

RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF
PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maxi- mum ordi- nate	
1	2	2a	2b	3	4	5	6	7	8	
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet	
19000	11 00.4	660.4	4.6	13 48	27.79	1767	90	27	3120	
19100	11 05.0	665.0	4.6	13 55	27.97	1765	91	27		
19200	11 09.6	669.6	4.6	14 02	28.15	1762	93	27		
19300	11 14.2	674.2	4.6	14 08	28.33	1759	94	26		
19400	11 18.8	678.8	4.6	14 15	28.51	1756	95	26		
19500	11 23.4	683.4	4.6	14 22	28.69	1754	96	26	3320	
19600	11 28.0	688.0	4.6	14 28	28.87	1751	97	26		
19700	11 32.6	692.6	4.6	14 35	29.05	1748	99	26		
19800	11 37.2	697.2	4.7	14 42	29.23	1745	100	25		
19900	11 41.9	701.9	4.7	14 49	29.41	1743	101	25		
20000	11 46.6	706.6	4.7	14 55	29.59	1740	102	25	3530	
20100	11 51.3	711.3	4.7	15 02	29.78	1737	103	25		
20200	11 56.0	716.0	4.7	15 09	29.96	1735	105	25		
20300	12 00.7	720.7	4.8	15 16	30.14	1732	106	24		
20400	12 05.5	725.5	4.8	15 23	30.33	1730	107	24		
20500	12 10.3	730.3	4.8	15 30	30.51	1727	108	24	3750	
20600	12 15.1	735.1	4.8	15 37	30.70	1725	110	24		
20700	12 19.9	739.9	4.8	15 44	30.88	1722	111	24		
20800	12 24.7	744.7	4.8	15 51	31.07	1720	112	23		
20900	12 29.5	749.5	4.8	15 58	31.26	1717	114	23		
21000	12 34.3	754.3	4.8	16 05	31.44	1715	115	23	3980	

RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT
PROJECTILE = 4.5 CALIBERS.

	Change of range for varia- tion of +10 feet per second initial velocity	Change of range for varia- tion of -10 pounds in weight of pro- jectile	Change of range for varia- tion in density of air of -10 per cent	Change of range for wind com- ponent in plane of fire of 10 knots	
	10	11	12	13	
Yards	Yards	Yards	Yards	Yards	
126	36	403	44		
127	36	407	45		
127	36	411	45		
128	36	415	46		
129	36	419	46		
129	36	423	47		
130	36	428	47		
130	36	432	48		
131	36	436	48		
132	36	440	49		
132	36	445	49		
133	36	449	50		
133	37	453	50		
134	37	458	51		
135	37	462	51		
135	37	467	52		
136	37	471	52		
136	37	476	53		
137	37	480	53		
138	37	485	54		
138	37	489	54		

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INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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RANGE TABLE FOR 16-INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maximum ordinate	
1	2	2a	2b	3	4	5	6	7	8	
<i>Yards</i>	° ' "	<i>Minutes</i>	<i>Minutes</i>	° ' "	<i>Seconds</i>	<i>F. S.</i>	<i>Yards</i>	<i>Yards</i>	<i>Feet</i>	
23000	14 14.4	854.4	5.2	18 31	35.27	1670	145	20	5010	
23100	14 19.6	859.6	5.2	18 39	35.47	1668	146	20		
23200	14 24.8	864.8	5.2	18 47	35.67	1666	148	20		
23300	14 30.0	870.0	5.2	18 54	35.86	1664	150	19		
23400	14 35.2	875.2	5.3	19 02	36.06	1662	151	19		
23500	14 40.5	880.5	5.3	19 10	36.26	1660	153	19	5300	
23600	14 45.8	885.8	5.3	19 17	36.46	1658	155	19		
23700	14 51.1	891.1	5.3	19 25	36.66	1656	156	19		
23800	14 56.4	896.4	5.3	19 33	36.86	1654	158	19		
23900	15 01.7	901.7	5.4	19 41	37.06	1652	160	19		
24000	15 07.1	907.1	5.4	19 48	37.26	1650	162	19	5600	
24100	15 12.5	912.5	5.4	19 56	37.46	1649	163	18		
24200	15 17.9	917.9	5.4	20 04	37.67	1647	165	18		
24300	15 23.3	923.3	5.4	20 12	37.87	1645	167	18		
24400	15 28.7	928.7	5.5	20 20	38.07	1643	169	18		
24500	15 34.2	934.2	5.5	20 28	38.28	1641	171	18	5910	
24600	15 39.7	939.7	5.5	20 35	38.48	1639	172	18		
24700	15 45.2	945.2	5.5	20 43	38.69	1637	174	18		
24800	15 50.7	950.7	5.5	20 51	38.89	1636	176	18		
24900	15 56.2	956.2	5.5	20 59	39.10	1634	178	17		
25000	16 01.7	961.7	5.6	21 07	39.30	1632	180	17	6230	

RANGE TABLE I

INITIAL VELOCITY = 2500 F. S. WEIGHT OF
PROJECTILE = 4.5 CALIBERS.

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RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT
PROJECTILE = 4.5 CALIBER

	Change of range for variation of +10 feet per second initial velocity	Change of range for variation of -10 pounds in weight of projectile	Change of range for variation in density of air of -10 per cent	Change of range for wind component in plane of fire of 10 knots
	10	11	12	13
	<i>Yards</i>	<i>Yards</i>	<i>Yards</i>	<i>Yards</i>
	150	38	580	64
	150	38	584	65
	151	39	589	65
	151	39	593	66
	152	39	598	66
	153	39	602	67
	153	39	607	68
	154	39	612	68
	154	39	616	69
	155	39	621	69
	155	39	626	70
	156	39	630	70
	156	39	635	71
	157	39	640	72
	158	39	644	72
	158	39	649	73
	159	39	654	73
	159	39	658	74
	160	39	663	75
	161	39	668	75
	161	39	673	76

RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF
PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maxi- mum ordi- nate
1	2	2a	2b	3	4	5	6	7	8
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet
25000	16 01.7	961.7	5.6	21 07	39.30	1632	180	17	6230
25100	16 07.3	967.3	5.6	21 15	39.51	1630	182	17	
25200	16 12.9	972.9	5.6	21 23	39.72	1629	183	17	
25300	16 18.5	978.5	5.6	21 31	39.92	1627	185	17	
25400	16 24.1	984.1	5.6	21 39	40.13	1625	187	17	
25500	16 29.7	989.7	5.7	21 48	40.34	1623	189	17	6560
25600	16 35.4	995.4	5.7	21 56	40.55	1622	191	17	
25700	16 41.1	1001.1	5.7	22 04	40.76	1620	193	16	
25800	16 46.8	1006.8	5.7	22 12	40.97	1618	195	16	
25900	16 52.5	1012.5	5.8	22 20	41.18	1617	197	16	
26000	16 58.3	1018.3	5.8	22 28	41.39	1615	199	16	6910
26100	17 04.1	1024.1	5.8	22 36	41.60	1613	201	16	
26200	17 09.9	1029.9	5.8	22 45	41.81	1612	203	16	
26300	17 15.7	1035.7	5.8	22 53	42.02	1610	205	16	
26400	17 21.5	1041.5	5.9	23 01	42.23	1609	207	16	
26500	17 27.4	1047.4	5.9	23 09	42.44	1607	209	16	7270
26600	17 33.3	1053.3	5.9	23 18	42.65	1606	211	15	
26700	17 39.2	1059.2	5.9	23 26	42.87	1604	214	15	
26800	17 45.1	1065.1	5.9	23 34	43.09	1603	216	15	
26900	17 51.0	1071.0	6.0	23 43	43.31	1601	218	15	

RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF
PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maxi- mum ordi- nate
1	2	2a	2b	3	4	5	6	7	8
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet
27000	17 57.0	1077.0	6.0	23 51	43.53	1600	220	15	7640
27100	18 03.0	1083.0	6.0	24 00	43.75	1599	222	15	

RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT
PROJECTILE = 4.5 CALIBERS.

	Change of range for varia- tion of +10 feet per second initial velocity	Change of range for varia- tion of -10 pounds in weight of pro- jectile	Change of range for varia- tion in density of air of -10 per cent	Change of range for wind com- ponent in plane of fire of 10 knots
	10	11	12	13
Yards	Yards	Yards	Yards	Yards
161	39	673	76	
162	40	677	76	
162	40	682	77	
163	40	687	78	
163	40	692	78	
164	40	697	79	
165	40	701	79	
165	40	706	80	
166	40	711	81	
166	40	716	81	
167	40	721	82	
167	40	726	82	
168	40	730	83	
169	40	735	84	
169	40	740	84	
170	40	745	85	
170	40	750	85	
171	40	755	86	
171	40	760	87	
172	40	765	87	
172	40	770	88	

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INITIAL VELOCITY = 2500 F. S. WEIGHT
PROJECTILE = 4.5 CALIBERS

	Change of range for varia- tion of +10 feet per second initial velocity	Change of range for varia- tion of -10 pounds in weight of pro- jectile	Change of range for varia- tion in density of air of -10 per cent	Change of range for wind com- ponent in plane of fire of 10 knots
	10	11	12	13
Yards	Yards	Yards	Yards	Yards
172	40	770	88	
173	41	775	89	

27200	18	09.0	1089.0	6.0	24	08	43.97	1597	225	15		174	41	780	89
27300	18	15.0	1095.0	6.0	24	17	44.19	1596	227	15		174	41	785	90
27400	18	21.0	1101.0	6.1	24	25	44.41	1595	229	15		175	41	790	91
27500	18	27.1	1107.1	6.1	24	34	44.63	1593	231	15	8030	176	41	795	91
27600	18	33.2	1113.2	6.1	24	43	44.85	1592	234	14		176	41	800	92
27700	18	39.3	1119.3	6.2	24	51	45.07	1591	236	14		177	41	805	93
27800	18	45.5	1125.5	6.2	25	00	45.29	1590	238	14		177	41	810	93
27900	18	51.7	1131.7	6.2	25	09	45.51	1588	241	14		178	41	815	94
28000	18	57.9	1137.9	6.2	25	17	45.73	1587	243	14	8430	178	41	820	94
28100	19	04.1	1144.1	6.2	25	26	45.95	1586	245	14		179	41	825	95
28200	19	10.3	1150.3	6.3	25	35	46.17	1585	248	14		180	41	830	96
28300	19	16.6	1156.6	6.3	25	44	46.39	1584	250	14		180	41	835	97
28400	19	22.9	1162.9	6.3	25	52	46.61	1583	252	14		181	41	840	97
28500	19	29.2	1169.2	6.3	26	01	46.84	1581	255	14	8850	181	41	845	98
28600	19	35.5	1175.5	6.4	26	10	47.07	1580	257	14		182	41	850	98
28700	19	41.9	1181.9	6.4	26	19	47.30	1579	260	13		183	41	855	99
28800	19	48.3	1188.3	6.4	26	28	47.53	1578	262	13		183	41	860	100
28900	19	54.7	1194.7	6.4	26	36	47.76	1577	265	13		184	41	865	101
29000	20	01.1	1201.1	6.5	26	45	47.99	1576	268	13	9290	184	41	870	101

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PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maxi- mum ordi- nate	
1	2	2a	2b	3	4	5	6	7	8	
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet	
29000	20 01.1	1201.1	6.5	26 45	47.99	1576	268	13	9290	
29100	20 07.6	1207.6	6.5	26 54	48.22	1575	270	13		
29200	20 14.1	1214.1	6.5	27 03	48.45	1574	273	13		
29300	20 20.6	1220.6	6.5	27 12	48.68	1573	276	13		
29400	20 27.1	1227.1	6.6	27 21	48.91	1572	278	13		
29500	20 33.7	1233.7	6.6	27 30	49.14	1571	281	13	9740	
29600	20 40.3	1240.3	6.6	27 39	49.37	1571	284	13		
29700	20 46.9	1246.9	6.6	27 48	49.60	1570	286	13		
29800	20 53.5	1253.5	6.6	27 57	49.84	1569	289	13		
29900	21 00.1	1260.1	6.7	28 06	50.08	1568	292	12		
30000	21 06.8	1266.8	6.7	28 15	50.32	1567	294	12	10210	
30100	21 13.5	1273.5	6.7	28 24	50.56	1566	297	12		
30200	21 20.2	1280.2	6.8	28 34	50.80	1566	300	12		
30300	21 27.0	1287.0	6.8	28 43	51.04	1565	303	12		
30400	21 33.8	1293.8	6.8	28 52	51.28	1564	306	12		
30500	21 40.6	1300.6	6.8	29 01	51.52	1563	309	12	10700	
30600	21 47.4	1307.4	6.9	29 10	51.76	1563	311	12		
30700	21 54.3	1314.3	6.9	29 19	52.00	1562	314	12		
30800	22 01.2	1321.2	6.9	29 29	52.24	1561	317	12		
30900	22 08.1	1328.1	7.0	29 38	52.48	1561	320	12		
31000	22 15.1	1335.1	7.0	29 47	52.72	1560	323	12	11210	

RANGE TAB

INITIAL VELOCITY = 2500 F. S. WEIG
PROJECTILE = 4.5 CALIB

	Change of range for varia- tion of +10 feet per second initial velocity	Change of range for varia- tion of -10 pounds in weight of pro- jectile	Change of range for varia- tion in density of air of -10 per cent	Chan of rang for wind com- ponen in pla of 10 knot
	10	11	12	13
Yards	Yards	Yards	Yards	Yards
184	41	870	101	
185	41	875	102	
186	41	880	103	
186	42	885	103	
187	42	890	104	
187	42	895	105	
188	42	900	106	
189	42	905	106	
189	42	910	107	
190	42	915	107	
190	42	920	108	
191	42	925	109	
192	42	930	110	
192	42	935	110	
193	42	940	111	
194	42	946	112	
194	42	951	112	
195	42	956	113	
196	42	961	114	
196	42	966	115	
197	42	971	115	

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PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

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Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maxi- mum ordi- nate	
1	2	2a	2b	3	4	5	6	7	8	
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet	
33000	24 40.8	1480.8	7.7	32 57	57.77	1554	388	10	13460	
33100	24 48.5	1488.5	7.7	33 07	58.03	1554	391	10		
33200	24 56.2	1496.2	7.7	33 16	58.29	1554	395	10		
33300	25 03.9	1503.9	7.8	33 26	58.55	1554	399	10		
33400	25 11.7	1511.7	7.8	33 36	58.82	1554	402	10		
33500	25 19.5	1519.5	7.9	33 46	59.09	1554	406	10	14080	
33600	25 27.4	1527.4	7.9	33 55	59.36	1554	410	10		
33700	25 35.3	1535.3	7.9	34 05	59.63	1554	414	10		
33800	25 43.2	1543.2	8.0	34 15	59.90	1554	417	10		
33900	25 51.2	1551.2	8.0	34 25	60.17	1554	421	10		
34000	25 59.2	1559.2	8.1	34 35	60.44	1554	425	10	14730	
34100	26 07.3	1567.3	8.1	34 45	60.71	1554	429	10		
34200	26 15.4	1575.4	8.2	34 55	60.98	1555	433	10		
34300	26 23.6	1583.6	8.2	35 05	61.26	1555	437	9		
34400	26 31.8	1591.8	8.3	35 15	61.54	1555	441	9		
34500	26 40.1	1600.1	8.3	35 26	61.82	1555	445	9	15410	
34600	26 48.4	1608.4	8.4	35 36	62.10	1555	449	9		
34700	26 56.8	1616.8	8.4	35 46	62.38	1555	453	9		
34800	27 05.2	1625.2	8.5	35 56	62.66	1556	457	9		
34900	27 13.7	1633.7	8.6	36 06	62.94	1556	461	9		
35000	27 22.3	1642.3	8.6	36 16	63.22	1556	465	9	16120	

RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 4.5 CALIBERS

RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 4.5 CALIBERS

	Change of range for variation of +10 feet per second initial velocity	Change of range for variation of -10 pounds in weight of pro- jectile	Change of range for variation in density of air of -10 per cent	Change of range for wind com- ponent in plan of fire of 10 knots
	10	11	12	13
Yards	Yards	Yards	Yards	Yards
210	44	1076	130	
210	44	1081	131	
211	44	1086	132	
212	44	1092	133	
212	44	1097	133	
213	44	1103	134	
214	44	1108	135	
214	44	1114	136	
215	44	1119	137	
215	44	1125	137	
216	44	1130	138	
217	44	1136	139	
217	44	1141	140	
218	45	1147	140	
219	45	1152	141	
219	45	1158	142	
220	45	1163	143	
221	45	1169	143	
222	45	1174	144	
222	45	1180	145	
223	45	1185	146	

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Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maximum ordinate
1	2	2a	2b	3	4	5	6	7	8
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet
35000	27 22.3	1642.3	8.6	36 16	63.22	1556	465	9	16120
35100	27 30.9	1650.9	8.7	36 27	63.50	1556	470	9	
35200	27 39.6	1659.6	8.7	36 37	63.79	1556	474	9	
35300	27 48.3	1668.3	8.8	36 47	64.08	1557	478	9	
35400	27 57.1	1677.1	8.8	36 58	64.37	1557	483	9	
35500	28 05.9	1685.9	8.9	37 08	64.66	1557	487	9	16860
35600	28 14.8	1694.8	9.0	37 18	64.95	1558	491	9	
35700	28 23.8	1703.8	9.0	37 29	65.24	1558	496	9	
35800	28 32.8	1712.8	9.1	37 39	65.53	1559	500	9	
35900	28 41.9	1721.9	9.2	37 50	65.83	1559	505	9	
36000	28 51.1	1731.1	9.2	38 00	66.13	1560	509	9	17640
36100	29 00.3	1740.3	9.3	38 11	66.43	1560	514	8	
36200	29 09.6	1749.6	9.4	38 21	66.73	1561	518	8	
36300	29 19.0	1759.0	9.5	38 32	67.03	1562	523	8	
36400	29 28.5	1768.5	9.5	38 42	67.33	1562	528	8	
36500	29 38.0	1778.0	9.6	38 53	67.64	1563	532	8	18450
36600	29 47.6	1787.6	9.7	39 03	67.95	1564	537	8	
36700	29 57.3	1797.3	9.7	39 14	68.26	1564	542	8	

RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maximum ordinate
1	2	2a	2b	3	4	5	6	7	8
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet
37000	30 27	1827	10	39 46	69.20	1567	557	8	19300
37100	30 37	1837	10	39 57	69.52	1568	562	8	
37200	30 47	1847	10	40 08	69.84	1569	568	8	

RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 4.5 CALIBERS

	Change of range for variation of +10 feet per second initial velocity	Change of range for variation of -10 pounds in weight of projectile	Change of range for variation in density of air of -10 per cent	Change of range for wind component in plane of fire of 10 knots
	10	11	12	13
Yards	Yards	Yards	Yards	Yards
223	45	1185	146	
224	45	1191	147	
224	45	1196	148	
225	45	1202	148	
226	45	1207	149	
226	45	1213	150	
227	46	1218	151	
228	46	1224	151	
229	46	1229	152	
229	46	1235	153	
230	46	1241	154	
231	46	1246	155	
232	46	1252	155	
232	46	1258	156	
233	46	1263	157	
234	46	1269	158	
235	47	1275	159	
235	47	1280	160	
236	47	1286	160	

RANGE TABLE

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 4.5 CALIBERS

	Change of range for variation of +10 feet per second initial velocity	Change of range for variation of -10 pounds in weight of projectile	Change of range for variation in density of air of -10 per cent	Change of range for wind component in plane of fire of 10 knots
	10	11	12	13
Yards	Yards	Yards	Yards	Yards
238	47	1298	162	
238	47	1303	163	
239	47	1309	164	

37300	30 57	1857	10	40 19	70.16	1570	573	8			240	47	1315	164
37400	31 07	1867	10	40 29	70.48	1571	578	8			241	47	1321	165
37500	31 17	1877	10	40 40	70.81	1572	584	8	20200		242	48	1327	166
37600	31 27	1887	10	40 51	71.14	1573	589	8			242	48	1332	167
37700	31 37	1897	11	41 02	71.47	1574	595	8			243	48	1338	168
37800	31 48	1908	11	41 13	71.80	1575	600	8			244	48	1344	169
37900	31 59	1919	11	41 24	72.13	1576	606	8			245	48	1350	169
38000	32 10	1930	10	41 35	72.47	1577	611	8	21160		246	48	1356	170
38100	32 20	1940	11	41 46	72.81	1579	617	7			247	48	1362	171
38200	32 31	1951	11	41 57	73.15	1580	623	7			248	48	1367	172
38300	32 42	1962	11	42 08	73.49	1581	628	7			248	49	1373	173
38400	32 53	1973	11	42 19	73.84	1582	634	7			249	49	1379	174
38500	33 04	1984	11	42 30	74.19	1583	640	7	22190		250	49	1385	174
38600	33 15	1995	11	42 41	74.55	1585	646	7			251	49	1391	175
38700	33 26	2006	11	42 52	74.91	1586	652	7			252	49	1397	176
38800	33 37	2017	12	43 04	75.27	1587	659	7			253	49	1403	177
38900	33 49	2029	12	43 16	75.64	1589	665	7			254	49	1408	178
39000	34 01	2041	12	43 28	76.01	1590	672	7	23290		255	49	1414	179

RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE = 9 CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maximum ordinate
1	2	2a	2b	3	4	5	6	7	8

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RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 2700 POUNDS. LENGTH OF PROJECTILE = 4.5 CALIBERS. RADIUS OF OGIVE CALIBERS

Range	Angle of elevation		Increase in angle of elevation for 100 yards increase in range	Angle of fall	Time of flight	Striking velocity	Drift	Danger space for a target 20 feet high	Maximum ordinate
1	2	2a	2b	3	4	5	6	7	8
Yards	° ' "	Minutes	Minutes	° ' "	Seconds	F. S.	Yards	Yards	Feet
41000	38 39	2319	18	47 44	84.54	1630	831	6	28800
41100	38 57	2337	19	47 59	85.06	1633	841	6	
41200	39 16	2356	19	48 15	85.60	1636	852	6	
41300	39 35	2375	20	48 31	86.15	1639	863	6	
41400	39 55	2395	21	48 48	86.72	1642	874	6	
41500	40 16	2416	22	49 06	87.31	1646	886	6	30720
41600	40 38	2438	24	49 25	87.93	1650	899	6	
41700	41 02	2462	25	49 45	88.58	1654	912	6	
41800	41 27	2487	27	50 07	89.26	1658	926	6	
41900	41 54	2514	29	50 30	89.98	1662	941	5	
42000	42 23	2543	33	50 56	90.78	1666	958	5	33210
42100	42 56	2576	40	51 26	91.70	1671	978	5	
42200	43 36	2616	52	52 01	92.79	1676	1001	5	
42300	44 28	2668		52 48	94.44	1682	1037	5	
42345	45 00	2700		53 14	95.32	1686	1057	5	36610

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RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 4.5 CALIBERS.

Change of range for variation of +10 feet per second initial velocity	Change of range for variation of -10 pounds in weight of projectile	Change of range for variation in density of air of -10 per cent	Change of range for wind component in plane of fire of 10 knots
10	11	12	13

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RANGE TABLE FOR 16 -INCH GUN

INITIAL VELOCITY = 2500 F. S. WEIGHT OF PROJECTILE = 4.5 CALIBERS.

Change of range for variation of +10 feet per second initial velocity	Change of range for variation of -10 pounds in weight of projectile	Change of range for variation in density of air of -10 per cent	Change of range for wind component in plane of fire of 10 knots
10	11	12	13
Yards	Yards	Yards	Yards
274	53	1532	195
275	53	1538	196
276	53	1544	197
277	54	1550	198
278	54	1556	199
279	54	1562	200
280	54	1568	201
281	54	1574	202
282	55	1580	203
283	55	1586	203
284	55	1592	204
286	55	1598	205
287	56	1604	206
288	56	1611	207
288	56	1612	207

I.V. = 2500 F.S.

*EFFECT IN YARDS OF RANGE DUE TO ROTATION OF THE EARTH.

True Target Bearing, Degrees							Range, Yards	True Target Bearing, Degrees						
0	15	30	45	60	75	90		0	15	30	45	60	75	90
180	165	150	135	120	105	90		180	165	150	135	120	105	90
Latitude 0°								Latitude 10° (North or South)						
0	10	20	28	35	39	40		0	10	20	28	34	38	39
0	19	37	52	64	71	74		0	19	36	52	63	70	73
0	27	52	74	90	100	104		0	27	51	72	89	99	102
0	33	65	91	112	125	129		0	33	63	90	110	123	127
0	39	75	106	130	145	150		0	38	74	104	128	143	148
0	43	84	118	145	161	167		0	43	82	116	142	159	165
0	47	91	128	157	175	181		0	46	89	126	154	172	178
0	49	95	134	165	184	190		0	48	93	132	162	181	187
0	50	97	137	168	187	194		0	49	95	135	165	184	191
0	48	93	131	160	179	185		0	47	91	129	158	176	182
0	41	79	112	137	153	158		0	40	78	110	135	150	156
Latitude 20° (North or South)								Latitude 30° (North or South)						
0	10	19	27	33	36	38		0	9	17	24	30	33	35
0	18	35	49	60	67	70		0	17	32	45	56	62	64
0	25	49	69	85	94	98		0	23	45	64	78	87	90
0	31	61	86	105	117	121		0	29	56	79	97	108	112
0	36	71	100	122	136	141		0	34	65	92	113	126	130
0	41	78	111	136	152	157		0	37	72	102	125	140	145
0	44	85	120	147	164	170		0	41	78	111	136	151	157
0	46	89	126	155	173	179		0	43	82	116	143	159	165
0	47	91	129	158	176	182		0	43	84	119	146	162	168
0	45	87	123	151	168	174		0	41	80	113	139	155	160
0	38	74	105	129	143	149		0	35	68	97	119	132	137
180	195	210	225	240	255	270		180	195	210	225	240	255	270
360	345	330	315	300	285	270		360	345	330	315	300	285	270
True Target Bearing, Degrees								True Target Bearing, Degrees						

*For bearing at top of table the range is increased.

For bearing at bottom of table the range is decreased.

I.V. = 2500 F.S.

*EFFECT IN YARDS OF RANGE DUE TO ROTATION OF THE EARTH.

True Target Bearing, Degrees							Range, Yards	True Target Bearing, Degrees						
0	15	30	45	60	75	90		0	15	30	45	60	75	90
180	165	150	135	120	105	90		180	165	150	135	120	105	90
Latitude 40° (North or South)								Latitude 50° (North or South)						
0	8	15	22	27	30	31		0	7	13	18	22	25	26
0	15	28	40	49	55	57	4,000	0	12	24	34	41	46	48
0	21	40	56	69	77	80	8,000	0	17	33	47	58	65	67
0	26	49	70	86	95	99	12,000	0	21	41	59	72	80	83
0	30	57	81	99	111	115	16,000	0	25	48	68	84	93	96
							20,000							
0	33	64	91	111	124	128	24,000	0	28	54	76	93	104	107
0	36	69	98	120	134	139	28,000	0	30	58	82	101	112	116
0	38	73	103	126	141	146	32,000	0	32	61	86	106	118	122
0	38	74	105	129	144	149	36,000	0	32	62	88	108	120	125
0	37	71	100	123	137	142	40,000	0	31	59	84	103	115	119
0	31	61	86	105	117	121	42,000	0	26	51	72	88	98	102
Latitude 60° (North or South)								Latitude 70° (North or South)						
0	5	10	14	17	19	20		0	4	7	10	12	13	14
0	10	19	26	32	36	37	4,000	0	7	13	18	22	24	25
0	13	26	37	45	50	52	8,000	0	9	18	25	31	34	36
							12,000							

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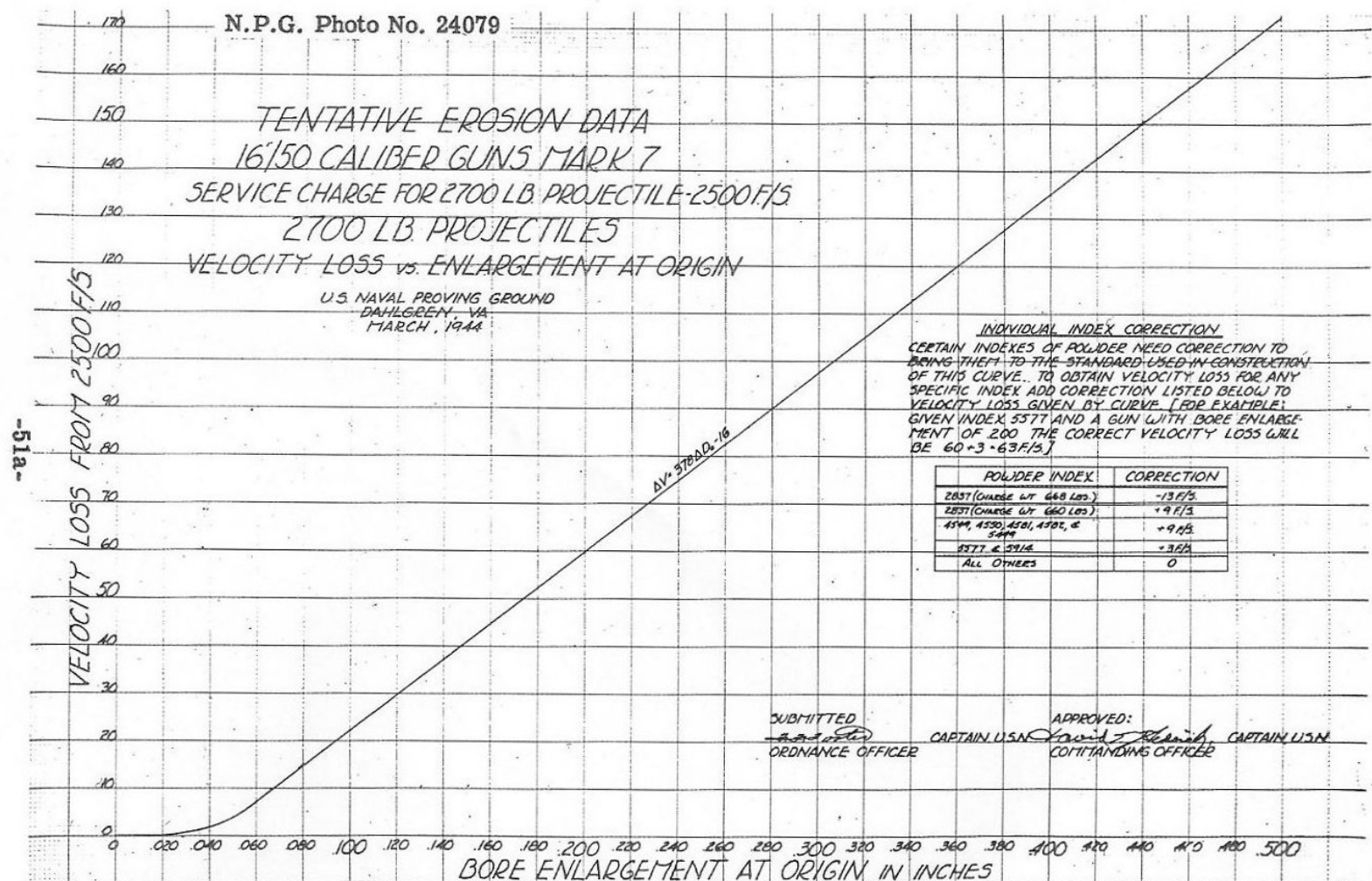
I.V. = 2500 F.S.

*DEFLECTION IN YARDS DUE TO ROTATION OF THE EARTH.

True Target Bearing, Degrees							Range, Yards	True Target Bearing, Degrees						
0	30	60	90	120	150	180		0	30	60	90	120	150	180
360	330	300	270	240	210	180		360	330	300	270	240	210	180
Latitude 0°								Latitude 10°						
0	0	0	0	0	0	0		0	0	0	0	0	0	0
0	0	0	0	0	0	0	4,000	1	1	1	1	1	1	1
0	0	0	0	0	0	0	8,000	2	2	2	2	3	3	3
-1	-1	-1	0	1	1	1	12,000	3	3	4	4	5	5	6
-3	-2	-1	0	1	2	3	16,000	4	5	6	7	8	9	10
							20,000							
-5	-5	-3	0	3	5	5	24,000	5	6	8	11	13	15	16
-10	-8	-5	0	5	8	10	28,000	5	7	10	15	20	23	25
-17	-15	-8	0	8	15	17	32,000	4	6	12	21	29	35	37
-29	-25	-14	0	14	25	29	36,000	-1	3	13	28	42	52	56
-52	-45	-26	0	26	45	52	40,000	-14	-7	12	37	63	81	88
-78	-67	-39	0	39	67	78	42,000	-32	-22	6	45	83	111	121
Latitude 20°								Latitude 30°						
0	0	0	0	0	0	0		1	1	1	1	1	1	1
2	2	2	2	2	2	2	4,000	3	3	3	3	3	3	3
4	4	4	5	5	5	5	8,000	6	6	7	7	7	7	7
7	8	8	9	9	10	10	12,000	11	12	12	13	13	14	14
11	12	13	14	15	16	16	16,000	18	18	19	20	21	22	23
							20,000							
16	16	18	21	23	25	26	24,000	26	26	28	30	33	34	35
20	21	25	29	34	37	39	28,000	35	36	39	43	47	50	51
24	27	32	40	48	54	56	32,000	44	46	52	59	66	72	74

27 31 41 54 68 78 81	36,000	54 58 67 79 92 101 104
25 31 49 73 97 115 122	40,000	62 68 85 107 129 146 152
15 24 51 88 125 151 161	42,000	61 70 95 129 162 187 196
180 150 120 90 60 30 0		180 150 120 90 60 30 0
180 210 240 270 300 330 360		180 210 240 270 300 330 360
True Target Bearing, Degrees		True Target Bearing, Degrees

*Deflections to the right are positive.
 Deflections to the left are negative.
 Deflections are tabulated for north latitude,
 for south latitude use opposite sign.
 For north latitude use bearing at top of table.
 For south latitude use bearing at bottom of table.



RESTRICTED

OP 770 CHANGE 2

BORE ENLARGEMENT AT ORIGIN IN INCHES

-51b-

TENTATIVE WEAR CURVE
16/50 CALIBER GUNS MARK 7
BORE ENLARGEMENT AT ORIGIN
 V^5
EQUIVALENT SERVICE ROUNDS

RECOMMENDED PROCEDURE:

- I. ENTER WITH BORE ENLARGEMENT AT ORIGIN OBTAINED ON LAST STRESSING OF GUN AND FIND THE CORRESPONDING PSEUDO-ESE.
- II. AND NUMBER OF ESR FIRED SINCE STRESSING TO THIS PSEUDO-ESE.
- III. ENTER CURVE WITH THIS SUM AND GET ESTIMATED PRESENT BORE ENLARGEMENT AT ORIGIN.
- IV. ENTER PROPER EROSION DATA CURVE WITH THIS BORE ENLARGEMENT AND OBTAIN DESIRED VELOCITY LOSS.

NOTE:
THIS WEAR CURVE IS FOR AN AVERAGE GUN. ANY PARTICULAR GUN MAY DIFFER FROM IT CONSIDERABLY. THIS HOWEVER, WILL NOT APPRECIABLY AFFECT THE ACCURACY OF VELOCITY LOSS DETERMINED BY THE ABOVE PROCEDURE.

U.S. NAVAL PROVING GROUND
DAHLGREN, VA
MARCH, 1944

SUBMITTED:

W. E. S. 1-10
ORDNANCE OFFICE

CAPTAIN, U.S.N.

APPROVED:

W. E. S. 1-10
COMMANDEER OFFICE

CAPTAIN, U.S.N.

EQUIVALENT SERVICE ROUNDS