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**Scientific and Technical
Information Branch**

SUMMARY

An experimental and theoretical investigation of fuselage incidence effects on two fighter aircraft models, which differed in wing planform shape only, has been conducted in the Langley Unitary Plan Wind Tunnel at Mach numbers of 1.6, 1.8, and 2.0. Experimental and theoretical results were obtained on the two models at fuselage incidence angles of 0°, 2°, and 5°. The fuselage geometry included two side-mounted, flow-through, half-axisymmetric inlets and twin vertical tails. The two planforms tested were cranked wings with 70°/66° and 70°/30° leading-edge sweep angles. The purpose of the study was to evaluate the impact of fuselage upwash on wing and configuration aerodynamic characteristics and to determine the ability of two linear-theory aerodynamic methods to predict these effects. Experimental data showed that fuselage incidence resulted in positive increments in configuration lift and pitching moment; most of the lift increment can be attributed to the fuselage-induced upwash acting on the wing and most of the pitching-moment increment is due to the fuselage. Theoretical analysis indicates that linear-theory methods can adequately predict the overall configuration forces and moments resulting from fuselage upwash, but a higher order surface-panel method (PAN AIR) more accurately predicted the distribution of forces and resulting moments between the components.

INTRODUCTION

Modern fighter aircraft have been designed for efficient transonic cruise and maneuvering, with little or no emphasis on sustained supersonic cruise capability. However, over the past several years, there has been considerable interest in a fighter aircraft with supersonic cruise and maneuver capability. This type of aircraft would have improved survivability in the increasingly hostile air combat environment of the future. As a result, military aircraft designers are placing more emphasis on sustained supersonic performance while retaining efficient transonic cruise and maneuvering capability. The aerodynamic requirements within this expanded flight envelope are stringent, and combining these aerodynamic capabilities into an efficient airframe poses a challenging aerodynamic design problem.

Previous supersonic wing-alone designs (refs. 1 and 2) have been proven satisfactory for supersonic-transport configurations, for which the interference effects of the fuselage on the wing are small and can be ignored. However, for fighter aircraft, the effects of the fuselage on the wing can be large and should be accounted for in the design of the wing camber. In an attempt to extend the wing-alone design approach to fighter aircraft, a fuselage camber requirement was defined which preserved the optimized wing-alone design characteristics (ref. 3). Application of the wing-alone design approach in conjunction with the fuselage camber requirement (refs. 4 and 5) verified that efficient supersonic cruise performance could be obtained for fighter configurations; however, the resulting extreme fuselage camber was unrealistic for a fighter aircraft.

After the wing-alone design studies, wing design and optimization procedures (ref. 6) were upgraded to include the effects of fuselage buoyancy and upwash (ref. 7). In a more recent study (ref. 8), this new capability was applied to the design of a wing in the presence of a fighter fuselage; however, this wing-design study incorporated only fuselage buoyancy terms and not effects of fuselage upwash.

Attempts to include upwash effects in this latter wing-design study were unsuccessful because of the inability of the slender-body theory to accurately predict the fuselage-induced upwash effects.

The concept of inclining a fuselage at a positive angle of attack with respect to a lifting surface, in order to generate a positive interference effect (fuselage upwash), is not new. Positive interference results from the lifting surface, at zero angle of attack, acting as if it were at an effective positive angle of attack because of fuselage-induced upwash. This upwash results in a lifting-surface normal force that is perpendicular to the free-stream direction. Theoretically, this normal force produces wing lift with no wing drag due to lift. Previous experimental work in this area has shown that fuselage incidence reduces drag due to lift and provides positive increments in pitching moment and lift (refs. 9 and 10). However, these data were obtained for missile configurations, in which the lifting surfaces are small compared with the body. The present experimental and theoretical investigation is an initial examination of the effects of fuselage incidence (fuselage-induced upwash) on wing and configuration performance for fighter aircraft. The supersonic wind-tunnel model geometry for this investigation consisted of a single fighter fuselage with two side-mounted, flow-through inlets, twin vertical tails, and two interchangeable uncambered wing planforms. The two planforms were cranked wings with leading-edge sweep of 70°/30° and 70°/66°.

The purpose of the present study was to evaluate the effect of fuselage upwash on wing performance and to evaluate the ability of two linear-theory methods to predict those effects. The models were tested at Mach numbers of 1.6, 1.8, and 2.0 in the Langley Unitary Plan Wind Tunnel. The paper reports the results of the experimental testing and theoretical analysis.

SYMBOLS

b wing span, in.

c wing chord, in.

$\bar{c}$ wing mean aerodynamic chord, in.

C_A corrected axial-force coefficient, $C_{A,unc} - C_{A,b} - C_{A,c} - C_{A,i}$, $\frac{\text{Axial force}}{qS}$

C_D corrected drag coefficient, $C_{D,unc} - C_{D,b} - C_{D,c} - C_{D,i}$, $\frac{\text{Drag}}{qS}$

$C_{D,min}$ minimum drag coefficient

ΔC_D change in drag coefficient, $(C_D - C_{D,min})$

C_l rolling-moment coefficient, $\frac{\text{Rolling moment}}{qSb}$

C_L lift coefficient, $\frac{\text{Lift}}{qS}$

C_m pitching-moment coefficient, $\frac{\text{Pitching moment}}{\bar{c}qS}$

$C_{m,o}$ pitching-moment coefficient at zero lift

C_n yawing-moment coefficient, $\frac{\text{Yawing moment}}{qSb}$

C_N normal-force coefficient, $\frac{\text{Normal force}}{qS}$

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

C_Y side-force coefficient, $\frac{\text{Side force}}{qS}$

L/D lift-drag ratio, $\frac{\text{Lift}}{\text{Drag}}$

M Mach number

p static pressure, lb/ft^2

q dynamic pressure, lb/ft^2

R Reynolds number, per foot

S wing reference area, in^2

x longitudinal distance from model nose, in.

y spanwise distance from model centerline, in.

z vertical distance from wing mean chord plane, in.

α angle of attack, deg

β $\sqrt{M^2 - 1}$; also angle of sideslip, deg

δ fuselage incidence angle, positive for fuselage nose up, deg

Λ sweep angle, deg

Subscripts:

b base

c chamber

des design

fus fuselage

i internal

ℓe leading edge

max maximum

te trailing edge

unc uncorrected

∞ free-stream conditions

MODEL DESCRIPTION

The two configurations tested were 4-percent-scale representations of a fighter aircraft. The models consisted of a single fighter fuselage with side-mounted, flow-through, half-axisymmetric inlets; twin vertical tails; and two uncambered wings which varied in planform shape only. The two planforms tested were a 70°/30° cranked wing and a 70°/66° cranked wing. Selection of the two planforms was based on an aircraft sizing procedure discussed in reference 11; the initial supersonic testing of these models was reported in reference 12.

Photographs of the two fighter configuration models installed in test section 1 of the Langley Unitary Plan Wind Tunnel are shown in figures 1 and 2, and three-view sketches of the two models are shown in figures 3 and 4. Details of the model vertical tails are shown in figure 5 and details of the two planforms are shown in figures 6 and 7. The geometric characteristics of the two models are given in table I, and contained in tables II and III are numerical descriptions of the models in the format described in reference 13.

The incidence of the fuselage relative to the wing was achieved by inserting a wedge between the fuselage wing attachment pad and wing attachment tab. Shown in figure 8 is the point of fuselage rotation and the definition of the fuselage incidence angle (δ). The center fuselage section and details of the fuselage wing attachment pad are shown in figure 9. Details of the wedge inserts are shown in figure 10. In addition to producing fuselage incidence, the wedge inserts also rotated the wing forward; wedges which produced values of δ of 2° and 5° reduced the wing leading-edge sweep by 1.16° and 2.89°, respectively. Shown in figure 11 are photographs of the 70°/66° cranked wing configuration with 5° of fuselage incidence. These photographs depict the significant amount of body filler required to smooth the fuselage external contours in order to minimize the flow disturbance from the fuselage upper surface.

TEST DESCRIPTION

The wind-tunnel test program was conducted in test section 1 of the Langley Unitary Plan Wind Tunnel (ref. 14) at Mach numbers of 1.6, 1.8, and 2.0. The tests were conducted under the following conditions:

Mach number	Stagnation pressure, lb/ft^2	Stagnation temperature, °F	Reynolds number, per foot
1.6	1079	125	2×10^6
1.8	1154	125	2
2.0	1253	125	2

The dew point was maintained sufficiently low to prevent condensation in the tunnel. Boundary-layer transition-inducing strips of No. 60 sand grit were applied at appropriate distances aft of the leading edge of all airfoil surfaces, the fuselage nose, inlet compression spikes, and inlet lip leading edges. The grit size and location were selected according to the method of reference 15 to ensure fully turbulent flow over the model and inside the inlet duct. Wind-tunnel data were obtained during two separate tunnel entries. During the first entry, inlet internal-flow data and base drag data were obtained for the isolated fuselage. External-flow force and moment data were collected during the second tunnel entry with the internal-flow measuring apparatus removed.

Internal-flow data were measured for the isolated fuselage with a duct-exit pressure-survey rake assembly which mounted on the wind-tunnel model. Base drag data were obtained with six pressure tubes that were an integral part of the duct-exit choke ring. Pressure tubing from both the survey rake and the choke ring was attached to an external scanning valve pressure-measuring system. Geometric details of the inlet and duct systems, a discussion of the internal-flow test, and a presentation of results are contained in reference 12.

The external-flow force and moment data were obtained at angles of attack from -4° to 20°. The data were measured by means of a six-component electrical strain-gage balance contained within the model and connected through a supporting sting to the permanent model-actuating system in the wind tunnel.

Balance chamber pressure was measured throughout the test with a pressure transducer mounted externally on the model and connected by pressure tubing to a pressure probe located in the balance cavity. Force and moment data were corrected to free-stream static pressure at the model base and balance chamber and were corrected for internal duct drag. All angles of attack were adjusted for tunnel flow misalignment and sting and balance deflections. The angle of attack was set relative to the fuselage axis, and the data were reduced relative to the wing reference plane.

A tabulation of the force data is contained in the appendix.

DISCUSSION

An experimental and theoretical investigation of the fuselage upwash induced by rotating the fuselage to a positive incidence relative to the wing mean chord plane has been conducted. Testing was performed on two fighter configurations which differed in wing planform only. The reduction in leading-edge sweep, resulting from inclining the fuselage, could have improved the drag-due-to-lift characteristics. However, only small increases in lift-curve slope would be expected within the range of $\beta \cot \Lambda$ tested (ref. 16). Figure 9 of reference 16 indicates that for a constant Mach number, significant increases in lift-curve slope occur for values of $\beta \cot \Lambda$ between 0 and 0.4; however, for values of $\beta \cot \Lambda$ greater than 0.4, only small changes in lift-curve slope occur. The approach used to produce fuselage incidence also resulted in a significant amount of fuselage upper surface distortion, which did significantly impact the experimentally measured zero-lift drag for each configuration. The significant distortions imposed on the model geometry by rotating the fuselage should have a negligible effect on the experimentally measured drag due to lift.

Drag data are presented as an incremental change from the minimum drag value. This was done to factor out the varying zero-lift drag penalty imposed on the different configurations because of fuselage upper-surface geometry distortion. In addition, no attempt was made to correct the data for changes in leading-edge sweep that resulted from incorporating fuselage incidence; however, on the basis of the experimental data of references 9, 10, and 11, we believe that the observed effects and trends reflect those that would be expected for a clean fuselage incidence study.

Experimental Results

Test results for the two configurations are presented for fuselage incidence angles of 0°, 2°, and 5°, with a special emphasis on the 70°/66° cranked wing configuration.

The drag and pitching-moment characteristics at the three test Mach numbers are presented in figure 12 for the two configurations at a fuselage incidence of 0°. The pitching-moment characteristics of the 70°/30° cranked wing geometry remain linear out to a lift coefficient of 0.20, but those of the 70°/66° cranked wing geometry exhibit an unstable break at a lift coefficient of 0.10 for $M = 1.6$ and 0.20 for $M = 2.0$. As previously discussed in reference 12, this break in pitching moment for the 70°/66° cranked wing was a result of extensive upper-surface flow separation occurring on the outboard wing panel at an angle of attack of 4°. The incremental drag polars for the three test Mach numbers show that the 70°/30° and 70°/66° cranked wing configurations have essentially the same drag-due-to-lift characteristics out to a lift coefficient of 0.20.

Presented in figure 13 are the effects of fuselage incidence on the drag and pitching-moment characteristics of the 70°/30° cranked wing configuration. Fuselage incidence of 5° increased $C_{m,o}$ by 0.016 and this increment remained constant with Mach number. Despite the significant impact of fuselage incidence on $C_{m,o}$, neither the stability level nor the linearity of the C_m against C_L curves was altered. Also, the drag-due-to-lift characteristics of the 70°/30° cranked wing configuration are not degraded by inclining the fuselage at an incidence of 5°.

Presented in figure 14 are the effects of fuselage incidence on the drag and pitching-moment characteristics of the 70°/66° cranked wing configuration. In addition to 0° and 5° of fuselage incidence tested with the 70°/30° cranked wing, the 70°/66° cranked wing was also tested with 2° of fuselage incidence. Fuselage incidence of 2° increased $C_{m,o}$ by 0.007 and fuselage incidence of 5° increased $C_{m,o}$ by 0.018, which is comparable to the increment seen for the 70°/30° cranked wing configuration. However, unlike the drag data for the 70°/30° cranked wing, fuselage incidence did alter the linearity of the C_m against C_L curve for the 70°/66° cranked wing. Changing fuselage incidence from 0° to 5° extended the linear range of the pitching moment. The effects of fuselage incidence on the drag characteristics for the 70°/66° cranked wing are similar to those observed for the 70°/30° cranked wing.

Presented in figure 15 is a comparison of drag and pitching-moment characteristics for the two configurations with 5° of fuselage incidence. The drag data show that the 70°/66° cranked wing configuration outperformed the 70°/30° cranked wing configuration at low to moderate lift conditions. These results indicate that the 70°/66° cranked wing received more benefit than the 70°/30° cranked wing configuration from the fuselage upwash. The more significant improvement in drag-due-to-lift characteristics for the 70°/66° cranked wing is a result of delaying flow separation on the wing to a higher lift coefficient; this delay in separation results in a more efficient lifting surface. The impact of fuselage incidence on longitudinal aerodynamics of the 70°/66° cranked wing is presented in more detail in figures 16 to 18.

Figures 16, 17, and 18 show the effects of fuselage incidence on the lift, pitching moment, and wing upper-surface flow quality of the 70°/66° cranked wing configuration. The lift and pitching-moment data are plotted against wing angle of attack for both 0° and 5° of fuselage incidence. Fuselage incidence of 5° resulted in an increase in lift coefficient (fig. 16) of approximately 0.075 for any given wing angle of attack. However, the force data also indicate that for both fuselage incidence angles, flow separation occurred at a wing angle of attack of approximately 4°, corresponding to lift coefficients of 0.15 for 0° of fuselage incidence and 0.23 for 5° of fuselage incidence. The onset of flow separation occurring at a wing angle of attack of approximately 4°, regardless of fuselage incidence angle, can also be seen in the pitching-moment data of figure 17. These effects can be further evaluated by investigating the quality of the flow on the wing upper surface. Presented in figure 18 are oil-flow photographs of the 70°/66° cranked wing with 0° and 5° of fuselage incidence. Comparing the photographs in figures 18(a) and 18(b) for 0° of fuselage incidence (upper row) with those for 5° of fuselage incidence (bottom row) reveals that with 5° of fuselage incidence, a wing angle of attack of 2° less was required to obtain the same upper-surface flow characteristics and lift coefficient. This indicates that the fuselage inclined at 5° induced a spanwise upwash distribution comparable to a wing angle of attack of 2° for the 70°/66° cranked wing. Comparing the photographs of figures 18(b) and 18(c) provides details of the flow separation characteristics for the 70°/66° cranked wing. The photographs of figure 18(b) show that with 0° of fuselage incidence the wing had begun to experience flow separation at a wing angle of attack of 4°; however, with 5° of fuselage incidence, the wing was still experiencing good flow quality at the same lift coefficient. The oil-flow photographs of figure 18(c) show that at a wing angle of attack of 6° similar flow separation conditions had occurred for both 0° and 5° of fuselage incidence. The correlations between the force and moment data of figures 16 and 17 and the oil-flow photographs of figure 18 are excellent and indicate that the wing lifting efficiency is improved by inclining the fuselage at positive incidence relative to the wing mean camber line. In addition to providing a lift increment, the fuselage upwash also provided a positive increment in zero-lift pitching moment; however, the percentage of the total configuration lift and pitching-moment increments due to fuselage incidence that can be attributed either to the fuselage or to the fuselage-induced effects needs to be determined.

Presented in figure 19 are the lifting characteristics of the fuselage alone and the 70°/66° cranked wing configuration at fuselage incidence angles of 0°, 2°, and 5°. Concentrating on the 70°/66° cranked wing data at an angle of attack of 0°, we see that 2° of fuselage incidence produced an increment in lift coefficient of approximately 0.03, and 5° of fuselage incidence produced an increment in lift coefficient of approximately 0.075. However, the fuselage-alone data suggest that the fuselage is actually carrying 33 percent of the total configuration lift. In particular, at an angle of attack of 2°, the fuselage alone has a lift coefficient of 0.01, compared with a value of 0.03 for the configuration with 2° of fuselage incidence at an angle of attack of 0°; and by extrapolating the fuselage-alone data to an angle of attack of 5°, the fuselage alone is expected to have a lift coefficient of 0.03, compared with a value of 0.075 for the configuration with 5° of fuselage incidence at an angle of attack of 0°. On the basis of the lift data of figure 19, the flow-visualization data of figure 18, and the previously discussed drag-due-to-lift data, we conclude that fuselage incidence does improve the lifting efficiency of a highly swept wing.

Presented in figure 20 are the fuselage-alone longitudinal characteristics. As previously shown in figure 14 for the 70°/66° cranked wing configuration, 2° of fuselage incidence increased $C_{m,o}$ by 0.007 and 5° of fuselage incidence increased $C_{m,o}$ by 0.018. The fuselage-alone pitching-moment data closely match these levels of pitching moment at fuselage angles of attack of 2° and 5°. The drag characteristics for the fuselage alone reveal that varying fuselage angle of attack between -1° and 2° essentially does not change the absolute drag level. However, at an angle of attack of 5°, the isolated fuselage would be expected to increase the drag coefficient by at least 0.0019, which could neutralize any improvements in wing performance. Analysis of the fuselage-alone data has shown that the total $C_{m,o}$ increment and 33 percent of the lift increment can be attributed to the fuselage. In addition, the data show that significant drag penalties could result with small amounts of fuselage incidence.

Theoretical Analysis

Two linear-theory supersonic aerodynamic prediction techniques were selected for theoretical analysis. The methods chosen were the PAN AIR code (ref. 17) and the lift-analysis method of reference 6 as implemented in the Supersonic Design and Analysis System (SDAS) of reference 7.

The PAN AIR code is an advanced panel method that employs surface distributions of quadratically varying doublets and linearly varying sources for computing the surface flow properties and resultant forces and moments. This code has the capability of analyzing completely arbitrary configurations; however, considerable attention must be paid to the details of the intersection of component boundaries, which results in a complicated geometry modeling process. The theoretical model defined for all PAN AIR analysis, shown in figure 21, consisted of a reasonably accurate representation of the fuselage geometry tested and a zero thickness wing.

The lift-analysis method of reference 7 includes the isolated effects of the wing, fuselage, and induced interference effects of one component on the other; these terms are then combined by superposition. The method can also take into account additional fuselage effects such as cross-section shape, camber, and incidence; these effects are also summed by superposition. Because of the extensive array of fuselage definition parameters which may be used in the analysis with SDAS, a sensitivity study was conducted to determine the best analytical representation of the fuselage geometry. The two representations selected for analysis, shown in figure 22, consisted of an arbitrary fuselage and a zero thickness wing and a mean-chord-plane representation of the fuselage and wing planform. Note that the analytic model depicted in figure 22, and used in the SDAS analysis, differs from that listed in table III.

Presented in figure 23 are the effects of analytical modeling on the prediction capability of the SDAS code. Comparing the theoretical and experimental force and moment values reveals that the arbitrary fuselage representation overpredicts the drag levels and underpredicts the pitching-moment levels associated with the 70°/66° cranked wing configuration. However, the mean-chord-plane analysis agrees well with the experimental force and moment data. On the basis of these results, the mean-chord-plane representation was selected for further SDAS analysis of all geometries.

The force and moment data presented previously showed that positive increments in lift and pitching moment can be obtained without a significant drag penalty for fuselage angles of attack less than 2°, and at these low fuselage angles of attack the linear-theory assumption of the two analysis methods should not be violated. For these two reasons, the following theoretical analysis is restricted to fuselage incidence angles of 2°.

Presented in figure 24 are typical theoretical and experimental force and moment results for the 70°/66° cranked wing with 0° and 2° of fuselage incidence. SDAS lift-analysis results shown in figure 24(a) are in good agreement with the experimentally measured drag and pitching-moment characteristics, but incorrectly predict the stability level and drag increment due to fuselage incidence. PAN AIR results presented in figure 24(b) correctly predict the experimentally measured increments in drag and pitching moment due to fuselage incidence, but incorrectly predict the levels of zero-lift pitching moment and drag due to lift.

Presented in figure 25 is a comparison of predicted lifting characteristics of the two methods for the 70°/66° cranked wing configuration with 2° of fuselage incidence. The lift-curve data show that both methods accurately predict the lift of the complete configuration and PAN AIR more closely predicts the fuselage-alone lift characteristics. However, the underprediction of the fuselage-alone lift by the SDAS lift-analysis method is not observed in the bar chart on the right of figure 25, in which the lift for the configuration with 2° of fuselage incidence at $\alpha = 0°$ has been divided into its fuselage and wing components. The breakdown of the theoretical lift at $\alpha = 0°$ has been extracted from the computational results (only for the configuration with 2° of fuselage incidence) by evaluating the spanwise lift distribution predicted by each method.

The theoretical analysis indicates that both methods are adequate for analysis purposes, but that the PAN AIR code better predicts the individual fuselage and fuselage-induced effects associated with fuselage incidence.

Design Application

Existing supersonic wing-camber design procedures have been proven adequate for wing-alone and supersonic-transport configurations (ref. 1), in which the near-field interference effects of the various components can be neglected when compared with the wing aerodynamics. In contrast, a fighter fuselage could significantly impact wing aerodynamics, and the application of wing-alone methods to fighter aircraft could result in an extensive modification to the fuselage geometry (ref. 3). Because of the limited scope of previous design methods and the increased attention to the supersonic efficiency of fighter aircraft, the wing-alone camber design methodology of reference 6 was modified to include configuration-related loadings and surface-ordinate constraints (ref. 7). The configuration-related loadings account for fuselage upwash, fuselage buoyancy, and nacelle pressure fields. However, attempts to employ the existing design methods to compute wing-incidence effects for fighter configurations have been unsuccessful. The failure of the design method can be attributed to the inability of the lift-analysis method of reference 7 (SDAS) to accurately predict the fuselage-alone aerodynamics and fuselage-induced flow field for fighter configurations.

A new wing-camber design approach, initially alluded to in reference 11, employs the PAN AIR code for computing the fuselage aerodynamic characteristics and the fuselage-induced interference effects on the wing. These PAN AIR predicted effects, shown in figure 26, are incorporated into the SDAS wing optimization procedure as an aerodynamic wing loading. This wing-design approach has been initially applied to the 70°/66° cranked wing configuration with 2° of fuselage incidence. Representative camber surfaces from this new combined approach and from SDAS-only method are shown in figure 27 for comparison. In each case, equivalent sets of loadings and appropriate design constraints were employed for trimmed flight at $M = 1.8$. With the combined PAN AIR/SDAS design approach, a solution was achieved for a design lift coefficient of 0.10; however, the SDAS-only solution failed to converge for a design lift coefficient of 0.10 and, as a result, a value of 0.05 was used to obtain a solution for comparison. Comparing the two solutions, we see that the SDAS-only method produces significantly more twist and less camber than does the combined method. These differences can be attributed to the inability of the SDAS-only method to accurately model the fuselage-induced effects. Presented in figure 28 are the theoretical drag predictions of the two camber designs and the trimmed drag polar for the uncambered 70°/66° cranked wing. The performance of the SDAS-only design never exceeds that of the design from the combined approach or of the flat wing, up to $C_L = 0.30$. However, compared with the flat wing, the combined approach improved performance by 5 percent at $C_L = 0.10$ and by 10 percent at $(L/D)_{max}$.

CONCLUDING REMARKS

An experimental and theoretical investigation of the effects of fuselage incidence on wing and configuration performance has been conducted in the Langley Unitary Plan Wind Tunnel at Mach numbers of 1.6, 1.8, and 2.0. Data were obtained on two cranked wing fighter configurations at fuselage incidence angles of 0°, 2°, and 5°. Experimental results showed that fuselage incidence provided a positive increment in both lift and pitching moment, with most of the lift increment being attributed to the fuselage-induced upwash acting on the wing and most of the pitching-moment increment attributed to the fuselage effects. In addition, the fuselage-alone data indicated that these positive lift and pitching-moment effects can be achieved with minimal drag penalty. Evaluation of the theoretical prediction capability revealed that both the SDAS and the PAN AIR code accurately predicted the overall lift and moment increments due to fuselage incidence; however, the PAN AIR code better predicted the fuselage aerodynamics and the fuselage-induced effects. These effects can have a large impact on the design of a supersonic wing-camber surface. To address the importance of fuselage incidence on wing-camber design, a theoretical study was conducted in which the fuselage-induced effects and fuselage aerodynamics predicted by the PAN AIR code were combined with the wing-camber design capability of the SDAS code. This study showed that a much more realistic camber surface would result.

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TABLE I.- GEOMETRY CHARACTERISTICS

Fuselage:	
Length, in.	32.200
Base area, in^2	1.118
Chamber area, in^2	2.667
Capture area, in^2	2.401
Exit area, in^2	2.074
Vertical tail (each):	
Area, in^2	12.211
$\Lambda_{\ell e}$, deg	60
Λ_{te}, deg	30
Aspect ratio	2.2
Semispan, in.	3.688
Airfoil section	64A005
70°/30° cranked wing:	
Area (reference), in^2	165.600
$\Lambda_{\ell e}$ (inboard), deg	70
$\Lambda_{\ell e}$ (outboard), deg	30
Λ_{te} (inboard), deg	0
Λ_{te} (outboard), deg	-26
Aspect ratio	1.90
Span, in.	17.618
Wing reference chord, in.	12.340
Airfoil section (0.25 semispan)	65A005.7
Airfoil section (0.30 semispan)	65A004
Airfoil section (outboard)	4 percent biconvex
Moment reference center, in.	19.980, $0.41\bar{c}$
Theoretical root chord (leading edge), in.	6.868
70°/66° cranked wing:	
Area (reference), in^2	165.600
$\Lambda_{\ell e}$ (inboard), deg	70
$\Lambda_{\ell e}$ (outboard), deg	66
Λ_{te} (inboard), deg	0
Λ_{te} (outboard), deg	50
Aspect ratio	1.90
Span, in.	17.618
Wing reference chord, in.	12.340
Airfoil section (0.25 semispan)	65A005.7
Airfoil section (0.30 semispan)	65A004
Airfoil section (outboard)	4 percent biconvex
Moment reference center, in.	20.510, $0.46\bar{c}$
Theoretical root chord (leading edge), in.	6.868

TABLE II.- NUMERICAL DESCRIPTION OF 70°/30° CRANKED WING MODEL

70/30 DEGREE LEADING-EDGE SWEEP CRANKED WING DIMENSIONS IN INCHES

1 -1	1	1	5 17	3 17	7 30	4 26 10			1 6	
165.6	12.34	19.98								REFAR
0.0	.50	.75	1.25	2.5	5.0	7.5	10.	20.	30.	XAF 10
40.	50.	60.	70.	80.	90.	100.				XAF 17
12.917	2.202	1.112	14.299							WORG 1
14.129	2.643	1.112	13.086							WORG 2
18.817	4.349	1.112	8.400							WORG 3
21.564	5.349	1.112	5.652							WORG 4
23.560	8.807	1.112	2.047							WORG 5
0.0	.556	.645	.827	1.190	1.581	1.815	1.980	2.271	2.425	WORD1
2.554	2.554	2.183	1.641	.728	.314	0.0				WORD1
0.0	.304	.368	.469	.647	.875	1.059	1.213	1.645	1.892	TC 65A
1.997	1.954	1.743	1.402	.967	.490	0.0				TC 65A
0.0	.304	.368	.469	.647	.875	1.059	1.213	1.645	1.892	TC 65A
1.997	1.954	1.743	1.402	.967	.490	0.0				TC 65A
0.0	.0398	.0596	.0988	.1950	.3800	.5550	.7200	1.28	1.68	TC CIR
1.920	2.0	1.920	1.680	1.280	.72	0.0				TC CIR
0.0	.0398	.0596	.0988	.1950	.3800	.5550	.7200	1.28	1.68	TC CIR
1.920	2.0	1.920	1.680	1.280	.72	0.0				TC CIR
0.000	2.400	4.920	7.360	9.202	10.632	10.960				XFUS
-.000	-.000	-.000	-.000	-.000	-.000	-.000	-.000	-.000	-.000	Y
-.000	-.000	-.000	-.000	-.000	-.000	-.000				Y
-.088	-.088	-.088	-.088	-.088	-.088	-.088	-.088	-.088	-.088	Z
-.088	-.088	-.088	-.088	-.088	-.088	-.088				Z
.002	.159	.328	.453	.534	.598	.619	.619	.619	.619	Y
.592	.540	.452	.380	.280	.140	-.008				Y
-.369	-.350	-.270	-.158	-.046	.086	.262	.262	.262	.262	Z
.435	.572	.684	.745	.814	.866	.887				Z
.003	.220	.453	.631	.736	.785	.793	.793	.793	.793	Y
.738	.658	.538	.398	.286	.130	-.007				Y
-.213	-.173	-.054	.122	.339	.587	.816	.816	.816	.816	Z
1.025	1.202	1.343	1.447	1.496	1.545	1.577				Z
-.000	.269	.515	.660	.750	.795	.796	.796	.796	.796	Y
.777	.707	.616	.513	.341	.165	-.007				Y
-.028	.011	.174	.398	.655	.907	1.152	1.152	1.152	1.152	Z
1.421	1.726	2.004	2.229	2.451	2.556	2.593				Z
-.004	.269	.451	.616	.706	.788	.813	.946	.946	.818	Y
.803	.760	.689	.554	.411	.219	-.014				Y
.000	.083	.198	.410	.638	.882	1.175	1.187	1.187	1.223	Z
1.436	1.673	1.927	2.204	2.378	2.495	2.529				Z
-.004	.201	.398	.555	.664	.721	.766	.955	.954	.798	Y
.754	.695	.620	.492	.352	.176	-.005				Y
.004	.019	.119	.258	.447	.651	.863	.863	1.597	1.602	Z
1.783	1.963	2.116	2.261	2.370	2.455	2.488				Z
-.008	.177	.350	.499	.612	.701	.758	.962	.950	.758	Y
.698	.639	.563	.467	.323	.159	-.010				Y
.008	.035	.119	.247	.391	.563	.747	.751	1.698	1.703	Z
1.883	2.028	2.149	2.246	2.367	2.444	2.464				Z
10.960	13.000	13.800	15.000							XFUS 4
-.000	.184	.360	.508	.612	.704	.755	.964	.966	1.198	Y
1.411	1.575	1.739	1.898	2.006	2.077	2.080	1.951	1.781	1.556	Y

TABLE II.- Continued

1.271	.970	.972	.780	.662	.585	.469	.340	.175	-.005	Y
.012	.037	.118	.255	.395	.572	.749	.749	.112	.133	Z
.210	.287	.432	.641	.870	1.155	1.339	1.692	1.940	2.147	Z
2.258	2.313	1.700	1.699	2.011	2.136	2.263	2.363	2.443	2.466	Z
-.008	.104	.244	.346	.424	.488	.717	.894	.886	1.151	Y
1.387	1.611	1.791	1.899	2.200	2.200	2.200	2.200	1.929	1.602	Y
1.245	.872	.872	.644	.419	.371	.295	.198	.086	-.007	Y
-.008	.000	.037	.094	.162	.247	.284	.156	.008	.009	Z
.062	.168	.285	.393	.830	1.041	1.202	1.540	1.845	2.173	Z
2.319	2.354	2.201	2.140	2.195	2.227	2.275	2.315	2.346	2.366	Z
.000	.088	.180	.297	.385	.449	.750	1.038	1.062	1.359	Y
1.615	1.831	1.967	2.200	2.200	2.200	2.200	2.200	1.881	1.555	Y
1.238	.969	.953	.680	.416	.364	.307	.223	.115	-.006	Y
-.012	-.012	-.007	.013	.034	.054	.055	.056	.052	.118	Z
.231	.376	.513	.785	.915	1.112	1.265	1.545	1.864	2.124	Z
2.251	2.282	2.282	2.292	2.295	2.316	2.316	2.316	2.316	2.316	Z
-.004	.136	.277	.409	.549	.650	.758	.866	.994	1.215	Y
1.459	1.703	1.923	2.200	2.200	2.200	2.200	2.200	2.121	1.912	Y
1.676	1.374	1.105	.813	.640	.528	.419	.271	.130	-.010	Y
-.012	-.020	-.031	-.031	-.035	-.027	-.026	-.010	.010	.071	Z
.196	.369	.550	.805	.924	1.044	1.201	1.585	1.637	1.789	Z
1.937	2.109	2.184	2.211	2.243	2.243	2.243	2.243	2.243	2.243	Z
15.0	16.840	18.600	20.360	22.320	24.240	25.800	28.096	30.132	32.200	XFUS 10
-.004	.136	.277	.409	.549	.650	.758	.866	.994	1.215	Y
1.459	1.703	1.923	2.200	2.200	2.200	2.200	2.200	2.200	1.912	Y
1.676	1.374	1.105	.813	.640	0.0					Y
-.012	-.020	-.031	-.031	-.035	-.027	-.026	-.010	.010	.071	Z
.196	.369	.550	.805	.924	1.044	1.201	1.529	1.585	1.789	Z
1.937	2.109	2.184	2.211	2.243	2.243					Z
-.008	.104	.221	.345	.481	.606	.738	.854	.954	1.183	Y
1.383	1.607	1.791	2.019	2.200	2.200	2.200	2.053	1.892	1.747	Y
1.563	1.386	1.205	1.029	.856	0.0					Y
-.016	-.008	-.003	-.003	-.007	.002	-.006	-.006	.011	.063	Z
.148	.265	.426	.611	.755	.828	1.595	1.662	1.729	1.801	Z
1.889	1.977	2.056	2.108	2.132	2.132					Z
-.008	.136	.277	.425	.589	.742	.878	1.007	1.143	1.311	Y
1.532	1.732	1.896	2.040	2.200	2.200	2.200	2.079	1.898	1.734	Y
1.597	1.421	1.268	1.072	.879	0.0					Y
.004	.000	-.004	-.007	-.011	-.011	-.011	-.019	.014	.078	Z
.199	.347	.468	.576	.685	.809	1.570	1.639	1.719	1.795	Z
1.875	1.971	2.015	2.071	2.082	2.082					Z
-.008	.168	.329	.481	.654	.798	.918	1.047	1.199	1.339	Y
1.527	1.735	1.891	2.067	2.200	2.200	2.200	2.200	2.051	1.874	Y
1.702	1.517	1.336	1.103	.879	0.0					Y
-.016	-.015	-.003	-.006	.002	-.001	-.005	-.000	.024	.077	Z
.178	.335	.448	.581	.685	.871	1.099	1.595	1.647	1.723	Z
1.799	1.870	1.950	2.025	2.064	2.064					Z
-.004	.128	.245	.365	.505	.650	.806	.942	1.119	1.279	Y
1.499	1.708	1.908	2.080	2.200	2.200	2.200	2.200	2.059	1.863	Y
1.698	1.506	1.273	1.056	.824	0.0					Y

TABLE II.- Concluded

-.012	-.012	-.012	-.012	-.011	-.011	-.011	-.003	.025	.086	Z
.214	.371	.520	.644	.735	.929	1.106	1.516	1.574	1.666	Z
1.750	1.842	1.942	2.014	2.030	2.030					Z
0.000	.120	.245	.369	.533	.666	.798	.914	1.139	1.303	Y
1.531	1.747	1.935	2.079	2.200	2.200	2.200	2.200	2.061	1.888	Y
1.708	1.527	1.338	1.077	.797	0.0					Y
0.000	.000	-.007	-.007	-.007	-.002	-.002	.002	.043	.092	Z
.225	.398	.579	.739	.870	1.053	1.189	1.450	1.525	1.609	Z
1.701	1.797	1.896	1.984	2.023	2.023					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
26.385	2.093	5.234	36.185	1.443	8.923	1.201				
0.0	20.0	40.0	60.0	80.0	100.0					
0.0	1.28	1.92	1.92	1.28	0.0					

TABLE III.- NUMERICAL DESCRIPTION OF 70°/66° CRANKED WING MODEL

70/66 DEGREE LEADING-EDGE SWEEP CRANKED WING DIMENSIONS IN INCHES

1 -1 1 1 5 17 3 17 7 30 4 26 10 1 6

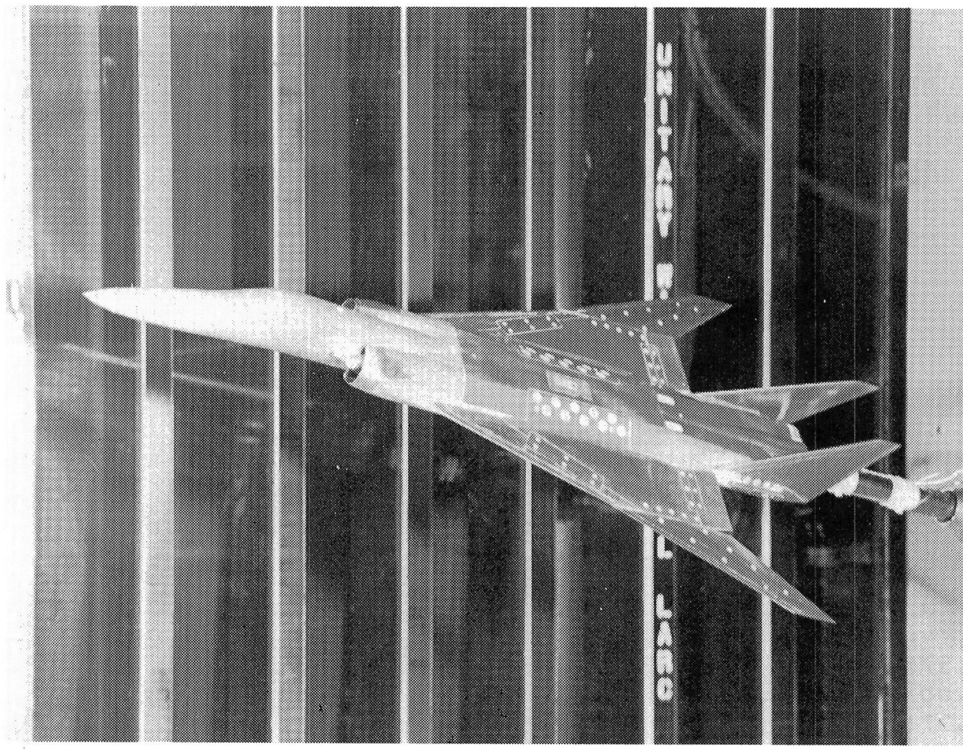
165.6	12.34	20.51								REFAR
0.0	.50	.75	1.25	2.5	5.0	7.5	10.	20.	30.	XAF 10
40.	50.	60.	70.	80.	90.	100.				XAF 17
12.917	2.202	1.112	14.299							WORG 1
14.129	2.643	1.112	13.086							WORG 2
18.817	4.349	1.112	8.400							WORG 3
21.564	5.349	1.112	5.652							WORG 4
29.331	8.807	1.112	2.047							WORG 5
0.0	.556	.645	.827	1.190	1.581	1.815	1.980	2.271	2.425	WORD1
2.554	2.554	2.183	1.641	.728	.314	0.0				WORD1
0.0	.304	.368	.469	.647	.875	1.059	1.213	1.645	1.892	TC 65A
1.997	1.954	1.743	1.402	.967	.490	0.0				TC 65A
0.0	.304	.368	.469	.647	.875	1.059	1.213	1.645	1.892	TC 65A
1.997	1.954	1.743	1.402	.967	.490	0.0				TC 65A
0.0	.0398	.0596	.0988	.1950	.3800	.5550	.7200	1.28	1.68	TC CIR
1.920	2.0	1.920	1.680	1.280	.72	0.0				TC CIR
0.0	.0398	.0596	.0988	.1950	.3800	.5550	.7200	1.28	1.68	TC CIR
1.920	2.0	1.920	1.680	1.280	.72	0.0				TC CIR
0.000	2.400	4.920	7.360	9.202	10.632	10.960				XFUS
-.000	-.000	-.000	-.000	-.000	-.000	-.000	-.000	-.000	-.000	Y
-.000	-.000	-.000	-.000	-.000	-.000	-.000				Y
-.088	-.088	-.088	-.088	-.088	-.088	-.088	-.088	-.088	-.088	Z
-.088	-.088	-.088	-.088	-.088	-.088	-.088				Z
.002	.159	.328	.453	.534	.598	.619	.619	.619	.619	Y
.592	.540	.452	.380	.280	.140	-.008				Y
-.369	-.350	-.270	-.158	-.046	.086	.262	.262	.262	.262	Z
.435	.572	.684	.745	.814	.866	.887				Z
.003	.220	.453	.631	.736	.785	.793	.793	.793	.793	Y
.738	.658	.538	.398	.286	.130	-.007				Y
-.213	-.173	-.054	.122	.339	.587	.816	.816	.816	.816	Z
1.025	1.202	1.343	1.447	1.496	1.545	1.577				Z
-.000	.269	.515	.660	.750	.795	.796	.796	.796	.796	Y
.777	.707	.616	.513	.341	.165	-.007				Y
-.028	.011	.174	.398	.655	.907	1.152	1.152	1.152	1.152	Z
1.421	1.726	2.004	2.229	2.451	2.556	2.593				Z
-.004	.269	.451	.616	.706	.788	.813	.946	.946	.818	Y
.803	.760	.689	.554	.411	.219	-.014				Y
.000	.083	.198	.410	.638	.882	1.175	1.187	1.187	1.223	Z
1.436	1.673	1.927	2.204	2.378	2.495	2.529				Z
-.004	.201	.398	.555	.664	.721	.766	.955	.954	.798	Y
.754	.695	.620	.492	.352	.176	-.005				Y
.004	.019	.119	.258	.447	.651	.863	.863	1.597	1.602	Z
1.783	1.963	2.116	2.261	2.370	2.455	2.488				Z
-.008	.177	.350	.499	.612	.701	.758	.962	.950	.758	Y
.698	.639	.563	.467	.323	.159	-.010				Y
.008	.035	.119	.247	.391	.563	.747	.751	1.698	1.703	Z
1.883	2.028	2.149	2.246	2.367	2.444	2.464				Z
10.960	13.000	13.800	15.000							XFUS 4
-.000	.184	.360	.508	.612	.704	.755	.964	.966	1.198	Y
1.411	1.575	1.739	1.898	2.006	2.077	2.080	1.951	1.781	1.556	Y
1.271	.970	.972	.780	.662	.585	.469	.340	.175	-.005	Y
.012	.037	.118	.255	.395	.572	.749	.749	.112	.133	Z
.210	.287	.432	.641	.870	1.155	1.339	1.692	1.940	2.147	Z
2.258	2.313	1.700	1.699	2.011	2.136	2.263	2.363	2.443	2.466	Z
-.008	.104	.244	.348	.424	.488	.717	.894	.886	1.151	Y
1.387	1.611	1.791	1.899	2.200	2.200	2.200	2.200	1.929	1.602	Y
1.245	.872	.872	.644	.419	.371	.295	.198	.086	-.007	Y

TABLE III.- Continued

-.008	.000	.037	.094	.162	.247	.284	.156	.008	.009	Z
.062	.168	.285	.393	.830	1.041	1.202	1.540	1.845	2.173	Z
2.319	2.354	2.201	2.140	2.195	2.227	2.275	2.315	2.346	2.366	Z
.000	.088	.180	.297	.385	.449	.750	1.038	1.062	1.359	Y
1.615	1.831	1.967	2.200	2.200	2.200	2.200	2.200	1.881	1.555	Y
1.238	.969	.953	.680	.416	.364	.307	.223	.115	-.006	Y
-.012	-.012	-.007	.013	.034	.054	.055	.056	.052	.118	Z
.231	.376	.513	.785	.915	1.112	1.265	1.545	1.864	2.124	Z
2.251	2.282	2.282	2.292	2.295	2.316	2.316	2.316	2.316	2.316	Z
-.004	.136	.277	.409	.549	.650	.758	.866	.994	1.215	Y
1.459	1.703	1.923	2.200	2.200	2.200	2.200	2.200	2.121	1.912	Y
1.676	1.374	1.105	.813	.640	.528	.419	.271	.130	-.010	Y
-.012	-.020	-.031	-.031	-.035	-.027	-.026	-.010	.010	.071	Z
.196	.369	.550	.805	.924	1.044	1.201	1.585	1.637	1.789	Z
1.937	2.109	2.184	2.211	2.243	2.243	2.243	2.243	2.243	2.243	Z
15.0	16.840	18.600	20.360	22.320	24.240	25.800	28.096	30.132	32.200	XFUS 10
-.004	.136	.277	.409	.549	.650	.758	.866	.994	1.215	Y
1.459	1.703	1.923	2.200	2.200	2.200	2.200	2.200	2.200	1.912	Y
1.676	1.374	1.105	.813	.640	0.0					Y
-.012	-.020	-.031	-.031	-.035	-.027	-.026	-.010	.010	.071	Z
.196	.369	.550	.805	.924	1.044	1.201	1.529	1.585	1.789	Z
1.937	2.109	2.184	2.211	2.243	2.243					Z
-.008	.104	.221	.345	.481	.606	.738	.854	.954	1.183	Y
1.383	1.607	1.791	2.019	2.200	2.200	2.200	2.053	1.892	1.747	Y
1.563	1.386	1.205	1.029	.856	0.0					Y
-.016	-.008	-.003	-.003	-.007	.002	-.006	-.006	.011	.063	Z
.148	.265	.426	.611	.755	.828	1.595	1.662	1.729	1.801	Z
1.889	1.977	2.056	2.108	2.132	2.132					Z
-.008	.136	.277	.425	.589	.742	.878	1.007	1.143	1.311	Y
1.532	1.732	1.896	2.040	2.200	2.200	2.200	2.079	1.898	1.734	Y
1.597	1.421	1.268	1.072	.879	0.0					Y
.004	.000	-.004	-.007	-.011	-.011	-.011	-.019	.014	.078	Z
.199	.347	.468	.576	.685	.809	1.570	1.639	1.719	1.795	Z
1.875	1.971	2.015	2.071	2.082	2.082					Z
-.008	.168	.329	.481	.654	.798	.918	1.047	1.199	1.339	Y
1.527	1.735	1.891	2.067	2.200	2.200	2.200	2.200	2.051	1.874	Y
1.702	1.517	1.336	1.103	.879	0.0					Y
-.016	-.015	-.003	-.006	.002	-.001	-.005	-.000	.024	.077	Z
.178	.335	.448	.581	.685	.871	1.099	1.595	1.647	1.723	Z
1.799	1.870	1.950	2.025	2.064	2.064					Z
-.004	.128	.245	.365	.505	.650	.806	.942	1.119	1.279	Y
1.499	1.708	1.908	2.080	2.200	2.200	2.200	2.200	2.059	1.863	Y
1.698	1.506	1.273	1.056	.824	0.0					Y
-.012	-.012	-.012	-.012	-.011	-.011	-.011	-.003	.025	.086	Z
.214	.371	.520	.644	.735	.929	1.106	1.516	1.574	1.666	Z
1.750	1.842	1.942	2.014	2.030	2.030					Z
0.000	.120	.245	.369	.533	.666	.798	.914	1.139	1.303	Y
1.531	1.747	1.935	2.079	2.200	2.200	2.200	2.200	2.061	1.888	Y
1.708	1.527	1.338	1.077	.797	0.0					Y
0.000	.000	-.007	-.007	-.007	-.002	-.002	.002	.043	.092	Z
.225	.398	.579	.739	.870	1.053	1.189	1.450	1.525	1.609	Z
1.701	1.797	1.896	1.984	2.023	2.023					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y

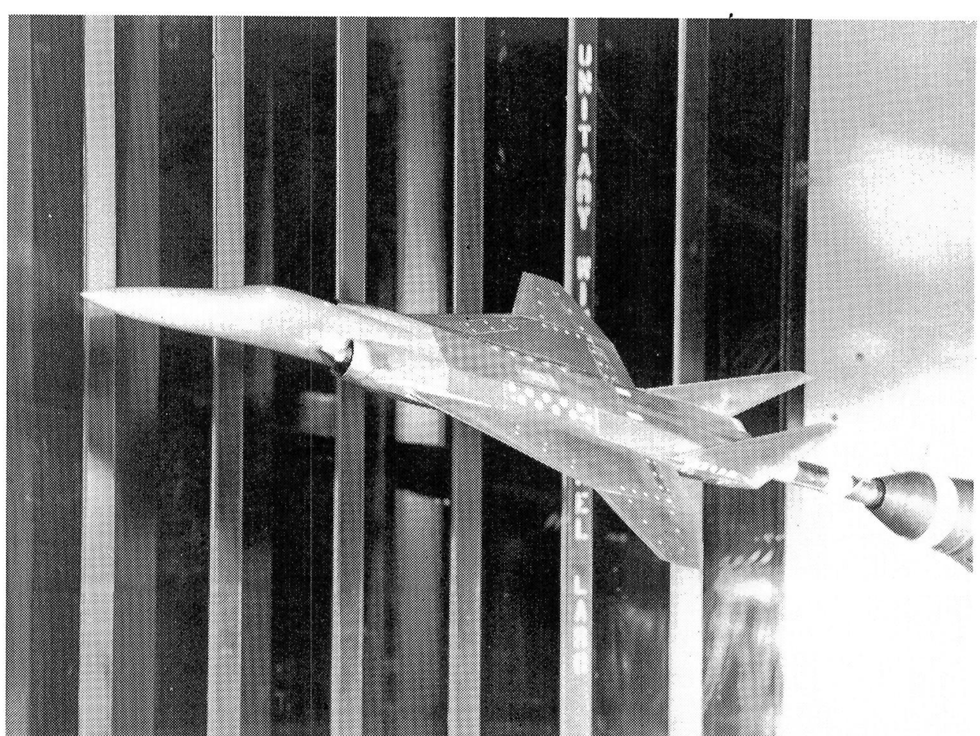
TABLE III.- Concluded

1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
.004	.152	.305	.457	.597	.742	.870	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
.004	.152	.305	.457	.597	.742	.370	.974	1.199	1.391	Y
1.579	1.746	1.878	2.009	2.200	2.200	2.200	2.200	2.038	1.889	Y
1.740	1.575	1.390	1.117	.820	0.0					Y
.000	-.003	.002	-.002	-.001	-.000	.000	.005	.046	.115	Z
.216	.378	.551	.720	.980	1.098	1.190	1.260	1.426	1.513	Z
1.613	1.728	1.836	1.946	1.977	1.977					Z
26.385	2.093	5.234	36.185	1.443	8.923	1.201				
0.0	20.0	40.0	60.0	80.0	100.0					
0.0	1.28	1.92	1.92	1.28	0.0					



L-82-9936

Figure 1.- Photograph of 70°/66° cranked wing configuration installed in the Langley Unitary Plan Wind Tunnel.



L-82-9840

Figure 2.- Photograph of the 70°/30° cranked wing configuration installed in the Langley Plan Unitary Wind Tunnel.

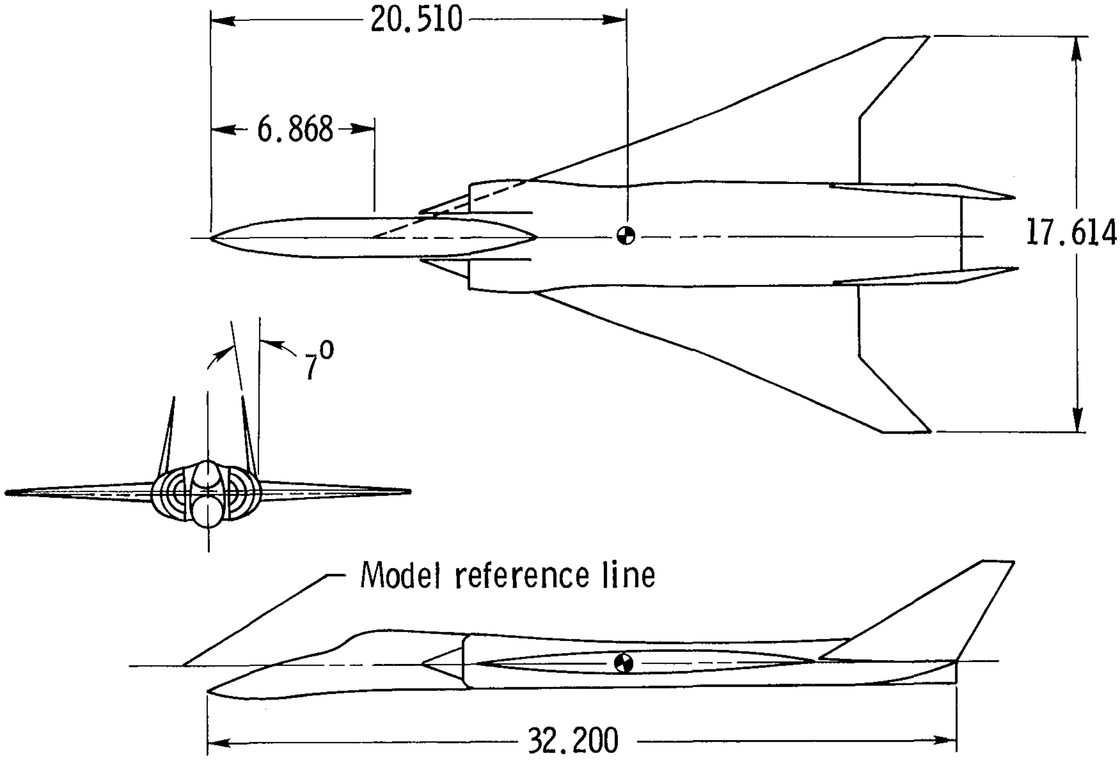


Figure 3.- Three-view sketch of 70°/66° cranked wing configuration. Linear dimensions are in inches.

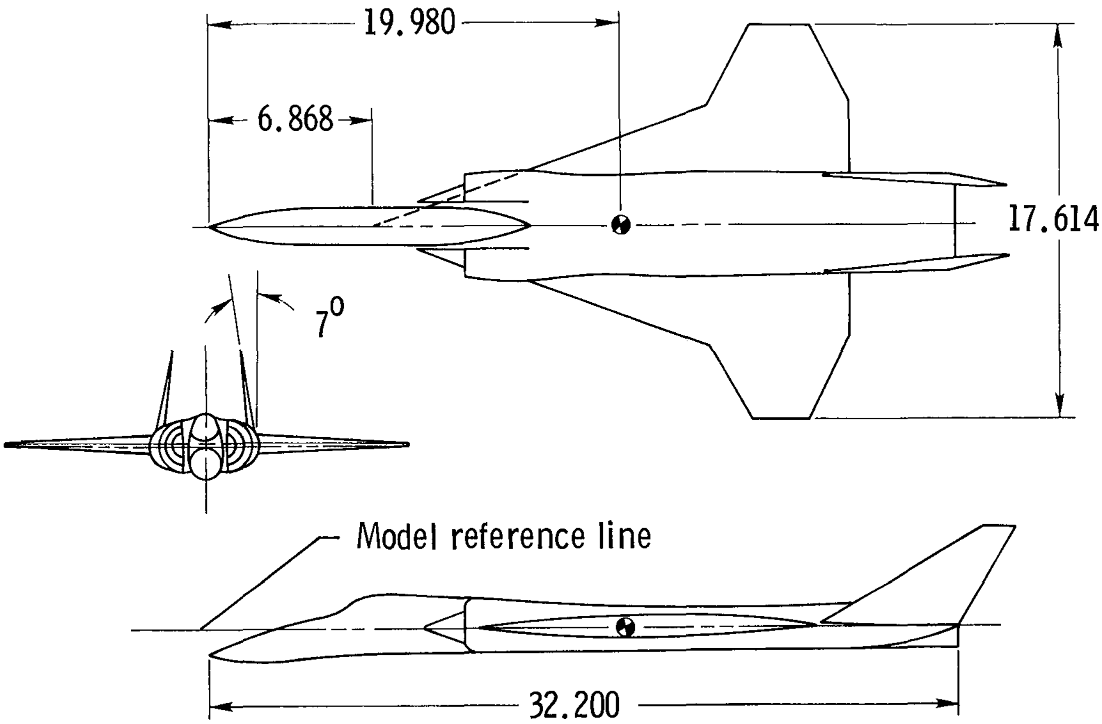


Figure 4.- Three-view sketch of 70°/30° cranked wing configuration. Linear dimensions are in inches.

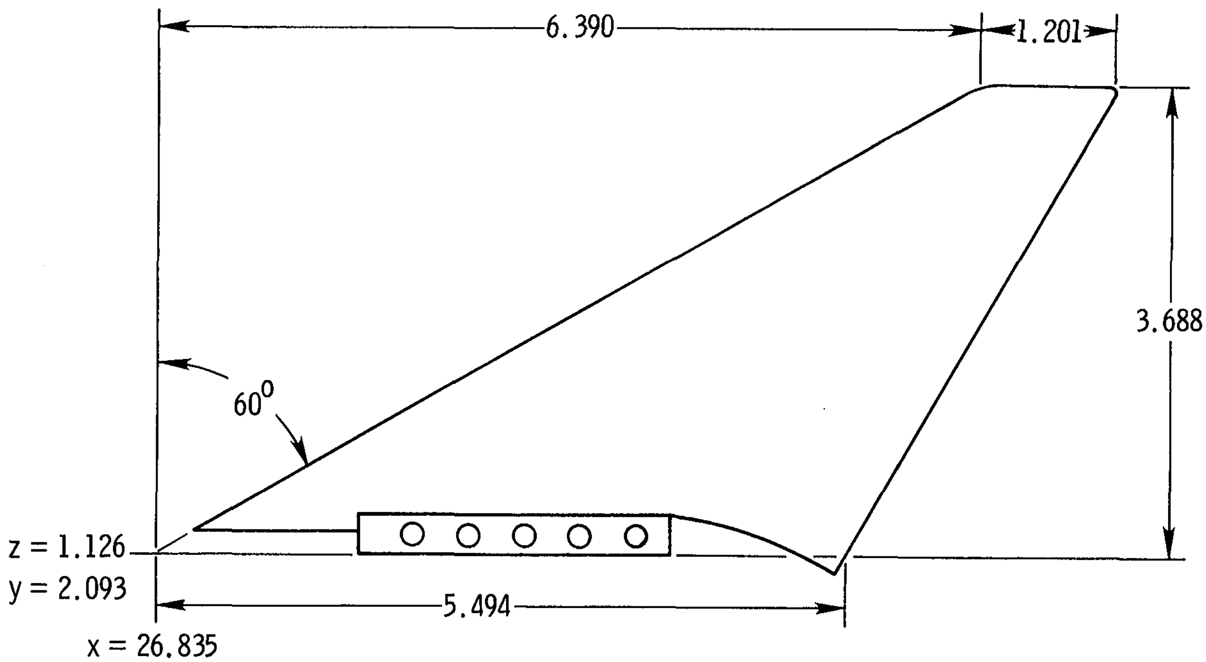


Figure 5.- Details of vertical tail. Linear dimensions are in inches.

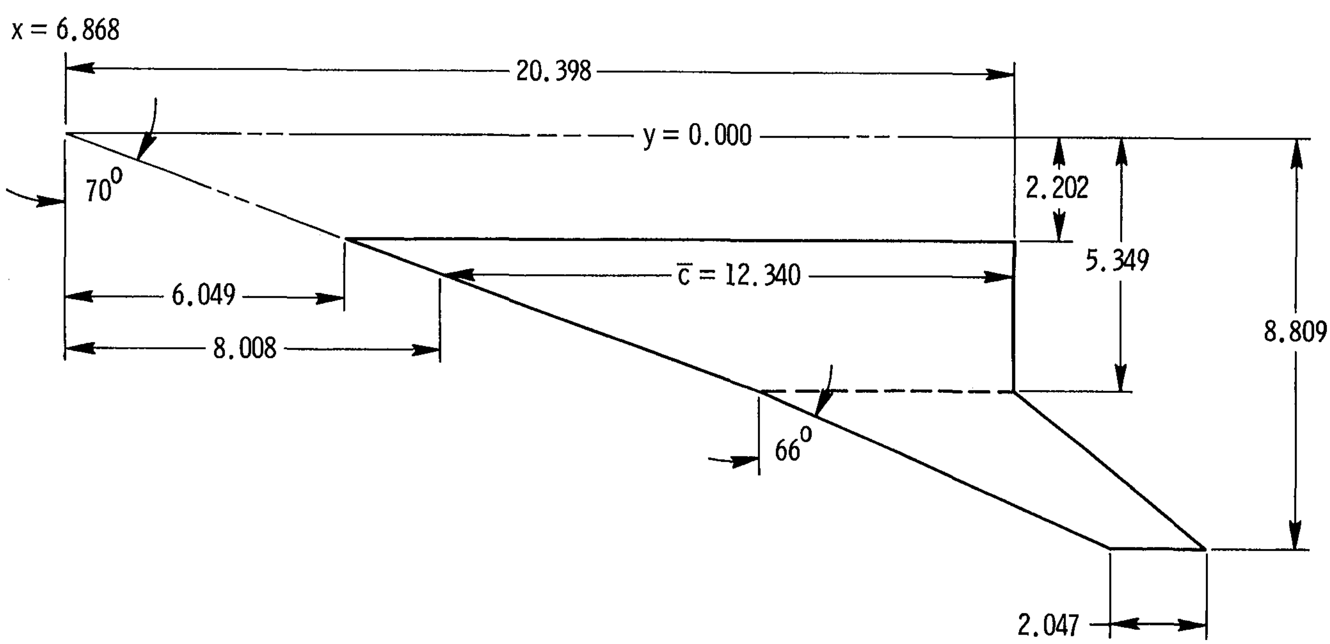


Figure 6.- Details of 70°/66° cranked wing. Linear dimensions are in inches.

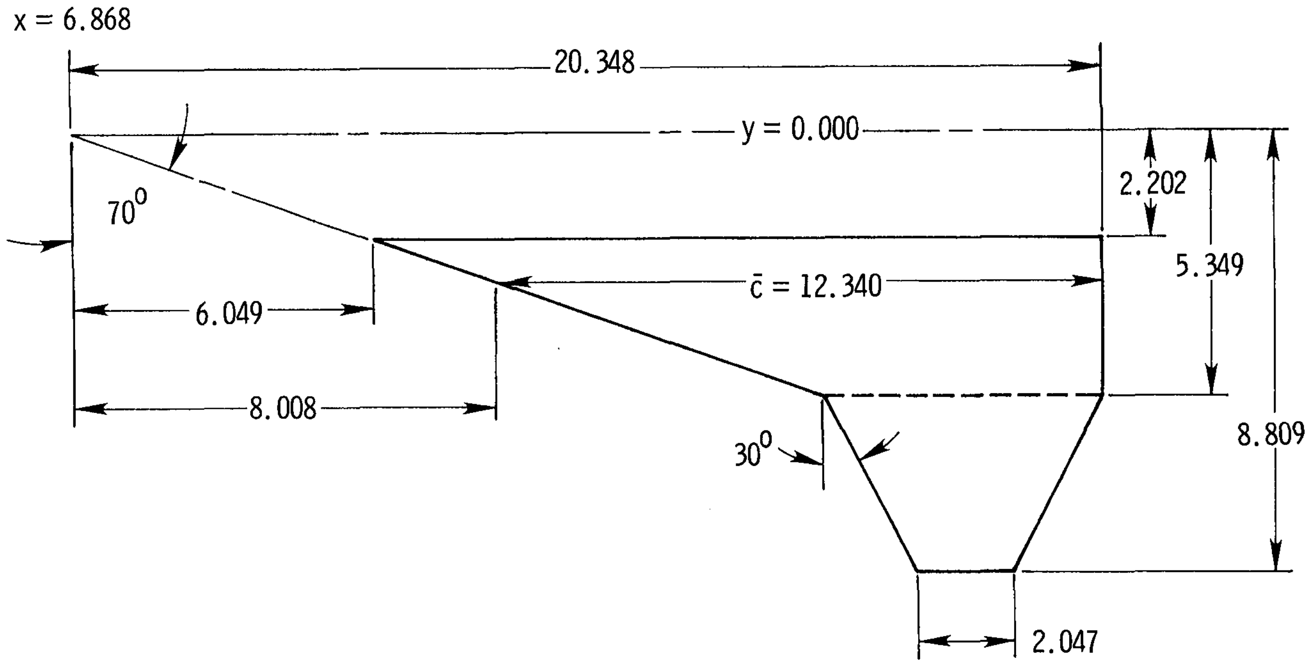


Figure 7.- Details of the 70°/30° cranked wing. Linear dimensions are in inches.

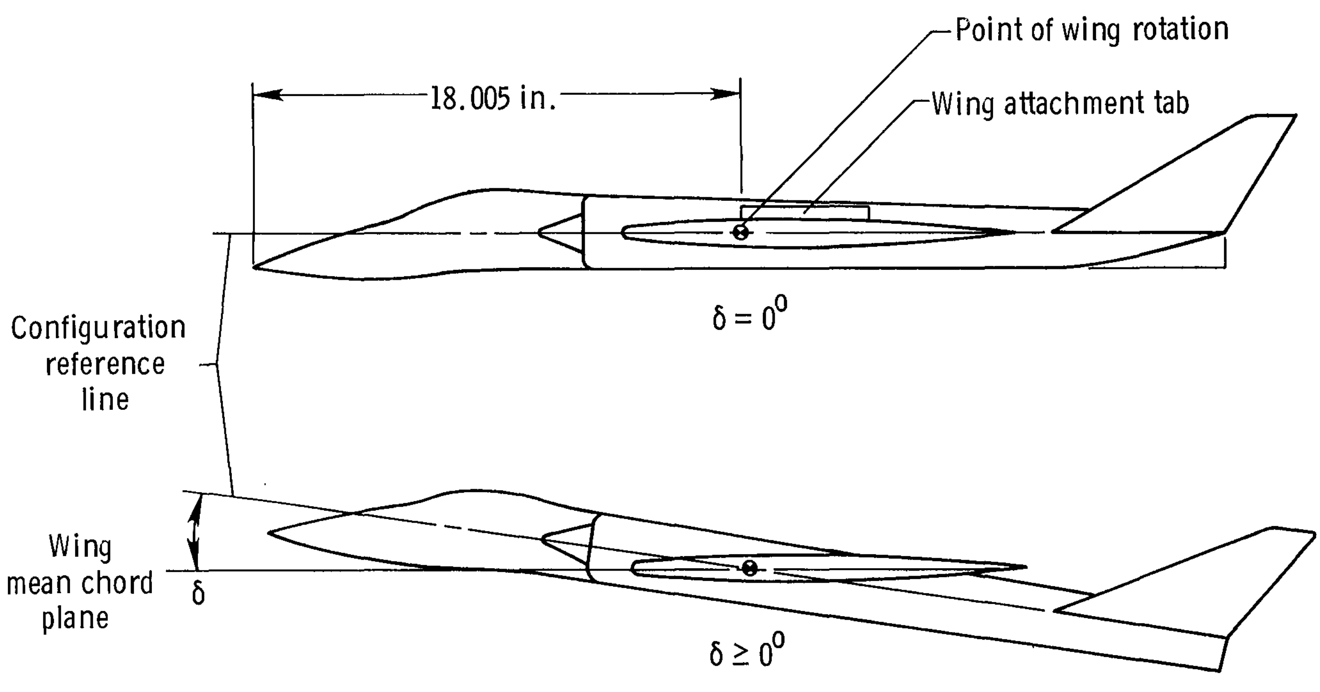


Figure 8.- Sketch detailing fuselage incidence.

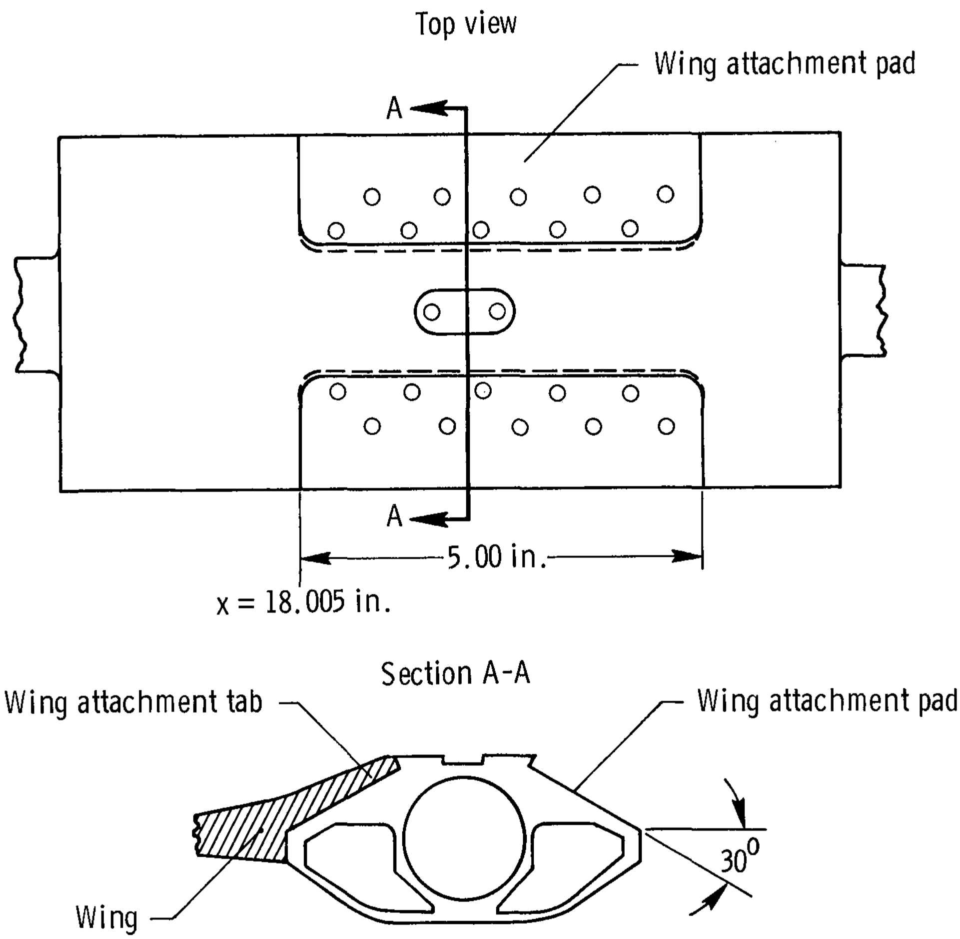
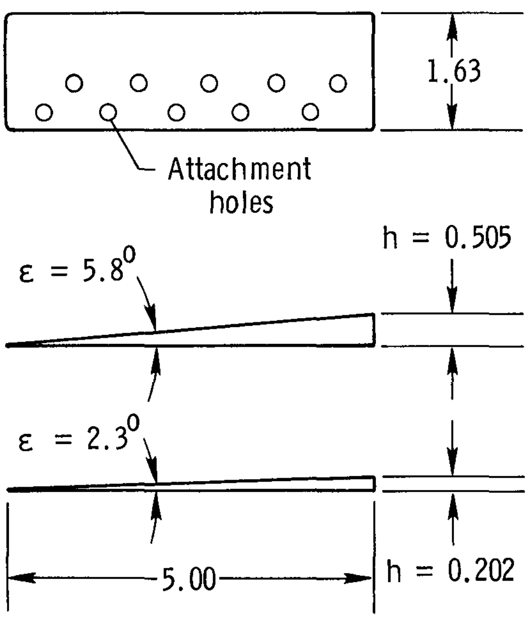


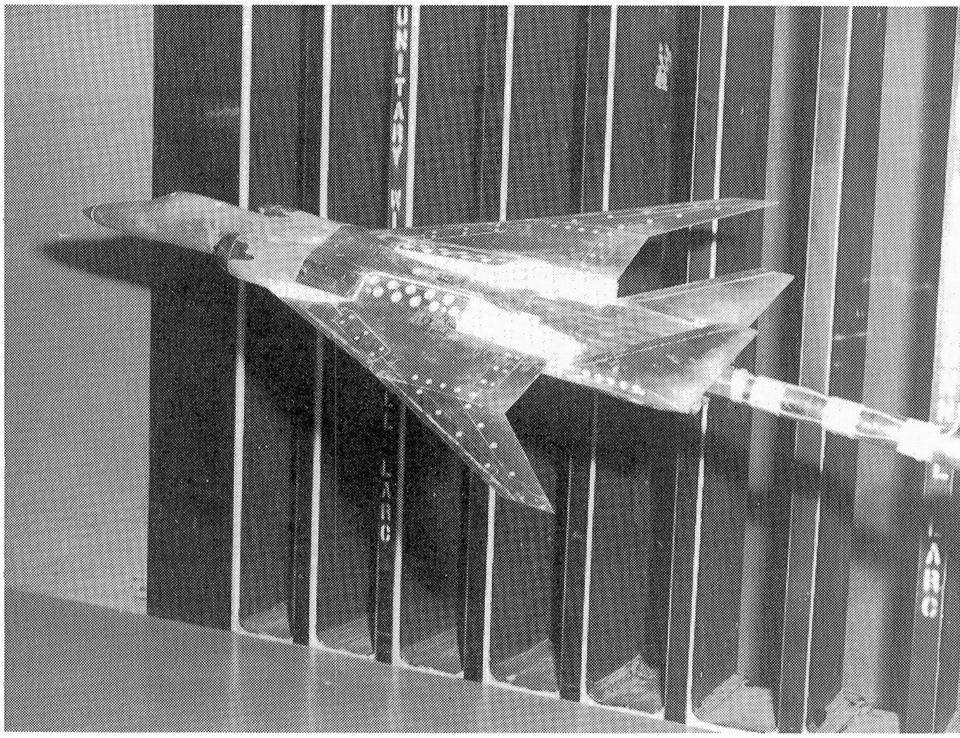
Figure 9.- Details of wing attachment pad.



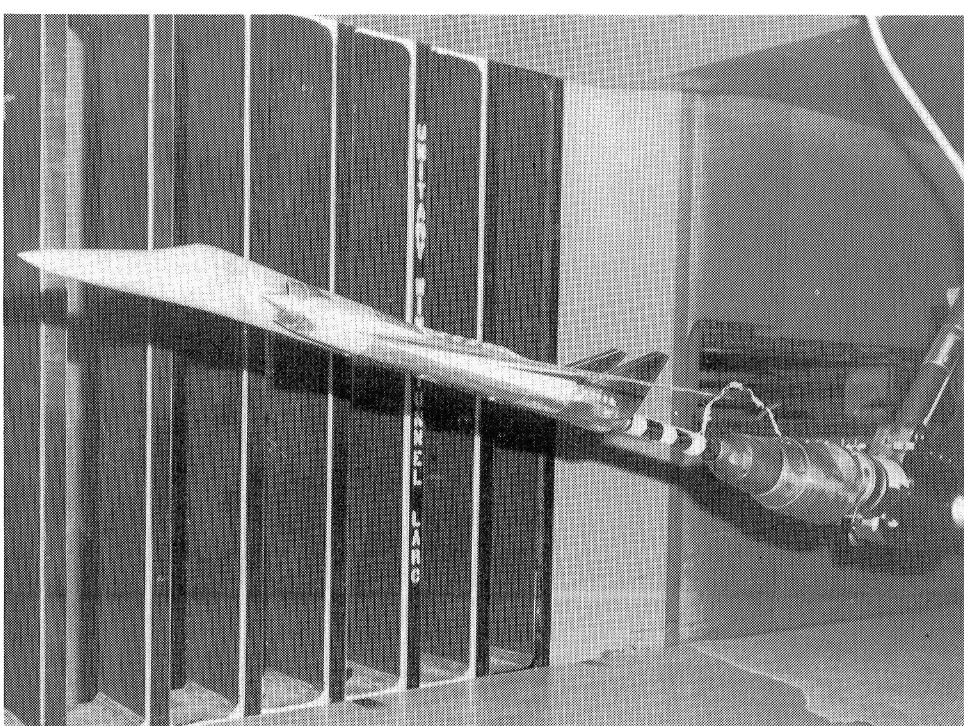
ε	δ
0°	0°
2.3°	2.0°
5.8°	5.0°

$$\delta = \arctan\left(\frac{h \cos 30^0}{5}\right)$$

Figure 10.- Details of the wedge inserts used to rotate the fuselage relative to the wing mean camber line. Linear dimensions are in inches.



L-82-11,175



L-82-11,173

Figure 11.- Photographs of 70°/66° configuration with 5° of fuselage incidence.

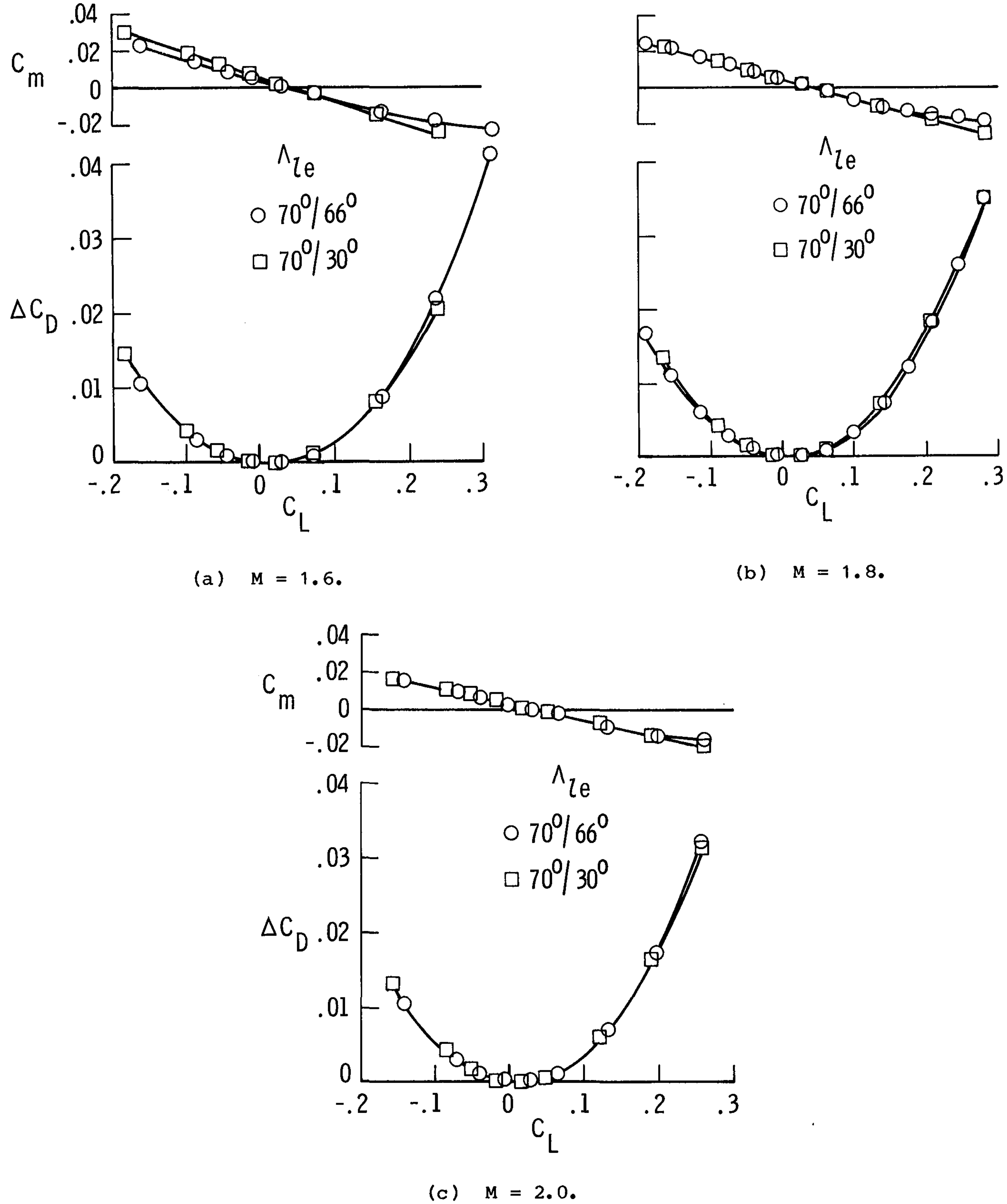
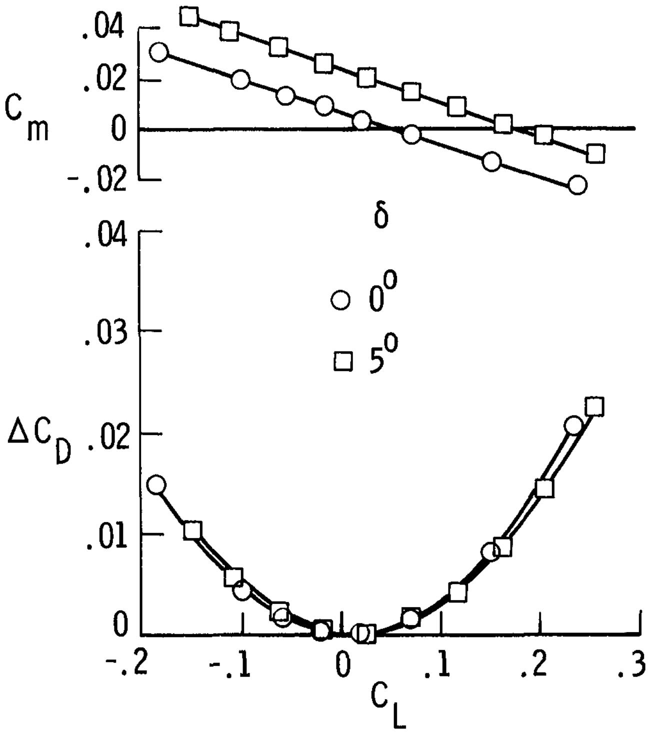
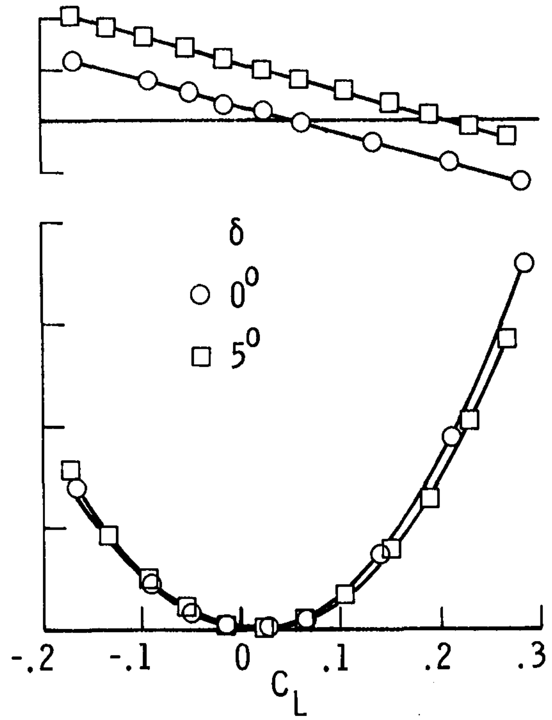


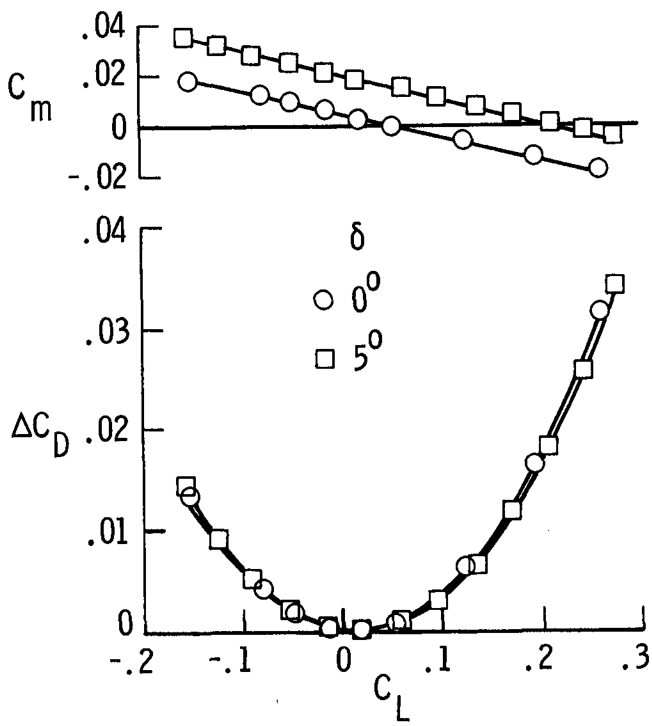
Figure 12.- Longitudinal characteristics of 70°/30° and 70°/66° cranked wing configurations without fuselage incidence.



(a) M = 1.6.

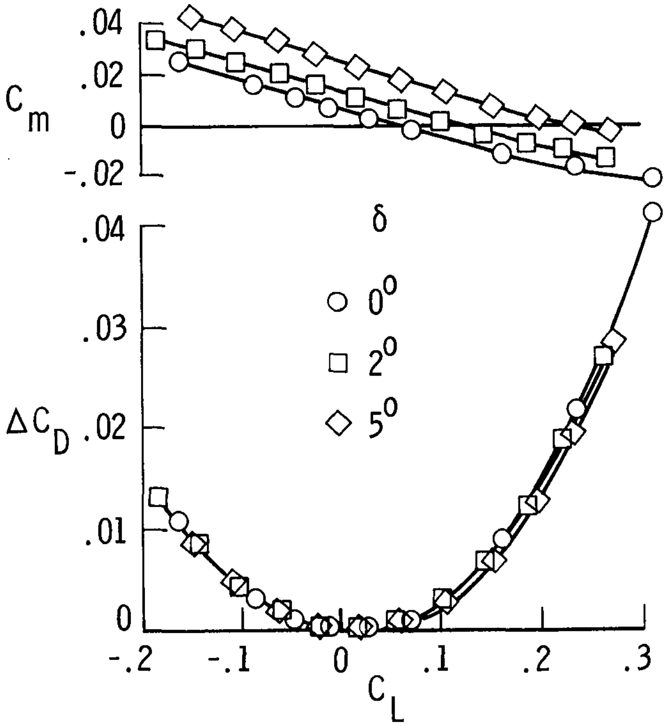


(b) M = 1.8.

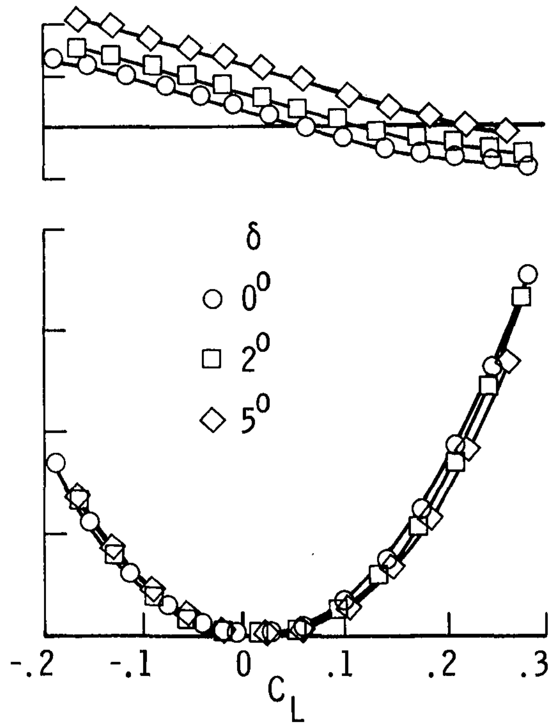


(c) M = 2.0.

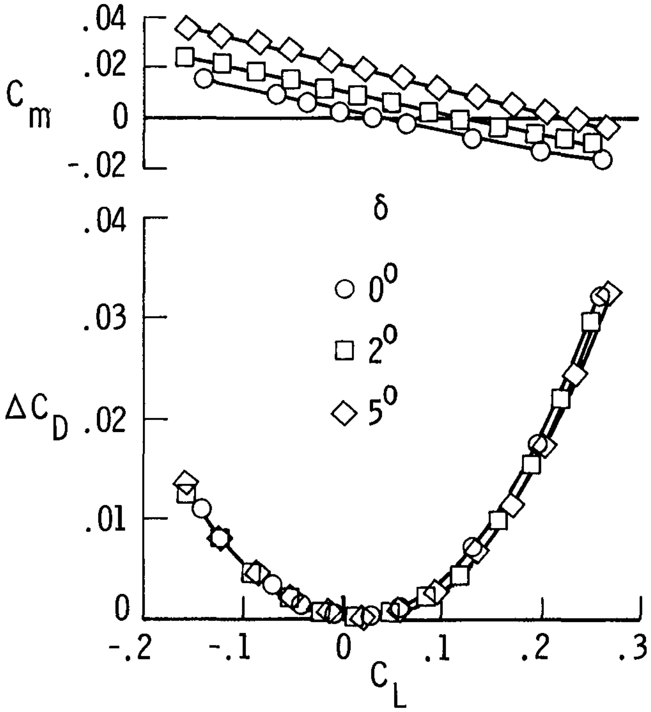
Figure 13.- Effect of fuselage incidence on the longitudinal characteristics of the 70°/30° cranked wing configuration.



(a) M = 1.6.

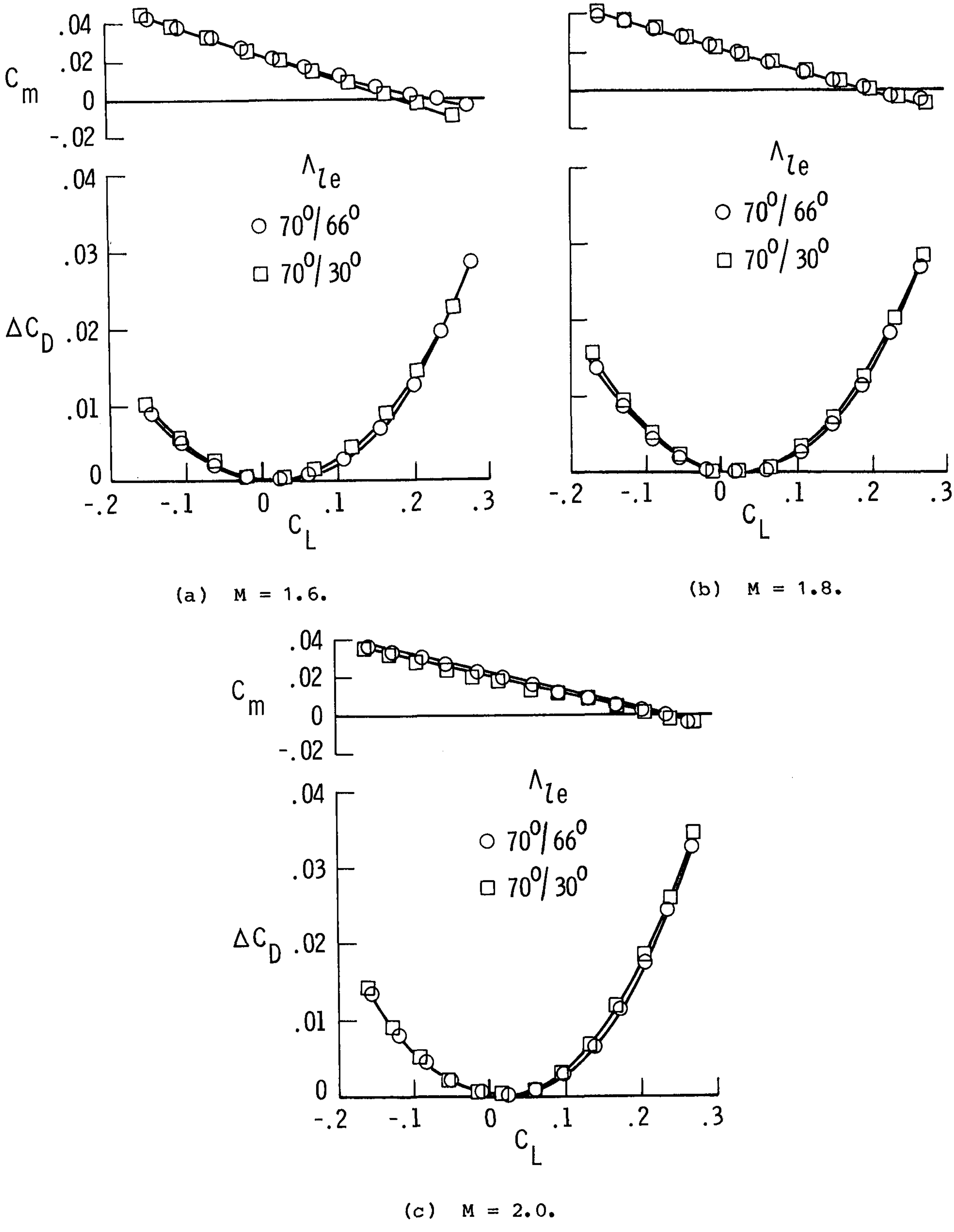


(b) M = 1.8.



(c) M = 2.0.

Figure 14.- Effect of fuselage incidence on the longitudinal characteristics of the 70°/66° cranked wing configuration.



(a) M = 1.6.

(b) M = 1.8.

(c) M = 2.0.

Figure 15.- Longitudinal characteristics of the 70°/30° and 70°/66° cranked wing configurations with 5° of fuselage incidence.

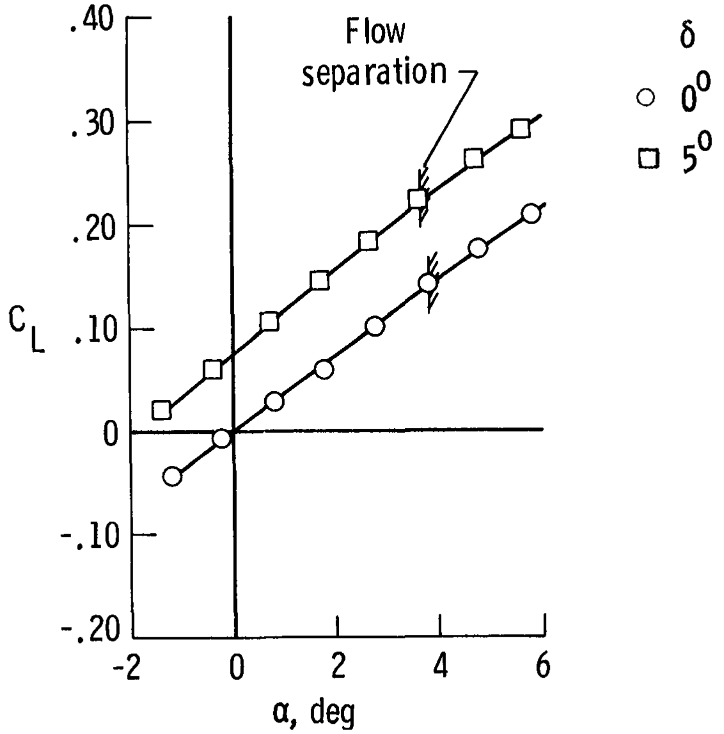


Figure 16.- Effect of fuselage incidence on the lifting characteristics of the 70°/66° cranked wing configuration at M = 1.8.

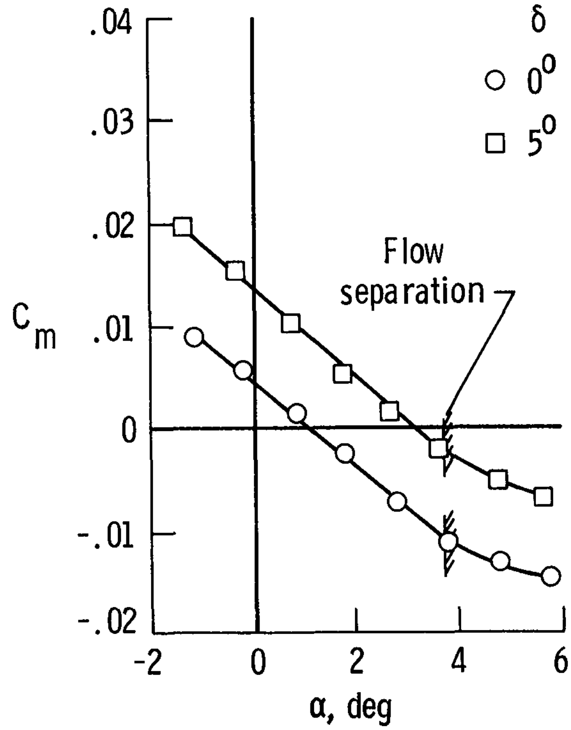


Figure 17.- Effect of fuselage incidence on the pitching-moment characteristics of the 70°/66° cranked wing configuration at M = 1.8.

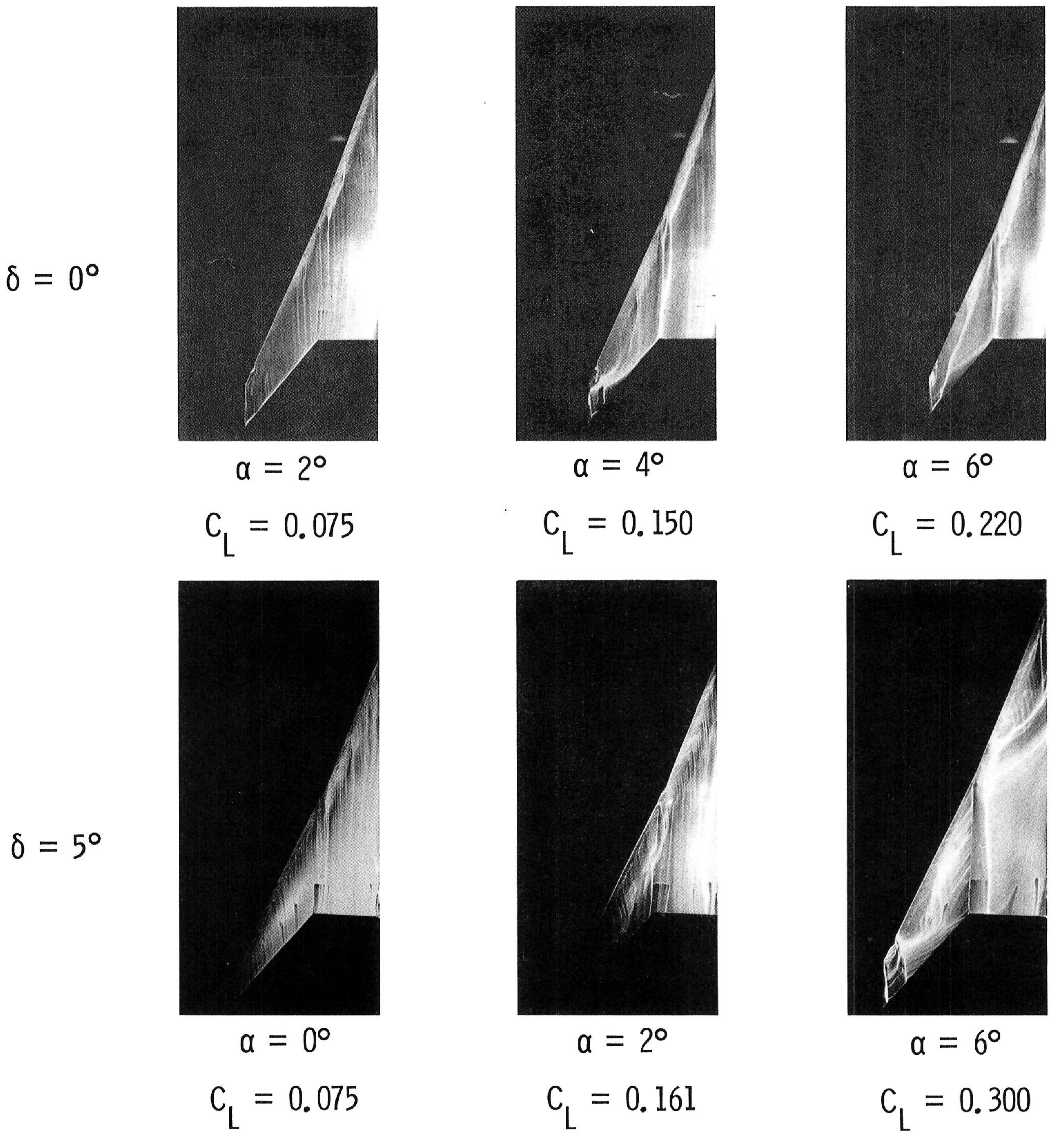


Figure 18.- Oil-flow photographs of 70°/66° cranked wing configuration at $M = 1.8$.

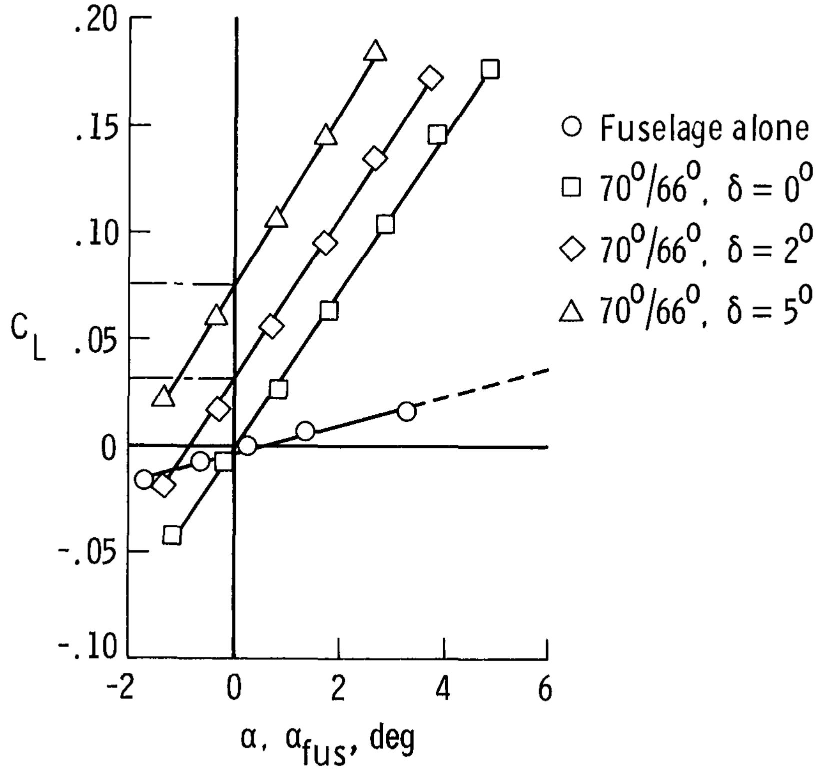


Figure 19.- Lifting characteristics of the 70°/66° cranked wing configuration at M = 1.8.

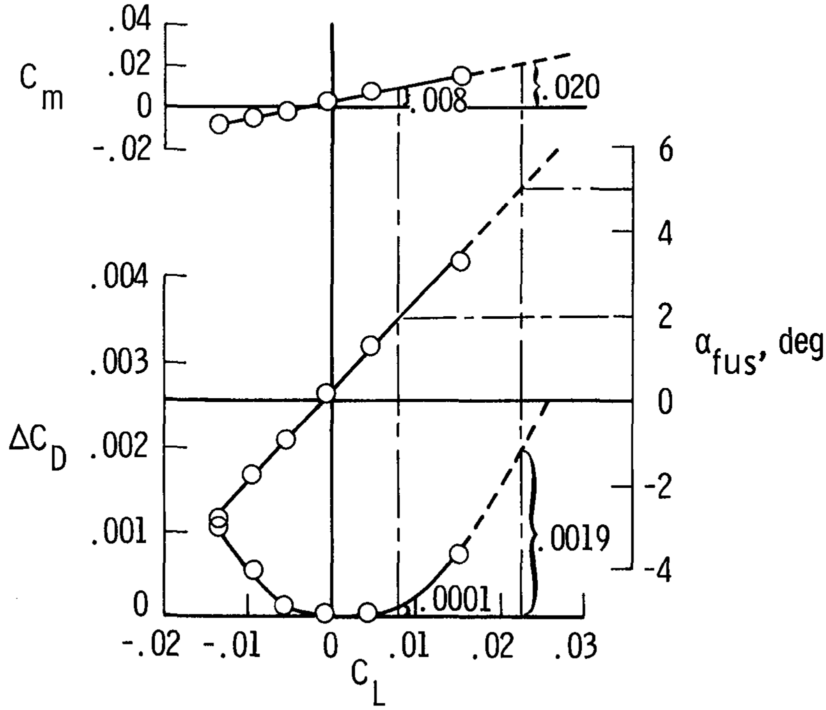


Figure 20.- Longitudinal characteristics of the fuselage at M = 1.8.

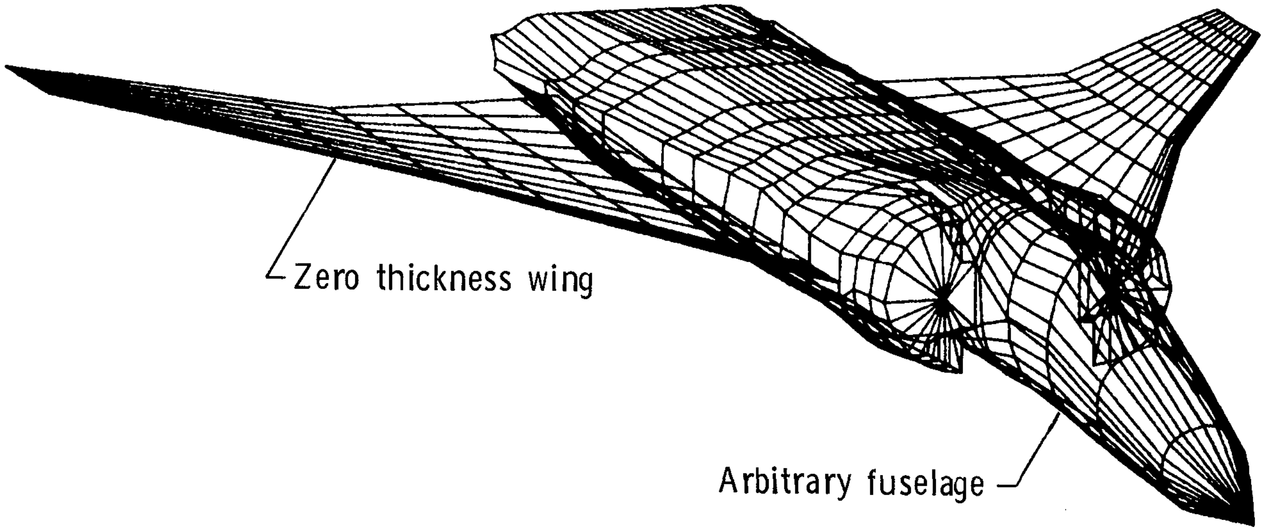
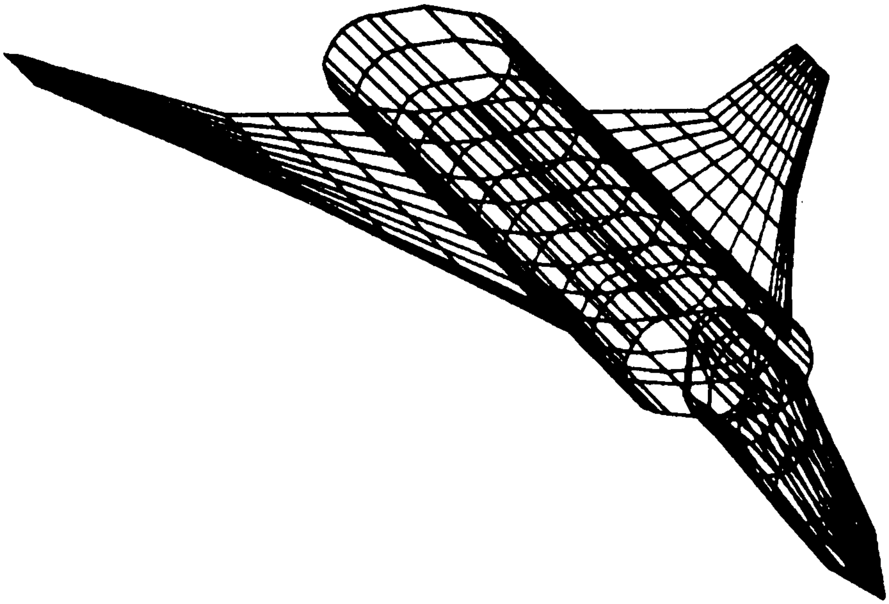
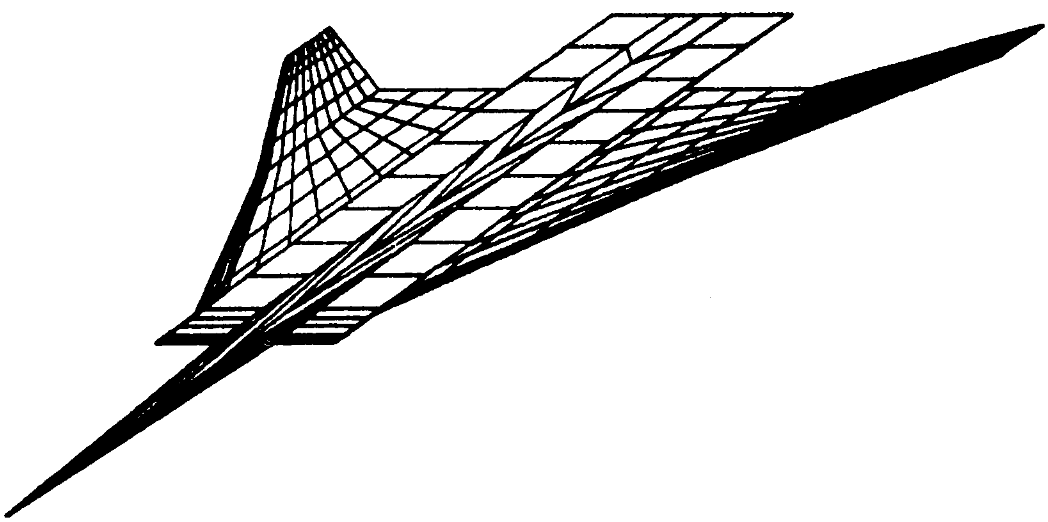


Figure 21.- Analytical modeling used in PAN AIR analysis.



(a) Arbitrary fuselage and zero thickness wing.



(b) Mean-chord-plane planform.

Figure 22.- Analytical modeling used for SDAS analysis.

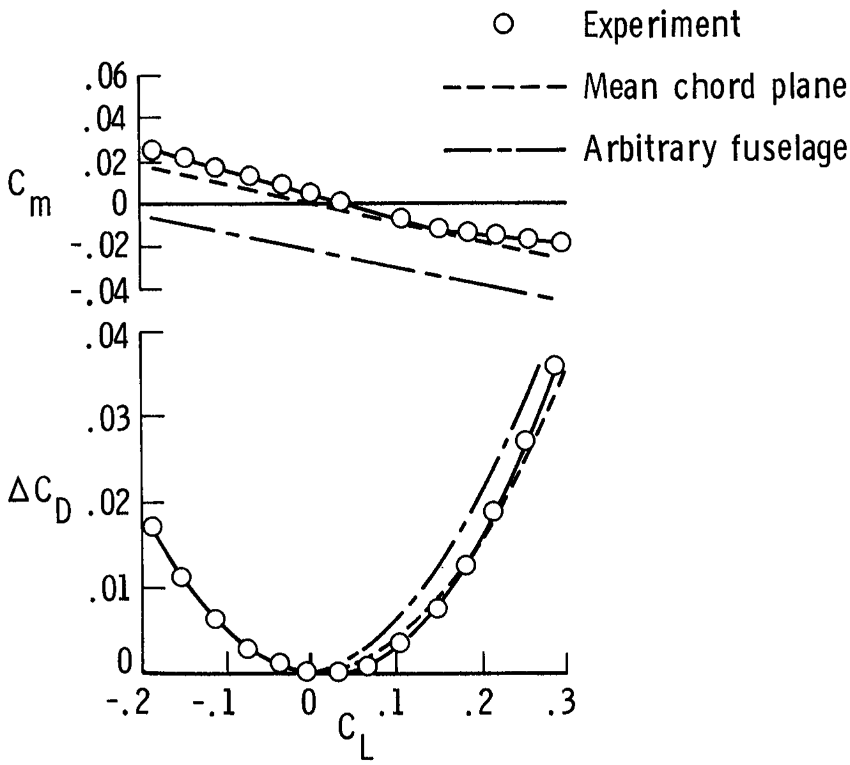


Figure 23.- Effect of analytical model on prediction capability of the SDAS method for the 70°/66° cranked wing configuration at $M = 1.8$.

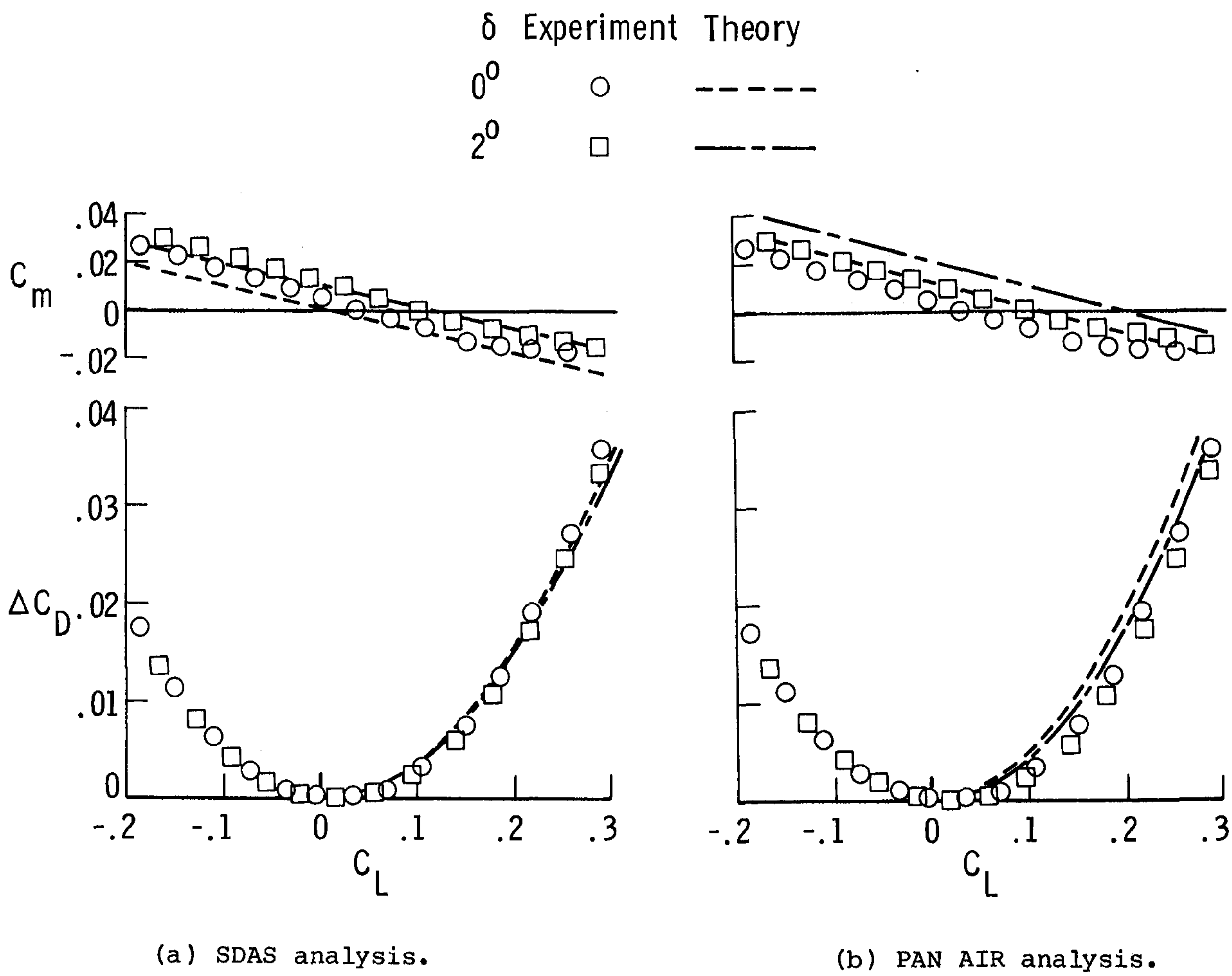


Figure 24.- Comparison of theoretical and experimental longitudinal characteristics of the 70°/66° cranked wing configuration at M = 1.8.

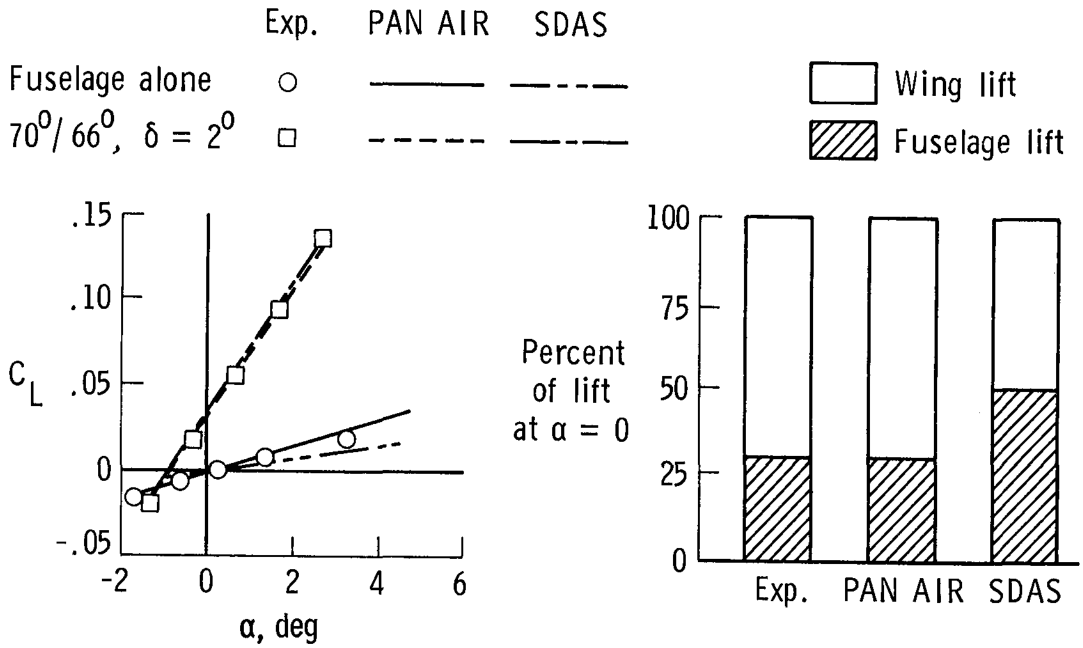


Figure 25.- Predicted lifting characteristics of the fuselage alone and of the 70°/66° cranked wing configuration with 2° of fuselage incidence at M = 1.8.

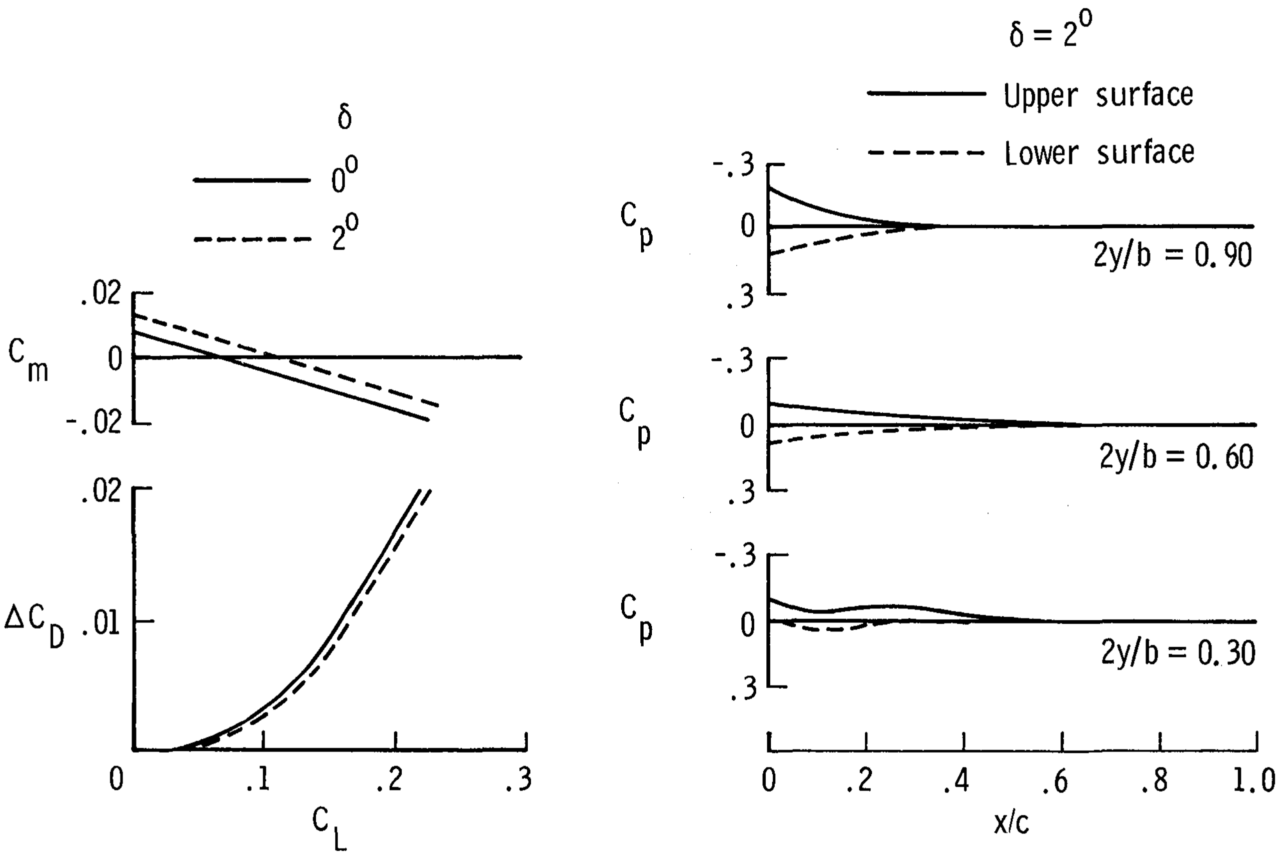


Figure 26.- Summary of the PAN AIR predicted characteristics for the 70°/66° cranked wing configuration at M = 1.8.

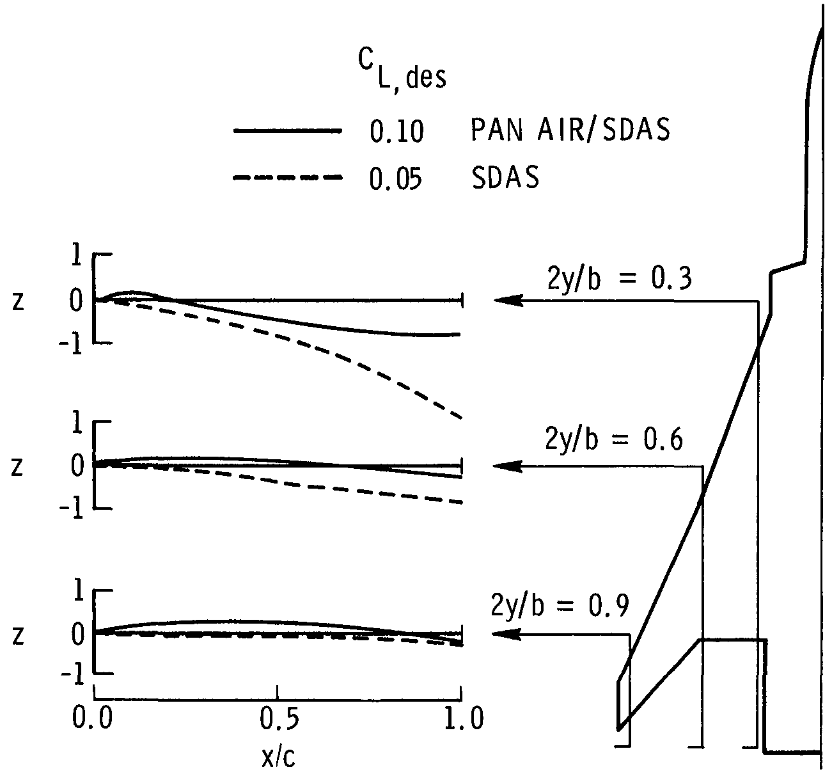


Figure 27.- Comparison of wing-camber designs for the 70°/66° cranked wing configuration at M = 1.8.

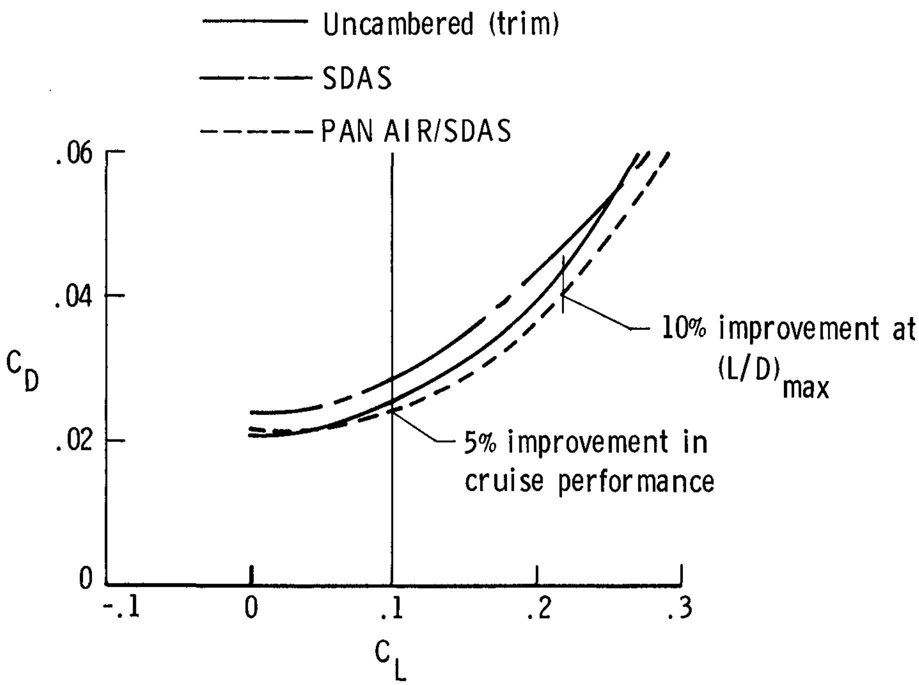


Figure 28.- Effect of wing-camber design approach on the predicted aerodynamic performance for the 70°/66° cranked wing configuration at M = 1.8.

FORCE AND MOMENT DATA

The tabulated force and moment data were reduced with respect to the wing mean chord plane. Table AI gives the column headings which appear on the tabulated data and identifies their corresponding symbols. Table AII is an index to the tabulated data, which are presented in table AIII.

TABLE AI.- TABULATED DATA SYMBOLS

Tabulated data headings	Definition
Both Axes:	
ALPHA	α
BETA	β (slideslip)
CM	C_m
CY	C_Y
MACH	M
Body axis:	
CA	C_A
CAB	$C_{A,b}$
CAC	$C_{A,c}$
CAI	$C_{A,i}$
CA UNC	$C_{A,unc}$
CLB	C_l
CN	C_N
CNB	C_n
R/FT	R
Stability axis:	
CD	C_D
CDB	$C_{D,b}$
CDC	$C_{D,c}$
CDI	$C_{D,i}$
CD UNC	$C_{D,unc}$
CL	C_L
CLS	C_l
CNS	C_n
L/D	L/D

TABLE AII.- INDEX TO TABULATED DATA

Page	Run	Configuration	Mach number	δ, deg
39	158	Fuselage	1.6	
40	159	Fuselage	1.8	
41	160	Fuselage	2.0	
42	79	70°/30° cranked wing	1.6	0
43	82		1.8	0
44	84		2.0	0
45	179		1.6	5
46	180		1.8	5
47	181		2.0	5
48	172	70°/66° cranked wing	1.6	0
49	170		1.8	0
50	171		2.0	0
51	173		1.6	2
52	174		1.8	2
53	175		2.0	2
54	176		1.6	5
55	177		1.8	5
56	178		2.0	5

TABLE AIII.- TABULATED FORCE AND MOMENT DATA

UPWT PROJECT 1424 RUN 158 MACH 1.60

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.001	.00	-4.57	-.0251	.0164	-.0159	.0000	-.0004	.0001	.0022	.0007	.0015	.0209
2.005	.00	-2.64	-.0145	.0158	-.0084	.0000	-.0004	.0003	.0021	.0007	.0015	.0200
2.004	.00	-1.57	-.0096	.0155	-.0045	.0000	-.0004	.0007	.0021	.0007	.0015	.0198
2.004	-.00	-.57	-.0043	.0154	-.0003	.0000	-.0003	.0008	.0021	.0007	.0015	.0197
2.004	.00	.41	.0002	.0153	.0033	.0000	-.0004	.0009	.0021	.0007	.0015	.0195
2.005	-.00	1.45	.0052	.0152	.0073	.0000	-.0003	.0009	.0021	.0007	.0015	.0195
2.006	.00	3.46	.0170	.0152	.0152	-.0000	-.0003	.0009	.0022	.0007	.0015	.0195
2.008	.00	-.60	-.0049	.0154	-.0006	.0000	-.0004	.0009	.0021	.0007	.0015	.0197

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-1.2881	.00	-4.57	-.0235	.0182	-.0159	.0001	-.0004	.0001	.0022	.0007	.0017	.0228
-.8350	.00	-2.64	-.0136	.0163	-.0084	.0000	-.0004	.0003	.0021	.0007	.0016	.0207
-.5739	.00	-1.57	-.0091	.0158	-.0045	.0000	-.0004	.0007	.0021	.0007	.0015	.0201
-.2652	-.00	-.57	-.0041	.0154	-.0003	.0000	-.0003	.0008	.0021	.0007	.0015	.0197
.0054	.00	.41	.0001	.0153	.0033	.0000	-.0004	.0009	.0021	.0007	.0015	.0195
.3077	-.00	1.45	.0047	.0153	.0073	.0000	-.0003	.0009	.0021	.0007	.0015	.0196
.9892	.00	3.46	.0159	.0161	.0152	-.0000	-.0003	.0009	.0022	.0007	.0016	.0205
-.3049	.00	-.60	-.0047	.0154	-.0006	.0000	-.0004	.0009	.0021	.0007	.0015	.0197

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 159 MACH 1.80

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.004	-.00	-4.72	-.0261	.0159	-.0166	.0000	-.0003	.0011	.0023	.0005	.0020	.0207
2.000	-.00	-2.66	-.0145	.0152	-.0084	.0000	-.0005	.0011	.0021	.0005	.0020	.0198
2.003	-.00	-1.70	-.0100	.0149	-.0044	.0000	-.0004	.0012	.0021	.0005	.0020	.0196
2.004	-.00	-.79	-.0059	.0147	-.0007	.0000	-.0003	.0014	.0022	.0005	.0020	.0194
2.005	-.00	.25	-.0007	.0147	.0034	.0000	-.0004	.0012	.0021	.0005	.0020	.0194
2.005	-.00	1.29	.0047	.0146	.0075	.0000	-.0003	.0014	.0021	.0005	.0020	.0193
2.004	.00	3.25	.0160	.0146	.0150	-.0000	-.0005	.0011	.0022	.0005	.0020	.0193
1.996	-.00	-.74	-.0057	.0148	-.0006	.0000	-.0004	.0014	.0022	.0005	.0020	.0195

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-1.3698	-.00	-4.72	-.0244	.0178	-.0166	.0000	-.0003	.0011	.0023	.0005	.0022	.0228
-.8641	-.00	-2.66	-.0136	.0157	-.0084	.0001	-.0005	.0011	.0021	.0005	.0021	.0204
-.6225	-.00	-1.70	-.0095	.0152	-.0044	.0000	-.0004	.0012	.0021	.0005	.0020	.0199
-.3777	-.00	-.79	-.0056	.0148	-.0007	.0000	-.0003	.0014	.0022	.0005	.0020	.0195
-.0563	-.00	.25	-.0008	.0147	.0034	.0000	-.0004	.0012	.0021	.0005	.0020	.0193
.2903	-.00	1.29	.0043	.0147	.0075	.0000	-.0003	.0014	.0021	.0005	.0020	.0194
.9728	.00	3.25	.0150	.0154	.0150	-.0000	-.0005	.0011	.0022	.0005	.0021	.0201
-.3688	-.00	-.74	-.0055	.0148	-.0006	.0000	-.0004	.0014	.0022	.0005	.0020	.0195

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 160 MACH 2.00

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.005	-.00	-5.25	-.0275	.0149	-.0170	.0000	-.0003	.0010	.0019	.0004	.0026	.0198
2.003	-.00	-3.33	-.0165	.0143	-.0095	.0000	-.0003	.0011	.0018	.0004	.0026	.0191
2.003	-.00	-2.26	-.0115	.0142	-.0051	.0000	-.0003	.0009	.0018	.0004	.0026	.0189
2.003	-.00	-1.29	-.0066	.0141	-.0010	.0000	-.0002	.0012	.0018	.0004	.0026	.0189
2.003	-.00	-.31	-.0019	.0139	.0031	.0000	-.0003	.0010	.0018	.0004	.0026	.0187
1.997	-.00	.68	.0031	.0139	.0069	.0000	-.0003	.0012	.0018	.0004	.0026	.0187
2.000	-.00	2.69	.0155	.0137	.0146	-.0000	-.0002	.0012	.0018	.0004	.0026	.0185
2.001	-.00	-1.29	-.0068	.0140	-.0011	.0000	-.0003	.0012	.0018	.0004	.0026	.0188

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-1.4933	-.00	-5.25	-.0255	.0171	-.0170	.0001	-.0003	.0010	.0019	.0004	.0028	.0222
-1.0128	-.00	-3.33	-.0153	.0151	-.0095	.0000	-.0003	.0011	.0018	.0004	.0027	.0200
-.7356	-.00	-2.26	-.0107	.0146	-.0051	.0000	-.0003	.0009	.0018	.0004	.0026	.0194
-.4350	-.00	-1.29	-.0062	.0142	-.0010	.0000	-.0002	.0012	.0018	.0004	.0026	.0190
-.1307	-.00	-.31	-.0018	.0139	.0031	.0000	-.0003	.0010	.0018	.0004	.0026	.0187
.2092	-.00	.68	.0029	.0139	.0069	.0000	-.0003	.0012	.0018	.0004	.0026	.0187
1.0171	-.00	2.69	.0146	.0144	.0146	-.0000	-.0002	.0012	.0018	.0004	.0027	.0192
-.4491	-.00	-1.29	-.0064	.0141	-.0011	.0000	-.0003	.0012	.0018	.0004	.0026	.0190

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 79 MACH 1.60

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.006	-.02	-4.40	-.1887	.0240	.0294	.0002	-.0004	.0011	.0024	.0007	.0015	.0286
2.000	-.02	-2.35	-.1012	.0239	.0182	.0001	-.0005	.0015	.0024	.0007	.0015	.0286
2.001	-.02	-1.34	-.0583	.0239	.0127	.0003	-.0004	.0015	.0026	.0007	.0015	.0287
2.001	-.02	-.40	-.0180	.0238	.0074	.0003	-.0003	.0015	.0027	.0007	.0015	.0287
2.002	-.02	.60	.0232	.0235	.0019	.0001	-.0005	.0018	.0027	.0007	.0015	.0285
1.997	-.02	1.67	.0702	.0230	-.0043	.0003	-.0003	.0015	.0028	.0007	.0015	.0280
2.001	-.02	3.62	.1539	.0221	-.0145	.0001	-.0003	.0018	.0029	.0007	.0015	.0271
2.001	-.02	5.63	.2388	.0210	-.0241	.0001	-.0002	.0019	.0029	.0007	.0015	.0261
1.997	-.03	7.66	.3251	.0202	-.0337	.0003	-.0003	.0020	.0030	.0007	.0014	.0253
2.000	-.03	9.67	.4081	.0197	-.0434	.0002	-.0004	.0025	.0030	.0007	.0014	.0248
1.999	-.03	11.61	.4884	.0191	-.0524	.0002	-.0004	.0027	.0030	.0007	.0014	.0243
2.001	-.03	13.59	.5644	.0186	-.0609	.0002	-.0007	.0031	.0030	.0007	.0014	.0237
1.999	-.03	15.62	.6440	.0182	-.0688	.0001	-.0008	.0033	.0030	.0008	.0014	.0233
2.002	-.03	17.62	.7185	.0180	-.0757	.0001	-.0013	.0048	.0030	.0009	.0013	.0232
1.999	-.03	19.66	.7982	.0179	-.0853	.0003	-.0014	.0050	.0030	.0009	.0013	.0231
2.001	-.02	-.39	-.0170	.0238	.0074	.0001	-.0004	.0011	.0027	.0007	.0015	.0287

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.8670	-.02	-4.40	-.1861	.0382	.0294	.0002	-.0004	.0011	.0024	.0007	.0017	.0430
-3.5692	-.02	-2.35	-.1000	.0280	.0182	.0001	-.0005	.0015	.0024	.0007	.0016	.0327
-2.2836	-.02	-1.34	-.0577	.0253	.0127	.0003	-.0004	.0015	.0026	.0007	.0015	.0301
-.7435	-.02	-.40	-.0178	.0239	.0074	.0003	-.0003	.0015	.0027	.0007	.0015	.0288
.9667	-.02	.60	.0229	.0237	.0019	.0001	-.0005	.0018	.0027	.0007	.0015	.0287
2.7767	-.02	1.67	.0694	.0250	-.0043	.0003	-.0003	.0015	.0028	.0007	.0015	.0300
4.7985	-.02	3.62	.1520	.0317	-.0145	.0001	-.0003	.0018	.0029	.0007	.0016	.0368
5.3420	-.02	5.63	.2353	.0441	-.0241	.0001	-.0003	.0019	.0029	.0007	.0017	.0494
5.0766	-.03	7.66	.3191	.0629	-.0337	.0003	-.0003	.0020	.0029	.0007	.0019	.0684
4.5685	-.03	9.67	.3985	.0872	-.0434	.0001	-.0004	.0025	.0030	.0007	.0021	.0930
4.0844	-.03	11.61	.4740	.1160	-.0524	.0001	-.0005	.0027	.0030	.0007	.0024	.1221
3.6401	-.03	13.59	.5436	.1493	-.0609	.0000	-.0007	.0031	.0029	.0007	.0027	.1557
3.2475	-.03	15.62	.6146	.1892	-.0688	-.0001	-.0008	.0033	.0029	.0008	.0030	.1959
2.9180	-.03	17.62	.6785	.2325	-.0757	-.0003	-.0013	.0048	.0028	.0009	.0033	.2396
2.6323	-.03	19.66	.7447	.2829	-.0853	-.0002	-.0014	.0050	.0028	.0008	.0037	.2903
-.7031	-.02	-.39	-.0168	.0239	.0074	.0001	-.0004	.0011	.0027	.0007	.0015	.0288

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 82 MACH 1.80

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.006	-.02	-4.47	-.1689	.0231	.0222	.0002	-.0003	.0005	.0024	.0005	.0020	.0280
2.000	-.02	-2.42	-.0912	.0229	.0144	.0002	-.0003	.0006	.0024	.0005	.0020	.0278
2.002	-.02	-1.32	-.0503	.0228	.0099	-.0000	-.0003	.0008	.0025	.0005	.0020	.0278
2.002	-.02	-.37	-.0141	.0226	.0061	.0001	-.0002	.0009	.0026	.0005	.0020	.0277
2.001	-.02	.71	.0256	.0222	.0016	.0000	-.0003	.0008	.0026	.0005	.0020	.0273
2.002	-.02	1.68	.0629	.0219	-.0024	.0000	-.0004	.0010	.0026	.0005	.0020	.0270
2.001	-.02	3.62	.1369	.0211	-.0103	-.0001	-.0004	.0011	.0026	.0005	.0020	.0262
2.002	-.02	5.62	.2130	.0204	-.0180	-.0000	-.0004	.0011	.0026	.0005	.0020	.0255
2.000	-.02	7.64	.2891	.0196	-.0257	.0000	-.0006	.0014	.0026	.0006	.0019	.0247
2.002	-.02	9.67	.3637	.0191	-.0339	-.0000	-.0004	.0013	.0026	.0006	.0018	.0242
2.000	-.02	11.61	.4351	.0190	-.0419	.0001	-.0005	.0017	.0025	.0006	.0018	.0240
2.003	-.02	13.68	.5070	.0188	-.0500	.0002	-.0007	.0016	.0025	.0007	.0017	.0236
2.004	-.02	15.64	.5728	.0189	-.0562	.0002	-.0008	.0022	.0025	.0007	.0016	.0236
2.000	-.02	17.64	.6408	.0190	-.0640	.0002	-.0009	.0025	.0024	.0007	.0015	.0236
2.002	-.02	19.65	.7136	.0184	-.0740	.0002	-.0013	.0025	.0024	.0007	.0014	.0229
2.000	-.02	-.31	-.0120	.0226	.0059	-.0000	-.0004	.0009	.0026	.0005	.0020	.0277

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.6114	-.02	-4.47	-.1662	.0360	.0222	.0003	-.0003	.0005	.0024	.0005	.0022	.0411
-3.3733	-.02	-2.42	-.0900	.0267	.0144	.0002	-.0003	.0006	.0024	.0005	.0021	.0317
-2.0774	-.02	-1.32	-.0497	.0239	.0099	-.0000	-.0003	.0008	.0025	.0005	.0020	.0289
-.6128	-.02	-.37	-.0139	.0227	.0061	.0001	-.0002	.0009	.0026	.0005	.0020	.0278
1.1213	-.02	.71	.0252	.0225	.0016	.0000	-.0003	.0008	.0026	.0005	.0020	.0276
2.6244	-.02	1.68	.0621	.0237	-.0024	-.0000	-.0004	.0010	.0026	.0005	.0020	.0288
4.5598	-.02	3.62	.1351	.0296	-.0103	-.0001	-.0004	.0011	.0026	.0005	.0021	.0348
5.1314	-.02	5.62	.2095	.0408	-.0180	-.0001	-.0004	.0011	.0026	.0005	.0023	.0462
4.9425	-.02	7.64	.2834	.0573	-.0257	-.0000	-.0006	.0014	.0026	.0005	.0024	.0629
4.4774	-.02	9.67	.3547	.0792	-.0339	-.0001	-.0004	.0013	.0025	.0006	.0026	.0849
4.0098	-.02	11.61	.4217	.1052	-.0419	-.0000	-.0005	.0017	.0025	.0006	.0028	.1111
3.5639	-.02	13.68	.4873	.1367	-.0500	.0000	-.0007	.0016	.0024	.0006	.0031	.1429
3.1937	-.02	15.64	.5457	.1709	-.0562	-.0000	-.0008	.0022	.0024	.0007	.0033	.1772
2.8750	-.02	17.64	.6040	.2101	-.0640	-.0001	-.0009	.0025	.0023	.0007	.0036	.2167
2.6101	-.02	19.65	.6649	.2547	-.0740	-.0003	-.0013	.0025	.0023	.0007	.0039	.2616
-.5224	-.02	-.31	-.0118	.0227	.0059	-.0000	-.0004	.0009	.0026	.0005	.0020	.0278

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 64 MACH 2.00

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.005	-.02	-4.58	-.1578	.0221	.0174	.0002	.0001	-.0002	.0019	.0004	.0026	.0271
2.003	-.02	-2.55	-.0867	.0219	.0112	.0003	.0001	-.0001	.0019	.0004	.0026	.0268
2.004	-.02	-1.55	-.0519	.0218	.0083	.0002	.0001	-.0000	.0019	.0004	.0026	.0267
2.002	-.02	-.62	-.0199	.0217	.0053	.0002	.0002	-.0001	.0019	.0004	.0026	.0266
2.006	-.02	.44	.0167	.0213	.0020	.0002	.0002	-.0002	.0019	.0004	.0026	.0262
2.002	-.02	1.42	.0508	.0209	-.0010	.0001	.0002	.0001	.0019	.0004	.0026	.0258
2.006	-.02	3.45	.1217	.0201	-.0076	.0000	.0002	.0001	.0019	.0004	.0026	.0251
2.005	-.02	5.42	.1922	.0196	-.0140	.0001	.0001	.0003	.0019	.0004	.0026	.0245
2.001	-.02	7.44	.2606	.0191	-.0202	.0002	-.0002	.0004	.0019	.0004	.0025	.0240
2.006	-.02	9.47	.3278	.0188	-.0267	-.0000	-.0002	.0004	.0019	.0005	.0024	.0236
2.002	-.02	11.41	.3905	.0187	-.0330	.0001	-.0002	.0005	.0019	.0005	.0023	.0235
2.002	-.02	13.39	.4518	.0191	-.0387	.0001	-.0003	.0008	.0019	.0005	.0022	.0237
1.998	-.02	15.51	.5180	.0193	-.0458	-.0001	-.0005	.0013	.0018	.0005	.0020	.0236
2.000	-.02	17.43	.5799	.0193	-.0540	-.0001	-.0008	.0015	.0018	.0005	.0019	.0235
1.997	-.01	19.44	.6487	.0187	-.0641	-.0000	-.0011	.0017	.0018	.0005	.0017	.0228
2.002	-.02	-.57	-.0176	.0217	.0050	.0002	.0002	-.0001	.0019	.0004	.0026	.0267

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.5000	-.02	-4.58	-.1551	.0345	.0174	.0002	.0001	-.0002	.0019	.0004	.0028	.0396
-3.3218	-.02	-2.55	-.0854	.0257	.0112	.0003	.0001	-.0001	.0019	.0004	.0027	.0306
-2.2043	-.02	-1.55	-.0511	.0232	.0083	.0002	.0001	-.0000	.0019	.0004	.0026	.0281
-.8932	-.02	-.62	-.0196	.0219	.0053	.0002	.0002	-.0001	.0019	.0004	.0026	.0268
.7733	-.02	.44	.0165	.0214	.0020	.0002	.0002	-.0002	.0019	.0004	.0026	.0263
2.2676	-.02	1.42	.0502	.0221	-.0010	.0001	.0002	.0001	.0019	.0004	.0026	.0271
4.3927	-.02	3.45	.1200	.0273	-.0076	.0000	.0002	.0001	.0019	.0004	.0027	.0324
5.0521	-.02	5.42	.1890	.0374	-.0140	.0002	.0001	.0003	.0019	.0004	.0028	.0426
4.8915	-.02	7.44	.2553	.0522	-.0202	.0001	-.0002	.0004	.0019	.0004	.0030	.0575
4.4541	-.02	9.47	.3195	.0717	-.0267	-.0001	-.0002	.0004	.0019	.0005	.0032	.0773
4.0016	-.02	11.41	.3782	.0945	-.0330	.0001	-.0002	.0005	.0019	.0005	.0034	.1003
3.5686	-.02	13.39	.4341	.1217	-.0387	-.0000	-.0003	.0008	.0019	.0005	.0036	.1276
3.1763	-.02	15.51	.4929	.1552	-.0458	-.0002	-.0005	.0013	.0018	.0005	.0039	.1613
2.8780	-.02	17.43	.5463	.1898	-.0540	-.0004	-.0007	.0015	.0017	.0005	.0041	.1961
2.6174	-.01	19.44	.6043	.2309	-.0641	-.0004	-.0010	.0017	.0017	.0005	.0043	.2374
-.7906	-.02	-.57	-.0173	.0219	.0050	.0002	.0002	-.0001	.0019	.0004	.0026	.0268

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 179 MACH 1.60

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.004	-.02	-9.17	-.3297	.0186	.0622	-.0005	-.0013	.0026	.0031	.0007	.0015	.0239
2.001	-.02	-8.17	-.2859	.0198	.0572	-.0004	-.0012	.0030	.0031	.0007	.0015	.0251
2.007	-.02	-7.16	-.2433	.0210	.0521	-.0007	-.0013	.0031	.0031	.0007	.0015	.0263
2.005	-.02	-6.18	-.2007	.0221	.0471	-.0005	-.0012	.0031	.0032	.0007	.0015	.0275
2.008	-.02	-5.16	-.1541	.0236	.0411	-.0006	-.0012	.0030	.0034	.0007	.0015	.0292
2.005	-.02	-4.15	-.1115	.0247	.0357	-.0007	-.0012	.0029	.0035	.0007	.0015	.0304
2.011	-.02	-3.17	-.0648	.0259	.0298	-.0004	-.0011	.0028	.0035	.0007	.0015	.0317
2.012	-.02	-2.15	-.0188	.0268	.0237	-.0005	-.0010	.0024	.0036	.0007	.0015	.0326
2.011	-.02	-1.17	.0220	.0276	.0183	-.0003	-.0010	.0026	.0037	.0007	.0015	.0334
2.009	-.02	-.15	.0711	.0285	.0123	-.0005	-.0010	.0022	.0037	.0007	.0015	.0344
2.009	-.02	.84	.1184	.0295	.0066	-.0005	-.0010	.0022	.0038	.0007	.0015	.0354
2.014	-.02	1.84	.1651	.0304	.0011	-.0001	-.0008	.0020	.0038	.0007	.0015	.0364
2.011	-.02	2.83	.2082	.0312	-.0039	-.0004	-.0009	.0020	.0038	.0007	.0015	.0371
2.006	-.02	3.85	.2558	.0324	-.0095	-.0001	-.0009	.0020	.0038	.0007	.0015	.0383
2.005	-.02	4.87	.3025	.0337	-.0146	-.0001	-.0009	.0017	.0037	.0007	.0015	.0396
2.015	-.02	5.83	.3454	.0347	-.0201	-.0002	-.0009	.0018	.0038	.0007	.0015	.0407
2.005	-.02	6.82	.3880	.0360	-.0257	-.0003	-.0009	.0017	.0037	.0007	.0015	.0419
2.002	-.01	7.86	.4355	.0375	-.0317	.0000	-.0008	.0007	.0037	.0007	.0014	.0433
2.006	-.02	8.85	.4774	.0388	-.0373	-.0000	-.0010	.0015	.0037	.0007	.0014	.0446
2.002	-.01	9.83	.5189	.0402	-.0424	-.0002	-.0013	.0018	.0037	.0007	.0014	.0460
2.002	-.01	10.80	.5603	.0416	-.0475	.0001	-.0014	.0015	.0037	.0007	.0014	.0474
2.007	-.02	-5.15	-.1530	.0236	.0410	-.0006	-.0012	.0031	.0034	.0007	.0015	.0291

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.5695	-.02	-9.17	-.3220	.0705	.0622	-.0003	-.0013	.0026	.0031	.0007	.0019	.0761
-4.6736	-.02	-8.17	-.2798	.0599	.0572	-.0002	-.0012	.0030	.0031	.0007	.0018	.0655
-4.6827	-.02	-7.16	-.2384	.0509	.0521	-.0005	-.0014	.0031	.0031	.0007	.0018	.0564
-4.5394	-.02	-6.18	-.1968	.0434	.0471	-.0004	-.0013	.0031	.0031	.0007	.0017	.0489
-4.0647	-.02	-5.16	-.1511	.0372	.0411	-.0005	-.0013	.0030	.0033	.0007	.0017	.0429
-3.3548	-.02	-4.15	-.1092	.0325	.0357	-.0006	-.0012	.0029	.0035	.0007	.0016	.0383
-2.1483	-.02	-3.17	-.0631	.0294	.0298	-.0004	-.0011	.0028	.0035	.0007	.0016	.0352
-.6447	-.02	-2.15	-.0177	.0274	.0237	-.0005	-.0010	.0024	.0036	.0007	.0016	.0333
.8329	-.02	-1.17	.0226	.0271	.0183	-.0003	-.0010	.0026	.0037	.0007	.0015	.0330
2.5122	-.02	-.15	.0711	.0283	.0123	-.0005	-.0010	.0022	.0037	.0007	.0015	.0343
3.7789	-.02	.84	.1179	.0312	.0066	-.0005	-.0010	.0022	.0038	.0007	.0015	.0372
4.5962	-.02	1.84	.1639	.0357	.0011	-.0001	-.0008	.0020	.0038	.0007	.0015	.0417
4.9876	-.02	2.83	.2063	.0414	-.0039	-.0005	-.0009	.0020	.0038	.0007	.0016	.0474
5.1238	-.02	3.85	.2528	.0493	-.0095	-.0001	-.0009	.0020	.0038	.0007	.0016	.0554
5.0525	-.02	4.87	.2983	.0590	-.0146	-.0002	-.0009	.0017	.0037	.0007	.0017	.0651
4.8979	-.02	5.83	.3398	.0694	-.0201	-.0003	-.0008	.0018	.0037	.0007	.0018	.0756
4.6741	-.02	6.82	.3806	.0814	-.0257	-.0004	-.0008	.0017	.0037	.0007	.0018	.0876
4.4301	-.01	7.86	.4259	.0961	-.0317	-.0001	-.0008	.0007	.0037	.0007	.0019	.1024
4.1851	-.02	8.85	.4654	.1112	-.0373	-.0002	-.0010	.0015	.0037	.0007	.0020	.1176
3.9557	-.01	9.83	.5040	.1274	-.0424	-.0004	-.0013	.0018	.0036	.0007	.0021	.1339
3.7382	-.01	10.80	.5421	.1450	-.0475	-.0002	-.0014	.0015	.0037	.0007	.0023	.1516
-4.0511	-.02	-5.15	-.1500	.0370	.0410	-.0005	-.0012	.0031	.0034	.0007	.0017	.0428

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 180 MACH 1.80

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.001	-.02	-9.33	-.2921	.0179	.0504	-.0002	-.0010	.0017	.0029	.0005	.0021	.0233
1.995	-.02	-8.36	-.2533	.0190	.0464	-.0003	-.0010	.0018	.0029	.0005	.0021	.0244
1.994	-.02	-7.32	-.2140	.0202	.0427	-.0004	-.0009	.0017	.0028	.0005	.0021	.0256
2.001	-.02	-6.30	-.1733	.0211	.0383	-.0003	-.0008	.0015	.0029	.0005	.0020	.0265
1.992	-.02	-5.32	-.1354	.0221	.0344	-.0004	-.0007	.0015	.0029	.0005	.0020	.0275
2.002	-.02	-4.31	-.0948	.0231	.0300	-.0005	-.0007	.0013	.0030	.0005	.0020	.0286
2.003	-.02	-3.33	-.0567	.0241	.0257	-.0005	-.0006	.0010	.0030	.0005	.0020	.0295
1.997	-.02	-2.32	-.0158	.0250	.0213	-.0006	-.0006	.0010	.0030	.0005	.0020	.0305
2.004	-.01	-1.32	.0238	.0257	.0170	-.0004	-.0005	.0005	.0030	.0005	.0020	.0312
2.001	-.01	-.31	.0660	.0264	.0123	-.0004	-.0006	.0006	.0030	.0005	.0020	.0320
1.998	-.01	.68	.1070	.0273	.0083	-.0004	-.0006	.0004	.0030	.0005	.0020	.0328
2.004	-.01	1.69	.1508	.0282	.0036	-.0002	-.0006	.0003	.0030	.0005	.0020	.0338
2.003	-.01	2.68	.1920	.0293	-.0009	-.0003	-.0007	.0002	.0030	.0005	.0020	.0348
2.005	-.01	3.66	.2304	.0304	-.0051	-.0003	-.0008	-.0002	.0030	.0005	.0020	.0360
2.005	-.01	4.68	.2698	.0316	-.0096	-.0003	-.0008	-.0001	.0031	.0005	.0020	.0371
2.002	-.01	5.70	.3107	.0329	-.0145	-.0005	-.0007	-.0005	.0031	.0005	.0020	.0384
2.002	-.01	6.67	.3486	.0342	-.0193	-.0004	-.0005	-.0002	.0030	.0005	.0020	.0397
2.004	-.01	7.69	.3869	.0354	-.0240	-.0004	-.0006	-.0009	.0030	.0006	.0019	.0409
1.993	-.01	8.68	.4262	.0368	-.0288	-.0002	-.0006	-.0007	.0030	.0006	.0019	.0422
1.996	-.01	9.64	.4602	.0380	-.0331	-.0002	-.0007	-.0006	.0030	.0006	.0018	.0435
1.999	-.01	10.65	.4964	.0395	-.0376	-.0001	-.0007	-.0007	.0029	.0006	.0018	.0448
1.996	-.01	-.34	.0655	.0265	.0126	-.0003	-.0005	.0003	.0030	.0005	.0020	.0320

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.4101	-.02	-9.33	-.2847	.0646	.0504	-.0000	-.0010	.0017	.0028	.0005	.0025	.0703
-4.4775	-.02	-8.36	-.2472	.0552	.0464	-.0001	-.0011	.0018	.0028	.0005	.0024	.0610
-4.4492	-.02	-7.32	-.2091	.0470	.0427	-.0003	-.0010	.0017	.0028	.0005	.0024	.0527
-4.2741	-.02	-6.30	-.1695	.0397	.0383	-.0002	-.0008	.0015	.0028	.0005	.0023	.0453
-3.8596	-.02	-5.32	-.1324	.0343	.0344	-.0003	-.0008	.0015	.0029	.0005	.0022	.0399
-3.0835	-.02	-4.31	-.0925	.0300	.0300	-.0004	-.0007	.0013	.0029	.0005	.0022	.0356
-2.0204	-.02	-3.33	-.0549	.0272	.0257	-.0005	-.0007	.0010	.0030	.0005	.0021	.0328
-.5739	-.02	-2.32	-.0147	.0255	.0213	-.0005	-.0007	.0010	.0030	.0005	.0021	.0311
.9722	-.01	-1.32	.0244	.0251	.0170	-.0004	-.0006	.0005	.0030	.0005	.0020	.0307
2.5395	-.01	-.31	.0662	.0261	.0123	-.0004	-.0006	.0006	.0030	.0005	.0020	.0316
3.7342	-.01	.68	.1066	.0286	.0083	-.0004	-.0006	.0004	.0030	.0005	.0020	.0341
4.5917	-.01	1.69	.1498	.0326	.0036	-.0002	-.0006	.0003	.0030	.0005	.0020	.0382
4.9851	-.01	2.68	.1903	.0382	-.0009	-.0003	-.0007	.0002	.0030	.0005	.0021	.0438
5.0689	-.01	3.66	.2278	.0449	-.0051	-.0004	-.0007	-.0002	.0030	.0005	.0021	.0506
4.9954	-.01	4.68	.2660	.0532	-.0096	-.0004	-.0007	-.0001	.0030	.0005	.0022	.0590
4.8245	-.01	5.70	.3055	.0633	-.0145	-.0006	-.0007	-.0005	.0030	.0005	.0023	.0691
4.6152	-.01	6.67	.3418	.0741	-.0193	-.0004	-.0005	-.0002	.0030	.0005	.0023	.0799
4.3779	-.01	7.69	.3781	.0864	-.0240	-.0004	-.0006	-.0009	.0030	.0005	.0024	.0923
4.1508	-.01	8.68	.4152	.1000	-.0288	-.0003	-.0006	-.0007	.0030	.0006	.0025	.1061
3.9249	-.01	9.64	.4467	.1138	-.0331	-.0003	-.0007	-.0006	.0029	.0006	.0026	.1199
3.7026	-.01	10.65	.4799	.1296	-.0376	-.0003	-.0007	-.0007	.0029	.0006	.0027	.1358
2.5211	-.01	-.34	.0657	.0261	.0126	-.0003	-.0005	.0003	.0030	.0005	.0020	.0316

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 181 MACH 2.00

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.004	-.02	-9.45	-.2736	.0171	.0425	-.0002	-.0004	.0006	.0023	.0004	.0026	.0224
1.999	-.02	-8.46	-.2365	.0182	.0390	-.0001	-.0003	.0005	.0022	.0004	.0026	.0234
2.005	-.02	-7.45	-.2001	.0191	.0360	-.0002	-.0002	.0004	.0022	.0004	.0026	.0243
2.003	-.02	-6.45	-.1632	.0200	.0326	-.0001	-.0001	.0003	.0022	.0004	.0026	.0252
2.004	-.02	-5.46	-.1277	.0209	.0294	-.0002	-.0002	.0005	.0022	.0004	.0026	.0261
1.996	-.02	-4.46	-.0922	.0216	.0262	-.0001	-.0001	.0005	.0023	.0004	.0026	.0269
1.991	-.02	-3.44	-.0544	.0225	.0228	-.0002	-.0001	.0003	.0023	.0004	.0026	.0278
1.997	-.02	-2.45	-.0169	.0234	.0193	-.0001	-.0001	.0001	.0023	.0004	.0026	.0287
1.996	-.02	-1.44	.0190	.0241	.0159	-.0002	-.0000	.0000	.0023	.0004	.0026	.0294
1.993	-.02	-.44	.0573	.0249	.0123	-.0003	-.0001	.0001	.0023	.0004	.0026	.0301
1.998	-.02	.56	.0950	.0256	.0087	-.0002	-.0001	-.0005	.0023	.0004	.0026	.0309
1.996	-.02	1.55	.1344	.0267	.0049	-.0001	-.0001	-.0004	.0022	.0004	.0026	.0319
1.998	-.01	2.54	.1700	.0277	.0013	.0000	-.0002	-.0006	.0022	.0004	.0026	.0329
1.997	-.01	3.55	.2072	.0288	-.0025	-.0000	-.0003	-.0008	.0023	.0004	.0026	.0341
1.999	-.01	4.56	.2440	.0300	-.0064	.0001	-.0003	-.0009	.0023	.0004	.0026	.0353
1.999	-.01	5.53	.2770	.0312	-.0097	.0000	-.0003	-.0008	.0023	.0004	.0026	.0365
1.998	-.01	6.54	.3131	.0324	-.0141	.0000	-.0005	-.0013	.0023	.0004	.0026	.0377
2.002	-.01	7.55	.3479	.0338	-.0179	-.0001	-.0004	-.0010	.0023	.0004	.0025	.0391
2.001	-.01	8.55	.3808	.0350	-.0217	-.0002	-.0004	-.0015	.0023	.0005	.0025	.0402
2.001	-.01	9.57	.4155	.0365	-.0258	-.0001	-.0005	-.0015	.0023	.0005	.0024	.0416
2.004	-.01	10.56	.4469	.0379	-.0296	-.0000	-.0003	-.0021	.0023	.0005	.0024	.0430
1.998	-.01	11.56	.4804	.0393	-.0335	-.0001	-.0002	-.0018	.0022	.0005	.0023	.0444
2.007	-.01	12.56	.5137	.0408	-.0371	-.0001	-.0006	-.0017	.0022	.0005	.0022	.0458
2.003	-.02	-.44	.0581	.0246	.0123	.0000	-.0000	-.0004	.0023	.0004	.0026	.0301

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.3407	-.02	-9.45	-.2662	.0613	.0425	-.0001	-.0004	.0006	.0022	.0004	.0031	.0670
-4.4010	-.02	-8.46	-.2305	.0524	.0390	-.0001	-.0003	.0005	.0022	.0004	.0030	.0580
-4.3823	-.02	-7.45	-.1952	.0446	.0360	-.0001	-.0002	.0004	.0022	.0004	.0029	.0501
-4.2086	-.02	-6.45	-.1594	.0379	.0326	-.0001	-.0001	.0003	.0022	.0004	.0029	.0433
-3.8120	-.02	-5.46	-.1246	.0327	.0294	-.0001	-.0002	.0005	.0022	.0004	.0028	.0382
-3.1492	-.02	-4.46	-.0899	.0285	.0262	-.0001	-.0001	.0005	.0023	.0004	.0028	.0340
-2.0518	-.02	-3.44	-.0526	.0256	.0228	-.0002	-.0001	.0003	.0023	.0004	.0027	.0310
-.6489	-.02	-2.45	-.0156	.0241	.0193	-.0001	-.0001	.0001	.0023	.0004	.0027	.0294
.8360	-.02	-1.44	.0197	.0236	.0159	-.0002	-.0000	.0000	.0023	.0004	.0026	.0289
2.3578	-.02	-.44	.0575	.0244	.0123	-.0003	-.0001	.0001	.0023	.0004	.0026	.0297
3.5714	-.02	.56	.0947	.0265	.0087	-.0002	-.0001	-.0005	.0023	.0004	.0026	.0318
4.4087	-.02	1.55	.1335	.0303	.0049	-.0001	-.0001	-.0004	.0022	.0004	.0026	.0355
4.7921	-.01	2.54	.1683	.0351	.0013	-.0000	-.0002	-.0006	.0022	.0004	.0027	.0404
4.9357	-.01	3.55	.2047	.0415	-.0025	-.0000	-.0003	-.0008	.0023	.0004	.0027	.0469
4.8952	-.01	4.56	.2404	.0491	-.0064	.0000	-.0003	-.0009	.0023	.0004	.0028	.0546
4.7355	-.01	5.53	.2722	.0575	-.0097	.0000	-.0003	-.0008	.0023	.0004	.0029	.0630
4.5466	-.01	6.54	.3067	.0675	-.0141	-.0000	-.0005	-.0013	.0023	.0004	.0029	.0731
4.3161	-.01	7.55	.3398	.0787	-.0179	-.0001	-.0004	-.0010	.0023	.0004	.0030	.0845
4.0937	-.01	8.55	.3706	.0905	-.0217	-.0003	-.0003	-.0015	.0023	.0004	.0031	.0963
3.8640	-.01	9.57	.4023	.1042	-.0258	-.0002	-.0005	-.0015	.0022	.0005	.0032	.1101
3.6534	-.01	10.56	.4315	.1181	-.0296	-.0001	-.0003	-.0021	.0022	.0005	.0033	.1241
3.4563	-.01	11.56	.4619	.1336	-.0335	-.0001	-.0002	-.0018	.0022	.0005	.0034	.1397
3.2719	-.01	12.56	.4915	.1502	-.0371	-.0003	-.0005	-.0017	.0022	.0005	.0035	.1564
2.3925	-.02	-.44	.0584	.0244	.0123	.0000	-.0000	-.0004	.0023	.0004	.0026	.0297

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 172 MACH 1.60

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
1.995	.00	-4.03	-.1650	.0225	.0240	.0002	-.0007	.0013	.0030	.0007	.0015	.0277
1.993	.00	-2.01	-.0859	.0232	.0148	.0001	-.0008	.0018	.0030	.0007	.0015	.0284
1.996	.00	-1.01	-.0445	.0234	.0102	.0001	-.0008	.0020	.0032	.0007	.0015	.0288
1.997	.00	-.03	-.0099	.0233	.0061	.0002	-.0007	.0018	.0033	.0007	.0015	.0288
1.997	-.00	1.01	.0319	.0228	.0016	.0001	-.0007	.0019	.0033	.0007	.0015	.0283
1.998	-.00	1.99	.0722	.0220	-.0032	.0001	-.0007	.0021	.0034	.0007	.0015	.0275
1.998	-.00	4.08	.1616	.0207	-.0129	.0005	-.0005	.0014	.0034	.0007	.0015	.0263
2.000	-.00	6.01	.2361	.0200	-.0179	.0003	-.0005	.0018	.0035	.0007	.0015	.0257
2.001	-.00	8.04	.3150	.0196	-.0233	.0004	-.0005	.0022	.0036	.0007	.0014	.0254
2.001	-.00	10.00	.3894	.0192	-.0281	.0003	-.0005	.0022	.0037	.0007	.0014	.0250
2.003	-.01	11.96	.4618	.0189	-.0326	.0003	-.0004	.0024	.0037	.0007	.0014	.0247
2.003	-.00	14.04	.5369	.0184	-.0370	.0003	-.0006	.0023	.0037	.0008	.0014	.0243
1.992	-.00	15.97	.6037	.0184	-.0397	.0003	-.0007	.0027	.0038	.0008	.0014	.0244
1.992	-.00	17.95	.6728	.0185	-.0436	.0003	-.0012	.0033	.0038	.0009	.0013	.0246
1.995	-.00	20.02	.7464	.0184	-.0484	.0002	-.0011	.0038	.0038	.0009	.0013	.0245
1.996	-.00	-.02	-.0080	.0233	.0062	.0001	-.0007	.0021	.0033	.0007	.0015	.0288

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.8074	.00	-4.03	-.1628	.0339	.0240	.0003	-.0006	.0013	.0030	.0007	.0016	.0392
-3.2511	.00	-2.01	-.0850	.0261	.0148	.0001	-.0007	.0018	.0030	.0007	.0015	.0314
-1.8212	.00	-1.01	-.0441	.0242	.0102	.0001	-.0008	.0020	.0032	.0007	.0015	.0296
-.4253	.00	-.03	-.0099	.0233	.0061	.0002	-.0007	.0018	.0033	.0007	.0015	.0288
1.3476	-.00	1.01	.0314	.0233	.0016	.0000	-.0007	.0019	.0033	.0007	.0015	.0288
2.9159	-.00	1.99	.0713	.0245	-.0032	.0001	-.0007	.0021	.0034	.0007	.0015	.0300
4.9849	-.00	4.08	.1595	.0320	-.0129	.0005	-.0005	.0014	.0034	.0007	.0016	.0377
5.2470	-.00	6.01	.2324	.0443	-.0179	.0002	-.0006	.0018	.0035	.0007	.0018	.0502
4.8991	-.00	8.04	.3087	.0630	-.0233	.0003	-.0006	.0022	.0036	.0007	.0019	.0692
4.4252	-.00	10.00	.3796	.0858	-.0281	.0002	-.0005	.0022	.0036	.0007	.0022	.0922
3.9531	-.01	11.96	.4473	.1132	-.0326	.0002	-.0005	.0024	.0036	.0007	.0024	.1199
3.5149	-.00	14.04	.5157	.1467	-.0370	.0001	-.0007	.0023	.0036	.0007	.0028	.1538
3.1571	-.00	15.97	.5746	.1820	-.0397	.0001	-.0007	.0027	.0037	.0008	.0031	.1895
2.8423	-.00	17.95	.6335	.2229	-.0436	-.0001	-.0013	.0033	.0037	.0009	.0034	.2308
2.5676	-.00	20.02	.6941	.2703	-.0484	-.0002	-.0011	.0038	.0036	.0008	.0038	.2785
-.3419	-.00	-.02	-.0080	.0233	.0062	.0001	-.0007	.0021	.0033	.0007	.0015	.0288

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 170 MACH 1.80

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.008	.00	-6.14	-.2249	.0216	.0256	.0005	-.0007	.0017	.0026	.0005	.0020	.0267
2.007	-.00	-5.18	-.1922	.0217	.0240	.0002	-.0007	.0019	.0026	.0005	.0020	.0268
2.006	-.00	-4.18	-.1566	.0219	.0209	.0001	-.0007	.0024	.0026	.0005	.0020	.0270
2.006	-.00	-3.17	-.1167	.0221	.0170	.0001	-.0006	.0018	.0026	.0005	.0020	.0272
2.008	-.00	-2.16	-.0796	.0223	.0127	.0001	-.0006	.0018	.0026	.0005	.0020	.0275
2.008	-.00	-1.17	-.0436	.0225	.0088	-.0000	-.0006	.0019	.0027	.0005	.0020	.0277
2.003	-.00	-.17	-.0076	.0223	.0055	.0000	-.0005	.0019	.0028	.0005	.0020	.0277
1.995	-.00	.84	.0278	.0218	.0015	-.0000	-.0005	.0017	.0029	.0005	.0020	.0272
1.994	-.00	1.80	.0641	.0212	-.0025	.0001	-.0005	.0016	.0029	.0005	.0020	.0266
1.997	-.00	2.82	.1042	.0205	-.0073	.0001	-.0005	.0019	.0029	.0005	.0020	.0260
1.997	-.00	3.83	.1435	.0200	-.0110	.0000	-.0004	.0014	.0030	.0005	.0020	.0254
1.999	-.00	4.82	.1791	.0196	-.0129	-.0001	-.0004	.0014	.0030	.0005	.0020	.0251
2.000	-.00	5.82	.2126	.0193	-.0145	.0002	-.0004	.0017	.0030	.0005	.0020	.0248
2.000	-.00	6.83	.2493	.0191	-.0167	.0003	-.0006	.0019	.0030	.0005	.0019	.0245
2.001	-.00	7.83	.2844	.0189	-.0192	.0003	-.0006	.0020	.0030	.0006	.0019	.0244
1.995	-.00	8.81	.3172	.0186	-.0213	.0003	-.0006	.0022	.0030	.0006	.0019	.0243
1.992	-.00	9.84	.3530	.0187	-.0231	.0003	-.0006	.0024	.0030	.0006	.0018	.0241
1.996	-.00	-.17	-.0078	.0224	.0053	.0001	-.0005	.0020	.0028	.0005	.0020	.0278

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.8789	.00	-6.14	-.2208	.0453	.0256	.0006	-.0006	.0017	.0026	.0005	.0023	.0506
-4.8781	-.00	-5.18	-.1891	.0388	.0240	.0003	-.0006	.0019	.0026	.0005	.0022	.0441
-4.6624	-.00	-4.18	-.1543	.0331	.0209	.0001	-.0007	.0024	.0026	.0005	.0022	.0384
-4.0538	-.00	-3.17	-.1151	.0284	.0170	.0002	-.0006	.0018	.0026	.0005	.0021	.0336
-3.1090	-.00	-2.16	-.0785	.0253	.0127	.0002	-.0005	.0018	.0026	.0005	.0021	.0304
-1.8419	-.00	-1.17	-.0430	.0234	.0088	.0000	-.0006	.0019	.0027	.0005	.0020	.0286
-.3375	-.00	-.17	-.0075	.0223	.0055	.0000	-.0005	.0019	.0028	.0005	.0020	.0277
1.2338	-.00	.84	.0274	.0222	.0015	-.0000	-.0005	.0017	.0029	.0005	.0020	.0276
2.7352	-.00	1.80	.0633	.0231	-.0025	.0001	-.0005	.0016	.0029	.0005	.0020	.0286
4.0221	-.00	2.82	.1029	.0256	-.0073	.0000	-.0005	.0019	.0029	.0005	.0021	.0311
4.8173	-.00	3.83	.1416	.0294	-.0110	.0000	-.0004	.0014	.0029	.0005	.0021	.0350
5.1370	-.00	4.82	.1764	.0343	-.0129	-.0001	-.0004	.0014	.0030	.0005	.0022	.0400
5.1663	-.00	5.82	.2091	.0405	-.0145	.0001	-.0005	.0017	.0030	.0005	.0023	.0462
5.0838	-.00	6.83	.2448	.0481	-.0167	.0002	-.0006	.0019	.0030	.0005	.0023	.0540
4.8959	-.00	7.83	.2787	.0569	-.0192	.0002	-.0006	.0020	.0030	.0006	.0024	.0629
4.6630	-.00	8.81	.3100	.0665	-.0213	.0002	-.0006	.0022	.0030	.0006	.0025	.0725
4.4137	-.00	9.84	.3439	.0779	-.0231	.0002	-.0007	.0024	.0030	.0006	.0026	.0841
-.3445	-.00	-.17	-.0077	.0224	.0053	.0001	-.0005	.0020	.0028	.0005	.0020	.0278

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 171 MACH 2.00

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
1.999	-.00	-4.31	-.1445	.0211	.0156	.0001	-.0003	.0010	.0021	.0004	.0026	.0262
1.994	-.00	-2.30	-.0741	.0215	.0090	.0002	-.0002	.0011	.0021	.0004	.0026	.0266
1.994	-.00	-1.26	-.0395	.0216	.0060	.0002	-.0002	.0009	.0021	.0004	.0026	.0268
1.997	-.00	-.28	-.0053	.0215	.0031	.0003	-.0001	.0010	.0021	.0004	.0026	.0266
1.997	-.00	.72	.0272	.0210	.0003	.0002	-.0000	.0008	.0022	.0004	.0026	.0262
1.997	-.00	1.74	.0626	.0203	-.0031	.0002	.0001	.0008	.0022	.0004	.0026	.0255
1.997	-.00	3.70	.1327	.0191	-.0094	.0002	.0000	.0010	.0022	.0004	.0026	.0244
1.998	-.00	5.71	.1993	.0184	-.0137	.0003	-.0001	.0010	.0022	.0004	.0026	.0236
1.998	-.00	7.71	.2619	.0180	-.0165	.0005	-.0004	.0014	.0023	.0004	.0025	.0232
1.997	-.00	9.72	.3230	.0178	-.0199	.0004	-.0004	.0015	.0023	.0005	.0024	.0230
1.998	-.00	11.70	.3809	.0178	-.0226	.0004	-.0004	.0014	.0023	.0005	.0023	.0229
1.999	-.00	13.75	.4391	.0182	-.0252	.0004	-.0003	.0014	.0023	.0005	.0021	.0232
2.000	-.00	15.76	.4971	.0185	-.0295	.0003	-.0004	.0015	.0022	.0005	.0020	.0232
2.000	-.00	17.73	.5562	.0185	-.0347	.0003	-.0006	.0020	.0022	.0005	.0019	.0231
2.000	.00	19.76	.6210	.0179	-.0419	.0003	-.0009	.0022	.0022	.0005	.0017	.0223
2.002	-.00	-.27	-.0048	.0215	.0030	.0002	-.0001	.0010	.0021	.0004	.0026	.0267

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.4793	-.00	-4.31	-.1421	.0317	.0156	.0002	-.0003	.0010	.0021	.0004	.0028	.0370
-2.9930	-.00	-2.30	-.0730	.0244	.0090	.0003	-.0002	.0011	.0021	.0004	.0026	.0295
-1.7283	-.00	-1.26	-.0389	.0225	.0060	.0002	-.0001	.0009	.0021	.0004	.0026	.0276
-.2416	-.00	-.28	-.0052	.0215	.0031	.0003	-.0000	.0010	.0021	.0004	.0026	.0267
1.2625	-.00	.72	.0269	.0213	.0003	.0002	-.0000	.0008	.0022	.0004	.0026	.0265
2.7920	-.00	1.74	.0618	.0221	-.0031	.0002	.0001	.0008	.0022	.0004	.0026	.0274
4.7538	-.00	3.70	.1309	.0275	-.0094	.0002	.0000	.0010	.0022	.0004	.0027	.0329
5.1788	-.00	5.71	.1960	.0378	-.0137	.0003	-.0001	.0010	.0022	.0004	.0029	.0433
4.8913	-.00	7.71	.2565	.0524	-.0165	.0004	-.0004	.0014	.0022	.0004	.0030	.0581
4.4127	-.00	9.72	.3145	.0713	-.0199	.0003	-.0005	.0015	.0023	.0005	.0032	.0772
3.9376	-.00	11.70	.3684	.0936	-.0226	.0003	-.0004	.0014	.0023	.0005	.0034	.0997
3.4936	-.00	13.75	.4211	.1205	-.0252	.0003	-.0003	.0014	.0022	.0005	.0036	.1269
3.1309	-.00	15.76	.4723	.1508	-.0295	.0002	-.0005	.0015	.0022	.0005	.0039	.1574
2.8318	-.00	17.73	.5230	.1847	-.0347	.0001	-.0007	.0020	.0021	.0005	.0041	.1914
2.5764	.00	19.76	.5772	.2240	-.0419	-.0001	-.0010	.0022	.0020	.0005	.0044	.2309
-.2179	-.00	-.27	-.0047	.0215	.0030	.0002	-.0001	.0010	.0021	.0004	.0026	.0267

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 173 MACH 1.60

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.003	.01	-8.19	-.3037	.0191	.0428	.0008	-.0008	.0006	.0029	.0007	.0015	.0242
2.001	.00	-7.21	-.2679	.0197	.0402	.0009	-.0008	.0010	.0030	.0007	.0015	.0248
2.003	.00	-6.14	-.2248	.0202	.0371	.0004	-.0008	.0010	.0030	.0007	.0015	.0254
2.004	.00	-5.16	-.1854	.0208	.0340	.0003	-.0006	.0009	.0030	.0007	.0015	.0260
2.005	.00	-4.15	-.1451	.0215	.0298	.0002	-.0005	.0009	.0030	.0007	.0015	.0267
2.006	.00	-3.15	-.1042	.0223	.0248	.0001	-.0006	.0010	.0032	.0007	.0015	.0277
2.006	.00	-2.17	-.0616	.0232	.0195	.0002	-.0005	.0011	.0033	.0007	.0015	.0287
2.006	.00	-1.18	-.0218	.0238	.0147	.0002	-.0006	.0013	.0033	.0007	.0015	.0293
2.007	.00	-.14	.0173	.0239	.0100	.0003	-.0006	.0013	.0034	.0007	.0015	.0295
2.007	.00	.86	.0590	.0238	.0053	.0002	-.0006	.0011	.0034	.0007	.0015	.0295
2.007	.00	1.86	.1028	.0235	-.0001	.0001	-.0006	.0015	.0035	.0007	.0015	.0291
2.007	-.00	2.85	.1473	.0233	-.0056	.0003	-.0005	.0014	.0035	.0007	.0015	.0289
2.008	-.00	3.87	.1891	.0234	-.0084	.0005	-.0005	.0016	.0035	.0007	.0015	.0291
2.008	-.00	4.82	.2266	.0236	-.0114	.0005	-.0005	.0016	.0036	.0007	.0015	.0294
2.001	-.00	5.84	.2678	.0237	-.0147	.0005	-.0007	.0022	.0036	.0007	.0015	.0295
1.997	-.00	6.82	.3083	.0241	-.0177	.0005	-.0007	.0019	.0036	.0007	.0015	.0299
1.996	-.00	7.83	.3471	.0245	-.0205	.0006	-.0006	.0021	.0036	.0007	.0014	.0302
1.996	-.00	8.84	.3871	.0249	-.0234	.0005	-.0006	.0025	.0036	.0007	.0014	.0307
1.998	-.00	9.83	.4237	.0254	-.0260	.0004	-.0005	.0020	.0037	.0007	.0014	.0312
1.999	-.00	11.85	.5000	.0265	-.0312	.0005	-.0006	.0025	.0037	.0007	.0014	.0324
2.000	-.00	13.84	.5716	.0276	-.0355	.0004	-.0009	.0028	.0037	.0008	.0014	.0335
2.001	.00	-2.17	-.0619	.0233	.0196	.0002	-.0005	.0012	.0033	.0007	.0015	.0288

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.8176	.01	-8.19	-.2975	.0618	.0428	.0009	-.0006	.0006	.0029	.0007	.0018	.0672
-4.9794	.00	-7.21	-.2629	.0528	.0402	.0010	-.0007	.0010	.0030	.0007	.0018	.0582
-5.0316	.00	-6.14	-.2210	.0439	.0371	.0005	-.0007	.0010	.0030	.0007	.0017	.0493
-4.9028	.00	-5.16	-.1825	.0372	.0340	.0003	-.0005	.0009	.0030	.0007	.0017	.0426
-4.4930	.00	-4.15	-.1429	.0318	.0298	.0003	-.0004	.0009	.0030	.0007	.0016	.0371
-3.6748	.00	-3.15	-.1026	.0279	.0248	.0001	-.0006	.0010	.0031	.0007	.0016	.0334
-2.3739	.00	-2.17	-.0606	.0255	.0195	.0002	-.0005	.0011	.0033	.0007	.0016	.0310
-.8759	.00	-1.18	-.0212	.0242	.0147	.0002	-.0006	.0013	.0033	.0007	.0015	.0297
.7262	.00	-.14	.0173	.0239	.0100	.0003	-.0006	.0013	.0034	.0007	.0015	.0295
2.3735	.00	.86	.0586	.0247	.0053	.0002	-.0006	.0011	.0034	.0007	.0015	.0303
3.8078	.00	1.86	.1019	.0267	-.0001	.0001	-.0006	.0015	.0035	.0007	.0015	.0324
4.7845	-.00	2.85	.1458	.0305	-.0056	.0003	-.0005	.0014	.0035	.0007	.0016	.0362
5.2004	-.00	3.87	.1869	.0359	-.0084	.0005	-.0005	.0016	.0035	.0007	.0016	.0417
5.2722	-.00	4.82	.2236	.0424	-.0114	.0004	-.0006	.0016	.0035	.0007	.0017	.0483
5.2109	-.00	5.84	.2637	.0506	-.0147	.0004	-.0007	.0022	.0036	.0007	.0018	.0566
5.0344	-.00	6.82	.3029	.0602	-.0177	.0004	-.0007	.0019	.0036	.0007	.0018	.0663
4.7887	-.00	7.83	.3401	.0710	-.0205	.0005	-.0007	.0021	.0036	.0007	.0019	.0772
4.5296	-.00	8.84	.3783	.0835	-.0234	.0004	-.0007	.0025	.0036	.0007	.0020	.0898
4.2710	-.00	9.83	.4126	.0966	-.0260	.0003	-.0006	.0020	.0036	.0007	.0021	.1030
3.7888	-.00	11.85	.4833	.1276	-.0312	.0004	-.0007	.0025	.0036	.0007	.0024	.1343
3.3782	-.00	13.84	.5477	.1621	-.0355	.0002	-.0010	.0028	.0036	.0007	.0027	.1692
-2.3813	.00	-2.17	-.0609	.0256	.0196	.0002	-.0005	.0012	.0033	.0007	.0016	.0311

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 174 MACH 1.80

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.000	.00	-8.35	-.2765	.0183	.0347	.0007	-.0005	.0008	.0027	.0005	.0021	.0236
1.999	.00	-7.31	-.2407	.0190	.0331	.0007	-.0004	.0005	.0027	.0005	.0020	.0242
2.001	.00	-6.32	-.2063	.0194	.0314	.0001	-.0003	.0003	.0027	.0005	.0020	.0247
2.003	.00	-5.32	-.1698	.0200	.0284	-.0000	-.0004	.0008	.0027	.0005	.0020	.0252
2.003	-.00	-4.31	-.1321	.0206	.0249	-.0000	-.0003	.0008	.0027	.0005	.0020	.0258
2.004	.00	-3.31	-.0937	.0213	.0207	-.0002	-.0003	.0008	.0028	.0005	.0020	.0266
2.004	-.00	-2.33	-.0578	.0220	.0164	.0000	-.0003	.0008	.0029	.0005	.0020	.0274
2.003	-.00	-1.32	-.0184	.0226	.0124	-.0000	-.0004	.0011	.0029	.0005	.0020	.0280
2.004	-.00	-.32	.0170	.0226	.0085	-.0000	-.0004	.0010	.0029	.0005	.0020	.0281
1.999	-.00	.68	.0546	.0225	.0045	-.0001	-.0004	.0011	.0030	.0005	.0020	.0280
1.995	-.00	1.67	.0954	.0223	-.0002	-.0000	-.0004	.0012	.0030	.0005	.0020	.0278
1.992	-.00	2.65	.1356	.0222	-.0045	.0001	-.0005	.0016	.0030	.0005	.0020	.0278
1.991	.00	3.65	.1736	.0222	-.0078	.0003	-.0004	.0010	.0031	.0005	.0020	.0278
1.992	-.00	4.66	.2101	.0224	-.0102	.0007	-.0005	.0016	.0031	.0005	.0020	.0279
1.994	-.00	5.67	.2452	.0227	-.0117	.0004	-.0007	.0018	.0031	.0005	.0020	.0282
1.995	.00	6.67	.2809	.0230	-.0140	.0002	-.0008	.0019	.0031	.0005	.0020	.0286
1.995	-.00	7.64	.3144	.0235	-.0166	.0002	-.0007	.0021	.0031	.0006	.0019	.0291
1.995	-.00	9.65	.3823	.0244	-.0217	.0003	-.0005	.0019	.0031	.0006	.0018	.0300
1.995	-.00	11.69	.4492	.0256	-.0262	.0004	-.0006	.0024	.0031	.0006	.0018	.0311
1.995	.00	13.67	.5121	.0271	-.0299	.0006	-.0008	.0020	.0031	.0007	.0017	.0325
1.996	-.00	-2.34	-.0564	.0221	.0165	.0001	-.0003	.0010	.0029	.0005	.0020	.0274

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.6665	.00	-8.35	-.2703	.0579	.0347	.0008	-.0004	.0008	.0026	.0005	.0024	.0635
-4.8029	.00	-7.31	-.2358	.0491	.0331	.0007	-.0003	.0005	.0027	.0005	.0024	.0546
-4.8492	.00	-6.32	-.2025	.0418	.0314	.0002	-.0003	.0003	.0027	.0005	.0023	.0472
-4.7107	.00	-5.32	-.1669	.0354	.0284	.0000	-.0004	.0008	.0027	.0005	.0022	.0409
-4.2870	-.00	-4.31	-.1299	.0303	.0249	-.0000	-.0003	.0008	.0027	.0005	.0022	.0357
-3.4702	.00	-3.31	-.0921	.0265	.0207	-.0002	-.0003	.0008	.0028	.0005	.0021	.0319
-2.3346	-.00	-2.33	-.0567	.0243	.0164	.0001	-.0003	.0008	.0029	.0005	.0021	.0297
-.7765	-.00	-1.32	-.0178	.0230	.0124	.0000	-.0004	.0011	.0029	.0005	.0020	.0284
.7636	-.00	-.32	.0172	.0225	.0085	-.0000	-.0004	.0010	.0029	.0005	.0020	.0280
2.3431	-.00	.68	.0542	.0232	.0045	-.0001	-.0004	.0011	.0030	.0005	.0020	.0287
3.7713	-.00	1.67	.0945	.0251	-.0002	-.0000	-.0004	.0012	.0030	.0005	.0020	.0306
4.7258	-.00	2.65	.1342	.0284	-.0045	.0001	-.0005	.0016	.0030	.0005	.0021	.0340
5.1882	.00	3.65	.1716	.0331	-.0078	.0003	-.0004	.0010	.0031	.0005	.0021	.0387
5.2936	-.00	4.66	.2073	.0392	-.0102	.0007	-.0006	.0016	.0030	.0005	.0022	.0449
5.1881	-.00	5.67	.2413	.0465	-.0117	.0003	-.0007	.0018	.0031	.0005	.0023	.0523
5.0026	.00	6.67	.2758	.0551	-.0140	.0001	-.0008	.0019	.0031	.0005	.0023	.0611
4.7664	-.00	7.64	.3080	.0646	-.0166	.0001	-.0007	.0021	.0031	.0005	.0024	.0706
4.2589	-.00	9.65	.3722	.0874	-.0217	.0002	-.0006	.0019	.0030	.0006	.0026	.0936
3.7733	-.00	11.69	.4340	.1150	-.0262	.0003	-.0006	.0024	.0031	.0006	.0028	.1215
3.3625	.00	13.67	.4904	.1459	-.0299	.0004	-.0010	.0020	.0030	.0006	.0031	.1526
-2.2752	-.00	-2.34	-.0553	.0243	.0165	.0001	-.0003	.0010	.0029	.0005	.0021	.0297

UPWT PROJECT 1424 RUN 175 MACH 2.00

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.004	-.00	-8.46	-.2574	.0175	.0289	.0006	.0001	-.0001	.0021	.0004	.0026	.0226
2.000	-.00	-7.46	-.2267	.0180	.0281	.0002	.0001	-.0001	.0021	.0004	.0026	.0231
2.000	.00	-6.45	-.1935	.0185	.0264	.0001	-.0000	-.0000	.0021	.0004	.0026	.0236
2.001	.00	-5.49	-.1611	.0190	.0242	.0001	-.0000	-.0000	.0021	.0004	.0026	.0241
2.003	-.00	-4.45	-.1258	.0195	.0216	.0003	.0000	.0003	.0021	.0004	.0026	.0246
2.004	-.00	-3.41	-.0897	.0201	.0183	.0003	.0001	.0002	.0021	.0004	.0026	.0251
2.004	-.00	-2.44	-.0547	.0208	.0149	.0001	-.0000	.0006	.0021	.0004	.0026	.0259
2.005	-.00	-1.44	-.0201	.0213	.0116	.0003	-.0000	.0008	.0022	.0004	.0026	.0265
2.006	-.00	-.45	.0133	.0213	.0086	.0001	-.0001	.0006	.0022	.0004	.0026	.0265
2.006	-.00	.59	.0496	.0212	.0053	.0002	-.0000	.0007	.0022	.0004	.0026	.0265
2.006	-.00	1.57	.0862	.0210	.0017	.0003	-.0001	.0011	.0022	.0004	.0026	.0262
2.007	-.00	2.56	.1218	.0209	-.0015	.0002	-.0002	.0009	.0023	.0004	.0026	.0262
2.007	-.00	3.57	.1581	.0210	-.0043	.0003	-.0003	.0010	.0023	.0004	.0026	.0263
2.007	-.00	4.58	.1933	.0212	-.0072	.0004	-.0004	.0011	.0022	.0004	.0026	.0265
2.006	-.00	5.56	.2251	.0215	-.0096	.0005	-.0005	.0015	.0023	.0004	.0026	.0267
2.006	-.00	6.55	.2566	.0218	-.0117	.0007	-.0005	.0015	.0023	.0004	.0026	.0270
2.006	-.00	7.56	.2864	.0222	-.0131	.0005	-.0006	.0017	.0023	.0004	.0025	.0275
1.998	-.00	9.52	.3472	.0232	-.0167	.0006	-.0006	.0018	.0023	.0005	.0024	.0284
1.996	-.00	11.54	.4055	.0246	-.0202	.0004	-.0004	.0018	.0023	.0005	.0023	.0297
1.996	-.00	13.53	.4646	.0260	-.0247	.0005	-.0006	.0017	.0023	.0005	.0022	.0309
1.998	-.00	-2.44	-.0552	.0208	.0151	.0002	-.0000	.0007	.0021	.0004	.0026	.0259

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.5920	-.00	-8.46	-.2513	.0547	.0289	.0006	.0002	-.0001	.0021	.0004	.0030	.0602
-4.7293	-.00	-7.46	-.2218	.0469	.0281	.0002	.0001	-.0001	.0021	.0004	.0029	.0523
-4.7577	.00	-6.45	-.1896	.0398	.0264	.0001	.0000	-.0000	.0021	.0004	.0029	.0452
-4.6381	.00	-5.49	-.1581	.0341	.0242	.0001	.0000	-.0000	.0021	.0004	.0028	.0394
-4.2508	-.00	-4.45	-.1235	.0290	.0216	.0003	.0000	.0003	.0021	.0004	.0028	.0343
-3.4883	-.00	-3.41	-.0881	.0253	.0183	.0003	.0001	.0002	.0021	.0004	.0027	.0304
-2.3240	-.00	-2.44	-.0536	.0231	.0149	.0001	-.0000	.0006	.0021	.0004	.0027	.0282
-.8920	-.00	-1.44	-.0194	.0218	.0116	.0003	-.0000	.0008	.0022	.0004	.0026	.0270
.6371	-.00	-.45	.0135	.0212	.0086	.0001	-.0001	.0006	.0022	.0004	.0026	.0264
2.2677	-.00	.59	.0493	.0217	.0053	.0002	-.0000	.0007	.0022	.0004	.0026	.0270
3.6645	-.00	1.57	.0854	.0233	.0017	.0003	-.0001	.0011	.0022	.0004	.0026	.0286
4.5884	-.00	2.56	.1205	.0263	-.0015	.0002	-.0002	.0009	.0023	.0004	.0027	.0316
5.0836	-.00	3.57	.1561	.0307	-.0043	.0003	-.0003	.0010	.0023	.0004	.0027	.0361
5.2364	-.00	4.58	.1906	.0364	-.0072	.0004	-.0004	.0011	.0022	.0004	.0028	.0418
5.1636	-.00	5.56	.2215	.0429	-.0096	.0004	-.0006	.0015	.0022	.0004	.0029	.0484
4.9866	-.00	6.55	.2519	.0505	-.0117	.0006	-.0006	.0015	.0023	.0004	.0029	.0561
4.7374	-.00	7.56	.2804	.0592	-.0131	.0005	-.0007	.0017	.0023	.0004	.0030	.0649
4.2468	-.00	9.52	.3378	.0795	-.0167	.0005	-.0007	.0018	.0023	.0005	.0032	.0855
3.7607	-.00	11.54	.3915	.1041	-.0202	.0003	-.0005	.0018	.0022	.0005	.0034	.1102
3.3560	-.00	13.53	.4446	.1325	-.0247	.0003	-.0007	.0017	.0022	.0005	.0036	.1388
-2.3417	-.00	-2.44	-.0541	.0231	.0151	.0002	-.0000	.0007	.0021	.0004	.0027	.0283

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 176 MACH 1.60

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.003	.00	-9.18	-.3112	.0168	.0556	.0008	-.0013	.0024	.0031	.0007	.0015	.0221
2.003	.00	-8.22	-.2735	.0179	.0529	.0007	-.0011	.0022	.0031	.0007	.0015	.0232
2.004	.00	-7.22	-.2340	.0191	.0503	.0001	-.0010	.0020	.0031	.0007	.0015	.0244
2.007	.00	-6.23	-.1953	.0203	.0473	-.0000	-.0009	.0018	.0032	.0007	.0015	.0256
2.002	.00	-5.16	-.1502	.0217	.0426	.0001	-.0008	.0018	.0033	.0007	.0015	.0272
2.005	.00	-4.21	-.1107	.0230	.0378	-.0000	-.0008	.0017	.0034	.0007	.0015	.0286
2.009	.00	-3.21	-.0673	.0244	.0321	-.0000	-.0008	.0016	.0035	.0007	.0015	.0300
2.007	.00	-2.20	-.0243	.0257	.0267	-.0000	-.0008	.0016	.0035	.0007	.0015	.0315
2.010	.00	-1.15	.0202	.0266	.0214	.0001	-.0009	.0018	.0036	.0007	.0015	.0324
2.001	.00	-.19	.0599	.0272	.0170	.0001	-.0009	.0019	.0036	.0007	.0015	.0330
1.999	.00	.80	.1047	.0276	.0119	-.0001	-.0010	.0022	.0037	.0007	.0015	.0335
2.001	.00	1.82	.1532	.0280	.0055	.0001	-.0008	.0012	.0037	.0007	.0015	.0339
2.003	.00	2.87	.1994	.0287	.0010	.0008	-.0008	.0014	.0037	.0007	.0015	.0346
2.004	.00	3.79	.2349	.0297	-.0008	.0006	-.0008	.0019	.0037	.0007	.0015	.0356
2.004	.00	4.82	.2782	.0311	-.0043	.0004	-.0008	.0015	.0037	.0007	.0015	.0369
2.005	.00	5.80	.3198	.0324	-.0078	.0004	-.0008	.0018	.0037	.0007	.0015	.0383
2.006	.00	6.79	.3609	.0337	-.0112	.0003	-.0008	.0016	.0037	.0007	.0015	.0396
2.007	.00	7.83	.4019	.0351	-.0148	.0004	-.0006	.0008	.0037	.0007	.0014	.0409
2.008	.00	8.80	.4411	.0364	-.0178	.0004	-.0009	.0013	.0037	.0007	.0014	.0422
2.008	.00	9.88	.4826	.0380	-.0215	.0002	-.0008	.0011	.0037	.0007	.0014	.0438
2.006	.00	10.78	.5163	.0392	-.0242	.0002	-.0009	.0012	.0037	.0007	.0014	.0450
1.995	-.00	-5.18	-.1500	.0217	.0425	.0001	-.0008	.0022	.0034	.0007	.0015	.0272

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.6210	.00	-9.18	-.3041	.0658	.0556	.0010	-.0012	.0024	.0031	.0007	.0019	.0715
-4.7387	.00	-8.22	-.2677	.0565	.0529	.0009	-.0010	.0022	.0031	.0007	.0018	.0621
-4.7687	.00	-7.22	-.2293	.0481	.0503	.0002	-.0010	.0020	.0031	.0007	.0018	.0537
-4.6636	.00	-6.23	-.1917	.0411	.0473	.0001	-.0009	.0018	.0032	.0007	.0017	.0467
-4.2229	.00	-5.16	-.1474	.0349	.0426	.0001	-.0008	.0018	.0033	.0007	.0017	.0406
-3.5126	.00	-4.21	-.1085	.0309	.0378	.0000	-.0008	.0017	.0034	.0007	.0016	.0366
-2.3466	.00	-3.21	-.0657	.0280	.0321	.0000	-.0008	.0016	.0035	.0007	.0016	.0337
-.8712	.00	-2.20	-.0232	.0266	.0267	-.0000	-.0008	.0016	.0035	.0007	.0016	.0324
.7942	.00	-1.15	.0208	.0262	.0214	.0002	-.0009	.0018	.0036	.0007	.0015	.0320
2.2207	.00	-.19	.0600	.0270	.0170	.0001	-.0009	.0019	.0036	.0007	.0015	.0328
3.5900	.00	.80	.1043	.0290	.0119	-.0001	-.0010	.0022	.0037	.0007	.0015	.0349
4.6331	.00	1.82	.1521	.0328	.0055	.0001	-.0008	.0012	.0037	.0007	.0015	.0388
5.1159	.00	2.87	.1975	.0386	.0010	.0008	-.0008	.0014	.0037	.0007	.0016	.0446
5.1577	.00	3.79	.2322	.0450	-.0008	.0006	-.0009	.0019	.0037	.0007	.0016	.0510
5.0716	.00	4.82	.2744	.0541	-.0043	.0003	-.0009	.0015	.0037	.0007	.0017	.0602
4.8930	.00	5.80	.3145	.0643	-.0078	.0003	-.0009	.0018	.0037	.0007	.0018	.0704
4.6721	.00	6.79	.3541	.0758	-.0112	.0002	-.0008	.0016	.0037	.0007	.0018	.0820
4.4149	.00	7.83	.3930	.0890	-.0148	.0003	-.0006	.0008	.0036	.0007	.0019	.0953
4.1795	.00	8.80	.4299	.1029	-.0178	.0002	-.0009	.0013	.0036	.0007	.0020	.1092
3.9225	.00	9.88	.4685	.1194	-.0215	.0001	-.0008	.0011	.0036	.0007	.0021	.1259
3.7201	.00	10.78	.4993	.1342	-.0242	.0000	-.0009	.0012	.0036	.0007	.0023	.1408
-4.2141	-.00	-5.18	-.1472	.0349	.0425	.0002	-.0008	.0022	.0033	.0007	.0017	.0406

TABLE AIII.- Continued

UPWT PROJECT 1424 RUN 177 MACH 1.80

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.006	.00	-9.39	-.2811	.0162	.0469	.0005	-.0010	.0025	.0028	.0005	.0021	.0216
2.006	-.00	-8.36	-.2449	.0172	.0454	.0002	-.0008	.0021	.0028	.0005	.0021	.0226
2.007	-.00	-7.36	-.2103	.0183	.0433	-.0002	-.0008	.0021	.0028	.0005	.0021	.0237
2.007	-.00	-6.31	-.1705	.0197	.0404	-.0004	-.0007	.0023	.0028	.0005	.0020	.0251
2.009	-.00	-5.38	-.1358	.0209	.0371	-.0004	-.0006	.0017	.0029	.0005	.0020	.0263
2.010	-.00	-4.30	-.0931	.0223	.0325	-.0003	-.0004	.0013	.0029	.0005	.0020	.0278
2.011	-.00	-3.33	-.0564	.0234	.0284	-.0004	-.0005	.0014	.0030	.0005	.0020	.0288
2.006	-.00	-2.36	-.0193	.0244	.0242	.0000	-.0004	.0011	.0030	.0005	.0020	.0299
1.996	.00	-1.36	.0207	.0251	.0197	-.0003	-.0006	.0016	.0030	.0005	.0020	.0307
1.995	.00	-.37	.0601	.0258	.0155	-.0001	-.0005	.0010	.0030	.0005	.0020	.0314
1.997	.00	.71	.1054	.0263	.0101	-.0001	-.0006	.0011	.0031	.0005	.0020	.0318
1.999	.00	1.71	.1473	.0269	.0055	.0001	-.0006	.0014	.0031	.0005	.0020	.0325
2.000	.00	2.66	.1851	.0276	.0018	.0001	-.0006	.0012	.0031	.0005	.0020	.0332
2.000	.00	3.64	.2233	.0286	-.0018	.0001	-.0008	.0011	.0031	.0005	.0020	.0342
2.001	.00	4.71	.2636	.0298	-.0048	.0005	-.0007	.0014	.0031	.0005	.0020	.0354
2.001	.00	5.63	.2948	.0310	-.0065	.0003	-.0008	.0010	.0031	.0005	.0020	.0366
2.002	.00	6.65	.3300	.0323	-.0092	.0001	-.0005	.0012	.0031	.0005	.0020	.0379
2.002	-.00	7.67	.3660	.0336	-.0122	.0002	-.0005	.0013	.0031	.0006	.0019	.0392
1.997	-.00	8.67	.3990	.0348	-.0151	.0002	-.0006	.0016	.0031	.0006	.0019	.0403
2.004	.00	9.65	.4343	.0362	-.0180	.0004	-.0007	.0016	.0031	.0006	.0018	.0417
2.004	.00	10.66	.4683	.0377	-.0209	.0004	-.0007	.0011	.0030	.0006	.0018	.0431
2.003	.00	-5.31	-.1321	.0209	.0367	-.0004	-.0005	.0013	.0029	.0005	.0020	.0264

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.4682	.00	-9.39	-.2740	.0613	.0469	.0007	-.0009	.0025	.0028	.0005	.0025	.0671
-4.5784	-.00	-8.36	-.2392	.0522	.0454	.0003	-.0008	.0021	.0028	.0005	.0024	.0580
-4.5966	-.00	-7.36	-.2057	.0447	.0433	-.0001	-.0008	.0021	.0028	.0005	.0024	.0504
-4.3812	-.00	-6.31	-.1668	.0381	.0404	-.0003	-.0008	.0023	.0028	.0005	.0023	.0437
-3.9909	-.00	-5.38	-.1329	.0333	.0371	-.0004	-.0006	.0017	.0029	.0005	.0022	.0389
-3.1270	-.00	-4.30	-.0908	.0291	.0325	-.0003	-.0005	.0013	.0029	.0005	.0022	.0347
-2.0648	-.00	-3.33	-.0547	.0265	.0284	-.0004	-.0005	.0014	.0030	.0005	.0021	.0321
-.7202	-.00	-2.36	-.0181	.0251	.0242	.0000	-.0004	.0011	.0030	.0005	.0021	.0307
.8686	.00	-1.36	.0214	.0246	.0197	-.0003	-.0006	.0016	.0030	.0005	.0020	.0302
2.3719	.00	-.37	.0603	.0254	.0155	-.0001	-.0005	.0010	.0030	.0005	.0020	.0310
3.8111	.00	.71	.1050	.0276	.0101	-.0001	-.0006	.0011	.0031	.0005	.0020	.0331
4.6763	.00	1.71	.1463	.0313	.0055	.0001	-.0006	.0014	.0031	.0005	.0020	.0369
5.0870	.00	2.66	.1834	.0361	.0018	.0001	-.0006	.0012	.0031	.0005	.0021	.0417
5.1773	.00	3.64	.2208	.0426	-.0018	.0000	-.0008	.0011	.0031	.0005	.0021	.0484
5.0806	.00	4.71	.2600	.0512	-.0048	.0005	-.0007	.0014	.0031	.0005	.0022	.0570
4.8751	.00	5.63	.2899	.0595	-.0065	.0002	-.0008	.0010	.0031	.0005	.0023	.0653
4.6255	.00	6.65	.3236	.0700	-.0092	.0000	-.0005	.0012	.0031	.0005	.0023	.0759
4.3798	-.00	7.67	.3577	.0817	-.0122	.0001	-.0005	.0013	.0031	.0005	.0024	.0877
4.1391	-.00	8.67	.3886	.0939	-.0151	.0002	-.0006	.0016	.0031	.0006	.0025	.1000
3.9114	.00	9.65	.4214	.1077	-.0180	.0002	-.0008	.0016	.0031	.0006	.0026	.1140
3.6871	.00	10.66	.4526	.1228	-.0209	.0003	-.0007	.0011	.0030	.0006	.0027	.1291
-3.9344	.00	-5.31	-.1292	.0328	.0367	-.0004	-.0005	.0013	.0029	.0005	.0022	.0385

TABLE AIII.- Concluded

UPWT PROJECT 1424 RUN 178 MACH 2.00

BODY AXIS AXIAL FORCE CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

R/FT	BETA	ALPHA	CN	CA	CM	CLB	CNB	CY	CAC	CAB	CAI	CA UNC
2.005	.00	-9.47	-.2596	.0153	.0412	.0002	-.0003	.0006	.0022	.0004	.0026	.0205
2.004	-.00	-7.47	-.1930	.0173	.0378	-.0001	-.0001	.0004	.0022	.0004	.0026	.0225
2.006	-.00	-6.49	-.1607	.0184	.0354	-.0001	-.0001	.0005	.0022	.0004	.0026	.0236
2.003	-.00	-5.47	-.1245	.0195	.0326	-.0001	-.0000	.0003	.0022	.0004	.0026	.0247
1.996	-.00	-4.43	-.0868	.0207	.0293	-.0001	-.0000	.0003	.0023	.0004	.0026	.0260
1.999	-.00	-3.46	-.0527	.0217	.0259	-.0001	.0000	.0003	.0023	.0004	.0026	.0270
2.001	-.00	-2.40	-.0140	.0229	.0219	.0000	.0000	.0002	.0023	.0004	.0026	.0281
2.001	-.00	-1.41	.0220	.0234	.0185	-.0001	-.0001	.0004	.0023	.0004	.0026	.0287
2.002	-.00	-.46	.0576	.0240	.0150	.0001	-.0001	.0003	.0023	.0004	.0026	.0293
2.003	.00	.54	.0948	.0245	.0110	.0001	-.0001	.0002	.0023	.0004	.0026	.0297
2.004	.00	1.60	.1354	.0253	.0071	.0002	-.0002	.0002	.0023	.0004	.0026	.0306
2.004	.00	2.55	.1690	.0262	.0041	.0002	-.0004	.0005	.0023	.0004	.0026	.0315
2.006	.00	3.53	.2038	.0272	.0009	.0004	-.0004	.0003	.0023	.0004	.0026	.0325
2.003	.00	4.54	.2378	.0282	-.0021	.0003	-.0004	.0002	.0023	.0004	.0026	.0335
1.995	.00	5.52	.2706	.0293	-.0052	.0004	-.0004	.0005	.0023	.0004	.0026	.0346
1.996	.00	6.55	.3020	.0304	-.0072	.0004	-.0006	.0005	.0023	.0004	.0026	.0357
1.999	.00	7.57	.3337	.0317	-.0094	.0004	-.0005	.0007	.0023	.0004	.0025	.0370
1.999	.00	8.52	.3629	.0330	-.0114	.0004	-.0003	.0005	.0023	.0005	.0025	.0382
2.002	.00	9.56	.3940	.0344	-.0138	.0005	-.0005	.0002	.0023	.0005	.0024	.0396
2.003	.01	10.53	.4234	.0358	-.0163	.0004	-.0004	-.0005	.0023	.0005	.0024	.0410
2.003	-.00	-5.47	-.1247	.0196	.0329	-.0002	-.0001	.0004	.0022	.0004	.0026	.0248

STABILITY AXIS DRAG CORRECTED FOR BASE, CHAMBER, AND INTERNAL FLOW

L/D	BETA	ALPHA	CL	CD	CM	CLS	CNS	CY	CDC	CDB	CDI	CD UNC
-4.4098	.00	-9.47	-.2527	.0573	.0412	.0002	-.0002	.0006	.0022	.0004	.0031	.0629
-4.4958	-.00	-7.47	-.1884	.0419	.0378	-.0000	-.0001	.0004	.0021	.0004	.0029	.0474
-4.3397	-.00	-6.49	-.1570	.0362	.0354	-.0001	-.0002	.0005	.0022	.0004	.0029	.0416
-3.9196	-.00	-5.47	-.1216	.0310	.0326	-.0001	-.0000	.0003	.0022	.0004	.0028	.0365
-3.1130	-.00	-4.43	-.0845	.0272	.0293	-.0001	-.0000	.0003	.0023	.0004	.0028	.0326
-2.0616	-.00	-3.46	-.0510	.0247	.0259	-.0001	.0000	.0003	.0023	.0004	.0027	.0301
-.5462	-.00	-2.40	-.0128	.0234	.0219	.0000	.0000	.0002	.0023	.0004	.0026	.0287
.9965	-.00	-1.41	.0227	.0228	.0185	-.0001	-.0001	.0004	.0023	.0004	.0026	.0281
2.4585	-.00	-.46	.0578	.0235	.0150	.0001	-.0001	.0003	.0023	.0004	.0026	.0288
3.7286	.00	.54	.0945	.0254	.0110	.0001	-.0001	.0002	.0023	.0004	.0026	.0306
4.6259	.00	1.60	.1345	.0291	.0071	.0002	-.0002	.0002	.0023	.0004	.0026	.0344
4.9730	.00	2.55	.1675	.0337	.0041	.0002	-.0004	.0005	.0023	.0004	.0027	.0390
5.0938	.00	3.53	.2014	.0395	.0009	.0004	-.0004	.0003	.0023	.0004	.0027	.0450
5.0174	.00	4.54	.2344	.0467	-.0021	.0003	-.0004	.0002	.0023	.0004	.0028	.0522
4.8450	.00	5.52	.2660	.0549	-.0052	.0004	-.0004	.0005	.0023	.0004	.0029	.0605
4.6110	.00	6.55	.2960	.0642	-.0072	.0003	-.0007	.0005	.0023	.0004	.0029	.0699
4.3545	.00	7.57	.3259	.0748	-.0094	.0004	-.0005	.0007	.0023	.0004	.0030	.0806
4.1195	.00	8.52	.3532	.0857	-.0114	.0004	-.0004	.0005	.0023	.0004	.0031	.0916
3.8772	.00	9.56	.3820	.0985	-.0138	.0004	-.0006	.0002	.0023	.0005	.0032	.1045
3.6621	.01	10.53	.4089	.1117	-.0163	.0003	-.0004	-.0005	.0023	.0005	.0033	.1177
-3.9115	-.00	-5.47	-.1217	.0311	.0329	-.0002	-.0001	.0004	.0022	.0004	.0028	.0366

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15. Supplementary Notes

16. Abstract

An experimental and theoretical investigation of fuselage incidence effects on two fighter aircraft models, which differed in wing planform only, has been conducted in the Langley Unitary Plan Wind Tunnel at Mach numbers of 1.6, 1.8, and 2.0. Results were obtained on the two models at fuselage incidence angles of 0°, 2°, and 5°. The fuselage geometry included two side-mounted, flow-through, half-axisymmetric inlets and twin vertical tails. The two planforms tested were cranked wings with 70°/66° and 70°/30° leading-edge sweep angles. Experimental data showed that fuselage incidence resulted in positive increments in configuration lift and pitching moment; most of the lift increment can be attributed to the fuselage-induced upwash acting on the wing and most of the pitching-moment increment is due to the fuselage. Theoretical analysis indicates that linear-theory methods can adequately predict the overall configuration forces and moments resulting from fuselage upwash, but a higher order surface-panel method (PAN AIR) more accurately predicted the distribution of forces and resulting moments between the components.

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