NASA Technical Memorandum 4062

Experimental Results for the Eppler 387 Airfoil at Low Reynolds Numbers in the Langley Low-Turbulence Pressure Tunnel

Robert J. McGhee, Betty S. Walker, and Betty F. Millard Langley Research Center Hampton, Virginia



Scientific and Technical Information Division

.

.

Contents

Abstract	1
Introduction	1
Symbols	1
Model, Apparatus, and Procedure	1 2
Instrumentation	ะ ว
Tests and Methods	2
Presentation of Results	ر ۸
Discussion of Results	±
Concluding Remarks	* 7
Tables	ן ה
Figures	5
Appendix A—Uncertainty Analysis	2
Appendix B -Section Characteristics	j
$\begin{array}{c} \begin{array}{c} \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array} \\ \end{array} \\ \end{array} \\ \end{array}$)
Appendix C—Spanwise Drag Coefficients $\dots \dots \dots$	3
Appendix D—Chordwise Pressure Coefficients	\$
Appendix E—Spanwise Pressure Coefficients	l
References	
	,

PRECEDING PAGE BLANK NOT FILMED

Abstract

Experimental results have been obtained for an Eppler 387 airfoil in the Langley Low-Turbulence Pressure Tunnel (LTPT). The tests were conducted over a Mach number range from 0.03 to 0.13 and a chord Reynolds number range from 60 000 to 460 000. Lift and pitching-moment data were obtained from airfoil surface pressure measurements, and drag data were obtained from wake surveys. Oil flow visualization was used to determine laminar-separation and turbulent-reattachment locations. Comparisons of these results with data on the Eppler 387 airfoil from two other facilities, as well as with predictions from the Eppler airfoil code, are included.

Introduction

Recent interest in low Reynolds number aerodynamics has increased for both military and civil applications with emphasis on providing better vehicle performance (ref. 1). Reynolds numbers below 500 000 are usually identified as being in this classification. Applications are varied and include remotely piloted vehicles, ultralight human-powered vehicles, wind turbines, and propellers.

Although the design and evaluation techniques for airfoils at Reynolds numbers above 500 000 are well developed, serious problems related to boundarylayer separation and transition have been encountered at lower Reynolds numbers. Presently available design and analysis methods generally do not adequately model flow phenomena such as laminar separation bubbles. Experimental results obtained on an Eppler 387 airfoil at low Reynolds numbers in the Model Wind Tunnel at Stuttgart (ref. 2) and the Low-Turbulence Tunnel at Delft (ref. 3) have shown large differences in airfoil performance. This is not surprising because of the sensitivity of the airfoil boundary layer to free-stream disturbances, model contour accuracy, and model surface roughness. Also, the model forces and pressure differences are small and difficult to measure accurately.

NASA Langley Research Center has initiated a research program to develop test techniques to determine performance characteristics of airfoils at low Reynolds numbers ($R \leq 500\,000$) (ref. 4). This experimental program uses the Langley Low-Turbulence Pressure Tunnel and consists of performance evaluation of both force and pressure models of an Eppler 387 airfoil. Oil flow visualization and surface-mounted thin-film gages were used to determine laminar-separation and turbulent-reattachment locations. Also, test-section turbulence and acoustic measurements were obtained.

This report presents only the pressure model results obtained from this research program. Tests on a pressure model of the Eppler 387 airfoil have been conducted over a Mach number range from 0.03 to 0.13 and a chord Reynolds number range from 60 000 to 460 000. Lift and pitching-moment data were obtained from airfoil surface pressure measurements, and drag data were obtained from wake surveys. Oil flow visualization was used to determine laminar-separation and turbulent-reattachment locations. Comparisons of these results with data on the Eppler 387 airfoil from two other facilities, as well as with predictions from the Eppler airfoil code, are included. A discussion of the most pertinent results from this test is reported in reference 5. The data are presented herein in both tabulated and plotted formats.

Symbols

The symbols in parentheses are those used in computer-generated tables in the appendixes.

Ь	(B)	airfoil span, in.
C_{p}		pressure coefficient, $\frac{p-p_{\infty}}{q_{\infty}}$
с	(C)	airfoil chord, 6 in.
c _c		section chord-force coefficient, $\int C_p \ d(z/c)$
c _d	(CD)	section profile-drag coefficient, $\int_{\text{wake}} c'_d \ d(h/c)$
c'_d		point-drag coefficient (see appendix A)
c _l	(CL)	section lift coefficient, $c_n \cos \alpha - c_c \sin \alpha$
с _т	(CM)	section pitching-moment coefficient about quarter- chord point, $-\int C_p(x/c - 0.25) d(x/c) + \int C_p z/c d(z/c)$
Cn		section normal-force coefficient, $-\int C_p \ d(x/c)$
h		vertical distance in wake profile, in.
Μ		free-stream Mach number
p		static pressure, psi
p_t	(PT)	total pressure, psi
q		dynamic pressure, psi
R		Reynolds number based on free-stream conditions and airfoil chord of 6 in

$R/{ m ft}$		unit Reynolds number
\tilde{u}/u		ratio of fluctuating velocity to mean velocity in streamwise direction
x	(X)	airfoil abscissa, in.
у	(Y)	spanwise distance along model from centerline, in.
z		airfoil ordinate, in.
α	(ALPHA)	angle of attack, deg
Subscrip	ts:	
des		design
diff		difference
max		maximum
meas		measured
∞	(INF)	free-stream conditions
Abbrevia	ations:	
LS		laminar separation from flow visualization
LTPT		Low-Turbulence Pressure Tunnel
NT		natural transition from flow visualization
rms		root mean square
sep.		separation
TR		turbulent reattachment from flow visualization

Model, Apparatus, and Procedure

Model

The airfoil model was machined from stainless steel. To provide structural integrity and room for pressure tubing, the trailing edge of the model was thickened from 0 to 0.01 in. The additional thickness was blended into the Eppler 387 coordinates at x/c = 0.95. (See table I.) The basic camber distribution of the Eppler 387 airfoil was retained. The model had a chord length of 6 in. and a span of 36 in. A drawing of the Eppler 387 section shape is shown in figure 1. A photograph of the model mounted in the LTPT is shown in figure 2. The model design contour accuracy was within ± 0.001 in. The differences between the design and measured coordinates are shown in figure 3 as a function of both chordwise and spanwise locations. In general, the specified fabrication tolerance was maintained except on the model upper surface between chordwise locations of x/c = 0.60 and x/c = 0.80. A surface finish of 64 μ in. (rms) was specified.

Grooves were machined in the surface of the steel model and pressure tubing was routed through the grooves for orifice locations. The grooves were filled with epoxy resin. Orifices were drilled through the metal surface into the tubing with their axes perpendicular to the local surface. Each orifice had a diameter of 0.020 in. except at x/c = 0.95 where a diameter of 0.010 in. was used. The locations of both upper and lower surface orifices are indicated in table II. The orifices were staggered to alleviate mutual interference, as illustrated by the photograph of figure 4.

Wind Tunnel

The test was conducted in the LTPT. This facility is described in detail in reference 6, and dynamic flow quality measurements are reported in reference 7. The LTPT is a pressurized, closed-circuit, continuous-flow wind tunnel with an operating pressure from approximately 0.10 to 10 atm. The test section was designed for two-dimensional testing of airfoil sections and is 7.5 ft high, 7.5 ft long, and 3 ft wide. The contraction ratio is 17.6:1, and 9 antiturbulence screens are installed in the settling chamber.

This facility was selected to develop test techniques for low Reynolds number aerodynamics because of its good flow quality, precision pressure instrumentation, and variable pressure capability. The tunnel operating envelope for a 6-in-chord airfoil model is shown in figure 5; test conditions for the Eppler 387 model are also indicated. In order to enchance the resolution of model forces and pressure differences, it is desirable to operate at the higher end of the dynamic pressure envelope.

To supplement the turbulence measurements for the LTPT (see ref. 7) in the low Reynolds number range, additional test-section turbulence was measured with a hot-wire anemometer by Gregory S. Jones of the Langley Research Center. These preliminary results, shown in figure 6, indicate that freestream turbulence is increased for a constant unit Reynolds number as the tunnel total pressure is decreased. For example, at a unit Reynolds number of 200 000 per foot, the test-section turbulence level (frequency bandpass from 1 to 50 000 Hz) increases from about 0.06 percent to 0.18 percent as the total pressure is reduced from 15 psi to 3 psi. It is well known (ref. 1) that boundary-layer receptivity is strongly affected by the frequency content of the disturbance environment as well as by the magnitude of both velocity and pressure fluctuations.

Wake Survey Rake

The wake survey rake (fig. 7) was mounted on the tunnel survey apparatus and located 1.50 chords behind the trailing edge of the airfoil. The rake contained seven total-pressure tubes, each 0.063 in. in diameter, which were flattened to 0.020 in. (internal height) over a length of 0.25 in. from the tip of the tube. The rake is equipped with both standard and disc-type static-pressure probes. The standard probes were used to measure the static pressure in the wake for the present test. The static probes were 0.125 in. in diameter with eight flush orifices (0.018 in. diameter) drilled 45° apart and located 8 tube diameters from the tip of the probe. The rake also contained two claw-type flow-angularity probes. which consisted of two open-ended probes inclined 90° with respect to each other. These probes were used to obtain the mean flow direction of the wake.

Survey Apparatus

The wake rake was positioned at various spanwise stations behind the model by means of the remotecontrolled survey apparatus (fig. 8). The apparatus basically consists of an articulating arm mounted on an arc strut. Movement of the arm enables the wake surveys to be made for various angles of attack.

The arm is composed of three movable components: a main boom, an offset boom, and a forward pivoting head. Each component has a position control device. The main boom is mounted on the strut with a pivot point allowing rotation in the vertical plane. Its motion is controlled by the linear actuator. The offset boom can be rotated about the main boom by the roll actuator. This allows survey positions to be made at distances up to 12 in. from the tunnel centerline. The forward pivoting head is mounted at the end of the offset boom and may be rotated in the vertical plane by the (internally mounted) pitch adjustment mechanism. Figure 8 shows the survey apparatus with the wake rake mounted on the forward pivoting head assembly. In addition, the entire apparatus can be positioned vertically in the wind tunnel by using the movable strut that moves within the confines of fixed leading- and trailing-edge fairings. Positioning and rate of movement of the rake are controlled by a microprocessor controller. In general, wake surveys using this apparatus provided good drag results with a survey rate of about 0.10 in/sec or less.

Instrumentation

Measurements of pressure on the model surfaces, wake-rake pressures, and basic tunnel pressures were made with variable-capacitance precision transducers. These transducers have an accuracy of ± 0.25 percent of reading. An automatic pressurescanning system was used to record the model pressures. The following full-scale ranges of pressure transducers were used: p_t , 1000 mm Hg; q, 10 mm Hg; wake rake, 10 mm Hg; model upper surface, 50 and 10 mm Hg; model lower surface, 10 mm Hg.

Model angle of attack was measured by a calibrated digital shaft encoder driven by a pinion gear and rack attached to the pitch mechanism. Data were obtained by a high-speed data acquisition system and recorded on magnetic tape. Real-time data displays on cathode-ray tubes were available for tunnel parameters, model pressures, and wake profiles.

Tests and Methods

The pressure model was tested at Reynolds numbers based on airfoil chord from approximately $60\,000$ to $460\,000$ and Mach numbers from 0.03 to 0.13. The model was generally tested in a smooth condition except for a strip of turbulator tape used at a Reynolds number of 100 000. This tape was 0.008 in. thick and 0.08 in. wide. The leading edge of the tape formed a zig zag pattern and was located at 0.22c on the model upper surface.

Laminar-separation and turbulent-reattachment locations were determined using the oil flow technique reported in reference 8. These results are shown in table III and a typical result for a Reynolds number of 300 000 is illustrated in the photograph of figure 9.

The static-pressure measurements at the model surface were reduced to standard pressure coefficients and numerically integrated to obtain section normal-force and chord-force coefficients and section pitching-moment coefficients about the quarterchord point. Section profile-drag coefficients were computed from the wake-rake total and static pressures by the method of reference 9.

Standard low-speed wind-tunnel boundary corrections (ref. 9) have been applied to the section data. Corrections were applied to the free-stream dynamic pressure because of solid and wake blockage and applied to lift, pitching moment, and angle of attack because of the effects of floor and ceiling constraints on streamline curvature. No blockage corrections have been applied to the pressure coefficient data. The magnitude of these corrections for the Eppler 387 airfoil are

- $\alpha \text{ corrected} = \alpha + 0.0083(c_l + 4c_m)$
- $c_l \text{ corrected} = c_l (0.9988 0.0333 c_d)$
- $c_m \text{ corrected} = c_m (0.9997 0.0333c_d) + 0.0002c_l$ $c_d \text{ corrected} = c_d (0.9995 - 0.0333c_d)$

It is important when measuring performance characteristics of airfoils to provide some indication of the data accuracy. There are several areas in twodimensional airfoil testing at low Reynolds numbers that contribute to the overall uncertainty of the results: tunnel flow quality, experimental apparatus, and instrumentation accuracy.

The major errors introduced by the apparatus are confinement effects of the wind-tunnel walls, sidewall boundary-layer interaction, and large-scale vortices in the wake if wake-rake surveys are used to determine drag. For the present tests, the confinement effect of the wind-tunnel walls was minimized by testing a model with a chord-to-tunnel-height ratio of about 0.07. The sidewall boundary-layer interaction effect was reduced by using a pressure model with orifices near the center of the model and a model span-to-chord ratio of 6. To survey the spanwise flow structure in the wake, the wake rake was traversed in the spanwise direction. However, the wakerake technique of determining drag is still subject to errors related to the changing flow direction in the unsteady wake. Figure 10 illustrates typical wake profiles where two different total-pressure probes traversed through the complete wake. Note the unsteady wakes for $R \leq 100\,000$. (See ref. 1.) The degree of uncertainty associated with the instrumentation accuracy was minimized by using precision pressure transducers.

An estimate of the uncertainties in the section data for $\alpha = 4^{\circ}$, using the technique of reference 10, is shown in appendix A.

Presentation of Results

The results of this investigation have been reduced to coefficient form and tabulated in appendixes B through E. Selected results are presented in the following figures:

	L I	iguie
Effect of tunnel environment on section data; $R = 60000$ and 100000		11
Spanwise drag data; $R = 100000$ to 300 000		12
Effect of tunnel environment on chordwise pressure distributions for		
$\hat{R} = 100000$		13

Effect of tunnel environment on chordwise pressure distributions for $R = 60000$	14
Spanwise pressure data for $\alpha = 5^{\circ}$; R = 60000 and 100000	15
Effect of Reynolds number on section data	16
Effect of angle of attack on chordwise pressure distributions; R = 60000 to 460000	17
Effect of Reynolds number on chordwise pressure distributions; R = 60000 to 460000	18
Variation of drag coefficient with Reynolds numbers	19
Variation of maximum lift coefficient with Reynolds number	20
Separation and reattachment locations from oil flow data; R = 100000 to 300000	21
Comparison of pressure data with oil flow results illustrating laminar-separation and turbulent- reattachment locations; R = 100000 to 300 000	22
Hysteresis effects on section data; $R = 60 \ 000 \ to \ 300 \ 000$	23
Hysteresis effects on chordwise pressure distributions for $R = 60\ 000$	24
Hysteresis effects on chordwise pressure distributions for $R = 100\ 000$	25
Effect of turbulator tape on section data; $R = 100000$	26
Effect of turbulator tape on chordwise pressure distributions; $R = 100000$	27
Data from LTPT and other facilities; R = 60000 to 200000	28
Experimental data and predictions from Eppler airfoil code; $R = 60000$ to 460000	29

Discussion of Results

Experimental Results

Effect of tunnel environment. Figures 11 through 15 illustrate the effect of tunnel environment. It is well known (ref. 1) that boundary-layer phenomena,

such as laminar-separation bubbles, can be affected by the tunnel environment. The effects of several free-stream conditions on the airfoil section data at $R = 100\,000$ are shown in figure 11(b). The measured turbulence levels (fig. 6) vary from about 0.06 percent at $p_t = 15$ psi and M = 0.03 to about 0.16 percent at $p_t = 5$ psi and M = 0.08. Increasing the tunnel turbulence level at constant Reynolds number showed no effect on the lift and pitching-moment data. However, some effect on the drag data did occur as illustrated by the drag polar of figure 11(b). Increasing the turbulence level of the tunnel would be expected to have a beneficial effect on the bubble characteristics, similar to that observed for surface roughness (ref. 1), and hence, cause a reduction in drag. However, this result is not clearly indicated. Significant spanwise variations in c_d are shown (fig. 12(a)) at $R = 100\,000$ for these free-stream conditions. The lowest values of c_d were measured at span station 3 in., which is where the model surface pressure orifices were located. Large improvements in spanwise variations of c_d are shown (fig. 12(b)) at Reynolds numbers of 200 000 and 300 000. The pressure data of figure 13 illustrate the effect of the tunnel environment on the bubble characteristics for several angles of attack. The main effect of different free-stream conditions is the location of flow reattachment on the upper surface of the airfoil. These results illustrate the sensitivity of the bubble phenomena to the freestream environment.

Figure 11(a) illustrates the effects of two freestream conditions on the section data at $R = 60\,000$. The tunnel turbulence levels were about 0.16 percent for $p_t = 5$ psi and M = 0.05, and 0.20 percent for $p_t = 3$ psi and M = 0.09. For the data taken at $p_t = 5$ psi and M = 0.05, two different flow phenomena (laminar separation with and without turbulent reattachment) were observed at the same angle of attack. This unsteady flow occurred for angles of attack between about 3° and 7° . The pressure data of figure 14 illustrate the two flow regimes for several angles of attack, and spanwise pressure data are shown in figure 15 for $\alpha = 5^{\circ}$. It should be noted that the pressure data were obtained using an automatic pressure scanning system; thus each pressure was measured at a different time. The data at $p_t = 3$ psi and M = 0.09 for the angleof-attack range where the two flow regimes were observed always resulted in laminar separation without flow reattachment. Consistent flow reattachment occurred at $\alpha = 7.5^{\circ}$ (fig. 11(a)) for both tunnel conditions. Large increases in drag are shown in the angle-of-attack range where flow reattachment did not occur. These results illustrate the extreme sensitivity of the airfoil boundary-layer characteristics at $R = 60\,000$.

Reynolds number effects. Figures 16 through 25 illustrate Reynolds number effects. The effects of increasing Reynolds number from 60 000 to 460 000 on the airfoil section data are shown in figure 16. The data presented are for the free-stream environment where the lowest disturbance levels were measured (fig. 6). Increasing the Reynolds number results in large improvements in airfoil performance because of the decrease in size of the laminar-separation bubble. The pressure data of figure 18 illustrate this favorable Reynolds number effect. For example, for $\alpha = 4^{\circ}$ (fig. 18(d)), a decrease in the extent of the upper surface laminar-separation bubble from more than 0.50c to about 0.10c is indicated for an increase in Reynolds number from 60 000 to 460 000. A corresponding decrease in c_d of 0.0310 is indicated. As discussed earlier, two flow regimes (laminar separation with and without turbulent reattachment) occurred at $R = 60\,000$ for several angles of attack. For Reynolds numbers greater than 60 000, when laminar separation occurred, turbulent reattachment always resulted. The pressure data (fig. 18) also indicate the changes in airfoil loading because of increases in Reynolds number $(R = 60\,000$ to 200000) and the resulting decrease in the magnitude of the pitchingmoment coefficients. Figures 19 and 20 summarize the effects of Reynolds number on drag coefficient and maximum lift coefficient.

A more detailed effect of Reynolds number and angle of attack on the upper surface bubble characteristics from the oil flow results is shown in figure 21 for Reynolds numbers from 100000 to 300000. The pressure data and oil flow results are shown in comparison in figure 22. A decrease in bubble length is shown for either an increase in angle of attack at a constant Reynolds number or an increase in Reynolds number at a constant angle of attack. Increasing the Reynolds number resulted in only a small effect on the location of laminar separation compared with turbulent reattachment. For example, for $\alpha = 4^{\circ}$, increasing the Reynolds number from 100 000 to 300000 produced only about 0.05c movement in the laminar-separation point compared with about 0.15c movement in the turbulent-reattachment location. At Reynolds numbers of 200 000 and 300 000 and angles of attack between 7° and 8° , the flow remained attached and natural transition occurred. This condition generally resulted in the best lift-todrag ratio for the airfoil.

The importance of hysteresis phenomena for airfoils at low Reynolds numbers is pointed out in reference 1. The presence and extent of these phenomena are generally determined by the location of separation and/or transition in the boundary layer. Hysteresis data were obtained at Reynolds numbers from 60 000 to 300 000 by increasing the angle of attack from -3° to stall and then decreasing the angle of attack from stall to about 0° . Figure 23 illustrates the hysteresis effect on the section data and figures 24 and 25 show the effects on the chordwise pressure data. Generally, no hysteresis loops were observed; however, as previously discussed, two flow regimes were present for a small angle-of-attack range for $R = 60\,000$.

Effect of turbulator. Figures 26 and 27 illustrate the effect of the turbulator. Performance characteristics of airfoils at low Reynolds numbers are dominated by laminar-separation bubbles. One approach to provide improvements is the introduction of suitable disturbances in the boundary layer such that transition occurs ahead of where laminar separation would normally occur. Thus, a boundary-layer disturbance or turbulator was employed. A spanwise strip of tape was placed at 0.22c on the model upper surface, and the results for $R = 100\,000$ are illustrated in figures 26 and 27. The turbulator was effective in reducing drag up to a lift coefficient of about 1.0, as shown by the drag polar of figure 26. The pressure data for $\alpha = 4^{\circ}$ (fig. 27(h)) show typical effects on the laminar-separation bubble due to the turbulator. The turbulator tape did not eliminate the bubble; however, turbulent reattachment occurred further forward on the airfoil upper surface, as indicated by the forward movement of the aft pressure recovery. A reduction in c_d of about 17 percent resulted. For $\alpha = 7^{\circ}$ (fig. 27(k)), transition occurred ahead of the turbulator tape (because of the adverse pressure gradient near the leading edge) and as expected, no reduction in c_d resulted.

Comparison With Results From Other Facilities

The results of the present experiment are compared with data obtained on an Eppler 387 airfoil model in the Model Wind Tunnel at Stuttgart and the Low-Turbulence Tunnel at Delft, where the free-stream turbulence levels are 0.08 percent and 0.03 percent, respectively. Data shown for the LTPT are for the environment where the lowest turbulence levels were measured (0.06 percent for $R = 100\,000$ and $R = 200\,000$, and 0.16 percent for $R = 60\,000$). The lift data for the LTPT tests were obtained from surface pressure measurements while the data from the other facilities were obtained from force-balance measurements. Drag data for all three facilities were obtained from pressure measurements by using a wake survey rake. For Reynolds numbers of 100 000 and 200 000 (figs. 28(b) and 28(c)), generally good agreement between the LTPT and Delft data is shown; the major discrepancy is in the lift data in the high-angle-of-attack range where the LTPT data show higher values of lift coefficients. This difference may be attributed to the flow interference effects between the tunnel sidewall and model end plates, since a balance was used for the Delft tests. However, large differences are shown between the Stuttgart data and data from the LTPT or Delft. The Stuttgart lift data are generally lower, particularly at the higher angles of attack, and large differences in drag data are indicated. The Stuttgart drag data, compared with the other tunnels, indicate lower values of c_d at lift coefficients where the bubble has a large influence on c_d , and generally higher values of c_d in the low lift coefficient range. (See fig. 28(b), R = 100000.) These differences in drag data may be attributed to tunnel flow quality, or perhaps model contour accuracy and surface roughness effects.

The data from the three facilities at $R = 60\,000$ is shown in comparison in figure 28(a). As previously discussed, the LTPT data displayed two flow regimes at several angles of attack and showed extreme sensitivity to the tunnel environment at $R = 60\,000$. The LTPT and Delft data both indicate that laminar stall near $c_l \approx 0.6$ occurred with large increases in c_d , and flow reattachment occurred near $c_l = 1.0$. However, the Stuttgart data do not display these phenomena.

Comparison of Results With Eppler Airfoil Code

The Eppler airfoil code (ref. 11) has been one of the most useful codes for the design and analysis of low-speed airfoils. The most important and difficult part of the boundary-layer calculations for low Reynolds numbers is to account for the laminarseparation bubble. This code contains a bubble analogue that is evaluated from conventional computational methods based on the integral momentum and energy equations.

Lift and pitching-moment coefficients are determined from the potential flow. Viscous corrections are applied, including a correction for boundarylayer separation. Drag coefficients are obtained by applying a modified Squire-Young formula to the boundary-layer characteristics at the trailing edge. The prediction of separation is determined by the shape factor based on energy and momentum thicknesses. The prediction of transition is based on an empirical criterion that contains the Reynolds number (based on local conditions and momentum thickness) and the shape factor. The code predicts the existence of significant laminar-separation bubbles and provides a warning to indicate that the predicted drag coefficient is probably too low. However, the code does not account quantitatively for the influence of the bubble on drag.

The LTPT data and predictions from the Eppler code are shown in comparison in figure 29 for Reynolds numbers from 60000 to 460000. For Reynolds numbers of 200 000 or larger, agreement between theory and experiment is considered good. Bubble warnings occurred only at the extremities of the drag polar. For R = 100000 (fig. 29(b)), good agreement between theory and experiment is indicated for the lift and pitching-moment data. However, the experimental drag data are higher than predicted except near a lift coefficient of about 1.06. Bubble warnings appear for all lift coefficients except $c_l = 1.06$. For $R = 60\,000$ (fig. 29(a)), bubble warnings appear at all conditions. The code does predict laminar stall for a lift coefficient of about 0.6 with flow reattachment occurring at a higher c_l , as is also indicated by the experimental results. Thus, even though the code cannot account for the influence of bubbles on the drag, the boundary-layer phenomena that occur at low Reynolds numbers are predicted well. The code prediction of laminar-separation locations and the oil flow data are shown in comparison in figure 21 for different angles of attack and Reynolds numbers. Generally good agreement between theory and experiment is indicated.

Concluding Remarks

Wind-tunnel tests have been conducted in the Langley Low-Turbulence Pressure Tunnel to determine the performance characteristics of the Eppler 387 airfoil at Reynolds numbers from 60 000 to 460 000. These tests are part of a research effort to develop test techniques for low Reynolds number aerodynamics. The tests were conducted in a manner as to minimize both experimental apparatus and instrumentation uncertainties. The following results were determined from this investigation:

- 1. The performance of the Eppler 387 airfoil is dominated by laminar-separation bubbles at Reynolds numbers below 200 000.
- 2. The wind-tunnel test-section environment had a measurable influence on the size of the laminar-separation bubble and, thus, on airfoil performance.
- 3. Two flow phenomena, laminar separation with and without turbulent reattachment, were observed at the same angle of attack for a Reynolds number of 60 000.
- 4. A boundary-layer turbulator was effective in decreasing bubble size and, hence, drag at a Reynolds number of 100 000.
- 5. The comparison of results from the Langley Low-Turbulence Pressure Tunnel with data from the Delft tunnel generally showed good agreement; however, the comparison with data from the Stuttgart tunnel showed large differences.
- 6. Comparison of the present results with predictions from the Eppler airfoil code generally showed good agreement for the lift and pitching-moment data. However, large differences between predicted and measured drag occurred at Reynolds numbers below 200 000.

NASA Langley Research Center Hampton, VA 23665-5225 August 4, 1988

	Upper	surface		Lower surface				
$\frac{x}{c}$	$\frac{z_{\text{des}}}{c}$	$\frac{z_{\rm meas}}{c}$	$\left(\frac{z}{c}\right)_{\rm diff}$	$\frac{x}{c}$	$\frac{z_{\text{des}}}{c}$	z _{meas} c	$\left(\frac{z}{c}\right)_{\rm diff}$	
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
.00043	.00233	.00197	00037	.00092	00287	00288	00002	
.00518	.00932	.00920	00012	.00717	00682	00678	.00003	
.01423	.01727	.01742	.00015	.01890	01017	01017	.00000	
.02748	.02562	.02555	00007	.03597	01265	01278	00013	
.04493	.03408	.03398	00010	.05827	01425	01430	00005	
.06643	.04238	.04233	00005	.08568	01500	01498	.00002	
.09185	.05033	.05032	00002	.11800	01502	01 497	.00005	
.12093	.05775	.05772	00003	.15490	01442	01433	.00008	
.15345	.06448	.06440	00008	.19598	01328	01318	.00010	
.18907	.07037	.07025	00012	.24083	01177	01165	.00012	
.22742	.07528	.07518	00010	.28892	00998	00987	.00012	
.26813	.07908	.07903	00005	.33968	00803	00793	.00010	
.31078	.08157	.08160	.00003	.39252	00605	00597	.00008	
.35505	.08247	.08260	.00013	.44678	00410	00402	.00008	
.40077	.08173	.08182	.00008	.50182	00228	00220	.00008	
.44767	.07937	.07935	00002	.55693	00065	00060	.00005	
.49548	.07547	.07535	00012	.61147	.00073	.00077	.00003	
.54393	.07020	.07005	00015	.66472	.00187	.00187	.00000	
.59272	.06390	.06372	00018	.71602	.00268	.00265	00003	
.64137	.05697	.05675	00022	.76475	.00320	.00317	00003	
.68922	.04975	.04955	00020	.81027	.00342	.00333	00008	
.73567	.04248	.04227	00022	.85202	.00337	.00323	00013	
.78007	.03540	.03518	00022	.88943	.00307	.00317	.00010	
.82183	.02867	.02845	00022	.92205	.00258	.00257	00002	
.86035	.02242	.02227	00015	.94942	.00197	.00182	00015	
.89510	.01678	.01673	00005	1.00000	00083	00098	00015	
.92553	.01183	.01188	.00005					
.95128	.00763	.00787	.00023					
1.00000	.00083	.00147	.00063					

Table I. Design and Measured Airfoil Coordinates With Thickened Trailing Edge

$\left[\frac{y}{b/2}=-0.14\right]$

Т

Table I. Concluded	
$\left[\frac{y}{b/2}=0.56\right]$	

Upper surface			Lower surface				
$\frac{x}{c}$	$\frac{z_{\text{des}}}{c}$	$\frac{z_{\rm meas}}{c}$	$\left(\frac{z}{c}\right)_{\text{diff}}$	$\frac{x}{c}$	$\frac{z_{\rm des}}{c}$	$\frac{z_{\text{meas}}}{c}$	$\left(\frac{z}{c}\right)_{\rm diff}$
0.00000 .00043 .00518 .01423 .02748 .04493 .06643 .09185 .12093 .15345 .18907	0.00000 .00233 .00932 .01727 .02562 .03408 .04238 .05033 .05775 .06448 .07037	0.00000 .00220 .00912 .01715 .02572 .03407 .04230 .05022 .05772 .06432 .07018	0.00000 00013 00020 00012 .00010 00002 00008 00012 00012 00013 00017 00018	0.00000 .00092 .00717 .01890 .03597 .05827 .08568 .11800 .15490 .19598 .24083	$\begin{array}{c} 0.00000\\00287\\00682\\01017\\01265\\01425\\01425\\01500\\01502\\01442\\01328\\01177\end{array}$	$\begin{array}{c} 0.00000\\00268\\00695\\01028\\01267\\01430\\01502\\01498\\01435\\01435\\01320\\01167\end{array}$	0.00000 .00018 00013 00012 00002 00005 00002 .00003 .00007 .00008
.22742 .26813 .31078 .35505 .40077 .44767 .49548 .54393 .59272 .64137 .68922 .73567 .73567 .78007 .82183 .86035 .89510 .92553 .95128	.07528 .07908 .08157 .08247 .08173 .07937 .07547 .07020 .06390 .05697 .04975 .04248 .03540 .02867 .02242 .01678 .01183 .00763	.07515 .07900 .08153 .08247 .08172 .07930 .07535 .07008 .06380 .05688 .04967 .04237 .03535 .02863 .02243 .01685 .01197 .00788	00013 00003 .00000 00002 00002 00012 00012 00012 00018 00008 00008 00008 000012 .000012 .000013 .00002	.24083 .28892 .33968 .39252 .44678 .50182 .55693 .61147 .66472 .71602 .76475 .81027 .85202 .88943 .92205 .94942 1.00000	00177 00998 00803 00605 00410 00228 00065 .00073 .00187 .00268 .00320 .00342 .00337 .00307 .00258 .00197 00083	01187 00987 00597 00402 00220 00062 .00077 .00187 .00267 .00317 .00337 .00337 .00330 .00295 .00243 .00190 00090	.00010 .00012 .00010 .00008 .00008 .00003 .00003 .00000 00002 00003 00005 00007 00012 00015 00007 00007

	Upper surface							
Orifice	$\frac{x}{c}$	$\frac{y}{b/2}$	$\frac{z}{c}$					
	Cho	rdwise						
1	0.0000	0.1667	0.0000					
2	.0047	.1722	.0095					
3	.0100	.1778	.0138					
4	.0150	.1556	.0180					
5	.0200	.1611	.0215					
6	.0250	.1667	.0245					
7	.0300	.1722	.0272					
8	.0400	.1778	.0320					
9	.0500	.1556	.0363					
10	.0600	.1612	.0402					
11	.0750	.1667	.0453					
12	.1000	.1722	.0527					
13	.1500	.1778	.0640					
14	.2000	.1556	.0720					
15	.2500	.1611	.0775					
16	.3001	.1667	.0810					
17	.3500	.1722	.0823					
18	.4000	.1778	.0817					
19	.4500	.1556	.0792					
20	.5000	.1611	.0750					
21	.5500	.1667	.0695					
22	.6000	.1722	.0630					
23	.6500	.1778	.0557					
24	.7000	.1556	.0482					
25	.7500	.1611	.0402					
26	.8000	.1667	.0322					
27	.8500	.1722	.0238					
28	.9000	.1778	.0160					
29	.9500	.1556	.0080					
	Sp	anwise						
31	0.0500	0.2223	0.0363					
32	.0500	.3334	.0363					
33	.0501	.4445	.0363					
34	.0500	.5556	.0363					
35	.0500	.6667	.0363					
36	.0500	.7778	.0363					
37	.0500	.8890	.0363					
38	.0501	.9446	.0363					
39	.9000	.2222	.0160					
40	.9000	.3334	.0160					
41	.9000	.4445	.0160					
42	.9000	.5556	.0160					
43	.9000	.6667	.0160					
44	.9001	.7778	.0160					
45	.9001	.8889	.0160					
46	.9000	.9446	.0160					

	Lower surface							
Orifice	$\frac{x}{c}$	$\frac{y}{b/2}$	$\frac{z}{c}$					
102	0.0051	0.1055	-0.0062					
103	.0100	.1111	0072					
104	.0150	.1167	0092					
105	.0201	.1222	0105					
106	.0251	.1000	0113					
107	.0307	.1056	0122					
108	.0402	.1111	0132					
109	.0499	.1167	0143					
110	.0600	.1222	0143					
111	.0750	.1000	0148					
112	.1001	.1056	0150					
113	.1500	.1111	0147					
114	.2000	.1167	0130					
115	.2500	.1222	0113					
116	.3000	.1000	0093					
117	.3500	.1056	0077					
118	.4000	.1111	0058					
119	.4501	.1167	0040					
120	.5049	.1224	0022					
121	.5500	.1000	0008					
122	.6000	.1056	.0005					
123	.6500	.1112	.0015					
124	.7001	.1167	.0025					
125	.7501	.1222	.0032					
126	.8000	.1001	.0035					
127	.8500	.1056	.0034					
128	.9000	.1111	.0030					
129	.9501	.1167	.0022					

Table	II.	Model	Orifice	Locations,	c =	6	in
-------	-----	-------	---------	------------	-----	---	----

T

	R = 100000)		R = 200000			R=300000	
α , deg	LS	TR	α, \deg	LS	TR	α , deg	LS	TR
-2.9	0.51	0.97	-2	0.53	0.80	-2	0.53	0.74
-2	.50	.90	0	.48	.74	0	.48	.69
0	.45	.87	2	.43	.67	2	.45	.62
2	.41	.79	4	.40	.62	4	.40	.58
4	.35	.73	5	.38	.59	5	.39	.55
5	.34	.67	6	.37	.55	6	.38	.50
6	.33	.62	7	.33	.48	6.5	.38	.44
7	.32	.56	8	(NT a	it .32)	7	(NT	at .40)
8	.29	.47	8.5	.03	.18	7.5	(NT	at .30)
8.5	.03	.11				8	(NT	at .20)
9	.02	.02				8.5	.04	.12

Table III. Upper Surface Chordwise Locations (x/c) of Separation and Reattachment From Oil Flow Visualization

LS laminar separation

TR turbulent reattachment

NT natural transition



Figure 1. Section shape for Eppler 387 airfoil.

ORIGINAL PAGE IS OF POOR QUALITY



Figure 2. Photograph of the Eppler 387 airfoil model mounted in LTPT.



Figure 3. Measured airfoil coordinate error.





OF POOR QUALITY



Figure 4. Orifice installation for Eppler 387 pressure model.



Figure 5. Low Reynolds number operating envelope for LTPT for c = 6 in.



Figure 6. Preliminary test-section turbulence levels for LTPT.



Figure 7. Wake survey rake.



Figure 8. Sketch of remote-controlled survey apparatus for the Langley Low-Turbulence Pressure Tunnel.

I



OTHER STREET



T







Runs

Σ

p_t, psi

c,



(b) $R = 100\ 000$.



T



Figure 12. Spanwise drag data.







Figure 13. Effect of tunnel environment on chordwise pressure distributions for $R = 100\,000$. Centered symbol designates lower surface.







.5

x/c

.6 .7

.2 .3 .4

.8

.9 1.0

Figure 13. Continued.

.8 .9 1.0

.6 .7

.5

x/c

.2

1.0

0.1

.2

.6

1.0L 0

L

.2

.1

3.4



(k) $\alpha = 7^{\circ}$.



Figure 13. Concluded.



Figure 14. Effect of tunnel environment on chordwise pressure distributions for $R = 60\,000$. Centered symbol designates lower surface.



Figure 14. Continued.







(j) $\alpha = 10^{\circ}$.

Figure 14. Concluded.


Figure 15. Spanwise pressure data for $\alpha = 5^{\circ}$.



Figure 16. Effect of Reynolds number on section data.

c,

34





c1

35

.



(a) $R = 60\,000$.

Figure 17. Effect of angle of attack on chordwise pressure distributions. Centered symbol designates lower surface.



(a) $R = 60\,000$. Continued. Figure 17. Continued.





Figure 17. Continued.



(b) R = 100 000.Figure 17. Continued.

.



(b) $R = 100\,000$. Continued. Figure 17. Continued.

T



(b) $R = 100\,000$. Concluded. Figure 17. Continued.



(c) $R = 200\,000$.

Figure 17. Continued.







(c) $R = 200\,000$. Concluded.

Figure 17. Continued.



(d) R = 300 000.Figure 17. Continued.



(d) $R = 300\,000$. Continued.

Figure 17. Continued.





t

Figure 17. Continued.



(e) $R = 460\,000$.

Figure 17. Continued.



(e) $R = 460\,000$. Continued.

Figure 17. Continued.



(e) $R = 460\,000$. Concluded.

Figure 17. Concluded.



(b) $\alpha = 0^{\circ}$.

Figure 18. Effect of Reynolds number on chordwise pressure distributions. Centered symbol designates lower surface.



(c) $\alpha = 2^{\circ}$.





Figure 18. Continued.



(e) $\alpha = 6^{\circ}$.



(f) $\alpha = 8^{\circ}$.

Figure 18. Continued.







(h) $\alpha = 12^{\circ}$.

Figure 18. Concluded.



Figure 19. Variation of drag coefficient with Reynolds number.



Figure 20. Variation of maximum lift coefficient with Reynolds number.

T

·









Figure 22. Comparison of pressure data with oil flow results illustrating laminar-separation and turbulentreattachment locations. Centered symbol designates lower surface.

T



(a) $R = 100\,000$. Concluded. Figure 22. Continued.



(b) $R = 200\,000$.

Figure 22. Continued.







(c) $R = 300\,000$.

Figure 22. Continued.



Figure 22. Concluded.

Figure 23. Hysteresis effects on section data.

(a) $R = 60\ 000$.

0

Pin Di -00 చి . 1 -0 Q. -.2 .08 5 .06 đ 01 .04 ပ ή r۲ റ Ø .02 θ 0 16 12 ω α,deg **D** 4 0 Ð 0 Ø 4 -.2 2 0 1.0 ø. 9 4 4. 1.2

 c_1

Runs O Increasing angle of attack 27,28 Decreasing angle of attack 31,32

64



c,

Figure 23. Continued.



(c) $R = 200\,000$.



Runs O Increasing angle of attack 9,10,13 Decreasing anale of attac

66

T



رم د





Figure 24. Hysteresis effects on chordwise pressure distributions for $R = 60\,000$. Centered symbol designates lower surface.


1.2L 0

.2

.3.4

.1

(g) $\alpha = 8^{\circ}$. Figure 24. Continued.

.8

.9

1.0

1.2

0

.1

.2

.3

.4

.5

x/c

.6 .7



.5

x/c

.6 .7

.8 .9 1.0



(i) $\alpha = 12^{\circ}$.

Figure 24. Concluded.

T



Figure 25. Hysteresis effects on chordwise pressure distributions for $R = 100\,000$. Centered symbol designates lower surface.



Figure 25. Concluded.



 c_{l}





Figure 27. Effect of turbulator tape on chordwise pressure distributions. $R = 100\,000$. Centered symbol designates lower surface.



(g) $\alpha = 3^{\circ}$.

(h) $\alpha = 4^{\circ}$.

Figure 27. Continued.



(i) $\alpha = 5^{\circ}$.





(k) $\alpha = 7^{\circ}$.

Figure 27. Continued.



(l) $\alpha = 8^{\circ}$.





(n) $\alpha = 10^{\circ}$.

Figure 27. Concluded.



Figure 28. Data from LTPT and other facilities.

(a) $R = 60\ 000$.

1

Tunnel



 c_{1}



 c_1

Figure 28. Concluded.



T

Tunnel







Figure 29. Continued.

0

82

T



Figure 29. Continued.







Separation bubble warning



85

Figure 29. Concluded.

Appendix A

Uncertainty Analysis

The method used for the uncertainty analysis is that of Kline and McClintock as reported in reference 10. The basis for this method is the careful specification of the uncertainty associated with each variable used in the given calculation. This method is straightforward and more accurate than simple error combinations that determine maximum and minimum deviations from the nominal result of a computation.

The uncertainty involved in determining the drag coefficient c_d from wake surveys is as follows:

$$c_d = \int_{\text{wake}} c'_d \ d\left(\frac{h}{c}\right) = \sum_{i=1}^n c'_{d_i}\left(\frac{\Delta h}{c}\right) i$$

where

$$c_d' = 2\left(\frac{\Delta p_s - \Delta p_t}{\Delta p_{\infty}}\right)^{1/2} \left[1 - \left(1 - \frac{\Delta p_t}{\Delta p_{\infty}}\right)^{1/2}\right]$$

Thus, c_d is a function of Δp_s , Δp_t , Δp_{∞} , Δh , and c. The uncertainty associated with each variable is

 $W\Delta p_s = 0.25$ percent of reading $W\Delta p_t = 0.25$ percent of reading $W\Delta p_{\infty} = 0.25$ percent of reading $W\Delta h = 0.005$ in. Wc = 0.001 in.

The uncertainty of c'_d is

$$(Wc'_d)^2 = \left(\frac{\partial c'_d}{\partial \Delta p_s} W \Delta p_s\right)^2 + \left(\frac{\partial c'_d}{\partial \Delta p_t} W \Delta p_t\right)^2 + \left(\frac{\partial c'_d}{\partial \Delta p_\infty} W \Delta p_\infty\right)^2$$

where

$$\frac{\partial c'_d}{\partial \Delta p_s} = \frac{1}{\Delta p_{\infty}} \left[\left(\frac{\Delta p_{\infty}}{\Delta p_s - \Delta p_t} \right)^{1/2} - \left(\frac{\Delta p_{\infty} - \Delta p_t}{\Delta p_s - \Delta p_t} \right)^{1/2} \right]$$
$$\frac{\partial c'_d}{\partial \Delta p_t} = \frac{1}{\Delta p_{\infty}} \left(\frac{\Delta p_s - \Delta p_t}{\Delta p_{\infty} - \Delta p_t} \right)^{1/2} - \frac{1}{\Delta p_{\infty}} \left[\left(\frac{\Delta p_{\infty}}{\Delta p_s - \Delta p_t} \right)^{1/2} - \left(\frac{\Delta p_{\infty} - \Delta p_t}{\Delta p_s - \Delta p_t} \right)^{1/2} \right]$$
$$\frac{\partial c'_d}{\partial \Delta p_{\infty}} = \left(\frac{\Delta p_s - \Delta p_t}{\Delta p_{\infty} - \Delta p_t} \right)^{1/2} \left(\frac{-\Delta p_t}{\Delta p_{\infty}^2} \right) + \left(\frac{-1}{\Delta p_{\infty}} \right) \left(\frac{\Delta p_s - \Delta p_t}{\Delta p_{\infty}} \right)^{1/2} \left[1 - \left(\frac{\Delta p_{\infty} - \Delta p_t}{\Delta p_{\infty}} \right)^{1/2} \right]$$

The uncertainty of $\frac{\Delta h}{c}$ is

$$\left(W \ \frac{\Delta h}{c}\right)^2 = \left(\frac{\partial \frac{\Delta h}{c}}{\partial \Delta h} \ W \Delta h\right)^2 + \left(\frac{\partial \frac{\Delta h}{c}}{\partial c} \ W c\right)^2$$

Q	R
o	υ

where

.

$$\frac{\partial \frac{\Delta h}{c}}{\partial \Delta h} = \frac{1}{c}$$
 and $\frac{\partial \frac{\Delta h}{c}}{\partial c} = \frac{-\Delta h}{c^2}$

Thus, the total uncertainty associated with c_d is

$$(Wc_d)^2 = \left(\frac{\partial c_d}{\partial c'_d} Wc'_d\right)^2 + \left(\frac{\partial c_d}{\partial \frac{\Delta h}{c}} W \frac{\Delta h}{c}\right)^2$$
$$\frac{\partial c_d}{\partial c'_d} = \frac{\Delta h}{c}$$
$$\frac{\partial c_d}{\partial \frac{\Delta h}{c}} = c'_d$$
$$(Wc_d)^2 = \left(\frac{\Delta h}{c} Wc'_d\right)^2 + \left(c'_d W \frac{\Delta h}{c}\right)^2$$

Since at least two tubes on the rake independently measure the same wake,

$$Wc_d = \sqrt{rac{(Wc_d)^2}{2}}$$

The uncertainties in normal-force coefficient c_n and pitching-moment coefficient c_m were calculated in a similar manner and the results are shown in table A1. The main contributions to the uncertainty of drag coefficient are the $\frac{\Delta h}{c}$ and Δp_{∞} terms, as illustrated by table A2. The uncertainty in drag coefficient is plotted against dynamic pressure for various Reynolds numbers in figure A1. The uncertainty in c_d is reduced to about ± 2 drag counts for dynamic pressures greater than about 0.08 psi.

The symbols used in appendix A are defined as follows:

c_d	section profile-drag coefficient
c'_d	point-drag coefficient
с	airfoil chord
h	vertical distance in wake profile
Δh	incremental distance moved by rake
i	step number
n	total number of steps
p_s	static pressure in wake
p_t	total pressure in wake
p_{∞}	free-stream static pressure
$p_{t_{\infty}}$	free-stream total pressure
Δp_s	$= p_s - p_{t_{\infty}}$
Δp_t	$= p_t - p_{t_{\infty}}$
Δp_{∞}	$= p_{\infty} - p_{t_{\infty}}$
W	uncertainty in measurement

Table A1. Uncertainty in c_d , c_n , and c_m

 $[\alpha = 4^{\circ}]$

T								
Wcm	0.0003	.0004	.0004	0004	.0004	.0004	.0004	.0004
Wcn	0.001	100.	.001	.001	.001	.00	.00	.001
Wcd	0.00059	.00041	.00030	.00035	.00045	.00026	.00022	.00019
cm	-0.1111	1128	0973	0945	0923	0806	0796	0803
cn	0.6014	.7236	.7885	.7872	.7796	.7854	.7918	.8032
cd	0.0478	.0401	.0250	.0241	.0230	.0133	0109	0600'
W	60.0	.05	80.	.04	.03	8	80.	.13
R	60 000	60 000	100 000	100 000	100 000	200 000	300 000	460 000
q, psi	0.015	600	.022	.013	.008	.033	.077	.178
p_t , psi		- vo	ŝ	01	15	15	15	15
	-	5		4	. r.		2	oo oo

Table A2. Calculations for Uncertainty in c_d

W cd	0.00059 .00041 .00030 .00035 .00035 .00045 .00026 .00026
$\left(Wc_d\right)^2$	7.0366 × 10 ⁻⁷ 3.4285 × 10 ⁻⁷ 1.8201 × 10 ⁻⁷ 2.3929 × 10 ⁻⁷ 4.0958 × 10 ⁻⁷ 1.3042 × 10 ⁻⁷ 9.6288 × 10 ⁻⁸ 7.3795 × 10 ⁻⁸
$\left(c_d'W \frac{\Delta h}{c}\right)^2$	7.0199×10^{-7} 3.4141×10^{-7} 1.8114×10^{-7} 2.3830×10^{-7} 4.0920×10^{-7} 1.3041×10^{-7} 1.3041×10^{-7} 9.6070×10^{-8} 7.3616×10^{-8}
$\left(\frac{\Delta h}{c} W c'_d\right)^2$	1.6689 × 10 ⁻⁹ 1.4346 × 10 ⁻⁹ 8.7105 × 10 ⁻¹⁰ 9.8756 × 10 ⁻¹⁰ 3.8119 × 10 ⁻¹⁰ 1.4378 × 10 ⁻¹¹ 2.1816 × 10 ⁻¹⁰ 2.1816 × 10 ⁻¹⁰ 1.7856 × 10 ⁻¹⁰
$\left(W \frac{\Delta h}{c}\right)^2$	2.8472 × 10 ⁻⁵ 2.9861 × 10 ⁻⁵ 2.5695 × 10 ⁻⁵ 2.8472 × 10 ⁻⁵ 3.4722 × 10 ⁻⁵ 3.4722 × 10 ⁻⁵ 1.7761 × 10 ⁻⁵ 1.7361 × 10 ⁻⁵ 1.3889 × 10 ⁻⁵
$(Wc'_d)^2$	2.3338 × 10 ⁻⁵ 1.06666 × 10 ⁻⁵ 6.0185 × 10 ⁻⁶ 1.0924 × 10 ⁻⁵ 1.3445 × 10 ⁻⁵ 1.3445 × 10 ⁻⁵ 1.3457 × 10 ⁻⁶ 3.1547 × 10 ⁻⁶ 3.1547 × 10 ⁻⁶ 2.4060 × 10 ⁻⁶
$\left(rac{\partial c_d'}{\partial \Delta p_\infty} W \Delta p_\infty ight)^2$	$\begin{array}{c} 1.5376\times10^{-5}\\ 6.9807\times10^{-6}\\ 3.9294\times10^{-6}\\ 7.1123\times10^{-6}\\ 8.7865\times10^{-6}\\ 1.2334\times10^{-7}\\ 1.2334\times10^{-7}\\ 2.0558\times10^{-6}\\ 1.5670\times10^{-6}\end{array}$
$\left(\frac{\partial c'_d}{\partial \Delta p_s} W \Delta p_s\right)^2$	2.5642 × 10 ⁻⁶ 1.0230 × 10 ⁻⁶ 5.5259 × 10 ⁻⁷ 9.6003 × 10 ⁻⁷ 1.2541 × 10 ⁻⁶ 1.4410 × 10 ⁻⁸ 2.8005 × 10 ⁻⁷ 2.1133 × 10 ⁻⁷
$\left(rac{\partial c_d'}{\partial \Delta p_t} W \Delta p_t ight)^2$	5.3979 × 10 ⁻⁶ 2.6621 × 10 ⁻⁶ 1.5365 × 10 ⁻⁶ 2.8519 × 10 ⁻⁶ 3.446 × 10 ⁻⁶ 5.3445 × 10 ⁻⁶ 8.1885 × 10 ⁻⁷ 6.2770 × 10 ⁻⁷
	1004502

.

T





Appendix B

Section Characteristics

This appendix contains a computer listing of the section characteristics for the Eppler 387 airfoil section as measured in the Langley Low-Turbulence Pressure Tunnel (table B1). Standard low-speed wind-tunnel boundary corrections have been applied to the data. Also included are the theoretical results from the Eppler airfoil code (table B2) and experimental results from the Model Wind Tunnel at Stuttgart (table B3) and the Low-Turbulence Tunnel at Delft (table B4).

I

Table B1. Experimental Results From Langley Low-Turbulence	e Pressure	Tunnel
--	------------	--------

RUNS 3,4,5	PTINF = 15 PSI	M = 0.09	R = 300,000
ALPHA, DEG	CL	CD	CM
-2.93	•051	•0140	0768
-2.01	•146	.0118	0788
-1.00	• 25 4	.0101	0807
75	.277	.0093	0798
-,50	• 300	•0289	0781
.00	•352	.0057	0768
•00	•351	.0089	0768
.01	• 35 2	.0089	0767
1.01	•465	.0093	0784
2.00	•573	• 0099	0785
3.00	• 68 5	.0104	0795
4.00	. 79 2	.0109	0794
5.01	•901	• 0114	0799
6.01	1.009	.0118	0799
6.01	1.009	.0117	0799
6.02	1.010	.0116	0799
6.12	1.020	.0119	0799
6.26	1.034	.0119	0797
6.52	1.059	.0123	0793
7.02	1.106	.0129	0785
8.02	1.180	•0168	0756
9.01	1.226	.0228	0711
10.02	1,251	•0316	0661
11.02	1.241	.0621	0670
12.01	1.215	****	0690
13.01	1.197	****	0689
14.01	1.179	****	0751
15.01	1.225	****	1184
16.00	•999	****	1693

RUN B PTINF = 15 PSI M = 0.09 R = 300,000

HYSTERESIS (DECREASING ANGLE OF ATTACK)

ALPHA, DEG CL CD	CM
16.01 1.002 ****	1649
14.02 1.173 ****	0747
12.00 1.214 ****	0681
10.04 1.251 .0322	0659
7.95 1.174 .0166	0755
5.99 1.006 .0119	0797
4.03 .797 .0110	0796
2.00 .574 .0098	0784
01 .351 .0090	0767

ALPHA, DEG CL CD CM -2.84 .066 .0163 0813 -1.99 .156 .0133 0814 99 .249 .0105 0804 01 .350 .0106 0780 .01 .352 .0105 0792 1.04 .466 .0113 0796 2.04 .574 .0118 0796 2.99 .680 .0127 0807 3.99 .785 .0133 0803 5.00 .891 .0138 0809 5.03 .895 .0139 0803
-2.84.066.0163 0813 -1.99 .156.0133 0814 99 .249.0105 0804 01 .350.0106 0780 .01.352.0105 0792 1.04.466.0113 0796 2.04.574.0118 0794 2.99.680.0127 0807 3.99.785.0133 0803 5.00.891.0138 0809 5.03.895.0139 0803
-1.99 $.156$ $.0133$ 0814 99 $.249$ $.0105$ 0804 01 $.350$ $.0106$ 0780 $.01$ $.352$ $.0105$ 0782 1.04 $.466$ $.0113$ 0796 2.04 $.574$ $.0118$ 0794 2.99 $.680$ $.0127$ 0807 3.99 $.785$ $.0133$ 0803 5.00 $.891$ $.0138$ 0809 5.03 $.895$ $.0137$ 0803
99 $.249$ $.0105$ 0804 01 $.350$ $.0106$ 0780 $.01$ $.352$ $.0105$ 0782 1.04 $.466$ $.0113$ 0796 2.04 $.574$ $.0118$ 0794 2.99 $.680$ $.0127$ 0807 3.99 $.785$ $.0133$ 0803 5.00 $.891$ $.0138$ 0809 5.03 $.895$ $.0137$ 0803
01.350.0106 0780 .01.352.0105 0782 1.04 .466.0113 0796 2.04 .574.0118 0794 2.99 .680.0127 0807 3.99 .785.0133 0803 5.00 .891.0136 0809 5.03 .895.0139 0803
.01 $.352$ $.0105$ 0782 1.04 $.466$ $.0113$ 0796 2.04 $.574$ $.0118$ 0794 2.99 $.680$ $.0127$ 0807 3.99 $.785$ $.0133$ 0803 5.00 $.891$ $.0136$ 0809 5.03 $.895$ $.0137$ 0803 5.06 $.996$ $.0137$ 0803
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
2.04 $.574$ $.0118$ 0794 2.99 $.680$ $.0127$ 0807 3.99 $.785$ $.0133$ 0803 5.00 $.891$ $.0136$ 0809 5.03 $.895$ $.0139$ 0803 5.06 $.994$ $.0137$ 0803
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
3.99 .785 .0133 0803 5.00 .891 .0138 0809 5.03 .895 .0139 0803 5.06 .994 .0137 0803
5.00 .891 .01380809 5.03 .895 .01390803 5.06 .894 .0137
5.03 $.895$ $.0139$ 0803
5.05 904 5137 5-1-
• • • • • • • • • • • • • • • • • • • •
.
•••• ••••••••••••••••••••••••••••••••
6.03 1.004 .01410809
6 51 1 052 0144 - 0790
7.06 1.107 0145 -0789
7.23 1.127 01/5 0701
7.57 1.155 0152 -60702
7.77 1.166 01520783
8•01 1•180 •0175 - 0762
9.01 1.219 0244 -0701
11.04 1.214 .05700606
12.09 1.174 ****0593
13.02 1.170 ****0633
14.01 1.155 ****0727
14.79 .882 ****1444
16.09 .851 ****1463
RUN 11 PTINE = 15 PSI M = 0.06 R = 200,000
HYSTERESIS (DECREASING ANGLE OF ATTACK)
ALPHA, DEG CL CD CM
16.09 .849 ****1463
14.04 1.156 ****0735
12.03 1.177 ****0589

.0367

.0171

•0144

•0135

.0121

.0107

.0107

-.0636

-.0754

-.0815

-.0811

-.0802 -.0797 -.0781

Table B1. Continued

8.02 1.179 .999 5.98 .791 4.03 • 574 • 359 2.01 •03 .03 • 35 6

1.231

10.05

Table B1. Continued

_

RUNS 15,16	PTINF = 15 PSI	M = 0.03	R = 100,000
ALPHA, DEG	CL	CD	CM
-2 09	.102	.0217	1040
-2.90	. 21 0	0162	1069
-1.99	210	.0168	1069
-1.99	204	.0156	0976
98	• 2 7 7	. 01 59	0978
98	• 274	.0158	0972
52	• • • • • • • • • • • • • • • • • • • •	0160	0972
52	• 3 5 0	0173	0984
02	• 390	0171	0978
02	• 388	0170	098 7
01	• 391	0167	0978
• 00	• 390	0173	0978
•00	• 3 90	0175	0967
1.00	• 48 /	0202	0981
1.99	• 28 /	0203	0981
1.99	• 5 5 7	0227	0968
3.01	• 68 4	• 0227	- 0965
3.01	•684	• 0229	0920
4.00	• 778	.0230	0920
4.00	•778	• 02 34	0889
5.01	.873	• 0237	
5.01	.873	.0240	0829
6.00	•974	+UZZ4 0225	0829
6.00	•974	.0229	0800
6 . 55	1.029	•0217	- 0800
6.55	1.028	• 0225	0777
7.01	1.072	.0206	- 0777
7.01	1.072	.0211	- 0793
7.26	1.104	.0207	- 0783
7.26	1.104	.0211	- 0777
7.51	1.130	• 0213	- 0777
7.51	1.130	.0217	- 0779
7.74	1.157	.0200	- 0779
7.74	1.157	• 0217	0777
7.79	1.157	0211	0752
8.00	1.172	0207	0755
8.00	1.174	0207	0752
8.00	1.172	0210	0738
8.27	1.194	.0215	0738
8.27	1.194	• 02 10	0704
8.50	1.190	.0237	0704
8.50	1.100	.0250	0692
8.77	1.192	. 02.57	- 0692
8.77	1.192	.0290	0671
9.02	1.207	. 0207	0671
9.02	1.207	. 0613	0599
10.06	1.200	+ UT10 AE25	0550
11.00	1.201	0022 	- 0517
12.01	1.189	**** ****	0541
13.01	1.160	* * * * * 	- 137R
14.00	•842	****	1370

Table B1. Continued

RUN 17	PTINF = 15 PSI	M = 0.03	R = 100,000
ЧҮ	STERESIS (DECREAS	ING ANGLE DF	ATTACK)
ALPHA, DEG	CL	CD	CM
14.00	.832	****	1
14.00	.835	****	1353
13.01	1.165	****	1361
11.99	1.191	****	
11.02	1.204	.053.8	
10.00	1.202	.0403	- 0000
9.02	1.202	.0293	
8.01	1.175	.0207	- 0751
7.01	1.082	• 0209	0779
6.02	•976	• 0229	0824
4.01	.780	• 0238	0034
2.00	• 58 9	.0210	0982
01	•391	•0169	0972
			_
RUN 20	PTINF = 15 PSI	M = 0.13 R	= 460,000
ALPHA, DEG	CL	CD	CM
-1.99	•153	.0103	0774
74	• 263	•0090	0797
75	• 28 4	.0085	0799
50	• 309	•0084	0799
26	• 331	• 0076	- 0790
01	•356	•0073	0785
1.01	•470	.0076	0783
2.00	• 58 0	• 00 78	0726
3.00	• 69 3	•0084	0799
4 • U I 5 · 0 2	•803	•0090	0801
5.02	.914	• 00 93	0807
6 5 1	1.022	.0101	0807
7.01	1.066	• 0103	0801
⁷ • • • 1 9 - 0 1	1.109	•0120	0788
3.03	1.179	•0161	0759
10.00	1.236	.0215	0719
11.00	1.201	• 0276	0671
12.02	1 244	.0503	0685
13.00	1 240	***	0766
	1.240	****	0813

Table B1. Continued

RUNS 25,26	PTINF = 5 PSI	M = 0.08	R = 100,000
ALPHA, DEG	CL	CD	CM
-2.88	•111	.0203	1012
-2.00	•204	.0162	1026
-2.00	204	.0166	1026
-1.50	.242	. 01 52	0985
-1.50	.242	.0154	0985
-1-01	.287	.0143	0954
-1-01	287	.0145	0954
- 49	.338	.0160	0938
- 49	• 338	.0164	-,0938
01	.388	.0163	0937
01	.388	•0167	0937
.00	•391	•0156	0965
•00	• 39 1	.0158	0965
• 50	• 444	.0175	0978
•50	• 4 4 4	•0179	0978
1.01	• 492	.0183	0963
1.01	. 492	.0193	0963
2.00	•591	.0221	1003
2.01	• 594	.0218	0999
2.01	• 594	.0220	0999
3.01	•692	.0236	0994
3.01	•692	•0242	0994
3.01	• 692	.0245	0994
4.00	• 78 3	• 0255	
4.00	•787	•0250	0970
4.00	• 78 7	•0252	0970
4.00	• 78 3	• 0259	- 0004
5.00	.881	• 0 2 4 3	- 0904
5.01	.881	• 0240	0904
5.01	• 5 5 1	0252	0897
5.02	• • • • •	. 0236	0846
0.01 (03	. 707	.0242	0847
0.02	1 093	. 0213	0799
7.02	1.084	.0208	0797
7.02	1.084	. 0212	0797
7 52	1,138	.0214	0783
8.01	1,186	.0215	0767
8.03	1,190	.0212	0763
8,51	1,200	• 0244	0724
8,51	1.200	.0246	0724
8.51	1.198	.0246	0727
9.01	1.208	.0297	0685
10.01	1.214	•0402	0612
11.01	1.210	• 0516	0551
12.01	1.191	•0688	0518
13.02	1.163	****	0527
13.50	1.146	****	0585
13.75	.861	****	1378
14.04	•814	****	1308

Table B1.	Continued

RUNS 27,28	PTINF = 5 PSI	₩ = 0.05	R = 60,000
ALPHA, DEG	CL	CD	CM
-2.94	056	-0336	A767
-2.00	•114	-0236	0757
-2.00	• 11 3	- 0232	0941
-1.00	•230	.0224	0941
01	• 337	• 0229	1002
•00	•348	.0243	1094
•00	• 34 3	.0237	1102
• 5 0	•410	.0255	1104
1.01	• 464	.0288	- 1170
1.50	•515	.0310	- 1201
2.01	• 55 9	. 0322	- 1171
2.03	• 558	• 0326	
2.50	•600	• 0349	- 1171
3.00	•602	• 0397	- 11/1
3.00	•634	• 0368	- 1190
3.54	•690	• 0385	- 1170
4.00	• 643	• 0431	1190
4.00	• 6 9 7	.0386	1059
4.00	•721	• 0400	-, 1125
4.49	•785	.0414	-,1180
4.99	•838	• 04 39	1139
5.51	•639	• 0588	1078
0.01	•661	• 0639	-1080
0.49	•685	.0684	1083
/•01	1.040	• 0337	0876
(•22	1.097	.0310	0808
8.02	1.142	• 0280	0756
0.0 9 50	1.170	.0279	0767
0.74	1.192	• 0242	0728
0 01	1.192	•0300	0700
7•U1 0 52	1.194	• 0323	0679
7+22	1.198	• 0337	0628
11 02	1.208	•0471	0596
12 01	1.211	• 0604	054 P
1401	1.193	• 0797	0528

Table B1. Continued

RUNS 31, 32	PTINF = 5 PSI	M = 0.05	R = 60,000
HYSTER	ESIS (DECREASING	ANGLE OF	ATTACK)
ALPHA, DEG	CL	CD	CM
12 04	.793	****	1233
12 04	.776	****	1227
12.01	.804	****	1319
12.01	.808	****	1298
12.01	1.195	.0797	0530
11.00	1.210	•0607	0541
10.01	1.206	.0472	0594
10.00	1.208	•0468	0590
9.01	1.193	•0317	0675
8,51	1.193	• 02.42	0724
8.01	1.146	• 0283	0762
7.01	1.043	•0339	0800
7.01	1.047	.0340	0800
6.76	1.017	.0349	0920
6.75	1.020	•0351	U417
6.48	•985	.0375	0900
6.44	•672	.0677	1075
6.25	•673	.0661	1064
6.25	•673	.0661	1091
5.99	•656	• 0639	- 1073
5.50	• 63 3	• 0588	- 1075
5.25	•625	•0564	- 1086
4.99	.628	• 0533	1116
4.75	•799	.0410	-,1104
4.50	• 647	.0497	-1187
4.25	• 656	•0495	-,1158
4.00	.681	• 0404	-,1145
3.50	•639	•0441	1155
2.99	• 600	• 0357	-,1179
2.00	• 557	0271	- 1190
• 99	•466	•ULII	1098
•01	• 342	+UCC1	0951
-2.00	.118	• 0220	0767
-2.85	045	•0310	

Table B1. Continued

RUN 39	PTINF = 10 PSI	M = 0.04	R = 100,000
ALPHA, DEG	CL	CD	CM
-2.97	• 098	0.2.0.1	
-2.97	.101	• 0201	1002
-2.01	.199	.0201	1005
-1.00	- 289	+0168	0994
-1.00	. 289	•0164	0955
•00	. 392	• 0155	0955
1.00	- 401	•0173	0971
2.00	580	• 0189	0972
2.00	• J0 7 5 9 0	.0218	0983
3.00	• 707	• 0216	0983
4.02	• 00 0	• 02 38	0983
5.00	• / 80	•0241	0943
5.00	• • • • • •	•0241	0879
5.00	• 880	• 0234	0879
6.01	• 0 0 0	•0237	0879
6.01	• 778	• 0230	0835
6.52	• 978	•0232	0835
6.52	1.029	•0225	0814
7.01	1.029	•0219	0814
7.01	1.077	• 0214	0786
8 0 2	1.077	•0212	0786
8 02	1.179	• 0212	- 0752
0+02 8 50	1.179	.0207	0752
0.02	1.190	.0246	- 0752
9.02	1.199	.0285	
12 04	1.205	.0505	- 05/0
12.04	1.194	****	- 0500
13.05	1.164	****	0509
13.50	•886	****	
			1390

|

Table	R1	Concluded
Table	ы.	Concludea

DUNS 43+44	PTINF =15 PSI	M = 0.03 R	= 100,000
	TURBULATOR	TAPE DN	
ALDUAL DEG	CL	CD	CM
ALPHAN DEG		0196	0914
-2.83	.095	. 0100	0895
-2.00	. 167	01/2	0852
-2,00	.205	• 0142	0789
-1.00	.242	.0133	0789
	.242	.0144	0789
- 99	• 242	0145	0815
.00	•351	0147	0830
-01	• 35 2	.0149	0819
1.00	• 455	0143	0819
1.00	•455	.0161	0819
1.01	•45 5	• 0105	0792
2.00	• 556	0170	0827
3.00	•665	0175	0827
3.00	•665	• 017 5	0804
4.00	•765	.0190	0825
5.01	. 875	.0197	0813
6.00	.971	• U 2 1 7	0813
6.01	.971	.0210	0779
6.99	1.071	.0211	0779
7.01	1.071	•0208	0758
7.51	1.118	0172	0760
7.52	1.121	0107	0747
2.01	1.166	0239	0715
8.51	1.189	0201	0676
9.02	1.192		0601
10.01	1.202	****	0498
12.01	1.173	****	0541
13.01	1.151	****	1398
14.00	.855		
RUNS 46,4	7 PTINF = 3	PSI M = 0.09	R = 60,000
	C I	CD	CM
ALPHA, DEG			0003
	.136	.0209	0993
-2.01	- 351	. 0263	
•01	.582	.0316	
2.00	.628	• 0368	- 1180
3.03	.617	.0412	- 1132
3.50	.608	• 0477	- 1107
4.00	. 598	.0477	- 1104
4 • U1 / 5 A	.603	.0513	- 1099
4.50	. 623	.0547	- 1095
5€00 E E 1	.643	•0589	- 1092
2071 2 AA	.665	.0637	1101
	.686	.0689	
0+2V 7 01	.707	• 0756	0845
7.20	1.097	.0319	0783
<u>7</u> €37 9_∩1	1.158	.0287	0741
*• * * 8,51	1.205	.0208	0614
10.01	1.217	•U412	0613
10.01	1.217	.0472	

Table B2. Theoretical Results From Eppler Airfoil Code

	R =	60,000	
ALPHA, DEG	CL	CD	C H
-2.00	171		ι μ
-1.00	•1/3	•0164 *	0822
•00	•202	•0148*	0830
1.00	• 390	•0152*	0834
2.00	. 574	•0157*	0798
3.00	.643	•0163*	0776
4.00	.705	• 0170 =	0713
5.00	• 794	• 01 /9* 0100+	0656
6.00	.842	•0192*	-•0639
7.00	1.031	+ V2U0+ 0350+	0587
7.25	1.058	● U C D D Ŧ . 0 2 5 C ★	0671
7.50	1.073	+U≥30+ .0261+	0672
		•0201#	0658
	R = 10	0,000	
ALPHA, DEG	CL	CD.	
-2.00	• -	CD	CM
-2.00	•173	•0141#	- 0622
-1.00	•283	•0113*	- 0022
1.00	• 39 3	•0122*	- 084 2
2.00	• 503	•0127*	
3.00	•611	•0131*	0850
4.00	• 702	•0138*	0827
5.00	• 795	•0146*	0800
6.00	•892	•0157*	0786
7.00	• 900	•0169*	0722
7.25	1.060	.0225	0720
7.50	1.005	• 0230*	0706
7.75	1.063	•0235*	0689
	1000	• 0240*	0676
	R = 200,	000	
ALPHA, DEG	CL	<u>^</u>	
2.00		υ	CM
-2.00	•173	•0118*	- 0000
-1.00	•283	.0090	0822
1.00	• 39 3	• 0093	
2.00	• 50 3	.0097	-+0842
3.00	•613	• 0099	
4.00	• 72 3	•0105	0875
5.00	•832	.0111	0895
6.00	• 740	.0121	0892
7.00	1 009	•0130	0863
7.25	1.110	•0190	0783
7.50	1,127	• 0200*	0757
7.75	1.142	•0205*	0740
7.87	1.151	• 0210*	0724
8.00	1.150	• 0213*	0717
8.12	1.165	• 0215*	0707
ø•25	1.173	• 0218*	0698
		• 0220*	0690

R = 300,000

		CD	CM
-2.00 -1.00 .00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 7.25 7.50 7.55 7.50 7.75 7.87 8.00 8.12 8.25 8.50	<pre>.173 .283 .393 .503 .613 .723 .833 .943 1.051 1.112 1.126 1.144 1.161 1.169 1.177 1.185 1.193 1.208</pre>	.0107* .0078 .0081 .0084 .0086 .0090 .0095 .0104 .0113 .0173 .0185* .0189* .0194* .0197* .0199* .0202* .0204* .0209*	$\begin{array}{c}0822\\0832\\0832\\0853\\0853\\0864\\0876\\0887\\0898\\0907\\0810\\0785\\0771\\0754\\0754\\0737\\0729\\0721\end{array}$

R = 460,000

ALPHA, DEG	CL	CD	CM
$\begin{array}{c} -2.00\\ -1.00\\ 00\\ 1.00\\ 2.00\\ 3.00\\ 4.00\\ 5.00\\ 6.00\\ 7.00\\ 7.25\\ 7.50\\ 7.75\\ 7.87\\ 8.00\\ 8.12\\ 6.25\\ 8.50\\ 8.75\\ 9.00\\ 9.25\end{array}$	<pre>.173 .283 .393 .503 .613 .723 .833 .943 1.053 1.120 1.138 1.159 1.178 1.187 1.196 1.204 1.213 1.228 1.228 1.244 1.258 1.272</pre>	.0097* .0068 .0070 .0073 .0075 .0078 .0078 .0090 .0098 .0157 .0170 .0175* .0179* .0179* .0181* .0194* .0194* .0199* .0204*	0822 0832 0842 0853 0864 0876 0887 0900 0911 0826 0810 0799 0778 0779 0771 0763 0754 0720 0701
	-	• • • 2 • • • •	0683

* SEPARATION BUBBLE WARNING

- ----

	R = 60,000	
ALPHA, DEG	CL	CD
ALPHA, DEG -3.00 -2.00 -1.00 1.00 2.00 3.00 4.00 5.00 6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00	140 010 .120 .240 .360 .470 .560 .640 .730 .810 .900 .980 1.050 1.100 1.130 1.140 1.120 1.050	.0411 .0310 .0284 .0294 .0315 .0341 .0368 .0390 .0407 .0434 .0455 .0415 .0312 .0256 .0253 .0287 .0363 ****
15.00 16.00	1.020 .950	****

Table B3. Experimental Results From Model Wind Tunnel at Stuttgart

R = 100,000

ALPHA, DEG	CL	CD
-3-00	070	.0363
-3.00	.070	• 0258
-2.00	-200	.0214
-1.00	320	.0207
•30	• 520	. 0213
1.00	.430	.0216
2.00	.520	0211
3.00	.610	•0211
4.00	•700	.0208
5.00	.780	.0206
6 00	.860	.0203
7.00	930	.0197
7.00	1,000	.0189
8.00	1 050	.0186
9.00	1.000	.0194
10.00	1.080	0215
11.00	1.100	• 0213
12.00	1.110	.0252
13.00	1.120	.0312
14-00	1.100	•0408
15 00	1.060	****
19.00	1.000	****
16.00	TOOOA	

- T

•

Table B3. Concluded

R = 200,000

ALPHA, DEG	CI	
	•••	CD
-4.00	- 120	
-3.00	130	• 0434
-2 00	• 020	.0257
-2.00	•130	.0172
-1.00	• 230	.0120
•00	• 330	01.00
1.00	. 430	• 01 08
2.00	. 520	•0097
3.00	• 520	• 0092
4.00	• 620	•0093
5.00	• /10	•0098
5.00	•800	.0107
2.00	098.	.0123
7.00	•950	. 0146
8.00	1.010	0100
9.00	1.060	•0153
10.00	1.080	• 0246
11.00	1 100	•0331
12.00	1.100	• 0402
13.00	1.110	•0448
1/ 00	1.100	****
15.00	1.090	****
12.00	1.060	****
16.00	1.010	****

	R = 50,000	
ALPHA, DEG	CL	CD
	- 155	.0413
-3.97		****
-3.10	.145	.0201
-1.00	220	****
-1.00	.330	.0213
1.00	.435	****
2.10	.545	.0274
2.95	•600	****
3.95	• 605	.0417
4.95	•600	****
5.95	•630	• 0525
7.10	•690	• 0788
7.45	1.005	****
8.25	1.075	•0329
9.00	1.135	.0306
10.30	1.135	.0432
10.95	1.170	• 0 7 0 7
11.95	1.185	• U / / J
12.95	1.160	****
13.40	.985	****
15.40	• 845	****
	P = 130,000	
ALPHA, DEG	CL	CD
1 45	065	.0288
-4.05	.075	****
-2.05	.175	.0167
-2.05	.265	****
-1.00	.365	•0151
1.00	.455	****
1.90	.545	.0190
2.95	.635	****
3.95	•725	.0223
4.90	.810	****
5.90	.895	.0230
6.75	.985	.0215
8.05	1.080	• 0205
8.90	1.105	.0256
10.00	1,130	• 03/3
10.85	1.150	****
11.90	1.155	
12.90	1.140	****
13.90	1.035	~ ~

Table B4. Experimental Results From Low-Turbulence Tunnel at Delft
Table B4. Concluded

R = 200,000

ALPHA, DEG	·CL	CD
-4.00	045	- 0212
-3.05	.050	• • • • • • •
-2.10	. 145	****
-1.10	• 1 7 7	•0127
.15	• 2 4 0	****
1 05	• 34 5	.0092
2.05	• 550	•0113
2	•650	****
4.05	•760	.0122
4.90	•855	.0131
6.05	•955	.0125
7.00	1.055	0120
9.15	1,125	•0130
8.90	1.145	•0108
10.25	1 1 7 2	****
10.90	1.1/3	•0312
11.05	1.185	****
12 05	1.185	****
14 00	1.170	****
1400	1.180	****
15.00	1.045	****

Appendix C

Spanwise Drag Coefficients

This appendix contains a computer listing of the spanwise drag coefficients for the Eppler 387 airfoil section as measured in the Langley Low-Turbulence Pressure Tunnel.

Table C1. Spanwise Drag Coefficients	
--------------------------------------	--

ALPHA = 0.0 DEG.ALPHA = 5.0 DEG.SPAN, IN.CDSPAN, IN.CD0.15220.00890.07910.01143.02100.00852.04280.01143.98050.00893.02100.01136.01230.00893.02100.01138.00510.00895.02710.01149.99570.00895.02710.01141.00380.00926.99160.012012.00230.00926.99160.01249.01700.00879.01700.01145.00470.008712.00580.01249.399210.008811.00380.01121.00350.00898.00510.0122-3.99210.00888.02370.0121-6.04440.0089-2.96660.0112-10.00290.0089-2.98560.0112-11.00910.0087-5.01600.0117-9.00870.0085-6.02300.0110-7.02200.0089-2.98560.0112-7.02200.0089-8.91450.0115-4.99360.0091-8.99190.0115-3.00930.0088-11.01960.0113-0.07910.0087-7.02200.0116-5.03830.0015-6.02160.0113-0.07910.0087-7.02200.0116-5.03830.0015-6.00160.0111-5.03830.0015-6.00160.0111-5.03830.0015-6.00160.0115-5	RUNS 5,6	PTINF = 15 PSI	M = 0.08 F	8 = 300,000
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	ALPHA =	0.0 DEG.	ALPHA =	5.0 DEG.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	SPAN, IN.	CD	SPAN, IN.	CD
U. MIIN	0.1522 1.9948 3.0210 3.9805 6.0123 8.0051 9.9957 12.0023 11.0038 9.0170 7.0118 5.0047 1.0035 -1.9828 -3.9921 -6.0444 -8.0145 -10.0029 -12.0037 -11.0091 -10.9986 -9.0087 -7.0220 -4.9936 -3.0093 -0.9914 0.0791	0.0089 0.0091 0.0085 0.0089 0.0089 0.0089 0.0092 0.0092 0.0091 0.0087 0.0089 0.0089 0.0089 0.0089 0.0089 0.0089 0.0089 0.0089 0.0089 0.0087 0.0089 0.0087 0.0089 0.0087 0.0089 0.0089 0.0087 0.0089 0.0087 0.0089 0.0089 0.0087 0.0089 0.0087 0.0089 0.0089 0.0087 0.0089 0.09	0.0791 1.0035 2.0428 3.0210 3.9805 5.0271 5.9908 6.9916 8.0051 9.0170 10.0242 11.0038 12.0058 8.0051 8.0237 -1.0157 -2.0068 -2.9856 -4.0152 -5.0160 -6.0230 -7.0220 -8.0145 -8.9919 -11.0196 -12.0018 -10.0171 -6.0016 -5.0383	0.0114 0.0114 0.0113 0.0113 0.0119 0.0114 0.0120 0.0114 0.0124 0.0114 0.0124 0.0114 0.0112 0.0112 0.0122 0.0121 0.0122 0.0121 0.0112 0.0112 0.0112 0.0112 0.0112 0.0116 0.0112 0.0115 0.0113 0.0114 0.0112 0.0112 0.0115 0.0113 0.0114 0.0112 0.0112 0.0115 0.0113 0.0114 0.0112 0.0114 0.0115 0.0113 0.0114 0.0112 0.0112 0.0114 0.0115 0.0113 0.0114 0.0112 0.0112 0.0114 0.0112 0.0114 0.0115 0.0113 0.0114 0.0112 0.0112 0.0114 0.0115 0.0113 0.0114 0.0112 0.0112 0.0113 0.0114 0.0112 0.0114 0.0114 0.0115 0.0113 0.0114 0.0112 0.0112 0.0114 0.0115 0.0114 0.0115 0.0114 0.0115 0.0112 0.0112 0.0114 0.0115 0.0113 0.0114 0.0112 0.0112 0.0114 0.0112 0.0112 0.0114 0.0112 0.0112 0.0114 0.0112 0.0114 0.0112 0.0111 0.0112 0.0114 0.0112 0.0111 0.0112 0.0112 0.0112 0.0114 0.0112 0.0111 0.0112 0.0112 0.0111 0.0112 0.0112 0.0112 0.0112 0.0112 0.0114 0.0112 0.0111 0.0112 0.0111 0.0112 0.0111 0.0112 0.0111 0.0112 0.0111 0.0112 0.0111 0.0112 0.0111 0.0112 0.012 0.012 0.012 0.012 0.012 0.012 0.012 0

Table C1. Continued

RUNS 12,14	PTINF = 15 PSI	M = 0.06	R = 200,000
ALPHA =	0.0 DEG.	ALPHA =	5.0 DEG.
SPAN, IN.	CD	SPAN, IN.	CD
ALPHA = SPAN, IN. 0.0304 -0.9914 -1.9828 -3.0329 -4.0152 -5.0160 -6.0016 -7.0220 -7.9957 -9.0087 -9.9743 -10.9986 -12.0007 -7.0220 -2.0309 -2.0068 -2.0007 -2.0309 -2.0309 -2.0309 -2.0309 -2.0309 -2.0007 -2.0309 -2.0007 -2.0309 -2.0007 -2.0007 -2.0007 -2.0007 -2.0008 -2.0009 -2.0029 -2.0029 -2.0029 -2.0029 -2.0029 -2.0029 -2.0027 -2.0027 -2.0009 -2.0029 -2.0007 -2.0007 -2.0007 -2.0007 -2.0009 -2.0007	CD 0.0 DEG. CD 0.0109 0.0108 0.0109 0.0107 0.0106 0.0107 0.0106 0.0107 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0109 0.0106 0.0109 0.0105 0.0104 0.0103 0.0105 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0106 0.0107 0.0109 0.0105 0.0107 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0109 0.0109 0.0106 0.0107 0.0109 0.0106 0.0109 0.0105 0.0107 0.0109 0.0105 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0109 0.0105 0.0107 0.0109 0.0106 0.0107 0.0109 0.0105 0.0107 0.0109 0.0106 0.0107 0.0109 0.0105 0.0107 0.0109 0.0106 0.0107 0.0109 0.0105 0.0107 0.0109 0.0106 0.0107 0.0109 0.0106 0.0107 0.0103 0.0106 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0108 0.0107 0.0103 0.0105 0.0105 0.0105 0.0105 0.0107 0.0103 0.0105 0.0105 0.0106 0.0107 0.0103 0.0105 0.0105 0.0106 0.0107 0.0103 0.0105 0.0106 0.0107 0.0108 0.0105 0.0106 0.0107 0.0108 0.0105 0.0106 0.0107 0.0108 0.0105 0.0106 0.0107 0.0108 0.0105 0.0106 0.0109 0.0106 0.0106 0.0107 0.0108 0.0105 0.0106 0.0106 0.0106 0.0106 0.0106 0.0107 0.0108 0.0106 0.0106 0.0106 0.0106 0.0106 0.0107 0.0108 0.0106 0.0106 0.0107 0.0108 0.0106 0.01	SPAN, IN. -0.0183 1.0278 2.0188 3.0210 3.9805 5.0047 5.9694 7.0118 8.0051 9.0170 10.0100 10.9932 11.9906 11.9906 11.9906 11.9906 11.9906 2.9737 3.4918 2.4742 -0.0183 -0.9914 -2.0068 -3.0329 -4.0152 -4.9936 -6.0016 -7.0018 -8.0145	$\begin{array}{c} CD\\ 0.0138\\ 0.0142\\ 0.0139\\ 0.0135\\ 0.0135\\ 0.0140\\ 0.0139\\ 0.0136\\ 0.0141\\ 0.0139\\ 0.0141\\ 0.0143\\ 0.0141\\ 0.0143\\ 0.0144\\ 0.0145\\ 0.0144\\ 0.0134\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0141\\ 0.0143\\ 0.0142\\ 0.0138\\ 0.0142\\ 0.0138\\ 0.0142\\ 0.0142\\ 0.0138\\ 0.0142\\ 0.0142\\ 0.0138\\ 0.0142\\ 0.0142\\ 0.0144\\ 0.0138\\ 0.0142\\ 0.0$
6.9916 8.0237 9.0002	0.0110 0.0107 0.0106 0.0107	-8.9919 -10.0171 -11.0196 -11.9609	$\begin{array}{c} 0.0143 \\ 0.0139 \\ 0.0141 \\ 0.0144 \end{array}$
9.0002 10.0100 11.0248 11.9990	0.0107 0.0108 0.0111 0.0107	-11.9809 0.0791 -1.0400	0.0140 0.0141

RUNS 21,41,	37 PTINF = 15	PSI M = 0.03	R = 100,000
ALPHA	= 0.0 DEG.	ALPHA =	0.0 DEG.
SPAN, IN.	CD	SPAN, IN.	CD
0.0304 0.0304 1.0035 1.0278 2.0188 2.0188 2.0188 3.0210 3.0210 4.0267 4.0036 5.0047 5.0047 5.0047 5.9908 6.0123 5.9908 6.0123 5.9916 6.9916 8.0051 8.0051 8.0051 9.0002 9.0002 10.0242 10.0210 3.5152 3.5152	$\begin{array}{c} 0.0169\\ 0.0164\\ 0.0169\\ 0.0171\\ 0.0167\\ 0.0167\\ 0.0169\\ 0.0161\\ 0.0162\\ 0.0152\\ 0.0154\\ 0.0152\\ 0.0165\\ 0.0163\\ 0.0163\\ 0.0165\\ 0.0163\\ 0.0165\\ 0.0163\\ 0.0163\\ 0.0169\\ 0.0167\\ 0.0173\\ 0.0174\\ 0.0174\\ 0.0174\\ 0.0174\\ 0.0174\\ 0.0166\\ 0.0166\\ 0.0166\\ 0.0166\\ 0.0166\\ 0.0166\\ 0.0172\\ 0.0173\\ 0.0181\\ 0.0173\\ 0.0181\\ 0.0173\\ 0.0181\\ 0.0173\\ 0.0180\\ 0.0161\\ 0.0161\\ 0.0161\\ 0.0160\\ \end{array}$	$\begin{array}{r} \text{SPAN, IN.}\\ &-3.0329\\ &-3.0093\\ &-3.0329\\ &-3.9921\\ &-4.0152\\ &-4.9936\\ &-4.9936\\ &-4.9936\\ &-6.0016\\ &-6.0016\\ &-7.0018\\ &-6.9815\\ &-6.9815\\ &-6.9815\\ &-6.9815\\ &-6.9815\\ &-8.0145\\ &-8.0145\\ &-9.0087\\ &-9.0087\\ &-9.8584\\ &-10.0171\\ &-11.0507\\ &-11.0507\\ &-11.9996\\ &-11.9983\\ &-3.0329\\ &-3.0329\\ &-3.0093\\ &0.1012\\ &0.0769\\ &-1.0178\\ &-1.0178\\ &-2.0328\\ &-2.0328\\ &-3.0111\\ &-4.0169\\ &-5.0621\end{array}$	CD 0.0173 0.0165 0.0170 0.0164 0.0165 0.0171 0.0168 0.0171 0.0171 0.0171 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0172 0.0173 0.0198 0.0198 0.0198 0.0198 0.0198 0.0198 0.0198 0.0161 0.0173 0.0170 0.0170 0.0172 0.0171 0.0171
3.5152 3.4918 4.0036	$0.0160 \\ 0.0167 \\ 0.0156$	-5.9815 -7.0231	0.0171 0.0177 0.0168
4.0267 4.4855	0.0158 0.0161	-8.0340 ALPHA = 5	0.0171 .0 DEG.
-0.0183 -0.0183 -0.9914 -0.9914 -1.0157 -1.9828 -1.9828	0.0163 0.0168 0.0172 0.0168 0.0169 0.0170 0.0168	-0.0171 -2.0056 -2.0537 -4.0139 -6.0003	0.0243 0.0249 0.0244 0.0242 0.0243

_

Table C1. Continued

RUN 35	PTINF = 5 PSI	M = 0.09 $R = 1$.00,000
ALPHA =	0.0 DEG.	ALPHA = 0.0	DEG.
SPAN, IN.	CD	SPAN, IN.	CD
0.0559 -0.9902 -2.0056 -2.0056 -3.0080 -4.0370 -5.0146 -6.0003 -6.0003 -7.0207 -8.0132 -9.0075 -10.0585 -11.0188 -12.0054 -12.0054 -12.0054 -11.5013 -11.0807 -10.0019 -9.0410 -8.0319 -7.0005 -6.0003 -5.0370 -4.0139 -3.0317 -2.0056 -1.0145 -0.0415 1.0531 2.0199 3.0220 3.4927 4.0276	0.0162 0.0163 0.0178 0.0178 0.0175 0.0176 0.0183 0.0192 0.0193 0.0182 0.0188 0.0188 0.0188 0.0195 0.0205 0.0223 0.0223 0.0217 0.0205 0.0217 0.0205 0.0195 0.0195 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0192 0.0173 0.0172 0.0178 0.0160 0.0144 0.0144	5.9916 7.0327 8.0056 9.0174 10.0245 11.0663 12.0050 12.0050 11.0250 9.0174 4.4863 4.0507 3.5162 3.0693 2.4991	0.0173 0.0183 0.0186 0.0183 0.0161 0.0181 0.0174 0.0174 0.0174 0.0153 0.0148 0.0146 0.0152
5,0055	0.01.0		

RUN 36	PTINF = 5 PSI	M = 0.09 R =	100,000
ALPHA =	5.0 DEG.	ALPHA = 5.0	DEG.
SPAN, IN.	CD	SPAN, IN.	CD
0.0803 1.0046 2.0199 2.4991 2.9984 3.4927 4.0276 4.5091 5.0055 6.0558 6.9923 8.0802 8.9839 10.0103 11.0354 11.9990 11.9990 11.0145 10.0809 9.0174 8.00566 7.0528 6.0130 5.0502 4.5091 4.0276 3.4224 3.0220 2.4991 2.0199 0.9803 0.0072 -0.0171 -1.0387 -2.00566 -3.0553 -4.0139 -4.9923 -5.0146	0.0251 0.0250 0.0254 0.0247 0.0238 0.0240 0.0246 0.0254 0.0254 0.0253 0.0260 0.0257 0.0264 0.0253 0.0262 0.0263 0.0251 0.0264 0.0254 0.0259 0.0255 0.0248 0.0251 0.0251 0.0250 0.0248 0.0251 0.0248 0.0251 0.0243 0.0241 0.0251 0.0243 0.0241 0.0251 0.0243 0.0241 0.0251 0.0243 0.0241 0.0251 0.0243 0.0241 0.0251 0.0243 0.0241 0.0251 0.0244 0.0251 0.0247 0.0251 0.0247 0.0253 0.0258 0.0249 0.0255 0.02	$\begin{array}{r} -6.0217\\ -7.0005\\ -8.0132\\ -9.0075\\ -10.0303\\ -10.9978\\ -12.0027\\ -12.0027\\ -11.0396\\ -10.0019\\ -9.0410\\ -8.0132\\ -7.0207\\ -6.0431\\ -5.0146\\ -4.0139\\ -3.9908\\ -3.0317\\ -3.0317\\ -3.0317\\ -2.0296\\ -1.0387\\ 0.0316\end{array}$	0.0250 0.0265 0.0264 0.0268 0.0277 0.0291 0.0294 0.0279 0.0266 0.0264 0.0259 0.0261 0.0249 0.0255 0.0248 0.0255 0.0248 0.0255 0.0248 0.0248 0.0257 0.0248

Table C1. Concluded

RUN 40	PTINF = 10 PSI	M = 0.04 R =	100,000
ALPHA =	0.0 DEG.	ALPHA = 5.0	O DEG.
SPAN, IN.	CD	SPAN, IN.	CD
0.0278 0.0278 -1.0182 -0.9940 -2.0574 -3.0116 -3.0116 -4.0405 -4.0636 -5.0180 -5.0180 -6.0249 -6.0249 -7.0035 -7.0035 -7.0237 -8.0533 -8.0533 -8.9932 -9.0100 -10.0040 -11.0203 -11.0203 -12.0047 -2.0574	0.0179 0.0175 0.0175 0.0173 0.0178 0.0176 0.0176 0.0172 0.0174 0.0174 0.0174 0.0178 0.0178 0.0178 0.0178 0.0178 0.0178 0.0176 0.0176 0.0177 0.0176 0.0177 0.0176 0.0177 0.0176 0.0177 0.0178 0.0178 0.0178 0.0178 0.0178 0.0178 0.0183 0.0193 0.0214	0.0034 -1.0182 -2.0333 -3.0116 -4.0174 -5.0404 -6.0249 -7.0035 -7.9786 -8.9932 -8.9764 -8.0160 -7.0035 -6.0035 -5.0180 -3.9712 -3.9712	0.0241 0.0246 0.0247 0.0258 0.0241 0.0245 0.0239 0.0252 0.0256 0.0260 0.0243 0.0243 0.0242 0.0242
0.0034	0.0180		

Appendix D

Chordwise Pressure Coefficients

This appendix contains a computer listing of the pressure coefficient data for the Eppler 387 airfoil section as measured in the Langley Low-Turbulence Pressure Tunnel. No wind-tunnel blockage corrections have been applied to the data.

.

د			-1.00	75	50	• 00	•00	•01
1								
					L 0 L L	0000	. 9046	.9072
00	3406	.1589	•6222	. 7090		- 7 C 3	. 4797	.6730
	4466	.9633	.8556	.8162	. (133	1000		3051
		7606	.6043	.5589	.5132	C865	5 5 5 C •	• • •
0	9779.		7 C 3 V	4070	.3551	.2461	.2452	.242.
5	.7515	.624			2225	-1243	.1235	.1248
20	.6375	.5030	• 3 2 8 4	0107.		0273	.0299	.0307
5	. 5423	• 4045	•2264	•1824			- 0304	- 0396
	4673	.3236	.1511	.1070	. 0386			
	2362	1985	.0325	0083	0542	1041 · I		
			- 0569	0961	1378	2259	2249	
50	• 2323	1040		- 1606	2075	2944	- • 2922	2926
60	.1452	• 0181	-, 1361		- 2816	3586	3587	3610
75	.0510	0707	2105	7/47-4			7554-	4348
	0649	1750	3028	3321	0.00		- 5143	5152
	2052	2981	4046	4310	0000			
	- 2952	3771	4673	4903	5146	#70C*#		- 5021
	- 3587	4313	5107	5286	5498		0060	
		1044	5402	5571	5755	6112	6088	60T0•-
00			5613	- 5633	5789	6103	6091	6108
50	4319	7024 • 1			- 5499	5779	5778	5771
00	4242	4703	+070+1			5241	5212	5224
50	3925	4352	4/8/	5-0t · l		- 4666	4656	4658
00	3480	3836	4237	4364			1224 -	4278
	- 2996	3330	3778	-• 3891	4010		1009 -	- 4083
	0.96	3018	3523	3652	3/84	6 A O F • I		2000
200		- 2826 -	- 3382	3517	3650	3961	3984	1050.
06				1116	2837	2052	2118	2043
00	-•2191	6007 - -	0176 .		- 0874	1034	1011	1044
50	2062	-1510	6780	3700 •		- 0820	0836	0809
00	0466	0348	0616	. * 00 * 1				0485
	- 0016	0182	0364	-•0357	0414	04+0*1		4 8 0 0 T
	0010	0083	. 0006	• 0002	0017	0800		
	0622	.0562	• 0509	.0507	•0526	•0476	.040.	60 FO +

114

RUNS 3+4+5 PTINF = 15 PSI M = 0.09 R = 300,000

x/C	-2.93	-2.01	-1.00		50	.00	00.	.01
• 000	3406	.1589	.6222	2090	7787	0.00		
-005	-1.5860		1020			0006.	• 40 40	-9072
					-• 60 70	3379	3414	3317
		-1.1349	-• 7233	6270	5301	3365	3391	- 3299
4T0 •	-1.4211	9822	6466	5628	4859	3265		
• 020	-1.3948	8802	5890	5172	- 4552	- 3108	- 2115	0476 • -
.025	-1.4171	8123	5419	- 4822	4221			
•031	-1.4201	- 7574	- 5027	1.4458	1776	1642.	+967 -	2911
•040	9364	6747	4478	C 70C -		9017*-	E6/2 -	2771
.050	- 5407					0862	2519	2484
040		1010-	0066.	4545.	3142	2272	2292	2258
	0000	2686.	3547	3178	2834	2070	2070	2051
c. n.	-•13/	5133	3073	2772	2450	1764	1768	-,1758
• 100	4401	3906	2511	2219	1949	- 1419	1384	
.150	3208	2172	1685	1485	1281	0842		
• 200	2422	1674	1162	0999	0829			
.250	1800	1213	0763	0409	0407			
• 300	1342	0805	0452			0020	85TO	-• 0191
.350		- 0560		0400	0633	• 0043	• 0057	• 0078
400	- 0401		0620.	+ 200	.100.	• 0251	.0255	.0241
	- 001E		0048	• 0122	•0192	16E0.	.0395	•0402
		0084	•0164	• 0254	.0347	.0522	.0520	.0526
		•0132	• 0408	• 0403	.0485	•0666	• 0668	.0658
		2620.	• 0 6 2 8	• 0491	• 06 00	• 0728	.0750	.0752
• • • • •	• 01 80	•0422	• 0763	• 0632	.0711	.0827	.0841	.0859
.070	+ C - C - C - C - C - C - C - C - C - C	•0554	• 0833	• 0736	.0800	.0922	5260 ·	0015
. 100	• 04 73	• 0668	• 0010	• 0900	•0856	.1013	.0080	
• 750	.0601	.0775	.1012	.1003	.0938	1051	1050	3440.
.800	.0754	-0905		0711			• 10.00	• 1050
.850	0864	1022	7077.	4011 ·	A+07.	•1134	.1119	.1126
			0011.	• 12/0	.1150	.1177	.1176	.1179
050	10101 1011	C111.	1202	.1321	.1277	.1228	.1219	.1218
074.	• 1105	1771.	•1336	.1388	•1388	.1230	.1234	.1243

5.7								
	1.01	2.00	3 • 00	4 .00	5 • 00	6 • 00		6.01
000	4996	.9887	.8765	.5583	.0300	6921	6842	c10/
	172	.0835	3260	7986	-1.3411	-1.9498	-1,9508	-1.9616
	1270	- 1630	5154	9109	-1.3483	-1.8329	-1.8316	-1.8382
• 010			- 4112	0440	-1.3505	-1.7733	-1.7792	-1.7808
•015	-• 00 41	1402	7770 .		20469	-1-7265	-1-7261	-1.7303
.020	1134	3792	6/43	C1 66 -				-1-6908
.025	2008	4500	7277	-1.0240	-1 - 3 4 5 5			
030	2587	4958	7562	-1.0325	-1.3302	-1.6469	-1.05.44	
	3408	56.23	7990	-1.0435	-1.3082	-1.5872	-1.5854	1066.1-
		- 6115	- 8755	-1-0479	-1.2852	-1.5352	-1.5339	-1.5360
000.	477 4 • 1		- 8574	-1,0560	-1.2710	-1.4963	-1.4975	-1.5020
.000				-1 0517	-1-2436	-1.4458	-1.4444	-1.4484
• 075	8024-	6/ DO • -	7/00*-		-1 2026	0074 [-	-1-3721	-1.3753
.100	5765	7238	8772	-1.U300	07071-		1 26 16	
.150	6297	7488	8731	9988	-1.1276	1797 1-	CT 07 1-	
000	6610	7601	8650	9671	-1.0736	-1.1848	-1.1841	000T • T-
	- 6760	7631	8516	9386	-1.0319	-1.1272	-1.1277	-1.1264
000		1001	2458	9112	-,9888	-1.0739	-1.0737	-1.0746
005.				- 8676	9371	-1.0170	-1.0185	-1.0188
•350					- 8716	9535	9528	9540
.400	6305	1 • 0 3 0 3			- 8187	9070	- 9073	9096
.450	5704	6217	CQ/Q				_ 7570	- 7500
.500	5176	5738	6401	7128	/932			
.550	4864	5507	6224	6978	6420	1000		
600	4714	5402	5652	4018	4121	4737	4/12	
650	- 4470	3136	2615	3128	3548	3912	3912	
	1520	- 1015	- 2291	2611	2900	3157	3155	3165
			1849	2070	2262	2421	2440	2427
. 190			- 1283	1504	1666	1781	1756	1773
• 8 0 0	1201.4			- 0961	1042	1136	1141	1127
068.	0790°-		4150-	0396	0447	0481	0484	0489
.900	+ 0 T 0 • -				0760	0215	.0228	.0225
.950	• 0422	• 0367	• 1364	0050.	• • • •			

PTINF = 15 PSI M = 0.09 R = 300,000

RUNS 3.4.5

116

RUNS 3+4+5 PTINF = 15 PSI M = 0.09 R = 300,000

6.01	7015	1.0038	.9747	• 6928 • 935	6170.	1001	.6375	.5785	.5376	4862	4370	3695	3255	3080	2000	2707	. 2685	- 2600	. 2505	.2427	.2380	. 2290	. 2214	2150	7/73•	+ / 02 •	• 2011	.1887	.1750
6.00		1.0018	•9754 •••••	0570. 7258.	0470. 7448	.7186	.6374	. 5783	• 5353	4870	.4371	.3683	.3318	3006	4162.	2802	-2685	.2576	. 2496	.2453	.2374	-2302	.2710	2136	2005	0403 •	7661.	• 1906	.1732
6.00	6921	1.0030	44/A.		-7638	.7175	.6372	.5782	.5348	• 4865	.4294	• 3669	.3296	• 3103	. 2923	.2774	.2670	.2598	.2520	.2425	.2353	.2300	.2210	.2151	-2056	2002	5002 .	11410	.1719
5.00	.0300	1000 T	00400	0602.	.6519	.5980	.5248	.4721	.4352	.3942	•3484	.3015	•2739	.2580	.2468	• 2 3 8 4	.2311	.2266	•2212	.2171	.2104	.2080	.2026	.1956	.1892	1876	1760	60.T.	.1677
4 • 00	.5583 0200	• 4540	. 6359	. 5626	. 5076	. 4653	• 3979	. 3573	.3272	• 2939	.2614	• 2318	.2132	.2040	. 2008	.1990	.1944	.1938	.1915	• 1909	.1869	.1841	.1824	.1793	.1775	1728			er et •
3 • 00	• 8765 - 7784	.5670	.4495	.3897	.3421	•3089	.2579	• 2 2 9 9	• 2 0 9 2	.1892	.1704	.1574	.1529	.1504	.1544	.1587	.1550	.1596	.1602	.1589	.1593	.1641	.1627	.1601	.1585	.1593	.1566		1641.
2 •00	•9887 -5027	.3211	.2300	.1866	• 1533	.1318	.1042	• 0886	•0194	•0744	•0725	.0810	.0873	•0959	.1064	.1152	.1189	.1232	.1280	.1327	.1345	.1382	.1412	•1428	.1446	.1462	.1448	1207	
1.01	•9926 •1342	. 0200	0279	0446	0557	0614	0662	0626	05/20	0474	0298	.000	•0197	•0394	• 0572	• 0676	• 0806	• 0863	• 0973	• 1046	•1105	• 1136	.1227	•1203	• 1296	.1318	.1349	1321 -	
X/C	• 000	.010	.015	• 020	.025	.031	.040	040.	000.	G/ 0 •	• 100	•150	• 200	• 250	• 300	• 350	• 400	• • • 0	404 •	044.	. 600	000	007 •	• 750	. 800	.850	• 900	.950	•

RUNS 3,4,5 PTINF = 15 PSI M = 0.09 R = 300,000

x/c	6.11	6 • 2 5	6.51	7.01	8.01	6 00	10.01	11.01
	9 C 9 C	0000	-1.1285	-1.5525	-2.4327	-3.2713	-4.0522	-4.4332
• 000	- /010			-2.5787	-3.1688	-3.6517	-3.9828	-4.2744
•002	-2.0130	- 2.105/	0/07•7-		-2.7851	-3.1377	-3.6992	-4.0931
•010	-1.8860	-1.9565	7400°7		-2.6094	-2.9182	-3.5049	-3.9786
•015	-1.8238	-1.5843	C 6 6 6 T	101 0	-2 4507	-2.8262	-3.5256	-3.0017
• 0 2 0	-1.7666	-1.8182	1/16-1-	-2• 1001 -2-	-24747 2 2507	-2.7275	-2.8730	-2.8311
.025	-1.7233	-1.7757	-1.8607	-2.0298		7761°7-		-2.4390
.030	-1.6801	-1.7287	-1-8084	-1.9085	1007°7-	6079 c -		-2.3139
.040	-1.6143	-1.6573	-1.7322	-1 - 8644	94 71 • 7-	-24-24-24-24		-2-20 -2-20 -2-20 -2-20 -2-20 -2-20 -2-2-2-2
. 050	-1.5601	-1.5944	-1.6589	-1.7826	-2.0195	-2.0931	07/1*7-	
0.60	-1-5208	-1.5526	-1.6111	-1.7250	-1.9421	-1.9725	-2.1355	CCD1•7-
9000	-1-4667	-1.4938	-1-5433	-1.6450	-1.8421	-1.8917	-2.0108	
		-1.4149	-1.4587	-1.5407	-1.7013	-1.7487	-1.8420	-1.8498
001.	1 2740	-1-2044	-1-3268	-1.3944	-1.5071	-1.5427	-1.5991	-1.5883
061.	04/7•1-		-1-2400	-1.2977	-1.3349	-1.4042	-1.4419	-1.4171
• 200	0/6T •T-		-1,744	-1 - 2233	-1.2557	-1.3038	-1.3202	-1.2812
• 250	-1.1347	04-1-1-		-1 1652	-1-1835	-1.2167	-1.2170	-1.1604
• 300	-1.0829	-1.0463	C/TT •T-		-1,1050	-1-1234	-1.1127	-1.0385
.350	1620.1-			7040		-1.0016	-,9843	8962
• 400	9619	+0.2.5.+	6100 T -	C 7 7 0 -	- 8701	- 8770	8499	7620
.450	9146	9155				7470	7107	6176
.500	7324	7074	7025	C667	4001 °-	5 5 5 9	- 5820	- 4907
.550	5672	5781	2466	1730.		- 5083	4676	4037
.600	4799	4852	2464 -	0116.			- 3725	2383
.650	3952	3986	4044	4185	6776°-			0106 -
002	3177	3204	3248	3326	3370	3413	-067	
750	2444	- 2460	2478	2589	2594	2473	9467	
	- 1788	1790	1803	1847	1846	1829	-1875	+097
	- 11 24	- 1151	1159	1196	1205	1262	1500	2480
•	- 0407	0487	0497	0524	0624	0811	1223	23 /1
004.			FUCU -	-0158	0054	0416	1022	2095
066.	7777	1147.	1 × 1 × 1					

Т

RUNS 3,4,5 PTINF = 15 PSI M = 0.09 R = 300,000

0.01		.0522 - 6 6333		497C* /CTO*	• 9327	1•0051 . 9997	0005 1.0058	.9772						• / T 48 • 7447	• 6481 • 6657	• 5491 • 5672	-4877 -5043	4448 4547			1065 • • • • • • • • • • • • • • • • • • •	•3617 •3653	•3387 •3405	.3199 .3146	•3036 •2990	.2875 .2758	2707 2505			• • • • • • • • • • • • • • • • • • • •	.2138 .1904	1014 7101	1001 • TOOT •
00•6		-3.2713 -4	4247		H 85 .	1.0025 1	.9888	.9531	9919.		7898			0000.	.6101	.5176	.4588	-4232	3018				.3273	•3122	.2973	.2831	• 2696	. 2560	0360		1122.	.2063	
8.01		-2.4327	. RADR			1066.	.9595	.9156	.8729	.7966	-7404	4194	1223		8596.	.4772	.4266	.3951	.3644	2447			.3129	• 2975	. 28 71	.2748	.2631	.2500	.2350		6177 •	• 2126	
7.01		-1.5525	.9569	1,0041	1100 11	7794.	.9080	.8552	.8099	. 7291	• 6663	. 6237	. 5640		0000.	• 4273	.3838	.3543	• 3331	41194	2002		6/07 •	. 2178	• 2677	. 2591	.2481	.2396	.2259	2216	0122.	0072.	
6.51		-1.1285	.9878	0666.	0260	3/04.0	20/ 8.	.8148	.7679	.6874	.6256	• 5801	.5271	C 0 7 7	2404	6865.	•3574	• 3318	.3131	-2997	. 2858	2462		6402.	9/67 •	• 2480	.2410	.2318	.2229	. 2151	2061	7/030	1040
6.25		8999	• 9960	.9883	9138		7440.	• 7927	• 7 4 4 2	•6647	• 5986	.5589	.5078	448			.3431	.3194	• 3008	.2884	.2778	2453	25.00	• C 7 0 4	01620	1242.	• 2353	•2264	.2182	.2130	2025	•	0201.
6.11	I	7818	• 9989	.9813	.9035			6///•	• 7284	• 6479	•5878	.5450	• 4949	4394	2725		5155.	• 3124	• 2990	.2842	.2725	.2622	. 2552			2452.	• 2308	• 2222	•2164	• 2091	. 2035		- 1405
x/c		000 •	• 005	.010	.015	020		C 2 0 •	• 031	• 040	• 020	•090	.075	.100	.150		0.10	067.	.300	• 350	• 400	.450	. 505	. 550				• /00	091.	.800	.850	000	004

00	1 6 8	2016		3549	1619	1360	0158	8636 8	8947	21 38	9942	0555	8038	9265	7554	7368	8171	7716	7570	76 37	8042	75.22	7656	7944	7967	7913	7574	7506	7185	
15.00 16		-2. 1024	-4.9109	-4.8300 -4	-4.3937 -1.	-2.9405 -1.	-2.7678 -1.	-2.5188	-2.3180	-2.1812 -1.	-2.0543	-1.8923 -1.	-1.6392	8266	-1.1186	0666	8525	8133	7834	7637	7380	7924	7410	6352	6638	6472	5296	5242	6410	
14.00		-5.2110	-4.9811	-4.8652	-4.2506	-2.8430	-2.8417	-2.5849	-2.4023	-2,2887	-2.1664	-1.9885	-1.7625	-1.4424	-1.2013	-1.0252	8463	6669	5417	4725	4378	4285	4310	4325	4288	4374	4453	4417	4457	
13.00		-5.0229	-4.8007	-4.6479	-4.2618	-2.7835	-2.8437	-2.5575	-2.4046	-2.3127	-2.1986	-2.0273	-1.8113	-1.5083	-1.2987	-1.1322	9754	8241	6448	5216	4413	3976	3840	-,3813	3788	- 3767	3791	- 3800	3826	1121 .
12.00		-4.7337	-4.5280	-4.3776	-4.1425	-2-7698	-2.8215	-2.4918	-2.3663	-2.3230	-2.1980	-2.0419	-1.8330	-1-5484	-1.3566	-1.2007	-1.0664	9187	- 7524	- 6194	- 4838	- 4057	- 3650	- 3567	7447	4745	- 3452	3263		
x/c		.000	.005				- - 	080				.075			002	. 250	300	- 10 S C	004	450	5005	.550	600	. 650						222

1**2**0

T

R = 300,000																																		
M = 0.09	16.00		99T6 -	.8542	2266.	1.0003	.9763	9479				6662 •	• 7 4 9 4	.6922	.6115		0477.4	. 44 LI	• 3808	.3621	.3239	.2910	. 25.05	. 2301	10.01	76670	•1056	.1452	.1094	.0743	7720.			1953
= 15 PSI	15.00	-5 1420	4 JOT • / -	6076 •	. 8579	.9821	1.0030	1.0052	. 9953	9505		0040.	2668.	. 7905	.6720	5382			• • • • 0.6	1166.	• 3625	• 3276	.2965	• 2636	1046 -		6 T T A	• 1840	.1529	.1204	• 0916	0440	- 0374	- 1185
3,4,5 PTINF	14.00	-5.2110	3245		2000.	2584.	1.0027	1.0035	.9915	.9452	. 8974			006/ •	.7140	.6007	.5316	4706	06144	1001.	• 4005	•3657	• 3336	• 3066	.2802	.2513			1641.	•1595	.1236	•0782	.0199	0653
RUNS	13.00	-5.0229	.3963	RAR	2000 ·		1 • UU 54	1.0021	.9821	.9335	.8801	.8346		* · · · ·	• 6993	.5917	.5212	. 4673	C124-	3000	0040.	6795.	• 3366	• 3051	.2856	• 2589	4655.	2052		01/10	.1431	.1016	•0499	0287
	12.00	-4.7337	• 4581	.9145	1.0011	1,0038		0070	9696.	• 9192	•8660	.8178	- 76 3 R	101	0100.	19/6.	• 5094	• 4642	.4208	. 3872	36.37			. 31 11	• 2403	• 2634	.2451	.2183	1014	1 2 2 2	0+01.	CU51 +	•0812	.0158
	x/C	• 000	• 005	.010	.015	.020	50.0				060.	•060	•075	100	150	061.	• 200	• 250	• 300	.350	-400	450				• • 00	• 650	. 700	.750	800			006.	066.

RUN 8 PTINF = 15 PSI M = 0.09 R = 300,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

	2.00	• 9925	.0772	1682	2955	3873	4562	5025	5691	6165	6556	6922	7772	7074		010/	7610	7586	7384	6861	6237	5741	5543	5423	3139	1917	1644	1193	- 0738			1150.	
	4.03	.5363	8236	9285	9827	-1.0135	-1.0381	-1-0474	-1.0563	-1.0603	-1-0653	-1-0621	- 100 C -		C+00.1-	9730	9424	9142	8721	8067	7498	7198	7032	-•3992	3140	2664	2086	- 1531		5 · 50 · I	0417	•0262	
	5 • 98	4850	-1.9421	-1.8.72	-1.7693		-1 4877	-1 6636 -1 6636			-T+JC+J	40 6 4 4 7 4 V	0744.II	-1-3645	-1.2609	-1.1815	-1.1247	-1.0717	-1.0134	9508	- 4047	- 7602	5587	4690	0085 -		9646		-•1 /07	1120	0504	•0229	
	7.94		-2.3404	7 3 2 C	7#C/•7#	1010*7-	-2.434L	-2.3320	1242.24	-2.10/3	-1.9960	-1.9211	-1.8227	-1.6957	-1.5088	-1.3375	-1-2456	-1 1781	4000 IT		-+77				777C+-	1014 0 1	1000	2568	1843	1211	0617	0038	•
	10.03		-4.0760	-4-0008	-3.7216	-3.5125	-3.5286	-2.8787	-2.4894	-2.2211	-2.1759	-2.1415	-2.0124	-1.8390	-1.6012				-1.2109	-1.1111	8616 -		/101	06/6*-	4668	3729	2959	2361	1895	- 1552	- 1777	- 1012	
•	11.99		-4.7542	-4.5297	-4.3780	-4.1018	-2.7743	-2.8248	-2.4998	-2.3625	-2.3163	-2.1920	-2.0390	0558.1-		T/ 10 T -	-1.5782	-1-2044	-1.0695	1606	7475	6212	4890	4016	3596	3494	3400	3429	- 339B				0 C T S • H
	14.01		-5.2117	-4.9639	-4.8486	-4.3021	-2.8527	-2.8259	-2.5737	-2.3921	-2.2801	-2.1565	-1.0836		1161-1-	-1.4343	-1.1927	9327	8447	6787	5466	4701	4373	4309	4236	4321	4314	4350				- 4404	4403
	16.01		9679	-1.0215	- 9121	-1.1349	7502-1-		-1.1199	8538		-105367	-1.41.4		8846	7651	- 8504	8304	7845	7853	8215	- 7975	7221	7498	7679	7719	7870			-• 7336	7370	7073	6498
				300.				020.				000	.000	•075	.100	.150	.200	. 250	300	350			005					• • • •	• 750	. 800	.850	006.	.950

T

RUN 8 PTINF = 15 PSI M = 0.09 R = 300,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

x/c	16.01	14.01	11.99	10.03	7.94	5.98	4.03	2.00
• 000	9679	-5.2117	-4.7542	-4.0760	-2-3904	6850	5252	900
• 005	.8667	.3368	.4596	. 6165	5 - 5	1-0024		- 4420
.010	1.0021	.8638	-9137	0096 -		4.0064 0760		9606.
.015	.9988	.9837	- 9983	1 - 0022	00077			• 3240
• 020	.9720	1.0017	1.0038	1,0023	0504	.000.	• 0 • 2 4	• 2323
.025	. 9444	1-0030	. 9053		++C++	0778.	• 7 7 2 8	.1854
.031	.9101	9879	07050	0000	4CTA •	• / 650	.5125	.1586
040	8044	0407			0 A A A A	•/166	• 4691	.1357
050			0016 •	• 8839	2461.	• 6361	.4037	.1042
000	• 0000 •	0268.	.8667	.8280	.7320	• 5786	.3618	.0870
	+000.	• 8 4 9 8	.8175	.7817	•6869	.5341	.3319	- 0815
c.n.	• • • • 0 6	• 78 71	.7596	• 7209	.6257	.4857	. 2987	.0766
• 100	.6159	.7102	.6811	• 6446	.5596	.4303	-2670	- 0714
• 150	• 5053	•6012	•5782	.5490	.4771	.3664	2300	
• 200	.4452	.5299	. 5090	.4880	6224	3308	2162	
.250	.3938	.4789	• 4602	. 444 .	3881	3066	0473	1000.
•300	.3610	.4317	.4249	.4113	3646	210 0		1040.
.350	•3199	.3973	1910	2844		.177.	9107.	• 1048
.400	. 3045	.3652	3604			1117.	. 1961.	· 1111
450	1070			0005.	. 3238	•2646	.1959	.1167
	1007 •	1.4.9.9.4 1.4.9.0	2666.	• 3429	.3105	.2596	.1910	.1243
	1022.	. 3063	• 3125	• 3200	• 2964	.2508	.1914	.1277
000.	505T •	1817.	• 2895	• 3026	.2823	.2423	.1887	1151.
• • • •	.1668	• 2535	• 2662	.2864	.2739	.2352	.1873	.1351
000	• 1387	• 2 2 2 4	.2451	.2686	.2584	.2284	-1866	1300
• 700	.1030	.1919	• 2194	.2493	.2480	FC22.	1807	0021
• 750	• 0680	.1622	•1909	. 2307	.2361	- 2145	1780	
.800	.0358	.1238	.1637	BCIC.	0466			C041.
.850	0199	.0784	1274	700F	6122.	7/07.	.1/0/	•1426
006	- 0976			- 1000	• 2104	•1997	.1718	.1450
050		1130.	6100*	E841 •	.1912	•1883	.1635	.1448
	7407 •_	0£00.• -	•0163	.1172	.1686	.1731	.1572	.1422

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS PUN 8 PTINF = 15 PSI M = 0.09 R = 300.000 HYSTERESIS (DECREASING ANGLE OF ATTACK)																														
	01	.9058	•6739	. 4007	.2432	.1246	•0304	0373	1454	2239	2892	3566	4328	5116	5581	5916	6106	6093	5750	5223	4647	4252	4073	3969	2144	1014	0842	0445	0068	• 0477
	x / C	000	• 005	.010	.015	• 020	.025	.030	.040	.050	.060	•075	.100	.150	.200	.250	.300	.350	.400	.450	.500	.550	.600	.650	• 700	.750	.800	.850	• 900	.950

RUN 8 PTINF = 15 PSI M = 0.09 R = 300.000 Hystedests (decedeasing angle de attack)																														
	01	.9058	3374	3339	3275	3123	2956	2795	2521	2281	2062	1767	1387	0839	0490	0168	.0045	.0251	•0402	.0523	.0654	.0756	.0852	.0911	0660.	.1049	.1107	.1228	.1227	.1223
	x/c	000	.005	.010	.015	• 020	•025	•031	• 040	•050	•060	• 075	.100	.150	• 200	.250	• 300	.350	•400	.450	• 505	.550	• 600	.650	• 700	.750	.800	.850	• 900	.950

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

-1.99 09 09 09 09 09 .7570 .6528 .6831 .6762 .4187 .0925 2837 .7570 .6064 .4054 .4013 .6762 .4187 .0925 2858 .7570 .6064 .4054 .4013 .6762 .4187 .0925 2887 .7570 .6064 .4054 .4013 .6762 .4187 0925 2887 .3986 .6031 .0573 .2314 .1258 16109 .5869 6580 .3981 .0377 .0346 .1258 16495 7709 .0974 .0316 .1288 1649 7699 7709 .09719 .0317 .0346 1649 7699 7709 .00719 1754 0346 7699 7699 7709 .00719 1754 1236 1410 7524 8693 .00719 1754 1236 7524 7694 7619 .00714 1756 16907 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>							
.2007 .6220 .8997 .9045 .9925 .9905 .8870 .7770 .6064 .4013 .6762 .4187 .0922 2852 .7770 .6064 .4013 .6762 .4187 0922 2852 .7770 .6467 .25139 6762 4187 0922 2852 .7986 .6611 25139 1578 1574 5763 5769 .3311 .1300 .1258 1128 7499 5683 .3986	-1.99	66	01	•01	1.04	2.04	2.99
.9578 .6831 .6762 .4187 .0922	.2007	. 6220	. 8997	.9045	•9925	.9905	.8870
.7570 $.6064$ $.4054$ $.4013$ $.11409$ 1676 4931 5980 $.4918$ $.2339$ $.0377$ $.0346$ 1961 4545 7068 $.3186$ $.1548$ $.0377$ $.0336$ 1961 4545 7069 $.3186$ $.1548$ 0336 0336 7412 7409 $.0974$ 01210 2180 1128 7617 7693 $.0974$ 01210 21865 2180 46495 7409 $.0156$ 11236 21865 2180 46495 7610 $.0176$ 1236 2180 6109 8109 8109 $.0176$ 1236 2180 61961 4695 7409 $.0176$ 1236 2180 6104 66109 8109 $.0176$ 1236 2289 2284 6109 8109 1236 2033 26919 6109 6109 81499 1236 2033 65029 6503 7760 8653 1236 2033 6503 6594 7760 8153 1236 5903 5903 5603 7760 8153 1274 8603 5603 7766 8653 7760 12720 6019 6603 7760 8153 1271 6803 5522 7220 7760 46	.9578	.8588	. 6831	•6762	.4187	•0922	2852
6198 .4617 .2539 .2516 -0049 2841 5588 .4984 .3311 .1300 .1258 1128 3778 5516 .1981 .0412 1363 1346 03340 1258 9588 .1981 .0412 1363 1416 26495 7058 .1981 .06412 1363 1416 6495 7058 .0974 .0510 2855 2884 6495 8310 .09719 2053 2865 2865 2843 6495 .0719 2753 2865 2864 6495 8310 .0719 2753 2865 2865 2865 86495 86495 .0719 2754 8610 66495 86113 7646 86495 .0716 2754 6847 8613 6169 66495 86114 .0716 2754 8603 5616 7524 86134 .0784 4603 5618 6504	.7570	.6064	. 4054	.4013	•1409	1676	4931
4984 .3311 .1300 .1258 1128 3778 6558 3986 .1548 .0377 .0340 1545 6558 3986 .1548 .0377 .0345 2561 4545 7058 1981 .04128 .0377 .0345 5610 4545 7493 0074 .0510 2165 2180 4110 60495 7493 0075 1236 2180 5167 6109 8110 0077 2053 2384 6108 6109 8110 0754 2963 5167 6188 6188 6188 0749 6508 5540 5517 8403 6698 1274 8603 5607 5603 7651 8514 4657 6508 5609 6603 7669 86163 4754 6509 6509 6603 7669 6503 4857 5708 5502 7451 7694	.6198	.4617	• 2539	.2516	-•0049	2841	5880
.3986.2339.0377.0340 1961 4545 7058 .3186.0412 0336 0336 0345 7495 7495 .0974 0510 2165 21816 5161 6495 7810^2 .0156 1236 2864 6495 6109^2 8103^2 .0176 1236 2865 2864 6495 6109^2 -0719 2053 2865 2864 6847^2 8103^2 0719 2053 2865 2864^2 6847^2 8103^2 0719 2053 2869^2 5649^2 6847^2 8693^2 0719 2053 2864^2 6847^2 8693^2 3735 4609^2 5863^2 5649^2 7684^2 8613^2 3775^2 8603^2 5693^2 5649^2 7684^2 8653^2 4657 6504^2 5693^2 5693^2 7769^2 8813^3 4657 6504^2 6594^2 7694^2 7084^2 8153^2 4657 6593^2 5720^2 5946^2 7769^2 8613^2 4657 6594^2 6594^2 7694^2 7201^2 7769^2 4657 6594^2 6594^2 7694^2 7614^2 6516^2 4657^2 9610^2 6594^2 7201^2 7769^2 4657^2 9610^2	.4984	.3311	.1300	.1258	1128	3778	6558
	.3986	•2339	• 0377	.0340	1961	4545	7058
. 1981. 04412 1363 1416 3451 5610 7817. 0719. 0719 2185 2186 4110 6109 8110. 0719 2155 2855 2864 6847 8410. 0719 2753 3755 2864 6847 8431. 1754 2763 3755 4258 5864 6847 8658 3077 3735 4609 6708 6564 7169 8514 4657 5700 5703 5540 6574 8514 8514 4857 5709 5603 6574 6678 7661 8514 4857 5709 5709 6574 6678 7661 7762 4857 5591 5607 6578 7651 7661 7764 4857 5598 5607 6578 7661 7764 6618 4857 5598 5607 6578 7661 7764 6618 4857 5709 6503 7764 6635 7766 7766 4857 4673 6573 4102 4102 4102 7603 7661 2791 4867 4494 6694 6603 2534 6635 1764 2791 3325 4102 4121 4495 6594 6635 1603 2791 2791 3867 4454 4551	.3186	.1548	0336	0345	2593	4935	7409
.09740510 2165 2180 4110 6109 8100 .0156 1236 2855 2884 6495 8498 0719 2053 2855 2884 6495 8498 1754 2736 8263 7169 86947 1754 2936 5682 7169 8659 1754 2976 5990 5699 5549 8659 4857 5990 5990 5694 7524 8659 4857 5990 5607 6594 7769 4857 5911 5944 5607 6596 8613 4679 5911 5926 7609 7601 4679 5381 5944 5607 6596 86503 4679 6509 6594 7769 7603 4679 65910 5607 6594 76013 4679 6018 5607 6594 7603 4679 6673 7201 7201 7769 4679 6673 6078 6693 74603 4679 6673 6694 7201 7201 4679 6679 6694 7201 7201 4659 6694 6694 6603 6603 4667 9325 4424 6603 6603 2791 <td< td=""><td>.1981</td><td>.0412</td><td>1363</td><td>1416</td><td>3451</td><td>5610</td><td>7817</td></td<>	.1981	.0412	1363	1416	3451	5610	7817
0156 1236 2855 2884 4648 6495 8847 0719 2936 3509 3549 5167 6847 86947 3077 3975 3975 3752 36495 86504 37754 2936 55089 55607 7169 86508 3775 6909 5590 5582 7769 86103 4677 6909 56946 7769 86133 4677 6508 5727 86133 4679 6508 5727 86133 4679 65946 65946 7769 4679 65946 65946 7769 4679 65946 6603 7769 4679 65946 7760 81537 4679 65946 65044 7603 4679 65946 7769 81537 4679 65946 65034 7603 4231 5940 65946 7760 22911 3325 4454 65946 22911 33229 3907 3867 65946 22911 33229 33601 4561 5535 22911 3229 3367 65946 22911 3273 33661 5535 22912 3273 32692 65946 22923 336019 6	• 0 9 7 4	0510	2165	2180	4110	6109	8100
-0719 2053 3509 3549 5167 6847 84599 3775 2936 4252 4299 5682 7169 865812 3735 4609 5508 5602 77527 86314 4657 6908 5590 5607 6697 7527 88514 4657 59181 5900 5590 5607 6697 7724 88357 4657 53811 5900 5590 5607 6603 7769 83357 4679 66018 5607 6603 7201 7769 83357 4679 6594 60094 6603 76603 7769 4852 5910 5501 5522 55340 66535 4274 96038 5607 66038 5511 5523 4274 98367 65946 66033 7169 3711 3635 4121 4754 55340 66136 22974 33267 93867 4553 561340 65635 3731 3229 9307 94956 65736 65346 22974 33267 4254 65367 65635 22974 33267 4754 5522 55340 22974 33267 4754 55340 66036 22974 33267	.0156	1236	2855	2884	4648	6495	8311
-1754 2936 4252 4299 5682 7169 86536 3735 4609 55808 5589 55825 7451 8514 4657 8609 55803 55825 7451 851527 8514 4657 5208 55938 55936 77607 81537 4657 53811 5944 5607 66976 77601 7769 4679 5598 5607 66976 77601 776635 4679 5990 5607 66976 77601 776635 4679 5916 5607 66976 66036 66355 4679 60094 66036 6535 66036 6535 4679 6008 6102 6721 6535 6108 3751 9867 6036 6535 6535 6535 37201 7201 7201 7201 7084 37211 4626 4102 4121 67535 5946 27011 3637 3637 3229 6535 56036 27011 3229 4102 4121 67535 5535 270111 3229 40653 5535 5643 270111 32291 3237 02833 02831 65735 260121 27231 02733 02691 <	0719	2053	3509	3549	5167	6847	- 8499
3007 3975 5008 5089 6265 7451 8603 4274 4909 5903 5540 6504 7527 8514 4557 4908 5825 6697 7524 851357 4657 53811 5903 5590 6697 7524 81537 4657 53811 5903 5708 7769 76697 76535 4679 53811 5996 6596 7769 7084 4679 53811 55038 6596 72011 7769 4679 65936 6596 72011 7769 4754 6598 74996 65936 66039 32791 33259 41021 4754 55936 66039 27911 33229 41021 4754 55340 66039 27911 33229 1675 3867 4553 55340 16043 26081 27791 33229 10792 4754 55340 16093 27911 27911 27731 25335 10693 11064 11064 27081 27722 26733 02813 02633 02619 02679 2791 27722 27722 25735 10602 10069	1754	2936	4252	4299	5682	7169	8658
3735 4609 5540 6504 7527 8514 4657 5726 5825 6697 7524 8153 4657 5720 5825 6697 7524 8153 4657 5701 5724 8153 7697 4657 5701 5726 7696 7769 4657 5944 6009 6596 7201 4626 55090 5503 6598 7603 4234 4626 5016 4424 6036 3211 3406 44121 4455 5596 2791 3325 44121 4455 5596 2791 3325 3970 3867 4553 2601 3325 3970 3867 4561 2791 3325 1675 1792 4626 2691 2523 5535 1404 2603 6013 5543 5643 2601 3360 3867 4561 5545 2603 1772 4226 2535 1404 2603 0373 0233 0264 0579 1344 0373 0223 0223 0579 1084 0361 00602 01699 1164 1084 00699 01699 01699 1084 0228 0228 0538 0538. 0538 01699 01699 05	3007	3975	5008	5089	6265	7451	8603
- 4274 - 4988 - 5825 - 6697 - 7524 - 8153 - 4657 - 5381 - 5944 - 5990 - 6708 - 7460 - 8153 - 4657 - 5381 - 5944 - 5990 - 6796 - 7201 - 7769 - 4679 - 5944 - 5009 - 5946 - 7001 - 7769 - 7769 - 4679 - 5090 - 5944 - 5003 - 5522 - 7201 - 7769 - 4534 - 4626 - 5016 - 55038 - 5522 - 5986 - 6535 - 3751 - 4080 - 4454 - 4424 - 6603 - 6536 - 6536 - 3751 - 3635 - 4121 - 4754 - 5548 - 6536 - 6168 - 2791 - 3325 - 3907 - 3867 - 4561 - 52340 - 65843 - 2691 - 3229 - 1675 - 1792 - 4561 - 52635 - 6036 - 2601 - 3229 - 1672 - 4226 - 52635 - 16084 - 16084 - 2601 - 2323 - 0337 - 0323 - 02248 - 62535	3735	4609	5490	5540	6504	7527	8514
4657 5270 6018 5990 6708 7460 8153 4852 5381 5944 6009 6596 7201 7769 4852 5381 5944 6009 6596 7201 7769 4852 5981 5944 5016 5512 7201 7769 4234 4626 5016 5522 5986 6535 3751 4626 4454 4121 4996 55986 65366 3211 3406 4121 4754 55495 6108 65366 2791 3325 4121 4754 55495 6019 2691 3325 3907 3867 4561 52340 65843 2601 3229 3325 1675 1792 65643 65846 65846 2601 3229 3327 33867 45661 55295 55646 2601 2723 0319 0602 2533 16648 <td>4274</td> <td>4988</td> <td>5803</td> <td>-,5825</td> <td>6697</td> <td>7524</td> <td>8357</td>	4274	4988	5803	-,5825	6697	7524	8357
- 4852 - 5381 - 5944 - 6009 - 6596 - 7201 - 7769 - 4679 - 5000 - 5598 - 5607 - 6094 - 6603 - 7084 - 453 - 4626 - 5016 - 5038 - 5522 - 5986 - 6535 - 3751 - 4026 - 4454 - 4424 - 5522 - 5986 - 6535 - 3751 - 4080 - 4454 - 4424 - 6036 - 6535 - 6168 - 3211 - 3635 - 4121 - 4754 - 55414 - 6036 - 2974 - 3406 - 3970 - 3867 - 4561 - 55436 - 6019 - 2791 - 3325 - 3907 - 3867 - 4561 - 52340 - 6036 - 2691 - 3229 - 1675 - 1792 - 4226 - 55635 - 16084 - 2601 - 22533 - 1675 - 1792 - 4226 - 55635 - 16096 - 2908 - 2033 - 0323 - 0323 - 0248 - 05235 - 1404 - 65235 - 1404 - 1344 - 0361 - 0361 - 0579	4657	5270	6018	5990	6708	7460	8153
	4852	5381	5944	6009	6596	7201	7769
4234 4626 5016 5038 5522 5986 6535 3751 4080 4454 4494 4996 5595 6168 3211 3635 4102 4121 4996 55414 6036 2974 3635 4102 4121 4554 5544 6019 2791 3325 3907 3867 4561 52340 6019 2691 3229 3860 3867 4561 52635 16096 2608 2523 1675 1792 0819 1668 16096 2608 2923 1675 1792 0819 16602 16096 1344 0373 0337 0233 0248 0602 070905 1114 .0108 .00220 .0010 .0089 0579 07169 07519 .0643 .0614 .0505 .07169 0672 0729 07169 07169 <td>4679</td> <td>5090</td> <td>5598</td> <td>5607</td> <td>6094</td> <td>6603</td> <td>7084</td>	4679	5090	5598	5607	6094	6603	7084
3751 4080 4454 4494 4996 5595 6168 3211 3635 4102 4121 4754 5340 6036 2974 3406 3970 3985 4561 5340 6019 2791 3325 3907 3867 4561 5295 6019 2691 3229 3860 3867 4561 52635 1698 2608 2923 1675 1792 0819 1064 1698 1344 0373 0337 03220 0602 0505 11404 . 0108 . 00220 . 00361 . 00579 01649 0714 . 0505 . 0538 . 0410 . 0420 . 03420 0169 02317	4234	4626	5016	5038	5522	5986	6535
3211 3635 4102 4121 4754 5414 6036 2974 3406 3970 3985 4653 5340 6019 2791 3325 3907 3867 4561 5235 6019 2691 3229 3860 3867 4561 52535 16098 2608 2923 1675 1792 0819 1064 1698 1344 0373 0337 03220 0602 0905 1114 .0108 .0002 0233 0248 05679 0714 .0361 .0220 .0010 .0089 00697 0169 0251 .0643 .0614 .0505 .0538 .0410 .0420 .0347	3751	4080	4454	4494	4996	5595	6168
2974340639703985465353406019 2791332539073867456152955643 26913229386038584226525351698 2608292316751792081910641404 1344037303370320060209051114 -0108 -000202480248036105790714 -0114 -057907140714 -01690251 -0251 -025105790714	3211	-,3635	4102	4121	4754	5414	6036
2791 3325 3907 3867 4561 5295 5643 2691 3229 3860 3858 4226 2535 1698 2608 2923 1675 1792 0819 1064 1404 1344 0373 0337 0320 0602 0905 1114 .0108 .0002 0233 0248 0361 0579 0714 .0361 .0220 .0010 .0089 0069 0169 0251 .0643 .0614 .0505 .0538 .0410 .0420 .0347	2974	3406	3970	3985	4653	5340	6019
2691322938603858422625351698 2608292316751792081910641404 1344037303370320060209051114 -0108 -000202330248036105790714 -0361 -0220 -0010 -0089006901690251 -0643 -0614 -0505 -0538 -0410 -0420 -0317	2791	3325	3907	3867	4561	5295	5643
2608292316751792081910641404 1344037303370320060209051114 .0108 .000202330248036105790714 .0361 .0220 .0010 .0089006901690251 .0643 .0614 .0505 .0538 .0410 .0420 .0317	2691	3229	3860	3858	4226	2535	1698
1344037303370320060209051114 .0108 .000202330248036105790714 .0361 .0220 .0010 .0089006901690251 .0643 .0614 .0505 .0538 .0410 .0420 .0317	2608	2923	1675	1792	0819	1064	1404
.0108 .0002 0233 0248 0361 0579 0714 .0361 .0220 .0010 .0089 0069 0169 0251 .0643 .0614 .0505 .0538 .0410 .0420 .0317	1344	0373	0337	0320	0602	0905	1114
.0361 .0220 .0010 .0089006901690251 .0643 .0614 .0505 .0538 .0410 .0420 .0317	.0108	• 0002	-• 0233	0248	0361	0579	0714
.0643 .0614 .0505 .0538 .0410 .0420 .0317	.0361	.0220	.0010	• 0089	-•0069	0169	0251
	• 0643	•0614	.0505	•0538	.0410	•0420	.0317

1**26**

T

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

-2.84	-1.99	66*-	01	•01	1.04	2.04	2.99
1							
	.2007	. 6220	. 9997	.9045	.9925	. 9905	. AR70
	-1.3677	8513	3206	3218	.1554	.5146	. 7695
	-1.0777	7143	3314	3232	.0342	.3306	. 5500
•	9310	6375	3218	3178	0154	.2411	4644
0	8429	5843	3088	3025	0365	1951	.3836
4	7586	5392	2923	2895	0482	-1609	3395
4	- • 6972	4996	2751	2747	0568	.1396	2906-
0	6189	4396	2470	2484	0592	1111.	-2562
0	5699	3940	2257	2264	0536	• 0960	.2240
4	5323	3548	2038	2057	0514	.0834	.2054
õ	4956	-•3076	1763	1779	0418	• 0802	.1837
57	4584	2489	1395	1375	0267	.0761	.1699
08	2140	1674	0812	0858	•0014	.0788	.1539
00	1477	1159	0458	-•0475	•0255	.0901	.1524
76	1087	0768	-• 0191	0179	.0401	.0973	.1509
*	0758	0452	• 0046	• 00 4 0	.0582	.1064	.1531
96	0482	0191	• 0231	.0213	•0684	.1168	.1536
0	0245	• 0000	.0422	1660.	•0809	.1215	.1577
68	0036	.0174	. 0531	•0508	• 0863	.1232	.1547
24	•0175	•0337	• 0683	•0657	.0961	.1294	.1574
51	•0308	.0450	• 0755	•0744	.1036	.1316	.1599
40	.0427	.0578	• 0839	.0825	.1094	.1355	.1593
05	• 0559	•0639	.0940	• 0935	.1129	.1387	.1594
1	• 0697	• 0770	• 0964	•0679	.1185	.1394	1441
28	.0797	•0892	.1033	.1064	.1234	.1412	1572
46	• 0930	.1054	.1119	.1113	.1283	.1426	.1570
2	.1006	.1167	.1144	.1159	.1318	.1446	1595
98	.1122	• 1300	.1161	.1226	.1324	.1426	1527
4	.1231	•1383	.1176	.1206	.1287	.1339	.1448

RUWS 9,10,13 PTINF # 15 PSI M = 0.06 R = 200,000

6.03	6542	-1.8074			-1 • 7448	-1.6928	-1.6597	-1.6217	-1.5643	-1.5127	-1.4772	-1.4204	-1.3529	-1.2422	-1.1622	-1.1029	-1.0421	9748	9186	8838	8681	7505	3987	3522	2926	2312	1666	1073	-•0493	•0195
6 • 0 2	6467	-1 8077	21604 -	-1-1431	-1.7436	-1.7013	-1.6565	-1.6225	-1.5649	-1.5168	-1.4810	-1.4279	-1.3563	-1.2453	-1.1700	-1.1029	-1.0441	9800	9224	8851	8708	7618	4011	3531	2972	2310	1674	1104	0500	.0215
5.51	- 2635		00/C•T-	-1.5481	-1.5224	-1.5058	-1.4874	-1.4629	-1.4217	-1.3880	-1.3662	-1.3263	-1.2688	-1.1787	-1.1127	-1.0586	-1.0018	9441	8789	8378	8230	8173	4302	3173	2767	2191	1634	1062	0455	.0217
5.05	0860		-1.5123	-1.3326	-1.3434	-1.3372	-1.3329	-1.3202	-1.2931	-1.2736	-1.2605	-1.2308	-1.1872	-1.1124	-1.0645	-1.0095	9659	- 9065	- 8379	7962	7813	7766	5644	2872	2555	2077	1517	0964	0405	.0248
5 • 05	0070		-1.3113	-1.3354	-1.3398	-1.3358	-1.3357	-1.3181	-1.2962	-1.2778	-1.2628	-1.2366	-1.1882	-1.1160	-1-0610	-1-0129		0000	- 8407	7797 -	7779	7730	5617	- 2864	2549	- 2070	1534	- 0983	0423	.0242
5 • 02		0000	-1.2968	-1.3197	-1.3261	-1.3251	-1.3237	-1.3099	-1-2890	-1.2615	-1.2540	-1.2302	-1.1858	-1-1133	-1-0560	-1.0125		- 0037	- 8253	5707	- 7773	7683	5634	2866	- 2509	- 2042	1521	- 0072		.0256
4.99		1410.	-1.2770	-1.3078	-1.3141	-1-3136	-1-3078	-1-2999	-1-2800	-1-2592	-1.2478	-1-2214	-1.1770				- T • 00-10			31604 -		7663	- 5848	- 2815	- 2504	- 2003	- 1513		2050-	054
3.99		• 5845	7529	8777	9312	9714	- 0082	-1-0116	-1 07 23	-1 0257	-1-0361	-1.0354		-1001-	12040		- 4 T 4 -				012/-	- 6834						7761.		-+0360
x/C		• 000	.005	- 010	- 015										061.	.200	062.	.300	065.	0.04	• 4 0 0							• 800	.850	900 960

128

Т

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

x/c	3.99	4•09	5.02	5 • 05	5.05	5.51	6.02	6.03
					8 1 1 1 1 1 1 1 1			
• 000	.5845	.0757	• 0588	.0428	.0380	2635	6467	6542
.005	.9327	9666.	6266.	1.0031	1.0058	1.0033	1.0042	1.0012
.010	.7515	.8860	.8883	.8914	.8944	•9383	.9716	.9734
.015	.6274	.7728	.7814	.7832	.7840	.8357	.8854	.8902
•020	.5569	.7016	.7058	.7123	.7103	.7685	.8273	.8206
.025	.5013	•6399	•6492	.6516	.6500	.7043	• 76 39	.7637
.031	.4606	.5927	.5971	• 6006	.6012	.6548	.7120	.7154
.040	.3937	.5191	.5260	.5276	•5255	.5789	•6346	.6371
.050	.3519	• 4675	.4698	.4755	.4761	.5270	.5772	.5795
.060	.3221	.4330	• 4366	.4376	.4293	.4821	•5342	•5364
.075	.2898	.3898	.3948	• 3979	• 3961	•4369	.4835	.4837
.100	.2580	.3430	• 3495	.3485	.3476	•3888	.4288	.4308
.150	.2229	• 2969	.3010	.2982	.3016	.3311	.3642	.3675
.200	.2133	.2690	.2725	.2730	.2734	.2989	.3305	•3334
.250	.2047	•2552	.2579	.2582	.2597	.2820	.3052	.3082
• 300	.1983	.2469	.2455	• 2484	.2468	.2641	•2885	.2877
.350	.1979	.2346	.2374	.2372	• 2399	• 2569	.2772	.2750
.400	.1912	.2314	•2318	.2323	.2310	.2459	.2650	.2656
.450	.1902	• 2223	.2259	.2261	.2252	.2421	.2576	.2590
.505	.1865	.2160	.2194	. 2205	.2218	.2331	•2466	.2490
.550	.1848	.2142	.2157	.2124	.2175	.2271	•2398	.2393
•600	.1846	. 2083	• 2099	. 2093	.2104	.2205	.2340	•2382
.650	.1827	.2037	.2075	• 2039	.2020	.2141	.2275	.2291
. 700	.1946	.2359	.2105	.1227	•1942	.2311	.2501	.1774
.750	.1763	.1958	.1956	.1930	.1967	.2014	.2117	.2135
.800	.1724	.1894	•1909	.1903	.1892	.1968	.2062	.2073
.850	.1671	.1837	.1837	.1846	.1839	.1873	.1976	.1981
• 900	.1623	.1744	.1715	.1730	.1750	.1779	.1837	.1839
.950	.1495	•1597	.1591	.1613	.1612	.1624	.1665	.1663

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

1 7.05 7.22 7.05 7.00 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>								
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	7.01	İ	7.05	7.22	7.56	7.76	8 • 00	8 • 0 2
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-1.5331		-1.5717	-1.7379	-2.0469	-2.2080	-2.4141	-2.4243
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1 -2.5389		-2.5653	-2.6814	-2,8884	-2.9910	-3.1227	-3.1383
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-2.3060		-2.3250	-2.4162	-2.5849	-2.6580	-2.7605	-2.7698
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-2.1858		-2.2085	-2.2800	-2.4236	-2.4946	-2.5821	-2.5904
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-2.0900		-2.1032	-2.1772	-2.2933	-2.3637	-2.4369	-2.4390
-1.9628 -2.0170 -2.1233 -2.1770 -2.2380 -2.24 -1.8641 -1.9126 -2.0047 -2.0047 -2.0976 -2.10976 -1.7795 -1.8231 -1.9118 -1.91670 -1.99162 -1.9916 -1.6337 -1.6336 -1.7696 -1.91670 -1.99162 -1.99162 -1.6337 -1.6738 -1.7366 -1.8670 -1.9162 -1.99162 -1.6337 -1.6738 -1.7366 -1.8670 -1.9162 -1.99162 -1.6337 -1.6337 -1.6473 -1.6118121 -1.69118 -1.5337 -1.5366 -1.8673 -1.6812 -1.6912 -1.22076 -1.3089 -1.3428 -1.8781 -1.63336 -1.22076 -1.2211 -1.2212 -1.2781 -1.6913 -1.2076 -1.3089 -1.3428 -1.2781 -1.6933 -1.2076 -1.2012 -1.2781 -1.6983 -1.6983 -1.0073 -1.0083 -1.2033 -1.6983 -1.0073 -1.0083 -1.0283 -0.8736 -1.0073 -1.0283 -0.7449 -0.7523 -1.0073 -1.0283 -0.7449 -0.753 -1.0073 -1.0283 -0.7419 -0.7523 -1.0073 -0.7233 -0.7523 -0.6332 -1.0073 -0.7419 -0.7523 -0.7523 -0.7465 -7.1903 -0.7233 -0.7523 -0.7465 -7.1903 -0.7233 -0.7523	-2.0137		-2.0284	-2.0940	-2.1998	-2.2541	-2.3332	-2.3370
-1.8641-1.9126-2.0047-2.0484-2.0976-2.11-1.7795-1.8231-1.9118-1.9439-1.99162-1.99162-1.6382-1.6728-1.7366-1.6404-1.6161-1.610-1.5337-1.6537-1.6728-1.7696-1.6118-1.610-1.5337-1.6537-1.6404-1.616404-1.616848-1.610-1.5337-1.6537-1.4130-1.4739-1.5118-1.610-1.2076-1.6116-1.4623-1.6404-1.6168-1.610-1.2076-1.2211-1.2212-1.2781-1.3033-1.400-1.2076-1.2012-1.2176-1.3033-1.673-1.10783-1.0086-1.2012-1.2176-1.3033-1.080-1.0783-1.0783-1.2781-1.2781-1.698-1.63-1.0783-1.0783-1.2786-1.2786-1.698-1.63-1.0783-1.0783-1.2781-1.2781-1.698-1.63-1.0783-1.0783-1.2786-1.2786-7.63-7.78-1.0783-1.2782-1.2783-7.6332-7.6332-7.63-1.0783-1.0869-1.8677-6.3361-7.63-6.3361-1.0783-1.6633-1.6233-7.623-7.623-7.623-1.0783-1.677-2.5633-1.2633-1.2633-6.276-2.2512-2.2533-2.6533-2.2576-7.2576-2.2512-2.2563-2.2563-2.2576-2.2576-2	-1。9447		-1.9628	-2.0170	-2,1233	-2.1770	-2.2380	-2.2457
-1.7795 -1.8231 -1.9118 -1.9439 -1.9982 -1.99162 -1.9162 -1.9162 -1.9162 -1.9162 -1.9162 -1.9162 -1.9162 -1.9162 -1.9162 -1.9162 -1.63337 -1.63327 -1.63637 -1.61944 -1.66448 -1.6648 -1.6648 -1.6637 -1.6637 -1.6637 -1.6104 -1.612012 -1.612337 -1.6123337 -1.613337 -1.613337 -1.613337 -1.633336 -11.6136337 -1.633336 -11.6136337 -1.633336 -11.61363372 -11.61363372 -11.633372 <th< td=""><td>-1.8496</td><td></td><td>-1.8641</td><td>-1.9126</td><td>-2.0047</td><td>-2.0484</td><td>-2.0976</td><td>-2.1120</td></th<>	-1.8496		-1.8641	-1.9126	-2.0047	-2.0484	-2.0976	-2.1120
-1.7145 -1.7548 -1.8306 -1.8670 -1.9162 -1.9162 -1.6382 -1.6728 -1.7366 -1.7696 -1.8121 -1.6848 -1.5337 -1.6194 -1.6404 -1.6848 -1.6537 -1.5337 -1.6194 -1.6404 -1.6848 -1.6537 -1.5337 -1.6194 -1.6404 -1.61848 -1.653 -1.2839 -1.3089 -1.4623 -1.6728 -1.6194 -1.2839 -1.3089 -1.3089 -1.3033 -1.6194 -1.2076 -1.2211 -1.2211 -1.2336 -1.3336 -1.2076 -1.2012 -1.2176 -1.3336 -1.303 -1.2078 -1.0986 -1.2012 -1.2176 -1.3936 -1.0783 -1.0986 -1.2012 -1.2176 -1.0803 -1.0783 -1.0986 -1.2012 -1.2176 -1.0803 -1.0783 -1.0986 -1.2012 -1.2176 -1.0803 -1.0783 -1.0986 -1.2012 -1.2176 -1.0803 -1.0783 -1.0963 -1.2012 -1.2176 -1.0803 -1.0783 -1.0963 -1.0803 -1.0863 -1.0783 -1.0963 -1.0803 -1.0863 -1.0783 -6.235 -6.235 -6.235 -1.0783 -6.235 -6.235 -6.233 -1.0803 -1.0803 -1.0803 -1.0803 -1.0803 -1.0803 -1.0803 -1.0803 -1.0803 -1.0803 </td <td>-1.7634</td> <td></td> <td>-1.7795</td> <td>-1,8231</td> <td>-1.9118</td> <td>-1.9439</td> <td>-1.9982</td> <td>-1.9943</td>	-1.7634		-1.7795	-1,8231	-1.9118	-1.9439	-1.9982	-1.9943
-1.6382 -1.6728 -1.7366 -1.7696 -1.8121 -1.8121 -1.5337 -1.5637 -1.6194 -1.66404 -1.6848 -1.6518 -1.53395 -1.4130 -1.4623 -1.4739 -1.6318 -1.651 -1.23839 -1.2012 -1.3645 -1.63936 -1.4014 -1.2076 -1.2211 -1.2212 -1.2781 -1.3333 -1.401 -1.2076 -1.2012 -1.2176 -1.3033 -1.208 -1.0783 -1.0166 -1.2176 -1.6893 -1.698 -1.0782 -1.2012 -1.2176 -1.6893 -1.686 -1.0783 -1.2166 -1.2176 -1.6893 -1.68 -1.0783 -1.2166 -1.2612 -1.2781 -1.6803 -1.0782 -1.2612 -1.2176 -1.6803 -1.6867 -1.0783 -1.2166 -1.21633 -1.6333 -1.6867 09829 -1.08608 -78679 -6332 -65332 08299 78608 78575 65332 -65332 65976 65334 65332 65332 65332 25912 2573 2573 25723 25723 25512 2573 25723 25723 25723 25512 2573 25723 25723 25723 25512 2563 2563 25723 225723 25512 2563 2563 25723 22576 <td>1.7103</td> <td></td> <td>-1.7145</td> <td>-1.7548</td> <td>-1.8306</td> <td>-1.8670</td> <td>-1.9162</td> <td>-1, 91 31</td>	1.7103		-1.7145	-1.7548	-1.8306	-1.8670	-1.9162	-1, 91 31
-1.5337 -1.5637 -1.6194 -1.6404 -1.6848 -1.651 -1.3855 -1.4130 -1.4623 -1.4739 -1.5118 -1.5118 -1.5118 -1.2839 -1.2839 -1.3033 -1.3936 -1.400 -1.2839 -1.2811 -1.2612 -1.2781 -1.3033 -1.403 -1.2076 -1.2012 -1.2176 -1.1698 -1.3033 -1.0783 -1.1616 -1.2012 -1.2176 -1.1698 -1.1303 -1.0783 -1.0986 -1.11046 -1.1698 -1.1303 -1.0783 -1.0986 -1.11046 -1.1698 -1.1303 -1.0783 -1.0986 -1.12012 -1.2176 -1.1698 -1.0783 -1.0783 -1.0803 -1.1303 -1.0783 -1.0986 -1.0263 -2.7419 -2.8637 -0.7465 -2.7419 -2.7419 -2.7523 -2.6332 -0.7467 7419 7419 -7.723 -2.6332 74900 7419 62335 6332 -6332 7497 62335 6332 6332 86705 7423 6332 6332 6332 4078 7419 7423 6332 6332 74078 7419 7523 6332 6332 74078 85197 6234 6332 6332 2553 8573 2563 2576 2576 1839 1882 <	-1.6262		-1.6382	-1.6728	-1.7366	-1.7696	-1.8121	-1.8095
-1.3855 -1.4130 -1.4623 -1.4739 -1.5118 -1.511 -1.2839 -1.3089 -1.3428 -1.3645 -1.3336 -1.401 -1.2076 -1.211 -1.2612 -1.2781 -1.333 -1.303 -1.10783 -1.1616 -1.2012 -1.2176 -1.1698 -1.3033 -1.0783 -1.0986 -1.1406 -1.1046 -1.1698 -1.3033 -1.0783 -1.0986 -1.1606 -1.1046 -1.1698 -1.3033 -1.0783 -1.0986 -1.1606 -1.1046 -1.1698 -1.30 -1.0702 -1.0426 -1.0263 9781 9813 986 -1.0702 -1.0223 7419 743 9813 745 7445 7419 7533 743 743 4078 7419 7533 742 742 4078 4195 6533 63361 63361 63361 4078 4195 6253 63361 63361 63361 63361 3346 1867	-1.5234		-1.5337	-1.5637	-1.6194	-1.6404	-1.6848	-1.6945
-1.2839 -1.3089 -1.3428 -1.3645 -1.3936 -1.40 -1.2076 -1.2211 -1.2612 -1.2781 -1.3033 -1.303 -1.10783 -1.1616 -1.2012 -1.2176 -1.1698 -1.303 -1.0783 -1.0986 -1.16063 -1.21676 -1.16983 -1.3033 -1.0783 -1.0766 -1.1046 -1.16983 -1.3033 -1.306 -1.0702 -1.0426 -1.0263 9781 -1.9813 9813 -1.0829 -1.0763 -1.6719 -1.69813 986 7465 7192 -1.0263 8719 7523 745 7465 7192 7383 7419 7523 745 7467 7192 7333 6332 6332 6332 4078 7419 6233 6332 6332 6332 6332 4078 4103 6234 6332 6332 6332 6332 3347 3263 74223 74223 63361 986	-1.3785		-1.3855	-1.4130	-1.4623	-1.4739	-1.5118	-1.5181
-1.2076 -1.2211 -1.2612 -1.2781 -1.3033 -1.303 -1.1063 -1.1616 -1.2012 -1.2176 -1.1698 -1.171 -1.0783 -1.0986 -1.1616 -1.2012 -1.2176 -1.1698 -1.171 -1.0783 -1.0986 -1.16063 -1.2012 -1.2012 -1.2012 -1.0603 -1.108 -1.00202 -1.0426 -1.0263 9781 9813 9813 9813 9829 9485 8608 -1.8575 8776 8733 9743 7465 7192 7383 7419 7523 7423 7467 7533 7419 7523 6332 6332 4078 4103 6234 65332 6332 63361 9513 3247 3279 3321 6233 63361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361 93361	-1.2772		-1.2839	-1.3089	-1.3428	-1.3645	-1.3936	-1.4043
-1.1363 -1.1616 -1.2012 -1.2176 -1.1698 -1.17 -1.0783 -1.0986 -1.1406 -1.1046 -1.0803 -1.068 -1.0202 -1.0426 -1.0263 9781 9813 9813 -1.0202 -1.0426 -1.0263 9781 9813 9813 9829 9485 8608 8575 8706 8653 7465 7192 7383 7419 7523 745 7465 7192 7383 7419 7523 745 7465 7192 7383 7419 7523 745 7469 7923 7419 7523 745 4078 4103 6234 6332 6332 6332 3247 32512 3254 6233 63361 93361 93361 32512 3259 2553 2576 3361 3361 9576 1839 1882 1882 1882 1869 1869 1869	-1.2009		-1.2076	-1.2211	-1.2612	-1.2781	-1,3033	-1.3086
-1.0783 -1.0986 -1.1406 -1.1046 -1.0803 -1.008 -1.0202 -1.0426 -1.0263 9781 9813 9813 9829 9485 8608 8575 8706 8613 7465 7192 7383 7419 7523 74 7465 7192 7383 7419 7523 745 7465 7192 7383 7419 7523 753 9900 5747 6535 6332 6332 6332 4978 6103 6147 61235 6332 6332 4078 9103 6147 61233 63361 93361 3247 3321 3396 3361 3361 3361 3361 1839 1867 1867 1866 1866 1866 1166 1839 1867 1862 1862 1866 1866 1867 1839 1867 1867 1882 1166 1166 <	-1.1344		-1.1363	-1.1616	-1.2012	-1.2176	-1.1698	-1.1716
-1.0202 -1.0426 -1.0263 9781 9813 98 9829 9485 8608 8575 8706 86 7465 7192 7383 7419 7523 74 7465 7192 7383 7419 7523 74 7465 7192 6234 6332 76332 763 4900 5740 5147 6235 6332 6332 4078 4103 6134 6332 6332 6332 4078 4103 61495 62336 6332 6332 3247 3321 6233 63361 933 63361 933 32512 3299 3321 3396 3361 3361 3361 3361 3361 2576 2576 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 1869 <t< td=""><td>-1.0727</td><td></td><td>-1.0783</td><td>-1.0986</td><td>-1.1406</td><td>-1.1046</td><td>-1.0803</td><td>-1.0857</td></t<>	-1.0727		-1.0783	-1.0986	-1.1406	-1.1046	-1.0803	-1.0857
9829 9485 8608 8575 8706 86 7465 7192 7383 7419 7523 74 7465 7192 7383 7419 7523 74 7400 5976 6234 6332 753 74 4900 5040 5147 6190 6332 6332 4078 5147 6190 6332 6332 6332 4078 9103 4195 61233 63361 63361 633 3247 3249 61867 3321 72563 4224 422 2512 2553 1867 1867 1869 2576 2576 2576 1164 1167 1209 1188 1213 1213 1213 11 0513 0562 0577 0612 0612 06 18 1164 1167 0552 0757 0612 11 12 0553 0577 <td< td=""><td>-1.0158</td><td></td><td>-1.0202</td><td>-1.0426</td><td>-1.0263</td><td>-,9781</td><td>9813</td><td>9874</td></td<>	-1.0158		-1.0202	-1.0426	-1.0263	-,9781	9813	9874
7465 7192 7383 7419 7523 74 5807 5976 6234 6335 6332 63 4900 5040 5147 6190 5194 51 4078 5147 5190 5194 51 4078 5147 5190 5194 51 4278 4195 4223 4224 42 3247 3321 3396 4224 42 32553 2553 2553 25563 25576 3361 3351 2512 2553 2563 25563 25576 25776	9759		9829	9485	8608	8575	8706	8673
5807 5976 6234 6235 6332 6332 4900 5040 5147 5190 5194 51 4078 5147 5190 5194 51 4078 4103 4195 4224 422 3247 3321 4223 4224 42 32553 3321 3396 3361 33 2512 2553 2563 2576 25 1867 1869 1866 1869 1869 120 1164 1167 1209 1188 1213 11 0513 0508 0552 0577 0612 06 .0151 .0052 0662 .0010 .0010 .0010	7483		7465	7192	7383	7419	7523	7499
4900 5040 5147 5190 5194 51 4078 4103 4195 4224 422 3247 3299 3321 3396 4224 42 3247 3299 3321 3396 3361 33 2512 2553 2563 2576 255 1867 1869 1869 1869 1869 1164 1167 1209 1188 1213 11 0513 0508 0552 0577 0612 06 01 .00513 0151 .0094 .0062 .0010 .00 .00	5721		5807	5976	6234	6235	6332	6329
4078410341954223422442 3247329933213396336133 2512255325892563257625 1839186718691869186918 1164116712091188121311 0513050805520577061206 .0010 .00	4864		4900	5040	5147	5190	5194	5198
3247 3299 3321 3396 3361 33 2512 2553 2589 2563 2576 25 1839 1867 1869 1869 18 26 1164 1167 1209 1188 1213 11 0513 0508 0552 0577 0612 06 .0153 .0151 .0094 .0062 .0010 .00	4028		4078	4103	4195	4223	4224	4264
2512255325892563257625 1839186718691882186918 1164116712091188121311 0513050805520577061206 .0153 .0151 .0094 .0062 .0010 .00	3233		3247	3299	3321	3396	3361	3392
1839186718691882186918 1164116712091188121311 0513050805520577061206 .0153 .0151 .0094 .0062 .0010 .00	2507		2512	2553	2589	2563	2576	2597
1164116712091188121311 0513050805520577061206 .0153 .0151 .0094 .0062 .0010 .00	1820		1839	1867	1869	1882	1869	1832
0513050805520577061206 .0153 .0151 .0094 .0062 .0010 .00	1186		1164	1167	1209	1188	1213	1182
•0153 •0151 •0094 •0062 •0010 •00	0537		0513	0508	0552	0577	0612	0607
	•0169		.0153	.0151	•000•	•0062	.0010	.0034

RUNS 9,10,13 PTINF = 15 PSI M = 0,06 R = 200,000

				7.56	7.76	8.00	8.02
-1.0508	-1 53 21	-153 L-					
			5/5/•T-	6960.7-	-2.2080	-2.4141	-2.4243
2106.	4004	8646.	.9419	.9080	.8860	.8583	.8581
• 9910	1.0041	1.0021	I.0034	1.0076	•9982	2666.	1.0026
• 9267	• 9593	• 9643	.9700	•9853	.9859	. 99 35	. 9951
.8671	.9059	.9113	.9250	.9367	- 9497	. 95.61	DADE.
. 8101	.8542	.8615	. 8733	. 8933	.9014	-010-	7010
.7620	.8033	.8145	. 8267	.8466	-8576	8732	8785
. 6814	1067.	. 7331	.7456	.7688	.7804	7947	7000
. 6232	• 6 6 9 4	.6730	.6841	.7096	.7228	.7359	7467.
.5782	•6269	.6287	.6414	•6639	.6762	.6918	0069.
. 5275	• 5655	.5719	.5833	.6060	.6184	.6300	0159.
• 46 79	• 5055	• 5096	.5199	.5363	.5445	.5623	.56.87
• 3964	.4293	•4332	• 4439	.4572	.4690	.4786	4800
.3574	.3850	.3841	• 3961	•4049	.4198	.42.69	.4323
• 3310	.3558	.3584	• 3618	.3770	•3831	.3908	. 3935
• 3129	• 3334	• 3342	•3424	.3509	.3586	• 3673	.3651
• 2964	• 3170	.3176	.3249	• 33 4 4	• 3370	.3435	.3450
.2823	• 3025	.3026	• 3084	.3184	.3221	.3298	9256.
.2717	•2892	.2915	.2946	.3021	.3070	.3110	.3125
• 2633	• 2793	.2800	.2838	.2914	•2922	.2971	.2986
• 2525	• 2689	• 2689	.2716	.2783	.2824	.2842	.2885
. 2443	.2593	.2587	. 2610	. 2679	.2696	.2740	5222
• 2360	.2490	.2496	.2549	.2563	•2608	-2606	- 2643
• 2613	.2468	• 2053	.2623	.2858	.3079	2998	2408
.2190	• 2285	.2294	.2318	.2327	.2376	.2368	7755.
.2135	.2213	.2215	.2222	.2264	.2249	.2252	2254
.2057	.2104	.2120	.2141	.2116	-2140		2212.
.1890	.1943	•1974	.1995	.1963	.1948	.1915	1978
.1733	.1752	.1766	.1779	-1744	2021.	1407	14 80

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

16.09	5476	- 3362	7281	7314	7428	7300	7225	7244	7309	7379	7262	6950	6801	6681	6531	6496	- • 6 4 7 4	6558	6504	6460	6552	6664	6772	6800	6809	6897	6850	6649
14.99		-1.0199	7588	-1.0760	7776	7846	78 29	8518	8666	7300	7736	7247	7142	6718	6245	7424	6256	6686	6619	7225	6686	6177	6569	6458	6373	6500	6372	6249
14.00	-4.1653	-3,9541 -2 0054	-3.9728	-3.9971	-3.9205	-3.6628	-2.7549	-2.1276	-1.9662	-1.7979	-1.6407	-1.3667	-1.1243	9554	7951	6532	5561	4571	- • 4 4 0 6	4289	4305	4259	4199	4253	4343	4343	4261	4136
13.01	-4 • 31 62	-4.1808 -6.0668	-4.1178	-4.1775	-3.6014	-3.1233	-2 • 25 48	-2.0836	-2.0417	-1.9112	-1.7414	-1.4580	-1.2577	-1.0857	9358	7921	6298	4961	4210	3791	3694	3631	3623	3633	3599	3557	3557	3560
12.08	-4.2648	-4.0883	-5.9164	-4.0300	-3.3139	-2.9595	-2.1308	-2,1181	-2.0898	-1.9535	-1.7701	-1.5052	-1.3058	-1.1638	-1.0088	8512	7140	5328	4565	3615	3330	3232	3202	3189	3098	-• 3019	3085	3020
11.03	-4.0666	-3,9243	-3.6570	-3 . 7368	-3.2919	-3.2756	-2.1762	-2.0501	-2.0780	-1.9704	-1.7987	-1.5555	-1.3810	-1.2506	-1.1383	-1.0110	8712	7260	5949	4759	-,3792	3208	2782	-,2528	2365	2231	2159	1988
10.01	-3.7039	-3.9722	-3.2371	-3.2536	-3.1364	-2.9106	-2.7171	-1.9043	-1.9936	-1.9529	-1.7888	-1.5637	-1.4077	-1.2874	-1.1908	-1.0869	9610	8217	6916	5727	4593	3697	2949	2372	1897	1606	1321	-,1013
00•6	-3.0891	-3.5862	-2.8718	-2.7656	-2.5913	-2.5741	-2.4965	-2.3308	-2.1650	-1.9214	-1.7327	-1.5183	-1.3842	-1.2861	-1.1959	-1.1034	9888	8634	7362	6149	5009	4038	3204	2522	1867	1275	0803	0430
x/C	000 •	• 005	.015	.020	.025	.030	•040	.050	• 060	.075	.100	.150	.200	.250	• 300	.350	.400	.450	.500	.550	•600	.650	.700	.750	. 800	.850	• 900	.950

T

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

ł

x/c	00.6	10.01	11.03	12-08	13 01			
					10.01	T4.00	14.99	16.09
• 000	-3,0891	-3.7039	-4.0666	-4.7648	C715 V-			
•005	.7523	.6473	. 5677		2010	-4.I653	6537	5476
.010	.9863	0427		450C •	0664.	• 4362	.9621	.9682
.015	1,000			• 9239	•9036	.8910	0000.	1 0017
		C 2 N N T	T.0007	1.0035	.9958	500 °		
	0684.	1.0001	1.0037	. 9988	3400-1		• • • • • •	. 4669
• 025	.9558	.9726	.9835	0007		L • UU 5 4	•9322	•9255
•031	.9143	.9413	OFFE	- 775 -	1666	• 9986	.8716	.8819
• 040	- 8407		0004	9696 .	•9764	•9865	.8346	8457
- 050	7826		6878.	• 9086	•9236	•9374	C177.	
040		6120.	.8490	.8603	.8718	8707		CT11.
000.	• /365	• 7719	. 7987	.8157	8241		• 1206	.7181
• 0 / 5	.6786	.7152	2157.	C 3C		8158.	•6730	.6749
.100	.6063	.6406	1504		• (6 5 4	.7739	.6114	.6181
.150	.5152			.0141	•6903	.7002	.5518	55.37
			196	.5741	.5836	.5076		
	+204+	• 4833	• 4963	. 5029	5205			• 4679
092.	.4231	• 4380	.4522	AROL		9776.	.4115	• • 066
• 300	.3914	-4065	4151	0604	. 4000	.4731	• 3663	-3604
.350	.3663	2760	1071 -	+ 4 2 0 4	• 4 2 4 2	•4308	.3252	7222
-400	C 7 4 5 .		• 3034	• 3875	.3928	.3929	0015	
460		+ 9 C F +	•3578	.3579	.3622	9145		0007.
	1626 .	• 3379	• 3359	. 3335	3360		4707.	.2587
• 505	.3108	.3118	. 3148	670E		• • • • • • • • • • • • • • • • • • • •	• 2 4 2 6	• 2 2 8 9
• 550	. 2991	.2986	2005		0000	1206.	• 22 09	.1972
• 600	.2831	1074.	2710	0407 •	• 2806	.2762	.1916	.1650
•650	.2695	- 7603	96140 3636	1692 •	• 2587	.2514	.1576	.1406
• 700	. 2640			• 2 4 1 3	• 22 93	•2235	1198	
750		1007.	• 2616	• 2446	.2335	4450		• 1034
	• < 3 3 4	.2242	.2055	- 1841	1717		9161.	•1385
• 800	.2213	• 2045	• 1864	1570		•1264	• 0506	•0309
.850	.2024	.1803	1550		07470	.1219	.0150	0103
• 900	.1766	.1622		7777 •	.1011	.0788	0337	- 0408
.950	2271.		/ 6110	• 0697	• 04 72	• 0242	- 08.25	
k 1		50TT •	2860.	• 000 •	-•0293	-•0613	- 1087	1001 -
								4767.

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPPER

RUN II PTINF = 15 PSI M = 0.06 R = 200,000

UVSTEDESIS (DFCREASING ANGLE OF ATTACK)

			20.21	10.04	8.01	5.97	4.03	2.01
X/C	16.09	14•03						
					((,, ,	- 6142	.5608	•9952
	- 5776	-4.1614	-4.2921	-3.7221	7754°7-	-1-8630	7698	.0987
• 000			-4-0937	-4.0108	-3.1600		0045	1544
•005	8115		3550 6-	-3.4876	-2.7611	-1.7/64		- 2770
010	7378	-3.8996		0076 6	-7.5898	-1.7198	7846	
	7247	-3.9509	-3,9978	-3.2000		-1-6734	-,9868	3695
010	7282	-3.9597	-4.0683	-3.2840		-1.6417	-1.0136	4410
• 0 2 0			-3.2818	-3.1586	-2.3334			4925
.025	6 4 2 2 • -	0076 * 6 -		-2.9157	-2.2466	-1.6084		5408
030	7197	-3.6738		2 2 2 2 2	-2.1058	-1.5512	-1°0389	
	7173	-2.7789	-2.1208	1000 - 7-	-1 0075	-1.5062	-1.0389	6033
	1066	-2.1271	-2.1119	-1.6808		1 4451	-1.0453	6442
040.		-1 0408	-2.0911	-2.0002	-1.4167		-1.0377	6807
• 060	6671		1 0450	-1.9524	-1.8123	-1.42C		7162
.075	7244	-1.8004		72.02	-1.6847	-1.3435	c770-1-	
	7128	-1.6258	-1.001		-1-5114	-1.2386	9844	
	6937	-1.3578	-1.5105	-1-2012		-1.1623	9567	7442
.170	200	-1.1229	-1.3274	-1-4114	10766	1 0054	9247	7506
• 200			-1.1846	-1.2918	0067.1-		- 8022	7474
.250	0000		-1.0296	-1.1850	-1.1724	a/60°T-	04.27	- 7223
.300	6441	5767 -		-1-0865	-1.0841	9770		. 44.78
.350	- 6464	6534	0 # 1 G # 1	- 1. OK73	9785	9158	+711 -	0700°
	6447	5494	+ 4 2 2 -		- 8660	8829	7178	+85C • -
	6479	4592	5393		- 7404	8683	6957	-,5541
		4430	4318			7777	6914	5400
006.		- 4256	3798	5628	0700-1	4406	6919	-,5325
.550		- 4796	3430	4575	0816		- 3205	5326
. 600	65 48		5 C C C C	3671	4192			7504
.650	6627	4312		- 202 -	3369	2980	2024	
2002	6714	4345	3118		- 2567	2290	1702	-• TOP3
	- 6723	4334	-,3036	232	1945	1714	1327	0877
	- 4807	4259	3067	1061		- 1099	0860	0604
• • • •	- 6673	- 4344	3049	1588			0311	0177
068.		- 4200	2913	1266		7750°-	- 02 73	.0362
• 900	0/00.		- 2999	1114	• 00 72	0010		
.950	650 B		J					

RUN II PTINF = 15 PSI M = 0.06 R = 200,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

	2.01			,9062		7606.	•3216	2306		. 1000	•1540	.1345	.1034	0000		• 0822	.0770	.0719	0804		1000.	• 0958	•1053	.1107	1187		9021.	• 1293	•1309	.1354	1377		• T004	.1403	.1447	1421		
	4.03			.5608	2020		• 1386	. 6375	.56.75		9900.	• 4666	• 4005	.3571	228.0		• 2945	•2615	.2310	A513A		1603.	.2011	.1985	.1927	1901			• 1404	.1848	.1843	2182		• 1/80	•1746	.1684	1440	
	74.0			2410.	1.0014	. 9720		• 38 • 6	.8165	. 7582		2001 •	• • • • • •	.5701	•5293	4841		• 4 6 3 0	• 3607	.3251	-2997	2040	5t 0 1 0	• 2112	•2649	•2545	.2478	1020		2262.	•2260	.2559	2002		8707.	•1976	.1829	
R_01			CCC4 2-		•8268•	.9967	00 4 4		2666.	.9144	.8741	7007		0041.	• 6951	.6302				.4267	• 3930	.3661			06.75.	.3133	.2991	.2871	2747		6 t 0 7 t	• 7 1 6 4	.2403	.2256		16120	26470	
10.04			-3.7221	4513	31/0.	6/96.	1.0025	1 - 0005		5616.	• 9406	. 8799	1128			• 7123	• 6431	. 5427	4020		414.	• 4046	.3804	. 3565			9676.	. 2965	.2787	- 2636	2673		• 2235	• 2043	. 1875	.1530		
12.02			-4.2921	. 5028	3600		• 9963	1.0051		6006 •	• 404 •	• 9089	.8548	- 8101		2061.	• 6739	.5717	.5032	. 4573		9/14*	• 3844	.3586	.3326	1905-		1607 .	•2651	.2411	.2528	1071		.1558	.1222	•0722		200°
14.03			4 T Q T • +-	• 4372	.8942	C 1 0 0	C T & A = -	.9987	1.0040	0770		- 4302	.8820	.8347	.7767		1101.	• 5975	• 52 62	.4719	4314		0 + + + +	•3614	• 3341	• 3075	1275.			• 22 38	• 2383	.1589	.1210	47 J T •	• 0 / 75	.0225		
16.09		- 5376		6404 .	1.0036	9694		6124.	.8839	.8406	7600		9911.	• 6760	.6189	. 5541			• 4068	.3597	.3221	F094 .		1102.	• < 3 0 6	• 1990	• 1686	.1425	1002		1041 •	•0331	-•0050			9971 •-	0677.	
x/C		• 000	-005		010.	•015	0.00		670.	•031	• 0 4 0	050			670 •	.100	150			062.	00E •	• 350	- 400	450			• 550	• 600	• 650	200		001 •	• 800	.850				

ACE PRESSURE CDEFFICIENTS FOR VARIDUS ALPHAS PTINF = 15 PSI M = 0.06 R = 200.000 VSTERESIS (DECREASING ANGLE DF ATTACK)																							
UPPER SURF RUN 11	• 03	.9106	. 3958	• 2448 • 1208	.0275	1488	2271 - 2009	3589	4263	5120	5872	5995	6023	5105	4517	4178		1476		7717°"	- 0014	0041	.0564
	•03	• 9066	.6707 .3991	.2461 .1230	.0286	0419 1485	2296	2949 3593	4313	5088	5603 5859	- 6053	6032	5653 5015	- 4465	4184	-• 3997	3908	3914	1690	0354	c770 •-	.00522
	x/c	000	.010	.015	.025	•030	• 050	.060		.150	.200	300	.350	.400	.500	.550	. 600	.650	.700	.750	.800	.850	.950

ALPHAS
VARIDUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
LOWER

RUN II PTINF = 15 PSI M = 0.06 R = 200,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

.03	.9106	3018	3151	3092	2977	2835	2677	2428	2181	1967	1695	1316	0810	0440	0182	.0051	.0257	• 0395	• 0531	.0671	• 0783	.0834	.0903	1260.	.1026	.1112	.1201	.1190	.1195
E0.	• 9066	3082	3155	3105	2984	2837	2712	2445	2223	-• 1991	1745	1348	0806	0443	0171	• 0098	•0237	• 0407	.0545	• 0683	• 0761	•0862	• 0929	.1496	.1060	.1112	.1172	.1197	.1215
X/C	.000	• 002	.010	.015	• 020	• 025	•031	•040	• 050	•060	• 075	•100	.150	.200	.250	• 300	•350	• 400	.450	• 505	•550	• 600	• 650	• 700	.750	• 800	• 850	• 900	.950

.

ALPHAS	
VARIDUS	
FOR	
CO EFF I CI EN TS	
PRESSURE	
SURFACE	
UPPER	

RUNS 15,16 PTINF = 15 PSI M = 0.03 R = 100,000

						02	01	00•
X/C	-2.98	-1-99	98					
						46.00	9182	.9136
		2025	2607-	.8294	.9231	• 7 T C •	. 6615	.6617
• 000	0+04	2000	0228	.7614	.6658	C/00.	2200	.3915
.005	.9805	-94IC		4895	.3907	•3854		5256
	.8462	.7378	7786.		.2376	.2388	.2417	
	4656	. 6021	.4289	0 C F G +	1158	.1199	.1193	.1132
CTO .		4674	.3045	.2155	• 1120	7270	.0292	.0317
.020	• 0131		.2118	.1212	• 02 64		4750-	0394
.025	.5239	01/6.	1 2 2 7	.0462	0469	0.650		1410
.030	• 4334	- 2848		- 0578	1448	1440		4666 -
040	.3090	.1757	+ 7 7 N +		2196	2236	9777 -	
	0110	•0724	0669		2763	2847	2829	
	1298	0008	1401	2130		3443	3486	3546
090.	1000	0886	2225	2794		- 41AB	4217	4247
• 075	1450.		3068	3607	4282		- 4012	4974
• 100	-• 0726		- 4017	4482	5039	0074-1		5448
.150	2083			- 4968	5426	5422		- 5678
- 200	2879	3867		5 222	5663	5662	1196	
250	3513	4386	1054-1		- 5780	5742	5764	
062.	2809	4714	5184		5643	56.89	-,5691	5591
005.		- 4743	5156	7845	170C*-	- 5240	5193	5248
•350		- 4606	4907	-, 5063	T+2C+-	- 76 - 6	4595	4622
. 400	CC 65 •-		- 4399	4525	4629		- 4022	- 4004
.450	3719		3809	3948	4162	4130	- 3063	3852
. 500	3236	3564		3689	-,3912	3917	7000- -	- 3780
.550	2697	3188		- 3553	3780	3799		- 3642
600	2378	2866	0000	7946	3627	3656	3041	
	- 2149	2754	3219		- 3706	3634	3656	
•	2070	2619	3093	+>		- 3603	3642	3635
• 700	0107.1	- 7595	3117	3350	07/5		3671	3710
.750	555T ·-		3078	3382	3721		- 3087	3134
.800	1943	1667 -	2067	2794	3045	***		0419
.850	1847	6662 - -		0741	0443	0410		0620
• 900	2003	- 2343		06.89	•0732	.0827	1100*	
.950	1433	0185	KC10.	•				

RUNS 15,16 PTINF = 15 PSI M = 0.03 R = 100,000

00.	- 2195 - 2553 - 2573 - 2573 - 2573 - 2573 - 2578 - 2578 - 1269 - 0328 - 00541 - 00541 - 00568 - 005641 - 00568 - 00508 - 00568 - 005688 - 00568 - 00568 - 00568 - 00568 - 0	•1241 -1168
01	- 21982 - 2194 - 2194 - 2563 - 2563 - 2563 - 2563 - 25667 - 2326 - 2326 - 2326 - 2326 - 2326 - 1147 - 1147 - 1288 - 0326 - 0326 - 0326 - 0326 - 0326 - 0326 - 0326 - 1288 - 1288 - 1288 - 1288 - 1286 - 12866 - 1286 - 12866 - 1286 - 12866 - 128	.1250
- 02		.1221
02		.1194
- • 52	 	• 1189
98	 7032 7032 6876 6876 7476 7476<td>•1202</td>	•1202
-1.99	-1.2182 	6457.
-2.98	-1.0409 -1.2925 	
x/C	000 000 000 000 000 000 000 000 000 00	b 1

×/C	1.00	1.99	3.01	3.01	4.00	5.01	5.99	
				r 1 1 1 1 1 1 1 1 1 1 1 1 1				
				1000	1219.	.1592	4766	9036
.000	.9961	.9857	9168.		6744	-1.1511	-1.7282	-2.0550
2002	.4224	1335	2332			-1-2163	-1.6644	-1.9372
	1430	1245	4423	1064		1 2220	-1.6248	-1.8538
010.		- 2491	5369	5433	8654	0377°T-	1 6020	-1.7979
610			- 4148	6116	9137	-1.2386	00601	
.020	1027	3410		2424	9409	-1.2302	-1.5624	-1.447
.025	1846	4080	5602		06.20	-1.7213	-1.5369	-1.7076
	- 2375	4641	-,6931	- 6487	6306°-		-1.4807	-1.6362
		- 5767	7430	7395	+604			-1.5706
•0+0	0076		C C C	7683	9700	-1.1864	1764 • 1 -	
.050	3976	5732	77//•-		- 0876	-1.1798	-1.4070	CCFC•I-
070		6118	7962	1010		1563	-1.3544	-1.4673
000.		- 4576	8137	8055	4831			-1.3820
• 075				- 8272	9656	-1.1159	-1.6463	
.100	5506	6810			- 9754	-1.0360	-1.1737	-1.2011
150	6047	7005	8130		0076	0816	-1.1046	-1.1671
		7135	7968	7980	0/06.1		-1 0327	-1.0904
• 200			7719	7752	8481	T076 *-		1 0126
• 250	6329		7461	- 7368	8061	8689		
• 300	6347	65553			7470	7952	8917	0504-1
350	- 6064	6478	6874	7000°-	0707	- 7447	8425	9050
	- 5522	5812	6243	6204		4162 -	- 8263	-,8882
			5793	5650	1669 -		4108 -	8689
• 4 5 0			= 5632	5544	6351	7,1,*-		- 2027
.500				5643	6327	7124	1018 -	
.550	4310	5001	0566.		5454	7117	8358	6643
600	4306	4954	5563			- 7177	4463	3015
	A164 -	4921	5531	5578	0000-1		- 2199	2433
000.			5620	5642	6230	× C × 4 • I		- 10AB
• 700	4251		5 2 5 7	5206	3670	2057	1040	
.750	4185	0164 -			1223	1012	1270	- T 7 C T -
B D D	4082	3687	2536			0591	0826	0882
	2021	1188	0557			- 0154	0272	0426
	0176	.0171	.0105	.0041			0182	.0143
• 400			0438	.0451	.0451	CTCN .		
.950	• 0 7 0 8							

C 1E 1 DIINE = 15 PSI M = 0.03 R = 100.000

140

Т

. -
RUNS 15,16 PTINF = 15 PSI M = 0,03 R = 100,000

6 • 5 4		9036	.9850	9862	0100	04740	1468.	•8024	.7534	•6749	•6109	.5764	.5213	24438 24438	3054			7476.	.3082	• 2 9 6 7	.2831	.2728	-2582	-2406	-2406	2210	77030 7700	• 22.34	.2091	.2110	.2043	.1794	.1598
5.99		4766	.9957	.9529	. 8701	8017		2/6/0	• 6985	.6160	• 5584	.5186	•4696	.4168	.3538	5925-	2080	2843	6007.	• 2736	.2624	• 2523	• 2 4 2 8	.2374	•2312	.2236	2128	0.14.20	96020	.1971	.1829	.1760	.1605
5.01		2461.	.9880	•8722	• 7602	.6889	6205		+ 7 0 C +	9776.	.4597	•4177	•3816	.3400	.2890	.2641	.2531	C05C.		+ C 3 D 4	•2212	•2195	.2177	.2105	.2073	•1992	.1905		+	•1/73	.1732	•1627	•1459
4.00	1014	1710.	.9269	• 7 4 2 8	.6190	.5466	.4966	- 4545 - 4545			. 3489	• 3143	• 28 79	.2585	.2204	.2121	.1970	•1978	1042		+ F O T •	• 1902	.1851	.1787	.1795	.1755	.1743	- 1688	00011	76070	• 1623	8667.	7661.
3.01	- 8801	7405	- 1040 	0100.	• 4 4 8 9	• 3863	.3408	• 3094	. 2551			25120	7607 •	• 1710	.1573	. 1515	.1515	.1520	. 1575	1557		0001.	261.	• 1380	.1587	• 1588	.1545	.1579	1528				
3.01	.8918	.7676	- 560B			• 3872	.3421	• 3079	.2608	. 7 7 6 7	2040	1883		.1750	• 1004	6001.	FIC1.	•1495	.1556	.1568	- 1417	1101.	ET010	C 4 7 7 •	01010	• T G T •	2/ 61 •	.1530	.1562	1536	1465	01370	
1.99	.9857	.5259	. 3340	2027 -		- 140C	.1721	.1410	•1116	• 09 64	.0853	.0858	0828				2040	/ 1 1 1 •	•1150	.1207	.1304	.1296	1360	1368	1376			9141.	.1481	.1401	.1385	.1336	
1.00	• 9961	.1911	.0589	• 0054	- 0140		T/ 20 •-	-0298	0419	0413	0384	0271	0103	.0151	.0346	1070	1440		1916.	• 0842	• 0947	.1067	.1109	.1144	.1175	1200	1256	0/77 •	.1361	.1321	.1313	.1234	
×/C	000.	• 005	.010	.015	.020	.025		160.	• 0 4 0	• 050	• 060	.075	.100	.150	•200	.250	300	350		• 400	•450	.505	.550	.600	.650	• 700	- 750		• 800	• 850	• 900	• 950	

M = 0.03 PTINF = 15 PSI

R = 100,000

RUNS 15,16

	8.76
	7 00
	c c r
	1

			7 50	۶۲۰۲	7.78	66*2	7.99	8.26
./c	2.00	(1+5)						
				0630 6	-2.0759	-2.3039	-2.2929	-2.5289
00	-1.3047	-1.5596	-L.6135	6300 • 3-			-3.0154	-3.1577
	4535 0-	-2.5338	-2.7143	-2.8807	-2.5504			
2			-7.4447	-2.5751	-2.5974	-2.7022	-2.6144	
10	-2.1695	7) TC • 7-			-2.4316	-2.5317	-2.5217	-2.6088
15	-2.0509	-2.1805	-2.3016			770C C	0275.2-	-2.4969
	1 0708	-2,0918	-2.1982	-2.2923	-2 • 3 T ND			787C C-
02			-2 11 46	-2.1951	-2.2070	-2.2759	-2.2830	
25	-1.9052	90 T N • 7-			1280	-2,1918	-2.2047	-2.2601
050	-1.8529	-1.9537	-2.0332	0611.2-			-2-0731	-2.1319
	7700	-1 - 8449	-1.9218	-1.9952	6100-2-	TCON-7-		
040	0011 •T-			-1,9003	-1.9088	-1.9684	-1.9625	1020-2-
050	-1.6972	-I. (033	0/70 1-		-1 8757	-1.8759	-1.8759	-1.9425
060	-1.6374	-1.7059	-I - 1 / 4 A			2003	-1.774	-1.8306
75	-1.5603	-1.6208	-1.6758	-1.7256	-1.1341		1 44.02	-1-7116
		-1.5143	-1.5609	-1.6123	-1.6084	-1.0475		
00				-1.4444	-1.4409	-1.4763	-1.4831	400C.T-
50	-1.3251	-1+3042			7025 1-	-1.3658	-1.3687	-1.4178
000	-1.2191	-1.2579	-1.2008	707C • T -		-1.2775	-1.2754	-1.3369
50	-1.1431	-1.1787	-1.2092	-1 • 2 4 4 3	766741-		-1.2051	-1.2401
	-1-0714	-1.1036	-1.1341	-1.1637	+7/1-1-		-1 1616	-1-1302
		-1-0435	-1.0761	-1.1113	-1.1146	-1.1480		
061			-1-0267	-1.0727	-1.0687	-1.0647	76/0.1-	- 0 - F • I
00	- 4623	1044 • I			-1.0201	8873	9204	- • 8 ° 0 4
50	9409	2416 -	76 TO•T-		75 Al	7168	7269	7360
00	9379	9778	4426 -				- 5947	6234
	7494	6501	5592	5864	0000.		- 4881	5058
	- 4111	- 4203	- 4572	4914				7514-
200			- 3025	4006	4140	4029	2050.1	
50	3434			0706 -	- 3181	3222	3195	3267
200	2890	3103	3165			- 2461	2433	2561
750	-,2222	2352	2360			1020	1805	1815
	1629	1766	1767	1812	00/1-	4 C D T • -	9001 -	1235
	- 1000	1058	- 1091	1199	1145	0/11-		0580
	- 0516	0522	0479	0539	0543	-•0443		200°-
200			0000	1210.	•0016	.0087	6600·	C200.
950	• 0131	• 0085	0 77 0 4					

RUNS 15,16 PTINF # 15 PSI M # 0,03 R = 100,000

7.99 8.26			6876-2-6768	.8501 .8167	,9902 ,9982	98.77	0510 0720 0510 0720		1126. 1216	• 8823		7371 .7482	6884 .7070	6328 .6487	5635 .5814	4798 4708					8/GF 9/8	3294 .3406	3195 .3184	2952 .3042	2917 .2897	2812 .2810	2674	25,24 25,20 25,24 25,20	2400 2275 2400 2275			
۲ - 66		C 0000 C -		• ///28•	• 9929	.9833	9512		• 1014 •		• • • • • • • • • • • • • • • • • • • •	. 1370 .	.6885	.6298	.5669	.4805	4292	3083				• • • • • • • • • • • • • • • • • • • •	.3141	.3027	.2881	.2799	.2654	.2526	2469	6400		3 0 t T 3 t
7.78	7 d B B F F F B F d F	-7.0750		2610.	.9937	.9825	.9382	8070	RANG	5 C 8 C .		• 1210	• 6730	•6150	• 5463	• 46 69	•4146	.3895	.3645	4055.			1806.	1162.	.2814	.2707	•2564	.2502	.2424	.2274	2136	
7.73		-2.0629	8 C 8 8		9466	.9824	.9422	- 9062	.8567	. 7786	501.1 51.55	1721 •	1600 .	• 6104	• 5501	• 4682	• 4206	.3882	• 3607	5145.	7262		0116 •	• 5464	. 2831	.2719	.2590	.2517	.2381	• 2233	- 2135	
7.50		-1.8135	.9116		1944	• 9731	.9343	.8856	.8301	.7607	. 4017		16000	0700.	• 5332	• 4581	• 3995	.3684	.3521	• 32 69	. 3163	2006		1602.	+ 0 / V •	• 2630	•2512	• 2458	.2337	.2206	.2105	
7.25	4 3 4 8 9 4 8 9 9 9 9 8 8	-1.5596	.9377	100	1344.	. 4563	.9124	.8613	.8189	.7394	- 6863	4554			6416.	.4382	• 3927	.3631	• 3399	.3183	.3055	2867	2007	2625	2645	COC3.	8642 .	• 2389	.2266	.2133	.2036	
7.00		-1.3047	.9568	, 997B		00+4.	.8919	• 8353	• 7973	.7117	• 6546	.6119	. 5575		1764 •	5074 •	96/6.	• 3501	• 3279	.3148	.2941	.2791	. 7750	2664	2544		C 0 4 7 •	• 2341	• 2198	• 2135	.2008	101
X/C		• 000	.005	.010	- 015		070.	• 025	.031	• 0 4 0	.050	.060	-075	100			.200	042.	.300	• 350	.400	.450	.505	-550	600				067.	• 800	.850	

PUNS 15,16 PTINF = 15 PSI M = 0.03 R = 100,000

×/C	8.49	8 • 76	9.01	10.05	10.99	12.00	13.00	14.00
000		-2.7528	-2.9010	-3.1781	-3.2330	-3.3828	-3.2889	5842
• • • •		2366 CT		-1.3739	-3.2518	-3.2289	-3.0628	-1.0884
<00°	-3.220			04.70	-3.0718	-3.1176	-3.0093	8799
.010	C858-2-	T/ #0 * 7 -			2450.5-	-3.1386	-3.0123	8103
.015	-2.6451	-2.6517	-2.0485	-2.4034				- 7615
.020	-2.5006	-2.4716	-2.5399	-2.9517	-3.0251	- 960 - 5-		
500	-7.3755	-2.3698	-2.4314	-2,9062	-3.0104	-3,1038	-3.0064	- 82U3
	-2.2750	-7.2689	-2.4079	-2.8607	-3.0103	-3.0998	-3.0166	/168
	-2 1412	-2-2116	9266.C-	-2.7821	-2.9922	-3.0949	-3.0243	7209
		-2 1141	-2.2582	-2.7219	-2.9757	-3.1497	-3.0459	6884
000		1 - 1 - 2	-2 2764	-2 . 6557	-3.0634	-3.1216	-3.0318	7025
.060	0794 · T -	C7C0•7-				-7-4325	-2.6006	7040
.075	-1.8643	-T• 4431		-1.7702			-1.7870	7103
.100	-1.7410	-1.9247	-1.9612	-1-6242	c00C*I-			
150	-1.6071	-1.5349	-1.4302	-1.4648	-1.4346	-1.3856	-1-3310	
	-1-4668	-1.3331	-1.3435	-1.3424	-1,3198	-1.2726	-1.1773	1382
	-1 2802	-1-2266	-1.2486	-1.2320	-1.2153	-1.1553	-1.0445	7064
0620		11525	-1-1737	-1-1327	-1.1112	-1.0343	-,9116	6424
				-1-0345	< 2 9 9	9152	7885	6341
• 350	-1.0666	0600-1-	1200.1-		BAR!	7658	6584	6149
• 400	96 / 2	0106.	1//6 •		- 7001		5479	6090
.450	8484	8432	0.59.5.1				- 4750	- 6710
. 500	7314	7277	7220	6663	0710-1	C05C•-		1 5003
.550	6073	6084	5976	5452	しキンキ・ー			
009	5055	4966	4953	4477	4096	3698	3628	0000
	7007 -	4096	3948	3632	3285	3123	3330	6194
000			- 3157	2851	2763	2755	3235	5998
. 100				- 2250	2287	2597	3147	6476
• 750	G6 # 7 = -						2983	6298
.800	1836	1748	1870	+ / 07 • 1	30.7.4		2040	- 6771
- R50	1162	1227	1326	1454	-•1/08	0177	4000 .	
000	0544	0735	-•0747	1211	1660	2312	6/ 6Z -	/
	400	- 0275	0386	0896	1513	2232	2997	6046
004.		• • •						

144

T

RUNS 15+16 PTINF = 15 PSI M = 0.03 R = 100,000

XXC 6.49 8.7h 9.01 10.05 10.90 13.00 14.00 14.00 000 -2.6422 -2.7528 -2.0710 -3.1781 -3.288 -5582 -5582 -5981 -9983 0010 -9021 -0858 -9757 -6735 -5682 -9983 -9181 010 -9906 -9721 -0818 -9984 -9981 -9181 010 -9725 -0818 -9984 -9981 -9182 -9182 010 -9725 -0818 -9976 -9182 -9182 -9182 011 -9759 -9187 -915 -9182 -9182 -9182 011 -7651 -9759 -9163 -9163 -9151 -9151 012 -7551 -915 -915 -915 -915 -9151 013 -7650 -918 -916 -916 -915 -916 014 -918 -916 -916 -916 <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>									
000 -2.6422 -2.7578 -2.9010 -3.1781 -3.2818 -3.2889 -5842 010 -7877 -9856 -9575 -9517 -9757 -9757 -9757 -9757 -9757 -9757 -9757 -97591 -97512	×/C	8.49	8 • 7 6	6.01	10.05	10.99	12.00	13.00	14.00
000 -2.6422 -2.7528 -2.9010 -18170 -582 -582 -5581 -5582 -5581 -5583 -9780 -9780 -9780 -9780 -9781									
005 8013 7817 6735 -6170 -5682 -5591 -5984 010 9906 9927 1001 9948 9961 9978 011 9916 9972 9917 9617 9914 9917 012 9917 9017 9914 9914 9917 9917 013 9873 9914 9972 9914 9914 9780 014 9819 9773 9915 9914 9914 8708 015 9757 9753 9793 9914 9915 9747 017 7659 9747 8795 9937 9747 8712 017 7514 7742 7476 7746 7746 7746 018 7604 9735 5742 9745 9781 9741 019 5704 5742 5742 5743 5761 7742 010 5704 5744 5745 5772	000	-2.6422	-2.7528	-2.9010	-3.1781	0222-6-	8785 E-	0000 6	
0906 0928 09283 09283 09591 09597 011 0902 0928 09283 09283 0951 09591 012 0921 0928 0928 0928 0921 0951 013 0921 0928 0928 0921 0928 0921 0951 013 0921 0928 0928 0928 0921 0928 0921 0951 014 0145 0946 0948 0927 0928 0921 0937 010 0146 0171 0155 0977 0948 0927 0913 0132 010 0146 0171 0173 0172 0132 0132 01412 0132 010 0146 0141 0172 0142 0132 01412 0111 0111 0111 0111 0111 0111 0111 0111 0111 0111 0111 0111 01111 0111 0111 <td< td=""><td>005</td><td>.8013</td><td>. 7817</td><td>. 75.77</td><td>2224</td><td></td><td></td><td>6007 °C</td><td>2480.1</td></td<>	005	.8013	. 7817	. 75.77	2224			6007 °C	2480.1
010 0710	010	0000	1000			0/10.	7896.	•5591	.9780
0.0012 0.9012 <t< td=""><td></td><td></td><td>1766.</td><td>9696.</td><td>0864.</td><td>• 9482</td><td>.9283</td><td>.9210</td><td>.9957</td></t<>			1766.	9696.	0864.	• 9482	.9283	.9210	.9957
0.20 0.9739 0.9725 0.9887 0.9015 0.9016		1266 •	1266 •	1.0012	.9884	.9921	.9946	.9882	OFRE
025 9311 9970 9478 9578 9693 9814 9728 050 711 9730 9716 9729 9895 9914 9718 050 7147 7711 7235 9749 98157 9896 98153 98153 050 7147 7731 7834 9807 98157 98153 98153 98123 050 7147 7735 68162 6908 88153 68153 6412 98153 6412 0751 6753 6761 6773 6751 6751 6751 5781 150 5704 5127 5534 5593 6743 5642 5781 5722 150 5704 5127 5534 5534 5594 5772 5781 5781 250 3816 3813 3136 5127 5534 5594 5642 5781 577 5781 577 5781 577 5781 5781 5781 5781 577 5781 577 5781 577 5781 <td>070</td> <td>.9739</td> <td>.9725</td> <td>.9887</td> <td>.9915</td> <td>-9962</td> <td>4006</td> <td>0041</td> <td>0014</td>	070	.9739	.9725	.9887	.9915	-9962	4006	0041	0014
031 0873 .9009 .9155 .9295 .9465 .9752 .9645 .9128 050 .7147 .7235 .8744 .8634 .8654 .8654 .8654 .9645 .9645 .96412 075 .6577 .7731 .78786 .9032 .9443 .8654 .8633 .9515 .96412 075 .6579 .6503 .65335 .65335 .6731 .7561 .5912 1700 .5914 .5734 .5594 .5594 .5594 .5761 .5912 1500 .5004 .5714 .6335 .65335 .6731 .6795 .5781 1500 .5014 .5734 .5594 .5594 .5781 .4416 2500 .44044 .5544 .5781 .4416 .7446 2500 .3176 .3115 .3142 .3345 .3846 .3847 3500 .3370 .3147 .3762 .3462 .3346 .3846 .2492 3500 .3376 .3346 .3345 .3146 .3146 .3846 .2492 3500 .3376 .33463 .31462 .33465 .3846 .2492 3500	025	.9311	.9370	•9478	.9578	2040.	6680		1614 •
040 08185 .8798 .8454 .8835 .8975 .9975 .9932 .7549 0750 .7751 .7835 .6874 .8857 .8975 .9932 .7549 0750 .7771 .7835 .6875 .6875 .6815 .6815 .6815 0750 .7771 .7735 .5747 .7751 .5735 .6412 .6735 .6735 .67412 100 .5835 .6146 .6335 .6535 .6542 .5781 .6815 .6812 1100 .5835 .6535 .6535 .6736 .6735 .6731 .6795 .5781 1100 .5836 .6535 .6535 .6731 .6795 .5781 .4416 1200 .3796 .3912 .4595 .5791 .5781 .4416 2500 .3813 .3902 .44521 .5194 .5642 .5781 2500 .3813 .3902 .44162 .44162 .4416 2500 .3846 .3846 .3861 .2402 .3846 2500 .3742 .3742 .4452 .4416 .2749 2500 .3742 .3148 .3365 .3846 <t< td=""><td>031</td><td>. 8873</td><td>• 9009</td><td>.9155</td><td>9299</td><td>2 4 7 0 °</td><td></td><td>4 T 0 A 4</td><td>.8/08</td></t<>	031	. 8873	• 9009	.9155	9299	2 4 7 0 °		4 T 0 A 4	.8/08
050 77650 7711 7735 8977 8937 9998 9975 6912 075 5777 5836 7905 8998 6731 6795 5812 076 5777 5635 7778 5761 5761 5761 5761 150 5934 5642 5937 6938 7742 7775 5512 150 5934 56145 5934 5642 5761 5712 200 4964 5977 5934 5642 5781 -4416 200 4467 5794 5794 5793 5945 5773 200 3796 38467 4322 44452 4757 3796 3796 216 3370 34462 33762 38465 3877 2492 3877 2492 200 33766 33765 33865 33877 2492 2747 2749 2747 2749 2749 27492 2492 2749	040	.8185	.8298	. 8454	8634	200.0	2104	0407.	
0.0 7500 .8498 .8615 .6812 0.75 .6935 .7478 .7600 .8751 .6812 0.75 .6935 .6731 .7561 .5228 .6731 .6751 .5781 100 .5934 .5035 .6535 .6731 .5781 .6795 .5228 100 .4464 .4517 .4574 .5781 .4765 .5781 .5781 200 .4464 .4517 .4574 .5781 .6731 .6795 .5228 200 .4464 .4517 .4574 .5781 .5781 .5781 200 .4464 .4517 .4574 .5781 .5781 .5781 210 .3313 .3902 .3467 .4452 .4416 .7417 .3319 310 .3779 .3467 .3457 .3456 .3365 .3396 .2240 310 .3779 .2779 .2747 .3336 .3338 .2240 .2240 310 .3779 .2747 .2749 .2659 .3336 .2	050	. 7650	[[2]	7686			• • • • •	2504.	• 7549
0.000 0.705 0.8080 0.8153 0.6412 0.000 5834 0.6938 0.7242 0.8153 0.6412 0.000 5834 5535 0.6731 0.705 55812 0.000 5834 5535 0.5731 0.5761 55812 0.000 5939 0.1467 65335 0.5731 0.5761 55812 0.000 0.9010 0.5127 5934 5594 5584 5781 0.4756 0.000 0.9010 0.9146 0.9124 0.4921 0.7463 5781 0.4416 0.000 0.9100 0.9102 0.9080 0.4921 0.7476 0.5781 0.4416 0.000 0.9100 0.9102 0.9102 0.9166 0.4212 0.9102 0.9166 0.000 0.9100 0.9102 0.9162 0.4921 0.4917 0.2740 0.2141 0.000 0.3170 0.9116 0.724 0.9240 0.9367 0.2240 0.000 0.3216 0.3148 0.3102 0.3861 0.2492 0.2240 0.000 0.3214 0.3148 0.3102 0.3236 0.9284 0.1165 0.000 0.3265 0.3246 0.2240 0.2240 0.0213 0.000 0.2240 0.2240 0.2240 0.2240 0.2284 0.1165 0.000 0.2240 0.2240 0.2240 0.2284 0.0821 0.0921 0.000 0.2240 0.2240 </td <td></td> <td>0/0/ •</td> <td></td> <td></td> <td></td> <td>.8302</td> <td>• 8 4 9 8</td> <td>.8515</td> <td>.6812</td>		0/0/ •				.8302	• 8 4 9 8	.8515	.6812
707 5937 5939 6603 6688 7242 7476 7561 5812 100 5934 5939 6146 6335 6535 6731 6795 5528 200 5944 5574 5594 55642 5781 6795 5528 200 4464 4615 4615 4653 6731 6795 5528 200 4464 4611 4615 4657 5594 55642 5781 5781 200 4466 4721 4465 6731 6795 5781 5781 200 4089 4194 4322 4963 6795 5781 5781 200 3796 3813 33022 4452 4750 4721 3361 200 3370 33796 3365 33646 33611 2811 3074 3315 3234 3303 3365 33646 3361 2836 500 3370 3796 3376 33646 3361 2816 3074 3316 3365 3366 33646 3861 2896 500 3279 3234 3303 3265 33646 3861 2896 500 3370 2294 3303 3265 2836 2896 2896 500 2294 2779 2294 2101 2833 2204 500 2286 2284 2284 2101 2833 500			6621.	• / 4 / 8	• 7600	.7905	.8080	.8153	.6412
100 5836 5939 6146 6335 6535 6731 6795 5781 5781 5795 5781 5642 5781 5781 5642 5781 5781 5895 3895 <	6 J D	6/69.	•6603	.6862	• 6988	.7242	.7476	. 7561	5812
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	001	• 5836	• 5939	•6146	.6335	.6535	1573.	. 4705	3401.
000 +4464 -4511 -4615 -4931 -4963 -5065 -3896 010 -3796 -3813 -3902 -4032 -4452 -4550 -4617 -3396 050 -3796 -3813 -3902 -4032 -4452 -4550 -4617 -3396 050 -3796 -3813 -3902 -3747 -3796 -3861 -2811 050 -3766 -3647 -3762 -3793 -3593 -3665 -3861 -2811 050 -3746 -3115 -3123 -3123 -3303 -3365 -3861 -2842 050 -3749 -3118 -3118 -3102 -3336 -2849 -2749 050 -2919 -2779 -2849 -2747 -2849 -2747 -2849 060 -2779 -2747 -2836 -2747 -2849 -2747 -2849 -2749 07 -2779 -2747 -2849 -2747 -2849 -2747 -2849 -2747 070 -2552	[50	• 5004	.5070	.5127	. 5354	- 5584	5642	5781	0776.0
(100) <	00	• 4464	.4511	.4615	4697	1204.	4073 4073		
100 .3796 .3813 .3902 .4032 .4162 .4220 .4221 .3535 100 .3666 .3647 .3762 .3865 .3846 .3510 .3110 100 .3370 .3666 .3647 .3762 .3865 .3846 .3110 100 .3370 .3460 .3462 .3762 .3865 .3861 .2811 100 .3234 .3732 .3155 .3365 .3846 .3861 .2811 100 .3234 .3248 .3303 .3365 .3365 .3846 .3861 .2841 105 .3274 .3365 .3365 .3386 .2747 .2838 .2749 100 .2747 .2938 .2747 .2869 .2846 .1766 100 .2747 .2939 .2747 .2836 .1766 .1443 100 .2747 .2938 .2747 .2626 .1443 100 .2747 .2699 .2747 .2626 .1443 100 .2747 .2693 .27	50	.4080	• 40.89	4194	6654.	4457			9695.
50 3366 3467 3762 4820 4220 4221 3110 3306 3460 3467 3762 3865 3846 3861 2811 50 3216 3370 3462 3365 3846 3361 2811 50 3216 3370 3462 3365 3846 3361 2841 50 3216 3234 32248 3303 3365 3846 3377 2849 50 2940 32123 3118 3303 3365 3386 3309 2249 50 2940 2779 2796 2793 33122 33123 3303 22240 50 22779 22779 2779 2747 22699 22249 1165 50 2659 2249 22649 22249 2101 0821 50 2294 22337 22249 22249 2101 0821 50 22195 22779 2256 22499 2776 22849 11655 50 2204 2779 22249 22101 0821 0821 50 22195 22799 2276 22849 1765 0213 50 2204 2197 22849 2101 0821 50 2219 22339 2226 2249 2749 2269 50 2204 2197 22249 2196 0213 50 2196 1987 1905	000	.3796	2813	2005			0001	1194.	•3536
50 3370 3360 3365 3365 3361 2811 51 3216 3234 3365 3365 3361 2811 50 3216 3234 3365 3365 3365 3367 2492 50 3216 3234 3115 3123 3148 3365 33661 2811 50 3274 3215 3123 3118 3148 3309 3577 2492 50 2940 2799 2793 3365 3365 3309 3577 2492 50 2940 2779 2938 2747 2938 2747 2861 2836 1766 50 2652 2838 2779 2747 2699 2747 2626 1443 50 2652 2838 2747 2249 2747 2693 1165 50 2698 2608 2747 2269 2747 2269 1243 50 2563 2698 2747 2249 2749 2769 2749 2769 </td <td>50</td> <td>- 3606</td> <td>3666</td> <td>20400</td> <td>2004 •</td> <td>7916.</td> <td>•4220</td> <td>•4221</td> <td>.3110</td>	50	- 3606	3666	20400	2004 •	7916.	•4220	•4221	.3110
50 32450 34430 3462 3573 3609 3577 2492 50 3216 3234 3248 3365 3365 3369 3577 2492 50 3216 3248 3365 3365 3365 3369 3577 2492 50 3216 3248 3303 3365 3365 3369 3577 22492 50 2919 2938 2949 2779 2747 2699 2678 1766 50 2779 2779 2747 2699 2777 2699 1766 50 2779 2747 2699 2779 2747 2699 1766 50 2779 2747 2699 2747 2699 2626 11443 50 2652 2439 2746 2749 2749 2626 11443 50 2552 2439 2746 2749 27699 2749 2769 50 2381 2331 2331 2756 2749 27699 11443				- 304/	.3/62	•3865	•3846	.3861	.2811
05 32.10 33.65 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2036 .2144 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .11443 .2626 .12659 .2626 .11443 .2626 .0213 .0213 .0213 .0213 .0213 .0213 .02134 .02134 .02134 </td <td></td> <td></td> <td>0046.</td> <td>. 3430</td> <td>• 3462</td> <td>.3593</td> <td>• 3609</td> <td>.3577</td> <td>2042.</td>			0046.	. 3430	• 3462	.3593	• 3609	.3577	2042.
50 -30/4 -3115 -3123 -3118 -3148 -3102 -3038 -2036 50 -2940 -2919 -2938 -29564 -2939 -2861 -2836 -1766 50 -2940 -2919 -2938 -2956 -2779 -2673 -2676 -1443 50 -2779 -2779 -2779 -2747 -2699 -2626 -1443 50 -2552 -2484 -2779 -2747 -2699 -2626 -1443 50 -2552 -2484 -2502 -2439 -2747 -2699 -2626 -1145 50 -2552 -2484 -2502 -2439 -2749 -2161 -0821 50 -2381 -2337 -2339 -2756 -2131 -1989 -1765 -0897 50 -2381 -2179 -1987 -1965 -1969 -1452 -0213 50 -2144 -2156 -1965 -1967 -1967 -1969 -1412 -0594 50 -1949 -1628 <td></td> <td>0175.</td> <td>.3234</td> <td>.3248</td> <td>• 3303</td> <td>.3365</td> <td>•3386</td> <td>.3309</td> <td>-2240</td>		0175.	.3234	.3248	• 3303	.3365	•3386	.3309	-2240
00 .2940 .2938 .2964 .2939 .2861 .2835 .1766 00 .2779 .2779 .2779 .2777 .2659 .2663 .2836 .1766 50 .2552 .2784 .2779 .2747 .2659 .2626 .1443 50 .2552 .2484 .2739 .2747 .2698 .2626 .1145 50 .2552 .2484 .2502 .2439 .2747 .2699 .2684 .1165 50 .2552 .2484 .2502 .2439 .2357 .2249 .1165 .0821 50 .2337 .2339 .2226 .2131 .1989 .1765 .0213 50 .2204 .2195 .1987 .1905 .1689 .1452 .0213 50 .2114 .2056 .1761 .1526 .1689 .1452 .0213 50 .1949 .1628 .1526 .1628 .1659 .0621 .0934 50 .1949 .1644 .1628 .1659 .0621	.	• 30 / 4	• 3115	•3123	.3118	.3148	.3102	303B	2036
00 .2779 .2779 .2747 .2699 .2626 .1443 50 .2659 .2673 .2698 .2779 .2747 .2659 .2626 .1443 50 .2552 .2484 .2698 .2678 .2684 .1165 50 .2552 .2439 .2357 .2549 .2101 .0821 51 .2337 .25339 .2226 .2131 .1989 .1765 .0897 50 .2104 .2195 .1987 .1905 .1765 .0213 50 .2114 .2105 .1987 .1905 .1452 .0213 50 .2195 .1987 .1905 .1689 .1452 .0213 50 .2196 .1964 .1628 .1689 .1452 .0213 50 .1949 .1628 .1526 .0934 .0934 .0934 50 .1949 .1628 .1628 .1629 .0934 .0934 50 .1949 .1628 .1626 .0934 .0934 .0934 .0934	20	0 4 6 7 •	• 2919	• 2938	.2964	.2939	.2861	2582.	1766
50 .2659 .2673 .2698 .2546 .2440 .2620 .1443 00 .2552 .2484 .2502 .2439 .2549 .2101 .0821 50 .2552 .2484 .2526 .2131 .1989 .1165 .0821 50 .2381 .2339 .2226 .2131 .1989 .1765 .0897 00 .2204 .2195 .1987 .1987 .1969 .1765 .0897 00 .2204 .2195 .1987 .1905 .16689 .1452 .0213 50 .2114 .2065 .1976 .1804 .1628 .1659 .0348 50 .1949 .1751 .1528 .1526 .0934 .0531 50 .1798 .1528 .1628 .0621 .0934 50 .1598 .1644 .0625 .0621 .0934	00	• 2779	.2796	.2838	.2779	7475.	2600		00/10
00 .2552 .2484 .2502 .2439 .2357 .2249 .2161 .0821 50 .2381 .2337 .2357 .2249 .2101 .0821 50 .2381 .2337 .2357 .2249 .2101 .0821 50 .2381 .2337 .2357 .2249 .2101 .0821 00 .2337 .2339 .2226 .2131 .1989 .1765 .0897 50 .2114 .2195 .1987 .1905 .1689 .1452 .0213 50 .2114 .2065 .1956 .1804 .1628 .1412 .1059 .0348 50 .1949 .1628 .1528 .1226 .0934 .0934 50 .1598 .1644 .0695 .0635 .0934 .0934	50	.2659	.2673	26 Q R	24.00			0707.	• 1 • 4 3
50 .2357 .2249 .2101 .0821 50 .2381 .2337 .2339 .2226 .2131 .1989 .1765 .0897 00 .2204 .2195 .2179 .1987 .1905 .1452 .0213 50 .2114 .2065 .1956 .1804 .1628 .1412 .1059 .0348 50 .2114 .2065 .1956 .1804 .1628 .1412 .0059 .0348 50 .1949 .1802 .151 .1528 .1226 .0621 .0934 50 .1598 .1226 .0946 .0621 .0934 50 .1598 .1644 .0695 .0348 .0534	JU	. 255.2	2446		• • • • •	0+07 •	0442.	•2284	.1165
00 .2204 .2195 .2219 .2219 .1987 .1989 .1765 .0897 00 .2204 .2195 .2179 .1987 .1905 .1452 .0213 50 .2114 .2065 .1956 .1804 .1628 .1412 .1059 .0348 00 .1949 .1802 .1804 .1628 .1412 .1059 .0348 50 .1956 .1528 .1226 .0946 .0621 .0934 50 .1598 .1044 .0695 .0330 .051 .0934		2301		7062.	• < 4 3 9	.2357	.2249	.2101	.0821
00 • 22195 • 2179 • 1987 • 1905 • 1689 • 1452 • 0213 50 • 2114 • 2065 • 1956 • 1804 • 1628 • 1412 • 1059 • 0348 00 • 1949 • 1802 • 1751 • 1528 • 1226 • 0946 • 0621 • 0934 50 • 1598 • 1430 • 1357 • 1044 • 0695 • 0934		1007 •	• 6 3 5 7	• 2339	.2226	.2131	.1989	.1765	.0897
20 -2114 -2065 -1956 -1804 -1628 -1412 -059 00 -1949 -1751 -1528 -1226 -0946 -0621 50 -1598 -1430 -1357 -1044 -0595		+ N Z Z •	6617.	•2179	: 1987	.1905	.1689	•1452	- 0713
00 • 1949 • 1802 • 1751 • 1528 • 1226 • 0946 • 0621 • 0934 50 • 1598 • 1430 • 1357 • 1044 • 0695 • 0330 • 035 • 055	000	• 2114	• 2065	.1956	.1804	.1628	.1412	.1059	87E0
50 •1598 •1430 •1357 •1044 • 0695 0000 •1358 1055	00	•1949	.1802	.1751	.1528	.1226	.0946	.0621	
	20	.1598	.1430	.1357	.1044	.0695	0220-	- 0126	

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPPER

RUN 17 PTINF = 15 PSI M = 0.03 R = 100,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

X/C	14.00	14.00	13.00	11 • 98	11.01	· · · · · · · · · · · · · · · · · · ·	7 ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	
1		EO 4 0	-3 2010	-3-3375	-3.2654	-3.2105	-2.8677	-2.3277
• 000	6111			1708	-3,3018	-3.3628	-3.2919	-3.0429
• 005	-1.0753	-1.0966	-9.0013	04/1.0		-2.0476	-7.8979	-2.7135
.010	8473	8631	-3.0255	-3.1160			-2 40.24	-2.5367
510	- 7797	8096	-3.0080	-3.0774	-3.0512	9769 7-	0340•74	
	7785	7280	-3.0133	-3.1034	-3.0857	-2.8210	-2.5203	2646.2-
		- 7716	-3.0201	-3.0894	-3.0647	-2.8253	-2.4254	-2.2491
• 0 2 5	1142	012/0-		-3.1203	1920-5-	-2.7603	-2.3921	-2.2028
• 030	7663				-3-0139	-2.7248	-2.3321	-2.0694
.040	6998	080/	-3.0620				-7.7545	-1.9749
.050	-• 6761	7005	-3,0635	-3 0884	-3.U04L	CEC0 7 -		-1.8798
040	7229	6981	-3.0449	-3.1240	9500.5-	C770•7-		-1-7852
	4008	6883	-2.5674	-2 4640	-2.0867	-2.2643		
C10+		- 70 47	-1.7808	-1.6464	-1.5563	-1.5994	-1.9431	-1.00/3
• 100	6671 -	7575	1 3507	-1.3816	-1.4257	-1.4392	-1.4373	-1.4827
.150	1439	000/*-			4025.1-	-1.3362	-1.3272	-1.3698
•200	7096	70 78	-1.01.1			1 2270	-1.2431	-1.2738
.250	6802	6626	-1.0414	-1.1402	061241-			1912-1-
- 300	6226	6509	9019	-1.0264	-1-043	70 4 1•1 -		-1.1439
	6195	6300	7917	8913	-1.00.1-	-1.0379	7700°T	
	- 4187	- 6138	6638	7657	8709	9269	0/9/-	7400°T-
		0220	5618	6469	7305	7959	- 8479	88/1
	6000 · -		- 4787	5468	6013	6751	-• 7191	- 1636
• 500	6330	0000 • -		4368	4955	5496	6000	6021
.550	6540	7070°-		2606	4021	4460	4879	5037
•600	5915		747641		- 3365	- 3576	3974	4068
. 650	5882	5983	3460			- 2870	- 3139	3215
200	6590	6341	3392	6692	2012*-			- 2457
750	6155	6129	3175	2734	2425			2781 -
	- 6267	6103	3160	2726	-,2132	-1814	6T0T-	
• • •		6663	- 2107	2472	1994	1463	1223	60TT -
.850	1210		202	2456	1824	1132	0869	0531
• 900	0030	6100.1			655	0911	0352	.0134
.950	5920	5826	* 6 6 7 * -	77C7•-				

146

Т

RUN 17 PTINF = 15 PSI M = 0.03 R = 100,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

x/c	14.00	14.00	13.00	11.98	11.01	66*6	9.01	8.00
			-					
• 000	6111	5968	-3.2919	-3, 3375	-3.2654	-3.2105	-7.8677	7775 -
• 005	.9711	.9713	.5627	.5717	.6168	.6849	.7551	8510
•010	.9848	.9870	.9240	.9317	.9580	9686	9796	0085
.015	-9407	• 9604	• 9908	• 9912	.9952	6266.	C100.	0024
• 020	• 90 70	.8974	• 97 6	.9908	1.0058	4279.	-9762	.9592
•025	.8431	.8567	.9812	.9765	.9844	.9648	96.38	. 0124
.031	.8235	.8175	.9626	.9604	.9478	.9234	9039	- 7 - C - 1
• 0 4 0	• 7339	.7381	.906	.9050	. 8964	.8674	29E8.	.7973
•050	.6819	•6860	.8507	.8427	.8475	.8051	- 78.09	7382
•090	• 6425	.6484	.8121	.8030	.7956	.7623	7298	.6904
•075	. 5868	• 5923	• 7533	.7460	.7273	.6997	.6793	P254.
.100	.5327	.5193	.6745	• 6696	.6663	.6256	2013-	56.32
.150	.4415	.4491	•5796	. 5731	.5564	- 5401	5141	
.200	.3790	•3864	.5072	. 4982	4915	4725	4574	
.250	.3453	•3369	.4614	. 4536	.4508	4369	4104	C 902
• 300	.3077	.3120	.4201	. 4183	.4163	4009	2875	002 C
.350	.2815	.2806	•3888	.3904	5095.	. 3752	1028	1010
•400	.2483	.2570	.3556	.3538	.3605	.3527	3645	10000
• 450	.2254	.2328	.3259	• 3369	.3330	.3312	.3769	.3137
• 505	• 2034	.1984	• 3044	.3111	.3142	.3117	.3067	3029
• 550	.1839	• 1801	•2842	.2904	.2929	.3012	1292.	.2854
•600	.1538	.1520	•2624	.2661	.2733	•2813	.2771	.2789
• 650	.1180	.1180	• 2338	.2469	.2544	.2620	.2686	-2669
• 700	•1033	.0916	.2057	. 2211	•2329	.2415	.2499	.2520
• 750	• 0516	• 0 • 0 •	.1793	• 1990	.2085	.2221	.2319	- 2417
.800	•0140	.0108	.1467	.1709	.1843	.2078	.2163	- 2264
.850	0400	0208	.1117	.1375	.1517	.1811	-2014	-2196
.900	1021	1002	.0597	• 0884	.1208	.1528	-1746	1979
•950	1960	1975	0094	.0267	•0585	.1073	.1415	.1698
								• • • • •

DF ATTACK)	••01	.92.78	6660	.3826	2281	1127	0187	.0466	1532	2326	2899	,3518	.4281	5147	5391	.5722	5737	5715	5210	.4664	4082	.3817	• 3803	• 3739	.3637	•3676	.3741	•2913	•0292	•0905
(DECREASING ANGLE	2.00	• 9789	. 1334	1382	2563	3557	4235	4717	- 5311 -	5813	6176	6527	6831	7162	7075	6952 -	6886	6567	5801	5286 -	5032	4861	4895	- 4929 -	4881	- 5010 -	3852	1129 -	.0206 -	. 0597
L/ PIINT = HYSTERESIS	4.01	.6099	6663	8117	8717	-,9193	9426	9634	9745	9759	-,9893	9751	9663	9235	- 8898	8447	- -8068	7441	6855	6431	- •6333	6225	6229	6294	6298	3847	1429	0406	.0024	•0365
	6.01	4799	-1.7361	-1.6727	-1.6281	-1.5875	-1.5661	-1.5371	-1.4866	-1.4329	-1.4003	-1.3564	-1.2816	-1.1775	-1.0963	-1.0298	9619	A 8 8 4	8360	8311	8260	8165	8108	4914	2315	1628	1318	0810	0395	.0207
	7.00	-1.3351	-7.3973	-2.2246	-2.0837	-2.0177	-1.9397	-1.8675	-1.8014	-1.7122	-1.6559	-1.5825	-1.4939	-1.3347	-1.2294	-1.1463	-1.0751	-1.0021	9668	9596	9474	8180	4066	3258	2708	2291	1630	- 1111	0519	.0185
	x/c	000	- 005 - 005	010	.015	.020	.025	.030	.040	.050	.060	.075	100	.150	.200	.250	.300	.350	.400	.450	. 500	.550	.600	.650	- 700	.750	. 800	.850	. 900	.950

R = 100,000 M = 0.03 PTINF = 15 PSIDIN 17

148

Ι

. ATTACK)		œ				nc								Ċ,		Ŧ			~												
SING ANGLE DF	01	89	79 - 221	63 - 258	75 - 257	21 - 254									/3	-0304	350055	.0189 •0189	50 .0363	71 .0524	26 .0615	.0735	.0860	16 .093B	6890. 05	.2 .1067		7 1168	5 .1215	1 1279	
ERESIS (DECREA	01 2.0	26. 6609	253 .52	7395 .33	230 . 24	528 20	001 17	14	11 1938	445 .10	168 .00	80.			80. ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	0.40	018 .10	447 .106		900 .127	885 .132	87 1 . 1 32	868 .133	824 .140	813 .143	700 .142	678 .141	690 .147	623 .141	531 139	390 .135
нүст	6.01 4.	4799 .6	• 9985 • 9	.9607 .7	.8729 .6	.8057 .5	.7485 .5	. 6990	•6213 •3	• 5635 • 3	. 5245	• 47 45	4253	3610				- 072C		1. 2022	I. 6062.	• < 4 8 4	• 2385	.2310 .13	.2206 .1	• 2111 • 1	.2062 .1(•1977 •10	.1858 .1(.1737 .15	•1549 •13
	7.00	-1.3351	• 9685	1.0096	.9585	.9062	.8452	• 7976	.7270	•6584	.6171	.5680	. 5004	. 4235	. 3779	2574	3266	3102	2010	2002	0407.	60/J.	+ 2 Q Z +	1767 •	• 2449	• 2395	• 2209	.2165	• 2033	.1852	• 1583
	X/C	000.	• 005	.010	•015	• 020	• 025	• 031	• 040	• 050	• 060	.075	•100	.150	• 200	-250	- 300	.350	004					• • • •	• • • •	• /00	• / 50	. 800	•850	006.	066.

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPPER

R = 460,000

M = 0.13

PTINF = 15 PSI

RUN 20

.

150

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

	-1-00						
			75	50	26	-•01	• 00
770	.1641	•6495	.7187	0597.	6 5 7 J	0900	
193	-1.2691	8428	7387	0000 -		FC0F •	2000.
318	-1-0964	- 101 2	2001			2066	• 3269
		370/0-	1 070 • 1	+226	-+4356	3427	.8501
		9979	- • 5 60 2	4826	4112	3313	-9624
958	- 8853	5725	5148	4463	3842	3149	9823
882	8048	5285	4795	4121	3501		
416	7684	4896	4438	3850	- 3358		1006.
554	6894	4303	- 3918	3427	2005 -	- 2616	0016
146	6254	3850	- 2506			CT C7 • -	1976.
828		0.000			** < / 31	2293	•8840
		4040 • I		2/66	2439	2055	.8445
		-•2999	2723	2386	2097	1771	.7876
	3185	2392	2161	1906	1659	1388	. 7138
6 8 T	2310	1621	1441	1209	1036	0842	ACRA.
380	1707	1124	0952	0785	0625	0450	5261
1788	1216	-•0747	-• 0597	04.42	0312	0165	
1315	0840	0422	0318	0158			
957	0556	0054	0111	0046			5755°
1625	0269	.0205	1170		6410 •	7/70.	• 4033
306				CT 70 .	• 0329	•0426	.3727
		• 0 3 7 2	• 0 4 0 4	•0361	•0458	• 0559	•3394
	• 0133	• 0534	• 0603	.0518	• 0593	•0692	.3139
220	• 0 2 8 6	•0628	.0684	.0712	• 0673	.0786	2857
1217	• 0421	.0735	.0813	• 08 6 4	.0791	0840	. 2563
347	•0596	.0836	- 0917	.0956	6500		
520	.0695	0460	0400	0701		TT 60 •	h 1 7 7 •
647	1620.	1011	1047		7601.	•1013	• 16/61 •
700				+1104	• 1111	•1043	.1643
		660T.	.1160	.1210	.1243	.1221	.1266
	• 1031	• 1213	• 1246	.1281	.1297	.1316	.0610
500	•1166	.1287	.1304	.1355	.1373	1391	0208
169	.1268	.1372	.1372	.1438	.1463	1520	0697
						> 3 \ 1 >	

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

							6.50	7.00
x/c	10.1	2.00	3.00	4 • 01	10+0			
		1						
	1000	12 00	.8719	.5313	0079	7644	-1.1766	-1.6185
• • • •	1044		2096 -	- 8520	-1.4056	-2,0300	-2.3304	-2.6364
• 00 •	• 4 0 T 0			- 0421	-1.3871	-1.8830	-2.1250	-2.3617
.010	.1339	1/64		7374 • 1		-1-8244	-2.0292	-2.2337
.015	0184	3069	0342			-1 - 7670	-1.9507	-2.1300
.020	1260	3952	6988	-1.0282	CT 05•1-			-2.0528
.025	- 2091	4636	7452	-1.0502	-1.3/40	-1-121-1-		-2.0050
0.50	2688	5104	7745	-1.0597	-1.3607	-T-000-T-		
	1 2563	5782	8155	-1.0691	-1.3370	-1.6217	-1. () 31	0+00•T-
		- 6262	- 8422	-1.0709	-1.3110	-1.5658	-1.6819	-1.8023
000			8450	-1,0781	-1.2965	-1.5269	-1.6345	-1.7408
• 0 6 0	4/26				-1-2652	-1.4729	-1.5672	-1.6625
.075	5300	7013	7100		1 2222	-1 304 2	-1-4769	-1.5581
.100	5849	7345	8917	-1 • U544			-1 -2 4 1 B	-1.4059
150	6338	7599	8847	-1.0133	-[.[453	00/7*1-	071071	
	- 6673	7697	8752	9824	-1.0919	-1.2016	-1.221	
0		- 7740	- A639	9548	-1.0485	-1.1422	-1.1829	-1.2014
062.	0000		8500	- 9285	-1.0101	-1.0943	-1.1126	-1.1383
• 300		22776		- RAGE	9615	-1.0440	-1.0522	-1.0671
.350	6887		- 070 • 1		- 8970	9784	-,9536	9661
• 400	6458	1034			CC 78	- 8414	8411	8576
.450	5880	6406	+669				1977	7425
.500	5336	5918	6564	- 12/8	4071 -			6242
.550	4984	5630	6273		0 A D C • I		5070	5149
- 600	4691	-,3994	3675	4064		0764 -	70007	- 1170
6 5 0 7 5 0	2457	2714	3111	-,3432	3758	6204 -	C 7 1 4 ° -	
020.			2569	2797	3034	3213	3292	
• 100			- 1083	7147	2336	2466	2516	2544
• 750	609T • -			- 1546	1686	1780	1812	1832
.800	1146	-•1285	0 f f T • T		- 1076	- 1131	1159	1168
.850	0685	0778	0893	1050 °-		0478	0502	0518
• 900	0188	0270	0324	5 0 4 0 3			2010.	-0118
.950	.0431	•0386	•0344	•1E0 •	1170.			

T

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

- 9981 -971 -8719 -5313 -0079 -7644 -1.1766 -1.6185 - 0242 -5736 -9533 -9858 -9858 -9662 -9440 - 0245 -3256 -5734 -5933 -8850 -9659 -9440 - 0243 -15915 -15915 -5734 -7587 -8850 -9756 -9440 - 0252 -15915 -5743 -5743 -7615 -9190 -9440 - 0551 -1591 -3515 -5743 -7573 -8847 -8847 - 0551 -1591 -0176 -7573 -8647 -8645 -6647 -7615 - 0511 -0103 -10417 -5643 -5643 -6647 -6647 -7711 - 0511 -0103 -1765 -1792 -5167 -5167 -6134 -7712 - 0511 -0101 -1761 -1767 -7675 -6667 -7613 - 0512 -0102 -0102 -1794 -6667 -7713 -7714 - 0112 -0102 -1754 -2			00.00	4.01	5.01	6.02	6.50	7,000
.9981 .9971 .8719 .5313 0079 7644 -1.1766 -1.6195 .12306 .5734 .9859 .9850 .9850 .9440 0248 .3256 .5734 .5734 .7537 .9859 .9440 0584 .1951 .5734 .5738 .7853 .8856 .9190 .9440 0584 .1951 .3515 .5738 .7853 .8857 .9533 .9847 0584 .1366 .5738 .5738 .7853 .8847 .9440 0581 .0925 .1951 .5157 .5157 .5133 .8256 .8447 .7757 0581 .0985 .1733 .6533 .6433 .7616 .7773 0581 .09810 .1734 .6575 .3431 .6575 .7773 0581 .09810 .1934 .6666 .1734 .6567 .7773 -0582 .0756 .1733 .6433 .6433 .6527 .7773 -0611 .0682 .1733 .6473 .686								
.1106.5068.775.007 -7044 -1.66647 -1.6469 -0242.3560.5734.933.9659.9693.9692.9440-0243.3560.5734.7537.8850.9595.9756.9440-0352.1915.3915.5167.5530.7675.8151.9493.9448-0352.1915.3915.5167.5530.7675.8126.9448-03143.1915.3143.4731.6573.8667.7632.8667-0618.0922.2344.4731.6573.6933.7632.8667-0518.0922.2344.0766.1934.7632.8667.7731-0518.0922.2344.3637.4935.5324.5842.6591-0511.0756.1758.3637.4935.5324.5933.6591-0744.0756.1758.2675.3557.6753.6533.6533-0748.0756.1758.2615.3737.6753.6595.6591-0448.0766.1758.1758.2755.2274.5943-0241.0909.1564.2133.2616.3313.4724.5696.0241.0909.1564.2133.2616.3130.4724.5732.0241.0909.1564.2133.2616.3130.2755.2733.0241.0909.1564.1979.2745.2947.2936<	1866.	1799.	-8710	6123				
$\begin{array}{cccccccccccccccccccccccccccccccccccc$.1306	• 506 B	7754		6/00 -	-•7644	-1.1766	-1.6185
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	- 02 42	3260			.9858	.9830	.9692	.9440
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	- 0240			1841.	.8850	.9595	.9766	0826
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		0007.	• 4586	• 6443	• 7853	.8868		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0436	·1915	• 3962	. 5738	5112.	9000 B		ロナナト・
-0584 -11564 -3143 -6731 -8480 -0631 -0032 -56343 -6732 -8867 -7271 -0618 -00226 -2346 -3637 -6867 -7271 -0618 -00726 -1934 -3637 -4932 -6255 -6691 -0756 -1934 -3637 -4937 -55865 -65265 -0756 -1793 -3637 -4937 -57344 -5684 -0756 -1758 -25765 -3565 -4937 -4331 -0741 -0909 -1510 -27366 -3737 -4935 -4331 -0731 -00909 -1510 -27366 -3737 -4935 -4331 -0741 -09099 -1510 -27366 -3130 -4331 -0743 -1005 -1594 -2713 -2748 -3361 -0743 -1005 -1594 -2713 -2745 -3869 -0599 -1005 -1594 -2714 -2986 -3769 -0799 -10072 -1977 -2986 -3775 -2933 -0992 -1164 -1977 -2748 -2897 -2996 -1072 -13361 -1976 -2334 -2748 -2893 -0775 -1233 -2748 -2896 -2714 -0992 -1124 -1646 -1919 -27482 -2893 -1124 -1646 -1976 -2187 -2893 -1124 $-$	0552	.1591	.3515	. 5167				• 8965
-0631 -0073 -0073 -0073 -0073 -0023 -0033 -1734 -5665 -6661 -7271 -0021 -0756 -1734 -3053 -4037 -5324 -5665 -6691 -0023 -0756 -1758 -2675 -3959 -4935 -5324 -5665 -0023 -0736 -1576 -2793 -3737 -4935 -5324 -5665 -0023 -0736 -1576 -2793 -4737 -5949 -5694 -0023 -0738 -1610 -2366 -3737 -3737 -3737 -0033 -1161 -1599 -2793 -2745 -3261 -3361 -00339 -11207 -1591 -1997 -2745 -2893 -3775 -00999 -11207 -1997 -2745 -2893 -2775 -2933 -00999 -11207 -1646 -1997 -2745 -2892 -2745 -00999 -11207 -1997 -2745 -2892 -2745 -2745 -00999 -11207 -1997 -2745 -2893 -2745 -2893 -00999 -11207 -1903 -2745 -2892 -2742 -2893 -00999 -11207 <td>0584</td> <td>.1364</td> <td>5416-</td> <td></td> <td></td> <td>6/9/.</td> <td>•8121</td> <td>.8480</td>	0584	.1364	5416-			6/9/.	•8121	.8480
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0631	1081			G/ Ng •	• 7199	•7632	.8032
-0.041 0.0846 3637 4802 .5842 .6656 .6691 -0.048 0.0766 11934 .3051 .4437 .5434 .5665 .6691 -0.021 0.0830 .1758 .2675 .3353 .4437 .5434 .5665 .6691 -0.021 0.0830 .1610 .2366 .3051 .3737 .4936 .5684 -0.023 0.0830 .11610 .2366 .3361 .3737 .4943 .4331 -0023 0.0830 .11661 .2193 .2616 .3382 .3826 .5844 -0639 .1161 .1594 .2113 .2616 .33120 .3359 .3351 -0639 .1161 .1934 .2798 .2847 .2895 .3361 .3374 -0639 .1161 .1934 .2798 .2895 .3361 .3374 -0639 .1161 .1934 .2795 .2993 .2745 .2993 -0726 .1332 .1937 .2993 .2745 .2993 .2714 -0939	- 0619		7607.	6804.	• 5343	•6434	•6867	1757.
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		9760.	• < 346	• 3637	.4802	•5842	. 62 65	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	T+00	•0846	.2137	• 3363	7544.	.5424		1400.
-0262 00766 1758 2677 5072 59324 5684 0021 00830 11555 23655 3051 47397 4737 5049 00241 00830 11555 22133 2798 3359 4331 4331 0028 00830 11564 21133 22616 33626 3369 3574 5049 00786 01005 11564 21133 22616 3130 3359 4033 3574 00839 01617 01594 2058 2514 22986 3176 3361 00912 01207 01597 2058 2363 2745 3071 3194 00929 01277 01979 2253 2745 22795 2793 00929 01314 01637 01919 22253 22745 22795 2793 00929 01321 01919 22253 22745 22696 2775 2293 01722 01321 01919 22253 22755 22755 22735 01722 01919 22251 22745 22696 2716 2263 01221 01923 01919 22151 22412 22696 2716 01229 01847 01919 22124 22412 22696 2716 01221 01919 22124 22124 22324 22424 22424 01229 01847 01919 21124 22184 22496 <	0448	• 0766	.1934	0405.	70.04		6996.	.6227
.0021 .0030 .1610 .2366 .3759 .4390 .4724 .5049 .0241 .0909 .1555 .2193 .2798 .3382 .4331 .4331 .0586 .1005 .1504 .2113 .2616 .3130 .3359 .4331 .0586 .1005 .1594 .2798 .3382 .3626 .3361 .0599 .1161 .1594 .2798 .3382 .3546 .3361 .0599 .1594 .2766 .2745 .2897 .3361 .0912 .1207 .1979 .2363 .2745 .2897 .3941 .0912 .1207 .1934 .1997 .2363 .2755 .2933 .2755 .2933 .0979 .1124 .1665 .1919 .2151 .2745 .2897 .2933 .0072 .1332 .1646 .1919 .2151 .2745 .2897 .2933 .1124 .1405 .1645 .1919 .2151 .2742 .2683 .2744 .2683 .1124	0262	.0756	1758		1704.	5574.	• 5324	•5684
0.241 0.000 1555 2193 2516 3382 365 0.438 1005 1555 2113 2516 3382 3559 3561 0.699 1161 1555 2798 2382 3361 374 0.0839 1161 1594 2066 2447 2866 3361 3361 0.0839 1161 1591 1979 2756 2303 2775 3361 0.912 11267 1591 1977 2865 3041 3361 0.9912 11314 1634 1997 2363 2775 2933 0.9920 1314 1634 1997 2253 2775 2933 0.9920 1314 1645 1911 2151 2775 2775 0.9920 1344 2653 2263 2775 2933 2775 0.9920 1344 2654 2865 2775 2942 2943 1124 1405 1645 1911 2151 2442 2563 11243 1446 <td>1200.</td> <td></td> <td></td> <td>C/07 •</td> <td>9666.</td> <td>.4390</td> <td>•4724</td> <td>.5049</td>	1200.			C/07 •	9666.	.4390	•4724	.5049
0.438 0.005 1.554 2.193 .2798 .3359 .3626 .3666 0.699 0.1161 1.594 .2058 .2514 .2986 .3176 .3359 .3574 0.699 0.1161 1.594 .2058 .2514 .2986 .3176 .3361 0.699 0.1207 .1594 .2058 .2514 .2986 .3176 .3361 0.912 0.1285 0.1637 .1997 .2363 .2775 .2933 0.912 0.1285 0.1637 0.1977 .2363 .2775 .2933 0.912 0.1285 0.1977 .2308 .2554 .2683 .2775 0.999 0.1314 0.1646 0.911 .2755 .2775 .2933 0.1072 0.1322 0.1919 .2151 .2442 .2568 .2775 0.1124 0.1405 0.1911 .2151 .2442 .2755 .2775 .2714 0.1124 0.1405 0.1916 .2161 .2113 .2742 .2755 .2755 0.1271 <td< td=""><td>10241</td><td></td><td></td><td>• 2366</td><td>.3051</td><td>.3737</td><td>.4043</td><td>1554.</td></td<>	10241			• 2366	.3051	.3737	.4043	1554.
0.930 .1005 .1564 .2113 .2616 .3130 .3359 .3351 0.699 .1085 .1594 .2058 .2514 .2986 .3176 .3351 0.699 .1161 .1594 .2058 .2514 .2986 .3176 .3351 0.699 .1161 .1591 .2058 .2514 .2986 .3176 .3351 0.912 .1285 .1591 .1979 .2753 .2853 .2775 .2933 0.912 .11285 .1637 .1997 .2363 .2775 .2933 0.912 .1332 .1634 .1965 .2308 .2653 .2775 .2933 0.999 .1314 .1634 .1965 .2221 .2753 .2756 .2714 1124 .1405 .1656 .1911 .2151 .2412 .2516 .2513 .1124 .1430 .1645 .1911 .2151 .2424 .2523 .1271 .1430 .1645 .1963 .2043 .2755 .2334 .2553		5050°	• 1555	• 2193	.2798	.3382	- 36.26	
0699 1161 1594 2058 2514 2986 3176 3361 0699 1161 1599 2050 2447 2896 3021 3176 3361 0839 11207 1599 2050 2447 2896 3021 3176 3041 0839 11207 1591 1979 2755 2897 2041 0912 1314 1634 1977 2303 2745 2897 3041 077 0314 1977 2303 2745 2897 2933 077 1314 1634 1965 2253 2755 2795 2793 1124 1405 1648 1919 22151 2482 2566 2714 1124 1422 1662 1919 22151 2775 2533 27253 1124 1430 16662 1919 2124 2424 2522 1271 1446 1865 2043 2268 2334 2419 1271 16465 1847 1973 2		• 1001	•1564	.2113	.2616	.3130	. 3350	- 00C -
0699 1161 1599 2650 2447 2365 3361 0839 1207 1591 1979 2363 2745 3021 3194 0912 1207 1591 1979 2363 2745 2897 3041 0912 1285 1637 1997 2363 2745 2897 3041 0999 1314 1634 1965 2308 2653 2775 2897 3041 0999 1314 1648 1945 2251 2253 2775 2933 1124 1405 1646 1911 2151 2442 2568 2775 1124 1430 1662 1911 2151 2442 2568 2783 1124 1430 1662 1903 2124 2334 2786 2714 1124 1430 1645 1847 1991 2187 2523 27424 2553 1271 1430 1645 1847 1991 2137 2195 2259 1271 15043	0000	• 1085	.1594	.2058	.2514	2006		+ · · · ·
0839 .1207 .1591 .1979 .2363 .2455 .3021 .3194 0912 .1285 .1637 .1979 .2363 .2775 .2933 0912 .1285 .1637 .1977 .2308 .2745 .2897 .3041 0999 .1314 .1634 .1977 .2308 .2653 .2775 .2933 0999 .1314 .1634 .1919 .2253 .2554 .2683 .2736 0172 .1322 .1919 .2221 .2253 .2554 .25683 .2714 11124 .1405 .1919 .22151 .2742 .2725 .2733 1190 .1422 .1646 .1865 .2043 .2742 .2523 .1243 .1430 .1645 .1865 .2043 .2725 .2334 .2725 .1271 .1456 .1865 .2043 .27424 .2523 .2137 .2195 .2229 .1271 .1573 .1673 .2137 .2195 .2229 .2229 .2229 .132	•0699	.1161	.1599	2050		00470	• 31 / 0	•3361
0912 0712 0745 02653 0275 3041 00999 11314 1637 1997 02308 02653 0275 02933 00999 11314 1634 1967 02308 02653 0275 02933 00999 11314 1634 1965 02221 0253 0275 02933 01072 11332 1648 1919 02221 02482 02683 0274 01124 1405 1656 1911 02151 02412 02683 02523 01124 1405 1911 02151 02412 02608 0275 02523 01243 1430 1666 1903 02124 02334 02419 01271 1456 1865 0243 0275 02334 0286 02239 1271 1501 1645 1867 01973 02137 02195 02229 1275 1236 02137 02137 02187 0275 02299 1275 1523 01976 01973 <td< td=""><td>.0839</td><td>-1207</td><td>1501</td><td></td><td></td><td>• 2856</td><td>.3021</td><td>•3194</td></td<>	.0839	-1207	1501			• 2856	.3021	•3194
0999 1314 1634 1997 2553 2554 2775 2933 1072 1332 1634 1965 2221 2554 2683 2783 1124 1405 1656 1919 2221 25482 2596 2714 1124 1405 1656 1911 2151 27482 2563 2753 1124 1405 1656 1911 2151 27482 2563 2753 11290 1422 1662 1903 2154 2334 2608 2714 1271 1456 1645 1865 2043 2275 2334 2753 1271 1456 1865 2043 2275 2334 2419 1271 1456 1861 1973 2137 2195 2229 1321 1523 1789 1973 2137 2195 2229 1355 1523 1789 1973 2137 2195 2229 13569 1569 1789 1976 1975 2229 2	<160 .	1785		6/67 •	• 2363	•2745	.2897	.3041
1072 1332 1965 2253 2554 2683 2780 1124 1405 1656 1919 2221 2482 2596 2714 1124 1405 1656 1919 2221 2482 2506 2714 1124 1405 1656 1911 2151 2412 2508 2714 1190 1422 1666 1911 2151 2412 2523 2523 1243 1430 1646 1865 2043 2344 2523 1271 1456 1865 2043 2275 2334 2419 1271 1456 1865 2043 2275 2334 2419 1271 1456 1861 1991 2137 2268 2305 1321 1523 1789 1973 2137 2195 2229 1365 1523 1789 1916 2137 2195 2229 1365 1523 1789 1916 2137 2195 2229 1395 1501 <td>.0999</td> <td>1214</td> <td>1601 -</td> <td>1 4 6 7 •</td> <td>• 2308</td> <td>•2653</td> <td>.2775</td> <td>• 2933</td>	.0999	1214	1601 -	1 4 6 7 •	• 2308	•2653	.2775	• 2933
1124 1919 .2221 .2482 .2596 .2714 11124 1405 1656 1911 .2151 .2412 .2608 1190 1422 1656 1911 .2151 .2412 .2506 .2608 1190 1422 1662 1903 .2154 .2516 .2523 1243 1646 1865 .2043 .2275 .2334 .2523 1271 1456 1646 1865 .2043 .2275 .2334 .2619 1271 1456 1865 .2043 .2275 .2334 .2753 .2268 .2305 1271 1504 .1645 .1810 .1973 .2137 .2195 .2229 1355 .1523 .1789 .1916 .2048 .2086 .2113 .1395 .1501 .1655 .1730 .1943 .1976 .1982	.1072		+ COT •	• 1465	•2253	•2554	.2683	.2780
1190 .1405 .1911 .2151 .2412 .2608 1190 .1422 .1662 .1903 .2124 .25516 .2608 1243 .1422 .1662 .1903 .2124 .2334 .25523 .1271 .1456 .1646 .1865 .2043 .2275 .2334 .2419 .1271 .1456 .1646 .1865 .2043 .2275 .2334 .2419 .1271 .1456 .1661 .1847 .1991 .2187 .2334 .2419 .1271 .1456 .1810 .1973 .2197 .2268 .2229 .1321 .1504 .1810 .1973 .2195 .2229 .1365 .1789 .1916 .1976 .2113 .2229 .1395 .1501 .1655 .1730 .1943 .1976 .2193	1126	30010	• 1048	.1919	.2221	•2482	.2596	2714
1190 .1422 .1662 .1903 .2124 .2334 .2424 .2523 .1243 .1430 .1646 .1865 .2043 .2334 .2419 .1271 .1456 .1646 .1865 .2043 .2334 .2334 .2419 .1271 .1456 .1646 .1865 .2043 .2275 .2334 .2419 .1271 .1456 .1661 .1847 .1991 .2187 .2268 .2305 .1321 .1504 .1661 .1810 .1973 .2195 .2229 .1365 .1523 .1789 .1916 .2048 .2195 .2229 .1397 .1501 .1655 .1730 .1943 .1976 .2113 .1395 .1730 .1861 .1976 .1982 .1982 .1982	- 7 T T •	• 1405	• 1656	.1911	.2151	.2412	-2516	1111
•1243 •1430 •1646 •1865 •2043 •2275 •2419 •1271 •1456 •1646 •1847 •1991 •2187 •2419 •1271 •1456 •1646 •1847 •1991 •2187 •2334 •2419 •1321 •1504 •1661 •1847 •1991 •2187 •2268 •2305 •1321 •1504 •1661 •1810 •1973 •2137 •2195 •2229 •1365 •1523 •1645 •1780 •1916 •2048 •2105 •2229 •1397 •1501 •1655 •1716 •1916 •1973 •2048 •2113 •1397 •1501 •1655 •1730 •1973 •1976 •1982	• 1140	•1422	.1662	• 1903	4615.			0000
.1271 .1456 .1646 .1847 .2419 .22187 .2334 .2419 .1321 .1504 .1646 .1847 .1991 .2187 .2268 .2305 .1321 .1504 .1661 .1810 .1973 .2137 .2195 .2229 .1365 .1523 .1645 .1789 .1916 .2048 .2305 .1397 .1501 .1645 .1716 .1916 .2048 .2113 .1397 .1642 .1716 .1861 .1978 .2113 .1395 .1482 .1569 .1655 .1730 .1904	.1243	.1430	.1646	. 1865	20.62		4747.	• 2523
.1321 .1504 .1661 .1810 .1991 .2187 .2268 .2305 .1365 .1504 .1661 .1810 .1973 .2137 .2195 .2229 .1365 .1523 .1645 .1789 .1916 .2048 .2105 .2229 .1397 .1501 .1635 .1716 .1916 .2048 .2113 .1395 .1482 .1569 .1716 .1861 .1976 .1982	.1271	-1456	7771			6177.	• 2334	.2419
1365 1523 1645 1810 1973 2137 2195 2229 1365 1523 1645 1789 1916 2048 2086 2113 1397 1501 1635 1716 1861 1943 1976 1982 1395 1482 1569 1655 1730 1804 1976 1982	1261.	1504		1 4 2 7 4	1661.	.2187	.2268	.2305
.1397 .1501 .1045 .1789 .1916 .2048 .2086 .2113 .1397 .1501 .1635 .1716 .1861 .1943 .1976 .1982 .1395 .1482 .1569 .1655 .1730 .1804 .1976 .1982	. 1365		1001.	• 1810	•1973	.2137	.2195	0222
•1395 •1201 •1635 •1716 •1861 •1943 •1976 •1982 •1395 •1482 •1569 •1655 •1730 •1804 •200 •200	5051		640T •	.1789	.1916	.2048	.2086	2112
•1372 •1482 •1569 •1655 •1730 1804 1		1011	•1635	.1716	.1861	.1943	.1976	1002
	C & C T •	·1482	.1569	.1655	.1730	1804		2011.

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

13.99	-5.6369	-5.5491	-4.0280	-3.2083	- 3.0940	-3.0285	-2.8297				C677•7-	-2.0466	-1.8118	-1.4916	-1.2286	-1.0487	- 8887	10000 -		0/10	0074 -	4993	4928	4918	4890	5130	5130	- 4026		4415	6064 -	5107	9 1
13.99	-5.6262	-5.5624	-4.0139	-3.2008	-3-0876				+04C•7+	-2,3698	-2.22.24	-2.0442	-1.8136	-1.4886	-1.2336	-1 0510		3000°		61 /1	5183	5021	5002	4955	4886	5140			**~* - 1	4925	4916	- 5096	
12.99	-5.4750	-5.3838	-4.2053	-3,1903			5070 6 7	1929-2-	1686.2-	-2,4019	-2.2573	-2.0882	-1.8554	-1.5271	-1.3256		C001-1-	6/TO*T-	8295	6430	5679	4733	4302	4313	- 4293	- 4202		0674.1	4266	4296	4283	- 4171	T 7 T t • I
12.01	-5.2008	-5.1382	-4 3380	4671 6-		-3.072 - 5555	-3.0008	-2.8118	-2.5941	-2.4153	-2.2847	-2.1093	-1-8906	-1.5074			-1.2402	-1.1038	9548	7926	6731	5302	4392	- 4006	2005 -			36/6	3587	3457	3480		36 0 6
10.99	8403				-3.1220	-2.9866	-2.9402	-2.7633	-2.5634	-2.4041	-2.2797	-7.1176	-1.9161	10101		-1.4624	-1.3215	-1.2044	-1.0843	9419	8069	- 4485	- 5303	0464 -			3002	2684	2426	7222			1834
66*6		0063 .4 -	1122.4-	-3.4000	-3.6486	-2.8869	-2.8077	-2.6118	-2.4431	-2.3068	-2.2058			0700-1-	-1.6319	-1.4697	-1.3430	-1.2400	-1.1344	-1.0035	8686		26218	7040		-3//6	2981	2317	1816	7671 -		-1128	-•0606
9.02		-3.46/3	-3.7418	-3.2643	-3.0581	-2.9402	-2.7902	-2.6519	-2.1698	-2.0508	-2-0244			6/0/•T-	-1.5684	-1.4231	-1.3148	-1.2255	-1-1315		- 101C		1.040	1020	9904	4074	3189	2431	- 1781		-1231	0779	0419
8 • 00		-2.5329	-3.2123	-2.8276	-2.6365	-2.4905	-2.3851	-7.2884	-2-1454	-2-0370			+6 TR • T-	-1.6700	-1.4539	-1.3457	-1.2633	-1-1877	-1-1088	7000 -		1100.	7583	- 6346	5198	4201	3322	- 2541			1187	0596	0072
×/C		• 000	• 005	.010	.015	.020	- 025	020				000	•075	.100	.150	- 200	. 250	300			- 4 UC	.450	• 500	•550	• 600	.650	. 700	75.0		• 800	.850	. 900	.950

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

x/C	8.00	9.02	66*6	10.99	12.01	12.99	12.00	
								66°CT
000	0603 C-							
200	670C • 7	- 3 + 4 8 / 3	-4.2988	-4.8693	-5.20.08	-5.4750	-5.6262	
•	4768 •	•7276	.5914	. 4833	4051			6000 ° C -
•010	.9836	. 9661	5969.	1700		20400	• 3232	.3269
.015	.9740	7080		T074 •	1198.	.8632	.8516	.8501
020	04.75	1 2010	6704.	• 790	.9698	.9661	.9597	4640.
		. 4 / 0 0	.9816	.9825	.9807	9841	C 6 8 0	- 1001 -
670.	• 9055	.9417	-9632	. 9727	. 9767		1706 •	. 9823
•031	• 8645	.9118	. 9360	QE7R		5006.	• 9803	.9807
• 0 4 0	.7922	.8433	8814		C 6 C 6 •	• 9666	• 9694	.9700
.050	. 7351	7880		5770 •	• 4136	• 9230	.9294	.9287
.060	. 4014	7455	6170+	+ N C R +	.8634	.8773	.8849	.8840
. 075				• 8084	.8248	.8363	.8428	. 8445
	0750.	• • • • • •	• 7266	. 7521	.7657	.7799	. 7876	
001.	• 5641	•6167	• 6525	. 6771	.6924	C C U L		9/9/•
.150	• 4803	• 5242	.5577	. 5782	5001 5007	2001	601.	• 7138
• 200	• 4296	. 4641	4044		1600.		• 6076	• 6088
.250	2473	4795		1410.	0774.	•5304	•5371	•5361
300	2476.	2025	0404.	• • • • • • •	•4740	•4796	.4816	.4828
. 350	2404		4 Q T 4 *	.4317	.4373	•4398	.4387	4474
		• 3120	.3920	.4001	.4021	.4040	- 40.23	4032
		5565.	• 3673	.3757	.3745	775.	. 2722	
	• 3 T 4 3	• 3337	.3475	. 3527	.3481	3455		1716.
COC •	• 3020	.3169	• 3284	. 3296	1725.		07404	• • • • • •
• 550	• 2863	.3005	.3112	2079		C016.	• 3109	•3139
• 600	.2770	• 2879	.7952				• 2 8 6 6	.2857
• 650	.2651	4676.	2700		.2003	• 2 6 9 0	.2574	.2563
• 700	.2529	25.00	7597	1117.	• 2 5 6 0	•2421	• 2300	.2274
. 750				• 2470	.2301	.2134	.1984	.1970
BOO .		C7474	6042.	• 2276	.2043	.1835	-1634	1642
	+ + + + + + + + + + + + + + + + + + + +	4177.	.2212	.2028	.1767	-1506		
.850	.2127	•2102	.1998	1775	1442		1071 •	• 1266
• 900	.1942	.1869	1708	1641		91110	• 08 04	.0810
.950	.1683	. 1511		1711 -	• 04 / 3	• 8 4 0 •	• 0203	• 0208
	b 1 1		76770	• 0847	• 03 09	0153	0677	0697

.000 0105 .3179 .5185 .6830 .8095 .010 0105 .3179 .5185 .6830 .8095 .010 .025 .9230 .8873 .6837 .5739 .7539 .010 .8351 .7579 .6737 .5778 .4933 .020 .8351 .7579 .6737 .5776 .2137 .020 .8351 .1234 .9233 .2137 .4736 .050 .4263 .2957 .2315 .1234 .2137 .050 .2109 .0843 .0168 .3033 .2225 .1429 .050 .2109 .01643 .0168 .2759 .1234 .050 .2109 .01643 .01698 .2759 .1429 .010 .2109 .01698 .0330 .2825 .1429 .010 .2115 .01698 .0330 .2759 .2825 .01690 .2315 .01698 .0200 .2759 .2950 .150 .2225 .2090 .29454 .2750 <th>·1•50 -1•01</th> <th>- 49</th> <th>•01</th> <th>• 00</th> <th>•50</th>	·1•50 -1•01	- 49	•01	• 00	•50
$\begin{array}{cccccccccccccccccccccccccccccccccccc$					
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		8005	8974	.8855	.9609
000 9626 9230 0873 8498 9626 0115 7579 6737 5878 9498 9705 0105 8351 7579 6737 5878 9498 9705 0105 5076 3818 3033 5225 1234 020 6039 4726 3033 2257 4729 030 4263 0843 0168 30330 2255 040 3107 0843 01698 -0547 -0547 050 2109 0843 01688 -0571 -2135 075 -2109 -1836 -01678 -0571 -2136 075 -2115 -1836 -01688 -2136 -2135 075 -2899 -1437 -2998 -5716 -2550 1100 -2115 -1832 -2998 -6768 -6750 1100 -21169 -2356 -4568 -5710 -5713 1100 -2115 -2356 -45710 -5713 -55162 200	•5185 • • • • • • • • • • • • • • • • • • •		6710	.6698	.5582
$\begin{array}{cccccccccccccccccccccccccccccccccccc$.8873 .8498	• • • • • • •		0700	2667
010 0321 0726 3766 3766 3766 3766 3766 3766 3766 3766 3766 3766 3766 3766 3295 2137 2137 2137 2137 2137 2137 2137 2137 2137 2137 2137 2137 2137 2137 2137 21477 0169 0169 -0628 -01437 -0571 -0330 -01429 -01429 -01429 -01429 -01429 -01429 -01429 -01429 -01439 -01628 -01429 -01439 -01628 -01429 -02289 -01429 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02399 -02590 <	×737 .5878	• 4933	3878	5 5 5 C .	
015 7268 6094 5327 2325 1234 025 6039 4726 4027 2315 1234 025 6039 4726 2033 2225 1234 030 2107 2818 2315 2225 1234 075 2109 0843 0169 -0571 -0628 -1472 075 01228 -0015 -0571 -0628 -2135 075 01228 -0015 -1434 -2090 -2135 075 02266 -0015 -1434 -2090 -2135 075 -02215 -1238 -0571 -2999 -25356 075 -02215 -1872 -2369 -2536 075 -0215 -1872 -7536 -5502 075 -0215 -1872 -7536 -51612 075 -02115 -07817 -4209 -6969 -5510 200 -02801 -0757 -2368 -6700 -5710 075 -02801 -4538 -4617 -4209 -5710 070 -02801 -4538 -4617 -4509 -5162 070 -02801 -0759 -0789 -7502 070 -02801 -02802 -0799 -79167 070 -02801 -0798 -0799 -0793 070 -02801 -0799 -04999 -0793 070 -02801 -02802 -28096 -0793		. 3506	2518	.2520	• 1200
020 6039 4726 4027 3295 2215 1234 025 5076 3818 3033 2225 01490 070 4263 2957 2315 01437 01497 070 2109 0843 0169 0169 -0571 0750 2109 0843 0169 -0128 -01429 0750 2109 0863 -0169 -0128 -01429 0750 02266 -00801 -11434 -2090 -2826 0750 02266 -0801 -12372 -2736 0750 -0289 -0811 -1234 -25090 0750 -0289 -0812 -1434 -2090 0750 -0817 -0729 -0790 -2876 0750 -0215 -0801 -2372 -2373 070 -2398 -4409 -5710 -5710 070 -2989 -4290 -4290 -6502 -0773 -0776 -23949 -6516 -0773 -2786 -23139 -6512 -0776 -2786 -23139 -3139 -0770 -2512 -2512 -25139 -0776 -2786 -2786 -23139 -0776 -2786 -2786 -23139 -0776 -2778 -2786 -23139 -0776 -2786 -2786 -23139 -07976 -2796 -2796 -23139 -07976 -2796	• 5327 • • • 4370		1104	.1174	.0139
025 5076 3818 3033 2225 1234 030 4263 2957 2315 0330 -0547 040 3107 1836 0169 -0330 -0547 075 2109 0843 -0169 -0288 -1472 075 01266 -00015 -1872 -2135 075 0256 -00015 -1872 -2135 075 02266 -00015 -12344 -2135 075 0227 -1872 -1236 -2135 075 -0289 -0811 -2090 -2135 075 -2115 -1872 -2350 -2998 -2010 -2377 -1434 -2090 -2135 075 -2398 -4209 -3773 -2598 2500 -23987 -4509 -6502 -5716 2700 -2798 -4290 -64617 -4577 2700 -2798 -4509 -6709 -5716 2700 -2798 -4729 -6709 -5716 2700 -2798 -4729 -6709 -5716 2700 -2289 -2326 -2326 -2326 -2289 -2289 -2326 -2326 -2326 -2289 -2289 -2316 -2326 -2316 -2289 -2269 -2269 -2316 -2316 -2289 -2269 -2269 -2316 -2366 -2092 -2269 -2269 <	.4027 .3295	• < 131			- 0806
025 5006 2957 2315 0330 06490 0400 3107 1288 0843 0169 -0547 0750 2109 0169 -0628 -01429 0750 22109 0069 -2350 -21354 0750 1228 -0015 -0571 -12286 0750 22109 -0801 -1434 -2090 0750 -0266 -0801 -2350 -2998 0750 -02827 -1872 -3529 -2998 0750 -23159 -7377 -4456 -5016 2000 -23177 -4458 -65016 2000 -2989 -6457 -6458 2000 -2989 -64617 -4969 -65161 2000 -23987 -4617 -44969 -65161 2000 -23987 -4617 -4963 -65162 2000 -23987 -4683 -4969 -65162 2000 -23987 -4683 -4974 -55162 2000 -24538 -64633 -65161 -55102 2000 -4290 -4683 -67633 -65161 2000 -4290 -4683 -67633 -65162 2000 -22916 -23683 -25162 2000 -22916 -22916 -23489 2000 -22916 -22916 -23139 2000 -22916 -22916 -23139 2000 -22916 -22916 <td>2033</td> <td>.1234 .</td> <td>0287</td> <td>C 7 5 7 •</td> <td></td>	2033	.1234 .	0287	C 7 5 7 •	
030 4263 2957 2319 0330 -0547 075 2109 0843 0169 -0548 -11429 075 1228 -0015 -0541 -2135 075 0260 -2090 -2135 075 0228 -0015 -2998 -2135 075 0287 -1872 -2350 -2998 -21450 075 -0287 -1872 -2350 -2998 -21450 0100 -2989 -08177 -1434 -2090 -3550 250 -2989 -4700 -72998 -5516 -5516 250 -2988 -4862 -4969 -5516 -5516 2777 -4862 -4863 -4796 -5516 2700 -4862 -4969 -5710 -5510 2700 -4983 -4969 -5716 -5716 2700 -2876 -4969 -4969 -5716 2700 -28016		- 0440	.0400	0369	1408
040 3107 .1836 .1088 .0330 -1424 050 .2109 .0843 .0169 -0628 -1429 075 .22109 .0843 .0169 -0628 2135 075 .0266 0801 1434 2826 2826 1100 2115 0377 1434 2998 3555 1200 23560 2998 5016 2505 2500 2989 3772 4557 4568 5516 2500 2989 4568 4568 5516 5516 2500 2989 4568 4568 5516 5516 2500 4583 4568 4568 5516 5516 350 4583 4568 5161 5516 5516 4400 4120 4583 4568 5516 5516 4400 4583 4583 4598 5516 5516 4400 24918 4583 49483 5516 4598 <td>1241 · GI 62 ·</td> <td></td> <td>1450</td> <td>1438</td> <td>2351</td>	1241 · GI 62 ·		1450	1438	2351
050 -2109 -0843 -0169 -0628 -11429 060 1228 -0015 -0571 -1304 -2135 075 0266 -0015 -0571 -1304 -2135 075 0266 -0015 -0571 -1304 -2135 170 -2115 -0827 -1434 -2098 -5162 200 -22115 -0827 -94569 -5508 -5508 200 -23987 -4509 -64617 -4509 -5516 200 -23987 -4568 -64617 -4568 -5516 200 -3373 -44617 -4568 -5516 -5516 200 -4290 -4582 -4968 -5516 -5516 200 -4282 -4568 -4568 -5516 -5516 200 -4282 -4968 -5516 -5516 -5516 200 -4282 -4583 -44683 -4948 -5162 2500 <td< td=""><td>•1088 •0330</td><td></td><td></td><td>- 2158</td><td>3113</td></td<>	•1088 •0330			- 2158	3113
050 2.109 -0.015 -0.015 -0.2826 075 0266 -0.0015 -1434 -2.2969 2826 150 -22115 -0.3041 -2826 2826 150 -22115 3025 2350 2968 2855 200 -2989 3025 3941 2856 200 2769 3941 2856 2360 2968 3773 4557 4577 4567 4969 5502 2500 3986 4682 4969 3773 4682 4963 5510 4797 4820 4797 5161 4797 4963 4969 5510 4797 4820 4963 4969 3773 4682 4963 4969 3773 4963 4969 5161 4797 4397 4120 4571 4700 4120 4563 4963 4700 4120 4538 4963 4700 4120 4538 4963 4700 4120 22696 32663 4700 22806 23663 4969 22499 22696 22696 23606 2057 22696 2915 23696 2057 22696 28009 3167 2057 22696 28009 31697	.01690628	1429	7577.		
060 11228 -0015 -0256 -0801 -02359 -02418 -02565 1100 -0286 -0801 -02359 -02468 -05016 1150 -02869 -03255 -03941 -05016 2000 -03025 -03529 -03941 -05016 2000 -03025 -04577 -04969 -05358 2000 -03987 -04617 -04969 -05210 2000 -03987 -04974 -05210 -05502 2000 -03397 -04974 -05161 -05502 2000 -03397 -04983 -04969 -053161 -05162 4500 -03773 -04974 -05101 -05162 -05161 -05363 -04969 -05162 4500 -03377 -04983 -04969 -05161 -05162 -05162 2000 -03363 -04983 -04989 -03663 -04969 -03739 4500 -03266 -02696		2135	.2863	2870	00 AL
075 0266 0801 1434 2998 5955 100 0827 1872 2350 3941 4509 2989 2915 3941 55016 2500 2989 3772 4568 5502 2500 2986 4209 4969 5502 2500 2987 4617 4877 4969 5502 2500 2987 4617 4862 4969 55162 350 2987 4617 4820 5510 55162 350 4290 4682 4974 5161 5510 350 4181 4943 5162 5510 450 4181 4943 5162 5162 450 2801 2802 2806 3363 450 2801 2802 2805 3167 4122 550 22696 2806 3167 4122 600 2249 2802 2806 3167 3403 600 22696 2806 2806 3167 3403 770 22692 2806 2806 2806 2806 22692 2806 2806 2806 2806 2806 22692 2806 2806 2806 2806 2806 1993 2269 2806 2802 2806 2802 <		- 2826	. 3503	3539	4264
100 0827 1872 2350 2998 5016 200 2916 3529 3941 4500 200 2989 3777 4209 3941 4500 250 23586 4209 4568 5016 250 3586 4209 4567 4969 5502 350 4290 4617 4820 5210 5502 350 4290 4682 4974 5161 5502 350 4290 4682 4974 5161 5510 400 4181 4397 4598 5162 450 3327 4583 4974 4598 450 3266 3268 4397 4598 450 3269 3268 4978 3539 450 2301 22696 3288 3289 2249 22696 22606 22809 3189 700 22696 22809 3189 700 22892 22809 3286 700 2809 2768 2809 1966 2592 2768 2892 1960 2809 2809 2892 1960 2809 2809 2809 1960 1960 2809 2809 1960 1960 2809 2802 1960 2892	-•1434 -• < 040		4735	4221	4923
150 -2115 -3225 -3529 -3941 -4500 200 -2989 -3777 -4557 -4568 -5502 250 -3987 -4617 -4557 -4969 -5502 250 -3987 -4617 -48209 -5510 -5502 300 -3987 -4617 -4820 -5510 -55502 350 -4780 -4682 -4974 -5161 -5510 350 -4796 -6768 -6769 -5510 -55162 450 -4120 -4538 -4974 -6493 -675162 450 -33977 -4983 -6493 -6493 -675162 450 -6120 -32663 -64938 -6493 -64122 450 -62096 -32663 -32863 -64397 -64122 450 -22801 -22692 -3288 -64397 -64122 550 -22499 -22692 -22696 -32368 -63339 560 -22806 -22692 -22915 -3235 -3383 700 -22692 -22906 -23049 -23049 750 -10993 -22692 -22809 -3239 -10903 -22692 -22809 -23139 -2057 -22692 -22809 -23139 -2057 -22692 -22692 -22892 -10963 -22892 -22892 -22892 -10960 -12968 -22892 -22892 <tr< td=""><td>23502998</td><td></td><td></td><td>- 5044</td><td>5570</td></tr<>	23502998			- 5044	5570
200 -2989 -3777 -4209 -4568 -5016 250 -3786 -4617 -4557 -4969 -5358 250 -3987 -4617 -4820 -5210 -5502 350 -3987 -4617 -4820 -5510 -5510 350 -4120 -4632 -4974 -5161 -55162 -400 -4120 -4637 -4974 -5161 -55162 450 -4794 -4181 -4943 -4598 -5162 450 -3397 -4938 -4181 -4943 -5162 450 -3226 -3263 -3867 -3383 -4938 450 -3226 -3268 -3268 -3383 -3493 550 -22499 -22696 -22915 -3167 -3403 650 -22499 -22696 -22809 -33339 -3463 700 -22692 -22915 -22809 -3167 -3463 700 -2125 -22692 -22809 -3236 -3236 700 -1993 -2758 -22892 -2386 -23839 700 -2125 -22592 -22809 -3268 -23939 700 -2758 -22892 -22892 -2386 -22892 700 -1993 -2758 -22892 -2386 -23839 700 -1993 -2778 -22892 -23892 -23949 700 -1996 -27892 <	35293941		2000 · · · · ·		1.5858
250	- 4209 - 4568	5016	•54/6		
.250 3586 4617 4974 5161 5510 .300 3987 4617 4974 5161 5510 .350 4290 4682 4974 5161 5510 .350 4120 4682 4974 5161 5510 .450 4120 4538 4974 5162 5516 .450 4120 4538 4583 45943 5162 .450 3373 4094 4588 4598 4598 .550 3226 3288 3489 3737 .550 2801 26946 3236 3383 .550 22499 26946 28068 3383 .750 22592 28099 3167 3463 .750 22694 28099 3167 3454 .750 22593 25949 2304 2304 .750 1966 2809 2892 2304 .750 19667 26915 2892	AEE74069	5358	.5703	9C9C•-	
.300 3987 4617 4820 45161 5510 .350 4290 4538 4974 5161 5510 .400 4120 4538 4974 5161 5510 .450 4181 4397 4598 4598 4598 .450 3377 4588 4397 4598 4598 .550 3377 32663 4397 4598 .550 3373 32663 4389 3737 .550 2801 3226 3288 3373 .550 2801 3226 3235 3733 .550 2489 2696 23167 3383 .550 2249 2696 3167 3383 .700 2125 2596 3167 3468 .700 2109 2598 2806 3468 .700 1990 2598 2892 2304 .850 1966 2758 2892 2304		- 5502 -	•5898	5847	6044
-6290 -6682 -6974 -7161 -5162 -4120 -64538 -6683 -64943 -5162 -6120 -64538 -6683 -64943 -5162 -6700 -7373 -64094 -6181 -64977 -64978 -600 -7373 -64094 -73638 -64927 -64397 -64927 -500 -72801 -3226 -3288 -63235 -3737 -500 -72499 -72696 -23236 -3235 -3493 -500 -72499 -72696 -23167 -34648 -3235 -3463 -500 -12259 -22696 -28069 -3236 -3463 -3448 -700 -1993 -25534 -2758 -3120 -3454 -700 -19960 -12634 -2758 -2892 -2304 -1960 -1962 -2758 -2892 -23454 -2304 -1960 -1962 -2778 -27892 -23947			.5757	5700	5908
400 4120 4538 4683 4397 7102 450 3773 4094 4181 4397 4598 500 3773 4094 3663 4397 4598 500 3397 3577 3663 4397 4598 500 3397 3276 3663 3737 4598 550 2801 3226 3288 3737 3737 550 2499 2696 3288 3235 3733 650 2249 2696 23167 3403 650 2249 2592 2806 3167 3403 7700 2125 2515 2806 3183 3448 7700 1993 2598 2758 3120 3454 .750 1993 2758 2892 2304 2304 .850 1966 2758 2892 2304 2304 .850 1962 2892 2304 2304	TOTC 46764		5348	5227	5483
450 3773 4094 4181 4397 4598 550 33773 3577 3663 3867 4122 550 3397 3226 3288 3737 3737 550 2801 3226 3288 3737 3737 550 2801 3226 3288 3737 3737 550 2801 3266 3288 3737 3737 550 2801 3288 3235 3539 3539 650 2249 2696 2806 3167 3403 700 22125 2806 3139 3448 770 2057 2512 2758 3120 780 1990 2758 2892 23454 .800 1960 2778 2892 2304 .850 1988 2778 2892 2304 .800 1986 2892 2304 2304 .850 19667 03757 .07	46834943	20TC*-		- 4737	4804
• • • • • • • • • • • • • • • • • • •	41814397				- 4407
550	36633867	4122	• 4 3 3 0	~ + 7 + • •	- 4112
• 550 -• 2801 -• 3226 -• 3268 -• 3235 -• 3539 • 600 -• 2489 -• 2827 -• 3068 -• 3167 -• 3403 • 650 -• 2249 -• 2696 -• 2915 -• 3139 -• 3483 • 650 -• 2249 -• 2592 -• 2806 -• 3139 -• 3483 • 700 -• 2125 -• 2592 -• 2809 -• 3139 -• 3448 • 750 -• 2125 -• 2515 -• 2809 -• 3120 -• 3464 • 750 -• 2193 -• 2508 -• 2758 -• 3120 -• 3454 • 800 -• 1960 -• 1962 -• 2786 -• 2892 -• 2304 • 850 -• 1888 -• 1962 -• 2778 -0 787 • 0196 • 900 -• 1888 -• 1661 -• 1062 -• 0355 • 0196	2200 - 3489	3737 -	.3942	-•344T	
.600 2489 2827 3058 3403 .650 2249 2696 2915 3139 3403 .650 2249 2592 2806 3139 3463 .700 2125 2592 2806 3139 3463 .750 2057 2515 2809 3068 3448 .750 2057 2515 2758 3120 3454 .800 1993 2508 2758 3120 3454 .800 1960 2534 2778 0387 .0196 .800 1888 1591 1062 0355 .0196 .0355 .0776 .0787 .0787 .0776		- 6535	.3856	3821	4021
650 2249 2696 2915 3167 3139 .700 2125 2592 2806 3139 3383 .700 2125 2515 2806 3139 3383 .750 2057 2515 2809 3068 3448 .750 2057 2515 2508 3464 .800 1993 2508 2758 3120 3454 .850 1960 2534 2778 2892 2304 .850 1888 1591 1062 0355 .0196 .0355 .0787 .0787 .0787 .0776			2755	3790	4083
700 2125 2592 2806 3139 3503 750 2057 2515 2809 3068 3448 800 1993 2508 2758 3120 3454 850 1960 2534 2758 3892 2304 850 1960 2534 2786 2892 2304 .850 1888 1591 1062 0355 .0196 .0355 .0787 .0787 .0776	2915316/		36.88	3699	4011
750 2057 2515 2809 3068 3448 .750 2057 2508 2758 3120 3454 .800 1993 2534 2786 3120 3454 .800 1960 2534 2786 2892 2304 .850 1888 1591 1062 0355 .0196 .0367 .0787 .0787 .0776	28063139			- 3672	3971
• 750 • • • • • • • • • • • • • • • • • • •	28093068		0015.		4001
• 80019932534278628922304 • 85019602534278628922304 • 9001898159110620355 -0196 • 0196 -0374 -0787 -0776	7583120	3454 -			
-85019602534270020196 -9001898159110620355 -0196 -0363 -0374 -0787 -0776	2704 - 2897	2304	.1610	-,2252	++22
•90018881591100202750776		-0196	•0385	• 00 95	e110.
		07 76	.0813	.0770	•0706
	•0697 •0101	•			

R = 100,000M = 0.08 5 051 TYNC

156

RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000

x/C	-2.88	-2.00	-1.50					
								06.
• 000	0105	- 3170	510F					
• 005	-1.3227	0712.1-		.0630	• 8095	•8974	•8855	.9609
.010	0000 -	- 0770	6006 • -	070/	4406	2187	2186	.0086
-015	- 9010			6240	4248	2600	2544	0863
020		55C0 • -	44I/	5685	3966	2528	2513	1011 -
		1795	6551	5125	3777	2528	- 2556	1414
	6959-	7112	5972	4810	3517	2307		
160.	8241	6584	5499	4503	- 3319	- 2276	2042*1	1287
040.	8010	5697	4845	- 3919	0502			-1190
•020	7925	5036	4328	3571	- 2604		1607-	1139
• 060	7903	4642	- 3R63		+007•1	006T • -	1847	1132
•075	7856	- 3971			9747.	-1710	1717	1011
.100	7922	- 3343			- 2010	1404	1490	0840
.150	- 1775			6477 -	1570	1117	1124	0608
200	- 1360		0 4 6 1 • 1	-• 1438	1010	0655	0700	2222-
. 250		0011-	13/1	1010	0630	0300	0230	0026
			0788	0608	0337	.0028	0014	
	-• 0896	0927	0497	0235	.0008	.0165		0.20.
065.	-•0701	0431	0312	0020	0162		9610	• 0475
• 400	0313	0180	-000-	. 0105		•121•	•0435	•0619
.450	0190	0119	-0174		1950.	•0564	.0614	•0662
.505	• 0022	0308	6960	0750 •	GIGO .	•0667	• 0637	.0927
.550	.0297	.0461	2020	- 0440 -	•0592	• 06 78	•0720	•0902
•600	• 0393	0.702		• 0338	.0667	.0915	•0852	.1072
.650	• 05 54	ORAB		.0778	• 0885	•0916	•0943	.1127
- 700	0443		1210.	16/0.	.1019	.1027	.0954	- 1045
.750		C C C C C C C C C C C C C C C C C C C	2680.	• 0829	.1002	.1135	5111.	1127
		260T •	• 0968	.1006	.0957	-1040	1125	
0000	9160.	.1172	.1146	.0983				0407.
.850	• 1046	.1228	.1246	1075		2011.	• 1139	.1342
• 900	.1151	.1265	.1344	1127	CD11.	.1263	.1240	.1226
.950	.1216	.1454	-1476	6264 6264	06710	• 1 4 3 0	•1420	.1218
				C/CT •	4611.	.1280	.1273	.1241

RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100.000

×/C	1.01	2 • 00	2.01	3 • 01	4.00	4.00	5.01	5 • 02
			T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
000	. 9581	.9545	.9736	. 8674	.6171	.6219	.1860	.1597
.005	404	.1676	.1484	2039	6273	6071	-1.1022	-1.1288
	1495	- 1153	1282	4431	8000	7872	-1.2068	-1.2190
	C110.	2464	2519	5416	8519	8489	-1.2253	-1.2346
	- 0003	5755	3397	6106	8990	8974	-1.2310	-1.2383
- 0 - C - C - C - C - C - C - C - C - C	1875	- 4080	4154	6635	9387	9219	-1.2284	-1.2397
.030	- 2524	- 4595	4637	-•6982	9453	-,9383	-1.2262	-1.2318
	- 3282	- 5294	5235	7379	9625	9535	-1.2145	-1.2150
	- 4006	5731	5771	7716	9681	9644	-1.1978	-1.2007
	7944 -	6160	6179	7968	9827	9727	-1.1765	-1.1865
	- 5010		6528	8187	9813	9710	-1.1619	-1.1632
	- 5557 - 5557	- 6801	6838	8208	9565	-,9581	-1.1224	-1.1242
		7057	7118	8211	9185	9183	-1.0469	-1.0515
	- 6209	7146	- 7089	8010	8962	8814	9882	9912
	- 6384	- 7025	7065	7800	8469	8426	-,9301	-,9353
	4254-	6861	6874	7452	8034	7980	8678	8738
	6071	6473	- 6489	6902	7292	-,7273	8070	8052
	- 5579	5815	5919	6173	6742	6664	7500	7541
024	4934	5323	5264	5834	6453	6381	7306	7287
500	4573	- 5051	5068	5700	6294	6244	-,7198	7170
550	4398	- 4954	4949	5558	6287	6307	7178	7193
009	- 4346	- 4934	4881	5566	6250	6261	7167	7162
. 650	- 4352	- 4894	4843	-,5525	6303	6277	7169	7201
	- 4294	- 4876	- 4947	5648	6317	6309	4873	4698
- 750	04240	4921	4972	5229	42 11	4294	2077	1863
	- 4103	4096 -	3760	2854	1682	1901	0992	-•0967
			- 1243	- 0010	0583	0666	0529	0500
000	1227		0042	- 0052	- 0073	0088	0167	0124
006.				0000	0350	0150.	.0238	.0327
.950	• 06 48	CCC0 •	• 1210	7 C C O •				

RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000

000 9581 •9545 •9736 •8674 •6171 •6219 •1860 •1597 010 •0728 •3388 •9736 •8774 •5174 •9156 •9957 •9879 011 •0728 •3388 •5534 •5738 •5634 •7508 •9779 •9957 •9957 •9957 •9957 •9957 •9957 •9956 •9759 •9759 •9759 •9759 •9759 •9759 •9759 •9759 •9759 •9759 •9759 •9750 •9759 •9759 •9759 •9759 •9759 •9750 •9759	x/c	1.01	2.00	2.01	3.01	4.00	4.00	5.01	5.02
000 -9545 -9736 -8674 -6171 -6219 -1860 -1977 010 -2031 -7740 -9156 -9752 -9753 -9795 -9975 010 -2031 -2738 -5034 -7740 -9156 -9975 -9975 011 -2014 -2018 -5721 -5733 -5721 -6915 -6915 0110 -2026 -1479 -3110 -4602 -5531 -5721 -6915 -6923 0101 -1037 -1479 -3110 -1649 -6723 -5724 0111 -1120 -1230 -2361 -3407 -5934 -5521 01013 -0014 -0012 -2311 -3407 -5034 -5724 0111 -1120 -1151 -1151 -2350 -3437 -5264 00115 -00126 -0120 -2351 -2361 -3187 -5261 00115 -00126 -11117 -1121 -2							***		
005 2051 5736 5740 5936 5034 7793 5793 5926 5926 5936 6976	000	. 9581	.9545	.9736	.8674	.6171	.6210	0786	16.01
100 -0728 -3386 -3366 -563 -779 -979 -979 215 -0114 -2766 -4525 -553 -5628 -5635 -5645 -7733 216 -0124 -1710 -11479 -3110 -4624 -4635 -5635 -5645 -5635 210 -0124 -1110 -11479 -3110 -4624 -4635 -5645	00£	.2051	• 5236	.5216	. 7740	00100	0164		1661.
115 -01014 -2026 -1002	010	.0728	AARE.	AACC.	56.26	~ ~ T ~ •	- 4170 	1044.	• • • •
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	015	.0186				e / 5 / 8	804.	.8702	.8976
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$			10424	0047*	2264.	• 6328	•6092	•7623	.7793
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	020	0014	.2026	•2124	.4002	• 5 5 3 3	.5521	.6915	.6926
331 0350 $.1454$ $.1479$ $.3110$ $.4624$ $.4632$ $.5856$ $.5856$ $.5870$ 560 0249 $.0987$ $.0780$ $.22611$ $.4009$ $.3317$ $.5034$ $.5034$ $.5034$ 500 0244 $.00856$ $.0927$ $.1911$ $.22651$ $.3187$ $.4711$ $.4692$ 500 0244 $.00856$ $.0927$ $.1911$ $.22651$ $.3197$ $.4711$ 500 -00115 $.00819$ $.0780$ $.1911$ $.27672$ $.2395$ $.3866$ 500 $.00115$ $.00819$ $.0780$ $.1911$ $.2767$ $.2395$ 500 $.0115$ $.00819$ $.0780$ $.19517$ $.2353$ $.22661$ 500 $.01157$ $.01197$ $.0780$ $.19517$ $.2353$ $.2744$ $.28613$ 500 $.07411$ $.01137$ $.11977$ $.19199$ $.2747$ $.2730$ $.28137$ 500 $.07411$ $.11277$ $.11547$ $.1568$ $.19491$ $.19491$ $.2756$ 500 $.00741$ $.11276$ $.11567$ $.19411$ $.1999$ $.2265$ $.2748$ 500 $.00741$ $.11276$ $.11567$ $.19411$ $.1999$ $.2295$ $.2748$ 500 $.00761$ $.1256$ $.11971$ $.1267$ $.2199$ $.2295$ $.2295$ 500 $.12026$ $.12079$ $.12941$ $.2295$ $.2199$ $.2295$ 500 $.12026$ $.19767$ $.1998$ <td< td=""><td>670</td><td>-•0192</td><td>.1710</td><td>.1689</td><td>• 3442</td><td>.4985</td><td>.5025</td><td>.6445</td><td>6305</td></td<>	670	-•0192	.1710	.1689	• 3442	.4985	.5025	.6445	6305
940 0295 .1110 .1230 .2661 .4009 .3911 .5034 .5704 750 0347 .0987 .1076 .2111 .3267 .4711 .4692 750 0347 .0987 .1076 .2111 .3266 .3917 .4711 .4692 750 -00115 .0818 .0780 .1911 .22657 .3917 .4711 .4692 700 -00115 .0818 .0780 .1813 .2667 .2895 .3866 .3979 701 -0057 .0818 .0780 .1813 .2667 .2813 .2767 700 .00115 .00818 .0780 .1813 .2667 .2793 .2467 .2755 701 .0741 .1127 .1167 .1568 .1943 .2766 .2765 .2746 .2755 700 .0741 .1127 .1159 .1568 .1943 .2265 .2746 .2755 7010 .0741 .1127 .1159 .1941 .27467 .27467 .2748 .2748	31	0350	.1454	.1479	.3110	4624	4463		C C C O S
500 -0347 .0987 .1076 .2311 .3474 .503 .4711 .4692 775 -0305 .0883 .0900 .2111 .3260 .3187 .4711 .4692 775 -0015 .0876 .0813 .0790 .1577 .2967 .3866 .3979 50 -0115 .0818 .0780 .1577 .2895 .3866 .3979 50 -0115 .0818 .0780 .1577 .2895 .3866 .3979 50 -0115 .0818 .0780 .1577 .2191 .2760 .3015 .2796 50 .0115 .1026 .1197 .1647 .2077 .2147 .2730 .2813 50 .0741 .1127 .1197 .1647 .2077 .2747 .2746 .2756 50 .0741 .1127 .1197 .1647 .1940 .2756 .2765 50 .0741 .1133 .1197 .1647 .1940 .2295 .2414 50 .0794 .11841 </td <td>040</td> <td> 02 95</td> <td>.1110</td> <td>.1230</td> <td>• 2661</td> <td>4009</td> <td>1105</td> <td>- 5024</td> <td>7007</td>	040	02 95	.1110	.1230	• 2661	4009	1105	- 5024	7007
50 -0305 0893 0900 2111 3260 3187 4283 4275 75 -0044 0827 0115 2895 3866 3979 60 -0115 -0819 01819 1577 2262 2501 3437 24283 60 -0115 -0819 -1057 -2895 3866 3979 60 -0419 -0780 -1517 -2622 2501 3437 2475 60 -0419 -0780 -1519 -2072 2147 2730 2843 60 -0741 -11123 -1167 -1568 -1993 27467 2750 60 -0741 -1123 -1167 -1568 -1993 2731 27467 2755 60 -077 -1891 -1647 -1647 -2756 2331 7 -0961 -1127 -11507 -1841 -1999 -2731 2231 60 -1052 -11647 <td>50</td> <td>0347</td> <td>.0987</td> <td>.1076</td> <td>. 2311</td> <td>.3474</td> <td>3503</td> <td></td> <td>F03/ •</td>	50	0347	.0987	.1076	. 2311	.3474	3503		F03/ •
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	090	0305	• 0893	• 0900	.2111	.3260	-3187	4783	2707.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	75	0244	.0856	.0927	. 1911	7962.	. 2805	2025	
50 .0115 .0780 1577 .2353 .2260 .3015 .2730 50 .0419 .0969 .1026 .1519 .2072 .2147 .2730 .2813 50 .0577 .1026 .1519 .2072 .2147 .2730 .2813 50 .0577 .1016 .1067 .1513 .2017 .1960 .2746 .2750 50 .0841 .1133 .1197 .1513 .2017 .1961 .2467 .2550 50 .0841 .1127 .1159 .1513 .2017 .1999 .2231 .2231 50 .0906 .1276 .1234 .1667 .1998 .1999 .2235 .2331 50 .1094 .1279 .1187 .1999 .2231 .2233 .2236 50 .1094 .1276 .1496 .1667 .1833 .2190 .2236 .2331 50 .1162 .1591 .1642 .1833 .1890 .2199 .2236 .2331 50 .1269	00	0066	.0827	.0819	.1813	.2622	. 25.01	2000.0	2120 2120
00 .0419 .0969 .1026 .1519 .2072 .2147 .2730 .2813 50 .0741 .11133 .11667 .1568 .2072 .2147 .2730 .2813 50 .0741 .11127 .11667 .1513 .2077 .2790 .2790 .2744 .2755 50 .0741 .1127 .1159 .1513 .2017 .1940 .2295 .2444 50 .0906 .1276 .1534 .1507 .1949 .2295 .2262 50 .1094 .1127 .1159 .1513 .2017 .2331 50 .1094 .1167 .1189 .2767 .2331 51 .1094 .1167 .1189 .2767 .2331 51 .1094 .11616 .1998 .1890 .2265 50 .1162 .1998 .1841 .2331 .2265 50 .1266 .1813 .1841 .1999 .2275 .2265 51 .1266 .1813 .1813 .2070	50	.0115	.0818	.0780	. 1557	.2353	. 2260		
50 .0557 .1016 .1067 .1568 .1993 .1941 .2574 .2550 50 .0741 .11127 .1167 .1568 .2079 .1961 .2467 .2550 50 .0906 .1276 .1234 .1563 .2017 .1940 .2295 .2262 50 .0906 .1276 .1534 .1567 .1941 .1999 .2265 .2262 50 .0906 .1276 .1534 .1567 .1998 .1940 .2295 .2262 50 .1094 .1311 .13167 .1998 .1993 .1999 .2201 50 .1094 .1276 .1341 .1497 .1616 .1988 .2179 .2202 50 .1162 .1872 .1833 .1872 .1789 .2139 .2205 50 .1228 .1497 .1642 .1833 .1872 .1789 .2070 .2202 50 .1228 .1497 .1642 .1833 .1872 .1789 .2070 .2055 50 <td>00</td> <td>.0419</td> <td>•0960</td> <td>.1026</td> <td>.1519</td> <td>.2022</td> <td>2167</td> <td></td> <td>0062.</td>	00	.0419	•0960	.1026	.1519	.2022	2167		0062.
00 0741 0133 0197 0647 2779 01961 2797 2795 22467 22467 22467 22467 22467 22467 22467 22467 22467 22467 22295 22262 50 0996 01276 01356 01507 01943 2231 22265 22262 50 01094 01311 01367 01667 01948 01943 2231 22262 50 01094 01311 01367 01616 01948 01943 2231 2231 22356 50 01094 01341 01497 01629 01872 01737 01943 22756 22756 50 01225 01447 01640 01872 01872 01787 01787 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976 01976	50	.0557	.1016	.1067	.1568	1992			6707.
50 0841 1127 1159 1513 2017 1940 2295 2480 50 0906 1276 1234 1667 1841 1999 2295 22414 50 1096 1276 1311 1367 1999 2295 22262 50 1094 1311 1367 11667 1999 2231 2231 50 1162 11872 1999 2231 22265 50 1162 11872 11872 11789 22139 22765 50 11225 11497 1642 1833 1874 2007 50 11208 11497 1642 1833 1813 2076 50 11208 11497 1642 1833 1813 2076 50 11302 1147 11737 1874 2076 2075 50 11302 11737 11874 2076 2015 50 11302 11477 11737 11874 2076 50 11302 11477 11737 11737 11874 2076 50 11377 11613 1737 1750 11879 10952 50 11377 1515 11613 1737 11610 1624 11737 50 11872 11612 1737 11610 1624 1787 1879 50 11372 11613 1737 11610 1624 1787 1849 50 11872 <t< td=""><td>00</td><td>• 0741</td><td>.1133</td><td>.1197</td><td>1647</td><td></td><td>1061</td><td>+ / C V +</td><td>0667.</td></t<>	00	• 0741	.1133	.1197	1647		1061	+ / C V +	0667.
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	50	.0841	7211.	1150	1512		10/1	/ 9 + 7 •	-2480
0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.000000 0.000000 0.000000000 0.000000000000 $0.00000000000000000000000000000000000$	00	9060	1276	1 1 1 2 4		1102.	0+67.	• 2295	.2414
05 1094 11307 11307 11307 11307 1231 2231 2231 2231 06 1162 11660 11986 11890 2199 2139 2256 00 1162 11672 11672 11872 2139 2275 00 11225 11866 11672 11872 2139 22756 00 11226 11497 11647 11833 11874 2084 2075 00 11208 11497 11660 11833 11813 2070 2075 00 11208 11477 11578 11876 11958 2070 2075 00 11302 11477 11578 11737 11676 11959 2075 00 11272 11475 11613 1737 11676 11959 2055 00 11272 11877 11613 1737 11676 11969 2055 00 11272 11872 11613 1787 11631 11699 00 11272 11872 11477 11610 11624 11787 11699 00 11372 11383 11812 11610 11654 11699 11599 00 11311 11352 11456 11776 11787 11699 11599 00 11417 11595 11456 11676 11599 11569 00 11212 11872 11872 11872 <td< td=""><td>20</td><td>1052</td><td></td><td>• 1 C J 4</td><td>1001.</td><td>1441.</td><td>•1999</td><td>.2295</td><td>•2262</td></td<>	20	1052		• 1 C J 4	1001.	1441.	•1999	.2295	•2262
00 1162 1341 1367 1616 1988 1872 2190 2202 50 1162 1341 1497 1629 1872 1872 2139 2256 50 11225 1346 1497 1642 1872 1874 2084 2075 50 11225 11366 1497 1642 1833 1874 2084 2075 50 11208 11403 1497 1660 1833 1813 2070 2275 50 11208 11477 11558 1660 1873 1676 1952 1958 50 11302 11477 11778 1737 11676 11969 2055 50 11292 11475 11613 1787 11631 11631 11639 50 11312 11301 11383 11872 11656 11676 11631 11699 50 11311 11352 11477 11476 11456 11787 11631 11639 50 11311 11352 11476 11656 11787 11631 11639 50 11311 11352 11456 11786 11787 11699 50 11301 11383 11395 11456 11631 11639		2007	6021.	966T.	1041.	•1998	.1943	• 2231	.2331
00 1341 1406 1629 1872 1789 2139 2256 00 11225 11366 1497 1642 1833 11874 2084 2075 50 11208 11403 1497 1642 1833 11874 2084 2075 50 11208 11403 11459 16600 11833 11676 11952 11958 50 11302 11477 11475 11578 11737 11676 11969 2055 50 11292 11475 11613 1787 11750 11872 2055 50 11272 11475 11613 1787 11879 11872 50 11372 11515 11488 11610 11624 11787 11839 50 11301 11383 11311 11352 11456 11561 11561 11569 50 11301 11383 11311 11352 11456 11955 11569 11569			1161.	•1367	.1616	.1988	.1890	.2190	.2202
00 .1208 .1497 .1642 .1833 .1874 .2084 .2075 50 .1208 .1403 .1459 .1660 .1833 .1813 .2070 .2015 50 .1208 .1477 .1356 .1558 .1865 .1676 .1952 .1958 50 .1302 .1477 .1356 .1578 .1737 .1969 .2055 50 .1309 .1477 .1578 .1737 .1844 .1958 50 .1292 .1443 .1578 .1787 .1879 .1872 50 .1272 .1515 .1613 .1787 .1750 .1879 .1872 50 .1272 .1377 .1515 .1488 .1610 .1624 .1787 .1839 50 .1311 .1352 .1541 .1541 .1541 .1549 .1549		2011 •	• 1341	• 1406	.1629	.1872	•1789	.2139	.2256
00 -1208 -1459 -1660 -1833 -1813 -2070 -2015 00 -1302 -1517 -1356 -1558 -1865 -1676 -1952 -1958 50 -1302 -1477 -1356 -1578 -1737 -1676 -1952 -1958 50 -1309 -1477 -1475 -1578 -1737 -1969 -2055 50 -1292 -1455 -1578 -1737 -1879 -1879 50 -1292 -1377 -1515 -1613 -1787 -1879 -1879 50 -1372 -1515 -1488 -1610 -1624 -1787 -1839 50 -1311 -1352 -1417 -1541 -1631 -1639 50 -1301 -1383 -1375 -1456 -1545 -1549		6771 •	•1366	.1497	.1642	.1833	.1874	.2084	.2075
0 •1502 •1517 •1356 •1558 •1665 •1676 •1952 •1958 50 •1309 •1477 •1475 •1578 •1737 •1969 •2055 50 •1292 •1455 •1443 •1578 •1737 •1844 •1969 •2055 50 •1292 •1455 •1443 •1613 •1787 •1879 •1872 50 •1377 •1515 •1613 •1787 •1872 •1872 50 •1372 •1515 •1488 •1610 •1624 •1787 •1839 50 •1311 •1541 •1541 •1631 •1639 •1699 50 •1383 •1311 •1352 •1456 •1546 •1569		907T •	• 1 403	.1459	.1660	.1833	.1813	.2070	.2015
0 •1309 •1477 •1475 •1578 •1737 •1844 •1969 •2055 00 •1292 •1455 •1443 •1613 •1787 •1879 •1879 50 •1372 •1377 •1515 •1488 •1610 •1624 •1787 •1879 50 •1372 •1515 •1488 •1610 •1624 •1787 •1839 50 •1372 •1515 •1488 •1610 •1631 •1839 50 •1372 •1515 •1417 •1541 •1631 •1639 50 •1383 •1311 •1352 •1456 •1395 •1569	2 2	• 1302	.1517	.1356	.1558	.1865	.1676	.1952	1958
00 •1292 •1455 •1443 •1613 •1760 •1879 •1872 50 •1372 •1377 •1515 •1488 •1610 •1624 •1787 •1879 50 •1372 •1377 •1515 •1488 •1610 •1624 •1787 •1839 50 •1415 •1520 •1442 •1417 •1541 •1631 •1631 •1699 50 •1301 •1383 •1311 •1352 •1456 •1395 •1569	0.0	•1309	.1477	.1475	.1578	.1737	.1844	.1969	.2055
>0 •1372 •1317 •1515 •1488 •1610 •1624 •1787 •1835 >0 •1415 •1520 •1442 •1417 •1541 •1631 •1699 >0 •1301 •1383 •1311 •1352 •1456 •1456 •1549	2	- 1292	.1455	• 1443	• 1613	.1787	.1750	.1879	.1872
00 • 1415 • 1520 • 1442 • 1417 • 1541 • 1631 • 1699 50 • 1301 • 1383 • 1311 • 1352 • 1456 • 1395 • 1466 • 1599	0	• 1372	.1377	.1515	.1488	.1610	.1624	.1787	1820
20 • 1301 • 1383 • 1311 • 1352 • 1456 • 1395 • 1466 • 1543	2	• 1415	.1520	.1442	• 1417	.1541	.1541	.1631	1699
	00	• 1301	.1383	.1311	.1352	.1456	.1395	-1466	.1543

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPPER

31100 - 26.26 pTINE = 5 PSI M = 0.08 R = 100.000

•	
>	
>	
•	
>	
۰.	
L	
`	
× .	
-	
•	
-	
L.	
-	
\sim	
· ·	
۱.	
\sim	
n	
0	
2	
n "	
n N	
5	
6 11	
ດ 	
ר ה ד	
5 H L	
6 H L Z	
C = INI - A	
C = ANTIA = 2	
26 PIINE = 5	
c = INIIA = 2	
c = ANTIA = 2	
c = INIIA = 0.000	
0,26 PIINF = 0	
C = ATTA = 2	
29,66 FIINF = 9	
25926 FILNE 3	
$25_{9}26$ FILME = 2	
S = 29,26 FILME = 2	
5 25926 PIINF = 5	
VS = 29,26 PIINE = 2	
NS 25926 FILNE = 5	
3NS 25,26 FIINF = 5	
UNS 25926 PILNE = 5	
C = INTIA 976GZ SNDA	

8 . 50	-2.5347	-3.2170	-2.8616	-2.6444	-2.4749	-2.3542	-2.2875	-2.1619	-2.0319	-1.9601	-1.8620	-1.7778	-1.6596	-1.4380	-1.2151	-1.1407	-1.0741	9715	8589	7373	6193	5071	4110	-, 3251	2474	1779	5121 -		0778	9600 -
8.02	-2,2689	-3.0430	-2.7408	-2.5505	-2.4231	-2.3043	-2,2291	-2.1027	-1.9870	-1.9164	-1.8075	-1.6711	-1.5037	-1.3742	-1.2990	-1.2293	-1.1568	-1.0730	8872	7260	6062	5020	4072	3239	2527	- 1785			0404	c/ 00 ·
8.00	-2.2185	-3.0259	-2.7102	-2.5505	-2.3939	-2,3072	-2.2181	-2.0754	-1.9792	-1.9030	-1.7861	-1.6630	-1.4963	-1.3760	-1.2842	-1.2235	-1.1541	-1.0778	9059	-• 7241	6060	4966	4029	3251	- 7466	1 7 0 1	C0/T	-• II /4	0514	.0088
7.51	-1.7507	-2.6916	-2.4564	-2.3107	-2.2139	-2.1202	-2.0487	-1.9372	-1.8513	-1.7682	-1.6852	-1.5774	-1.4016	-1.2956	-1.2118	-1.1415	-1.0788	-1.0383	-1.0144	9360	- 5688	4455	3766	3103	- 745A		TG/T •-	1108	0455	.0121
7.01	-1.2889	-7.3432	-2.2036	-2.0870	-2.0011	-1-9314	-1.8705	-1.7754	-1-7095	-1.6419	-1-5705	-1.4716	-1.3310	-1-2272	-1.1391	-1-0720	-1-137	9675	9471	- 0424	8385	4166	- 3313	- 2823		1677 • -	1597	0968	0447	0000
7.00	-1.2604	2226-2-	-2,1865	-2-0704	-1,9963	0000 T-	-1.8649	-1.7728	-1-7078	-1-4441	-1.5707	-1-4724	-1 2252	-1-2201	-1 -1 4 2 8	-1-0756	-1-0077	- 020		0770	- 8245	- 4266	- 3354		74 I 74 I	2224	1602	1062	0428	1210
6.01	4551	-1 6976	-1.6784	-1-6350	-1.5005		- 1 0 C • T -		-1 4520		-1 3618		-1,1007	700T°T-							- 2028 -	- B274				1694	1262	0781	0329	0187
6.00	- 4613		- 1. 4 0 E C			- 1 • 0 0 0 4	10001	10001	T+6+ •1-		- F 0 + 0 +	0006 1-	-1.2700	-I.I.4U5	470 1 • 1 -	-I. UC 33	0565			0100-1	1/20	- 0204 -		474 4 -	22 80	1656	1237	0789	- 0298	2 I C C
×/C			000	010	010.	020.	620.	050.	040.	060.	000.	670.	•100	.150		062.	.300	065.	• • 0 0	. 400	000.	000.	• • • •	069.	• 700	.750	.800	. R 5 O		

RUNS 25+26 PTINF = 5 PSI M = 0.08 R = 100,000

6-00 6-01 7.00 7.01 7.51 8.00 8.02 8.02 1.0011 1-0151 1-0504 -1.2889 -1.7507 -2.22689 -2.554 1.0011 1-0511 1-0504 -1.2889 -1.7507 -2.22689 -2.554 1.0011 1-0511 1-0501 1.0025 -9919 1.0005 -8005 9676 -9914 1.0020 1.0001 8.02 -8059 -015 1.0011 1-0511 -1.0521 -1.2889 -1.7507 -2.22689 -2.553 8194 -8024 -0944 -9657 -9744 -9899 -973 7028 -6141 -7025 -5779 -6170 -7148 -9245 7028 -6114 -6571 -6572 -6573 -6171 -049 6632 -5714 -6573 -6572 -6503 -6784 -918 7028 -5544 -6573 -6573 -5564 -5591 -718 <td< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></td<>								
4613 4551 -1.2869 -1.7507 -2.2869 -2.554 .9014 .9575 -9516 -9516 -2.5689 -2.554 .915 .9516 .974 .9605 -2.6689 -2.554 .916 .9014 .9622 .974 .9609 1.001 .8136 .9044 .9662 .974 .9609 1.001 .716 .7028 .9044 .9657 .9048 .9744 .9048 .7028 .6216 .7232 .7078 .8846 .9743 .8892 .9893 .65715 .6514 .6573 .7087 .769 .8036 .7247 .769 .65715 .6514 .6571 .6573 .769 .8036 .7789 .893 .65715 .6571 .6573 .6573 .6573 .6573 .6573 .6593 .65715 .6574 .6574 .6573 .6573 .6593 .769 .7083 .7083 .7083 .778 .778 .769 .769 .714 .7148 <td< th=""><th>6.00</th><th>6.01</th><th>2.00</th><th>7.01</th><th>7.51</th><th>8.00</th><th>8.02</th><th>8.50</th></td<>	6.00	6.01	2.00	7.01	7.51	8.00	8.02	8.50
	4613	4551	-1.2604	-1.2889	-1-7607	3010 0-		1
9676 974 1.0001 1.0001 1.0005 1.0001 1.0005 1.0001 1.0005 1.0005 1.0001 1.0005 1.0001 1.0005 1.0001 1.0005 1.0001 1.0005 1.0005 1.0001 1.0005 1.0005 1.0005 1.0005 1.0005 1.0005 1.0005 1.0005 1.0005 1.0005 1.0005 1.0015 974 9948 9999 1.0015 974 974 974 974 974 974 974 974 974 974 974 9768 9845 975 9768 9768 974 974 9769 9847 9769	1.0011	1.0019	0500	DELT		COT7•7-	-2.2589	-2.5347
8836 6751 -9744 1.0027 1.0026 -9948 -9948 -9949 -9101 8104 8008 -9044 8992 -975 -9948 -9949 -9124 8104 8073 -9044 8992 -974 -9948 -9949 -9124 6327 -5554 -6571 -7151 -769 -8127 -9134 -928 6327 -5554 -6571 -6571 -6572 -7389 -7471 -847 6526 -5570 -5570 -5573 -5573 -5732 -7714 -769 6573 -5570 -5573 -5573 -5573 -6009 -6701 -7005 -728 6743 -6573 -5570 -5573 -5573 -5732 -778 -778 7753 -3564 -3742 -5573 -5573 -5732 -5732 -5732 6705 -5573 -5553 -3167 -5633 -5732 -5732 -5732 3015 -3161 -3734 -3161 -3754 -5653	.9676	06.40		1001	66 T 6 •	.8605	.8605	.8157
8194 8028 9944 9899 1.011 7616 764 9941 9948 9948 9948 7616 7648 8991 9892 9949 9948 9948 7616 7648 8941 8843 8841 9134 9134 65715 5564 6571 6572 9144 9134 9134 65715 5564 6571 6572 9148 7899 7647 769 65264 5554 6571 6572 7647 7789 7781 769 65264 5573 5577 5544 5773 5732 7783 3337 3337 3594 4563 6501 6501 7693 3337 3337 3318 4760 6572 5454 5732 5793 3337 3318 3734 3764 573 3734 3734 3734 33337 3315 2867 3734 3734 3734 3734 3734 3331 2773 3734 3734<	8826	0004.	9766	1.0057	1.0020	1.0001	1.0085	1.0064
08194 08028 -9044 0892 -99302 -9575 -9054 -9134 -928 77018 -7648 -8043 -80572 -7087 -8149 -8121 -8193 5726 -5554 -6571 -6573 -8149 -7843 -8192 -8193 5726 -5554 -6573 -6170 -7148 -7389 -7471 -7692 5726 -5554 -5573 -6573 -61670 -7148 -7389 -7471 -7692 5769 -5554 -5573 -6572 -7087 -7092 -7673 3643 -5573 -5454 -5653 -5732 -5732 -5935 3657 -3181 -3788 -9742 -4700 -4246 -5732 3657 -3057 -5454 -5633 -5453 -5732 -5935 3734 -3181 -3788 -3147 -3751 -3752 3734 -3151 -3734 -3161 -3657 -3467 2701 -2759 -3157 -3157 -3157 <td></td> <td>19/0.</td> <td>• 3 4 2 4</td> <td>• 9662</td> <td>• 67 4 4</td> <td>.9948</td> <td>9890</td> <td></td>		19/0.	• 3 4 2 4	• 9662	• 67 4 4	.9948	9890	
7/616 .7648 .86491 .8846 .8946 .9743 .9743 .9946 .5712 .5674 .6971 .8845 .9149 .9846 .9743 .9946 .5715 .5654 .6571 .7619 .8872 .8892 .8892 .5715 .5654 .6571 .6570 .7471 .769 .4247 .4814 .6571 .6570 .6772 .769 .8892 .8892 .4247 .4296 .6714 .6571 .5673 .6561 .6563 .6563 .6563 .6563 .4247 .4296 .4918 .7471 .7693 .6501 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .6503 .7411 .7092 .728 .728 .7294 .7093 .7294 .7294 .7294 .7294 .7294 .2093 .2347 .2943 .2943 .2943 .23471 .2243 .2943	• 8194	.8028	• 9044	. 8992	•9302	.0575	. 9668	C T T O T
• 77028 • 6974 • 8043 • 8035 • 9743 • 8923 • 5717 • 5654 • 5571 • 5670 • 8035 • 8121 • 847 • 5715 • 5574 • 5570 • 5670 • 5732 • 8075 • 7087 • 7092 • 8743 • 5769 • 5570 • 5570 • 5570 • 5673 • 6099 • 6424 • 5702 • 7092	.7616	• 7648	.8491	.8546	A B Q B	6760		1415.
6327 6216 .7232 7151 .7689 8935 .8739 .8935 6571 6572 7148 .6572 .7087 .7792 .847 7589 5570 .7151 .7689 .6571 .7689 .8935 6572 .5570 .5570 .5171 .7689 .6571 .7687 .7792 7471 .4784 .4814 .5570 .5772 .5454 .5572 .7783 .4784 .4814 .572 .5570 .5454 .5591 .7687 .7789 .3057 .3454 .4784 .5653 .47173 .4400 .4724 .5951 .3055 .3025 .3117 .3550 .3142 .4731 .728 .2753 .2753 .3751 .3751 .3751 .3751 .3751 .2753 .3117 .3355 .3373 .3373 .3421 .2693 .3421 .2753 .2753 .3751 .3373 .3751 .3255 .3421 .2753 .2755 .2745 .3373	• 7028	• 6974	.8043	. 8073	94440	2424	4616. Cooo	.9282
• 5715 • 5654 • 6571 • 6672 • 7005 • 7005 • 7471 • 769 • 5284 • 6572 • 6572 • 5732 • 595 • 7769 • 7767 • 7769 • 4247 • 4296 • 4984 • 5573 • 6572 • 5695 • 5732 • 7789 • 4247 • 4296 • 4928 • 5573 • 5695 • 4929 • 4924 • 595 • 3343 • 3594 • 4260 • 4432 • 4969 • 595 • 595 • 3365 • 3761 • 378 • 3965 • 4173 • 4909 • 4721 • 769 • 3333 • 3137 • 3761 • 3763 • 3763 • 3753 • 4263 • 2753 • 3765 • 3177 • 3355 • 3365 • 3365 • 3365 • 2753 • 2759 • 3155 • 313 • 3255 • 3365 • 3461 • 3461 • 3461 • 2763 • 2759 • 3155 • 313 • 3255 • 3365 • 3451 • 3256 • 3451 • 2703 • 2745 • 2745 • 2759 • 2759 </td <td>.6327</td> <td>.6216</td> <td>.7232</td> <td>. 7151</td> <td>76.80</td> <td></td> <td>- 88 - 2</td> <td>• 8998</td>	.6327	.6216	.7232	. 7151	76.80		- 88 - 2	• 8998
5269 5724 6194 6572 7087 7471 769 4784 4814 5570 5672 7087 7792 5730 4784 4814 5570 5672 5764 6501 66572 5732 5792 4784 4814 5570 5672 5454 5653 5732 5732 5732 4284 4814 5570 5672 6609 6432 6501 6601 3337 3181 3788 573 5732 5732 5792 5793 3337 3181 3734 565 3347 3784 4700 4784 2753 2710 2365 3347 3365 3342 4703 3651 3853 2701 2803 3345 3365 3342 3784 3784 3784 2701 2633 2777 3382 3373 3365 3467 3651 3865 2701 2632 2795 3382 3373 3255 3477 28457 28457 28457	.5715	• 5 6 5 4	. 4571		600. •	• 0136	.8121	.8474
4784 44814 5570 5672 5672 5672 5672 5673 5732 5595 3643 3594 4484 6501 6661 6601 6661 6601 3065 3594 4488 5027 5672 6609 6424 6501 6661 3065 3181 3788 4328 4780 5673 5595 5995 3065 3181 3728 4400 4784 6501 6661 6666 3065 3181 3734 4400 4784 4400 4784 595 2753 2753 3550 317 3734 4400 4784 365 2753 2773 3550 3377 3377 3377 3377 345 2753 2753 2759 2759 3734 345 345 2745 2745 3734 3734 3761 3377 3257 2753 2756 2759 2757 2758 3377 2847 2769 2745 2745	. 57.60	5252		0/00.	• /148	• 7389	.7471	• 7699
42.47 4704 5572 5600 56424 6501 3337 3594 4328 5702 5653 5732 5995 3343 3594 4328 4507 5553 5732 5995 3347 3311 3788 4328 4500 4464 4766 3355 3365 3327 3594 4400 4284 4465 2753 3328 3328 3340 3550 3342 4600 4284 2753 2753 3550 3345 3550 3461 3734 4635 2753 2753 2956 3357 3352 3365 3365 3461 2701 2563 2759 3352 3373 3373 374 3657 2701 2633 2764 3117 3155 3377 3473 3657 2701 2633 2769 3382 3367 374 374 3657 2701 2765 2775 2777 2837 2947 2947 29467 <t< td=""><td>- 47 R 4</td><td></td><td>5570.</td><td>• 6144</td><td>•6572</td><td>.7087</td><td>.7092</td><td>.7284</td></t<>	- 47 R 4		5570.	• 6144	•6572	.7087	.7092	.7284
3354 5725 5563 5732 5653 5732 5950 3357 3181 5746 4632 4463 4924 5663 5732 5950 3337 3181 3781 5732 5530 4565 5732 5950 3337 3181 3781 3784 4909 4924 5693 291 2887 3352 3590 3117 3585 3742 4700 4724 2753 2753 3734 3734 4700 4724 3693 3451 2753 2701 2755 3377 3377 3377 3451 3857 2701 2633 2756 3734 3157 373 373 375 27531 2632 2759 3377 3377 3451 3255 3401 2745 2756 2759 2756 2775 2756 2697 2697 2745 2756 2756 2775 2775 2756 2756 2673 2044 1916 2164			0/66.	• 5672	•6009	.6424	.6501	. 6660
.3544 .4726 .4632 .4909 .4924 .5905 .3337 .3181 .3738 .3905 .4173 .4400 .4284 .4460 .3065 .3027 .3368 .3734 .3761 .3761 .3851 .3065 .3117 .3550 .3734 .3761 .4709 .4284 .2753 .2710 .3106 .3117 .3355 .3734 .3761 .3851 .2701 .2633 .2996 .3340 .3550 .3342 .4909 .4201 .2701 .2633 .2995 .3117 .3351 .374 .374 .374 .2701 .2633 .2954 .3954 .377 .3377 .347 .2701 .2642 .2759 .2756 .3255 .3467 .3467 .2731 .2642 .2759 .2756 .2756 .2756 .2756 .2756 .2743 .2759 .2759 .2756 .2756 .2756 .2423 .243 .2844 .1910 .2765 .2757 .2756<		• 4296	.4988	. 5027	• 5454	.5653	.5727	
3337 3181 3788 3905 4173 4400 4284 9400 3065 3027 3522 3530 3685 3734 3761 3851 27931 2783 3317 3550 3565 3734 3761 3853 27931 2687 3352 3355 3357 3565 3734 3761 3853 27931 2687 3317 3352 3382 3365 374 3761 3853 2759 2633 2799 3056 3734 374 3761 3853 2751 2632 2759 2645 2756 3367 3255 3422 2743 2743 2647 2759 2877 2837 3259 3422 2434 2743 2647 2759 2847 2756 2756 2756 2203 2243 2747 2575 2756 2756 2756 2647 2647 2647 2647 2647 2647 2647 2647 2647 2647 2647 264	• 3643	.3594	.4328	.4260	-4632	0007	70.07	*C*C•
3065 -3027 -3622 3530 -35685 -3742 -4030 -420 2753 -2817 -3550 -3754 -3751 -3555 -3742 -4030 -420 2753 -2710 -3106 -3117 -3550 -3744 -4030 -420 2761 -2837 -3317 -3551 -3577 -3557 -3555 -3461 -3855 2701 -2633 -2945 -3155 -3315 -3315 -3557 -3657 2751 -2633 -2956 -2945 -3036 -3417 -3259 -3457 2547 -2645 -3036 -3417 -2837 -3756 -2759 -3756 2445 -2759 -2759 -2759 -2759 -2756 -2756 -2637 -2637 2205 -2156 -2256 -2759 -2759 -2756 -2756 -2637 -2637 -2637 -2637 -2637 -2637 -2637 -2637 -2637 -2636 -24462 -2636 -2436 -2637 -2637 -2637	• 3337	.3181	.3788	. 3905	5714.	0044		+ 9 0 C •
2931 2887 3328 3340 550 3734 4030 4420 2753 2710 3106 3117 3355 3734 3761 385 2701 2633 2798 317 3355 3375 3761 385 2701 2633 2998 317 3355 3373 3761 385 2701 2633 2998 3054 3155 3377 385 340 2567 2867 2367 3373 3377 385 340 2567 2786 2759 2867 3377 2855 340 2434 2746 2759 2877 2877 2877 2877 2878 2434 2745 2759 2877 2877 2877 2876 2756 2243 2244 2777 2877 2877 2876 2756 2756 2203 2241 2557 2877 2876 2766 269 269 2205 2847 2777 2785 2765 <td< td=""><td>• 3065</td><td>.3027</td><td>.3622</td><td>3530</td><td>26.85</td><td></td><td>+07+•</td><td>- 4 - 6 4</td></td<>	• 3065	.3027	.3622	3530	26.85		+07+•	- 4 - 6 4
2753 2753 2710 3106 3117 3352 3577 3561 385 2701 2633 2998 3054 3117 3352 3577 3585 3651 3651 3651 3651 3651 3651 3657 3651 3651 3651 3651 3651 3651 3651 3651 3651 3651 3651 3651 3461 3651 3461 372 3555 3461 3651 3461 372 3555 3461 372 3421 372 3421 372 3421 372 3421 372 3421 372 3421 372 3421 372 3421 374 3421 374 3421 374 3421 374 3421 374 3421 374 3421 2744 2744 2743 2643	.2931	.2887	2328 2328	0966		74664	.4030	•4205
2701 2533 2998 3155 3577 3585 365 2561 2968 3054 3155 3382 3377 3585 346 2561 2645 2945 3036 3311 3255 340 2567 2867 3036 3311 3255 340 2567 2867 3073 3069 313 2567 2867 3073 3069 313 28445 2844 2726 2759 2877 2947 28445 22641 2642 2779 2897 2897 2845 2263 2841 2577 2897 2876 2093 2265 2747 2785 2756 263 2093 2094 2785 2777 2765 263 2093 2094 2741 2577 2756 263 2093 2094 2741 2765 2756 264 2094 2703 2765 2765 2765 264 2094 294 <t< td=""><td>.2753</td><td>. 7710</td><td>2106</td><td></td><td></td><td>4515.</td><td>.3761</td><td>.3853</td></t<>	.2753	. 7710	2106			4515.	.3761	.3853
2531 2955 3155 3382 3377 342 2531 2657 2945 3036 3311 3255 3406 2551 2759 2759 2867 3036 3311 3255 3406 2551 2756 2759 2867 3036 3311 3255 3406 2551 2744 2756 2759 2877 2947 2947 2947 2445 2244 2632 2759 2877 2877 2876 2877 2445 2265 2759 2777 2785 2766 2697 2203 2238 2441 25577 2785 2766 2697 2165 2265 2477 2572 2785 2766 2697 2093 2043 2265 27462 2766 2643 2643 2094 2846 28462 2777 2578 27423 2443 2095 1978 2216 22553 2341 2378 2342 1910 1926 202	1075	07170 CC7C	0010	• 3117	•3352	.3577	• 3585	.3655
2551 .2945 .3036 .3311 .3255 .340 2567 .2746 .2759 .2867 .3073 .3069 .313 25446 .2776 .2759 .2867 .3073 .3069 .313 2445 .2746 .2759 .2867 .3073 .3069 .313 2445 .2748 .2731 .2642 .2877 .2947 .2947 .2947 2445 .2226 .2759 .2877 .2894 .2850 .287 .2947 2203 .2238 .2541 .2557 .2785 .2756 .2693 .2093 .2247 .2541 .2577 .2785 .2756 .243 .2093 .2043 .2247 .2557 .2745 .2658 .2453 .2093 .2043 .2247 .2259 .2745 .2423 .2443 .2054 .2055 .2766 .2265 .2765 .2423 .2423 .2054 .1910 .1926 .2021 .2164 .2137 .2228 .2331	25.21	(()) (())	.2798	+ COF •	.3155	.3382	.3377	.3429
2446 2759 2867 3073 3069 313 2445 2448 2731 2642 2877 2837 2947 2947 2445 2448 2731 2642 2877 2837 2947 2947 2445 2264 2832 2759 2877 2837 2947 2876 2445 2226 2531 2541 2577 2785 2756 2697 2203 2238 2349 2777 2777 2776 2697 2697 2165 2223 2349 2777 2572 2568 2697 2093 2043 2247 2557 2785 2642 2697 2093 2043 2247 2259 27462 2423 2436 2093 2046 2196 2196 2164 2378 2378 2378 2094 1910 1915 2196 2137 2238 2326 2378 1910 1926 2021 2137 2233 2137 2228 2033 </td <td>16/34</td> <td>22021</td> <td>• 2456</td> <td>• 2945</td> <td>•3036</td> <td>.3311</td> <td>. 32 55</td> <td>-3406</td>	16/34	22021	• 2456	• 2945	•3036	.3311	. 32 55	-3406
2445 287 2877 2837 2947 2947 2445 2226 2581 2632 2879 2894 2850 287 2203 2228 2581 2632 2759 2894 2850 287 2203 2238 2441 2541 2577 2785 2756 2697 2165 2238 2441 2541 2577 2785 2756 2697 2165 2223 2319 2477 2572 2572 2568 2637 2093 2043 2247 2559 2477 2572 2568 2637 2093 2043 2247 2259 2462 2423 2438 2054 1978 2218 2164 2341 2378 2358 1910 1926 2021 2164 2137 2238 2055 1596 1765 1917 2033 2742 2033 2025 1596 1763 1725 1725 1742 1611 1611	1073.	0777	• 2 / 26	. 2759	.2867	• 3073	• 3069	.3134
2203 2581 2632 2759 2894 2850 287 2203 2238 2441 2541 2577 2785 2756 2697 2165 2238 2441 2541 2577 2785 2756 2697 2165 2223 2380 2319 2477 2572 2568 2693 2093 22043 2247 2259 2245 27422 26423 2643 2054 1978 2218 2196 2253 2341 2378 2326 1910 1926 2021 2164 2137 2228 2055 1818 1765 1917 2021 2033 2025 1965 1596 1587 1725 1725 1742 1615 1615		- 2 4 4 8	• 2731	• 2642	• 2877	.2837	.2947	2946
.2203 .2238 .2441 .2541 .2577 .2575 .2697 .2165 .2223 .2380 .2319 .2477 .25785 .2697 .2165 .2223 .2380 .2319 .2477 .25785 .2697 .2093 .2043 .2247 .2559 .2462 .2568 .2633 .2093 .2043 .2247 .2259 .22653 .2462 .2423 .2436 .2054 .1978 .2218 .2196 .2253 .2341 .2378 .2326 .1910 .1926 .2021 .2164 .2137 .2228 .2056 .1818 .1765 .1917 .2021 .2033 .2025 .1982 .1596 .1763 .1725 .1740 .1742 .1612 .1612		• 2226	.2581	• 2632	.2759	.2894	2850	2075
.2165 .2223 .2380 .2319 .2477 .2572 .2568 .263 .2093 .2043 .2247 .2559 .2565 .2568 .2635 .2093 .2043 .2247 .2559 .2565 .2568 .2635 .2054 .1978 .2218 .2196 .2253 .2341 .2378 .2343 .1910 .1926 .2021 .2146 .2164 .2137 .2378 .2326 .1910 .1926 .2021 .2146 .2164 .2137 .2228 .2326 .1818 .1765 .1917 .2021 .2033 .2025 .1982 .1596 .1763 .1725 .1780 .1742 .1617	• 2203	.2238	.2441	. 2541	-7577	2785	3760	C/ D7 •
2093 2043 2247 2259 2465 2568 2635 2054 1978 2247 2259 2265 2462 2423 2436 2054 1978 2218 2196 2253 2341 2378 2326 1910 1926 2021 2146 2164 2137 2378 2326 1818 1765 1917 2021 21917 2021 2021 2058 2056 1596 1755 1917 2021 2021 2033 20255 1982 1596 1587 1753 1725 1780 1742 1617	.2165	.2223	.2380	0157.	26.77		06120	• 2697
.2054 .1978 .2218 .2196 .2253 .2462 .2423 .2436 .1910 .1926 .2218 .2196 .2253 .2341 .2378 .2326 .1910 .1926 .2021 .2146 .2164 .2137 .2328 .2326 .1818 .1765 .1917 .2021 .2021 .2023 .2058 .2056 .1596 .1587 .1763 .1623 .1725 .1780 .1742 .1617	• 2093	.2043	7262	2260		2167.	• 4 5 6 8	.2635
1910 1926 2021 2146 2253 2341 2378 2326 1910 1926 2021 2146 2164 2137 2228 2058 1818 1765 1915 1917 2021 2021 2055 1982 1596 1587 1763 1623 1725 1780 1742 1617	- 2054	1078		66220	6977.	•2462	•2423	•2436
.1740 .2021 .2146 .2164 .2137 .2228 .2058 .1818 .1765 .1917 .2021 .2033 .2025 .1982 .1596 .1587 .1763 .1623 .1725 .1742 .1617		01670	0177.	• 2196	.2253	.2341	.2378	.2326
•1596 •1587 •1742 •1917 •2021 •2033 •2025 •1982 •1596 •1587 •1763 •1623 •1725 •1780 •1742 •1617	1818	1745	1707.	• 2146	.2164	.2137	.2228	.2058
• 1710 • 1763 • 1623 • 1725 • 1780 • 1742 • 161	1505		CT 6T •	1917	.2021	.2033	.2025	.1982
	0477 •	J QCT *	.1763	• 1623	.1725	.1780	.1742	1617

RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000

x/c	8.50	00*6	10.00	11.00	12.00	13.01	13.49	13.75
			7 1 00 c	C87C C			-2 0051	- 4554 -
• 000		6621.5-	+ / 00 • n +	C007 • C				
•005	-3.1819	-3.2417	-3,3326	-3,3992	-3.2846	-3.1720	-2.9752	-1.1155
.010	-2.8406	-2.8808	-2.9418	-3.1598	-3.2103	-3.0939	-2.9295	9178
•015	-2.6305	-2.7079	-2.8663	-3.1272	-3.2049	-3.0994	-2.9403	8360
.020	-2.4736	-2.4947	-2,8535	-3.1317	-3.1878	-3,1024	-2.9308	7882
.025	-2.3488	-2.4516	-2.8276	-3.1545	-3.1761	-3,1086	-2.9012	7897
.030	-2.2633	-2.3737	-2.8004	-3.1229	-3.1799	-3.1386	-2.9294	8554
• 040	-2.1468	-2.3116	-2.7432	-3.0726	-3.1583	-3.1204	-2.9575	7489
.050	-2.0372	-2.2585	-2.6663	-3.0449	-3.1776	-3.1769	-2.9936	7866
•060	-1.9395	-2.2314	-2.6356	-2.9495	-3.0592	-3.0695	-2.9375	6913
.075	-1.8569	-2.1768	-2.3520	-1.9981	-2.1989	-2,4458	-2.5579	8133
.100	-1.7706	-1.9656	-1.6758	-1.6113	-1.5980	-1.6899	-1.8556	7019
.150	-1.6551	-1.4431	-1.4275	-1.4635	-1.4200	-1.3549	-1.3199	7568
.200	-1.4535	-1.3314	-1.3406	-1.3376	-1.2873	-1.1889	-1.1318	7570
.250	-1.2121	-1.2422	-1.2437	-1.2239	-1.1535	-1.0504	9791	7041
.300	-1.1550	-1.1662	-1.1468	-1.1059	-1.0344	9212	8379	-•7011
.350	-1.0772	-1.0822	-1.0488	9966	9085	7841	7183	6489
. 400	9690	9648	-• 9333	8699	7698	6593	5979	6311
.450	8589	8491	-•7997	7323	6381	5408	4965	6206
.500	7370	7211	6702	6073	5209	4463	4476	6371
.550	6150	6024	5520	4931	4304	3912	3990	6382
. 600	5023	4896	4516	3970	3579	3496	3768	6258
.650	- 4090	-, 3964	3537	3270	3124	3254	3592	6742
. 700	3262	3112	2901	2747	2771	3205	3566	6259
.750	2499	2436	2256	2319	2561	3057	3469	6335
. 800	1780	1821	1838	1985	2458	2983	3488	6120
.850	1168	1226	1468	1857	2213	2981	3443	6224
.900	0627	-• 0761	-,1163	1622	2223	2991	3440	5888
.950	0075	0423	0895	1603	2166	2906	3322	5837

RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000

				1				
x/C	8 • 50	0°°6	10.00	11.00	12.00	13.01	13.49	13.75

• 000	-2+5298	-2.7259	-3.0874	-3.2683	-3.3530	-3.3192	-3,0951	6554
• 005	.8072	.7729	.6912	.6114	.5507	-5472	.5596	9954
.010	.9867	.9858	• 9763	.9476	•9299	.9315	7979.	0000
•015	• 9995	1.0103	1.0093	1.0077	1.0040	.9984	.9978	.9667
• 020	.9740	.9620	• 9966	• 9946	1.0045	1.0022	1.0061	.9052
.025	• 9386	•9618	•9684	.9857	.9853	.9952	9879	.8587
•031	•8994	.9114	.9497	.9540	• 96 96	9667	.9653	2128-
•040	.8348	.8298	.8761	. 8871	• 9076	.9175	.9108	-7416
•050	.7695	.7845	• 8076	.8355	.8446	.8695	.8633	.7024
• 060	•7232	.7467	• 7643	.7937	.8090	.8260	. 82 44	.6424
•075	• 6534	•6867	.7153	. 7340	.7601	.7602	.7728	.6112
.100	.5940	.6071	.6374	. 6593	.6785	.6812	. 6858	.5266
.150	.5016	.5245	•5385	• 5696	.5794	. 5958	.5738	.4523
• 200	.4541	.4659	• 4786	. 4935	.5157	.5243	.5157	0205
•250	.4178	.4272	• 4393	.4619	.4653	.4549	6694.	3648
• 300	.3824	.3865	.4071	.4073	.4219	.4360	4182	3245
•350	.3585	.3674	.3857	.3859	.3985	.3984	3996	. 2794
.400	•3473	•3469	.3619	.3726	.3701	.3584	.3535	.2632
.450	• 3259	• 3348	.3427	• 3493	•3489	.3410	.3316	7322
• 505	•3129	•3136	.3160	• 3183	• 32 29	.3105	.3049	.2094
• 550	• 3067	• 2933	.2982	.2988	.2947	•2989	.2820	.1898
• 600	• 2903	.2911	• 2838	.2851	.2740	.2602	.2537	1590
• 650	. 2673	•2704	.2775	. 2588	.2465	.2454	.2367	.1287
• 700	• 2564	.2578	•2476	• 2355	.2279	.2041	.2011	.0981
• 750	. 2420	• 2373	.2352	.2181	• 2009	.1848	.1753	.0714
.800	• 2322	•2169	• 2063	• 2029	.1666	.1527	.1333	•0194
.850	.2126	.2101	.1858	.1576	•1535	.1052	• 0934	0283
006.	1061.	•1823	.1530	.1343	• 0968	.0590	.0430	0840
.950	.1684	.1415	.1126	.0594	•0368	0064	0305	1869

UPPER SURFACE PRESSURE CDEFFICIENTS FOR VARIOUS ALPHAS RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000																														
	14.04	5466	-1.0907	8718	7740	7374	7102	6917	6788	6954	6797	6829	6881	6967	7027	6742	6505	6201	6112	5923	5910	5977	- 5953	5811	5996	5975	6106	61 29	6027	
	x/c	000	• 005	.010	.015	.020	.025	.030	•040	•050	• 090	.075	.100	.150	• 200	.250	• 300	.350	.400	.450	.500	.550	•600	.650	.700	.750	. 800	.850	006 •	0

1

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
LOWER

RUNS 25,26 PTINF = 5 PSI M = 0,08 R = 100,000

14.04	5466	. 9787	• 9972	.9581	.8916	. 8501	. 8101	• 7470	.6787	• 6423	• 5863	• 5248	•4384	• 3763	• 3459	• 3016	•2842	.2466	• 2263	.2030	.1716	.1481	• 1203	.0807	• 0448	• 0036	-•0392	1054	1951
x/C	• 000	• 0 0 E	.010	.015	• 020	• 025	.031	• 040	• 050	• 060	•075	.100	.150	• 200	.250	• 300	•350	• 400	.450	• 505	•550	•600	• 650	• 700	.750	.800	.850	• 900	.950

x/c		-2-00	-2.00	-1.00	01	• 00	••••••	• 50
				5615	.8287	.8342	.8314	• 9093
• 000	1589	• 1394	.1302		7627	.7478	•7476	.6505
.005	.9634	.9524	6646.	0610.		4763	4893	.3682
	8074	.8030	.8073	• 6702	00/4.			2214
	1000	6872	.6829	. 5244	.3466	.331/		
GI0.	0.5.5.		5645	299F .	.2248	.2036	• 20 74	0640.
•020	.6842	0506.			1293	.1158	.1180	.0124
-025	. 6006	.4714	• 46 / 0			0415	.0540	0569
020	.5203	• 3915	.3871	c172 •	0000.		0587	-,1511
	0414	4675.	• 2639	.1098	+000			- 2278
		1400	7774	.0208	1329	1.1430		
• 020	0 C T S •			0567	1974	2101	2085	6767°-
.060	.2190				- 2644	2750	2751	3554
-075	.1324	0020	- 0002			- 3537	3449	4169
001	.0168	1022	1011	2264			1254 -	4842
	- 1154	2250	2296	3338	C774			- 5182
		2640	3065	3910	4684	4/70		
• • • •			- 3579	4884	4875	4982		
.250	- 4000			4485	4953	5064	5075	5390
.300	3101	3400	0707 .		4886	- 4046	4839	5173
.350	3273	-•3947	6004 -			- 4 485	4390	4597
400	3228	3792	3779	4 1 6 4	0000		3861	4048
	- 2872	3381	3459	3673	3779	0100.1		2718
• • • •		- 2017	2592-	3160	3353	1245-1	2045.4	
004.	1262		2454	- 2807	3141	3238	31 /2	
.550	1981	T947 -		2668	- 2981	3077	3028	3343
.600	1633	2160	-• - 1 8 3		4 0 0 0 0 0 0 0 0	8406 -	3037	3296
. 650	1400	1964	2007	2548	6767 -		9405	3271
	- 1214	- 1871	1916	2453	3002			7755
	- 1211	1843	1924	-,2392	2970	# 5 6 7 • •	- 0 6 7 - 1	
		1788	1845	2430	2928	2967		
.800	7,77		0001	- 2362	- 2939	3042	2973	
.850	1154	1642		- 2450	1905 -	3122	-,3096	3591
• 900	1165	1411			7000 -	2951	3298	2646
.950	1170	1827	1801	****		 		

٠

RUNS 27,328 PTINF = 5 PSI M = 0.05 R = 60,000

x/c	-2.94	-2.00	-2.00	-1.00	-01	. 00		
								06.
• 000	-,1580	1001		1				
-005	1001 - 1-		2051.	• • • • 15	.8287	.8342	.8314	6002
	766707-	-1-3461	-1.3465	8451	3606	3359	0295-	
010.	4643	-1.0824	-1.0947	7309	3686			1440.1
•015	9041	9372	9450	- 6544		0770-1 0760	2066	1629
• 020	8841	8557	- 8504		1105.	3370	3438	1876
.025	- 8700	- 7662			0455	3186	3272	1888
.031	- 8636				3182	3027	3175	-,1818
040				5148	2993	2892	2970	- 1801
			6437	4546	2662	2590	- 2660	
	6 6 7 7 9 -	5822	5764	4018	2485	1455		7T0T•_
• 0 • 0	8447	5384	5278	3670	- 2141		T652•-	1489
.075	8407	4756	- 4805		1012.	6012	2163	1366
.100	837A	4281			4761	1812	1895	1182
.150	- 8561			2561	1504	1440	1458	5080 -
		24264	3728	1781	0952	0861	0053	
	4536	2895	2833	1242	0570			
• 250	1381	1344	1242			T760•-	-•0621	0136
• 300	0873	0640	- 766			0217	0241	• 0025
.350	0734	0317			0059	•0041	0017	.0283
.400	- 0701			0257	•0157	• 0171	.0180	1640.
450			-0212	-• 0069	.0321	.0341	.0258	0581
		9700*	-•0093	• 0070	.0470	.0436	-0424	10770
	0000 0000	•010•	•0133	.0260	.0569	0630-		1000.
066.	0222	• 9263	.0258	.0347	.0615			11/0.
• 600	0068	•0387	.0345	.0526			• 0623	• 0917
•650	.0057	.0524				6410.	•0787	.0889
• 700	.0135	. 05.70			•0841	•0832	•0723	.1030
.750			0600.	• 0652	•0840	• 0893	.0788	1036
		. 0000	•0636	.0757	•0812	-0870	0847	
• • • •	0120.	•0747	• 0685	- 0794	.0816			6601.
.850	•0328	•0756	7770-			• 0 4 T 4	•0834	.1037
• 900	.0289	.0794	.0780		0000	• 0894	.0881	.1029
.950	-0156	0646			.080.	• 08 4 2	•0812	•1016
1	•		Tean•	• 0607	.0511	•0605	.0549	. 0851
								4 \ > > >

×/C	1.01	1.50	2.01	2.03	2.50	3.00	3•00	3.51
			0401	. 9556	.9443	.9293	.9138	.8874
• 000	• 9536	9796.	1004 •	2007	1247	• 0213	0186	0819
.005	• 5223	• • 0 8 8	CT/7.	0044	1570	2097	2387	2959
-010	.2374	• 11 44	1010				7645	- 4000
-015	.1042	0109	1488	1248				5136
	12.00	1219	2416	2270	3563			56.28
n20•		2002 -	- 3174	2967	4187	4683	- + 0 + -	0000
• 0 2 5	t 20.01		1 2508	3582	4614	5163	5589	5932
.030	1522	6002.		C 3 C 7	<u>-</u> .5286	5911	6144	- • 6466
.040	2448	3379				- 4074	6231	6585
050	3144	4008	4937	4886				- 7001
		4547	5277	5347	6106	6210		
000.		0707	- 5705	5688	6418	6535	6902	1132
G10.	42 20			- 6033	6631	6800	7236	7221
.100	4781	1646	14004		- 4812		7185	6987
.150	5345	5852	-0321			- 4573	- 6779	6814
.200	5602	5975	6391	0670 -			4444	6470
.250	5673	5981	6231	6151	1700-1		- 6041	5890
	5641	5827	6072	5932	02 43	0610		4004 -
	- 5354 - 5354	5497	5567	5493	5693	5528	5540-1	
066.		7707	4034	4852	5081	4802	5057	5 5 7 4 • 1
• 400	+ 7 / + -	1 T T T • 1		- 4411	- 4525	4379	4807	4585
.450	4225	4315			- 4460	4405	4831	4563
.500	3891	4138	4234	1007 • I		4774 -	4703	4549
.550	3683	3998	4209				- 4679	4530
	3608	3908	4165	4046			2019 2222	- 4467
	- 3620	3857	4188	4010	4376			3044
	2525	LURE -	4079	4076	4350	4342	7794*-	
. 100	2100.	2785	- 4122	4105	4370	4361	4709	
061.			2224	- 4127	4501	4607	4763	46/3
.800	-,3586			1771 - 17	4544 -	6767-	4217	4308
.850	3703	4052		1606	7997	3535	3312	3804
. 900	- ,3938	3881		1040 -	10671	1616 -	1825	3071
.950	2242	2241	-,1589	- 2333	0C0T•-			

NC 37, 38 DTINE = 5 PSI M = 0.05 R = 60.000

168

RUNS 27+28 PTINF = 5 PSI M = 0+05 R = 60+000

3.51	10.0		. 8874			0114.	• 4020	.3651	.3157	2840	.2432	.2072	1964	1760	1676		90 t 1 •	• 13 79	•1423	.1407	.1312	.1353	-1407			9951.	2451.	.1277	.1180	.1115	1082	0700		
3.00			.9138	6464	4775		• 3571	• 2927	.2491	.2485	.2156	.1696	.1618	.1498	-1418	8451.		71710	• 13 11	.1253	•1332	•1344	.1392	.1427	1407	1474		•1426	.1403	.1374	.1275	.1180	.0905	
3.00			• 9293	.6621	.4482		5 / 5 F •	.3022	.2518	• 2256	.1962	.1657	.1427	.1298	.1242	.1133	5111- 5111-	11775		6 h 7 T •	.1379	•1329	.1282	•1313	.1257	.1233		4 C J T •	+c71.	•1160	.1109	•0664	•0765	0616
2.50			• 9443	• 5903	• 38 70	7 C U E .		21 6 2 4	• 20 79	• 1804	.1476	•1329	•1199	.1140	•1066	.1048	.1089	.1114	1102	76779	7721.	• 12 96	• 1333	.1282	.1290	.1317	.1280	1220		• 1313	.1232	•1185	•1039	-0797
2 • 03					• 2716	.1777	. 1515		0 7 7 7 1	COTT •	• 0806	9690.		+ 6 6 0 •	• 0561	• 0669	• 0799	• 0896	.0952	1036			1011 •	/ 6 1 1 •	• 1183	• 1233	.1280	1321.	2727	C071 •	C 7 7 7 4	• 1 1 4 3	• 1100	• 0821
2.01		1040.	4572 -		67070	• 2031	.1599	.1296	1140		- 07EU	0000	.0615		+ COD +	+ C / D +	4G80 •	• 0922	• 0968	.1087	.1127	.1220	1226		6771.	• 1254	1421.	.1338	.1273	1196			00110	• 0 4 3 4
1.50		.9628	- 2897	.1472		• 0 / / 8	• 0473	• 0292	.0151	.0048	0039	0020	.0055	0130	6460.			2190.	1610.	• 08 42	.0886	.1063	.1095	4001.		1011.		•1240	.1193	.1169	.1140	-1052	. 0854	r > >>•
1.01		• 9536	.1283	• 0042	0360		2140	0750	-• 07 98	0764	0730	0735	0526	0335	- 0069	- 02.06	- 0246			• 0655	.0752	.0840	• 0 9 4 4	.1021	.1051	-1042		6611•	•1122	.1139	.1116	.0960	.0918)
×/c		• 000	• 005	• 010	.015		0000	620.	.031	• 040	• 050	•060	•075	.100	.150	.200	.250	2005		065.	• 400	.450	•505	• 550	• 600	•650	200			. 800	•850	• 900	.950	

ALPHAS
VARIDUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPP ER

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60.000

5.51	0000		0.000.1	5784	6476	7060	- 7286	7516	016/ •-	+711	7790	7870	7885	- 7644		0669 -	6299	5544	4813	- 4487	4399	2454 -			4331	4466	4470	4557	4665			2044.	4202	3829	
4.99		• 4 Z 4 •	8359	9906	-1-0064	-1-0571		-I.0373	-1.0311	-1.0469	-1.0463	-1.0360	-1-0262		7400.1-	9291	8648	8065	- 7310		- 6220		+ 7 T Q • •	0665"-	5985	6075	6126	6307	- 5077			2418	1214	0370	
4.49		.6015	6026	7595	- 7944		0+10-1	9126	9528	9348	9394	0267		ホーオフォー	9339	8708	7911	- 7508	- 4767				4212°-	5564	5579	5612	- 5606	- 5636			4964	3427	1968	- 0087	
4.02		.8300	2300	4578	E 708		6112	6562	6801	7387	- 7666		//01	7646	7641	7372	- 7092	- 4678		57/C - -	C80C	4881	4465	4577	4633	4719	- 4812		1001.	4931	4778	4338	3605		4707°-
4 •00		. 8665	2876	3607		43/8	5257	5781	6425	- 8116		240/	7094	7176	7330	- 7030	0701	1000 • -		5750	4947	4722	4429	4355	- 4336	0079 -			4940	5270	5263	- 4146		2434	2637
4.00		.7474	- 4501	7 7 7 7 9		7353	7350	7133	8409			7968	7292	8023	- 8393	000		8104	7811	6601	5156	4914	5376	- 5407			+ 000	5395	5590	5648				1704	0589
4.00		5147			6273	71 39	7862	- 8200			8317	7924	8849	8978			8064	7732	7463	6192	5015	5035	- 4707				4272	5071	5507	- 5504			3638	2029	0687
3.54			• C C C •	2028	4480	5457	- 6163	C010 -	-+00		7257	7517	- 7707	7840		C / D / • I	7646	7461	7055	6523	- 5762	- 5260			5037	4994	4954	4939	- 4992	- 5070		4/1/	3977	2356	-1740
x/c			• 000	•005	.010	-015		020.	670.	.030	040.	.050	090		c	•100	.150	.200	.250	300				.430	• 500	.550	. 600	- 650	2002		061.	. 800	.850	.900	050

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60,000

x/c	3.54	4 • 00	4 • 00	4 • 00	4.02	4.49	4.99	5.51
	• 6 3 3 4	•7413	• 7 4 7 4	• 8665	.8300	1016		
	• 8025	.8956	.8915	- 8446	0110	6100.	+/7+·	• 7383
010	•6029	.6991	707.		0110	eee6•	.9710	.8802
015	.4873	.5842	5861	6136.	•6124	.7577	.8403	.6930
020	. 4755		1007.	- 4 3 2 2	• 5081	.6278	FF 17.	5720
225		1410.	1004.	.3808	.4377	.5734		6210.
	4616.	• 4670	.4165	•3379	3868		1660.	• 5101
151	• 3423	.4290	.4242	2162		1/16.	• 58 45	.4537
040	• 2936	.3553	- 3615		• 3 4 6 3	• 4853	•5370	.4097
050	.2594	.2878	2100	0066.	. 5042	.4198	.4701	.3566
090	• 2397	.2982	17/7.	6102.	• 2693	• 3696	.4291	4006
75	.2138	2726	1677 •	1/07.	• 2556	93398	-3932	2996
00	1960		0162.	• 1876	.2201	.3025	3505	
		+C C 7 •	•2222	• 1680	.1945	7776		+007 •
	• 1 / 2 3	• 2003	.2115	.1476	4171.		0026.	• 2293
00	•1616	.1897	.2002	1448			.2817	.2013
50	.1673	.1893	1945		CO / T •	.2154	.2570	.1745
00	.1624	.1658	1810		• 10 34	• 2096	•2380	.1678
50	.1637	.1420	- 1 4 7 N	7077 ·	•1644	.1986	.2354	.1633
00	.1610	-1562	01470	9/57.	.1528	.1961	• 22 43	.1597
50	.1589	. 1547	C 70 T •	• 1400	.1549	.1945	.2156	1400
05	.1568	1205	1601.	• 1338	.1495	.1924	.2144	0647. 1412
50	1602		• T / d d	• 1343	.1422	.1876	2044	7474
		6071.	.1613	.1336	- 1 4 4 4	1817		01410
	+ / 61 •	•1231	.1588	.1302	.1415		584T •	•1286
00	.1571	.1494	.1674	000		7707.	1977	.1180
00	.1498	.1653	1640	7674	445T•	.1777	.1912	.1076
50	.1461	.1576	1007	• 1362	•1343	.1737	.1837	1045
00	. 1120		07070	• 1 • 8 5	.1246	.1635	.1786	
50	1101	3666	• 1111	•1436	.1076	.1585	1754	- 1 4 D +
		• 1 6 3 0	• 0958	.1307	.0879	1691		• • • •
	0011.	.1162	.1244	.1023	.0641		•1013	•0513
2	• 0/12	.1057	.1110	C 7 4 3		+07T•	•1461	.0185
					HT 70	•1032	.1178	0443

·
•
•
٦.
>
>
•
-
_
\sim
n
м 1
ž
TINE
- INIId
PTINE
PTINE
PTINE
PTINE
PTINE :
8 PTINE :
28 PTINF
,28 PTINF
,28 PTINE
7,28 PTINE
27,28 PTINE
27,28 PTINE
27,28 PTINE
S 27,28 PTINE
NS 27,28 PTINF -
INS 27,28 PTINE
UNS 27+28 PTIME

ł

					8.01	8.25	8.51	8.75
X/C	6.01	6 • 49						
							780	-7.4717
			0147	-1.4297	-1.8797	-2.1242		4721 5-
.000	.6208	9714.	- 0101	4764 6-	-2.7624	-2.9402	71 Q D * E-	
0.05	5163	6511	-2.038/		-2 5160	-2.6474	-2.7490	-2.1030
		8084	-1.9502	0667.2-		6727 0-	-2.5978	-2.5940
•010			-1.8676	-2.1417	-2,3666		0197 0	-2.4262
.015	7520			-2.0402	-2.2534	-2.3424	676697-	
020	7942	8634	-1.5032		-2 1556	-2.2517	-2.3227	047697-
	- 8222	8789	-1.7521	-T- 404+		-2 1517	-2.2227	-2.2212
670.		8022	-1-7079	-1.9039	6610.7-		0000	-2.0739
• 030	CAT8		-1 4417	-1.8002	-1.9693	90TO • 7-		- 2,0010
.040	8272	1-3344			-] - 8624	-1.9367	-1.4486	
	- 8319	8875	-1.5660		1 7041	-1-8465	-1.8938	-1.9040
		8723	-1.5120	-1.6020			-1-7980	-1.8392
•090			-1-4413	-1.5713	-1.6804	-1.1.2		-1.7538
.075	8157	0460-1		1 4667	-1.5719	-1.6166	cz/0*T-	
	7875	- 8053	-146.1-		1 2000	-1-4409	-1.5264	-I.001/
• 100		7012	-1.2328	-1.315 <i>5</i>			-1.4318	-1.5147
041.			-1,1010	-1.1959	-1.2828	6 / 7 C • T -		-1-3298
.200	6181	0710		-1 1066	-1.1922	-1.2504	000001-	
250	5388	5208	67T0"T-		-1.1288	-1.1843	-1.2777	
200	- 4807	4855	9519	cocn•1-	-1 0707	-1.1451	-1.1786	-1.0194
	4675	4727	9078	9066 -			9363	-,9283
045.			- 8277	9682	1620.1-			8222
.400	4451		0.710	9565	-1,0586	-1.0103		2110
.450		26140-		0706	9212	6875	-• 1120	~ ~ ~ ~ •
500	4499	4827	5 D/ G • -			5348	6018	74 L4
		1.4885	3807				4904	4871
066.		- 4842	8488	5695	4121		2010	3900
•600			L KEAO	3400	3491	- 3000		1015 -
.650	4647	4991		2601	7848	3143	3102	
	4805	4972	-,2852		2207	2483	2394	2349
		4828	-,1825	1940			1735	1651
NC1 •			1184	1339	-1036		7111	1057
.800	4672			- 0928	1086	1172	0111.	
.850	4477	4359	1000 • -		0485	0610	-•0541	
000	4203	4173	033L		- 0022	-0074	•0024	1.0004
	- 3866	3849	G600.			I		
		I I						

172

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60,000

.2551 .2726 .2936 .2936 .2948 .2948 .2897 .2897 .2897 .2897 .2890 .2857 .2551 .2551	2788 29124 31337 2788 2936 3152 2713 2893 28948 2661 2893 2897 2897 2893 2897 2897 2897 2897 2897 2897 2890 2897 2890 2897 2890 2897 2891 28551 2897 2851 2897 2891 2890 2897 2891 2890	• 1669 • 2968 • 3124 • 3337 • 1628 • 2788 • 2936 • 3152 • 1464 • 2713 • 2936 • 3152 • 1365 • 2661 • 2726 • 2893 • 1363 • 2594 • 2726 • 2897 • 1363 • 2594 • 2678 • 2890 • 1163 • 2594 • 2578 • 2800 • 1163 • 2246 • 2429 • 2551 • 0842 • 2209 • 2722 • 2420 • 0684 • 277
.2893 .2726 .2678 .2678 .2581 .2722 .2722 .2187	.2713 .2893 .2661 .2726 .2594 .2678 .2394 .2678 .2394 .2678 .2728 .2728 .272 .2171 .2187 .1976	.1464 .2713 .2893 .1365 .2661 .2726 .1363 .2594 .2678 .1163 .2394 .2581 .1043 .2246 .2581 .0842 .2209 .272 .0684 .2171 .2187
	2788 2788 27113 2564 2594 2594 22246 22296 22296	.1669 .2968 .1628 .2788 .1464 .2713 .1365 .2713 .1365 .2713 .2713 .2713 .2713 .2713 .2713 .2794 .2861 .2864 .2864 .2869 .0684 .2171

12.00	-2.7832	-2.6858	-2.5561			-Z•50 41	-2.4894	-2,5035	-2.4868	-2.4800	-7.4789	5 7 7 2 B		+916-Z-	-1.8780	-1.2275	-1.0332	9380	9543			0770 - -	C04C	0600	3820	3322	2854	2586	2294	- 2125			
11.01	-2.8428	-7.8223	-2.4.24		-2 • 57 45	-2.5384	-2.5308	-2.5110	-2.5127	- 7.5066			C1 4 4 1 2 -	-2.5090	-1.7797	-1.1520	-1.0879	7520.1-	0474		7070 • I	7274	6178	5084	4127	3423	2721	2281	- 1896			I 37 U	
10.01	-2.7098	-7 076		-2.943	-2,5065	-2.4030	-2.3645	-7.3415	-2.3163		-2.22.00	0T97•7-	-2.2734	-2.2724	-2.0345	-1.1041	-1-0020		4060 T-	+ 2 A A	8855	7742	6614	5540	4428	3612	7836	- 2290	1704	0417.	131/	1006	
9.51	-2 . 6 7 4 B		0044.7-	-2.6168	-2.5673	-7.3919	- 2042	-2.2437			-2.1438	-2,1565	-2.1221	-2.1017	-2.0163	-1-1442		+001.11	-1.0/60	-1.0110	9071	7961	6823	5674	4591	3733			6122.	1688	1227	0895	
00°6	2773 C		-3.1244	-2.7880		- 2 4265				COTT • 7-	-2.0457	-1.9967	-1.9338	-1.8818				-1.1933	-1.1066	-1.0337	9325	- 8248	7081	- 5857	- 480]			5011	cf f Z • -	1749	1163	0686	
×/C		.000	• 005	. 010		010.	020.	670.	.030	.040	.050	.060	. 075		001.	061.	• 200	.250	• 300	.350	400	450 450					069.	• 700	.750	.800	.850	000	

R = 60,000																																
M = 0.05	12.00		-2.7832	.6372	9482	.9975	0000	.0762	.0502	9081	8438			0711	07/00 57/5	CO/C•		+0~+•	1624.	2076.	.3697		C 7 7 C •	01470	04030	04634	• 2364	4212.	.1823	.1533	.1131	.0505
IF = 5 PSI	11.01		-2.8428	. 6445	.9580	. 9989	- 9962	. 9801	9444	. 8895	. 8339	. 7882	4757 -	6579	- 20	. 5030	4444				01/10 •		3075	2800	2680			1962.	. 2067	.1780	.1418	.0915
27,28 PTIN	10.01		-2.1098	• 7080	.9735	1.0013	• 9937	.9647	• 9326	.8732	.8097	.7682	- 7045	.6324	- 5489	4932	4472	- 4045	3861	3645	4446	.3184	- 3019	- 2894	. 7755	0696	• 505 •	22020	• 128	•1953	•1612	.1197
RUNS	9.51			• 7416	.9856	1.0028	.9856	.9543	.9218	.8573	• 7943	.7589	•6924	•6266	.5347	.4752	.4348	.4010	.3783	.3594	.3349	.3170	• 3027	.2917	.2616	.2538	2428	2227	1633.	9102.	76/1.	+ 9 7 T •
	00°6			6811.	• 9922	1.0064	.9837	•9502	.9042	.8317	.7810	.7399	.6823	.6137	•5160	•4613	.4240	• 3981	.3705	.3553	.3360	.3183	• 2997	.2846	• 2699	.2607	.2412	0122.	2002	C 7 8 1	- 1 4 6 E	6647.
	X/C	000			010	•015	• 020	• 025	.031	.040	.050	• 060	•075	.100	.150	.200	.250	• 300	• 350	.400	.450	•505	.550	• 600	.650	• 700	.750	. 800	850		050	

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60.000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

			13.01	13.01	12.00	10.99	10.00	6*6
×/ ר								
				1007	-2 7765	-2.8522	-2.6812	-2.7200
• 000	5819	4978	6944.		-2,4715	-2.8318	-2.9334	-2.9444
.005	-1.1629	-1.1381	-1.1288	0/61.1-			-2.6013	-2.6035
	-1.0023	-1.0088	-1.0301	-1.0097	00+6•7-	3030924		-7.5730
		99040	9 00 0	9037	-2.5109	841 6. 2-		
610.		7015	8163	8214	-2.4815	-2.5461	-2.4063	1/1407-
• 0 2 0	0601		- 7586	7827	-2.4775	-2.5262	-2.3549	-2.3003
.025	7332	101/ -		- 7521	-2.4986	-2.5099	-2.3425	-2,3333
.030	6855			- 4802	-7.74	-2.5078	-2.3219	-2.3170
.040	6403	- • 6 4 0 4			-2 4881	- 7.5081	-2.3015	-2,2995
.050	6124	6464	6193	-• 0071		-7 A052	- 2 - 7 48	-2.3004
.060	5986	6500	6646	- 7053			-2.2926	-2.2738
0.75	6022	6166	7310	6143	-2.4133			P777.5-
	- 6578	5907	6306	6669	-2.5103	fc14•7-	0007*7-	
		5915	- •6102	5970	-1.8986	-1.7602	1200.5-	770F F
061.	+0+C • +	C777	- 6541	5093	-1.2216	-1.1523	-1.1199	-1.1040
.200	-• /0.46			7219	-1.0433	-1.0820	-1.0972	-1.0953
.250	7174	+T79				-1.0236	-1.0617	-1.0578
• 300	6585	6052	5070 • I		8460	- 9422	9912	9869
.350	5899	5960	-+0 T+2	1000	7040	8390	8878	8942
.400	5862	5822	0412			7 7 3 3	7865	7814
.450	5735	5792	5953	56/6 •-		- 6007		6607
- 500	5923	5572	5602	5760	10 F L - I	- 6102 - 6102	- 5485 - 5485	5471
	6138	5789	6220	5540	1.4070		0.000	- 4457
9004 400	- 5440	5423	5531	6159	3857	1214 -		6196
	- 4140	5995	6062	6346	3258	9665 . -		
069.		57 E 2	- 5950	5542	2849	2791	2403	
• 700				- 5689	2569	2272	2278	2272
.750	5423		1001	<pre></pre>		-1923	1761	1705
.800	5395	5620			20.97	- 1612	1313	1290
.850	5680	5521	- • 6008	0110		- 1265	0961	0957
006	5439	5510	5903	6766		- 1136	06.80	0668
.950	5291	-,5356	-•5591	- .5459	4C Q T		•	1) }
LOWER SURFACE PRESSURE CDEFFICIENTS FOR VARIDUS ALPHAS

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

×/C	13.04	13.04	13.01	13.01	12.00	10.99	10.00	66*6
•000	5819	4978	4485	6001	-7.7765	-7 8633	, , , , , , , , , , , , , , , , , , , 	
• 005	.9927	.9971	0100	5 5 5 5 5			7T00 7-	-2.1200
010-	0051			2116 .	•0360•	• 6565	• 7064	.7182
		0066.	F066 •	• 9902	.9421	.9551	.9685	.9762
	.494.	1959.	• 9364	• 9309	1.0031	1.0001	.9955	1-0104
070.	.8796	.8767	.8936	. 9002	1.0012	2000	7000	
• 025	.8346	.9253	• 8336	.8486	9809	9788	05.74	
•031	. 7922	.7827	.7970	. 8100	.9598	2070	0266	4707.4
.040	.7166	.7137	•7144	7199	. 9053			2626.
.050	. 6548	.6765	.6471	- 6704	- 7 7 J B - 7 7		20100	• 8083
.060	.6145	.6341	875Y-	0729			7618.	• 8086
.075	.5569	5678	5735		6000 •	• 181•	• 7573	.7735
100	5213		0210.	- 2000 	• / 4 5 0	• 7335	.7105	.7083
		0044.	• • • • •	• 5129	•6775	• 6635	• 6358	.6350
	507 4 •	1 4 7 4 .	•4236	.4149	• 5707	• 5665	.5335	5418
002.	• 3915	.3790	.3785	.3641	•5135	.5122	1000 - 10	0707
092.	• 3531	.3347	• 3301	.3447	.4697	.4591	0044	600F.
• 300	.3171	• 2983	• 2936	3064	4644	1/2/		07.5.5
•350	• 2608	.2692	.2666	2806		6595 •	9774.	• 4 T 3 9
• 400	• 2445	5443	- 2503	2600		0120	66/5.	•3849
.450	.2260	2022	2 2 F 0		());	.3/38	•3561	.3581
.505	8615.	TROF	FC01	1512.	. 3469	•3489	.3325	.3484
.550	- 1861	7271	1021	545T •	.9193	.3250	.3235	.3212
.600	1641.		.1030	+ 1 0 0 4	• 3019	.2980	.3107	.3054
. 650	7721			• 1006	• 2832	.2937	• 2874	• 2918
202	0840		6121.	• 13 / 8	• 2603	.2723	.2719	.2722
76.0	.000.	• 0000	1601.	• 0877	•2402	•2509	.2520	.2550
002 •	80C0.	6EGO.	• 0548	• 0589	.2108	•2333	1954.	. 2364
000.	6410 ·	•0176	• 0251	.0250	.1865	.2004	-2125	. 2174
• 6 2 0	0212	0288	0189	0219	.1524	.1722	1026	
006.	0913	0865	0759	0765	.1125	-1486	1631	0001
.950	1860	1840	1689	1844	.0455	• 0914	- 1184	470 1 1
							- > + + -	

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPPER

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

								6.47
X/C	00*6	8.50	8.00					
							7305	5042
) EEIO	7775-5-	-1.9103	9463	9560	-•/3/1		-1 6751
• 000	-2010		7977 . 4	-2.0680	-2.0571	-1.8866	-1-8803	
.005	-3.1284			-1 0485	-1.9850	-1.8296	-1.8420	-1+0+13
.010	-2.7618	-2.7472	-2+22+0		-1 80.01	-1.7665	-1.7713	-1.6417
510	-2.5964	-2.5891	-2,3681	7768 • 1-		-1 7067	-1.7230	-1.6029
	-7.4219	-2.4378	-2.2449	-1.8115	-1.8292	- T • 1001	-1.6745	-1.5589
1000	-2,3150	-2.3046	-2.1633	-1.7641	-1.7684	-1-0737	0867 1	-1-5290
C 2 0 •			-2.0794	-1.7124	-1.7190	-1.96.90		
• 030	TN77•7-		-1 0433	-1.6271	-1.6491	-1.5486	-1-2644	
.040	-2.1116	2000.54		-1-5672	-1.5757	-1.4950	-1.5054	-1.4120
.050	-2.0502	-2.0004	-1.0072		-1.5211	-1.4531	-1.4601	-1.3775
.060	-1.9884	-1.9070	-1.7800	DCTC •1-	-+•/c++	0006-1-	-1.3953	-1.3154
0.75	-1.9412	-1.7948	-1.6914	- 1 • 4 4 4 /			-1-3183	-1.2493
	1 9875	-1-6730	-1.5657	-1.3528	-1.3627	75 UC • T -		-1.1279
00 1 •		-1.5280	-1-3975	-1.2196	-1.2196	-1.16/8		
.150	-1. (333	1000 T	1076 1	-1-1038	-1.1158	-1.0720	-1.0701	0670-1-
.200	-1.4045	-1.4300	T6/2•T-		-1-0344	9817	-,9839	9462
.250	-1.1948	-1.3594	-T-T430		_ 0517	9091	9153	8693
006-	-1.1011	-1.2809	-1.1353	0166.		- 8653	- 8684	8189
.350	-1.0341	-1.1711	-1.0959	1006 -	1016.1	- 8417	- 8484	7899
	9321	-,9342	-1.0729	8801			8366	7883
	8251	8062	-1.0712	8700	5 T 2 2 + 1		- 8375	7694
	- 7033	7032	9454	8695	8/42	-070 * -	0000	- 7841
		- 5958	5761	8781	8866	1758 .		ACOA -
044.		- 48 7 B	4124	8516	8495	8418	0100.1	
•600				- 5677	5403	6717	6695	
.650	3828	-•3947			4500 -	3767	3762	4927
.700	3035	3058	2847			- 2192	2075	2769
750	- 2325	2350	2182	1858		1222	4261	1607
	1771	1714	1562	1266	1 6 7 1 • -		0785	0876
	1150	1065	0995	0823	0814			0360
000		0478	- 0464	0364	0346	0350.1		- 0025
006.			0000	.0019	•0046	.200.	F COD•	
.950	-,0293	• • • •	• • • •) 				

T

LOWER SURFACE PRESSURE CDEFFICIENTS FOR VARIDUS ALPHAS

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

I	8 - 50	8 . 00					
	-		/ •00	7.00	6.75	6.74	6 . 4
7775.2-		-1 0103					
0146		COT 4 • T -		9560	7321	7305	- 5042
		• • • • •	• 9795	.9670	.9887	. 9901	.0855
1166 •		• 9961	0666 •	.9958	.9889	9858	
• 9666		.9830	.9476	.9328	4710.		4/06.0
7979.		.9472	. 8797	RA61		0014	• 8889
.9248		.9142	. 8276	10001 1001		0100.	•8362
.8922		.8627	. 7842	7767	. 1923	.8066	.7822
.8379		- 7957	7031		5861.	• 7573	.7339
.7719		7342		077.*	• • 1 / 2	• 68 0 4	•6496
.7257			1000		•6180	•6240	.5897
		1000	1600 .	• 5984	.5736	•5764	•5465
5005			04040	.5497	.5268	.5182	.4938
5005		0000.	• 4872	.4947	.4710	•4652	- 4474
		5784 •	• 4129	•4193	•3982	.4052	.3767
11/4		オインナ・	• 3757	.3703	• 3600	.3576	.3470
		- 475.	• 3402	.3419	.3280	.3328	7515.
6046. 2466		• 3625	• 3263	.3286	.3081	.3137	2957
		1045.	. 3092	•3086	• 3008	.2877	- 2873
		2000	. 2956	.2910	.2793	• 28 37	.2696
		6016 ·	• 2809	•2880	.2782	.2762	.2621
0105 ·		07470 2041	• 2712	.2726	•2677	•2668	.2500
7887			• 6024	.2602	.2521	.2514	.2430
7 6 3		0/07•	8/67 •	• 2489	.2453	•2432	.2297
		017.	- 2414	• 24 22	.2377	• 2386	.2267
		4 C H 2 H	. 2297	.2363	.2254	.2247	2145
		• 2381	.2217	.2191	.2115	- 2149	2041
2062.		.2285	• 2080	.2071	.2062	1996	1070
6612.		•2136	.1922	.1902	. 1915	1007	• 1 7 C 7
. 2041		.1952	.1747	•1798	1729	1785	
.1685		.1608	.1501	.1494	.1442	.1467	.1421
							11.

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60.000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

× / C	6.44	6.44	6.25	6.25	5.99	5.50	5•25	00.00
		5405	5056	.5890	.6488	.7358	• 7799	0106.
• 000	48 L 8			- 5604	4869	3597	3492	C 06/ • -
.005	-1.6677	-•6212			- 6805	5738	5164	9494
.010	-1.6442	7802			4666 -	6358	5955	9854
015	-1-6121	8242	7935	- / 845		9007 -	6475	9344
	-1.5624	8449	8270	8107	/804		6023	-1-0185
.0.00	-1-7061	8697	8404	8347	7996	1302	1707 1707	0443
• • • •		8600	8533	8578	8126	7463		
•030	011C•1-		- A510	- 8589	8151	7636	1313	477N°T-
•040	-1.4913		7400 -	- 8589	8262	7703	7433	7087 . -
• 050	-1.4027			- 8450 -	8209	7848	7604	+0/6
•090	-1.3580	8607	2040-1		- 8060	7725	7552	-,9323
.075	-1.3084	8328	8340		7875 -	7567	7511	9301
100	-1.2242	7875	-•7899			- 4070	6964	8532
150	-1.1149	6998	7133	- 101 -		- 4220	6257	8051
	-1.00.65	6006	6110	6108	0010-1		- 5587	7279
	- 0100	5132	5389	5308	0656		1087 -	6777
	- 8636	- 4776	4867	4791	4788			6154
	00000	- 4622	4668	4690	4521			- 5779
065.		45R6	4647	4621	4452	4681	~~~~	2020
.400	/072		- 4606	4710	4420	4281	4315	
•450			- 4612	- 4608	4454	4346	4268	1620-1
. 500	4746	5007-1		- 4711	4515	4277	4232	7696 -
.550	4746	4/13		- 4813	- 4544	4333	4305	- 5929
. 600	4839	4850	0014-1		- 4707	4439	4409	5670
.650	4952	4812	4782	1.04.1	- 4701	- 4458	4453	5890
200	4956	4889	4888			- 4566	4523	5684
0.50	- 4825	4901	4818	4841	1014.1		4527	4584
	46.81	4703	4639	4699	06040		- 4408	3248
	- AAAR	- 4477	4466	4415	44/8			- 1865
• 000	70C7	- 4765	4137	4184	4192	4685	041 8-1	1301
• 900	007 4 • -		2042 -	3868	3906	3904	3882	T07T •
.950	3954		1 C C C • I					

T

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

X/C	6.44	6.44	6.25	6 • 25	5.99	5.50	5.25	5 • 00
• 000	4818	.5495	.5956	.5890	.6488	.7358	6677.	.5076
• 00 5	1.0073	.9518	.9407	• 9362	• 9144	.8719	.8569	9688
.010	• 9656	. 7825	.7703	.7604	.7575	.6837	• 6655	.8221
•015	.8941	.6721	• 6525	• 6659	.6237	.5741	.5423	- 7110
•020	.8177	• 5991	.5761	• 5839	•5555	.5072	.4716	.6116
• 025	.7663	.5383	.5317	.5181	.4982	.4576	.4234	•5776
•031	. 7191	• 4034	.4827	.4820	.4595	.4084	.3864	. 5029
•040	.6461	.4289	.4155	.4187	.3987	.3527	.3319	.4615
•050	• 5853	.3800	• 3676	.3770	.3514	.3095	.2839	• 4063
•060	• 5446	•3553	.3407	• 3430	.3247	•2833	.2659	.3647
•075	• 4935	.3157	• 3076	• 3084	.2917	.2515	.2457	.3208
.100	.4401	.2757	.2695	. 2650	.2516	.2286	.2141	2907
.150	.3748	.2375	• 2293	• 2293	.2141	.1999	.1830	.2514
•200	• 3339	.2128	.2124	.1989	•1944	.1775	.1675	.2324
.250	.3117	.1953	.1962	.1976	.1878	.1694	.1577	.2173
• 300	• 2945	.1832	.1830	•1833	.1727	.1606	.1556	.2138
.350	.2831	.1784	.1689	.1755	.1649	.1502	.1540	.2115
• 400	•2662	•1579	.1568	.1639	.1574	.1508	.1465	.2022
• 4 5 0	.1486	.1544	.1618	.1518	.1521	.1455	.1345	.2015
• 505	.1400	.1459	.1477	.1482	.1392	.1360	.1249	.2005
• 550	•1355	.1335	.1346	.1436	•1434	.1335	.1357	.1909
• 600	.1248	.1239	.1302	.1237	•1327	.1168	.1220	.1911
• 650	.1130	.1175	.1148	.1164	.1104	.1062	.1040	.1750
• 700	• 1021	• 0976	.0988	.1065	•0953	.1104	• 0966	.1696
• 750	.0840	.0774	•0914	• 0893	•0864	•0869	.0847	.1506
• 800	.0590	• 0593	.0691	• 0684	• 0676	•0595	•0697	.1592
.850	• 0382	• 0 4 0 4	•0452	• 0492	•0433	•0437	.0570	.1433
006 •	• 0061	• 0011	•0079	.0101	.0150	.0148	.0173	.1248
•950	-• 0626	0651	0528	0549	0529	-•0449	0398	.0859

ALPHAS	
VARIDUS	
FOR	
COEFFICIENTS	
PRESSURE	
SURFACE	
UPPER	

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE OF ATTACK)

x/c	5.00	4°99	4°64	4 • 75	4.75	4 • 50	4.50	4.25
	.5267	.8115	.4361	• 4440	.7451	.8057	.7541	.8948
005	6738	- 2924	7956	7825	4504	1584	1289	0669
	- 7714	- 5034	6626-	9280	5555	4714	3627	3218
.015	- 8069	5602	- 9996	9719	6892	4770	4838	4394
020	- 8902	6397	9980	-1.0067	8565	5656	5400	4910
.025	9266	6614	-1.0012	-1.0247	8537	5860	5767	7125
030	9356	7046	9839	-1.0299	8686	6189	7214	7556
040	- 9476	7456	-1.0066	-1.0305	8586	7590	6572	7949
.050	- 9409	7549	-1.0706	-1.0269	32 65	7595	6699	8101
.060	- 8107	7639	-1.0305	-1.0287	8387	6920	6956	8164
.075	8793	7537	-1.0187	-1.0133	8916	7240	7141	8195
		7458	9641	9780	8391	8412	8121	7282
150	- 82 64	7049	9103	9125	7544	7571	6880	6915
200	- 8062	6398	8486	8621	7794	7218	6325	6360
.250	7150	5750	7929	8010	7101	6025	5643	5733
300	5625	- 5031	7000	7312	6319	4987	4979	5037
.350	- 5239	4541	6673	6711	5175	4598	5037	5211
400	5131	4428	6008	5711	5140	5003	4574	-•5011
450	5639	4314	5900	5786	4988	4615	4135	4913
. 500	5702	4294	5851	4931	5199	4557	4126	4902
.550	5052	4300	6063	4629	5343	4741	4089	4940
.600	5195	4428	5881	5210	5142	4521	4068	4889
.650	5540	4249	5758	4609	5242	4597	4056	4977
- 700	5696	4534	5871	-• 5061	5741	4586	4233	5048
- 750	5559	- • 4 4 4 2	6013	5625	5508	4862	4387	5185
BOD.	4888	4522	4373	4499	4997	4476	4318	4856
.850	- 3701	4471	2823	3039	3987	4389	4410	4185
006	2832	4174	1642	3731	2988	3616	4229	3182
.950	1382	3657	1000	3443	2631	2011	3647	2403

182

Т

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

X/C 5.00 4.99 4.75 4.75 4.75 4.50 4.50 000 -5267 -8444 -4451 -6512 -7719 -7719 010 -7656 -6451 -8122 -6051 -6734 -5711 010 -7656 -6451 -8125 -6127 -7719 -5771 010 -7656 -6470 -8122 -6127 -7719 -5771 010 -7656 -6470 -8122 -61296 -7719 -5772 010 -5689 -6459 -5784 -5774 -5947 -3942 010 -4702 -8813 -5578 -5672 -5773 -5672 011 -4701 -3826 -5798 -5794 -3947 -3947 0750 -3817 -5794 -5747 -5743 -3141 -2643 0750 -2259 -1794 -5747 -2193 -1415 -1415 0750 -2254 -									
000 5267 .0815 .4361 .4460 .4361 .4461 .8671 .715 0105 .7656 .6420 .6734 .6734 .7541 .7719 0105 .7656 .6420 .6734 .6734 .5742 .57719 0105 .7656 .6420 .6736 .6734 .5740 .57719 0105 .7656 .6470 .7156 .7756 .5672 .57719 .57719 0103 .7756 .5676 .6573 .6573 .5784 .5672 .5774 0104 .7791 .3191 .3289 .5784 .5774 .3494 .2740 0750 .3813 .2795 .5672 .3191 .2740 .2784 0750 .2819 .4162 .4473 .3191 .2740 .2784 0750 .2814 .4702 .3161 .2740 .2784 .2619 0750 .2815 .4112 .3191 .2719 .2740 .2784 0700 .2816 .4772 .3164 .2784	X/C	5.00	4.99	4.99	4.75	4.75	4 • 50	4.50	4.25
•000 •5267 •015 •4440 7451 •0657 7749 •015 •0469 •0652 •0691 •0674 •0573 •7642 •7719 •015 •7656 •6470 •7156 •7673 •7673 •7657 •7719 •010 •7656 •6401 •7656 •6403 •7656 •4037 •7842 •7719 •0115 •5160 •7156 •7058 •5672 •1138 •7674 •574 •574 •023 •5164 •5786 •578 •574 •5138 •5672 •5139 •051 •5164 •5786 •5794 •574 •5138 •5895 •5689 •057 •5816 •574 •5794 •5199 •2689 •2689 •2689 •050 •2895 •1657 •2895 •3744 •1799 •2899 •2689 •050 •2895 •1657 •3745 •2895 •2689 •2689 •2689 •2689 •100 •2895 •1657 •2895 •2895 •2895									
005 0449 9652 9681 5970 7719 5672 015 015 6404 9652 9681 5970 7744 5672 015 016 5160 7156 5086 4696 5672 5672 010 5160 7156 5784 5784 5672 5672 5672 020 5589 4649 5154 5784 5672 4138 3749 5672 031 1908 5154 5784 5784 5672 3749 3749 0460 5866 4561 5784 5784 3749 3749 050 5870 5870 5784 5784 5784 5784 5784 050 2810 2294 3951 2872 2189 2284 5876 050 2810 2267 3845 27475 2849 2764 150 2284 3947 2846 2649 1994 2649 150 2284 2847 2847 2849 27475 <	• 000	.5267	.8115	.4361	. 4440	.7451	.8057	75.61	0700
010 .7556 .6420 .0725 .0734 .6734 .6734 .6734 .6752 .4657 015 .5689 .4049 .5686 .7756 .7756 .7756 .4734 .65672 .4657 .5672 .4657 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .4657 .3434 .5672 .3434 .5672 .3434 .5672 .3434 .3494 .455 .3464 .3454 .3454 .3454 .3454 .3454 .3454 .3454 .3454 .3264 .3469 .2689 .2689 .2101 .2264 .2119 .2264 .2119 .2264 .2475 .2119 .2264 .1117 .2649 .1121 .2649 .1121 .2264 .2475 .2264 .2119 .2264 .2475 .2264 .2117 .2649 .2769 .2649 .2649 .2649	• 005	.9499	- B 4 6 4	.9652	06.81	02.08			0
0.00 0.00	.010	7456					2401 .	6T/10	• 7349
0.25 0.990 0.100 0.100 0.100 0.4649 0.6239 0.6572 0.4603 0.6650 0.6650 0.101 0.4921 0.3847 0.5784 0.479 0.3647 0.3927 0.3949 0.3471 0.3264 0.3927 0.3949 0.3471 0.3264 0.3984 0.2284 0.2284 0.2089 0.1969 0.1969 0.1969 0.1969 0.1969 0.1969 0.1969 0.1969 0.1969 0.1969 0.1412 0.2284 0.2084 0.1969 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11412 0.11254 0.11264 0.11412 <td></td> <td></td> <td></td> <td>7979.</td> <td></td> <td>•6734</td> <td>•6296</td> <td>•5672</td> <td>• 5335</td>				7979.		•6734	•6296	•5672	• 5335
0.20 .5889 .4649 .5230 .5784 .4138 .9927 .3947 .3927 0.31 .4921 .3849 .4649 .5784 .4138 .3944 .3740 0.01 .4921 .3893 .4151 .4702 .3822 .32810 .2686 0.05 .2810 .2594 .4112 .3191 .2681 .2740 0.05 .2810 .2594 .4112 .3191 .2681 .2686 0.06 .2870 .2594 .3471 .2914 .1999 .1984 0.100 .2159 .2023 .3164 .2745 .1999 .1984 100 .2357 .1657 .3471 .2919 .2069 .2861 .2010 .2357 .1657 .3108 .2459 .2122 .1932 .1233 .150 .2257 .1657 .2465 .2122 .1415 .1415 .255 .1794 .2747 .2359 .1232 .1233 .2601 .1766 .1864 .1775 .1415 .1415 <td>C T O •</td> <td>1040.</td> <td>0914.</td> <td>• 7156</td> <td>.7058</td> <td>• 5866</td> <td>• 4603</td> <td>•4650</td> <td>4384</td>	C T O •	1040.	0914.	• 7156	.7058	• 5866	• 4603	•4650	4384
$\begin{array}{llllllllllllllllllllllllllllllllllll$	• 020	• 5889	• 4 6 4 9	•6329	.6290	.5672	.4138	.3927	.3665
.031 .4921 .3839 .5154 .5298 .4574 .3164 .3740 .040 .2875 .3959 .4451 .4702 .3822 .3364 .3740 .050 .3813 .2895 .4465 .4162 .4112 .3191 .2810 .2284 .050 .2813 .2895 .39545 .3471 .2914 .1999 .2069 .050 .2813 .2895 .39545 .3471 .2914 .1999 .2069 .050 .2815 .39545 .3471 .2914 .1999 .2069 .100 .23159 .2151 .3064 .3191 .2356 .2984 .200 .2315 .1954 .3191 .2364 .3740 .200 .2315 .1918 .2364 .2845 .2119 .200 .2357 .3647 .2364 .2846 .2846 .200 .2351 .2164 .2193 .1415 .1415 .200 .1766 .1779 .11979 .1415 .14152 .200 <td>• 025</td> <td>•5368</td> <td>• 4048</td> <td>• 5686</td> <td>• 5784</td> <td>6267.</td> <td>.3547</td> <td>4046</td> <td>0027</td>	• 025	•5368	• 4048	• 5686	• 5784	6267.	.3547	4046	0027
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	•031	.4921	•3839	.5154	.5298	.4574	-3164	3740	
050 3813 2895 4412 3191 2810 2284 075 2870 2257 3951 3191 275 2719 2069 100 2159 2019 2759 3951 3191 2275 22069 100 2159 2023 3064 3167 2475 22369 2261 100 2159 2023 3064 3167 2475 22369 2261 100 2157 1965 22761 1963 11412 100 21767 1969 11673 11412 11742 11556 22251 22459 22465 12732 11742 11579 22617 12767 11979 11533 11742 11742 11573 11673 11673 11452 11742 11767 11772 11732 11472 11452 11742 11879 11772 11673 11673 11452 11742 11673 11673 11673 11472 11772 11775 11673 11673 11673 11772 11772 11775 11673 11673 11673 11772 11775 11673 11672 11772 11772 11775 11672 11672 11772 11772 11775 11672 11672 11772 11772 11775 11672 11772 11772 11772 117122 10972 11	• 040	.4291	• 3289	.4551	.4702	.3822	.3264	26.80	2276.
000 $.2870$ $.2596$ $.3951$ $.3855$ $.2965$ $.2119$ $.2069$ 075 $.22159$ $.2267$ $.3471$ $.2914$ $.1984$ $.2261$ 100 $.2257$ $.3757$ $.3755$ $.3471$ $.2914$ $.1932$ $.1984$ 100 $.2257$ $.3757$ $.3567$ $.3471$ $.2914$ $.1932$ $.1984$ 250 $.2257$ $.3567$ $.2459$ $.2475$ $.2359$ $.1235$ 250 $.2751$ $.2459$ $.2475$ $.2367$ $.1932$ $.1932$ 250 $.2161$ $.1576$ $.2367$ $.2479$ $.2099$ $.1932$ 250 $.1785$ $.1979$ $.1809$ $.11412$ $.11452$ 1176 $.11789$ $.1247$ $.1279$ $.1267$ $.1267$ 450 $.1746$ $.2261$ $.2267$ $.1979$ $.1267$ 450 $.1746$ $.1279$ $.1679$ $.1269$ $.1264$ 450 $.1742$ $.1679$ $.1672$ $.1264$ 450 $.1864$ $.1975$ $.1672$ $.1672$ 450 $.1864$ $.1775$ $.1979$ $.1672$ 1609 $.1672$ $.1275$ $.1979$ $.1275$ 450 $.1672$ $.1275$ $.1276$ $.1275$ 450 $.1672$ $.1276$ $.1276$ $.1276$ 450 $.1672$ $.1276$ $.1276$ $.1276$ 450 $.1276$ $.1276$ $.1276$ $.1276$ 700 $.1279$ $.17$.050	• 3813	.2895	.4162	. 4112	1915	- 2810	2284	
075 $.2919$ $.2257$ $.3545$ $.3471$ $.2914$ $.1999$ $.2261$ $.100$ $.2153$ $.2023$ $.3064$ $.3108$ $.2475$ $.2359$ $.2261$ $.2070$ $.2153$ $.1657$ $.2465$ $.2122$ $.1932$ $.1532$ $.2070$ $.2251$ $.22457$ $.2465$ $.2122$ $.1932$ $.1532$ $.200$ $.2757$ $.2465$ $.2122$ $.1932$ $.1532$ $.1532$ $.257$ $.2251$ $.22457$ $.22457$ $.2251$ $.2251$ $.2251$ $.2251$ $.22567$ $.1932$ $.1532$ $.1415$ $.11532$ $.1532$ $.1532$ $.1532$ $.1532$ $.1532$ $.1532$ $.15122$ $.1572$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11264$ $.11772$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$ $.11722$	• 060	.2870	• 2596	.3951	. 3855	.2965	2110	1070¢	7776•
.100 $.2158$ $.2023$ $.3064$ $.3108$ $.2475$ $.2359$ $.2261$ $.1500$ $.2325$ $.1794$ $.2687$ $.2465$ $.2122$ $.1932$ $.1532$ $.2000$ $.2251$ $.2459$ $.2261$ $.1932$ $.1912$ $.1415$ $.2000$ $.2251$ $.2459$ $.2261$ $.1932$ $.1415$ $.300$ $.1760$ $.1556$ $.2367$ $.2465$ $.2261$ $.1932$ $.300$ $.1760$ $.1556$ $.1932$ $.1812$ $.1415$ $.300$ $.1760$ $.1549$ $.2261$ $.1979$ $.1533$ $.300$ $.1742$ $.1549$ $.2261$ $.1979$ $.1533$ $.300$ $.1742$ $.1549$ $.2261$ $.1703$ $.1452$ $.400$ $.1742$ $.1890$ $.1703$ $.1613$ $.1264$ $.400$ $.1742$ $.1879$ $.1673$ $.1613$ $.1259$ $.400$ $.1742$ $.1672$ $.1673$ $.1673$ $.1264$ $.400$ $.1742$ $.1672$ $.1673$ $.1269$ $.400$ $.1890$ $.1945$ $.1672$ $.1673$ $.1269$ $.400$ $.1782$ $.1945$ $.1673$ $.1673$ $.1264$ $.400$ $.1782$ $.1975$ $.1673$ $.1673$ $.1279$ $.400$ $.1672$ $.1975$ $.1672$ $.1264$ $.1177$ $.400$ $.1672$ $.1975$ $.1672$ $.1279$ $.1603$ $.1662$ $.1775$ $.1276$ $.1276$.075	.2919	.2257	. 3545	1245	2014	1000	4007 •	0//7.
150 2325 1794 2687 2469 19165 1932 11532 250 2251 1556 2367 2465 22122 19932 11267 250 2156 2367 2465 2209 11722 112979 11267 350 1776 1576 2261 22267 1979 11267 11267 350 17785 1546 2204 2132 11979 11267 350 1778 11742 11779 11779 11267 450 11742 11879 11779 11479 11452 450 11742 11879 11673 11673 11452 450 11890 11779 11672 11673 11452 450 11864 11779 11672 11673 11259 650 11635 11276 11779 11277 650 11635 11775 11672 11272 650 11637 11779 11277 11277 650 11637 11775 11279 11277 700 11672 11772 11275 11277 650 11643 11777 11277 650 11672 11775 11279 650 11672 11772 11277 700 11672 11772 11272 650 11772 11772 11272 700 11672 11772 11272 700	.100	.2158	502-	3064	30.15	7.7.5	• L 7 4 7 2 2 F 0	+94T •	• 2 4 6 0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	150	2226					6667.	• 2261	.1637
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			tr	1997.	• 2643	1965	.1932	.1532	.1516
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0020	1677 •	1 6 9 1 •	• 2459	.2465	.2122	•1809	.1412	.1363
300 1760 1545 2251 2267 1979 1392 1267 350 1785 1540 2204 2132 1688 1359 1513 400 1742 1890 2204 2132 1688 1359 1652 450 1742 1172 1673 1649 11452 5505 1864 11324 2000 1957 11672 11463 1635 11826 1975 11672 11672 11264 1635 11226 1975 11672 11672 11239 1600 11226 11975 11613 11319 11027 1650 11627 11775 11613 11777 09633 1620 11627 11612 11775 09633 11777 750 11412 09911 17622 11475 011433 750 11412 09911 17622 11475 011433 850 11225 09921 07972 07947 07648 9900 0921 007497 07645 007645 9900 0921 007497 007645 007645 9900 0921 007497 007645 007645 9900 09272 01595 007645 007645 9900 09249 007645 007645 007645	367.	. 2161	.1556	.2367	.2429	•2009	.1533	.1415	2021.
350 .1785 .1540 .2204 .2132 .1688 .1513 400 .1742 .1469 .2101 .1879 .1703 .1614 .1452 450 .1742 .1469 .2101 .1879 .1703 .1614 .1452 450 .1324 .2000 .1955 .1672 .1469 .1264 550 .1864 .1472 .1672 .1469 .1264 550 .1635 .1258 .1955 .1672 .1264 .1177 550 .1635 .1264 .1775 .1672 .1276 .1277 560 .1635 .1275 .1566 .1663 .1027 650 .1627 .1755 .1575 .1027 .1027 770 .1613 .1752 .1575 .1027 .1027 770 .1446 .0901 .1752 .1475 .1027 780 .1642 .1752 .1576 .1672 .1027 780 .1662 .1752 .1672 .1672 .1027 <tr< td=""><td>• 300</td><td>.1760</td><td>.1545</td><td>.2251</td><td>.2267</td><td>•1979</td><td>.1392</td><td>.1267</td><td>1215</td></tr<>	• 300	.1760	.1545	.2251	.2267	•1979	.1392	.1267	1215
400 $.1742$ $.1469$ $.2101$ $.1879$ $.1703$ $.1614$ $.1452$ 450 $.1890$ $.1324$ $.2000$ $.1955$ $.1673$ $.1499$ $.1264$ 505 $.1864$ $.1425$ $.1945$ $.1977$ $.1672$ $.1473$ $.1264$ 550 $.1864$ $.1472$ $.1597$ $.1672$ $.1264$ $.1177$ 550 $.1864$ $.1955$ $.1972$ $.1972$ $.1276$ $.1276$ 550 $.1635$ $.1276$ $.1972$ $.1672$ $.1177$ 600 $.1637$ $.1276$ $.1972$ $.1027$ 650 $.1629$ $.1755$ $.1613$ $.1107$ 650 $.1612$ $.1775$ $.1276$ $.1276$ 770 $.1672$ $.1276$ $.1672$ $.1027$ 770 $.1672$ $.1276$ $.1276$ $.0963$ 770 $.1762$ $.1772$ $.1270$ $.0797$ 770 $.1276$ $.1776$ $.1177$ $.0963$ 770 $.1276$ $.1270$ $.0797$ $.0777$ 800 $.1225$ $.0502$ $.1549$ $.1762$ $.1762$ $.1343$ $.0246$ $.0246$ $.00921$ $.0279$ $.02960$ $.0246$ $.00937$ $.0261$ $.0265$ $.02262$	•350	.1785	.1540	.2204	.2132	.1688	.1359	.1513	- 1 4 5 1
450 1890 1324 2000 1955 1673 1469 11239 505 1864 1425 1945 1977 1672 1463 11239 550 1635 1226 1977 1672 11463 11739 650 1635 1226 1975 1672 11739 650 1603 1226 1977 1672 11739 650 1603 1121 1775 1177 09653 650 11629 1177 1012 1177 09653 7700 1577 1012 11755 11777 09653 7700 1577 1012 1762 11777 09653 7700 1412 00911 11662 11772 09783 8000 1412 00911 1762 11475 07977 8000 11412 00911 11689 11772 07977 8000 12255 00797 07977 00797 8000 12255 00896 06166 00246 9000 00939 00797 00797 00246 9500 00837 00797 00797 00246 9500 00797 00797 00797 00246 9700 00797 00797 00796 00796 9700 00797 00797 00797 00252	• 400	.1742	.1469	.2101	. 1879	.1703	-1614	1452	7071
505 $.1864$ $.1425$ $.1945$ $.197$ $.1577$ $.1672$ $.1463$ $.1239$ 550 $.1635$ $.1258$ $.1955$ $.1472$ $.1755$ $.1239$ $.1177$ 600 $.1603$ $.1286$ $.1925$ $.1472$ $.1755$ $.1204$ $.1177$ 650 $.1629$ $.1121$ $.1775$ $.1276$ $.1279$ $.1027$ $.1027$ 700 $.1577$ $.1012$ $.1755$ $.1276$ $.1276$ $.0963$ 770 $.1577$ $.1077$ $.10627$ $.1276$ $.1177$ $.0963$ 770 $.1475$ $.1177$ $.0963$ $.1762$ $.1177$ $.0963$ 770 $.1475$ $.1177$ $.0963$ $.1279$ $.0958$ $.1672$ 770 $.1475$ $.1177$ $.0797$ $.0797$ $.0768$ $.0768$ 800 $.1225$ $.0592$ $.1762$ $.1147$ $.02545$ $.0246$ 870 $.0272$ $.1343$ $.0482$ $.0896$ $.0616$ $.0246$ 990 $.0896$ $.0261$ $.0252$ $.0252$ $.0252$.450	.1890	.1324	.2000	.1955	.1673	1490	77270	
• 550 • 1635 • 1258 • 1955 • 1472 • 1755 • 1504 • 1177 • 600 • 1603 • 1286 • 1925 • 1588 • 1613 • 1108 • 1177 • 650 • 1623 • 1286 • 1925 • 1588 • 1613 • 1108 • 1177 • 650 • 1627 • 1121 • 1775 • 1226 • 1555 • 1102 • 700 • 1577 • 1012 • 1662 • 1323 • 1652 • 1177 • 0963 • 750 • 1446 • 0911 • 1662 • 1323 • 1652 • 1177 • 0963 • 750 • 1445 • 0911 • 1662 • 1762 • 1475 • 1177 • 0963 • 800 • 1412 • 09911 • 1669 • 1770 • 0797 • 0768 • 1 • 850 • 11225 • 1143 • 0852 • 0797 • 0768 • 0768 • 1 • 900 • 0921 • 07272 • 1343 • 0482 • 0896 • 0616 • 0246 • 0252 • 900 • 0837 • 0769 • 0159	• 505	.1864	.1425	.1945	.1597	.1672	1462	1220	
600 $.1603$ $.1286$ $.1925$ $.1588$ $.1613$ $.1319$ $.1108$ $.650$ $.1629$ $.1121$ $.1775$ $.1226$ $.1555$ $.1305$ $.1027$ $.700$ $.1577$ $.1012$ $.1775$ $.1226$ $.1555$ $.1305$ $.1027$ $.700$ $.1577$ $.1012$ $.1775$ $.1226$ $.1555$ $.1108$ $.1027$ $.700$ $.1577$ $.0911$ $.1775$ $.1226$ $.1177$ $.0963$ $.750$ $.1445$ $.0911$ $.1662$ $.1772$ $.1972$ $.0963$ $.800$ $.1446$ $.0911$ $.1689$ $.1772$ $.0963$ $.800$ $.1442$ $.0977$ $.0797$ $.0768$ $.1$ $.850$ $.1270$ $.0797$ $.0768$ $.1270$ $.0797$ $.0768$ $.850$ $.1225$ $.00939$ $.1270$ $.0797$ $.07645$ $.0$ $.990$ $.0921$ $.0272$ $.1343$ $.0482$ $.0896$ $.0616$ $.0246$ $.0246$ $.950$ $.0837$ $.0261$ $.02655$ $.02252$ $.0$.550	.1635	.1258	.1955	.1472	.1755	1504	55 57 •	400T.
.650 .1629 .1121 .1775 .1226 .1555 .1305 .1027 .700 .1577 .1012 .1662 .1323 .1652 .1177 .0963 .700 .1577 .1012 .1662 .1323 .1652 .1177 .0963 .750 .1446 .0911 .1689 .1762 .1475 .1143 .0963 .750 .1445 .0911 .1689 .1762 .1475 .1143 .0953 .800 .1412 .0699 .1700 .0939 .1270 .0797 .0768 .1 .850 .1225 .0502 .1549 .1355 .1148 .0768 .1 .950 .0921 .0272 .1343 .0482 .0896 .0616 .0246 .0 .950 .0837 .0261 .0265 .0252 .0252 .0	.600	.1603	.1286	.1925	1588	.1613		0 / T T •	.1040
700 1577 1012 1662 1323 1652 1137 0963 1 750 1446 0911 1662 1323 1652 1177 0963 1 800 1412 00911 1689 1762 1475 1143 0858 1 800 1412 00699 1700 0939 1270 0797 0768 1 850 1225 0502 1549 1355 1148 0852 0545 0 900 0921 0772 1343 0482 0896 0616 0246 0 950 0837 -0249 0960 -0159 0261 0252 0	.650	.1629	1121	1775	7001				6767 •
750 11446 0963 11 800 1446 0911 1689 1762 1475 1143 0858 1 800 1412 00699 1700 0939 1270 0797 0768 1 800 1412 0699 1700 0939 1270 0797 0768 1 850 1225 0502 1549 1355 1148 0852 0545 0 900 0921 0772 1343 0482 0896 0616 0246 0 950 0837 -0249 0960 -0159 0261 0252 0	- 700	1577	1012		0771 •	6667.	- T 3 U 2	.1027	•1432
000 11412 00411 1689 1762 1475 1143 0858 1 000 11412 00699 1700 0939 1270 0797 0768 1 000 11412 00502 1760 0939 1270 0797 0768 1 010 01225 0502 1549 1355 1148 0852 0545 0 000 0921 0272 1343 0482 0896 0616 0246 0 090 00837 -0249 0960 -0159 0261 0252 0	75.0	1 2 2 2 1	3101.	7001.	• 1 3 2 3	7691.	.1177	• 0963	.1338
•000 •1412 •0699 •1700 •0939 •1270 •0747 •0768 •1 •850 •1225 •0502 •1549 •1355 •1148 •0852 •0545 •0 •900 •0921 •0722 •1343 •0482 •0896 •0616 •0246 •0 •950 •0837 -0249 •0960 -0159 •0261 •0252 •0			1160.	• 1689	•1762	.1475	.1143	• 0858	.1274
• • • • • • • • • • • • • • • • • • •	000.	27470	6690.	•1700	• 0939	.1270	.0797	.0768	.1140
•900 •0921 •0772 •1343 •0482 •0896 •0616 •0246 •0 •950 •08370249 •09600159 •0261 •05650252 •0	. 830	• 1225	• 0502	.1549	.1355	.1148	• 0852	.0545	.0988
•950 •0837 -•0249 •0960 -•0159 •0261 •0565 -•0252 0	• 900	.0921	• 0272	.1343	• 0482	• 0896	.0616	.0246	7270.
	• 950	•0837	0249	• 0960	0159	•0261	.0565	0252	0286

ALPHAS
VARIOUS
F JR
CO EFFICIENTS
PRESSURE
SURFACE
UPPER

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

0 -2.85	571474	45 .9629	50 00 00 00 00 00 00 00 00 00 00 00 00 0		EC 6 1 • 2 2	01	33 • 5946	12 • 5069	35 .3958	90 • 3002	36 .2174	81 .1237	68 . 0074	031242	24 2115	03 2753	743093	14 3370	273208	02 2895	202412	80 1976	771662	74	101 - 1331		1240	1401179		181 - - 1229	
-2.01	, 1 5'	.40			2 • 68	3 .56	5 .46	0 .39	1 .26	1 .16	90.08	2 00	311	923	831	636	438	8 40	138	635	629	124	622	620	019	119	318	.418	.718	18	
.01	1758.				*334§	.214	.126	•021(0591	138]	201	- 268	348	- 426	472	501	- 505	483	438	384	337	316	302	- 300	296	295	297	296	313	322	
66*	0667		C # C C *	.2400	.1127	0080	-0956	1606	2470	3180	3718	4244	4815	5362	5625	5704	5651	5380	4758	4190	3859	3666	3623	3598	3641	3570	3614	3703	6666"-	2497	
2.00		• • • • • • • • • • • • • • • • • • • •	. 2836	-• 0043	1325	2440	3205	3741	- 4333	4883	- 5233	5640	6154	6366	- 6267	6256	- 6043	5604	4937	- 4407	4213	4176	4156	4117	4131	4097	4254	4291	3313	1651	
2.99		F0F6.	• 0558	2353	3741	3718	- 4 3 9 4	5391	- 5599	- 5765	6197	- 6439	- 6900	6707		6530	- 5991	- 5107	- 4748	4412	4415	4273	- 4363	4209	- 4367	- 4420	- 4379	4454-	- 3422	2510	
3 • 50		.8859	1289	3252	- 4462	5262	6071	1.00	- 4877		- 7082	- 7244	- 7306	7180			- 5048	- 5330	- 4010	× 1 × 1 × 1	- 4 5 8 3	7677 -	4511	- 4509	4459	- 4628	- 4685	7027 -	0404	- 7381	
4.00		.8058	2826	5102	- 5877		1007 -		103/ •-	- 7573						L C T J •						- 4705		- 4827					1+2+4-1	0980 -	
x/c		• 000	• 005	010	• • •		020.	020	050.	040.	000.	000.	0 / D •	.100	001.	. 200	062.		000.	• • 00			0004			. 100	000	. 800	• 670 000	005°	- JUC

Т

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

						1		
×/C	4 • 00	3.50	2 • 99	2.00	66.	• 01	-2.00	-2.85
			+ + + + + + + + + + + + + + + + + + +					
• 000	.8058	.8859	• 9303	. 965R	. 05.67		1 1 1	
.005	.8296	7597				0160.	1991.	1474
-010	4448	5220		• + + 0 +	•1116	3437	-1.3248	-1.2190
510		0000	• 4033	• 2711	-•0067	3515	-1.0955	- 4702
	8776.	• 4318	• 3385	.1894	0394	3420	9 0 4 0 B	
020.	.4598	• 3747	.2710	.1519	0588			2040-
۲۵0.	• 4073	• 3447	• 2299	. 1763	- 0701			06/8
•031	• 3689	.3081	.2385	.1170		1 + 7 0 4 1	/849	8540
•040	• 3142	.2712	1847	7637		- 5438	- •6952	8482
.050	. 2758	2120		+ 700 •		2640	6331	8390
090-	2654		40CT •	• 0649	0790	2365	5760	8279
- 0.75		0102.	c/11.	• 0614	0608	2131	5346	8280
		96/1.	•1224	.0541	0528	1834	4738	- 0.241
0.01.	4402	•1605	.1257	• 0562	0365	- 1502		
•150	.1837	.1492	.1155	.0716	00			1 < 70 • -
• 200	.1746	.1424	01170	C 7 B U		0140-1	1446	8414
.250	.1685	1436			6CT0 •	0569	3010	4176
- 300	.1620		4477.		.0367	0291	1522	1188
	1505		• T Z H B	• 0962	•0503	0018	0532	1620
			• 1 2 4 4	•1052	.0610	.0180	0353	- 0.79R
	C0C1 •	9/5T •	.1255	.1114	•0767	.0331	0252	- 05.74
		• 1446	.1273	.1197	.0866	.0455	0110	
	1761.	1691.	.1296	• 1203	•0929	.0575	.0152	
166.	8141.	•1398	.1305	• 1193	F101.	0626		
.600	.1482	.1330	.1258	. 1240	1041		.0232	0160
.650	• 1403	.1306	1281				-U38Z	-•0085
• 700	.1332	2721	1 2 6 2		9/ NT •	•0/61	•0500	• 0026
.750	1764	1174		647T.	.1141	.0847	•0613	.0151
008	1112		9777 •	.1231	.1136	.0849	• 0622	.0185
050.		660T.	• 1061	.1268	.1091	• 0860	.0720	.0272
		0440.	• 0430	.1184	.1092	• 0863	.0770	2,222
	1610.	• 0 / 34	• 0846	•1142	.1064	.0732	.0755	
004.	.0331	.0381	• 0441	.0914	.0814	• 0563	06.84	0120
								01200

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPP ER

RUN 39 PTINF = 10 PSI M = 0.04 R = 100.000

×/C	-2.97	-2.97	-2.01	-1.00	• 00	1.00	00 • Z	
				4045	.9295	.9819	.9801	.8884
• 000	0388	0386	1426 .		6 7 J J	4187	.1254	2297
-005	.9800	•9833	•9366	1058.		7171	-1347	4460
	8415	.8384	.7460	• 5867	• 3 8 1 4	01410		- 5280
			5961	.4419	.2381	• 0043	1062	
•015	. 1284	C121.	1017	3005	.1127	1088	3468	6144
.020	.6110	•6089	71/6*		0228	1880	4186	6638
.025	•5169	• 5094	90/E.	0717 .	- 0677	- 2496	- 4609	- 6944
-030	• 4390	.4317	• 2983	1382			- 5272	7374
040	. 3131	.3113	.1772	• 0229	-1008			7643
		.2157	.0819	0680	2282	1045		- 7935
	1256	9741.	.0024	1377	2890	4503		
- 000	0667.	0.051	0860	7113	3544	5032	6503	
•075	•0389	1050.	1000	- 3027	4267	5571	6826	8146
.100	0721	-•0/00	+ 6 J T • +		4085	6037	7036	8097
.150	2048	2107	3033			- 4787	7092	7955
200	2897	-,3003	3795			- 40645	- 2027	7746
250	3563	3536	4276	4987	76/3		- 40.7	- 7410
	- 2062	3962	4600	5207	5763	0342	1200 -	
		4212	4752	5193	5659	6104		
065.		37 36 8	- 4515	4878	5228	5518	5813	
• 400	4033			- 4364	4587	4893	5261	c 0/ c • -
.450	3708	3179	7776-			4555	5013	-,5588
. 500	3271	3309	1965	0100.	2870	- 4389	4936	5539
-550	2753	2845	-3124			F 2 2 4 -	- 4879	5515
. 600	2489	2524	2845	3636			- 4832	5533
650	7191	2228	2681	3179	30 / 0			5543
	- 2076	2083	2591	3141	3709	C D C B •		- 5201
		2011	2546	-,3096	3679	4266	676 8 -	
061 •			. 2615	- 3082 -	3688	4141	3420	T 06 7 * -
. 800	1938	2002			- 2848	1836	1190	-•0771
.850	1890	1899	214			.0215	.0185	.0027
. 900	1918	1921	1498	0400		.0785	•0604	.0458
.950	0379	0471	•0724	.080.	1010			

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUN 39 PTINF = 10 PSI M = 0.04 R = 100,000

97
396 .3241 058 -1.2158
8779809
099 - 8523
789 7800
218 <u>- 3264</u>
18 1782
1671304
)380860
0398 0398
il40084
.50 .0124
• 0562
60 . 0989
14 .1219
• 1356
44 • I323

ALPHAS
VARIDUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPP ER

RUN 39 PTINF = 10 PSI M = 0.04 R = 100.000

	4 0 7	5 - 00	6.00	6.51	7.00	8.01	8.51	9.01
					4916 1	4225-2-	-2.6228	-2.8372
.000	.6091	.1507	4912	- 0/07	LOTC - T_	- 3 - 0504	-3.1941	-3.2616
- 005	6684	-1.1578	-1.7379	-2.033/	1016 • 7 -		-2.8226	-2.8808
	- 8754	-1.2297	-1.6832	-1.9315	-2.1822			2029 2-
		1 2268	-1-6320	-1.8462	-2.0711	-2.5524	1020.2-	
•015	•• 8803			78.81	-1.9866	-2,3933	-2.4601	1016.2-
.020	-, 9171	-1.2489	0046.1-		-1 9220	-7.7986	-2.3461	-2.4135
.025	9492	-1.2478	-1.5663	T66/*T-	1 01 35	-2.2081	-2.2574	-2.3866
020	9558	-1.2378	-1,5323	-1.692/			0761.0-	7925.5-
	- 0741	-1-2242	-1.4860	-1.6282	-1.7718	-2.0.2		
		-1 2020	-1.4328	-1.5582	-1.6981	-1.9780	00TA•7-	
• 020	0106.		1 4036	-1.5275	-1.6391	-1.8830	-1.9327	+012.2-
•090	9816	-1.1911	C 7 0 4 7 -		-1 5635	-1.7866	-1.8520	-2.1770
-075	9751	-1.1656	-1.3540	-1.4021-		1 4430	-1 - 77 32	-1.9195
	- 9603	-1.1214	-1.2846	-1.3743	-1.4004			-1.4350
0.1.		-1 0552	-1.1803	-1.2530	-1.3165	-1.4848	0000-1-	
.150	オオウア・I		1 0054	-1-1592	-1.2199	-1.3679	-1.4198	
.200	8912	9666 -	- T+0404		-1 1372	-1.2785	-1.2018	-1.2376
.250	8535	9416	-1.022			-1-2106	-1.1395	-1.1566
1006	8039	8810	9549	-1-00/9	70001-	-1.1.4.81	-1-0724	-1.0695
350	- 7348	8002	9864	9395	50T0•T-	7077 T	06.38	9590
		7541	8467	9037	9635	-1.0644		8700 -
• 400	7T/0°-	7255	- 8228	- 8865	9415	- 8944		
.450	0401			- R721	9310	7208	7261	- 1173
.500	6318	/ 1 / 1	.010.		- 8277 	6000	6098	5937
.550	6332	7205	0719	- 000	410E	- 4043	5021	4903
. 600	6294	7156	8254	0822			- 4044	3927
1000	- 6327	7342	4964	3135	5634	7104.4	2261	119
				2402	2715	3216	TC 25 •-	
.700	6402			1053	2147	2505	2439	+ 7 + 7 • -
.750	3846	1684	0467.		1585	1750	1738	1777
.800	1266	-•0000	-1233				1193	-,1267
. 850	0416	0539	0803	T060 •-			- 0586	0795
	-0046	0138	0298	0334	0431		- 0074	0381
00F •			.0269	.0174	•0142	.010	r 2 00 • 1	
•950	• 0 4 1 2	••••						

LOWER SURFACE PRESSURE CDEFFICIENTS FOR VARIOUS ALPHAS

RUN 39 PTINF = 10 PSI M = 0.04 R = 100,000

x/c	4.02	5.00	6.00	6.51	7.00	8 - 01	8 5 1	
								10.4
• 000	. 6091	1607						6 8 9 1 1
.005	2020.		7164.	- 8785	-1.3184	-2.3274	-2.6228	-7-8-7-
.010	7452	0.774	6100-T	• 9848	•9646	.8490	• 8009	- 7675
		7//0.	. 4627	.9851	1.0005	1.0024	4000	
	• 0 3 2 2	• 7709	.8791	.9145	0040.	00.70		7074 7075
070.	• 5637	• 6903	.8135	.8556	ROFE			• 9988
• 025	• 5024	.6351	7490	8052		01040	.9705	.9781
•031	• 4627	. 5958	- 707 -	7506	50 5 0 5	9148	.9328	• 6484
• 040	.3977	.5231	. 4353		0608.	.8744	.8997	.9131
.050	• 3609	4638	5701		1 6 7 1 .	•8009	.8258	.8384
.060	• 3373	-4305	5270		• 6 5 9 8	•7486	.7717	• 7865
.075	. 2966	2042	612C+	67/6.	•6154	•6915	.7193	.7402
.100	- 2608			6176 .	• 5621	.6346	• 6569	.6808
.150	- 2211		- 4 Z D - 2 Z Z Z - 2 Z Z Z Z Z Z Z Z Z Z Z Z Z	• 4626	•5065	.5694	.5940	.6052
000	- 11 77 •	6467 •	.3607	• 3942	.4218	•4866	- 5041	5155
	6 4 7 7 •	• 2 6 8 8	• 3295	• 3523	.3742	-43B3	4610	
	1602.	•2596	•3025	• 3357	.3572	4056		0004.
• 300	• 1991	•2462	• 2953	1515.	2272			•4206
• 350	.1967	.2419	.2781	2067		• 30UL	• 3 / 45	•3890
.400	• 1996	.2234	-2618		1116.	• 3516	.3620	.3677
.450	.2000	9522.	2572	00100	• 3004	• 3306	.3475	.3505
.505	.1899	.2166		8112.	• 2918	.3177	.3307	.3301
.550	. 1881	.2150	1013	6192.	.2775	•3008	.3137	.3087
• 600	• 1866	2066	1013.	1007.	- 26 70	• 2933	.2988	• 2970
.650	.1820	. 2005	0662.	8747*	.2630	.2791	.2825	.2800
. 700	. 1817	2008	FC33+	6962.	•2542	.2708	.2698	. 2663
.750	1788		1/1/	• 2289	• 2 4 0 6	.2585	.2515	. 2550
.800	1746	0/01.	• 2103	.2197	• 2283	•2399	- 7452	. 2222
850		- 7 2 7 •	• 2005	.2108	.2160	.2356	2316	
	0001.	.1747	.1897	.2011	.1992	2146		6622.
• • • •	6101.	.1649	•1799	.1897	.1893	1081	00/7.	986T•
066.	•1467	.1467	.1594	1596	14 51	1041.	• 1 4 3 4	.1765
					1/01 •	•1/32	.1656	.1391

R = 100,000																														
10 PSI M = 0.04	13.50	7890	-1.3532	9387	8260	7882	7993	7854	7968	8523	8752	8815	7303	7763	7604	7751	8102	6776	6392	6568	6558	6681	6355	6307	5616	6286	6402	6178	5970	5798
39 PTINF =	13.04	-3.1924	-2.9689	-2,9222	-2,9523	-2,9383	-2,9420	-2.9493	-2.9477	-2.9822	-2.9570	-2.6848	-1.9479	-1.3536	-1.1567	-1.0391	8971	7728	6529	5401	4634	4011	3667	3472	3222	3198	3080	2976	2914	2916
RUN	12.03	-3.3373	-3.1603	-3.0967	-3.0860	-3.0759	-3.0600	-3.0594	-3.0547	-3.1181	-3.1316	-2.6531	-1.7152	-1.3716	-1.2574	-1.1432	-1.0282	9067	7742	6481	5247	4352	3652	3154	2770	2546	2383	2290	2188	2114
	11.01	-3.2077	-3.2017	-3.0612	-3.0234	-2.9976	-2.9988	-3.0090	-2.9977	-2.9712	-3.0408	-2.3429	-1.5691	-1.4248	-1.3150	-1.2107	-1.0977	-• 9929	8619	7350	6038	4907	4007	3307	2742	- 2295	1975	1802	1633	1455
	×/C		.005	010	.015	.020	.025	-030	.040	.050	.060	-075	.100	.150	.200	.250	.300	.350	. 400	.450	.500	.550	.600	.650	.700	.750	. 800	.850	• 900	.950

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

R = 100,000																														
= 10 PSI M = 0.04	13.50	7890	. 9359	. 9972	. 9500	. 9122	. 8608	.8226	. 7520	. 7013	• 6606	. 6039	5167	. 4426	. 4020	. 3671	.3455	• 2888	. 2643	.2313	- 2096	. 1964	.1662	.1297	. 0900	.0710	• 0362	. 0027	0887	1690
39 PTINF =	13.04	-3.1924	.5660	.9205	.9935	1.0006	.9868	.9702	.9122	.8598	.8175	.7592	• 6808	• 5884	.5197	.4581	.4244	.3911	.3653	•3343	•3082	• 2932	.2570	.2363	.2159	.1761	.1530	.1160	.0725	0059
NUN	12.03	-3.3373	.5629	• 9333	.9995	1.0035	.9912	.9582	.8958	.8549	.8136	.7578	.6764	.5755	.5145	.4585	.4275	.3897	.3596	•3369	• 3238	• 2992	.2723	.2514	.2303	•2062	.1732	.1397	• 0969	.0381
	11.01	-3.2077	.6134	.9467	1.0029	• 9989	.9731	• 0 4 4 4	.8966	.8367	.7912	.7256	.6575	• 5636	.5058	.4567	.4195	.3902	.3592	•3384	.3200	.3010	.2814	.2581	.2371	.2212	.1943	.1640	.1243	.0759
	x/c	• 000	• 005	.010	.015	• 020	• 025	• 031	• 0 4 0	.050	.060	.075	.100	.150	•200	.250	• 300	•350	• 400	.450	• 505	•550	• 600	.650	• 700	.750	• 800	.850	• 900	.950

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIDUS ALPHAS

.

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 43,44 PTINF = 15 PSI M = 0.03 R = 100,000

TURBULATOR TAPE, ON

000 -0005 9750 -0901 -0903 010 9750 -0750 -9750 -0903 0115 9750 -9750 -0193 -0193 0105 9750 -701 -0014 -0193 0105 9750 -701 -0115 -701 0105 -9750 -701 -0116 -1156 0105 -9750 -0112 -0112 -0112 0109 -9994 -1126 -0116 -0116 0109 -11996 -0126 -01216 -0110 0109 -1100 -0110 -0116 -0116 -0116 0106 -1126 -0126 -0126 -0126 -01316 0116 -1126 -0126 -0126 -0126 -0126 0116 -1126 -0126 -0126 -0126 -0126 0116 -1126 -0126 -0126 -0126 -0126 0116 -1100 -0126 -0126 -0126 -0126 0107 -11101 -0126	×/C	-2.83	-2.00	-1.51	-1.00	00.	.01	1.01	2.00
000 -0062 .2546 .4614 .6358 .9941 .9000 .9834 010 -9760 .9373 .6978 .6645 .47127 .1671 0110 -9760 .9976 .6145 .5456 .4618 .6635 .4617 0110 -9760 .9975 .6145 .5456 .4618 .6635 .4617 0125 -5931 .9927 .1132 .2410 .3407 .1267 .1273 025 .5918 .0126 .0176 .0176 .0126 .9319 .0199 0175 .1906 .0176 .0176 .12746 .1263 .1270 .1270 0176 .1107 .2746 .1273 .1264 .1266 .1270 .1270 0176 .1107 .2746 .2746 .2770 .2693 .2693 0176 .1107 .2746 .2776 .2694 .2695 .2695 0176 .1107 .2746 .2746 .2694 .2693 .2694 0170 .1107 .2746									
$\begin{array}{cccccccccccccccccccccccccccccccccccc$			7646	4614	. 6358	.8941	. 9000	•9834	.9796
005 9760 9776 9760 9760 9760 9760 9176 6145 6176 6167 6167 6167 6167 6109 6127 6167 6109 6128 62625 5593 6109 6109 6109 6109 6109 6167 6109 6167 6100 6167 6100 6128 6019 6167 6109 61009 6109 6109	• 000	0062	0+67*		95.25	.6756	.6853	• 4489	.1490
0.010 0.857 7501 6.978 6.049 7.100 2.573 0.092 0.025 5.931 $.9922$ $.3400$ $.1334$ 0.1357 -0.092 0.025 $.5931$ $.9922$ $.3102$ $.26418$ $.00418$ $.00426$ 2319 0.026 $.5948$ $.01263$ 0276 2319 2319 0.040 $.2948$ $.01263$ 0276 2319 0270 0.050 $.1107$ 0395 0276 2319 0270 0.076 0.0730 02741 20101 2316 2319 0.076 01726 02741 2763 0270 3378 4916 0.076 0170 2763 0170 2763 0270 5937 0.0860 0760 0763 0764 0700 0770 0700 0.070 0763 0170 2763 0270 0270 0270 0.070 077	• 005	.9760	E1 E6 .	- 20A			7614	.1671	1145
015 7095 .6145 .5456 .4618 .2622 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1573 .1503 .1573 .1516 .0619 .1263 .1261 .0216 .1263 .1261 .1	010	. 8357	. 7501	. 6978	• 6049		- 1 T L -	0100	2359
025 5931 4957 4190 3400 11367 -1700^{10} 025 5018 3922 23102 22418 01667 2319 026 5018 3922 23102 22418 -10263 2319 050 11976 -03266 -10395 21263 22319 2319 0660 -1176 -03246 -12663 1204 2319 2319 0750 -1176 -03240 -1264 1264 24018 1704 0760 -1176 02390 02741 2763 22698 4407 -1700 2763 2763 2763 2796 6077 -1700 2763 2763 2763 4918 6077 -2700 2763 2763 2763 5726 5726 5728 -2000 2793 4946 7746 5728 6077 5728 -2000 2794 4966 <td>115</td> <td>7095</td> <td>.6145</td> <td>•5456</td> <td>.4618</td> <td>• 2 6 2 3</td> <td>6762.</td> <td>64TA</td> <td></td>	115	7095	.6145	•5456	.4618	• 2 6 2 3	6762.	64TA	
0.020 0.7731 0.0467 -0.0270 -0.2319 0.020 -5748 0.1107 -0.0270 -0.2319 0.075 -5748 0.1260 -0.0519 -0.2163 -0.1263 0.075 -1107 -0.2163 -0.2163 -0.2163 -0.2163 0.075 0.0176 -0.0230 -0.0230 -0.2763 -0.2496 -0.9337 0.075 -0.1766 -0.0230 -0.1284 -1100 -2.2463 -4.918 0.075 -0.1766 -0.2733 -1100 -2.2693 -4.9186 0.075 -0.2733 -2.1264 -2.2693 -4.9186 -5.760 -5.9378 0.075 -0.2733 -4.9264 -5.760 -5.5135 -6.0577 0.0000 -0.3317 -0.4964 -4.9564 -5.9327 -5.5135 0.0000 -0.2733 -0.4964 -5.760 -5.5135 -6.0577 0.0000 -0.2733 -4.956 -4.956 -5.9496 -6.9327 $0.$	CT0.		40 5 7	4190	.3400	.1334	.1367	2060	0000 • -
0.025 0.2018 0.3726 0.0319 0.0726 -0.0270 -0.2319 -0.2319 0.030 0.7946 0.1260 0.0519 -1263 -0.0270 -2.2319 0.060 1107 0.0396 -0.0395 -1201 -2.2401 -3378 -4407 0.060 0.1107 -0.0230 -0.0395 -14120 -2698 -44018 0.075 0.0176 -0.0549 -12841 -2763 -2763 -5698 -44018 0.075 -0.0860 -2.241 -2.2737 -44948 -59496 -59476 0.075 -0.0860 -0.3370 -2.4408 -49667 -65077 0.075 -0.0860 -0.3777 -2.2041 -5704 -55136 -69507 0.075 -0.2700 -2.2707 -2.5304 -5.504 -5.5770 -5.5927 0.075 -3751 -44766 -4768 -6.6577 -6.6577 -6.6577 0.0760 -3757 -44766 -47566 <t< td=""><td>.020</td><td>1646.</td><td></td><td></td><td>2418</td><td>.0418</td><td>•0467</td><td>1700</td><td>4083</td></t<>	.020	1646.			2418	.0418	•0467	1700	4083
030 4.220 3132 0.099 0.0519 -1263 -1204 -3160 075 0176 0939 00366 -0395 -1201 -2015 -3839 075 0176 -0230 -0366 -0379 -0368 -4918 -4918 075 00176 -0280 -1284 -1284 -1263 -12698 -4918 075 -0176 -0280 -1284 -1284 -1263 -5977 0100 -0860 -12763 -1284 -1263 -6977 -5977 200 -19466 -1263 -1264 -5780 -5977 -5977 200 -4978 -4954 -5780 -56677 -59770 -69329 200 -40461 -4778 -4956 -6937 -69329 -69329 200 -40470 -5697 -6937 -69329 -69329 -69329 200 -49762 -49762 -49462 -69369 -69329	.025	• 5018	- 3426	3016	1605		0270	2319	4560
040 2948 11996 0366 0395 -1200 -2015 -3378 -4407 075 0176 00339 -01284 -1100 -2746 -2698 -4407 075 0176 -00339 -01284 -1100 -2741 -2763 -3378 -4976 -59496 100 -1107 -02830 -0733 -07442 -2693 -4976 -5749 -5749 -5749 -5749 -59496 -59496 -59496 -59496 -59496 -59496 -59496 -59496 -5937 1750 -2737 -2493 -4651 -4954 -5135 -6337 -6337 2500 -2737 -9496 -4650 -4476 -5728 -6327 -6337 3300 -4476 -4476 -5728 -4762 -6327 -6327 3300 -2731 -7466 -4456 -6376 -6372 -6372 -6327 3300 -22631 -4456 $-$	•030	.4220	.3132	• 4 4 0		- 1262	1204	3160	5272
0.0000 0.00000 0.00000 0.00000 0.000000 $0.00000000000000000000000000000000000$	-040	. 2948	.1996	.1260	6T GD .	CO7T•_		00000	5717
0.075 0.1107 0.0230 -0.0428 -0.1100 2746 2698 4916 3378 4916 5977 0.075 -0.0176 -0.0860 1284 1864 3460 3378 4916 5977 0.075 -0.0860 12726 2241 2763 4964 5977 59378 4916 0.075 0860 12726 2745 2763 4976 59378 4916 0.070 2737 3376 4084 4956 5704 5135 66577 0.070 2793 4788 4956 5704 5738 66329 0.070 40161 4470 5604 5728 66329 0.0702 40121 4470 5728 66329 0.0702 49105 4956 5704 5728 66329 0.0702 49105 4456 5704 5728 65329 0.0702 4470 5604 5728 66329 0.0702 49105 4456 4812 5728 65329 0.0702 4812 4812 63649 64326 5504 0.0702 2793 4912 4289 63249 64326 0.0702 2792 2795 2314 23649 3649 0.0702 22135 2792 27962 2796 3649 <		1996	•0030	•0366	0395	2101	GTN7-		
0075 0176 -0649 -1284 -1864 -3460 -3378 -4918 -5977 100 -0860 -1726 -2241 -2763 -4956 -5977 -5977 150 -0860 -1726 -3770 -5135 -4956 -5977 2700 -2737 -9845 -6773 -6077 -5977 250 -2737 -9845 -6677 -5604 -5135 -6077 -2737 -9496 -5700 -5137 -6077 -2737 -4976 -5700 -5139 -6077 -2737 -4976 -67397 -6077 -2737 -4796 -4761 -67397 -2700 -3757 -67397 -6677 -4011 -67604 -5770 -63229 -4170 -44126 -67896 -66727 -4170 -44962 -5604 -5389 -4170 -4961 -4962 -67899 -4170 -4912 -67899 -67399 -4211 -44126 -64912 -67899 -4211 -4912 -6912 -6937 -4200 -73969 -67399 -67399 -4700 -2734 -2765 -3277 -2700 -2943 -2795 -3277 -2713 -2738 -2869 -67399 -27135 -27136 -2726 -2729 -27135 -2700 -2729 -27005 -27135 -2700 <td< td=""><td></td><td>1107</td><td>0520.</td><td>0428</td><td>1100</td><td>2746</td><td>2648</td><td></td><td>3770°L</td></td<>		1107	0520.	0428	1100	2746	2648		3770°L
0775 00176 00176 5740 5763 4142 40647 5496 5977 150 2783 3740 3740 57204 5976 5977 5977 250 2737 3757 3757 4954 56077 5977 5977 250 2737 3757 4954 5604 66677 66077 2737 2737 2737 5970 65804 66677 2737 2737 4956 5726 5904 66077 2737 3769 56047 5728 6329 4011 4962 5728 6329 6329 4105 44766 6728 6329 6329 4110 4962 4962 5904 6329 4105 4956 4962 5904 6329 4110 44766 4956 3346 6329 2333 4105 4956 32649 6329 2333 22628 22653 22642 32649 6329 2233 22628 22628 22643 2669 4762 2233 22628 22642 32649 6329 2233 22628 22642 32649 4269 2233 2419 22628 22642 23649 4762 2074 22942	000.			- 1284	1864	3460	3378	4918	1769 -
-100 -0860 $-11/26$ -2641 -3740 -4948 -4956 -5977 2500 -2850 -5850 -5135 -6077 -6077 2500 -2737 -5850 -5728 -66577 2500 -4045 -95647 -55004 -55804 -56377 250 -4045 -4651 -4954 -5728 -66377 250 -4178 -6461 -4962 -5728 -66327 -4017 -4486 -4456 -4812 -5804 -5822 -4017 -4461 -4456 -4812 -5404 -5728 -500 -5312 -6470 -57404 -5728 -56327 -4017 -4466 -4476 -64813 -5728 -56327 -4017 -4466 -4812 -5404 -5728 -56327 -5004 -5728 -6377 -5728 -56327 -5004 -5728 -6327 -5822 -5199 -6702 -3813 -4470 -6426 -4812 -500 -5333 -2292 -3271 -5494 -5199 -500 -2310 -22419 -2262 -3261 -4226 -500 -22135 -22419 -22023 -2249 -2349 -500 -2214 -2268 -22023 -2249 -2349 -700 -22134 -2262 -2249 -2349 -0074 -1024 -22134 -2262 -0734 <td>• 075</td> <td>• 01 / 0</td> <td>**00*1</td> <td></td> <td>- 2763</td> <td>- 4142</td> <td>4084</td> <td>5496</td> <td>6870</td>	• 075	• 01 / 0	**00*1		- 2763	- 4142	4084	5496	6870
-150 -2850 -3370 -3370 -3370 -5770 -5737 -5867 -56677 250 -3757 -4951 -4954 -5870 -5804 -5827 -1045 -4951 -4954 -5720 -55804 -5822 -1045 -4966 -4954 -5720 -5728 -65329 -1005 -4456 -4952 -5740 -5728 -65222 -4767 -4456 -4456 -4456 -6728 -65222 -4762 -4456 -4456 -4456 -6728 -65222 -4952 -94762 -5704 -5728 -65222 -4978 -6011 -4456 -4456 -6728 -4762 -3337 -33752 -6728 -65223 -550 -23170 -23446 -33755 -6077 -550 -22533 -22651 -23649 -64762 -2553 -22652 -3224 -33696 -64762 -2795 -22942 -33755 -3649 -6726 -2213 -22623 -22942 -3649 -6074 -2213 -22419 -22623 -28449 -0106 -2214 -22623 -28449 -0106 -2214 -22622 -22942 -3649 -0974 -2022 -22419 -22623 -28449 -0106 -2074 -22722 -0734 -00337 -0033 -1024 -2022 -2212 -0734 <td>.100</td> <td>0860</td> <td>1/26</td> <td>T 6 7 7 •</td> <td></td> <td>0 7 C 7</td> <td>- 4056</td> <td>5977</td> <td>7130</td>	.100	0860	1/26	T 6 7 7 •		0 7 C 7	- 4056	5977	7130
250 2737 3845 4269 5704 58694 66677 250 3757 49946 4651 4954 5726 5726 66677 300 4045 4954 55604 5728 66329 4045 44766 4954 5728 66329 4011 4496 4670 49564 5728 66329 4010 4718 4956 4966 4728 65329 4010 4710 4670 49162 4843 51899 4106 4476 4762 4966 4476 4000 4106 4476 67389 67389 4100 4476 4788 6512 4728 4000 2793 4726 4849 67399 2793 2942 33755 33649 4726 2310 2263 23649 4269 4470 2310 22419 2795 23649 4269 2135 22135 2342 2342 2314 2074 2342 2523 23649 0974 2074 2022 2795 23649 4269 2135 22135 2314 0076 22135 22134 2342 2344 0106 2074 2342 2798 23649 0974 <t< td=""><td>.150</td><td>2080</td><td>2850</td><td>3370</td><td></td><td></td><td></td><td>- 6077</td><td>7076</td></t<>	.150	2080	2850	3370				- 6077	7076
2500 4293 4651 4954 5850 5004 570 300 4045 4778 5047 5760 5770 6337 300 4015 44061 4778 5760 5710 63397 350 4170 4486 4450 4812 5199 5199 400 4170 4488 4450 4412 5199 5199 450 4813 4812 4812 4813 5199 450 3337 3376 4812 4813 4762 550 33170 3376 3976 4812 4770 550 2943 2135 2376 3375 4776 550 2310 2346 2796 3376 4369 2310 2342 2795 32649 4762 2310 2342 2563 2943 3649 4261 770 2342 2563 2943 2694 2694 22342 2795 2905 3549 4261 2012 2342 2793 2205 2314 0074 2012 22342 2562 2949 4261 2012 22342 2793 0336 2340 2012 22342 0333 0038 2314 2012 2022 03377 0	200	2737	3514	3845	4269	+ 0 7 0 +		2777 7772	0547 -
-4045 -4496 -4778 -5047 -57260 -5728 -6329 -3500 -4170 -4661 -4661 -4661 -5180 -5728 -6329 -4005 -4170 -4661 -4661 -4662 -5504 -5728 -6329 -400 -4170 -4481 -6329 -6329 -6329 -400 -4170 -4486 -6470 -64962 -5504 -5728 -6329 -4700 -94105 -44766 -64812 -64843 -63299 -64243 -500 -3337 -33796 -64843 -64762 -64843 -64369 -500 -2310 -23825 -33755 -64369 -64262 -64265 -600 -22943 -22651 -22942 -33755 -33759 -64261 -700 -2310 -22633 -22653 -22649 -3449 -6725 -700 -2135 -22419 -22653 -22649 -3469 -64261 -700 -2135 -22623 -22649 -3649 -62149 -23144 -2074 -22342 -22653 -22649 -23149 -00764 -00106 -2074 -22022 -0702 -0702 0044 -01064 -01067 -2074 -22022 -0702 -0702 0044 -010627 -0495 -2074 -22022 -0702 -0702 -06077 -0128	250	- 3757	4293	4651	4954	5850	1000-1		7076
350 -6218 -5580 -5728 -6329 -4201 -4456 -5404 -5728 -6329 -4170 -4408 -4456 -6412 -5404 -5728 -401 -4456 -4412 -6812 -6829 -401 -4456 -4412 -4843 -5199 -550 -3337 -3376 -6379 -61299 -600 -22943 -3170 -3346 -3543 -6476 -600 -22943 -3170 -3375 -3751 -44762 -550 -22943 -3170 -3227 -3751 -44762 -550 -22943 -3170 -3227 -3751 -44762 -550 -22943 -21795 -3227 -3751 -44762 -550 -22943 -28658 -2795 -3227 -3751 -4289 -600 -22135 -22942 -3541 -3619 -6225 -22135 -22419 -22942 -35649 -3649 -32649 -22135 -2213 -2205 -3541 -3649 -32649 -2023 -2219 -2205 -2314 -0076 -20744 -22022 -0734 -0333 -0125 -20744 -22022 -0734 -0333 -0125 -10024 -0297 -0386 -0485 -0333 -10024 -0702 -0734 -0702 -0485	002		4040	4778	5047	5760	5770	0341	
-350 -4211 -5404 -5389 -5822 $+470$ -4476 -4812 -5389 -5822 $+470$ -4812 -4812 -5199 -5199 $+450$ -4476 -4812 -4843 -5199 -3337 -3170 -3543 -4476 -4843 -3337 -3598 -3376 -4876 -4876 -550 -3376 -3756 -4876 -4843 -550 -3376 -3775 -3976 -4876 -550 -2343 -32795 -3756 -3751 -2533 -22962 -3227 -3658 -3449 -22913 -22962 -32649 -4261 -22913 -22419 -22942 -3658 -3649 -22135 -22342 -22942 -3649 -3649 -22135 -22342 -22942 -3649 -3649 -22342 -22942 -23651 -22942 -3649 -22023 -22342 -22942 -2314 -00744 -1906 -22342 -0734 -0333 -0125 -19024 -22022 -0734 -0336 -0333 -19024 -22022 -0734 -0702 -0722 -19024 -20722 -0733 -0702 -0722 -19024 -20722 -0734 -0722 -0722 -19024 -20722 -0733 -0702 -0722 -19027 -0722 -0734 -0722				4884	5180	5604	5728	6329	C069 -
400 4170 4496 4812 4843 5199 450 3813 4105 4269 4611 4812 4843 5199 450 3813 3170 3376 3376 4812 4762 550 3337 3376 3376 3376 4470 550 2943 3170 3346 3376 4812 4470 550 2943 3170 3346 3375 3751 4470 550 2943 2825 3262 32649 4470 2310 2825 2942 3551 3649 4261 700 2135 22474 2795 3561 23649 4261 770 2135 22474 2795 23649 4269 4269 770 2135 22419 2563 23649 2314 09749 770 20734 23649 2314 01066 20744 0734 03377 0.0333 -0125 1024 20722 0734 0702 0627 0485 1024 20722 0734 0702 0627 0485 2072 27022 0734 0702 0627 0485 2072 0734 0702 0734 0722 0734	.350	4411	1004 •		- 4047	5404	5389	5822	6436
450 3813 4105 4269 4769 4358 4289 4762 500 3337 3598 3783 4011 4358 4762 4470 550 2943 3170 3346 3375 3751 4762 550 2825 3170 3262 3375 3751 4470 2825 2825 3270 3756 3751 4476 2963 2962 3275 3751 4369 4476 2310 2825 28651 2942 3561 4269 2023 2651 2942 35649 4261 2005 2474 2523 2849 3649 3649 2135 2419 2563 2849 3649 3649 2005 2673 2849 3649 3649 3649 2005 2342 2563 2849 2342 23649 2074 2005 2342 2342 2369 2409 2074 2005 2314 0005 2314 0106 2074 2073 0033 0.0150 0.493 0.025 2072 0734 0396 0485 0106 2072 0734 0702 0.0627 0.0485	.400	4170		1.04.1			- 4843	5199	5836
550 -3337 -3598 -3783 -4011 -4570 -3969 -4470 550 -2943 -3170 -3346 -3543 -3976 -3969 -4470 550 -2533 -2825 -3376 -3751 -4345 600 -2533 -2825 -3227 -3751 -4470 -500 -22310 -2825 -3227 -3758 -3409 -700 -2135 -2474 -2795 -32649 -4261 -700 -2135 -2474 -2795 -35649 -4261 -700 -2135 -22474 -22653 -2849 -3649 -3409 -700 -2135 -22135 -22474 -2563 -2849 -3649 -3649 -700 -1906 -22342 -2563 -2849 -03649 -0974 -80074 -1906 -22022 -0734 -0035 -0333 -0125 -850 -1024 -0176 -0734 -0702 -0627 -0491	.450	3813	4105	4269				- 4762	5388
-550 2943 3170 3346 3543 3976 3751 43455 -600 2533 2825 2962 3755 3751 43455 -650 25310 2826 2795 3755 3751 4345 -650 23135 2658 2795 35649 42619 -700 2135 26419 2651 2942 35649 42619 -700 2135 26419 27942 26449 3649 4261 -700 2135 26419 2663 28449 3649 4261 -700 2023 26419 2849 2344 09744 00166 -800 2074 20734 0333 0126 2342 2314 0126 -10024 20734 0336 0333 0126 0491 0491 0005 2072 0733 $.0702$ $.0627$. 500	3337	3598	3783	4011			- 4470 - 4470	5056
600 2533 2825 2962 3227 3755 3751 4349 650 2310 2658 2795 3026 3649 4225 650 2135 2474 2651 2942 3649 4226 700 2135 2419 2651 2942 3649 4261 700 2135 2419 2651 2942 3649 4261 700 2135 2342 2668 2849 3649 3649 3409 7700 21906 2342 2508 1831 2314 0974 860 1906 2022 0734 0397 .0035 .0333 .0125 .850 1024 .0702 .0663 .0722 .0491 .0491		- 2043	3170	3346	3543	3976	5059 · I		2007 -
• • • • • • • • • • • • • • • • • • •			- 2825	2962	3227	3755	-,3751	・ ・ ・ ・ ・ ・	
.650 2310 2651 2942 3541 3619 4261 .700 2135 2474 2651 2649 3540 3649 3409 .750 2135 2419 2523 2849 3548 3649 3409 .750 2023 2542 2568 1831 2005 2314 0974 .800 1906 2342 2508 1831 2005 2314 0106 .800 1906 2074 2022 0734 0336 .0333 .0125 .900 1024 .0150 .0433 .0702 .0627 .0485 .0491	• • • •			- 2705	3026	3658	3649	6224-	CA24
.700 2135 2474 2651 2849 3588 3649 3409 3409 .750 2023 2419 2523 2849 3588 3649 3409 3409 .800 1906 2342 2508 1831 2005 2314 0106 0106 .800 1906 2074 27508 0337 .0035 .0044 0106 0106 .850 1024 .0150 .0433 .0377 .0386 .01333 .0125 .019125 .900 1024 .0150 .0463 .0702 .0627 .0485 .0491	.650	2310	• • • • •		- 2047	- 3541	3619	4261	4074
.750 2023 2419 2523 2849 3314 0974 - .800 1906 2342 2508 1831 2005 2314 0974 - .800 1906 2342 2508 1831 2005 2314 0974 - .850 1906 2342 0734 0397 .0035 .0044 0106 - .850 1024 .0150 .0433 .0377 .0386 .01333 .0125 - .900 1024 .0150 .0663 .0702 .0627 .0491 .0491	. 700	2135	2474	1007			9449	3409	1358
800 1906 2342 2508 1831 2003 2014 0106 .850 2074 2022 0734 0397 .0035 .0044 0106 .850 1024 2073 .0377 .0386 .0333 .0125 .900 1024 .0150 .0433 .0702 .0663 .0491	.750	2023	2419	2523	5+97 · -		4150 -	- 0974	0679
850 2074 2022 0734 0397 .0035 .0044 .900 1024 .0150 .0433 .0377 .0386 .0333 .0125 .900 1024 .0150 .0433 .0722 .02627 .0485 .0491	. 800	1906	2342	2508	1831	6007 . -			0355
• 000 -1024 0150 • 0433 • 0377 • 0386 • 0333 • 0491 • 900 -1024 0857 • 0663 • 0702 • 0627 • 0485 • 0491	RFO	- 2074	2022	0734	-•0397	• • • • •			0018
		- 1024	.0150	·0433	.0377	• 0386			.0357
			.0857	.0663	.0702	• 0627	6840.	1640.	•

<u>ر - ک</u>

LOWER SURFACE PRESSURE CDEFFICIENTS FOR VARIDUS ALPHAS

RUNS 43,44 PTINF = 15 PSI M = 0.03 R = 100,000

TURBULATOR TAPE, ON

X/C	-2.83	-2.00	-1.51	-1.00	00.	• 01	1.01	2.00
• 000	-• 0062	.2546	.4614	. 6358	.8941	0006-	4580.	7020
• 005	-1.3320	-1.2876	-1.0384	7775	7764	- 2805 - 2805		
.010	9879	-1.0385	- 8652	6854	3066	- 3062		20000
•015	8947	8977	7652	- 6098	2978	- 3051	77CO -	CD76 •
• 020	8668	8125	6876	5575	- 2892	787A		6767 .
.025	8291	7501	6328	5276		2850		0707 • 16 46
.031	8204	6896	5903	- 4833	2650	2674	0573	
•040	8027	5978	5099	4310	2386	- 2357	0568	C2CT.
.050	7876	5334	4556	3828	2181	2129	0561	.0861
• 060	7863	4865	4132	3450	-1970	-,1953	0576	.0376
• 0.75	7782	4257	3590	2914	1713	1644	0462	0120-
.100	7844	3591	2985	2413	1351	1331	0331	0736
• 150	1869	2519	2105	1640	0841	0881	0070	-0749
• 200	1360	2022	1439	1153	0527	0553	.0194	.0844
• 250	1253	1539	1009	0728	0166	0194	.0391	.0955
• 300	0968	0816	0654	0366	• 0 0 0 0	•0062	.0590	-1049
• 350	0614	0411	0442	0182	.0329	.0241	.0679	-1104
• 400	0477	0230	0197	.0078	•0418	•0366	.0742	.1154
.450	0249	• 0026	-•0043	.0180	.0514	.0465	.0881	.1215
606 .	.0081	1020.	•0281	.0364	•0572	.0661	.0947	.1214
066.	• 0048	•0424	•0292	.0459	•0736	•0745	•0962	.1304
. 600	• 0311	.0614	.0759	.0551	.0860	•0815	.1041	.1349
000	• 0462	.0667	•020•	.0671	.0877	•0932	.1135	.1340
00/ •	• 0568	•0420	.0847	.0718	.1007	•0983	.1198	.1341
. 150	• 0723	1060.	• 0966	.0878	.1026	.0985	.1261	.1376
. 800	0160.	• 0 6 7 4	.0997	.0968	.1090	.1046	.1197	.1375
068.	• 0869	.1077	•1260	.1007	.1104	.1078	.1244	.1401
006.	• 10/6	• 1183	•1309	.1062	.1140	.1095	.1224	.1358
• 950	.1107	.1325	.1242	.1035	.1139	.1094	.1144	.1287

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIDUS ALPHAS

RUNS 43,44 PTINF = 15 PSI M = 0.03 R = 100,000

TURBULATOR TAPE. ON

i	3.00	4 • 00	5.00	6 • 00	7.00	7.50	7.51	8 • 00
			1 5 3 4	. 4603	-1.7836	-1.7644	-1-7448	-2,2279
	. 89 24	1619.				-2 6820	-7.6678	-7.9799
	2378	6670	-I+ 1001	-1.1134				- 7.4614
	- 4474	8128	-1.2249	-1.6642	9661.2-	041407-	112602	
	5468	8723	-1.2500	-1.6213	-2.0635	-2.2782	-2.2703	-2.4431
	6216	- 9202	-1.2433	-1.5927	-1.9726	-2.1880	-2.1755	-2.3654
		- 9427	-1.2475	-1.5604	-1.9006	-2.0934	-2.0810	-2.2611
		- 0533	-1-2301	-1.5283	-1.8518	-2.0097	-2.0074	-2.1785
		8020 -	-1-2232	-1-4747	-1.7586	-1.9055	-1.9119	-2.0454
		- OBR4	-1.2149	-1.4320	-1.6881	-1.8060	-1.8125	-1.9499
			111050	4005.1-	-1.6255	-1.7426	-1.7491	-1.8587
				-1.3524	-1.5590	-1.6479	-1.6726	-1.7604
		0006 • •	11206	-1-2847	-1.4550	-1.5524	-1.5543	-1.6401
				-1-1877	-1.3156	-1.3846	-1.3937	-1.4587
		- 0000	- 0016	-1.0852	-1-2097	-1.2709	-1.2789	-1.3494
		- 0767	- 9975	-1.0608	-1.1570	-1.2073	-1.2127	-1.2883
		1004 °	- 0147	9719	-1.0682	-1.1250	-1.1298	-1.2012
				- 9013	-1-0183	-1.0677	-1.0715	-1.1310
				- 8578	9725	-1.0290	-1.0365	-1.0740
	CT / O	- 4744	- 7517	- 8379	9481	-1.0019	-1.0150	9005
			7366	- 8296	9466	8777	8921	7122
			- 7777 -	8235	7613	5369	5364	5959
	- 5665		7355	- 7724	4074	4419	4484	4923
		1059 -	- 5699	- 3599	3426	3737	3750	4015
			- 2275	2194	2776	3038	3085	3175
		7761 -	- 1470	- 1761	2209	- 2400	2375	2486
	1020		1177	1331	1582	1660	1720	1806
			- 0785	0879	- 0989	1102	1129	1205
				0322	- 0424	0504	0485	0499
	6000°-		1720.	0168	.0131	.0161	.0141	.0078
	Vee 0.	11000	* * • •		1 5 0 2 2	1		

T

LOWER SURFACE PRESSUPE COEFFICIENTS FOR VARIDUS ALPHAS

RUNS 43,44 PTINF = 15 PSI M = 0.03 R = 100,000

TURBULATOR TAPE, ON

00.00
0.00
• 8
æ.
· ·
•
••
•2
5
•
• 4
.
ń.
m.
~
Э́С
• 5,
.21
•21
•21
• 5 •
•
•2(
.1.
.1.

R ≖ 100,000		14.00	5905	-1.1016	2 4 4 5 5				2742-1	/1 /8	8161	7525	6846	7118	7146	7821	7095	7066	6786	6264	6776	6189		6340	6149	5938	6731	6096	6557	6406	6153	5835
M = 0.03	E, ON	13.00	-3-2562				0006 • 7 -	-2.9768	-2.9813	-3.0021	-3.0157	-3.0272	-2,9925	-2 • 5252	-1.8014	-1.3375	-1.1434	-1.0287	8757	7705	6347	5160	4438	3892	3614	3431	3339	3243	3112	3068	3138	2918
= 15 PSI	RBULATOR TAF	12.00	8745 C.		-3. 1/9U	-3.0804	-3.0810	-3.0671	-3.0868	-3.0918	-3.0722	-3.0876	-3.0893	-2.4195	-1.6227	-1.3741	-1.2402	-1.1240	-1.0091	8837	7415	6149	5011	4085	3468	-,3006	2745	2582	2378	2315	2270	2220
3,44 PTINF	TU	10.00		70#T*6=	-3.2829	-2.8915	-2.8212	-2.7889	-2.7636	-2.7543	-2.7076	-2.6502	-2.6460	-2.3476	-1.7013	-1.4197	-1.2935	-1.2425	-1.1382	-1.0418	9262	-•7992	6616	5487	4493	3605	- 2931	- 2305	1829	1458	1135	- 0894
RUNS 4		9.01		-2.484/2	-3.2429	-2.8905	-2.6498	-2.4781	-2.4080	-2.3460	-2.2915	-2-2314	-2.1981		-1.9023	-1.4470	-1-2802	-1.2315		-1-0756	9632	8412	7177	5965	- 4810	-3980	1916	- 2419	1776	1264	0801	0401
		8.50		-2.6188	-3.1998	-2.8280	-2.6582	-2.4876	-2.3802	-2.2893	-2.1547			-1 RA5R		-1.5240 -1.5240			1 1 2 2 2 0	-1.13/7		8410	7375	6218	R O C	- 4074	3758			- 1154		0070
		×/C		.000	.005	.010	.015	020-	.025					• 000		001.		.200	062.	• • • • •						• • • • •			000	• • • •	000	.950

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

ALPHAS
VARIOUS
FOR
CO EFFICIENTS
PRESSURE
SURFACE
LOWER

RUNS 43,44 PTINF = 15 PSI M = 0.03 R = 100,000

TURBULATCR TAPE, ON

14.00		5905	.9640	.9933	96.40				0110	110/ •	• • • • •	• 6 4 0 1	•5819	•5237	.4458	3870			•3199	• 2829	• 2666	•2259	.2143	.1829	.1576			• 0968	•0529	.0316	0150	0.041	• 1838
13.00		2962.6-	•5583	.9228	.9881	4600	0782	20174			0700.	0710.	. 1218	•6820	.5779	.5161	5C 74 -					•3313	• 3009	.2805	.2508	7882			08/1.	.1490	.1096 -	.0552	-0183
12.00		5.45.61	• 5765	.9230	. 9931	. 9928	9854	9546	. 9055	. 8516		1100.		• 6750	.5718	. 5069	. 4588	acc4	0775			.542.	.3176	• 2985	.2708	.2418	5262	1071	1771 •	.1707	.1394	• 0912	.0249
10.00	6771 6-		6180.	.9725	1.0057	1066.	.9581	.9280	.8593	.8133	. 7590			• 0 < 3 <	• 5383	.4759	• 4336	0504.	176.	2440		0000	• 3153	• 2954	.2797	.2629	.2389	- 2261		• 2060	.1845	.1511	.1046
9.01	-2.8472	7404	000.0	.9857	1.0000	• 9723	.9412	.9078	.8322	•7796	.7336	.6740	6072		82IC•	.4557	.4216	.3882	.3603	742.	3108		0105.	• 2 4 7 8	• 2863	.2595	• 2463	.2349		24124	• 1965	.1768	.1376
8 • 50	-2.6188	7082		9797.	• 9927	.9651	• 9304	.8960	.8285	.7596	.7210	.6588	.5902		++00+	• 4 4 4 5	• 40 4 9	.3787	.3637	• 3339	.3262	2044		07674	• 2196	• 2699	.2574	.2406	2206		6012.	• 1940	•1622
x/c	• 000	-005			CT0.	.020	• 025	.031	• 0 4 0	.050	• 060	• 075	.100			002.	062.	• 300	.350	• 400	.450	505			• • • •	069.	• 700	.750	. 800			. 900	066.

ALPHAS
VARIOUS
FOR
COEFFICIENTS
PRESSURE
SURFACE
UPPER

RUNS 46,47 PTINF = 3 PSI M = 0.09 R = 60,000

4.50	.7887	0523	3596	4627	5335	5840	6205	6578	6825	7081	7131	7156	6861	6408	5842	5166	4538	4286	4170	4119	4142	4159	4203	4265	4356	4425	4427	4278	3784
4 • 0 1	.8185	.0154	2836	4018	4804	5379	5747	6257	6545	6743	6927	7048	6841	6449	6022	5409	4775	4404	4254	4175	4179	4170	4145	4308	4320	4439	4391	3720	3240
4 • 00	.8102	.0273	2998	4193	4842	5402	5897	6283	6615	6840	6946	7035	7154	6523	6094	5434	4836	4471	4330	4365	4174	4215	4248	4349	4415	4569	4355	3947	3403
3.50	.8369	.0830	2832	3722	4431	5129	5419	5963	6353	6662	6807	6934	7007	6710	6325	5838	5140	4651	4447	4309	4499	4352	4565	4541	4538	- • 4694	4400	3628	2714
3.03	. 8383	.1357	2012	3567	4277	4956	5187	5832	6343	6587	6746	7006	7083	6892	6640	6327	5590	4932	4578	4486	4506	4546	4523	4616	4545	4740	- 4332	- 3350	2041
2.00		.3192	0033	1381	2537	3271	3813	4516	4966	5456	5806	6195	6461	6543	6479	6217	5802	5169	4683	4430	4306	4245	- 4298	- 4275	4253	4356		- 3685	1857
.01	. 76.09	.7374	. 5025	.3452	-2156	.1218	.0469	0539	-1350	2114	2768	- 3509	- 4299	- 4779	5028	5077	4986	- 4553	- 4004	3529	- 3246	3156	3106	- 3045	- 3027	- 3059	3048		2985
-2.01	1507	. 8753	. 8072	.6824	.5658	.4575	3767	- 2628	-1616	.0798	0046	- 1092	- 2320	3136	3648	- 3988	4163	7795 -	3576		2663	2374	2177		- 1997	- 1070		- 1054	1943
x/c				510	020	.025	.030	040	.050	090	- 075	100	.150	200	. 250	300			450									068.	- 950

98

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 46,47 PTINF = 3 PSI M = 0.09 R = 60,000

	10.	2.00	3 • 03	3.50	4.00	4.01	4.50
101					•		
	600/•	• 90 •	• 8383	.8369	.8102	.8185	.7887
000	-3160	• 4536	• 6203	. 6578	.7011	.7171	-7436
0.08	3397	• 2986	• 4739	.5409	.5394	. 5276	5707
565	3322	.2165	•3894	.3880	4319	4235	1 L L C O
617	3246	•1683	• 3089	.3299	.3652	7175 ·	
959	2986	.1397	.2696	2976	3203		
327	2824	.1195	.2277	.2505	2840	0/TC+	• • • • • • • • • • • • • • • • • • • •
425	2540	• 0982	. 2043	-2144	2405	((0)) 1360	1616.
181	2324	•0799	.1772	1865	0110	1662.	F 2 9 7 •
6169	2159	.0720	1660	1735	0117.	6717.	• 2345
693	1807	.0711	1277		224T•	•1936	•2190
1062			1167 .	1661.	•1717	•1688	.1965
	~ " ~ " • •	+/90•	.1320	•1406	.1575	.1551	.1720
	9660*-	· 0 / / 2	• 1313	.1404	.1514	.1435	.1566
600	69G0	• 0816	• 1201	.1268	.1365	.1389	-1422
8651	- 0205	•0943	.1318	.1228	.1329	.1385	.1372
4670	• 0043	.1062	.1271	.1331	.1326	2921.	1354
1617	•0173	•1099	.1384	.1298	1317	1207	
135C	.0345	.1149	.1324	.1287	1247	1270	
001	• 0 4 4 3	•1208	.1301	.1307	.1270	1201	1204
1226	•0599	.1292	.1361	.1294	1294	1761	
329	• 0690	.1282	.1376	.1470	1270	7037 .	24210
416	• 0696	.1310	.1389	1304	1226		64270
549	.0772	2021			0007	CJ T T •	•1184
60.R				97470	•1093	.1156	.1044
		57 51 •	• 1344	•1233	.1085	.1175	.1010
	6/ 9 0 •	.1347	.1221	.1165	•0984	.0955	7690.
141	• 0413	.1318	.1310	.1188	-0937	.0780	1280.
919	•0899	.1305	.1300	-0893	0773	0000	
957	•0767	.1173	. 0977	-0662			
746	.0625	0950	9220			0000	• 0 5 3 0
			0410.	0010	0 t O O •	-0047	013

UPPER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 46,47 PTINF = 3 PSI M = 0.09 R = 60,000

.

			6.00	6.50	7.01	7.38	8.00	8.50
×/ר								
				3007	3854	-1.1731	-1.7158	-2.1512
000	.7407	•6685	2064.			CLCC C-	-2.6848	-3.0119
005	1530	2737	-,3981	9976	0100-1		-2.5358	-2.7801
		5486	6634	7614	- 8941			-2 6102
• 010			7457	8313	9407	-2.1015	-2.4203	3010•2m
.015	5446	0000		- 8586	9461	-2.0005	-2.2779	-2.4670
.020	6151	5960	018/-		7649-	-1.0343	-2.1824	-2.3430
.025	6529	7353	8142		- 05 35	-1.8767	-2.0902	-2.2604
.030	6879	7553			71C0 -	-1.7850	-1.9869	-2.1003
040	7153	7749	8301	- 8//8			-1-8011	-2.0204
	7281	7831	8281	8756	1616-1	010191	-1-8037	-1.9296
040	7449	78 31	8340	8665			-1-7134	-1-8224
		<u> </u>	8166	8477	8707	c/ cc • 1 -		1 7001
6/0.		- 7602	7968	8072	8132	-1.4608	1286.1-	- T+ 1071
•100			- 7173	7159	7008	-1.3101	-1.4219	CT0C•T-
.150	-•6947	071/-		- 4143	5918	-1.1912	-1.3011	74445
.200	6440	-•6399	6 0 F G • 1		- 5792	-1.1039	-1.2182	-1.3639
.250	5734	5622	5461		- 5035 - 5035	-1-0314	-1.1494	-1.2769
.300	5064	4932	4879			- 0845	-1.1021	-1.1737
.350	4533	4569	4626	5574 · I	- 4050	9576	-1.0704	9599
400	4299	4405	4548	0404 • 1		- 0443	-1-0716	8254
450	4274	4361	4554	4/10		0487	9012	7161
. 500	- 4274	4391	4535	4/38		- 0410	5812	6048
	- 4233	4415	4569	4860	0,00,-	5 7 0 7 ° -	- 4798	4961
	- 4249	4428	4679	4931	0524-		- 3602	3964
	- 4308	4518	4729	4956	-• 5 1 8 4		- 2045	3114
		- 4583	4754	4972	5057	76479-		4860 -
. 100		4701	- 4800	4889	4831	1884		
061.			- 4706	4713	4640	1402	1644	0011-
.800	4568			- 4540	4437	0915	1126	-•1114
.850	4534	4536			4256	0449	0563	0534
• 900	4294	42 79			- 4006	0016	-•0061	0054
.950	3859	-•3866	4245 -	TOAC •.	•	1 		

200

LOWER SURFACE PRESSURE COEFFICIENTS FOR VARIOUS ALPHAS

RUNS 46,47 PTINF = 3 PSI M = 0.09 R = 60,000

5.51 6.0(
.5902
. 8510 . 8968
- 7018 - 7479
3550 + 4019
2666. 1226.
• 2580 • 2890
• 2280 • 2569
• 2014 • 2239
.1758 .1947
.1743 .1872
.1616 .1787
.1505 .1689
• 1514 . 1551
• 1453 . 1540
• 1351 .1466
.1267 .1359
.1230
•1115 -1142
0989
• 0642
• 0511 • 0433
• 0181 • 0125
03520494

0,09 R = 60,000		
PTINF ≈ 3 PSI M = 0		
RUNS 46,47	10.00	-2.411 -2.413 -2.6709 -2.6709 -2.4484 -2.4684 -2.33397 -2.33397 -2.33397 -2.33397 -2.33397 -2.33397 -2.33397 -2.3358 -1.8931 -1.8931 -1.8931 -1.8931 -1.1203 -1.8931 -1.1203 -1.23688 -1.236888 -1.23688 -1.23688 -1.236888 -1.236888 -1.236888 -1.236888 -1.236888 -1.2368888 -1.2368888 -1.2368888888 -1.236888888888888888888888888888888888888
	10.00	- 2. 4217 - 2. 9345 - 2. 6530 - 2. 6530 - 2. 6530 - 2. 5729 - 2. 3365 - 2. 3365 - 2. 3365 - 2. 3365 - 2. 3305 - 2. 3365 - 2. 3305 - 2. 3365 - 2. 3365 - 1. 2058 - 1. 8871 - 1. 8775 - 1. 87755 - 1. 87755 - 1. 87755 - 1
	x/C	.000 .000 .010 .010 .020 .020 .020 .020

UPPER SURFACE PRESSURE CDEFFICIENTS FOR VARIOUS ALPHAS

R = 60,000																															
м = 0°09		* * * * * * * * * * *																													
PTINF = 3 PSI																															
RUNS 46,47	10.00		-2.4711	.6924	.9677	1.0028	.9885	.9695	• 9363	.8674	.8161	.7674	• 7044	. 6440	•5493	.4930	.4499	.4103	. 3851	• 3613	. 3407	.3230	.3065	• 28 82	.2706	.2503	.2337	•2224	. 1961	.1670	.1247
	10.00	, ; ; ; ; ; ;	-2.4217	• 6 6 4 6	.9476	1.0043	1.0018	.9586	• 9346	• 8682	. 8077	.7766	.7141	.6367	•5439	.4875	- 4447	- 4047	• 3925	.3677	.3400	• 3209	.3104	• 2909	.2695	.2534	.2298	• 2134	.1897	.1647	.1188
	X/C		• 0 0 0	• 005	.010	.015	.020	• 025	•031	•040	.050	.060	.075	.100	.150	•200	.250	• 300	.350	.400	.450	.505	• 550	•600	.650	• 700	.750	• 800	.850	• 900	.950

LOWER SURFACE PRESSURE CDEFFICIENTS FOR VARIOUS ALPHAS

Appendix E

Spanwise Pressure Coefficients

This appendix contains a computer listing of the upper surface spanwise pressure coefficient data for various angles of attack for the Eppler 387 airfoil section as measured in the Langley Low-Turbulence Pressure Tunnel. No wind-tunnel blockage corrections have been applied to the data.

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

x/c	Y/(8/2)	-2.93	-2.01	-1.00	-•75	50	00.	00.	.01
	1 								
•05	.156	.2323	.0987	0569	0961	1378	2259	2249	2253
•05	.222	.2216	.0916	0657	1026	1434	2330	2321	2335
• 05	• 333	.2181	.0876	0703	1109	1536	2409	2383	2416
• 05	777°	.2205	•0926	0660	1056	1463	2346	2363	2368
• 05	• 556	.2313	.1046	0544	0923	1348	2215	2213	2225
•05	.667	.2245	.0957	0578	0960	1384	2237	2245	2260
•05	. 778	.2323	.1056	0475	0859	1258	2117	2106	2106
• 05	.989	•2242	.1008	0486	0844	1253	2051	2077	2101
•05	• 9 4 5	.2058	.0836	0652	-•0470	1327	2325	2173	- #2252
• 90	.178	•0212	•0083	•0000	•0002	-•0017	0080	0071	-•0084
• 90	• 222	.0245	.0107	.0010	• 0000	0028	-•0079	0082	-*0075
• 90	• 3 3 3	•0324	.0171	.0080	• 0074	•0045	0042	0023	0018
• 90	. 444	.0270	•0138	.0025	•0001	-•0010	0058	-•0055	-•0063
.90	.556	•0253	.0103	0012	•000+	0008	0110	0059	0070
.90	.667	•0239	.0123	• 00 02	0012	0018	0061	0072	0073
• 90	.778	•0231	.0102	.0011	0009	0010	0084	0052	-•0069
- 90	.945	0042	0073	0177	0223	0243	0278	0249	0236

RUNS 3,4,5 PTINF = 15 PSI M = 0.09 R = 300,000

RUNS 3+4+5 PTINF = 15 PSI M = 0.09 R = 300,000

x/c	Y/ (8/2)	1.01	2.00	3.00	4 • 00	5.00	6 • 00	6•00	6.01
•02	.156	4129	6115	8255	-1.0479	-1.2852	-1.5352	-1.5339	-1.5360
•05	.222	4218	6208	8330	-1.0548	-1.2888	-1.5364	-1.5360	-1.5384
•05	.333	4288	6255	8393	-1.0591	-1.2921	-1.5375	-1.5402	-1.5433
• 05	• 4 4 4	4238	6208	8335	-1.0542	-1.2872	-1.5346	-1.5346	-1.5370
•02	. 556	4082	6077	8202	-1.0419	-1.2747	-1.5214	-1.5246	-1.5257
• 05	.667	4085	6041	8135	-1.0329	-1.2621	-1.5018	-1.5032	-1.5051
• 05	.778	3910	5857	7909	-1.0047	-1.2287	-1.4626	-1.4652	-1.4693
• 05	.889	3843	5725	7723	9787	-1.2023	-1.4277	-1.4310	-1.4334
• 05	.945	3890	5849	7851	9840	-1.2054	-1.4268	-1.4435	-1.4363
.90	.178	0164	0243	0314	-•0396	0447	0481	0484	0489
• • 0	.222	0162	0236	0310	0395	0460	0482	0485	0496
• • 0	• 3 3 3	0114	0193	0272	0328	-•0391	0426	0425	0417
.90	• 4 4 4	0154	0226	0306	0387	0433	0468	0468	0480
.90	.556	0164	0241	0314	-•0394	0448	0484	0477	0477
• • 0	.667	0143	0216	0301	0363	0423	0481	0464	0473
06.	.778	0160	0232	-•0292	0376	0426	0486	0469	0477
. 90	.945	0331	0409	04 76	0552	0624	0.704	0703	0640

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

RUNS 3,4,5 PTINF = 15 PSI M = 0.09 R = 300,000

Y/ (B/2)	6.11	6 • 25	6.51	7.01	8.01	00*6	10.01	11.01
.156	-1.5601	-1.5944	-1.6589	-1.7826	-2.0195	-2.0931	-2.1726	-2 • 2 9 2 5
• 222	-1.5639	-1.5972	-1.6662	-1.7823	-2,0063	-1.9642	-2.1333	-2.2135
EEE •	-1.5617	-1.5989	-1.6609	-1.7808	-2.0136	-2.0964	-2.2217	-2.2481
• 4 4 4	-1.5600	-1.5966	-1.6586	-1.7798	-2.0031	-2.4156	-1.9981	-2.2099
• 556	-1.5488	-1.5865	-1.6504	-1.7680	-2.0014	-2.4478	-2.1313	-2.2753
.667	-1.5270	-1.5524	-1.6237	-1.7435	-1.9643	-2.0859	-2.1354	-2.2266
.778	-1.4906	-1.5267	-1.5870	-1.7038	-1.9225	-2.3077	-1.9159	-2.2119
.889	-1.4559	-1.4903	-1.5523	-1.6707	-1.8752	-2.1063	-2.0101	-2.1702
.945	-1.4531	-1.4903	-1.5508	-1.6739	-1.8908	-2.0857	-2.1182	-2.1623
.178	-•0492	0487	0497	0524	0624	0811	1223	2371
• 222	0494	0514	0505	-+0565	0611	0835	1303	2567
• 333	0429	0426	0453	0479	0575	0824	1346	2694
• 444	0482	0472	0493	0549	0589	0800	1221	2083
.556	0486	0511	0498	0501	0588	0790	1139	2112
.667	0463	0480	0490	0522	0585	0753	1165	2196
.778	0473	- • 0 50 2	0510	0511	0579	- • 0 7 4 0	1041	1603
.945	0692	0758	0768	0840	1071		-1873	9462-

RUNS 3,4,5 PTINF = 15 PSI M = 0.09 R = 300,000

×/c	Y/ (8/2)	12.00	13.00	14.00	15.00	16.00
•05	.156	-2.3230	-2.3127	-2.2887	-2.1812	-1.2138
•05	. 222	-2.2300	-2.2530	-2.2416	-2.1760	890.0
• 05	•333	-2.2324	-2.2103	-2.1694	-2.2915	7099
•05	. 4 4 4	-2.2439	-2.2340	-2.2022	-2.1000	7311
• 05	.556	-2.2975	-2.2746	-2.2079	-2.0741	8421
•0£	. 667	-2.2709	-2.2691	-2.1888	-2.0407	-1.0338
•05	. 778	-2.2724	-2.3208	-2.3145	-2.2283	-1.2796
÷0•	.889	-2 • 2 4 4 2	-2.3006	-2.3638	-2.3231	-1.5971
• 05	.945	-2.2026	-2.2588	-2.3643	-2.4865	-1.6881
. 90	.178	3311	3826	4457	6410	7185
06.	.222	3352	3865	4427	5127	6868
• 90	• 333	3235	3762	4396	5017	6548
• 90	• 4 4 4	- • 2 982	3697	4368	4875	6568
.90	• 556	2928	3679	4188	4744	6669
.90	.667	2778	3816	4333	6113	6736
• 90	.778	2404	3324	4590	5210	6474
.90	• 9 4 5	2744	3062	3323	4536	6126

•

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

RUN R PTINF = 15 PSI M = 0.09 R = 300,000

HYSTERESIS (DECREASING ANGLE OF ATTACK)

	11.99	10.03	7.94	5.98	4.03	2.00
Ň	801 -2.3163	-2.1759	-1.9960	-1.5295	-1.0603	6165
~	333 -2.2342	-2.1349	-1.9926	-1.5320	-1.0648	6218
.17	84 -2.2137	-2.1612	-1.9915	-1.5344	-1.0718	6299
-	76 -2.2411	-2.0107	-1.9873	-1.5323	-1.0652	6241
•19	58 -2.2901	-2.1407	-1.9825	-1.5185	-1.0510	6108
.18	09 -2.2676	-2.1374	-1.9466	-1.4979	-1.0409	6074
• 30 •	+4 -2.2740	-1.9130	-1.9098	-1.4622	-1.0135	5847
.351	0 -2.2426	-2 •0052	-1.8659	-1.4317	9928	5750
• 376	1 -2.2057	-2.1267	-1.8693	-1.4383	-1.0017	5820
• 4 40	43314	1277	0617	0504	0417	0238
• 4 42	83270	1337	0611	- • 0 4 7 9	- • 0 4 0 4	0270
4 € 4 •	43138	1427	0555	0422	0340	0188
• 433	2990	1246	+•0587	0468	0406	0231
.419	2922	1157	0580	0483	0384	0259
.430	2775	1173	0558	0480	-•0397	0246
• 452	222448	1067	0574	- • 0 4 7 2	0403	0228
• 340	5 - 7684	- 1977	-,1019	0405	0571	0417

RUN 8 PTINF = 15 PSI M = 0.09 R = 300,000

HYSTERESIS (DECREASING ANGLE OF ATTACK)

x/c	Y/ (8/2)	01
• 05	.156	2239
• 05	. 222	- <u>-</u> 2305
•05	.333	- <u>-</u> 2404
• 05	• 444	2320
• 05	.556	2 203
•05	• 667	226
• 05	.778	2085
•05	• 889	2051
• 05	.945	- •2162
- OC	.178	0068
.90	.222	0075
• 90	• 333	0019
- 90	• 4 4 4	0051
• 90	• 556	0063
90	.667	0064
• 90	. 778	0063
.90	.945	0273

•

Attack
of
\mathbf{Angles}
Various
for
Coefficients
Pressure
Spanwise
Surface
Upper

P = 200,000
M = 0.06
15 PSI
= JNI14
9,10,13
RUNS

2/X	Y/(R/2)	-2.84	-1.99		01	• 01	1.04	2.04	2.99
• 05	.156	-2115	• 1 0 • 7 • 0	0510	2165	2180	4110	- 6109	8100
• 05	. 222	.2037	.0882	0603	2743	2259	4180	6158	8129
• 05	.333	.2018	•0839	0647	2341	2358	4253	6195	8197
• 05	575.	-2032	•0863	0603	2279	2303	4210	6193	8178
•05	• 556	.2155	.0980	0461	2116	2153	4051	6047	8022
• 05	. 667	.2071	- 0 4 7	0513	2167	2176	4052	6014	7964
• 05	.778	.2137	.1020	- • 0 4 2 7	2025	2065	3895	5844	-*7747
• 05	.889	.2070	.0977	0437	2029	2061	3878	5729	7577
• 05	.945	.1890	.0773	0576	2124	2256	4027	5817	7709
•90	.178	.0391	.0361	.0220	.0010	•0089	-•0069	0169	0251
.90	. 222	.0585	•0403	.0265	.0080	.0058	0055	0150	-•0263
. 90	.333	.0728	•0491	•0304	•0104	.0119	0000.	0110	0188
.90	• 4 4 4	.0611	.0418	.0263	0600.	•0073	0038	0131	0225
.90	.556	.0577	•0414	.0263	•0074	.0054	0046	0126	0229
.90	.667	•0604	•0419	.0259	•0114	.0073	0068	0175	0238
. 90	.778	.0593	•0400	.0252	.0105	.0085	0022	0129	0220
06-	.945	0025	0064	0122	0221	0220	0266	0357	0439

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

×/C	Y/(8/2)	3.99	4.99	5.02	5.05	5.05	5 • 51	6.02	E0.9
50	. 156	-1.0257	-1.2502	-1.2615	-1 2 7 7 8	-1.2736	U AAR I	<u>-1</u> 5168	-1-6127
.05		-1-0362	-1.2646	-1.2736	-1.2834	-1.2815		-1.5181	-1.5135
.05	• 333	-1.0403	-1.2686	-1.2742	-1.2844	-1.2869	-1.3928	-1.5235	-1.5212
•05	• 4 4 4	-1.0338	-1.2641	-1.2715	-1.2788	-1.2791	-1.3921	-1.5137	-1.5209
•05	.556	-1.0195	-1.2532	-1.2597	-1.2681	-1.2732	-1.3775	-1.5054	-1.5066
• 05	. 667	-1.0148	-1.2393	-1.2474	-1.2552	-1.2570	-1.3655	-1.4927	-1.4830
•05	. 778	-•9891	-1.2176	-1.2151	-1.2306	-1.2271	-1.3414	-1.4592	-1.4541
• 05	.889	9726	-1.1879	-1.1966	-1.2137	-1.2082	-1.3096	-1.4324	-1.4295
• 05	.945	- • 9 736	-1.1924	-1.1903	-1.2182	-1.2157	-1.3154	-1.4305	-1.4356
• 90	.178	0328	-•0391	0438	0423	0405	0455	0500	-•0403
06.	.222	0336	0430	0397	0426	0407	0429	0472	0472
• 90	• 333	0285	0342	0343	0362	0352	0411	0422	0423
.90	• 4 4 4	0333	- 0392	0384	-•0393	-•0391	0434	0484	0455
.90	.556	0322	- • 0 392	-•0395	0434	-•0399	0441	0487	0459
.90	.667	0346	0376	0378	0422	0363	- • 0 4 4 7	0474	-•0443
• 90	.778	0286	0386	0385	0417	-•0392	0451	0456	0439
06.	.945	0517	0551	0595	0568	0589	0663	0697	0696

: Attack
of
Angles
Various
for
Coefficients
Pressure
Spanwise
Surface
Upper

X/C	Y/ (B/2)	6.50	7.01	7.05	7.22	7.56	7.76	8.00	8 • 02
• 05	.156	-1.6322	-1.7634	-1.7795	-1.8231	-1.9118	-1.9439	-1.9982	-1-9943
• 05	• 2 2 2	-1.6367	-1.7757	-1.7826	-1.8218	-1.9050	-1.9382	-1.9924	-1-9954
• 05	• 333	-1.6354	-1.7733	-1.7788	-1.8277	-1.9023	-1.9396	-1.9950	-2.0051
• 0 5	• 4 4 4	-1.6343	-1.7694	-1.7793	-1.8247	-1.9057	-1.9397	-1.9926	-1.9991
• 05	• 556	-1.6257	-1.7591	-1.7698	-1.8112	-1.8946	-1.9365	-1.9886	-1-9982
• 05	.667	-1.6007	-1.7361	-1.7433	-1.7880	-1.8619	-1.9075	-1.9550	-1.9584
• 05	.778	-1.5686	-1.7005	-1.7061	-1.7526	-1.8247	-1.8619	-1.9208	-1.9291
• 05	.889	-1.5325	-1.6627	-1.6761	-1.7129	-1.7886	-1.8249	-1.8749	-1.8875
• 05	• 945	-1.5381	-1.6626	-1.6836	-1.7163	-1.7887	-1.8282	-1.8762	-1-8968
• • 0	.178	0515	0537	0513	0508	0552	- • 0577	0612	0607
• 90	• 222	0485	0494	0513	0547	0588	0578	0610	0601
• 90	• 333	0438	0443	0432	0481	0515	0522	0553	0577
• 90	• • • •	- • 0 4 7 2	0515	0504	0533	0544	0551	0585	0589
• 90	• 556	0482	0481	0514	0521	0569	0573	0586	0560
- 90	. 667	0473	0495	0499	0510	0550	0531	0554	0564
• 90	.778	0477	0504	0545	0523	0546	0523	0550	- 0524
• •0	.945	0679	-•0791	0839	-•0832	0946	0968	0990	1052

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

RUNS 9,10,13 PTINF = 15 PSI M = 0.06 R = 200,000

>	(8/2)	00.6	10.01	11.03	12.08	13.01	14.00	14.99	16.09
					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
•	156	-2.3308	-1.9043	-2.0501	-2.1181	-2.0836	-2.1276	8518	7244
•	222	-2.3618	-2.0203	-1.9095	-1.9679	-2.0452	-2.2987	8793	7408
•	333	-1.8753	-1.8750	-1.9446	-2.0400	-2.2078	-2.5463	-1.1206	7280
•	444	-2.4547	-2.9008	-1.9742	-1.9650	-2.0457	-2.2769	9750	6949
•	556	-2.4464	-2.2211	-1.9461	-2.0004	-2.0575	-2.2230	9353	7081
•	667	-2.2765	-1.8558	-1.9216	-1.9967	-2.0766	-2.3378	-1.3743	7794
•	778	-2.2563	-2.7412	-1.9094	-1.9726	-2.0286	-2.1321	-1.6745	8862
•	889	-2.1128	-2.2077	-1.9180	-1.9550	-2.0131	-2.1216	-1.8103	-1.1568
•	945	-2.0823	-2.1692	-2.0151	-1.9737	-2.0814	-2.2613	-2.0413	-1.2681
•	178	0803	1321	2159	3085	3557	4261	6372	6850
•	222	0839	1 332	2273	2957	-•3467	4095	6396	6835
•	333	-•0812	1392	2288	2756	3355	4081	6252	6853
•	444	0832	1270	1951	2821	3391	- 4009	6428	6798
•	556	0809	1213	1968	2762	3379	3769	6488	6846
•	667	0771	1215	2026	2640	3308	3788	6318	6860
•	778	0737	1080	1663	2466	3186	3811	5500	7314
	945	1264	1561	2065	2823	9525	3556	5136	7220

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

.....

RUN 11 PTINF = 15 PSI M = 0.06 R = 200,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

Y/ (8/2)	16.09	14.03	12.02	10.04	8.01	5.97	4.03	2.01
) 					
156	7201	-2.1271	-2.1119	-1.8868	-1.9975	-1.5062	-1.0389	6033
222	7270	-2.3075	-1.9734	-1.9761	-2.0024	-1.5050	-1.0464	6107
333	7129	-2.5413	-2.0300	-1.8865	-1.9982	-1.5069	-1.0484	6193
444	- 6965	-2.3026	-1.9602	-2.8845	-1.9959	-1.5073	-1.0439	6142
556	7114	-2.2673	-1.9995	-2.1022	-1.9947	-1.4942	-1.0336	6003
667	7676	-2.3727	-2.0027	-1.8610	-1.9604	-1.4740	-1.0258	5965
778	- 8576	-2.1569	-1.9829	-2.6959	-1.9258	-1 .4 4 4 2	9997	-,5821
889	-1.0738	-2.1302	-1.9556	-2.1838	-1.8883	-1.4214	9807	5696
945	-1.2263	-2.2575	-1.9944	-2.1564	-1.8868	-1.4212	9916	5893
178	6878	4200	2913	1266	0586	0509	0311	0177
222	6818	4198	2951	1382	0583	0505	-•0349	0147
333	6877	4147	2753	1367	0504	0415	0272	-•0091
444	6782	3965	2765	1316	0598	0435	0325	0129
556	6760	3819	2787	1246	0550	0480	0323	0166
667	7001	3766	2634	1254	0553	0470	0303	0148
778	7110	3807	2390	1128	0552	0468	0318	0119
945	7049	3562	2743	1604	1022	0687	0515	0346

RUN 11 PTINF = 15 PSI M = 0.06 R = 200,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

• 03	2271	2321	2402	2360	2226	2260	2139	2117	2295	0041	0068	0123	0079	0101	0086	0087	
• 03	2 296	2361	2423	2376	2230	2272	2133	2143	2 267	• 0023	.0037	.0112 .	.0068	.0085 .	.0087 .	.0080	
Y/(B/2)	.156	• 222	.333	5 4 4 4	. 556	.667	. 778	.889	.945	.178	• 222	• 333	. 444	.556	. 667	.778	
x / C	•05	• 05	• 05	•05	•05	• 05	•05	• 05	• 05	.90	.90	.90	.90	.90	.90	00.	

210

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

x/c	Y/(8/2)	-2.98	-1.99		52	02	02	01	00.
• 05	.156	.2110	.0724	0669	1467	2196	9622-	2226	2234
• 05	. 222	.2090	.0701	0716	1507	2340	2279	2318	2312
• 05	• 333	•2075	•0612	0782	1580	2361	- •2362	2347	2387
.05	- 444	.2111	.0685	0755	1520	2318	2327	2315	2286
• 05	. 556	• 2 2 3 9	.0923	-•0641	1369	2208	2151	- • 2192	2171
.05	.667	• 2193	•0739	0614	1369	2178	2199	2131	2138
• 05	. 778	.2244	•0329	0580	1319	2137	2110	2035	2098
• 05	. 889	.2143	2 090 .	0680	1410	2174	2138	2166	2157
• 05	.945	.2015	.0575	0801	1613	2341	2271	2318	2296
.90	.178	2 00 3	2393	1313	0741	0443	0410	0449	0419
06.	.222	-,1903	2618	1496	-•0945	0271	0340	0408	0514
.90	• 333	1863	2609	1936	1207	0378	0592	0742	0665
. 90	4 4 4 e	1859	2690	2029	1280	0585	0720	0837	-•0799
• 90	. 556	1834	2649	2086	1385	0680	0897	0932	0962
.90	•667	1853	2689	2070	0954	0894	-•0834	0867	0809
. 90	. 778	1894	2498	1597	0657	0619	0553	0595	0526
90	.945	0765	0152	.0113	.0098	•0089	.0056	•0082	.0064

RUNS 15,16 PTINF = 15 PSI M = 0,03 R = 100,000

RUNS 15,16 PTINF = 15 PSI M = 0.03 R = 100,000

x / C	Y/ (8/2)	1.00	1.99	3.01	10.°E	4 • 00	5.01	5.99	6.54
			 			, , , , , , , , , , , , , , , , , , , ,			
• 05	.156	3976	5732	7712	7683	9700	-1.1864	-1.4321	-1.5706
• 0 5	• 222	4034	5824	7778	7826	9931	-1.2107	-1.4432	-1.5731
• 05	• 333	4129	5878	7780	7840	9945	-1.2020	-1.4467	-1.5840
• 0 5	***	4075	5879	7796	7799	9904	-1.2035	-1.4364	-1.5845
• 05	• 556	3921	5712	7683	7673	-,9757	-1.1860	-1.4347	-1.5698
• 05	.667	3857	5645	7584	7580	9604	-1.1831	-1.4117	-1.5507
•02	. 778	3827	5547	7462	7512	9562	-1.1574	-1.3984	-1.5271
• 05	.889	3849	5655	7527	7549	9553	-1.1607	-1.3937	-1.5229
• 05	.945	4010	5800	7736	7677	-•9691	-1.1703	-1.4079	-1.5245
.90	•178	•0176	.0171	.0105	1400.	0008	0154	0272	0426
.90	• 222	.0154	.0170	.0001	.0097	0024	0131	0360	-+0429
.90	• 333	.0080	.0177	•0032	.0137	0024	0161	0334	0366
J6 •	***	0008	•0138	.0024	.0016	-•0040	0144	0344	0418
. 90	.556	0016	• 0025	•0064	.0000	0064	0115	-•0338	0370
06.	•667	0064	•00+0	•0040	.0000	0048	0145	0314	0370
• 90	.778	0047	0016	0016	0041	0096	0167	0320	0384
• 90	• 945	.0016	0113	0269	-•0206	0356	0440	0574	0637

14 - 00	00 51	12 00							•
		00,000	0.03 R = 1	5 P 5 J M = (RUNS 15,16			
				:					
•								•	•
090 • I	8760	- • 0505	C # C D # L	1440	04/0		0404		с і •
054	0523	0537	0532	0493	0453	0488	0474	.667	- 6
-•026	0518	0512	0518	0498	-•0510	0474	0503	• 556	• 90
-*027	0499	0529	0530	0533	0502	0504	0509	• 444	.90
056	0463	0480	-•0469	0440	0459	0432	0403	•333	• 90
090	0506	0526	0513	0572	0563	0528	0498	• 222	06.
058	0564	0493	0543	0539	0479	0522	0516	.178	.90
-1.931	-1.8772	-1.8665	-1.8320	-1.8153	-1.7597	-1.6968	-1 .6444	•945	• 05
-1-920	-1.8731	-1.8680	-1.8242	-1.8177	-1.7517	-1.6994	-1.6164	• 889	• 05
-1.963	-1.8954	-1.8921	-1.8441	-1.8383	-1.7792	-1.7139	-1.6365	.778	• 05
-2.010	-1.9202	-1.9303	-1.8724	-1.8711	-1.8102	-1.7376	-1.6657	. 667	• 0 •
-2 • 00 7	-1.9554	-1.9657	-1.9055	-1.9000	-1.8277	-1.7583	-1.6760	.556	• 05
-2.030	-1.9571	-1.9683	-1.9112	-1.9017	-1.8380	-1.7719	-1.6959	• 4 4 4	• 05
-2.005	-1.9559	-1.9565	-1.9055	-1.9015	-1.8391	-1.7730	-1.6949	• 333	• 05
-2.023	-1.9605	-1.9641	-1.9038	-1.8985	-1.8359	-1.7635	-1.6870	• 222	• 0 5
-2•020	-1.9625	-1.9684	-1.9088	-1.9003	-1.8258	-1.7653	-1.6972	.156	• 05
	7.99	1.99		7.73	7.50	7.25	7.00	Y/(B/2)	2 X

x/C	Y/ (B/2)	8.49	8.76	9.01	10.05	10.99	12.00	13.00	14.00
• 05	.156	-2.0418	-2.1141	-2.2582	-2.7219	-2.9757	-3.1497	-3.0459	6884
• 05	.222	-2.0256	-2.1284	-2.3374	-2.6723	-2.9553	-3.0733	-3.0802	6973
• 05	• 333	-2.2764	-2.4052	-2.5371	-2.8204	-3.1010	-3.1733	-3.0331	7466
• 05	• 4 4 4	-2.0361	-2.1353	-2.2746	-2.6074	-2.9272	-3.0929	-3.0183	8079
•02	.556	-2.0344	-2.1041	-2.2567	-2.6239	-2.9391	-3.1546	-3.0519	-1.1555
• 05	. 667	-2.0255	-2.0581	-2.2513	-2.7720	-3.0207	-3.1283	-3.1185	-1.9667
• 05	.778	-1.9848	-2.0082	-2.1246	-2.4752	-2.8316	-3.0928	-3.2228	-2.9476
• 05	.889	-1.9544	-1.9764	-2.0500	-2.5263	-2,8671	-3.1061	-3,1675	-2.9434
•05	.945	-1.9659	-2.0047	-2.0500	-2.4353	-2.8896	-3.0783	-3.0329	-3.0435
• 90	•178	0544	0735	0747	1211	1660	2312	2979	6157
• 90	.222	0607	0739	0813	1220	1738	2304	3016	6157
06.	.333	0671	0743	0847	1244	1738	2326	2918	6346
.90	****	0611	- 0707	0841	1162	1683	2353	-,2999	6267
.90	.556	0610	0687	0800	1128	1683	2302	2866	6271
.90	.667	0578	0695	0793	1140	1674	2257	2980	- 5997
• 90	.778	0535	0618	0708	1069	-,1513	2141	2898	4571
00	240.	1042	1050		1503	1881	2403	-2036	4866

T

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack
R = 100,000
M = 0.03
5 PSI
PTINF = 1
RUN 17

HYSTERESIS (DECREASING ANGLE DF ATTACK)

x/C	Y/(8/2)	14.00	14.00	13.00	11.98	10.11			
							55°5	9.01	8.00
• 05	.156	- 6761	1005						
• 05	.222	- 7225		-3.0635	-3.0884	-3.0641	-7.4442		
20			/044	-3.0515	- 3 .0 992			-2.2545	-1.9749
•		7527	7346	2 UU 3 2			-2 • 6 7 8 4	-2.2992	-1.0704
• 02	• 4 4 4	7559	- 7666		1660.6-	-3.0434	-2.8453	7 555 6	
• 05	.556	-1 1463		+616.2	-3.0637	-2.9582	0104 2-		1196.1-
50.5	277		2864•1-	-3.0875	-3.1216		6100.5	-2.2680	-1.9765
		+0cc·I-	-1.5175	-3.1026		00000	-2.6159	-2.2734	-].9685
60 •	• 778	-1.6812	-7.3614			-3.0286	-2.6652	-2.2400	
• 05	. 889	-3.0461		1611.61	-3.1002	-2.8800	-7.4900		9744°T_
• 05	. 945		0564.71	-3.1873	-3.1186	-7.8677		+9T1 · 2	-1.9052
		1 C + 1 D 4 4	-2.8222	-3.1540	-3,0827		GT/ + • 7-	-2.0497	-1.8742
•	9/T•	6085	6079	3024	- 3 A E C	5054.3-	-2.4425	-2.0362	-1.8748
• • •	• 222	6066	6168	1000		1824	1132	0869	
• •0	• 333	6071	5 1 7 T		6642 . -	1836	1204		
06.	444		5410-	3012	2450	1757		0100	0550
			6297	3138	7315		-1213	0853	0485
) () (000.	5626	- • 6 40 7	- 3000		8 C D T • L	1120	0818	0519
• • 0	• 667	5749	5117			1725	1135		
06.	.778	- 5000		0687	2116	1747			9660
06.	045		- • 4 6 6 2	2732	2026	- 1582		0818	0500
			3318	2749	27R	7071	G70T*-	-•0762	0539
						06070_	- • 1 40 7	1089	0905

RUN 17 PTINF = 15 PSI M = 0.03 R = 100,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

	01				2362	2475	2390	4600-			2138	2076	2223		2620-	2050	0439	0659	0835	0816	0445	.0055
	2.00		5813	5860		1160	5904	5762	5723	5503		6 6 6 6 6 • -	-•5667	•0206	.0157		.013/	• 0041	.0041	•0073	0041	0113
	4.01		9759	9828	9858		2684	9704	-• 9691	9506	9514		L 7 4 7 • I	•0024	0039	2001 S			0039	0078	0078	0352
	6.01		-1.4329	-1.4456	-1.4455	-1.4414			990+-1-	-1.3899	-1.3824	-1-3800		6660 - 1	10E0 .	0260	0335	3800.4				
	7 • 00		271/11-		-1.1207	-1.7372	-1.7073	- 1 . 6 9 4 2			8679.1-	-1.6448	0519			1.0404	0471	0485	- 0 4 4 2	0455	0695	
	(7/9///	. 156	~~~~	. 3 3 3		***	• 556	. 667	. 778	S B C		• 440	.178	.222	222		***	• 556	.667	.778	.945	
7/2		.05	.05	.05	30	•	• 02	• 05	• 0 5	.05		•	• • 0	.90	.90			.90	• 90	• 90	• 90	

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

				46	75	50	26	01	8
×/C	7/18/21								
						- 1465	1850	2304	-2.3678
i d		8766	.0949	0719	1034			7358	• 0002
0	• 170			0789	1089	1014			-1-4011
0.05	. 222	• 2 2 1 3	1010		C311 -	1601	1986	0647	
		-2147	.0824	0840°-	70TT•_		1031	2386	-1.4054
50.			0802	0792	1108			1466	-1.4108
• 05	444	66120			09R3	1416	1304		
30	556	.2322	0601.	1100*-		- 1454	1832	2276	104-1-
			7590.	0698	1023			- 2132	-1.4056
•02	.667	0 (7 7 *		0507	0922	1299			1207 1-
، 05	. 778	.2315	5 H O T *			1284	1665	2120	
	089	. 2 2 8 4	.0984			1 445		2246	-1.404.
•0.	• • •		0778	0786	1122			C110 -	- 490
• 03	• 945	1 60 2 .		4400	0071	0075	- • 0 0 B C		
00	.178	.0123	.0043			00R7	-•0000	110	
		40124	22002	0051	1900			0056	470
• • 0	777 •			0100	0024	7700 -	3300.		- 466
00	. 333	.0182	+ O T O +		0.050	0074	0062	-•00 ··	
	444	.0138	.0041	00+4			0091	0110	GC4
.	•		0000	0044	2600			0110	478
- 90	.556	.0138				0071	0080	-•U114	
0	. 447	0122	• 0 0 2 7	conn•-			0088	0091	744.1
	976	2210-	•0035	-•0066	FC00		- 0220	0252	330
• 40			0125	0191	0213	1330			
000	. 045								

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

			2.00	3.00	4.01	5.01	6.02	6.50	7.00
X/L	1/18/21								
								-1 6810	-1.8023
			6969	- 8422	-1.0709	-1.3110	00001-		1 41 25
- 05	.156	4227	7070		10758	-1.3136	-1.4151	-1-4104	
90	222	4277	6302	8408			-1-4140	-1.4099	-1.4194
•	•		- 6378	8537	-1.0816	00Tc*T-		1003	_].4]55
• 0.9	EE E •	2054-			-1 0752	-1.3116	-1.4121		
5	. 4 4 4	4279	6312				-1-4119	-1.4166	-1.4112
		- 415 R	6174	8336	-1.0522			-1.4126	-1.4082
•02	066.			_ 8705	-1.0535	-1.2875	007 * 1 -		7014 1-
50.	- 667	4167	6104			_1 2551	-1.4068	-1.4088	
		7 9 9 7	5940	8029	7070°1-		1204	-1-4099	-1.4145
60 •	• • •		2707	7878 	-1.0033	-1.2242			-1 41 26
\$0 .	.989	3902			-1.0153	-1.2308	-1.4096	55 Dt • 1 -	
5	. 945	4045	5938	nch/ -		0426	0478	0502	9140
		O TRA	0270	0324	F 0 F 0 F			0516	0522
	• 1 / 0			0331	0406				9440
06.	. 222	0198	020		0335	0390	0416	9740	
	525	0129	0205	0214			0477	0493	1140
•			0261	0326	0/ 50.1		0130	- 0502	0518
06.	****	00T 0.		4660	0405	0450			0070
06-	.556	0183	9970		0220	0454	0484	0485	
	. 667	0194	0260	C760		0290 -	0471	0490	-•0501
•		7810	0258	0328	2850		1 2 2 0	- 1012	0778
06.	.//8			0467	0544	0600	1000		
06 •	945	0340	0160		, ,				

.

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

×/C	Y/ (B/2)							Ĩ	
			20*6	9.99	10.99	12.01	12.99	13.99	13.99
• 05	.156	-7.0379	0000			i			
• 05	.222	-1.4175	0000.2	- 2 • 30 68	-2.4041	-2.4153	-7.4010	00/C C	
.05	222		7404411	-1.4116	-1.4079	-1-4040		0600-7-	-2.3678
		-T.4084	-1.4068	-1.4008	-1-4040		9014.1-	-1.4011	-1.4070
•	***	-1.4173	-1.4107	-1.4155		7545.1-	-1.4097	-1.3976	-1.4011
• 02	• 556	-1.4106	-1.4181		990+1-	-1.3968	-1.4052	-1.3055	77017
• 05	. 66.7	- 0 0 V	1011 1		-1.4049	-1.3970	-1-4066		+ C O + + T
.05	770		-1.4 1 54	-1.4080	-1.4111			-1 • 34 33	-1.4108
		49T 4 · T+	-1.4110	-1.4107	0404-1-		4014.1-	-1.3940	-1.4070
•	• 684	-1.4146	-1.4169	-1.4046		+/65-1-	-1.4083	-1.3970	-1-4056
• 02	.945	-1.4118	-1.4118		2414 1	-1.3944	-1.4115	-1-4016	
.90	.17R			1214.1-	-1.4027	-1.3990	-1 40.00		
00)		6110	1158	2085			- I - 40 32	-1.4041
	277 •	0606	0813	-,1228			4283	4916	- 4900
• • 0	• 333	0549	- 0804			0.016	- • 4 4 0 0	4666	
06.	.444			6621	2719	3592	- 4764		
0		70C0-1	0786	1127	2137) , , , , , , , , , , , , , , , , , , ,		4699	4703
	966.	0585	0735	- 1008			-•3995	4736	- 4666
• 90	.667	0572	0730		* 20 Z • -	3014	3948	- 4608	
• 90	. 77R			1133	2076	2839	CCUV -		
0		5000 ·	-•0733	- 0975	1551			4/48	4787
•	0 * * *	-•0460	1283	1866	2311		3343	4931	4923
						0707-	3036	3246	3307

RUN 20 PTINF = 15 PSI M = 0.13 R = 460,000

RUNS 25+26 PTINF = 5 PSI M = 0+08 R = 100+000

AVE VERZE -2.00 -1.50 -1.01 -49 -01 05 .156 .2109 .0843 .0169 -0628 1429 2232 05 .156 .2109 .0843 .0169 0628 1429 2232 05 .1982 .0704 .0134 0623 1536 2234 05 .444 .1900 .0831 .0062 0649 0134 1536 2236 05 .667 .0331 .00195 0726 0138 2236 05 .667 .2013 .00491 0138 1536 2236 05 .667 .2023 .0731 .0035 0145 2236 05 .667 .2103 .0875 .0336 0138 2287 05 .667 .2103 .0741 .0167 0138 2286 05 .667 .2028 .0761 .0126 .0136 .22124 <tr< th=""><th>~ ~ ~</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr<>	~ ~ ~									
05 .156 .2109 .0843 .0169 0628 1429 2232 05 .1924 .0704 .0134 0162 1429 2233 05 .4333 .1982 .0704 .0134 01623 1502 2233 05 .4333 .1982 .0704 .0134 0726 2233 05 .4333 .1900 .0831 .0002 06633 1429 2239 05 .556 .2103 .0991 .0195 0726 2239 2213 05 .667 .2103 .00395 .00138 0726 2213 07 .073 .2103 .0731 .0138 2123 2214 05 .0875 .0138 .0157 2287 2216 2216 07 .0781 .0138 .0138 .01967 2287 2287 090 .1785 .01967 .01967 .01967 .0236 .0238 .01968 .0238 090 .1786 .01261 .0	· · · ·	T/ (B/2)	-2.88	-2.00	-1.50	-1.01				
.05 .156 .2109 .0843 .0169 0628 1429 2232 .05 .222 .1924 .0704 .0134 0623 1502 2296 .05 .444 .1900 .0831 .0002 06649 0726 2296 .05 .655 .2213 .0905 .0649 .00195 0654 1502 2296 .05 .657 .22023 .0905 .0195 0654 11338 2219 .05 .556 .2103 .0939 .00138 0654 11338 2219 .05 .945 .2103 .0939 .0731 .0138 1272 2216 .05 .945 .2103 .0731 .0138 0475 1272 2287 .06 .945 .0117 .0135 .0135 .01262 1272 2287 .0731 .0127 .0127 .0135 0137 0267 0268 1272 .09 .178 1737 1737 1252 1272 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>• 00</th> <th>• 50</th>									• 00	• 50
•05 .222 .1924 .0169 0628 1429 2232 •05 .333 .1982 .0049 .00134 0623 1502 2296 •05 .444 .1900 .0831 .0002 0664 .0134 0523 2399 •05 .444 .1900 .0831 .0002 0664 0534 1518 2399 •05 .667 .2023 .0731 .0195 0654 1518 2219 •05 .667 .2023 .0731 .0195 0649 .0230 0264 21338 2216 •05 .778 .2003 .0731 .0164 1338 2216 •05 .778 .2103 .0781 .0177 21272 2216 •05 .9467 .0781 .0187 .0187 .0186 1252 2287 •05 .178 .1788 .1781 .0196 .0236 .0196 .0236 .0248 0264 2287 •06 .2178 .21035 <	• 05	.156	2100	0,00						
05 333 1982 00049 0134 -0623 -1502 -2295 05 444 1900 0831 0002 -0664 -1536 -2295 05 -556 -2113 0905 0195 -0726 -1518 -2219 05 -667 -2023 -0731 -0035 -0726 -1536 -2219 05 -667 -2103 0939 -0033 -0475 -11338 -2219 05 -889 -2103 -0731 -0138 -0475 -1272 -2219 05 -889 -2103 -0731 -0117 -0647 -1272 -22058 05 -889 -2103 -0781 -0135 -1272 -2219 06 -1788 -11893 -11896 -1257 -0259 -0726 -0726 90 -1897 -21897 -21237 -11897 -0726 -0726 -0726 90 -778 -11897 -27233 -21457 -0726 -0726 -0726 90 -77	• 0 5		1024	• 0 0 4 3	.0169	0628	1470			
05 556 .01982 .0002 -0664 -1726 -1536 -2299 05 556 .2113 .0905 .0195 -0726 -1518 -2399 05 556 .2113 .0939 .0138 -0726 -1518 -2219 05 .667 .2023 .0731 .0138 -0654 -1518 -2219 05 .667 .2023 .0731 .0138 -0654 -1272 -2219 05 .889 .2100 .0875 .0133 -0485 -1272 -2216 05 .945 .2023 .0781 .0133 -0675 -1272 -2216 09 .178 -1188 -1162 -0633 -1252 -2287 90 .178 -11866 -0667 -0196 -0564 -00230 90 .2193 -11897 -11897 -1252 -02597 -0584 -00567 90 .556 -19667 -11897 -11897 -0196 -0564 -0057 90 .556 <t< td=""><td>50</td><td>222</td><td>+ 7 4 7 +</td><td>•0104</td><td>.0134</td><td>0673</td><td></td><td>7677.</td><td>2158</td><td>3113</td></t<>	50	222	+ 7 4 7 +	•0104	.0134	0673		7677.	2158	3113
005 0444 $.1900$ 0831 00062 0064 1536 2399 05 556 $.2113$ $.0905$ $.0731$ $.0726$ 1518 2368 05 $.667$ $.2103$ $.0939$ $.0731$ $.0138$ 0451 1338 2124 05 $.667$ $.2103$ $.09739$ $.0230$ 0451 11338 2219 05 $.667$ $.2103$ $.09739$ $.0230$ 0485 1272 2219 05 $.689$ $.21003$ $.09739$ $.0230$ 0485 1272 2219 05 $.945$ $.22028$ $.07316$ 0485 1272 2287 090 $.178$ 1188 1186 1282 2287 090 $.222$ 1986 11816 1286 2287 090 $.222$ 19067 0607 0.0766 2287 090 $.222$ 1906 2373 1286 0057 090 $.556$ 1996 2553 2253 2286 090 $.778$ 1935 2853 2853 0726 090 $.778$ 0716 0726 0259 090 $.778$ 0716 0726 0259 090 $.778$ 0716 0726 0286 090 $.778$ 0716 0726 0259 090 $.945$ 0716 0786 0359 </td <td></td> <td>CCC •</td> <td>•1982</td> <td>.0649</td> <td></td> <td></td> <td>2061</td> <td>2296</td> <td>2331</td> <td></td>		CCC •	•1982	.0649			2061	2296	2331	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	• 0.2	• 4 4 4	.1900			0664	1536	2300		7606 -
05 667 0195 -0654 -1138 -2219 05 778 -2023 0731 0138 -0654 -11338 -2219 05 778 -2103 0731 0138 -06475 -1272 -2219 05 945 -2103 0781 -0117 -06475 -1272 -2219 05 945 -2028 -0781 -0117 -06475 -1252 -2287 90 178 -1888 -1591 -01162 -0631 -1380 -2287 90 178 -1888 -1914 -0677 -0677 -0756 -2056 90 -222 -1836 -2557 -25598 -0194 -0677 -0020 90 -2557 -1914 -0677 -0667 -00567 -00567 90 -556 -11897 -2553 -27457 -11737 -0726 -0259 90 -778 -1897 -2753 -27457 -0726 -0726 -0259 90 -778 -1892 -1892<	.05	. 556		1500.	-0062	0726	- 1510		1042	3223
05 778 .2023 .0731 .0138 0491 1434 2124 05 .889 .2100 .0939 .0230 0475 1272 2213 05 .889 .2103 .0875 .01335 0475 1272 2213 05 .945 .2103 .0875 .01335 0485 1272 2213 90 .178 1888 .0731 0117 0631 1272 2287 90 .178 1988 1914 0167 0136 2287 90 .222 1916 .0194 0607 .0476 .0542 90 .2557 2553 2553 2553 1286 0267 90 .556 1935 2553 27855 0786 0259 90 .778 2007 27853 27355 1737 0726 90 .778 2003 1737 0726 0259 0726 90 .778 07193 1737			6113	• 0 9 0 5	•0195			2368	2327	3219
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	•	- 200	•2029	.0731	9210		1338	2124	2113	
05 889 $.2103$ 0035 00230 -00475 1272 2058 0781 $.0781$ $.0117$ -0631 1252 2068 90 $.178$ 1888 1591 $.0117$ -0631 1252 2287 90 $.178$ 1888 1591 $.0117$ -0631 1380 2287 90 $.222$ 1886 1914 0607 $.0476$ $.0385$ 90 $.225$ 1914 0607 $.0476$ $.0542$ 90 $.444$ 2007 2553 25598 1869 0020 90 $.444$ 2007 2553 25598 1866 00267 90 $.556$ 1914 0607 0667 0259 90 $.556$ 1935 22533 22533 22698 0726 90 $.778$ 0726 0726 0259 0264 0259 90 $.778$ 0716 01452 0264 01455 90 $.778$ 0716 0716 0276 0340 90 $.945$ 0716 0226 0246 0286	• •	. 778	.2100			1640.~	1434	2219		
05 945 0103 .01335 0485 1252 2006 90 178 1888 .0781 .0117 0631 1380 2287 90 178 1888 1691 .0117 0631 1380 2287 90 .178 1886 1591 .0117 0657 1380 2287 90 .222 1916 .0194 0572 1914 0607 .0476 .0542 90 .333 1906 2573 21896 01867 0647 02597 90 .556 1935 22673 27457 1286 0767 0297 90 .556 1935 25533 2373 1737 0726 0259 90 .778 2000 2457 1737 0654 0145 90 .778 2001 27453 2373 1412 0726 0259 90 .778 0716 07186 0726 0726 0259 -	• 05	. 889			• 0 < 3 0	0475	1272		9 1 2 2 1 2	2997
90 178 -2028 .0781 .0117 -0.051 -1.224 2006 90 178 1888 1591 .0117 0607 1380 287 90 .222 1888 1591 .0106 0355 0367 .0196 287 90 .222 1888 1914 0607 .0196 287 90 .333 1906 2572 1914 0607 .0196 0385 90 .444 2007 2553 2457 1869 0684 0020 90 .556 1935 2373 2356 1737 0726 0259 90 .556 1897 2553 2355 1897 0726 0259 90 .778 2000 24412 1892 0726 0145 90 .945 0716 0314 0026 0340 .0197	20		- 4 103	• 08 75	.0335			8502-	2058	2955
90 1178 11888 1591 -01062 -0031 1380 2287 90 1222 11836 2572 1914 -00355 -0196 .0385 90 133 1906 2557 1914 0607 .0476 .0542 90 .333 1906 2557 2598 1867 0667 .0020 90 .444 2007 2553 2598 11867 0027 .0297 90 .556 11897 2533 2373 11737 0726 0259 90 .667 1897 2533 2356 1466 0259 0264 0259 90 .778 2000 2553 2356 1412 0624 0145 90 .778 0716 0314 .0026 0546 0340 90 .945 0716 0314 .0026 0246 0340	•	• 7 + 5	• 2028	.0781			2671	2006	2020	
•90 .222 1836 1771 1062 0355 .0196 .0542 •90 .333 1906 2557 1914 0607 .0476 .0542 •90 .333 1906 2557 1914 0607 .0476 .0542 •90 .556 1935 2557 2593 1859 0667 .0674 •90 .556 1935 2573 2373 1737 0726 0259 •90 .578 1897 2553 2373 1737 0726 0259 •90 .778 2000 2553 2356 1446 0726 0259 •90 .778 2000 2553 2356 1442 0726 0259 •90 .778 0716 0314 .0026 07465 0145 •90 .976 0716 0314 .0026 0785 0340	• • 0	.178	1888		1110.	0631	1380	7287		
90 333 -1100 2572 1914 0607 0476 0.0542 90 444 2007 2557 2598 1859 0684 0597 90 .556 1935 2573 2573 2577 1286 0667 0597 90 .556 1935 2457 2373 1737 0726 0257 90 .556 1897 2533 2375 1737 0726 0259 90 .778 2000 25533 23356 1145 0726 0259 90 .778 2000 2412 1892 0145 0145 90 .945 0716 0314 .0026 0340 .0197	. 90	<i></i>		1461-	1062	0355	104		6622.	2979
• • • • • • • • • • • • • • • • • • •			9591.	2572	1914			6860.	•0095	.0118
90 +44 2007 2523 2457 1859 0684 0020 90 556 1935 25423 2457 1286 0967 0297 90 556 1935 2533 2373 1737 0726 0259 90 .778 2000 25412 2356 1446 0145 0145 90 .778 0716 0314 .0026 0785 0340 90 .945 0716 0314 .0026 0261 0296 0197		• 33 5	1906	2557	1 2500		• 0 4 7 6	•0542	-0442	
.90 .556 1935 2457 1286 0967 0267 .90 .667 1935 2233 2373 1737 0726 0259 .90 .667 1897 2533 2356 1737 0726 0259 .90 .778 2000 2412 2356 1466 0624 0145 .90 .945 0716 0314 .0026 0785 0340 .90 .945 0716 0314 .0026 .0261 .0296 .0197	.90	• 4 4 4	2007			1859	0684	- 0020		P1138
90 -0.290 -0.2423 2373 1737 0726 0259 90 -667 1897 2533 2356 1466 0726 0259 90 .778 2000 2512 1892 0624 0145 90 .778 2016 2412 1892 0785 0145 90 .945 0716 0314 .0026 .0261 .0296 .0197	- 90	- 556		6263	2457	1286	- 104 -		0660	0369
-70 -007189725332356172007260259 -90 -778200024121892146606240145 -90 -94507160314 -0026 -0340 -0261 -0296 -0197			6641.	2423	2373	1 7 2 7		- • 0 2 4 7	0915	0599
-90 -778200024121892146606240145 -90 -94507160314 -0026 -0261 -07850340 -0197		100.	1897	2533			-•0 726	0259	0 7 0 2	
•90 •94507160314 -0892141207850340 •026 -0314 -0026 -0261 -0296 -0197	. 90	.778	- 2000		0667.	1466	0624	- 0145		6/00*-
	. 90	.945	- 0716	21624	1892	1412	- 0.785		0432	0222
			01/0	0314	•0026	-0261		-•0340	-•0644	0371
							0620.	•0197	.0180	• 02 44

8.02 -1.9870 -1.0379	8.00 	7.51 	7.01	7.00	6.01		9 • 00	Y/ (B/2) 6.00
8.02	8.00	7.51	7.01	7.00		6.01		6.01
	• 000	08 R = 100	PST M = 0.	PTINF = 5	9	RUNS 2542	RUNS 25.2	RUNS 25.2
0087 0351	0329	-0205	0140 0125 0091	0164 0037 .0036		0228 0108 .0015	01430228 01030108 .0223 .0015	
0124 0121 0029	0075 0155 0056	0019	0012 0012	-0028 -0059 -0138		0036 0144 0132	00230036 02020144 01230132	
-1.1833 0167 0388	9490 0088 0269	0511	7591 7591 0052 0111	5593 5687 .0062		5575 5737 .0106	38895575 39205737 .0338 .0106	
-1.1810 -1.1507 -1.1587	9546 9320 9320	- 404 - 9407 - 9407	1031 7571 7495	5759 5649 5621		5747 5633 5508	39175747 39045633 38195508	
-1.1978 -1.1686 -1.2013 -1.2017 -1.1959	9644 9363 9809 9734 9634	9681 9925 9805 9805	7716 7568 7871 785	5771 5697 5889 5881		5731 5696 5829	40065731 39935696 41345829	.15640065731 .22239935696 .33341345829 .445785
10-6		4 • 00	3.01	2.01		2.00	1.01 2.00	r/(8/2) 1.01 2.00
	-1.1978 -1.1686 -1.2013 -1.2013 -1.2013 -1.1959 -1.1587 -1.1587 -1.1587 -1.1587 -1.1587 -1.1587 -1.1587 -1.0029 0029 0121 0029 0370	4,000 4,000 4,000 9644 -1.1978 9320 -1.2013 9734 -1.2013 9546 -1.2013 9546 -1.1978 9546 -1.1978 9546 -1.1978 9546 -1.1978 9546 -1.1958 9490 -1.1933 9490 -1.1933 94490 -1.1933 90269 0167 00269 0121 00269 0121 00269 0121 00269 00269 00269 00269 00269 00269 00269 00269 00269 00269 00269 00269 00269 00329 0026 00329 0028 0351 0008 0351 1.9702 -1.9870	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.01 4.00 4.00 4.00 4.00 4.00 5.01 7716 9681 9644 -11.1978 7785 95525 9734 -11.2017 7785 98996 99309 -11.2017 7785 99896 99434 -11.1978 7785 99406 95434 -11.1978 7785 99514 99434 -11.2017 76516 99532 99434 -11.19787 7785 99534 -10.1978 91810 7785 99534 -11.1978 7516 7791 99534 91.11978 91677 7516 99407 916393 01677 00121 0073 00231 02699 00167 00122 00122 00256 00329 00272 00122 01220 01250 02379 02379 00122 00265 03229 03229	2.01 3.01 4.00 4.00 5.01 2.01 3.01 4.00 4.00 5.01 5771 7568 9681 9644 -1.1978 5697 7568 9895 9809 -1.2017 5789 7871 9805 9634 -1.2017 5789 7785 9874 -1.1810 5621 7571 9874 -1.1810 5621 7571 9478 9470 -1.1810 5687 7591 9478 9470 -1.1833 5687 7591 9478 9470 -1.1833 7516 7591 9470 -1.1833 7591 7591 9470 -1.1833 7591 7591 9269 0028 7591 0023 00269 00269 0033 0011 0026 0026 00337 00126 0025 0025 0037 0126 0122 0329 0037 0035 0035 0212 0037 0036 0026 0026 0037 0126 0122 0026 0037 0126 0236 0037 0035 0236 0037 0036 0266 0037 0036 02124 0037 0036 0026 0036 0036 0026 <t< td=""><td>2.00 2.01 3.01 4.00 4.00 7.01 5731 5771 7716 9681 9644 -1.1978 5697 5697 7568 9896 9809 -1.2013 5785 5697 7768 9764 -1.1810 5785 5789 7781 9805 9734 -1.2013 5785 5781 7781 9805 9734 -1.2013 5785 7571 9754 9763 97546 -1.1810 5785 5573 5543 7591 9470 -11.1810 5575 5563 7551 9473 -1.1810 5575 5563 7591 9473 -1.1810 5575 5563 7591 9473 -1.1810 5575 5563 7591 9731 0064 5575 5563 7591 0073 0163 5575 0064 0073 0165 0167 0010 0012 0073 0165 0167 0124 0120 0122 0035 0127 0124 0126 0127</td></t<> <td>1.01 2.01 3.01 4.00 4.00 5.01 400 5731 7716 9681 9544 -1.1078 400 5731 7781 9736 9766 9736 9105 3993 5731 7781 9768 9734 -1.1098 4134 5569 5731 7781 9805 9734 -1.1019 4134 5563 5759 5764 9746 -1.1180 3917 5745 5764 9751 9754 -1.1180 3917 5563 5563 5563 5563 1180 3924 5573 5563 5563 94470 -1.1180 3924 5737 5563 5563 94470 -1.1587 3924 5737 5563 7591 9713 0049 3928 0011 0011 0075 0167 0167 3929 0144 0075 0122 0075 0121 0023 0124 0124 0075 0075 0021 0123 0124 0126 01205 0125 0</td> <td>V(R/Z) 1.01 3.01 4.00 4.00 5.01 156 5731 5771 7768 9644 -1.1978 2222 3993 5696 5697 7768 9641 -1.1978 333 -4134 5731 7768 9645 16667 11666 333 -4134 55696 5689 7785 9646 -1.1959 333 -4134 5569 7785 9647 11567 333 -4084 5747 5569 7785 9574 -1.1597 333 -4134 5563 5563 7591 9574 -1.1597 444 3104 5563 5563 7591 9574 -1.1597 456 3117 5563 5563 7591 9544 -1.1597 457 3104 5563 5563 7591 9120 -1.1597 457 3104 5563 5563 5563 9123 -0164 3117 3117 0112 0112 0123 -0164 1123 0112 0123 0123 0124 0125</td>	2.00 2.01 3.01 4.00 4.00 7.01 5731 5771 7716 9681 9644 -1.1978 5697 5697 7568 9896 9809 -1.2013 5785 5697 7768 9764 -1.1810 5785 5789 7781 9805 9734 -1.2013 5785 5781 7781 9805 9734 -1.2013 5785 7571 9754 9763 97546 -1.1810 5785 5573 5543 7591 9470 -11.1810 5575 5563 7551 9473 -1.1810 5575 5563 7591 9473 -1.1810 5575 5563 7591 9473 -1.1810 5575 5563 7591 9731 0064 5575 5563 7591 0073 0163 5575 0064 0073 0165 0167 0010 0012 0073 0165 0167 0124 0120 0122 0035 0127 0124 0126 0127	1.01 2.01 3.01 4.00 4.00 5.01 400 5731 7716 9681 9544 -1.1078 400 5731 7781 9736 9766 9736 9105 3993 5731 7781 9768 9734 -1.1098 4134 5569 5731 7781 9805 9734 -1.1019 4134 5563 5759 5764 9746 -1.1180 3917 5745 5764 9751 9754 -1.1180 3917 5563 5563 5563 5563 1180 3924 5573 5563 5563 94470 -1.1180 3924 5737 5563 5563 94470 -1.1587 3924 5737 5563 7591 9713 0049 3928 0011 0011 0075 0167 0167 3929 0144 0075 0122 0075 0121 0023 0124 0124 0075 0075 0021 0123 0124 0126 01205 0125 0	V(R/Z) 1.01 3.01 4.00 4.00 5.01 156 5731 5771 7768 9644 -1.1978 2222 3993 5696 5697 7768 9641 -1.1978 333 -4134 5731 7768 9645 16667 11666 333 -4134 55696 5689 7785 9646 -1.1959 333 -4134 5569 7785 9647 11567 333 -4084 5747 5569 7785 9574 -1.1597 333 -4134 5563 5563 7591 9574 -1.1597 444 3104 5563 5563 7591 9574 -1.1597 456 3117 5563 5563 7591 9544 -1.1597 457 3104 5563 5563 7591 9120 -1.1597 457 3104 5563 5563 5563 9123 -0164 3117 3117 0112 0112 0123 -0164 1123 0112 0123 0123 0124 0125

Y/(E/2) 6.00 156 -1.4339 .222 -1.4186 .333 -1.4509 .444 -1.4509 .444 -1.4511 .556 -1.4511 .556 -1.4511 .556 -1.3951 .778 -1.3975 .778 -1.3975	6.01 -1.4529 -1.4526 -1.4556 -1.4408 -1.4408 -1.4424	7.00 -1.7078 -1.6555 -1.6985 -1.6985 -1.6531 -1.6531 -1.6531	7.01 -1.7095 -1.7095 -1.6693 -1.6693 -1.6891 -1.6891 -1.6894 -1.6309	7.51 -1.8513 -1.8513 -1.8419 -1.8386 -1.8386 -1.8346 -1.7839 -1.7518		-1.9870 -1.9379 -1.9379 -1.9867 -1.9867 -1.9865 -1.9244 -1.9244	-2.0319 -1.9862 -2.3122 -2.3122 -2.04813 -2.0483 -2.0339 -2.0339
-1-4339 -222 -1-4339 -222 -1-4186 -3333 -1-4509 -444 -1-4510 -556 -1-4511 -556 -1-4511 -556 -1-4511 -2778 -1-3959 -1455 -1-3975	-1.4529 -1.4529 -1.44566 -1.44865 -1.4408 -1.4444 -1.4244	-1.7078 -1.6555 -1.6985 -1.6953 -1.6531 -1.6516 -1.6516	-1.7095 -1.7026 -1.7026 -1.7149 -1.6981 -1.6886 -1.6884	-1.8513 -1.8513 -1.8419 -1.8346 -1.8346 -1.8346 -1.7613 -1.7518	-1.9792 -1.9737 -1.9737 -1.9661 -1.9761 -1.9325 -1.9325 -1.8968	-1.9870 -1.9379 -1.9778 -1.9865 -1.9865 -1.9562 -1.9562 -1.9244	-2.0319 -1.9862 -2.3122 -2.0813 -2.0483 -2.0339 -2.0339
.156 -1.4339 .222 -1.4186 .333 -1.4509 .444 -1.4506 .556 -1.4546 .556 -1.4546 .558 -1.4295 .667 -1.3951 .889 -1.3975 .445 -1.3975		-1.7078 -1.6555 -1.6985 -1.7053 -1.6731 -1.6731 -1.6531	-1.7095 -1.6693 -1.7026 -1.7149 -1.6981 -1.6886 -1.6884	-1.8513 -1.8009 -1.83419 -1.8346 -1.8346 -1.8346 -1.7839 -1.7518	-1.9171 -1.9171 -1.9737 -1.9761 -1.9761 -1.9325 -1.9122	-1.9379 -1.9778 -1.9867 -1.9805 -1.9562 -1.9562 -1.9244	-1.9862 -2.3122 -2.0813 -2.0483 -2.0339 -2.0339 -2.0339
156 -1.4186 222 -1.4186 333 -1.4546 444 -1.4546 556 -1.4546 667 -1.4546 556 -1.4546 778 -1.3951 889 -1.3949 889 -1.3949 889 -1.3949		-1.6555 -1.6985 -1.7053 -1.6950 -1.6731 -1.6573 -1.6573	-1.6693 -1.7026 -1.7149 -1.6981 -1.6886 -1.6884 -1.6876	-1.8009 -1.8419 -1.83386 -1.83386 -1.8221 -1.7839 -1.7618	-1.9737 -1.9737 -1.9761 -1.9325 -1.9325 -1.8928	-1.9778 -1.9867 -1.9805 -1.9562 -1.9244 -1.9244	-2.3122 -2.0813 -2.0483 -2.0483 -2.0339 -1.9778
.222 -1.4186 .333 -1.4509 .444 -1.4546 .556 -1.4546 .667 -1.4295 .778 -1.3949 .889 -1.3975 .945 -1.3975		-1.6985 -1.7053 -1.6950 -1.6516 -1.6516 -1.65293	-1.7026 -1.7149 -1.6981 -1.6856 -1.6484 -1.6484	-1.8419 -1.8386 -1.8346 -1.8221 -1.7839 -1.7618	-1.9757 -1.9661 -1.9741 -1.9325 -1.9122	-1.9867 -1.9867 -1.9562 -1.9244	-2.0813 -2.0483 -2.0339 -2.0339 -1.9778
.333 -1.4509 .444 -1.4546 .556 -1.47411 .667 -1.4295 .778 -1.3951 .889 -1.3975 .945 -1.3975	-1. 4930 -1. 4485 -1. 4485 -1. 4485 -1. 4488 -1. 4684 -1. 3868	-1.6950 -1.6950 -1.6516 -1.6516	-1.7149 -1.6981 -1.6856 -1.6856 -1.6884	-1.8386 -1.8346 -1.8221 -1.7839 -1.7618	-1.9561 -1.9741 -1.9325 -1.9122 -1.8968	-1.9805 -1.9562 -1.9244	-2.0483 -2.0339 -1.9778
.444 -1.4546 .556 -1.4541 .667 -1.4295 .667 -1.4295 .778 -1.3951 .889 -1.3975 .945 -1.3975	-1.4485 -1.4408 -1.4283 -1.4283 -1.3868	-1.6950 -1.6950 -1.6516 -1.6293	-1.6981 -1.6856 -1.6856 -1.6484 -1.6309	-1.8346 -1.8221 -1.7839 -1.7618	-1.9741 -1.9325 -1.9122 -1.8968	-1.9009 -1.9562 -1.9244 -1.9013	-2.0339 -2.0085 -1.9778
-556 -1.4411 -567 -1.4295 -667 -1.4295 -778 -1.3951 -889 -1.3949 -1.3975 -778 -1.2375	-1.408 -1.4283 -1.4044 -1.3868	-1.6930 -1.6731 -1.6516 -1.6293	-1.6856 -1.6484 -1.6309	-1.8221 -1.7839 -1.7618	-1.9325 -1.9122 -1.8968	-1.9964 -1.9244 -1.9013	-2.0085
.667 -1.4295 .778 -1.3951 .889 -1.3949 .889 -1.3949 .945 -1.3975	-1.4283 -1.4044 -1.3868	-1.6/31 -1.6516 -1.6293	-1.65484 -1.65484	-1.7839	-1.9122 -1.8968	-1.9244 -1.9013	-1.9778
.778 -1.3951 .889 -1.3949 .945 -1.3975 .945 -1.3975	-1.4044 -1.3868	-1.6516 -1.6293	-1-6309	-1.7618	-1-8968	-1.9013	
	-1.3868	-1.6293	-1.6309				
				1 7151	-1.8848	-1.8995	-1.4685
.945 -1.3973	1 2008	-1.6313	-1.6434		7190	4040	0578
1780298		- 0428	0447	-•0425		0018	1016
		0000	0806	-•0906	-•1011		0637
222 -•0540	2210 (- 0387	0458	0423		
222 0268	10313	+ 6 € 0 • -		- 0508	- • 0 4 6 2	04/4	
		0476	2040-		- 0535	0503	0582
		0437	0425			- 0478	0527
•556 -•0313		- 0347	0437	0409	0401		0574
.6670284	4		- 0337	-•0391	0443		- 0877
7780223	0368		- 0592	0669	-•0799	0700.	•
. 945 - 044 <u>2</u>	0478						

Ι

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

		i) 	00010		
×/C	Y/(B/2)	8.50	9.00	10.00					
						12.00	13.01	13.49	13.75
• 05	.156	-2.0372	-2 360E						
• 05	• 222	-2.0047	-2 7348	-2.6663	-3.0449	-3.1776	0721 2-	4	
• 05	• 333	-7.2850		-2.6285	-2.9678	-3-1040	69/ T • C -	-2.9936	7866
.05	. 444	-2.0424	6166.2-	-2.7966	-3.0868		-3-0638	-2.8564	9541
• 05	. 556		-2.2704	-2.5944	-759-7-		-1.012	-2.9018	
.05	. 667	7760.2	-2.2570	-2.6090	-2.9804	19971-5-	-3.0762	-2.9290	-1.0125
	022	-4.0255	-2.2234	-2.7196		-3•I995	-3.1611	-2.9831	
	8/1.	-1.9949	-2.1461		7660.6-	-3.2291	-3.206 B		C252.
• 0 2	.889	-1.9699		1706.2	-2.8954	-3.1392		-3.04/4	-1.4710
• 05	. 945	-1-0664		-2.5273	-2.9018	-3,1062		-3.1157	-2.7541
.90	.178		-2.0778	-2.5431	-2.9597		-3.1916	-3.1483	-3.2415
- 90		1700.	0761	1163	- 1622	1910.01	-3.0918	-3.0809	-7.7166
		6017 -	1329	1706		E777-	2991	3440	
	• • • •	0615	0756			2894	3547		8896
• •0	. 444	0671	1720-		1669	2352		8766-1	6611
• •0	• 556	0563		-1076	1596	2160	0407.	3277	5991
• 90	.667		0.87.0.	1077	1597	- 2164	6067-	3305	5086
. 90	. 778		0650	1095] 4R6	- 2151	2893	3291	6013
• 90	.945		-•0649	1035	-1579		2718	3297	
			-•1073	-•1441	2129		2614	-•3098	4110
						+ + < 2 + -	2878	3138	- 3202

PUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000

RUNS 25,26 PTINF = 5 PSI M = 0.08 R = 100,000

14.04	- 7 DE 1		-•0/62	7451	7431	1.8368	-1.1.67				6606.3-	6027	6511	6134	6096	6766	- 6 2 2 2		1140	4314
Y/(B/2)	.156			• 433	• 4 4 4	.556	.667	. 778	. 889	.945	170	0/7 •	• 222	• 333	- 444	• 556	.667	. 778		- 945
x/c	• 05	505		•	• 05	•05	• 05	•05	• 05	• 05	00.		- A C	06.	• • 0	• 90	• 90	• 90	ç	• 70

s of Attack
Angle
Various
Pressure Coefficients for
Upper Surface Spanwise I

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60,000

						01	00.	• 00	04.
× / C	Y/(8/2)	-2.94	-2.00	-2.00	00•T-				
							0646	1438	2278
			00.1	1724	.0208	1329		- 1445	2287
30	156	.3150	•1044		0100	1344	1077-1		- 2444
•		2026	.1608	2041.			1527	1261	
• 02	777*		1581	.1607	£200°			1471	2302
.05	• 333	71670		.1563	.0075	1313		1356	2259
30	444	.2920	+0CT+		7510	1308			2292
•		2078	.1719	.1630		1 2 7 6	1484	14/9	
.05	• 5 5 6		4141	.1622	.0146		1312	1356	2124
. 05	. 667	• 2 9 0 9		1 4 4 7	.0240	1272	37670	7 4 7 1	2275
	778	.2935	.170/		0125	1377	1346		- 2268
CD .	• • •		1676	.1635			1496	1726	
• 05	.889			4961.	.0018	7 C T • -	C C L C	3096	3591
50.	.945	.2973			2459	3091		871C -	3660
	178	1165	-, 1811	- 1001	14.78	3101	3114		30405
06.	• • •		1742	1701	0717.1		3304	3254	
06.	.222	1 C A D *-		1780	2446		6710	3163	3664
06.	333	-,1172		- 1817	2514	3060		3042	3493
		1153	1829		2 2 2 C	3025	1016		6446
	***		1771	1790			0505	3081	3 - + 0 - -
. 90	.556	1163		- 1786	2459	+062		3098	3208
0	667	-,1073			2459	-•3042	070¢•-		1806
	. 778	1134	1768		- 1920	2024	4261		
•	0.45	0460	1586	TACT					
5.	· • •								

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60,000

1

									2 51
			. 50	2.01	2.03	2.50	3.00	3.00	
x/c	Y/ (8/2)	10.1							
							1074	6231	6585
				7504	4886	5179		- 4379	- • 6762
4	156	3144	4008		- 4702	5758	6 038		- 7071
•		- 3751	4017	4821		L RORO	6520		
• 02	-222		6163	5088	4991		1307	6363	6855
- 05	.333	3388		6105	4929	6034		6763	6878
	4 4 4	3350	4140			5868	6189		7775
c0.			1595	5010	JT 0			6165	
• 05	.556			4903	4820			6048	6950
30	. 667	2952			4741	5644			6951
•			3829			- 5622	6272	c 100 · -	
•02	e//e		1905	4630				6579	.71/
.05	.889	301/		- 4671	-,5021	C 7 / C • -		3312	3804
2	. 945	3133	1040		1696	2987			3530
•		L JOJR	3881	F005		- 7860	0445		
06.	•1/0		- 4055	3135			- 3337	2724	6442
06.	• 222			2889	3916	1707-		2751	2743
06	.333	4021	6000 • -	2764	3915	2301		5746 -	2583
	4.4.4	3969	3476		1005	2274	6762		76.40
. 40				2809	0066.1		3080	2445	
06.	.556	3016		789	3643			2581 .	- 2006
00	.667	3821		4240	3083	2128	1107	1 20 4	0464
	. 778	3 32 2	3411		1107	0469	-•0482		•
	.945	1419	1201	r 0 4 0 • -					
	••••								

Т

I									
×/c	Y/ (B/2)	3 • 5 4	4.00	4.00	4.00	4 • 02	<u> </u>		
								5.5°\$	5.51
• 05	.156	7517	101 -						
- 05 -			+261	7968	7842	7666			
		1241.4	8061	8029	- 4013		4454-	-1.0463	7700
cn •		7635	CC08		2100	7426	9160		
.05	. 444		22/00	8480	7997	7783			/683
		010/-	8658	8809			1.4040	-1.0592	A00 2
•	966.	7579	8633		6400.	7853	9326		
.05	. 667			2230	6690	8125			1261
		106/	8778	8296			8106	-1.0409	8032
•	• / /8	7440	8620		E 0 4 0 • -	1667	9257	-1 OFIC	
• 05	. 8.80			1869	6926	7855		CTCN T-	8209
			8729	8734	- 7610			-1.0167	5558°-
• • •	• • • •	7503	- 8421		61010-	7812	9520		
.90	.178	1 2366			8173	8,00,0			8762
00			6202	1704	- 2034		4164°-	-1.0452	8760
•	777.	2603	2639	1116 -		COC 5	1968	1214	
- OC		2340			-•2999	3218			2024.1
00	446		1201	3161	3665		ACA T • -	1516	4369
•	***	2459	1097	- 2522		1112	1857	1282	- 4160
• •0	• 556	7554		7777	60/ F · -	2646	1619		
00	277		2001	1980	3664		0101.	1278	4133
	100 •	2633	1956	1204		00000	1622	1164	- 2077
. 40	• 778	5542			2006.	2181	1738		
.90	. 945			0912	3104	1470		1163	3731
•		2000-	-•0651	0360	- 1087		-•TAR4	1039	3508
						6770+-	-•0512	0225	1521

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60,000

RUNS 27,28 PTINF = 5 PSI M = 0.05 R = 60,000

512									
	1/(8/2)	6.01	6•49	7.00	7.51	8-01			
							67.0	8.51	8.75
•05	.156	8310							
202		47000	6188	-1.5660	-1.7268	1 0121			
	777.	0078	8699	-1.5222		4 20 D + T	-1.9367	-1.9982	-2.0010
cn •	• 333	8482	0043		0.000.1	-1.8091	-1.8732	-1 0180	
• 05	- 444			099C • T-	-1.7228	-1.8556			-1.4183
Line Contraction			9164	-1.5637	-1-7223		+TCK+T-	-1.9493	-2.1016
•	000.	8645	9199	-1.5508			-1.9282	-1.9641	10101
• 02	•667	8903	0501		5227.1-	-1.8515	-].9144		101092
- 05	977		1464	-1.5352	-1.6879	-1.0767		+202+ T-	-2.0105
		4316	9846	-1.5149		2020.1	-1-891I	-1.9579	-1.9806
•	.889	9414	-1.0477		10001	-1.7947	-1.8651	1069.1-	
\$0 .	.945	- 0 5 B 7		E02C+T-	-1.6508	-1.7778	-1.9757		DE 64 • T -
00 .	1 70		5++0+1-	-1.5163	-1.6381	1016 []	7070.1	-1-9006	-1.9273
	0.1.	4203	4173	1550		+ 70 / • T	-1.8159	-1.8853	-1.0102
• •0	• 222	4290	4324			0485	0610	- 0541	
- 90	525.			00/4	0811	7500			-•0047
0			4106	0312	- 0365		0+01-1	0971	1118
•	*** •	4100	3987				-•0391	0530	- 0461
.90	• 556	3051			0475	0449	040 8		1000-
00.	. 447		E815	-•0349	0450			0532	0593
•		3/20	3540	0313			0578	0519	0540
. 40	• 7 78	3359	- 2957		2040.	0471	0554	0407	
.90	.945	- 1 20 4		FC20	0311	0480			0504
			1123	-•0492	0471		TTON	0525	0424
							0619	0765	0685

12.00		-2.4800	-2.4302	-2.4936	-2.4738	-2.4999	-2.5495	-2.5034	-2.5019	-2 • 5 4 5 4	1942	2560	1942	1957	1882	1821	1693	1835	
11.01		-2.5066	-2.4529	-2.5266	-2.4824	-2.4856	-2.5053		-2.4215	-2.4671		1958	1362	1323	1316		1158	1471	•
10.01		-2.2906	-2.2632	2601	70800	6776 C	6007°7-	01/7·7-	1001 • 7 -	721157	2477•7 -	9001.1	- 0074						- • 11 (
9.51			0661.2-	0601 7 -	94FE - 2-	-2.1213	-2.1048	-2.2187	-2.0450	-2,0538	-2.0456	-•0895	1360	0835 	0838	0776	0730	-•0716	- 0964
0,00		1	-2.0457	-1.9988	-2.2138	-2.0568	-2.0549	-2.0087	-1.9649	-1.9402	-1.0446	0686	1175	0702	0696	0623	0617	0573	0805
	X/(1/ 1/ 10/ 5 /		.05 .156	.05 .222	.05 .333	.05 .444	-05 -556 -05 -556	.05 .667	- 778	05 889	05 045	90 178	90 .222	90 333	444 · 06 ·	90 556	90 .667	an 778	. 90 . 945
		X/C Y/(B/2) 9.00 9.51 10.01 11.01 12.00	X/C Y/(B/2) 9.00 9.51 10.01 11.01 12.00 X/C Y/(B/2) 9.00 -2.5066 -2.5066 -2.4800	X/C Y/(B/Z) 9.00 9.51 10.01 11.01 12.00 X/C Y/(B/Z) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.5066 -2.4800 -2.4529 -2.4302	X/C Y/(B/Z) 9.00 9.51 10.01 11.01 12.00 X/C Y/(B/Z) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.5066 -2.4800 -2.4529 -2.4302 -2.5532 -2.4936	X/C Y/(B/Z) 9.00 9.51 10.01 11.01 12.00 X/C Y/(B/Z) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.5046 -2.4800 05 .222 -1.9988 -2.1098 -2.2632 -2.4529 -2.4936 05 .333 -2.2138 -2.358 -2.3691 -2.5266 -2.4936	X/C Y/(B/2) 9.00 9.51 10.01 11.01 12.00 X/C Y/(B/2) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.5066 -2.4800 05 .222 -1.9988 -2.1098 -2.3691 -2.5266 -2.4936 05 .333 -2.2138 -2.3358 -2.3691 -2.5266 -2.4936 05 .444 -7.0568 -2.1218 -2.2804 -2.4824 -2.4999	X/C Y/(B/2) 9.00 9.51 10.01 11.01 12.00 05 156 -2.0457 -2.1938 -2.2906 -2.5066 -2.4800 05 .222 -1.9988 -2.1098 -2.2532 -2.4529 -2.4302 05 .333 -2.2138 -2.3358 -2.3691 -2.5266 -2.4936 05 .344 -2.0568 -2.1098 -2.2804 -2.4856 -2.4936 05 .556 -2.0549 -2.1098 -2.25663 -2.4956 -2.4999	x/r Y/(E/2) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.4529 -2.4800 05 .222 -1.9988 -2.1098 -2.2632 -2.4529 -2.4302 05 .222 -1.9988 -2.1098 -2.25632 -2.4529 -2.4936 05 .222 -1.9988 -2.1098 -2.25632 -2.4529 -2.4936 05 .333 -2.2138 -2.3358 -2.52663 -2.4936 05 .444 -2.0568 -2.1218 -2.25663 -2.4936 05 .556 -2.0687 -2.25633 -2.4936 -2.0568 -2.1218 -2.25633 -2.4939 05 .556 -2.0687 -2.22663 -2.4936 -2.0087 -2.2187 -2.25187 -2.5635 -2.5495	X/C Y/(E/2) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.5066 -2.4800 .05 .272 -1.9988 -2.1938 -2.2632 -2.4529 -2.4800 .05 .272 -1.9988 -2.1938 -2.25632 -2.4529 -2.4800 .05 .333 -2.2138 -2.1098 -2.5566 -2.4936 .05 .333 -2.2138 -2.7804 -2.4936 .05 .333 -2.2138 -2.27804 -2.4936 .05 .444 -2.0568 -2.10218 -2.25663 .05 .556 -2.4856 -2.4856 .05 .556 -2.4856 -2.4856 .05 .556 -2.0950 -2.1861 .2.5053 -2.5053 -2.5053 -2.5019 .05 .778 -1.9649 -2.0950	X/C Y/(E/2) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.25066 -2.4800 05 .156 -2.0457 -2.1938 -2.2632 -2.4529 05 .272 -1.9988 -2.1098 -2.25632 -2.4529 05 .272 -1.9988 -2.3358 -2.5664 -2.4936 05 .333 -2.2138 -2.3358 -2.5804 -2.4936 05 .444 -2.0549 -2.3358 -2.5804 -2.4936 -2.1018 -2.5804 -2.4824 -2.4738 -2.0549 -2.101218 -2.5804 -2.4936 -2.1028 -2.2101 2.4824 -2.4738 05 .444 -2.0549 -2.1718 -2.4356 -2.1038 -2.211218 -2.4824 -2.4936 -2.0087 -2.21861 -2.4824 -2.5639 -2.484 -2.5053 -2.5639 -2.5619 .05 .667 -2.0650 -2.1739 -2.0538 -2.0538 -2.1739 -2.5619 -2.4215 -2.5619 -2.5619	x/r Y/(E/2) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.26906 -2.5066 -2.4800 .05 .222 -1.9988 -2.1098 -2.2632 -2.4529 -2.4302 .05 .222 -1.9988 -2.1218 -2.5358 -2.5632 -2.4936 .05 .333 -2.01078 -2.7804 -2.4738 .05 .333 -2.01098 -2.7804 -2.4738 .05 .444 -2.0549 -2.3358 -2.7804 .05 .556 -2.06799 -2.8663 -2.4738 .05 .556 -2.06799 -2.2804 -2.4738 .05 .556 -2.06799 -2.2804 -2.4824 .05 .556 -2.4824 -2.4738 .05 .556 -2.0679 -2.21861 -2.4824 .05 .667 -2.4824 -2.5039 .05 .778 -1.9649 -2.0538 .05 .6897 -2.0538 -2.1739 .05 .0446 -2.0538 -2.2248 .05 .9869 -1.94656 -2.4671 .05 .9869 -1.94656 -2.4671	x/r Y/(E/2) 9.00 9.51 10.01 11.01 12.00 05 .156 -2.0457 -2.1938 -2.2906 -2.4509 -2.4800 .05 .222 -1.9988 -2.25056 -2.4900 .05 .222 -1.9988 -2.25632 -2.4936 .05 .222 -1.9988 -2.2563 -2.4936 .05 .2333 -2.21218 -2.2564 -2.4936 .05 .333 -2.21218 -2.3691 -2.4936 .05 .444 -2.0087 -2.1218 -2.5643 .05 .556 -2.4936 -2.4936 .05 .556 -2.1098 -2.2718 .05 .556 -2.4936 -2.4936 .05 .556 -2.4936 -2.4936 .05 .556 -2.1218 -2.2518 .05 .567 -2.0087 -2.2186 .05 .568 -2.2034 -2.5053 .05 .667 -2.0087 -2.2186 .05 .689 -1.9449 -2.4854 .05 .689 -1.9449 -2.6533 .05 .889 -1.9456 -2.4215 .068 -1.9456	x/r Y/(E/2) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.5906 -2.4529 -2.4800 .05 .222 -1.9988 -2.1098 -2.5565 -2.4936 .05 .222 -1.9988 -2.1098 -2.5632 -2.4529 -2.4302 .05 .222 -1.9988 -2.1218 -2.5566 -2.4738 .05 .333 -2.01098 -2.1218 -2.57663 -2.4738 .05 .444 -7.0568 -2.1218 -2.57804 -2.4936 .05 .444 -7.0568 -2.1218 -2.2718 -2.4936 .05 .556 -2.087 -2.1861 -2.4824 -2.4738 .05 .556 -2.0650 -2.1738 -2.4544 -2.5019 .05 .889 -1.9649 -2.0538 -2.1739 -2.4215 .05 .945 -1.9649 -2.0538 -2.1739 -2.4215 .05 .945 -1.9442 -2.4546 -2.5619 .05 .945 -1.9440 -2.0538 -2.1739 .05 .945 -1.9442 -1.9442 -1.9442 .0686 -0.1360	x/r y/r y/r <td>X/C Y/(E/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.5906 -2.4500 .05 .222 -2.0457 -2.1938 -2.5906 -2.4500 .05 .222 -2.0457 -2.1938 -2.5906 -2.4500 .05 .222 -2.5906 -2.4529 -2.4930 .05 .444 -2.01098 -2.2504 -2.4936 .05 .444 -2.01098 -2.2504 -2.4824 .05 .667 -2.01097 -2.1218 -2.5043 .05 .667 -2.01097 -2.1218 -2.5184 .05 .667 -2.01097 -2.1218 -2.4854 .05 .667 -2.0087 -2.1187 -2.5163 .05 .667 -2.0087 -2.1173 -2.5503 .05 .667 -2.0187 -2.2516 -2.5503 .05 .667 -1.9464 -2.0187 -2.5503 .05 .778 -1.9445 -2.1739 -2.5503 .05 .944 -2.0548 -2.4671 -2.5604 .05 .9445 -1.9695 -1.94215 -2.56019 .06</td> <td>X/C Y/(E/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.2532 -2.4800 .05 .222 -1.9988 -2.2532 -2.4936 .05 .333 -2.2138 -2.3594 -2.4936 .05 .333 -2.2138 -2.2563 -2.4936 .05 .444 -7.0568 -2.1098 -2.5663 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -2.0549 -2.1218 -2.4856 .05 .444 -2.0649 -2.187 -2.5187 .05 .444 -2.0649 -2.1861 -2.4738 .05 .444 -2.0649 -2.2187 -2.5186 .05 .444 -2.0649 -2.4611 -2.5494 .05 .444 -2.0649 -2.1861 -2.4514 .05 .989 -1.9466 <td< td=""><td>X/f V/(B/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.5906 -2.4529 -2.4900 .05 .222 -1.9988 -2.1098 -2.5132 -2.4930 .05 .222 -1.9988 -2.1018 -2.5564 -2.4936 .05 .333 -2.2138 -2.3691 -2.5432 -2.4936 .05 .444 -2.01098 -2.5804 -2.4936 -2.4936 .05 .956 -2.01098 -2.5718 -2.54936 -2.4936 .05 .667 -2.00549 -2.1018 -2.5053 -2.4936 .05 .667 -2.00549 -2.1018 -2.4864 -2.4936 .05 .667 -2.00549 -2.1218 -2.5053 -2.4936 .05 .667 -2.00549 -2.1739 -2.4284 -2.61919 .05 .0689 -1.9466 -2.4671 -2.5019 .05 .089 -1.9446 -2.01739 -2.4284 -2.5019 .05 .989 -1.9446 -2.1329 -2.4284 -2.5019 .05 .989 -1.9446 -2.04584 -2.4671 .05</td><td>X/C Y/(E/2) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.25056 -2.4900 .05 .215 -1.9988 -2.1098 -2.4529 -2.4900 .05 .225 -1.9988 -2.1098 -2.5452 -2.4936 .05 .333 -2.0138 -2.1535 -2.4936 -2.4936 .05 .444 -2.0568 -2.1218 -2.5495 -2.4936 .05 .556 -2.0987 -2.5187 -2.5495 -2.4936 .05 .657 -2.0987 -2.1218 -2.5495 -2.4738 .05 .657 -2.0987 -2.1218 -2.5503 -2.4738 .05 .657 -2.0950 -2.718 -2.5503 -2.5495 .05 .657 -2.0950 -2.1739 -2.5503 -2.5503 .05 .989 -1.9449 -2.5503 -2.5503 -2.5503 .05 .989 -1.9440 -2.0950 -2.1739 -2.5503 .05 .989 -1.9445 -2.0560 -2.4671 -2.5503 .05 .989 -1.9445 -2.0560 -1.9451 -2.5503 .06</td></td<></td>	X/C Y/(E/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.5906 -2.4500 .05 .222 -2.0457 -2.1938 -2.5906 -2.4500 .05 .222 -2.0457 -2.1938 -2.5906 -2.4500 .05 .222 -2.5906 -2.4529 -2.4930 .05 .444 -2.01098 -2.2504 -2.4936 .05 .444 -2.01098 -2.2504 -2.4824 .05 .667 -2.01097 -2.1218 -2.5043 .05 .667 -2.01097 -2.1218 -2.5184 .05 .667 -2.01097 -2.1218 -2.4854 .05 .667 -2.0087 -2.1187 -2.5163 .05 .667 -2.0087 -2.1173 -2.5503 .05 .667 -2.0187 -2.2516 -2.5503 .05 .667 -1.9464 -2.0187 -2.5503 .05 .778 -1.9445 -2.1739 -2.5503 .05 .944 -2.0548 -2.4671 -2.5604 .05 .9445 -1.9695 -1.94215 -2.56019 .06	X/C Y/(E/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.2532 -2.4800 .05 .222 -1.9988 -2.2532 -2.4936 .05 .333 -2.2138 -2.3594 -2.4936 .05 .333 -2.2138 -2.2563 -2.4936 .05 .444 -7.0568 -2.1098 -2.5663 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -7.0568 -2.1018 -2.4856 .05 .444 -2.0549 -2.1218 -2.4856 .05 .444 -2.0649 -2.187 -2.5187 .05 .444 -2.0649 -2.1861 -2.4738 .05 .444 -2.0649 -2.2187 -2.5186 .05 .444 -2.0649 -2.4611 -2.5494 .05 .444 -2.0649 -2.1861 -2.4514 .05 .989 -1.9466 <td< td=""><td>X/f V/(B/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.5906 -2.4529 -2.4900 .05 .222 -1.9988 -2.1098 -2.5132 -2.4930 .05 .222 -1.9988 -2.1018 -2.5564 -2.4936 .05 .333 -2.2138 -2.3691 -2.5432 -2.4936 .05 .444 -2.01098 -2.5804 -2.4936 -2.4936 .05 .956 -2.01098 -2.5718 -2.54936 -2.4936 .05 .667 -2.00549 -2.1018 -2.5053 -2.4936 .05 .667 -2.00549 -2.1018 -2.4864 -2.4936 .05 .667 -2.00549 -2.1218 -2.5053 -2.4936 .05 .667 -2.00549 -2.1739 -2.4284 -2.61919 .05 .0689 -1.9466 -2.4671 -2.5019 .05 .089 -1.9446 -2.01739 -2.4284 -2.5019 .05 .989 -1.9446 -2.1329 -2.4284 -2.5019 .05 .989 -1.9446 -2.04584 -2.4671 .05</td><td>X/C Y/(E/2) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.25056 -2.4900 .05 .215 -1.9988 -2.1098 -2.4529 -2.4900 .05 .225 -1.9988 -2.1098 -2.5452 -2.4936 .05 .333 -2.0138 -2.1535 -2.4936 -2.4936 .05 .444 -2.0568 -2.1218 -2.5495 -2.4936 .05 .556 -2.0987 -2.5187 -2.5495 -2.4936 .05 .657 -2.0987 -2.1218 -2.5495 -2.4738 .05 .657 -2.0987 -2.1218 -2.5503 -2.4738 .05 .657 -2.0950 -2.718 -2.5503 -2.5495 .05 .657 -2.0950 -2.1739 -2.5503 -2.5503 .05 .989 -1.9449 -2.5503 -2.5503 -2.5503 .05 .989 -1.9440 -2.0950 -2.1739 -2.5503 .05 .989 -1.9445 -2.0560 -2.4671 -2.5503 .05 .989 -1.9445 -2.0560 -1.9451 -2.5503 .06</td></td<>	X/f V/(B/Z) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.5906 -2.4529 -2.4900 .05 .222 -1.9988 -2.1098 -2.5132 -2.4930 .05 .222 -1.9988 -2.1018 -2.5564 -2.4936 .05 .333 -2.2138 -2.3691 -2.5432 -2.4936 .05 .444 -2.01098 -2.5804 -2.4936 -2.4936 .05 .956 -2.01098 -2.5718 -2.54936 -2.4936 .05 .667 -2.00549 -2.1018 -2.5053 -2.4936 .05 .667 -2.00549 -2.1018 -2.4864 -2.4936 .05 .667 -2.00549 -2.1218 -2.5053 -2.4936 .05 .667 -2.00549 -2.1739 -2.4284 -2.61919 .05 .0689 -1.9466 -2.4671 -2.5019 .05 .089 -1.9446 -2.01739 -2.4284 -2.5019 .05 .989 -1.9446 -2.1329 -2.4284 -2.5019 .05 .989 -1.9446 -2.04584 -2.4671 .05	X/C Y/(E/2) 9.00 9.51 10.01 11.01 12.00 .05 .156 -2.0457 -2.1938 -2.25056 -2.4900 .05 .215 -1.9988 -2.1098 -2.4529 -2.4900 .05 .225 -1.9988 -2.1098 -2.5452 -2.4936 .05 .333 -2.0138 -2.1535 -2.4936 -2.4936 .05 .444 -2.0568 -2.1218 -2.5495 -2.4936 .05 .556 -2.0987 -2.5187 -2.5495 -2.4936 .05 .657 -2.0987 -2.1218 -2.5495 -2.4738 .05 .657 -2.0987 -2.1218 -2.5503 -2.4738 .05 .657 -2.0950 -2.718 -2.5503 -2.5495 .05 .657 -2.0950 -2.1739 -2.5503 -2.5503 .05 .989 -1.9449 -2.5503 -2.5503 -2.5503 .05 .989 -1.9440 -2.0950 -2.1739 -2.5503 .05 .989 -1.9445 -2.0560 -2.4671 -2.5503 .05 .989 -1.9445 -2.0560 -1.9451 -2.5503 .06

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60.000

									6,99
				19-51	13.01	12.00	10.99		
×/C	Y/(8/2)	13.04	1 3 • 04						
								-2.3015	-2.2995
					- 6651	-2.4881	T806-2-		-7 2675
	16.6	- 6124	6464			2 4118	-2.4621	-2.5348	
• 0•	0 C T •		6768	6432	1104		4 9 5 5 C	-2.3554	-2.3824
• 05	• 222	0001-		- 4233	8022	-2.4520		7501	-2.2780
5	525.	8787			-1 7019	-2.4475	-2.41/8		7446 6-
•	•	1 1 4 0 5	9730	066/ • 1 -		1 4 9 0 3	-7.4768	-2.2541	
•02	****		0176	-1.2826	-1.1945	3004.7-		-2.2472	-2.2554
50	.556	-1.0024			-2.7644	-2.5367	1004-7-		-7.1673
•	111	-1.2287	-1.4155	2001.2-		-2.4847	-2.4097	60/T·7-	
cn•	100.		-1-7856	-2.1107	+265+2-		-7 3066	-2.1763	CT/T.2-
.05	. 778	-1.4000		-2.3251	-2.4074	-2.4445			-7.1900
50	. 889	-1.9996	1106.1-		-2.2553	-2.5385	8164.2-		- 0057
			-2.0212	2142.2-		1951	1265	-•0401	
60	C+ A +		- 5510	5903	6766	4 \ \ \ 4 \ \ \ 4 \ \ \	1801	1647	1442
06.	.178			= 6122	6420	1962 -		5501 -	0955
00.	. 222	5858	0/10.1	22204 -	5583	1984	1341		- 0905
•	223	5672	5466	1676-	E 4 7 0	1918	1310	0660	2000
		2 2 2 7	5487	- • 4 4 6 2	0100.			0884	- 060
06.	• • • •			- 5205	3834	1842		0082	- 0905
. 90	• 556	3959			4938	1840	1240		0796
00	. 667	5459	5216		- 2713	1565	1093		901
•	778	2 05 7	2516	1667		1574	1305	1213	
	•	0.40	2219	2334	0067				
. 90	• • • •								

Т

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

×/C	Y/(8/2)	6 00	8.50	8.00	7.00	7.00	6 . 75		
- 05	.156	-2 0503							
			6000*2-	-1.8655	-1.5622	-1.5757	1 4060		
• •	• 222	-1.9965	-1.9164	-1.8108				40041-	-1.4126
• 05	.333	7712.2-	0700		5 6 5 C • T -	2226+1-	-1.4660	-1.4554	-1.3802
			0/#/*T-	-1.8613	-1.5751	-1.5716	-1-4046		
•••	***	-2.0683	-1.9563	-1.8575			004 - 1	7106.1-	-1.4121
• 0 5	.556	-2.0600	0440			-1.5826	-1.5023	-1.5034	0 7 2 7 7 1 -
30			0 - 0 - 7 -	+1cg.1-	-I.5653	-1.5679	-1.4964		
•	100.	-2.00.92	-1.9477	-1_R198	-1 530A			- 7 0 C • T -	C554.1-
• 05	.778	-1.9578	-1 0105			8666.1-	-1.4726	-1.4925	-1.4183
30	000			-1./500	-1.5164	-1.5303	-1.450R		
•	- DD -	4764 T-	-1.8899	-1.7667	-1.4008	- 1 C S [-			- F 8 5 * T -
• 02	.945	-1.9213	-1.8550	0000			-1.4383	-1.4740	-1.3966
06.	, 1 7A			0461.1-	-1.4403	-1.5440	-1.4269	-1-4876	CC07 [-
		T000	04/8	0464	0364	4450- -			2101 1
. 40	• 222	1134	0447	- 0836			9750	-•0309	0360
06.	525.	- 0733			CBC0*-	-•0/01	0643	0732	- 080 -
			U348	0437	0315	0330	1660 -		
06.	****	0589	0552	10401			+>CO+L	1620	0388
. 90	- 556	- 0547			0322	0312	0324	0358	0434
•			0460	0422	0328				
• 90	• 667	0594	0456				282	-•0332	- • 0302
06.	. 778			6740	0321	0272	- 0302	- 000 a	
		CCC	0200	0439	0288	0 30 0			12000-
• •0	• 945	0765	0710	1990 -			CIEN	0301	0275
					0388	0475	0420	0480	0445
								•	

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE OF ATTACK)

X/C	Y/(8/2)	6.44	6 • 4 4						
							5.50	5.25	5.00
• 05	.156	-1-4027	86 48 - -						
25					6268	8262	7703	CE47	
•	777 •	-1.3 (46	8573	8316	B 304		· · ·		7007°-
•02	• 333	-1.4114	4698 -				6867	7290	9553
				8014	8681	8347	7891	- 7616	
•••	t t t	-1.4061	8927	- 8803	- 9740				1060.1-
• 05	.556	-1.4079	- 0163				7980	7625	-1.0377
20	277			6060°I	-	8521	7936	7645	
	100.	-1.5411	9332	9256	- 0077				CC 70 • T
.05	. 778	-1.3656	- 08 -			0600	1 G T 8 -	7810	- 9604
30	000		1204 -	1104	9513	9118	8319	0 7 0 8 0 7 0	
•	• 0 0 4	6795 .1-	-1.0074	-1.0046	-1 0072				8700 · T -
•0•	.945	-1.3471	-1 0014			2004-	9 :838.	8349	9605
00.	3 7 8			-1.0165	-1.0246	9548	8850	8531	-1 0767
•	0.1.	9074.1	4265	4137	4184	- 4102			1670.1-
• • 0	.222	0736	1054			7474	C 2 7 4 • I	4196	1865
. 90	.333	7220			4301	4392	4304	444	7245
Ċ			0076.	4183	4156	4173	4 7 4 1		
	***	-•0391	4093	4013				1074.1	2200
.90	.556	0378	1 2004				4135	4081	7665
			***	9 F 7 F 9 G	3953		- 304 J		
. 40	. 667	0331	3728				2040-	6875-	2241
.90	. 778	5 8 2 U			2/05.	2616	3802	3860	7510
0				3102	3148	3342	- 3484	30.05	
	. 440	0381	1256	1080				00+5-1	2046
					74770-	131/	1459	1436	0552

es of Attack
Angle
Various
for
Coefficients
Pressure
Spanwise
Surface
Upper

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

		4.99	4.99	4.75	4.75	4.50	4.50	62+4
.05 .05 .05 .05 .05 .05 .05 .05 .05 .05					- 0 7 F F	- 7595	6699	8101
002 005 005 005 005 005 005 005	404	7549	-1.0/06	-1.0204	6070-			7 C 3 7
005 005 005 005 005 005 005 005	474	- 7174	-1.0008	-1.0009	7870	7511	F008	
.05 .05 .05 .05 .05 .05 .05 .05 .05 .05					- 0 5 0 4	7067	6916	66669
05 444 - 91 05 5566 - 99 05 5566 - 99 05 8889 - 99 05 1278 - 99 90 2278 - 99 90 3332 - 27 90 3332 - 27 90 3332 - 27 1 37 1 37 1 37 1 37 1 37 1 37 1 37 1 3	719	7695	-1.034/	0/6 0 • T -				1127 -
00 00 00 00 00 00 00 00 00 00	193	7647	-1.0533	-1.0268	7986	6242 -	0760	
005 005 005 005 005 005 005 005		7 5 1 0	1 0780	-1.0185	8437	7033	7237	681/
.05 .66793 .05 .77893 .05 .989995 .05 .94595 .90 .17825 .90 .33321 .90 .44431	234					7227	- 7113	6718
005 005 005 005 005 005 005 005	308	7737	-1.00 79	-I.0163	e c 1 6 •			
005 005 005 005 005 005 005 005	573	7777	0856	-1.0048	8803	7221	7040	
.00 .05 .05 .04 .00 .04 .04 .00 .033 .00 .033 .00 .033 .033		0140	- 0857	-1.0132	- 8977	7517	8157	8624
.05 .94595 .90 .17828 .90 .22227 .90 .33337 .90 .44431	010				0440	A 307	7332	8649
.90 .178 -28 .90 .222 -27 .90 .333 -27 .90 .444 -31 .91 .556 -33	571	8415	-1.0045	LT TO . T-				2187
	222	4174	1642	3731	2488	0105	67769	
		(31.)	- 1735	1357	3480	3786	4377	- 30 / 8
.90 .33337 .90 .44431 .90 .55631	CD/					- 4183	4208	- 2554
.90 .55631	745	4057	2141					
-90 -556	152	000	1465	1038	2750	5 7 5 F 1 - I	C 7 N 4 • -	
-90 -5563/	+ / L			1071	-3052	7919	2198	-•366
	788	7766-	0701				0026 -	- 362
00 . 447 / Y	853	3706	1658	1285	オオグクーー			
		4455 -	1376	1038	2326	2702	3533	040-040
.1 811. 04.	1.5					- 1606	1782	- 201
-90 -945 -12	275	1499	0373	7470	-•000			

RUNS 31,32 PTINF = 5 PSI M = 0.05 R = 60,000

HYSTERESIS (DECREASING ANGLE DF ATTACK)

05 .156 7573 66822 5765 05 .222 7573 68822 6020 05 .233 8088 7330 6621 6 05 .333 8088 7330 66221 6 05 .556 8198 7330 6520 6 05 .556 8193 7277 6520 6 05 .667 8193 7277 6520 6 05 .667 8193 7371 6520 6 05 .778 8224 7371 67485 6 05 .945 8283 7371 6183 6 06 .333 2441 5120 3472 3 90 .222 3353 3452 3 3 90 .222 3254 3465 3367 3 3 90 .333 2466 2466 3452 3 3 90 .3355 <th>3/2)</th> <th>4.00</th> <th>3.50</th> <th>2,99</th> <th>2.00</th> <th>66 •</th> <th>.01</th> <th>-2.00</th> <th>-2.85</th>	3/2)	4.00	3.50	2,99	2.00	66 •	.01	-2.00	-2.85
05 .156 7573 66668 5765 05 .222 7573 66822 6020 05 .444 8088 7330 66201 6724 05 .444 81216 7330 6520 6724 05 .444 81216 7330 65242 6520 05 .555 81216 7330 65242 65242 05 .555 8123 7371 65242 65242 05 .5677 8224 7371 65242 444 05 .945 8228 7371 6186 6186 07 .178 3253 3441 61282 3452 90 .222 3265 33452 3452 3452 90 .333 2496 28653 33452 3452 90 .33451 28653 33452 3452 3452 90 .5667 2496 28653 3452 3452 3452									
05 1156 -7573 -68822 -5620 05 2222 -7578 -68822 -5620 05 444 -8088 -7330 -66520 -6620 05 5556 -81038 -7257 -65520 -67242 05 5576 -81038 -7277 -65520 -67242 05 5677 -8229 -77277 -65242 -6742 05 -7787 -67242 -67431 -67242 05 -7787 -7371 -6013 -7461 05 -945 -7371 -6013 -67485 06 -9422 -3412 -3472 -3472 90 -1786 -3254 -3441 -3472 -3472 90 -222 -3254 2466 3472 -3472 -3472 90 -222 -3254 2466 2466 3472 -3472 90 -22669 24669 28673				3763	- 4882	3180	1381	.1690	.3002
05 222 -7578 6822 6020 05 $.333$ 8088 7330 6520 05 $.556$ 8103 7330 6520 05 $.6677$ 8103 7277 6520 05 $.6677$ 8229 7277 65242 05 $.6677$ 8229 7305 6542 05 $.7786$ 8229 7305 6542 05 $.7786$ 8229 7305 6542 05 $.7786$ 8229 7305 66113 6720 05 $.7895$ 74611 59611 67306 66113 6485 090 $.222$ 8228 74612 6120 3472 900 $.222$ 325412 3472 3472 3472 900 $.222$ 324512 3472 3452 3452 3472 900 $.3333$ 22496 23456 3	92	15/5	0000					1661	2821
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		7578	6822	6020	4818	-•3183			
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1 5		0662 -	=.6291	5026	3315	1564	•1477	.2870
05 .444 8216 7277 6242 05 .667 8229 7305 6242 05 .667 8229 7316 6242 05 .667 8229 73305 6242 05 .788 8224 73305 6485 05 .889 8228 73305 6485 05 .889 8228 7461 6485 07 .178 8228 7461 6120 90 .178 3452 3472 3472 90 .222 3253 3452 3452 90 .222 2496 23453 3452 3 90 .222 2496 24455 3 3 90 .444 2184 2669 3382 3 90 .556 1688 2151 3382 3 90 .556 1688 1688 3452 3 90 .556 1688 28944		0000			- 4047	7755 -	- 1502	.1526	.2942
05 .556 8193 7277 6242 4 05 .667 8229 7371 6013 4 05 .778 8224 7371 6013 4 05 .945 8228 7462 6013 4 05 .945 8228 7462 6013 4 05 .945 8228 7462 6120 4 90 .178 3412 6120 4 90 .222 3453 3471 3472 3 90 .222 23653 3452 3 3 90 .222 2184 28653 3452 3 90 .556 1688 28649 33452 3 90 .556 1688 2161 33452 3 90 .556 1688 2161 33452 3 90 .556 1688 18466 34452 3 90 .5669 289		8216	+-0.4	0769-				1454	7987.
05 667 8229 7306 5961 4 05 778 8224 7371 6013 4 05 .789 8193 7371 6013 4 05 .789 8193 7462 6013 4 05 .945 8193 7461 6120 4 07 .07401 7412 6120 4 90 .178 3253 3441 3472 3 90 .222 32453 3441 3472 3 90 .223 2496 23453 33452 3 90 .444 2184 2465 33452 3 90 .444 2184 28653 3382 3 90 .556 1688 2164 33670 3 90 .556 1688 1845 3070 3 90 .556 1688 1845 3 3 .9 .9 90	56.	8193	7277	- +6242	4868	1 505			
05 778 8224 7371 6013 4 05 7879 8193 7462 6485 4 05 .849 8193 7461 6120 4 05 .945 8228 7461 6120 4 90 .178 3253 3412 3422 3 90 .222 3254 3441 3452 3 90 .222 3454 3452 3 3 90 .222 2496 28653 3452 3 90 .444 2184 2669 3382 3 90 .556 1688 1846 3452 3 90 .556 1282 1846 3136 3 90 .778 1282 1846 3 3 90 .778 1282 1846 3 3 90 .778 1282 1846 3 3 90 .778 -		- 8220	7306	5961	4982	3073	1378	.10201	
05 889 -8122 -7462 -6485 -4 05 989 -8123 -7462 -6485 -4 05 945 -8258 -7462 -6120 -6 90 178 -3253 -3412 -5120 3422 90 222 -3254 -3441 3422 3452 90 333 -22496 28653 -3452 3452 90 444 -2184 28653 -33382 3452 90 556 -1688 28694 3382 3452 90 556 -1688 28699 3382 3382 90 556 -1688 28953 3382 3382 90 556 -1688 1282 3020 33020 33020 90 -758 11282 0336 03496 3020 33020 90 -945 0336 0336 03496 33020 345		- 0 2 2 A	- 7271	- 6013	4867	3004	-1230	.1670	• 2955
05 .889 8193 7462 6462 6463 05 .945 8228 7401 6120 63412 90 .178 3253 3441 5422 3 90 .222 3254 3441 3472 3 90 .222 3264 3441 3452 3 90 .444 2184 2669 33652 3 90 .556 1288 22465 33670 3 90 .556 1688 2169 3319 3 90 .778 11882 1845 3 3 90 .778 1282 3 3 3 90 .778 1282 3 3 3 3 90 .778 1682 1845 3 3 3 3 90 .778 1282 3 3 3 3 3 90 .945 03356 0336 03						3041	1386	.1624	.2778
05 945 8228 7401 5120 4 90 178 3253 3412 3422 3 90 .222 3254 3441 3471 3 90 .222 3546 3441 3472 3 90 .222 2496 2853 3452 3 90 .444 2184 2669 3382 3 90 .456 28466 28944 3 90 .556 1688 28466 3 3 90 .556 1688 1846 3 3 3 90 .778 11682 1845 3 3 .9 .3 .9 .3 .9 .3 .9 .3	0	8193	1462					C C 7 L	2700
90 178 3253 3412 3422 3 90 .222 3254 3441 3452 3 90 .222 3254 3441 3452 3 90 .333 2496 2853 3452 3 90 .444 2184 2669 3452 3 90 .556 1980 2894 3 90 .556 1688 2894 3 90 .556 1688 1282 3 90 .667 1282 3369 3 90 .778 11282 1846 3 90 .645 0336 3 3	45	8228	7401	6120	4796	318T	9661		
90 .222 .3254 .3441 .3571 .3 90 .222 .2496 .28653 .3452 .3 90 .333 .2184 .26669 .3382 .3 90 .444 .2184 .26669 .3882 .3 90 .556 .1980 .24669 .2894 .3 90 .556 .11888 .2151 .3020 .3 90 .778 .11882 .0336 .2319 .3 90 .778 .0193 .0336 .0499 .3		- 3253	- 3417	3422	3313	3939	3137	1821	11/3
90 .222 3441 3441 3452 3452 90 .333 2496 2853 3452 3 90 .444 2184 2669 3382 3 90 .556 1980 2465 3382 3 90 .556 1988 2151 3020 3 90 .778 1688 1866 3190 3 90 .778 11682 1845 3 3 90 .778 1282 1845 3 3 90 .778 1282 0336 3 3	0				0866	4040	3075	1722	1069
.90 .333 2496 2853 3452 3 .90 .444 2184 2669 3382 3 .90 .556 1980 2466 3894 3 .90 .556 1688 151 3020 3 .90 .778 1282 3876 3 3 .90 .778 1282 3866 3 3 .90 .778 1282 1836 3 3 .90 .778 1282 1846 3 3	. 22	+ 4 2 7 5 + -	3441				2315	- 1827	-1154
90 444 2184 2669 3382 3 90 556 1980 2466 2894 3 90 567 1688 2151 3020 3 90 778 1282 1896 2319 3 90 .778 1282 1896 2319 3 90 .945 0193 0336 0949 1		2496	2853	3452	3191	+			1165
90 556 -1980 -2465 -2894 -3 90 556 -1688 -2151 -3020 -3 90 778 -11895 -1896 -319 90 778 -1282 -0336 -349		2184	7669	3382	3127	3773	3067	/ 681	
.90 .556 1980 2465 094 .90 .667 1688 2151 3020 3 .90 .778 1282 1896 2319 3 .90 .778 1282 1896 2319 3 .90 .945 0193 0336 0949 1	,				7515 -	-3880	1605	1903	1222
-90 -6671688215130203 -90 -7781282189623193 -90 -9450193033609491	56	1980	2400	++02				1 700	-1152
	57	1688	2151	3020	3086	C 08 F			
-90 -6450193033609491	70	- 1282	1896	2319	3005	3481	3059	1831	
					- 1604	- 1518	1961	1456	0920
	4 10	-•0103	0.336	***0*1	1001.	04/4			

Upper Surface Spanwise Pressure Coefficients for Various Angles of Attack

,

	-2.97	-2.97	-2.01	-1.00	00.	1.00	2.00	3.00
	.2126	.2157	0110					
	2046				7077.	1045	667 C • -	/643
		0007	***	242 0.0	G D F 7 • -	4073	5809	7638
_	696T.	• 2000	•0630	0850	2384	4123	5871	7786
	• 2 0 0 2	.1985	.0771	0681	2360	- 4052	- 5855	- 7775
_	.2181	.2181	•0833	0533	2182		- 5604	- 7570
	.2116	.2108	.0768	0641	2235			7-C
	-2189	-2140	.0857	- 0521	- 2040			1001
	1712.	211C.					1 000 •	1391
			6T60 •	C7CN	2124	3789	5488	7376
_	• 2068	• 502 •	• 0748	0657	2225	-,3900	5616	7477
	1918	1921	1498	0846	0080	•0215	.0185	7200-
• .	1909	1841	1961	1270	0306	.0281	C 10-	-0046
_	1857	1877	2463	1860	0568	- 0043	.00.72	
	1908	1952	2511	1392	- 000 a	0110		
.0	1890	1877	2216	- 7728				7600
~	- 1851	- 1950	7676 -		0.26.0		9100.	0019
		6C07 .	9747.	1/33	0458	0152	0021	0096
_	- 06T • -	1/61 -	2324	1574	0612	-•0043	• 0000	0095
_	0802	0842	- 01c -	200	~ ~ ~ ~			

RUN 39 PTINF = 10 PSI M = 0.04 R = 100.000

RUN 39 PTINF = 10 PSI M = 0.04 R = 100,000

x/c	Y/ (8/2)	4.02	5.00	6.00	6.51	7.00	8.01	8.51	9.01
• 05	.156	9818	9F 05 -1 -	ACE4-1-	-1.5587	1007 [-			
° 0 °		- 0780	0706 1-			T040•T-	00/6 T-	-2.0166	-2.2660
			6007°T-	0664.1-	1166.1-	-1.6907	-1.9612	-2.0202	-2.2971
CO •	• •	9851	-1.2025	-1.4458	-1.5634	-1.7003	-1-9660	-7.2724	-7.5587
• 02	• • • •	2066 -	-1.2071	-1.4449	-1.5740	-1-6068	7 7 7 7 T		
-05	. 556	- 0782						-2.0468	-2.45458
			764141-	-1.4323	0096.1-	-1.6898	-1.9683	-2.0345	-2.2287
	.00.	+-07.1	1661.1-	-1.4198	-1.5425	-1.6681	-1.9268	-2.0210	-7.2195
•	• (/8	9526	-1.1671	-1.3946	-1.5167	-1.6366	-1.9036	-1-0068	-7.1102
• 02	.889	9448	-1.1556	-1.3820	-1.4982	-1.6210	-1-8776		
• 05	.945	9550	-1.1606	4080 L-				0104 • 1 -	164042-
0	170				670C · T -	6479•T-	-1.8/0/	-1.9672	-2.0450
	0/7•	0400.	0138	0298	-,0334	0437	0518	0586	0795
06.	• 222	•0043	0208	0339	0414	0506	- 0520		
.90	. 333	.0137	0104	- 0363					+000
00	4.4.4			CO 70 -	9950	C 0 4 0 • I	0496	0638	0734
		6700.	+010*-	0304	0387	0437	0533	0637	0704
. 40	• 556	0053	0145	0290	0379	2020	1 0530		
00.	- 667	0077				347.00	6300-	6/ CO · -	96/0*-
				-•0317	03/4	0460	0466	0543	0750
06.	011.	7900.	0163	0276	0402	0507	0448	0508	0736
06.	• 945	0343	0404	0443	0523	0684	0745	- 1025	
))))			

Angles of Attack
Various
Coefficients for
Spanwise Pressure
Jpper Surface

= 100,000
~
u.
4
0
H
Σ
ΓSΑ
o,
H
PTINE
99
RUN

, , , , , , , , , , , , , , , , , , ,	1181 -2.9822 0674 -2.9401 0925 -2.9432 0526 -2.9432 1076 -3.0154 1325 -3.0757 0835 -3.0757	8523 8523 9834 -1.7935 -1.9133 -2.7821 -2.7821 -3.0674
	0674 -2.9401 09526 -2.9432 0526 -2.9311 1076 -3.0154 1325 -3.0757	
	0925 -2.9432 0526 -2.9311 1076 -3.0154 1325 -3.0563 0835 -3.0757	-1.7935 -1.9133 -2.2015 -2.7821 -3.0674
	0526 -2.9311 1076 -3.0154 1325 -3.0563 0835 -3.0757	-1,9133 -2,2015 -2,7821 -3,0674
, , , , , , , , , , , , , , , , , , ,	1076 -3.0154 1325 -3.0563 0835 -3.0757	-2.2015 -2.7821 -3.0674
	1325 -3.0563 0835 -3.0757	-2.7821 -3.0674
• •	0835 -3.0757	-3.0674
۳	0564 -3.0935	-3.0943
-3.	0841 -3.0940	-3.1523
1	21882914	5970
i	23292980	6054
ľ	21822808	5509
i	21042945	4581
i	2071 2873	5594
i	20822768	3895
•	19292634	4823
i	23792839	2962

RUNS 43,44 PTINF = 15 PSI P = 0.03 R = 100,000

TURBULATOR TAPE, DN

						- 00		1.01	2.00
) / Y									
5	. 156	1996	6560.	.0366	0395	2101	-,2015	3839	5717
		1889	.0858	.0267	0503	2149	2042	3854	5765
50.	. 333	-1834	0818	.0210	0582	2267	2139	-,3960	5820
50.	444	0061	.0840	.0264	0587	2261	2104	3896	5779
-05	.556	2022	.0955	.0287	0411	-•2091	1949	3812	5593
0	- 667	.1965	•0912	.0213	0450	2152	1969	3797	-,5593
50.	. 778	.1965	.0983	•0332	0396	2005	1900	3619	5415
501	889	2001	.0948	.0313	0448	-,2153	-,1932	3713	5450
190 T	.945	.1755	.0627	.0150	-•0663	2255	2195	3977	5835
06	.178	- 1024	.0150	.0433	.0377	•0386	•0333	.0125	0018
06	- 222	1086	•0132	.0383	.0386	.0336	•0368	•0100	0036
06.	- 333	1334	.0291	•0530	.0453	.0340	•0453	.0180	0071
00	444	1149	-0142	.0406	•0395	.0318	•0447	•0062	0105
0.6	- 556	1299	•0113	•0402	.0365	•0364	+0337	•0063	0061
06.	.667	1246	•0244	.0381	•0408	.0367	•0229	•000	0070
06	.778	1422	0018	.0471	.0456	•0333	•0353	•0019	-• 0061
06.	.945	0305	0017	.0113	.0052	0121	0009	0152	0232

}.

R = 100,000
H = 0.03
PTINF = 15 PSI
RUNS 43,44

NO
UU.
AP
-
ř
F
<
_
⊃
Β
œ
5
1

x/c	Y/(8/2)	3.00	4.00	5 • 00	6.00	7.00	7.50		
								16•/	8.00
-05	- 156	7805							
			9884	-1.2149	-1.4320	-1 4001			
• •	• 272	7793	9813	-1 2104		1000-1-	-1.8060	-1.8125	-1.9400
• 05	.333	- 7007			162691-	-1.6814	-1.8103		
30			+T^~-	-1.2102	-1.4325	-1.4733			-1.4336
•	***	7785	9845	-1.2050			1128.1-	-1.8045	-1.9316
• 02	• 556	7705	5620 -		4054979	-1.6785	-1.8126	U BIAD	
50.	647			-1.2048	-1.4233	-1.6766			-1,4362
	100.	1291	9699	-1.1846	-1-4110		7110.1-	-1.8006	-1.9299
6 0•	• 778	7417	- 0574		67769-	6/40"T-	-1.8012	-1.7847	10001-
• 0 5	. 880	C 3 V C 1		1601 • 1-	-I.3887	-1.6238	-1.7502		
			4463	-1.1647	-1.3872	-1 4 20 4		816/ •1-	-1.8687
•	• 440	7616	9665	-1,1878			-1.1310	-1.7416	-1.8525
• • 0	.178	0089	0160			-1.6359	-1.7418	-1.7605	- C C G -
- 90				0.050	-•0322	0424	- 0504		171007
			0193	0270	0370				0499
0	• • • •	0063	0194	- 0787			0484	0466	0527
. 90	• 4 4 4	0132	- 0103			0410	0462	0472	
00.	556			9670.	-•0373	0489	10,01		
		6/00	0186	031R	0220		16+0	0528	0520
. 40	• 667	0130	0222			0420	0479	0549	0404
.00	.778			2000	1660	0475	0506	- 0515	
0		77704	0249	0270	0417			0TC0	0510
• • •	C+7.	0426	0420	0558	- 0617		50G0 · -	0531	0594
						C610	-•0795	0873	0983

RUNS 43,44 PTINF = 15 PSI M = 0.03 R = 100,000

TURBULATOR TAPE, ON

		7525	6999	-1-3122	- 8000				-2.5258	-2,3441	-2.5962	6153	- 6175	1701		6247	6355	5120		3688
13.00		-3.0272	-2.9945	-2.9761	-2.9325	-3.0199	-3.0672			-3.0770	-3.0216	3138	3081	2858		8-83	2902	2903	2691	2805
12.00		-3.0876	-3.0860	-3.0532	-2.9663	-3.0784	-3.0725	-3.0404		6720.6-	-3.0311	2270	2238	2240	2136		2224	2115	2038	2547
10.00	 -2 4603	7060°7-	50 t C + 2 -	-2. / 359	-2.5233	-2.5412	-2.6294	-2.4604	-2 4040		2404.2-	1135	1185	1192	1137		2211-	7601	1051	1639
10.9	4122°2-	-2.2478			961242	6681.2-	-2.1573	-2.0768	-2.0240			1000.	0857	0807	0795	0761	10101		01/0	6027
8 • 50	-2.0223	-2.0311	- 2 1 78 2	-7.0310			+ q n n + 7 -	-1.9196	-1.9619	-1-9750	0545		07070	0800-	66CO+1	0600	0533	0501		
Y/ (8/2)	.156	• 222	• 333	. 4 4 4	.556	647		0	. 889	- 945	.178			444		• • • • •	.667	. 778	.945	
×/C	• 05	• 0 5	• 05	• 05	.05	105			• 00	• 05	.90	. 90	06	06.		. 40	• 90	. 90	.90	

-2.0204 -1.7676 -1.9442	-1.8911 -1.6972	-1.7018 -1.5269	9191	8756	8281 7531	7831	7281		.156
8 • 5 0	8.00	7.38	7.01	6. 50	6.00	5.51	5.00	Y/ (B/2)	i
8		• 000	•09 R = 6(o = M ISd i	PTINE =	RUNS 46,47			
						•		· ·	
		6607.4	1891	1540	0633	1639			
2249	- 2100	- 2053		660 6.1	- •2962	3059	1903	. 778	
3697	3460	7746	2926.			3071	1889	. 667	
3852	3708	3544	3320	3000	07000 • -	3128	1896	• 556	
-•403I	3798	3828	-3454		616\$. -	3179	1935	575 °	
4111	3946	3852	3542				1899	• 333	
6074°-	3902	3884	3471				1644	.222	
- 4 503	4229	4131	3662	2466		- 3223 2027	1954	.178	
42/8	3720	3947	3628	- 3350	1010		•1462	.945	
7130	6820	6739	6229	- 5973			•1504	.889	
7120	6662	6802	6271			9461	.1512	.778	
6987	6616	- •6632	- 6370	- 4145	2106°-	1.14×0	.1543	.667	
- 6950	6603	6670	6367	- 6100		1466	.1521	.556	
6950	6623	6763	6458			1546	.1433	• 4 4 4	
6993	6648	6758	6730	- 4786		1634	.1359	• 333	
-•6911	6656	- • 6 5 9 4	6353	149		• • • • • • •	.1302	• 222	
6206	5915	6015	5648	1.5.5.74		-•1300	.1616	.155	
6825	6545	6615	6353	6343	4066				
							-2.01	Y/ (B/2)	
	4.01	>>==		5,03	200 6				

									8.50
×/C	Y/(B/2)	5.00	5.51	6. 00	6.50	10•7			
						1010	-1.7018	-1.8911	-2.0204
1		- 7281	7831	8281	06/8	1 6 1 6 °-			-1-7676
• 02	•170	T07/		1030	- 7959	8232	-1.5269	7/64ºT-	
, 0 F	. 222	6607	7129			0000	-1.6679	-1.8502	-1.9442
		7364	7848	8352	••8×13			1 8555	-1-9510
• • •				- 8467	- 8842	9718	COCO•1-		
.05	444	7424				- 0046	-1.6799	-1.8659	-1.9636
	EK A	1967	7915	8469	0606			-1.8756	-1.9544
• •			0010 -	- 8732	9313	-1.0268	0640.1-		1 0175
• 05	. 667	1.444			0230	-1.0663	-1.6213	+06/ •1-	C116-1-
50	. 778	7593	8216	1066			-1.4008	-1.7651	-1.8785
•		1487 -	<u> </u>	9164	-1.0024	OF T-T-			-1.8557
60	• 0 0 •			0187	1000	-1.1005	0286.1-	0401-1-	
.05	.945	7589				- 4756	0449	0563	0534
	178	4264	4279	c92 4 -			101	2125	2300
	•		- 1667	4 70 7	4800		0141.		0770
06.	.222		1000		- 4378	4195	0455	0570	5 to 0 • -
00	. 333	4237	4213	2624 -		2070	0377	0433	0522
•		100 V	4165	4109	4 IU /			0455	0577
06.	t t t t •			5 L U 7 -	1,3965	3857	0342		
06.	.556	4056	4048			- 3506	0284	0464	0423
00	. 44.7	3932	3861	in F.			- 0103	0484	0515
	778	3672	3663	3515	3371			- 0527	0662
			000	-,1567	1385	108/			
06.	945	2023	7007.1						

Various Angles of Attack
for
Coefficients f
Pressure
Spanwise
Surface
Upper

10.00	-2.3307	-7.1087	-7.3878	-2.2935	-2.2798	-2.2741	-2.1846	-2-1708	-2.1548	- 1001	3017	1166	- 1000	0908	- 0920	0801	
10.00	-2.3200	-2.0776	-2.3783	-2.2749	-2.2726	-2.2724	-2.1760	-2.1756	-2.1682	1019	3234	1195	0951	0458	0949	0846	- 1140
T/ (8/2)	.156	.222	• 333	• 4 4 4	.556	.667	.778	• 889	.945	.178	• 222	• 333	• • • •	• 556	.667	• 778	. 045
	• 05	•05	• 05	• 05	•05	• 05	•05	• 05	• 05	06.	- 60	• 90	- 90	.90	.90	• 90	- 90

RUNS 46,47 PTINE = 3 PSI M = 0.00 P = 20.00

References

- 1. Mueller, Thomas J.: Low Reynolds Number Vehicles. AGARD-AG-288, Feb. 1985.
- Althaus, Dieter: Profilpolaren fur den Modellflug— Windkanalmessungen an Profilen im Kritischen Reynoldszahlbereich. Neckar-Verlag VS-Villingen, c. 1980.
- Volkers, D. F.: Preliminary Results of Windtunnel Measurements on Some Airfoil Sections at Reynolds Numbers Between 0.6 × 10⁵ and 5.0 × 10⁵. Memo. M-276, Dep. of Aerospace Engineering, Delft Univ. of Technology, June 1977.
- 4. Harvey, William D.: Low-Reynolds Number Aerodynamics Research at NASA Langley Research Center. Aerodynamics at Low Reynolds Numbers $10^4 < Re < 10^6$ —Proceedings, Volume II, Day 2, Royal Aeronautical Soc., c.1986, pp. 19.1–19.49.
- McGhee, Robert J.; Jones, Gregory S.; and Jouty, Remi: Performance Characteristics From Wind-Tunnel Tests of a Low-Reynolds-Number Airfoil. AIAA-88-0607, Jan. 1988.

- McGhee, Robert J.; Beasley, William D.; and Foster, Jean M.: Recent Modifications and Calibration of the Langley Low-Turbulence Pressure Tunnel. NASA TP-2328, 1984.
- Stainback, P. Calvin; and Owen, F. Kevin: Dynamic Flow Quality Measurements in the Langley Low Turbulence Pressure Tunnel. *Technical Papers—19th Aerodynamic Testing Conference*, American Inst. of Aeronautics & Astronautics, 1984, pp. 257-265. (Available as AIAA-84-0621.)
- Loving, Donald L.; and Katzoff, S.: The Fluorescent-Oil Film Method and Other Techniques for Boundary-Layer Flow Visualization. NASA MEMO 3-17-59L, 1959.
- Pankhurst, R. C.; and Holder, D. W.: Wind-Tunnel Techniques. Sir Isaac Pitman & Sons, Ltd. (London), 1965.
- Kline, S. J.; and McClintock, F. A.: Describing Uncertainties in Single-Sample Experiments. *Mech. Eng.*, vol. 75, no. 1, Jan. 1953, pp. 3-8.
- 11. Eppler, Richard; and Somers, Dan M.: A Computer Program for the Design and Analysis of Low-Speed Airfoils. NASA TM-80210, 1980.

L

National Accorducts into Space Admonstration	Report Docum	entation Page	e					
1. Report No. NASA TM-4062	2. Government Access	on No.	3. Recipient's Ca	atalog No.				
4. Title and Subtitle Experimental Results for the Ep	pler 387 Airfoil at		5. Report Date October 198	38				
Low Reynolds Numbers in the L Pressure Tunnel	angley Low-Turbule	nce	6. Performing O	rganization Code				
Robert J. McGhee, Betty S. Wal	ker, and Betty F. M	lillard	8. Performing Organization Report L-16430					
9. Performing Organization Name and Ad NASA Langley Research Center	ldress		10. Work Unit No. 505-60-21-01					
Hampton, VA 23665-5225			11. Contract or (Grant No.				
12. Sponsoring Agency Name and Addres National Aeronautics and Space	s Administration		13. Type of Repo Technical M	ort and Period Covered emorandum				
Washington, DC 20546-0001	rammistration		14. Sponsoring A	gency Code				
15. Supplementary Notes								
used to determine laminar-sepa results with data on the Eppler the Eppler airfoil code, are incl	aration and turbule 387 airfoil from two luded.	other facilities	locations. Con a, as well as wit	mparisons of these h predictions from				
17. Key Words (Suggested by Authors(s)) Low Reynolds number Eppler 387 airfoil Laminar-separation bubbles Wind-tunnel comparisons Experiment/Theory		18. Distribution S Unclassified—	tatement -Unlimited	00				
19. Security Classif.(of this report)	20. Security Classif.(of	Su this page)	Dject Category 21. No. of Pages	02 22. Price				
NASA FORM 1626 OCT 86	Unclassified		231					

For sale by the National Technical Information Service, Springfield, Virginia 22161-2171