of | attack |  |  | ngle | attaok |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{6}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | －1．269 | －2． 829 | －4． 807 | －7．002 |  |  |  |  |
|  | 1．5 | －1．783 | －2．730 | -3.760 -1.361 | －1． -1.759 | 0.517 |  | 0．252 |  |
|  | 5 | －－．712 | －1．989 | －1． 35 | －1．756 | － 415 | －523 | －607 | －663 |
|  | 11.0 14.5 | － | －．713 | －． 858 | －1．231 | － 353 | ． 428 | －558 | ． 653 |
|  | 21.5 | －．467 | －： 579 | －． 723 | －1．010 | ： 268 | － 376 | －4 4 | －563 |
|  | $\frac{24}{31} .5$ | －： 724 | －． 5 ¢5 | －$=123$ | －： 976 | ．238 | － 3178 | ． 407 | － S $^{63}$ |
|  | 34．5 | －． 390 | －． 502 | －-66 | －． 889 | ． 184 | ： 287 | － 385 | ：453 |
|  | 41.0 | －． 377 | －． 488 | －． 646 | － 8.89 | －156 | －25 | －38 | － |
|  | $\frac{43}{51.5}$ | －． 368 | 二： 45 | 二： 681 | －$=812$ | － 115 | － 203 | －277 | － 3 建 |
|  | 79.5 | －． 225 | －． 3.274 | －． 5000 | －． 714 | ．1096 | ． 179 | ． 237 | ．238 |
|  | 79.5 | －． 133 | －． 187 | －． 292 | － 74.4 | ：096 | ． 145 | ． 174 | ．130 |
|  |  |  |  |  |  | － |  |  |  |
| $0.382 \mathrm{~b} / 2$ | 1.5 | －2．778 | －5．527 | －8．686 | －4．2044 | 0.200 | － 20 | －079 | －729 |
|  | 5.5 | －1．c5 | －1．506 | －2．338 | －2．721 | － 467 | －522 | －598 | －609 |
|  | 5.5 | －． 965 | －1．359 | －2．251 | －2．493 | － 438 | － 474 | ：556 | ． 654 |
|  | 14.5 | －： 634 | －-.876 | －1．438 | －2．666 | －${ }^{\text {32 }}$ | ． 439 | － 54 | －616 |
|  | 21．0 | －．54． | －． 723 | －． 986 | －1．752 | ．268 | ． 387 | ． 484 | － 525 |
|  | 31.0 | －． 454 | －．583 | －．783 | －1． 351 | ． 179 | － 377 | ． 402 | ． 46 |
|  | 54．5 | － 4.459 | －-572 | －． 78.8 | －1．312 | － 175 | －279 | ．368 | － 330 |
|  | 4.5 | －． 3199 | －． 312 | －：662 | －1：070 | －13 | ． 226 | － 304 | － 3 |
|  | 51.0 | －． 352 | － 2.45 | － 6.604 | －－909 | ． 108 | ． 194 | －258 | － 315 |
|  | 7910 | －． 196 | －： 266 | 二：396 | －： 656 | －089 | ．132 | ． 176 | －153 |
|  | 79.5 | －：．00\％ | －． 3.048 | －． i 134 | －．533 | ． 0992 | ．132 | ． 1188 | ． 144 |
| $0.382 \mathrm{~b} / 2$ | $\bigcirc$ | －4． 398 | －8．${ }^{34}$ | －3．535 | －2．049 |  |  |  |  |
|  | 1.5 | －3．099 | －${ }^{-2.4 .98}$ | －2．222 | －1．4．407 | 0.373 | ． 118 | ． 6.15 |  |
|  | 6.5 | －1．230 | －-1.967 | －1．915 | －1．359 | ． 429 | ．499 | －56 | － 576 |
|  | 11.8 | －． 715 | －1．428 | －1．918 | －1．364 | － 373 | －476 | －543 | ：575 |
|  | 14.5 21.0 | －． 765 | －1．28 | －1．872 | －1．320 | －374 | － 347 | － 14 | ：531 |
|  | 24：5 | －：650 | －：85 |  | －1：366 | ：248 | ：363 | ：426 | ：472 |
|  | 31.0 | －．510 | －． 704 | －1． 512 | －1．260 | ． 203 | － 3818 | － 370 | －400 |
|  | 54．5 | －． 4.497 | －． 6.575 | －-1.202 | －1．213 | ．154 | ：285 | － 34 | － 388 |
|  | 49.5 | －． 40 \％ | －．53 | －1．166 | －1．144 | ．133 | － 221 | ． 266 | － 366 |
|  | $51 .{ }^{51}$ | －． 348 | －：． 365 | －． 282 | －1．025 | ：091 | ． 148 | ． 176 | ． 14 |
|  | 71．0 | －． 169 | －． 5 | －． 575 | －． 9172 | ：081 | －123 | ． 129 | ． 125 |
|  | 79.5 91.5 | －．081 | －． 1665 | －$=.264$ | －． 6962 | ．097 | ：118 | ：0988 | －． 058 |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 | －5．${ }^{\text {2 }}$ | －3．105 | －1．657 | －1．718 | 0.297 | 0.191 | 0.285 | 0.227 |
|  | 5：5 | 1．513 | －2．356 | －1．210 | －1：062 | －${ }_{4}$ | ：517 | ：526 | ：531 |
|  | 11．0 | －1．016 | －1．950 | －1．171 | －1．032 | － 389 | －487 | －512 | ． 537 |
|  |  | －． 887 | －1．764 | －1．150 | －1．014 | －352 | ． 348 | － 4.4 | － 515 |
|  | 24 | －．-869 | －1．700 | －1．103 | －． 9.96 | ． 260 | － 354 | － 38 | －475 |
|  | 31.0 | －．553 | －1．176 | －1．098 | －． 965 | ． 209 | ． 298 | －332 | －374 |
|  | 37． | －．-45 | －1．736 | －1．05 | 二： | ．151 | ：287 | ：35 | ：356 |
|  | 4.5 | －． 418 | －． 745 | －1．020 | －． 974 | ． 136 | ． 201 | ． 236 | 256 |
|  | 51.0 | －－352 | －． 420 | －．994 | －．9666 | ． 078 | ．117 | ． 176 | － 124 |
|  | 71.0 | －-15 | － 270 | －$=82$ | －887 | ． 077 | ． 094 | ． 065 | ． 042 |
|  | 91.0 | －．016 | －－．051 | －． 68 | $=.773$ | ．088 | ：051 | －．104 | －：． 194 |

TABLE XIX. - CONCLUDED.
(c) $\alpha_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Berinspan sta. | Percent chord | UPPER BURTACE |  |  |  | LONER BUAFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $26^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 24.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -6.499 \\ -3.811 \\ -1.642 \\ -1.530 \\ -1.059 \\ -.939 \\ -.755 \\ -.682 \\ =.583 \\ -.544 \\ -.480 \\ -.406 \\ =.335 \\ -.250 \\ =.136 \\ =.063 \\ .021 \end{array}$ | $\begin{aligned} & -1.717 \\ & -1.674 \\ & -1.357 \\ & -1.264 \\ & -1.256 \\ & -1.187 \\ & -1.148 \\ & -1.114 \\ & -1.070 \\ & -1.032 \\ & -.984 \\ & -.935 \\ & -.880 \\ & -.784 \\ & =.663 \\ & =.566 \\ & -.403 \end{aligned}$ | $\begin{array}{r} -1.206 \\ -.979 \\ -.924 \\ -.877 \\ -.885 \\ -.825 \\ -.842 \\ -.804 \\ -.804 \\ -.787 \\ -.804 \\ -.762 \\ -.768 \\ -.725 \\ -.700 \\ -.655 \\ -.609 \end{array}$ | $\begin{array}{r} -1.105 \\ -.889 \\ -.859 \\ -.859 \\ -.833 \\ -.799 \\ -.795 \\ =.773 \\ -.795 \\ -.756 \\ -.773 \\ -.718 \\ -.724 \\ -.701 \\ -.683 \\ -.645 \\ -.598 \end{array}$ | 0.058 <br> .449 <br> .444 <br> .388 <br> . 289 <br> . 261 <br> .206 <br> . 154 <br> .142 <br> .091 <br> .060 <br> .057 <br> .067 | 0.173 <br> .501 .501 <br> .454 <br> .424 <br> - 352 <br> .322 .264 <br> .236 <br> .188 <br> .123 <br> .047 <br> .014 <br> $-.034$ | .7. 0.188 .498 .499 .470 .442 .378 .346 .285 .199 .180 .119 .050 -.009 -.068 -.183 | $\begin{array}{r} 0.118 \\ .495 \\ .406 \\ .499 \\ .472 \\ .457 \\ .324 \\ .294 \\ .231 \\ .200 \\ .142 \\ .067 \\ . .008 \\ =.072 \\ =.189 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 24.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 54.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -5.822 \\ -3.674 \\ -1.612 \\ -1.470 \\ -1.059 \\ -.956 \\ -.716 \\ -.656 \\ -.544 \\ =.502 \\ -.433 \\ -.371 \\ =.306 \\ -.223 \\ -.136 \\ =.077 \\ -.006 \end{array}$ | $\begin{array}{r} -1.527 \\ -.989 \\ -.907 \\ -.898 \\ . .833 \\ . .842 \\ -.807 \\ . .807 \\ -.777 \\ . .760 \\ -.747 \\ =.693 \\ . .685 \\ -.644 \\ . .603 \\ =.553 \\ -.513 \end{array}$ | $\begin{array}{r} -1.060 \\ =.761 \\ =.610 \\ -.697 \\ =.672 \\ =.676 \\ =.650 \\ =.633 \\ =.607 \\ =.612 \\ =.580 \\ =.585 \\ =.560 \\ =.562 \\ =.525 \\ =.496 \end{array}$ | -0.881 -.726 -.657 $=.678$ -.652 -.644 -.635 -.622 -.609 $=.601$ -.605 $=.562$ -.572 $=.551$ $=.543$ $=.504$ -.476 |  | $\begin{array}{r} 0.256 \\ .462 \\ .461 \\ .406 \\ . .294 \\ .264 \\ .201 \\ .170 \\ .126 \\ .095 \\ .060 \\ . .006 \\ =.025 \\ =.062 \\ =.246 \end{array}$ | $\begin{array}{r} .0 .246 \\ .463 \\ .461 \\ .422 \\ .316 \\ .353 \\ .220 \\ .182 \\ .132 \\ .098 \\ .055 \\ . .008 \\ . .057 \\ . .296 \end{array}$ | 0.188 <br> .472 <br> .452 <br> .356 <br> .323 <br> .219 <br> .164 <br> .083 <br> .012 <br> $-.044$ <br> $=.089$ -.176 |
| $0.924 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{array}{r} -7.104 \\ -3.995 \\ -1.509 \\ -1.397 \\ -.974 \\ =.845 \\ =.656 \\ =.577 \\ =.493 \\ -.459 \\ -.377 \\ =.372 \\ =.377 \\ =.292 \\ -.255 \\ -.162 \end{array}$ | $\begin{array}{r} -0.898 \\ -.764 \\ =.764 \\ =.747 \\ -.717 \\ -.682 \\ -.682 \\ -.631 \\ =.631 \\ -.583 \\ -.596 \\ -.504 \\ -.504 \\ =.447 \\ -.447 \\ -.394 \\ -.402 \end{array}$ | $\begin{aligned} & -0.687 \\ & -.612 \\ & -.582 \\ & -.573 \\ & =.582 \\ & -.535 \\ & -.539 \\ & =.505 \\ & -.505 \\ & =.462 \\ & =.479 \\ & -.426 \\ & =.437 \\ & =.496 \\ & =.378 \\ & -.375 \end{aligned}$ | $\begin{array}{r} -0.648 \\ -.588 \\ -.579 \\ -.545 \\ -.557 \\ -.562 \\ -.545 \\ -.501 \\ -.514 \\ -.480 \\ -.493 \\ -.446 \\ -.451 \\ =.423 \\ -.424 \\ -.392 \\ -.377 \end{array}$ | $\begin{array}{r} 0.105 \\ .403 \\ .386 \\ .316 \\ .247 \\ .161 \\ .105 \\ .067 \\ .021 \\ .002 \\ .026 \\ =.032 \\ . .055 \\ =.036 \\ =.042 \\ . .017 \end{array}$ | 0.304 <br> .408 .388 <br> - 324 <br> .260 <br> .189 <br> .135 <br> .052 <br> .030 <br> .003 <br> $-.022$ <br> $-.066$ <br> -.090 -.146 <br> $-.146$ | $\begin{array}{r} -. .770 \\ 0.415 \\ .391 \\ .342 \\ .284 \\ .213 \\ .161 \\ .118 \\ .074 \\ .039 \\ .009 \\ . .017 \\ =.055 \\ =.083 \\ =.107 \\ . .150 \end{array}$ | $\begin{array}{r} . .219 \\ .417 \\ .397 \\ .369 \\ .347 \\ .197 \\ .146 \\ .097 \\ .067 \\ .031 \\ . .065 \\ -.073 \\ -.104 \\ -.155 \end{array}$ |

 (a) $\alpha_{11}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Sanispan sta. | Percent chord | UPPER SUPFICE |  |  |  | LOTMR SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | 20 | $3^{0}$ | $0^{\circ}$ | $1{ }^{0}$ | $2^{\circ}$ | $3^{0}$ |
| $0.086 \mathrm{~b} / 2$ | 0 1.5 5.5 67.5 14.0 27.5 24.0 31.5 34.5 4.0 44.0 51.8 59.5 79.0 91.5 | $\begin{aligned} & 0.502 \\ & .064 \\ & -.010 \\ & =.007 \\ & =.043 \\ & =.061 \\ & =.081 \\ & =.103 \\ & =.132 \\ & =.155 \\ & =.150 \\ & =.163 \\ & =.150 \\ & =.156 \\ & -.074 \end{aligned}$ | 0.493 0.043 $=.064$ $=.080$ $=.091$ $=.109$ -.118 $=.133$ -.158 -.163 -.187 -.217 -.218 $=.181$ $=.145$ $=.090$ -.053 | 1.170 0.148 $=.121$ -.132 $=.132$ $=.146$ $=.155$ $=.168$ $=.179$ $=.191$ $=.216$ $=.234$ $=.233$ $=.199$ $=.157$ $=.099$ | $\begin{aligned} & 0.436 \\ & =.262 \\ & =.169 \\ & -.1867 \\ & -.167 \\ & =.192 \\ & =.196 \\ & -.196 \\ & =.218 \\ & -.237 \\ & =.285 \\ & =.216 \\ & =.170 \\ & =.107 \end{aligned}$ | $\begin{aligned} & 0.056 \\ & 0.036 \\ & -.0074 \\ & -.042 \\ & =.094 \\ & =.075 \\ & =.098 \\ & -.114 \\ & -.137 \\ & -.155 \\ & -.172 \\ & -.153 \\ & -.130 \\ & -.086 \\ & -.029 \end{aligned}$ |  | -.7 0.183 .056 .051 .026 .001 -.019 -.040 -.056 -.079 -.100 -.129 -.118 -.102 -.067 -.017 | .--1 0.245 .129 .093 .059 .052 .009 -.012 -.028 -.049 -.068 -.101 -.097 -.086 -.054 -.009 |
| 0.195 b/2 | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.444 -.005 -.061 $=.088$ -.101 -.112 -.128 -.139 -.146 $=.173$ $=.184$ $=.186$ -.376 $=.152$ -.116 -.060 .005 | 0.424 $=.133$ $=.136$ $=.149$ $=.149$ $=.15$ $=.171$ $=.180$ $=.205$ $=.217$ $=.220$ $=.204$ $=.174$ $=.133$ $=.002$ | 0.371 -.274 $=.207$ $=.220$ $=.198$ $=.298$ $=.207$ $=.213$ $=.213$ $=.231$ $=.243$ $=.245$ $=.225$ $=.197$ $=.144$ $=.080$ $=.004$ | 0.285 -.427 -.271 $=.252$ -.244 $=.245$ $=.244$ -.241 $=.2664$ -.2667 $=.245$ $=.207$ $=.154$ $=.006$ | $\begin{aligned} & 0.090 \\ & -.067 \\ & =.051 \\ & =.099 \\ & =.112 \\ & =.125 \\ & -.137 \\ & =.157 \\ & -.172 \\ & =.177 \\ & -.178 \\ & =.785 \\ & -.155 \\ & -.114 \\ & -.059 \end{aligned}$ | $\begin{aligned} & 0.155 \\ & =.003 \\ & -.027 \\ & =.054 \\ & -.067 \\ & -.088 \\ & -.104 \\ & -.128 \\ & -.145 \\ & -.153 \\ & -.156 \\ & -.166 \\ & -.142 \\ & -.103 \\ & -.054 \\ & .007 \end{aligned}$ |  | $\begin{array}{r} 0.321 \\ .113 \\ .080 \\ .040 \\ .011 \\ -.020 \\ -.037 \\ -.066 \\ -.085 \\ -.135 \\ -.1119 \\ -.104 \\ -.074 \\ -.035 \\ .018 \end{array}$ |
| $0.382 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 17.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 11.0 79.5 91.0 | 0.408 $=.039$ $=.117$ $=.128$ $=.147$ $=.132$ $=.157$ $=.175$ $=.200$ $=.187$ $=.172$ $=.150$ -.094 -.024 | 0.390 $=.2005$ $=.205$ $=.208$ $=.198$ $=.208$ $=.207$ $=.210$ $=.205$ $=.220$ $=.200$ $=.172$ $=.121$ $=.054$ | 0.308 $=.286$ $=.280$ $=.252$ -.245 -.245 $=.240$ -.249 $=.236$ $=.252$ $=.245$ $=.280$ $=.189$ -.060 .013 | 0.176 -.578 $=.371$ $=.360$ $=.318$ $=.303$ $=.287$ $=.276$ $=.268$ -.275 $=.268$ -.240 $=.203$ $=.1356$ $=.013$ | $\begin{aligned} & -0.071 \\ & =.117 \\ & -.123 \\ & =.139 \\ & -.145 \\ & -.155 \\ & -.162 \\ & -.178 \\ & -.183 \\ & -.174 \\ & -.180 \\ & -.181 \\ & -.145 \\ & -.093 \\ & -.037 \\ & -.001 \end{aligned}$ | 0.044 -.043 -.058 -.086 -.094 $=.111$ -.145 -.155 -.153 -.158 -.162 -.131 $=.083$ -.031 | $\begin{array}{r} -.141 \\ .025 \\ .006 \\ . .030 \\ . .047 \\ =.074 \\ . .088 \\ . .113 \\ . .123 \\ . .126 \\ =.132 \\ -.139 \\ -.112 \\ . .071 \\ -.023 \end{array}$ | -.022 .0869 .0026 . .002 -.035 -.051 -.099 . .097 $=.105$ . .117 .094 $=.058$ .014 .035 |
| $0.555 \mathrm{~b} / 2$ | 0 7.5 5.5 6.5 71.8 14.5 21.0 24.5 31.0 34.5 41.0 41.5 51.0 59.5 71.0 79.5 91.0 |  | 0.413 $=.241$ $=.225$ $=.241$ $=.212$ -.210 $=.205$ -.20 $=.224$ $=.214$ -.293 $=.150$ -.102 -.084 |  | $\begin{aligned} & 0.188 \\ & =.675 \\ & =.422 \\ & =.418 \\ & =.341 \\ & =.332 \\ & =.303 \\ & =.2876 \\ & =.2800 \\ & =.263 \\ & =.284 \\ & =.235 \\ & =.119 \\ & =.055 \\ & .064 \end{aligned}$ | $\begin{array}{r} -0.072 \\ -.120 \\ -.185 \\ -.144 \\ -.147 \\ -.161 \\ -.163 \\ -.174 \\ -.180 \\ -.176 \\ -.174 \\ -.169 \\ -.145 \\ -.087 \\ -.029 \\ .036 \end{array}$ | $\begin{aligned} & 0.053 \\ & -.05\} \\ & -.052 \\ & -.090 \\ & -.113 \\ & -.122 \\ & -.142 \\ & =.148 \\ & -.149 \\ & =.151 \\ & -.150 \\ & =.152 \\ & -.074 \\ & -.026 \end{aligned}$ |  | 0.249 .107 .088 .032 .010 -.032 -.045 -.083 -.092 $=.097$ -.109 -.095 -.051 -.010 .040 |

table xX.- OONTINUED.
(a) $\alpha_{u}, 0^{\circ}, 1^{0}, 2^{0}, 3^{\circ}$ - Conoluded.

| Semispan sta | Percent chord | UPPER SURFACE |  |  |  | LOITR BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attaok |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{0}$ | $3^{\circ}$ | $0^{\circ}$ | $1{ }^{\circ}$ | $2{ }^{\circ}$ | $3^{0}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.399 -.044 -.141 $=.137$ $=.141$ -.173 -.168 -.177 -.172 -.198 -.1762 -.135 -.077 -.026 .041 | $\begin{aligned} & 0.379 \\ & -.257 \\ & -.250 \\ & =.246 \\ & -.216 \\ & -.223 \\ & -.219 \\ & -.219 \\ & -.217 \\ & -.228 \\ & -.210 \\ & -.189 \\ & -.155 \\ & -.092 \\ & -.037 \\ & .033 \end{aligned}$ | 0.267 -.482 -.360 $=.347$ -.276 -.263 -.270 -.258 -.250 -.247 -.254 -.236 -.209 -.170 -.098 -.039 .034 | 0.074 $=.736$ -.460 $=.435$ -.350 $=.337$ -.318 $=.300$ -.2876 -.282 -.258 -.256 -.180 $=.104$ -.041 .035 | $\begin{aligned} & -0.072 \\ & -.130 \\ & -.139 \\ & -.159 \\ & -.161 \\ & -.167 \\ & -.173 \\ & -.178 \\ & -.172 \\ & -.169 \\ & -.169 \\ & -.166 \\ & -.137 \\ & -.071 \\ & -.021 \\ & .046 \end{aligned}$ | $\begin{aligned} & 0.005 \\ & -.036 \\ & -.052 \\ & -.091 \\ & -.099 \\ & -.313 \\ & -.123 \\ & -.138 \\ & -.141 \\ & -.146 \\ & -.148 \\ & -.149 \\ & -.127 \\ & -.067 \\ & -.020 \\ & .044 \end{aligned}$ | -.206 0.048 .027 -.022 -.036 $=.070$ -.083 -.102 -.108 -.119 -.123 -.128 -.131 -.057 -.015 .044 | $\begin{array}{r} 0.298 \\ .129 \\ .097 \\ .016 \\ . .027 \\ -.042 \\ -.068 \\ -.075 \\ -.092 \\ -.098 \\ -.107 \\ -.095 \\ -.046 \\ -.009 \\ .046 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 56.5 61.5 11.0 14.5 21.0 24.5 31.0 44.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.386 $=.068$ -.146 $=.150$ $=.146$ $=.171$ $=.182$ -.178 $=.188$ -.171 $=.158$ $=.114$ $=.067$ -.013 .050 | $\begin{aligned} & 0.440 \\ & =.270 \\ & -.255 \\ & -.248 \\ & -.219 \\ & -.223 \\ & -.221 \\ & -.221 \\ & -.208 \\ & -.216 \\ & -.219 \\ & -.197 \\ & -.180 \\ & -.130 \\ & -.078 \\ & -.021 \\ & .046 \end{aligned}$ | $\begin{aligned} & 0.367 \\ & -.495 \\ & -.364 \\ & -.355 \\ & -.277 \\ & -.285 \\ & -.263 \\ & -.263 \\ & -.240 \\ & -.243 \\ & -.238 \\ & -.217 \\ & -.194 \\ & -.139 \\ & -.080 \\ & -.021 \\ & .047 \end{aligned}$ |  | $\begin{array}{r} -0.076 \\ -.143 \\ -.138 \\ -.155 \\ -.163 \\ -.162 \\ -.170 \\ -.170 \\ -.169 \\ -.165 \\ -.152 \\ -.051 \\ -.004 \\ .059 \end{array}$ | $\begin{aligned} & -0.092 \\ & 0.051 \\ & -.056 \\ & -.089 \\ & -.121 \\ & -.123 \\ & -.139 \\ & -.144 \\ & -.148 \\ & -.148 \\ & -.140 \\ & -.116 \\ & -.056 \\ & -.006 \\ & .054 \end{aligned}$ | $\begin{array}{r} -.205 \\ 0.031 \\ .028 \\ -.029 \\ -.076 \\ -.084 \\ -.108 \\ -.116 \\ -.126 \\ -.129 \\ -.125 \\ -.107 \\ -.052 \\ -.006 \\ .053 \end{array}$ | .--7 0.295 .1046 .027 -.036 -.047 -.077 -.089 -.103 -.110 -.1096 -.047 -.004 .051 |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.5 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.404 -.018 -.168 -.164 -.174 $=.184$ -.173 -.175 -.153 -.1770 $=.153$ -.087 -.039 .059 | $\begin{aligned} & 0.278 \\ & -.226 \\ & -.271 \\ & -.266 \\ & -.241 \\ & =.235 \\ & -.219 \\ & -.205 \\ & -.199 \\ & -.180 \\ & -.190 \\ & -.167 \\ & -.149 \\ & -.098 \\ & -.045 \\ & .056 \end{aligned}$ | 0.155 -.466 -.374 -.360 -.290 -.270 -.250 -.229 -.216 -.200 -.213 -.181 -.158 -.046 -.004 .055 | $\begin{array}{r} -0.101 \\ -.739 \\ -.475 \\ -.453 \\ -.351 \\ -.323 \\ -.264 \\ -.255 \\ -.239 \\ -.219 \\ -.223 \\ -.194 \\ -.168 \\ -.110 \\ -.05 I \\ -.001 \\ .049 \end{array}$ | $\begin{array}{r} -0.094 \\ -.150 \\ -.153 \\ -.165 \\ -.172 \\ -.174 \\ -.171 \\ -.168 \\ -.154 \\ -.150 \\ -.142 \\ -.138 \\ -.086 \\ -.029 \\ .016 \\ .072 \end{array}$ | $\begin{aligned} & 0.062 \\ & -.057 \\ & -.064 \\ & -.103 \\ & -.123 \\ & -.141 \\ & -.136 \\ & -.143 \\ & -.137 \\ & -.140 \\ & -.136 \\ & -.133 \\ & -.086 \\ & -.034 \\ & .008 \\ & .063 \end{aligned}$ | $\begin{array}{r} -.179 \\ .023 \\ .014 \\ -.047 \\ -.075 \\ -.099 \\ -.111 \\ -.120 \\ -.123 \\ -.128 \\ -.123 \\ -.122 \\ -.084 \\ -.034 \\ .062 \\ .057 \end{array}$ | $\begin{array}{r} -.271 \\ 0.097 \\ .085 \\ . .007 \\ -.027 \\ -.068 \\ -.086 \\ -.100 \\ -.107 \\ -.116 \\ -.117 \\ -.117 \\ -.082 \\ -.037 \\ .003 \end{array}$ |

TABLE XX.- COMTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| $\begin{aligned} & \text { Semi- } \\ & \text { apan } \\ & \text { ontion } \end{aligned}$ | Percent | UPPER BURFICS |  |  |  | Hover surfme |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angie or attaok |  |  |  |
|  |  | $4^{\circ}$ | 6 | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | 8 | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.383 | 0.224 | -0.040 | -0.356 |  |  |  |  |
|  | 1.5 | -. 39 | -. 6740 | -1.058 | -1. 631 | 0. 2028 | 0. 398 | 0.473 | 0.531 |
|  | ${ }^{5} .5$ | -. 231 | --337 | --461 | --593 | .134 | . 216 | - 285 | . 365 |
|  | 11.0 | -. 212 | -. 29.29 | -. 389 | -. 4749 | .093 | . 1362 | . 2195 | . 296 |
|  | 21.6 | -. 228 | -. 288 | - -359 | 二. 438 | -036 | :096 | -154 | -216 |
|  | 24. ${ }^{24}$ | --. 233 | -:. 290 | -. -3.39 | -:433 | -.016 | :073 | . 1200 | .189 |
|  | \}4.5 | -. 249 | -. 298 | --357 | -. 421 | -. 0202 | .028 | .077 | . 132 |
|  | 41.0 | -. 263 | -. 3098 | -- $\mathrm{S}^{662}$ | -. 421 | -. 041 | . 006 | . 051 | .101 |
|  | 51.8 | --. 276 | --315 |  | -. 413 | -.079 | -. 02. | -014 | . 059 |
|  | 79.5 | --. 232 | -. -203 | -. 322 | -. 342 | . 074 | -. 023 | .0214 | .049 |
|  | 79.5 91.0 | -. 114 | -. 127 | -. 149 | -. 178 | Ol | -.003 | 026 | :054 |
| 0.195 b/2 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  | 1.5 |  | -1. 019 | -1.763 | -2.135 | 0.379 | 0.453 | 0.458 | 0.45 |
|  | 5.5 | -. 344 | -. 592 | -. 6.69 | -1.061 | . 163 | .223 | . 3403 | . 376 |
|  | 11.0 | -. 304 | --.407 | -. 525 | -. 68 | -055 | .162 | - 234 | - 306 |
|  | $\frac{14.5}{21.6}$ | -:. 295 | -. 384 | -:4912 | -: 6.53 | .044 | .124 | - 143 | . 268 |
|  | 24.5 | -..281 | -. 3 248 | -. 430 | -. 509 | -.004 | .060 | . 119 | . 279 |
|  | 31.0 | -. 272 | -. 332 | -. 398 | $=-.468$ | -. 0.054 | .025 | .079 | . 136 |
|  | 41.6 | -. 295 | -. 336 | -. 394 | -. 454 | -. 070 | -. 015 | :033 | :083 |
|  | 44.5 | -. 266 | -. 3 34 |  | $=.443$ $=-397$ | -. -0.97 | -. 084 | . 022 | . 074 |
|  | 59.5 | -.221 | -. 248 | -. 285 | -. 321 | -. 0.04 | -. 0.040 | -. 002 | -035 |
|  | 71.0 | -. 16. | -. -181 | -. 207 | -. 234 | -. 060 | -. 0.024 | .006 | . 036 |
|  | 91.0 | -. 007 | -. 008 | -. 019 | -. 038 | . 025 | . 039 | . 050 | . 061 |
| $0.382 \mathrm{~b} / 2$ | 0 | -0.018 | -0.523 | -1.038 | -1.173 |  |  |  |  |
|  | 1.5 | - 80.5 | -1.471 | -2.037 | -1.356 | 0.291 | 0.394 | 0.446 |  |
|  | 6.5 | -. 4.46 | -:644 | -1.016 | -1.008 | . 143 | :252 | . 331 | - 36 |
|  | 13.0 | -. 384 | -. 511 | -. 705 | -. 940 | -072 | . 160 | . 235 | . 297 |
|  | 14.5 | -. 361 | -. 476 | -. 613 | -. 802 | . 042 | .126 | . 198 | . 261 |
|  | 21.0. | -. 338 | -. 422 |  | -. 686 | -.004 | .058 | .121 | - 278 |
|  | 31.6 | -. 315 | -. 380 | -:461 | -. 607 | -. 0.046 | . 020 | :077 | . 132 |
|  | 34.5 | -. 303 | --357 | - 430 | -. 549 | -. 060 | . 004 | . 059 | . 111 |
|  | 44.5 | -. 291 | -. 336 | -. 3130 | -. 4.46 | -. 076 | -.,024 | :022 | .068 |
|  | 51.0 | -. 259 | -. 284 | -. 341 | -. 401 | -. 0.02 | -. 043 | -. 0001 | . 040 |
|  | 79 | -. 213 | -. 15 | -. 178 | -. 320 | -. -.04 | -. 01014 | -. 0.009 | :033 |
|  | 79:5 | -. 0.069 | -.076 | -:005 | -. i 136 | -:004 | .018 | .031 | :047 |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | ${ }^{\circ}$ | -0.044 | -0.612 | -1.052 | -1.293 |  |  |  |  |
|  | $\frac{1}{5} \cdot 5$ | -. 532 | -1.80 | -1.162 | -1.182 | - 0.327 | 0.422 .278 |  |  |
|  | 5. 5 | -. 525 | -. 738 | -. 950 | -1.112 | . 148 | - 257 | - 35 | - 383 |
|  | 11.0.0. | - $=.429$ | --568 | -. 577 | -1.001 | -088 | -171 | - 215 | - 313 |
|  | 21.5 | -. 3974 | --. 523 | -:. 595 | -. 846 | .059 | .1468 | . 151 | .275 |
|  | 24.5 | -. 336 | -.422 | -: | -. 665 | -. -006 | -068 | . 122 | . 185 |
|  | 31.0 | --. 317 | -. 378 | -. 745 | -. 575 | -. 039 | .029 | . 0.068 | . 134 |
|  | 41:8 | --. 306 | -. 375 | -. 414 | -.486 | -. 06 | -.007 | . 039 | . 083 |
|  | 44.5 | -. 2885 | -. 3 3 ${ }^{\text {a }}$ | -. 3 .38 | -. 4597 | -. 0780 | -:.017 | -026 | . 064 |
|  | 59.5 | --195 | -. 218 | -. 249 | -. 296 | -. 0.077 | -..035 | -.011 | . 017 |
|  | 71.0 | -. 0.05 | -. 137 | -. 156 | -. 196 | -. 037 | -. 010 | . 006 | . 23 |
|  | 91.5 | -. 025 | -. 0.025 | -.005 | -:.042 | -.004 | .015 | :047 | :036 |

table xx. - CONTINUED.

$$
\text { (b) } a_{u}, 4^{\circ}, 6^{\circ}, 5^{\circ}, 10^{\circ} \text { - concluded. }
$$

| Seriupan sta. | Percent chord | UPPER SURFACE |  |  |  | LOWRR SUAPACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | - | -0.203 | -0.851 | -1.097 | -1.344 |  |  |  |  |
|  | 1.5 | -1.038 | -2.090 | -1.550 | -1.323 | 0.365 | 0.434 | 0.430 | 0.409 |
|  | 5.5 | -. 589 | -. -849 | -2.040 | -1.054 | . 168 | . 300 | . 360 | . 405 |
|  | 11.0 | -. 431 | -. 5 -. 592 | -. $\mathrm{-}$ 872 | -. 9.978 | . 091 | . 185 | . 251 | . 307 |
|  | 14.5 | -. 408 | -. 541 | -.742 | -. 885 | .065 | . 154 | . 216 | . 273 |
|  | 21.0 | -. $37{ }^{2}$ | -. 469 | -. 668 | -. 860 | . 016 | . 094 | . 151 | . 206 |
|  | 24.5 31.0 | -. 347 | -. 4333 | -.599 -.532 | -. 722 | -.003 -.034 | . 071 | . 128 | . 179 |
|  | 34.5 | -. 517 | -. 371 | -. 4970 | -. 553 | -. 0.045 | .017 | . 065 | . 109 |
|  | 41.0 | -. 310 | -. 352 | -. 431 | -. 488 | -. 065 | -. 010 | . 029 | . 069 |
|  | 44.5 | -. 282 | -. 322 | -. 396 | -. 438 | -. 0.072 | -. 022 | . 014 | . 051 |
|  | 51.0 | -. 244 | -. 273 | -. 330 |  | -. 085 | -. 041 | -. 011 | . 021 |
|  | 79.5 | -.193 -.108 | -. 209 | -. 251 | -. 278 | -.080 -.037 | -. 0.047 | $=.025$ -.007 | -.004 |
|  | 79.5 | -. 0.044 | -. 046 | -..085 | -. 1175 | -.003 | -.008 | . 009 | . 006 |
|  | 91.0 | . 036 | . 037 | -. 007 |  | . 048 | . 049 | . 039 | 018 |
| $0.831 \mathrm{~b} / 2$ | 5 | -0.018 | -0.619 |  |  |  |  |  |  |
|  | 1.5 | -1.048 | -2.069 | $\begin{aligned} & -1.303 \\ & -1.031 \end{aligned}$ | $-1.265$ | 0.361 | 0.425 | 0.417 | 0.393 |
|  | 5.5 | -. 591 | -. 835 | -1.031 | -1.154 | .169 | .260 | . 336 | . 372 |
|  | 11.0 | -. 431 | -. 589 | -. 857 | -1.003 | . 087 | . 175 | . 235 | . 287 |
|  | 14.5 | -. 413 | -. 546 | -. 745 | -. 860 | -- | - | - | - |
|  | 21.0 | -. 361 | -. 451 | -. 678 | -. 868 | . 005 | . 075 | . 131 | . 279 |
|  | 24.5 | -. 342 | -. 419 | -. 585 | -. 727 | -. 01011 | . 057 | . 105 | . 152 |
|  | 31.0 | -. 306 | -. 362 $=.343$ | -. 495 | -. 614 | -.046 $=.063$ | -.012 | . 029 | .068 |
|  | 41.5 | -. 289 | -. 343 | -:373 | -. 523 | -.080 | -. 0.035 | -.003 | .029 |
|  | 44.5 | -. 251 | -. 280 | -. 338 | -. 370 | -. 0.08 | -. 050 | -. 015 | . 007 |
|  | 51.0 | -. 220 | -. 239 | -. 276 | -. 301 | -. 098 | -. 060 | -. 038 | -. 014 |
|  | 79.5 | -.154 -.087 | -.166 -.092 | -. 213 -.129 | -.237 -.167 | -.085 -.041 | -. 065 | -.053 -.036 | -. 040 |
|  | 79.5 | -.007 | -..029 | -. -.077 | -. 128 | -. 0003 | -.002 | -.009 | -. 0.017 |
|  | 91.0 | 046 | . 041 | -. 013 | -. 074 | . 050 | . 043 | . 020 | -. 006 |
| $0.924 \mathrm{~b} / 2$ | $\bigcirc$ |  |  |  |  |  |  |  |  |
|  | 1.5 | $-1.056$ | -2.087 -.830 | -1.642 | $\begin{aligned} & -1.720 \\ & -1.251 \end{aligned}$ | 0.337 .160 | 0.401 | 0.395 .313 | 0.374 .355 |
|  | 5.5 | -. 596 | -. 8.766 | -1.84 | -1.256 | . 147 | . 250 | . 297 | . 339 |
|  | 17.0 | -. 424 | -. 550 | -. 653 | -1.107 | . 056 | . 146 | . 196 | - 24 |
|  | 14.5 | -. 377 | -. 476 | -. 698 | -. 860 | . 022 | . 089 | . 135 | . 181 |
|  | 21.0 | -. 324 | -. 391 | -. 564 | -. 778 | -. 039 | . 018 | . 060 | . 098 |
|  | 24.5 31.0 | -. 288 | -. 339 | -. 479 -.389 | -. 625 | -.062 -.061 | -. 0104 | .012 | . 018 |
|  | 31.0 34.5 | -. 264 | -. 381 | -. 385 | -. 4975 | -. 0.092 | -. -.065 | -..047 | -..022 |
|  | 41.0 | -. 2440 | -. 274 | -. 322 | -. 377 | -. 103 | -. 0.079 | -..064 | -..042 |
|  | 44.5 | -. 209 | -. 240 | -. 293 | -. 376 | -. 1107 | -. 0.01 | -. 078 | -. 0665 |
|  | 51.0 59.5 | -. 181 -.119 | -. 203 -.144 -.074 | -. 255 -.216 | -. 309 -.312 -.34 | -. 1108 | -. $\mathrm{-}$-. 074 | -. 08. | -. 066 -.066 |
|  | 71.0 | -. 0.05 | -. 0.079 | -. 2167 | -. 243 | -. 0.039 | -:.043 | -.046 | -. 048 |
|  | 79.5 | -. 01011 | -. 0.045 | -. 160 | -. 244 | -. 0098 | -. 021 | -. 030 | -. 039 |
|  | 91.0 | . 038 | . 005 | -. 092 | -. 170 | . 04 |  |  | -.029 |

TABLE XX.- CORTIRUED.
(0) $\alpha_{n}, 12^{\circ}, 14^{\circ}, 16^{\circ}, 20^{\circ}$.

|  | Percent | OFPER SURAFACE |  |  |  | Lovin murict |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | migle of attaok |  |  |  | magie of atteok |  |  |  |
|  |  | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  | - 0.993 -2.155 <br> -:975 <br> -: 697 <br> -: 69 $=-59$ -.57 <br>  <br>  <br> -: 330 - 117 |  |  |  |  |  |  |
| 0.195 b/2 |  |  |  |  |  |  |  |  |  |
| $0.382 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  | -.726 0.426 .4766 $: 412$ $: 376$ $: 308$ .279 .201 .160 .159 .103 .063 .045 .032 .066 |  |  |

TABLE XX. - CONCLUDED.
(c) $a_{u}, 12^{\circ}, 14^{\circ}, 16^{\circ}, 20^{\circ}$ - Concluded.

| Sem1epan ota. | Percent chord | UPPER SURFACE |  |  |  | LOVER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.0 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & -1.526 \\ & -1.128 \\ & -1.247 \\ & -1.079 \\ & -1.177 \\ & -1.056 \\ & -1.112 \\ & -.946 \\ & -.843 \\ & -.714 \\ & -.616 \\ & -.544 \\ & -.446 \\ & -.355 \\ & -.250 \\ & -.200 \\ & -.127 \end{aligned}$ | $\begin{aligned} & -1.382 \\ & -1.201 \\ & -1.189 \\ & -1.130 \\ & -1.128 \\ & -1.055 \\ & -1.071 \\ & -1.076 \\ & -.998 \\ & -.937 \\ & -.909 \\ & -.854 \\ & -.802 \\ & -.708 \\ & -.591 \\ & -.504 \\ & -.372 \end{aligned}$ |  |  | $\begin{array}{r} 0.371 \\ .443 \\ .425 \\ .356 \\ .322 \\ .252 \\ .223 \\ .170 \\ .148 \\ .103 \\ .043 \\ .010 \\ .002 \\ -.007 \\ -.017 \end{array}$ | $\begin{array}{r} 0.356 \\ .474 \\ .462 \\ .397 \\ .362 \\ .292 \\ .261 \\ .179 \\ .130 \\ .107 \\ .065 \\ .020 \\ 0 \\ -.026 \\ -.066 \end{array}$ |  |  |
| $0.831 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | -1.427 -1.427 -1.163 -1.275 -1.121 -1.198 -1.053 -1.037 -.908 -.779 -.709 -.587 -.546 -.454 -.393 -.202 -.268 -.207 | $\begin{aligned} & -1.048 \\ & -.822 \\ & -.796 \\ & -.772 \\ & -.751 \\ & -.714 \\ & -.690 \\ & -.664 \\ & -.639 \\ & -.615 \\ & -.606 \\ & -.568 \\ & -.567 \\ & -.717 \\ & -.453 \\ & -.419 \end{aligned}$ |  |  | $\begin{array}{r} 0.367 \\ .417 \\ .410 \\ .334 \\ .221 \\ .192 \\ .131 \\ .059 \\ .056 \\ .0092 \\ -.036 \\ -.040 \\ -.043 \\ -.060 \end{array}$ | $\begin{array}{r} -.362 \\ 0.437 \\ .429 \\ .359 \\ .247 \\ .215 \\ .153 \\ .118 \\ .071 \\ .042 \\ . .008 \\ -.064 \\ \hline .087 \\ -.148 \end{array}$ |  |  |
| $0.924 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 5.5 \\ & 6.5 \\ & 11.5 \\ & 14.5 \\ & 21.0 \\ & 24.5 \\ & 31.0 \\ & 34.5 \\ & 41.5 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.5 \end{aligned}$ | $\begin{array}{r} -1.098 \\ -.997 \\ -1.004 \\ -.906 \\ -.945 \\ -.819 \\ -.775 \\ -.676 \\ -.560 \\ -.539 \\ -.534 \\ -.493 \\ -.464 \\ -.366 \\ -.361 \\ -.311 \\ -.274 \end{array}$ | $\begin{aligned} & -0.681 \\ & -.598 \\ & -.601 \\ & -.566 \\ & -.577 \\ & -.530 \\ & -.526 \\ & -.477 \\ & -.427 \\ & -.424 \\ & -.379 \\ & -.376 \\ & -.327 \\ & -.336 \\ & -.300 \\ & -.310 \end{aligned}$ |  |  | $\begin{array}{r} -.371 \\ 0.387 \\ .370 \\ .280 \\ .215 \\ .130 \\ .078 \\ . .007 \\ =.026 \\ -.047 \\ -.062 \\ -.070 \\ =.064 \\ \hline .068 \\ \hline .085 \end{array}$ | -.370 0.380 .393 .375 .294 .148 .094 .052 .009 -.018 -.044 -.064 -.085 -.094 -.107 -.143 |  |  |


(a) $a_{u}, 0^{0}, 1^{0}, 2^{0}, 3^{0}$.

table XXI.- CONrINUED.
(a) $\alpha_{u}, 0^{\circ}, 1^{\circ}, 2^{\circ}, 3^{\circ}=$ Goncluded.

| Sem1span sta. | Percent chord | UPPER SURFAGE |  |  |  | LOWER BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $2^{\circ}$ | $2^{\circ}$ | $3^{0}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & 0.378 \\ & =.059 \\ & -.137 \\ & =.137 \\ & =.146 \\ & -.174 \\ & =.165 \\ & -.160 \\ & =.160 \\ & =.188 \\ & =.155 \\ & -.143 \\ & -.071 \\ & -.043 \\ & .040 \end{aligned}$ | 0.365 -.236 -.228 -.184 -.200 -.200 -.192 -.181 -.197 -.192 $=.1761$ -.134 -.079 -.030 .062 | 0.263 -.444 -.313 $=.307$ -.257 -.243 -.226 -.226 -.223 -.207 -.182 -.149 -.090 -.039 | 0.241 -.681 -.416 $=.3102$ $=.305$ $=.291$ $=.277$ -.263 -.263 -.227 -.201 -.164 $=.097$ -.058 .030 | $\begin{array}{r} -0.068 \\ -.118 \\ -.112 \\ -.129 \\ -.131 \\ -.142 \\ -.145 \\ -.151 \\ -.150 \\ -.152 \\ -.149 \\ -.148 \\ -.123 \\ -.068 \\ -.026 \\ .041 \end{array}$ | $\begin{aligned} & 0.079 \\ & -.029 \\ & -.045 \\ & -.079 \\ & -.075 \\ & -.097 \\ & -.105 \\ & -.118 \\ & -.119 \\ & -.126 \\ & -.124 \\ & -.127 \\ & -.107 \\ & -.062 \\ & -.014 \\ & .044 \end{aligned}$ | 0.195 .046 .027 -.016 -.028 -.060 -.062 -.089 -.094 -.105 -.111 -.096 -.046 -.011 .043 | -.291 0.122 .097 .042 .023 -.031 -.058 -.058 .078 -.051 -.090 -.080 -.004 -.047 |
| $0.831 \mathrm{~b} / 2$ | 0 11.5 56.5 11.0 14.5 21.0 24.5 31.0 44.5 41.0 44.5 51.8 59.5 71.0 79.5 91.0 | 0.353 $=.070$ $=.046$ $=.046$ $=.046$ $=.160$ $=.174$ $=.1765$ $=.160$ $=.177$ -.150 $=.142$ $=.104$ $=.0716$ $=.041$ | 0.385 -.248 -.236 -.214 -.192 $=.206$ -.200 -.186 -.192 -.200 -.168 -.156 -.115 $=.065$ -.019 .041 | $\begin{aligned} & 0.358 \\ & =.447 \\ & . .332 \\ & -.343 \\ & -.259 \\ & -.232 \\ & -.237 \\ & -.221 \\ & -.221 \\ & -.221 \\ & -.191 \\ & -.174 \\ & -.076 \\ & -.023 \\ & . .038 \end{aligned}$ | 0.200 -.681 -.422 $=.402$ -.310 $=.280$ -.268 $=.252$ $=.241$ -.238 -.209 -.188 -.134 $=.080$ -.024 .039 | $\begin{array}{r} -0.069 \\ -.127 \\ -.116 \\ -.126 \\ -.142 \\ -.141 \\ -.148 \\ -.147 \\ -.147 \\ -.144 \\ -.129 \\ -.109 \\ -.054 \\ -.007 \\ .049 \end{array}$ | $\begin{array}{r} 0.077 \\ -.044 \\ -.047 \\ -.072 \\ -.101 \\ -.103 \\ -.118 \\ -.119 \\ -.125 \\ -.124 \\ -.118 \\ =.099 \\ -.048 \\ -.005 \\ .051 \end{array}$ | $\begin{array}{r} 0.195 \\ .032 \\ .026 \\ -.015 \\ -.060 \\ -.072 \\ -.094 \\ -.099 \\ -.108 \\ -.109 \\ -.096 \\ -.054 \\ -.005 \\ .048 \end{array}$ | $\begin{array}{r} .0 .090 \\ .102 \\ .094 \\ .039 \\ -.025 \\ -.035 \\ -.067 \\ -.075 \\ -.084 \\ -.090 \\ -.089 \\ -.081 \\ -.037 \\ -.001 \\ \hline .049 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | 0 7.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.5 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.373 \\ & =.034 \\ & =.150 \\ & =.154 \\ & =.154 \\ & =.146 \\ & =.160 \\ & =.151 \\ & =.151 \\ & =.146 \\ & -.135 \\ & =.086 \\ & -.038 \\ & .004 \\ & .049 \end{aligned}$ | 0.312 -.211 -.245 $=.239$ -.200 $=.206$ $=.186$ $=.1816$ -.176 $=.279$ $=.144$ -.137 $=.087$ -.040 .051 | $\begin{aligned} & 0.162 \\ & -.419 \\ & =.324 \\ & =.316 \\ & =.260 \\ & -.232 \\ & -.223 \\ & =.215 \\ & -.181 \\ & -.182 \\ & -.160 \\ & -.145 \\ & -.095 \\ & -.042 \\ & -.002 \\ & .046 \end{aligned}$ |  | $\begin{array}{r} -0.082 \\ -.130 \\ -.132 \\ -.143 \\ -.130 \\ -.141 \\ -.138 \\ =.138 \\ =.133 \\ -.135 \\ -.127 \\ -.125 \\ -.081 \\ -.331 \\ .010 \\ .061 \end{array}$ | $\begin{array}{r} 0.058 \\ =.048 \\ =.054 \\ =.087 \\ =.088 \\ =.113 \\ =.111 \\ =.115 \\ -.115 \\ -.119 \\ -.113 \\ =.076 \\ -.030 \\ .008 \\ .058 \end{array}$ | -0.171 .026 .016 -.024 -.046 -.087 $=.089$ -.100 $=.103$ -.111 -.108 -.109 -.077 -.033 .051 | -.075 0.095 .085 .024 -.010 -.051 -.064 -.080 -.096 -.097 -.099 -.072 -.032 -.044 |

FABLE XXI．－CONTIMUED．
（b）$\pi_{0}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ ．

| $\begin{aligned} & \text { Seal1- } \\ & \text { span } \\ & \text { sta. } \end{aligned}$ | Peroent chord | UPPER SURTACE |  |  |  | LOUER SURFICE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attack |  |  |  | Angle or attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4{ }^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | 30 |
| $0.086 \mathrm{~b} / 2$ | 0 | 0.336 | 0.113 | －0． 213 | －0．646 |  |  |  |  |
|  | 2.5 | －．-234 | －．722 | －1．049 | －1．423 | 0.286 | 0.360 | 0.459 | 0.506 |
|  | 5．5 | －． 225 | －． 3378 | －． 491 | －． 809 | ．163 | ． 2485 | ． 3200 | － 392 |
|  | 11.8 | －－231 | －： 307 | －． 375 | －： H H | ．284 | ． 154 | －284 | － |
|  | $2{ }^{21} 2.5$ | －． 2230 | －． 285 | －． 363 | －． 427 | ． 056 | ．128 | ． 185 | － 253 |
|  | 21.5 | －． 217 | －． 274 | －． 316 | －． 375 | －009 | ．067 | ． 127 | ． 182 |
|  | 31.0 | －：223 | －． 276 | －－319 | －． 341 | －． 006 | ． 043 | ． 094 | － 125 |
|  | 4 | 二： 220 | －． 2786 | －－ 318 | －． 350 | －． 0.048 | ．025 | ．075 | ． 129 |
|  | 44.5 | －． 246 | －． 286 | －：324 | －． 356 |  |  | － | －102 |
|  | 51.0 | －． 236 | －． 273 | －． 35 | －． 355 | －． 0.068 | －． 022 | ． 017 | ． 065 |
|  | 17．5 | －． 254 | －． 2.274 | －． 2191 | －． 2207 | －．．068 | －．．019 | ．017 | ．058 |
|  | 79.5 91.5 | －． 0951 | －．-.036 | － $\mathrm{-}$－ 0419 | －． 2131 | －．030 | －． 001 | －039 | ：066 |
| $0.195 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
|  | 1.5 |  |  |  |  |  |  |  |  |
|  | 5.5 | －． 339 | －． 415 | －． 669 | －－． 845 | ． 1265 | ． 264 | ． 3 2 | －． 3 ． |
|  | 11．8 | －． 3 34 | －．480 | －． 627 | －． 775 | ． 127 | － 220 | － 298 | － 371 |
|  | 14.5 | －：27 | －－360 | －： 74 | －：535 | －045 | ：157 | ．189 | ． 259 |
|  | 21.8 | －． 273 | －． 332 | －． 311 | －． 4.45 | ． 011 | － 077 | － 139 | ． 205 |
|  | 31.0 | －． 248 | －． 302 | －． 35 | －． 402 | －：．03I | ：025 | ． 1180 | ． 175 |
|  | 閨．5 | －． 259 | －-307 | －． 5 施 | －． 397 | －． 049 | －006 | －05 | －117 |
|  | 44.5 | －． 25 | －． 294 | －． 332 | －：366 | －：065 | －－．012 | ． 028 | －090 |
|  | 51.0 | －． 232 | －． 270 | －． 296 | －． 325 | －．063 | －． 036 | －007 | ：055 |
|  | $7{ }_{71}$ | －． 1140 | －． 215 | －． 239 | －． 268 | －．．058 | －． 032 | ． 017 | ． 248 |
|  | 79.5 | －． 01010 | －．857 | －． 066 | －． 101 | －． 013 | －：010 | ：035 | ．066 |
|  | 91.0 | ． 010 | －． 005 | －． 007 | －． 005 | ． 027 | ． 041 | ． 056 | ． 075 |
| $0.352 \mathrm{~b} / 2$ |  | 0．055 | －0．724 | －1．647 | －2．${ }^{\text {5 }}$ |  |  |  |  |
|  | 5.5 | －． 44 | －－．641 | －-7.75 | －1．083 | －．154 | －． 250 | ． 330 | － 0.495 |
|  | $1{ }^{6} \cdot 5$ | －．${ }^{425}$ | －＝ 617 | － 7 756 | －． 997 | ． 125 | ． 224 | － 305 | － 375 |
|  | 14.5 | －． 3 ． 31 | －： 4.438 | －：-54 | －： 65 | ：044 | ：136 | ． 198 | － 26 |
|  | 21.0 | －． 306 | －． 388 | －． 472 | －． 549 | ． 006 | ． 080 | ． 146 | ． 213 |
|  | 24.5 31.5 | －． 378 | －． 365 | －－435 | － C － 515 | －． 009 | ． 060 | －122 | ．156 |
|  | 34．0 | －． 276 | －． 324 | －． 375 | －． 4.43 | －． 0.05 | ．0008 | ：062 | ． 124 |
|  | 41.0 | －． 276 | －． 310 | －． 363 | －． 377 | －． 060 | －． 005 | ．c45 | ． 099 |
|  | 54：5 | －． 2526 | －：258 | －． 348 | －． 375 | －：．068 | －． 0.017 | ：031 | ．083 |
|  | 59.5 | －． 250 | －． 216 | －． 23 | －． 58 | －．068 | －． 027 | －099 | ． 050 |
|  | 79：5 | －． 068 | －：0才8 | －：103 | －． O －812 | ． 035 | －．010 | ：019 | ：059 |
|  | 91.0 | ． 010 | ． 008 | ． 09 | ． 013 | ：040 | ．050 | ．064 | ：079 |
| $0.555 \mathrm{~b} / 2$ | 0 | －0．109 | －0．313 | －1．977 | －3．412 |  |  |  |  |
|  | 1.5 | ． 785 | －1．421 | －2．07 | －2．734 | 0.328 | 0.420 | 0.442 | 0.403 |
|  | \％${ }^{5}$ | －：492 | －：853 | ． 967 | －1． 2231 | －174 | ． 278 | ． 35 | ． 4145 |
|  | 11.0 | －． 387 | －．527 | －． 674 | －1833 | ．085 | －180 | ：37 | － 370 |
|  | 74．5 | －． 362 | －． 474 | －． 611 | －． 725 | ． 060 | ． 146 | ． 219 | － $5^{2} 2$ |
|  | 24.5 | －． 306 | －． 388 | －． 472 | －．549 | －01 | －077 | ． 142 | －201 |
|  | 37.0 | －． 28.8 | －． 3 37 | －． 419 | －．482 | －．028 | －035 | －093 | －157 |
|  | 4it．0 | －． 276 | －． 327 | －． 369 | －．422 | －． 054 | －．01 | ：005 | －102 |
|  | 44.5 | －． 256 | －． 307 | －． 34 | －． 384 | －．061 | －． 010 | ．037 | ． 088 |
|  | 59 | －． 123 | －．200 | －：．226 | 二－245 | －：．077 | －． 024 | ． 017 | ． 068 |
|  |  | －． 017 | －． 132 | －． 145 | －． 35 | －． 030 | －．006 | ． 020 | ：049 |
|  | 91：\％ | ． 016 | ． 016 | －． 015 | ． 019 | ．044 | ：054 | ．062 | ：974 |

TABLE XXI.- CONTINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| Sem1span sta. | Percent chord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $\mathrm{g}^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 1.5 5 6.5 11.5 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.0 71.0 79.5 91.0 |  | $-1.224$ <br> $-1.563$ <br> -.778 -.731 <br> -.736 -.759 <br> -. 430 <br> -.399 -.363 <br> -.343 -.332 -.397 <br> -.297 -.256 <br> -. 200 <br> -. 055 | $\begin{array}{r} -2.585 \\ -2.194 \\ -1.058 \\ -.980 \\ -.697 \\ -.633 \\ -.530 \\ -.480 \\ -.433 \\ -.416 \\ -.388 \\ -.344 \\ -.291 \\ -.224 \\ -.132 \\ -.055 \\ .023 \end{array}$ | -4.325 -2.989 -1.332 -1.246 -.864 -.772 -.626 -.582 -.496 -.411 -.386 -.320 -.243 -.129 -.065 .025 | $\begin{array}{r} 0.367 \\ .1967 \\ .0991 \\ .067 \\ .0003 \\ .0035 \\ . .035 \\ -.057 \\ .057 \\ . .075 \\ -.059 \\ .0001 \end{array}$ | 0.427 .300 .272 .183 .157 .074 .037 .024 -.005 -.012 -.037 -.007 -.017 .054 | 0.388 .376 .350 .263 .169 .138 .094 .078 .045 .032 .008 -.004 .012 .059 .059 | $\begin{array}{r} -.266 \\ .445 \\ .410 \\ .532 \\ .2989 \\ .202 \\ .153 \\ .134 \\ .090 \\ .057 \\ .029 \\ .037 \\ .065 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.5 14.5 21.0 24.0 31.5 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | -0.081 -.959 -.548 -.792 -.398 -.384 -.331 -.328 -.281 -.278 -.273 -.230 -.205 -.146 -.089 .009 .035 | $\begin{array}{r} -0.923 \\ -1.491 \\ -.778 \\ -.755 \\ -.588 \\ -.502 \\ -.416 \\ -.302 \\ -.346 \\ -.332 \\ -.364 \\ -.337 \\ -.367 \\ -.101 \\ -.039 \\ .030 \end{array}$ | $\begin{aligned} & -2.183 \\ & -6.152 \\ & -1.035 \\ & -.977 \\ & -.697 \\ & -.505 \\ & -.508 \\ & -.474 \\ & -.405 \\ & -.391 \\ & -.347 \\ & -.308 \\ & -.266 \\ & -.191 \\ & -.116 \\ & -.053 \\ & .020 \end{aligned}$ | $\begin{array}{r} -3.786 \\ -2.920 \\ -1.324 \\ -1.227 \\ -1.141 \\ -.765 \\ -.610 \\ -.549 \\ -.477 \\ -.438 \\ -.388 \\ -.341 \\ -.291 \\ -.130 \\ -.130 \\ -.013 \end{array}$ | $\begin{array}{r} 0.362 \\ .175 \\ .164 \\ .086 \\ .009 \\ -.004 \\ -.036 \\ -.048 \\ -.066 \\ -.073 \\ -.076 \\ -.071 \\ -.033 \\ -.001 \end{array}$ | -.420 <br> .280 <br> .268 <br> .176 <br> .080 <br> .062 <br> .019 <br> .002 <br> -.023 <br> -.035 <br> .044 <br> -.050 <br> -.021 <br> .005 <br> .047 | $\begin{array}{r} -0.104 \\ -.129 \\ -.140 \\ -251 \\ -.147 \\ .149 \\ .11970 \\ .048 \\ .017 \\ -.001 \\ -.014 \\ -.030 \\ -.010 \\ .009 \\ .072 \end{array}$ | $\begin{array}{r} .-.756 \\ .407 \\ .401 \\ .317 \\ .205 \\ .178 \\ .122 \\ .097 \\ .039 \\ .020 \\ -.005 \\ .006 \\ .018 \\ .043 \end{array}$ |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{array}{r} -0.500 \\ -.967 \\ -.542 \\ -.500 \\ -.384 \\ -.356 \\ -.303 \\ -.276 \\ -.253 \\ -.228 \\ -.231 \\ -.192 \\ -.168 \\ -.115 \\ -.061 \\ -.017 \\ .030 \end{array}$ | $\begin{array}{r} -1: 547 \\ -1.705 \\ -.761 \\ -.697 \\ -.513 \\ -.355 \\ -.377 \\ -.332 \\ -.302 \\ -.276 \\ =.268 \\ -.228 \\ -.199 \\ -.144 \\ =.085 \\ -.044 \\ -.003 \end{array}$ | -3.019 -2.255 -1.002 -.927 -.661 -.563 -.447 -.405 -.361 -.313 -.308 -.275 -.240 -.188 -.124 -.102 -.043 | -4.909 -3.161 -1.268 -1.171 -.790 -.676 $=.527$ $=.466$ -.408 -.330 -.33 $=.383$ -.235 -.235 -.160 -.100 | $\begin{array}{r} 0.378 \\ . .163 \\ . .062 \\ .023 \\ -.024 \\ . .042 \\ . .064 \\ -.075 \\ . .085 \\ . .090 \\ . .092 \\ -.035 \\ -.0099 \\ .039 \end{array}$ |  | $\begin{array}{r} -.376 \\ .334 \\ .318 \\ .213 \\ .077 \\ .0666 \\ .004 \\ . .025 \\ . .041 \\ . .058 \\ \hline .067 \\ \hline .040 \\ . .031 \\ .009 \end{array}$ | 0.274 .384 .368 .2066 .123 .074 .038 0.017 -.044 -.147 .- .58 -.039 -.003 |

TABLE XXI．－OONTINUED．
（o）$C_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ ．

| $\mathrm{semin}_{\text {sexan }}$$\begin{aligned} & \text { Bpan } \\ & \text { nta. } \\ & \hline \end{aligned}$ | （ Percent | UPPER surface |  |  |  | LOWER sugrace |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AngIe of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | 12 | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | 0 | －1．232 | －2．750 | －4，785 | －6．975 |  | 0.450 |  |  |
|  | 1.5 | －1．822 | －2．750 | －3．892 | －4．900 | 0.518 | 0.450 | －0．266 | 0.084 |
|  | 6：5 | －．：707 | －． 9 93 | －1．306 | － 1.688 | － 41.4 | －${ }^{\text {cel }}$ | ． 602 | ： 54 |
|  | 12.0 | －．532 | －： 681 | －． 8572 | －1．190 | ． 313 | ． 425 | ． 531 | ：623 |
|  | 21．0 | 二－：$=1474$ | － | －．740 | －1．151 | － 2185 | ： 3745 | ． 475 | －561 |
|  | 31.0 | － 39 | －． 250 | －． 666 | －1． 935 | ． 204 | ． 307 | ． 407 | ． 485 |
|  | 34.5 | －．405 | －． 500 | －． 650 | －． 891 | －151 | －253 | －3795 | ． 405 |
|  | $4{ }^{44 .}$ | －． 394 | －． 4772 | －． 618 | －：864 | $\underline{-15}$ | $\bigcirc$ | ． 336 | $\bigcirc$ |
|  | 51.0 | －$=364$ | －$=4.45$ | 二－：776 | －：800 | ．109 | ．1799 | ：279 | ： 375 |
|  | 71.0 | －：204 | －－367 | －-3.35 |  | ． 0.092 | －159 | － | － 245 |
|  | 79.5 91.6 | －-.136 | －．-.065 | －． 2745 | $=. .440$ | $\text { : } 0954$ | $.147$ | ． 136 | ：120 |
| 0.195 b／2 | 0 |  | －5．349 | －8．697 | －6．3g7 |  |  |  |  |
|  | 1.5 | －2．463 | －2．${ }^{2} 65$ | －5．128 | －2．983 | 0.207 | ． 317 | ． 038 | ． 935 |
|  | \％${ }^{5}$ | －1．04 | －1．341 | －1．940 | －2：57 | 430 | － Sll $^{17}$ | ． 562 | ． 63 |
|  | 11.6 | －． 726 | －-954 | －1．273 | －2．455 | －${ }^{366}$ | －473 | －541 | ： 614 |
|  | $\frac{11}{12.5}$ | －：637 | －． 854 | －1．123 | －2．175 | ． 364 | ． 336 | ： 487 | ． 59 |
|  | 24.5 | －． 310 | －． 656 | －． 894 | －1．685 | ． 238 | ． 349 | ． 455 | － 54 |
|  | 31.0 | －． 458 | －． 579 | －－792 | －2．346 | －194 | － 31 | －409 | － 47 |
|  | 34.5 | －－．452 | －．：519 | －．-711 | －-1.302 | ．142 | ． 241 | －${ }^{2}$ | ． 357 |
|  | 44.5 | －． 403 | －． 491 | －． 685 | －1．048 | ．127 | － 224 | － 3 264 | － 35 |
|  | 59.5 | －：．258 | －． 3.45 | －． 499 | －－．757 | －038 | －166 | ． 219 | ：257 |
|  | 71.0 | －． 198 | －． 243 | －． 380 | －－602 | －082 | ． 1348 | ． 1186 | ． 200 |
|  | 79 | －：1106 | －：1027 | －：119 | －－． 316 | ：094 | ： 123 | ． 111 | －279 |
| $0.382 \mathrm{~b} / 2$ | T | －4．347 | －5．276 | －5．677 |  |  |  |  |  |
|  | 7．5 | －3．122 | －4．653 | -2.487 -2.474 | －1．456 | ． $374{ }^{4}$ | 0.115 | 0.112 | ． 1457 |
|  | \％ $5 \cdot 5$ | －1．343 | － 1.275 | －2．474 | －1．430 | ． 427 | ：488 | ． 575 | ． 5 弱 |
|  | 11.6 | －． 586 | －1． 253 | －2．314 | －1．395 | － 367 | ． 460 | －${ }^{515}$ | － 575 |
|  | －14．5 | －． 784 | －1．088 | －2．130 | －1．343 | － 372 | ． 385 | ： 4183 | －554 |
|  | 21.5 | －-.595 | －． $\mathrm{F}^{73}$ | －1．930 | －1．${ }^{12}$ | ：246 | － 55 | －429 | ：475 |
|  |  | －． 521 | －． 670 | －1．55 | －1．310 | －1988 | － 385 | － 375 | ． 422 |
|  | 34.5 4 4 | －：．455 | －：-53 | －1．465 | －$-1.27{ }^{2}$ | ． 178 | ． 285 | －3037 |  |
|  | $4{ }^{4 .}$ | －． 415 | －． 5 张 3 | －1．092 | －1．186 | ． 137 | ． 244 | －273 | － 310 |
|  | 51.8 | －－． 35 | －－ 345 | －： 8.65 | －1．146 | －058 | ． 159 | ． 183 | ． 198 |
|  | 71.0 | －－170 | －：323 | －． 449 | －． 941 | ：079 | －133 | － 1240 | \％ |
|  | 79.5 | －． 0.086 | －． 026 | －． 395 | －． $68{ }^{\text {c }}$ | ．089 | ：103 | ：110 | －．057 |
| $0.555 \mathrm{~b} / 2$ |  |  |  | －3．651 |  |  |  |  |  |
|  | 1.5 | －5．548 | 10．559 | －1．336 | －1．080 | 0.300 | －0．068 | 0.182 |  |
|  | 5．5 | －1．512 | －2．255 | －1．312 | －1．064 | －438 | 4791 | － 524 | － 515 |
|  | 11.0 | －1．005 | －1．484 | －1．265 | －1．050 | 3 3 | －473 | －517 | －556 |
|  | 14．6 | －． 885 | －1．284 | －1．213 | －1．034 | － 350 | ． 353 | ． 4829 | ． 517 |
|  | 21．5 | －－． 63 | － 857 | －1． 210 | －1．001 | 258 | － 369 | － 397 | － 436 |
|  | 31.8 | －-546 | －． 678 | －1．191 | －． 988 | ． 215 | －3118 | －345 | －378 |
|  | 41.6 | －： 48 | －－670 | －1．144 | －． 9.976 | ． 142 | ． 243 | － 264 | ． 291 |
|  | 44.5 | －-4.424 | － 5.560 | －${ }^{-1.089}$ | －-941 | ． 1326 | ． 2218 | ． 236 | ． 259 |
|  | 59.5 | －． 364 | －． 4.357 | －1．955 | －－．947 | ：077 | －138 | ： 130 | ． 125 |
|  | 71.0 | － | －．-141 | －． 8.745 | －：852 | ：777 | ． O 114 | ． 972 | ．047 |
|  | 79．5 | －．078 | －． 057 | －． 596 | －． 78 | ：087 | ：070 | ．．0\％${ }^{2}$ | －191 |

TABLE XXI. - COMCLUDED.
(o) $a_{u}, 12^{\circ}, 16^{\circ}, 20^{\circ}, 24^{\circ}$ - Concluded.

| Semiepan ta. | Percent chord | UPPER SURFACE |  |  |  | LOWER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attack |  |  |  | Angle of sttack |  |  |  |
|  |  | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ | $12^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $24^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 61.0 34.5 41.5 44.5 51.0 59.5 71.0 79.5 91.0 | 1.516 -6.5161 -3.898 -1.658 -1.534 -1.050 -.928 -.734 -.673 -.568 -.532 -.471 -.415 -.347 -.259 -.145 -.066 .022 | -1.305 -2.305 -2.830 -2.931 -2.574 -2.458 -2.222 -1.820 -1.724 -1.218 -1.204 -.766 -.780 -.499 -.408 -.229 -.146 -.042 | -2.330 -.957 -.952 -.921 -.927 -.891 -.900 -.867 -.831 -.847 -.805 -.810 -.765 -.729 -.675 -.624 | -1.798 -.837 -.861 -.828 -.837 -.801 -.720 -.799 -.795 -.780 -.739 -.745 -.721 -.704 -.656 -.018 | . .056 0.443 .440 .383 .353 .285 .254 .203 .182 .137 .080 .059 .058 .058 .068 | $\begin{array}{r} -0.206 \\ .483 \\ .497 \\ .479 \\ .451 \\ .350 \\ .353 \\ .296 \\ .266 \\ .155 \\ .192 \\ .1006 \\ .082 \\ .064 \\ .047 \end{array}$ | $\begin{array}{r} 0.115 \\ .498 \\ .501 \\ .480 \\ .450 \\ .357 \\ .357 \\ .267 \\ .210 \\ .187 \\ .130 \\ .064 \\ .001 \\ -.065 \\ -.176 \end{array}$ | $\begin{array}{r} .0-044 \\ 0.488 \\ .503 \\ .500 \\ .476 \\ .419 \\ .387 \\ .354 \\ .232 \\ .202 \\ .142 \\ .065 \\ -.007 \\ \hline .075 \\ \hline . .194 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 56.5 61.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 79.5 71.0 79.5 91.0 | -5.041 -3.755 -1.628 -1.501 -1.041 -.928 -.712 $=.648$ -.532 -.436 -.337 -.379 -.319 -.235 -.145 -.085 -.005 | -3.765 -1.424 -1.377 -1.308 -1.295 -1.200 -1.237 -1.174 -1.176 -1.116 -1.091 -1.020 -.960 -.848 -.649 -.552 -.344 | $\begin{aligned} & -2.768 \\ & -.748 \\ & -.732 \\ & -.729 \\ & -.713 \\ & -.696 \\ & -.680 \\ & -.666 \\ & -.658 \\ & -.644 \\ & -.652 \\ & -.606 \\ & -.615 \\ & -.588 \\ & -.588 \\ & -.753 \\ & -.520 \end{aligned}$ | .- .548 -.686 -.672 -.664 -.645 -.645 -.637 -.626 -.618 -.615 -.618 -.576 -.587 -.567 -.519 -.519 -.492 | $\begin{array}{r} 0.051 \\ .430 \\ .426 \\ .365 \\ .254 \\ .226 \\ .167 \\ .137 \\ .076 \\ .048 \\ .016 \\ .017 \\ .022 \\ .035 \end{array}$ | $\begin{array}{r} .071 \\ 0.071 \\ .479 \\ .438 \\ -.329 \\ .397 \\ .237 \\ .200 \\ .156 \\ .1257 \\ .0046 \\ .0288 \\ .007 \\ -.027 \end{array}$ | -.180 0.471 .492 .432 .327 .293 .228 .192 .142 .063 -.004 -.056 -.098 -.185 | . .736 0.437 .467 .452 -.357 .354 .259 .223 .165 .1272 .008 -.048 -.090 -.182 |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 17.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & -7.263 \\ & -4.129 \\ & -1.550 \\ & -1.418 \\ & -.969 \\ & -.812 \\ & -.629 \\ & -.560 \\ & -.477 \\ & -.447 \\ & -.275 \\ & -.382 \\ & -.331 \\ & -.298 \\ & -.229 \\ & -.253 \\ & -.164 \end{aligned}$ | $\begin{aligned} & -1.817 \\ & -1.044 \\ & -1.011 \\ & -.965 \\ & -.959 \\ & -.907 \\ & -.896 \\ & -.841 \\ & -.849 \\ & -.786 \\ & -.813 \\ & -.730 \\ & -.704 \\ & -.726 \\ & -.648 \\ & -.616 \end{aligned}$ | $\begin{aligned} & -1.026 \\ & -.625 \\ & -.600 \\ & -.586 \\ & -.586 \\ & -.562 \\ & -.562 \\ & -.529 \\ & -.529 \\ & -.488 \\ & -.712 \\ & -.448 \\ & -.459 \\ & -.427 \\ & -.409 \\ & -.401 \end{aligned}$ | $\begin{aligned} & -0.782 \\ & -.571 \\ & -.563 \\ & -.535 \\ & -.552 \\ & -.527 \\ & -.511 \\ & -.505 \\ & -.522 \\ & -.481 \\ & -.508 \\ & -.453 \\ & -.462 \\ & -.439 \\ & -.439 \\ & -.409 \\ & -.394 \end{aligned}$ | 0.089 .399 .373 .345 .160 .101 .064 . .0017 -.031 -.007 -.061 . .043 -.031 -.019 | -.289 <br> 0.431 <br> .407 <br> .353 <br> .287 <br> .153 <br> .157 <br> .072 <br> .049 <br> .020 <br> .007 <br> -.027 <br> .045 <br> -.065 <br> -.135 | 0.076 <br> 0.417 <br> .397 <br> .351 <br> .293 <br> .219 <br> .172 <br> .182 <br> .076 <br> .043 <br> -.010 <br> -.059 <br> .083 <br> .110 <br> -.161 | $\begin{array}{r} 0.199 \\ .413 \\ .396 \\ .372 \\ .315 \\ .247 \\ .190 \\ .095 \\ .065 \\ .026 \\ -.001 \\ -.051 \\ -.078 \\ \hline .111 \end{array}$ |


(a) $\alpha_{k}, \infty^{0}, 1^{0}, 2^{0}, 3^{0}$.

| Seaiapan sta. | Percent obord | UPPER SUEFAGE |  |  |  | LOMER SURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of ettack |  |  |  | angle of attack |  |  |  |
|  |  | $0^{\circ}$ | $1{ }^{0}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $I^{\circ}$ | $2^{0}$ | $3^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | 0.485 .050 .015 $=.034$ $=.051$ $=.069$ $=.086$ $=.094$ $=.105$ $=.146$ $=.161$ $=.160$ $=.137$ $=.197$ $=.062$ $=.015$ | $\begin{aligned} & 0.487 \\ & =.043 \\ & =.087 \\ & =.083 \\ & =.086 \\ & =.104 \\ & =.118 \\ & =.123 \\ & =.124 \\ & =.146 \\ & =.165 \\ & =.185 \\ & -.182 \\ & =.155 \\ & =.162 \\ & =.072 \\ & =.020 \end{aligned}$ | $\begin{aligned} & 0.464 \\ & =.148 \\ & =.139 \\ & =.131 \\ & =.131 \\ & =.144 \\ & =.150 \\ & =.160 \\ & =.161 \\ & =.177 \\ & =.206 \\ & =.201 \\ & =.170 \\ & =.134 \\ & =.081 \\ & =.026 \end{aligned}$ | 0.419 <br> -.273 -.178 <br> $-.183$ <br> -.174 -.180 <br> $-.180$ <br> $-.182$ <br> -.183 -.199 <br> $-212$ <br> $-.219$ <br> -.178 -.142 <br> -.142 -.087 <br> $-.029$ | $\begin{aligned} & -.007 \\ & 0.012 \\ & =.044 \\ & =.051 \\ & =.071 \\ & =.082 \\ & =.102 \\ & =.113 \\ & =.144 \\ & -.17 \\ & =.154 \\ & =.112 \\ & =.073 \\ & =.019 \end{aligned}$ | $\begin{aligned} & 0.081 \\ & .055 \\ & -.001 \\ & -.020 \\ & =.039 \\ & =.052 \\ & -.074 \\ & =.082 \\ & =.106 \\ & -.193 \\ & -.175 \\ & -.119 \\ & =.100 \\ & =.064 \\ & =.013 \end{aligned}$ | $\begin{array}{r} . .784 \\ 0.077 \\ .039 \\ .014 \\ -.008 \\ =.027 \\ =.046 \\ =.059 \\ =.077 \\ =.094 \\ -.175 \\ =.103 \\ =.087 \\ =.053 \\ -.007 \end{array}$ | $\begin{aligned} & -.023 \\ & 0.223 \\ & .1053 \\ & .048 \\ & .043 \\ & .020 \\ & -.018 \\ & =.032 \\ & =.051 \\ & -.066 \\ & -.091 \\ & -.0964 \\ & -.072 \\ & -.042 \\ & 0 \end{aligned}$ |
| $0.195 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 12.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 32.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | 0.445 .006 $=.055$ -.080 $=.092$ $=.105$ $=.124$ $=.126$ $=.132$ $=.149$ $=.165$ $=.156$ $=.132$ $=.096$ $=.048$ .009 | $\begin{aligned} & 0.428 \\ & -.120 \\ & -.123 \\ & -.139 \\ & -.140 \\ & -.142 \\ & -.154 \\ & =.180 \\ & =.163 \\ & =.179 \\ & -.182 \\ & -.189 \\ & =.177 \\ & =.148 \\ & =.171 \\ & =.057 \\ & .005 \end{aligned}$ | $\begin{aligned} & 0.367 \\ & -.257 \\ & =.186 \\ & -.200 \\ & =.186 \\ & -.184 \\ & =.188 \\ & =.186 \\ & =.185 \\ & =.207 \\ & =.213 \\ & -.213 \\ & =.197 \\ & =.163 \\ & =.1064 \\ & . .002 \end{aligned}$ | 0.269 <br> $-.404$ <br> $-.259$ <br> $-.261$ <br> $-.237$ <br> $-.227$ <br> -. 216 <br> $-.218$ <br> $-.229$ <br> -.237 -.231 <br> .225 -.177 <br> -.177 $=.137$ -0 | $\begin{aligned} & =.031 \\ & 0.069 \\ & =.086 \\ & =.097 \\ & =.111 \\ & =.121 \\ & =.129 \\ & =.146 \\ & =.177 \\ & =.160 \\ & =.164 \\ & =.138 \\ & =.098 \\ & =.045 \\ & .009 \end{aligned}$ | $\begin{aligned} & 0.144 \\ & =.007 \\ & =.089 \\ & =.053 \\ & =.072 \\ & =.089 \\ & =.098 \\ & =.179 \\ & =.122 \\ & =.159 \\ & =.149 \\ & =.146 \\ & =.123 \\ & =.087 \\ & -.042 \\ & .011 \end{aligned}$ | $\begin{array}{r} .-.039 \\ .053 \\ . .023 \\ -.010 \\ =.034 \\ -.056 \\ -.068 \\ =.092 \\ -.106 \\ -.114 \\ -.117 \\ -.126 \\ -.107 \\ -.075 \\ -.034 \\ .016 \end{array}$ | $\begin{array}{r} . .37 \\ 0.319 \\ .077 \\ .033 \\ .007 \\ . .022 \\ . .036 \\ =.062 \\ =.077 \\ =.088 \\ =.093 \\ =.105 \\ =.089 \\ -.062 \\ . .022 \\ .023 \end{array}$ |
| $0.312 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.6 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | 0.397 $=.015$ $=.090$ $=.109$ $=.124$ $=.128$ $=.245$ $=.157$ $=.151$ $=.166$ $=.172$ $=.130$ $=.079$ $=.037$ .021 | 0.382 -.163 $=.175$ -.781 -.177 $=.177$ $=.179$ $=.281$ -.182 $=.181$ $=.194$ $=.170$ $=.147$ $=.094$ -.045 .016 | $\begin{aligned} & 0.294 \\ & =.337 \\ & =.257 \\ & =.267 \\ & =.224 \\ & =.222 \\ & =.219 \\ & =.219 \\ & =.215 \\ & =.207 \\ & =.221 \\ & =.212 \\ & =.192 \\ & =.163 \\ & =.104 \\ & =.052 \\ & \hline \end{aligned}$ | 0.147 <br> $-523$ <br> -.347 -.335 <br> $=.286$ <br> $=.256$ <br> $=.254$ $=.250$ <br> $-237$ <br> -.237 -.232 <br> -.208 -.175 <br> -.113 -.058 .012 <br> .012 | $\begin{aligned} & -0.059 \\ & =.106 \\ & =.118 \\ & =.126 \\ & =.135 \\ & =.1448 \\ & =.161 \\ & =.165 \\ & =.158 \\ & =.159 \\ & =.161 \\ & =.189 \\ & =.081 \\ & =.071 \\ & .024 \end{aligned}$ | $\begin{aligned} & 0.046 \\ & =.037 \\ & =.053 \\ & =.076 \\ & -.090 \\ & =.103 \\ & =.134 \\ & =.132 \\ & =.137 \\ & =.137 \\ & =.242 \\ & =.117 \\ & =.066 \\ & -.025 \\ & .026 \end{aligned}$ | $\begin{array}{r} 0.139 \\ .027 \\ .008 \\ -.026 \\ -.046 \\ -.067 \\ =.080 \\ =.102 \\ =.109 \\ =.110 \\ =.115 \\ -.122 \\ =.098 \\ =.060 \\ -.017 \\ .031 \end{array}$ | $\begin{array}{r} 0.223 \\ .090 \\ .068 \\ .023 \\ -.001 \\ -.028 \\ -.044 \\ =.070 \\ -.078 \\ -.084 \\ =.089 \\ =.100 \\ -.080 \\ =.048 \\ -.009 \\ .036 \end{array}$ |
| $0.55 .5 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.8 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $\begin{aligned} & 0.425 \\ & =.030 \\ & -.095 \\ & -.124 \\ & =.122 \\ & =.126 \\ & =.136 \\ & =.141 \\ & =.147 \\ & -.163 \\ & =.168 \\ & -.159 \\ & =.145 \\ & =.115 \\ & -.077 \\ & -.032 \\ & .026 \end{aligned}$ | $\begin{aligned} & 0.428 \\ & -.186 \\ & -.182 \\ & =.198 \\ & =.181 \\ & =.181 \\ & =.181 \\ & =.177 \\ & =.181 \\ & -.182 \\ & =.195 \\ & =.184 \\ & -.167 \\ & -.132 \\ & =.089 \\ & =.039 \\ & .082 \end{aligned}$ | 0.348 <br> -. 381 <br> -. 282 <br> -. 291 <br> $-.243$ <br> $-.240$ <br> -. 224 <br> -. 219 <br> -. 219 <br> -. 219 <br> -. 222 <br> -. 209 <br> $-.188$ <br> $-.147$ <br> -. 098 <br> .046 .019 | 0.181 <br> $-.592$ <br> $-.379$ <br> -. 315 <br> -294 $=-275$ <br> $=.275$ <br> $=.250$ $=.248$ <br> $=.244$ <br> $-231$ <br> . .259 $=.108$ -.051 .019 | $\begin{aligned} & -0.071 \\ & -.106 \\ & =.115 \\ & -.134 \\ & -.135 \\ & -.146 \\ & =.156 \\ & =.160 \\ & =.154 \\ & =.153 \\ & =.149 \\ & =.1374 \\ & -.027 \\ & .031 \end{aligned}$ | $\begin{aligned} & 0.054 \\ & =.020 \\ & =.037 \\ & =.076 \\ & =.085 \\ & =.107 \\ & -.110 \\ & =.125 \\ & =.133 \\ & =.133 \\ & =.133 \\ & =.133 \\ & =.066 \\ & -.023 \\ & .030 \end{aligned}$ | $\begin{aligned} & -.07 \\ & 0.163 \\ & .044 \\ & .027 \\ & -.020 \\ & . .036 \\ & -.065 \\ & -.073 \\ & =.093 \\ & =.105 \\ & =.100 \\ & =.117 \\ & =.112 \\ & =.103 \\ & -.057 \\ & -.017 \\ & .033 \end{aligned}$ | $\begin{array}{r} -.251 \\ 0.110 \\ .092 \\ .034 \\ . .017 \\ =.026 \\ =.036 \\ =.060 \\ =.073 \\ =.085 \\ =.090 \\ =.085 \\ =.044 \\ =.007 \\ .038 \end{array}$ |

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TABLE XXII.- CONTINUED.
(a) $a_{12}, 0^{\circ}, 2^{\circ}, 2^{\circ}, 3^{\circ}$ - OonoIuded.

| Sem1span sta. | Percent chord | UPPER SURFACE |  |  |  | LONER BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angie or attack |  |  |  |
|  |  | $0^{\circ}$ | $1^{\circ}$ | $2^{\circ}$ | $3^{\circ}$ | $0^{\circ}$ | $1^{3}$ | $2^{\circ}$ | $3{ }^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{aligned} & 0 \\ & 1.5 \\ & 55.5 \\ & 51.6 \\ & 14.0 \\ & 21.5 \\ & 24.0 \\ & 31.5 \\ & 34.0 \\ & 41.5 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ | $\begin{aligned} & 0.405 \\ & . .034 \\ & -.113 \\ & -.115 \\ & . .118 \\ & .145 \\ & . .147 \\ & -.157 \\ & . .1172 \\ & . .176 \\ & -.141 \\ & -. .119 \\ & -.024 \\ & . .035 \end{aligned}$ | 0.376 $=.211$ -.205 $=.202$ $=.179$ $=.181$ $=.180$ $=.184$ $=.182$ -.198 $=.184$ -.166 $=.235$ $=.034$ -.059 |  | $\begin{array}{r} 0.050 \\ -.639 \\ . .498 \\ -.398 \\ -.311 \\ -.295 \\ -.286 \\ . .273 \\ -.256 \\ -.254 \\ -.252 \\ -.202 \\ -.163 \\ -.098 \\ -.044 \\ .027 \end{array}$ | $\begin{array}{r} -0.057 \\ -.106 \\ -.115 \\ -.136 \\ -.136 \\ -.144 \\ -.149 \\ -.153 \\ -.153 \\ -.154 \\ -.142 \\ -.124 \\ -.066 \\ -.022 \\ .039 \end{array}$ | 0.079 -.024 -.038 -.078 -.084 -.105 -.112 -.124 -.125 -.133 -.132 -.233 $=.113$ -.059 -.020 .037 | -.203 0.054 .034 -.021 -.024 -.065 -.074 $=.091$ -.108 $=.109$ -.113 $=.100$ $=.053$ -.015 .038 | $.0-97$ .1266 .102 .037 .017 -.035 -.055 -.065 -.081 -.093 -.083 -.040 -.007 .043 |
| $0.831 \mathrm{~b} / 2$ | 0 1.5 6.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.5 79.5 91.5 | 0.368 -.048 -.128 $=.122$ -.113 -.144 -.161 -.157 -.164 -.189 -.114 -.104 -.063 .- .016 .042 | 0.411 -.224 -.222 -.209 -.181 $=.196$ -.190 $=.182$ -.186 -.184 -.174 -.118 $=.071$ -.021 .038 | 0.351 -.447 . .318 -.347 -.259 -.240 -.234 -.219 -.215 -.194 -.178 $=.079$ -.025 .036 | $\begin{aligned} & 0.206 \\ & =.651 \\ & . .415 \\ & =.398 \\ & =.313 \\ & =.278 \\ & =.271 \\ & =.246 \\ & =.239 \\ & -.217 \\ & =.189 \\ & -.138 \\ & =.082 \\ & -.027 \end{aligned}$ | $\begin{array}{r} -0.079 \\ -.128 \\ -.120 \\ -.131 \\ -.186 \\ -.183 \\ -.190 \\ -.190 \\ -.190 \\ -.186 \\ -.177 \\ -.096 \\ -.007 \\ -.050 \end{array}$ | $\begin{array}{r} 0.074 \\ -.034 \\ -.041 \\ -.075 \\ -.107 \\ =.109 \\ -.124 \\ -.125 \\ -.132 \\ -.132 \\ -.104 \\ -.053 \\ -.009 \\ .046 \end{array}$ | $\begin{array}{r} 0.193 \\ .041 \\ . .030 \\ -.070 \\ -.075 \\ -.095 \\ . .102 \\ . .112 \\ . .112 \\ . .095 \\ -.049 \\ -.008 \\ .045 \end{array}$ |  |
| $0.924 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 11.0 14.5 21.0 24.5 31.0 34.5 43 44.0 51.5 59.5 71.0 79.5 91.0 |  | 0.319 -.200 -.234 -.251 -.198 -.196 -.179 -.175 -.166 -.165 -.143 -.097 -.043 0 .047 | 0.157 -.425 -.325 -.3187 -.242 -.221 -.005 -.200 -.184 -.184 -.163 -.048 -.049 -.004 .043 | $\begin{array}{r} -0.102 \\ -.656 \\ -.427 \\ -.392 \\ -.313 \\ -.292 \\ -.256 \\ -.235 \\ -.218 \\ -.199 \\ -.195 \\ -.174 \\ -.156 \\ -.104 \\ -.052 \\ -.005 \\ .039 \end{array}$ | $\begin{array}{r} -0.087 \\ -.135 \\ -.119 \\ -.135 \\ -.136 \\ -.141 \\ -.139 \\ -.134 \\ -.135 \\ -.125 \\ -.125 \\ -.081 \\ -.031 \\ .010 \\ .052 \end{array}$ | $\begin{aligned} & 0.051 \\ & -.056 \\ & -.075 \\ & -.095 \\ & . .114 \\ & . .117 \\ & -.122 \\ & -.121 \\ & -.125 \\ & -.120 \\ & -.080 \\ & -.034 \\ & . .003 \\ & .054 \end{aligned}$ | $\begin{array}{r} 0.166 \\ 0.034 \\ -.037 \\ -.051 \\ -.085 \\ -.094 \\ -.104 \\ -.107 \\ -.117 \\ -.112 \\ -.079 \\ -.076 \\ -.002 \\ -.049 \end{array}$ | -.270 .100 .091 -.013 -.053 -.067 -.082 -.089 -.708 -.1011 -.074 -.734 -.044 .046 |

TABLE XXII.- CONTIEUED.
(b) $a_{11}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$.

| Semiapan日ta. | Percent ohord | UPPER SURFACE |  |  |  | LOWER SURTACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | angle of attack |  |  |  | angle of attack |  |  |  |
|  |  | $4{ }^{\text {a }}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | 8 | $10^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  | $\begin{aligned} & 0.141 \\ & =.676 \\ & -.356 \\ & -.345 \\ & -.294 \\ & -.264 \\ & -.277 \\ & =.269 \\ & -.269 \\ & -.273 \\ & =.287 \\ & -.273 \\ & =.228 \\ & =.174 \\ & =. .037 \end{aligned}$ |  | $\begin{aligned} & -0.678 \\ & -\mathrm{I.} 424 \\ & -.616 \\ & -.584 \\ & -.469 \\ & -.435 \\ & -.398 \\ & -.381 \\ & -.358 \\ & -.360 \\ & -.356 \\ & -.361 \\ & -.337 \\ & -.208 \\ & -.128 \\ & -.044 \end{aligned}$ | $\begin{array}{r} 0.085 \\ .165 \\ .124 \\ .085 \\ .050 \\ .069 \\ . .007 \\ -.023 \\ -.040 \\ -.063 \\ -.068 \\ -.056 \\ -.029 \\ .010 \end{array}$ | $\begin{array}{r} 0.381 \\ .242 \\ .200 \\ .148 \\ .118 \\ .085 \\ .061 \\ .040 \\ .022 \\ .001 \\ -.025 \\ -.022 \\ -.017 \\ -.001 \\ .027 \end{array}$ | 0.458 | $\begin{array}{r} -.507 \\ 0.388 \\ .349 \\ .389 \\ .049 \\ .204 \\ .788 \\ .147 \\ .098 \\ .062 \\ .0066 \\ .053 \\ .067 \\ .070 \end{array}$ |
| $0.195 \mathrm{~b} / 2$ | 0 1.5 5.5 6.5 31.0 14.5 21.0 24.5 31.0 34.5 41.0 44.5 51.0 59.5 71.0 79.5 | $\begin{aligned} & 0.122 \\ & -.573 \\ & -.535 \\ & -.387 \\ & -.270 \\ & -.275 \\ & -.249 \\ & -.242 \\ & -.242 \\ & -.253 \\ & -.253 \\ & -.232 \\ & -.189 \\ & -.140 \\ & -.076 \\ & -.001 \end{aligned}$ |  | $\begin{aligned} & -0.939 \\ & -1.412 \\ & -.675 \\ & -.634 \\ & -.504 \\ & -.451 \\ & -.402 \\ & -.379 \\ & -.355 \\ & -.359 \\ & -.342 \\ & -.332 \\ & -.257 \\ & -.239 \\ & -.172 \\ & -.095 \\ & -.006 \end{aligned}$ | $\begin{aligned} & -I .741 \\ & -I .914 \\ & -.854 \\ & -.789 \\ & -.601 \\ & -.542 \\ & -.473 \\ & -.447 \\ & =.411 \\ & -.407 \\ & -.361 \\ & -.369 \\ & -.326 \\ & -.262 \\ & -.186 \\ & -.103 \\ & -.008 \end{aligned}$ | $\begin{array}{r} . .380 \\ .166 \\ .197 \\ .046 \\ .013 \\ -.007 \\ . .032 \\ -.0468 \\ -.069 \\ -.062 \\ -.070 \\ -.048 \\ -.012 \end{array}$ | $\begin{array}{r} -.4 \overline{4} 1 \\ .255 \\ .214 \\ .152 \\ .115 \\ .073 \\ .056 \\ .021 \\ . .007 \\ -.018 \\ -.038 \\ -.034 \\ -.018 \\ .010 \\ .041 \end{array}$ | 0.437 .344 .299 .289 .139 .118 .079 .059 .037 .007 .007 .015 .036 .059 | $\begin{aligned} & 0.3 \overline{5} \\ & .489 \\ & .367 \\ & .254 \\ & .200 \\ & .176 \\ & .154 \\ & .086 \\ & .075 \\ & .052 \\ & .045 \\ & .0460 \\ & .074 \end{aligned}$ |
| $0.312 \mathrm{~b} / 2$ | $\begin{aligned} & \hline 0 \\ & 3.5 \\ & 5.5 \\ & 6.5 \\ & 11.0 \\ & 24.5 \\ & 21.0 \\ & 24.5 \\ & 31: 0 \\ & 34.5 \\ & 41.0 \\ & 44.5 \\ & 51.0 \\ & 59.5 \\ & 71.0 \\ & 79.5 \\ & 91.0 \end{aligned}$ |  | $\begin{array}{r} -0.693 \\ -1.210 \\ -.630 \\ -.594 \\ -.466 \\ -.426 \\ -.377 \\ -.350 \\ -.339 \\ -.511 \\ -.307 \\ -.297 \\ -.262 \\ =.215 \\ -.136 \\ -.073 \\ .008 \end{array}$ | -1.625 -1.759 -.854 -.7922 -.602 -.545 -.466 -.434 -.402 $=.361$ -.338 -.338 -.226 -.152 -.079 .010 | -2.797 -2.420 <br> $-1.087$ <br> -.997 -.744 -.661 <br> -. 559 <br> =. 5.424 <br> -.434 -.409 <br> $-.377$ <br> -.359 -.164 <br> -. 084 .011 .011 |  | 0.390 .245 .219 .152 .077 .056 .020 .007 -.005 $=.018$ -.035 -.015 -.010 .020 .052 | -.439 .330 <br> $\begin{array}{r}304 \\ .235 \\ \hline\end{array}$ <br> .198 <br> .122 <br> .085 <br> .032 .011 .010 .020 .043 .065 |  |
| $0.555 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 5.5 \\ 61.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 99.5 \end{gathered}$ | $\begin{aligned} & -0.081 \\ & -.837 \\ & -.481 \\ & -.471 \\ & -.373 \\ & =.345 \\ & -.310 \\ & =.291 \\ & =-274 \\ & =.270 \\ & -.254 \\ & =.244 \\ & =.174 \\ & -.715 \\ & -.056 \\ & .013 \end{aligned}$ |  | -1.942 -2.034 $=.958$ -.901 $=.673$ -.602 -.504 $=.464$ -.415 -.394 -.374 -.396 -.296 $=.245$ -.072 -.016 | $\begin{aligned} & -3.363 \\ & -2.760 \\ & -1.219 \\ & -1.129 \\ & -.826 \\ & -.734 \\ & -.597 \\ & -.542 \\ & -.480 \\ & -.454 \\ & -.417 \\ & -.385 \\ & -.329 \\ & -.245 \\ & -.156 \\ & -.076 \\ & .017 \end{aligned}$ | $\begin{array}{r} 0.325 \\ .173 \\ .055 \\ .059 \\ .013 \\ 0 \\ -.029 \\ =.042 \\ -.054 \\ -.059 \\ =.069 \\ =.066 \\ -.031 \\ .065 \\ .045 \end{array}$ | $\begin{array}{r} 0.416 \\ .278 \\ .252 \\ .175 \\ .142 \\ .084 \\ .068 \\ .012 \\ -.004 \\ -.013 \\ -.028 \\ -.033 \\ -.008 \\ .017 \\ .050 \end{array}$ | $\begin{array}{r} 0.442 \\ .356 \\ .335 \\ .258 \\ .275 \\ .154 \\ .093 \\ .074 \\ .049 \\ .038 \\ .019 \\ .005 \\ .021 \\ .040 \\ .065 \end{array}$ | $\begin{array}{r} 0.401 \\ .412 \\ .394 \\ .355 \\ .285 \\ .1196 \\ .149 \\ .127 \\ .0973 \\ .0599 \\ .039 \\ .0457 \\ .052 \end{array}$ |

TABLE XXII. - CONFINUED.
(b) $a_{u}, 4^{\circ}, 6^{\circ}, 8^{\circ}, 10^{\circ}$ - Concluded.

| gemia epan sta. | Percent chord | UPPER SURFACE |  |  |  | LOWER BURFACE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ | $4^{\circ}$ | $6^{\circ}$ | $8^{\circ}$ | $10^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.266 \\ -.903 \\ -.524 \\ -.500 \\ -.362 \\ -.361 \\ -.327 \\ -.310 \\ -.289 \\ -.274 \\ -.272 \\ -.252 \\ -.219 \\ -.177 \\ =.104 \\ -.046 \\ .027 \end{array}$ | $\begin{array}{r} -1.176 \\ -1.503 \\ -.766 \\ -.725 \\ -.528 \\ -.485 \\ -.417 \\ =.390 \\ -.358 \\ -.345 \\ =.326 \\ -.300 \\ -.258 \\ =.204 \\ =.122 \\ -.057 \\ . .022 \end{array}$ | $\begin{array}{r} -2.532 \\ -2.228 \\ -1.048 \\ -.979 \\ -.692 \\ -.624 \\ -.525 \\ -.487 \\ -.428 \\ -.411 \\ -.378 \\ -.342 \\ -.290 \\ -.224 \\ -.132 \\ -.061 \\ .024 \end{array}$ | $\begin{array}{r} -4.270 \\ -3.041 \\ -1.335 \\ -1.243 \\ -.854 \\ -.768 \\ -.620 \\ -.577 \\ -.492 \\ -.469 \\ -.430 \\ =.366 \\ -.324 \\ -.247 \\ -.142 \\ -.068 \\ .023 \end{array}$ | 0.366 <br> .191 <br> .087 <br> .065 <br> .017 <br> .. 026 <br> -. 035 <br> $-.075$ <br> $-.061$ <br> $-.066$ <br> $-.029$ <br> .047 | 0.424 <br> .293 <br> .178 <br> .148 .089 <br> .032 <br> .019 -.008 <br> $=.016$ <br> $-.033$ <br> -.040 -.012 .012 .050 | $\begin{array}{r} .0-7 \\ 0.393 \\ .374 \\ .362 \\ .228 \\ .162 \\ .139 \\ .094 \\ .078 \\ .034 \\ .010 \\ .004 \\ .014 \\ .028 \\ .061 \end{array}$ | 0.268 <br> .421 <br> .403 <br> . 325 <br> . 292 <br> .222 <br> .148 <br> .129 <br> .089 <br> .047 <br> .026 .033 <br> .042 <br> .064 |
| $0.831 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 11.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 37.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.046 \\ =.892 \\ -.524 \\ -.500 \\ =.384 \\ =.367 \\ =.319 \\ =.306 \\ =.272 \\ =.265 \\ =.253 \\ =.229 \\ =.204 \\ =.146 \\ =.087 \\ -.030 \\ .035 \end{array}$ | $\begin{array}{r} -0.887 \\ -1.481 \\ =.764 \\ -.723 \\ -.524 \\ -.496 \\ =-2 \\ =- \\ =- \\ -.270 \\ -.237 \\ =.171 \\ -.103 \\ -.044 \end{array}$ | $\begin{array}{r} -2.147 \\ -2.170 \\ -1.035 \\ -.967 \\ -.688 \\ -.638 \\ =.508 \\ =.468 \\ =.406 \\ -.379 \\ -.351 \\ -.306 \\ =.265 \\ =.190 \\ -.116 \\ -.054 \\ .021 \end{array}$ | $\begin{array}{r} -3.797 \\ -2.929 \\ -1.320 \\ -1.219 \\ -.851 \\ -.764 \\ =.606 \\ =.558 \\ =.471 \\ =.434 \\ =.394 \\ =.348 \\ =.297 \\ =.216 \\ =.133 \\ -.071 \\ .009 \end{array}$ | 0.359 .173 <br> .161 <br> .082 <br> .009 <br> $-.005$ <br> -.037 -.046 <br> $-.066$ <br> $-.074$ <br> -.075 -.073 <br> $-.034$ <br> .047 | 0.417 <br> .282 .261 .170 <br> .170 <br> .075 .057 <br> .015 <br> $-.002$ <br> -.032 -.040 <br> $-.048$ <br> -.053 -.025 <br> .025 .001 <br> .043 | $\begin{array}{r} 0.384 \\ .354 \\ .344 \\ .250 \\ . .143 \\ .119 \\ .070 \\ .048 \\ .017 \\ .073 \\ . .029 \\ -.008 \\ .011 \\ .045 \end{array}$ | $.0-$ 0.258 .402 .394 .311 .199 .273 .117 .091 .055 .035 .016 . .010 .002 .015 .042 |
| $0.924 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 5.5 \\ 6.5 \\ 21.0 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{array}{r} -0.467 \\ -.930 \\ -.550 \\ -.488 \\ -.367 \\ -.333 \\ -.269 \\ =.259 \\ -.232 \\ =.217 \\ -.213 \\ -.190 \\ -.168 \\ -.114 \\ -.061 \\ -.017 \end{array}$ | $==-$ $=-=$ $=-=$ $=-=$ $=-=$ $=-2$ $=.230$ $=.202$ $=.147$ $=.089$ -.053 $=.006$ | $\begin{array}{r} -2.984 \\ -2.326 \\ -1.005 \\ -.926 \\ -.643 \\ -.560 \\ =.449 \\ -.396 \\ =.353 \\ -.325 \\ -.300 \\ -.272 \\ -.239 \\ -.185 \\ =.123 \\ =.106 \\ -.048 \end{array}$ | $\begin{array}{r} -4.868 \\ -3.190 \\ -1.275 \\ -1.166 \\ -.789 \\ -.678 \\ -.531 \\ =.471 \\ =.411 \\ -.379 \\ -.358 \\ =.326 \\ -.285 \\ =.241 \\ -.175 \\ =.165 \\ -.702 \end{array}$ |  | 0.400 <br> .258 .243 <br> .243 <br> .091 .026 <br> $-.004$ <br> -. 030 <br> $-.052$ <br> -.065 -.075 <br> -, 081 <br> -. 070 <br> -.040 -.021 <br> .023 | 0.380 <br> . 334 <br> - 318 <br> .213 <br> .071 <br> .037 .066 <br> $-.023$ <br> $-.041$ <br> -. 058 <br> $-.063$ <br> -. 064 <br> $-.038$ <br> -.028 .013 | 0.273 $\begin{array}{r} .378 \\ .362 \\ . .267 \\ . .118 \\ . .070 \\ .033 \\ -.003 \\ -.023 \\ -.045 \\ -.052 \\ -.064 \\ -.041 \\ -.039 \\ -.003 \end{array}$ |

TABLE XXII. - CONTANUED.
(c) $\alpha_{u}, 12^{\circ}, 24^{\circ}, 16^{\circ}, 20^{\circ}$.

| Seaista. | Percent chord | UPPER SURPACE |  |  |  | LCwar surface |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle or attack |  |  |  | ingle of attact |  |  |  |
|  |  | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $12^{\text {o }}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ |
| $0.086 \mathrm{~b} / 2$ |  |  | $-1.867$ -. g 827 -.635 -.511 -. 5096 $-.447$ -.429 -.424 $=: 315$ $=-15$ $=-154$ -. 646 |  |  |  | -500 <br> 0.500 <br> .469 <br> .406 <br> .475 <br> .377 <br> .359 <br> .253 <br> .230 <br> 157 <br> .152 <br> .137 <br> .125 <br> .122 <br> .115 |  |  |
| 0.195 b/2 | [ ${ }^{0}$ |  |  |  |  |  | -001 0.496 .472 .419 .776 .717 .291 .220 .188 .175 .144 .127 .115 .115 .15 |  |  |
| $0.312 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |
| $0.555 \mathrm{~b} / 2$ |  |  |  |  |  |  |  |  |  |

TABLE XXII. - CONOLUDED.
(o) $\alpha_{u}, 12^{\circ}, 14^{\circ}, 16^{\circ}, 20^{\circ}-$ Concluded.

| Semispan sta. | Percent chora | UPPER SURPACE |  |  |  | LONER SURPAOE |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Angle of attack |  |  |  | Angle of attack |  |  |  |
|  |  | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ | $12^{\circ}$ | $14^{\circ}$ | $16^{\circ}$ | $20^{\circ}$ |
| $0.707 \mathrm{~b} / 2$ | $\begin{array}{r} 0 \\ 1.5 \\ 56.5 \\ 6.5 \\ 11.6 \\ 14.5 \\ 21.0 \\ 24.5 \\ 31.0 \\ 34.5 \\ 41.0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{array}$ | $\begin{aligned} & -6.400 \\ & -3.911 \\ & -1.631 \\ & -1.515 \\ & -1.027 \\ & -.901 \\ & -.718 \\ & -.656 \\ & -.557 \\ & -.523 \\ & -.465 \\ & -.424 \\ & -.352 \\ & -.263 \\ & =.150 \\ & -.071 \\ & .022 \end{aligned}$ | $\begin{array}{r} -8.897 \\ -4.816 \\ -1.973 \\ -1.815 \\ -1.210 \\ -1.056 \\ -.820 \\ -.747 \\ -.628 \\ -.579 \\ -.503 \\ -.458 \\ -.374 \\ -.274 \\ -.152 \\ -.073 \\ .014 \end{array}$ | $\begin{array}{r} -10.748 \\ -4.520 \\ -3.558 \\ -3.377 \\ -1.654 \\ -1.530 \\ -.969 \\ -.769 \\ -.730 \\ -.686 \\ -.606 \\ -.544 \\ -.438 \\ -.366 \\ -.162 \\ -.074 \\ -.005 \end{array}$ | $\begin{array}{r} -2.710 \\ -.971 \\ -.971 \\ -.936 \\ -.935 \\ -.900 \\ -.896 \\ -.865 \\ -.878 \\ -.847 \\ -.878 \\ -.842 \\ -.798 \\ -.755 \\ -.695 \\ -.632 \end{array}$ | 0.068 .442 .438 .380 .378 .278 .198 .178 .133 .117 .085 .055 .055 .058 | $\begin{array}{r} -0.208 \\ .436 \\ .447 \\ .419 \\ .392 \\ .327 \\ .301 \\ .246 \\ .175 \\ .157 \\ .123 \\ .087 \\ .075 \\ .067 \\ .068 \end{array}$ |  | $\begin{array}{r} 0.080 \\ .489 \\ .4975 \\ .449 \\ .388 \\ .355 \\ .300 \\ .270 \\ .183 \\ .134 \\ .067 \\ .010 \\ -.153 \\ -.188 \end{array}$ |
| $0.831 \mathrm{~b} / 2$ | 0 11.5 56.5 71.0 14.0 14.5 21.0 24.5 31.0 44.5 41.0 44.5 51.0 59.5 71.0 79.5 91.0 | $-5.764$ <br> -3.750 -1.618 <br> $-1.489$ <br> $-.913$ <br> -.634 -.523 <br> -.486 -.430 <br> $-.385$ <br> -: 3240 <br> .- .149 -.086 <br> $-.004$ | $\begin{aligned} & -8.097 \\ & -4.558 \\ & -1.938 \\ & -1.798 \\ & -1.197 \\ & -1.063 \\ & -.788 \\ & -.717 \\ & -.581 \\ & -.540 \\ & -.468 \\ & -.418 \\ & -.349 \\ & -.261 \\ & -.162 \\ & -.103 \\ & -.026 \end{aligned}$ | $\begin{array}{r} -4.705 \\ -1.929 \\ -1.851 \\ -1.714 \\ -1.747 \\ -1.630 \\ -1.666 \\ -1.568 \\ -1.494 \\ -1.409 \\ -1.246 \\ -1.172 \\ -.897 \\ -.685 \\ -.287 \\ -.214 \\ -.064 \end{array}$ | $\begin{aligned} & -2.217 \\ & -.748 \\ & -.729 \\ & -.715 \\ & -.705 \\ & -.691 \\ & -.678 \\ & -.660 \\ & -.656 \\ & -.641 \\ & -.647 \\ & -.625 \\ & -.682 \\ & -.616 \\ & -.616 \\ & -.576 \\ & -.537 \end{aligned}$ | $\begin{array}{r} 0.058 \\ .448 \\ .425 \\ .361 \\ .250 \\ .226 \\ .1644 \\ .133 \\ .090 \\ .046 \\ .012 \\ .015 \\ .038 \end{array}$ |  |  | 0.156 .464 .460 .429 .327 .294 .231 .744 .708 .065 -.005 -.058 -.1997 -.188 |
| $0.924 \mathrm{~b} / 2$ | $\begin{gathered} 0 \\ 1.5 \\ 56 \\ 6.5 \\ 11: \% \\ 14: 5 \\ 21: 0 \\ 24.5 \\ 31.0 \\ 44.5 \\ 41: 0 \\ 44.5 \\ 51.0 \\ 59.5 \\ 71.0 \\ 79.5 \\ 91.0 \end{gathered}$ | $\begin{aligned} & -7.164 \\ & -4.128 \\ & -1.549 \\ & -1.418 \\ & -.939 \\ & -.800 \\ & -.615 \\ & -.542 \\ & -.465 \\ & -.443 \\ & =.409 \\ & -.355 \\ & -.337 \\ & -.303 \\ & -.242 \\ & -.165 \end{aligned}$ | $\begin{aligned} & -9.809 \\ & -5.064 \\ & -1.845 \\ & -1.679 \\ & -1.110 \\ & -.935 \\ & -.708 \\ & -.630 \\ & -.535 \\ & -.507 \\ & -.464 \\ & -.447 \\ & -.387 \\ & -.368 \\ & -.297 \\ & -.360 \\ & -.241 \end{aligned}$ | -3.799 -1.289 -1.230 -1.176 -1.168 -1.088 -1.084 -1.005 -1.044 -1.967 -1.052 -1.992 -1.007 -1.900 -.809 -.617 | $\begin{aligned} & -1.715 \\ & -.588 \\ & -.58 \\ & -.568 \\ & -.568 \\ & -.535 \\ & -.533 \\ & -.515 \\ & -.523 \\ & -.491 \\ & =.497 \\ & -.464 \\ & -.480 \\ & -.451 \\ & -.469 \\ & -.435 \\ & -.453 \end{aligned}$ |  | $\begin{array}{r} -0.144 \\ .390 \\ .379 \\ .339 \\ .272 \\ .188 \\ .1284 \\ .031 \\ .013 \\ -.022 \\ -.026 \\ -.058 \\ -.041 \\ -.051 \\ -.034 \end{array}$ | $\begin{array}{r} 0.095 \\ .427 \\ .410 \\ .367 \\ .304 \\ .169 \\ .130 \\ .082 \\ .060 \\ .029 \\ .020 \\ -.014 \\ -.011 \\ \hline . .035 \end{array}$ | -.708 0.208 .3138 .354 .396 .223 .168 .123 .076 .043 . .016 -.059 -.085 -.113 -.167 |

HACAR

| Aspect ratio | 3.0 |
| :--- | :--- |
| Taper ratio | 0.5 |
| Area, semispan | $10.083 \mathrm{ft}^{2}$ |
| $\bar{c}$ | 2.688 ff |
| - |  |



TEDTCY KE YDYZ
figure 1.- Plan form of the wing.


Figure 2.- The model mounted in the Ames $12-$ Ifoot pressure wind tunnel. $^{\text {then }}$


Figure 3.-The location of the wall orificies in the Ames 12 -foot pressure wind-funnel test section.


Figure 4.-Crass sections of several seals at the base of the model.

$$
\begin{aligned}
& A=5 \quad \text { Aser } 185^{-\infty} \\
& A=3
\end{aligned}
$$


Figure 5.-The effect of Reynolds number on the low-speed aerodynamic characteristics. Mo, 0.25.

$$
c_{c_{\alpha}}=2.86 .5
$$



Figure 5.-Continued.



Figure 6. -The chorcwise distribution of pressure coefficiont of seven somispon stotions for severad angles of attock and Ryynolds numbers of 4,000,000, 8,000,000, and 18,000,000. 1., 0.25.


Figure 6.-Continued.



Figure 7.-The effect of Reynolds number on the section normal-force coefficients of seven semispan stations. $M_{0}, 0.25$.


Figure 8.-The variation of the section centers of pressure and the pitching-moment coefficient with angle of atfack for Reynolds numbers of $4,000,000,8,000,000$, and $18,000,000 . \mathrm{M}_{0}, 0.25$.


Figure 9.-The aerodynamic characteristics of Reynolds numbers of $4,000,000$ and $8,000,000$. Ah, 0.60 .


Figure 10. The chordwise distribution of pressure coefficient at seven semispan stations for several angles of atfack and Reynolds numbers of 4,000,000 and 8,000,000. $k_{6}, 0.60$.


Sta. $0.924 \frac{6}{2}$


Figure 11.-The effect of Reynolds number on the section normal-force coefficients at seven semispan stations. $M_{0}, 0.60$.


Flgure 12.-The variation of the section centers of pressure and the pitching-moment coefficient with angle of attack for Reynolds numbers of 4,000,000 and 8,000,000. $\mathrm{M}_{0}, 0.60$.


Figure 13.-The development of supersonic flow on the upper surface of the model and on the tunnel wall with increasing angle of attack. $M_{0}, 0.92 ; R, 4,000,000$.

(a) $C_{z}$ vs a

Figure 14.-The effect of Mach number on the oerodynamic characteristics.

(b) $C_{L} \vee s C_{m}$

Figure 14:-Continued.

(c) $C_{\mathrm{Z}}$ vs $C_{D}$

Figure 14:-Concluded.



Figure 15. -The variation of the lift and pitching-moment coefficients with Mach number. R, 4,000,000.


Figure 16.-The variation of the drag coefficient with Mach number. $R, 4,000,000$.


Figure 17.-The variation of the lift-curve slope with Mach number. R, 4,000,000.


Figure 18.-The variation of the location of the aerodynamic center with Mach number. R,4,000,000.


Figure 19.-The variation of the maximum lift-to-drag ratio and the lift coefficient for the maximum lift-to-drag ratio with Mach number. R, 4,000,000.


Figure 20.-The chorctwise distribution of pressure coofficient at seven semispan stotions for several Mach numbers. $R, 4,000,000$.




Figure 21.-The lines of constant pressure coefficient on the upper and lower surfaces for several Mach numbers. $a_{u}, 2^{\circ} ; R, 4,000,000$.

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Figure 22.-The spanwise distribution of section normal-force coefficient at several Mach numbers for three angles of attack. R, 4,000,000.


Figure 23.-The spanwise distributlon of loading coefficient at several Mach numbers. R, 4,000,000.


Figure 24.-The variation of the section centers of pressure with Mach number for three anglas of attack. $R, 4,000,000$.

(a) $C_{L}$ vsa

Figure 25.- The effect of various seals at the base of the model on the aerodynamic characteristics at Mach numbers of 0.25 and 0.80 . R, 4,000,000.

(b) $C_{L}$ vs $C_{m}$

Figure 25.-Continued.

(c) $C_{L}$ vs $C_{D}$

Figure 25.-Concluded.


Figure 26. - The chordwise distribution of pressure coefficient at 0.086 b/2 for the model-turntable juncture seals $A$ and $B$. $a_{u}, 16^{\circ}$; R, 4,000,000.


