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SUMMARY OF NAVY STUDY PROGRAM FOR F4H-1 WEAPON SYSTEM

Parameter Plots for Pull-up Attacks
(Unclassified Title)

VOLUME X

R. L. Lister
I. N. Bellavin
C. M. Loughmiller
J. C. Ryon

RADAR DIVISION

January 1960

U. S. NAVAL RESEARCH LABORATORY
Washington, D.C.

CONFIDENTIAL

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Equipment Research Branch
RADAR DIVISION

Naval Research Laboratory
Washington 25, D. C.

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ABSTRACT

(Confidential)

The Naval Research Laboratory is serving as technical director of the Navy's Air-to-Air Missile Study. The results are presented in a series of volumes under NRL Memorandum Report 754. This volume is the tenth in the series. The study to date has been primarily concerned with the system employing the F4H-1 aircraft, the AN/APQ-72 radar, and the Sparrow III-6a missile. This volume represents a continuation of the study results presented in preceding volumes.

PROBLEM STATUS

This is an interim report; work on the problem is continuing.

AUTHORIZATION

NRL Problem 53R05-04
BUAER No. EL-42001

INTRODUCTION

The Bureau of Aeronautics has contracted with the Naval Research Laboratory to conduct system studies directed toward establishing the tactical use capability of Navy Air-to-Air Missile Systems. These studies are conducted under the technical direction of the Naval Research Laboratory with all inputs derived from Navy sources. To date, study effort has been primarily directed toward revealing the tactical use capability of the F4H-1 Weapon System. In support of this effort, NRL has contracted with Westinghouse, Air Arm Division, for analytical services. This report is the tenth in a series (see references (1) thru (7)) directed toward carrying out this responsibility.

In Volume IX of this series, the results of a study directed toward revealing the probability of successful arrival to missile launch for a system using the Sparrow III-6a missile, F4H-1 aircraft and AN/APQ-72 radar are detailed. This volume presents selected samples of plots of parameter variations during the fire control runs (interceptor trajectories) associated with some of the situations investigated during the probability of success study for pull-up attacks.

SPACE GEOMETRY

Figure 1 shows a typical interceptor trajectory taken from the results of the study of probability of successful arrival to missile launch for the F4H-1 Weapons System under pull-up attack conditions. As shown on this drawing, the target is nonmaneuvering. The conditions of the study phase for which parameter plots are presented were:

a. Aircraft characteristics - F4H-1 (reference (2)).

b. Target altitude - 65,000 ft.

c. Interceptor altitude - varied.

d. Reflective area - B-47 size target, assumed same as for the co-altitude case.

e. Interceptor velocity - V_{max} at start of pull-up.

f. Target velocity - M 2.0.

g. Vectoring inaccuracy - $1\sigma = \pm 3$ n. m. in azimuth.

h. Straight line flight path (target).

i. AI detection capability - that associated with the AN/APQ-72; 85% probability against nose aspect of B-47 size target - 19 n. mi.

j. Missile aerodynamics - Sparrow III-6a (reference (7)).

k. AI radar gimbal limits - $\pm 57^{\circ}$ azimuth and elevation.

l. Interceptor restricted to 3g pull-up or $C_{L_{max}}$.

m. Target aspect angle associated with the center of the vectoring distribution (τ_o) - head-on, 15°, 30°, 45°.

These conditions apply to that portion of the study associated with the parameter plots presented in this volume. Other conditions were studied and the results are presented in reference (7).

The relationships of the parameters plotted in this volume are illustrated by the sketches of Figures 2 and 3. Definitions of the parameters involved are as follows:

R = Range between interceptor and target positions

V_F = Fighter velocity

V_T = Target velocity

τ_o = Target aspect angle (angle between line of sight to target and line of flight of the target)

H_F = Fighter altitude

H_T = Target altitude

α = Fighter angle of attack. This is the angle between the frame reference line (FRL) and the fighter flight path.

λ_a = Azimuth gimbal angle. This is the angle between the radar gimbal mechanical axis (RGMA) and the line of sight (LOS) measured in the plane of the azimuth gimbals.

λ_e = Elevation gimbal angle. This is the angle between the radar gimbal mechanical axis (RGMA) and the line of sight (LOS) measured in the plane of the elevation gimbals.

ω_k = Line of sight rate measured in the plane of the azimuth gimbals.

ω_j = Line of sight rate measured in the plane of the elevation of gimbals.

ϕ = Fighter roll angle.

L/W = Load factor.

ϵ = Fighter heading error. Difference between actual fighter heading and correct lead pursuit heading.

Referring again to Figure 1, it is seen that a sample air battle is plotted. At the start of the engagement, the interceptor is flying at 40,000 ft. altitude at M 2.0, and the target is flying at 65,000 ft. altitude at M 2.0. AI radar detection occurs at zero time. Radar lock-on and start of 3g pull-up occurs 10 seconds later. At 25.4 seconds, the interceptor has corrected its flight path to that required for the correct lead pursuit course. At 25.5 seconds the interceptor has closed range to the maximum aerodynamic range of the missile (R_{max}). Missile target impact for firing at R_{max} occurs at 37.3 seconds.

PARAMETER VARIATIONS

A complete index of the pull-up runs, for which parameter plots are presented in this volume, are given on Table 1. It is important that the reader examine this index carefully in order that the meaning of

each of the associated figures will be clear. Referring to the table, it is seen that it is an index of runs along with the initial conditions for each run. The runs have been separated into families according to the initial target aspect angle (τ_o). This initial target aspect angle represents the path along which the interceptor would have flown if it were possible to vector it on a perfect pure collision course and is measured with respect to the nose of the target aircraft. The parameter plots presented in this volume can be separated into four basic families (τ_o = 0°, 15°, 30°, 45°). Further examination of Table I reveals that parameter plots are presented for only one target altitude (65,000 ft.) and one target velocity (M 2.0). Data is available for other target velocity and altitude conditions, but is not presented in this volume. In addition, only one interceptor velocity condition is examined (V_{max} at the start of pull-up).

As was stated previously, the results of the pull-up attack investigation are detailed in Volume IX (reference (7)) of this series. The parameter plots presented in this volume are from a selected sample of the total number of pull-up trajectories available. Figures 4 thru 7 are copies from Volume IX of the probability of successful arrival to missile launch results from which the parameter plots presented in this volume were obtained. On these figures the probability of successful arrival to missile launch versus initial fighter altitude (pull-up altitude) is plotted. For example, refer to Figure 4, if the fighter starts a head-on pull-up attack from 50,000 ft. altitude against this M 2.0, 65,000 ft. altitude target, the probability of successful arrival to missile launch is 63%.

The parameter plots presented in this volume are associated with the probability results shown on Figures 4 thru 7. Referring to Table I, it is seen that the parameter plots are divided into four major categories (τ_o = 0°, 15°, 30°, 45°). Each of these major categories correspond to one of these figures. For example, referring to family 1-1A, on Table I, it is seen that the fighter altitude is 58,000 ft. when the head-on pull-up attack is started against this M 2.0, 65,000 ft. altitude target. This interceptor run was one of several used to obtain the probability point shown at 58,000 ft. on Figure 4.

Referring to Table I again, it is seen that the parameter plots are grouped still further according to the box in the probability grid

from which the pull-up attack originated. Figure 8 illustrates the probability grid used in the probability studies. The azimuth dimension of this grid is associated with the vectoring inaccuracy ($1\sigma = \pm 3$ n. mi.). The range dimension of this grid is associated with the AI radar detection range distribution. The weightings of each of the columns and rows are shown. By examining interceptor runs from a sufficient number of boxes in this grid, the probability of successful arrival to missile launch can be generated. The parameter plots presented in this volume were taken at random from the many interceptor trajectories examined. For example, Figures 9 thru 20 give the parameter plots associated with an interceptor pull-up attack originating from Box B-3 at 58,000 ft against a M 2.0 target flying at 65,000 ft.

The remaining parameter plots are grouped according to fighter altitude and the box in the probability grid from which the intercept started. For example, Family 2 of Table I has three sets of parameter plots for 58,000 ft. altitude intercepts (2A, 2B, 2C). These intercept runs originated from Boxes A-3, F-3 and H-6 in the probability grid. Next, there are five sets of parameter plots for the 50,000 ft. intercept (2D, 2E, 2F, 2G and 2H). These intercept runs originated from Boxes A-3, A-5, D-3, F-4, and F-5 in the probability grid.

The parameter plots are numbered consecutively throughout the report. For example, the parameter plots of Family 1A are given on Figures 9 thru 20. Two figures are given on each sheet. The first plot of each family gives range (R) between interceptor and target as a function of time from AI radar lock-on (pull-up at zero time). On this first curve of each family the following points are labeled:

⊙ = R_{max}

⊳ = Start of lead pursuit

X = Impact for launch at R_{max} or start of lead pursuit

◘ = R_{min}

.... = $C_L = C_{L_{max}}$

These labeled points can then be transferred readily to the other plots in the associated family.

Figures 9 thru 20 give the parameter plots for head-on pull-up attacks, from 58,000 ft. altitude against a M 2.0, 65,000 ft. altitude target. Figure 9 gives the range (R) between interceptor and target as a function of time. At zero time, pull-up occurs and the range is 116,700 ft. The interceptor immediately starts a $C_{L_{max}}$ course which continues until a lead pursuit course is reached (R = 48,700 ft.). The maximum aerodynamic range of the missile (R_{max}) is reached at 17.5 seconds (R = 58,000 ft.). Impact point is arbitrarily plotted for two conditions. If the allowable launch (ϵ) is 10° or less at R_{max} and all other conditions for a successful attack are satisfied the impact point is computed for an R_{max} launch. If these conditions are not met, the next point to be examined is the point where a lead pursuit course starts. The impact point for a launch from this point is then calculated. Of course a missile could be launched anywhere on the course where all necessary launching criteria are met ($R_{min} \geq R \leq R_{max}$, $\lambda \leq \pm 57^{\circ}$ and $\epsilon \leq 10^{\circ}$). On Figure 9 the impact point is calculated for an R_{max} launch ($\epsilon \leq 10^{\circ}$ as shown on Figure 19) and occurs at 20,200 ft. R_{min} occurs at 34.5 seconds.

Figures 10 and 11 give the azimuth (λ_a) and elevation (λ_e) gimbal angles. These are the angles between the radar gimbal mechanical axes (RGMA) and the line of sight (LOS) measured in the plane of the azimuth and elevation gimbals. Referring to Figure 10, it is seen that λ_a varies from 7.5° to -29.5° during the run. Correspondingly, Figure 11 shows that λ_e varies from 10° to -41° during the run.

The graphs of Figures 12 and 13 give the azimuth (ω_k) and elevation (ω_j) line of sight rates. These angular rates are measured in the plane of the gimbals. Figure 14 gives load factor L/W versus range. Referring to this figure, it is seen that at 48,700 ft. range the load factor drops sharply from 2.25 to 1.34. Referring to Figure 9, it is seen that at this range the interceptor course changes from a $C_{L_{max}}$ course to a lead pursuit course. This then explains the reason for the sudden changes in L/W.

Figure 15 gives interceptor angle of attack (α) versus (R). Referring to this figure, it is seen that α builds up from 13.5° to 16° until the range where the interceptor course changes from $C_{L_{max}}$ to lead pursuit at which time α drops sharply to 9.5°. α then builds up again until the interceptor goes back onto a $C_{L_{max}}$ course (30,000 ft. range) at which time it drops off sharply.

Interceptor velocity (V_F) as a function of range is shown on Figure 16. It is seen that during the pull-up attack V_F decreases from 1,698 ft./second to 990 ft./second during the portion of the run that is of interest. Figure 17 gives fighter altitude as a function of range. During this particular pull-up run the interceptor reaches an altitude of approximately 63,000 ft. Target aspect angle (τ) as a function of range is shown on Figure 18.

The heading error of the interceptor (ϵ) is given on Figure 19. ϵ varies from 36.5° to zero during the run. Referring to Figure 9 and accepting the criteria that $\epsilon \leq 10^{\circ}$ for successful missile launch between R_{max} and R_{min}, it is seen that a missile could be launched between the ranges of 58,000 ft. and 17,500 ft. Figure 20 gives the roll angle (ϕ) of the interceptor as a function of range. The roll angle varies from 61° to 8° during the run with a sudden change occurring at the ranges were the course changes from $C_{L_{max}}$ to lead pursuit.

The remaining figures of the report are grouped in the same order as described above for the first family.

ACKNOWLEDGEMENTS

The data presented in this report represents a continuation of the results of the Navy's Air-to-Air Missile Study Program. The analytical results, including those from which the figures were derived, are the results of the computation work underway at Westinghouse Air Arm Division. The authors would like to thank the Analytical Section of this Division for their major contribution to this report. In addition, the authors would like to thank Laurence F. Gilchrist of the Equipment Research Branch, Naval Research Laboratory for his assistance in the preparation of this report.

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TABLE 1

INDEX OF RUNS
(Initial Conditions)

FAMILY 1

τ_o = 0° (Head-on attack)
Target Altitude = 65,000 ft
Target Velocity = M 2.0
Fighter Velocity at Pull-up = V_{max}

1A - Fighter Altitude = 58,000 ft
Box in Probability Grid = B-3

Fig. 9 - Range vs Time
Fig. 10 - Azimuth Gimbal Angle vs Range
Fig. 11 - Elevation Gimbal Angle vs Range
Fig. 12 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 13 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 14 - Load Factor vs Range
Fig. 15 - Angle of Attack vs Range
Fig. 16 - Fighter Velocity vs Range
Fig. 17 - Fighter Altitude vs Range
Fig. 18 - Aspect Angle vs Range
Fig. 19 - Heading Error vs Range
Fig. 20 - Roll Angle vs Range

FAMILY 2

τ_o = 15°
Target Altitude = 65,000 ft
Target Velocity = M 2.0
Fight Velocity at Pull-up = V_{max}

2A - Fighter Altitude = 58,000 ft
Box in Probability Grid = A-3

Fig. 21 - Range vs Time
Fig. 22 - Azimuth Gimbal Angle vs Range
Fig. 23 - Elevation Gimbal Angle vs Range
Fig. 24 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 25 - Line of Sight Rate (Elevation Plane of Antenna) vs Range

Fig. 26 - Load Factor vs Range
Fig. 27 - Angle of Attack vs Range
Fig. 28 - Fighter Velocity vs Range
Fig. 29 - Fighter Altitude vs Range
Fig. 30 - Aspect - Angle vs Range
Fig. 31 - Heading Error vs Range
Fig. 32 - Roll Angle vs Range

2B - Fighter Altitude = 58,000 ft
Box in Probability Grid = F-3

Fig. 33 - Range vs Time
Fig. 34 - Azimuth Gimbal Angle vs Range
Fig. 35 - Elevation Gimbal Angle vs Range
Fig. 36 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 37 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 38 - Load Factor vs Range
Fig. 39 - Angle of Attack vs Range
Fig. 40 - Fighter Velocity vs Range
Fig. 41 - Fighter Altitude vs Range
Fig. 42 - Aspect - Angle vs Range
Fig. 43 - Heading Error vs Range
Fig. 44 - Roll Angle vs Range

2C - Fighter Altitude = 58,000 ft
Box in Probability Grid = H-6

Fig. 45 - Range vs Time
Fig. 46 - Azimuth Gimbal Angle vs Range
Fig. 47 - Elevation Gimbal Angle vs Range
Fig. 48 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 49 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 50 - Load Factor vs Range
Fig. 51 - Angle of Attack vs Range
Fig. 52 - Fighter Velocity vs Range
Fig. 53 - Fighter Altitude vs Range
Fig. 54 - Aspect - Angle vs Range
Fig. 55 - Heading Error vs Range
Fig. 56 - Roll Angle vs Range

2D - Fighter Altitude = 50,000 ft
Box in Probability Grid = A-3

Fig. 57 - Range vs Time
Fig. 58 - Azimuth Gimbal Angle vs Range
Fig. 59 - Elevation Gimbal Angle vs Range
Fig. 60 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 61 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 62 - Load Factor vs Range
Fig. 63 - Angle of Attack vs Range
Fig. 64 - Fighter Velocity vs Range
Fig. 65 - Fighter Altitude vs Range
Fig. 66 - Aspect-Angle vs Range
Fig. 67 - Heading Error vs Range
Fig. 68 - Roll Angle vs Range

2E - Fighter Altitude = 50,000 ft
Box in Probability Grid = A-5

Fig. 69 - Range vs Time
Fig. 70 - Azimuth Gimbal Angle vs Range
Fig. 71 - Elevation Gimbal Angle vs Range
Fig. 72 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 73 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 74 - Load Factor vs Range
Fig. 75 - Angle of Attack vs Range
Fig. 76 - Fighter Velocity vs Range
Fig. 77 - Fighter Altitude vs Range
Fig. 78 - Aspect-Angle vs Range
Fig. 79 - Heading Error vs Range
Fig. 80 - Roll Angle vs Range

2F - Fighter Altitude = 50,000 ft
Box in Probability Grid = D-3

Fig. 81 - Range vs Time
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Fig. 83 - Elevation Gimbal Angle vs Range
Fig. 84 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
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Fig. 88 - Fighter Velocity vs Range
Fig. 89 - Fighter Altitude vs Range
Fig. 90 - Aspect - Angle vs Range
Fig. 91 - Heading Error vs Range
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2G - Fighter Altitude = 50,000 ft
Box in Probability Grid = F-4

Fig. 93 - Range vs Time
Fig. 94 - Azimuth Gimbal Angle vs Range
Fig. 95 - Elevation Gimbal Angle vs Range
Fig. 96 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 97 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 98 - Load Factor vs Range
Fig. 99 - Angle of Attack vs Range
Fig. 100 - Fighter Velocity vs Range
Fig. 101 - Fighter Altitude vs Range
Fig. 102 - Aspect - Angle vs Range
Fig. 103 - Heading Error vs Range
Fig. 104 - Roll Angle vs Range

2H - Fighter Altitude = 50,000 ft
Box in Probability Grid = F-5

Fig. 105 - Range vs Time
Fig. 106 - Azimuth Gimbal Angle vs Range
Fig. 107 - Elevation Gimbal Angle vs Range
Fig. 108 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 109 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 110 - Load Factor vs Range
Fig. 111 - Angle of Attack vs Range
Fig. 112 - Fighter Velocity vs Range
Fig. 113 - Fighter Altitude vs Range
Fig. 114 - Aspect - Angle vs Range
Fig. 115 - Heading Error vs Range
Fig. 116 - Roll Angle vs Range

2I - Fighter Altitude = 40,000 ft
Box in Probability Grid = A-4

Fig. 117 - Range vs Time
Fig. 118 - Azimuth Gimbal Angle vs Range
Fig. 119 - Elevation Gimbal Angle vs Range
Fig. 120 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 121 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 122 - Load Factor vs Range
Fig. 123 - Angle of Attack vs Range
Fig. 124 - Fighter Velocity vs Range
Fig. 125 - Fighter Altitude vs Range
Fig. 126 - Aspect - Angle vs Range
Fig. 127 - Heading Error vs Range
Fig. 128 - Roll Angle vs Range

2J - Fighter Altitude = 40,000 ft
Box in Probability Grid = D-4

Fig. 129 - Range vs Time
Fig. 130 - Azimuth Gimbal Angle vs Range
Fig. 131 - Elevation Gimbal Angle vs Range
Fig. 132 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 133 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 134 - Load Factor vs Range
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Fig. 136 - Fighter Velocity vs Range
Fig. 137 - Fighter Altitude vs Range
Fig. 138 - Aspect - Angle vs Range
Fig. 139 - Heading Error vs Range
Fig. 140 - Roll Angle vs Range

2K - Fighter Altitude = 40,000 ft
Box in Probability Grid = E-4

Fig. 141 - Range vs Time
Fig. 142 - Azimuth Gimbal Angle
Fig. 143 - Elevation Gimbal Angle vs Range
Fig. 144 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 145 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
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Fig. 147 - Angle of Attack vs Range
Fig. 148 - Fighter Velocity vs Range
Fig. 149 - Fighter Altitude vs Range
Fig. 150 - Aspect - Angle vs Range
Fig. 151 - Heading Error vs Range
Fig. 152 - Roll Angle vs Range

2L - Fighter Altitude = 40,000 ft
Box in Probability Grid = G-5

Fig. 153 - Range vs Time
Fig. 154 - Azimuth Gimbal Angle vs Range
Fig. 155 - Elevation Gimbal Angle vs Range
Fig. 156 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 157 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 158 - Load Factor vs Range
Fig. 159 - Angle of Attack vs Range
Fig. 160 - Fighter Velocity vs Range
Fig. 161 - Fighter Altitude vs Range
Fig. 162 - Aspect - Angle vs Range
Fig. 163 - Heading Error vs Range
Fig. 164 - Roll Angle vs Range

2M - Fighter Altitude = 30,000 ft
Box in Probability Grid = A-4

Fig. 165 - Range vs Time
Fig. 166 - Azimuth Gimbal Angle vs Range
Fig. 167 - Elevation Gimbal Angle vs Range
Fig. 168 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 169 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 170 - Load Factor vs Range
Fig. 171 - Angle of Attack vs Range
Fig. 172 - Fighter Velocity vs Range
Fig. 173 - Fighter Altitude vs Range
Fig. 174 - Aspect - Angle vs Range
Fig. 175 - Heading Error vs Range
Fig. 176 - Roll Angle vs Range

2N - Fighter Altitude = 30,000 ft
Box in Probability Grid = B-6

Fig. 177 - Range vs Time
Fig. 178 - Azimuth Gimbal Angle vs Range
Fig. 179 - Elevation Gimbal Angle vs Range
Fig. 180 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 181 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 182 - Load Factor vs Range
Fig. 183 - Angle of Attack vs Range
Fig. 184 - Fighter Velocity vs Range
Fig. 185 - Fighter Altitude vs Range
Fig. 186 - Aspect-Angle vs Range
Fig. 187 - Heading Error vs Range
Fig. 188 - Roll Angle vs Range

20 - Fighter Altitude = 30,000 ft
Box in Probability Grid = D-5

Fig. 189 - Range vs Time
Fig. 190 - Azimuth Gimbal Angle vs Range
Fig. 191 - Elevation Gimbal Angle vs Range
Fig. 192 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 193 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 194 - Load Factor vs Range
Fig. 195 - Angle of Attack vs Range
Fig. 196 - Fighter Velocity vs Range
Fig. 197 - Fighter Altitude vs Range
Fig. 198 - Aspect-Angle vs Range
Fig. 199 - Heading Error vs Range
Fig. 200 - Roll Angle vs Range

2P - Fighter Altitude = 30,000 ft
Box in Probability Grid = G-5

Fig. 201 - Range vs Time
Fig. 202 - Azimuth Gimbal Angle vs Range
Fig. 203 - Elevation Gimbal Angle vs Range
Fig. 204 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 205 - Line of Sight Rate (Elevation Plane of Antenna) vs Range

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Fig. 208 - Fighter Velocity vs Range
Fig. 209 - Fighter Altitude vs Range
Fig. 210 - Aspect - Angle vs Range
Fig. 211 - Heading Error vs Range
Fig. 212 - Roll Angle vs Range

2Q - Fighter Altitude = 20,000 ft
Box in Probability Grid = E-5

Fig. 213 - Range vs Time
Fig. 214 - Azimuth Gimbal Angle vs Range
Fig. 215 - Elevation Gimbal Angle vs Range
Fig. 216 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 217 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 218 - Load Factor vs Range
Fig. 219 - Angle of Attack vs Range
Fig. 220 - Fighter Velocity vs Range
Fig. 221 - Fighter Altitude vs Range
Fig. 222 - Aspect - Angle vs Range
Fig. 223 - Heading Error vs Range
Fig. 224 - Roll Angle vs Range

2R - Fighter Altitude = 20,000 ft
Box in Probability Grid = E-6

Fig. 225 - Range vs Time
Fig. 226 - Azimuth Gimbal Angle vs Range
Fig. 227 - Elevation Gimbal Angle vs Range
Fig. 228 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 229 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 230 - Load Factor vs Range
Fig. 231 - Angle of Attack vs Range
Fig. 232 - Fighter Velocity vs Range
Fig. 233 - Fighter Altitude vs Range
Fig. 234 - Aspect - Angle vs Range
Fig. 235 - Heading Error vs Range
Fig. 236 - Roll Angle vs Range

FAMILY 3

$\gamma_o = 30^\circ$
Target Altitude = 65,000 ft
Target Velocity = M 2.0
Fighter Velocity at Pull-up = V_{max}

3A - Fighter Altitude = 58,000 ft
Box in Probability Grid = F-3

Fig. 237 - Range vs Time
Fig. 238 - Azimuth Gimbal Angle vs Range
Fig. 239 - Elevation Gimbal Angle vs Range
Fig. 240 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 241 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
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Fig. 243 - Angle of Attack vs Range
Fig. 244 - Fighter Velocity vs Range
Fig. 245 - Fighter Altitude vs Range
Fig. 246 - Aspect - Angle vs Range
Fig. 247 - Heading Error vs Range
Fig. 248 - Roll Angle vs Range

3B - Fighter Altitude = 50,000 ft
Box in Probability Grid = A-4

Fig. 249 - Range vs Time
Fig. 250 - Azimuth Gimbal Angle vs Range
Fig. 251 - Elevation Gimbal Angle vs Range
Fig. 252 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 253 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 254 - Load Factor vs Range
Fig. 255 - Angle of Attack vs Range
Fig. 256 - Fighter Velocity vs Range
Fig. 257 - Fighter Altitude vs Range
Fig. 258 - Aspect - Angle vs Range
Fig. 259 - Heading Error vs Range
Fig. 260 - Roll Angle vs Range

3C - Fighter Altitude = 50,000 ft
Box in Probability Grid = B-1

Fig. 261 - Range vs Time
Fig. 262 - Azimuth Gimbal Angle vs Range
Fig. 263 - Elevation Gimbal Angle vs Range
Fig. 264 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 265 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 266 - Load Factor vs Range
Fig. 267 - Angle of Attack vs Range
Fig. 268 - Fighter Velocity vs Range
Fig. 269 - Fighter Altitude vs Range
Fig. 270 - Aspect - Angle vs Range
Fig. 271 - Heading Error vs Range
Fig. 272 - Roll Angle vs Range

3D - Fighter Altitude = 50,000 ft
Box in Probability Grid = E-3

Fig. 273 - Range vs Time
Fig. 274 - Azimuth Gimbal Angle vs Range
Fig. 275 - Elevation Gimbal Angle vs Range
Fig. 276 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 277 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 278 - Load Factor vs Range
Fig. 279 - Angle of Attack vs Range
Fig. 280 - Fighter Velocity vs Range
Fig. 281 - Fighter Altitude vs Range
Fig. 282 - Aspect - Angle vs Range
Fig. 283 - Heading Error vs Range
Fig. 284 - Roll Angle vs Range

3E - Fighter Altitude = 50,000 ft
Box in Probability Grid = F-5

Fig. 285 - Range vs Time
Fig. 286 - Azimuth Gimbal Angle vs Range
Fig. 287 - Elevation Gimbal Angle vs Range
Fig. 288 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 289 - Line of Sight Rate (Elevation Plane of Antenna) vs Range

Fig. 290 - Load Factor vs Range
Fig. 291 - Angle of Attack vs Range
Fig. 292 - Fighter Velocity vs Range
Fig. 293 - Fighter Altitude vs Range
Fig. 294 - Aspect - Angle vs Range
Fig. 295 - Heading Error vs Range
Fig. 296 - Roll Angle vs Range

3F - Fighter Altitude = 40,000 ft
Box in Probability Grid = A-5

Fig. 297 - Range vs Time
Fig. 298 - Azimuth Gimbal Angle vs Range
Fig. 299 - Elevation Gimbal Angle vs Range
Fig. 300 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 301 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 302 - Load Factor vs Range
Fig. 303 - Angle of Attack vs Range
Fig. 304 - Fighter Velocity vs Range
Fig. 305 - Fighter Altitude vs Range
Fig. 306 - Aspect - Angle vs Range
Fig. 307 - Heading Error vs Range
Fig. 308 - Roll Angle vs Range

3G - Fighter Altitude = 40,000 ft
Box in Probability Grid = E-3

Fig. 309 - Range vs Time
Fig. 310 - Azimuth Gimbal Angle vs Range
Fig. 311 - Elevation Gimbal Angle vs Range
Fig. 312 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 313 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 314 - Load Factor vs Range
Fig. 315 - Angle of Attack vs Range
Fig. 316 - Fighter Velocity vs Range
Fig. 317 - Fighter Altitude vs Range
Fig. 318 - Aspect - Angle vs Range
Fig. 319 - Heading Error vs Range
Fig. 320 - Roll Angle vs Range

3H - Fighter Altitude = 40,000 ft
Box in Probability Grid = G-5

Fig. 321 - Range vs Time
Fig. 322 - Azimuth Gimbal Angle vs Range
Fig. 323 - Elevation Gimbal Angle vs Range
Fig. 324 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 325 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 326 - Load Factor vs Range
Fig. 327 - Angle of Attack vs Range
Fig. 328 - Fighter Velocity vs Range
Fig. 329 - Fighter Altitude vs Range
Fig. 330 - Aspect - Angle vs Range
Fig. 331 - Heading Error vs Range
Fig. 332 - Roll Angle vs Range

3I - Fighter Altitude = 30,000 ft
Box in Probability Grid = E-3

Fig. 333 - Range vs Time
Fig. 334 - Azimuth Gimbal Angle vs Range
Fig. 335 - Elevation Gimbal Angle vs Range
Fig. 336 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 337 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 338 - Load Factor vs Range
Fig. 339 - Angle of Attack vs Range
Fig. 340 - Fighter Velocity vs Range
Fig. 341 - Fighter Altitude vs Range
Fig. 342 - Aspect - Angle vs Range
Fig. 343 - Heading Error vs Range
Fig. 344 - Roll Angle vs Range

3J - Fighter Altitude = 30,000 ft
Box in Probability Grid = G-5

Fig. 345 - Range vs Time
Fig. 346 - Azimuth Gimbal Angle vs Range
Fig. 347 - Elevation Gimbal Angle vs Range
Fig. 348 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 349 - Line of Sight Rate (Elevation Plane of Antenna) vs Range

Fig. 350 - Load Factor vs Range
Fig. 351 - Angle of Attack vs Range
Fig. 352 - Fighter Velocity vs Range
Fig. 353 - Fighter Altitude vs Range
Fig. 354 - Aspect-Angle vs Range
Fig. 355 - Heading Error vs Range
Fig. 356 - Roll Angle vs Range

3K - Fighter Altitude = 20,000 ft
Box in Probability Grid = E-5

Fig. 357 - Range vs Time
Fig. 358 - Azimuth Gimbal Angle vs Range
Fig. 359 - Elevation Gimbal Angle vs Range
Fig. 360 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 361 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 362 - Load Factor vs Range
Fig. 363 - Angle of Attack vs Range
Fig. 364 - Fighter Velocity vs Range
Fig. 365 - Fighter Altitude vs Range
Fig. 366 - Aspect-Angle vs Range
Fig. 367 - Heading Error vs Range
Fig. 368 - Roll Angle vs Range

3L - Fighter Altitude = 20,000 ft
Box in Probability Grid = G-6

Fig. 369 - Range vs Time
Fig. 370 - Azimuth Gimbal Angle vs Range
Fig. 371 - Elevation Gimbal Angle vs Range
Fig. 372 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 373 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 374 - Load Factor vs Range
Fig. 375 - Angle of Attack vs Range
Fig. 376 - Fighter Velocity vs Range
Fig. 377 - Fighter Altitude vs Range
Fig. 378 - Aspect-Angle vs Range
Fig. 379 - Heading Error vs Range
Fig. 380 - Roll Angle vs Range

3M - Fighter Altitude = 10,000 ft
Box in Probability Grid = D-6

Fig. 381 - Range vs Time
Fig. 382 - Azimuth Gimbal Angle vs Range
Fig. 383 - Elevation Gimbal Angle vs Range
Fig. 384 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 385 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 386 - Load Factor vs Range
Fig. 387 - Angle of Attack vs Range
Fig. 388 - Fighter Velocity vs Range
Fig. 389 - Fighter Altitude vs Range
Fig. 390 - Aspect - Angle vs Range
Fig. 391 - Heading Error vs Range
Fig. 392 - Roll Angle vs Range

FAMILY 4

$\gamma_o = 45^o$
Target Altitude = 65,000 ft
Target Velocity = M 2.0
Fighter Velocity at Pull-up = V_{max}

4A - Fighter Altitude = 58,000 ft
Box in Probability Grid = A-6

Fig. 393 - Range vs Time
Fig. 394 - Azimuth Gimbal Angle vs Range
Fig. 395 - Elevation Gimbal Angle vs Range
Fig. 396 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 397 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 398 - Load Factor vs Range
Fig. 399 - Angle of Attack vs Range
Fig. 400 - Fighter Velocity vs Range
Fig. 401 - Fighter Altitude vs Range
Fig. 402 - Aspect - Angle vs Range
Fig. 403 - Heading Error vs Range
Fig. 404 - Roll Angle vs Range

4B - Fighter Altitude = 58,000 ft
Box in Probability Grid = E-4

Fig. 405 - Range vs Time
Fig. 406 - Azimuth Gimbal Angle vs Range
Fig. 407 - Elevation Gimbal Angle vs Range
Fig. 408 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 409 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 410 - Load Factor vs Range
Fig. 411 - Angle of Attack vs Range
Fig. 412 - Fighter Velocity vs Range
Fig. 413 - Fighter Altitude vs Range
Fig. 414 - Aspect - Angle vs Range
Fig. 415 - Heading Error vs Range
Fig. 416 - Roll Angle vs Range

4C - Fighter Altitude = 50,000 ft
Box in Probability Grid = A-4

Fig. 417 - Range vs Time
Fig. 418 - Azimuth Gimbal Angle vs Range
Fig. 419 - Elevation Gimbal Angle vs Range
Fig. 420 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 421 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 422 - Load Factor vs Range
Fig. 423 - Angle of Attack vs Range
Fig. 424 - Fighter Velocity vs Range
Fig. 425 - Fighter Altitude vs Range
Fig. 426 - Aspect - Angle vs Range
Fig. 427 - Heading Error vs Range
Fig. 428 - Roll Angle vs Range

4D - Fighter Altitude = 50,000 ft
Box in Probability Grid = F-3

Fig. 429 - Range vs Time
Fig. 430 - Azimuth Gimbal Angle vs Range
Fig. 431 - Elevation Gimbal Angle vs Range
Fig. 432 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 433 - Line of Sight Rate (Elevation Plane of Antenna) vs Range

Fig 434 Load Factor vs Range
Fig. 435 - Angle of Attack vs Range
Fig. 436 - Fighter Velocity vs Range
Fig. 437 - Fighter Altitude vs Range
Fig. 438 - Aspect - Angle vs Range
Fig. 439 - Heading Error vs Range
Fig. 440 - Roll Angle vs Range

4E - Fighter Altitude = 40,000 ft
Box in Probability Grid = A-6

Fig. 441 - Range vs Time
Fig. 442 - Azimuth Gimbal Angle vs Range
Fig. 443 - Elevation Gimbal Angle vs Range
Fig. 444 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 445 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 446 - Load Factor vs Range
Fig. 447 - Angle of Attack vs Range
Fig. 448 - Fighter Velocity vs Range
Fig. 449 - Fighter Altitude vs Range
Fig. 450 - Aspect - Angle vs Range
Fig. 451 - Heading Error vs Range
Fig. 452 - Roll Angle vs Range

4F - Fighter Altitude = 30,000 ft
Box in Probability Grid = B-3

Fig. 453 - Range vs Time
Fig. 454 - Azimuth Gimbal Angle vs Range
Fig. 455 - Elevation Gimbal Angle vs Range
Fig. 456 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 457 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 458 - Load Factor va Range
Fig. 459 - Angle of Attack vs Range
Fig. 460 - Fighter Velocity vs Range
Fig. 461 - Fighter Altitude vs Range
Fig. 462 - Aspect - Angle vs Range
Fig. 463 - Heading Error vs Range
Fig. 464 - Roll Angle vs Range

4G - Fighter Altitude = 20,000 ft
Box in Probability Grid = B-4

Fig. 465 - Range vs Time
Fig. 466 - Azimuth Gimbal Angle vs Range
Fig. 467 - Elevation Gimbal Angle vs Range
Fig. 468 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 469 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 470 - Load Factor vs Range
Fig. 471 - Angle of Attack vs Range
Fig. 472 - Fighter Velocity vs Range
Fig. 473 - Fighter Altitude vs Range
Fig. 474 - Aspect - Angle vs Range
Fig. 475 - Heading Error vs Range
Fig. 476 - Roll Angle vs Range

4H - Fighter Altitude = 20,000 ft
Box in Probability Grid = C-3

Fig. 477 - Range vs Time
Fig. 478 - Azimuth Gimbal Angle vs Range
Fig. 479 - Elevation Gimbal Angle vs Range
Fig. 480 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 481 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 482 - Load Factor vs Range
Fig. 483 - Angle of Attack vs Range
Fig. 484 - Fighter Velocity vs Range
Fig. 485 - Fighter Altitude vs Range
Fig. 486 - Aspect - Angle vs Range
Fig. 487 - Heading Error vs Range
Fig. 488 - Roll Angle vs Range

4I - Fighter Altitude = 20,000 ft
Box in Probability Grid = E-3

Fig. 489 - Range vs Time
Fig. 490 - Azimuth Gimbal Angle vs Range
Fig. 491 - Elevation Gimbal Angle vs Range
Fig. 492 - Line of Sight Rate (Azimuth Plane of Antenna) vs Range
Fig. 493 - Line of Sight Rate (Elevation Plane of Antenna) vs Range
Fig. 494 - Load Factor vs Range
Fig. 495 - Angle of Attack vs Range
Fig. 496 - Fighter Velocity vs Range
Fig. 497 - Fighter Altitude vs Range
Fig. 498 - Aspect - Angle vs Range
Fig. 499 - Heading Error vs Range
Fig. 500 - Roll Angle vs Range

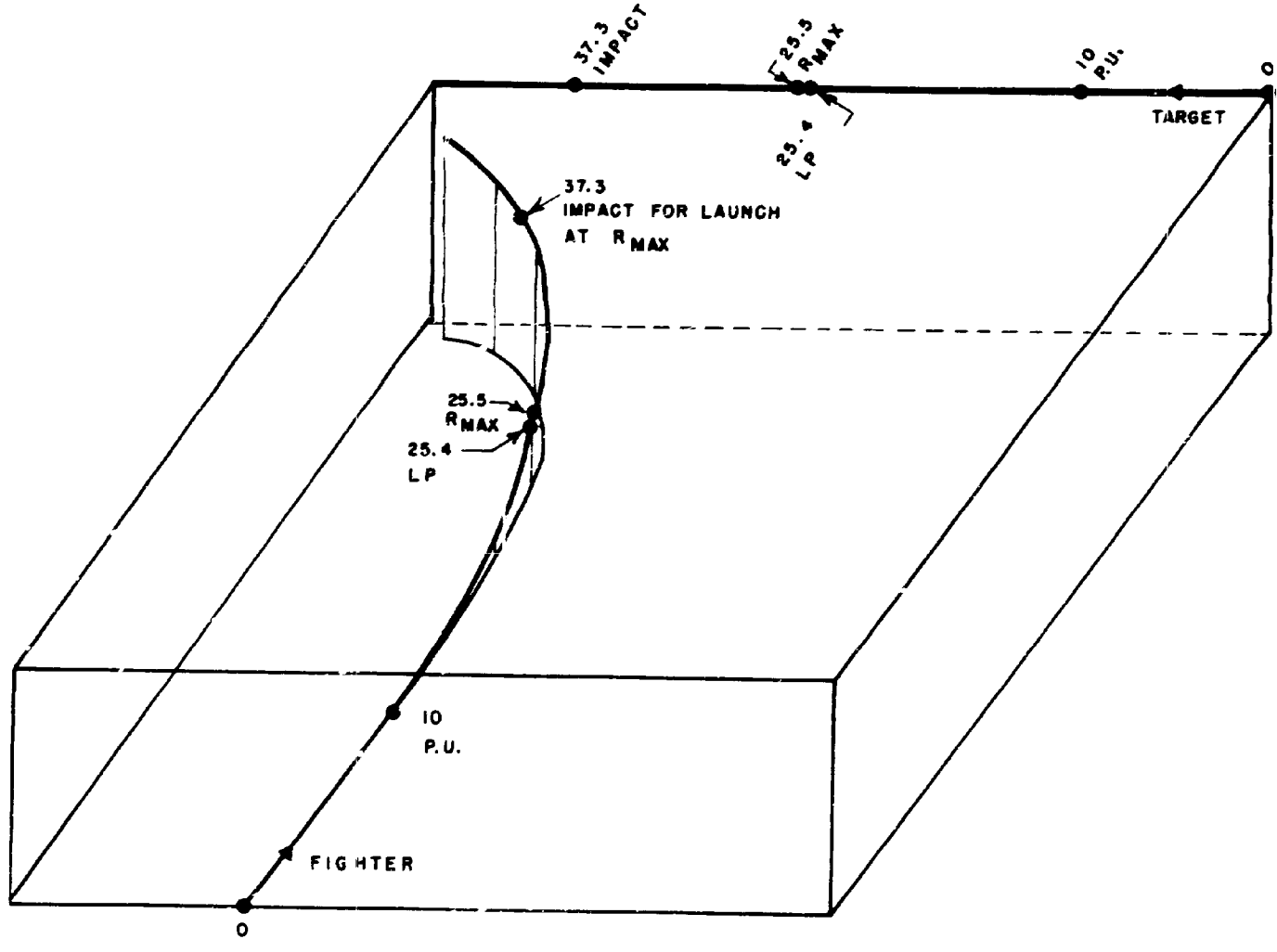

Fig. 1- Typical Pull-up Attack

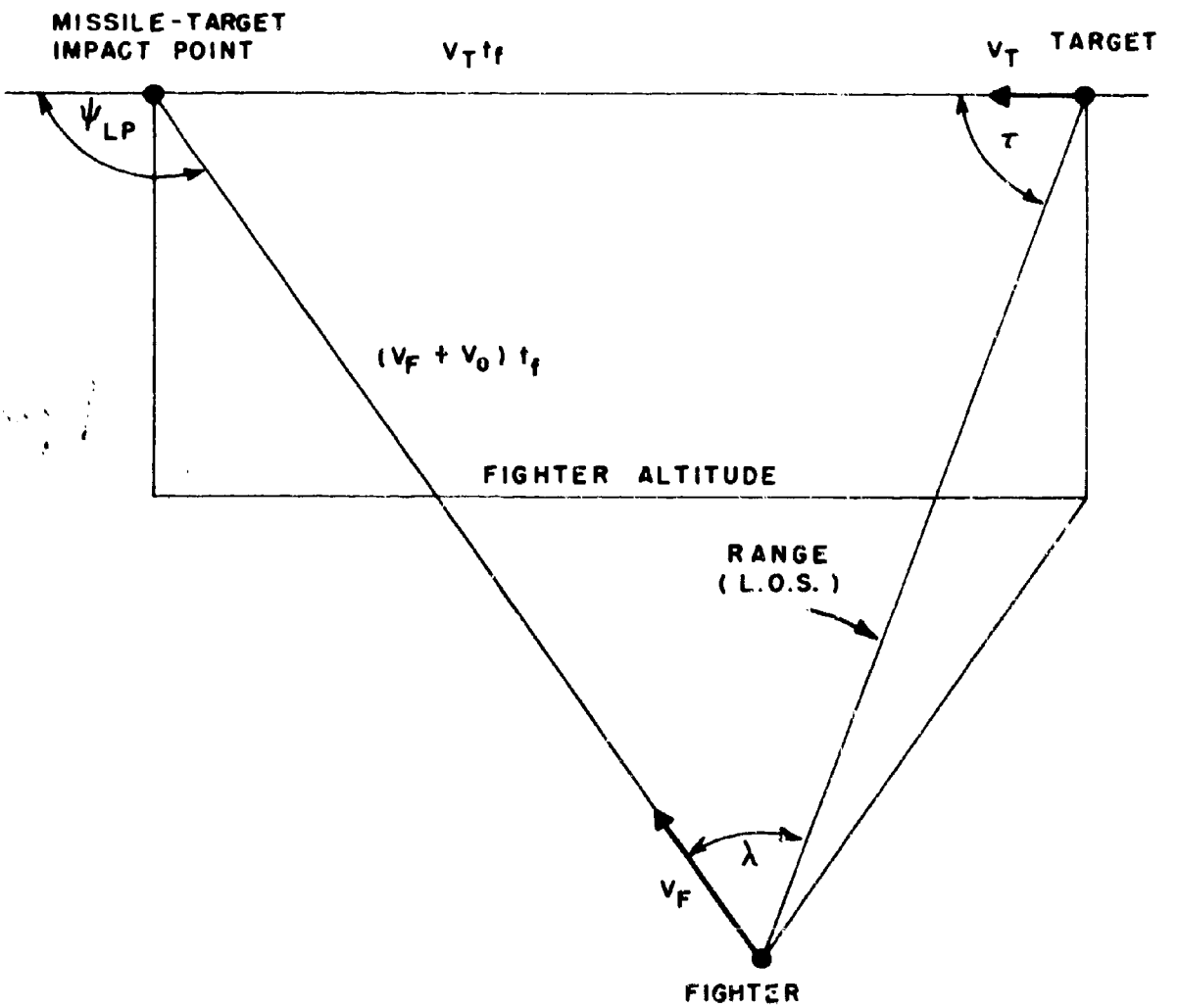

Fig. 2- Lead Pursuit Geometry

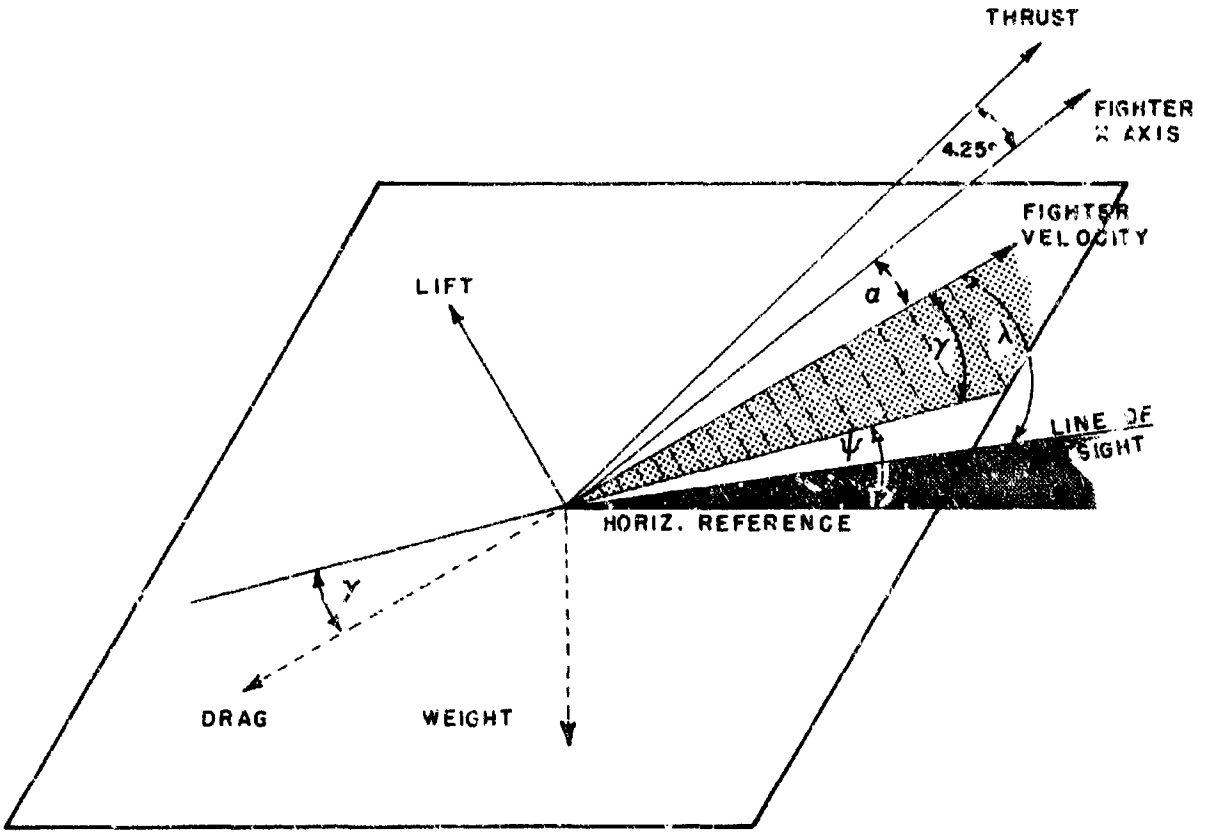

Fig. 3- Fighter Geometry

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Fig. 4 -Probability of Successful Arrival to Missile Launch for Pull-up Attacks, Head-on - AN/APQ-72 (XN-3) Radar
Mach 2.0 Target 65,000 Ft.
Pull-up 3g or $C_{L_{Max}}$

Vectoring Accuracy- σ = 3 N. Miles in Azimuth
Antenna Coverage
Azimuth ± 57°
Elevation ± 57°

V_F M 2.0 or $V_{F_{Max}}$

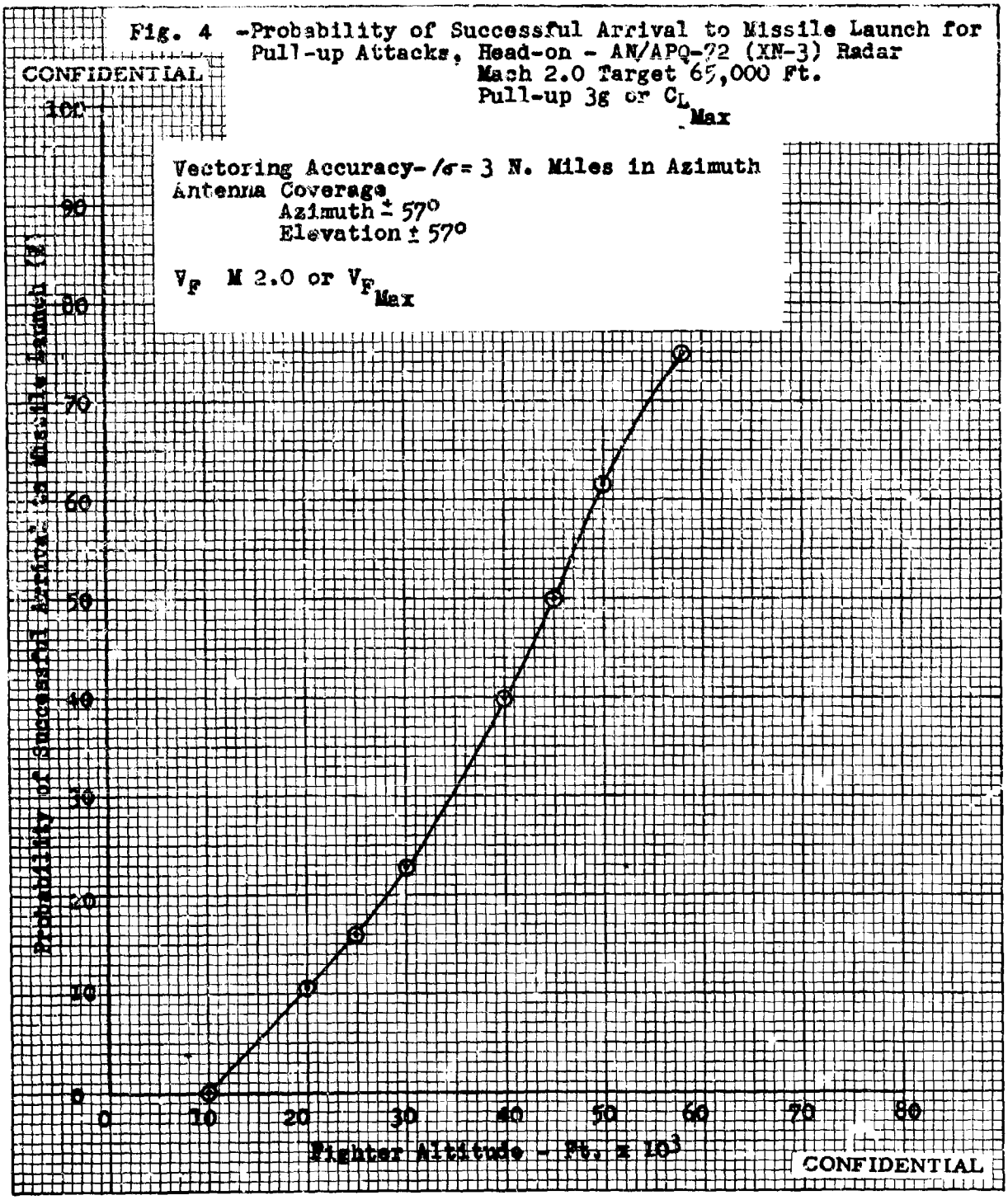

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Fig. 5 - Probability of Successful Arrival to Missile Launch for Pull-up Attacks, $\gamma_o = 15^o$ - AN/APQ-72 (XN-3) Radar

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Mach 2.0 Target 65,000
Pull-up 3g or $C_{L_{Max}}$

Vectoring Accuracy - σ = 3 N. Miles in Azimuth
Antenna Coverage
Azimuth $\pm 57^o$
Elevation $\pm 57^o$

V_F M 2.0 or $V_{F_{Max}}$

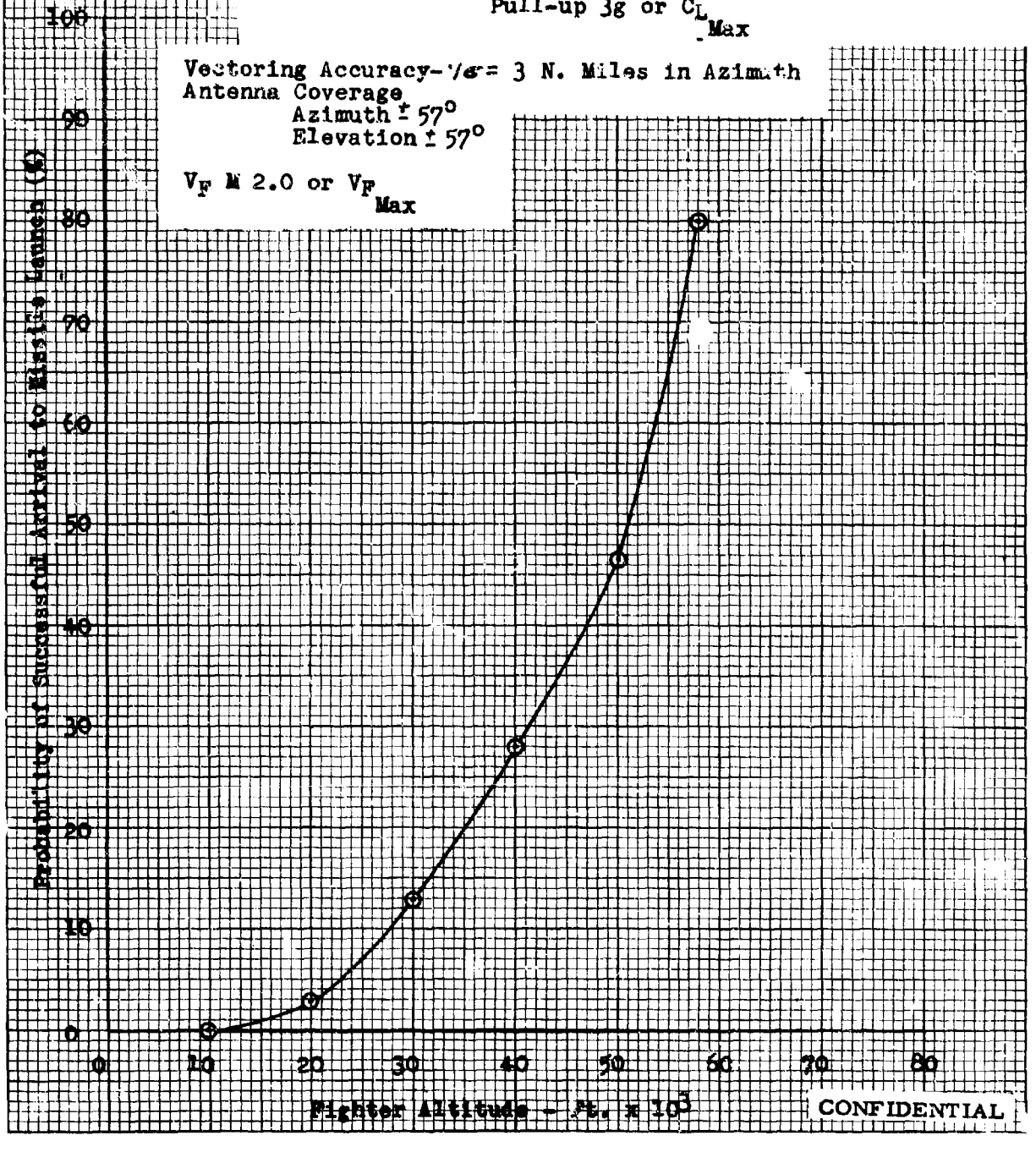

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Fig. 6 - Probability of Successful Arrival to Missile Launch for Pull-up Attacks, $\gamma_o = 30^\circ$ - AN/APQ-72 (XN-3) Radar
Mach 2.0 Target 65,000 Ft.
Pull-up 3g or $C_{L_{Max}}$

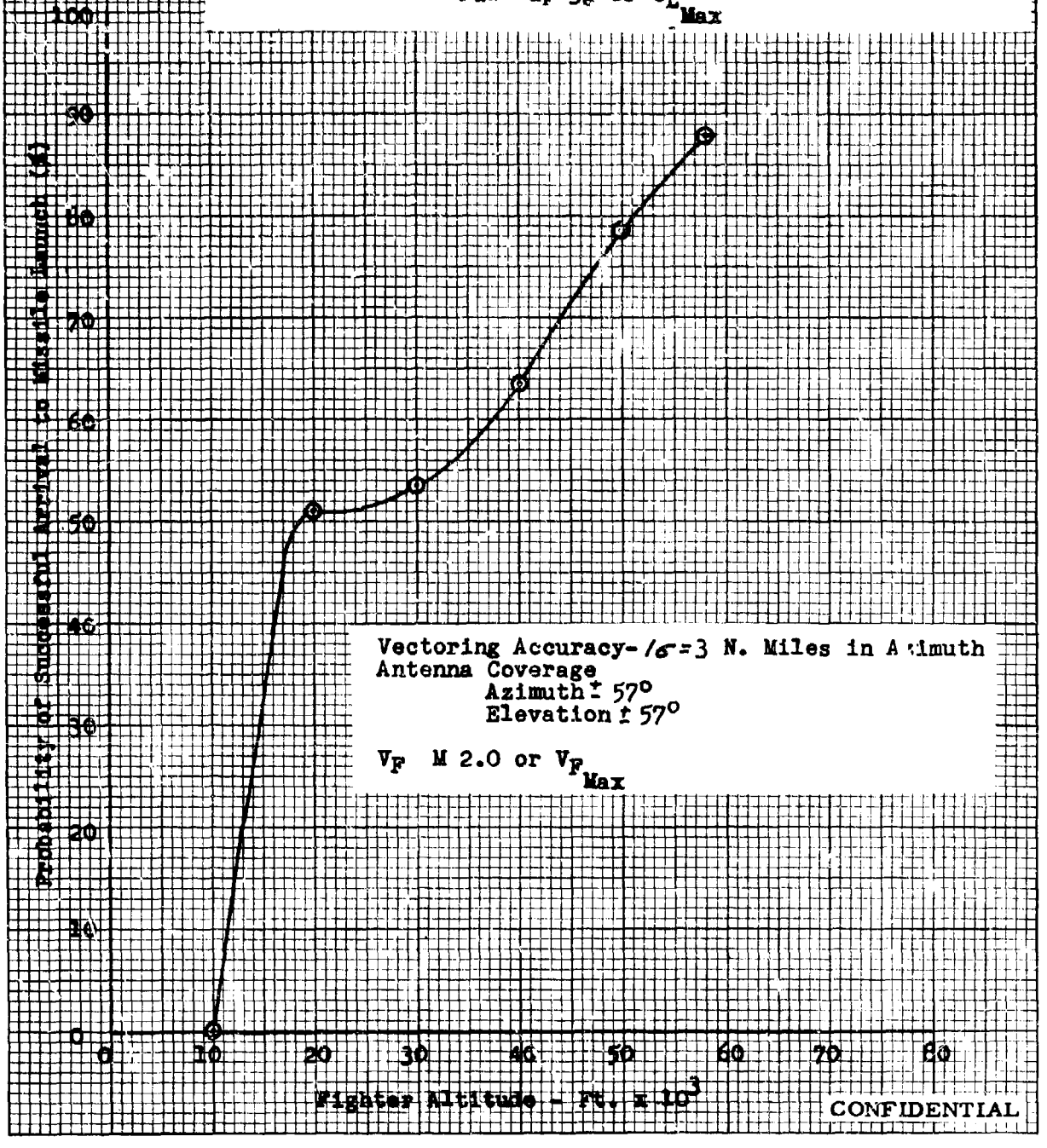

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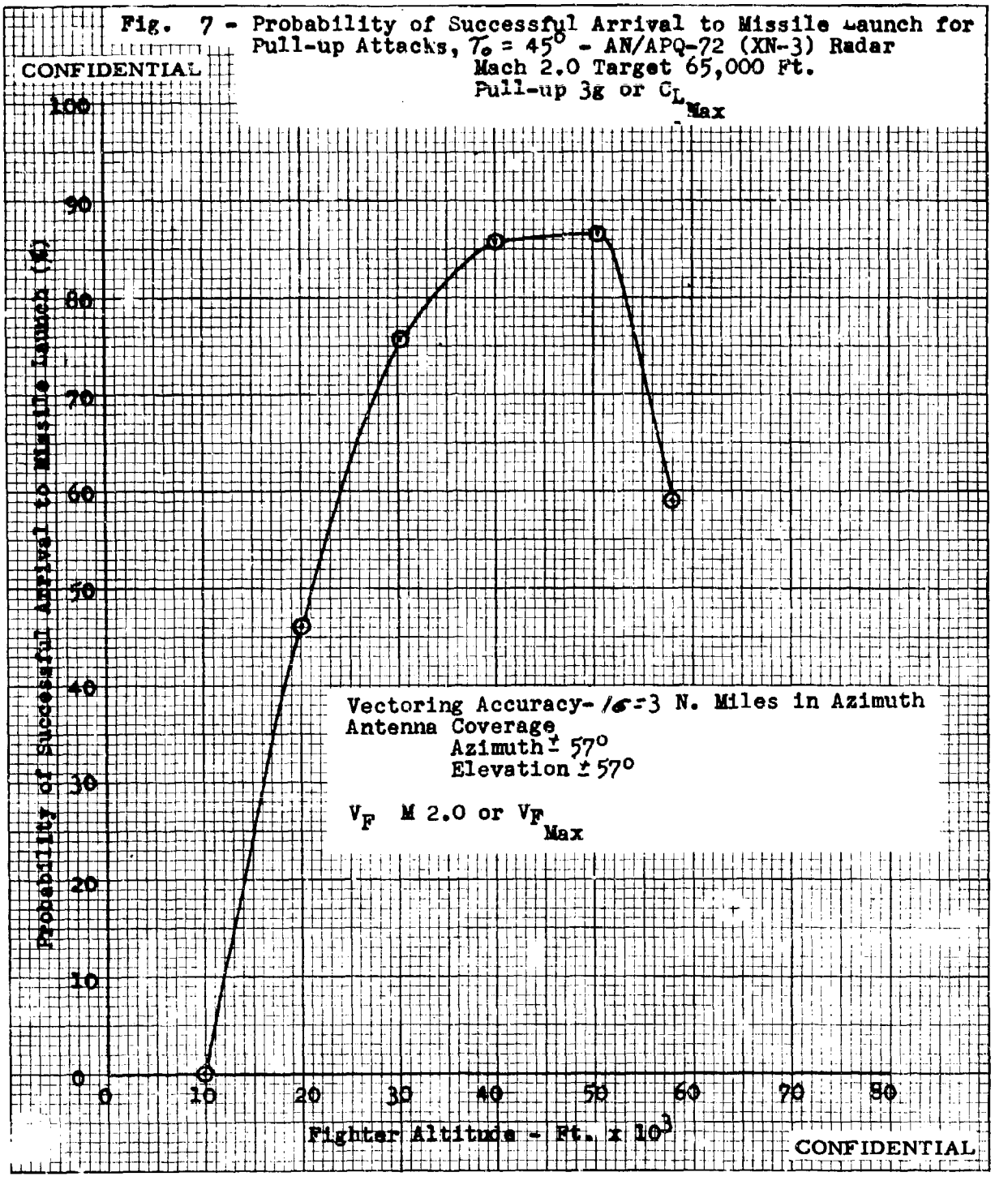
Fig. 7 - Probability of Successful Arrival to Missile Launch for Pull-up Attacks, $\gamma_o = 45^o$ - AN/APQ-72 (XN-3) Radar
Mach 2.0 Target 65,000 Ft.
Pull-up 3g or $C_{L_{Max}}$



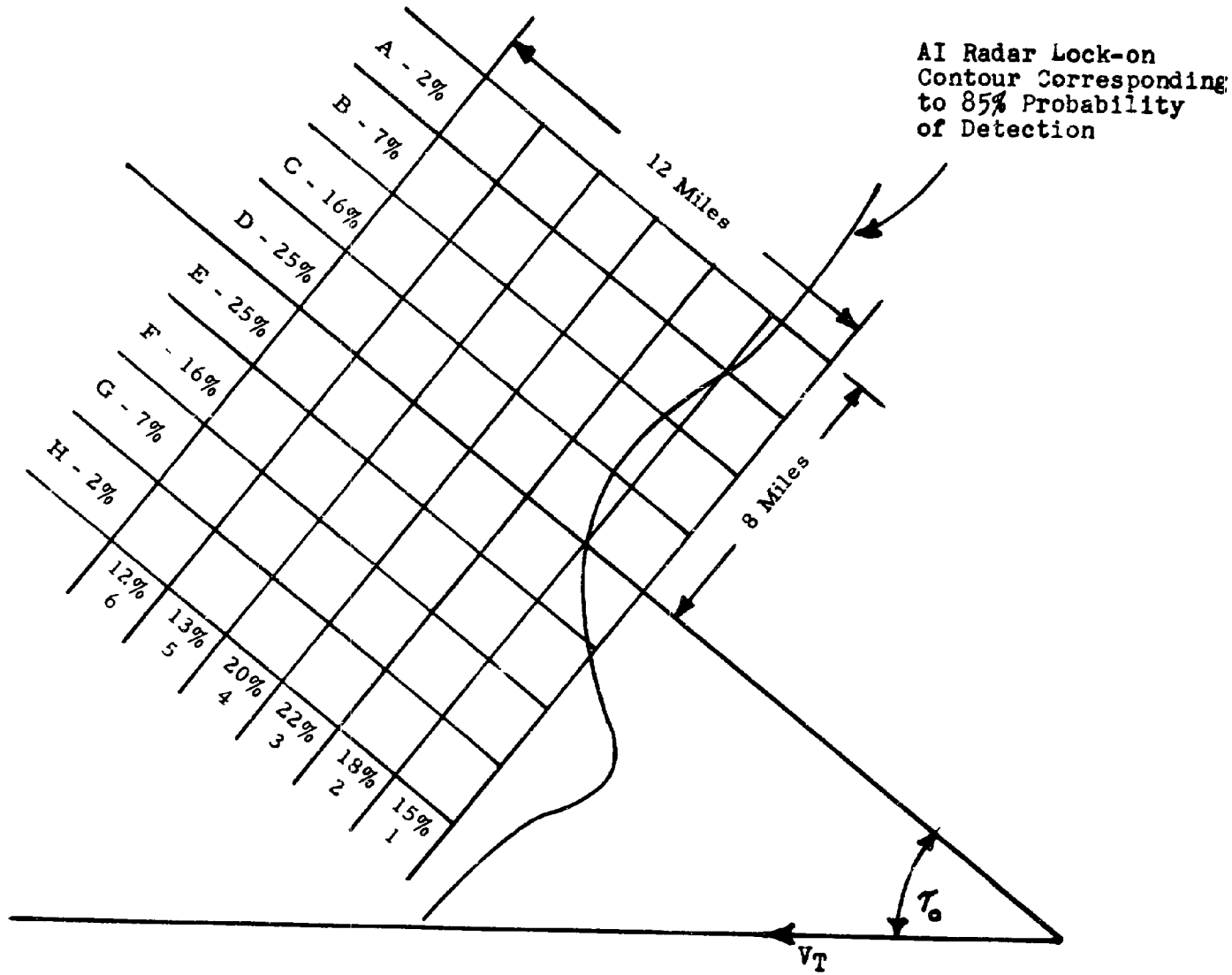


Fig. 8 - Probability Grid from which Intercepts Originate

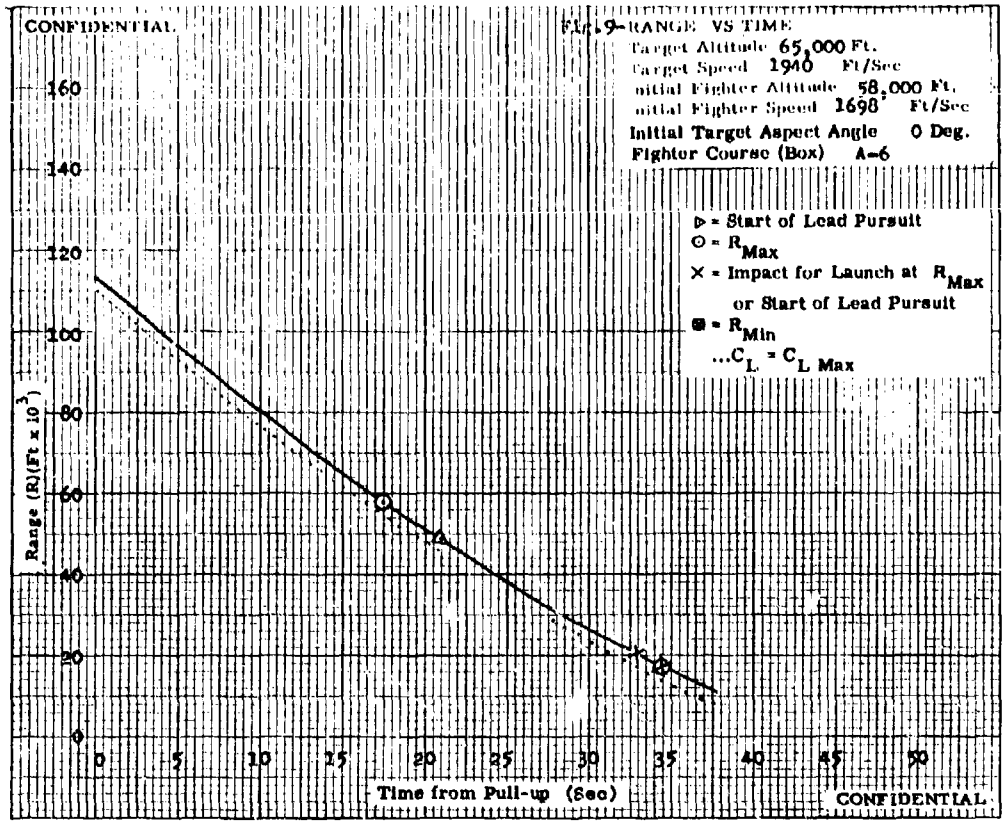

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Fig. 9 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) A-6
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
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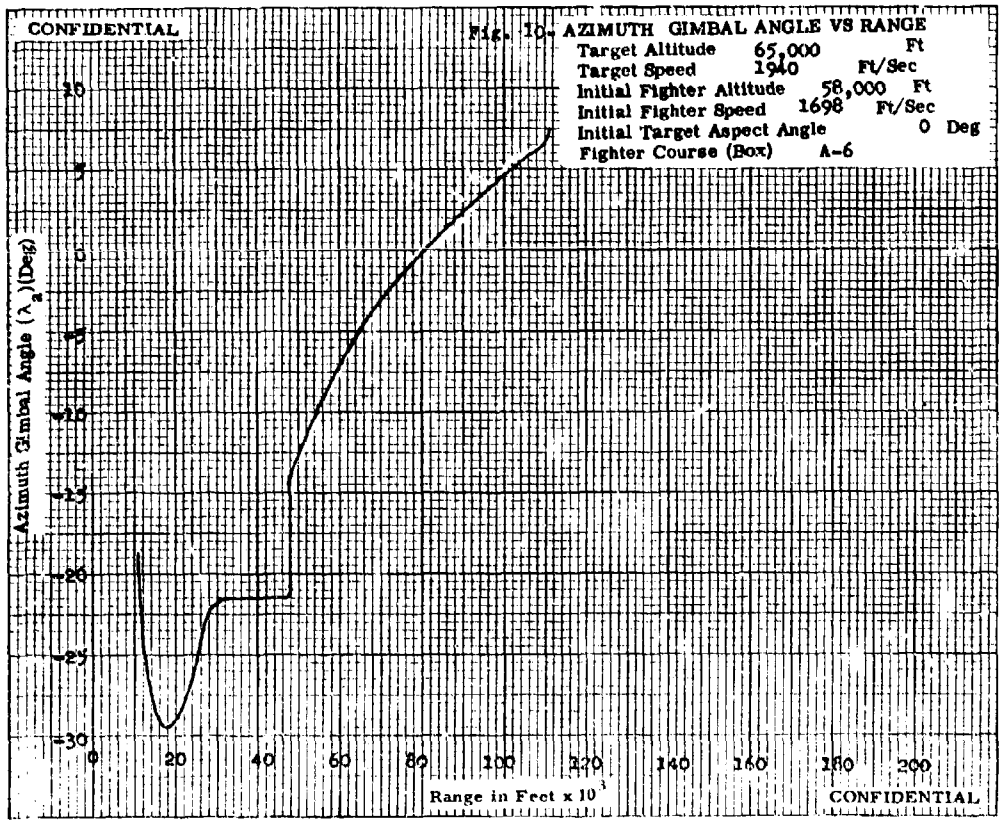
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Fig. 10 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg
Fighter Course (Box) A-6
Azimuth Gimbal Angle (λ_2)(Deg)
-30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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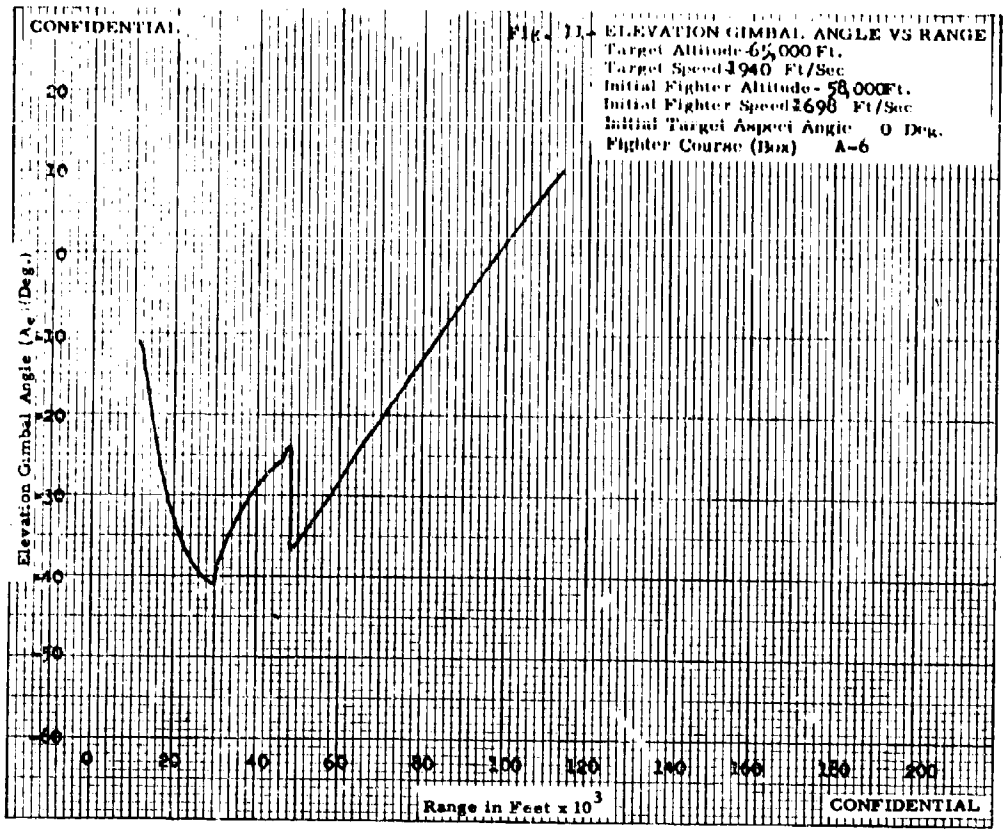
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Fig. 11 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude - 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) A-6
Elevation Gimbal Angle (Deg.)
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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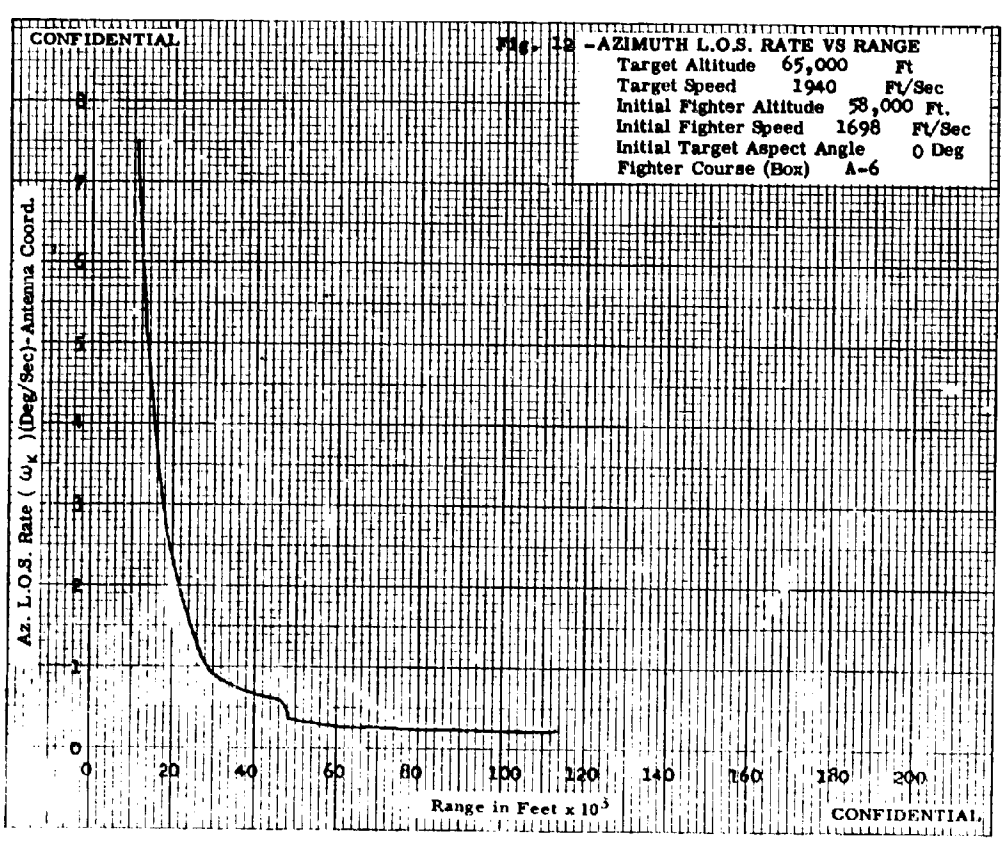
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Fig. 12 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg
Fighter Course (Box) A-6
Az. L.O.S. Rate (ω_K) (Deg/Sec) - Antenna Coord.
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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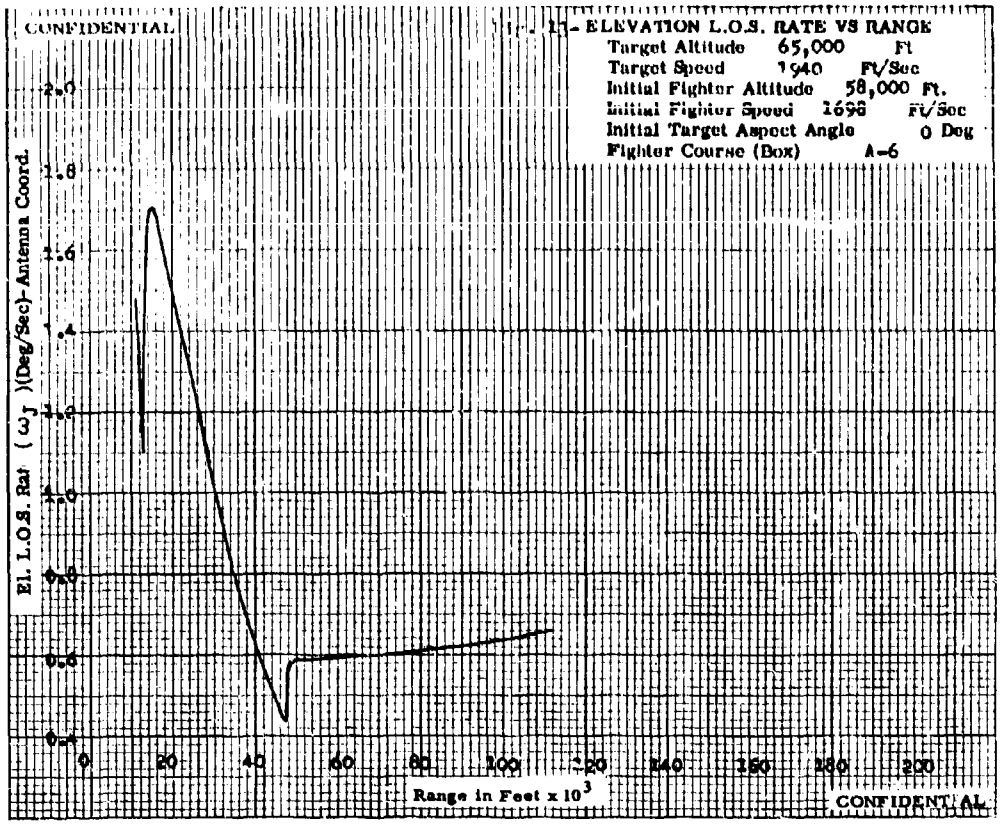
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Fig. 11 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg
Fighter Course (Box) A-6
El. L.O.S. Rat (ω_J)(Deg/Sec)-Antenna Coord.
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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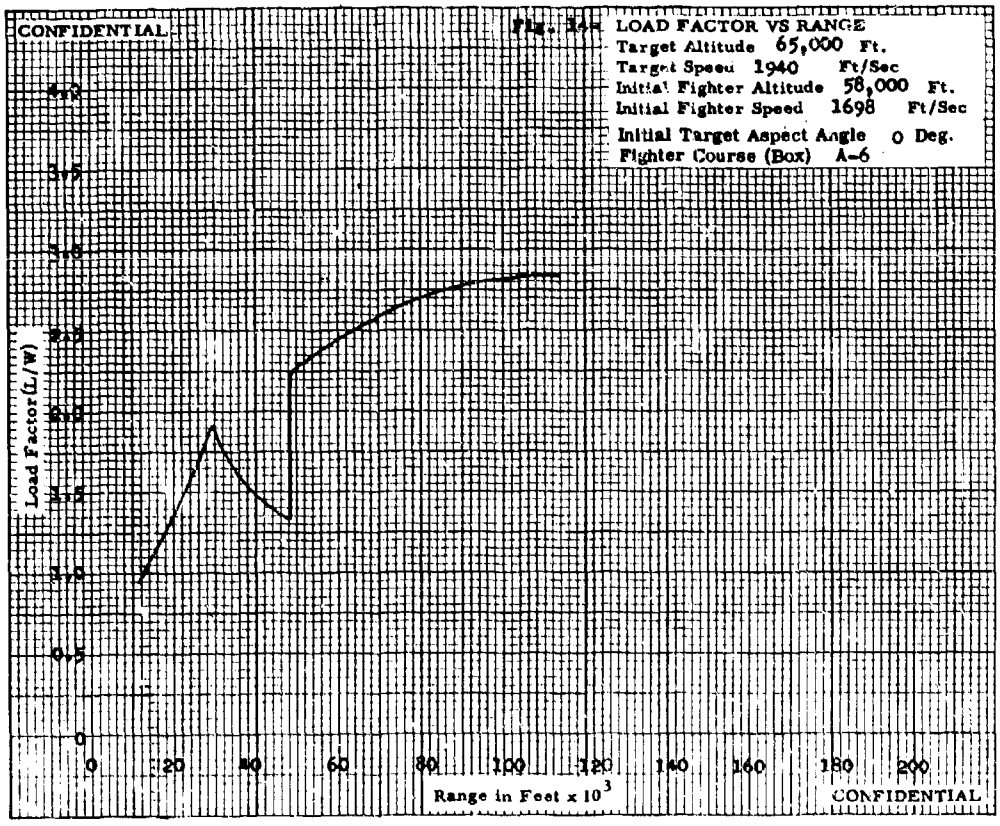
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Fig. 14 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) A-6
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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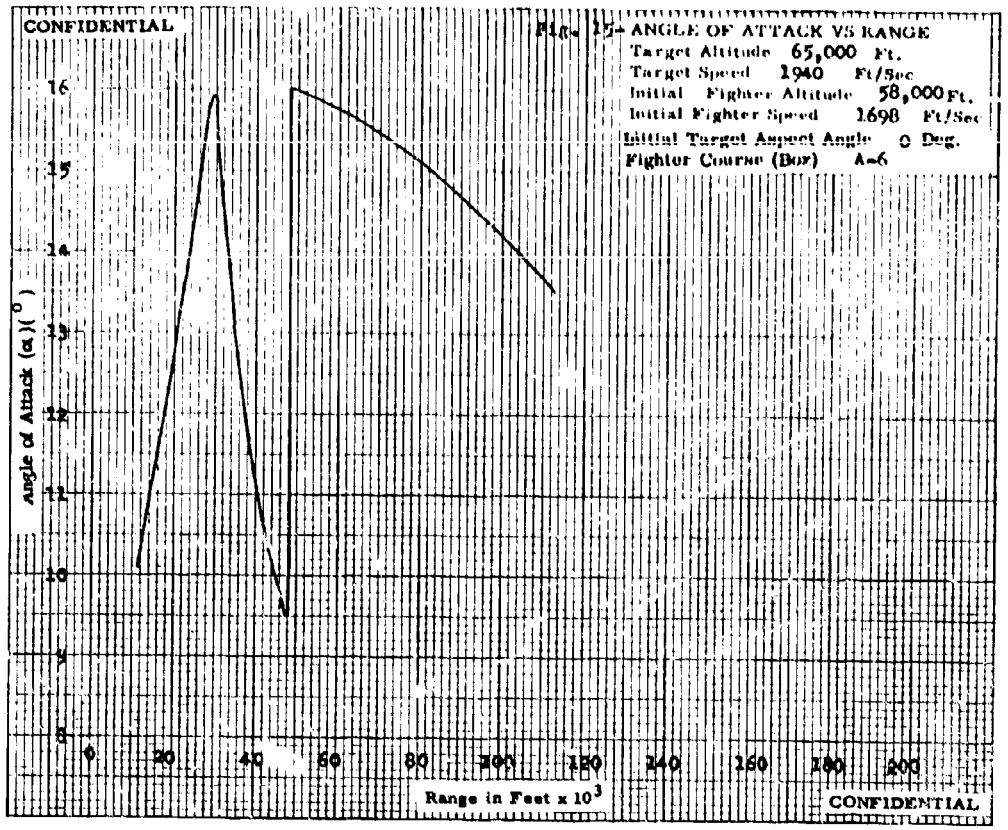
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ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) A-6
Angle of Attack (α)(°)
16
15
14
13
12
11
10
9
8
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
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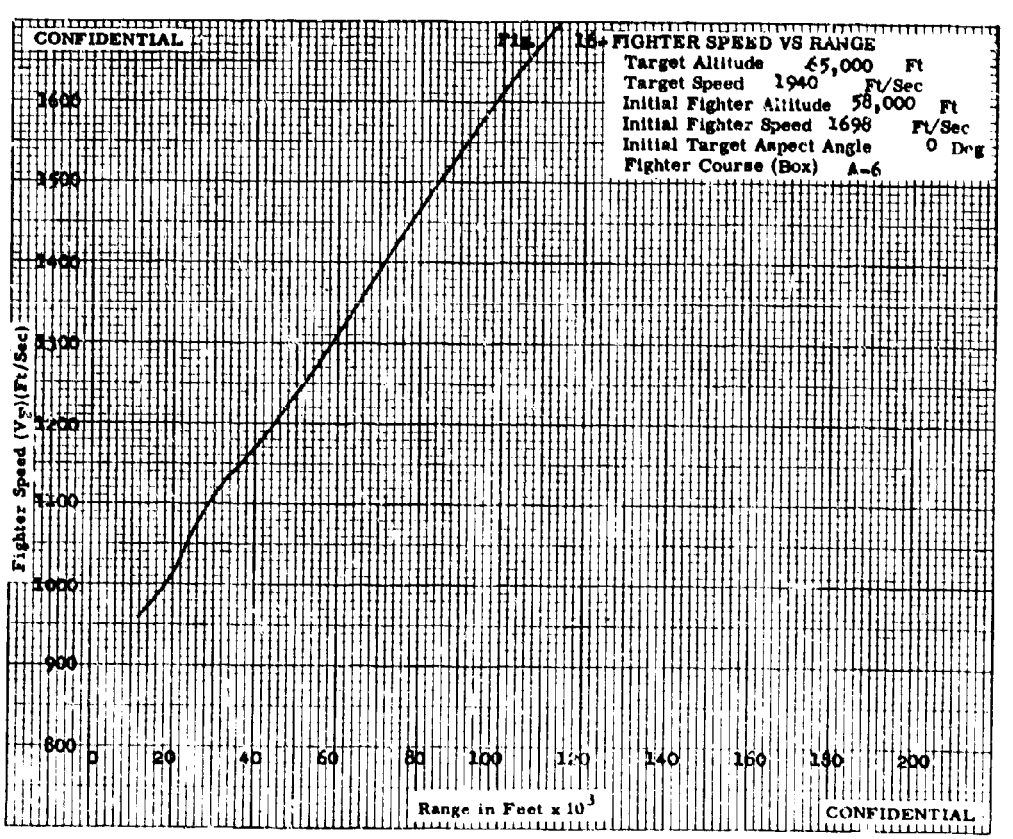
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FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg
Fighter Course (Box) A-6
Fighter Speed (Vf)(Ft/Sec)
1600
1500
1400
1300
1200
1100
1000
900
800
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
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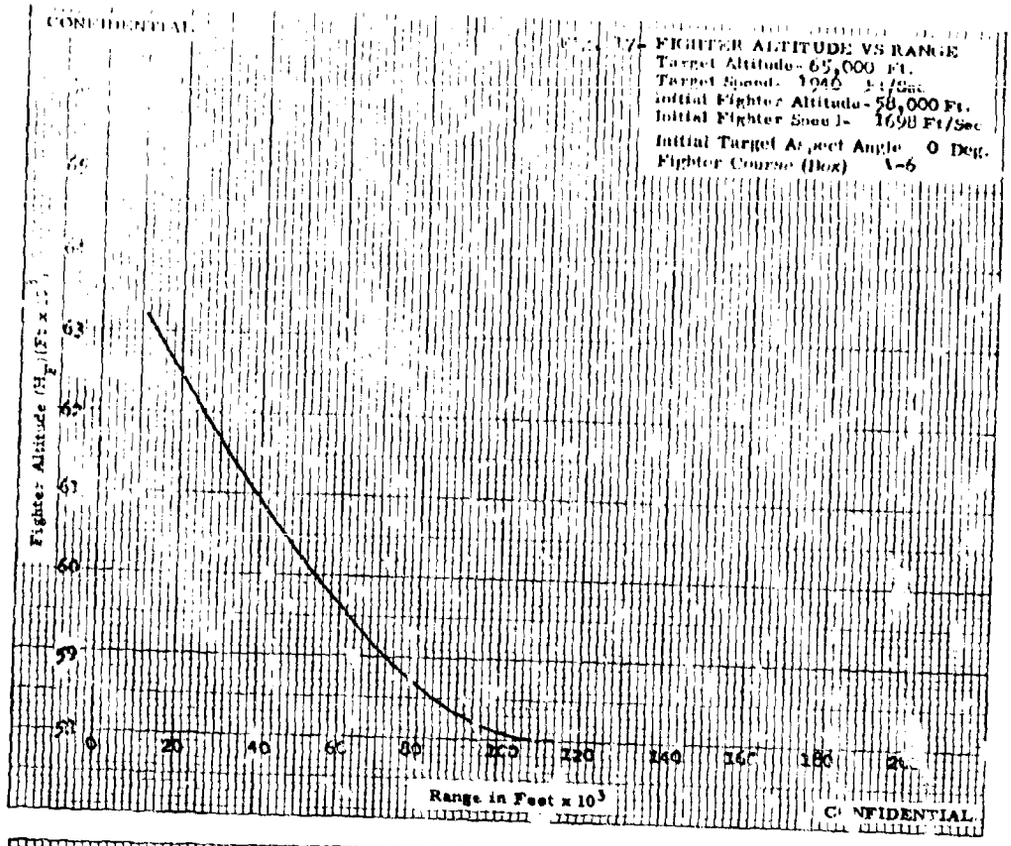
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Fig. 17- FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) 4-6
Fighter Altitude (Hf) (Ft x 10^3)
63
62
61
60
59
0
20
40
60
80
100
120
140
160
180
Range in Feet x 10^3
CONFIDENTIAL

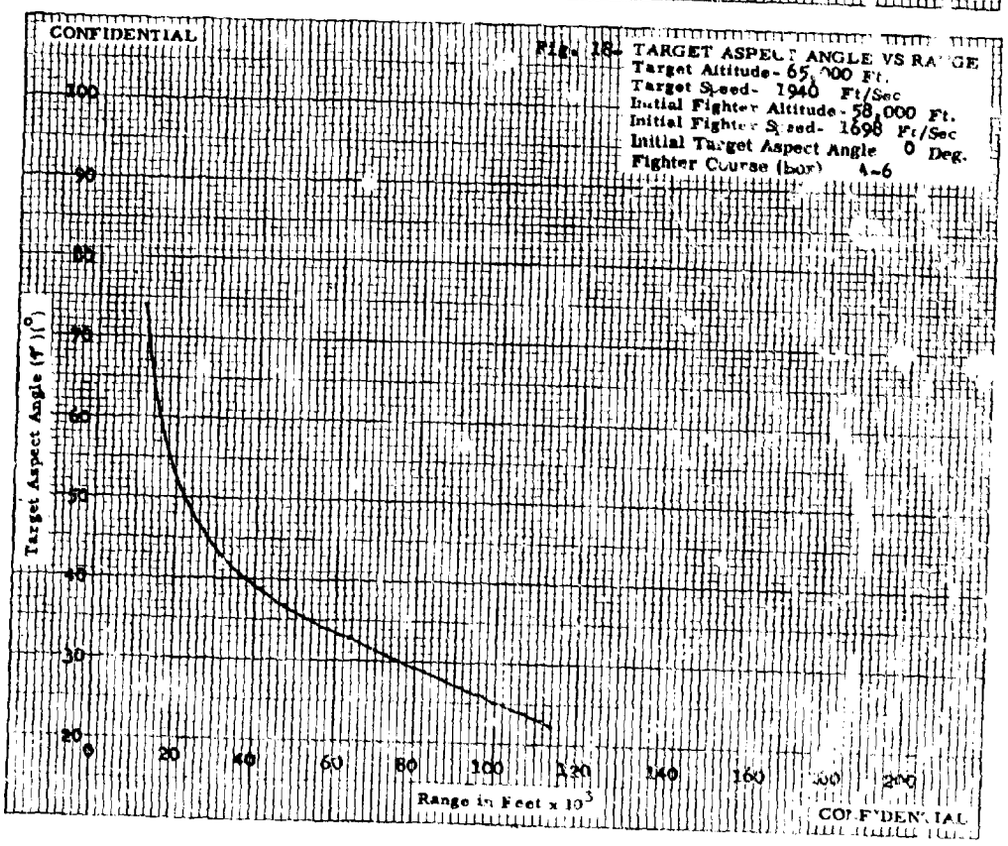
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Fig. 18- TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (box) 4-6
Target Aspect Angle (Φ) (°)
100
90
80
70
60
50
40
30
20
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

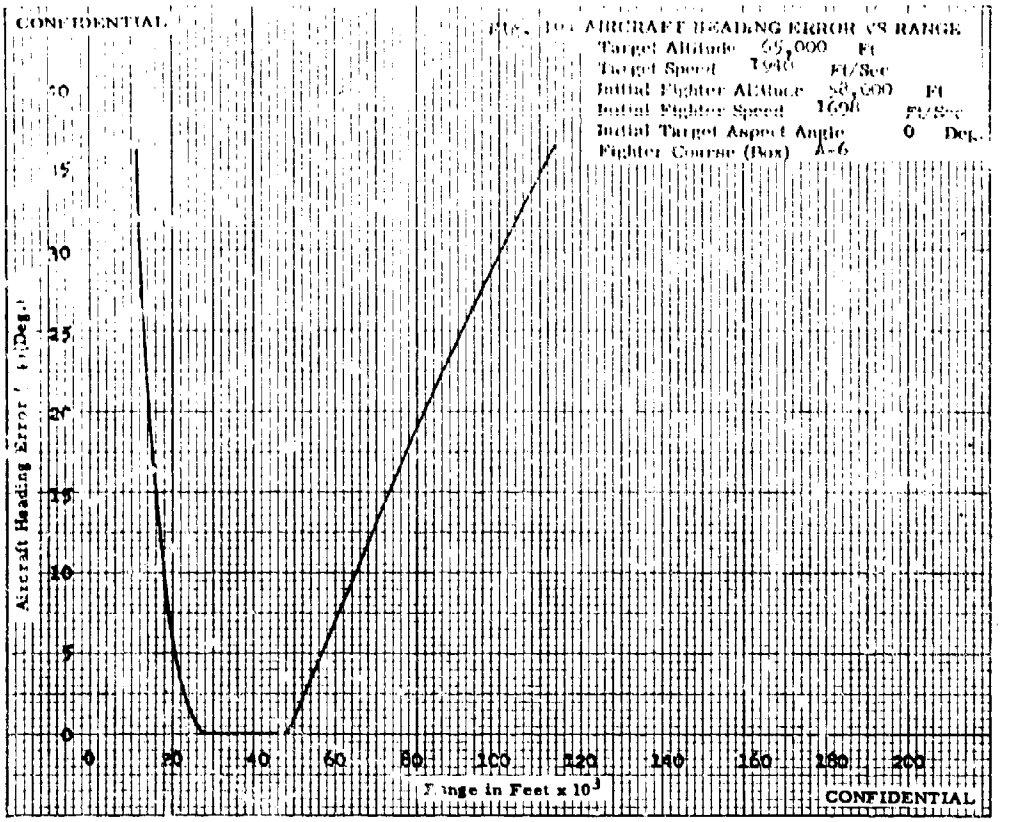
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Fig. 19- AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) A-6
Aircraft Heading Error
Range in Feet x 10³
CONFIDENTIAL

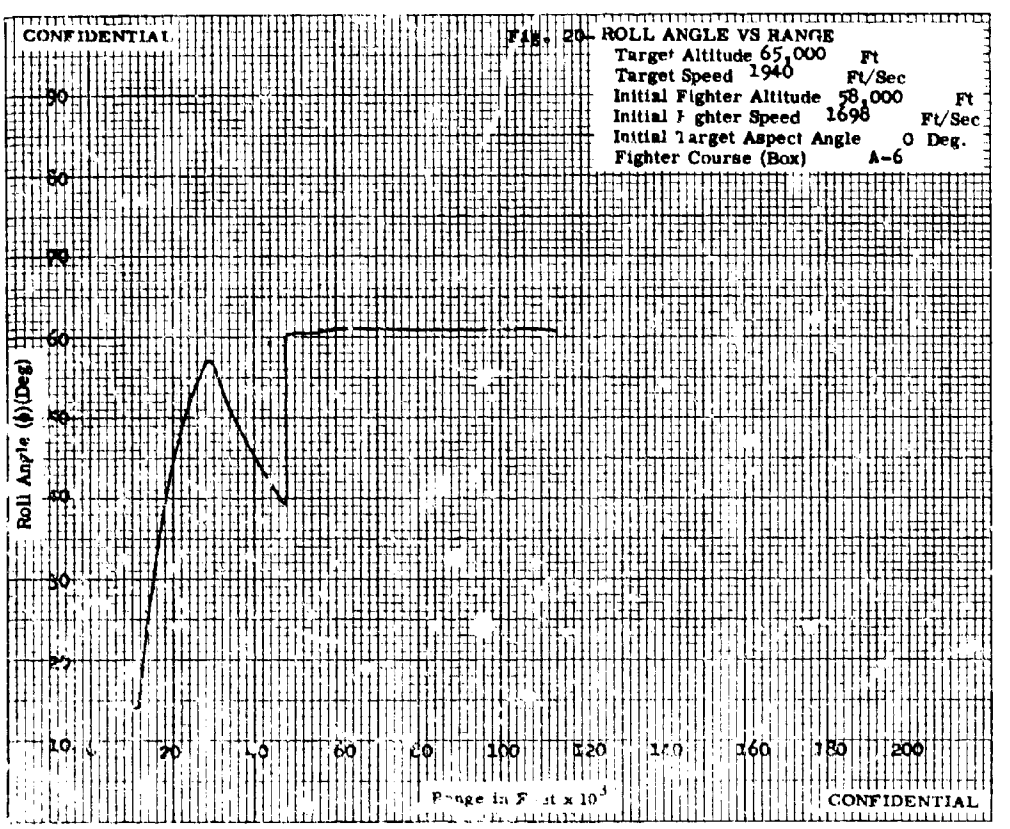
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Fig. 20- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 0 Deg.
Fighter Course (Box) A-6
Roll Angle (Φ)(Deg)
Range in Feet x 10³
CONFIDENTIAL

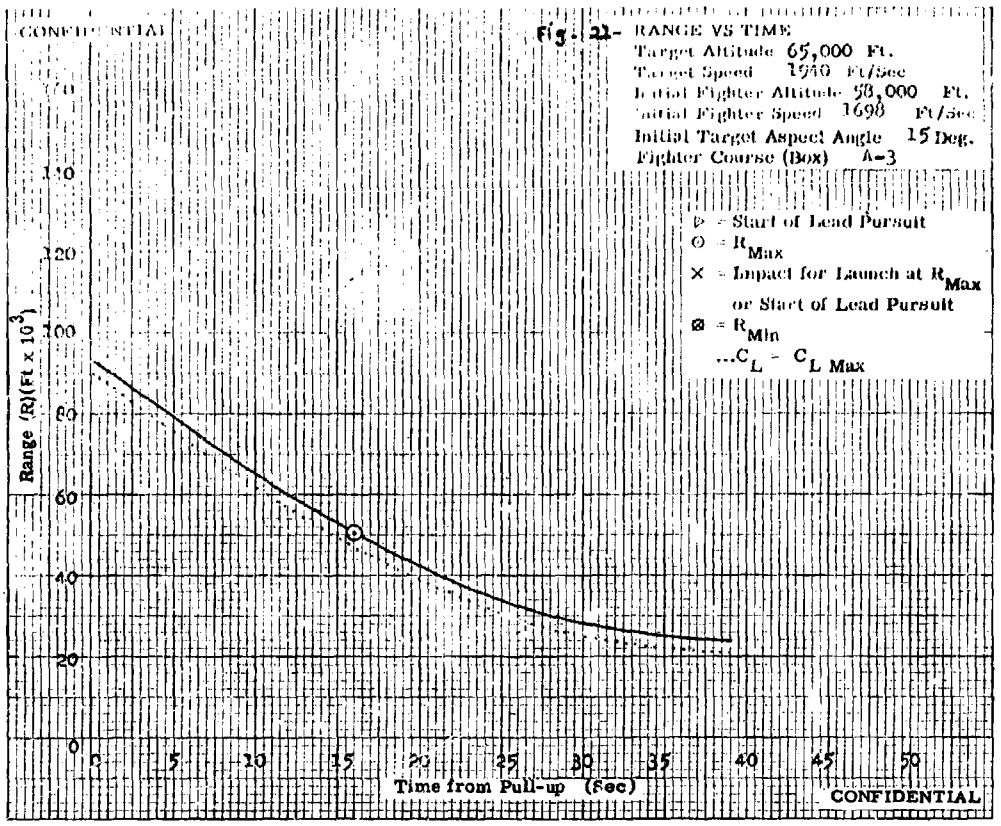
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Fig. 21- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...C_L - $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
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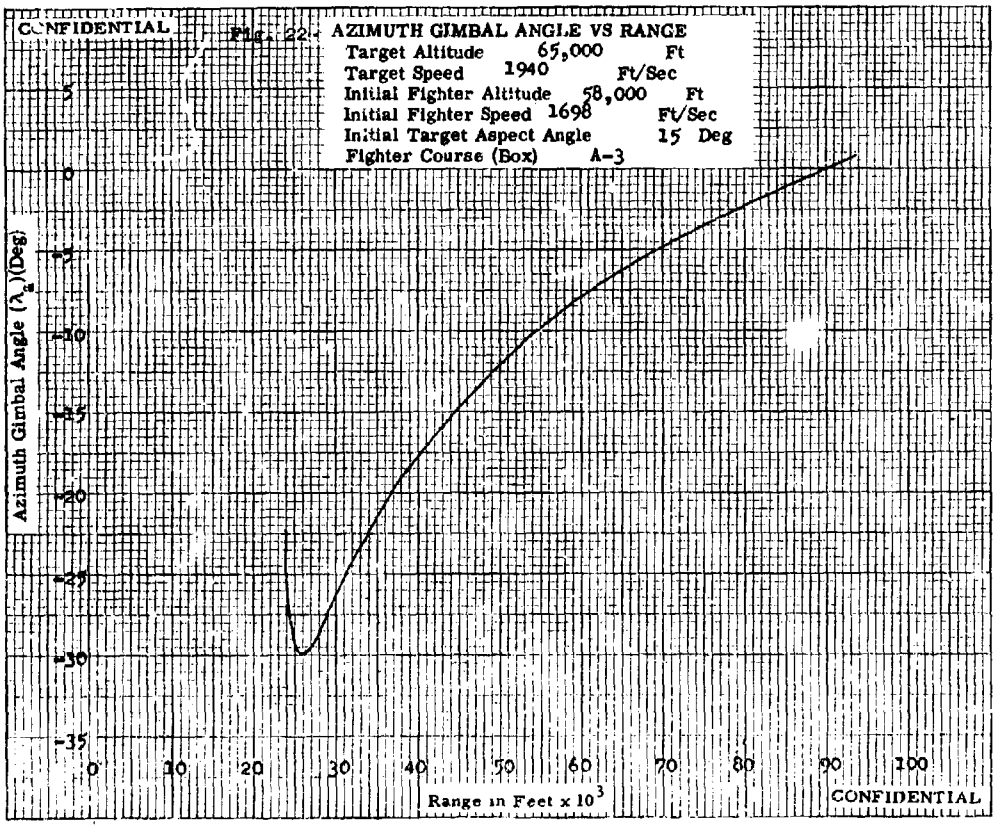
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Fig. 22- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

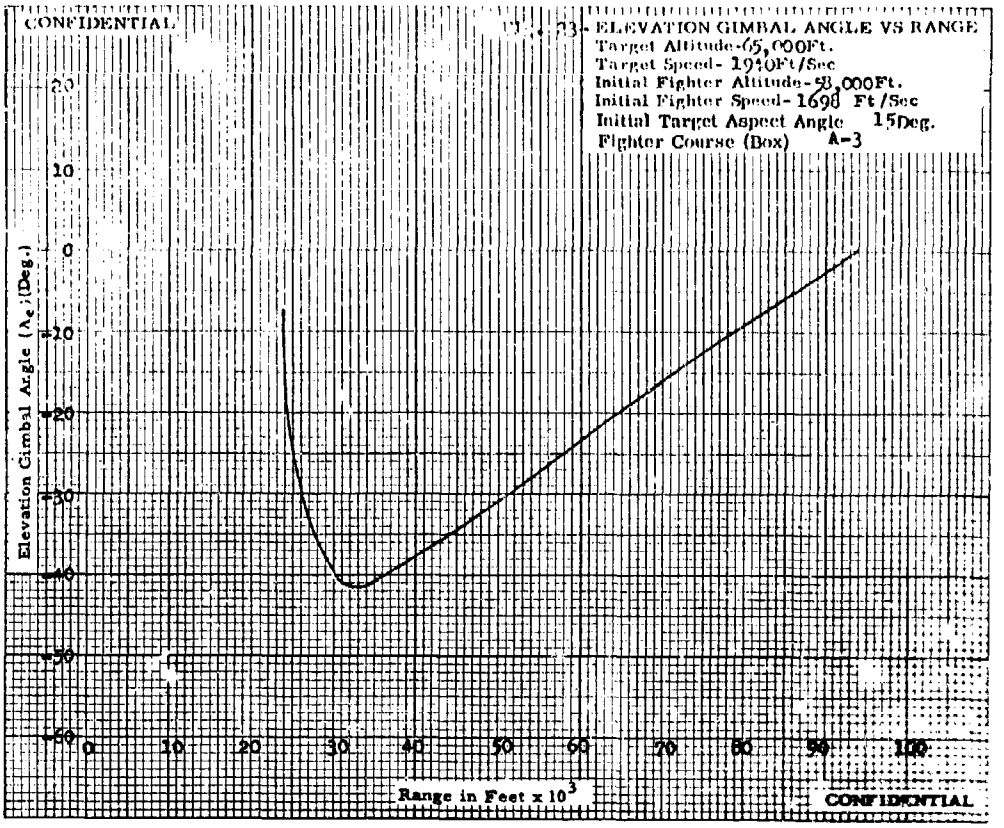
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FIG. 23- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000Ft.
Target Speed- 1940Ft/Sec
Initial Fighter Altitude-58,000Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15Deg.
Fighter Course (Box) A-3
Elevation Gimbal Angle (λe)(Deg.)
20
10
0
+10
+20
+30
+40
+50
+60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

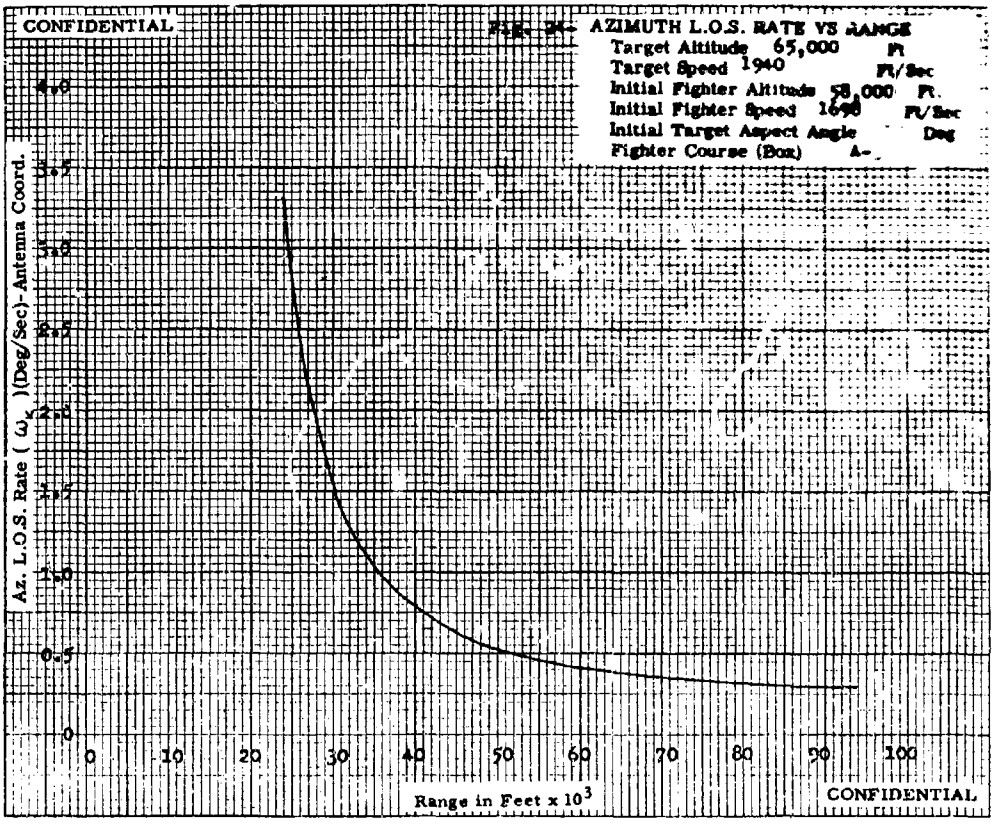
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FIG. 24- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle Deg
Fighter Course (Box) A-
Az. L.O.S. Rate (ωx)(Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

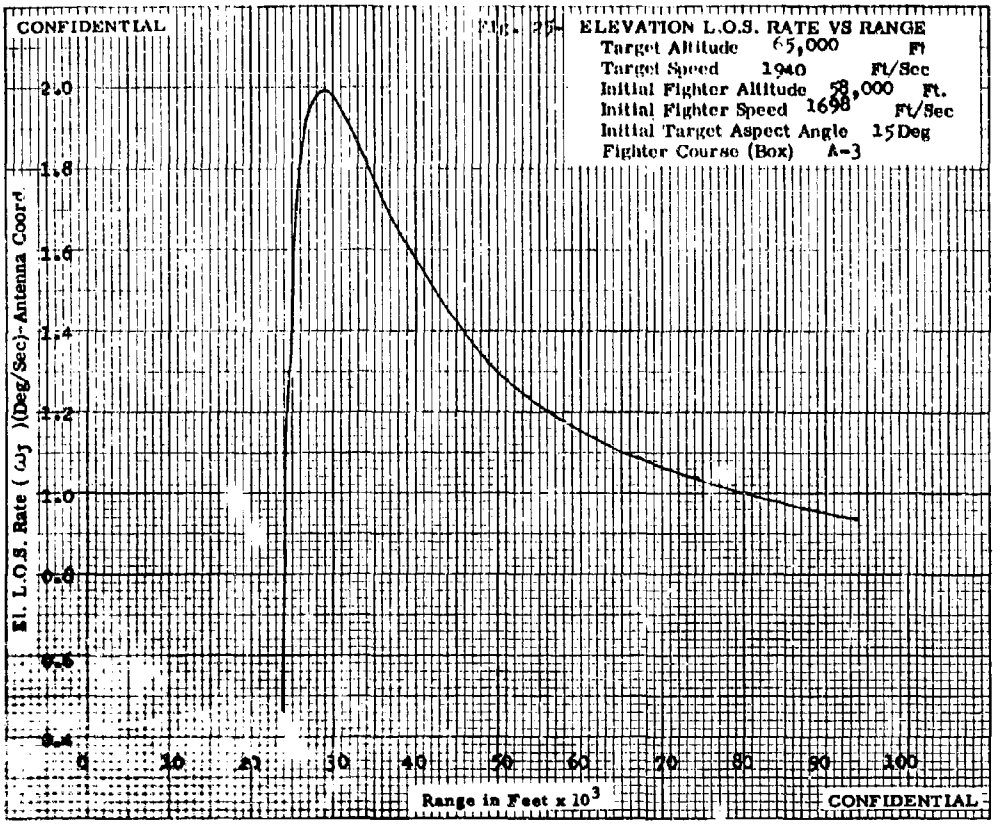
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Fig. 25 – ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3
El. L.O.S. Rate (ωy) (Deg/Sec) - Antenna Coord
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

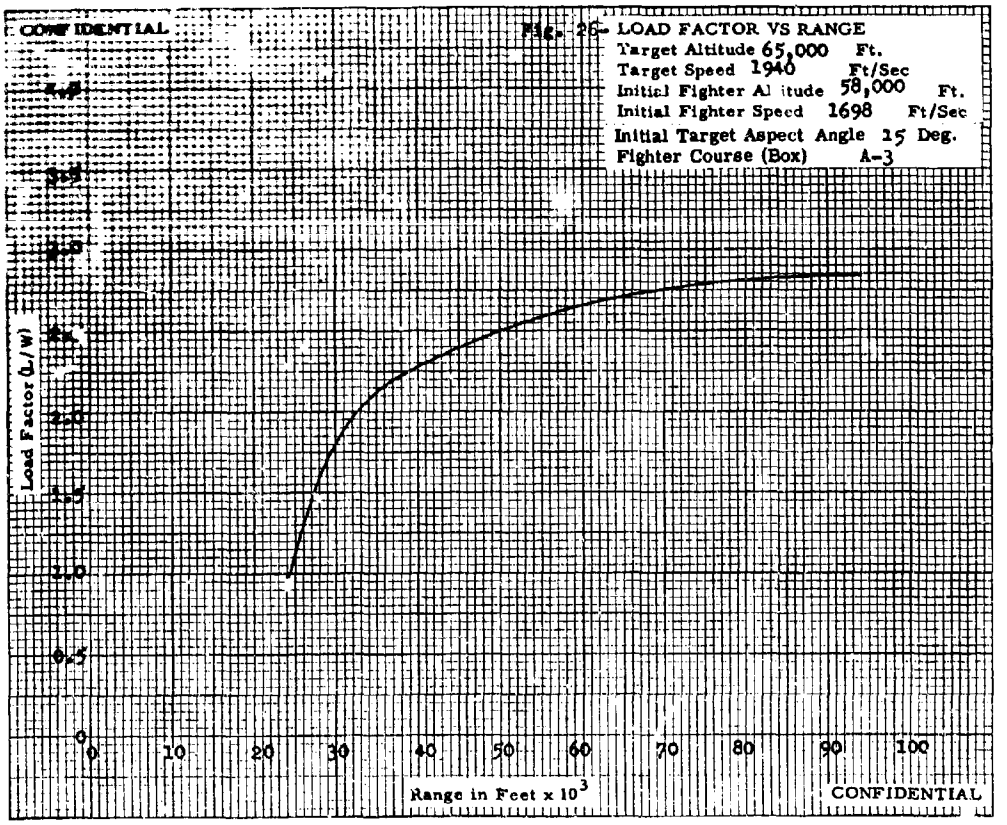
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Fig. 26 – LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Load Factor (L/W)
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

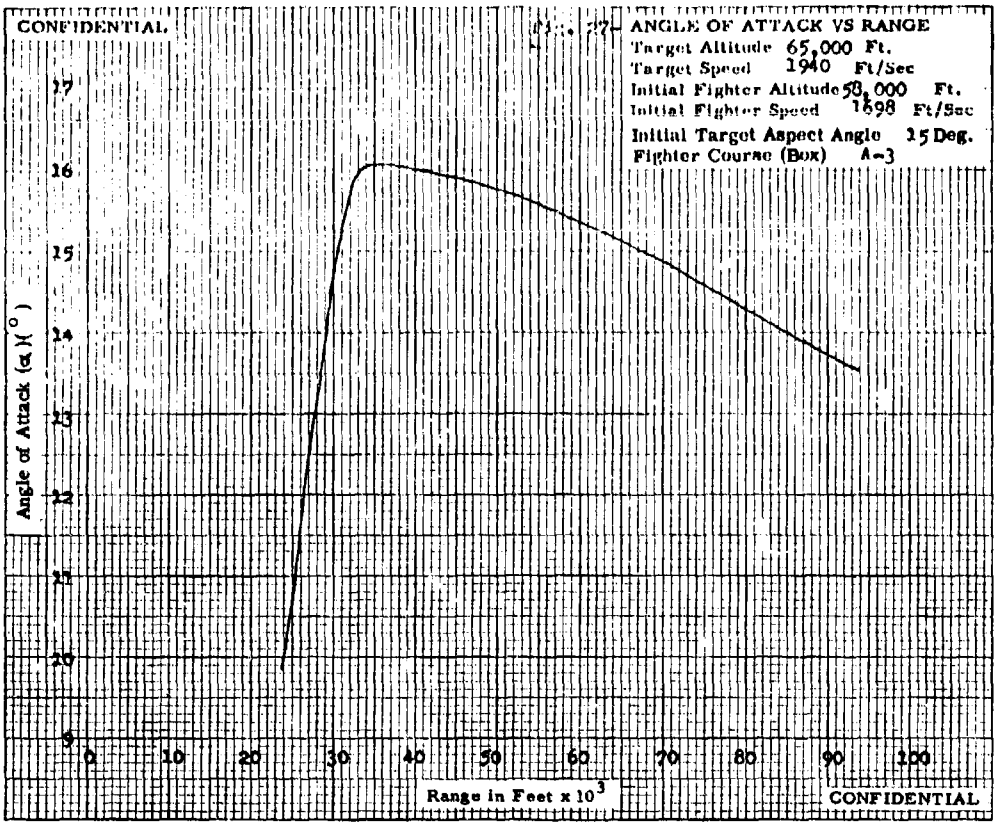
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Fig. 27 ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Angle of Attack (α) (°)
17
16
15
14
13
12
11
10
9
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

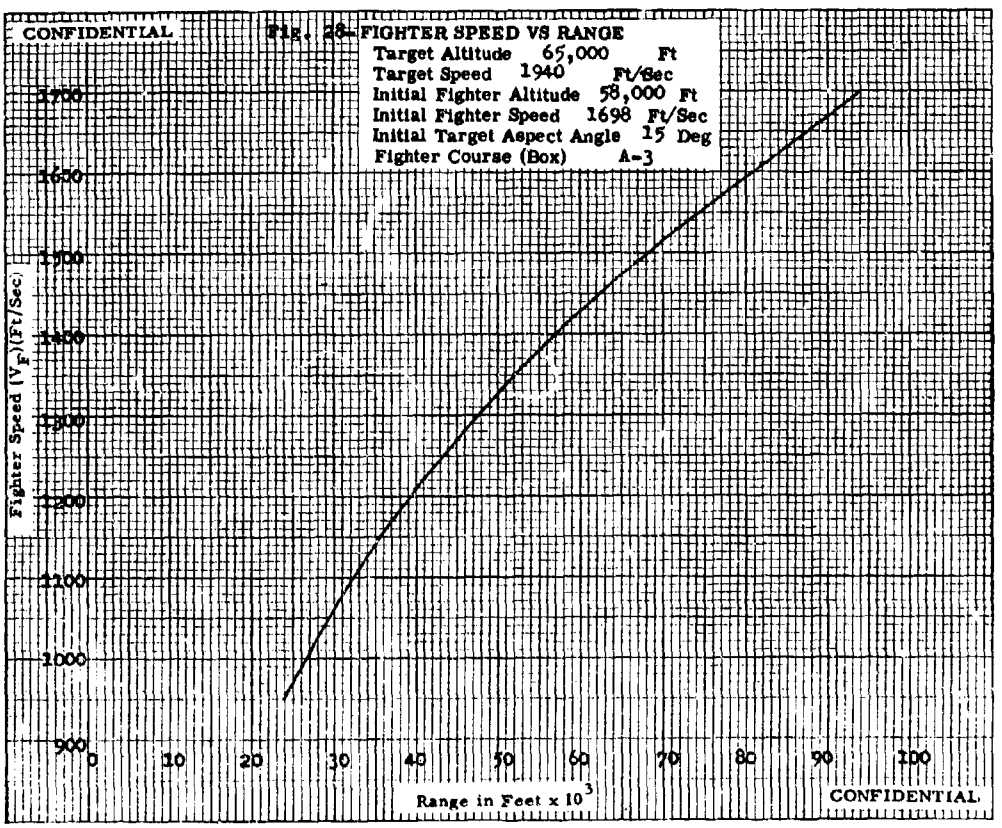
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Fig. 28 FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3
Fighter Speed (V_F) (Ft/Sec)
1700
1600
1500
1400
1300
1200
1100
1000
900
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

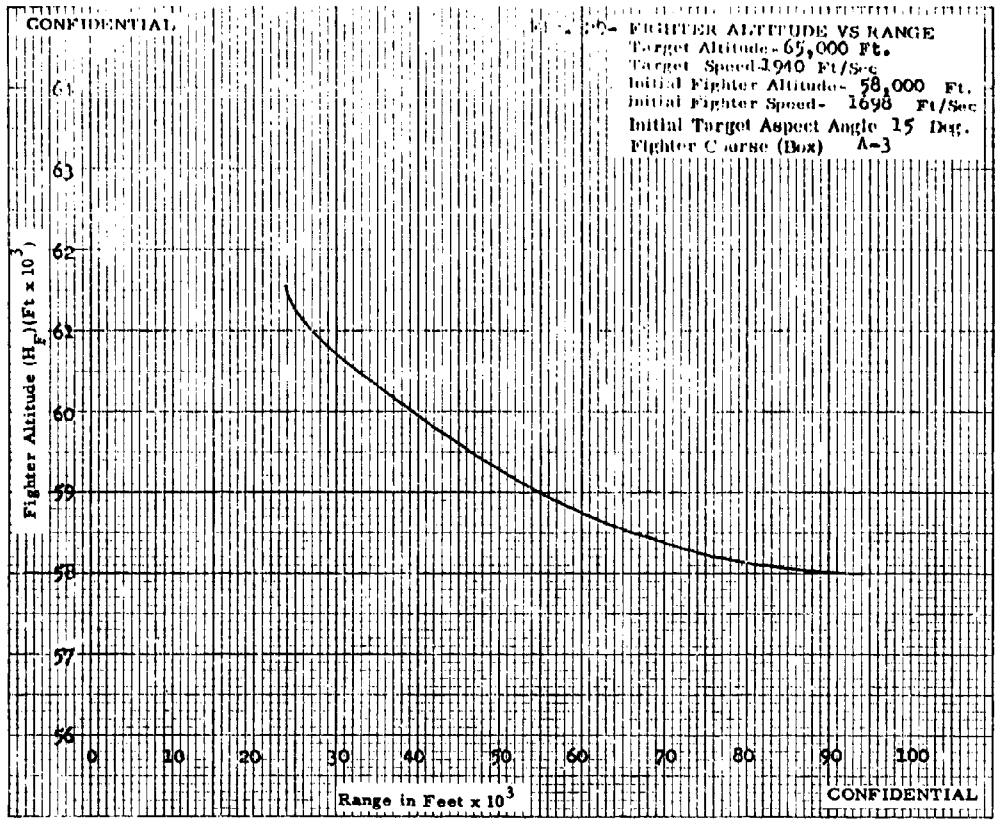
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Fig. 29- FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Fighter Altitude (H_F)(Ft x 10^3)
64
63
62
61
60
59
58
57
56
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

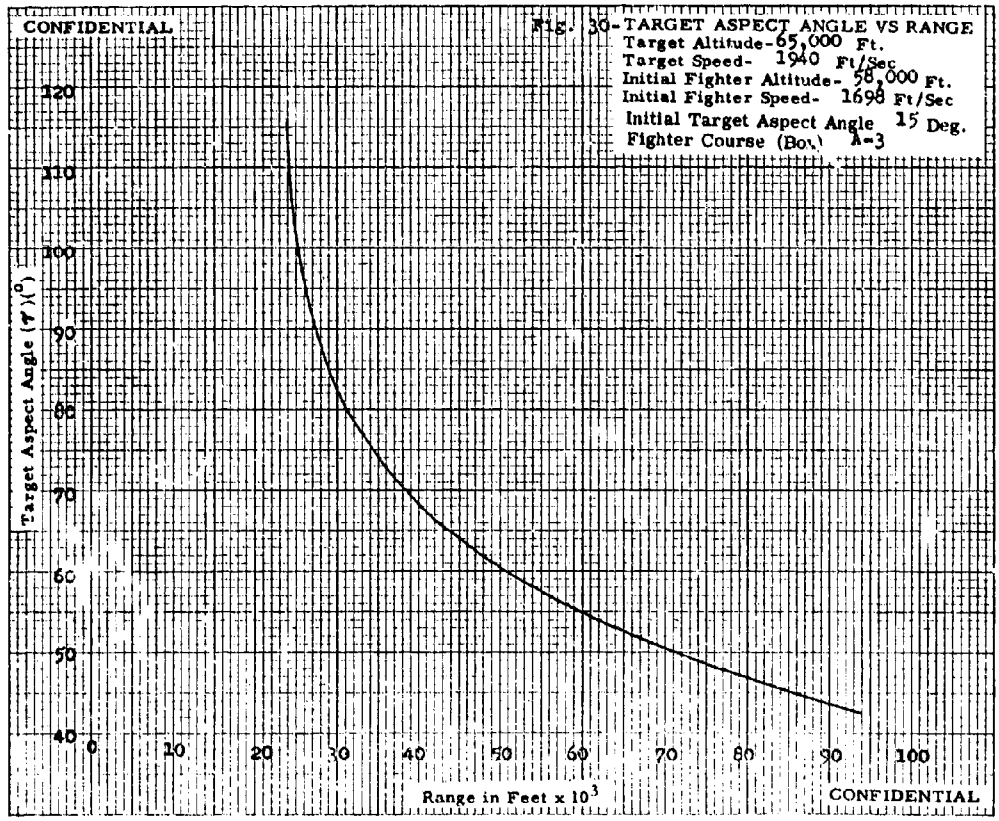
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Fig. 30- TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Target Aspect Angle (Ψ)(^{0})
120
110
100
90
80
70
60
50
40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
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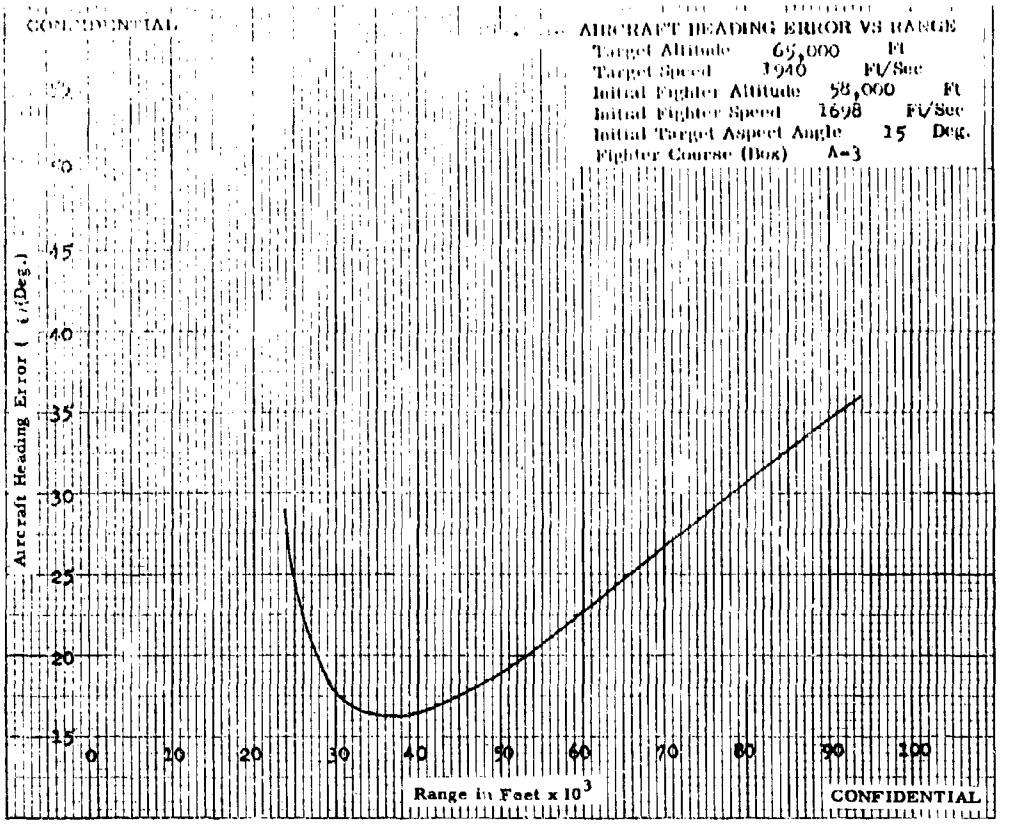
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AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Aircraft Heading Error ( ) (Deg.)
45
40
35
30
25
20
15
0
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

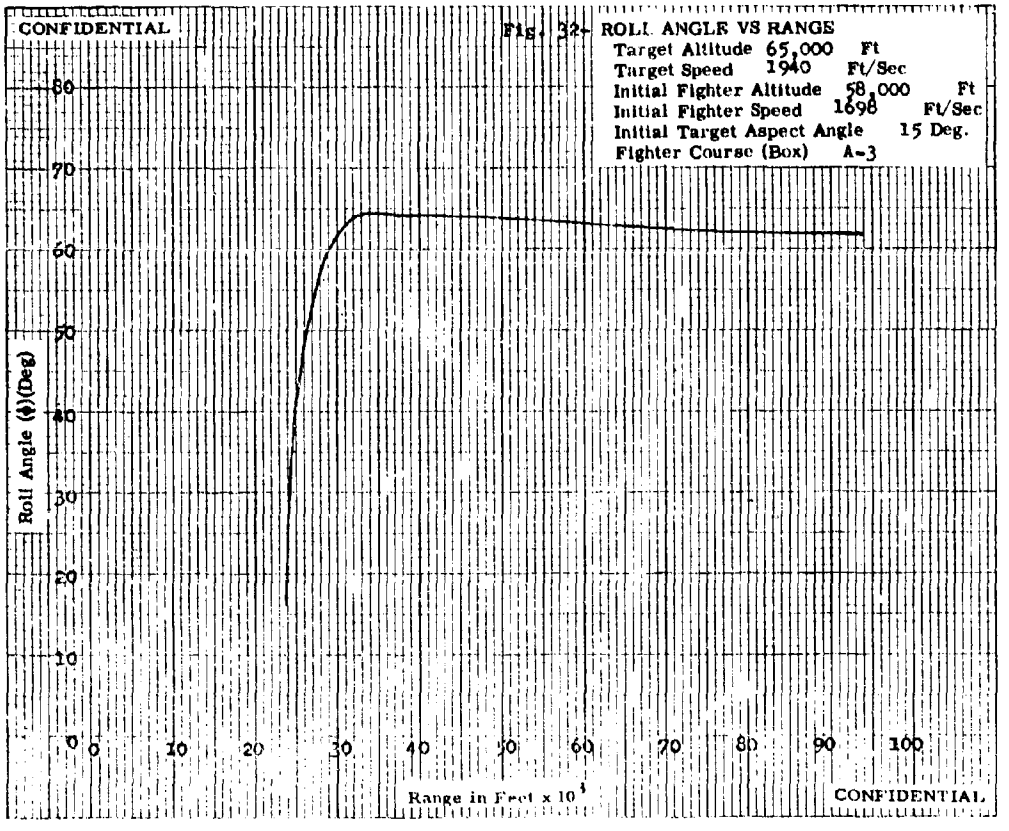
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Fig. 32- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Roll Angle (Φ)(Deg)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

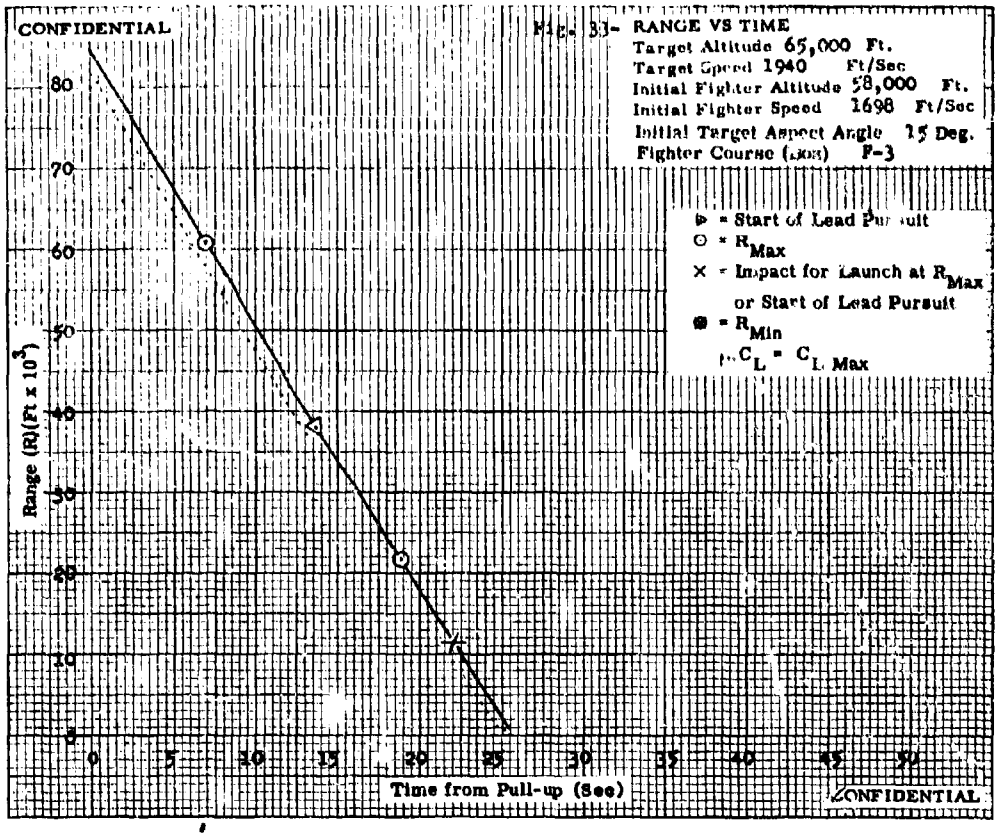
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Fig. 33 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

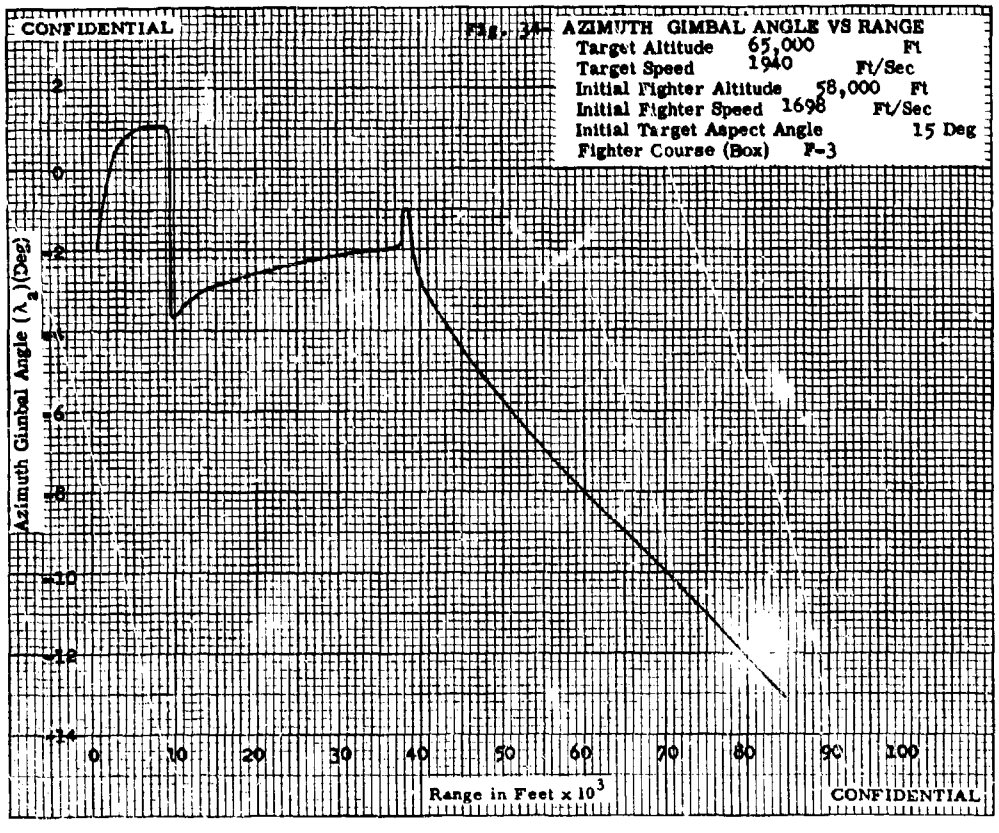
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Fig. 34 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-3
Azimuth Gimbal Angle (λ_a)(Deg)
2
0
-2
-4
-6
-8
-10
-12
-14
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

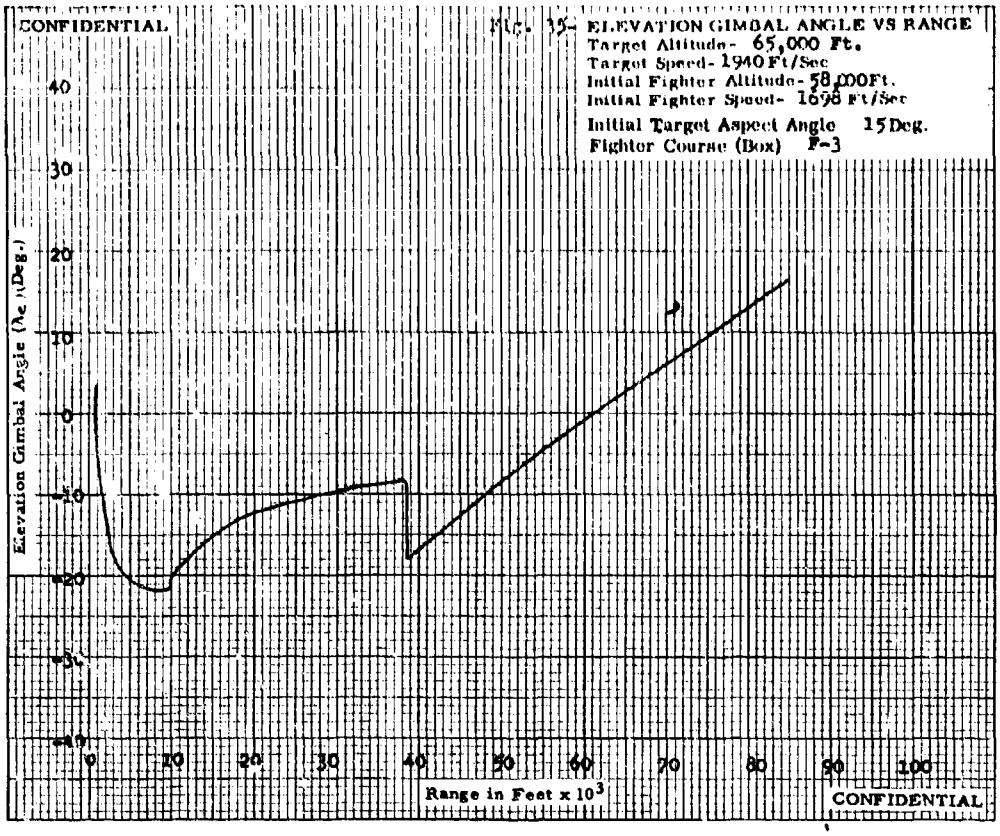
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Fig. 35- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
Elevation Gimbal Angle (λe) (Deg.)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

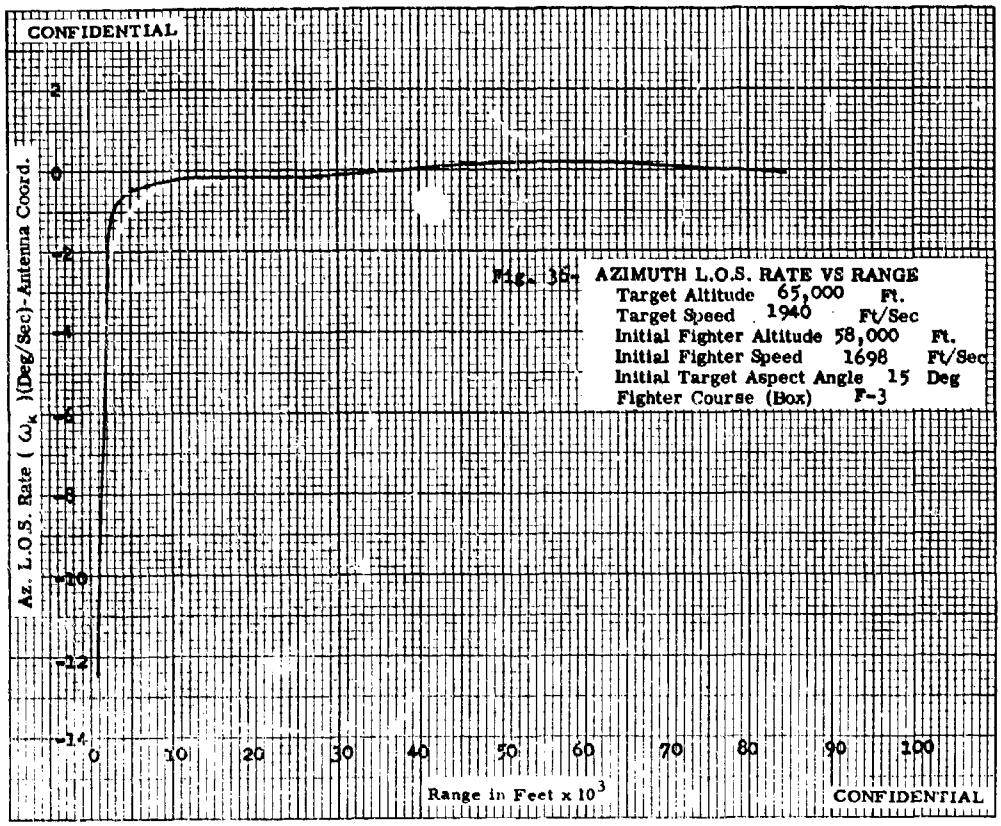
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Fig. 36- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-3
Az. L.O.S. Rate (ωk) (Deg/Sec)-Antenna Coord.
2
0
-2
-4
-6
-8
-10
-12
-14
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

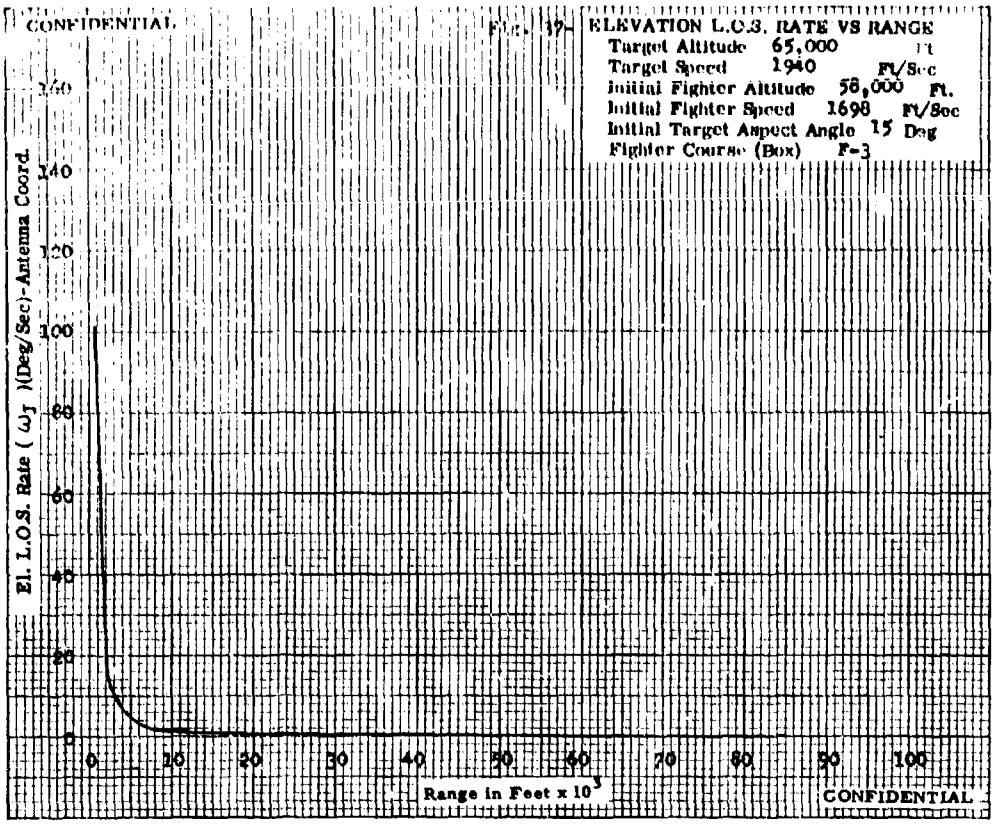
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Fig. 37- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-3
El. L.O.S. Rate (ωJ)(Deg/Sec)-Antenna Coord.
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

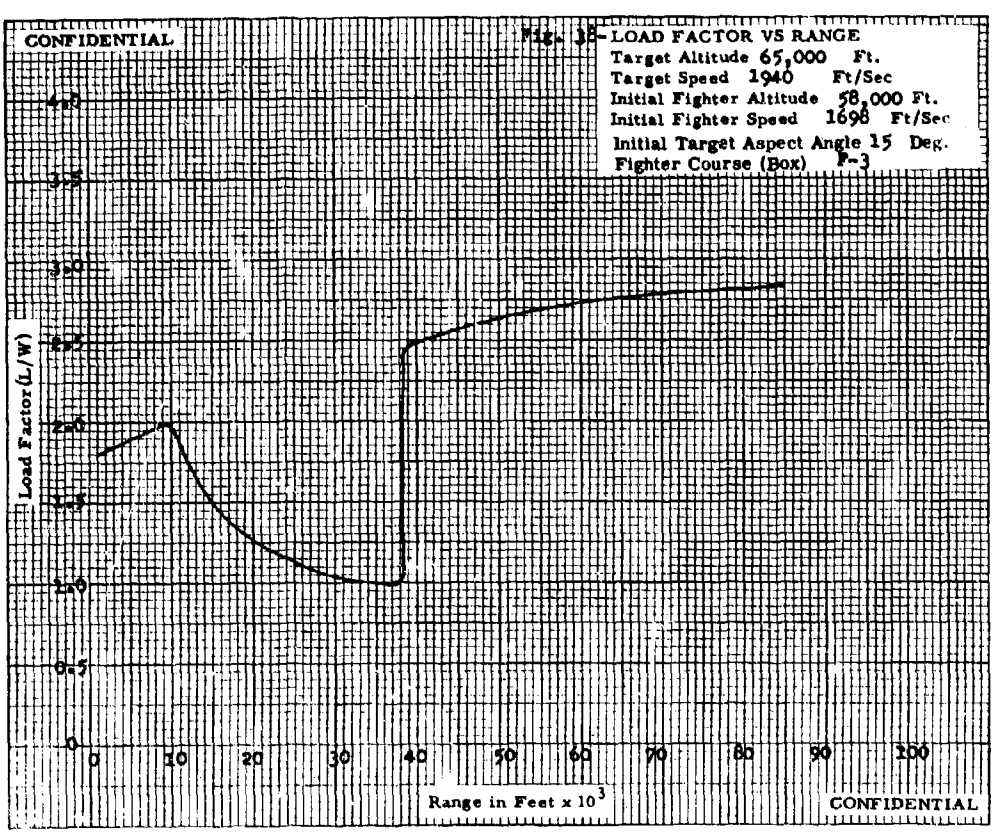
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Fig. 38- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
Load Factor (L/W)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

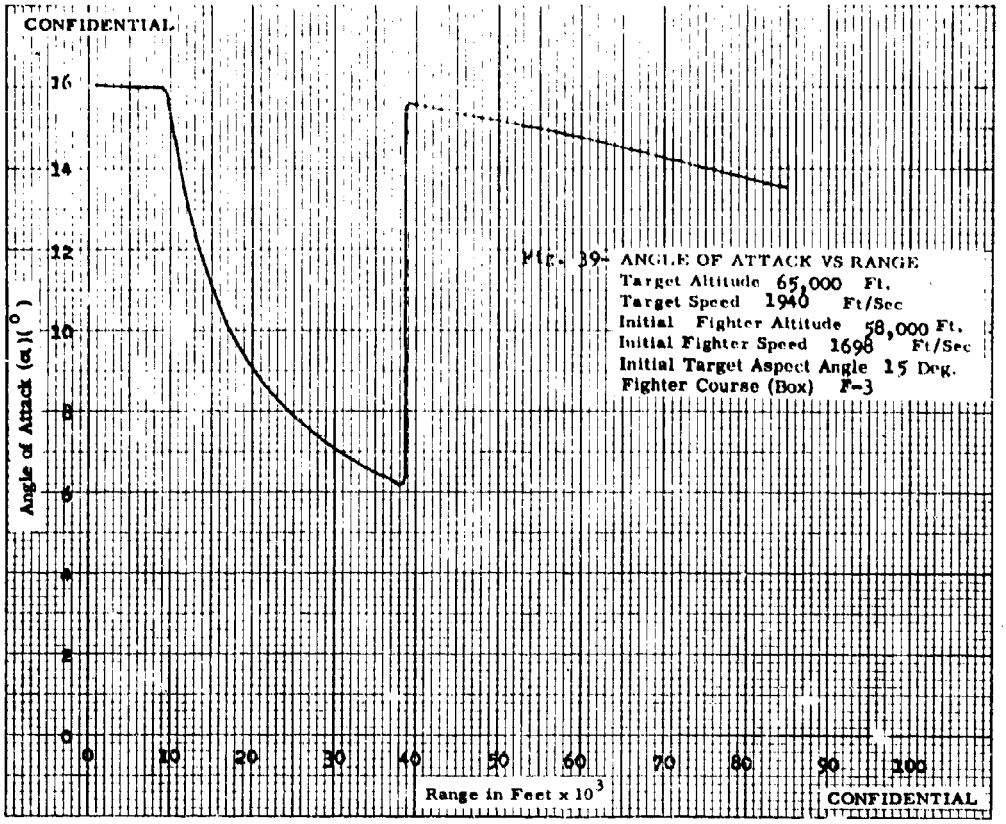

Fig. 39- ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3

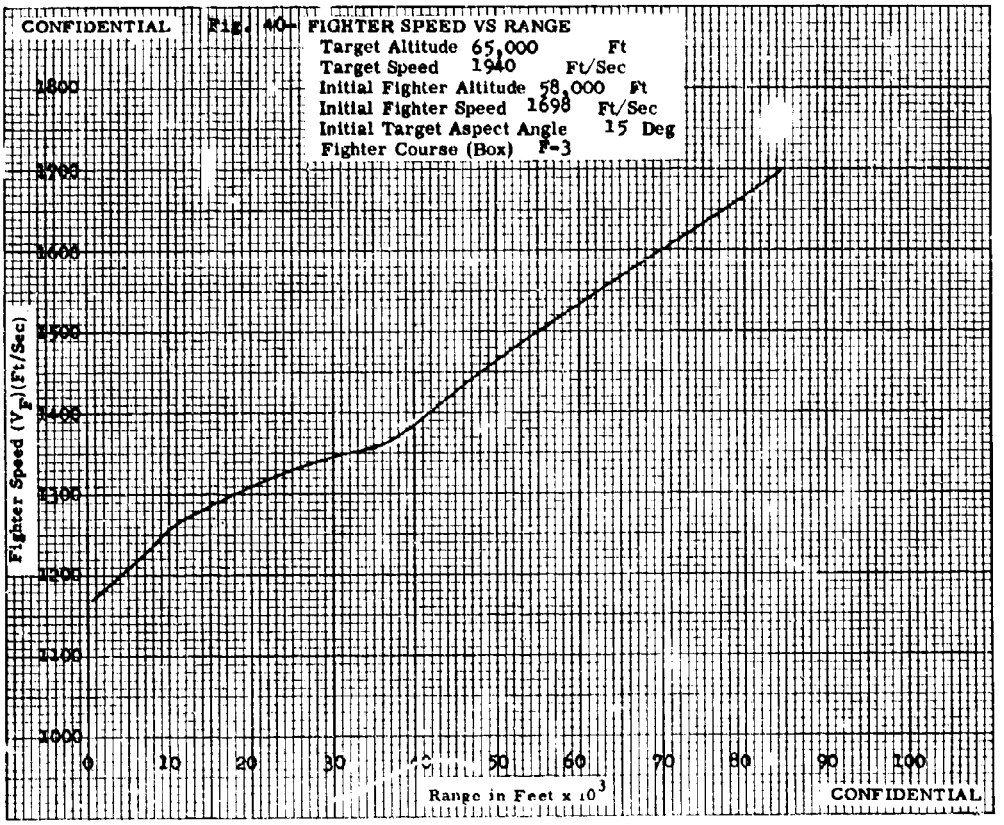

Fig. 40- FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-3

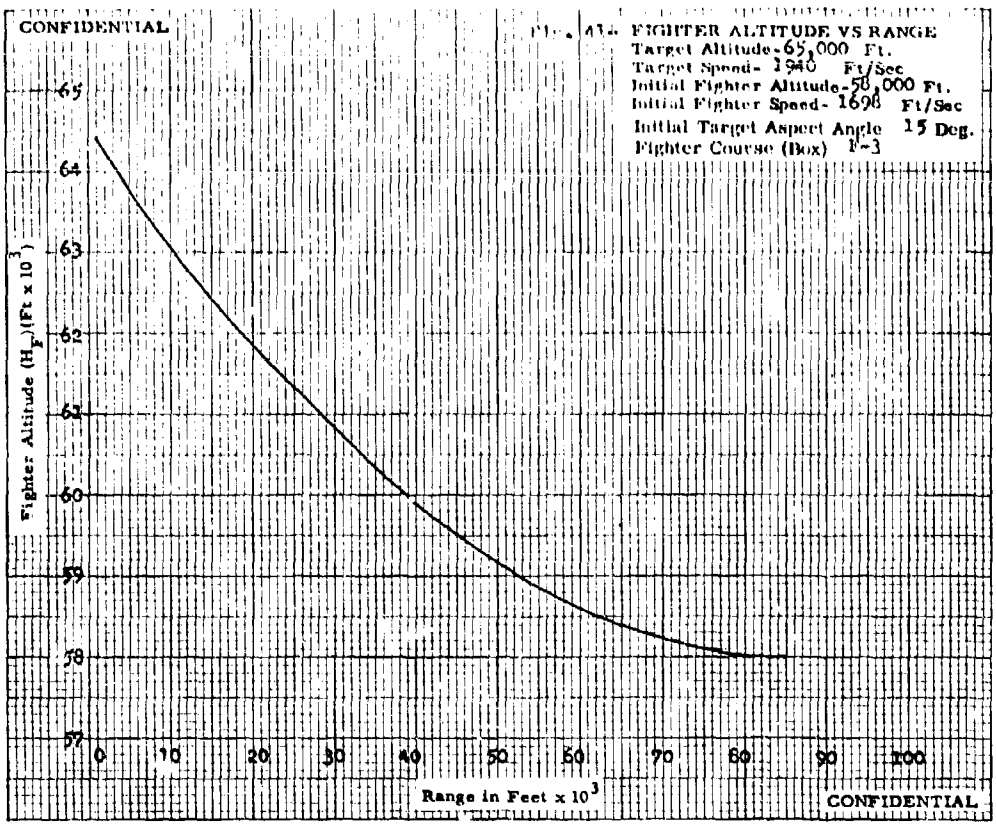
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Fig. 41- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
Fighter Altitude (H_F)(Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

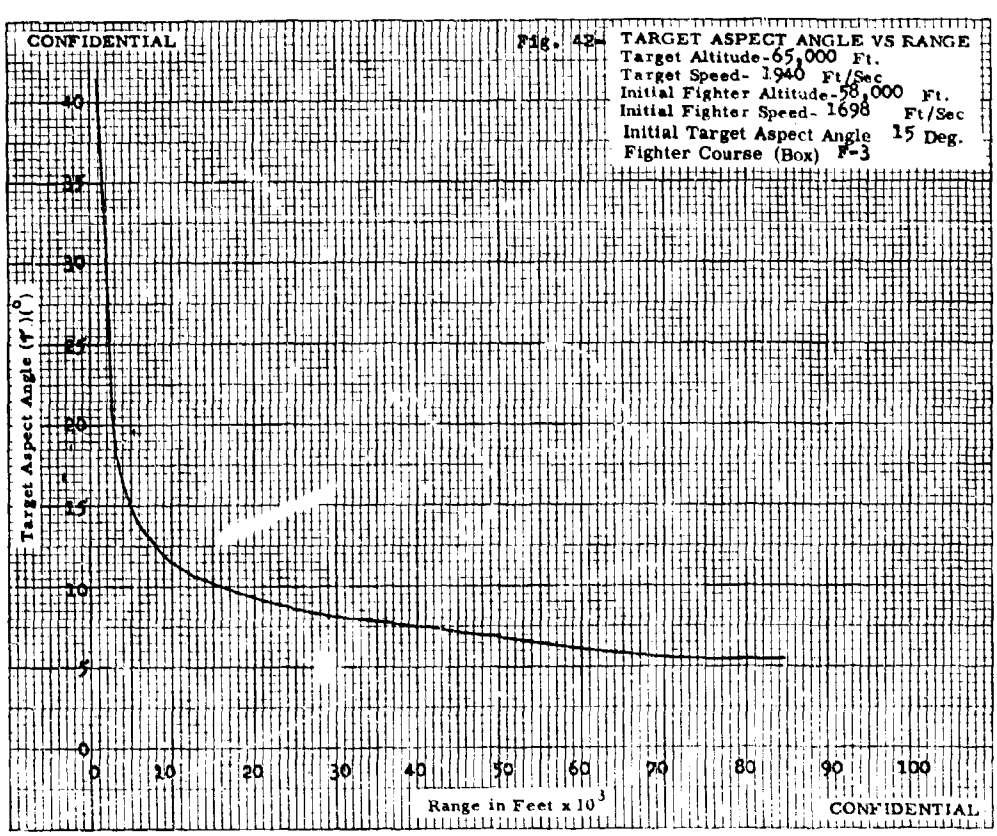
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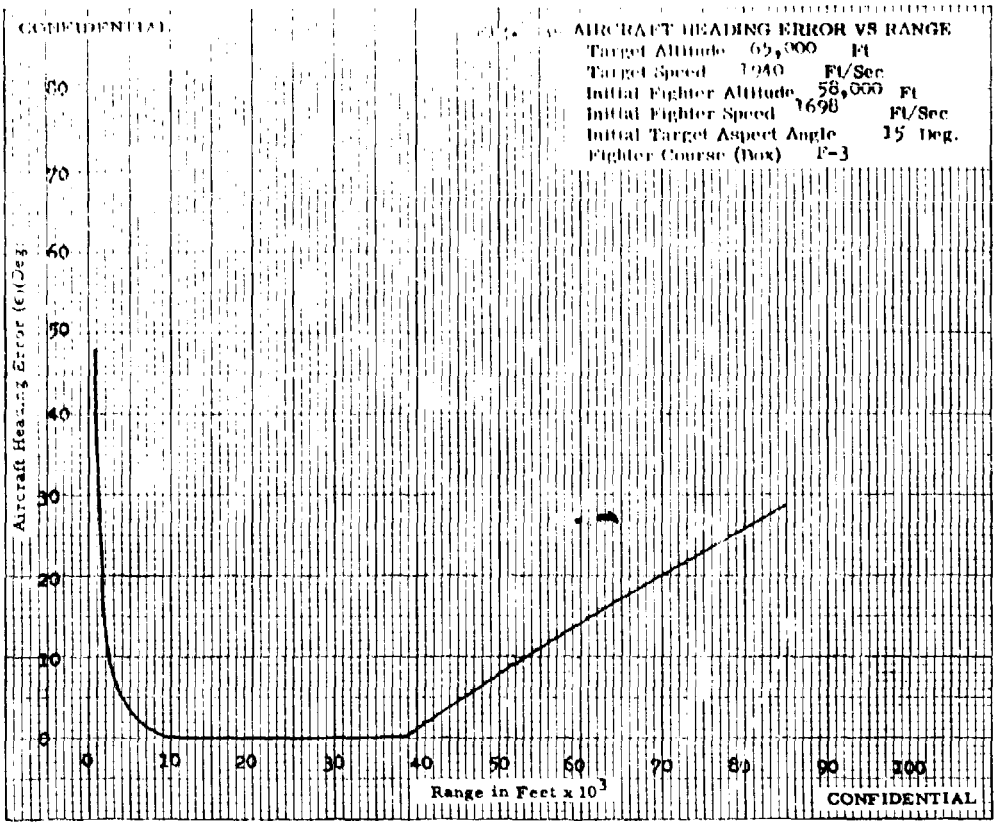
Fig. 42- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
Target Aspect Angle (Ψ)(°)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL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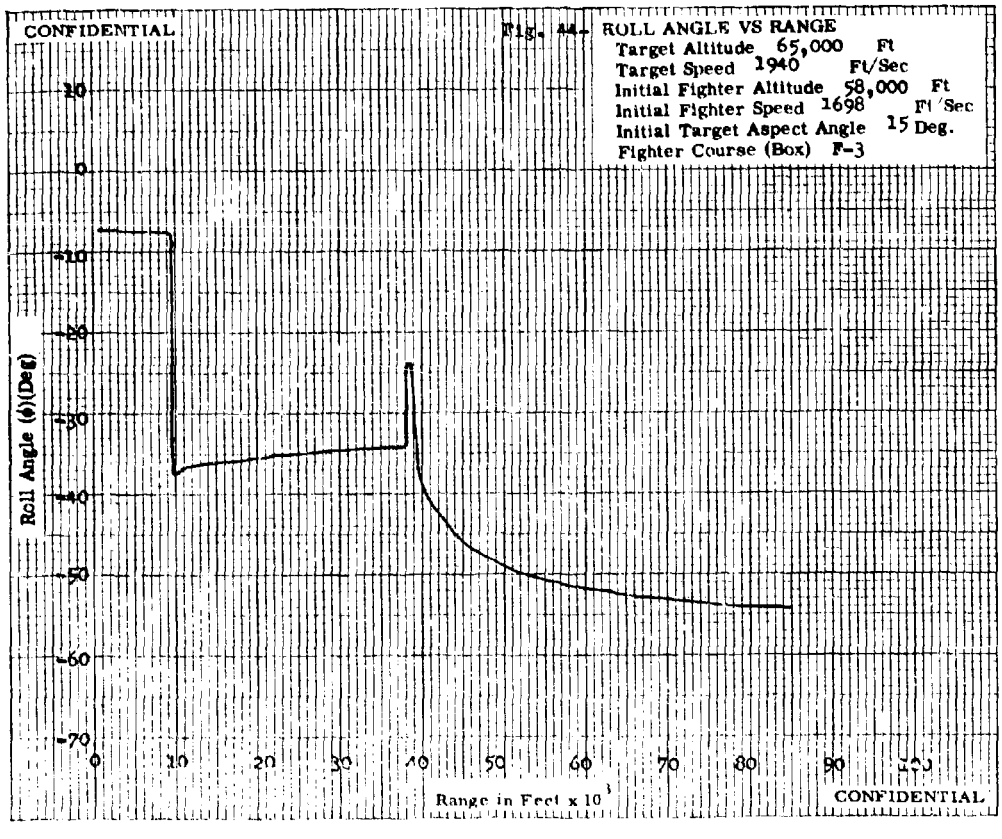
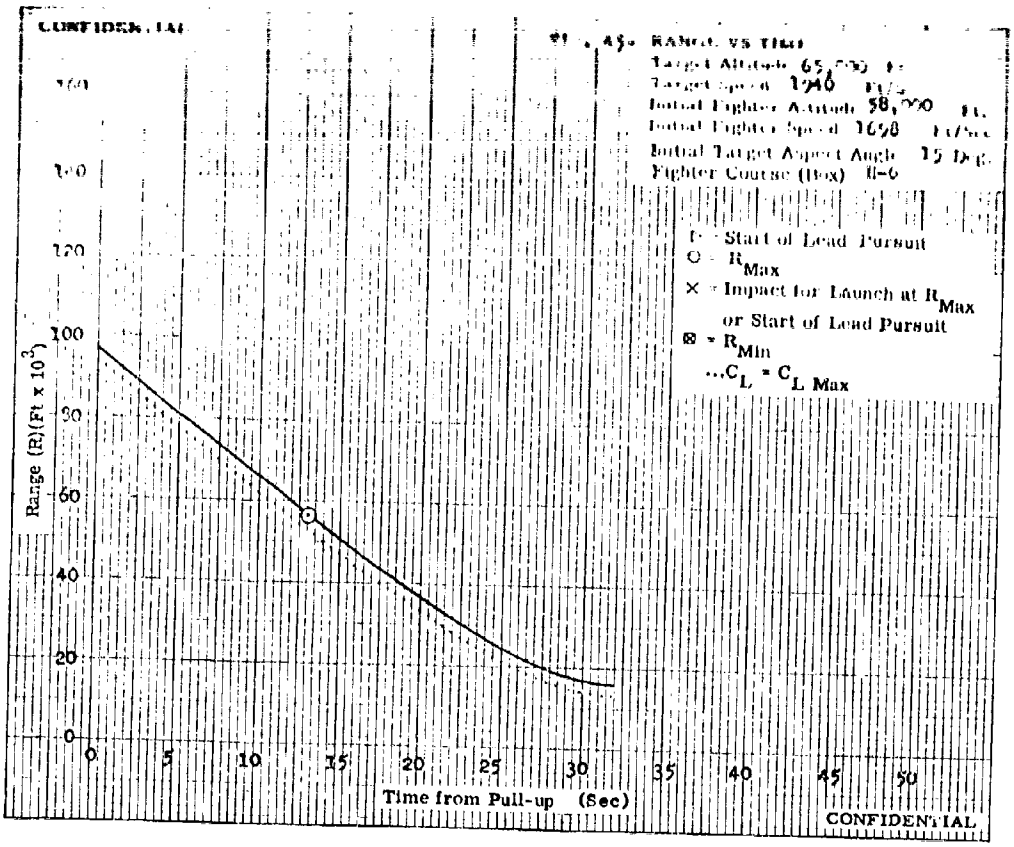
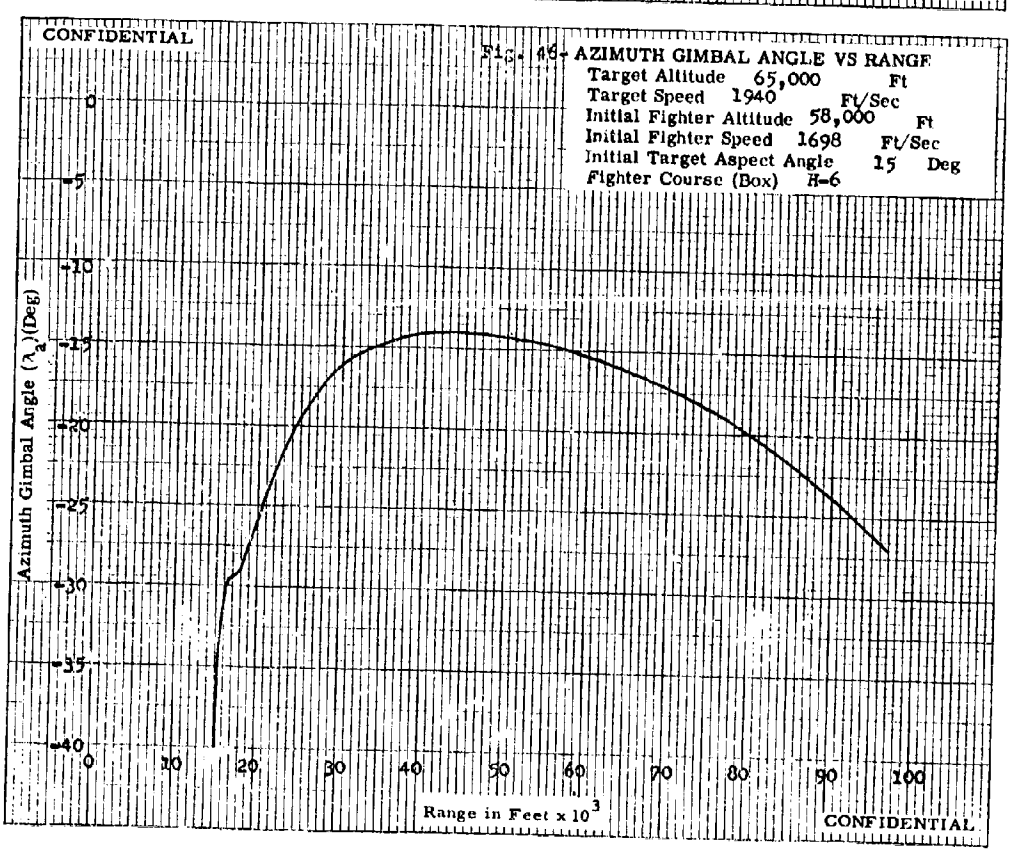
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
Aircraft Heading Error (ε)(Deg)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 44 ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-3
Roll Angle (ϕ)(Deg)
10
0
-10
-20
-30
-40
-50
-60
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 45 - RANGE VS TIME
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) H-6
F = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 46 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) H-6
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

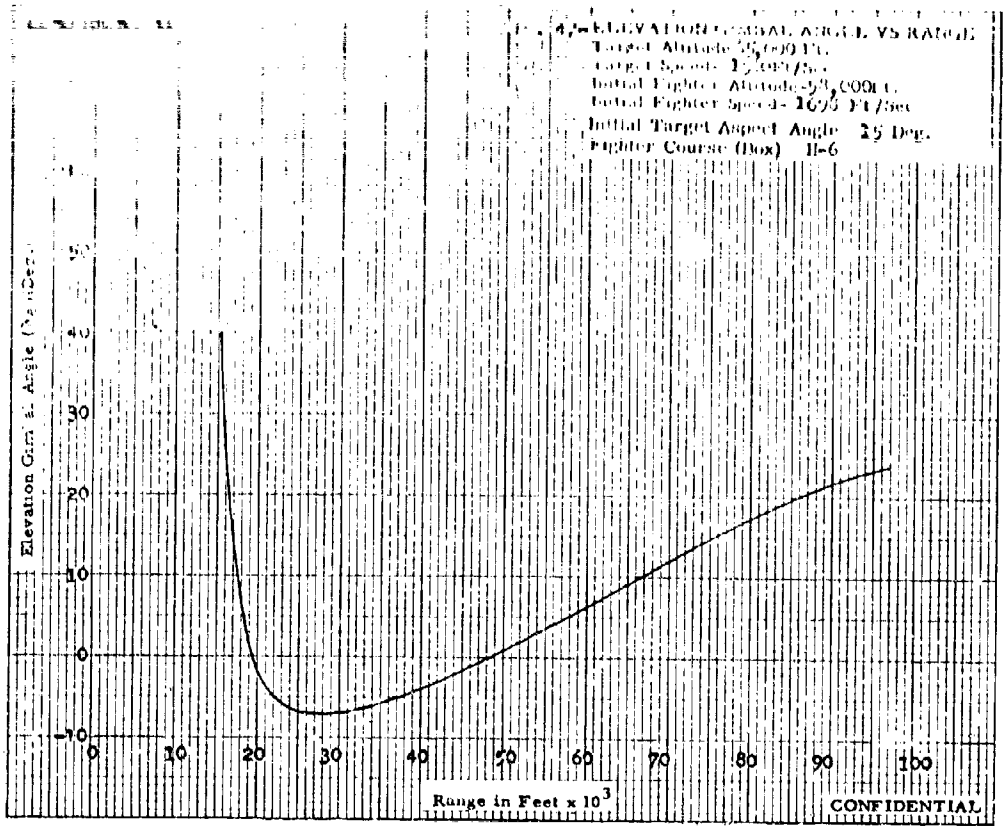


Fig. 47- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 25 Deg.
Fighter Course (Box) H-6

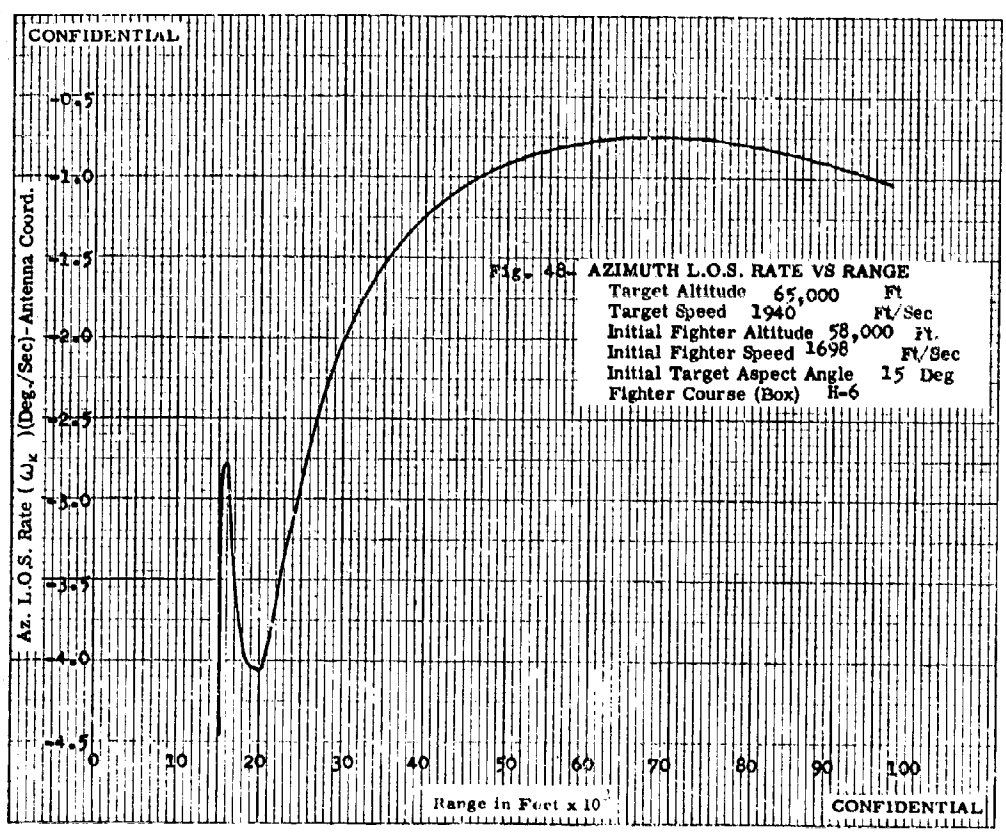
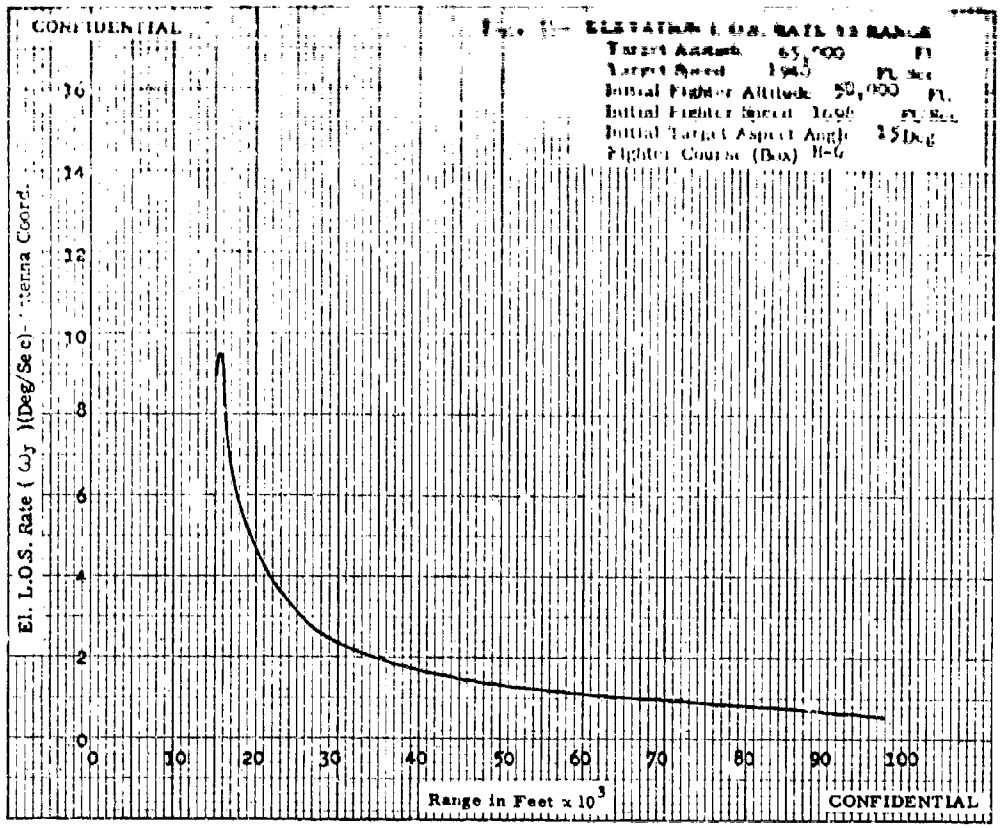


Fig. 48- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) H-6


CONFIDENTIAL
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) H-6
El. L.O.S. Rate (ωy) (Deg/Sec) - Antenna Coord.
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

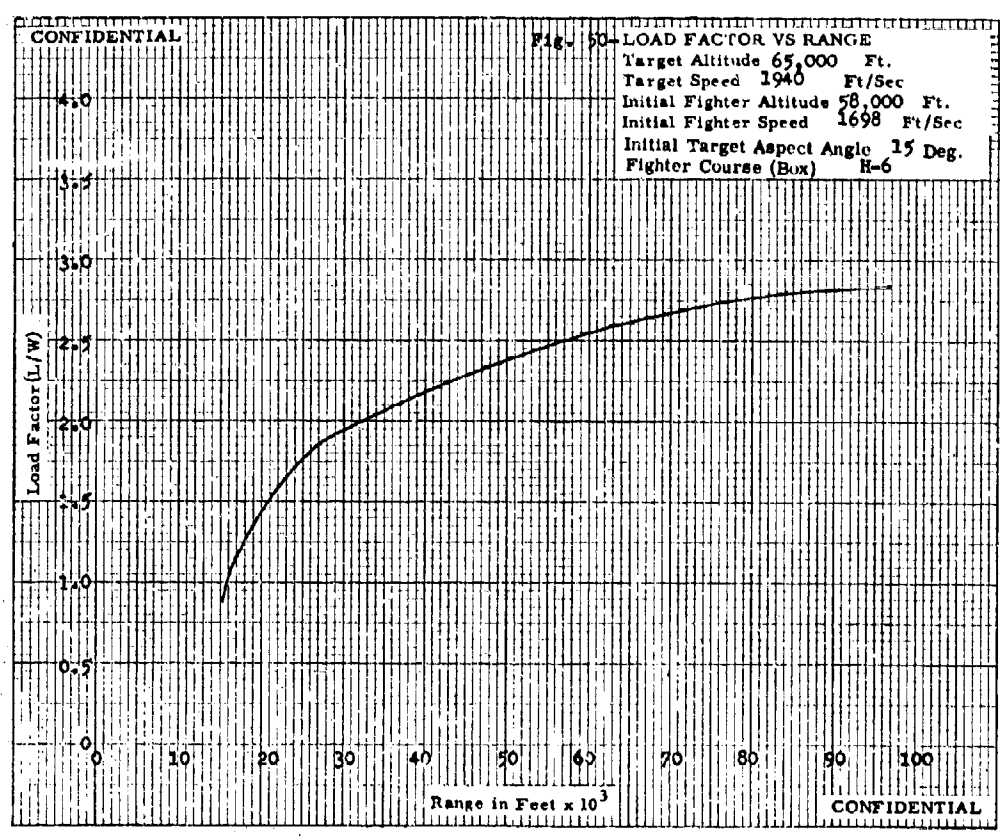

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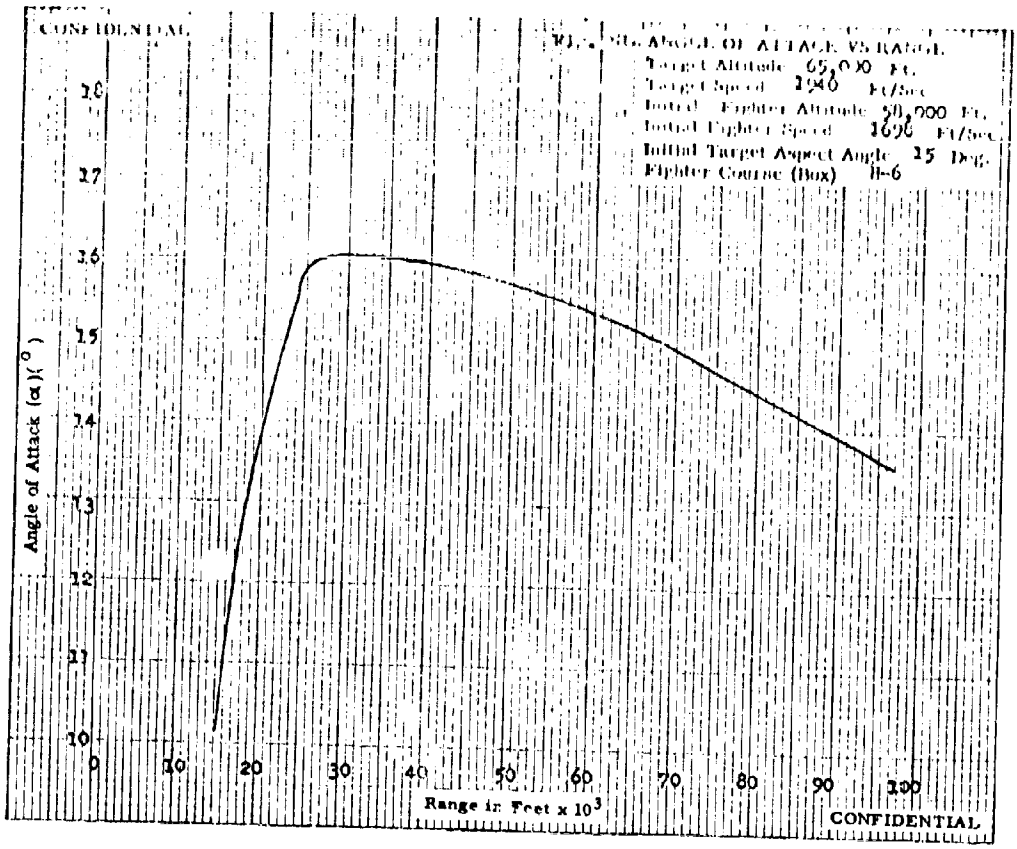
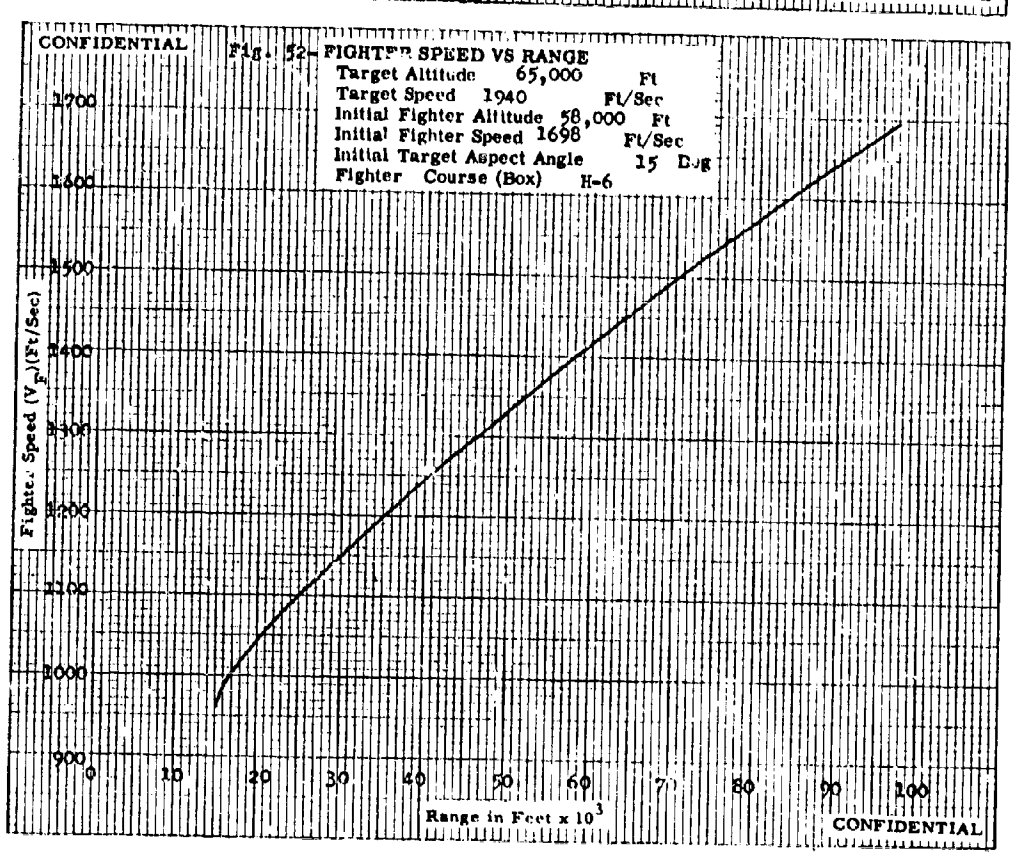
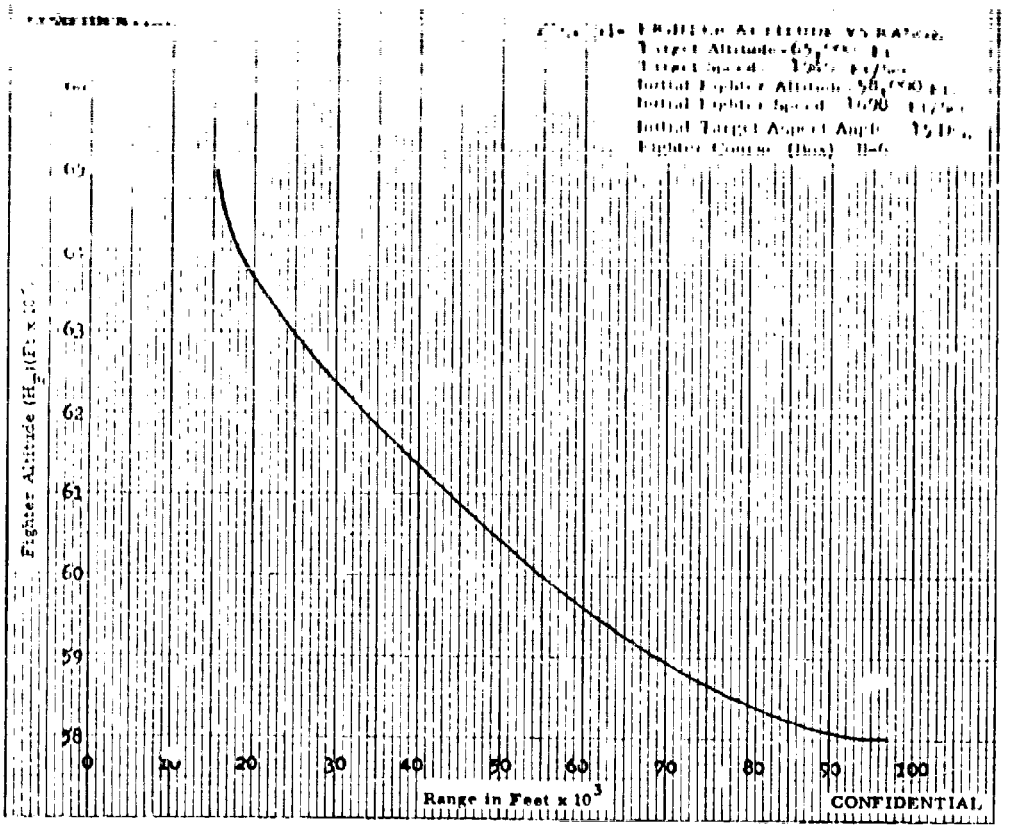
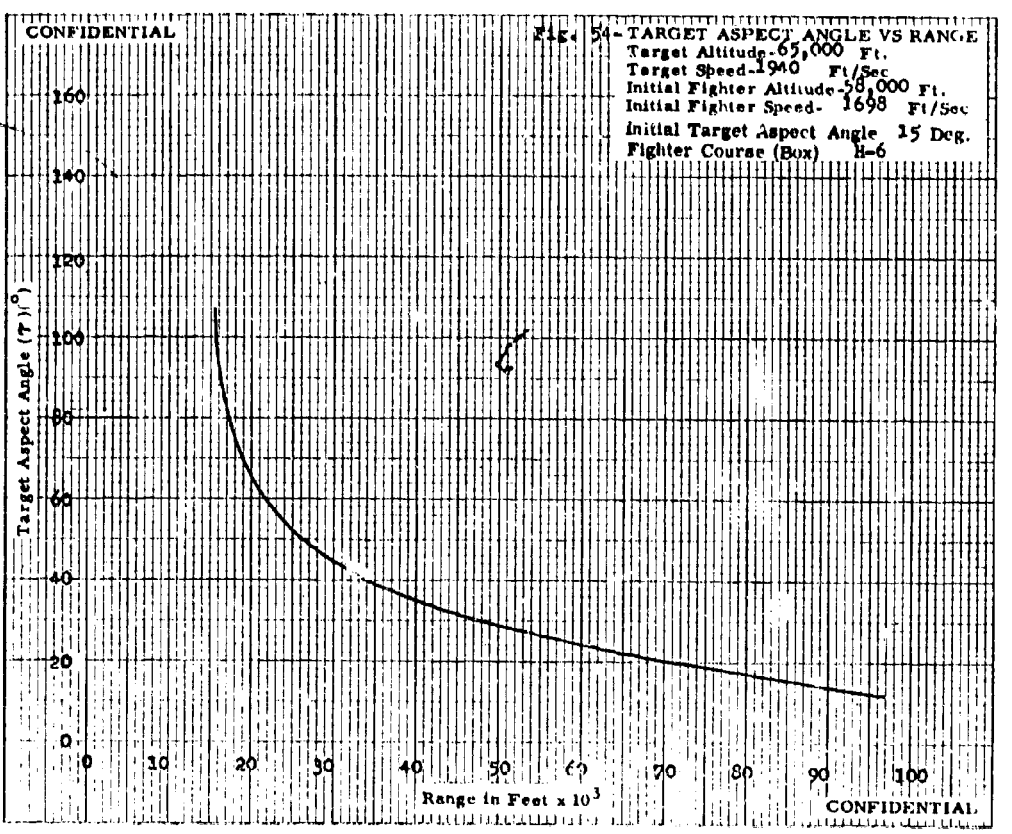
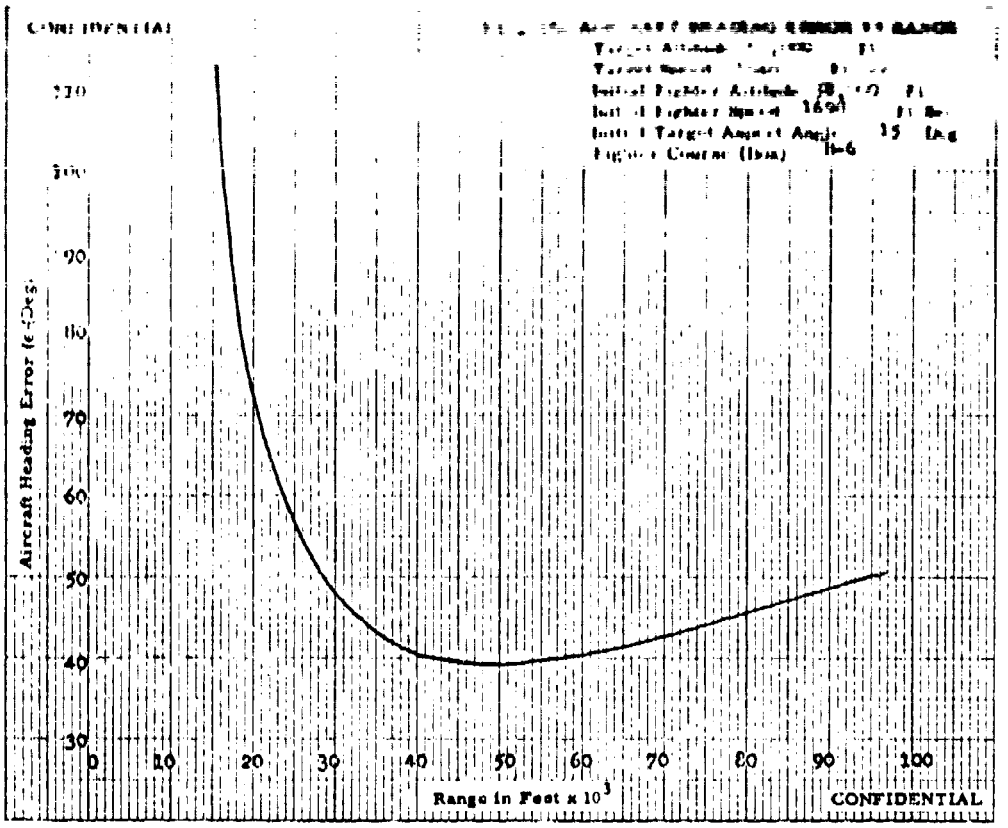
Fig. 50 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) H-6
Load Factor (L/W)
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 51- ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) H-6
Angle of Attack (α)(°)
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 52- FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) H-6
Fighter Speed (V_F)(Ft/Sec)
2700
2600
2500
2400
2300
2200
2100
2000
1900
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


Fighter Altitude (H_F)(Ft x 10^3)
63
62
61
60
59
58
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 54 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) H-6
Target Aspect Angle (Ψ_T)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL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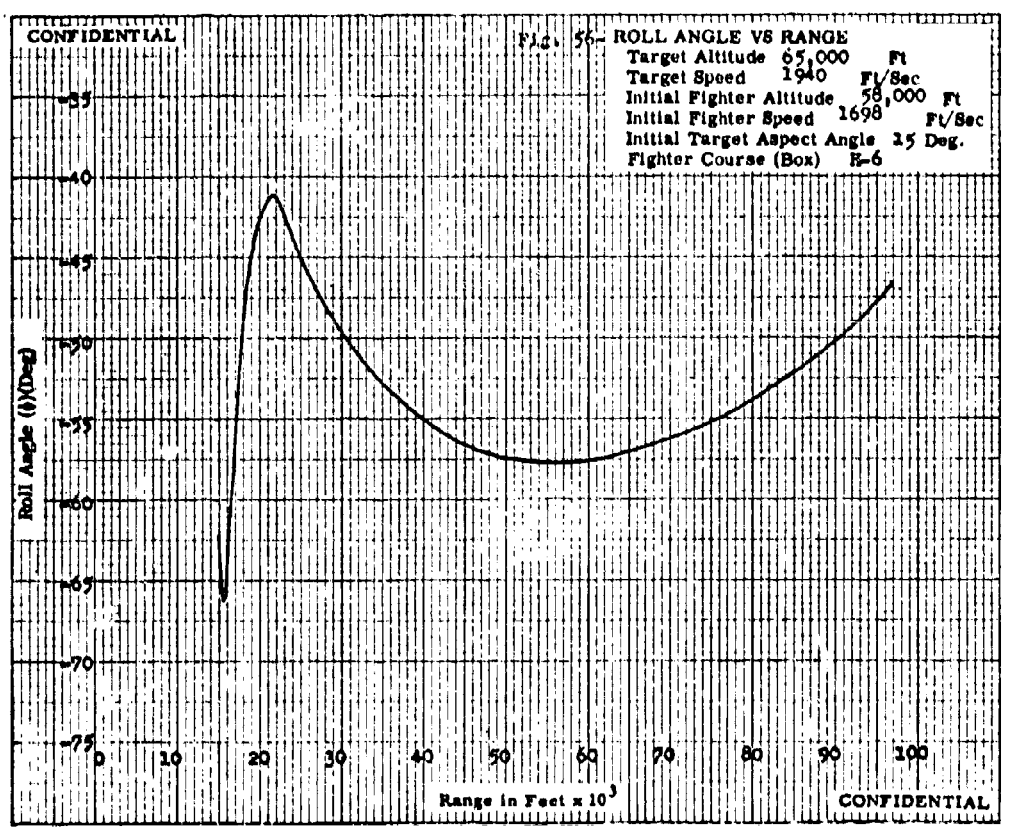
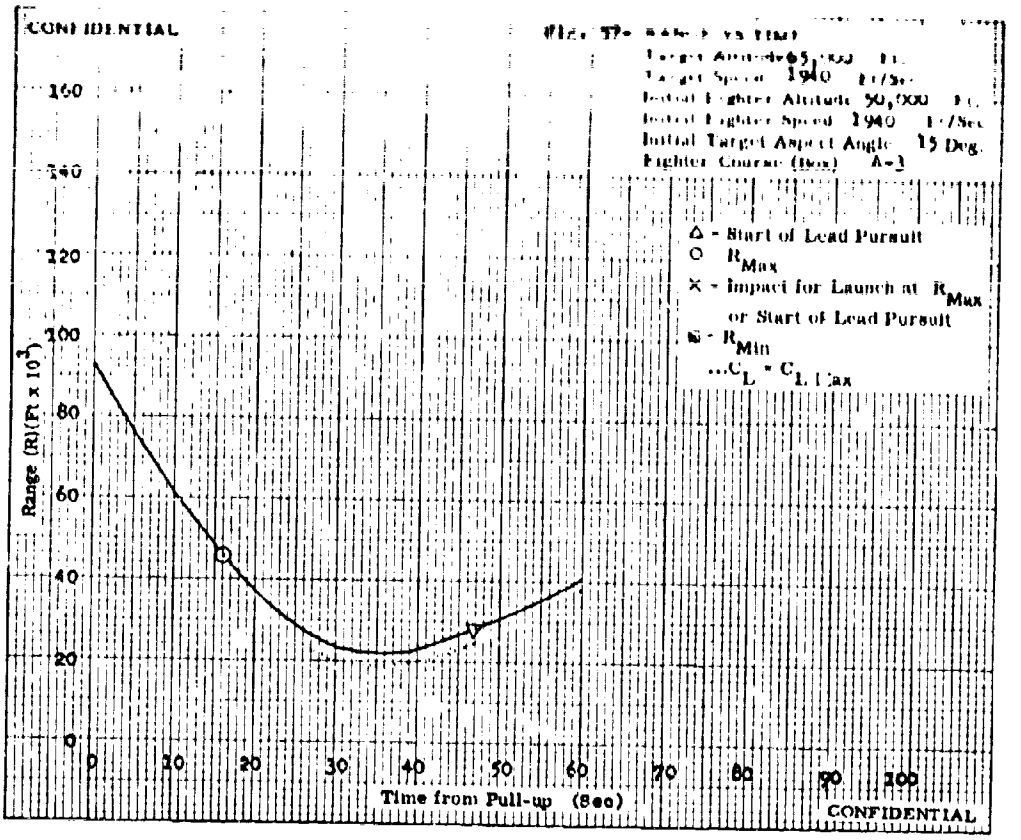
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 25 Deg.
Fighter Course (Box) B-6
Aircraft Heading Error (ε) Deg.
90
80
70
60
50
40
30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIG. 56- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 25 Deg.
Fighter Course (Box) B-6
Roll Angle (ϕ) Deg.
-35
-40
-45
-50
-55
-60
-65
-70
-75
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL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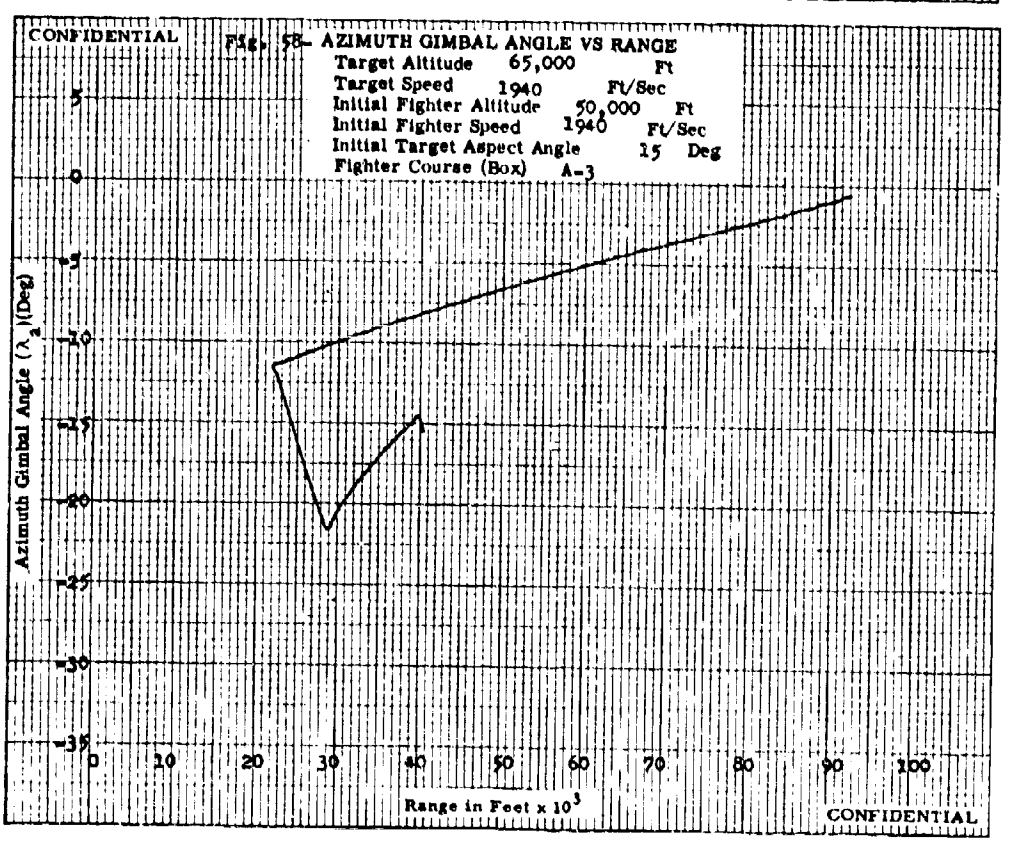
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
△ - Start of Lead Pursuit
○ - R_{Max}
× - Impact for Launch at R_{Max} or Start of Lead Pursuit
▣ - R_{Min}
...$C_L = C_{L\,Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 58- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3
Azimuth Gimbal Angle (λ_a)(Deg)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

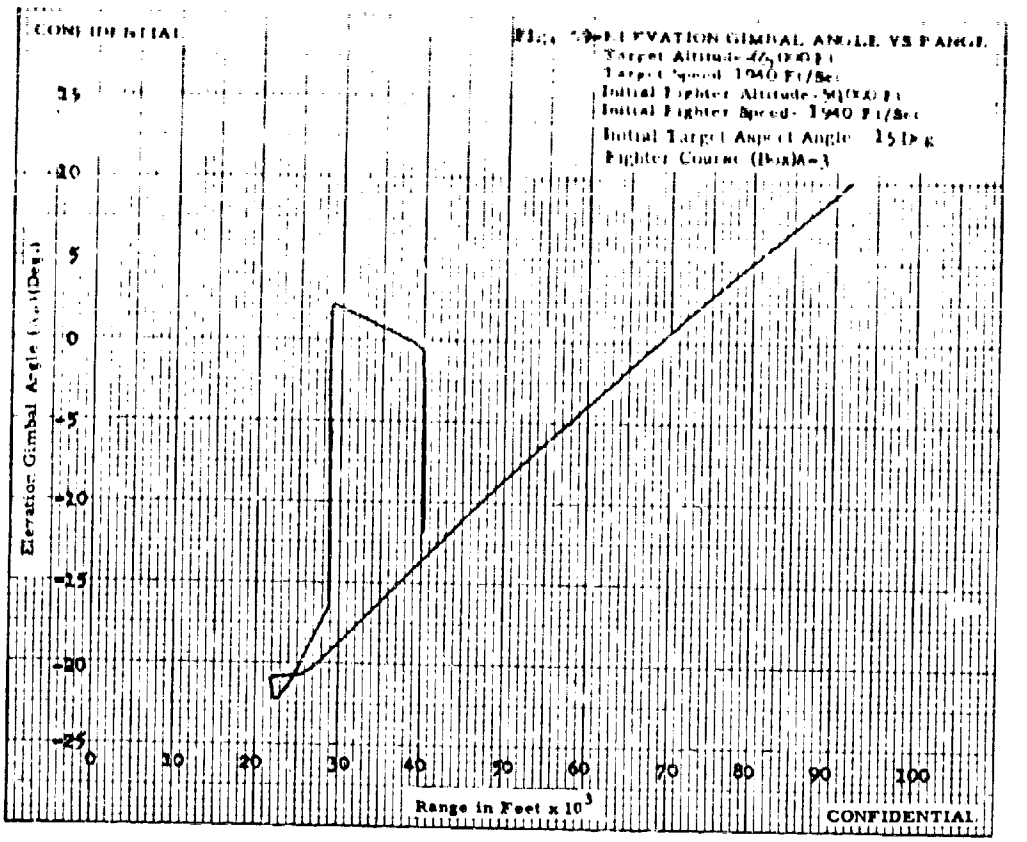


Fig. 59- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3

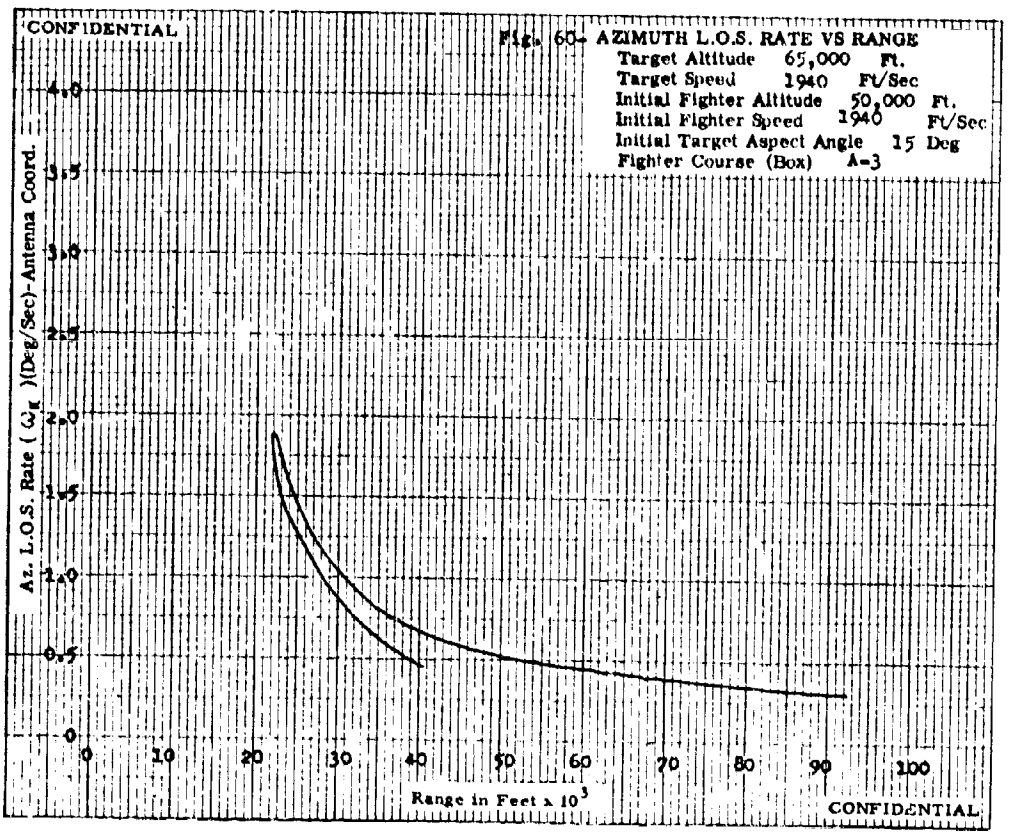
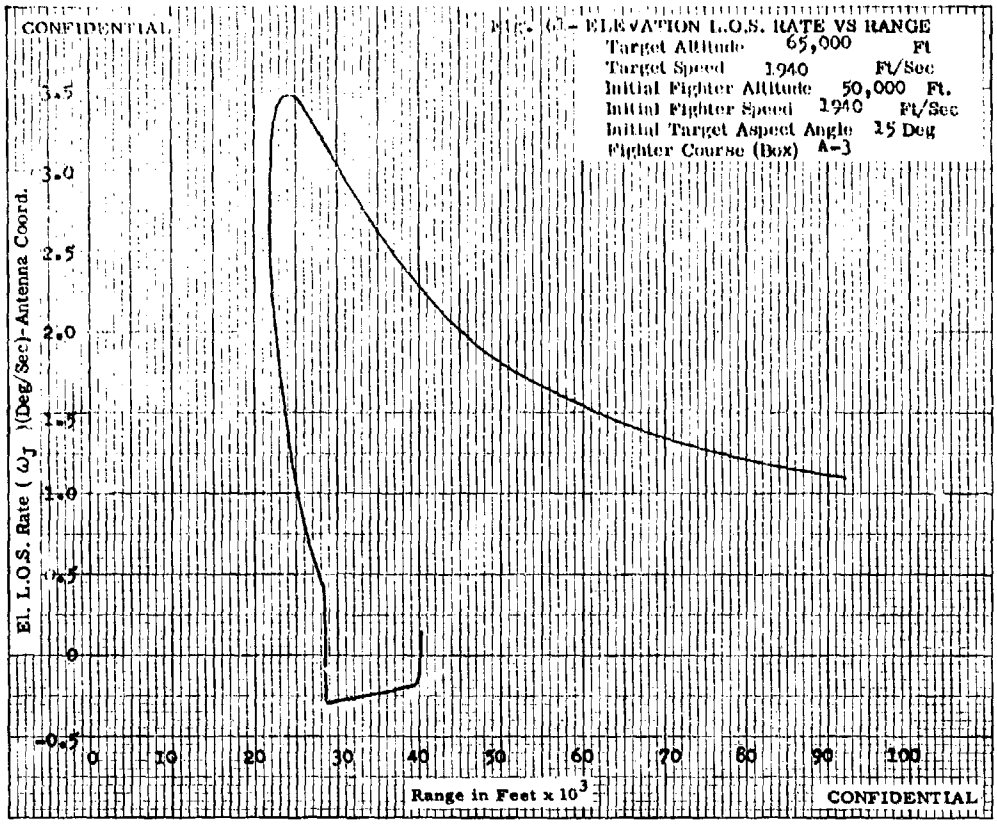
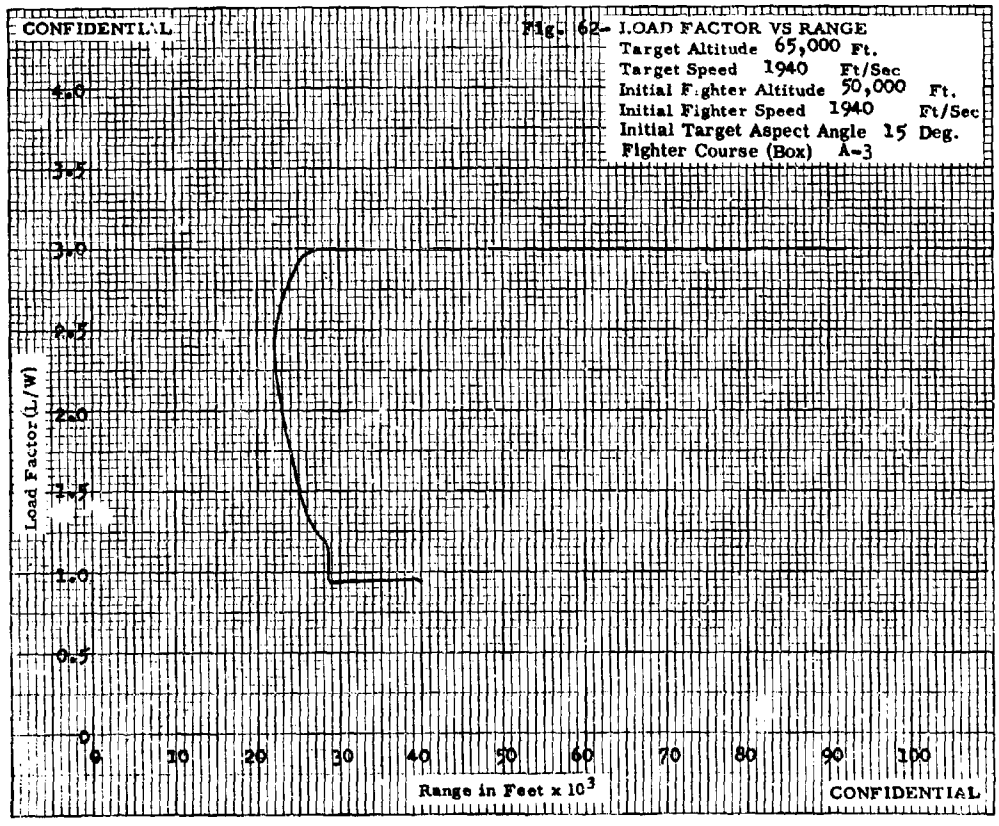
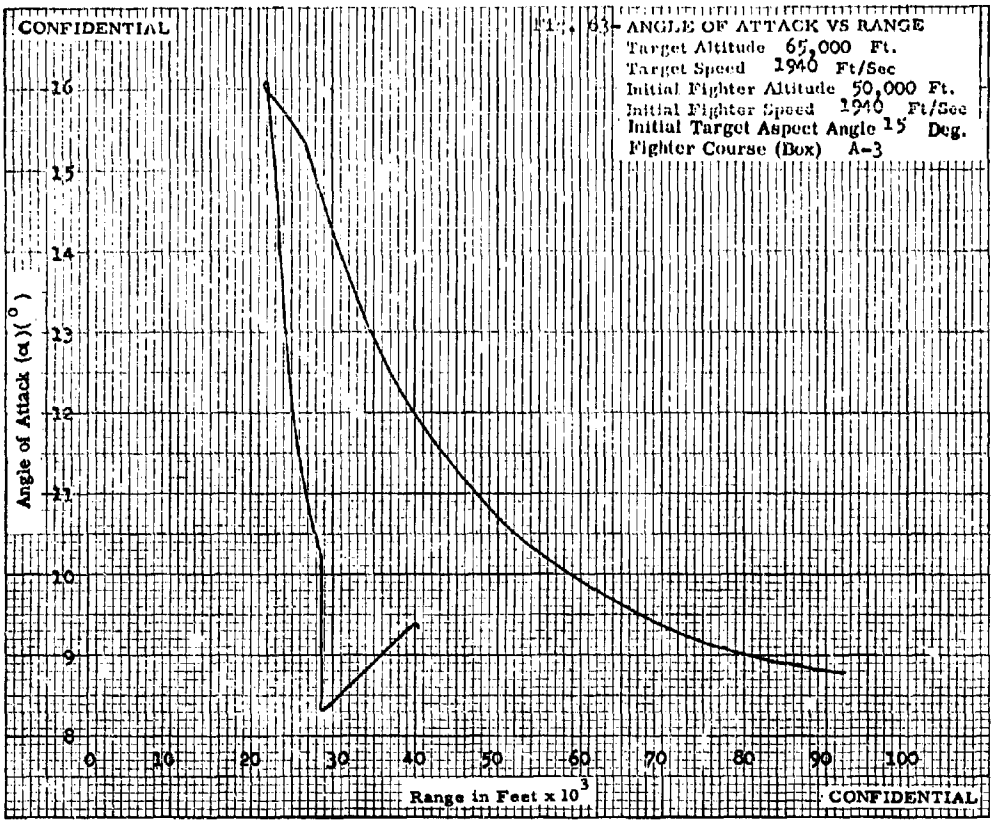
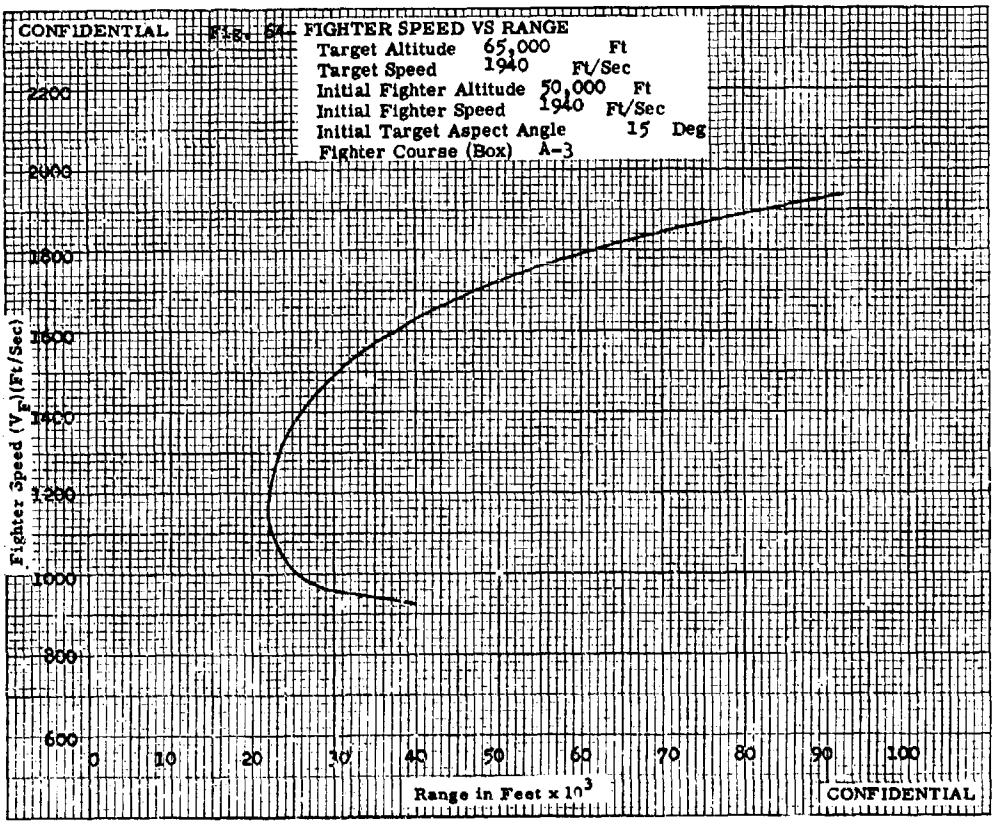


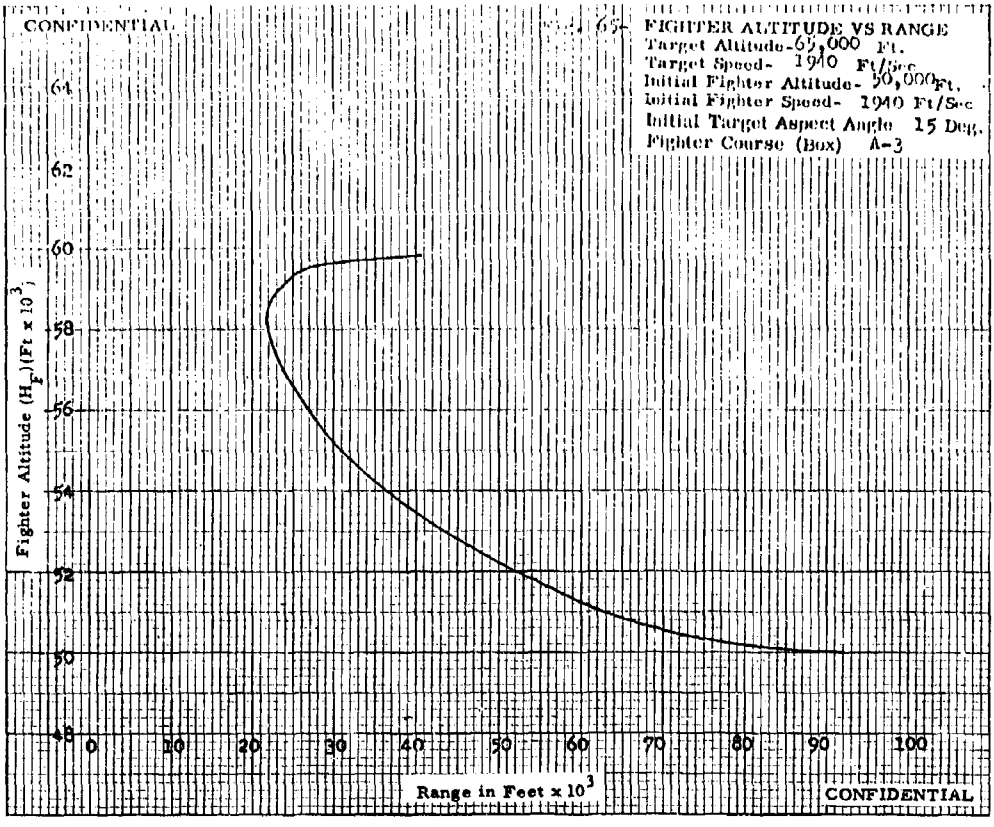
Fig. 60- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3

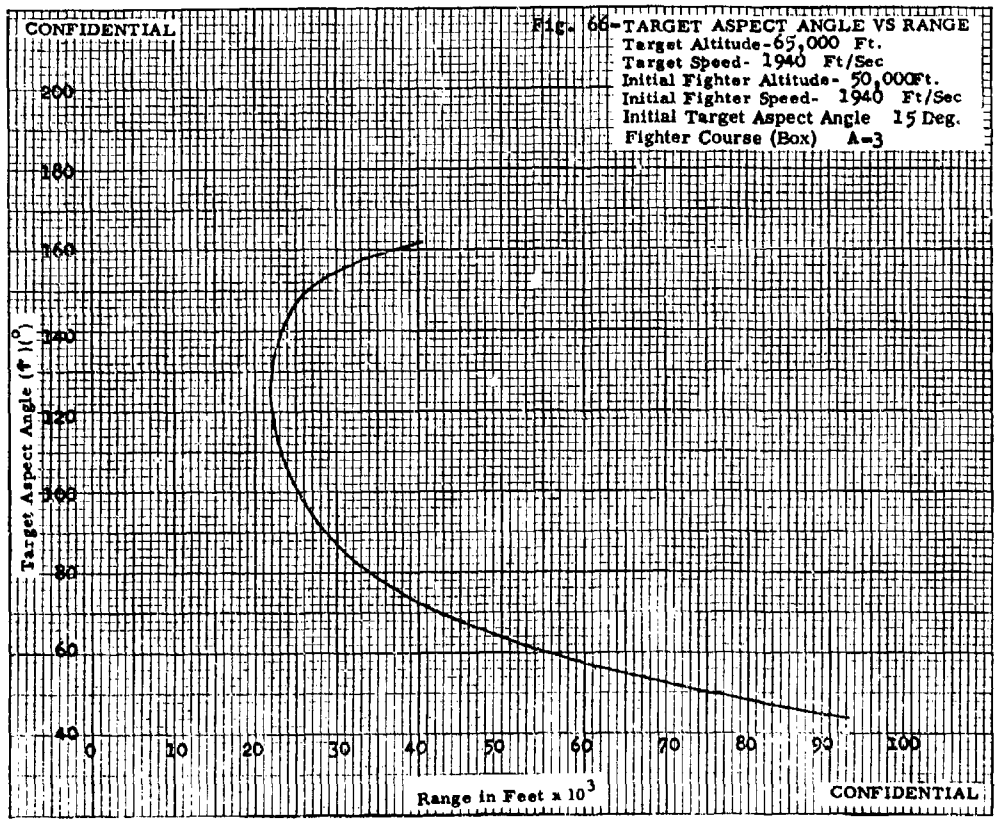

CONFIDENTIAL
Fig. 61 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3
El. L.O.S. Rate (ω_T) (Deg/Sec)-Antenna Coord.
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 62 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 63 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Angle of Attack (α)(°)
16
15
14
13
12
11
10
9
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 64 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-3
Fighter Speed (V_F)(Ft/Sec)
2200
2000
1800
1600
1400
1200
1000
800
600
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 65-FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Fighter Altitude (H_F)(Ft x 10^3)
64
62
60
58
56
54
52
50
48
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 66-TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3
Target Aspect Angle (Ψ_T)(°)
200
180
160
140
120
100
80
60
40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

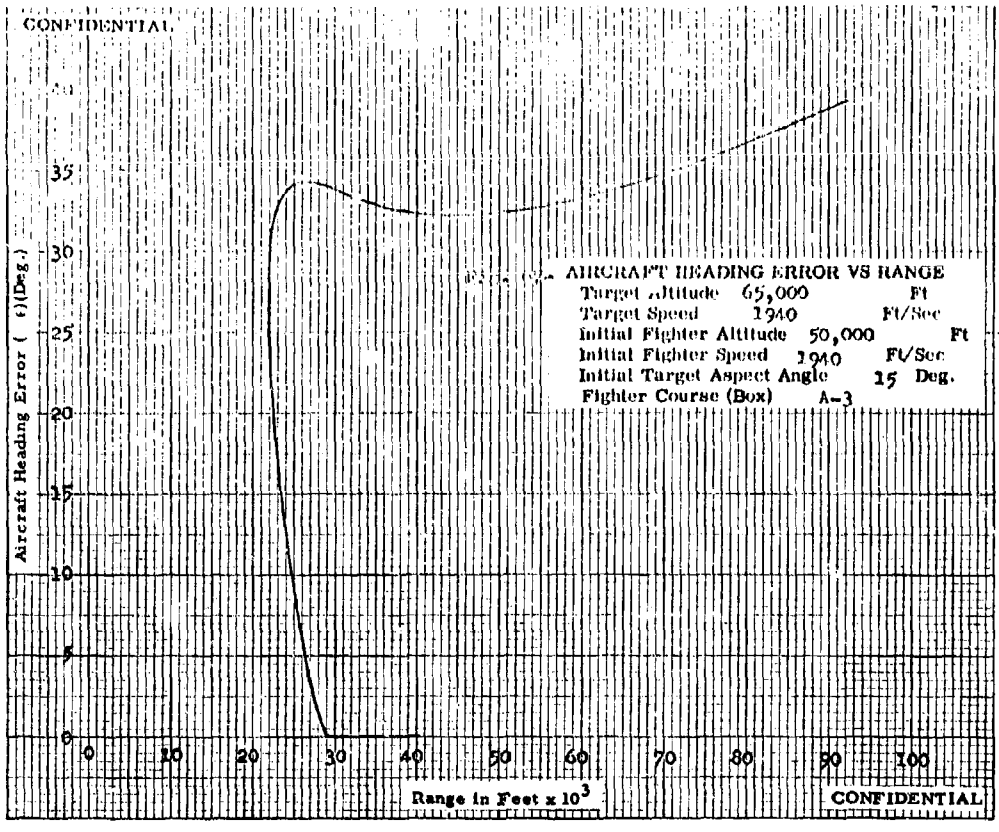


FIG. 68 AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-3

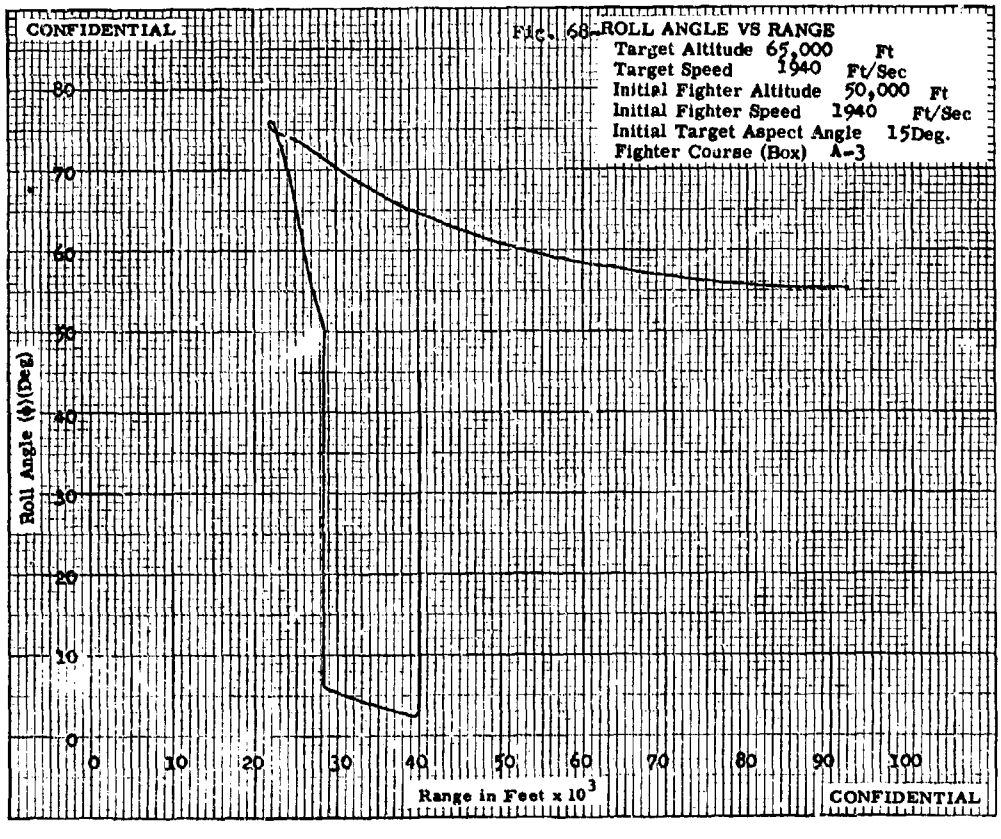
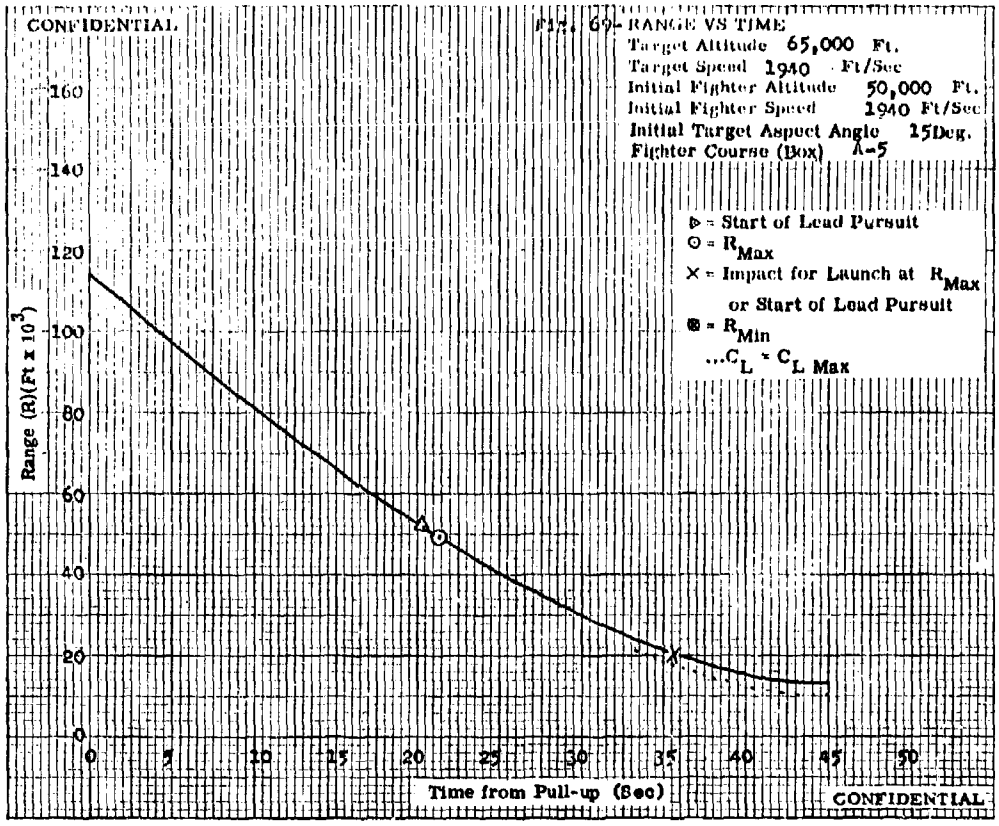


FIG. 69 ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15Deg.
Fighter Course (Box) A-3


CONFIDENTIAL
Fig. 69- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15Deg.
Fighter Course (Box) A-5
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
◉ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

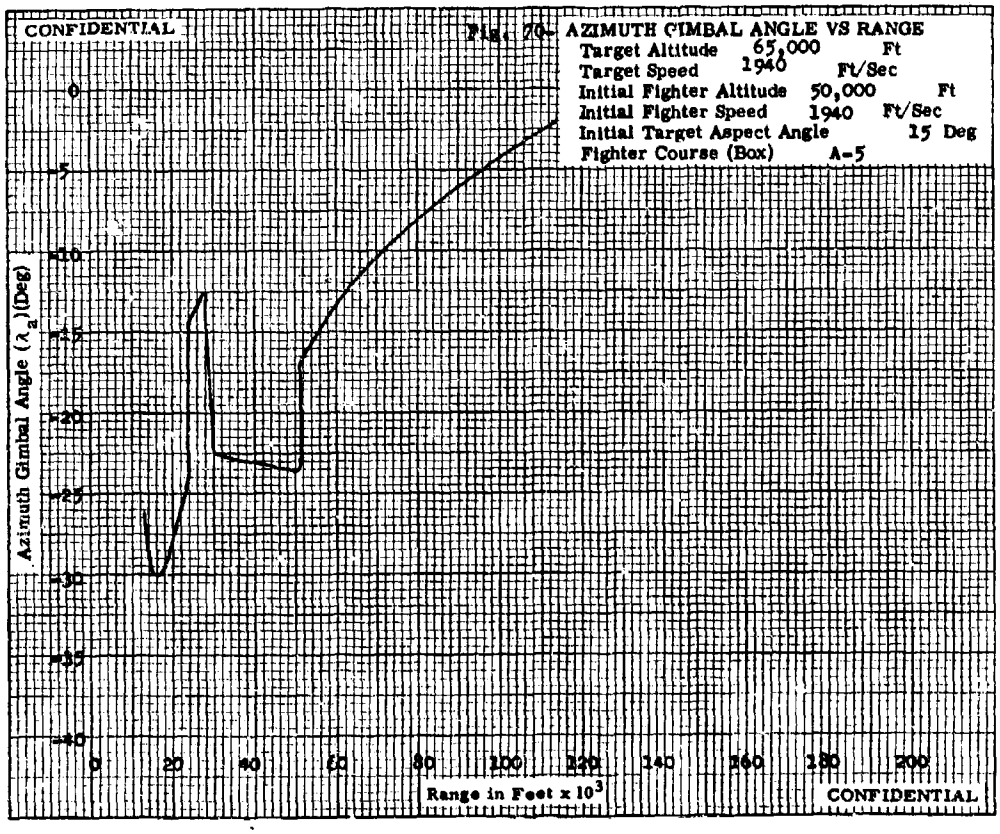

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Fig. 70- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-5
Azimuth Gimbal Angle (λ_a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

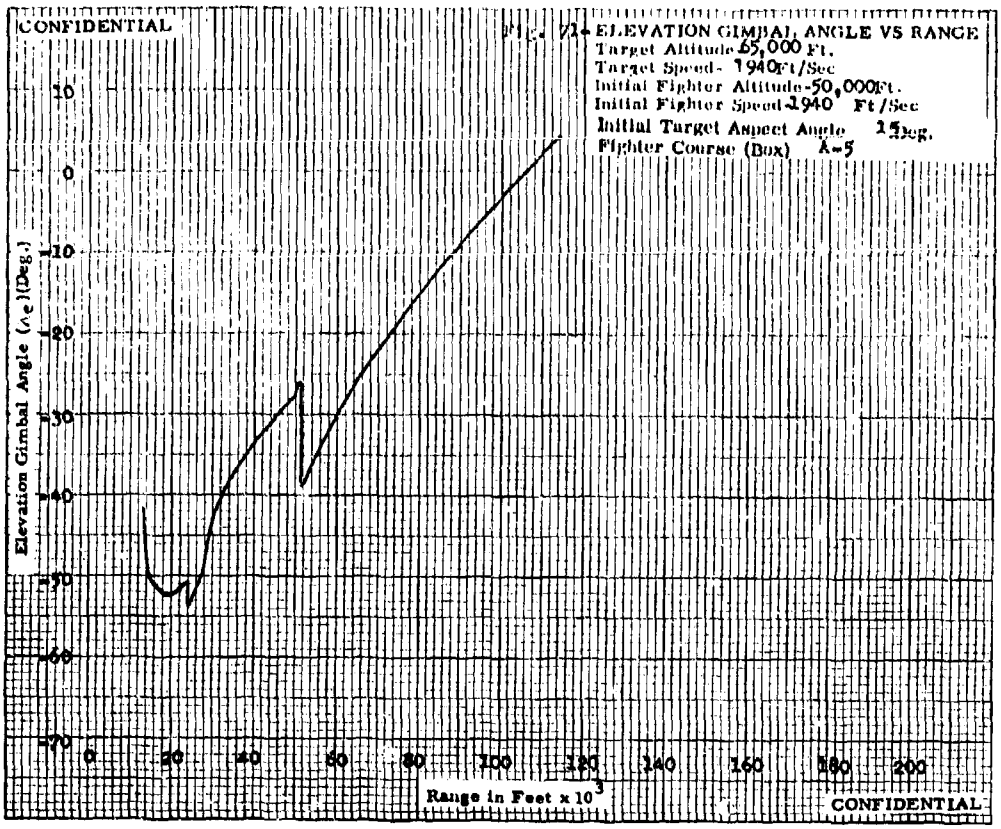
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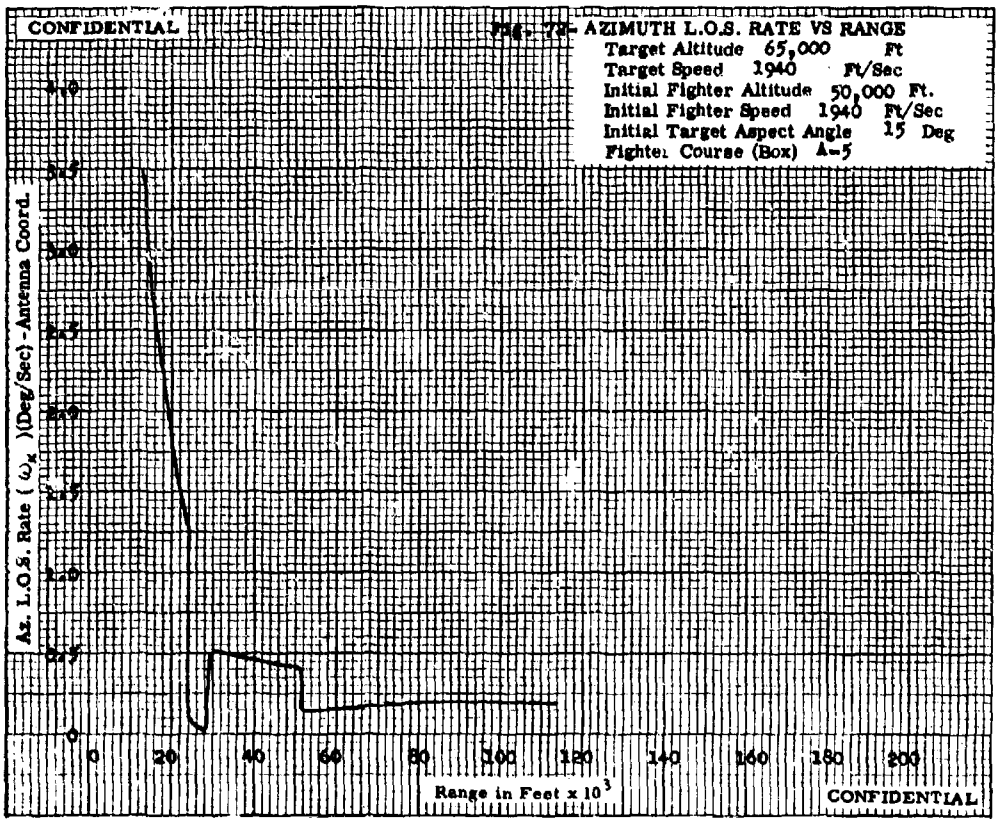
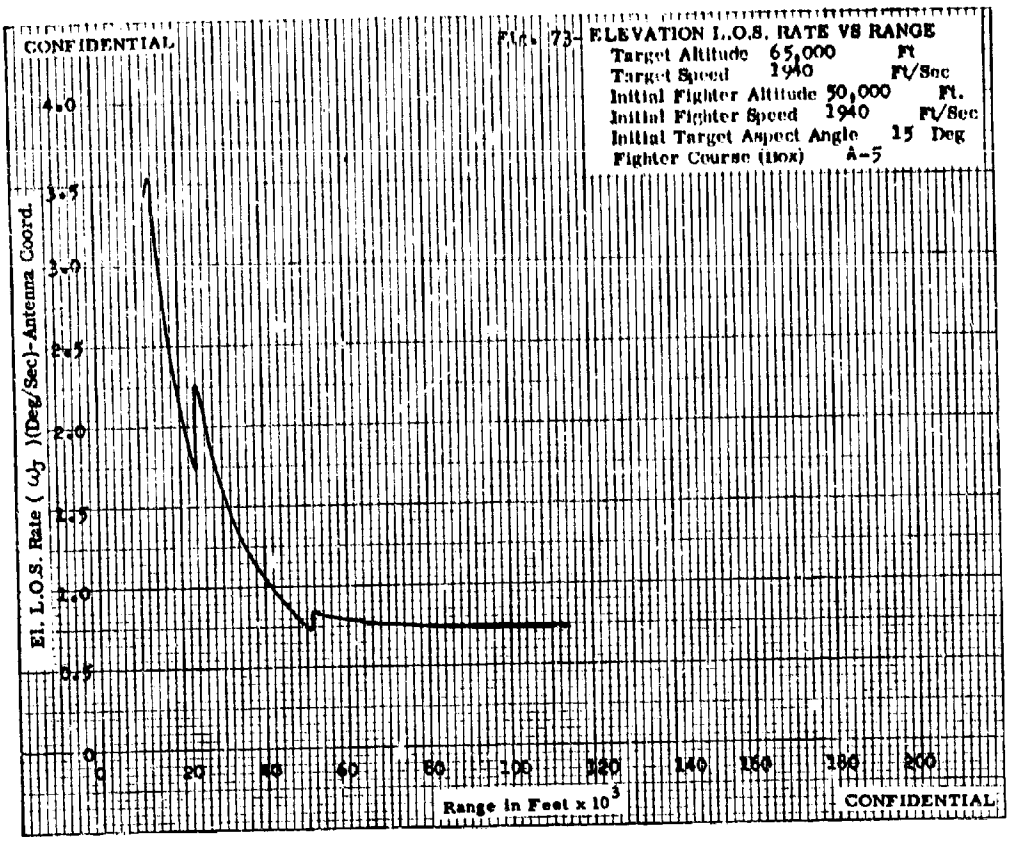
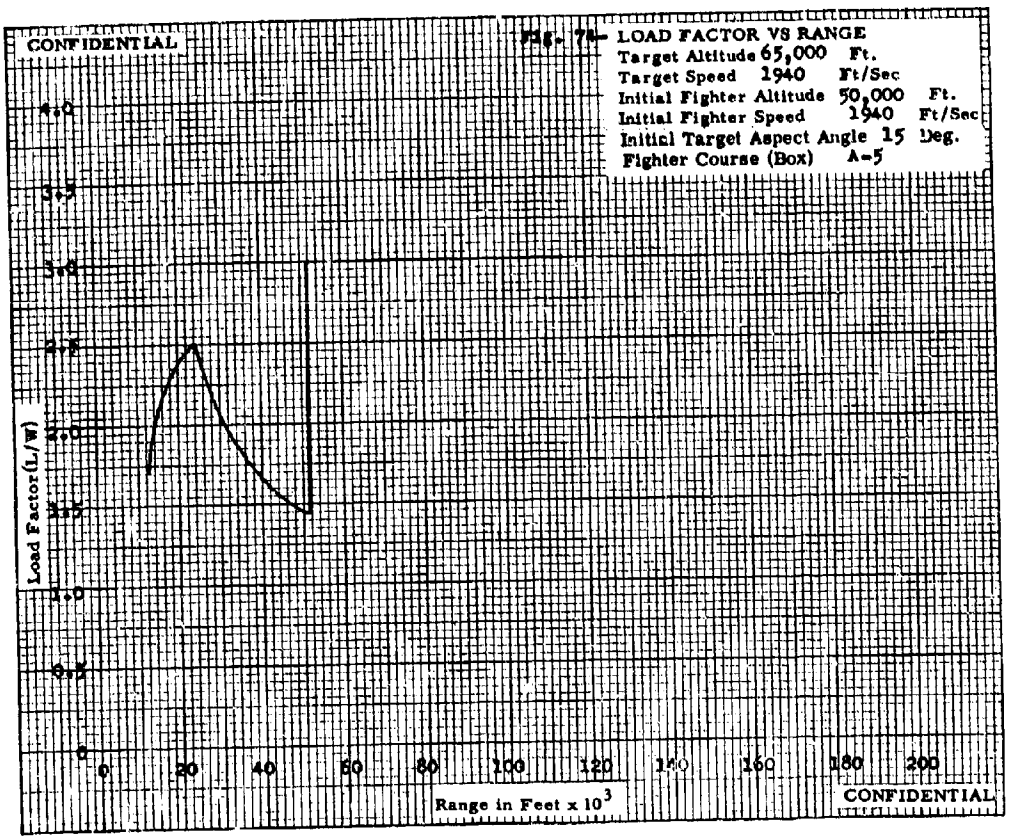
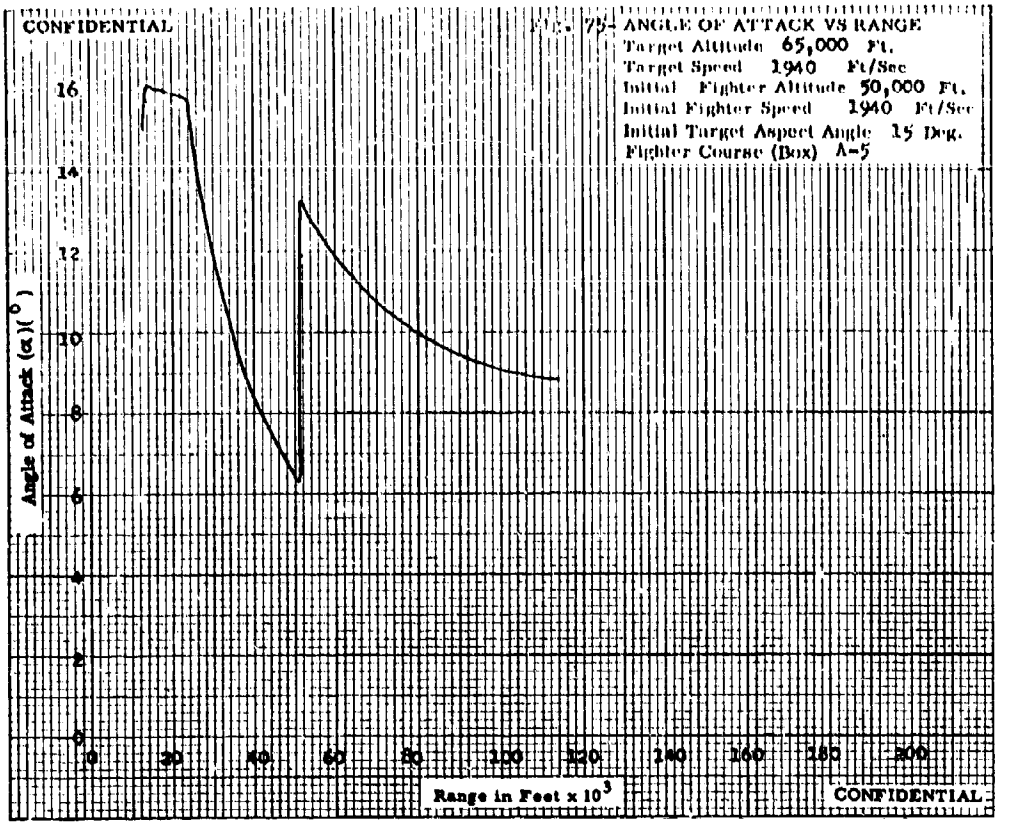
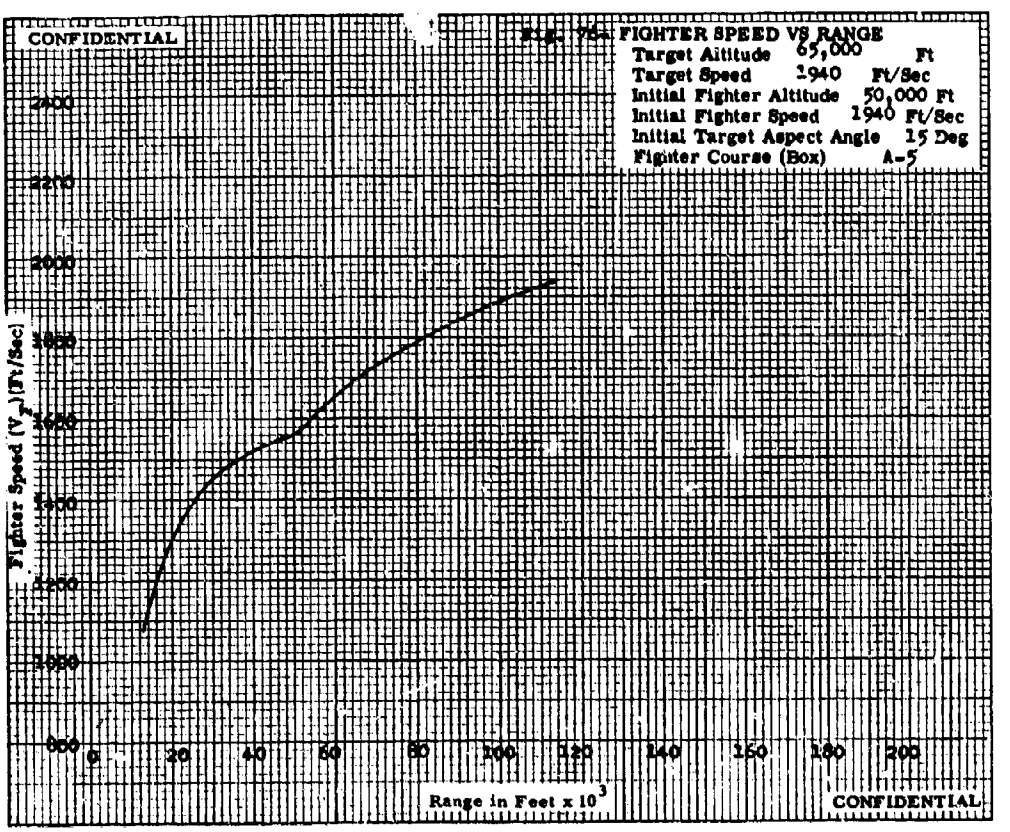
Fig. 71 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed - 1940 Ft/Sec
Initial Fighter Altitude - 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Elevation Gimbal Angle (θe) (Deg.)
10
0
-10
-20
-30
-40
-50
-60
-70
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 72 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-5
Az. L.O.S. Rate (ωx) (Deg/Sec) - Antenna Coord.
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIG. 73
ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-5
El. L.O.S. Rate (ω_T)(Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIG. 74
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL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FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-5
Fighter Speed (V_F) (Ft/Sec)
2400
2200
2000
1800
1600
1400
1200
1000
800
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

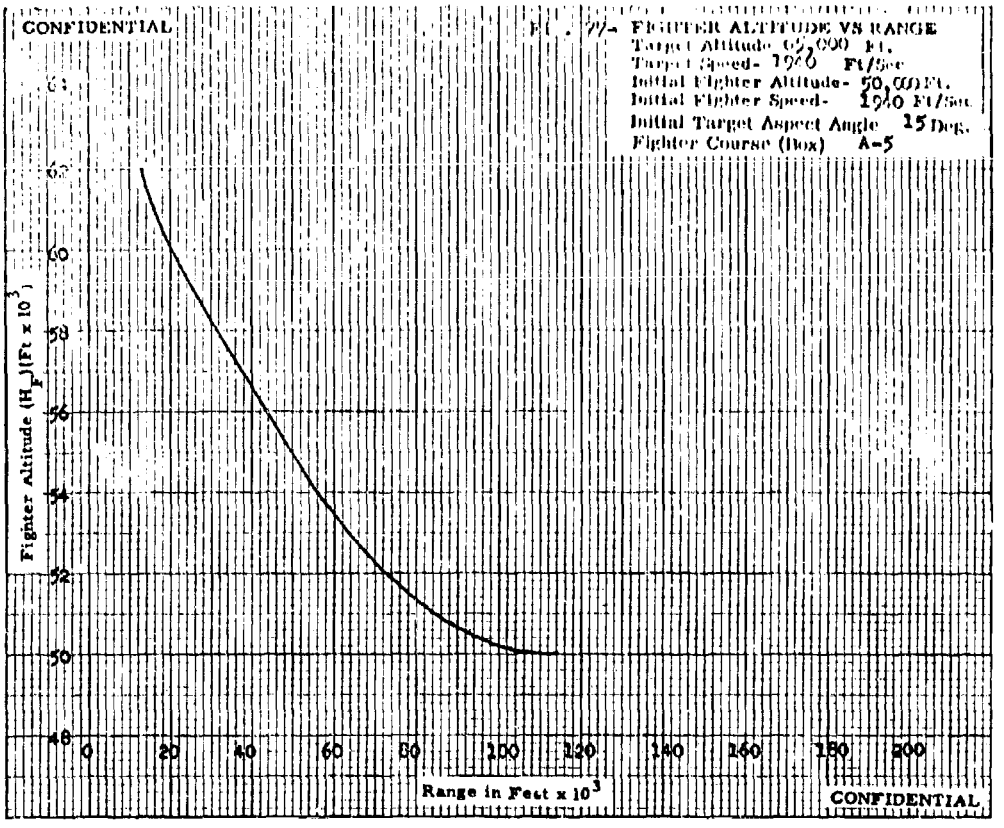
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Fig. 77- FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
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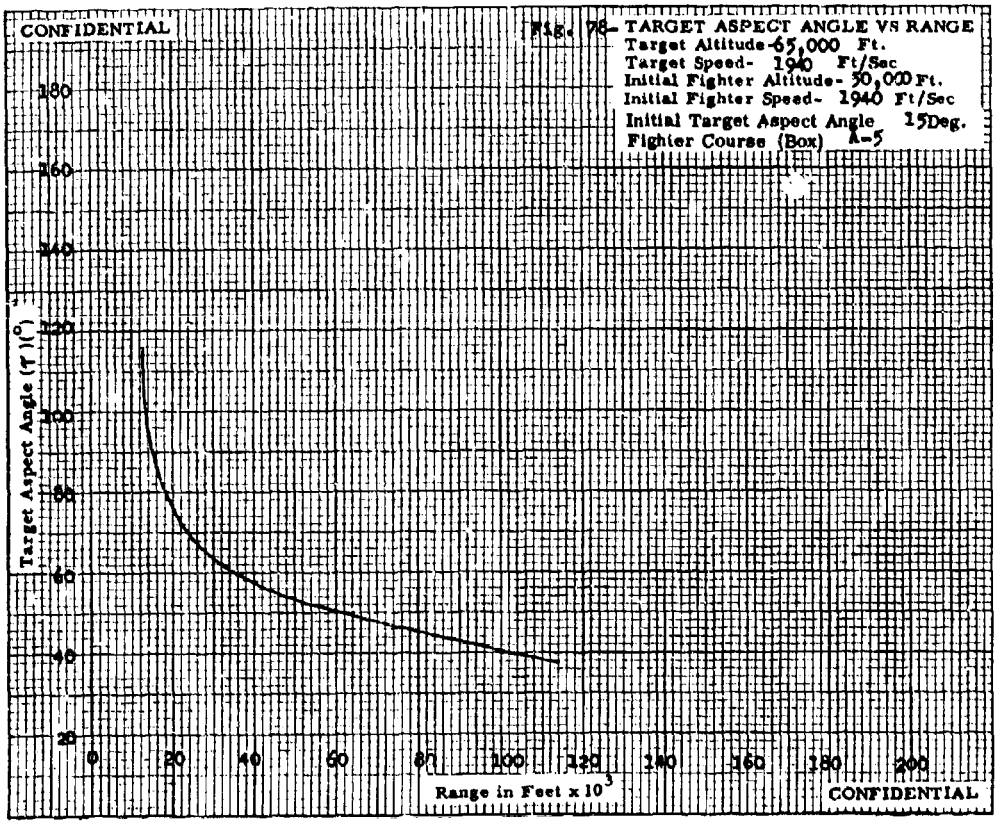
CONFIDENTIAL
Fig. 78- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Target Aspect Angle (τ_1)(°)
Range in Feet x 10^3
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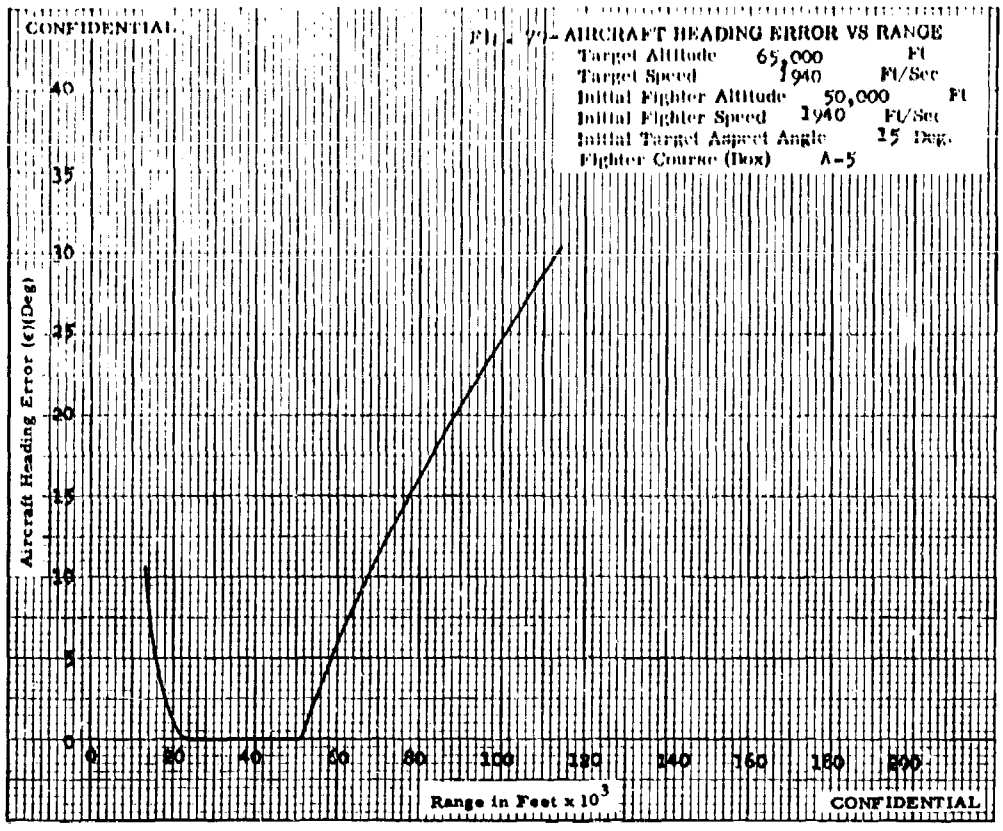
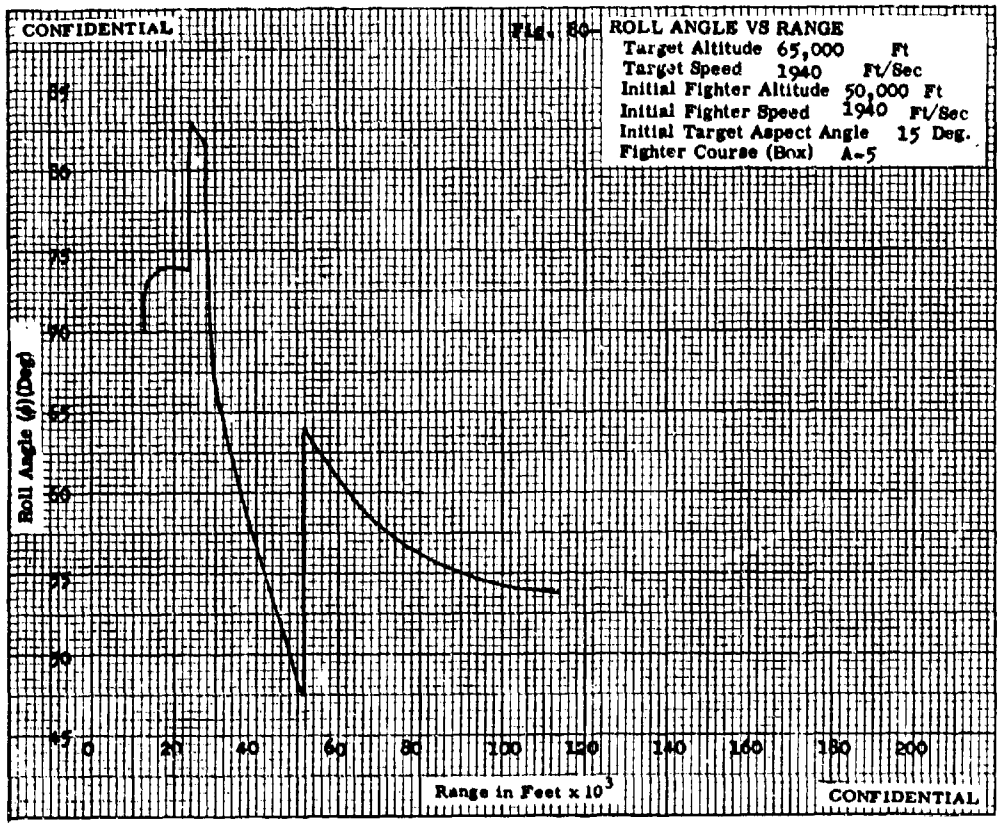
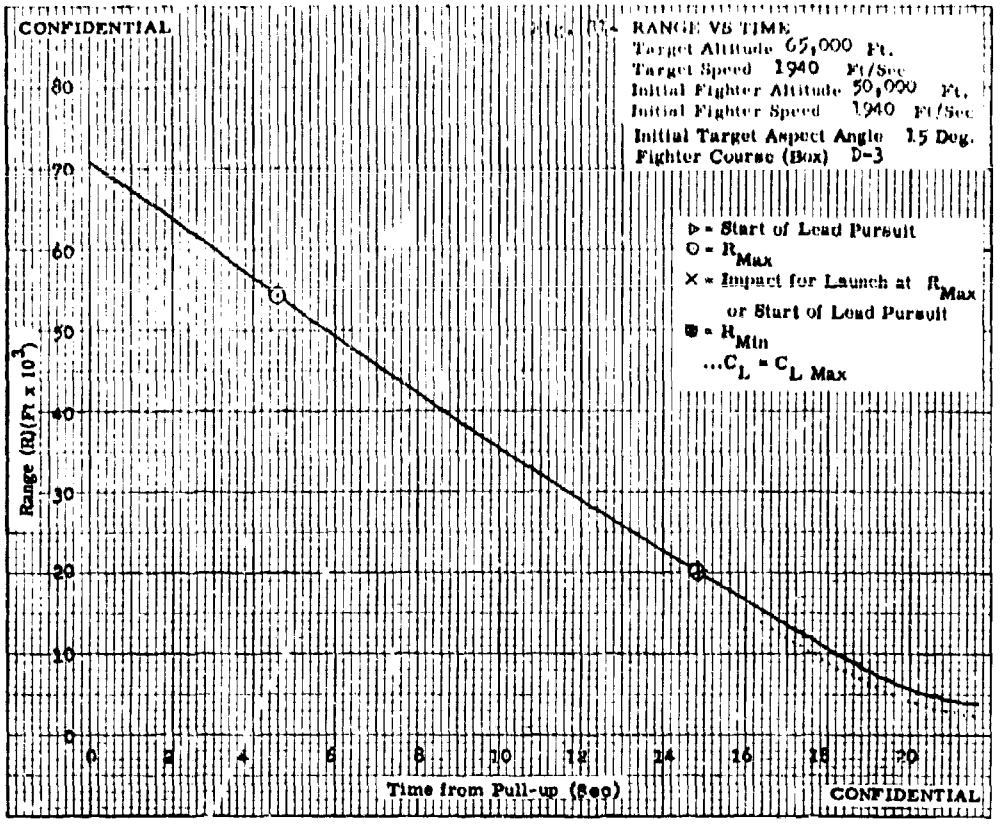

CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Aircraft Heading Error (ε)(Deg)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-5
Roll Angle (φ)(Deg)
85
80
75
70
65
60
55
50
45
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL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RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3
▷ = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
80
70
60
50
40
30
20
10
0
0
2
4
6
8
10
12
14
16
18
20
Time from Pull-up (Sec)
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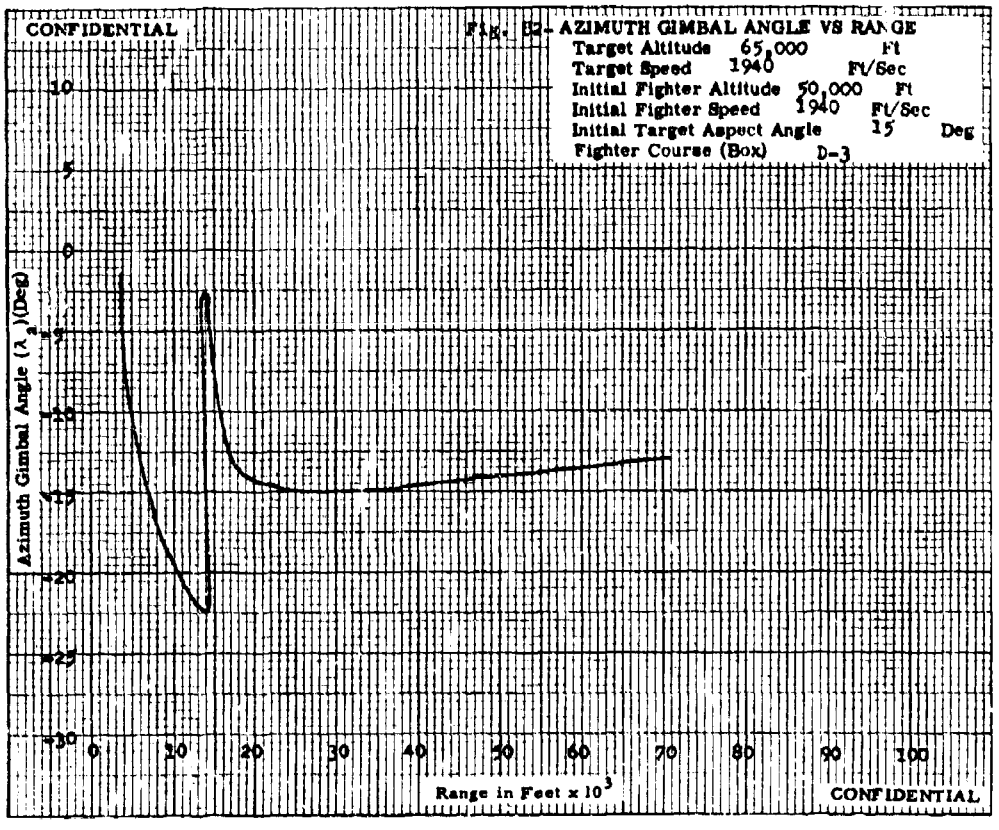
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Fig. 12 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-3
Azimuth Gimbal Angle (λ_a)(Deg)
10
5
0
-5
-10
-15
-20
-25
-30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 33 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3

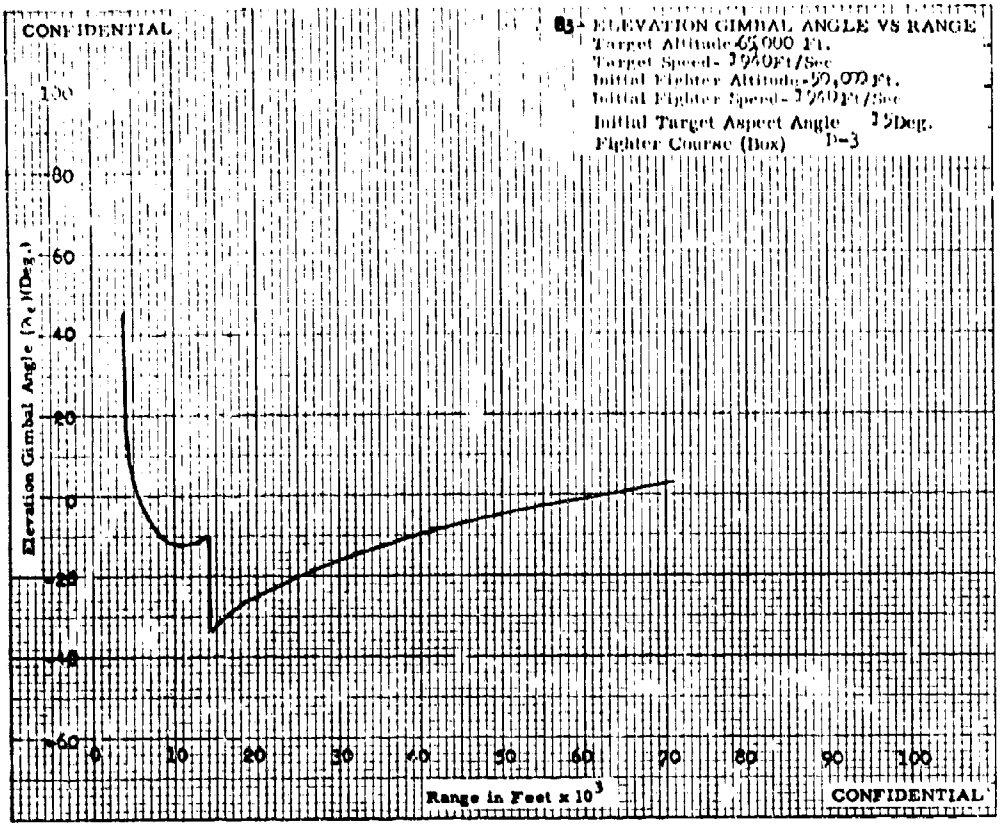

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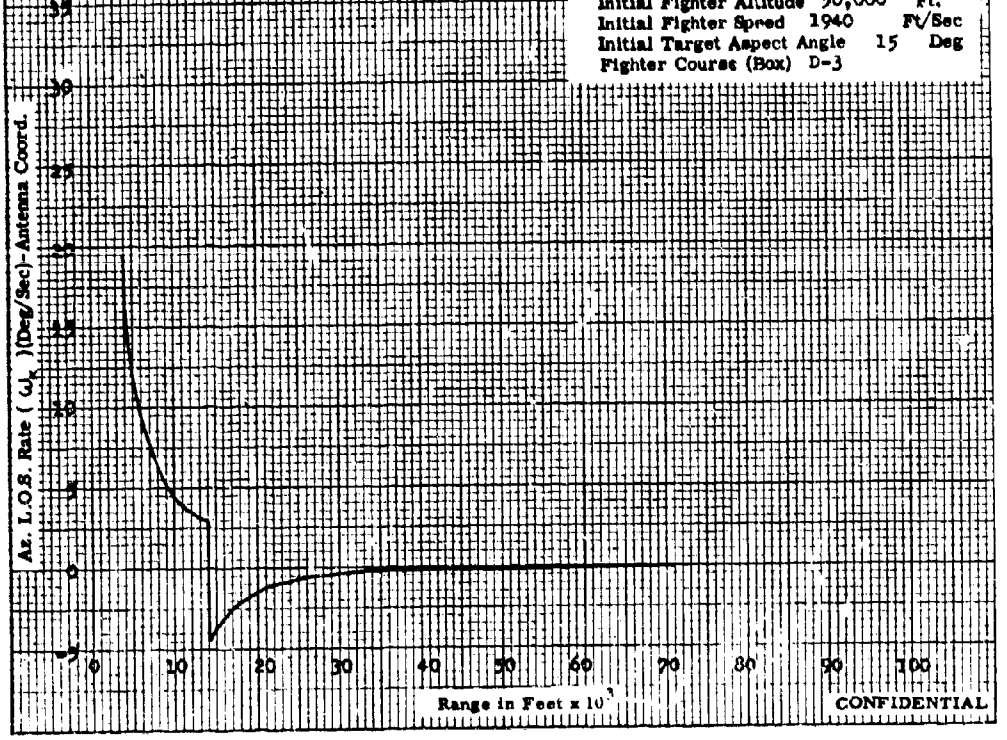
Fig. 34 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-3



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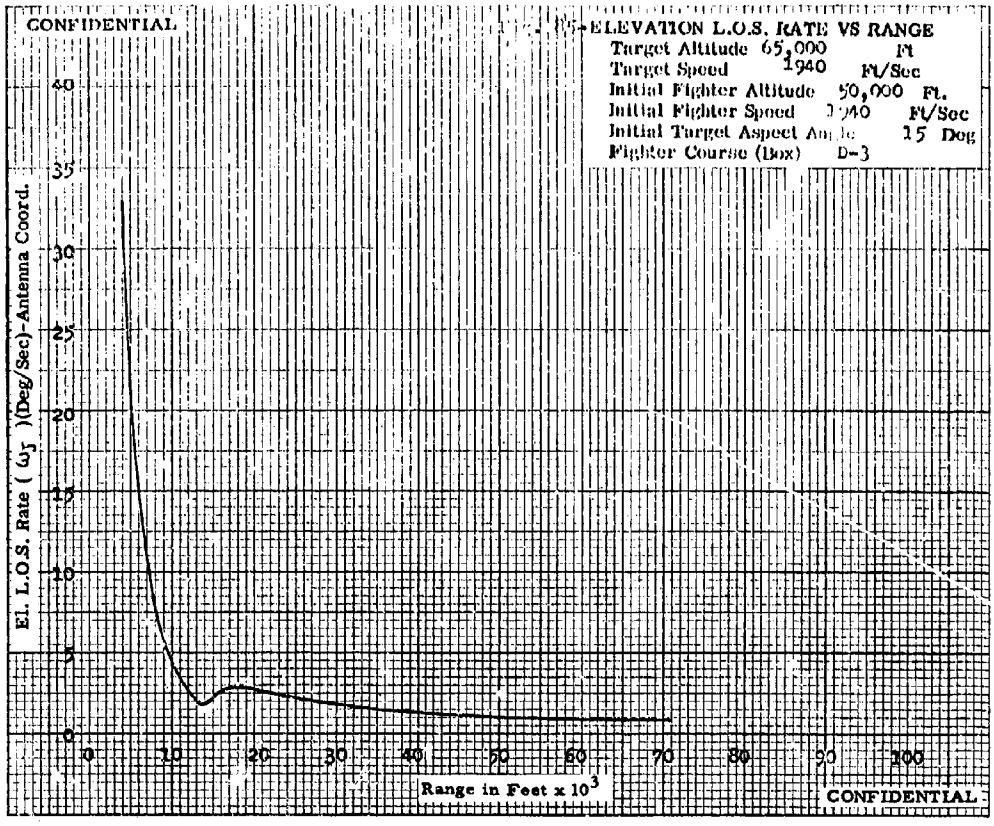
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ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-3
El. L.O.S. Rate (ω_y)(Deg/Sec)-Antenna Coord.
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

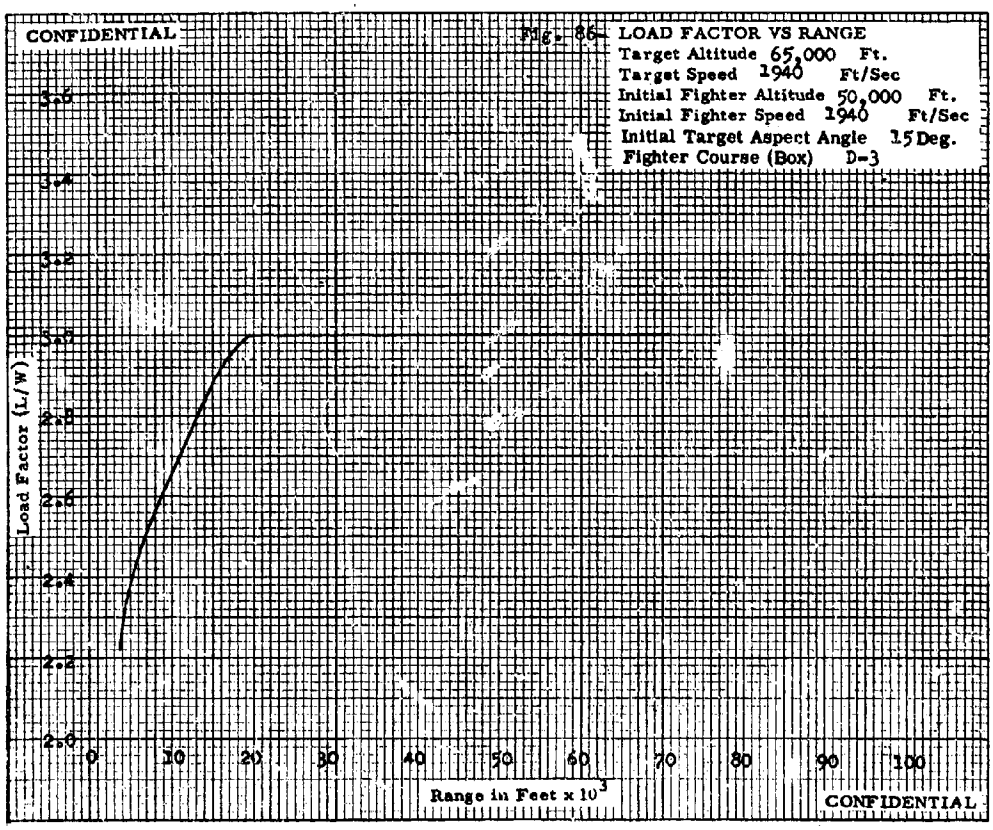
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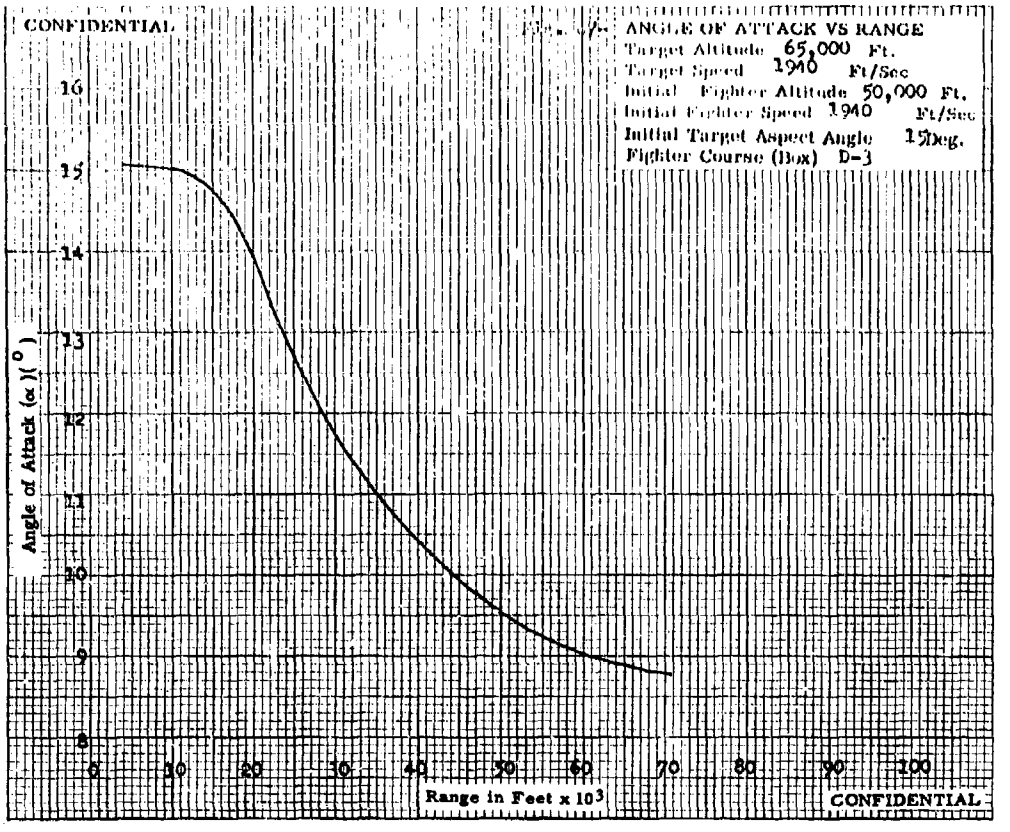
Fig. 86
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3
Load Factor (L/W)
3.0
2.8
2.6
2.4
2.2
2.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL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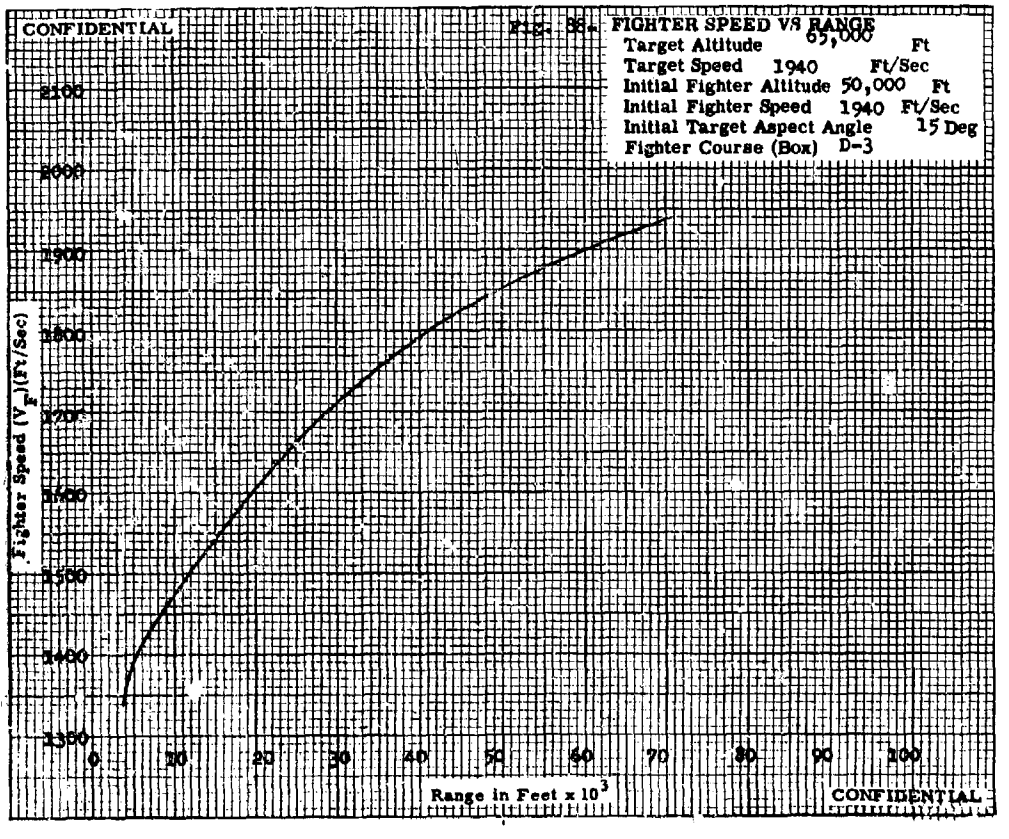
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3
Angle of Attack (α)(°)
16
15
14
13
12
11
10
9
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL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FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-3
Fighter Speed (V_F)(Ft/Sec)
2100
2000
1900
1800
1700
1600
1500
1400
1350
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

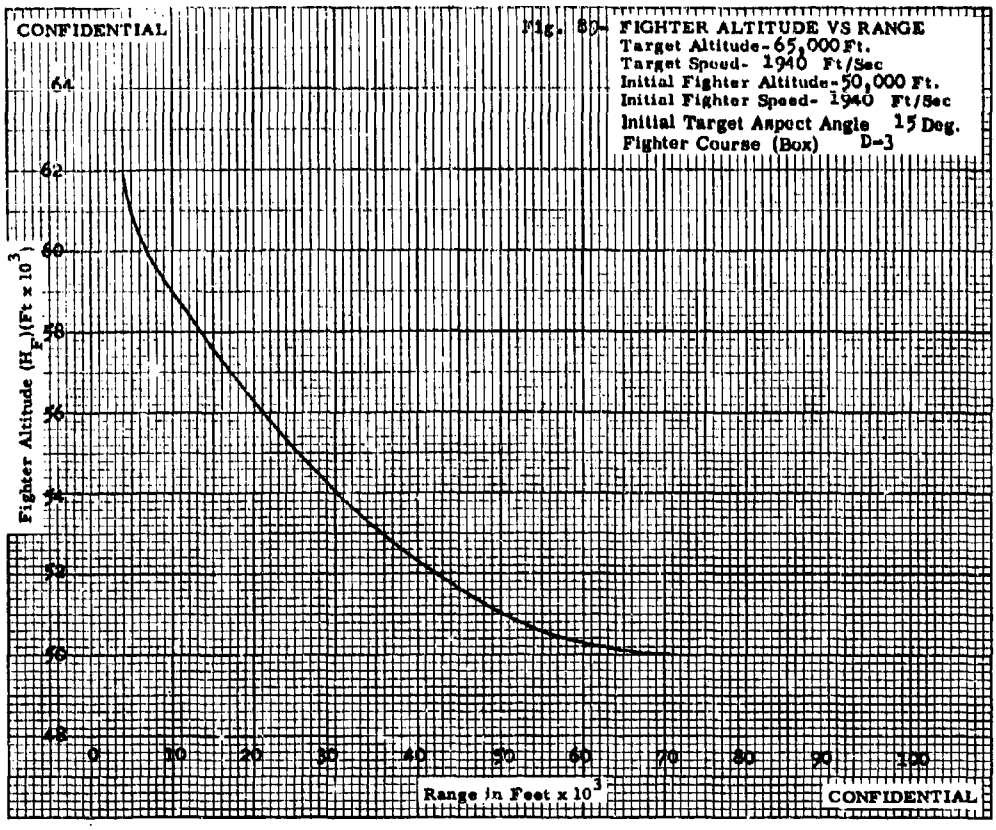
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Fig. 89
FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3
Fighter Altitude (H_F)(Ft x 10^3)
64
62
60
58
56
54
52
50
48
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

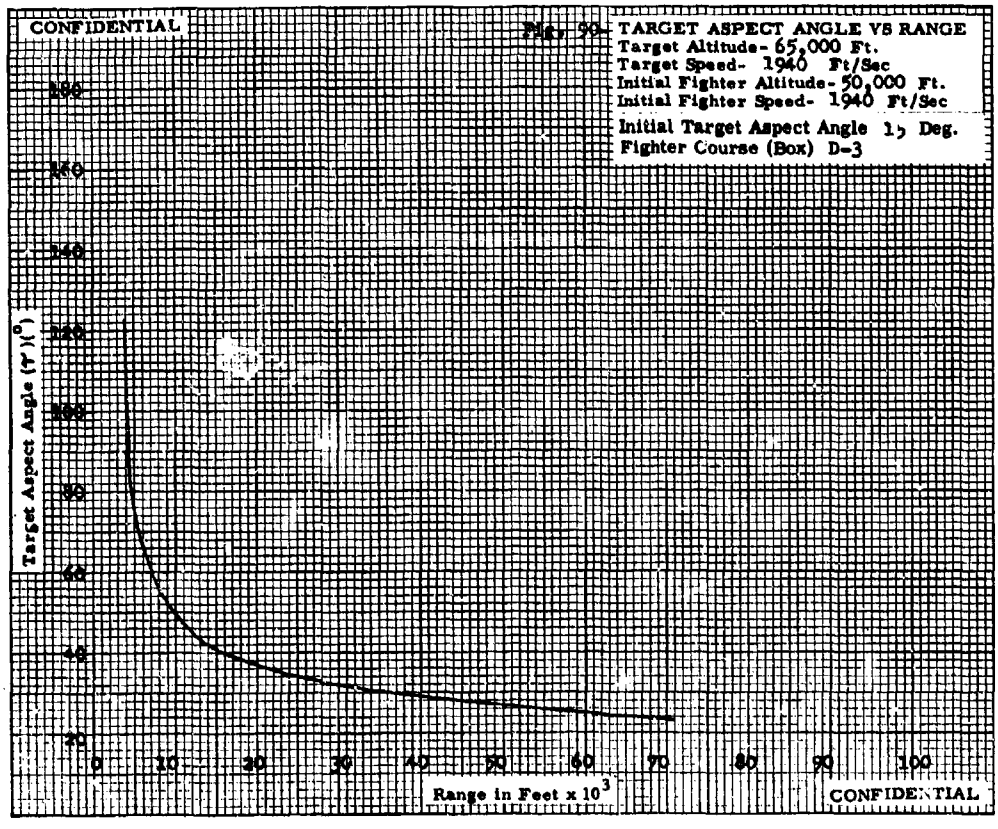
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Fig. 90
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3
Target Aspect Angle (Ψ)(^{0})
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 91 – AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3

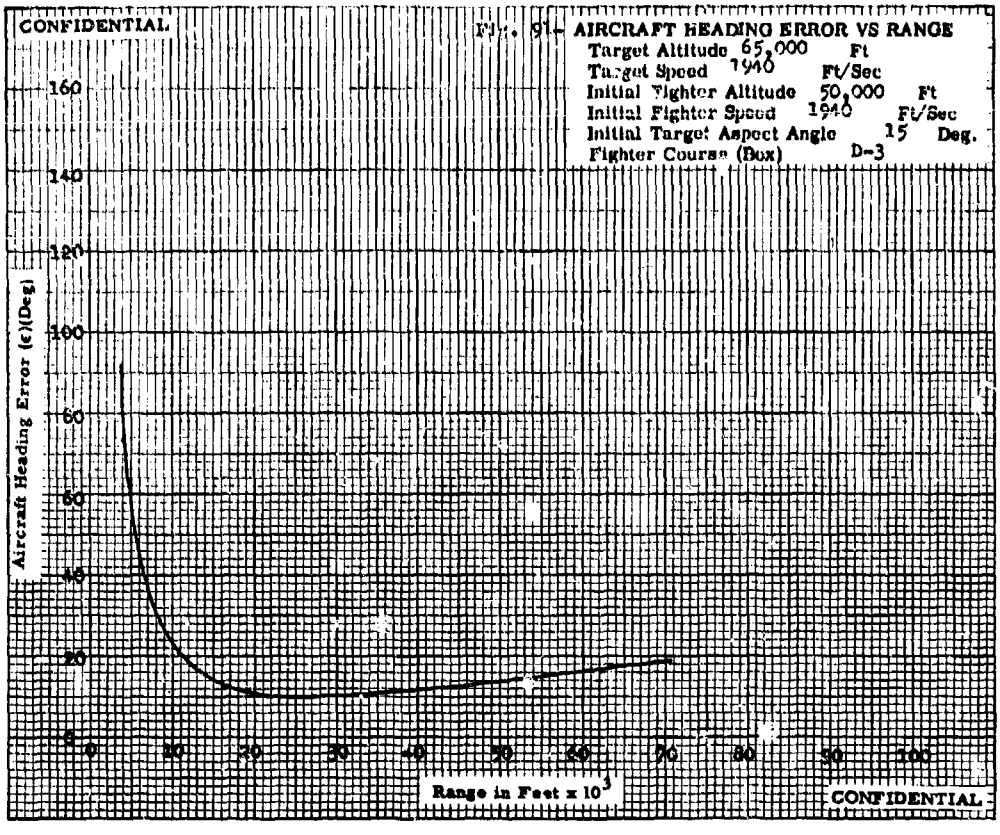

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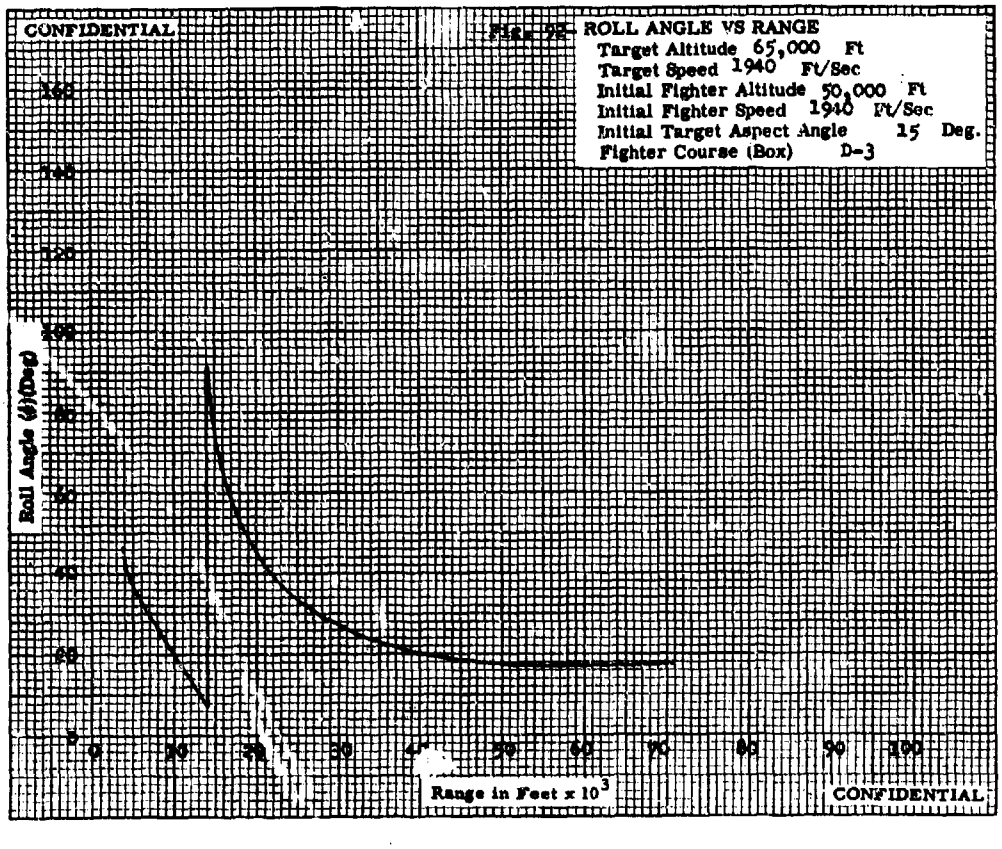
Fig. 92 – ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-3



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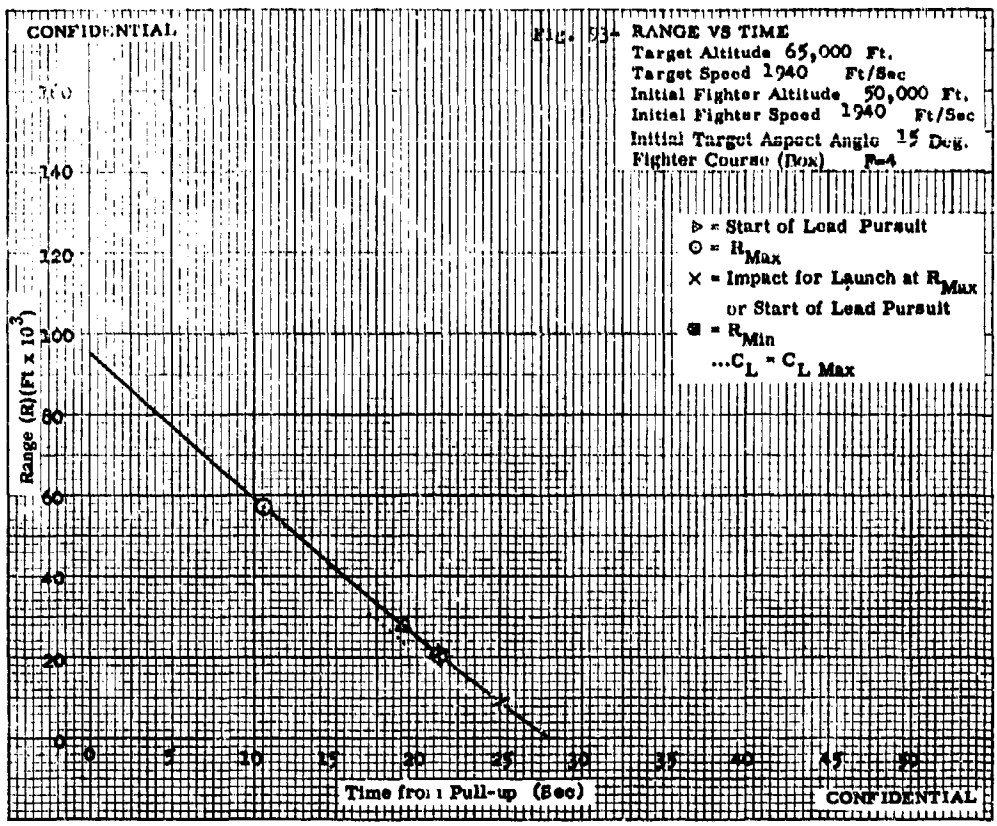
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Fig. 53 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min} ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
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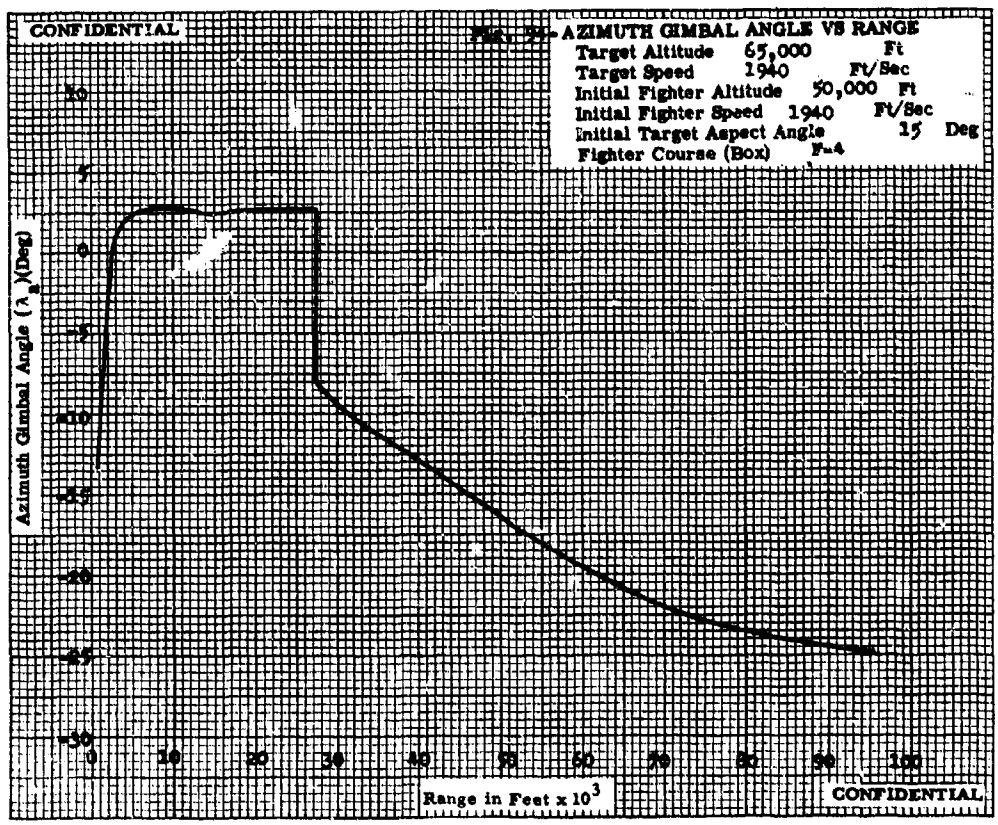
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Fig. 54 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-4
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
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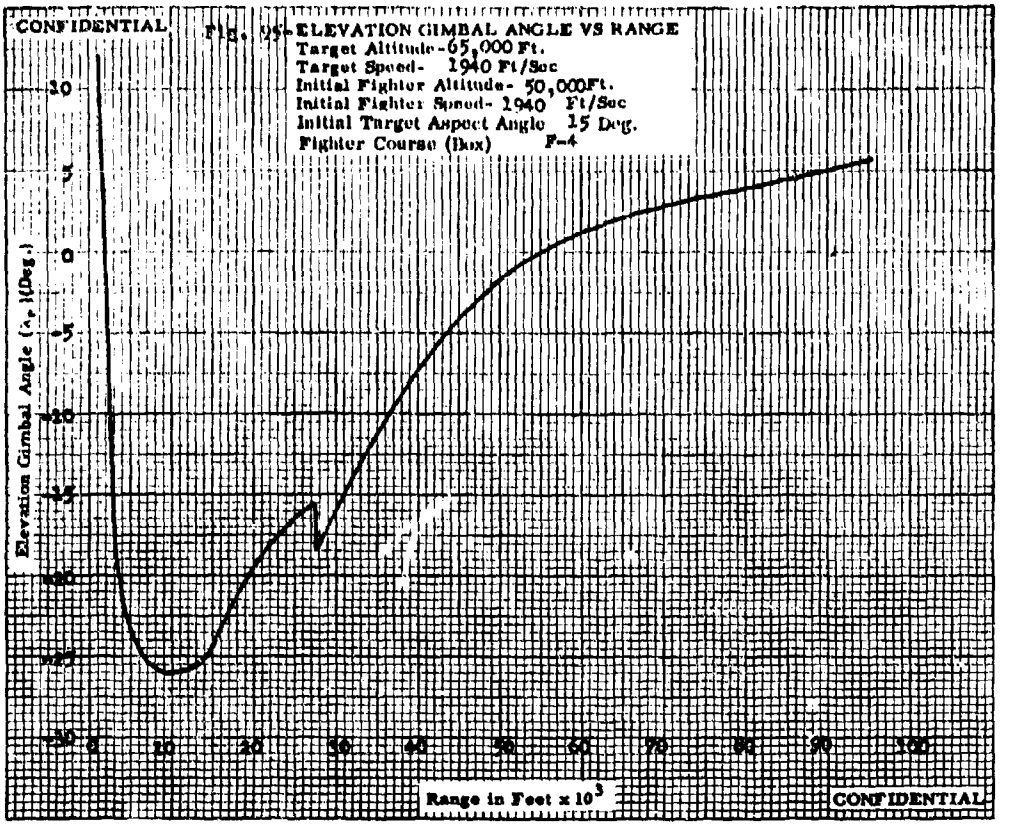
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Fig. 95- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
Elevation Gimbal Angle
Range in Feet x 10³
CONFIDENTIAL

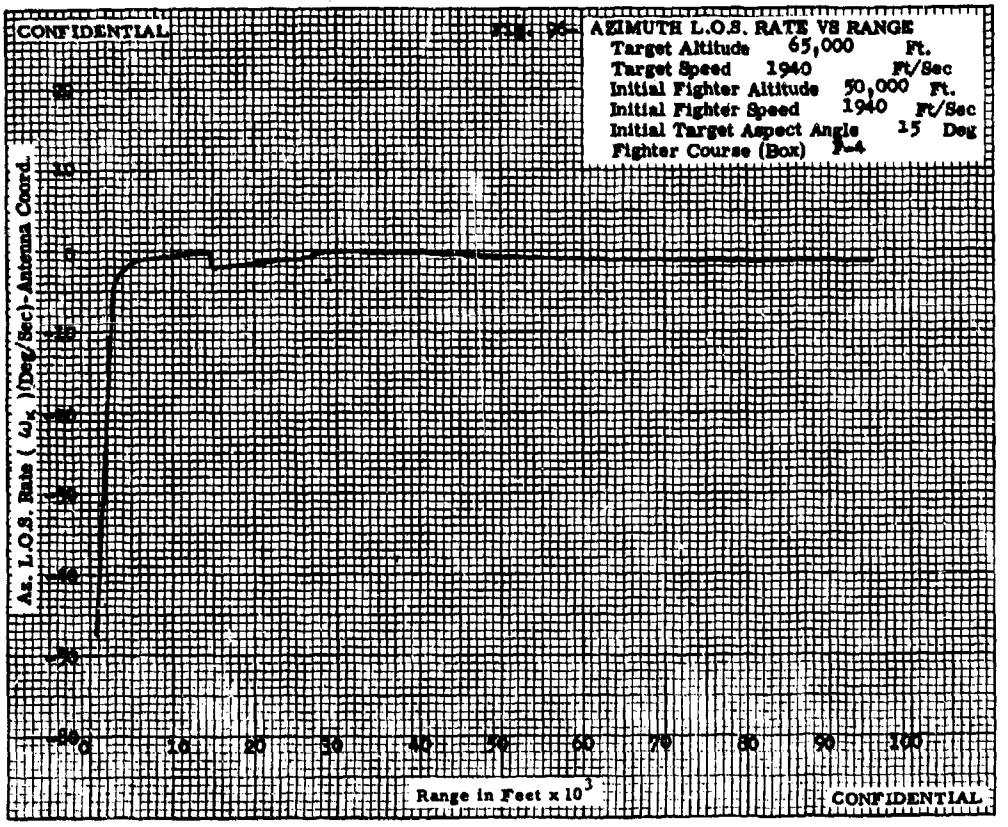
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Fig. 96- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-4
Az. L.O.S. Rate (Deg/Sec)-Antenna Coord.
Range in Feet x 10³
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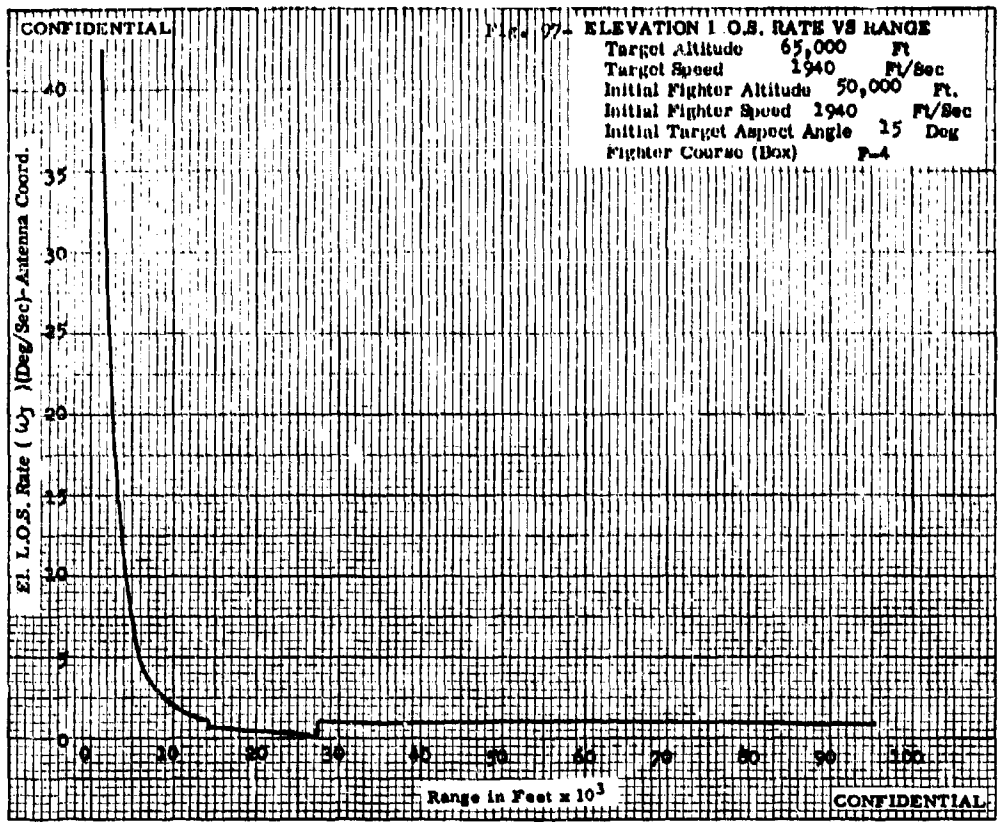
CONFIDENTIAL
Fig. 97 - ELEVATION 1 O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-4
El. L.O.S. Rate (ω_y) (Deg/Sec)-Antenna Coord.
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

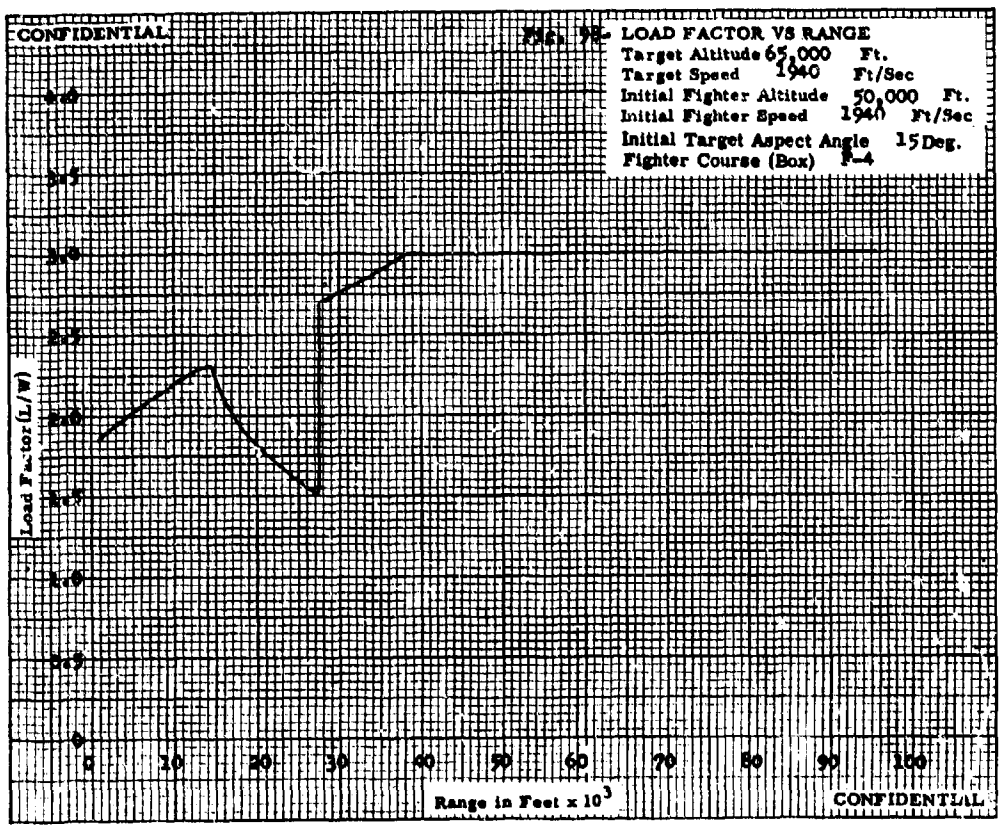
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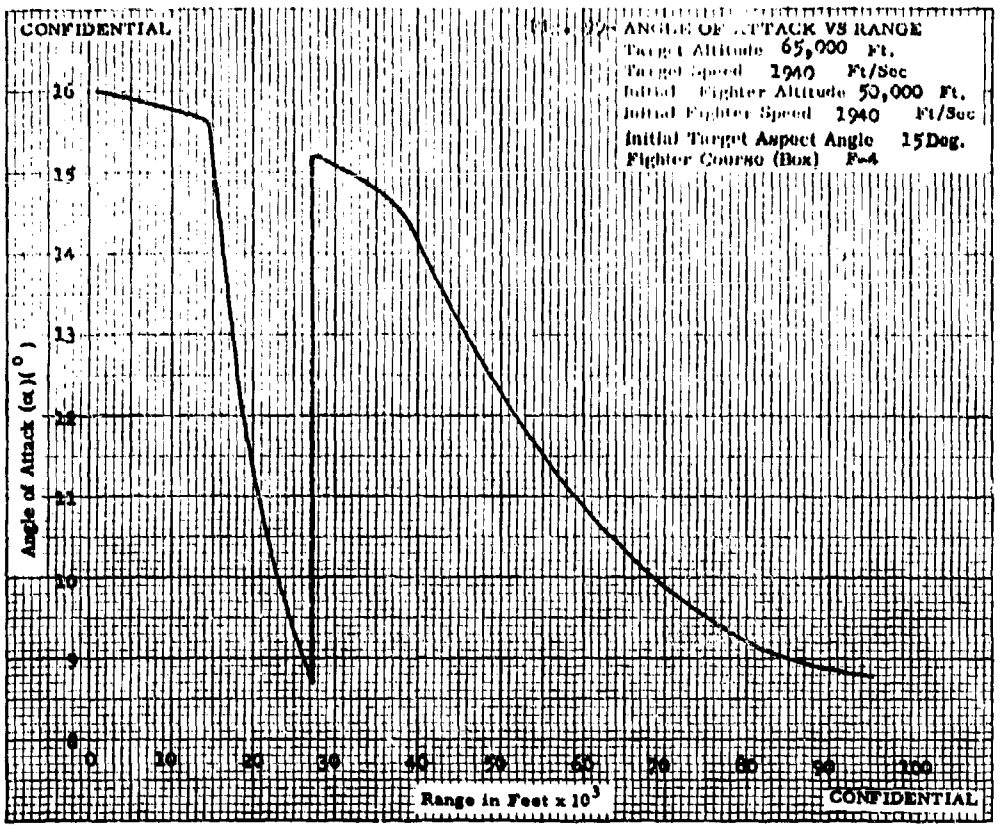
Fig. 98 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
Load Factor (L/W)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL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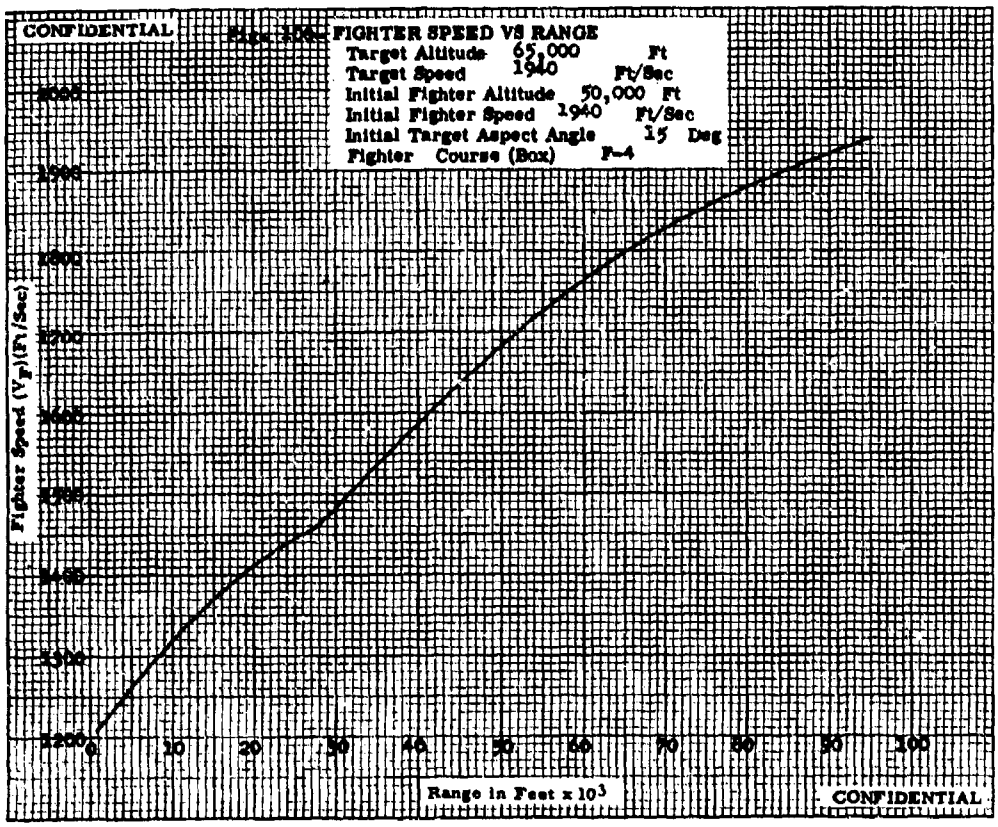
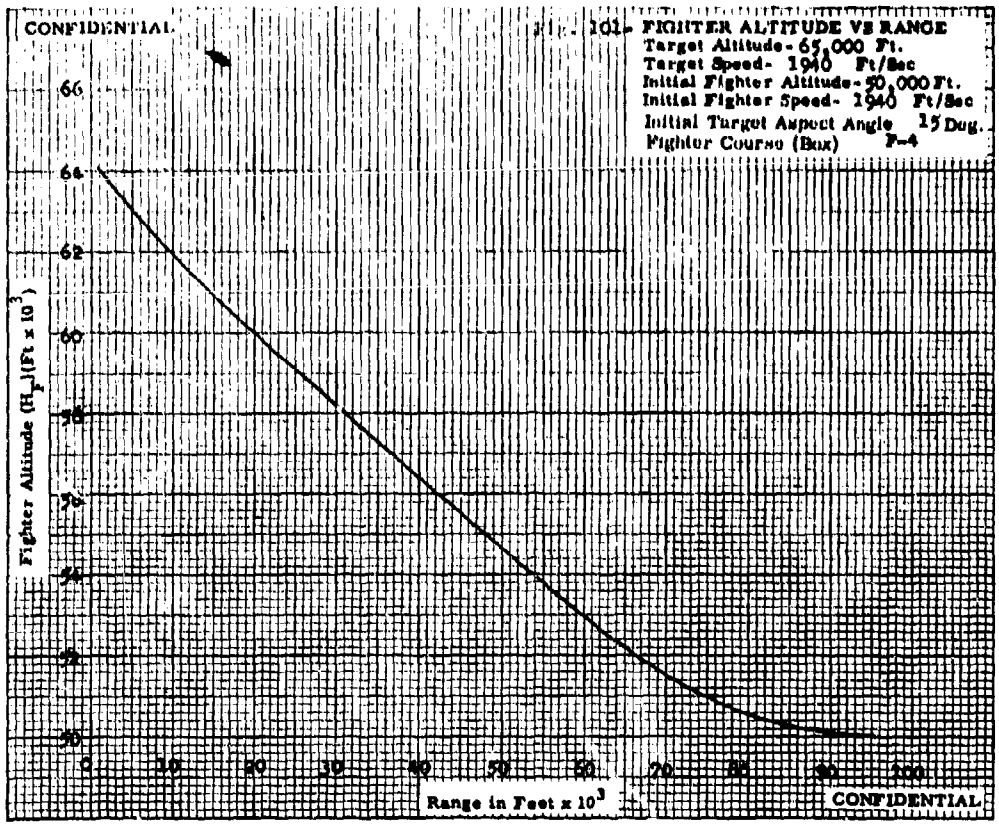
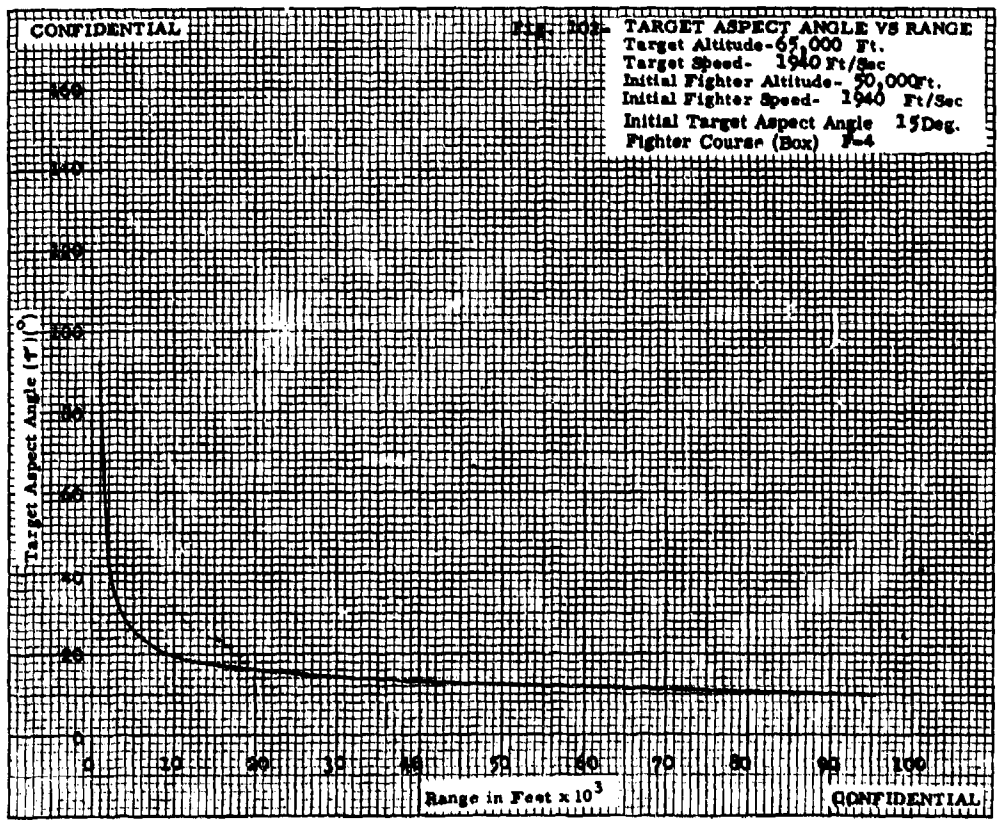
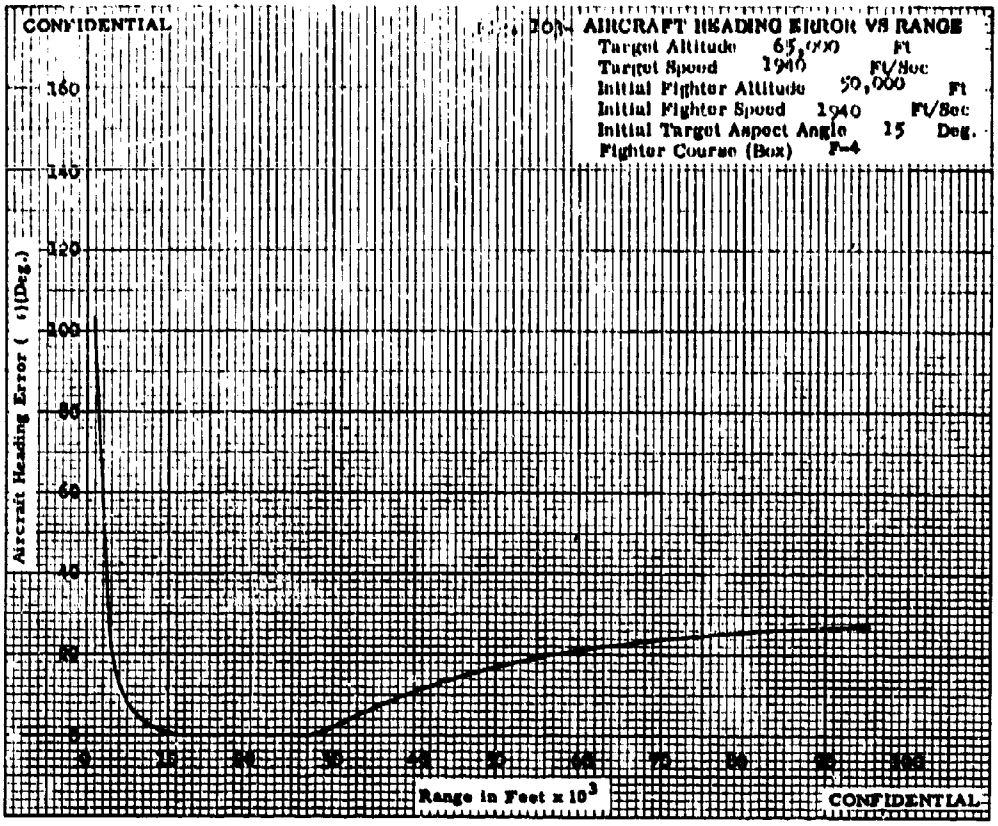
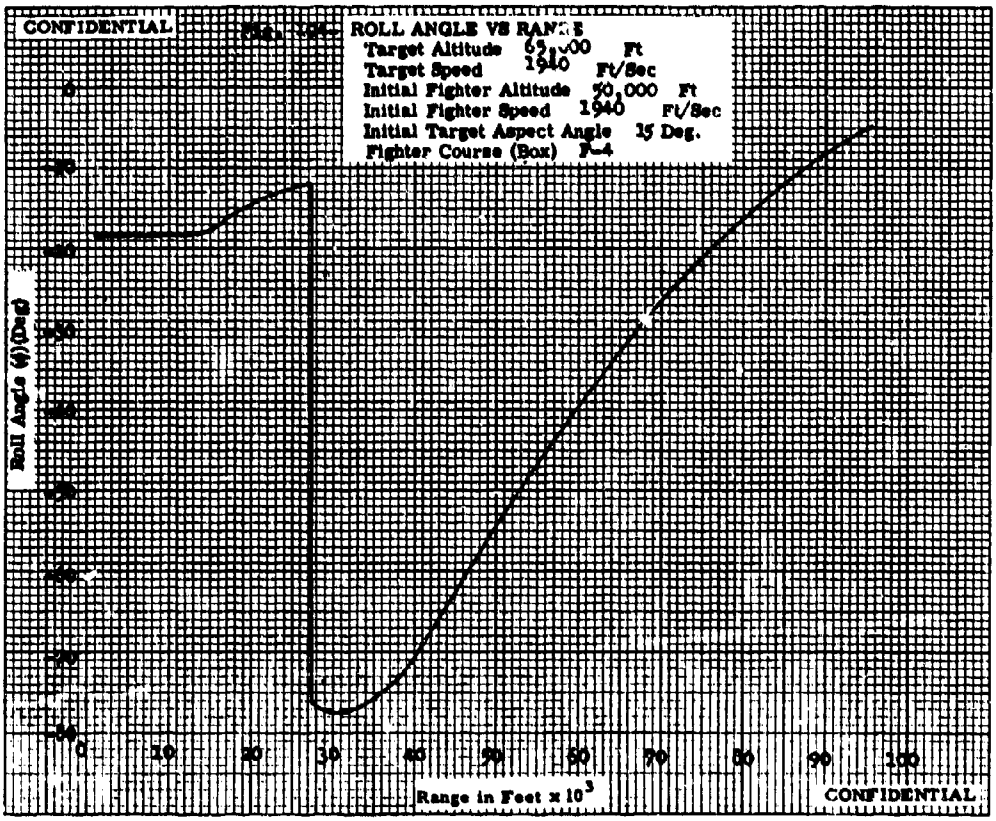
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15Deg.
Fighter Course (Box) F-4
Angle of Attack (α)(°)
Range in Feet x 10³
CONFIDENTIAL

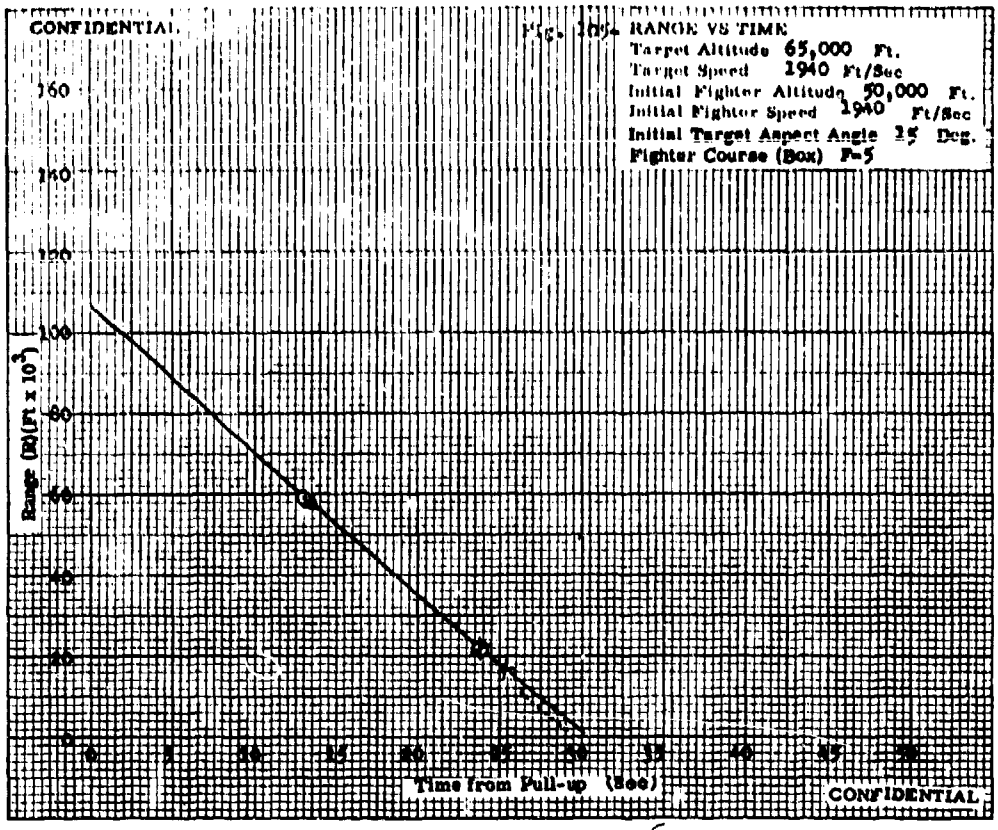

CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-4
Fighter Speed (Vf)(Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIG. 101
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
Fighter Altitude (H_p)(Ft x 10^3)
66
64
62
60
58
56
54
52
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIG. 102
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
Target Aspect Angle (Ψ)(°)
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
Aircraft Heading Error (ψ)(Deg.)
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-4
Roll Angle (ϕ)(Deg)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5
Range (R)(Ft x 10³)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
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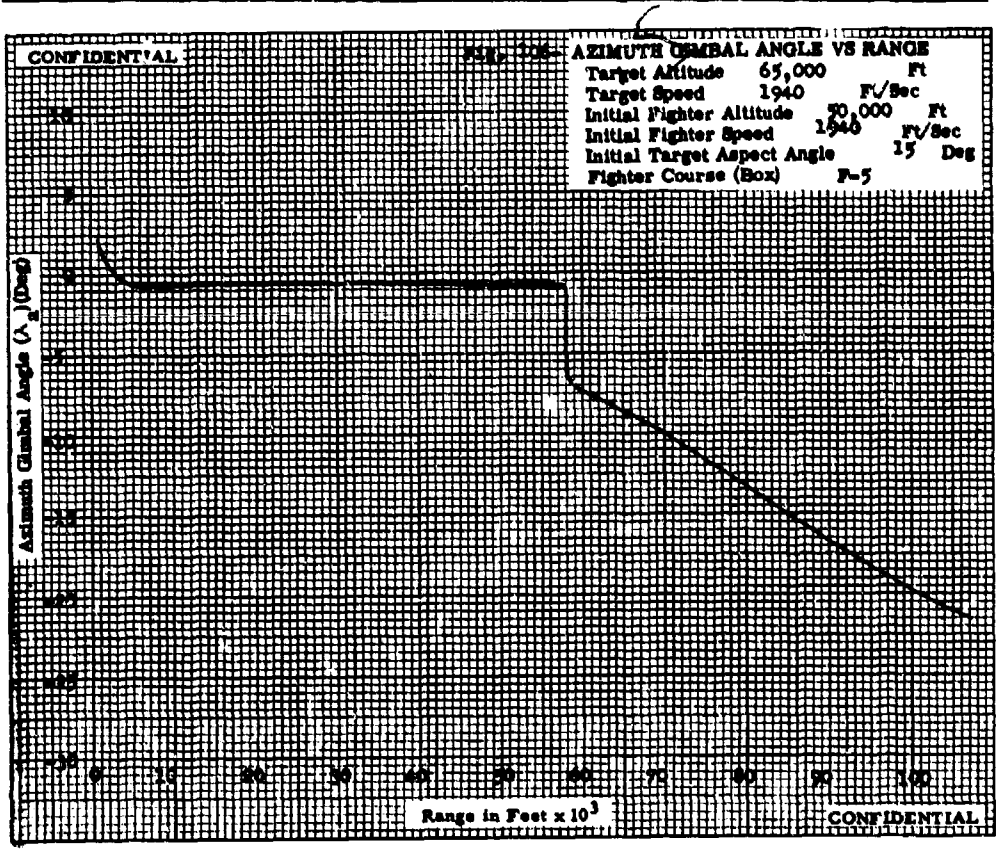
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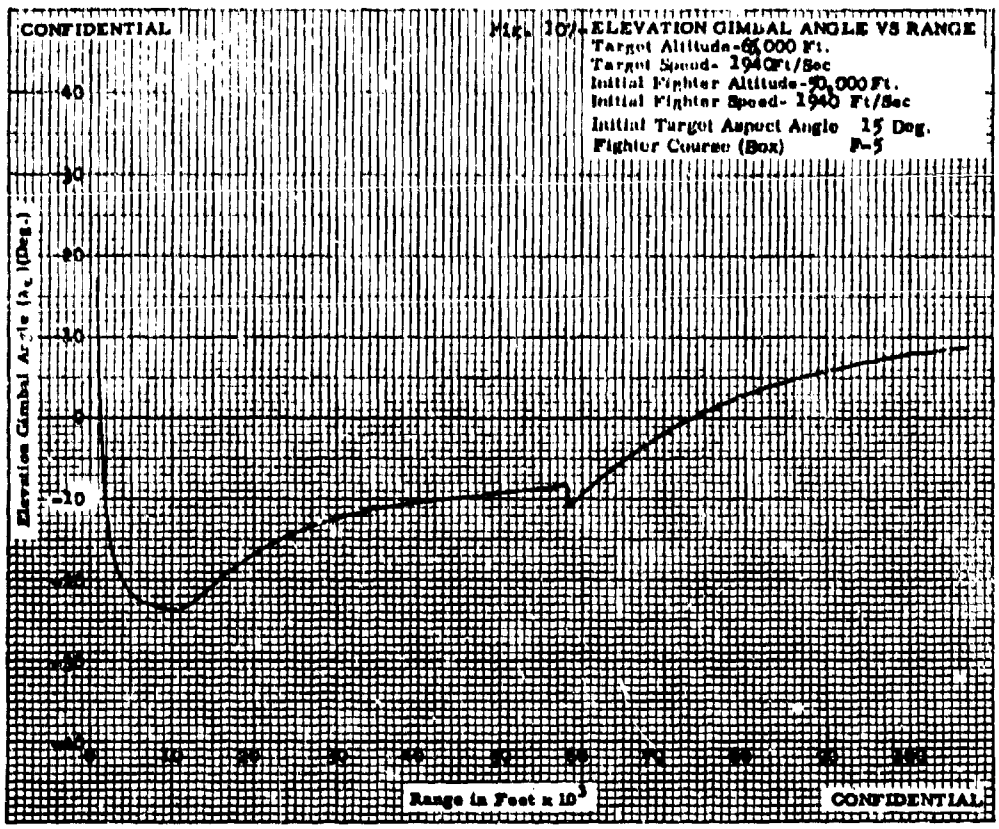
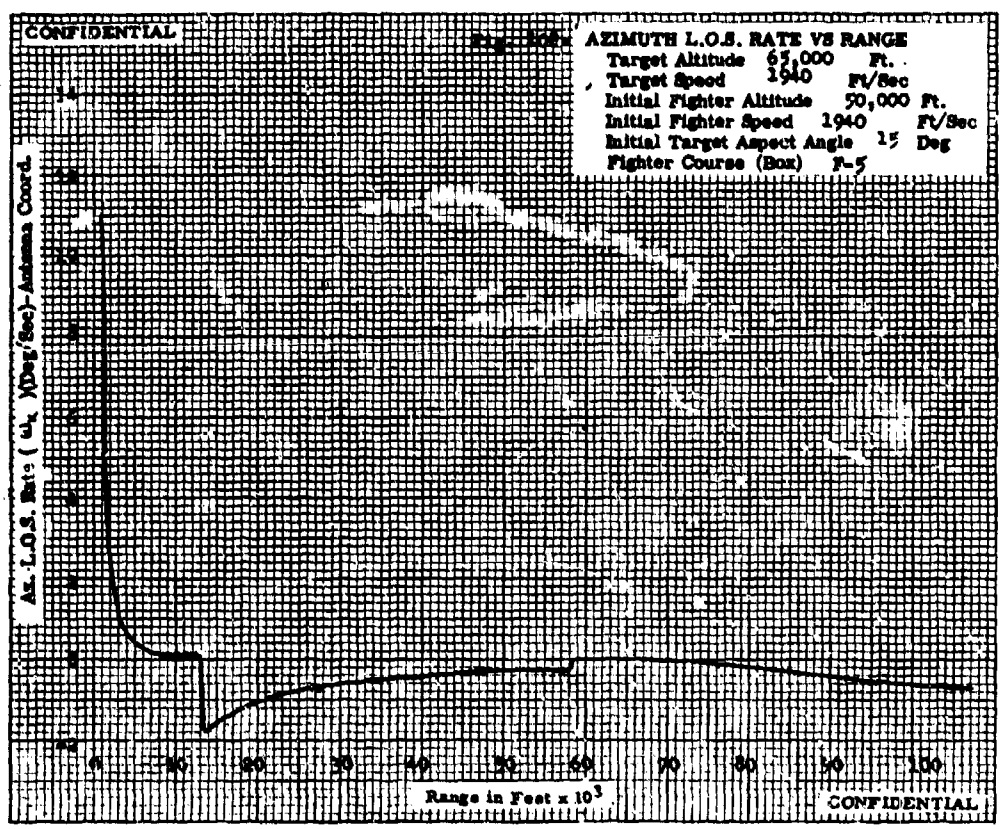
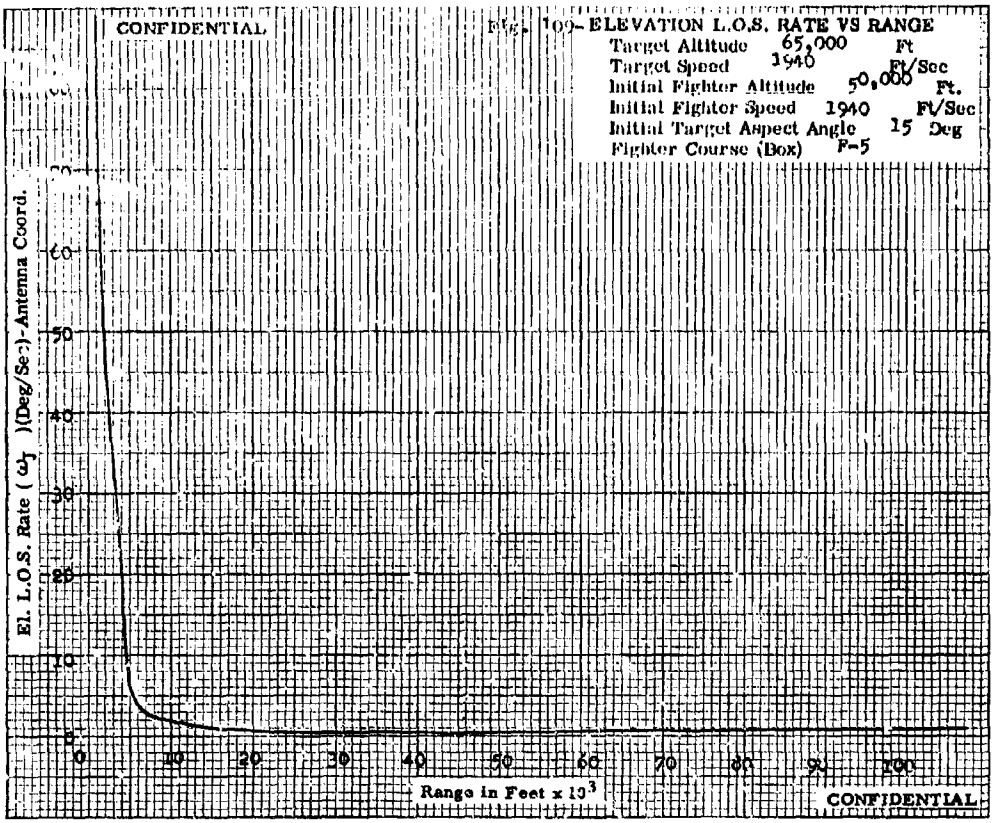
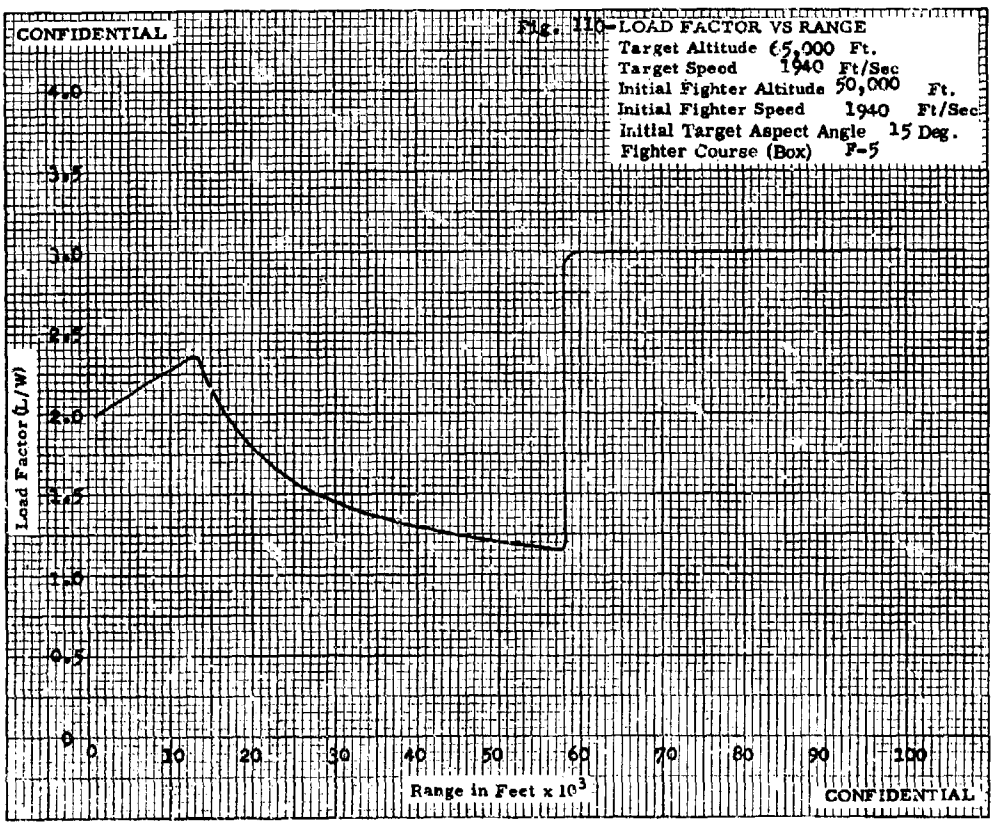
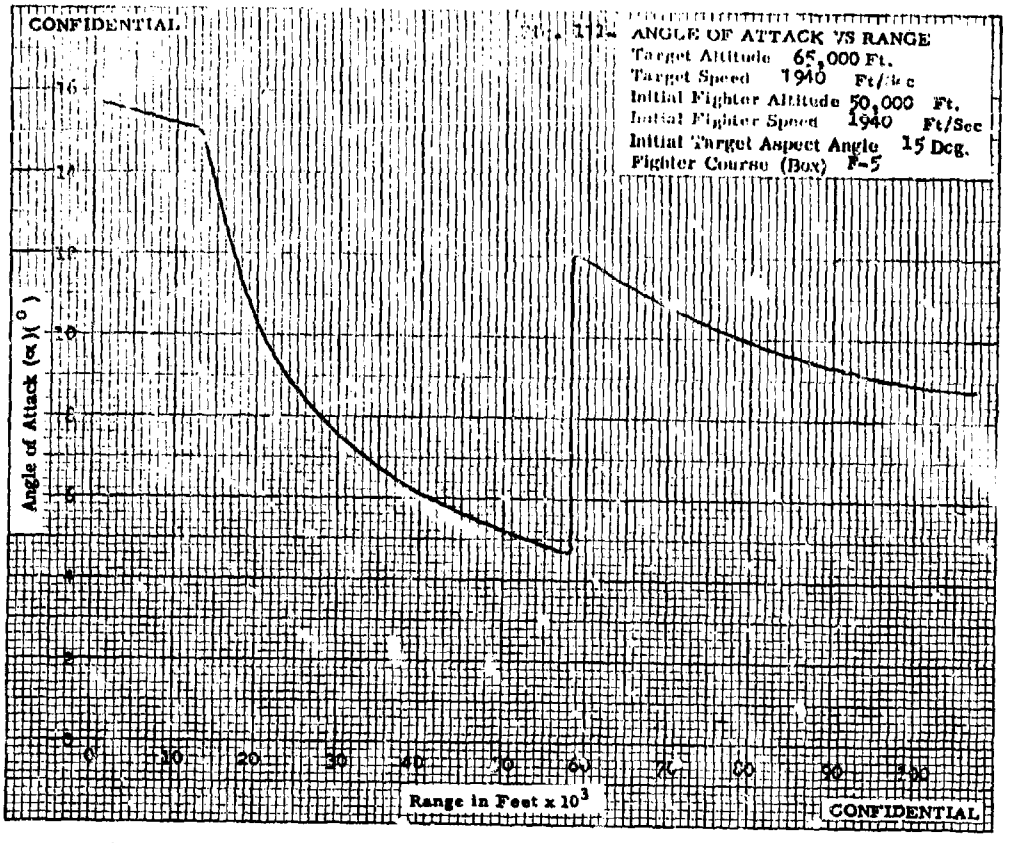
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-5
Azimuth Gimbal Angle (λg)(Deg)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 10
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5
Elevation Gimbal Angle (Deg.)
40
30
20
0
-10
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-5
Az. L.O.S. Rate (Deg/Sec)-Antenna Coord.
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 109-ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-5
El. L.O.S. Rate (ω_y) (Deg/Sec)-Antenna Coord.
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 110-LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL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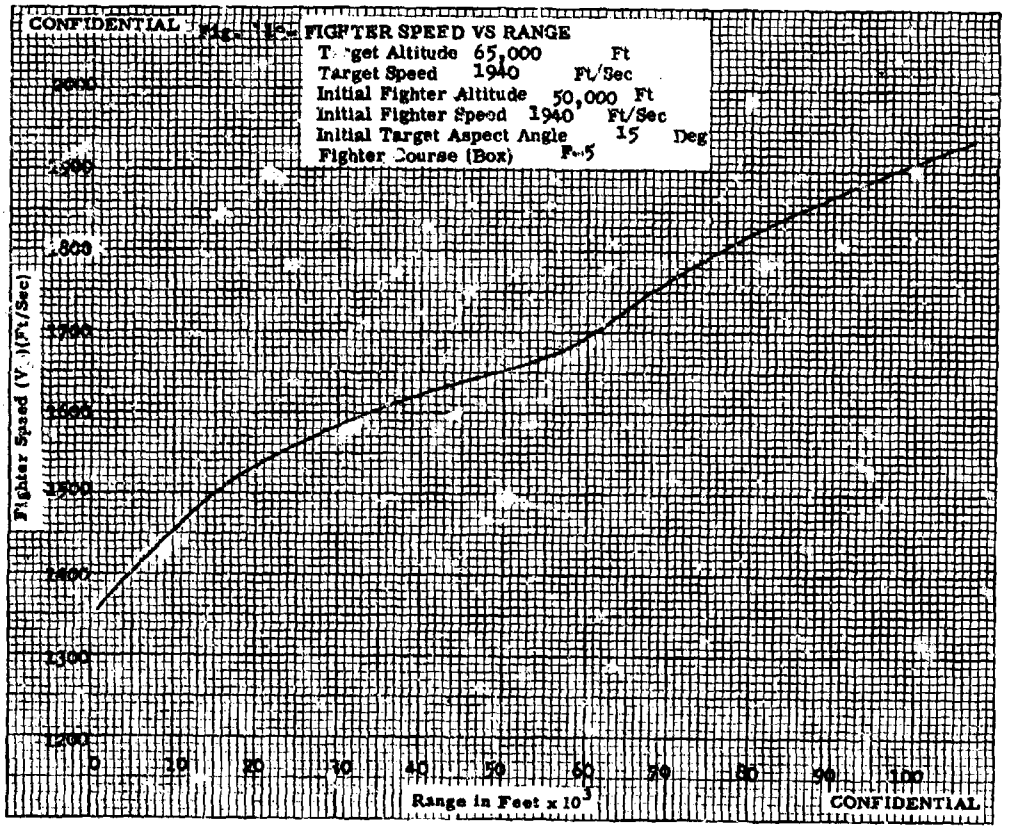
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5
Angle of Attack (α) (°)
16
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL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FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) F-5
Fighter Speed (V) (Ft/Sec)
2600
2500
2400
2300
2200
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

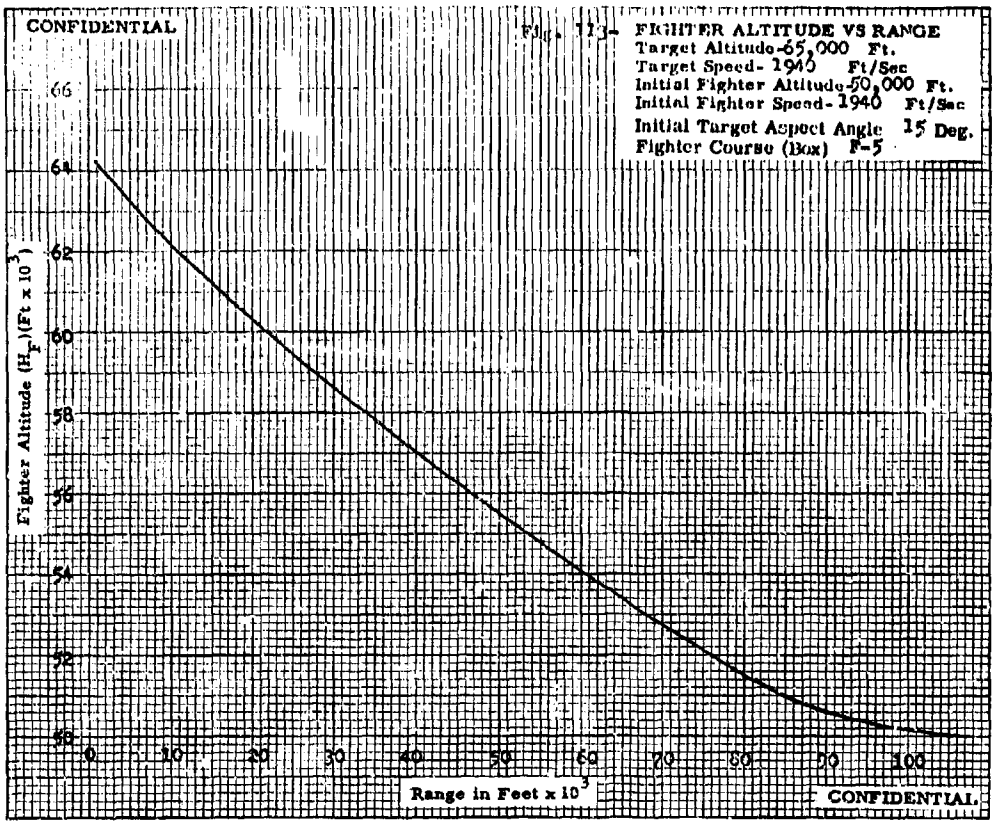
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Fig. 113- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5
Fighter Altitude (H_F)(Ft x 10^3)
66
64
62
60
58
56
54
52
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

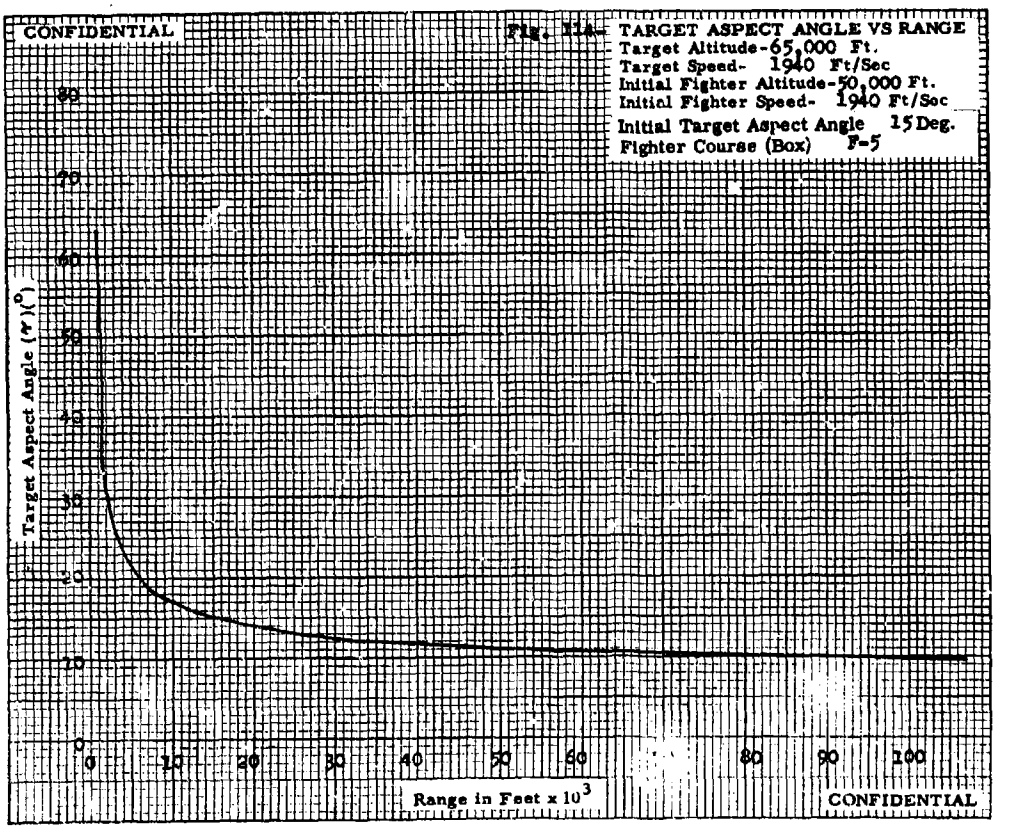
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Fig. 114- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5
Target Aspect Angle (ψ)(°)
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Fig. 125 AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5

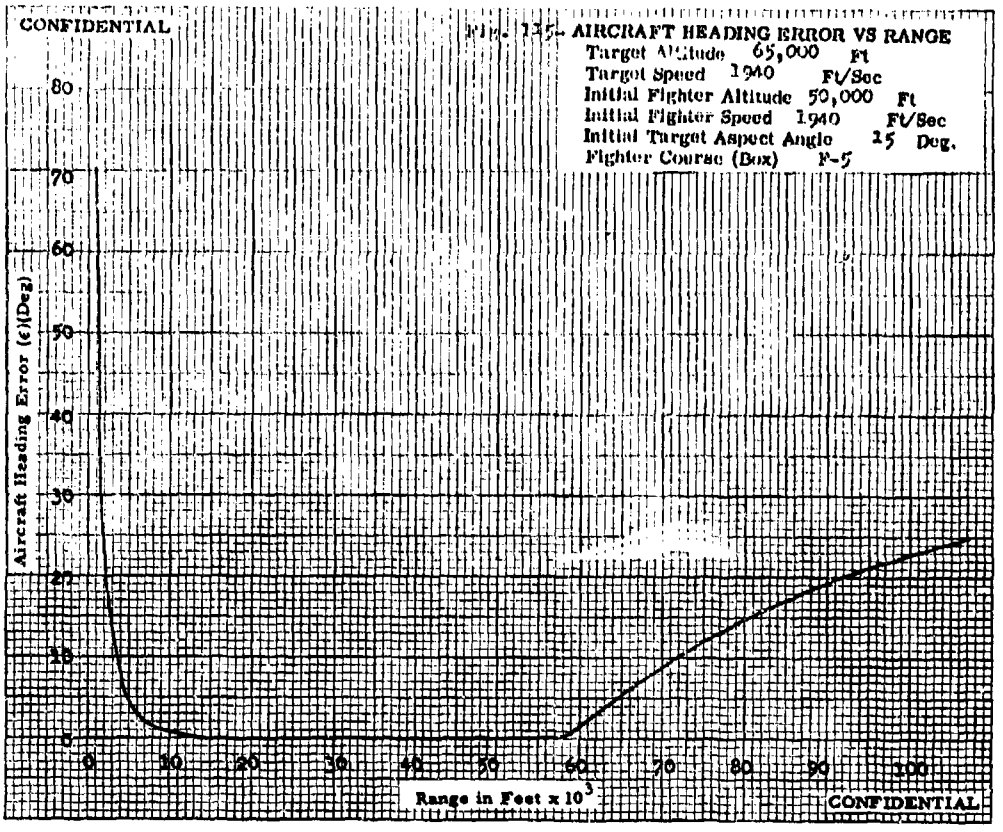
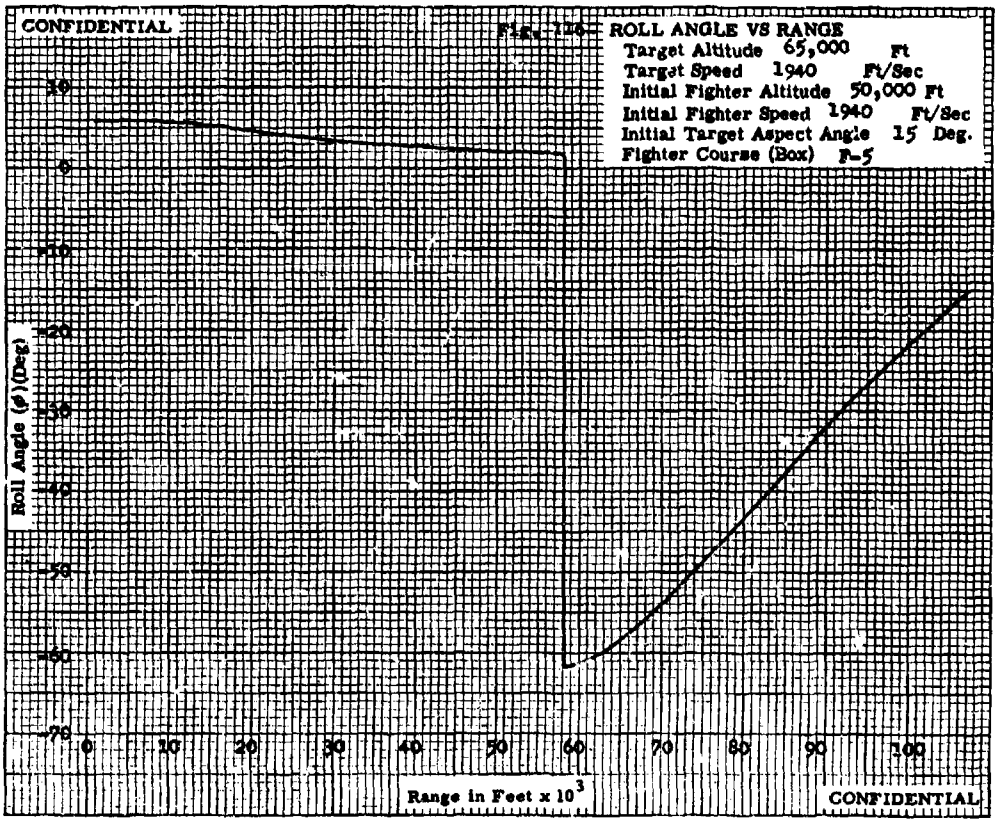
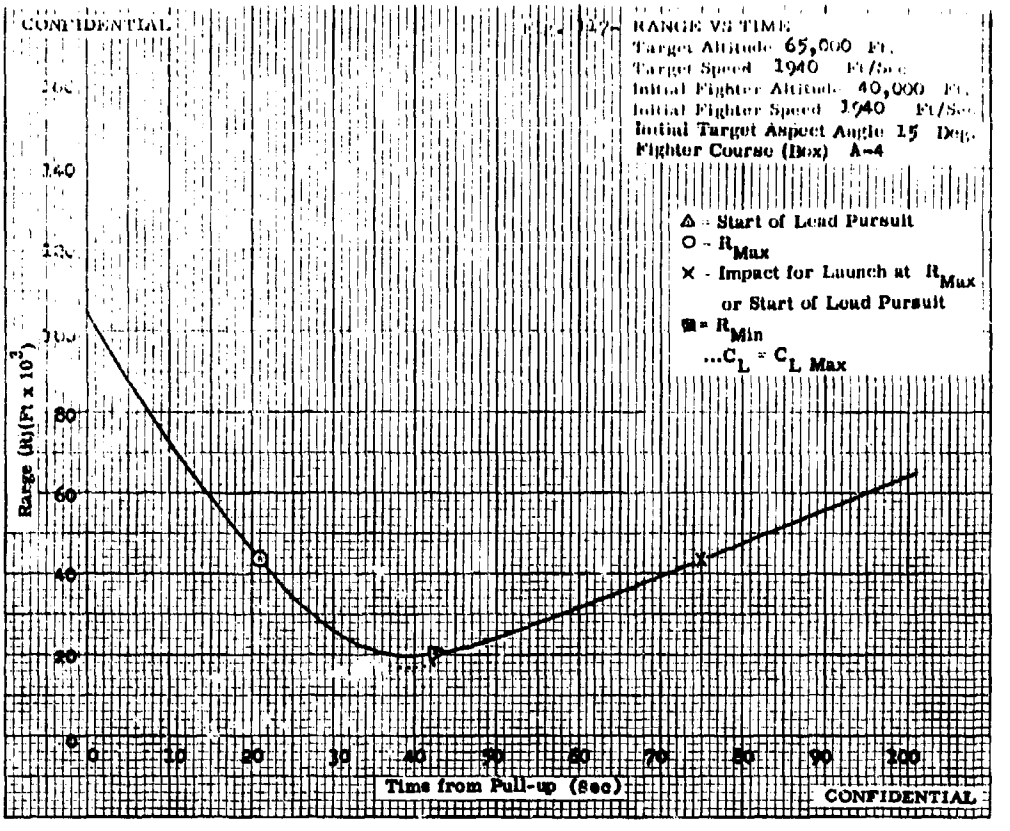
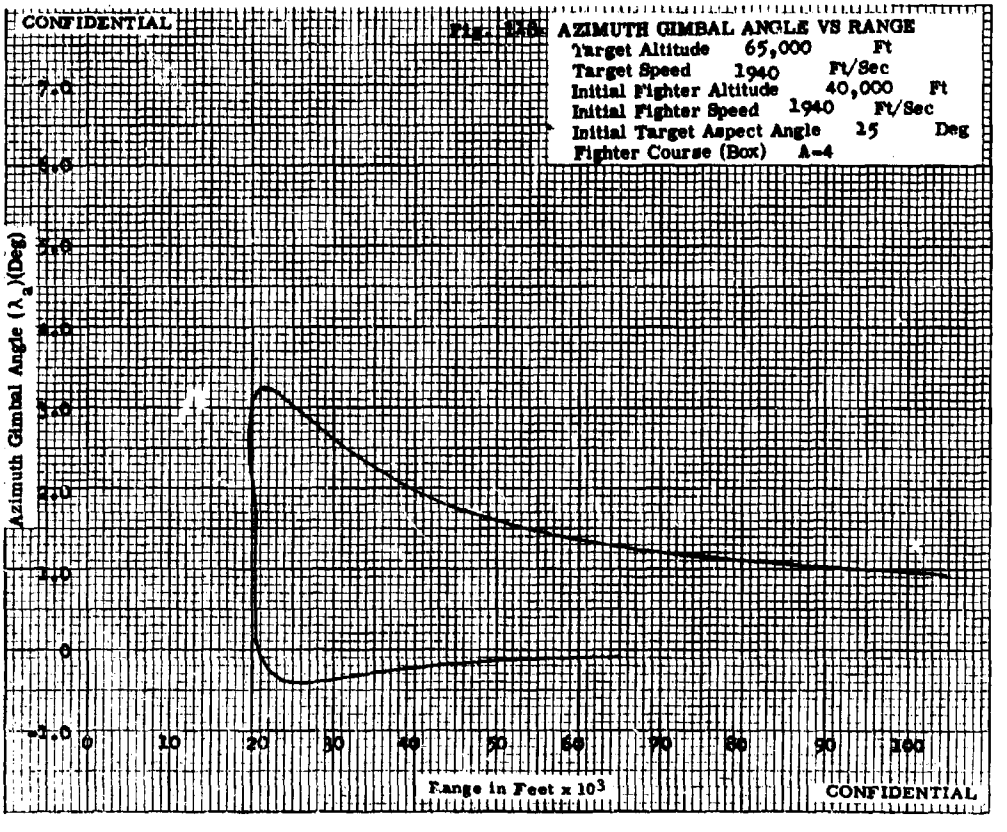


Fig. 126 ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) F-5




CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Δ - Start of Lead Pursuit
O - R_{Max}
× - Impact for Launch at R_{Max} or Start of Lead Pursuit
□ - R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL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AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 219 – ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4

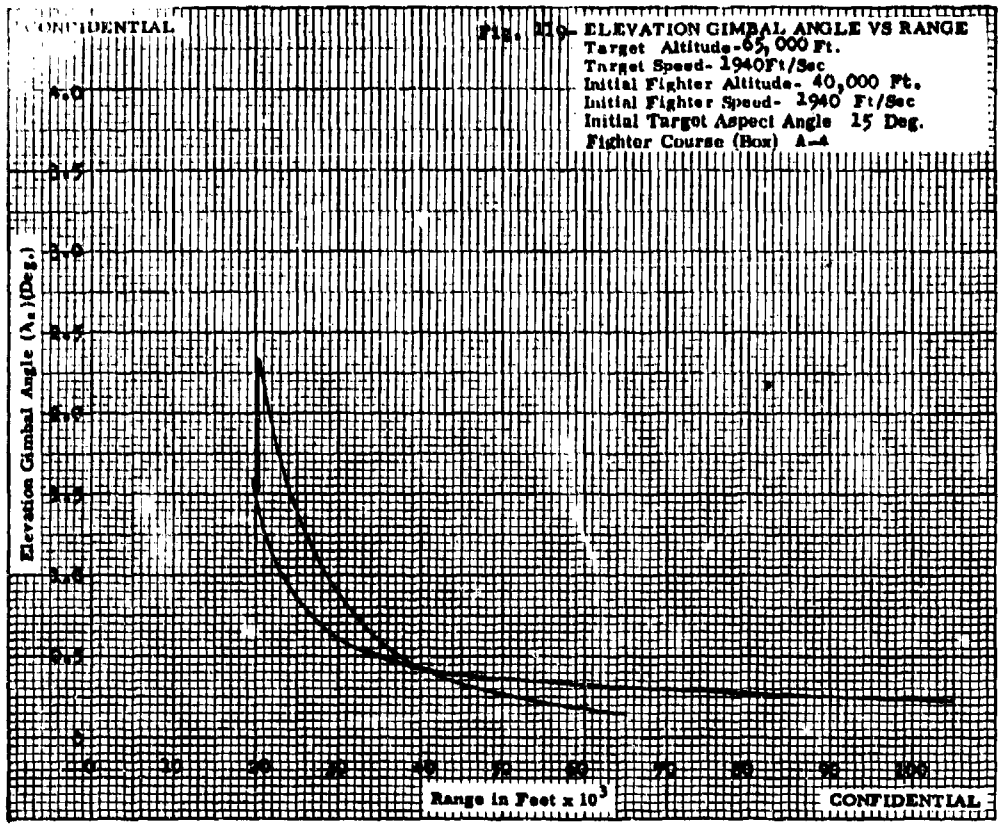

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Fig. 220 – AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4

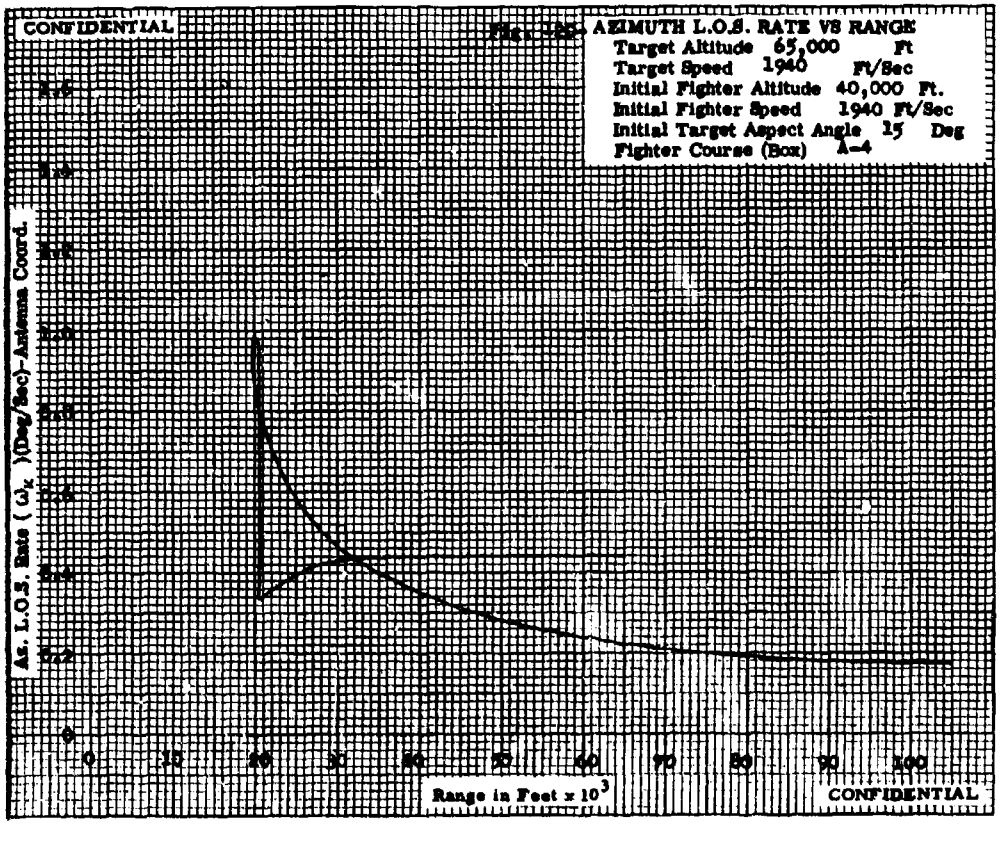

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Fig. 2.21 – ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4

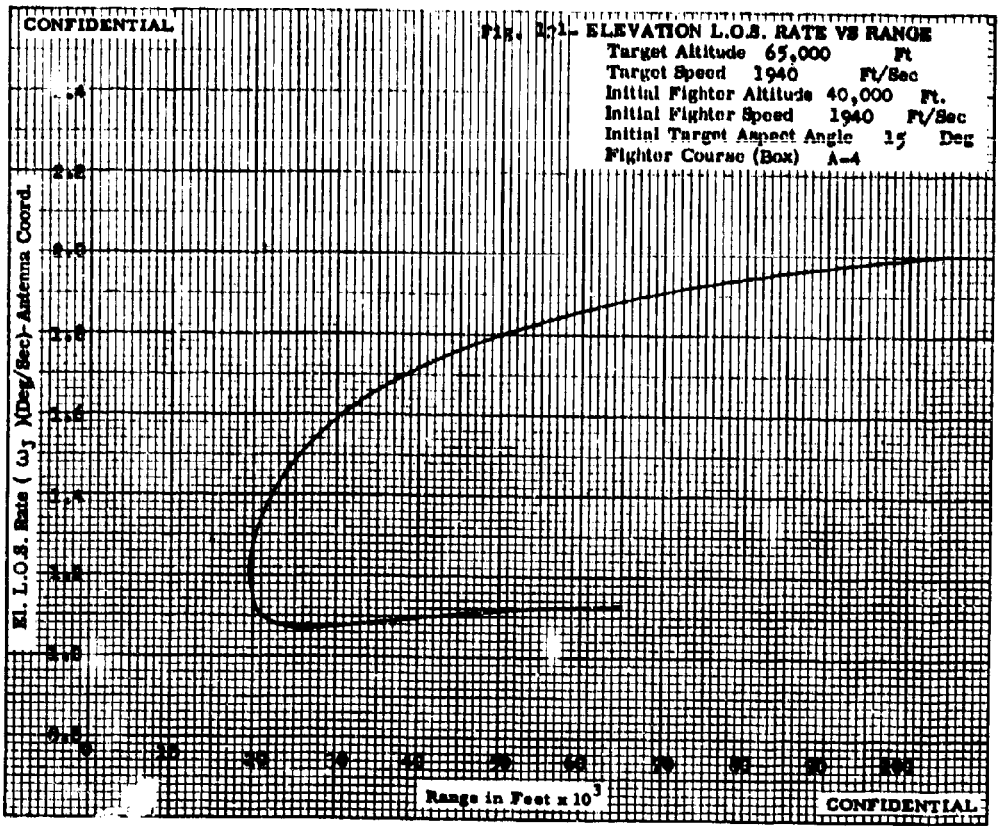

Fig. 2.22 – LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4

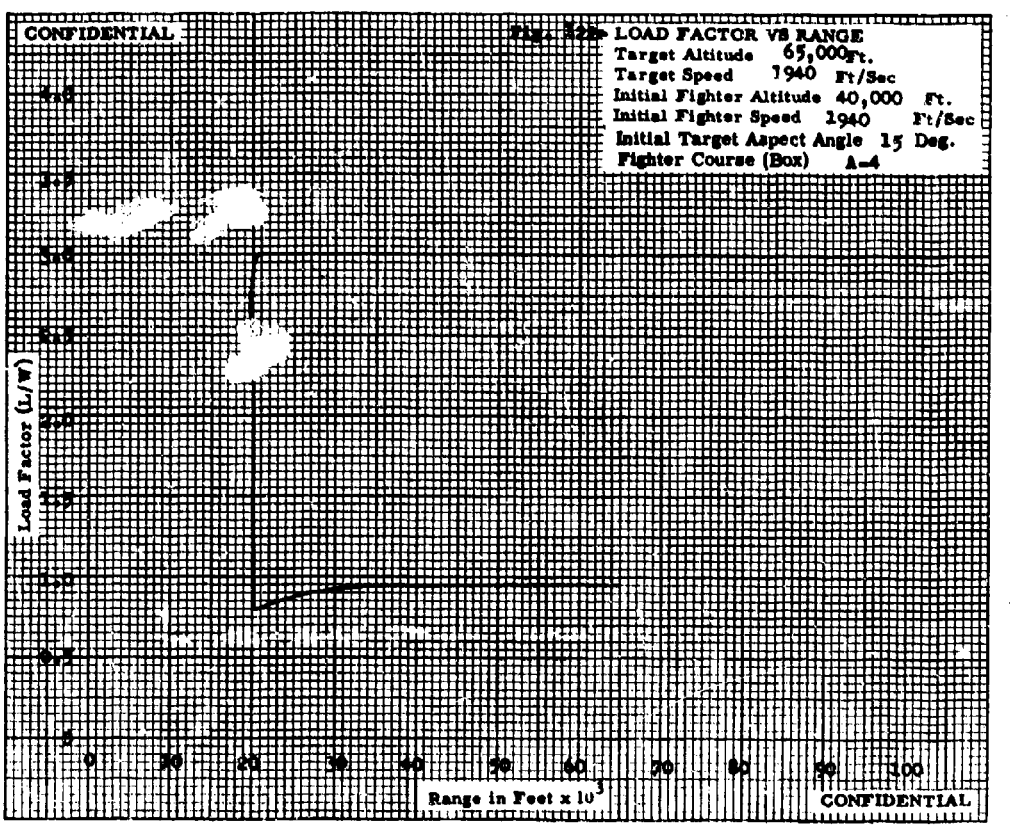

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Fig. 125

ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4

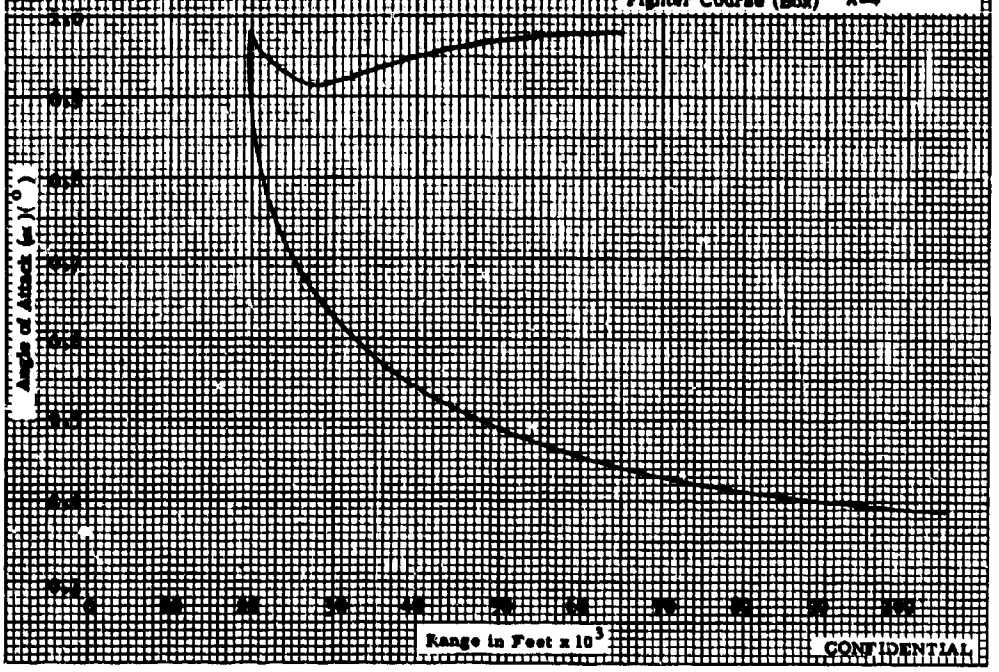

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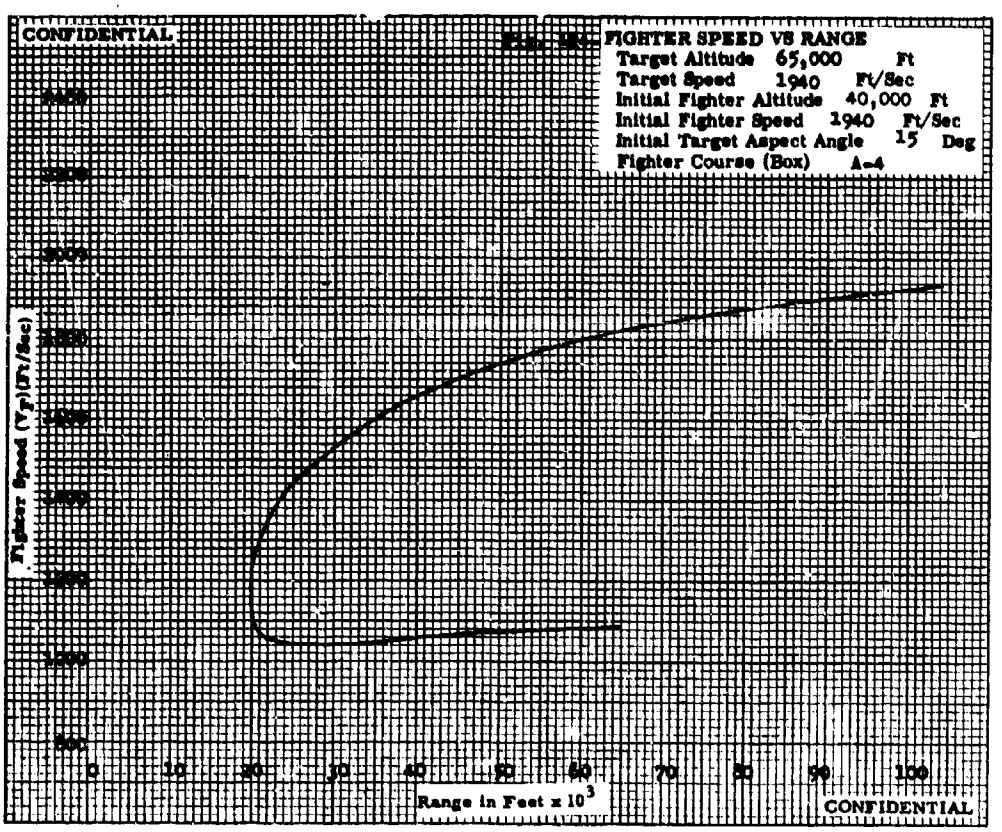
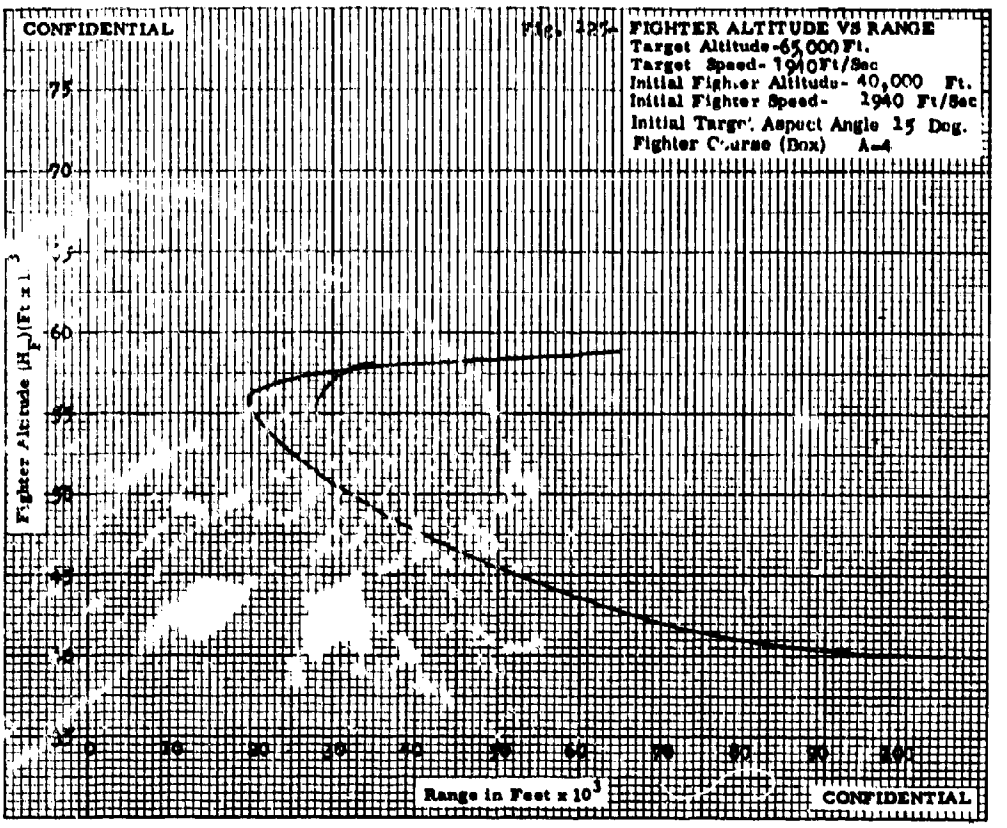
Fig. 126

FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4




CONFIDENTIAL
Fig. 227
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Fighter Altitude (H_F)(Ft x 1
Range in Feet x 10^3
CONFIDENTIAL

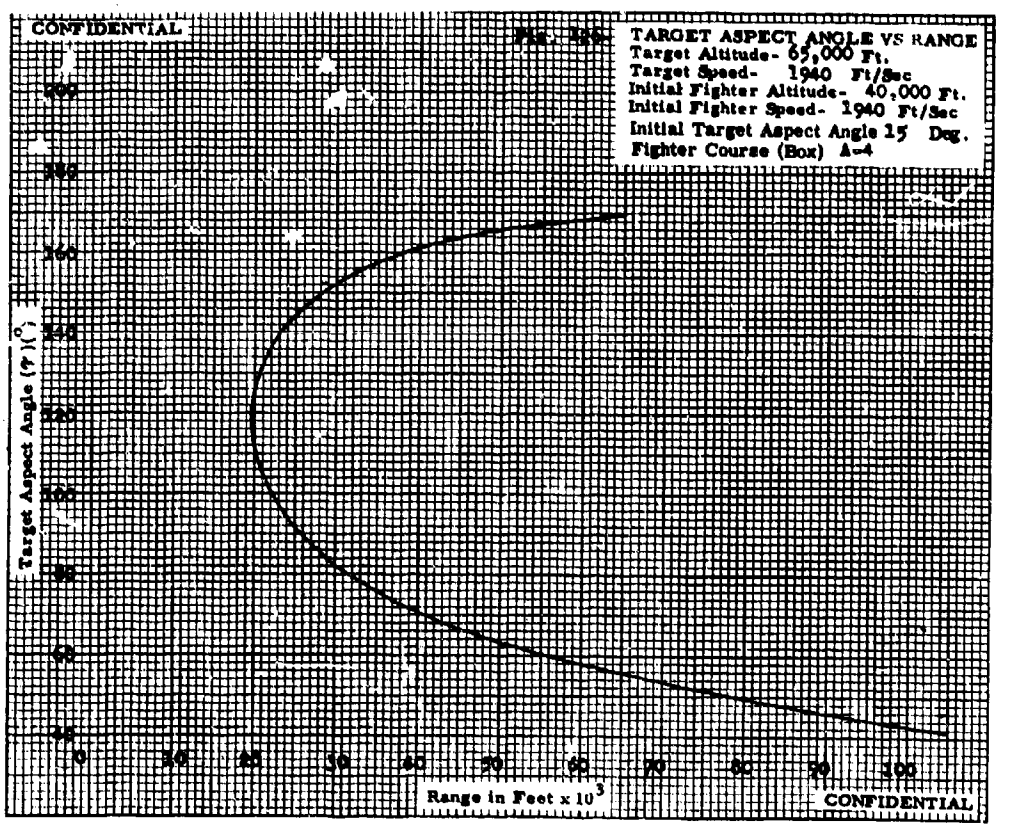

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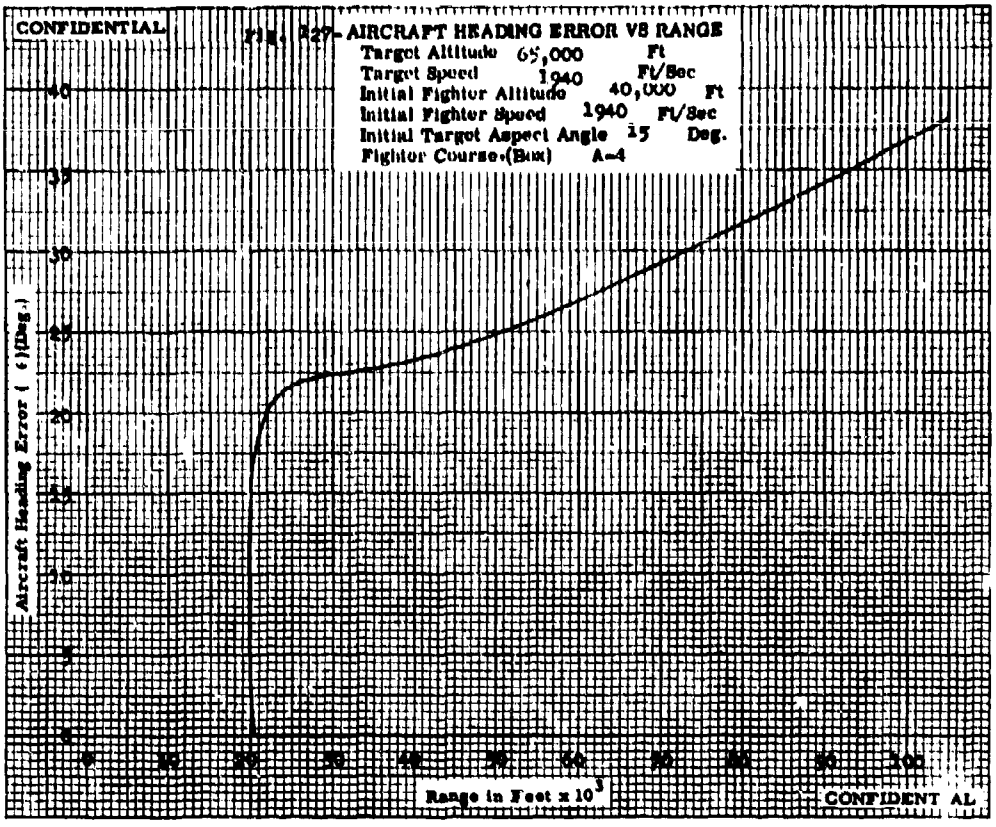
Fig. 228
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Target Aspect Angle (γ_T)(°)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Aircraft Heading Error (ψ)(Deg.)
Range in Feet x 10^3
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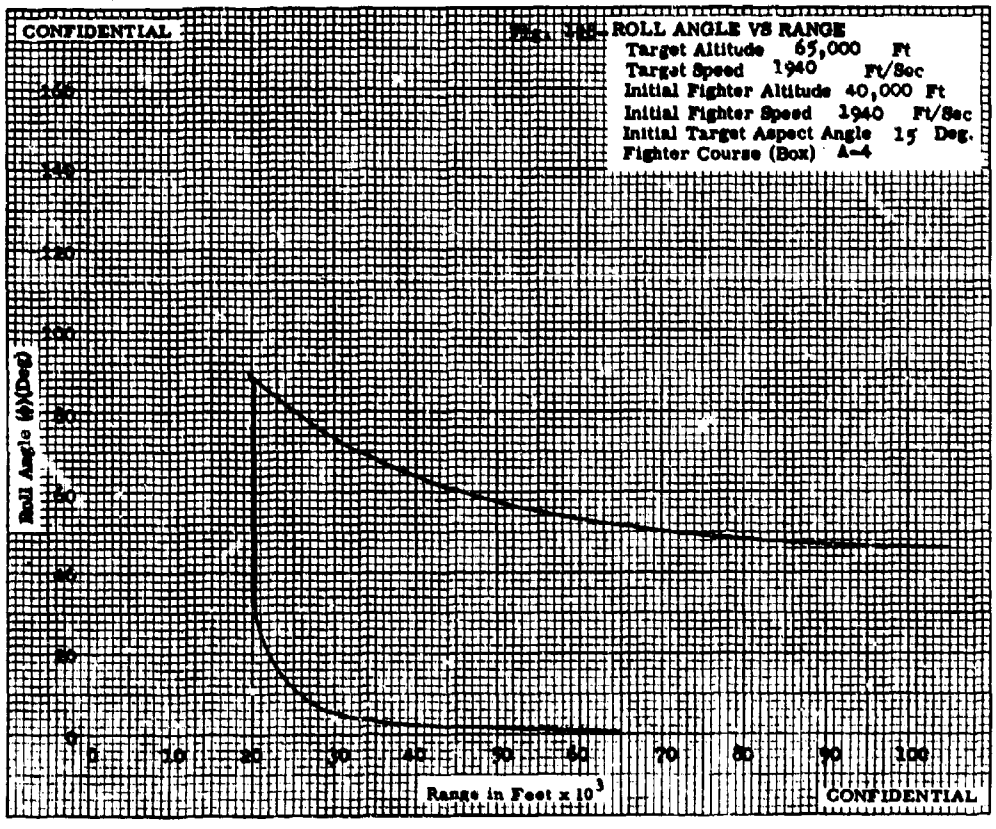
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ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Roll Angle (ϕ)(Deg)
Range in Feet x 10^3
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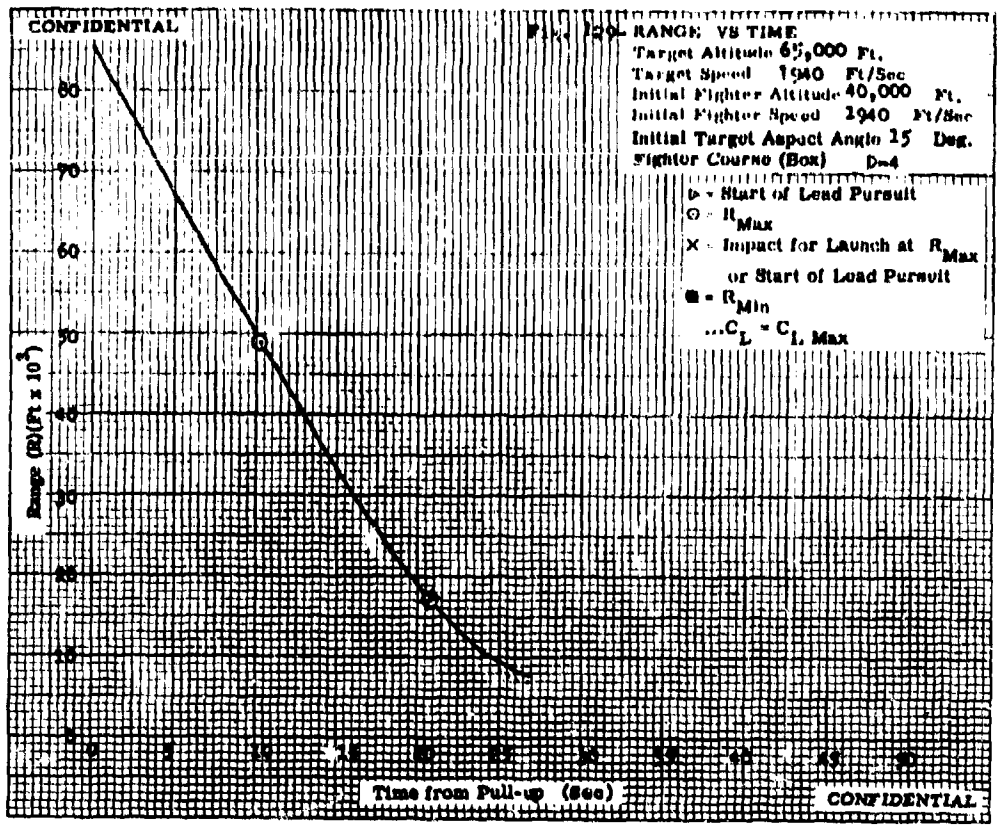
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Fig. 129
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
▷ - Start of Lead Pursuit
○ - R_{Max}
× - Impact for Launch at R_{Max} or Start of Lead Pursuit
● - R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
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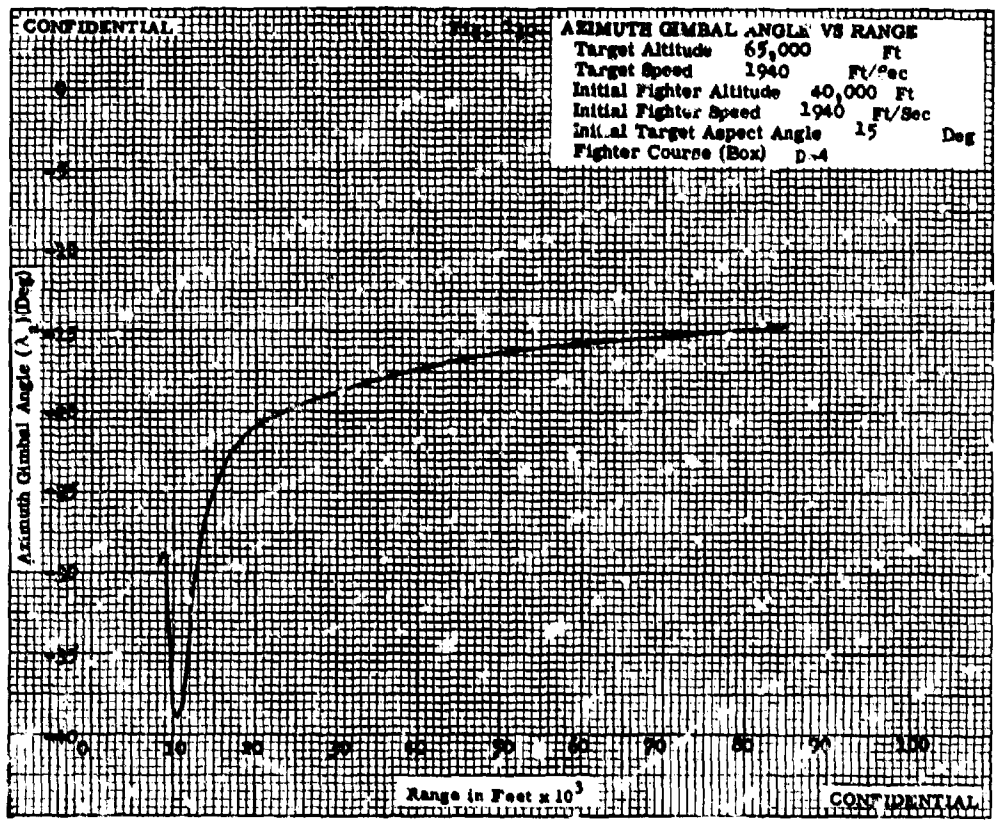
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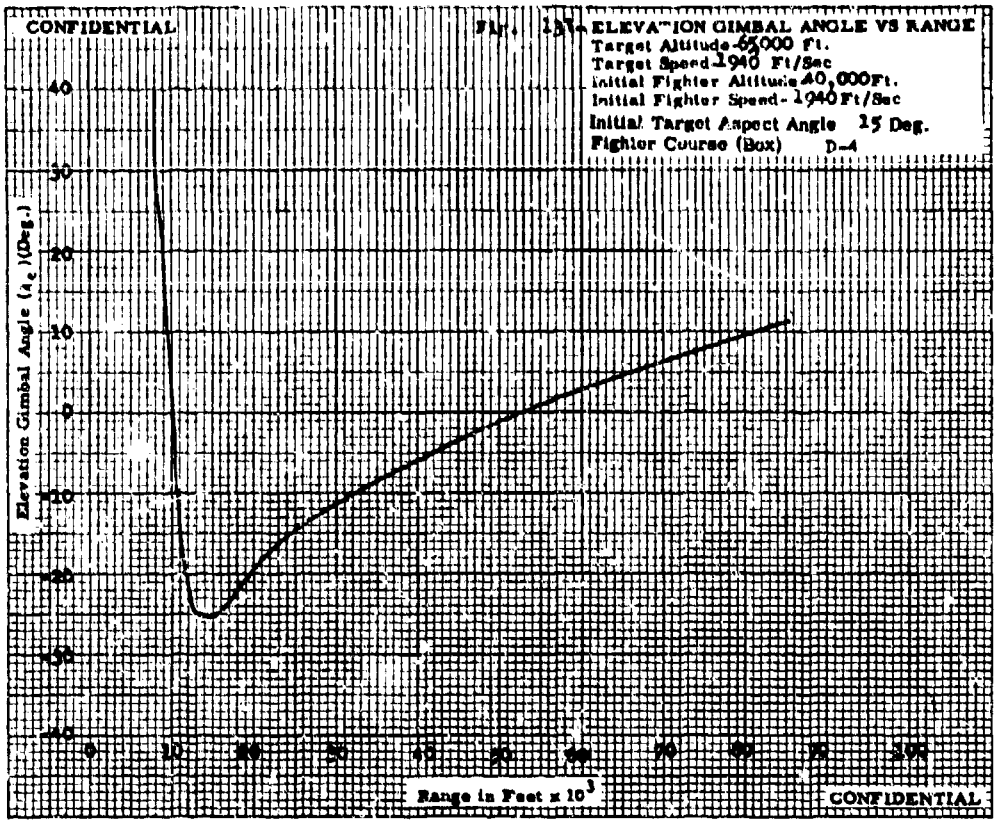
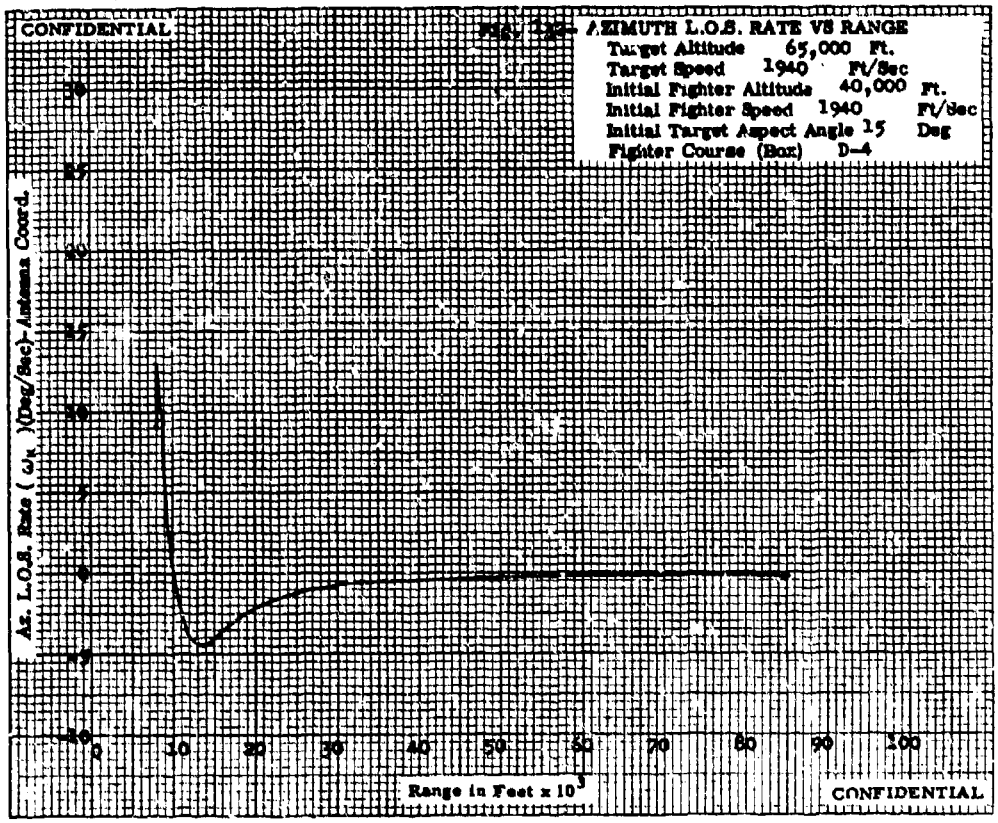
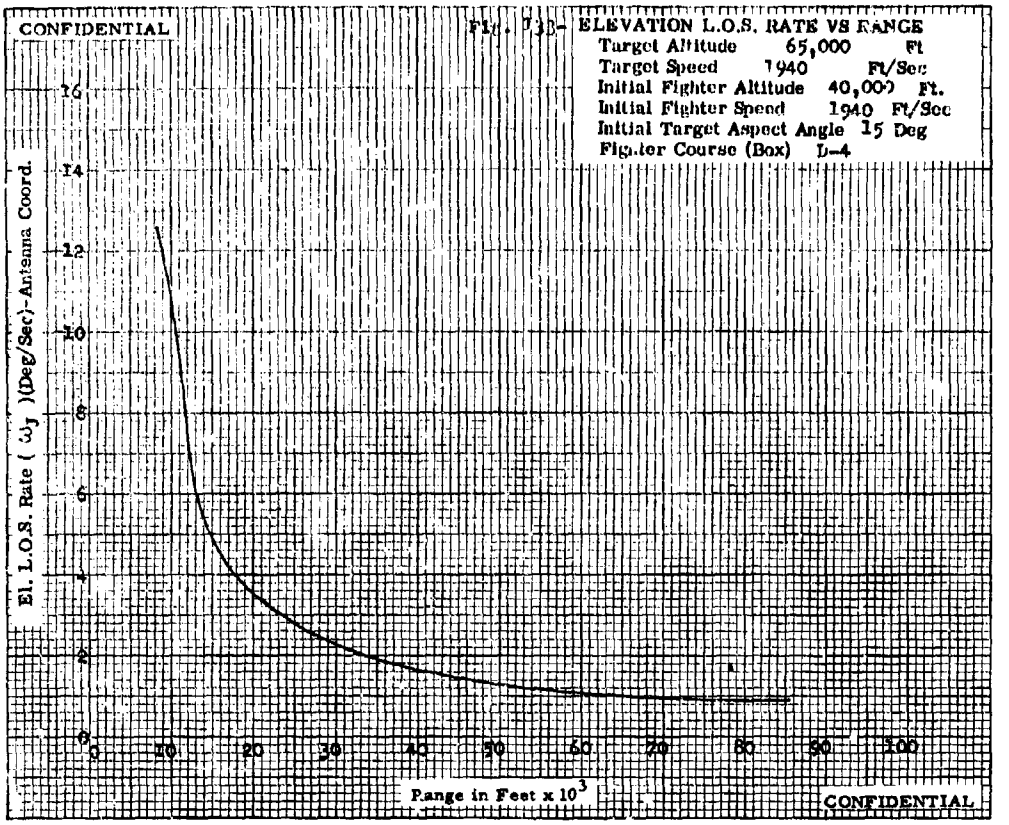
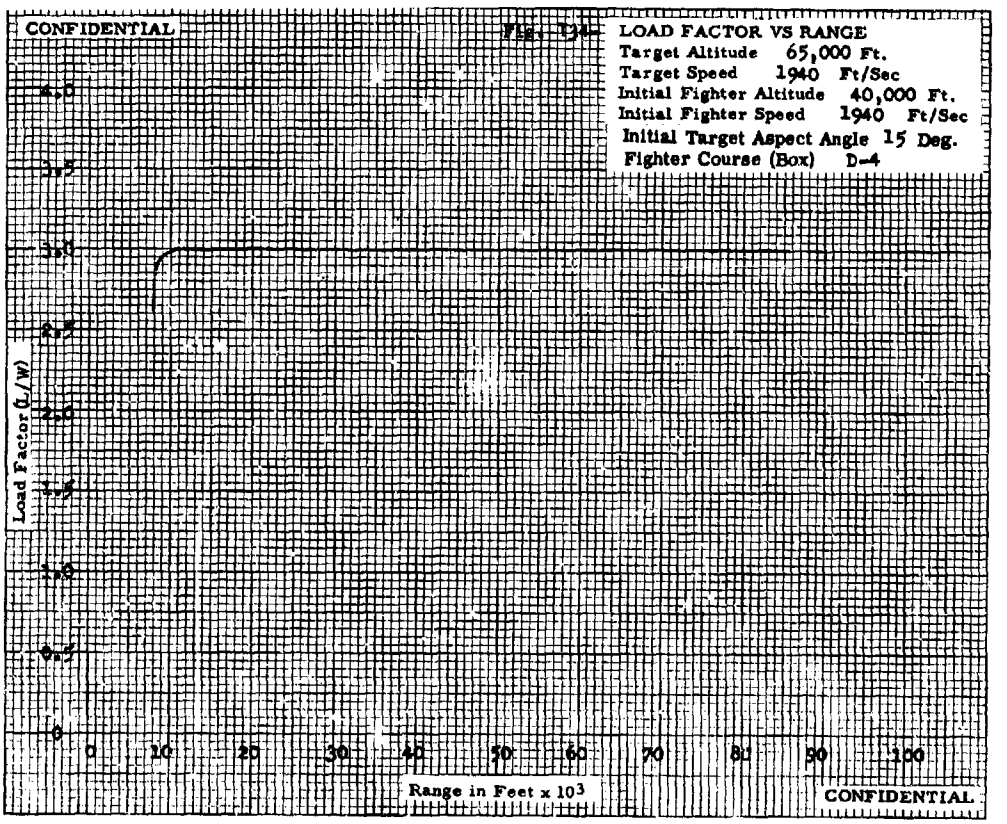
Fig. 130
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-4
Azimuth Gimbal Angle (λ_g)(Deg)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Elevation Gimbal Angle (α_e) (Deg.)
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-4
Az. L.O.S. Rate (ω_{LA}) (Deg/Sec)-Antenna Coord.
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 7.3b- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-4
El. L.O.S. Rate (ωy)(Deg/Sec)-Antenna Coord.
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 7.3c- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

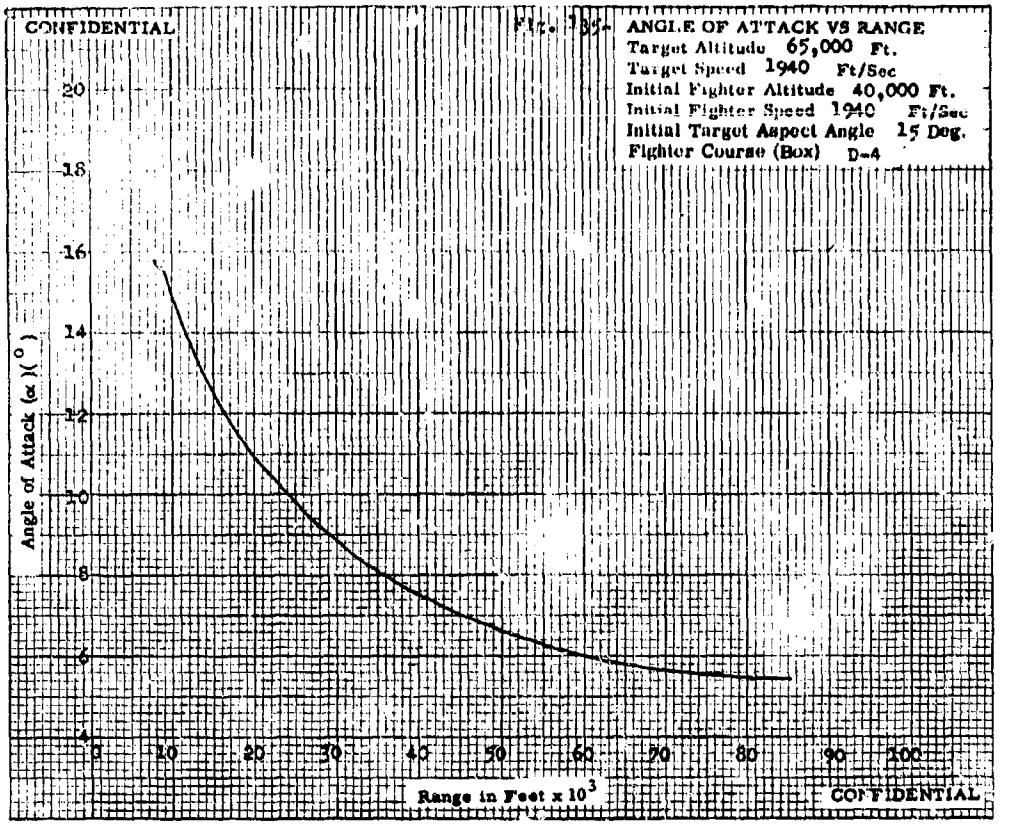

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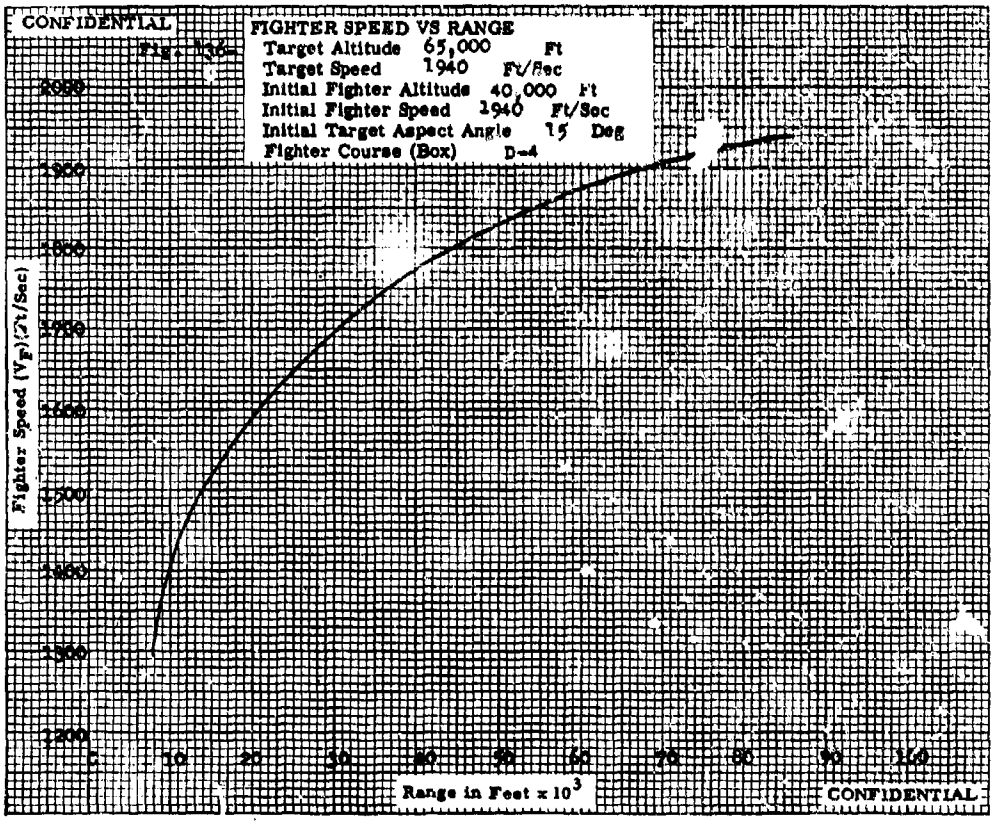
Fig. 135
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Angle of Attack (α)(°)
20
18
16
14
12
10
8
6
4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 136
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-4
Fighter Speed (V_F)(Ft/Sec)
2000
1900
1800
1700
1600
1500
1400
1300
1200
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

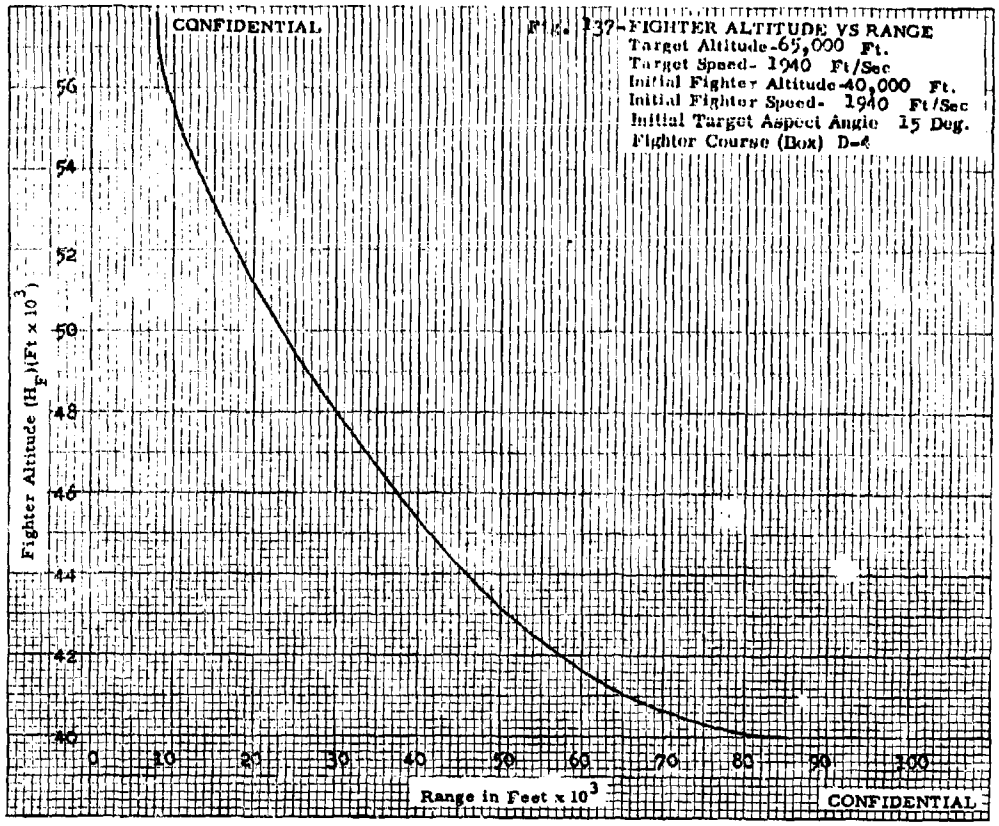

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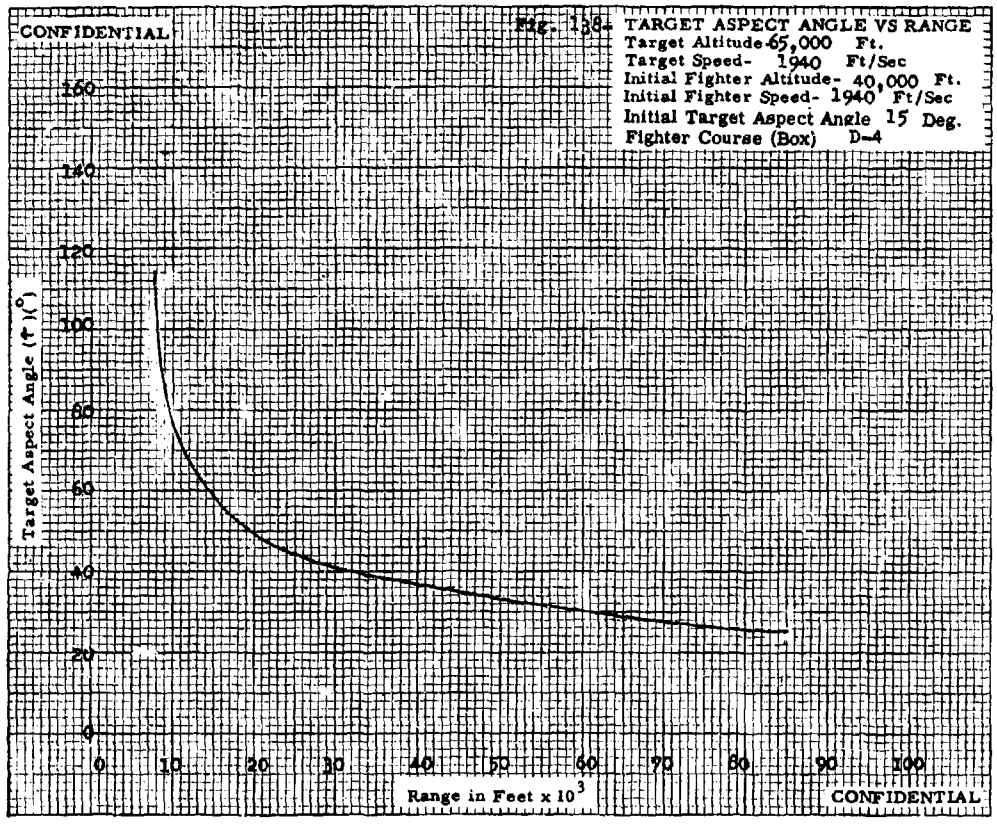
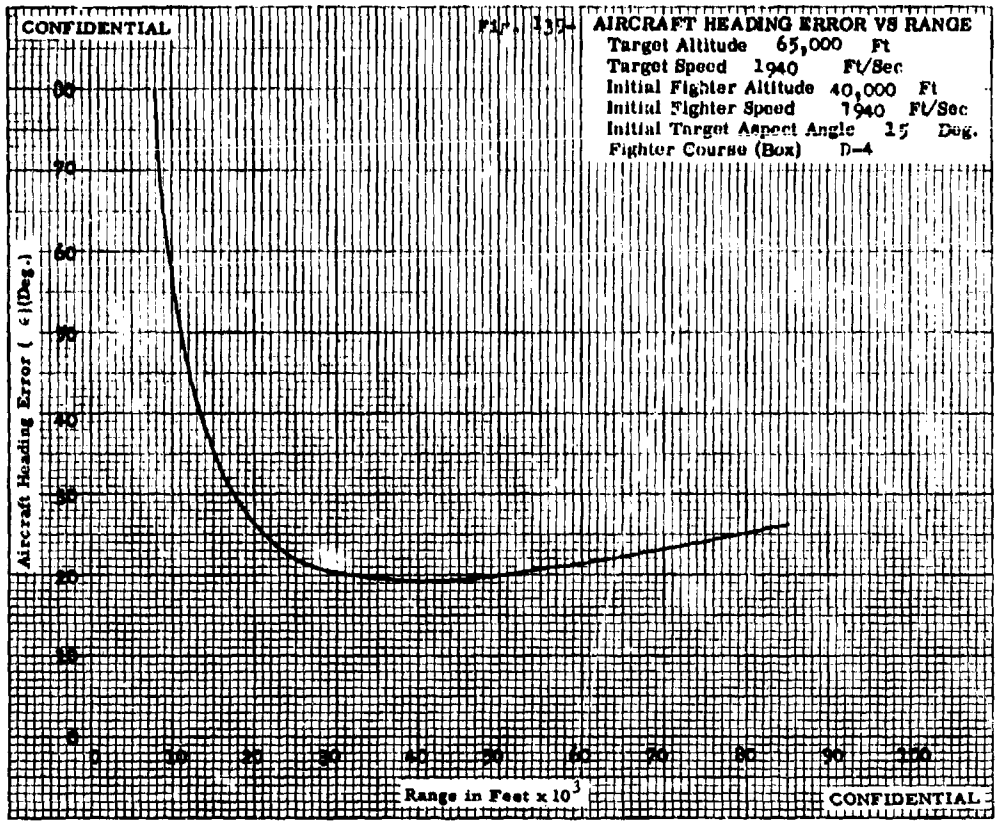
Fig. 137-FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Fighter Altitude (H_F)(Ft x 10^3)
56
54
52
50
48
46
44
42
40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 138-TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Target Aspect Angle (ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 135
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Aircraft Heading Error (ε) (Deg.)
Range in Feet x 10^3
CONFIDENTIAL

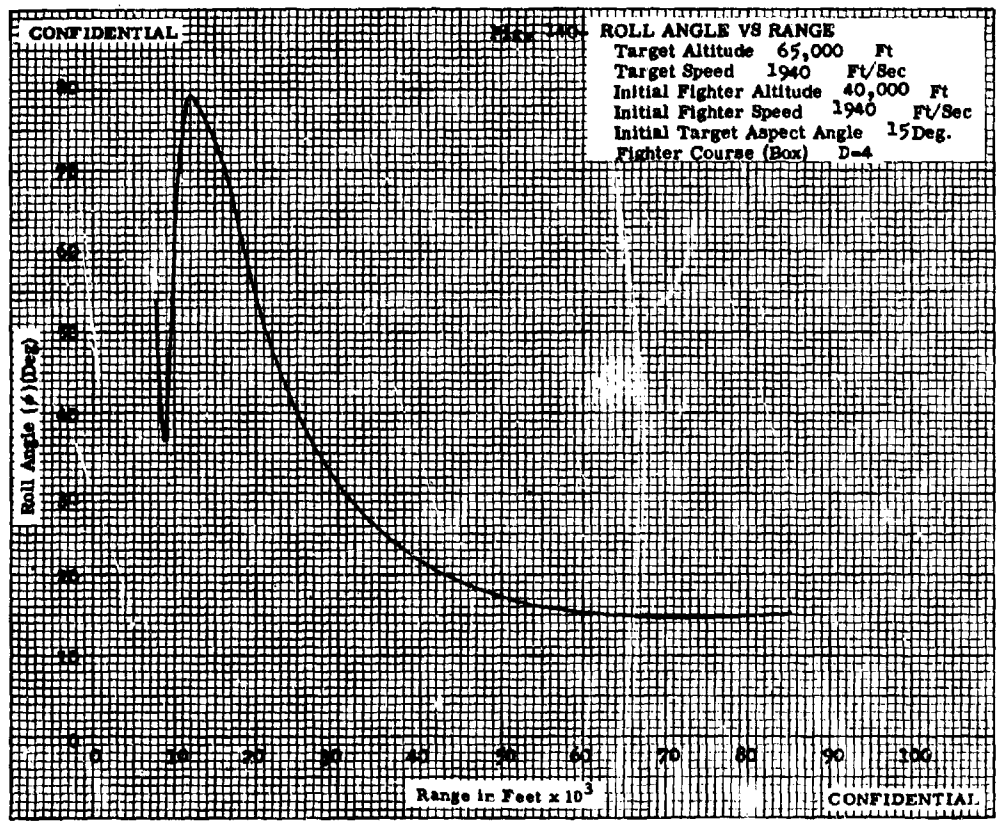

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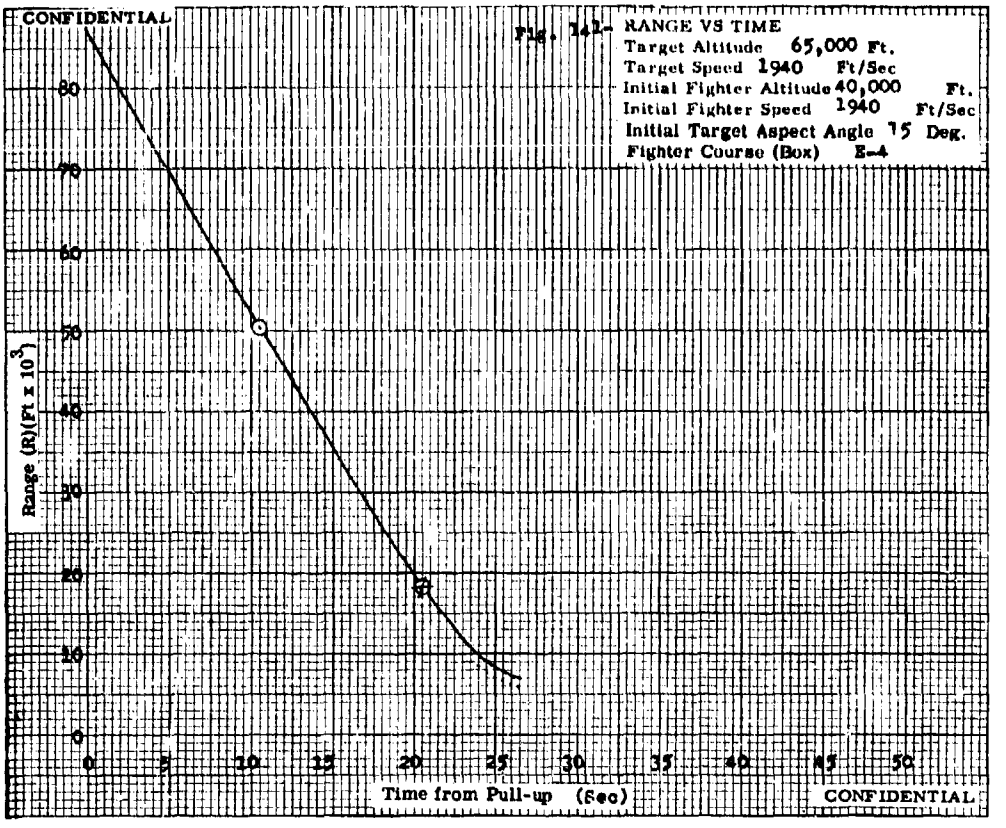
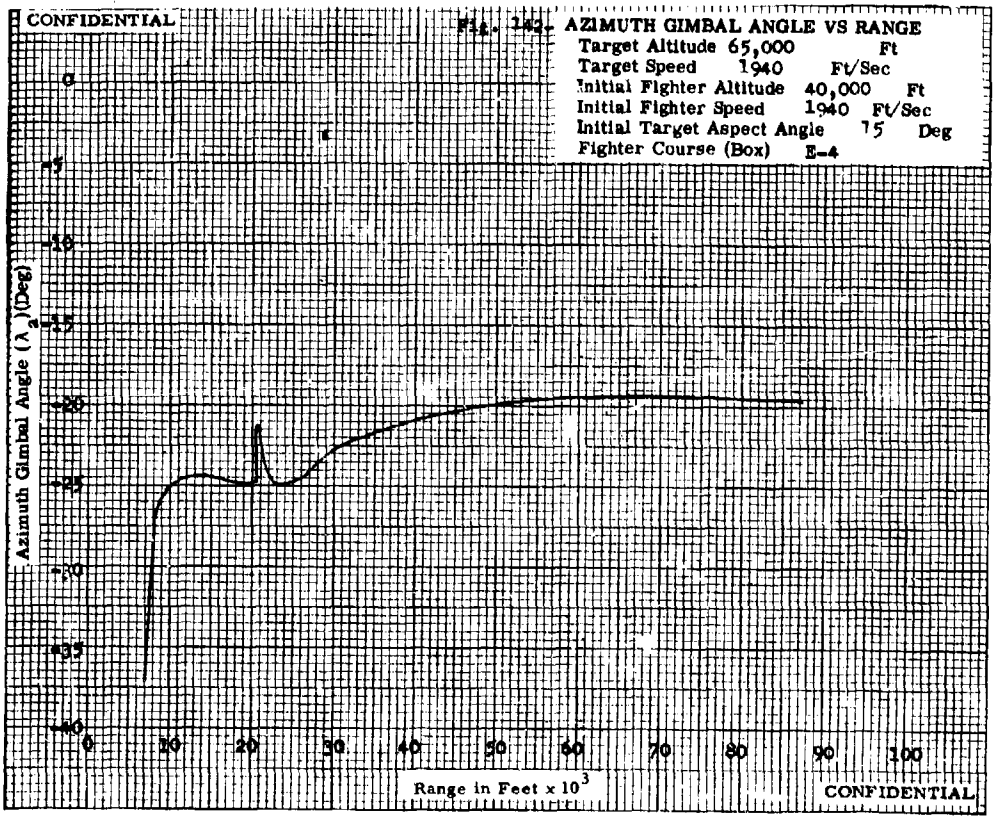
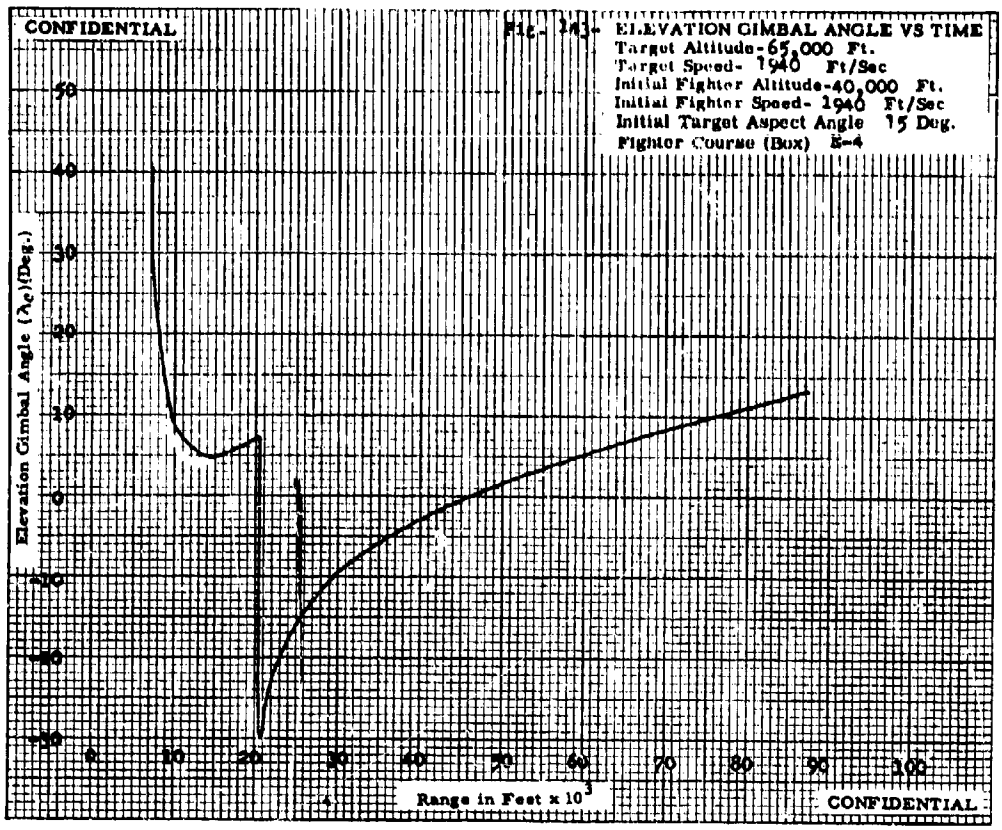
Fig. 136
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-4
Roll Angle (φ) (Deg)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 142- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 75 Deg.
Fighter Course (Box) E-4
Range (R)(Ft x 10^3)
0
10
20
30
40
60
80
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 143- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 75 Deg
Fighter Course (Box) E-4
Azimuth Gimbal Angle (λ_a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 3A1-
ELEVATION GIMBAL ANGLE VS TIME
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Elevation Gimbal Angle (λ_e)(Deg.)
50
40
30
20
10
0
-10
-20
-30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

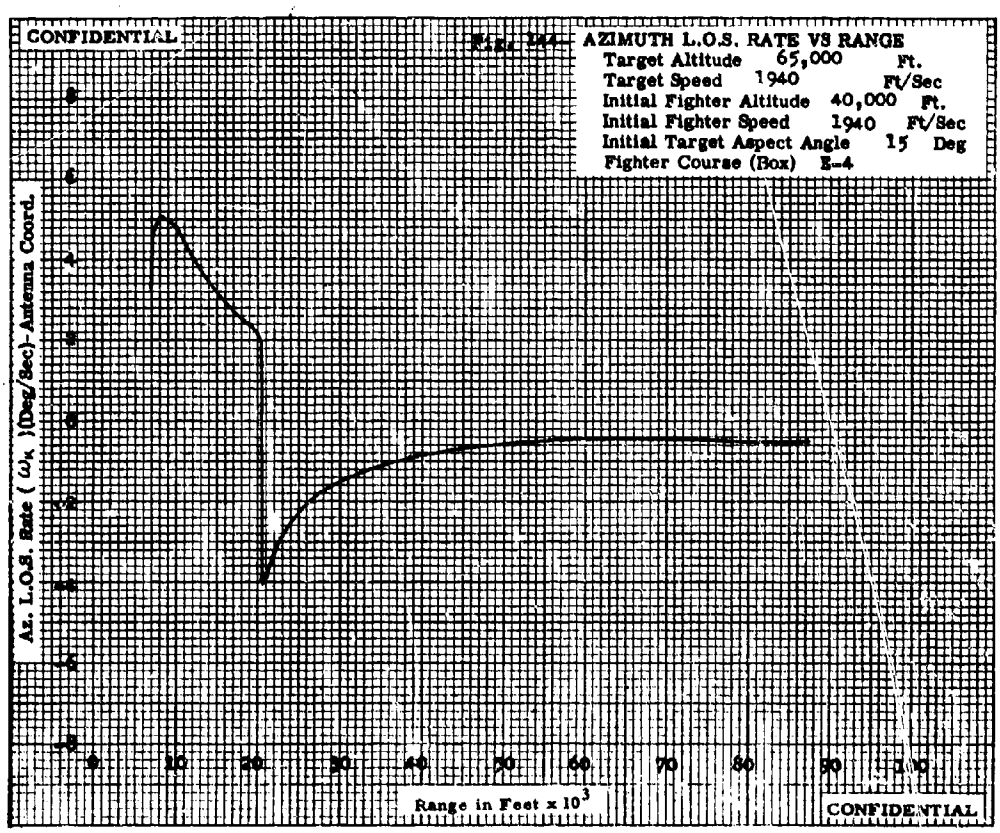

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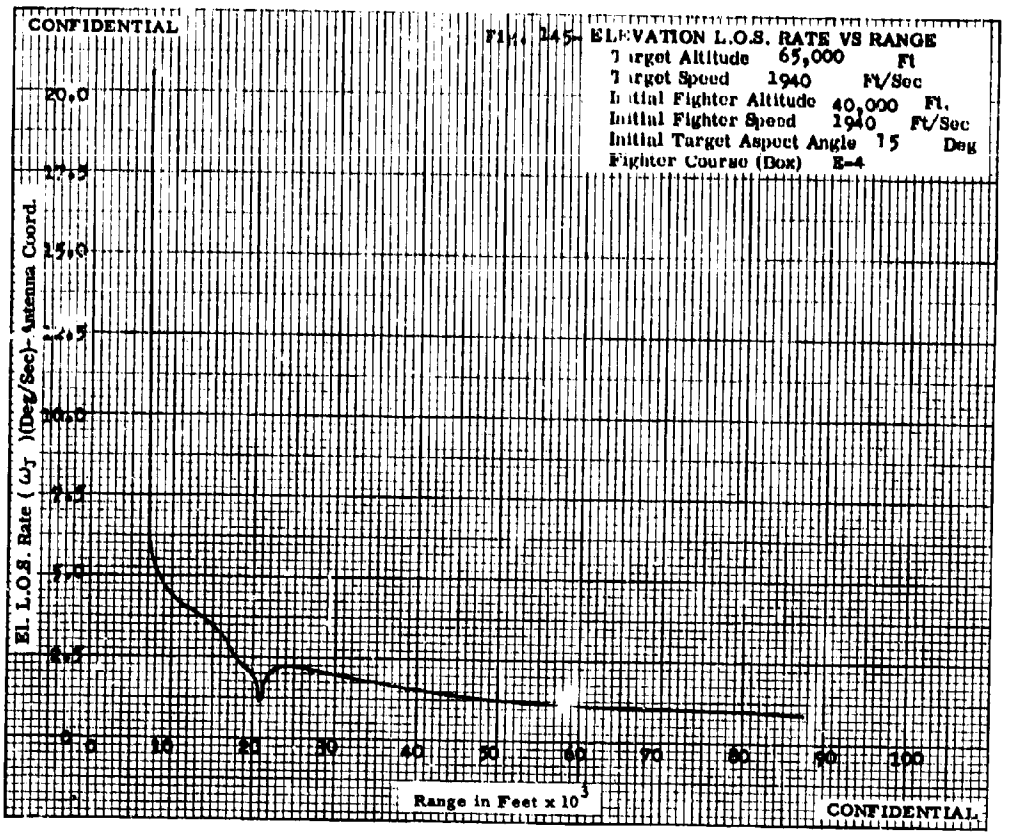
Fig. 3A2-
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-4
Az. L.O.S. Rate (ω_x)(Deg/Sec)-Antenna Coord.
8
6
4
2
0
-2
-4
-6
-8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL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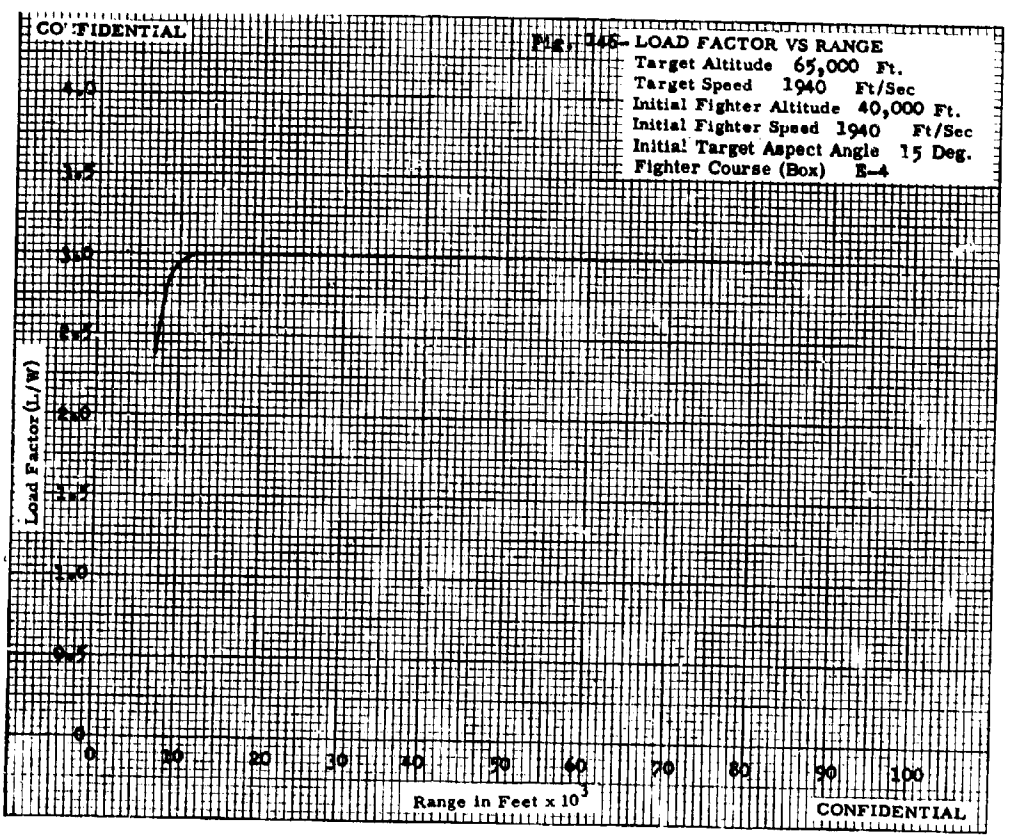
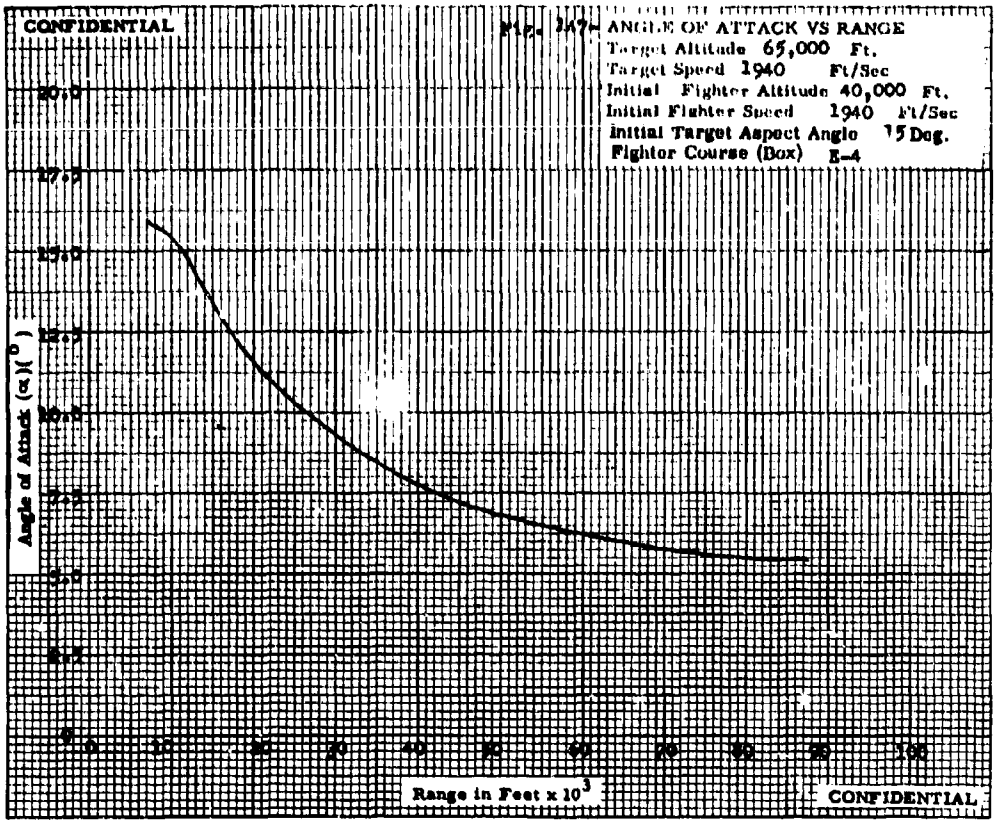
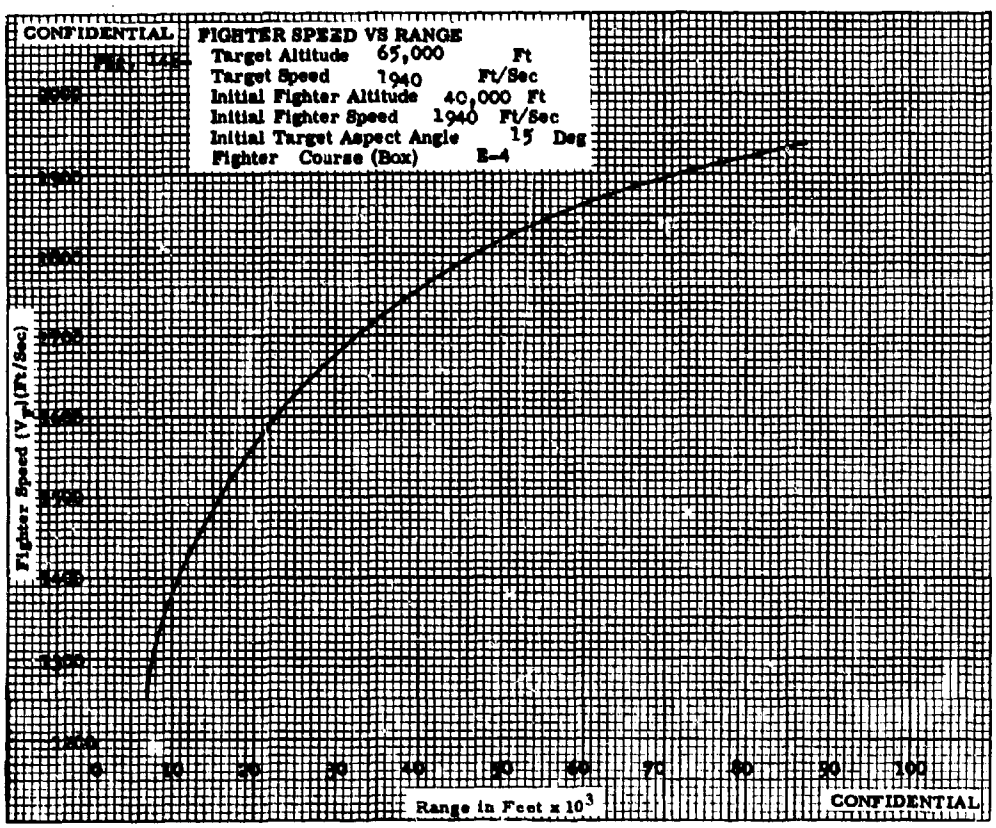
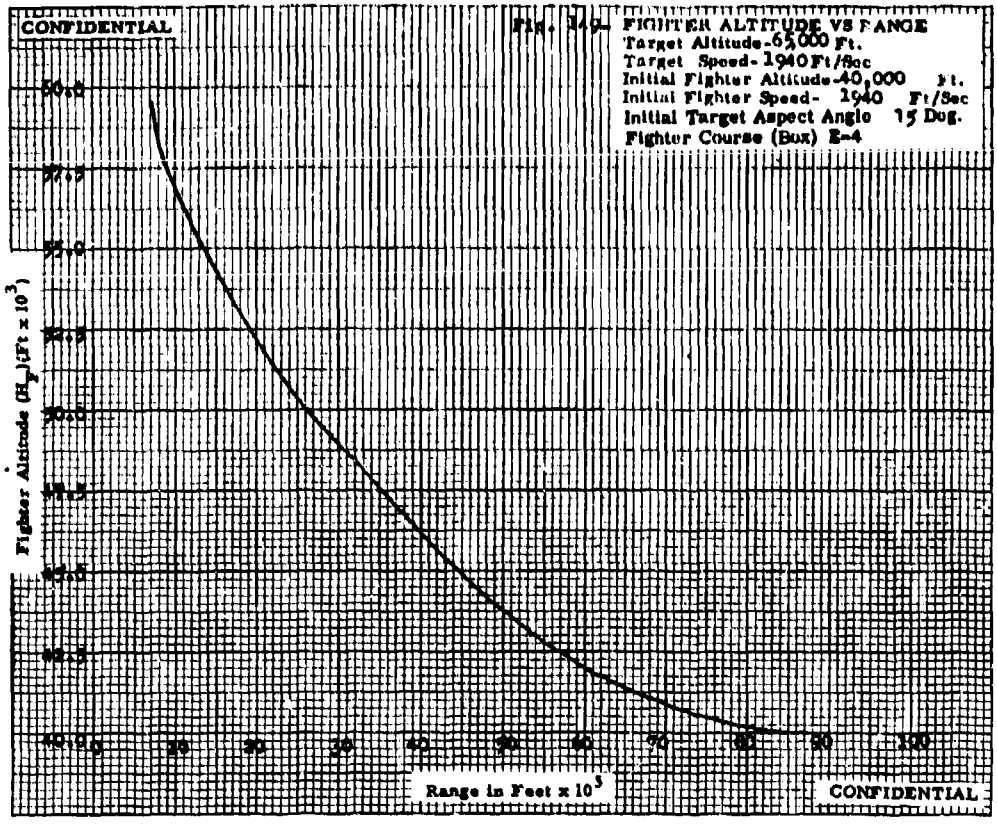
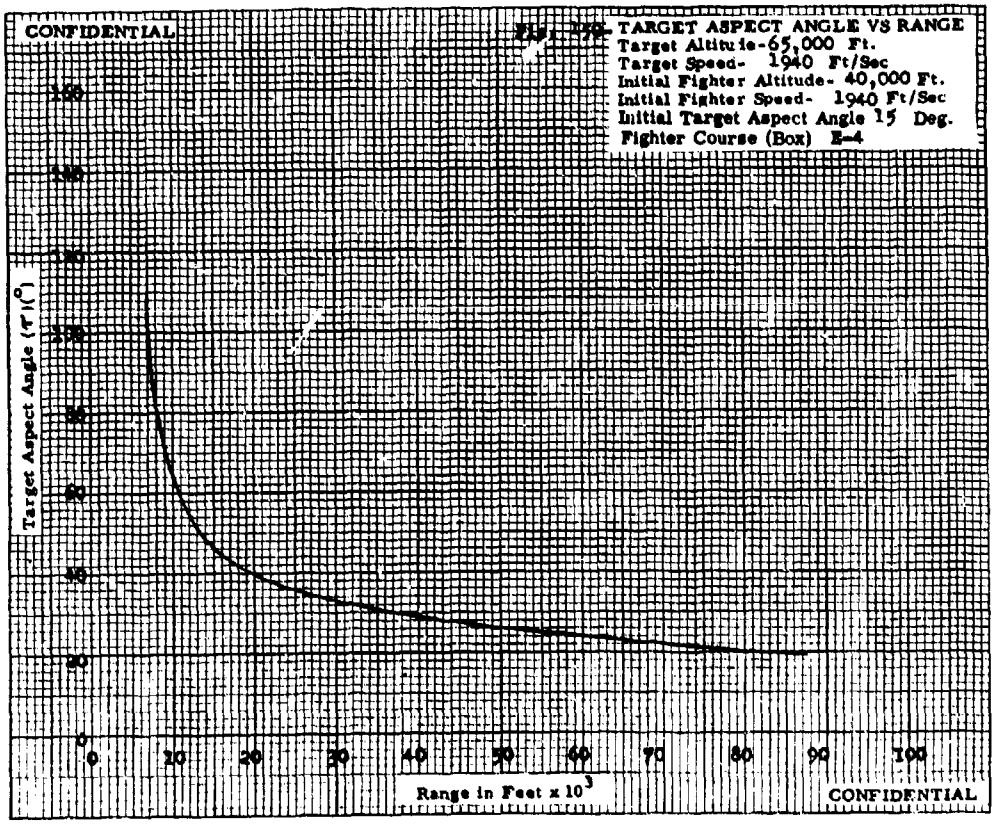
ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-4
El. L.O.S. Rate (ω_T) (Deg/Sec) - Antenna Coord.
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

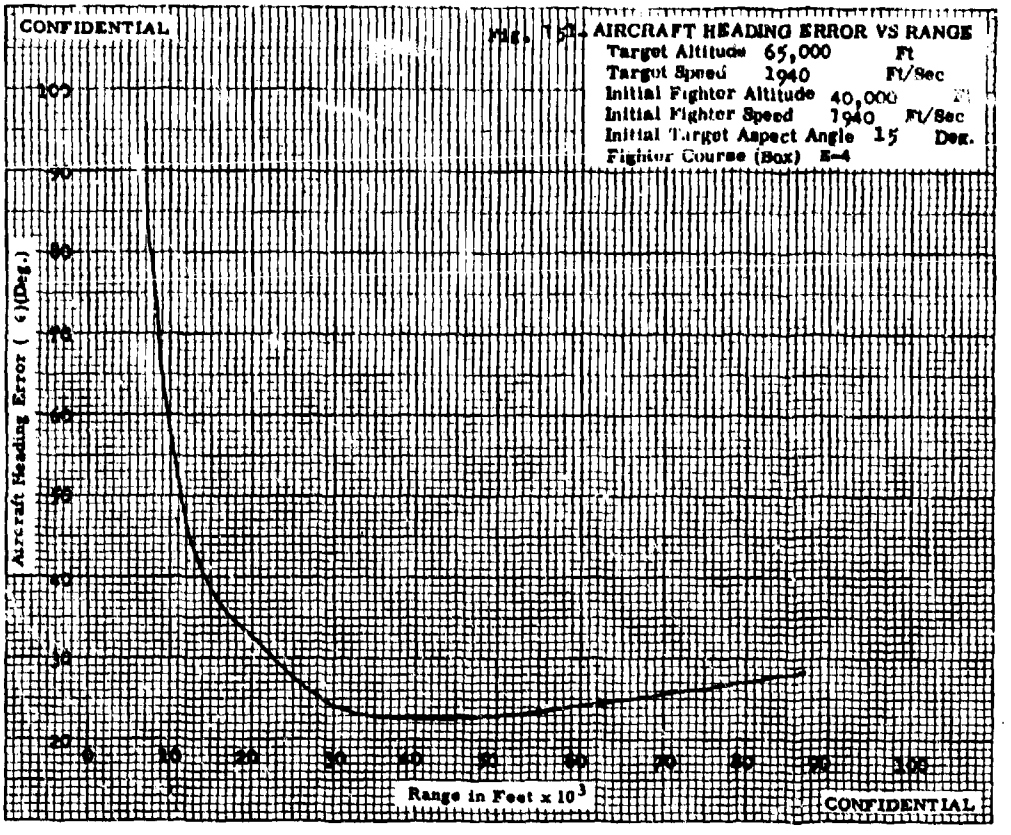

CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

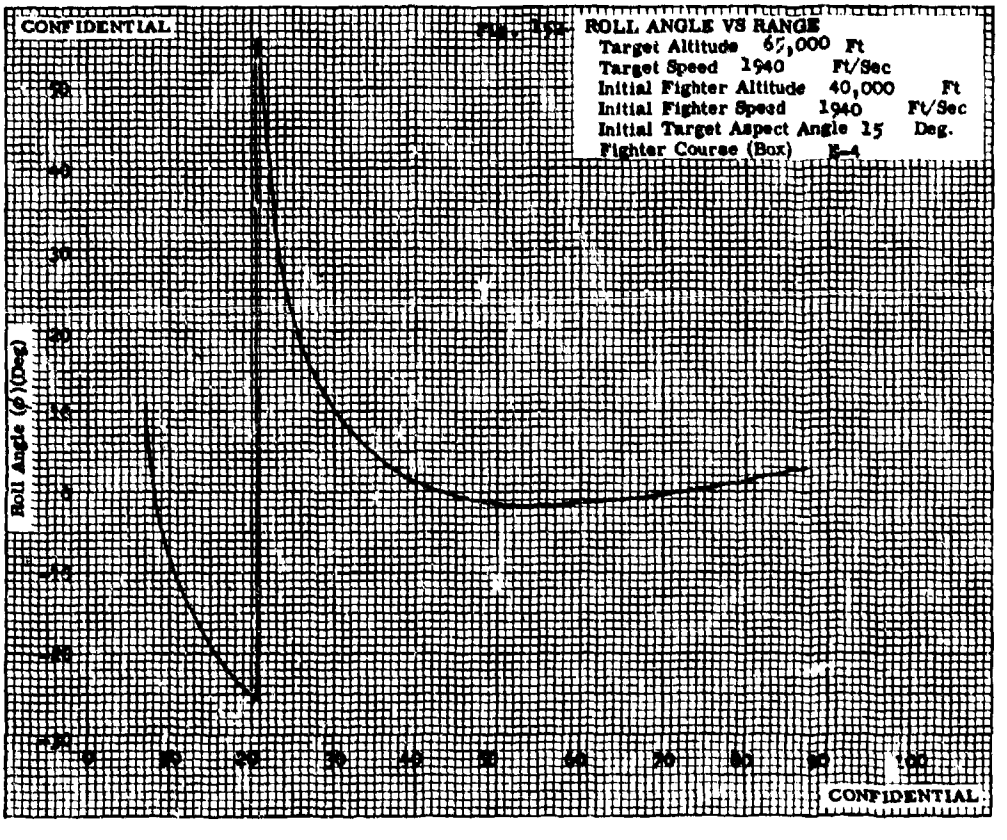

CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Angle of Attack (α)(°)
Range in Feet x 10³
CONFIDENTIAL

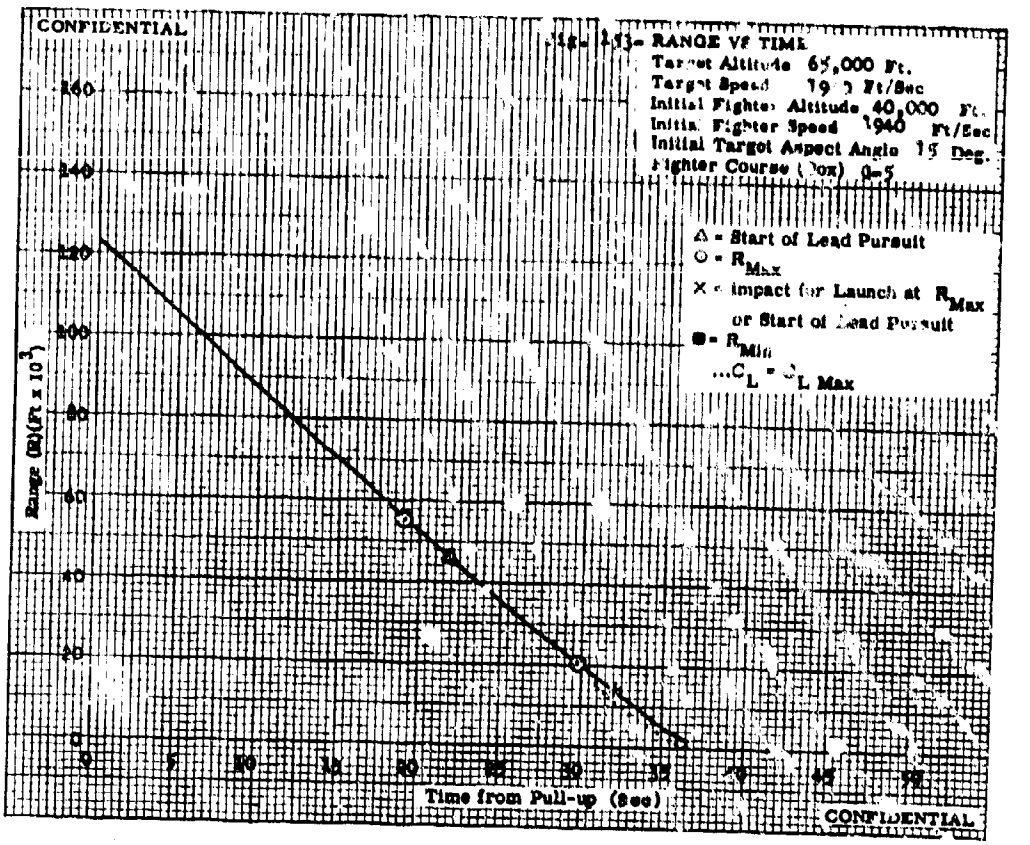

CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-4
Fighter Speed (V_F)(Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 149- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Fighter Altitude (H_F)(Ft x 10^3)
50.0
45.0
40.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 150- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Target Aspect Angle (τ_1)(^{o})
100
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 151
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Aircraft Heading Error (ψ)(Deg.)
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 152
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-4
Roll Angle (φ)(Deg)
CONFIDENTIAL


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
● = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL

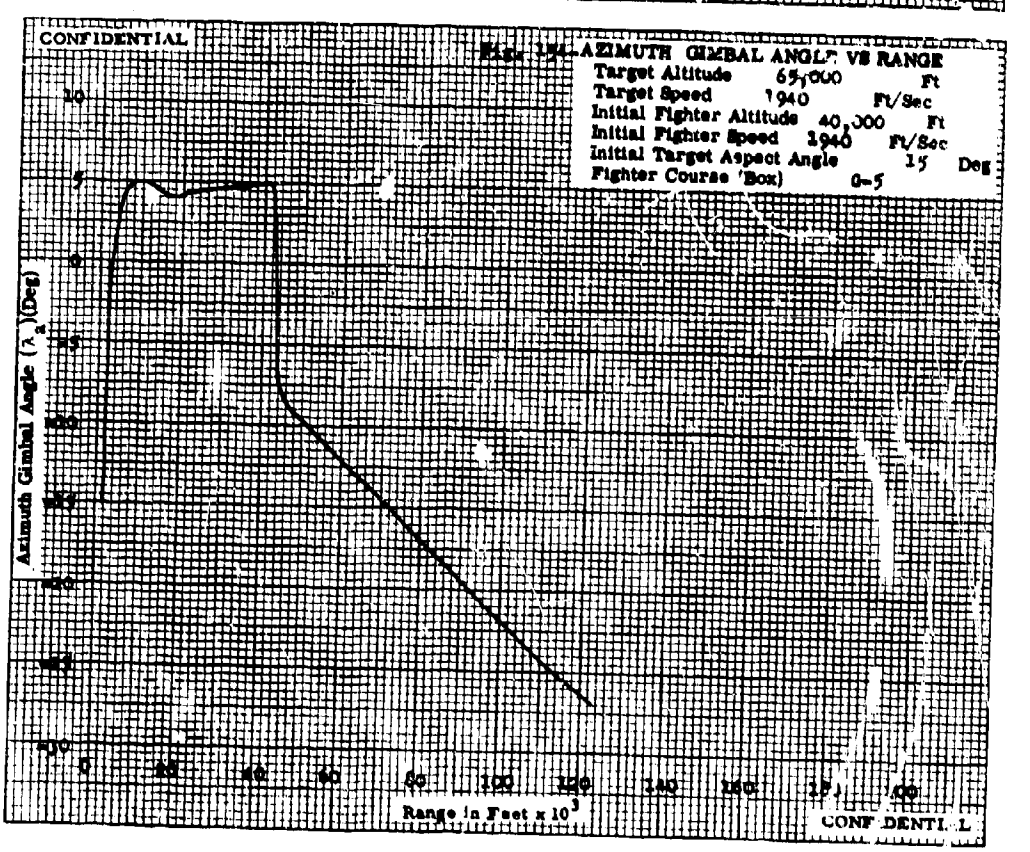

CONFIDENTIAL
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) 0-5
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

Fig. 155 ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5

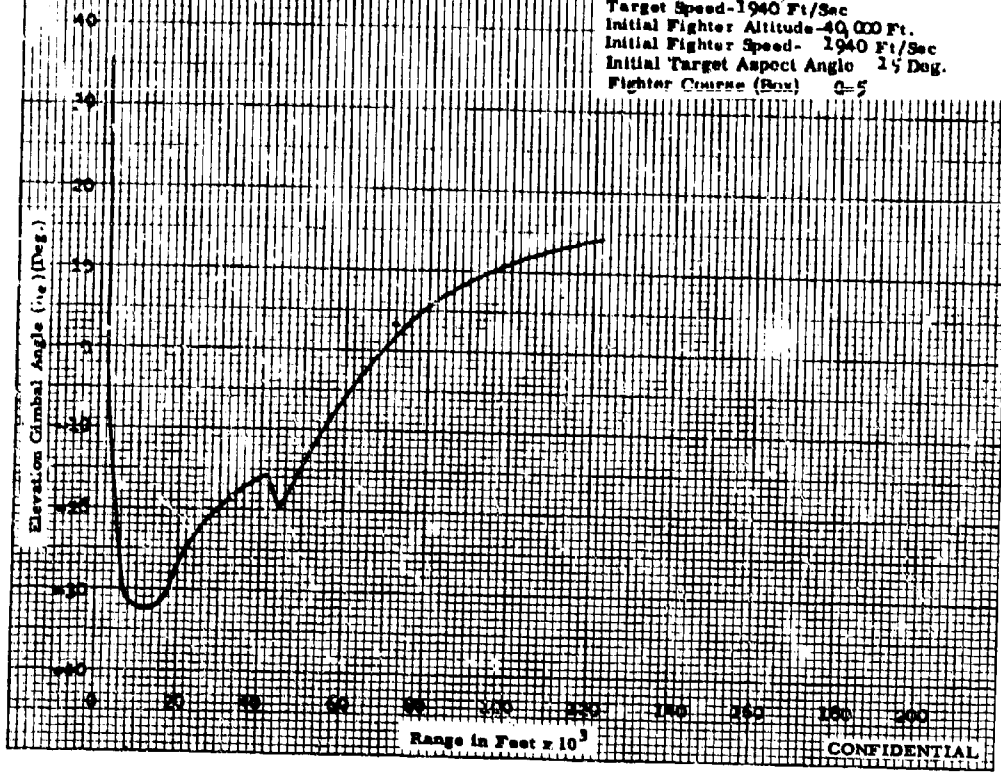
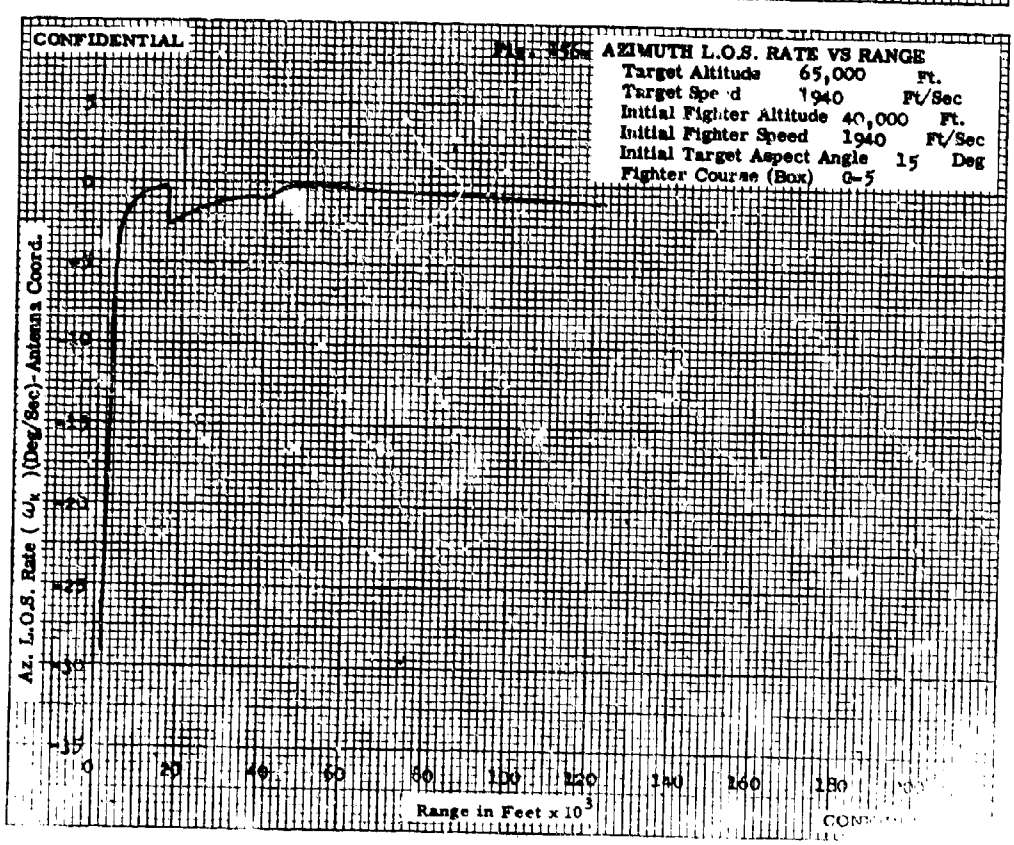
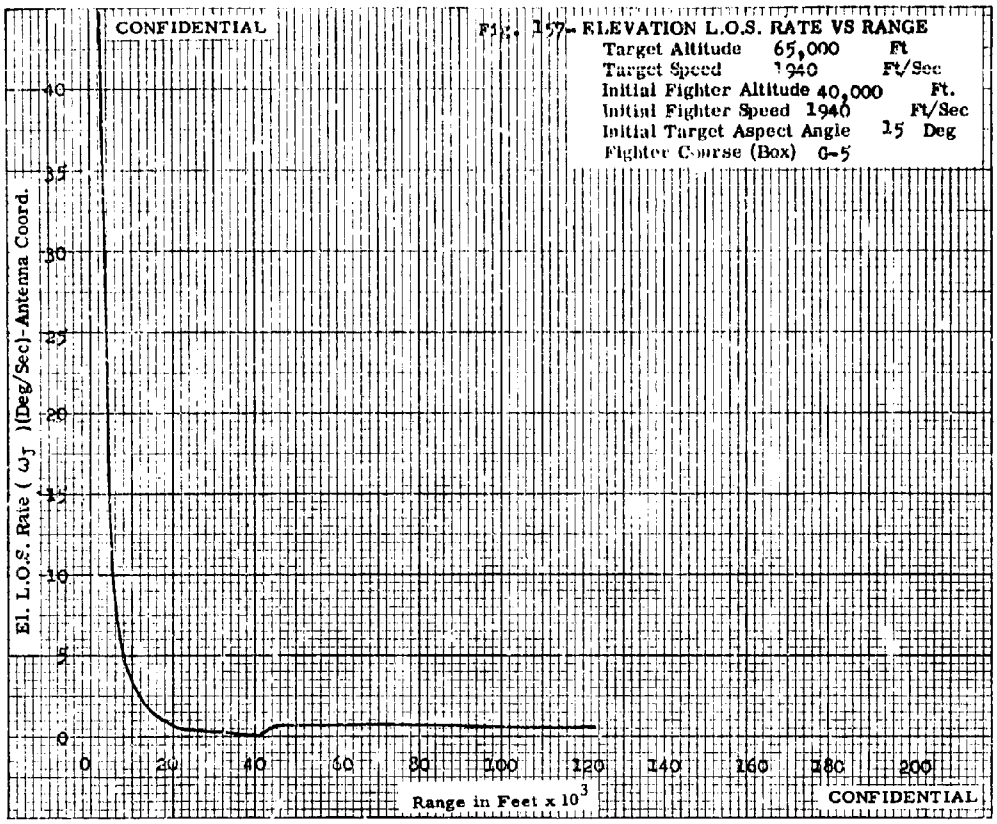
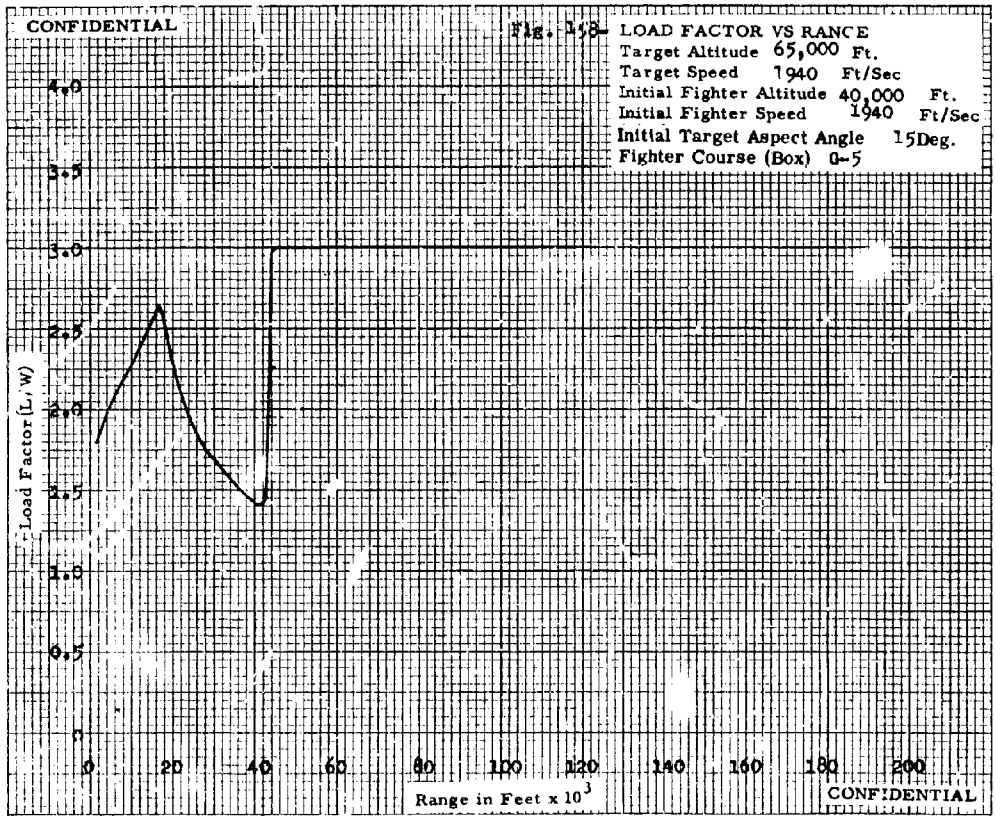
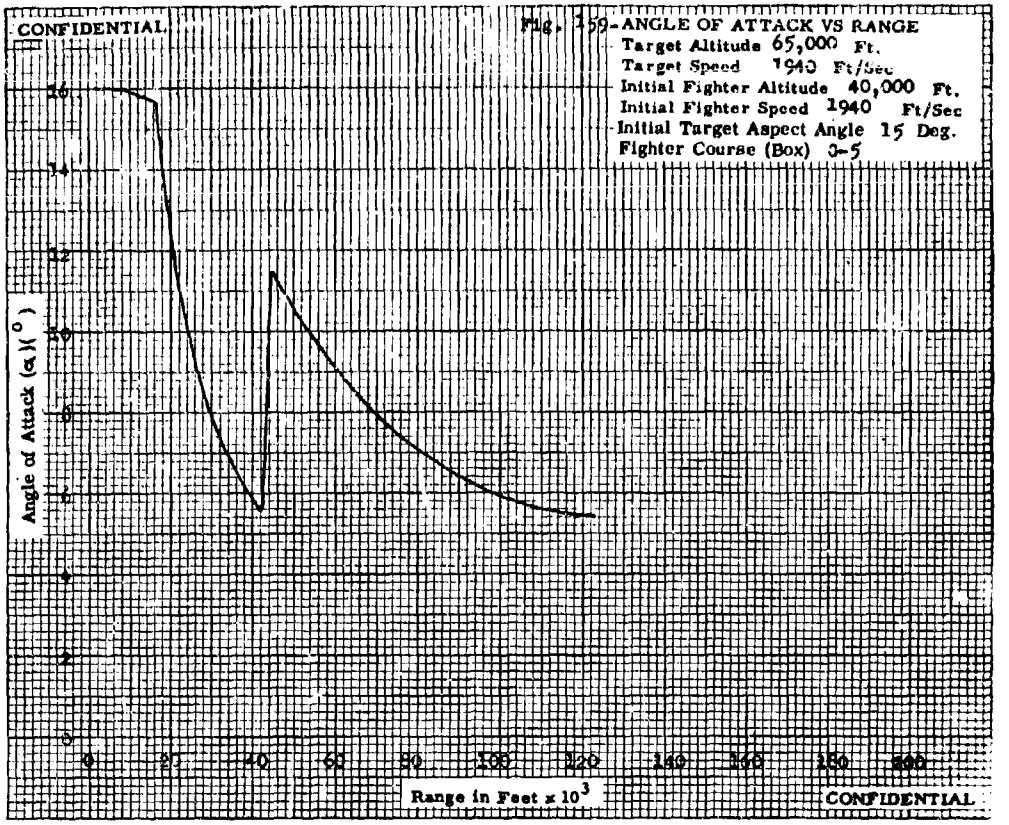


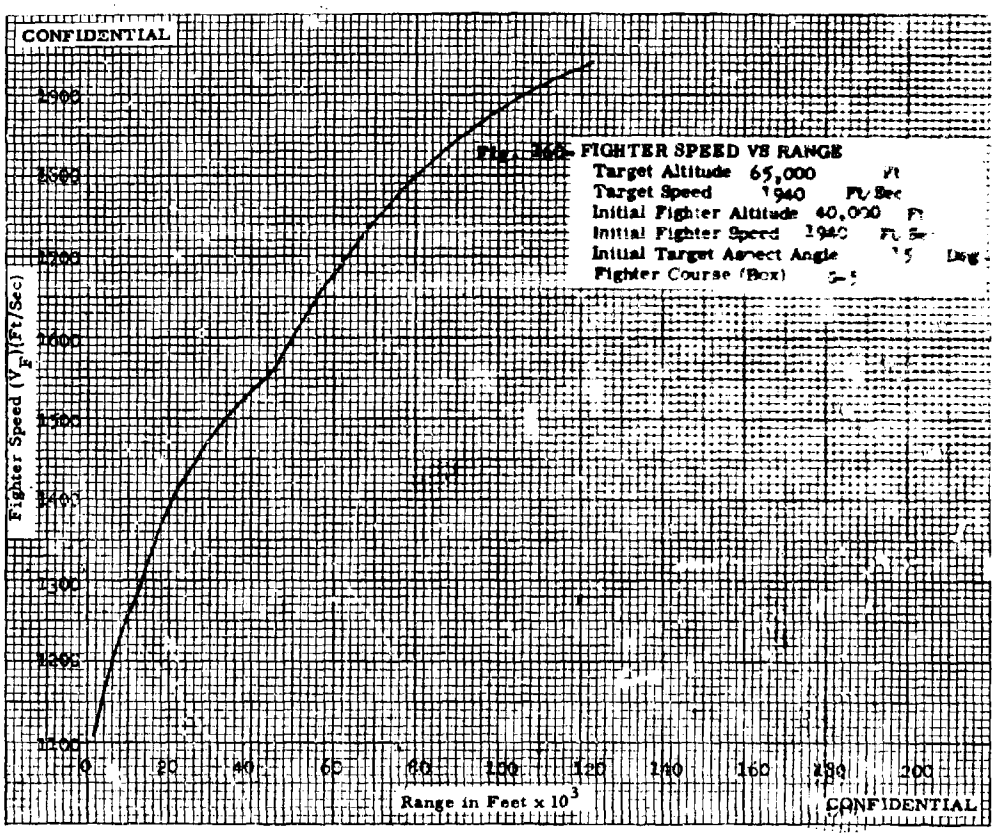
Fig. 156 AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) 0-5

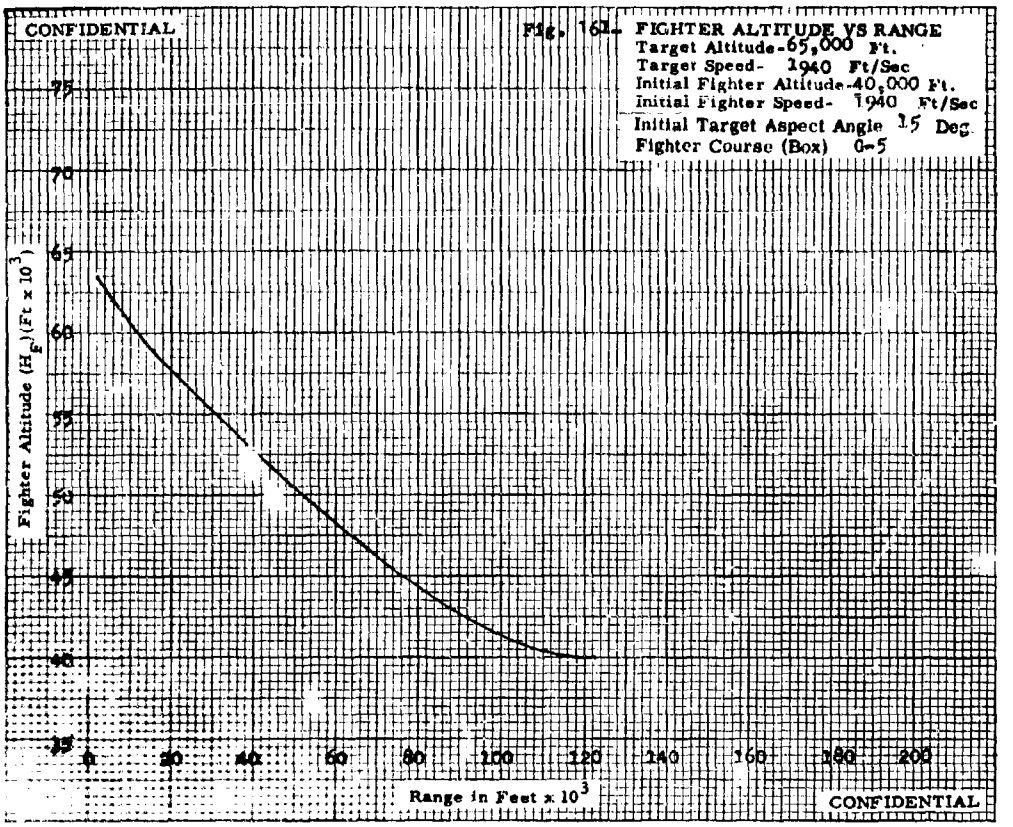


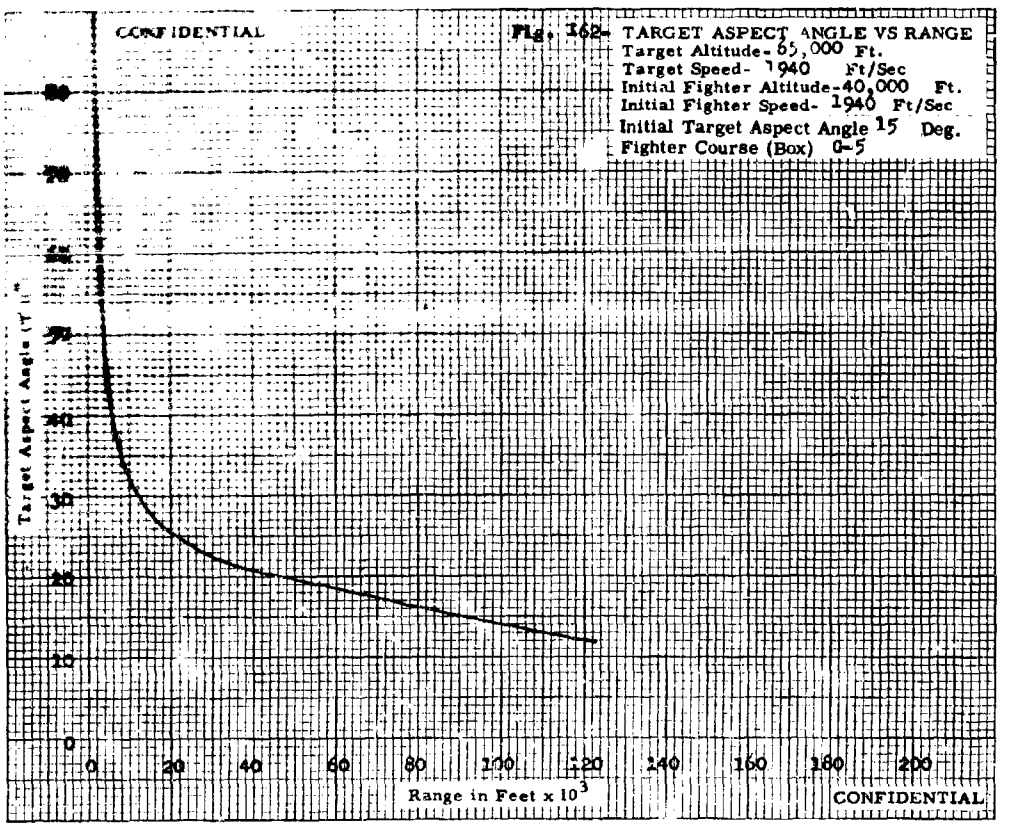

CONFIDENTIAL
Fig. 157- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) 0-5
El. L.O.S. Rate (ω)(Deg/Sec)-Antenna Coord.
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

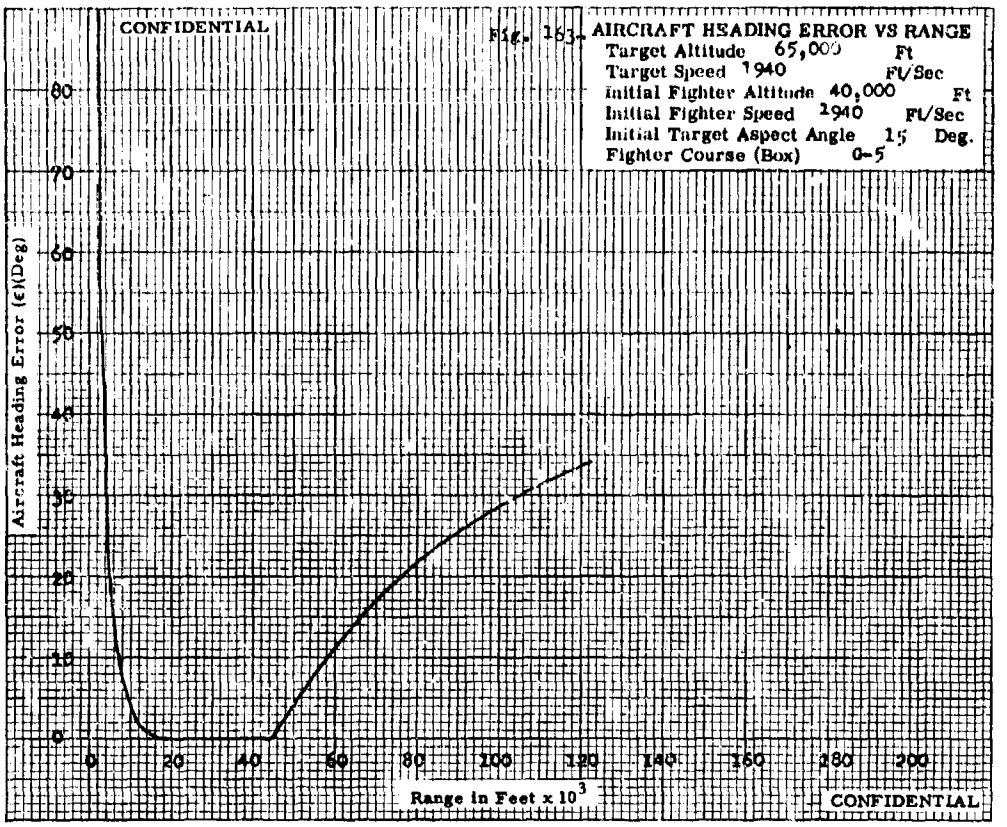

CONFIDENTIAL
Fig. 158- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15Deg.
Fighter Course (Box) 0-5
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

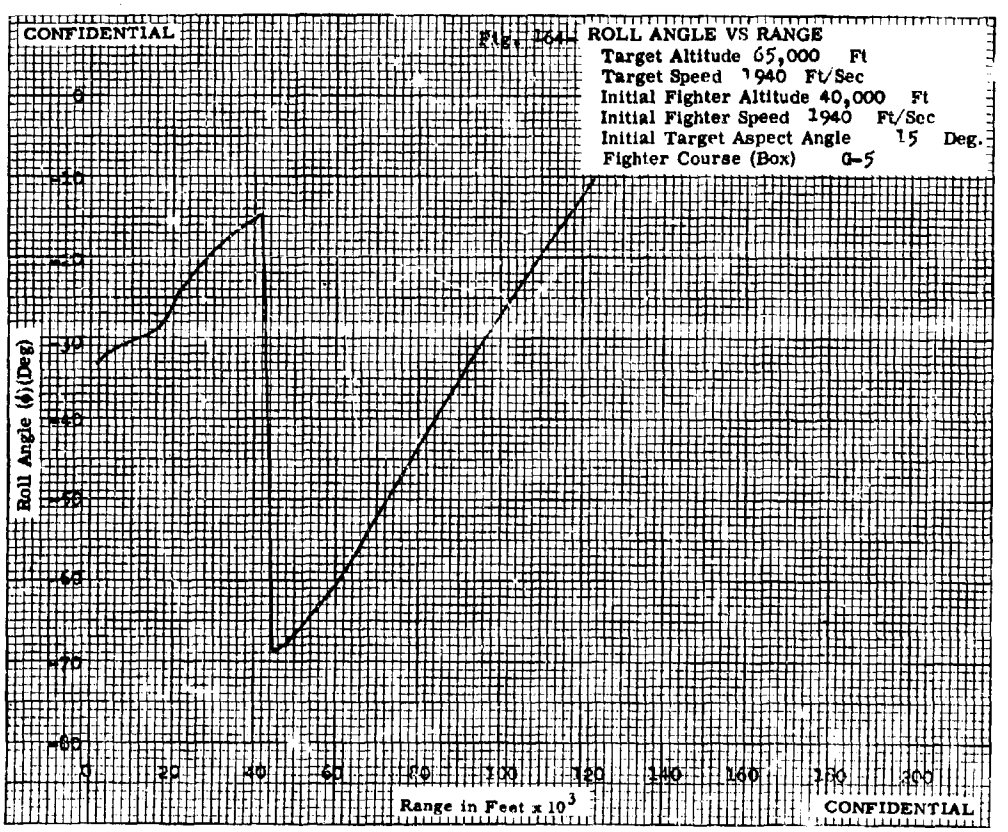

CONFIDENTIAL
Fig. 159-ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 3-5
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

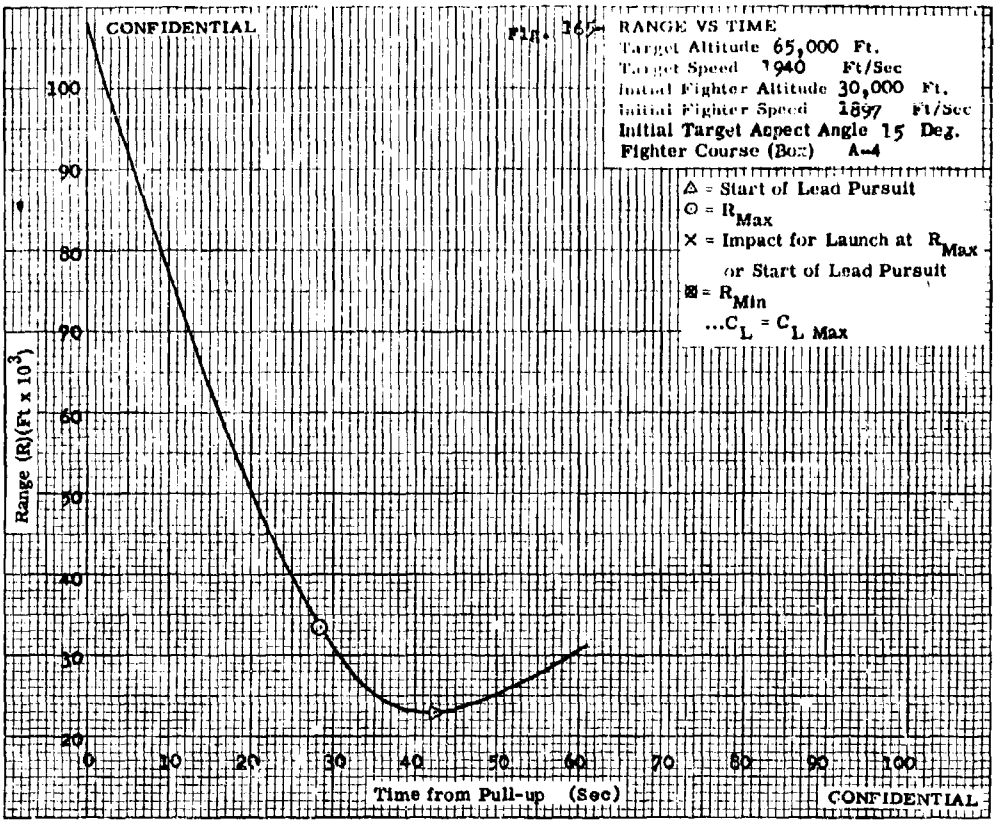

CONFIDENTIAL
Fig. 160- FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 3-5
Fighter Speed (V_F)(Ft/Sec)
2900
2800
2700
2600
2500
2400
2300
2200
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

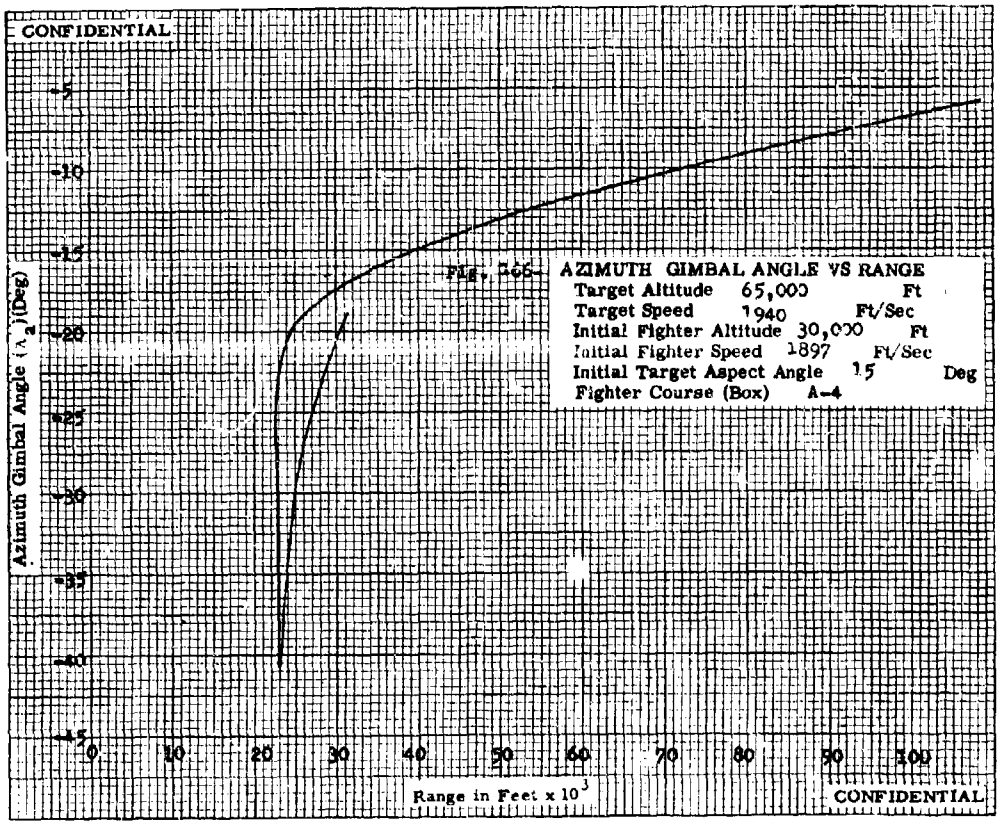

CONFIDENTIAL
Fig. 161 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5
Fighter Altitude (H_F)(Ft x 10^3)
75
70
65
60
55
50
45
40
35
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

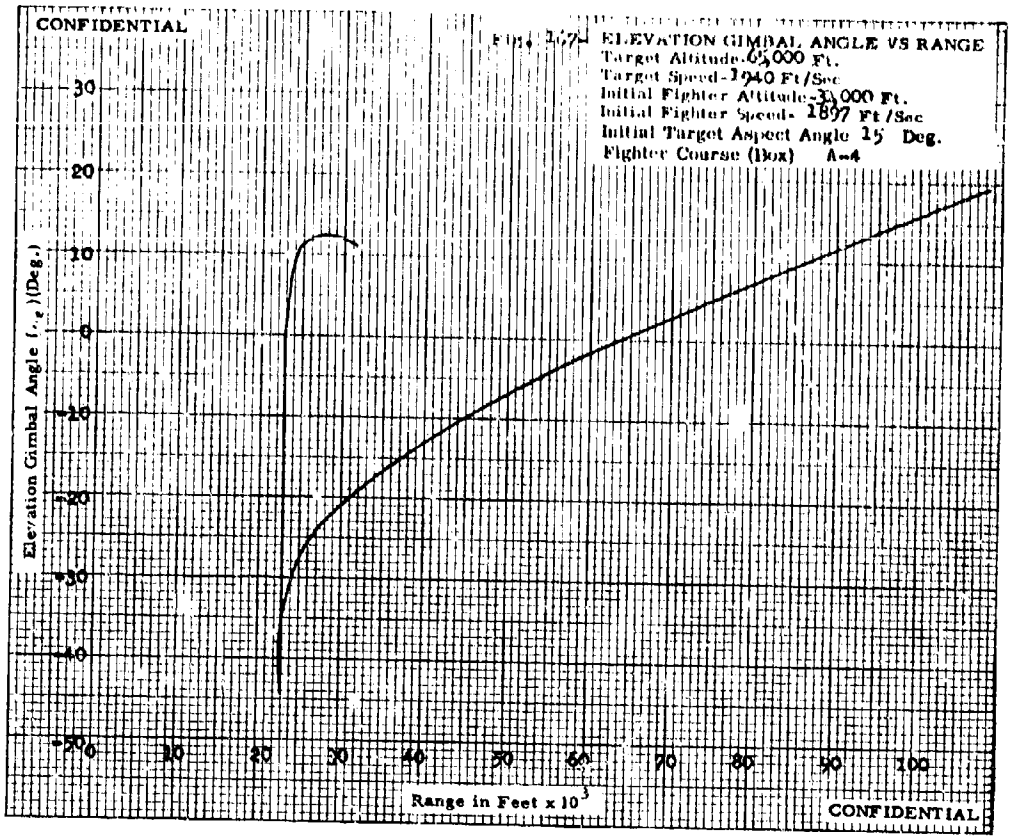

CONFIDENTIAL
Fig. 162 - TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5
Target Aspect Angle (T
70
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

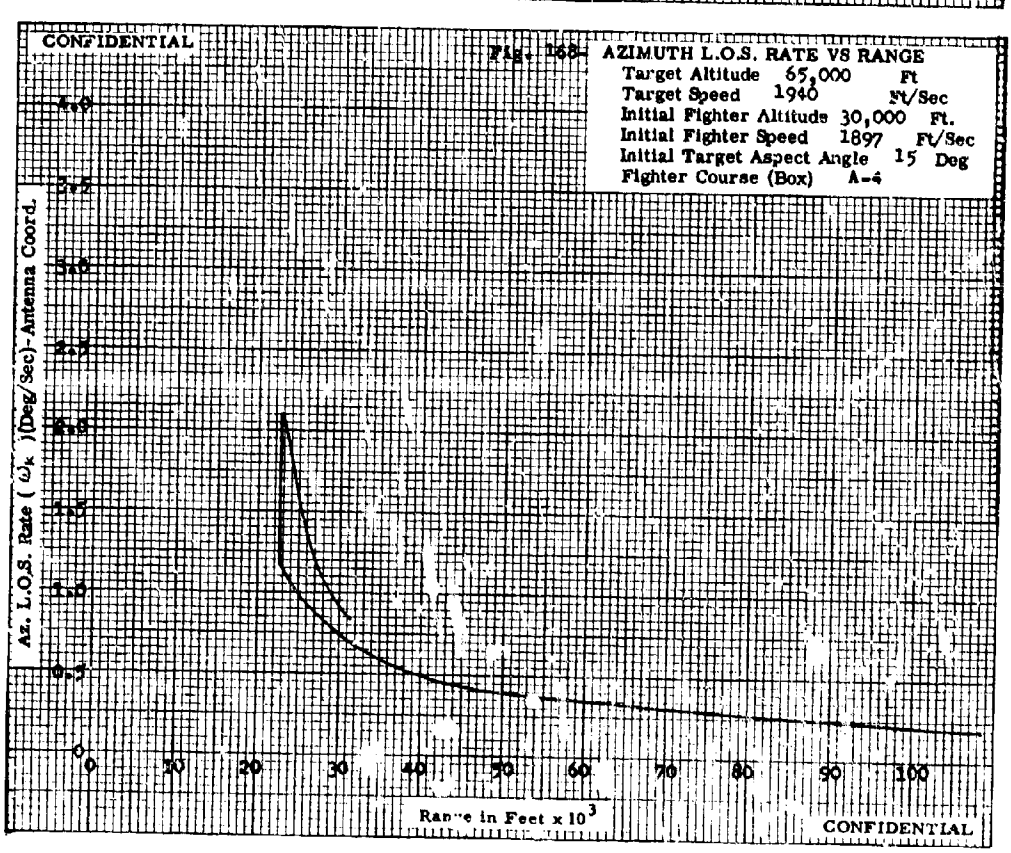

CONFIDENTIAL
Fig. 163
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5
Aircraft Heading Error (€)(Deg)
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

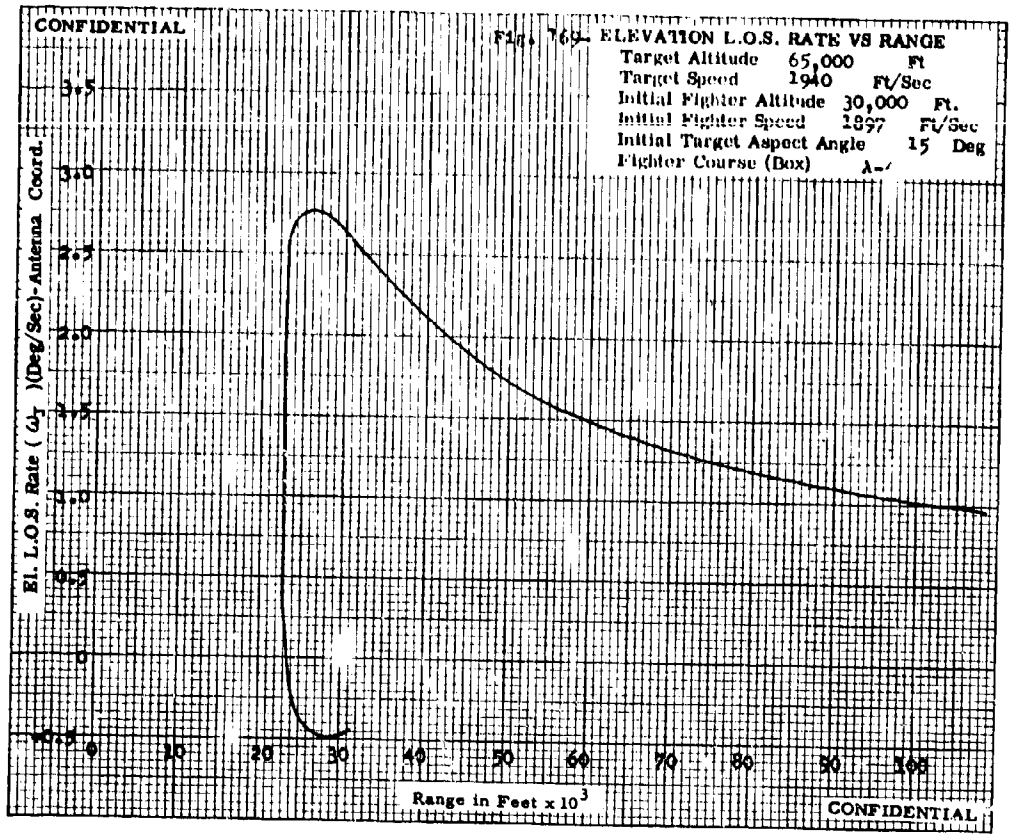

CONFIDENTIAL
Fig. 164
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5
Roll Angle (ϕ)(Deg)
0
-10
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

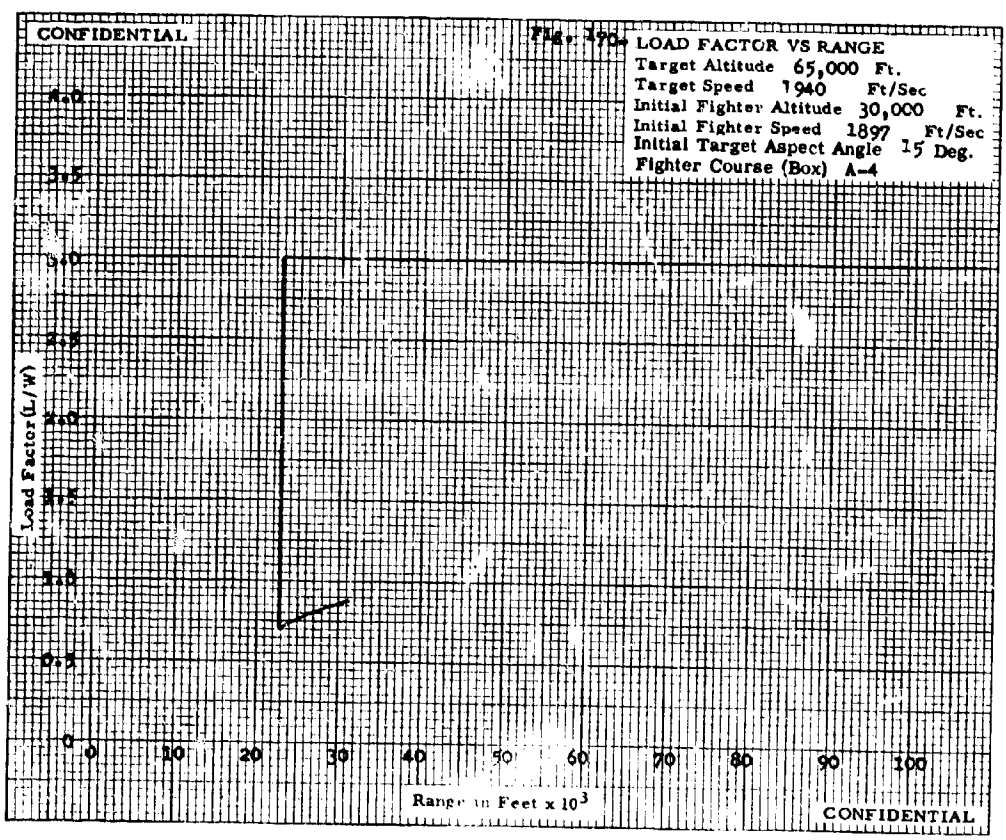

CONFIDENTIAL
Fig. 165
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
100
90
80
70
60
50
40
30
20
0
10
20
30
40
50
60
70
80
90
100
Time from Pull-up (Sec)
CONFIDENTIAL

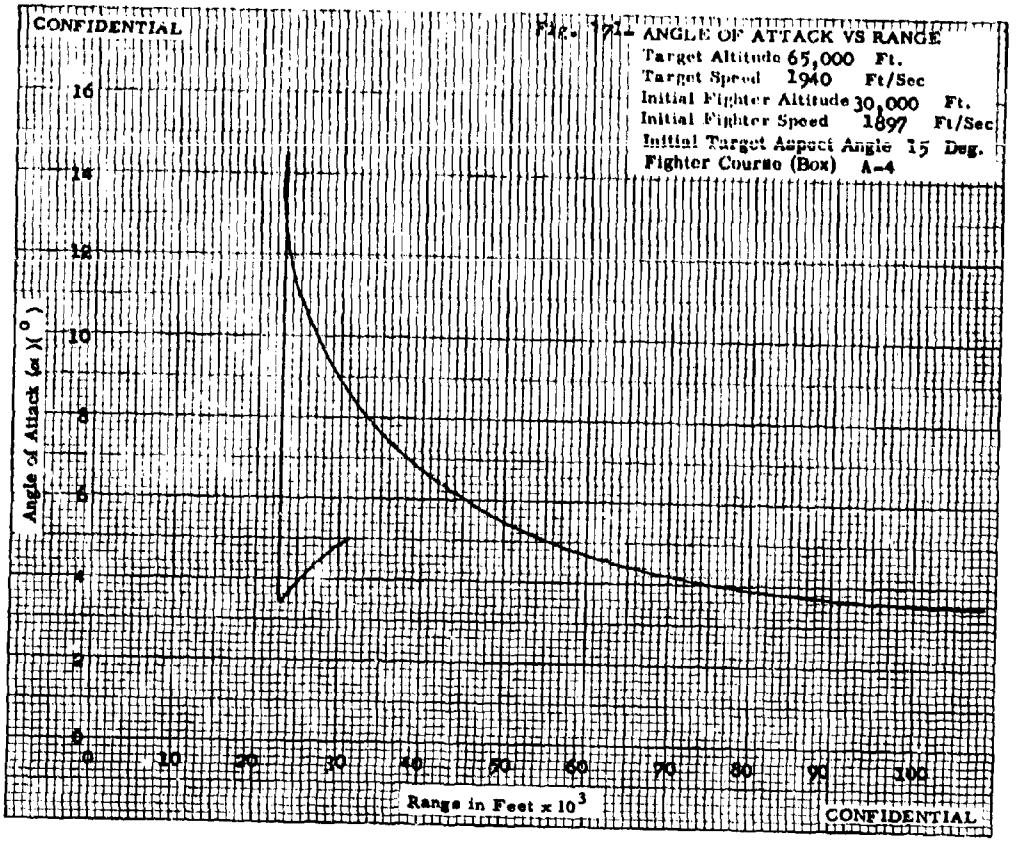

CONFIDENTIAL
Fig. 166
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4
Azimuth Gimbal Angle (A_2)(Deg)
-5
-10
-15
-20
-25
-30
-35
-40
-45
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

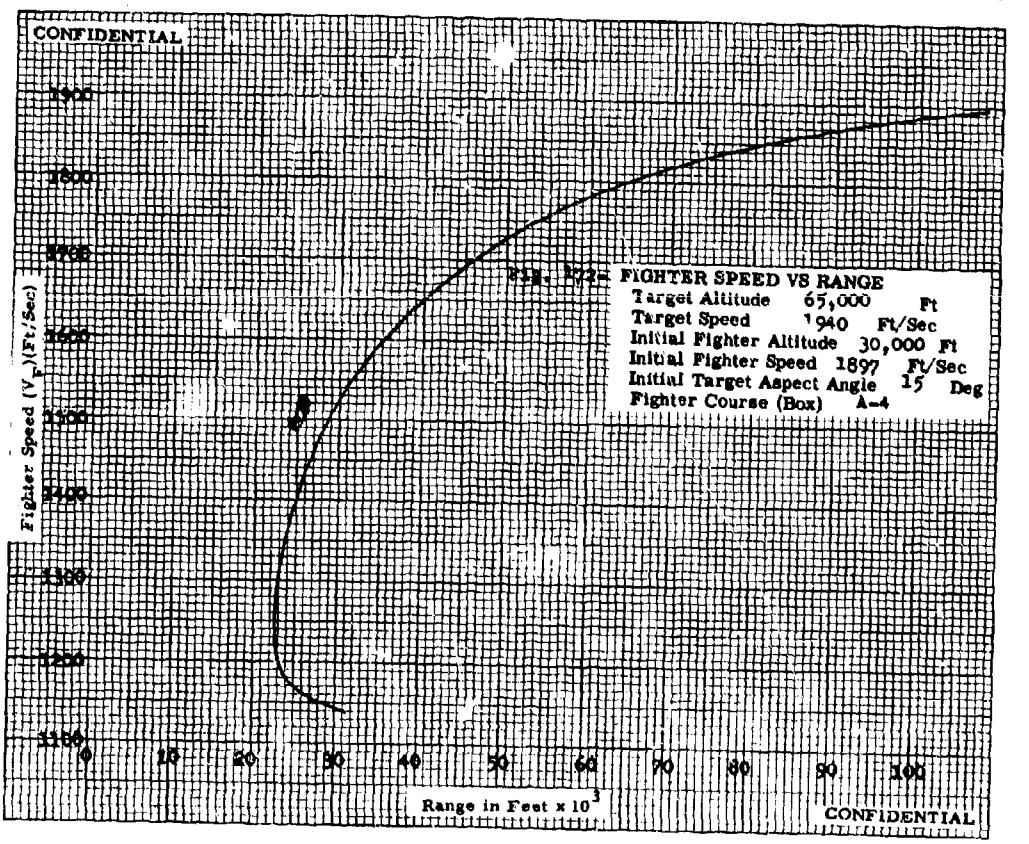

CONFIDENTIAL
Fig. 167
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Elevation Gimbal Angle (ϵ_e) (Deg.)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

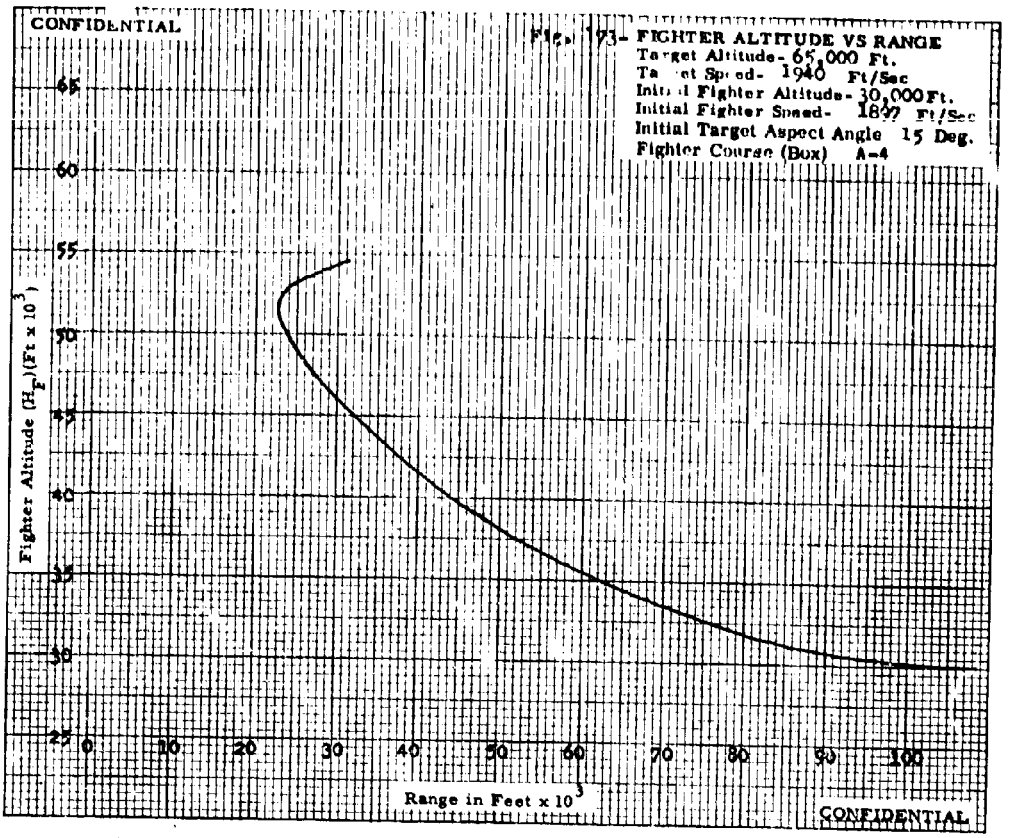

CONFIDENTIAL
Fig. 168
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4
Az. L.O.S. Rate (ω_k) (Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

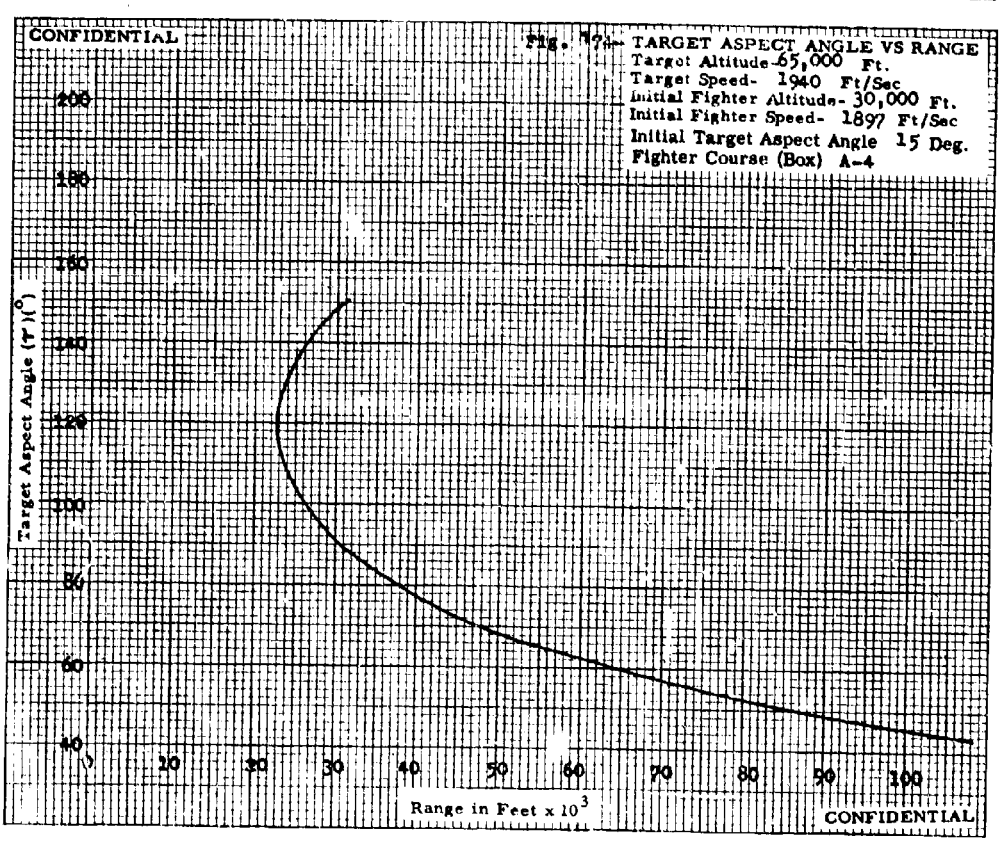

CONFIDENTIAL
Fig. 169 ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4
El. L.O.S. Rate (ω_T)(Deg/Sec)-Antenna Coord.
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
-0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

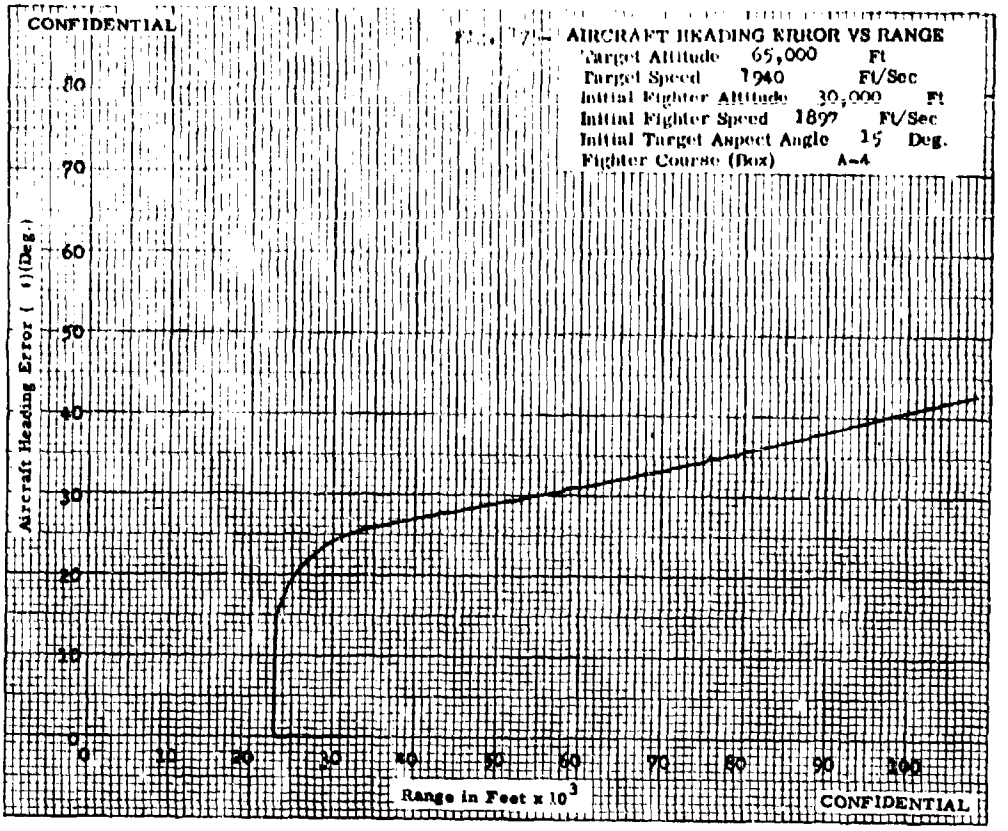

CONFIDENTIAL
Fig. 170 LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

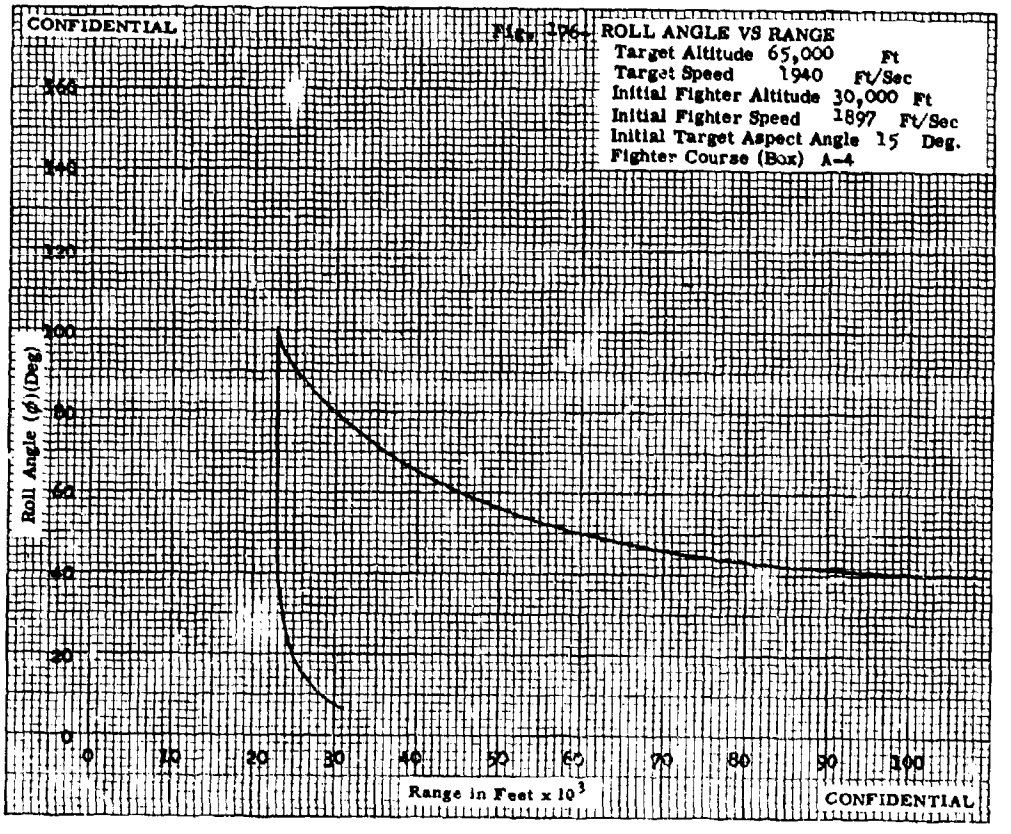

CONFIDENTIAL
Fig. 1711 ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

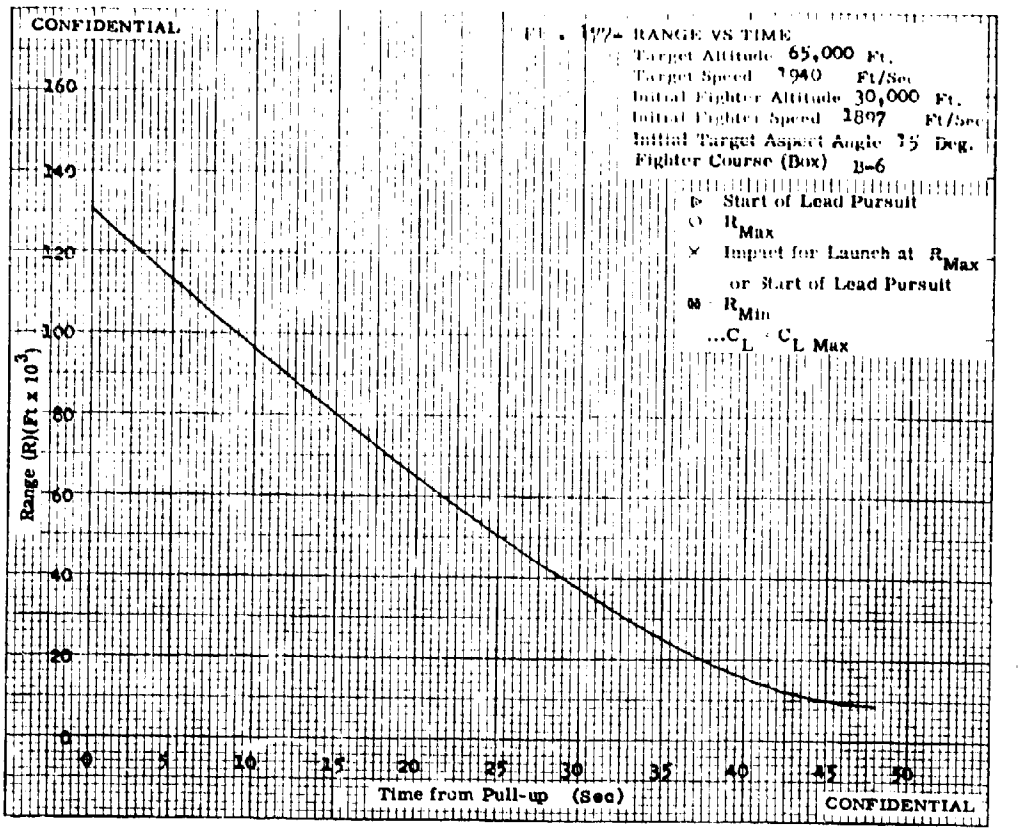

CONFIDENTIAL
Fig. 1712 FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) A-4
Fighter Speed (V_F)(Ft/Sec)
1900
1800
1700
1600
1500
1400
1300
1200
1100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

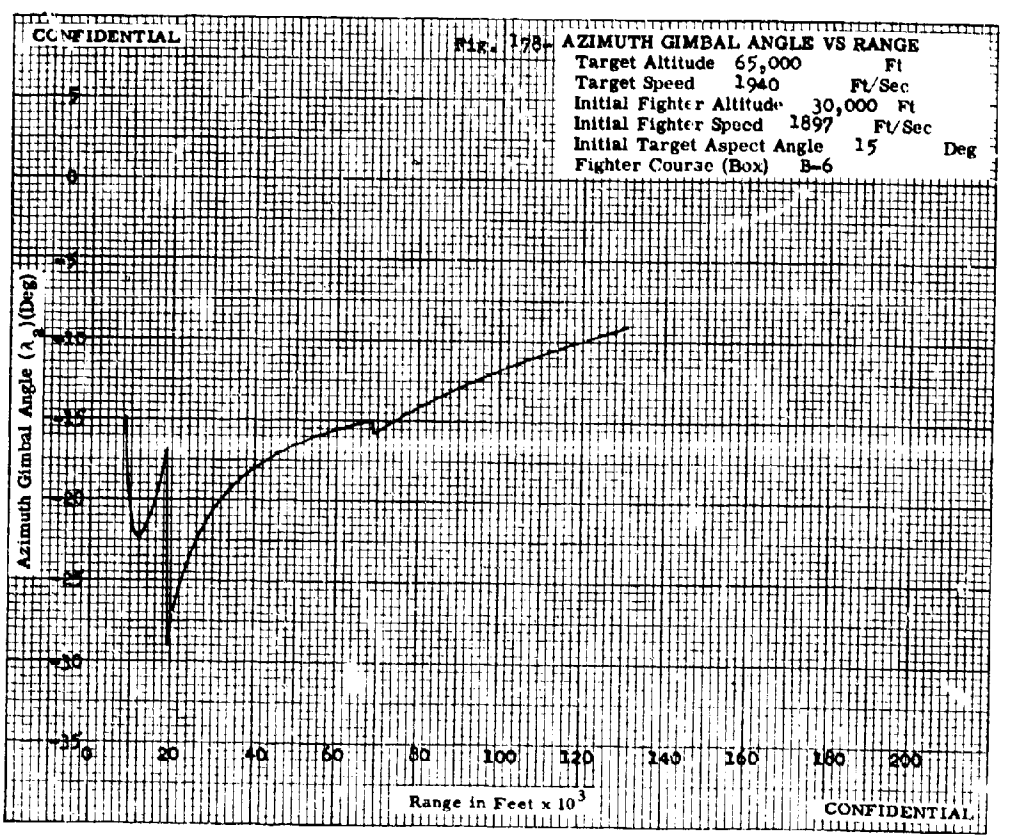

CONFIDENTIAL
Fig. 173- FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Fighter Altitude (H_F)(Ft x 10^3)
65
60
55
50
45
40
35
30
25
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 174- TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Target Aspect Angle (Γ_T)(^{0})
200
180
160
140
120
100
80
60
40
0
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Aircraft Heading Error (ψ)(Deg.)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) A-4
Roll Angle (ϕ)(Deg)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 177- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6
▷ Start of Lead Pursuit
○ R_{Max}
× Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ R_{Min}
...C_L - $C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 178- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) B-6
Azimuth Gimbal Angle (λ_2)(Deg)
5
0
-5
-10
-15
-20
-25
-30
-35
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

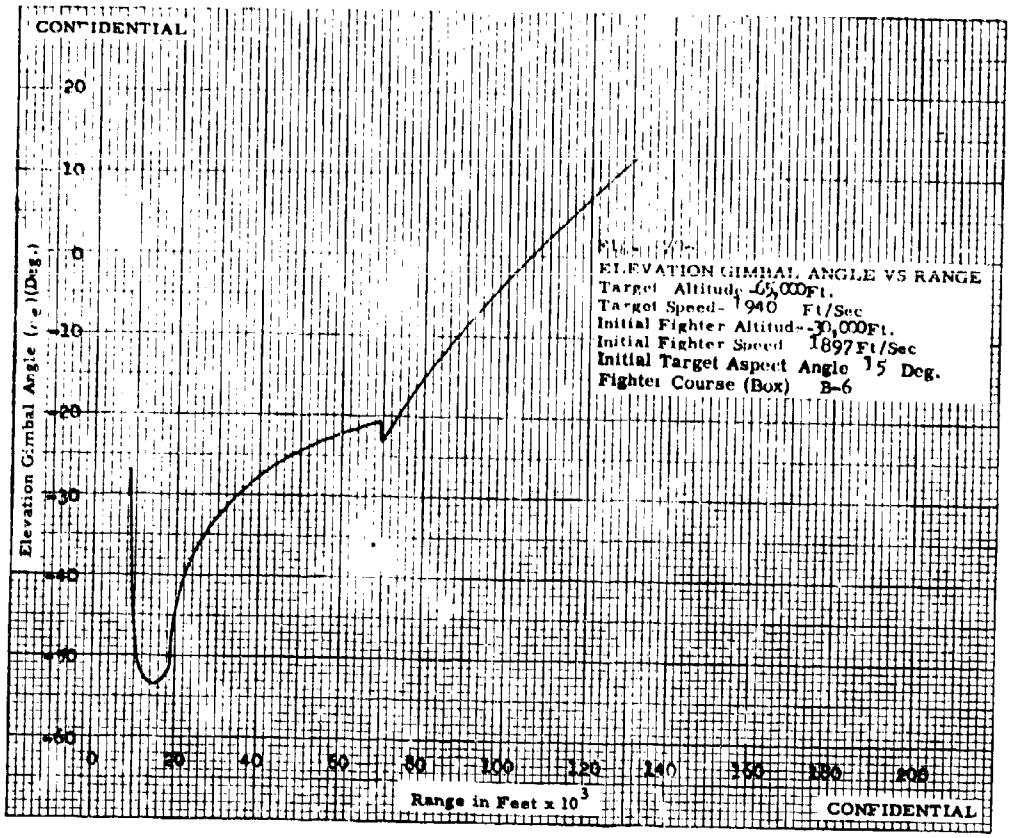


Fig. 179 ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6

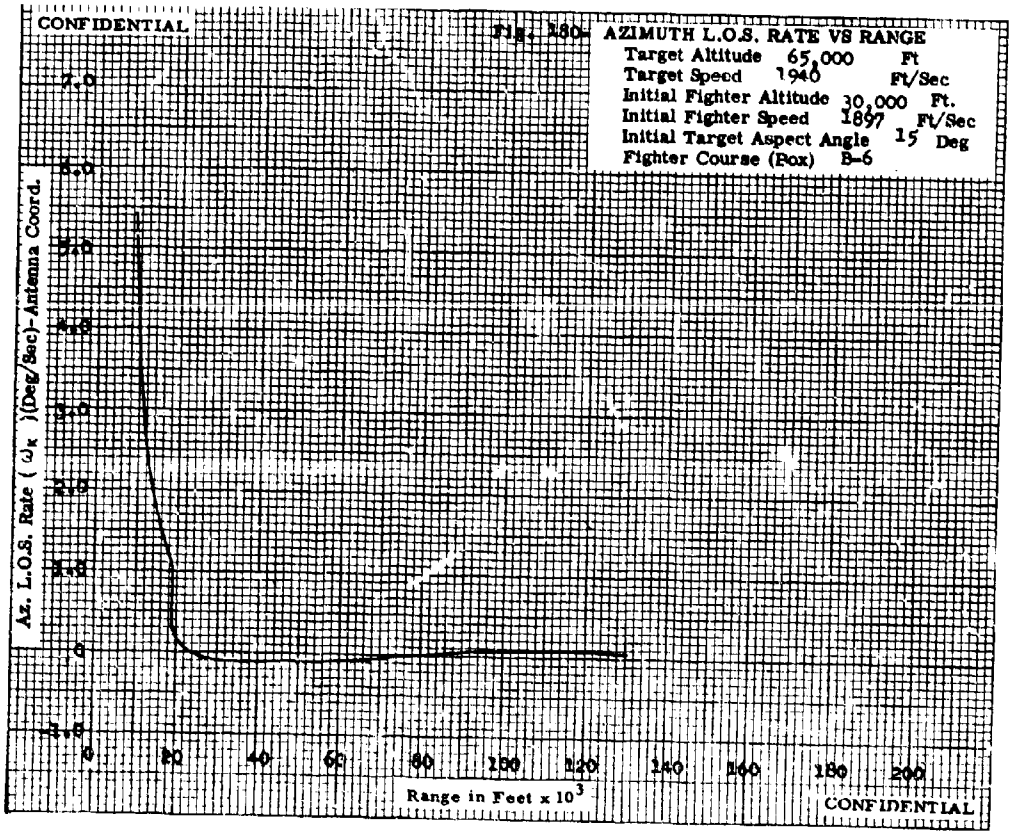


Fig. 180 AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) B-6

Fig. 181- ELEVATION L.O.S. RATE VS RANGE
Target Altitude [illegible] Ft
Target Speed [illegible] Ft/Sec
Initial Fighter Altitude [illegible],000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) B-6

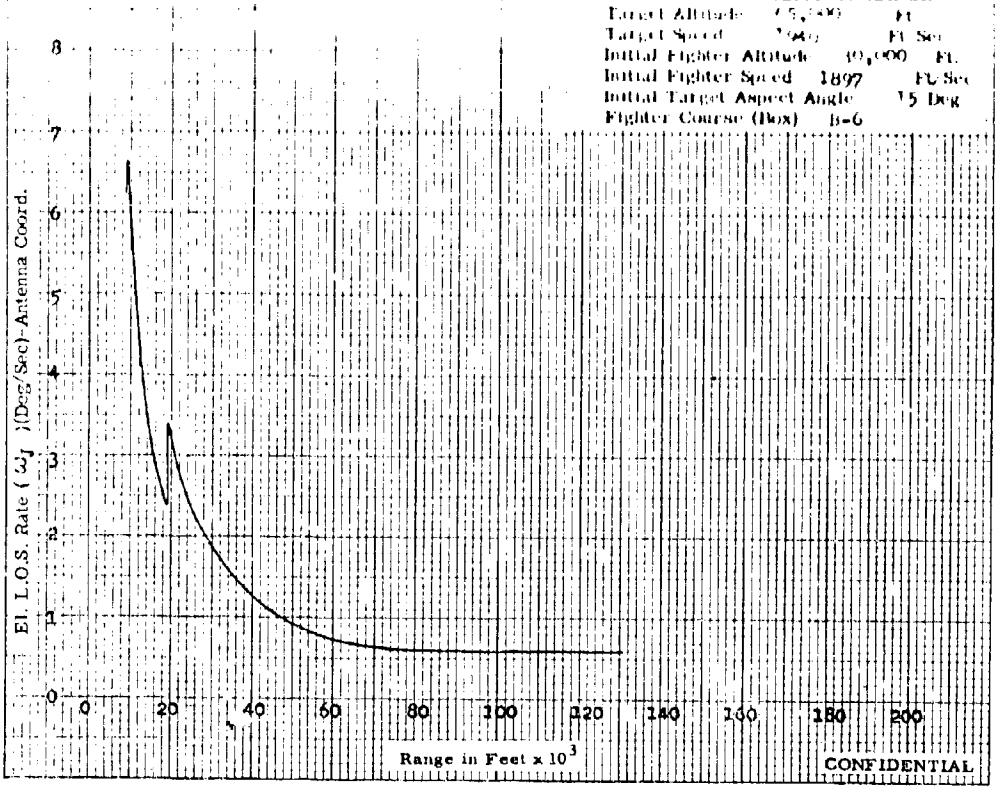
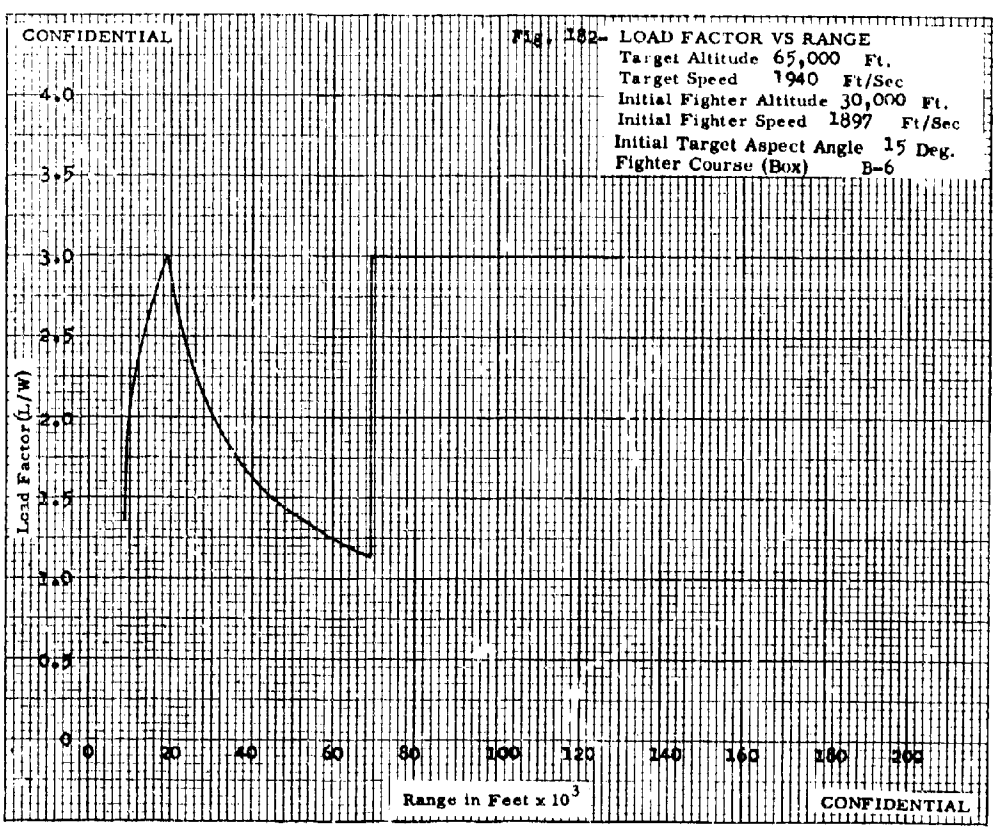
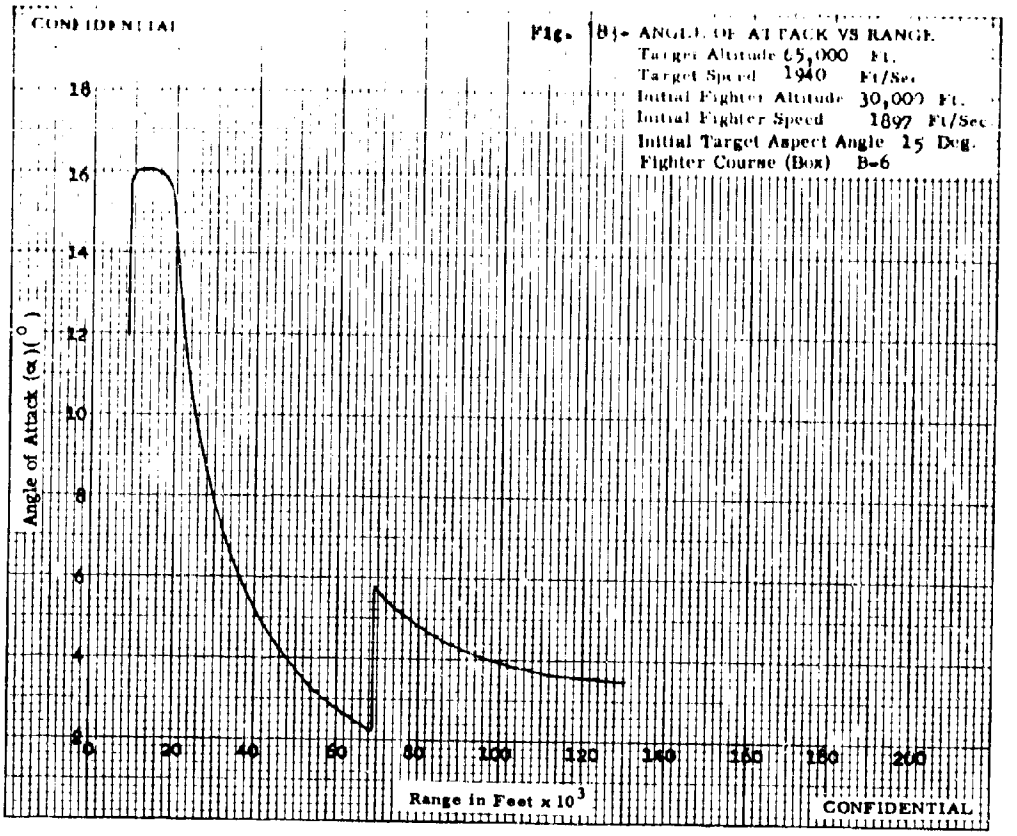
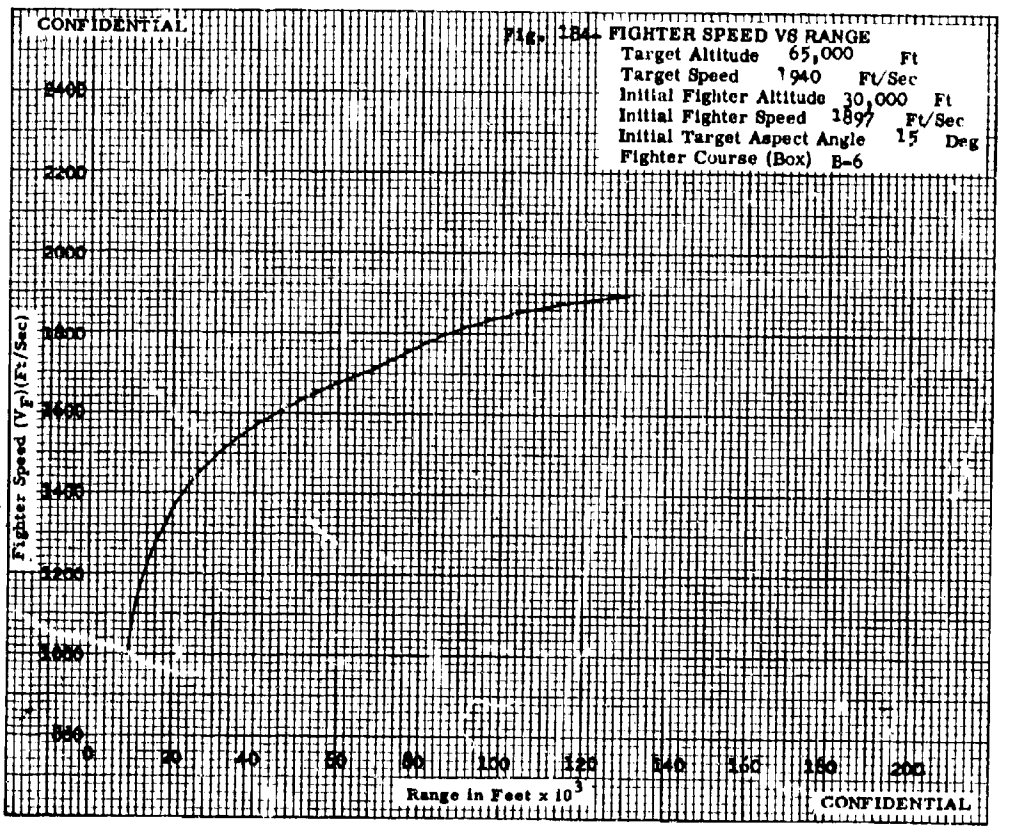


Fig. 182- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6




CONFIDENTIAL
Fig. 183 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6
Angle of Attack (α)(°)
18
16
14
12
10
8
6
4
2
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 184 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) B-6
Fighter Speed (V_F)(Ft/Sec)
2400
2200
2000
1800
1600
1400
1200
1000
800
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

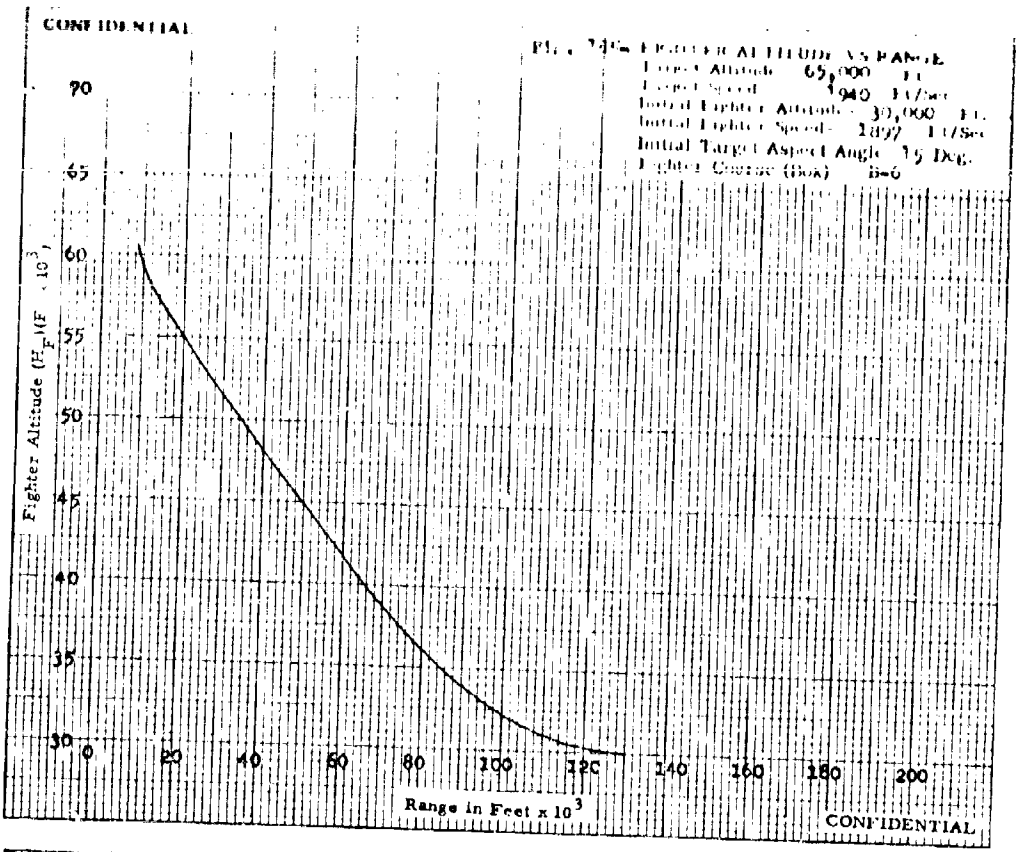


Fig. 3[illegible] FIGHTER ALTITUDE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6

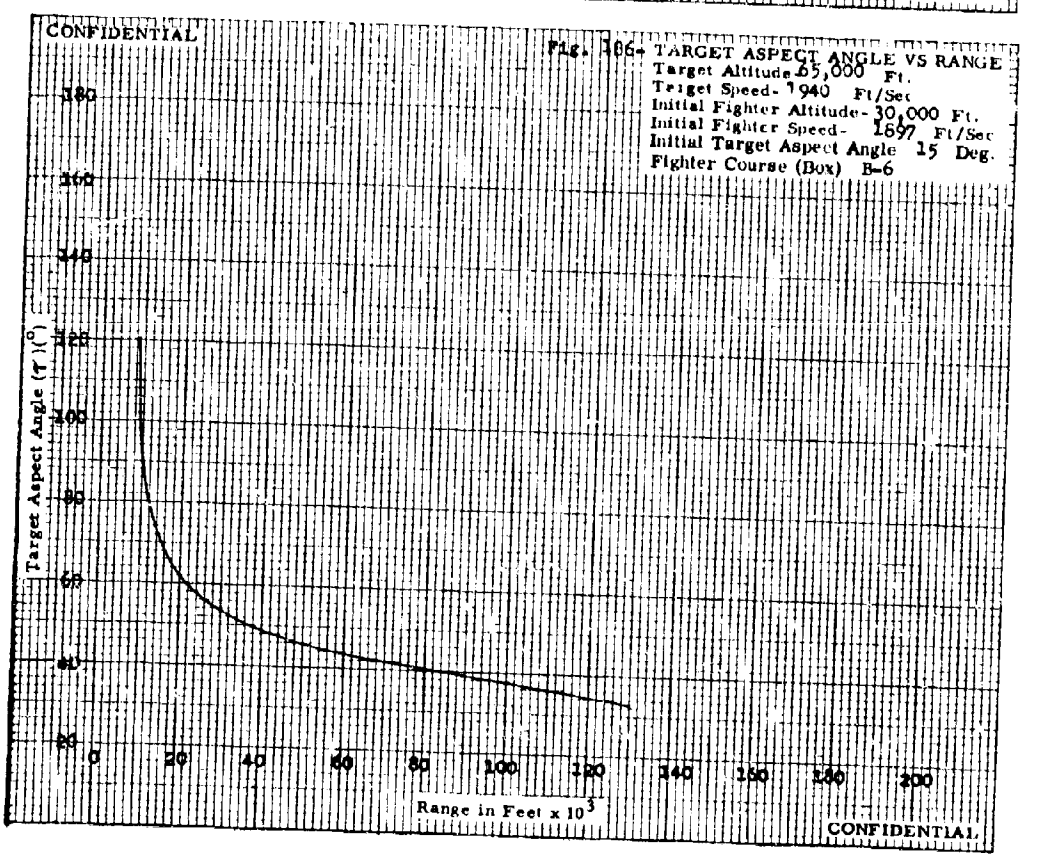
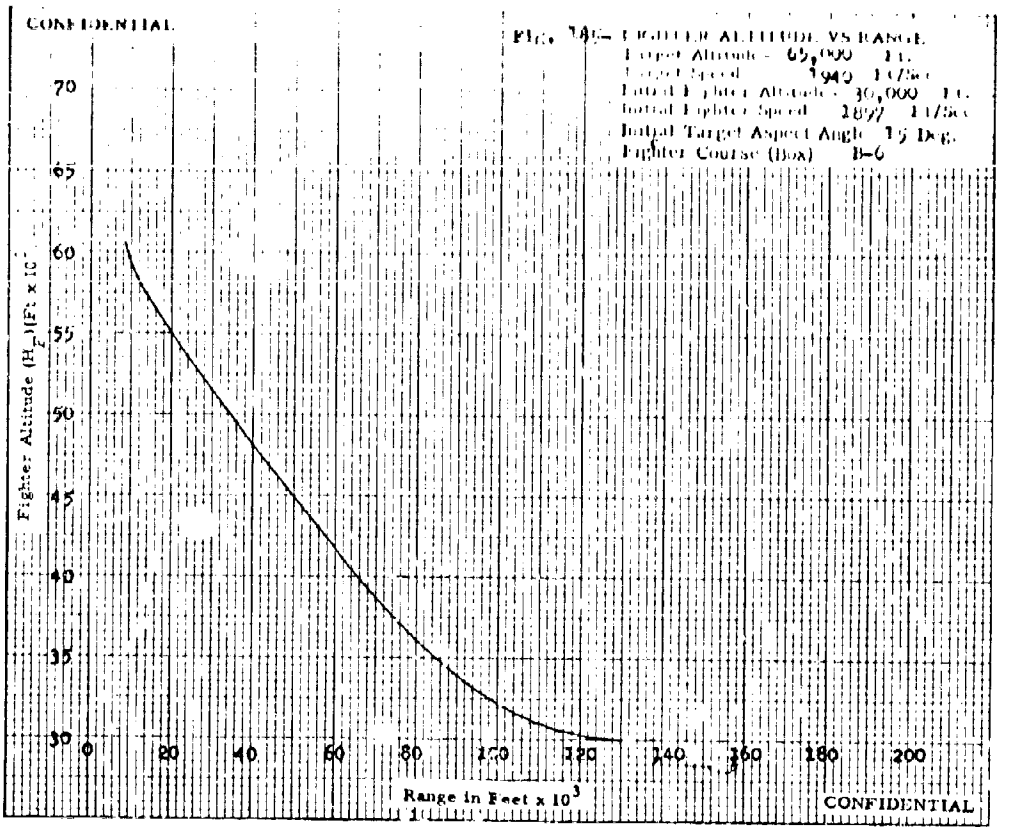
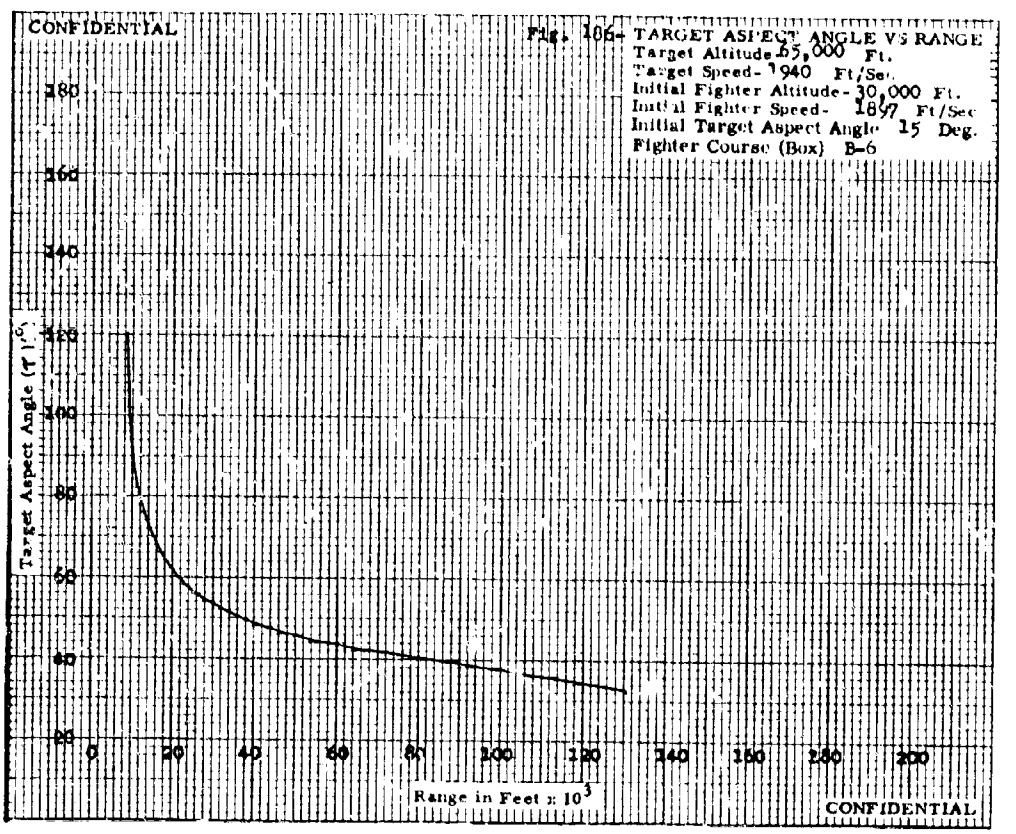


Fig. 3[illegible] TARGET ASPECT ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1697 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6


CONFIDENTIAL
Fig. 105 - FIGHTER ALTITUDE VS RANGE
Target Altitude - 65,000 Ft.
Target Speed - 1940 Ft/Sec
Initial Fighter Altitude - 30,000 Ft.
Initial Fighter Speed - 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6
Fighter Altitude (H_F) (Ft. x 10^3)
70
65
60
55
50
45
40
35
30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 106 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec.
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6
Target Aspect Angle (ψ_T) Deg.
180
160
140
120
100
80
60
40
20
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

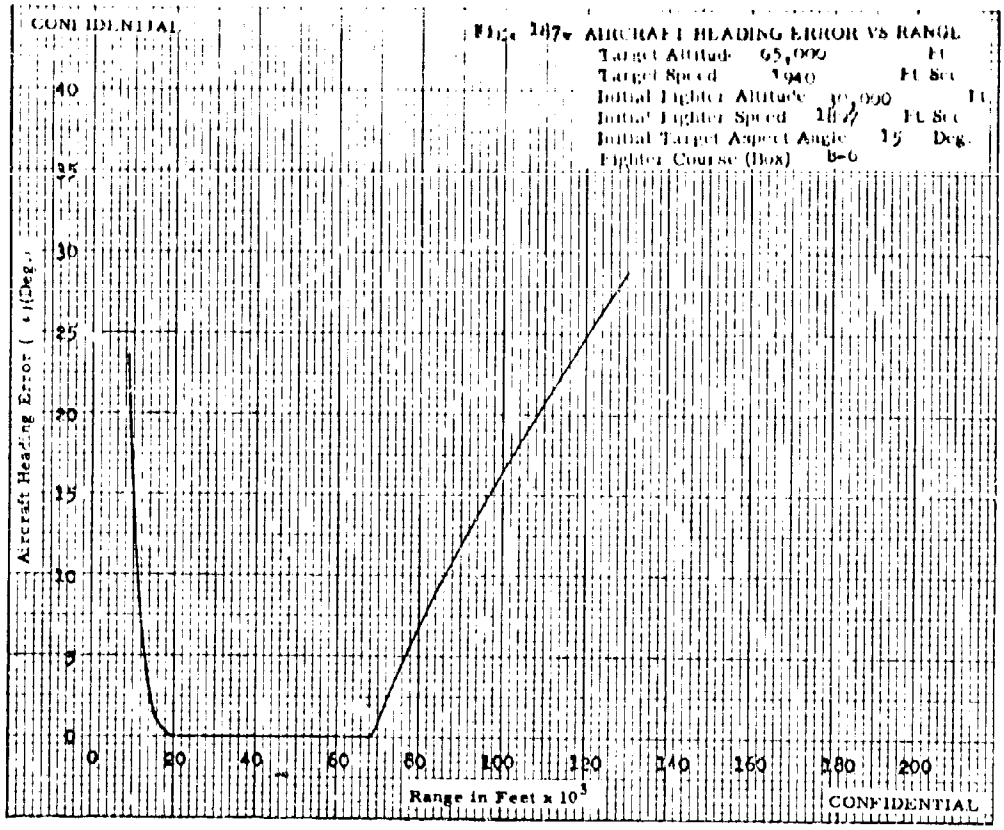
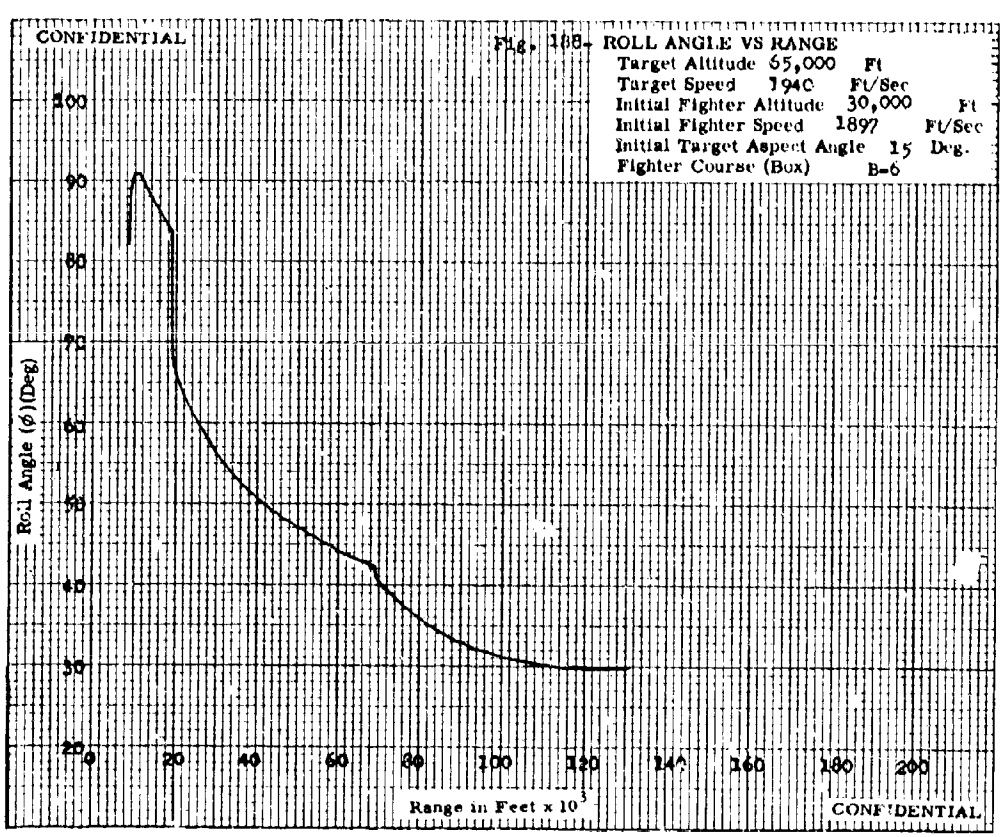


Fig. 187- AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6
Aircraft Heading Error ( ) (Deg.)
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 188- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) B-6
Roll Angle (ϕ) (Deg)
Range in Feet x 10³
CONFIDENTIAL

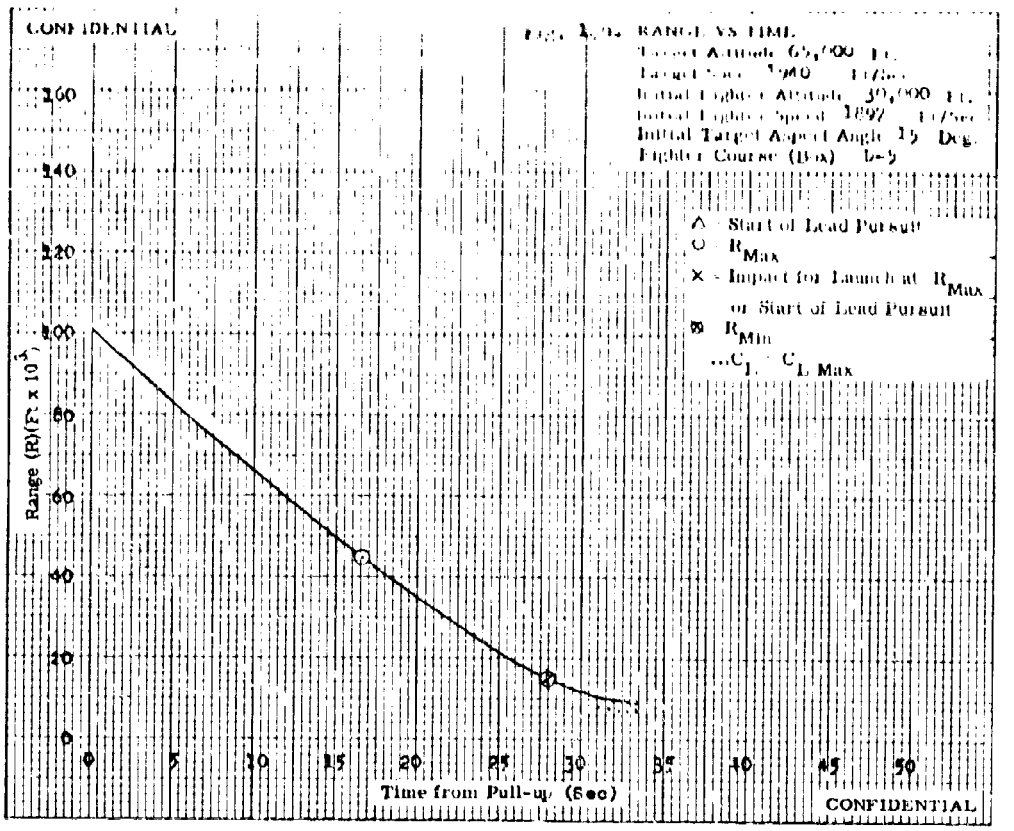
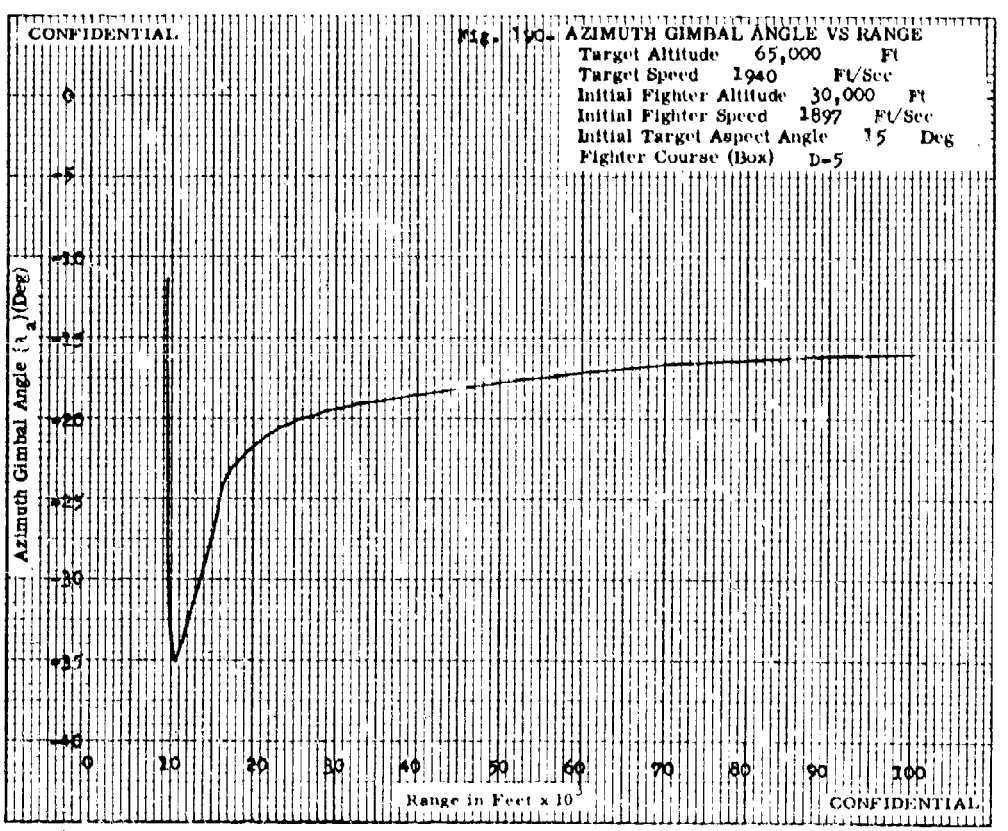


Fig. 189- RANGE VS TIME
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5
△ Start of Lead Pursuit
○ R_{Max}
× - Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ R_{Min}
...C_L - $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 190- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-5
Azimuth Gimbal Angle (λ_2)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

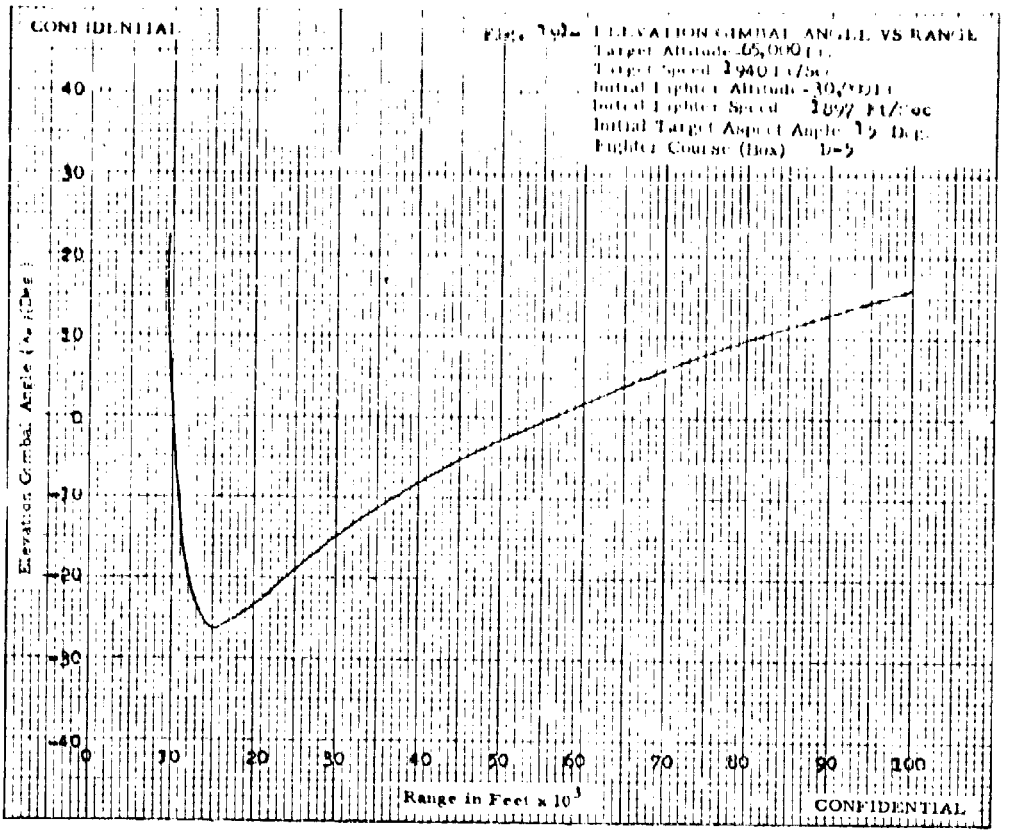
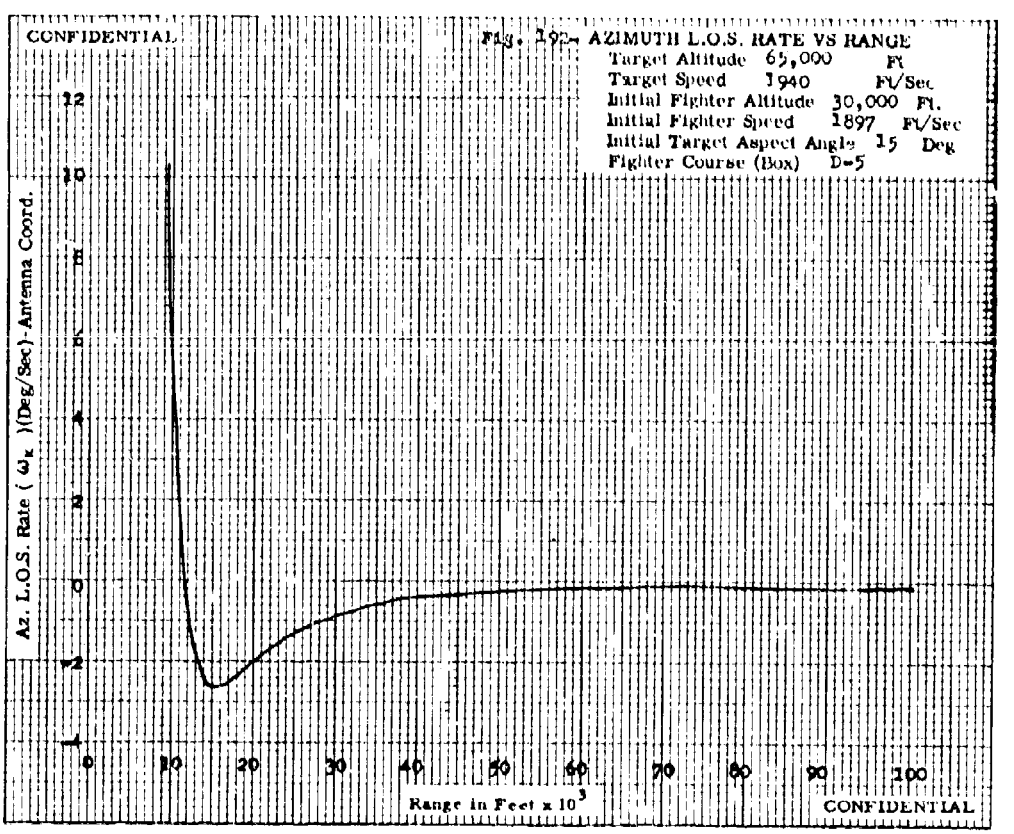


Fig. 191 – ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5
Elevation Gimbal Angle (Deg/Sec)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 192 – AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-5
Az. L.O.S. Rate (ω_K)(Deg/Sec)-Antenna Coord.
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

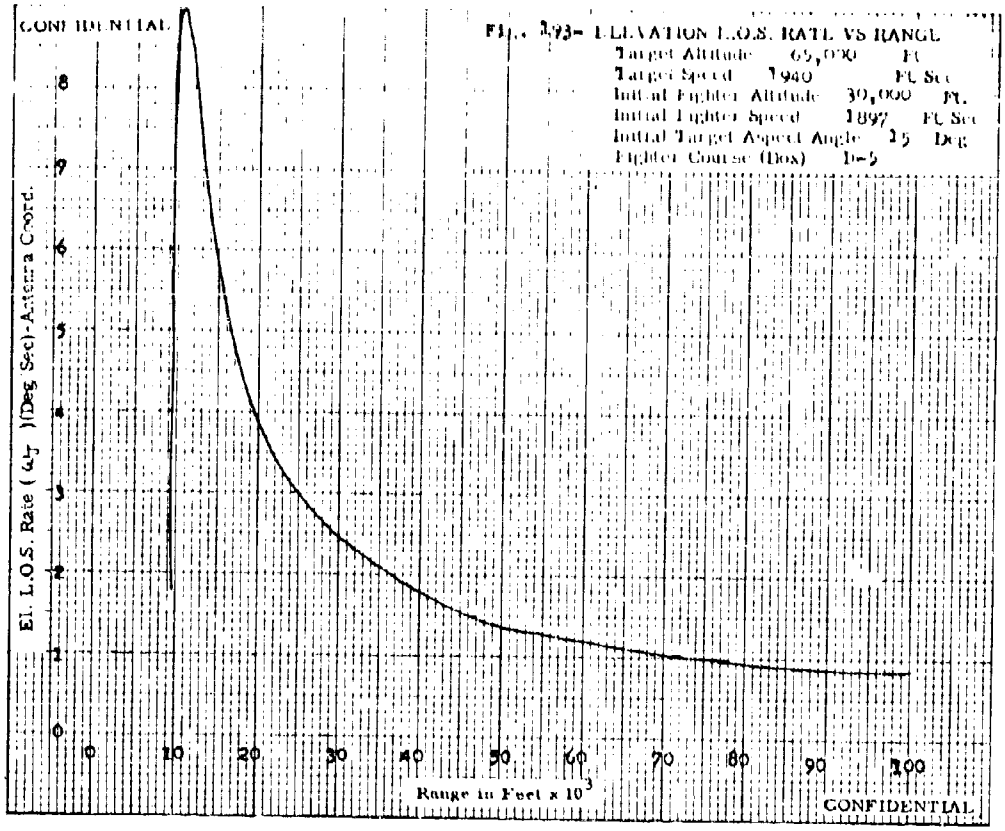


Fig. 193 – ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft. Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft. Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5

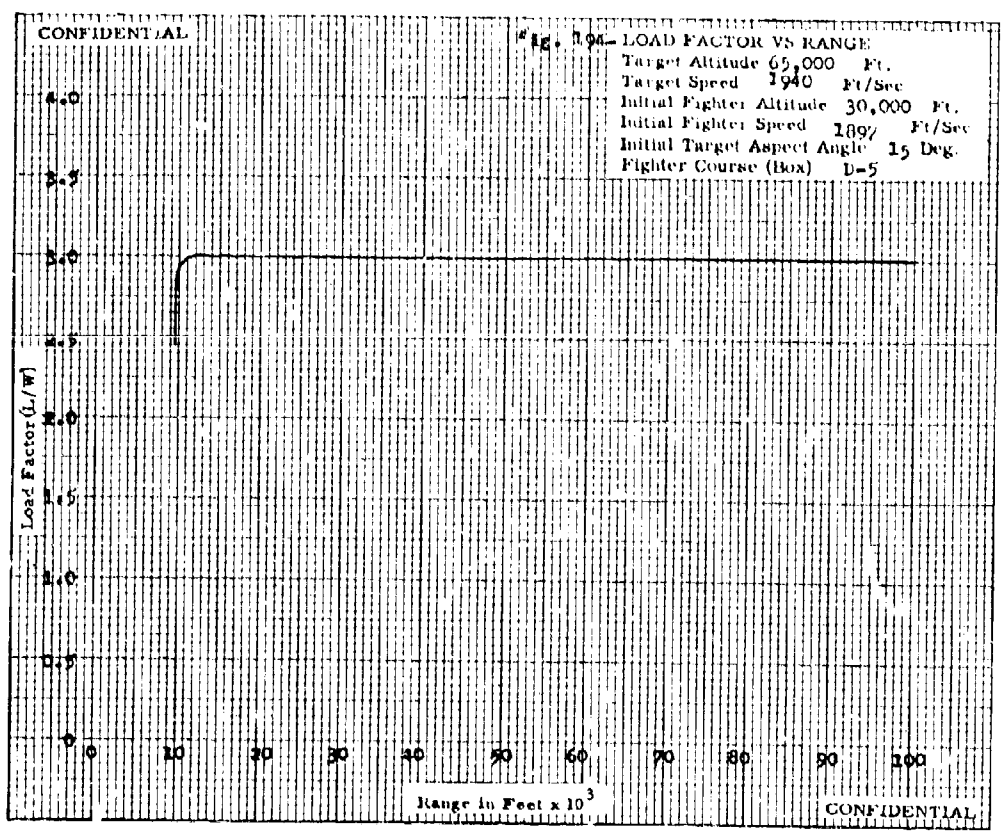
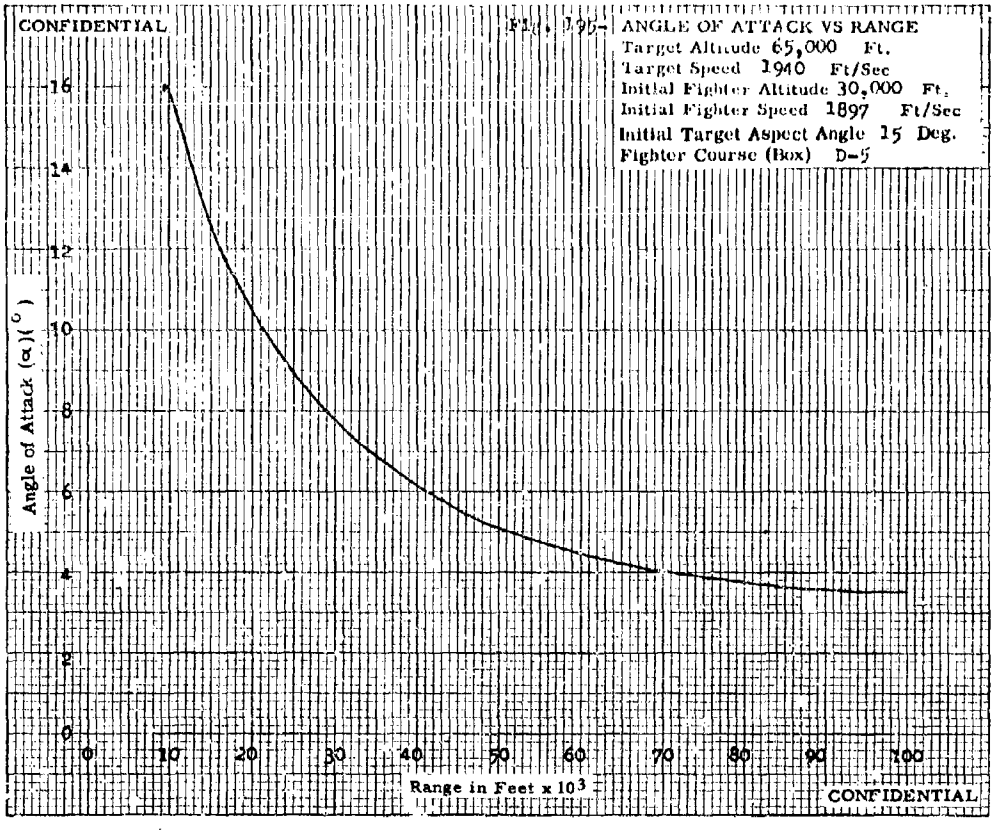


Fig. 194 – LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5


CONFIDENTIAL
Fig. 195
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

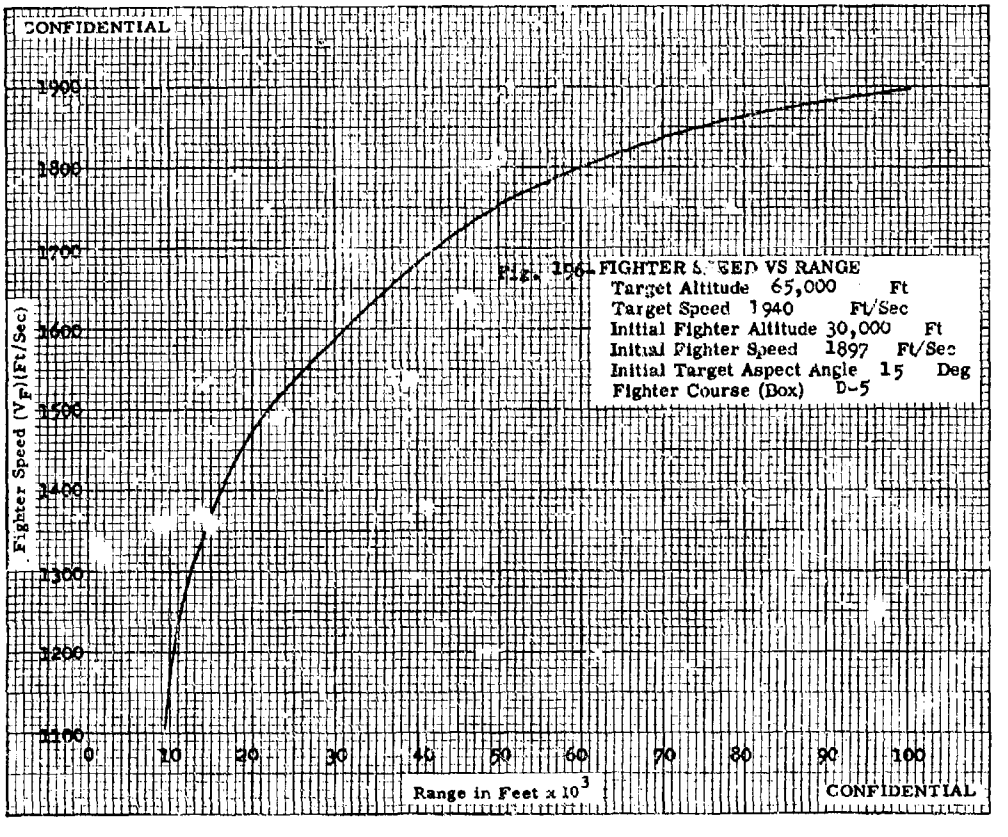

CONFIDENTIAL
Fig. 196
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) D-5
Fighter Speed (Vf)(Ft/Sec)
1900
1800
1700
1600
1500
1400
1300
1200
1100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

Fig. 197- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5

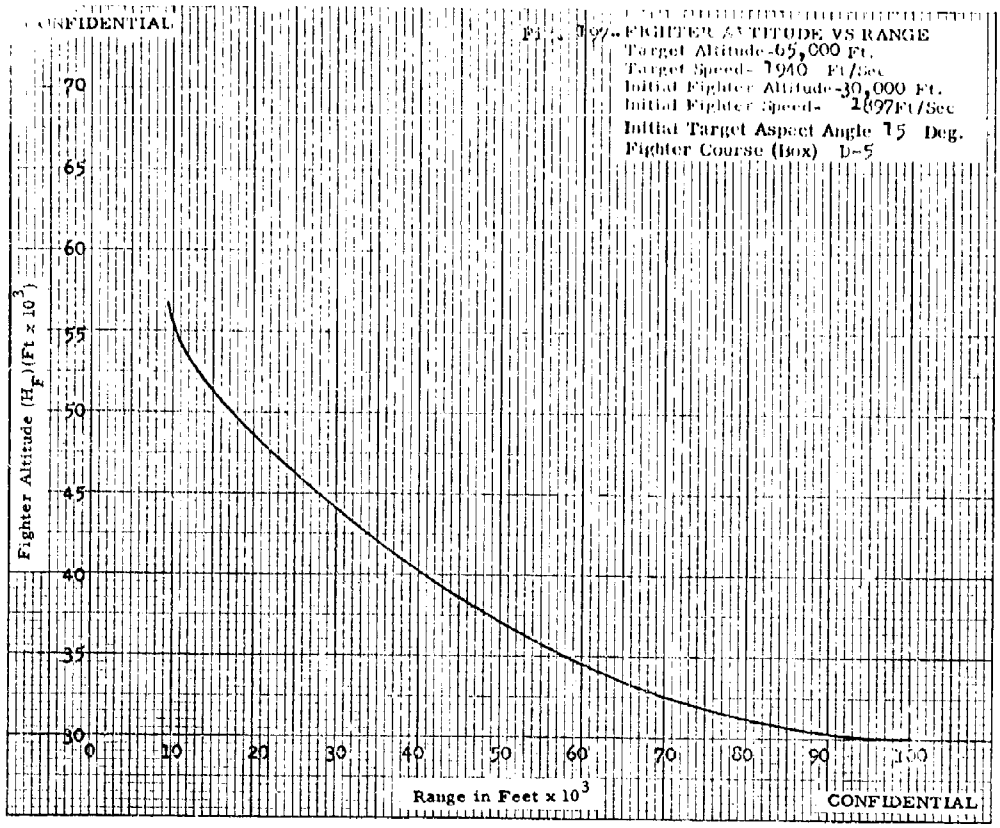
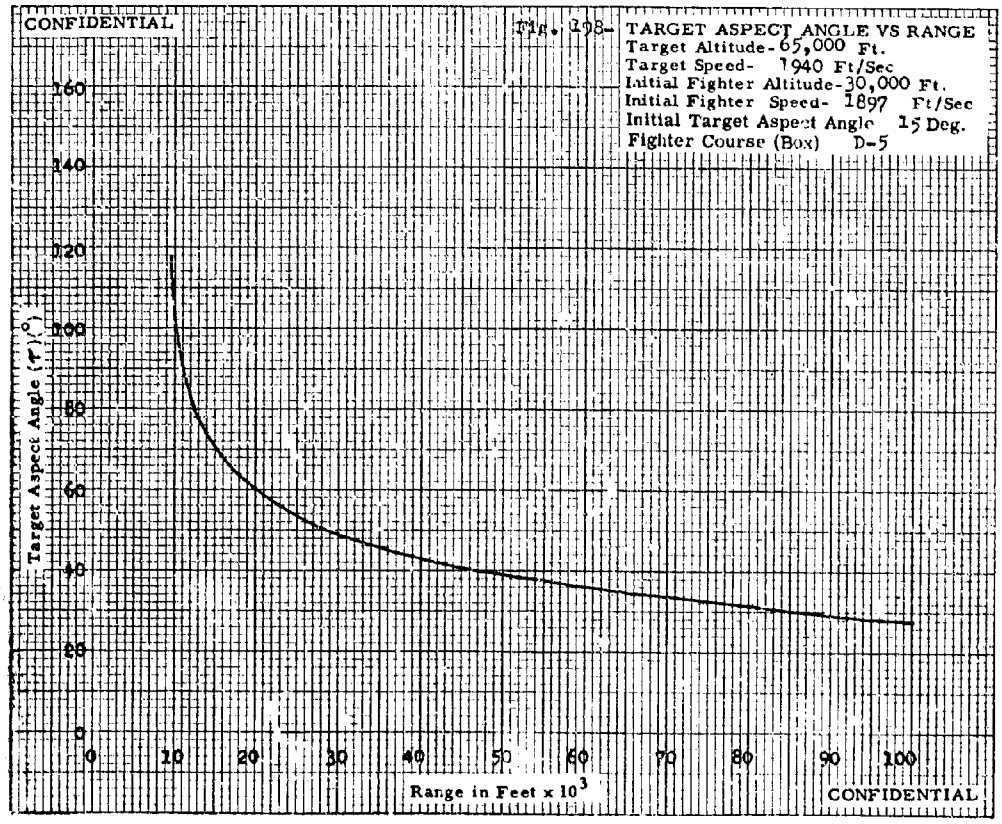
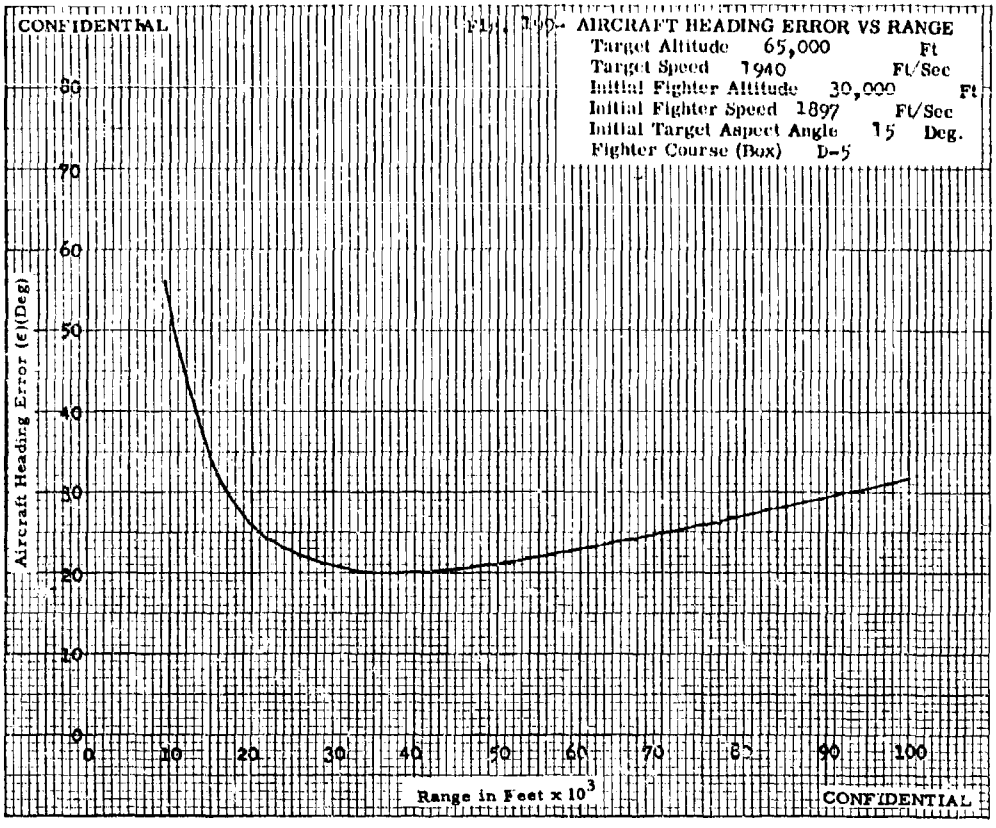


Fig. 198- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5




CONFIDENTIAL
Fig. 300- AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5
Aircraft Heading Error (ε)(Deg)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

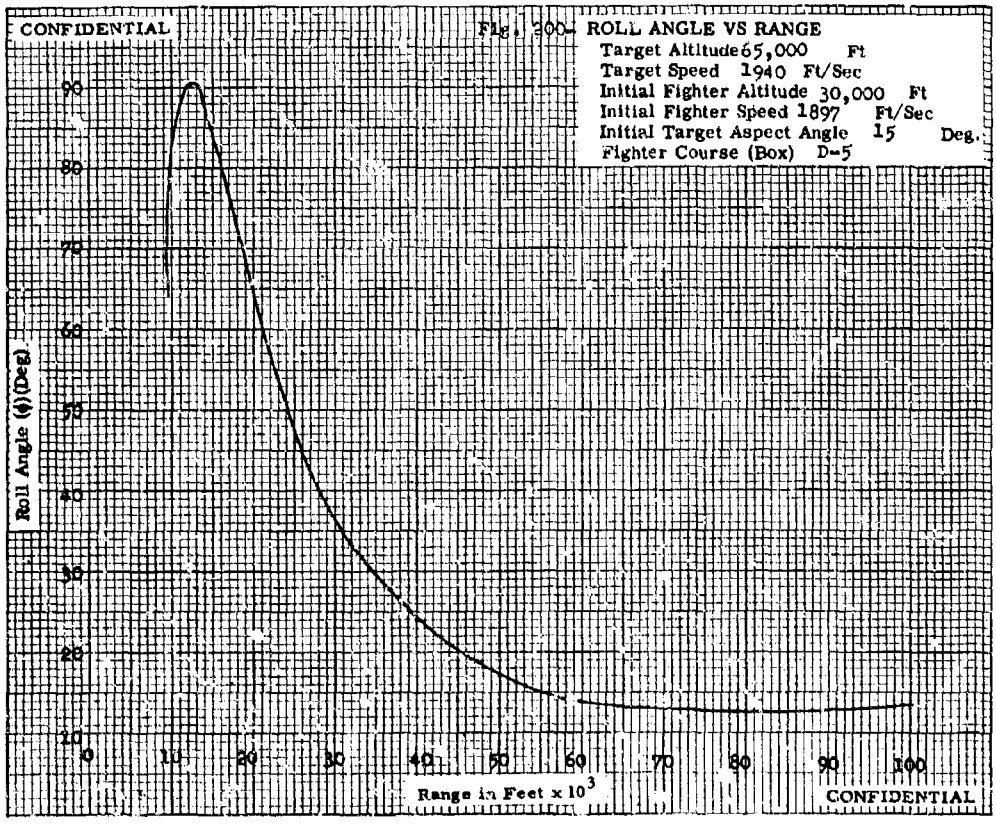

CONFIDENTIAL
Fig. 300- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) D-5
Roll Angle (φ)(Deg)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Fig. 20a – RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) Q-5

△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$

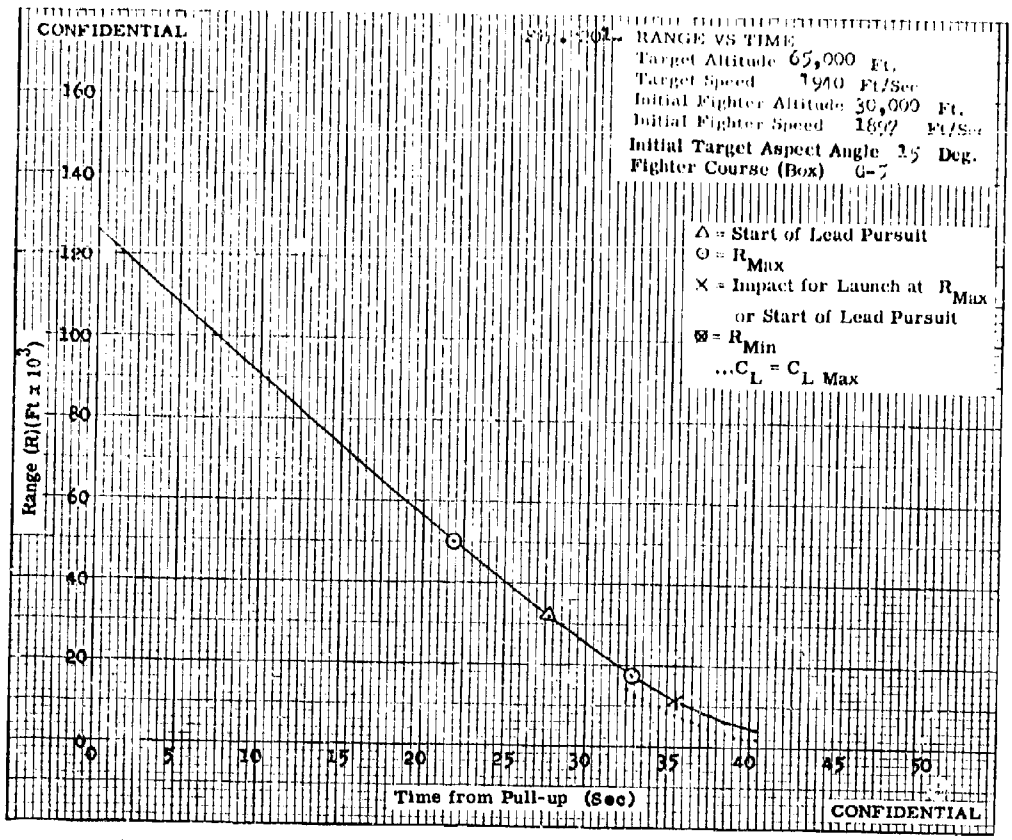
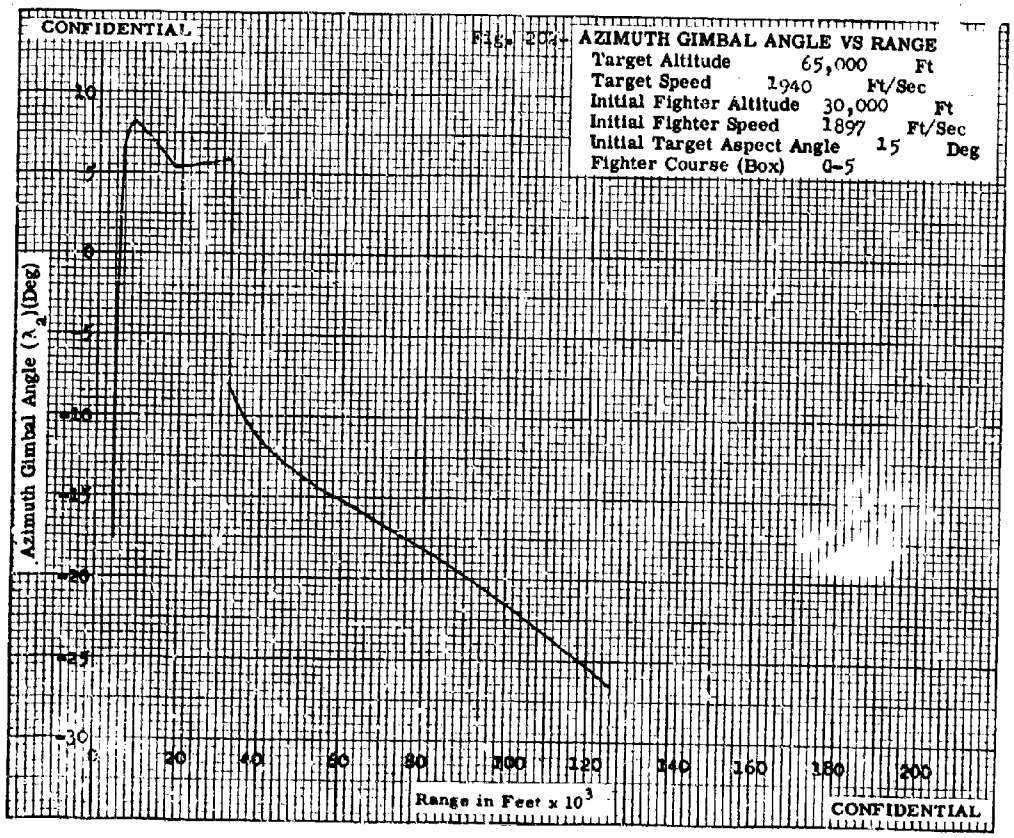
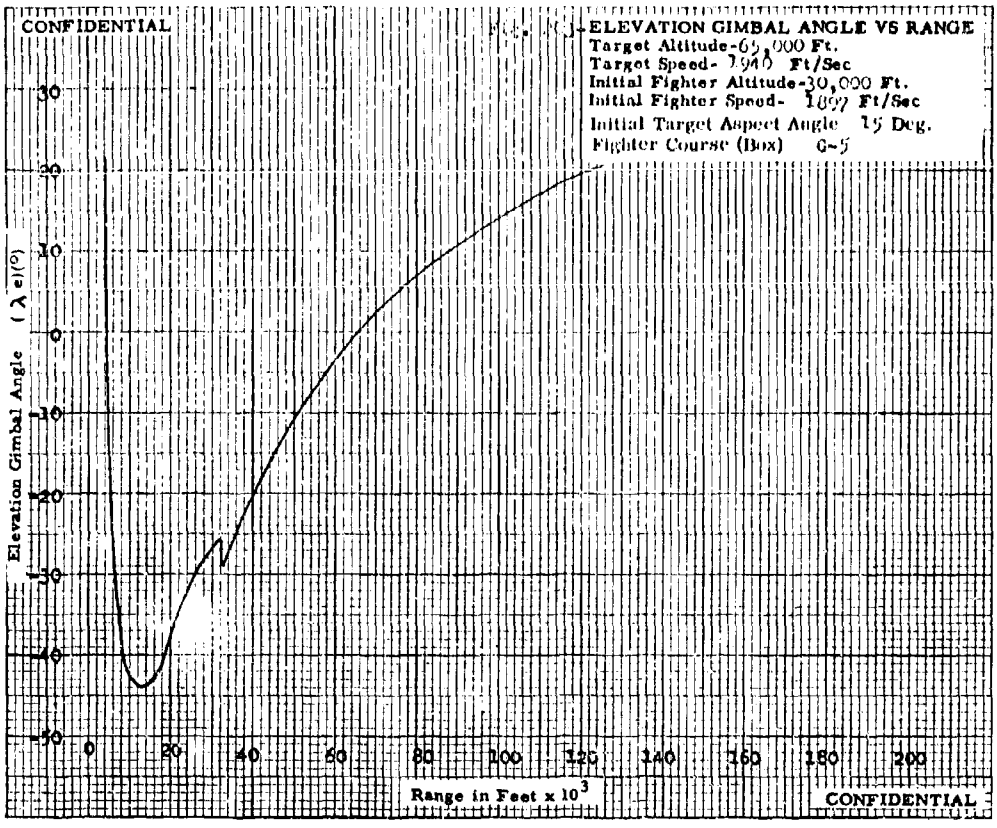
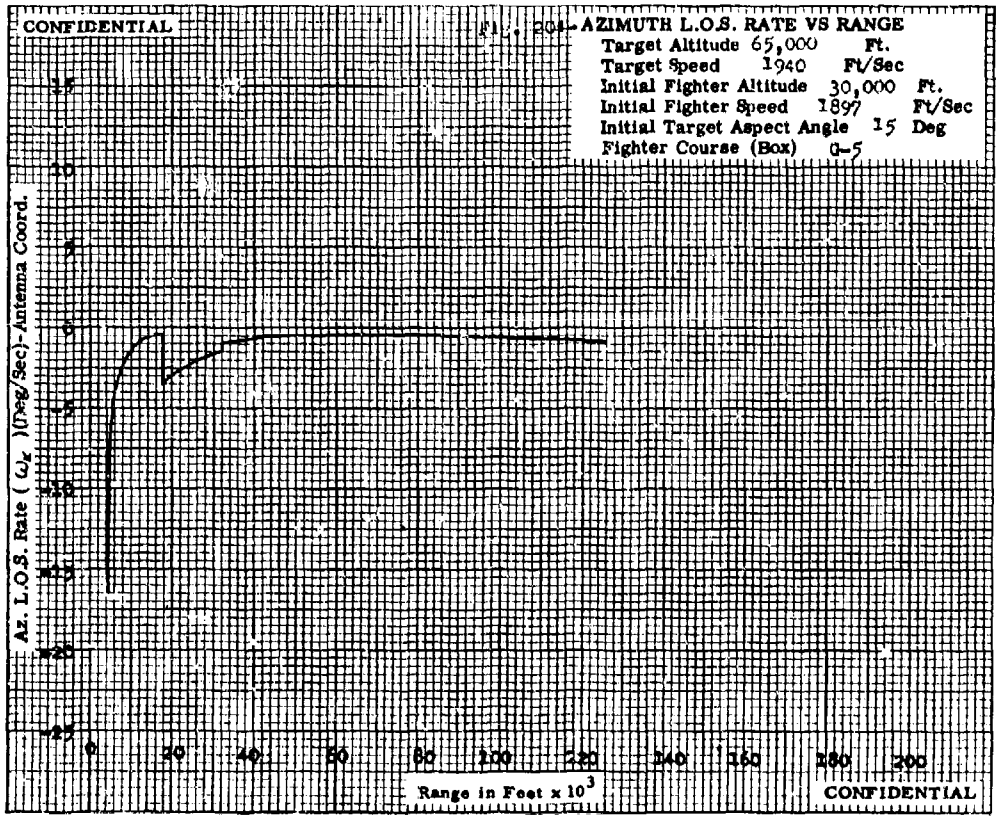
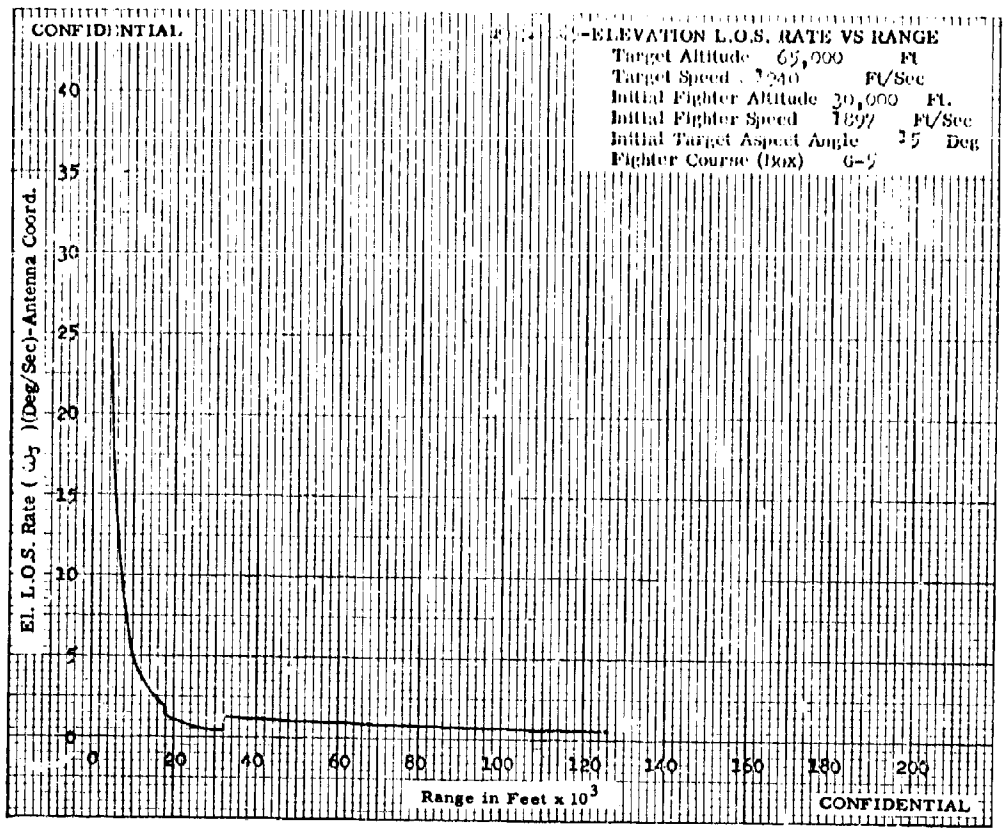


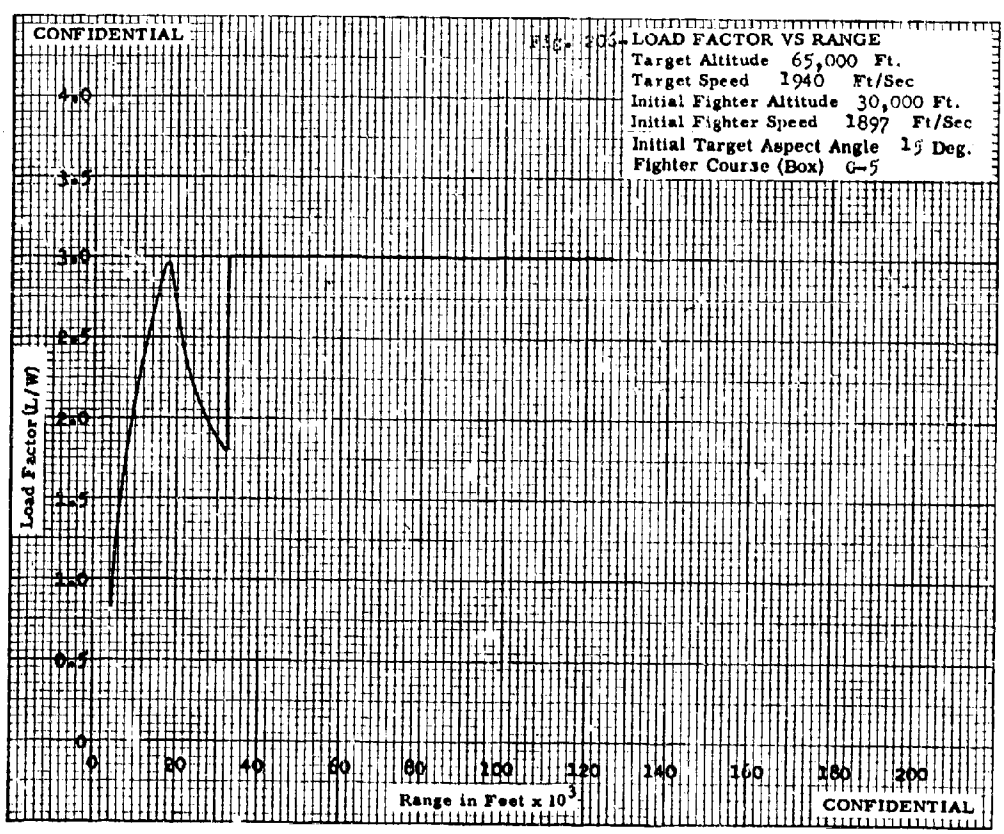
Fig. 20b – AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) Q-5

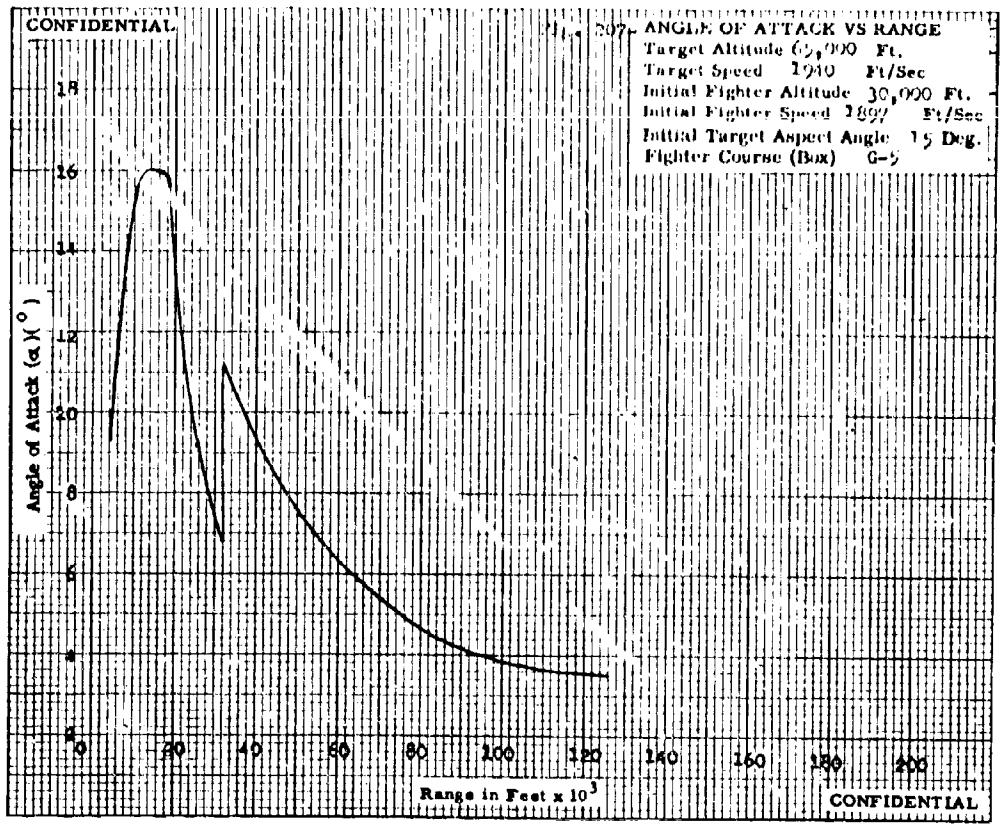


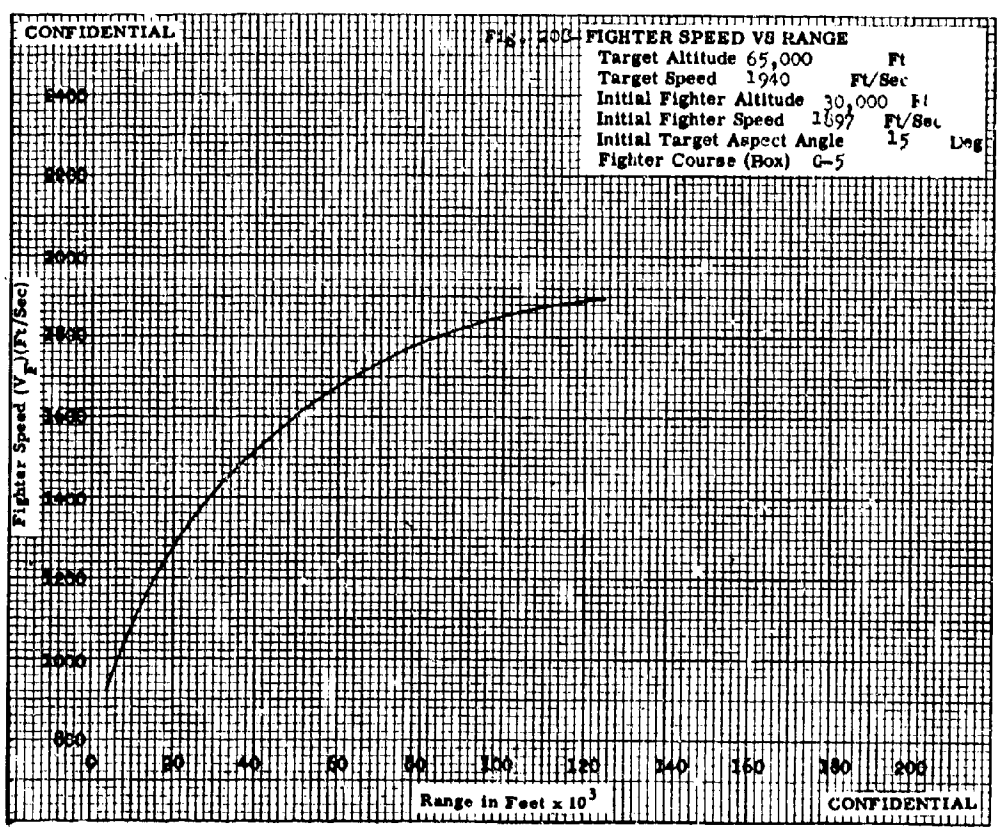

CONFIDENTIAL
Fig. 203 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) C-5
Elevation Gimbal Angle (λ el)(°)
30
20
10
0
-10
-20
-30
-40
-50
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

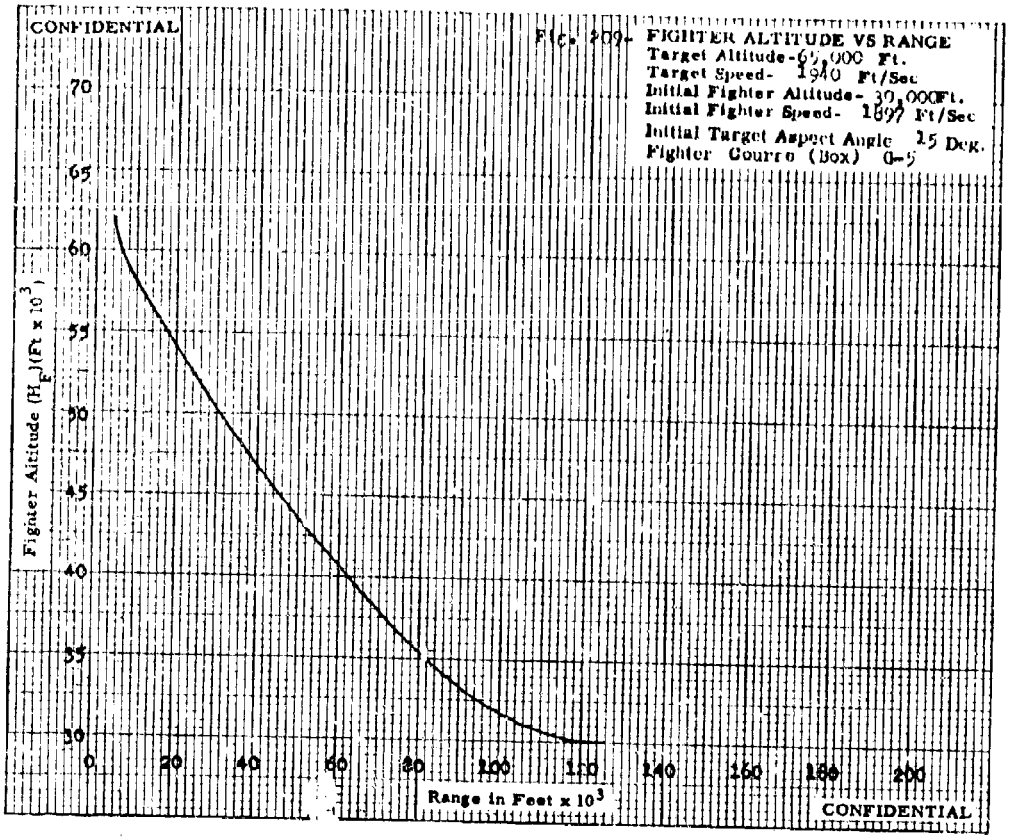

CONFIDENTIAL
Fig. 204 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) C-5
Az. L.O.S. Rate (ω_z)(Deg/Sec)-Antenna Coord.
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

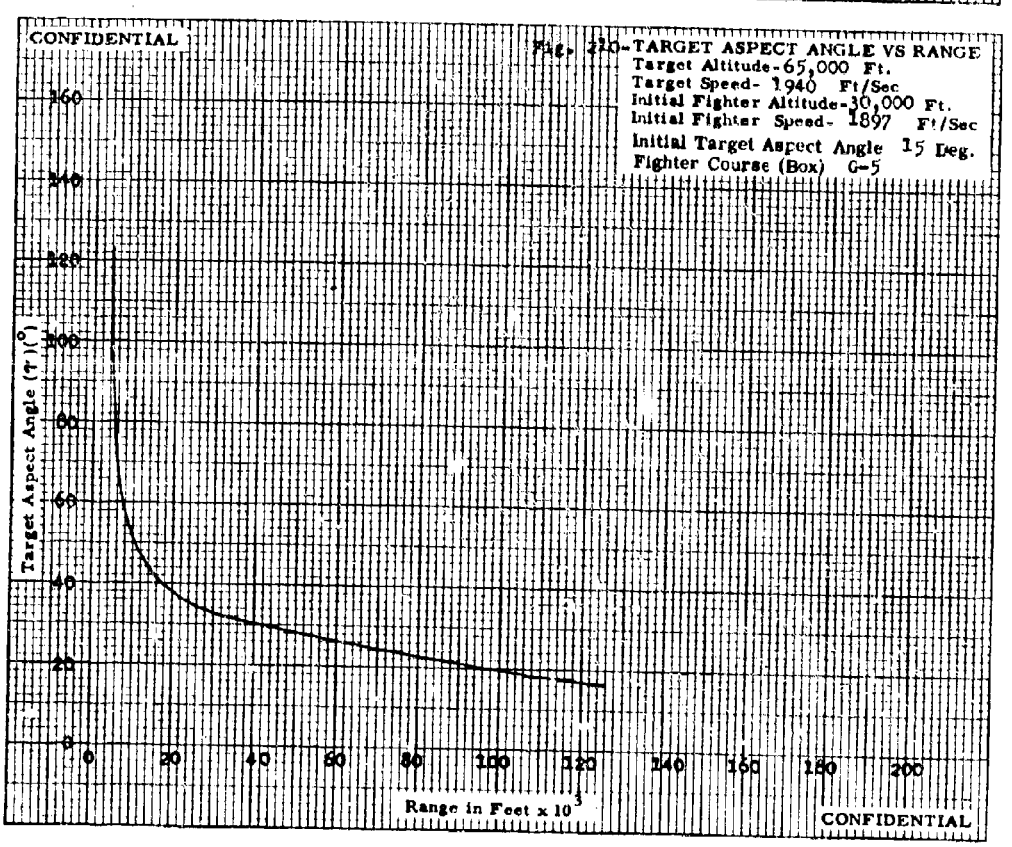

CONFIDENTIAL
-ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) G-5
El. L.O.S. Rate (Deg/Sec)-Antenna Coord.
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) G-5
Load Factor (L/W)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 207 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) G-5
Angle of Attack (α) (°)
18
16
14
12
10
8
6
4
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 208 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) G-5
Fighter Speed (V_F) (Ft/Sec)
2400
2200
2000
1800
1600
1400
1200
1000
800
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) G-5
Fighter Altitude (H_F)(Ft x 10^3)
70
65
60
55
50
45
40
35
30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) G-5
Target Aspect Angle (T_A)(°)
160
140
120
100
80
60
40
20
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 221 – AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5

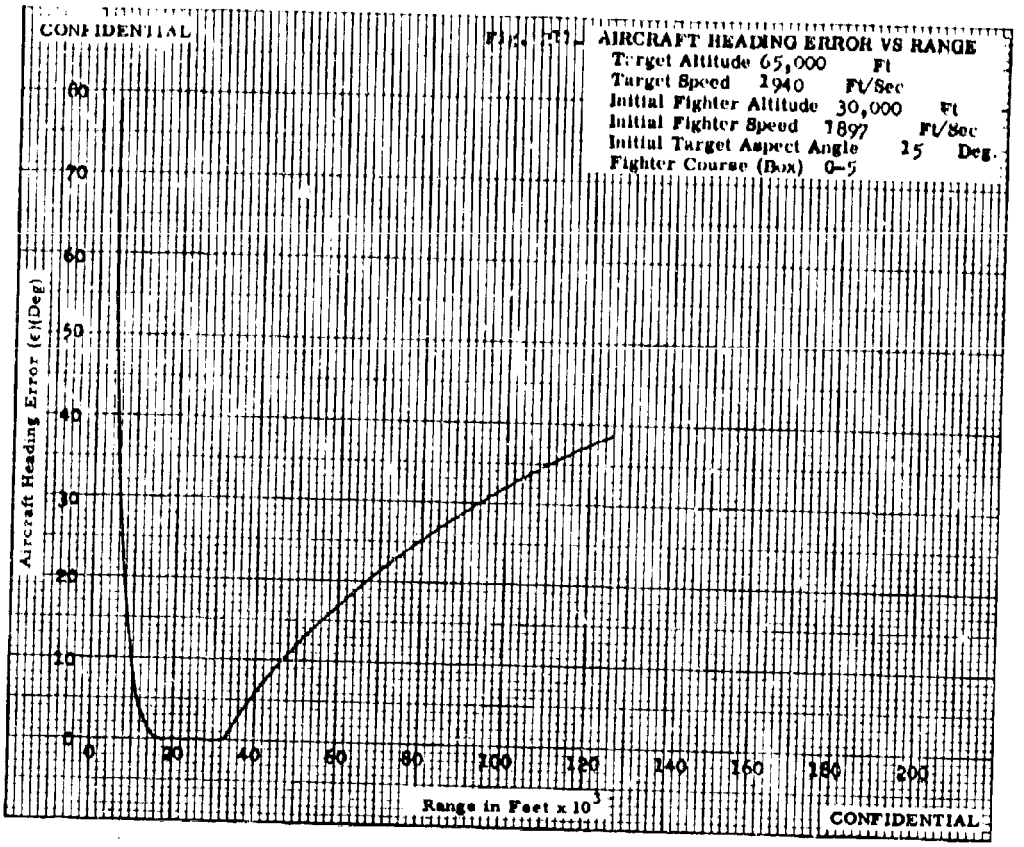


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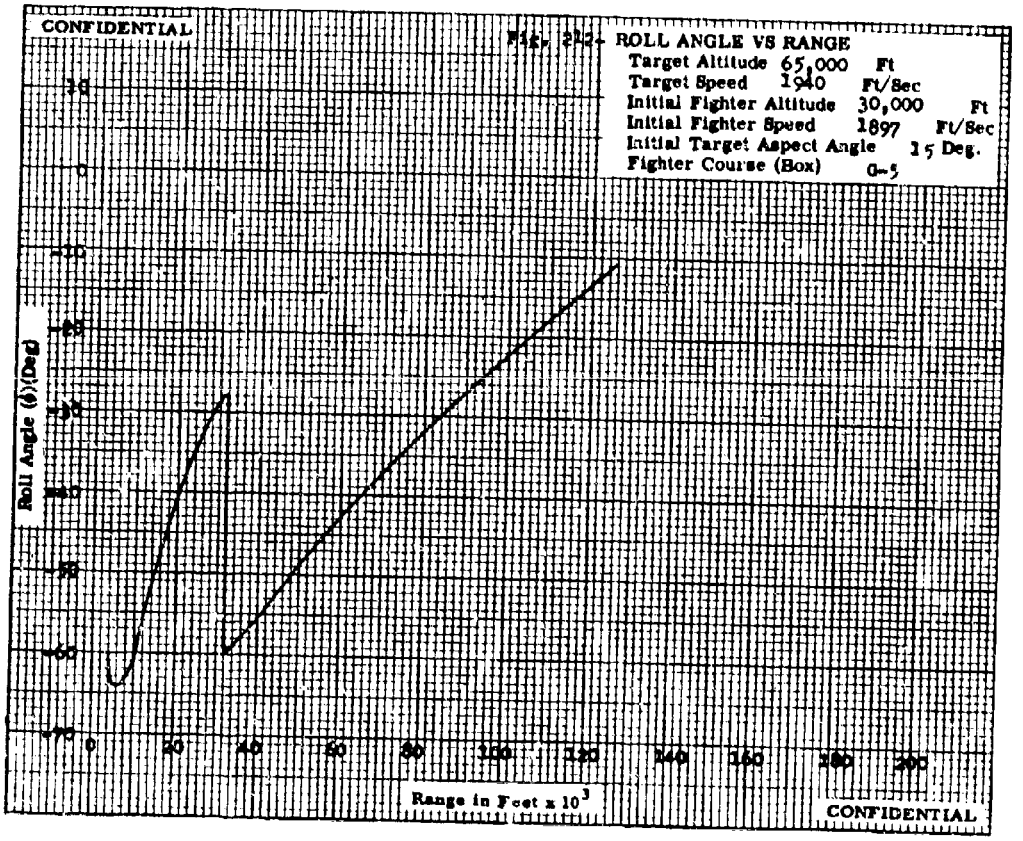
Fig. 222 – ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) 0-5



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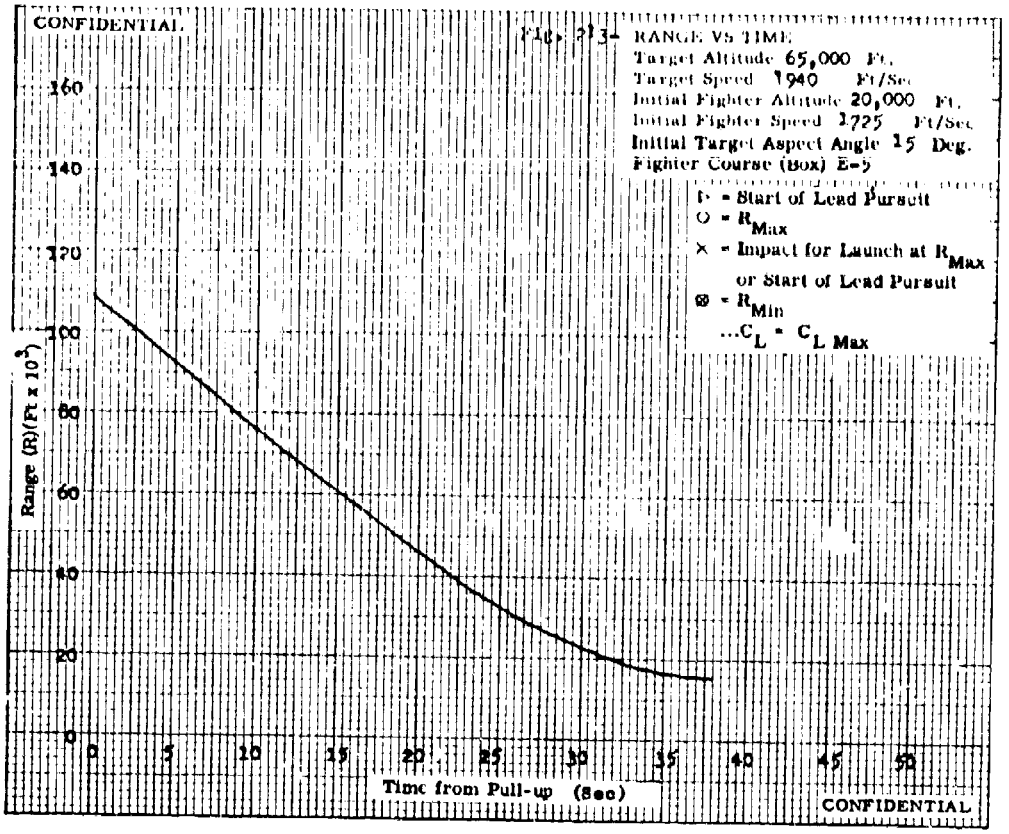

CONFIDENTIAL
Fig. 213 RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

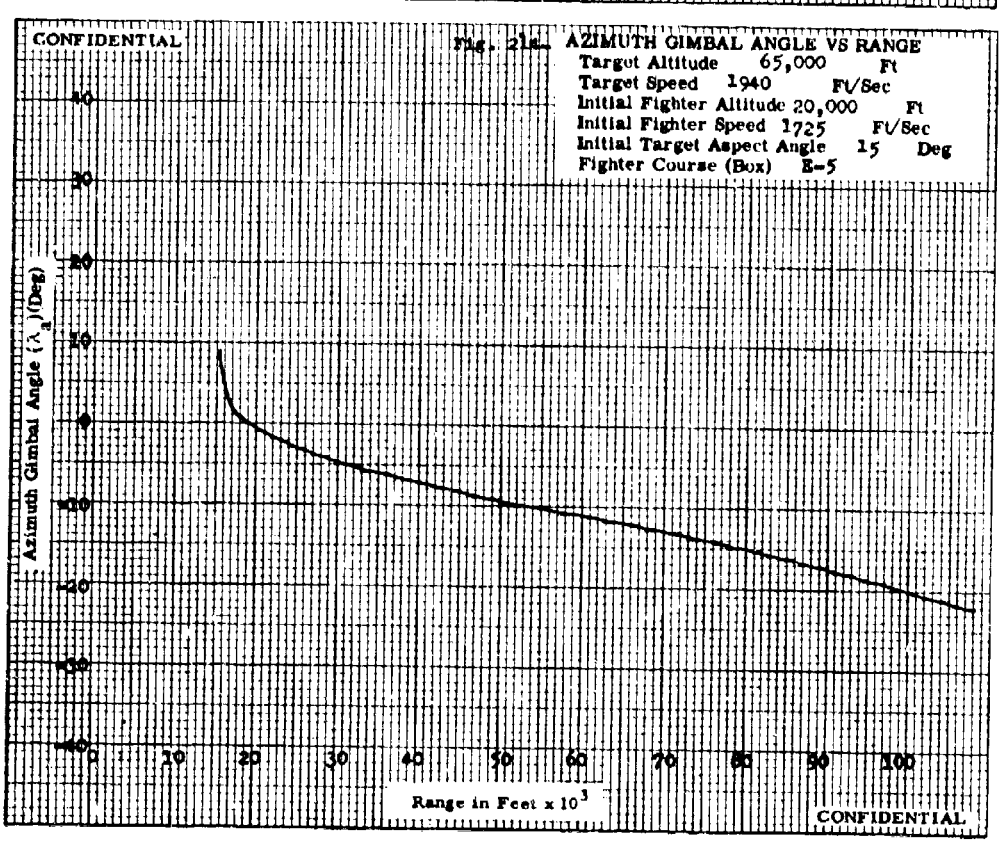
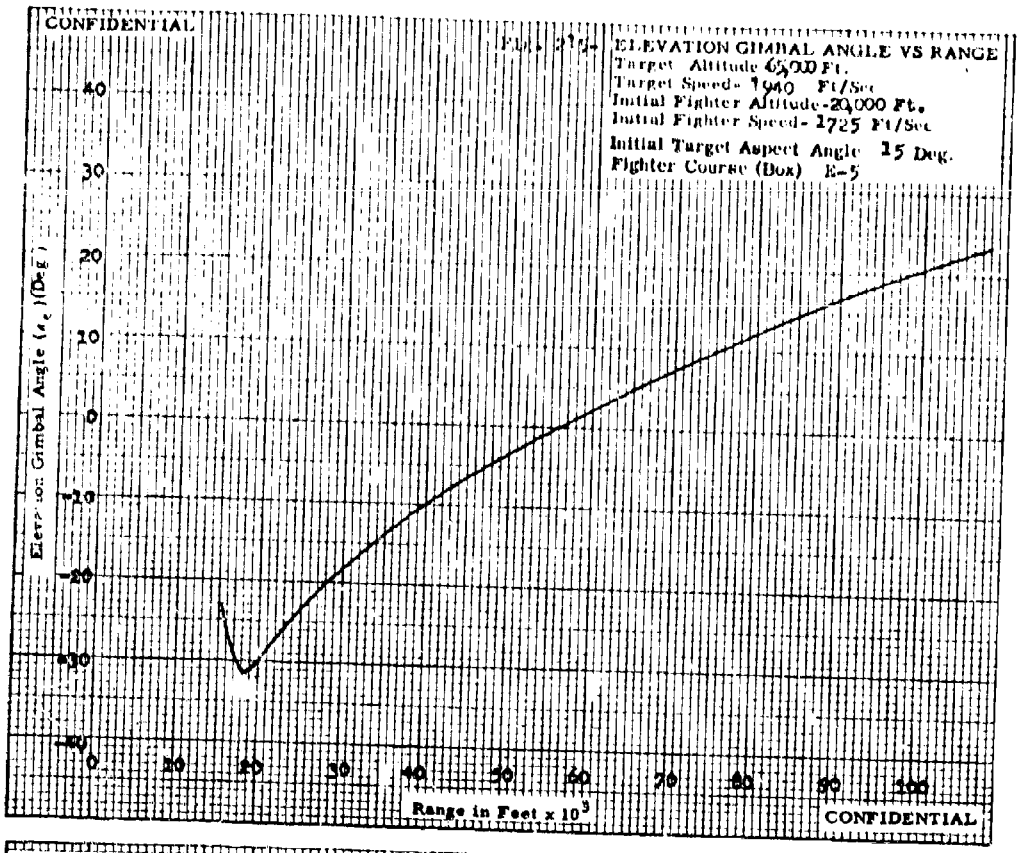
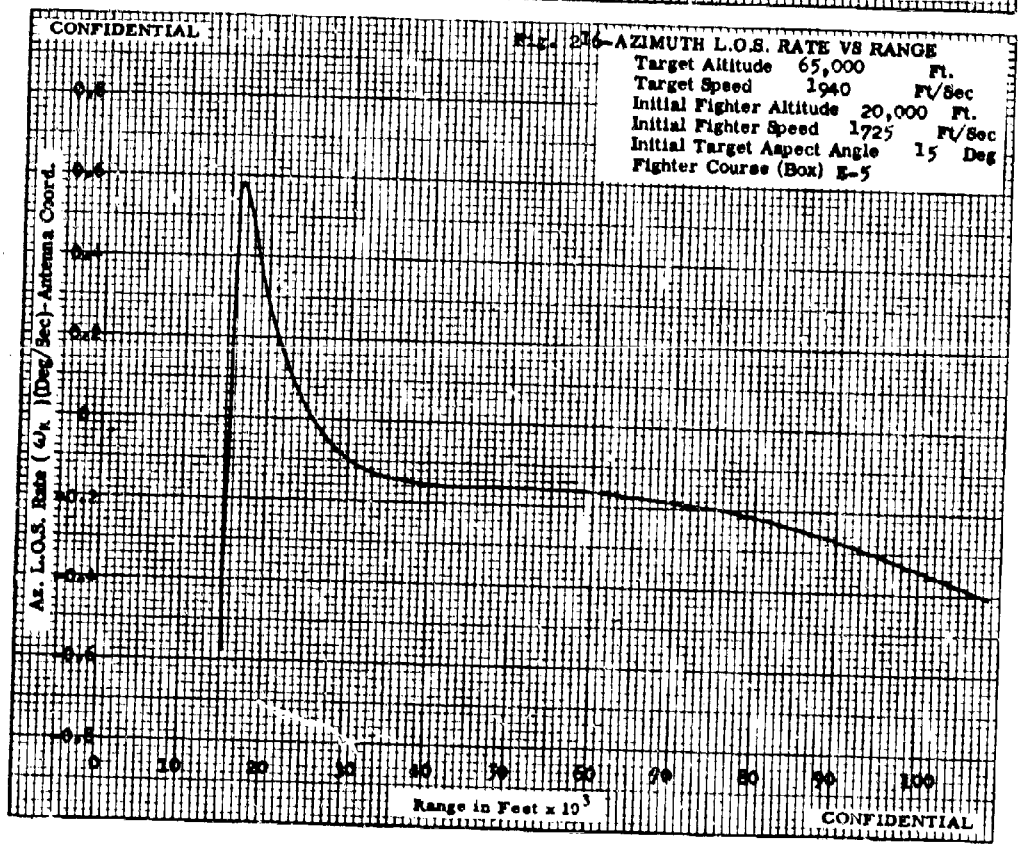

CONFIDENTIAL
Fig. 214 AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-5
Azimuth Gimbal Angle (λ_a)(Deg)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Fig. 214 – ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5



CONFIDENTIAL

Fig. 215 – AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-5



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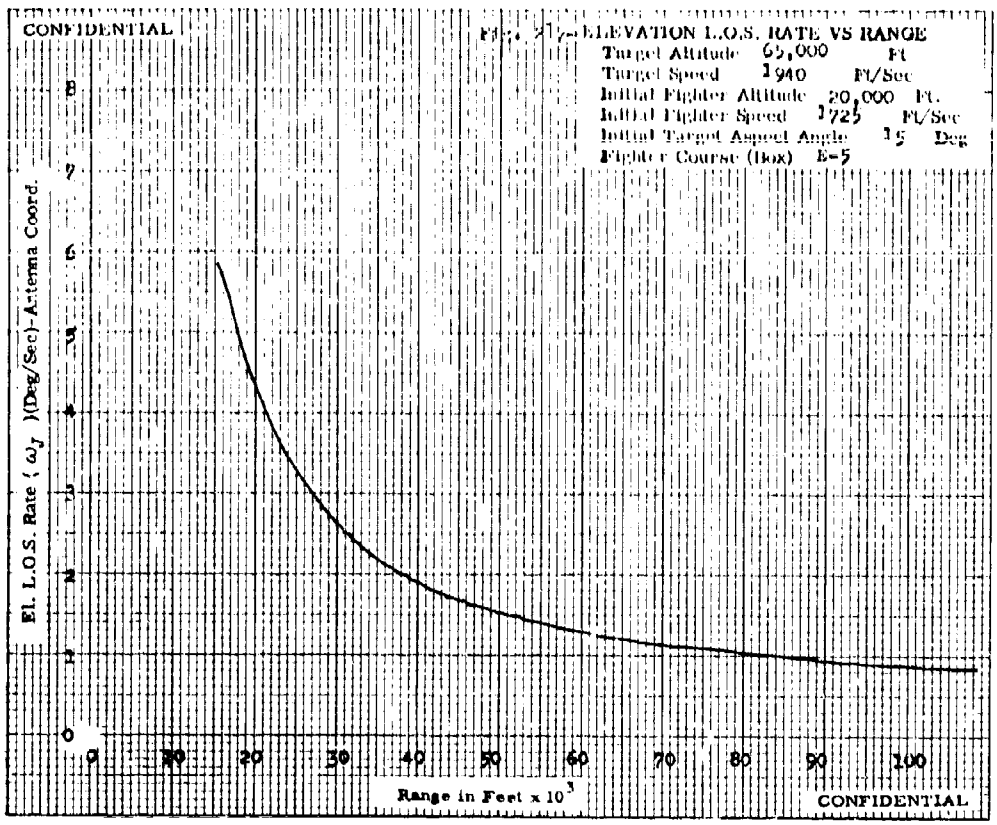
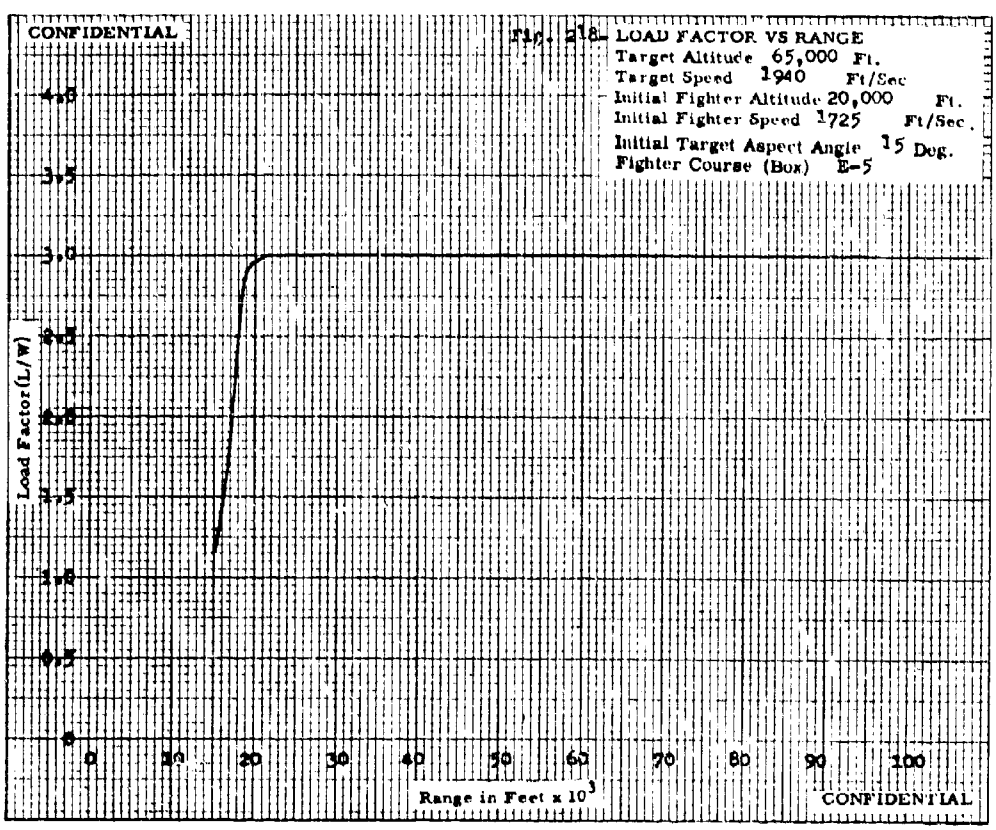
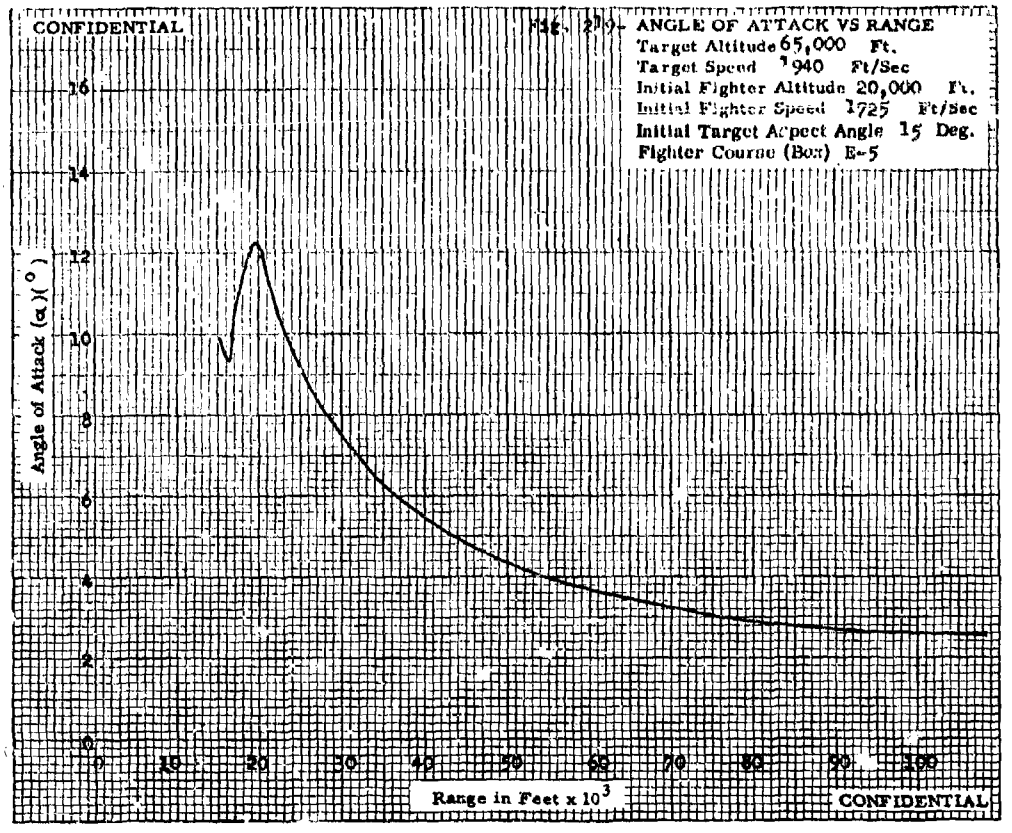
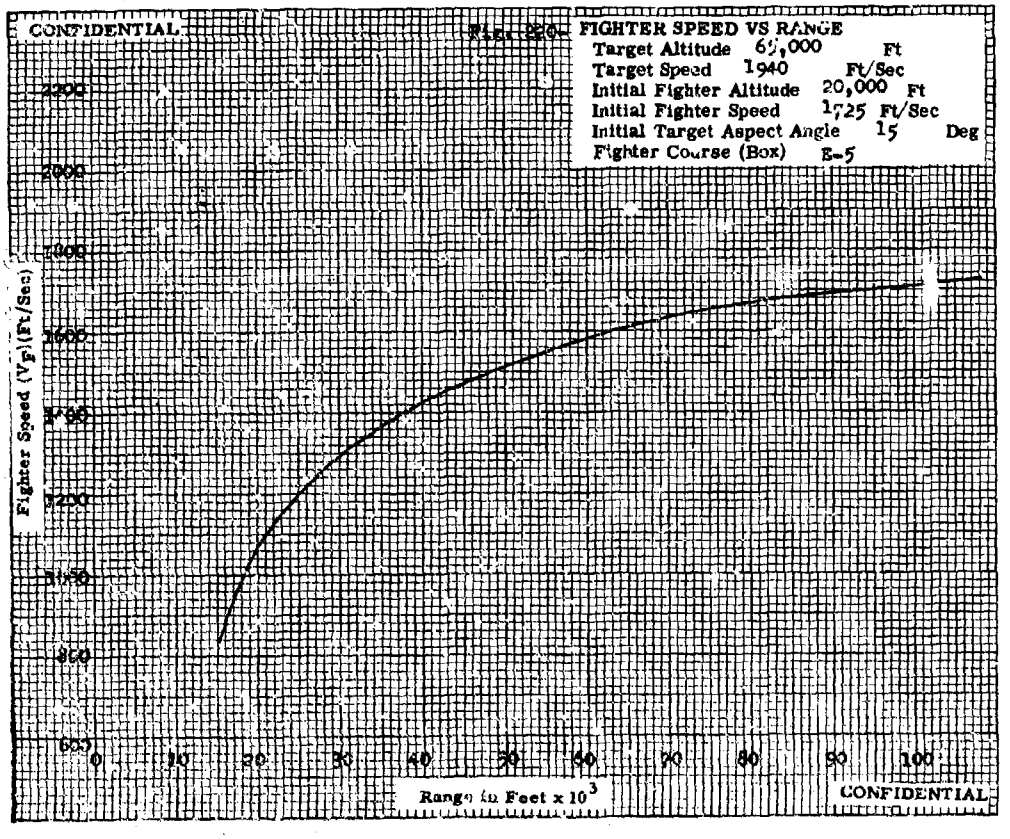
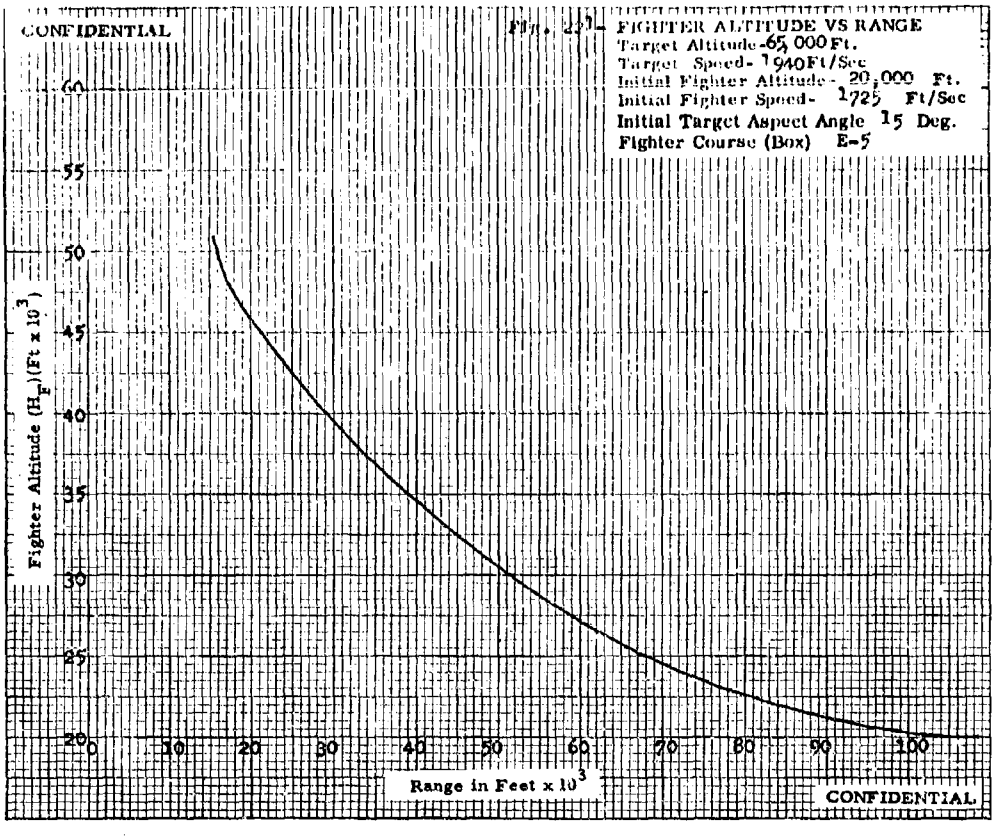

CONFIDENTIAL
Fig. 217- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-5
El. L.O.S. Rate (ω_y)(Deg/Sec)-Antenna Coord.
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 218- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec.
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5
Load Factor (L/W)
0
0,5
1,0
1,5
2,0
2,5
3,0
3,5
4,0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-5
Fighter Speed (Vf)(Ft/Sec)
2200
2000
1800
1600
1400
1200
1000
800
600
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 221 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5
Fighter Altitude (H_F)(Ft x 10^3)
60
55
50
45
40
35
30
25
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

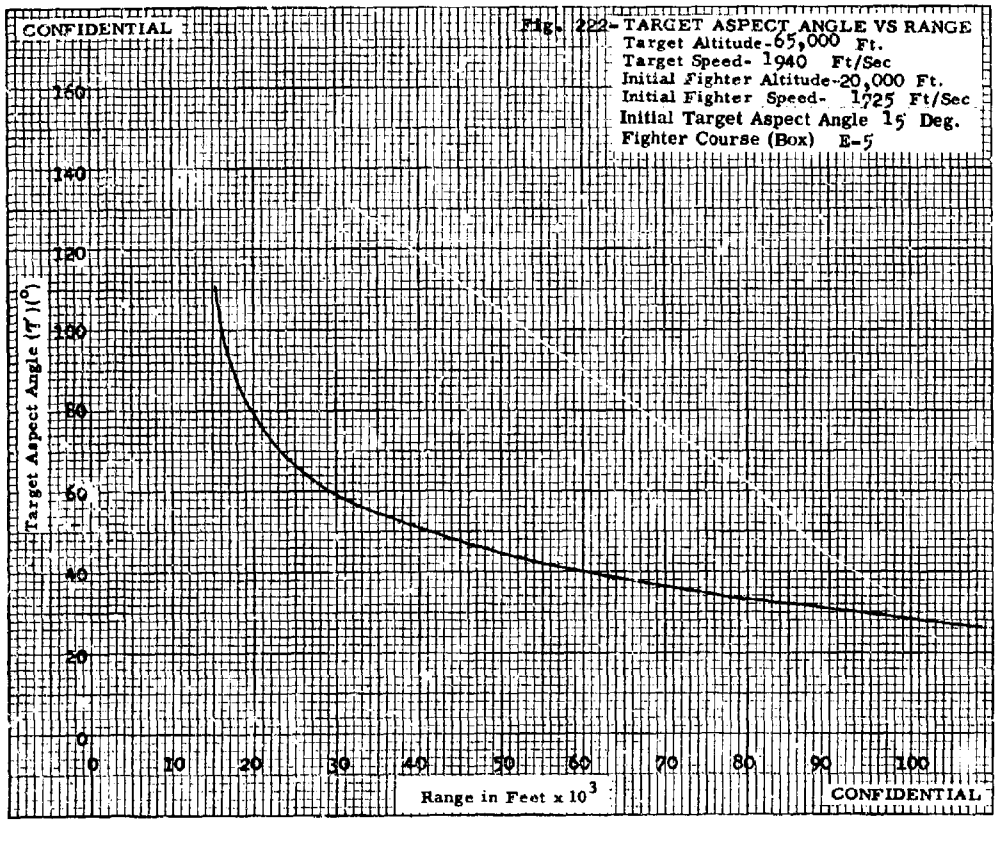

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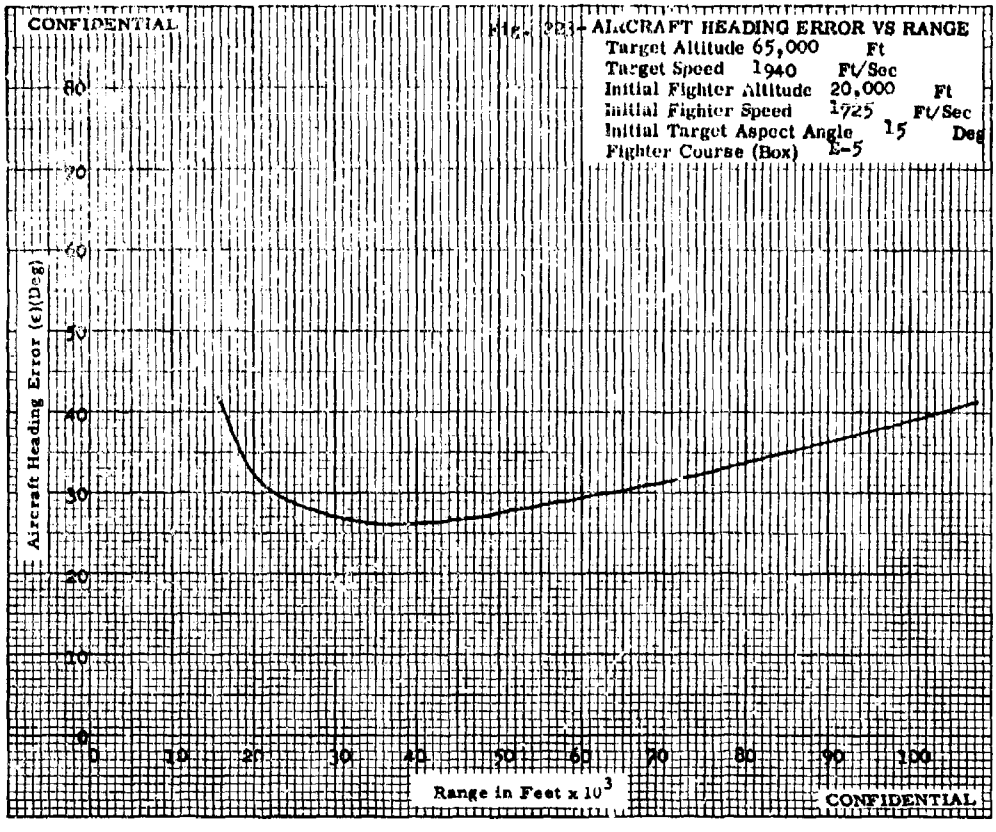
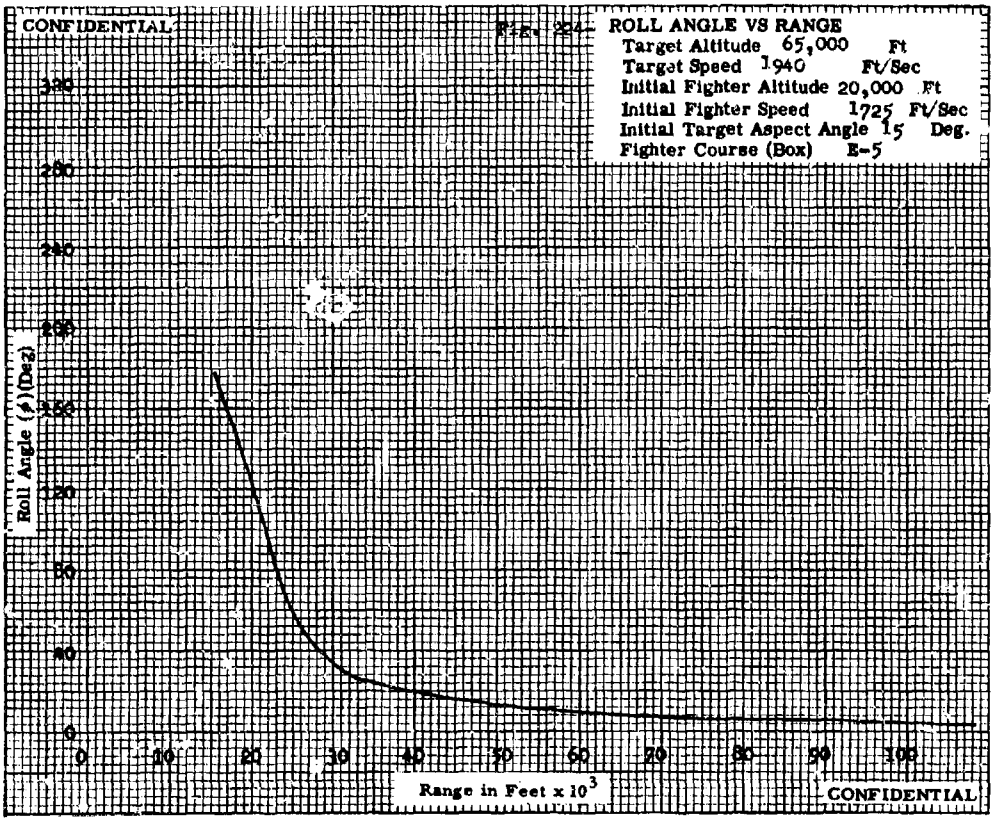
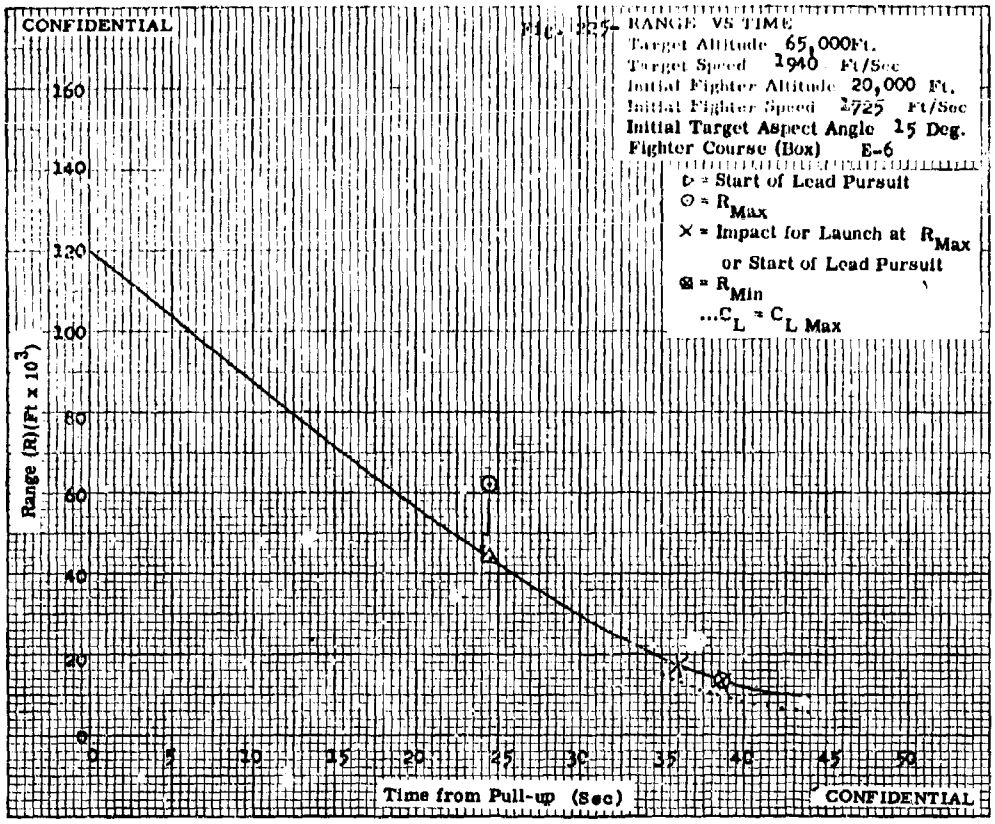
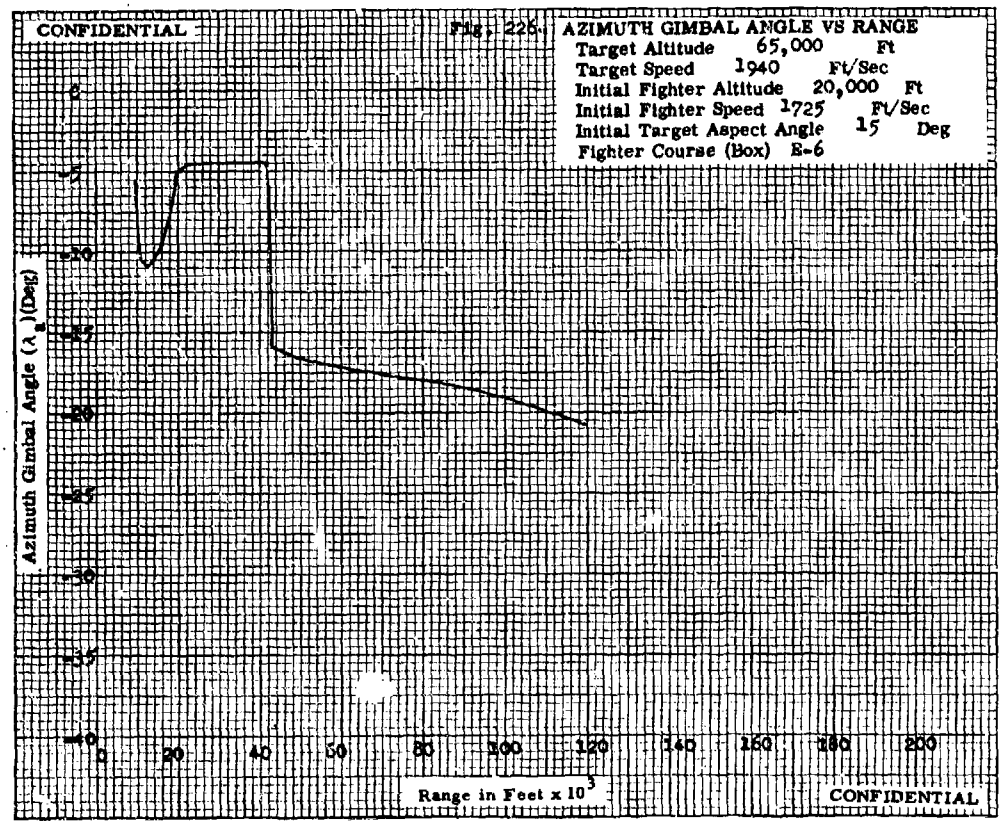
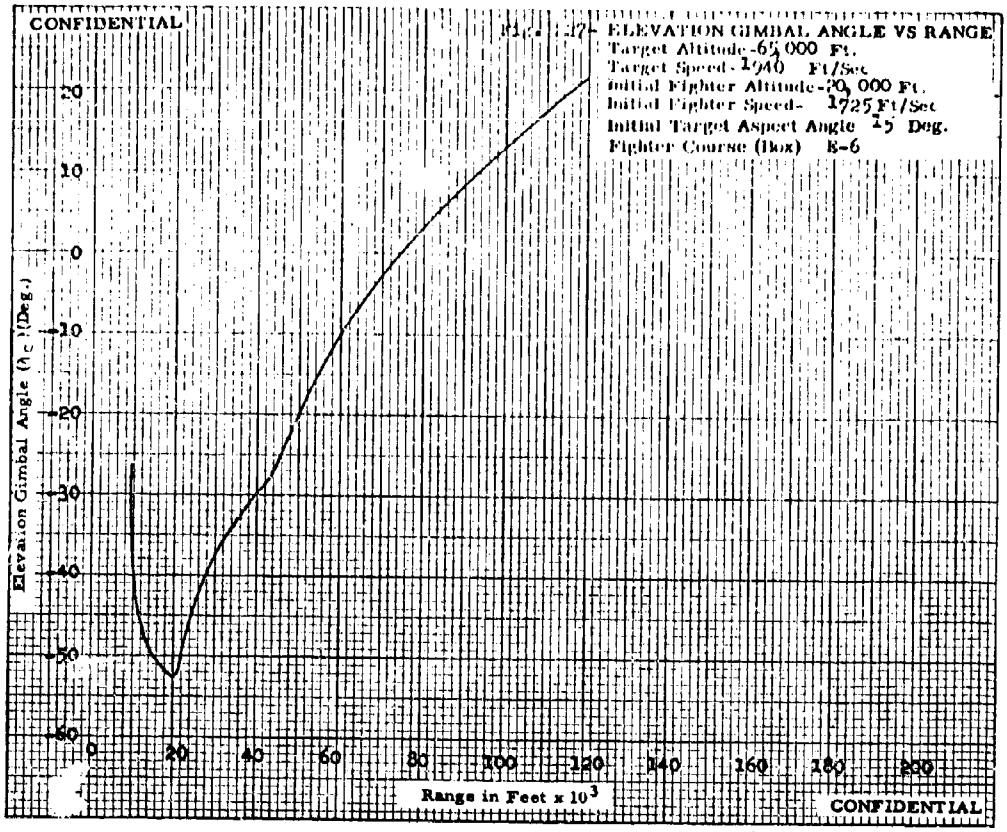
Fig. 222 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5
Target Aspect Angle (Ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 223 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-5
Aircraft Heading Error (ε)(Deg)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 224 -
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-5
Roll Angle (φ)(Deg)
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 225
RANGE VS TIME
Target Altitude 65,000Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 226
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-6
Azimuth Gimbal Angle (λ_a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 17- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
Elevation Gimbal Angle (θc)(Deg.)
20
10
0
-10
-20
-30
-40
-50
-60
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

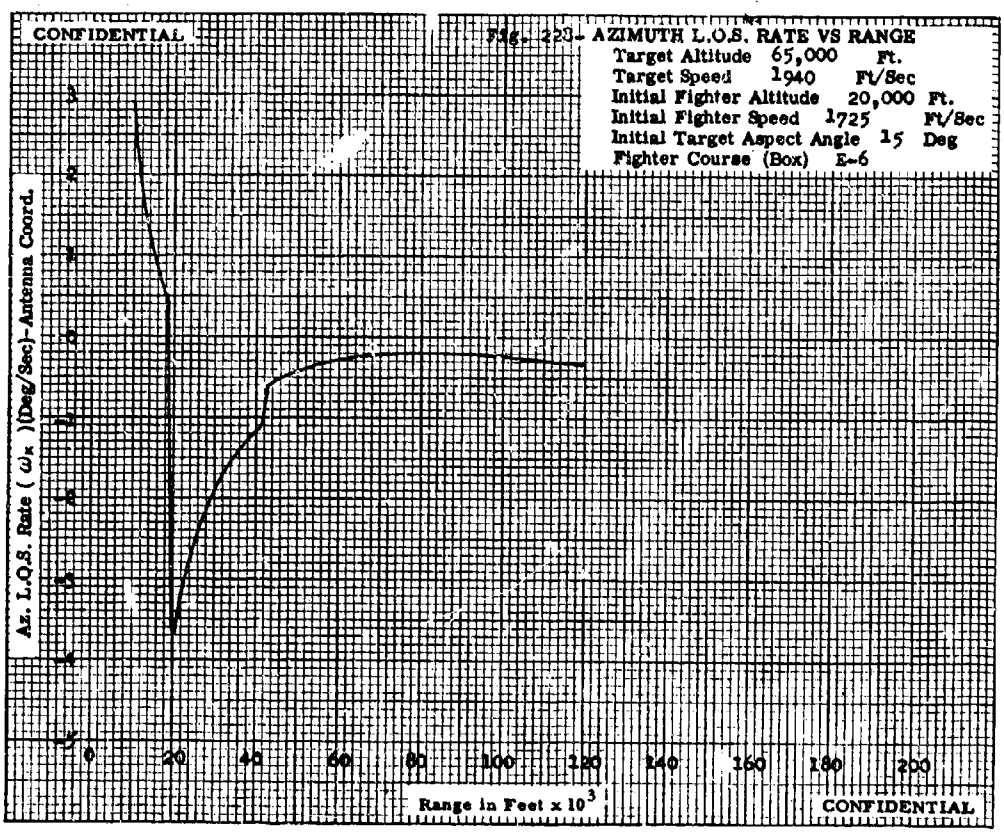

CONFIDENTIAL
Fig. 22- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-6
Az. L.O.S. Rate (ωx)(Deg/Sec)-Antenna Coord.
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

Fig. 229 – ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-6

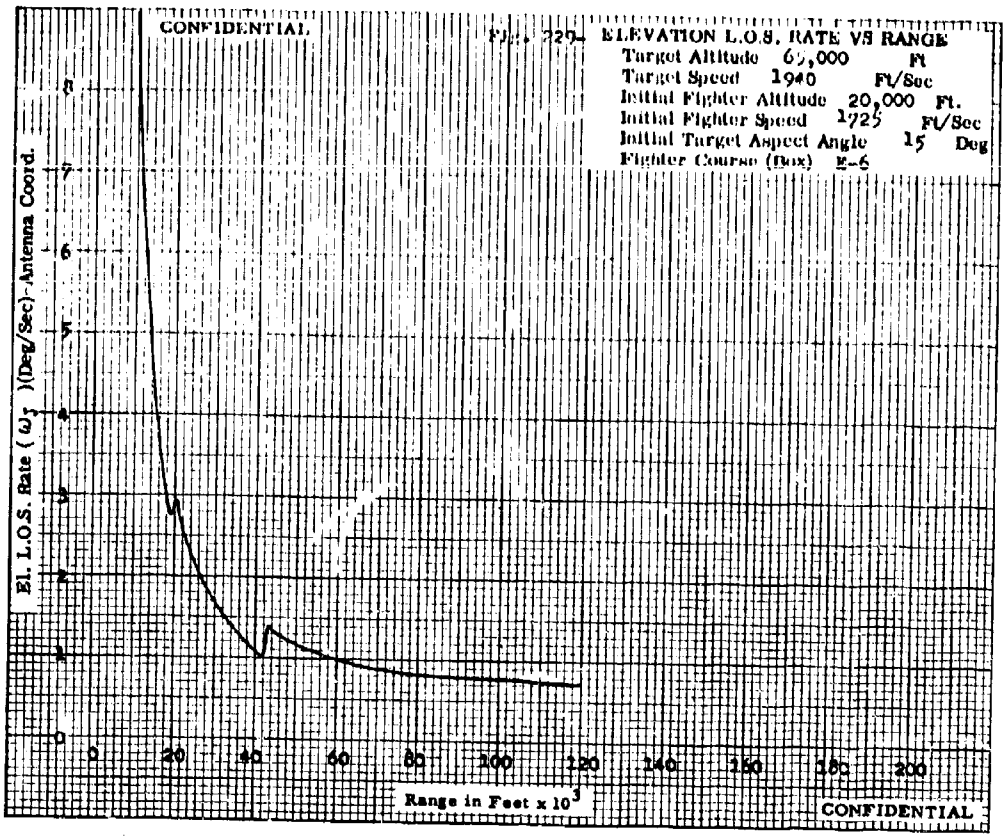
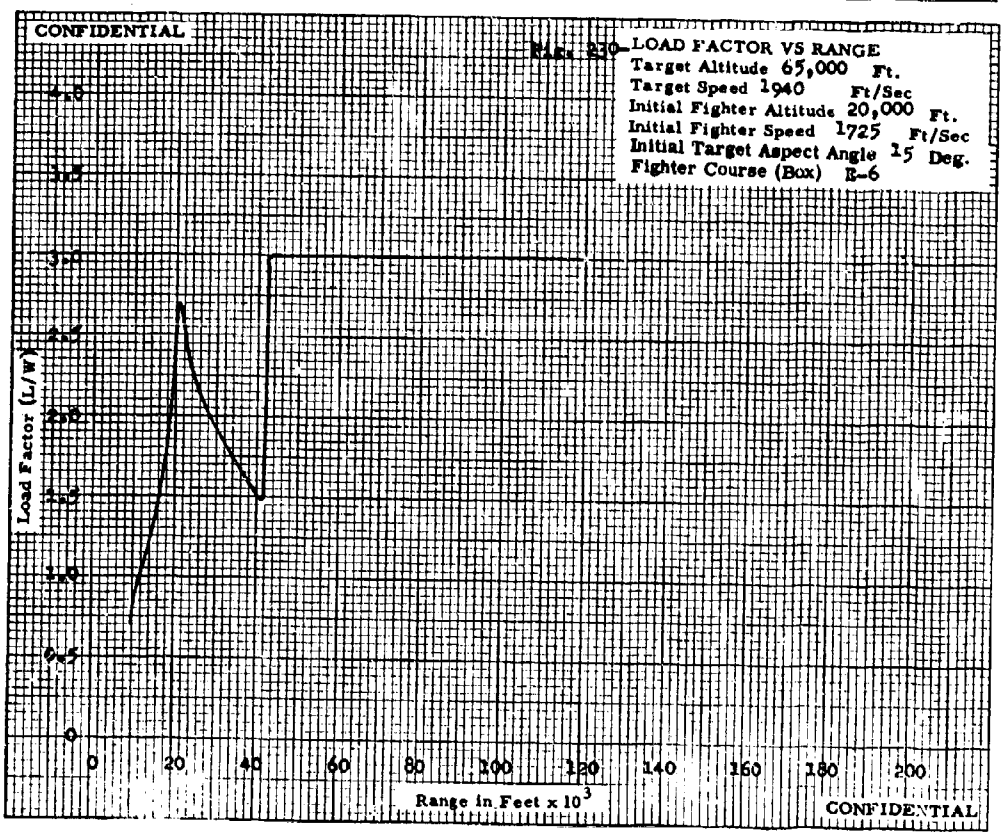


Fig. 230 – LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6



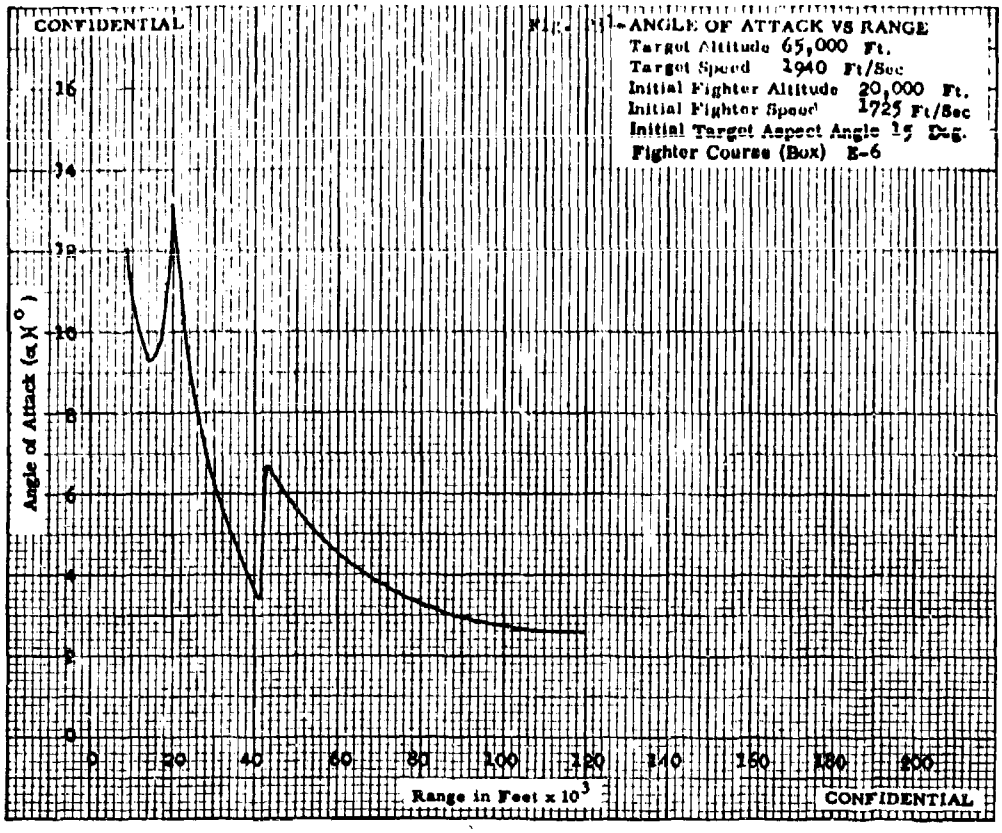

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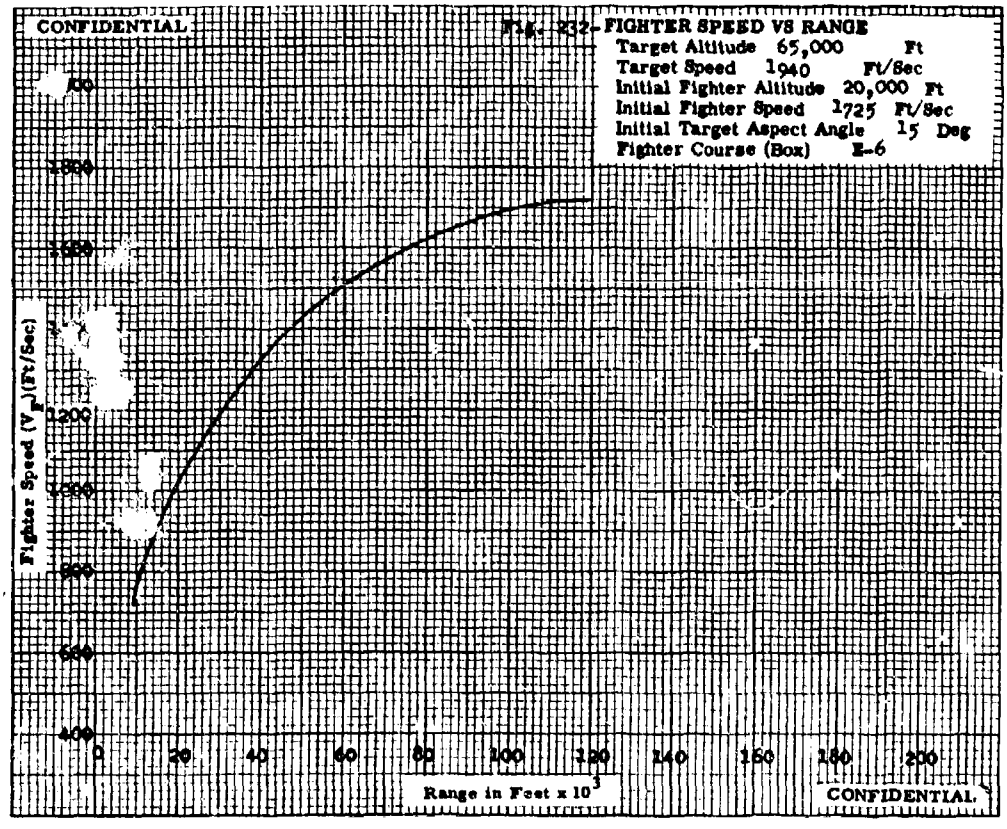
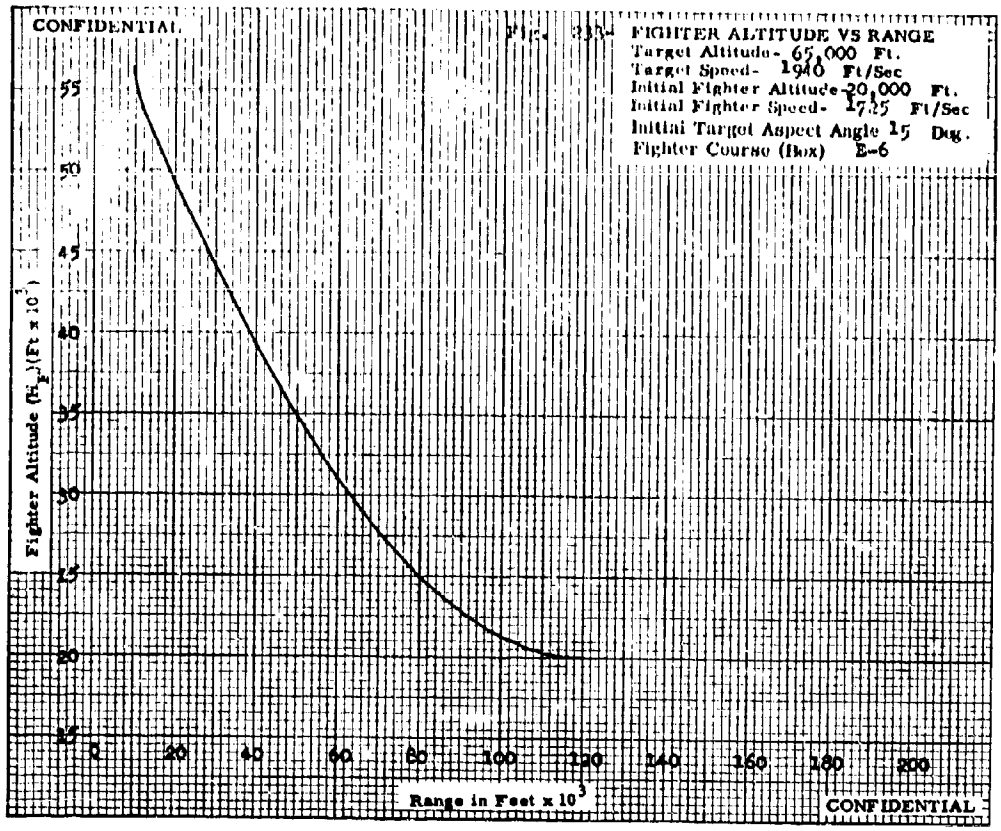
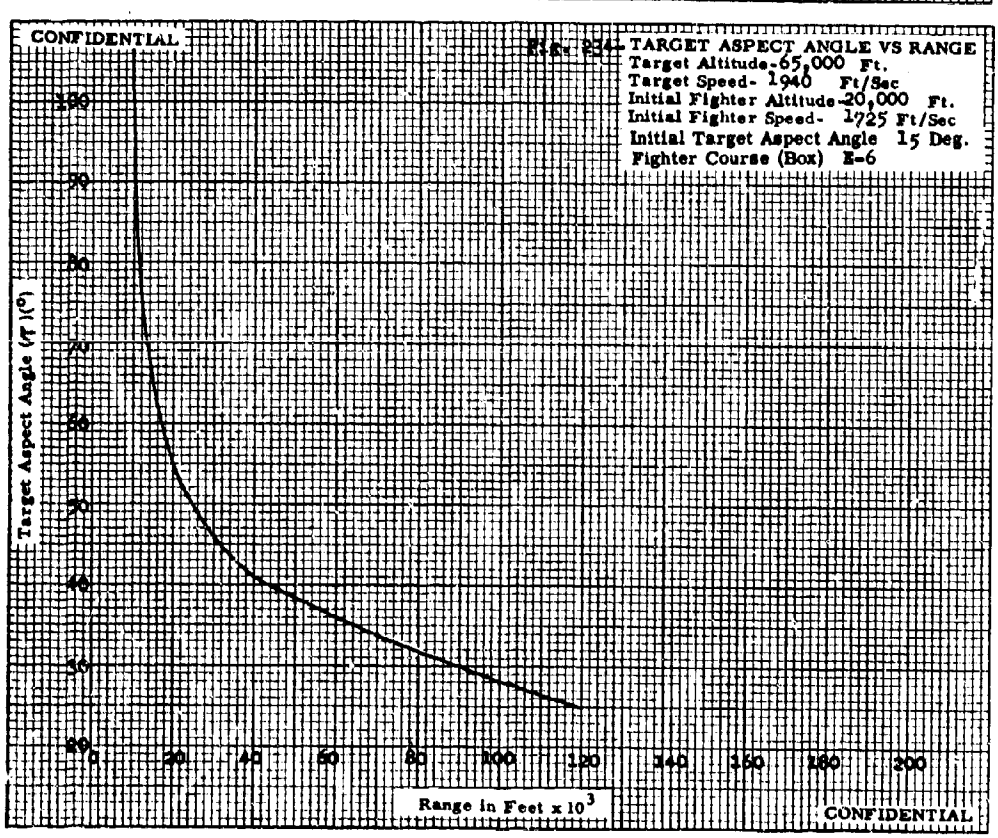
Fig. 231 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
Angle of Attack (α) (°)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 232 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg
Fighter Course (Box) E-6
Fighter Speed (V_F) (Ft/Sec)
1800
1600
1400
1200
1000
800
600
400
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIGURE 233
FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
Fighter Altitude (H_F)(Ft x 10^3)
55
50
45
40
35
30
25
20
15
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIGURE 234
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
Target Aspect Angle (ψ)(°)
100
90
80
70
60
50
40
30
20
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

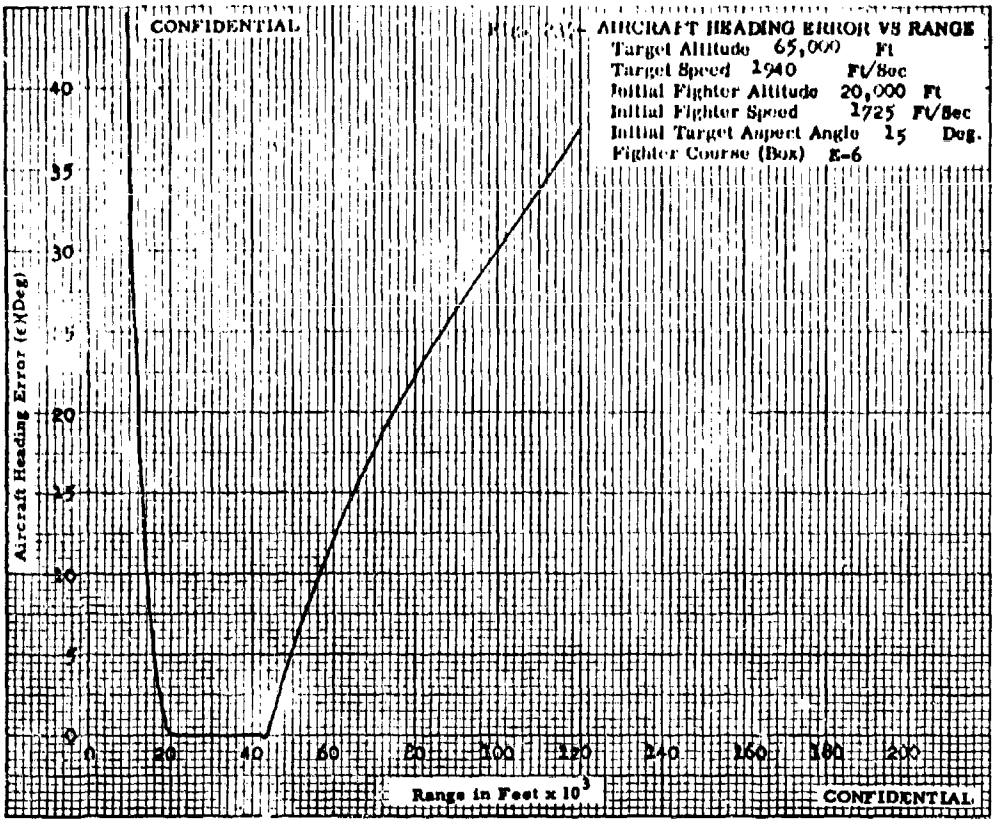
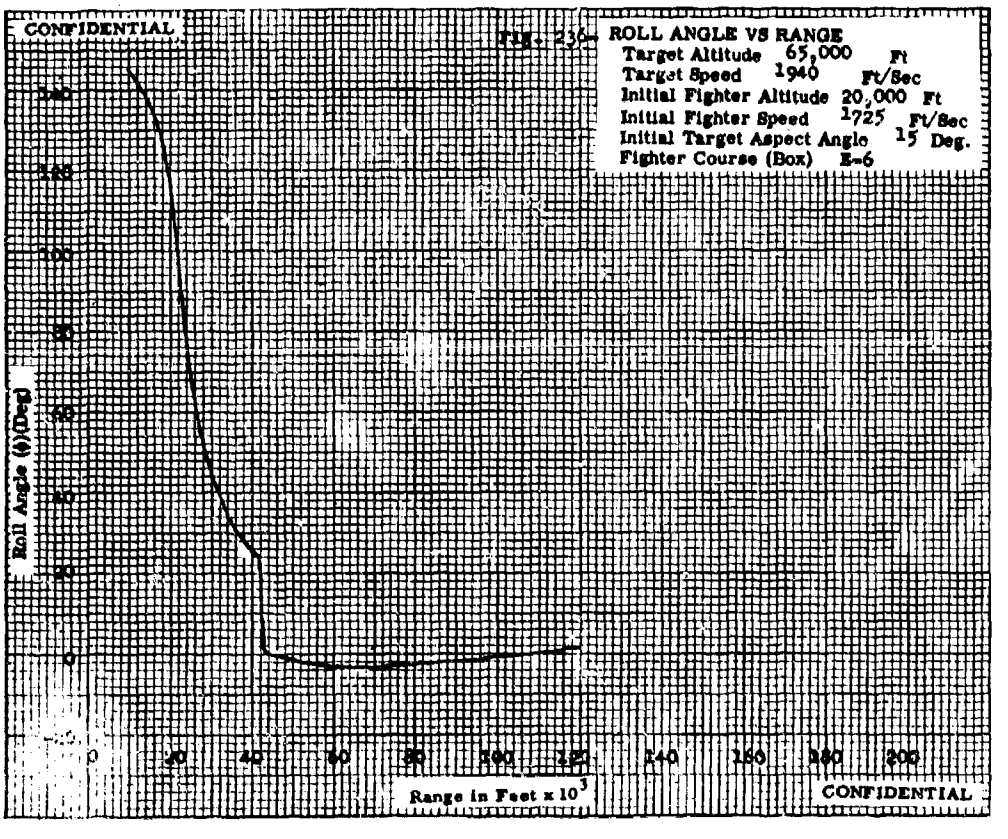
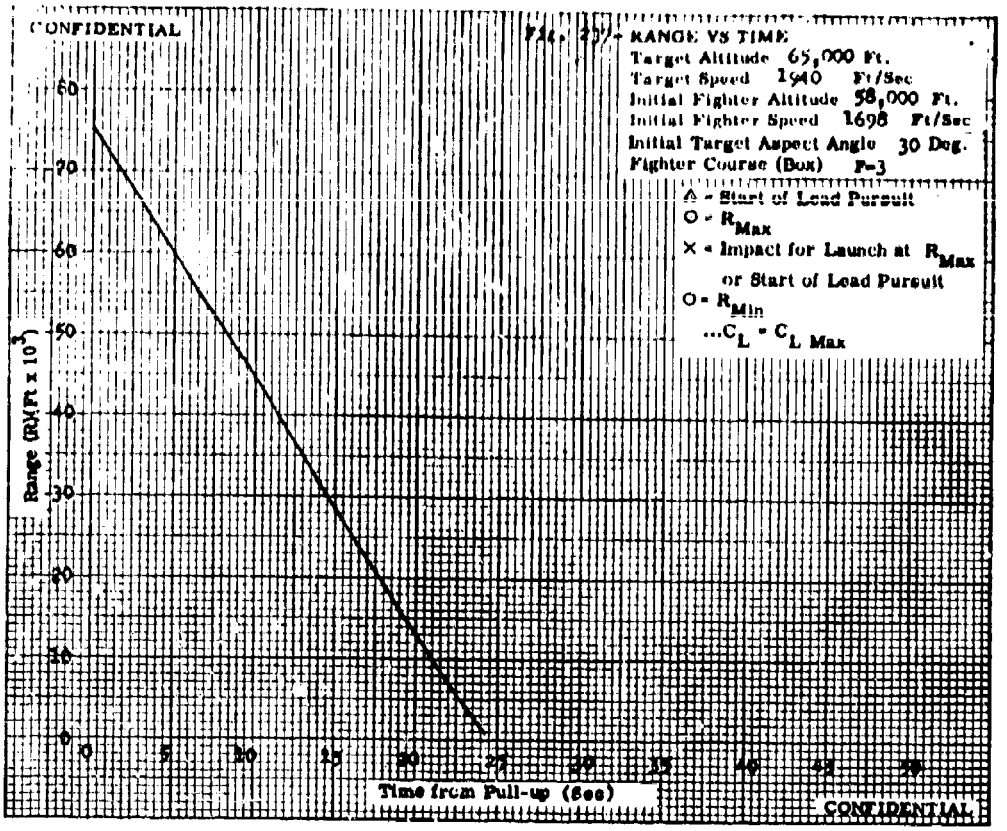

CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
Aircraft Heading Error (ε)(Deg)
40
35
30
20
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

FIG. 236


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 15 Deg.
Fighter Course (Box) E-6
Roll Angle (ϕ)(Deg)
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 22F - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3
△ - Start of Lead Pursuit
O - R_{Max}
× - Impact for Launch at R_{Max} or Start of Lead Pursuit
O - R_{Min}
...$C_L = C_{L\ Max}$
Range (R) Ft x 10^3
60
70
60
50
40
30
20
10
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

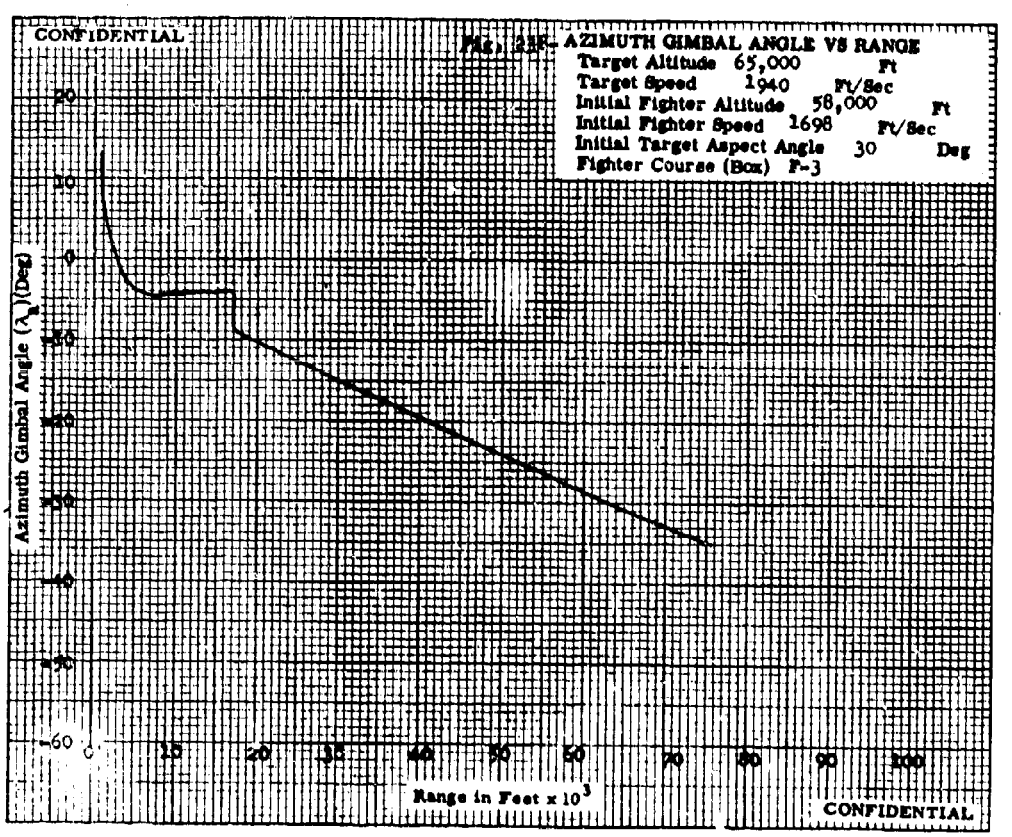

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Fig. 23F - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-3
Azimuth Gimbal Angle (λ_a) (Deg)
20
10
0
-10
-20
-30
-40
-50
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 237 ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1698Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3

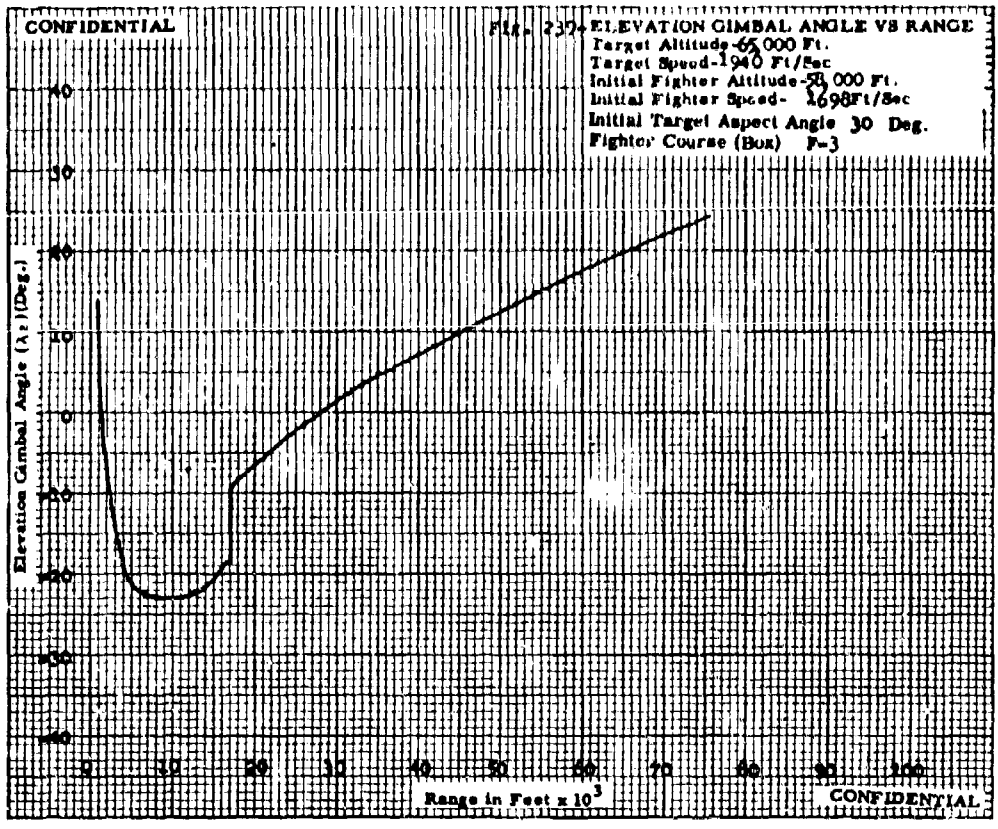

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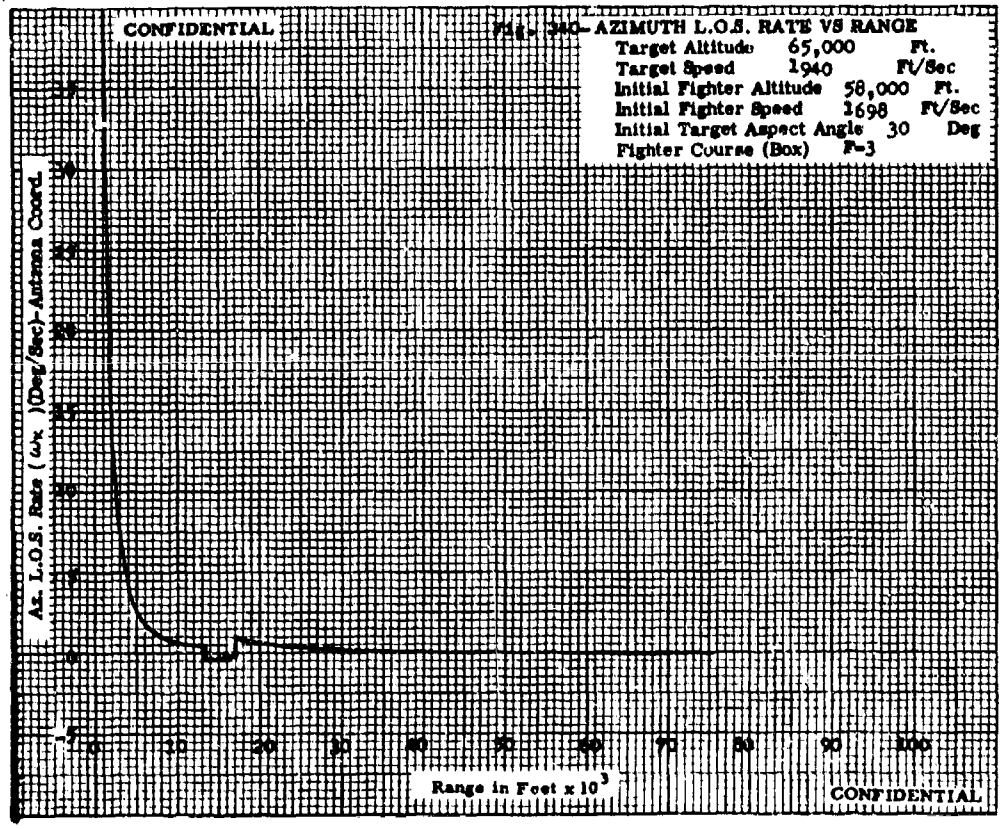
Fig. 240 AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-3



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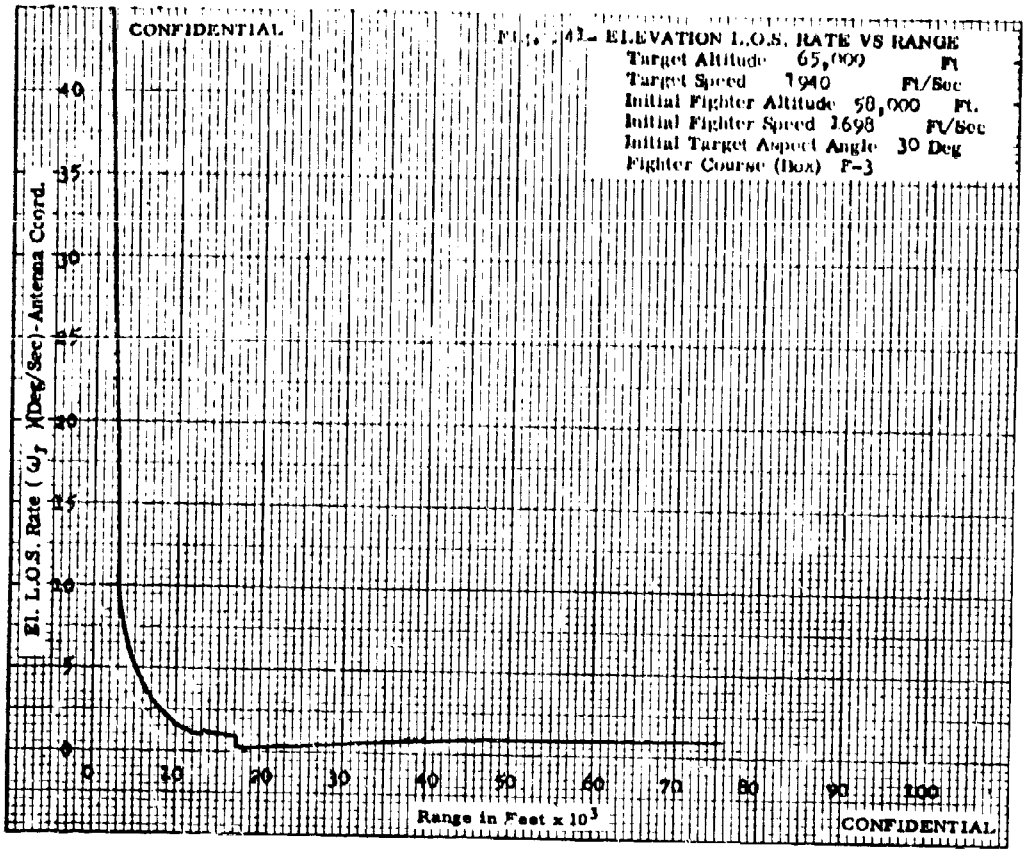


Fig. 241- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-3

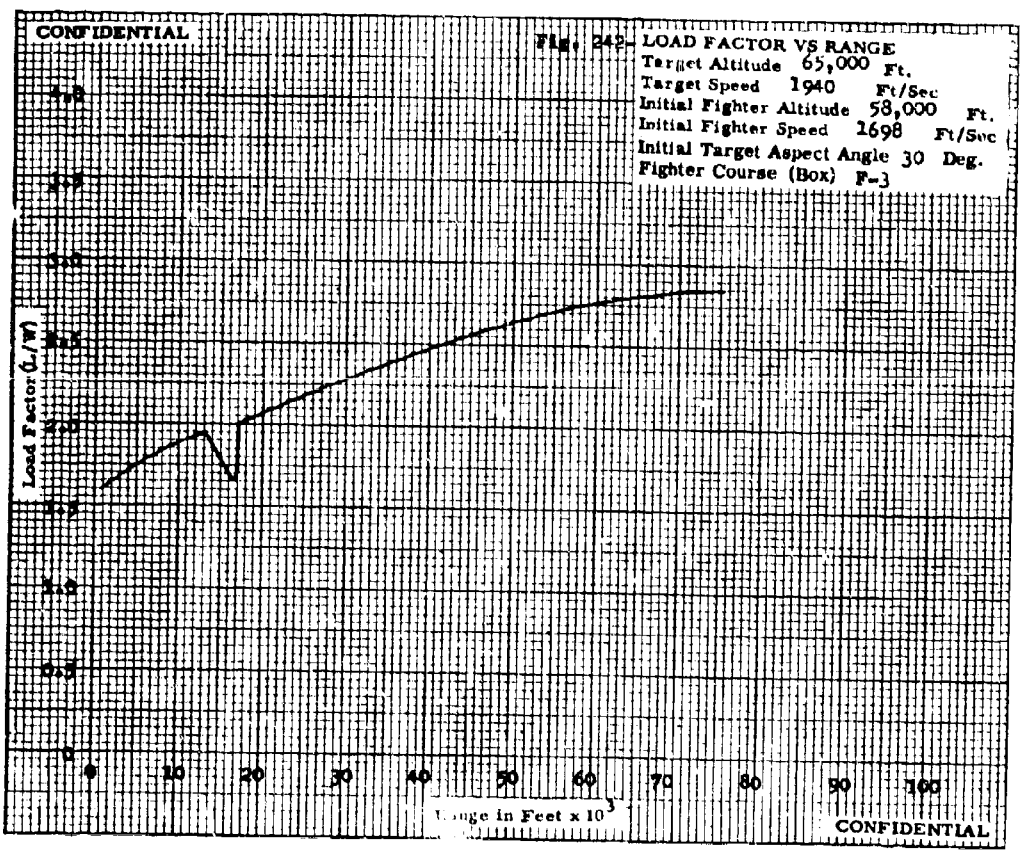
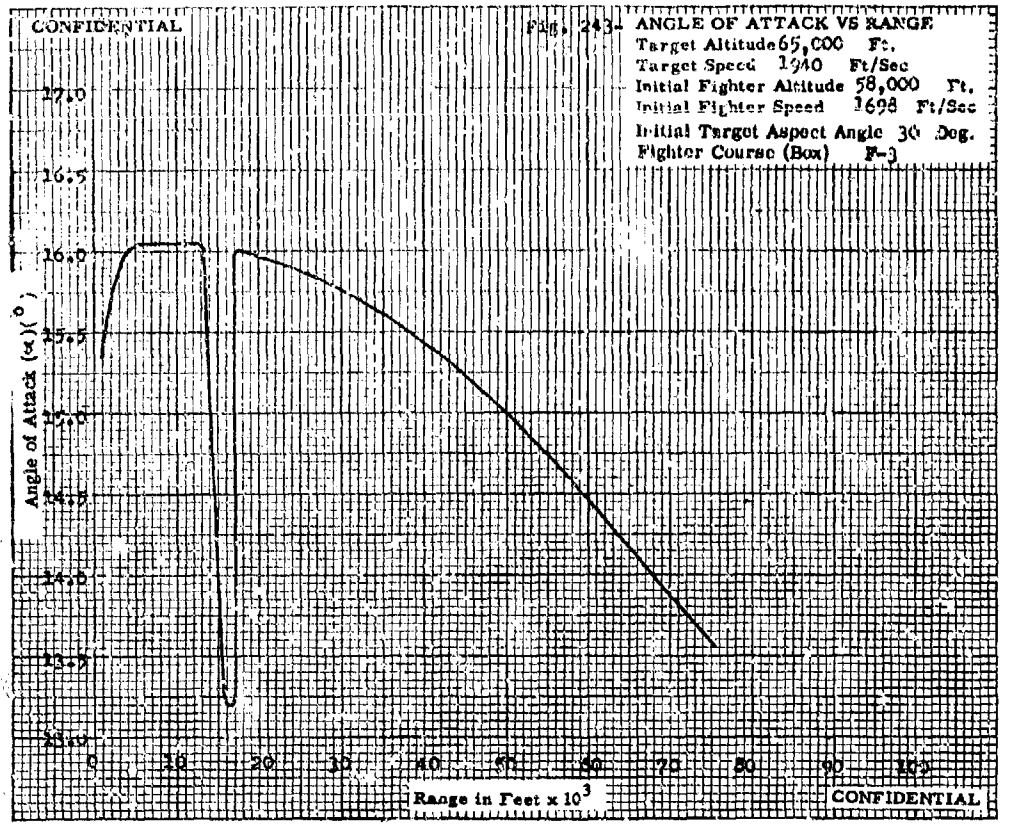
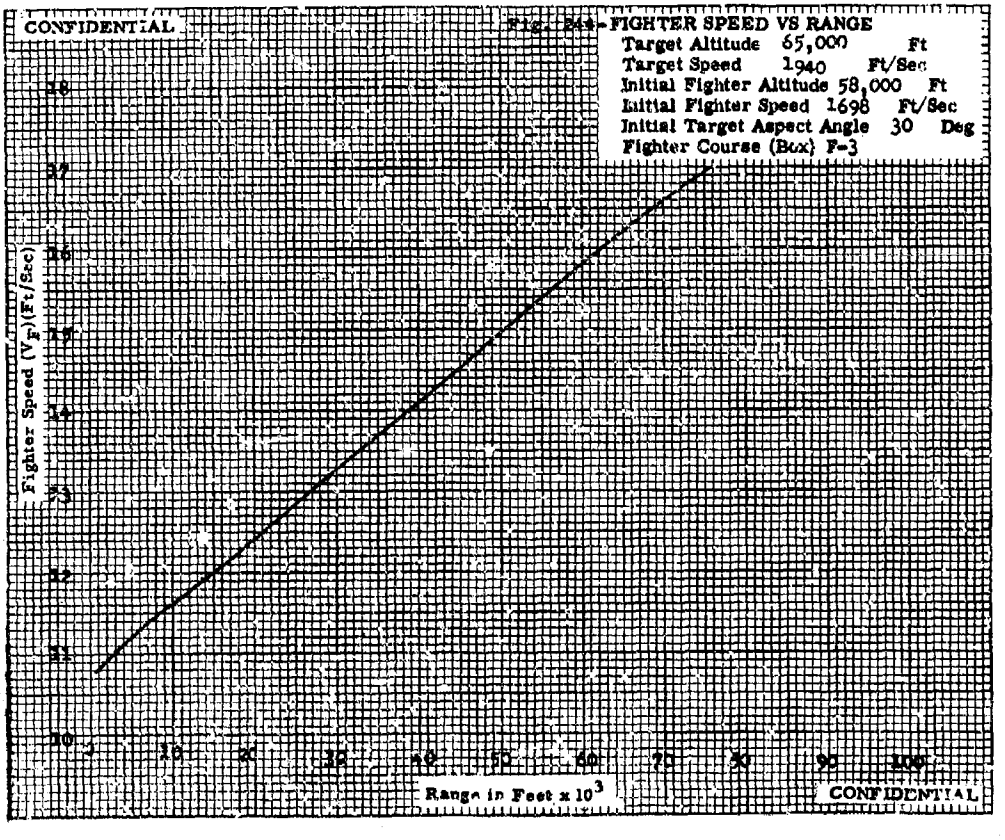
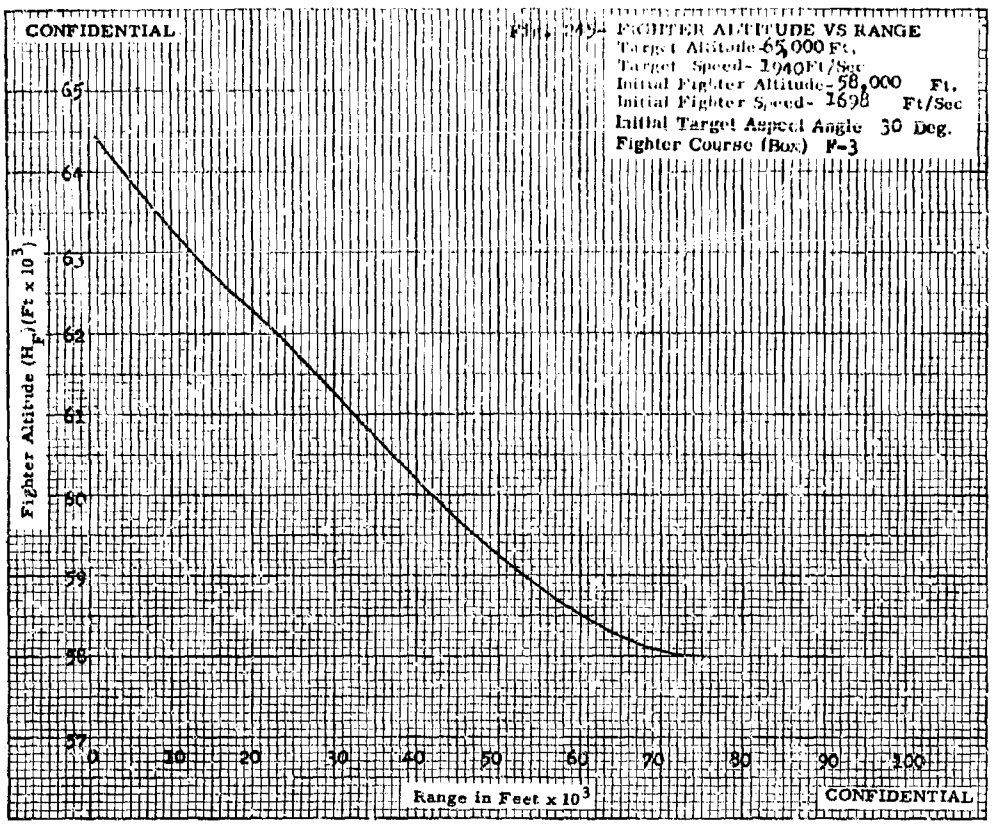
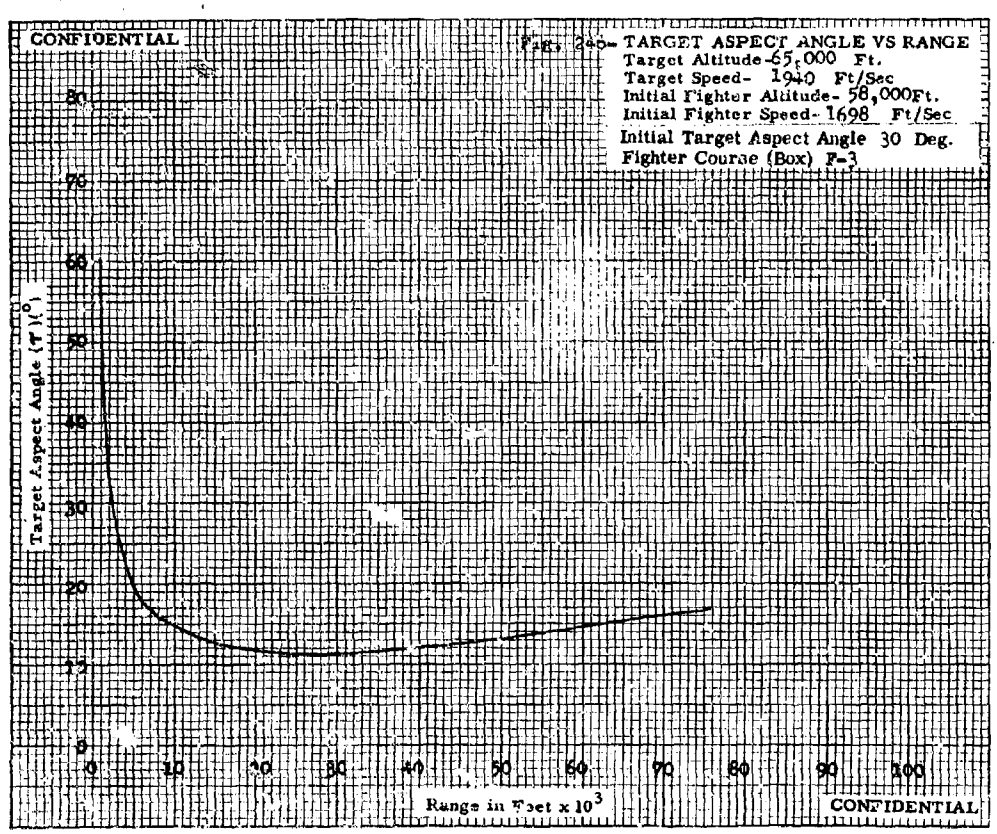


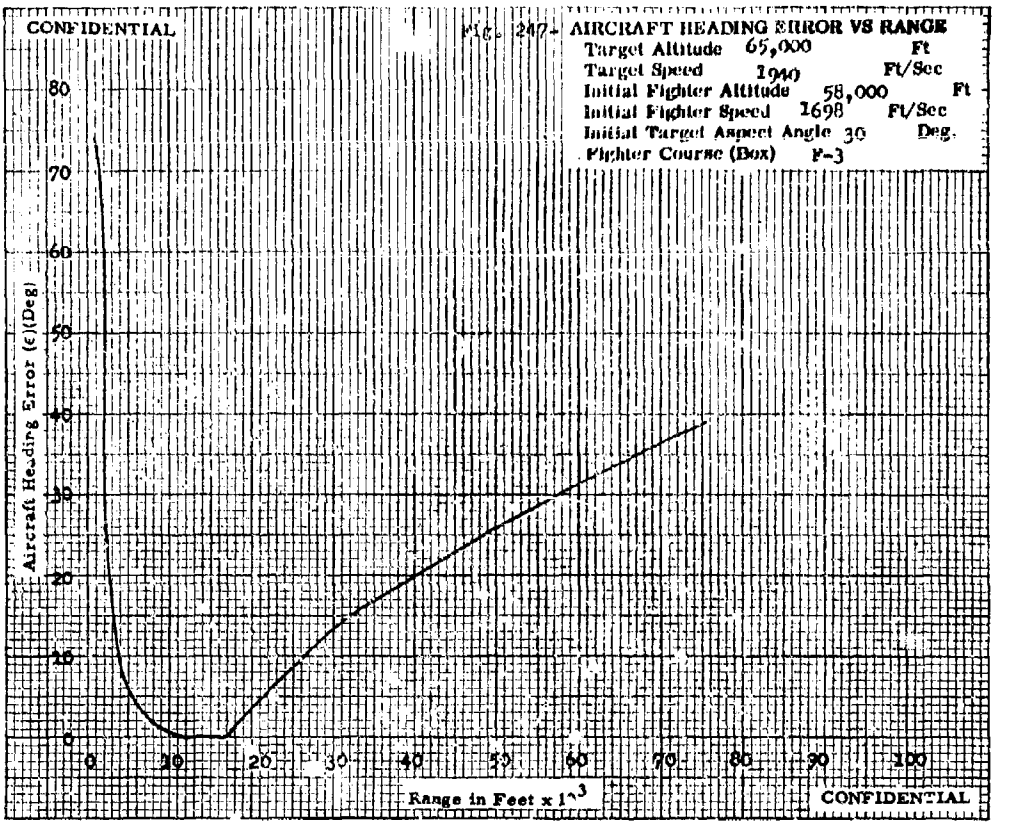
Fig. 242- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3

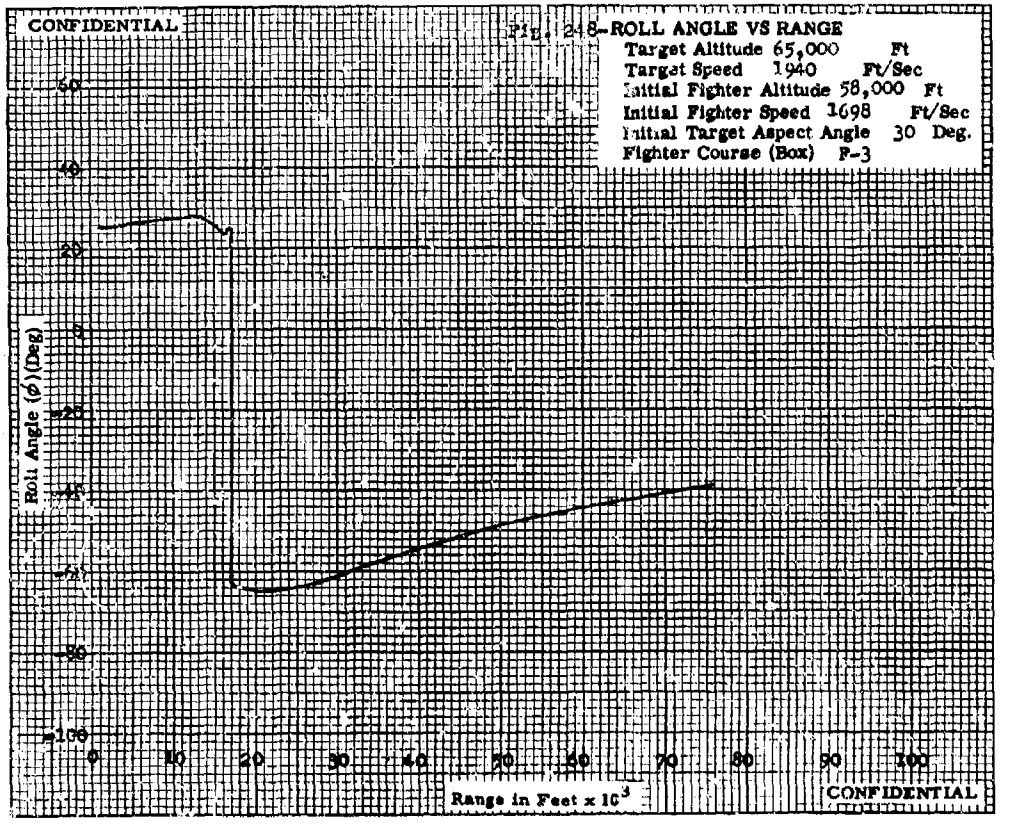

CONFIDENTIAL
Fig. 243 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3
Angle of Attack (α)(°)
17.0
16.5
16.0
15.5
15.0
14.5
14.0
13.5
13.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

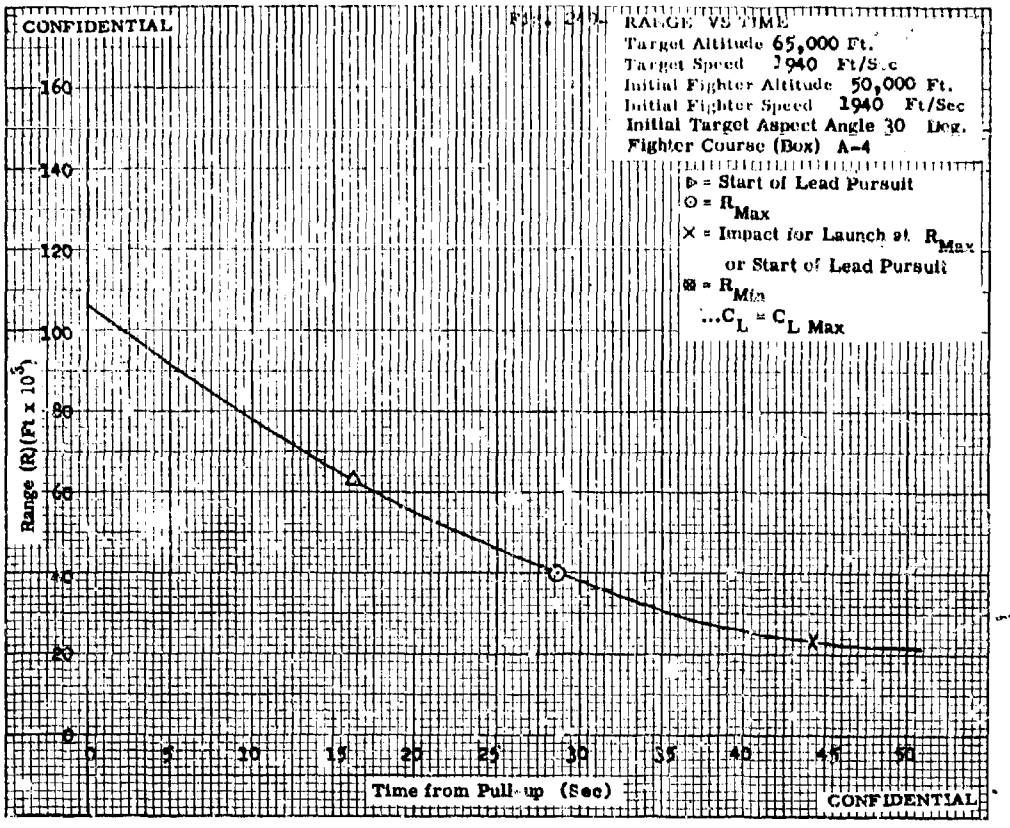

CONFIDENTIAL
Fig. 244 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-3
Fighter Speed (V_F)(Ft/Sec)
38
37
36
35
34
33
32
31
30
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

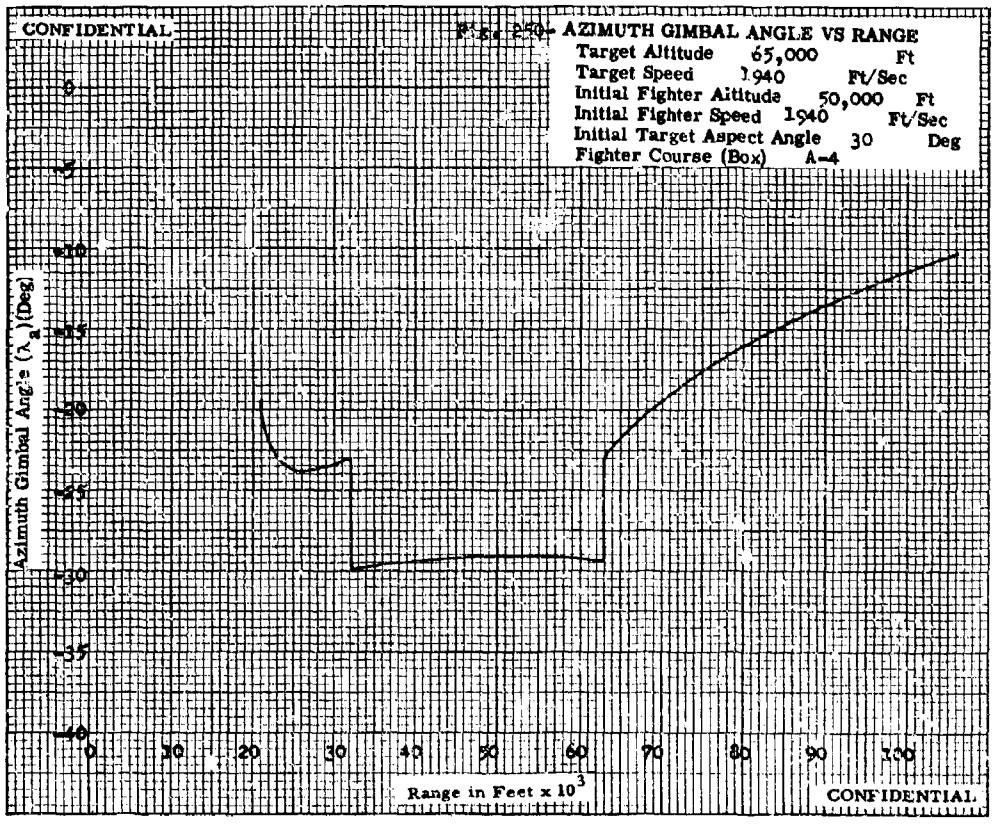

CONFIDENTIAL
Fig. 245 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3
Fighter Altitude (H_F) (Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

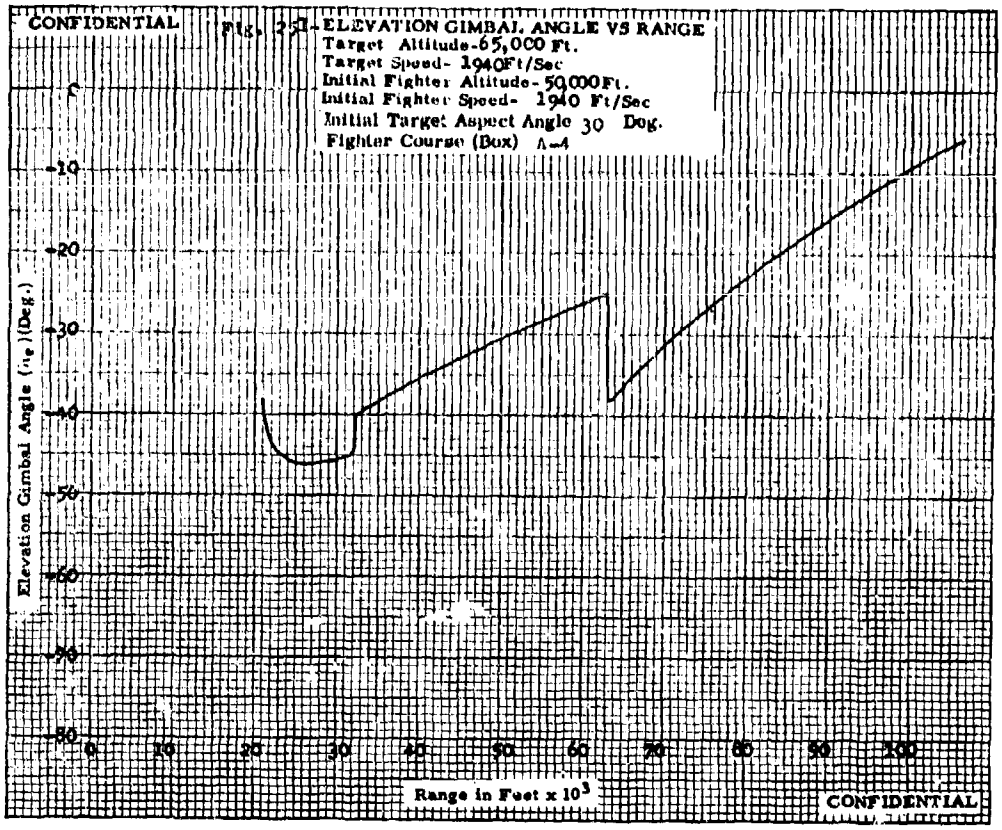

CONFIDENTIAL
Fig. 246 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3
Target Aspect Angle (T) (^{0})
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

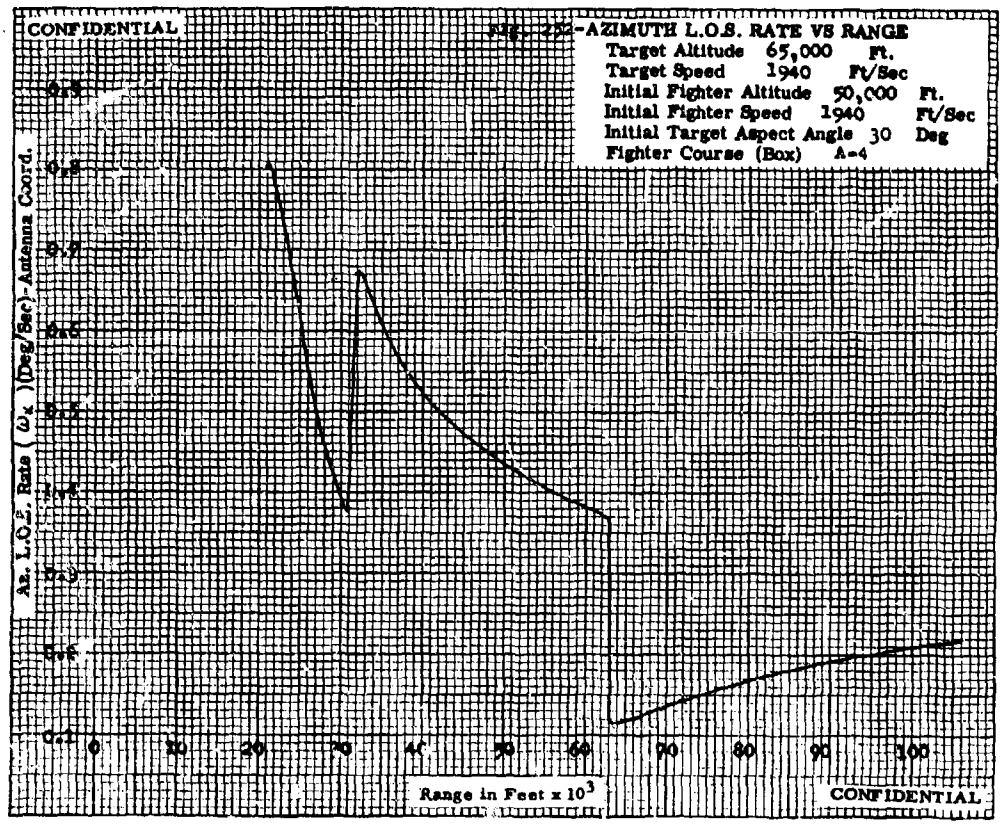

CONFIDENTIAL
Fig. 247 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3
Aircraft Heading Error (ε)(Deg)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

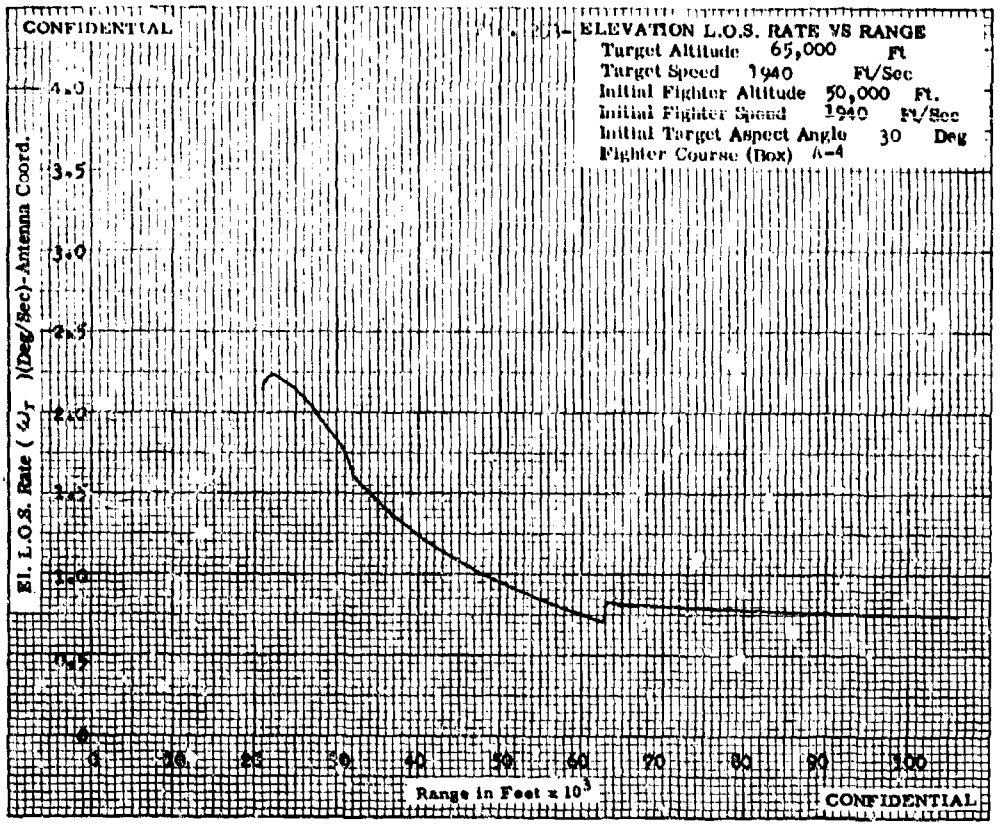

CONFIDENTIAL
Fig. 248 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-3
Roll Angle (φ)(Deg)
60
40
20
0
-20
-40
-60
-80
-100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

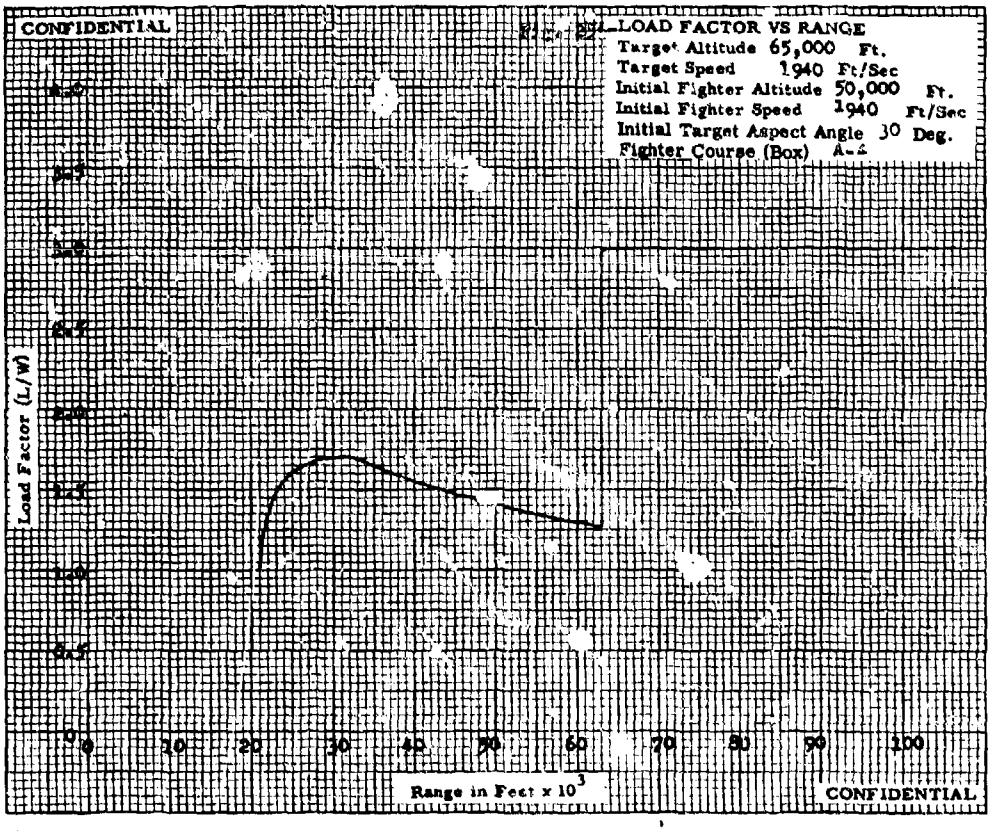

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

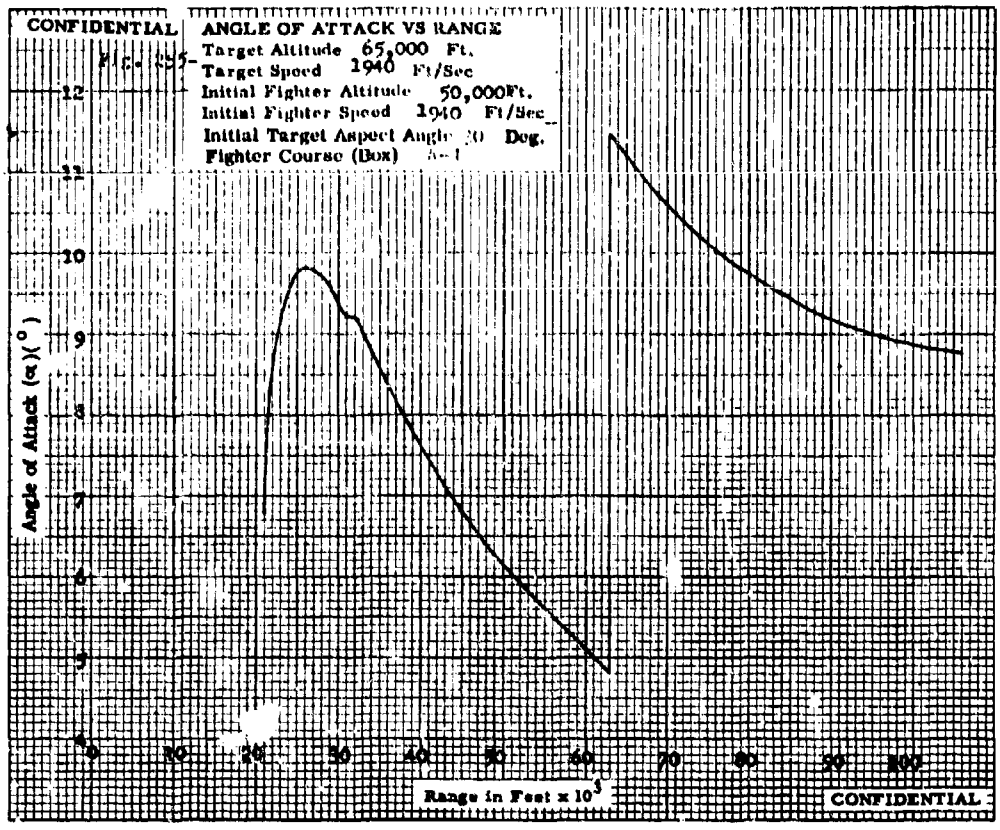

CONFIDENTIAL
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-4
Azimuth Gimbal Angle (λ_a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

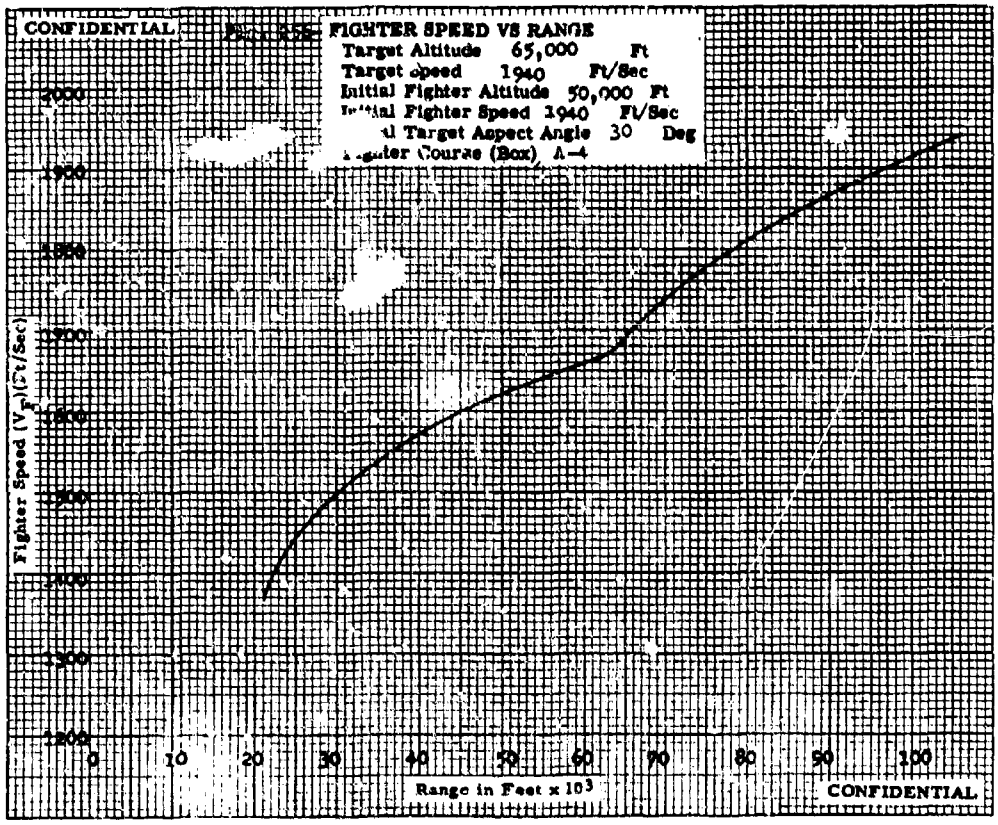

CONFIDENTIAL
Fig. 251 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940Ft/Sec
Initial Fighter Altitude- 50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
Elevation Gimbal Angle (ε_E) (Deg.)
-10
-20
-30
-40
-50
-60
-70
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

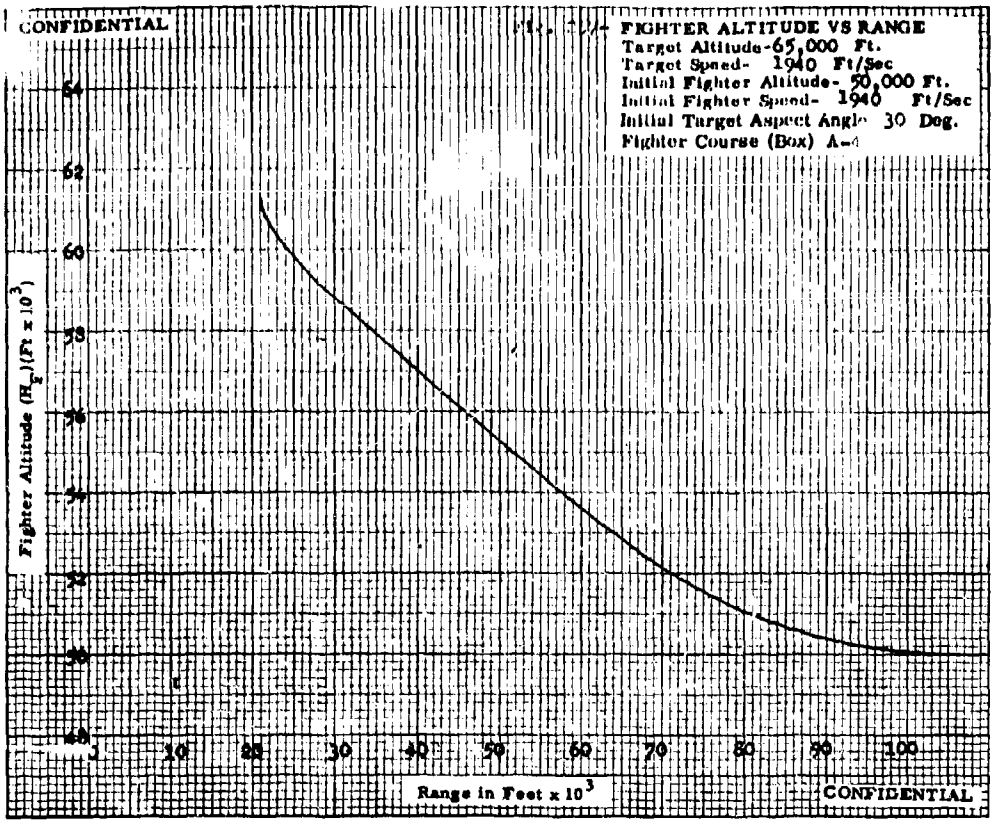

CONFIDENTIAL
Fig. 252 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-4
Az. L.O.S. Rate (ω_x) (Deg/Sec)-Antenna Coord.
0.8
0.6
0.4
0.2
0
20
40
60
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

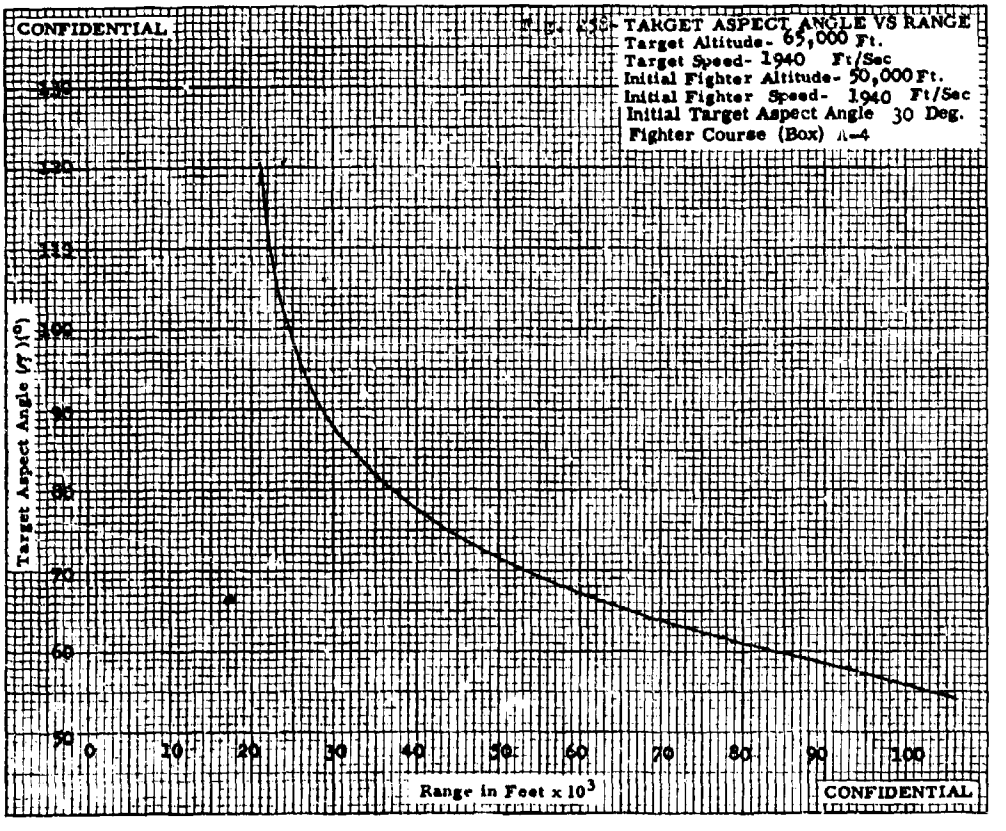

CONFIDENTIAL
ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-4
El. L.O.S. Rate (ω_r)(Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

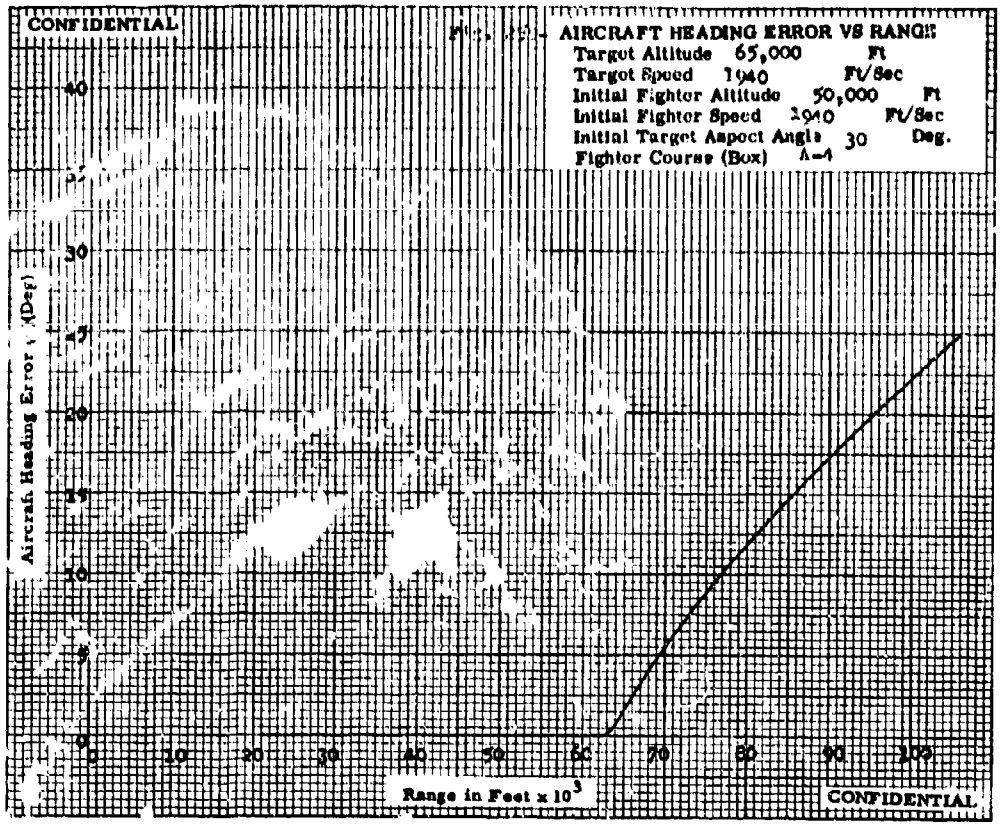

CONFIDENTIAL
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
Load Factor (L/W)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

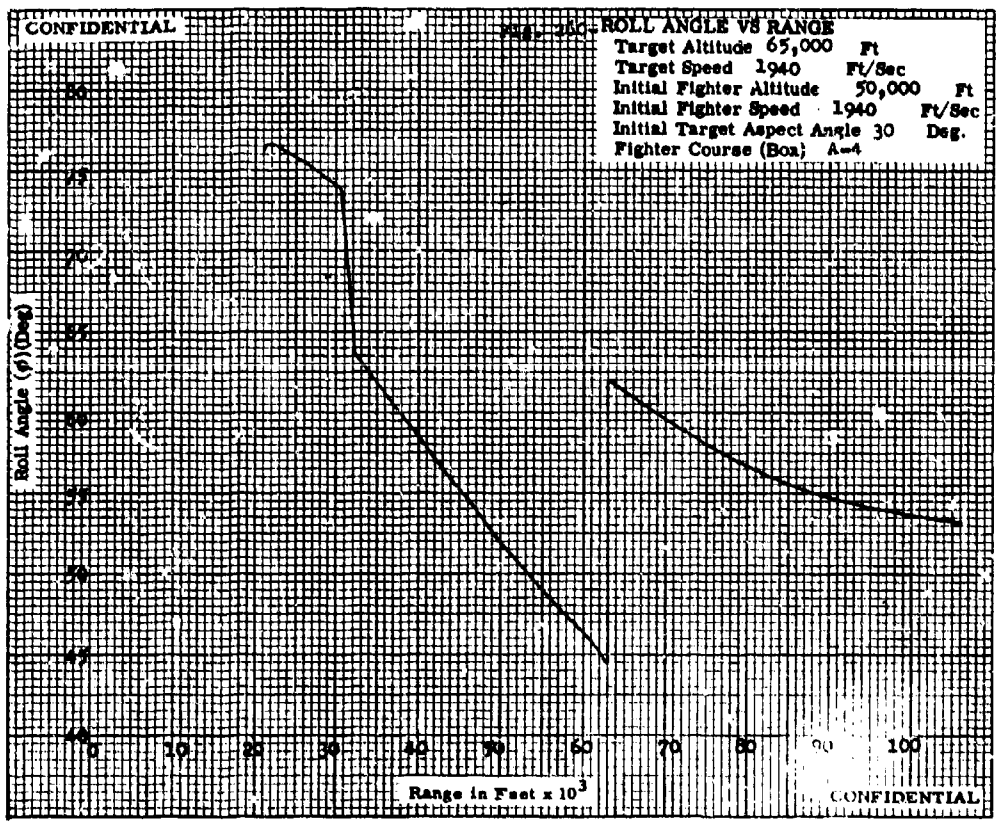

CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-1
Angle of Attack (α)(°)
Range in Feet x 10³
CONFIDENTIAL

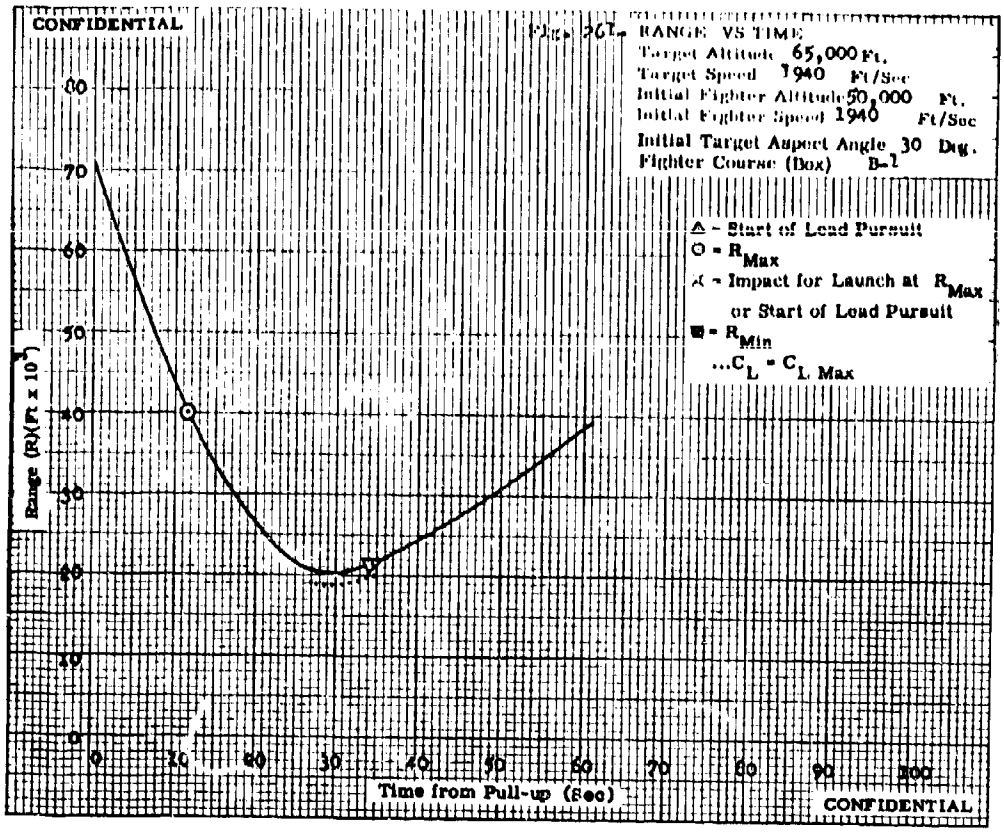

CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-4
Fighter Speed (V_F)(Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL

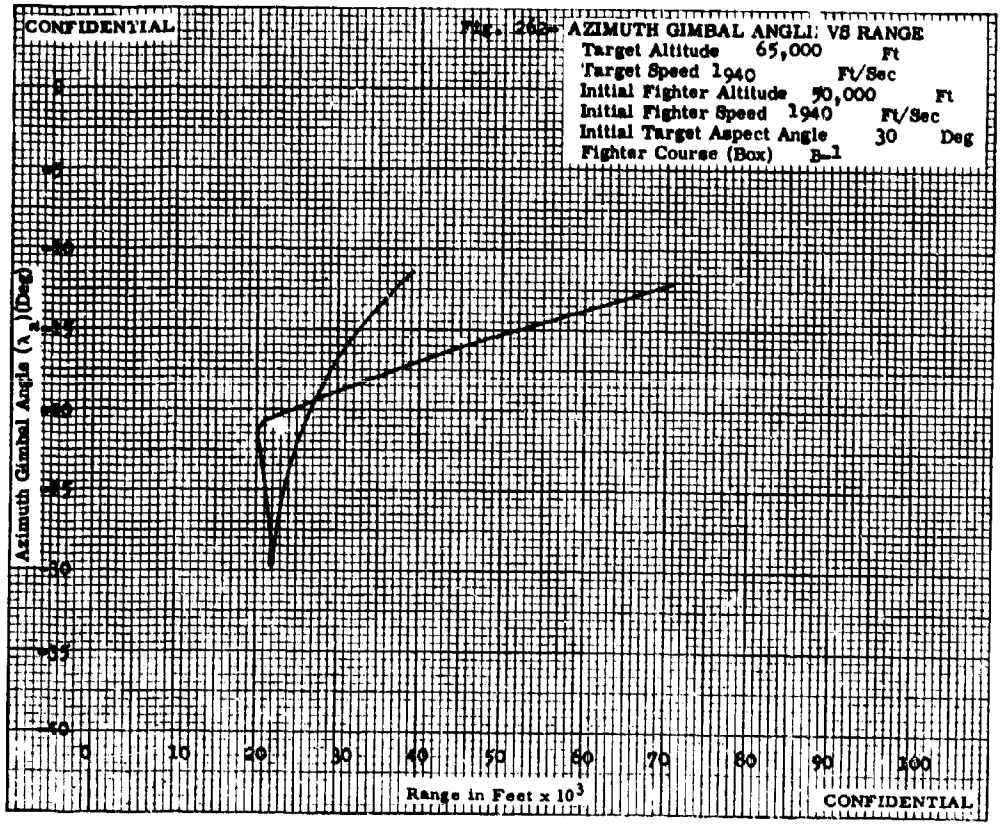

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
Fighter Altitude (R_z)(Ft x 10^3)
64
62
60
58
56
54
52
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

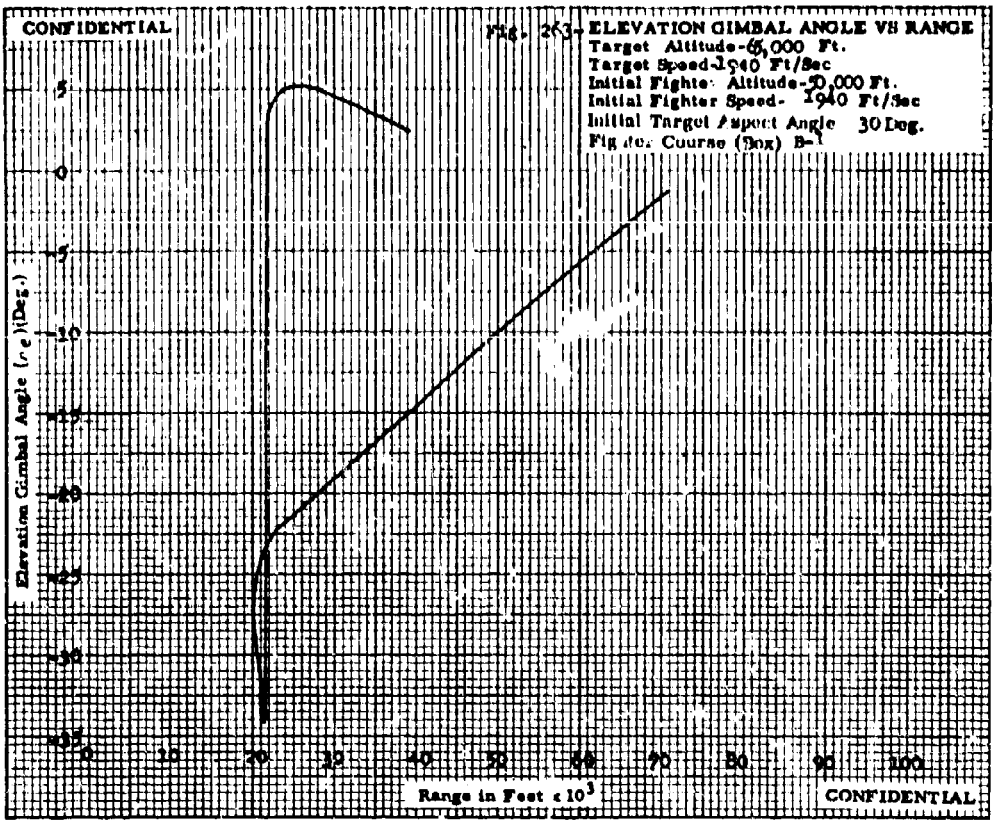

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
Target Aspect Angle (γ_T)(°)
110
100
90
80
70
60
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
Aircraft Heading Error
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-4
Roll Angle (φ) (Deg)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 26L - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
△ - Start of Lead Pursuit
○ - R_{Max}
⊿ - Impact for Launch at R_{Max} or Start of Lead Pursuit
▣ - R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 26M - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) B-1
Azimuth Gimbal Angle (λ_2) (Deg)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 263 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
Elevation Gimbal Angle (σe)(Deg.)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

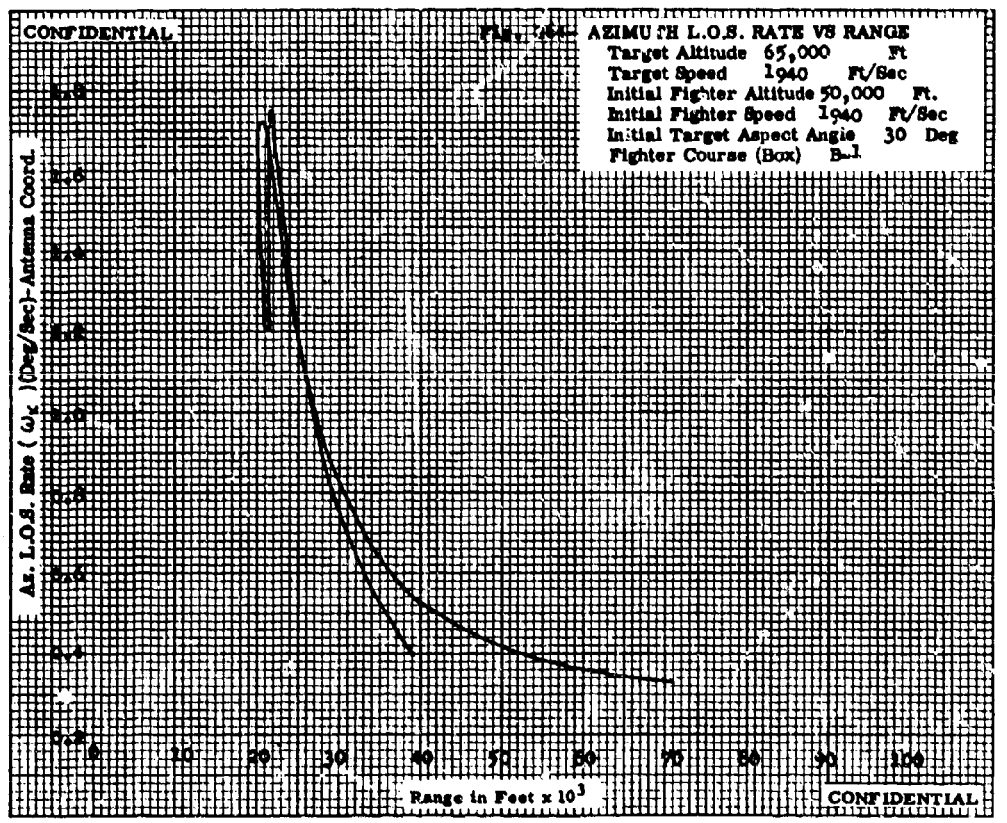

CONFIDENTIAL
Fig. 264 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) B-1
Az. L.O.S. Rate (ωε)(Deg/Sec)-Antenna Coord.
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

Fig. 265- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) B-1

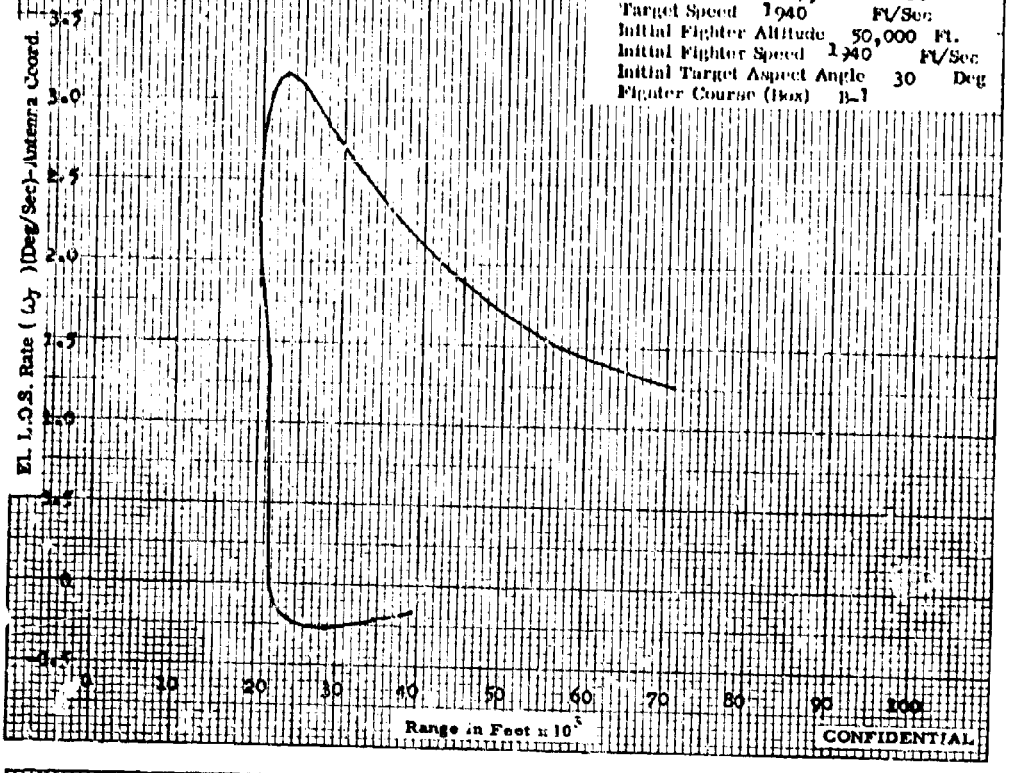
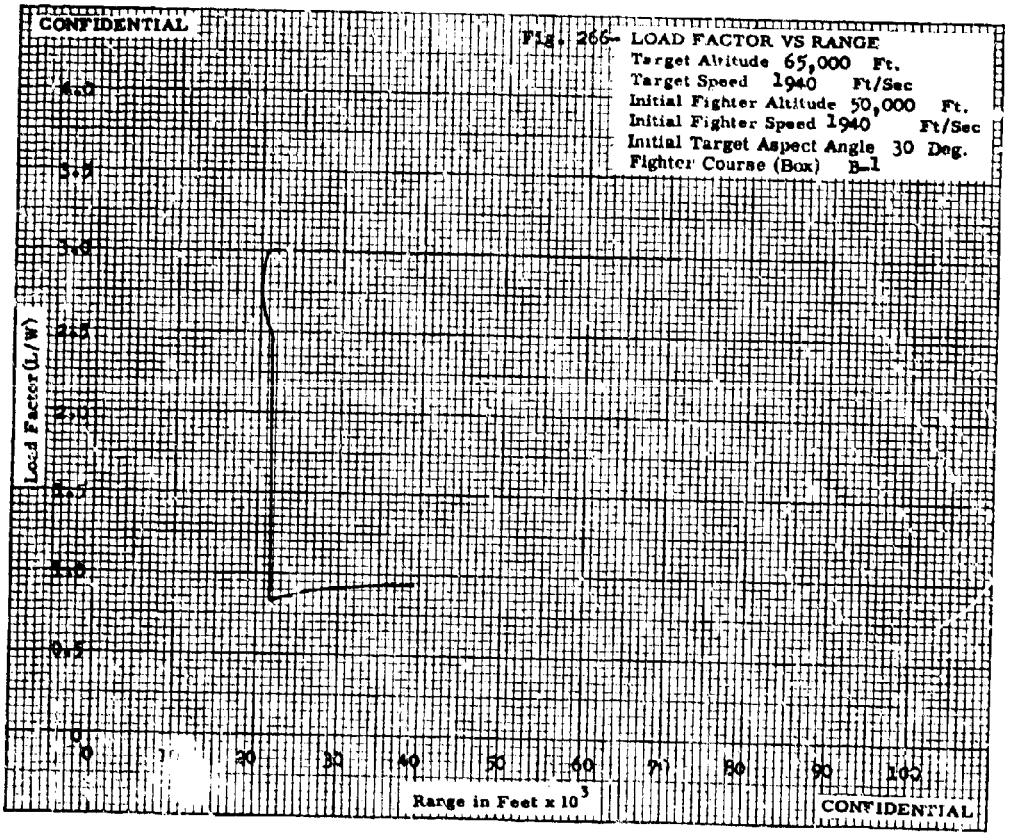
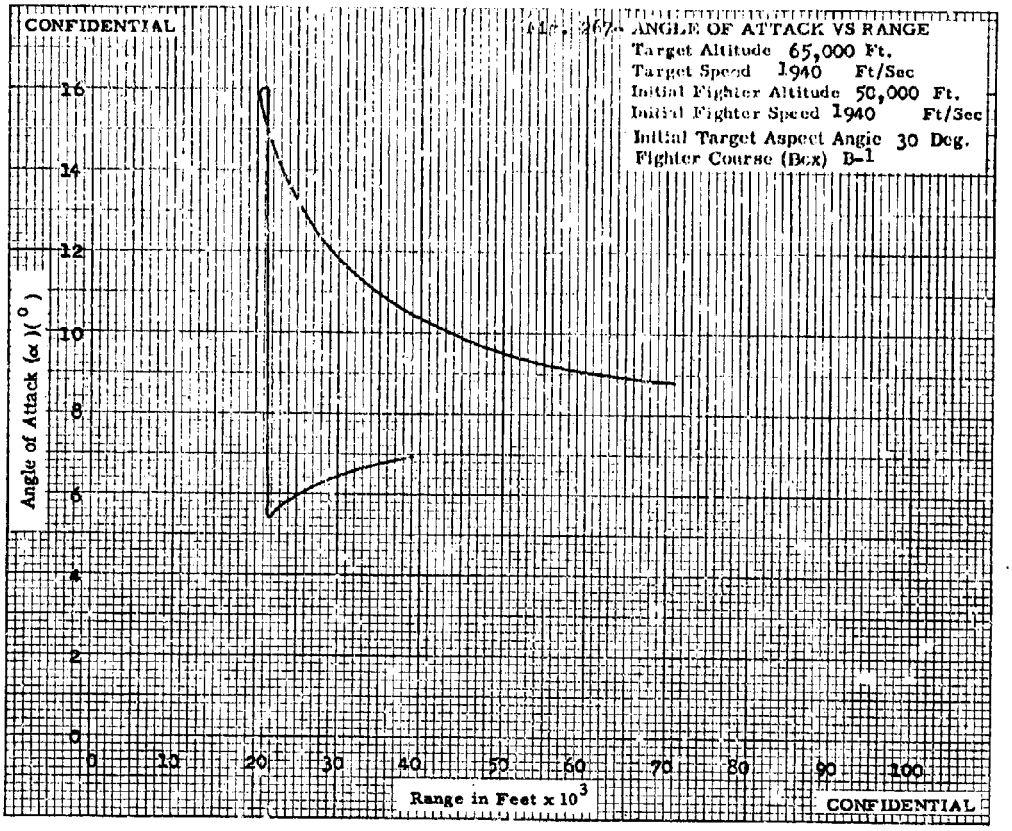
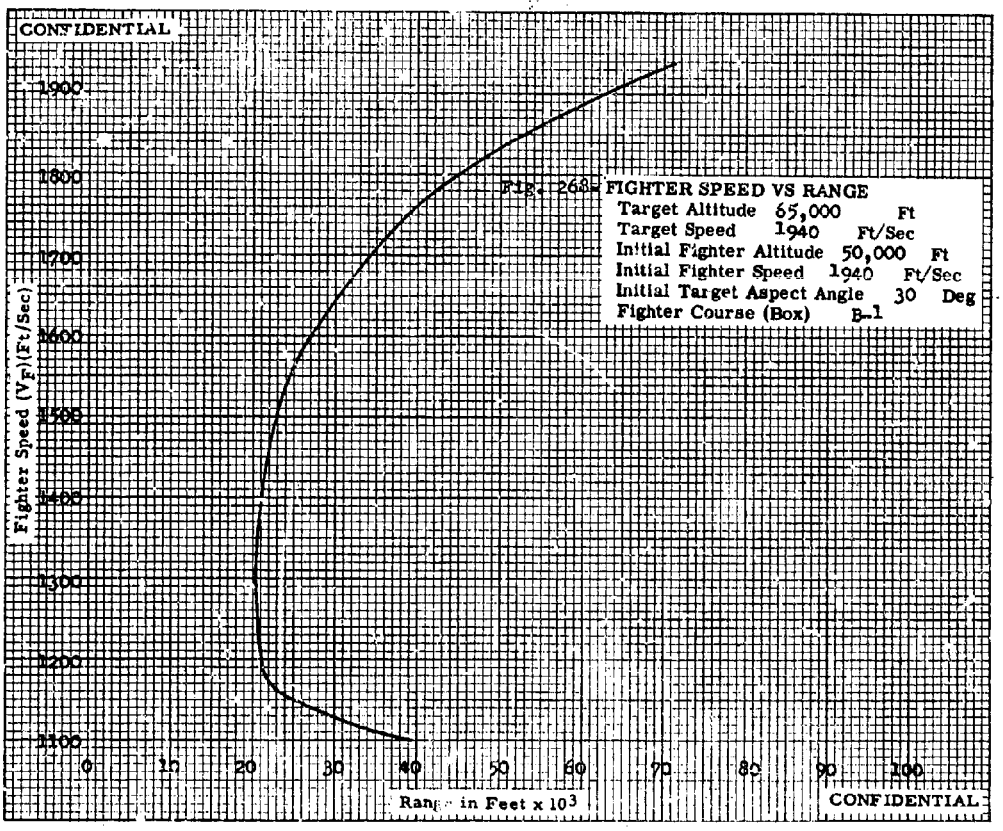
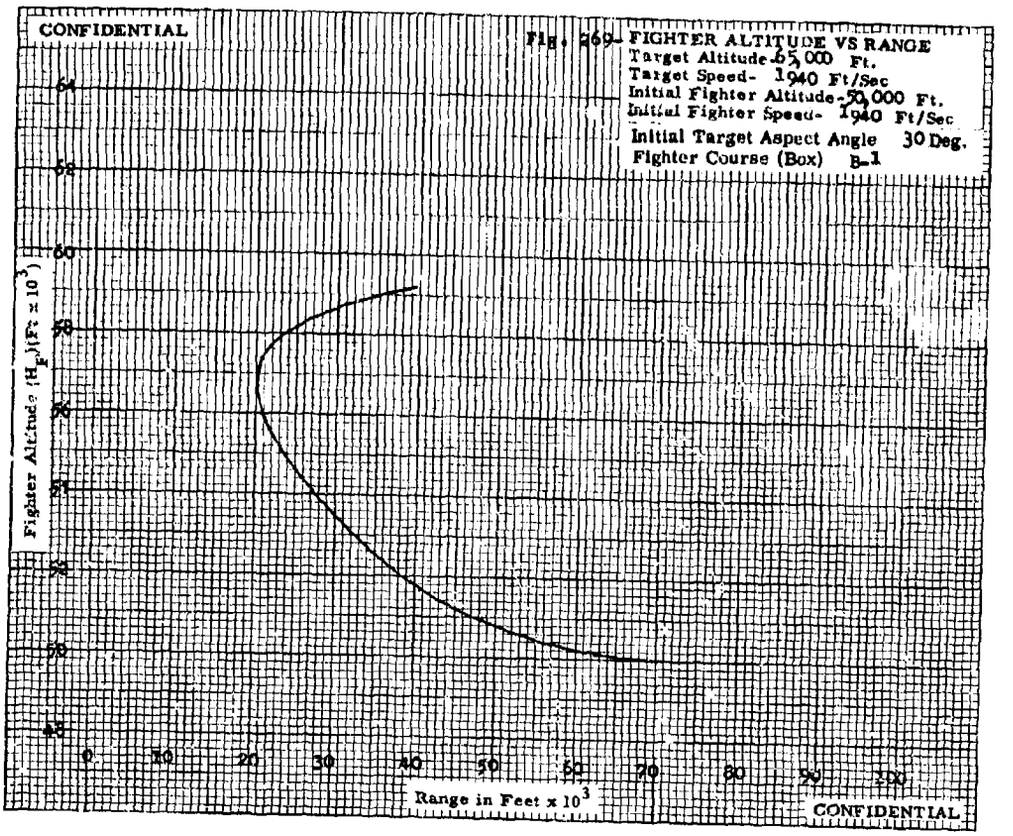


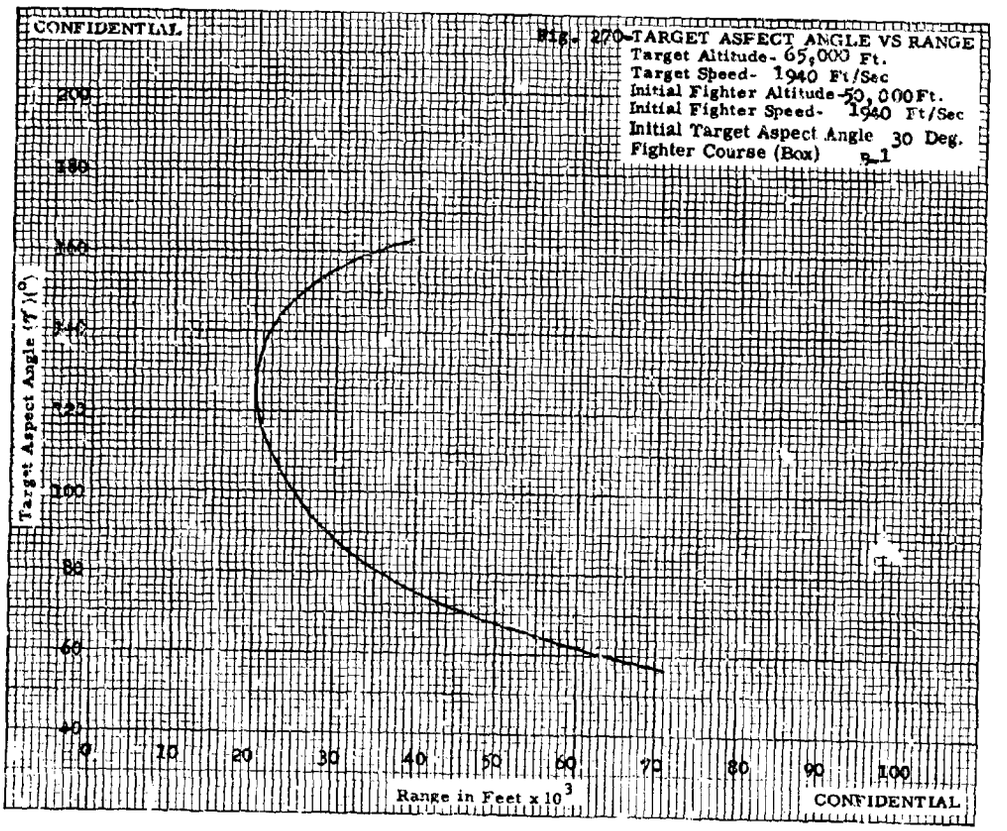
Fig. 266- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1

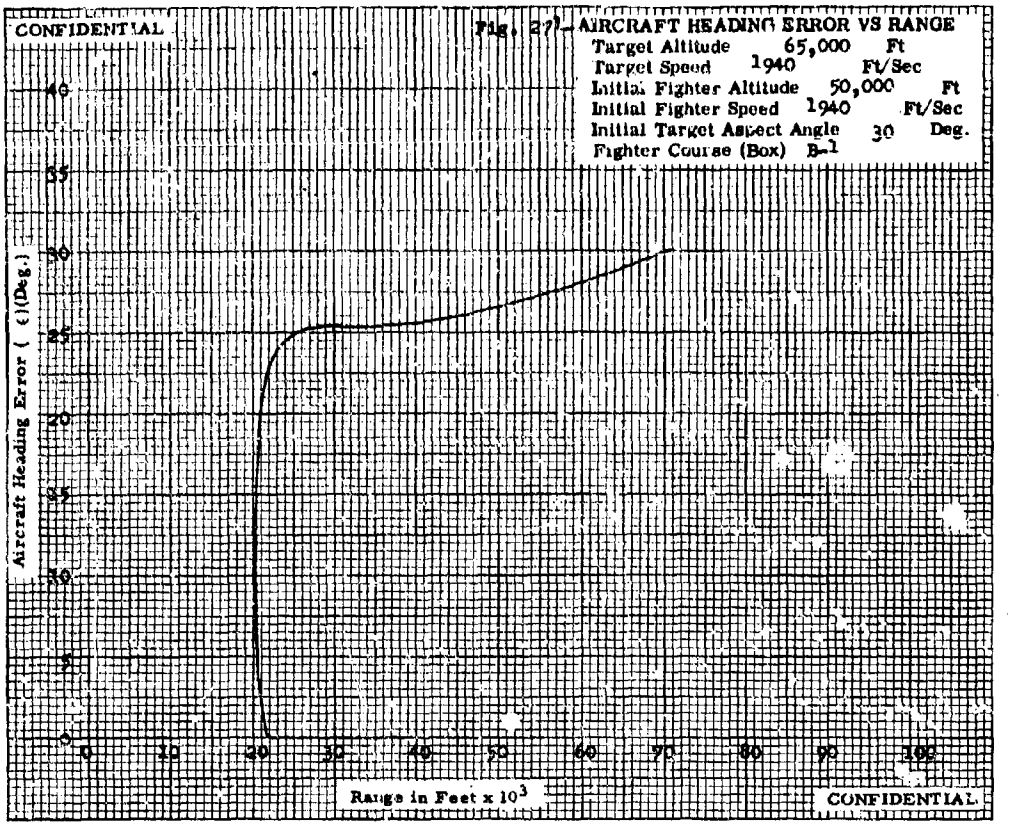


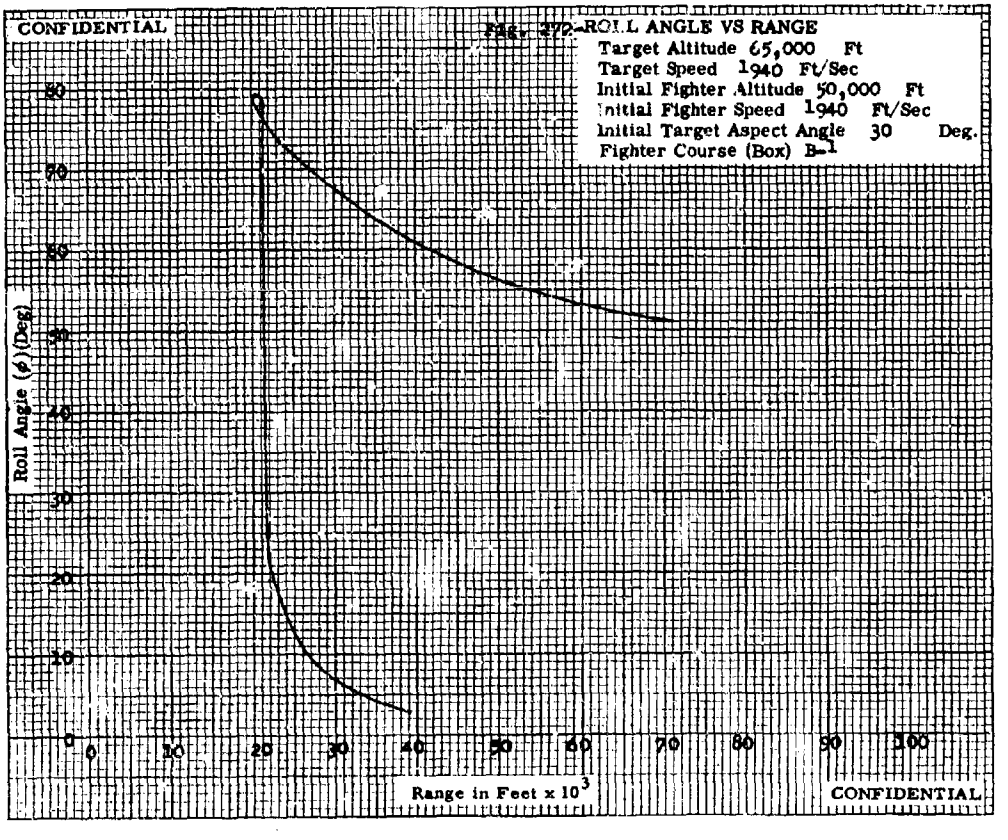

CONFIDENTIAL
Fig. 267
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

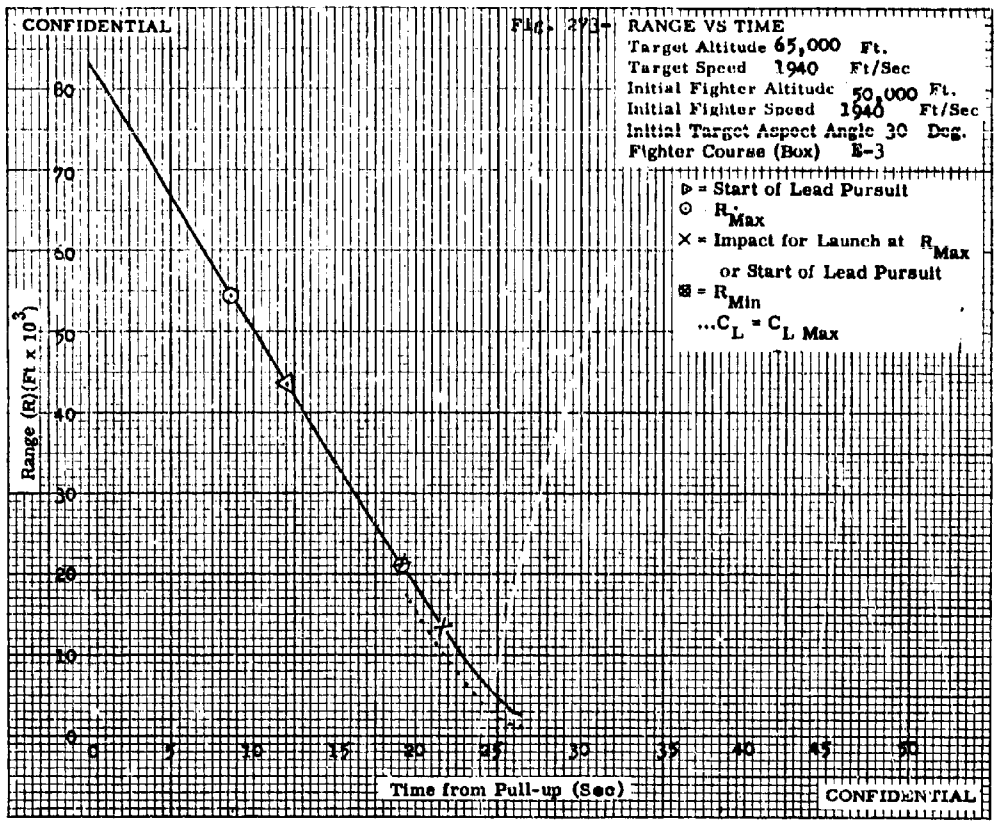

CONFIDENTIAL
Fig. 268
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) B-1
Fighter Speed (VF)(Ft/Sec)
1900
1800
1700
1600
1500
1400
1300
1200
1100
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 269- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
Fighter Altitude (H_F)(Ft x 10^3)
64
62
60
58
56
54
52
50
48
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 270-TARGET ASFECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
Target Aspect Angle (Ψ')(^{0})
200
180
160
140
120
100
80
60
40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 27 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
Aircraft Heading Error (ε)(Deg.)
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 27a - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) B-1
Roll Angle (φ)(Deg)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 273
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL

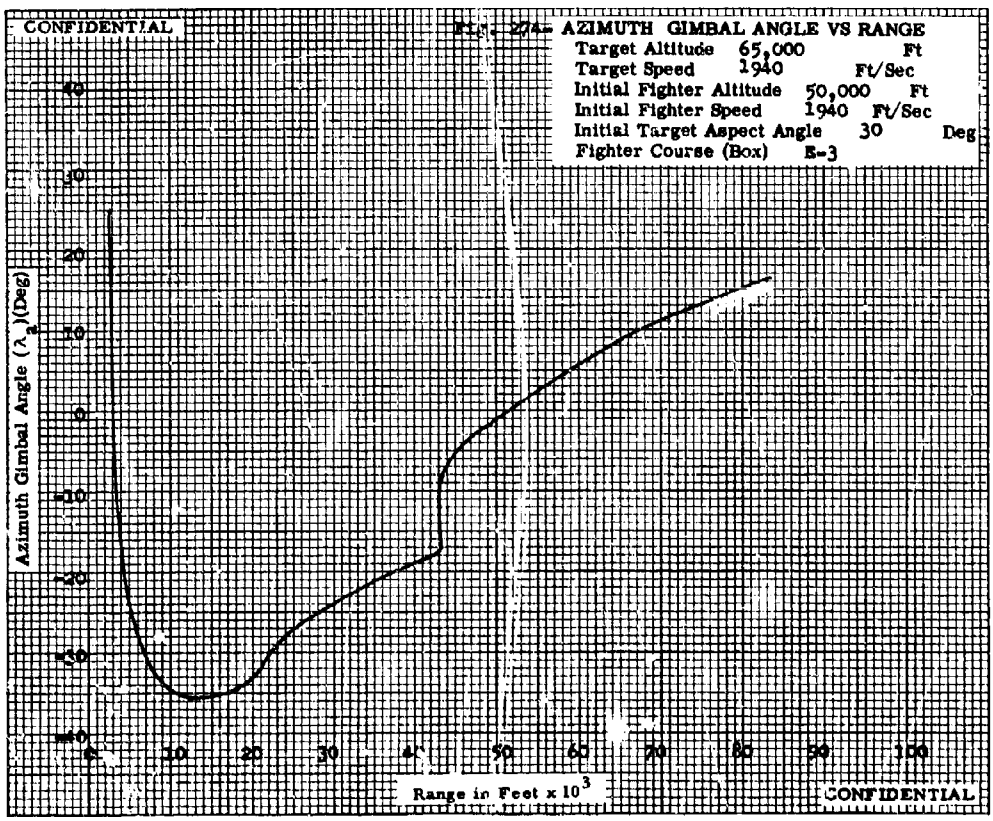

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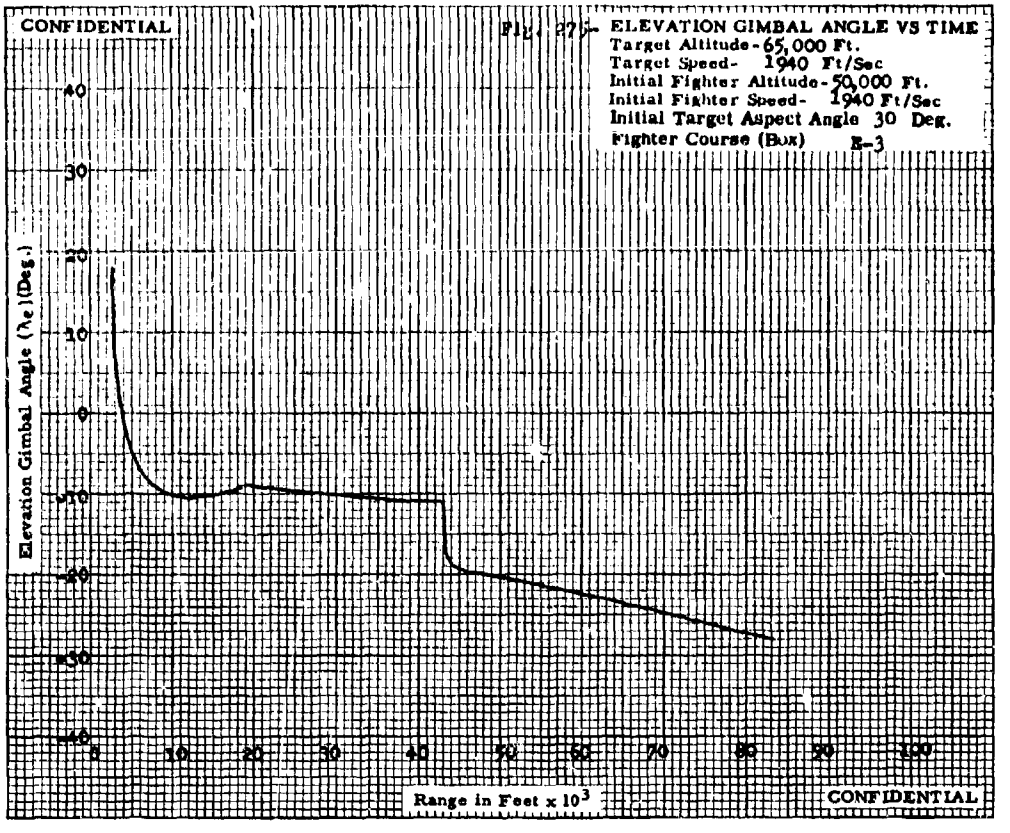
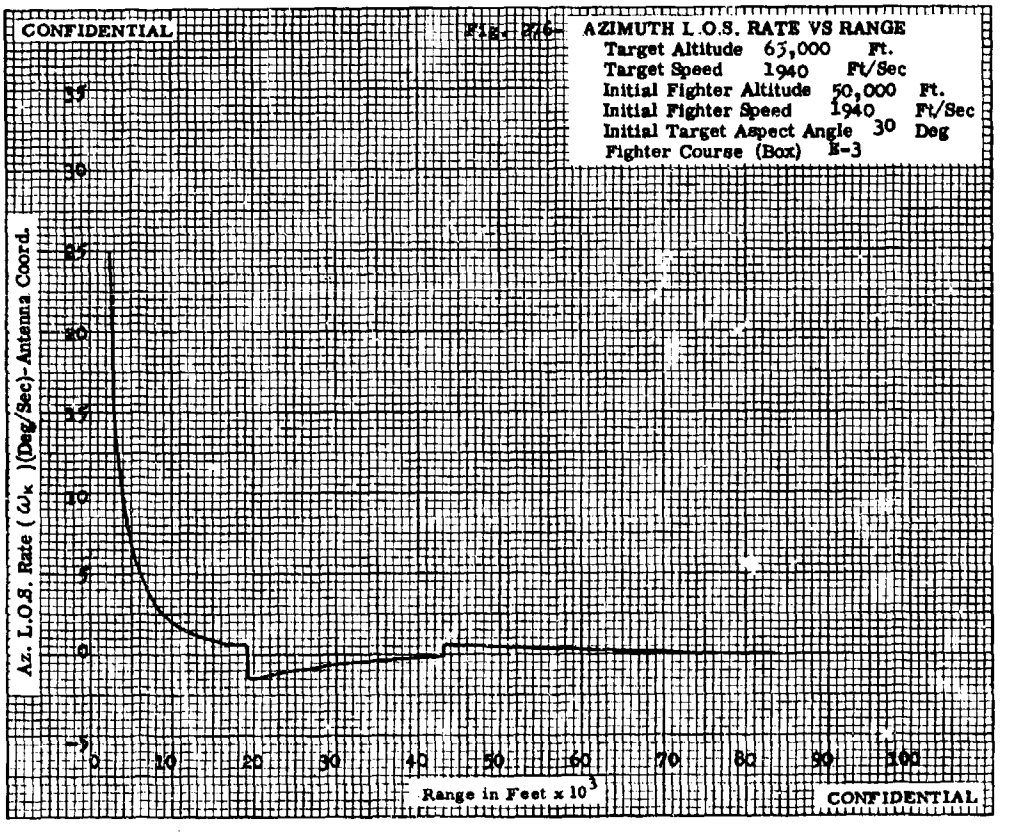
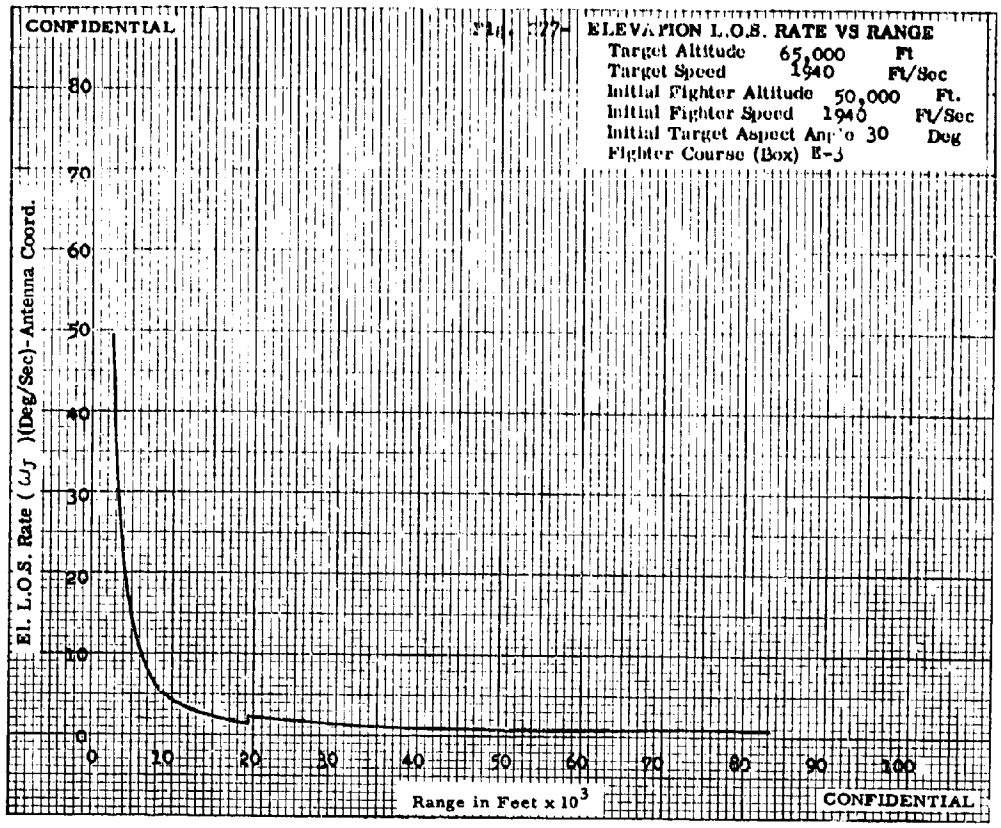
Fig. 274
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 275- ELEVATION GIMBAL ANGLE VS TIME
Target Altitude - 65,000 Ft.
Target Speed - 1940 Ft/Sec
Initial Fighter Altitude - 50,000 Ft.
Initial Fighter Speed - 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Elevation Gimbal Angle (λ_e)(Deg.)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 276- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Az. L.O.S. Rate (ω_K)(Deg/Sec)-Antenna Coord.
35
30
25
20
15
10
5
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 277
ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
El. L.O.S. Rate (ω_f) (Deg/Sec)-Antenna Coord.
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

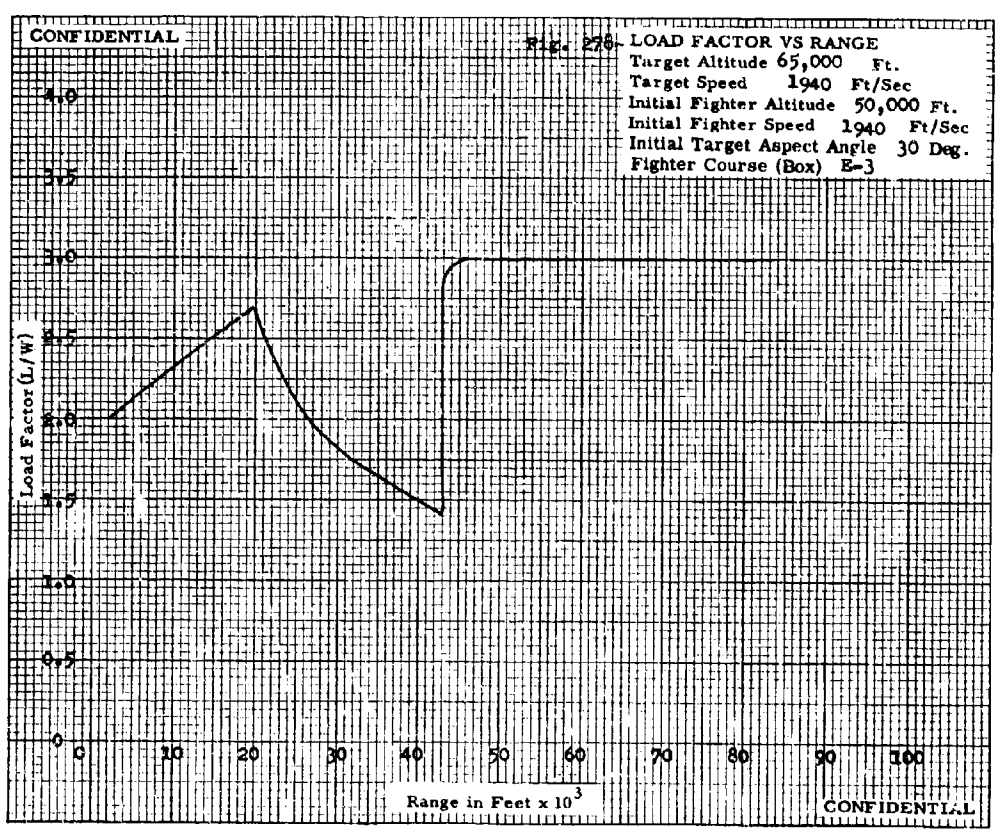

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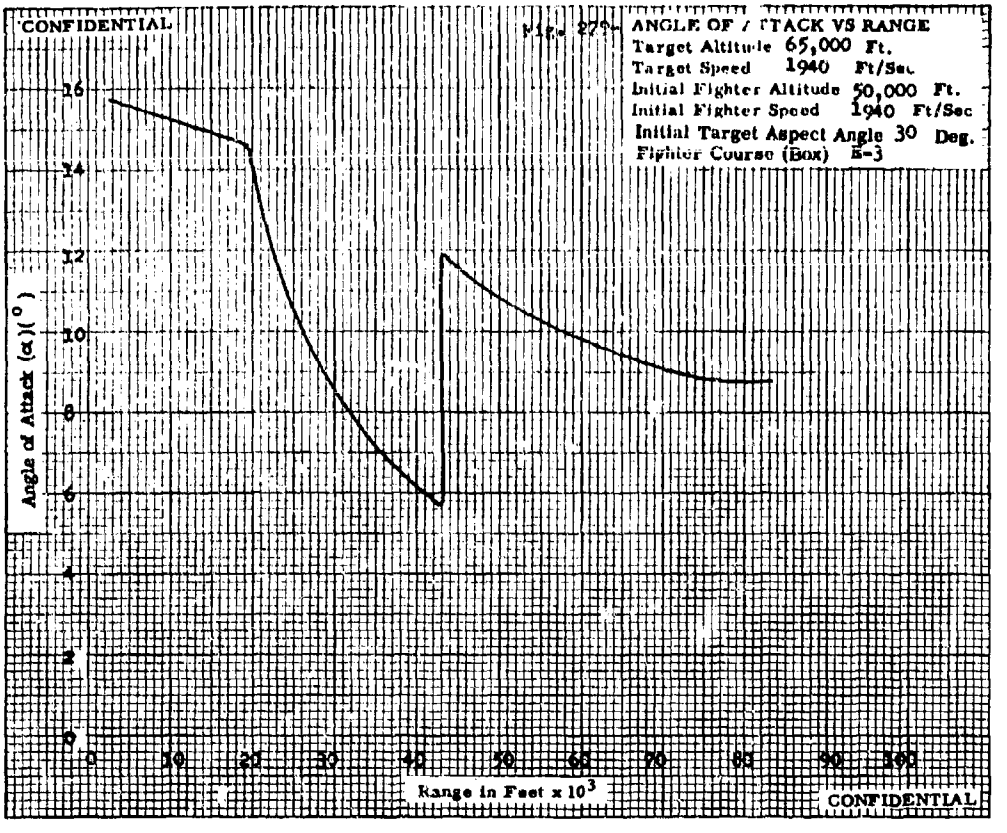
Fig. 278
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 279
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Angle of Attack (α)(°)
26
24
22
20
18
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

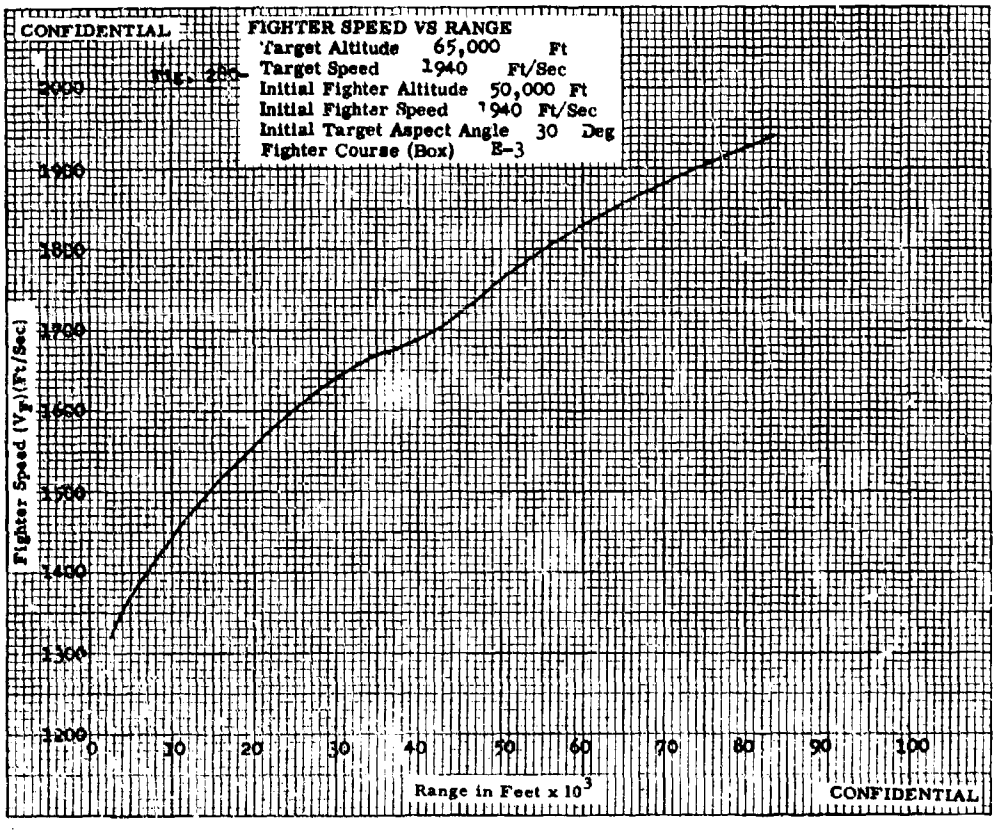

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Fig. 280
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Fighter Speed (Vf)(Ft/Sec)
2000
1900
1800
1700
1600
1500
1400
1300
1200
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

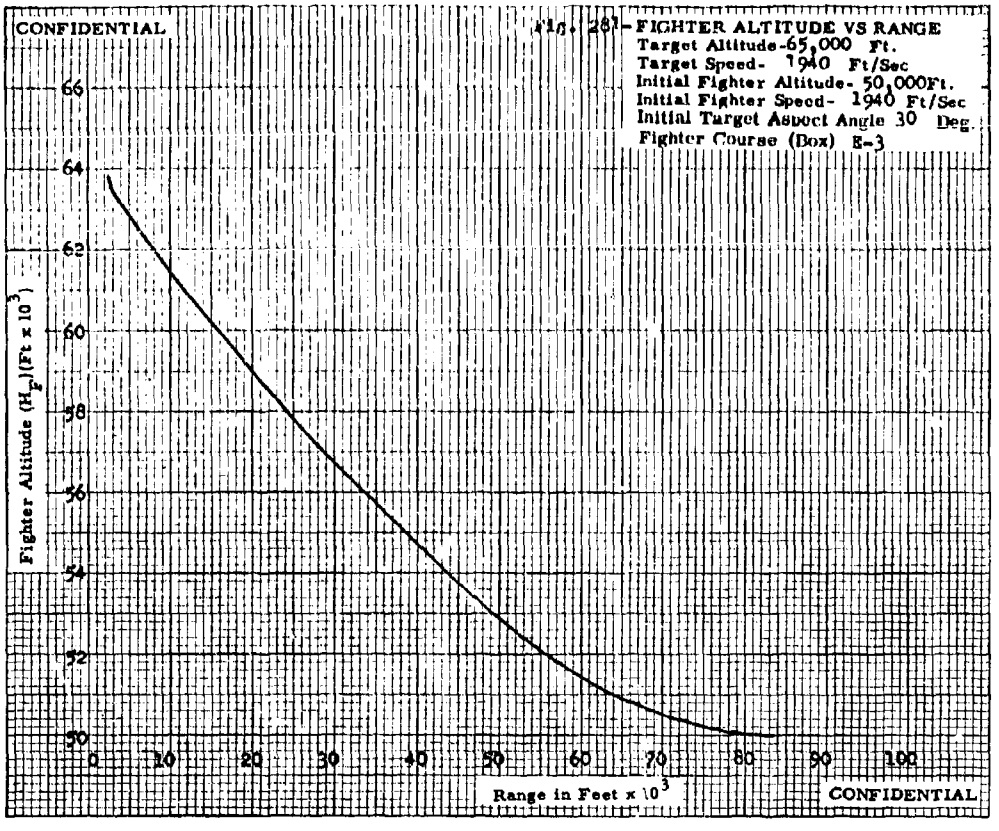
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Fig. 28 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Fighter Altitude (H_F)(Ft x 10^3)
66
64
62
60
58
56
54
52
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

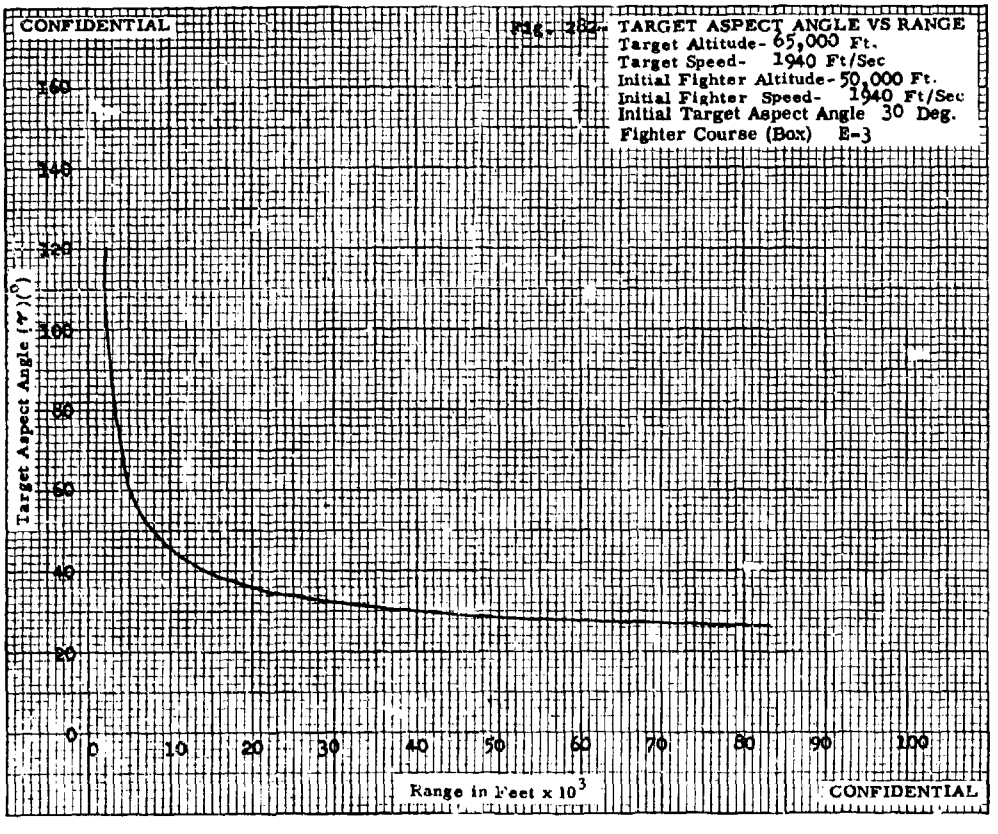
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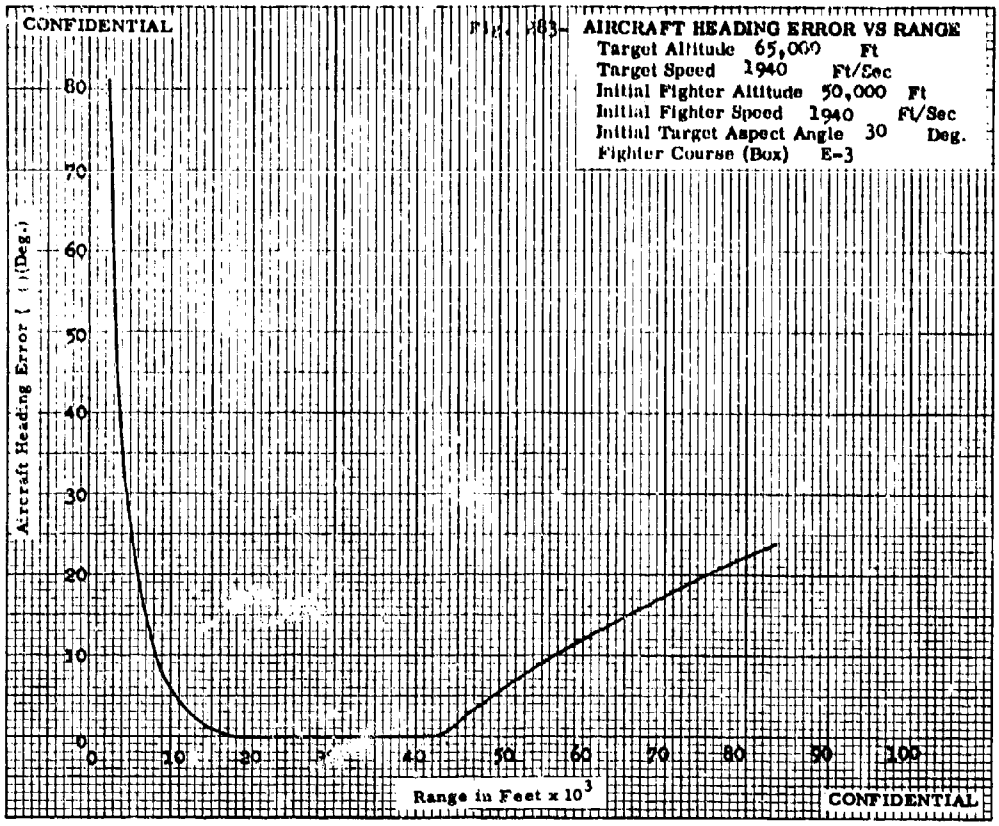
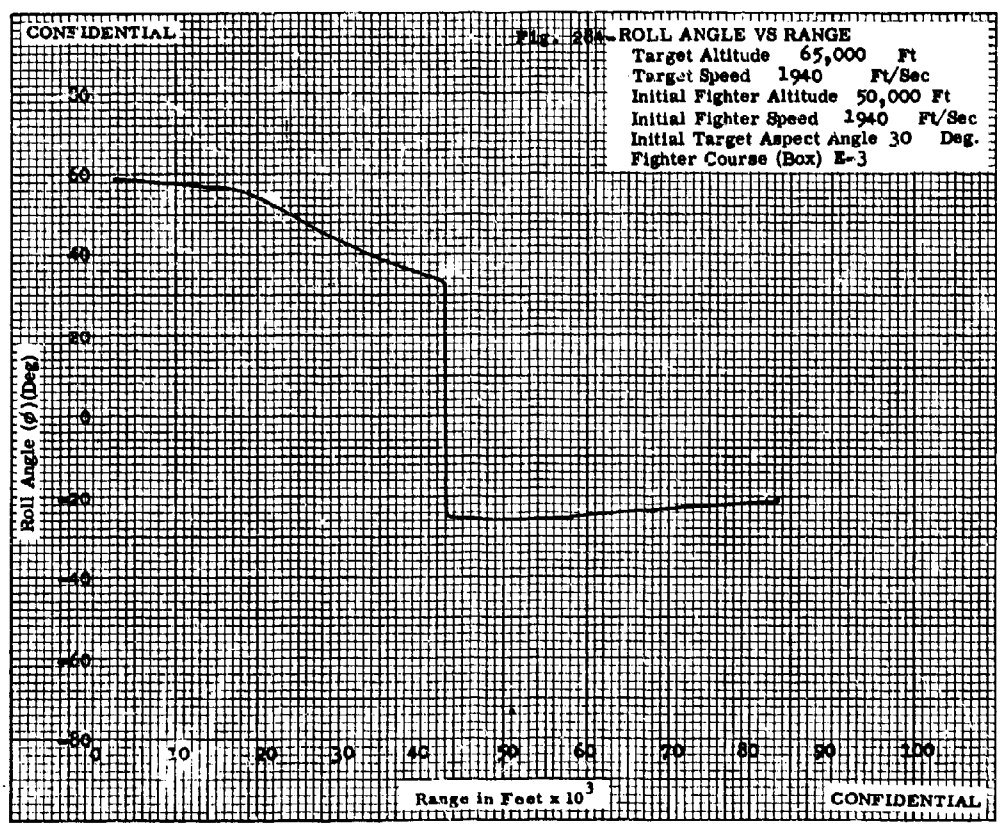
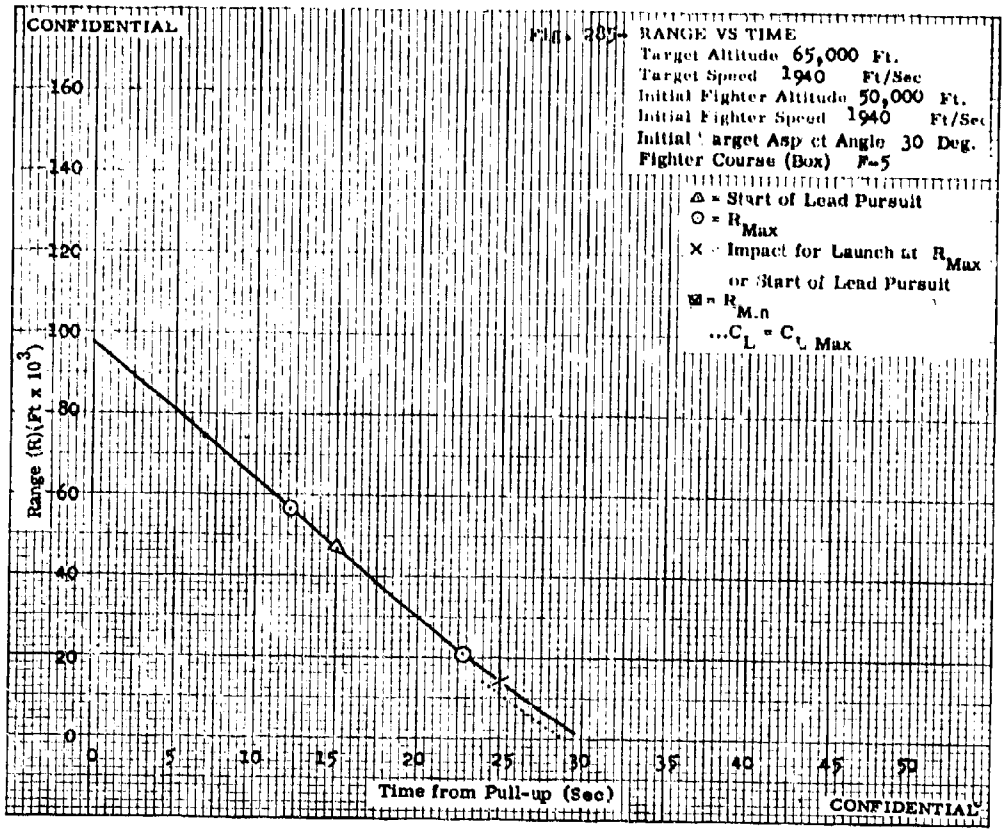
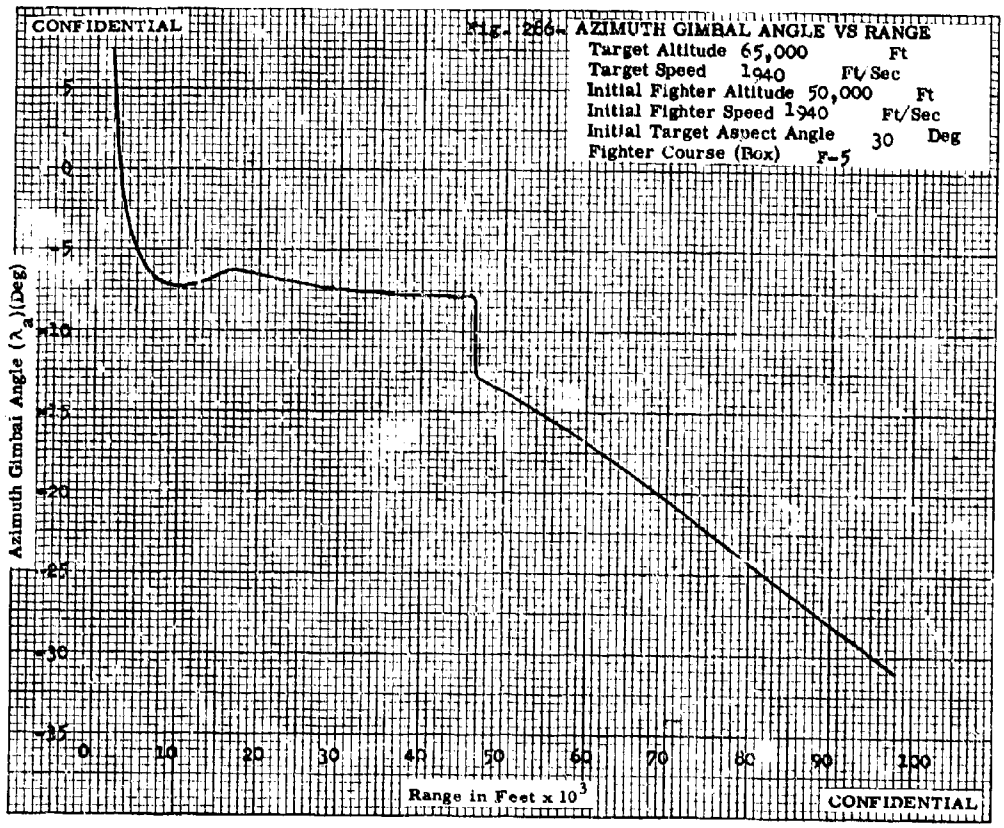
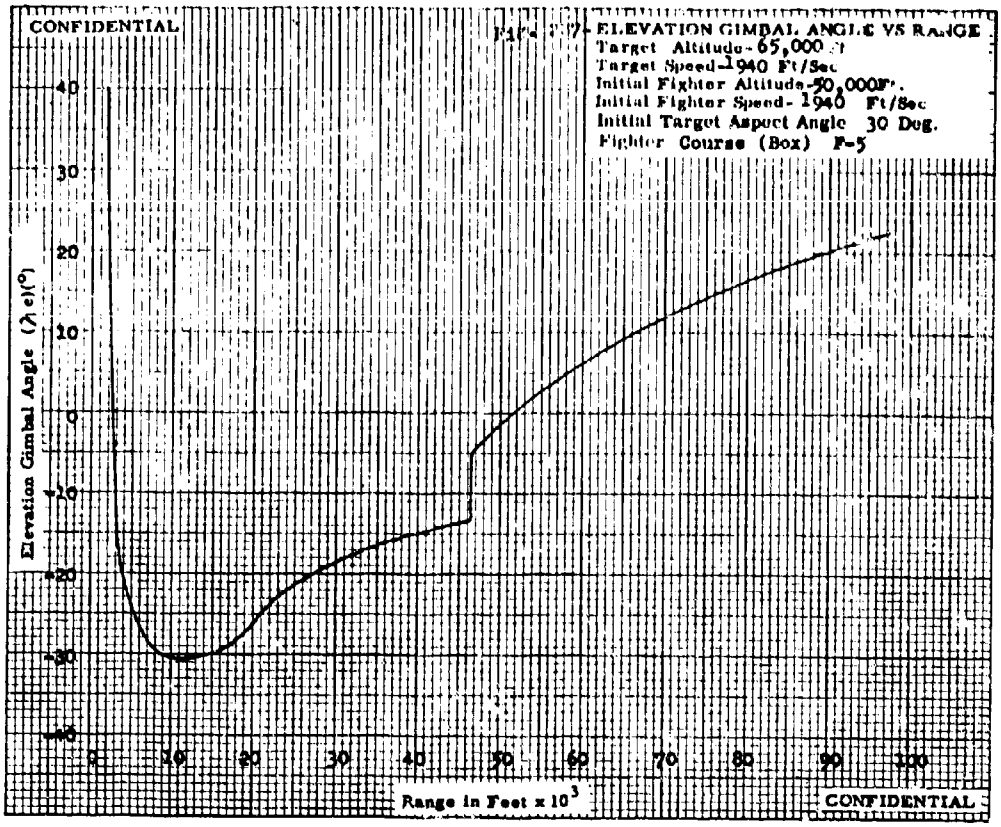
Fig. 28a - TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Target Aspect Angle (Ψ)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

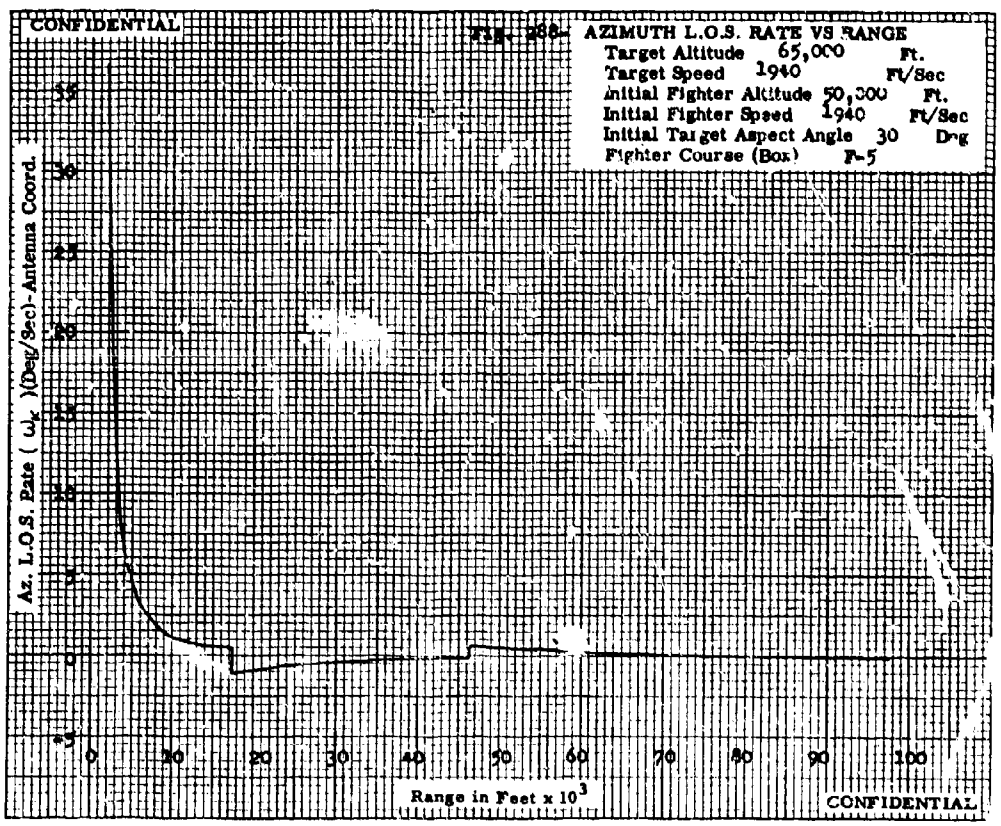

CONFIDENTIAL
Fig. 283 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Aircraft Heading Error ( )(Deg.)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

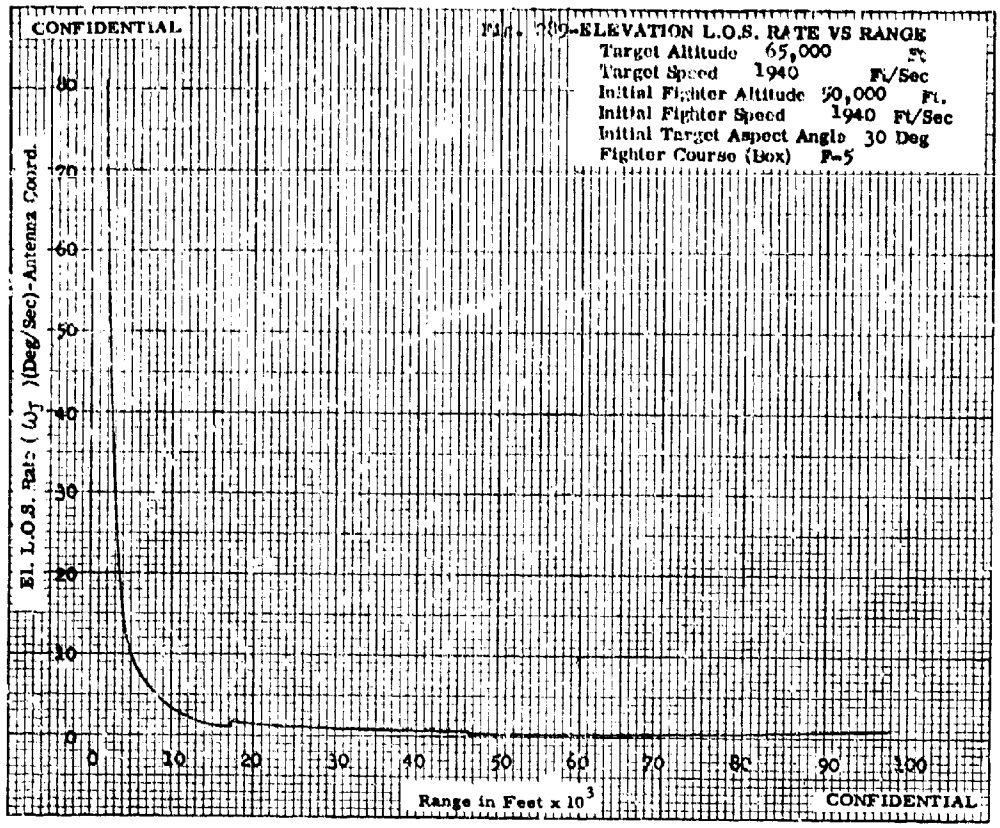

CONFIDENTIAL
Fig. 284 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Roll Angle (ϕ)(Deg)
50
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

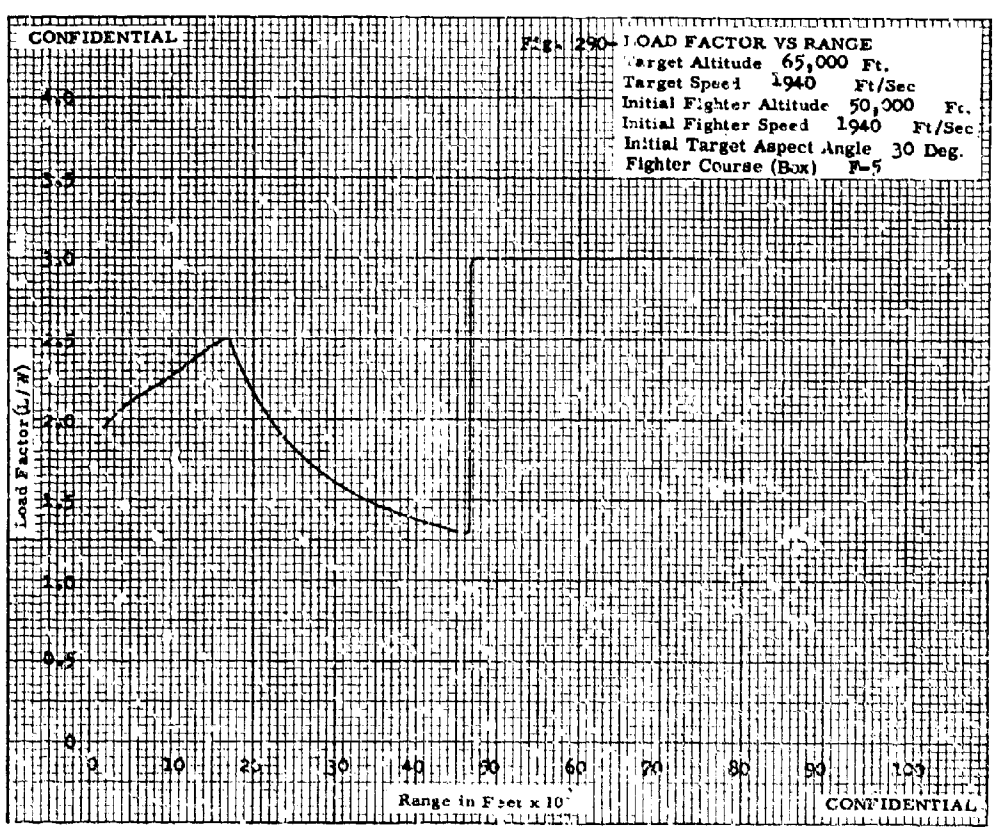

CONFIDENTIAL
Fig. 285 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
△ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = $R_{M.n}$ ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

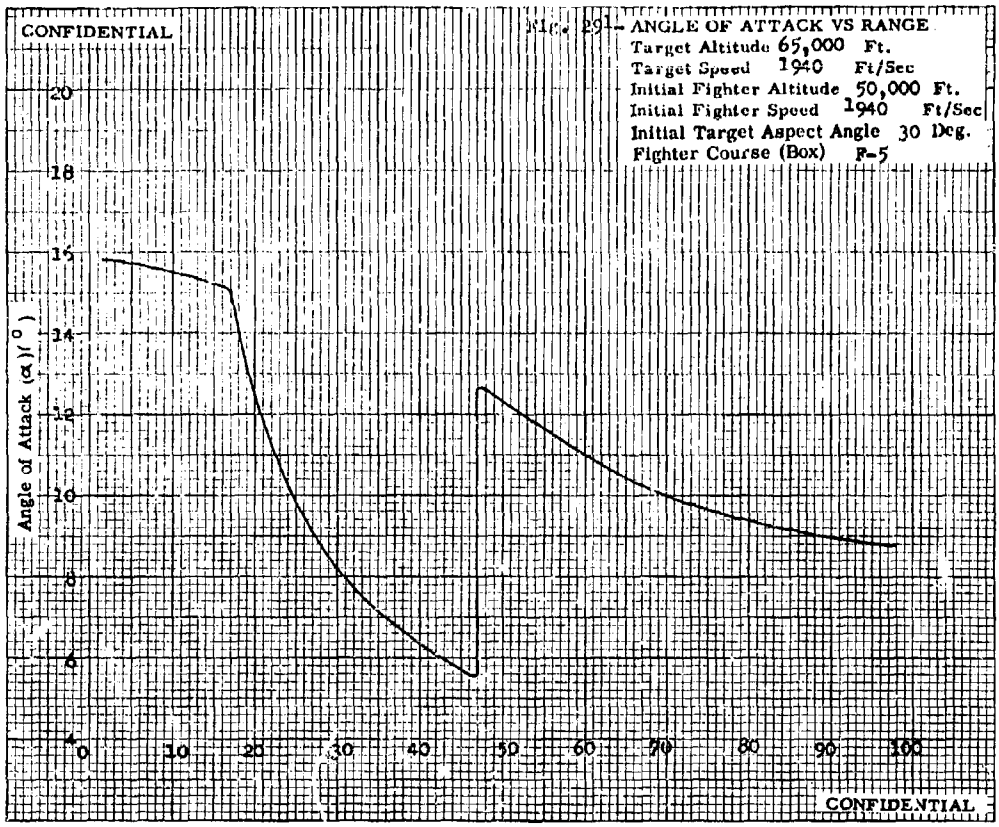

CONFIDENTIAL
Fig. 286 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-5
Azimuth Gimbal Angle (λ_a)(Deg)
5
0
-5
-10
-15
-20
-25
-30
-35
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

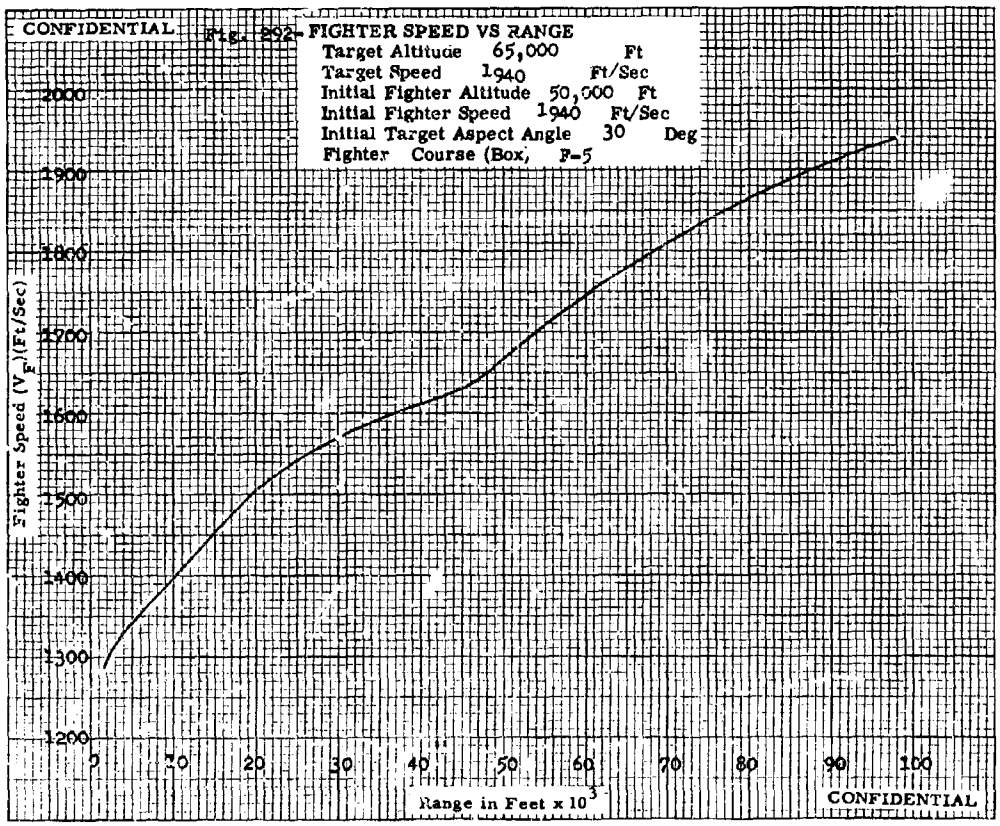

CONFIDENTIAL
FIG. 27- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-50,000Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Elevation Gimbal Angle (λ el)(°)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIG. 28- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-5
Az. L.O.S. Rate (ω_λ)(Deg/Sec)-Antenna Coord.
0
-5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 289-ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) F-5
El. L.O.S. Rate (ω_y) (Deg/Sec)-Antenna Coord.
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 290-LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Load Factor (L/W)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 291 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Angle of Attack (α)/(°)
20
18
16
14
12
10
8
6
4
0
10
20
30
40
50
60
70
80
90
100
CONFIDENTIAL


CONFIDENTIAL
Fig. 292 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box, F-5
Fighter Speed (V_F)/(Ft/Sec)
2000
1900
1800
1700
1600
1500
1400
1300
1200
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

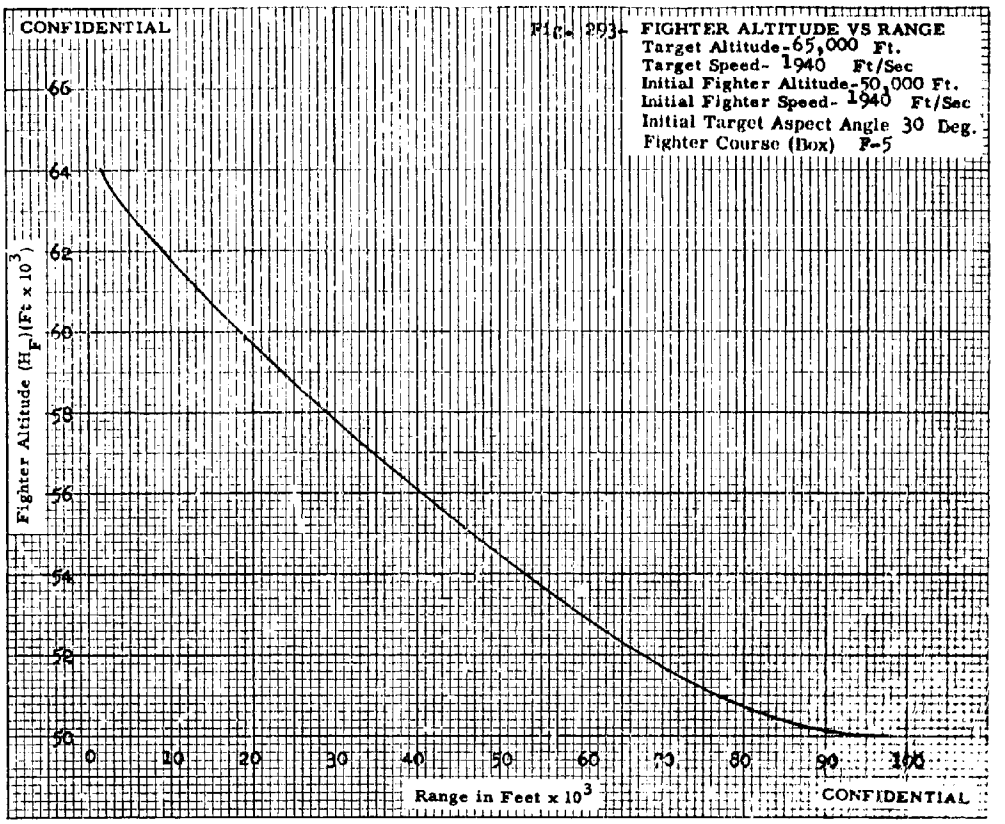

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FIG. 293 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Fighter Altitude (H_F)(Ft x 10^3)
66
64
62
60
58
56
54
52
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

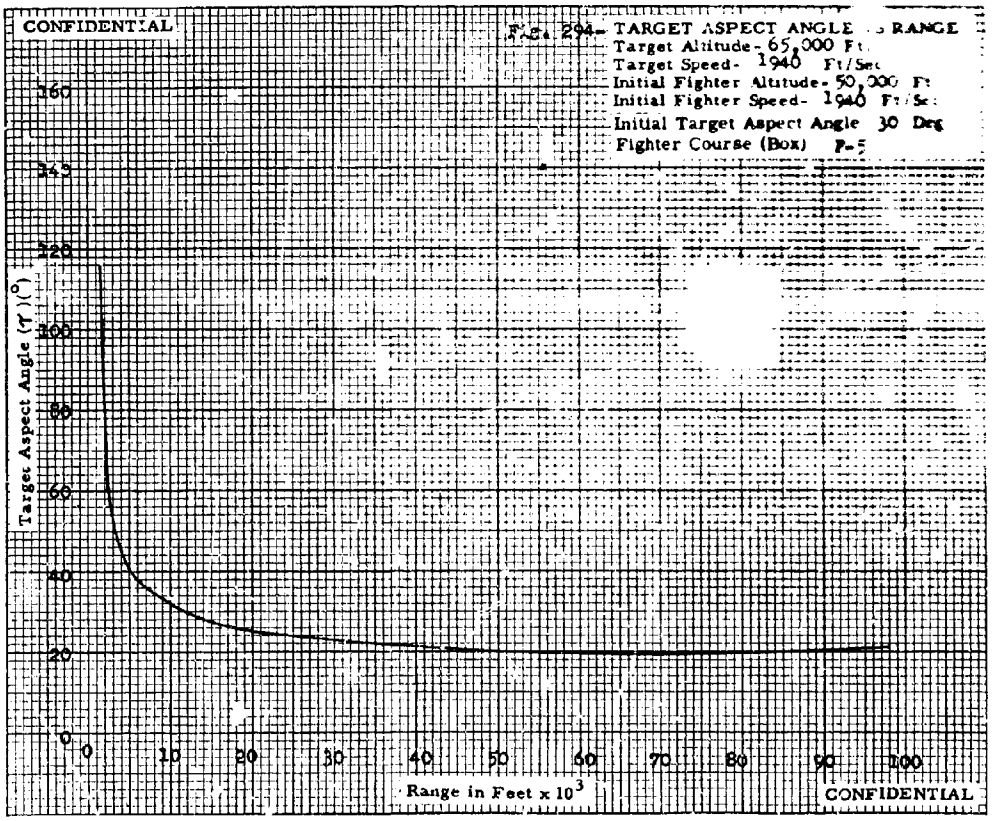
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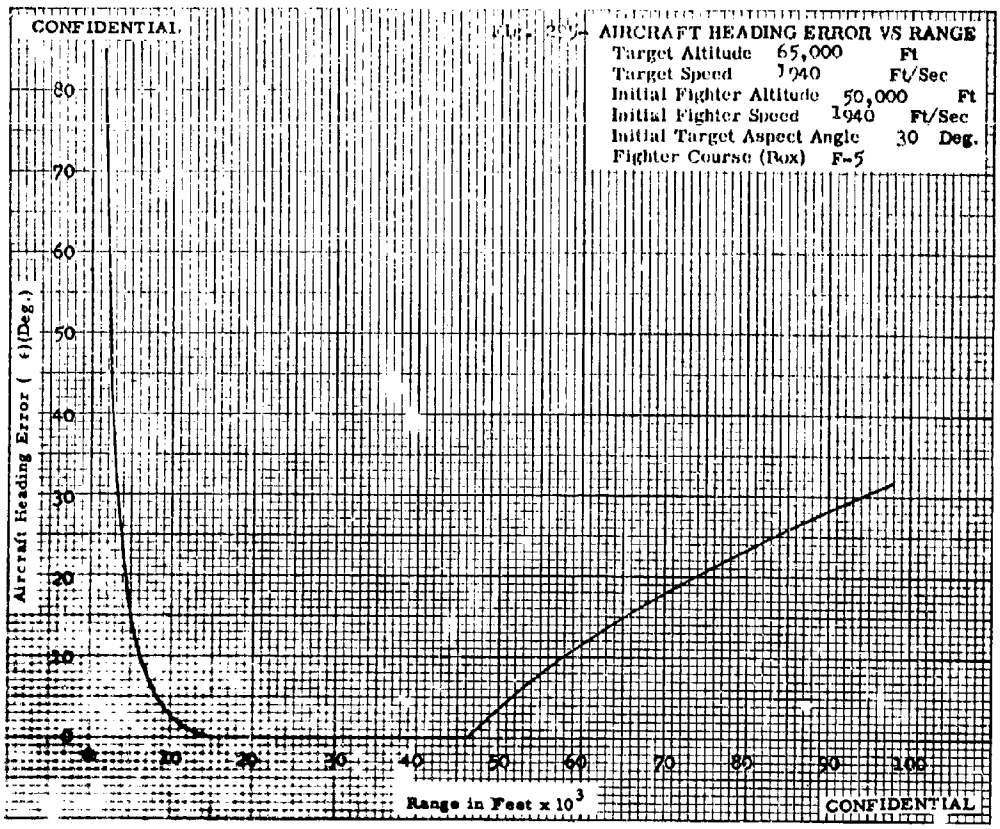
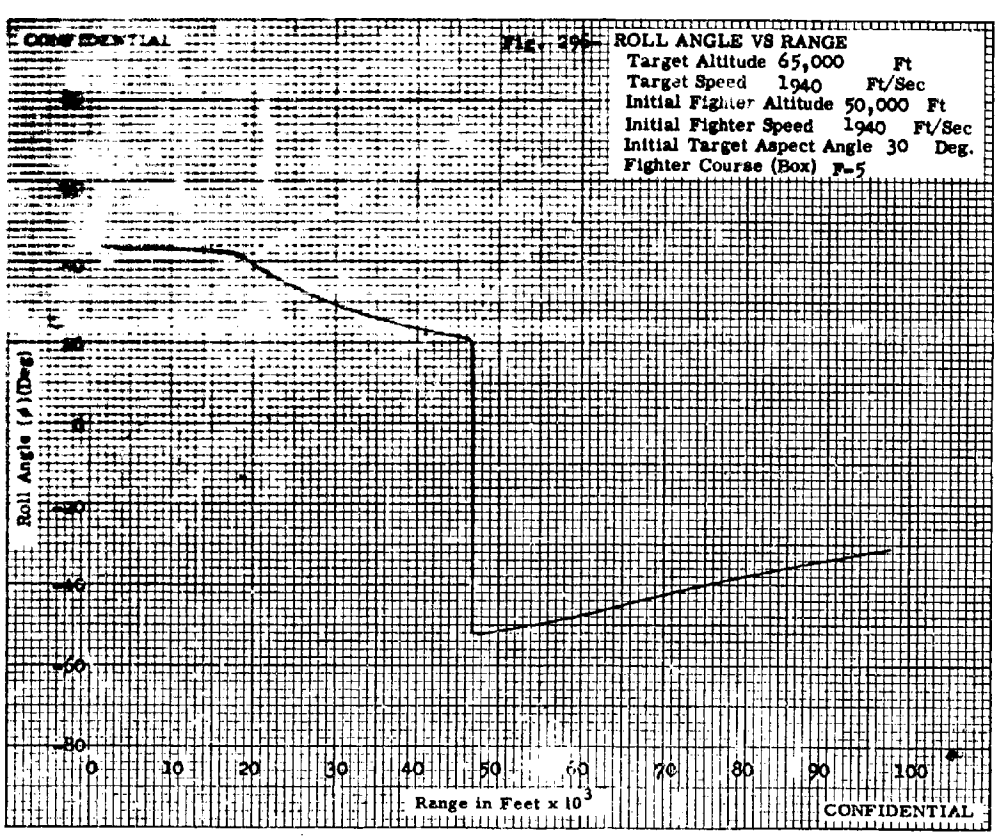
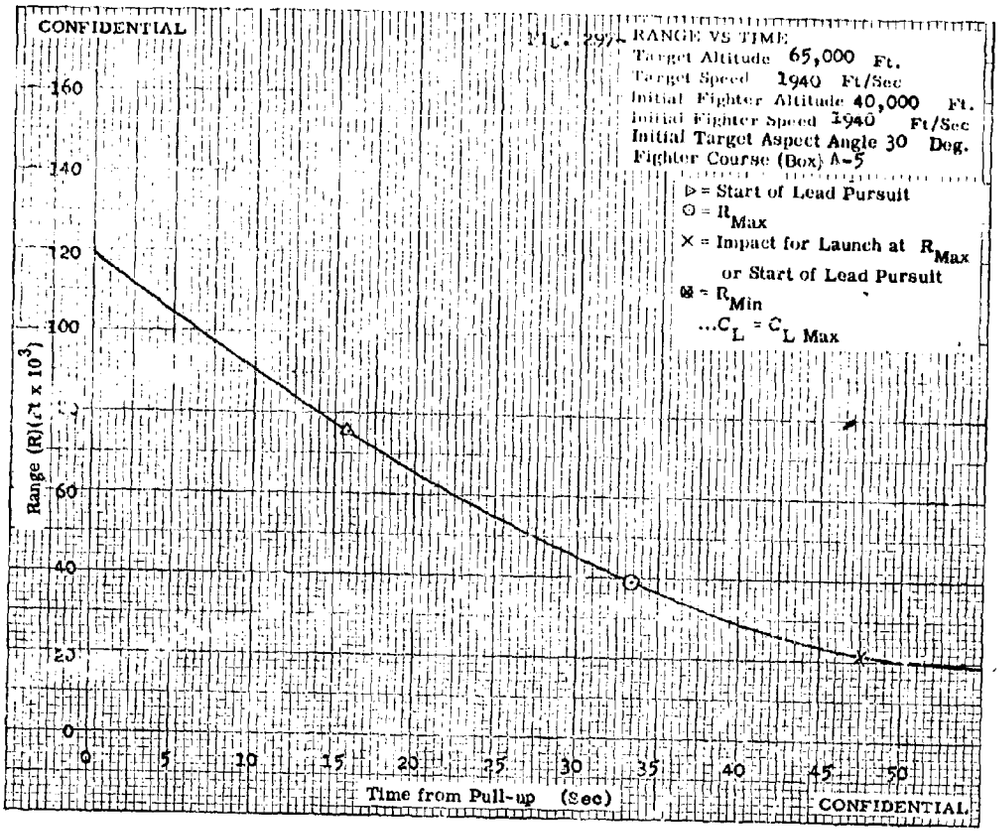
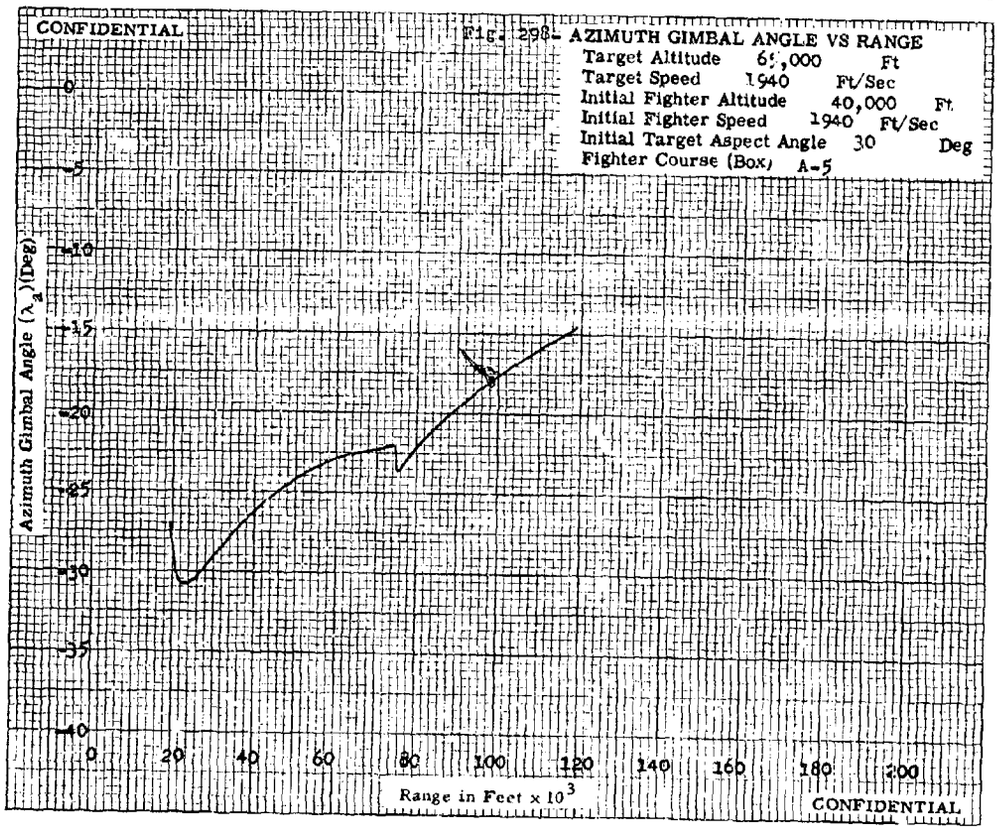
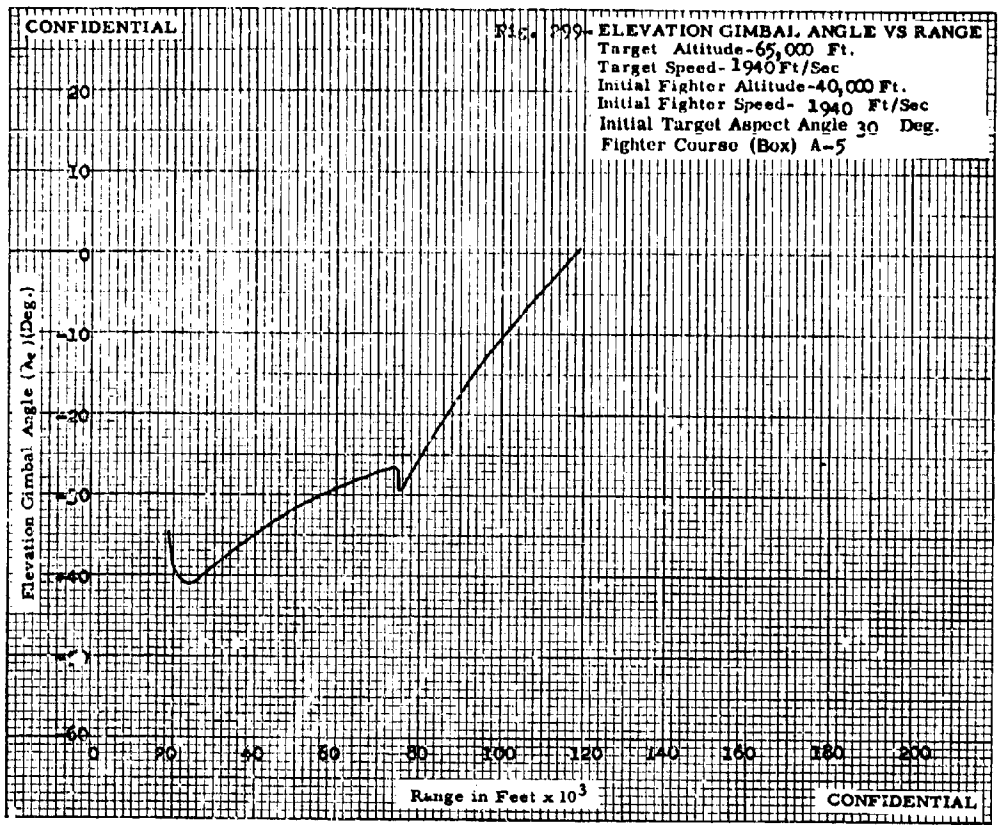
FIG. 294 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Target Aspect Angle (γ)(^{o})
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

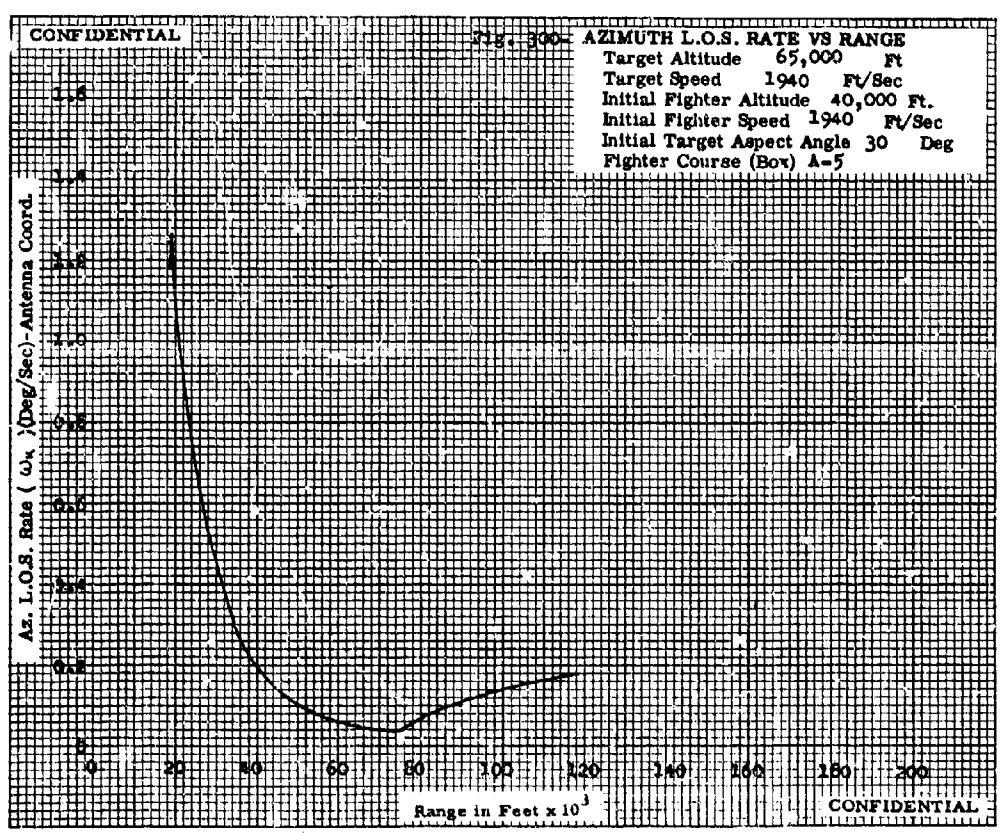

CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Aircraft Heading Error (ε)(Deg.)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

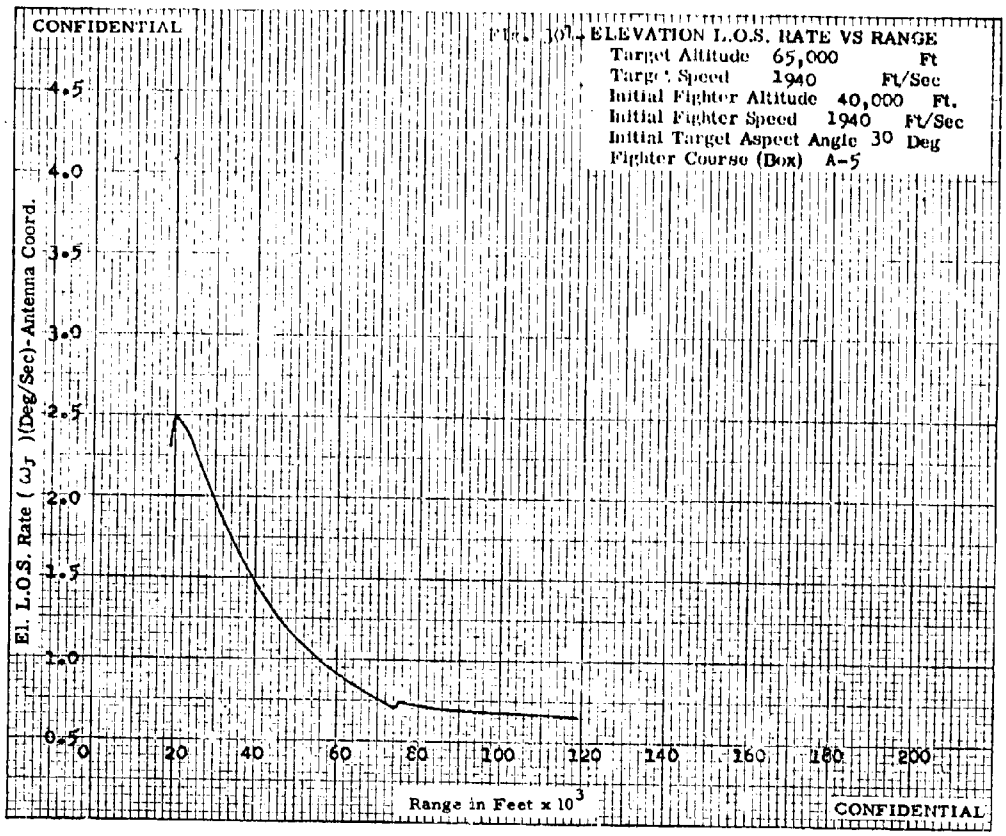

CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) F-5
Roll Angle (φ)(Deg)
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 297- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-5
⊳ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)($ft \times 10^3$)
160
140
120
100
80
60
40
20
0
0 5 10 15 20 25 30 35 40 45 50
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 298- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-5
Azimuth Gimbal Angle (λ_a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0 20 40 60 80 100 120 140 160 180 200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 299- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-5
Elevation Gimbal Angle (θe) (Deg.)
20
10
0
-10
-20
-30
-40
-60
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 300- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-5
Az. L.O.S. Rate (ωx) (Deg/Sec)-Antenna Coord.
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 301 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-5
El. L.O.S. Rate (ω_r)(Deg/Sec)-Antenna Coord.
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

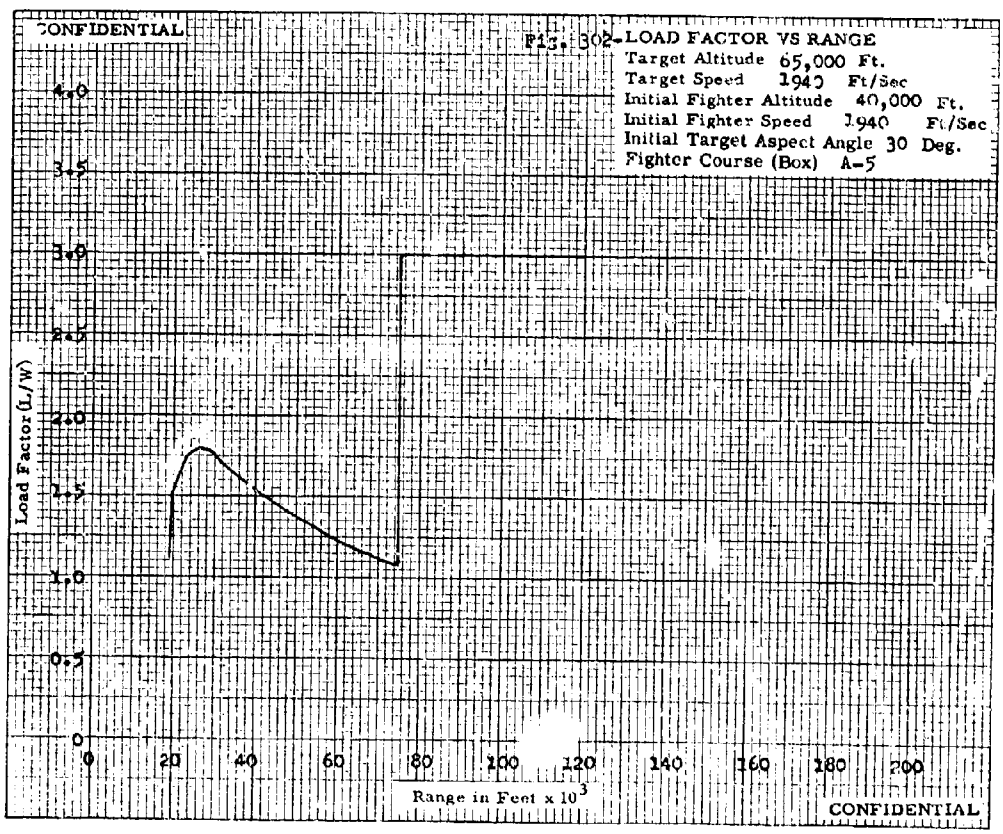

CONFIDENTIAL
Fig. 302 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-5
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

Fig. 303 — ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-5

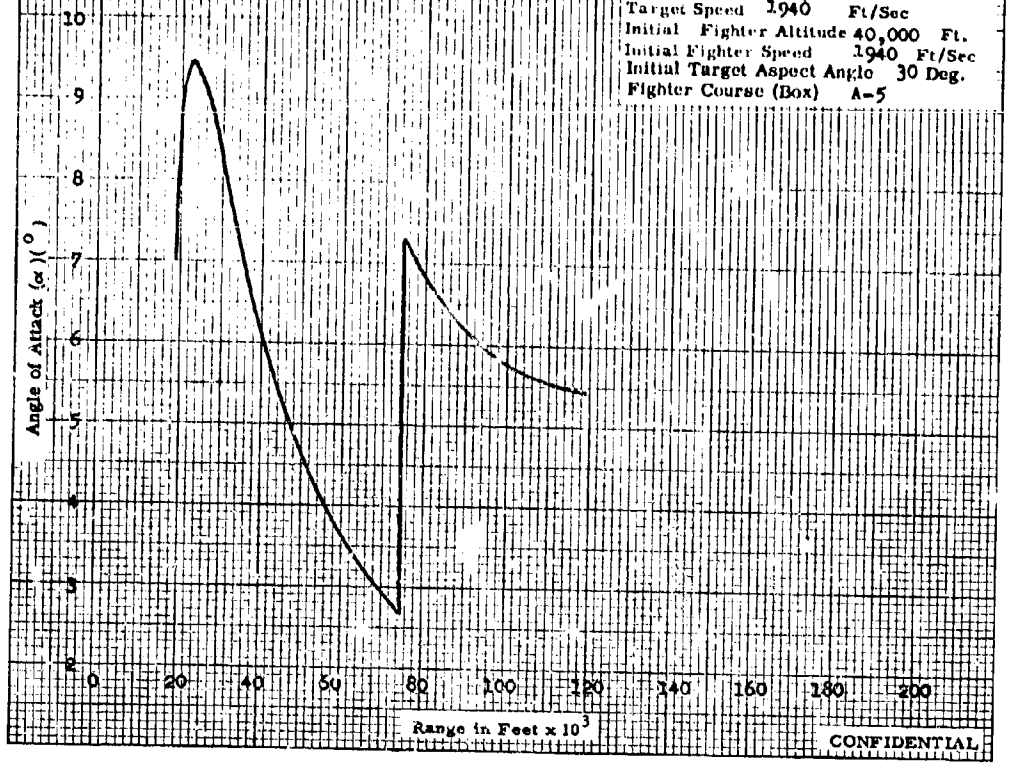
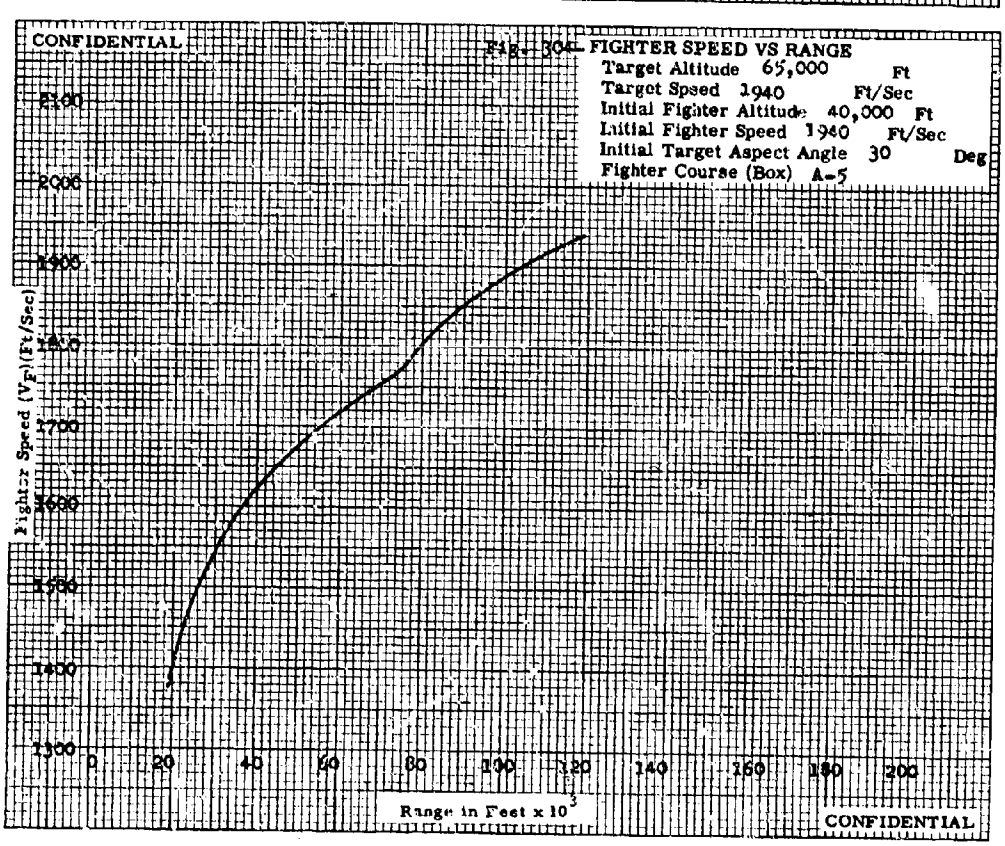


Fig. 304 — FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Spsed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) A-5



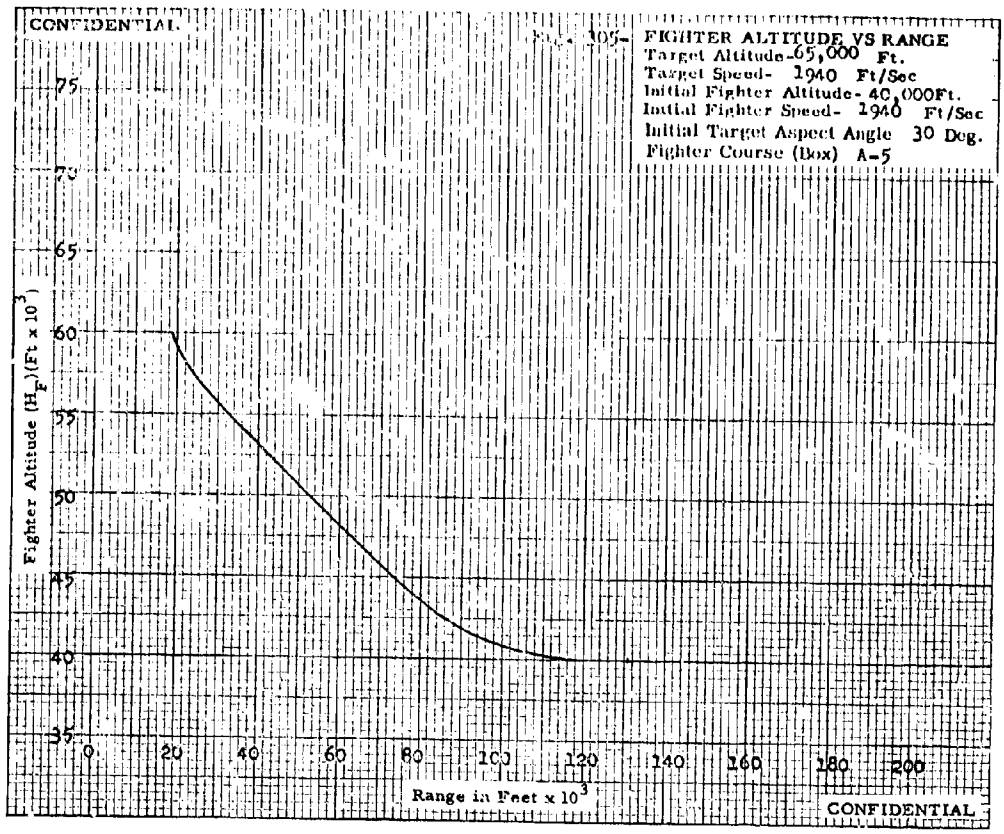
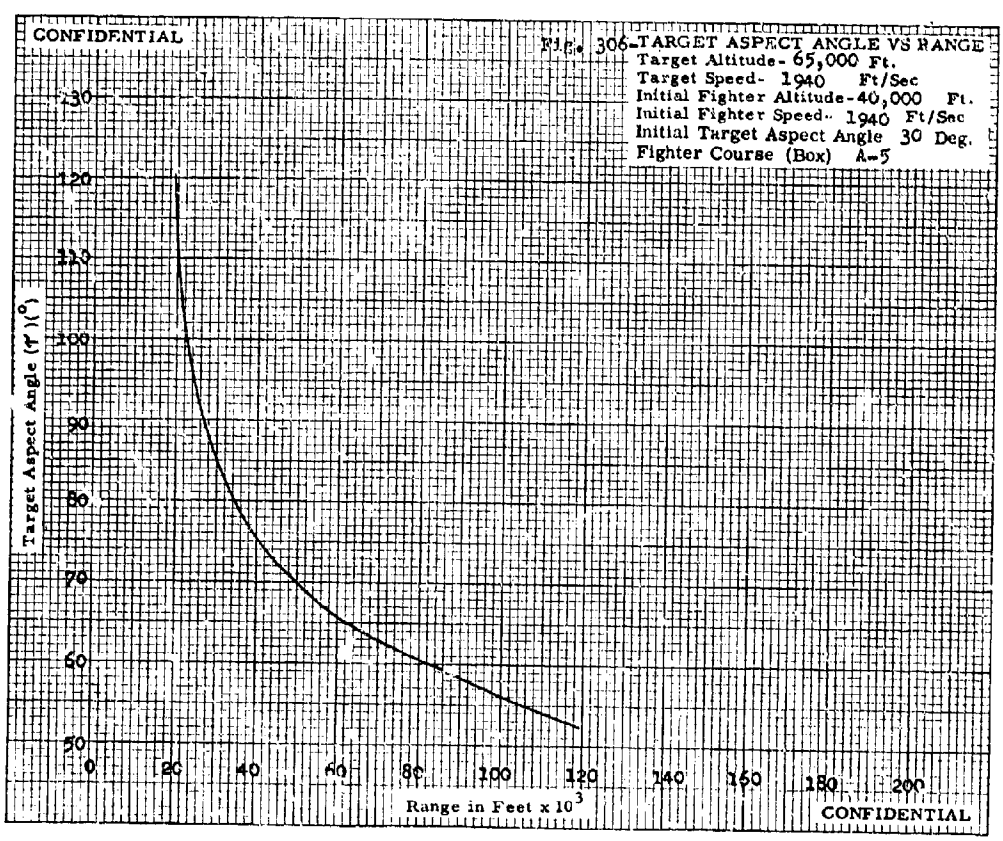
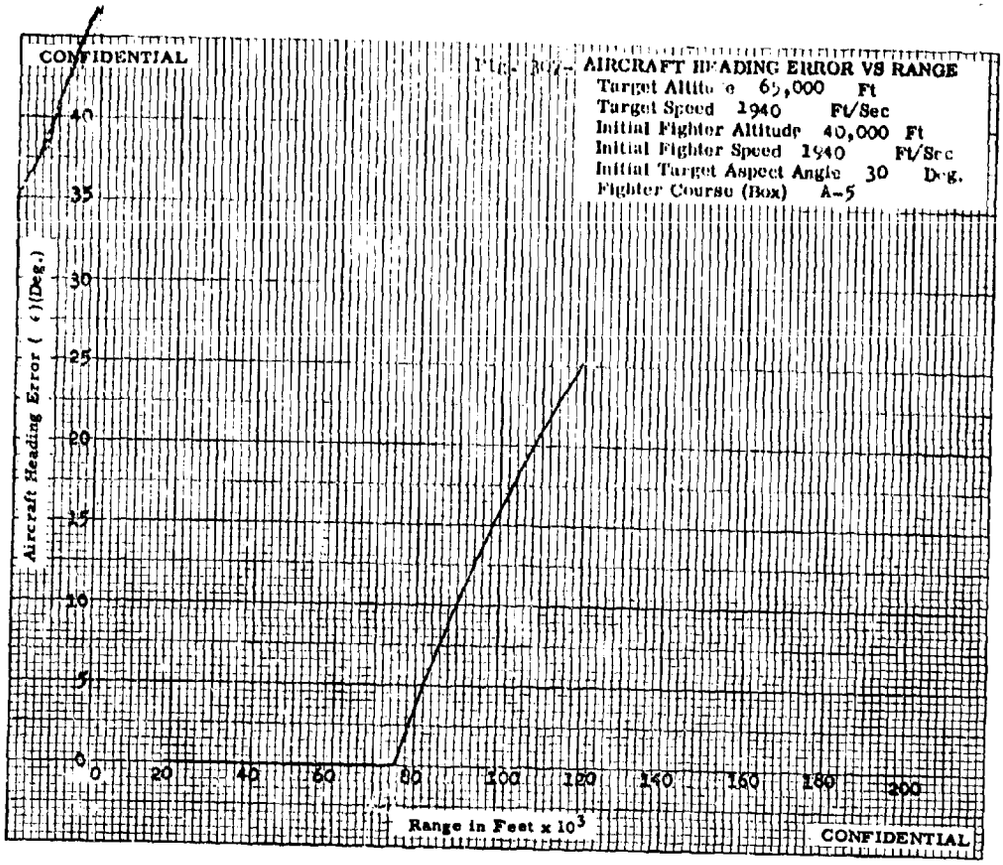
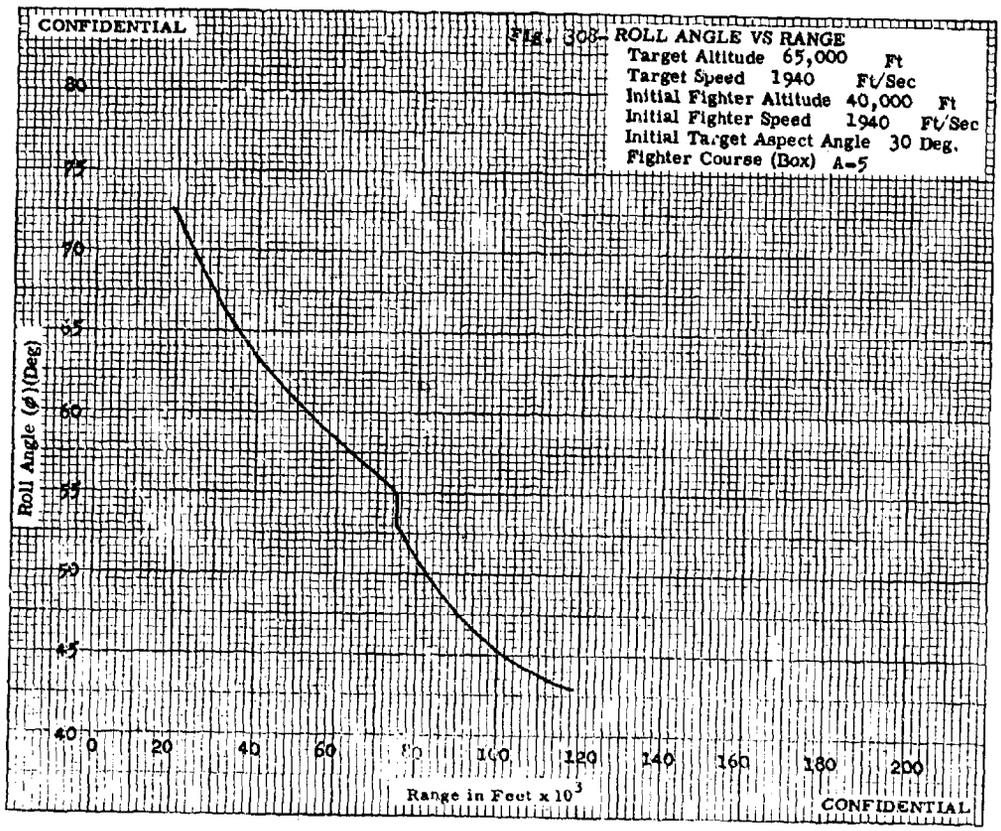
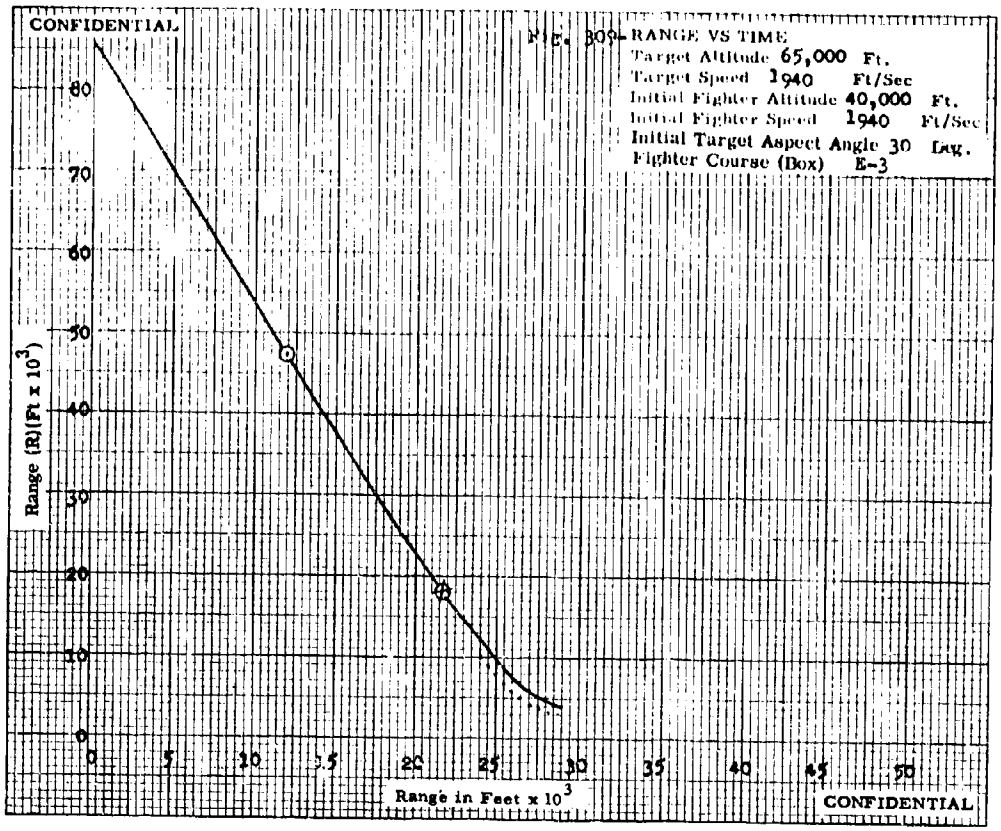


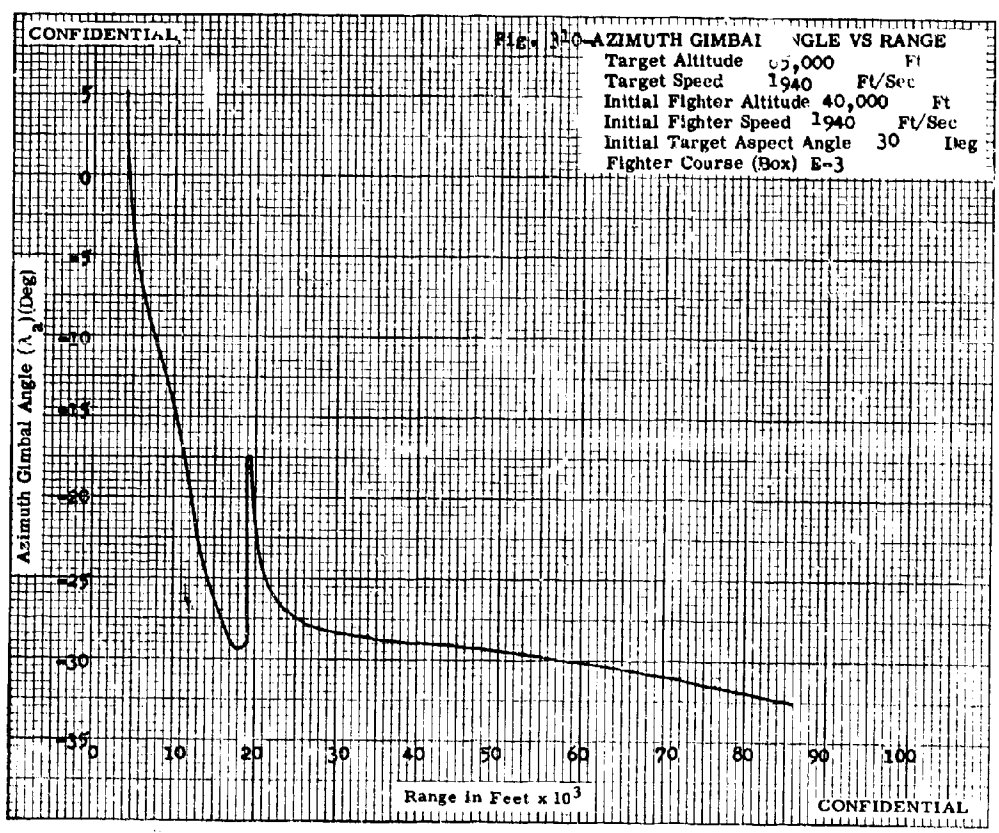
Fig. 306-TARGET ASPECT ANGLE VS RANGE

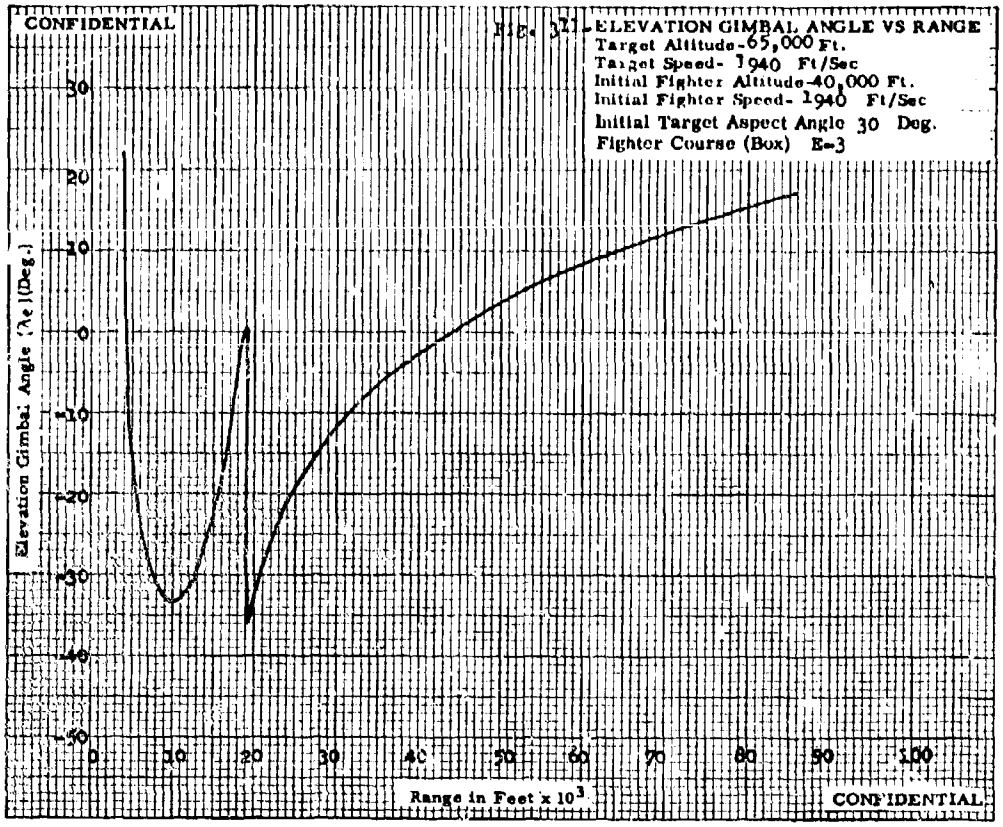


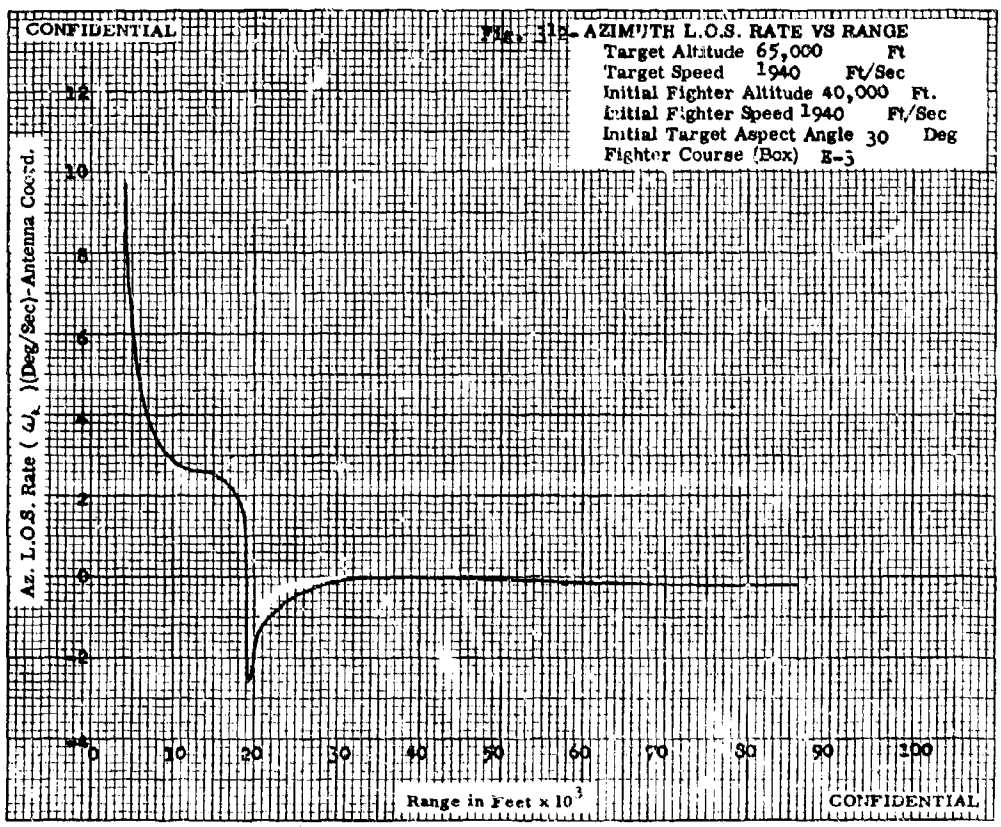

CONFIDENTIAL
Fig. 307 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-5
Aircraft Heading Error ( ) (Deg.)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

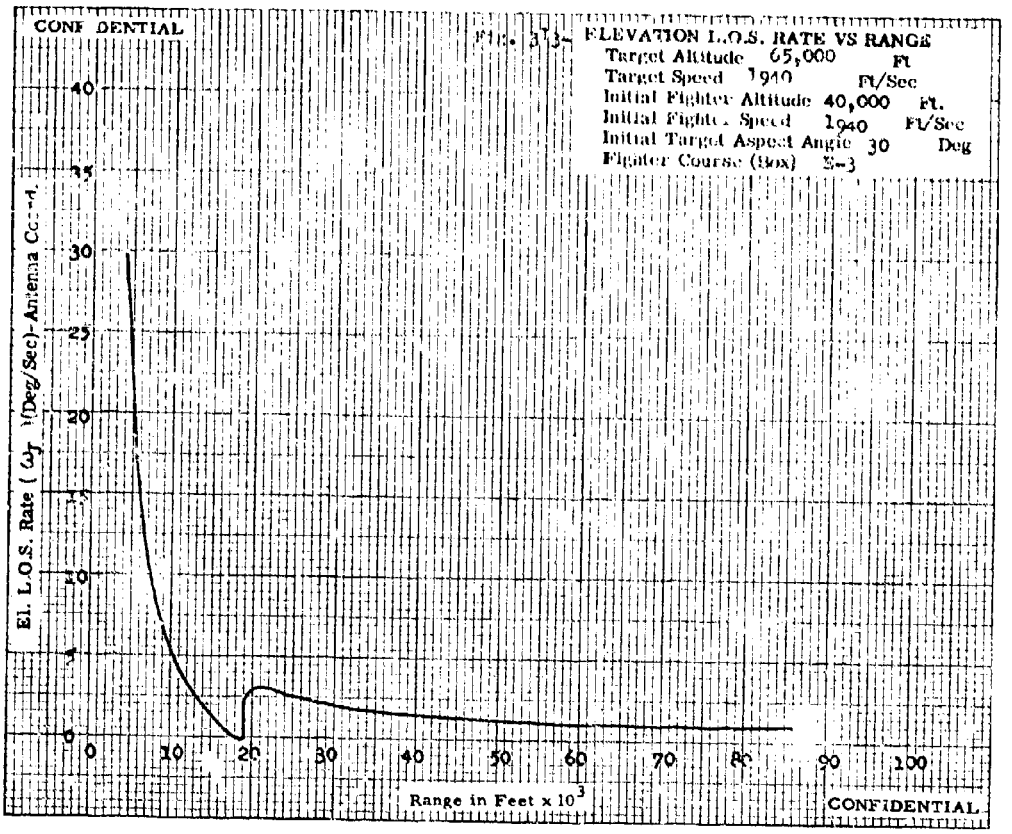

CONFIDENTIAL
Fig. 308 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) A-5
Roll Angle (φ) (Deg)
80
75
70
65
60
55
50
45
40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

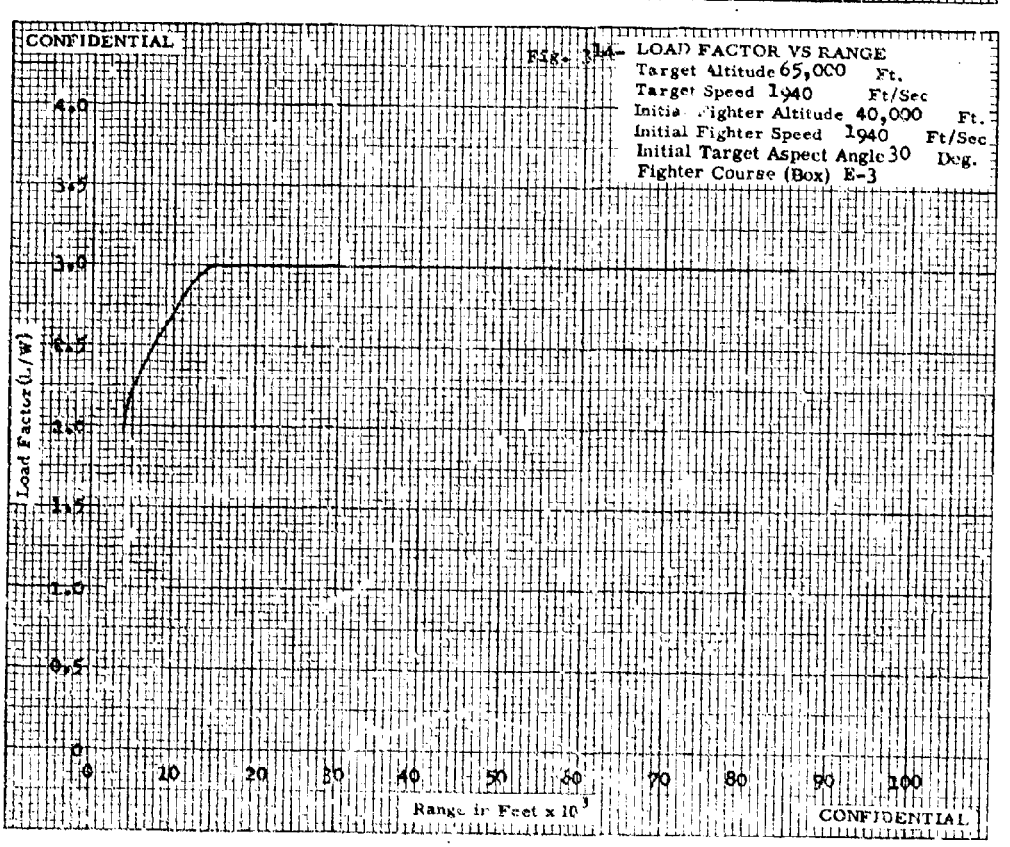

CONFIDENTIAL
Fig. 309—RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Range (R)(Ft x 10^3)
Range in Feet x 10^3
CONFIDENTIAL

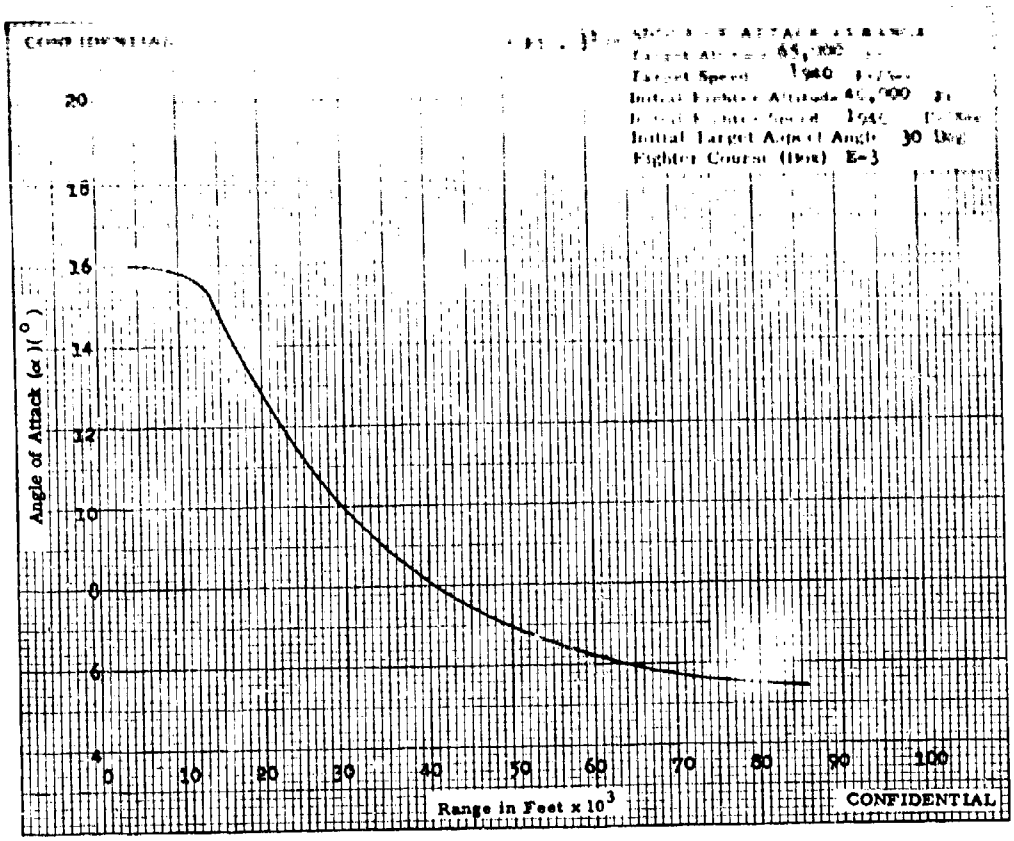

CONFIDENTIAL
Fig. 310—AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Azimuth Gimbal Angle (λa)(Deg)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 11 - ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Elevation Gimbal Angle (Deg.)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 12 - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Az. L.O.S. Rate (ω_λ) (Deg/Sec)-Antenna Coord.
12
10
8
6
4
2
0
-2
-4
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
FIG. 313
ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
El. L.O.S. Rate (ωr °/Deg/Sec)-Antenna Coord.
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIG. 314
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL



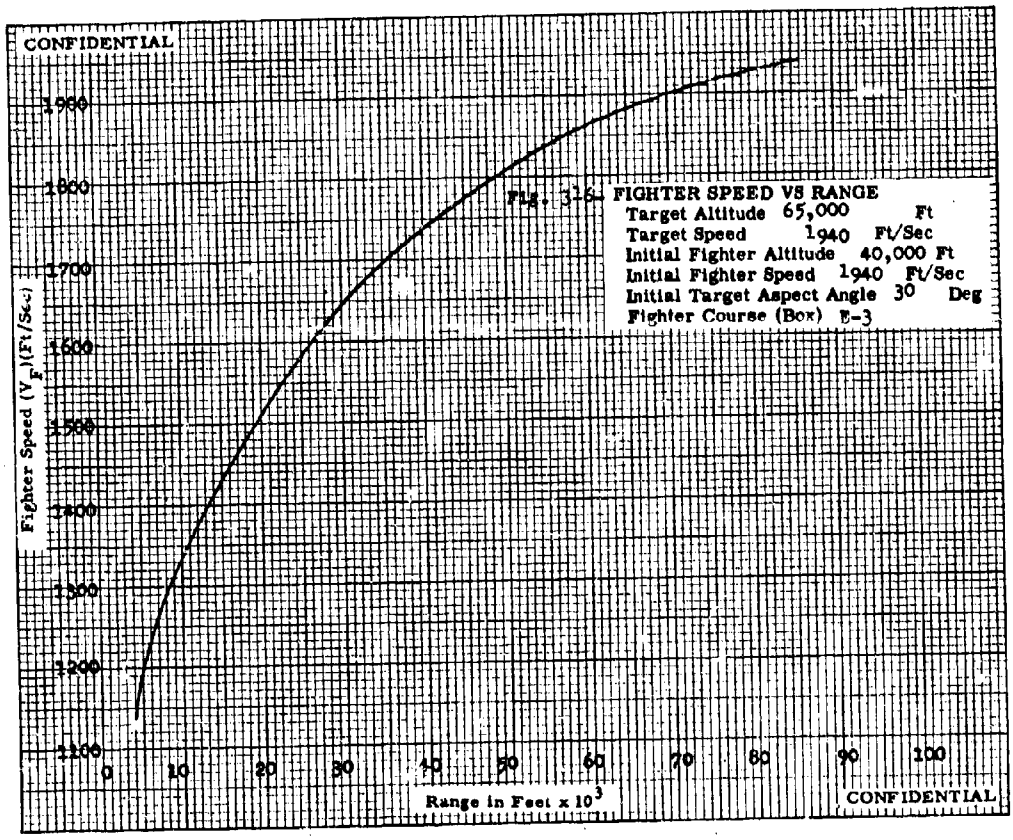


Fig. 3-16 FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3

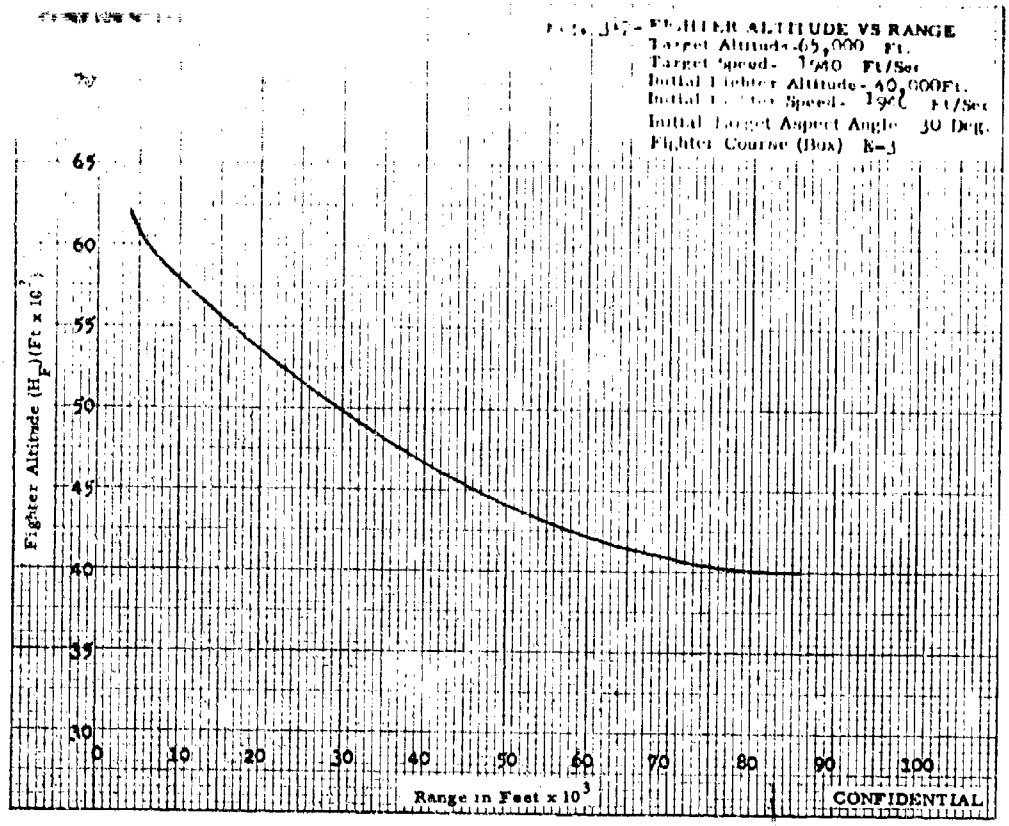
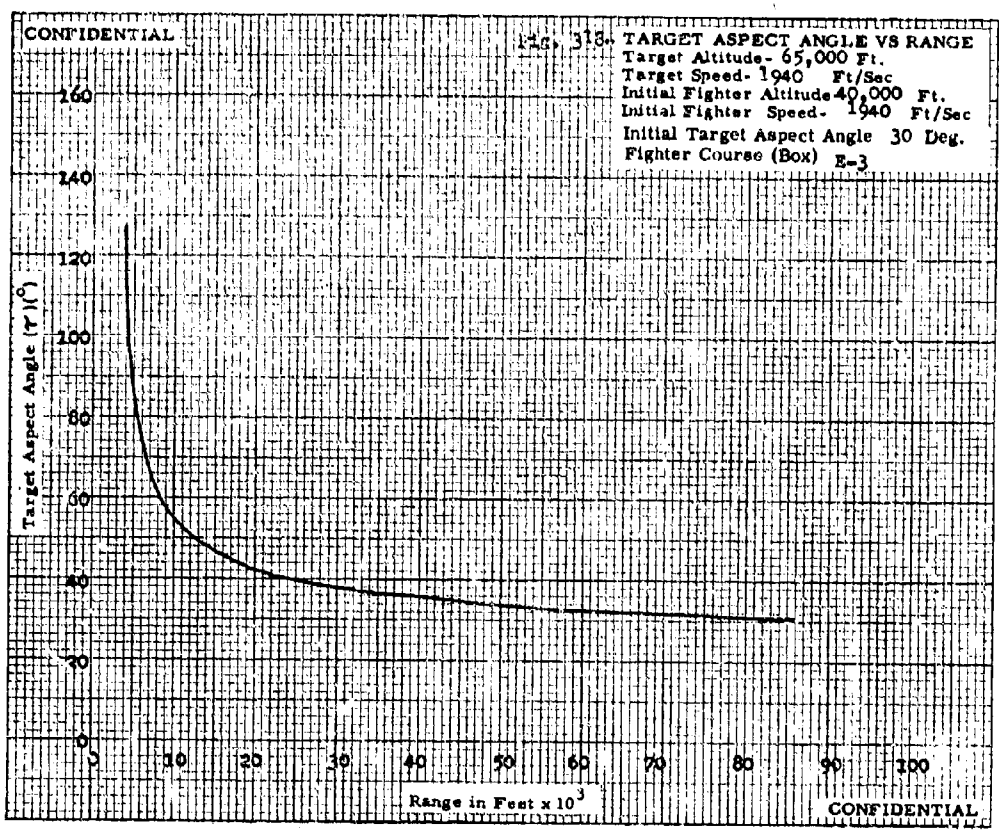
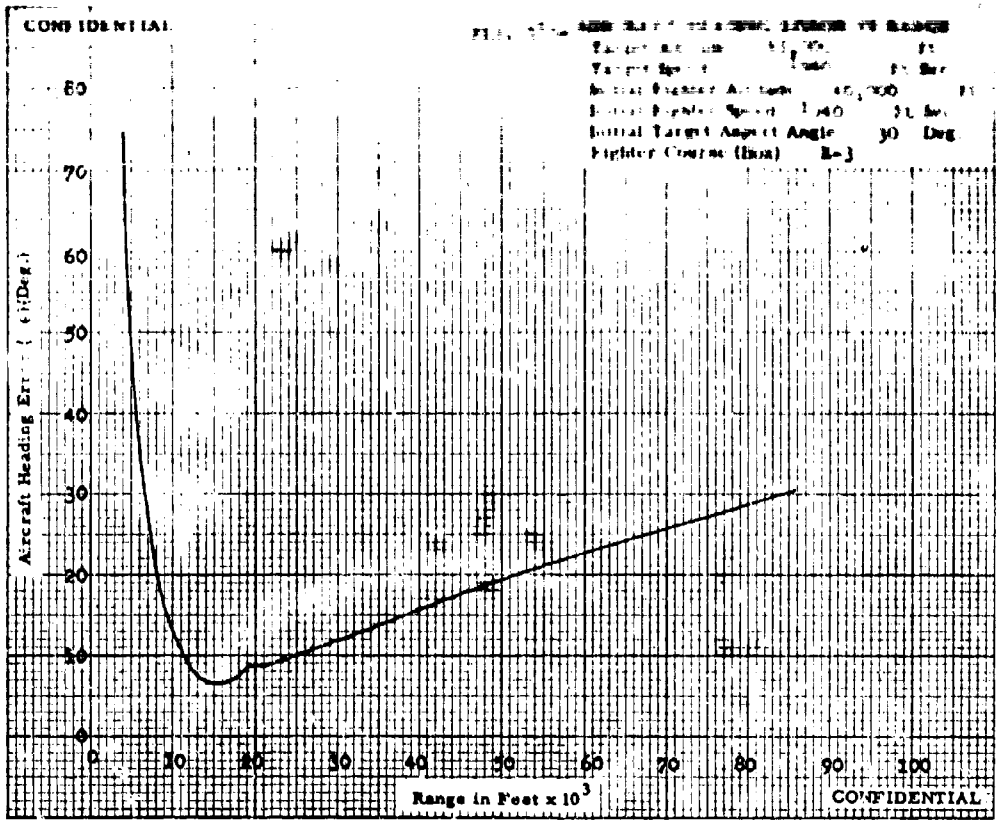
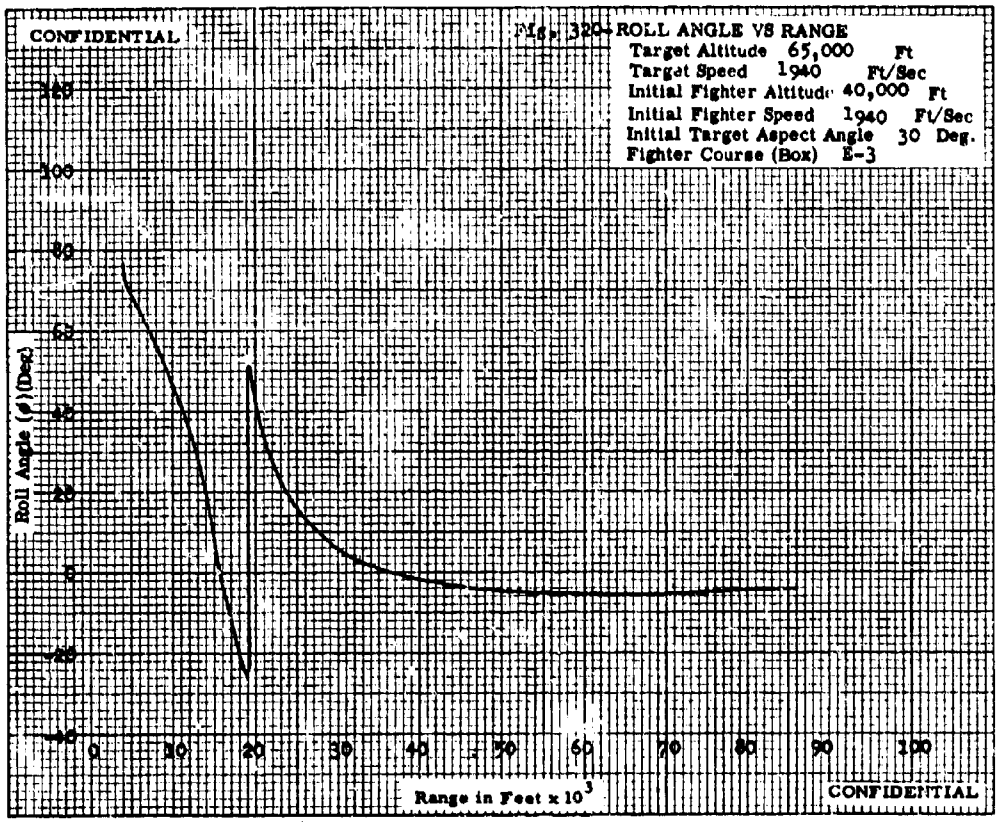
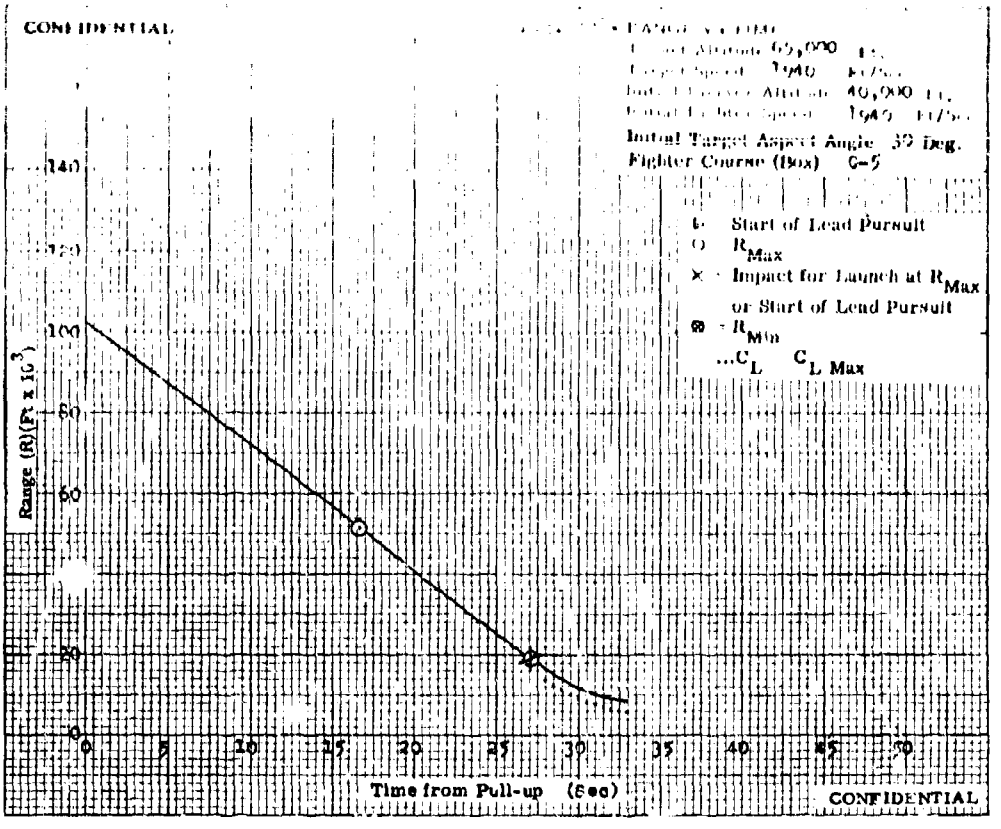


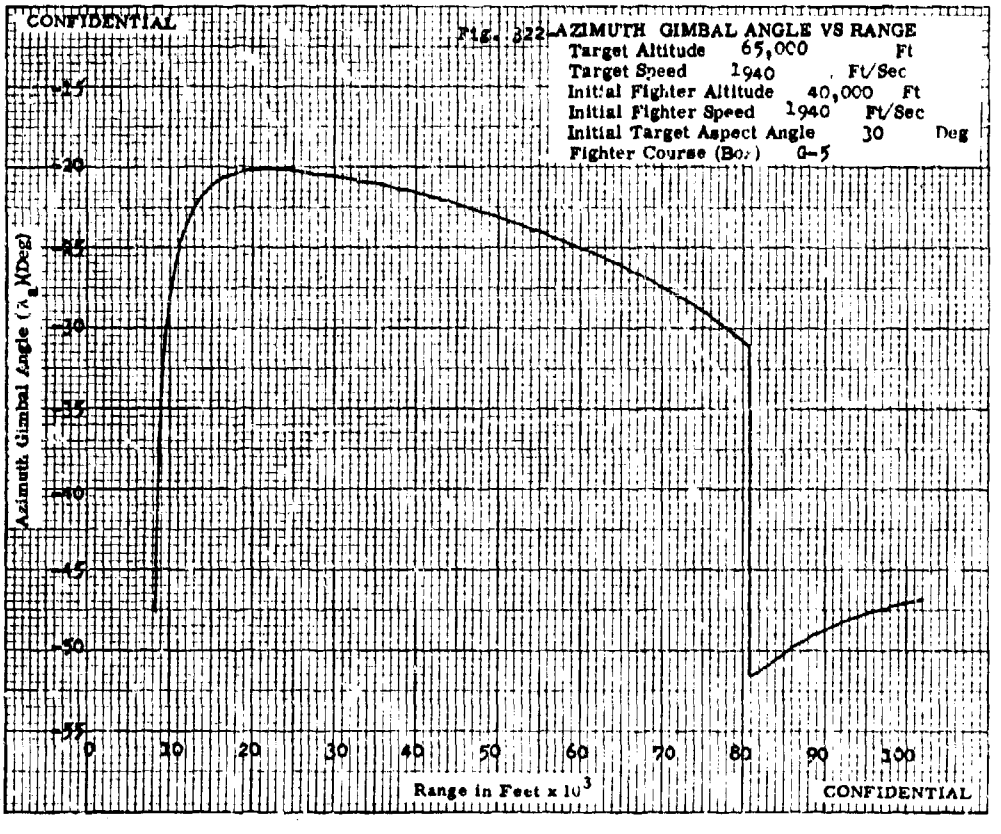
FIGURE 317 - FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Fighter Altitude (H_F)(Ft x 10^3)
65
60
55
50
45
40
35
30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

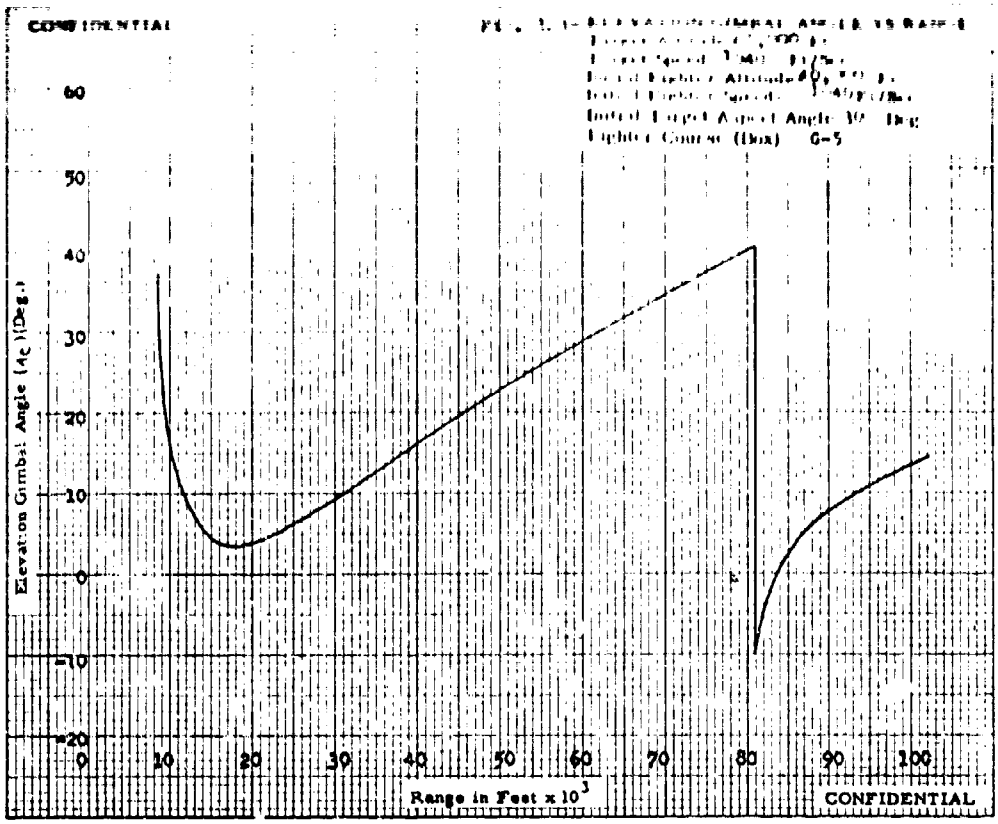

CONFIDENTIAL
FIG. 318 - TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Target Aspect Angle (τ_1)(°)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

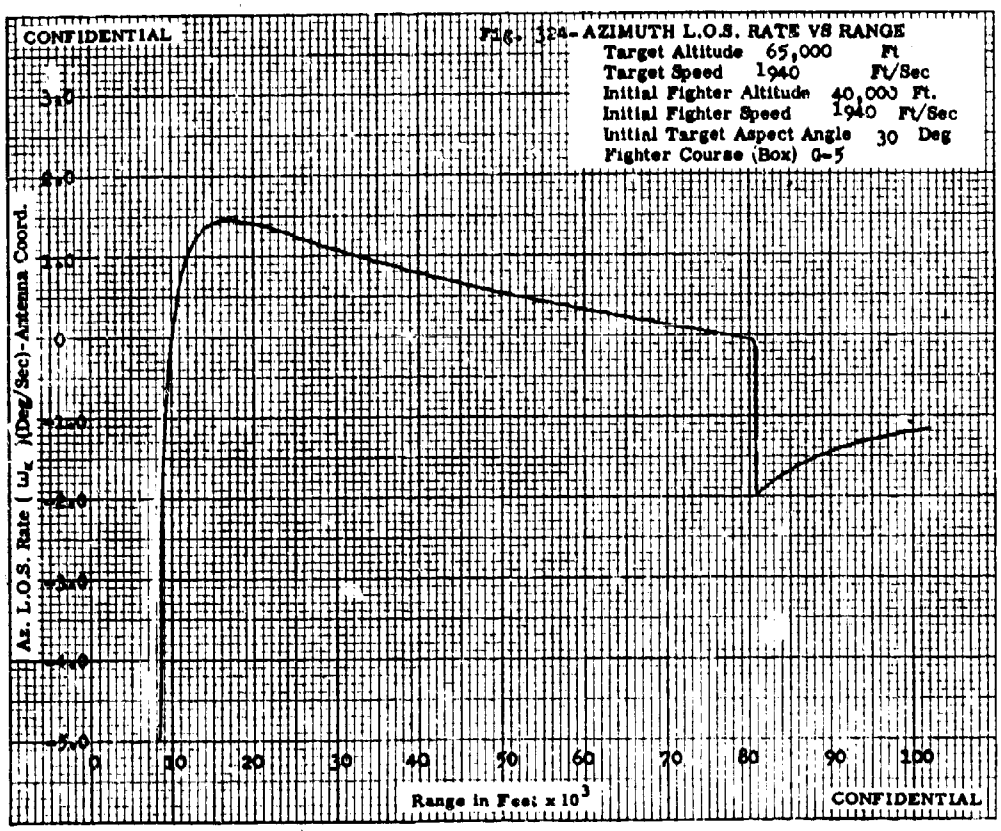

CONFIDENTIAL
Initial Target Aspect Angle 30 Deg
Aircraft Heading Err
Range in Feet x 10^3
CONFIDENTIAL

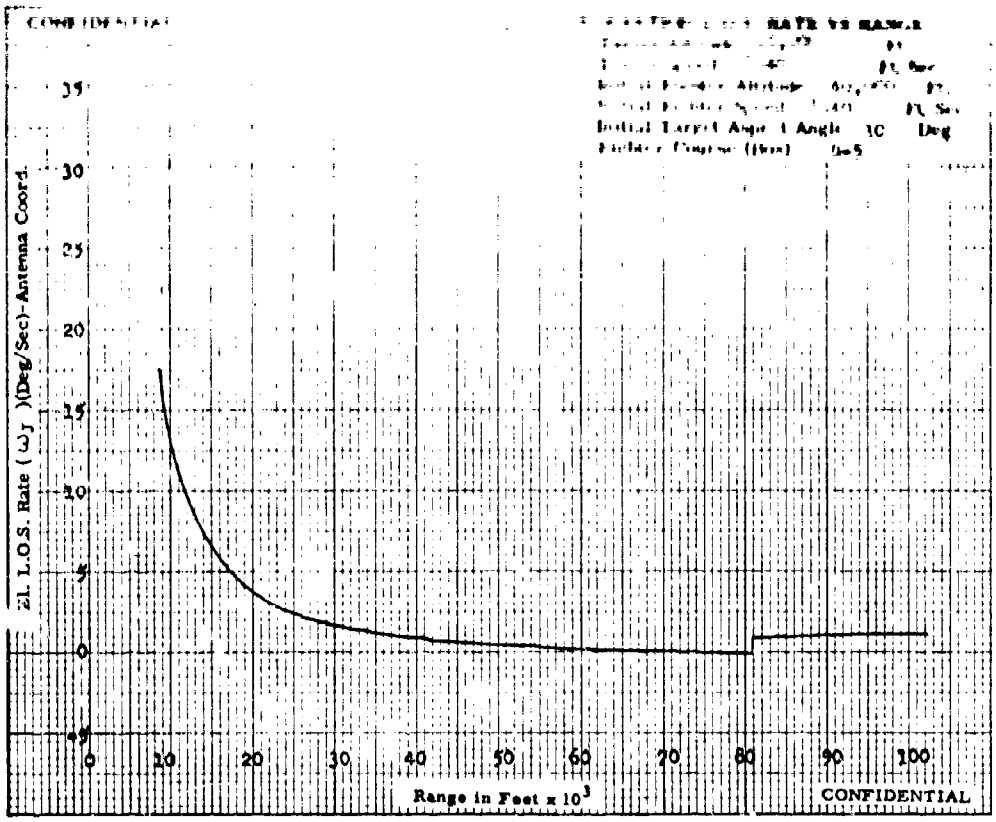

CONFIDENTIAL
Fig. 320 ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Roll Angle (φ) (Deg)
Range in Feet x 10^3
CONFIDENTIAL

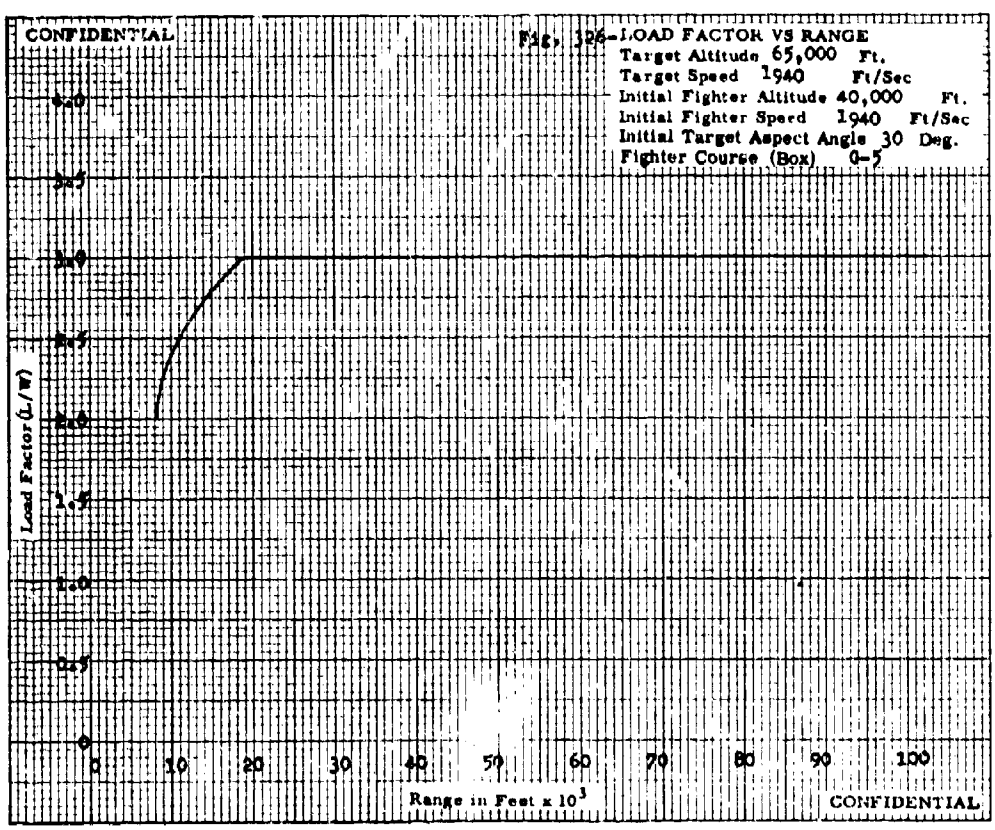

CONFIDENTIAL
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) C-5
Start of Lead Pursuit
R_{Max}
Impact for Launch at R_{Max} or Start of Lead Pursuit
R_{Min}
C_L $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL

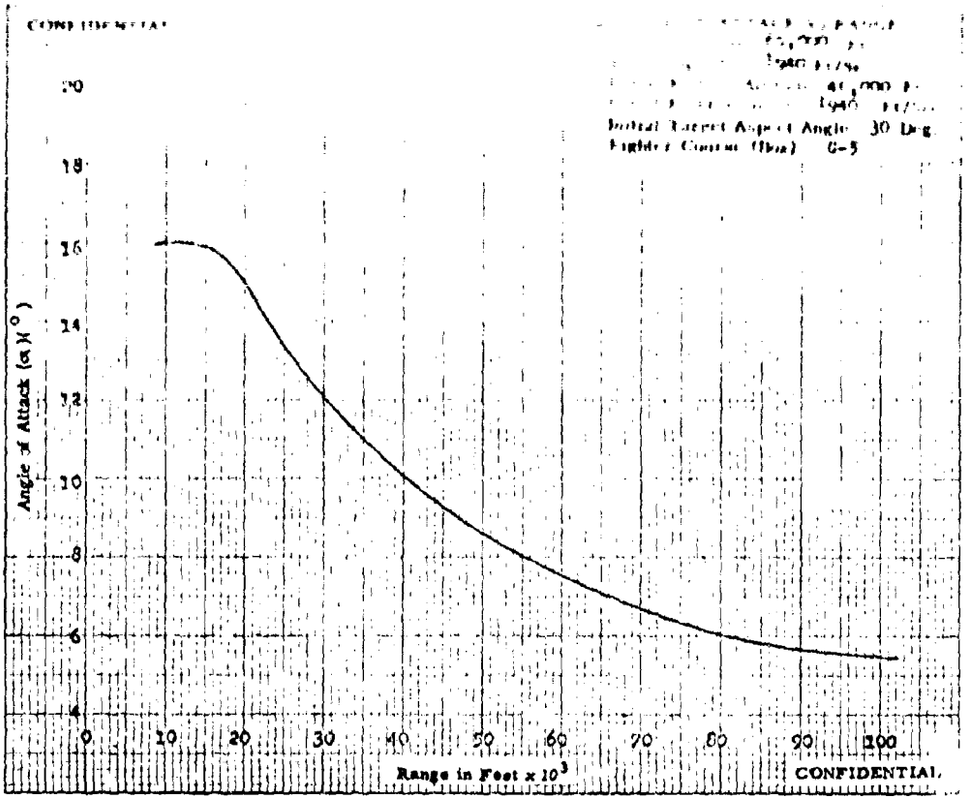

CONFIDENTIAL
Fig. 322-AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) C-5
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) G-5
Elevation Gimbal Angle (θE) (Deg.)
60
50
40
30
20
10
0
-10
-20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIG. 32a - AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) G-5
Az. L.O.S. Rate (ωK) (Deg/Sec)-Antenna Coord.
3.0
2.0
1.0
0
-1.0
-2.0
-3.0
-4.0
-5.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
RATE VS RANGE
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-5
35
30
25
20
15
10
5
0
-5
Zl L.O.S. Rate (ωy) (Deg/Sec)-Antenna Coord.
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 126-LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
Load Factor (L/W)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL



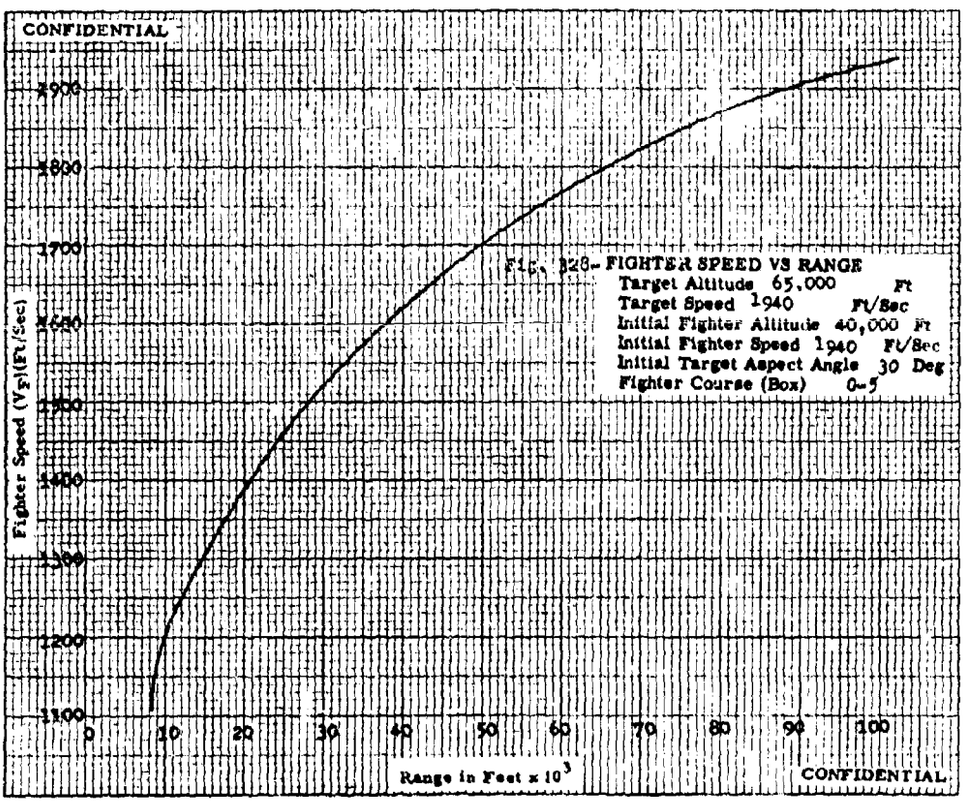
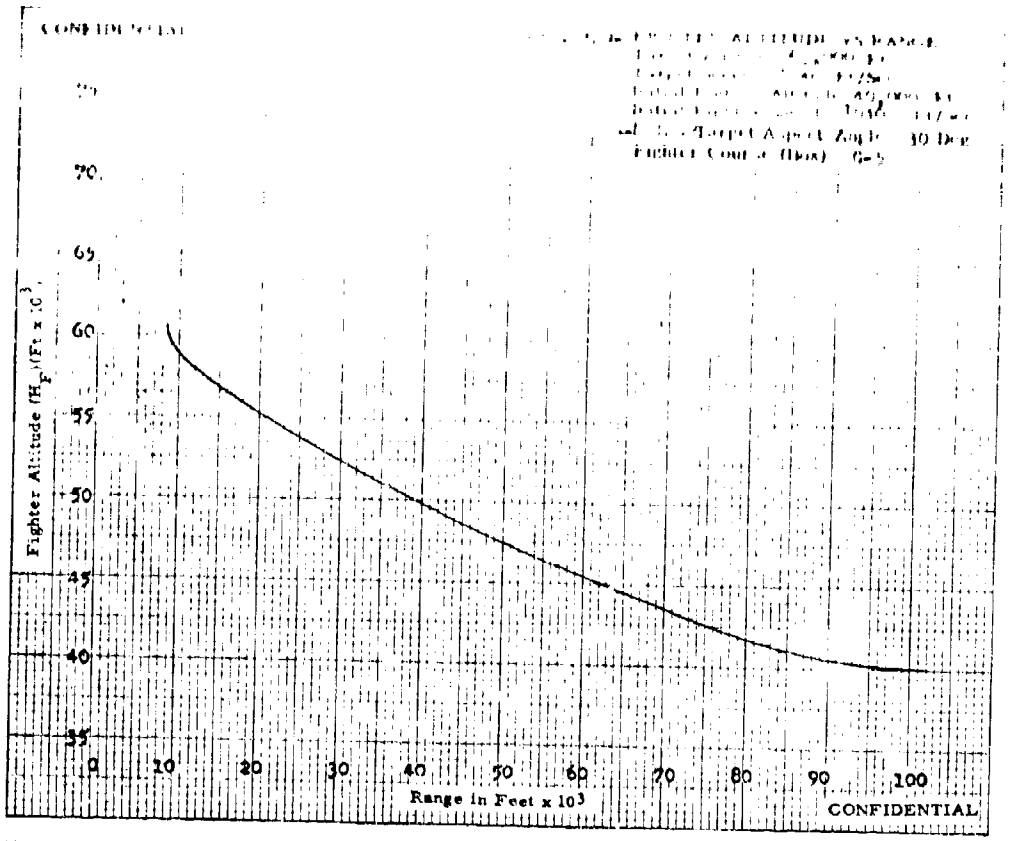
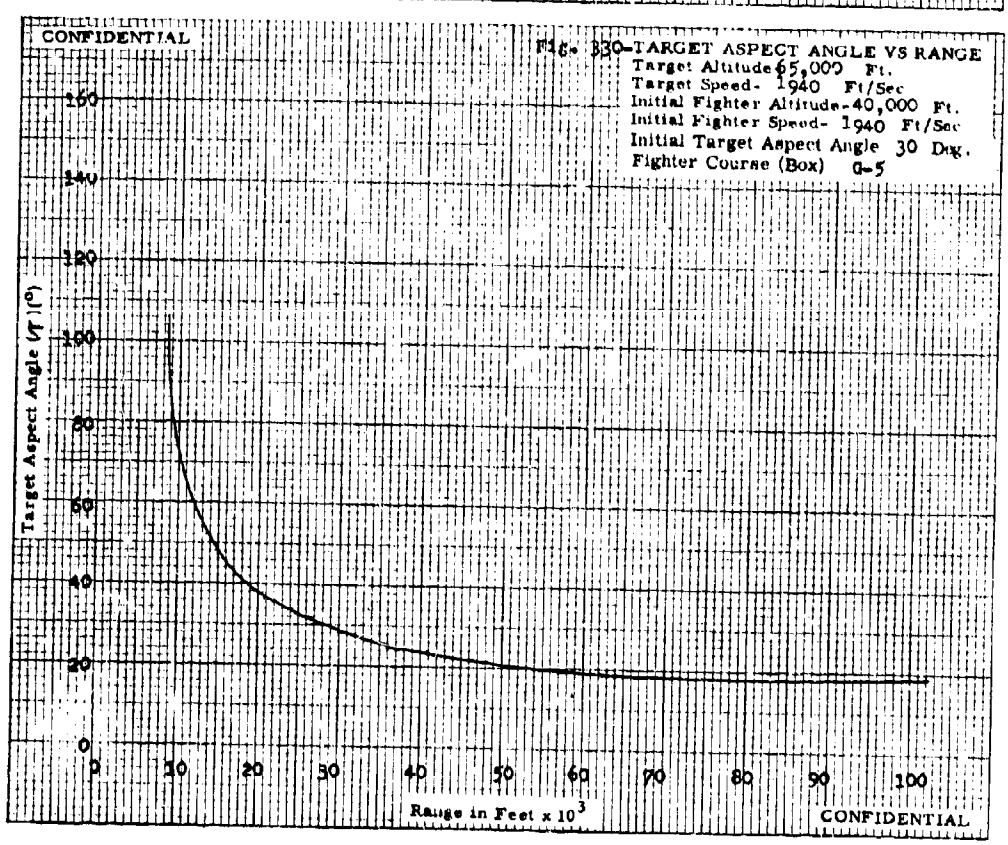
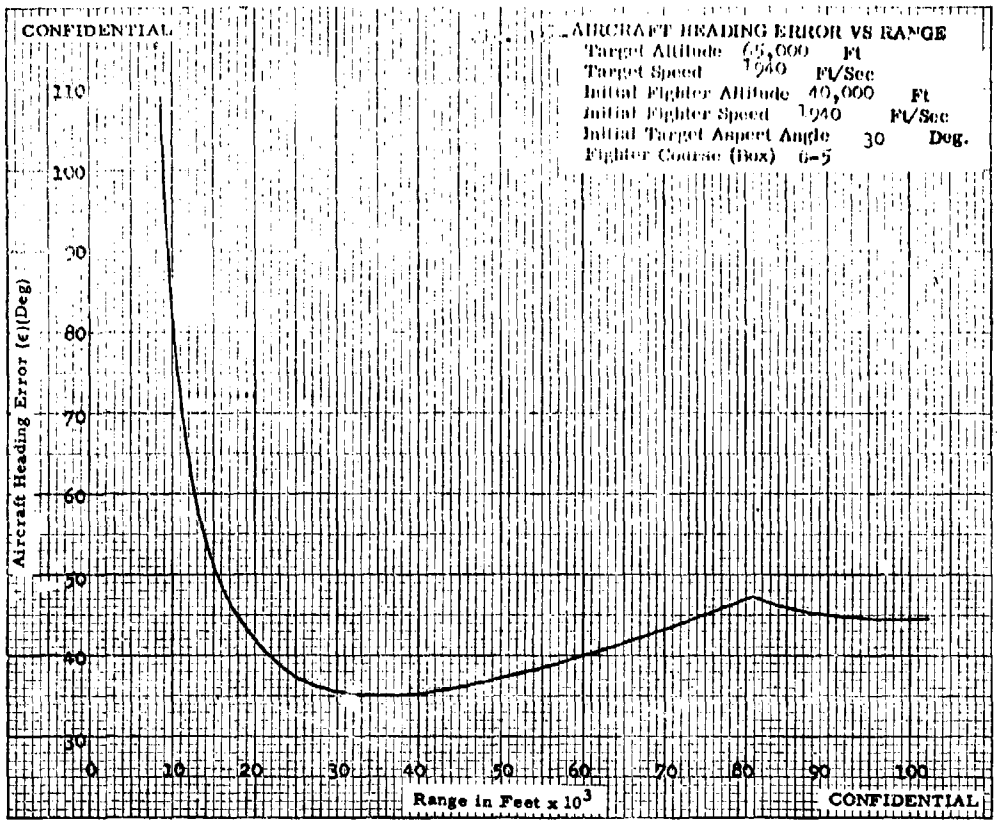
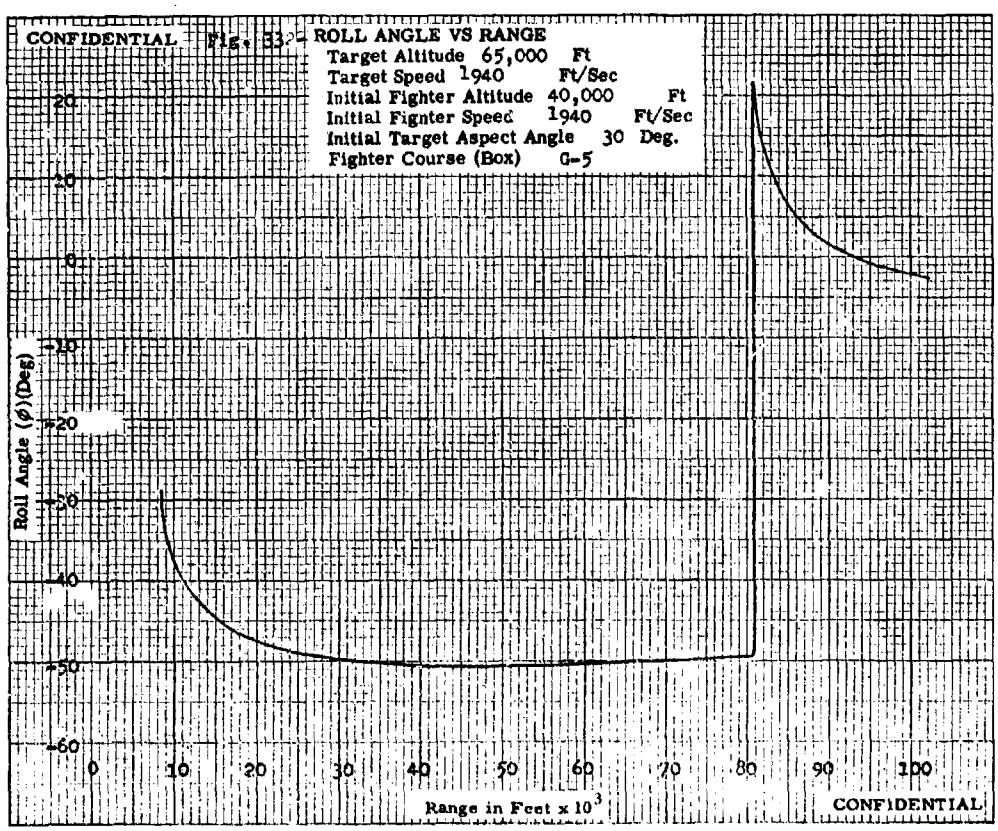


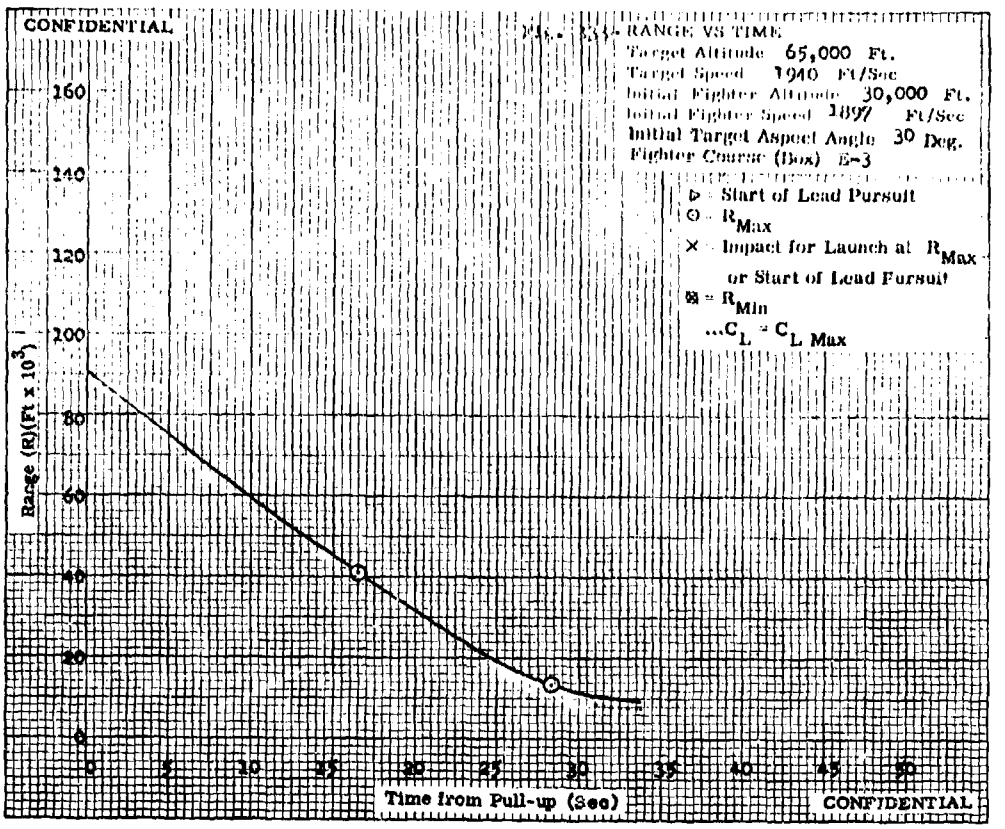
FIG. 328- FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-5

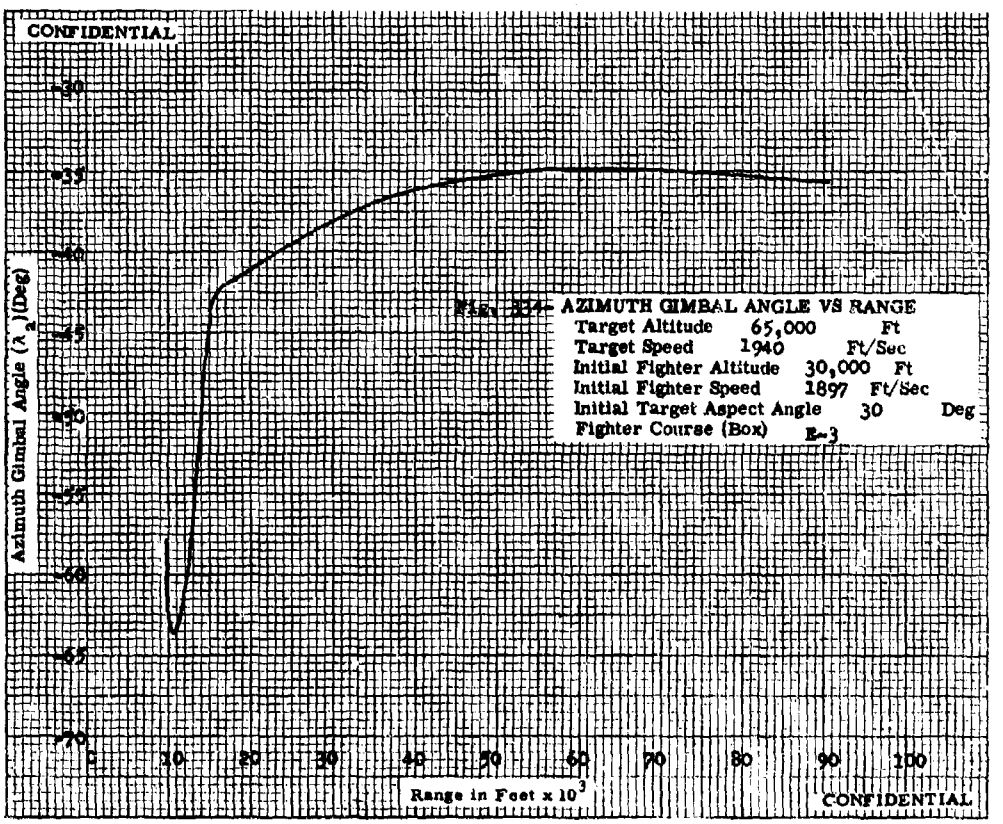

CONFIDENTIAL
Target Aspect Angle 30 Deg
Fighter Course (Box) G-5
70
65
60
55
50
45
40
35
Fighter Altitude (H_F) (Ft. x 10^3)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

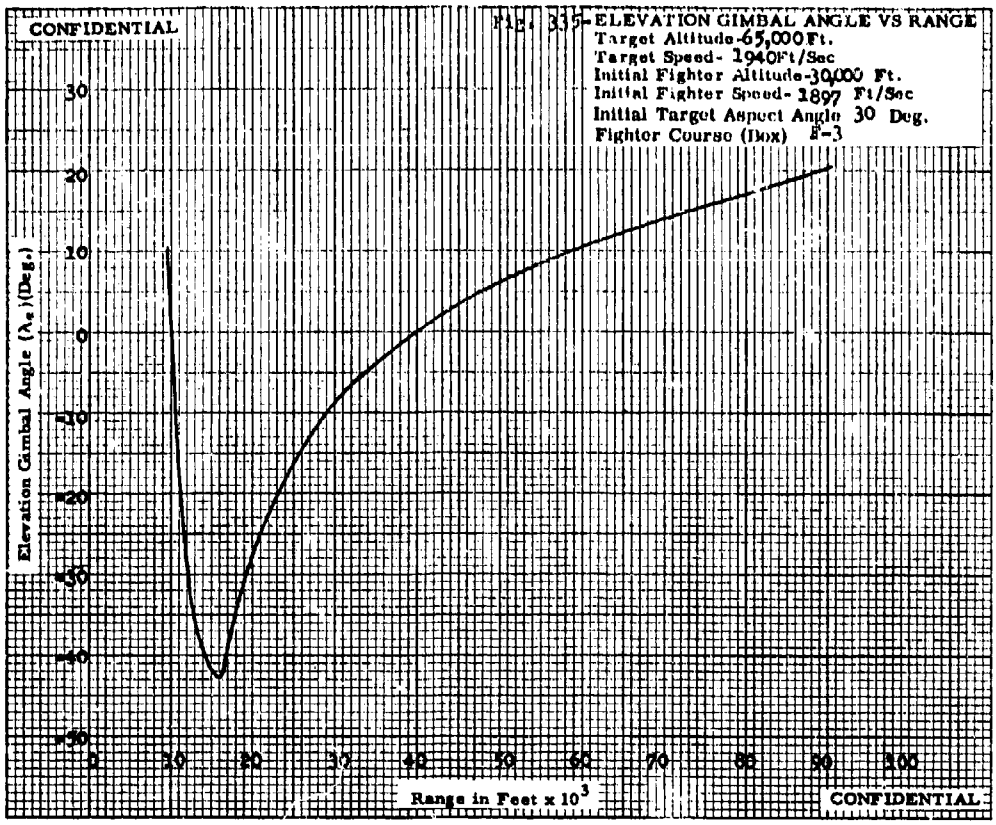

CONFIDENTIAL
Fig. 330-TARGET ASPECT ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) G-5
160
140
120
100
80
60
40
20
0
Target Aspect Angle (ψ_T) (^{0})
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

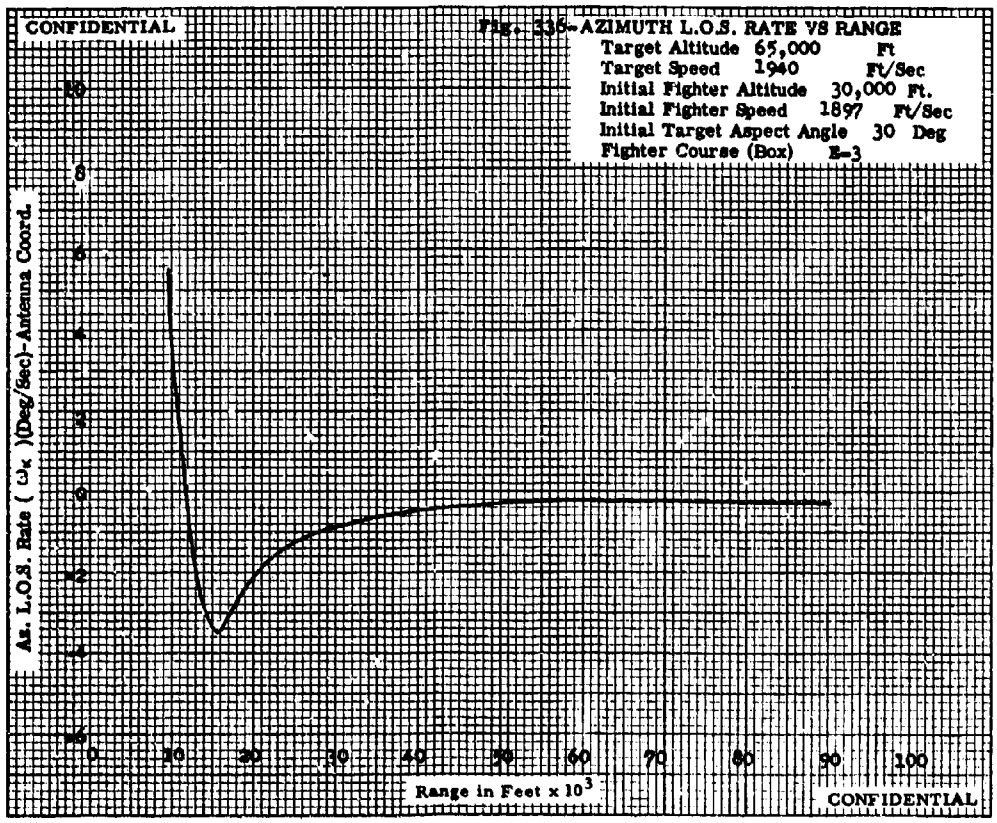

CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) G-5
Aircraft Heading Error (€)(Deg)
110
100
90
80
70
60
50
40
30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

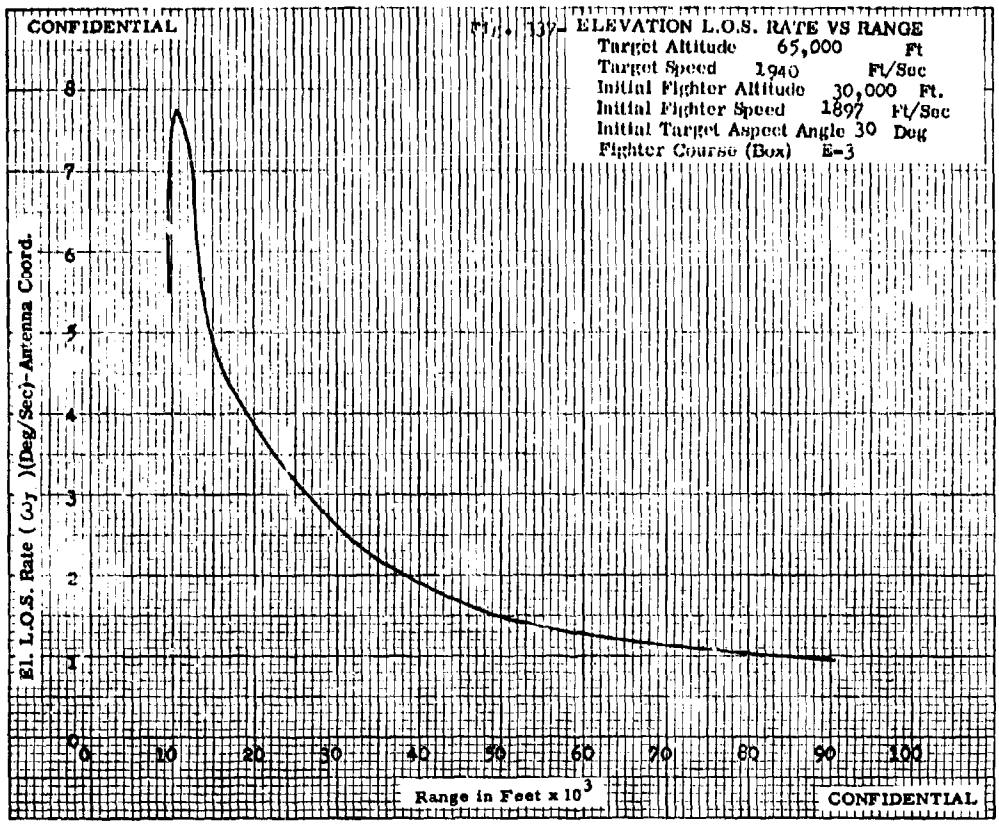

CONFIDENTIAL
Fig. 33
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fignter Speed 1940 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) G-5
Roll Angle (ϕ)(Deg)
-20
-10
0
10
20
30
40
50
60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

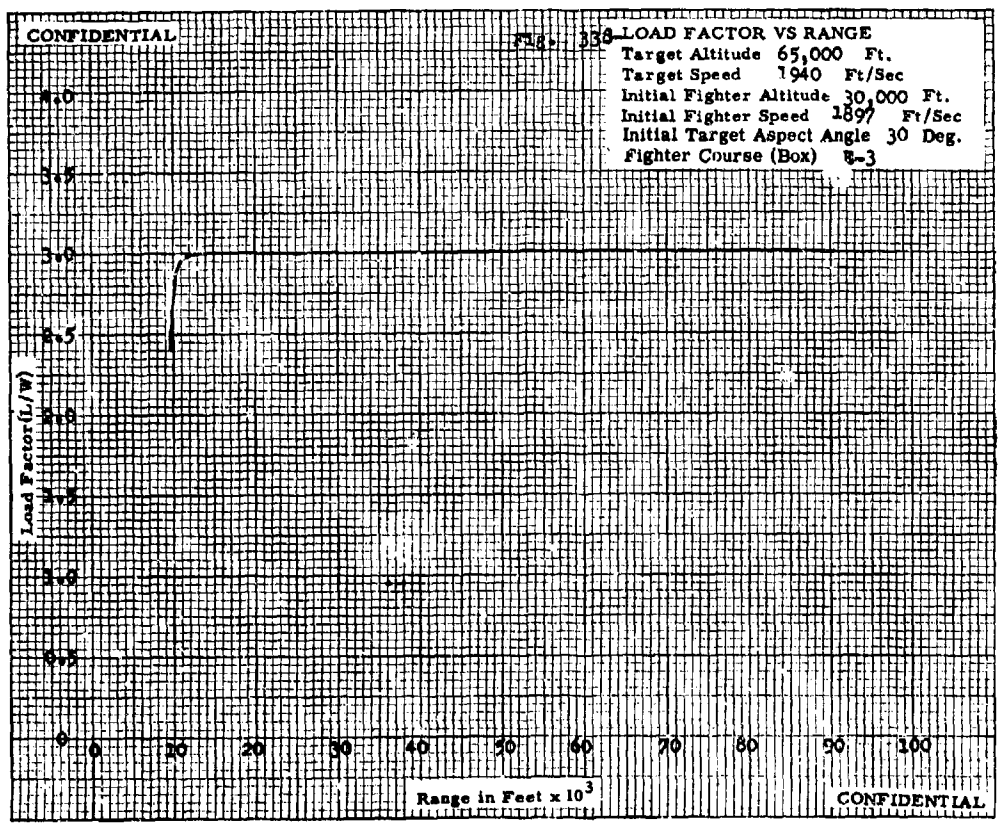

CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
▷ Start of Lead Pursuit
○ = R_{Max}
× Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

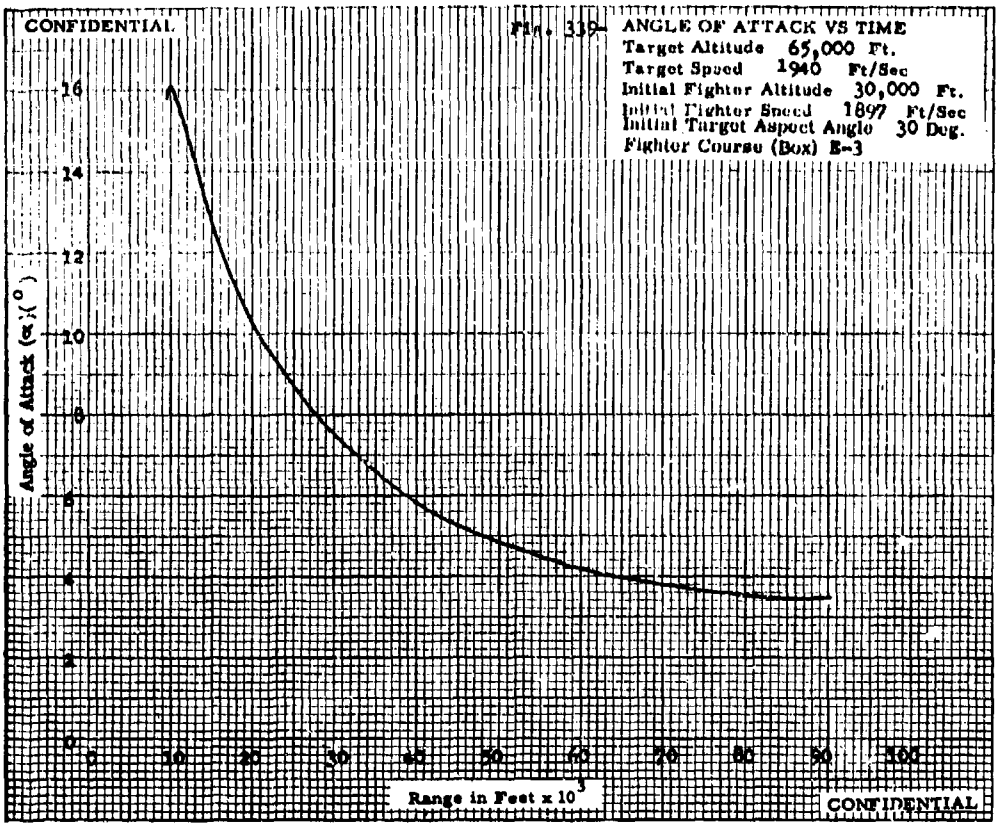

CONFIDENTIAL
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Azimuth Gimbal Angle (λ_2)(Deg)
-30
-35
-40
-45
-50
-55
-60
-65
-70
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

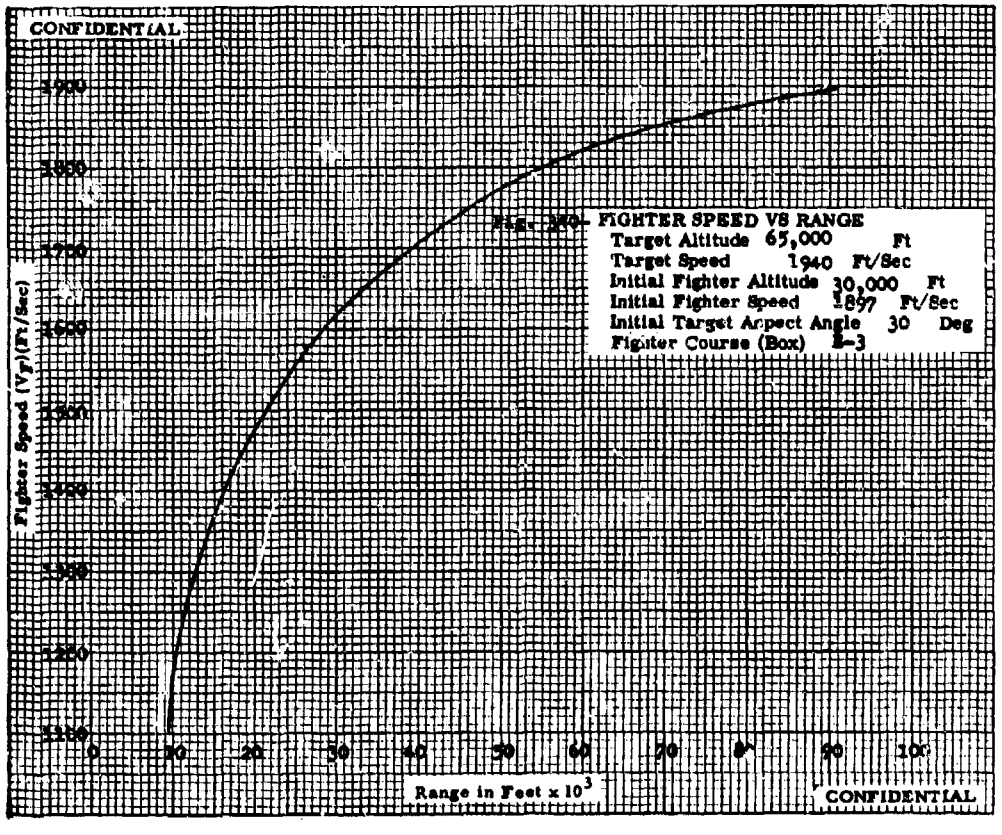

CONFIDENTIAL
Fig. 335-ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000Ft.
Target Speed- 1940Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Elevation Gimbal Angle (λ_e)(Deg.)
30
20
10
0
-10
-20
-30
-40
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

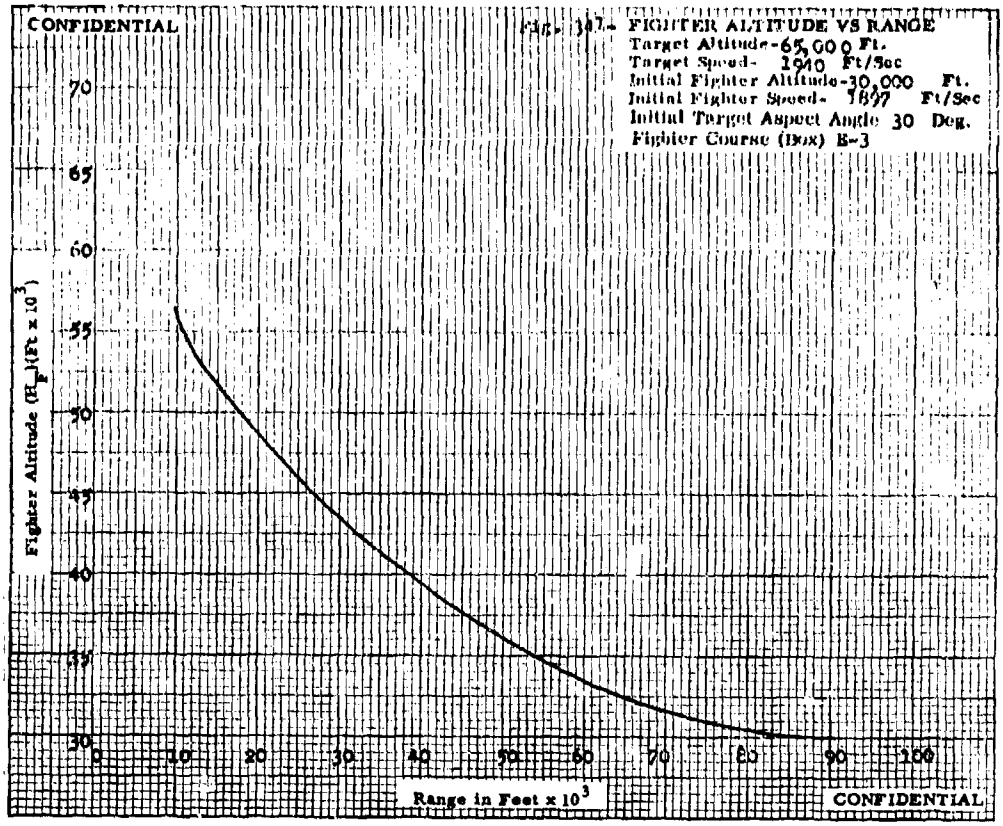

CONFIDENTIAL
Fig. 336-AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Az. L.O.S. Rate (ω_k)(Deg/Sec)-Antenna Coord.
8
6
4
2
0
-2
-4
-6
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

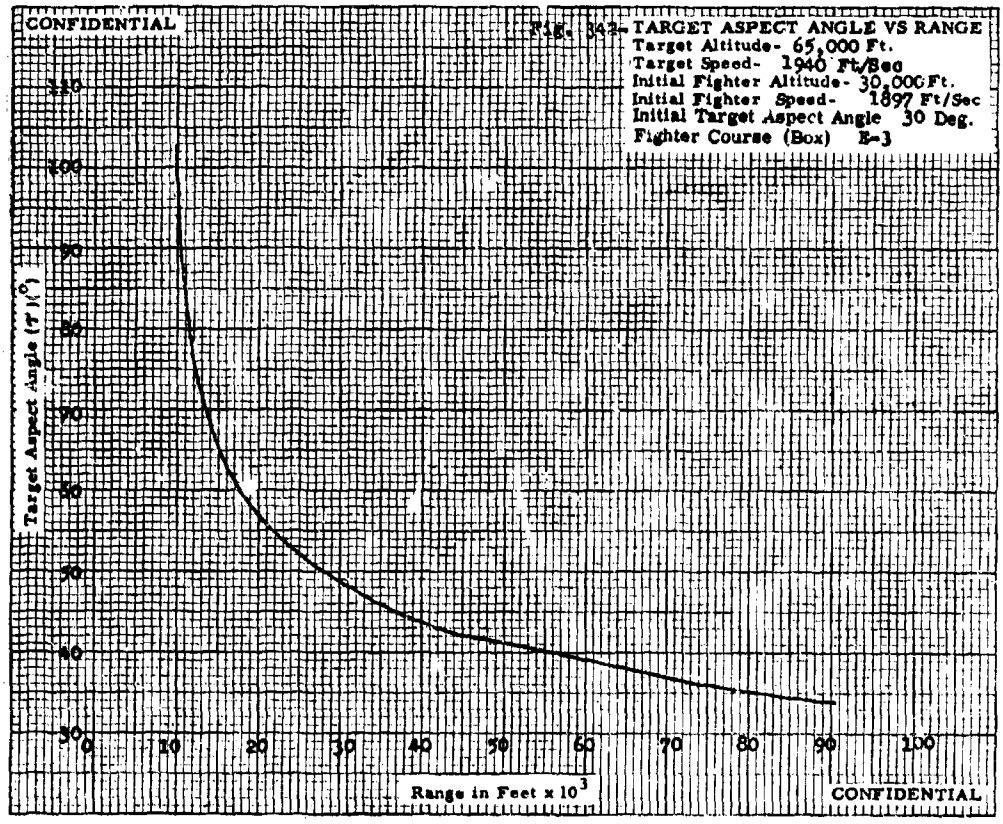

CONFIDENTIAL
Fig. 137
ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
El. L.O.S. Rate (ω_y) (Deg/Sec)-Antenna Coord.
0
1
2
3
4
5
6
7
8
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

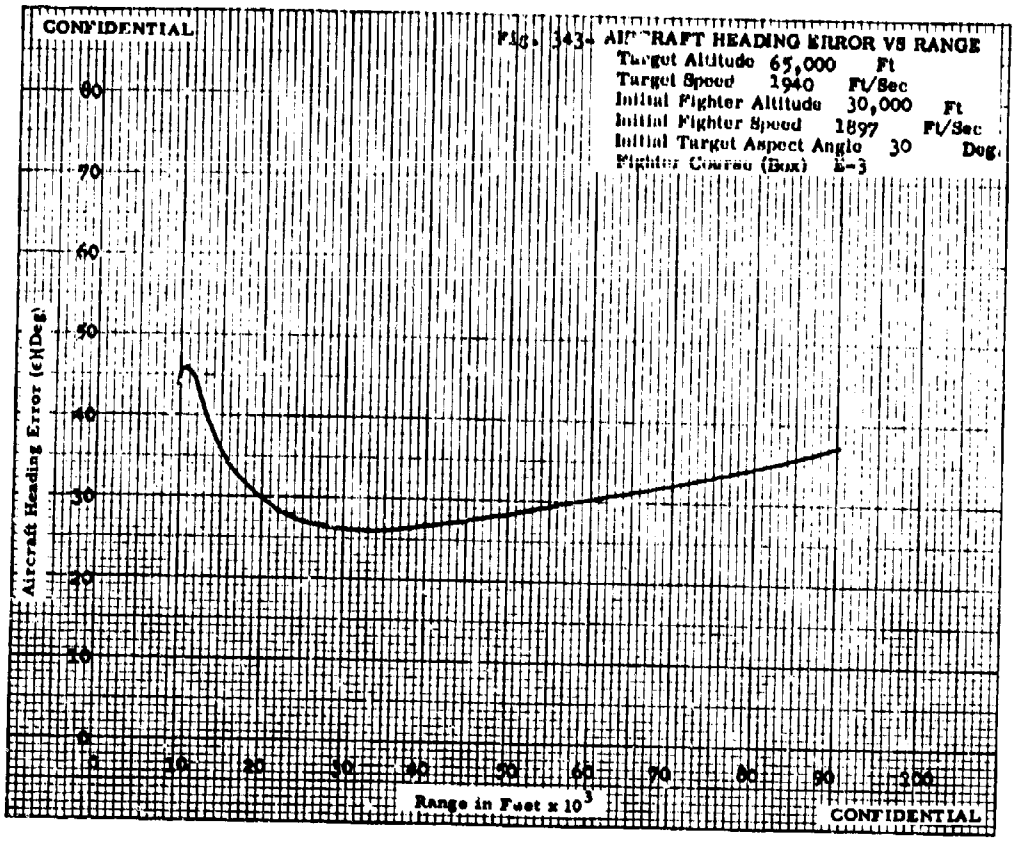

CONFIDENTIAL
Fig. 338
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Load Factor (L/W)
0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

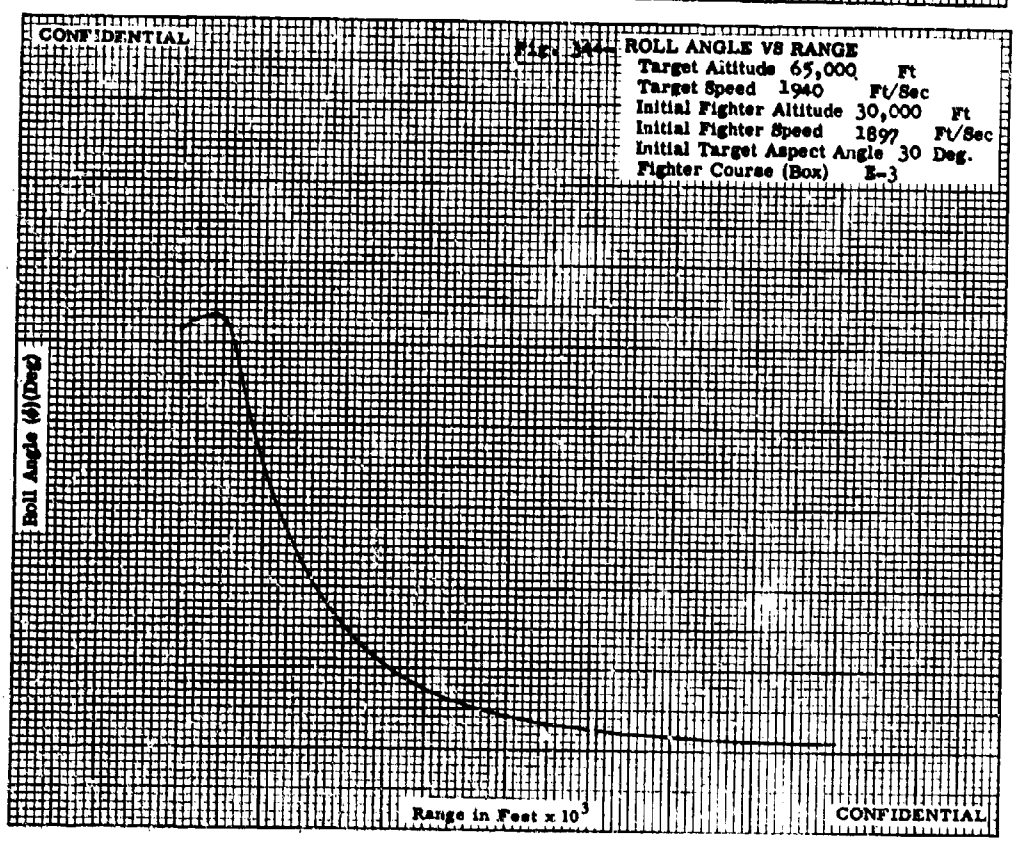

CONFIDENTIAL
Fig. 339 ANGLE OF ATTACK VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Angle of Attack (α) (°)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

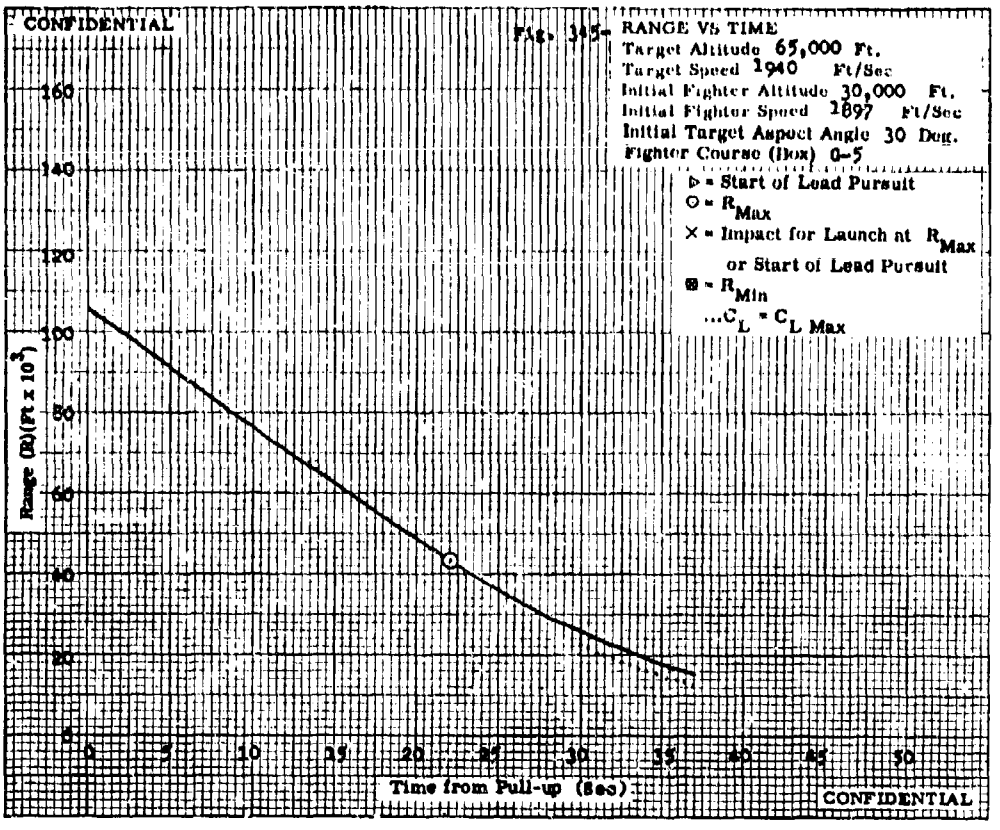

CONFIDENTIAL
Fig. 340 FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-3
Fighter Speed (Vf) (Ft/Sec)
1900
1850
1750
1650
1550
1450
1350
1250
1150
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10³
CONFIDENTIAL

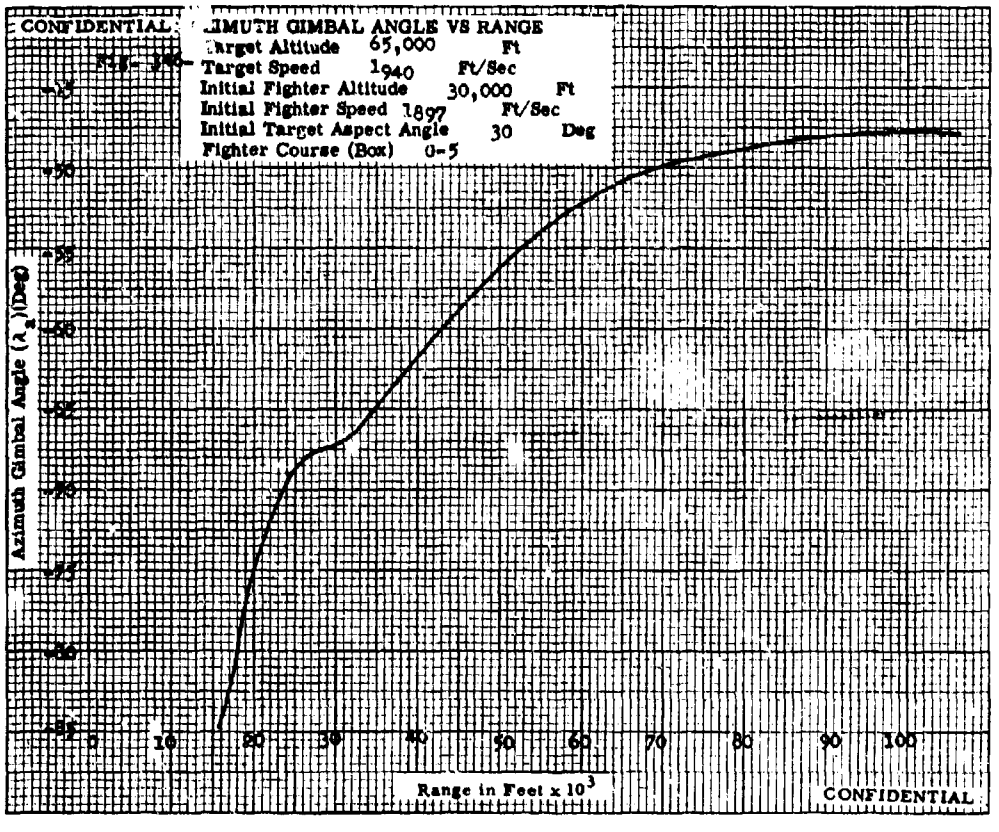

CONFIDENTIAL
Fig. 341- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Fighter Altitude (H_F)(Ft x 10^3)
70
65
60
55
50
45
40
35
30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

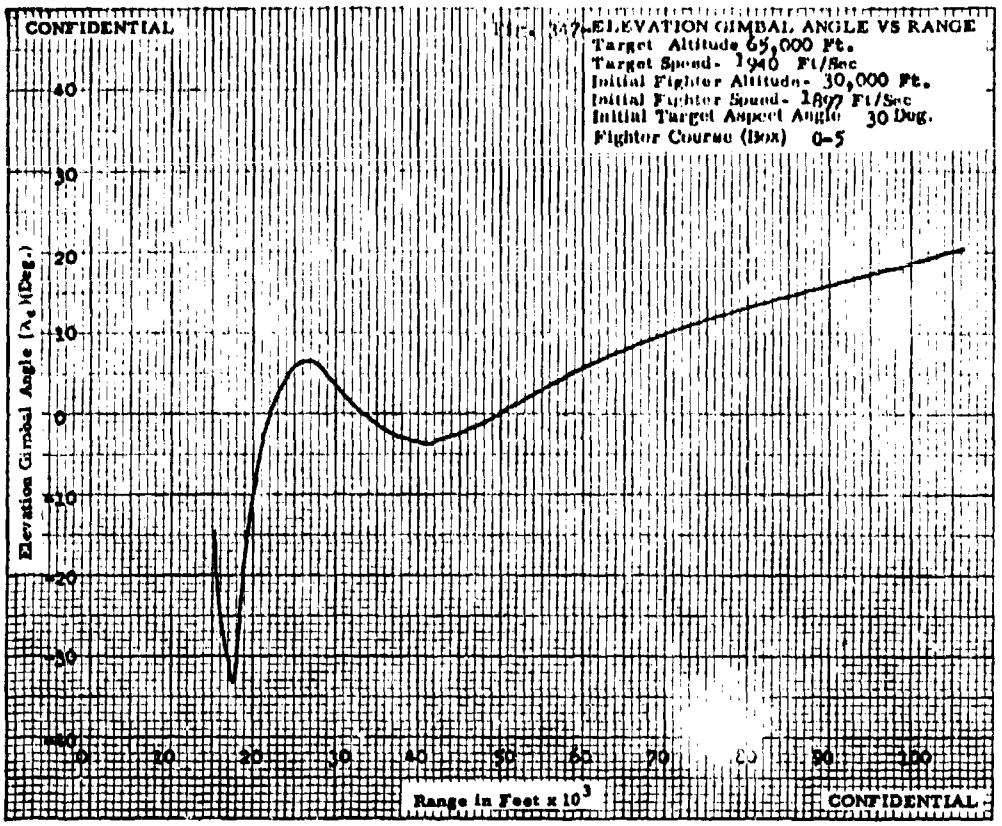

CONFIDENTIAL
Fig. 342- TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Target Aspect Angle (Ψ_T)(°)
110
100
90
80
70
60
50
40
30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

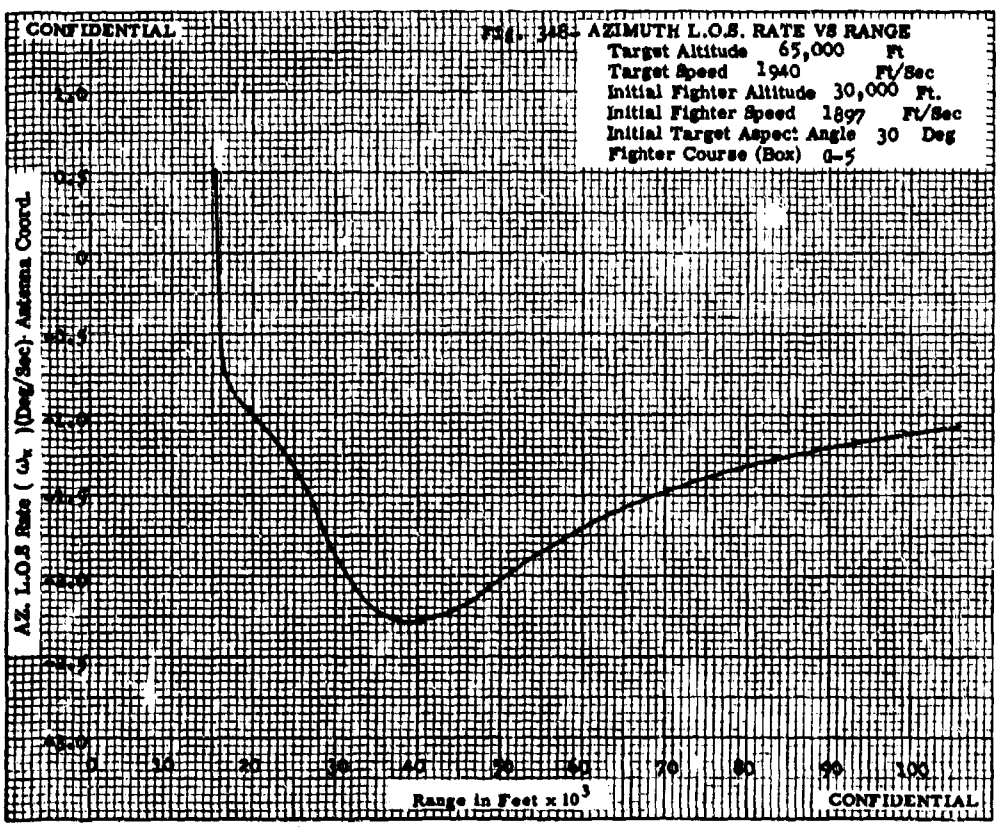

CONFIDENTIAL
Fig. 343 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Aircraft Heading Error (ε)(Deg)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

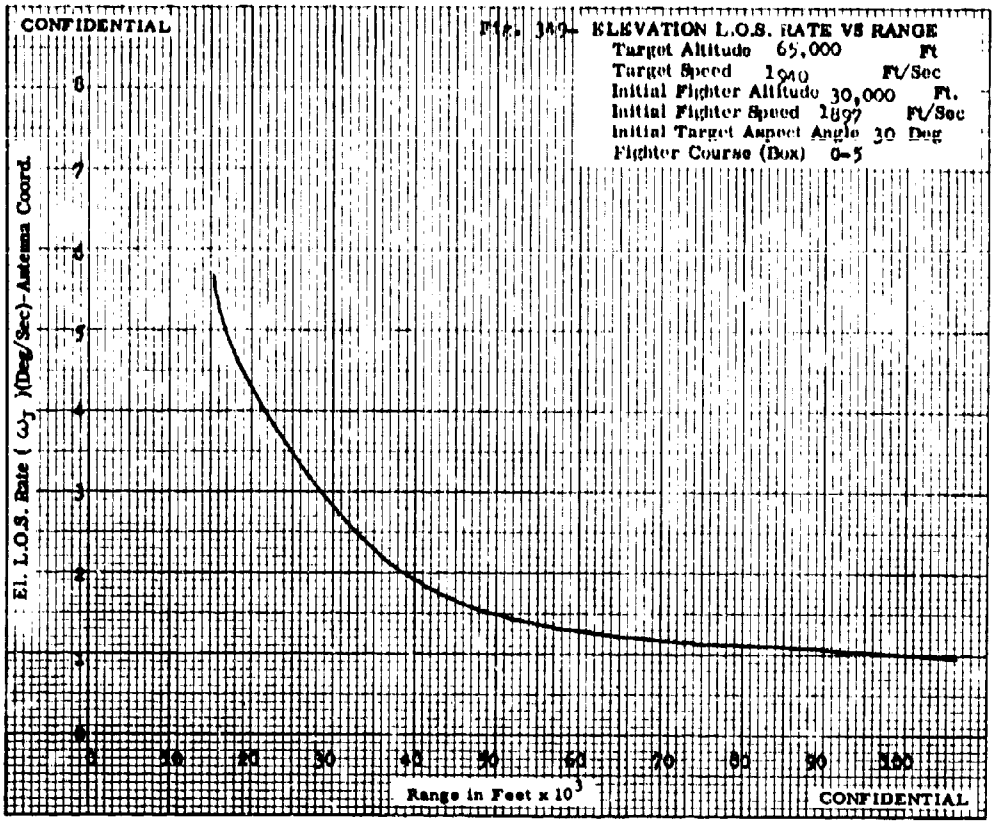

CONFIDENTIAL
Fig. 344 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-3
Roll Angle (Φ)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

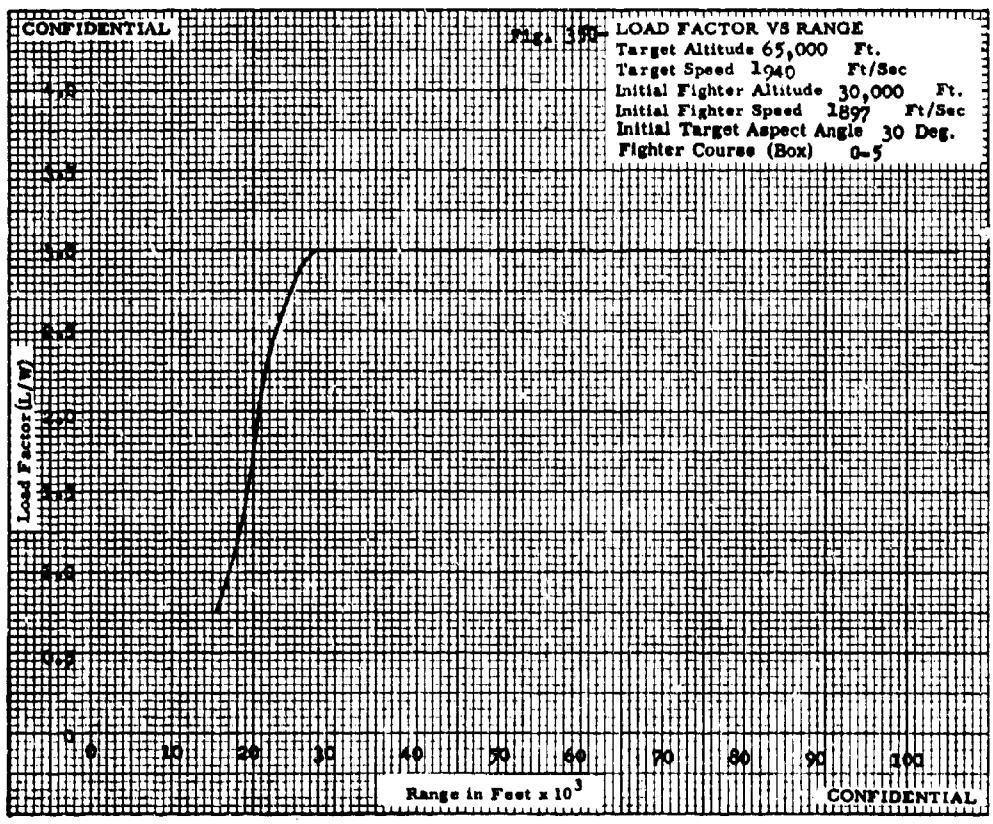

CONFIDENTIAL
Fig. 345
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

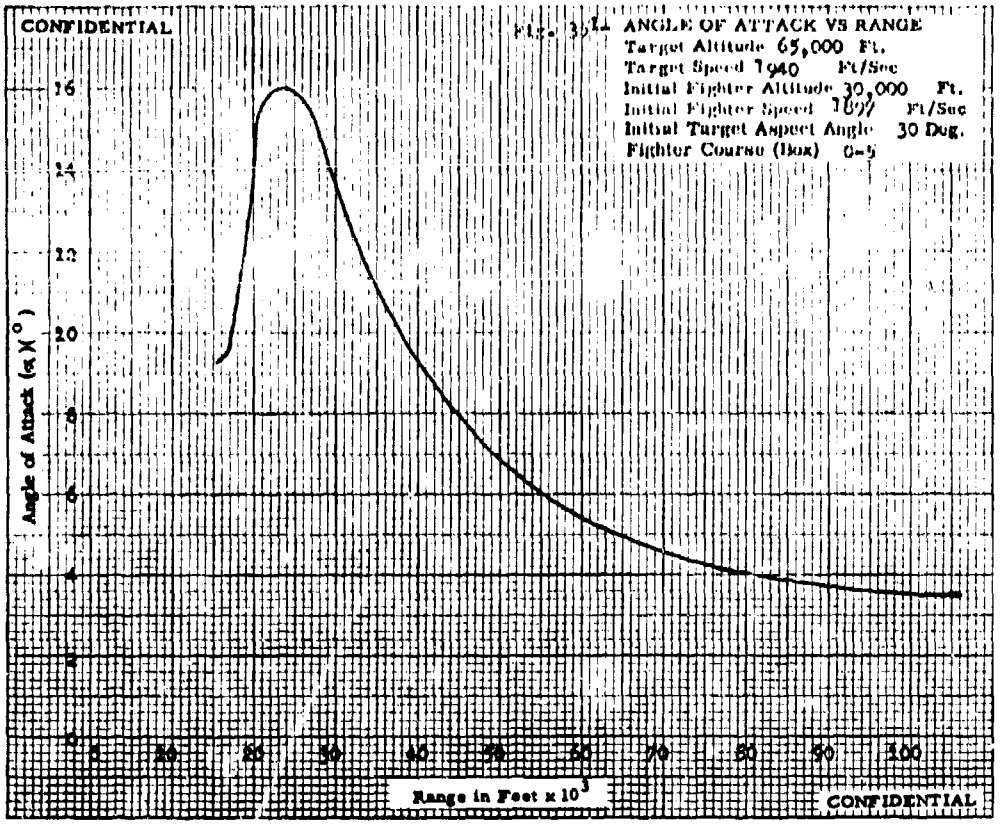

CONFIDENTIAL
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-5
Azimuth Gimbal Angle (λ_a)(Deg)
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

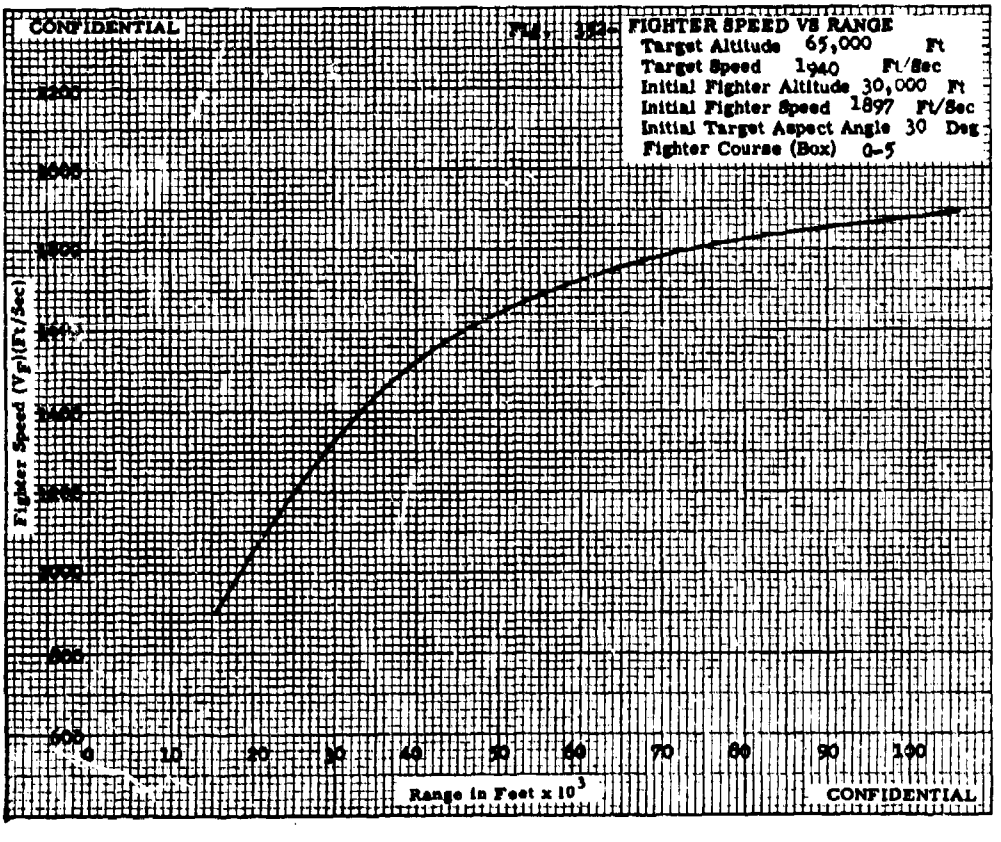

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
Elevation Gimbal Angle (Deg.)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

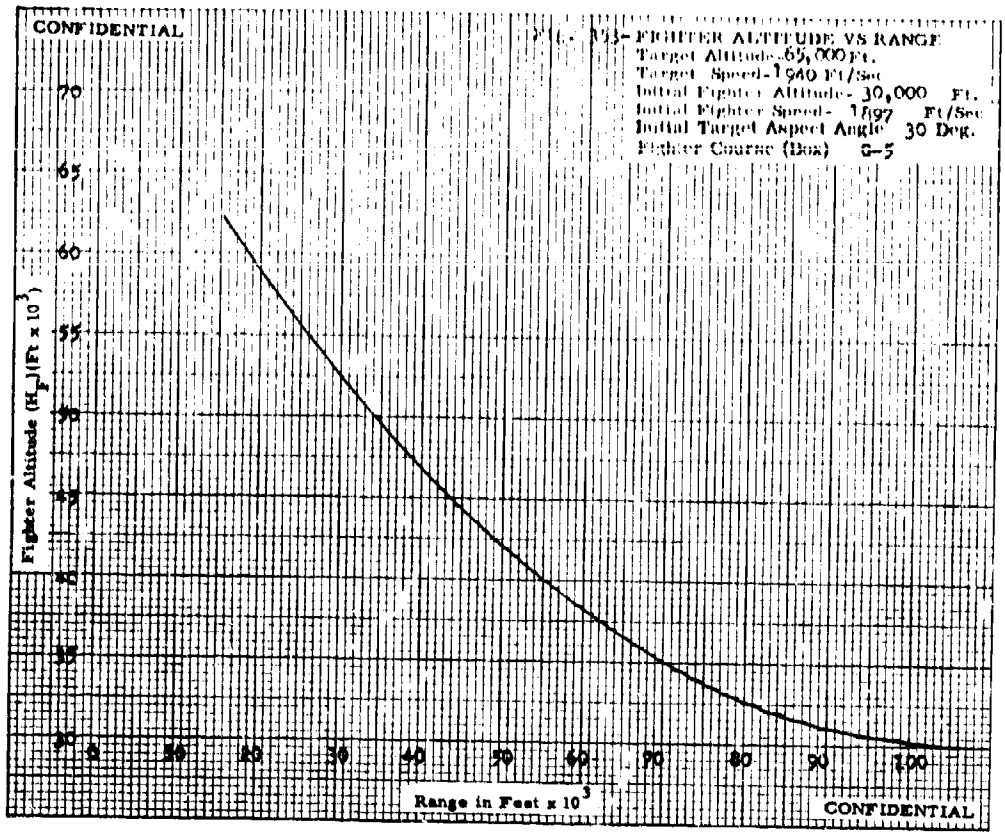

CONFIDENTIAL
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-5
AZ. L.O.S Rate (Deg/Sec)- Antenna Coord.
0.5
0
-0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

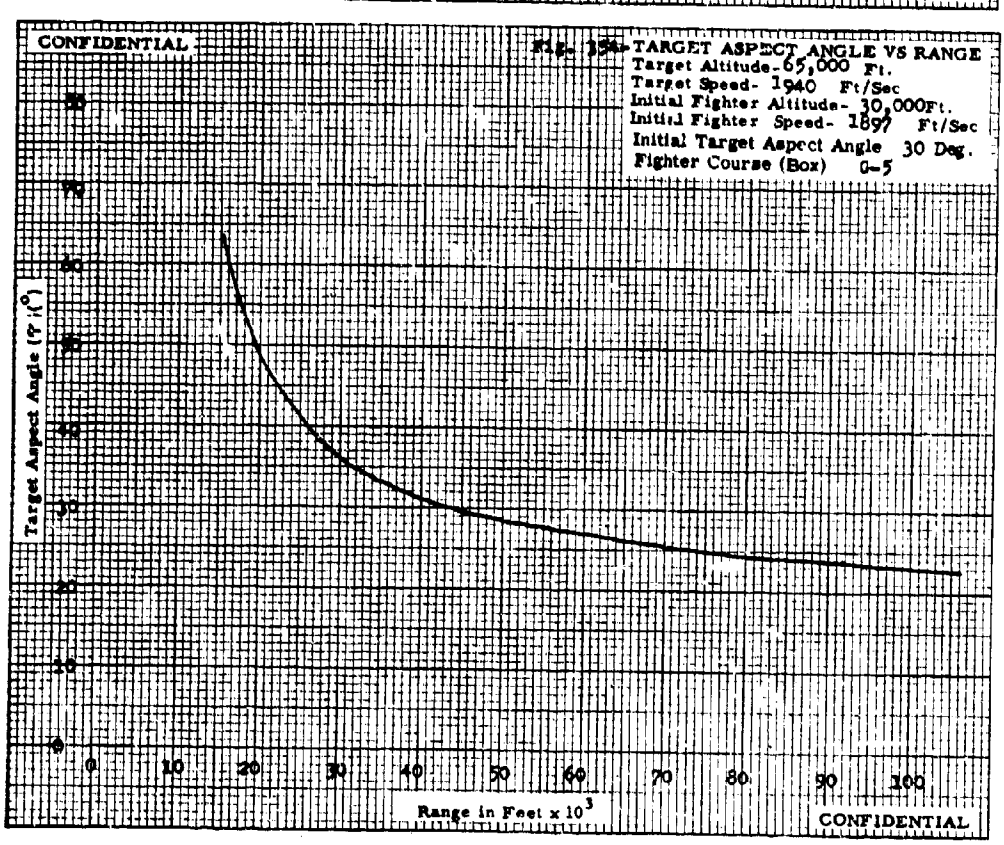

CONFIDENTIAL
Fig. 389 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-5
El. L.O.S. Rate (ω_y)(Deg/Sec)-Antenna Coord.
Range in Feet x 10^3
CONFIDENTIAL

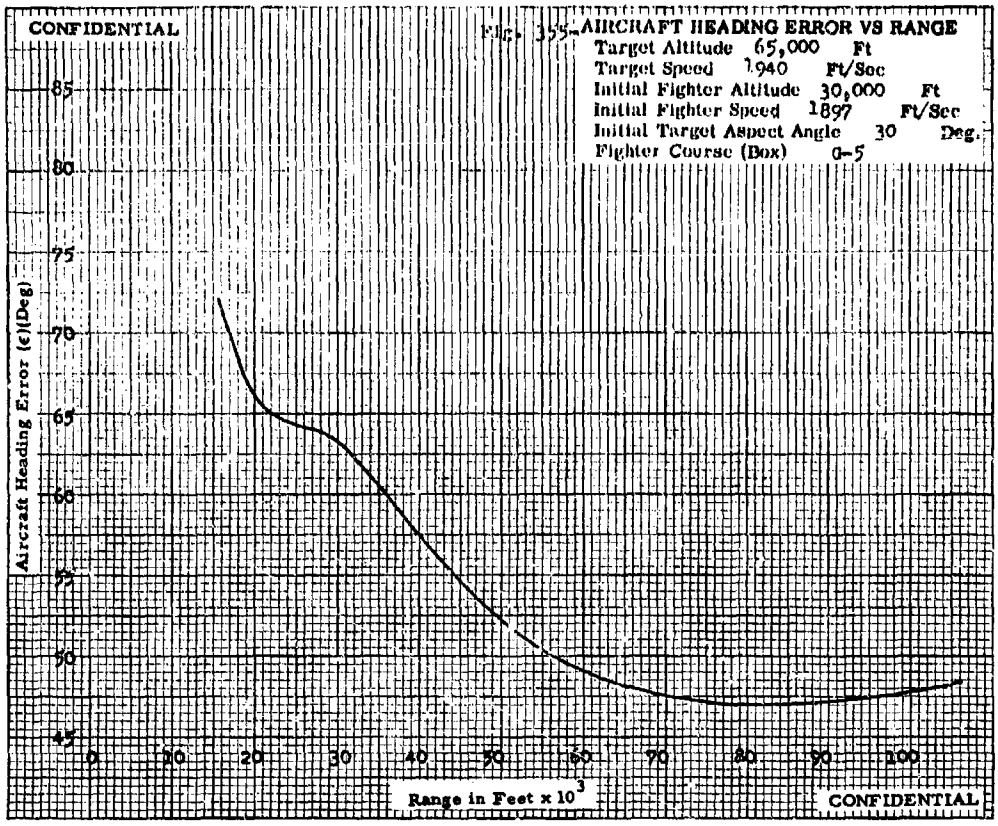

CONFIDENTIAL
Fig. 390 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
Load Factor (L/W)
Range in Feet x 10^3
CONFIDENTIAL

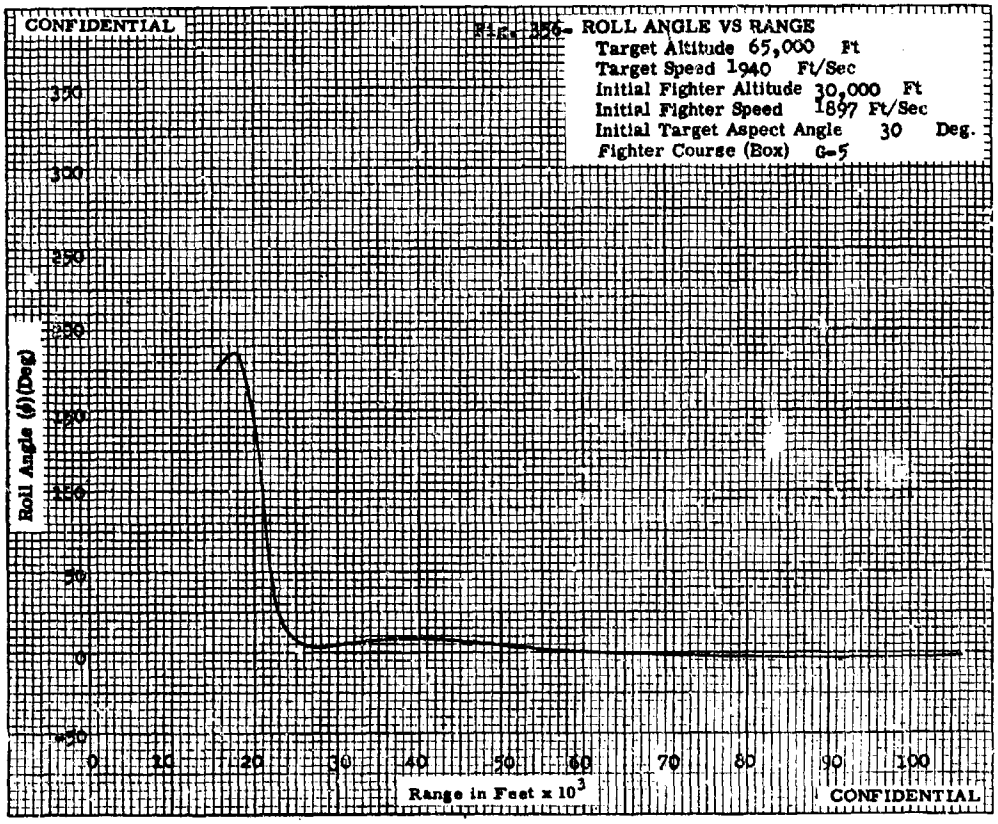

CONFIDENTIAL
Fig. 3.11 ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 3.12
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-5
Fighter Speed (Vf)(Ft/Sec)
2200
2000
1800
1600
1400
1200
1000
800
600
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 33- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
Fighter Altitude (H_F)(Ft x 10^3)
70
65
60
55
50
45
40
35
30
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 34- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-5
Target Aspect Angle (Ψ_T)(°)
90
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) G-5
Aircraft Heading Error (ε)(Deg)
85
80
75
70
65
60
55
50
45
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) G-5
Roll Angle (φ)(Deg)
300
250
200
150
100
50
0
-50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

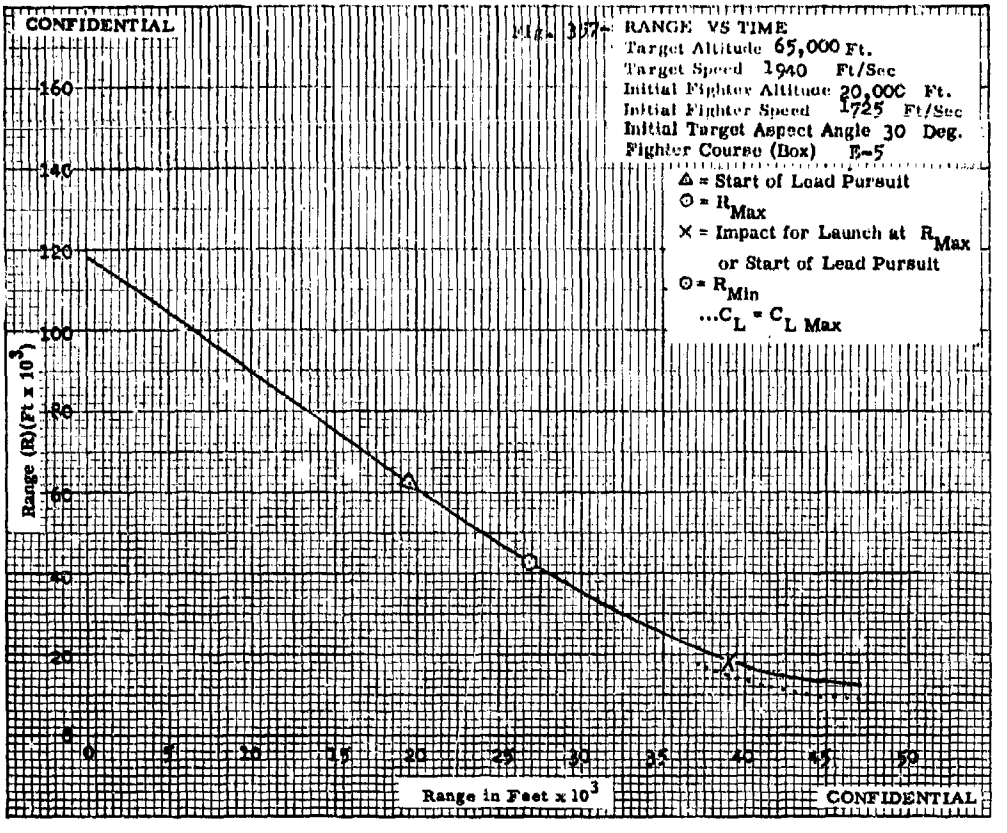

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Fig. 327
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Δ = Start of Lead Pursuit
⊙ = R Max
× = Impact for Launch at R Max or Start of Lead Pursuit
⊙ = R Min
...C L = C L Max
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Range in Feet x 10^3
CONFIDENTIAL

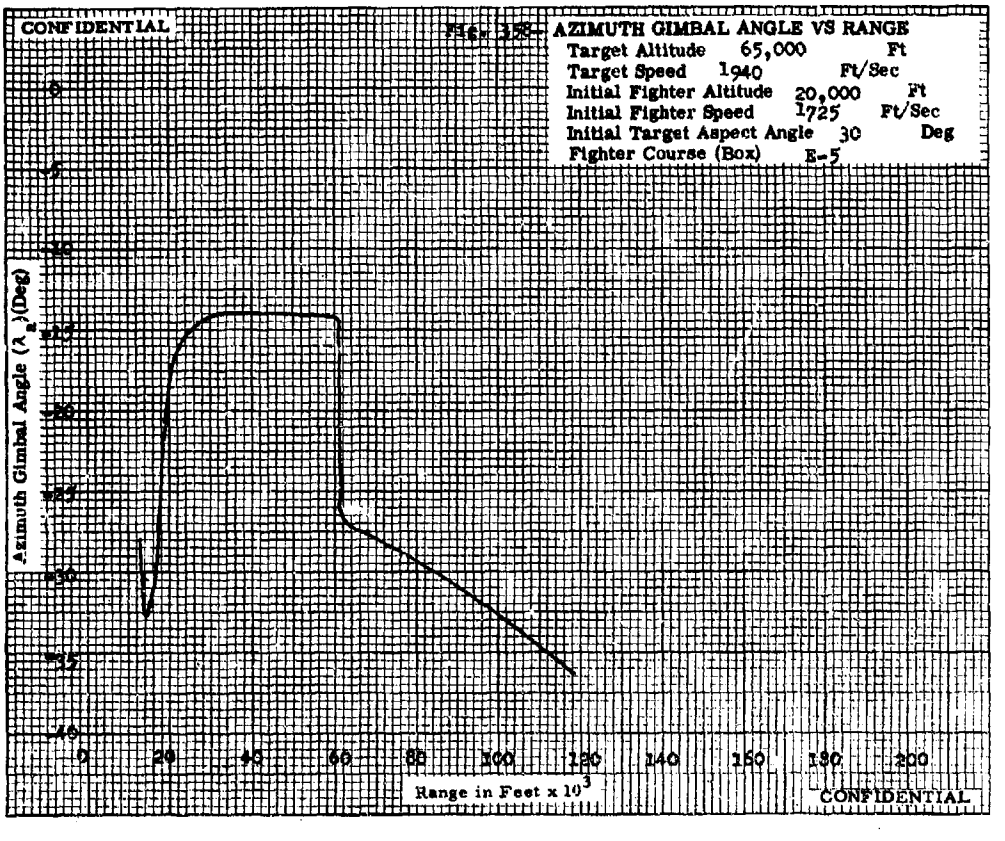
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Fig. 328
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-5
Azimuth Gimbal Angle (λ a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

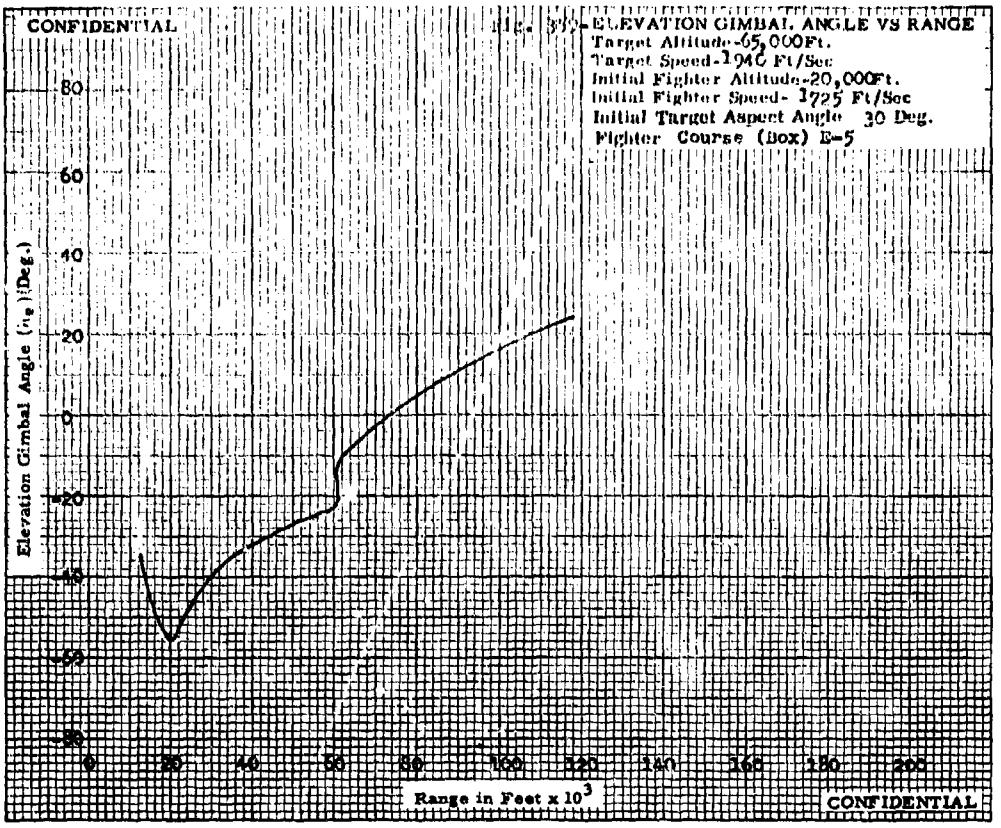
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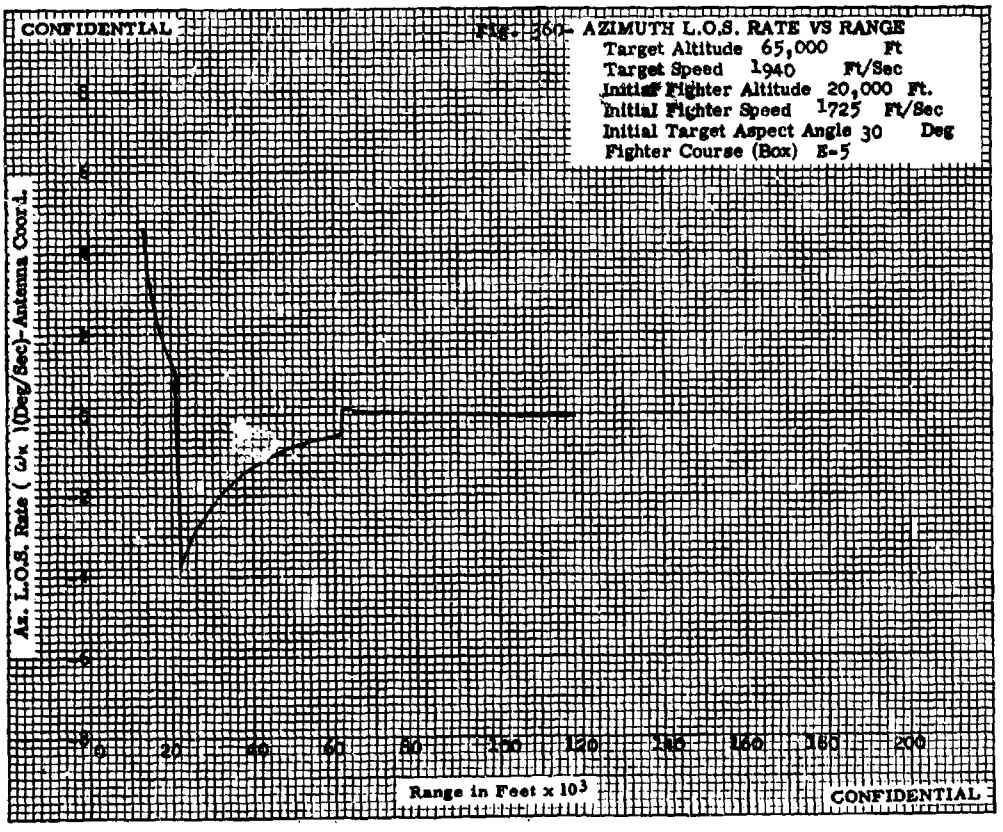
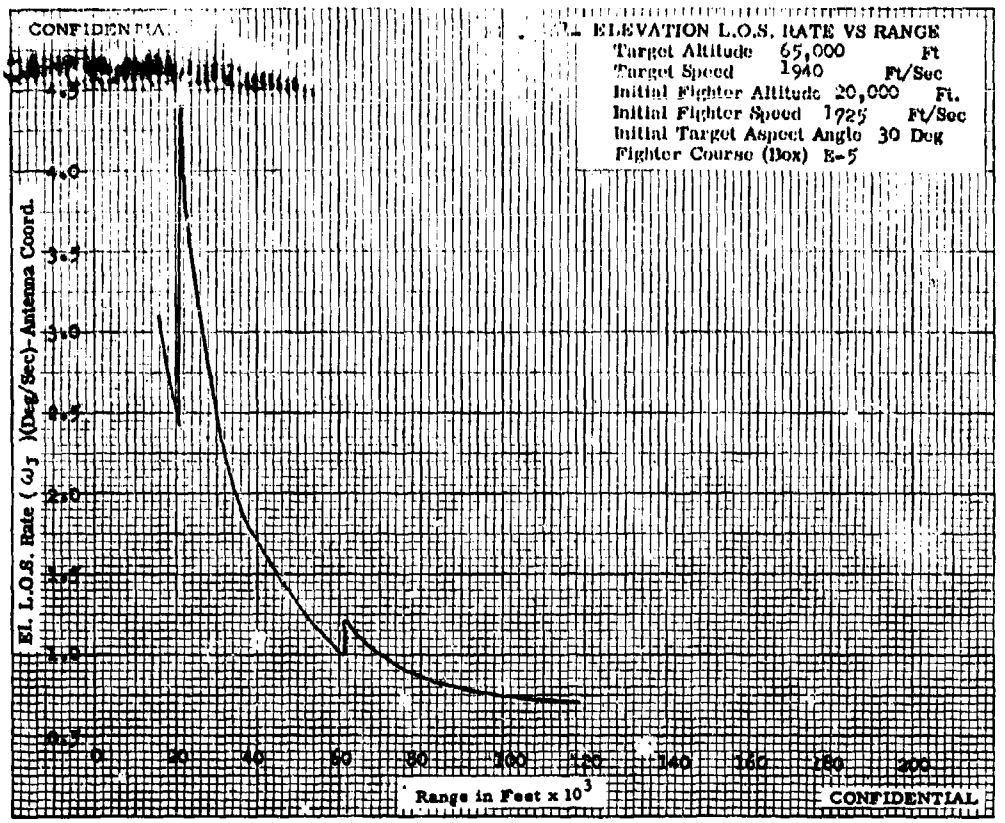
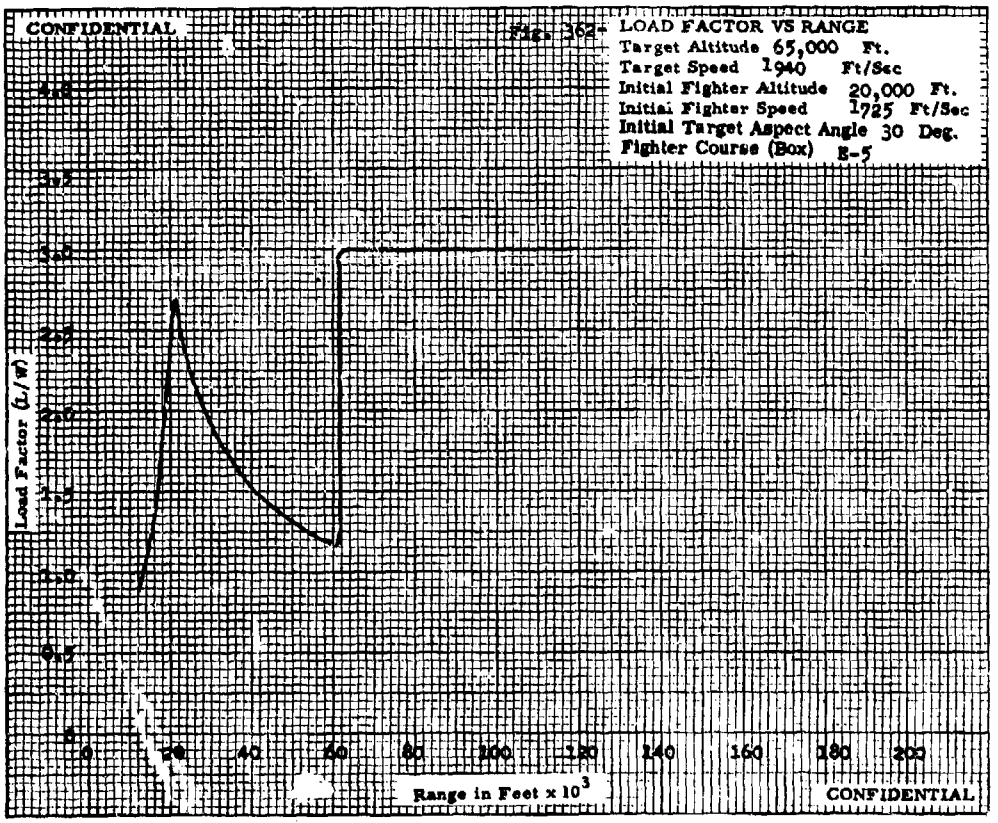
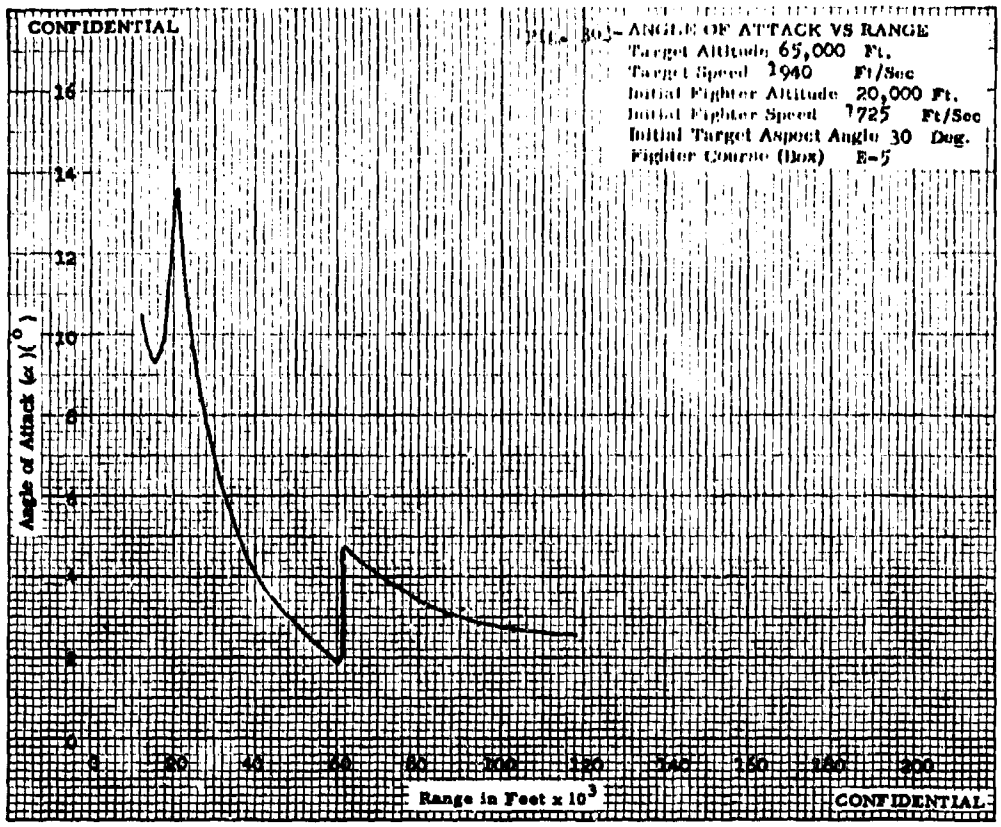
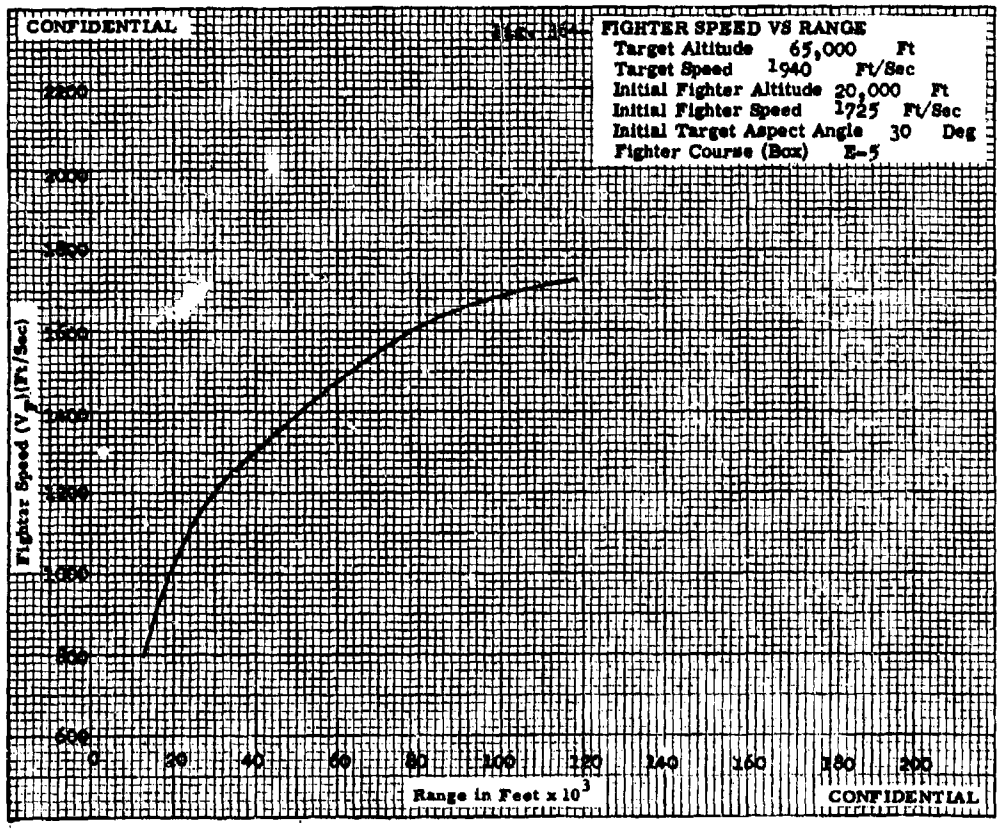
Fig. 359- ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-20,000Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Elevation Gimbal Angle (θe) (Deg.)
80
60
40
20
0
-20
-40
-60
-80
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

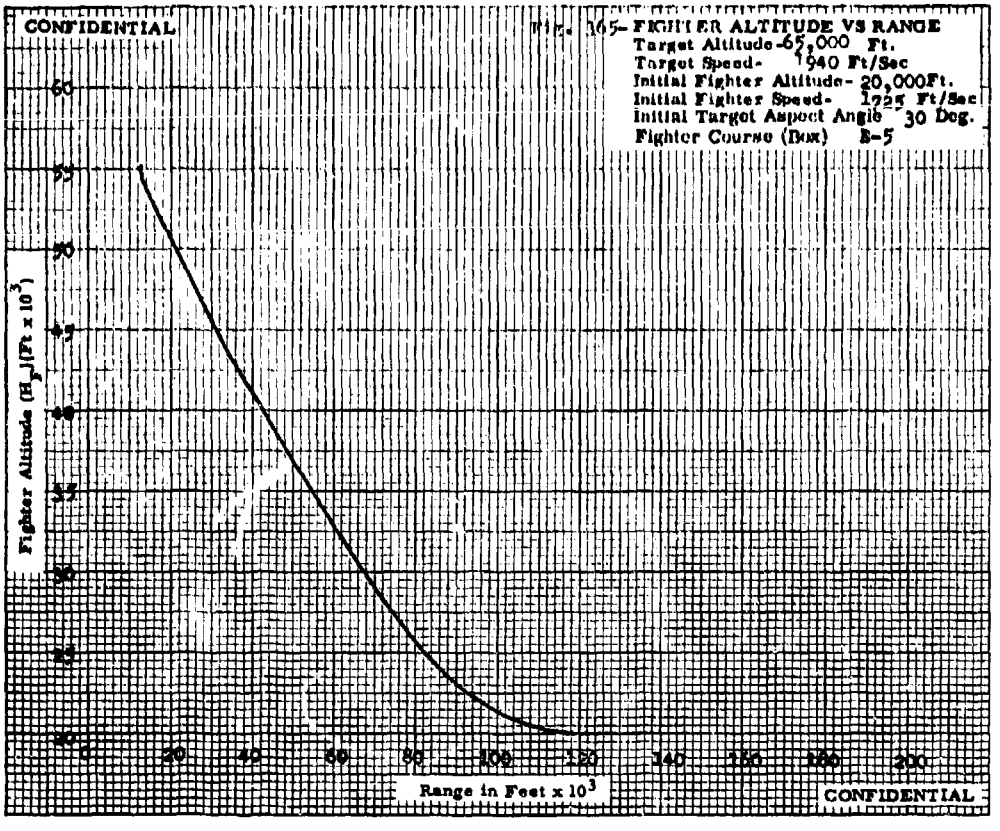

CONFIDENTIAL
Fig. 360- AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-5
Az. L.O.S. Rate (ωx) (Deg/Sec)-Antenna Coord.
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

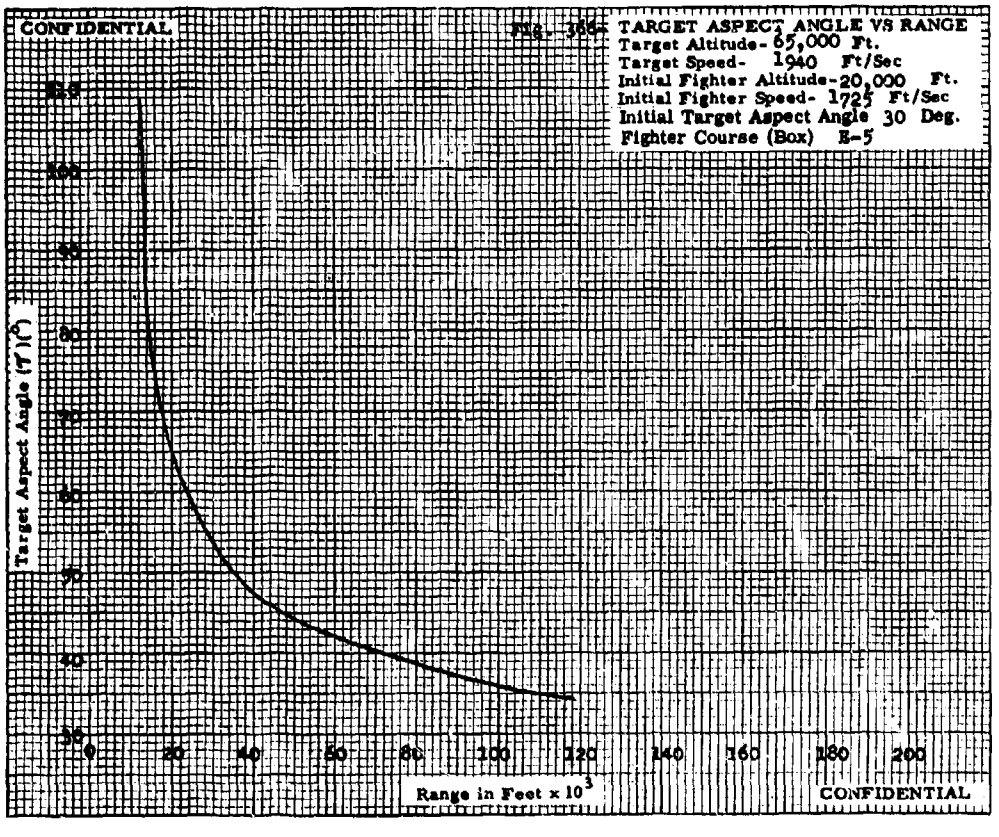

CONFIDENTIAL
EL ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-5
El. L.O.S. Rate (ω_y) (Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

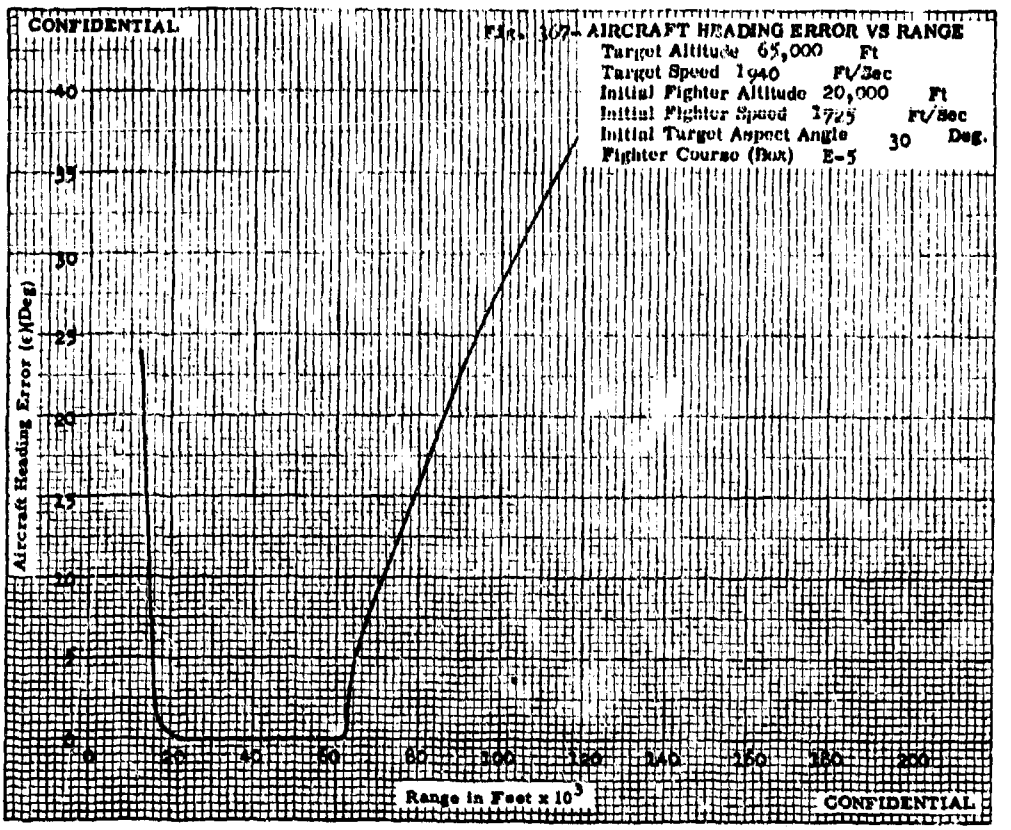

CONFIDENTIAL
Fig. 362
LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

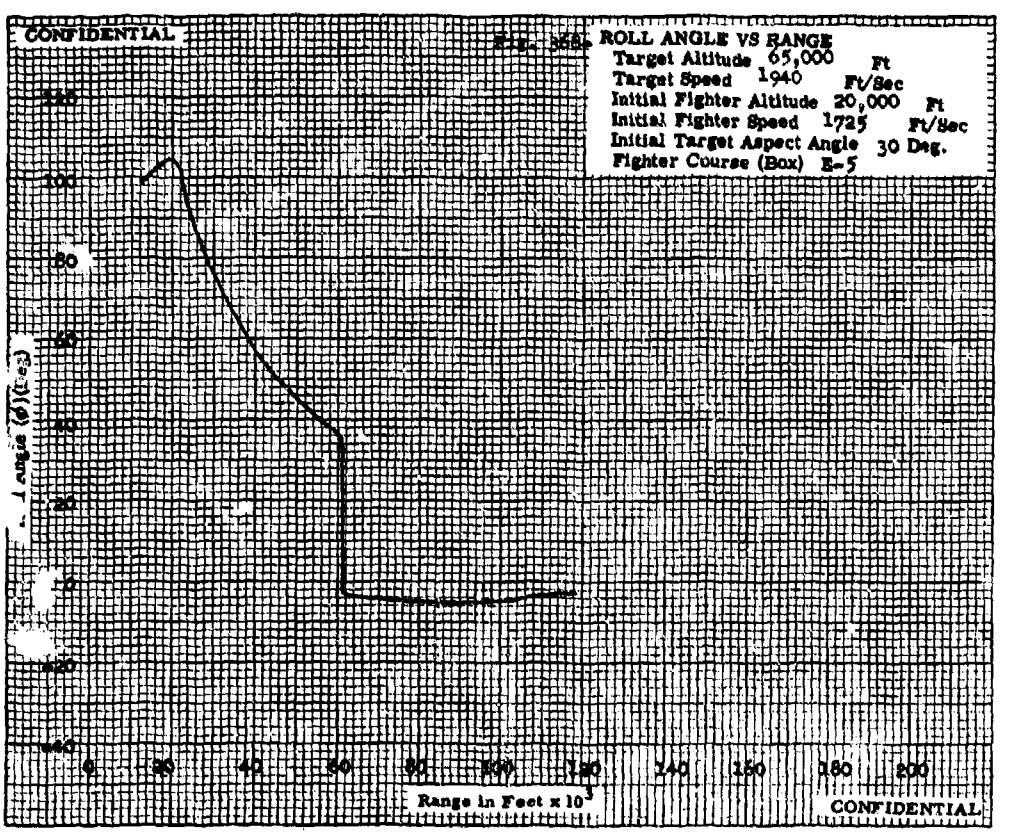

CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Angle of Attack (α)(°)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

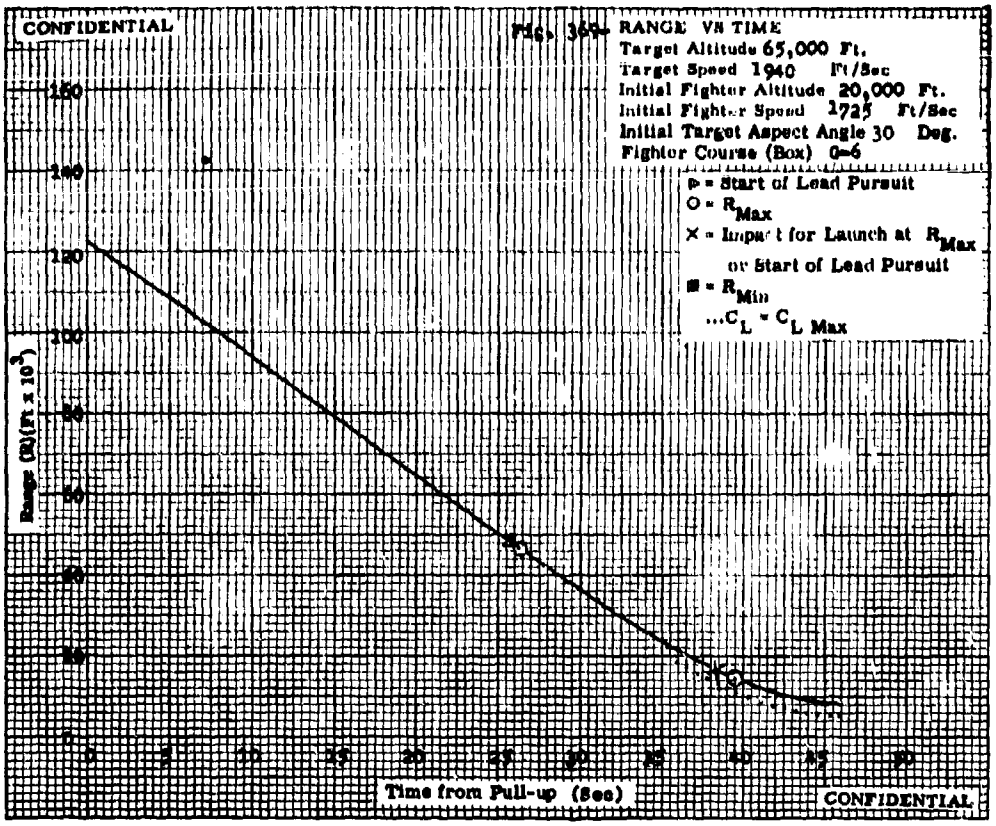

CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) E-5
Fighter Speed (V_F)(Ft/Sec)
2200
2000
1800
1600
1400
1200
1000
800
600
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

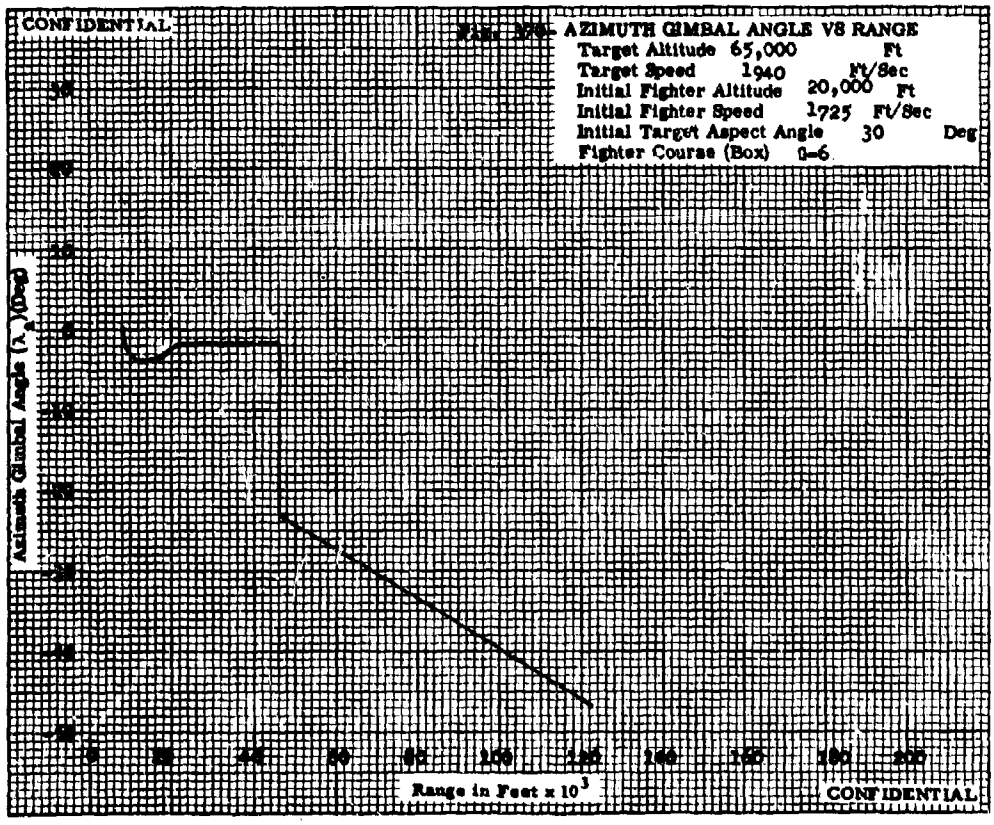

CONFIDENTIAL
Fig. 365- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Fighter Altitude (H_f)(Ft x 10^3)
60
55
50
45
40
35
30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 366-
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Target Aspect Angle (T_A)(D)
90
80
70
60
50
40
30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
Aircraft Heading Error (ε)(Deg)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) E-5
100
80
60
40
20
0
-20
-40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6
P = Start of Lead Pursuit
O = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
■ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-6
Azimuth Gimbal Angle (λ_2)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

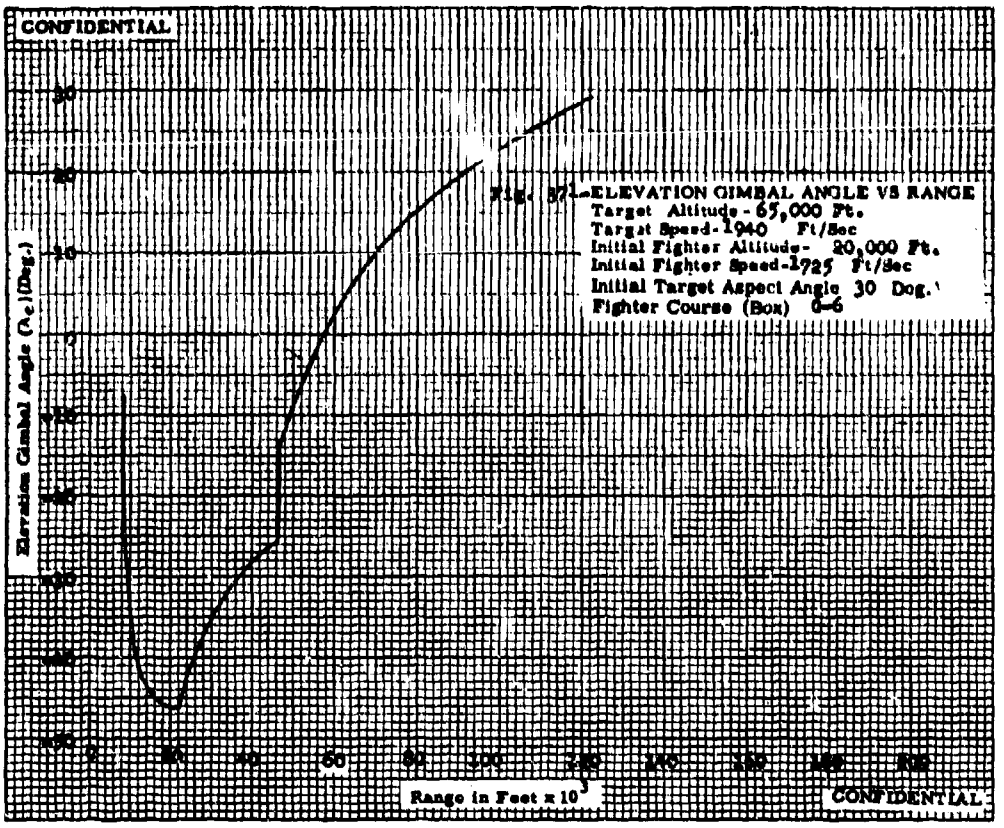


Fig. 371—ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude - 65,000 Ft.
Target Speed - 1940 Ft/Sec
Initial Fighter Altitude - 20,000 Ft.
Initial Fighter Speed - 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6

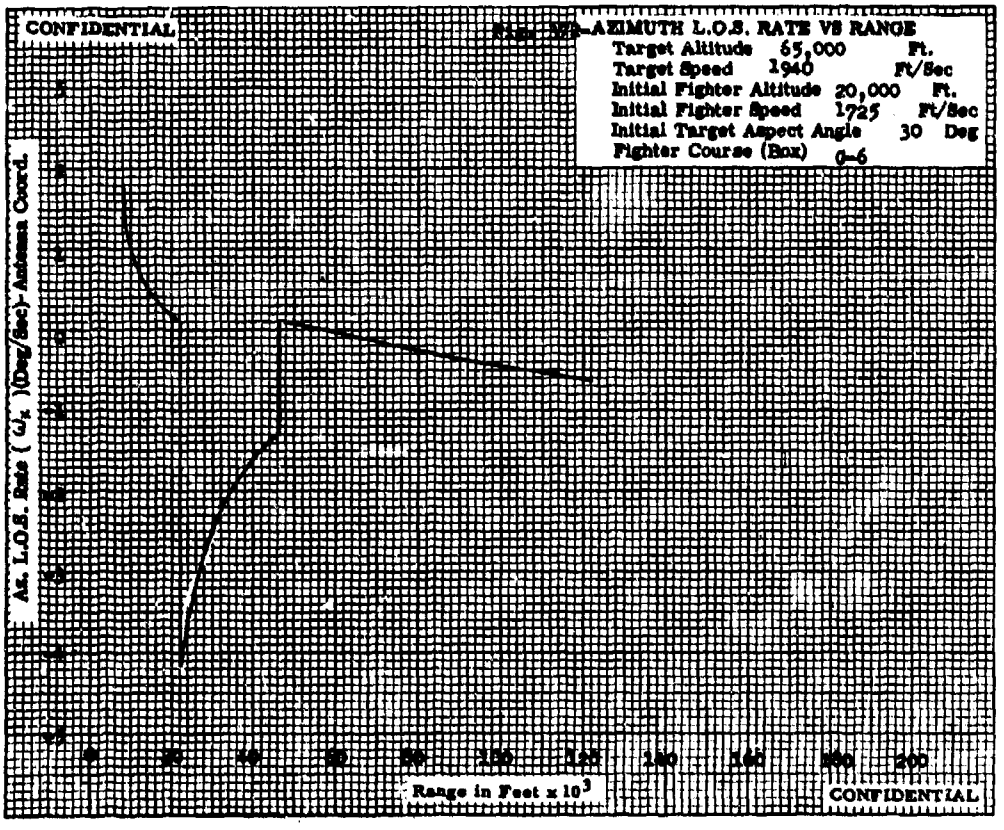


Fig. 372—AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-6

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Fig. 173

ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-6

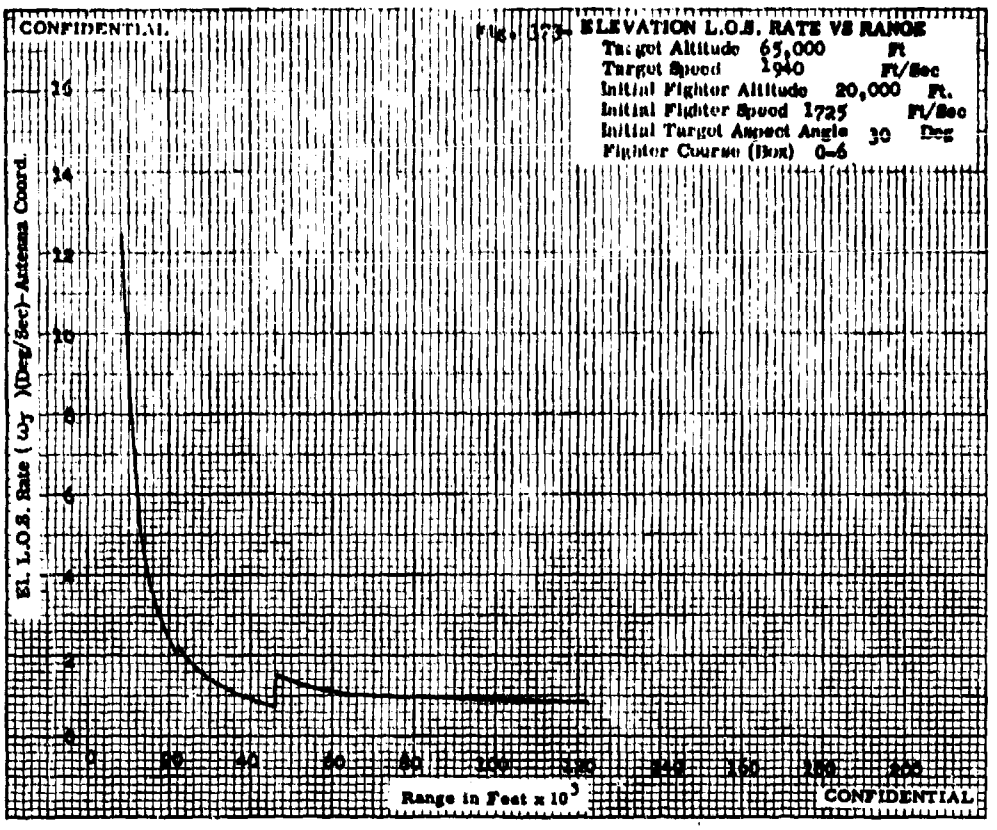

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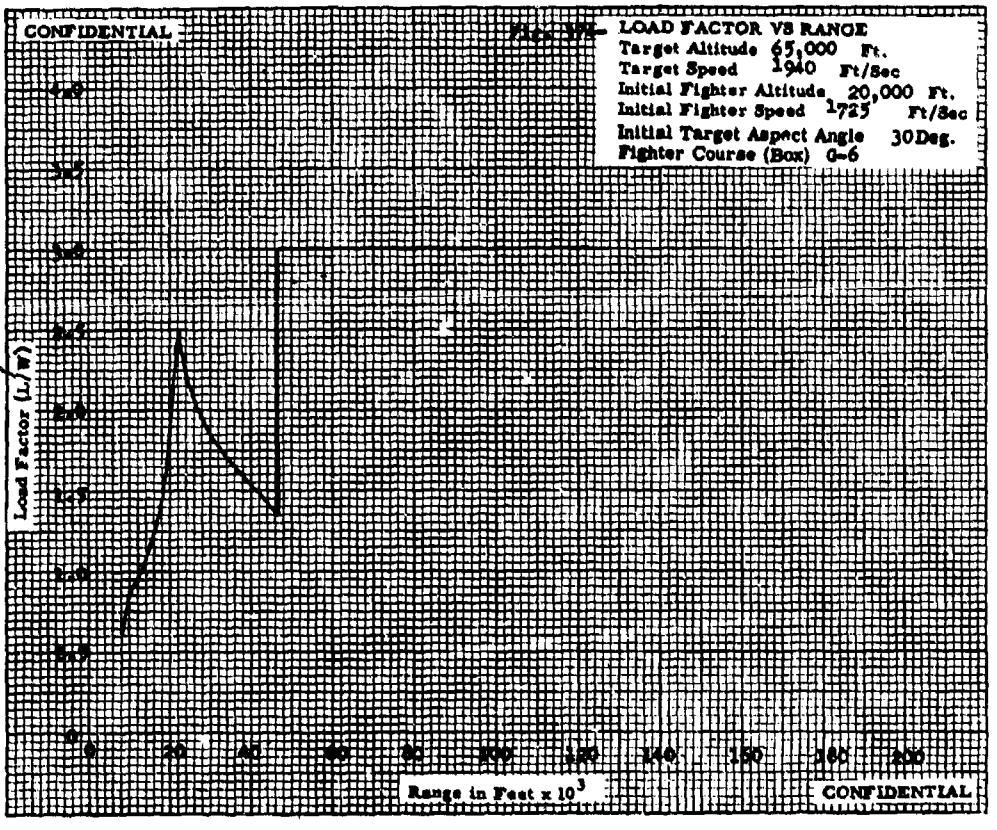
Fig. 174

LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6



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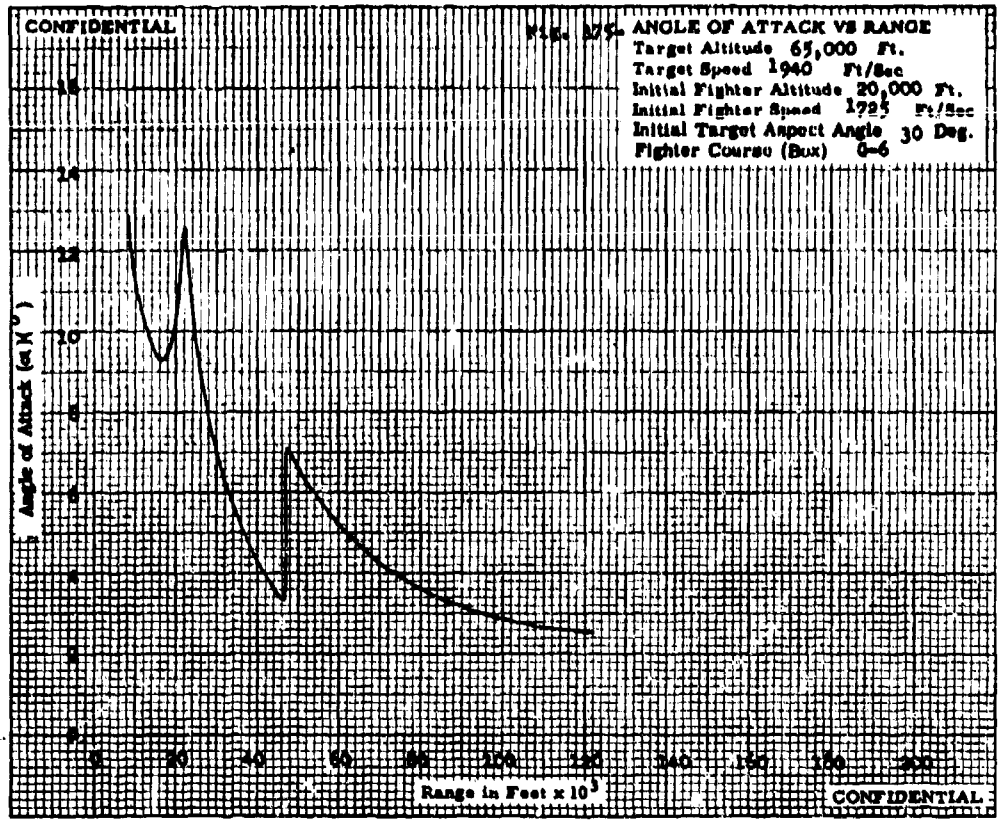
CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6
Angle of Attack (α) (°)
Range in Feet x 10³
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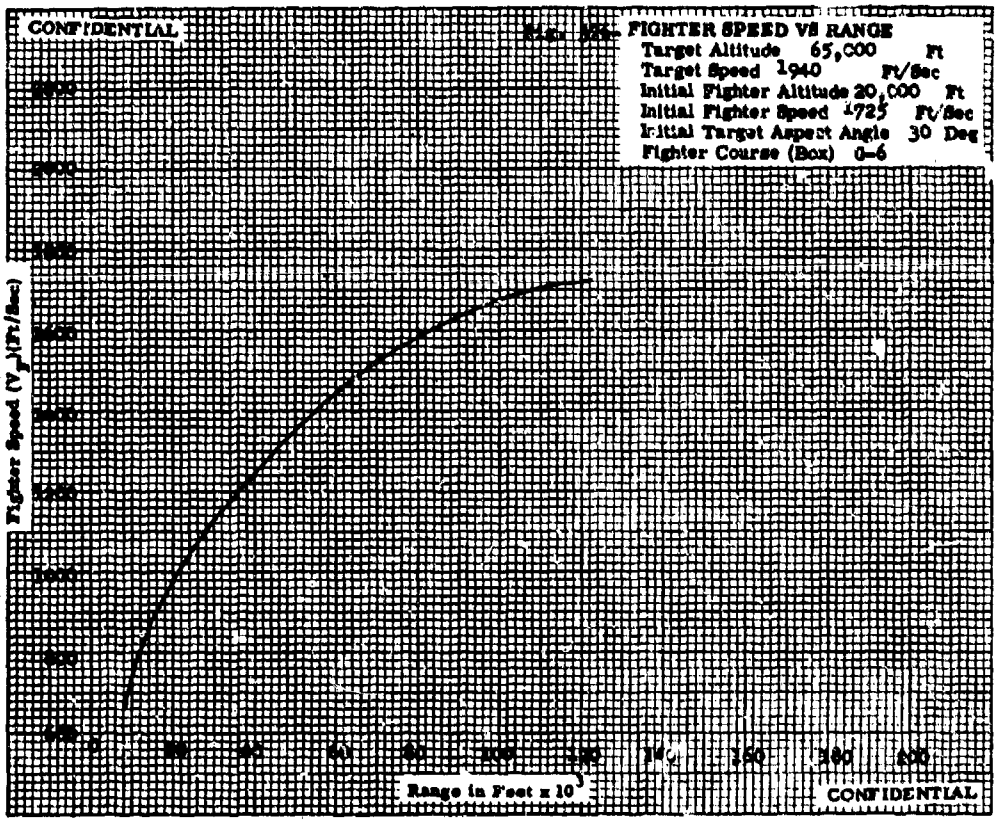
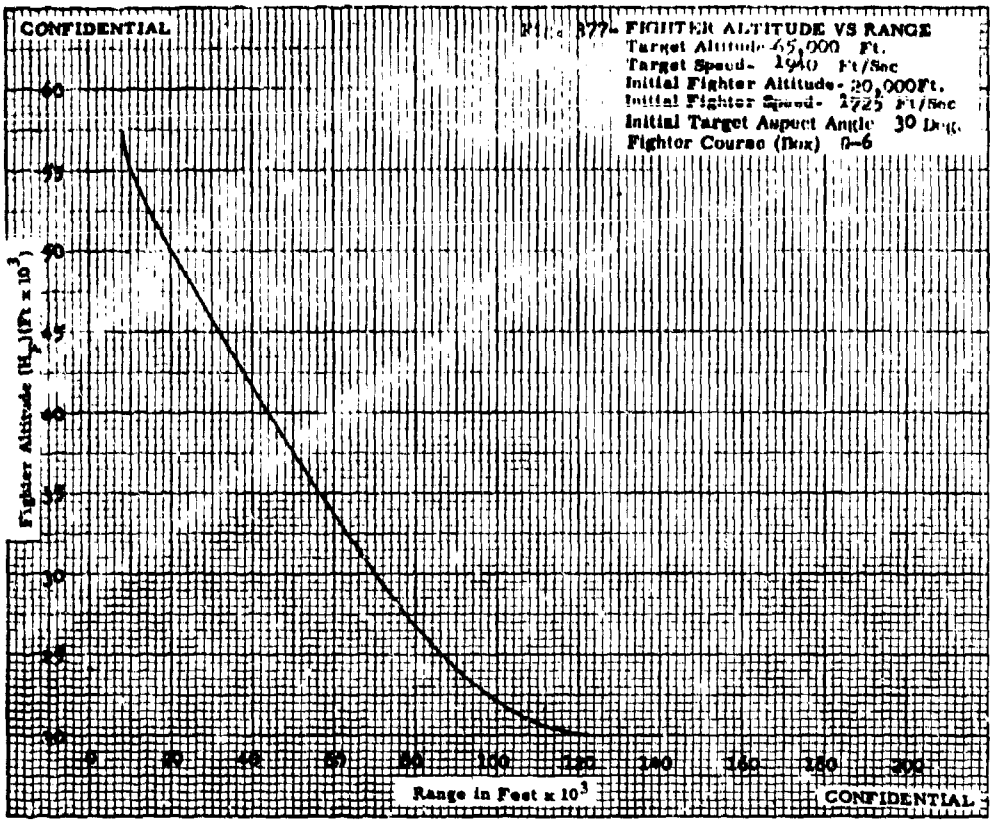

CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) 0-6
Fighter Speed (V_F) (Ft/Sec)
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 377- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6
Fighter Altitude (H_F)(Ft x 10^3)
Range in Feet x 10^3
CONFIDENTIAL

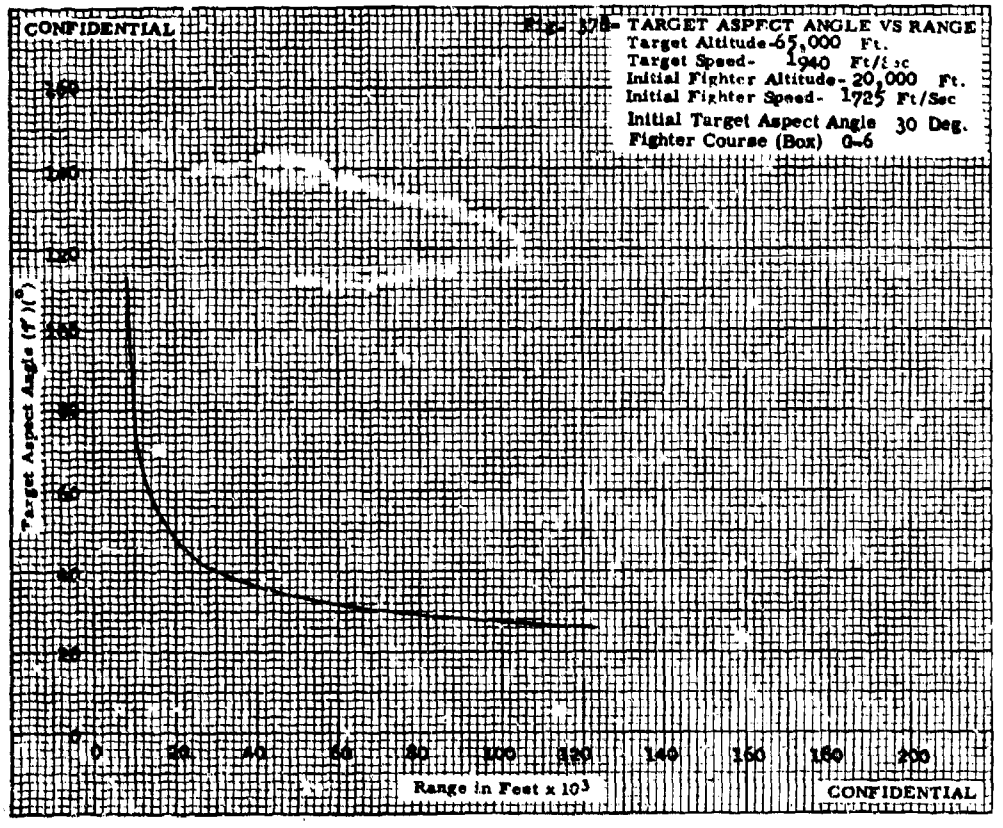

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Fig. 378- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6
Target Aspect Angle (ψ')(°)
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 379 AIRCRAFT HEADING ERROR VS RANGE

Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6

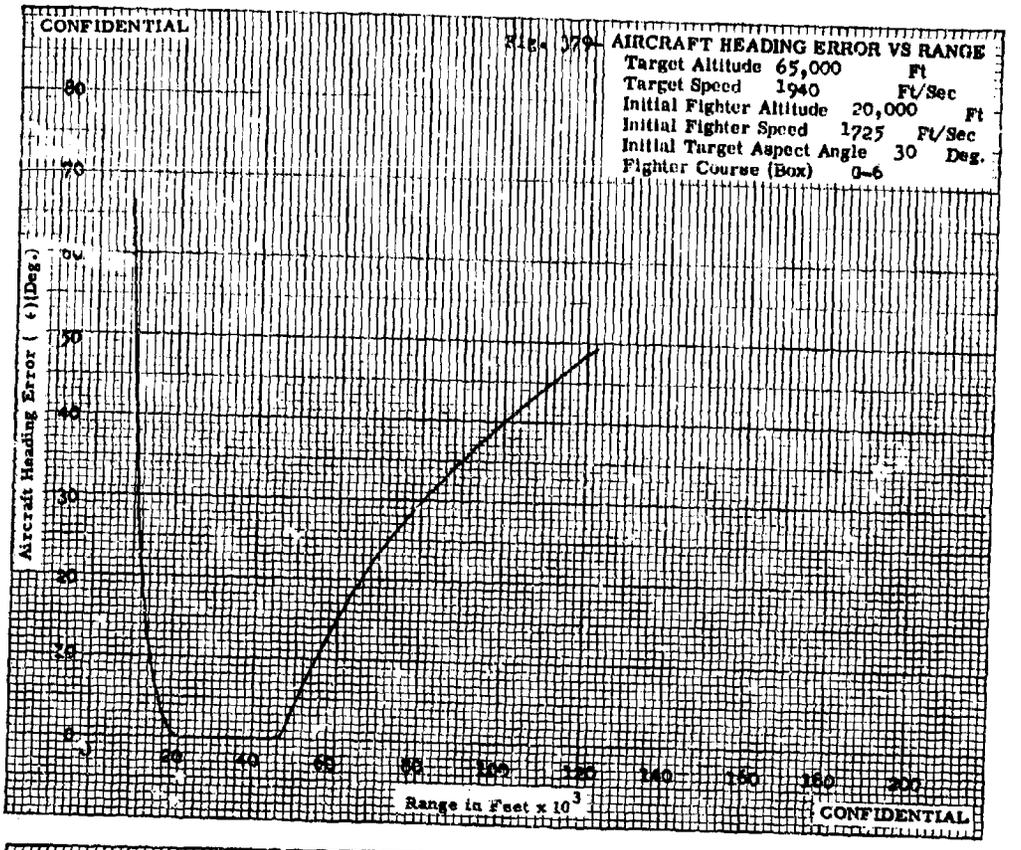

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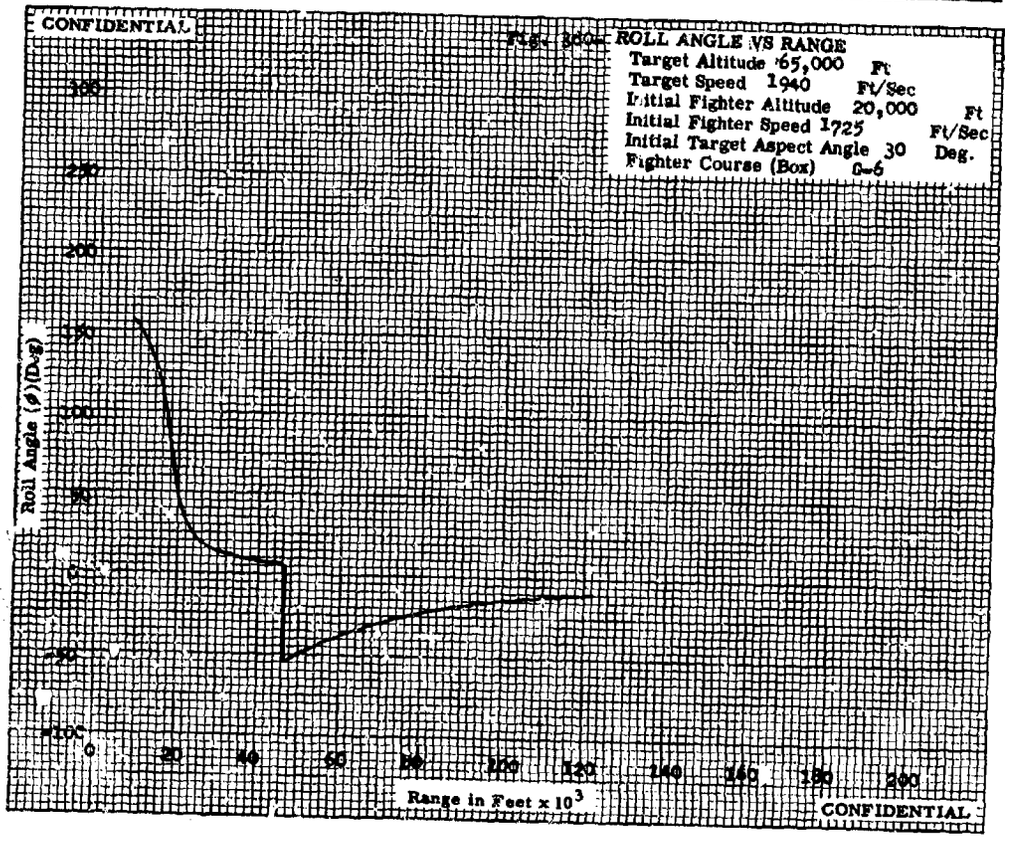
Fig. 380 ROLL ANGLE VS RANGE

Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) 0-6



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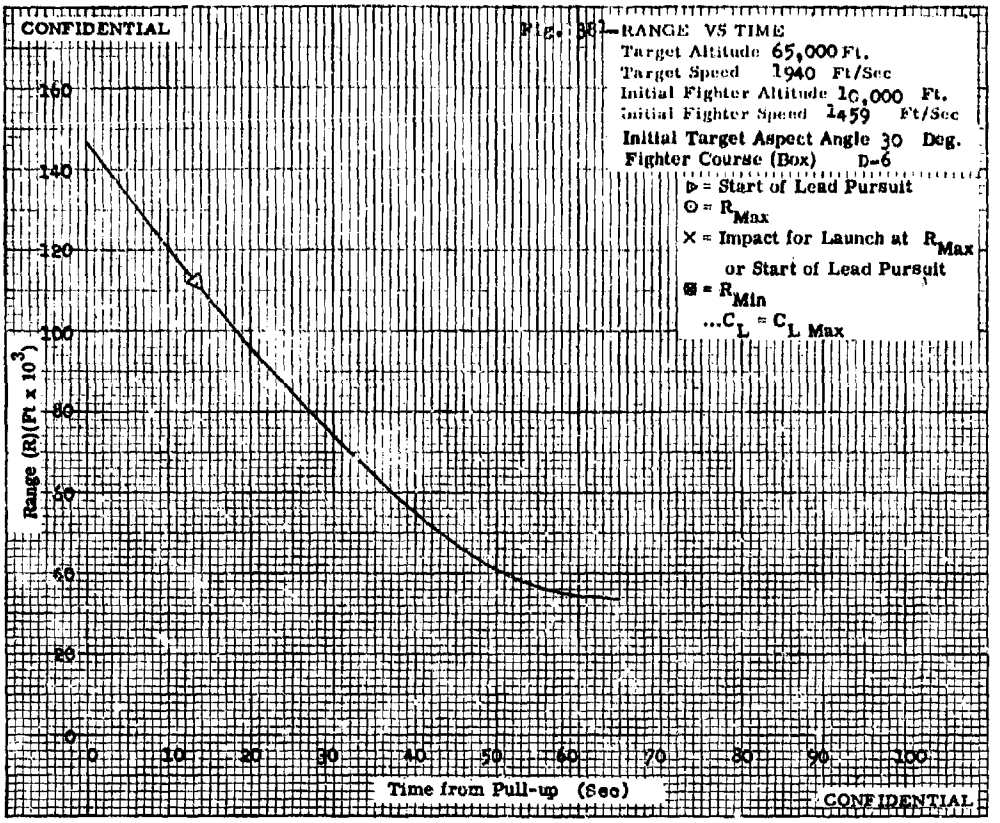
CONFIDENTIAL
Fig. 362—RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min} ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Time from Pull-up (Sec)
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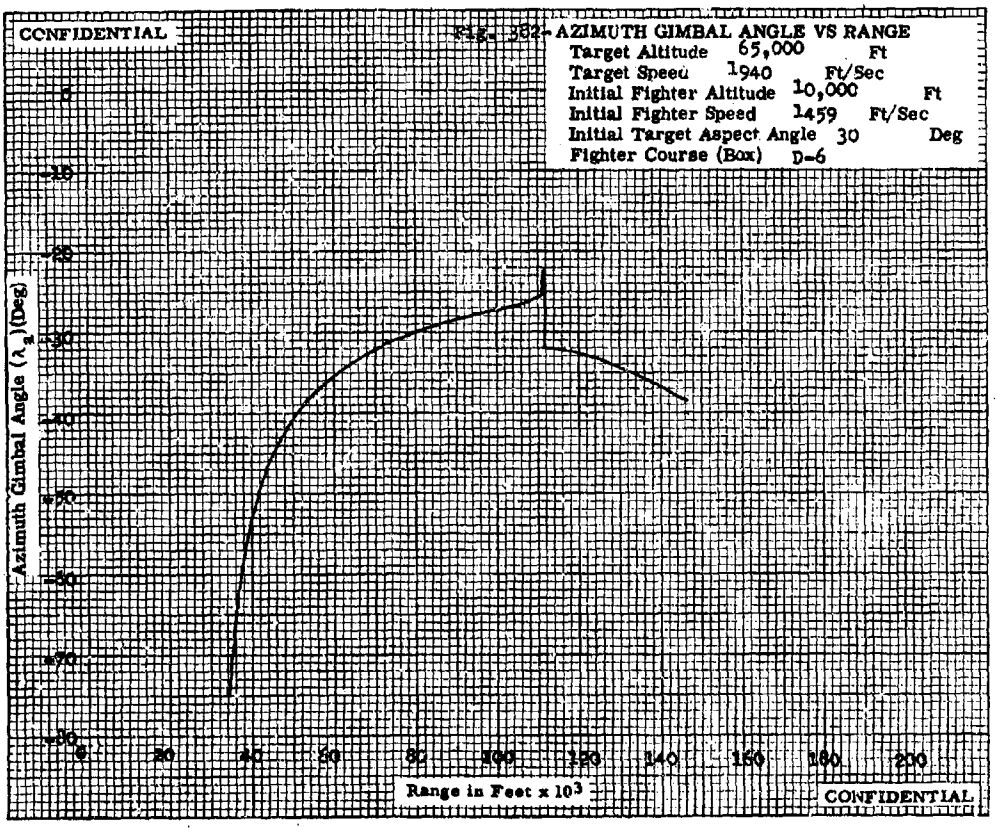
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Fig. 362—AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) D-6
Azimuth Gimbal Angle (λ_2)(Deg)
0
-10
-20
-30
-40
-50
-60
-70
-80
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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Fig. 363 – ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6

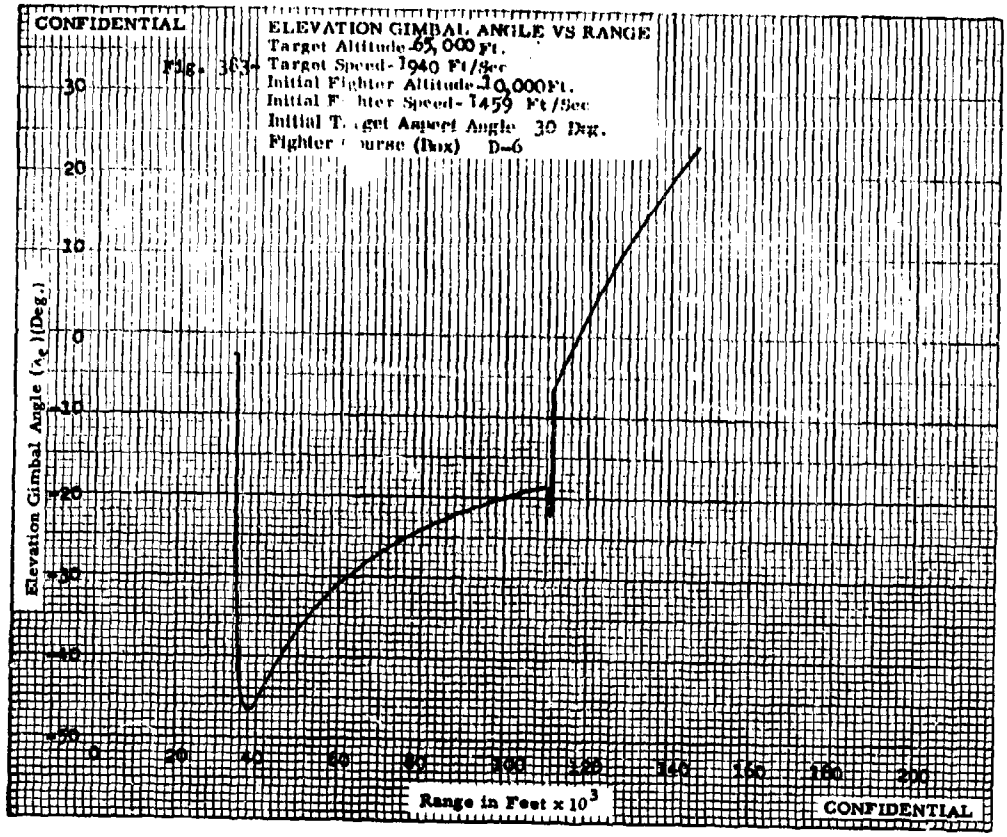

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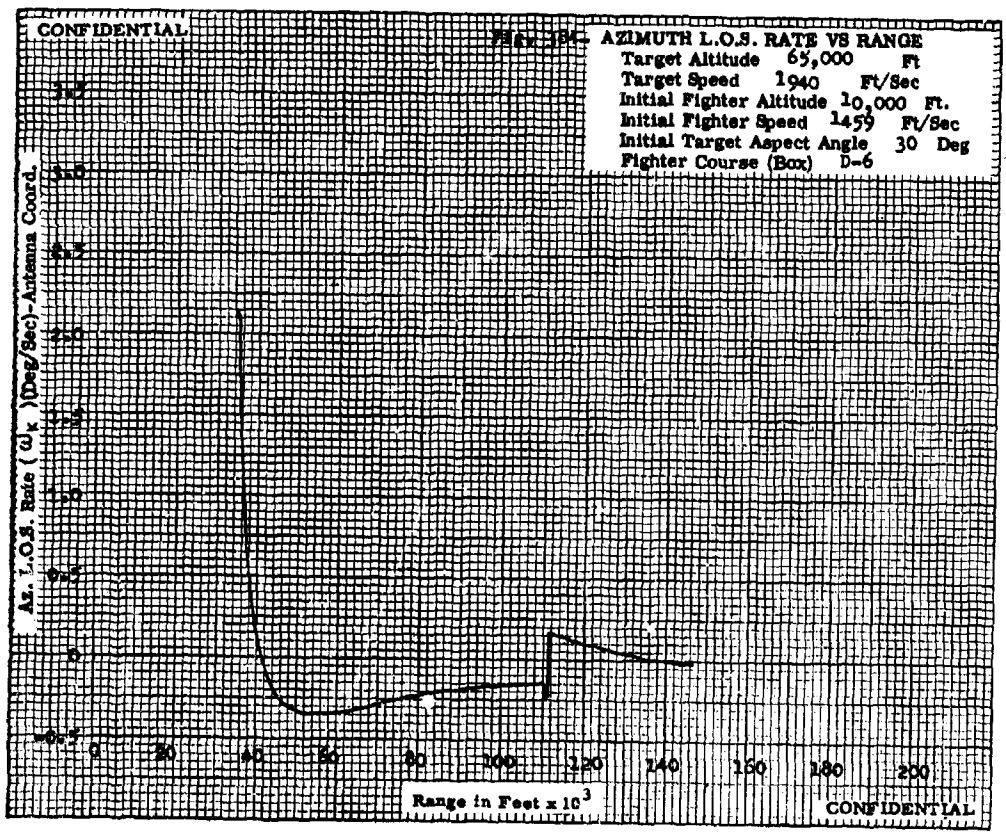
Fig. 364 – AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) D-6



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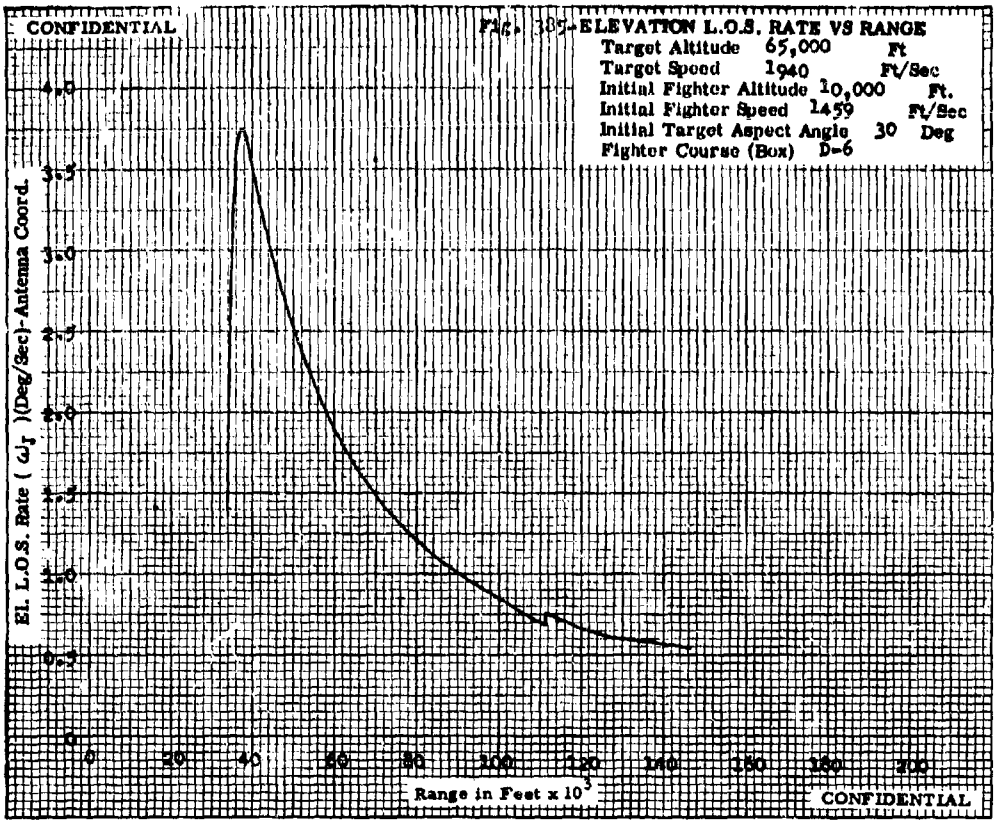
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Fig. 385 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) D-6
El. L.O.S. Rate (ω_T)(Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

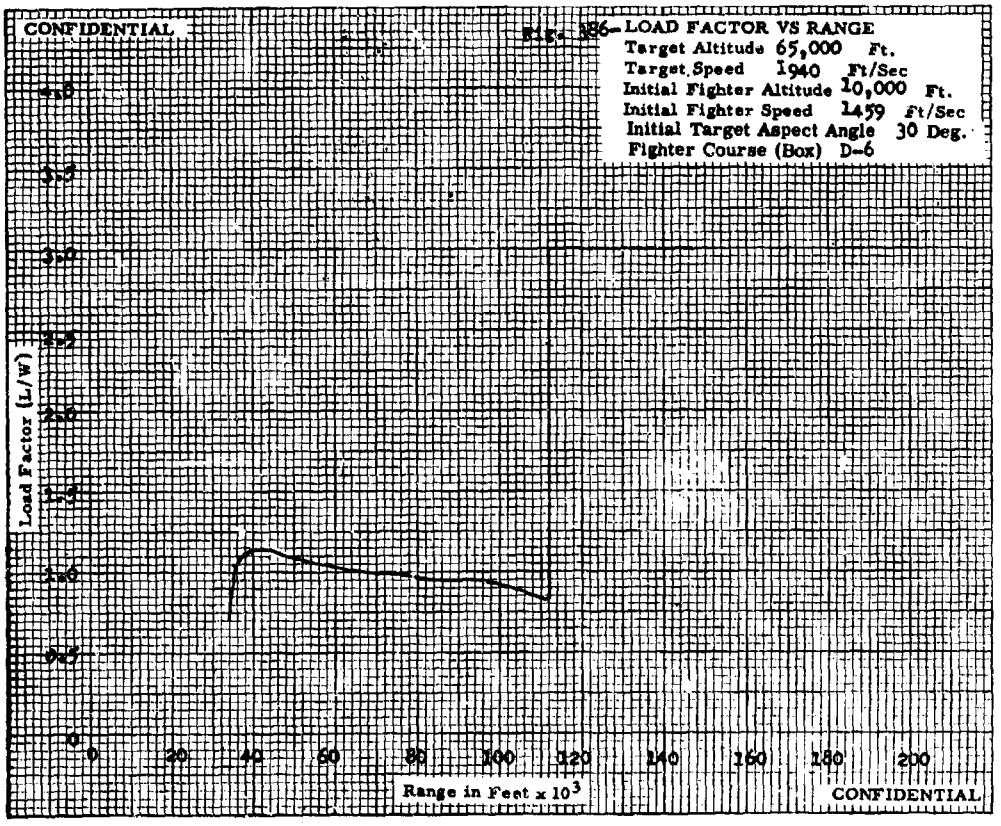
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Fig. 386 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6
Load Factor (L/W)
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 87 - ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft.
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6

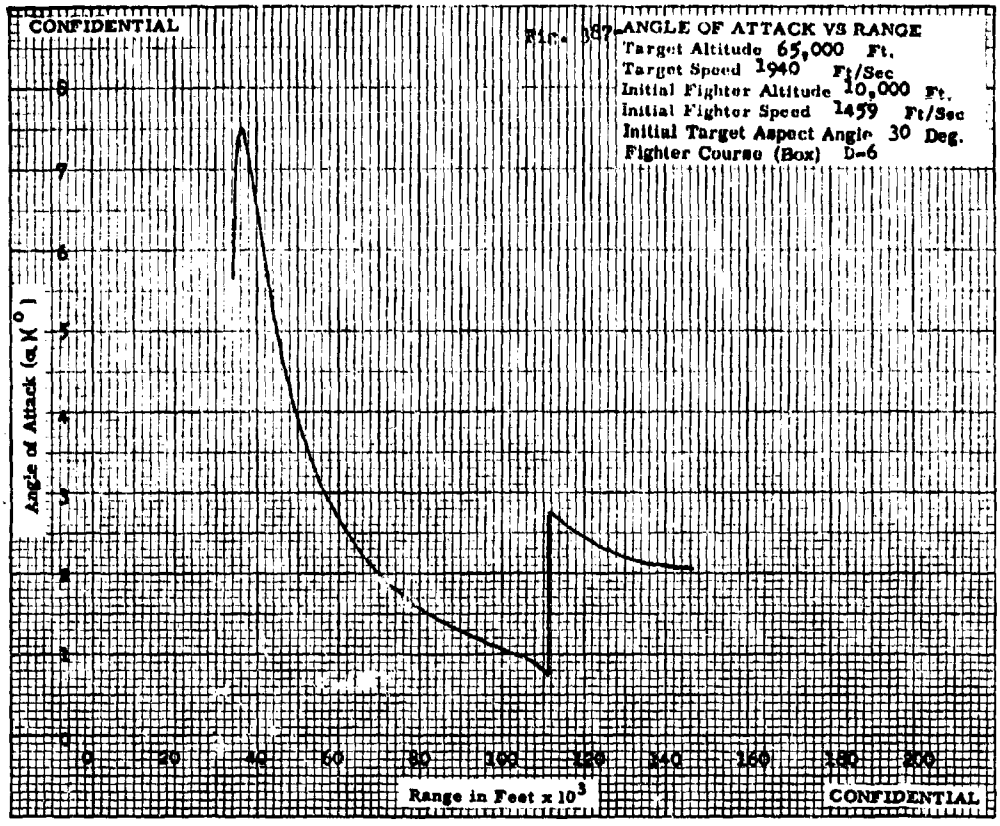

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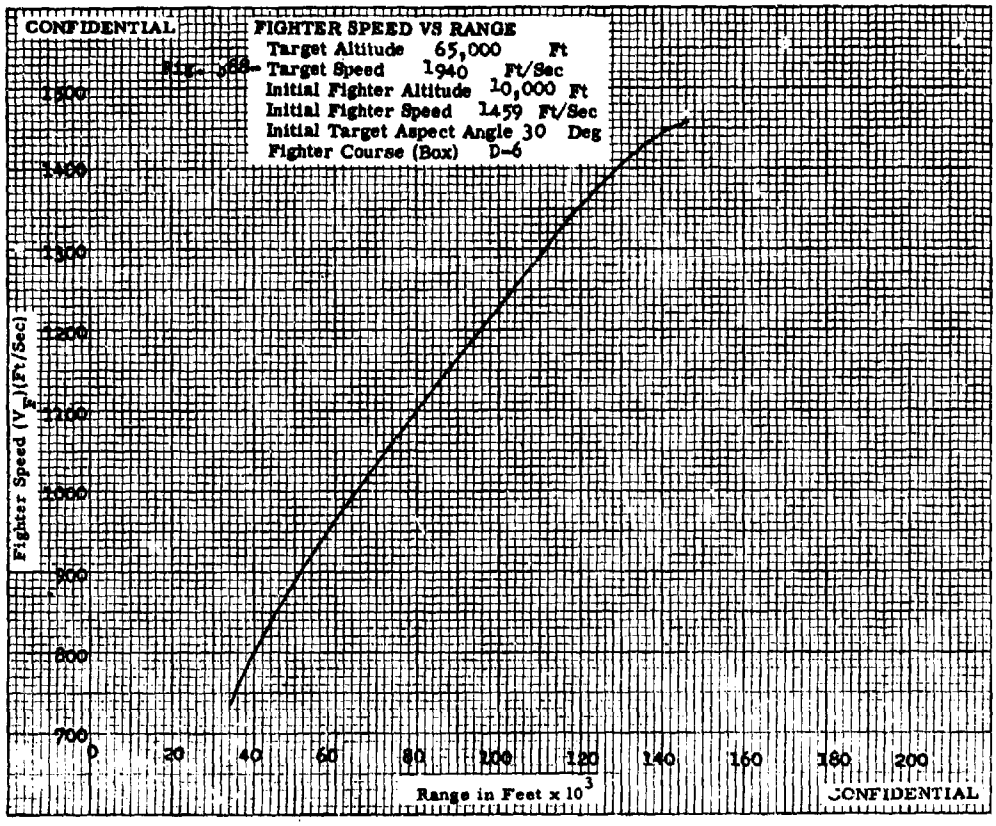
Fig. 88 - FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg
Fighter Course (Box) D-6



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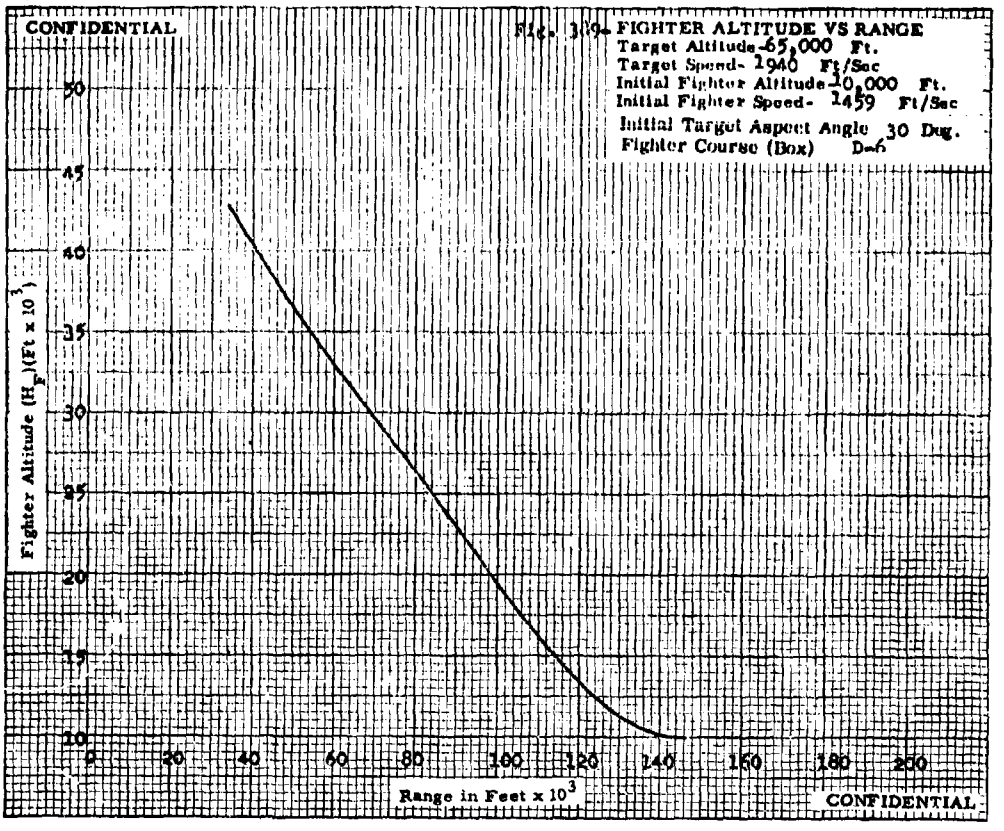
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Fig. 349
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6
Fighter Altitude (H_F)(Ft x 10^3)
50
45
40
35
30
25
20
15
10
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

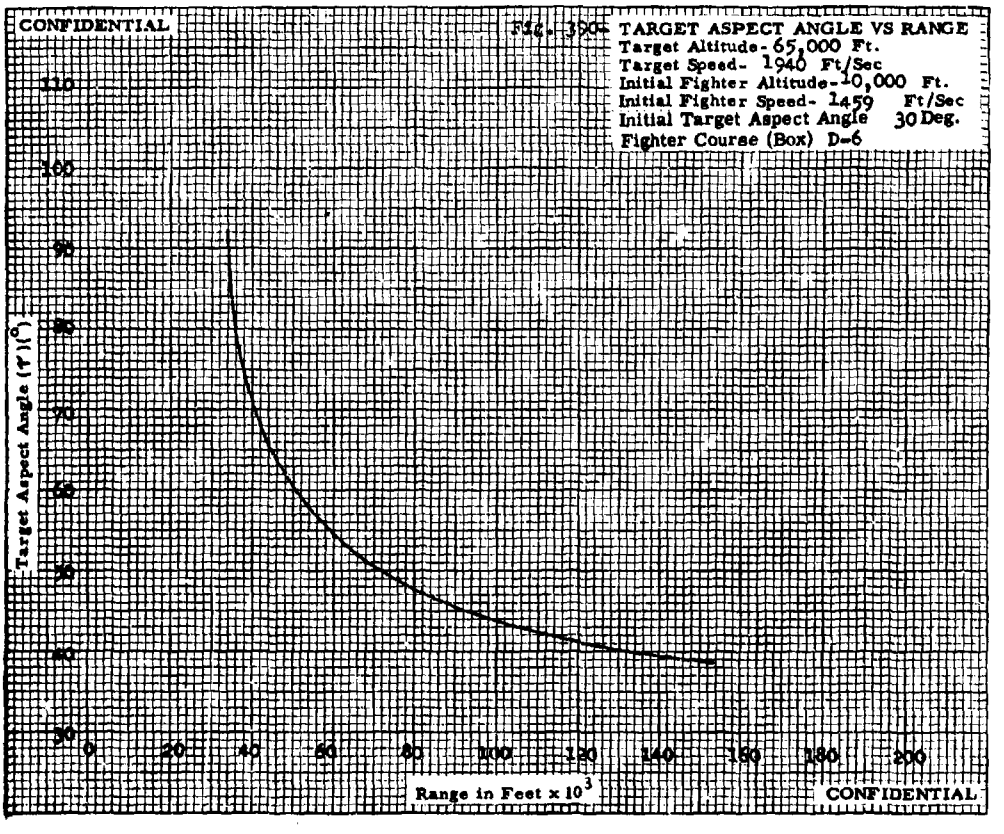
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Fig. 350
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6
Target Aspect Angle (Ψ)(^{0})
110
100
90
80
70
60
50
40
30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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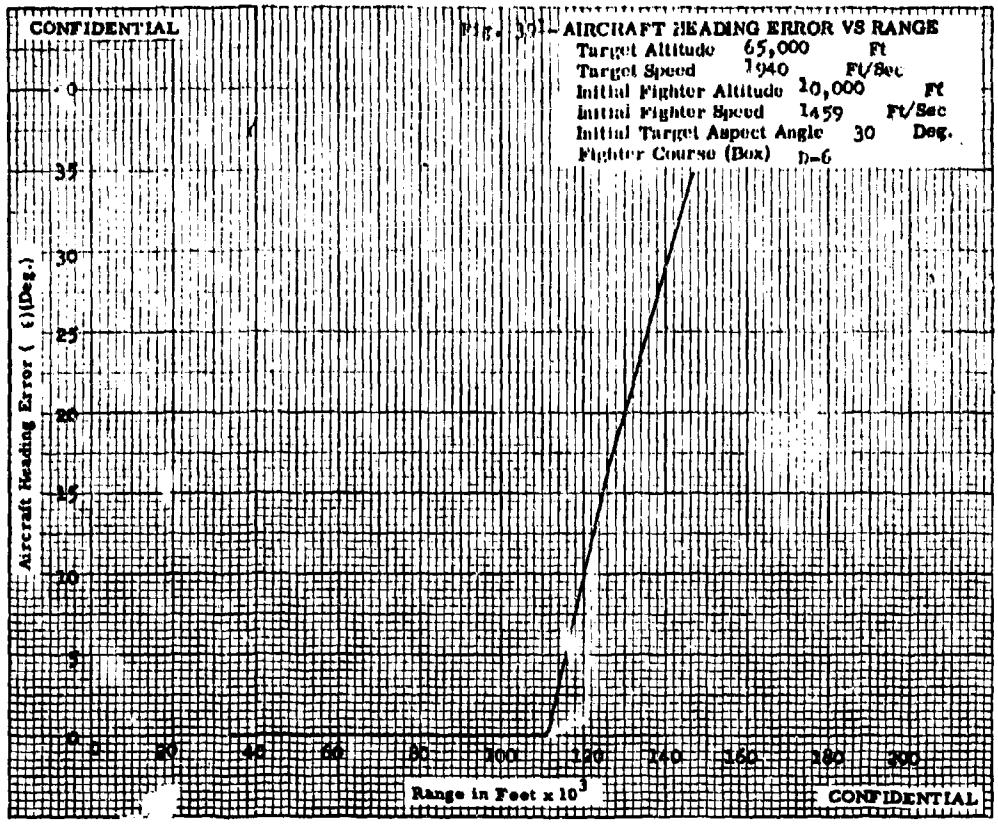
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Fig. 37 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6
Aircraft Heading Error ( ) (Deg.)
Range in Feet x 10^3
CONFIDENTIAL

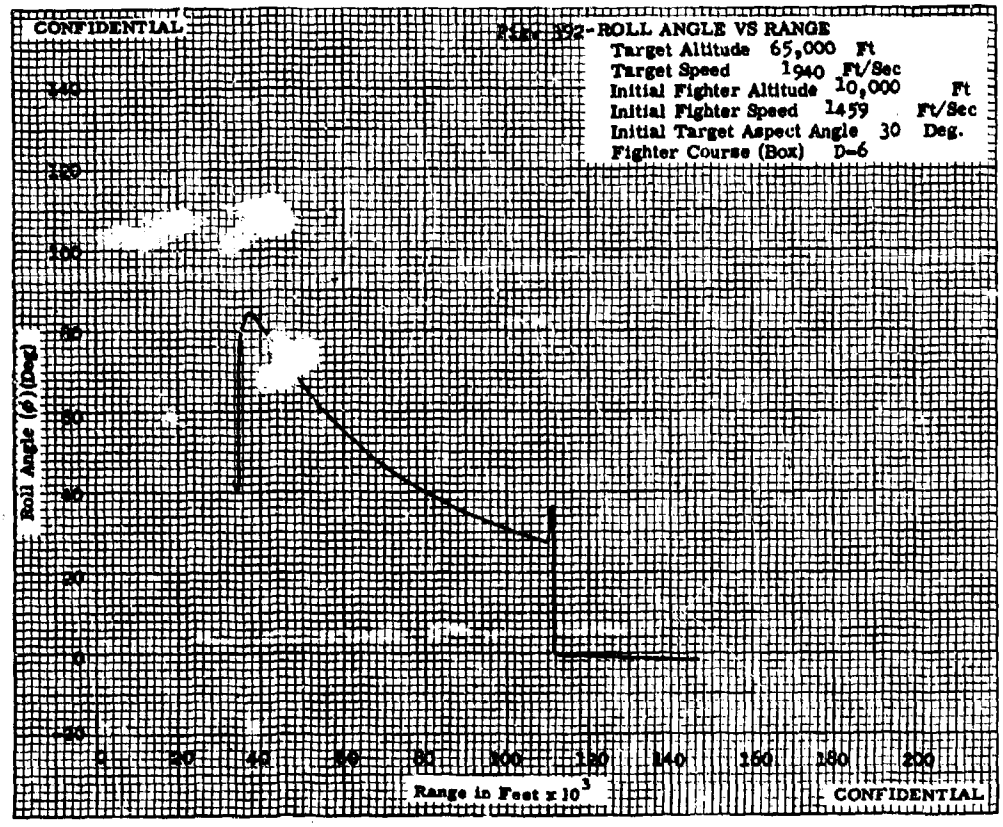
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Fig. 38 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 10,000 Ft
Initial Fighter Speed 1459 Ft/Sec
Initial Target Aspect Angle 30 Deg.
Fighter Course (Box) D-6
Roll Angle (φ) (Deg)
Range in Feet x 10^3
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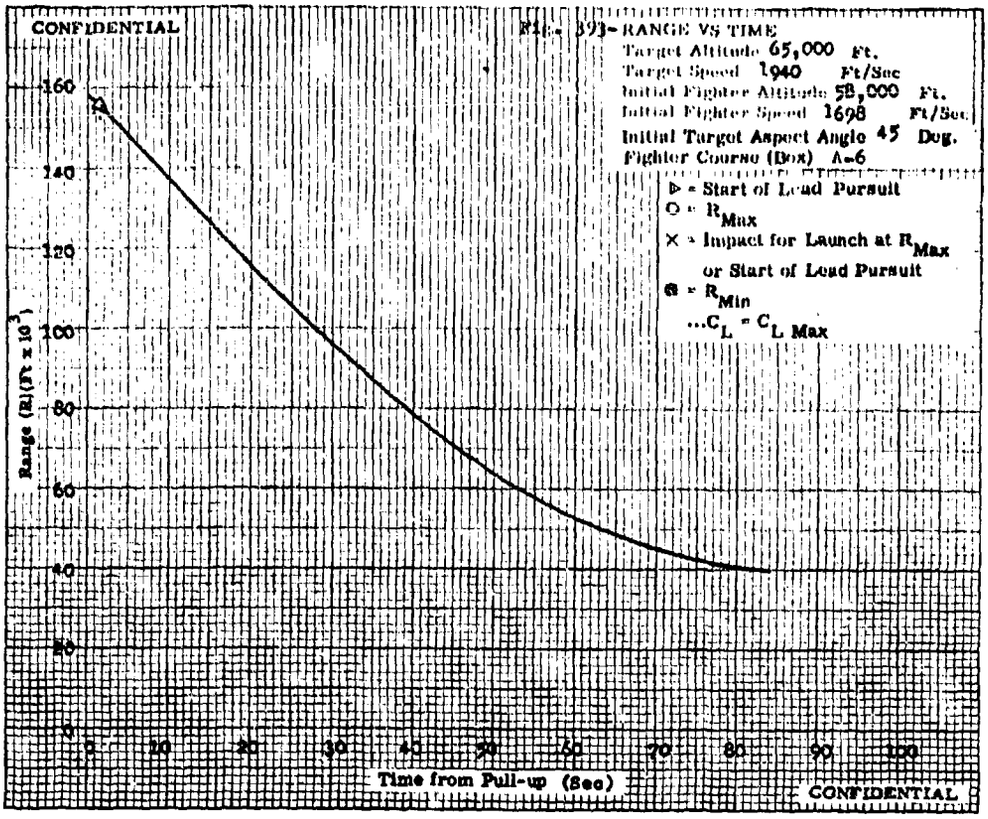
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Fig. 393 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
◎ = R_{Min} ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
10
20
30
40
50
60
70
80
90
100
Time from Pull-up (Sec)
CONFIDENTIAL

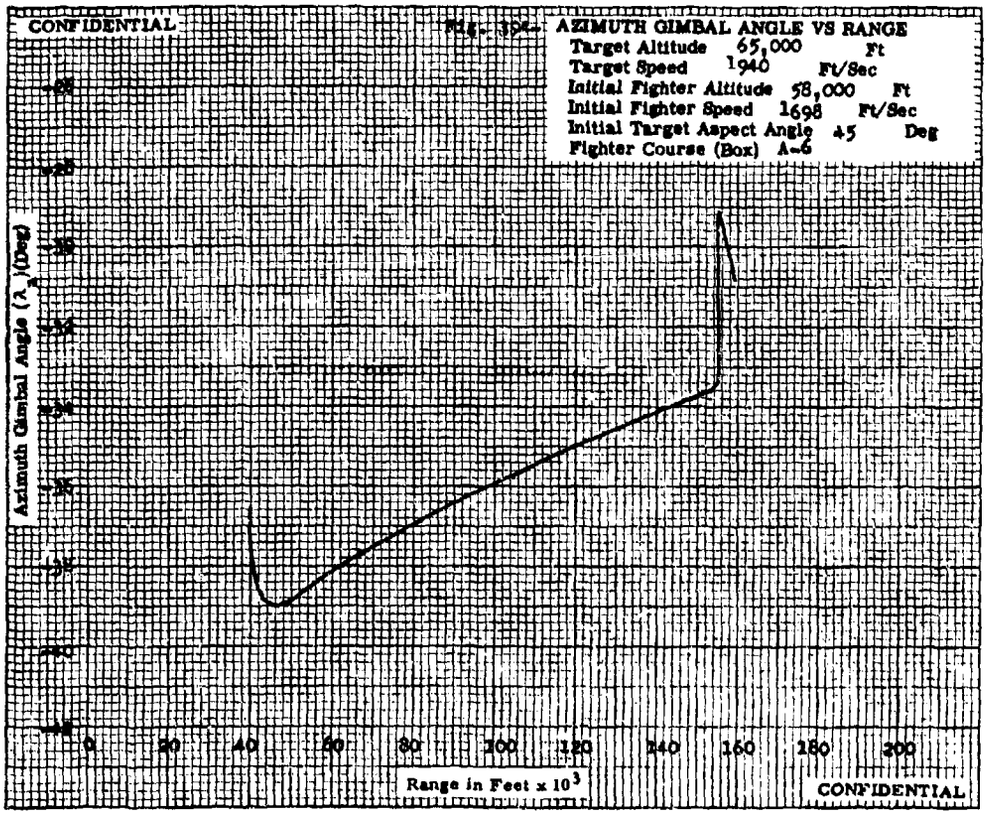
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Fig. 394 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6
Azimuth Gimbal Angle (λ_A)(Deg)
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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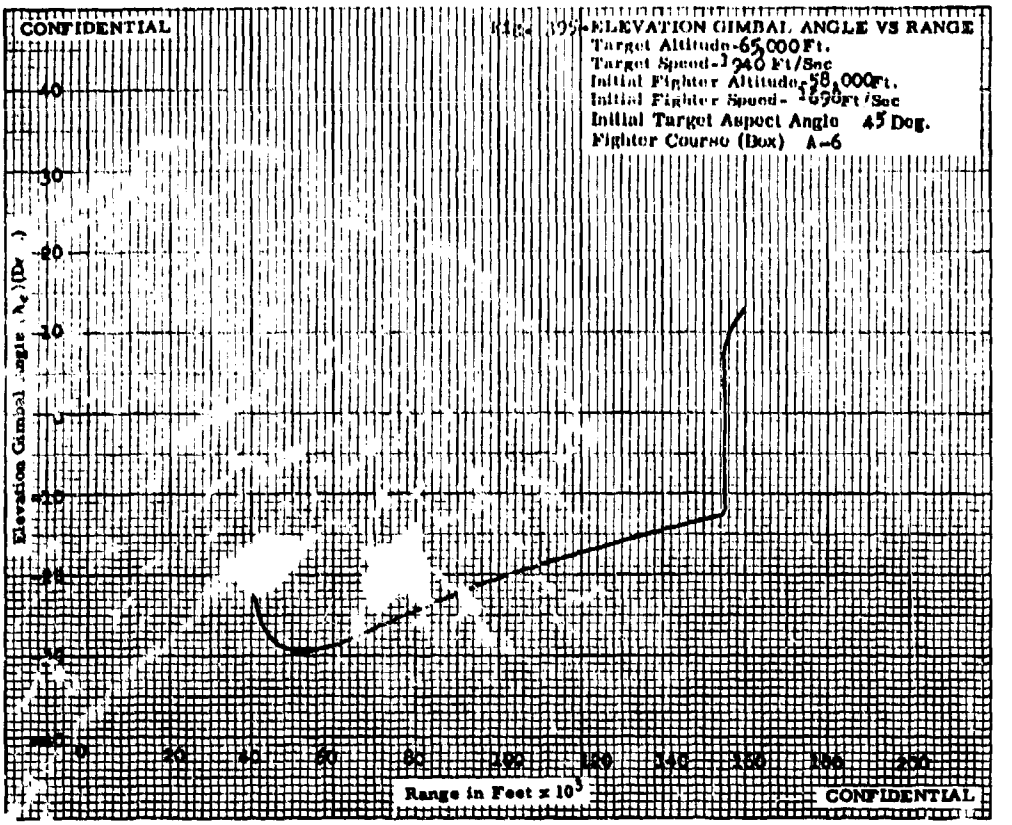
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Fig. 395 ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Elevation Gimbal Angle
40
30
20
10
0
-10
-20
-30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

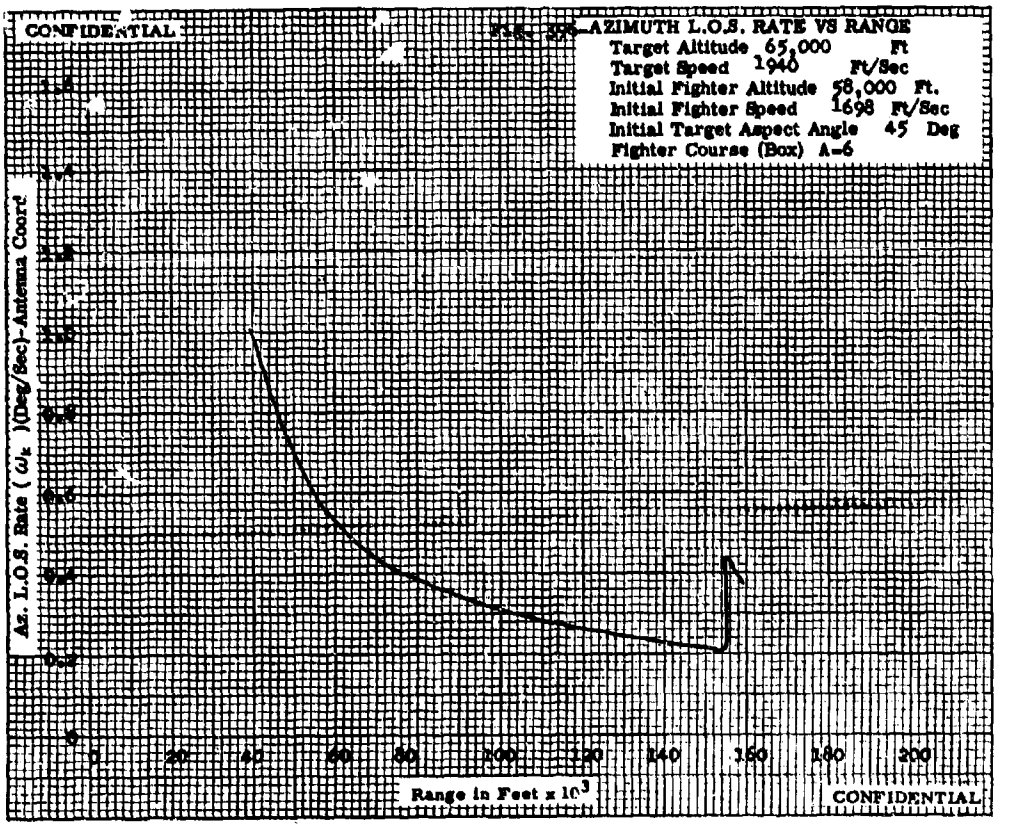
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Fig. 396 AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6
Az. L.O.S. Rate
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

CONFIDENTIAL

Fig. 377 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6

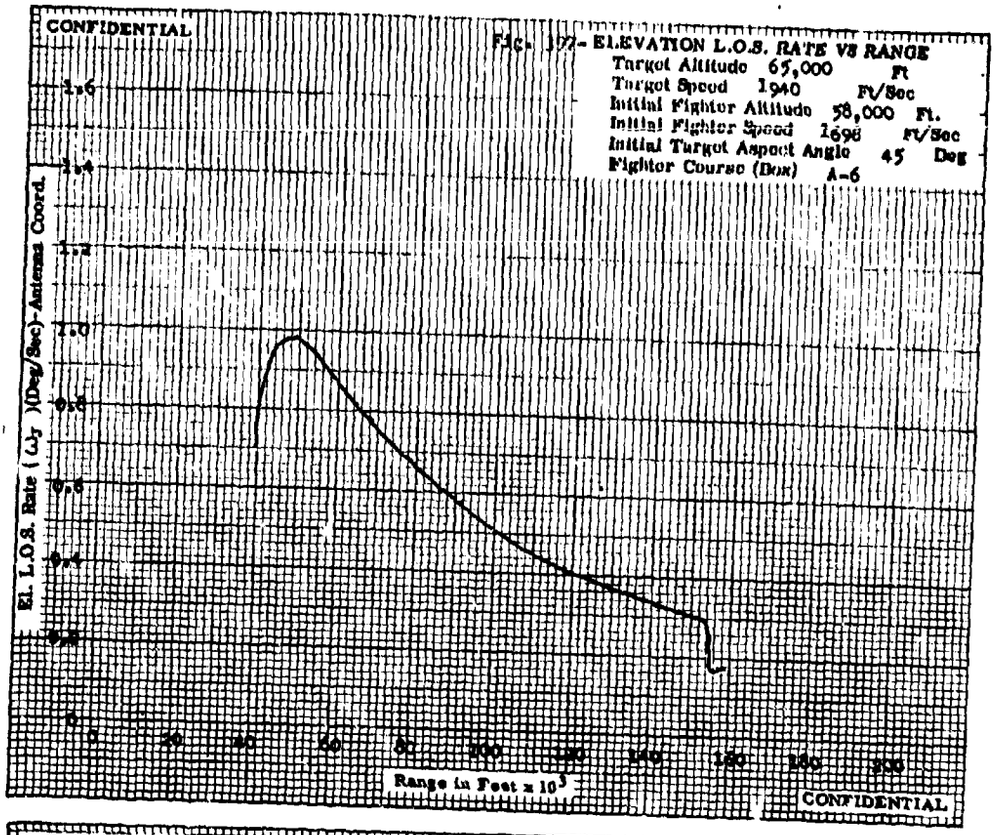

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Fig. 378 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6

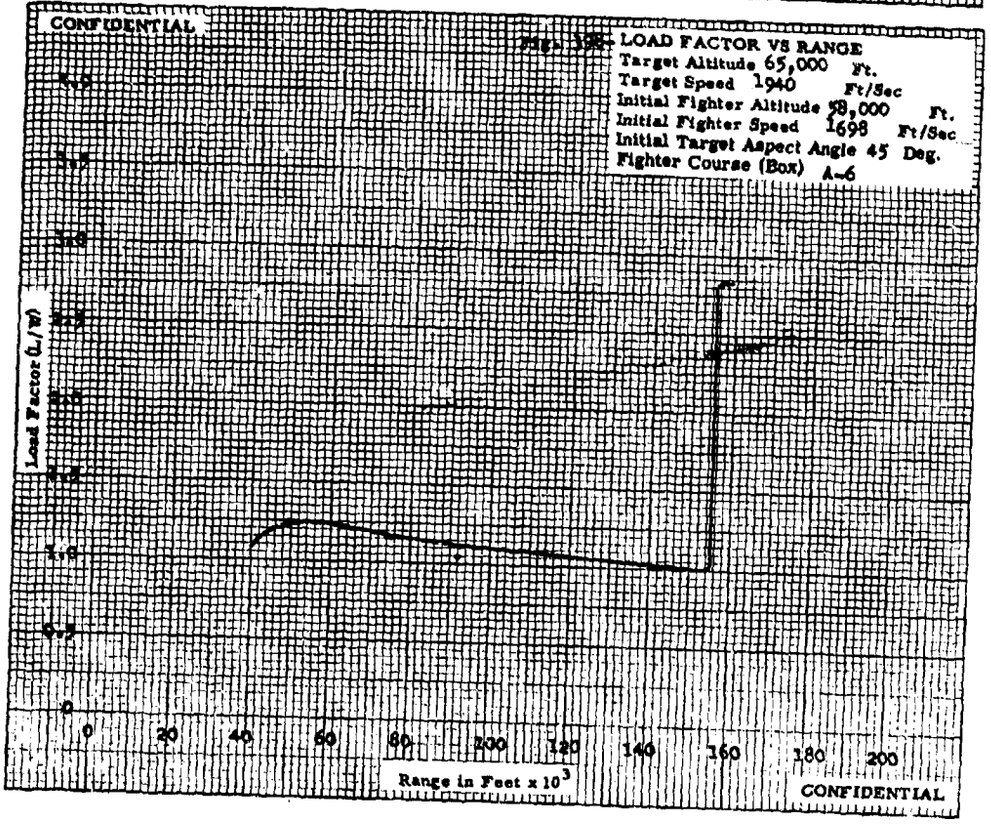

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Fig. 399—ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6

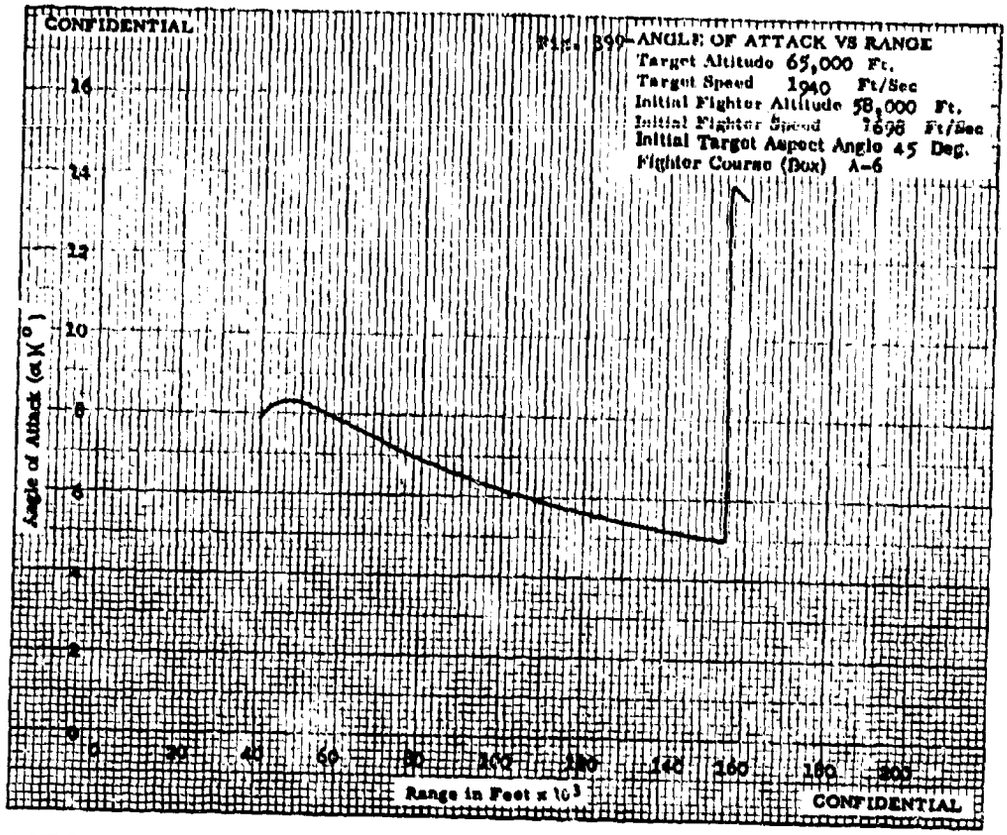

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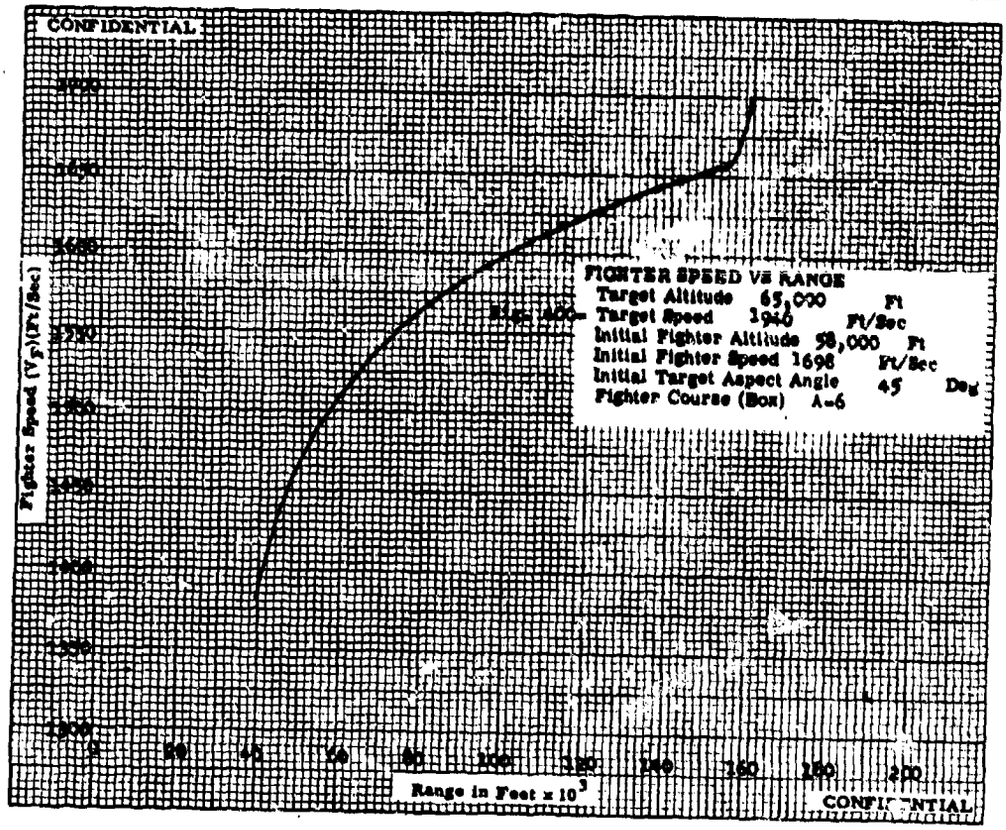
Fig. 400—FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6



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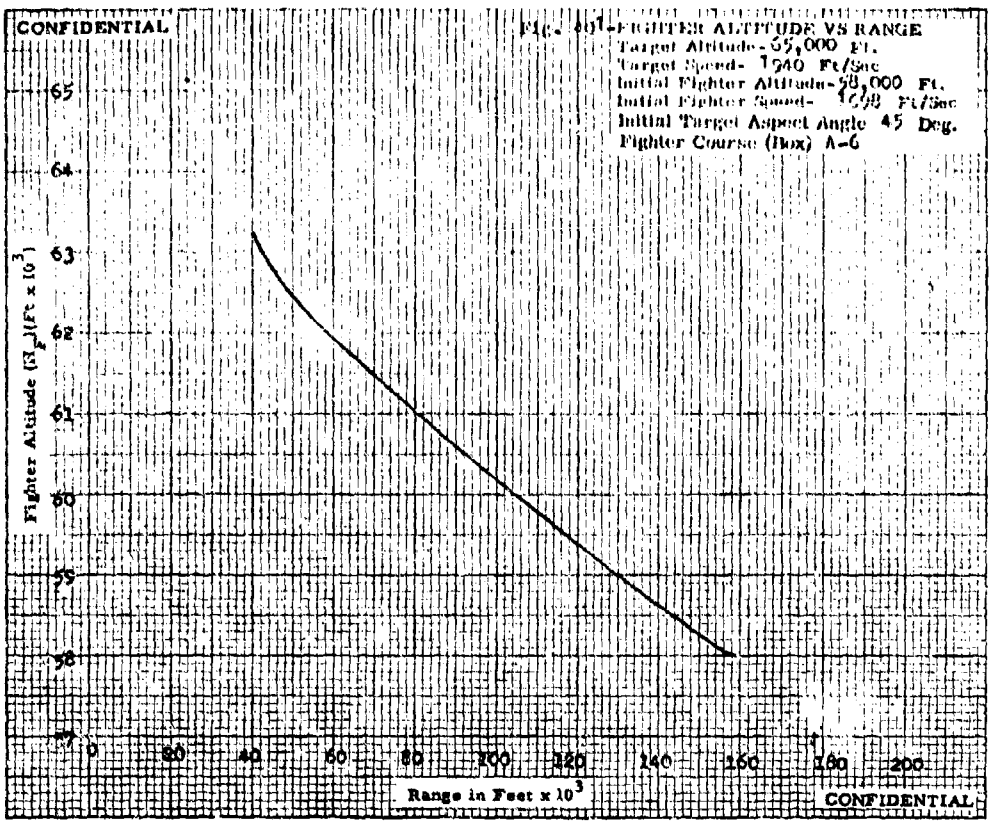
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Fig. 401 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Fighter Altitude (H_F)(Ft x 10^3)
65
64
63
62
61
60
59
58
57
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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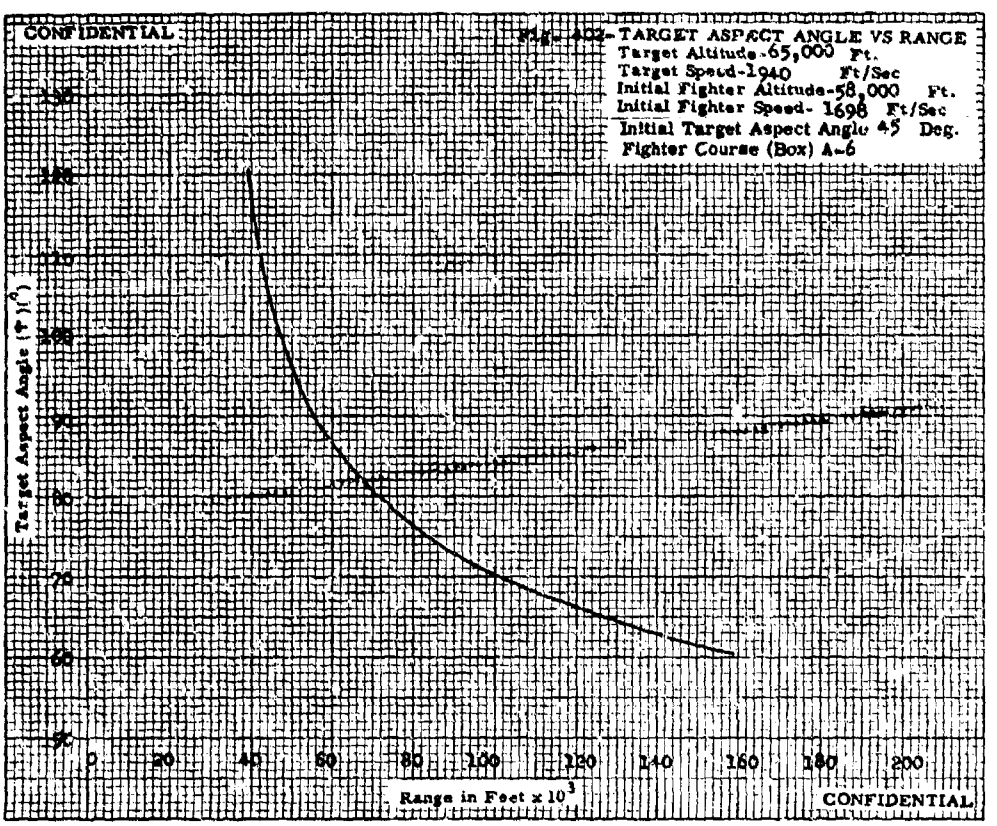
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Fig. 402 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Target Aspect Angle (Ψ_T)(°)
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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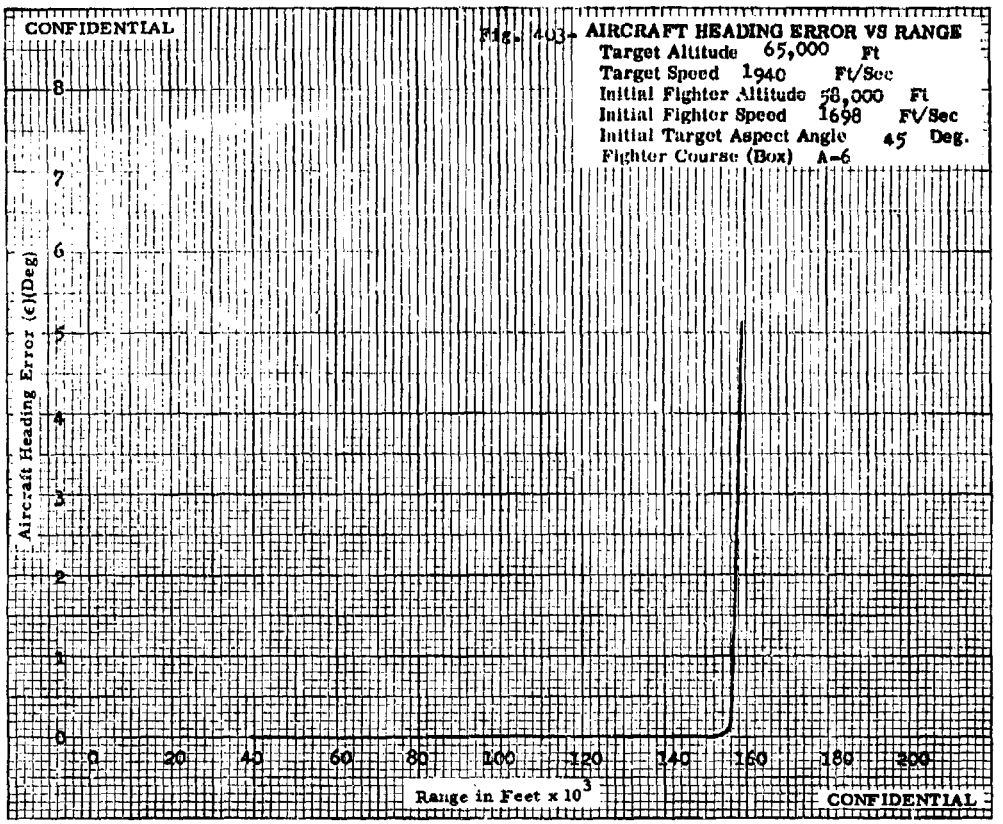
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FIG. 403 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Aircraft Heading Error (ε)(Deg)
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

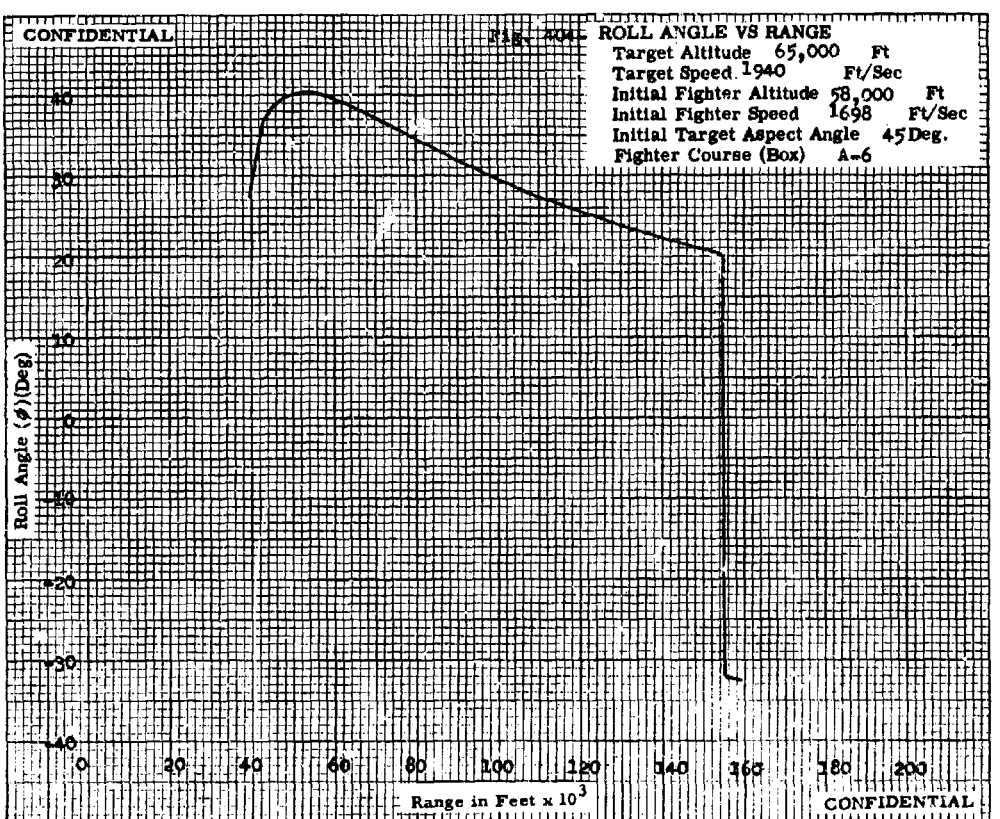
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FIG. 404 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Roll Angle (φ)(Deg)
40
30
20
10
0
-10
-20
-30
-40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

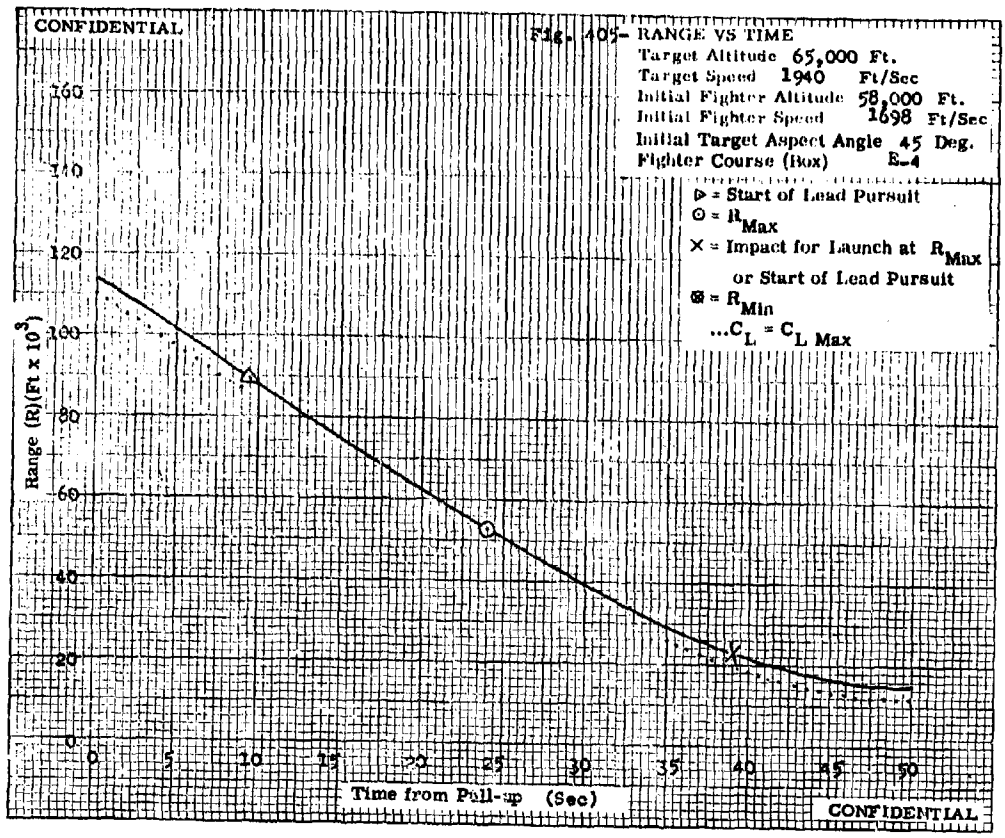
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Fig. 405- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊗ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL

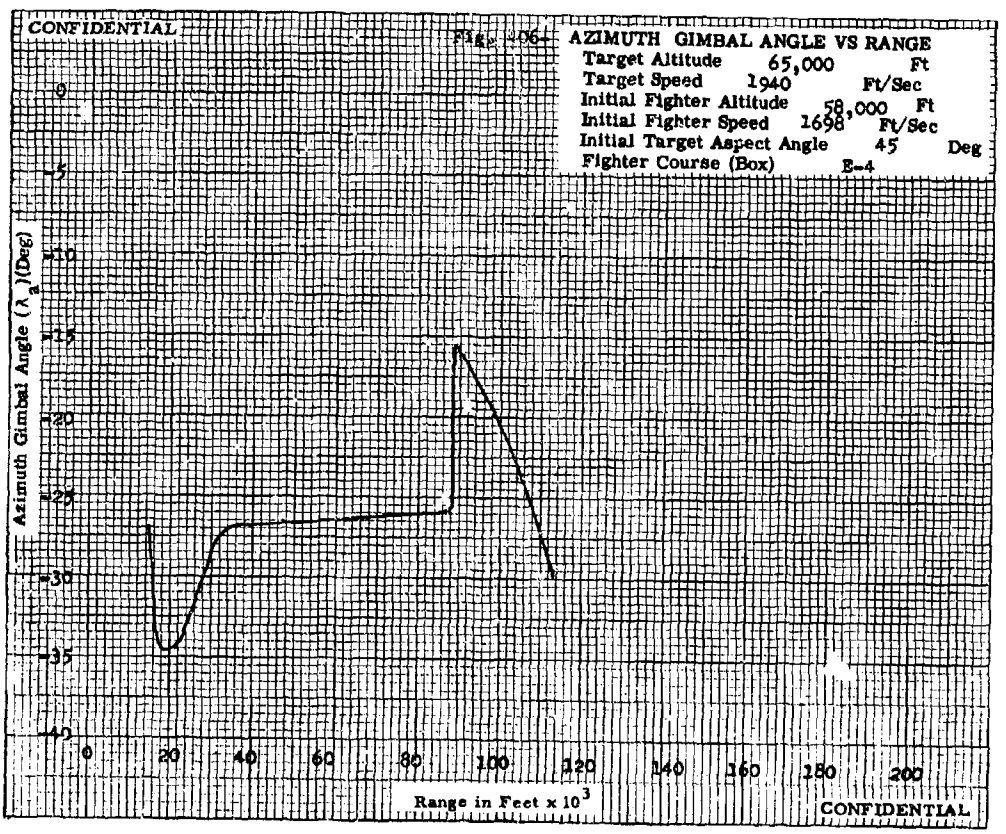
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Fig. 406- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-4
Azimuth Gimbal Angle (λ_a)(Deg)
0
-5
-10
-15
-20
-25
-30
-35
-40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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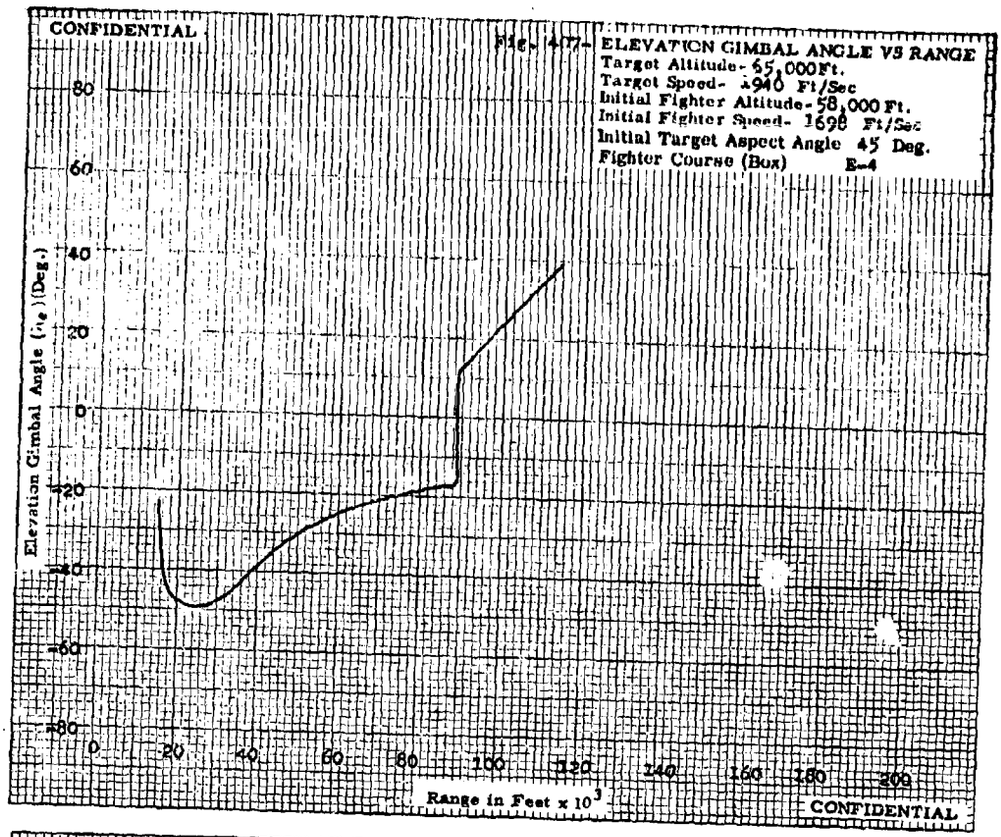
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Fig. 407
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4
Elevation Gimbal Angle (θe) (Deg.)
80
60
40
20
0
-20
-40
-60
-80
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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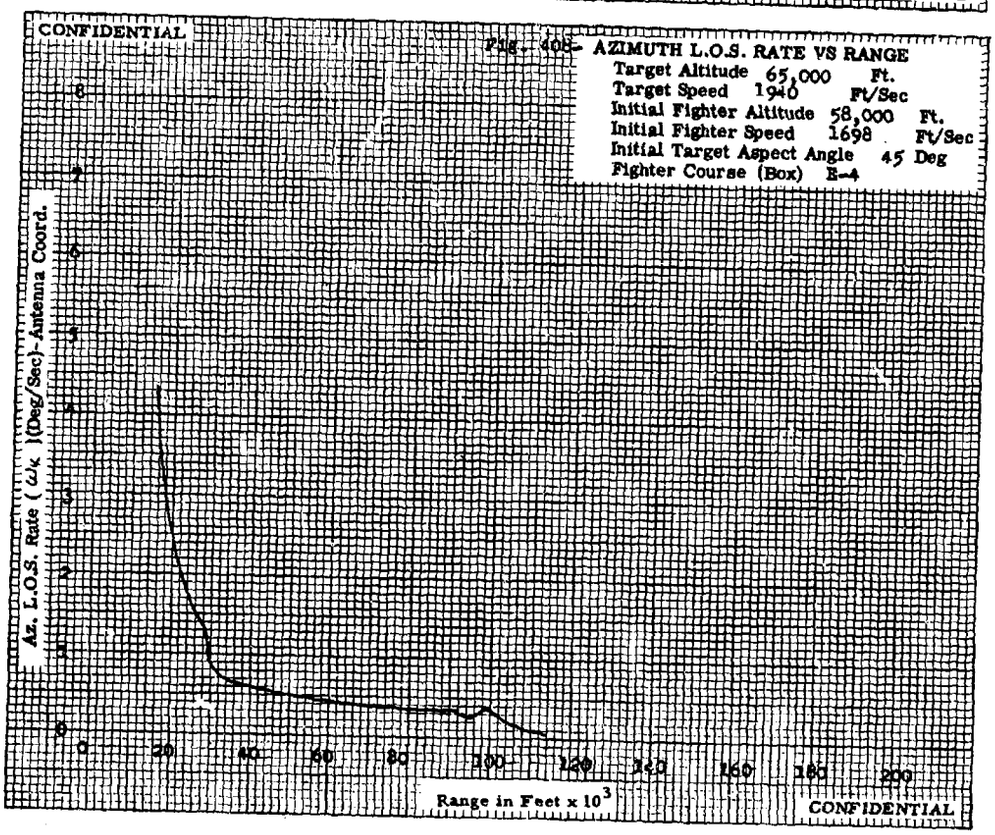
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Fig. 408
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-4
Az. L.O.S. Rate (dψ/dt) (Deg/Sec)-Antenna Coord.
8
7
6
5
4
3
2
1
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 409 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-4

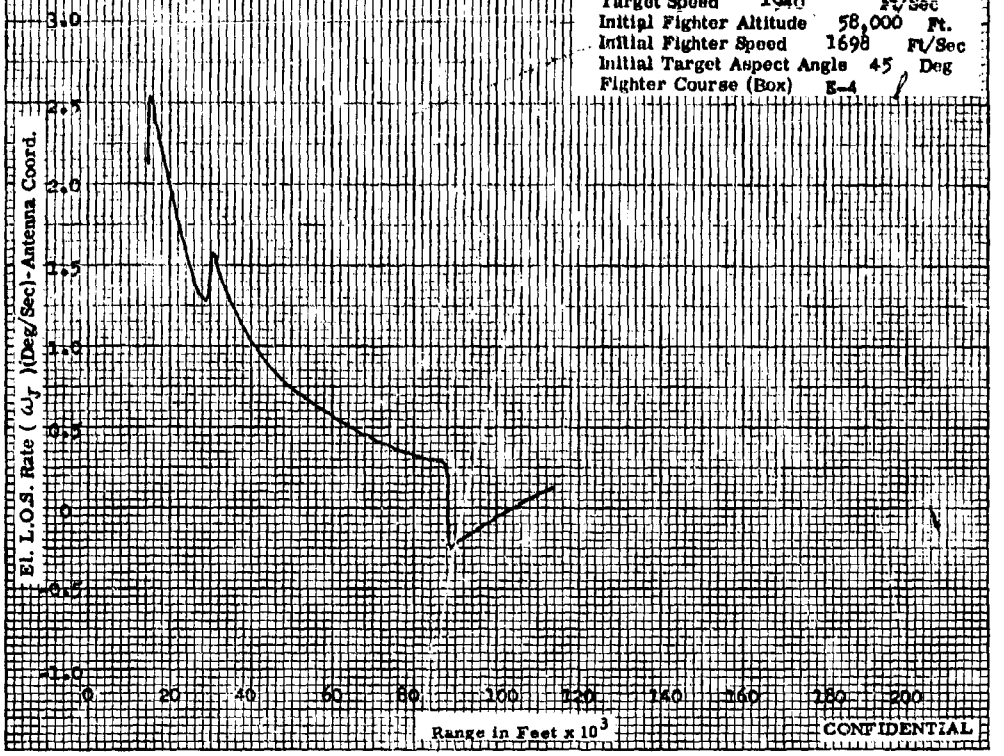

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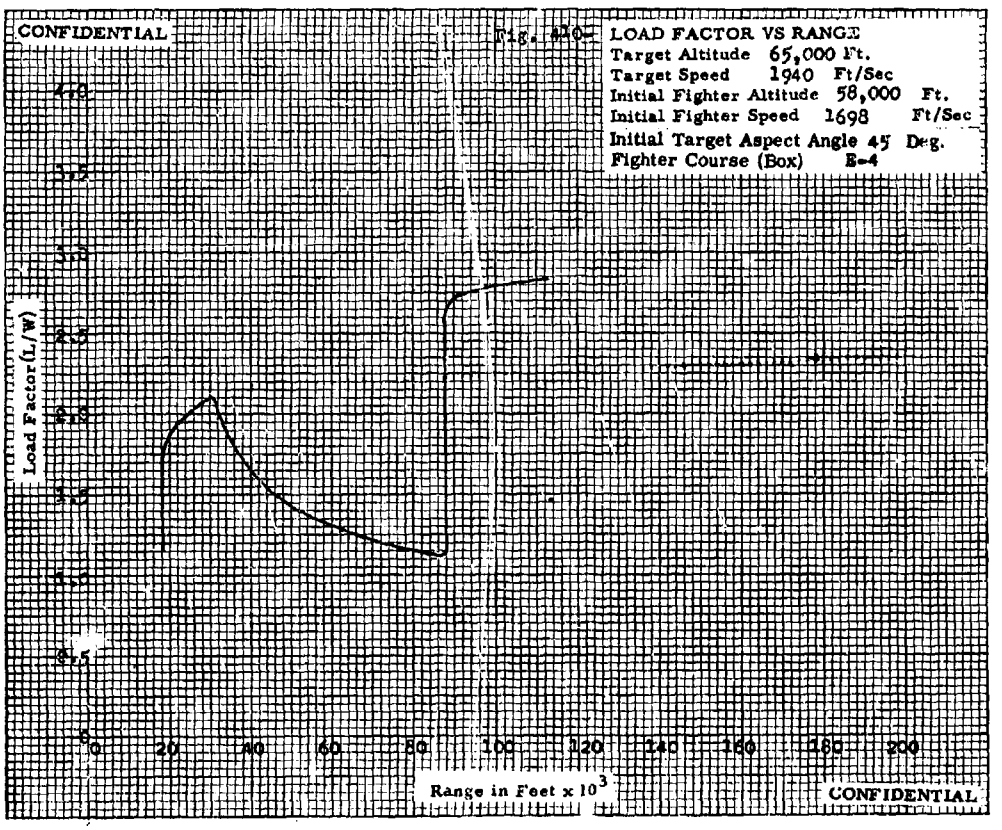
Fig. 410 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4



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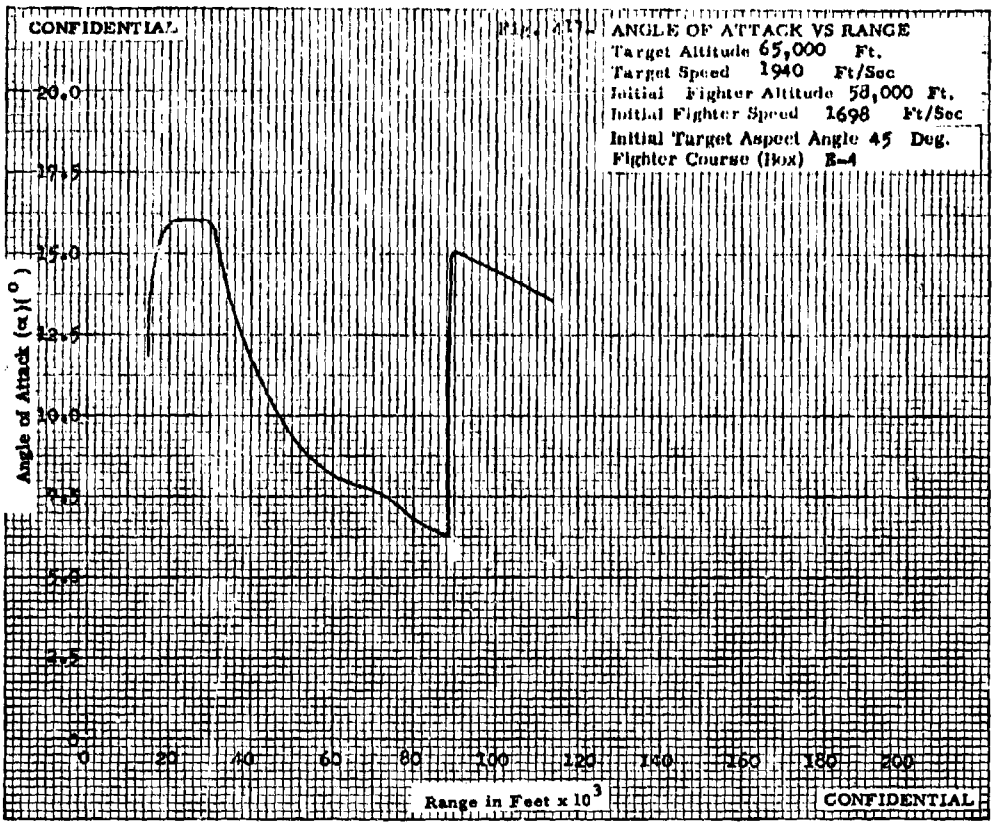
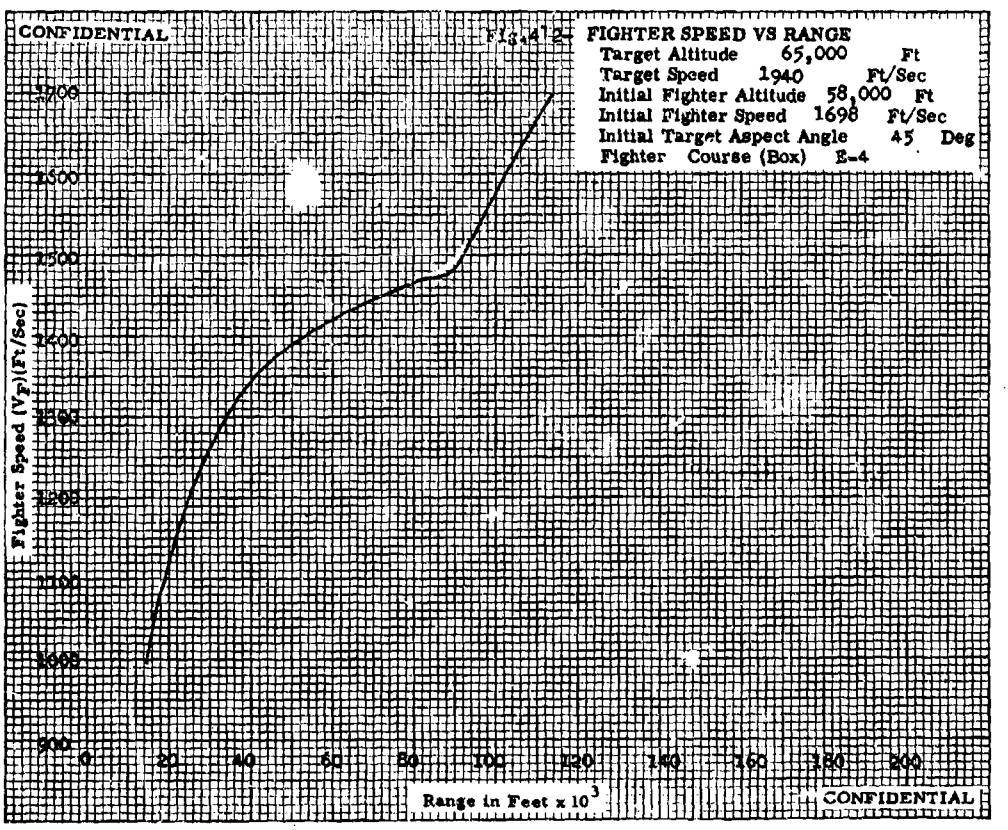
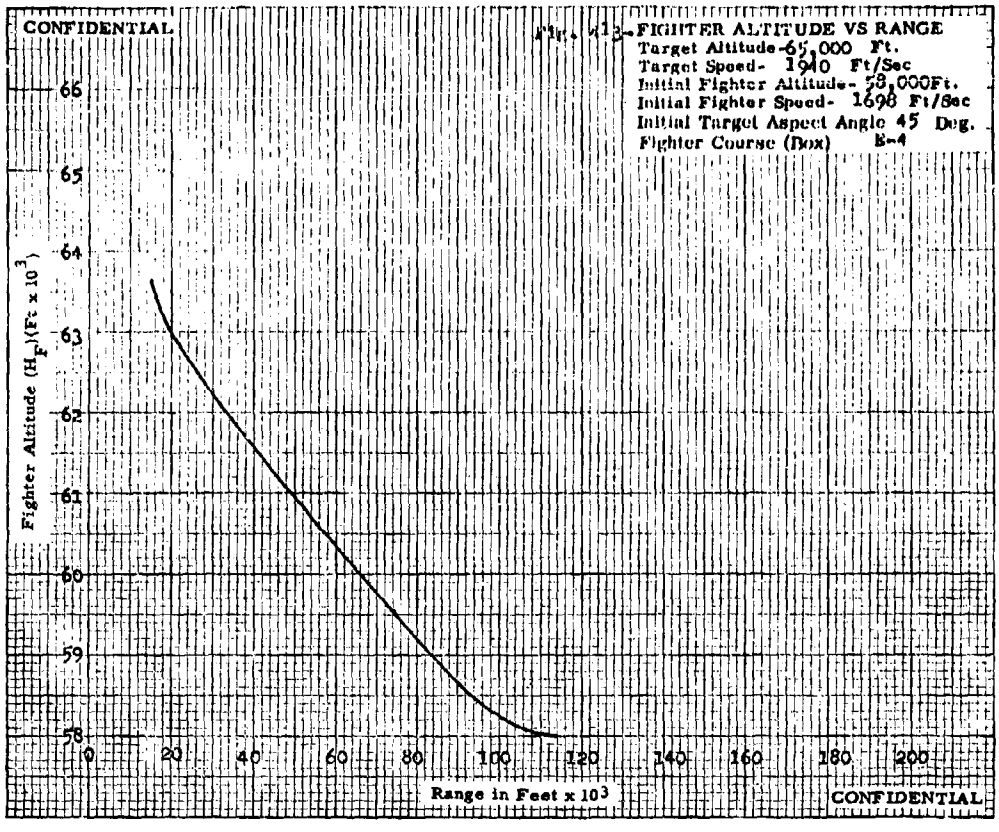
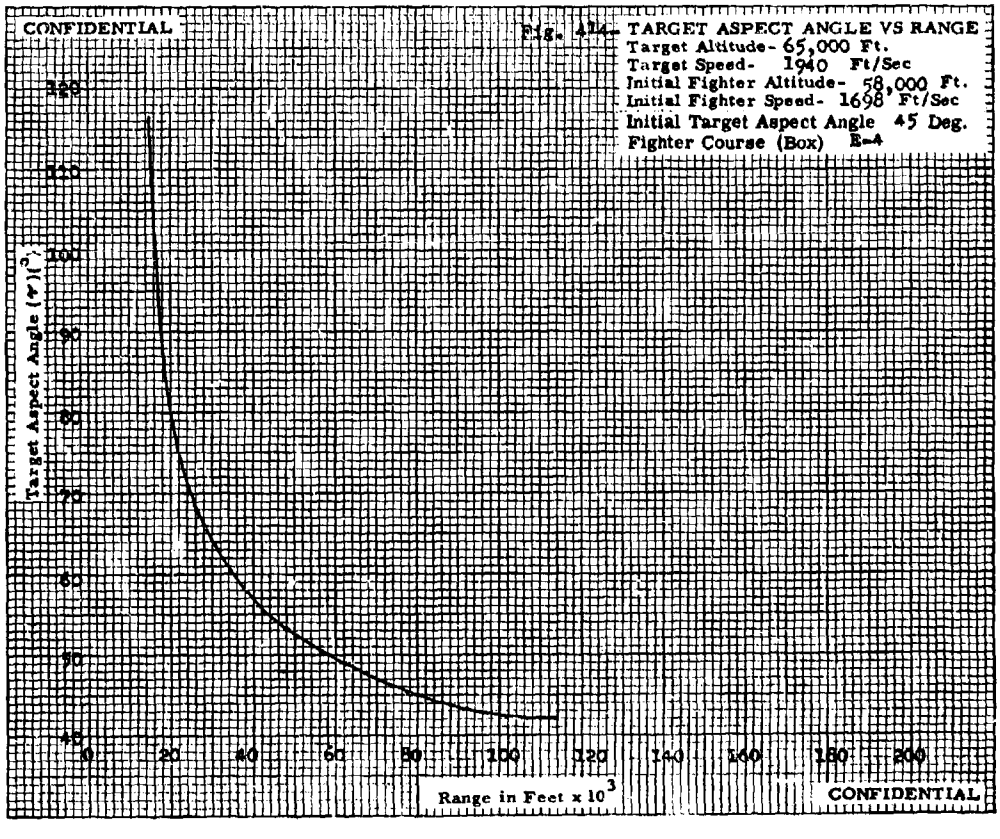

CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft.
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4
Angle of Attack (α)(°)
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-4
Fighter Speed (VF)(Ft/Sec)
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 413 FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4
Fighter Altitude (H_F)(Ft x 10^3)
66
65
64
63
62
61
60
59
58
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 414 TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 58,000 Ft.
Initial Fighter Speed- 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4
Target Aspect Angle (Ψ)(°)
100
90
80
70
60
50
45
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 4-15 AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighte Altitude 58,000 Ft
Initial Fighte Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4

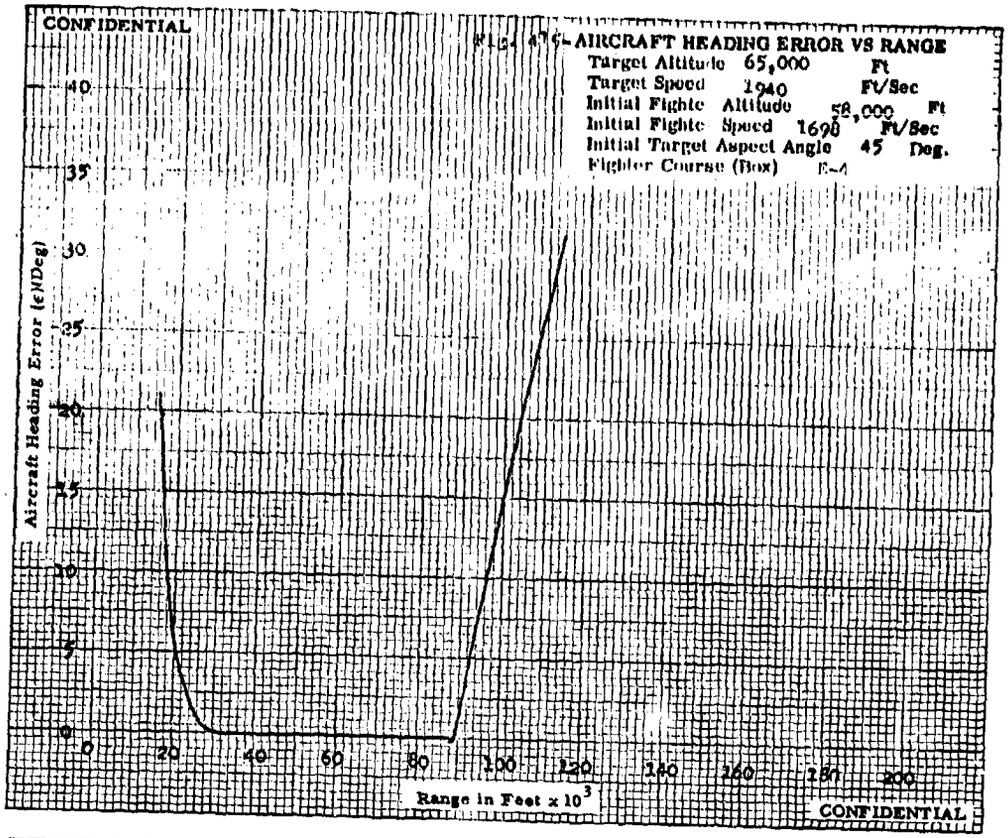


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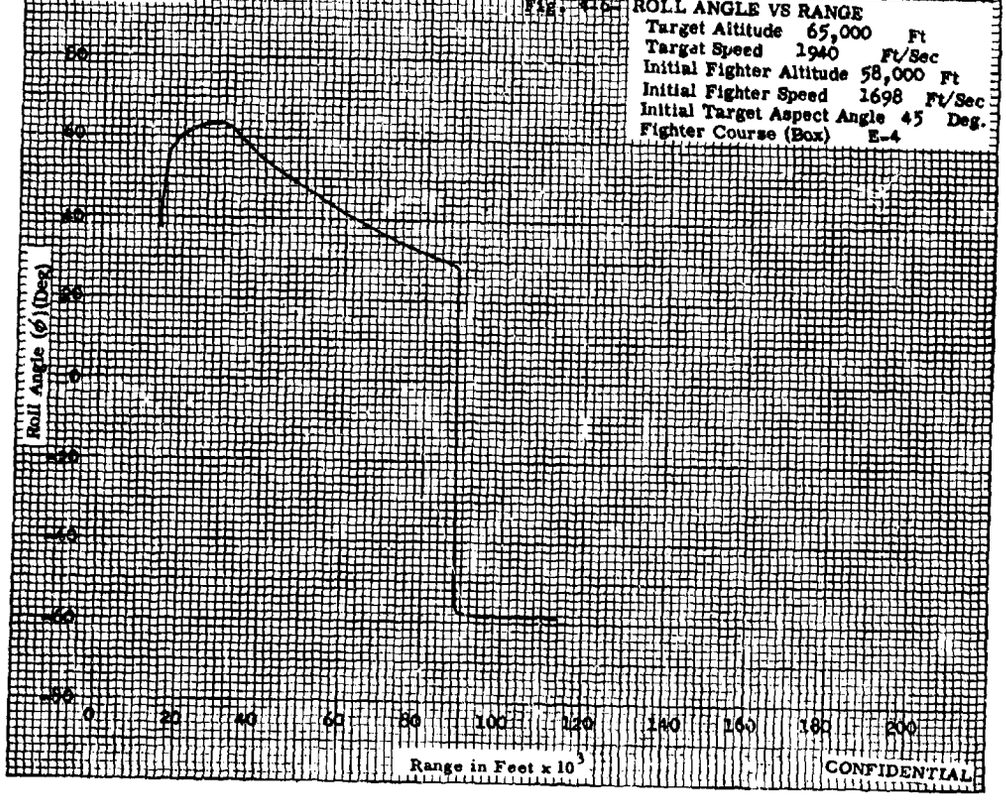
Fig. 4-16 ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 58,000 Ft
Initial Fighter Speed 1698 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-4



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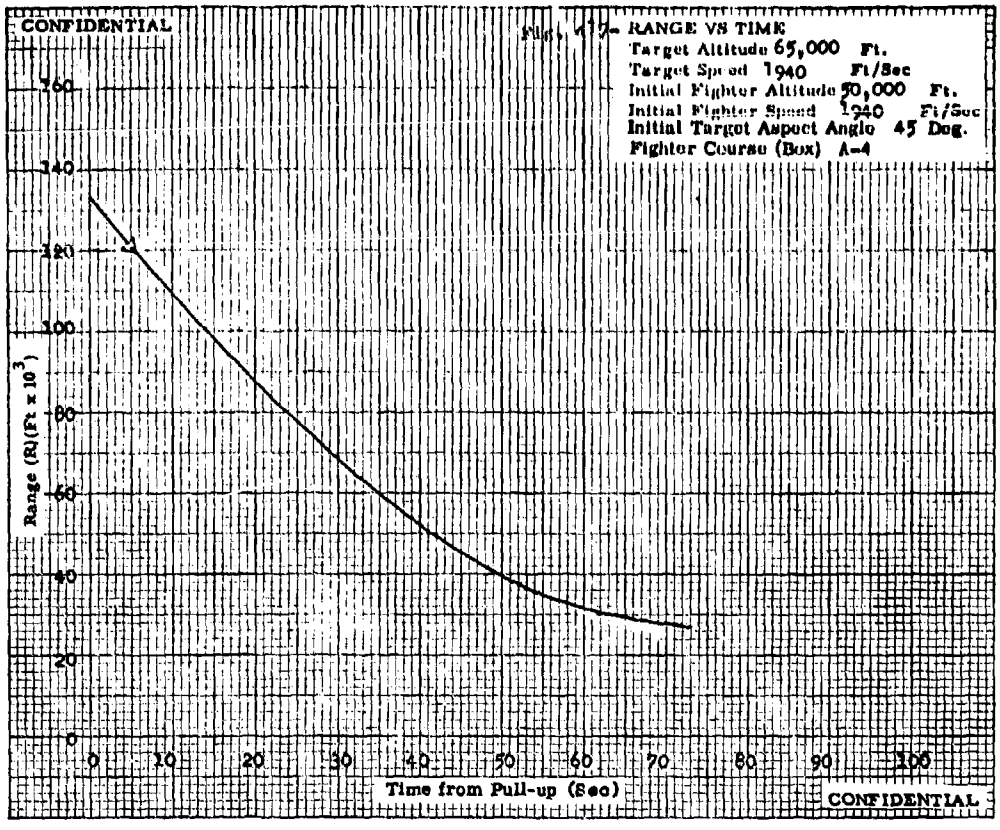
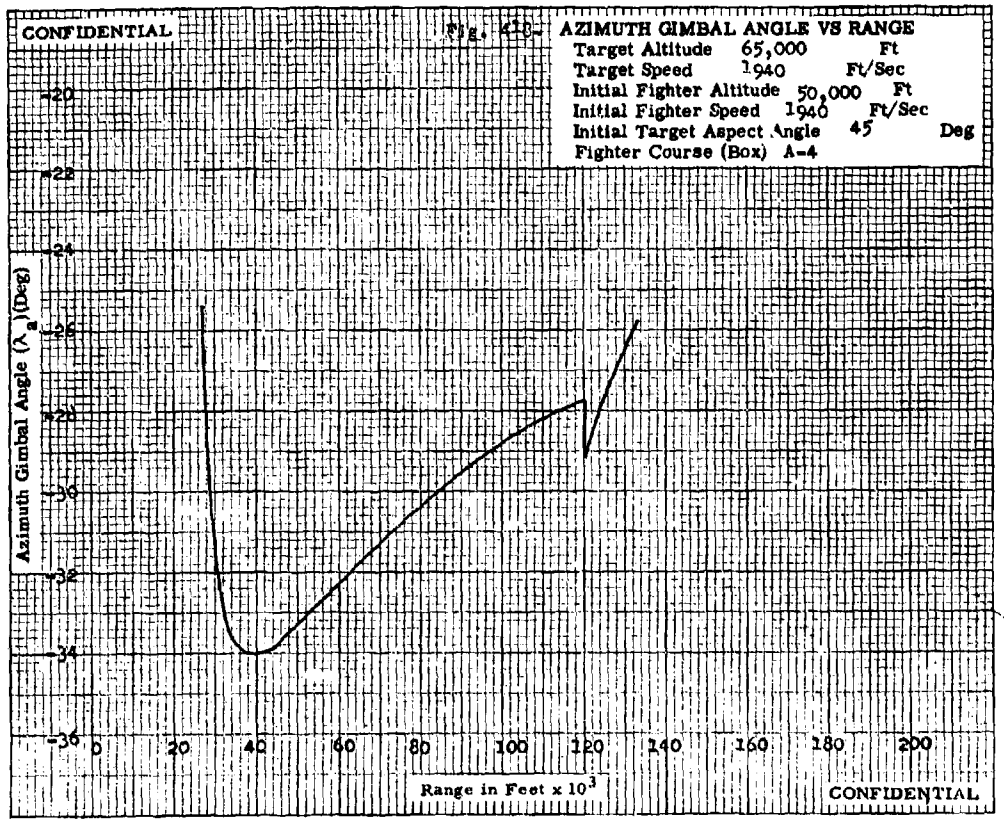

CONFIDENTIAL
Fig. 417
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 418
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-4
Azimuth Gimbal Angle (λa)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

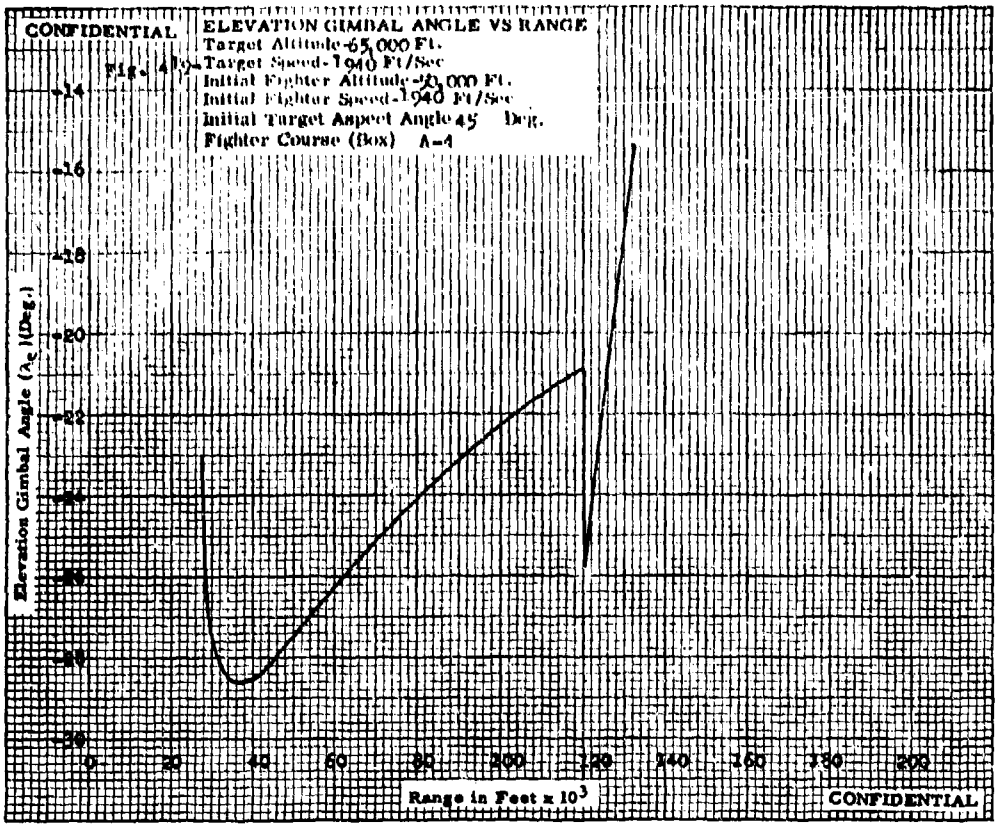
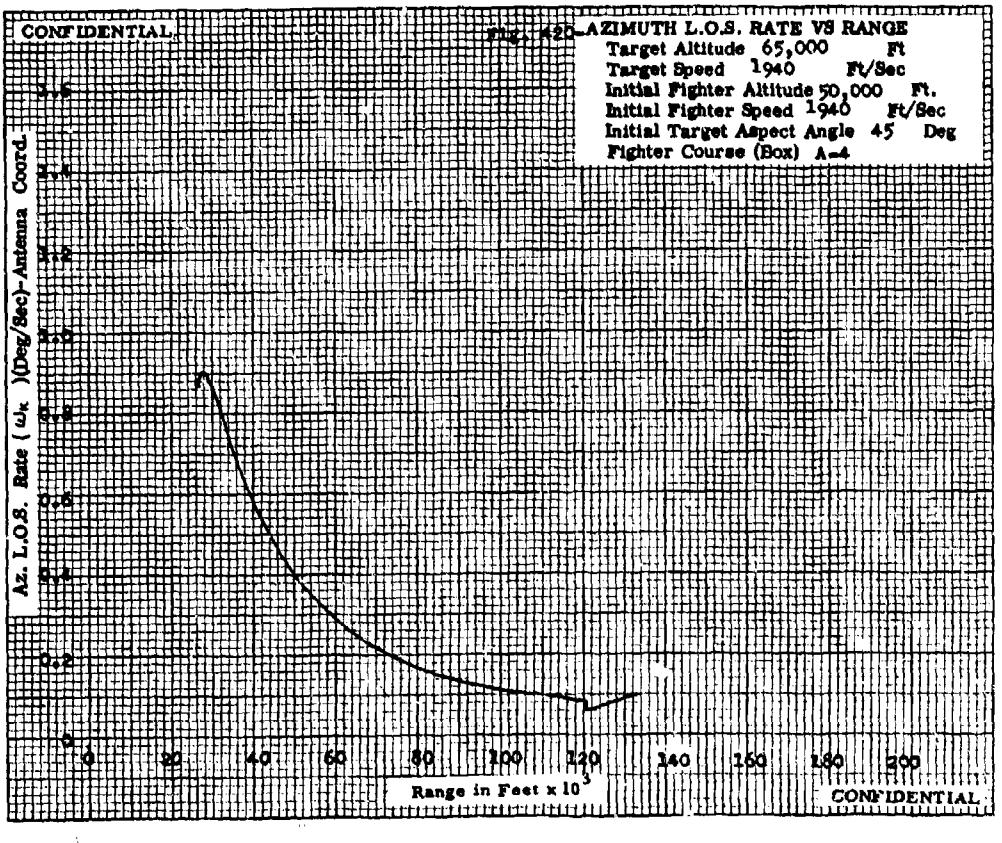
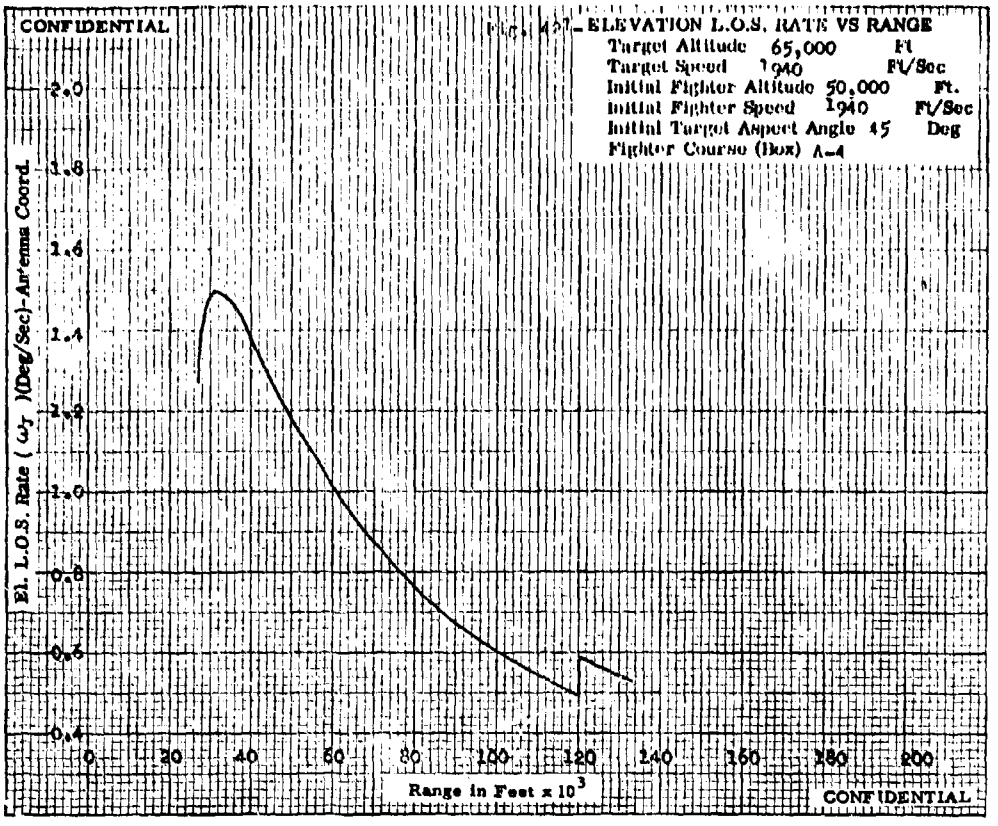
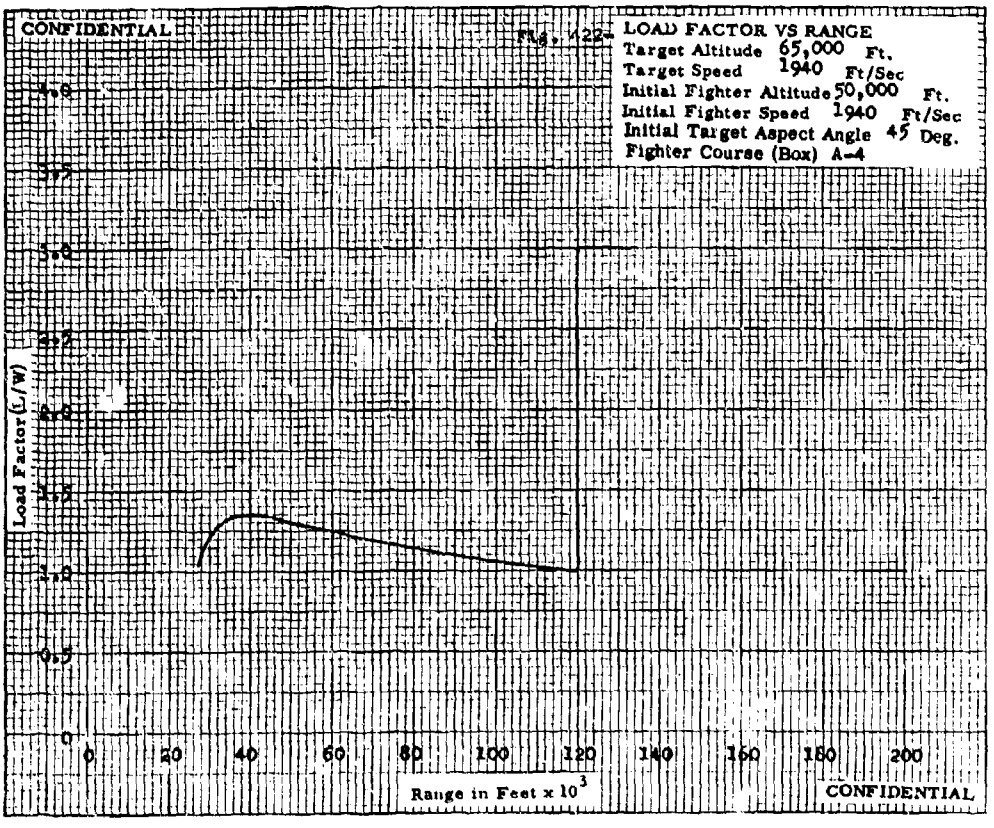
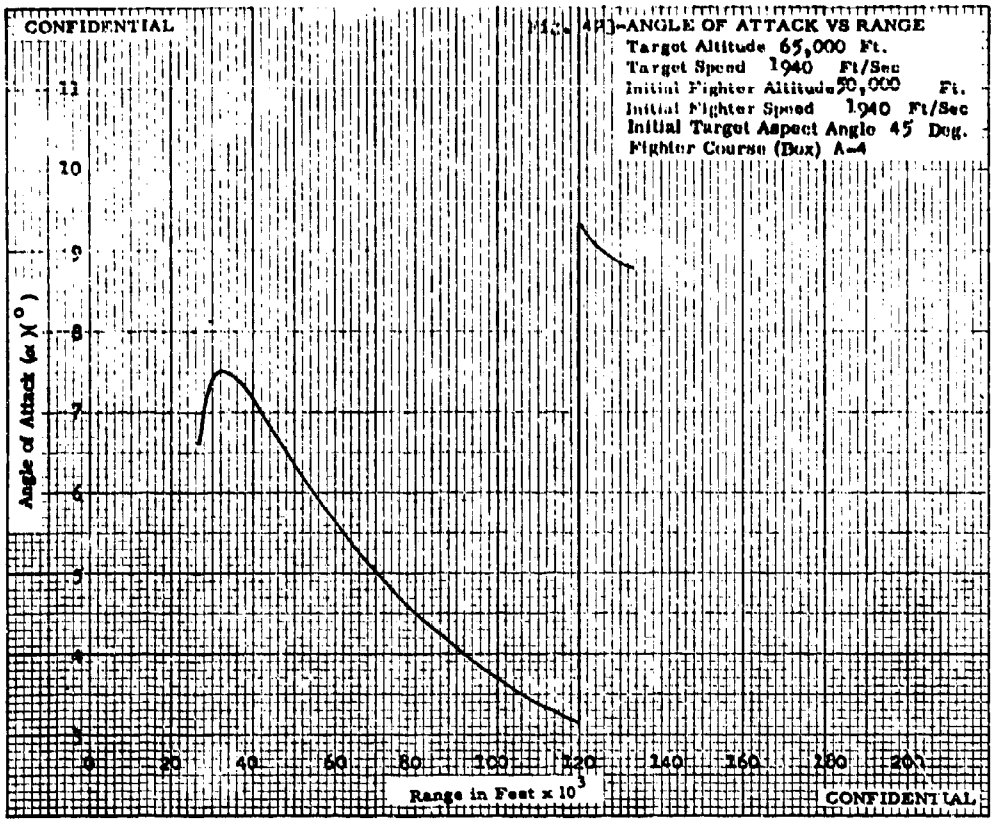

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Elevation Gimbal Angle (A_E) (Deg.)
-14
-16
-18
-20
-22
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

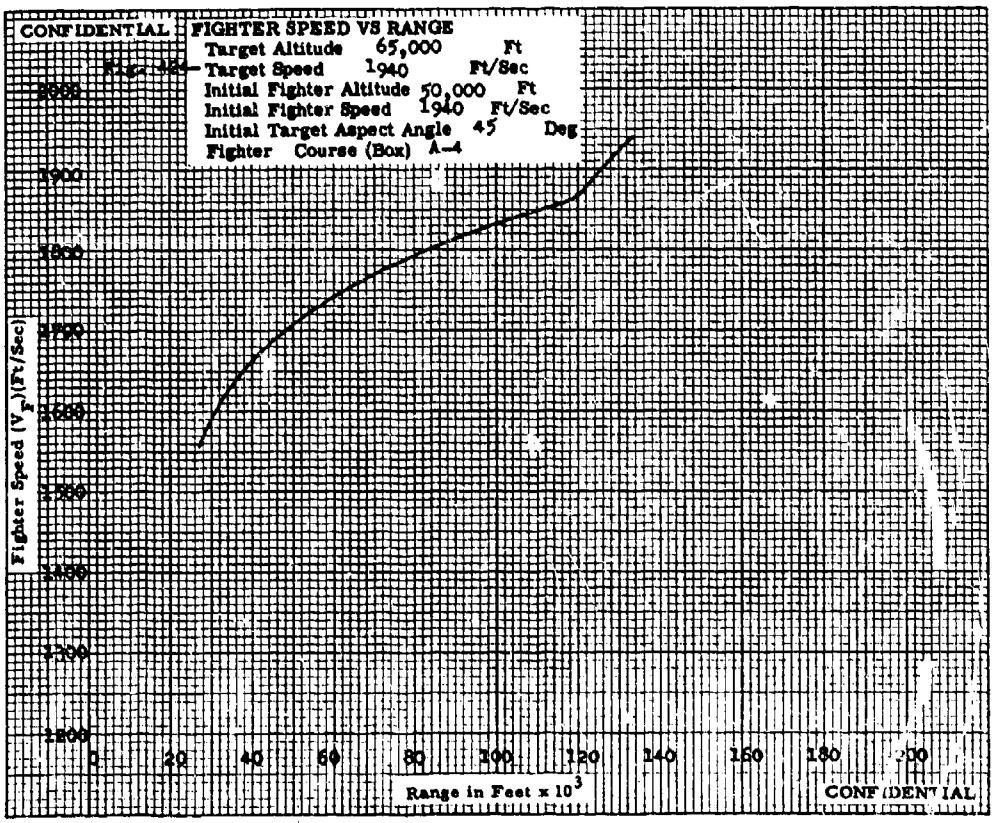
Fig. 420

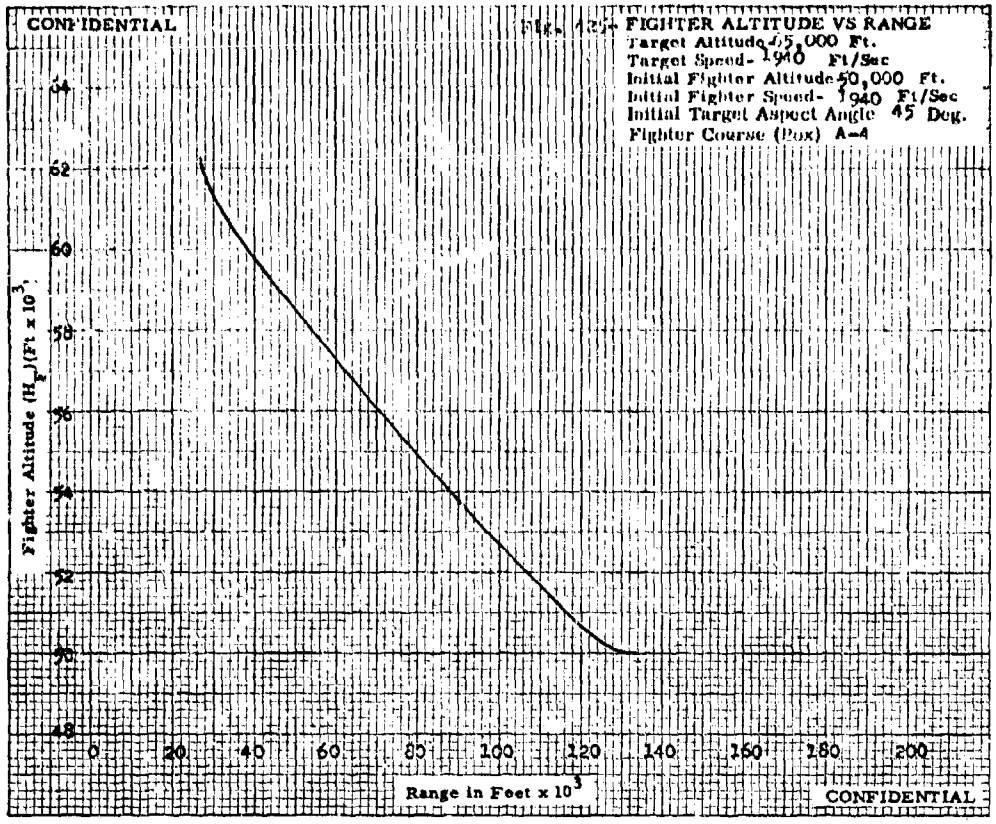

CONFIDENTIAL
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-4
Az. L.O.S. Rate (ω_K) (Deg/Sec)-Antenna Coord.
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

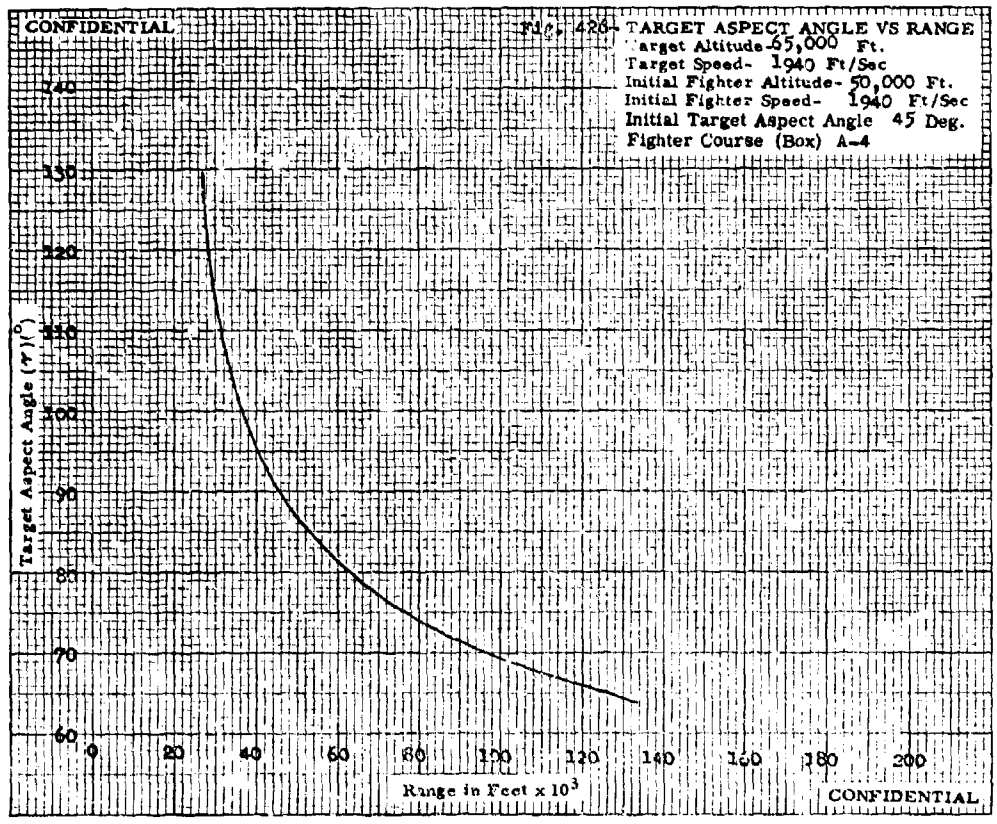

CONFIDENTIAL
Fig. 421 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-4
El. L.O.S. Rate (ω_T) (Deg/Sec)-Arrows Coord.
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

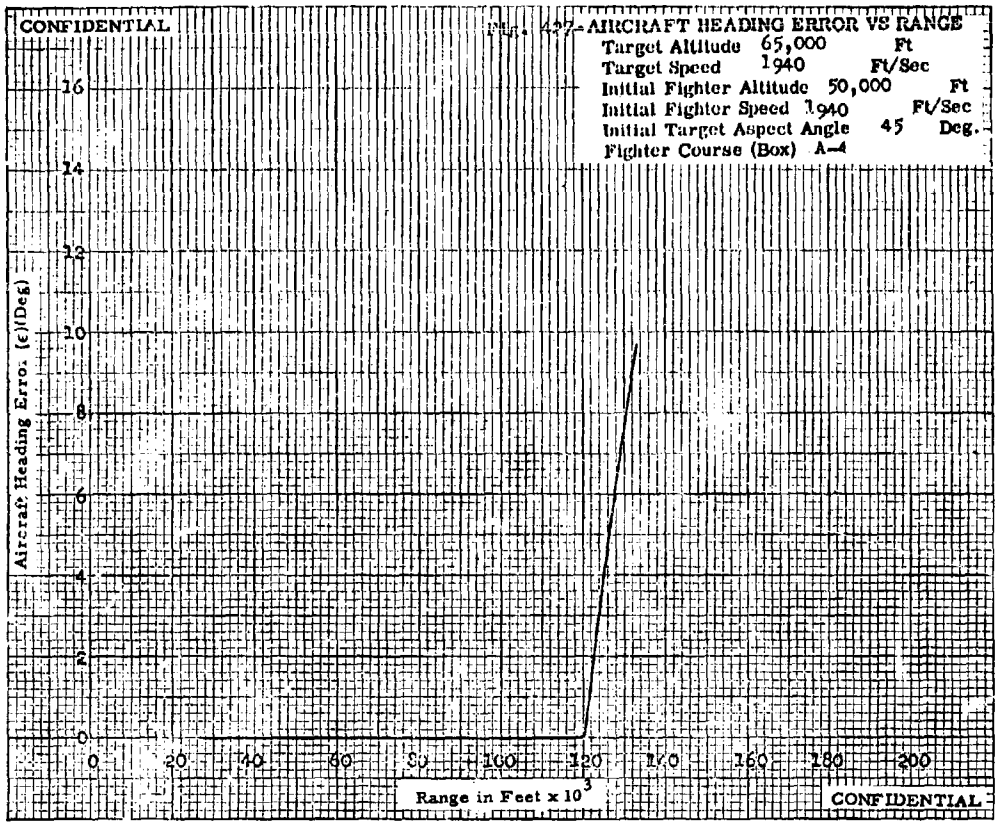

CONFIDENTIAL
Fig. 422 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Load Factor (L/W)
1.8
1.5
1.2
0.9
0.6
0.3
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

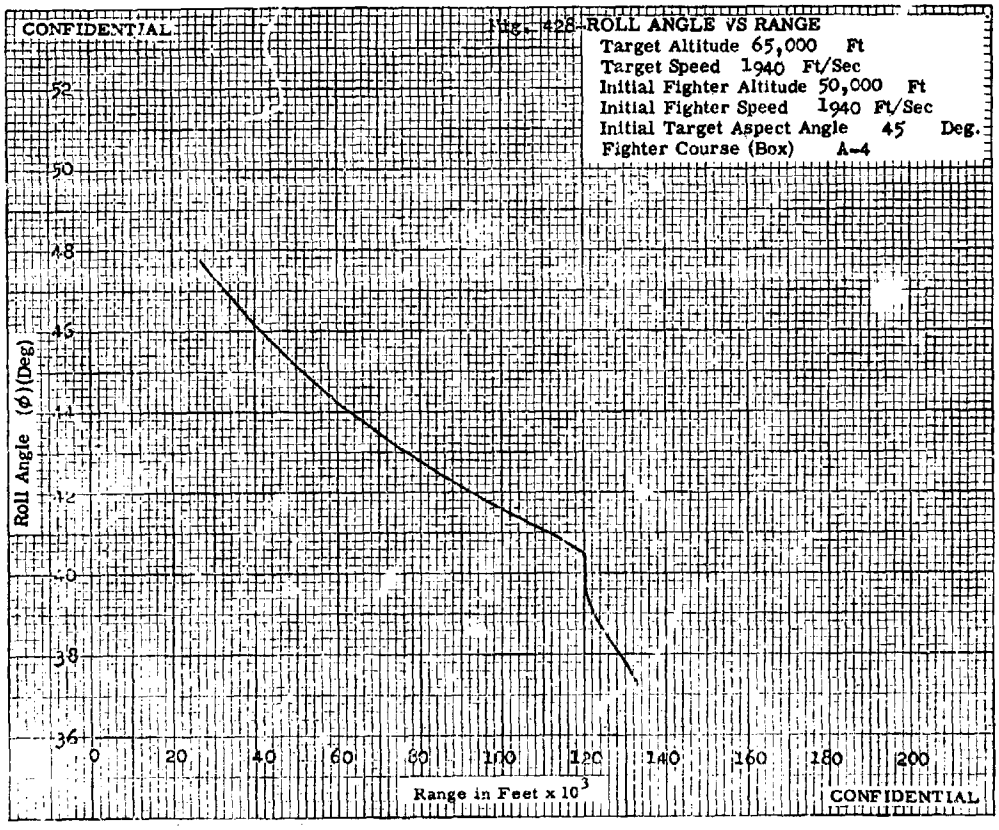

CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Angle of Attack (α X °)
11
10
9
8
7
6
5
4
3
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

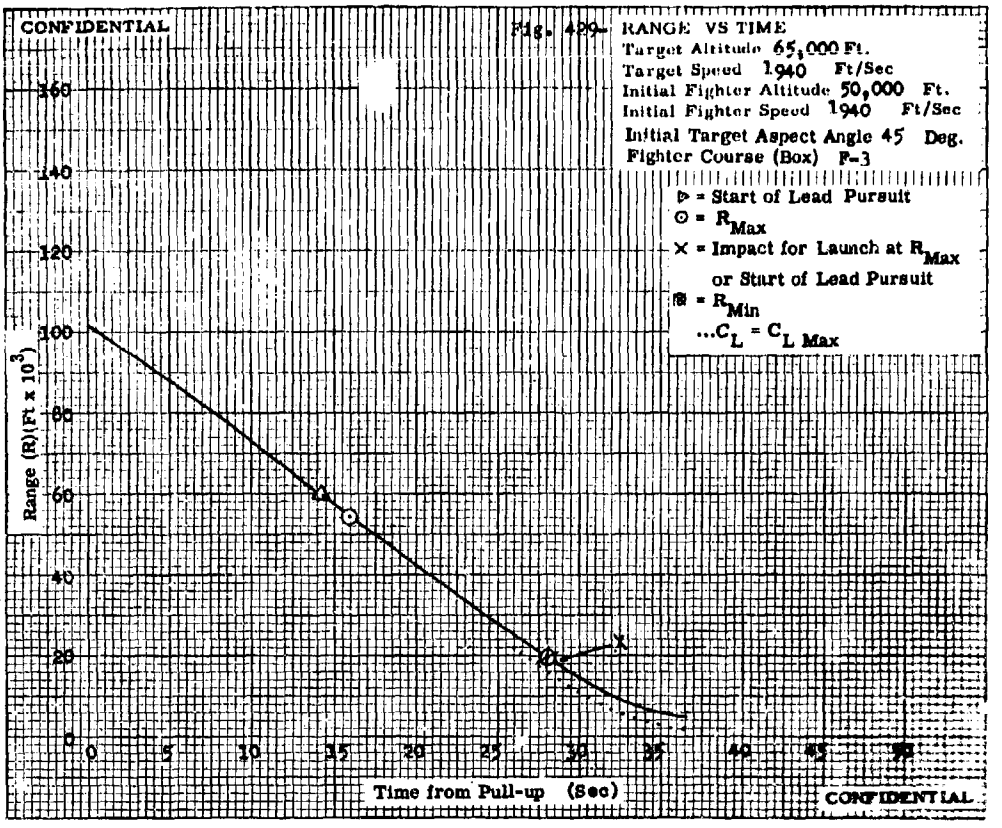

CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-4
Fighter Speed (V_F)(Ft/Sec)
2000
1900
1800
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

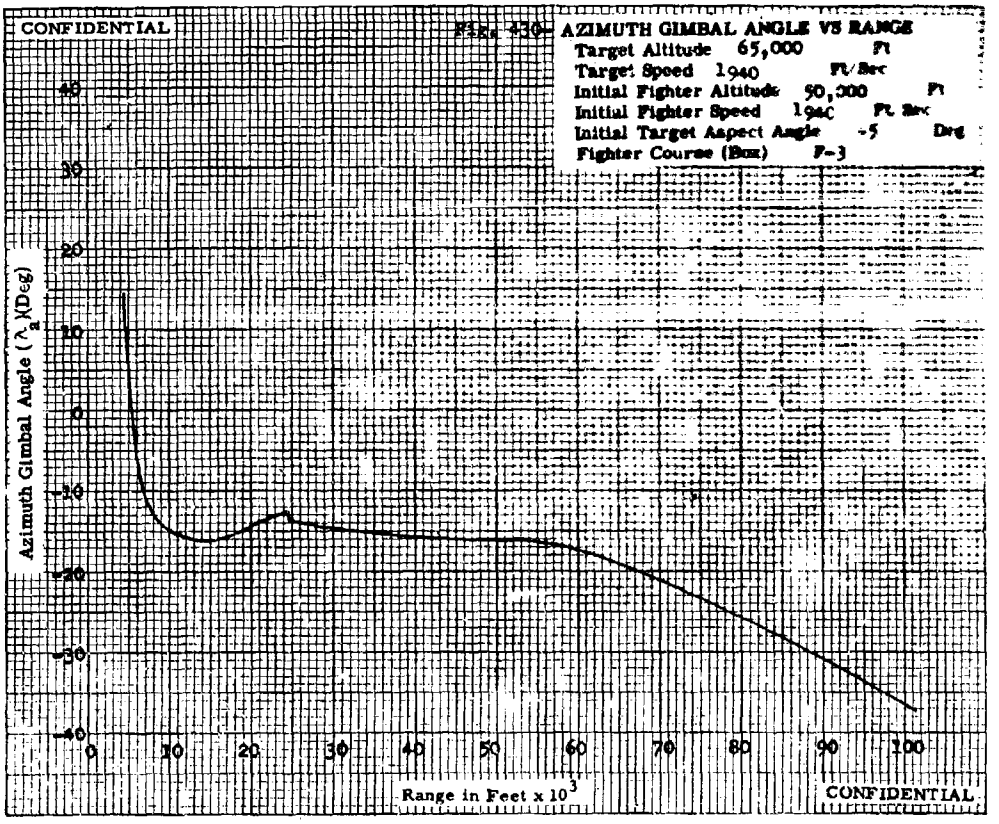

CONFIDENTIAL
FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Fighter Altitude (H_F)(Ft x 10^3)
64
62
60
58
56
54
52
50
48
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Target Aspect Angle (ψ)(°)
140
130
120
110
100
90
80
70
60
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 427 - AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Aircraft Heading Error (ε)(Deg)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 428 - ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-4
Roll Angle (φ)(Deg)
52
50
48
46
44
42
40
38
36
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 429
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min} ...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0
5
10
15
20
25
30
35
40
45
50
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 430
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft Sec
Initial Target Aspect Angle -5 Deg
Fighter Course (Box) F-3
Azimuth Gimbal Angle (λ_a)(Deg)
40
30
20
10
0
-10
-20
-30
-40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
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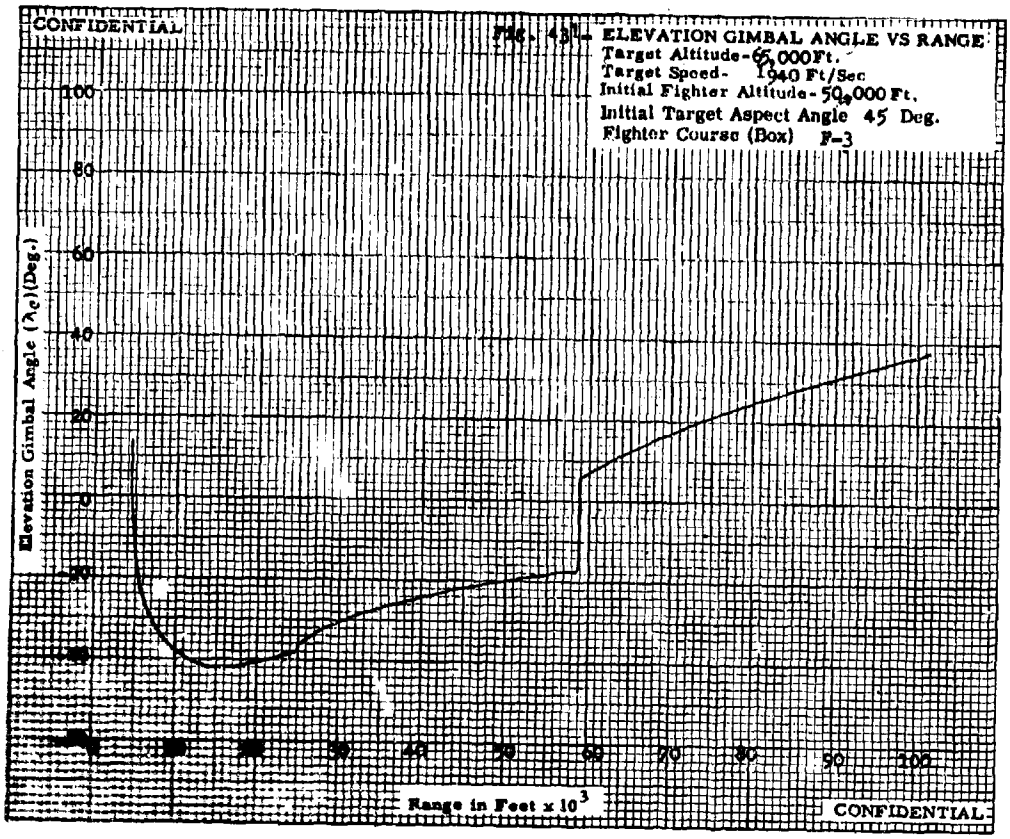
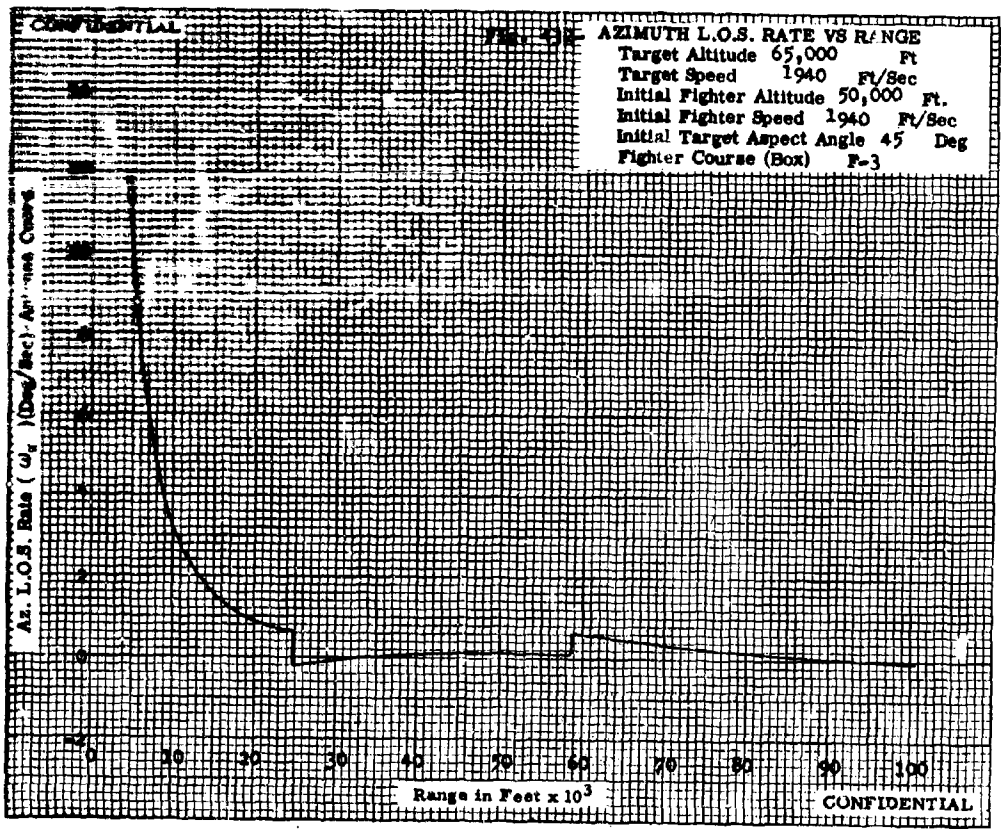
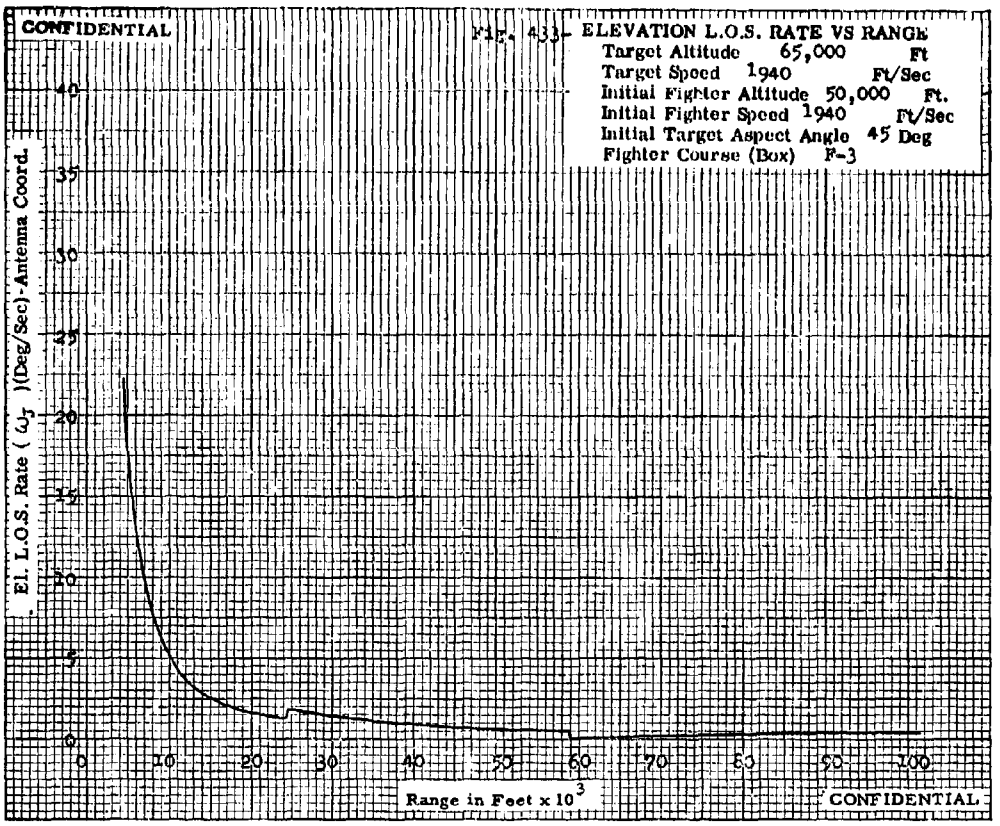
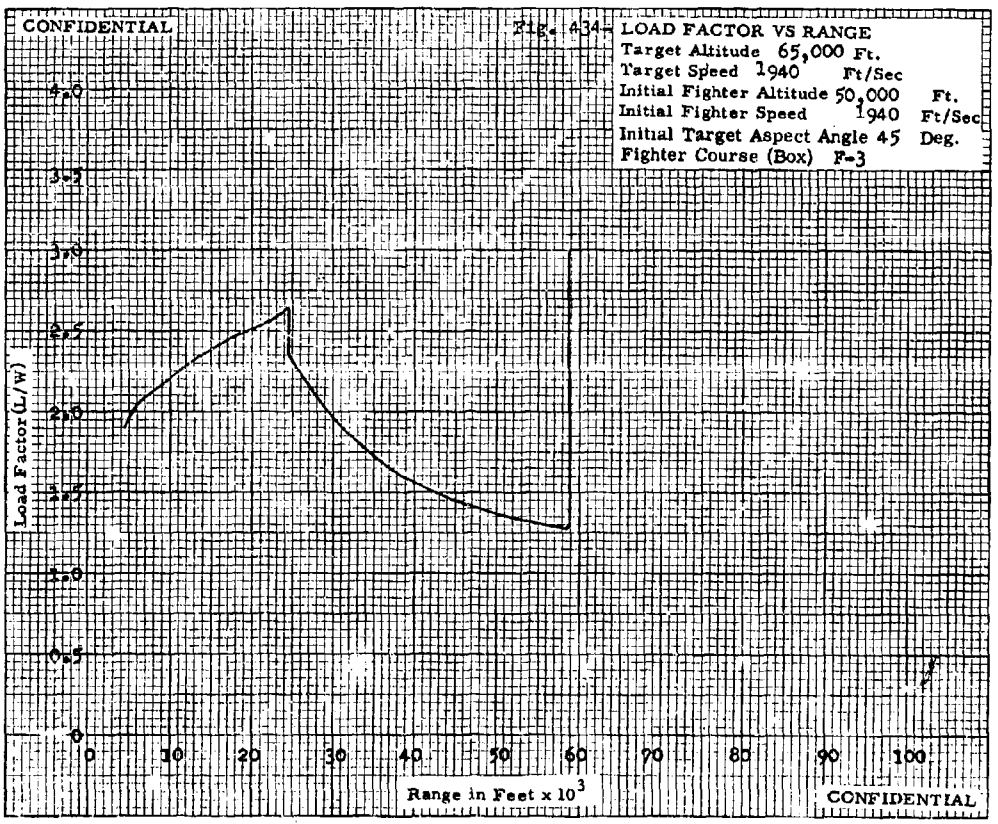

CONFIDENTIAL
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
Elevation Gimbal Angle (λ_e)(Deg.)
100
80
60
40
20
0
-20
-40
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) F-3
Az. L.O.S. Rate (ω_z) (Deg/Sec) Ar... ...ns Curve
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 433 - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) F-3
El. L.O.S. Rate (ω_γ) (Deg/Sec)-Antenna Coord.
40
35
30
25
20
15
10
5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 434 - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 435 ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude [illegible] Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3

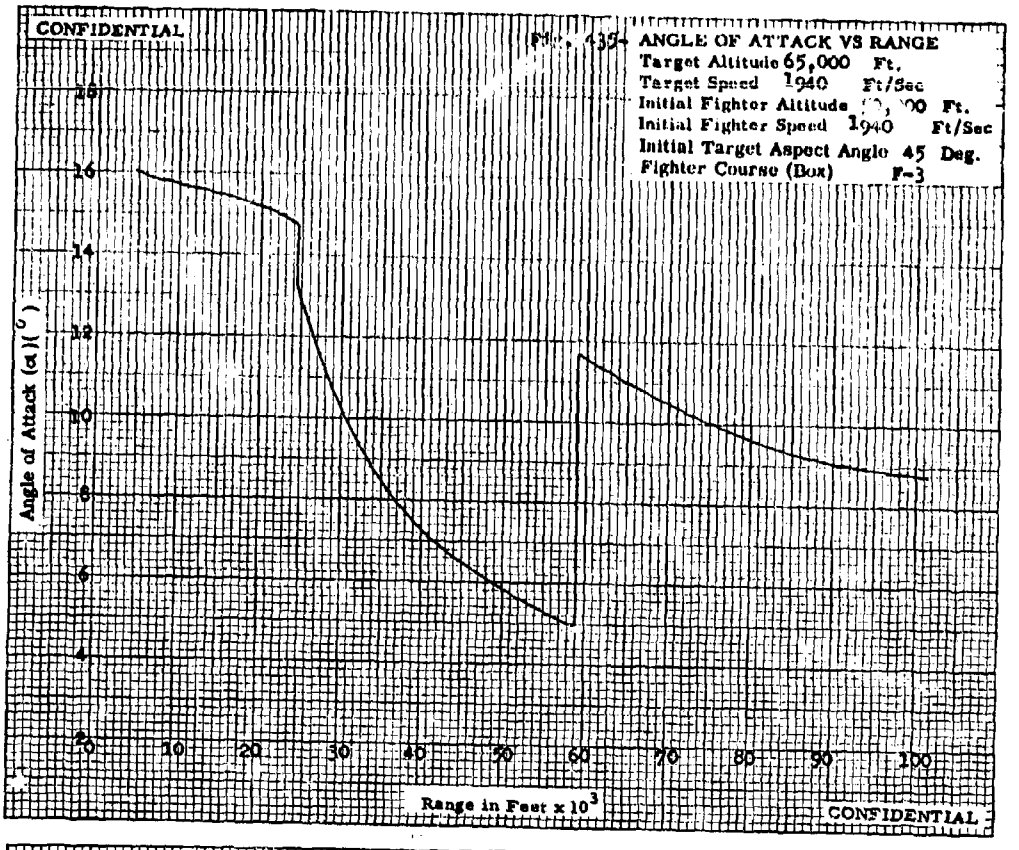


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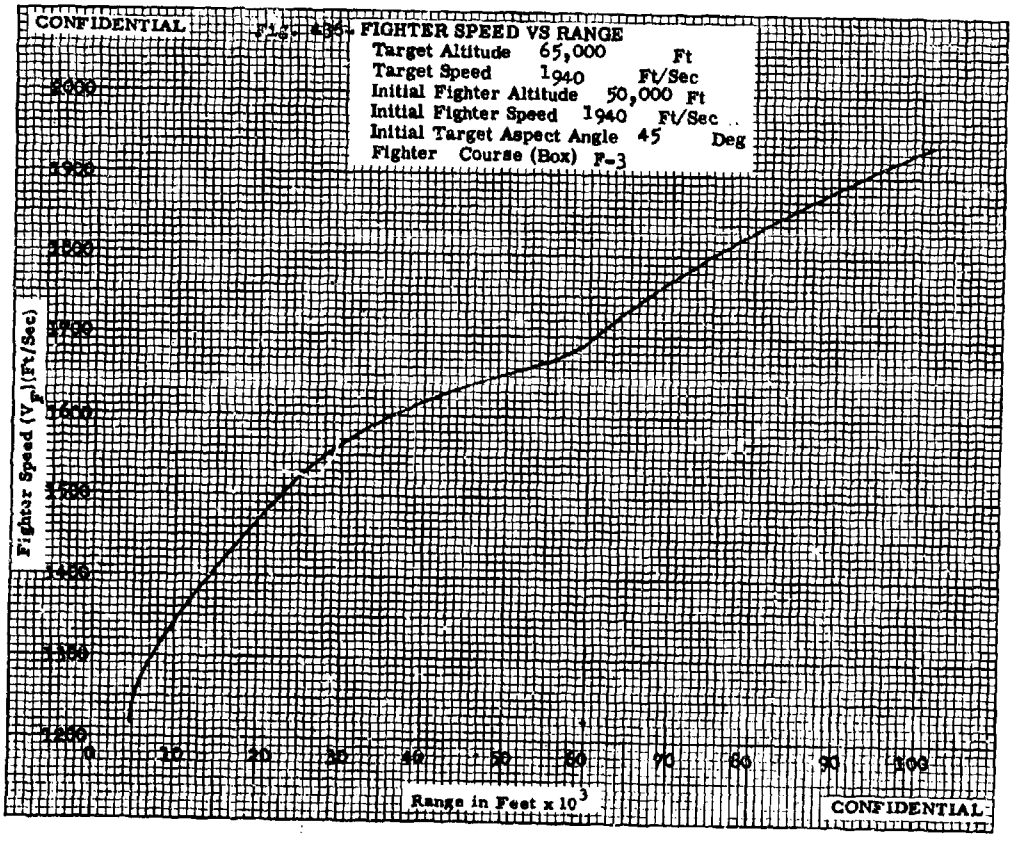
Fig. 436 FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) F-3



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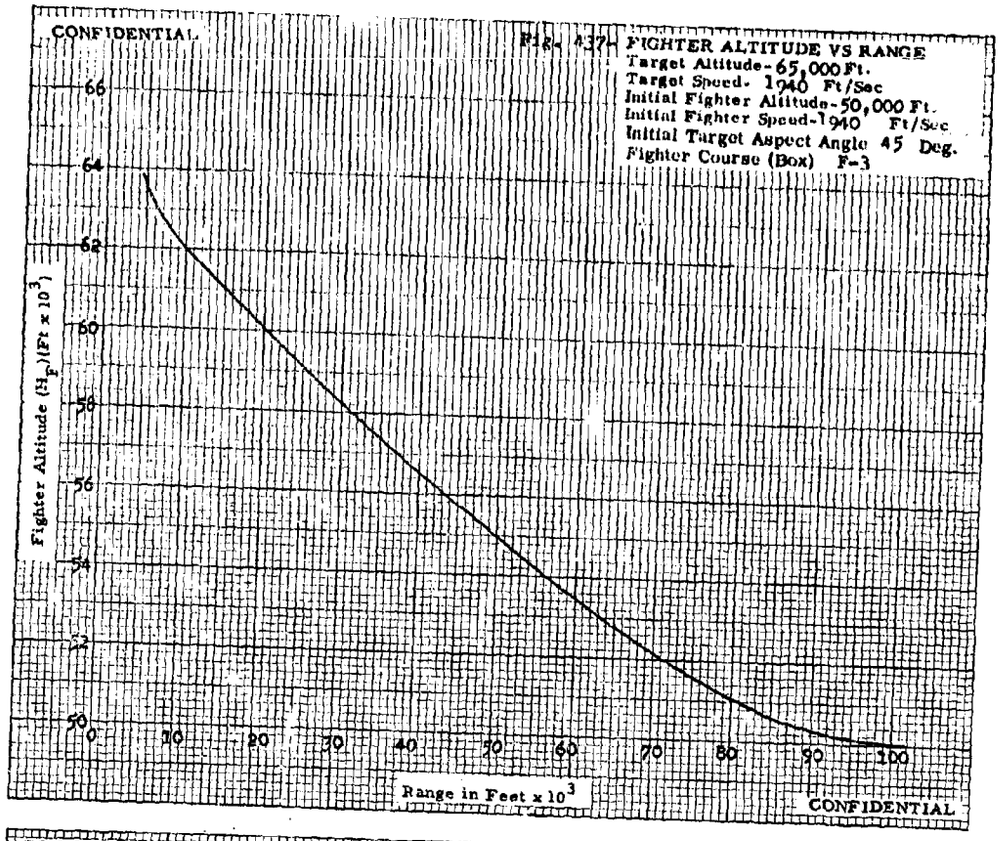
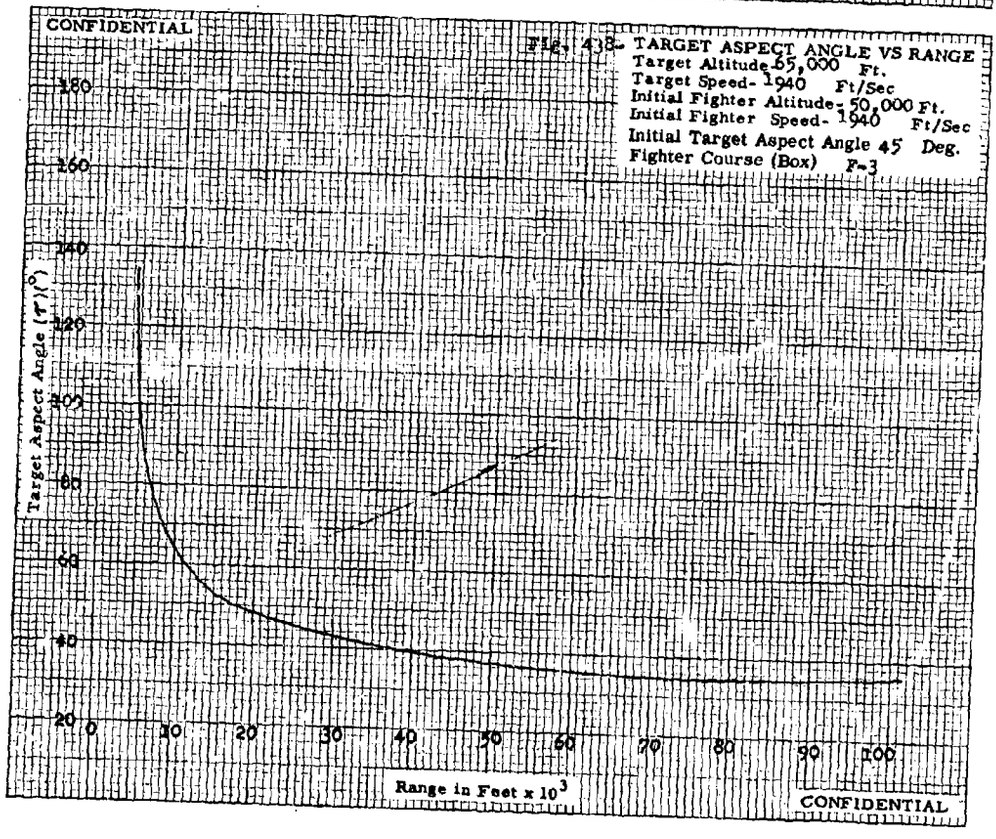
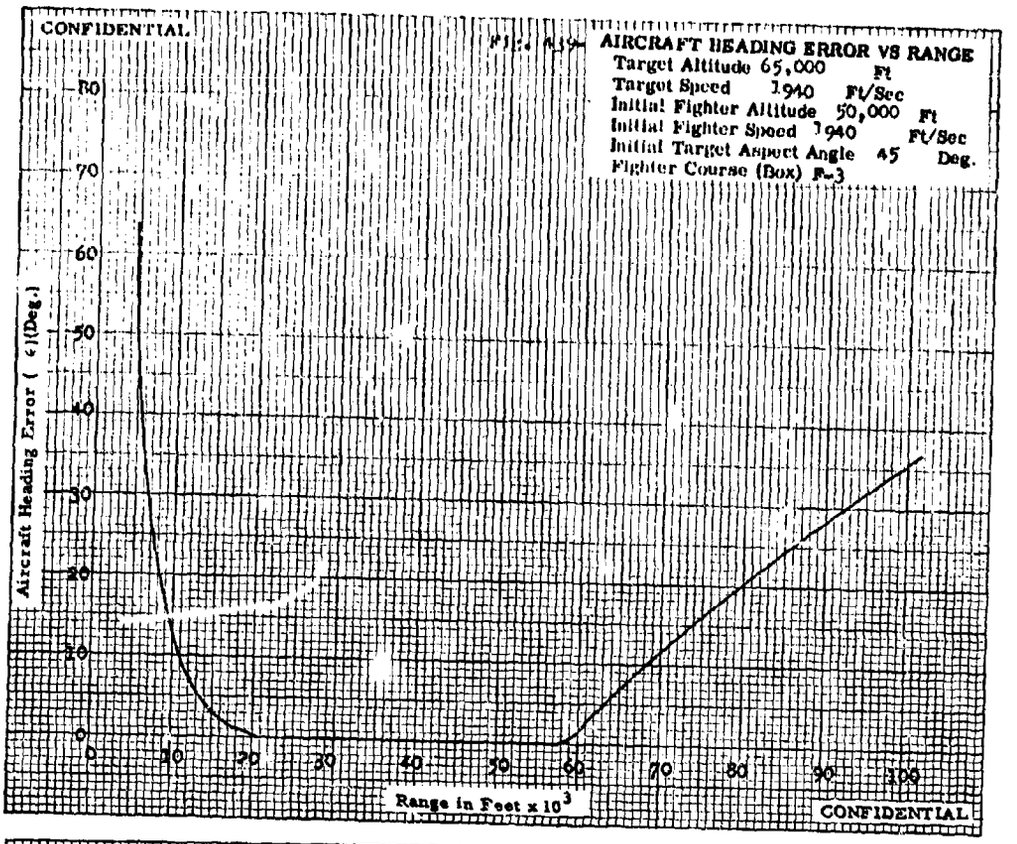
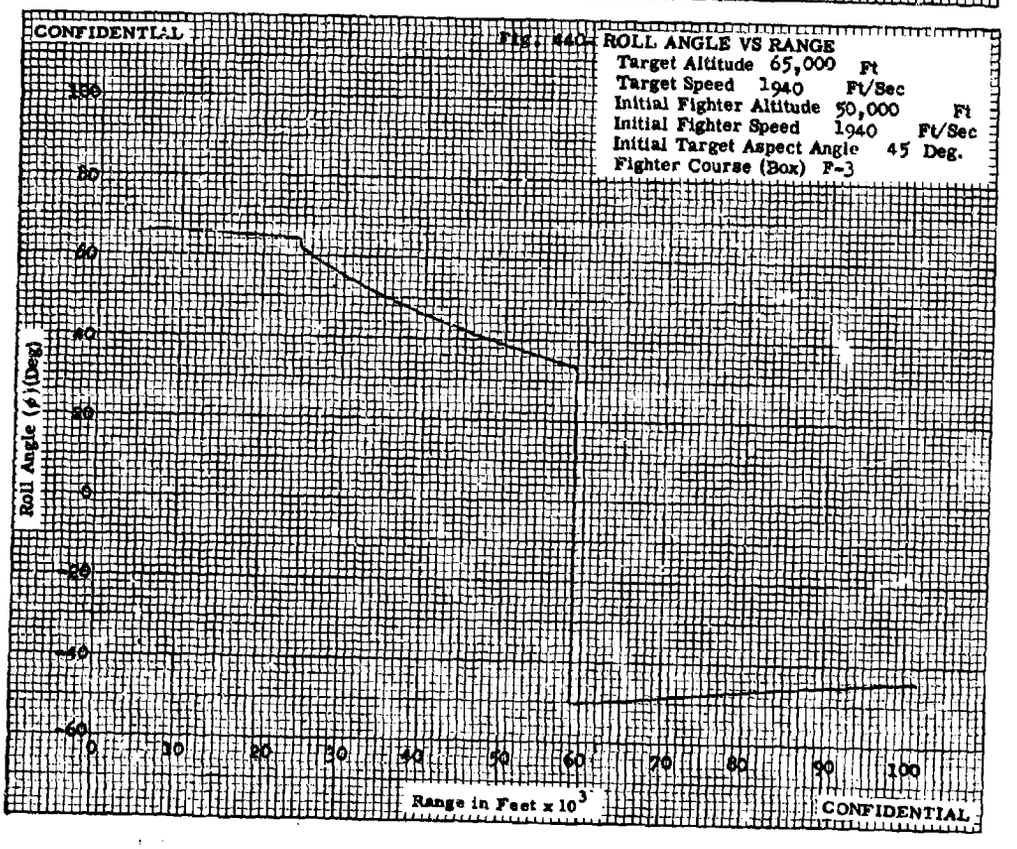
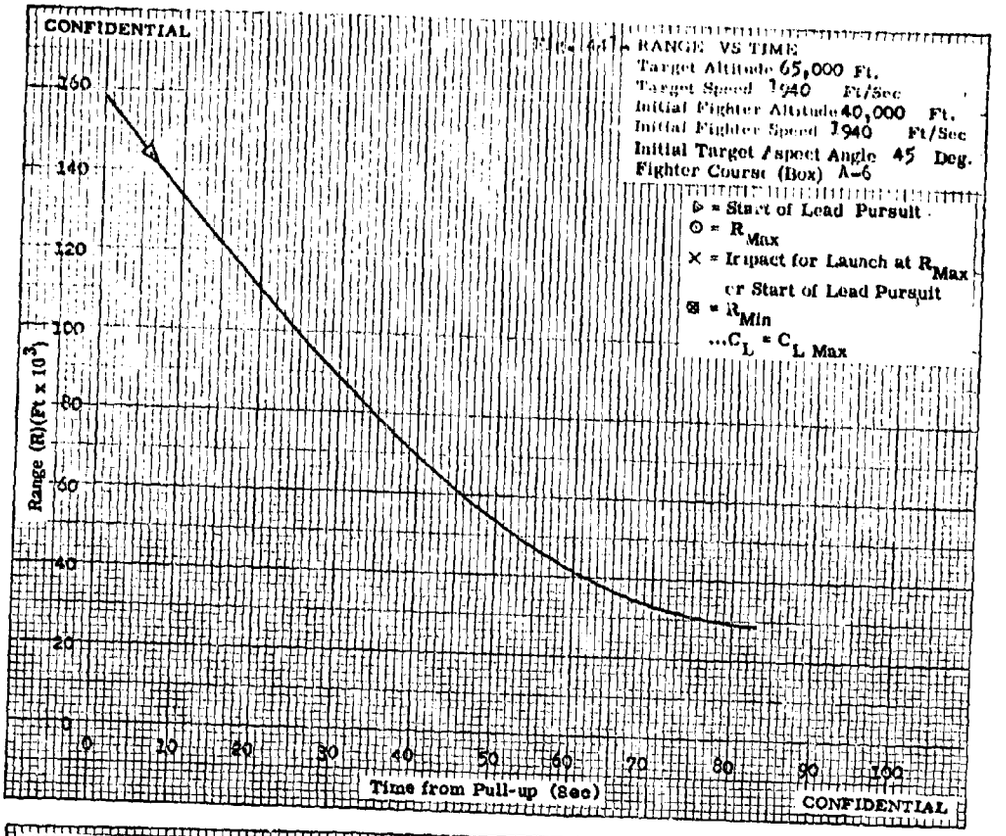
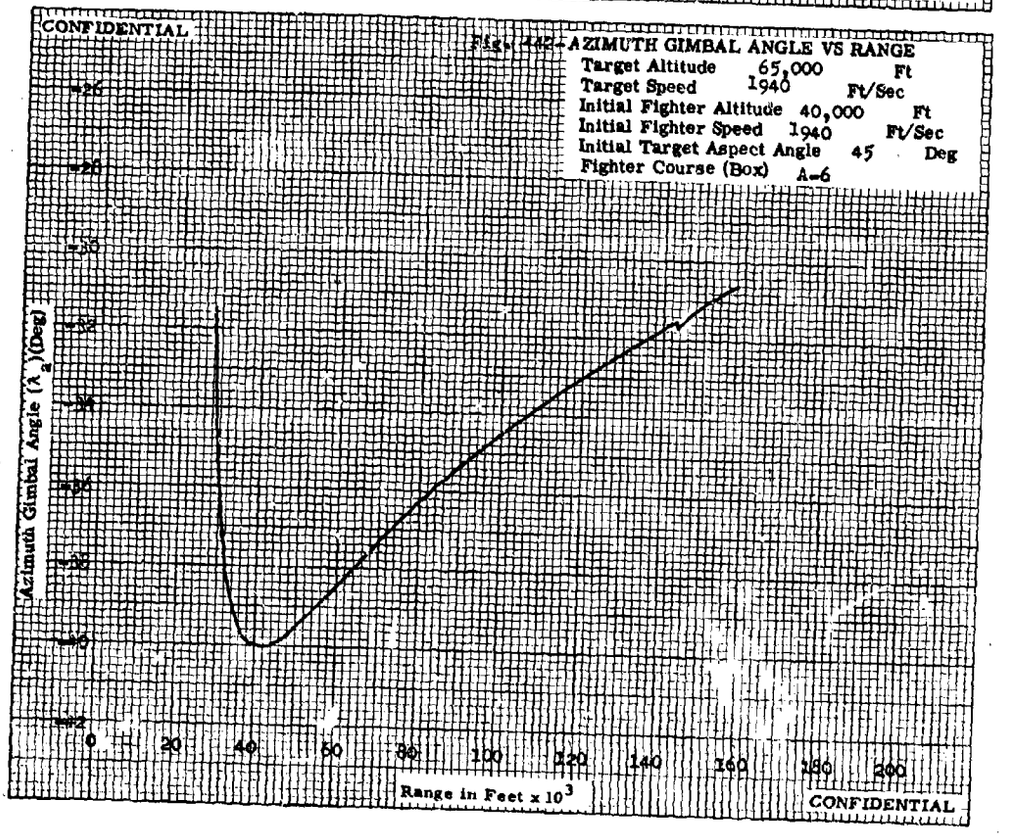

CONFIDENTIAL
Fig. 437 - FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed-1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
Fighter Altitude (H_F)(Ft x 10^3)
66
64
62
60
58
56
54
52
50
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 438 - TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-50,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
Target Aspect Angle (Ψ_T)(°)
180
160
140
120
100
80
60
40
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
Aircraft Heading Error (ε)(Deg.)
80
70
60
50
40
30
20
10
0
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

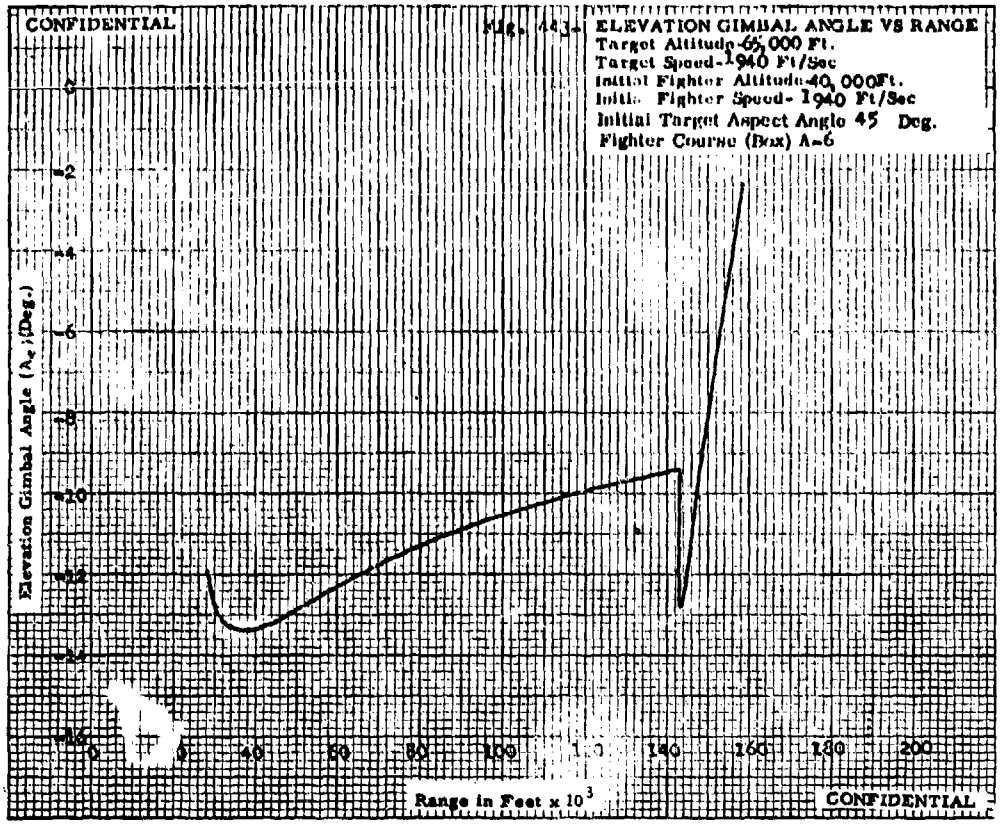

CONFIDENTIAL
ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 50,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) F-3
Roll Angle (φ)(Deg)
100
80
60
40
20
0
-20
-40
-60
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
▷ = Start of Lead Pursuit
⊙ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

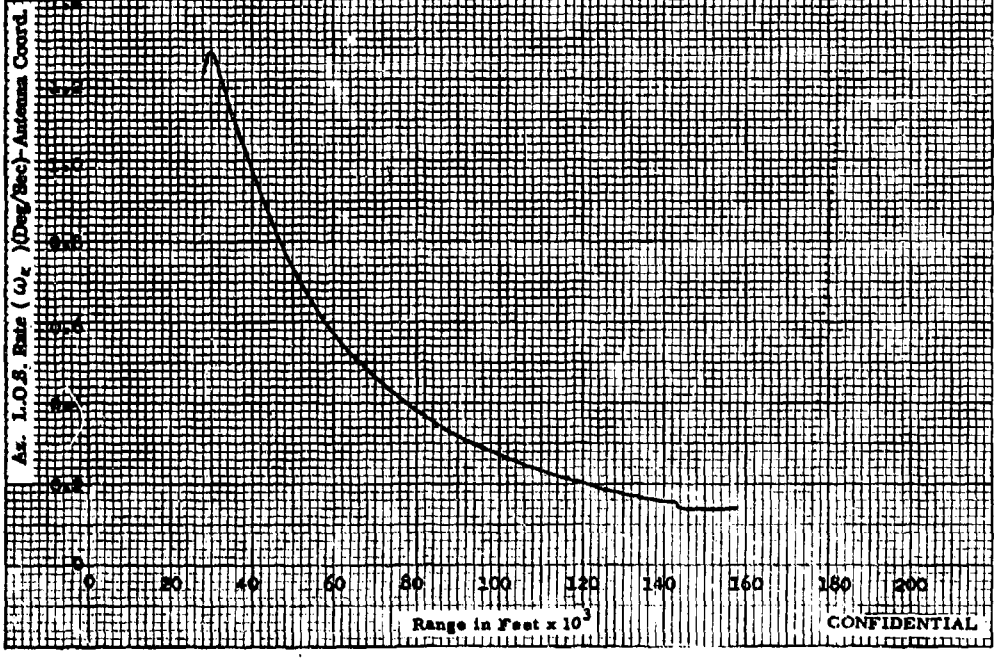
Fig. 44 – ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6



CONFIDENTIAL

CONFIDENTIAL

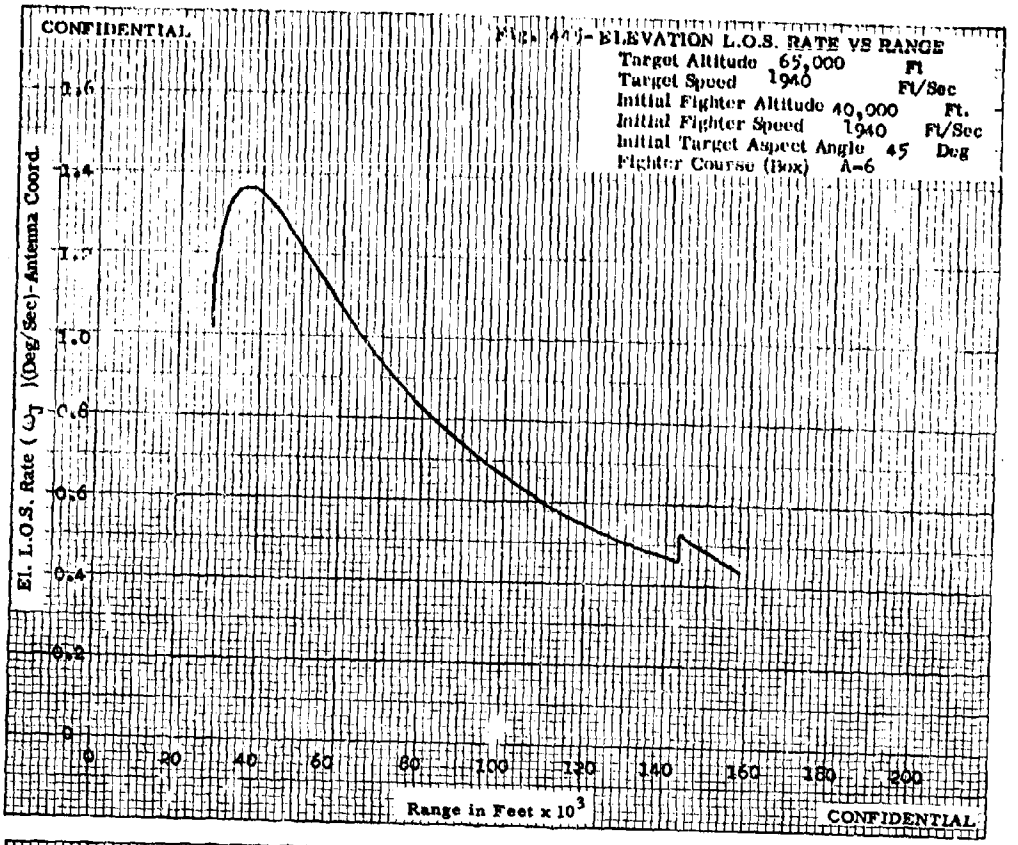
Fig. 44a – AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6



CONFIDENTIAL

CONFIDENTIAL

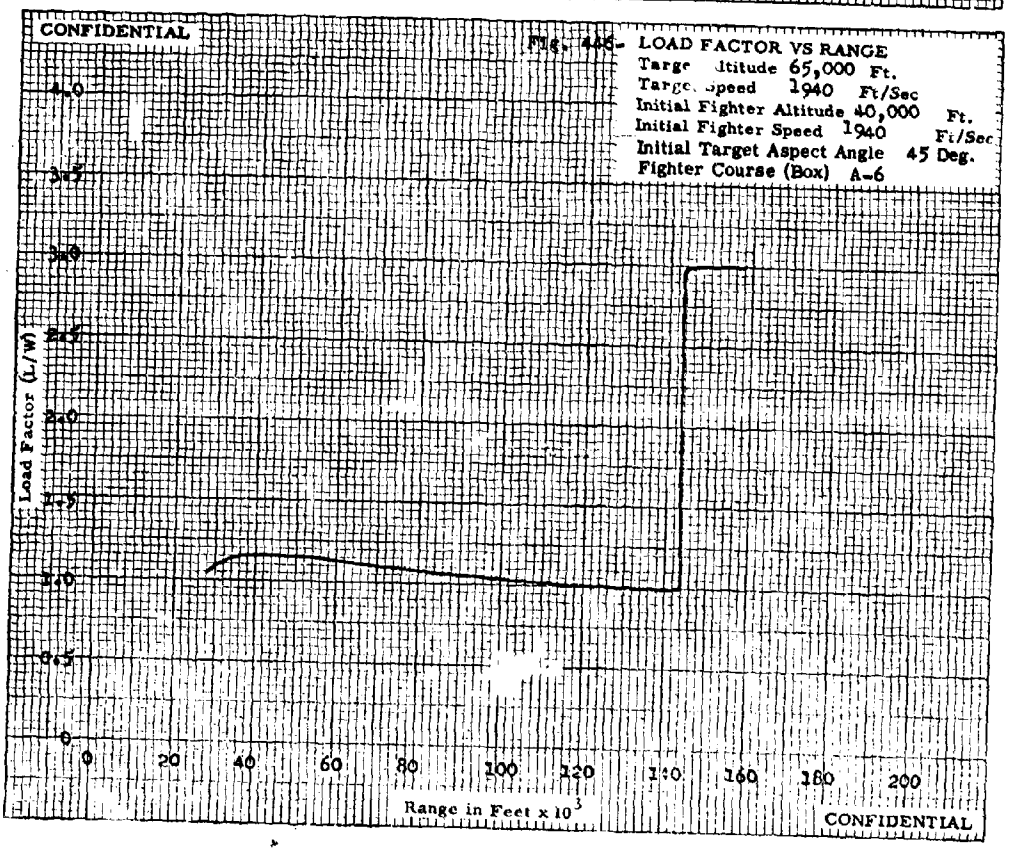
Fig. 44[illegible]- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6



CONFIDENTIAL

CONFIDENTIAL

Fig. 44[illegible]- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6



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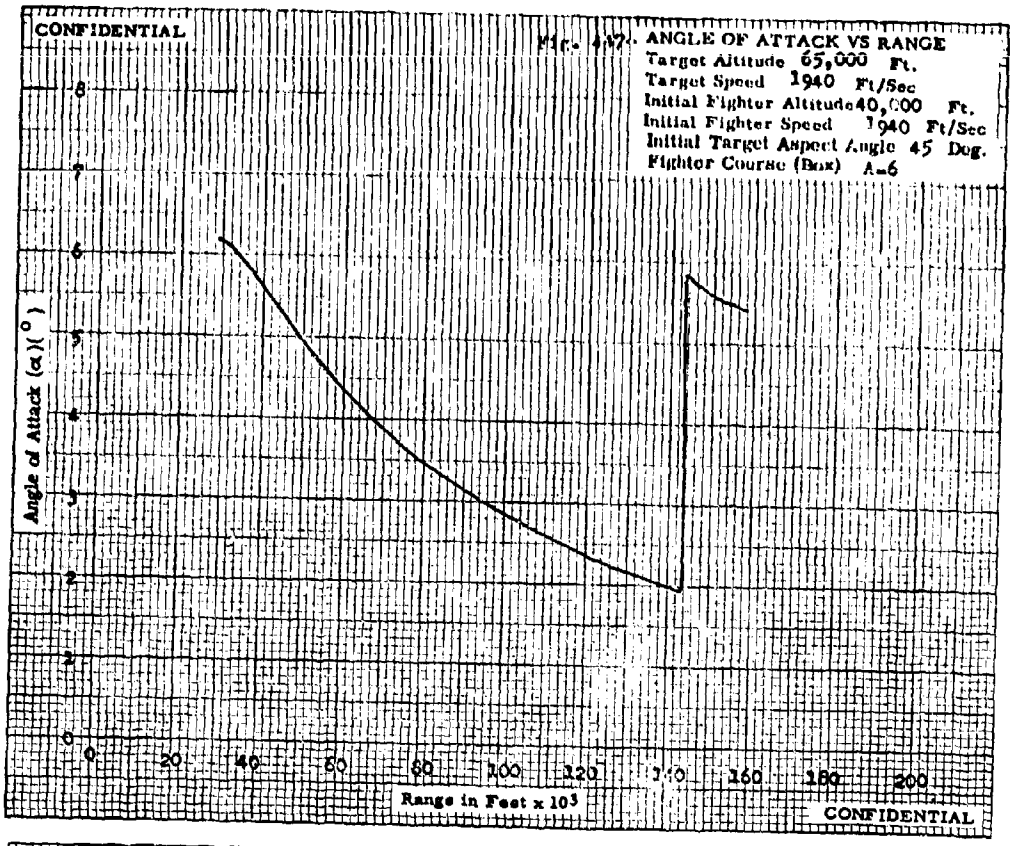

CONFIDENTIAL
Fig. 447
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft.
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Angle of Attack (α)(°)
8
6
5
4
3
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

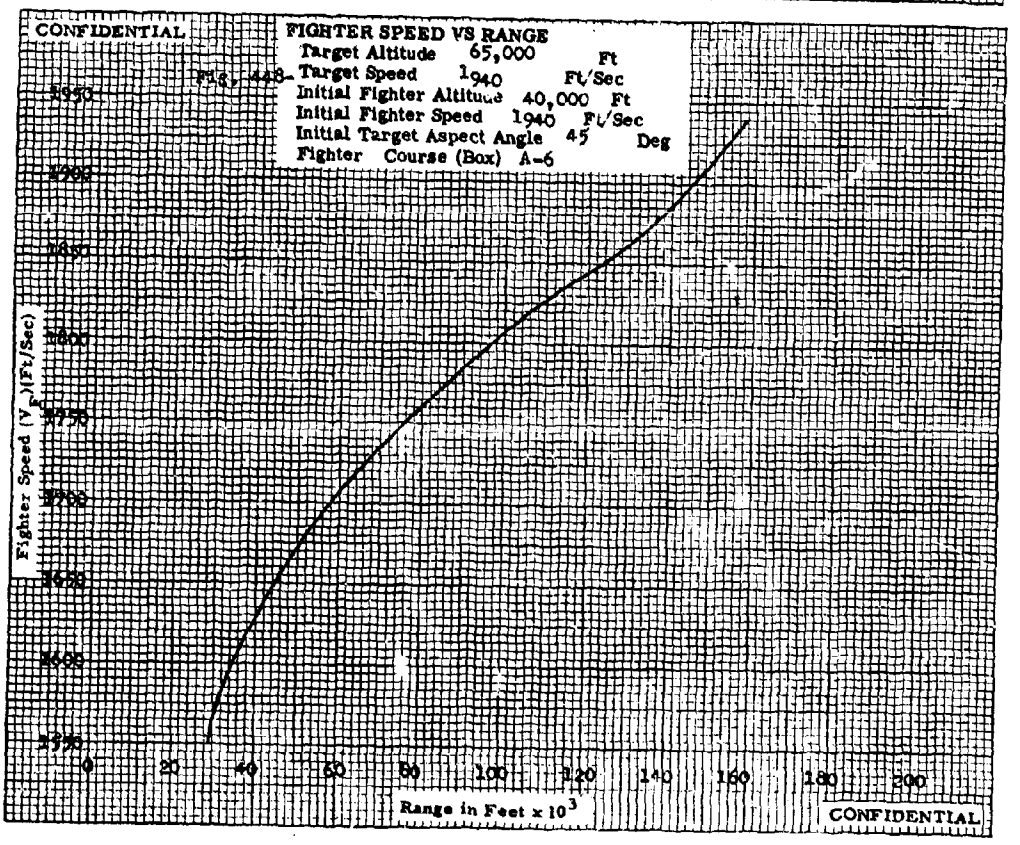
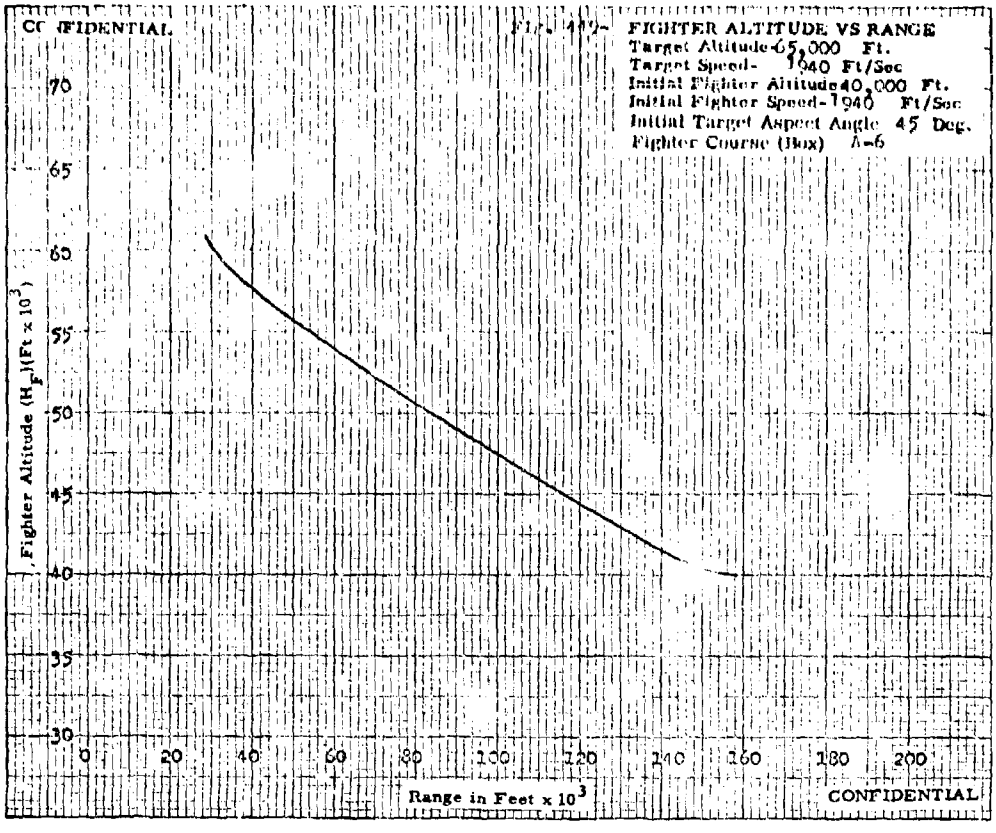
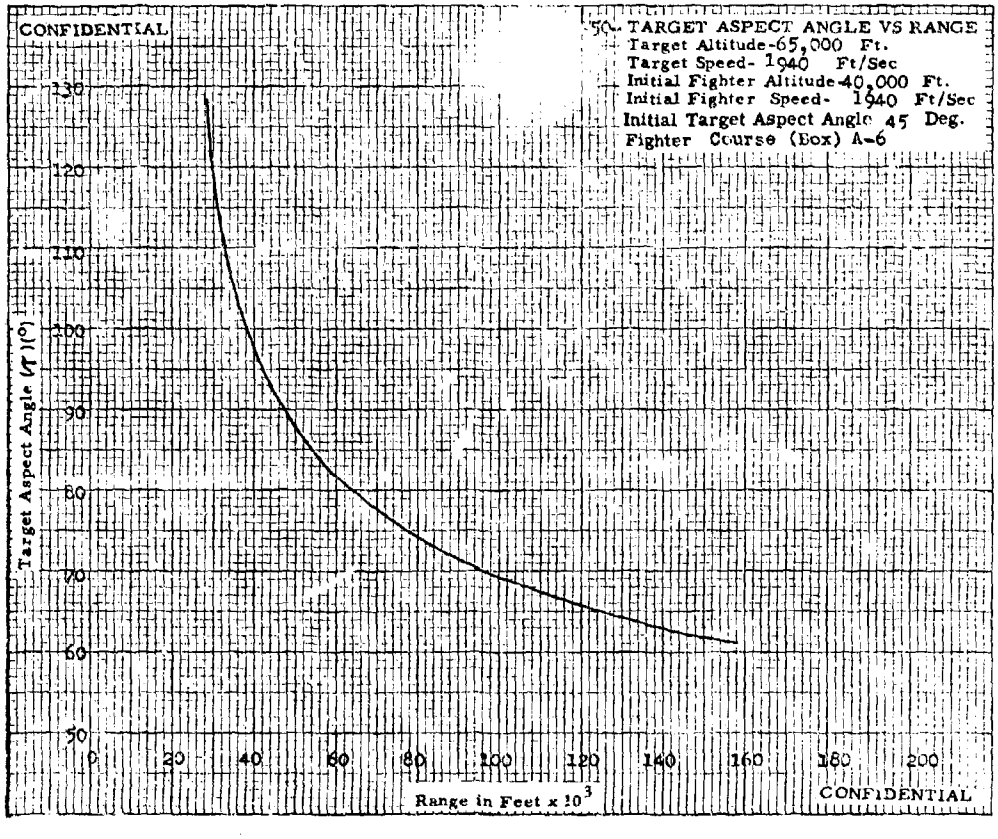
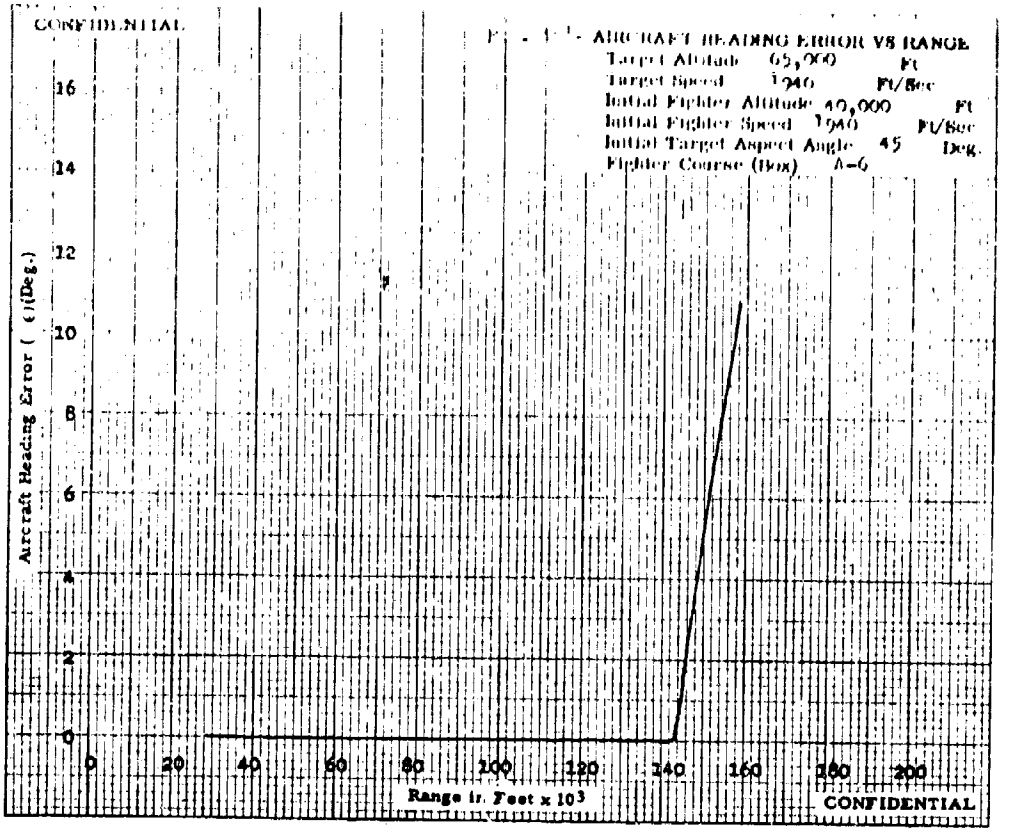
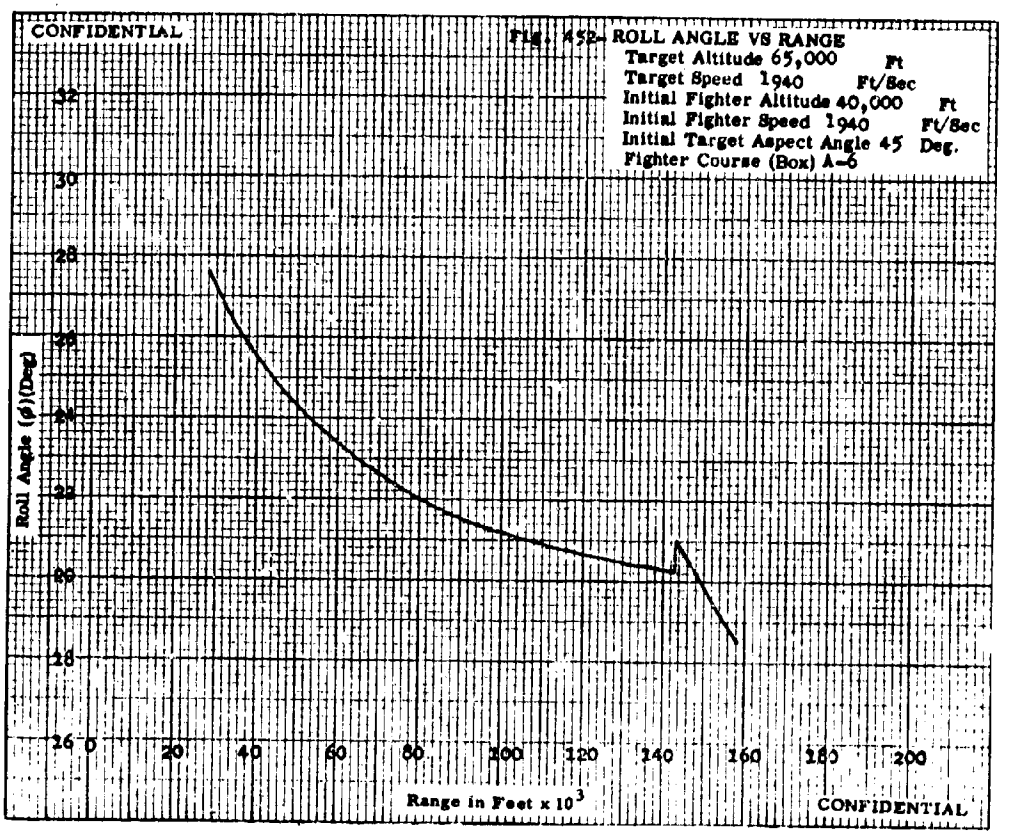

CONFIDENTIAL
Fig. 448
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) A-6
Fighter Speed (V_F)(Ft/Sec)
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

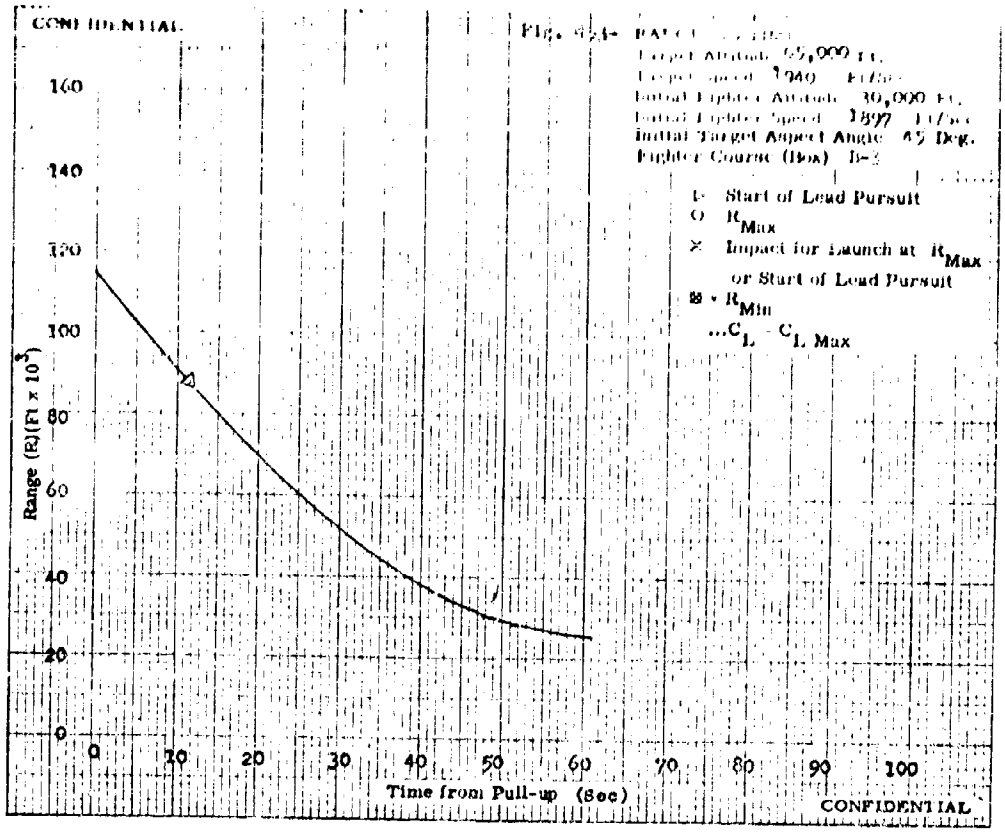
Fig. 119

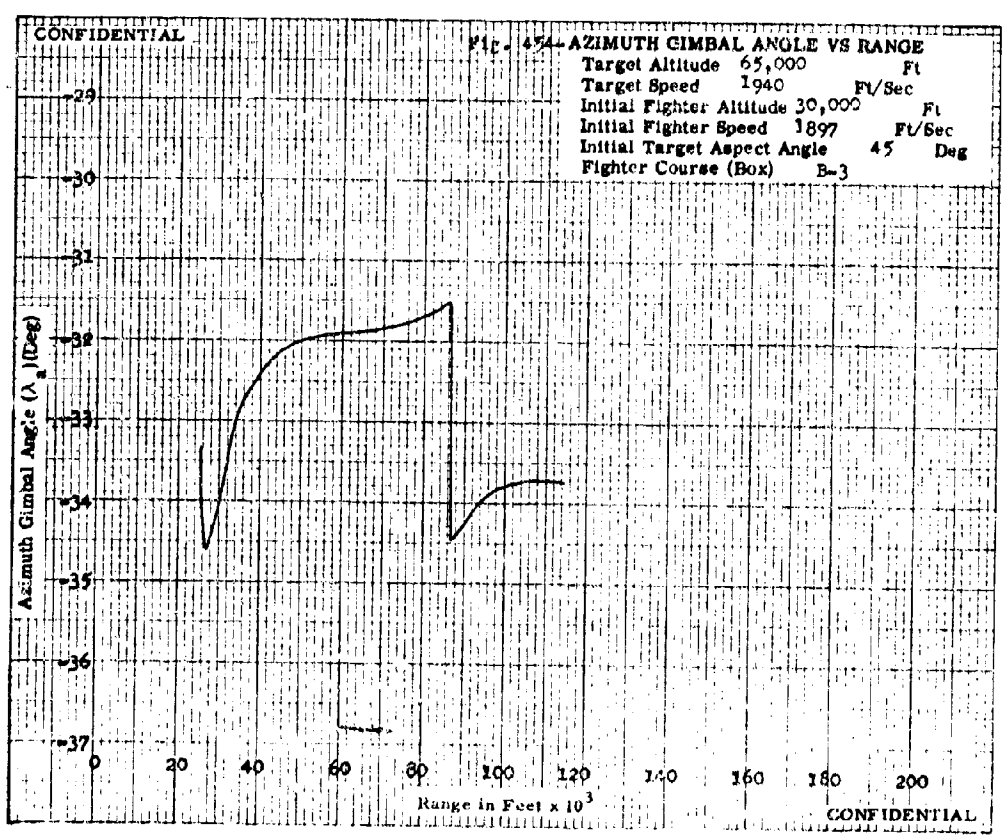

FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed-1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Fighter Altitude (H_F)(Ft x 10^3)
70
65
60
55
50
45
40
35
30
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

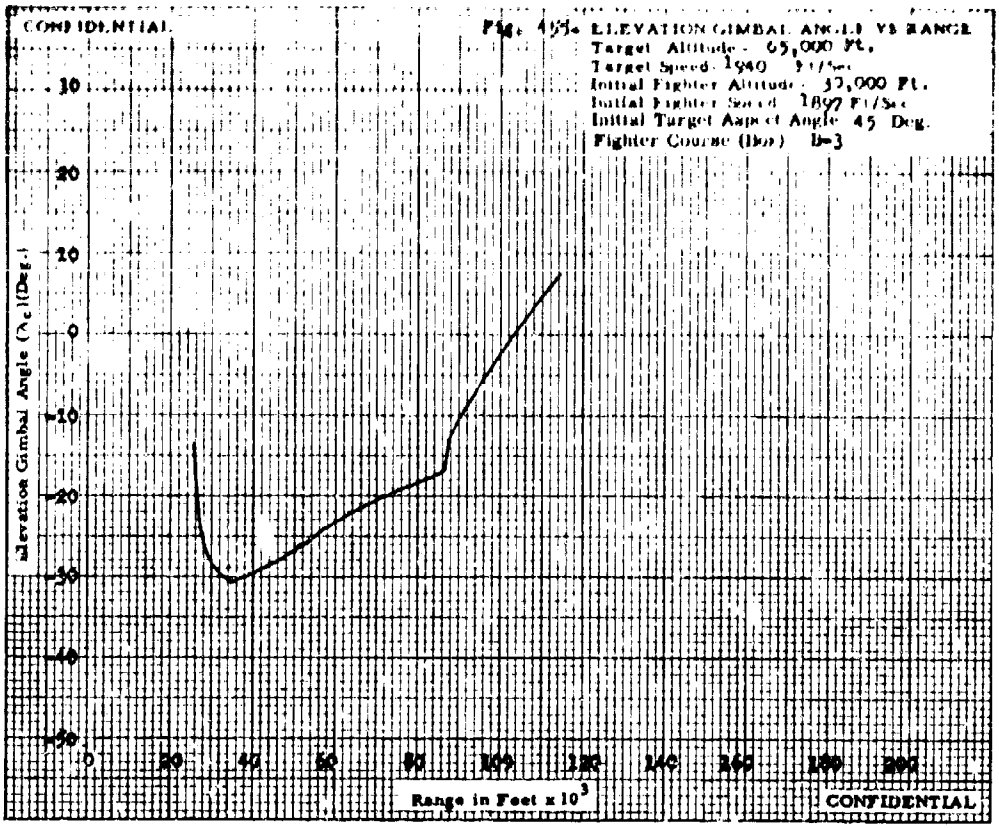

CONFIDENTIAL
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-40,000 Ft.
Initial Fighter Speed- 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Target Aspect Angle (α_T)(°)
130
120
110
100
90
80
70
60
50
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

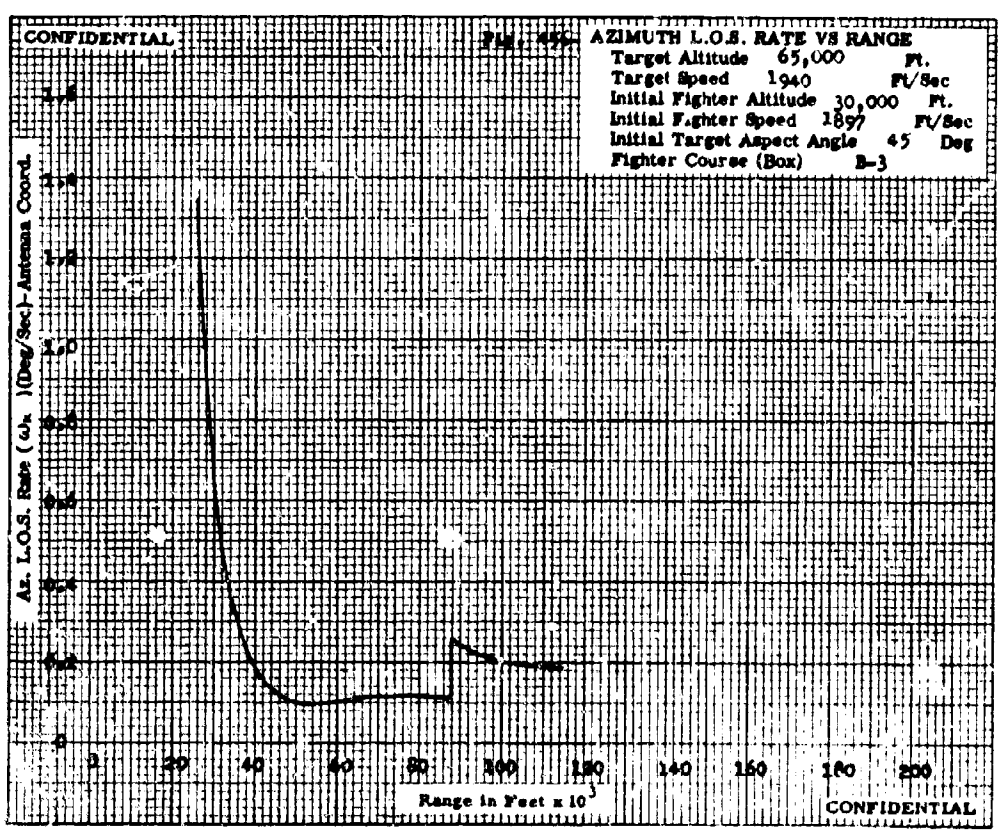

CONFIDENTIAL
Fig. 452- AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Aircraft Heading Error ( ) (Deg.)
16
14
12
10
8
6
4
2
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

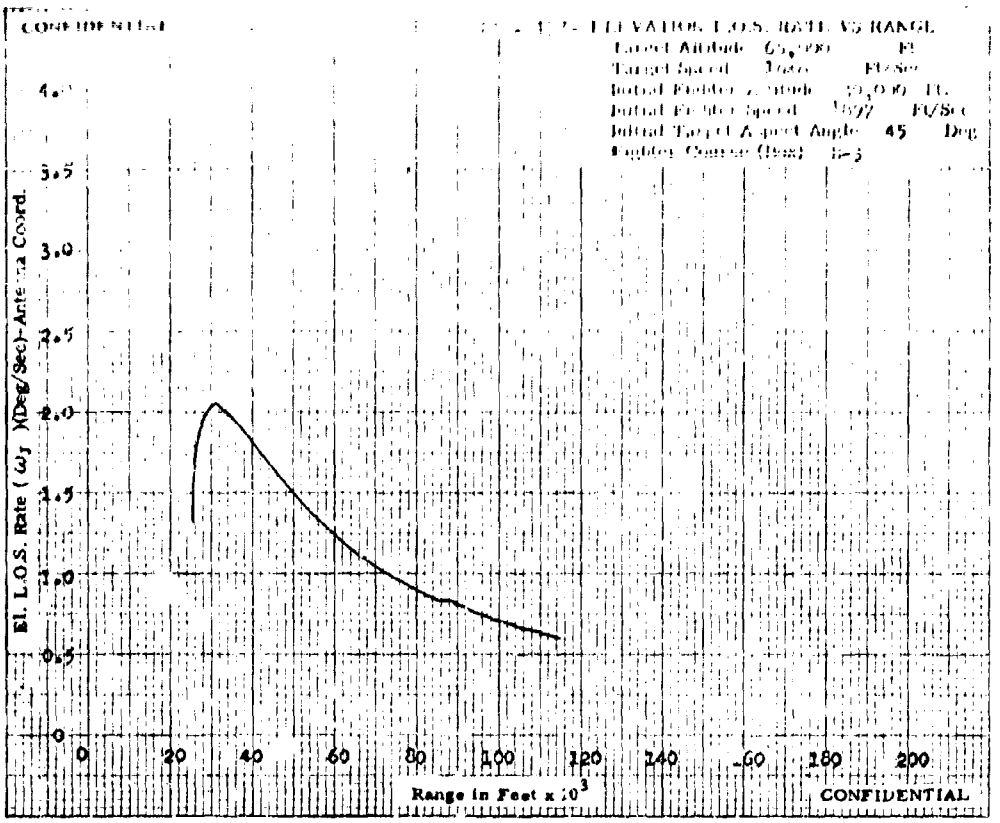

CONFIDENTIAL
Fig. 452- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 40,000 Ft
Initial Fighter Speed 1940 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) A-6
Roll Angle (φ) (Deg)
32
30
28
26
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-2
L Start of Lead Pursuit
O R_{Max}
X Impact for Launch at R_{Max} or Start of Lead Pursuit
88 = R_{Min}
...C_L = $C_{L\ Max}$
Range (R)(Ft x 10^3)
160
140
120
100
80
60
40
20
0
0 10 20 30 40 50 60 70 80 90 100
Time from Pull-up (Sec)
CONFIDENTIAL


CONFIDENTIAL
Fig. 454 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-3
Azimuth Gimbal Angle (λ_a)(Deg)
-29
-30
-31
-32
-33
-34
-35
-36
-37
0 20 40 60 80 100 120 140 160 180 200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 45a ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude - 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude - 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3
Elevation Gimbal Angle (θe) (Deg.)
10
20
0
-10
-20
-30
-40
-50
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 45b AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-3
Az. L.O.S. Rate (ωx) (Deg/Sec)-Antenna Coord.
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Target Altitude 6[illegible],000 Ft
Target Speed [illegible] Ft/Sec
Initial Fighter Altitude [illegible],000 Ft.
Initial Fighter Speed [illegible] Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-3
El. L.O.S. Rate (ω y)(Deg/Sec)-Antenna Coord.
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

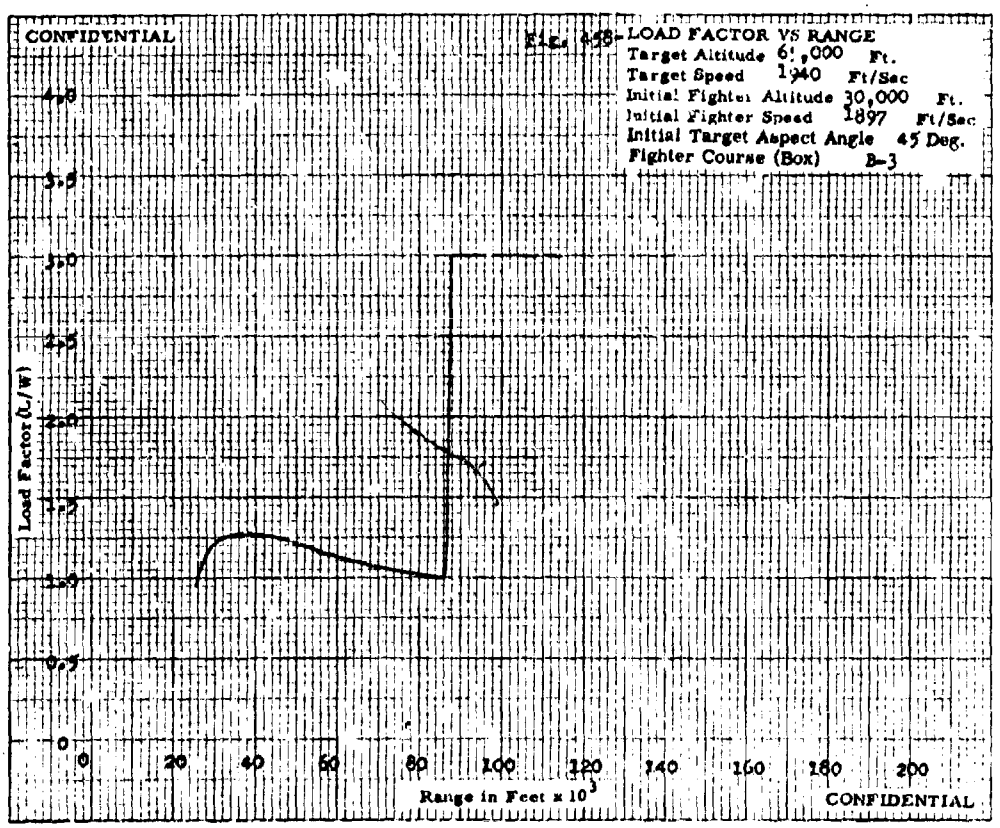

CONFIDENTIAL
Fig. 6[illegible]
LOAD FACTOR VS RANGE
Target Altitude 6[illegible],000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

Fig. 459 ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft.
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3

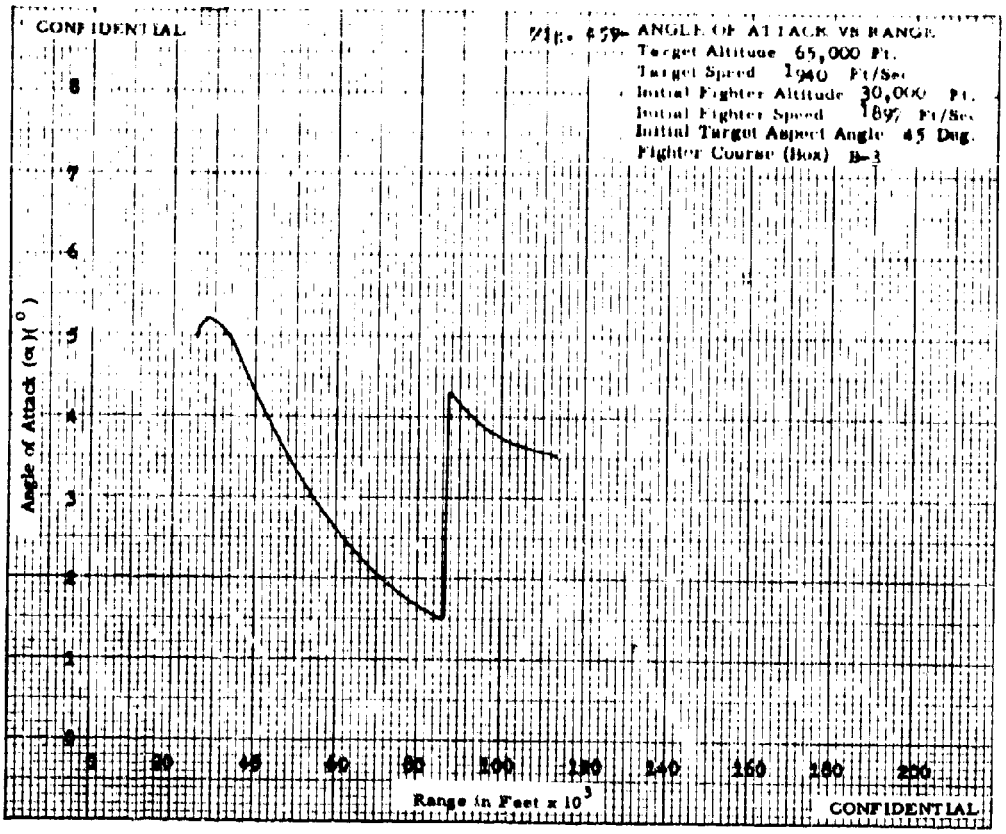
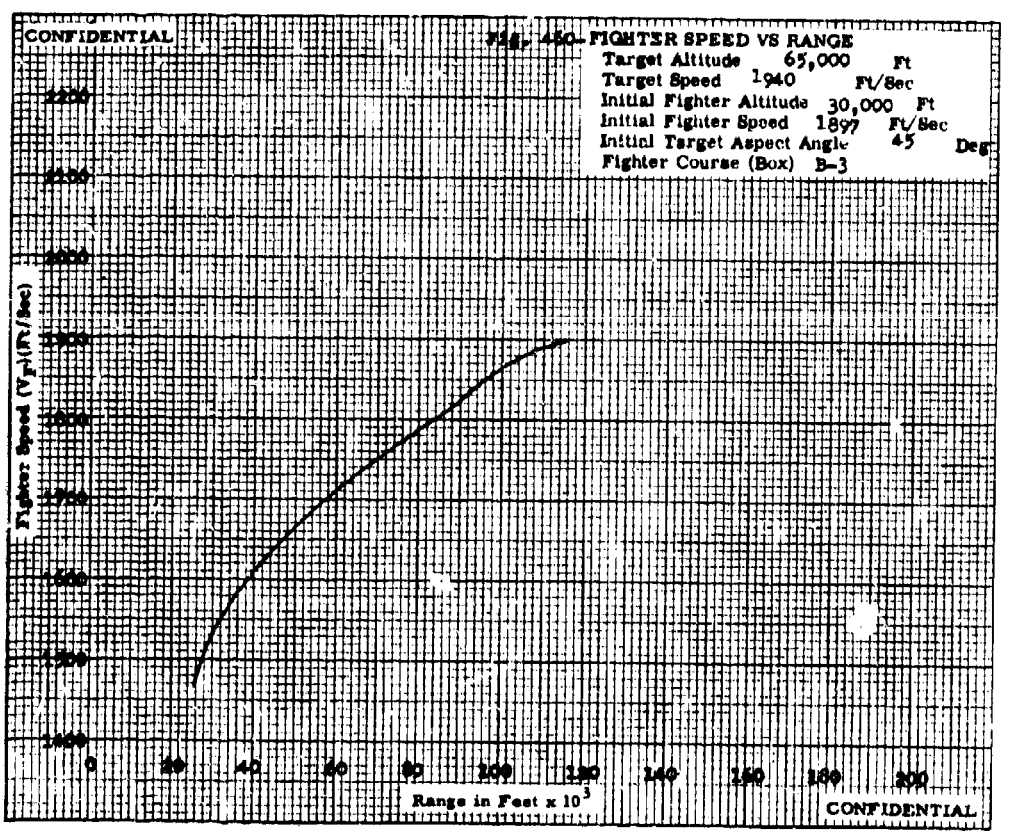


Fig. 460 FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-3



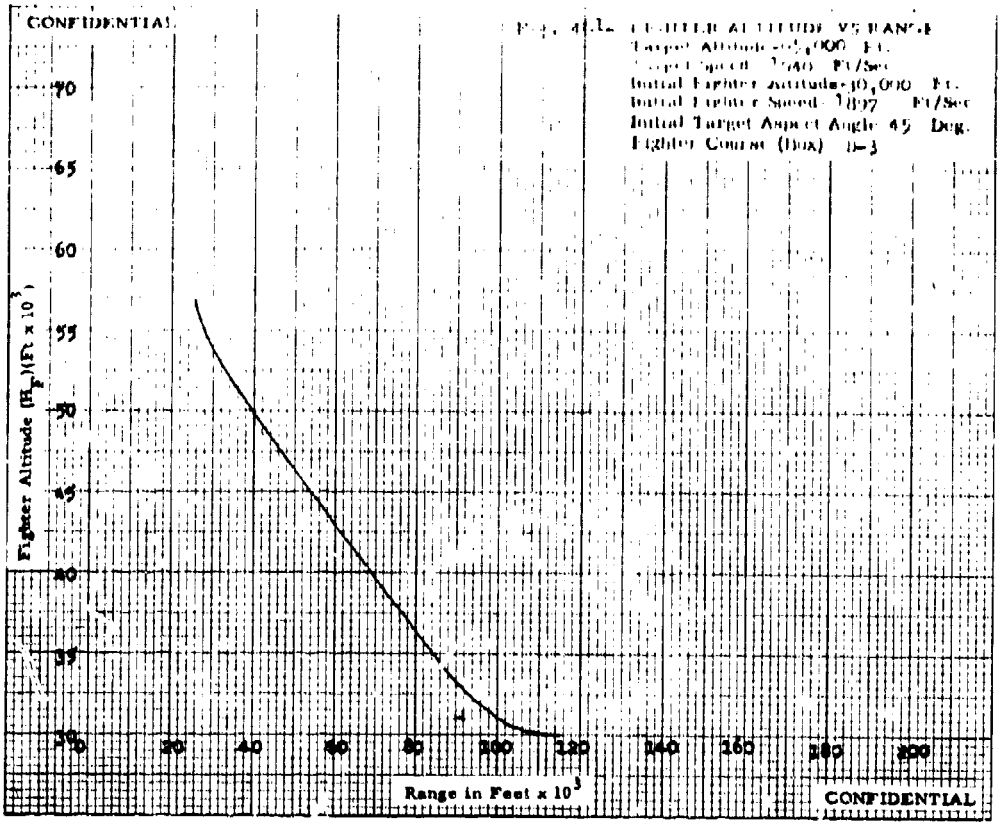


Fig. 4b. FIGHTER ALTITUDE VS RANGE
Target Altitude- 65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000 Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3

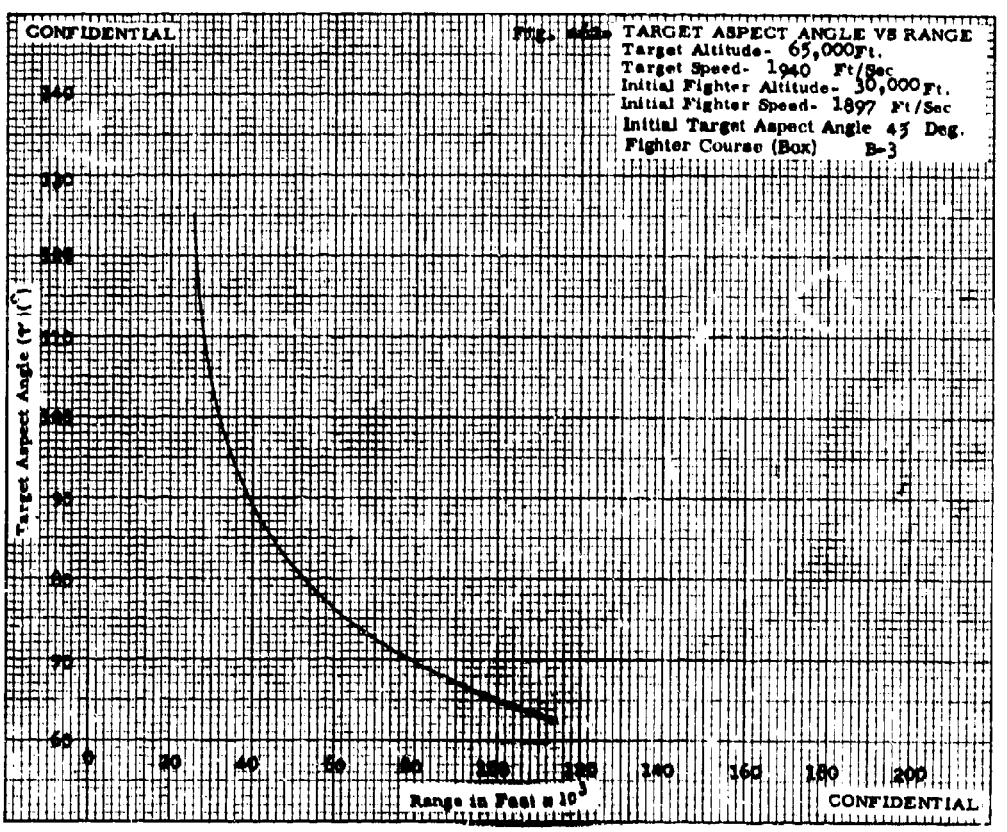
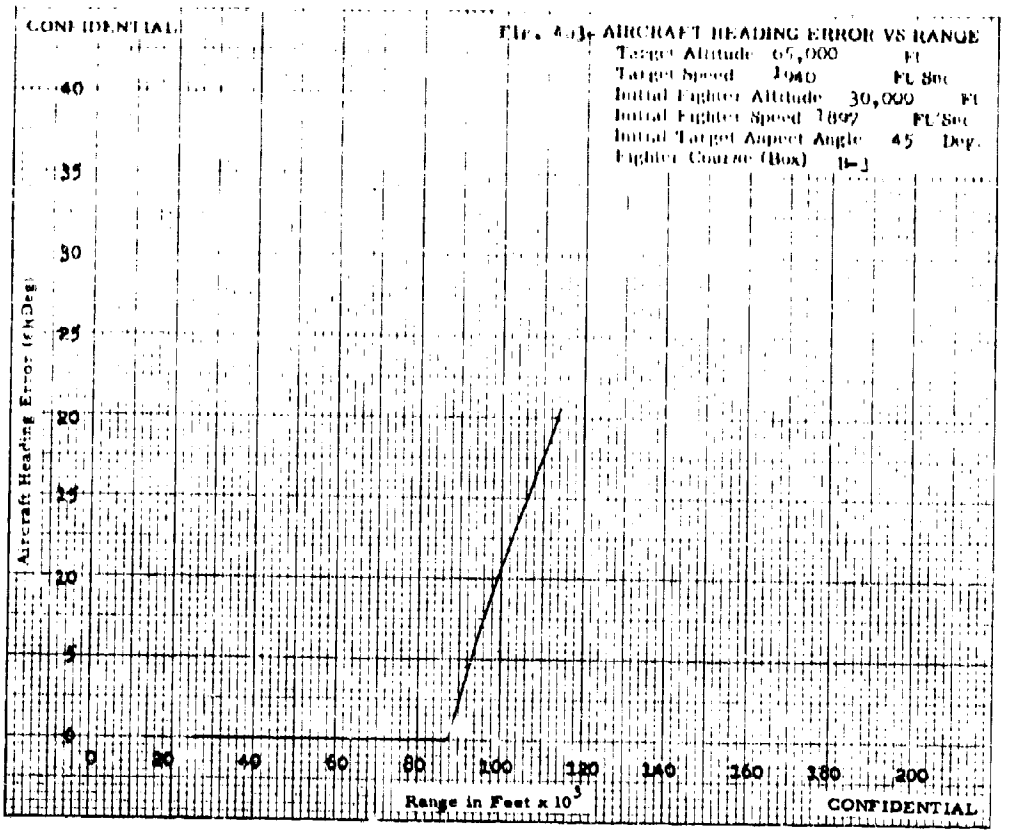
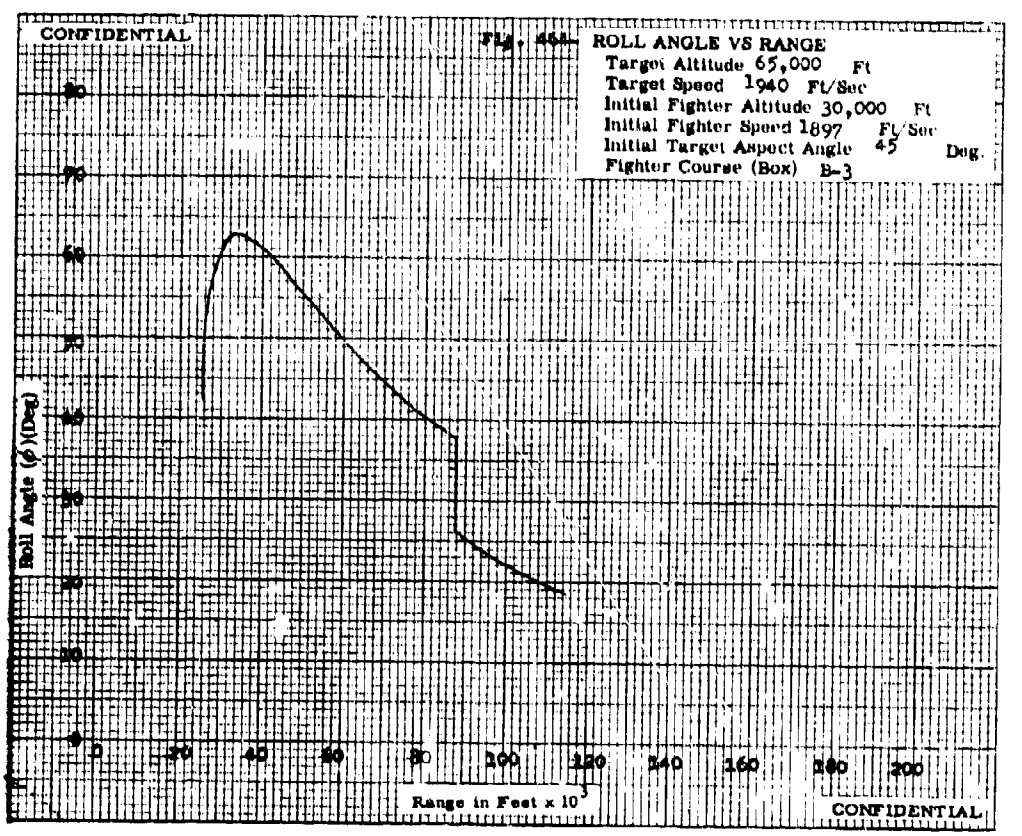


Fig. 4c. TARGET ASPECT ANGLE VS RANGE
Target Altitude- 65,000Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 30,000Ft.
Initial Fighter Speed- 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3


CONFIDENTIAL
Fig. 463 AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3
Aircraft Heading Error (ε) (Deg)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 464 ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 30,000 Ft
Initial Fighter Speed 1897 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-3
Roll Angle (φ) (Deg)
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

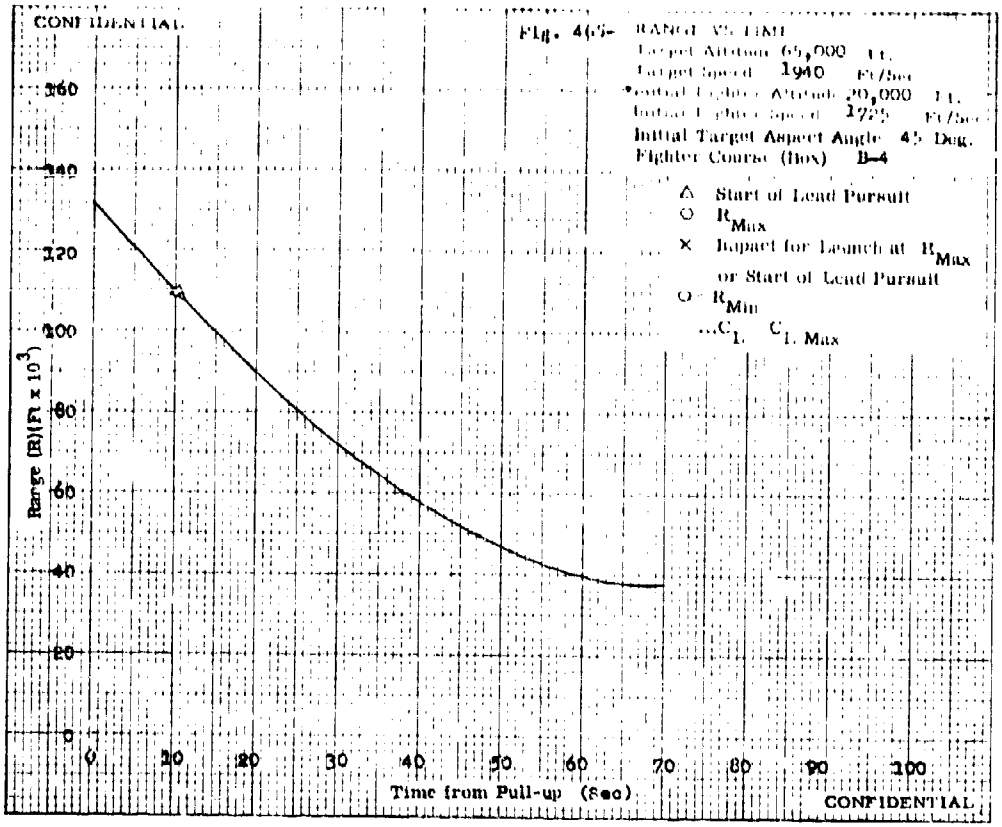


Fig. 465- RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
△ Start of Lead Pursuit
○ R_{Max}
× Impact for Launch at R_{Max} or Start of Lead Pursuit
○ R_{Min}
...C_L $C_{L\ Max}$
Range (R)(Ft x 10^3)
Time from Pull-up (Sec)
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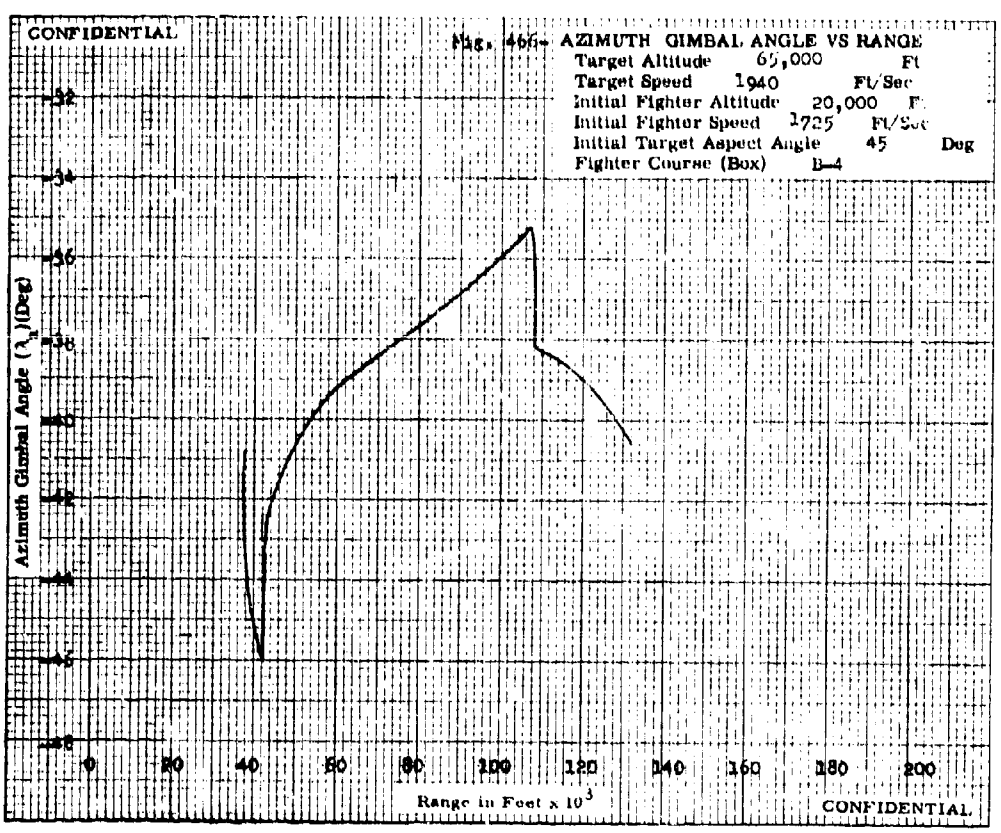
CONFIDENTIAL
Fig. 466- AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-4
Azimuth Gimbal Angle (λ_a)(Deg)
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 467 – ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940Ft/Sec
Initial Fighter Altitude-20,000Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4

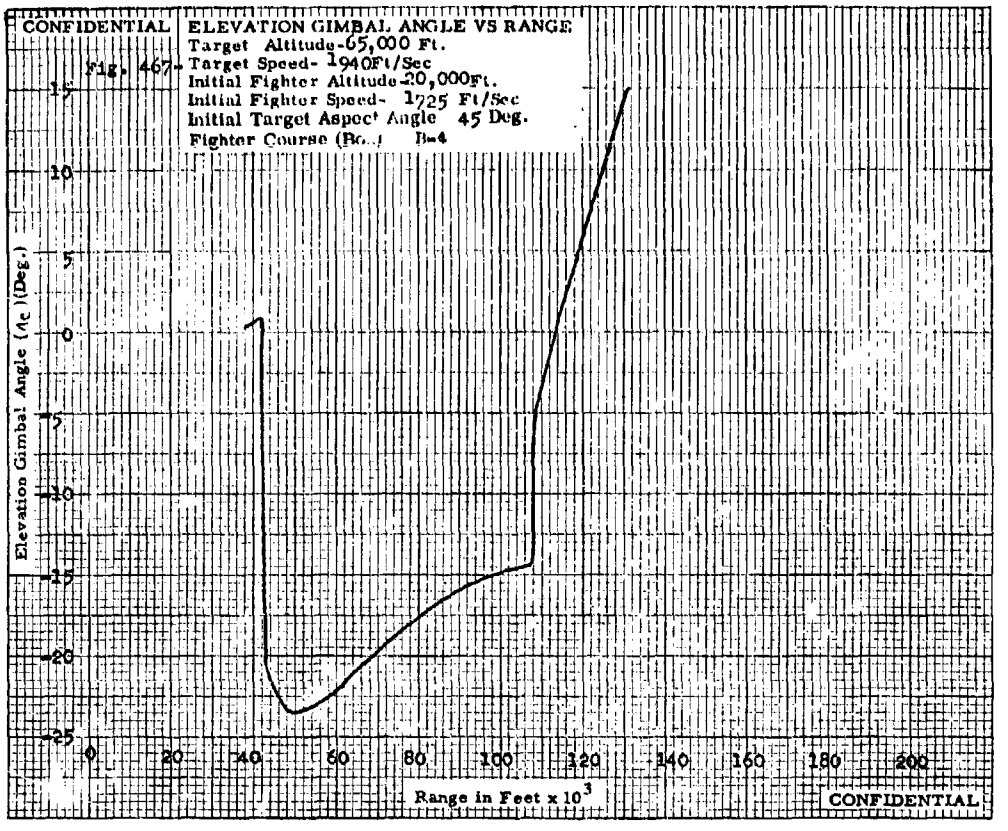

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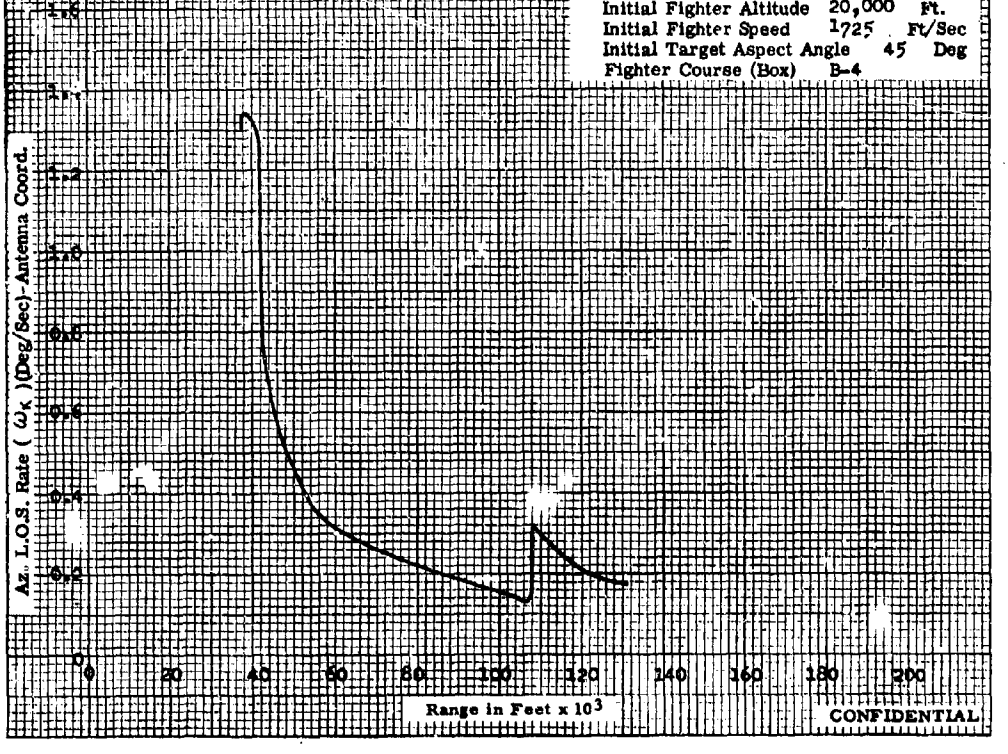
Fig. 468 – AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-4



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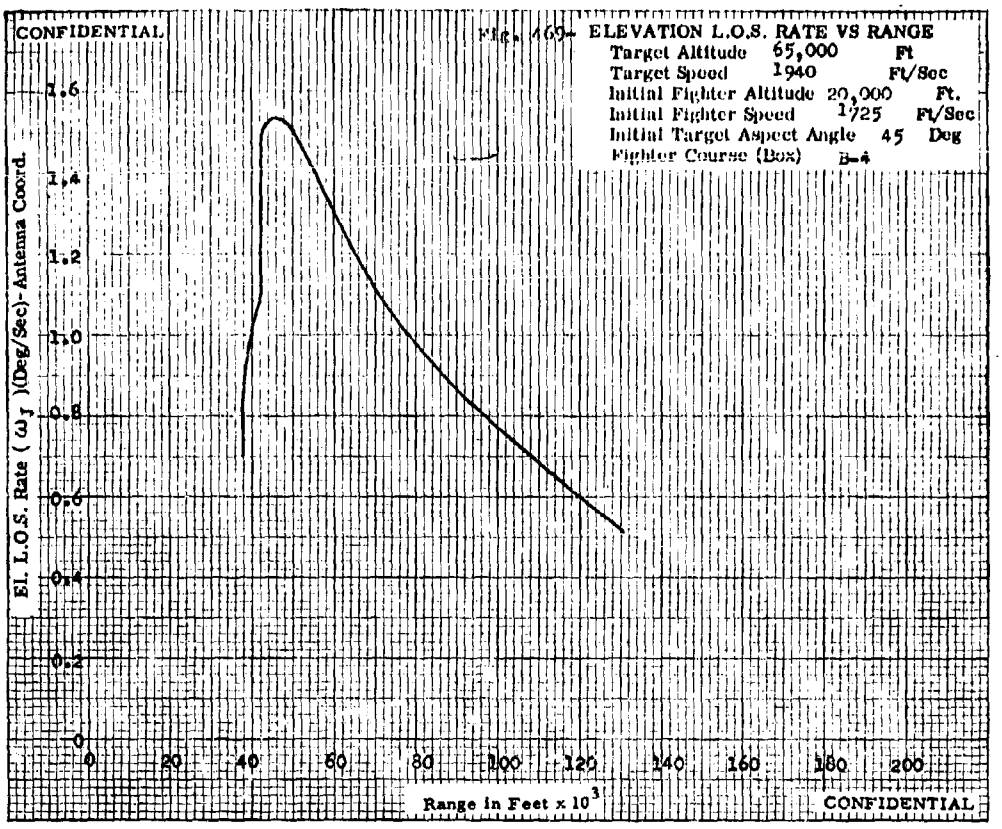
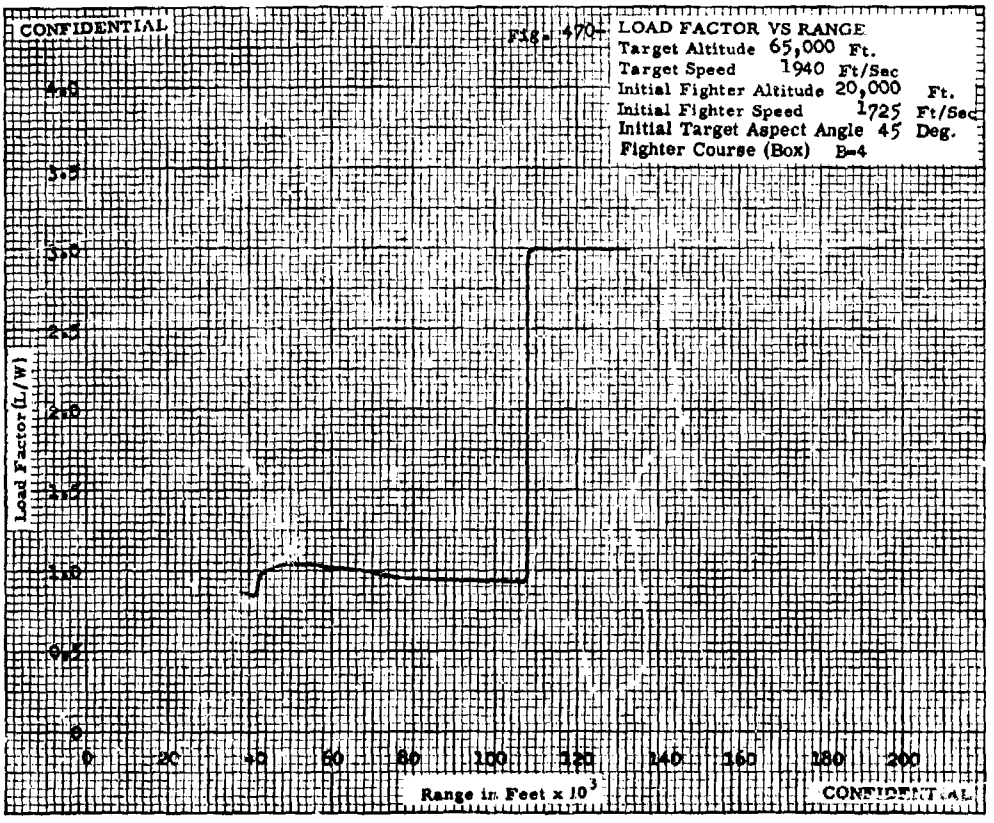

CONFIDENTIAL
Fig. 469- ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-4
El. L.O.S. Rate (ω_f)(Deg/Sec)-Antenna Coord.
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0
0 20 40 60 80 100 120 140 160 180 200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 470- LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
Load Factor (L/W)
4.0
3.0
2.0
1.0
0.2
0
0 20 40 60 80 100 120 140 160 180 200
Range in Feet x 10^3
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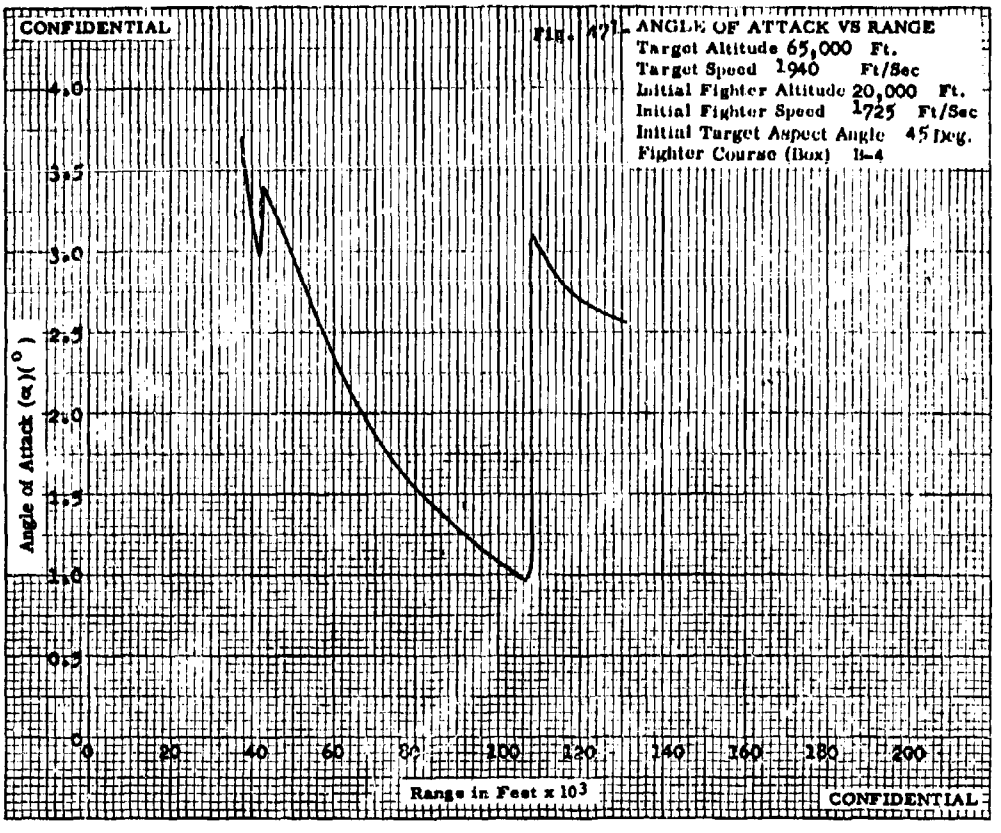
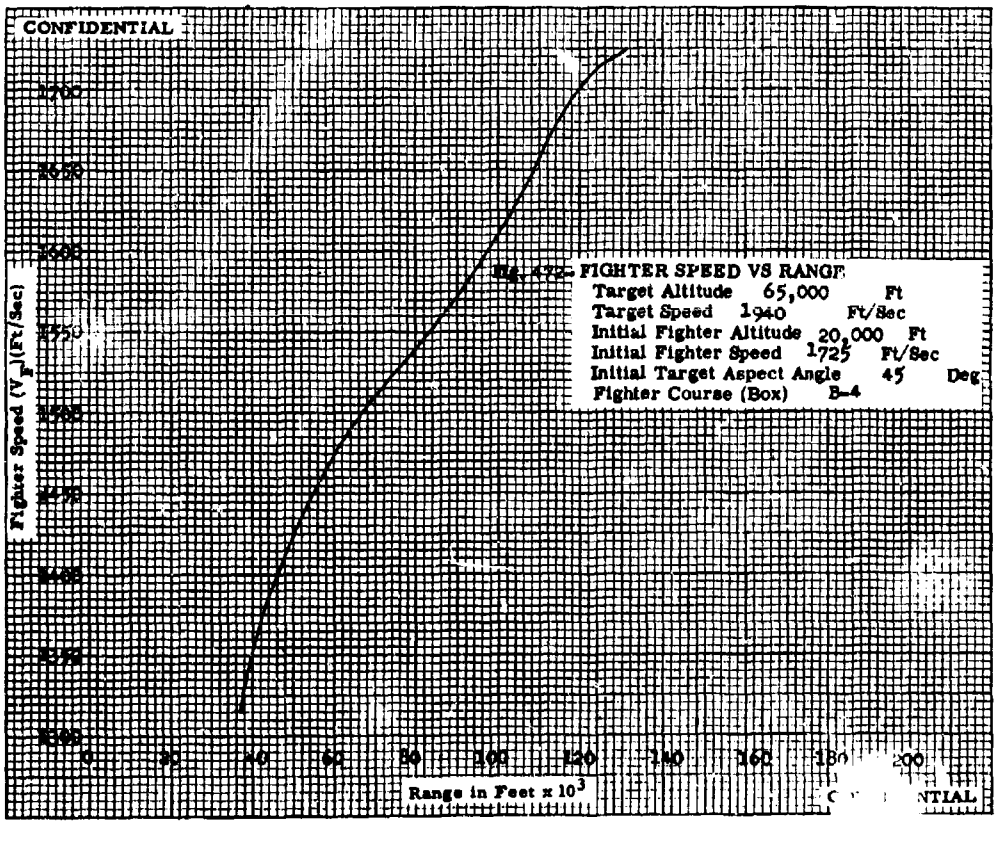
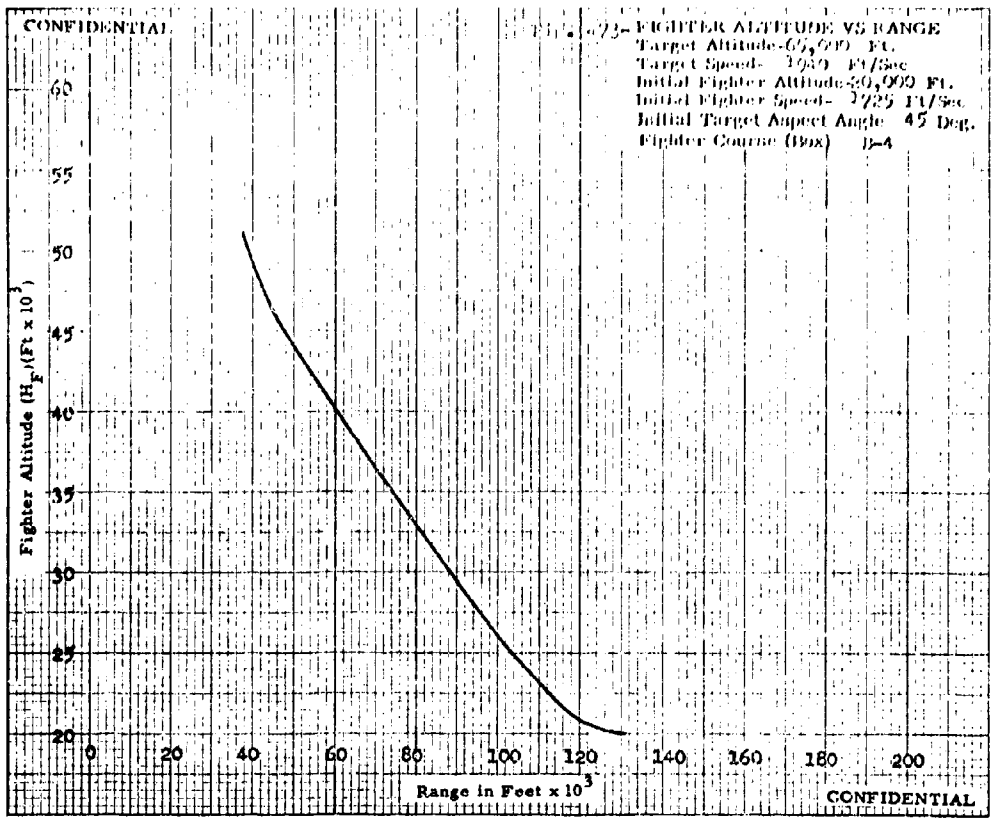
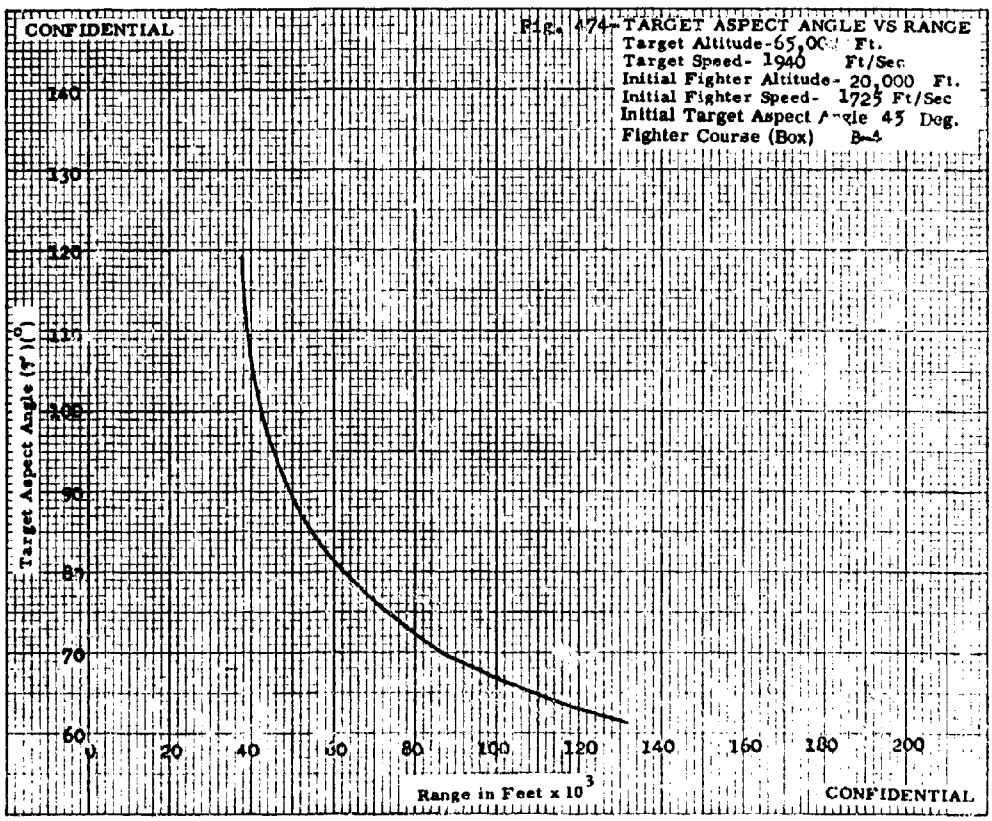
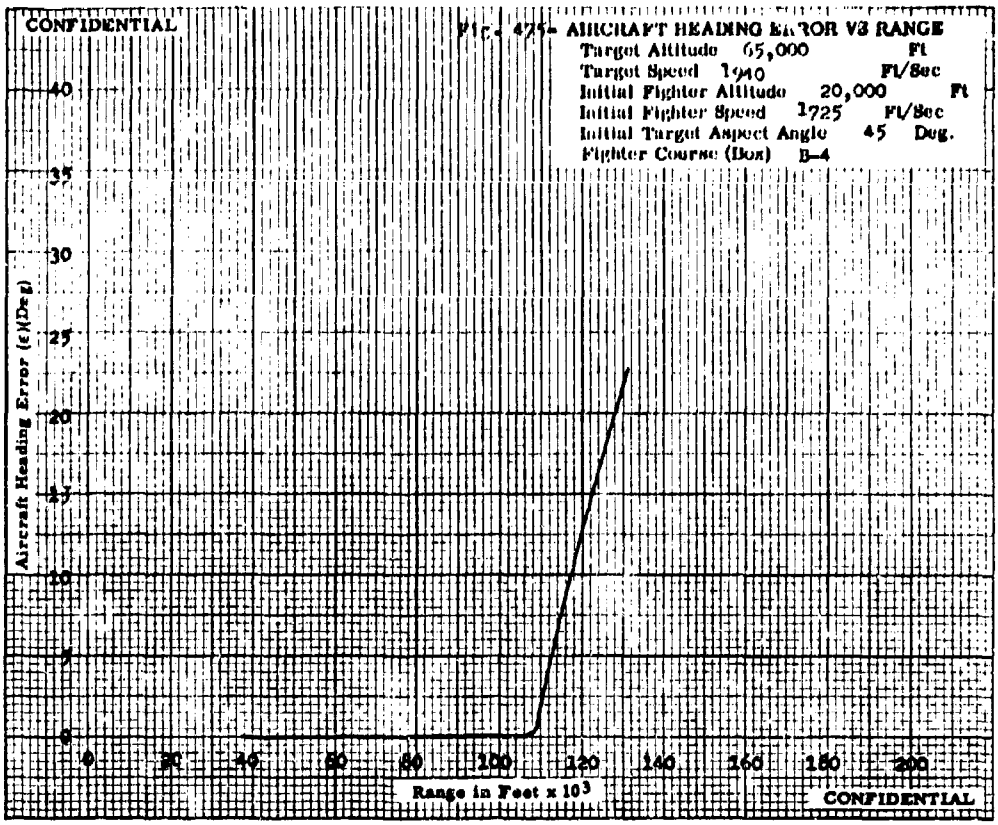
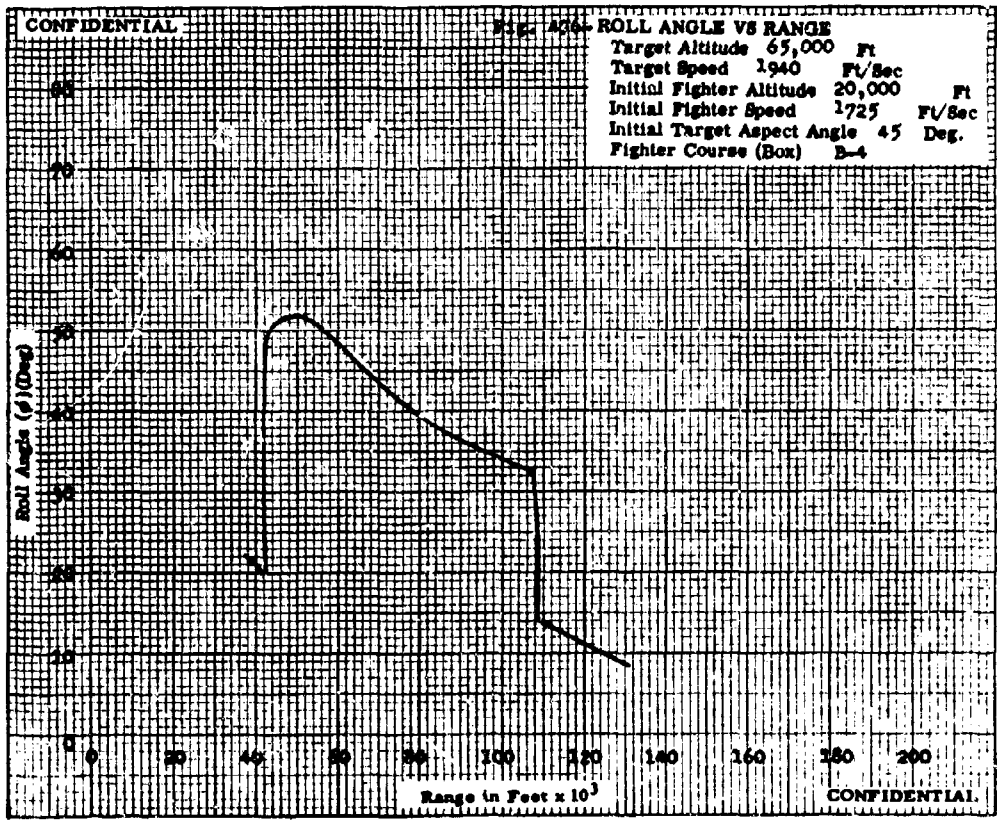

CONFIDENTIAL
Fig. 471 – ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
Angle of Attack (α)(°)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 472 – FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) B-4
Fighter Speed (V_F)(Ft/Sec)
1700
1650
1600
1550
1500
1450
1400
1350
1300
1250
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³


CONFIDENTIAL
Fig. 473- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
Fighter Altitude (H_F)(Ft x 10^3)
60
55
50
45
40
35
30
25
20
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 474- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
Target Aspect Angle (T^A)(°)
130
120
110
100
90
80
70
60
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 425- AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
Aircraft Heading Error (ε)(Deg)
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
Fig. 426- ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) B-4
Roll Angle (φ)(Deg)
80
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL

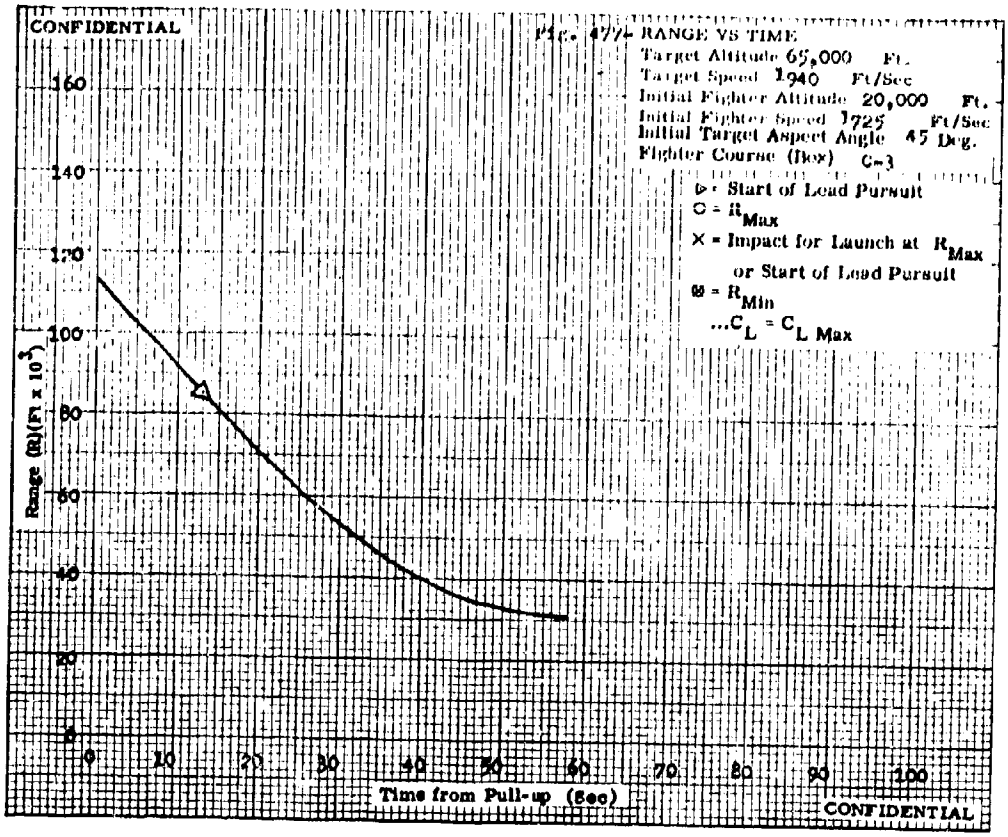


FIG. 477 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3

▷ = Start of Lead Pursuit
○ = R_{Max}
× = Impact for Launch at R_{Max} or Start of Lead Pursuit
⊠ = R_{Min}
...$C_L = C_{L\ Max}$

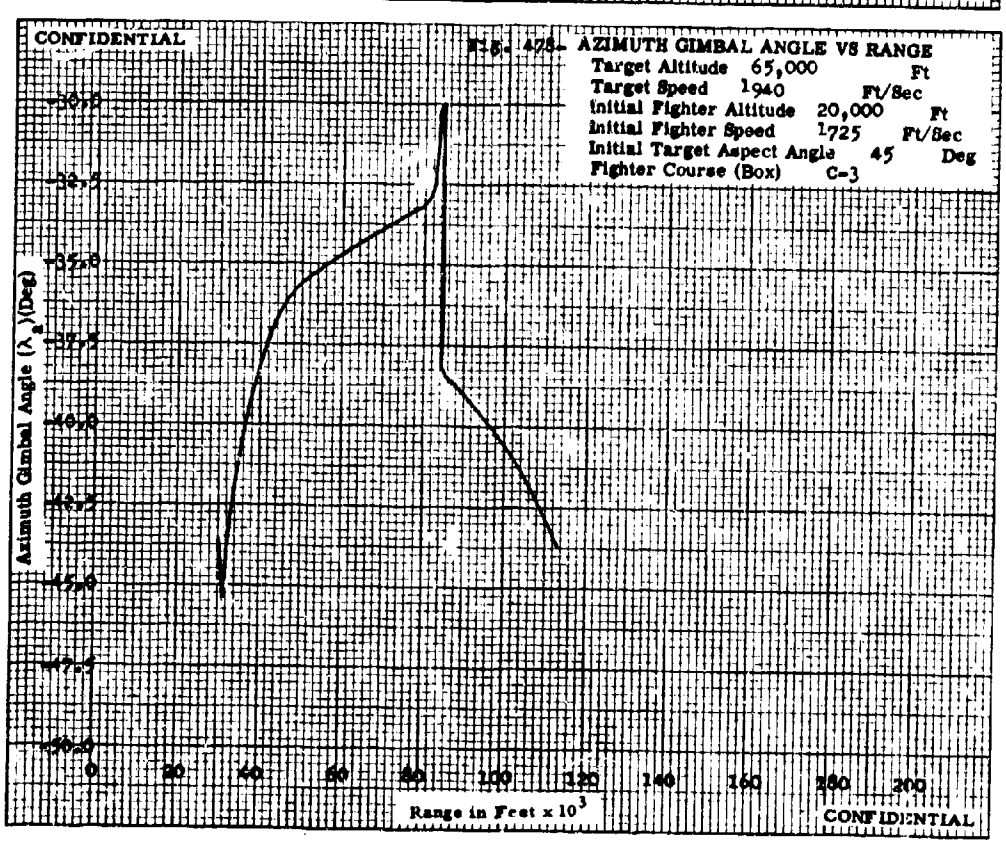
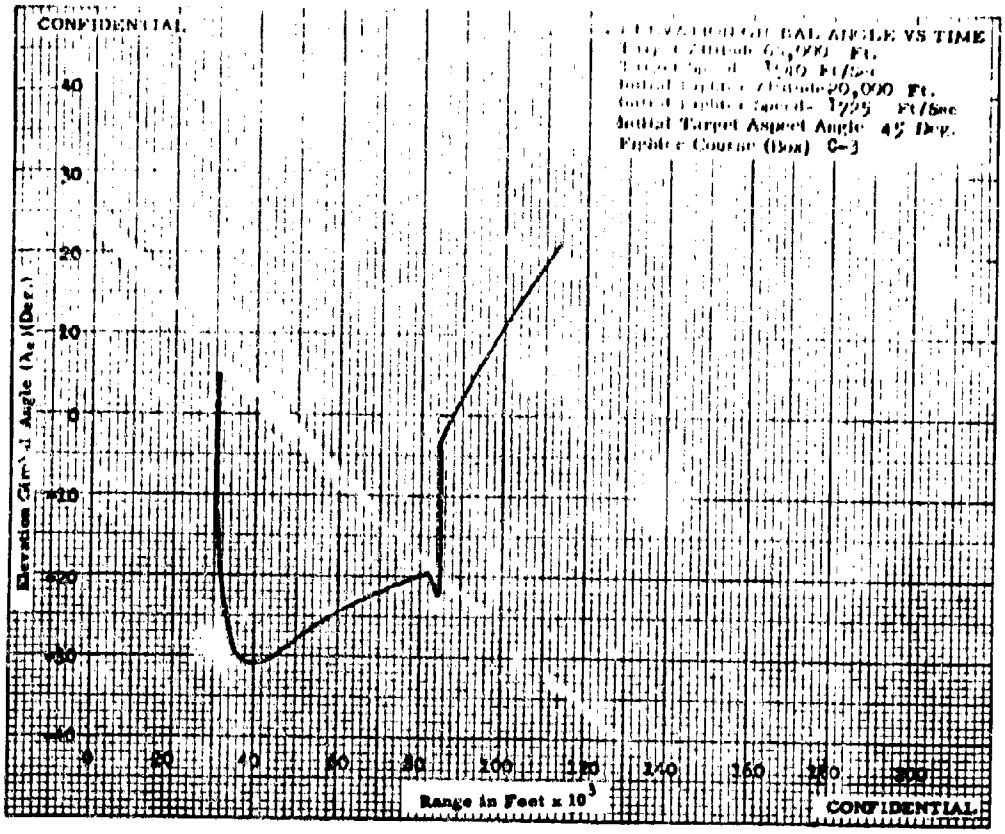


FIG. 478 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) C-3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Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3
Range in Feet x 10³
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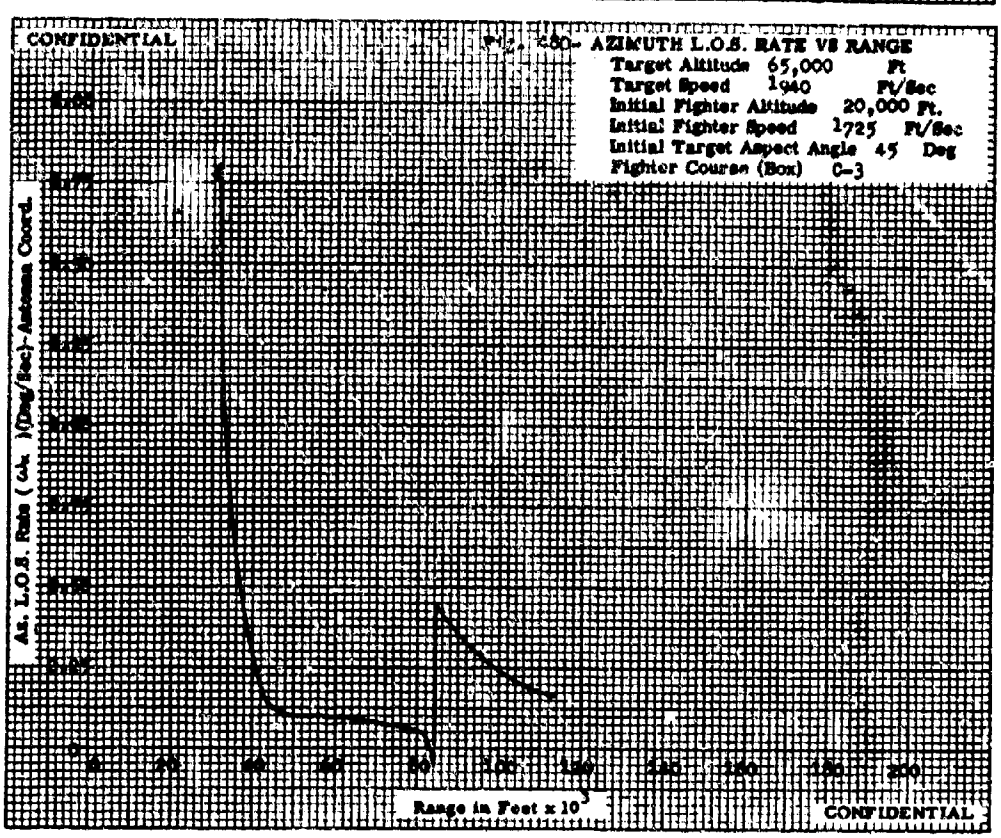
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Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) C-3
Range in Feet x 10³
CONFIDENTIAL

CONFIDENTIAL

Fig. 48 ELEVATION L.O.S. RATE VS RANGE

Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) C-3

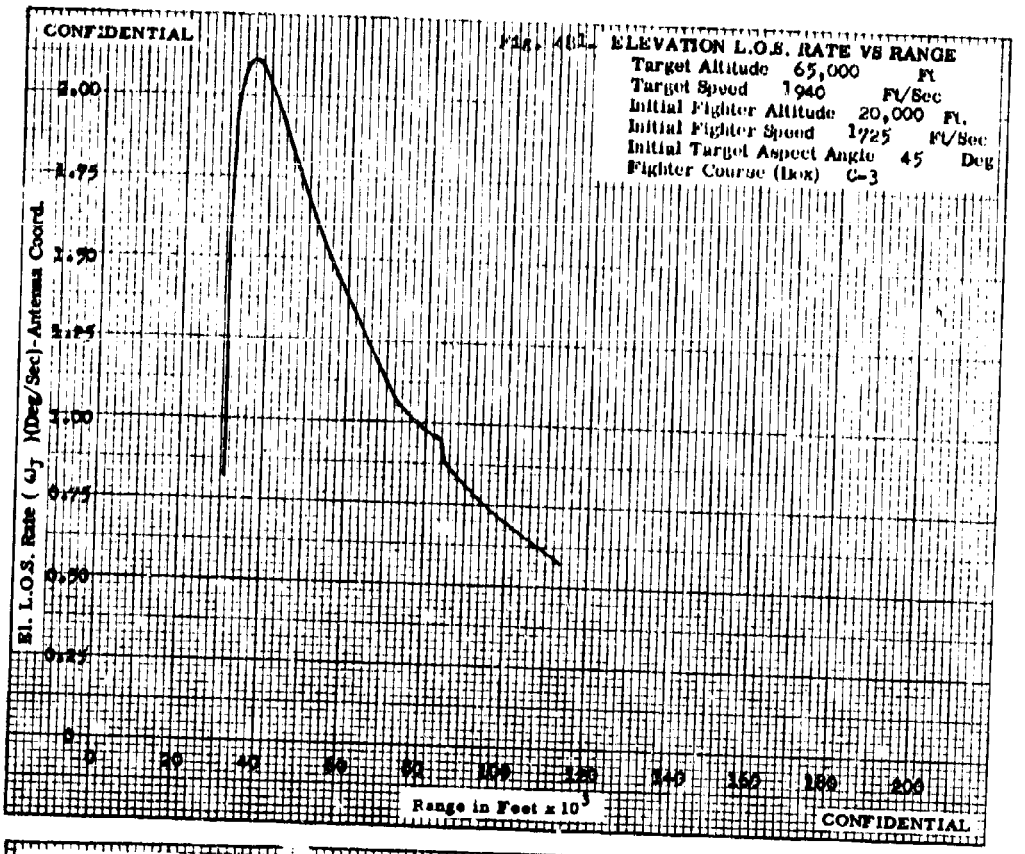

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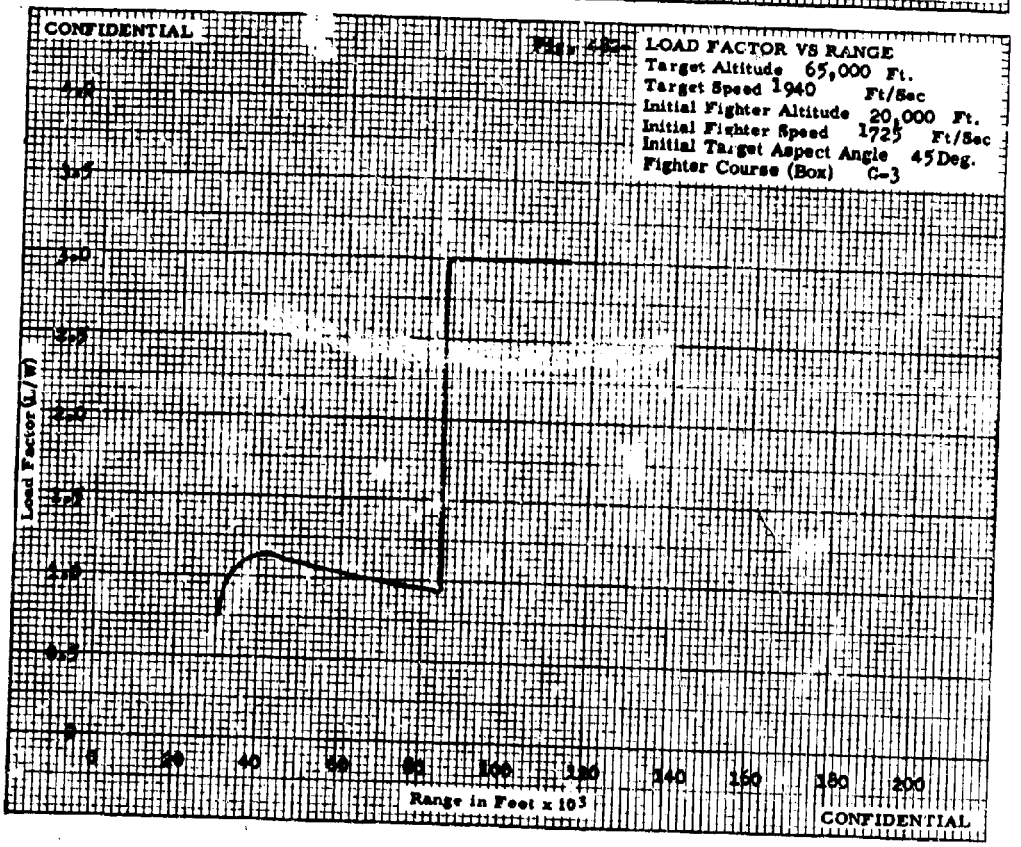
Fig. 49 LOAD FACTOR VS RANGE

Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3



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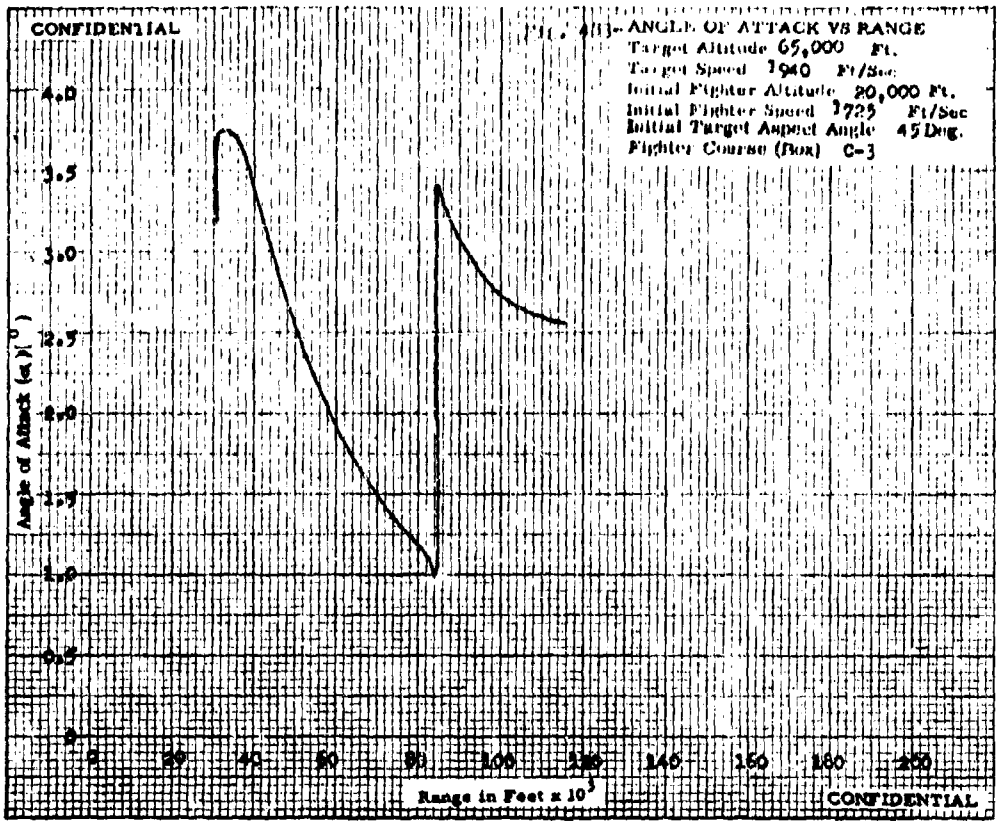
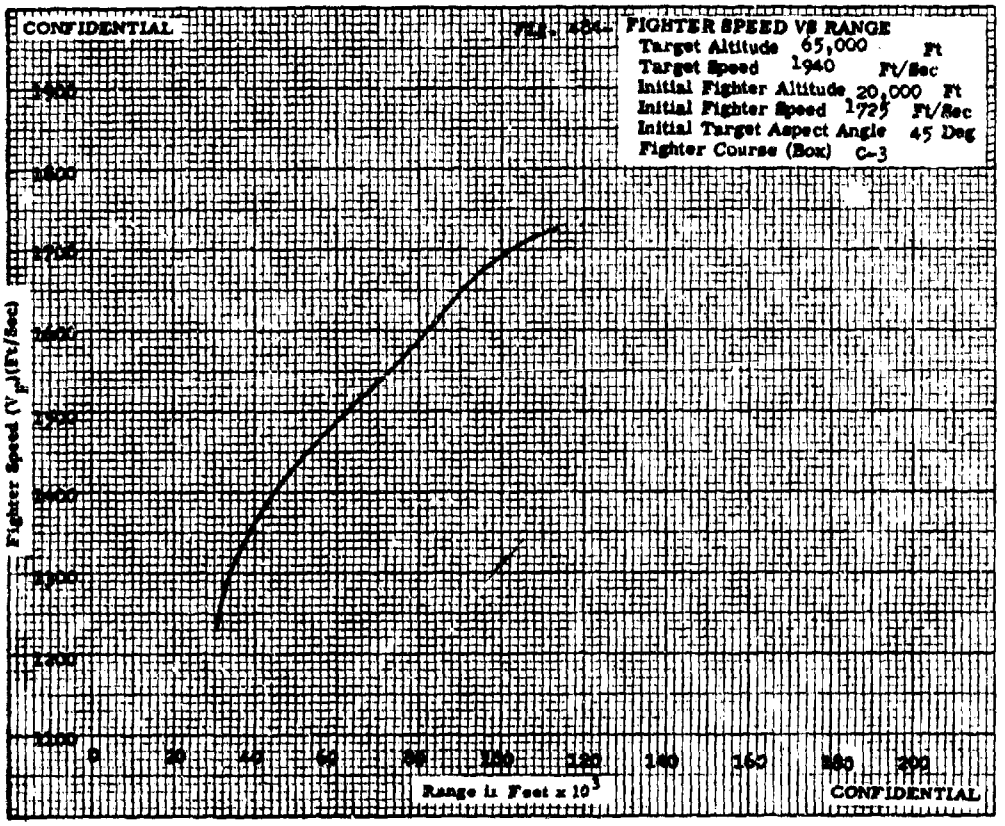

CONFIDENTIAL
ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3
Angle of Attack (α)(°)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
CONFIDENTIAL


CONFIDENTIAL
FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) C-3
Fighter Speed (V_F)(Ft/Sec)
1900
1800
1700
1600
1500
1400
1300
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10³
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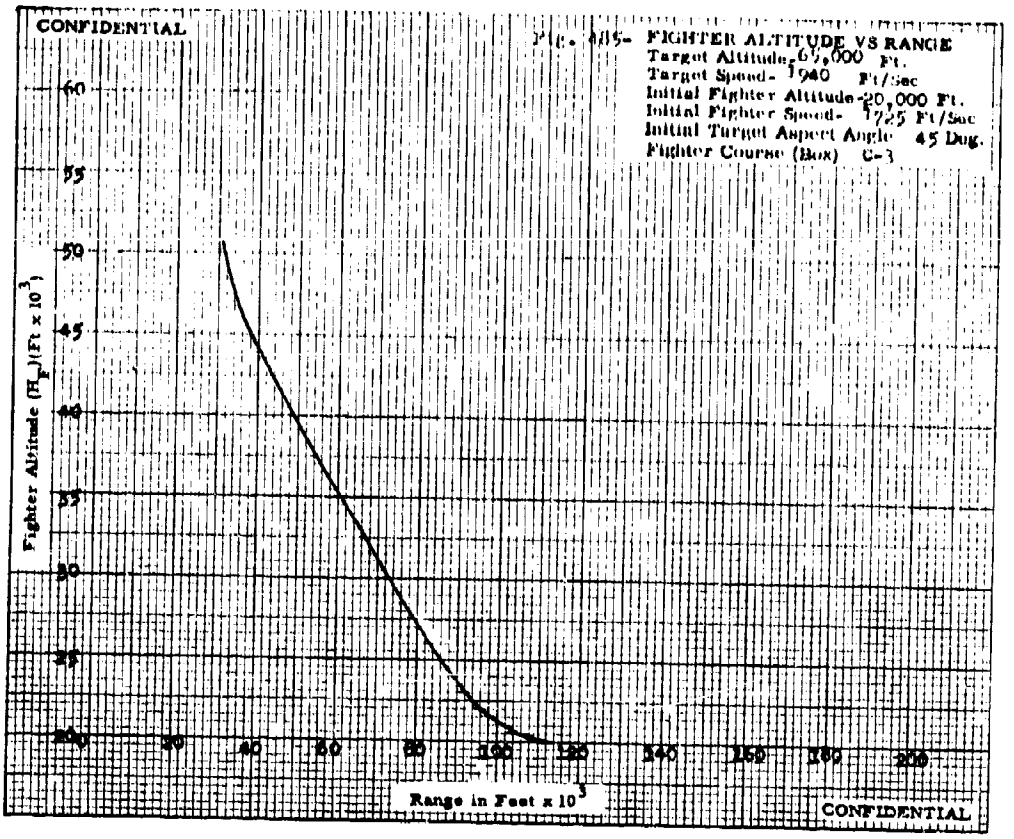
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Fig. 455- FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3
Fighter Altitude (H_F)(Ft x 10^3)
60
55
50
45
40
35
30
25
20
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
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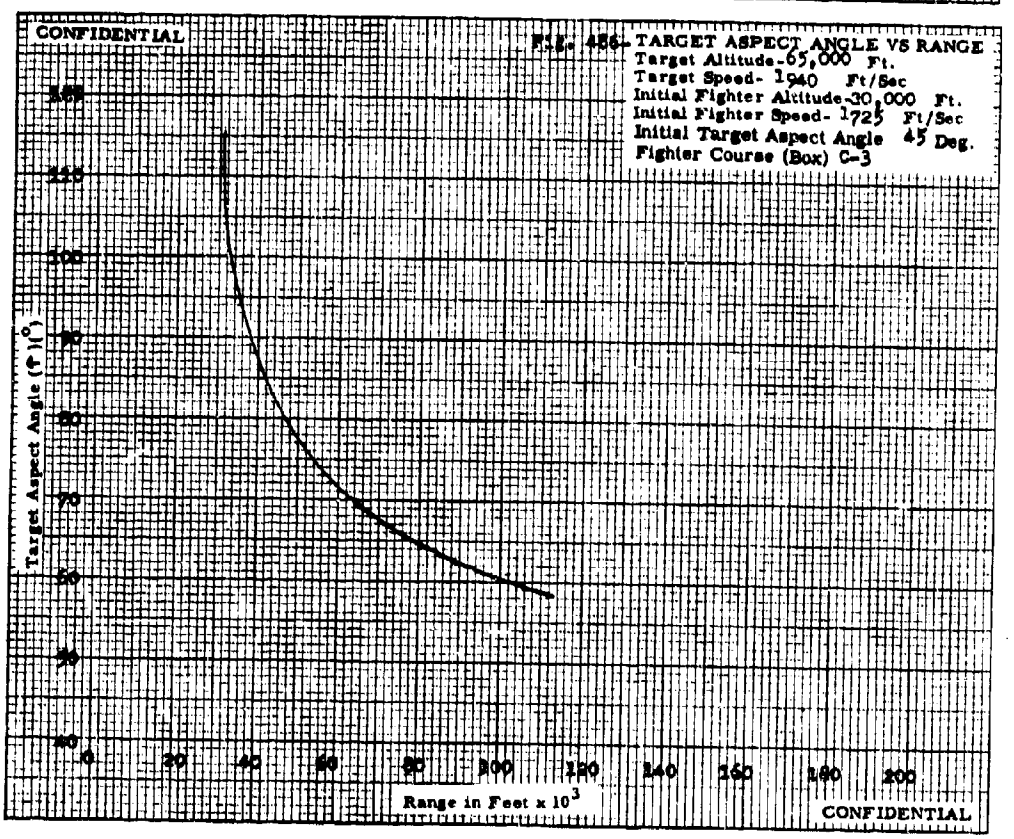
CONFIDENTIAL
Fig. 456- TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-30,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3
Target Aspect Angle (Ψ_T)(°)
110
100
90
80
70
60
50
40
0
20
40
60
80
100
120
140
160
180
200
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 487. AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3

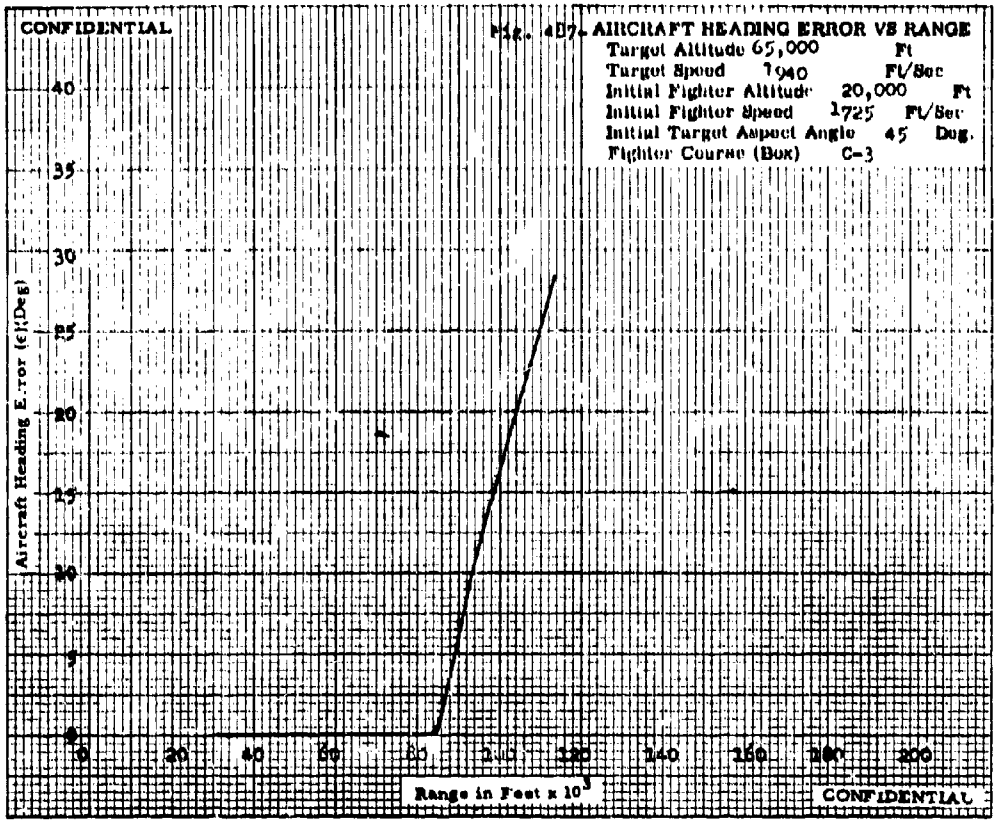

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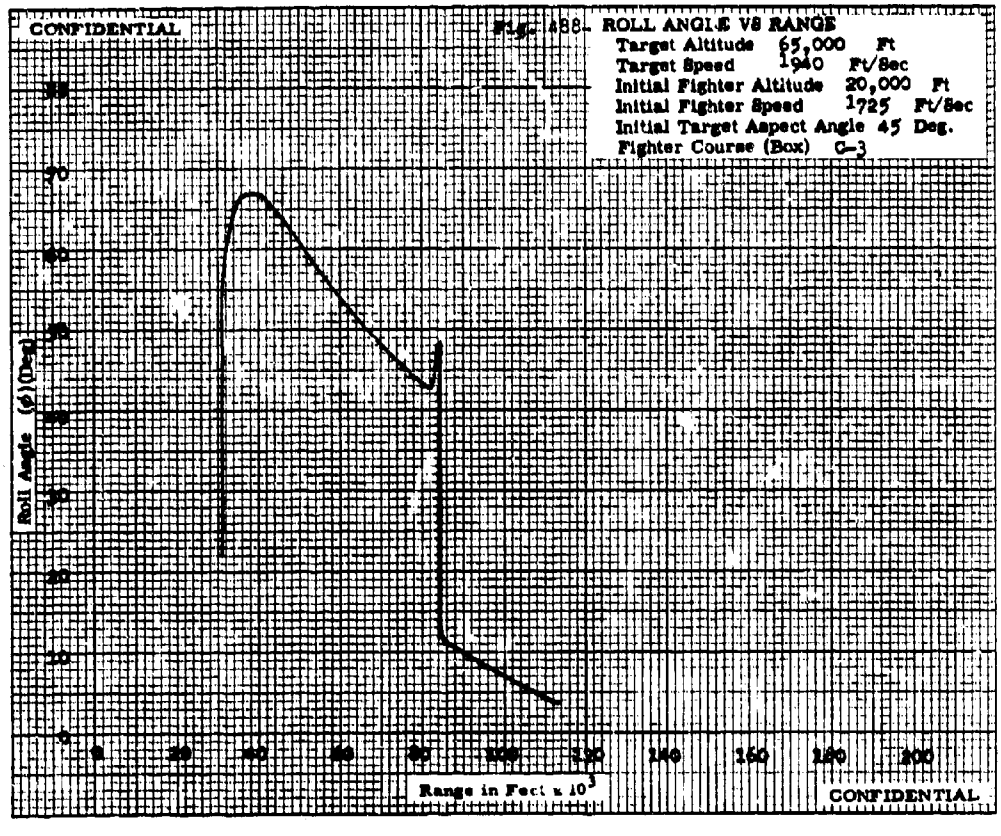
Fig. 488. ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) C-3



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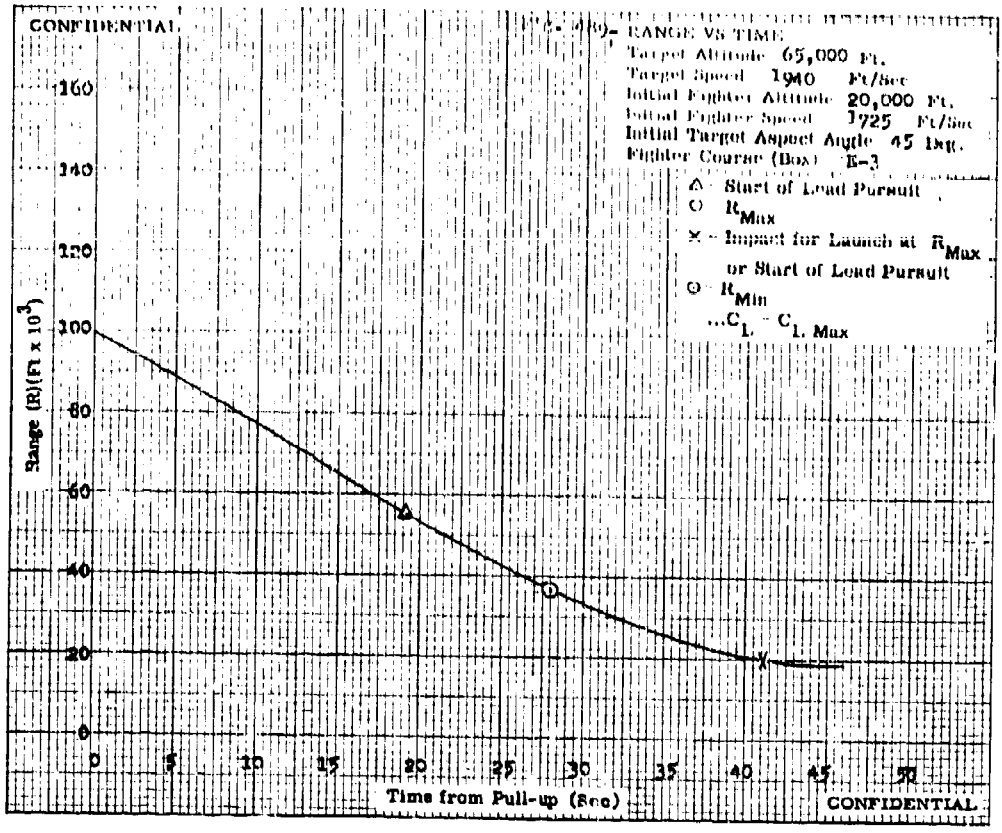

FIG. 4-6 - RANGE VS TIME
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
△ Start of Lead Pursuit
○ R_{Max}
✕ - Impact for Launch at R_{Max} or Start of Lead Pursuit
⊙ R_{Min}
...C_L - $C_{L\ Max}$

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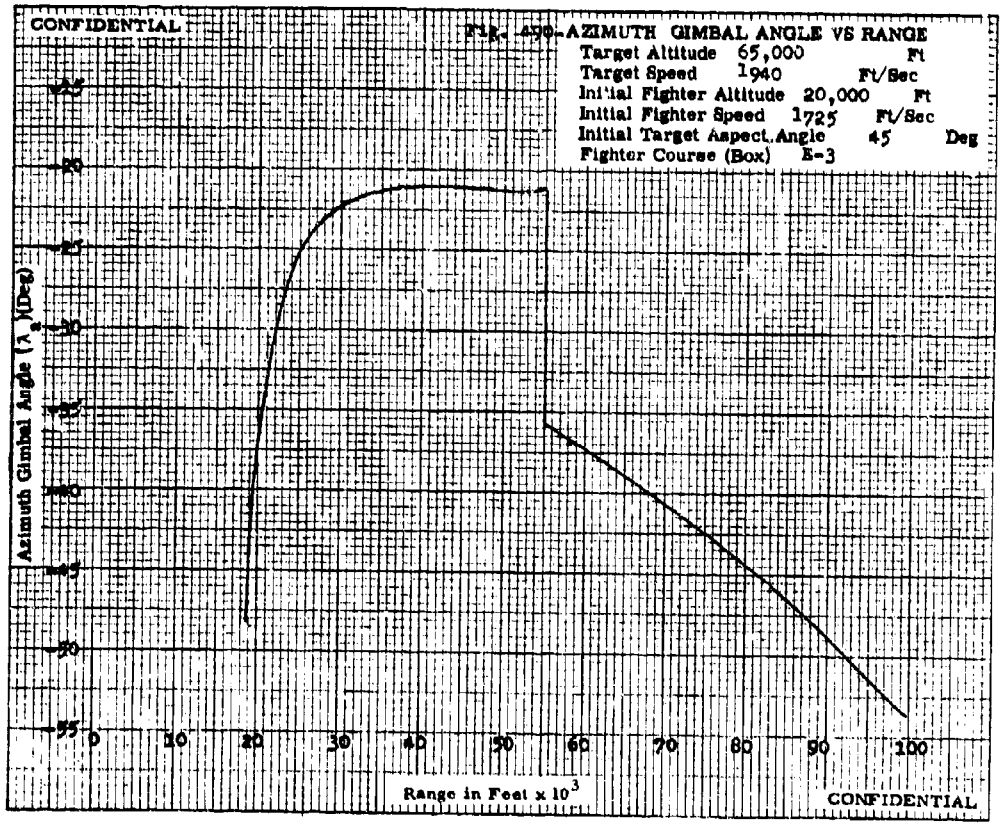
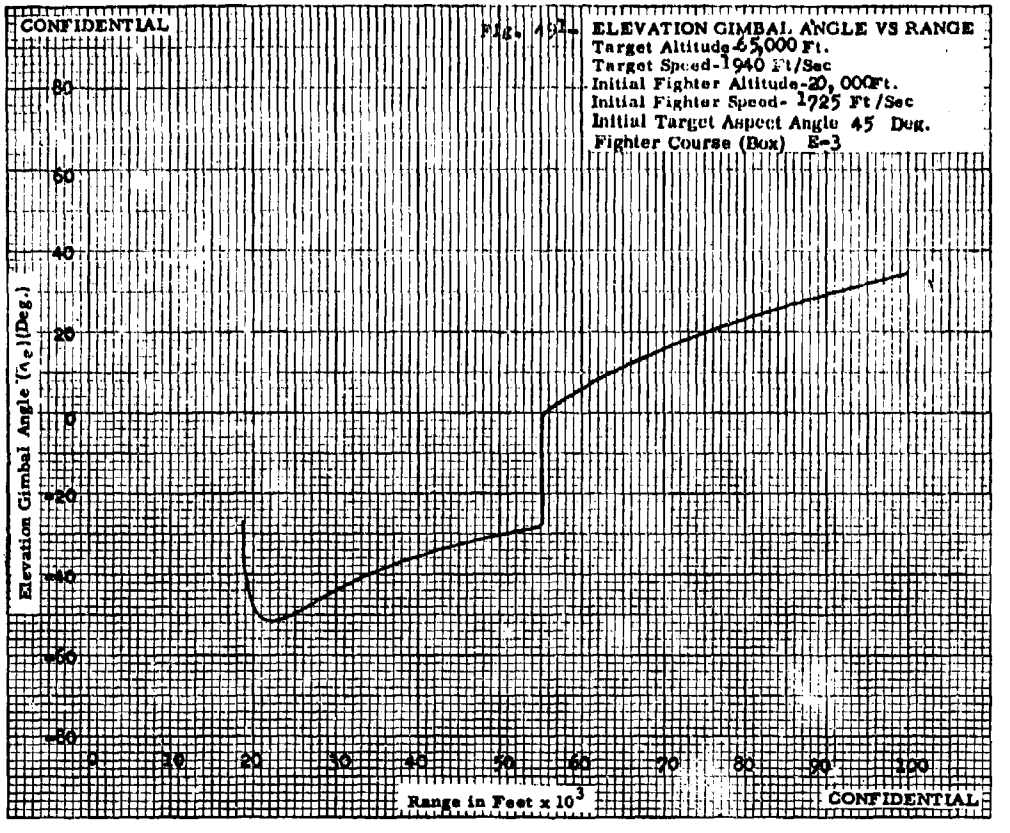
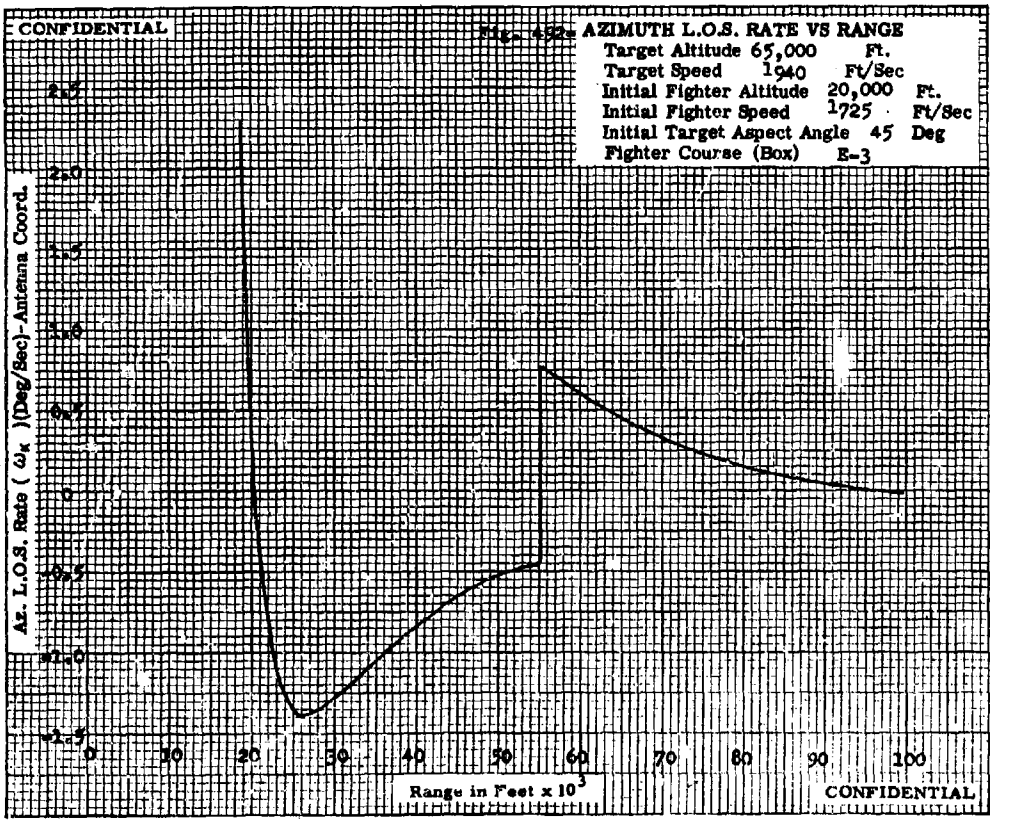


FIG. 4-7 - AZIMUTH GIMBAL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-3


CONFIDENTIAL
Fig. 191
ELEVATION GIMBAL ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed-1940 Ft/Sec
Initial Fighter Altitude-20,000Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
Elevation Gimbal Angle (θe) (Deg.)
80
60
40
20
0
-20
-40
-60
-80
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL


CONFIDENTIAL
Fig. 192
AZIMUTH L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-3
Az. L.O.S. Rate (ωK) (Deg/Sec)-Antenna Coord.
2.5
2.0
1.5
1.0
0.5
0
-0.5
-1.0
-1.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

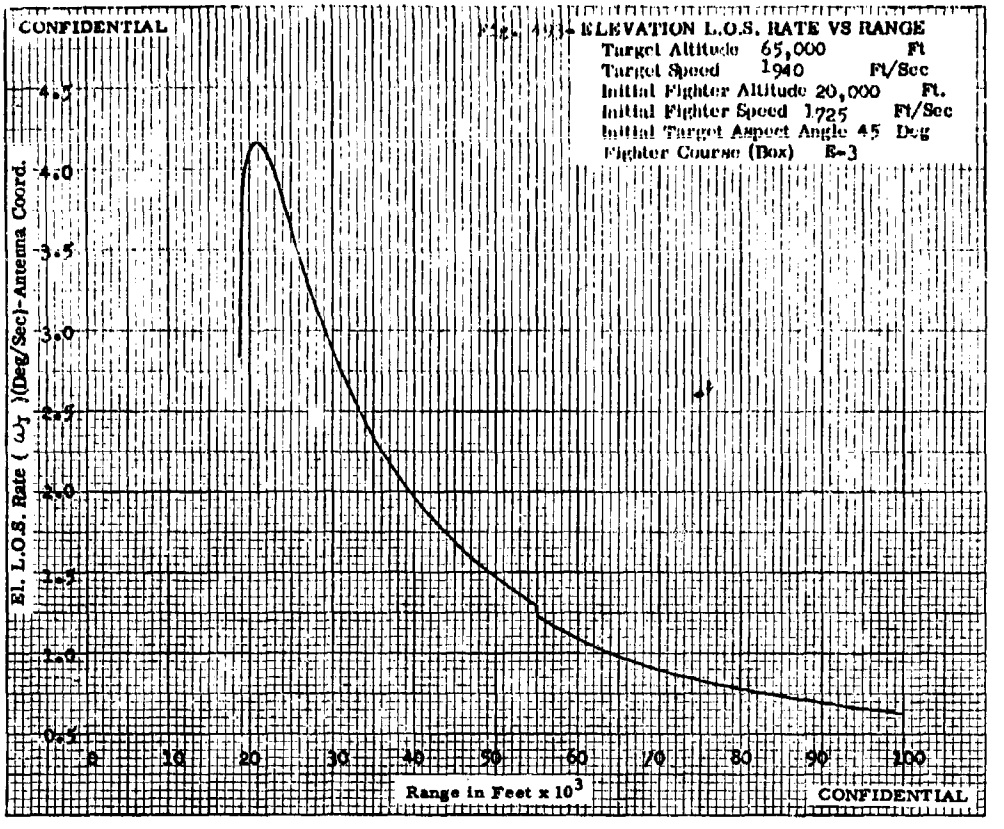

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Fig. 49a - ELEVATION L.O.S. RATE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-3
El. L.O.S. Rate (ω_γ)(Deg/Sec)-Antenna Coord.
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

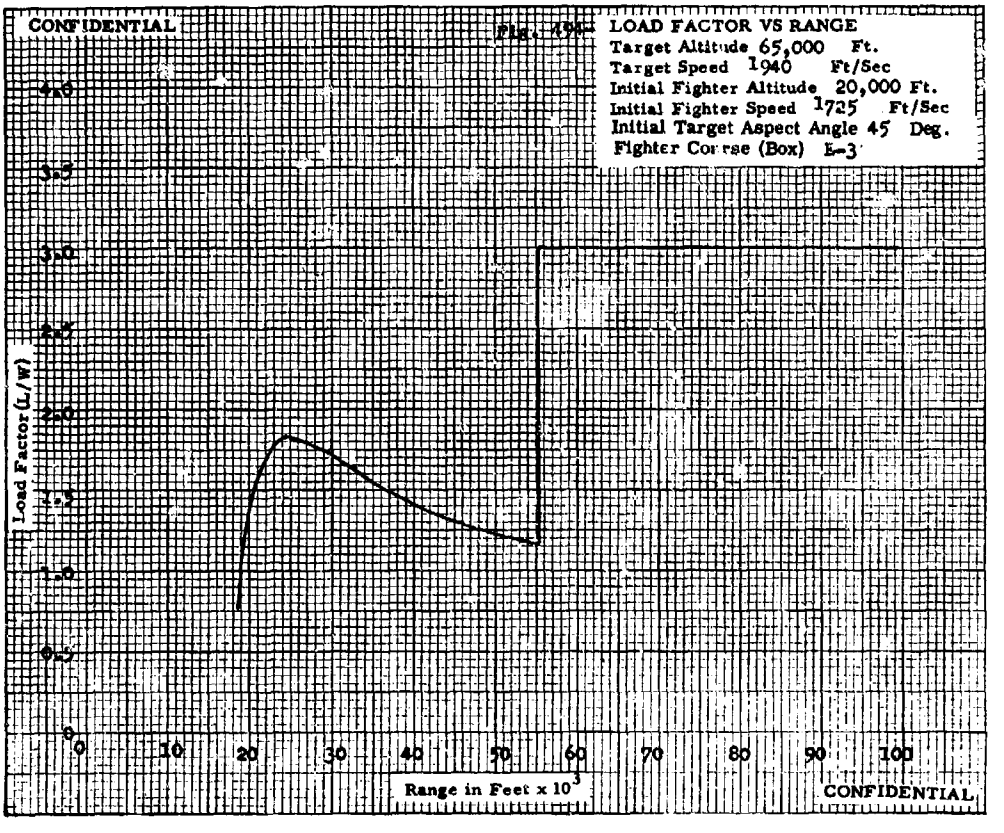
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Fig. 49b - LOAD FACTOR VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
Load Factor (L/W)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
CONFIDENTIAL

CONFIDENTIAL

Fig. 4-25

ANGLE OF ATTACK VS RANGE
Target Altitude 65,000 Ft.
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft.
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3

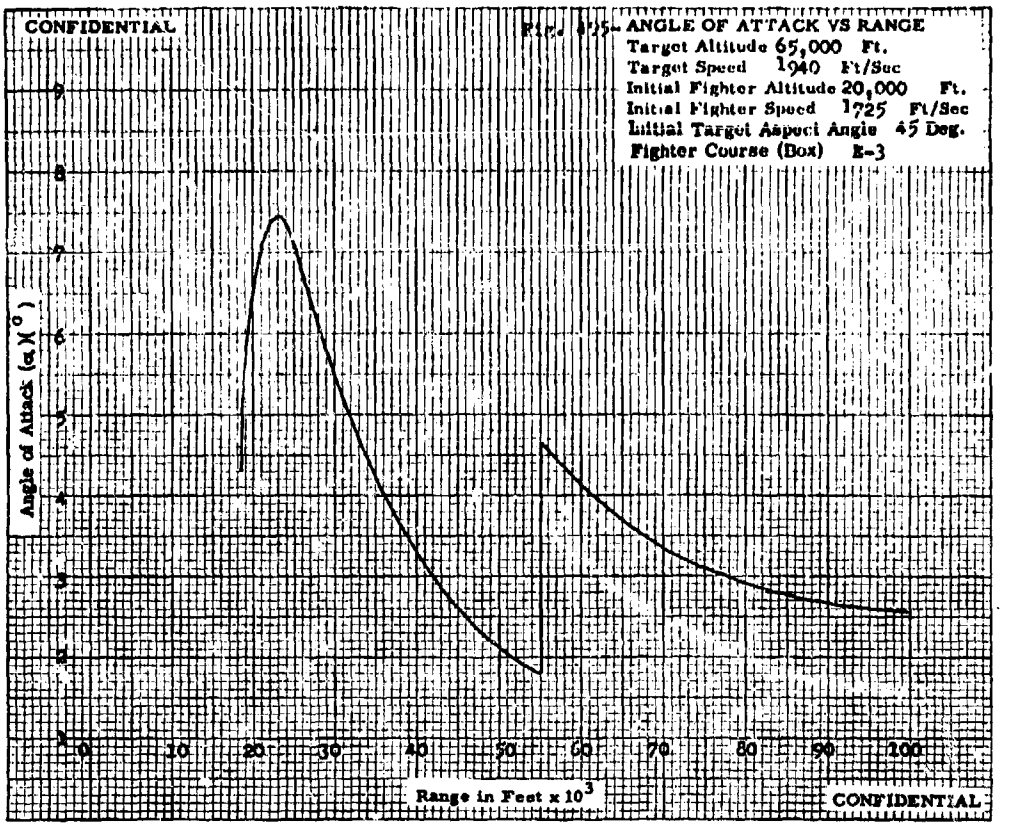

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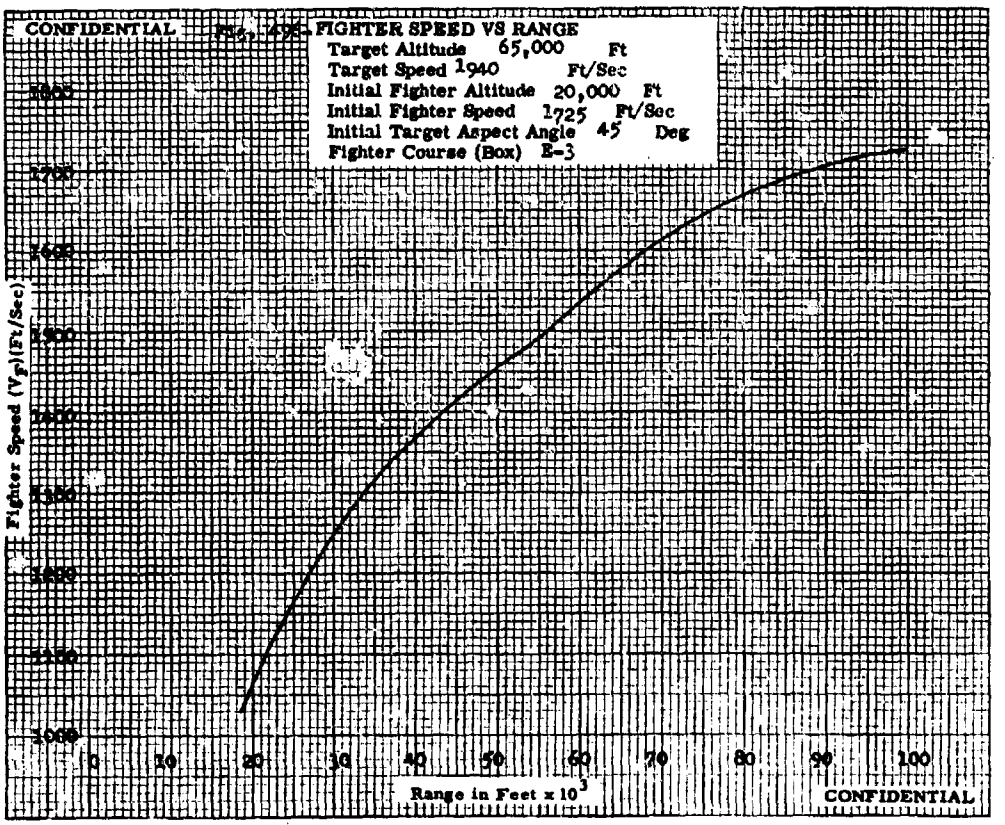
Fig. 4-26

FIGHTER SPEED VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg
Fighter Course (Box) E-3



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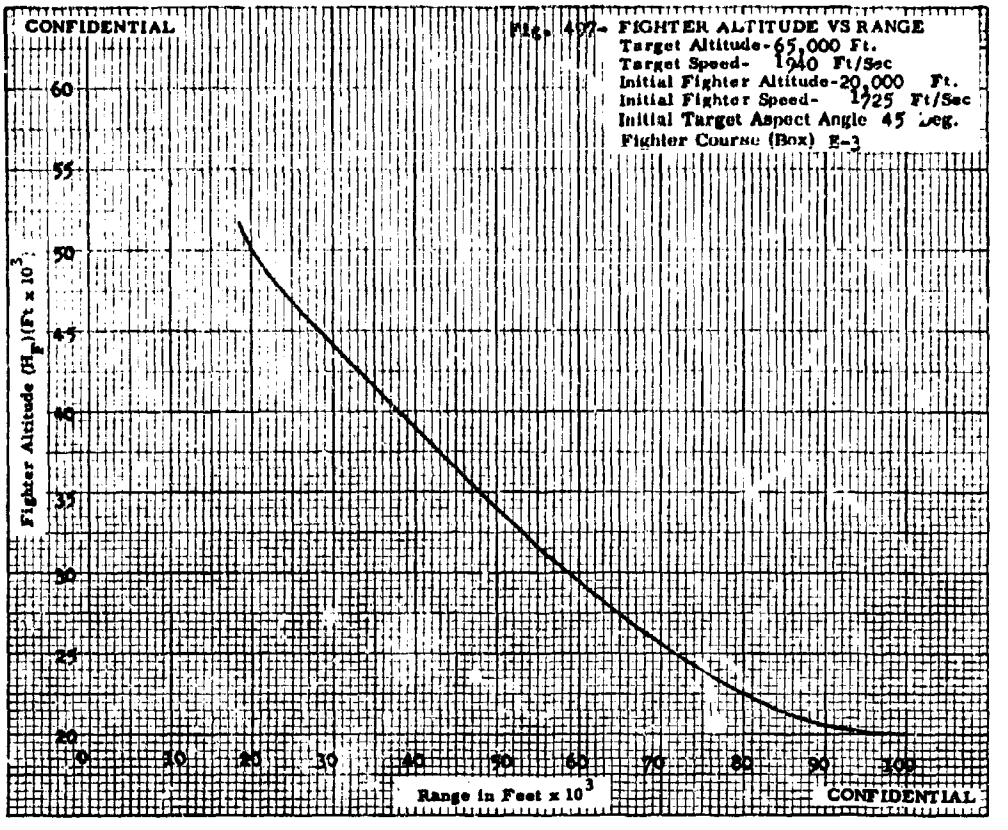
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Fig. 407
FIGHTER ALTITUDE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude-20,000 Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
Fighter Altitude (H_F)(Ft x 10^3)
60
55
50
45
40
35
30
25
20
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
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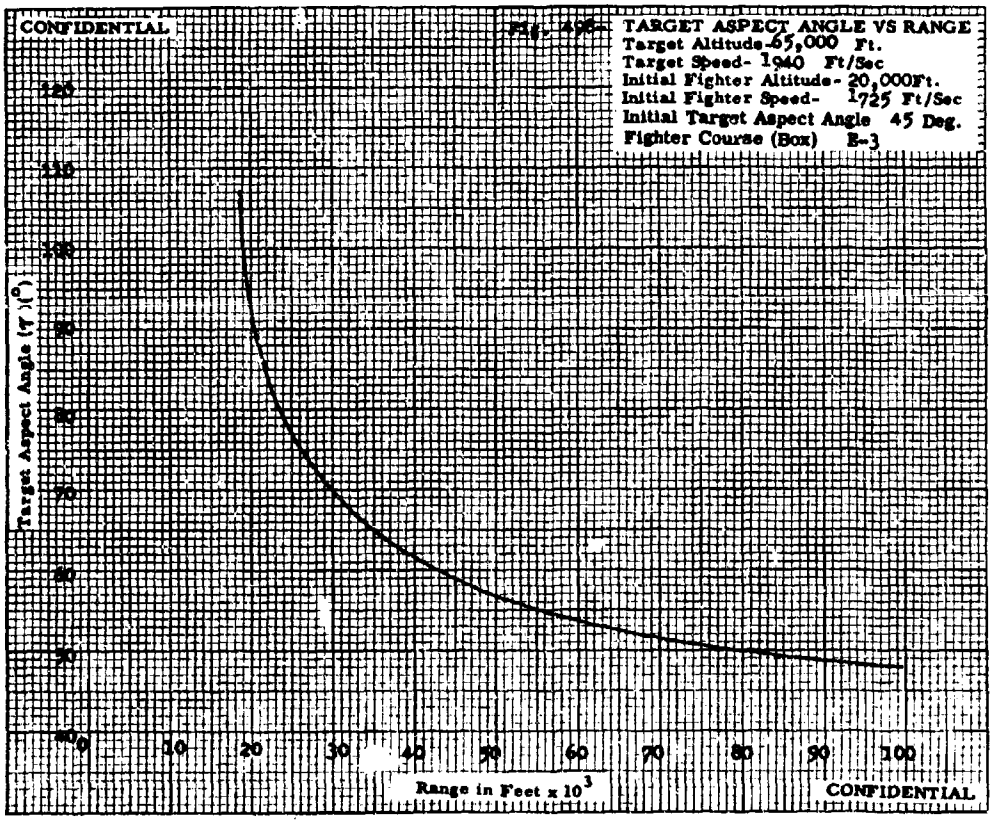
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Fig. 408
TARGET ASPECT ANGLE VS RANGE
Target Altitude-65,000 Ft.
Target Speed- 1940 Ft/Sec
Initial Fighter Altitude- 20,000Ft.
Initial Fighter Speed- 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
Target Aspect Angle (γ_T)(°)
120
110
100
90
80
70
60
50
40
0
10
20
30
40
50
60
70
80
90
100
Range in Feet x 10^3
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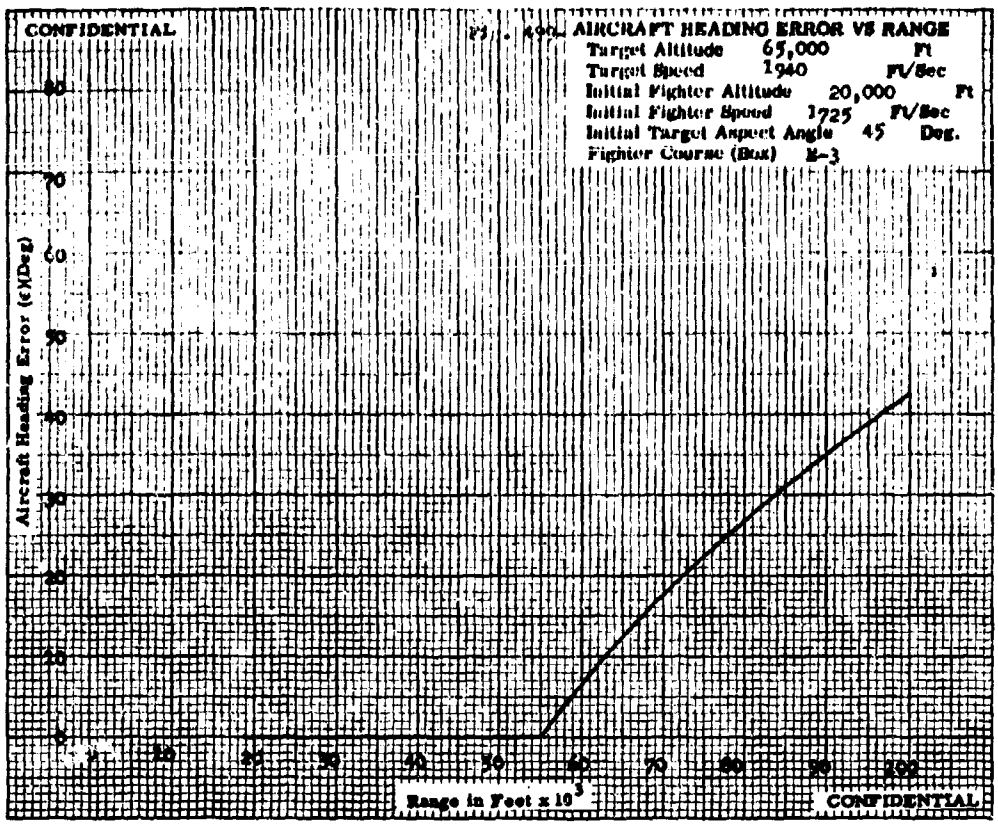
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AIRCRAFT HEADING ERROR VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
Aircraft Heading Error (ε)(Deg)
Range in Feet x 10^3
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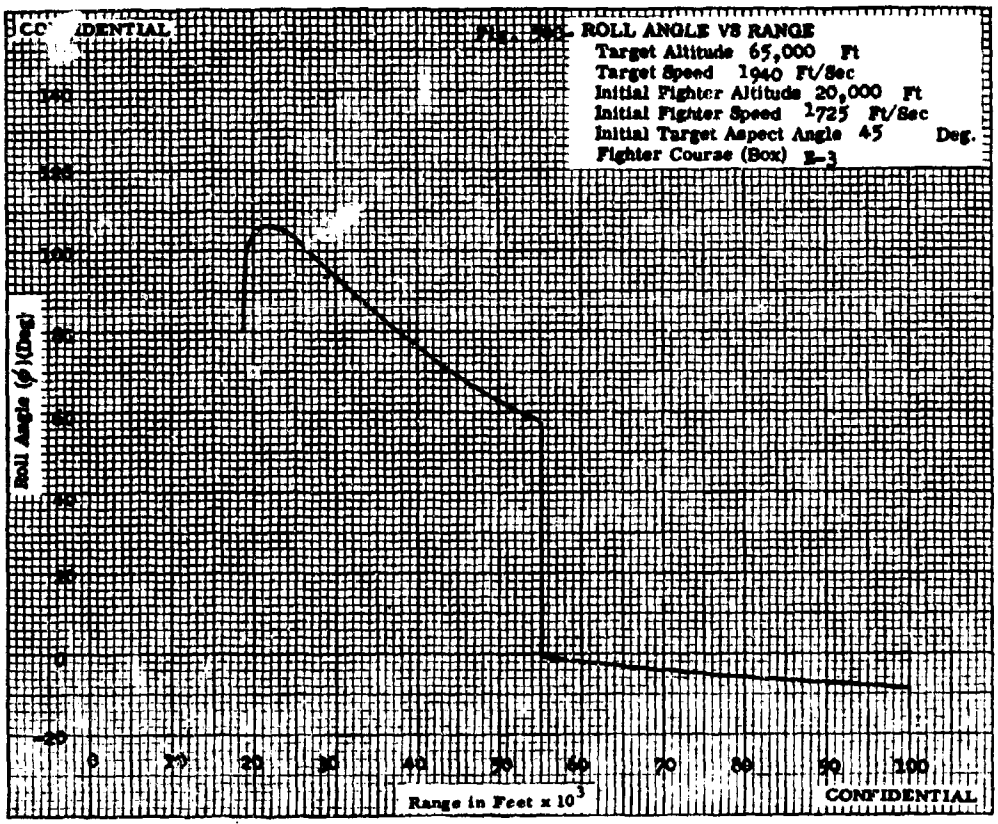
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ROLL ANGLE VS RANGE
Target Altitude 65,000 Ft
Target Speed 1940 Ft/Sec
Initial Fighter Altitude 20,000 Ft
Initial Fighter Speed 1725 Ft/Sec
Initial Target Aspect Angle 45 Deg.
Fighter Course (Box) E-3
Roll Angle (φ)(Deg)
Range in Feet x 10^3
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