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THEORETICAL INVESTIGATIONS OF THE  
PROPERTIES OF OBLIQUE DETONATION WAVES

PHILIP 'F' GIBBER

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THEORETICAL INVESTIGATIONS OF THE PROPERTIES  
OF OBLIQUE DETONATION WAVES

\* \* \* \* \*

Philip 'F' Gibber

THEORETICAL INVESTIGATIONS OF THE PROPERTIES  
OF OBLIQUE DETONATION WAVES

by

Philip 'F' Gibber

Lieutenant, United States Navy

Submitted in partial fulfillment of  
the requirements for the degree of

MASTER OF SCIENCE  
IN  
AERONAUTICAL ENGINEERING

United States Naval Postgraduate School  
Monterey, California

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THEORETICAL INVESTIGATIONS OF THE PROPERTIES  
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the thesis requirements for the degree of

MASTER OF SCIENCE

IN

AERONAUTICAL ENGINEERING

from the

United States Naval Postgraduate School

## ABSTRACT

One method of solving the problem of burning or combustion at supersonic speed is by combusting in a stationary detonation wave. Stabilization of a detonation wave has been recently accomplished and is reproducible, but only in laboratory type apparatus.

Using two-dimensional steady flow, perfect gas theory, this paper provides solutions for the changes in properties that may be expected across any oblique detonation wave. Equations are established and solved using the Control Data Corporation 1604 digital computer of the U. S. Naval Postgraduate School, Monterey, California, for different values of specific heat ratio, initial Mach number, a function of the flow deflection angle, and the amount of heat added in the detonation. The results appear in tabular form and for several specific values of Mach number and heat addition in graphical form. An example of use of the data is shown with reference to a ramjet engine operating with a stationary detonation wave for the combustion process.

The author wishes to express his sincere appreciation to Professor Michael H. Vavra for his encouragement, supervision, and patience during the period of this work.

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## TABLE OF SYMBOLS

### Symbol

a	Acoustic velocity
a*	Critical acoustic velocity
M	Mach number
M <sub>1</sub> *	Velocity ratio, $V_1/a_1^*$
M <sub>2</sub> *	Velocity ratio, $V_2/a_2^*$
M <sub>2u</sub> *	Velocity ratio, $u/a_2^*$
M <sub>2v</sub> *	Velocity Ratio, $v/a_2^*$
p	Static pressure
P <sub>T</sub>	Total pressure
PR21	Pressure ratio, $p_2/p_1$
PTR21	Total pressure ratio, $P_{T2}/P_{T1}$
R	Universal gas constant
T	Static temperature (° Rankine)
T <sub>T</sub>	Total temperature (° Rankine)
TR21	Temperature ratio, $T_2/T_1$
u	Horizontal velocity component of $V_2$
v	Vertical Velocity component of $V_2$
V	Velocity
x	M <sub>2L</sub> *
y	M <sub>2v</sub> *
δ	Heat addition parameter, $(T_{T2}/T_{T1})^{1/2}$
γ	Specific heat ratio
ρ	Density
σ	Detonation (or shock) wave angle
θ	Flow deflection angle

## TABLE OF SYMBOLS

### Subscripts

1 Before Detonation Wave

2 After Detonation Wave

max Maximum

min Minimum

n Normal

t Tangential

T Total (stagnation)

u In u direction

v In v direction

## CHAPTER I

### INTRODUCTION

A detonation wave is a phenomenon which may occur as a result of a combustion process. The difference between a detonation wave and an ordinary deflagration wave or burning is that a detonation wave travels at supersonic velocity whereas a deflagration wave travels at subsonic velocity. Much has been written about detonation waves.<sup>1, 2, 3, 4</sup> Recently stationary normal detonation waves have been produced and maintained in a special supersonic wind tunnel<sup>5</sup>.

This thesis evaluates the downstream properties of a plane oblique stationary detonation wave as a function of the initial Mach number, flow deflection angle, and the amount of heat added in the detonation wave. The heat added is represented by a parameter  $\delta$ , the ratio of the total (stagnation) temperature after the detonation wave, to the total temperature prior to detonation. In addition, properties after the detonation wave are calculated for three values of the specific heat ratio  $\gamma$ , namely 1.2, 1.3, and 1.4.

Due to the complexities of establishing equations for actual flows for which solutions can be found, several basic assumptions have been made in the calculations. It is assumed that:

1) The flow is uniform and steady.

2) The gas to be burned is an ideal gas, i.e.,  
the equation of state

$$pv = RT$$

defines the state of the fluid at any time.

3) The friction between the fluid and the wall is considered negligible, or a non-viscous fluid is assumed.

4) The entire process is considered to take place in an isolated system. The process is assumed to be adiabatic except for the addition of heat in the detonation.

5) Transport properties such as internal heat transfer by radiation and conduction are neglected.

6) The composition of the fluid and the specific heats are unchanged through the detonation wave, i.e.,  $\gamma$  and the universal gas constant,  $R$ , remain constant.

Assumption 6) places the most severe restrictions on the applications of the results, but without these simplifications, the equations would become considerably more complicated if at all solvable.

If it proves possible to stabilize detonation waves in a practical manner, several possibilities for their use are imaginable; 1) use of the detonation as a combustion system for a ramjet, and 2) use of the detonation to provide underwing heating as a lift augmentation device or even as a means of primary propulsion.

There are several advantages of detonation wave combustion over conventional combustion in a ramjet. At the present state of the art, velocities of fuel-air mixtures entering a combustion chamber must be subsonic in order to achieve stable burning. This dictates deceleration of the incoming supersonic flow through a diffuser to subsonic speed. In the combustion chamber a flameholder is necessary to insure continuous combustion.

A ramjet operating with a standing detonation wave where the combustion takes place could be smaller and of simpler design. An inlet duct would be necessary to inject and mix fuel into the flow. The supersonic stream could be detonated in a normal detonation wave by spontaneous combustion if temperatures are high enough, or by an electric spark. The velocity after the detonation would be subsonic and would then be accelerated by passing through a converging diverging nozzle. A simplified schematic of such an engine is shown in Fig. 1.

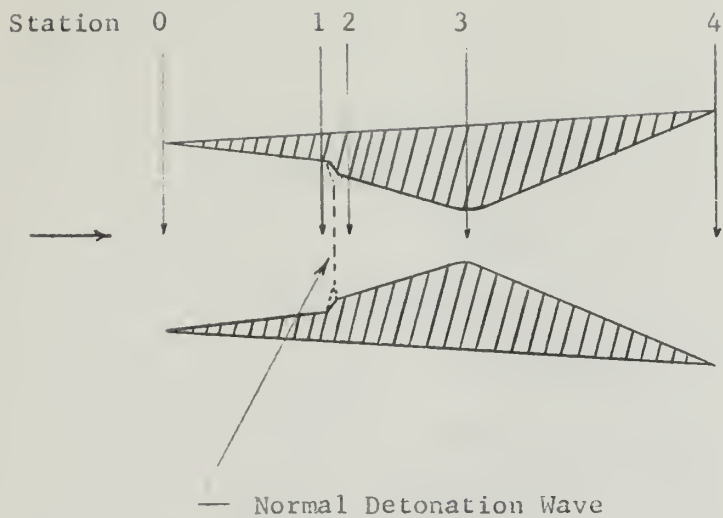


Fig. 1 Schematic of a Detonation Wave Ramjet Engine

The formation of the normal detonation wave between stations 1 and 2 near the wedge at the walls is postulated since such a near normal detonation wave has been stabilized, observed and reproduced<sup>5</sup>.

Fig. 2 shows an example of a ramjet engine using an oblique detonation wave for a combustion process. In this engine fuel is mixed with a supersonic incoming stream. An oblique detonation wave is formed at a conically pointed body. After the detonation wave the flow is of sonic velocity or greater and is then expanded to higher velocity.

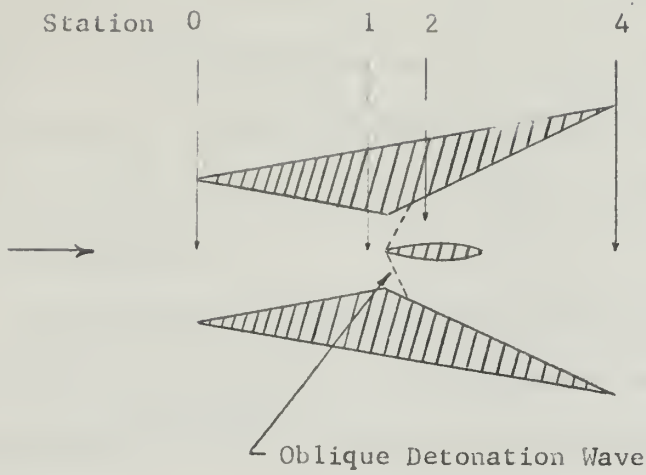


Fig. 2 Schematic of a Detonation Wave Ramjet

Fig. 3 is a concept of Sargent and Gross<sup>6</sup>. In Fig. 3 a free stream of Mach 6 is decelerated to Mach 4.0 and is detonated such that the products of detonation have sonic velocity. This flow is then accelerated in a nozzle.

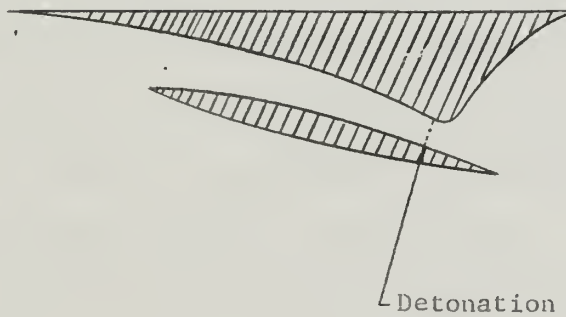
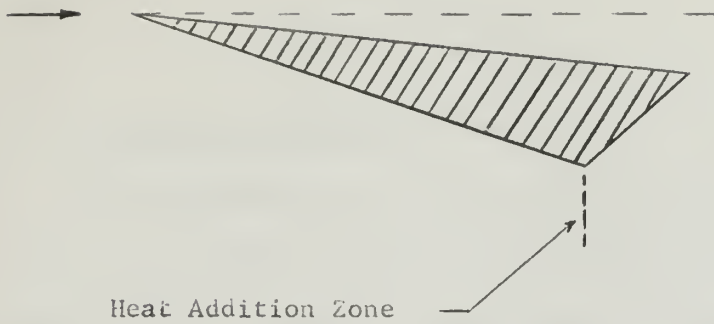


Fig. 3 Schematic of a Detonation Wave Ramjet Engine

It has been theorized<sup>6,7</sup> that the conventional subsonic burning ramjet engine will have a greater efficiency up to Mach numbers of 7 to 8. Above Mach 8 the efficiency of the supersonic combustion ramjet will be greater.

Experiments in supersonic combustion have been conducted with successful results without using detonation.<sup>8,9,10,11</sup> Aluminum borohydride was burned under the surface of a wing and a flat plate in a wind tunnel in the Mach 2.4 to 3.0 range. It was found that underwing heating increased the static pressure in the heated area. This pressure increase resulted in an increased lift and lift-drag ratio. The added lift could be used to increase the rate of climb, decrease the wing area needed, or if intermittent burning is considered, as a means of controlling or increasing the maneuverability of a missile or ramjet at high altitude. With a specially designed airfoil underwing heating provides a method of propulsion<sup>10</sup> as shown in Fig. 4. The similarity with Fig. 3 may be noted.

A detonation wave may be a possible method of adding the heat necessary for underwing heating.



Heat Addition Zone

Fig. 4 Schematic of Supersonic Burning Under a Wing

CHAPTER II  
ANALYSIS OF PROBLEM

1. Classical Shock Polar.

The solution to the problem of finding the properties of an oblique detonation wave is made along lines similar to those used for establishing the classical shock polar. The shock polar is used for determining properties after an oblique shock wave if no heat is added to the system. Fig. 5 depicts a wedge of flow deflection angle  $\theta$  in a supersonic stream of velocity  $V_1$ . An oblique shock wave forms at an angle  $\sigma$ , at

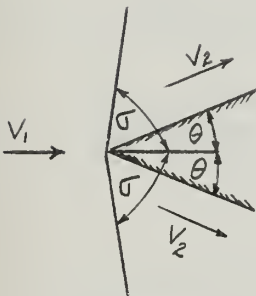


Fig. 5 A Wedge in a Supersonic Flow

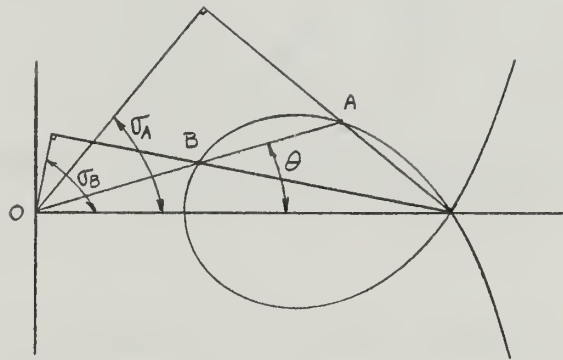


Fig. 6 Shock Polar Diagram

the apex of the wedge. Behind the shock wave the velocity  $V_2$ , is shown at an angle  $\theta$ . For a given  $V_1$  Fig. 6 represents a typical shock polar diagram for a flow such as that of Fig. 5. For a flow deflection angle  $\theta$ , OA and OB represent the two possible values of  $V_2$ . The ordinate and abscissa represent

the vertical and horizontal components of  $V_2$ , and  $\sigma_A$  and  $\sigma_B$  the possible shock wave angles. Fig. 5 and Fig. 6 are both symmetrical about the horizontal axis.

## 2. Detonation Polar.

If the shock in Fig. 5 is not considered to occur at constant total temperature or if the shock may be considered a detonation, the velocities of the fluid may be shown as in Fig. 7 and Fig. 8. Fig. 7 shows

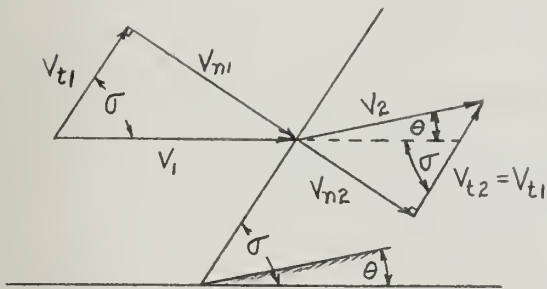


Fig. 7 Velocities across a Detonation Wave

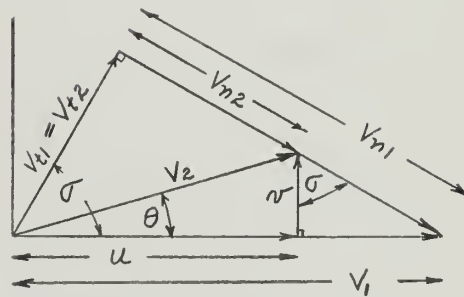


Fig. 8 Velocities across a Detonation Wave Superimposed

the velocities and their components as they would appear relative to the detonation wave and Fig. 8 shows them superimposed. Due to the symmetry about the horizontal axis only half the flow is shown. For such a detonation wave the law of conservation of mass can be applied normal to the detonation wave if it is assumed that the entire combustion takes place in the detonation wave and that the detonation wave is infinitesimally thin. Thus

$$\rho_1 V_{n1} = \rho_2 V_{n2} \quad (1)$$

Application of the conservation of momentum parallel to the detonation wave shows that the tangential components of the velocities, that is, the components parallel to the detonation wave, must be the same on both sides of the wave or

$$V_{t1} = V_{t2}$$

Likewise the conservation of momentum applied normal to the detonation wave can be written

$$p_1 + \rho_1 V_{n1}^2 = p_2 + \rho_2 V_{n2}^2 \quad (2)$$

Dividing Eq. 2 by Eq. 1 and rearranging

$$\frac{p_2}{\rho_2 V_{n2}} - \frac{p_1}{\rho_1 V_{n1}} = V_{n1} - V_{n2} \quad (3)$$

From  $a^2 = \gamma RT$

and the equation of state

$$\frac{p}{\rho} = RT = \frac{a^2}{\gamma} \quad (4)$$

substitution into Eq. 3, for the appropriate subscripted values of  $\frac{p}{\rho}$  and multiplying through by  $V_{n1}$ , gives

$$\frac{a_2^2 V_{n1}}{\gamma V_{n2}} - \frac{a_1^2}{\gamma} = V_{n1}(V_{n1} - V_{n2}) \quad (5)$$

From Fig. 8

$$\sin \sigma = \frac{V_{n1}}{V_1} = \frac{V_1 - u}{V_{n1} - V_{n2}}$$

and

$$V_{n1}(V_{n1} - V_{n2}) = V_1(V_1 - u) \quad (6)$$

or

$$\frac{V_{n2}}{V_{n1}} = 1 - \frac{V_1(V_1 - u)}{V_{n1}^2} \quad (7)$$

From Fig. 8

$$\tan \sigma = \frac{V_1 - u}{r} = \frac{V_{n1}}{V_t} = \frac{V_{n1}}{\sqrt{V_1^2 - V_{n1}^2}}$$

and

$$V_{n1}^2 r^2 = (V_1 - u)^2 (V_1^2 - V_{n1}^2)$$

or

$$V_{n1}^2 r^2 = V_1^2 (V_1 - u)^2 - V_{n1}^2 (V_1 - u)^2$$

and

$$\frac{1}{V_{n1}^2} = \frac{r^2 + (V_1 - u)^2}{V_1^2 (V_1 - u)^2} \quad (8)$$

Substituting Eq. 8 into the right side of Eq. 7

$$\frac{V_{n2}}{V_{n1}} = \frac{u(V_1 - u) - r^2}{V_1(V_1 - u)}$$

or

$$\frac{V_{n1}}{V_{n2}} = \frac{V_1(V_1 - u)}{u(V_1 - u) - v^2} \quad (9)$$

Substituting Eq. (9) and Eq. (6) into Eq. (5)

$$a_2^2 \left[ \frac{V_1(V_1 - u)}{u(V_1 - u) - v^2} \right] - a_1^2 = V_1(V_1 - u)\gamma \quad (10)$$

In order to correlate the quantity of heat added in the detonation wave to the velocities and acoustic velocities before and after the detonation wave, a transformation to a new reference system is desirable. Considering the flow before the detonation wave as having originated in a reservoir, then for a given reservoir condition the relation between the acoustic velocity  $a_0$ , of the fluid in the reservoir and the critical acoustic velocity  $a^*$  for an isentropic process is

$$a^{*2} = \frac{2}{\gamma+1} a_0^2$$

The relation between reservoir conditions and conditions at any point in an isentropic flow is

$$\frac{a^2}{\gamma-1} + \frac{V^2}{2} = \frac{a_0^2}{\gamma-1}$$

where  $a$  and  $V$  refer to any point in the flow.

Elimination of  $a_0$  from these equations results in

a relation between  $a$ ,  $a^*$ , and  $V$ , namely

$$a^2 = \left(\frac{\gamma+1}{2}\right) a^{*2} - \left(\frac{\gamma-1}{2}\right) V^2 \quad (11)$$

Using Eq. 11 with proper subscripts,  $a_1$  and  $a_2$  can be eliminated from Eq. 10 and

$$\begin{aligned} \left[ \left(\frac{\gamma+1}{2}\right) a_2^{*2} - \left(\frac{\gamma-1}{2}\right) V_2^2 \right] \left[ \frac{V_1(V_1-u)}{u(V_1-u)-v^2} \right] - \left[ \left(\frac{\gamma+1}{2}\right) a_1^{*2} - \left(\frac{\gamma-1}{2}\right) V_1^2 \right] \\ = V_1(V_1-u) \gamma \end{aligned} \quad (12)$$

with

$$V_2^2 = u^2 + v^2 \quad (13)$$

The quantity  $V_2$  may be eliminated from Eq. 12.

Substituting Eq. 12 into Eq. 13 and expanding yields

$$\begin{aligned} \left[ (\gamma+1) a_2^{*2} - (\gamma-1)(u^2+v^2) \right] \left[ V_1(V_1-u) \right] \\ - \left[ (\gamma+1) a_1^{*2} - (\gamma-1) V_1^2 \right] \left[ u(V_1-u) - v^2 \right] \\ = 2V_1\gamma(V_1-u) \left[ u(V_1-u) - v^2 \right] \end{aligned}$$

or

$$\begin{aligned} \left[ (\gamma+1) a_2^{*2} V_1(V_1-u) \right] - \left[ (\gamma-1) u^2 V_1(V_1-u) \right] \\ - \left[ (\gamma-1) v^2 V_1(V_1-u) \right] - \left[ (\gamma+1) a_1^{*2} u(V_1-u) \right] \\ + \left[ (\gamma+1) a_1^{*2} v^2 \right] + \left[ (\gamma-1) V_1^2 u(V_1-u) \right] - \left[ (\gamma-1) V_1^2 v^2 \right] \\ - \left[ 2\gamma V_1 u(V_1-u)^2 \right] + \left[ 2\gamma V_1(V_1-u) v^2 \right] = 0 \end{aligned}$$

Solving for  $v^2$

$$v^2 = \frac{(V_1 - u) \left[ (\gamma + 1) a_2^{*2} V_1 - (\gamma - 1) u^2 V_1 - (\gamma + 1) a_1^{*2} u + (\gamma - 1) V_1 u - 2\gamma V_1 u (V_1 - u) \right]}{(\gamma - 1) V_1 (V_1 - u) - (\gamma + 1) a_1^{*2} + (\gamma - 1) V_1^2 - 2\gamma V_1 (V_1 - u)}$$

$$v^2 = \frac{(V_1 - u) \left[ (\gamma + 1) \left\{ a_2^{*2} V_1 - a_1^{*2} u - V_1 u (V_1 - u) \right\} \right]}{- (\gamma + 1) a_1^{*2} - 2V_1^2 + u V_1 (\gamma + 1)}$$

$$v^2 = \frac{(V_1 - u)^2 \left[ u - \frac{(a_2^{*2} V_1 - a_1^{*2} u)}{V_1 (V_1 - u)} \right]}{\frac{a_1^{*2}}{V_1} + \left( \frac{2}{\gamma + 1} \right) V_1 - u} \quad (14)$$

It is customary and useful to express supersonic velocities by non-dimensional velocity ratios. These velocity ratios can be used to eliminate  $a_1^*$  and  $a_2^*$  as working parameters and simultaneously introduce the heat addition parameter  $\delta$ . To accomplish this let, by definition

$$M_{2v}^* \equiv \frac{v}{a_2^*} \quad (15)$$

$$M_{2u}^* \equiv \frac{u}{a_2^*} \quad (16)$$

$$M_1^* \equiv \frac{V_1}{a_1^*} \quad (17)$$

$$\delta^2 \equiv \frac{T_{T2}}{T_{T1}} \quad (18)$$

where the designation  $M^*$  means a velocity ratio based on a critical acoustic velocity of a fluid in a reservoir. The parameter  $\delta$  is a measure of the heat added by combustion during the detonation.

Assuming that the specific heats remain unchanged by the combustion,  $\delta$  is also proportional to the ratio of total enthalpies after and before the detonation wave.

With

$$a_1^{*2} = \left(\frac{2}{\gamma+1}\right) a_0^2 = \left(\frac{2}{\gamma+1}\right) \gamma R T_{T1}$$

and

$$a_2^{*2} = \left(\frac{2}{\gamma+1}\right) \gamma R T_{T2}$$

there is

$$\frac{a_2^{*2}}{a_1^{*2}} = \frac{T_{T2}}{T_{T1}} \equiv \delta^2 \quad (19)$$

Substitution of Eq. 15, Eq. 16, Eq. 17, and Eq. 19 into Eq. 14 yields the following series of equations

$$\frac{v_2^2 a_2^{*2}}{a_2^{*2}} = \frac{\left(\frac{v_1 a_1^*}{a_1^*} - \frac{u a_2^*}{a_2^*}\right)^2 \left[ \frac{u \frac{d_2^*}{a_2^*} - \frac{a_2^{*2} v_1 \frac{a_1^*}{a_1^*} - a_1^{*2} u \frac{d_2^*}{a_2^*}}{v_1 \frac{d_1^*}{a_1^*} \left(\frac{v_1 a_1^*}{a_1^*} - u \frac{d_2^*}{a_2^*}\right)} \right]}{\frac{a_1^{*2}}{v_1} + \left(\frac{2}{\gamma+1}\right) v_1 \frac{d_1^*}{a_1^*} - u \frac{d_2^*}{a_2^*}}$$

or

$$\begin{aligned}
 M_{2v}^{*2} a_2^{*2} &= \frac{(M_1^* a_1^* - M_{2u}^* a_2^*)^2 \left[ M_{2u}^* a_2^* - \frac{(M_1^* a_2^{*2} - M_{2u}^* a_1^* a_2^*)}{M_1^* a_1^* (M_1^* a_1^* - M_{2u}^* a_2^*)} \right]}{\frac{a_1^*}{M_1^*} + \left(\frac{2}{\gamma+1}\right) M_1^* a_1^* - M_{2u}^* a_2^*} \\
 M_{2v}^{*2} &= \frac{\left(\frac{M_1^*}{\delta} - M_{2u}^*\right)^2 \left[ M_{2u}^* \delta - \frac{\delta^2 M_1^* - \delta M_{2u}^*}{M_1^* (M_1^* - \delta M_{2u}^*)} \right]}{\frac{1}{M_1^*} + \left(\frac{2}{\gamma+1}\right) M_1^* - \delta M_{2u}^*} \\
 M_{2v}^{*2} &= \frac{(M_1^* - \delta M_{2u}^*)^2 \left[ M_{2u}^* - \frac{(\delta M_1^* - M_{2u}^*)}{M_1^* (M_1^* - \delta M_{2u}^*)} \right]}{\delta \left[ \frac{1}{M_1^*} + \left(\frac{2}{\gamma+1}\right) M_1^* - M_{2u}^* \delta \right]} \\
 M_{2v}^{*2} &= \frac{(M_1^* - \delta M_{2u}^*) \left[ M_{2u}^* (M_1^* - \delta M_{2u}^*) - \frac{(\delta M_1^* - M_{2u}^*)}{M_1^*} \right]}{\delta \left[ \frac{1}{M_1^*} + \left(\frac{2}{\gamma+1}\right) M_1^* - \delta M_{2u}^* \right]} \quad (20)
 \end{aligned}$$

This equation is the basic relation between the properties ahead of and after the oblique detonation wave. Introducing

$$x \equiv M_{2u}^*$$

$$y \equiv M_{2v}^*$$

substitution yields

$$y^2 = \frac{(M_1^* - \delta x) \left[ x(M_1^* - \delta x) - \frac{(\delta M_1^* - x)}{M_1^*} \right]}{\delta \left[ \frac{1}{M_1^*} + \left(\frac{2}{\gamma+1}\right) M_1^* - \delta x \right]} \quad (20a)$$

In equation Eq. 20a  $y$  is given as a function of  $\delta$ ,  $M_1^*$ ,  $\gamma$ , and  $x$ . When the heat addition parameter  $\delta$  is unity,

i.e., if no heat is added, the equation reduces to that of the shock polar. When  $\delta$  is greater than unity, however, the curve of the equation has two non-intersecting branches. One part is an ellipselike curve which shall henceforth be called the loop branch. The other part has a range of  $y$  values from plus infinity to minus infinity for finite values of  $x$ . This part shall be referred to as the infinite branch. Typical examples of the graph of Eq. 20a for a given  $\delta$  and  $M_1^*$  are shown in Fig. 9 for values of  $\delta$  of unity and greater than unity.

The velocity ratio  $M_1^*$  appears in Eq. 20a and also in later equations and calculations. A relation to transform  $M_1^*$  to  $M_1$  and vice versa is useful and desirable. By definition

$$M_1^* \equiv \frac{V_1}{a_1^*} = M_1 \frac{a_1}{a_1^*} \quad (21)$$

and

$$M_1^{*2} \equiv M_1^2 \left( \frac{a_1}{a_1^*} \right)^2$$

From Eq. 11

$$a_1^2 = \left( \frac{\gamma+1}{2} \right) a_1^{*2} - \left( \frac{\gamma-1}{2} \right) V_1^2$$

$$1 = \left( \frac{\gamma+1}{2} \right) \left( \frac{a_1}{a_1^*} \right)^2 - \left( \frac{\gamma-1}{2} \right) M_1^2 \quad (22)$$

$$\left( \frac{a_1}{a_1^*} \right)^2 = \frac{\gamma+1}{2+(\gamma-1)M_1^2}$$

Therefore

$$M_1^{*2} = \frac{M_1^2(\gamma+1)}{2+(\gamma-1)M_1^2} \quad (23)$$

and

$$M_1^2 = \frac{2M_1^{*2}}{(\gamma+1) - (\gamma-1)M_1^{*2}} \quad (24)$$

Eq. 23 shows that as  $M_1$  approaches an infinitely large value,  $M_1^*$  approaches a finite limit of

$$M_1^* = \sqrt{\frac{\gamma+1}{\gamma-1}}$$

In particular, for  $\gamma = 1.4$

$$M_1^* = \sqrt{6} = 2.4495$$

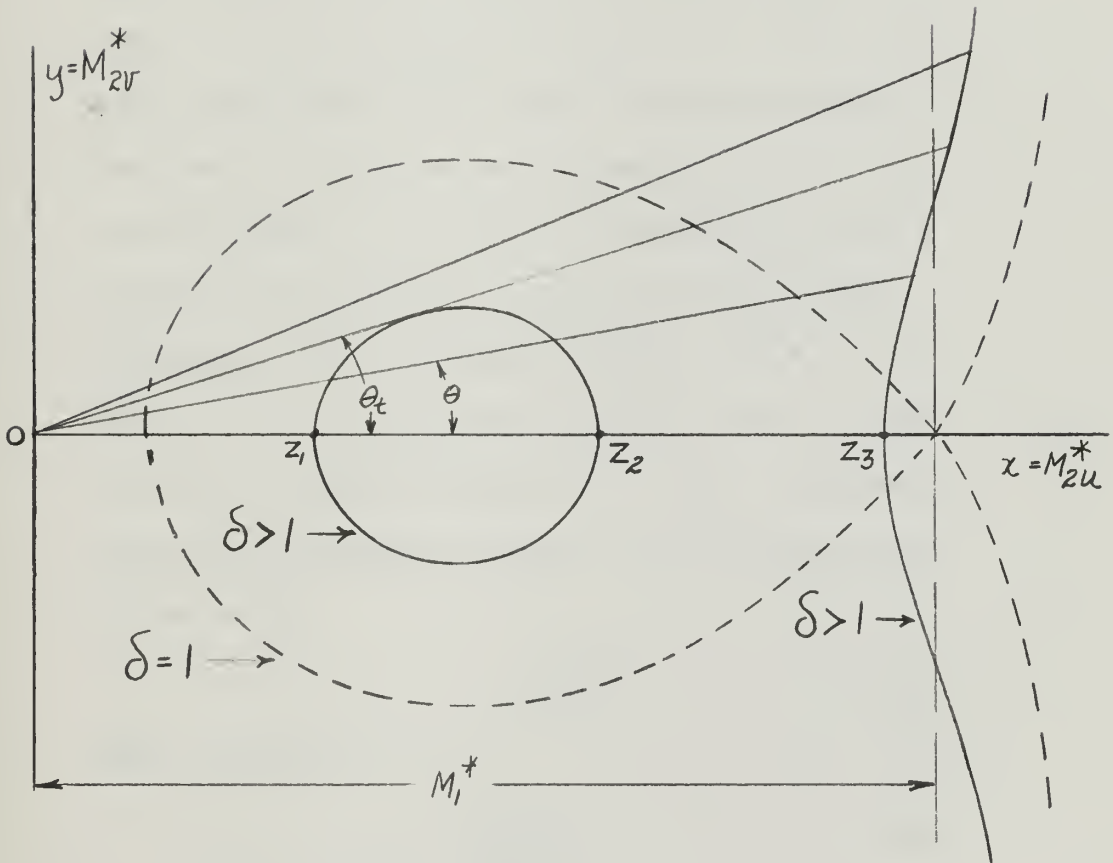


Fig. 9 Detonation Polar Diagram

Eq. 23 is shown in graphical form in Fig E-1 in Appendix E.

### 3. Discussion of Detonation Polar Equation.

The general form of Eq. 20a is that of a cubic

$$y^2 = f(x^3)$$

Such a curve may have three values of  $x$  at which  $y$  is zero or at which the curve crosses the  $x$  axis. For given values of  $M_1^*$ ,  $\delta$ , and  $\gamma$  these zero values are fixed. The minimum and maximum values of  $x$  on the loop branch,  $Z_1$  and  $Z_2$  respectively on Fig. 9, are found by setting the right hand bracket of the numerator to zero. For heat addition,  $\delta > 1$ , the values of  $x$  are always less than  $M_1^*$ . With no heat addition the maximum value of  $x$  is  $M_1^*$ . The general equation for finding the zeros of the loop branch may be reduced to

$$x = A \pm \sqrt{A^2 - 1} \quad (25)$$

where  $A$  is defined by

$$A \equiv \frac{M_1^{*2} + 1}{2\delta M_1^*} \quad (26)$$

From Eq. 25 and Eq. 26 it is seen that there exists a maximum value of  $\delta$  or a maximum amount of heat which

can be added in the detonation wave for any given value of  $M_1^*$ . When  $A$  of Eq. 26 is equal to unity the loop branch degenerates to a single point. At values less than unity the solution becomes imaginary and the loop branch disappears completely.  $\delta_{\max}$ , the maximum value of  $\delta$ , is found from Eq. 26 for  $A = 1$  by

$$\delta_{\max} = \frac{M_1^{*2} + 1}{2 M_1^*} \quad (27)$$

The third zero,  $Z_3$  on Fig. 9, is found by equating the left hand bracket of the numerator to zero so that

$$x = \frac{M_1^*}{\delta} \quad (28)$$

This value of  $x$  is also less than  $M_1^*$  for  $\delta > 1$ . When  $\delta = 1$ ,  $x$  reaches a maximum equal to  $M_1^*$  and the points  $Z_2$  and  $Z_3$  coalesce. Eq. 27 and Eq. 28 show that for values of  $\delta > \delta_{\max}$ , the infinite branch exists although the loop branch has disappeared.

A fourth value of interest is the value of  $x$  at which  $y$  becomes infinite, i.e., the value of  $x$  which makes the denominator of Eq. 20a zero. This is

$$x = \left[ \frac{1}{M_1^*} + \left( \frac{2}{\delta+1} \right) M_1^* \right] \frac{1}{\delta} \quad (29)$$

Eq. 29 gives the maximum possible value of  $x$  for any given  $\gamma$ ,  $M_1^*$ , and  $\delta$ , and may be  $\geq M_1^*$  depending upon the amount of heat added in the detonation wave.

In the shock polar of Fig. 6, OA represents the velocity  $V_2$ .  $\theta$  represents the flow deflection angle. In the detonation polar a position line, a line drawn from the origin ( $x = 0, y = 0$ ) to any point on the detonation polar, represents a function of  $V_2$  and  $\delta$ .  $\theta$  remains the flow deflection angle. As can be seen in Fig. 9, there are three distinct cases and/or ranges of  $\theta$ . In the first case  $\theta$  varies from  $0^\circ$  to  $\theta_t$ , the angle at which a position line is tangent to the loop branch. The second case is  $\theta = \theta_t$ , and in the third case  $\theta > \theta_t$ . All three conditions exist in the shock polar also. A position line intersects the infinite branch once, twice, or not at all. In the shock polar the intersection with the infinite branch can be eliminated as a possible solution since this part of the curve corresponds to values of  $V_2$  greater than  $V_1$ . Such an increase in velocity across a shock wave would be accompanied by a decrease in entropy, a violation of the second law of thermodynamics.

In the detonation polar the intersection of a position line with the infinite branch also produces solutions inconsistent with the second law of thermodynamics. By definition

$$x \equiv \frac{u}{a_2^*} \leq \frac{V_2}{a_2^*}$$

Across a detonation wave  $V_1 > V_2$  so that

$$x \leq \frac{V_2}{a_2^*} < \frac{V_1}{a_2^*} \quad (30)$$

By tautology, Eq. 19, and Eq. 17,

$$\frac{V_1}{a_2^*} = \frac{V_1}{a_2^*} \frac{a_2^*}{a_1^* \delta} = \frac{M_1^*}{\delta}$$

Substitution in Eq. 30 gives

$$x < \frac{M_1^*}{\delta} \quad (31)$$

Eq. 28 shows that the minimum value of  $x$  on the

infinite branch is  $\frac{M_1^*}{\delta}$  or

$$x \geq \frac{M_1^*}{\delta} \quad (32)$$

Comparison of the inequalities of Eq. 31 and Eq. 32 show the infinite branch of the detonation polar to correspond to solutions where  $V_2 > V_1$ . Thus the infinite branch is of no practical value for determining properties after an oblique detonation wave.

A position line generally intersects the loop branch of the detonation polar at two points, corresponding to weak and strong detonation waves. Each point determines the possible properties of the flow after the detonation wave. The values corresponding to points on the detonation polar are the principal subject of this thesis and

will be treated subsequently.

When  $\theta = \theta_t$ , the position line is tangent to the loop branch, and only one possible condition may exist after the detonation wave. Values of  $\theta > \theta_t$  correspond to a detached shock wave in the shock polar. Similarly for the detonation polar it may be theorized that a detached detonation wave would form for  $\theta > \theta_t$  but this occurrence would have to be verified by experimental evidence.

For the range  $\theta$  to  $\theta_t$ , using Eq. 20a as a basis for the conditions across a detonation wave, the properties of state after the detonation wave can be established.

#### 4. Temperature Ratios.

By definition the total temperature ratio is

$$\frac{T_{T2}}{T_{T1}} \equiv \delta^2$$

The total temperature is related to the static temperature by

$$T_T = T \left[ 1 + \left( \frac{\gamma-1}{2} \right) M^2 \right] \quad (33)$$

For simplicity, let

$$D = 1 + \left( \frac{\gamma-1}{2} \right) M^2 \quad (34)$$

hence,

$$T_T = TD$$

The static temperature ratio is therefore

$$\frac{T_2}{T_1} = \frac{T_{T2} D_1}{T_{T1} D_2} = \delta^2 \frac{D_1}{D_2} \quad (35)$$

5. Pressure Ratios.

With

$$\frac{p_2}{p_1} = \frac{\rho_2 R T_2}{\rho_1 R T_1}$$

Eq. 35 gives

$$\frac{p_2}{p_1} = \delta^2 \frac{\rho_2 D_1}{\rho_1 D_2}$$

Using the density ratio of Eq. 1

$$\frac{p_2}{p_1} = \delta^2 \frac{V_{n1} D_1}{V_{n2} D_2}$$

From Eq. 9 the ratio of the velocities normal to the detonation wave is expressed by

$$\frac{p_2}{p_1} = \left[ \frac{V_1 (V_1 - u)}{u (V_1 - u) - v^2} \right] \delta^2 \frac{D_1}{D_2}$$

By tautology, definition of Mach number, Eq. 19 and

$$\frac{a_2^2}{a_1^2} = \delta^2 \frac{D_1}{D_2}$$

there is

$$\frac{p_2}{p_1} = \delta^2 \frac{D_1}{D_2} \left[ \frac{M_1^2 a_1^2 - M_1 M_2 u a_1 a_2}{M_1 M_2 u a_1 a_2 - M_2^2 a_2^2 - M_2^2 v^2} \right]$$

and

$$\frac{p_2}{p_1} = \delta^2 \frac{D_1}{D_2} \left[ \frac{M_1^2 - M_1 M_2 u \delta \left( \frac{D_1}{D_2} \right)^{1/2}}{M_1 M_2 u \delta \left( \frac{D_1}{D_2} \right)^{1/2} - M_2^2 \delta^2 \left( \frac{D_1}{D_2} \right)} \right]$$

The static pressure ratio can then be calculated from

$$\frac{P_2}{P_1} = \delta \left( \frac{D_1}{D_2} \right)^{\frac{1}{2}} \left[ \frac{M_1^2 - M_1 M_2 u \delta \left( \frac{D_1}{D_2} \right)^{\frac{1}{2}}}{M_1 M_2 u - M_2 \delta \left( \frac{D_1}{D_2} \right)^{\frac{1}{2}}} \right] \quad (36)$$

or

$$\frac{P_2}{P_1} = \delta \left( \frac{D_1}{D_2} \right)^{\frac{1}{2}} \cdot \left[ \frac{M_1^2 - M_1 M_2 \cos \theta \delta \left( \frac{D_1}{D_2} \right)^{\frac{1}{2}}}{M_1 M_2 \cos \theta - M_2^2 \delta \left( \frac{D_1}{D_2} \right)^{\frac{1}{2}}} \right] \quad (37)$$

The total pressure is related to the static pressure by

$$P_T = P \left[ 1 + \left( \frac{\gamma-1}{2} \right) M^2 \right]^{\frac{\gamma}{\gamma-1}} = P D^{\frac{\gamma}{\gamma-1}} \quad (38)$$

and

$$\frac{P_{T2}}{P_{T1}} = \frac{P_2}{P_1} \left( \frac{D_2}{D_1} \right)^{\frac{\gamma}{\gamma-1}} \quad (39)$$

## 6. Flow Deflection Angle and Detonation Wave Angle.

The flow deflection angle  $\theta$  is

$$\theta = \tan^{-1} \left( \frac{y}{x} \right) \quad (40)$$

The detonation wave angle  $\sigma$  may be found from the geometry of Fig. 8

$$\tan \sigma = \frac{V_1 - u}{v} = \frac{V_1}{v} - \frac{u}{v}$$

Conversion to the starred system gives

$$\tan \sigma = \frac{V_1 a_1^* a_2^*}{v a_1^* a_2^*} - \cot \theta = \frac{M_1^* a_1^*}{y a_2^*} - \cot \theta$$

and

$$\sigma = \tan^{-1} \left( \frac{M_1^*}{y \delta^{1/2}} - \frac{x}{y} \right) \quad (41)$$

7. Mach number after a detonation wave.

The Mach number of the flow after the detonation wave is found as a function of  $x$  and  $y$ . From Eq. 24

$$M_2^2 = \frac{2 M_2^{*2}}{(\gamma+1) - (\gamma-1) M_2^{*2}}$$

With

$$M_2^{*2} = x^2 + y^2 \quad (42)$$

then

$$M_2^2 = \frac{2(x^2 + y^2)}{(\gamma+1) - (\gamma-1)(x^2 + y^2)}$$

The components of  $M_2$ , namely  $M_{2u}$  and  $M_{2v}$  are

$$M_{2u} = M_2 \cos \theta$$

$$M_{2v} = M_2 \sin \theta$$

CHAPTER III

CALCULATIONS AND RESULTS

1. Calculations.

Properties concerning the oblique detonation wave, namely  $M_2$ ,  $\theta$ ,  $\sigma$ ,  $\frac{P_2}{P_1}$ ,  $\frac{P_{r2}}{P_{r1}}$ , and  $\frac{T_2}{T_1}$  were calculated for given values of  $\gamma$ ,  $M_1$ ,  $\delta$ , and  $x$ , using a Control Data Corporation 1604 digital computer. A program was composed for a specific  $\gamma$ .  $M_1$ ,  $\delta$ , and  $x$  were allowed to assume a range of suitable values for three values of  $\gamma$ . These ranges are given in Table I.

TABLE I	
Ranges or Values of Parameters	
Parameter	Range of Values
$\gamma$	1.2, 1.3, 1.4
$M_1$	1.5 to 5.0 by increments of 0.50 8.0 to 14.0 by increments of 3.00
$\delta$	1.0 to $\delta_{\max}$ by increments of 0.04 or 0.08
$x$	$x_{\min}$ to $x_{\max}$ by increments of 0.03 or 0.05

where

$\delta_{\max}$  is defined by Eq. 27

$x_{\min}$  is the  $Z_1$  value of Fig. 9 and is defined by Eq. 25

$x_{\max}$  is the  $Z_2$  value of Fig. 9 and is defined by Eq. 25

For the given set of conditions  $\gamma$ ,  $M_1$ ,  $\delta$ , and  $x$ , the order of calculation and the equations used are given in Table II.

TABLE II		
Order of Calculations		
	Parameter	Equation Number
1)	$M_1^*$	23
2)	$y$	20a
3)	$\theta$	40
4)	$\sigma$	41
5)	$M_2^*$	42
6)	$M_2$	24
7)	$T_2/T_1$	35
8)	$P_2/P_1$	37
9)	$P_{T2}/P_{T1}$	39

The Fortran program used for the above calculations appears in Appendix F.

## 2. Results.

For given values of  $\gamma$ ,  $M_1$ ,  $\delta$ , and  $x$  (as indicated in Table I) the conditions defining the flow after an oblique detonation wave are shown in tabular form in Appendices G, H, and I. These properties are  $\theta$ ,  $M_2$ ,  $\sigma$ ,  $P_2/P_1$ ,  $P_{T2}/P_{T1}$ , and  $T_2/T_1$ . For several select values of  $\gamma$ ,  $M_1$ , and  $\delta$  graphs of these conditions are

shown in Appendices A through D. With one notable exception the graphs are shown with  $x$  ( $M_{2u}^*$ ) as the abscissa. Selections of the graphs of  $\sigma$  versus  $x$  were unintelligible in several cases. When this occurred the flow deflection angle  $\theta$  was used as an abscissa.

CHAPTER IV  
APPLICATIONS

The main application of the data presented in the appendices is the prediction of properties following a stationary oblique detonation wave which has formed on a wedge-like body in a supersonic stream. The actual physical establishment of such waves has been performed only on a small scale in special laboratory apparatus and only the normal detonation wave has been stabilized. Many experiments will be necessary to determine methods by which oblique detonation waves may be stabilized. Estimations of expected temperatures and pressures will be valuable in such experiments. Maximum values of wedge angles and the amount of heat that may be added for a given pre-detonation velocity should also prove useful.

The data in the appendices may also be used to give a first approximation in calculating or comparing the performance of detonation wave ramjet engines. As an example let the engines of Fig. 1 and Fig. 2 be denoted as A and B respectively. Consider these engines flying at an altitude of 50,000 feet at Mach 5. Table III gives the state of the flowing stream at various stations in these engines under the following assumptions:

- 1) Flow conditions at stations 0 and 1 are the same.
- 2) In engine A, a normal detonation wave occurs

TABLE III

FLOW CONDITIONS IN A RAMJET ENGINE

Altitude: 50,000 feet

Velocity: Mach 5

$\delta$  : 1.2

$\gamma$  : 1.4

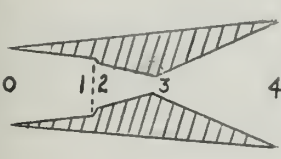
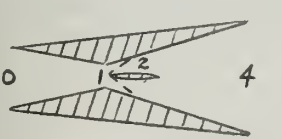
Configuration	Station	0	1	2	3	4
<p>Ramjet A</p> 	M	5	5	.587	1	2.88
	p (psia)	1.685	1.685	41.00	29.35	1.685
	$P_T$ (psia)	890	890	51.7	51.7	51.7
	T ( $^{\circ}$ R)	390	390	3150	2805	1050
	$T_T$ ( $^{\circ}$ R)	2340	2340	3370	3370	3370
	a(ft/sec.)	968.5				1592
	V(ft/sec.)	4843				4590
Configuration	Station	0	1	2		4
<p>Ramjet B</p> 	M	5	5	1		2.99
	p (psia)	1.685	1.685	32.1		1.685
	$P_T$ (psia)	890	890	61.0		61.0
	T ( $^{\circ}$ R)	390	390	2805		1210
	$T_T$ ( $^{\circ}$ R)	2340	2340	3370		3370
	a(ft/sec)	968.5				1710
	<u>Specific Impulse</u>	V(ft/sec)	4843			
8.90 lb-sec/lb	Area(cross-sectional)	$A_0$	$A_0$	$A_0$		$4.19A_0$

TABLE IV

FLOW CONDITIONS IN A RAMJET ENGINE

Altitude: 50,000 feet  
 Velocity: Mach 5  
 $\gamma$  : 1.4  
 $\delta$  : 1.2

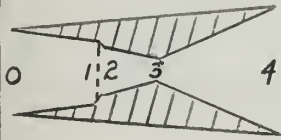
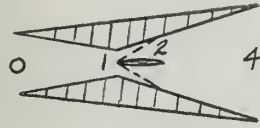
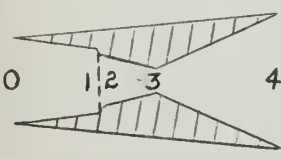
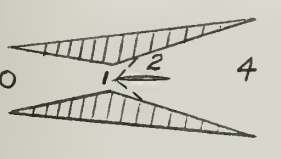
Configuration	Station	0	1	2	3	4	
 <p>Ramjet A</p>	M	5	3	.72	1	4.03	
	p (psia)	1.685	24.2	182	141.5	1.685	
	$p_T$ (psia)	890	890	268	268	268	
	T ( $^{\circ}$ R)	390	835	3100	2805	782	
	$T_T$ ( $^{\circ}$ R)	2340	2340	3370	3370	3370	
	a(ft/sec.)	968.3				1386	
	<u>Specific Impulse</u>	V(ft/sec.)	4843				5600
	23.5 lb-sec/lb	Area(cross-sectional)	$A_o$	.169 $A_o$	.169 $A_o$	.157 $A_o$	1.69 $A_o$
Configuration	Station	0	1	2		4	
 <p>Ramjet B</p>	M	5	3	1		4.38	
	p (psia)	1.685	24.2	148		1.685	
	$p_T$ (psia)	890	890	2795		279.5	
	T ( $^{\circ}$ R)	390	835	2805		780	
	$T_T$ ( $^{\circ}$ R)	2340	2340	3370		3370	
	a(ft/sec.)	968.5				1380	
	<u>Specific Impulse</u>	V(ft/sec.)	4843				6050
	37.5 lb-sec/lb	Area(cross-sectional)	$A_o$	.169 $A_o$	.169 $A_o$		2.53 $A_o$

TABLE V

FLOW CONDITIONS IN A RAMJET ENGINE

Altitude: 100,000 feet  
 Velocity: Mach 8  
 $\gamma$  : 1.4  
 $\delta$  : 1.2

Configuration	Station	0	1	2	3	4	
Ramjet A 	M	8	3	.750	1	6.60	
	p (psia)	.157	42.0	31.8	243.5	.157	
	$P_T$ (psia)	1540	1540	462	462	462	
	T ( $^{\circ}$ R)	419.6	2065	7480	6950	860	
	$T_T$ ( $^{\circ}$ R)	5790	5790	8340	8340	8340	
	a(ft/sec.)	1005				1440	
	<u>Specific Impulse</u>	V(ft/sec.)	8040				9500
	45.4 lb-sec/lb	Area(cross-sectional)	$A_o$	.0223 $A_o$	.0223 $A_o$	.0209 $A_o$	1.75 $A_o$
Configuration	Station	0	1	2		4	
Ramjet B 	M	8	3	1		6.71	
	p (psia)	.157	42.0	256		.157	
	$P_T$ (psia)	1540	1540	484		484	
	T ( $^{\circ}$ R)	419.6	2065	6940		834	
	$T_T$ ( $^{\circ}$ R)	5790	5790	8340		8340	
	a(ft/sec.)	1005				1417	
	<u>Specific Impulse</u>	V(ft/sec.)	8040				9500
	45.4 lb-sec/lb	Area(cross-section)	$A_o$	.0223 $A_o$	.0223 $A_o$		1.99 $A_o$

between stations 1 and 2. In engine B, an oblique detonation wave occurs between stations 1 and 2 such that  $M_2 = 1$ .

- 3) The properties across the detonation wave may be determined from Appendix G ( $\gamma = 1.4$ ) for a  $\delta$  of 1.2 or total temperature ratio of 1.44.
- 4) Engine A is choked at station 3, i.e.,  $M_3 = 1$ .
- 5) The flow is fully expanded to ambient pressure by the divergent nozzle so that  $p_4 = p_o$ .
- 6) The mass flow rate remains constant throughout.
- 7) Except in the detonation wave, the entire cycle is isentropic.

One measure of the performance of a ramjet engine is the specific impulse, the pounds of thrust per pound of air flow per second. From Table III engine A may be seen to have the flow velocity at exit smaller than that at the inlet,  $V_4 < V_o$ . This is unacceptable. The exit velocity of engine B is greater than the inlet velocity and the specific impulse is 8.90. This is low compared to specific impulse estimations for a conventional type ramjet<sup>6</sup>. Since the exit pressure is fixed at ambient pressure, the total pressure at station 4 is the determining factor for the Mach number at exit. From Appendix G it may be seen that the total pressure losses across detonation waves are smaller at lower Mach numbers. The reason for the converging inlet duct of the ramjet shown in Fig. 3 is now evident.

Let the inlet ducts of engines A and B be such that the stream is isentropically compressed from free stream Mach number  $M_0$  of 5 to a pre-detonation Mach number  $M_1$  of 3. Other assumptions remain the same as in the examples of Table III. Table IV gives conditions at stations in engines A and B. The specific impulse of A is 23.5 and B is 37.5. As expected, A has a smaller specific impulse due to greater losses in the stronger (normal) detonation wave.

A final example is shown in Table V for ramjet A and B at 100,000 feet and Mach 8. A specific impulse higher than any of the previous cases is shown. The high temperatures associated with hypersonic speeds may be noted. The pre-detonation temperature of  $2065^\circ \text{R}$  may be sufficient to allow the detonation to occur spontaneously.

The cross-sectional areas were calculated for the engines in Tables III, IV, and V. The range of values of exit to inlet areas is from 1.69 to 4.19. Such sizes seem possible for a ramjet configuration. The inlet duct ratios  $A_0/A_1$  are high, becoming almost 50 for the Mach 8 example. The efficiency or recovery factor of such an inlet duct will not be large.

More accurate values of performance parameters may be obtained by including representative efficiencies for the various stages, and by adjusting mass flow rate and  $\gamma$  appropriately. Performance parameters as specific

fuel consumption, mass flow rate, specific impulse and thermal efficiency can be estimated and optimized for various altitudes, flight Mach number, pre-detonation Mach number and amount of heat addition.

Although the values for the examples of Tables III, IV and V are not exact, they provide rough estimations of what can be expected, and may suggest methods for design improvement or for increasing the performance.

## CHAPTER V

### CONCLUSIONS

At the present time the interest in stationary detonation waves is primarily academic because of the lack of experimental data. Theoretically the use of detonation waves is a feasible method for supersonic combustion. Supersonic burning has been achieved without resort to detonation and the losses associated with detonation. But expensive, not readily available, exotic fuels such as aluminum borohydride are necessary whereas detonation wave combustion may be accomplished with common hydrocarbon fuels. The temperatures encountered in supersonic combustion are beyond the structural capabilities of any materials now in use. While external combustion or detonation may provide a means to lessen the effects of high temperature, external combustion is also in the theoretical category.

It may be concluded that a detonation wave process in a propulsive unit is a possibility, but it is still a method of the future and will depend on experimental progress in stabilization of detonation waves and technological advances in structural materials.

## REFERENCES

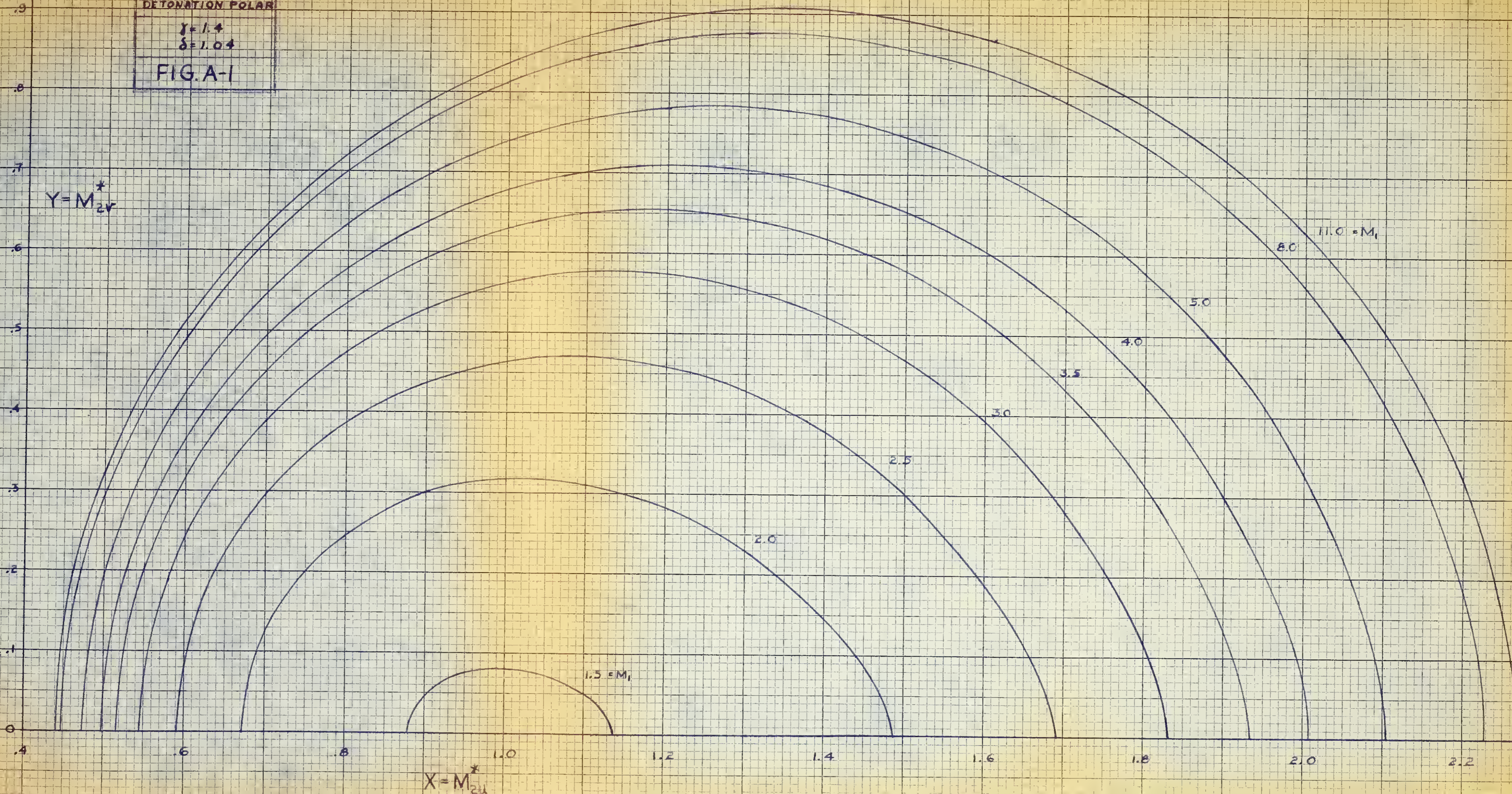
1. Eisen, C. L., Gross, R. A., and Rivlin, T. J., Theoretical Calculations in Gaseous Detonation, AFOSR TN-58-326, ASTIA No. AD 154230, Mar., 1958.
2. Chinitz, W., Bohrer, L. C., and Foreman, K. M., Properties of Oblique Detonation Waves, AFOSR TN-59-462, ASTIA No. AD 215267, April 1959.
3. Siestrunk, R., Fabri, J., and Le Grives, E., Some Properties of Stationary Detonation Waves, Fourth Symposium on Combustion, William and Wilkins Co., Baltimore, 1953, pp.498-501.
4. Nicholls, J. A., Dabora, E. K., and Gealer, R. L., Studies in Connection with Stabilized Gaseous Detonation Waves, Seventh Symposium on Combustion, Butterworth Scientific Publications, 1959, pp. 144-150 .
5. Gross, R. A., A Study of Combustion in Supersonic Flow, Research, Vol. 12, Oct.-Nov. 1959, pp. 381-389.
6. Sargent, W. H. and Gross, R. A., Detonation Wave Hypersonic Ramjet, ARS Journal, Vol. 30, No. 6, June 1960, pp. 543-549.
7. Dugger, G. L., Recent Advances in Ramjet Combustion, ARS Journal, Vol. 29 No. 11, Nov. 1959, pp. 819-834.
8. Lomax, H., Two-Dimensional, Supersonic, Linearized Flow with Heat Addition, NASA Memo 1-10-59A, February 1959.
9. Dorsch, R. G., Serafini, J. S., Fletcher, E.A. and Pinkel, I. I., Experimental Investigation of Aerodynamic Effects of External Combustion in Airstream Below Two-Dimensional Supersonic Wing at Mach 2.5 and 3.0, NASA Memo 1-11-59E, March 1959.
10. Luidens, R. W., and Flaherty, R. J., Analysis and Evaluation of Supersonic Underwing Heat Addition, NASA Memo 3-17-59E, April 1959.
11. Dorsch, R. G., Allen, Jr., H. and Dryer, M., Investigation of Aerodynamic Effects of External Combustion Below Flat-Plate Model in 10-by 10-Foot Wind Tunnel at Mach 2.4, NASA TN-D-282, April 1960.

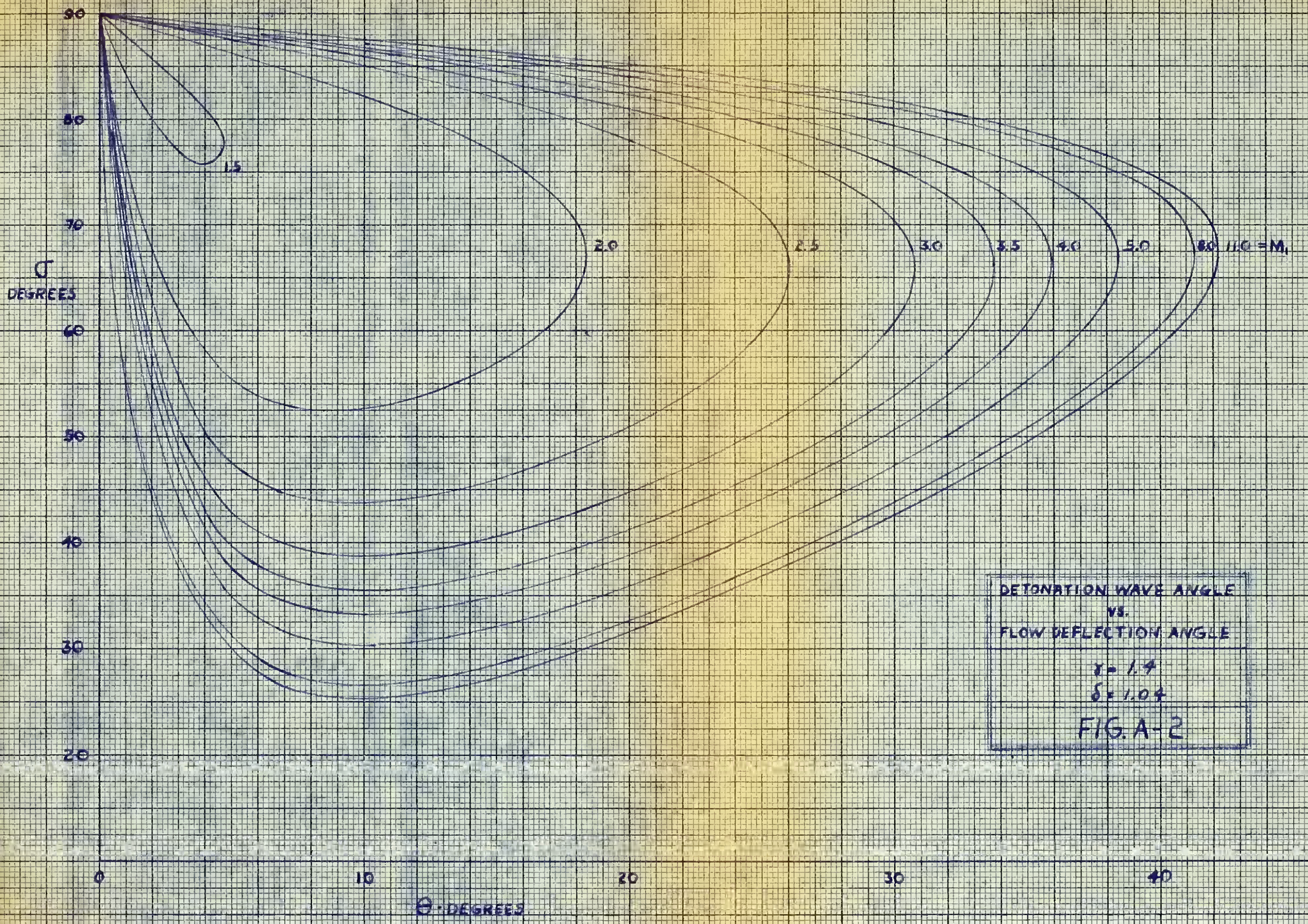
APPENDIX A

DETONATION POLAR

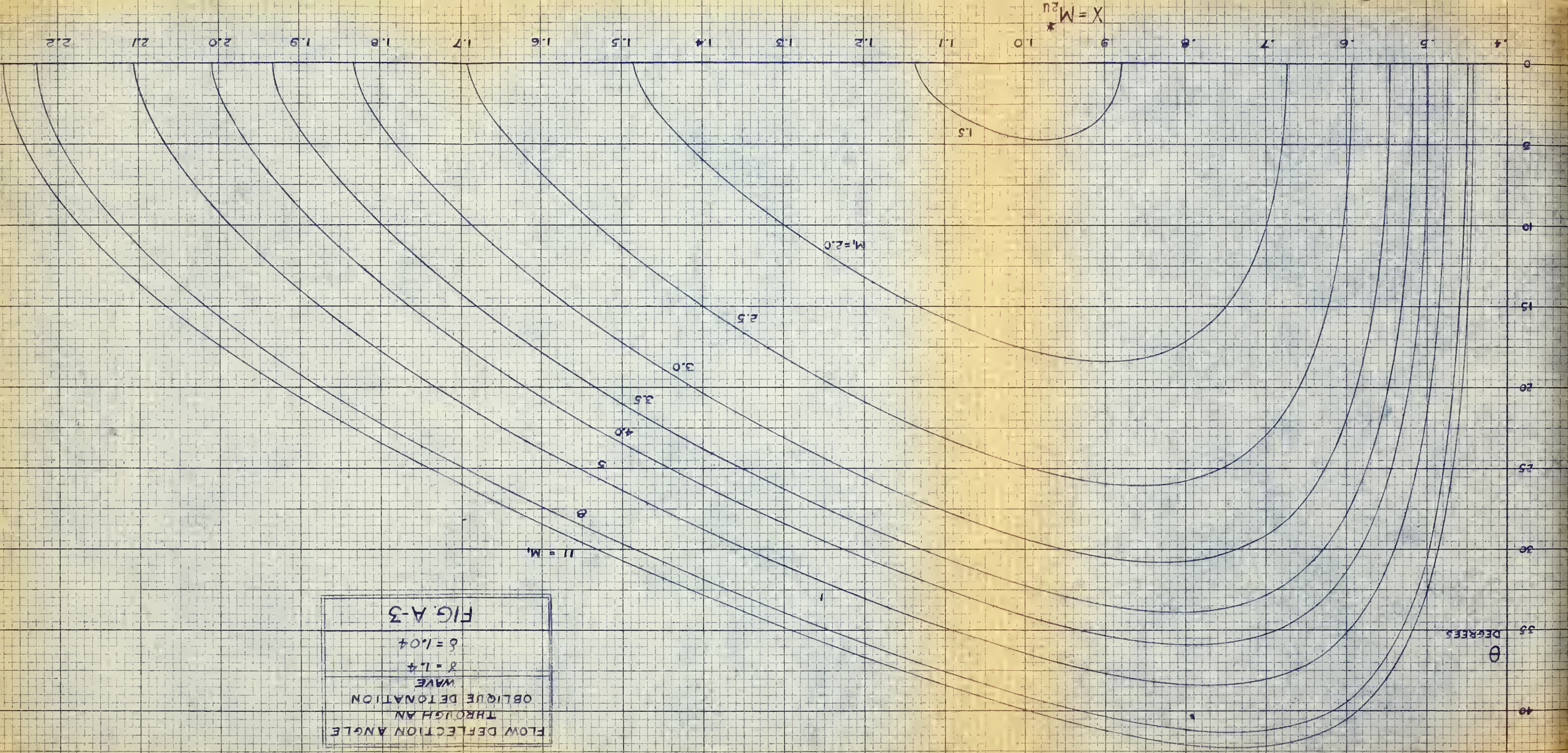
$\gamma = 1.4$   
 $\delta = 1.04$

FIG. A-1





DETONATION WAVE ANGLE  
 VS.  
 FLOW DEFLECTION ANGLE  
 $\gamma = 1.4$   
 $\delta = 1.04$   
 FIG. A-2



FLOW DEFLECTION ANGLE  
 THROUGH AN  
 OBLIQUE DETONATION  
 WAVE  
 $\gamma = 1.4$   
 $\delta = 1.04$   
 FIG. A-3

MACH NUMBER AFTER  
AN OBLIQUE DETONATION  
WAVE  
 $\gamma = 1.4$   
 $\delta = 1.04$   
FIG. A-4

$M_2$

3

2

1

1.5 =  $M_1$

2.0

2.5

3.0

3.5

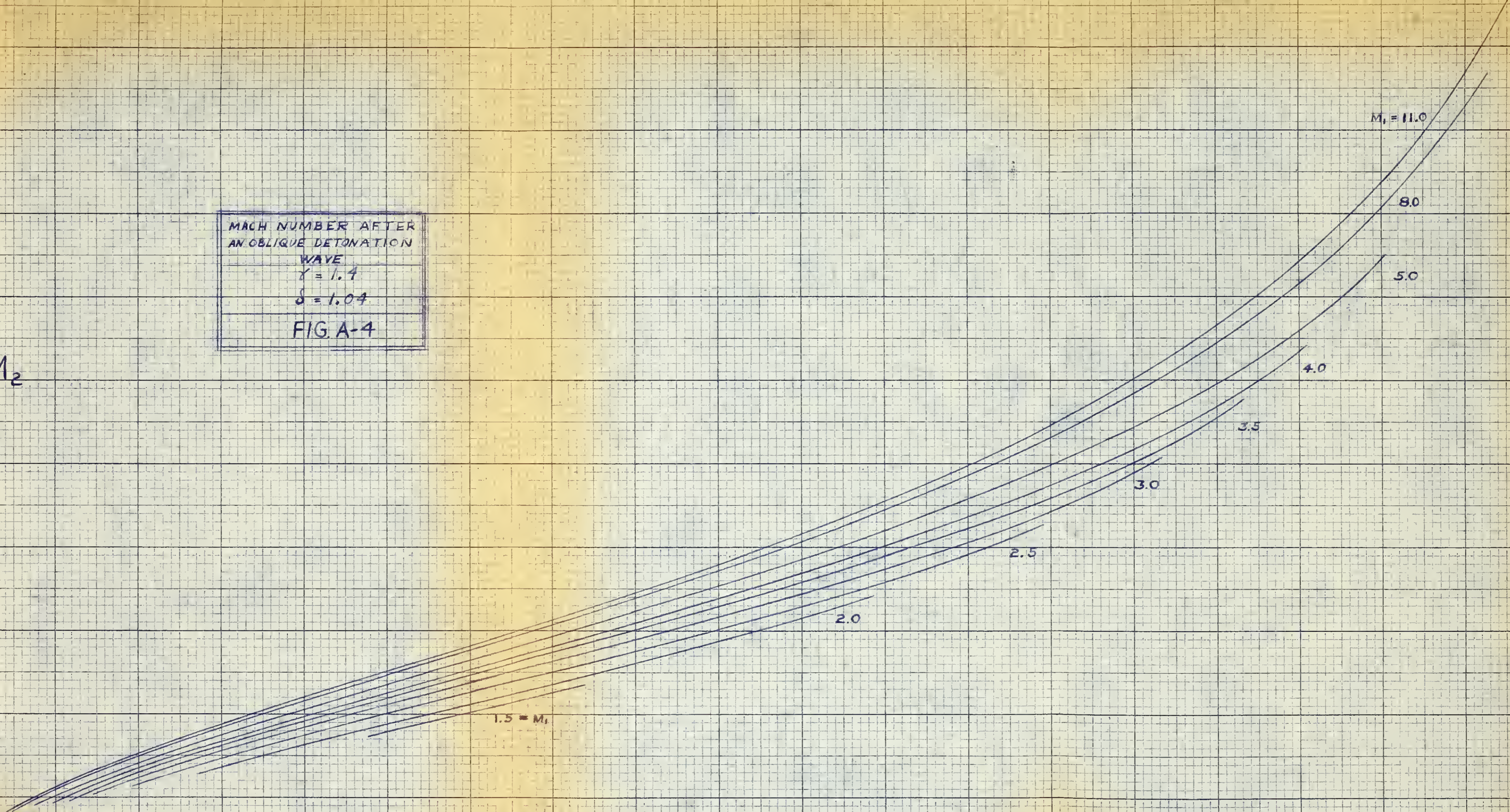
4.0

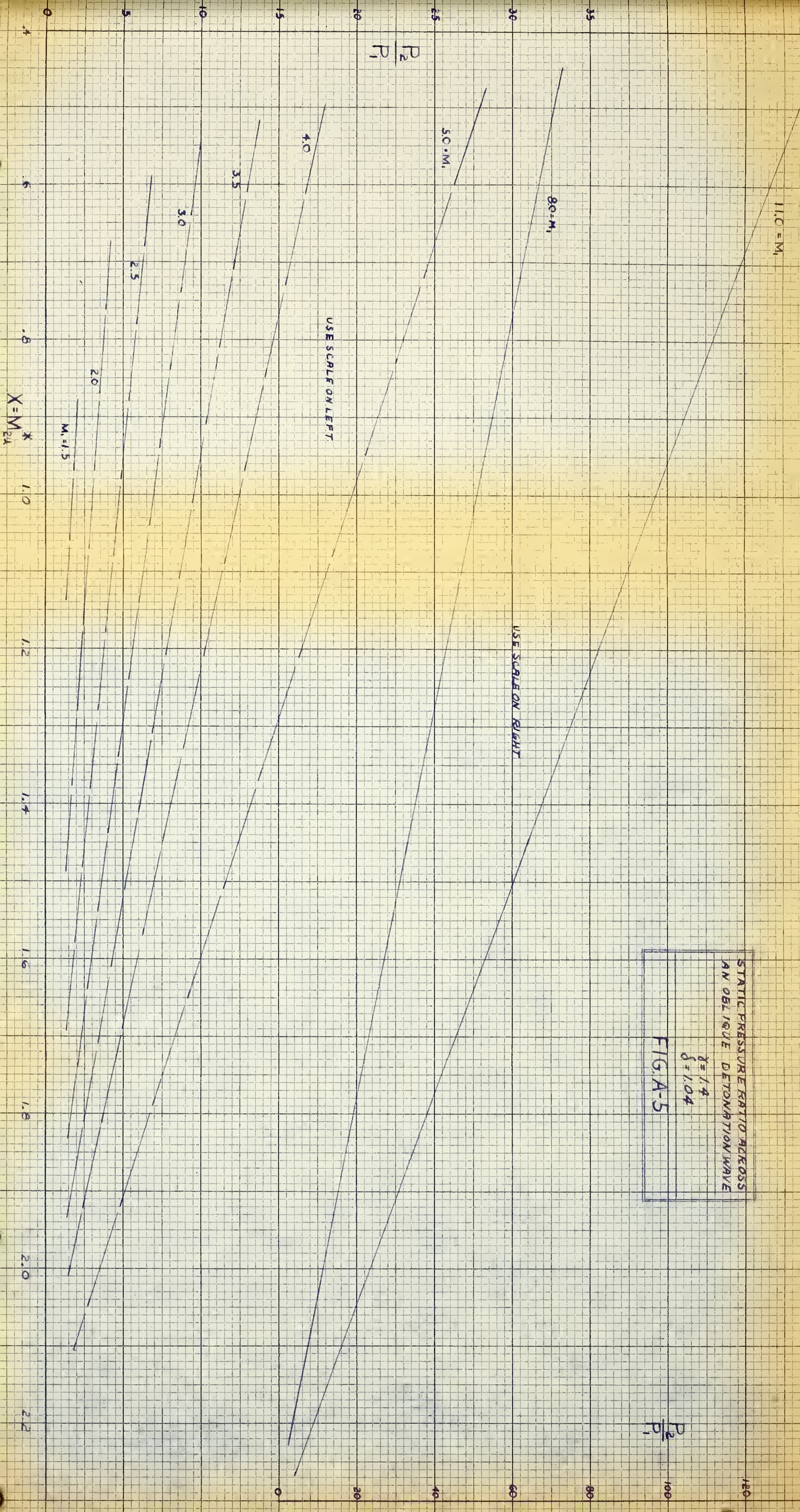
5.0

8.0

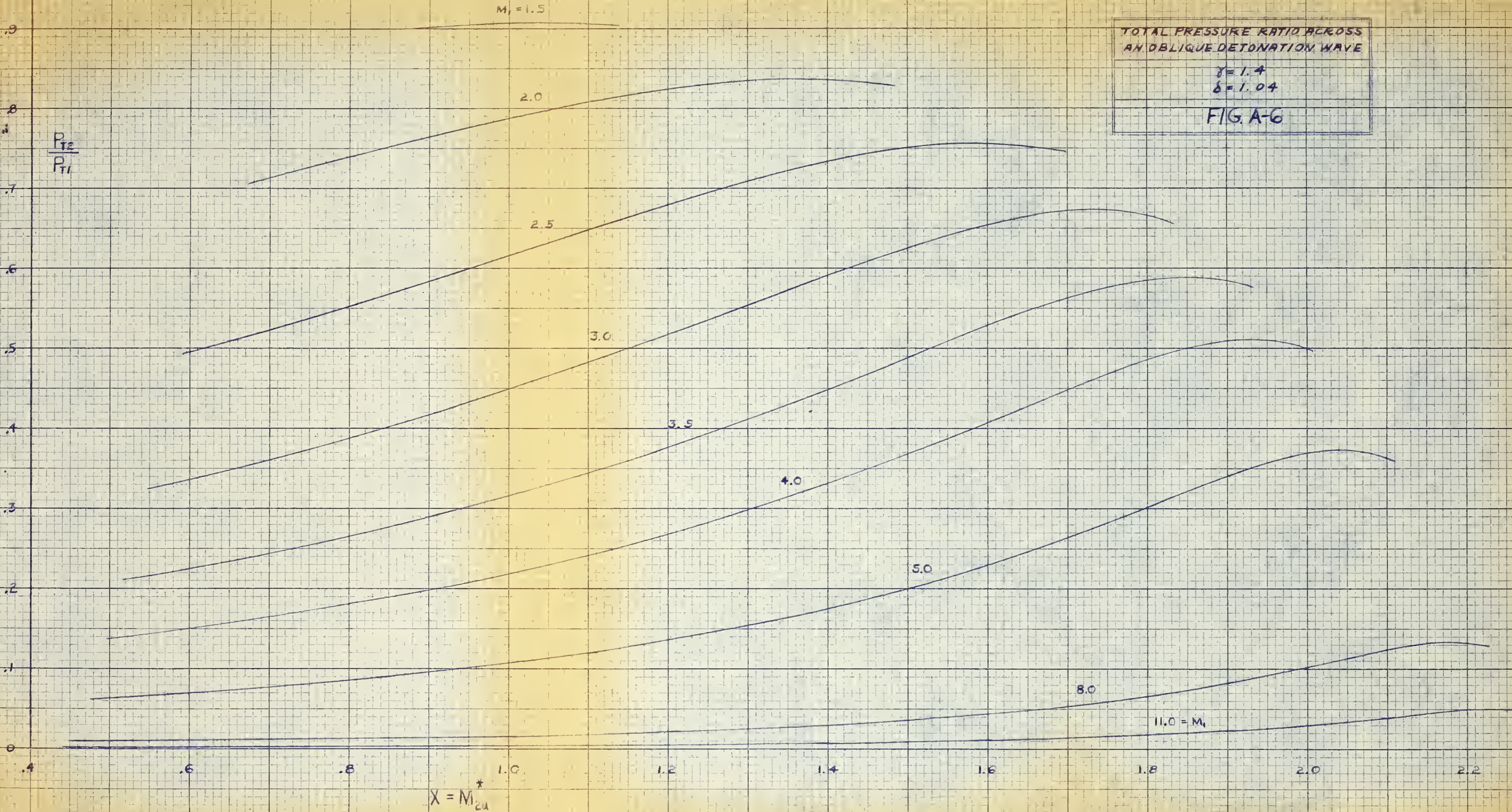
$M_1 = 11.0$

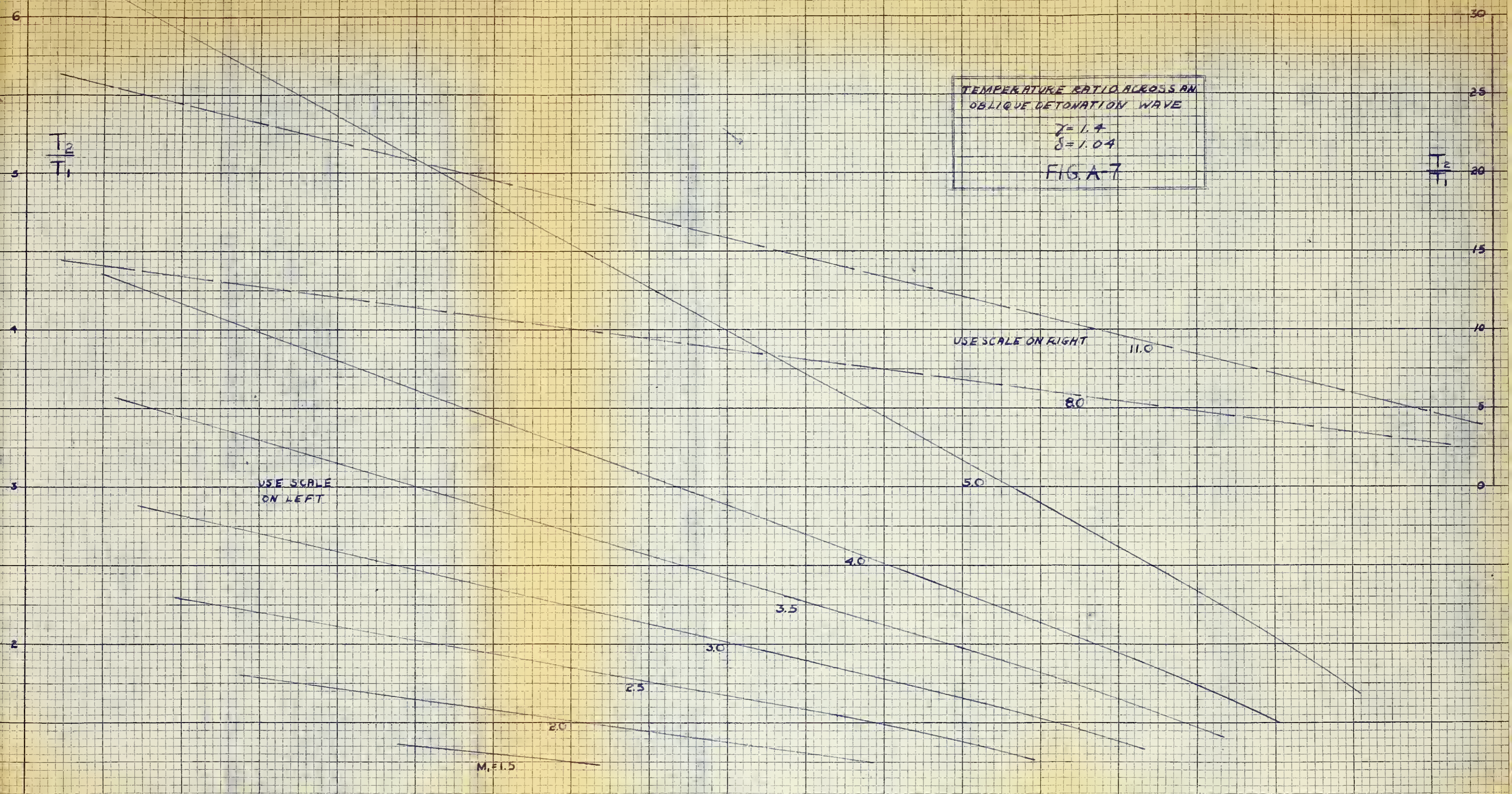
$X = M_{2.1}^*$





TOTAL PRESSURE RATIO ACROSS  
AN OBLIQUE DETONATION WAVE  
 $\gamma = 1.4$   
 $\delta = 1.04$   
FIG. A-6





APPENDIX B

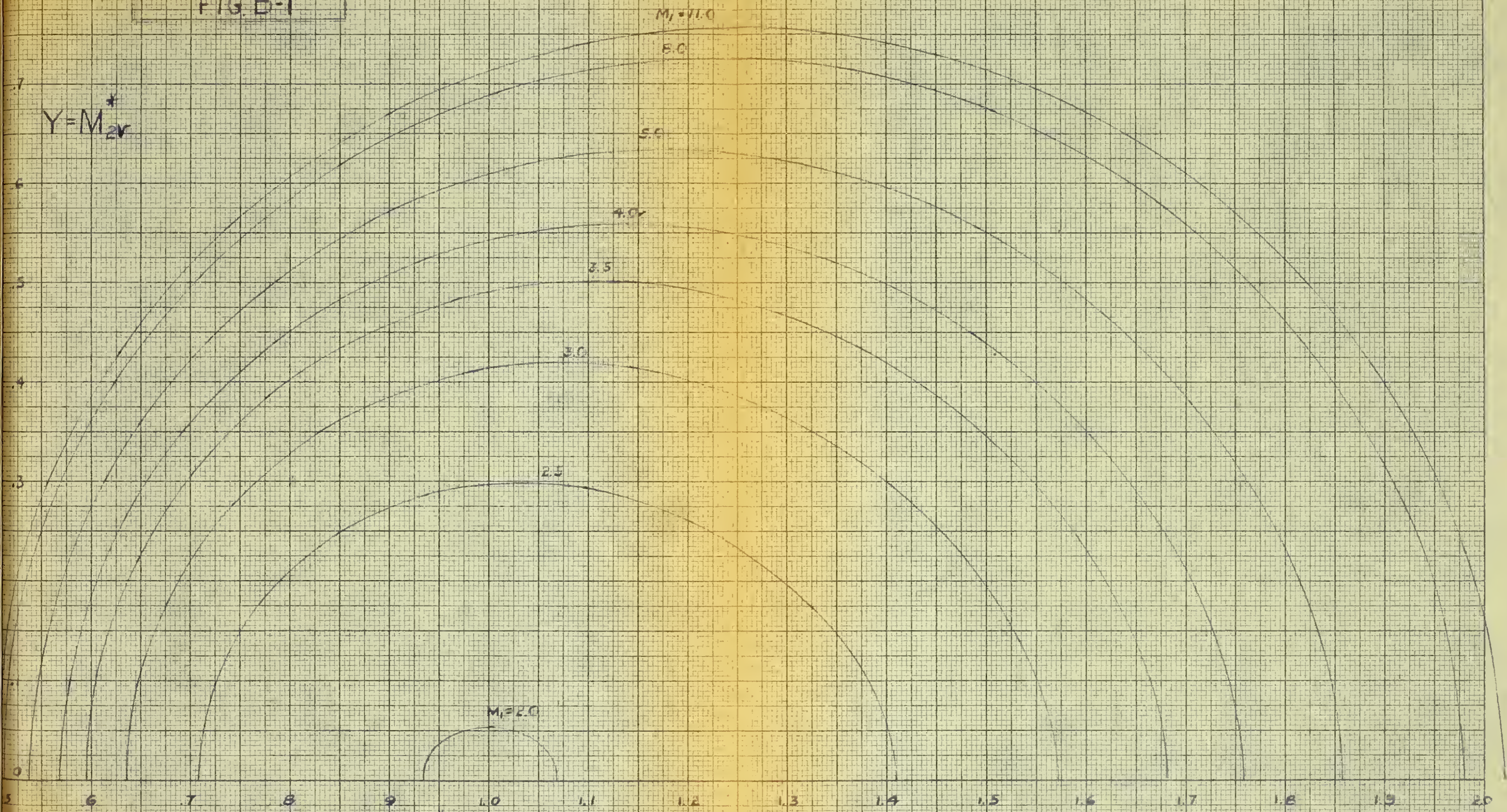
DETONATION POLAR

$\gamma = 1.4$

$S = 1.12$

FIG. B-1

$Y = M_{2v}^*$



$X = M_1^2$

$M_1 = 2.0$

DEFLECTION ANGLE VS. FLOW DEFLECTION ANGLE

$\gamma = 1.4$

$\delta = 11.5$

FIG. B-2

30

DEGREES

80

70

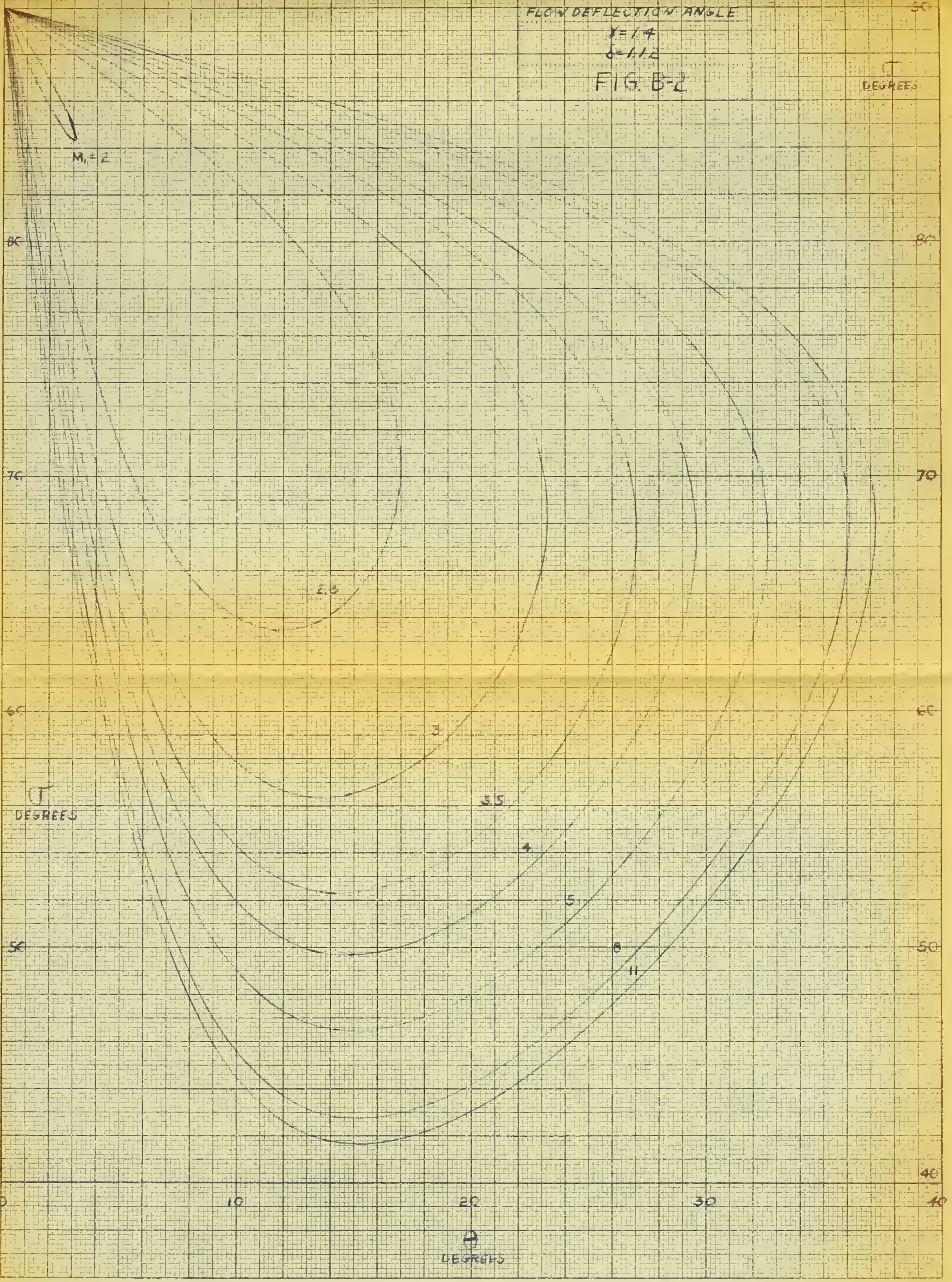
60

50

40

30

DEGREES



$M_1 = 2$

80

70

60

50

40

30

DEGREES

10

20

30

2.5

3

3.5

4

5

6

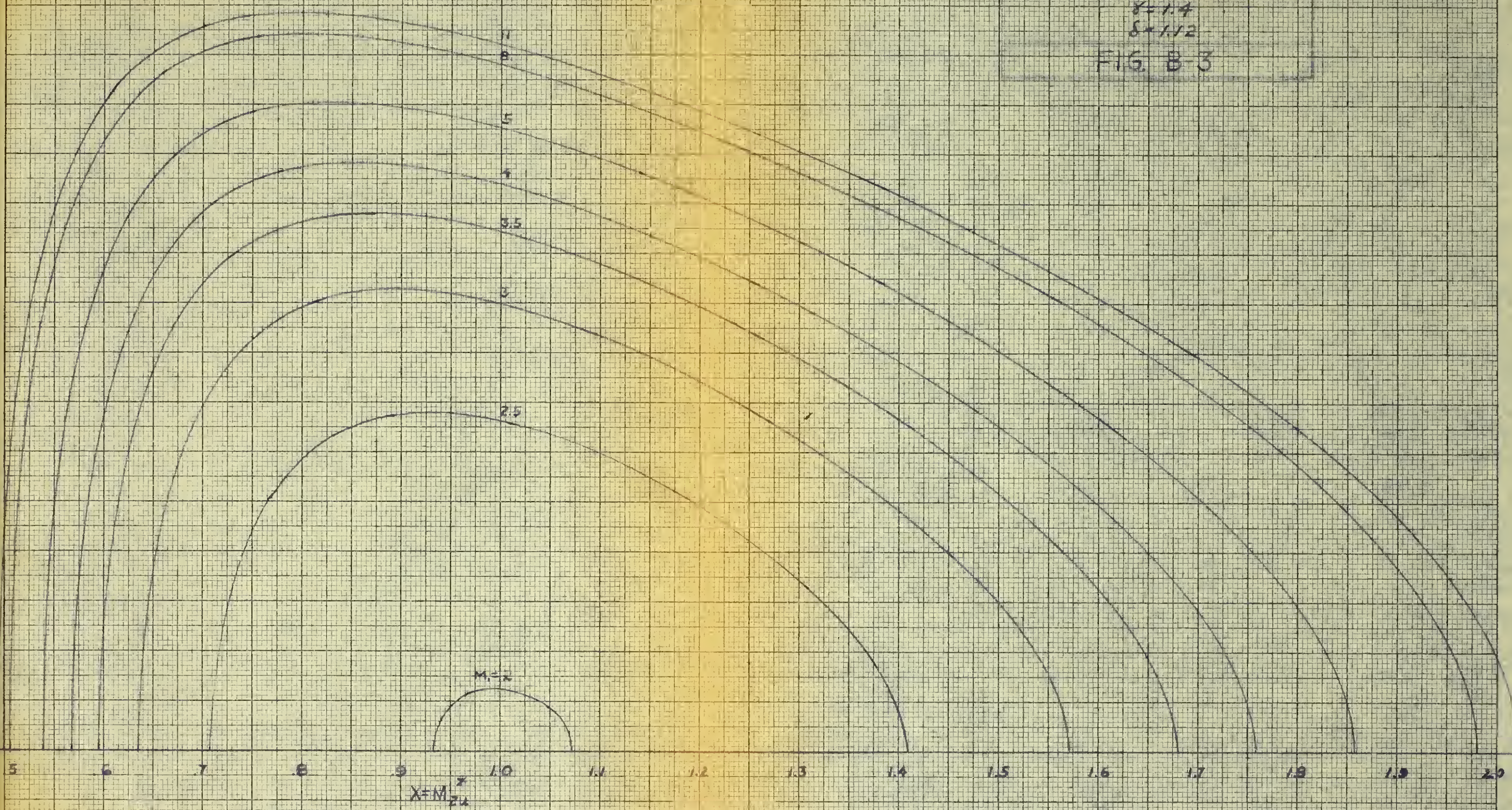
11

θ  
DEGREES

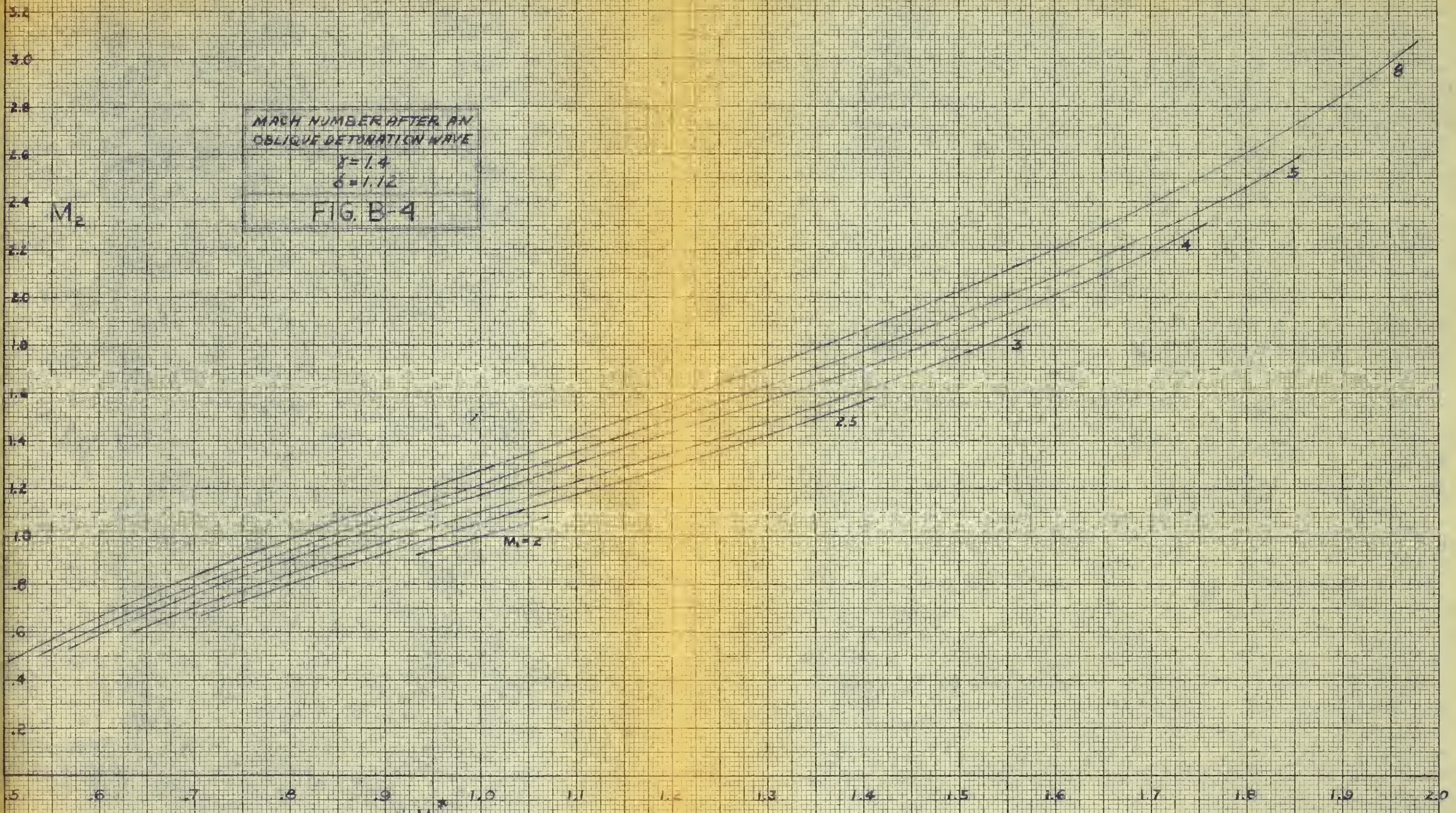
FLOW DEFLECTION ANGLE THROUGH  
AN OBLIQUE DETONATION WAVE

$\gamma = 1.4$   
 $S = 1.12$

FIG. B-3



MACH NUMBER AFTER AN  
OBLIQUE DETONATION WAVE  
 $\gamma = 1.4$   
 $\delta = 1.12$   
FIG. B-4



$M_2$

$X/M_{au}$

$M_1 = 2$

2.5

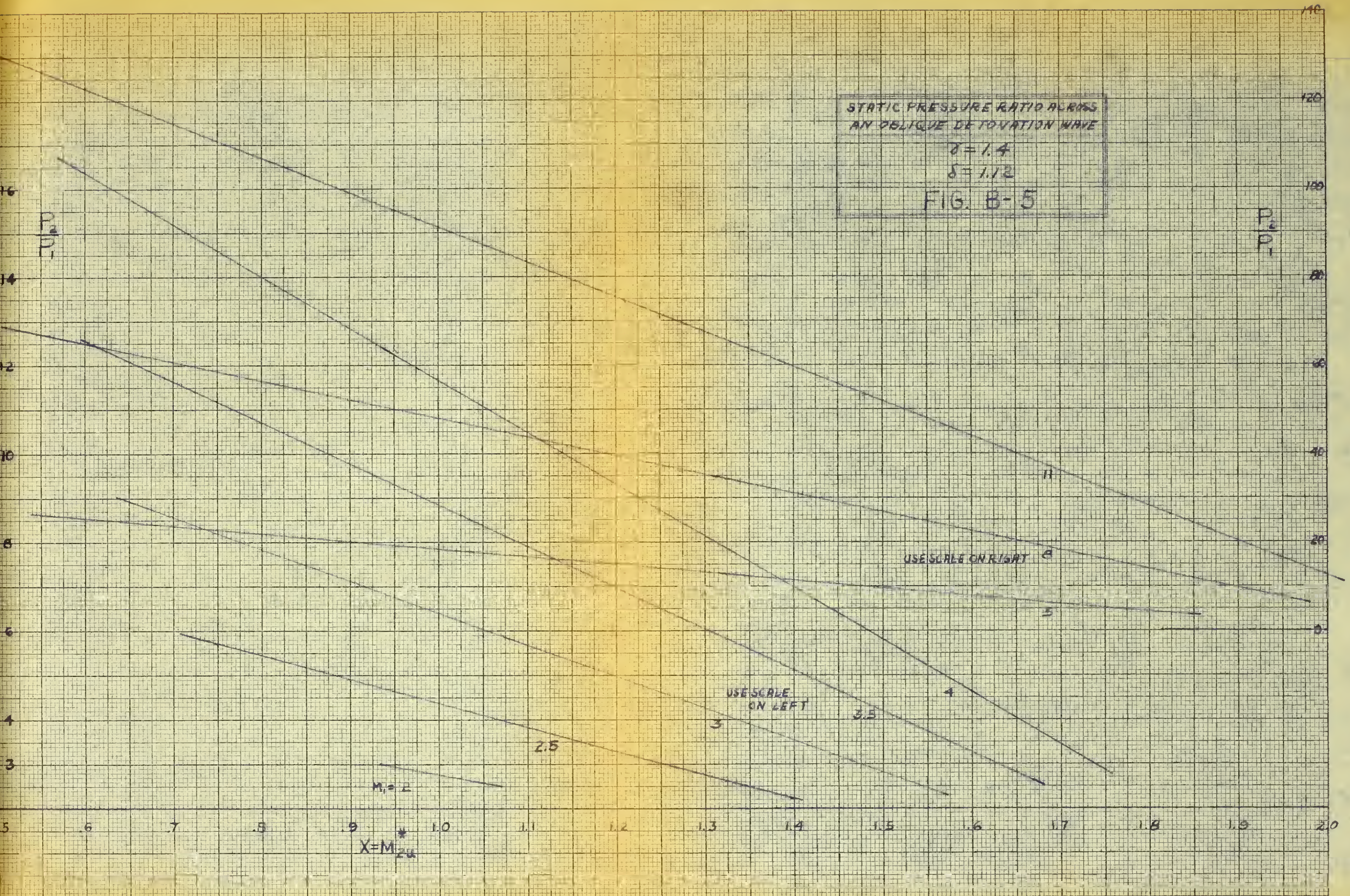
3

4

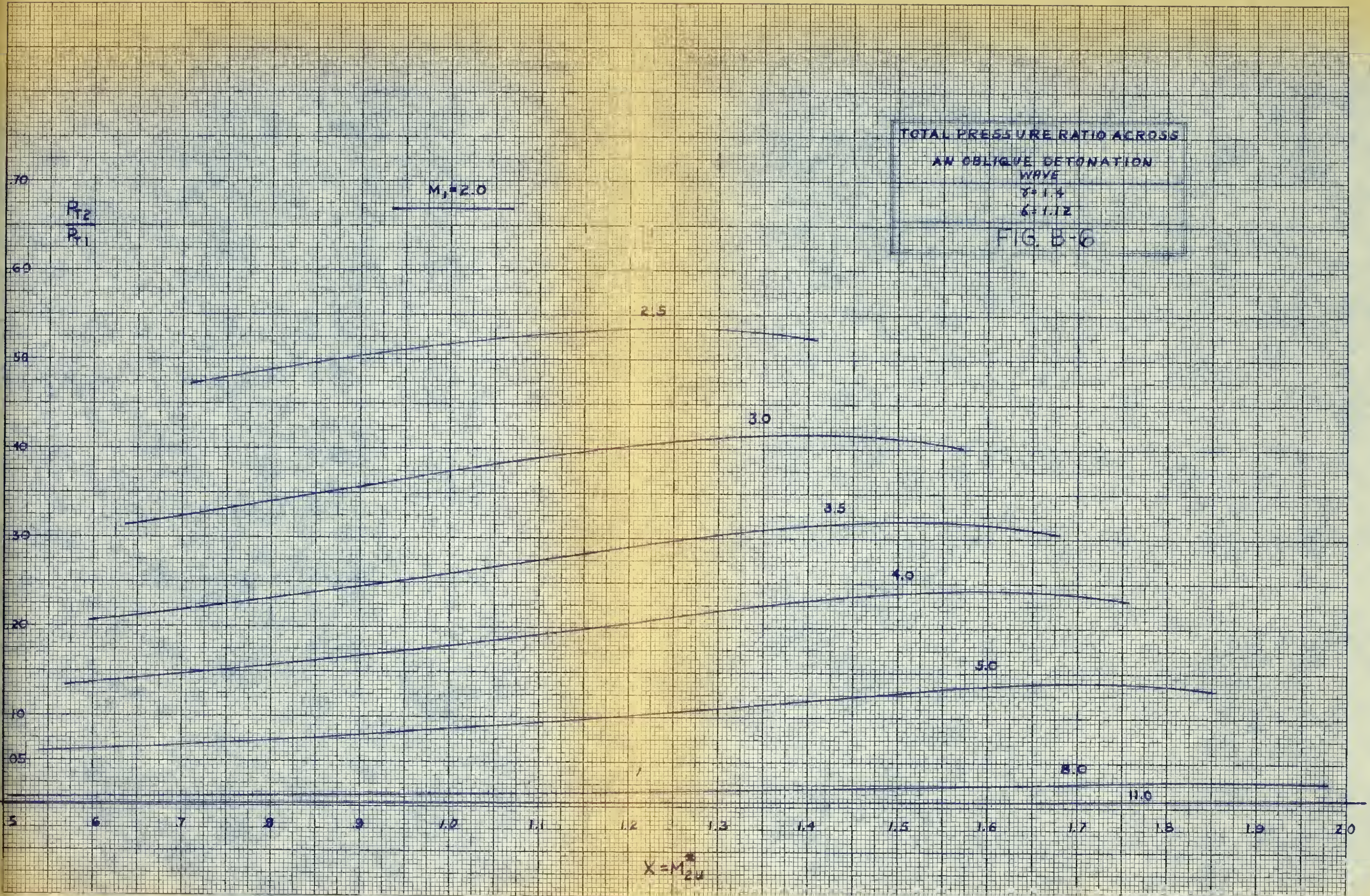
5

6

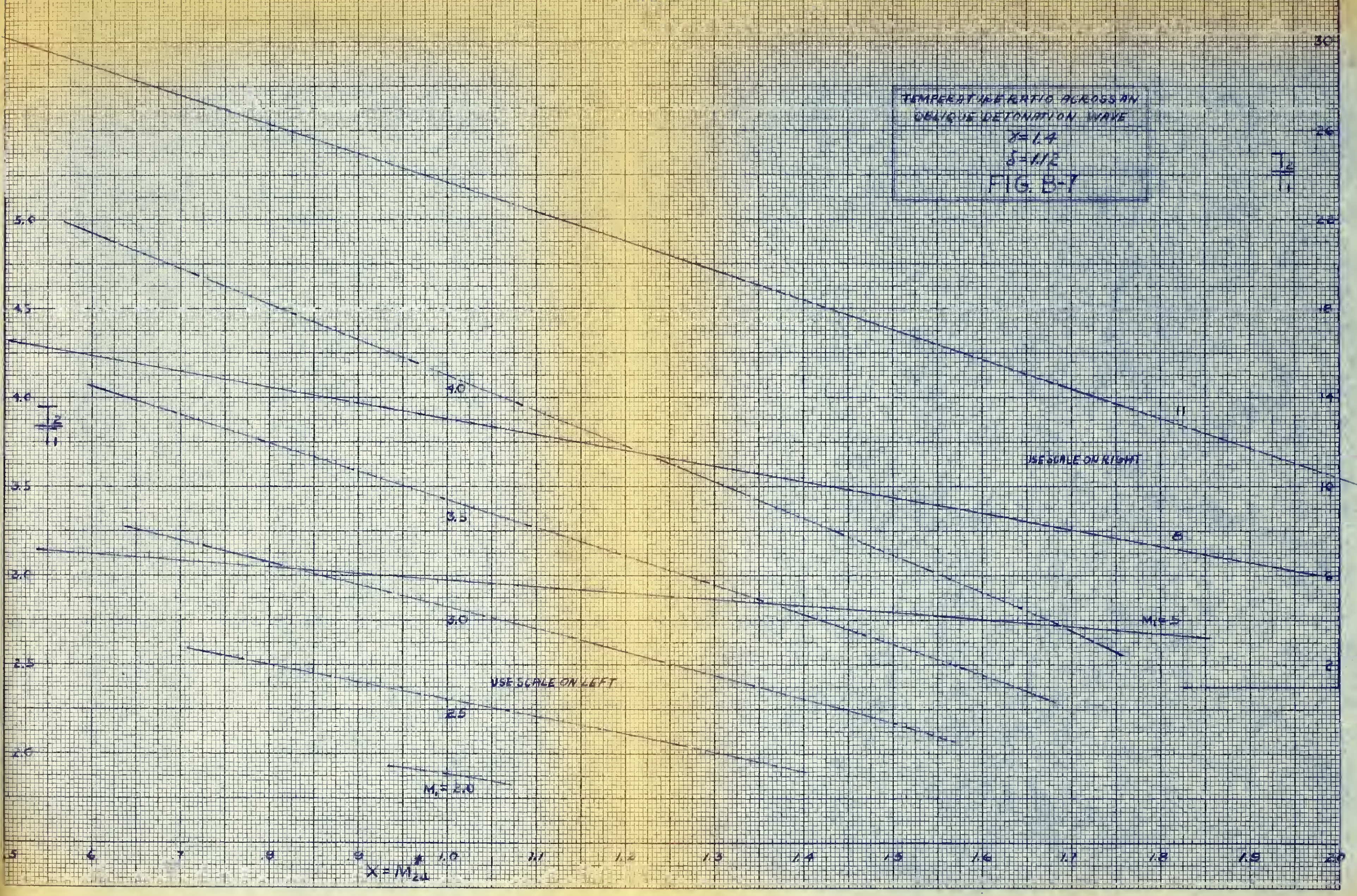
STATIC PRESSURE RATIO ACROSS  
 AN OBLIQUE DETOURN WAVE  
 $\delta = 1.4$   
 $\delta = 1.12$   
 FIG. B-5



TOTAL PRESSURE RATIO ACROSS  
 AN OBLIQUE DETONATION  
 WAVE  
 $\gamma = 1.4$   
 $k = 1.12$   
 FIG. B-6



TEMPERATURE RATIO ACROSS AN  
 OBLIQUE DETONATION WAVE  
 $\gamma = 1.4$   
 $\delta = 1/2$   
 FIG. B-7



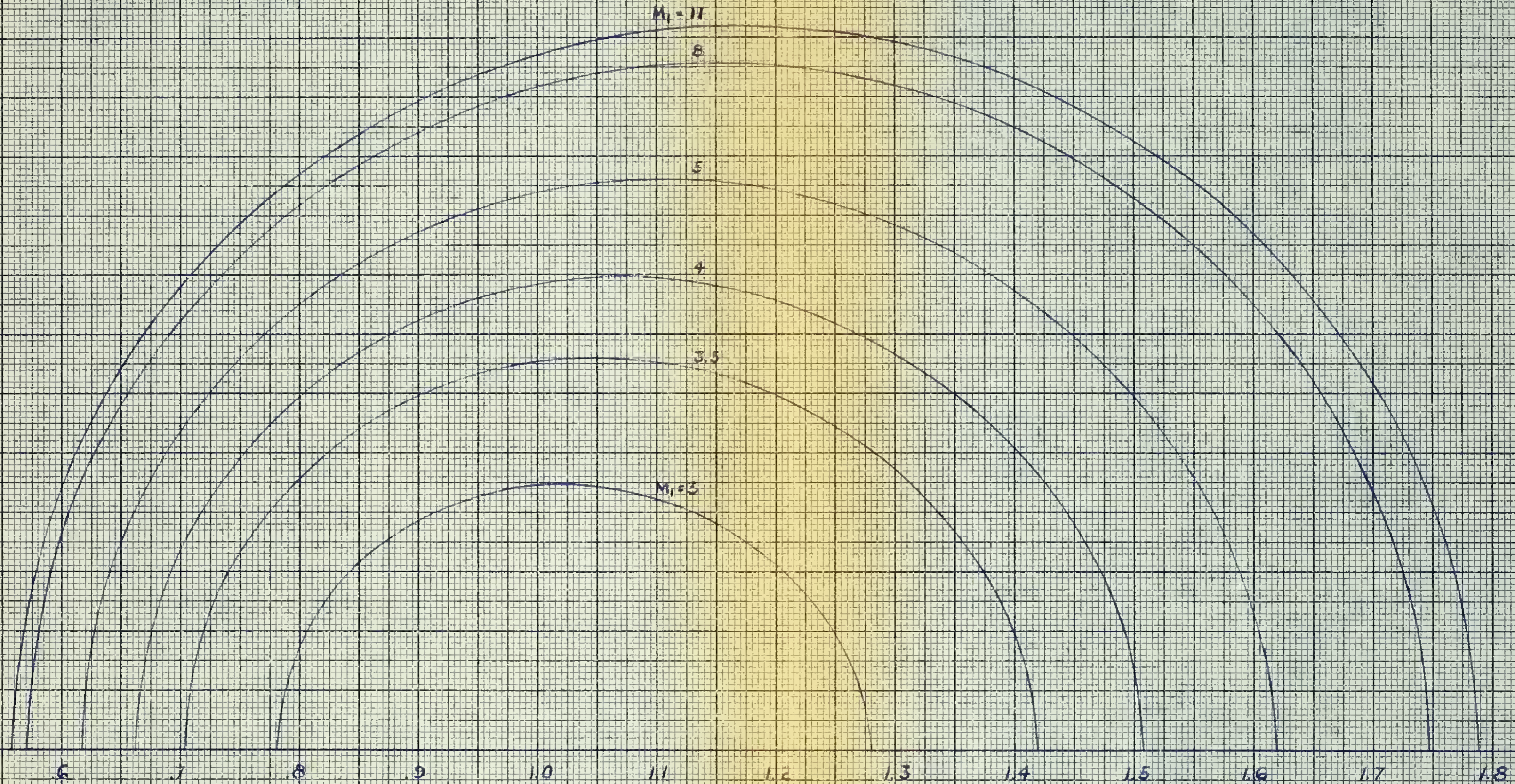
APPENDIX C

DETONATION POLAR

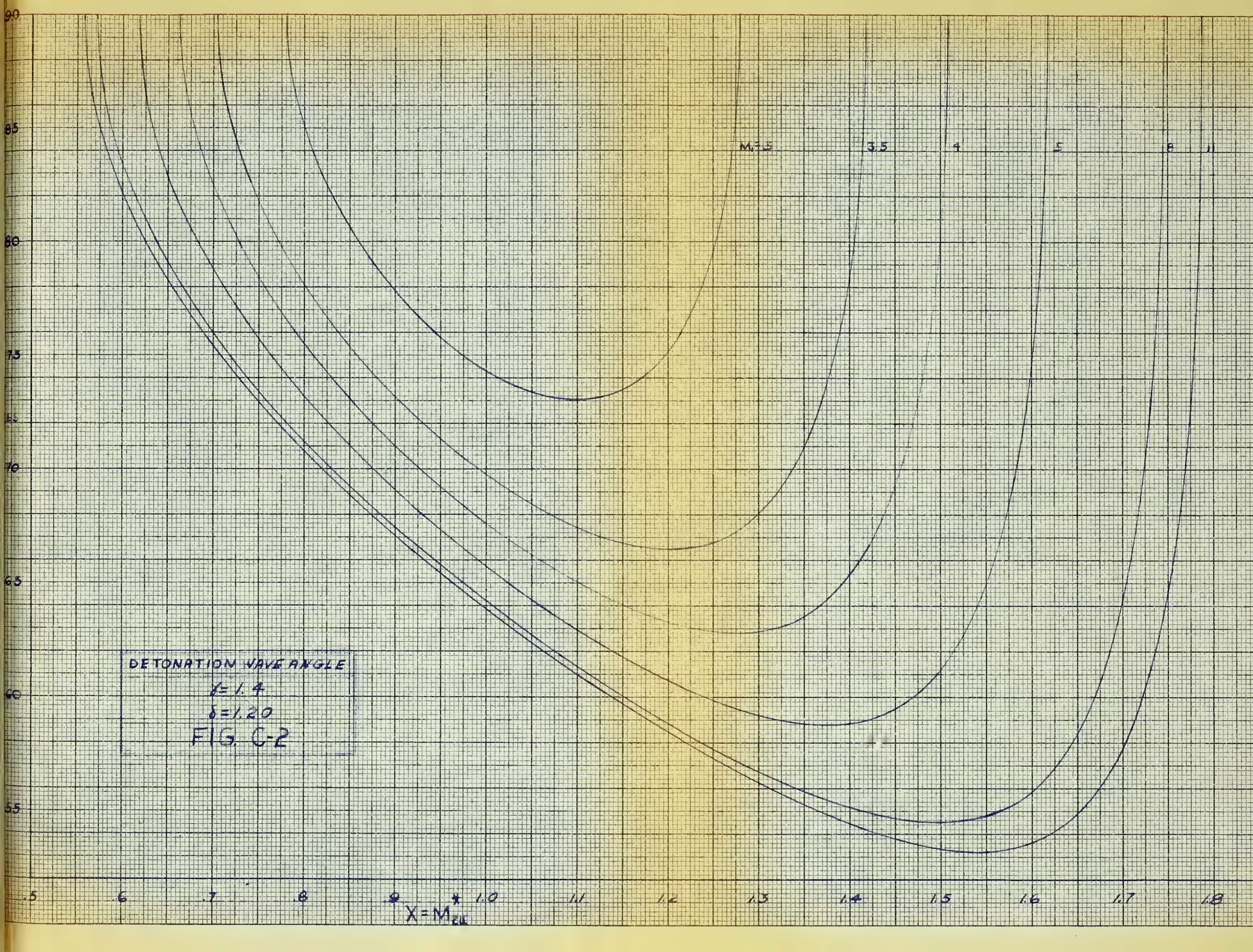
$$\gamma = 1.4$$

$$\delta = 1.20$$

FIG. C-1



$$X = M_2^*$$



DETONATION WAVE ANGLE  
 $\gamma = 1.4$   
 $\delta = 1.20$   
FIG. C-2

$X = M_{eff}$

$M_{eff}$

3.5

$\infty$

5

8

11

5

6

7

8

9

10

11

12

13

14

15

16

17

18

85

80

75

70

65

60

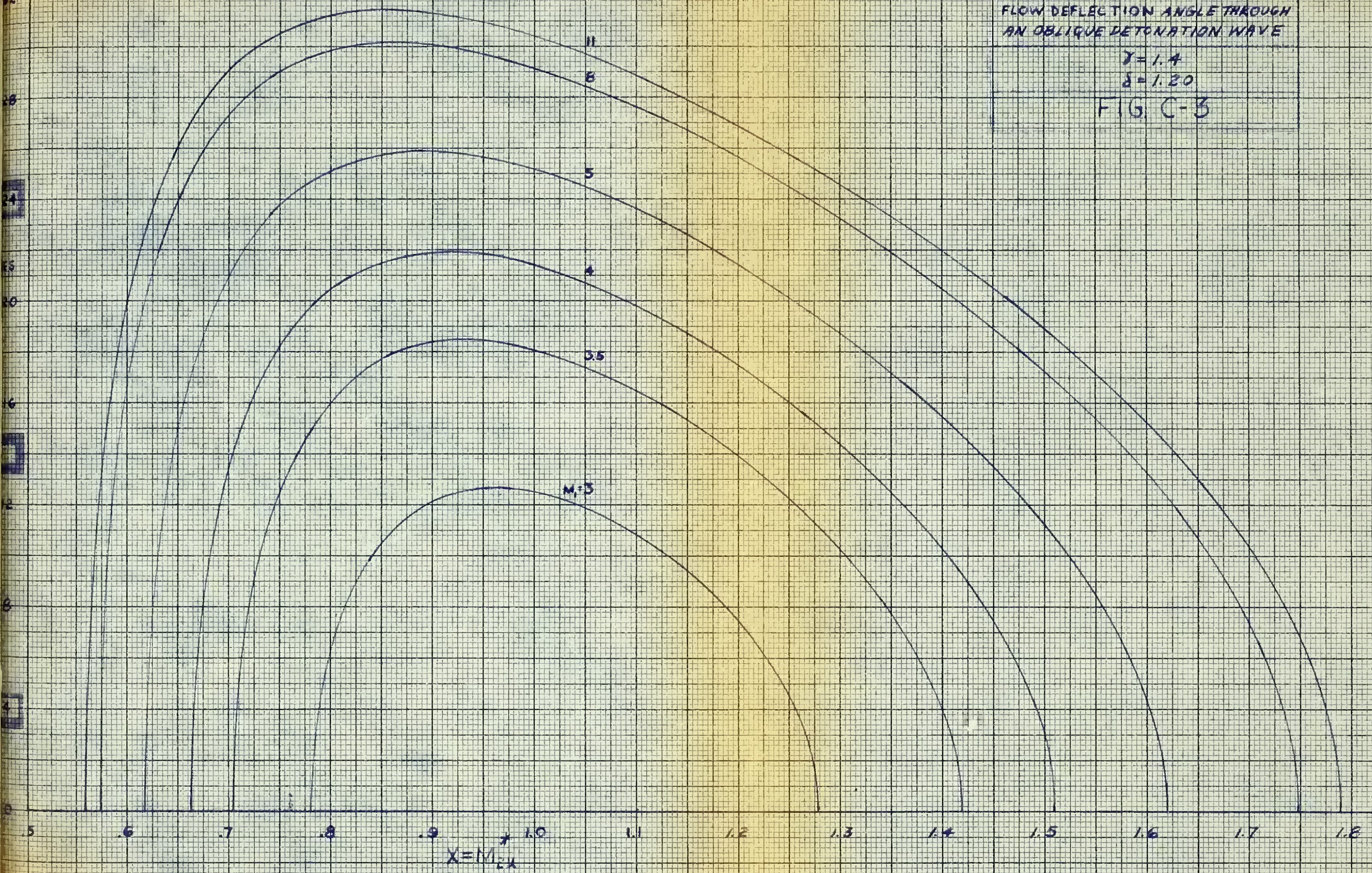
55

90

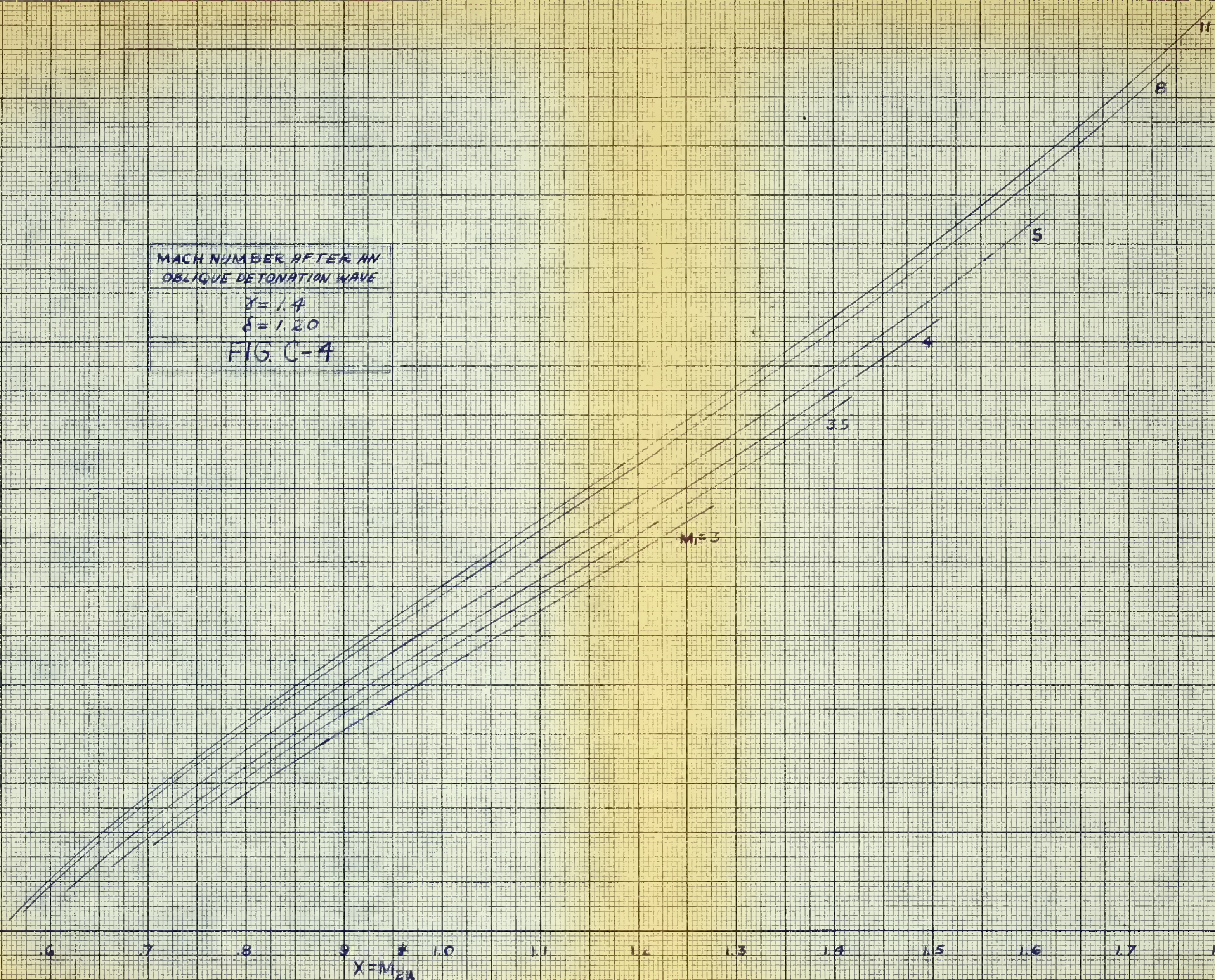
FLOW DEFLECTION ANGLE THROUGH  
AN OBLIQUE DETONATION WAVE

$\gamma = 1.4$   
 $\delta = 1.20$

FIG. C-3



MACH NUMBER AFTER AN  
OBLIQUE DETONATION WAVE  
 $\gamma = 1.4$   
 $\delta = 1.20$   
FIG. C-4



STATIC PRESSURE RATIO ACROSS  
AN OBLIQUE DETONATION WAVE

$\gamma = 1.4$   
 $\delta = 1.20$

FIG. C-5

$P_2/P_1$

120  
100  
80  
60  
40  
20  
0

5 6 7 8 9 10 11 12 13 14 15 16 17 18

$X = M_2 \sin \theta$

$M_1 = 3$

3.5

4

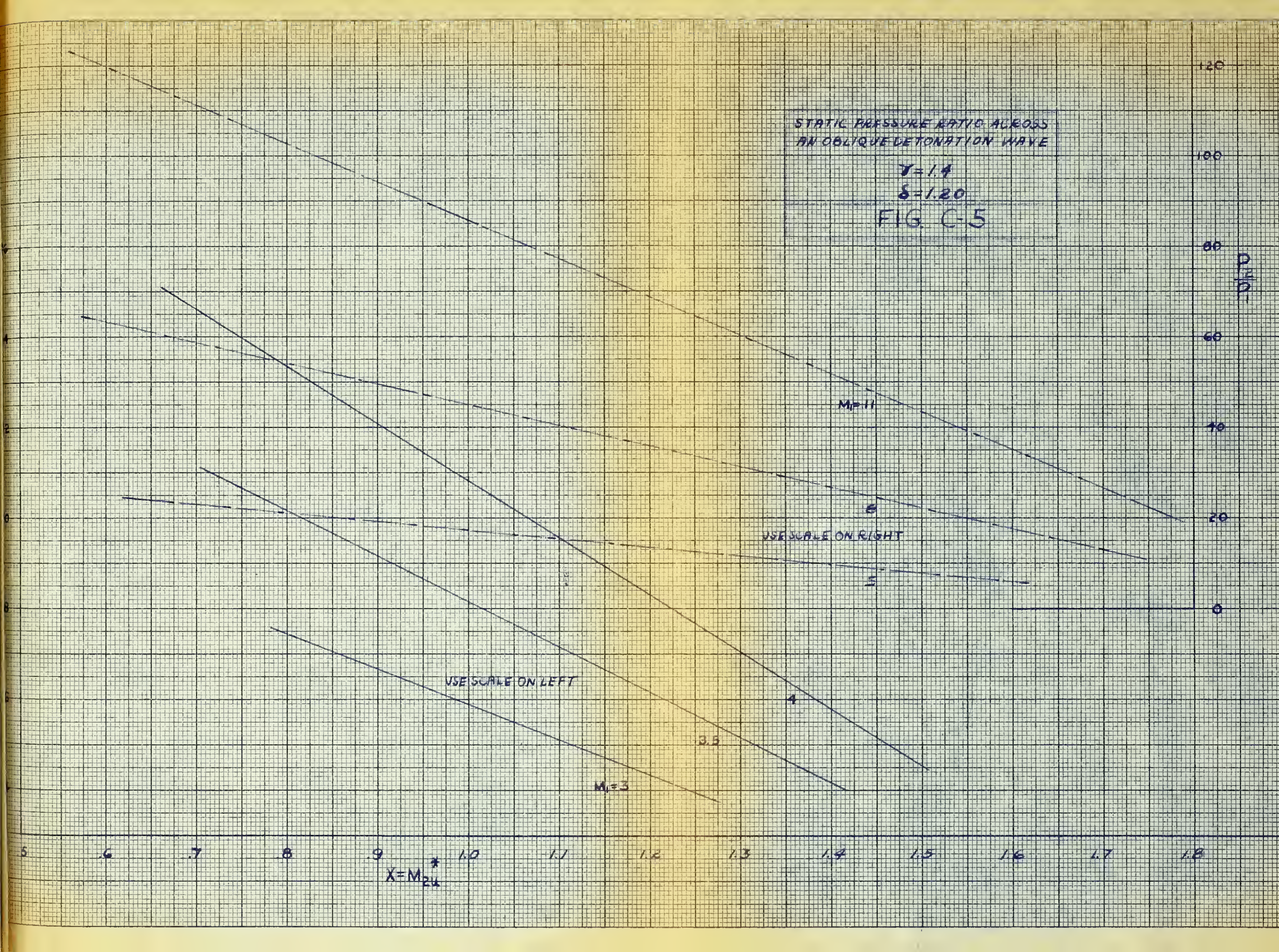
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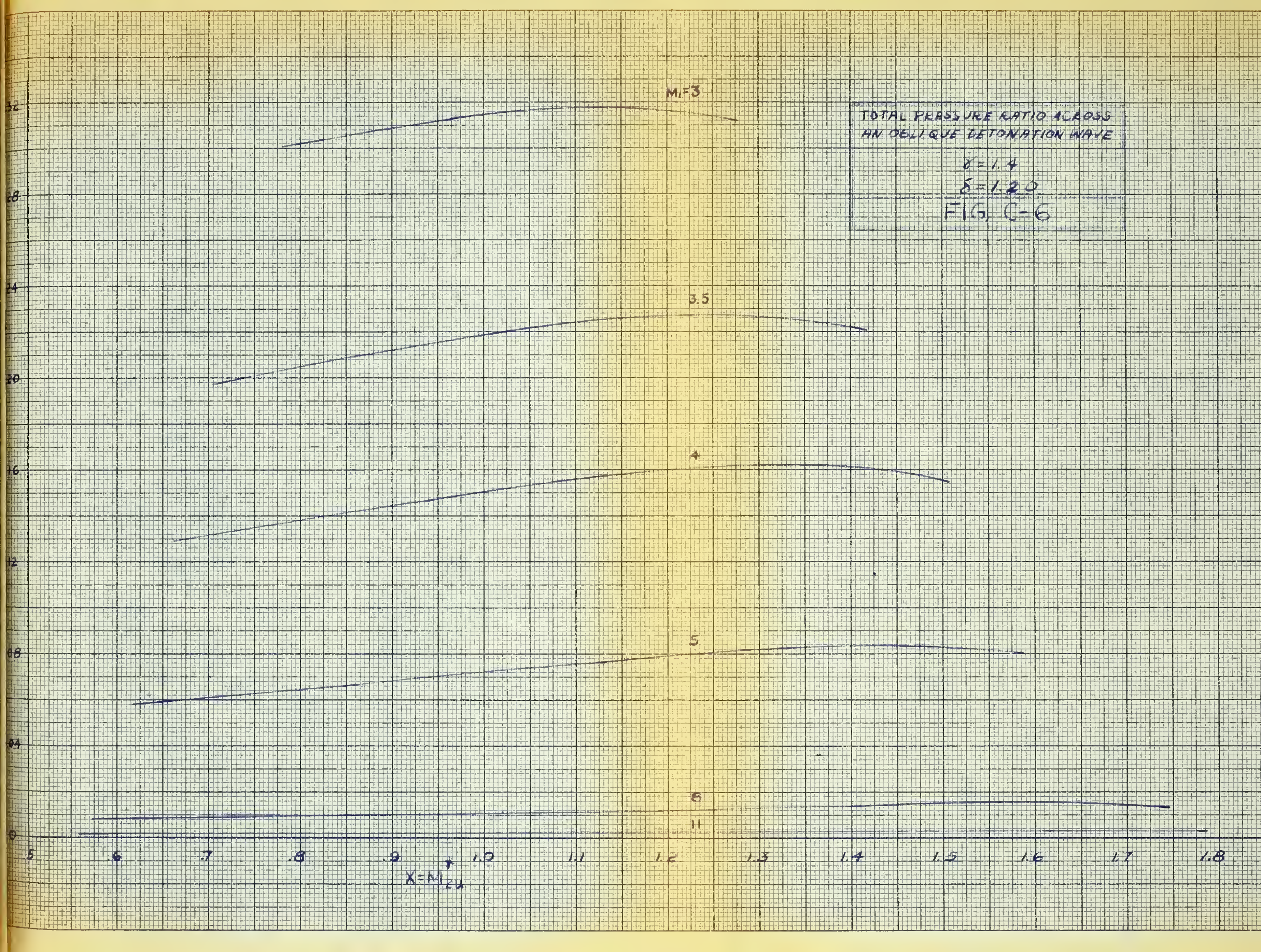
5

$M_1 = 11$

USE SCALE ON RIGHT

USE SCALE ON LEFT





TEMPERATURE RATIO ACROSS  
AN OBLIQUE DETONATION WAVE

$\gamma = 1.4$   
 $\delta = 1.20$

FIG. C-7

36  
32  
28  
24  
20  
16  
12  
8

$T_2/T_1$

USE SCALE ON RIGHT

USE SCALE ON LEFT

$M_1 = 11$

5

6

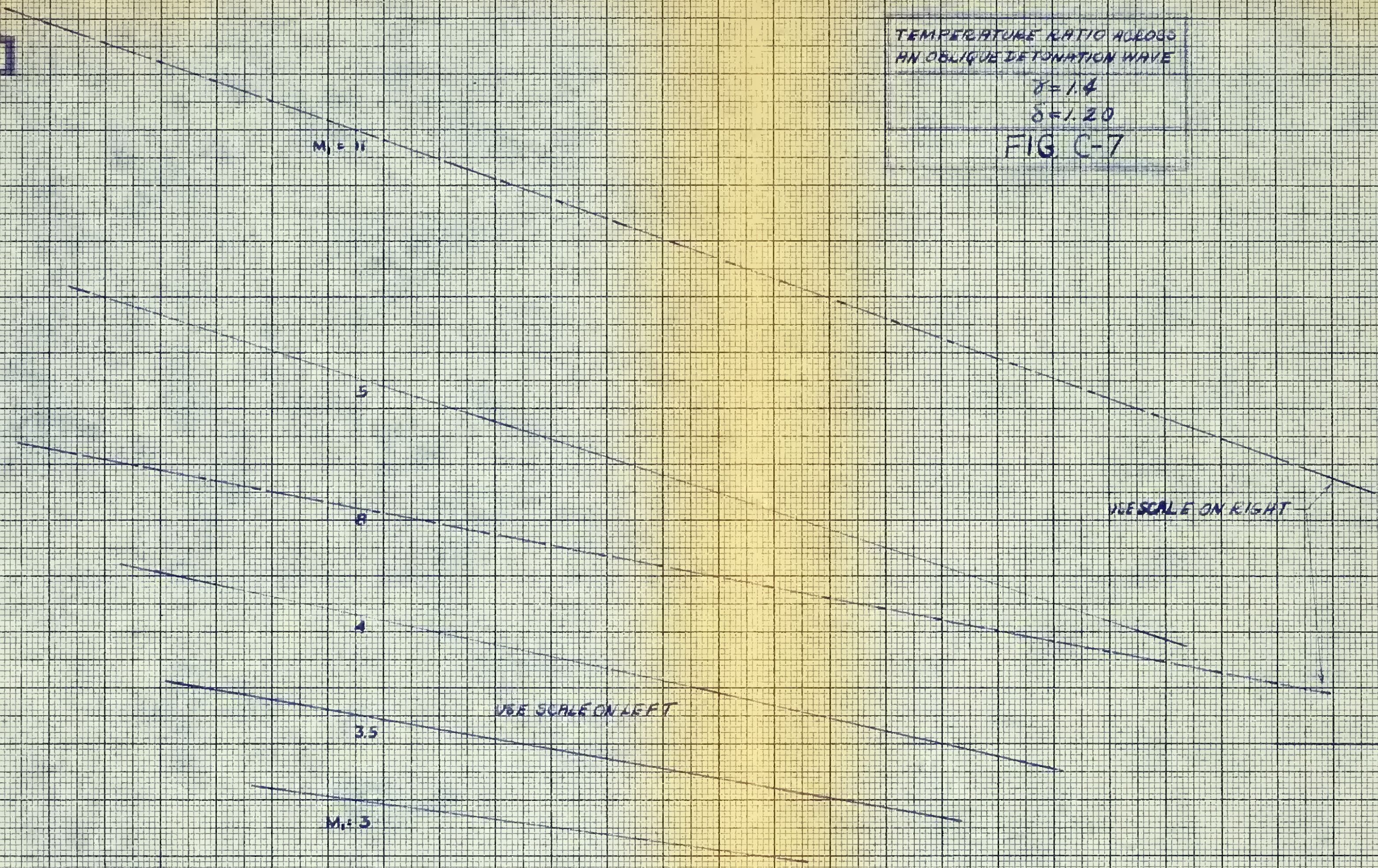
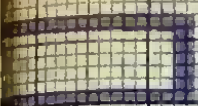
4

3.5

$M_1 = 3$

$X = M_{2u}^*$

5 6 7 8 9 10 11 12 13 14 15 16 17 18



APPENDIX D

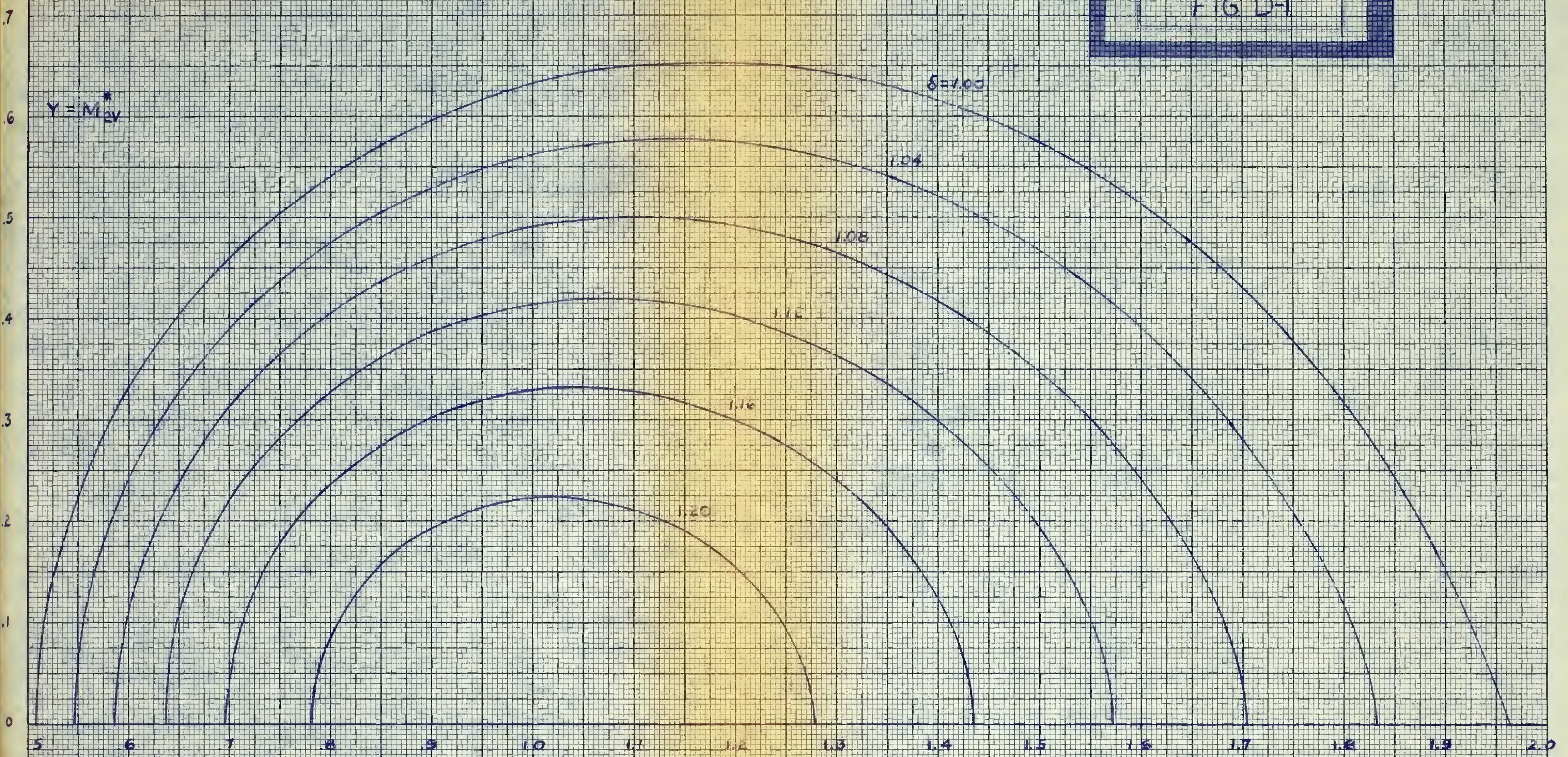
DETONATION POLAR

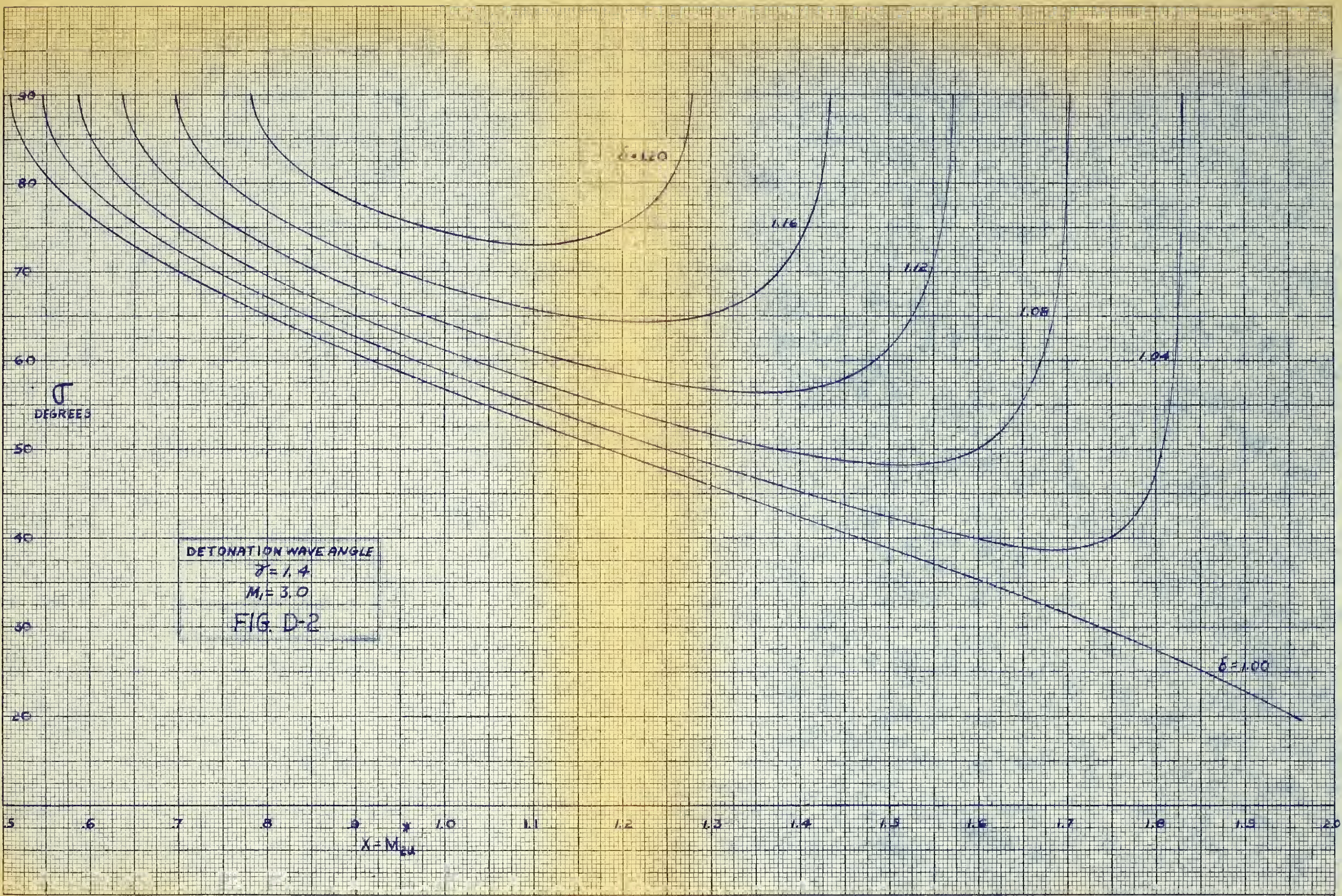
$\gamma = 1.4$   
 $M_1 = 3.0$

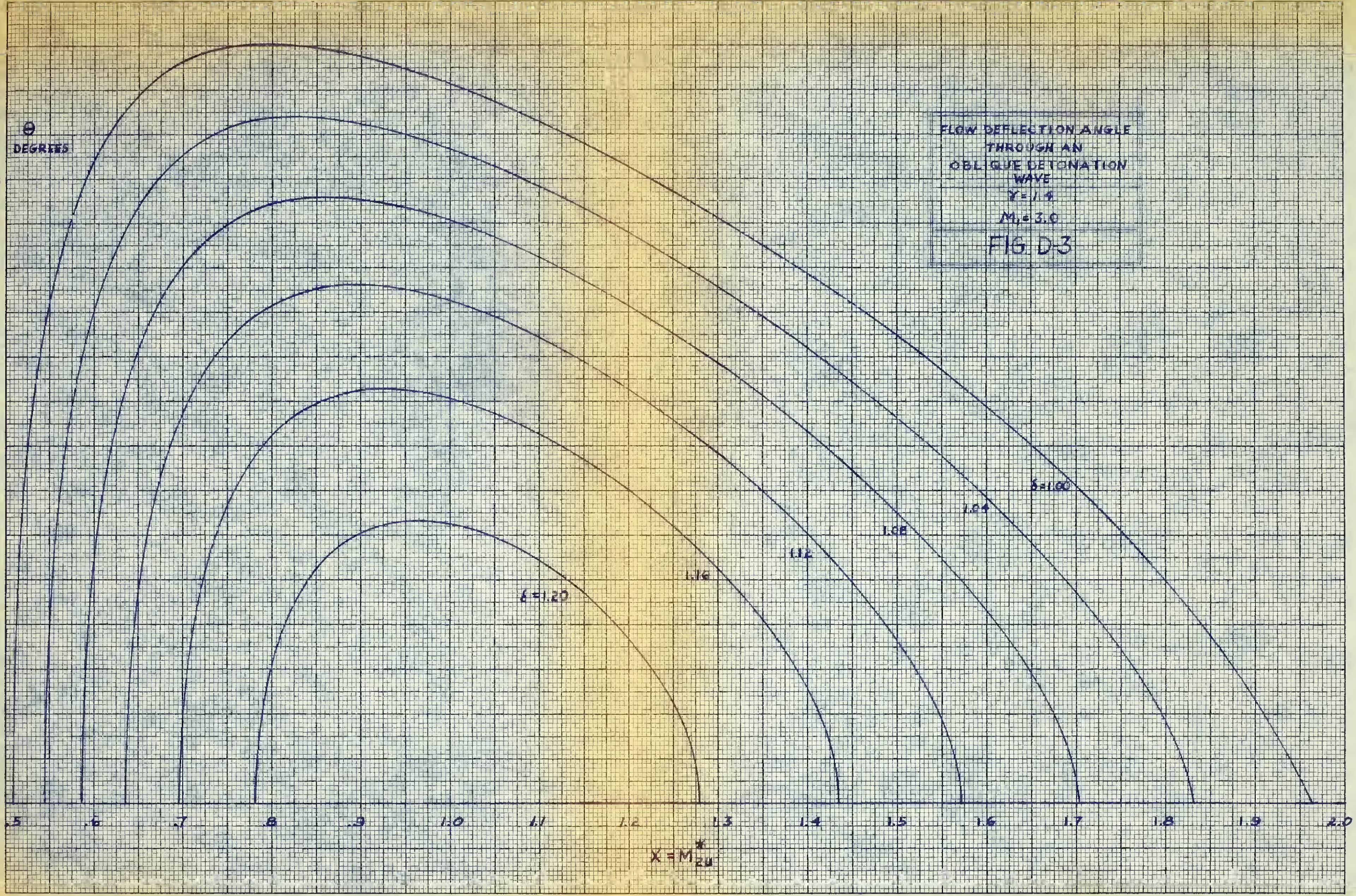
FIG D-1

$Y = M_{2y}$

$X = M_{2x}$







FLOW DEFLECTION ANGLE  
 THROUGH AN  
 OBLIQUE DETONATION  
 WAVE  
 $\gamma = 1.4$   
 $M_1 = 3.0$   
 FIG. D-3

$\theta$   
 DEGREES

$X = M_1 \sin \delta$

$\delta = 1.20$

1.16

1.12

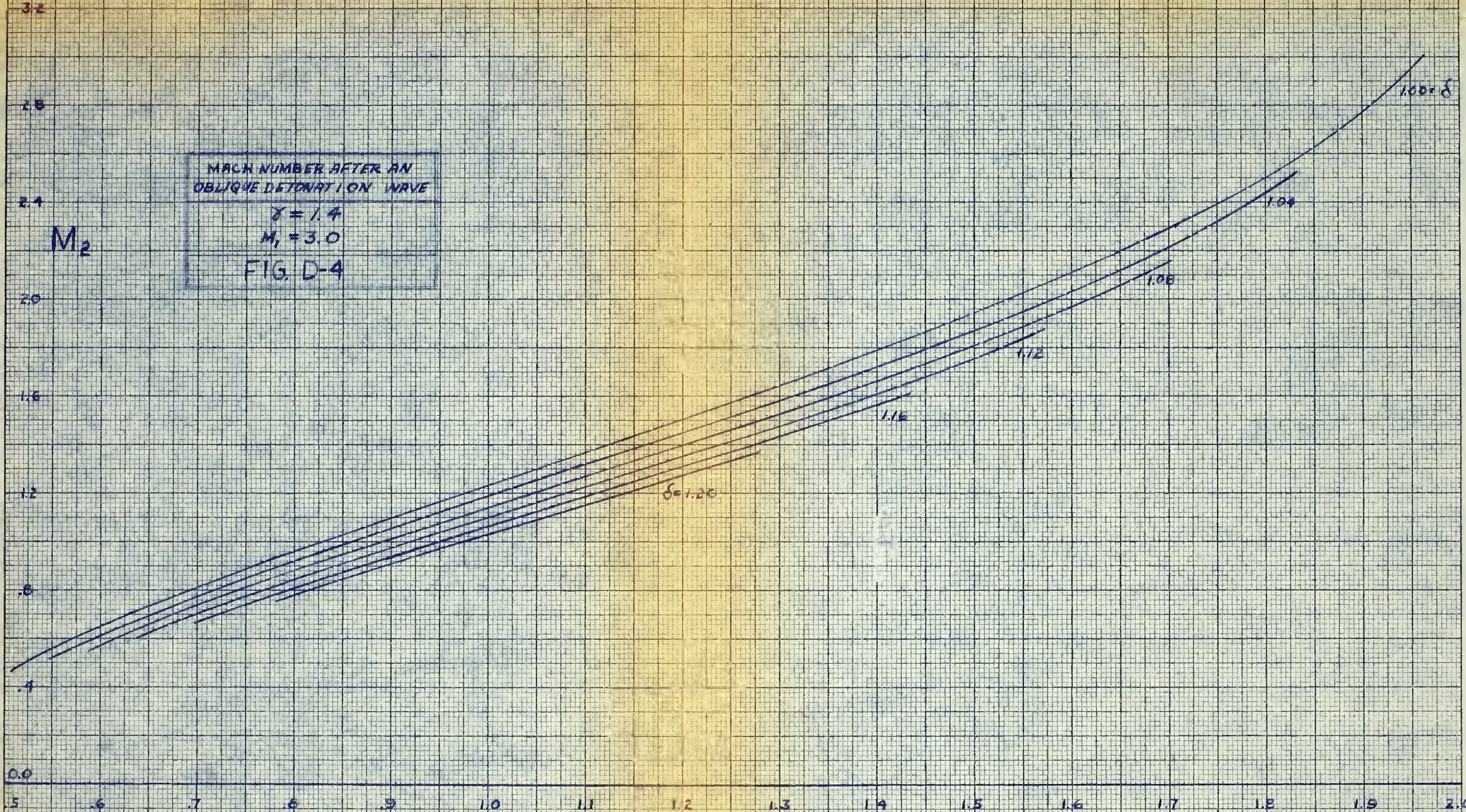
1.08

1.04

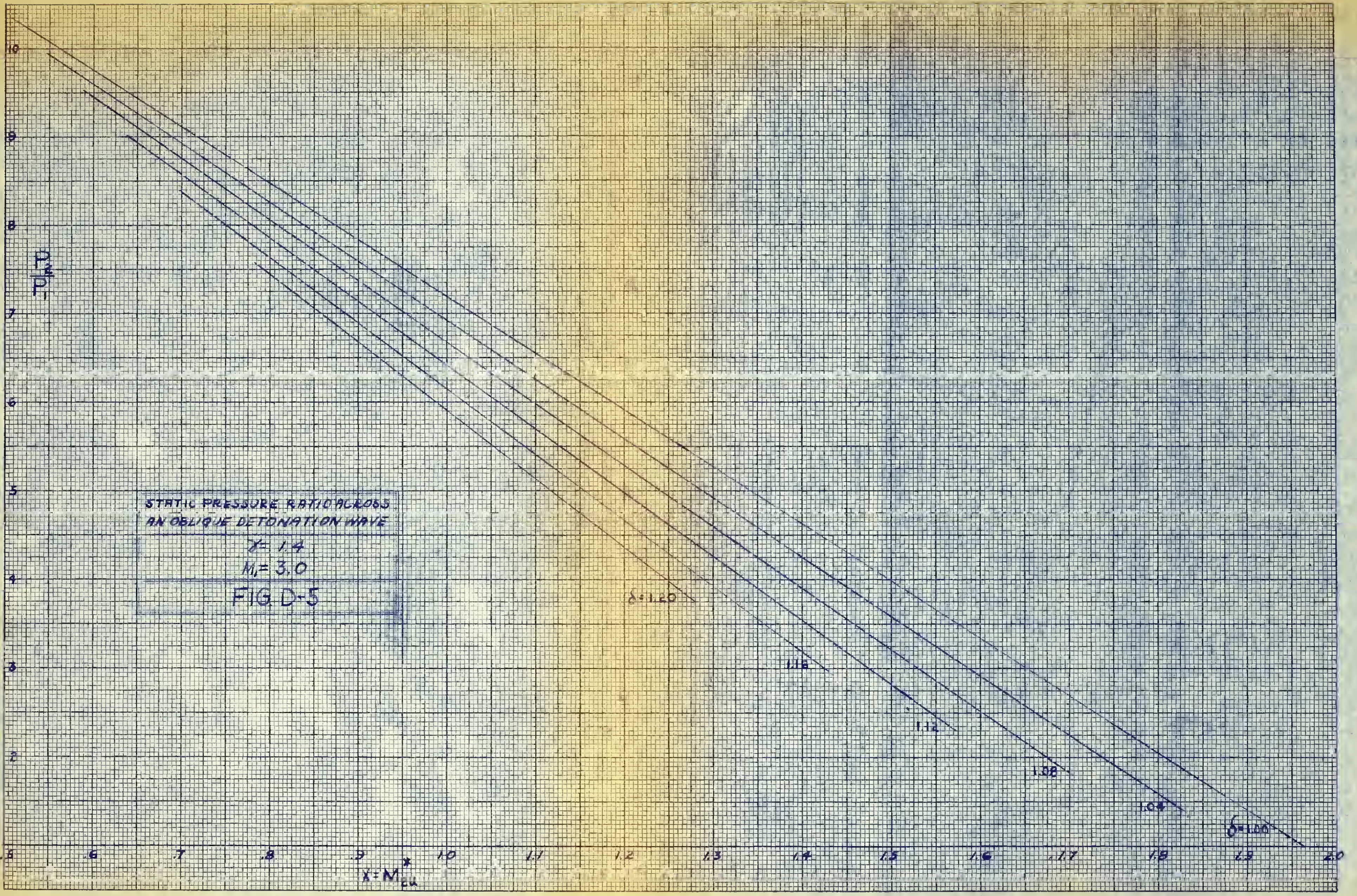
$\delta = 1.00$

MACH NUMBER AFTER AN  
OBLIQUE DETONATION WAVE  
 $\gamma = 1.4$   
 $M_1 = 3.0$   
FIG. D-4

$M_2$

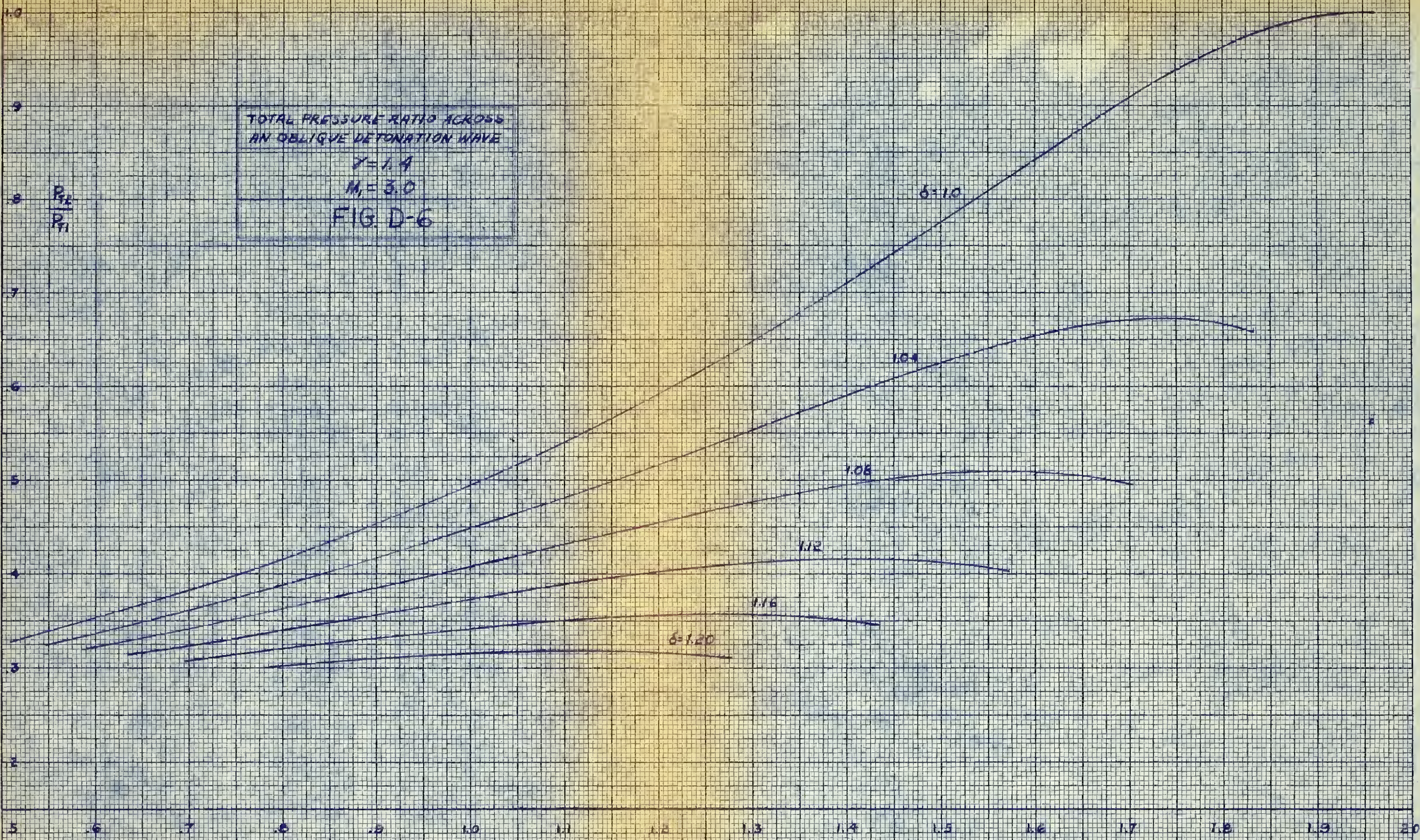


$X = M_1 \sin \delta$

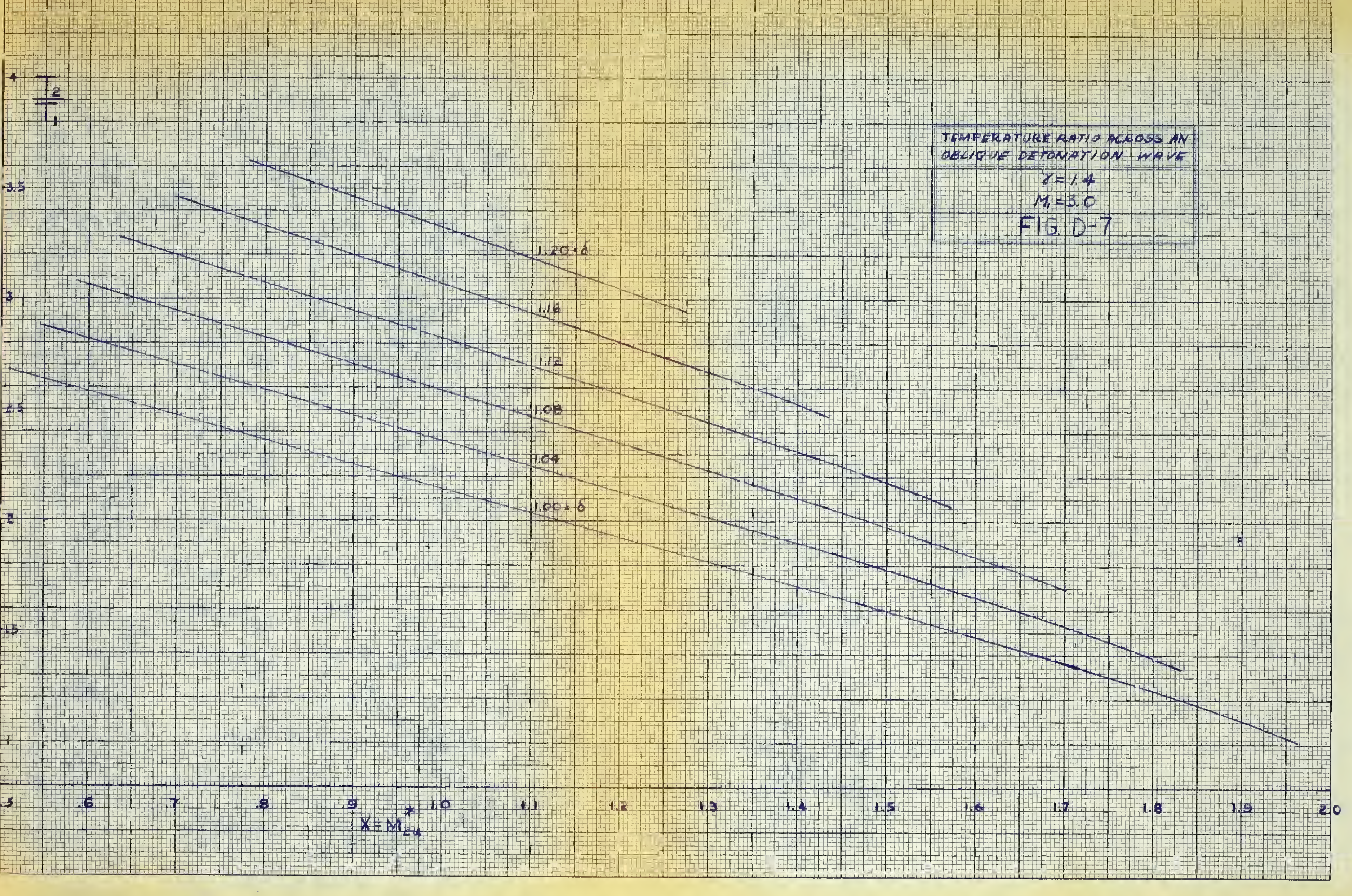


TOTAL PRESSURE RATIO ACROSS  
AN OBLIQUE DETONATION WAVE  
 $\gamma = 1.4$   
 $M_1 = 3.0$   
FIG. D-6

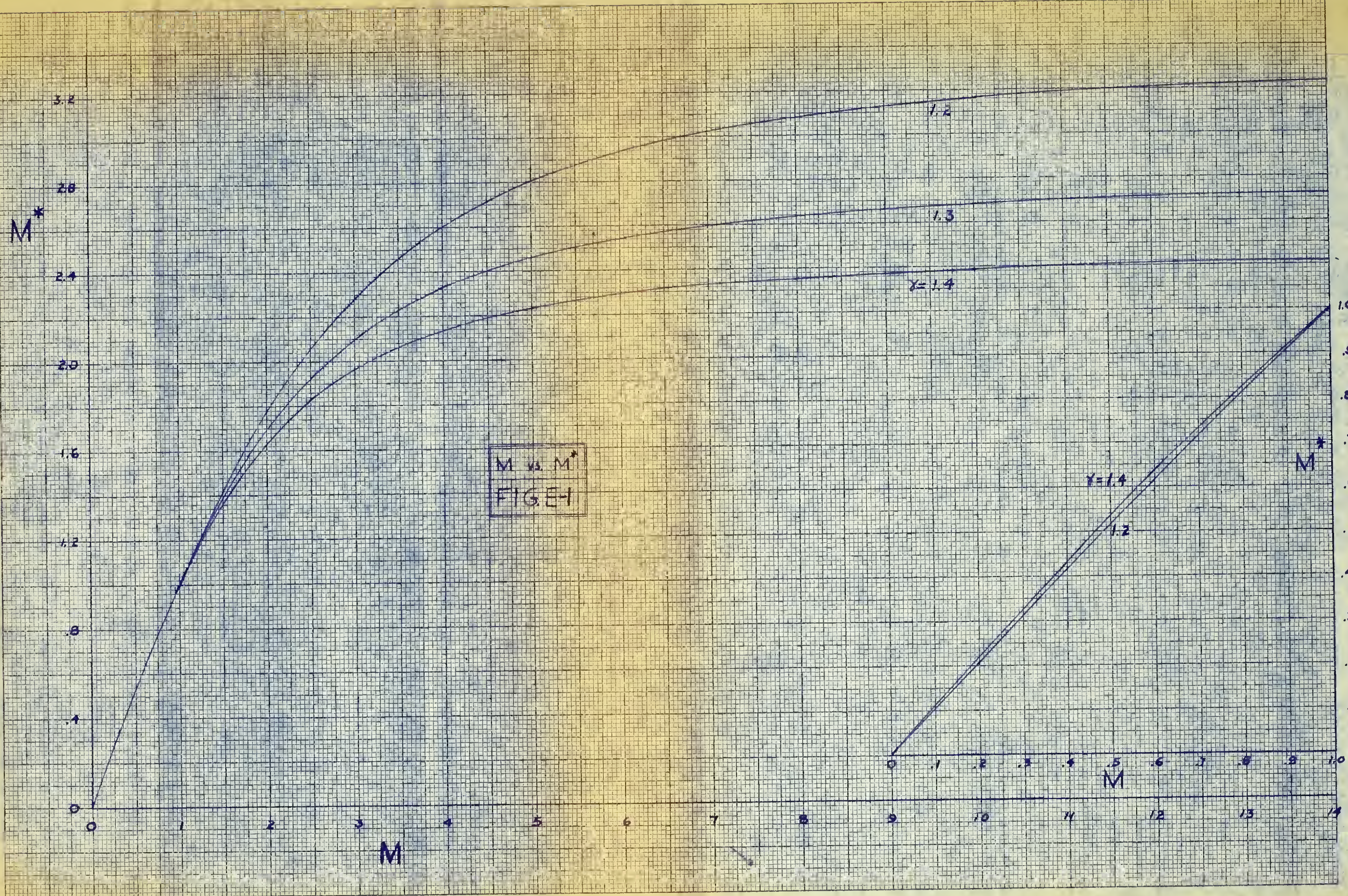
$\frac{P_{T2}}{P_{T1}}$



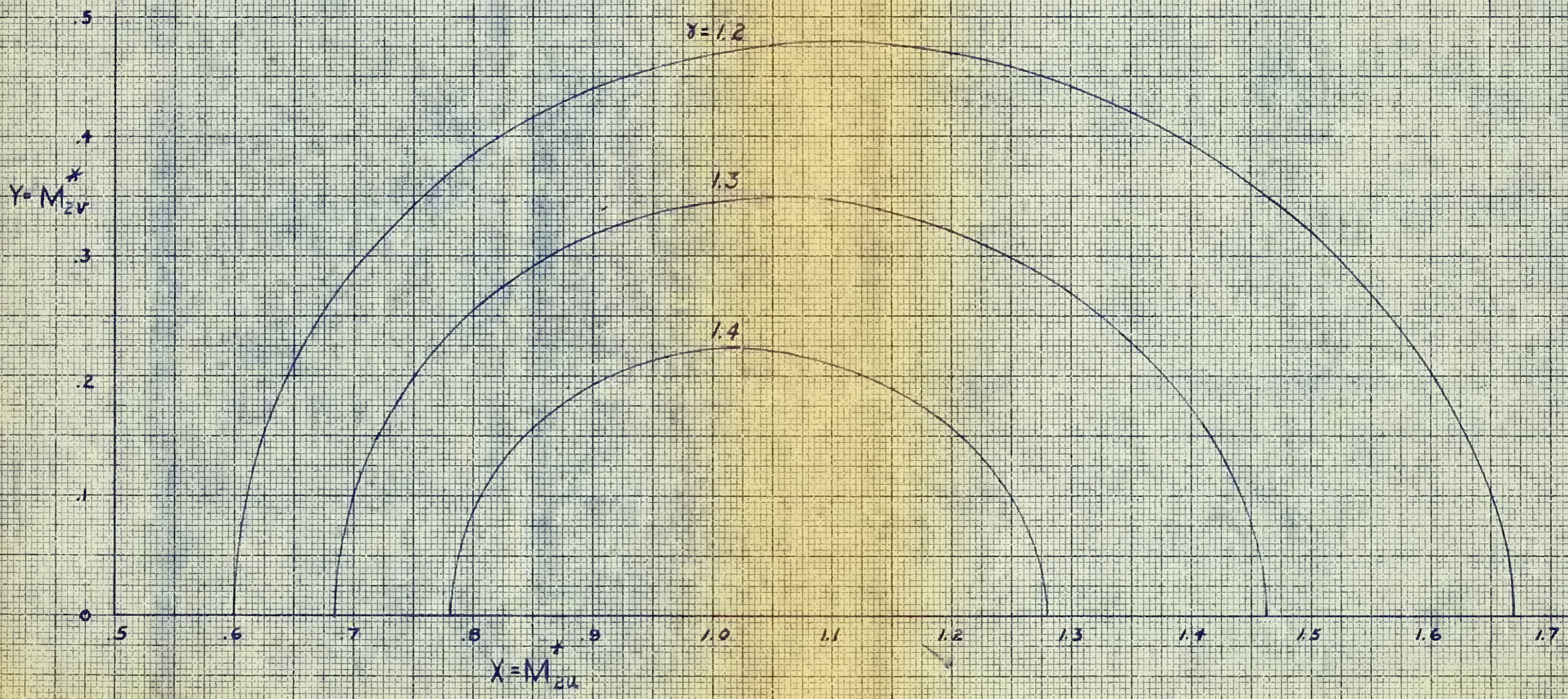
$M_2$



APPENDIX E



DETONATION POLAR  
 $M_1 = 3.0$   
 $S = 1.20$   
FIG. E-2



APPENDIX F

APPENDIX F  
COMPUTER PROGRAM

The data in Appendices G, H, and I was obtained by use of a Fortran (Formula translation) program on the U. S. Naval Postgraduate School Control Data Corporation 1604 digital computer. Table F-I is a list of variable names used in the program and their actual counterparts. Table F-II is an example of the program for a specific value of  $\gamma = 1.4$ . In this program the equations noted in Table II were solved for  $\gamma = 1.4$ .  $M_1$ ,  $\delta$ , and  $x$  were allowed to assume ranges of values. Use of the program may be made for any value of  $\gamma$ ,  $M_1$ , or  $\delta$  with only minor alterations.

TABLE F-1

## TABLE OF FORTRAN VARIABLE NAMES

Fortran Symbol	Definition
BY	$y$
DEL	$\delta$
DELMAX	$\delta_{\max}$
EM1	$M_1$
EM1SQ	$M_1^2$
EM1ST	$M_1^*$
EM2	$M_2$
EM2SQ	$M_2^2$
EM2STSQ	$(M_2^*)^2$
EM2U	$M_{2u}$
EX	$x$
GAM	$\gamma$
P21	$P_2/P_1$
PT21	$P_{T2}/P_{T1}$
SIGD	$\sigma$ (degrees)
SIGR	$\sigma$ (radians)
THETAD	$\theta$ (degrees)
THETAR	$\theta$ (radians)
T21	$T_2/T_1$
XMA	$x_{\max}$ ( $Z_2$ value of Fig. 9)
XMI	$x_{\min}$ ( $Z_1$ value of Fig. 9)

## TABLE F-II

```

PROGRAM OBLIQUE
OPROGRAM TO CALCULATE PROPERTIES OF AN OBLIQUE DETONATION (LOOP
1BRANCH M1 = 1 TO 5 BY .5)
OCOMMON GAM,GPL,GMS, EM1, EM1ST, DEL, EX, BY, EM2U, EM2, DELMAX,
1THETAD, SIGD, P21, PT21, XMI, IXMI, XMA, IXMA, A2, C5, EMISQ,T21
GAM = 1.4
GPL = GAM+1.
GMS = GAM-1.
DO 120 IEM1 = 10,50,5
XEM1 = IEM1
EM1 = XEM1/10.
EMISQ = EM1**2
EM1ST = SQRTF(EMISQ * GPL/ (2. + EMISQ * GMS ))
DELMAX = (EM1ST**2+1.)/(2.*EM1ST)
DDELMX = DELMAX*1000.
IDELMX = DDELMX
WRITE OUTPUT TAPE 3,95
WRITE OUTPUT TAPE 3, 100
DO 60 IDEL= 1000,IDEIMX,40
XDEL=IDEL
DEL =XDEL/1000.
CALL ZERO
IF (A2) 60, 40, 40
40 DO 50 IEX=IXMI, IXMA, 300
XEX=IEX
EX = XEX/10000.
CALL CALCU
IF (C5) 50, 55, 55
550 WRITE OUTPUT TAPE 3, 110, EM1, EM1ST, DELMAX, DEL, XMI, XMA, EX,
1BY, EM2U, EM2, THETAD, SIGD, P21, PT21, T21
50 CONTINUE
WRITE OUTPUT TAPE 3, 57
57 FORMAT ( / )
60 CONTINUE
950 FORMAT (1H1 45X 29H LOOP BRANCH (M1 FROM 1 TO 5) //
112H GAMMA = 1.4, // )
1000 FORMAT (119H M1 M1* DELMAX DEL XMIN XMAX X(M2U*) Y(
1M2V*) M2U M2 THETA SIGMA PR21 PTR21 TR21 )
110 FORMAT (F5.1,2F8.4,F5.2,4F8.4, 2F9.4, 2F8.4, 2F9.4, F 9.4)
120 CONTINUE
END FILE 3
STOP
END
SUBROUTINE ZERO
OCOMMON GAM,GPL,GMS, EM1, EM1ST, DEL, EX, BY, EM2U, EM2, DELMAX,
1THETAD, SIGD, P21, PT21, XMI, IXMI, XMA, IXMA, A2, C5, EMISQ,T21
A1 = DELMAX/DEL
A2 = A1 ** 2 - 1.
IF (A2) 35, 29, 30
29 A3 = 0.
GO TO 31
30 A3 = SQRTF (A2)
31 XMI = A1 - A3
XMA = A1+ A3
XXMI = XMI * 100. + 1.
IXXMI = XXMI
IXMI = IXXMI * 100
XXMA = XMA *10000.
IXMA = XXMA
35 RETURN
END
SUBROUTINE CALCU
OCOMMON GAM,GPL,GMS, EM1, EM1ST, DEL, EX, BY, EM2U, EM2, DELMAX,
1THETAD, SIGD, P21, PT21, XMI, IXMI, XMA, IXMA, A2, C5, E 1SQ,T21
C1 = EM1ST-DEL*EX
C2 = EX *C1-(DEL*EM1ST-EX )/EM1ST
C3 = 1./EM1ST + 2.*EM1ST/GPL
C4 = DEL*(C3-DEL*EX )
C5 = C1*C2/C4
IF (C5) 45, 46, 40
46 BY = 0.0
THETAR = 0.0
THETAD = 0.0

```

```

SIGD = 90.0
GO TO 42
40 BY      =SQRTF(C5)
   THETAR = ATANF (BY/EX)
   THETAD = THETAR * 57.2958
   W1 = EM1ST / (BY * SQRTF(DEL))
   SIGR = ATANF ( W1 - EX/BY )
   SIGD = SIGR * 57.2958
42 EM2STSQ = EX **2 + C5
   EM2 = SQRTF ((2.* EM2STSQ) / (GPL - GMS * EM2STSQ))
   EM2U = EM2 * COSF(THETAR)
   EM2SQ = EM2 ** 2
   D1 = 1. + EM1SQ * GMS/2.
   D2 = 1. + EM2SQ * GMS/2.
   T21 = (DEL ** 2) * (D1/D2)
   D3 = SQRTF (T21)
   D4 = EM1 * EM2U
   P21 = (EM1SQ - D4 * D3) * D3 / ( D4 - EM2SQ * D3 )
   PT21 = P21 * (D2/D1) ** ( GAM / GMS )
45 RETURN
   END
   END

```

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THEORETICAL INVESTIGATIONS OF THE PROPERTIES  
OF OBLIQUE DETONATION WAVES

by

Philip 'F' Gibber

APPENDICES G, H, and I

Thesis  
G368  
Appendix



Gibber, Philip 'F'

APPENDIX G

NPS ARCHIVE  
1962/APPEN.  
GIBBER, P.

~~Thesis~~  
~~G 368~~  
Appendix

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GAMMA = 1.4

M1	M1*	DELMAX	DEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
1.5	1.3646	1.0487	1.00	.7328	1.3646	.7400	.0498	.7088	.7104	3.8469	85.4450	2.4418	.9313	1.3171
1.5	1.3646	1.0487	1.00	.7328	1.3646	.7700	.1093	.7413	.7487	8.0791	79.5837	2.3725	.9374	1.3038
1.5	1.3646	1.0487	1.00	.7328	1.3646	.8000	.1415	.7741	.7861	10.0276	75.9337	2.3033	.9434	1.2905
1.5	1.3646	1.0487	1.00	.7328	1.3646	.8300	.1634	.8074	.8229	11.1377	73.0030	2.2340	.9492	1.2771
1.5	1.3646	1.0487	1.00	.7328	1.3646	.8600	.1790	.8410	.8590	11.7607	70.4630	2.1648	.9547	1.2635
1.5	1.3646	1.0487	1.00	.7328	1.3646	.8900	.1901	.8751	.8948	12.0544	68.1750	2.0955	.9600	1.2498
1.5	1.3646	1.0487	1.00	.7328	1.3646	.9200	.1973	.9096	.9303	12.1064	66.0646	2.0263	.9651	1.2360
1.5	1.3646	1.0487	1.00	.7328	1.3646	.9500	.2014	.9446	.9656	11.9711	64.0866	1.9570	.9699	1.2221
1.5	1.3646	1.0487	1.00	.7328	1.3646	.9800	.2027	.9801	1.0009	11.6845	62.2108	1.8878	.9744	1.2080
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.0100	.2013	1.0162	1.0362	11.2717	60.4157	1.8185	.9786	1.1937
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.0400	.1975	1.0528	1.0716	10.7504	58.6855	1.7493	.9824	1.1792
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.0700	.1912	1.0900	1.1072	10.1336	57.0079	1.6800	.9859	1.1645
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.1000	.1827	1.1278	1.1432	9.4304	55.3729	1.6108	.9891	1.1495
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.1300	.1719	1.1663	1.1797	8.6476	53.7726	1.5415	.9918	1.1343
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.1600	.1587	1.2056	1.2168	7.7896	52.2002	1.4722	.9941	1.1187
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.1900	.1431	1.2456	1.2546	6.8592	50.6496	1.4030	.9961	1.1028
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.2200	.1252	1.2866	1.2933	5.8578	49.1156	1.3337	.9976	1.0865
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.2500	.1046	1.3285	1.3331	4.7855	47.5935	1.2645	.9987	1.0697
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.2800	.0815	1.3715	1.3743	3.6410	46.0786	1.1952	.9994	1.0525
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.3100	.0554	1.4158	1.4170	2.4220	44.5668	1.1260	.9998	1.0345
1.5	1.3646	1.0487	1.00	.7328	1.3646	1.3400	.0263	1.4614	1.4617	1.1246	43.0537	1.0567	1.0000	1.0159
1.5	1.3646	1.0487	1.04	.8787	1.1380	.8800	.0124	.8608	.8609	.8076	88.4488	2.0373	.9003	1.3659
1.5	1.3646	1.0487	1.04	.8787	1.1380	.9100	.0568	.8950	.8968	3.5725	82.4399	1.9653	.9023	1.3510
1.5	1.3646	1.0487	1.04	.8787	1.1380	.9400	.0725	.9297	.9325	4.4122	79.6740	1.8933	.9040	1.3360
1.5	1.3646	1.0487	1.04	.8787	1.1380	.9700	.0796	.9649	.9682	4.6907	77.7987	1.8213	.9052	1.3207
1.5	1.3646	1.0487	1.04	.8787	1.1380	1.0000	.0809	1.0007	1.0039	4.6251	76.5427	1.7493	.9061	1.3052
1.5	1.3646	1.0487	1.04	.8787	1.1380	1.0300	.0775	1.0370	1.0399	4.3009	75.8863	1.6772	.9066	1.2894
1.5	1.3646	1.0487	1.04	.8787	1.1380	1.0600	.0695	1.0739	1.0762	3.7510	75.9686	1.6052	.9066	1.2734
1.5	1.3646	1.0487	1.04	.8787	1.1380	1.0900	.0564	1.1115	1.1130	2.9620	77.1915	1.5332	.9062	1.2569
1.5	1.3646	1.0487	1.04	.8787	1.1380	1.1200	.0351	1.1498	1.1503	1.7939	80.8621	1.4612	.9053	1.2401











3.0	1.9640	1.2366	1.16	.6967	1.4353	.7000	.0456	6669	.6684	3.7288	87.6748	8.3905	.3082	3.4587
3.0	1.9640	1.2366	1.16	.6967	1.4353	.7300	.1421	6994	.7125	11.0132	82.5973	8.1673	.3119	3.4204
3.0	1.9640	1.2366	1.16	.6967	1.4353	.7600	.1913	7323	.7551	14.1263	79.8044	7.9440	.3156	3.3820
3.0	1.9640	1.2366	1.16	.6967	1.4353	.7900	.2265	7655	.7964	15.9959	77.6402	7.7207	.3192	3.3436
3.0	1.9640	1.2366	1.16	.6967	1.4353	.8200	.2536	7992	.8366	17.1842	75.8182	7.4975	.3228	3.3051
3.0	1.9640	1.2366	1.16	.6967	1.4353	.8500	.2750	8333	.8759	17.9302	74.2236	7.2742	.3264	3.2665
3.0	1.9640	1.2366	1.16	.6967	1.4353	.8800	.2921	8679	.9145	18.3626	72.7979	7.0509	.3298	3.2278
3.0	1.9640	1.2366	1.16	.6967	1.4353	.9100	.3055	9029	.9525	18.5591	71.5071	6.8277	.3332	3.1891
3.0	1.9640	1.2366	1.16	.6967	1.4353	.9400	.3158	9384	.9900	18.5704	70.3306	6.6044	.3364	3.1502
3.0	1.9640	1.2366	1.16	.6967	1.4353	.9700	.3233	9744	1.0271	18.4311	69.2558	6.3812	.3395	3.1112
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.0000	.3281	1 0109	1.0640	18.1656	68.2753	6.1579	.3425	3.0721
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.0300	.3305	1 0480	1.1006	17.7913	67.3862	5.9346	.3452	3.0329
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.0600	.3306	1 0856	1.1371	17.3204	66.5889	5.7114	.3478	2.9935
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.0900	.3283	1 1238	1.1736	16.7617	65.8877	5.4881	.3501	2.9539
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.1200	.3237	1 1625	1.2101	16.1208	65.2905	5.2648	.3522	2.9142
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.1500	.3168	1 2019	1.2467	15.4007	64.8100	5.0416	.3540	2.8742
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.1800	.3074	1 2420	1.2835	14.6020	64.4651	4.8183	.3554	2.8340
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.2100	.2955	1 2828	1.3205	13.7227	64.2834	4.5951	.3564	2.7935
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.2400	.2808	1 3243	1.3578	12.7576	64.3048	4.3718	.3571	2.7527
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.2700	.2629	1 3666	1.3956	11.6973	64.5895	4.1485	.3572	2.7114
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.3000	.2416	1 4098	1.4339	10.5261	65.2302	3.9253	.3568	2.6698
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.3300	.2158	1 4538	1.4728	9.2163	66.3805	3.7020	.3558	2.6277
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.3600	.1843	1 4989	1.5126	7.7163	68.3185	3.4787	.3541	2.5849
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.3900	.1439	1 5450	1.5532	5.9087	71.6413	3.2555	.3516	2.5414
3.0	1.9640	1.2366	1.16	.6967	1.4353	1.4200	.0838	1 5923	1.5950	3.3782	78.2643	3.0322	.3483	2.4971

3.0	1.9640	1.2366	1.20	.7817	1.2792	.7900	.0586	7621	.7642	4.2419	86.6561	7.5180	.3013	3.6103
3.0	1.9640	1.2366	1.20	.7817	1.2792	.8200	.1218	7955	.8042	8.4459	82.8661	7.2870	.3037	3.5702
3.0	1.9640	1.2366	1.20	.7817	1.2792	.8500	.1568	8293	.8433	10.4488	80.5607	7.0561	.3059	3.5300
3.0	1.9640	1.2366	1.20	.7817	1.2792	.8800	.1808	8635	.8815	11.6098	78.7972	6.8251	.3081	3.4896
3.0	1.9640	1.2366	1.20	.7817	1.2792	.9100	.1980	8982	.9192	12.2729	77.3616	6.5942	.3100	3.4492
3.0	1.9640	1.2366	1.20	.7817	1.2792	.9400	.2100	9333	.9563	12.5930	76.1674	6.3632	.3118	3.4086
3.0	1.9640	1.2366	1.20	.7817	1.2792	.9700	.2178	9689	.9930	12.6549	75.1745	6.1322	.3134	3.3678
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.0000	.2219	1 0050	1.0294	12.5099	74.3659	5.9013	.3148	3.3269
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.0300	.2225	1 0416	1.0656	12.1899	73.7393	5.6703	.3160	3.2858
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.0600	.2198	1 0787	1.1017	11.7143	73.3052	5.4393	.3168	3.2445
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.0900	.2137	1 1164	1.1377	11.0928	73.0875	5.2084	.3174	3.2029
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.1200	.2041	1 1547	1.1737	10.3264	73.1277	4.9774	.3176	3.1611
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.1500	.1905	1 1936	1.2099	9.4055	73.4938	4.7465	.3174	3.1189
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.1800	.1723	1 2332	1.2463	8.3051	74.3010	4.5155	.3168	3.0764
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.2100	.1479	1 2735	1.2829	6.9689	75.7611	4.2845	.3158	3.0334
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.2400	.1140	1 3145	1.3200	5.2546	78.3446	4.0536	.3142	2.9900
3.0	1.9640	1.2366	1.20	.7817	1.2792	1.2700	.0564	1 3563	1.3576	2.5447	83.8387	3.8226	.3121	2.9460

















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4.5 2.19336 1.32247 1.20 .6363 1.5716 1.2100 .4300 2971 1.3766 19.5657 61.5130 10.5844 .1126 5.2734  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.2400 .4213 3395 1.4147 18.7650 61.0783 10.1191 .1136 5.1933  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.2700 .4104 3826 1.4530 17.9078 60.7391 9.6539 .1144 5.1130  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.3000 .3972 4266 1.4917 16.9906 60.5138 9.1886 .1152 5.0325  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.3300 .3816 4713 1.5307 16.0083 60.4283 8.7234 .1157 4.9516  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.3600 .3632 5170 1.5702 14.9532 60.5186 8.2581 .1161 4.8704  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.3900 .3418 5637 1.6102 13.8139 60.8375 7.7928 .1162 4.7887  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.4200 .3167 6113 1.6509 12.5736 61.4648 7.3276 .1161 4.7065  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.4500 .2873 6600 1.6923 11.2060 62.5272 6.8623 .1157 4.6238  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.4800 .2521 7099 1.7345 9.6662 64.2438 6.3970 .1149 4.5402  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.5100 .2086 7610 1.7777 7.8662 67.0416 5.9318 .1138 4.4558  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.5400 .1505 8135 1.8221 5.5805 71.9772 5.4665 .1123 4.3702  
4.5 2.19336 1.32247 1.20 .6363 1.5716 1.5700 .0340 8675 1.8679 1.2402 85.5063 5.0013 .1102 4.2831

4.5	2.1936	1.3247	1.24	.6924	1.4443	.7000	.0729	6671	.6707	5.9420	86.7165	18.1320	.0847	7.1239
4.5	2.1936	1.3247	1.24	.6924	1.4443	.7300	.1585	6997	.7160	12.2473	82.7170	17.6512	.0858	7.0427
4.5	2.1936	1.3247	1.24	.6924	1.4443	.7600	.2077	7327	.7596	15.2879	80.2574	17.1705	.0869	6.9615
4.5	2.1936	1.3247	1.24	.6924	1.4443	.7900	.2438	7661	.8018	17.1521	78.3245	16.6897	.0881	6.8803
4.5	2.1936	1.3247	1.24	.6924	1.4443	.8200	.2720	8000	.8428	18.3522	76.6910	16.2089	.0892	6.7989
4.5	2.1936	1.3247	1.24	.6924	1.4443	.8500	.2946	8342	.8829	19.1163	75.2614	15.7281	.0902	6.7175
4.5	2.1936	1.3247	1.24	.6924	1.4443	.8800	.3128	8690	.9222	19.5692	73.9857	15.2474	.0913	6.6361
4.5	2.1936	1.3247	1.24	.6924	1.4443	.9100	.3274	9042	.9609	19.7874	72.8347	14.7666	.0923	6.5545
4.5	2.1936	1.3247	1.24	.6924	1.4443	.9400	.3388	9398	.9990	19.8209	71.7905	14.2858	.0933	6.4728
4.5	2.1936	1.3247	1.24	.6924	1.4443	.9700	.3474	9760	1.0367	19.7039	70.8420	13.8051	.0943	6.3910
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.0000	.3533	1 0127	1.0741	19.4605	69.9831	13.3243	.0952	6.3092
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.0300	.3568	1 0500	1.1112	19.1080	69.2111	12.8435	.0961	6.2271
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.0600	.3579	1 0877	1.1481	18.6585	68.5267	12.3627	.0969	6.1450
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.0900	.3567	1 1261	1.1848	18.1203	67.9336	11.8820	.0976	6.0626
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.1200	.3531	1 1650	1.2216	17.4988	67.4388	11.4012	.0983	5.9801
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.1500	.3471	1 2046	1.2583	16.7966	67.0533	10.9204	.0988	5.8974
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.1800	.3387	1 2448	1.2951	16.0138	66.7932	10.4397	.0993	5.8145
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.2100	.3276	1 2857	1.3320	15.1477	66.6812	9.9589	.0996	5.7313
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.2400	.3136	1 3273	1.3691	14.1923	66.7503	9.4781	.0998	5.6477
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.2700	.2964	1 3696	1.4064	13.1370	67.0479	8.9973	.0998	5.5639
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.3000	.2755	1 4127	1.4441	11.9647	67.6462	8.5166	.0997	5.4796
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.3300	.2500	1 4566	1.4821	10.6463	68.6593	8.0358	.0993	5.3948
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.3600	.2186	1 5014	1.5207	9.1299	70.2847	7.5550	.0987	5.3094
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.3900	.1782	1 5471	1.5598	7.3073	72.9146	7.0743	.0979	5.2233
4.5	2.1936	1.3247	1.24	.6924	1.4443	1.4200	.1209	1 5938	1.5996	4.8674	77.5983	6.5935	.0968	5.1364

4.5	2.1936	1.3247	1.28	.7683	1.3016	.7700	.0293	7405	.7410	2.1794	88.5640	16.6121	.0827	7.4551
4.5	2.1936	1.3247	1.28	.7683	1.3016	.8000	.1216	7737	.7826	8.6407	83.9071	16.1159	.0834	7.3710
4.5	2.1936	1.3247	1.28	.7683	1.3016	.8300	.1642	8074	.8230	11.1911	81.5766	15.6196	.0842	7.2868
4.5	2.1936	1.3247	1.28	.7683	1.3016	.8600	.1934	8414	.8625	12.6771	79.8347	15.1233	.0849	7.2024
4.5	2.1936	1.3247	1.28	.7683	1.3016	.8900	.2148	8759	.9011	13.5716	78.4241	14.6270	.0856	7.1180
4.5	2.1936	1.3247	1.28	.7683	1.3016	.9200	.2306	9109	.9391	14.0722	77.2467	14.1307	.0862	7.0334
4.5	2.1936	1.3247	1.28	.7683	1.3016	.9500	.2419	9463	.9765	14.2842	76.2558	13.6345	.0868	6.9487
4.5	2.1936	1.3247	1.28	.7683	1.3016	.9800	.2493	9822	1.0135	14.2704	75.4287	13.1382	.0873	6.8639
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.0100	.2531	1 0186	1.0501	14.0702	74.7563	12.6419	.0877	6.7789
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.0400	.2537	1 0555	1.0865	13.7086	74.2395	12.1456	.0881	6.6937
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.0700	.2510	1 0930	1.1226	13.2008	73.8884	11.6493	.0884	6.6083
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.1000	.2449	1 1310	1.1587	12.5534	73.7231	11.1531	.0886	6.5226
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.1300	.2354	1 1695	1.1946	11.7655	73.7767	10.6568	.0887	6.4367
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.1600	.2218	1 2087	1.2306	10.8269	74.1018	10.1605	.0886	6.3505
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.1900	.2037	1 2485	1.2667	9.7135	74.7835	9.6642	.0884	6.2639
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.2200	.1796	1 2890	1.3029	8.3761	75.9703	9.1679	.0881	6.1769
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.2500	.1469	1 3301	1.3393	6.7044	77.9593	8.6717	.0876	6.0895
4.5	2.1936	1.3247	1.28	.7683	1.3016	1.2800	.0976	1 3720	1.3760	4.3598	81.5752	8.1754	.0869	6.0015

4.5	2.1936	1.3247	1.32	.9188	1.0884	.9200	.0136	9062	.9063	.8458	89.2135	13.6551	.0803	7.5576
4.5	2.1936	1.3247	1.32	.9188	1.0884	.9500	.0628	9412	.9433	3.7794	86.2571	13.1434	.0806	7.4698
4.5	2.1936	1.3247	1.32	.9188	1.0884	.9800	.0776	9767	.9798	4.5296	85.2244	12.6316	.0807	7.3818
4.5	2.1936	1.3247	1.32	.9188	1.0884	1.0100	.0804	1 0127	1.0159	4.5529	84.8894	12.1198	.0808	7.2936
4.5	2.1936	1.3247	1.32	.9188	1.0884	1.0400	.0727	1 0492	1.0517	3.9973	85.2210	11.6080	.0807	7.2052
4.5	2.1936	1.3247	1.32	.9188	1.0884	1.0700	.0499	1 0861	1.0873	2.6701	86.5975	11.0962	.0806	7.1164





















GAMMA = 1.4

Table with columns: M1, M1\*, DELMAX, DEL, XMIN, XMAX, X(M2U\*), Y(M2V\*), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Contains numerical data for M1 values from 14.0 to 2.0.

Table with columns: M1, M1\*, DELMAX, DEL, XMIN, XMAX, X(M2U\*), Y(M2V\*), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Contains numerical data for M1 values from 14.0 to 2.0.

Table with columns: M1, M1\*, DELMAX, DEL, XMIN, XMAX, X(M2U\*), Y(M2V\*), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Contains numerical data for M1 values from 14.0 to 2.0.





APPENDIX H

PROPERTIES OF AN OBLIQUE DETONATION WAVE

GAMMA = 1.3

M1	M1*	DELMAX	DEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
1.5	1.3909	1.0549	1.00	.7190	1.3909	.7200	.0197	.6953	.6956	1.5633	88.3223	2.4109	.9263	1.2470
1.5	1.3909	1.0549	1.00	.7190	1.3909	.7500	.1040	.7271	.7341	7.8953	80.7820	2.3478	.9325	1.2375
1.5	1.3909	1.0549	1.00	.7190	1.3909	.7800	.1408	.7591	.7714	10.2348	77.0180	2.2847	.9385	1.2279
1.5	1.3909	1.0549	1.00	.7190	1.3909	.8100	.1657	.7914	.8078	11.5633	74.0765	2.2216	.9444	1.2182
1.5	1.3909	1.0549	1.00	.7190	1.3909	.8400	.1837	.8240	.8435	12.3362	71.5580	2.1585	.9500	1.2085
1.5	1.3909	1.0549	1.00	.7190	1.3909	.8700	.1968	.8570	.8786	12.7442	69.3058	2.0954	.9554	1.1987
1.5	1.3909	1.0549	1.00	.7190	1.3909	.9000	.2060	.8902	.9132	12.8898	67.2390	2.0323	.9606	1.1888
1.5	1.3909	1.0549	1.00	.7190	1.3909	.9300	.2119	.9238	.9474	12.8353	65.3095	1.9692	.9655	1.1788
1.5	1.3909	1.0549	1.00	.7190	1.3909	.9600	.2150	.9577	.9814	12.6218	63.4858	1.9062	.9702	1.1687
1.5	1.3909	1.0549	1.00	.7190	1.3909	.9900	.2154	.9920	1.0152	12.2774	61.7456	1.8431	.9745	1.1584
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.0200	.2135	1.0266	1.0489	11.8224	60.0729	1.7800	.9786	1.1480
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.0500	.2093	1.0617	1.0826	11.2714	58.4551	1.7169	.9823	1.1375
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.0800	.2028	1.0972	1.1164	10.6352	56.8825	1.6538	.9857	1.1268
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.1100	.1942	1.1332	1.1504	9.9216	55.3470	1.5907	.9887	1.1160
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.1400	.1833	1.1696	1.1846	9.1365	53.8420	1.5276	.9914	1.1049
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.1700	.1703	1.2066	1.2193	8.2837	52.3619	1.4645	.9937	1.0936
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.2000	.1551	1.2441	1.2544	7.3658	50.9016	1.4014	.9957	1.0821
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.2300	.1376	1.2822	1.2902	6.3843	49.4567	1.3383	.9972	1.0703
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.2600	.1178	1.3210	1.3268	5.3393	48.0232	1.2753	.9984	1.0581
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.2900	.0954	1.3605	1.3642	4.2303	46.5972	1.2122	.9992	1.0456
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.3200	.0705	1.4009	1.4028	3.0555	45.1752	1.1491	.9997	1.0327
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.3500	.0427	1.4421	1.4428	1.8121	43.7537	1.0860	.9999	1.0192
1.5	1.3909	1.0549	1.00	.7190	1.3909	1.3800	.0120	1.4844	1.4844	.4964	42.3290	1.0229	1.0000	1.0052
1.5	1.3909	1.0549	1.04	.8443	1.1844	.8500	.0304	.8329	.8334	2.0464	86.6177	2.0660	.9003	1.3101
1.5	1.3909	1.0549	1.04	.8443	1.1844	.8800	.0714	.8658	.8686	4.6393	81.6051	2.0004	.9029	1.2996
1.5	1.3909	1.0549	1.04	.8443	1.1844	.9100	.0903	.8990	.9034	5.6682	78.7455	1.9348	.9051	1.2888
1.5	1.3909	1.0549	1.04	.8443	1.1844	.9400	.1008	.9326	.9379	6.1217	76.6211	1.8691	.9071	1.2780
1.5	1.3909	1.0549	1.04	.8443	1.1844	.9700	.1058	.9665	.9723	6.2252	74.9637	1.8035	.9087	1.2670
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.0000	.1065	1.0009	1.0065	6.0779	73.6895	1.7379	.9099	1.2558
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.0300	.1034	1.0356	1.0408	5.7325	72.7930	1.6723	.9107	1.2444
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.0600	.0968	1.0707	1.0752	5.2178	72.3312	1.6067	.9112	1.2329
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.0900	.0866	1.1064	1.1098	4.5448	72.4454	1.5411	.9112	1.2210
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.1200	.0725	1.1425	1.1449	3.7035	73.4449	1.4755	.9108	1.2090
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.1500	.0529	1.1791	1.1804	2.6332	76.1104	1.4099	.9101	1.1966
1.5	1.3909	1.0549	1.04	.8443	1.1844	1.1800	.0185	1.2164	1.2165	.9006	84.2400	1.3442	.9089	1.1838













LOOP BRANCH (M1 FROM 1 TO 5)

GAMMA = 1.3

Table with columns: M1, M1\*, DELMAX, DEL, X MIN, X MAX, X (M2U\*), Y (M2V\*), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Contains numerical data for each parameter across multiple iterations.























8.0	2.6350	1.5073	1.32	.5906	1.6931	.6000	.1002	.5735	.5815	9.4845	86.6126	59.1929	.0026	17.5780
8.0	2.6350	1.5073	1.32	.5906	1.6931	.6500	.2464	.6262	.6697	20.7596	81.4740	57.1090	.0027	17.3054
8.0	2.6350	1.5073	1.32	.5906	1.6931	.7000	.3262	.6797	.7499	24.9839	78.4319	55.0251	.0028	17.0327
8.0	2.6350	1.5073	1.32	.5906	1.6931	.7500	.3835	.7342	.8246	27.0845	76.0454	52.9412	.0029	16.7600
8.0	2.6350	1.5073	1.32	.5906	1.6931	.8000	.4276	.7896	.8953	28.1247	74.0231	50.8573	.0030	16.4872
8.0	2.6350	1.5073	1.32	.5906	1.6931	.8500	.4622	.8460	.9629	28.5354	72.2455	48.7733	.0031	16.2143
8.0	2.6350	1.5073	1.32	.5906	1.6931	.9000	.4893	.9034	1.0282	28.5328	70.6514	46.6894	.0032	15.9413
8.0	2.6350	1.5073	1.32	.5906	1.6931	.9500	.5102	.9618	1.0917	28.2381	69.2056	44.6055	.0033	15.6682
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.0000	.5256	1.0214	1.1539	27.7248	67.8875	42.5216	.0034	15.3950
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.0500	.5359	1.0821	1.2149	27.0391	66.6857	40.4377	.0035	15.1216
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.1000	.5415	1.1440	1.2751	26.2104	65.5953	38.3537	.0036	14.8481
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.1500	.5426	1.2072	1.3348	25.2573	64.6172	36.2698	.0037	14.5743
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.2000	.5391	1.2717	1.3941	24.1905	63.7582	34.1859	.0037	14.3004
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.2500	.5310	1.3376	1.4532	23.0145	63.0316	32.1020	.0038	14.0261
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.3000	.5181	1.4049	1.5124	21.7283	62.4595	30.0180	.0039	13.7515
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.3500	.5001	1.4737	1.5716	20.3251	62.0766	27.9341	.0039	13.4765
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.4000	.4764	1.5442	1.6311	18.7910	61.9366	25.8502	.0040	13.2010
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.4500	.4461	1.6163	1.6911	17.1021	62.1252	23.7663	.0040	12.9249
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.5000	.4081	1.6903	1.7517	15.2182	62.7859	21.6824	.0040	12.6479
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.5500	.3598	1.7661	1.8131	13.0672	64.1789	19.5984	.0040	12.3699
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.6000	.2966	1.8441	1.8755	10.5013	66.8457	17.5145	.0040	12.0904
8.0	2.6350	1.5073	1.32	.5906	1.6931	1.6500	.2058	1.9242	1.9392	7.1094	72.2657	15.4306	.0039	11.8068

8.0	2.6350	1.5073	1.40	.6777	1.4755	.6800	.0420	.6542	.6555	3.5353	88.4445	54.1410	.0026	19.5182
8.0	2.6350	1.5073	1.40	.6777	1.4755	.7300	.1952	.7076	.7325	14.9734	82.5695	51.9308	.0026	19.2286
8.0	2.6350	1.5073	1.40	.6777	1.4755	.7800	.2637	.7618	.8042	18.6762	79.6737	49.7206	.0027	18.9389
8.0	2.6350	1.5073	1.40	.6777	1.4755	.8300	.3098	.8169	.8720	20.4663	77.4977	47.5104	.0027	18.6491
8.0	2.6350	1.5073	1.40	.6777	1.4755	.8800	.3427	.8729	.9368	21.2783	75.7254	45.3001	.0028	18.3592
8.0	2.6350	1.5073	1.40	.6777	1.4755	.9300	.3661	.9299	.9994	21.4862	74.2384	43.0899	.0028	18.0690
8.0	2.6350	1.5073	1.40	.6777	1.4755	.9800	.3816	.9879	1.0602	21.2771	72.9838	40.8797	.0029	17.7787
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.0300	.3903	1.0469	1.1195	20.7552	71.9392	38.6695	.0029	17.4882
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.0800	.3927	1.1069	1.1778	19.9800	71.1022	36.4593	.0030	17.1973
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.1300	.3887	1.1681	1.2353	18.9843	70.4874	34.2490	.0030	16.9062
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.1800	.3784	1.2305	1.2922	17.7811	70.1284	32.0388	.0030	16.6146
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.2300	.3612	1.2940	1.3487	16.3655	70.0852	29.8286	.0031	16.3226
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.2800	.3361	1.3589	1.4049	14.7116	70.4610	27.6184	.0031	16.0300
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.3300	.3012	1.4250	1.4611	12.7593	71.4403	25.4082	.0031	15.7366
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.3800	.2526	1.4926	1.5174	10.3738	73.3925	23.1979	.0030	15.4423
8.0	2.6350	1.5073	1.40	.6777	1.4755	1.4300	.1800	1.5617	1.5741	7.1742	77.2737	20.9877	.0030	15.1467

8.0	2.6350	1.5073	1.48	.8256	1.2113	.8300	.0405	.8114	.8123	2.7948	88.2629	45.4138	.0025	21.1270
8.0	2.6350	1.5073	1.48	.8256	1.2113	.8800	.1325	.8666	.8763	8.5621	84.1177	43.0773	.0025	20.8198
8.0	2.6350	1.5073	1.48	.8256	1.2113	.9300	.1690	.9227	.9378	10.2985	82.2147	40.7408	.0025	20.5124
8.0	2.6350	1.5073	1.48	.8256	1.2113	.9800	.1862	.9796	.9972	10.7569	81.0783	38.4043	.0025	20.2047
8.0	2.6350	1.5073	1.48	.8256	1.2113	1.0300	.1895	1.0376	1.0550	10.4227	80.5312	36.0677	.0025	19.8966
8.0	2.6350	1.5073	1.48	.8256	1.2113	1.0800	.1797	1.0965	1.1115	9.4452	80.6060	33.7312	.0025	19.5881
8.0	2.6350	1.5073	1.48	.8256	1.2113	1.1300	.1544	1.1564	1.1671	7.7824	81.5212	31.3947	.0025	19.2790
8.0	2.6350	1.5073	1.48	.8256	1.2113	1.1800	.1032	1.2174	1.2220	4.9984	84.0246	29.0582	.0025	18.9691





11.0	2.6956	1.5333	1.32	.5706	1.7526	.5800	.1045	.5535	.5625	10.2175	86.6127	113.6241	.0004	31.8553
11.0	2.6956	1.5333	1.32	.5706	1.7526	.6300	.2569	.6061	.6545	22.1866	81.4859	109.7727	.0004	31.3523
11.0	2.6956	1.5333	1.32	.5706	1.7526	.6800	.3407	.6595	.7376	26.6150	78.4425	105.9213	.0004	30.8492
11.0	2.6956	1.5333	1.32	.5706	1.7526	.7300	.4015	.7138	.8147	28.8115	76.0488	102.0700	.0004	30.3460
11.0	2.6956	1.5333	1.32	.5706	1.7526	.7800	.4487	.7691	.8873	29.9099	74.0138	98.2186	.0004	29.8428
11.0	2.6956	1.5333	1.32	.5706	1.7526	.8300	.4863	.8254	.9566	30.3652	72.2181	94.3672	.0005	29.3396
11.0	2.6956	1.5333	1.32	.5706	1.7526	.8800	.5164	.8827	1.0235	30.4030	70.5995	90.5159	.0005	28.8362
11.0	2.6956	1.5333	1.32	.5706	1.7526	.9300	.5402	.9411	1.0884	30.1498	69.1220	86.6645	.0005	28.3328
11.0	2.6956	1.5333	1.32	.5706	1.7526	.9800	.5586	1.0007	1.1518	29.6816	67.7634	82.8131	.0005	27.8292
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.0300	.5720	1.0614	1.2141	29.0465	66.5103	78.9617	.0005	27.3256
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.0800	.5809	1.1233	1.2755	28.2756	65.3551	75.1104	.0005	26.8218
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.1300	.5855	1.1865	1.3363	27.3891	64.2950	71.2590	.0006	26.3178
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.1800	.5857	1.2510	1.3967	26.3996	63.3316	67.4076	.0006	25.8137
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.2300	.5818	1.3170	1.4569	25.3143	62.4709	63.5563	.0006	25.3094
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.2800	.5735	1.3844	1.5170	24.1353	61.7244	59.7049	.0006	24.8047
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.3300	.5607	1.4533	1.5772	22.8610	61.1105	55.8535	.0006	24.2998
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.3800	.5432	1.5239	1.6377	21.4847	60.6572	52.0021	.0006	23.7946
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.4300	.5203	1.5961	1.6985	19.9947	60.4076	48.1508	.0006	23.2888
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.4800	.4915	1.6702	1.7599	18.3715	60.4287	44.2994	.0006	22.7824
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.5300	.4556	1.7462	1.8220	16.5835	60.8290	40.4480	.0006	22.2753
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.5800	.4109	1.8242	1.8848	14.5779	61.7965	36.5967	.0006	21.7672
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.6300	.3541	1.9043	1.9487	12.2572	63.6911	32.7453	.0006	21.2578
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.6800	.2782	1.9868	2.0138	9.4022	67.3366	28.8939	.0006	20.7465
11.0	2.6956	1.5333	1.32	.5706	1.7526	1.7300	.1581	2.0717	2.0804	5.2229	75.6071	25.0425	.0006	20.2324
11.0	2.6956	1.5333	1.40	.6486	1.5418	.6500	.0355	.6236	.6245	3.1229	88.7523	105.1978	.0004	35.4594
11.0	2.6956	1.5333	1.40	.6486	1.5418	.7000	.2069	.6767	.7056	16.4664	82.5311	101.1130	.0004	34.9255
11.0	2.6956	1.5333	1.40	.6486	1.5418	.7500	.2817	.7306	.7805	20.5890	79.5542	97.0282	.0004	34.3915
11.0	2.6956	1.5333	1.40	.6486	1.5418	.8000	.3331	.7855	.8508	22.6069	77.3003	92.9434	.0004	33.8574
11.0	2.6956	1.5333	1.40	.6486	1.5418	.8500	.3709	.8412	.9178	23.5756	75.4412	88.8586	.0004	33.3233
11.0	2.6956	1.5333	1.40	.6486	1.5418	.9000	.3990	.8979	.9822	23.9111	73.8527	84.7738	.0004	32.7889
11.0	2.6956	1.5333	1.40	.6486	1.5418	.9500	.4194	.9556	1.0446	23.8205	72.4756	80.6890	.0004	32.2544
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.0000	.4331	1.0144	1.1054	23.4195	71.2802	76.6042	.0004	31.7198
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.0500	.4409	1.0742	1.1650	22.7764	70.2542	72.5194	.0004	31.1849
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.1000	.4429	1.1351	1.2237	21.9320	69.3978	68.4347	.0005	30.6498
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.1500	.4394	1.1972	1.2816	20.9094	68.7226	64.3499	.0005	30.1143
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.2000	.4301	1.2605	1.3391	19.7179	68.2535	60.2651	.0005	29.5786
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.2500	.4147	1.3251	1.3962	18.3549	68.0334	56.1803	.0005	29.0423
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.3000	.3926	1.3910	1.4531	16.8042	68.1323	52.0955	.0005	28.5056
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.3500	.3625	1.4584	1.5100	15.0303	68.6677	48.0107	.0005	27.9682
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.4000	.3223	1.5271	1.5671	12.9628	69.8495	43.9259	.0005	27.4299
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.4500	.2674	1.5975	1.6244	10.4502	72.1041	39.8411	.0005	26.8905
11.0	2.6956	1.5333	1.40	.6486	1.5418	1.5000	.1858	1.6694	1.6822	7.0593	76.5751	35.7564	.0005	26.3497
11.0	2.6956	1.5333	1.48	.7652	1.3068	.7700	.0502	.7476	.7492	3.7310	88.0109	91.7996	.0004	38.6885
11.0	2.6956	1.5333	1.48	.7652	1.3068	.8200	.1622	.8021	.8176	11.1891	83.3715	87.4814	.0004	38.1234
11.0	2.6956	1.5333	1.48	.7652	1.3068	.8700	.2124	.8574	.8826	13.7226	81.0293	83.1632	.0004	37.5580
11.0	2.6956	1.5333	1.48	.7652	1.3068	.9200	.2429	.9135	.9448	14.7896	79.3830	78.8450	.0004	36.9925
11.0	2.6956	1.5333	1.48	.7652	1.3068	.9700	.2606	.9706	1.0051	15.0379	78.1849	74.5268	.0004	36.4267
11.0	2.6956	1.5333	1.48	.7652	1.3068	1.0200	.2681	1.0287	1.0636	14.7272	77.3626	70.2086	.0004	35.8606
11.0	2.6956	1.5333	1.48	.7652	1.3068	1.0700	.2663	1.0878	1.1209	13.9764	76.9152	65.8904	.0004	35.2941
11.0	2.6956	1.5333	1.48	.7652	1.3068	1.1200	.2550	1.1478	1.1772	12.8282	76.8979	61.5722	.0004	34.7272
11.0	2.6956	1.5333	1.48	.7652	1.3068	1.1700	.2330	1.2090	1.2327	11.2608	77.4419	57.2540	.0004	34.1597
11.0	2.6956	1.5333	1.48	.7652	1.3068	1.2200	.1965	1.2713	1.2877	9.1506	78.8361	52.9358	.0004	33.5915
11.0	2.6956	1.5333	1.48	.7652	1.3068	1.2700	.1346	1.3347	1.3422	6.0521	81.8973	48.6176	.0004	33.0224





14.0	2.7230	1.5451	1.32	.5621	1.7789	.5700	.0972	.5435	.5514	9.6771	86.9092	185.3943	.0001	50.6590
14.0	2.7230	1.5451	1.32	.5621	1.7789	.6200	.2581	.5959	.6455	22.6045	81.6091	179.2183	.0001	49.8528
14.0	2.7230	1.5451	1.32	.5621	1.7789	.6700	.3447	.6493	.7302	27.2260	78.5375	173.0424	.0001	49.0465
14.0	2.7230	1.5451	1.32	.5621	1.7789	.7200	.4075	.7035	.8084	29.5069	76.1285	166.8664	.0001	48.2402
14.0	2.7230	1.5451	1.32	.5621	1.7789	.7700	.4563	.7588	.8820	30.6529	74.0816	160.6905	.0001	47.4339
14.0	2.7230	1.5451	1.32	.5621	1.7789	.8200	.4954	.8150	.9522	31.1403	72.2743	154.5146	.0001	46.6274
14.0	2.7230	1.5451	1.32	.5621	1.7789	.8700	.5270	.8723	1.0198	31.2036	70.6434	148.3386	.0001	45.8210
14.0	2.7230	1.5451	1.32	.5621	1.7789	.9200	.5522	.9306	1.0854	30.9733	69.1518	142.1627	.0001	45.0144
14.0	2.7230	1.5451	1.32	.5621	1.7789	.9700	.5720	.9901	1.1494	30.5277	67.7767	135.9867	.0001	44.2077
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.0200	.5869	1.0508	1.2123	29.9161	66.5036	129.8108	.0001	43.4010
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.0700	.5973	1.1127	1.2743	29.1707	65.3241	123.6348	.0001	42.5941
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.1200	.6034	1.1759	1.3356	28.3124	64.2341	117.4589	.0001	41.7871
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.1700	.6053	1.2404	1.3966	27.3548	63.2334	111.2830	.0001	40.9799
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.2200	.6031	1.3063	1.4573	26.3057	62.3260	105.1070	.0001	40.1725
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.2700	.5968	1.3738	1.5179	25.1688	61.5199	98.9311	.0001	39.3649
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.3200	.5861	1.4427	1.5786	23.9437	60.8288	92.7551	.0001	38.5570
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.3700	.5710	1.5133	1.6395	22.6260	60.2741	86.5792	.0001	37.7488
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.4200	.5510	1.5856	1.7008	21.2072	59.8876	80.4033	.0001	36.9402
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.4700	.5255	1.6597	1.7626	19.6726	59.7185	74.2273	.0001	36.1311
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.5200	.4939	1.7357	1.8251	17.9995	59.8435	68.0514	.0001	35.3213
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.5700	.4547	1.8138	1.8883	16.1511	60.3895	61.8754	.0001	34.5107
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.6200	.4059	1.8939	1.9525	14.0646	61.5814	55.6995	.0001	33.6990
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.6700	.3434	1.9764	2.0178	11.6198	63.8694	49.5235	.0001	32.8857
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.7200	.2578	2.0613	2.0843	8.5237	68.3681	43.3476	.0001	32.0703
14.0	2.7230	1.5451	1.32	.5621	1.7789	1.7700	.1022	2.1488	2.1524	3.3058	80.3303	37.1717	.0001	31.2516

14.0	2.7230	1.5451	1.40	.6367	1.5706	.6400	.0552	.6135	.6158	4.9266	88.0981	171.9569	.0001	56.3770
14.0	2.7230	1.5451	1.40	.6367	1.5706	.6900	.2159	.6666	.6984	17.3739	82.3689	165.4067	.0001	55.5216
14.0	2.7230	1.5451	1.40	.6367	1.5706	.7400	.2919	.7204	.7744	21.5245	79.4118	158.8564	.0001	54.6661
14.0	2.7230	1.5451	1.40	.6367	1.5706	.7900	.3446	.7752	.8457	23.5687	77.1544	152.3062	.0001	53.8105
14.0	2.7230	1.5451	1.40	.6367	1.5706	.8400	.3839	.8309	.9135	24.5609	75.2810	145.7559	.0001	52.9549
14.0	2.7230	1.5451	1.40	.6367	1.5706	.8900	.4135	.8875	.9787	24.9202	73.6698	139.2057	.0001	52.0991
14.0	2.7230	1.5451	1.40	.6367	1.5706	.9400	.4355	.9452	1.0417	24.8560	72.2617	132.6555	.0001	51.2451
14.0	2.7230	1.5451	1.40	.6367	1.5706	.9900	.4509	1.0039	1.1031	24.4853	71.0258	126.1052	.0001	50.3870
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.0400	.4604	1.0637	1.1632	23.8781	69.9476	119.5550	.0001	49.5307
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.0900	.4644	1.1246	1.2224	23.0766	69.0240	113.0047	.0001	48.6742
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.1400	.4630	1.1867	1.2808	22.1059	68.2617	106.4545	.0001	47.8174
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.1900	.4563	1.2500	1.3387	20.9783	67.6781	99.9043	.0001	46.9603
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.2400	.4439	1.3145	1.3962	19.6955	67.3039	93.3540	.0001	46.1028
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.2900	.4253	1.3805	1.4536	18.2486	67.1892	86.8038	.0001	45.2449
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.3400	.3999	1.4478	1.5108	16.6151	67.4154	80.2535	.0001	44.3863
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.3900	.3660	1.5165	1.5682	14.7512	68.1195	73.7033	.0001	43.5271
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.4400	.3211	1.5868	1.6258	12.5720	69.5522	67.1531	.0001	42.6668
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.4900	.2598	1.6588	1.6838	9.8895	72.2462	60.6028	.0001	41.8053
14.0	2.7230	1.5451	1.40	.6367	1.5706	1.5400	.1645	1.7324	1.7423	6.0954	77.8106	54.0526	.0001	40.9421

14.0	2.7230	1.5451	1.48	.7441	1.3438	.7500	.0588	.7267	.7289	4.4810	87.7384	151.9319	.0001	61.6726
14.0	2.7230	1.5451	1.48	.7441	1.3438	.8000	.1736	.7809	.7991	12.2445	83.1170	145.0073	.0001	60.7677
14.0	2.7230	1.5451	1.48	.7441	1.3438	.8500	.2277	.8360	.8654	14.9968	80.6851	138.0828	.0001	59.8626
14.0	2.7230	1.5451	1.48	.7441	1.3438	.9000	.2619	.8919	.9289	16.2238	78.9279	131.1583	.0001	58.9573
14.0	2.7230	1.5451	1.48	.7441	1.3438	.9500	.2834	.9488	.9901	16.6129	77.5916	124.2337	.0001	58.0518
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.0000	.2952	1.0066	1.0495	16.4452	76.5922	117.3092	.0001	57.1460
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.0500	.2983	1.0654	1.1076	15.8571	75.9099	110.3846	.0001	56.2399
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.1000	.2930	1.1252	1.1645	14.9132	75.5668	103.4601	.0001	55.3334
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.1500	.2788	1.1862	1.2205	13.6293	75.6286	96.5356	.0001	54.4264
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.2000	.2544	1.2482	1.2759	11.9716	76.2299	89.6110	.0001	53.5188
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.2500	.2164	1.3114	1.3309	9.8207	77.6500	82.6865	.0001	52.6106
14.0	2.7230	1.5451	1.48	.7441	1.3438	1.3000	.1549	1.3758	1.3855	6.7963	80.6236	75.7619	.0001	51.7013

APPENDIX I

PROPERTIES OF AN OBLIQUE DETONATION WAVE

GAMMA = 1.2

M1	M1*	DELMAX	DEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
1.5	1.4214	1.0625	1.00	.7035	1.4214	.7100	.0505	.6931	.6949	4.0668	85.9413	2.3513	.9234	1.1686
1.5	1.4214	1.0625	1.00	.7035	1.4214	.7600	.1414	.7452	.7579	10.5392	77.9331	2.2564	.9336	1.1584
1.5	1.4214	1.0625	1.00	.7035	1.4214	.8100	.1832	.7977	.8179	12.7454	73.3186	2.1614	.9433	1.1482
1.5	1.4214	1.0625	1.00	.7035	1.4214	.8600	.2084	.8508	.8754	13.6207	69.6361	2.0664	.9524	1.1378
1.5	1.4214	1.0625	1.00	.7035	1.4214	.9100	.2230	.9045	.9313	13.7705	66.4386	1.9714	.9609	1.1272
1.5	1.4214	1.0625	1.00	.7035	1.4214	.9600	.2296	.9588	.9858	13.4511	63.5440	1.8765	.9687	1.1165
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.0100	.2294	1.0137	1.0395	12.7965	60.8561	1.7815	.9758	1.1055
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.0600	.2231	1.0693	1.0927	11.8841	58.3162	1.6865	.9820	1.0943
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.1100	.2110	1.1257	1.1458	10.7610	55.8849	1.5915	.9873	1.0828
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.1600	.1932	1.1829	1.1992	9.4558	53.5335	1.4966	.9917	1.0710
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.2100	.1697	1.2410	1.2531	7.9852	51.2401	1.4016	.9951	1.0587
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.2600	.1404	1.3001	1.3081	6.3572	48.9867	1.3066	.9976	1.0460
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.3100	.1048	1.3604	1.3647	4.5729	46.7580	1.2116	.9991	1.0327
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.3600	.0624	1.4220	1.4235	2.6272	44.5398	1.1167	.9998	1.0186
1.5	1.4214	1.0625	1.00	.7035	1.4214	1.4100	.0125	1.4853	1.4854	.5092	42.3190	1.0217	1.0000	1.0036
1.5	1.4214	1.0625	1.04	.8126	1.2306	.8200	.0388	.8069	.8079	2.7114	86.1283	2.0801	.8995	1.2438
1.5	1.4214	1.0625	1.04	.8126	1.2306	.8700	.0990	.8600	.8656	6.4912	79.2986	1.9813	.9045	1.2326
1.5	1.4214	1.0625	1.04	.8126	1.2306	.9200	.1221	.9137	.9217	7.5617	75.5462	1.8825	.9086	1.2212
1.5	1.4214	1.0625	1.04	.8126	1.2306	.9700	.1309	.9680	.9768	7.6881	72.8304	1.7838	.9119	1.2096
1.5	1.4214	1.0625	1.04	.8126	1.2306	1.0200	.1298	1.0229	1.0312	7.2516	70.8526	1.6850	.9143	1.1976
1.5	1.4214	1.0625	1.04	.8126	1.2306	1.0700	.1202	1.0786	1.0854	6.4094	69.6351	1.5862	.9157	1.1853
1.5	1.4214	1.0625	1.04	.8126	1.2306	1.1200	.1025	1.1351	1.1399	5.2270	69.4838	1.4874	.9161	1.1726
1.5	1.4214	1.0625	1.04	.8126	1.2306	1.1700	.0754	1.1925	1.1950	3.6883	71.3768	1.3887	.9154	1.1594
1.5	1.4214	1.0625	1.04	.8126	1.2306	1.2200	.0301	1.2510	1.2514	1.4132	80.1760	1.2899	.9137	1.1456













GAMMA = 1.2

Table with 13 columns: M1, M1\*, DELMAX, DEL, XMIN, XMAX, X(M2U\*1), Y(M2V\*1), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Rows contain numerical data for various parameters.

Table with 13 columns: M1, M1\*, DELMAX, DEL, XMIN, XMAX, X(M2U\*1), Y(M2V\*1), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Rows contain numerical data for various parameters.

Table with 13 columns: M1, M1\*, DELMAX, DEL, XMIN, XMAX, X(M2U\*1), Y(M2V\*1), M2U, M2, THETA, SIGMA, PR21, PTR21, TR21. Rows contain numerical data for various parameters.





## LOOP BRANCH (M1 FROM 1 TO 5)

GAMMA = 1.2

M1	M1*	DELMAX	DEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
4.0	2.6018	1.4931	1.00	.3844	2.6018	.3900	.1082	.3747	.3888	15.5060	87.1993	17.3220	.0614	2.5613
4.0	2.6018	1.4931	1.00	.3844	2.6018	.4400	.3356	.4255	.5351	37.3300	81.1769	16.9530	.0650	2.5276
4.0	2.6018	1.4931	1.00	.3844	2.6018	.4900	.4566	.4770	.6520	42.9808	77.7989	16.5840	.0689	2.4940
4.0	2.6018	1.4931	1.00	.3844	2.6018	.5400	.5472	.5293	.7535	45.3800	75.1360	16.2150	.0731	2.4603
4.0	2.6018	1.4931	1.00	.3844	2.6018	.5900	.6208	.5823	.8453	46.4573	72.8506	15.8460	.0776	2.4266
4.0	2.6018	1.4931	1.00	.3844	2.6018	.6400	.6829	.6361	.9302	46.8582	70.8064	15.4771	.0824	2.3930
4.0	2.6018	1.4931	1.00	.3844	2.6018	.6900	.7365	.6906	1.0101	46.8659	68.9319	15.1081	.0876	2.3593
4.0	2.6018	1.4931	1.00	.3844	2.6018	.7400	.7832	.7460	1.0863	46.6251	67.1844	14.7391	.0932	2.3256
4.0	2.6018	1.4931	1.00	.3844	2.6018	.7900	.8243	.8023	1.1595	46.2178	65.5355	14.3701	.0992	2.2919
4.0	2.6018	1.4931	1.00	.3844	2.6018	.8400	.8606	.8594	1.2303	45.6935	63.9657	14.0012	.1056	2.2582
4.0	2.6018	1.4931	1.00	.3844	2.6018	.8900	.8926	.9174	1.2993	45.0838	62.4602	13.6322	.1125	2.2245
4.0	2.6018	1.4931	1.00	.3844	2.6018	.9400	.9208	.9764	1.3668	44.4098	61.0081	13.2632	.1200	2.1907
4.0	2.6018	1.4931	1.00	.3844	2.6018	.9900	.9456	1.0363	1.4331	43.6859	59.6007	12.8942	.1280	2.1570
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.0400	.9672	1.0973	1.4985	42.9221	58.2309	12.5252	.1367	2.1232
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.0900	.9858	1.1593	1.5631	42.1257	56.8930	12.1563	.1461	2.0895
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.1400	1.0016	1.2224	1.6272	41.3015	55.5821	11.7873	.1562	2.0557
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.1900	1.0147	1.2866	1.6909	40.4534	54.2941	11.4183	.1671	2.0219
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.2400	1.0252	1.3520	1.7543	39.5839	53.0253	11.0493	.1789	1.9881
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.2900	1.0333	1.4187	1.8177	38.6947	51.7724	10.6803	.1917	1.9543
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.3400	1.0389	1.4866	1.8811	37.7869	50.5327	10.3114	.2055	1.9205
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.3900	1.0422	1.5558	1.9446	36.8612	49.3033	9.9424	.2205	1.8866
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.4400	1.0431	1.6265	2.0083	35.9177	48.0819	9.5734	.2367	1.8527
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.4900	1.0416	1.6986	2.0725	34.9563	46.8660	9.2044	.2543	1.8188
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.5400	1.0378	1.7722	2.1371	33.9765	45.6536	8.8354	.2733	1.7849
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.5900	1.0317	1.8474	2.2022	32.9774	44.4423	8.4665	.2939	1.7509
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.6400	1.0231	1.9243	2.2680	31.9579	43.2300	8.0975	.3162	1.7169
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.6900	1.0121	2.0029	2.3346	30.9167	42.0145	7.7285	.3403	1.6828
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.7400	.9986	2.0834	2.4021	29.8519	40.7936	7.3595	.3665	1.6487
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.7900	.9825	2.1658	2.4706	28.7614	39.5650	6.9906	.3947	1.6145
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.8400	.9637	2.2503	2.5403	27.6426	38.3261	6.6216	.4252	1.5803
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.8900	.9420	2.3370	2.6112	26.4925	37.0744	6.2526	.4580	1.5459
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.9400	.9173	2.4260	2.6835	25.3074	35.8070	5.8836	.4934	1.5115
4.0	2.6018	1.4931	1.00	.3844	2.6018	1.9900	.8895	2.5174	2.7574	24.0828	34.5206	5.5146	.5312	1.4770
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.0400	.8581	2.6115	2.8331	22.8135	33.2117	5.1457	.5716	1.4423
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.0900	.8230	2.7084	2.9108	21.4927	31.8761	4.7767	.6145	1.4075
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.1400	.7837	2.8084	2.9908	20.1124	30.5090	4.4077	.6597	1.3724
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.1900	.7397	2.9118	3.0734	18.6623	29.1048	4.0387	.7069	1.3371
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.2400	.6904	3.0188	3.1589	17.1289	27.6565	3.6697	.7555	1.3014
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.2900	.6348	3.1300	3.2480	15.4948	26.1557	3.3008	.8047	1.2652
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.3400	.5720	3.2459	3.3414	13.7361	24.5913	2.9318	.8531	1.2284
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.3900	.5001	3.3673	3.4402	11.8193	22.9494	2.5628	.8991	1.1907
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.4400	.4169	3.4955	3.5461	9.6949	21.2105	2.1938	.9400	1.1517
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.4900	.3183	3.6326	3.6622	7.2854	19.3475	1.8248	.9726	1.1106
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.5400	.1981	3.7826	3.7941	4.4598	17.3187	1.4559	.9933	1.0658
4.0	2.6018	1.4931	1.00	.3844	2.6018	2.5900	.0438	3.9543	3.9549	.9682	15.0562	1.0869	.9999	1.0140

4.0	2.6018	1.4931	1.04	.4056	2.4657	.4100	.0924	.3941	.4040	12.7040	87.5284	17.0533	.0608	2.7670
4.0	2.6018	1.4931	1.04	.4056	2.4657	.4600	.3195	.4450	.5418	34.7825	81.3136	16.6696	.0642	2.7320
4.0	2.6018	1.4931	1.04	.4056	2.4657	.5100	.4366	.4965	.6537	40.5680	77.9262	16.2859	.0678	2.6969
4.0	2.6018	1.4931	1.04	.4056	2.4657	.5600	.5237	.5488	.7514	43.0804	75.2655	15.9021	.0716	2.6619
4.0	2.6018	1.4931	1.04	.4056	2.4657	.6100	.5940	.6018	.8400	44.2398	72.9859	15.5184	.0756	2.6268
4.0	2.6018	1.4931	1.04	.4056	2.4657	.6600	.6531	.6555	.9222	44.6984	70.9492	15.1347	.0799	2.5918
4.0	2.6018	1.4931	1.04	.4056	2.4657	.7100	.7037	.7100	.9996	44.7454	69.0834	14.7509	.0846	2.5567
4.0	2.6018	1.4931	1.04	.4056	2.4657	.7600	.7476	.7652	1.0734	44.5300	67.3453	14.3672	.0895	2.5216
4.0	2.6018	1.4931	1.04	.4056	2.4657	.8100	.7860	.8213	1.1444	44.1370	65.7068	13.9834	.0947	2.4865
4.0	2.6018	1.4931	1.04	.4056	2.4657	.8600	.8195	.8782	1.2131	43.6181	64.1478	13.5997	.1003	2.4514
4.0	2.6018	1.4931	1.04	.4056	2.4657	.9100	.8488	.9360	1.2800	43.0064	62.6541	13.2160	.1063	2.4163
4.0	2.6018	1.4931	1.04	.4056	2.4657	.9600	.8743	.9947	1.3454	42.3242	61.2145	12.8322	.1127	2.3811
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.0100	.8963	1.0543	1.4096	41.5865	59.8205	12.4485	.1196	2.3460
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.0600	.9151	1.1149	1.4729	40.8038	58.4651	12.0648	.1269	2.3108
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.1100	.9309	1.1765	1.5355	39.9839	57.1426	11.6810	.1347	2.2756
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.1600	.9438	1.2391	1.5974	39.1319	55.8483	11.2973	.1430	2.2404
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.2100	.9539	1.3028	1.6590	38.2516	54.5783	10.9135	.1519	2.2052
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.2600	.9615	1.3676	1.7203	37.3457	53.3290	10.5298	.1615	2.1700
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.3100	.9664	1.4336	1.7815	36.4159	52.0975	10.1461	.1717	2.1347
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.3600	.9688	1.5008	1.8426	35.4631	50.8810	9.7623	.1826	2.0994
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.4100	.9686	1.5692	1.9038	34.4879	49.6773	9.3786	.1942	2.0640
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.4600	.9660	1.6390	1.9652	33.4901	48.4843	8.9948	.2066	2.0287
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.5100	.9608	1.7101	2.0270	32.4692	47.3001	8.6111	.2198	1.9932
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.5600	.9531	1.7827	2.0891	31.4243	46.1230	8.2274	.2339	1.9578
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.6100	.9428	1.8567	2.1517	30.3540	44.9516	7.8436	.2489	1.9222
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.6600	.9299	1.9324	2.2149	29.2564	43.7845	7.4599	.2649	1.8866
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.7100	.9142	2.0097	2.2788	28.1295	42.6208	7.0762	.2817	1.8510
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.7600	.8956	2.0887	2.3436	26.9703	41.4597	6.6924	.2995	1.8152
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.8100	.8740	2.1696	2.4093	25.7754	40.3007	6.3087	.3183	1.7793
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.8600	.8492	2.2524	2.4761	24.5407	39.1441	5.9249	.3379	1.7433
4.0	2.6018	1.4931	1.04	.4056	2.4657	1.9100	.8210</							

4.0	2.6018	1.4931	1.08	.4279	2.3370	.4300	.0613	.4136	.4177	8.1169	88.3060	16.7729	.0602	2.9806
4.0	2.6018	1.4931	1.08	.4279	2.3370	.4800	.3006	.4645	.5480	32.0563	81.5507	16.3744	.0633	2.9442
4.0	2.6018	1.4931	1.08	.4279	2.3370	.5300	.4147	.5161	.6553	38.0423	78.1329	15.9759	.0666	2.9078
4.0	2.6018	1.4931	1.08	.4279	2.3370	.5800	.4987	.5683	.7495	40.6871	75.4669	15.5774	.0700	2.8713
4.0	2.6018	1.4931	1.08	.4279	2.3370	.6300	.5660	.6213	.8352	41.9371	73.1904	15.1789	.0736	2.8349
4.0	2.6018	1.4931	1.08	.4279	2.3370	.6800	.6222	.6749	.9148	42.4577	71.1609	14.7804	.0775	2.7984
4.0	2.6018	1.4931	1.08	.4279	2.3370	.7300	.6700	.7293	.9900	42.5462	69.3048	14.3819	.0816	2.7620
4.0	2.6018	1.4931	1.08	.4279	2.3370	.7800	.7112	.7845	1.0616	42.3569	67.5783	13.9834	.0859	2.7255
4.0	2.6018	1.4931	1.08	.4279	2.3370	.8300	.7468	.8404	1.1305	41.9782	65.9530	13.5849	.0905	2.6890
4.0	2.6018	1.4931	1.08	.4279	2.3370	.8800	.7776	.8972	1.1972	41.4639	64.4089	13.1864	.0954	2.6525
4.0	2.6018	1.4931	1.08	.4279	2.3370	.9300	.8041	.9547	1.2622	40.8490	62.9314	12.7880	.1005	2.6159
4.0	2.6018	1.4931	1.08	.4279	2.3370	.9800	.8269	1.0132	1.3256	40.1565	61.5098	12.3895	.1059	2.5794
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.0300	.8461	1.0725	1.3880	39.4023	60.1355	11.9910	.1117	2.5428
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.0800	.8621	1.1327	1.4494	38.5978	58.8016	11.5925	.1178	2.5062
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.1300	.8750	1.1939	1.5100	37.7506	57.5029	11.1940	.1243	2.4695
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.1800	.8849	1.2561	1.5701	36.8663	56.2348	10.7955	.1311	2.4329
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.2300	.8920	1.3193	1.6297	35.9487	54.9936	10.3970	.1383	2.3962
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.2800	.8963	1.3836	1.6891	35.0006	53.7764	9.9985	.1459	2.3595
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.3300	.8979	1.4490	1.7483	34.0233	52.5806	9.6000	.1540	2.3227
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.3800	.8968	1.5155	1.8074	33.0178	51.4042	9.2015	.1624	2.2859
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.4300	.8930	1.5833	1.8666	31.9840	50.2456	8.8030	.1713	2.2490
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.4800	.8865	1.6522	1.9260	30.9215	49.1038	8.4045	.1806	2.2121
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.5300	.8773	1.7225	1.9856	29.8292	47.9780	8.0060	.1904	2.1751
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.5800	.8652	1.7942	2.0456	28.7053	46.8681	7.6075	.2006	2.1380
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.6300	.8502	1.8673	2.1060	27.5477	45.7747	7.2090	.2112	2.1008
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.6800	.8323	1.9418	2.1671	26.3533	44.6992	6.8105	.2221	2.0636
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.7300	.8111	2.0180	2.2288	25.1184	43.6440	6.4120	.2334	2.0262
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.7800	.7865	2.0959	2.2913	23.8384	42.6133	6.0135	.2449	1.9886
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.8300	.7583	2.1755	2.3548	22.5075	41.6134	5.6150	.2565	1.9508
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.8800	.7261	2.2570	2.4195	21.1184	40.6542	5.2165	.2681	1.9129
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.9300	.6896	2.3405	2.4855	19.6620	39.7513	4.8180	.2796	1.8746
4.0	2.6018	1.4931	1.08	.4279	2.3370	1.9800	.6482	2.4263	2.5530	18.1265	38.9292	4.4195	.2906	1.8360
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.0300	.6012	2.5145	2.6224	16.4963	38.2285	4.0210	.3008	1.7969
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.0800	.5476	2.6054	2.6941	14.7505	37.7195	3.6225	.3099	1.7572
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.1300	.4862	2.6993	2.7687	12.8593	37.5334	3.2240	.3172	1.7167
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.1800	.4150	2.7969	2.8471	10.7784	37.9416	2.8255	.3222	1.6749
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.2300	.3306	2.8988	2.9305	8.4338	39.6027	2.4270	.3241	1.6315
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.2800	.2264	3.0067	3.0215	5.6714	44.6349	2.0285	.3218	1.5853
4.0	2.6018	1.4931	1.08	.4279	2.3370	2.3300	.0700	3.1230	3.1244	1.7214	68.0278	1.6300	.3143	1.5346

4.0	2.6018	1.4931	1.12	.4515	2.2146	.4600	.1177	.4432	.4574	14.3572	86.6283	16.3980	.0601	3.1946
4.0	2.6018	1.4931	1.12	.4515	2.2146	.5100	.3048	.4943	.5758	30.8630	81.1097	15.9848	.0629	3.1568
4.0	2.6018	1.4931	1.12	.4515	2.2146	.5600	.4086	.5460	.6759	36.1169	77.8533	15.5715	.0659	3.1190
4.0	2.6018	1.4931	1.12	.4515	2.2146	.6100	.4859	.5984	.7650	38.5384	75.2724	15.1583	.0690	3.0811
4.0	2.6018	1.4931	1.12	.4515	2.2146	.6600	.5480	.6515	.8467	39.7005	73.0550	14.7450	.0723	3.0433
4.0	2.6018	1.4931	1.12	.4515	2.2146	.7100	.5996	.7052	.9230	40.1796	71.0726	14.3318	.0758	3.0054
4.0	2.6018	1.4931	1.12	.4515	2.2146	.7600	.6432	.7597	.9952	40.2436	69.2571	13.9185	.0794	2.9675
4.0	2.6018	1.4931	1.12	.4515	2.2146	.8100	.6805	.8149	1.0643	40.0353	67.5679	13.5052	.0832	2.9296
4.0	2.6018	1.4931	1.12	.4515	2.2146	.8600	.7124	.8708	1.1308	39.6379	65.9779	13.0920	.0872	2.8917
4.0	2.6018	1.4931	1.12	.4515	2.2146	.9100	.7396	.9276	1.1953	39.1030	64.4685	12.6787	.0915	2.8537
4.0	2.6018	1.4931	1.12	.4515	2.2146	.9600	.7626	.9851	1.2581	38.4641	63.0261	12.2655	.0959	2.8157
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.0100	.7819	1.0435	1.3196	37.7440	61.6403	11.8522	.1005	2.7777
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.0600	.7975	1.1027	1.3800	36.9580	60.3035	11.4390	.1054	2.7397
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.1100	.8099	1.1628	1.4395	36.1170	59.0093	11.0257	.1105	2.7016
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.1600	.8192	1.2239	1.4983	35.2287	57.7532	10.6125	.1158	2.6635
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.2100	.8253	1.2859	1.5565	34.2982	56.5313	10.1992	.1213	2.6254
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.2600	.8286	1.3489	1.6144	33.3291	55.3408	9.7859	.1271	2.5872
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.3100	.8289	1.4129	1.6720	32.3236	54.1797	9.3727	.1332	2.5489
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.3600	.8263	1.4779	1.7294	31.2828	53.0468	8.9594	.1394	2.5106
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.4100	.8209	1.5441	1.7867	30.2067	51.9415	8.5462	.1458	2.4722
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.4600	.8125	1.6115	1.8442	29.0948	50.8642	8.1329	.1525	2.4337
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.5100	.8010	1.6800	1.9018	27.9456	49.8161	7.7197	.1593	2.3952
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.5600	.7865	1.7499	1.9597	26.7567	48.7999	7.3064	.1662	2.3565
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.6100	.7688	1.8210	2.0180	25.5251	47.8196	6.8931	.1733	2.3177
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.6600	.7477	1.8935	2.0767	24.2465	46.8816	6.4799	.1803	2.2787
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.7100	.7229	1.9676	2.1361	22.9157	45.9953	6.0666	.1873	2.2395
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.7600	.6942	2.0431	2.1963	21.5258	45.1748	5.6534	.1942	2.2001
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.8100	.6612	2.1204	2.2574	20.0680	44.4413	5.2401	.2008	2.1605
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.8600	.6235	2.1994	2.3197	18.5308	43.8274	4.8269	.2069	2.1204
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.9100	.5803	2.2804	2.3833	16.8990	43.3851	4.4136	.2124	2.0800
4.0	2.6018	1.4931	1.12	.4515	2.2146	1.9600	.5308	2.3636	2.4487	15.1519	43.2020	4.0003	.2169	2.0389
4.0	2.6018	1.4931	1.12	.4515	2.2146	2.0100	.4736	2.4491	2.5162	13.2594	43.4348	3.5871	.2203	1.9971
4.0	2.6018	1.4931	1.12	.4515	2.2146	2.0600	.4070	2.5375	2.5865	11.1754	44.3936	3.1738	.2221	1.9541
4.0	2.6018	1.4931	1.12	.4515	2.2146	2.1100	.3273	2.6291	2.6606	8.8186	46.7884	2.7606	.2218	1.9096
4.0	2.6018	1.4931	1.12	.4515	2.2146	2.1600	.2271	2.7251	2.7401	6.0028	52.7270	2.3473	.2189	1.8628
4.0	2.6018	1.4931	1.12	.4515	2.2146	2.2100	.0614	2.8268	2.8279	1.5911	76.1210	1.9341	.2127	1.8122

4.0	2.6018	1.4931	1.16	.4768	2.0975	.4800	.0699	.4626	.4675	8.2853	87.9320	16.0911	.0593	3.4237
4.0	2.6018	1.4931	1.16	.4768	2.0975	.5300	.2787	.5138	.5805	27.7375	81.5928	15.6630	.0619	3.3845
4.0	2.6018	1.4931	1.16	.4768	2.0975	.5800								

4.0	2.6018	1.4931	1.20	.5039	1.9845	.5100	.0916	.4923	.5002	10.1768	87.1898	15.6837	.0589	3.6526
4.0	2.6018	1.4931	1.20	.5039	1.9845	.5600	.2725	.5436	.6045	25.9453	81.4629	15.2409	.0612	3.6120
4.0	2.6018	1.4931	1.20	.5039	1.9845	.6100	.3676	.5955	.6953	31.0772	78.2343	14.7981	.0636	3.5713
4.0	2.6018	1.4931	1.20	.5039	1.9845	.6600	.4372	.6480	.7773	33.5223	75.6986	14.3554	.0661	3.5307
4.0	2.6018	1.4931	1.20	.5039	1.9845	.7100	.4922	.7012	.8531	34.7294	73.5334	13.9126	.0687	3.4900
4.0	2.6018	1.4931	1.20	.5039	1.9845	.7600	.5370	.7550	.9244	35.2450	71.6081	13.4698	.0713	3.4493
4.0	2.6018	1.4931	1.20	.5039	1.9845	.8100	.5741	.8094	.9921	35.3296	69.8548	13.0270	.0741	3.4085
4.0	2.6018	1.4931	1.20	.5039	1.9845	.8600	.6050	.8646	1.0571	35.1247	68.2332	12.5843	.0769	3.3677
4.0	2.6018	1.4931	1.20	.5039	1.9845	.9100	.6304	.9204	1.1198	34.7142	66.7171	12.1415	.0798	3.3269
4.0	2.6018	1.4931	1.20	.5039	1.9845	.9600	.6512	.9770	1.1806	34.1504	65.2888	11.6987	.0829	3.2860
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.0100	.6677	1.0344	1.2400	33.4677	63.9360	11.2560	.0859	3.2451
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.0600	.6802	1.0925	1.2981	32.6892	62.6498	10.8132	.0891	3.2041
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.1100	.6891	1.1514	1.3553	31.8307	61.4243	10.3704	.0923	3.1630
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.1600	.6943	1.2112	1.4116	30.9028	60.2556	9.9276	.0956	3.1219
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.2100	.6961	1.2718	1.4673	29.9127	59.1418	9.4849	.0989	3.0807
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.2600	.6945	1.3334	1.5225	28.8648	58.0827	9.0421	.1023	3.0394
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.3100	.6896	1.3958	1.5774	27.7616	57.0800	8.5993	.1056	2.9981
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.3600	.6811	1.4592	1.6320	26.6035	56.1376	8.1565	.1089	2.9566
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.4100	.6692	1.5236	1.6865	25.3896	55.2621	7.7138	.1121	2.9149
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.4600	.6536	1.5891	1.7411	24.1170	54.4633	7.2710	.1153	2.8731
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.5100	.6342	1.6557	1.7958	22.7813	53.7560	6.8282	.1182	2.8311
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.5600	.6106	1.7234	1.8507	21.3761	53.1619	6.3854	.1210	2.7888
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.6100	.5826	1.7924	1.9061	19.8922	52.7130	5.9427	.1235	2.7462
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.6600	.5495	1.8627	1.9621	18.3171	52.4577	5.4999	.1256	2.7033
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.7100	.5108	1.9343	2.0188	16.6330	52.4725	5.0571	.1273	2.6599
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.7600	.4655	2.0076	2.0766	14.8139	52.8833	4.6143	.1284	2.6159
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.8100	.4119	2.0825	2.1357	12.8192	53.9137	4.1716	.1287	2.5712
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.8600	.3474	2.1593	2.1967	10.5783	56.0051	3.7288	.1282	2.5254
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.9100	.2664	2.2384	2.2601	7.9396	60.1979	3.2860	.1265	2.4782
4.0	2.6018	1.4931	1.20	.5039	1.9845	1.9600	.1498	2.3202	2.3270	4.3718	70.1507	2.8432	.1235	2.4288

4.0	2.6018	1.4931	1.24	.5334	1.8748	.5400	.0905	.5220	.5293	9.5105	87.1171	15.2586	.0583	3.8888
4.0	2.6018	1.4931	1.24	.5334	1.8748	.5900	.2596	.5735	.6265	23.7494	81.5453	14.8011	.0604	3.8468
4.0	2.6018	1.4931	1.24	.5334	1.8748	.6400	.3488	.6255	.7124	28.5922	78.3809	14.3436	.0625	3.8047
4.0	2.6018	1.4931	1.24	.5334	1.8748	.6900	.4136	.6781	.7906	30.9386	75.8992	13.8860	.0647	3.7626
4.0	2.6018	1.4931	1.24	.5334	1.8748	.7400	.4642	.7314	.8634	32.1026	73.7857	13.4285	.0669	3.7204
4.0	2.6018	1.4931	1.24	.5334	1.8748	.7900	.5051	.7853	.9320	32.5924	71.9128	12.9710	.0692	3.6782
4.0	2.6018	1.4931	1.24	.5334	1.8748	.8400	.5383	.8398	.9975	32.6547	70.2145	12.5134	.0716	3.6360
4.0	2.6018	1.4931	1.24	.5334	1.8748	.8900	.5654	.8950	1.0603	32.4251	68.6517	12.0559	.0740	3.5937
4.0	2.6018	1.4931	1.24	.5334	1.8748	.9400	.5870	.9509	1.1211	31.9849	67.1996	11.5984	.0764	3.5514
4.0	2.6018	1.4931	1.24	.5334	1.8748	.9900	.6039	1.0075	1.1802	31.3850	65.8418	11.1408	.0789	3.5090
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.0400	.6165	1.0649	1.2379	30.6591	64.5677	10.6833	.0814	3.4665
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.0900	.6250	1.1230	1.2945	29.8294	63.3703	10.2258	.0839	3.4240
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.1400	.6296	1.1819	1.3501	28.9109	62.2460	9.7682	.0864	3.3814
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.1900	.6304	1.2416	1.4050	27.9136	61.1938	9.3107	.0888	3.3387
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.2400	.6276	1.3021	1.4594	26.8435	60.2157	8.8532	.0913	3.2958
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.2900	.6209	1.3635	1.5133	25.7037	59.3165	8.3956	.0937	3.2528
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.3400	.6105	1.4259	1.5669	24.4947	58.5047	7.9381	.0959	3.2097
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.3900	.5962	1.4892	1.6204	23.2146	57.7933	7.4806	.0981	3.1664
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.4400	.5777	1.5535	1.6738	21.8591	57.2022	7.0230	.1001	3.1229
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.4900	.5547	1.6188	1.7273	20.4211	56.7602	6.5655	.1018	3.0791
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.5400	.5269	1.6852	1.7812	18.8896	56.5110	6.1080	.1033	3.0349
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.5900	.4937	1.7529	1.8354	17.2489	56.5213	5.6504	.1044	2.9904
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.6400	.4540	1.8217	1.8903	15.4751	56.8985	5.1929	.1051	2.9453
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.6900	.4067	1.8920	1.9460	13.5307	57.8259	4.7354	.1053	2.8996
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.7400	.3493	1.9638	2.0030	11.3509	59.6464	4.2778	.1048	2.8531
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.7900	.2771	2.0374	2.0616	8.8012	63.1076	3.8203	.1036	2.8054
4.0	2.6018	1.4931	1.24	.5334	1.8748	1.8400	.1763	2.1129	2.1226	5.4728	70.4503	3.3628	.1014	2.7560

4.0	2.6018	1.4931	1.28	.5659	1.7670	.5700	.0671	.5518	.5556	6.7153	87.7780	14.8159	.0576	4.1323
4.0	2.6018	1.4931	1.28	.5659	1.7670	.6200	.2394	.6034	.6468	21.1142	81.8879	14.3436	.0594	4.0888
4.0	2.6018	1.4931	1.28	.5659	1.7670	.6700	.3244	.6555	.7283	25.8350	78.7421	13.8713	.0612	4.0452
4.0	2.6018	1.4931	1.28	.5659	1.7670	.7200	.3850	.7083	.8032	28.1367	76.3016	13.3990	.0631	4.0017
4.0	2.6018	1.4931	1.28	.5659	1.7670	.7700	.4317	.7616	.8732	29.2790	74.2388	12.9267	.0650	3.9581
4.0	2.6018	1.4931	1.28	.5659	1.7670	.8200	.4687	.8156	.9394	29.7510	72.4243	12.4544	.0670	3.9144
4.0	2.6018	1.4931	1.28	.5659	1.7670	.8700	.4981	.8702	1.0027	29.7917	70.7920	11.9821	.0689	3.8706
4.0	2.6018	1.4931	1.28	.5659	1.7670	.9200	.5212	.9255	1.0637	29.5339	69.3038	11.5098	.0709	3.8269
4.0	2.6018	1.4931	1.28	.5659	1.7670	.9700	.5389	.9814	1.1227	29.0570	67.9363	11.0375	.0728	3.7830
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.0200	.5518	1.0381	1.1802	28.4112	66.6752	10.5652	.0748	3.7390
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.0700	.5601	1.0954	1.2364	27.6291	65.5123	10.0929	.0767	3.6950
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.1200	.5641	1.1535	1.2916	26.7321	64.4440	9.6206	.0786	3.6508
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.1700	.5639	1.2124	1.3459	25.7341	63.4712	9.1483	.0804	3.6066
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.2200	.5597	1.2721	1.3995	24.6433	62.5988	8.6760	.0821	3.5621
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.2700	.5513	1.3326	1.4527	23.4636	61.8367	8.2038	.0838	3.5176
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.3200	.5386	1.3939	1.5055	22.1952	61.2010	7.7315	.0853	3.4728
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.3700	.5214	1.4562	1.5581	20.8345	60.7162	7.2592	.0866	3.4277
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.4200	.4993	1.5194	1.6106	19.3738	60.4191	6.7869	.0877	3.3824
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.4700	.4720	1.5836	1.6633	17.8002	60.3658	6.3146	.0885	3.3367
4.0	2.6018	1.4931	1.28	.5659	1.7670	1.5200	.4385	1.6489	1.7162	16.0930	60.6444	5.8423	.0890	3.2906

4.0	2.6018	1.4931	1.32	.6025	1.6597	.6100	.0852	.5919	.5977	7.9495	87.0529	14.2580	.0570	4.3740
4.0	2.6018	1.4931	1.32	.6025	1.6597	.6600	.2301	.6437	.6817	19.2197	81.8396	13.7709	.0585	4.3290
4.0	2.6018	1.4931	1.32	.6025	1.6597	.7100	.3062	.6961	.7581	23.3279	78.8577	13.2839	.0601	4.2840
4.0	2.6018	1.4931	1.32	.6025	1.6597	.7600	.3601	.7491	.8290	25.3541	76.5390	12.7968	.0617	4.2389
4.0	2.6018	1.4931	1.32	.6025	1.6597	.8100	.4010	.8027	.8957	26.3373	74.5879	12.3098	.0633	4.1938
4.0	2.6018	1.4931	1.32	.6025	1.6597	.8600	.4325	.8569	.9591	26.6979	72.8852	11.8227	.0649	4.1486
4.0	2.6018	1.4931	1.32	.6025	1.6597	.9100	.4566	.9117	1.0200	26.6471	71.3707	11.3357	.0665	4.1033
4.0	2.6018	1.4931	1.32	.6025	1.6597	.9600	.4745	.9671	1.0788	26.3036	70.0109	10.8486	.0680	4.0579
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.0100	.4869	1.0232	1.1360	25.7395	68.7869	10.3615	.0695	4.0125
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.0600	.4943	1.0801	1.1917	25.0000	67.6894	9.8745	.0709	3.9669
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.1100	.4968	1.1376	1.2463	24.1137	66.7161	9.3874	.0723	3.9211
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.1600	.4947	1.1958	1.3001	23.0985	65.8717	8.9004	.0735	3.8753
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.2100	.4880	1.2549	1.3531	21.9644	65.1676	8.4133	.0747	3.8292
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.2600	.4765	1.3147	1.4056	20.7147	64.6240	7.9263	.0757	3.7829
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.3100	.4600	1.3753	1.4577	19.3469	64.2725	7.4392	.0765	3.7364
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.3600	.4380	1.4369	1.5096	17.8520	64.1624	6.9522	.0771	3.6895
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.4100	.4100	1.4993	1.5614	16.2123	64.3707	6.4651	.0775	3.6422
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.4600	.3748	1.5628	1.6134	14.3968	65.0230	5.9781	.0776	3.5945
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.5100	.3306	1.6273	1.6658	12.3497	66.3396	5.4910	.0773	3.5462
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.5600	.2739	1.6929	1.7188	9.9582	68.7562	5.0040	.0766	3.4971
4.0	2.6018	1.4931	1.32	.6025	1.6597	1.6100	.1955	1.7598	1.7728	6.9231	73.3711	4.5169	.0754	3.4470
4.0	2.6018	1.4931	1.36	.6448	1.5509	.6500	.0657	.6321	.6354	5.7750	87.6191	13.6765	.0561	4.6224
4.0	2.6018	1.4931	1.36	.6448	1.5509	.7000	.2076	.6842	.7137	16.5218	82.2765	13.1746	.0575	4.5759
4.0	2.6018	1.4931	1.36	.6448	1.5509	.7500	.2776	.7368	.7857	20.3110	79.3838	12.6728	.0588	4.5294
4.0	2.6018	1.4931	1.36	.6448	1.5509	.8000	.3258	.7900	.8531	22.1616	77.1722	12.1710	.0601	4.4827
4.0	2.6018	1.4931	1.36	.6448	1.5509	.8500	.3612	.8438	.9169	23.0244	75.3415	11.6692	.0613	4.4361
4.0	2.6018	1.4931	1.36	.6448	1.5509	.9000	.3873	.8982	.9779	23.2850	73.7751	11.1674	.0625	4.3893
4.0	2.6018	1.4931	1.36	.6448	1.5509	.9500	.4060	.9532	1.0366	23.1380	72.4165	10.6656	.0637	4.3424
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.0000	.4182	1.0089	1.0935	22.6932	71.2375	10.1638	.0648	4.2953
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.0500	.4246	1.0652	1.1490	22.0163	70.2264	9.6620	.0658	4.2482
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.1000	.4255	1.1222	1.2032	21.1472	69.3832	9.1602	.0667	4.2008
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.1500	.4210	1.1799	1.2565	20.1091	68.7193	8.6583	.0675	4.1533
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.2000	.4112	1.2383	1.3090	18.9130	68.2583	8.1565	.0682	4.1055
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.2500	.3955	1.2975	1.3609	17.5592	68.0406	7.6547	.0687	4.0575
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.3000	.3737	1.3575	1.4125	16.0367	68.1313	7.1529	.0690	4.0091
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.3500	.3446	1.4184	1.4639	14.3194	68.6375	6.6511	.0690	3.9603
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.4000	.3066	1.4802	1.5153	12.3547	69.7455	6.1493	.0688	3.9110
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.4500	.2565	1.5429	1.5669	10.0318	71.8183	5.6475	.0682	3.8610
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.5000	.1856	1.6067	1.6190	7.0544	75.7521	5.1457	.0673	3.8102
4.0	2.6018	1.4931	1.36	.6448	1.5509	1.5500	.0249	1.6717	1.6719	.9212	87.9040	4.6438	.0660	3.7584
4.0	2.6018	1.4931	1.40	.6958	1.4371	.7000	.0530	.6829	.6849	4.3290	87.9754	12.9680	.0553	4.8677
4.0	2.6018	1.4931	1.40	.6958	1.4371	.7500	.1843	.7353	.7572	13.8075	82.7501	12.4514	.0563	4.8197
4.0	2.6018	1.4931	1.40	.6958	1.4371	.8000	.2456	.7883	.8246	17.0691	80.0407	11.9349	.0573	4.7716
4.0	2.6018	1.4931	1.40	.6958	1.4371	.8500	.2862	.8418	.8883	18.6105	78.0199	11.4183	.0583	4.7233
4.0	2.6018	1.4931	1.40	.6958	1.4371	.9000	.3143	.8959	.9490	19.2492	76.3983	10.9017	.0592	4.6750
4.0	2.6018	1.4931	1.40	.6958	1.4371	.9500	.3330	.9506	1.0074	19.3185	75.0690	10.3852	.0600	4.6265
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.0000	.3441	1.0060	1.0639	18.9869	73.9871	9.8686	.0608	4.5779
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.0500	.3482	1.0619	1.1188	18.3475	73.1385	9.3520	.0614	4.5291
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.1000	.3458	1.1186	1.1726	17.4523	72.5314	8.8354	.0620	4.4800
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.1500	.3369	1.1759	1.2253	16.3266	72.1952	8.3189	.0623	4.4308
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.2000	.3210	1.2340	1.2773	14.9743	72.1870	7.8023	.0625	4.3812
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.2500	.2972	1.2928	1.3288	13.3761	72.6070	7.2857	.0626	4.3312
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.3000	.2639	1.3524	1.3800	11.4765	73.6369	6.7692	.0624	4.2808
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.3500	.2172	1.4128	1.4310	9.1404	75.6474	6.2526	.0619	4.2298
4.0	2.6018	1.4931	1.40	.6958	1.4371	1.4000	.1457	1.4742	1.4822	5.9425	79.6625	5.7360	.0611	4.1781
4.0	2.6018	1.4931	1.44	.7629	1.3108	.7700	.0592	.7549	.7571	4.3948	87.5764	12.0175	.0544	5.0990
4.0	2.6018	1.4931	1.44	.7629	1.3108	.8200	.1593	.8079	.8230	10.9971	83.2590	11.4862	.0551	5.0494
4.0	2.6018	1.4931	1.44	.7629	1.3108	.8700	.2063	.8614	.8853	13.3393	80.9706	10.9549	.0558	4.9995
4.0	2.6018	1.4931	1.44	.7629	1.3108	.9200	.2346	.9155	.9448	14.3050	79.3554	10.4235	.0564	4.9495
4.0	2.6018	1.4931	1.44	.7629	1.3108	.9700	.2507	.9702	1.0021	14.4939	78.1797	9.8922	.0569	4.8994
4.0	2.6018	1.4931	1.44	.7629	1.3108	1.0200	.2572	1.0255	1.0576	14.1516	77.3742	9.3609	.0572	4.8490
4.0	2.6018	1.4931	1.44	.7629	1.3108	1.0700	.2548	1.0814	1.1116	13.3935	76.9378	8.8295	.0575	4.7984
4.0	2.6018	1.4931	1.44	.7629	1.3108	1.1200	.2435	1.1380	1.1646	12.2649	76.9224	8.2982	.0576	4.7475
4.0	2.6018	1.4931	1.44	.7629	1.3108	1.1700	.2222	1.1953	1.2166	10.7529	77.4503	7.7669	.0576	4.6962
4.0	2.6018	1.4931	1.44	.7629	1.3108	1.2200	.1880	1.2533	1.2680	8.7589	78.7866	7.2356	.0573	4.6445
4.0	2.6018	1.4931	1.44	.7629	1.3108	1.2700	.1318	1.3120	1.3191	5.9257	81.6506	6.7042	.0568	4.5923
4.0	2.6018	1.4931	1.48	.8757	1.1420	.8800	.0319	.8703	.8709	2.0778	88.5470	10.5888	.0531	5.2936
4.0	2.6018	1.4931	1.48	.8757	1.1420	.9300	.1014	.9242	.9297	6.2213	85.2053	10.0427	.0535	5.2419
4.0	2.6018	1.4931	1.48	.8757	1.1420	.9800	.1224	.9788	.9864	7.1183	83.9705	9.4967	.0537	5.1901
4.0	2.6018	1.4931	1.48	.8757	1.1420	1.0300	.1233	1.0339	1.0413	6.8252	83.6549	8.9506	.0537	5.1379
4.0	2.6018	1.4931	1.48	.8757	1.1420	1.0800	.1051	1.0897	1.0949	5.5566	84.3320	8.4045	.0537	5.0854
4.0	2.6018	1.4931	1.48	.8757	1.1420	1.1300	.0513	1.1461	1.1473	2.5987	87.0892	7.8584	.0534	5.0326

GAMMA = 1.2

MI	MI*	DELMAX	DEL	XMIN	XMAX	X(M2U*1)	Y(M2V*1)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
4.5	2.7136	1.5411	1.00	3685	2.7136	.3700	.0575	.3551	.3593	8.8394	88.5936	21.9867	.0310	2.9864
4.5	2.7136	1.5411	1.00	3685	2.7136	.4200	.3349	.4058	.5190	38.5651	81.6936	21.5389	.0330	2.9457
4.5	2.7136	1.5411	1.00	3685	2.7136	.4700	.4647	.4573	.6431	44.6766	78.2977	21.0912	.0351	2.9049
4.5	2.7136	1.5411	1.00	3685	2.7136	.5200	.5611	.5095	.7496	47.1764	75.6524	20.6435	.0374	2.8643
4.5	2.7136	1.5411	1.00	3685	2.7136	.5700	.6393	.5626	.8453	48.2790	73.3940	20.1957	.0399	2.8233
4.5	2.7136	1.5411	1.00	3685	2.7136	.6200	.7054	.6164	.9336	48.6858	71.3803	19.7480	.0426	2.7825
4.5	2.7136	1.5411	1.00	3685	2.7136	.6700	.7625	.6710	1.0166	48.6958	69.5379	19.3002	.0454	2.7417
4.5	2.7136	1.5411	1.00	3685	2.7136	.7200	.8126	.7265	1.0955	48.4587	67.8232	18.8525	.0486	2.7008
4.5	2.7136	1.5411	1.00	3685	2.7136	.7700	.8569	.7829	1.1714	48.0580	66.2078	18.4047	.0520	2.6600
4.5	2.7136	1.5411	1.00	3685	2.7136	.8200	.8962	.8402	1.2447	47.5438	64.6717	17.9570	.0556	2.6192
4.5	2.7136	1.5411	1.00	3685	2.7136	.8700	.9313	.8985	1.3162	46.9477	63.2004	17.5092	.0596	2.5784
4.5	2.7136	1.5411	1.00	3685	2.7136	.9200	.9624	.9577	1.3860	46.2907	61.7829	17.0615	.0639	2.5375
4.5	2.7136	1.5411	1.00	3685	2.7136	.9700	.9901	1.0180	1.4547	45.5870	60.4105	16.6138	.0686	2.4967
4.5	2.7136	1.5411	1.00	3685	2.7136	1.0200	1.0146	1.0794	1.5224	44.8466	59.0763	16.1660	.0737	2.4558
4.5	2.7136	1.5411	1.00	3685	2.7136	1.0700	1.0361	1.1418	1.5894	44.0765	57.7746	15.7183	.0792	2.4150
4.5	2.7136	1.5411	1.00	3685	2.7136	1.1200	1.0548	1.2054	1.6558	43.2818	56.5005	15.2705	.0853	2.3741
4.5	2.7136	1.5411	1.00	3685	2.7136	1.1700	1.0708	1.2702	1.7219	42.4660	55.2501	14.8228	.0919	2.3332
4.5	2.7136	1.5411	1.00	3685	2.7136	1.2200	1.0844	1.3363	1.7878	41.6318	54.0198	14.3750	.0991	2.2923
4.5	2.7136	1.5411	1.00	3685	2.7136	1.2700	1.0955	1.4036	1.8536	40.7809	52.8065	13.9273	.1069	2.2514
4.5	2.7136	1.5411	1.00	3685	2.7136	1.3200	1.1043	1.4723	1.9195	39.9146	51.6074	13.4795	.1155	2.2105
4.5	2.7136	1.5411	1.00	3685	2.7136	1.3700	1.1107	1.5424	1.9857	39.0337	50.4199	13.0318	.1250	2.1696
4.5	2.7136	1.5411	1.00	3685	2.7136	1.4200	1.1150	1.6140	2.0521	38.1384	49.2419	12.5841	.1353	2.1286
4.5	2.7136	1.5411	1.00	3685	2.7136	1.4700	1.1170	1.6871	2.1189	37.2289	48.0710	12.1363	.1466	2.0877
4.5	2.7136	1.5411	1.00	3685	2.7136	1.5200	1.1167	1.7619	2.1863	36.3049	46.9052	11.6886	.1590	2.0467
4.5	2.7136	1.5411	1.00	3685	2.7136	1.5700	1.1143	1.8384	2.2544	35.3659	45.7426	11.2408	.1727	2.0057
4.5	2.7136	1.5411	1.00	3685	2.7136	1.6200	1.1097	1.9166	2.3232	34.4113	44.5812	10.7931	.1877	1.9646
4.5	2.7136	1.5411	1.00	3685	2.7136	1.6700	1.1028	1.9968	2.3929	33.4401	43.4192	10.3453	.2042	1.9236
4.5	2.7136	1.5411	1.00	3685	2.7136	1.7200	1.0937	2.0789	2.4636	32.4451	42.2545	9.8976	.2224	1.8825
4.5	2.7136	1.5411	1.00	3685	2.7136	1.7700	1.0822	2.1631	2.5354	31.4430	41.0852	9.4499	.2424	1.8414
4.5	2.7136	1.5411	1.00	3685	2.7136	1.8200	1.0684	2.2495	2.6084	30.4139	39.9093	9.0021	.2645	1.8002
4.5	2.7136	1.5411	1.00	3685	2.7136	1.8700	1.0521	2.3382	2.6828	29.3620	38.7247	8.5544	.2888	1.7590
4.5	2.7136	1.5411	1.00	3685	2.7136	1.9200	1.0332	2.4294	2.7588	28.2848	37.5291	8.1066	.3156	1.7177
4.5	2.7136	1.5411	1.00	3685	2.7136	1.9700	1.0116	2.5232	2.8364	27.1795	36.3200	7.6589	.3451	1.6764
4.5	2.7136	1.5411	1.00	3685	2.7136	2.0200	.9871	2.6198	2.9158	26.0428	35.0948	7.2111	.3776	1.6349
4.5	2.7136	1.5411	1.00	3685	2.7136	2.0700	.9596	2.7194	2.9974	24.8708	33.8503	6.7634	.4132	1.5934
4.5	2.7136	1.5411	1.00	3685	2.7136	2.1200	.9288	2.8222	3.0811	23.6580	32.5832	6.3156	.4523	1.5518
4.5	2.7136	1.5411	1.00	3685	2.7136	2.1700	.8944	2.9284	3.1674	22.4505	31.2897	5.8679	.4949	1.5101
4.5	2.7136	1.5411	1.00	3685	2.7136	2.2200	.8561	3.0384	3.2565	21.0893	29.9651	5.4202	.5413	1.4681
4.5	2.7136	1.5411	1.00	3685	2.7136	2.2700	.8135	3.1524	3.3487	19.7160	28.6039	4.9724	.5914	1.4260
4.5	2.7136	1.5411	1.00	3685	2.7136	2.3200	.7659	3.2708	3.4445	18.2690	27.1998	4.5247	.6451	1.3835
4.5	2.7136	1.5411	1.00	3685	2.7136	2.3700	.7125	3.3942	3.5443	16.7333	25.7445	4.0769	.7019	1.3407
4.5	2.7136	1.5411	1.00	3685	2.7136	2.4200	.6524	3.5232	3.6490	15.0886	24.2277	3.6292	.7609	1.2974
4.5	2.7136	1.5411	1.00	3685	2.7136	2.4700	.5842	3.6586	3.7596	13.3065	22.6361	3.1814	.8205	1.2534
4.5	2.7136	1.5411	1.00	3685	2.7136	2.5200	.5056	3.8017	3.8774	11.3455	20.9516	2.7337	.8783	1.2083
4.5	2.7136	1.5411	1.00	3685	2.7136	2.5700	.4136	3.9543	4.0052	9.1418	19.1484	2.2859	.9304	1.1616
4.5	2.7136	1.5411	1.00	3685	2.7136	2.6200	.3026	4.1200	4.1474	6.5883	17.1881	1.8382	.9716	1.1121
4.5	2.7136	1.5411	1.00	3685	2.7136	2.6700	.1626	4.3061	4.3141	3.4857	15.0080	1.3905	.9954	1.0573
4.5	2.7136	1.5411	1.04	3883	2.5753	.3900	.0592	.3745	.3788	8.6358	88.5060	21.6679	.0308	3.2256
4.5	2.7136	1.5411	1.04	3883	2.5753	.4400	.3236	.4253	.5280	36.3329	81.7100	21.2022	.0326	3.1831
4.5	2.7136	1.5411	1.04	3883	2.5753	.4900	.4483	.4769	.6463	42.4533	78.3331	20.7366	.0346	3.1407
4.5	2.7136	1.5411	1.04	3883	2.5753	.5400	.5405	.5291	.7486	45.0289	75.7017	20.2709	.0367	3.0982
4.5	2.7136	1.5411	1.04	3883	2.5753	.5900	.6152	.5821	.8410	46.1972	73.4554	19.8053	.0389	3.0557
4.5	2.7136	1.5411	1.04	3883	2.5753	.6400	.6780	.6359	.9264	46.6532	71.4527	19.3396	.0414	3.0133
4.5	2.7136	1.5411	1.04	3883	2.5753	.6900	.7322	.6904	1.0067	46.6978	69.6210	18.8740	.0440	2.9708
4.5	2.7136	1.5411	1.04	3883	2.5753	.7400	.7793	.7458	1.0831	46.4835	67.9167	18.4083	.0467	2.9283
4.5	2.7136	1.5411	1.04	3883	2.5753	.7900	.8208	.8020	1.1566	46.0960	66.3116	17.9427	.0497	2.8858
4.5	2.7136	1.5411	1.04	3883	2.5753	.8400	.8574	.8591	1.2277	45.5872	64.7860	17.4770	.0530	2.8433
4.5	2.7136	1.5411	1.04	3883	2.5753	.8900	.8897	.9172	1.2968	44.9900	63.3254	17.0114	.0564	2.8008
4.5	2.7136	1.5411	1.04	3883	2.5753	.9400	.9182	.9761	1.3645	44.3263	61.9189	16.5457	.0602	2.7583
4.5	2.7136	1.5411	1.04	3883	2.5753	.9900	.9431	1.0361	1.4310	43.6111	60.5578	16.0800	.0642	2.7157
4.5	2.7136	1.5411	1.04	3883	2.5753	1.0400	.9649	1.0970	1.4965	42.8546	59.2355	15.6144	.0685	2.6732
4.5	2.7136	1.5411	1.04	3883	2.5753	1.0900	.9837	1.1590	1.5612	42.0644	57.9463	15.1487	.0732	2.6307
4.5	2.7136	1.5411	1.04	3883	2.5753	1.1400	.9996	1.2221	1.6254	41.2458	56.6854	14.6831	.0782	2.5881
4.5	2.7136	1.5411	1.04	3883	2.5753	1.1900	1.0129	1.2864	1.6892	40.4025	55.4489	14.2174	.0837	2.5455
4.5	2.7136	1.5411	1.04	3883	2.5753	1.2400	1.0235	1.3518	1.7528	39.5371	54.2335	13.7518	.0896	2.5029
4.5	2.7136	1.5411	1.04	3883	2.5753	1.2900	1.0317	1.4184	1.8162	38.6516	53.0361	13.2861	.0959	2.4603
4.5	2.7136	1.5411	1.04	3883	2.5753	1.3400	1.0437	1.4863	1.8797	37.7471	51.8542	12.8205	.1028	2.4176
4.5	2.7136	1.5411	1.04	3883	2.5753	1.3900	1.0556	1.5556	1.9433	36.8242	50.6853	12.3548	.1102	2.3750
4.5	2.7136	1.5411	1.04	3883	2.5753	1.4400	1.0622	1.6262	2.0071	35.8832	49.5275	11.8892	.1183	2.3323
4.5	2.7136	1.5411	1.04	3883	2.5753	1.4900	1.0683	1.6983	2.0713	34.9238	48.3787	11.4235	.1270	2.2896
4.5	2.7136	1.5411	1.04	3883	2.5753	1.5400	1.0719	1.7719	2.1359	33.9457	47.2372	10.9579	.1364	2.2468
4.5	2.7136	1.5411	1.04	3883	2.5753	1.5900	1.0730	1.8471	2.2011	32.9479	46.1015	10.4922	.1465	2.2040
4.5	2.7136	1.5411	1.04	3883	2.5753	1.6400	1.0720	1.9240	2.2670	31.9293	44.9700	10.0265	.1575	2.1612
4.5	2.7136	1.5411	1.04	3883	2.5753	1.6900	1.0695	2.0026	2.3336	30.8886	43.8415	9.5609	.1694	2.1183
4.5	2.7136	1.5411	1.04	3883	2.5753	1.7400	1.0655	2.0831	2.4011	29.8238	42.7146	9.0952	.1822	2.0754
4.5	2.7136	1.5411	1.04	3883	2.5									

4.5	2.71336	1.54111	1.08	.4090	2.4448	.4100	.0432	.3940	.3962	6.0090	88.8768	21.3348	.0306	3.4738
4.5	2.71336	1.54111	1.08	.4090	2.4448	.4600	.3097	.4449	.5363	33.9467	81.8088	20.8512	.0323	3.4297
4.5	2.71336	1.54111	1.08	.4090	2.4448	.5100	.4300	.4964	.6493	40.1376	78.4334	20.3676	.0341	3.3856
4.5	2.71336	1.54111	1.08	.4090	2.4448	.5600	.5186	.5487	.7478	42.8045	75.6099	19.8841	.0360	3.3415
4.5	2.71336	1.54111	1.08	.4090	2.4448	.6100	.5900	.6016	.8370	44.0447	73.5733	19.4005	.0380	3.2974
4.5	2.71336	1.54111	1.08	.4090	2.4448	.6600	.6498	.6554	.9197	44.5528	71.5813	18.9170	.0402	3.2532
4.5	2.71336	1.54111	1.08	.4090	2.4448	.7100	.7010	.7098	.9975	44.6333	69.7608	18.4334	.0425	3.2091
4.5	2.71336	1.54111	1.08	.4090	2.4448	.7600	.7453	.7651	1.0716	44.4423	68.0685	17.9498	.0450	3.1649
4.5	2.71336	1.54111	1.08	.4090	2.4448	.8100	.7841	.8212	1.1429	44.0679	66.4760	17.4663	.0476	3.1207
4.5	2.71336	1.54111	1.08	.4090	2.4448	.8600	.8179	.8781	1.2119	43.5639	64.9637	16.9827	.0504	3.0765
4.5	2.71336	1.54111	1.08	.4090	2.4448	.9100	.8475	.9359	1.2790	42.9644	63.5172	16.4991	.0534	3.0323
4.5	2.71336	1.54111	1.08	.4090	2.4448	.9600	.8733	.9946	1.3446	42.2924	62.1257	16.0156	.0567	2.9881
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.0100	.8956	1.0543	1.4090	41.5634	60.7808	15.5320	.0601	2.9439
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.0600	.9146	1.1149	1.4725	40.7885	59.4756	15.0484	.0638	2.8996
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.1100	.9306	1.1765	1.5352	39.9753	58.2049	14.5649	.0677	2.8554
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.1600	.9437	1.2391	1.5974	39.1293	56.9641	14.0813	.0719	2.8111
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.2100	.9540	1.3028	1.6591	38.2545	55.7494	13.5978	.0763	2.7668
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.2600	.9617	1.3677	1.7205	37.3535	54.5578	13.1142	.0811	2.7224
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.3100	.9668	1.4337	1.7818	36.4282	53.3864	12.6306	.0862	2.6781
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.3600	.9693	1.5009	1.8431	35.4795	52.2332	12.1471	.0917	2.6337
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.4100	.9694	1.5694	1.9044	34.5079	51.0961	11.6635	.0975	2.5893
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.4600	.9668	1.6391	1.9660	33.5134	49.9736	11.1799	.1037	2.5448
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.5100	.9618	1.7103	2.0278	32.4955	48.8645	10.6964	.1103	2.5003
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.5600	.9542	1.7829	2.0900	31.4532	47.7678	10.2128	.1173	2.4557
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.6100	.9440	1.8570	2.1527	30.3850	46.6829	9.7292	.1247	2.4111
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.6600	.9311	1.9327	2.2160	29.2892	45.6096	9.2457	.1326	2.3664
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.7100	.9155	2.0100	2.2799	28.1635	44.5482	8.7621	.1409	2.3216
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.7600	.8970	2.0890	2.3447	27.0049	43.4996	8.2786	.1497	2.2767
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.8100	.8754	2.1699	2.4104	25.8098	42.4656	7.7950	.1589	2.2317
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.8600	.8506	2.2528	2.4771	24.5740	41.4492	7.3114	.1684	2.1866
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.9100	.8223	2.3377	2.5451	23.2921	40.4551	6.8279	.1784	2.1413
4.5	2.71336	1.54111	1.08	.4090	2.4448	1.9600	.7902	2.4247	2.6144	22.0574	39.4904	6.3443	.1885	2.0958
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.0100	.7540	2.5142	2.6852	20.5616	38.5664	5.8607	.1988	2.0501
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.0600	.7131	2.6062	2.7579	19.0941	37.7009	5.3772	.2090	2.0041
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.1100	.6669	2.7009	2.8326	17.5411	36.9225	4.8936	.2189	1.9576
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.1600	.6146	2.7987	2.9098	15.8839	36.2800	4.4100	.2283	1.9106
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.2100	.5550	2.8999	2.9899	14.0968	35.8610	3.9265	.2365	1.8629
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.2600	.4862	3.0051	3.0738	12.1422	35.8369	3.4429	.2432	1.8142
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.3100	.4057	3.1150	3.1627	9.9606	36.5893	2.9593	.2474	1.7640
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.3600	.3084	3.2310	3.2584	7.4446	39.1617	2.4758	.2482	1.7114
4.5	2.71336	1.54111	1.08	.4090	2.4448	2.4100	.1821	3.3554	3.3650	4.3200	47.8548	1.9922	.2444	1.6547

4.5	2.71336	1.54111	1.12	.4308	2.3210	.4400	.1278	.4236	.4411	16.1973	86.5567	20.8870	.0306	3.7221
4.5	2.71336	1.54111	1.12	.4308	2.3210	.4900	.3202	.4746	.5670	33.1668	81.2229	20.3856	.0322	3.6764
4.5	2.71336	1.54111	1.12	.4308	2.3210	.5400	.4287	.5264	.6721	40.4471	78.0411	19.8841	.0338	3.6306
4.5	2.71336	1.54111	1.12	.4308	2.3210	.5900	.5100	.5788	.7650	48.8393	75.5153	19.3826	.0356	3.5848
4.5	2.71336	1.54111	1.12	.4308	2.3210	.6400	.5757	.6319	.8499	41.9707	73.3436	18.8811	.0374	3.5389
4.5	2.71336	1.54111	1.12	.4308	2.3210	.6900	.6307	.6857	.9290	42.4275	71.4012	18.3797	.0394	3.4931
4.5	2.71336	1.54111	1.12	.4308	2.3210	.7400	.6776	.7402	1.0037	42.4790	69.6220	17.8782	.0415	3.4473
4.5	2.71336	1.54111	1.12	.4308	2.3210	.7900	.7180	.7956	1.0751	42.2672	67.9659	17.3767	.0437	3.4014
4.5	2.71336	1.54111	1.12	.4308	2.3210	.8400	.7530	.8517	1.1438	41.8743	66.4067	16.8752	.0461	3.3556
4.5	2.71336	1.54111	1.12	.4308	2.3210	.8900	.7833	.9086	1.2104	41.3511	64.9259	16.3738	.0485	3.3097
4.5	2.71336	1.54111	1.12	.4308	2.3210	.9400	.8094	.9664	1.2753	40.7304	63.5101	15.8723	.0512	3.2638
4.5	2.71336	1.54111	1.12	.4308	2.3210	.9900	.8317	1.0250	1.3388	40.0343	62.1492	15.3708	.0539	3.2178
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.0400	.8506	1.0846	1.4011	39.2781	60.8354	14.8693	.0569	3.1719
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.0900	.8662	1.1450	1.4625	38.4722	59.5623	14.3679	.0600	3.1259
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.1400	.8787	1.2065	1.5233	37.6242	58.3252	13.8664	.0633	3.0799
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.1900	.8883	1.2689	1.5834	36.7395	57.1199	13.3649	.0668	3.0339
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.2400	.8950	1.3324	1.6432	35.8217	55.9434	12.8635	.0704	2.9878
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.2900	.8990	1.3969	1.7027	34.8732	54.7931	12.3620	.0743	2.9417
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.3400	.9003	1.4626	1.7620	33.8954	53.6670	11.8605	.0784	2.8956
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.3900	.8989	1.5294	1.8213	32.8891	52.5637	11.3590	.0827	2.8494
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.4400	.8947	1.5975	1.8807	31.8541	51.4825	10.8576	.0872	2.8031
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.4900	.8879	1.6667	1.9402	30.7899	50.4229	10.3561	.0919	2.7568
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.5400	.8782	1.7374	2.0000	29.6952	49.3853	9.8546	.0968	2.7104
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.5900	.8657	1.8093	2.0602	28.5681	48.3708	9.3531	.1020	2.6639
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.6400	.8503	1.8828	2.1208	27.4061	47.3815	8.8517	.1073	2.6173
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.6900	.8318	1.9577	2.1820	26.2061	46.4207	8.3502	.1127	2.5706
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.7400	.8100	2.0343	2.2439	24.9639	45.4933	7.8487	.1183	2.5238
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.7900	.7848	2.1125	2.3066	23.6746	44.6070	7.3472	.1240	2.4768
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.8400	.7558	2.1925	2.3702	22.3316	43.7725	6.8458	.1297	2.4296
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.8900	.7227	2.2744	2.4350	20.9268	43.0064	6.3443	.1353	2.3821
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.9400	.6851	2.3583	2.5010	19.4500	42.3336	5.8428	.1407	2.3344
4.5	2.71336	1.54111	1.12	.4308	2.3210	1.9900	.6423	2.4445	2.5686	17.8873	41.7932	5.3413	.1457	2.2862
4.5	2.71336	1.54111	1.12	.4308	2.3210	2.0400	.5935	2.5330	2.6380	16.2204	41.4493	4.8399	.1503	2.2375
4.5	2.71336	1.54111	1.12	.4308	2.3210	2.0900	.5375	2.6242	2.7096	14.4232	41.4133	4.3384	.1540	2.1881
4.5	2.71336	1.54111	1.12	.4308	2.3210	2.1400	.4728	2.7185	2.7840	12.4574	41.8955	3.8369	.1567	2.1377
4.5	2.71336	1.54111	1.12	.4308	2.3210	2.1900	.3964							

4.5	2.7136	1.5411	1.20	.4785	2.0899	.4800	.0481	.4626	.4690	5.7235	88.6201	20.1420	.0299	4.2638
4.5	2.7136	1.5411	1.20	.4785	2.0899	.5300	.2755	.5137	.5790	27.4684	81.9460	19.6047	.0312	4.2147
4.5	2.7136	1.5411	1.20	.4785	2.0899	.5800	.3802	.5655	.6762	33.2463	78.6675	19.0674	.0325	4.1655
4.5	2.7136	1.5411	1.20	.4785	2.0899	.6300	.4563	.6179	.7630	35.9180	76.1229	18.5301	.0340	4.1164
4.5	2.7136	1.5411	1.20	.4785	2.0899	.6800	.5167	.6710	.8427	37.2302	73.9593	17.9928	.0354	4.0672
4.5	2.7136	1.5411	1.20	.4785	2.0899	.7300	.5664	.7247	.9173	37.8066	72.0388	17.4555	.0370	4.0179
4.5	2.7136	1.5411	1.20	.4785	2.0899	.7800	.6080	.7791	.9879	37.9352	70.2908	16.9182	.0386	3.9687
4.5	2.7136	1.5411	1.20	.4785	2.0899	.8300	.6431	.8343	1.0554	37.7688	68.6733	16.3809	.0403	3.9194
4.5	2.7136	1.5411	1.20	.4785	2.0899	.8800	.6727	.8902	1.1205	37.3965	67.1593	15.8436	.0420	3.8701
4.5	2.7136	1.5411	1.20	.4785	2.0899	.9300	.6976	.9468	1.1835	36.8735	65.7303	15.3063	.0439	3.8208
4.5	2.7136	1.5411	1.20	.4785	2.0899	.9800	.7182	1.0042	1.2450	36.2357	64.3731	14.7691	.0458	3.7714
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.0300	.7349	1.0624	1.3051	35.5072	63.0781	14.2318	.0477	3.7220
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.0800	.7480	1.1215	1.3641	34.7044	61.8384	13.6945	.0498	3.6726
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.1300	.7576	1.1814	1.4223	33.8388	60.6488	13.1572	.0519	3.6231
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.1800	.7639	1.2422	1.4798	32.9183	59.5059	12.6199	.0540	3.5735
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.2300	.7670	1.3039	1.5366	31.9482	58.4074	12.0826	.0563	3.5239

4.5	2.7136	1.5411	1.20	.4785	2.0899	1.2800	.7670	1.3666	1.5931	30.9317	57.3523	11.5453	.0585	3.4742
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.3300	.7639	1.4302	1.6493	29.8706	56.3412	11.0080	.0609	3.4244
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.3800	.7576	1.4949	1.7054	28.7655	55.3755	10.4707	.0632	3.3746
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.4300	.7481	1.5607	1.7613	27.6154	54.4588	9.9334	.0656	3.3246
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.4800	.7353	1.6276	1.8173	26.4186	53.5963	9.3961	.0680	3.2745
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.5300	.7190	1.6956	1.8735	25.1719	52.7959	8.8588	.0703	3.2243
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.5800	.6992	1.7649	1.9300	23.8708	52.0694	8.3215	.0726	3.1738
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.6300	.6755	1.8354	1.9868	22.5093	51.4334	7.7842	.0748	3.1232
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.6800	.6476	1.9073	2.0441	21.0793	50.9122	7.2469	.0768	3.0723
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.7300	.6150	1.9807	2.1021	19.5697	50.5422	6.7097	.0787	3.0210
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.7800	.5772	2.0556	2.1609	17.9659	50.3787	6.1724	.0803	2.9694
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.8300	.5333	2.1321	2.2208	16.2468	50.5106	5.6351	.0815	2.9172
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.8800	.4821	2.2105	2.2820	14.3817	51.0880	5.0978	.0823	2.8644
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.9300	.4216	2.2909	2.3449	12.3215	52.3875	4.5605	.0825	2.8106
4.5	2.7136	1.5411	1.20	.4785	2.0899	1.9800	.3483	2.3736	2.4101	9.9769	54.9859	4.0232	.0820	2.7555
4.5	2.7136	1.5411	1.20	.4785	2.0899	2.0300	.2543	2.4591	2.4783	7.1390	60.3782	3.4859	.0805	2.6985
4.5	2.7136	1.5411	1.20	.4785	2.0899	2.0800	.1011	2.5481	2.5511	2.7819	75.7225	2.9486	.0779	2.6387

4.5	2.7136	1.5411	1.24	.5049	1.9807	.5100	.0844	.4923	.4990	9.3993	87.4913	19.6369	.0297	4.5382
4.5	2.7136	1.5411	1.24	.5049	1.9807	.5600	.2718	.5436	.6042	25.8887	81.7605	19.0817	.0309	4.4874
4.5	2.7136	1.5411	1.24	.5049	1.9807	.6100	.3683	.5955	.6957	31.1236	78.6014	18.5265	.0321	4.4365
4.5	2.7136	1.5411	1.24	.5049	1.9807	.6600	.4388	.6481	.7782	33.6152	76.1298	17.9713	.0334	4.3857
4.5	2.7136	1.5411	1.24	.5049	1.9807	.7100	.4944	.7012	.8545	34.8502	74.0243	17.4161	.0347	4.3347
4.5	2.7136	1.5411	1.24	.5049	1.9807	.7600	.5398	.7551	.9262	35.3854	72.1560	16.8609	.0361	4.2838
4.5	2.7136	1.5411	1.24	.5049	1.9807	.8100	.5775	.8096	.9942	35.4852	70.4581	16.3057	.0375	4.2328
4.5	2.7136	1.5411	1.24	.5049	1.9807	.8600	.6088	.8648	1.0595	35.2932	68.8908	15.7505	.0389	4.1818
4.5	2.7136	1.5411	1.24	.5049	1.9807	.9100	.6347	.9207	1.1225	34.8939	67.4289	15.1953	.0404	4.1308
4.5	2.7136	1.5411	1.24	.5049	1.9807	.9600	.6559	.9773	1.1837	34.3404	66.0549	14.6401	.0420	4.0797
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.0100	.6728	1.0348	1.2433	33.6674	64.7569	14.0849	.0435	4.0285
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.0600	.6857	1.0929	1.3017	32.8981	63.5266	13.5297	.0452	3.9773
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.1100	.6949	1.1519	1.3591	32.0484	62.3584	12.9745	.0468	3.9261
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.1600	.7006	1.2118	1.4156	31.1291	61.2488	12.4193	.0485	3.8747
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.2100	.7028	1.2725	1.4715	30.1474	60.1963	11.8641	.0502	3.8233
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.2600	.7015	1.3341	1.5269	29.1078	59.2012	11.3089	.0519	3.7718
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.3100	.6969	1.3966	1.5819	28.0127	58.2658	10.7537	.0536	3.7202
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.3600	.6888	1.4601	1.6367	26.8625	57.3944	10.1985	.0553	3.6685
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.4100	.6773	1.5246	1.6913	25.6560	56.5943	9.6433	.0569	3.6166
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.4600	.6620	1.5901	1.7460	24.3905	55.8763	9.0881	.0585	3.5646
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.5100	.6429	1.6568	1.8007	23.0612	55.2559	8.5329	.0601	3.5124
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.5600	.6196	1.7246	1.8556	21.6614	54.7561	7.9777	.0615	3.4599
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.6100	.5918	1.7936	1.9109	20.1815	54.4101	7.4225	.0627	3.4071
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.6600	.5589	1.8639	1.9667	18.6079	54.2680	6.8673	.0638	3.3540
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.7100	.5202	1.9355	2.0231	16.9217	54.4081	6.3121	.0645	3.3004
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.7600	.4747	2.0087	2.0805	15.0944	54.9582	5.7569	.0650	3.2462
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.8100	.4206	2.0835	2.1390	13.0808	56.1434	5.2017	.0651	3.1912
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.8600	.3548	2.1601	2.1990	10.8006	58.4051	4.6464	.0647	3.1351
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.9100	.2710	2.2388	2.2612	8.0753	62.7820	4.0912	.0636	3.0776
4.5	2.7136	1.5411	1.24	.5049	1.9807	1.9600	.1452	2.3200	2.3264	4.2354	73.0713	3.5360	.0618	3.0179

4.5	2.7136	1.5411	1.28	.5335	1.8744	.5400	.0904	.5220	.5293	9.5054	87.2148	19.1104	.0294	4.8211
4.5	2.7136	1.5411	1.28	.5335	1.8744	.5900	.2614	.5735	.6273	23.8932	81.7765	18.5373	.0305	4.7685
4.5	2.7136	1.5411	1.28	.5335	1.8744	.6400	.3514	.6256	.7137	28.7728	78.6981	17.9642	.0316	4.7160
4.5	2.7136	1.5411	1.28	.5335	1.8744	.6900	.4169	.6782	.7924	31.1391	76.2877	17.3910	.0327	4.6633
4.5	2.7136	1.5411	1.28	.5335	1.8744	.7400	.4681	.7315	.8656	32.3172	74.2381	16.8179	.0339	4.6107
4.5	2.7136	1.5411	1.28	.5335	1.8744	.7900	.5095	.7854	.9346	32.8184	72.4249	16.2448	.0350	4.5580
4.5	2.7136	1.5411	1.28	.5335	1.8744	.8400	.5432	.8400	1.0004	32.8908	70.7837	15.6717	.0362	4.5053
4.5	2.7136	1.5411	1.28	.5335	1.8744	.8900	.5707	.8953	1.0636	32.6707	69.2764	15.0986	.0375	4.4525
4.5	2.7136	1.5411	1.28	.5335	1.8744	.9400	.5929	.9512	1.1246	32.2396	67.8792	14.5255	.0387	4.3997
4.5	2.7136	1.5411	1.28	.5335	1.8744	.9900	.6102	1.0079	1.1840	31.6488	66.5761	13.9524	.0400	4.3468
4.5	2.7136	1.5411	1.28	.5335	1.8744	1.0400	.6232	1.0653	1.2420	30.9318	65.3569	13.3793	.0413	4.2938
4.5	2.7136	1.5411	1.28	.5335	1.8744	1.0900	.6321	1.1235	1.2988	30.1111	64.2151	12.8061	.0426	4.2408
4.5	2.7136	1.5411	1.28	.5335	1.8744	1.1400	.6372	1.1825	1.3546	29.2016	63.1475	12.2330	.0439	4.1877
4.5	2.7136	1.5411	1.28	.5335	1.8744	1.1900	.6384	1.2423	1.4097	28.2134	62.1535	11.6599	.0452	4.1345
4.5	2.7136	1.5411	1.28	.5335	1.8744</									

4.5	2.7136	1.5411	1.32	.5650	1.7699	.5700	.0752	.5518	.5566	7.5202	87.5954	18.5623	.0291	5.1124
4.5	2.7136	1.5411	1.32	.5650	1.7699	.6200	.2438	.6034	.6484	21.4663	82.0324	17.9713	.0300	5.0581
4.5	2.7136	1.5411	1.32	.5650	1.7699	.6700	.3291	.6556	.7305	26.1588	78.9931	17.3803	.0310	5.0038
4.5	2.7136	1.5411	1.32	.5650	1.7699	.7200	.3902	.7084	.8058	28.4537	76.6323	16.7893	.0320	4.9494
4.5	2.7136	1.5411	1.32	.5650	1.7699	.7700	.4373	.7618	.8761	29.5958	74.6379	16.1983	.0329	4.8950
4.5	2.7136	1.5411	1.32	.5650	1.7699	.8200	.4748	.8158	.9427	30.0707	72.8854	15.6072	.0339	4.8406
4.5	2.7136	1.5411	1.32	.5650	1.7699	.8700	.5047	.8705	1.0064	30.1163	71.3112	15.0162	.0350	4.7861
4.5	2.7136	1.5411	1.32	.5650	1.7699	.9200	.5283	.9258	1.0676	29.8646	69.8786	14.4252	.0360	4.7315
4.5	2.7136	1.5411	1.32	.5650	1.7699	.9700	.5464	.9818	1.1269	29.3947	68.5653	13.8342	.0370	4.6768
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.0200	.5597	1.0385	1.1846	28.7568	67.3573	13.2431	.0380	4.6221
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.0700	.5685	1.0960	1.2411	27.9831	66.2470	12.6521	.0390	4.5673
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.1200	.5730	1.1541	1.2964	27.0952	65.2311	12.0611	.0400	4.5124
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.1700	.5733	1.2131	1.3509	26.1066	64.3106	11.4701	.0409	4.4573
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.2200	.5696	1.2728	1.4047	25.0257	63.4905	10.8791	.0418	4.4021
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.2700	.5616	1.3334	1.4580	23.8562	62.7805	10.2880	.0427	4.3468
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.3200	.5494	1.3948	1.5108	22.5981	62.1963	9.6970	.0435	4.2912
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.3700	.5327	1.4572	1.5635	21.2478	61.7616	9.1060	.0441	4.2355
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.4200	.5112	1.5205	1.6160	19.7973	61.5116	8.5150	.0447	4.1794
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.4700	.4843	1.5847	1.6685	18.2334	61.4998	7.9239	.0451	4.1230
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.5200	.4512	1.6500	1.7212	16.5348	61.8088	7.3329	.0454	4.0661
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.5700	.4109	1.7165	1.7743	14.6676	62.5739	6.7419	.0455	4.0088
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.6200	.3613	1.7841	1.8279	12.5731	64.0330	6.1509	.0453	3.9507
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.6700	.2985	1.8530	1.8824	10.1353	66.6610	5.5598	.0448	3.8917
4.5	2.7136	1.5411	1.32	.5650	1.7699	1.7200	.2127	1.9235	1.9381	7.0504	71.6645	4.9688	.0439	3.8315

4.5	2.7136	1.5411	1.36	.6002	1.6660	.6100	.0985	.5920	.5996	9.1683	86.7181	17.8710	.0288	5.4008
4.5	2.7136	1.5411	1.36	.6002	1.6660	.6600	.2374	.6438	.6842	19.7825	81.8949	17.2621	.0296	5.3448
4.5	2.7136	1.5411	1.36	.6002	1.6660	.7100	.3132	.6963	.7610	23.8051	79.0366	16.6532	.0305	5.2887
4.5	2.7136	1.5411	1.36	.6002	1.6660	.7600	.3674	.7493	.8323	25.7992	76.8044	16.0442	.0313	5.2326
4.5	2.7136	1.5411	1.36	.6002	1.6660	.8100	.4086	.8029	.8993	26.7685	74.9243	15.4353	.0321	5.1764
4.5	2.7136	1.5411	1.36	.6002	1.6660	.8600	.4405	.8572	.9631	27.1239	73.2840	14.8264	.0329	5.1201
4.5	2.7136	1.5411	1.36	.6002	1.6660	.9100	.4651	.9120	1.0243	27.0728	71.6265	14.2174	.0338	5.0638
4.5	2.7136	1.5411	1.36	.6002	1.6660	.9600	.4835	.9675	1.0833	26.7325	70.5198	13.6085	.0346	5.0074
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.0100	.4964	1.0237	1.1407	26.1738	69.3459	12.9996	.0353	4.9508
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.0600	.5043	1.0806	1.1967	25.4415	68.2958	12.3906	.0361	4.8942
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.1100	.5074	1.1382	1.2515	24.5639	67.3676	11.7817	.0368	4.8374
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.1600	.5058	1.1965	1.3053	23.5587	66.5655	11.1728	.0375	4.7805
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.2100	.4996	1.2556	1.3585	22.4356	65.9003	10.5638	.0381	4.7234
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.2600	.4887	1.3155	1.4110	21.1980	65.3908	9.9549	.0386	4.6661
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.3100	.4727	1.3763	1.4631	19.8433	65.0666	9.3460	.0391	4.6085
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.3600	.4514	1.4378	1.5150	18.3625	64.9731	8.7370	.0394	4.5506
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.4100	.4240	1.5003	1.5667	16.7380	65.1807	8.1281	.0396	4.4924
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.4600	.3895	1.5638	1.6185	14.9393	65.8027	7.5192	.0396	4.4336
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.5100	.3462	1.6283	1.6705	12.9122	67.0344	6.9102	.0395	4.3743
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.5600	.2905	1.6939	1.7230	10.5493	69.2522	6.3013	.0391	4.3143
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.6100	.2143	1.7606	1.7762	7.5805	73.3599	5.6924	.0385	4.2532
4.5	2.7136	1.5411	1.36	.6002	1.6660	1.6600	.0710	1.8288	1.8305	2.4504	83.9198	5.0834	.0376	4.1909

4.5	2.7136	1.5411	1.40	.6407	1.5608	.6500	.0891	.6322	.6382	7.8086	86.8953	17.1511	.0284	5.6970
4.5	2.7136	1.5411	1.40	.6407	1.5608	.7000	.2184	.6844	.7169	17.3291	82.1949	16.5242	.0291	5.6392
4.5	2.7136	1.5411	1.40	.6407	1.5608	.7500	.2874	.7370	.7893	20.9654	79.4525	15.8974	.0298	5.5813
4.5	2.7136	1.5411	1.40	.6407	1.5608	.8000	.3356	.7903	.8570	22.7557	77.3363	15.2705	.0305	5.5233
4.5	2.7136	1.5411	1.40	.6407	1.5608	.8500	.3712	.8441	.9211	23.5896	75.5789	14.6437	.0312	5.4653
4.5	2.7136	1.5411	1.40	.6407	1.5608	.9000	.3976	.8986	.9824	23.8364	74.0732	14.0168	.0318	5.4072
4.5	2.7136	1.5411	1.40	.6407	1.5608	.9500	.4167	.9536	1.0413	23.6843	72.7668	13.3900	.0324	5.3490
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.0000	.4294	1.0093	1.0985	23.2401	71.6332	12.7632	.0330	5.2906
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.0500	.4364	1.0657	1.1541	22.5680	70.6611	12.1363	.0335	5.2321
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.1000	.4379	1.1228	1.2085	21.7071	69.8503	11.5095	.0340	5.1735
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.1500	.4341	1.1806	1.2619	20.6802	69.2109	10.8826	.0345	5.1146
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.2000	.4249	1.2391	1.3144	19.4980	68.7641	10.2558	.0348	5.0555
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.2500	.4100	1.2983	1.3664	18.1612	68.5462	9.6289	.0351	4.9962
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.3000	.3890	1.3584	1.4179	16.6595	68.6149	9.0021	.0353	4.9365
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.3500	.3609	1.4193	1.4692	14.9683	69.0641	8.3753	.0353	4.8765
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.4000	.3242	1.4811	1.5203	13.0393	70.0538	7.7484	.0352	4.8159
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.4500	.2759	1.5438	1.5715	10.7735	71.8854	7.1216	.0349	4.7547
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.5000	.2088	1.6076	1.6231	7.9257	75.2541	6.4947	.0345	4.6927
4.5	2.7136	1.5411	1.40	.6407	1.5608	1.5500	.0897	1.6724	1.6752	3.3110	83.1223	5.8679	.0338	4.6297

4.5	2.7136	1.5411	1.44	.6890	1.4513	.6900	.0264	.6726	.6731	2.1925	89.0369	16.4024	.0279	6.0008
4.5	2.7136	1.5411	1.44	.6890	1.4513	.7400	.1838	.7250	.7470	13.9461	83.1126	15.7577	.0285	5.9411
4.5	2.7136	1.5411	1.44	.6890	1.4513	.7900	.2490	.7779	.8156	17.4930	80.3954	15.1129	.0290	5.8814
4.5	2.7136	1.5411	1.44	.6890	1.4513	.8400	.2922	.8314	.8802	19.1810	78.3827	14.4682	.0295	5.8216
4.5	2.7136	1.5411	1.44	.6890	1.4513	.8900	.3224	.8854	.9417	19.9156	76.7681	13.8234	.0300	5.7617
4.5	2.7136	1.5411	1.44	.6890	1.4513	.9400	.3432	.9401	1.0008	20.0575	75.4399	13.1787	.0305	5.7016
4.5	2.7136	1.5411	1.44	.6890	1.4513	.9900	.3562	.9953	1.0578	19.7870	74.3496	12.5339	.0309	5.6414
4.5	2.7136	1.5411	1.44	.6890	1.4513	1.0400	.3623	1.0512	1.1132	19.2042	73.4795	11.8892	.0313	5.5810
4.5	2.7136	1.5411	1.44	.6890	1.4513	1.0900	.3619	1.1078	1.1673	18.3655	72.8323	11.2444	.0316	5.5205
4.5	2.7136	1.5411	1.44	.6890	1.4513	1.1400	.3551	1.1651	1.2203	17.3004	72.4293	10.5997	.0318	5.4597
4.5	2.7136	1.5411	1.44	.6890	1.4513	1.1900	.3416	1.2230	1.2724	16.0178	72.3136	9.9549	.0320	5.3986
4.5	2.7136	1.5411	1.44	.6890	1.4513	1.2400	.3208	1.2817	1.3239	14.5063	72.5611	9.3102	.0320	5.3371
4.5	2.7136	1.5411	1.44	.6890	1.4513	1.2900								

GAMMA = 1.2

M1	M1*	DELMAX	DFL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SICMA	PR21	PTR21	TR21
5.0	2.8031	1.5799	1.00	.3568	2.8031	.3600	.0873	.3454	.3554	13.6255	87.9544	27.1471	.0159	3.4563
5.0	2.8031	1.5799	1.00	.3568	2.8031	.4100	.3496	.3962	.5207	40.4534	81.6886	26.6119	.0170	3.4076
5.0	2.8031	1.5799	1.00	.3568	2.8031	.4600	.4815	.4477	.6481	46.3073	78.3877	26.0768	.0182	3.3589
5.0	2.8031	1.5799	1.00	.3568	2.8031	.5100	.5800	.5000	.7572	48.6766	75.3045	25.5417	.0194	3.3102
5.0	2.8031	1.5799	1.00	.3568	2.8031	.5600	.6604	.5531	.8552	49.7014	73.5955	25.0065	.0208	3.2615
5.0	2.8031	1.5799	1.00	.3568	2.8031	.6100	.7285	.6071	.9456	50.0595	71.6242	24.4714	.0223	3.2127
5.0	2.8031	1.5799	1.00	.3568	2.8031	.6600	.7876	.6619	1.0305	50.0387	69.8202	23.9363	.0239	3.1640
5.0	2.8031	1.5799	1.00	.3568	2.8031	.7100	.8397	.7175	1.1113	49.7829	68.1411	23.4012	.0256	3.1153
5.0	2.8031	1.5799	1.00	.3568	2.8031	.7600	.8858	.7742	1.1889	49.3722	66.5593	22.8660	.0275	3.0665
5.0	2.8031	1.5799	1.00	.3568	2.8031	.8100	.9270	.8317	1.2641	48.8546	65.0554	22.3309	.0296	3.0178
5.0	2.8031	1.5799	1.00	.3568	2.8031	.8600	.9639	.8903	1.3373	48.2603	63.6153	21.7958	.0318	2.9691
5.0	2.8031	1.5799	1.00	.3568	2.8031	.9100	.9969	.9499	1.4089	47.6094	62.2283	21.2606	.0343	2.9203
5.0	2.8031	1.5799	1.00	.3568	2.8031	.9600	1.0264	1.0105	1.4794	46.9153	60.8859	20.7255	.0370	2.8715
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.0100	1.0528	1.0723	1.5489	46.1876	59.5815	20.1904	.0399	2.8228
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.0600	1.0761	1.1352	1.6177	45.4329	58.3094	19.6553	.0431	2.7740
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.1100	1.0968	1.1994	1.6861	44.6562	57.0650	19.1201	.0467	2.7252
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.1600	1.1148	1.2648	1.7541	43.8607	55.8445	18.5850	.0506	2.6765
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.2100	1.1303	1.3315	1.8220	43.0490	54.6442	18.0499	.0548	2.6277
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.2600	1.1434	1.3996	1.8899	42.2229	53.4613	17.5147	.0595	2.5789
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.3100	1.1543	1.4691	1.9580	41.3836	52.2932	16.9796	.0647	2.5301
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.3600	1.1629	1.5401	2.0263	40.5318	51.1373	16.4445	.0705	2.4812
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.4100	1.1693	1.6126	2.0950	39.6680	49.9914	15.9093	.0768	2.4324
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.4600	1.1735	1.6869	2.1642	38.7922	48.8536	15.3742	.0838	2.3836
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.5100	1.1757	1.7628	2.2341	37.9045	47.7218	14.8391	.0916	2.3347
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.5600	1.1757	1.8405	2.3047	37.0045	46.5943	14.3040	.1003	2.2858
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.6100	1.1737	1.9202	2.3762	36.0917	45.4693	13.7688	.1099	2.2369
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.6600	1.1695	2.0018	2.4487	35.1654	44.3450	13.2337	.1206	2.1880
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.7100	1.1632	2.0855	2.5223	34.2246	43.2197	12.6986	.1325	2.1391
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.7600	1.1547	2.1715	2.5972	33.2685	42.0916	12.1634	.1459	2.0901
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.8100	1.1440	2.2598	2.6734	32.2955	40.9590	11.6283	.1608	2.0412
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.8600	1.1311	2.3507	2.7512	31.3044	39.8200	11.0932	.1775	1.9921
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.9100	1.1158	2.4441	2.8306	30.2933	38.6726	10.5581	.1962	1.9431
5.0	2.8031	1.5799	1.00	.3568	2.8031	1.9600	1.0981	2.5404	2.9119	29.2601	37.5148	10.0229	.2171	1.8940
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.0100	1.0779	2.6397	2.9953	28.2026	36.3444	9.4878	.2407	1.8448
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.0600	1.0550	2.7422	3.0808	27.1178	35.1589	8.9527	.2671	1.7956
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.1100	1.0292	2.8481	3.1688	26.0025	33.9555	8.4175	.2967	1.7464
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.1600	1.0005	2.9577	3.2595	24.8527	32.7312	7.8824	.3300	1.6970
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.2100	.9684	3.0712	3.3532	23.6636	31.4826	7.3473	.3674	1.6475
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.2600	.9329	3.1891	3.4501	22.4295	30.2055	6.8121	.4092	1.5980
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.3100	.8934	3.3116	3.5506	21.1432	28.8952	6.2770	.4558	1.5482
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.3600	.8494	3.4392	3.6552	19.7956	27.5460	5.7419	.5076	1.4983
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.4100	.8005	3.5724	3.7643	18.3751	26.1508	5.2068	.5647	1.4481
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.4600	.7458	3.7119	3.8788	16.8664	24.7010	4.6716	.6271	1.3975
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.5100	.6842	3.8585	3.9993	15.2487	23.1853	4.1365	.6942	1.3465
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.5600	.6142	4.0132	4.1271	13.4925	21.5889	3.6014	.7646	1.2947
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.6100	.5336	4.1776	4.2640	11.5540	19.8914	3.0662	.8357	1.2419
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.6600	.4386	4.3542	4.4130	9.3641	18.0632	2.5311	.9029	1.1875
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.7100	.3233	4.5475	4.5797	6.8029	16.0586	1.9960	.9588	1.1300
5.0	2.8031	1.5799	1.00	.3568	2.8031	2.7600	.1753	4.7674	4.7770	3.6344	13.8000	1.4608	.9931	1.0664

5.0	2.8031	1.5799	1.04	.3756	2.6627	.3800	.0987	.3649	.3770	14.5552	87.6148	26.7703	.0158	3.7326
5.0	2.8031	1.5799	1.04	.3756	2.6627	.4300	.3413	.4157	.5308	38.4438	81.6251	26.2138	.0168	3.6819
5.0	2.8031	1.5799	1.04	.3756	2.6627	.4800	.4672	.4673	.6521	44.2284	78.3622	25.6573	.0179	3.6312
5.0	2.8031	1.5799	1.04	.3756	2.6627	.5300	.5614	.5196	.7569	46.6459	75.8010	25.1007	.0191	3.5805
5.0	2.8031	1.5799	1.04	.3756	2.6627	.5800	.6379	.5727	.8513	47.7229	73.6082	24.5442	.0203	3.5298
5.0	2.8031	1.5799	1.04	.3756	2.6627	.6300	.7027	.6266	.9386	48.1224	71.6506	23.9877	.0217	3.4791
5.0	2.8031	1.5799	1.04	.3756	2.6627	.6800	.7587	.6813	1.0208	48.1314	69.6586	23.4311	.0231	3.4284
5.0	2.8031	1.5799	1.04	.3756	2.6627	.7300	.8078	.7369	1.0990	47.8954	68.1906	22.8746	.0247	3.3776
5.0	2.8031	1.5799	1.04	.3756	2.6627	.7800	.8511	.7933	1.1742	47.4963	66.6194	22.3181	.0264	3.3269
5.0	2.8031	1.5799	1.04	.3756	2.6627	.8300	.8895	.8507	1.2469	46.9834	65.1258	21.7615	.0282	3.2762
5.0	2.8031	1.5799	1.04	.3756	2.6627	.8800	.9237	.9090	1.3178	46.3879	63.6959	21.2050	.0301	3.2255
5.0	2.8031	1.5799	1.04	.3756	2.6627	.9300	.9540	.9683	1.3872	45.7307	62.3191	20.6485	.0323	3.1747
5.0	2.8031	1.5799	1.04	.3756	2.6627	.9800	.9809	1.0286	1.4553	45.0259	60.9871	20.0919	.0346	3.1240
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.0300	1.0046	1.0900	1.5225	44.2836	59.6932	19.5354	.0371	3.0732
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.0800	1.0253	1.1524	1.5890	43.5106	58.4320	18.9788	.0399	3.0224
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.1300	1.0432	1.2160	1.6550	42.7121	57.1989	18.4223	.0428	2.9717
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.1800	1.0584	1.2803	1.7206	41.8917	55.9901	17.8658	.0461	2.9209
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.2300	1.0712	1.3469	1.7861	41.0520	54.8023	17.3092	.0496	2.8701
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.2800	1.0815	1.4142	1.8514	40.1947	53.6325	16.7527	.0534	2.8192
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.3300	1.0894	1.4829	1.9168	39.3211	52.4782	16.1962	.0576	2.7684
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.3800	1.0950	1.5530	1.9825	38.4318	51.3371	15.6396	.0622	2.7176
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.4300	1.0984	1.6245	2.0484	37.5273	50.2072	15.0831	.0672	2.6667
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.4800	1.0994	1.6976	2.1147	36.6074	49.0865	14.5266	.0726	2.6158
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.5300	1.0983	1.7723	2.1816	35.6719	47.9735	13.9700	.0786	2.5649
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.5800	1.0949	1.8486	2.2491	34.7202	46.8664	13.4135	.0851	2.5139
5.0	2.8031	1.5799	1.04	.3756	2.6627	1.6300	1.0892	1.9258	2.3173	33.7516	45.7637	12.8570	.0922	2.

5.0	2.80031	1.5799	1.08	.3952	2.5306	.4000	.0994	.3844	.3960	13.9526	87.5229	26.3765	.0158	4.0194
5.0	2.80031	1.5799	1.08	.3952	2.5306	.4500	.3306	.4353	.5401	36.3016	81.0231	25.7985	.0167	3.9667
5.0	2.80031	1.5799	1.08	.3952	2.5306	.5000	.4513	.4869	.6559	42.0715	78.3924	25.2206	.0177	3.9140
5.0	2.80031	1.5799	1.08	.3952	2.5306	.5500	.5414	.5392	.7566	44.5497	75.8480	24.6427	.0187	3.8613
5.0	2.80031	1.5799	1.08	.3952	2.5306	.6000	.6145	.5923	.8478	45.6834	73.6696	24.0647	.0199	3.8087
5.0	2.80031	1.5799	1.08	.3952	2.5306	.6500	.6761	.6461	.9322	46.1261	71.7251	23.4868	.0211	3.7560
5.0	2.80031	1.5799	1.08	.3952	2.5306	.7000	.7291	.7008	1.0118	46.1658	69.9458	22.9088	.0224	3.7033
5.0	2.80031	1.5799	1.08	.3952	2.5306	.7500	.7753	.7562	1.0876	45.9499	68.2902	22.3309	.0238	3.6506
5.0	2.80031	1.5799	1.08	.3952	2.5306	.8000	.8159	.8125	1.1605	45.5621	66.7314	21.7530	.0253	3.5979
5.0	2.80031	1.5799	1.08	.3952	2.5306	.8500	.8516	.8697	1.2311	45.0530	65.2505	21.1750	.0269	3.5451
5.0	2.80031	1.5799	1.08	.3952	2.5306	.9000	.8830	.9278	1.2998	44.4552	63.8336	20.5971	.0286	3.4924
5.0	2.80031	1.5799	1.08	.3952	2.5306	.9500	.9107	.9868	1.3670	43.7904	62.4703	20.0191	.0304	3.4396
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.0000	.9349	1.0468	1.4330	43.0732	61.1524	19.4412	.0324	3.3869
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.0500	.9559	1.1078	1.4981	42.3140	59.9473	18.8633	.0346	3.3341
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.1000	.9739	1.1698	1.5625	41.5203	58.8280	18.2853	.0369	3.2813
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.1500	.9891	1.2330	1.6263	40.6973	57.7411	17.7074	.0394	3.2285
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.2000	1.0015	1.2972	1.6897	39.8487	56.7209	17.1294	.0421	3.1757
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.2500	1.0114	1.3627	1.7529	38.9871	55.7524	16.5515	.0449	3.1229
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.3000	1.0188	1.4293	1.8159	38.0843	54.9036	15.9736	.0480	3.0700
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.3500	1.0236	1.4973	1.8790	37.1716	54.2721	15.3956	.0514	3.0171
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.4000	1.0261	1.5665	1.9422	36.2593	53.8560	14.8177	.0550	2.9642
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.4500	1.0262	1.6371	2.0057	35.2878	53.5536	14.2397	.0589	2.9113
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.5000	1.0239	1.7092	2.0694	34.3167	53.3634	13.6618	.0631	2.8583
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.5500	1.0191	1.7828	2.1337	33.3254	53.2841	13.0839	.0676	2.8053
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.6000	1.0120	1.8580	2.1984	32.3129	53.3149	12.5059	.0725	2.7522
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.6500	1.0023	1.9348	2.2638	31.2779	53.4550	11.9280	.0777	2.6991
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.7000	.9902	2.0133	2.3300	30.2188	53.7040	11.3500	.0833	2.6460
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.7500	.9754	2.0937	2.3970	29.1335	54.0617	10.7721	.0893	2.5927
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.8000	.9579	2.1760	2.4649	28.0194	54.5286	10.1942	.0957	2.5394
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.8500	.9375	2.2604	2.5340	26.8734	55.1057	9.6162	.1026	2.4860
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.9000	.9141	2.3468	2.6043	25.6919	55.7945	9.0383	.1099	2.4325
5.0	2.80031	1.5799	1.08	.3952	2.5306	1.9500	.8874	2.4356	2.6760	24.4702	56.5981	8.4603	.1175	2.3789
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.0000	.8573	2.5268	2.7492	23.2029	57.5209	7.8824	.1256	2.3252
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.0500	.8234	2.6206	2.8240	21.8831	58.5699	7.3045	.1340	2.2711
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.1000	.7852	2.7171	2.9009	20.5022	59.7560	6.7265	.1427	2.2169
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.1500	.7424	2.8167	2.9799	19.0490	61.0965	6.1486	.1515	2.1623
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.2000	.6940	2.9195	3.0614	17.5090	62.6199	5.5706	.1602	2.1074
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.2500	.6393	3.0260	3.1458	15.8626	64.3743	4.9927	.1685	2.0519
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.3000	.5770	3.1366	3.2337	14.0822	66.479	4.4148	.1760	1.9956
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.3500	.5049	3.2518	3.3260	12.1268	68.9515	3.8368	.1822	1.9382
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.4000	.4202	3.3728	3.4241	9.9302	71.7770	3.2589	.1864	1.8819
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.4500	.3169	3.5010	3.5302	7.3700	74.9620	2.6809	.1873	1.8274
5.0	2.80031	1.5799	1.08	.3952	2.5306	2.5000	.1799	3.6398	3.6492	4.1162	78.6315	2.1030	.1838	1.7708

5.0	2.80031	1.5799	1.12	.4157	2.4056	.4200	.0904	.4039	.4131	12.1472	87.6772	25.9655	.0156	4.3167
5.0	2.80031	1.5799	1.12	.4157	2.4056	.4700	.3172	.4548	.5487	34.0117	81.7173	25.3662	.0165	4.2621
5.0	2.80031	1.5799	1.12	.4157	2.4056	.5200	.4336	.5065	.6594	39.8242	78.4860	24.7662	.0174	4.2074
5.0	2.80031	1.5799	1.12	.4157	2.4056	.5700	.5201	.5588	.7565	42.3780	75.9529	24.1675	.0184	4.1528
5.0	2.80031	1.5799	1.12	.4157	2.4056	.6200	.5899	.6119	.8446	43.5741	73.7868	23.5681	.0194	4.0981
5.0	2.80031	1.5799	1.12	.4157	2.4056	.6700	.6484	.6657	.9264	44.0629	71.8552	22.9688	.0205	4.0434
5.0	2.80031	1.5799	1.12	.4157	2.4056	.7200	.6986	.7202	1.0035	44.1344	70.0893	22.3694	.0216	3.9887
5.0	2.80031	1.5799	1.12	.4157	2.4056	.7700	.7420	.7756	1.0771	43.9389	68.4479	21.7701	.0229	3.9340
5.0	2.80031	1.5799	1.12	.4157	2.4056	.8200	.7798	.8318	1.1478	43.5619	66.9039	21.1707	.0242	3.8793
5.0	2.80031	1.5799	1.12	.4157	2.4056	.8700	.8129	.8888	1.2163	43.0559	65.4387	20.5714	.0256	3.8246
5.0	2.80031	1.5799	1.12	.4157	2.4056	.9200	.8417	.9466	1.2830	42.4545	64.0385	19.9721	.0271	3.7698
5.0	2.80031	1.5799	1.12	.4157	2.4056	.9700	.8667	1.0054	1.3483	41.7801	62.6930	19.3727	.0287	3.7151
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.0200	.8882	1.0651	1.4125	41.0483	61.3941	18.7734	.0304	3.6603
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.0700	.9065	1.1258	1.4755	40.2697	60.1357	18.1740	.0322	3.6055
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.1200	.9217	1.1875	1.5378	39.4521	58.9125	17.5747	.0342	3.5507
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.1700	.9340	1.2502	1.5997	38.6008	57.7204	16.9753	.0362	3.4958
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.2200	.9436	1.3139	1.6611	37.7197	56.5560	16.3760	.0384	3.4410
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.2700	.9505	1.3788	1.7222	36.8115	55.4165	15.7766	.0408	3.3861
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.3200	.9547	1.4449	1.7832	35.8777	54.2997	15.1773	.0433	3.3311
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.3700	.9564	1.5121	1.8442	34.9195	53.2037	14.5779	.0459	3.2762
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.4200	.9555	1.5807	1.9052	33.9371	52.1273	13.9786	.0488	3.2212
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.4700	.9521	1.6505	1.9664	32.9303	51.0693	13.3793	.0517	3.1661
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.5200	.9461	1.7217	2.0279	31.8985	50.0293	12.7799	.0549	3.1110
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.5700	.9374	1.7943	2.0898	30.8405	49.0072	12.1806	.0583	3.0559
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.6200	.9261	1.8684	2.1521	29.7546	48.0035	11.5812	.0618	3.0006
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.6700	.9120	1.9440	2.2150	28.6388	47.0194	10.9819	.0655	2.9453
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.7200	.8950	2.0214	2.2786	27.4903	46.0567	10.3825	.0694	2.8899
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.7700	.8750	2.1004	2.3430	26.3057	45.1188	9.7832	.0735	2.8344
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.8200	.8518	2.1812	2.4083	25.0808	44.2102	9.1838	.0777	2.7787
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.8700	.8252	2.2640	2.4746	23.8105	43.3380	8.5845	.0821	2.7229
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.9200	.7948	2.3488	2.5421	22.4883	42.5123	7.9851	.0865	2.6669
5.0	2.80031	1.5799	1.12	.4157	2.4056	1.9700	.7604	2.4358	2.6110	21.1106	41.7483	7.3858	.0909	2.6106
5.0	2.80031	1.5799	1.12	.4157	2.4056	2.0200	.7214	2.5252	2.6814	19.6534	41.0692	6.7865	.0952	2.5541
5.0	2.80031	1.5799	1.12	.4157	2.4056	2.0700	.6772	2.6170	2.7535	18.1165	40.5111	6.18		

5.0	2.8031	1.5799	1.20	.4602	2.1730	.4700	.1264	.4530	.4691	15.0480	86.5383	24.9637	.0155	4.9315
5.0	2.8031	1.5799	1.20	.4602	2.1730	.5200	.3073	.5042	.5857	30.5817	81.4287	24.3216	.0162	4.8728
5.0	2.8031	1.5799	1.20	.4602	2.1730	.5700	.4098	.5561	.6849	35.7139	78.4572	23.6794	.0170	4.8142
5.0	2.8031	1.5799	1.20	.4602	2.1730	.6200	.4863	.6086	.7734	38.1077	75.9202	23.0373	.0178	4.7555
5.0	2.8031	1.5799	1.20	.4602	2.1730	.6700	.5478	.6617	.8547	39.2673	73.8282	22.3951	.0186	4.6969
5.0	2.8031	1.5799	1.20	.4602	2.1730	.7200	.5989	.7156	.9308	39.8521	71.9609	21.7530	.0195	4.6382
5.0	2.8031	1.5799	1.20	.4602	2.1730	.7700	.6421	.7702	1.0028	39.8243	70.2547	21.1108	.0204	4.5794
5.0	2.8031	1.5799	1.20	.4602	2.1730	.8200	.6790	.8255	1.0718	39.6244	68.6712	20.4687	.0214	4.5207
5.0	2.8031	1.5799	1.20	.4602	2.1730	.8700	.7104	.8816	1.1382	39.2348	67.1852	19.8265	.0224	4.4619
5.0	2.8031	1.5799	1.20	.4602	2.1730	.9200	.7372	.9385	1.2026	38.7067	65.7792	19.1843	.0235	4.4032
5.0	2.8031	1.5799	1.20	.4602	2.1730	.9700	.7599	.9962	1.2654	38.0735	64.4407	18.5422	.0246	4.3444
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.0200	.7787	1.0547	1.3269	37.3577	63.1604	17.9000	.0258	4.2855
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.0700	.7939	1.1141	1.3872	36.5747	61.9313	17.2579	.0270	4.2266
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.1200	.8058	1.1743	1.4467	35.7353	60.7481	16.6157	.0283	4.1677
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.1700	.8146	1.2355	1.5055	34.8471	59.6069	15.9736	.0296	4.1088
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.2200	.8203	1.2977	1.5637	33.9153	58.5049	15.3314	.0310	4.0498
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.2700	.8230	1.3608	1.6215	32.9433	57.4405	14.6893	.0324	3.9907
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.3200	.8227	1.4250	1.6791	31.9330	56.4128	14.0471	.0339	3.9316
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.3700	.8195	1.4902	1.7365	30.8853	55.4219	13.4049	.0354	3.8724
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.4200	.8132	1.5566	1.7938	29.8002	54.4691	12.7628	.0370	3.8131
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.4700	.8040	1.6241	1.8511	28.6767	53.5568	12.1206	.0386	3.7537
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.5200	.7917	1.6928	1.9086	27.5128	52.6891	11.4785	.0403	3.6942
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.5700	.7761	1.7627	1.9664	26.3056	51.8717	10.8363	.0419	3.6346
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.6200	.7572	1.8340	2.0245	25.0512	51.1134	10.1942	.0435	3.5749
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.6700	.7346	1.9067	2.0830	23.7443	50.4263	9.5520	.0452	3.5149
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.7200	.7082	1.9808	2.1421	22.3782	49.8280	8.9099	.0467	3.4547
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.7700	.6774	2.0564	2.2019	20.9438	49.3441	8.2677	.0482	3.3943
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.8200	.6420	2.1337	2.2624	19.4293	48.9127	7.6255	.0496	3.3335
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.8700	.6011	2.2128	2.3243	17.8186	48.6928	6.9834	.0507	3.2723
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.9200	.5538	2.2937	2.3872	16.0888	49.6795	6.3412	.0516	3.2104
5.0	2.8031	1.5799	1.20	.4602	2.1730	1.9700	.4987	2.3767	2.4517	14.2063	49.7368	5.6991	.0522	3.1479
5.0	2.8031	1.5799	1.20	.4602	2.1730	2.0200	.4336	2.4620	2.5181	12.1162	51.1731	5.0569	.0524	3.0843
5.0	2.8031	1.5799	1.20	.4602	2.1730	2.0700	.3545	2.5500	2.5871	9.7168	54.6538	4.4148	.0520	3.0192
5.0	2.8031	1.5799	1.20	.4602	2.1730	2.1200	.2512	2.6412	2.6597	6.7577	60.2111	3.7726	.0508	2.9518
5.0	2.8031	1.5799	1.20	.4602	2.1730	2.1700	.0580	2.7366	2.7376	1.5322	81.5096	3.1305	.0488	2.8809

5.0	2.8031	1.5799	1.24	.4846	2.0637	.4900	.0903	.4726	.4805	10.4434	87.4491	24.4971	.0153	5.2601
5.0	2.8031	1.5799	1.24	.4846	2.0637	.5400	.2839	.5238	.5918	27.7324	81.8292	23.8335	.0159	5.1995
5.0	2.8031	1.5799	1.24	.4846	2.0637	.5900	.3848	.5757	.6873	33.1127	78.7084	23.1700	.0166	5.1389
5.0	2.8031	1.5799	1.24	.4846	2.0637	.6400	.4589	.6282	.7730	35.6417	76.2631	22.5064	.0173	5.0782
5.0	2.8031	1.5799	1.24	.4846	2.0637	.6900	.5178	.6813	.8519	36.8875	74.1774	21.8429	.0181	5.0175
5.0	2.8031	1.5799	1.24	.4846	2.0637	.7400	.5664	.7352	.9258	37.4283	72.3244	21.1793	.0189	4.9568
5.0	2.8031	1.5799	1.24	.4846	2.0637	.7900	.6070	.7897	.9959	37.5357	70.6378	20.5157	.0197	4.8960
5.0	2.8031	1.5799	1.24	.4846	2.0637	.8400	.6412	.8449	1.0630	37.3554	69.0785	19.8522	.0205	4.8353
5.0	2.8031	1.5799	1.24	.4846	2.0637	.8900	.6700	.9009	1.1277	36.9730	67.6207	19.1886	.0214	4.7745
5.0	2.8031	1.5799	1.24	.4846	2.0637	.9400	.6941	.9577	1.1904	36.4417	66.2473	18.5251	.0223	4.7136
5.0	2.8031	1.5799	1.24	.4846	2.0637	.9900	.7139	1.0152	1.2516	35.7965	64.9457	17.8615	.0233	4.6527
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.0400	.7299	1.0735	1.3115	35.0606	63.7073	17.1979	.0242	4.5918
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.0900	.7422	1.1326	1.3703	34.2501	62.5255	16.5344	.0253	4.5309
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.1400	.7510	1.1927	1.4282	33.3761	61.3961	15.8708	.0263	4.4699
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.1900	.7565	1.2536	1.4854	32.4461	60.3161	15.2073	.0274	4.4088
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.2400	.7588	1.3154	1.5422	31.4651	59.2842	14.5437	.0285	4.3476
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.2900	.7579	1.3782	1.5984	30.4363	58.3004	13.8801	.0296	4.2864
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.3400	.7538	1.4419	1.6545	29.3610	57.3660	13.2166	.0307	4.2251
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.3900	.7465	1.5067	1.7103	28.2393	56.4842	12.5530	.0318	4.1637
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.4400	.7359	1.5726	1.7661	27.0701	55.6599	11.8895	.0330	4.1021
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.4900	.7219	1.6396	1.8219	25.8507	54.9008	11.2259	.0341	4.0405
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.5400	.7043	1.7077	1.8778	24.5775	54.2178	10.5623	.0352	3.9786
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.5900	.6829	1.7771	1.9341	23.2448	53.6264	9.8988	.0362	3.9166
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.6400	.6575	1.8477	1.9906	21.8452	53.1494	9.2352	.0372	3.8543
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.6900	.6275	1.9197	2.0477	20.3686	52.7195	8.5717	.0381	3.7917
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.7400	.5924	1.9931	2.1054	18.8011	52.3862	7.9081	.0389	3.7287
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.7900	.5515	2.0680	2.1640	17.1231	52.1263	7.2445	.0395	3.6653
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.8400	.5036	2.1446	2.2235	15.3060	53.9660	6.5810	.0399	3.6012
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.8900	.4469	2.2230	2.2844	13.3046	54.9277	5.9174	.0400	3.5363
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.9400	.3785	2.3035	2.3469	11.0392	56.7479	5.2538	.0398	3.4702
5.0	2.8031	1.5799	1.24	.4846	2.0637	1.9900	.2916	2.3862	2.4117	8.3372	61.6511	4.5903	.0391	3.4026
5.0	2.8031	1.5799	1.24	.4846	2.0637	2.0400	.1637	2.4718	2.4797	4.5888	71.6631	3.9267	.0379	3.3325

5.0	2.8031	1.5799	1.28	.5108	1.9578	.5200	.1126	.5023	.5139	12.2139	86.7092	23.8764	.0152	5.5868
5.0	2.8031	1.5799	1.28	.5108	1.9578	.5700	.2799	.5537	.6169	26.1547	81.6521	23.1914	.0158	5.5242
5.0	2.8031	1.5799	1.28	.5108	1.9578	.6200	.3729	.6057	.7069	31.0272	78.6480	22.5064	.0164	5.4615
5.0	2.8031	1.5799	1.28	.5108	1.9578	.6700	.4414	.6584	.7884	33.3786	76.2766	21.8215	.0170	5.3988
5.0	2.8031	1.5799	1.28	.5108	1.9578	.7200	.4957	.7117	.8640	34.5445	74.2507	21.1365	.0177	5.3361
5.0	2.8031	1.5799	1.28	.5108	1.9578	.7700	.5400	.7656	.9351	35.0407	72.4519	20.4515	.0184	5.2733
5.0	2.8031	1.5799	1.28	.5108	1.9578	.8200	.5766	.8202	1.0027	35.1161	70.8179	19.7666	.0191	5.2105
5.0	2.8031	1.5799	1.28	.5108	1.9578	.8700	.6071	.8755	1.0676	34.9072	69.3116	19.0816	.0198	5.1477
5.0	2.8031	1.5799	1.28	.5108	1.9578	.9200	.6322	.9315	1.1303	34.4951	67.9090	18.3966	.0206	5.0848
5.0	2.8031	1.5799	1.28	.5108	1.9578	.9700	.6526	.9883	1.1911	33.9308	66.5942	17.7117	.0214	5.0219
5.0	2.8031	1.5799	1.28	.5108	1.9578	1.0200	.6687	1.0						

5.0	2.8031	1.5799	1.32	.5392	1.8546	.5400	.0317	.5219	.5228	3.3544	89.0456	23.3712	.0149	5.9362
5.0	2.8031	1.5799	1.32	.5392	1.8546	.5900	.2473	.5733	.6216	22.7417	82.3849	22.6648	.0155	5.8715
5.0	2.8031	1.5799	1.32	.5392	1.8546	.6400	.3411	.6253	.7086	28.0587	79.2672	21.9585	.0160	5.8068
5.0	2.8031	1.5799	1.32	.5392	1.8546	.6900	.4082	.6780	.7878	30.6096	76.8677	21.2521	.0166	5.7421
5.0	2.8031	1.5799	1.32	.5392	1.8546	.7400	.4604	.7313	.8612	31.8890	74.8440	20.5457	.0172	5.6773
5.0	2.8031	1.5799	1.32	.5392	1.8546	.7900	.5024	.7852	.9305	32.4533	73.0636	19.8393	.0178	5.6125
5.0	2.8031	1.5799	1.32	.5392	1.8546	.8400	.5365	.8397	.9964	32.5677	71.4592	19.1330	.0184	5.5476
5.0	2.8031	1.5799	1.32	.5392	1.8546	.8900	.5643	.8950	1.0597	32.3770	69.9920	18.4266	.0190	5.4827
5.0	2.8031	1.5799	1.32	.5392	1.8546	.9400	.5866	.9509	1.1209	31.9666	68.6375	17.7202	.0196	5.4178
5.0	2.8031	1.5799	1.32	.5392	1.8546	.9900	.6041	1.0075	1.1803	31.3904	67.3799	17.0139	.0202	5.3527
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.0400	.6171	1.0649	1.2383	30.6834	66.2091	16.3075	.0209	5.2876
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.0900	.6260	1.1231	1.2951	29.8688	65.1190	15.6011	.0215	5.2225
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.1400	.6309	1.1820	1.3509	28.9623	64.1069	14.8947	.0222	5.1572
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.1900	.6320	1.2417	1.4060	27.9740	63.1728	14.1884	.0228	5.0918
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.2400	.6294	1.3023	1.4604	26.9099	62.3197	13.4820	.0234	5.0264
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.2900	.6229	1.3637	1.5144	25.7731	61.5540	12.7756	.0240	4.9607
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.3400	.6125	1.4261	1.5680	24.5636	60.8858	12.0693	.0246	4.8950
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.3900	.5980	1.4894	1.6213	23.2789	60.3307	11.3629	.0251	4.8290
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.4400	.5793	1.5536	1.6746	21.9137	59.9112	10.6565	.0255	4.7628
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.4900	.5559	1.6189	1.7279	20.4590	59.6603	9.9501	.0260	4.6963
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.5400	.5273	1.6853	1.7813	18.9016	59.6272	9.2438	.0263	4.6294
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.5900	.4928	1.7528	1.8350	17.2212	59.8874	8.5374	.0265	4.5622
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.6400	.4513	1.8215	1.8892	15.3869	60.5624	7.8310	.0266	4.4944
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.6900	.4010	1.8915	1.9440	13.3473	61.8617	7.1247	.0265	4.4258
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.7400	.3384	1.9629	1.9997	11.0071	64.1886	6.4183	.0263	4.3564
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.7900	.2561	2.0359	2.0566	8.1435	68.4850	5.7119	.0258	4.2857
5.0	2.8031	1.5799	1.32	.5392	1.8546	1.8400	.1222	2.1107	2.1153	3.7984	78.4873	5.0055	.0250	4.2132

5.0	2.8031	1.5799	1.36	.5705	1.7529	.5800	.1031	.5619	.5708	10.0794	86.7642	22.5578	.0149	6.2694
5.0	2.8031	1.5799	1.36	.5705	1.7529	.6300	.2520	.6137	.6609	21.8024	81.9130	21.8300	.0153	6.2026
5.0	2.8031	1.5799	1.36	.5705	1.7529	.6800	.3339	.6660	.7419	26.1492	79.0379	21.1022	.0158	6.1359
5.0	2.8031	1.5799	1.36	.5705	1.7529	.7300	.3930	.7189	.8164	28.2983	76.7839	20.3745	.0163	6.0691
5.0	2.8031	1.5799	1.36	.5705	1.7529	.7800	.4388	.7724	.8862	29.3627	74.8752	19.6467	.0168	6.0022
5.0	2.8031	1.5799	1.36	.5705	1.7529	.8300	.4752	.8265	.9523	29.7900	73.1982	18.9189	.0173	5.9353
5.0	2.8031	1.5799	1.36	.5705	1.7529	.8800	.5040	.8813	1.0156	29.8032	71.6945	18.1911	.0178	5.8683
5.0	2.8031	1.5799	1.36	.5705	1.7529	.9300	.5268	.9367	1.0765	29.5273	70.3301	17.4634	.0183	5.8013
5.0	2.8031	1.5799	1.36	.5705	1.7529	.9800	.5441	.9928	1.1355	29.0375	69.0846	16.7356	.0188	5.7342
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.0300	.5565	1.0496	1.1930	28.3816	67.9456	16.0078	.0193	5.6670
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.0800	.5644	1.1072	1.2492	27.5906	66.9067	15.2800	.0198	5.5997
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.1300	.5679	1.1655	1.3044	26.6846	65.9661	14.5523	.0203	5.5323
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.1800	.5673	1.2245	1.3587	25.6764	65.1263	13.8245	.0208	5.4648
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.2300	.5624	1.2844	1.4123	24.5733	64.3942	13.0967	.0212	5.3971
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.2800	.5533	1.3451	1.4654	23.3779	63.7820	12.3689	.0216	5.3292
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.3300	.5398	1.4067	1.5181	22.0891	63.3087	11.6412	.0220	5.2611
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.3800	.5215	1.4691	1.5705	20.7012	63.0027	10.9134	.0223	5.1928
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.4300	.4981	1.5325	1.6228	19.2037	62.9063	10.1856	.0225	5.1242
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.4800	.4689	1.5969	1.6751	17.5793	63.0841	9.4578	.0227	5.0551
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.5300	.4329	1.6623	1.7276	15.7998	63.6380	8.7300	.0228	4.9857
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.5800	.3886	1.7288	1.7803	13.8185	64.7393	8.0023	.0227	4.9156
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.6300	.3331	1.7965	1.8336	11.5489	66.7056	7.2745	.0225	4.8447
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.6800	.2600	1.8655	1.8877	8.7976	70.2357	6.5467	.0222	4.7728
5.0	2.8031	1.5799	1.36	.5705	1.7529	1.7300	.1472	1.9360	1.9430	4.8629	77.6744	5.8189	.0216	4.6995

5.0	2.8031	1.5799	1.40	.6055	1.6515	.6100	.0667	.5918	.5954	6.2362	87.8299	21.8600	.0147	6.6252
5.0	2.8031	1.5799	1.40	.6055	1.6515	.6600	.2264	.6437	.6805	18.9317	82.4546	21.1108	.0151	6.5564
5.0	2.8031	1.5799	1.40	.6055	1.6515	.7100	.3052	.6961	.7577	23.2589	79.5772	20.3616	.0155	6.4875
5.0	2.8031	1.5799	1.40	.6055	1.6515	.7600	.3607	.7491	.8292	25.3890	77.5648	19.6124	.0159	6.4187
5.0	2.8031	1.5799	1.40	.6055	1.6515	.8100	.4027	.8027	.8965	26.4352	75.5166	18.8633	.0163	6.3497
5.0	2.8031	1.5799	1.40	.6055	1.6515	.8600	.4352	.8570	.9604	26.8390	73.9142	18.1141	.0167	6.2807
5.0	2.8031	1.5799	1.40	.6055	1.6515	.9100	.4601	.9118	1.0217	26.8201	72.4983	17.3649	.0171	6.2116
5.0	2.8031	1.5799	1.40	.6055	1.6515	.9600	.4787	.9673	1.0809	26.5014	71.2365	16.6157	.0175	6.1424
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.0100	.4917	1.0235	1.1383	25.9570	70.1107	15.8665	.0179	6.0731
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.0600	.4995	1.0803	1.1943	25.2331	69.1122	15.1174	.0183	6.0037
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.1100	.5026	1.1379	1.2491	24.3591	68.2396	14.3682	.0187	5.9341
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.1600	.5008	1.1962	1.3030	23.3529	67.4979	13.6190	.0190	5.8644
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.2100	.4944	1.2553	1.3560	22.2241	66.8991	12.8698	.0193	5.7945
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.2600	.4831	1.3151	1.4085	20.9756	66.4636	12.1206	.0195	5.7244
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.3100	.4666	1.3758	1.4605	19.6038	66.2234	11.3714	.0197	5.6540
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.3600	.4445	1.4373	1.5121	18.0975	66.2275	10.6223	.0199	5.5833
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.4100	.4159	1.4998	1.5637	16.4359	66.5526	9.8731	.0200	5.5123
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.4600	.3798	1.5631	1.6151	14.5822	67.3233	9.1239	.0199	5.4407
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.5100	.3339	1.6275	1.6668	12.4690	68.7588	8.3747	.0198	5.3685
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.5600	.2738	1.6929	1.7188	9.9561	71.5000	7.6255	.0196	5.2956
5.0	2.8031	1.5799	1.40	.6055	1.6515	1.6100	.1875	1.7595	1.7714	6.6429	76.1238	6.8764	.0192	5.2215

5.0	2.8031	1.5799	1.44	.6458	1.5485	.6500	.0601	.6321	.6348	5.2793	87.9597	20.7824	.0145	6.9765
5.0	2.8031	1.5799	1.44	.6458	1.5485	.7000	.2087	.6842	.7140	16.6001	82.7304	20.2118	.0148	6.9056
5.0	2.8031	1.5799	1.44	.6458	1.5485	.7500	.2803	.7369	.7867	20.4946	79.9755	19.4412	.0152	6.8346
5.0	2.8031	1.5799	1.44	.6458	1.5485	.8000	.3298	.7901	.8546	22.4012	77.8825	18.6706	.0155	6.7636
5.0	2.8031	1.5799	1.44	.6458	1.5485	.8500	.3661	.8440	.9189	23.3008	76.1595	17.9000	.0158	6.6925
5.0	2.8031	1.5799	1.44	.6458	1.5485	.9000	.3930	.8984	.9803	23.5885	74.6936	17.1294	.0162	6.6213
5.0	2.8031	1.5799	1.44	.6458	1.5485	.9500	.4123	.9535	1.0394	23.4628	73.4309	16.3589	.0165	6.5500
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.0000	.4252	1.0092	1.0966	23.0352	72.3442	15.5883	.0168	6.4785
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.0500	.4322	1.0655	1.1523	22.3723	71.4226	14.8177	.0170	6.4070
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.1000	.4336	1.1226	1.2066	21.5143	70.6663	14.0471	.0173	6.3352
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.1500	.4296	1.1803	1.2600	20.4842	70.0863	13.2765	.0175	6.2633
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.2000	.4201	1.2388	1.3125	19.2925	69.7053	12.5059	.0177	6.1911
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.2500	.4047	1.2980	1.3643	17.9384	69.5617	11.7353	.0178	6.1186
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.3000	.3828	1.3580	1.4157	16.4091	69.7170	10.9647	.0178	6.0459
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.3500	.3535	1.4189	1.4667	14.6753	70.2719	10.1942	.0179	5.9727
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.4000	.3150	1.4806	1.5176	12.6785	71.4005	9.4236	.0178	5.8990
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.4500	.2634	1.5432	1.5685	10.2949	73.4426	8.6530	.0176	5.8246
5.0	2.8031	1.5799	1.44	.6458	1.5485	1.5000	.1892	1.6069	1.6196	7.1890	77.2461	7.8824	.0173	5.7495

5.0	2.8031	1.5799	1.48	.6939	1.4411	.7000	.0653	.6829	.6859	5.3270	87.6700	19.9121	.0143	7.3219
5.0	2.8031	1.5799	1.48	.6939	1.4411	.7500	.1912	.7354	.7589	14.3016	82.9864	19.1201	.0146	7.2489
5.0	2.8031	1.5799	1.48	.6939	1.4411	.8000	.2529	.7884	.8269	17.5457	80.4541	18.3281	.0148	7.1758
5.0	2.8031	1.5799	1.48	.6939	1.4411	.8500	.2942	.8420	.8910	19.0910	78.5625	17.5361	.0151	7.1025
5.0	2.8031	1.5799	1.48	.6939	1.4411	.9000	.3229	.8962	.9521	19.7384	77.0479	16.7441	.0153	7.0292
5.0	2.8031	1.5799	1.48	.6939	1.4411	.9500	.3424	.9509	1.0108	19.8178	75.8114	15.9522	.0156	6.9557
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.0000	.3540	1.0063	1.0675	19.4965	74.8109	15.1602	.0158	6.8821
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.0500	.3588	1.0624	1.1227	18.8670	74.0333	14.3682	.0159	6.8083
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.1000	.3570	1.1190	1.1765	17.9809	73.4854	13.5762	.0161	6.7343
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.1500	.3486	1.1764	1.2293	16.8629	73.1936	12.7842	.0162	6.6600
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.2000	.3332	1.2345	1.2812	15.5164	73.2090	11.9922	.0162	6.5854
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.2500	.3098	1.2933	1.3324	13.9210	73.6205	11.2002	.0162	6.5105
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.3000	.2768	1.3529	1.3832	12.0207	74.5874	10.4082	.0162	6.4352
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.3500	.2303	1.4133	1.4337	9.6817	76.4287	9.6162	.0161	6.3592
5.0	2.8031	1.5799	1.48	.6939	1.4411	1.4000	.1596	1.4745	1.4841	6.5023	79.9908	8.8242	.0158	6.2826

5.0	2.8031	1.5799	1.52	.7559	1.3229	.7600	.0466	.7445	.7459	3.5091	88.2364	18.6364	.0140	7.6602
5.0	2.8031	1.5799	1.52	.7559	1.3229	.8100	.1614	.7974	.8131	11.2708	83.7061	17.8230	.0142	7.5849
5.0	2.8031	1.5799	1.52	.7559	1.3229	.8600	.2124	.8509	.8765	13.8732	81.4548	17.0096	.0144	7.5095
5.0	2.8031	1.5799	1.52	.7559	1.3229	.9100	.2437	.9049	.9368	14.9895	79.8689	16.1962	.0146	7.4340
5.0	2.8031	1.5799	1.52	.7559	1.3229	.9600	.2624	.9595	.9947	15.2869	78.7037	15.3828	.0147	7.3583
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.0100	.2713	1.0148	1.0507	15.0347	77.8828	14.5694	.0149	7.2824
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.0600	.2714	1.0706	1.1051	14.3610	77.3944	13.7560	.0149	7.2063
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.1100	.2628	1.1271	1.1583	13.3218	77.2712	12.9426	.0150	7.1299
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.1600	.2449	1.1843	1.2104	11.9196	77.5987	12.1292	.0150	7.0531
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.2100	.2153	1.2421	1.2616	10.0913	78.5540	11.3158	.0149	6.9760
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.2600	.1687	1.3007	1.3123	7.6249	80.5516	10.5024	.0148	6.8984
5.0	2.8031	1.5799	1.52	.7559	1.3229	1.3100	.0798	1.3601	1.3626	3.4840	85.2685	9.6890	.0146	6.8202

5.0	2.8031	1.5799	1.56	.8525	1.1730	.8600	.0468	.8491	.8504	3.1182	88.0616	16.6414	.0138	7.9432
5.0	2.8031	1.5799	1.56	.8525	1.1730	.9100	.1187	.9029	.9106	7.4308	84.9168	15.8066	.0139	7.8655
5.0	2.8031	1.5799	1.56	.8525	1.1730	.9600	.1457	.9573	.9682	8.6326	83.5254	14.9718	.0139	7.7875
5.0	2.8031	1.5799	1.56	.8525	1.1730	1.0100	.1540	1.0122	1.0239	8.6679	82.8891	14.1370	.0140	7.7094
5.0	2.8031	1.5799	1.56	.8525	1.1730	1.0600	.1468	1.0678	1.0780	7.8833	82.9350	13.3022	.0140	7.6309
5.0	2.8031	1.5799	1.56	.8525	1.1730	1.1100	.1217	1.1240	1.1307	6.2585	83.8743	12.4674	.0140	7.5521
5.0	2.8031	1.5799	1.56	.8525	1.1730	1.1600	.0603	1.1808	1.1824	2.9739	86.8188	11.6326	.0139	7.4729

PROPERTIES ACROSS AN OBLIQUE DETONATION WAVE

GAMMA = 1.2

M1	M1*	DELMAX	DEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
8.0	3.0844	1.7043	1.00	.3242	3.0844	.3300	.1253	.3164	.3385	20.7867	87.3961	69.5832	.0005	7.3162
8.0	3.0844	1.7043	1.00	.3242	3.0844	.3800	.3853	.3672	.5230	45.3978	81.8913	68.3382	.0005	7.2030
8.0	3.0844	1.7043	1.00	.3242	3.0844	.4300	.5256	.4189	.6615	50.7124	78.8000	67.0932	.0005	7.0898
8.0	3.0844	1.7043	1.00	.3242	3.0844	.4800	.6317	.4713	.7791	52.7696	76.3666	65.8482	.0006	6.9766
8.0	3.0844	1.7043	1.00	.3242	3.0844	.5300	.7189	.5247	.8842	53.6005	74.2818	64.6033	.0006	6.8634
8.0	3.0844	1.7043	1.00	.3242	3.0844	.5800	.7935	.5790	.9812	53.8342	72.4204	63.3583	.0007	6.7502
8.0	3.0844	1.7043	1.00	.3242	3.0844	.6300	.8587	.6343	1.0722	53.7337	70.7171	62.1133	.0007	6.6370
8.0	3.0844	1.7043	1.00	.3242	3.0844	.6800	.9166	.6905	1.1590	53.4292	69.1324	60.8683	.0008	6.5237
8.0	3.0844	1.7043	1.00	.3242	3.0844	.7300	.9685	.7478	1.2424	52.9922	67.6405	59.6234	.0009	6.4105
8.0	3.0844	1.7043	1.00	.3242	3.0844	.7800	1.0152	.8062	1.3233	52.4654	66.2233	58.3784	.0009	6.2973
8.0	3.0844	1.7043	1.00	.3242	3.0844	.8300	1.0576	.8657	1.4022	51.8752	64.8675	57.1334	.0010	6.1841
8.0	3.0844	1.7043	1.00	.3242	3.0844	.8800	1.0960	.9264	1.4796	51.2393	63.5632	55.8884	.0011	6.0709
8.0	3.0844	1.7043	1.00	.3242	3.0844	.9300	1.1310	.9882	1.5559	50.5695	62.3024	54.6435	.0012	5.9577
8.0	3.0844	1.7043	1.00	.3242	3.0844	.9800	1.1627	1.0514	1.6314	49.8739	61.0788	53.3985	.0013	5.8445
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.0300	1.1915	1.1159	1.7064	49.1582	59.8872	52.1535	.0015	5.7312
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.0800	1.2176	1.1818	1.7810	48.4268	58.7233	50.9085	.0016	5.6180
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.1300	1.2411	1.2492	1.8555	47.6824	57.5835	49.6636	.0018	5.5048
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.1800	1.2622	1.3181	1.9301	46.9274	56.4647	48.4186	.0020	5.3916
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.2300	1.2810	1.3886	2.0049	46.1632	55.3640	47.1736	.0022	5.2783
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.2800	1.2976	1.4608	2.0801	45.3910	54.2791	45.9286	.0024	5.1651
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.3300	1.3121	1.5348	2.1559	44.6115	53.2079	44.6837	.0027	5.0519
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.3800	1.3245	1.6106	2.2325	43.8251	52.1483	43.4387	.0030	4.9386
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.4300	1.3350	1.6885	2.3099	43.0321	51.0986	42.1937	.0033	4.8254
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.4800	1.3435	1.7684	2.3883	42.2327	50.0572	40.9487	.0037	4.7122
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.5300	1.3501	1.8505	2.4680	41.4268	49.0225	39.7038	.0042	4.5989
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.5800	1.3549	1.9349	2.5489	40.6141	47.9931	38.4588	.0047	4.4856
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.6300	1.3578	2.0218	2.6314	39.7944	46.9675	37.2138	.0053	4.3724
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.6800	1.3588	2.1114	2.7156	38.9672	45.9445	35.9688	.0060	4.2591
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.7300	1.3581	2.2037	2.8016	38.1322	44.9226	34.7239	.0068	4.1459
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.7800	1.3554	2.2990	2.8897	37.2887	43.9007	33.4789	.0078	4.0326
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.8300	1.3510	2.3975	2.9801	36.4360	42.8773	32.2339	.0089	3.9193
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.8800	1.3446	2.4994	3.0729	35.5734	41.8512	30.9889	.0102	3.8060
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.9300	1.3364	2.6050	3.1685	34.6999	40.8211	29.7440	.0117	3.6927
8.0	3.0844	1.7043	1.00	.3242	3.0844	1.9800	1.3262	2.7144	3.2671	33.8146	39.7855	28.4990	.0136	3.5794
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.0300	1.3141	2.8281	3.3689	32.9164	38.7429	27.2540	.0157	3.4661
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.0800	1.2999	2.9463	3.4744	32.0039	37.6918	26.0090	.0183	3.3527
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.1300	1.2837	3.0695	3.5838	31.0757	36.6306	24.7640	.0214	3.2394
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.1800	1.2652	3.1980	3.6976	30.1302	35.5574	23.5191	.0252	3.1260
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.2300	1.2445	3.3324	3.8162	29.1654	34.4703	22.2741	.0298	3.0126
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.2800	1.2215	3.4731	3.9401	28.1793	33.3671	21.0291	.0354	2.8992
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.3300	1.1959	3.6208	4.0699	27.1691	32.2452	19.7841	.0423	2.7858
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.3800	1.1676	3.7762	4.2062	26.1321	31.1020	18.5392	.0509	2.6723
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.4300	1.1365	3.9401	4.3498	25.0646	29.9342	17.2942	.0616	2.5587
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.4800	1.1022	4.1135	4.5015	23.9624	28.7380	16.0492	.0751	2.4452
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.5300	1.0646	4.2975	4.6625	22.8204	27.5091	14.8042	.0922	2.3315
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.5800	1.0232	4.4934	4.8339	21.6322	26.2421	13.5593	.1139	2.2178
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.6300	.9776	4.7028	5.0172	20.3897	24.9306	12.3143	.1420	2.1039
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.6800	.9271	4.9276	5.2141	19.0826	23.5662	11.0693	.1783	1.9900
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.7300	.8711	5.1700	5.4268	17.6969	22.1387	9.8243	.2255	1.8758
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.7800	.8084	5.4331	5.6582	16.2136	20.6340	8.5794	.2874	1.7613
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.8300	.7374	5.7206	5.9117	14.6053	19.0332	7.3344	.3683	1.6464
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.8800	.6559	6.0376	6.1922	12.8297	17.3089	6.0894	.4733	1.5307
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.9300	.5598	6.3912	6.5068	10.8168	15.4189	4.8444	.6064	1.4139
8.0	3.0844	1.7043	1.00	.3242	3.0844	2.9800	.4419	6.7933	6.8676	8.4354	13.2916	3.5995	.7648	1.2945
8.0	3.0844	1.7043	1.00	.3242	3.0844	3.0300	.2855	7.2689	7.3011	5.3834	10.7865	2.3545	.9230	1.1689
8.0	3.0844	1.7043	1.00	.3242	3.0844	3.0800	.0333	7.9196	7.9201	.6186	7.5346	1.1095	.9999	1.0175
8.0	3.0844	1.7043	1.08	.3573	2.7988	.3600	.0806	.3454	.3539	12.6213	88.2296	68.1191	.0004	8.5246
8.0	3.0844	1.7043	1.08	.3573	2.7988	.4100	.3519	.3962	.5222	40.6418	82.1663	66.7745	.0005	8.4023
8.0	3.0844	1.7043	1.08	.3573	2.7988	.4600	.4860	.4478	.6514	46.5756	79.0326	65.4299	.0005	8.2800
8.0	3.0844	1.7043	1.08	.3573	2.7988	.5100	.5862	.5002	.7620	48.9743	76.5871	64.0854	.0005	8.1577
8.0	3.0844	1.7043	1.08	.3573	2.7988	.5600	.6678	.5534	.8612	50.0174	74.4999	62.7408	.0006	8.0354
8.0	3.0844	1.7043	1.08	.3573	2.7988	.6100	.7371	.6074	.9528	50.3901	72.6407	61.3962	.0006	7.9131
8.0	3.0844	1.7043	1.08	.3573	2.7988	.6600	.7973	.6624	1.0387	50.3825	70.9421	60.0516	.0007	7.7907
8.0	3.0844	1.7043	1.08	.3573	2.7988	.7100	.8503	.7182	1.1206	50.1395	69.3639	58.7071	.0007	7.6684
8.0	3.0844	1.7043	1.08	.3573	2.7988	.7600	.8975	.7750	1.1992	49.7414	67.8797	57.3625	.0008	7.5461
8.0	3.0844	1.7043	1.08	.3573	2.7988	.8100	.9396	.8328	1.2754	49.2365	66.4712	56.0179	.0008	7.4238
8.0	3.0844	1.7043	1.08	.3573	2.7988	.8600	.9774	.8915	1.3496	48.6550	65.1250	54.6733	.0009	7.3015
8.0	3.0844	1.7043	1.08	.3573	2.7988	.9100	1.0113	.9514	1.4223	48.0171	63.8310	53.3288	.0010	7.1791
8.0	3.0844	1.7043	1.08	.3573	2.7988	.9600	1.0417	1.0123	1.4937	47.3362	62.5813	51.9842	.0011	7.0568
8.0	3.0844	1.7043	1.08	.3573	2.7988	1.0100	1.0689	1.0744	1.5643	46.6220	61.3696	50.6396	.0011	6.9345
8.0	3.0844	1.7043	1.08	.3573	2.7988	1.0600	1.0931	1.1376	1.6342	45.8811	60.1907	49.2950	.0012	6.8121
8.0	3.0844	1.7043	1.08	.3573	2.7988	1.1100	1.1146	1.2022	1.7036	45.1184	59.0404	47.9505	.0013	6.6898
8.0	3.0844	1.7043	1.08	.3573	2.7988	1.1600	1.1335	1.2680	1.7728	44.3374	57.9150	46.6059	.0015	6.5674
8.0	3.0844	1.7043	1.08	.3573	2.7988	1.2100	1.1499	1.3351	1.8418	43.5406	56.8115	45.2613	.0016	6.4450
8.0	3.0844	1.7043	1.08	.3573	2.7988	1.2600	1.1639	1.4037	1.9109	42.7298	55.7272	43.9168	.0017	6.3226
8.0	3.0844													

8.0	3.0844	1.7043	1.16	.3928	2.5456	.4000	.1230	.3845	.4022	17.0932	87.1419	66.2466	.0004	9.7989
8.0	3.0844	1.7043	1.16	.3928	2.5456	.4500	.3432	.4354	.5476	37.3322	81.9076	64.8025	.0005	9.6675
8.0	3.0844	1.7043	1.16	.3928	2.5456	.5000	.4642	.4871	.6647	42.8722	78.8903	63.3583	.0005	9.5361
8.0	3.0844	1.7043	1.16	.3928	2.5456	.5500	.5551	.5396	.7666	45.2643	76.5093	61.9141	.0005	9.4047
8.0	3.0844	1.7043	1.16	.3928	2.5456	.6000	.6291	.5928	.8590	46.3580	74.4687	60.4699	.0006	9.2733
8.0	3.0844	1.7043	1.16	.3928	2.5456	.6500	.6917	.6468	.9445	46.7818	72.6477	59.0258	.0006	9.1418
8.0	3.0844	1.7043	1.16	.3928	2.5456	.7000	.7458	.7016	1.0252	46.8139	70.9827	57.5816	.0006	9.0104
8.0	3.0844	1.7043	1.16	.3928	2.5456	.7500	.7930	.7573	1.1021	46.5975	69.4354	56.1374	.0007	8.8790
8.0	3.0844	1.7043	1.16	.3928	2.5456	.8000	.8346	.8138	1.1761	46.2138	67.9808	54.6933	.0007	8.7475
8.0	3.0844	1.7043	1.16	.3928	2.5456	.8500	.8714	.8712	1.2477	45.7122	66.6012	53.2491	.0008	8.6161
8.0	3.0844	1.7043	1.16	.3928	2.5456	.9000	.9039	.9296	1.3175	45.1245	65.2838	51.8049	.0008	8.4846
8.0	3.0844	1.7043	1.16	.3928	2.5456	.9500	.9326	.9890	1.3859	44.4716	64.0189	50.3607	.0009	8.3531
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.0000	.9579	1.0493	1.4530	43.7681	62.7991	48.9166	.0009	8.2216
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.0500	.9800	1.1107	1.5193	43.0241	61.6183	47.4724	.0010	8.0901
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.1000	.9991	1.1731	1.5848	42.2469	60.4716	46.0282	.0011	7.9586
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.1500	1.0153	1.2367	1.6498	41.4415	59.3552	44.5841	.0012	7.8271
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.2000	1.0290	1.3015	1.7144	40.6118	58.2658	43.1399	.0012	7.6955
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.2500	1.0400	1.3675	1.7789	39.7602	57.2007	41.6957	.0013	7.5640
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.3000	1.0485	1.4347	1.8432	38.8886	56.1577	40.2515	.0014	7.4324
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.3500	1.0547	1.5032	1.9076	37.9982	55.1349	38.8074	.0015	7.3008
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.4000	1.0584	1.5732	1.9721	37.0896	54.1308	37.3632	.0016	7.1691
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.4500	1.0598	1.6445	2.0369	36.1629	53.1443	35.9190	.0018	7.0375
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.5000	1.0588	1.7174	2.1021	35.2181	52.1744	34.4749	.0019	6.9058
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.5500	1.0555	1.7918	2.1678	34.2546	51.2206	33.0307	.0020	6.7741
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.6000	1.0499	1.8678	2.2340	33.2716	50.2827	31.5865	.0022	6.6423
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.6500	1.0418	1.9456	2.3010	32.2678	49.3607	30.1423	.0023	6.5105
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.7000	1.0313	2.0252	2.3687	31.2419	48.4553	28.6982	.0025	6.3787
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.7500	1.0182	2.1066	2.4373	30.1920	47.5674	27.2540	.0027	6.2467
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.8000	1.0025	2.1901	2.5069	29.1157	46.6987	25.8098	.0029	6.1147
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.8500	.9841	2.2756	2.5776	28.0103	45.8518	24.3657	.0032	5.9827
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.9000	.9628	2.3634	2.6495	26.8725	45.0302	22.9215	.0034	5.8505
8.0	3.0844	1.7043	1.16	.3928	2.5456	1.9500	.9384	2.4535	2.7228	25.6981	44.2391	21.4773	.0036	5.7182
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.0000	.9107	2.5460	2.7976	24.4822	43.4857	20.0331	.0039	5.5858
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.0500	.8794	2.6412	2.8740	23.2185	42.7805	18.5890	.0042	5.4532
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.1000	.8442	2.7392	2.9523	21.8992	42.1386	17.1448	.0045	5.3203
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.1500	.8045	2.8402	3.0325	20.5143	41.5824	15.7006	.0048	5.1872
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.2000	.7597	2.9444	3.1150	19.0503	41.1463	14.2565	.0051	5.0537
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.2500	.7090	3.0520	3.1999	17.4891	40.8852	12.8123	.0054	4.9198
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.3000	.6510	3.1634	3.2877	15.8048	40.8921	11.3681	.0056	4.7851
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.3500	.5841	3.2790	3.3788	13.9581	41.3360	9.9239	.0058	4.6495
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.4000	.5051	3.3992	3.4737	11.8842	42.5606	8.4798	.0060	4.5124
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.4500	.4082	3.5249	3.5735	9.4587	45.3915	7.0356	.0060	4.3730
8.0	3.0844	1.7043	1.16	.3928	2.5456	2.5000	.2787	3.6574	3.6801	6.3616	52.5422	5.5914	.0058	4.2295

8.0	3.0844	1.7043	1.24	.4315	2.3174	.4400	.1250	.4236	.4403	15.8652	86.9278	64.2148	.0004	11.1618
8.0	3.0844	1.7043	1.24	.4315	2.3174	.4900	.3240	.4747	.5691	33.4759	81.9110	62.6711	.0005	11.0213
8.0	3.0844	1.7043	1.24	.4315	2.3174	.5400	.4352	.5265	.6762	38.8633	78.9577	61.1273	.0005	10.8807
8.0	3.0844	1.7043	1.24	.4315	2.3174	.5900	.5184	.5790	.7708	41.3038	76.6230	59.5835	.0005	10.7402
8.0	3.0844	1.7043	1.24	.4315	2.3174	.6400	.5858	.6322	.8571	42.4666	74.6225	58.0398	.0005	10.5996
8.0	3.0844	1.7043	1.24	.4315	2.3174	.6900	.6423	.6862	.9375	42.9485	72.8391	56.4960	.0006	10.4591
8.0	3.0844	1.7043	1.24	.4315	2.3174	.7400	.6906	.7409	1.0134	43.0223	71.2108	54.9522	.0006	10.3185
8.0	3.0844	1.7043	1.24	.4315	2.3174	.7900	.7324	.7964	1.0860	42.8317	69.7005	53.4084	.0006	10.1779
8.0	3.0844	1.7043	1.24	.4315	2.3174	.8400	.7686	.8527	1.1558	42.4595	68.2837	51.8647	.0007	10.0373
8.0	3.0844	1.7043	1.24	.4315	2.3174	.8900	.8002	.9099	1.2235	41.9570	66.9434	50.3209	.0007	9.8966
8.0	3.0844	1.7043	1.24	.4315	2.3174	.9400	.8275	.9679	1.2895	41.3572	65.6674	48.7771	.0007	9.7560
8.0	3.0844	1.7043	1.24	.4315	2.3174	.9900	.8510	1.0268	1.3540	40.6823	64.4464	47.2334	.0008	9.6153
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.0400	.8710	1.0867	1.4174	39.9475	63.2734	45.6896	.0008	9.4746
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.0900	.8878	1.1475	1.4799	39.1637	62.1430	44.1458	.0009	9.3339
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.1400	.9016	1.2092	1.5417	38.3384	61.0510	42.6021	.0009	9.1932
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.1900	.9124	1.2721	1.6029	37.4770	59.9941	41.0583	.0010	9.0524
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.2400	.9203	1.3359	1.6637	36.5831	58.9698	39.5145	.0010	8.9116
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.2900	.9256	1.4009	1.7242	35.6593	57.9766	37.9707	.0011	8.7708
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.3400	.9281	1.4670	1.7846	34.7070	57.0132	36.4270	.0012	8.6299
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.3900	.9280	1.5344	1.8449	33.7271	56.0792	34.8832	.0012	8.4890
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.4400	.9252	1.6029	1.9052	32.7195	55.1747	33.3394	.0013	8.3480
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.4900	.9197	1.6728	1.9657	31.6837	54.3007	31.7957	.0014	8.2069
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.5400	.9114	1.7440	2.0265	30.6185	53.4589	30.2519	.0015	8.0658
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.5900	.9004	1.8166	2.0876	29.5221	52.6519	28.7081	.0015	7.9246
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.6400	.8865	1.8906	2.1491	28.3921	51.8837	27.1644	.0016	7.7833
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.6900	.8695	1.9662	2.2112	27.2254	51.1598	25.6206	.0017	7.6419
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.7400	.8493	2.0434	2.2738	26.0178	50.4880	24.0768	.0018	7.5004
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.7900	.8257	2.1222	2.3372	24.7643	49.8790	22.5331	.0019	7.3587
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.8400	.7985	2.2029	2.4013	23.4583	49.3479	20.9893	.0020	7.2168
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.8900	.7671	2.2853	2.4664	22.0915	48.9162	19.4455	.0020	7.0746
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.9400	.7312	2.3698	2.5325	20.6529	48.6151	17.9017	.0021	6.9321
8.0	3.0844	1.7043	1.24	.4315	2.3174	1.9900	.6902	2.4563	2.5998	19.1275	48.4918	16.3580	.0022	6.7893
8.0	3.0844	1.7043	1.24	.4315	2.3174	2.0400	.6430	2.5450	2.6685	17.4949	48.6202	14.8142	.0023	6.6459
8.0	3.0844	1.7043	1.24	.4315	2.3174	2.0900	.5884	2.						

8.0	3.0844	1.7043	1.40	.5231	1.9116	.5300	.0966	.5121	.5206	10.3277	87.3374	59.3246	.0004	14.1213
8.0	3.0844	1.7043	1.40	.5231	1.9116	.5800	.2726	.5636	.6228	25.1728	82.3401	57.5816	.0004	13.9625
8.0	3.0844	1.7043	1.40	.5231	1.9116	.6300	.3665	.6157	.7123	30.1868	79.4973	55.8386	.0005	13.8036
8.0	3.0844	1.7043	1.40	.5231	1.9116	.6800	.4351	.6685	.7936	32.6139	77.2749	54.0957	.0005	13.6447
8.0	3.0844	1.7043	1.40	.5231	1.9116	.7300	.4892	.7218	.8689	33.8300	75.3892	52.3527	.0005	13.4857
8.0	3.0844	1.7043	1.40	.5231	1.9116	.7800	.5333	.7759	.9399	34.3621	73.7253	50.6097	.0005	13.3268
8.0	3.0844	1.7043	1.40	.5231	1.9116	.8300	.5697	.8306	1.0074	34.4637	72.2233	48.8668	.0005	13.1678
8.0	3.0844	1.7043	1.40	.5231	1.9116	.8800	.5997	.8860	1.0721	34.2739	70.8481	47.1238	.0006	13.0087
8.0	3.0844	1.7043	1.40	.5231	1.9116	.9300	.6243	.9421	1.1347	33.8751	69.5774	45.3808	.0006	12.8496
8.0	3.0844	1.7043	1.40	.5231	1.9116	.9800	.6442	.9989	1.1954	33.3193	68.3964	43.6379	.0006	12.6905
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.0300	.6597	1.0565	1.2547	32.6404	67.2954	41.8949	.0006	12.5313
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.0800	.6712	1.1149	1.3127	31.8612	66.2682	40.1519	.0006	12.3720
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.1300	.6789	1.1741	1.3698	30.9970	65.3114	38.4090	.0007	12.2126
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.1800	.6829	1.2342	1.4259	30.0581	64.4241	36.6660	.0007	12.0532
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.2300	.6832	1.2951	1.4815	29.0508	63.6074	34.9230	.0007	11.8937
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.2800	.6800	1.3569	1.5364	27.9787	62.8650	33.1801	.0007	11.7340
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.3300	.6731	1.4196	1.5910	26.8430	62.2033	31.4371	.0007	11.5743
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.3800	.6624	1.4832	1.6452	25.6425	61.6318	29.6942	.0008	11.4143
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.4300	.6479	1.5478	1.6993	24.3739	61.1648	27.9512	.0008	11.2542
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.4800	.6292	1.6135	1.7532	23.0311	60.8222	26.2082	.0008	11.0939
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.5300	.6059	1.6802	1.8072	21.6053	60.6327	24.4653	.0008	10.9333
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.5800	.5777	1.7480	1.8612	20.0831	60.6381	22.7223	.0008	10.7724
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.6300	.5437	1.8170	1.9154	18.4451	60.9010	20.9793	.0008	10.6110
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.6800	.5028	1.8872	1.9699	16.6618	61.5194	19.2364	.0008	10.4492
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.7300	.4534	1.9586	2.0248	14.6859	62.6560	17.4934	.0008	10.2867
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.7800	.3924	2.0315	2.0802	12.4334	64.6081	15.7504	.0008	10.1232
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.8300	.3137	2.1057	2.1364	9.7263	68.0110	14.0075	.0008	9.9586
8.0	3.0844	1.7043	1.40	.5231	1.9116	1.8800	.1977	2.1816	2.1936	6.0036	74.7816	12.2645	.0008	9.7922

8.0	3.0844	1.7043	1.48	.5805	1.7226	.5900	.1026	.5719	.5805	9.8662	86.9806	56.0578	.0004	15.6805
8.0	3.0844	1.7043	1.48	.5805	1.7226	.6400	.2512	.6238	.6701	21.4298	82.4504	54.2152	.0004	15.5124
8.0	3.0844	1.7043	1.48	.5805	1.7226	.6900	.3327	.6762	.7507	25.7431	79.7795	52.3726	.0004	15.3443
8.0	3.0844	1.7043	1.48	.5805	1.7226	.7400	.3916	.7292	.8250	27.8856	77.6964	50.5301	.0005	15.1761
8.0	3.0844	1.7043	1.48	.5805	1.7226	.7900	.4370	.7828	.8946	28.9513	75.9426	48.6875	.0005	15.0079
8.0	3.0844	1.7043	1.48	.5805	1.7226	.8400	.4730	.8370	.9606	29.3817	74.4123	46.8449	.0005	14.8396
8.0	3.0844	1.7043	1.48	.5805	1.7226	.8900	.5014	.8919	1.0238	29.3975	73.0510	45.0024	.0005	14.6713
8.0	3.0844	1.7043	1.48	.5805	1.7226	.9400	.5237	.9475	1.0846	29.1221	71.8278	43.1598	.0005	14.5028
8.0	3.0844	1.7043	1.48	.5805	1.7226	.9900	.5404	1.0038	1.1436	28.6303	70.7242	41.3172	.0005	14.3343
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.0400	.5523	1.0607	1.2010	27.9692	69.7300	39.4747	.0005	14.1658
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.0900	.5594	1.1184	1.2571	27.1691	68.8406	37.6321	.0006	13.9971
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.1400	.5622	1.1768	1.3121	26.2496	68.0560	35.7896	.0006	13.8282
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.1900	.5605	1.2360	1.3662	25.2224	67.3812	33.9470	.0006	13.6593
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.2400	.5545	1.2960	1.4196	24.0934	66.8256	32.1044	.0006	13.4902
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.2900	.5440	1.3568	1.4725	22.8638	66.4050	30.2619	.0006	13.3208
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.3400	.5286	1.4184	1.5248	21.5295	66.1431	28.4193	.0006	13.1513
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.3900	.5082	1.4809	1.5768	20.0812	66.0751	26.5767	.0006	12.9814
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.4400	.4819	1.5444	1.6285	18.5024	66.2538	24.7342	.0006	12.8112
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.4900	.4489	1.6087	1.6802	16.7658	66.7608	22.8916	.0006	12.6406
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.5400	.4076	1.6741	1.7317	14.8257	67.7298	21.0490	.0006	12.4695
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.5900	.3554	1.7405	1.7834	12.5987	69.3984	19.2065	.0006	12.2976
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.6400	.2864	1.8080	1.8353	9.9068	72.2605	17.3639	.0006	12.1248
8.0	3.0844	1.7043	1.48	.5805	1.7226	1.6900	.1834	1.8766	1.8876	6.1938	77.7590	15.5214	.0006	11.9508

8.0	3.0844	1.7043	1.56	.6525	1.5325	.6600	.0798	.6423	.6470	6.8945	87.4747	52.1635	.0004	17.2851
8.0	3.0844	1.7043	1.56	.6525	1.5325	.7100	.2150	.6946	.7257	16.8481	83.0330	50.2213	.0004	17.1077
8.0	3.0844	1.7043	1.56	.6525	1.5325	.7600	.2848	.7474	.7981	20.5454	80.5402	48.2791	.0004	16.9302
8.0	3.0844	1.7043	1.56	.6525	1.5325	.8100	.3333	.8007	.8659	22.3657	78.6439	46.3370	.0004	16.7526
8.0	3.0844	1.7043	1.56	.6525	1.5325	.8600	.3689	.8547	.9300	23.2169	77.0908	44.3948	.0004	16.5750
8.0	3.0844	1.7043	1.56	.6525	1.5325	.9100	.3952	.9093	.9913	23.4722	75.7813	42.4527	.0005	16.3973
8.0	3.0844	1.7043	1.56	.6525	1.5325	.9600	.4139	.9645	1.0503	23.3209	74.6680	40.5105	.0005	16.2194
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.0100	.4260	1.0203	1.1074	22.8698	73.7280	38.5683	.0005	16.0415
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.0600	.4322	1.0768	1.1629	22.1820	72.9531	36.6262	.0005	15.8633
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.1100	.4327	1.1340	1.2171	21.2951	72.3463	34.6840	.0005	15.6850
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.1600	.4275	1.1919	1.2703	20.2291	71.9215	32.7419	.0005	15.5065
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.2100	.4164	1.2505	1.3225	18.9911	71.7047	30.7997	.0005	15.3278
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.2600	.3991	1.3099	1.3740	17.5749	71.7391	28.8575	.0005	15.1488
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.3100	.3746	1.3700	1.4249	15.9595	72.0943	26.9154	.0005	14.9694
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.3600	.3416	1.4309	1.4753	14.1002	72.8865	24.9732	.0005	14.7895
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.4100	.2973	1.4926	1.5254	11.9062	74.3260	23.0310	.0005	14.6091
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.4600	.2356	1.5552	1.5753	9.1659	76.8645	21.0889	.0005	14.4280
8.0	3.0844	1.7043	1.56	.6525	1.5325	1.5100	.1348	1.6187	1.6252	5.1010	82.0035	19.1467	.0005	14.2460

8.0	3.0844	1.7043	1.64	.7564	1.3220	.7600	.0442	.7445	.7458	3.3284	88.4642	46.7653	.0004	18.8544
8.0	3.0844	1.7043	1.64	.7564	1.3220	.8100	.1636	.7975	.8135	11.4164	84.1577	44.7235	.0004	18.6675
8.0	3.0844	1.7043	1.64	.7564	1.3220	.8600	.2159	.8510	.8774	14.0940	82.0620	42.6817	.0004	18.4805
8.0	3.0844	1.7043	1.64	.7564	1.3220	.9100	.2481	.9050	.9381	15.2521	80.5980	40.6400	.0004	18.2933
8.0	3.0844	1.7043	1.64	.7564	1.3220	.9600	.2676	.9597	.9963	15.5755	79.5334	38.5982	.0004	18.1060
8.0	3.0844	1.7043	1.64	.7564	1.3220	1.0100	.2770	1.0149	1.0524	15.3388	78.7950	36.5565	.0004	17.9184
8.0	3.0844	1.7043	1.64	.7564	1.3220	1.0600	.2775	1.0708	1.1069	14.6716	78.3709	34.5147	.0004	17.7307
8.0	3.0844	1.7043	1.64	.7564	1.3220	1.1100	.2691	1.1273	1.1600	13.6294	78.2902			

PROPERTIES ACROSS AN OBLIQUE DETONATION WAVE

GAMMA = 1.2

M1	M1*	DELMAX	DEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
11.0	3.1875	1.7506	1.00	.3137	3.1875	.3200	.1336	.3068	.3325	22.6610	87.3324	131.6232	.0000	12.9568
11.0	3.1875	1.7506	1.00	.3137	3.1875	.3700	.3965	.3576	.5241	46.9812	81.9893	129.3455	.0000	12.7497
11.0	3.1875	1.7506	1.00	.3137	3.1875	.4200	.5400	.4093	.6666	52.1250	78.9592	127.0679	.0000	12.5427
11.0	3.1875	1.7506	1.00	.3137	3.1875	.4700	.6488	.4618	.7872	54.0810	76.5717	124.7903	.0000	12.3356
11.0	3.1875	1.7506	1.00	.3137	3.1875	.5200	.7385	.5153	.8950	54.8488	74.5258	122.5126	.0000	12.1285
11.0	3.1875	1.7506	1.00	.3137	3.1875	.5700	.8153	.5697	.9943	55.0418	72.6992	120.2350	.0000	11.9214
11.0	3.1875	1.7506	1.00	.3137	3.1875	.6200	.8827	.6251	1.0876	54.9153	71.0279	117.9574	.0000	11.7144
11.0	3.1875	1.7506	1.00	.3137	3.1875	.6700	.9426	.6816	1.1765	54.5946	69.4735	115.6798	.0000	11.5073
11.0	3.1875	1.7506	1.00	.3137	3.1875	.7200	.9964	.7391	1.2620	54.1488	68.0104	113.4021	.0001	11.3002
11.0	3.1875	1.7506	1.00	.3137	3.1875	.7700	1.0451	.7978	1.3450	53.6184	66.6210	111.1245	.0001	11.0932
11.0	3.1875	1.7506	1.00	.3137	3.1875	.8200	1.0893	.8577	1.4261	53.0289	65.2924	108.8469	.0001	10.8861
11.0	3.1875	1.7506	1.00	.3137	3.1875	.8700	1.1296	.9187	1.5057	52.3972	64.0146	106.5692	.0001	10.6790
11.0	3.1875	1.7506	1.00	.3137	3.1875	.9200	1.1664	.9811	1.5842	51.7342	62.7800	104.2916	.0001	10.4719
11.0	3.1875	1.7506	1.00	.3137	3.1875	.9700	1.1999	1.0448	1.6619	51.0479	61.5822	102.0140	.0001	10.2648
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.0200	1.2305	1.1099	1.7392	50.3437	60.4164	99.7363	.0001	10.0578
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.0700	1.2584	1.1765	1.8162	49.6256	59.2783	97.4587	.0001	9.8507
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.1200	1.2837	1.2446	1.8932	48.8962	58.1642	95.1811	.0001	9.6436
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.1700	1.3066	1.3144	1.9703	48.1578	57.0712	92.9034	.0001	9.4365
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.2200	1.3273	1.3858	2.0479	47.4117	55.9966	90.6258	.0001	9.2295
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.2700	1.3458	1.4591	2.1259	46.6590	54.9380	88.3482	.0002	9.0224
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.3200	1.3621	1.5342	2.2047	45.9003	53.8934	86.0706	.0002	8.8153
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.3700	1.3765	1.6114	2.2843	45.1363	52.8609	83.7929	.0002	8.6082
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.4200	1.3890	1.6907	2.3650	44.3671	51.8388	81.5153	.0002	8.4011
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.4700	1.3995	1.7722	2.4469	43.5928	50.8255	79.2377	.0003	8.1940
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.5200	1.4082	1.8561	2.5302	42.8134	49.8195	76.9600	.0003	7.9869
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.5700	1.4151	1.9425	2.6150	42.0288	48.8195	74.6824	.0003	7.7798
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.6200	1.4201	2.0316	2.7016	41.2388	47.8241	72.4048	.0004	7.5727
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.6700	1.4234	2.1235	2.7902	40.4431	46.8322	70.1271	.0004	7.3656
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.7200	1.4250	2.2185	2.8809	39.6412	45.8424	67.8495	.0005	7.1585
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.7700	1.4248	2.3167	2.9741	38.8328	44.8536	65.5719	.0006	6.9514
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.8200	1.4228	2.4185	3.0698	38.0172	43.8647	63.2943	.0007	6.7443
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.8700	1.4191	2.5240	3.1685	37.1939	42.8744	61.0166	.0008	6.5372
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.9200	1.4136	2.6335	3.2703	36.3622	41.8816	58.7390	.0009	6.3301
11.0	3.1875	1.7506	1.00	.3137	3.1875	1.9700	1.4063	2.7474	3.3756	35.5213	40.8850	56.4614	.0011	6.1230
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.0200	1.3972	2.8660	3.4848	34.6703	39.8834	54.1837	.0013	5.9159
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.0700	1.3862	2.9898	3.5982	33.8084	38.8753	51.9061	.0015	5.7087
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.1200	1.3733	3.1191	3.7163	32.9344	37.8596	49.6285	.0018	5.5016
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.1700	1.3584	3.2545	3.8396	32.0471	36.8345	47.3508	.0021	5.2945
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.2200	1.3416	3.3966	3.9687	31.1451	35.7986	45.0732	.0026	5.0873
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.2700	1.3226	3.5461	4.1041	30.2269	34.7501	42.7956	.0032	4.8801
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.3200	1.3014	3.7037	4.2466	29.2909	33.6870	40.5180	.0039	4.6730
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.3700	1.2780	3.8703	4.3971	28.3348	32.6072	38.2403	.0048	4.4658
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.4200	1.2521	4.0469	4.5565	27.3565	31.5083	35.9627	.0060	4.2586
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.4700	1.2236	4.2348	4.7260	26.3532	30.3874	33.6851	.0076	4.0513
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.5200	1.1924	4.4355	4.9070	25.3217	29.2415	31.4074	.0097	3.8441
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.5700	1.1581	4.6506	5.1010	24.2581	28.0667	29.1298	.0126	3.6368
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.6200	1.1207	4.8823	5.3102	23.1579	26.8586	26.8522	.0165	3.4295
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.6700	1.0796	5.1331	5.5368	22.0153	25.6119	24.5745	.0220	3.2221
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.7200	1.0345	5.4061	5.7839	20.8232	24.3199	22.2969	.0297	3.0147
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.7700	.9848	5.7054	6.0552	19.5723	22.9744	20.0193	.0409	2.8072
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.8200	.9299	6.0359	6.3556	18.2506	21.5648	17.7416	.0575	2.5996
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.8700	.8688	6.4042	6.6911	16.8414	20.0768	15.4640	.0826	2.3918
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.9200	.8000	6.8191	7.0703	15.3210	18.4908	13.1864	.1216	2.1837
11.0	3.1875	1.7506	1.00	.3137	3.1875	2.9700	.7215	7.2926	7.5047	13.6535	16.7784	10.9088	.1837	1.9752
11.0	3.1875	1.7506	1.00	.3137	3.1875	3.0200	.6298	7.8423	8.0111	11.7800	14.8952	8.6311	.2845	1.7660
11.0	3.1875	1.7506	1.00	.3137	3.1875	3.0700	.5187	8.4950	8.6155	9.5907	12.7652	6.3535	.4488	1.5553
11.0	3.1875	1.7506	1.00	.3137	3.1875	3.1200	.3740	9.2991	9.3656	6.8356	10.2341	4.0759	.7020	1.3406
11.0	3.1875	1.7506	1.00	.3137	3.1875	3.1700	.1454	10.3951	10.4060	2.6266	6.8708	1.7982	.9746	1.1075

11.0	3.1875	1.7506	1.08	.3452	2.8967	.3500	.1098	.3358	.3519	17.4204	87.6856	128.9811	.0000	15.0929
11.0	3.1875	1.7506	1.08	.3452	2.8967	.4000	.3682	.3866	.5255	42.6305	82.1399	126.5213	.0000	14.8623
11.0	3.1875	1.7506	1.08	.3452	2.8967	.4500	.5041	.4383	.6581	48.2444	79.0981	124.0614	.0000	14.6456
11.0	3.1875	1.7506	1.08	.3452	2.8967	.5000	.6063	.4907	.7713	50.4894	76.7115	121.6016	.0000	14.4219
11.0	3.1875	1.7506	1.08	.3452	2.8967	.5500	.6900	.5440	.8728	51.4430	74.6703	119.1418	.0000	14.1982
11.0	3.1875	1.7506	1.08	.3452	2.8967	.6000	.7614	.5982	.9665	51.7597	72.8501	116.6819	.0000	13.9746
11.0	3.1875	1.7506	1.08	.3452	2.8967	.6500	.8235	.6533	1.0545	51.7164	71.1863	114.2221	.0000	13.7509
11.0	3.1875	1.7506	1.08	.3452	2.8967	.7000	.8785	.7093	1.1383	51.4511	69.6399	111.7622	.0000	13.5272
11.0	3.1875	1.7506	1.08	.3452	2.8967	.7500	.9275	.7664	1.2188	51.0401	68.1854	109.3024	.0000	13.3035
11.0	3.1875	1.7506	1.08	.3452	2.8967	.8000	.9715	.8244	1.2969	50.5293	66.8050	106.8425	.0001	13.0798
11.0	3.1875	1.7506	1.08	.3452	2.8967	.8500	1.0111	.8835	1.3730	49.9473	65.4858	104.3827	.0001	12.8561
11.0	3.1875	1.7506	1.08	.3452	2.8967	.9000	1.0468	.9438	1.4477	49.3132	64.2178	101.9229	.0001	12.6325
11.0	3.1875	1.7506	1.08	.3452	2.8967	.9500	1.0791	1.0051	1.5211	48.6398	62.9934	99.4630	.0001	12.4088
11.0	3.1875	1.7506	1.08	.3452	2.8967	1.0000	1.1081	1.0677	1.5937	47.9361	61.8064	97.0032	.0001	12.1851
11.0	3.1875	1.7506	1.08	.3452	2.8967	1.0500	1.1342	1.1315	1.6656	47.2085	60.6517	94.5433	.0001	11.9614
11.0	3.1875	1.7506	1.08	.3452	2.8967	1.1000	1.1576	1.1966	1.7372	46.4615	59.5253	92.0835	.0001	11.7376

11.0	3.1875	1.7506	1.16	.3789	2.6394	.3800	.0504	.3648	7.5519	88.8812	126.1204	.0000	17.3919
11.0	3.1875	1.7506	1.16	.3789	2.6394	.4300	.3346	.4156	.5267	37.8906	82.4642	.0000	17.1516
11.0	3.1875	1.7506	1.16	.3789	2.6394	.4800	.4652	.4673	.6507	44.1036	79.3737	.0000	16.9113
11.0	3.1875	1.7506	1.16	.3789	2.6394	.5300	.5620	.5196	.7574	46.6796	76.9750	.0000	16.6710
11.0	3.1875	1.7506	1.16	.3789	2.6394	.5800	.6406	.5728	.8534	47.8405	74.9335	.0000	16.4308
11.0	3.1875	1.7506	1.16	.3789	2.6394	.6300	.7069	.6268	.9421	48.2938	73.1186	.0000	16.1905
11.0	3.1875	1.7506	1.16	.3789	2.6394	.6800	.7643	.6816	1.0254	48.3421	71.4634	.0000	15.9502
11.0	3.1875	1.7506	1.16	.3789	2.6394	.7300	.8147	.7373	1.1048	48.1374	69.9279	.0000	15.7099
11.0	3.1875	1.7506	1.16	.3789	2.6394	.7800	.8592	.7939	1.1811	47.7646	68.4862	.0000	15.4695
11.0	3.1875	1.7506	1.16	.3789	2.6394	.8300	.8987	.8514	1.2549	47.2749	67.1202	.0000	15.2292
11.0	3.1875	1.7506	1.16	.3789	2.6394	.8800	.9339	.9099	1.3268	46.7006	65.8168	.0001	14.9889
11.0	3.1875	1.7506	1.16	.3789	2.6394	.9300	.9652	.9694	1.3971	46.0632	64.5661	.0001	14.7486
11.0	3.1875	1.7506	1.16	.3789	2.6394	.9800	.9930	1.0300	1.4663	45.3773	63.3604	.0001	14.5082
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.0300	1.0176	1.0916	1.5345	44.6532	62.1937	.0001	14.2679
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.0800	1.0392	1.1543	1.6020	43.8981	61.0609	.0001	14.0275
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.1300	1.0581	1.2183	1.6689	43.1172	59.9581	.0001	13.7871
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.1800	1.0743	1.2834	1.7356	42.3142	58.8820	.0001	13.5468
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.2300	1.0879	1.3498	1.8020	41.4919	57.8296	.0001	13.3064
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.2800	1.0991	1.4175	1.8684	40.6522	56.7987	.0001	13.0660
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.3300	1.1080	1.4867	1.9349	39.7962	55.7973	.0001	12.8255
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.3800	1.1145	1.5572	2.0016	38.9249	54.7936	.0001	12.5851
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.4300	1.1188	1.6293	2.0687	38.0385	53.8163	.0001	12.3446
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.4800	1.1208	1.7029	2.1361	37.1372	52.8543	.0001	12.1041
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.5300	1.1206	1.7782	2.2042	36.2207	51.9066	.0001	11.8636
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.5800	1.1182	1.8552	2.2728	35.2886	50.9725	.0002	11.6231
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.6300	1.1136	1.9340	2.3423	34.3400	50.0517	.0002	11.3825
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.6800	1.1067	2.0148	2.4126	33.3739	49.1439	.0002	11.1419
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.7300	1.0974	2.0975	2.4839	32.3892	48.2494	.0002	10.9013
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.7800	1.0858	2.1824	2.5564	31.3842	47.3685	.0002	10.6606
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.8300	1.0718	2.2694	2.6300	30.3571	46.5022	.0002	10.4199
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.8800	1.0552	2.3589	2.7050	29.3056	45.6520	.0003	10.1791
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.9300	1.0360	2.4508	2.7815	28.2270	44.8201	.0003	9.9383
11.0	3.1875	1.7506	1.16	.3789	2.6394	1.9800	1.0140	2.5453	2.8597	27.1182	44.0094	.0003	9.6973
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.0300	.9890	2.6426	2.9396	25.9753	43.2245	.0003	9.4562
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.0800	.9608	2.7429	3.0214	24.7936	42.4714	.0004	9.2150
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.1300	.9291	2.8464	3.1054	23.5672	41.7592	.0004	8.9737
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.1800	.8936	2.9532	3.1917	22.2889	41.1006	.0004	8.7321
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.2300	.8537	3.0637	3.2805	20.9492	40.5144	.0004	8.4903
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.2800	.8090	3.1780	3.3721	19.5359	40.0295	.0005	8.2482
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.3300	.7585	3.2965	3.4668	18.0324	39.6914	.0005	8.0056
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.3800	.7011	3.4196	3.5649	16.4149	39.5760	.0006	7.7624
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.4300	.6351	3.5477	3.6668	14.6480	39.8192	.0006	7.5184
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.4800	.5577	3.6812	3.7732	12.6742	40.6898	.0006	7.2730
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.5300	.4637	3.8211	3.8847	10.3869	42.6072	.0006	7.0254
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.5800	.3414	3.9683	4.0028	7.5370	48.0320	.0006	6.7738
11.0	3.1875	1.7506	1.16	.3789	2.6394	2.6300	.1345	4.1250	4.1304	2.9284	67.7918	.0006	6.5141

11.0	3.1875	1.7506	1.24	.4152	2.4084	.4200	.0971	.4039	.4145	13.0129	87.7243	.0000	19.8023
11.0	3.1875	1.7506	1.24	.4152	2.4084	.4700	.3244	.4549	.5527	34.6117	82.2789	.0000	19.5454
11.0	3.1875	1.7506	1.24	.4152	2.4084	.5200	.4427	.5067	.6654	40.4118	79.2971	.0000	19.2885
11.0	3.1875	1.7506	1.24	.4152	2.4084	.5700	.5309	.5591	.7640	42.9643	76.9618	.0000	19.0316
11.0	3.1875	1.7506	1.24	.4152	2.4084	.6200	.6022	.6123	.8536	44.1651	74.9686	.0000	18.7746
11.0	3.1875	1.7506	1.24	.4152	2.4084	.6700	.6622	.6663	.9367	44.6625	73.1951	.0000	18.5177
11.0	3.1875	1.7506	1.24	.4152	2.4084	.7200	.7136	.7210	1.0151	44.7454	71.5779	.0000	18.2608
11.0	3.1875	1.7506	1.24	.4152	2.4084	.7700	.7583	.7766	1.0899	44.5632	70.0787	.0000	18.0038
11.0	3.1875	1.7506	1.24	.4152	2.4084	.8200	.7974	.8329	1.1619	44.2012	68.6728	.0000	17.7468
11.0	3.1875	1.7506	1.24	.4152	2.4084	.8700	.8317	.8902	1.2315	43.7115	67.3429	.0000	17.4899
11.0	3.1875	1.7506	1.24	.4152	2.4084	.9200	.8617	.9484	1.2994	43.1275	66.0764	.0000	17.2329
11.0	3.1875	1.7506	1.24	.4152	2.4084	.9700	.8880	1.0074	1.3658	42.4716	64.8640	.0001	16.9758
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.0200	.9107	1.0675	1.4310	41.7591	63.6984	.0001	16.7188
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.0700	.9302	1.1285	1.4953	41.0008	62.5741	.0001	16.4618
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.1200	.9466	1.1906	1.5589	40.2043	61.4866	.0001	16.2047
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.1700	.9602	1.2537	1.6219	39.3752	60.4324	.0001	15.9476
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.2200	.9710	1.3180	1.6845	38.5171	59.4087	.0001	15.6905
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.2700	.9792	1.3834	1.7468	37.6328	58.4133	.0001	15.4334
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.3200	.9848	1.4500	1.8090	36.7241	57.4447	.0001	15.1762
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.3700	.9878	1.5178	1.8712	35.7920	56.5018	.0001	14.9190
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.4200	.9883	1.5869	1.9334	34.8368	55.5840	.0001	14.6618
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.4700	.9863	1.6574	1.9959	33.8586	54.6911	.0001	14.4045
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.5200	.9817	1.7293	2.0586	32.8566	53.8236	.0001	14.1472
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.5700	.9746	1.8027	2.1217	31.8299	52.9825	.0001	13.8898
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.6200	.9648	1.8775	2.1853	30.7769	52.1694	.0001	13.6323
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.6700	.9524	1.9540	2.2495	29.6957	51.3871	.0001	13.3748
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.7200	.9371	2.0322	2.3143	28.5837	50.6392	.0001	13.1172
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.7700	.9190	2.1121	2.3798	27.4376	49.9307	.0001	12.8594
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.8200	.8977	2.1939	2.4463	26.2534	49.2689	.0001	12.6016
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.8700	.8730	2.2776	2.5136	25.0262	48.6635	.0002	12.3436
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.9200	.8448	2.3634	2.5820	23.7497	48.1281	.0002	12.0854
11.0	3.1875	1.7506	1.24	.4152	2.4084	1.9700	.8126	2.4513	2.6516	22.4157	47.6820	.0002	11.8269
11.0	3.1875	1.7506	1.24	.4152	2.4084	2.0200	.7760	2.5414	2.7225	21.0139	47.3534	.0002	11.5682
11.0	3.1875	1.7506	1.24	.4152	2.4084	2.0700	.7342	2.6340	2.7948	19.5301	47.1843	.0002	11.3091
11.0	3.1875	1.7506	1.24	.4152	2.4084	2.1200	.6866	2.7291	2.8687	17.9451	47.2400	.0002	11.0495
11.0	3.1875	1.7506	1.24	.4152	2.4084	2.1700	.6317	2.8270					

11.0	3.	1875	1.7506	1.40	.4997	2.0012	.5000	.0210	.4823	.4827	2.4049	89.4517	114.3132	.0000	25.0914
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.5500	.2688	.5336	.5939	26.0492	82.8528	111.1245	.0000	24.8012
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.6000	.3730	.5855	.6894	31.8666	79.9002	107.9358	.0000	24.5110
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.6500	.4483	.6381	.7751	34.5933	77.6294	104.7471	.0000	24.2207
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.7000	.5078	.6913	.8541	35.9564	75.7131	101.5584	.0000	23.9304
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.7500	.5565	.7453	.9280	36.5757	74.0249	98.3698	.0000	23.6401
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.8000	.5971	.7999	.9981	36.7388	72.5004	95.1811	.0000	23.3498
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.8500	.6313	.8552	1.0652	36.5994	71.1020	91.9924	.0000	23.0594
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.9000	.6598	.9113	1.1299	36.2473	69.8057	88.8037	.0000	22.7690
11.0	3.	1875	1.7506	1.40	.4997	2.0012	.9500	.6836	.9681	1.1927	35.7384	68.5954	85.6150	.0000	22.4786
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.0000	.7030	1.0257	1.2538	35.1089	67.4600	82.4264	.0000	22.1881
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.0500	.7185	1.0841	1.3136	34.3831	66.3920	79.2377	.0000	21.8976
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.1000	.7302	1.1433	1.3723	33.5778	65.3864	76.0490	.0000	21.6070
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.1500	.7384	1.2034	1.4301	32.7043	64.4401	72.8603	.0000	21.3163
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.2000	.7432	1.2644	1.4872	31.7701	63.5520	69.6716	.0000	21.0256
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.2500	.7446	1.3263	1.5437	30.7802	62.7223	66.4829	.0000	20.7348
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.3000	.7426	1.3891	1.5998	29.7374	61.9534	63.2943	.0000	20.4439
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.3500	.7373	1.4529	1.6555	28.6423	61.2493	60.1056	.0001	20.1529
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.4000	.7286	1.5177	1.7109	27.4945	60.6162	56.9169	.0001	19.8618
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.4500	.7164	1.5836	1.7663	26.2913	60.0634	53.7282	.0001	19.5705
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.5000	.7004	1.6505	1.8216	25.0289	59.6038	50.5395	.0001	19.2791
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.5500	.6804	1.7186	1.8769	23.7008	59.2555	47.3508	.0001	18.9874
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.6000	.6562	1.7878	1.9323	22.2985	59.0444	44.1622	.0001	18.6955
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.6500	.6271	1.8582	1.9879	20.8094	59.0073	40.9735	.0001	18.4033
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.7000	.5925	1.9300	2.0438	19.2161	59.1989	37.7848	.0001	18.1107
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.7500	.5515	2.0030	2.1001	17.4927	59.7033	34.5961	.0001	17.8176
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.8000	.5025	2.0774	2.1569	15.5990	60.6574	31.4074	.0001	17.5238
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.8500	.4430	2.1533	2.2142	13.4675	62.3026	28.2187	.0001	17.2291
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.9000	.3682	2.2308	2.2722	10.9661	65.1228	25.0301	.0001	16.9332
11.0	3.	1875	1.7506	1.40	.4997	2.0012	1.9500	.2656	2.3098	2.3312	7.7563	70.3527	21.8414	.0001	16.6356
11.0	3.	1875	1.7506	1.40	.4997	2.0012	2.0000	.0410	2.3907	2.3912	1.1731	86.6527	18.6527	.0001	16.3354

11.0	3.	1875	1.7506	1.48	.5511	1.8146	.5600	.1053	.5420	.5515	10.6471	87.0746	108.4460	.0000	27.8473
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.6100	.2650	.5937	.6473	23.4844	82.4888	105.0751	.0000	27.5404
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.6600	.3527	.6459	.7324	28.1219	79.7987	101.7042	.0000	27.2334
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.7100	.4167	.6988	.8103	30.4064	77.6947	98.3333	.0000	26.9264
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.7600	.4667	.7523	.8829	31.5532	75.9154	94.9624	.0000	26.6194
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.8100	.5070	.8065	.9515	32.0425	74.3536	91.5915	.0000	26.3123
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.8600	.5397	.8613	1.0169	32.1102	72.9535	88.2206	.0000	26.0052
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.9100	.5661	.9168	1.0798	31.8874	71.6826	84.8497	.0000	25.6980
11.0	3.	1875	1.7506	1.48	.5511	1.8146	.9600	.5872	.9730	1.1406	31.4528	70.5209	81.4789	.0000	25.3907
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.0100	.6034	1.0300	1.1998	30.8559	69.4558	78.1080	.0000	25.0834
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.0600	.6152	1.0877	1.2576	30.1292	68.4799	74.7371	.0000	24.7760
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.1100	.6228	1.1461	1.3141	29.2942	67.5895	71.3662	.0000	24.4686
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.1600	.6263	1.2053	1.3698	28.3647	66.7843	67.9953	.0000	24.1610
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.2100	.6259	1.2654	1.4246	27.3495	66.0671	64.6244	.0000	23.8533
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.2600	.6214	1.3262	1.4788	26.2531	65.4441	61.2535	.0000	23.5455
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.3100	.6130	1.3880	1.5324	25.0768	64.9254	57.8826	.0000	23.2375
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.3600	.6003	1.4506	1.5856	23.8181	64.5262	54.5117	.0000	22.9293
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.4100	.5832	1.5141	1.6386	22.4716	64.2683	51.1408	.0000	22.6209
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.4600	.5612	1.5786	1.6913	21.0272	64.1837	47.7699	.0000	22.3122
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.5100	.5338	1.6441	1.7438	19.4694	64.3192	44.3990	.0000	22.0031
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.5600	.5001	1.7106	1.7964	17.7742	64.7457	41.0281	.0000	21.6937
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.6100	.4587	1.7782	1.8490	15.9034	65.5761	37.6572	.0000	21.3837
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.6600	.4075	1.8469	1.9017	13.7914	67.0040	34.2864	.0000	21.0730
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.7100	.3420	1.9168	1.9547	11.3113	69.4029	30.9155	.0000	20.7613
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.7600	.2519	1.9878	2.0081	8.1441	73.6786	27.5446	.0000	20.4485
11.0	3.	1875	1.7506	1.48	.5511	1.8146	1.8100	.0746	2.0602	2.0620	2.3607	84.7376	24.1737	.0000	20.1338

11.0	3.	1875	1.7506	1.56	.6130	1.6314	.6200	.0839	.6020	.6074	7.7098	87.5125	102.1415	.0000	30.7457
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.6700	.2329	.6540	.6923	19.1667	82.9462	98.5884	.0000	30.4220
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.7200	.3105	.7065	.7694	23.3315	80.3794	95.0353	.0000	30.0982
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.7700	.3656	.7597	.8410	25.3990	78.4062	91.4822	.0000	29.7744
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.8200	.4073	.8135	.9083	26.4155	76.7662	87.9291	.0000	29.4506
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.8700	.4395	.8678	.9723	26.8035	75.3557	84.3760	.0000	29.1266
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.9200	.4642	.9229	1.0337	26.7745	74.1225	80.8229	.0000	28.8026
11.0	3.	1875	1.7506	1.56	.6130	1.6314	.9700	.4825	.9785	1.0929	26.4478	73.0386	77.2698	.0000	28.4785
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.0200	.4952	1.0349	1.1504	25.8950	72.0888	73.7167	.0000	28.1542
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.0700	.5026	1.0919	1.2064	25.1606	71.2669	70.1636	.0000	27.8299
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.1200	.5050	1.1497	1.2612	24.2724	70.5737	66.6105	.0000	27.5054
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.1700	.5026	1.2081	1.3149	23.2465	70.0162	63.0574	.0000	27.1808
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.2200	.4952	1.2674	1.3678	22.0907	69.6087	59.5043	.0000	26.8559
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.2700	.4825	1.3274	1.4200	20.8047	69.3745	55.9512	.0000	26.5308
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.3200	.4643	1.3882	1.4716	19.3807	69.3493	52.3981	.0000	26.2054
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.3700	.4399	1.4498	1.5227	17.8011	69.5880	48.8450	.0000	25.8797
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.4200	.4081	1.5123	1.5735	16.0337	70.1770	45.2919	.0000	25.5536
11.0	3.	1875	1.7506	1.56	.6130	1.6314	1.4700								

PROPERTIES ACROSS AN OBLIQUE DETONATION WAVE

GAMMA = 1.2

M1	M1*	OELMAX	OEL	XMIN	XMAX	X(M2U*)	Y(M2V*)	M2U	M2	THETA	SIGMA	PR21	PTR21	TR21
14.0	3.2351	1.7721	1.00	.3091	3.2351	.3100	.0510	.2969	.3009	9.3371	89.0017	213.6624	.0000	20.4152
14.0	3.2351	1.7721	1.00	.3091	3.2351	.3600	.3815	.3476	.5065	46.6629	82.4411	210.0273	.0000	20.0847
14.0	3.2351	1.7721	1.00	.3091	3.2351	.4100	.5325	.3992	.6543	52.4041	79.3262	206.3922	.0000	19.7542
14.0	3.2351	1.7721	1.00	.3091	3.2351	.4600	.6454	.4517	.7782	54.5196	76.9084	202.7571	.0000	19.4238
14.0	3.2351	1.7721	1.00	.3091	3.2351	.5100	.7379	.5051	.8883	55.3488	74.8495	199.1220	.0000	19.0933
14.0	3.2351	1.7721	1.00	.3091	3.2351	.5600	.8170	.5595	.9895	55.5707	73.0178	195.4869	.0000	18.7628
14.0	3.2351	1.7721	1.00	.3091	3.2351	.6100	.8862	.6149	1.0844	55.4598	71.3457	191.8518	.0000	18.4323
14.0	3.2351	1.7721	1.00	.3091	3.2351	.6600	.9478	.6713	1.1748	55.1491	69.7930	188.2167	.0000	18.1019
14.0	3.2351	1.7721	1.00	.3091	3.2351	.7100	1.0032	.7288	1.2616	54.7105	68.3336	184.5816	.0000	17.7714
14.0	3.2351	1.7721	1.00	.3091	3.2351	.7600	1.0532	.7875	1.3458	54.1861	66.9490	180.9465	.0000	17.4409
14.0	3.2351	1.7721	1.00	.3091	3.2351	.8100	1.0988	.8474	1.4281	53.6024	65.6261	177.3114	.0000	17.1104
14.0	3.2351	1.7721	1.00	.3091	3.2351	.8600	1.1403	.9085	1.5088	52.9762	64.3548	173.6763	.0000	16.7800
14.0	3.2351	1.7721	1.00	.3091	3.2351	.9100	1.1782	.9710	1.5885	52.3191	63.1272	170.0412	.0000	16.4495
14.0	3.2351	1.7721	1.00	.3091	3.2351	.9600	1.2129	1.0348	1.6673	51.6390	61.9371	166.4060	.0000	16.1190
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.0100	1.2446	1.1000	1.7457	50.9414	60.7792	162.7709	.0000	15.7885
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.0600	1.2736	1.1667	1.8238	50.2302	59.6495	159.1358	.0000	15.4581
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.1100	1.3000	1.2350	1.9020	49.5083	58.5442	155.5007	.0000	15.1276
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.1600	1.3240	1.3050	1.9803	48.7778	57.4603	151.8656	.0000	14.7971
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.2100	1.3457	1.3767	2.0590	48.0401	56.3952	148.2305	.0000	14.4666
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.2600	1.3653	1.4502	2.1384	47.2963	55.3465	144.5954	.0000	14.1362
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.3100	1.3827	1.5257	2.2184	46.5472	54.3120	140.9603	.0000	13.8057
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.3600	1.3982	1.6033	2.2994	45.7931	53.2901	137.3252	.0000	13.4752
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.4100	1.4117	1.6830	2.3815	45.0344	52.2788	133.6901	.0000	13.1447
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.4600	1.4233	1.7650	2.4649	44.2713	51.2768	130.0550	.0000	12.8142
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.5100	1.4331	1.8494	2.5498	43.5036	50.2825	126.4199	.0000	12.4837
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.5600	1.4411	1.9365	2.6363	42.7314	49.2946	122.7848	.0000	12.1533
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.6100	1.4473	2.0263	2.7247	41.9544	48.3118	119.1497	.0000	11.8228
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.6600	1.4518	2.1191	2.8151	41.1724	47.3329	115.5146	.0001	11.4923
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.7100	1.4546	2.2150	2.9079	40.3850	46.3568	111.8795	.0001	11.1618
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.7600	1.4556	2.3142	3.0032	39.5918	45.3822	108.2444	.0001	10.8313
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.8100	1.4549	2.4172	3.1012	38.7923	44.4081	104.6093	.0001	10.5008
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.8600	1.4525	2.5240	3.2023	37.9861	43.4333	100.9742	.0001	10.1703
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.9100	1.4483	2.6350	3.3069	37.1724	42.4566	97.3391	.0001	9.8398
14.0	3.2351	1.7721	1.00	.3091	3.2351	1.9600	1.4424	2.7505	3.4151	36.3506	41.4770	93.7040	.0001	9.5093
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.0100	1.4348	2.8710	3.5275	35.5200	40.4932	90.0689	.0002	9.1788
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.0600	1.4253	2.9969	3.6443	34.6797	39.5041	86.4338	.0002	8.8483
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.1100	1.4141	3.1286	3.7662	33.8288	38.5082	82.7987	.0002	8.5178
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.1600	1.4009	3.2668	3.8937	32.9662	37.5043	79.1636	.0003	8.1873
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.2100	1.3858	3.4120	4.0273	32.0908	36.4909	75.5285	.0003	7.8568
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.2600	1.3688	3.5650	4.1678	31.2012	35.4664	71.8934	.0004	7.5262
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.3100	1.3496	3.7266	4.3160	30.2960	34.4291	68.2583	.0005	7.1957
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.3600	1.3284	3.8978	4.4729	29.3735	33.3770	64.6232	.0006	6.8652
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.4100	1.3048	4.0798	4.6394	28.4318	32.3080	60.9881	.0008	6.5346
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.4600	1.2789	4.2740	4.8171	27.4686	31.2198	57.3530	.0010	6.2041
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.5100	1.2504	4.4819	5.0073	26.4814	30.1095	53.7179	.0013	5.8735
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.5600	1.2193	4.7055	5.2120	25.4672	28.9740	50.0828	.0017	5.5429
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.6100	1.1852	4.9472	5.4334	24.4222	27.8096	46.4477	.0023	5.2123
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.6600	1.1479	5.2100	5.6744	23.3422	26.6119	42.8126	.0032	4.8817
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.7100	1.1071	5.4973	5.9384	22.2218	25.3754	39.1775	.0044	4.5510
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.7600	1.0625	5.8140	6.2299	21.0542	24.0938	35.5424	.0063	4.2203
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.8100	1.0134	6.1658	6.5545	19.8310	22.7585	31.9073	.0092	3.8896
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.8600	.9592	6.5608	6.9199	18.5409	21.3591	28.2722	.0139	3.5588
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.9100	.8991	7.0093	7.3362	17.1688	19.8813	24.6371	.0218	3.2278
14.0	3.2351	1.7721	1.00	.3091	3.2351	2.9600	.8316	7.5262	7.8176	15.6930	18.3055	21.0020	.0355	2.8967
14.0	3.2351	1.7721	1.00	.3091	3.2351	3.0100	.7550	8.1326	8.3845	14.0812	16.6031	17.3669	.0609	2.5654
14.0	3.2351	1.7721	1.00	.3091	3.2351	3.0600	.6661	8.8605	9.0681	12.2810	14.7296	13.7318	.1106	2.2336
14.0	3.2351	1.7721	1.00	.3091	3.2351	3.1100	.5594	9.7619	9.9185	10.1968	12.6080	10.0967	.2141	1.9008
14.0	3.2351	1.7721	1.00	.3091	3.2351	3.1600	.4225	10.9298	11.0271	7.6155	10.0820	6.4616	.4391	1.5654
14.0	3.2351	1.7721	1.00	.3091	3.2351	3.2100	.2136	12.5880	12.6158	3.8070	6.7080	2.8265	.8666	1.2178
14.0	3.2351	1.7721	1.08	.3399	2.9418	.3400	.0132	.3259	.3261	2.2295	89.7265	209.5038	.0000	23.7749
14.0	3.2351	1.7721	1.08	.3399	2.9418	.3900	.3565	.3767	.5103	42.4295	82.5414	205.5779	.0000	23.4480
14.0	3.2351	1.7721	1.08	.3399	2.9418	.4400	.4990	.4282	.6475	48.5948	79.4259	201.6520	.0000	23.0611
14.0	3.2351	1.7721	1.08	.3399	2.9418	.4900	.6049	.4806	.7636	50.9907	77.0139	197.7261	.0000	22.7011
14.0	3.2351	1.7721	1.08	.3399	2.9418	.5400	.6912	.5339	.8672	52.0029	74.9625	193.8002	.0000	22.3472
14.0	3.2351	1.7721	1.08	.3399	2.9418	.5900	.7647	.5880	.9626	52.3472	73.1390	189.8743	.0000	21.9902
14.0	3.2351	1.7721	1.08	.3399	2.9418	.6400	.8286	.6431	1.0521	52.3191	71.4754	185.9484	.0000	21.6333
14.0	3.2351	1.7721	1.08	.3399	2.9418	.6900	.8852	.6991	1.1372	52.0636	69.9315	182.0224	.0000	21.2763
14.0	3.2351	1.7721	1.08	.3399	2.9418	.7400	.9357	.7562	1.2190	51.6601	68.4810	178.0965	.0000	20.9194
14.0	3.2351	1.7721	1.08	.3399	2.9418	.7900	.9810	.8142	1.2982	51.1557	67.1056	174.1706	.0000	20.5624
14.0	3.2351	1.7721	1.08	.3399	2.9418	.8400	1.0219	.8734	1.3754	50.5800	65.7921	170.2447	.0000	20.2055
14.0	3.2351	1.7721	1.08	.3399	2.9418	.8900	1.0589	.9337	1.4511	49.9524	64.5304	166.3188	.0000	19.8485
14.0	3.2351	1.7721	1.08	.3399	2.9418	.9400	1.0923	.9951	1.5256	49.2858	63.3127	162.3929	.0000	19.4915
14.0	3.2351	1.7721	1.08	.3399	2.9418	.9900	1.1225	1.0578	1.5992	48.5895	62.1327	158.4670	.0000	19.1346
14.0	3.2351	1.7721	1.08	.3399	2.9418	1.0400	1.1498	1.1217	1.6721	47.8698	60.9855	154.5411	.0000	18.7776

14.0	3.2351	1.7721	1.16	.3728	2.6826	.3800	.1287	.3650	.3853	18.7043	87.1928	204.1529	.0000	27.3138
14.0	3.2351	1.7721	1.16	.3728	2.6826	.4300	.3581	.4160	.5413	39.7840	82.0799	199.9362	.0000	26.9304
14.0	3.2351	1.7721	1.16	.3728	2.6826	.4800	.4846	.4677	.6646	45.2748	79.1300	195.7195	.0000	26.5469
14.0	3.2351	1.7721	1.16	.3728	2.6826	.5300	.5801	.5201	.7711	47.5842	76.8024	191.5028	.0000	26.1635
14.0	3.2351	1.7721	1.16	.3728	2.6826	.5800	.6582	.5734	.8673	48.6122	74.8078	187.2861	.0000	25.7801
14.0	3.2351	1.7721	1.16	.3728	2.6826	.6300	.7245	.6275	.9563	48.9893	73.0280	183.0694	.0000	25.3966
14.0	3.2351	1.7721	1.16	.3728	2.6826	.6800	.7820	.6825	1.0401	48.9904	71.4009	178.8526	.0000	25.0132
14.0	3.2351	1.7721	1.16	.3728	2.6826	.7300	.8326	.7384	1.1200	48.7555	69.8890	174.6359	.0000	24.6297
14.0	3.2351	1.7721	1.16	.3728	2.6826	.7800	.8774	.7952	1.1968	48.3633	68.4677	170.4192	.0000	24.2463
14.0	3.2351	1.7721	1.16	.3728	2.6826	.8300	.9173	.8529	1.2713	47.8613	67.1199	166.2025	.0000	23.8628
14.0	3.2351	1.7721	1.16	.3728	2.6826	.8800	.9530	.9117	1.3438	47.2801	65.8329	161.9858	.0000	23.4794
14.0	3.2351	1.7721	1.16	.3728	2.6826	.9300	.9848	.9714	1.4149	46.6395	64.5972	157.7690	.0000	23.0959
14.0	3.2351	1.7721	1.16	.3728	2.6826	.9800	1.0132	1.0323	1.4848	45.9536	63.4054	153.5523	.0000	22.7124
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.0300	1.0384	1.0942	1.5537	45.2317	62.2516	149.3356	.0000	22.3289
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.0800	1.0606	1.1573	1.6220	44.4809	61.1309	145.1189	.0000	21.9455
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.1300	1.0801	1.2216	1.6899	43.7061	60.0395	140.9022	.0000	21.5620
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.1800	1.0969	1.2872	1.7574	42.9107	58.9741	136.6855	.0000	21.1784
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.2300	1.1113	1.3540	1.8248	42.0974	57.9319	132.4687	.0000	20.7949
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.2800	1.1232	1.4222	1.8922	41.2679	56.9106	128.2520	.0000	20.4114
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.3300	1.1329	1.4919	1.9597	40.4234	55.9082	124.0353	.0000	20.0278
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.3800	1.1402	1.5630	2.0275	39.5648	54.9230	119.8186	.0000	19.6443
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.4300	1.1453	1.6357	2.0956	38.6924	53.9536	115.6019	.0000	19.2607
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.4800	1.1483	1.7100	2.1643	37.8063	52.9988	111.3852	.0000	18.8771
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.5300	1.1490	1.7860	2.2335	36.9064	52.0577	107.1684	.0000	18.4935
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.5800	1.1476	1.8638	2.3035	35.9921	51.1294	102.9517	.0000	18.1098
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.6300	1.1440	1.9435	2.3744	35.0628	50.2135	98.7350	.0000	17.7262
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.6800	1.1382	2.0251	2.4461	34.1178	49.3097	94.5183	.0000	17.3425
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.7300	1.1302	2.1088	2.5190	33.1557	48.4177	90.3016	.0000	16.9587
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.7800	1.1199	2.1948	2.5930	32.1754	47.5380	86.0848	.0000	16.5750
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.8300	1.1072	2.2830	2.6683	31.1751	46.6709	81.8681	.0000	16.1912
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.8800	1.0921	2.3737	2.7451	30.1529	45.8175	77.6514	.0000	15.8073
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.9300	1.0745	2.4670	2.8235	29.1065	44.9793	73.4347	.0000	15.4234
14.0	3.2351	1.7721	1.16	.3728	2.6826	1.9800	1.0543	2.5630	2.9037	28.0332	44.1585	69.2180	.0000	15.0394
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.0300	1.0312	2.6619	2.9857	26.9297	43.3582	65.0013	.0000	14.6553
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.0800	1.0052	2.7639	3.0698	25.7920	42.5830	60.7845	.0000	14.2711
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.1300	.9759	2.8693	3.1561	24.6154	41.8391	56.5678	.0000	13.8868
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.1800	.9431	2.9782	3.2449	23.3937	41.1355	52.3511	.0001	13.5023
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.2300	.9064	3.0908	3.3364	22.1197	40.4853	48.1344	.0001	13.1177
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.2800	.8653	3.2075	3.4308	20.7835	39.9078	43.9177	.0001	12.7327
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.3300	.8193	3.3286	3.5284	19.3725	39.4328	39.7009	.0001	12.3475
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.3800	.7673	3.4544	3.6295	17.8692	39.1074	35.4842	.0001	11.9618
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.4300	.7082	3.5854	3.7345	16.2487	39.0114	31.2675	.0001	11.5754
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.4800	.6401	3.7219	3.8439	14.4730	39.2893	27.0508	.0001	11.1881
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.5300	.5599	3.8647	3.9582	12.4794	40.2333	22.8341	.0001	10.7994
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.5800	.4618	4.0145	4.0783	10.1479	42.5392	18.6174	.0001	10.4082
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.6300	.3313	4.1723	4.2053	7.1806	48.4409	14.4006	.0001	10.0125
14.0	3.2351	1.7721	1.16	.3728	2.6826	2.6800	.0732	4.3405	4.3422	1.5644	77.2603	10.1839	.0001	9.6066

14.0	3.2351	1.7721	1.24	.4081	2.4501	.4100	.0613	.3940	.3984	8.5080	88.5920	199.2383	.0000	31.1797
14.0	3.2351	1.7721	1.24	.4081	2.4501	.4600	.3203	.4450	.5423	34.8530	82.5364	194.7308	.0000	30.7698
14.0	3.2351	1.7721	1.24	.4081	2.4501	.5100	.4433	.4967	.6581	40.9948	79.5156	190.2232	.0000	30.3599
14.0	3.2351	1.7721	1.24	.4081	2.4501	.5600	.5342	.5491	.7588	43.6476	77.1688	185.7157	.0000	29.9499
14.0	3.2351	1.7721	1.24	.4081	2.4501	.6100	.6076	.6023	.8501	44.8878	75.1722	181.2082	.0000	29.5400
14.0	3.2351	1.7721	1.24	.4081	2.4501	.6600	.6694	.6562	.9346	45.4041	73.3990	176.7007	.0000	29.1300
14.0	3.2351	1.7721	1.24	.4081	2.4501	.7100	.7224	.7109	1.0143	45.4979	71.7837	172.1931	.0000	28.7201
14.0	3.2351	1.7721	1.24	.4081	2.4501	.7600	.7686	.7665	1.0901	45.3238	70.2874	167.6856	.0000	28.3101
14.0	3.2351	1.7721	1.24	.4081	2.4501	.8100	.8091	.8229	1.1631	44.9690	68.8848	163.1781	.0000	27.9002
14.0	3.2351	1.7721	1.24	.4081	2.4501	.8600	.8447	.8802	1.2337	44.4866	67.5583	158.6706	.0000	27.4902
14.0	3.2351	1.7721	1.24	.4081	2.4501	.9100	.8760	.9384	1.3025	43.9106	66.2953	154.1630	.0000	27.0802
14.0	3.2351	1.7721	1.24	.4081	2.4501	.9600	.9035	.9975	1.3698	43.2637	65.0863	149.6555	.0000	26.6702
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.0100	.9275	1.0576	1.4359	42.5612	63.9239	145.1480	.0000	26.2602
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.0600	.9482	1.1188	1.5011	41.8141	62.8024	140.6404	.0000	25.8501
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.1100	.9659	1.1809	1.5655	41.0301	61.7173	136.1329	.0000	25.4401
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.1600	.9808	1.2442	1.6293	40.2146	60.6649	131.6254	.0000	25.0300
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.2100	.9929	1.3086	1.6928	39.3716	59.6423	127.1179	.0000	24.6199
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.2600	1.0024	1.3741	1.7560	38.5039	58.6473	122.6103	.0000	24.2098
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.3100	1.0093	1.4409	1.8190	37.6132	57.6781	118.1028	.0000	23.7996
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.3600	1.0137	1.5090	1.8821	36.7007	56.7334	113.5953	.0000	23.3895
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.4100	1.0157	1.5784	1.9452	35.7669	55.8123	109.0878	.0000	22.9793
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.4600	1.0152	1.6491	2.0086	34.8120	54.9144	104.5802	.0000	22.5690
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.5100	1.0122	1.7213	2.0723	33.8355	54.0398	100.0727	.0000	22.1587
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.5600	1.0068	1.7950	2.1364	32.8367	53.1889	95.5652	.0000	21.7484
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.6100	.9988	1.8703	2.2010	31.8143	52.3628	91.0577	.0000	21.3380
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.6600	.9883	1.9472	2.2661	30.7667	51.5634	86.5501	.0000	20.9276
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.7100	.9750	2.0258	2.3320	29.6918	50.7931	82.0426	.0000	20.5170
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.7600	.9591	2.1062	2.3986	28.5871	50.0556	77.5351	.0000	20.1064
14.0	3.2351	1.7721	1.24	.4081	2.4501	1.8100	.9402	2.1885	2.4662	27.4491				

14.0	3.2351	1.7721	1.32	.4468	2.2382	.4500	.0757	.4332	.4393	9.5467	88.1678	193.0150	.0000	35.2140
14.0	3.2351	1.7721	1.32	.4468	2.2382	.5000	.3033	.4843	.5664	31.2389	82.5391	188.2167	.0000	34.7776
14.0	3.2351	1.7721	1.32	.4468	2.2382	.5500	.4162	.5361	.6723	37.1161	79.5915	183.4183	.0000	34.3411
14.0	3.2351	1.7721	1.32	.4468	2.2382	.6000	.4995	.5886	.7659	39.7763	77.2969	178.6200	.0000	33.9047
14.0	3.2351	1.7721	1.32	.4468	2.2382	.6500	.5663	.6418	.8513	41.0654	75.3459	173.8217	.0000	33.4682
14.0	3.2351	1.7721	1.32	.4468	2.2382	.7000	.6221	.6957	.9308	41.6278	73.6155	169.0233	.0000	33.0317
14.0	3.2351	1.7721	1.32	.4468	2.2382	.7500	.6695	.7504	1.0059	41.7555	72.0425	164.2250	.0000	32.5953
14.0	3.2351	1.7721	1.32	.4468	2.2382	.8000	.7103	.8058	1.0777	41.6016	70.5891	159.4267	.0000	32.1587
14.0	3.2351	1.7721	1.32	.4468	2.2382	.8500	.7455	.8621	1.1467	41.2540	69.2308	154.6283	.0000	31.7222
14.0	3.2351	1.7721	1.32	.4468	2.2382	.9000	.7760	.9191	1.2136	40.7670	67.9508	149.8300	.0000	31.2857
14.0	3.2351	1.7721	1.32	.4468	2.2382	.9500	.8021	.9770	1.2787	40.1757	66.7369	145.0317	.0000	30.8491
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.0000	.8244	1.0358	1.3425	39.5035	65.5804	140.2333	.0000	30.4125
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.0500	.8432	1.0955	1.4050	38.7665	64.4746	135.4350	.0000	29.9759
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.1000	.8587	1.1561	1.4667	37.9761	63.4145	130.6366	.0000	29.5393
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.1500	.8710	1.2177	1.5276	37.1401	62.3963	125.8383	.0000	29.1026
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.2000	.8803	1.2803	1.5879	36.2642	61.4175	121.0400	.0000	28.6659
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.2500	.8868	1.3439	1.6477	35.3521	60.4762	116.2416	.0000	28.2291
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.3000	.8903	1.4086	1.7073	34.4063	59.5715	111.4433	.0000	27.7923
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.3500	.8911	1.4744	1.7667	33.4281	58.7033	106.6450	.0000	27.3554
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.4000	.8891	1.5414	1.8260	32.4182	57.8724	101.8466	.0000	26.9185
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.4500	.8843	1.6096	1.8852	31.3761	57.0803	97.0483	.0000	26.4815
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.5000	.8766	1.6790	1.9446	30.3007	56.3297	92.2500	.0000	26.0444
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.5500	.8659	1.7497	2.0042	29.1904	55.6246	87.4516	.0000	25.6073
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.6000	.8523	1.8218	2.0641	28.0423	54.9706	82.6533	.0000	25.1700
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.6500	.8354	1.8952	2.1243	26.8530	54.3756	77.8550	.0000	24.7326
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.7000	.8152	1.9702	2.1849	25.6179	53.8501	73.0566	.0000	24.2950
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.7500	.7913	2.0466	2.2461	24.3308	53.4089	68.2583	.0000	23.8573
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.8000	.7635	2.1247	2.3079	22.9838	53.0726	63.4600	.0000	23.4193
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.8500	.7312	2.2044	2.3704	21.5665	52.8707	58.6616	.0000	22.9810
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.9000	.6940	2.2859	2.4337	20.0648	52.8462	53.8633	.0000	22.5424
14.0	3.2351	1.7721	1.32	.4468	2.2382	1.9500	.6509	2.3693	2.4978	18.4589	53.0647	49.0650	.0000	22.1033
14.0	3.2351	1.7721	1.32	.4468	2.2382	2.0000	.6008	2.4546	2.5629	16.7199	53.6311	44.2666	.0000	21.6635
14.0	3.2351	1.7721	1.32	.4468	2.2382	2.0500	.5417	2.5419	2.6292	14.8026	54.7246	39.4683	.0000	21.2229
14.0	3.2351	1.7721	1.32	.4468	2.2382	2.1000	.4705	2.6315	2.6967	12.6286	56.6830	34.6700	.0000	20.7811
14.0	3.2351	1.7721	1.32	.4468	2.2382	2.1500	.3806	2.7233	2.7657	10.0377	60.2489	29.8716	.0000	20.3375
14.0	3.2351	1.7721	1.32	.4468	2.2382	2.2000	.2533	2.8178	2.8364	6.5670	67.6441	25.0733	.0000	19.8910

14.0	3.2351	1.7721	1.40	.4898	2.0418	.4900	.0194	.4724	.4728	2.2731	89.5035	186.3264	.0000	39.4933
14.0	3.2351	1.7721	1.40	.4898	2.0418	.5400	.2739	.5237	.5872	26.8928	82.8853	181.2373	.0000	39.0304
14.0	3.2351	1.7721	1.40	.4898	2.0418	.5900	.3803	.5756	.6848	32.8059	79.9420	176.1481	.0000	38.5674
14.0	3.2351	1.7721	1.40	.4898	2.0418	.6400	.4575	.6281	.7721	35.5570	77.6775	171.0590	.0000	38.1044
14.0	3.2351	1.7721	1.40	.4898	2.0418	.6900	.5186	.6814	.8523	36.9270	75.7653	165.9698	.0000	37.6414
14.0	3.2351	1.7721	1.40	.4898	2.0418	.7400	.5688	.7353	.9274	37.5492	74.0794	160.8807	.0000	37.1783
14.0	3.2351	1.7721	1.40	.4898	2.0418	.7900	.6109	.7899	.9985	37.7156	72.5556	155.7916	.0000	36.7153
14.0	3.2351	1.7721	1.40	.4898	2.0418	.8400	.6464	.8452	1.0666	37.5811	71.1562	150.7024	.0000	36.2522
14.0	3.2351	1.7721	1.40	.4898	2.0418	.8900	.6764	.9013	1.1321	37.2363	69.8572	145.6133	.0000	35.7890
14.0	3.2351	1.7721	1.40	.4898	2.0418	.9400	.7016	.9582	1.1957	36.7372	68.6423	140.5241	.0000	35.3259
14.0	3.2351	1.7721	1.40	.4898	2.0418	.9900	.7225	1.0158	1.2576	36.1202	67.5002	135.4350	.0000	34.8627
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.0400	.7394	1.0743	1.3181	35.4097	66.4231	130.3458	.0000	34.3994
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.0900	.7526	1.1336	1.3775	34.6225	65.4056	125.2567	.0000	33.9362
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.1400	.7623	1.1938	1.4361	33.7699	64.4440	120.1676	.0000	33.4728
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.1900	.7687	1.2549	1.4939	32.8599	63.5367	115.0784	.0000	33.0094
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.2400	.7718	1.3169	1.5511	31.8976	62.6831	109.9893	.0000	32.5459
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.2900	.7716	1.3798	1.6078	30.8861	61.8844	104.9001	.0000	32.0824
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.3400	.7683	1.4438	1.6642	29.8268	61.1432	99.8110	.0000	31.6187
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.3900	.7616	1.5087	1.7204	28.7195	60.4639	94.7218	.0000	31.1550
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.4400	.7516	1.5748	1.7764	27.5629	59.8531	89.6327	.0000	30.6911
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.4900	.7381	1.6419	1.8324	26.3538	59.3202	84.5436	.0000	30.2271
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.5400	.7210	1.7102	1.8884	25.0878	58.8784	79.4544	.0000	29.7629
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.5900	.6999	1.7797	1.9445	23.7583	58.5460	74.3653	.0000	29.2985
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.6400	.6745	1.8504	2.0008	22.3563	58.3487	69.2761	.0000	28.8338
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.6900	.6443	1.9223	2.0573	20.8690	58.3237	64.1870	.0000	28.3688
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.7400	.6086	1.9957	2.1142	19.2789	58.5258	59.0979	.0000	27.9034
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.7900	.5664	2.0704	2.1715	17.5597	59.0395	54.0087	.0000	27.4375
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.8400	.5162	2.1465	2.2294	15.6712	60.0025	48.9196	.0000	26.9709
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.8900	.4553	2.2242	2.2878	13.5455	61.6584	43.8304	.0000	26.5034
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.9400	.3789	2.3035	2.3470	11.0504	64.4962	38.7413	.0000	26.0347
14.0	3.2351	1.7721	1.40	.4898	2.0418	1.9900	.2743	2.3845	2.4071	7.8489	69.7645	33.6521	.0000	25.5640
14.0	3.2351	1.7721	1.40	.4898	2.0418	2.0400	.0524	2.4674	2.4682	1.4701	85.6870	28.5630	.0000	25.0906

14.0	3.2351	1.7721	1.48	.5388	1.8559	.5400	.0394	.5219	.5233	4.1772	88.9339	178.0965	.0000	43.9197
14.0	3.2351	1.7721	1.48	.5388	1.8559	.5900	.2538	.5734	.6242	23.2725	83.0086	172.7166	.0000	43.4302
14.0	3.2351	1.7721	1.48	.5388	1.8559	.6400	.3496	.6255	.7128	28.6474	80.1769	167.3366	.0000	42.9406
14.0	3.2351	1.7721	1.48	.5388	1.8559	.6900	.4184	.6783	.7932	31.2340	78.0039	161.9567	.0000	42.4510
14.0	3.2351	1.7721	1.48	.5388	1.8559	.7400	.4722	.7317	.8679	32.5411	76.1785	156.5767	.0000	41.9614
14.0	3.2351	1.7721	1.48	.5388	1.8559	.7900	.5156	.7857	.9382	33.1298	74.5801	151.1968	.0000	41.4718
14.0	3.2351	1.7721	1.48	.5388	1.8559	.8400	.5511	.8404	1.0051	33.2674	73.1473	145.8168	.0000	40.9821
14.0	3.2351	1.7721	1.48	.5388	1.8559	.8900	.5802	.8958	1.0693	33.0993	71.8449	140.4369	.0000	40.4923
14.0	3.2351	1.7721	1.48	.5388	1.8559	.9400	.6037	.9519	1.1313	32.7116	70.6507	135.0569	.0000	40.0025
14.0	3.2351	1.7721	1.48	.5388	1.8559	.9900	.6224	1.0087	1.1915	32.1583	69.5506	129.6770	.0000	39.5127
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.0400	.6367	1.0663	1.2502	31.4744	68.5358	124.2970	.0000	39.0227
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.0900	.6468	1.1246	1.3077	30.6834	67.6011	118.9171	.0000	38.5327
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.1400	.6529	1.1838	1.3642	29.8007	66.7443	113.5371	.0000	38.0426
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.1900	.6552	1.2437	1.4198	28.8365	65.9661	108.1572	.0000	37.5524
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.2400	.6537	1.3045	1.4747	27.7968	65.2699	102.7772	.0000	37.0621
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.2900	.6484	1.3662	1.5291	26.6843	64.6619	97.3973	.0000	36.5717
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.3400	.6391	1.4288	1.5830	25.4989	64.1520	92.0173	.0000	36.0811
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.3900	.6258	1.4923	1.6365	24.2377	63.7550	86.6374	.0000	35.5903
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.4400	.6081	1.5567	1.6899	22.8947	63.4916	81.2574	.0000	35.0993
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.4900	.5857	1.6222	1.7430	21.4602	63.3918	75.8775	.0000	34.6080
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.5400	.5581	1.6886	1.7961	19.9192	63.4994	70.4975	.0000	34.1164
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.5900	.5243	1.7562	1.8492	18.2494	63.8800	65.1176	.0000	33.6244
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.6400	.4832	1.8248	1.9024	16.4158	64.6370	59.7376	.0000	33.1318
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.6900	.4327	1.8946	1.9557	14.3602	65.9445	54.3577	.0000	32.6386
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.7400	.3690	1.9656	2.0093	11.9736	68.1283	48.9777	.0000	32.1444
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.7900	.2836	2.0378	2.0633	9.0036	71.9294	43.5978	.0000	31.6490
14.0	3.2351	1.7721	1.48	.5388	1.8559	1.8400	.1419	2.1114	2.1177	4.4114	80.1702	38.2178	.0000	31.1518

14.0	3.2351	1.7721	1.56	.5971	1.6749	.6000	.0561	.5818	.5843	5.3397	88.3860	168.1509	.0000	48.4771
14.0	3.2351	1.7721	1.56	.5971	1.6749	.6500	.2322	.6336	.6728	19.6552	83.1765	162.4801	.0000	47.9610
14.0	3.2351	1.7721	1.56	.5971	1.6749	.7000	.3157	.6861	.7526	24.2749	80.5181	156.8094	.0000	47.4448
14.0	3.2351	1.7721	1.56	.5971	1.6749	.7500	.3747	.7391	.8262	26.5497	78.4892	151.1386	.0000	46.9285
14.0	3.2351	1.7721	1.56	.5971	1.6749	.8000	.4198	.7927	.8953	27.6877	76.8028	145.4679	.0000	46.4122
14.0	3.2351	1.7721	1.56	.5971	1.6749	.8500	.4550	.8470	.9607	28.1598	75.3471	139.7971	.0000	45.8959
14.0	3.2351	1.7721	1.56	.5971	1.6749	.9000	.4825	.9019	1.0234	28.1980	74.0663	134.1263	.0000	45.3794
14.0	3.2351	1.7721	1.56	.5971	1.6749	.9500	.5037	.9575	1.0838	27.9312	72.9295	128.4556	.0000	44.8629
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.0000	.5192	1.0138	1.1422	27.4366	71.9191	122.7848	.0000	44.3463
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.0500	.5295	1.0707	1.1992	26.7626	71.0263	117.1141	.0000	43.8296
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.1000	.5351	1.1284	1.2548	25.9399	70.2483	111.4433	.0000	43.3128
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.1500	.5360	1.1867	1.3093	24.9876	69.5876	105.7726	.0000	42.7958
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.2000	.5322	1.2459	1.3629	23.9164	69.0525	100.1018	.0000	42.2787
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.2500	.5237	1.3058	1.4158	22.7304	68.6572	94.4310	.0000	41.7613
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.3000	.5102	1.3666	1.4680	21.4276	68.4242	88.7603	.0000	41.2438
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.3500	.4913	1.4281	1.5197	19.9992	68.3872	83.0895	.0000	40.7259
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.4000	.4665	1.4905	1.5711	18.4284	68.5972	77.4188	.0000	40.2078
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.4500	.4346	1.5538	1.6221	16.6859	69.1333	71.7480	.0000	39.6892
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.5000	.3941	1.6180	1.6729	14.7206	70.1252	66.0772	.0000	39.1700
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.5500	.3419	1.6831	1.7236	12.4376	71.8068	60.4065	.0000	38.6502
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.6000	.2713	1.7492	1.7742	9.6243	74.6765	54.7357	.0000	38.1295
14.0	3.2351	1.7721	1.56	.5971	1.6749	1.6500	.1601	1.8164	1.8249	5.5411	80.3375	49.0650	.0000	37.6077

14.0	3.2351	1.7721	1.64	.6712	1.4900	.6800	.0843	.6627	.6677	7.0679	87.3853	155.1227	.0000	53.0409
14.0	3.2351	1.7721	1.64	.6712	1.4900	.7300	.2107	.7150	.7442	16.0986	83.3102	149.1611	.0000	52.4980
14.0	3.2351	1.7721	1.64	.6712	1.4900	.7800	.2769	.7680	.8150	19.5459	80.9890	143.1996	.0000	51.9551
14.0	3.2351	1.7721	1.64	.6712	1.4900	.8300	.3225	.8215	.8814	21.2327	79.2355	137.2380	.0000	51.4120
14.0	3.2351	1.7721	1.64	.6712	1.4900	.8800	.3554	.8757	.9444	21.9932	77.8167	131.2764	.0000	50.8689
14.0	3.2351	1.7721	1.64	.6712	1.4900	.9300	.3790	.9304	1.0047	22.1747	76.6416	125.3149	.0000	50.3257
14.0	3.2351	1.7721	1.64	.6712	1.4900	.9800	.3950	.9858	1.0628	21.9544	75.6682	119.3533	.0000	49.7823
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.0300	.4043	1.0418	1.1191	21.4315	74.8787	113.3917	.0000	49.2388
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.0800	.4073	1.0984	1.1739	20.6636	74.2705	107.4302	.0000	48.6951
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.1300	.4042	1.1557	1.2274	19.6826	73.8539	101.4686	.0000	48.1512
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.1800	.3949	1.2137	1.2799	18.5018	73.6528	95.5070	.0000	47.6071
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.2300	.3788	1.2725	1.3315	17.1180	73.7089	89.5455	.0000	47.0626
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.2800	.3552	1.3319	1.3823	15.5090	74.0915	83.5839	.0000	46.5179
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.3300	.3223	1.3921	1.4324	13.6237	74.9187	77.6223	.0000	45.9727
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.3800	.2770	1.4531	1.4821	11.3517	76.4118	71.6608	.0000	45.4269
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.4300	.2115	1.5149	1.5314	8.4140	79.0786	65.6992	.0000	44.8805
14.0	3.2351	1.7721	1.64	.6712	1.4900	1.4800	.0889	1.5775	1.5804	3.4378	85.1426	59.7376	.0000	44.3331

14.0	3.2351	1.7721	1.72	.7823	1.2783	.7900	.0612	.7757	.7780	4.4284	87.9104	137.4125	.0000	57.4646
14.0	3.2351	1.7721	1.72	.7823	1.2783	.8400	.1584	.8289	.8435	10.6794	84.4383	131.1601	.0000	56.8948
14.0	3.2351	1.7721	1.72	.7823	1.2783	.8900	.2036	.8827	.9055	12.8877	82.6411	124.9077	.0000	56.3248
14.0	3.2351	1.7721	1.72	.7823	1.2783	.9400	.2299	.9370	.9647	13.7456	81.4352	118.6554	.0000	55.7547
14.0	3.2351	1.7721	1.72	.7823	1.2783	.9900	.2435	.9920	1.0215	13.8204	80.6353	112.4030	.0000	55.1844
14.0	3.2351	1.7721	1.72	.7823	1.2783	1.0400	.2466	1.0475	1.0765	13.3373	80.1955	106.1506	.0000	54.6139
14.0	3.2351	1.7721	1.72	.7823	1.2783	1.0900	.2394	1.1036	1.1299	12.3882	80.1350	99.8982	.0000	54.0431
14.0	3.2351	1.7721	1.72	.7823	1.2783	1.1400	.2211	1.1604	1.1820	10.9785	80.5368	93.6459	.0000	53.4719
14.0	3.2351	1.7721	1.72	.7823	1.2783	1.1900	.1886	1.2178	1.2330	9.0050	81.5979	87.3935	.0000	52.9004
14.0	3.2351	1.7721	1.72	.7823	1.2783	1.2400	.1316	1.2759	1.2831	6.0561	83.8791	81.1411	.0000	52.3284

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