GENE SLOVERS
US NAVY PAGES

A. A. RANGE TABLE
FOR
16-INCH 50-CALIBER GUN

HOME

RESTRICTED

ORDNANCE PAMPHLET No. 1091

A. A. RANGE TABLE

FOR

FOR

16-INCH 50-CALIBER GUN

2,615 F. S. INITIAL VELOCITY
1,900-POUND HIGH-CAPACITY PROJECTILE

A BUREAU OF ORDNANCE PUBLICATION 11 MARCH 1944

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16-INCH, 50-CALIBER GUN

2,615 F. S. INITIAL VELOCITY
1,900-POUND HIGH-CAPACITY PROJECTILE

This table is prepared for 2,615 f. s., the expected average velocity over the life of the gun when firing high-capacity projectiles with service charges for 2,700-pound projectiles

11 MARCH 1944

This publication is RESTRICTED and will be handled in accordance with Article 76, United States Navy Regulations, 1920

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RESTRICTED

NAVY DEPARTMENT,
BUREAU OF ORDNANCE,
Washington, D. C., 11 March 1944.

ORDNANCE PAMPLET NO. 1091

16 INCH ANTIAIRCRAFT RANGE TABLE

16-INCH ANTIAIRCRAFT RANGE TABLE

1. Ordnance Pamphlet No. 1091 contains information on the flight of 16-Inch High Capacity Projectiles Mark 13 for use in controlling the fire of 16-Inch 50-Caliber Guns against aircraft.

2. This pamphlet does not supersede any existing publication.

3. This publication is *RESTRICTED* and should be handled in accordance with the provisions of Article 76, U. S. Navy Regulations, 1920.

G. F. Hussey, Jr.
Rear Admiral, U. S. Navy,
Chief of the Bureau of Ordnance.

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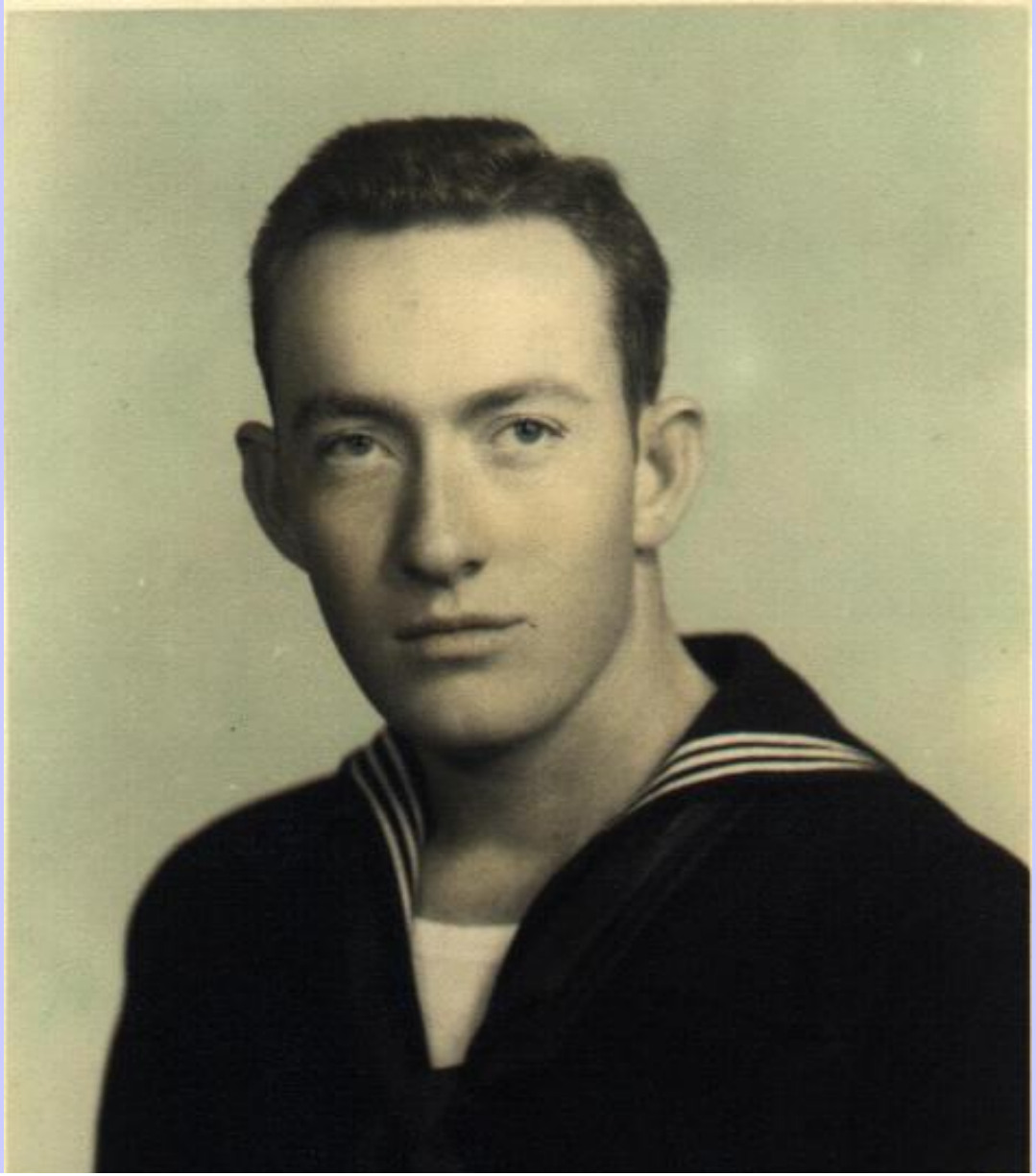

GENE SLOVER

THIS PICTURE WAS TAKEN IN JAPAN. AT THE TIME THE JAPANESE DID NOT HAVE ANY COLOR FILM SO THE ORIGINAL PICTURE WAS BLACK AND WHITE. THE JAPANESE PHOTOGRAPHER WHO TOOK AND COLORED THE PICTURE KEPT ASKING ME WHAT COLOR MY HAIR WAS AND I KEPT TELLING HIM THAT IS WAS A VERY DARK RED.

WHEN I WENT BACK TO GET THE PICTURE FEW DAYS LATER HE EXPLAINED TO ME THAT MOST JAPANESE WERE COLORBLIND AND THAT HE COULD NOT TELL WHAT COLOR MY HAIR WAS.

HE KEPT APOLOGIZING FOR GETTING THE COLOR WRONG AND WAS MORE THAN WILLING TO TRY TO CORRECT IT.

HE COULD SEE ALL OF THE OTHER COLORS WHEN HE LOOKED AT ME. HE JUST COULD NOT SEE THE HAIR COLOR OR TINT.

I TOLD HIM THE PICTURE WAS FINE AS WE WERE GETTING UNDERWAY THE NEXT MORNING AND I MIGHT NOT BE BACK.

THE HEAD OF THE CROW ON THE RATING BADGE IS SUPPOSED TO LOOK TOWARD YOUR BODY.

THE REASON IT DOES NOT IS THAT THE PICTURE IS TAKEN RIGHT AFTER THE USN HAD EVERYONE PUT THEIR RATE BADGE ON THE LEFT ARM BUT THE RATING BADGE IN THE PICTURE IS FOR THE RIGHT ARM.

SOME RATINGS IN THE NAVY WERE RIGHT ARM RATED AND OTHERS WERE LEFT ARM RATED. THE NAVY DID AWAY WITH THE RIGHT ARM RATINGS AND FROM THEN ON EVERYONE WORE THEIR RATING BADGES ON THEIR LEFT ARM AS IN THE PICTURE.

THE INSIGNIA HAS A RANGEFINDER WHICH DESIGNATES ME AS A FIRE CONTROLMAN. IN THE EARLY 1950'S THE FIRE CONTROL RATING WAS CHANGED TO FIRE CONTROL TECHNICIAN. THE FIRE CONRTOL TECHNICIAN RATING BADGE HAD A DIRECTOR ON IT WITH A RECTANGULAR ANTENNA ON TOP OF THE DIRECTOR. IF YOU WERE RIGHT ARM RATED THEN YOU WERE ALSO CALLED A LINE PETTY OFFICER WHICH PUT YOU IN A LITTLE DIFFERENT CLASS.

16"/50 GUN BOOK

USN GUNS MARKS AND MODS 1942

USN GUNS MARKS AND MODS 1956

RANGE AND BALLISTIC TABLES 1935

EXTERIOR BALLISTICS 1935 (UNDER CONSTRUCTION)

RANGE AND BALLISTIC TABLES 1946

A.A. RANGE TABLE FOR 16-INCH 50-CALIBER GUN

BB59 BOMBARDS JAPAN

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LUZON EXPRESS

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HOW THE AFRICAN LANDING WAS EFFECTED

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GENE SLOVERS
US NAVY PAGES

A. A. RANGE TABLE
FOR
16-INCH 50-CALIBER GUN

PART I

HOME INDEX

EXPLANATORY NOTES

EXPLANATORY NOTES

1. This range table is applicable to 16-inch high-capacity projectiles, Mark 13 fitted with point detonating fuzes, nose plugs, or mechanical time fuzes. The projectile is 4 calibers long, has a 9-caliber radius of ogive, and a standard weight of 1,900 pounds.

2. When firing high-capacity projectiles with service charges for 2,700-pound projectiles the initial velocity in a new gun with 90° powder will be 2,690 feet per second. This table is computed for 2,615 feet per second, the expected average velocity over the life of the gun. Surface range table data for 2,690 feet per second are given in Ordnance Pamphlet 1100.

3. A constant ballistic coefficient of 7.98 with the Army J6 resistance function was used in computing the trajectories.

4. The table is divided into four parts.

5. Part I gives the elements of the standard trajectories tabulated against elevation and time of flight.[1] Tables of sight angle and time of flight are also given in terms of slant range and angle of position. Elevation is defined as the angle between the axis of the bore and the horizontal plane at the gun. The line of position of a point is the straight line connecting the gun with that point. Slant range is the distance from the gun to the point measured along the line of position. The horizontal range and altitude are, respectively, the horizontal and vertical components of the slant range. Angle of position is the angle between the line of position and the horizontal plane at the gun. Sight angle is the difference between elevation and angle of position. Fuze setting and time of flight are the same.

6. Part II gives the deflection effects due to drift and to a wind component across the plane of the trajectory. Drift is to the right and is for guns rifled with a twist of one turn in 25 calibers.

[1] The Naval Proving Ground firings upon which this table is based indicate that the angle of departure differs from the angle of elevation by 9.7 minutes; i. e., the projectile apparently leaves the gun at an angle 9.7 minutes less than the angle of elevation. This was taken into account in computing

7. Part III gives the effects on horizontal range and altitude due to variations from standard conditions. With these effects, the position of the burst for any given time of flight under other than standard conditions may be determined. For example, assume the position of burst is desired when the air density is below standard.

Given conditions

Elevation	35°.
Time of flight (and fuze setting)	20 seconds.
Initial velocity	2,615 feet per second.
Ballistic density	95 percent of standard.
Change in density	−5 percent.

Solution

From Part I, page 8, for standard air, the position of burst is—

Horizontal range	12,250 yards.
Altitude	6,568 yards.

From Part III, pages 28 and 29, the effects of a 10 percent decrease in density are—

On horizontal range	+184 yards.
On altitude	+113 yards.

and the effects of a 5 percent decrease in density will be one half of these values or—

On horizontal range	+92 yards.
On altitude	+57 yards.

Therefore, under the given conditions, the position of the burst will be—

Horizontal range = 12,250 + 92 = 12,342 yards.
Altitude = 6,568 + 57 = 6,625 yards.

8. Part IV gives the corrections to sight angle and time of flight to compensate for the effects due to non-standard conditions. These corrections are tabulated against slant range and position angle. To illustrate their use, assume that sight angle and fuze setting are desired with a rear wind blowing.

Given conditions

Slant range to burst	15,000 yards.
Position angle of burst	30°.
Initial velocity	2,615 feet per second.
Rear wind	20 knots.

Solution

From Part I, pages 17 and 19 for still air, the settings are—

Sight Angle	7.40°.
Fuze setting	

the range table and no corrections are necessary.

(time of flight)..... 22.06 seconds.

From Part IV, pages 40 and 41, the corrections for a 10 knot rear wind are—

To sight angle..... 0.03°.

To fuze setting (time of flight)..... −0.04 second.

and the corrections for a 20 knot rear wind will be twice these values or—

To sight angle..... 0.06°.

To fuze setting..... −0.08 second.

Therefore, under the given conditions, the desired settings will be—

Sight angle=7.40+0.06=7.46°

Fuze setting=22.06−0.08=21.98 seconds.

Problems involving a head wind are solved in the same manner except that the signs of the tabular corrections given for a rear wind must be reversed.

9. The standard air has a surface density of 1.2034 kg. per cubic meter, corresponding to a temperature of 59° F., a barometric pressure of 29.53 inches and a humidity of 78 percent.

10. The effects, or corrections, due to a change in air density given in this table are also applicable to a change in ballistic coefficient but when so used the signs of the tabular values must be reversed because the effect of a change in ballistic coefficient is opposite to that of a change in air density.

11. The standard air density aloft and information concerning the preparation of ballistic density and ballistic wind are given in Bureau of Aeronautics publication N. Aer. 440, 1942, Instructions and Tables for Making Observations and Computing Ballistic Wind and Ballistic Density.

12. The corrections for a variation in weight of projectile are based on the assumption that the charge remains the same.

13. The powder is assumed to give normal velocity at 90° F. For each degree increase in temperature the initial velocity is increased approximately 2 feet per second; a decrease in temperature causes a corresponding decrease in velocity.

PART I

Elements of the Trajectories

5° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	4.84	0.16	2,606	221
2	1,701	123	1,705	4.13	.87	2,499	149
4	3,334	199	3,340	3.41	1.59	2,399	80
6	4,903	229	4,908	2.68	2.32	2,305	14
8	6,409	217	6,413	1.94	3.06	2,215	−50
10	7,856	163	7,858	1.19	3.81	2,129	−111
12	9,248	69	9,248	.43	4.57	2,047	−170
13.12	10,004	0	10,004	0	5.00	2,003	−202
14	10,586	−62	10,586	−.34	5.34	1,968	−227

10° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	9.84	0.16	2,577	447
2	1,683	271	1,705	9.14	.86	2,472	368
4	3,299	489	3,335	8.43	1.57	2,375	288
6	4,852	656	4,896	7.70	2.30	2,285	214
8	6,346	775	6,393	6.96	3.04	2,200	143
10	7,785	847	7,831	6.21	3.79	2,119	75
12	9,172	875	9,214	5.45	4.55	2,043	9
14	10,510	860	10,545	4.68	5.32	1,970	−55
16	11,800	804	11,827	3.90	6.10	1,901	−116
18	13,045	709	13,064	3.11	6.89	1,835	−175
20	14,248	572	14,259	2.30	7.70	1,771	−232
22	15,409	398	15,414	1.48	8.52	1,710	−287
24	16,530	188	16,530	.65	9.35	1,651	−340
25.56	17,375	0	17,375	0	10.00	1,607	−380
26	17,611	−57	17,611	−.19	10.19	1,594	−391

15° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	14.84	0.16	2,528	670

2	1, 652	417	1, 704	14. 15	. 85	2, 426	580
4	3, 238	774	3, 329	13. 45	1. 55	2, 333	494
6	4, 764	1, 076	4, 884	12. 73	2. 27	2, 247	413
8	6, 235	1, 325	6, 374	12. 00	3. 00	2, 167	336
10	7, 654	1, 524	7, 804	11. 26	3. 74	2, 092	261
12	9, 025	1, 674	9, 179	10. 51	4. 49	2, 022	189
14	10, 352	1, 777	10, 503	9. 74	5. 26	1, 956	119
16	11, 635	1, 835	11, 779	8. 96	6. 04	1, 894	52
18	12, 878	1, 849	13, 010	8. 17	6. 83	1, 835	−13
20	14, 082	1, 819	14, 199	7. 36	7. 64	1, 779	−75
22	15, 248	1, 748	15, 348	6. 54	8. 46	1, 724	−136
24	16, 380	1, 635	16, 461	5. 70	9. 30	1, 671	−195
26	17, 477	1, 483	17, 540	4. 85	10. 15	1, 621	−253
28	18, 541	1, 297	18, 586	4. 00	11. 00	1, 572	−309
30	19, 571	1, 074	19, 600	3. 14	11. 86	1, 524	−363
32	20, 570	815	20, 586	2. 27	12. 73	1, 477	−415
34	21, 541	519	21, 547	1. 38	13. 62	1, 431	−466
36	22, 484	191	22, 485	. 49	14. 51	1, 385	−515
37. 08	22, 982	0	22, 982	0	15. 00	1, 360	−540
38	23, 396	−168	23, 397	−. 41	15. 41	1, 340	−561

20° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	19.84	0.16	2,460	888
2	1,608	559	1,702	19.16	.84	2,361	789
4	3,153	1,054	3,324	18.48	1.52	2,272	696
6	4,640	1,488	4,873	17.78	2.22	2,191	608
8	6,076	1,866	6,356	17.07	2.93	2,117	525
10	7,464	2,188	7,778	16.34	3.66	2,049	445
12	8,808	2,459	9,145	15.60	4.40	1,985	367
14	10,111	2,679	10,460	14.84	5.16	1,925	292
16	11,376	2,851	11,728	14.07	5.93	1,869	220
18	12,605	2,975	12,951	13.28	6.72	1,816	151
20	13,798	3,054	14,142	12.48	7.52	1,766	84
22	14,959	3,087	15,274	11.66	8.34	1,718	18
24	16,088	3,078	16,380	10.83	9.17	1,673	−46
26	17,189	3,025	17,453	9.98	10.02	1,629	−108
28	18,262	2,932	18,496	9.12	10.88	1,587	−169
30	19,307	2,799	19,509	8.25	11.75	1,546	−228
32	20,323	2,629	20,492	7.37	12.63	1,505	−286
34	21,312	2,417	21,449	6.47	13.53	1,465	−342
36	22,278	2,169	22,383	5.56	14.44	1,426	−396
38	23,217	1,888	23,294	4.65	15.35	1,388	−449
40	24,131	1,573	24,182	3.73	16.27	1,350	−500
42	25,019	1,224	25,049	2.80	17.20	1,312	−549
44	25,882	841	25,896	1.86	18.14	1,275	−597
46	26,722	426	26,725	.91	19.09	1,238	−643
47.92	27,505	0	27,505	0	20.00	1,202	−685
48	27,536	−18	27,536	−.04	20.04	1,200	−687

25° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	24.84	0.16	2,373	1,099
2	1,552	697	1,701	24.18	.82	2,279	992
4	3,043	1,324	3,319	23.51	1.49	2,194	892
6	4,481	1,887	4,862	22.84	2.16	2,118	798
8	5,870	2,391	6,338	22.16	2.84	2,050	709
10	7,215	2,835	7,752	21.45	3.55	1,988	624
12	8,521	3,223	9,110	20.72	4.28	1,930	542
14	9,789	3,559	10,416	19.98	5.02	1,876	463
16	11,023	3,843	11,674	19.22	5.78	1,826	387
18	12,225	4,078	12,887	18.45	6.55	1,779	314
20	13,396	4,265	14,059	17.66	7.34	1,735	243
22	14,540	4,404	15,192	16.85	8.15	1,694	174
24	15,655	4,498	16,288	16.03	8.97	1,655	106
26	16,745	4,546	17,351	15.19	9.81	1,617	40
28	17,812	4,550	18,384	14.33	10.67	1,581	−25
30	18,854	4,513	19,387	13.46	11.54	1,546	−88

32	19, 873	4, 435	20, 362	12. 58	12. 42	1, 512	−149
34	20, 871	4, 315	21, 312	11. 68	13. 32	1, 479	−209
36	21, 845	4, 155	22, 237	10. 77	14. 23	1, 446	−268
38	22, 799	3, 959	23, 140	9. 85	15. 15	1, 414	−326
40	23, 731	3, 725	24, 022	8. 92	16. 08	1, 382	−382
42	24, 643	3, 450	24, 883	7. 97	17. 03	1, 351	−437
44	25, 533	3, 135	25, 725	7. 00	18. 00	1, 320	−490
46	26, 402	2, 789	26, 549	6. 03	18. 97	1, 289	−542
48	27, 252	2, 408	27, 358	5. 05	19. 95	1, 257	−592
50	28, 080	1, 998	28, 151	4. 07	20. 93	1, 225	−640
52	28, 886	1, 559	28, 928	3. 09	21. 91	1, 193	−687
54	29, 669	1, 088	29, 689	2. 10	22. 90	1, 160	−732
56	30, 430	586	30, 436	1. 10	23. 90	1, 127	−775
58	31, 170	54	31, 170	. 10	24. 90	1, 094	−815
58. 20	31, 242	0	31, 242	0	25. 00	1, 091	−818
60	31, 887	−506	31, 891	−. 91	25. 91	1, 060	−852

30° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	29. 84	0. 16	2, 268	1, 301
2	1, 483	829	1, 699	29. 20	. 80	2, 179	1, 187
4	2, 910	1, 584	3, 313	28. 56	1. 44	2, 099	1, 080

6	4, 286	2, 271	4, 851	27. 92	2. 08	2, 028	981
8	5, 618	2, 895	6, 320	27. 26	2. 74	1, 966	887
10	6, 909	3, 457	7, 726	26. 58	3. 42	1, 910	797
12	8, 165	3, 961	9, 075	25. 88	4. 12	1, 858	712
14	9, 387	4, 409	10, 371	25. 16	4. 84	1, 810	630
16	10, 579	4, 803	11, 618	24. 42	5. 58	1, 766	551
18	11, 741	5, 147	12, 820	23, 67	6. 33	1, 725	475
20	12, 879	5, 440	13, 981	22. 90	7. 10	1, 687	401
22	13, 991	5, 684	15, 102	22. 11	7. 89	1, 651	329
24	15, 079	5, 882	16, 186	21. 31	8. 69	1, 617	259
26	16, 147	6, 031	17, 236	20. 48	9. 52	1, 585	190
28	17, 194	6, 133	18, 255	19. 63	10. 37	1, 554	122
30	18, 221	6, 192	19, 244	18. 77	11. 23	1, 525	56
32	19, 228	6, 210	20, 206	17. 90	12. 10	1, 497	−8
34	20, 217	6, 185	21, 142	17. 01	12. 99	1, 470	−71
36	21, 187	6, 119	22, 053	16. 11	13. 89	1, 443	−134
38	22, 139	6, 011	22, 942	15. 19	14. 81	1, 416	−195
40	23, 076	5, 861	23, 809	14. 25	15. 75	1, 390	−255
42	23, 996	5, 668	24, 656	13. 29	16. 71	1, 365	−314
44	24, 897	5, 438	25, 484	12. 32	17. 68	1, 340	−372
46	25, 783	5, 166	26, 295	11. 33	18. 67	1, 314	−428
48	26, 651	4, 863	27, 091	10. 34	19. 66	1, 289	−483
50	27, 503	4, 523	27, 872	9. 34	20. 66	1, 263	−537
52	28, 337	4, 149	28, 639	8. 33	21. 67	1, 237	−590
54	29, 153	3, 735	29, 391	7. 30	22. 70	1, 210	−641
56	29, 950	3, 285	30, 130	6. 26	23. 74	1, 183	−690
58	30, 730	2, 807	30, 858	5. 22	24. 78	1, 156	−737
60	31, 492	2, 302	31, 576	4. 18	25. 82	1, 128	−783
62	32, 235	1, 763	32, 283	3. 13	26. 87	1, 099	−827
64	32, 956	1, 197	32, 978	2. 08	27. 92	1, 069	−868
66	33, 657	608	33, 662	1. 03	28. 97	1, 038	−906
67. 99	34, 334	0	34, 334	0	30. 00	1, 008	−942
68	34, 338	−4	34, 338	−. 01	30. 01	1, 007	−943

35° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	34.84	0.16	2,146	1,493
2	1,404	955	1,698	34.24	.76	2,062	1,372
4	2,754	1,833	3,308	33.63	1.37	1,988	1,260
6	4,058	2,637	4,840	33.02	1.98	1,923	1,155
8	5,322	3,376	6,302	32.39	2.61	1,866	1,057
10	6,548	4,051	7,700	31.74	3.26	1,815	964
12	7,743	4,665	9,040	31.07	3.93	1,769	876
14	8,908	5,222	10,326	30.38	4.62	1,727	792
16	10,046	5,723	11,562	29.67	5.33	1,688	711
18	11,159	6,173	12,752	28.95	6.05	1,653	632
20	12,250	6,568	13,900	28.20	6.80	1,620	556
22	13,319	6,916	15,007	27.44	7.56	1,589	482
24	14,368	7,214	16,077	26.66	8.34	1,560	410
26	15,398	7,464	17,112	25.86	9.14	1,533	339
28	16,413	7,664	18,114	25.03	9.97	1,507	269
30	17,410	7,821	19,086	24.19	10.81	1,483	201
32	18,392	7,932	20,030	23.33	11.67	1,460	134
34	19,358	8,003	20,947	22.46	12.54	1,438	69
36	20,310	8,029	21,839	21.57	13.43	1,417	4
38	21,247	8,012	22,707	20.66	14.34	1,395	−60
40	22,170	7,951	23,553	19.73	15.27	1,374	−123
42	23,080	7,848	24,378	18.78	16.22	1,354	−185
44	23,977	7,703	25,184	17.81	17.19	1,334	−246
46	24,862	7,516	25,973	16.82	18.18	1,314	−306
48	25,732	7,291	26,745	15.82	19.18	1,294	−365
50	26,588	7,030	27,502	14.81	20.19	1,274	−423
52	27,432	6,728	28,245	13.78	21.22	1,254	−480
54	28,261	6,390	28,974	12.74	22.26	1,233	−536
56	29,076	6,011	29,691	11.68	23.32	1,212	−591
58	29,877	5,597	30,397	10.61	24.39	1,191	−644
60	30,665	5,148	31,094	9.53	25.47	1,169	−696
62	31,438	4,665	31,782	8.44	26.56	1,146	−746
64	32,193	4,153	32,460	7.35	27.65	1,122	−794

64	32, 198	4, 195	32, 400	[illegible]	[illegible]	[illegible]	[illegible]
66	32, 932	3, 607	33, 129	6. 25	28. 75	1, 097	−840
68	33, 655	3, 033	33, 791	5. 15	29. 85	1, 072	−885
70	34, 361	2, 427	34, 447	4. 04	30. 96	1, 046	−927
72	35, 051	1, 794	35, 097	2. 93	32. 07	1, 019	−966
74	35, 721	1, 135	35, 739	1. 82	33. 18	991	−1, 003
76	36, 372	457	36, 375	. 72	34. 28	962	−1, 037
77. 31	36, 788	0	36, 788	0	35. 00	943	−1, 058
78	37, 004	−245	37, 628	−. 38	35. 38	933	−1, 068

40° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	39. 84	0. 16	2, 008	1, 674
2	1, 313	1, 074	1, 696	39. 29	. 71	1, 929	1, 547
4	2, 577	2, 066	3, 303	38. 72	1. 28	1, 861	1, 429
6	3, 799	2, 983	4, 830	38. 14	1. 86	1, 802	1, 320
8	4, 984	3, 830	6, 285	37. 54	2. 46	1, 751	1, 219
10	6, 135	4, 611	7, 675	36. 93	3. 07	1, 705	1, 123
12	7, 257	5, 331	9, 005	36. 30	3. 70	1, 664	1, 033
14	8, 355	5, 991	10, 281	35. 64	4. 36	1, 627	947
16	9, 429	6, 595	11, 506	34. 97	5. 03	1, 593	864
18	10, 481	7, 144	12, 684	34. 28	5. 72	1, 563	783
20	11, 513	7, 641	13, 818	33. 57	6. 43	1, 535	705
22	12, 527	8, 086	14, 910	32. 84	7. 16	1, 509	630
24	13, 525	8, 481	15, 964	32. 09	7. 91	1, 485	556
26	14, 507	8, 828	16, 982	31. 32	8. 68	1, 462	484
28	15, 477	9, 124	17, 966	30. 52	9. 48	1, 441	413
30	16, 431	9, 376	18, 918	29. 71	10. 29	1, 422	344
32	17, 373	9, 583	19, 841	28. 88	11. 12	1, 403	275
34	18, 303	9, 744	20, 735	28. 03	11. 97	1, 385	207
36	19, 221	9, 861	21, 603	27. 16	12. 84	1, 368	141

38	20, 125	9, 938	22, 445	26. 28	13. 72	1, 351	76
40	21, 020	9, 968	23, 264	25. 37	14. 63	1, 335	11
42	21, 905	9, 955	24, 061	24. 44	15. 56	1, 319	−53
44	22, 781	9, 896	24, 838	23. 48	16. 52	1, 303	−117
46	23, 647	9, 795	25, 595	22. 50	17. 50	1, 288	−180
48	24, 502	9, 651	26, 334	21. 50	18. 50	1, 273	−241

40° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
48	24, 502	9, 651	26, 334	21. 50	18. 50	1, 273	−241
50	25, 345	9, 471	27, 057	20. 49	19. 51	1, 257	−302
52	26, 179	9, 250	27, 765	19. 46	20. 54	1, 242	−362
54	27, 001	8, 992	28, 459	18. 42	21. 58	1, 227	−422
56	27, 814	8, 695	29, 141	17. 36	22. 64	1, 212	−481
58	28, 617	8, 352	29, 811	16. 27	23. 73	1, 196	−539

60	29,410	7,968	30,470	15.16	24.84	1,179	−595
62	30,189	7,555	31,120	14.05	25.95	1,162	−649
64	30,957	7,107	31,762	12.93	27.07	1,144	−702
66	31,714	6,620	32,397	11.79	28.21	1,125	−755
68	32,457	6,098	33,025	10.64	29.36	1,106	−806
70	33,187	5,542	33,647	9.48	30.52	1,086	−855
72	33,903	4,958	34,264	8.32	31.68	1,065	−903
74	34,606	4,341	34,877	7.15	32.85	1,042	−948
76	35,295	3,691	35,487	5.97	34.03	1,020	−991
78	35,969	3,014	36,095	4.79	35.21	997	−1,031
80	36,626	2,317	36,699	3.62	36.38	972	−1,069
82	37,262	1,588	37,296	2.44	37.56	946	−1,104
84	37,880	845	37,889	1.28	38.72	919	−1,136
86	38,480	81	38,488	.12	39.88	891	−1,164
86.21	38,542	0	38,542	0	40.00	888	−1,166
88	39,065	−702	39,071	−1.03	41.03	862	−1,188

45° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	44.84	0.16	1,854	1,843
2	1,211	1,185	1,695	44.34	.66	1,782	1,709
4	2,380	2,284	3,299	43.82	1.18	1,720	1,587
6	3,510	3,304	4,821	43.27	1.73	1,667	1,474
8	4,606	4,252	6,269	42.71	2.29	1,621	1,370
10	5,673	5,133	7,651	42.14	2.86	1,580	1,272
12	6,714	5,951	8,972	41.55	3.45	1,544	1,180
14	7,733	6,708	10,237	40.94	4.06	1,512	1,092
16	8,732	7,408	11,451	40.31	4.69	1,483	1,007
18	9,713	8,053	12,617	39.66	5.34	1,457	926
20	10,677	8,643	13,737	38.99	6.01	1,433	847
22	11,626	9,181	14,814	38.30	6.70	1,412	770
24	12,560	9,669	15,851	37.59	7.41	1,392	695
26	13,483	10,108	16,851	36.86	8.14	1,373	622
28	14,393	10,499	17,815	36.11	8.89	1,356	551
30	15,291	10,843	18,745	35.34	9.66	1,341	481
32	16,181	11,138	19,644	34.54	10.46	1,326	411
34	17,062	11,387	20,513	33.72	11.28	1,312	342
36	17,931	11,596	21,354	32.89	12.11	1,298	275
38	18,790	11,760	22,167	32.04	12.96	1,285	209
40	19,642	11,877	22,954	31.16	13.84	1,273	143
42	20,486	11,952	23,718	30.26	14.74	1,261	77
44	21,324	11,981	24,459	29.33	15.67	1,249	11
46	22,153	11,968	25,179	28.38	16.62	1,237	−53
48	22,975	11,909	25,878	27.40	17.60	1,226	−116

45° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	3	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
48	22, 975	11, 909	25, 878	27. 40	17. 60	1, 226	−116
50	23, 789	11, 809	26, 559	26. 40	18. 60	1, 214	−179
52	24, 594	11, 673	27, 223	25. 39	19. 61	1, 202	−241
54	25, 392	11, 491	27, 871	24. 35	20. 65	1, 191	−303
56	26, 182	11, 268	28, 505	23. 29	21. 71	1, 180	−364
58	26, 967	11, 005	29, 126	22. 20	22. 80	1, 169	−424
60	27, 743	10, 700	29, 735	21. 09	23. 91	1, 157	−483
62	28, 512	10, 355	30, 334	19. 96	25. 04	1, 145	−542
64	29, 271	9, 976	30, 924	18. 82	26. 18	1, 132	−600
66	30, 021	9, 558	31, 506	17. 66	27. 34	1, 119	−657
68	30, 763	9, 101	32, 081	16. 48	28. 52	1, 105	−713
70	31, 496	8, 604	32, 650	15. 28	29. 72	1, 090	−768
72	32, 218	8, 075	33, 214	14. 07	30. 93	1, 075	−821
74	32, 928	7, 511	33, 774	12. 85	32. 15	1, 059	−872
76	33, 630	6, 909	34, 332	11. 61	33. 39	1, 042	−922
78	34, 319	6, 280	34, 889	10. 37	34. 63	1, 024	−970
80	34, 996	5, 618	35, 444	9. 12	35. 88	1, 006	−1, 016
82	35, 660	4, 923	35, 998	7. 86	37. 14	987	−1, 060
84	36, 311	4, 201	36, 553	6. 60	38. 40	966	−1, 101
86	36, 948	3, 454	37, 109	5. 34	39. 66	944	−1, 140
88	37, 570	2, 682	37, 665	4. 08	40. 92	921	−1, 176
90	38, 175	1, 887	38, 222	2. 83	42. 17	896	−1, 208
92	38, 766	1, 072	38, 781	1. 58	43. 42	870	−1, 236

92	38, 760	1, 072	38, 781	1. 03	45. 42	870	−1, 250
94	39, 340	240	39, 341	.35	44. 65	843	−1, 260
94. 57	39, 500	0	39, 500	0	45. 00	835	−1, 266
96	39, 895	−606	39, 900	−. 87	45. 87	815	−1, 281

50° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	49. 84	0. 16	1, 686	1, 998
2	1, 103	1, 287	1, 695	49. 39	. 61	1, 621	1, 858
4	2, 166	2, 484	3, 296	48. 91	1. 09	1, 566	1, 732
6	3, 195	3, 600	4, 813	48. 41	1. 59	1, 519	1, 616
8	4, 193	4, 640	6, 254	47. 90	2. 10	1, 478	1, 509
10	5, 166	5, 612	7, 628	47. 37	2. 63	1, 442	1, 409
12	6, 117	6, 521	8, 941	46. 83	3. 17	1, 411	1, 315
14	7, 049	7, 368	10, 197	46. 27	3. 73	1, 384	1, 226
16	7, 963	8, 158	11, 400	45. 69	4. 31	1, 359	1, 140

18	8, 862	8, 890	12, 553	45. 09	4. 91	1, 337	1, 058
20	9, 747	9, 569	13, 659	44. 47	5. 53	1, 317	979
22	10, 620	10, 195	14, 721	43. 83	6. 17	1, 299	901
24	11, 481	10, 770	15, 742	43. 17	6. 83	1, 282	825
26	12, 331	11, 296	16, 723	42. 49	7. 51	1, 267	751
28	13, 172	11, 773	17, 666	41. 79	8. 21	1, 253	680
30	14, 002	12, 202	18, 573	41. 07	8. 93	1, 241	610
32	14, 827	12, 583	19, 447	40. 32	9. 68	1, 230	540
34	15, 645	12, 920	20, 290	39. 55	10. 45	1, 219	471
36	16, 454	13, 210	21, 101	38. 76	11. 24	1, 208	403
38	17, 255	13, 457	21, 882	37. 95	12. 05	1, 198	336
40	18, 049	13, 660	22, 635	37. 12	12. 88	1, 189	269
42	18, 838	13, 817	23, 362	36. 26	13. 74	1, 180	202
44	19, 623	13, 930	24, 065	35. 37	14. 63	1, 172	136
46	20, 402	14, 001	24, 744	34. 46	15. 54	1, 164	71
48	21, 176	14, 027	25, 400	33. 52	16. 48	1, 156	7
50	21, 945	14, 007	26, 034	32. 55	17. 45	1, 149	−57

55° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	54.84	0.16	1,506	2,138
2	985	1,378	1,694	54.44	.56	1,448	1,992
4	1,935	2,664	3,292	54.01	.99	1,399	1,862
6	2,853	3,865	4,804	53.56	1.44	1,358	1,744
8	3,747	4,990	6,240	53.10	1.90	1,323	1,635
10	4,618	6,046	7,608	52.63	2.37	1,292	1,533
12	5,471	7,038	8,914	52.14	2.86	1,265	1,438
14	6,307	7,966	10,161	51.63	3.37	1,242	1,348
16	7,129	8,835	11,353	51.10	3.90	1,221	1,262
18	7,937	9,649	12,494	50.56	4.44	1,203	1,179
20	8,734	10,408	13,587	50.00	5.00	1,187	1,099
22	9,520	11,115	14,635	49.42	5.58	1,172	1,021
24	10,298	11,771	15,640	48.82	6.18	1,158	945
26	11,066	12,376	16,602	48.20	6.80	1,146	871
28	11,826	12,932	17,524	47.56	7.44	1,135	799
30	12,578	13,442	18,409	46.90	8.10	1,125	729
32	13,325	13,905	19,259	46.22	8.78	1,116	659
34	14,068	14,320	20,074	45.51	9.49	1,107	590
36	14,803	14,690	20,855	44.78	10.22	1,099	522
38	15,532	15,015	21,603	44.03	10.97	1,092	454
40	16,258	15,294	22,321	43.25	11.75	1,085	387
42	16,982	15,528	23,011	42.44	12.56	1,079	320
44	17,701	15,721	23,674	41.61	13.39	1,074	254
46	18,416	15,869	24,310	40.75	14.25	1,070	189
48	19,127	15,976	24,921	39.87	15.13	1,066	124
50	19,836	16,034	25,506	38.95	16.05	1,063	60

60° ELEVATION

Time of flight	Horizontal range	Altitude	Slant range	Angle of position	Sight angle	Horizontal velocity	Vertical velocity
1	2	3	4	5	6	7	8
Seconds	*Yards*	*Yards*	*Yards*	*Degrees*	*Degrees*	*F. S.*	*F. S.*
0	0	0	0	59.84	0.16	1,316	2,261
2	860	1,459	1,693	59.49	.51	1,264	2,111
4	1,687	2,820	3,286	59.11	.89	1,222	1,977
6	2,489	4,096	4,793	58.71	1.29	1,186	1,857
8	3,270	5,297	6,225	58.31	1.69	1,156	1,746
10	4,033	6,430	7,590	57.90	2.10	1,130	1,643
12	4,781	7,496	8,891	57.47	2.53	1,108	1,547
14	5,514	8,498	10,130	57.02	2.98	1,088	1,457
16	6,234	9,439	11,312	56.56	3.44	1,071	1,371
18	6,943	10,325	12,442	56.08	3.92	1,056	1,288
20	7,643	11,158	13,524	55.59	4.41	1,043	1,207
22	8,334	11,938	14,559	55.08	4.92	1,031	1,129
24	9,018	12,666	15,548	54.55	5.45	1,021	1,053
26	9,694	13,343	16,493	54.00	6.00	1,011	979
28	10,365	13,972	17,397	53.43	6.57	1,002	907
30	11,030	14,553	18,261	52.84	7.16	994	836
32	11,690	15,087	19,086	52.23	7.77	986	765
34	12,345	15,575	19,874	51.60	8.40	979	696
36	12,998	16,017	20,627	50.94	9.06	974	628
38	13,647	16,414	21,346	50.26	9.74	970	561
40	14,293	16,765	22,031	49.55	10.45	966	495
42	14,935	17,072	22,683	48.82	11.18	963	429

44	15, 576	17, 335	23, 305	48. 06	11. 94	960	363
46	16, 216	17, 554	23, 898	47. 27	12. 73	958	298
48	16, 855	17, 731	24, 464	46. 45	13. 55	956	233
50	17, 491	17, 864	25, 003	45. 61	14. 39	954	168

SIGHT ANGLE IN DEGREES

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
0	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16	0. 16
500	. 36	. 36	. 36	. 36	. 35	. 35	. 34	. 33	. 32	. 30	. 29	. 28
1, 000	. 57	. 57	. 57	. 56	. 55	. 54	. 52	. 50	. 48	. 45	. 42	. 40
1, 500	. 78	. 78	. 78	. 77	. 75	. 73	. 70	. 67	. 64	. 60	. 56	. 52
2, 000	1. 00	1. 00	1. 00	. 98	. 95	. 92	. 89	. 85	. 81	. 76	. 70	. 64
2, 500	1. 22	1. 22	1. 21	1. 19	1. 16	1. 12	1. 08	1. 03	. 98	. 92	. 85	. 77
3, 000	1. 44	1. 44	1. 43	1. 41	1. 37	1. 33	1. 28	1. 22	1. 15	1. 08	1. 00	. 90
3, 500	1. 66	1. 66	1. 65	1. 62	1. 58	1. 54	1. 48	1. 41	1. 33	1. 24	1. 15	1. 04
4, 000	1. 89	1. 89	1. 87	1. 84	1. 80	1. 75	1. 68	1. 60	1. 51	1. 41	1. 30	1. 18
4, 500	2. 12	2. 12	2. 10	2. 07	2. 02	1. 96	1. 88	1. 79	1. 69	1. 58	1. 46	1. 32

5,000	2.36	2.36	2.34	2.30	2.25	2.18	2.09	1.99	1.88	1.76	1.62	1.46
5,500	2.60	2.60	2.58	2.54	2.49	2.41	2.31	2.20	2.07	1.93	1.78	1.61
6,000	2.85	2.85	2.83	2.79	2.73	2.64	2.54	2.42	2.27	2.11	1.94	1.76
6,500	3.10	3.11	3.09	3.04	2.97	2.88	2.76	2.62	2.47	2.30	2.11	1.91
7,000	3.36	3.36	3.34	3.29	3.22	3.12	2.99	2.84	2.67	2.49	2.29	2.06
7,500	3.62	3.62	3.60	3.55	3.47	3.36	3.23	3.07	2.88	2.68	2.46	2.22
8,000	3.88	3.89	3.87	3.81	3.72	3.61	3.47	3.30	3.10	2.88	2.64	2.38
8,500	4.15	4.16	4.13	4.07	3.98	3.86	3.71	3.53	3.32	3.09	2.83	2.54
9,000	4.43	4.43	4.40	4.34	4.25	4.12	3.96	3.77	3.55	3.30	3.02	2.72
9,500	4.71	4.71	4.68	4.62	4.52	4.38	4.21	4.01	3.78	3.52	3.22	2.89
10,000	5.00	5.00	4.97	4.90	4.79	4.65	4.47	4.26	4.02	3.74	3.42	3.07
10,500	5.29	5.30	5.27	5.19	5.07	4.92	4.73	4.51	4.26	3.97	3.63	3.25
11,000	5.59	5.60	5.56	5.48	5.36	5.20	5.00	4.77	4.50	4.19	3.84	3.44
11,500	5.90	5.90	5.86	5.78	5.66	5.49	5.28	5.03	4.74	4.42	4.06	3.64
12,000	6.21	6.21	6.17	6.09	5.96	5.79	5.57	5.30	4.99	4.65	4.27	3.84
12,500	6.53	6.52	6.48	6.40	6.27	6.09	5.86	5.58	5.26	4.89	4.48	4.04
13,000	6.85	6.85	6.80	6.71	6.58	6.40	6.16	5.87	5.53	5.14	4.71	4.25
13,500	7.18	7.19	7.14	7.04	6.90	6.71	6.46	6.16	5.81	5.41	4.96	4.46
14,000	7.52	7.53	7.48	7.38	7.23	7.03	6.77	6.46	6.10	5.68	5.21	4.68
14,500	7.87	7.87	7.82	7.72	7.56	7.35	7.08	6.76	6.39	5.96	5.46	4.90

SIGHT ANGLE IN DEGREES—Continued

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
14,500	7.87	7.87	7.82	7.72	7.56	7.35	7.08	6.76	6.39	5.96	5.46	4.90
15,000	8.22	8.22	8.17	8.06	7.90	7.68	7.40	7.07	6.69	6.24	5.71	----
15,500	8.58	8.58	8.53	8.42	8.25	8.02	7.73	7.39	6.99	6.52	5.97	----
16,000	8.95	8.95	8.90	8.79	8.62	8.38	8.08	7.72	7.30	6.81	6.25	----
16,500	9.32	9.33	9.28	9.16	8.98	8.74	8.43	8.06	7.62	7.10	6.52	----
17,000	9.70	9.72	9.67	9.54	9.35	9.10	8.79	8.41	7.95	7.41	6.80	----
17,500	10.09	10.11	10.06	9.93	9.73	9.47	9.15	8.76	8.29	7.74	7.10	----
18,000	10.49	10.51	10.46	10.33	10.13	9.86	9.53	9.13	8.64	8.07	7.41	----
18,500	10.90	10.92	10.87	10.74	10.54	10.27	9.93	9.51	9.00	8.41	7.73	----
19,000	11.32	11.34	11.29	11.16	10.96	10.68	10.33	9.89	9.37	8.76	8.07	----
19,500	11.75	11.77	11.72	11.59	11.38	11.10	10.74	10.29	9.75	9.12	8.41	----
20,000	12.19	12.21	12.15	12.02	11.81	11.53	11.16	10.70	10.15	9.50	8.76	----
20,500	12.63	12.65	12.60	12.47	12.26	11.97	11.60	11.13	10.56	9.89	9.13	----
21,000	13.08	13.11	13.06	12.93	12.72	12.43	12.05	11.57	10.99	10.30	9.51	----
21,500	13.55	13.58	13.53	13.40	13.19	12.90	12.52	12.03	11.44	10.73	9.91	----
22,000	14.03	14.06	14.01	13.88	13.67	13.38	13.00	12.51	11.91	11.18	10.33	----
22,500	14.52	14.56	14.51	14.38	14.17	13.88	13.49	13.00	12.39	11.65	----	----
23,000	15.01	15.06	15.02	14.89	14.68	14.39	14.00	13.51	12.90	12.14	----	----
23,500	15.52	15.57	15.53	15.41	15.21	14.92	14.54	14.05	13.43	12.66	----	----
24,000	16.04	16.09	16.06	15.95	15.75	15.47	15.10	14.61	13.99	13.22	----	----
24,500	16.57	16.62	16.60	16.50	16.31	16.04	15.68	15.20	14.59	13.82	----	----
25,000	17.11	17.17	17.16	17.07	16.89	16.63	16.28	15.82	15.23	14.47	----	----
25,500	17.66	17.73	17.73	17.65	17.49	17.25	16.92	16.48	15.91	----	----	----
26,000	18.22	18.30	18.32	18.26	18.12	17.90	17.59	17.18	----	----	----	----
26,500	18.79	18.89	18.93	18.89	18.77	18.58	18.30	----	----	----	----	----
27,000	19.38	19.50	19.55	19.53	19.44	19.28	----	----	----	----	----	----
27,500	19.99	20.12	20.19	20.19	20.13	----	----	----	----	----	----	----
28,000	20.61	20.76	20.85	----	----	----	----	----	----	----	----	----
28,500	21.24	21.41	----	----	----	----	----	----	----	----	----	----

TIME OF FLIGHT IN SECONDS

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
0	0	0	0	0	0	0	0	0	0	0	0	0
500	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58	.58
1,000	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16	1.16
1,500	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75
2,000	2.35	2.35	2.35	2.35	2.35	2.35	2.36	2.36	2.36	2.36	2.36	2.36
2,500	2.96	2.96	2.96	2.97	2.97	2.97	2.98	2.98	2.98	2.99	2.99	2.99
3,000	3.57	3.58	3.58	3.59	3.59	3.60	3.61	3.61	3.61	3.62	3.62	3.63
3,500	4.19	4.20	4.21	4.22	4.22	4.23	4.24	4.24	4.25	4.26	4.26	4.27
4,000	4.82	4.83	4.84	4.85	4.86	4.87	4.88	4.89	4.90	4.91	4.91	4.92
4,500	5.46	5.47	5.48	5.49	5.51	5.52	5.53	5.55	5.56	5.57	5.58	5.59
5,000	6.11	6.12	6.13	6.15	6.17	6.18	6.20	6.22	6.23	6.24	6.26	6.27
5,500	6.77	6.79	6.80	6.82	6.84	6.86	6.88	6.90	6.92	6.93	6.95	6.96
6,000	7.44	7.46	7.48	7.50	7.52	7.54	7.57	7.59	7.61	7.63	7.65	7.67
6,500	8.12	8.14	8.16	8.18	8.21	8.24	8.27	8.29	8.31	8.34	8.36	8.39
7,000	8.80	8.83	8.85	8.88	8.91	8.95	8.98	9.01	9.03	9.06	9.09	9.12
7,500	9.49	9.53	9.56	9.59	9.62	9.66	9.70	9.73	9.76	9.79	9.83	9.86
8,000	10.20	10.24	10.28	10.31	10.35	10.39	10.43	10.46	10.50	10.54	10.58	10.61
8,500	10.92	10.96	11.00	11.05	11.09	11.13	11.17	11.21	11.25	11.30	11.34	11.38
9,000	11.64	11.69	11.74	11.79	11.84	11.88	11.93	11.97	12.02	12.07	12.12	12.16
9,500	12.37	12.43	12.49	12.54	12.59	12.64	12.70	12.75	12.81	12.86	12.91	12.96
10,000	13.12	13.18	13.24	13.29	13.35	13.41	13.48	13.54	13.61	13.67	13.72	13.77
10,500	13.88	13.94	14.00	14.06	14.13	14.20	14.27	14.34	14.42	14.49	14.55	14.60
11,000	14.65	14.72	14.78	14.85	14.93	15.00	15.08	15.16	15.24	15.32	15.39	15.45
11,500	15.43	15.50	15.57	15.65	15.74	15.82	15.90	15.99	16.08	16.16	16.24	16.32
12,000	16.22	16.29	16.37	16.46	16.55	16.65	16.74	16.83	16.93	17.02	17.11	17.20
12,500	17.02	17.10	17.19	17.28	17.38	17.49	17.59	17.69	17.80	17.90	18.00	18.10

12,500	17.62	17.70	17.79	17.88	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13,000	17.84	17.93	18.02	18.12	18.23	18.34	18.45	18.57	18.69	18.80	18.91	19.01
13,500	18.67	18.76	18.86	18.97	19.09	19.21	19.33	19.46	19.59	19.72	19.84	19.94
14,000	19.51	19.60	19.71	19.83	19.96	20.09	20.23	20.37	20.51	20.65	20.78	20.90
14,500	20.36	20.46	20.58	20.71	20.85	20.99	21.14	21.29	21.45	21.60	21.75	21.89

TIME OF FLIGHT IN SECONDS—Continued

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
14,500	20.36	20.46	20.58	20.71	20.85	20.99	21.14	21.29	21.45	21.60	21.75	21.89
15,000	21.23	21.34	21.46	21.60	21.75	21.90	22.06	22.23	22.41	22.58	22.74	-----
15,500	22.11	22.23	22.36	22.50	22.66	22.83	23.01	23.20	23.39	23.58	23.76	-----
16,000	23.01	23.13	23.27	23.42	23.59	23.78	23.98	24.19	24.39	24.60	24.80	-----
16,500	23.92	24.05	24.19	24.35	24.54	24.75	24.97	25.20	25.42	25.64	25.86	-----
17,000	24.85	24.98	25.13	25.30	25.50	25.73	25.97	26.22	26.47	26.71	26.95	-----
17,500	25.79	25.93	26.09	26.28	26.49	26.73	26.99	27.26	27.54	27.81	28.07	-----
18,000	26.74	26.89	27.07	27.27	27.50	27.76	28.04	28.33	28.63	28.93	29.22	-----
18,500	27.71	27.86	28.05	28.27	28.53	28.81	29.11	29.43	29.75	30.08	30.41	-----
19,000	28.69	28.84	29.04	29.29	29.57	29.87	30.20	30.55	30.91	31.27	31.63	-----
19,500	29.69	29.85	30.06	30.32	30.62	30.95	31.31	31.70	32.10	32.49	32.89	-----
20,000	30.70	30.88	31.10	31.37	31.69	32.05	32.45	32.88	33.32	33.75	34.19	-----

20,500	31.73	31.92	32.16	32.45	32.79	33.18	33.62	34.09	34.57	35.06	35.55	-----
21,000	32.77	32.97	33.23	33.54	33.91	34.34	34.82	35.33	35.87	36.42	36.96	-----
21,500	33.83	34.04	34.31	34.65	35.05	35.52	36.04	36.61	37.21	37.82	38.43	-----
22,000	34.91	35.13	35.42	35.78	36.22	36.73	37.30	37.93	38.60	39.28	39.96	-----
22,500	36.00	36.24	36.55	36.94	37.42	37.97	38.60	39.30	40.04	40.80	-----	-----
23,000	37.11	37.36	37.70	38.12	38.64	39.25	39.95	40.72	41.54	42.40	-----	-----
23,500	38.24	38.50	38.86	39.32	39.89	40.56	41.34	42.20	43.12	44.08	-----	-----
24,000	39.38	39.66	40.05	40.55	41.17	41.91	42.77	43.73	44.77	45.86	-----	-----
24,500	40.54	40.83	41.26	41.81	42.49	43.30	44.25	45.32	46.50	47.76	-----	-----
25,000	41.72	42.03	42.49	43.09	43.84	44.74	45.79	46.99	48.33	49.79	-----	-----
25,500	42.92	43.25	43.75	44.41	45.23	46.23	47.41	48.76	50.27	-----	-----	-----
26,000	44.13	44.50	45.04	45.76	46.67	47.78	49.10	50.64	-----	-----	-----	-----
26,500	45.36	45.77	46.35	47.14	48.15	49.39	50.88	-----	-----	-----	-----	-----
27,000	46.62	47.05	47.69	48.56	49.68	51.07	-----	-----	-----	-----	-----	-----
27,500	47.89	48.36	49.07	50.03	51.28	-----	-----	-----	-----	-----	-----	-----
28,000	49.19	49.69	50.48	-----	-----	-----	-----	-----	-----	-----	-----	-----
28,500	50.51	51.06	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

GENE SLOVERS
US NAVY PAGES

A. A. RANGE TABLE
FOR
16-INCH 50-CALIBER GUN

PART II

HOME INDEX

PART II

Deflection Effects Due to Drift and Wind

DRIFT IN YARDS	
Time of	Angle of elevation in degrees

flight	5	10	15	20	25	30	35	40	45	50	55	60
2	1	1	0	0	0	0	0	0	0	0	0	0
4	3	3	2	2	1	1	1	1	1	1	1	1
6	6	6	5	5	4	4	3	3	3	3	3	2
8	11	10	10	9	8	8	7	7	6	6	5	4
10	18	17	16	15	14	13	12	11	10	9	8	7
12	27	26	24	22	21	19	18	16	15	13	12	10
14	39	36	33	31	29	27	25	23	21	19	17	14
16	--	47	44	41	39	36	34	31	28	26	22	19
18	--	59	56	53	50	47	44	40	37	33	29	25
20	--	73	69	66	62	59	55	51	47	42	38	33
22	--	88	84	80	76	72	68	63	58	52	47	41
24	--	105	101	96	92	87	82	77	71	64	57	50
26	--	125	120	115	110	104	98	92	85	77	69	60
28	--	147	142	136	129	123	116	109	101	92	82	71
30	--	---	166	158	150	143	135	127	119	109	97	84
32	--	---	190	182	174	165	156	147	138	127	113	98
34	--	---	215	207	199	190	180	170	159	146	131	114
36	--	---	241	234	226	216	205	194	181	167	151	132
38	--	---	---	264	254	243	232	220	206	191	174	153
40	--	---	---	296	284	273	261	248	234	217	198	175
42	--	---	---	330	317	305	293	279	263	245	223	198
44	--	---	---	366	352	339	326	311	294	274	250	223
46	--	---	---	403	389	375	361	345	327	305	280	251
48	--	---	---	442	427	413	398	381	362	339	312	281
50	--	---	---	---	467	452	436	419	399	375	346	313

1900-Lb. H. C. Projectile RESTRICTED

DRIFT IN YARDS

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
500	0	0	0	0	0	0	0	0	0	0	0	0
1,000	0	0	0	0	0	0	0	0	0	0	0	0
1,500	1	1	1	1	0	0	0	0	0	0	0	0
2,000	1	1	1	1	1	1	1	1	1	1	1	1
2,500	2	2	2	2	1	1	1	1	1	1	1	1
3,000	2	2	2	2	2	2	2	2	2	2	2	2
3,500	3	3	3	3	2	2	2	2	2	2	2	2
4,000	4	4	4	4	3	3	3	3	3	3	3	3
4,500	6	6	5	5	4	4	4	4	3	3	3	3
5,000	7	7	6	6	5	5	5	5	4	4	4	4
5,500	9	8	8	7	6	6	6	6	5	5	5	5
6,000	11	10	9	8	8	7	7	7	6	6	6	5
6,500	13	12	11	10	9	9	8	8	7	7	7	6
7,000	15	14	13	12	11	10	10	10	9	9	8	7
7,500	17	16	15	14	13	12	12	11	10	10	9	9
8,000	20	19	18	16	15	14	14	13	12	12	11	10
8,500	23	21	20	19	17	16	16	15	14	13	12	12
9,000	26	24	22	21	20	19	18	17	16	15	14	13
9,500	29	27	25	24	23	22	21	19	18	17	16	15
10,000	33	31	29	27	26	24	23	22	20	19	18	17
10,500	37	35	33	31	29	27	26	25	23	22	20	19
11,000	41	39	37	35	33	31	30	28	26	24	22	21
11,500	46	43	41	39	37	35	33	31	29	27	25	23
12,000	51	48	45	43	41	39	37	35	32	30	28	26
12,500	56	53	50	48	46	43	41	39	36	34	31	29
13,000	61	58	55	53	51	48	46	43	40	38	35	33
13,500	67	63	60	58	56	53	51	48	45	42	39	37
14,000	73	69	66	63	61	58	55	52	49	46	43	41
14,500	80	76	72	69	66	63	60	57	54	50	46	--

15,000	87	82	78	75	72	69	66	63	59	55	50	--

DRIFT IN YARDS—Continued

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
15,000	87	82	78	75	72	69	66	63	59	55	50	---
15,500	94	89	85	81	78	75	72	69	65	60	55	--
16,000	102	96	92	88	85	82	79	75	71	66	60	--
16,500	110	104	100	96	93	89	86	82	77	72	66	--
17,000	119	113	108	104	101	97	93	89	84	78	72	--
17,500	128	122	117	113	109	105	101	97	92	85	78	--
18,000	137	131	126	122	118	114	110	106	100	93	85	--
18,500	147	141	136	131	127	124	120	115	109	102	93	--
19,000	158	151	146	141	137	134	130	125	119	111	102	--
19,500	169	162	157	152	148	144	140	135	129	121	111	--
20,000	181	174	168	163	159	155	151	146	139	131	121	--
20,500	193	186	180	175	171	167	163	158	151	143	133	--
21,000	206	199	193	188	184	180	176	171	164	156	146	--
21,500	220	213	207	202	198	194	190	185	178	170	160	--
22,000	234	227	221	216	212	209	205	199	192	184	175	--
22,500	249	242	236	231	227	224	220	215	208	200	---	--

23,000	265	257	251	246	243	240	237	232	226	218	---	--
23,500	281	273	267	263	260	258	255	251	246	239	---	--
24,000	298	290	285	281	279	277	275	272	268	262	---	--
24,500	316	308	303	300	299	297	296	294	292	288	---	--
25,000	335	326	321	319	319	319	319	319	318	316	---	--
25,500	354	345	341	340	341	342	344	347	---	---	---	--
26,000	374	366	362	362	364	367	371	---	---	---	---	--
26,500	395	388	385	386	389	394	---	---	---	---	---	--
27,000	417	411	409	411	416	---	---	---	---	---	---	--
27,500	440	435	435	---	---	---	---	---	---	---	---	--
28,000	465	460	---	---	---	---	---	---	---	---	---	--

DEFLECTION IN YARDS FOR A 10-KNOT CROSS WIND

Time of Flight	Angle of elevation in degrees					
	10	20	30	40	50	60
2	0	0	0	0	0	0
4	1	1	1	1	1	1
6	2	2	2	2	2	2
8	3	3	3	3	3	3

10	5	5	5	5	5	4
12	7	7	7	7	7	6
14	9	9	9	9	9	8
16	12	12	11	11	11	10
18	15	15	14	13	13	12
20	19	18	17	15	15	14
22	23	21	20	18	17	16
24	27	25	23	21	20	18
26	31	28	26	24	23	21
28	--	32	29	27	25	24
30	--	36	33	30	28	27
32	--	40	37	34	32	30
34	--	45	40	37	35	33
36	--	50	44	40	38	36
38	--	55	49	44	41	39
40	--	60	53	48	44	42
42	--	65	57	51	47	45
44	--	70	62	55	50	48
46	--	75	67	60	54	50
48	--	81	72	64	58	53
50	--	87	77	69	63	58

DEFLECTION IN YARDS FOR A 10-KNOT CROSS WIND

Slant range, yds.	Position angle in degrees					
	0	10	20	30	40	50
500	0	0	0	0	0	0
1, 000	0	0	0	0	0	0
1, 500	0	0	0	0	0	0
2, 000	1	1	1	1	1	0
2, 500	1	1	1	1	1	1
3, 000	1	1	1	1	1	1
3, 500	1	1	1	1	1	1
4, 000	1	2	2	2	2	2
4, 500	2	2	2	2	2	2
5, 000	2	2	2	2	2	2
5, 500	2	3	3	3	3	3
6, 000	3	3	3	3	3	3
6, 500	4	4	4	4	4	4
7, 000	5	5	5	4	4	4
7, 500	5	5	5	5	5	5
8, 000	6	6	6	5	5	5
8, 500	7	6	7	6	6	6
9, 000	7	7	7	7	7	7
9, 500	8	8	8	7	7	7
10, 000	9	9	9	8	8	8
10, 500	10	10	10	9	9	9
11, 000	11	11	11	10	10	10
11, 500	12	12	12	11	11	11
12, 000	13	13	13	12	12	12
12, 500	15	14	13	13	13	12
13, 000	16	15	14	14	14	13
13, 500	18	16	15	15	15	14
14, 000	19	18	17	16	16	15
14, 500	20	19	18	17	17	16
15, 000	22	20	19	18	18	18

DEFLECTION IN YARDS FOR A 10-KNOT CROSS WIND—Continued

Slant range, yds.	Position angle in degrees					
	0	10	20	30	40	50
15. 000	22	20	19	18	18	18
15, 500	24	22	21	20	20	19
16, 000	26	24	22	21	21	20
16, 500	27	25	24	23	22	22
17, 000	29	27	25	24	24	23
17, 500	31	29	27	26	25	25
18, 000	33	30	28	27	27	26
18, 500	35	32	30	29	28	28
19, 000	37	34	32	31	30	30
19, 500	39	36	34	33	32	32
20, 000	41	38	36	34	33	34
20, 500	43	40	37	36	35	36
21, 000	46	42	39	38	37	38
21, 500	49	44	41	40	40	40
22, 000	51	47	44	42	42	42
22, 500	53	49	46	44	44	--
23, 000	56	51	48	46	46	--
23, 500	58	53	50	48	48	--
24, 000	61	56	53	51	51	--

24, 500	64	59	56	54	54	--
25, 000	66	61	58	57	57	--
25, 500	69	64	61	60	--	--
26, 000	71	66	63	62	--	--
26, 500	74	69	66	--	--	--
27, 000	77	72	68	--	--	--
27, 500	81	74	--	--	--	--
28, 000	84	--	--	--	--	--
28, 500	87	--	--	--	--	--

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A. A. RANGE TABLE
FOR
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PART III

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PART III

Effects on Horizontal Range and Altitude Due to Variations From Standard Conditions

EFFECT ON HORIZONTAL RANGE IN YARDS DUE TO 100 FEET PER SECOND INCREASE IN INITIAL VELOCITY

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	65	65	64	61	58	55	52	49	45	41	37	32
4	127	126	124	120	115	110	104	97	89	81	72	63
6	186	184	181	176	170	163	154	144	132	120	107	93
8	243	240	236	230	222	213	202	189	174	158	141	123
10	297	294	289	282	272	261	248	233	215	196	175	152
12	348	346	340	332	321	308	293	276	256	233	208	180
14	396	395	390	381	369	354	337	318	295	269	240	208
16	443	443	438	428	415	399	380	359	334	305	272	235
18	---	489	484	474	460	443	423	400	372	340	303	262
20	---	532	528	518	504	486	465	440	410	375	334	289
22	---	573	570	561	547	528	506	480	448	410	366	316
24	---	613	611	603	589	570	547	519	485	444	397	343
26	---	651	651	644	630	611	588	559	523	479	428	370
28	---	689	690	684	671	652	628	598	560	513	458	398
30	---	---	729	722	710	693	669	637	597	547	488	425
32	---	---	766	759	749	733	709	676	633	580	519	452
34	---	---	801	795	787	773	749	714	669	613	549	478
36	---	---	835	831	825	812	788	752	704	645	578	504
38	---	---	868	867	863	851	827	790	740	678	607	530
40	---	---	900	902	900	889	865	827	775	711	637	556
42	---	---	930	937	937	927	904	865	810	743	666	581
44	---	---	---	971	973	965	942	902	846	776	695	606
46	---	---	---	1,005	1,010	1,003	980	940	882	808	723	631
48	---	---	---	1,037	1,047	1,041	1,018	977	917	840	751	656
50	---	---	---	1,067	1,083	1,079	1,056	1,014	952	873	781	680

EFFECT ON ALTITUDE IN YARDS DUE TO 100 FEET PER SECOND INCREASE IN INITIAL VELOCITY

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	5	11	17	23	28	32	36	41	46	50	53	55
4	10	22	33	44	55	64	73	82	91	98	104	109
6	15	33	49	64	80	95	109	122	134	145	154	161
8	20	43	64	84	104	124	143	160	176	191	203	213
10	25	52	78	103	128	152	175	197	217	236	252	264
12	30	61	91	121	151	180	207	233	258	281	300	314
14	35	70	105	139	173	206	238	269	298	325	348	363
16	40	79	118	157	195	232	269	304	337	368	394	412
18	--	88	131	174	216	258	299	338	376	410	439	460
20	--	96	143	190	236	282	328	372	414	452	484	507
22	--	104	154	205	256	306	356	405	452	494	529	554
24	--	111	165	220	275	330	385	438	489	535	573	601
26	--	118	176	235	295	354	413	471	526	575	617	649
28	--	124	186	250	314	378	442	504	563	616	661	696
30	--	---	196	264	332	401	470	537	600	657	705	742
32	--	---	207	279	351	424	497	569	637	698	749	787
34	--	---	217	293	370	447	524	600	673	739	793	832
36	--	---	227	307	388	469	550	631	709	779	837	876
38	--	---	236	320	406	491	576	661	743	818	880	921
40	--	---	244	333	423	513	602	691	778	858	924	965
42	--	---	253	345	439	534	628	721	812	897	967	1009
44	--	---	---	356	454	554	653	751	847	936	1009	1053
46	--	---	---	366	469	574	678	781	881	973	1049	1097
48	--	---	---	376	484	593	702	811	915	1010	1089	1140
50	--	---	---	386	498	612	727	840	948	1047	1129	1182

EFFECT ON HORIZONTAL RANGE IN YARDS DUE TO A 10 PERCENT DECREASE IN AIR DENSITY

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	4	4	4	4	3	3	3	3	3	2	2	2
4	14	14	13	13	12	12	11	10	9	8	7	6
6	30	29	28	27	26	25	23	21	19	17	15	13
8	50	49	47	45	44	42	39	36	32	29	26	23
10	75	73	71	68	65	62	58	53	48	43	38	33
12	105	102	99	95	90	85	79	73	66	59	52	45
14	139	135	130	124	117	110	103	95	86	76	67	58
16	176	171	164	156	147	138	128	118	107	95	84	72
18	216	209	200	190	179	168	155	142	129	115	101	87
20	258	249	239	227	214	200	184	168	152	136	119	102
22	---	291	280	266	250	233	215	196	177	158	138	118
24	---	335	322	306	287	267	246	225	203	181	158	135
26	---	381	366	347	326	303	279	255	230	204	178	152
28	---	428	411	390	366	340	313	286	257	228	199	170
30	---	476	458	434	407	378	348	317	285	253	221	189

32	---	525	506	480	450	417	383	349	314	278	243	207
34	---	---	554	526	493	457	420	382	343	304	265	226
36	---	---	603	572	537	499	458	416	373	330	287	244
38	---	---	653	620	582	541	497	451	404	357	310	263
40	---	---	703	669	628	583	536	486	435	384	332	281
42	---	---	754	718	675	627	575	521	466	410	354	299
44	---	---	805	768	723	671	615	557	497	437	377	318
46	---	---	---	818	771	716	656	593	529	464	399	336
48	---	---	---	869	820	762	698	630	561	491	421	354
50	---	---	---	921	869	808	740	668	593	518	444	372

EFFECT ON ALTITUDE IN YARDS DUE TO A 10 PERCENT DECREASE IN AIR DENSITY

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	0	1	1	1	1	2	2	2	2	2	3	3
4	1	2	3	4	5	6	7	8	9	9	10	11
6	2	4	7	9	11	13	15	17	19	20	21	23
8	3	7	11	15	19	22	26	29	32	34	36	38

10	4	10	16	22	28	33	38	42	46	49	53	56
12	4	13	21	30	38	45	51	57	62	66	71	75
14	4	16	27	38	48	57	66	73	79	85	91	96
16	4	19	33	46	59	70	81	90	98	105	112	118
18	3	21	39	55	70	84	97	108	117	126	134	141
20	--	23	45	64	82	98	113	126	137	147	157	165
22	--	25	50	73	94	113	130	145	158	169	180	190
24	--	26	55	81	105	127	147	164	179	192	204	215
26	--	26	59	89	116	141	164	184	201	215	228	241
28	--	25	62	96	127	156	181	203	222	238	252	267
30	--	24	65	103	138	170	198	222	243	261	277	293
32	--	22	67	110	149	184	215	242	265	285	302	319
34	--	--	69	116	159	198	232	262	287	308	327	345
36	--	--	70	121	169	212	250	282	309	332	352	372
38	--	--	71	126	178	225	267	302	331	356	378	399
40	--	--	70	130	186	238	283	321	353	380	404	426
42	--	--	68	133	194	250	299	340	374	403	429	452
44	--	--	--	135	202	262	314	358	395	426	453	477
46	--	--	--	136	209	273	329	377	417	450	478	503
48	--	--	--	136	214	283	343	395	438	473	503	529
50	--	--	--	135	218	293	358	413	459	497	528	555

EFFECT ON HORIZONTAL RANGE IN YARDS DUE TO 1-DEGREE INCREASE IN ANGLE OF ELEVATION

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	−3	−6	−8	−11	−13	−15	−17	−19	−21	−23	−25	−27
4	−5	−10	−15	−20	−25	−29	−33	−37	−41	−45	−49	−53
6	−7	−14	−21	−28	−35	−42	−48	−54	−60	−66	−71	−77
8	−7	−17	−27	−36	−45	−54	−63	−71	−79	−86	−93	−99
10	---	−20	−32	−44	−55	−66	−77	−87	−97	−106	−114	−121
12	---	−22	−37	−51	−64	−78	−91	−103	−114	−125	−134	−143
14	---	−23	−40	−57	−73	−89	−104	−118	−131	−143	−154	−164
16	---	−24	−43	−62	−81	−99	−116	−132	−147	−161	−174	−185
18	---	−23	−45	−66	−87	−107	−127	−145	−162	−178	−193	−206
20	---	−21	−45	−69	−92	−115	−137	−158	−177	−195	−211	−226
22	---	−18	−44	−71	−97	−123	−147	−170	−191	−211	−229	−246
24	---	−14	−43	−72	−101	−130	−157	−182	−205	−227	−247	−266
26	---	----	−41	−73	−105	−136	−165	−193	−219	−243	−265	−286
28	---	----	−38	−73	−108	−141	−173	−203	−232	−258	−283	−305
30	---	----	−33	−72	−110	−146	−180	−213	−244	−273	−300	−324
32	---	----	−28	−70	−111	−150	−187	−222	−256	−287	−316	−343
34	---	----	−23	−68	−111	−153	−193	−231	−267	−301	−332	−361
36	---	----	−18	−64	−110	−155	−198	−239	−278	−314	−348	−379
38	---	----	----	−60	−109	−157	−203	−247	−288	−327	−363	−397
40	---	----	----	−55	−107	−158	−207	−254	−298	−339	−378	−414
42	---	----	----	−49	−104	−158	−211	−261	−308	−352	−393	−431
44	---	----	----	−43	−100	−158	−214	−267	−317	−364	−408	−448
46	---	----	----	−35	−95	−156	−216	−273	−326	−376	−422	−465
48	---	----	----	−26	−90	−154	−217	−278	−335	−387	−436	−482
50	---	----	----	−16	−84	−151	−218	−283	−343	−398	−449	−498

EFFECT ON ALTITUDE IN YARDS DUE TO 1-DEGREE INCREASE IN ANGLE OF ELEVATION

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	30	29	29	28	27	26	25	23	22	20	18	16
4	59	57	56	55	53	51	48	45	42	38	34	30
6	86	85	83	81	78	75	71	66	61	56	50	44
8	112	111	109	106	102	98	93	87	80	73	65	57
10	137	136	134	131	126	121	115	108	100	90	80	70
12	160	160	158	155	150	144	137	129	119	108	96	83
14	---	184	182	178	173	166	158	149	138	125	111	96
16	---	207	205	201	195	188	179	168	156	142	126	109
18	---	229	227	223	217	210	200	188	174	159	142	124
20	---	250	248	245	239	231	220	207	192	176	158	138
22	---	270	269	266	260	251	240	227	211	193	173	151
24	---	289	289	286	280	272	260	246	229	209	188	165
26	---	307	308	306	300	292	280	265	247	226	203	178
28	---	---	326	325	320	312	300	284	265	243	218	191
30	---	---	344	344	339	331	319	303	283	260	233	204
32	---	---	361	362	358	350	338	322	301	276	248	217
34	---	---	377	380	377	369	357	340	318	292	263	230
36	---	---	393	397	395	388	375	357	335	308	277	244
38	---	---	---	414	413	406	393	375	352	324	292	258
40	---	---	---	430	429	423	411	393	369	340	307	272

42	---	---	---	446	445	440	429	411	386	356	322	286
44	---	---	---	460	461	457	446	428	403	372	337	300
46	---	---	---	473	476	473	463	445	419	388	352	313
48	---	---	---	484	490	488	479	462	436	404	367	327
50	---	---	---	---	503	503	495	479	454	421	383	340

EFFECT ON HORIZONTAL RANGE IN YARDS DUE TO A 10 KNOT REAR WIND

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1
6	2	2	2	2	2	2	2	2	2	2	2	2
8	4	4	4	3	3	3	3	3	3	3	3	3
10	7	6	6	5	5	5	5	5	5	5	4	4
12	10	9	9	8	7	8	7	8	7	7	6	6
14	--	12	12	11	10	10	9	10	10	9	8	8
16	--	15	15	14	13	13	12	12	12	11	11	11

18	--	19	19	18	17	16	15	15	15	14	14	13
20	--	24	23	22	21	20	19	18	17	17	17	16
22	--	28	27	26	25	24	23	21	20	19	19	18
24	--	32	32	31	30	28	26	24	23	22	21	21
26	--	38	37	35	34	32	30	28	26	25	24	23
28	--	--	42	40	38	36	34	32	30	29	28	26
30	--	--	48	46	43	40	38	36	34	32	31	29
32	--	--	53	51	48	45	42	40	38	36	34	32
34	--	--	59	56	53	50	47	44	42	40	38	35
36	--	--	65	62	58	55	52	49	46	44	42	39
38	--	--	--	68	64	60	56	53	50	47	45	42
40	--	--	--	74	70	66	62	58	54	51	48	45
42	--	--	--	81	77	72	67	63	59	56	52	49
44	--	--	--	89	83	77	72	67	63	60	56	53
46	--	--	--	96	89	83	77	72	68	64	61	57
48	--	--	--	103	96	89	83	78	73	69	65	61
50	--	--	--	---	102	96	90	84	79	74	70	65

EFFECT ON ALTITUDE IN YARDS DUE TO A 10-KNOT REAR WIND

Time of flight	Angle of elevation in degrees											
	5	10	15	20	25	30	35	40	45	50	55	60
2	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
14	--	0	0	1	1	1	1	1	0	0	0	0
16	--	0	1	1	1	1	1	1	1	0	0	0
18	--	0	1	1	1	1	1	1	1	1	0	0
20	--	0	1	1	2	2	2	1	1	1	1	1
22	--	0	1	1	2	2	2	2	1	1	1	1
24	--	0	1	1	2	2	2	2	2	1	1	1
26	--	0	1	1	2	2	2	2	2	2	2	2
28	--	--	1	1	2	2	3	2	2	2	2	2
30	--	--	1	2	2	3	3	3	2	2	2	2
32	--	--	1	2	3	3	3	3	3	3	3	3
34	--	--	1	2	3	3	3	3	3	3	3	3
36	--	--	1	2	3	3	3	3	3	3	4	4
38	--	--	--	2	3	3	4	4	4	4	4	5
40	--	--	--	2	3	3	4	4	4	4	5	6
42	--	--	--	2	3	3	4	4	4	5	5	6
44	--	--	--	2	3	4	4	4	5	5	6	7
46	--	--	--	2	3	4	4	5	5	5	6	8
48	--	--	--	2	3	4	4	5	5	5	6	8
50	--	--	--	--	3	4	5	5	6	6	7	9

GENE SLOVERS
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A. A. RANGE TABLE
FOR
16-INCH 50-CALIBER GUN

PART IV

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PART IV

Corrections to Sight Angle and Time of Flight for Variations From Standard Conditions

CORRECTION TO SIGHT ANGLE IN DEGREES FOR 100 FEET PER SECOND DECREASE IN INITIAL VELOCITY

Slant	Position angle in degrees

range, yds.	0	5	10	15	20	25	30	35	40	45	50	55
1,000	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
2,000	.07	.06	.06	.06	.07	.07	.06	.06	.06	.05	.04	.04
3,000	.10	.09	.09	.10	.11	.10	.09	.09	.09	.08	.07	.06
4,000	.14	.13	.13	.14	.15	.14	.13	.12	.12	.11	.10	.08
5,000	.18	.17	.17	.18	.19	.18	.16	.15	.15	.14	.13	.11
6,000	.22	.21	.21	.22	.23	.22	.20	.19	.19	.18	.16	.14
7,000	.26	.25	.25	.26	.27	.26	.24	.23	.22	.21	.19	.17
8,000	.31	.30	.30	.30	.31	.30	.28	.27	.26	.24	.22	.20
9,000	.36	.35	.35	.35	.36	.35	.33	.32	.30	.28	.26	.23
10,000	.41	.40	.40	.40	.41	.40	.38	.37	.35	.32	.30	.27
11,000	.46	.45	.45	.45	.46	.45	.44	.42	.40	.37	.34	.31
12,000	.52	.51	.51	.51	.51	.50	.49	.47	.45	.42	.39	.36
13,000	.58	.57	.57	.57	.57	.56	.55	.53	.51	.48	.44	.41
14,000	.64	.63	.63	.63	.63	.62	.61	.59	.57	.54	.50	.46
15,000	.71	.70	.70	.70	.70	.69	.68	.66	.64	.61	.57	----
16,000	.78	.77	.77	.77	.78	.77	.76	.74	.72	.69	.65	----
17,000	.85	.85	.85	.85	.86	.86	.85	.83	.81	.78	.74	----
18,000	.93	.94	.94	.94	.95	.95	.95	.93	.90	.87	.84	----
19,000	1.02	1.03	1.04	1.04	1.05	1.06	1.06	1.04	1.01	.98	.94	----
20,000	1.11	1.13	1.15	1.16	1.17	1.18	1.18	1.17	1.15	1.11	1.05	----
21,000	1.21	1.24	1.26	1.28	1.30	1.31	1.32	1.32	1.31	1.27	1.16	----
22,000	1.31	1.35	1.38	1.41	1.44	1.46	1.48	1.50	1.50	1.46	----	----
23,000	1.42	1.47	1.51	1.55	1.60	1.63	1.67	1.71	1.72	1.69	----	----
24,000	1.54	1.60	1.66	1.72	1.78	1.83	1.89	1.96	2.00	1.99	----	----
25,000	1.66	1.74	1.83	1.91	1.99	2.08	2.17	2.26	2.34	2.40	----	----
26,000	1.79	1.90	2.01	2.12	2.24	2.38	2.52	----	----	----	----	----
27,000	1.94	2.07	2.20	2.35	2.53	----	----	----	----	----	----	----
28,000	2.11	2.25	----	----	----	----	----	----	----	----	----	----

CORRECTION OF TIME OF FLIGHT IN SECONDS FOR 100 FEET PER SECOND DECREASE IN INITIAL VELOCITY

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
1,000	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05
2,000	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09	.10
3,000	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14	.14	.15
4,000	.19	.19	.19	.19	.20	.20	.20	.20	.20	.20	.20	.21
5,000	.25	.25	.25	.25	.26	.26	.26	.26	.26	.26	.26	.27
6,000	.31	.31	.31	.31	.32	.32	.32	.32	.33	.33	.33	.34
7,000	.37	.37	.37	.38	.38	.39	.39	.39	.40	.40	.41	.41
8,000	.43	.43	.44	.45	.45	.46	.46	.47	.48	.48	.49	.49
9,000	.50	.50	.51	.52	.52	.53	.54	.55	.56	.57	.58	.58
10,000	.57	.57	.58	.59	.60	.61	.63	.64	.65	.66	.67	.68
11,000	.64	.65	.66	.67	.69	.70	.72	.74	.75	.77	.78	.79
12,000	.72	.73	.74	.76	.78	.80	.82	.84	.86	.88	.90	.91
13,000	.80	.82	.83	.85	.88	.90	.92	.95	.98	1.00	1.03	1.05
14,000	.89	.91	.93	.95	.98	1.01	1.04	1.07	1.11	1.14	1.17	1.20
15,000	.99	1.01	1.03	1.06	1.09	1.13	1.17	1.21	1.25	1.29	1.32	----
16,000	1.09	1.11	1.14	1.18	1.22	1.26	1.31	1.36	1.41	1.46	1.50	----
17,000	1.19	1.22	1.26	1.30	1.35	1.40	1.46	1.53	1.60	1.66	1.71	----
18,000	1.29	1.33	1.38	1.43	1.49	1.56	1.64	1.72	1.81	1.89	1.95	----
19,000	1.40	1.45	1.51	1.57	1.65	1.74	1.84	1.94	2.05	2.15	2.23	----
20,000	1.51	1.58	1.65	1.73	1.83	1.94	2.07	2.20	2.33	2.46	2.57	----
21,000	1.63	1.72	1.81	1.91	2.03	2.17	2.33	2.50	2.67	2.83	2.98	----
22,000	1.76	1.87	1.98	2.11	2.26	2.43	2.63	2.85	3.08	3.29	----	----
23,000	1.90	2.03	2.17	2.33	2.52	2.73	2.98	3.27	3.58	3.88	----	----
24,000	2.06	2.21	2.38	2.58	2.81	3.08	3.40	3.78	4.21	4.67	----	----
25,000	2.24	2.41	2.61	2.86	3.15	3.50	3.93	4.44	5.04	5.75	----	----
26,000	2.43	2.62	2.87	3.18	3.56	4.03	4.64	----	----	----	----	----
27,000	2.63	2.85	3.16	3.56	4.06	----	----	----	----	----	----	----
28,000	2.84	3.09	----	----	----	----	----	----	----	----	----	----

CORRECTION TO SIGHT ANGLE IN DEGREES FOR 10-PERCENT INCREASE IN AIR DENSITY

Slant, range yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
1,000	0	0	0	0	0	0	0	0	0	0	0	0
2,000	0	0	0	0	0	0	0	0	0	0	0	0
3,000	.01	.01	.01	0	0	0	0	0	0	0	0	0
4,000	.01	.02	.02	.01	.01	.01	.01	.01	.01	.01	.01	.01
5,000	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
6,000	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03	.02	.02
7,000	.04	.05	.05	.05	.04	.05	.05	.04	.04	.04	.03	.03
8,000	.05	.06	.06	.06	.06	.06	.06	.05	.05	.05	.04	.03
9,000	.07	.08	.08	.07	.07	.07	.07	.07	.06	.06	.05	.04
10,000	.09	.10	.10	.09	.09	.09	.09	.09	.08	.07	.06	.06
11,000	.12	.12	.12	.11	.11	.11	.11	.11	.10	.08	.07	.07
12,000	.15	.15	.15	.14	.14	.14	.14	.13	.12	.10	.09	.09
13,000	.18	.18	.18	.17	.16	.16	.16	.15	.14	.12	.11	.11
14,000	.22	.21	.21	.20	.19	.19	.19	.18	.16	.15	.14	.13
15,000	.26	.25	.25	.24	.23	.23	.22	.21	.19	.18	.17	--
16,000	.30	.30	.29	.28	.28	.27	.26	.24	.23	.21	.20	--
17,000	.35	.35	.34	.33	.33	.32	.30	.28	.27	.25	.24	--

18,000	.41	.41	.40	.39	.38	.37	.35	.33	.31	.29	.28	--
19,000	.48	.47	.46	.45	.44	.43	.41	.39	.36	.34	.33	--
20,000	.55	.54	.53	.52	.51	.49	.48	.46	.43	.41	.39	--
21,000	.63	.62	.61	.60	.59	.57	.56	.54	.52	.49	.46	--
22,000	.71	.71	.70	.69	.68	.66	.65	.64	.62	.59	---	--
23,000	.80	.80	.80	.79	.78	.77	.76	.75	.74	.72	---	--
24,000	.90	.90	.90	.89	.89	.89	.89	.89	.89	.89	---	--
25,000	1.01	1.01	1.01	1.01	1.02	1.03	1.05	1.07	1.09	1.11	---	--
26,000	1.13	1.13	1.14	1.15	1.17	1.20	1.23	---	----	----	---	--
27,000	1.26	1.27	1.29	1.32	1.35	----	----	---	----	----	---	--
28,000	1.41	1.42	----	----	----	----	----	---	----	----	---	--

CORRECTION TO TIME OF FLIGHT IN SECONDS FOR 10-PERCENT INCREASE IN AIR DENSITY

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
1,000	0	0	0	0	0	0	0	0	0	0	0	0
2,000	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
3,000	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
4,000	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02

5,000	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04	.04
6,000	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
7,000	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
8,000	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
9,000	.15	.15	.15	.14	.14	.14	.14	.14	.14	.14	.14	.14
10,000	.19	.19	.19	.18	.18	.18	.18	.18	.18	.18	.18	.18
11,000	.23	.23	.23	.23	.23	.23	.23	.22	.22	.22	.22	.22
12,000	.28	.28	.28	.28	.28	.28	.28	.27	.27	.27	.27	.27
13,000	.34	.34	.34	.34	.33	.33	.33	.33	.33	.33	.33	.33
14,000	.41	.41	.40	.40	.39	.39	.39	.40	.40	.40	.40	.41
15,000	.49	.48	.47	.47	.46	.46	.46	.47	.47	.48	.48	---
16,000	.58	.56	.55	.55	.54	.54	.54	.55	.55	.56	.57	---
17,000	.67	.65	.64	.64	.63	.63	.63	.64	.65	.66	.67	---
18,000	.77	.75	.74	.74	.73	.73	.74	.75	.77	.78	.79	---
19,000	.88	.86	.85	.84	.84	.85	.86	.88	.90	.92	.94	---
20,000	.99	.98	.97	.96	.96	.98	1.00	1.03	1.05	1.08	1.12	---
21,000	1.12	1.11	1.10	1.09	1.10	1.13	1.16	1.20	1.23	1.27	1.33	---
22,000	1.26	1.25	1.24	1.24	1.26	1.30	1.35	1.40	1.45	1.51	----	---
23,000	1.41	1.40	1.40	1.41	1.44	1.49	1.56	1.64	1.73	1.83	----	---
24,000	1.57	1.56	1.57	1.60	1.64	1.71	1.81	1.93	2.08	2.26	----	---
25,000	1.75	1.74	1.76	1.80	1.87	1.98	2.12	2.29	2.51	2.83	----	---
26,000	1.95	1.93	1.96	2.03	2.15	2.31	2.51	----	----	----	----	---
27,000	2.16	2.14	2.17	2.28	2.49	----	----	----	----	----	----	---
28,000	2.37	2.37	2.37	----	----	----	----	----	----	----	----	---

CORRECTION TO SIGHT ANGLE IN DEGREES FOR 10-POUND INCREASE IN WEIGHT OF PROJECTILE

Slant range, yds.	Position angle in degrees					
	0	10	20	30	40	50
1,000	0	0	0	0	0	0
2,000	0	0	0	0	0	0
3,000	0	0	0	0	0	0
4,000	0	0	0	0	0	0
5,000	0	0	0	0	0	0
6,000	.01	.01	.01	.01	.01	.01
7,000	.01	.01	.01	.01	.01	.01
8,000	.01	.01	.01	.01	.01	.01
9,000	.01	.01	.01	.01	.01	.01
10,000	.01	.01	.01	.01	.01	.01
11,000	.01	.01	.01	.01	.01	.01
12,000	.01	.01	.01	.01	.01	.01
13,000	.01	.01	.01	.01	.01	.01
14,000	.01	.01	.01	.01	.01	.01
15,000	.01	.01	.01	.01	.01	.01
16,000	.01	.01	.01	.01	.01	.01
17,000	.01	.01	.01	.01	.01	.01
18,000	.01	.01	.01	.01	.01	.01
19,000	.01	.01	.01	.02	.02	.02
20,000	.01	.01	.01	.02	.02	.02
21,000	.01	.01	.01	.02	.02	.02
22,000	.01	.01	.01	.02	.02	---
23,000	.01	.01	.01	.02	.02	---
24,000	.01	.01	.02	.02	.02	---
25,000	0	.01	.02	.02	.02	---
26,000	0	.01	.02	.02	---	---
27,000	0	.01	.02	---	---	---
28,000	0	---	---	---	---	---

CORRECTION TO TIME OF FLIGHT IN SECONDS FOR 10-POUND INCREASE IN WEIGHT OF PROJECTILE

Slant range, yds.	Position angle in degrees					
	0	10	20	30	40	50
1,000	0	0	0	0	0	0
2,000	0	0	0	0	0	0
3,000	0	0	0	0	0	0
4,000	.01	.01	.01	.01	.01	.01
5,000	.01	.01	.01	.01	.01	.01
6,000	.01	.01	.01	.01	.01	.01
7,000	.01	.01	.01	.01	.01	.01
8,000	.01	.01	.01	.01	.01	.01
9,000	.01	.01	.01	.01	.01	.01
10,000	.01	.01	.01	.01	.01	.01
11,000	.01	.01	.01	.01	.01	.02
12,000	.01	.01	.01	.01	.02	.02
13,000	.01	.01	.01	.01	.02	.02
14,000	.01	.01	.01	.02	.02	.02
15,000	.01	.01	.01	.02	.02	.02
16,000	.01	.01	.01	.02	.02	.02
17,000	.01	.01	.01	.02	.02	.02
18,000	0	.01	.01	.02	.02	.03
19,000	0	.01	.01	.02	.02	.03
20,000	0	.01	.01	.02	.02	.03

20, 000	0	.01	.01	.02	.03	.03
21, 000	0	.01	.01	.02	.03	.03
22, 000	—.01	0	.01	.02	.03	---
23, 000	—.01	0	.01	.02	.03	---
24, 000	—.01	0	.01	.02	.04	---
25, 000	—.01	0	.01	.03	.04	---
26, 000	—.02	0	.01	.03	---	---
27, 000	—.02	0	.01	---	---	---
28, 000	—.03	---	---	---	---	---

CORRECTION TO SIGHT ANGLE IN DEGREES FOR A 10-KNOT REAR WIND

Slant range, yds.	Position angle in degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
1, 000	0	0	0	0	0	0	0	0	0	0	0	0
2, 000	0	0	0	0	0	0	0	0	0	0	0	0
3, 000	0	0	0	0	.01	.01	.01	.01	.01	01	.01	.01
4, 000	0	0	0	.01	.01	.01	.01	.01	.01	.01	.01	.01
5, 000	0	0	0	.01	.01	.01	.01	.01	.02	.02	.02	.02
6, 000	0	0	.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
7, 000	0	0	.01	.01	.01	.01	.01	.02	.02	.03	.03	.03
8, 000	0	0	.01	.01	.01	.02	.02	.02	.03	.03	.03	.03

9,000	—.01	0	.01	.01	.01	.02	.02	.03	.03	.04	.04	.04
10,000	—.01	0	0	.01	.01	.02	.02	.03	.03	.04	.04	.04
11,000	—.01	0	0	.01	.01	.02	.02	.03	.03	.04	.04	.04
12,000	—.01	0	0	.01	.01	.02	.02	.03	.03	.04	.04	.04
13,000	—.01	0	0	.01	.01	.02	.02	.03	.03	.04	.04	.04
14,000	—.02	—.01	0	.01	.01	.02	.03	.03	.03	.04	.04	.04
15,000	—.02	—.01	—.01	0	.01	.02	.03	.03	.04	.04	.04	---
16,000	—.02	—.01	—.01	0	0	.01	.02	.03	.04	.04	.04	---
17,000	—.03	—.02	—.01	0	0	.01	.02	.03	.03	.04	.04	---
18,000	—.03	—.02	—.01	—.01	0	.01	.02	.02	.03	.04	.04	---
19,000	—.04	—.03	—.02	—.01	0	.01	.02	.02	.03	.04	.04	---
20,000	—.04	—.03	—.02	—.01	—.01	0	.01	.02	.03	.04	.04	---
21,000	—.05	—.04	—.03	—.02	—.01	0	.01	.02	.03	.04	.04	---
22,000	—.06	—.05	—.04	—.02	—.01	0	.01	.02	.03	.03	---	---
23,000	—.07	—.06	—.04	—.03	—.02	—.01	0	.01	.02	.02	---	---
24,000	—.08	—.07	—.05	—.04	—.03	—.02	—.01	.01	.01	.02	---	---
25,000	—.10	—.08	—.06	—.05	—.04	—.03	—.02	0	.01	.01	---	---
26,000	—.11	—.09	—.07	—.06	—.05	—.04	—.03	---	---	---	---	---
27,000	—.12	—.10	—.08	—.07	—.06	-----	-----	---	---	---	---	---
28,000	—.14	—.12	-----	-----	-----	-----	-----	---	---	---	---	---

CORRECTION TO TIME OF FLIGHT IN SECONDS FOR A 10-KNOT REAR WIND

CORRECTION TO TIME OF FLIGHT IN SECONDS FOR A 10 KNOT [illegible]

Slant range, yds.	Position Angle in Degrees											
	0	5	10	15	20	25	30	35	40	45	50	55
1,000	0	0	0	0	0	0	0	0	0	0	0	0
2,000	0	0	0	0	0	0	0	0	0	0	0	0
3,000	0	0	0	0	0	0	0	0	0	0	0	0
4,000	0	0	0	0	0	0	0	0	0	0	0	0
5,000	0	0	0	0	0	0	0	0	0	0	0	0
6,000	0	0	0	0	0	0	0	0	0	0	0	0
7,000	−.01	−.01	−.01	−.01	−.01	−.01	−.01	0	0	0	0	0
8,000	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	0	0
9,000	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	0
10,000	−.02	−.02	−.02	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01	−.01
11,000	−.02	−.02	−.02	−.02	−.02	−.02	−.02	−.01	−.01	−.01	−.01	−.01
12,000	−.03	−.03	−.03	−.02	−.02	−.02	−.02	−.02	−.02	−.02	−.01	−.01
13,000	−.03	−.03	−.03	−.03	−.03	−.03	−.02	−.02	−.02	−.02	−.02	−.01
14,000	−.04	−.04	−.04	−.03	−.03	−.03	−.03	−.03	−.02	−.02	−.02	−.02
15,000	−.05	−.05	−.05	−.04	−.04	−.04	−.04	−.03	−.03	−.03	−.03	-----
16,000	−.06	−.06	−.05	−.05	−.05	−.05	−.04	−.04	−.04	−.03	−.03	-----
17,000	−.07	−.07	−.06	−.06	−.06	−.05	−.05	−.05	−.04	−.04	−.04	-----
18,000	−.08	−.08	−.07	−.07	−.07	−.06	−.06	−.05	−.05	−.04	−.04	-----
19,000	−.09	−.09	−.08	−.08	−.08	−.07	−.07	−.06	−.06	−.06	−.05	-----
20,000	−.10	−.10	−.10	−.09	−.09	−.08	−.08	−.08	−.07	−.07	−.06	-----
21,000	−.12	−.12	−.11	−.11	−.10	−.10	−.09	−.09	−.09	−.08	−.08	-----
22,000	−.13	−.13	−.13	−.12	−.12	−.11	−.11	−.11	−.10	−.10	-----	-----
23,000	−.15	−.15	−.15	−.14	−.14	−.13	−.13	−.13	−.12	−.12	-----	-----
24,000	−.17	−.17	−.17	−.16	−.16	−.15	−.15	−.15	−.15	−.15	-----	-----
25,000	−.20	−.19	−.19	−.18	−.18	−.18	−.18	−.18	−.18	−.18	-----	-----
26,000	−.22	−.22	−.21	−.21	−.21	−.21	−.21	-----	-----	-----	-----	-----
27,000	−.25	−.24	−.24	−.24	−.24	-----	-----	-----	-----	-----	-----	-----
28,000	−.28	−.27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

GENE SLOVERS
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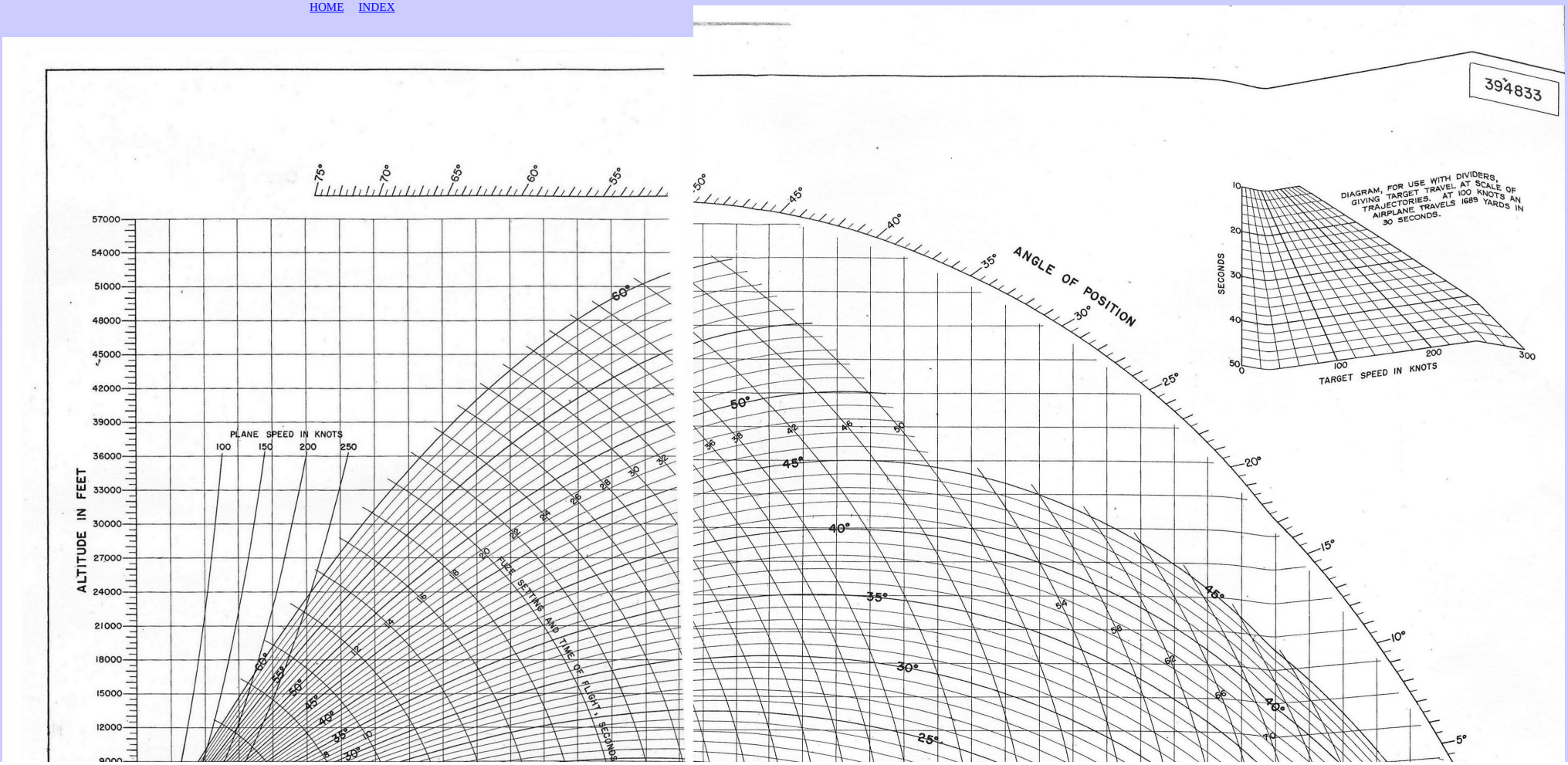
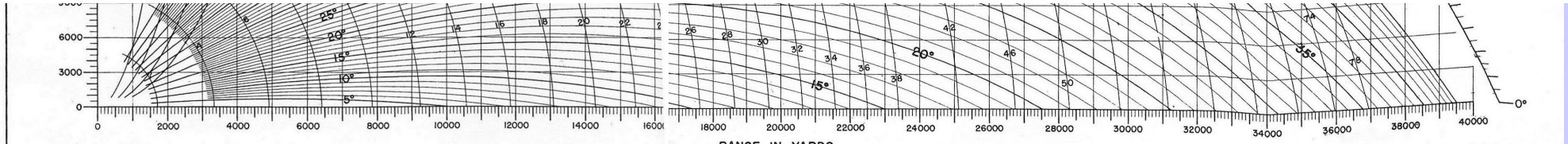
TRAJECTORIES

HOME INDEX





RANGE IN YARDS

NOTES:

1. THE TRAJECTORIES ARE APPLICABLE TO 16 INCH HIGH CAPACITY PROJECTILES MK. 13, FITTED WITH MECHANICAL TIME FUZES, POINT DETONATING FUZES, OR NOSE PLUGS.

2. IN NEW GUN WITH 90° POWDER THE INITIAL VELOCITY OF THE 1900 LB. HIGH CAPACITY PROJECTILE WHEN FIRED WITH SERVICE CHARGES FOR 2700 F.S. PROJECTILES WILL BE 2690 F.S. THE TRAJECTORIES ARE COMPUTED FOR 2615 F.S., THE EXPECTED AVERAGE VELOCITY OVER THE LIFE OF THE GUN.

(D) (C) 3. TRANGLE IN DEGREES INDICATED ON THE TRAJECTORIES IS THE ELEVATION OF THE GUN. THE WAL PROVING GROUND FIRINGS UPON WHICH THESE TRAJECTORIES ARE BASED INDICE THAT THE ANGLE OF DEPARTURE DIFFERS FROM THE ANGLE OF ELEVATION BY 9.7 MUTES; I.E., THE PROJECTILE APPARENTLY LEAVES THE GUN AT AN ANGLE 9.7 MINUS LESS THAN THE ANGLE OF ELEVATION. THIS WAS TAKEN INTO ACCOUNT IN COMPUTING THE TRAJECTORIES AND NO CORRECTIONS ARE NECESSARY.

4. T CURVES FOR PLANE SPEEDS OF 100, 150, 200, AND 250 KNOTS ARE HE LOCI OF RELEASE POINTS FOR A 1000 LB. BOMB HAVING A BALLISTIC COEFFICIENT OF 2.75.

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(B) REPRODUCTION OF DRAWING NO. 394833, DATED 28, OCT. 1943.

REVISIONS		
LET.	NUMBER	DATE
B	6165	11/25/43
C	6390	1/31/44
D	6540	3/17/44

EXAMINED		
SECTION	DIVISION OF RECORD	DATE
PLANNING-COORDINATING		11/5/43
DESIGN		11/22/43
CHIEF ENGINEER		11/27/43
HEAD ENGINEER		11/26/43
PRINCIPAL ENGINEER	J.W.W.	11/16/43
ASSISTANT ENGINEER		

CHECKED	
ENGINEER	CHIEF DRAFTS.
DRAWN BY: J.W.G.	TRACED BY: J.W.G.

16 IN. 50 CAL. GUN

TRAJECTORIES

I. V. = 2615 F. S.

1900 LB. H. C. PROJECTILE

NAVY DEPARTMENT
BUREAU OF ORDNANCE
WASHINGTON, D. C.
1 Dec., 1943

BY DIRECTION OF THE CHIEF OF BUREAU

BUREAU'S FILE	CLASSIFICATION	BUORD. DRAWING NO.
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