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PRACTICAL CALCULATION OF SECOND-ORDER SUPERSONIC FLOW PAST NONLIFTING BODIES OF REVOLUTION

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SUMMARY

Calculation of second-order supersonic flow past bodies of revolution at zero angle of attack is described in detail, and reduced to routine computation. Use of an approximate tangency condition is shown to increase the accuracy for bodies with corners. Tables of basic functions and standard computing forms are presented. The procedure is summarized so that one can apply it without necessarily understanding the details of the theory. A sample calculation is given, and several examples are compared with solutions calculated by the method of characteristics.

INTRODUCTION

For predicting the pressure distribution over a nonlifting body of revolution in supersonic flow, linearized theory is often found to be inadequate. In the past, greater accuracy could be achieved only by resorting to the laborious method of characteristics. Recently, however, a second-order solution has been found which within its range of applicability yields greater accuracy than linearized theory, while requiring considerably less labor than the method of characteristics.

The present paper aims to give a complete description of the second-order method, and to reduce it to routine computation. Previously published descriptions of the procedure, which are inadequate in some respects, are revised. Shortcuts in the computing scheme are pointed out. Extensive tables of the required basic solutions are presented, to be used in conjunction with standard computing forms. Several examples illustrate the procedure.

The reader interested only in calculating the second-order solution for a definite body, without necessarily understanding the details of

the theory, can turn directly to the final section Practical Use of Method on page 26.

NOTATION

a, b, c, d, e, f	functions of t associated with linear and quadratic source solutions
g, h, i, j, k, l, m	functions of t associated with step, corner, and curvature solutions
C_p	pressure coefficient
E	complete elliptic integral of second kind with modulus $k = \sqrt{(1-t)/(1+t)}$
G_o	function associated with determination of first interval
G_1	function associated with determination of subsequent intervals
K	complete elliptic integral of first kind with modulus $k = \sqrt{(1-t)/(1+t)}$
M	free-stream Mach number
N	$\frac{\gamma+1}{2}\frac{M^2}{\beta^2}$
P_n	nth point on surface of body
q	resultant velocity
r	radial coordinate
R	local radius of body
S(x)	source strength distribution function
t	conical variable $\left(\frac{\beta r}{x}\right)$

u	axial velocity component
v	radial velocity component
x	axial coordinate
β	$\sqrt{M^2 - 1}$
γ	adiabatic exponent of gas
δ_n	length of interval between points P_n and P_{n+1}
φ	first-order (linearized) perturbation potential
$\varphi^{(m)}$	basic first-order solution homogeneous of order m
ϕ	second-order perturbation potential
Φ	exact perturbation potential
χ	complementary function for second-order solution
ψ	particular integral for second-order solution

Superscripts

(1)	first-order value
(2)	second-order value
$'$	differentiation with respect to x

Subscripts

o	value at tip of pointed body
n	value at nth point on body, P_n
c	value at corner

DETAILS OF SECOND-ORDER SOLUTION

The natural way of attempting to improve a first-order (linearized) solution is by iteration. For nonlifting bodies of revolution, the second-order iteration equation was solved in principle in 1949 by the discovery of a particular integral expressed in terms of the first-order solution (reference 1). This reduces the second-order problem to the form of the first-order problem. For supersonic speeds, both problems can then be solved by suitable modification of the method of Kármán and Moore (reference 2). The result is the axially symmetric counterpart of Busemann's second-order solution for plane supersonic flow (reference 3), to which it reduces locally at a corner.

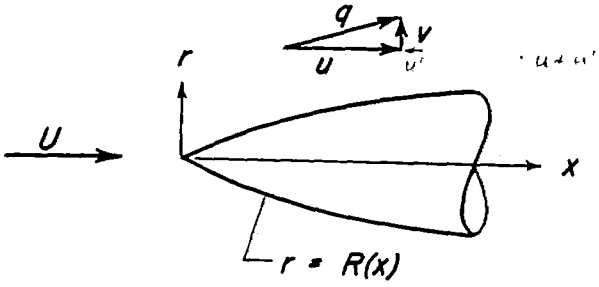
As a preliminary to describing this procedure in detail, the reduction of the second-order problem will be summarized. Further details will be found in references 1 and 4.

Reduction of Second-Order Problem to Two First-Order Problems

At moderate supersonic speeds, the flow past a reasonably slender body of revolution is nearly isentropic and therefore nearly irrotational. To this approximation, there exists a perturbation potential Φ whose derivatives give the velocity perturbations (referred to the velocity U of the free stream), so that

$$\left.\begin{aligned} \frac{u}{U} &= 1 + \Phi_x \\ \frac{v}{U} &= \Phi_r \end{aligned}\right\} \qquad (1)$$

Here subscripts indicate differentiation, and the notation is explained by sketch (a). The equations of motion for a polytropic gas combine into the single equation



Sketch (a)

in cylinder coordinates:

$$\left.\begin{aligned} \Phi_{rr} + \frac{\Phi_r}{r} - \beta^2\Phi_{xx} &= M^2\left[\begin{aligned}&2(N-1)\beta^2\Phi_x\Phi_{xx} + 2\Phi_r\Phi_{xr} + \\ &\Phi_r{}^2\Phi_{rr} + \text{other cubic terms}\end{aligned}\right] \\ \text{where} \qquad \beta^2 &= M^2 - 1 \\ N &= \frac{\gamma+1}{2}\frac{M^2}{\beta^2}\end{aligned}\right\} \tag{2}$$

Here all linear terms have been grouped on the left and quadratic and cubic terms on the right. The only cubic term which gives a second-order contribution is the one involving $\Phi_r{}^2\Phi_{rr}$.

This equation must be solved subject to the boundary conditions that all disturbances vanish ahead of the body, and that the flow is tangent to the surface of the body.

Iteration procedure.- The equation of motion (2) cannot be solved directly because it is nonlinear. Therefore a method of successive approximations is adopted - the so-called Prandtl-Busemann iteration procedure.

In the first approximation, the nonlinear right-hand side of equation (2) is neglected altogether. Hence the first-order perturbation potential φ satisfies the familiar wave equation of linearized supersonic theory:

$$\varphi_{rr} + \frac{\varphi_r}{r} - \beta^2\varphi_{xx} = 0 \tag{3}$$

In the second approximation, the right-hand side of equation (2) is no longer entirely neglected but is evaluated approximately in terms of the previously determined first-order solution. Hence the second-order perturbation potential ϕ satisfies the nonhomogeneous wave equation

$$\phi_{rr} + \frac{\phi_r}{r} - \beta^2\phi_{xx} = M^2[2(N-1)\beta^2\varphi_x\varphi_{xx} + 2\varphi_r\varphi_{xr} + \varphi_r{}^2\varphi_{rr}] \tag{4}$$

Here ϕ will be taken to be the complete second-order perturbation potential, rather than a correction to the first-order solution.

This procedure could be continued to third and higher approximations, subject to the limitation that at some stage the effects of

entropy variations, which were ignored in assuming potential flow, would exceed the remainder in the iteration procedure. For slender bodies at moderate Mach numbers, Lighthill has shown (reference 5) that this limit is reached only in the sixth approximation. For practical purposes, however, only the first two steps appear to be useful.

Particular integral.- Solution of the second-order problem is greatly simplified by the discovery that a particular integral ψ of the iteration equation (4) is given in terms of the first-order solution by

$$\psi = M^2 \left[\varphi_x(\varphi+Nr\varphi_r) - \frac{1}{4} r\varphi_r^3 \right] \tag{5a}$$

so that

$$\left.\begin{aligned} \psi_x &= M^2 \left[\varphi_{xx}(\varphi+Nr\varphi_r)+\varphi_x(\varphi_x+Nr\varphi_{xr}) - \frac{3}{4} r\varphi_{xr}\varphi_r^2 \right] \\ \psi_r &= M^2 \left\{ \varphi_{xr}(\varphi+Nr\varphi_r)+\varphi_x \left[(N+1)\varphi_r+Nr\varphi_{rr} \right] - \frac{1}{4} \varphi_r^2(\varphi_r+3r\varphi_{rr}) \right\} \end{aligned}\right\} \tag{5b}$$

This reduces the second-order problem to the form of the first-order problem, because the nonhomogeneous iteration equation (4) is reduced to the homogeneous equation (3) of first-order theory. The complete second-order potential consists of the particular integral plus a complementary function χ which is required to re-establish the boundary conditions:

$$\phi = \psi + \chi \tag{6}$$

and χ is a solution of the first-order equation (3). Thus the remaining problem for χ differs from that for the first-order potential φ only in that the tangency condition is more complicated. Methods for solving first-order problems are well established, so that in principle the second-order problem is solved. In practice, however, various details require careful consideration, to which the subsequent discussion is devoted.

Tangency Condition

Because approximations were made in the equation of motion, one would anticipate that a corresponding approximation is permissible in the condition of tangent flow at the body. Such an approximation can be made, and it can be shown that the mathematical order of the error is not thereby increased. This suggests that it is immaterial whether or not the approximation is adopted. However, numerical examples show that the

approximation has in some cases a large effect upon the solution, so that the choice of tangency condition must be carefully considered.[1]

Exact and approximate tangency conditions.- If the body is defined by $r = R(x)$, the exact tangency condition for the original problem of equation (2) is

$$\Phi_r = R'(1+\Phi_x) \qquad \text{at} \quad r = R(x) \tag{7}$$

where the prime indicates differentiation with respect to x. The corresponding exact tangency conditions for the first- and second-order problems of equations (3) and (4) are

$$\varphi_r = R'(1+\varphi_x) \qquad \text{at} \quad r = R(x) \tag{8}$$

and

$$\phi_r = R'(1+\phi_x) \qquad \text{at} \quad r = R(x) \tag{9}$$

exact

Now in equation (8) it is consistent with the approximations of the first-order theory to neglect the small quantity φ_x in comparison with unity. Thus the approximate first-order tangency condition becomes

$$\varphi_r = R' \qquad \text{at} \quad r = R(x) \tag{10}$$

Similarly, in equation (9) the term ϕ_x can be replaced by its first-order counterpart. Thus the approximate second-order tangency condition becomes

$$\phi_r = R'(1+\varphi_x) \qquad \text{at} \quad r = R(x) \tag{11a}$$

approx.

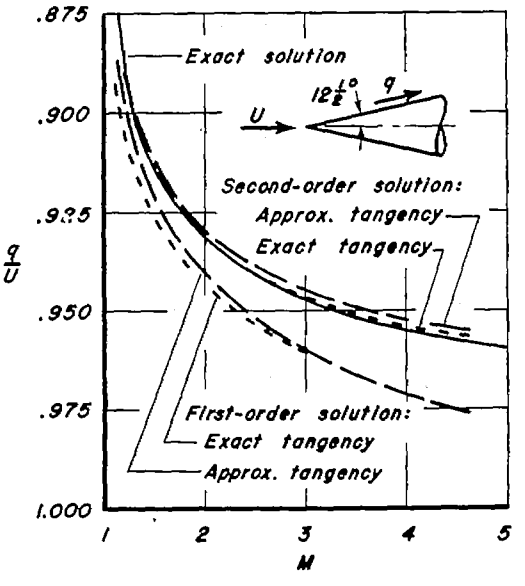
or, separating the second-order term into particular integral and complementary function according to equation (6) and collecting known quantities on the right-hand side,

$$\chi_r = R'(1+\varphi_x) - \psi_r \qquad \text{at} \quad r = R(x) \tag{11b}$$

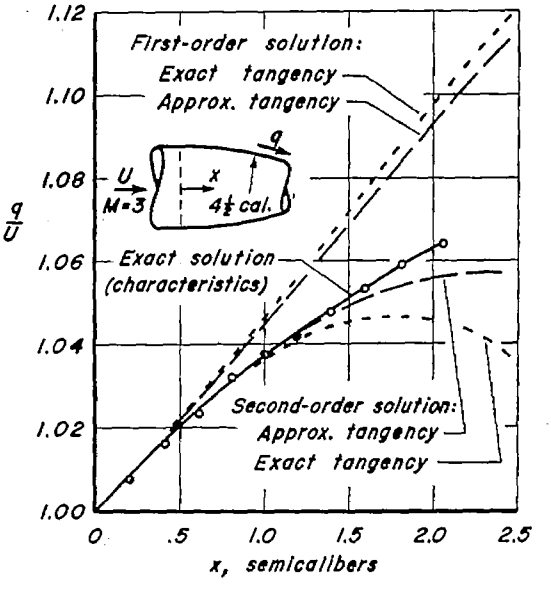
Smooth bodies.- For bodies without corners, the choice of tangency condition has no consistent effect upon the error in surface velocity. Greater accuracy in the second-order solution results from using the exact tangency condition in some cases, but the approximate condition

[1] The magnitude of this effect was brought to the author's attention by John Huth and E. P. Williams of the Rand Corporation.

in others.[2] For example, the exact condition leads to greater accuracy for cones, as shown in sketch (b). This superiority, of course, arises at the tip of any pointed body and persists for some distance downstream. On the other hand, the approximate tangency condition leads to greater accuracy for the boattail following a long cylinder shown in sketch (c), for which the exact solution has been determined by the



Sketch (b)



Sketch (c)

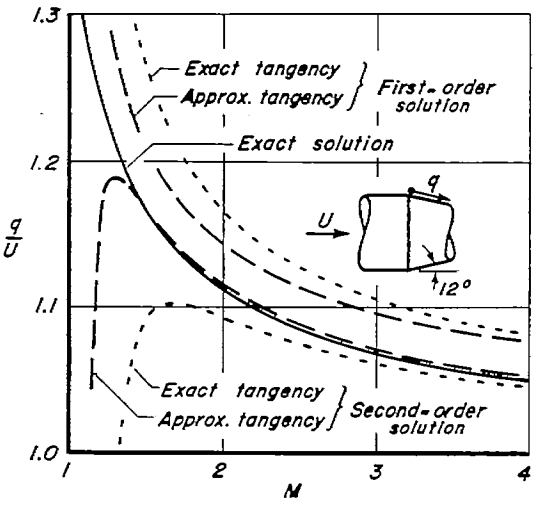
method of characteristics. Thus the conclusion, based upon estimates of the order of error, that neither tangency condition is consistently more accurate, is confirmed empirically for smooth bodies.

Bodies with corners.- In plane flow, the approximate tangency condition invariably leads to more accurate first- and second-order velocities than the exact condition. The superiority of the approximate tangency condition is most pronounced for expansions, and becomes greater as the Mach number falls toward unity.

At a corner on a body of revolution the flow is locally two-dimensional. Therefore the approximate tangency condition is, at least locally, consistently superior to the exact condition for both the

[2]In the first-order solution, however, the approximate tangency condition seems invariably to yield greater accuracy.

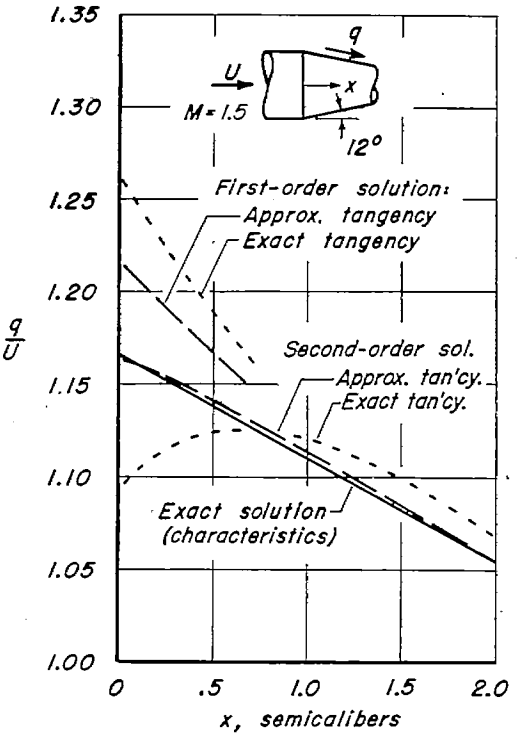
first- and second-order solutions. This is shown in sketch (d) for the velocity just behind the corner of a conical boattail which follows a very long circular cylinder. (The exact solution is, of course, given by a plane Prandtl-Meyer expansion.) At moderate Mach numbers, the superiority of the approximate tangency condition is of considerable practical importance in the second-order solution. The superiority is not confined to the immediate vicinity of the corner, but persists far downstream. This is illustrated in sketch (e) by comparison with the solution for a conical boattail calculated by the method of characteristics. (For clarity, the first-order solutions are only partially shown.)



Sketch (d)

Sketch (d) suggests that the large discrepancy associated with the choice of tangency condition is in some sense a transonic phenomenon. This is confirmed by examination of the expressions for the streamwise velocity just behind the corner. For expansion through an angle whose tangent is ϵ, the second-order solution using the exact tangency condition is

$$\frac{u}{U} = 1 + \frac{\epsilon}{\beta-\epsilon} - \frac{\gamma+1}{4}\frac{M^4}{\beta}\frac{\epsilon^2}{(\beta-\epsilon)^3} \qquad (12a)$$



Sketch (e)

whereas the second-order solution using the approximate tangency condition is

$$\frac{u}{U} = 1 + \frac{\epsilon}{\beta} + \frac{\epsilon^2}{\beta^2} - \frac{\gamma+1}{4}\frac{M^4}{\beta^4}\epsilon^2 \qquad (12b)$$

The difference between these two results is clearly of order ϵ^3 and hence of third order in the usual sense, according to which linearized theory gives the first approximation. However, in the transonic range (where β is of order $\epsilon^{1/3}$ for small disturbances) the main term in the difference is

$$\frac{\Delta u}{U} \sim \frac{3(\gamma+1)}{4}\frac{M^4}{\beta^5}\epsilon^3 \qquad (12c)$$

which is small only of order $\epsilon^{4/3}$. Since u/U itself is of order $\epsilon^{2/3}$ in the transonic range, it is seen that the discrepancy has grown to be of second order in the sense of transonic small-disturbance theory. This is simply another example of the fact, which plagues all users of transonic small-disturbance theory, that higher-order effects are greater in the transonic range than at other speeds.

Choice of tangency condition.- It has been seen that although for smooth bodies neither tangency condition can be preferred, for bodies with corners the approximate condition is consistently superior to the exact condition in both first and second order. Consequently, the approximate tangency condition (equations (10) and (11)) is adopted for use henceforth.[3]

The approximate tangency condition has several minor additional advantages. As might be expected, the computing procedure is simplified. For example, the second-order velocities on the surface of a cone, which could not conveniently be written in explicit form in reference 1 (where the exact tangency condition was used) are not unduly complicated if the approximate condition is used. The result is that

[3]All numerical examples given in references 1 and 4 were calculated using the exact tangency condition, and will therefore not agree precisely with results from the present computing scheme. It should also be noted that the solution presented in references 1 and 4 for the 3-1/2-caliber-long ogive at $M = 3.24$ is inaccurate near the nose because linear rather than quadratic source solutions were used for calculating the complementary function X, which results in appreciable error where the body slope is nearly that of the Mach cone.

at the surface of a cone of semivertex angle $\tan^{-1}\epsilon$

$$\frac{u}{U} = 1 - \epsilon^2 \frac{\operatorname{sech}^{-1}T}{\sqrt{1-T^2}} + \epsilon^4\left(\frac{\operatorname{sech}^{-1}T}{\sqrt{1-T^2}}\right)^2 +$$

$$\frac{M^2\epsilon^4}{1-T^2}\left[-(\operatorname{sech}^{-1}T)^2 + \frac{10+T^2}{4}\frac{\operatorname{sech}^{-1}T}{\sqrt{1-T^2}} - \left(N+\frac{7}{4}\right) + (N-1)T^2\left(\frac{\operatorname{sech}^{-1}T}{\sqrt{1-T^2}}\right)^2\right] \quad (13a)$$

$$\frac{v}{U} = \epsilon\left(1 - \epsilon^2\frac{\operatorname{sech}^{-1}T}{\sqrt{1-T^2}}\right) \quad (13b)$$

where $T = \beta\epsilon$.

Another advantage is that with the approximate tangency condition the first-order solution exactly satisfies the supersonic similarity rule (the supersonic counterpart of the Göthert rule, reference 6).

Pressure Relation

After the velocity components are determined, the pressure coefficient is given by

$$C_p = \frac{2}{\gamma M^2}\left[\left\{1 + \frac{\gamma-1}{2}M^2\left[1 - (1+\Phi_x)^2 - \Phi_r{}^2\right]\right\}^{\frac{\gamma}{\gamma-1}} - 1\right] \quad (14)$$

It was shown in reference 4 that approximating this expression by the leading terms of its series expansion cannot generally be justified, and numerical examples show that such expansion leads to unnecessary loss of accuracy, particularly in the second-order solution (references 1 and 4). Therefore the complete pressure relation of equation (14) is used in the present computing scheme.

Basic Solutions of First-Order Equation

It has been seen that discovery of a particular integral reduces the second-order problem to a sequence of two first-order problems. These are best solved by repeated superposition of five basic solutions, which are derived and tabulated below.

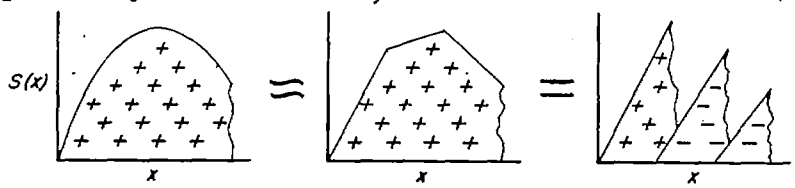
Any first-order solution may be regarded as resulting from a continuous distribution of supersonic sources along the axis of the body.

(See, for example, reference 2 or 7.) A source distribution of local strength $S(x)$ per unit length yields a first-order perturbation potential given by

$$\varphi(x,r) = -\int_{-\infty}^{x-\beta r} \frac{S(\xi)\, d\xi}{\sqrt{(x-\xi)^2 - \beta^2 r^2}} \qquad (15)$$

Therefore the first-order problem consists simply in determining the source-distribution function $S(x)$ which produces the desired shape. However, substituting this expression into the tangency condition yields an integral equation which cannot be solved exactly.

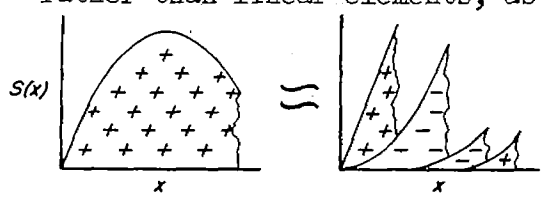
The Kármán-Moore procedure for obtaining an approximate numerical solution involves the assumption that the unknown source function $S(x)$ can be replaced by a broken line, as indicated in sketch (f). Another



Sketch (f)

(quite equivalent) viewpoint is that the function is approximated by the sum of a number of linear source distributions having various starting points, as shown. The slope of each of these linear elements is determined in succession by imposing the tangency condition at corresponding points along the body. (The details of this procedure are clearly described in Sauer's book, reference 7.)

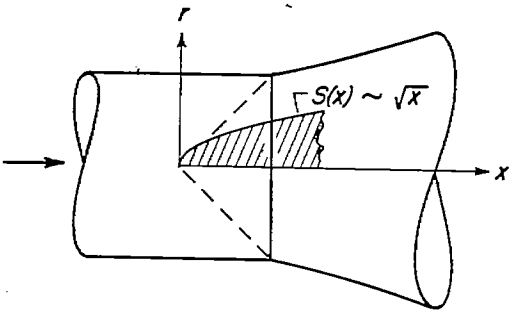
For calculating a first-order solution which forms the first step of a second-order solution, this broken-line approximation to the source strength is too crude. Although the final second-order velocities are given by first derivatives of ϕ, they involve second derivatives of the first-order solution φ, which enter through the particular integral. (See equations (5a) and (5b).) Since differentiation is a roughening process, this means that the first-order potential must be one degree smoother when used as the basis for a second-order solution. This is achieved by approximating the unknown source strength by quadratic rather than linear elements, as shown in sketch (g). However, as indicated in the sketch, the linear element is also required for use at the tip of a pointed body, where the source strength actually rises linearly.



Sketch (g)

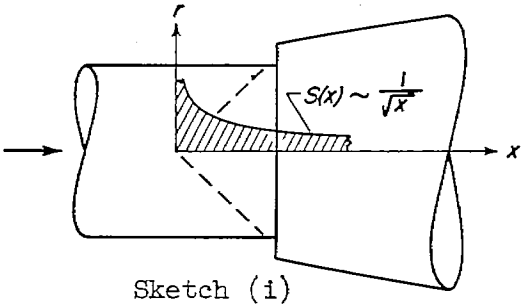
For a smooth body with continuous curvature these two basic solutions are sufficient. Others are required, however, if the body has corners or discontinuities in curvature, which require special treatment. A corner

is accounted for in the first-order solution by adding a source distribution of square-root strength, which produces a discontinuity in streamline slope along its foremost Mach cone. As indicated in sketch (h), this corner solution must be shifted upstream so that its effect first reaches the surface just at the corner. In the same way, a curvature discontinuity is accounted for in the first-order solution by adding a source distribution of 3/2-power strength, which produces a discontinuity in streamline curvature along its foremost Mach cone. This curvature solution is required also at a corner, because an apparent curvature discontinuity remains after the corner solution is added.



Sketch (h)

Because of the roughening due to differentiation, the particular integral has stronger discontinuities than the first-order solution. Thus in the case of a discontinuity in body curvature the particular integral behaves like a corner solution, while in the case of an actual corner it behaves like the solution at a step in the streamlines (sketch (i)). These spurious discontinuities must be canceled in the complementary function. For this purpose the corner solution is used again in the first case. In the second case, another basic solution is required which produces an actual step in the streamlines. As indicated in sketch (i), this step solution results from an inverse square-root source distribution.



Sketch (i)

To summarize, the first-order solution and complementary function are calculated by superposing the following five basic solutions:

1. Linear source solution - used at tip of pointed body
2. Quadratic source solution - used thereafter for body having continuous curvature
3. Corner solution - used to account for corner
4. Curvature solution - used to account for curvature discontinuity
5. Step solution - used to cancel step in ψ' at corner

Homogeneous solutions.- The required solutions are axially symmetric solutions of the wave equation, homogeneous in the space variables. The order of homogeneity is integral (1 and 2) in the first two cases, and half-integral (1/2, 3/2, -1/2) in the others. Such solutions have been studied in detail by Hayes (reference 8). For present purposes $\varphi^{(m)}$,

the solution homogeneous of order m, can be obtained by taking the source distribution $S(x)$ in equation (15) proportional to x^m. It is convenient to choose the source strength as

$$S^{(m)}(x) = \frac{C}{m!} x^m \tag{16}$$

where C is a normalization constant, so that solutions of various orders are related by

$$\varphi^{(m-p)} = \left(\frac{\partial}{\partial x}\right)^p \varphi^{(m)} \tag{17}$$

For integral m, the solutions have simplest form if the normalization constant C is taken to be unity. Then using various relations for the hypergeometric function (see, for example, reference 9) the solutions are found to be given by

$$\varphi^{(m)}(x,r) = -\frac{x^m}{1\cdot 3\ldots(2m-1)} (1-t^2)^{m+\frac{1}{2}} F\left(\frac{m+1}{2}, \frac{m+2}{2}; m+\frac{3}{2}; 1-t^2\right) \tag{18}$$

Here the conical variable

$$t = \frac{\beta r}{x} \tag{19}$$

is the ratio of the tangent of the polar angle to the tangent of the Mach angle, and so varies from zero on the axis to unity at the Mach cone. For integral m, the hypergeometric functions which occur in equation (18) can be expressed in terms of products of $\sqrt{1-t^2}$ and $\operatorname{sech}^{-1} t$ with polynomials in t^2. The first two required basic solutions are obtained by setting m equal to 1 and 2, which gives:

Linear source solution ($m = 1$)

$$\left.\begin{aligned} \varphi &= -x\left(\operatorname{sech}^{-1} t - \sqrt{1-t^2}\right) & \varphi_{xx} &= -\frac{1}{x}\frac{1}{\sqrt{1-t^2}} \\ \varphi_x &= -\operatorname{sech}^{-1} t & \varphi_{xr} &= \frac{\beta}{x}\frac{1}{t\sqrt{1-t^2}} \\ \varphi_r &= \beta\frac{\sqrt{1-t^2}}{t} & \varphi_{rr} &= -\frac{\beta^2}{x}\frac{1}{t^2\sqrt{1-t^2}} \end{aligned}\right\} \tag{20}$$

Quadratic source solution ($m = 2$)

$$\left.\begin{aligned} \varphi &= -\frac{1}{2}x^2\left[\left(1+\frac{1}{2}t^2\right)\operatorname{sech}^{-1}t - \frac{3}{2}\sqrt{1-t^2}\right] & \varphi_{xx} &= -\operatorname{sech}^{-1}t \\ \varphi_x &= -x\left(\operatorname{sech}^{-1}t - \sqrt{1-t^2}\right) & \varphi_{xr} &= \beta\frac{\sqrt{1-t^2}}{t} \\ \varphi_r &= \frac{\beta}{2}x\left(\frac{\sqrt{1-t^2}}{t} - t\operatorname{sech}^{-1}t\right) & \varphi_{rr} &= -\frac{\beta^2}{2}\left(\frac{\sqrt{1-t^2}}{t^2} + \operatorname{sech}^{-1}t\right) \end{aligned}\right\} \quad (21)$$

For half-integral m, it is convenient to choose the normalization constant C as $\sqrt{2/\pi}$, so that the solutions have simple values at the Mach cone. (The difference in normalization for integral and half-integral m is of no concern, because the connection between them is never used.) Transforming the hypergeometric function into a more useful form for this case gives

$$\varphi^{(m)}(x,r) = -x^m\frac{\sqrt{2}(1-t)^{m+\frac{1}{2}}}{\Gamma\left(m+\frac{3}{2}\right)\sqrt{1+t}}F\left(\frac{1}{2},m+1;m+\frac{3}{2};\frac{1-t}{1+t}\right) \quad (22)$$

The hypergeometric functions occurring here can be expressed in terms of products of complete elliptic integrals and algebraic functions of t. The remaining three required basic solutions are obtained by setting m equal to $1/2$, $3/2$, and $-1/2$. For convenience, asymptotic values valid just inside the Mach cone (where $t = 1$) are also given below:

Corner solution ($m = 1/2$)

$$\left.\begin{aligned} \varphi &= -\sqrt{x}\frac{4\sqrt{2}}{\pi}\sqrt{1+t}\,(K-E) & &\sim 0 \\ \varphi_x &= -\frac{1}{\sqrt{x}}\frac{2\sqrt{2}}{\pi}\frac{1}{\sqrt{1+t}}K & &\sim -\frac{1}{\sqrt{x}} \\ \varphi_r &= \frac{\beta}{\sqrt{x}}\frac{2\sqrt{2}}{\pi}\frac{1}{\sqrt{1+t}}\left(\frac{1+t}{t}E - K\right) & &\sim \frac{\beta}{\sqrt{x}} \\ \varphi_{xx} &= \frac{1}{x^{3/2}}\frac{\sqrt{2}}{\pi}\frac{1}{(1-t)\sqrt{1+t}}(K-E) & &\sim \frac{1}{8}\frac{1}{x^{3/2}} \\ \varphi_{xr} &= \frac{\beta}{x^{3/2}}\frac{\sqrt{2}}{\pi}\frac{1}{(1-t)\sqrt{1+t}}\left(\frac{1}{t}E-K\right) & &\sim \frac{3}{8}\frac{\beta}{x^{3/2}} \\ \varphi_{rr} &= -\frac{\beta^2}{x^{3/2}}\frac{\sqrt{2}}{\pi}\frac{1}{(1-t)\sqrt{1+t}}\left(\frac{2-t^2}{t^2}E - \frac{2-t}{t}K\right) & &\sim -\frac{7}{8}\frac{\beta^2}{x^{3/2}} \end{aligned}\right\} \quad (23)$$

Curvature solution ($m = 3/2$)

$$\left.\begin{aligned}
\varphi &= -x^{3/2}\frac{8\sqrt{2}}{9\pi}\sqrt{1+t}\,[(3+t)\,K - 4E] && \sim 0\\
\varphi_x &= -\sqrt{x}\,\frac{4\sqrt{2}}{\pi}\sqrt{1+t}\,(K-E) && \sim 0\\
\varphi_r &= \beta\sqrt{x}\,\frac{4\sqrt{2}}{3\pi}\sqrt{1+t}\left(\frac{1}{t}E-K\right) && \sim 0\\
\varphi_{xx} &= -\frac{1}{\sqrt{x}}\,\frac{2\sqrt{2}}{\pi}\,\frac{1}{\sqrt{1+t}}\,K && \sim -\frac{1}{\sqrt{x}}\\
\varphi_{xr} &= \frac{\beta}{\sqrt{x}}\,\frac{2\sqrt{2}}{\pi}\,\frac{1}{\sqrt{1+t}}\left(\frac{1+t}{t}E-K\right) && \sim \frac{\beta}{\sqrt{x}}\\
\varphi_{rr} &= -\frac{\beta^2}{\sqrt{x}}\,\frac{2\sqrt{2}}{3\pi}\,\frac{1}{\sqrt{1+t}}\left(2\frac{1+t}{t^2}E-\frac{2-t}{t}K\right) && \sim -\frac{\beta^2}{\sqrt{x}}
\end{aligned}\right\} \qquad (24)$$

Step solution ($m = -1/2$)

$$\left.\begin{aligned}
\varphi &= -\frac{1}{\sqrt{x}}\,\frac{2\sqrt{2}}{\pi}\,\frac{1}{\sqrt{1+t}}\,K && \sim -\frac{1}{\sqrt{x}}\\
\varphi_x &= \frac{1}{x^{3/2}}\,\frac{\sqrt{2}}{\pi}\,\frac{1}{(1-t)\sqrt{1+t}}\,(K-E) && \sim \frac{1}{8}\,\frac{1}{x^{3/2}}\\
\varphi_r &= \frac{\beta}{x^{3/2}}\,\frac{\sqrt{2}}{\pi}\,\frac{1}{(1-t)\sqrt{1+t}}\left(\frac{1}{t}E-K\right) && \sim \frac{3}{8}\,\frac{\beta}{x^{3/2}}
\end{aligned}\right\} \qquad (25)$$

Here K and E are the complete elliptic integrals of first and second kind with modulus $k = \sqrt{(1-t)/(1+t)}$. The second derivatives of the step solution are not required.

Use of relations among second derivatives.- All three second derivatives of the first-order potential are required in order to carry out the second-order solution. (See equations (5b).) Considerable labor can be avoided by calculating directly only one of them, say φ_{xx}. Then φ_{xr} and φ_{rr} can be obtained from the equation of motion and tangency condition. Thus the first-order equation of motion (3) gives immediately an expression for φ_{rr}:

$$\varphi_{rr} = \beta^2\varphi_{xx} - \frac{\varphi_r}{r} \tag{26}$$

Differentiating the first-order tangency condition (equation (10)) with respect to x gives an expression for φ_{xr} on the surface of the body:

$$\varphi_{xr} = R'' - R'\varphi_{rr} \qquad \text{at} \quad r = R(x) \tag{27}$$

The computing forms described later incorporate this simplification.

Tables of basic solutions.- With this simplification, the five basic solutions and their required derivatives comprise 13 distinct functions. Each is a power of x multiplied by a function of t alone. Thus, associated with the linear and quadratic source solutions are the following six functions of t, which, as indicated, play different roles in the two solutions:

Symbol	Functional form	Role in quadratic source solution	Role in linear source solution
a(t)	$\left(\frac{1}{2}+\frac{1}{4}t^2\right)\operatorname{sech}^{-1}t-\frac{3}{4}\sqrt{1-t^2}$	$-\varphi/x^2$	---
b(t)	$\operatorname{sech}^{-1}t-\sqrt{1-t^2}$	$-\varphi_x/x$	$-\varphi/x$
c(t)	$\frac{1}{2}\left(\frac{\sqrt{1-t^2}}{t}-t\operatorname{sech}^{-1}t\right)$	$\varphi_r/\beta x$	---
d(t)	$\operatorname{sech}^{-1}t$	$-\varphi_{xx}$	$-\varphi_x$
e(t)	$\frac{\sqrt{1-t^2}}{t}$	(φ_{xr}/β)	φ_r/β
f(t)	$\frac{1}{\sqrt{1-t^2}}$	---	$-x\varphi_{xx}$

(28)

$\operatorname{sech}^{-1}t = \ln\left(\frac{1}{t}+\sqrt{\frac{1}{t^2}-1}\right)$

These functions are tabulated in table I for t ranging from 0.100 to 0.940 by increments of 0.001.[4] Values are given to six significant figures or seven decimals, whichever is the lesser, and are believed to be correct to within one-half unit in the last place. Linear interpolation results in errors of no more than three units in the last place except near the beginning and end of the table.

[4]Tables I and II are modeled after unpublished tables for calculating first-order supersonic flow past inclined bodies which were prepared for the author at the Rand Corporation.

Likewise, associated with the corner, curvature, and step solutions are the following seven functions of t:

Symbol	Functional form	Role in curvature solution	Role in corner solution	Role in step solution	
g(t)	$\frac{8\sqrt{2}}{9\pi}\sqrt{1+t}\,[(3+t)\,K-4E]$	$-\varphi/x^{3/2}$	---	---	(29)
h(t)	$\frac{4\sqrt{2}}{\pi}\sqrt{1+t}\,(K-E)$	$-\varphi_x/\sqrt{x}$	$-\varphi/\sqrt{x}$	---	
i(t)	$\frac{4\sqrt{2}}{3\pi}\sqrt{1+t}\left(\frac{1}{t}E-K\right)$	$\varphi_r/\beta\sqrt{x}$	---	---	
j(t)	$\frac{2\sqrt{2}}{\pi}\frac{1}{\sqrt{1+t}}K$	$-\sqrt{x}\,\varphi_{xx}$	$-\sqrt{x}\,\varphi_x$	$-\sqrt{x}\,\varphi$	
k(t)	$\frac{2\sqrt{2}}{\pi}\frac{1}{\sqrt{1+t}}\left(\frac{1+t}{t}E-K\right)$	$(\sqrt{x}\,\varphi_{xr}/\beta)$	$\sqrt{x}\,\varphi_r/\beta$	---	
l(t)	$\frac{\sqrt{2}}{\pi}\frac{1}{(1-t)\sqrt{1+t}}(K-E)$	---	$x^{3/2}\,\varphi_{xx}$	$x^{3/2}\varphi_x$	
m(t)	$\frac{\sqrt{2}}{\pi}\frac{1}{(1-t)\sqrt{1+t}}\left(\frac{1}{t}E-K\right)$	---	$(x^{3/2}\,\varphi_{xr}/\beta)$	$x^{3/2}\varphi_r/\beta$	

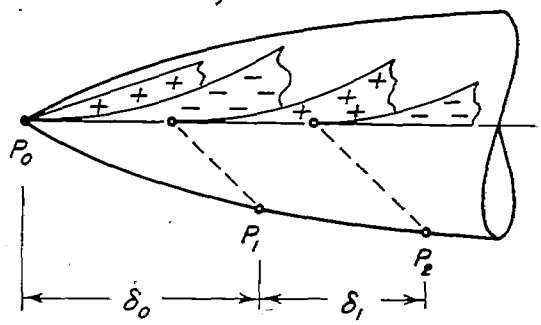
These functions are tabulated in table II for t ranging from 0.100 to 1.000 by increments of 0.001. The number of figures and accuracy are the same as for table I. Linear interpolation results in errors of no more than three units in the last place except for certain of the functions near the beginning of the table.

To facilitate interpolation, first forward differences are given without their algebraic sign in both tables. It should be noted that the differences are actually negative except in the case of the function $f(t)$ in table I.

Choice of Intervals

The five basic solutions are superimposed to calculate the first-order potential φ and again to calculate the complementary function χ.

The procedure, analogous to that of Kármán and Moore, is indicated in sketch (j) for a smooth pointed body. First, a linear source is added at the origin of strength sufficient to produce tangent flow just at the tip. Second, a quadratic source is added at the origin of strength (negative for a convex body), such that together with the linear source it produces tangent flow on the body at some distance δ_0 from the nose. Third, another quadratic source is added with its vertex shifted downstream so that its effect begins at the end of the first interval, and its strength is determined by imposing the tangency condition at some farther distance δ_1 along the body. Any corners or curvature discontinuities (or steps in the complementary function) must be accounted for by adding suitable strengths of the appropriate solutions, after which the superposition of quadratic sources continues as before.



Sketch (j)

The proper choice of intervals is of crucial importance. They should be taken as large as possible, because the computing labor increases nearly as the square of the number of intervals. On the other hand, the inaccuracy associated with using finite intervals rises with the square of their length, so that too large intervals lead to unacceptable error. It should be emphasized that the error considered here, which will be termed "numerical error," is the difference between the approximate second-order solution for finite intervals and the corresponding limiting solution for infinitesimal intervals; it is quite distinct from the difference between the second-order and exact solutions.

Fortunately, the tendency for numerical errors in successive intervals to accumulate is largely offset by the downstream damping of disturbances. Furthermore, successive numerical errors alternate in sign in most cases. Consequently, it has been found sufficient to formulate rules according to which each interval alone in an otherwise exact solution would cause no more than 1-percent numerical error. The entire second-order pressure distribution will then be determined correctly to within roughly 1 percent of the maximum pressure increment.

Simplification resulting from similarity.- The dependence of the first-order solution upon Mach number can be accounted for by the supersonic counterpart of the Göthert rule (reference 6), which is the similarity rule for linearized compressible flow. This similarity rule does not hold to second order. However, carrying out the usual similarity analysis shows that it holds approximately for the particular integral, which is the primary source of numerical error. (The similarity for the particular integral fails to be exact only to the extent to

which β differs from M, which is important only in the transonic range.) Therefore, any measure of numerical inaccuracy in the second-order solution may be expected to follow roughly the ordinary supersonic similarity rule. It is clear that this approximate result is adequate for estimating lengths of intervals, because moderate errors in interval length will not appreciably affect the solution. As a consequence, rules for choosing intervals which have been determined at one Mach number become universally valid if restated with the radius R replaced throughout by βR, the reduced radius of the supersonic similarity rule (or possibly MR, since the approximate similarity rule does not distinguish between β and M). This conclusion, which greatly simplifies the formulation of rules, has been confirmed by a number of numerical calculations.

First interval for pointed body.- If a pointed body begins with a conical nose of finite length, the first interval is, of course, taken equal to the length of the cone. Otherwise, the meridian curve will ordinarily begin with finite curvature. For a specified limit of numerical error, the maximum permissible length of the first interval must be proportional to the initial radius of curvature, which is the primary length in the problem. The factor of proportionality will, of course, depend upon the shape of the body. If the meridian curve is analytic, dimensional analysis combined with the supersonic similarity rule indicates that the first interval is given by an expression of the form[5]

$$\delta_o = \frac{1}{M|R_o''|} G_o\left(\beta R_o', \frac{R_o'''}{\beta R_o''^2}, \ldots\right) \tag{30}$$

Here R_o', R_o'', R_o''' are the first three derivatives of $R(x)$ evaluated at the vertex, and the dots indicate that no appreciable dependence upon higher derivatives is to be expected. Indeed, for slender smooth bodies even the second variable $R_o'''/(\beta R_o''^2)$ is normally very small compared with the first. Hence it may be assumed that the function G_o does not depend significantly upon its second variable, so that the length of the first interval is given by

$$\delta_o = \frac{1}{M|R_o''|} G_o(\beta R_o') \tag{31}$$

It is now clear that the body shape need not be analytic throughout the first interval; it is sufficient that no violent changes in curvature occur.

[5]That the denominator should be taken as MR_o rather than βR_o is suggested by the result of equation (32).

The form of the function G_o can be determined by analysis, because the second-order solution at the end of the first interval of a general ogive can be calculated exactly as well as approximately if the interval is very short. Although the result is formidable, it simplifies greatly in the limiting case when $\beta R_o'$ approaches unity (which corresponds physically to the Mach cone becoming tangent to the nose). In this case, for a relative numerical error $\Delta\phi_x/\phi_x$ in streamwise velocity perturbation, the length of the first interval is

$$\delta_o \sim \sqrt{\frac{40}{\gamma+1}} \frac{1}{M|R_o''|} (1-\beta^2 R_o'^2) \sqrt{|\Delta\phi_x/\phi_x|} \qquad \text{as } \beta R_o' \to 1 \tag{32}$$

Numerical examples show that this asymptotic form is, with a revised constant of proportionality, a good approximation to the function throughout the range of practical application. The relative numerical error at the end of the first interval will not exceed 1 percent if[6]

$$\delta_o = \frac{1}{8} \frac{1}{M|R_o''|} (1-\beta^2 R_o'^2) \tag{33}$$

It is conceivable that an unusual body shape might be encountered for which the curvature would change considerably over this length. If so, the above rule would not apply (the variable $R_o'''/(\beta R_o''^2)$ in equation (30) would not be negligible), and some experimentation would be required to ascertain how much the interval should be reduced.

Internal intervals.- At any point on a smooth body, the length of the next interval will be proportional to the local radius, with the factor of proportionality depending upon the body shape in the vicinity of the point. If the meridian curve is analytic, dimensional analysis together with the supersonic similarity rule indicates that for a specified limit of numerical error the length of the interval from the nth to (n + 1)st point is given by

$$\delta_n = \beta R_n \, G_1(\beta R_n', \beta^2 R_n R_n'', \beta^3 R_n^2 R_n''', \ldots) \tag{34}$$

The third variable here corresponds to the second variable in equation (30); its form is different because R rather than $1/R''$ is taken as the primary reference length. (The second variable here has no counterpart in equation (30) because R is zero at the tip.) For a smooth slender body, the third variable is ordinarily very small, as

[6]This rule ordinarily permits greater first intervals than the rule $\delta_o = 0.025/\beta$ times initial radius of curvature which was previously suggested in reference 4.

are all subsequent variables which involve higher derivatives. Then according to the argument used previously, the function G_1 depends significantly upon only its first two variables. This conclusion is reinforced by the empirically determined fact that discontinuities in curvature must be accounted for separately, but not jumps in third and higher derivatives. Hence the nth interval is given by

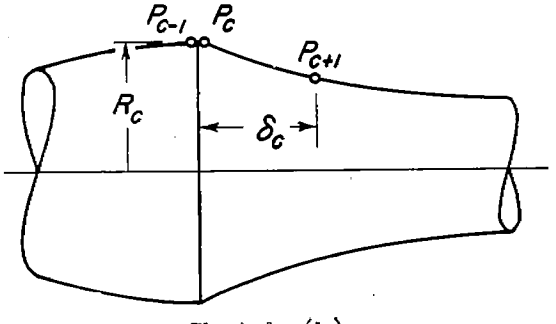
$$\delta_n = \beta R_n \, G_1(\beta R_n', \beta^2 R_n R_n'') \tag{35}$$

As before, the assumption that the body is analytic can now be replaced by the requirement that no violent changes in curvature occur.

Analytic determination of the function G_1 seems impractical. Its detailed form could be determined experimentally by calculating a number of solutions using intervals of various lengths. However, experience suggests that for the body shapes encountered in practice G_1 may be taken as a constant. The relative numerical error will apparently not exceed 1 percent if internal intervals for bodies without corners are chosen so that

$$\boxed{\delta_n = \beta R_n} \tag{36}$$

Modification for corner or curvature discontinuity.- Two points must be chosen at any discontinuity in slope or curvature, one just on each side, as indicated in sketch (k). A corner so strongly affects the subsequent flow field that it has been found necessary to reduce the next interval. The relative error will apparently not exceed 1 percent if the interval following a corner is taken to be



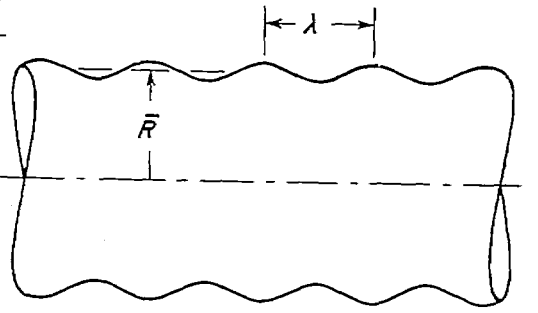
Sketch (k)

$$\delta_c = \frac{1}{2} \beta R_c \tag{37}$$

where R_c is the radius at the corner. Thereafter, intervals can be chosen according to the rule for smooth bodies (equation (36)).

Limitations of rules.- These rules for choosing intervals are intended only as guides and must not be followed blindly. Although adequate for most bodies, they may fail for unusual shapes, particularly those having rapid changes in curvature. For example, the rule for choosing internal intervals (equation (36)) does not apply to the

corrugated body shown in sketch (l). In this case the variable $\beta^3 R_n^2 R_n'''$ which was taken to be very small in equation (34) is proportional to $(\bar{R}/\lambda)^2$, and so becomes arbitrarily large as the corrugation wave length is reduced. It is clear physically that the interval should in this case be chosen as some fraction of the wave length. Fortunately, the fact that intervals have been taken too large usually reveals itself by excessive scatter in the final second-order results.



Sketch (l)

Also, the rules have been developed for the purpose of calculating flows at moderate or high supersonic speeds. They may accordingly become invalid at Mach numbers only slightly greater than unity, where they should involve the transonic similarity parameter, R'/β.

As in the case of solution by the method of characteristics, the only infallible rule (which may be invoked in case of doubt) is that the intervals are sufficiently small if further reduction causes no discernible change in the result.

The rules given above are believed to be somewhat conservative for normal shapes. In some cases, therefore, experience may indicate that the length of the intervals can be increased. It seems inadvisable, however, ever to double the prescribed values; not only is the scatter quadrupled, but successive errors then accumulate to such an extent that the result departs progressively farther from the true solution with distance downstream.

Description of Computing Forms

Standard computing forms have been prepared which largely reduce the second-order solution to routine calculation with a desk machine. Form A is used for bodies having continuous curvature. Form B is an insert to be pasted into form A to account for a corner or discontinuity in curvature. Provision is made for six points beyond the tip of a pointed body, which is adequate for most purposes. The forms can readily be extended to handle longer calculations.[7] Copies of the forms suitable for photosensitive reproduction are enclosed.

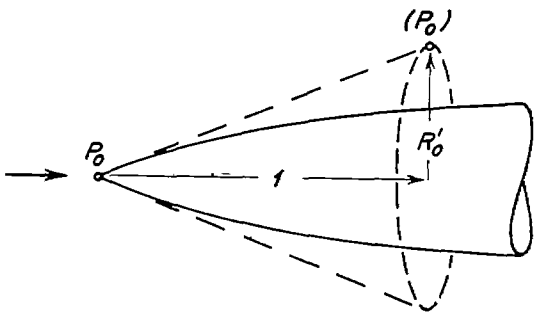
[7]Thus if one extra point is required, every row on each side of forms A and B which now extends to column P_6 (except rows (6m) to (6s), (6mm), and (6ss) of form A) is extended to form an additional column labeled P_7, and below row (6w) of form A is inserted a new group of rows identical with rows (6a) to (6w) on the left and (6mm) to (6vv) on the right, but labeled (7-) and containing blanks only in column P_7.

The desired values of Mach number and γ are entered at the top of form A, together with values of x, R, R', and R'' at points along the body chosen according to the rules formulated above. Then the form can be given to a computer together with tables I and II. The solution for a typical ogive or boattail can be calculated in from 5 to 10 hours.

As the solution progresses along the body, the results are found as differences of increasingly large numbers. Consequently, it is advisable to carry all computations to six significant figures or seven decimal places, whichever is the lesser. It is for this reason that tables I and II must be so extensive. It is not, of course, necessary to prescribe the problem with such accuracy; it is sufficient to give M, γ, and the body shape to three significant figures.

Details of form A.- The left half of form A is devoted chiefly to the calculation of the first-order potential φ and its required derivatives. The particular integral ψ is also found in the last 23 rows of the left side. The right half gives a parallel calculation of the complementary function χ. The second-order pressure coefficient is obtained in rows (63) to (73), and the corresponding first-order result, if required, in rows (74) to (83).

Following various preliminary calculations in rows (1) to (19), each group of from 10 to 13 rows bounded by double lines comprises a separate basic solution. The first such group (rows (0d) to (0w)) provides for a linear source solution beginning at the origin in case the body has a pointed tip. It may be noted that a stratagem has been introduced in calculating its effect at the tip. There both x and R are zero, so that the value of the conical variable t given by equation (19) would be indeterminate. This difficulty is surmounted by identifying values at the tip with those at the end of a tangent cone whose length is arbitrarily chosen as unity, as indicated in sketch (m). The requisite modification of given values in the first column is indicated by asterisks in rows (13), (14), and (16). Each of the subsequent six groups (coded (1-) to (6-)) provides a quadratic source solution, the first beginning at the origin. Each of these seven groups is separated into three subdivisions: first, determination of the conical variable t (row (-d)) and interpolation of the required functions from table I; second, calculation of the required strength of the solution (row (-s)) from the tangency condition; third, calculation of its contributions to $-\varphi$, $-\varphi_x$, $\bar{\varphi}_r/\beta$, and $-\varphi_{xx}$ (rows (-t) to (-w)) at each of the points P_0 to P_6.



Sketch (m)

These separate contributions are added to obtain the corresponding complete first-order results in rows (20) to (23). Then equations (26) and (27) permit the calculation of the remaining two second derivatives, $-\varphi_{rr}$ (row (27)) and φ_{xr} (row (29)). Finally, equations (5) for the particular integral are used to determine ψ_x/M^2 (row (45)), ψ_r/M^2 (row (49)), and $-\psi/M^2$ (row (52)), the last being required only on each side of every corner.

On the right half, various quantities required in calculating the complementary function χ are assembled in rows (53) to (60). There follow seven groups of three or four rows each which are the second-order counterparts of the adjacent first-order groups, a linear source solution in rows (0--) and quadratic source solutions in rows (1--) to (6--). For each group, the second-order tangency condition yields a weighting factor (row (-ss)) which multiplies the first-order results to give the corresponding contributions to the complementary function. Thus the contributions to $-\chi_x$ and χ_r/β are found in rows (-uu) and (-vv).[8] Adding these together with the components due to the particular integral gives the complete second-order velocity components $-\phi_x$ (row (61)) and ϕ_r/β (row (62)). Then the second-order pressure coefficient at each point is determined in row (73) from equation (14). The first-order pressure coefficient, if required, is likewise obtained in row (83).

Details of form B.- The left half of form B provides a corner solution (rows (C-)) followed by a curvature solution (rows (K-)) for the first-order potential. Both are inserted at a corner; only the latter is used at a curvature discontinuity. The two groups are similar in structure to those of form A, with the addition that φ_{xr}/β is also calculated (rows (-x)) for later use.

The right half of form B contains the corresponding corner and curvature solutions for the complementary function. In addition, a step solution is provided (rows (S-)) which, as discussed previously, is required in the complementary function to neutralize a step in the particular integral at a corner. This step solution is placed adjacent to the first-order corner solution with which it is associated. Similarly, the corner solution is placed adjacent to the first-order curvature solution, with which it is associated even if the body has no corner. The curvature solution is not required in the complementary function except at a corner. At a corner the curvature discontinuity is so great that it must be accounted for at least approximately in order to preserve numerical accuracy. Its strength cannot be calculated exactly in terms of previously determined quantities, but fortunately curvature and corner solutions are so intimately related that it

[8]It may be noted that the coding is mnemonic to the extent that rows (-u) and (-v) are proportional to the first-order velocity perturbations in u and v, and rows (-uu) and (-vv) to the second-order values.

suffices to take them in the same ratio in the complementary function as in the first-order solution.

Use for first-order solution alone.- A very accurate first-order solution is found in the course of the second-order computation. The present scheme can therefore be simplified if only a first-order solution is desired. Except for rows (74) to (83), only the left halves of forms A and B are used, and form A can be terminated with row (22) and form B with row (Cx) (because curvature discontinuities need not be accounted for). Moreover, the following rows can be deleted from form A:

(7); (8); (16); all (-e)'s, (-h)'s, (-t)'s, and (-w)'s; and (20)

and the following from form B:

(Ce), and (Ct)

The restrictions on interval length can be considerably relaxed. An analysis similar to that described previously shows that the first interval for a pointed ogive can be taken as

$$\delta_o = \frac{1}{3} \frac{R_o'}{|R_o''|} \sqrt{1-\beta^2 R_o'^2} \tag{38}$$

A few numerical examples suggest that subsequent intervals can be taken at least twice as large as for a second-order solution, so that

$$\delta_n = \begin{cases} 2\beta R_n & \text{except just behind a corner} \\ \beta R_n & \text{just behind a corner} \end{cases} \tag{39}$$

PRACTICAL USE OF METHOD

The following instructions are intended to permit the reader to apply the method without reference to the preceding detailed discussion.

Applicability

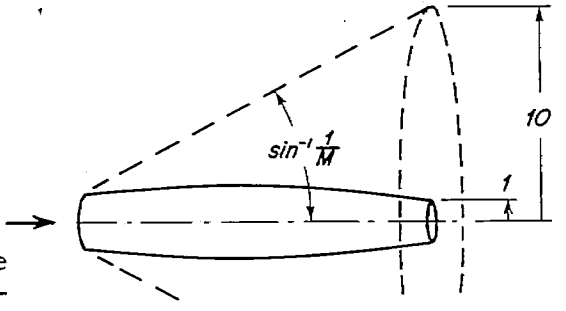
The method gives both the first- and second-order velocities and pressures at the external surface of a body of revolution in supersonic flow provided that:

1. The body has a pointed nose, or has a sharp-edged open nose with purely supersonic external flow at the entrance, or is a boattail following an infinite cylinder.

2. The body contour is continuous (corners are permitted, but not steps), and has finite curvature (except at corners).

3. The slope of the contour is everywhere less than $(M^2 - 1)^{-1/2}$, the slope of the free-stream Mach cones.[9]

In order to take advantage of the tables, the slope must in fact be nowhere greater than 94 percent of this value. Furthermore, the solution can be carried back only to the point at which the radius of the Mach cone from the nose has grown to ten times the local radius, as indicated in sketch (n) for an open-nosed body. The solution could be continued beyond this point only by extending the tables according to equations (28) and (29).



Sketch (n)

Choice of Points

For normal bodies, points on the body are chosen according to the following rules. These rules may fail if the curvature changes unusually rapidly; this will be revealed by excessive scatter in the second-order solution, which indicates that the intervals must be reduced.

1. Choose point P_0 at the vertex of a pointed body.

2. If a pointed body has a conical nose of finite length, choose point P_1 immediately behind the base of the cone. Otherwise, choose P_1 at a distance behind the vertex no greater than

$$\delta_0 = \frac{1-\beta^2 R_0'^2}{8M\left|R_0''\right|}$$

where R_0' and R_0'' are the slope and second derivative at the vertex.

3. Choose point P_1 immediately behind the start of an open-nosed body or boattail.

[9]Although there is no absolute limitation on negative slope, the method becomes inaccurate when the magnitude of the maximum negative slope exceeds $(M^2-1)^{1/2}$.

4. Wherever the body has continuous curvature, choose point P_{n+1} beyond point P_n no farther than

$$\delta_n = \beta R_n$$

where R_n is the radius at P_n.

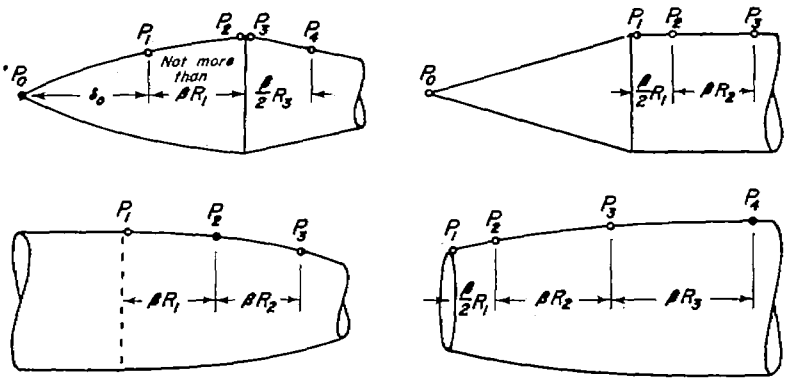
5. For a discontinuity in slope or curvature, reduce the preceding intervals if necessary so that a point falls exactly upon the discontinuity. Associate this point with the body shape just ahead of the discontinuity. Choose the next point at the same abscissa, but associate it with the body shape just behind the discontinuity. An exception arises, however, if the discontinuity follows a conical tip or infinitely long cylinder, or is the lip of an open-nosed body; then (as prescribed by rules 2 and 3) only a single point is required, and is associated with the body shape just behind the discontinuity.

6. Choose the first interval behind a corner no greater than

$$\delta_c = \frac{1}{2} \beta R_c$$

where R_c is the radius at the corner. A boattail or open-nosed body is to be regarded as starting with a corner if its initial slope is different from zero. The previous rules apply to subsequent intervals.

Examples of choice of points.- The choice of points for four typical bodies is indicated in sketch (o).



Sketch (o)

Preparation of Computing Form

Form A is prepared for computation in the following steps:

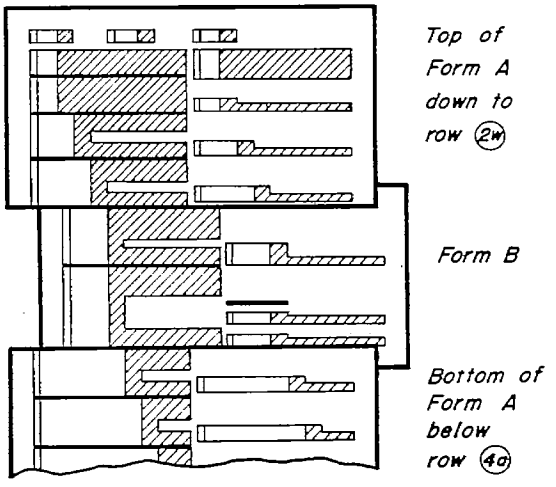
1. Enter the desired free-stream Mach number M in row (1) to three significant figures.

2. Enter the desired value of the adiabatic exponent γ in row (2) to three significant figures (1.40 for air).

3. In the column corresponding to each of the points P_n enter the abscissa in row (13), body radius in row (14), slope in row (15), and second derivative in row (16) to three significant figures.[10] However, in column P_o (which is used only for a pointed body) indeterminate forms are avoided by replacing the abscissa, radius, and second derivative by unity, the slope, and zero, respectively, as indicated on form A by asterisks. The origin for measuring abscissas must be taken at the tip of a pointed body, but is arbitrary for other shapes.[11] The unit of length is arbitrary, but it is usually convenient to measure in semicalibers.

4. If the body is not pointed, strike out column P_o and rows (0d) to (0w) and (0ss) to (0vv).

5. If point P_n lies just behind a corner or curvature discontinuity, cut out and discard all rows labeled (n-). Replace these by pasting in form B for a corner, or the portion of form B below the double line for a curvature discontinuity, with the first column alined below column P_n of form A. For example, sketch (p) shows schematically the modification required for a discontinuity between points P_2 and P_3, as on the first body shown in sketch (o). Note that a boattail or open-nosed body is to be regarded as starting with a corner unless the initial slope is zero, and with a curvature discontinuity unless the initial curvature is zero.



Sketch (p)

Computing

The computing instructions on forms A and B are intended to be completely self-explanatory. As noted, all calculations should be carried to six significant figures or seven decimals, whichever

[10] Care should be taken to give R' and R'' the proper algebraic sign.

[11] An exception arises in the unlikely case of an open-nosed body or boattail which starts with zero slope and curvature. In order to avoid indeterminate forms in this case, the origin must not coincide with the start of the contour.

is the lesser (regarding given data as exact to that accuracy). The tables should be interpolated linearly, noting that the first differences are given without algebraic sign.

Because the computations are rather involved, with only partial checks at rows (22) and (62), it has been found expedient when possible to have two computers carry out the same solution simultaneously with frequent comparisons. Typical shapes can be solved in from 5 to 10 hours.

Results

The quantities of interest obtained at each point of the body are:

First-order quantities

Row (21): $-\varphi_x = 1 - \frac{u^{(1)}}{U}$

Row (22): $\varphi_r/\beta = \frac{1}{\beta}\frac{v^{(1)}}{U}$

Row (83): $C_p^{(1)}$

Second-order quantities

Row (62): $\phi_r/\beta = \frac{1}{\beta}\frac{v^{(2)}}{U}$

Row (63): $1 + \phi_x = \frac{u^{(2)}}{U}$

Row (73): $C_p^{(2)}$

Only three significant figures should be kept in the final results.

Examples

Before calculating a new case, the reader may wish to check his computing procedure on the first few columns of a known solution. For this purpose, numerical values from various intermediate rows of the computing form are given below for a 6-caliber-long circular-arc ogive at a Mach number of 3. The significance of these rows is also indicated.

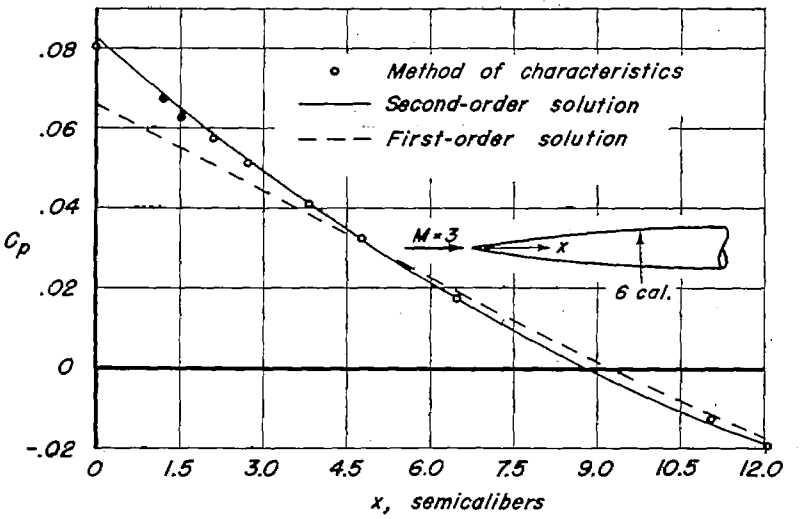
Dimensions are measured in semicalibers, and the intervals have been chosen slightly smaller than the limits prescribed by the rules in order to give simple values of x.

M:	1	3
γ:	2	1.4

		P_0	P_1	P_2	P_3
x:	13	*1	2.00	2.80	3.90
R:	14	*.168	.307	.414	.546
R':	15	.168	.139	.128	.112
R'':	16	*0	-.0142	-.0141	-.0141
$-\varphi$:	20	.0158906	.0305140	.0413536	.0549784
$-\varphi_x$:	21	.0441146	.0333807	.0295479	.0239671
φ_r/β:	22	.0593969	.0491439	.0452548	.0395979
$-\varphi_{xx}$:	23	.0364553	-.0001277	-.0011030	-.0052442
ψ_x/M^2:	45	.0018064	-.0002293	-.0003804	-.0006239
ψ_r/M^2:	49	.0037346	-.0019991	-.0021893	-.0028234
ϕ_r/β:	62	.0567766	.0475034	.0439176	.0386489
$1+\phi_x$:	63	.950400	.963404	.968955	.975150
$C_p^{(2)}$:	73	.0830	.0606	.0506	.0403
$C_p^{(1)}$:	83	.0660	.0514	.0459	.0376

Note: The asterisks serve as a reminder that in column P_0 the actual values of x,R, and R'' must be replaced by 1, the value of R', and 0, respectively.

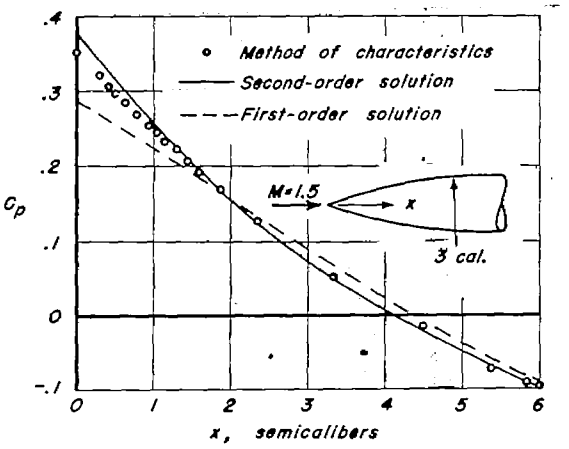
The first- and second-order pressure distributions for the complete ogive are shown in sketch (q) in comparison with a solution by the



Sketch (q)

numerical method of characteristics given by Rossow in reference 10.

As a further example, corresponding results are shown in sketch (r) for a 3-caliber ogive at a Mach number of 1.5.



Sketch (r)

Ames Aeronautical Laboratory
National Advisory Committee for Aeronautics
Moffett Field, Calif., May 12, 1952

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* see Note p. 10 (3)

TABLE I.— LINEAR AND QUADRATIC SOURCE SOLUTIONS

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.100	.757854	4800	1.99824	990	4.82528	5075	2.99322	1000	9.94987	9951	1.00504	10
.101	.753054	4750	1.98834	981	4.77453	4978	2.98322	990	9.85036	9757	1.00514	10
.102	.748304	4700	1.97853	970	4.72475	4882	2.97332	981	9.75279	9569	1.00524	11
.103	.743604	4652	1.96883	961	4.67593	4781	2.96351	971	9.65710	9388	1.00535	10
.104	.738952	4604	1.95922	952	4.62802	4701	2.95380	963	9.56324	9208	1.00545	11
.105	.734348	4558	1.94970	942	4.58101	4614	2.94417	953	9.47116	9035	1.00556	11
.106	.729790	4512	1.94028	934	4.53487	4530	2.93464	944	9.38081	8867	1.00567	10
.107	.725278	4467	1.93094	925	4.48957	4448	2.92520	936	9.29214	8704	1.00577	11
.108	.720811	4424	1.92169	916	4.44509	4367	2.91584	927	9.20510	8545	1.00588	11
.109	.716387	4378	1.91253	908	4.40142	4291	2.90657	919	9.11965	8391	1.00599	12
.110	.712008	4338	1.90345	899	4.35851	4214	2.89738	910	9.03574	8240	1.00611	11
.111	.707670	4295	1.89446	892	4.31637	4141	2.88828	903	8.95334	8095	1.00622	11
.112	.703375	4255	1.88554	885	4.27496	4069	2.87925	894	8.87239	7951	1.00633	12
.113	.699120	4214	1.87671	875	4.23427	4000	2.87031	887	8.79288	7814	1.00645	11
.114	.694906	4175	1.86796	868	4.19427	3932	2.86144	878	8.71474	7678	1.00656	12
.115	.690731	4135	1.85928	860	4.15495	3865	2.85265	872	8.63796	7547	1.00668	12
.116	.686596	4098	1.85068	852	4.11630	3801	2.84393	864	8.56249	7418	1.00680	12
.117	.682498	4059	1.84216	846	4.07829	3738	2.83529	857	8.48831	7294	1.00692	12
.118	.678439	4023	1.83370	837	4.04091	3677	2.82672	850	8.41537	7172	1.00704	12
.119	.674416	3988	1.82533	831	4.00414	3617	2.81822	843	8.34365	7055	1.00716	12
.120	.670430	3950	1.81702	824	3.96797	3559	2.80979	836	8.27312	6938	1.00728	12
.121	.666480	3915	1.80878	817	3.93238	3502	2.80143	829	8.20374	6825	1.00740	13
.122	.662565	3880	1.80061	810	3.89736	3446	2.79314	823	8.13549	6714	1.00753	12
.123	.658685	3846	1.79251	804	3.86290	3392	2.78491	816	8.06835	6607	1.00765	13
.124	.654839	3812	1.78447	797	3.82898	3339	2.77675	809	8.00228	6503	1.00778	13
.125	.651027	3779	1.77650	790	3.79559	3288	2.76866	803	7.93725	6399	1.00791	12
.126	.647248	3746	1.76860	784	3.76271	3237	2.76063	797	7.87326	6300	1.00803	13
.127	.643502	3715	1.76076	778	3.73034	3189	2.75266	791	7.81026	6202	1.00816	13
.128	.639787	3683	1.75298	772	3.69845	3140	2.74475	785	7.74824	6107	1.00829	14
.129	.636104	3651	1.74526	766	3.66705	3093	2.73690	778	7.68717	6014	1.00843	13
.130	.632453	3621	1.73760	760	3.63612	3047	2.72912	775	7.62703	5923	1.00856	13
.131	.628832	3591	1.73000	753	3.60565	3002	2.72139	767	7.56780	5833	1.00869	14
.132	.625241	3560	1.72247	748	3.57563	2958	2.71372	762	7.50947	5747	1.00883	13
.133	.621681	3532	1.71499	743	3.54604	2915	2.70610	756	7.45200	5662	1.00896	14
.134	.618149	3502	1.70756	737	3.51689	2874	2.69854	750	7.39538	5578	1.00910	14
.135	.614647	3474	1.70019	731	3.48815	2832	2.69104	745	7.33960	5498	1.00924	14
.136	.611173	3446	1.69288	726	3.45983	2793	2.68359	739	7.28462	5417	1.00938	14
.137	.607727	3418	1.68562	720	3.43190	2753	2.67620	735	7.23045	5341	1.00952	14
.138	.604309	3391	1.67842	715	3.40437	2715	2.66885	729	7.17704	5265	1.00966	14
.139	.600918	3364	1.67127	710	3.37722	2677	2.66156	724	7.12441	5190	1.00980	15
.140	.597554	3337	1.66417	704	3.35045	2640	2.65432	719	7.07251	5117	1.00995	14
.141	.594217	3311	1.65713	700	3.32405	2604	2.64713	716	7.02134	5045	1.01009	15
.142	.590906	3285	1.65013	695	3.29801	2569	2.64000	709	6.97089	4975	1.01024	14
.143	.587621	3260	1.64318	689	3.27232	2535	2.63291	705	6.92114	4907	1.01038	15
.144	.584361	3234	1.63629	685	3.24697	2500	2.62586	699	6.87207	4840	1.01053	15
.145	.581127	3210	1.62944	680	3.22197	2468	2.61887	695	6.82367	4775	1.01068	15
.146	.577917	3185	1.62264	675	3.19729	2435	2.61192	690	6.77592	4710	1.01083	15
.147	.574732	3161	1.61589	671	3.17294	2403	2.60502	685	6.72882	4647	1.01098	16
.148	.571571	3137	1.60918	666	3.14891	2372	2.59817	681	6.68235	4586	1.01114	15
.149	.568434	3113	1.60252	661	3.12519	2341	2.59136	677	6.63649	4525	1.01129	15
.150	.565321	3090	1.59591	657	3.10178	2312	2.58459	672	6.59124	4466	1.01144	16
.151	.562231	3068	1.58934	653	3.07866	2282	2.57787	667	6.54658	4408	1.01160	16
.152	.559163	3044	1.58281	648	3.05584	2253	2.57120	664	6.50250	4351	1.01176	15
.153	.556119	3022	1.57633	643	3.03331	2225	2.56456	659	6.45899	4295	1.01191	16
.154	.553097	3000	1.56990	640	3.01106	2197	2.55797	655	6.41604	4240	1.01207	16
.155	.550097	2979	1.56350	635	2.98909	2170	2.55142	651	6.37364	4186	1.01223	16
.156	.547118	2956	1.55715	631	2.96739	2144	2.54491	647	6.33178	4134	1.01239	17
.157	.544162	2936	1.55084	627	2.94595	2117	2.53844	643	6.29044	4083	1.01256	16
.158	.541226	2914	1.54457	623	2.92478	2092	2.53201	639	6.24961	4031	1.01272	17
.159	.538312	2893	1.53834	619	2.90386	2066	2.52562	635	6.20930	3982	1.01289	16
.160	.535419		1.53215		2.88320		2.51927		6.16948		1.01305	

TABLE I.— CONTINUED

t	a(t)	b(t)	c(t)	d(t)	e(t)	f(t)
.160	.535419 2873	1.53215 615	2.88320 2042	2.51927 632	6.16948 3933	1.01305 17
.161	.532546 2858	1.52600 611	2.86278 2017	2.51295 627	6.13015 3885	1.01322 17
.162	.529693 2833	1.51989 607	2.84261 1884	2.50668 624	6.09130 3838	1.01339 17
.163	.526860 2812	1.51382 604	2.82267 1970	2.50044 620	6.05292 3792	1.01356 17
.164	.524048 2794	1.50778 599	2.80297 1947	2.49424 616	6.01500 3746	1.01373 17
.165	.521254 2773	1.50179 596	2.78350 1924	2.48808 613	5.97754 3702	1.01390 17
.166	.518481 2755	1.49583 592	2.76426 1903	2.48195 609	5.94052 3658	1.01407 17
.167	.515726 2736	1.48991 589	2.74523 1880	2.47586 605	5.90393 3615	1.01424 18
.168	.512990 2717	1.48402 585	2.72643 1860	2.46981 602	5.86778 3573	1.01442 17
.169	.510273 2699	1.47817 581	2.70783 1838	2.46379 599	5.83205 3532	1.01459 18
.170	.507574 2680	1.47236 578	2.68945 1817	2.45780 595	5.79673 3491	1.01477 18
.171	.504894 2662	1.46658 575	2.67128 1798	2.45185 592	5.76182 3451	1.01495 18
.172	.502232 2645	1.46083 571	2.65330 1777	2.44593 589	5.72731 3412	1.01513 18
.173	.499587 2627	1.45512 567	2.63553 1758	2.44004 585	5.69319 3373	1.01531 18
.174	.496960 2609	1.44945 565	2.61795 1738	2.43419 582	5.65946 3335	1.01549 18
.175	.494351 2592	1.44380 561	2.60057 1719	2.42837 579	5.62611 3298	1.01567 19
.176	.491759 2575	1.43819 557	2.58338 1701	2.42258 575	5.59313 3262	1.01586 18
.177	.489184 2558	1.43262 555	2.56637 1683	2.41683 572	5.56051 3225	1.01604 19
.178	.486626 2541	1.42707 551	2.54954 1664	2.41110 569	5.52826 3190	1.01623 19
.179	.484085 2524	1.42156 548	2.53290 1647	2.40541 566	5.49636 3155	1.01642 18
.180	.481561 2508	1.41608 545	2.51643 1629	2.39975 563	5.46481 3120	1.01660 19
.181	.479052 2492	1.41063 542	2.50014 1612	2.39412 561	5.43361 3087	1.01679 20
.182	.476560 2476	1.40521 539	2.48402 1596	2.38851 557	5.40274 3054	1.01699 19
.183	.474084 2460	1.39982 535	2.46806 1578	2.38294 555	5.37220 3021	1.01718 19
.184	.471624 2444	1.39447 533	2.45228 1563	2.37739 551	5.34199 2988	1.01737 19
.185	.469180 2428	1.38914 530	2.43665 1548	2.37188 549	5.31210 2957	1.01756 20
.186	.466751 2414	1.38384 527	2.42119 1531	2.36639 546	5.28253 2927	1.01776 20
.187	.464337 2398	1.37857 523	2.40588 1515	2.36093 543	5.25326 2896	1.01796 19
.188	.461939 2383	1.37334 521	2.39073 1499	2.35550 540	5.22430 2865	1.01815 20
.189	.459556 2368	1.36813 519	2.37574 1485	2.35010 537	5.19565 2837	1.01835 20
.190	.457187 2353	1.36294 515	2.36089 1469	2.34473 535	5.16728 2807	1.01855 21
.191	.454834 2339	1.35779 512	2.34620 1455	2.33938 532	5.13921 2778	1.01876 20
.192	.452495 2324	1.35267 510	2.33165 1441	2.33406 528	5.11143 2750	1.01896 20
.193	.450171 2311	1.34757 507	2.31724 1426	2.32877 527	5.08393 2722	1.01916 21
.194	.447860 2295	1.34250 505	2.30298 1413	2.32350 524	5.05671 2695	1.01937 20
.195	.445565 2282	1.33745 501	2.28885 1398	2.31826 522	5.02976 2668	1.01957 21
.196	.443283 2268	1.33244 499	2.27486 1385	2.31304 519	5.00308 2641	1.01978 21
.197	.441015 2254	1.32745 496	2.26101 1372	2.30785 516	4.97667 2615	1.01999 21
.198	.438761 2241	1.32249 494	2.24729 1359	2.30269 514	4.95052 2590	1.02020 21
.199	.436520 2227	1.31755 491	2.23370 1345	2.29755 512	4.92462 2564	1.02041 21
.200	.434293 2213	1.31264 488	2.22025 1333	2.29243 509	4.89898 2539	1.02062 21
.201	.432080 2201	1.30775 486	2.20692 1321	2.28734 507	4.87359 2515	1.02083 22
.202	.429879 2187	1.30289 484	2.19371 1308	2.28227 504	4.84844 2490	1.02105 21
.203	.427692 2174	1.29805 481	2.18063 1296	2.27723 502	4.82354 2466	1.02126 22
.204	.425518 2161	1.29324 479	2.16767 1284	2.27221 499	4.79888 2443	1.02148 22
.205	.423357 2149	1.28845 476	2.15483 1271	2.26722 498	4.77445 2420	1.02170 22
.206	.421208 2136	1.28369 474	2.14212 1261	2.26224 495	4.75025 2397	1.02192 22
.207	.419072 2123	1.27895 471	2.12951 1248	2.25729 492	4.72628 2374	1.02214 22
.208	.416949 2111	1.27424 469	2.11703 1238	2.25237 491	4.70254 2352	1.02236 22
.209	.414838 2098	1.26955 467	2.10465 1228	2.24746 488	4.67902 2330	1.02258 23
.210	.412740 2086	1.26488 464	2.09239 1215	2.24258 486	4.65572 2309	1.02281 22
.211	.410654 2073	1.26024 462	2.08024 1204	2.23772 483	4.63263 2287	1.02303 23
.212	.408579 2062	1.25562 460	2.06820 1194	2.23289 482	4.60976 2266	1.02326 23
.213	.406517 2050	1.25102 458	2.05626 1183	2.22807 479	4.58710 2246	1.02349 23
.214	.404467 2039	1.24644 455	2.04443 1172	2.22328 478	4.56464 2225	1.02372 23
.215	.402428 2027	1.24189 453	2.03271 1163	2.21850 475	4.54239 2205	1.02395 23
.216	.400401 2015	1.23736 451	2.02108 1152	2.21375 473	4.52034 2185	1.02418 23
.217	.398386 2004	1.22285 449	2.00956 1142	2.20902 471	4.49849 2166	1.02441 23
.218	.396382 1992	1.22836 447	1.99814 1132	2.20431 469	4.47683 2146	1.02464 24
.219	.394390 1981	1.22389 444	1.98682 1122	2.19962 467	4.45537 2128	1.02488 24
.220	.392409	1.21945	1.97560	2.19495	4.43409	1.02512

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TABLE I.– CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.220	.392409	1870	1.21945	442	1.97560	1116	2.19495	465	4.43409	2108	1.02512	28
.221	.390439	1858	1.21503	441	1.96447	1103	2.19030	463	4.41300	2080	1.02535	24
.222	.388480	1848	1.21062	438	1.95344	1094	2.18567	461	4.39210	2072	1.02559	24
.223	.386532	1837	1.20624	436	1.94250	1084	2.18106	458	4.37138	2053	1.02583	24
.224	.384595	1827	1.20188	434	1.93166	1076	2.17647	457	4.35085	2037	1.02607	25
.225	.382668	1815	1.19754	432	1.92090	1058	2.17190	455	4.33048	2018	1.02632	24
.226	.380753	1805	1.19322	430	1.91024	1058	2.16735	454	4.31030	2001	1.02656	24
.227	.378848	1795	1.18892	428	1.89966	1046	2.16281	451	4.29029	1985	1.02680	25
.228	.376953	1784	1.18464	426	1.88918	1041	2.15830	450	4.27044	1967	1.02705	25
.229	.375069	1773	1.18038	424	1.87877	1031	2.15380	447	4.25077	1951	1.02730	25
.230	.373196	1764	1.17614	422	1.86846	1023	2.14933	446	4.23126	1934	1.02755	25
.231	.371332	1753	1.17192	421	1.85823	1015	2.14487	444	4.21192	1918	1.02780	25
.232	.369479	1743	1.16771	418	1.84808	1006	2.14043	442	4.19274	1902	1.02805	25
.233	.367636	1733	1.16353	416	1.83802	998	2.13601	441	4.17372	1886	1.02830	26
.234	.365803	1723	1.15937	415	1.82803	990	2.13160	438	4.15486	1871	1.02856	25
.235	.363980	1713	1.15522	413	1.81813	983	2.12722	437	4.13615	1855	1.02881	26
.236	.362167	1703	1.15109	411	1.80830	974	2.12285	436	4.11760	1840	1.02907	26
.237	.360364	1694	1.14698	409	1.79856	967	2.11849	433	4.09920	1825	1.02933	25
.238	.358570	1684	1.14289	407	1.78889	958	2.11416	432	4.08095	1811	1.02958	27
.239	.356786	1675	1.13882	405	1.77930	952	2.10984	430	4.06284	1795	1.02985	26
.240	.355011	1665	1.13477	404	1.76978	944	2.10554	428	4.04489	1782	1.03011	26
.241	.353246	1656	1.13073	402	1.76034	937	2.10126	427	4.02707	1768	1.03037	26
.242	.351490	1646	1.12671	400	1.75097	930	2.09699	425	4.00941	1753	1.03063	27
.243	.349744	1637	1.12271	398	1.74167	922	2.09274	423	3.99188	1739	1.03090	27
.244	.348007	1628	1.11873	396	1.73245	916	2.08851	422	3.97449	1725	1.03117	26
.245	.346279	1618	1.11477	395	1.72329	908	2.08429	420	3.95724	1712	1.03143	27
.246	.344561	1610	1.11082	394	1.71421	901	2.08009	419	3.94012	1698	1.03170	28
.247	.342851	1601	1.10688	391	1.70520	895	2.07590	417	3.92314	1685	1.03198	27
.248	.341150	1592	1.10297	390	1.69625	888	2.07173	415	3.90629	1672	1.03225	27
.249	.339458	1583	1.09907	388	1.68737	881	2.06758	414	3.88957	1659	1.03252	28
.250	.337775	1574	1.09519	386	1.67856	874	2.06344	413	3.87298	1646	1.03280	27
.251	.336101	1565	1.09133	385	1.66982	868	2.05931	410	3.85652	1633	1.03307	28
.252	.334436	1557	1.08748	385	1.66114	862	2.05521	410	3.84019	1621	1.03335	28
.253	.332779	1548	1.08365	382	1.65252	855	2.05111	408	3.82398	1608	1.03363	28
.254	.331131	1540	1.07983	380	1.64397	849	2.04703	406	3.80789	1596	1.03391	28
.255	.329491	1531	1.07603	378	1.63548	842	2.04297	405	3.79193	1585	1.03419	28
.256	.327860	1523	1.07225	377	1.62706	837	2.03892	403	3.77608	1572	1.03447	29
.257	.326237	1515	1.06848	375	1.61869	830	2.03489	402	3.76036	1561	1.03476	28
.258	.324622	1506	1.06473	374	1.61039	824	2.03087	400	3.74475	1549	1.03504	29
.259	.323016	1498	1.06099	372	1.60215	818	2.02687	398	3.72926	1538	1.03533	29
.260	.321418	1490	1.05727	371	1.59397	813	2.02288	398	3.71388	1526	1.03562	29
.261	.319828	1482	1.05356	368	1.58584	806	2.01890	395	3.69862	1515	1.03591	29
.262	.318246	1474	1.04987	368	1.57778	801	2.01494	395	3.68347	1504	1.03620	29
.263	.316672	1465	1.04619	366	1.56977	795	2.01099	393	3.66843	1493	1.03649	29
.264	.315107	1458	1.04253	364	1.56182	790	2.00706	393	3.65350	1483	1.03678	30
.265	.313549	1450	1.03889	363	1.55392	784	2.00313	390	3.63867	1471	1.03708	29
.266	.311999	1442	1.03526	362	1.54608	778	1.99923	389	3.62396	1461	1.03737	30
.267	.310457	1435	1.03164	360	1.53830	773	1.99534	388	3.60935	1450	1.03767	30
.268	.308922	1427	1.02804	359	1.53057	768	1.99146	387	3.59485	1440	1.03797	30
.269	.307395	1419	1.02445	357	1.52289	762	1.98759	385	3.58045	1430	1.03827	30
.270	.305876	1411	1.02088	356	1.51527	757	1.98374	384	3.56615	1420	1.03857	31
.271	.304365	1404	1.01732	355	1.50770	752	1.97990	383	3.55195	1409	1.03888	30
.272	.302861	1397	1.01377	355	1.50018	746	1.97607	382	3.53786	1400	1.03918	31
.273	.301364	1389	1.01024	352	1.49272	742	1.97225	380	3.52386	1390	1.03949	30
.274	.299875	1381	1.00672	350	1.48530	736	1.96845	378	3.50996	1380	1.03979	31
.275	.298394	1375	1.00322	348	1.47794	731	1.96467	378	3.49616	1370	1.04010	31
.276	.296919	1368	.999731	3475	1.47063	727	1.96089	378	3.48246	1362	1.04041	31
.277	.295453	1360	.996256	3482	1.46336	722	1.95713	376	3.46884	1351	1.04072	32
.278	.293993	1353	.992794	3449	1.45614	716	1.95337	376	3.45533	1343	1.04104	31
.279	.292540	1345	.989345	3435	1.44898	712	1.94964	375	3.44190	1333	1.04135	32
.280	.291095		.985910		1.44186		1.94591		3.42857		1.04167	

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TABLE I.- CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.280	.291095	1439	.985910	3422	1.44186	707	1.94591	871	3.42857	1524	1.04167	31
.281	.289656	1431	.982488	3408	1.43479	703	1.94220	871	3.41533	1515	1.04198	32
.282	.288225	1424	.979079	3395	1.42776	698	1.93849	869	3.40218	1506	1.04230	32
.283	.286801	1417	.975684	3383	1.42078	696	1.93480	867	3.38912	1498	1.04262	32
.284	.285384	1411	.972301	3370	1.41385	689	1.93113	867	3.37614	1489	1.04294	33
.285	.283973	1403	.968931	3356	1.40696	684	1.92746	868	3.36325	1480	1.04327	32
.286	.282570	1397	.965575	3344	1.40012	678	1.92380	864	3.35045	1471	1.04359	33
.287	.281173	1390	.962231	3332	1.39333	676	1.92016	863	3.33774	1463	1.04392	32
.288	.279783	1383	.958899	3319	1.38657	671	1.91653	862	3.32511	1455	1.04424	33
.289	.278400	1377	.955580	3306	1.37986	666	1.91291	861	3.31256	1447	1.04457	33
.290	.277023	1370	.952274	3294	1.37320	663	1.90930	860	3.30009	1438	1.04490	33
.291	.275653	1363	.948980	3281	1.36657	658	1.90570	858	3.28771	1430	1.04523	34
.292	.274290	1357	.945699	3270	1.35999	654	1.90212	858	3.27541	1423	1.04557	33
.293	.272933	1350	.942429	3257	1.35345	648	1.89854	856	3.26318	1414	1.04590	34
.294	.271583	1346	.939172	3245	1.34696	646	1.89498	856	3.25104	1407	1.04624	34
.295	.270240	1338	.935927	3233	1.34050	641	1.89142	854	3.23897	1398	1.04658	33
.296	.268902	1331	.932694	3221	1.33409	638	1.88788	853	3.22699	1391	1.04691	34
.297	.267571	1324	.929473	3209	1.32771	633	1.88435	852	3.21508	1384	1.04725	35
.298	.266247	1318	.926264	3197	1.32138	630	1.88083	851	3.20324	1376	1.04760	34
.299	.264929	1312	.923067	3186	1.31508	625	1.87732	850	3.19148	1368	1.04794	34
.300	.263617	1306	.919881	3174	1.30883	622	1.87382	848	3.17980	1361	1.04828	35
.301	.262311	1300	.916707	3162	1.30261	618	1.87033	848	3.16819	1354	1.04863	35
.302	.261011	1293	.913545	3151	1.29643	614	1.86685	847	3.15665	1347	1.04898	35
.303	.259718	1287	.910394	3140	1.29029	610	1.86338	845	3.14518	1338	1.04933	35
.304	.258431	1281	.907254	3128	1.28419	607	1.85993	845	3.13379	1332	1.04968	35
.305	.257150	1275	.904126	3117	1.27812	603	1.85648	844	3.12247	1326	1.05003	36
.306	.255875	1270	.901009	3105	1.27209	599	1.85304	843	3.11121	1318	1.05039	35
.307	.254605	1263	.897904	3095	1.26610	596	1.84961	841	3.10003	1311	1.05074	36
.308	.253342	1257	.894809	3083	1.26014	592	1.84620	841	3.08892	1305	1.05110	36
.309	.252085	1251	.891726	3073	1.25422	588	1.84279	840	3.07787	1298	1.05146	36
.310	.250834	1246	.888653	3061	1.24834	585	1.83939	839	3.06689	1291	1.05182	36
.311	.249588	1239	.885592	3051	1.24249	581	1.83600	838	3.05598	1285	1.05218	36
.312	.248349	1234	.882541	3038	1.23668	578	1.83262	837	3.04513	1277	1.05254	37
.313	.247115	1228	.879502	3028	1.23090	575	1.82925	835	3.03436	1272	1.05291	36
.314	.245887	1222	.876473	3018	1.22515	571	1.82590	835	3.02364	1265	1.05327	37
.315	.244665	1217	.873454	3007	1.21944	567	1.82255	834	3.01299	1258	1.05364	37
.316	.243448	1211	.870447	2997	1.21377	565	1.81921	833	3.00240	1252	1.05401	37
.317	.242237	1205	.867450	2987	1.20812	561	1.81588	832	2.99188	1246	1.05438	37
.318	.241032	1200	.864463	2976	1.20251	558	1.81255	831	2.98142	1240	1.05475	38
.319	.239832	1194	.861487	2966	1.19693	554	1.80924	830	2.97102	1234	1.05513	37
.320	.238638	1189	.858521	2956	1.19139	551	1.80594	830	2.96068	1228	1.05550	38
.321	.237449	1183	.855565	2946	1.18588	548	1.80264	828	2.95040	1221	1.05588	38
.322	.236266	1177	.852620	2935	1.18040	545	1.79936	828	2.94019	1216	1.05626	38
.323	.235089	1173	.849685	2925	1.17495	542	1.79608	828	2.93003	1210	1.05664	38
.324	.233916	1168	.846760	2915	1.16953	539	1.79282	826	2.91993	1204	1.05702	38
.325	.232750	1162	.843845	2906	1.16414	535	1.78956	825	2.90989	998	1.05740	38
.326	.231588	1156	.840940	2895	1.15879	533	1.78631	824	2.89991	993	1.05779	38
.327	.230432	1151	.838045	2885	1.15346	530	1.78307	823	2.88998	987	1.05817	39
.328	.229281	1145	.835160	2875	1.14816	528	1.77984	823	2.88011	981	1.05856	38
.329	.228136	1141	.832285	2865	1.14290	524	1.77661	821	2.87030	976	1.05895	39
.330	.226995	1135	.829420	2856	1.13766	520	1.77340	821	2.86055	970	1.05934	40
.331	.225860	1130	.826564	2846	1.13246	518	1.77019	819	2.85085	965	1.05974	39
.332	.224730	1124	.823718	2837	1.12728	515	1.76700	819	2.84120	959	1.06013	40
.333	.223606	1120	.820881	2828	1.12213	512	1.76381	818	2.83161	954	1.06053	40
.334	.222486	1114	.818055	2818	1.11701	508	1.76063	817	2.82207	948	1.06093	40
.335	.221372	1110	.815237	2808	1.11192	506	1.75746	817	2.81259	943	1.06133	40
.336	.220262	1104	.812429	2798	1.10686	504	1.75429	815	2.80316	938	1.06173	40
.337	.219158	1098	.809631	2789	1.10182	500	1.75114	815	2.79378	932	1.06213	40
.338	.218059	1095	.806842	2780	1.09682	498	1.74799	814	2.78446	928	1.06253	41
.339	.216964	1089	.804062	2771	1.09184	495	1.74485	813	2.77518	922	1.06294	41
.340	.215875		.801291		1.08689		1.74172		2.76596		1.06335	41

TABLE I.- CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.340	.215875	1084	.801291	2761	1.08689	493	1.74172	816	2.76596	815	1.06335	41
.341	.214791	1080	.798530	2752	1.08196	490	1.73859	811	2.75678	812	1.06376	41
.342	.213711	1075	.795778	2743	1.07706	487	1.73548	811	2.74766	907	1.06417	41
.343	.212636	1068	.793035	2734	1.07219	484	1.73237	810	2.73859	903	1.06458	42
.344	.211567	1065	.790301	2725	1.06735	482	1.72927	808	2.72956	897	1.06500	41
.345	.210502	1060	.787576	2717	1.06253	479	1.72618	809	2.72059	893	1.06541	42
.346	.209442	1056	.784859	2707	1.05774	477	1.72309	807	2.71166	888	1.06583	42
.347	.208386	1050	.782152	2698	1.05297	474	1.72002	807	2.70278	883	1.06625	42
.348	.207336	1046	.779454	2690	1.04823	472	1.71695	806	2.69395	878	1.06667	43
.349	.206290	1041	.776764	2680	1.04351	468	1.71389	806	2.68517	874	1.06710	42
.350	.205249	1037	.774084	2673	1.03882	467	1.71083	804	2.67643	869	1.06752	43
.351	.204212	1032	.771411	2663	1.03415	464	1.70779	804	2.66774	865	1.06795	43
.352	.203180	1027	.768748	2655	1.02951	462	1.70475	803	2.65909	860	1.06838	43
.353	.202153	1023	.766093	2646	1.02489	458	1.70172	802	2.65049	855	1.06881	43
.354	.201130	1018	.763447	2638	1.02030	457	1.69870	802	2.64194	851	1.06924	43
.355	.200112	1013	.760809	2629	1.01573	454	1.69568	801	2.63343	847	1.06967	44
.356	.199099	1008	.758180	2621	1.01119	453	1.69267	801	2.62496	842	1.07011	43
.357	.198090	1004	.755559	2612	1.00666	449	1.68966	799	2.61654	838	1.07054	44
.358	.197086	1000	.752947	2604	1.00217	448	1.68667	798	2.60816	833	1.07098	44
.359	.196086	996	.750343	2598	.997692	4451	1.68368	798	2.59983	830	1.07142	45
.360	.195090	991	.747747	2587	.993241	4428	1.68070	797	2.59153	824	1.07187	44
.361	.194099	986	.745160	2578	.988813	4406	1.67773	797	2.58329	821	1.07231	45
.362	.193113	983	.742581	2571	.984407	4382	1.67476	796	2.57508	817	1.07276	44
.363	.192130	977	.740010	2563	.980025	4361	1.67180	795	2.56691	812	1.07320	45
.364	.191153	974	.737447	2555	.975664	4338	1.66885	795	2.55879	808	1.07365	46
.365	.190179	969	.734892	2548	.971326	4316	1.66590	794	2.55071	805	1.07411	45
.366	.189210	965	.732346	2538	.967010	4294	1.66296	793	2.54266	800	1.07456	45
.367	.188245	960	.729807	2531	.962716	4273	1.66003	793	2.53466	796	1.07501	46
.368	.187285	957	.727276	2522	.958443	4250	1.65710	792	2.52670	792	1.07547	46
.369	.186328	952	.724754	2515	.954193	4230	1.65418	791	2.51878	788	1.07593	46
.370	.185376	948	.722239	2507	.949963	4208	1.65127	791	2.51090	785	1.07639	46
.371	.184428	943	.719732	2499	.945755	4187	1.64836	789	2.50305	780	1.07685	47
.372	.183485	940	.717233	2492	.941568	4166	1.64547	790	2.49525	777	1.07732	46
.373	.182545	935	.714741	2483	.937402	4145	1.64257	788	2.48748	772	1.07778	47
.374	.181610	931	.712258	2476	.933257	4125	1.63969	788	2.47976	769	1.07825	47
.375	.180679	927	.709782	2469	.929132	4104	1.63681	788	2.47207	765	1.07872	47
.376	.179752	923	.707313	2460	.925028	4084	1.63393	786	2.46442	762	1.07919	47
.377	.178829	918	.704853	2453	.920944	4064	1.63107	786	2.45680	758	1.07966	48
.378	.177910	915	.702400	2446	.916880	4044	1.62821	786	2.44922	754	1.08014	48
.379	.176995	911	.699954	2438	.912836	4024	1.62535	785	2.44168	750	1.08062	48
.380	.176084	907	.697516	2430	.908812	4004	1.62250	784	2.43418	747	1.08110	48
.381	.175177	903	.695086	2423	.904808	3985	1.61966	783	2.42671	744	1.08158	48
.382	.174274	899	.692663	2416	.900823	3965	1.61683	783	2.41927	739	1.08206	48
.383	.173375	894	.690247	2408	.896858	3946	1.61400	783	2.41188	737	1.08255	48
.384	.172481	891	.687839	2401	.892912	3927	1.61117	782	2.40451	732	1.08303	49
.385	.171590	887	.685438	2393	.888985	3908	1.60835	781	2.39719	729	1.08352	49
.386	.170703	883	.683045	2386	.885077	3889	1.60554	780	2.38990	727	1.08401	48
.387	.169820	880	.680659	2379	.881188	3871	1.60274	780	2.38263	722	1.08450	50
.388	.168940	875	.678280	2372	.877317	3852	1.59994	779	2.37541	719	1.08500	50
.389	.168065	872	.675908	2365	.873465	3833	1.59715	779	2.36822	716	1.08550	49
.390	.167193	867	.673543	2357	.869632	3815	1.59436	778	2.36106	712	1.08599	51
.391	.166326	864	.671186	2351	.865817	3797	1.59158	778	2.35394	708	1.08650	50
.392	.165462	860	.668835	2343	.862020	3778	1.58880	777	2.34685	706	1.08700	50
.393	.164602	857	.666492	2336	.858241	3761	1.58603	776	2.33979	702	1.08750	51
.394	.163745	852	.664156	2330	.854480	3743	1.58327	776	2.33277	698	1.08801	51
.395	.162893	848	.661826	2322	.850737	3725	1.58051	776	2.32578	697	1.08852	51
.396	.162044	845	.659504	2315	.847012	3708	1.57775	774	2.31881	692	1.08903	51
.397	.161199	842	.657189	2309	.843304	3690	1.57501	774	2.31189	690	1.08954	51
.398	.160357	838	.654880	2301	.839614	3674	1.57227	774	2.30499	687	1.09005	52
.399	.159519	834	.652579	2295	.835940	3656	1.56953	773	2.29812	683	1.09057	52
.400	.158685		.650284		.832284		1.56680		2.29129		1.09109	

NACA

TABLE I.— CONTINUED

t	a(t)	b(t)	c(t)	d(t)	e(t)	f(t)
.400	.158685 831	.650284 2288	.832284 3639	1.56680 273	2.29129 681	1.09109 52
.401	.157854 826	.647996 2281	.828645 3622	1.56407 272	2.28448 677	1.09161 52
.402	.157028 823	.645715 2274	.825023 3605	1.56135 271	2.27771 674	1.09213 53
.403	.156205 820	.643441 2268	.821418 3588	1.55864 271	2.27097 672	1.09266 52
.404	.155385 816	.641173 2261	.817829 3572	1.55593 270	2.26425 668	1.09318 53
.405	.154569 812	.638912 2254	.814257 3555	1.55323 270	2.25757 665	1.09371 53
.406	.153757 808	.636658 2248	.810702 3540	1.55053 269	2.25092 662	1.09424 54
.407	.152948 806	.634410 2241	.807162 3523	1.54784 268	2.24430 660	1.09478 53
.408	.152142 802	.632169 2234	.803639 3506	1.54515 268	2.23770 656	1.09531 54
.409	.151340 798	.629935 2228	.800133 3491	1.54247 268	2.23114 654	1.09585 54
.410	.150542 795	.627707 2221	.796642 3475	1.53979 267	2.22460 651	1.09639 54
.411	.149747 791	.625486 2215	.793167 3459	1.53712 267	2.21809 648	1.09693 54
.412	.148956 788	.623271 2208	.789708 3444	1.53445 266	2.21161 645	1.09747 55
.413	.148168 785	.621062 2201	.786264 3427	1.53179 265	2.20516 642	1.09802 55
.414	.147383 781	.618861 2196	.782837 3413	1.52914 265	2.19874 640	1.09857 55
.415	.146602 778	.616665 2189	.779424 3397	1.52649 265	2.19234 637	1.09912 55
.416	.145824 774	.614476 2183	.776027 3381	1.52384 264	2.18597 634	1.09967 55
.417	.145050 771	.612293 2176	.772646 3367	1.52120 264	2.17963 631	1.10022 56
.418	.144279 768	.610117 2171	.769279 3351	1.51856 263	2.17332 629	1.10078 56
.419	.143511 764	.607946 2164	.765928 3336	1.51593 262	2.16703 626	1.10134 56
.420	.142747 761	.605782 2157	.762592 3322	1.51331 262	2.16077 623	1.10190 56
.421	.141986 757	.603625 2152	.759270 3307	1.51069 262	2.15454 621	1.10246 57
.422	.141229 755	.601473 2145	.755963 3292	1.50807 261	2.14833 618	1.10303 56
.423	.140474 751	.599328 2139	.752671 3278	1.50546 261	2.14215 615	1.10359 57
.424	.139723 748	.597189 2133	.749393 3263	1.50285 260	2.13600 613	1.10416 58
.425	.138975 744	.595056 2127	.746130 3248	1.50025 260	2.12987 611	1.10474 57
.426	.138231 741	.592929 2120	.742882 3235	1.49765 259	2.12376 607	1.10531 58
.427	.137490 738	.590809 2115	.739647 3220	1.49506 259	2.11769 606	1.10589 57
.428	.136752 735	.588694 2109	.736427 3206	1.49247 258	2.11163 603	1.10646 59
.429	.136017 732	.586585 2102	.733221 3192	1.48989 258	2.10560 600	1.10705 58
.430	.135285 728	.584483 2097	.730029 3178	1.48731 257	2.09960 598	1.10763 59
.431	.134557 726	.582386 2091	.726851 3164	1.48474 257	2.09362 595	1.10822 58
.432	.133831 722	.580295 2084	.723687 3151	1.48217 257	2.08767 593	1.10880 59
.433	.133109 719	.578211 2079	.720536 3137	1.47960 256	2.08174 590	1.10939 58
.434	.132390 715	.576132 2073	.717399 3123	1.47704 255	2.07584 588	1.10998 60
.435	.131675 713	.574059 2067	.714276 3110	1.47449 255	2.06995 585	1.11058 60
.436	.130962 710	.571992 2061	.711166 3096	1.47194 255	2.06410 584	1.11118 60
.437	.130252 706	.569931 2055	.708070 3083	1.46939 254	2.05826 581	1.11178 60
.438	.129546 704	.567876 2050	.704987 3070	1.46685 254	2.05245 578	1.11238 60
.439	.128842 700	.565826 2044	.701917 3056	1.46431 253	2.04667 577	1.11298 61
.440	.128142 698	.563782 2038	.698861 3044	1.46178 253	2.04090 574	1.11359 61
.441	.127444 694	.561744 2032	.695817 3031	1.45925 252	2.03516 571	1.11420 61
.442	.126750 691	.559712 2027	.692786 3017	1.45673 252	2.02945 570	1.11481 61
.443	.126059 688	.557685 2021	.689769 3005	1.45421 252	2.02375 567	1.11542 62
.444	.125371 686	.555664 2015	.686764 2992	1.45169 251	2.01808 565	1.11604 62
.445	.124685 682	.553649 2008	.683772 2980	1.44918 251	2.01243 563	1.11666 62
.446	.124003 678	.551640 2005	.680792 2967	1.44667 250	2.00680 561	1.11728 62
.447	.123324 677	.549635 1998	.677825 2954	1.44417 250	2.00119 558	1.11790 63
.448	.122647 673	.547637 1993	.674871 2942	1.44167 249	1.99561 556	1.11853 62
.449	.121974 670	.545644 1987	.671929 2929	1.43918 249	1.99005 554	1.11915 63
.450	.121304 668	.543657 1982	.669000 2918	1.43669 248	1.98451 552	1.11978 64
.451	.120636 665	.541675 1978	.666082 2905	1.43420 248	1.97899 550	1.12042 63
.452	.119971 661	.539699 1971	.663177 2892	1.43172 248	1.97349 548	1.12105 64
.453	.119310 659	.537728 1965	.660285 2881	1.42924 248	1.96801 545	1.12169 64
.454	.118651 656	.535763 1960	.657404 2868	1.42676 247	1.96256 544	1.12233 65
.455	.117995 653	.533803 1954	.654535 2857	1.42429 246	1.95712 541	1.12298 64
.456	.117342 650	.531849 1948	.651678 2845	1.42183 246	1.95171 539	1.12362 65
.457	.116692 648	.529900 1944	.648833 2833	1.41937 246	1.94632 538	1.12427 65
.458	.116044 645	.527956 1938	.646000 2822	1.41691 246	1.94094 535	1.12492 65
.459	.115399 641	.526018 1933	.643178 2810	1.41445 245	1.93559 533	1.12557 66
.460	.114758	.524085	.640368	1.41200	1.93026	1.12623

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TABLE I.– CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.460	.114758	639	.524085	1828	.640368	2783	1.41200	244	1.93026	531	1.12623	66
.461	.114119	636	.522157	1822	.637570	2787	1.40956	243	1.92495	530	1.12689	66
.462	.113483	634	.520235	1817	.634783	2775	1.40711	243	1.91965	527	1.12755	66
.463	.112849	630	.518318	1812	.632008	2764	1.40468	244	1.91438	525	1.12821	67
.464	.112219	628	.516406	1806	.629244	2753	1.40224	243	1.90913	524	1.12888	67
.465	.111591	625	.514500	1801	.626491	2741	1.39981	242	1.90389	521	1.12955	67
.466	.110966	622	.512599	1797	.623750	2731	1.39738	242	1.89868	520	1.13022	67
.467	.110343	619	.510702	1791	.621019	2719	1.39496	242	1.89348	517	1.13089	68
.468	.109724	617	.508811	1885	.618300	2708	1.39254	242	1.88831	516	1.13157	68
.469	.109107	615	.506926	1881	.615592	2697	1.39012	241	1.88315	514	1.13225	68
.470	.108492	611	.505045	1875	.612895	2687	1.38771	241	1.87801	512	1.13293	68
.471	.107881	609	.503170	1871	.610208	2675	1.38530	240	1.87289	510	1.13362	68
.472	.107272	606	.501299	1865	.607533	2665	1.38290	240	1.86779	508	1.13430	69
.473	.106666	604	.499434	1860	.604868	2654	1.38050	240	1.86271	506	1.13499	70
.474	.106062	601	.497574	1855	.602214	2643	1.37810	240	1.85765	505	1.13569	69
.475	.105461	598	.495719	1850	.599571	2633	1.37570	239	1.85260	503	1.13638	70
.476	.104863	596	.493869	1845	.596938	2622	1.37331	238	1.84757	501	1.13708	70
.477	.104267	593	.492024	1840	.594316	2611	1.37093	238	1.84256	499	1.13778	70
.478	.103674	590	.490184	1835	.591705	2602	1.36854	238	1.83757	497	1.13848	71
.479	.103084	588	.488349	1831	.589103	2591	1.36616	237	1.83260	496	1.13919	71
.480	.102496	585	.486518	1825	.586512	2580	1.36379	236	1.82764	494	1.13990	71
.481	.101911	583	.484693	1820	.583932	2570	1.36141	237	1.82270	492	1.14061	72
.482	.101328	580	.482873	1815	.581362	2560	1.35904	236	1.81778	490	1.14133	72
.483	.100748	577	.481058	1811	.578802	2550	1.35668	236	1.81288	488	1.14205	72
.484	.100171	575	.479247	1805	.576252	2540	1.35432	236	1.80799	487	1.14277	72
.485	.0995958	5724	.477442	1801	.573712	2530	1.35196	236	1.80312	485	1.14349	73
.486	.0990234	5700	.475641	1796	.571182	2520	1.34960	235	1.79827	484	1.14422	73
.487	.0984534	5674	.473845	1791	.568662	2510	1.34725	235	1.79343	482	1.14495	73
.488	.0978860	5649	.472054	1786	.566152	2500	1.34490	235	1.78861	480	1.14568	74
.489	.0973211	5624	.470268	1781	.563652	2490	1.34255	234	1.78381	478	1.14642	73
.490	.0967587	5598	.468487	1777	.561162	2481	1.34021	234	1.77903	477	1.14715	73
.491	.0961988	5575	.466710	1772	.558681	2471	1.33787	234	1.77426	476	1.14790	74
.492	.0956413	5549	.464938	1767	.556210	2461	1.33553	233	1.76950	475	1.14864	73
.493	.0950864	5525	.463171	1762	.553749	2452	1.33320	233	1.76477	473	1.14939	75
.494	.0945339	5501	.461409	1758	.551297	2442	1.33087	233	1.76004	470	1.15014	73
.495	.0939838	5477	.459651	1753	.548855	2432	1.32854	232	1.75534	469	1.15089	75
.496	.0934361	5452	.457898	1748	.546423	2424	1.32622	232	1.75065	467	1.15164	76
.497	.0928909	5428	.456150	1744	.543999	2413	1.32390	232	1.74598	466	1.15240	77
.498	.0923481	5403	.454406	1739	.541586	2405	1.32158	231	1.74132	464	1.15317	76
.499	.0918078	5380	.452667	1734	.539181	2395	1.31927	231	1.73668	463	1.15393	77
.500	.0912698	5356	.450933	1730	.536786	2386	1.31696	231	1.73205	461	1.15470	77
.501	.0907342	5332	.449203	1725	.534400	2377	1.31465	230	1.72744	460	1.15547	78
.502	.0902010	5309	.447478	1721	.532023	2367	1.31235	231	1.72284	458	1.15625	77
.503	.0896701	5284	.445757	1716	.529656	2359	1.31004	230	1.71826	456	1.15702	78
.504	.0891417	5262	.444041	1711	.527297	2349	1.30774	229	1.71370	455	1.15780	79
.505	.0886155	5238	.442330	1707	.524948	2341	1.30545	228	1.70915	454	1.15859	79
.506	.0880917	5214	.440623	1703	.522607	2331	1.30316	229	1.70461	452	1.15938	78
.507	.0875703	5191	.438920	1697	.520276	2323	1.30087	229	1.70009	451	1.16016	80
.508	.0870512	5168	.437223	1694	.517953	2314	1.29858	228	1.69558	449	1.16096	80
.509	.0865344	5145	.435529	1689	.515639	2305	1.29630	228	1.69109	447	1.16176	79
.510	.0860199	5122	.433840	1684	.513334	2296	1.29401	227	1.68662	447	1.16255	81
.511	.0855077	5099	.432156	1680	.511038	2287	1.29174	228	1.68215	444	1.16336	80
.512	.0849978	5078	.430476	1675	.508751	2279	1.28946	227	1.67771	444	1.16416	81
.513	.0844902	5053	.428801	1671	.506472	2270	1.28719	227	1.67327	442	1.16497	82
.514	.0839849	5031	.427130	1667	.504202	2262	1.28492	227	1.66885	440	1.16579	81
.515	.0834818	5008	.425463	1662	.501940	2253	1.28265	226	1.66445	439	1.16660	82
.516	.0829810	4986	.423801	1658	.499687	2244	1.28039	226	1.66006	438	1.16742	82
.517	.0824824	4963	.422143	1654	.497443	2236	1.27813	226	1.65568	437	1.16824	83
.518	.0819861	4941	.420489	1649	.495207	2228	1.27587	226	1.65131	435	1.16907	83
.519	.0814920	4918	.418840	1645	.492979	2219	1.27361	225	1.64696	433	1.16990	83
.520	.0810001		.417195		.490760		1.27136		1.64263		1.17073	

TABLE I.— CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.520	.0810001	4896	.417195	1640	.490760	2211	1.27136	225	1.64263	433	1.17073	84
.521	.0805105	4875	.415555	1636	.488549	2208	1.26911	225	1.63830	430	1.17157	84
.522	.0800230	4852	.413919	1632	.486346	2184	1.26686	224	1.63400	430	1.17241	84
.523	.0795378	4830	.412287	1628	.484152	2187	1.26462	224	1.62970	428	1.17325	85
.524	.0790548	4809	.410659	1628	.481965	2178	1.26238	224	1.62542	427	1.17410	85
.525	.0785739	4787	.409036	1619	.479787	2170	1.26014	224	1.62115	426	1.17495	85
.526	.0780952	4766	.407417	1615	.477617	2162	1.25790	223	1.61689	424	1.17580	86
.527	.0776186	4745	.405802	1610	.475455	2153	1.25567	223	1.61265	423	1.17666	86
.528	.0771443	4723	.404192	1607	.473302	2146	1.25344	223	1.60842	422	1.17752	86
.529	.0766720	4701	.402585	1602	.471156	2138	1.25121	223	1.60420	420	1.17838	87
.530	.0762019	4679	.400983	1598	.469018	2130	1.24898	222	1.60000	420	1.17925	87
.531	.0757340	4658	.399385	1593	.466888	2122	1.24676	222	1.59580	418	1.18012	87
.532	.0752682	4635	.397792	1590	.464766	2114	1.24454	222	1.59162	416	1.18099	88
.533	.0748044	4615	.396202	1585	.462652	2107	1.24232	222	1.58746	416	1.18187	88
.534	.0743429	4593	.394617	1581	.460545	2099	1.24010	221	1.58330	414	1.18275	89
.535	.0738834	4574	.393036	1578	.458446	2090	1.23789	221	1.57916	413	1.18364	89
.536	.0734260	4554	.391458	1573	.456356	2084	1.23568	221	1.57503	411	1.18453	89
.537	.0729706	4532	.389885	1568	.454272	2075	1.23347	221	1.57092	411	1.18542	90
.538	.0725174	4512	.388317	1565	.452197	2068	1.23126	220	1.56681	408	1.18632	90
.539	.0720662	4490	.386752	1561	.450129	2061	1.22906	220	1.56272	408	1.18722	90
.540	.0716172	4471	.385191	1557	.448068	2053	1.22686	220	1.55864	407	1.18812	91
.541	.0711701	4450	.383634	1552	.446015	2045	1.22466	220	1.55457	406	1.18903	91
.542	.0707251	4428	.382082	1548	.443970	2038	1.22246	219	1.55051	404	1.18994	92
.543	.0702822	4410	.380534	1545	.441932	2030	1.22027	220	1.54647	403	1.19086	91
.544	.0698412	4388	.378989	1540	.439902	2023	1.21807	219	1.54244	403	1.19177	93
.545	.0694024	4369	.377449	1537	.437879	2016	1.21588	218	1.53841	401	1.19270	92
.546	.0689655	4348	.375912	1532	.435863	2008	1.21370	219	1.53440	399	1.19362	93
.547	.0685306	4325	.374380	1529	.433855	2001	1.21151	218	1.53041	399	1.19455	94
.548	.0680978	4309	.372851	1524	.431854	1994	1.20933	218	1.52642	398	1.19549	94
.549	.0676669	4288	.371327	1521	.429860	1987	1.20715	218	1.52244	396	1.19643	94
.550	.0672381	4268	.369806	1516	.427873	1979	1.20497	217	1.51848	395	1.19737	94
.551	.0668112	4248	.368290	1513	.425894	1972	1.20280	218	1.51453	394	1.19831	95
.552	.0663863	4230	.366777	1508	.423922	1965	1.20062	217	1.51059	393	1.19926	96
.553	.0659633	4209	.365269	1505	.421957	1958	1.19845	217	1.50666	392	1.20022	96
.554	.0655424	4191	.363764	1501	.419999	1951	1.19628	217	1.50274	391	1.20118	96
.555	.0651233	4171	.362263	1497	.418048	1944	1.19411	216	1.49883	390	1.20214	96
.556	.0647062	4151	.360766	1492	.416104	1936	1.19195	216	1.49493	389	1.20310	98
.557	.0642911	4132	.359274	1490	.414168	1930	1.18979	217	1.49104	387	1.20408	97
.558	.0638779	4113	.357784	1485	.412238	1923	1.18762	215	1.48717	387	1.20505	98
.559	.0634666	4093	.356299	1481	.410315	1916	1.18547	216	1.48330	385	1.20603	98
.560	.0630573	4075	.354818	1478	.408399	1910	1.18331	215	1.47945	384	1.20701	99
.561	.0626498	4054	.353340	1474	.406489	1902	1.18116	216	1.47561	384	1.20800	99
.562	.0622444	4037	.351866	1469	.404587	1895	1.17900	215	1.47177	382	1.20899	99
.563	.0618407	4016	.350397	1466	.402692	1889	1.17685	215	1.46795	381	1.20998	100
.564	.0614389	3998	.348931	1462	.400803	1882	1.17470	214	1.46414	380	1.21098	101
.565	.0610390	3979	.347468	1458	.398921	1875	1.17256	214	1.46034	379	1.21199	101
.566	.0606411	3961	.346010	1455	.397046	1868	1.17042	215	1.45655	379	1.21300	101
.567	.0602450	3943	.344555	1451	.395177	1862	1.16827	214	1.45276	377	1.21401	101
.568	.0598507	3924	.343104	1447	.393315	1855	1.16613	214	1.44899	376	1.21502	102
.569	.0594583	3905	.341657	1443	.391460	1849	1.16399	213	1.44523	375	1.21604	103
.570	.0590678	3887	.340214	1440	.389611	1842	1.16186	214	1.44148	374	1.21707	103
.571	.0586791	3868	.338774	1436	.387769	1835	1.15972	213	1.43774	373	1.21810	104
.572	.0582922	3850	.337338	1432	.385934	1830	1.15759	213	1.43401	372	1.21914	103
.573	.0579072	3832	.335906	1428	.384104	1822	1.15546	213	1.43029	371	1.22017	103
.574	.0575240	3813	.334478	1425	.382282	1816	1.15333	212	1.42658	370	1.22122	104
.575	.0571427	3796	.333053	1421	.380466	1810	1.15121	213	1.42288	370	1.22226	106
.576	.0567631	3777	.331632	1417	.378656	1803	1.14908	212	1.41918	368	1.22332	105
.577	.0563854	3760	.330215	1414	.376853	1797	1.14696	212	1.41550	367	1.22437	106
.578	.0560094	3742	.328801	1410	.375056	1791	1.14484	212	1.41183	367	1.22543	107
.579	.0556352	3725	.327391	1406	.373265	1784	1.14272	212	1.40816	365	1.22650	107
.580	.0552629		.325985		.371481		1.14060		1.40451		1.22757	

NACA

TABLE I.- CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.580	.0552629	3706	.325985	1405	.371481	1778	1.14060	211	1.40451	384	1.22757	108
.581	.0548923	3688	.324582	1399	.369703	1771	1.13849	212	1.40067	384	1.22865	108
.582	.0545235	3671	.323183	1395	.367932	1766	1.13637	211	1.39723	382	1.22973	108
.583	.0541564	3653	.321788	1392	.366166	1759	1.13426	211	1.39361	382	1.23081	109
.584	.0537911	3635	.320396	1388	.364407	1753	1.13215	211	1.38999	381	1.23190	110
.585	.0534276	3618	.319008	1385	.362654	1747	1.13004	211	1.38638	380	1.23300	109
.586	.0530658	3600	.317623	1381	.360907	1741	1.12793	210	1.38278	378	1.23409	111
.587	.0527058	3583	.316242	1377	.359166	1734	1.12583	210	1.37919	378	1.23520	111
.588	.0523475	3566	.314865	1374	.357432	1728	1.12373	211	1.37561	377	1.23631	111
.589	.0519909	3548	.313491	1370	.355703	1722	1.12162	210	1.37204	376	1.23742	112
.590	.0516361	3531	.312121	1367	.353981	1717	1.11952	209	1.36848	375	1.23854	112
.591	.0512830	3514	.310754	1363	.352264	1710	1.11743	210	1.36493	375	1.23966	113
.592	.0509316	3498	.309391	1360	.350554	1705	1.11533	210	1.36138	373	1.24079	113
.593	.0505818	3480	.308031	1356	.348849	1699	1.11323	209	1.35785	373	1.24192	114
.594	.0502338	3463	.306675	1352	.347150	1692	1.11114	209	1.35432	372	1.24306	114
.595	.0498875	3446	.305323	1350	.345458	1687	1.10905	209	1.35080	371	1.24420	115
.596	.0495429	3429	.303973	1345	.343771	1681	1.10696	209	1.34729	370	1.24535	116
.597	.0492000	3413	.302628	1342	.342090	1675	1.10487	208	1.34379	370	1.24651	116
.598	.0488587	3395	.301286	1338	.340415	1669	1.10278	208	1.34029	368	1.24767	116
.599	.0485192	3380	.299947	1335	.338746	1663	1.10070	209	1.33681	368	1.24883	117
.600	.0481812	3362	.298612	1331	.337083	1658	1.09861	208	1.33333	366	1.25000	117
.601	.0478450	3346	.297281	1328	.335425	1651	1.09653	208	1.32987	366	1.25117	118
.602	.0475104	3330	.295953	1325	.333774	1646	1.09445	208	1.32641	366	1.25235	119
.603	.0471774	3312	.294628	1321	.332128	1641	1.09237	208	1.32295	364	1.25354	119
.604	.0468462	3297	.293307	1318	.330487	1634	1.09029	208	1.31951	363	1.25473	119
.605	.0465165	3281	.291989	1314	.328853	1629	1.08821	207	1.31608	363	1.25592	121
.606	.0461884	3264	.290675	1311	.327224	1623	1.08614	207	1.31265	362	1.25713	120
.607	.0458620	3248	.289364	1308	.325601	1618	1.08407	208	1.30923	361	1.25833	121
.608	.0455372	3232	.288056	1304	.323983	1612	1.08199	207	1.30582	341	1.25954	122
.609	.0452140	3215	.286752	1301	.322371	1607	1.07992	207	1.30241	338	1.26076	123
.610	.0448925	3200	.285451	1297	.320764	1601	1.07785	207	1.29902	339	1.26199	123
.611	.0445725	3183	.284154	1294	.319163	1595	1.07578	206	1.29563	338	1.26322	123
.612	.0442542	3168	.282860	1291	.317568	1590	1.07372	207	1.29225	337	1.26445	124
.613	.0439374	3152	.281569	1287	.315978	1584	1.07165	206	1.28888	337	1.26569	125
.614	.0436222	3136	.280282	1284	.314394	1579	1.06959	206	1.28551	335	1.26694	125
.615	.0433086	3120	.278998	1280	.312815	1574	1.06753	207	1.28216	335	1.26819	125
.616	.0429966	3105	.277718	1277	.311241	1568	1.06546	206	1.27881	334	1.26944	127
.617	.0426861	3089	.276441	1274	.309673	1562	1.06340	206	1.27547	334	1.27071	127
.618	.0423772	3073	.275167	1271	.308111	1557	1.06135	206	1.27213	332	1.27198	127
.619	.0420699	3058	.273896	1267	.306554	1552	1.05929	206	1.26881	332	1.27325	128
.620	.0417641	3042	.272629	1264	.305002	1547	1.05723	205	1.26549	332	1.27453	129
.621	.0414599	3027	.271365	1260	.303455	1541	1.05518	206	1.26217	330	1.27582	129
.622	.0411572	3012	.270105	1257	.301914	1536	1.05312	205	1.25887	330	1.27711	130
.623	.0408560	2998	.268848	1254	.300378	1530	1.05107	205	1.25557	329	1.27841	130
.624	.0405564	2980	.267594	1251	.298848	1526	1.04902	205	1.25228	328	1.27971	131
.625	.0402584	2966	.266343	1247	.297322	1520	1.04697	205	1.24900	328	1.28102	132
.626	.0399618	2950	.265096	1244	.295802	1515	1.04492	205	1.24572	327	1.28234	132
.627	.0396668	2936	.263852	1241	.294287	1509	1.04287	205	1.24245	326	1.28366	133
.628	.0393732	2920	.262611	1238	.292778	1505	1.04082	204	1.23919	325	1.28499	134
.629	.0390812	2905	.261373	1234	.291273	1499	1.03878	205	1.23594	325	1.28633	134
.630	.0387907	2891	.260139	1231	.289774	1494	1.03673	204	1.23269	324	1.28767	135
.631	.0385016	2875	.258908	1228	.288280	1488	1.03469	204	1.22945	323	1.28902	136
.632	.0382141	2861	.257680	1224	.286791	1484	1.03265	204	1.22622	323	1.29038	136
.633	.0379280	2845	.256456	1222	.285307	1479	1.03061	204	1.22299	322	1.29174	136
.634	.0376435	2831	.255234	1218	.283828	1478	1.02857	204	1.21977	322	1.29310	138
.635	.0373604	2816	.254016	1215	.282355	1468	1.02653	204	1.21655	320	1.29448	138
.636	.0370788	2802	.252801	1212	.280886	1464	1.02449	204	1.21335	320	1.29586	139
.637	.0367986	2787	.251589	1208	.279422	1458	1.02245	206	1.21015	320	1.29725	139
.638	.0365199	2772	.250381	1206	.277964	1454	1.02042	204	1.20695	318	1.29864	140
.639	.0362427	2758	.249175	1202	.276510	1448	1.01838	203	1.20377	318	1.30004	141
.640	.0359669		.247973		.275062		1.01635		1.20059		1.30145	

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TABLE I.- CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.640	.0359669	2743	.247973	1199	.275062	1444	1.01635	203	1.20059	318	1.30145	141
.641	.0356926	2729	.246774	1186	.273618	1438	1.01432	204	1.19741	317	1.30286	142
.642	.0354197	2715	.245578	1182	.272179	1434	1.01228	203	1.19424	316	1.30428	143
.643	.0351482	2700	.244386	1180	.270745	1428	1.01025	203	1.19108	315	1.30571	145
.644	.0348782	2686	.243196	1186	.269317	1424	1.00822	203	1.18793	316	1.30714	145
.645	.0346096	2672	.242010	1183	.267893	1420	1.00619	205	1.18478	314	1.30859	145
.646	.0343424	2658	.240827	1180	.266473	1414	1.00416	202	1.18164	314	1.31004	145
.647	.0340766	2643	.239647	1177	.265059	1409	1.00214	203	1.17850	313	1.31149	147
.648	.0338123	2630	.238470	1174	.263650	1405	1.00011	208	1.17537	312	1.31296	146
.649	.0335493	2615	.237296	1171	.262245	1400	.998084	2025	1.17225	312	1.31442	148
.650	.0332878	2602	.236125	1167	.260845	1394	.996059	2024	1.16913	311	1.31590	149
.651	.0330276	2587	.234958	1165	.259451	1391	.994035	2023	1.16602	311	1.31739	148
.652	.0327689	2574	.233793	1161	.258060	1385	.992012	2022	1.16291	310	1.31888	150
.653	.0325115	2560	.232632	1158	.256675	1381	.989990	2022	1.15981	308	1.32038	151
.654	.0322555	2546	.231473	1155	.255294	1376	.987968	2021	1.15672	309	1.32189	151
.655	.0320009	2532	.230318	1152	.253918	1371	.985947	2020	1.15363	308	1.32340	152
.656	.0317477	2519	.229166	1148	.252547	1367	.983927	2018	1.15055	308	1.32492	153
.657	.0314958	2505	.228017	1146	.251180	1361	.981908	2018	1.14747	307	1.32645	154
.658	.0312453	2491	.226871	1143	.249819	1358	.979889	2018	1.14440	306	1.32799	154
.659	.0309962	2478	.225728	1138	.248461	1352	.977871	2017	1.14134	306	1.32953	156
.660	.0307484	2464	.224589	1137	.247109	1348	.975854	2016	1.13828	305	1.33109	156
.661	.0305020	2451	.223452	1134	.245761	1344	.973838	2016	1.13523	305	1.33265	157
.662	.0302569	2438	.222318	1131	.244417	1338	.971822	2015	1.13218	304	1.33422	157
.663	.0300131	2424	.221187	1127	.243079	1334	.969807	2015	1.12914	304	1.33579	159
.664	.0297707	2411	.220060	1125	.241745	1330	.967792	2013	1.12610	303	1.33738	159
.665	.0295296	2397	.218935	1121	.240415	1325	.965779	2014	1.12307	302	1.33897	160
.666	.0292899	2384	.217814	1119	.239090	1321	.963765	2012	1.12005	302	1.34057	161
.667	.0290515	2371	.216695	1115	.237769	1316	.961753	2012	1.11703	302	1.34218	161
.668	.0288144	2358	.215580	1113	.236453	1311	.959741	2011	1.11401	300	1.34379	163
.669	.0285786	2345	.214467	1109	.235142	1307	.957730	2011	1.11101	301	1.34542	163
.670	.0283441	2332	.213358	1107	.233835	1302	.955719	2011	1.10800	300	1.34705	165
.671	.0281109	2318	.212251	1103	.232533	1298	.953708	2009	1.10500	299	1.34870	164
.672	.0278790	2306	.211148	1101	.231235	1294	.951699	2009	1.10201	298	1.35034	166
.673	.0276484	2293	.210047	1097	.229941	1289	.949690	2009	1.09902	298	1.35200	167
.674	.0274191	2280	.208950	1095	.228652	1285	.947681	2008	1.09604	298	1.35367	168
.675	.0271911	2267	.207855	1092	.227367	1280	.945673	2008	1.09306	297	1.35535	168
.676	.0269644	2255	.206763	1088	.226087	1276	.943665	2007	1.09009	297	1.35703	170
.677	.0267389	2241	.205675	1086	.224811	1272	.941658	2007	1.08712	296	1.35873	170
.678	.0265148	2228	.204589	1082	.223539	1267	.939651	2006	1.08416	295	1.36043	171
.679	.0262919	2217	.203507	1080	.222272	1263	.937645	2006	1.08121	296	1.36214	172
.680	.0260702	2204	.202427	1077	.221009	1258	.935639	2006	1.07825	294	1.36386	173
.681	.0258498	2191	.201350	1074	.219751	1254	.933633	2005	1.07531	295	1.36559	174
.682	.0256307	2179	.200276	1071	.218497	1250	.931628	2004	1.07236	293	1.36733	175
.683	.0254128	2166	.199205	1068	.217247	1246	.929624	2005	1.06943	294	1.36908	176
.684	.0251962	2154	.198137	1065	.216001	1241	.927619	2004	1.06649	292	1.37084	176
.685	.0249808	2141	.197072	1062	.214760	1237	.925615	2003	1.06357	293	1.37260	178
.686	.0247667	2128	.196010	1058	.213523	1233	.923612	2004	1.06064	291	1.37438	178
.687	.0245538	2117	.194951	1056	.212290	1228	.921608	2003	1.05773	292	1.37616	180
.688	.0243421	2104	.193895	1054	.211062	1224	.919605	2002	1.05481	291	1.37796	180
.689	.0241317	2093	.192841	1050	.209838	1221	.917603	2003	1.05190	290	1.37976	182
.690	.0239224	2080	.191791	1048	.208617	1215	.915600	2002	1.04900	290	1.38158	182
.691	.0237144	2068	.190743	1044	.207402	1212	.913598	2002	1.04610	290	1.38340	184
.692	.0235076	2055	.189699	1042	.206190	1208	.911596	2001	1.04320	288	1.38524	184
.693	.0233021	2044	.188657	1039	.204982	1203	.909595	2002	1.04031	288	1.38708	186
.694	.0230977	2032	.187618	1036	.203779	1199	.907593	2001	1.03743	288	1.38894	186
.695	.0228945	2020	.186582	1033	.202580	1195	.905592	2001	1.03455	288	1.39080	188
.696	.0226925	2008	.185549	1030	.201385	1191	.903591	2001	1.03167	287	1.39268	188
.697	.0224917	1996	.184519	1028	.200194	1187	.901590	2001	1.02880	287	1.39456	190
.698	.0222921	1984	.183491	1024	.199007	1182	.899589	2000	1.02593	287	1.39646	190
.699	.0220937	1972	.182467	1022	.197825	1179	.897589	2001	1.02306	286	1.39836	192
.700	.0218965		.181445		.196646		.895588		1.02020		1.40028	

TABLE I.- CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.700	.0218965	1961	.181445	1019	.196646	1174	.895588	2000	1.02020	285	1.40028	183
.701	.0217004	1949	.180426	1015	.195472	1171	.893588	2000	1.01735	285	1.40221	184
.702	.0215055	1937	.179411	1014	.194301	1166	.891588	2001	1.01450	285	1.40415	184
.703	.0213118	1925	.178397	1010	.193135	1162	.889587	2000	1.01165	284	1.40609	196
.704	.0211193	1914	.177387	1007	.191973	1159	.887587	2000	1.00881	284	1.40805	197
.705	.0209279	1903	.176380	1005	.190814	1154	.885587	2000	1.00597	284	1.41002	199
.706	.0207376	1891	.175375	1001	.189660	1150	.883587	2000	1.00313	283	1.41201	199
.707	.0205485	1878	.174374	999	.188510	1146	.881587	2000	1.00030	283	1.41400	200
.708	.0203606	1868	.173375	996	.187364	1143	.879587	2000	.997475	2823	1.41600	202
.709	.0201738	1857	.172379	994	.186221	1138	.877587	2000	.994652	2819	1.41802	203
.710	.0199881	1845	.171385	990	.185083	1134	.875587	2000	.991833	2815	1.42005	204
.711	.0198036	1834	.170395	988	.183949	1130	.873587	2000	.989018	2811	1.42209	205
.712	.0196202	1822	.169407	985	.182819	1127	.871587	2000	.986207	2807	1.42414	206
.713	.0194380	1811	.168422	981	.181692	1122	.869587	2001	.983400	2804	1.42620	207
.714	.0192569	1801	.167441	980	.180570	1119	.867586	2000	.980596	2800	1.42827	209
.715	.0190768	1788	.166461	978	.179451	1114	.865586	2001	.977796	2796	1.43036	210
.716	.0188979	1777	.165485	974	.178337	1111	.863585	2001	.975000	2792	1.43246	211
.717	.0187202	1767	.164511	970	.177226	1107	.861584	2000	.972208	2789	1.43457	212
.718	.0185435	1756	.163541	969	.176119	1106	.859584	2001	.969419	2785	1.43669	214
.719	.0183679	1744	.162572	965	.175016	1099	.857583	2002	.966634	2781	1.43883	215
.720	.0181935	1734	.161607	962	.173917	1095	.855581	2001	.963853	2778	1.44098	216
.721	.0180201	1723	.160645	960	.172822	1091	.853580	2002	.961075	2774	1.44314	217
.722	.0178478	1712	.159685	957	.171731	1088	.851578	2002	.958301	2771	1.44531	219
.723	.0176766	1701	.158728	954	.170643	1084	.849576	2002	.955530	2768	1.44750	220
.724	.0175065	1690	.157774	951	.169559	1079	.847574	2002	.952762	2764	1.44970	221
.725	.0173375	1678	.156823	949	.168480	1076	.845572	2003	.949998	2760	1.45191	222
.726	.0171696	1669	.155874	946	.167404	1073	.843569	2003	.947238	2757	1.45413	224
.727	.0170027	1658	.154928	943	.166331	1068	.841566	2004	.944481	2754	1.45637	226
.728	.0168369	1648	.153985	940	.165263	1065	.839562	2004	.941727	2751	1.45863	226
.729	.0166721	1636	.153045	938	.164198	1061	.837558	2004	.938976	2747	1.46089	228
.730	.0165085	1626	.152107	935	.163137	1057	.835554	2004	.936229	2744	1.46317	229
.731	.0163459	1616	.151172	932	.162080	1053	.833550	2005	.933485	2741	1.46546	231
.732	.0161843	1605	.150240	929	.161027	1050	.831545	2006	.930744	2738	1.46777	232
.733	.0160238	1594	.149311	927	.159977	1046	.829539	2005	.928006	2734	1.47009	234
.734	.0158644	1584	.148384	924	.158931	1042	.827534	2007	.925272	2732	1.47243	235
.735	.0157060	1574	.147460	921	.157889	1038	.825527	2006	.922540	2728	1.47478	237
.736	.0155486	1563	.146539	918	.156850	1034	.823521	2008	.919812	2726	1.47715	237
.737	.0153923	1553	.145621	916	.155816	1032	.821513	2007	.917086	2722	1.47952	240
.738	.0152370	1543	.144705	913	.154784	1027	.819506	2009	.914364	2718	1.48192	241
.739	.0150827	1533	.143792	910	.153757	1024	.817497	2009	.911645	2717	1.48433	242
.740	.0149294	1522	.142882	908	.152733	1020	.815488	2009	.908928	2713	1.48675	244
.741	.0147772	1512	.141974	905	.151713	1016	.813479	2010	.906215	2711	1.48919	246
.742	.0146260	1502	.141069	902	.150697	1013	.811469	2011	.903504	2708	1.49165	247
.743	.0144758	1492	.140167	899	.149684	1009	.809458	2011	.900796	2705	1.49412	248
.744	.0143266	1481	.139268	897	.148675	1005	.807447	2012	.898091	2702	1.49660	251
.745	.0141785	1472	.138371	894	.147670	1002	.805435	2012	.895389	2700	1.49911	251
.746	.0140313	1462	.137477	892	.146668	998	.803423	2014	.892689	2697	1.50162	254
.747	.0138851	1451	.136585	888	.145670	995	.801409	2015	.889992	2694	1.50416	255
.748	.0137400	1442	.135697	886	.144675	991	.799396	2015	.887298	2692	1.50671	256
.749	.0135958	1432	.134811	883	.143684	987	.797381	2016	.884606	2689	1.50927	259
.750	.0134526	1422	.133928	881	.142697	984	.795365	2016	.881917	2686	1.51186	260
.751	.0133104	1412	.133047	878	.141713	981	.793349	2017	.879231	2684	1.51446	262
.752	.0131692	1402	.132169	875	.140732	976	.791332	2018	.876547	2682	1.51708	263
.753	.0130290	1393	.131294	873	.139756	973	.789314	2018	.873865	2678	1.51971	265
.754	.0128897	1383	.130421	869	.138783	970	.787296	2020	.871186	2676	1.52236	267
.755	.0127514	1373	.129552	868	.137813	966	.785276	2020	.868510	2674	1.52503	269
.756	.0126141	1364	.128684	864	.136847	963	.783256	2021	.865836	2672	1.52772	270
.757	.0124777	1354	.127820	862	.135884	959	.781235	2022	.863164	2670	1.53042	272
.758	.0123423	1345	.126958	859	.134925	955	.779213	2023	.860494	2667	1.53314	274
.759	.0122078	1334	.126099	857	.133970	952	.777190	2024	.857827	2665	1.53588	276
.760	.0120744		.125242		.133018		.775166		.855162		1.53864	

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TABLE I.– CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.760	.0120744	1326	.125242	858	.133018	848	.775166	2028	.855162	2863	1.53864	278
.761	.0119418	1316	.124389	852	.132070	945	.773140	2028	.852499	2860	1.54142	280
.762	.0118102	1306	.123537	848	.131125	842	.771114	2027	.849839	2859	1.54422	281
.763	.0116796	1298	.122689	846	.130183	838	.769087	2028	.847180	2856	1.54703	284
.764	.0115498	1287	.121843	843	.129245	934	.767059	2029	.844524	2854	1.54987	285
.765	.0114211	1279	.121000	841	.128311	931	.765030	2030	.841870	2853	1.55272	288
.766	.0112932	1268	.120159	838	.127380	928	.763000	2031	.839217	2850	1.55560	289
.767	.0111663	1260	.119321	835	.126452	924	.760969	2033	.836567	2848	1.55849	291
.768	.0110403	1251	.118486	832	.125528	921	.758936	2034	.833919	2846	1.56140	294
.769	.0109152	1241	.117654	830	.124607	917	.756902	2034	.831273	2845	1.56434	295
.770	.0107911	1232	.116824	828	.123690	914	.754868	2037	.828628	2842	1.56729	298
.771	.0106679	1224	.115996	824	.122776	910	.752831	2037	.825986	2841	1.57027	299
.772	.0105455	1214	.115172	822	.121866	907	.750794	2038	.823345	2839	1.57326	302
.773	.0104241	1205	.114350	820	.120959	903	.748756	2040	.820706	2837	1.57628	304
.774	.0103036	1196	.113530	816	.120056	901	.746716	2041	.818069	2835	1.57932	306
.775	.0101840	1187	.112714	815	.119155	896	.744675	2043	.815434	2834	1.58238	308
.776	.0100653	1178	.111899	811	.118259	894	.742632	2043	.812800	2832	1.58546	310
.777	.0099475	1169	.111088	809	.117365	890	.740589	2046	.810168	2830	1.58856	313
.778	.0098306	1161	.110279	806	.116475	886	.738543	2046	.807538	2829	1.59169	315
.779	.0097145	1151	.109473	804	.115589	883	.736497	2048	.804909	2828	1.59484	317
.780	.0095994	1143	.108669	801	.114706	880	.734449	2050	.802281	2825	1.59801	319
.781	.0094851	1133	.107868	798	.113826	877	.732399	2051	.799656	2825	1.60120	322
.782	.0093718	1126	.107070	796	.112949	873	.730348	2052	.797031	2823	1.60442	324
.783	.0092592	1116	.106274	793	.112076	869	.728296	2054	.794408	2821	1.60766	327
.784	.0091476	1108	.105481	790	.111207	867	.726242	2056	.791787	2820	1.61093	329
.785	.0090368	1099	.104691	788	.110340	863	.724186	2057	.789167	2818	1.61422	331
.786	.0089269	1090	.103903	785	.109477	860	.722129	2058	.786548	2816	1.61753	334
.787	.0088179	1082	.103118	783	.108617	856	.720071	2061	.783930	2816	1.62087	336
.788	.0087097	1074	.102335	780	.107761	853	.718010	2062	.781314	2815	1.62423	339
.789	.0086023	1064	.101555	777	.106908	850	.715948	2064	.778699	2814	1.62762	342
.790	.0084959	1057	.100778	775	.106058	847	.713884	2065	.776085	2813	1.63104	344
.791	.0083902	1048	.100003	772	.105211	843	.711819	2067	.773472	2812	1.63448	347
.792	.0082854	1039	.0992306	7698	.104368	840	.709752	2069	.770860	2811	1.63795	349
.793	.0081815	1031	.0984610	7696	.103528	836	.707683	2071	.768249	2809	1.64144	352
.794	.0080784	1023	.0976941	7644	.102692	833	.705612	2073	.765640	2809	1.64496	355
.795	.0079761	1014	.0969297	7617	.101859	830	.703539	2074	.763031	2808	1.64851	357
.796	.0078747	1007	.0961680	7591	.101029	827	.701465	2077	.760423	2807	1.65208	361
.797	.0077740	997	.0954089	7565	.100202	824	.699388	2078	.757816	2806	1.65569	363
.798	.0076743	990	.0946524	7539	.0993783	8202	.697310	2080	.755210	2805	1.65932	366
.799	.0075753	982	.0938985	7513	.0985581	8170	.695230	2083	.752605	2805	1.66298	369
.800	.0074771	973	.0931472	7487	.0977411	8137	.693147	2084	.750000	2804	1.66667	372
.801	.0073798	965	.0923985	7461	.0969274	8104	.691063	2087	.747396	2803	1.67039	374
.802	.0072833	957	.0916524	7435	.0961170	8072	.688976	2088	.744793	2802	1.67413	378
.803	.0071876	949	.0909089	7408	.0953098	8040	.686888	2091	.742191	2802	1.67791	381
.804	.0070927	941	.0901680	7383	.0945058	8007	.684797	2092	.739589	2802	1.68172	384
.805	.0069986	934	.0894297	7357	.0937051	7975	.682705	2095	.736987	2801	1.68556	387
.806	.0069052	925	.0886940	7331	.0929076	7943	.680610	2098	.734386	2800	1.68943	390
.807	.0068127	917	.0879609	7304	.0921133	7810	.678512	2099	.731786	2800	1.69333	394
.808	.0067210	909	.0872305	7278	.0913223	7878	.676413	2102	.729186	2599	1.69727	396
.809	.0066301	901	.0865026	7253	.0905345	7846	.674311	2104	.726587	2599	1.70123	400
.810	.0065400	894	.0857773	7227	.0897499	7815	.672207	2106	.723988	2599	1.70523	404
.811	.0064506	886	.0850546	7201	.0889684	7782	.670101	2108	.721389	2599	1.70927	406
.812	.0063620	878	.0843345	7175	.0881902	7750	.667992	2111	.718790	2598	1.71333	410
.813	.0062742	870	.0836170	7148	.0874152	7718	.665881	2114	.716192	2598	1.71743	414
.814	.0061872	863	.0829021	7123	.0866434	7686	.663767	2116	.713593	2598	1.72157	417
.815	.0061009	855	.0821898	7097	.0858748	7654	.661651	2119	.710995	2598	1.72574	421
.816	.0060154	847	.0814801	7071	.0851094	7623	.659532	2121	.708397	2598	1.72995	424
.817	.0059307	840	.0807730	7045	.0843471	7590	.657411	2124	.705799	2598	1.73419	428
.818	.0058467	832	.0800685	7018	.0835881	7558	.655287	2127	.703201	2598	1.73847	432
.819	.0057635	824	.0793666	6993	.0828322	7527	.653160	2128	.700603	2598	1.74279	435
.820	.0056811		.0786673		.0820795		.651031		.698004		1.74714	

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TABLE I.- CONTINUED

t	a(t)		b(t)		c(t)		d(t)		e(t)		f(t)	
.820	.0056811	817	.0786673	6867	.0820795	7485	.651031	2132	.698004	2588	1.74714	439
.821	.0055994	810	.0779706	6841	.0813300	7464	.648899	2135	.695406	2598	1.75153	443
.822	.0055184	802	.0772765	6815	.0805836	7432	.646764	2138	.692807	2599	1.75596	448
.823	.0054382	795	.0765850	6889	.0798404	7401	.644626	2140	.690208	2599	1.76044	451
.824	.0053587	787	.0758961	6863	.0791003	7369	.642486	2143	.687609	2600	1.76495	455
.825	.0052800	780	.0752098	6837	.0783634	7338	.640343	2147	.685009	2600	1.76950	459
.826	.0052020	773	.0745261	6811	.0776296	7308	.638196	2149	.682409	2600	1.77409	463
.827	.0051247	765	.0738450	6785	.0768990	7274	.636047	2152	.679809	2601	1.77872	468
.828	.0050482	758	.0731665	6759	.0761716	7245	.633895	2156	.677208	2602	1.78340	471
.829	.0049724	751	.0724906	6733	.0754473	7212	.631739	2158	.674606	2602	1.78811	476
.830	.0048973	744	.0718173	6707	.0747261	7181	.629581	2162	.672004	2603	1.79287	481
.831	.0048229	736	.0711466	6681	.0740080	7149	.627419	2163	.669401	2603	1.79768	485
.832	.0047493	729	.0704785	6655	.0732931	7118	.625254	2166	.666798	2605	1.80253	490
.833	.0046764	723	.0698130	6629	.0725813	7086	.623086	2171	.664193	2605	1.80743	494
.834	.0046041	715	.0691501	6603	.0718727	7055	.620915	2175	.661588	2606	1.81237	498
.835	.0045326	708	.0684898	6577	.0711672	7023	.618740	2176	.658982	2607	1.81736	503
.836	.0044618	701	.0678321	6551	.0704647	6993	.616562	2182	.656375	2608	1.82239	509
.837	.0043917	694	.0671770	6524	.0697654	6961	.614380	2185	.653767	2608	1.82748	513
.838	.0043223	688	.0665246	6498	.0690693	6931	.612195	2188	.651158	2610	1.83261	518
.839	.0042535	680	.0658747	6472	.0683762	6899	.610006	2192	.648548	2612	1.83779	523
.840	.0041855	673	.0652275	6447	.0676863	6869	.607814	2196	.645936	2612	1.84302	529
.841	.0041182	667	.0645828	6420	.0669994	6837	.605618	2200	.643324	2614	1.84831	534
.842	.0040515	660	.0639408	6394	.0663157	6806	.603418	2203	.640710	2616	1.85365	538
.843	.0039855	653	.0633014	6368	.0656351	6776	.601215	2207	.638094	2616	1.85903	545
.844	.0039202	646	.0626646	6341	.0649575	6744	.599008	2211	.635478	2618	1.86448	550
.845	.0038556	638	.0620305	6316	.0642831	6713	.596797	2215	.632860	2620	1.86998	555
.846	.0037917	633	.0613989	6289	.0636118	6682	.594582	2218	.630240	2621	1.87553	561
.847	.0037284	626	.0607700	6263	.0629436	6652	.592363	2220	.627619	2623	1.88114	567
.848	.0036658	620	.0601437	6237	.0622784	6620	.590140	2227	.624996	2625	1.88681	572
.849	.0036038	613	.0595200	6211	.0616164	6588	.587913	2231	.622371	2627	1.89253	579
.850	.0035425	606	.0588989	6184	.0609575	6559	.585682	2236	.619744	2628	1.89832	584
.851	.0034819	600	.0582805	6158	.0603016	6528	.583446	2239	.617116	2630	1.90416	591
.852	.0034219	593	.0576647	6132	.0596488	6496	.581207	2245	.614486	2633	1.91007	597
.853	.0033626	587	.0570515	6105	.0589992	6466	.578962	2248	.611853	2634	1.91604	603
.854	.0033039	580	.0564410	6078	.0583526	6435	.576714	2253	.609219	2637	1.92207	609
.855	.0032459	574	.0558331	6053	.0577091	6404	.574461	2257	.606582	2638	1.92816	617
.856	.0031885	567	.0552278	6026	.0570687	6373	.572204	2262	.603944	2641	1.93433	625
.857	.0031318	561	.0546252	6000	.0564314	6343	.569942	2267	.601303	2644	1.94056	629
.858	.0030757	555	.0540252	5973	.0557971	6312	.567675	2272	.598659	2646	1.94685	637
.859	.0030202	548	.0534279	5947	.0551659	6280	.565403	2278	.596013	2648	1.95322	648
.860	.0029653	542	.0528332	5920	.0545379	6250	.563127	2281	.593365	2651	1.95965	651
.861	.0029111	536	.0522412	5894	.0539129	6220	.560846	2286	.590714	2653	1.96616	658
.862	.0028575	530	.0516518	5867	.0532909	6188	.558560	2291	.588061	2657	1.97274	666
.863	.0028045	523	.0510651	5841	.0526721	6158	.556269	2296	.585404	2659	1.97940	675
.864	.0027522	518	.0504810	5814	.0520563	6127	.553973	2302	.582745	2662	1.98613	681
.865	.0027004	511	.0498996	5788	.0514436	6098	.551671	2306	.580083	2665	1.99294	688
.866	.0026493	506	.0493208	5761	.0508340	6065	.549365	2312	.577418	2668	1.99982	697
.867	.0025987	498	.0487447	5734	.0502275	6034	.547053	2317	.574750	2671	2.00679	705
.868	.0025488	493	.0481713	5707	.0496241	6004	.544736	2323	.572079	2675	2.01384	715
.869	.0024995	487	.0476006	5681	.0490237	5973	.542413	2328	.569404	2678	2.02097	721
.870	.0024508	482	.0470325	5654	.0484264	5942	.540084	2334	.566726	2681	2.02818	731
.871	.0024026	475	.0464671	5627	.0478322	5911	.537750	2340	.564045	2685	2.03549	739
.872	.0023551	470	.0459044	5600	.0472411	5881	.535410	2345	.561360	2689	2.04288	748
.873	.0023081	463	.0453444	5573	.0466530	5849	.533065	2352	.558671	2692	2.05036	757
.874	.0022618	458	.0447871	5547	.0460681	5819	.530713	2358	.555979	2696	2.05793	766
.875	.0022160	452	.0442324	5519	.0454862	5788	.528355	2363	.553283	2700	2.06559	776
.876	.0021708	446	.0436805	5492	.0449074	5757	.525992	2370	.550583	2703	2.07335	786
.877	.0021262	441	.0431313	5465	.0443317	5727	.523622	2377	.547880	2708	2.08121	795
.878	.0020821	434	.0425848	5439	.0437590	5695	.521245	2382	.545172	2713	2.08916	806
.879	.0020387	429	.0420409	5411	.0431895	5664	.518863	2388	.542459	2716	2.09722	818
.880	.0019958		.0414998		.0426231		.516474		.539743		2.10538	

NACA

TABLE I.— CONCLUDED

t	a(t)	b(t)	c(t)	d(t)	e(t)	f(t)
.880	.0019958 424	.0414998 5383	.0426231 5634	.516474 2396	.539743 2721	2.10538 827
.881	.0019534 417	.0409615 5357	.0420597 5608	.514078 2408	.537022 2726	2.11365 837
.882	.0019117 413	.0404258 5329	.0414994 5572	.511675 2403	.534296 2730	2.12202 848
.883	.0018704 406	.0398929 5302	.0409422 5540	.509266 2416	.531566 2735	2.13050 860
.884	.0018298 401	.0393627 5275	.0403882 5510	.506850 2424	.528831 2738	2.13910 871
.885	.0017897 396	.0388352 5247	.0398372 5478	.504426 2430	.526092 2745	2.14781 883
.886	.0017501 390	.0383105 5220	.0392893 5448	.501996 2438	.523347 2750	2.15664 894
.887	.0017111 385	.0377885 5192	.0387445 5417	.499558 2445	.520597 2755	2.16558 907
.888	.0016726 379	.0372693 5165	.0382028 5386	.497113 2453	.517842 2761	2.17465 918
.889	.0016347 374	.0367528 5137	.0376642 5354	.494660 2460	.515081 2766	2.18384 933
.890	.0015973 368	.0362391 5109	.0371288 5324	.492200 2468	.512315 2771	2.19317 946
.891	.0015604 365	.0357282 5082	.0365964 5293	.489732 2477	.509544 2778	2.20263 958
.892	.0015241 358	.0352200 5053	.0360671 5261	.487255 2484	.506766 2788	2.21221 973
.893	.0014883 358	.0347147 5026	.0355410 5230	.484771 2492	.503983 2790	2.22194 987
.894	.0014530 348	.0342121 4998	.0350180 5198	.482279 2501	.501193 2795	2.23181 1001
.895	.0014182 342	.0337123 4970	.0344981 5167	.479778 2509	.498398 2802	2.24182 1016
.896	.0013840 337	.0332153 4942	.0339814 5137	.477269 2517	.495596 2808	2.25198 1031
.897	.0013503 332	.0327211 4914	.0334677 5105	.474752 2527	.492788 2815	2.26229 1046
.898	.0013171 327	.0322297 4885	.0329572 5073	.472225 2535	.489973 2822	2.27275 1062
.899	.0012844 322	.0317412 4858	.0324499 5042	.469690 2545	.487151 2829	2.28337 1078
.900	.0012522 317	.0312554 4829	.0319457 5011	.467145 2553	.484322 2836	2.29416 1095
.901	.0012205 312	.0307725 4801	.0314446 4978	.464592 2564	.481486 2843	2.30511 1112
.902	.0011893 307	.0302924 4772	.0309467 4948	.462028 2572	.478643 2851	2.31623 1130
.903	.0011586 302	.0298152 4745	.0304519 4918	.459456 2585	.475792 2858	2.32753 1147
.904	.0011284 298	.0293409 4715	.0299603 4884	.456873 2592	.472934 2866	2.33900 1166
.905	.0010986 292	.0288694 4687	.0294719 4853	.454281 2605	.470068 2874	2.35066 1185
.906	.0010694 287	.0284007 4657	.0289866 4820	.451678 2612	.467194 2882	2.36251 1205
.907	.0010407 283	.0279350 4628	.0285046 4790	.449066 2624	.464312 2891	2.37456 1224
.908	.0010124 278	.0274721 4600	.0280256 4757	.446442 2634	.461421 2898	2.38680 1245
.909	.0009846 273	.0270121 4570	.0275499 4725	.443808 2645	.458522 2909	2.39925 1266
.910	.0009573 268	.0265551 4542	.0270774 4693	.441163 2656	.455613 2917	2.41191 1288
.911	.0009305 264	.0261009 4512	.0266081 4661	.438507 2667	.452696 2926	2.42479 1310
.912	.0009041 259	.0256497 4483	.0261420 4629	.435840 2678	.449770 2936	2.43789 1333
.913	.0008782 255	.0252014 4454	.0256791 4597	.433161 2691	.446834 2945	2.45122 1357
.914	.0008527 250	.0247560 4424	.0252194 4564	.430470 2703	.443889 2956	2.46479 1381
.915	.0008277 245	.0243136 4395	.0247630 4532	.427767 2715	.440933 2965	2.47860 1406
.916	.0008032 241	.0238741 4364	.0243098 4500	.425052 2727	.437968 2976	2.49266 1431
.917	.0007791 236	.0234377 4335	.0238598 4467	.422325 2740	.434992 2987	2.50697 1459
.918	.0007555 232	.0230042 4305	.0234131 4435	.419585 2754	.432005 2998	2.52156 1485
.919	.0007323 228	.0225737 4275	.0229696 4402	.416831 2766	.429007 3009	2.53641 1514
.920	.0007095 223	.0221462 4245	.0225294 4369	.414065 2781	.425998 3020	2.55155 1543
.921	.0006872 218	.0217217 4215	.0220925 4336	.411284 2784	.422978 3032	2.56698 1573
.922	.0006654 215	.0213002 4184	.0216589 4305	.408490 2808	.419946 3045	2.58271 1604
.923	.0006439 210	.0208818 4154	.0212286 4271	.405682 2828	.416901 3056	2.59875 1636
.924	.0006229 206	.0204664 4123	.0208015 4237	.402859 2838	.413845 3070	2.61511 1670
.925	.0006023 202	.0200541 4082	.0203778 4204	.400021 2853	.410775 3082	2.63181 1703
.926	.0005821 197	.0196449 4062	.0199574 4170	.397168 2868	.407693 3096	2.64884 1739
.927	.0005624 193	.0192387 4030	.0195404 4137	.394300 2884	.404597 3110	2.66623 1776
.928	.0005431 190	.0188357 4000	.0191267 4104	.391416 2901	.401487 3126	2.68399 1813
.929	.0005241 185	.0184357 3968	.0187163 4069	.388515 2917	.398364 3138	2.70212 1858
.930	.0005056 181	.0180389 3936	.0183094 4036	.385598 2934	.395225 3153	2.72065 1893
.931	.0004875 177	.0176453 3905	.0179058 4002	.382664 2951	.392072 3168	2.73958 1936
.932	.0004698 173	.0172548 3873	.0175056 3968	.379713 2969	.388904 3184	2.75894 1979
.933	.0004525 169	.0168675 3841	.0171088 3934	.376744 2988	.385720 3201	2.77873 2025
.934	.0004356 165	.0164834 3808	.0167154 3899	.373756 3006	.382519 3217	2.79898 2072
.935	.0004191 162	.0161025 3777	.0163255 3865	.370750 3025	.379302 3234	2.81970 2121
.936	.0004029 157	.0157248 3745	.0159390 3830	.367725 3045	.376068 3251	2.84091 2172
.937	.0003872 154	.0153503 3711	.0155560 3796	.364680 3066	.372817 3270	2.86263 2225
.938	.0003718 150	.0149792 3680	.0151764 3760	.361614 3086	.369547 3288	2.88488 2280
.939	.0003568 146	.0146112 3646	.0148004 3725	.358528 3107	.366259 3307	2.90768 2337
.940	.0003422	.0142466	.0144279	.355421	.362952	2.93105

NACA

TABLE II.– STEP, CORNER, AND CURVATURE SOLUTIONS

t	g(t)	h(t)	i(t)	j(t)	k(t)	l(t)	m(t)
.100	1.03564 5866	2.14267 8899	5.89216 6030	1.97491 4444	9.03573 8892	.541079 2161	4.46376 4478
.101	1.02978 5781	2.13368 8790	5.83186 5913	1.97047 4400	8.94681 8716	.538918 2139	4.41897 4391
.102	1.02397 5714	2.12478 8682	5.77273 5800	1.96607 4355	8.85963 8548	.536779 2116	4.37506 4306
.103	1.01823 5688	2.11596 8573	5.71473 5690	1.96172 4321	8.77415 8384	.534663 2085	4.33200 4223
.104	1.01254 5663	2.10723 8465	5.65783 5583	1.95741 4277	8.69031 8235	.532568 2075	4.28977 4143
.105	1.00691 5597	2.09858 8357	5.60200 5478	1.95314 4233	8.60808 8088	.530493 2052	4.24834 4066
.106	1.00134 5552	2.09001 8248	5.54721 5378	1.94891 4189	8.52739 7947	.528441 2033	4.20768 3989
.107	.995819 5467	2.08152 8140	5.49343 5280	1.94472 4145	8.44822 7770	.526408 2012	4.16779 3916
.108	.990352 5414	2.07312 8034	5.44063 5185	1.94057 4111	8.37052 7627	.524396 1993	4.12863 3845
.109	.984938 5364	2.06478 8825	5.38878 5091	1.93646 4067	8.29425 7488	.522403 1974	4.09018 3774
.110	.979574 5314	2.05653 8818	5.33787 5001	1.93239 4033	8.21937 7353	.520429 1955	4.05244 3707
.111	.974260 5283	2.04834 8811	5.28786 4813	1.92836 4000	8.14584 7222	.518474 1936	4.01537 3641
.112	.968997 5214	2.04023 8803	5.23873 4828	1.92436 3966	8.07362 7094	.516538 1918	3.97896 3577
.113	.963783 5186	2.03220 7797	5.19045 4744	1.92040 3932	8.00268 6968	.514620 1900	3.94319 3514
.114	.958617 5120	2.02423 7780	5.14301 4663	1.91648 3899	7.93300 6846	.512720 1882	3.90805 3453
.115	.953497 5078	2.01633 7783	5.09638 4583	1.91259 3866	7.86452 6729	.510838 1865	3.87352 3394
.116	.948424 5028	2.00850 7777	5.05055 4507	1.90873 3832	7.79723 6618	.508973 1847	3.83958 3337
.117	.943395 4983	2.00073 7769	5.00548 4431	1.90491 3799	7.73110 6502	.507126 1831	3.80621 3279
.118	.938412 4938	1.99304 7764	4.96117 4358	1.90112 3776	7.66608 6382	.505295 1815	3.77342 3225
.119	.933473 4886	1.98540 7757	4.91759 4287	1.89736 3748	7.60216 6285	.503480 1798	3.74117 3171
.120	.928577 4854	1.97783 7751	4.87472 4217	1.89363 3718	7.53931 6181	.501682 1782	3.70946 3120
.121	.923723 4811	1.97032 7744	4.83255 4148	1.88994 3686	7.47750 6078	.499900 1767	3.67826 3068
.122	.918912 4778	1.96288 7738	4.79106 4083	1.88628 3664	7.41671 5980	.498133 1751	3.64758 3018
.123	.914140 4730	1.95549 7733	4.75023 4018	1.88264 3630	7.35691 5884	.496382 1736	3.61740 2970
.124	.909410 4690	1.94816 7727	4.71005 3955	1.87904 3597	7.29807 5789	.494646 1721	3.58770 2923
.125	.904720 4650	1.94089 7721	4.67050 3884	1.87547 3555	7.24018 5697	.492925 1708	3.55847 2875
.126	.900070 4618	1.93368 7715	4.63156 3833	1.87192 3531	7.18321 5608	.491219 1692	3.52971 2831
.127	.895457 4574	1.92653 7710	4.59323 3774	1.86841 3498	7.12713 5519	.489527 1677	3.50140 2788
.128	.890883 4537	1.91943 7705	4.55549 3717	1.86492 3466	7.07194 5434	.487850 1664	3.47352 2744
.129	.886346 4500	1.91238 7699	4.51832 3661	1.86146 3443	7.01760 5349	.486186 1650	3.44608 2702
.130	.881846 4464	1.90539 7694	4.48171 3608	1.85803 3411	6.96411 5268	.484536 1636	3.41906 2661
.131	.877382 4428	1.89845 7688	4.44565 3553	1.85462 3388	6.91143 5188	.482900 1622	3.39245 2620
.132	.872954 4392	1.89157 7684	4.41012 3500	1.85124 3355	6.85955 5110	.481278 1610	3.36625 2582
.133	.868562 4358	1.88473 7678	4.37512 3449	1.84789 3333	6.80845 5033	.479668 1596	3.34043 2543
.134	.864204 4324	1.87795 7673	4.34063 3399	1.84456 3300	6.75812 4959	.478072 1584	3.31500 2506
.135	.859880 4290	1.87122 7669	4.30664 3350	1.84126 3278	6.70853 4885	.476488 1571	3.28994 2469
.136	.855590 4258	1.86453 7663	4.27314 3302	1.83798 3255	6.65968 4814	.474917 1558	3.26525 2433
.137	.851334 4224	1.85790 7659	4.24012 3255	1.83473 3223	6.61154 4744	.473359 1546	3.24092 2398
.138	.847110 4191	1.85131 7654	4.20757 3209	1.83150 3200	6.56410 4675	.471813 1534	3.21694 2363
.139	.842919 4160	1.84477 7648	4.17548 3165	1.82830 3179	6.51735 4609	.470279 1523	3.19331 2330
.140	.838759 4128	1.83828 7645	4.14383 3120	1.82511 3156	6.47126 4543	.468756 1510	3.17001 2297
.141	.834631 4097	1.83183 7641	4.11263 3078	1.82196 3134	6.42583 4478	.467246 1499	3.14704 2265
.142	.830534 4067	1.82542 7636	4.08185 3036	1.81882 3111	6.38105 4416	.465747 1487	3.12439 2234
.143	.826467 4037	1.81906 7631	4.05149 2994	1.81571 3088	6.33689 4355	.464260 1476	3.10205 2202
.144	.822430 4008	1.81275 7627	4.02155 2954	1.81262 3067	6.29334 4294	.462784 1465	3.08003 2172
.145	.818424 3978	1.80648 7623	3.99201 2914	1.80955 3035	6.25040 4235	.461319 1453	3.05831 2143
.146	.814446 3948	1.80025 7619	3.96287 2876	1.80650 3008	6.20805 4177	.459864 1443	3.03688 2113
.147	.810498 3920	1.79406 7615	3.93411 2838	1.80347 3000	6.16628 4121	.458421 1433	3.01575 2085
.148	.806578 3892	1.78791 7610	3.90573 2800	1.80047 2999	6.12507 4066	.456988 1421	2.99490 2057
.149	.802686 3864	1.78181 7606	3.87773 2765	1.79748 2996	6.08441 4010	.455567 1412	2.97433 2030
.150	.798822 3836	1.77575 7603	3.85008 2728	1.79452 2995	6.04431 3958	.454155 1401	2.95403 2003
.151	.794986 3809	1.76972 7598	3.82280 2693	1.79157 2982	6.00473 3906	.452754 1392	2.93400 1977
.152	.791177 3783	1.76374 7595	3.79587 2659	1.78865 2980	5.96567 3854	.451362 1381	2.91423 1951
.153	.787394 3756	1.75779 7591	3.76928 2626	1.78575 2989	5.92713 3804	.449981 1371	2.89472 1926
.154	.783638 3730	1.75188 7587	3.74302 2592	1.78286 2986	5.88909 3755	.448610 1362	2.87546 1901
.155	.779908 3705	1.74601 7583	3.71710 2560	1.78000 2985	5.85154 3708	.447248 1352	2.85645 1877
.156	.776203 3678	1.74018 7580	3.69150 2529	1.77715 2983	5.81448 3659	.445896 1345	2.83768 1853
.157	.772525 3654	1.73438 7576	3.66621 2497	1.77432 2981	5.77789 3613	.444553 1333	2.81915 1830
.158	.768871 3629	1.72862 7572	3.64124 2466	1.77151 2979	5.74176 3567	.443220 1324	2.80085 1807
.159	.765242 3604	1.72290 7569	3.61658 2437	1.76872 2978	5.70609 3522	.441896 1314	2.78278 1784
.160	.761638	1.71721	3.59221	1.76594	5.67087	.440582	2.76494

NACA

TABLE II.- CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.160	.761638	3580	1.71721	565	3.59221	2407	1.76594	275	5.67087	3479	.440582	1366	2.76494	1782
.161	.758058	3557	1.71156	562	3.56814	2378	1.76319	274	5.63608	3435	.439276	1287	2.74732	1741
.162	.754501	3532	1.70594	559	3.54436	2350	1.76045	272	5.60173	3393	.437979	1288	2.72991	1719
.163	.750969	3510	1.70035	555	3.52086	2322	1.75773	271	5.56780	3351	.436691	1280	2.71272	1688
.164	.747459	3486	1.69480	552	3.49764	2285	1.75502	268	5.53429	3311	.435411	1270	2.69574	1678
.165	.743973	3463	1.68928	548	3.47469	2267	1.75234	267	5.50118	3271	.434141	1263	2.67896	1658
.166	.740510	3441	1.68380	545	3.45202	2242	1.74967	266	5.46847	3231	.432878	1253	2.66238	1638
.167	.737069	3418	1.67835	542	3.42960	2215	1.74701	264	5.43616	3193	.431625	1246	2.64600	1618
.168	.733651	3397	1.67293	539	3.40745	2190	1.74437	262	5.40423	3155	.430379	1238	2.62981	1600
.169	.730254	3375	1.66754	536	3.38555	2165	1.74175	260	5.37268	3118	.429141	1229	2.61381	1580
.170	.726879	3353	1.66218	532	3.36390	2141	1.73915	259	5.34150	3081	.427912	1221	2.59801	1563
.171	.723526	3331	1.65686	530	3.34249	2116	1.73656	258	5.31069	3045	.426691	1214	2.58238	1544
.172	.720195	3311	1.65156	526	3.32133	2093	1.73398	256	5.28024	3010	.425477	1205	2.56694	1527
.173	.716884	3290	1.64630	524	3.30040	2069	1.73142	254	5.25014	2975	.424272	1198	2.55167	1508
.174	.713594	3270	1.64106	521	3.27971	2046	1.72888	253	5.22039	2941	.423074	1190	2.53658	1492
.175	.710324	3249	1.63585	517	3.25925	2024	1.72635	252	5.19098	2907	.421884	1183	2.52166	1475
.176	.707075	3229	1.63068	515	3.23901	2002	1.72383	249	5.16191	2875	.420701	1175	2.50691	1458
.177	.703846	3208	1.62553	512	3.21899	1980	1.72134	249	5.13316	2842	.419526	1168	2.49233	1443
.178	.700637	3188	1.62041	509	3.19919	1958	1.71885	247	5.10474	2810	.418358	1160	2.47790	1426
.179	.697448	3170	1.61532	506	3.17961	1938	1.71638	246	5.07664	2779	.417198	1154	2.46364	1410
.180	.694278	3151	1.61026	504	3.16023	1917	1.71392	244	5.04885	2748	.416044	1146	2.44954	1395
.181	.691127	3132	1.60522	500	3.14106	1896	1.71148	243	5.02137	2717	.414898	1138	2.43559	1380
.182	.687995	3112	1.60022	499	3.12210	1876	1.70905	241	4.99420	2688	.413759	1132	2.42179	1364
.183	.684883	3094	1.59523	495	3.10334	1857	1.70664	240	4.96732	2659	.412627	1125	2.40815	1350
.184	.681789	3076	1.59028	493	3.08477	1837	1.70424	238	4.94073	2629	.411502	1118	2.39465	1335
.185	.678713	3057	1.58535	490	3.06640	1818	1.70185	238	4.91444	2602	.410384	1112	2.38130	1321
.186	.675656	3039	1.58045	487	3.04821	1799	1.69947	236	4.88842	2573	.409272	1105	2.36809	1307
.187	.672617	3022	1.57558	485	3.03022	1781	1.69711	235	4.86269	2546	.408167	1098	2.35502	1293
.188	.669595	3003	1.57073	483	3.01241	1763	1.69476	233	4.83723	2519	.407069	1092	2.34209	1280
.189	.666592	2985	1.56590	480	2.99478	1745	1.69243	233	4.81204	2492	.405977	1085	2.32929	1266
.190	.663606	2968	1.56110	477	2.97733	1727	1.69010	231	4.78712	2466	.404892	1079	2.31663	1253
.191	.660637	2951	1.55633	475	2.96006	1710	1.68779	229	4.76246	2440	.403813	1072	2.30410	1240
.192	.657686	2936	1.55158	473	2.94296	1693	1.68550	228	4.73806	2415	.402741	1066	2.29170	1227
.193	.654751	2918	1.54685	470	2.92603	1676	1.68321	227	4.71391	2390	.401675	1060	2.27943	1214
.194	.651833	2900	1.54215	468	2.90927	1659	1.68094	226	4.69001	2365	.400615	1054	2.26729	1203
.195	.648933	2885	1.53747	465	2.89268	1643	1.67868	225	4.66636	2341	.399561	1048	2.25526	1189
.196	.646048	2868	1.53282	464	2.87625	1628	1.67643	224	4.64295	2317	.398513	1041	2.24337	1178
.197	.643180	2851	1.52818	460	2.85997	1611	1.67419	223	4.61978	2294	.397472	1036	2.23159	1166
.198	.640329	2837	1.52358	459	2.84386	1596	1.67196	221	4.59684	2270	.396436	1030	2.21993	1155
.199	.637492	2820	1.51899	456	2.82790	1580	1.66975	221	4.57414	2248	.395406	1024	2.20838	1143
.200	.634672	2804	1.51443	454	2.81210	1565	1.66754	219	4.55166	2225	.394382	1018	2.19695	1131
.201	.631868	2789	1.50989	452	2.79645	1551	1.66535	218	4.52941	2203	.393364	1012	2.18564	1121
.202	.629079	2773	1.50537	450	2.78094	1536	1.66317	216	4.50738	2182	.392352	1007	2.17443	1109
.203	.626306	2758	1.50087	447	2.76559	1522	1.66101	216	4.48556	2158	.391345	1001	2.16334	1098
.204	.623548	2743	1.49640	446	2.75037	1507	1.65885	215	4.46397	2139	.390344	995	2.15235	1088
.205	.620805	2728	1.49194	443	2.73530	1493	1.65670	214	4.44258	2118	.389349	990	2.14147	1077
.206	.618077	2716	1.48751	441	2.72037	1479	1.65456	212	4.42140	2097	.388359	985	2.13070	1067
.207	.615364	2698	1.48310	439	2.70558	1465	1.65244	212	4.40043	2077	.387374	978	2.12003	1057
.208	.612666	2683	1.47871	437	2.69093	1452	1.65032	210	4.37966	2057	.386395	974	2.10946	1047
.209	.609983	2670	1.47434	435	2.67641	1438	1.64822	208	4.35909	2038	.385421	968	2.09899	1037
.210	.607313	2655	1.46999	432	2.66202	1426	1.64613	209	4.33871	2018	.384453	963	2.08862	1027
.211	.604658	2640	1.46567	431	2.64776	1413	1.64404	207	4.31853	1998	.383490	958	2.07835	1017
.212	.602018	2627	1.46136	429	2.63363	1400	1.64197	206	4.29855	1980	.382532	953	2.06818	1008
.213	.599391	2612	1.45707	427	2.61963	1388	1.63991	206	4.27875	1962	.381579	948	2.05810	999
.214	.596779	2598	1.45280	425	2.60575	1375	1.63785	204	4.25913	1943	.380631	942	2.04811	988
.215	.594180	2586	1.44855	423	2.59200	1363	1.63581	204	4.23970	1923	.379689	938	2.03822	980
.216	.591594	2571	1.44432	421	2.57837	1351	1.63377	202	4.22045	1907	.378751	933	2.02842	972
.217	.589023	2558	1.44011	419	2.56486	1340	1.63175	201	4.20138	1880	.377818	927	2.01870	962
.218	.586465	2545	1.43592	418	2.55146	1327	1.62974	200	4.18248	1872	.376891	923	2.00908	954
.219	.583920	2532	1.43174	415	2.53819	1316	1.62774	200	4.16376	1855	.375968	918	1.99954	945
.220	.581388		1.42759		2.52503		1.62574		4.14521		.375050		1.99009	

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TABLE II.- CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.220	.581388	2318	1.42759	414	2.52503	1305	1.62574	198	4.14521	1838	.375050	914	1.99009	936
.221	.578870	2306	1.42345	411	2.51198	1293	1.62376	198	4.12683	1822	.374136	908	1.98073	928
.222	.576364	2292	1.41934	410	2.49905	1282	1.62178	197	4.10861	1805	.373228	904	1.97145	920
.223	.573872	2280	1.41524	409	2.48623	1272	1.61981	196	4.09056	1789	.372324	899	1.96225	912
.224	.571392	2268	1.41115	406	2.47351	1260	1.61785	194	4.07267	1773	.371425	894	1.95313	903
.225	.568924	2254	1.40709	405	2.46091	1250	1.61591	194	4.05494	1758	.370531	890	1.94410	895
.226	.566470	2243	1.40304	402	2.44841	1240	1.61397	193	4.03736	1741	.369641	885	1.93514	887
.227	.564027	2229	1.39902	402	2.43601	1229	1.61204	193	4.01995	1727	.368756	881	1.92627	880
.228	.561598	2218	1.39500	398	2.42372	1218	1.61011	191	4.00268	1711	.367875	877	1.91747	873
.229	.559180	2205	1.39101	398	2.41153	1209	1.60820	190	3.98557	1696	.366998	872	1.90874	864
.230	.556775	2284	1.38703	396	2.39944	1199	1.60630	190	3.96861	1682	.366126	867	1.90010	858
.231	.554381	2681	1.38307	394	2.38745	1188	1.60440	189	3.95179	1667	.365259	863	1.89152	850
.232	.552000	2370	1.37913	393	2.37556	1179	1.60251	188	3.93512	1652	.364396	859	1.88302	843
.233	.549630	2358	1.37520	391	2.36377	1170	1.60063	187	3.91860	1639	.363537	855	1.87459	835
.234	.547272	2346	1.37129	389	2.35207	1160	1.59876	186	3.90221	1624	.362682	850	1.86624	829
.235	.544926	2335	1.36740	388	2.34047	1151	1.59690	185	3.88597	1611	.361832	846	1.85795	821
.236	.542591	2323	1.36352	388	2.32896	1142	1.59505	185	3.86986	1596	.360986	842	1.84974	815
.237	.540268	2312	1.35966	385	2.31754	1133	1.59320	183	3.85390	1584	.360144	838	1.84159	807
.238	.537956	2300	1.35581	383	2.30621	1123	1.59137	183	3.83806	1570	.359306	834	1.83352	801
.239	.535656	2290	1.35198	381	2.29498	1115	1.58954	183	3.82236	1557	.358472	830	1.82551	795
.240	.533366	2278	1.34817	380	2.28383	1106	1.58771	181	3.80679	1544	.357642	826	1.81756	788
.241	.531088	2268	1.34437	379	2.27277	1098	1.58590	181	3.79135	1531	.356816	821	1.80968	781
.242	.528820	2256	1.34058	378	2.26179	1088	1.58409	179	3.77604	1518	.355995	818	1.80187	775
.243	.526564	2245	1.33682	376	2.25091	1081	1.58230	179	3.76086	1506	.355177	814	1.79412	769
.244	.524319	2235	1.33306	374	2.24010	1072	1.58051	179	3.74580	1494	.354363	810	1.78643	762
.245	.522084	2224	1.32932	372	2.22938	1063	1.57872	177	3.73086	1481	.353553	806	1.77881	756
.246	.519860	2214	1.32560	371	2.21875	1056	1.57695	177	3.71605	1468	.352747	802	1.77125	750
.247	.517646	2202	1.32189	369	2.20819	1047	1.57518	176	3.70136	1456	.351945	798	1.76375	744
.248	.515444	2193	1.31820	368	2.19772	1040	1.57342	175	3.68678	1445	.351147	795	1.75631	738
.249	.513251	2182	1.31452	367	2.18732	1032	1.57167	175	3.67233	1434	.350352	791	1.74893	733
.250	.511069	2172	1.31085	365	2.17700	1024	1.56992	173	3.65799	1423	.349561	787	1.74160	728
.251	.508897	2162	1.30720	365	2.16676	1016	1.56819	174	3.64376	1411	.348774	784	1.73434	721
.252	.506735	2151	1.30357	363	2.15660	1008	1.56645	172	3.62965	1400	.347990	778	1.72713	715
.253	.504584	2142	1.29994	360	2.14651	1001	1.56473	172	3.61565	1388	.347211	777	1.71998	709
.254	.502442	2131	1.29634	360	2.13650	993	1.56301	170	3.60176	1378	.346434	772	1.71289	704
.255	.500311	2122	1.29274	358	2.12657	987	1.56131	171	3.58798	1367	.345662	769	1.70585	699
.256	.498189	2112	1.28916	357	2.11670	979	1.55960	169	3.57431	1356	.344893	766	1.69886	693
.257	.496077	2102	1.28559	355	2.10691	972	1.55791	169	3.56075	1346	.344127	762	1.69193	687
.258	.493975	2092	1.28204	354	2.09719	965	1.55622	168	3.54729	1336	.343365	758	1.68506	683
.259	.491883	2083	1.27850	353	2.08754	958	1.55454	168	3.53393	1325	.342607	755	1.67823	677
.260	.489800	2073	1.27497	351	2.07796	951	1.55286	167	3.52068	1314	.341852	752	1.67146	672
.261	.487727	2064	1.27146	351	2.06845	944	1.55119	166	3.50754	1305	.341100	748	1.66474	667
.262	.485663	2054	1.26795	348	2.05901	938	1.54953	165	3.49449	1295	.340352	745	1.65807	662
.263	.483609	2045	1.26447	348	2.04963	931	1.54788	165	3.48154	1285	.339607	742	1.65145	656
.264	.481564	2036	1.26099	346	2.04032	924	1.54623	164	3.46869	1275	.338865	738	1.64489	652
.265	.479528	2026	1.25753	345	2.03108	917	1.54459	164	3.45594	1266	.338127	735	1.63837	647
.266	.477502	2018	1.25408	344	2.02191	912	1.54295	163	3.44328	1256	.337392	731	1.63190	643
.267	.475484	2008	1.25064	342	2.01279	904	1.54132	162	3.43072	1246	.336661	728	1.62547	637
.268	.473476	1999	1.24722	341	2.00375	899	1.53970	161	3.41826	1237	.335932	725	1.61910	633
.269	.471477	1990	1.24381	340	1.99476	892	1.53809	161	3.40589	1228	.335207	721	1.61277	628
.270	.469487	1982	1.24041	339	1.98584	886	1.53648	161	3.39361	1219	.334486	719	1.60649	623
.271	.467505	1972	1.23702	338	1.97698	880	1.53487	159	3.38142	1210	.333767	716	1.60026	619
.272	.465533	1964	1.23364	338	1.96818	874	1.53328	159	3.36932	1201	.333051	712	1.59407	614
.273	.463569	1955	1.23028	335	1.95944	868	1.53169	159	3.35731	1192	.332339	709	1.58793	610
.274	.461614	1947	1.22693	334	1.95076	862	1.53010	158	3.34539	1184	.331630	707	1.58183	606
.275	.459667	1938	1.22359	333	1.94214	856	1.52852	157	3.33355	1175	.330923	703	1.57577	601
.276	.457729	1929	1.22026	331	1.93358	851	1.52695	157	3.32180	1166	.330220	700	1.56976	597
.277	.455800	1921	1.21695	331	1.92507	844	1.52538	156	3.31014	1158	.329520	697	1.56379	592
.278	.453879	1912	1.21364	329	1.91663	839	1.52382	155	3.29856	1149	.328823	694	1.55787	588
.279	.451967	1904	1.21035	328	1.90824	834	1.52227	155	3.28707	1141	.328129	691	1.55199	584
.280	.450063		1.20707		1.89990		1.52072		3.27566		.327438		1.54615	

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TABLE II.— CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.280	.450063	1806	1.20707	327	1.89990	827	1.52072	155	3.27566	1133	.327438	888	1.54615	580
.281	.448167	1888	1.20380	326	1.89163	823	1.51917	158	3.26433	1125	.326750	885	1.54035	576
.282	.446279	1879	1.20054	325	1.88340	817	1.51764	154	3.25308	1117	.326065	883	1.53459	572
.283	.444400	1871	1.19729	324	1.87523	811	1.51610	152	3.24191	1108	.325382	878	1.52887	568
.284	.442529	1863	1.19405	322	1.86712	807	1.51458	152	3.23082	1102	.324703	877	1.52319	564
.285	.440666	1855	1.19083	321	1.85905	801	1.51306	152	3.21980	1093	.324026	873	1.51755	559
.286	.438811	1847	1.18762	321	1.85104	795	1.51154	151	3.20887	1088	.323353	871	1.51196	556
.287	.436964	1839	1.18441	318	1.84309	791	1.51003	150	3.19801	1078	.322682	868	1.50640	553
.288	.435125	1832	1.18122	318	1.83518	785	1.50853	150	3.18723	1071	.322014	865	1.50087	548
.289	.433293	1823	1.17804	317	1.82733	781	1.50703	148	3.17652	1068	.321349	863	1.49539	545
.290	.431470	1816	1.17487	316	1.81952	775	1.50554	148	3.16589	1056	.320686	860	1.48994	540
.291	.429654	1808	1.17171	315	1.81177	771	1.50405	148	3.15533	1048	.320026	858	1.48454	538
.292	.427846	1800	1.16856	314	1.80406	766	1.50257	148	3.14484	1041	.319370	855	1.47916	533
.293	.426046	1792	1.16542	313	1.79640	760	1.50109	147	3.13443	1035	.318715	851	1.47383	530
.294	.424254	1785	1.16229	312	1.78880	756	1.49962	146	3.12408	1027	.318064	848	1.46853	526
.295	.422469	1778	1.15917	311	1.78124	752	1.49816	146	3.11381	1020	.317415	846	1.46327	523
.296	.420691	1770	1.15606	310	1.77372	746	1.49670	146	3.10361	1014	.316769	844	1.45804	518
.297	.418921	1762	1.15296	308	1.76626	742	1.49524	145	3.09347	1006	.316125	841	1.45285	516
.298	.417159	1756	1.14987	308	1.75884	737	1.49379	144	3.08341	1000	.315484	838	1.44769	512
.299	.415403	1747	1.14679	307	1.75147	733	1.49235	144	3.07341	993	.314846	836	1.44257	508
.300	.413656	1741	1.14372	305	1.74414	728	1.49091	144	3.06348	987	.314210	833	1.43748	506
.301	.411915	1733	1.14067	305	1.73686	724	1.48947	143	3.05361	979	.313577	831	1.43242	502
.302	.410182	1726	1.13762	304	1.72962	720	1.48804	142	3.04382	974	.312946	828	1.42740	499
.303	.408456	1719	1.13458	303	1.72242	714	1.48662	142	3.03408	967	.312318	828	1.42241	496
.304	.406737	1712	1.13155	302	1.71528	711	1.48520	142	3.02441	960	.311693	825	1.41745	492
.305	.405025	1704	1.12853	301	1.70817	706	1.48378	141	3.01481	954	.311070	823	1.41253	489
.306	.403321	1698	1.12552	300	1.70111	702	1.48237	140	3.00527	948	.310449	818	1.40764	486
.307	.401623	1690	1.12252	299	1.69409	698	1.48097	140	2.99579	942	.309831	818	1.40278	483
.308	.399933	1684	1.11953	298	1.68711	694	1.47957	140	2.98637	936	.309215	816	1.39795	480
.309	.398249	1677	1.11655	298	1.68017	688	1.47817	139	2.97701	929	.308602	810	1.39315	477
.310	.396572	1670	1.11357	296	1.67328	686	1.47678	139	2.96772	924	.307992	809	1.38838	474
.311	.394902	1663	1.11061	295	1.66642	681	1.47539	138	2.95848	917	.307383	808	1.38364	470
.312	.393239	1656	1.10766	295	1.65961	677	1.47401	137	2.94931	912	.306777	803	1.37894	468
.313	.391583	1649	1.10471	293	1.65284	674	1.47264	138	2.94019	906	.306174	802	1.37426	464
.314	.389934	1643	1.10178	293	1.64610	668	1.47126	136	2.93113	900	.305572	798	1.36962	462
.315	.388291	1637	1.09885	292	1.63941	666	1.46990	137	2.92213	894	.304974	797	1.36500	459
.316	.386654	1628	1.09593	291	1.63275	661	1.46853	135	2.91319	888	.304377	794	1.36041	456
.317	.385025	1626	1.09302	290	1.62614	658	1.46718	136	2.90430	883	.303783	792	1.35585	453
.318	.383402	1616	1.09012	289	1.61956	654	1.46582	135	2.89547	877	.303191	790	1.35132	450
.319	.381786	1610	1.08723	288	1.61302	650	1.46447	134	2.88670	872	.302601	887	1.34682	448
.320	.380176	1603	1.08435	287	1.60652	647	1.46313	134	2.87798	867	.302014	585	1.34234	444
.321	.378573	1597	1.08148	287	1.60005	642	1.46179	134	2.86931	861	.301429	583	1.33790	442
.322	.376976	1590	1.07861	286	1.59363	640	1.46045	133	2.86070	855	.300846	581	1.33348	439
.323	.375386	1584	1.07576	285	1.58723	635	1.45912	133	2.85215	851	.300265	578	1.32909	437
.324	.373802	1578	1.07291	284	1.58088	632	1.45779	132	2.84364	845	.299687	576	1.32472	433
.325	.372224	1571	1.07007	283	1.57456	628	1.45647	132	2.83519	840	.299111	574	1.32039	432
.326	.370653	1565	1.06724	283	1.56828	625	1.45515	131	2.82679	834	.298537	572	1.31607	428
.327	.369088	1559	1.06441	281	1.56203	622	1.45384	131	2.81845	830	.297965	570	1.31179	426
.328	.367529	1553	1.06160	281	1.55581	618	1.45253	131	2.81015	824	.297395	568	1.30753	423
.329	.365976	1547	1.05879	278	1.54963	614	1.45122	130	2.80191	820	.296827	565	1.30330	421
.330	.364429	1540	1.05600	279	1.54349	611	1.44992	129	2.79371	814	.296262	563	1.29909	418
.331	.362889	1534	1.05321	278	1.53738	607	1.44863	130	2.78557	810	.295699	561	1.29491	416
.332	.361355	1528	1.05043	278	1.53131	605	1.44733	128	2.77747	804	.295138	560	1.29075	413
.333	.359826	1522	1.04765	276	1.52526	601	1.44604	128	2.76943	800	.294578	557	1.28662	411
.334	.358304	1516	1.04489	276	1.51925	597	1.44476	128	2.76143	795	.294021	555	1.28251	408
.335	.356788	1511	1.04213	275	1.51328	595	1.44348	128	2.75348	790	.293466	552	1.27843	406
.336	.355277	1504	1.03938	274	1.50733	591	1.44220	127	2.74558	788	.292914	551	1.27437	404
.337	.353773	1498	1.03664	274	1.50142	588	1.44093	127	2.73772	781	.292363	548	1.27033	401
.338	.352274	1492	1.03390	272	1.49554	585	1.43966	126	2.72991	776	.291814	547	1.26632	398
.339	.350782	1487	1.03118	272	1.48969	582	1.43840	126	2.72215	771	.291267	545	1.26234	397
.340	.349295		1.02846		1.48387		1.43714		2.71444		.290722		1.25837	

NACA

TABLE II.– CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.340	.349295	1481	1.02846	271	1.48387	578	1.43714	126	2.71444	768	.290722	542	1.25837	584
.341	.347814	1475	1.02575	270	1.47809	576	1.43588	125	2.70676	762	.290180	541	1.25443	582
.342	.346339	1468	1.02305	270	1.47233	572	1.43463	125	2.69914	758	.289639	539	1.25051	589
.343	.344870	1464	1.02035	269	1.46661	570	1.43338	124	2.69156	754	.289100	537	1.24662	587
.344	.343406	1458	1.01766	268	1.46091	566	1.43214	125	2.68402	749	.288563	535	1.24275	585
.345	.341948	1456	1.01498	267	1.45525	563	1.43089	126	2.67653	745	.288028	533	1.23890	583
.346	.340495	1446	1.01231	267	1.44962	561	1.42966	124	2.66908	740	.287495	531	1.23507	581
.347	.339049	1442	1.00964	265	1.44401	557	1.42842	122	2.66168	736	.286964	529	1.23126	578
.348	.337607	1435	1.00699	265	1.43844	555	1.42720	123	2.65432	732	.286435	527	1.22748	576
.349	.336172	1430	1.00434	265	1.43289	552	1.42597	122	2.64700	728	.285908	526	1.22372	574
.350	.334742	1425	1.00169	263	1.42737	549	1.42475	122	2.63972	724	.285382	525	1.21998	572
.351	.333317	1418	.999056	2628	1.42188	546	1.42353	121	2.63248	719	.284859	522	1.21626	570
.352	.331898	1414	.996427	2621	1.41642	543	1.42232	122	2.62529	715	.284337	519	1.21256	568
.353	.330484	1408	.993806	2615	1.41099	540	1.42110	120	2.61814	712	.283818	518	1.20888	566
.354	.329076	1403	.991191	2607	1.40559	538	1.41990	121	2.61102	707	.283300	516	1.20522	563
.355	.327673	1398	.988584	2601	1.40021	535	1.41869	120	2.60395	703	.282784	514	1.20159	562
.356	.326275	1392	.985983	2593	1.39486	532	1.41749	118	2.59692	700	.282270	513	1.19797	559
.357	.324883	1387	.983390	2587	1.38954	530	1.41630	120	2.58992	695	.281757	511	1.19438	558
.358	.323496	1381	.980803	2579	1.38424	527	1.41510	118	2.58297	691	.281246	508	1.19080	556
.359	.322115	1377	.978224	2573	1.37897	524	1.41392	119	2.57606	688	.280738	507	1.18724	553
.360	.320738	1371	.975651	2566	1.37373	521	1.41273	118	2.56918	684	.280231	506	1.18371	552
.361	.319367	1366	.973085	2558	1.36852	518	1.41155	118	2.56234	679	.279725	503	1.18019	550
.362	.318001	1361	.970527	2552	1.36333	517	1.41037	117	2.55555	677	.279222	502	1.17669	547
.363	.316640	1355	.967974	2545	1.35816	516	1.40920	118	2.54878	672	.278720	500	1.17322	546
.364	.315285	1351	.965429	2539	1.35303	512	1.40802	116	2.54206	669	.278220	498	1.16976	544
.365	.313934	1345	.962890	2532	1.34791	508	1.40686	117	2.53537	665	.277722	496	1.16632	542
.366	.312589	1340	.960358	2525	1.34283	507	1.40569	116	2.52872	661	.277226	495	1.16290	541
.367	.311249	1335	.957833	2519	1.33776	503	1.40453	116	2.52211	658	.276731	493	1.15949	538
.368	.309914	1331	.955314	2512	1.33273	502	1.40337	115	2.51553	654	.276238	492	1.15611	537
.369	.308583	1325	.952802	2506	1.32771	498	1.40222	115	2.50899	651	.275746	489	1.15274	534
.370	.307258	1320	.950296	2499	1.32273	497	1.40107	115	2.50248	647	.275257	488	1.14940	533
.371	.305938	1315	.947797	2493	1.31776	494	1.39992	114	2.49601	643	.274769	487	1.14607	531
.372	.304623	1311	.945304	2486	1.31282	491	1.39878	115	2.48958	640	.274282	484	1.14276	530
.373	.303312	1305	.942818	2480	1.30791	490	1.39763	113	2.48318	637	.273798	484	1.13946	527
.374	.302007	1301	.940338	2474	1.30301	486	1.39650	114	2.47681	633	.273314	481	1.13619	526
.375	.300706	1296	.937864	2467	1.29815	485	1.39536	113	2.47048	630	.272833	480	1.13293	525
.376	.299410	1290	.935397	2462	1.29330	482	1.39423	113	2.46418	626	.272353	478	1.12968	522
.377	.298120	1287	.932935	2454	1.28848	480	1.39310	112	2.45792	624	.271875	476	1.12646	521
.378	.296833	1281	.930481	2448	1.28368	478	1.39198	112	2.45168	619	.271399	475	1.12325	519
.379	.295552	1278	.928032	2442	1.27890	475	1.39086	112	2.44549	617	.270924	474	1.12006	517
.380	.294276	1272	.925590	2436	1.27415	473	1.38974	112	2.43932	613	.270450	471	1.11689	516
.381	.293004	1267	.923154	2431	1.26942	471	1.38862	111	2.43319	610	.269979	470	1.11373	514
.382	.291737	1263	.920723	2424	1.26471	469	1.38751	111	2.42709	607	.269509	469	1.11059	512
.383	.290474	1257	.918299	2418	1.26002	467	1.38640	110	2.42102	604	.269040	467	1.10747	511
.384	.289217	1253	.915881	2412	1.25535	464	1.38530	111	2.41498	600	.268573	465	1.10436	509
.385	.287964	1248	.913469	2408	1.25071	462	1.38419	110	2.40898	597	.268108	464	1.10127	508
.386	.286715	1243	.911063	2400	1.24609	460	1.38309	109	2.40301	595	.267644	463	1.09819	506
.387	.285472	1240	.908663	2394	1.24149	458	1.38200	110	2.39706	591	.267181	461	1.09513	504
.388	.284232	1234	.906269	2388	1.23691	456	1.38090	109	2.39115	588	.266720	459	1.09209	503
.389	.282998	1230	.903881	2382	1.23235	454	1.37981	109	2.38527	585	.266261	458	1.08906	501
.390	.281768	1226	.901499	2377	1.22781	451	1.37872	108	2.37942	582	.265803	456	1.08605	500
.391	.280542	1221	.899122	2371	1.22330	450	1.37764	108	2.37360	578	.265347	455	1.08305	498
.392	.279321	1217	.896751	2365	1.21880	448	1.37656	108	2.36781	576	.264892	453	1.08007	497
.393	.278104	1212	.894386	2359	1.21432	445	1.37548	108	2.36205	573	.264439	452	1.07710	495
.394	.276892	1207	.892027	2353	1.20987	444	1.37440	107	2.35632	570	.263987	450	1.07415	494
.395	.275685	1203	.889674	2348	1.20543	441	1.37333	107	2.35062	568	.263537	449	1.07121	492
.396	.274482	1199	.887326	2342	1.20102	440	1.37226	107	2.34494	564	.263088	448	1.06829	491
.397	.273283	1195	.884984	2337	1.19662	437	1.37119	106	2.33930	562	.262640	446	1.06538	489
.398	.272088	1190	.882647	2331	1.19225	436	1.37013	106	2.33368	558	.262194	444	1.06249	488
.399	.270898	1188	.880316	2325	1.18789	433	1.36907	106	2.32810	556	.261750	443	1.05961	486
.400	.269712		.877991		1.18356		1.36801		2.32254		.261307		1.05675	

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TABLE II.– CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.400	.269712	1181	.877991	2318	1.18356	432	1.36801	105	2.32254	559	.261307	442	1.05675	285
.401	.268531	1177	.875672	2315	1.17924	430	1.36696	106	2.31701	551	.260865	440	1.05390	284
.402	.267354	1173	.873357	2309	1.17494	428	1.36590	105	2.31150	547	.260425	439	1.05106	282
.403	.266181	1168	.871048	2303	1.17066	426	1.36485	104	2.30603	545	.259986	437	1.04824	281
.404	.265013	1165	.868745	2298	1.16640	424	1.36381	105	2.30058	542	.259549	436	1.04543	279
.405	.263848	1160	.866447	2292	1.16216	422	1.36276	104	2.29516	540	.259113	435	1.04264	278
.406	.262688	1156	.864155	2287	1.15794	421	1.36172	104	2.28976	536	.258678	433	1.03986	277
.407	.261532	1151	.861868	2282	1.15373	418	1.36068	103	2.28440	534	.258245	432	1.03709	275
.408	.260381	1148	.859586	2276	1.14955	417	1.35965	104	2.27906	532	.257813	430	1.03434	274
.409	.259233	1145	.857310	2272	1.14538	415	1.35861	103	2.27374	529	.257383	428	1.03160	273
.410	.258090	1139	.855038	2265	1.14123	413	1.35758	102	2.26845	526	.256954	428	1.02887	271
.411	.256951	1135	.852773	2261	1.13710	412	1.35656	103	2.26319	524	.256526	427	1.02616	270
.412	.255816	1131	.850512	2255	1.13298	410	1.35553	102	2.25795	521	.256099	426	1.02346	268
.413	.254685	1127	.848257	2250	1.12888	408	1.35451	102	2.25274	519	.255674	425	1.02078	268
.414	.253558	1123	.846007	2245	1.12480	406	1.35349	102	2.24755	516	.255251	425	1.01810	266
.415	.252435	1118	.843762	2240	1.12074	404	1.35247	101	2.24239	513	.254828	421	1.01544	265
.416	.251317	1115	.841522	2235	1.11670	403	1.35146	101	2.23726	512	.254407	420	1.01279	263
.417	.250202	1111	.839287	2229	1.11267	401	1.35045	101	2.23214	508	.253987	418	1.01016	262
.418	.249091	1106	.837058	2225	1.10866	399	1.34944	101	2.22706	506	.253569	417	1.00754	261
.419	.247985	1103	.834833	2219	1.10467	398	1.34843	100	2.22200	504	.253152	416	1.00493	260
.420	.246882	1099	.832614	2215	1.10069	396	1.34743	100	2.21696	502	.252736	415	1.00233	259
.421	.245783	1095	.830399	2209	1.09673	394	1.34643	100	2.21194	498	.252321	413	.999745	2573
.422	.244688	1090	.828190	2205	1.09279	393	1.34543	100	2.20696	497	.251908	412	.997172	2560
.423	.243598	1087	.825985	2199	1.08886	391	1.34443	99	2.20199	494	.251496	410	.994612	2548
.424	.242511	1083	.823786	2195	1.08495	389	1.34344	99	2.19705	492	.251086	410	.992063	2537
.425	.241428	1079	.821591	2190	1.08106	388	1.34245	98	2.19213	490	.250676	408	.989526	2524
.426	.240349	1076	.819401	2185	1.07718	386	1.34146	98	2.18723	487	.250268	407	.987002	2513
.427	.239273	1071	.817216	2179	1.07332	385	1.34048	99	2.18236	485	.249861	406	.984489	2501
.428	.238202	1068	.815037	2175	1.06947	383	1.33949	98	2.17751	483	.249455	404	.981988	2489
.429	.237134	1063	.812862	2171	1.06564	381	1.33851	98	2.17268	480	.249051	403	.979499	2478
.430	.236071	1061	.810691	2166	1.06183	380	1.33753	97	2.16788	478	.248648	402	.977021	2466
.431	.235010	1058	.808525	2160	1.05803	378	1.33656	98	2.16310	478	.248246	401	.974555	2455
.432	.233955	1053	.806365	2156	1.05424	376	1.33558	97	2.15834	474	.247845	399	.972100	2444
.433	.232902	1048	.804209	2151	1.05048	376	1.33461	97	2.15360	472	.247446	399	.969656	2432
.434	.231854	1045	.802058	2147	1.04672	374	1.33364	96	2.14888	468	.247047	397	.967224	2421
.435	.230809	1041	.799911	2141	1.04298	372	1.33268	96	2.14420	468	.246650	396	.964803	2410
.436	.229768	1038	.797770	2138	1.03926	371	1.33172	97	2.13952	465	.246254	394	.962393	2399
.437	.228730	1034	.795632	2132	1.03555	369	1.33075	95	2.13487	465	.245860	394	.959994	2388
.438	.227696	1030	.793500	2128	1.03186	368	1.32980	96	2.13024	461	.245466	392	.957606	2376
.439	.226666	1026	.791372	2124	1.02818	366	1.32884	96	2.12563	458	.245074	391	.955230	2367
.440	.225640	1022	.789248	2118	1.02452	365	1.32788	95	2.12105	457	.244683	390	.952863	2355
.441	.224618	1020	.787130	2115	1.02087	364	1.32693	95	2.11648	454	.244293	389	.950508	2345
.442	.223598	1015	.785015	2109	1.01723	362	1.32598	94	2.11194	453	.243904	388	.948163	2334
.443	.222583	1012	.782906	2105	1.01361	360	1.32504	95	2.10741	450	.243516	386	.945829	2324
.444	.221571	1008	.780801	2101	1.01001	359	1.32409	94	2.10291	448	.243130	386	.943505	2313
.445	.220563	1005	.778700	2096	1.00642	358	1.32315	94	2.09843	447	.242744	384	.941192	2303
.446	.219558	1001	.776604	2092	1.00284	356	1.32221	94	2.09396	444	.242360	383	.938889	2292
.447	.218557	997	.774512	2087	.999275	3549	1.32127	93	2.08952	442	.241977	382	.936597	2282
.448	.217560	994	.772425	2083	.995726	3536	1.32034	94	2.08510	440	.241595	381	.934315	2272
.449	.216566	991	.770342	2079	.992190	3523	1.31940	93	2.08070	439	.241214	379	.932043	2262
.450	.215575	987	.768263	2074	.988667	3509	1.31847	93	2.07631	436	.240835	379	.929781	2252
.451	.214588	983	.766189	2070	.985158	3495	1.31754	92	2.07195	434	.240456	377	.927529	2242
.452	.213605	980	.764119	2065	.981663	3481	1.31662	93	2.06761	433	.240079	376	.925287	2232
.453	.212625	976	.762054	2061	.978182	3469	1.31569	92	2.06328	430	.239703	376	.923055	2222
.454	.211649	973	.759993	2057	.974713	3455	1.31477	92	2.05898	429	.239327	374	.920833	2212
.455	.210676	970	.757936	2052	.971258	3442	1.31385	92	2.05469	427	.238953	373	.918621	2203
.456	.209706	966	.755884	2049	.967816	3429	1.31293	91	2.05042	425	.238580	372	.916418	2192
.457	.208740	963	.753835	2044	.964387	3416	1.31202	92	2.04617	423	.238208	370	.914226	2184
.458	.207777	959	.751791	2040	.960972	3403	1.31110	90	2.04194	421	.237838	370	.912042	2174
.459	.206818	956	.749751	2035	.957569	3390	1.31020	91	2.03773	419	.237468	369	.909868	2164
.460	.205862		.747716		.954179		1.30929		2.03354		.237099		.907704	

TABLE II.- CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.460	.205862	852	.747716	2032	.954179	3377	1.30929	91	2.03354	418	.237099	388	.907704	2155
.461	.204910	948	.745684	2027	.950802	3365	1.30838	90	2.02936	415	.236731	368	.905549	2145
.462	.203961	948	.743657	2028	.947437	3352	1.30748	91	2.02521	416	.236365	366	.903404	2138
.463	.203015	943	.741634	2019	.944085	3338	1.30657	90	2.02108	413	.235999	364	.901268	2127
.464	.202072	939	.739615	2018	.940746	3327	1.30567	90	2.01695	410	.235635	363	.899141	2118
.465	.201133	935	.737600	2011	.937419	3315	1.30477	88	2.01285	408	.235272	363	.897023	2109
.466	.200198	933	.735589	2007	.934104	3302	1.30388	90	2.00876	406	.234909	361	.894914	2100
.467	.199265	929	.733582	2002	.930802	3290	1.30298	89	2.00470	405	.234548	360	.892814	2090
.468	.198336	926	.731580	1998	.927512	3278	1.30209	89	2.00065	403	.234188	360	.890724	2082
.469	.197410	922	.729581	1995	.924234	3266	1.30120	88	1.99662	402	.233828	358	.888642	2073
.470	.196488	920	.727586	1990	.920968	3254	1.30032	89	1.99260	400	.233470	357	.886569	2064
.471	.195568	916	.725596	1987	.917714	3242	1.29943	88	1.98860	398	.233113	356	.884505	2055
.472	.194652	913	.723609	1982	.914472	3230	1.29855	88	1.98462	396	.232757	355	.882450	2046
.473	.193739	909	.721627	1978	.911242	3218	1.29766	88	1.98066	395	.232402	355	.880404	2038
.474	.192830	907	.719648	1975	.908024	3207	1.29678	87	1.97671	393	.232047	353	.878366	2030
.475	.191923	903	.717673	1971	.904817	3195	1.29591	88	1.97278	391	.231694	352	.876336	2020
.476	.191020	900	.715702	1967	.901622	3185	1.29503	87	1.96887	390	.231342	351	.874316	2012
.477	.190120	897	.713735	1963	.898439	3172	1.29416	87	1.96497	388	.230991	350	.872304	2004
.478	.189223	894	.711772	1959	.895267	3161	1.29329	87	1.96109	386	.230641	349	.870300	1996
.479	.188329	890	.709813	1955	.892106	3149	1.29242	87	1.95723	385	.230292	349	.868304	1986
.480	.187439	887	.707858	1952	.888957	3138	1.29155	86	1.95338	383	.229943	347	.866318	1979
.481	.186552	885	.705906	1947	.885819	3128	1.29069	87	1.94955	382	.229596	346	.864339	1971
.482	.185667	881	.703959	1944	.882693	3116	1.28982	86	1.94573	380	.229250	345	.862368	1962
.483	.184786	878	.702015	1940	.879577	3104	1.28896	86	1.94193	378	.228905	345	.860406	1954
.484	.183908	875	.700075	1936	.876473	3094	1.28810	86	1.93815	377	.228560	343	.858452	1946
.485	.183033	872	.698139	1933	.873379	3083	1.28724	85	1.93438	375	.228217	342	.856506	1938
.486	.182161	868	.696206	1929	.870296	3071	1.28639	85	1.93063	374	.227875	342	.854568	1930
.487	.181293	866	.694277	1926	.867225	3061	1.28554	86	1.92689	372	.227533	340	.852638	1922
.488	.180427	863	.692352	1921	.864164	3050	1.28468	85	1.92317	371	.227193	340	.850716	1914
.489	.179564	859	.690431	1917	.861114	3040	1.28383	84	1.91946	369	.226853	338	.848802	1907
.490	.178705	857	.688514	1914	.858074	3028	1.28299	85	1.91577	367	.226514	337	.846895	1898
.491	.177848	855	.686600	1911	.855046	3019	1.28214	84	1.91210	366	.226177	337	.844997	1891
.492	.176995	851	.684689	1906	.852027	3008	1.28130	85	1.90844	365	.225840	336	.843106	1883
.493	.176144	848	.682783	1903	.849019	2997	1.28045	84	1.90479	363	.225504	335	.841223	1876
.494	.175296	844	.680880	1900	.846022	2987	1.27961	83	1.90116	361	.225169	334	.839347	1867
.495	.174452	842	.678980	1895	.843035	2977	1.27878	84	1.89755	361	.224835	333	.837480	1861
.496	.173610	838	.677085	1893	.840058	2966	1.27794	84	1.89394	358	.224502	332	.835619	1852
.497	.172772	838	.675192	1888	.837092	2957	1.27710	83	1.89036	357	.224170	331	.833767	1848
.498	.171936	832	.673304	1885	.834135	2946	1.27627	83	1.88679	356	.223839	331	.831921	1837
.499	.171104	830	.671419	1882	.831189	2936	1.27544	83	1.88323	354	.223508	329	.830084	1831
.500	.170274	827	.669537	1878	.828253	2928	1.27461	83	1.87969	353	.223179	328	.828253	1823
.501	.169447	824	.667659	1874	.825327	2916	1.27378	82	1.87616	352	.222851	328	.826430	1816
.502	.168623	821	.665785	1871	.822411	2907	1.27296	83	1.87264	350	.222523	327	.824614	1808
.503	.167802	818	.663914	1867	.819504	2896	1.27213	82	1.86914	349	.222196	326	.822806	1802
.504	.166984	815	.662047	1864	.816608	2887	1.27131	82	1.86565	347	.221870	325	.821004	1794
.505	.166169	812	.660183	1861	.813721	2877	1.27049	82	1.86218	346	.221545	324	.819210	1787
.506	.165357	810	.658322	1857	.810844	2867	1.26967	81	1.85872	344	.221221	323	.817423	1780
.507	.164547	806	.656465	1853	.807977	2858	1.26886	82	1.85528	344	.220898	322	.815643	1773
.508	.163741	804	.654612	1850	.805119	2848	1.26804	81	1.85184	341	.220576	322	.813870	1766
.509	.162937	801	.652762	1847	.802271	2838	1.26723	81	1.84843	341	.220254	321	.812104	1759
.510	.162136	798	.650915	1843	.799432	2828	1.26642	81	1.84502	338	.219933	319	.810345	1752
.511	.161338	795	.649072	1840	.796603	2820	1.26561	81	1.84163	338	.219614	318	.808593	1745
.512	.160543	792	.647232	1837	.793783	2810	1.26480	80	1.83825	336	.219295	318	.806848	1738
.513	.159751	790	.645395	1833	.790973	2801	1.26400	81	1.83489	335	.218977	318	.805110	1732
.514	.158961	787	.643562	1830	.788172	2792	1.26319	80	1.83154	334	.218659	316	.803378	1725
.515	.158174	784	.641732	1826	.785380	2783	1.26239	80	1.82820	333	.218343	315	.801653	1718
.516	.157390	781	.639906	1824	.782597	2774	1.26159	80	1.82487	331	.218028	315	.799935	1711
.517	.156609	778	.638082	1820	.779823	2764	1.26079	80	1.82156	330	.217713	314	.798224	1705
.518	.155831	776	.636262	1816	.777059	2756	1.25999	78	1.81826	328	.217399	313	.796519	1698
.519	.155055	773	.634446	1814	.774303	2747	1.25920	80	1.81498	328	.217086	312	.794821	1692
.520	.154282		.632632		.771556		1.25840		1.81170		.216774		.793129	

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TABLE II.- CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.520	.154282	770	.632632	1810	.771556	2737	1.25840	79	1.81170	326	.216774	312	.793129	1685
.521	.153512	768	.630822	1806	.768819	2729	1.25761	79	1.80844	325	.216462	310	.791444	1678
.522	.152744	764	.629016	1804	.766090	2720	1.25682	78	1.80519	323	.216152	310	.789766	1672
.523	.151980	762	.627212	1800	.763370	2711	1.25603	78	1.80196	322	.215842	309	.788094	1666
.524	.151218	760	.625412	1797	.760659	2703	1.25524	78	1.79874	322	.215533	308	.786428	1659
.525	.150458	756	.623615	1794	.757956	2694	1.25446	79	1.79552	318	.215225	307	.784769	1653
.526	.149702	754	.621821	1791	.755262	2685	1.25367	78	1.79233	319	.214918	307	.783116	1647
.527	.148948	751	.620030	1788	.752577	2677	1.25289	78	1.78914	318	.214611	305	.781469	1640
.528	.148197	749	.618242	1784	.749900	2668	1.25211	78	1.78596	316	.214306	305	.779829	1634
.529	.147448	746	.616458	1781	.747232	2660	1.25133	78	1.78280	315	.214001	304	.778195	1628
.530	.146702	743	.614677	1778	.744572	2651	1.25055	77	1.77965	314	.213697	304	.776567	1622
.531	.145959	741	.612899	1775	.741921	2643	1.24978	78	1.77651	312	.213393	302	.774945	1615
.532	.145218	738	.611124	1772	.739278	2634	1.24900	77	1.77339	312	.213091	302	.773330	1610
.533	.144480	735	.609352	1769	.736644	2626	1.24823	77	1.77027	310	.212789	301	.771720	1603
.534	.143745	733	.607583	1765	.734018	2618	1.24746	77	1.76717	309	.212488	300	.770117	1598
.535	.143012	730	.605818	1763	.731400	2610	1.24669	77	1.76408	308	.212188	300	.768519	1591
.536	.142282	727	.604055	1759	.728790	2601	1.24592	76	1.76100	307	.211888	298	.766928	1585
.537	.141555	725	.602296	1757	.726189	2594	1.24516	77	1.75793	305	.211590	298	.765343	1580
.538	.140830	722	.600539	1753	.723595	2585	1.24439	76	1.75488	305	.211292	297	.763763	1573
.539	.140108	720	.598786	1751	.721010	2577	1.24363	76	1.75183	303	.210995	296	.762190	1568
.540	.139388	717	.597035	1747	.718433	2570	1.24287	76	1.74880	303	.210699	295	.760622	1562
.541	.138671	715	.595288	1744	.715863	2561	1.24211	76	1.74577	301	.210403	295	.759060	1556
.542	.137956	712	.593544	1741	.713302	2553	1.24135	76	1.74276	299	.210108	294	.757504	1550
.543	.137244	709	.591803	1738	.710749	2546	1.24059	75	1.73977	299	.209814	293	.755954	1545
.544	.136535	707	.590064	1735	.708203	2538	1.23984	76	1.73678	298	.209521	293	.754409	1539
.545	.135828	705	.588329	1732	.705665	2530	1.23908	75	1.73380	297	.209228	292	.752870	1533
.546	.135123	702	.586597	1730	.703135	2522	1.23833	75	1.73083	295	.208936	291	.751337	1528
.547	.134421	698	.584867	1726	.700613	2515	1.23758	75	1.72788	295	.208645	290	.749809	1522
.548	.133722	697	.583141	1722	.698098	2507	1.23683	74	1.72493	293	.208355	289	.748287	1516
.549	.133025	694	.581418	1721	.695591	2499	1.23609	75	1.72200	293	.208066	289	.746771	1511
.550	.132331	692	.579697	1718	.693092	2492	1.23534	74	1.71907	291	.207777	288	.745260	1505
.551	.131639	689	.577979	1714	.690600	2484	1.23460	75	1.71616	290	.207489	288	.743755	1500
.552	.130950	687	.576265	1712	.688116	2477	1.23385	74	1.71326	289	.207201	286	.742255	1494
.553	.130263	685	.574553	1708	.685639	2469	1.23311	74	1.71037	288	.206915	286	.740761	1489
.554	.129578	682	.572844	1706	.683170	2462	1.23237	74	1.70749	287	.206629	286	.739272	1483
.555	.128896	678	.571138	1703	.680708	2454	1.23163	73	1.70462	286	.206343	284	.737789	1478
.556	.128217	678	.569435	1701	.678254	2447	1.23090	74	1.70176	285	.206059	284	.736311	1473
.557	.127539	674	.567734	1697	.675807	2440	1.23016	73	1.69891	284	.205775	283	.734838	1468
.558	.126865	672	.566037	1695	.673367	2433	1.22943	74	1.69607	283	.205492	282	.733370	1462
.559	.126193	669	.564342	1692	.670934	2425	1.22869	73	1.69324	282	.205210	282	.731908	1457
.560	.125524	668	.562650	1689	.668509	2418	1.22796	73	1.69042	281	.204928	281	.730451	1451
.561	.124856	665	.560961	1686	.666091	2411	1.22723	73	1.68761	279	.204647	280	.729000	1447
.562	.124191	662	.559275	1683	.663680	2404	1.22650	72	1.68482	279	.204367	280	.727553	1441
.563	.123529	660	.557592	1681	.661276	2397	1.22578	73	1.68203	278	.204087	279	.726112	1436
.564	.122869	658	.555911	1678	.658879	2389	1.22505	72	1.67925	277	.203808	278	.724676	1431
.565	.122211	655	.554233	1675	.656490	2383	1.22433	72	1.67648	276	.203530	277	.723245	1426
.566	.121556	653	.552558	1672	.654107	2376	1.22360	72	1.67372	276	.203253	277	.721819	1421
.567	.120903	651	.550886	1670	.651731	2369	1.22288	72	1.67097	274	.202976	276	.720398	1415
.568	.120252	648	.549216	1667	.649362	2362	1.22216	71	1.66823	273	.202700	276	.718983	1411
.569	.119604	646	.547549	1664	.647000	2355	1.22145	72	1.66550	272	.202424	274	.717572	1406
.570	.118958	643	.545885	1661	.644645	2348	1.22073	72	1.66278	271	.202150	274	.716166	1401
.571	.118315	641	.544224	1659	.642297	2342	1.22001	71	1.66007	270	.201876	274	.714765	1395
.572	.117674	639	.542565	1656	.639955	2334	1.21930	71	1.65737	269	.201602	272	.713370	1391
.573	.117035	637	.540909	1653	.637621	2328	1.21859	71	1.65468	268	.201330	272	.711979	1386
.574	.116398	634	.539256	1651	.635293	2322	1.21788	71	1.65200	267	.201058	272	.710593	1382
.575	.115764	631	.537605	1648	.632971	2314	1.21717	71	1.64933	267	.200786	271	.709211	1376
.576	.115133	630	.535957	1645	.630657	2308	1.21646	71	1.64666	265	.200515	270	.707835	1371
.577	.114503	627	.534312	1643	.628349	2302	1.21575	71	1.64401	264	.200245	269	.706464	1367
.578	.113876	625	.532669	1640	.626047	2295	1.21504	70	1.64137	264	.199976	269	.705097	1362
.579	.113251	623	.531029	1637	.623752	2288	1.21434	70	1.63873	263	.199707	268	.703735	1357
.580	.112628		.529392		.621464		1.21364		1.63610		.199439		.702378	

TABLE II.– CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.580	.112628	620	.529392	1665	.621464	2282	1.21364	70	1.63610	261	.199439	267	.702378	1353
.581	.112008	618	.527757	1632	.619182	2275	1.21294	71	1.63349	261	.199172	267	.701025	1348
.582	.111390	616	.526125	1630	.616907	2269	1.21223	68	1.63088	260	.198905	266	.699677	1343
.583	.110774	613	.524495	1627	.614638	2263	1.21154	70	1.62828	259	.198639	264	.698334	1338
.584	.110161	612	.522868	1624	.612375	2256	1.21084	70	1.62569	258	.198373	264	.696996	1334
.585	.109549	609	.521244	1622	.610119	2250	1.21014	68	1.62311	257	.198109	265	.695662	1329
.586	.108940	606	.519622	1620	.607869	2244	1.20945	70	1.62054	256	.197844	263	.694333	1325
.587	.108334	605	.518002	1618	.605625	2237	1.20875	68	1.61798	256	.197581	263	.693008	1320
.588	.107729	602	.516386	1614	.603388	2231	1.20806	69	1.61542	254	.197318	262	.691688	1316
.589	.107127	600	.514772	1612	.601157	2225	1.20737	69	1.61288	254	.197056	262	.690372	1311
.590	.106527	598	.513160	1609	.598932	2218	1.20668	69	1.61034	253	.196794	261	.689061	1307
.591	.105929	596	.511551	1607	.596713	2213	1.20599	69	1.60781	252	.196533	260	.687754	1302
.592	.105333	593	.509944	1604	.594500	2206	1.20530	68	1.60529	251	.196273	260	.686452	1298
.593	.104740	591	.508340	1601	.592294	2200	1.20462	69	1.60278	250	.196013	259	.685154	1293
.594	.104149	588	.506739	1599	.590094	2195	1.20393	68	1.60028	250	.195754	259	.683861	1289
.595	.103560	587	.505140	1597	.587899	2188	1.20325	68	1.59778	248	.195495	258	.682572	1285
.596	.102973	585	.503543	1594	.585711	2182	1.20257	68	1.59530	248	.195237	257	.681287	1280
.597	.102388	582	.501949	1591	.583529	2177	1.20189	68	1.59282	247	.194980	257	.680007	1276
.598	.101806	580	.500358	1590	.581352	2170	1.20121	68	1.59035	246	.194723	256	.678731	1271
.599	.101226	578	.498768	1586	.579182	2165	1.20053	68	1.58789	245	.194467	255	.677460	1268
.600	.100648	576	.497182	1584	.577017	2158	1.19985	67	1.58544	245	.194212	255	.676192	1265
.601	.100072	574	.495598	1582	.574859	2153	1.19918	68	1.58299	245	.193957	254	.674929	1259
.602	.0994979	5716	.494016	1578	.572706	2147	1.19850	67	1.58056	243	.193703	254	.673670	1254
.603	.0989263	5695	.492437	1577	.570559	2141	1.19783	67	1.57813	242	.193449	253	.672416	1251
.604	.0983568	5674	.490860	1575	.568418	2135	1.19716	67	1.57571	241	.193196	253	.671165	1246
.605	.0977894	5652	.489285	1572	.566283	2130	1.19649	67	1.57330	240	.192943	251	.669919	1242
.606	.0972242	5631	.487713	1570	.564153	2124	1.19582	67	1.57090	240	.192692	252	.668677	1238
.607	.0966611	5609	.486143	1567	.562029	2118	1.19515	67	1.56850	239	.192440	250	.667439	1234
.608	.0961002	5588	.484576	1565	.559911	2113	1.19448	66	1.56611	238	.192190	251	.666205	1230
.609	.0955413	5567	.483011	1562	.557798	2107	1.19382	67	1.56373	237	.191939	249	.664975	1225
.610	.0949846	5547	.481449	1561	.555691	2101	1.19315	66	1.56136	236	.191690	249	.663750	1222
.611	.0944299	5525	.479888	1558	.553590	2096	1.19249	66	1.55900	236	.191441	248	.662528	1217
.612	.0938774	5505	.478330	1555	.551494	2090	1.19183	66	1.55664	235	.191193	248	.661311	1214
.613	.0933269	5485	.476775	1553	.549404	2085	1.19117	66	1.55429	234	.190945	247	.660097	1210
.614	.0927786	5463	.475222	1551	.547319	2079	1.19051	66	1.55195	233	.190698	247	.658887	1205
.615	.0922323	5442	.473671	1548	.545240	2078	1.18985	66	1.54962	233	.190451	246	.657682	1202
.616	.0916881	5421	.472123	1546	.543167	2069	1.18919	65	1.54729	231	.190205	245	.656480	1197
.617	.0911460	5401	.470577	1544	.541098	2063	1.18854	66	1.54498	231	.189960	245	.655283	1194
.618	.0906059	5380	.469033	1542	.539035	2057	1.18788	65	1.54267	231	.189715	244	.654089	1190
.619	.0900679	5360	.467491	1539	.536978	2052	1.18723	65	1.54036	229	.189471	244	.652899	1186
.620	.0895319	5338	.465952	1537	.534926	2047	1.18658	65	1.53807	228	.189227	243	.651713	1182
.621	.0889980	5320	.464415	1535	.532879	2041	1.18593	65	1.53578	228	.188984	243	.650531	1178
.622	.0884660	5298	.462880	1532	.530838	2036	1.18528	65	1.53350	227	.188741	242	.649353	1175
.623	.0879362	5277	.461348	1530	.528802	2031	1.18463	65	1.53123	227	.188499	242	.648178	1170
.624	.0874085	5257	.459818	1528	.526771	2025	1.18398	65	1.52896	226	.188257	241	.647008	1167
.625	.0868828	5237	.458290	1525	.524746	2021	1.18333	64	1.52670	225	.188016	240	.645841	1165
.626	.0863591	5218	.456765	1524	.522725	2015	1.18269	65	1.52445	224	.187776	240	.644678	1160
.627	.0858373	5197	.455241	1521	.520710	2010	1.18204	64	1.52221	224	.187536	239	.643518	1155
.628	.0853176	5177	.453720	1519	.518700	2005	1.18140	64	1.51997	223	.187297	239	.642363	1152
.629	.0847999	5157	.452201	1516	.516695	1999	1.18076	64	1.51774	222	.187058	238	.641211	1148
.630	.0842842	5137	.450685	1515	.514696	1995	1.18012	64	1.51552	222	.186820	238	.640063	1145
.631	.0837705	5118	.449170	1512	.512701	1989	1.17948	64	1.51330	220	.186582	237	.638918	1141
.632	.0832587	5097	.447658	1510	.510712	1985	1.17884	64	1.51110	221	.186345	236	.637777	1137
.633	.0827490	5077	.446148	1508	.508727	1979	1.17820	63	1.50889	219	.186109	236	.636640	1133
.634	.0822413	5058	.444640	1506	.506748	1974	1.17757	64	1.50670	219	.185873	236	.635507	1130
.635	.0817355	5038	.443134	1503	.504774	1970	1.17693	63	1.50451	218	.185637	235	.634377	1126
.636	.0812317	5018	.441631	1501	.502804	1964	1.17630	63	1.50233	217	.185402	234	.633251	1123
.637	.0807299	4998	.440130	1499	.500840	1960	1.17567	64	1.50016	217	.185168	234	.632128	1119
.638	.0802301	4979	.438631	1497	.498880	1954	1.17503	63	1.49799	216	.184934	233	.631009	1116
.639	.0797322	4958	.437134	1495	.496926	1950	1.17440	63	1.49583	215	.184701	233	.629893	1112
.640	.0792363	4940	.435639	1492	.494976	1944	1.17378	63	1.49368	215	.184468	232	.628781	1108

TABLE II.– CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.640	.0792363	4840	.435639	1482	.494976	1944	1.17378	65	1.49368	215	.184468	232	.628781	1109
.641	.0787423	4821	.434147	1481	.493032	1940	1.17315	63	1.49153	213	.184236	232	.627672	1105
.642	.0782502	4801	.432656	1488	.491092	1885	1.17252	63	1.48940	214	.184004	231	.626567	1101
.643	.0777601	4883	.431168	1486	.489157	1931	1.17189	62	1.48726	212	.183773	231	.625466	1099
.644	.0772718	4862	.429682	1485	.487226	1929	1.17127	63	1.48514	212	.183542	230	.624367	1094
.645	.0767856	4844	.428197	1482	.485301	1921	1.17064	62	1.48302	212	.183312	230	.623273	1091
.646	.0763012	4824	.426715	1478	.483380	1916	1.17002	62	1.48090	210	.183082	229	.622182	1088
.647	.0758188	4805	.425236	1479	.481464	1911	1.16940	62	1.47880	210	.182853	229	.621094	1085
.648	.0753383	4786	.423758	1478	.479553	1906	1.16878	62	1.47670	209	.182624	228	.620009	1081
.649	.0748597	4767	.422282	1478	.477647	1903	1.16816	62	1.47461	209	.182396	228	.618928	1077
.650	.0743830	4748	.420809	1472	.475745	1897	1.16754	62	1.47252	208	.182168	227	.617851	1075
.651	.0739082	4728	.419337	1469	.473848	1893	1.16692	61	1.47044	207	.181941	226	.616776	1071
.652	.0734354	4710	.417868	1467	.471955	1888	1.16631	62	1.46837	207	.181715	227	.615705	1067
.653	.0729644	4691	.416401	1466	.470067	1883	1.16569	61	1.46630	206	.181488	225	.614638	1065
.654	.0724953	4673	.414935	1466	.468184	1878	1.16508	61	1.46424	206	.181263	225	.613573	1061
.655	.0720280	4654	.413472	1461	.466305	1874	1.16447	62	1.46218	204	.181038	225	.612512	1058
.656	.0715626	4635	.412011	1459	.464431	1869	1.16385	61	1.46014	205	.180813	224	.611454	1054
.657	.0710991	4616	.410552	1457	.462562	1865	1.16324	61	1.45809	205	.180589	224	.610400	1051
.658	.0706375	4598	.409095	1455	.460697	1861	1.16263	61	1.45606	203	.180365	223	.609349	1048
.659	.0701777	4578	.407640	1455	.458836	1856	1.16202	60	1.45403	202	.180142	222	.608301	1045
.660	.0697199	4561	.406187	1451	.456980	1851	1.16142	61	1.45201	202	.179920	222	.607256	1042
.661	.0692638	4541	.404736	1449	.455129	1848	1.16081	61	1.44999	201	.179698	222	.606214	1038
.662	.0688097	4525	.403287	1447	.453281	1842	1.16020	60	1.44798	201	.179476	221	.605176	1035
.663	.0683572	4506	.401840	1445	.451439	1838	1.15960	60	1.44597	200	.179255	221	.604141	1033
.664	.0679067	4487	.400395	1443	.449600	1833	1.15900	61	1.44397	199	.179034	220	.603108	1028
.665	.0674580	4468	.398952	1441	.447767	1830	1.15839	60	1.44198	198	.178814	220	.602080	1026
.666	.0670112	4450	.397511	1439	.445937	1825	1.15779	60	1.44000	198	.178594	219	.601054	1023
.667	.0665662	4432	.396072	1437	.444112	1821	1.15719	60	1.43801	197	.178375	219	.600031	1019
.668	.0661230	4414	.394635	1435	.442291	1817	1.15659	60	1.43604	197	.178156	219	.599012	1017
.669	.0656816	4396	.393200	1433	.440474	1812	1.15599	59	1.43407	196	.177937	217	.597995	1013
.670	.0652420	4378	.391767	1432	.438662	1808	1.15540	60	1.43211	196	.177720	217	.596982	1011
.671	.0648042	4359	.390335	1429	.436854	1804	1.15480	60	1.43015	195	.177503	217	.595971	1007
.672	.0643683	4342	.388906	1427	.435050	1799	1.15420	59	1.42820	194	.177286	218	.594964	1004
.673	.0639341	4323	.387479	1425	.433251	1795	1.15361	59	1.42626	194	.177070	216	.593960	1001
.674	.0635018	4306	.386054	1424	.431456	1791	1.15302	60	1.42432	194	.176854	215	.592959	999
.675	.0630712	4287	.384630	1421	.429665	1787	1.15242	59	1.42238	192	.176639	215	.591960	995
.676	.0626425	4270	.383209	1419	.427878	1783	1.15183	59	1.42046	193	.176424	215	.590965	992
.677	.0622155	4252	.381790	1418	.426095	1779	1.15124	59	1.41853	191	.176209	214	.589973	989
.678	.0617903	4235	.380372	1416	.424316	1774	1.15065	58	1.41662	191	.175995	215	.588984	987
.679	.0613668	4216	.378956	1416	.422542	1770	1.15006	58	1.41471	191	.175782	213	.587997	983
.680	.0609452	4198	.377543	1412	.420772	1766	1.14948	59	1.41280	190	.175569	213	.587014	980
.681	.0605253	4181	.376131	1410	.419006	1763	1.14889	59	1.41090	189	.175356	212	.586034	978
.682	.0601072	4164	.374721	1408	.417243	1758	1.14830	58	1.40901	189	.175144	212	.585056	974
.683	.0596908	4146	.373313	1406	.415485	1754	1.14772	58	1.40712	188	.174932	211	.584082	972
.684	.0592762	4128	.371907	1405	.413731	1750	1.14714	59	1.40524	188	.174721	211	.583110	969
.685	.0588634	4112	.370502	1402	.411981	1746	1.14655	58	1.40336	187	.174510	210	.582141	966
.686	.0584522	4093	.369100	1401	.410235	1742	1.14597	58	1.40149	187	.174300	210	.581175	963
.687	.0580429	4076	.367699	1398	.408493	1738	1.14539	58	1.39962	186	.174090	210	.580212	960
.688	.0576353	4059	.366301	1397	.406755	1734	1.14481	58	1.39776	185	.173880	209	.579252	957
.689	.0572294	4042	.364904	1395	.405021	1730	1.14423	58	1.39591	185	.173671	208	.578295	955
.690	.0568252	4024	.363509	1393	.403291	1726	1.14365	57	1.39406	185	.173463	208	.577340	952
.691	.0564228	4007	.362116	1392	.401565	1722	1.14308	58	1.39221	183	.173255	208	.576388	949
.692	.0560221	3990	.360724	1389	.399843	1718	1.14250	57	1.39038	184	.173047	207	.575439	946
.693	.0556231	3973	.359335	1388	.398124	1714	1.14193	58	1.38854	183	.172840	207	.574493	946
.694	.0552258	3955	.357947	1386	.396410	1711	1.14135	57	1.38671	182	.172633	206	.573550	941
.695	.0548303	3939	.356561	1384	.394699	1708	1.14078	57	1.38489	182	.172427	206	.572609	938
.696	.0544364	3921	.355177	1382	.392993	1703	1.14021	57	1.38307	181	.172221	206	.571671	935
.697	.0540443	3904	.353795	1380	.391290	1700	1.13964	57	1.38126	181	.172015	205	.570736	933
.698	.0536539	3888	.352415	1379	.389590	1695	1.13907	57	1.37945	180	.171810	204	.569803	929
.699	.0532651	3870	.351036	1378	.387895	1691	1.13850	57	1.37765	179	.171606	204	.568874	928
.700	.0528781	3854	.349660	1376	.386204	1688	1.13793	57	1.37586	180	.171402	204	.567946	924

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TABLE II.– CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.700	.0528781	8854	.349660	1375	.386204	1688	1.13793	57	1.37586	180	.171402	204	.567946	824
.701	.0524927	8837	.348285	1374	.384516	1684	1.13736	57	1.37406	178	.171198	203	.567022	822
.702	.0521090	8820	.346911	1371	.382832	1680	1.13679	56	1.37228	178	.170995	203	.566100	819
.703	.0517270	8803	.345540	1370	.381152	1677	1.13623	57	1.37050	178	.170792	202	.565181	816
.704	.0513467	8788	.344170	1367	.379475	1673	1.13566	56	1.36872	177	.170590	202	.564265	814
.705	.0509681	8770	.342803	1366	.377802	1669	1.13510	56	1.36695	177	.170388	202	.563351	811
.706	.0505911	8753	.341437	1365	.376133	1665	1.13454	56	1.36518	176	.170186	201	.562440	908
.707	.0502158	8736	.340072	1362	.374468	1662	1.13398	57	1.36342	176	.169985	201	.561532	906
.708	.0498422	8720	.338710	1361	.372806	1658	1.13341	56	1.36167	175	.169784	200	.560626	903
.709	.0494702	8703	.337349	1359	.371148	1655	1.13285	55	1.35992	175	.169584	200	.559723	901
.710	.0490999	8687	.335990	1357	.369493	1651	1.13230	56	1.35817	174	.169384	200	.558822	898
.711	.0487312	8670	.334633	1356	.367842	1647	1.13174	56	1.35643	174	.169184	199	.557924	896
.712	.0483642	8654	.333277	1354	.366195	1644	1.13118	56	1.35469	173	.168985	198	.557028	893
.713	.0479988	8637	.331923	1352	.364551	1640	1.13062	55	1.35296	173	.168787	198	.556135	890
.714	.0476351	8621	.330571	1350	.362911	1637	1.13007	56	1.35123	172	.168589	198	.555245	888
.715	.0472730	8605	.329221	1348	.361274	1633	1.12951	55	1.34951	171	.168391	198	.554357	885
.716	.0469125	8588	.327872	1347	.359641	1629	1.12896	55	1.34780	172	.168193	197	.553472	883
.717	.0465537	8572	.326525	1345	.358012	1626	1.12841	56	1.34608	170	.167996	196	.552589	881
.718	.0461965	8556	.325180	1344	.356386	1622	1.12785	55	1.34438	170	.167800	196	.551708	877
.719	.0458409	8539	.323836	1341	.354764	1619	1.12730	55	1.34268	170	.167604	196	.550831	876
.720	.0454870	8523	.322495	1341	.353145	1616	1.12675	55	1.34098	169	.167408	195	.549955	873
.721	.0451347	8508	.321154	1338	.351529	1612	1.12620	55	1.33929	168	.167213	195	.549082	870
.722	.0447839	8491	.319816	1337	.349917	1609	1.12565	54	1.33760	169	.167018	195	.548212	868
.723	.0444348	8475	.318479	1335	.348308	1605	1.12511	55	1.33591	167	.166823	194	.547344	866
.724	.0440873	8459	.317144	1335	.346703	1601	1.12456	55	1.33424	168	.166629	194	.546478	863
.725	.0437414	8443	.315811	1332	.345102	1599	1.12401	54	1.33256	167	.166435	193	.545615	861
.726	.0433971	8427	.314479	1330	.343503	1595	1.12347	55	1.33089	166	.166242	193	.544754	858
.727	.0430544	8411	.313149	1328	.341908	1591	1.12292	54	1.32923	166	.166049	193	.543896	856
.728	.0427133	8395	.311821	1327	.340317	1588	1.12238	54	1.32757	166	.165856	192	.543040	853
.729	.0423738	8380	.310494	1325	.338729	1585	1.12184	54	1.32591	165	.165664	192	.542187	851
.730	.0420358	8363	.309169	1324	.337144	1582	1.12130	55	1.32426	165	.165472	191	.541336	849
.731	.0416995	8348	.307845	1321	.335562	1578	1.12075	54	1.32261	164	.165281	191	.540487	846
.732	.0413647	8332	.306524	1321	.333984	1575	1.12021	54	1.32097	165	.165090	190	.539641	844
.733	.0410315	8316	.305203	1318	.332409	1571	1.11967	53	1.31934	164	.164900	191	.538797	842
.734	.0406999	8301	.303885	1317	.330838	1568	1.11914	54	1.31770	163	.164709	188	.537955	839
.735	.0403698	8284	.302568	1315	.329270	1565	1.11860	54	1.31607	162	.164520	190	.537116	838
.736	.0400414	8270	.301253	1314	.327705	1562	1.11806	53	1.31445	162	.164330	188	.536278	834
.737	.0397144	8253	.299939	1312	.326143	1558	1.11753	54	1.31283	161	.164141	188	.535444	833
.738	.0393891	8238	.298627	1310	.324585	1556	1.11699	53	1.31122	161	.163953	188	.534611	830
.739	.0390653	8223	.297317	1308	.323029	1552	1.11646	54	1.30961	161	.163764	188	.533781	828
.740	.0387430	8207	.296008	1307	.321477	1548	1.11592	53	1.30800	160	.163576	187	.532953	825
.741	.0384223	8192	.294701	1306	.319929	1546	1.11539	53	1.30640	160	.163389	187	.532128	823
.742	.0381031	8176	.293395	1304	.318383	1542	1.11486	53	1.30480	159	.163202	187	.531305	821
.743	.0377855	8160	.292091	1302	.316841	1538	1.11433	53	1.30321	159	.163015	186	.530484	819
.744	.0374695	8146	.290789	1301	.315302	1536	1.11380	53	1.30162	159	.162829	186	.529665	817
.745	.0371549	8130	.289488	1298	.313766	1533	1.11327	53	1.30003	158	.162643	186	.528848	814
.746	.0368419	8114	.288189	1298	.312233	1530	1.11274	53	1.29845	157	.162457	185	.528034	812
.747	.0365305	8100	.286891	1296	.310703	1527	1.11221	52	1.29688	157	.162272	185	.527222	810
.748	.0362205	8084	.285595	1295	.309176	1523	1.11169	53	1.29531	157	.162087	184	.526412	808
.749	.0359121	8068	.284300	1293	.307653	1520	1.11116	52	1.29374	156	.161903	185	.525604	805
.750	.0356052	8054	.283007	1291	.306133	1518	1.11064	53	1.29218	156	.161718	183	.524799	803
.751	.0352998	8038	.281716	1290	.304615	1514	1.11011	52	1.29062	156	.161535	184	.523996	802
.752	.0349960	8024	.280426	1288	.303101	1511	1.10959	53	1.28906	155	.161351	183	.523194	798
.753	.0346936	8008	.279138	1287	.301590	1508	1.10906	52	1.28751	155	.161168	182	.522396	797
.754	.0343928	7993	.277851	1285	.300082	1505	1.10854	52	1.28596	154	.160986	183	.521599	795
.755	.0340935	7979	.276566	1284	.298577	1502	1.10802	52	1.28442	154	.160803	181	.520804	792
.756	.0337956	7963	.275282	1282	.297075	1498	1.10750	52	1.28288	153	.160622	182	.520012	791
.757	.0334993	7948	.274000	1280	.295576	1496	1.10698	52	1.28135	153	.160440	181	.519221	788
.758	.0332045	7933	.272720	1280	.294080	1493	1.10646	52	1.27982	153	.160259	181	.518433	786
.759	.0329112	7919	.271440	1277	.292587	1490	1.10594	51	1.27829	152	.160078	180	.517647	784
.760	.0326193	7904	.270163	1276	.291097	1487	1.10543	52	1.27677	152	.159898	181	.516863	782

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TABLE II.- CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.760	.0326193	2804	.270163	1276	.291097	1487	1.10543	52	1.27677	152	.159898	181	.516863	782
.761	.0323289	2888	.268887	1275	.289610	1484	1.10491	52	1.27525	151	.159717	179	.516081	779
.762	.0320401	2674	.267612	1275	.288126	1481	1.10439	51	1.27374	151	.159538	180	.515302	778
.763	.0317527	2858	.266339	1271	.286645	1478	1.10388	51	1.27223	151	.159358	179	.514524	776
.764	.0314668	2844	.265068	1270	.285167	1475	1.10337	52	1.27072	150	.159179	178	.513748	773
.765	.0311824	2830	.263798	1268	.283692	1472	1.10285	51	1.26922	150	.159001	179	.512975	772
.766	.0308994	2815	.262530	1267	.282220	1469	1.10234	51	1.26772	149	.158822	178	.512203	769
.767	.0306179	2800	.261263	1266	.280751	1467	1.10183	51	1.26623	149	.158644	177	.511434	768
.768	.0303379	2785	.259997	1264	.279284	1463	1.10132	51	1.26474	149	.158467	177	.510666	765
.769	.0300594	2771	.258733	1262	.277821	1461	1.10081	51	1.26325	148	.158290	178	.509901	763
.770	.0297823	2757	.257471	1261	.276360	1458	1.10030	51	1.26177	148	.158112	178	.509138	762
.771	.0295066	2741	.256210	1260	.274902	1455	1.09979	52	1.26029	147	.157936	176	.508376	759
.772	.0292325	2727	.254950	1258	.273447	1452	1.09927	50	1.25882	146	.157760	176	.507617	757
.773	.0289598	2713	.253692	1257	.271995	1449	1.09877	50	1.25734	146	.157584	176	.506860	755
.774	.0286885	2698	.252435	1255	.270546	1446	1.09827	51	1.25588	147	.157408	175	.506105	754
.775	.0284186	2683	.251180	1254	.269100	1444	1.09776	50	1.25441	146	.157233	175	.505351	751
.776	.0281503	2670	.249926	1252	.267656	1441	1.09726	51	1.25295	145	.157058	174	.504600	749
.777	.0278833	2655	.248674	1251	.266215	1438	1.09675	50	1.25150	145	.156884	174	.503851	748
.778	.0276178	2640	.247423	1249	.264777	1435	1.09625	50	1.25005	145	.156710	174	.503103	745
.779	.0273538	2626	.246174	1248	.263342	1432	1.09575	51	1.24860	145	.156536	173	.502358	744
.780	.0270912	2612	.244926	1246	.261910	1430	1.09524	50	1.24715	144	.156363	174	.501614	741
.781	.0268300	2598	.243680	1245	.260480	1427	1.09474	50	1.24571	143	.156189	172	.500873	740
.782	.0265702	2583	.242435	1244	.259053	1424	1.09424	50	1.24428	144	.156017	173	.500133	737
.783	.0263119	2570	.241191	1242	.257629	1421	1.09374	50	1.24284	143	.155844	172	.499396	736
.784	.0260549	2555	.239949	1241	.256208	1418	1.09324	50	1.24141	142	.155672	172	.498660	734
.785	.0257994	2540	.238708	1239	.254789	1416	1.09274	48	1.23999	142	.155500	171	.497926	732
.786	.0255454	2527	.237469	1238	.253373	1413	1.09225	50	1.23857	142	.155329	171	.497194	730
.787	.0252927	2513	.236231	1236	.251960	1411	1.09175	50	1.23715	142	.155158	171	.496464	728
.788	.0250414	2498	.234995	1235	.250549	1408	1.09125	49	1.23573	141	.154987	171	.495736	726
.789	.0247916	2484	.233760	1234	.249141	1405	1.09076	50	1.23432	141	.154816	170	.495010	724
.790	.0245432	2471	.232526	1232	.247736	1402	1.09026	49	1.23291	140	.154646	169	.494286	723
.791	.0242961	2456	.231294	1231	.246334	1400	1.08977	48	1.23151	140	.154477	170	.493563	720
.792	.0240505	2442	.230063	1229	.244934	1398	1.08928	50	1.23011	140	.154307	169	.492843	719
.793	.0238063	2429	.228834	1228	.243536	1394	1.08878	49	1.22871	139	.154138	169	.492124	717
.794	.0235634	2414	.227606	1227	.242142	1882	1.08829	49	1.22732	139	.153969	168	.491407	715
.795	.0233220	2401	.226379	1225	.240750	1389	1.08780	49	1.22593	139	.153801	168	.490692	713
.796	.0230819	2387	.225154	1224	.239361	1387	1.08731	48	1.22454	138	.153632	167	.489979	711
.797	.0228432	2372	.223930	1222	.237974	1384	1.08682	49	1.22316	138	.153465	168	.489268	710
.798	.0226060	2359	.222708	1222	.236590	1382	1.08633	49	1.22178	138	.153297	167	.488558	707
.799	.0223701	2345	.221486	1219	.235208	1378	1.08584	48	1.22040	137	.153130	167	.487851	707
.800	.0221356	2332	.220267	1219	.233829	1376	1.08536	48	1.21903	137	.152963	166	.487144	704
.801	.0219024	2318	.219048	1217	.232453	1374	1.08487	49	1.21766	136	.152797	167	.486440	702
.802	.0216706	2304	.217831	1215	.231079	1371	1.08438	48	1.21630	137	.152630	166	.485738	700
.803	.0214402	2290	.216616	1214	.229708	1369	1.08390	49	1.21493	136	.152464	165	.485038	698
.804	.0212112	2276	.215402	1213	.228339	1366	1.08341	48	1.21357	135	.152299	166	.484339	697
.805	.0209836	2263	.214189	1212	.226973	1363	1.08293	48	1.21222	135	.152133	164	.483642	695
.806	.0207573	2250	.212977	1210	.225610	1362	1.08245	49	1.21087	135	.151969	165	.482947	694
.807	.0205323	2235	.211767	1209	.224248	1358	1.08196	48	1.20952	135	.151804	164	.482253	691
.808	.0203088	2222	.210558	1207	.222890	1356	1.08148	48	1.20817	134	.151640	165	.481562	690
.809	.0200866	2208	.209351	1207	.221534	1354	1.08100	48	1.20683	134	.151475	163	.480872	688
.810	.0198657	2195	.208144	1204	.220180	1351	1.08052	48	1.20549	133	.151312	164	.480184	687
.811	.0196462	2182	.206940	1204	.218829	1349	1.08004	48	1.20416	134	.151148	163	.479497	685
.812	.0194280	2168	.205736	1202	.217480	1346	1.07956	48	1.20282	132	.150985	162	.478812	683
.813	.0192112	2154	.204534	1201	.216134	1343	1.07908	47	1.20150	133	.150823	163	.478129	681
.814	.0189958	2141	.203333	1199	.214791	1342	1.07861	48	1.20017	132	.150660	162	.477448	679
.815	.0187817	2128	.202134	1199	.213449	1339	1.07813	48	1.19885	132	.150498	162	.476769	678
.816	.0185689	2115	.200935	1198	.212110	1336	1.07765	47	1.19753	132	.150336	162	.476091	676
.817	.0183574	2101	.199739	1196	.210774	1334	1.07718	48	1.19621	131	.150174	161	.475415	675
.818	.0181473	2087	.198543	1194	.209440	1331	1.07670	47	1.19490	131	.150013	161	.474740	673
.819	.0179386	2075	.197349	1193	.208109	1330	1.07623	48	1.19359	130	.149852	160	.474067	671
.820	.0177311		.196156		.206779		1.07575		1.19229		.149692		.473396	

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TABLE II.– CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.820	.0177311	2061	.196156	1182	.206779	1326	1.07575	47	1.19229	131	.149692	161	.473396	669
.821	.0175250	2048	.194964	1180	.205453	1325	1.07528	47	1.19098	130	.149531	160	.472727	668
.822	.0173202	2035	.193774	1179	.204128	1322	1.07481	47	1.18968	129	.149371	160	.472059	666
.823	.0171167	2021	.192585	1185	.202806	1319	1.07434	48	1.18839	128	.149211	159	.471393	664
.824	.0169146	2008	.191397	1186	.201487	1317	1.07386	47	1.18710	130	.149052	159	.470729	663
.825	.0167138	1996	.190211	1185	.200170	1315	1.07339	47	1.18580	128	.148893	159	.470066	662
.826	.0165142	1982	.189026	1184	.198855	1313	1.07292	46	1.18452	129	.148734	159	.469404	659
.827	.0163160	1968	.187842	1183	.197542	1310	1.07246	47	1.18323	128	.148575	158	.468745	658
.828	.0161192	1956	.186659	1181	.196232	1308	1.07199	47	1.18195	127	.148417	158	.468087	656
.829	.0159236	1943	.185478	1180	.194924	1305	1.07152	47	1.18068	128	.148259	157	.467431	655
.830	.0157293	1929	.184298	1178	.193619	1303	1.07105	47	1.17940	127	.148102	156	.466776	652
.831	.0155364	1917	.183119	1178	.192316	1301	1.07058	46	1.17813	127	.147944	157	.466124	652
.832	.0153447	1904	.181941	1176	.191015	1299	1.07012	46	1.17686	126	.147787	157	.465472	650
.833	.0151543	1891	.180765	1175	.189716	1296	1.06966	47	1.17560	127	.147630	156	.464822	648
.834	.0149652	1877	.179590	1174	.188420	1294	1.06919	46	1.17433	125	.147474	156	.464174	646
.835	.0147775	1865	.178416	1172	.187126	1292	1.06873	47	1.17308	126	.147318	156	.463528	645
.836	.0145910	1852	.177244	1171	.185834	1289	1.06826	46	1.17182	125	.147162	156	.462883	644
.837	.0144058	1839	.176073	1170	.184545	1287	1.06780	46	1.17057	125	.147006	155	.462239	642
.838	.0142219	1826	.174903	1169	.183258	1285	1.06734	46	1.16932	125	.146851	155	.461597	640
.839	.0140393	1813	.173734	1167	.181973	1283	1.06688	46	1.16807	125	.146696	155	.460957	639
.840	.0138580	1801	.172567	1167	.180690	1280	1.06642	46	1.16682	124	.146541	154	.460318	637
.841	.0136779	1788	.171400	1164	.179410	1278	1.06596	46	1.16558	123	.146387	155	.459681	635
.842	.0134991	1775	.170236	1164	.178132	1278	1.06550	46	1.16435	124	.146232	154	.459046	634
.843	.0133216	1762	.169072	1163	.176856	1274	1.06504	46	1.16311	123	.146078	153	.458412	633
.844	.0131454	1749	.167909	1161	.175582	1272	1.06458	46	1.16188	123	.145925	153	.457779	631
.845	.0129705	1737	.166748	1160	.174310	1269	1.06412	45	1.16065	123	.145772	154	.457148	630
.846	.0127968	1724	.165588	1159	.173041	1267	1.06367	46	1.15942	122	.145618	152	.456518	627
.847	.0126244	1711	.164429	1158	.171774	1265	1.06321	46	1.15820	122	.145466	153	.455891	627
.848	.0124533	1699	.163271	1156	.170509	1263	1.06275	45	1.15698	122	.145313	152	.455264	625
.849	.0122834	1686	.162115	1155	.169246	1260	1.06230	46	1.15576	121	.145161	152	.454639	623
.850	.0121148	1674	.160960	1154	.167986	1258	1.06184	45	1.15455	121	.145009	151	.454016	622
.851	.0119474	1661	.159806	1153	.166728	1257	1.06139	45	1.15334	121	.144858	152	.453394	620
.852	.0117813	1648	.158653	1151	.165471	1254	1.06094	45	1.15213	121	.144706	151	.452774	619
.853	.0116165	1636	.157502	1150	.164217	1252	1.06049	46	1.15092	120	.144555	151	.452155	618
.854	.0114529	1624	.156352	1150	.162965	1250	1.06003	45	1.14972	120	.144404	150	.451537	615
.855	.0112905	1611	.155202	1147	.161715	1247	1.05958	45	1.14852	120	.144254	151	.450922	615
.856	.0111294	1598	.154055	1147	.160468	1246	1.05913	45	1.14732	120	.144103	150	.450307	613
.857	.0109696	1586	.152908	1146	.159222	1243	1.05868	45	1.14612	119	.143953	149	.449694	611
.858	.0108110	1574	.151762	1144	.157979	1241	1.05823	45	1.14493	119	.143804	150	.449083	611
.859	.0106536	1561	.150618	1143	.156738	1240	1.05778	44	1.14374	118	.143654	149	.448472	608
.860	.0104975	1548	.149475	1142	.155498	1237	1.05734	45	1.14256	119	.143505	149	.447864	607
.861	.0103426	1536	.148333	1141	.154261	1235	1.05689	45	1.14137	118	.143356	148	.447257	606
.862	.0101890	1525	.147192	1140	.153026	1233	1.05644	44	1.14019	118	.143208	149	.446651	604
.863	.0100365	1511	.146052	1138	.151793	1231	1.05600	45	1.13901	117	.143059	148	.446047	603
.864	.0098854	1498	.144914	1137	.150562	1228	1.05555	45	1.13784	118	.142911	148	.445444	601
.865	.0097355	1488	.143777	1136	.149334	1227	1.05510	44	1.13666	118	.142763	147	.444843	600
.866	.0095867	1475	.142641	1136	.148107	1225	1.05466	44	1.13550	117	.142616	148	.444243	599
.867	.0094392	1462	.141506	1134	.146882	1222	1.05422	45	1.13433	117	.142468	147	.443644	597
.868	.0092930	1451	.140372	1132	.145660	1221	1.05377	44	1.13316	116	.142321	147	.443047	596
.869	.0091479	1438	.139240	1132	.144439	1218	1.05333	44	1.13200	116	.142174	146	.442451	594
.870	.0090041	1426	.138108	1130	.143221	1217	1.05289	44	1.13084	115	.142028	146	.441857	593
.871	.0088615	1414	.136978	1129	.142004	1214	1.05245	43	1.12969	116	.141882	146	.441264	591
.872	.0087201	1402	.135849	1128	.140790	1213	1.05200	44	1.12853	115	.141736	146	.440673	590
.873	.0085799	1390	.134721	1127	.139577	1210	1.05156	44	1.12738	114	.141590	145	.440083	589
.874	.0084409	1377	.133594	1126	.138367	1209	1.05112	44	1.12624	115	.141445	145	.439494	587
.875	.0083032	1366	.132468	1124	.137158	1206	1.05068	43	1.12509	115	.141300	145	.438907	586
.876	.0081666	1353	.131344	1124	.135952	1205	1.05025	44	1.12394	114	.141155	145	.438321	585
.877	.0080313	1342	.130220	1122	.134747	1202	1.04981	44	1.12280	114	.141010	144	.437736	583
.878	.0078971	1330	.129098	1121	.133545	1201	1.04937	44	1.12166	113	.140866	145	.437153	582
.879	.0077641	1317	.127977	1120	.132344	1198	1.04893	43	1.12053	113	.140721	144	.436571	580
.880	.0076324		.126857		.131146		1.04850		1.11940		.140577		.435991	

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TABLE II.- CONTINUED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.880	.0076324	1305	.126857	1118	.131146	1197	1.04850	44	1.11940	113	.140577	143	.435991	579
.881	.0075019	1294	.125738	1117	.129949	1194	1.04806	43	1.11827	118	.140434	144	.435412	578
.882	.0073725	1281	.124621	1117	.128755	1196	1.04763	44	1.11714	113	.140290	143	.434834	577
.883	.0072444	1270	.123504	1115	.127562	1180	1.04719	43	1.11601	112	.140147	143	.434257	575
.884	.0071174	1258	.122389	1115	.126372	1189	1.04676	43	1.11489	112	.140004	142	.433682	573
.885	.0069916	1246	.121274	1113	.125183	1187	1.04633	44	1.11377	111	.139862	142	.433109	573
.886	.0068670	1234	.120161	1112	.123996	1185	1.04589	43	1.11266	112	.139720	142	.432536	571
.887	.0067436	1222	.119049	1111	.122811	1183	1.04546	43	1.11154	111	.139577	141	.431965	570
.888	.0066214	1210	.117938	1110	.121628	1181	1.04503	43	1.11043	111	.139436	142	.431395	568
.889	.0065004	1199	.116828	1108	.120447	1179	1.04460	43	1.10932	111	.139294	141	.430827	567
.890	.0063805	1187	.115719	1107	.119268	1177	1.04417	43	1.10821	110	.139153	142	.430260	566
.891	.0062618	1175	.114612	1107	.118091	1176	1.04374	43	1.10711	111	.139011	140	.429694	565
.892	.0061443	1163	.113505	1105	.116915	1173	1.04331	43	1.10600	110	.138871	141	.429129	563
.893	.0060280	1151	.112400	1105	.115742	1172	1.04288	43	1.10490	109	.138730	140	.428566	562
.894	.0059129	1140	.111295	1106	.114570	1169	1.04245	43	1.10381	110	.138590	140	.428004	560
.895	.0057989	1128	.110192	1102	.113401	1168	1.04202	42	1.10271	109	.138450	140	.427444	560
.896	.0056861	1117	.109090	1101	.112233	1166	1.04160	43	1.10162	109	.138310	140	.426884	558
.897	.0055744	1105	.107989	1100	.111067	1164	1.04117	43	1.10053	109	.138170	139	.426326	557
.898	.0054639	1093	.106889	1099	.109903	1162	1.04074	42	1.09944	108	.138031	139	.425769	555
.899	.0053546	1082	.105790	1098	.108741	1161	1.04032	43	1.09836	108	.137892	139	.425214	554
.900	.0052464	1070	.104692	1097	.107580	1158	1.03989	42	1.09727	108	.137753	139	.424660	553
.901	.0051394	1058	.103595	1095	.106422	1157	1.03947	43	1.09619	107	.137614	138	.424107	552
.902	.0050336	1047	.102500	1095	.105265	1155	1.03904	42	1.09512	108	.137476	138	.423555	550
.903	.0049289	1035	.101405	1093	.104110	1153	1.03862	42	1.09404	107	.137338	138	.423005	550
.904	.0048254	1024	.100312	1093	.102957	1151	1.03820	42	1.09297	107	.137200	138	.422455	547
.905	.0047230	1013	.0992192	10914	.101806	1148	1.03778	43	1.09190	107	.137062	137	.421908	547
.906	.0046217	1000	.0981278	10908	.100657	1148	1.03735	42	1.09083	107	.136925	138	.421361	546
.907	.0045217	990	.0970375	10892	.0995094	11458	1.03693	42	1.08976	106	.136787	137	.420815	544
.908	.0044227	978	.0959483	10882	.0983636	11458	1.03651	42	1.08870	106	.136650	136	.420271	543
.909	.0043249	966	.0948601	10871	.0972197	11422	1.03609	42	1.08764	106	.136514	137	.419728	542
.910	.0042283	955	.0937730	10861	.0960775	11406	1.03567	42	1.08658	106	.136377	136	.419186	540
.911	.0041328	944	.0926869	10848	.0949372	11386	1.03525	41	1.08552	105	.136241	136	.418646	539
.912	.0040384	932	.0916020	10840	.0937986	11368	1.03484	42	1.08447	105	.136105	136	.418107	538
.913	.0039452	921	.0905180	10828	.0926618	11350	1.03442	42	1.08342	105	.135969	135	.417569	537
.914	.0038531	910	.0894351	10818	.0915268	11333	1.03400	42	1.08237	105	.135834	136	.417032	536
.915	.0037621	898	.0883533	10808	.0903935	11315	1.03358	41	1.08132	104	.135698	135	.416496	534
.916	.0036723	887	.0872725	10788	.0892620	11297	1.03317	42	1.08028	105	.135563	134	.415962	534
.917	.0035836	876	.0861927	10787	.0881323	11280	1.03275	41	1.07923	104	.135429	133	.415428	532
.918	.0034960	864	.0851140	10777	.0870043	11262	1.03234	42	1.07819	103	.135294	134	.414896	531
.919	.0034096	853	.0840363	10766	.0858781	11243	1.03192	41	1.07716	104	.135160	134	.414365	530
.920	.0033243	842	.0829597	10756	.0847536	11228	1.03151	41	1.07612	104	.135026	134	.413835	528
.921	.0032401	831	.0818841	10746	.0836308	11210	1.03110	42	1.07508	103	.134892	134	.413307	527
.922	.0031570	819	.0808095	10735	.0825098	11194	1.03068	41	1.07405	103	.134758	133	.412780	526
.923	.0030751	809	.0797360	10725	.0813904	11175	1.03027	41	1.07302	102	.134625	134	.412254	525
.924	.0029942	797	.0786635	10715	.0802729	11159	1.02986	41	1.07200	103	.134491	133	.411729	524
.925	.0029145	786	.0775920	10705	.0791570	11142	1.02945	41	1.07097	102	.134358	132	.411205	523
.926	.0028359	775	.0765215	10684	.0780428	11125	1.02904	42	1.06995	102	.134226	133	.410682	521
.927	.0027584	763	.0754521	10684	.0769303	11107	1.02862	41	1.06893	102	.134093	132	.410161	520
.928	.0026821	753	.0743837	10674	.0758196	11091	1.02821	40	1.06791	101	.133961	132	.409641	519
.929	.0026068	741	.0733163	10664	.0747105	11074	1.02781	41	1.06690	102	.133829	132	.409122	518
.930	.0025327	731	.0722499	10654	.0736031	11057	1.02740	41	1.06588	101	.133697	132	.408604	517
.931	.0024596	719	.0711845	10644	.0724974	11040	1.02699	41	1.06487	101	.133565	131	.408087	516
.932	.0023877	709	.0701201	10633	.0713934	11023	1.02658	41	1.06386	100	.133434	131	.407571	515
.933	.0023168	697	.0690568	10624	.0702911	11007	1.02617	40	1.06286	101	.133303	131	.407056	514
.934	.0022471	687	.0679944	10613	.0691904	10990	1.02577	41	1.06185	100	.133172	131	.406543	512
.935	.0021784	675	.0669331	10604	.0680914	10974	1.02536	41	1.06085	100	.133041	130	.406031	511
.936	.0021109	665	.0658727	10593	.0669940	10957	1.02495	40	1.05985	100	.132911	130	.405520	510
.937	.0020444	653	.0648134	10584	.0658983	10941	1.02455	41	1.05885	100	.132781	130	.405010	509
.938	.0019791	643	.0637550	10573	.0648042	10924	1.02414	40	1.05785	99	.132651	130	.404501	508
.939	.0019148	631	.0626977	10564	.0637118	10907	1.02374	40	1.05686	99	.132521	130	.403993	507
.940	.0018517		.0616413		.0626211		1.02334		1.05587		.132391		.403486	

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TABLE II.– CONCLUDED

t	g(t)		h(t)		i(t)		j(t)		k(t)		l(t)		m(t)	
.940	.0018517	621	.0616413	10554	.0626211	10882	1.02334	41	1.05587	89	.132391	129	.403486	505
.941	.0017896	610	.0605859	10544	.0615319	10875	1.02293	40	1.05488	99	.132262	130	.402981	505
.942	.0017286	599	.0595315	10534	.0604444	10859	1.02253	40	1.05389	99	.132132	128	.402476	503
.943	.0016687	588	.0584781	10524	.0593585	10842	1.02213	40	1.05290	98	.132004	129	.401973	502
.944	.0016099	577	.0574257	10514	.0582743	10827	1.02173	41	1.05192	98	.131875	129	.401471	501
.945	.0015522	567	.0563743	10505	.0571916	10810	1.02132	40	1.05094	98	.131746	128	.400970	501
.946	.0014955	558	.0553238	10494	.0561106	10795	1.02092	40	1.04996	98	.131618	128	.400469	499
.947	.0014399	545	.0542744	10485	.0550311	10778	1.02052	40	1.04898	97	.131490	128	.399970	497
.948	.0013854	534	.0532259	10475	.0539533	10762	1.02012	40	1.04801	97	.131362	127	.399473	497
.949	.0013320	523	.0521784	10466	.0528771	10747	1.01972	39	1.04704	98	.131235	128	.398976	496
.950	.0012797	516	.0511318	10456	.0518024	10731	1.01933	40	1.04606	97	.131107	127	.398480	495
.951	.0012284	502	.0500862	10446	.0507293	10714	1.01893	40	1.04509	96	.130980	127	.397985	493
.952	.0011782	491	.0490416	10436	.0496579	10699	1.01853	40	1.04413	97	.130853	127	.397492	493
.953	.0011291	481	.0479980	10427	.0485880	10684	1.01813	39	1.04316	96	.130726	126	.396999	491
.954	.0010810	469	.0469553	10417	.0475196	10667	1.01774	40	1.04220	96	.130600	127	.396508	490
.955	.0010341	460	.0459136	10408	.0464529	10652	1.01734	40	1.04124	96	.130473	126	.396018	490
.956	.0009881	448	.0448728	10398	.0453877	10637	1.01694	39	1.04028	95	.130347	126	.395528	488
.957	.0009433	438	.0438330	10388	.0443240	10621	1.01655	40	1.03932	95	.130221	125	.395040	487
.958	.0008995	427	.0427942	10379	.0432619	10605	1.01615	38	1.03837	95	.130096	126	.394553	486
.959	.0008568	417	.0417563	10370	.0422014	10590	1.01576	39	1.03742	96	.129970	125	.394067	485
.960	.0008151	406	.0407193	10360	.0411424	10575	1.01537	40	1.03646	94	.129845	125	.393582	484
.961	.0007745	396	.0396833	10350	.0400849	10559	1.01497	39	1.03552	95	.129720	125	.393098	484
.962	.0007349	385	.0386483	10341	.0390290	10544	1.01458	39	1.03457	95	.129595	125	.392614	482
.963	.0006964	374	.0376142	10332	.0379746	10528	1.01419	38	1.03362	94	.129470	124	.392132	480
.964	.0006590	364	.0365810	10322	.0369218	10514	1.01380	40	1.03268	94	.129346	124	.391652	480
.965	.0006226	354	.0355488	10312	.0358704	10498	1.01340	39	1.03174	94	.129222	124	.391172	478
.966	.0005872	343	.0345176	10304	.0348206	10483	1.01301	39	1.03080	94	.129098	124	.390693	478
.967	.0005529	333	.0334872	10294	.0337723	10467	1.01262	39	1.02986	93	.128974	124	.390215	477
.968	.0005196	321	.0324578	10284	.0327256	10454	1.01223	39	1.02893	93	.128850	123	.389738	476
.969	.0004875	312	.0314294	10276	.0316802	10438	1.01184	39	1.02800	94	.128727	124	.389262	474
.970	.0004563	301	.0304018	10268	.0306364	10422	1.01145	38	1.02706	92	.128603	123	.388788	474
.971	.0004262	291	.0293752	10258	.0295942	10408	1.01107	39	1.02614	93	.128480	122	.388314	473
.972	.0003971	280	.0283496	10248	.0285534	10394	1.01068	39	1.02521	93	.128358	123	.387841	472
.973	.0003691	270	.0273248	10238	.0275140	10378	1.01029	39	1.02428	92	.128235	122	.387369	471
.974	.0003421	260	.0263010	10229	.0264762	10365	1.00990	38	1.02336	92	.128113	123	.386898	470
.975	.0003161	248	.0252781	10220	.0254399	10348	1.00952	39	1.02244	92	.127990	122	.386428	468
.976	.0002912	239	.0242561	10210	.0244050	10334	1.00913	38	1.02152	92	.127868	121	.385960	468
.977	.0002673	228	.0232351	10202	.0233716	10319	1.00874	38	1.02060	92	.127747	122	.385492	467
.978	.0002445	219	.0222149	10192	.0223397	10305	1.00836	39	1.01968	91	.127625	121	.385025	466
.979	.0002226	207	.0211957	10183	.0213092	10290	1.00797	38	1.01877	91	.127504	122	.384559	465
.980	.0002019	198	.0201774	10174	.0202802	10276	1.00759	38	1.01786	91	.127382	121	.384094	463
.981	.0001821	187	.0191600	10165	.0192526	10261	1.00721	39	1.01695	91	.127261	120	.383631	463
.982	.0001634	178	.0181435	10158	.0182265	10246	1.00682	38	1.01604	91	.127141	121	.383168	462
.983	.0001456	167	.0171279	10147	.0172019	10233	1.00644	38	1.01513	90	.127020	120	.382706	461
.984	.0001289	156	.0161132	10138	.0161786	10217	1.00606	38	1.01423	91	.126900	120	.382245	460
.985	.0001133	147	.0150994	10128	.0151569	10204	1.00568	38	1.01332	90	.126780	120	.381785	459
.986	.0000986	136	.0140866	10120	.0141365	10188	1.00529	38	1.01242	90	.126660	120	.381326	458
.987	.0000850	126	.0130746	10111	.0131176	10175	1.00491	38	1.01152	89	.126540	120	.380868	457
.988	.0000724	116	.0120635	10102	.0121001	10161	1.00453	38	1.01063	90	.126420	119	.380411	456
.989	.0000608	106	.0110533	10093	.0110840	10146	1.00415	38	1.00973	89	.126301	119	.379955	455
.990	.0000502	95	.0100440	10084	.0100694	10132	1.00377	38	1.00884	89	.126182	120	.379500	455
.991	.0000407	86	.0090356	10074	.0090562	10118	1.00339	38	1.00795	89	.126062	118	.379045	453
.992	.0000321	75	.0080282	10067	.0080443	10104	1.00301	37	1.00706	89	.125944	119	.378592	452
.993	.0000246	66	.0070215	10057	.0070339	10090	1.00264	38	1.00617	89	.125825	118	.378140	452
.994	.0000180	55	.0060158	10048	.0060249	10078	1.00226	38	1.00528	88	.125707	119	.377688	450
.995	.0000125	45	.0050110	10040	.0050173	10068	1.00188	38	1.00440	89	.125588	118	.377238	450
.996	.0000080	35	.0040070	10030	.0040110	10048	1.00150	37	1.00351	88	.125470	117	.376788	448
.997	.0000045	25	.0030040	10022	.0030062	10034	1.00113	38	1.00263	88	.125353	118	.376340	448
.998	.0000020	15	.0020018	10014	.0020028	10021	1.00075	37	1.00175	87	.125235	117	.375892	446
.999	.0000005	5	.0010004	10004	.0010007	10007	1.00038	38	1.00088	88	.125118	118	.375446	446
1.000	0		0		0		1		1		.125000		.375000	

NACA

1	Given	M =	
2		γ =	
3	① × ①		
4	③ − 1		

Compute 6 sig. figs. or 7 dec.

5	√④	
6	1 ÷ ⑤	
7	② + 1	
8	½ × ③ × ⑦ ÷ ④	

Interpolate linearly in tables

9	② − 1	
10	½ × ③ × ⑧	
11	③ ÷ ⑤	
12	2 + [② × ③]	

FORM A: Calculation of sonic Flow Past Bo

		P_0	P_1	P_2	P_3	P_4	P_5	P_6
13	x (*1)	*						
14	R (*R')	*						
15	R'							
16	R'' (*0)	*						
17	③ × ⑭							
18	⑬ − ⑰							
19	⑥ × ⑮							
0d	⑰ ÷ ⑬							
0e	b(t)							
0f	d(t)	From Table I						
0g	e(t)	as funct.						
0h	f(t)	of ⑳						
0s	⑲ ÷ ⑳							
0t	⑳ × ⑳ × ⑬							
0u	⑳ × 0f							
0v	⑳ × ⑳							
0w	⑳ × 0h + ⑬							
1d	⑰ ÷ ⑬							
1e	a(t)							
1f	b(t)	From Table I						
1g	c(t)	as functions						
1h	d(t)	of 1d						
1m	⑱ − [All V's above]							
1n	⑲ × ⑲							
1s	1m ÷ 1n							
1t	⑬ × ⑬ × ⑬ × 1e							
1u	⑲ × ⑬ × 1f							
1v	⑲ × ⑬ × ⑲							
1w	⑲ × 1h							
2a	⑲ − [⑱ from column P_1 ⇧]							
2d	⑰ ÷ 2a							
2e	a(t)							
2f	b(t)	From Table I						
2g	c(t)	as functions						
2h	d(t)	of 2d						
2m	⑲ − [All V's above]							
2n	2a × ㉙							
2s	2m ÷ 2n							
2t	㉕ × 2a × 2a × 2e							
2u	㉙ × 2a × 2f							
2v	㉕ × 2a × ㉙							
2w	㉙ × 2h							
3a	⑲ − [⑱ from column P_2 ⇧]							
3d	⑰ ÷ 3a							
3e	a(t)							
3f	b(t)	From Table I						
3g	c(t)	as functions of 3d						
3h	d(t)							
3m	⑲ − [All V's above]							
3n	3a × 3g							
3s	3m ÷ 3n							
3t	㉟ × 3a × 3a × 3e							
3u	㉙ × 3a × 3f							
3v	㉟ × 3a × 3g							
3w	㉟ × 3h							
4a	⑲ − [⑱ from column P_3 ⇧]							
4d	⑰ ÷ 4a							
4e	a(t)							
4f	b(t)	From Table I						
4g	c(t)	as functions of 4d						
4h	d(t)							
4m	⑱ − [All V's above]							
4n	4a × 4g							
4s	4m ÷ 4n							
4t	45 × 4a × 4a × 4e							
4u	45 × 4a × 4f							
4v	45 × 4a × 4g							
4w	45 × 4h							
5a	⑲ − [⑱ from column P_4 ⇧]							
5d	⑰ ÷ 5a							
5e	a(t)							
5f	b(t)	From Table I						
5g	c(t)	as functions of 5d						
5h	d(t)							
5m	⑲ − [All V's above]							
5n	5a × 59							
5s	5m + 5n							
5t	59 × 5a × 5a × 5e							
5u	55 × 5a × 5f							
5v	55 × 5a × 59							
5w	55 × 5h							
6a	⑬ − [⑱ from column P_5 ⇧]							
6d	⑰ ÷ 6a							
6e	a(t)							
6f	b(t)	From Table I						
6g	c(t)	as functions of 6d						
6h	d(t)							
6m	⑲ − [All V's above]							
6n	6a × 69							
6s	6m ÷ 6n							
6t	65 × 6a × 6a × 6e							
6u	65 × 6a × 6f							
6v	65 × 6a × 69							
6w	65 × 6h							
20	Add all t's							
21	Add all u's							
22	Add all V's							
23	Add all W's							

		P_0	P_1	P_2	P_3
53	Copy ⑬				
54	Copy ⑲				
55	1 − ㉑				
56	③ × 46				
57	③ × ⑥ × 49				
58	③ × 52				
59	54 × 55				
60	58 − 57				
0ss	60 ÷ 54				
0uu	0ss × 0u				
0vv	0ss × 0v				
1mm	60 − [All VV's above]				
1ss	1mm ÷ 1m				
1uu	1ss × 1u				
1vv	1ss × 1v				
2mm	60 − [All VV's above]				
2ss	2mm ÷ 2m				
2uu	2ss × 2u				
2vv	2ss × 2v				
3mm	60 − [All VV's above]				
3ss	3mm ÷ 3m				
3uu	3ss × 3u				
3vv	3ss × 3v				
4mm	60 − [All VV's above]				
4ss	4mm ÷ 4m				
4uu	4ss × 4u				
4vv	4ss × 4v				
5mm	60 − [All VV's above]				
5ss	5mm ÷ 5m				
5uu	5ss × 5u				
5vv	5ss × 5v				
6mm	60 − [All VV's above]				
6ss	6mm ÷ 6m				
6uu	6ss × 6u				
6vv	6ss × 6v				
	Check: 22 should equal 19				
61	54 + All uu's				
62	57 + All vv's				

4h	a(t)]
4m	(19) − [All V's above]
4n	(4a) × (4g)
4s	(4m) ÷ (4n)
4t	(4s) × (4a) × (4a) × (4e)
4u	(4s) × (4a) × (4f)
4v	(4s) × (4a) × (4g)
4w	(4s) × (4h)
5a	(13) − [(18) from column P_4 ⇧]
5d	(17) ÷ (5a)
5e	a(t)
5f	b(t)
5g	c(t)
5h	d(t)
	} From Table I as functions of (5d)
5m	(19) − [All V's above]
5n	(5a) × (5g)
5s	(5m) ÷ (5n)
5t	(5s) × (5a) × (5a) × (5e)
5u	(5s) × (5a) × (5f)
5v	(5s) × (5a) × (5g)
5w	(5s) × (5h)
6a	(13) − [(18) from column P_5 ⇧]
6d	(17) ÷ (6a)
6e	a(t)
6f	b(t)
6g	c(t)
6h	d(t)
	} From Table I as functions of (6d)
6m	(19) − [All V's above]
6n	(6a) × (6g)
6s	(6m) ÷ (6n)
6t	(6s) × (6a) × (6a) × (6e)
6u	(6s) × (6a) × (6f)
6v	(6s) × (6a) × (6g)
6w	(6s) × (6h)
20	Add all t's
21	Add all u's
22	Add all v's
23	Add all w's
24	(5) × (23)
25	(24) + (14)
26	(4) × (23)
27	(25) + (26)
28	(15) × (27)
29	(16) + (28)
30	(8) × (14)
31	(30) × (24)
32	(30) × (28)
33	(30) × (27)
34	(31) − (20)
35	(32) − (21)
36	[(8)+1] × (24)
37	(33) − (36)
38	3 × (14) × (28)
39	3 × (14) × (27)
40	(39) − (24)
41	½ × (24) × (24)
42	(23) × (34)
43	(21) × (35)
44	(38) × (41)
45	(42)+(43)+(44)
46	(28) × (34)
47	(21) × (37)
48	(40) × (41)
49	(46)+(47)+(48)
50	(21) × (34)
51	(14) × (24) × (41)
52	(50) + (51)

4mm	(20) − [All VV's above]
4ss	(4mm) ÷ (4m)
4uu	(4ss) × (4u)
4vv	(4ss) × (4v)

5mm	(20) − [All VV's above]
5ss	(5mm) ÷ (5m)
5uu	(5ss) × (5u)
5vv	(5ss) × (5v)

6mm	(20) − [All VV's above]
6ss	(6mm) ÷ (6m)
6uu	(6ss) × (6u)
6vv	(6ss) × (6v)

Check: (22) should equal (19)

61	(32) + All uu's
62	(37) + All vv's

Check: (62) should equal (6)

63	1 − (61)
64	(63) × (63)
65	(4) × (62) × (62)
66	1 − (64) − (65)
67	(10) × (66)
68	1 + (67)
69	$\log_{10}$ (68)
70	(11) × (69)
71	antilog (70)
72	(71) − 1
73	(12) × (72)

Second-order C_p Keep only 3 sig. f

74	(33) × (35)
75	(15) × (15)
76	1 − (74) − (75)
77	(10) × (76)
78	1 + (77)
79	$\log_{10}$ (78)
80	(11) × (79)
81	antilog (80)
82	(81) − 1
83	(12) × (82)

First-order C_p

Calculate only on each side of every corner (that column which has a (Cs) somewhere above, and the c

mpute
lg. figs.
7 dec.

5	$\sqrt{4}$
6	1 ÷ 5
7	2 + 1
8	½ 3 × 7 ÷ 4

Interpolate linearly in tables

9	2 − 1
10	½ 3 × 9
11	2 ÷ 9
12	2 ÷ [3 × 5]

FORM A: Calculation of 2nd-Order Supersonic Flow Past Body of Revolution

	P_0	P_1	P_2	P_3	P_4	P_5	P_6
53	Copy 13						
54	Copy 19						
55	1 − 21						
56	3 × 45						
57	3 × 6 × 49						
58	3 × 52						
59	54 × 55						
60	59 − 57						

0ss	60 ÷ 54						
0uu	0ss × 0u						
0vv	0ss × 0v						

1mm	60 − [All VV's above]						
1ss	1mm ÷ 1m						
1uu	1ss × 1u						
1vv	1ss × 1v						

2mm	60 − [All VV's above]						
2ss	2mm ÷ 2m						
2uu	2ss × 2u						
2vv	2ss × 2v						

3mm	60 − [All VV's above]						
3ss	3mm ÷ 3m						
3uu	3ss × 3u						
3vv	3ss × 3v						

P_1 P_2 P_3 P_4 P_5 P_6

⇧]

n P_2 ⇧]

of 3d

, P_3 ⇧]

of 4d

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1mm	(60) − [All VV's above]	
1ss	(1mm) ÷ (1m)	
1uu	(1ss) × (1u)	
1vv	(1ss) × (1v)	

2mm	(60) − [All VV's above]	
2ss	(2mm) ÷ (2m)	
2uu	(2ss) × (2u)	
2vv	(2ss) × (2v)	

3mm	(60) − [All VV's above]	
3ss	(3mm) ÷ (3m)	
3uu	(3ss) × (3u)	
3vv	(3ss) × (3v)	

4mm	(60) − [All VV's above]	
4ss	(4mm) ÷ (4m)	
4uu	(4ss) × (4u)	
4vv	(4ss) × (4v)	

5mm	(60) − [All VV's above]	
5ss	(5mm) ÷ (5m)	
5uu	(5ss) × (5u)	
5vv	(5ss) × (5v)	

6mm	(60) − [All VV's above]	
6ss	(6mm) ÷ (6m)	
6uu	(6ss) × (6u)	
6vv	(6ss) × (6v)	

Check: (22) should equal (19)

61	(36) + All uu's	
62	(37) + All vv's	

Check: (82) should equal (59)

63	1 − (61)	
64	(63) × (63)	
65	(4) × (62) × (62)	
66	1 − (64) − (65)	
67	(10) × (66)	
68	1 + (67)	
69	$\log_{10}$ (68)	
70	(11) × (69)	
71	antilog (70)	
72	(71) − 1	
73	(12) × (72)	

Second-order C_p

Keep only 3 sig. figs. in final results

74	(58) × (55)	
75	(13) × (15)	
76	1 − (74) − (75)	
77	(10) × (76)	
78	1 + (77)	
79	$\log_{10}$ (78)	
80	(11) × (79)	
81	antilog (80)	
82	(81) − 1	
83	(12) × (82)	

First-order C_p

Calculate only on each side of every corner (that is, only for every column which has a (Cs) somewhere above, and the column preceding it).

Ca	(13) - [(18) from this col. ⇨]						
Cb	√(Ca)						
Cc	(Ca) × (Cb)						
Cd	(17) ÷ (Ca)						
Ce	h(t)						
Cf	j(t)						
Cg	k(t)	From Table II as functions of (Cd)					
Ch	l(t)						
Ci	m(t)						
Cm	(19) - [All V's above]						
Cs	(Cb) × (Cm)						
Ct	(Cs) × (Ce) × (Cb)						
Cu	(Cs) × (Cf) ÷ (Cb)						
Cv	(Cs) × (Cg) ÷ (Cb)						
Cw	(Cs) × (Ch) ÷ (Cc)						
Cx	(Cs) × (Cl) ÷ (Cc)						
Ka	(13) - [(18) from this col. ⇨]						
Kb	√(Ka)						
Kd	(17) ÷ (Ka)						
Ke	g(t)						
Kf	h(t)	From Table II as functions of (Kd)					
Kg	i(t)						
Kh	j(t)						
Kl	k(t)						
Kj	3 × (5) × (Cw)						
Kk	7 × (4) × (Cw)						
Kl	[(27) from this col. ⇩] - (Kk)						
Km	(15) × (Kl)						
Kn	[(29) from this col. ⇩] - (Kj)						
Kp	(16) + (Km) - (Kn)						
Kq	(4) × (15)						
Kr	(5) - (Kq)						
Ks	(Kb) × (Kp) ÷ (Kr)						
Kt	(Ks) × (Ka) × (Kb) × (Ke)						
Ku	(Ks) × (Kb) × (Kf)						
Kv	(Ks) × (Kb) × (Kg)						
Kw	(Ks) × (Kh) ÷ (Kb)						
Kx	(Ks) × (Kl) ÷ (Kb)						

← 0 if no corner (No (Cw) ten rows above)

← -(Kk), -(Kj) if no previous column

FORM B: Insert at Corner or Curvature Discontinuity

Spp	(58) from this ⇧ col.		← 0 if no previous column				
Sqq	(58) from this col. ⇨						
Srr	(Spp) - (Sqq)						
Sss	(Srr) ÷ [First (Cu)]						
Suu	(Sss) × (Cw)						
Svv	(Sss) × (Cx)						

Cmm	(60) - [All VV's above]						

← Omit these 3 rows if no corner (no (S-)'s directly above)

Kss	(Cmm) ÷ (Cm)						
Kuu	(Kss) × (Ku)						
Kvv	(Kss) × (Kv)						

Css	(Cmm) ÷ [First (Kx)]						
Cuu	(Css) × (Kw)						
Cvv	(Css) × (Kx)						