

PART 1

GUN, 8 INCH, MK.VI MOD. 342

FIRING

SHELL, H.E., 240 LB., MK103

SHELL, A.P., 260 LB., MK.XX

SHELL, T.P., 260 LB., MK.XVIII

PART I A WIND COMPONENT CHART

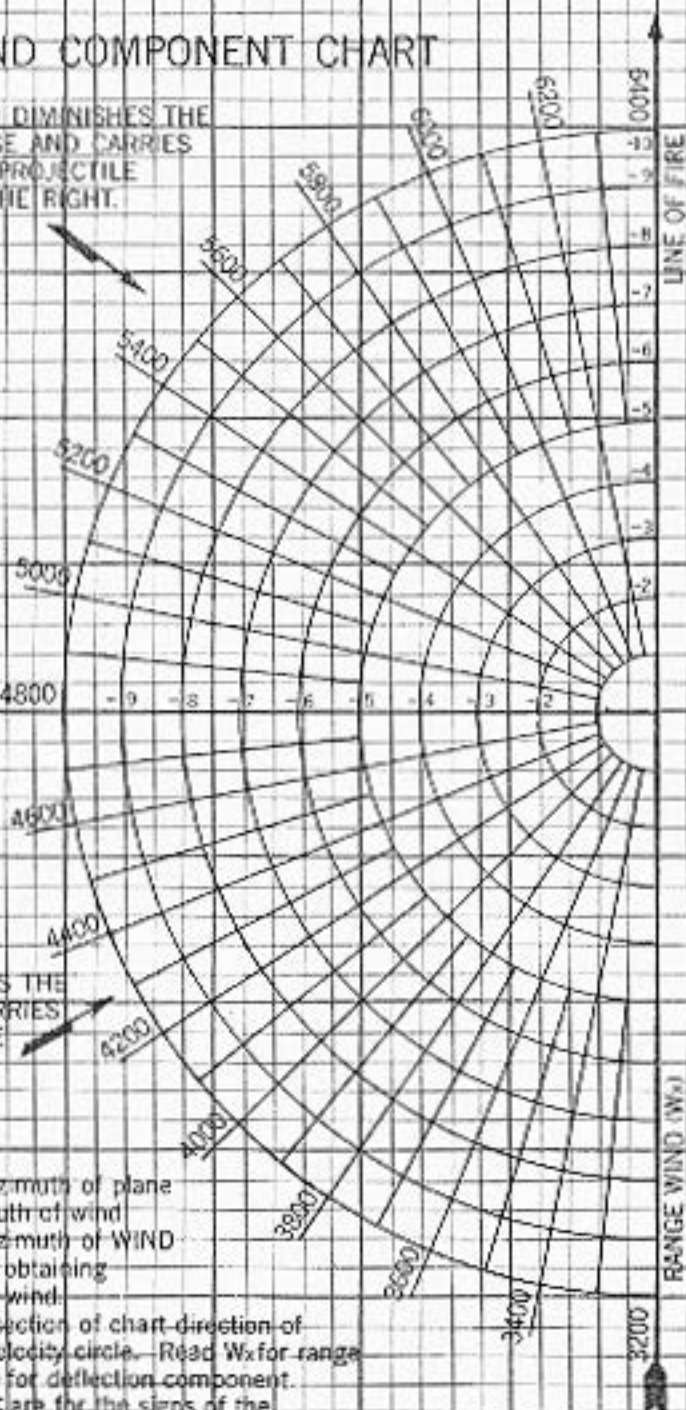
WIND DIMINISHES THE RANGE AND CARRIES THE PROJECTILE TO THE RIGHT.

CROSS WIND (W_x) 4800

WIND INCREASES THE RANGE AND CARRIES THE PROJECTILE TO THE RIGHT.

DIRECTIONS:-

- 1st. Subtract azimuth of plane of fire from azimuth of wind adding 6400 to azimuth of WIND if necessary, thus obtaining chart direction of wind.
- 2nd. Find intersection of chart direction of wind with wind velocity circle. Read W_x for range component or W_y for deflection component.
- 3rd. The signs are for the signs of the effects in range and deflection.



WIND COMPONENT CHART PART 1A

WIND DIMINISHES THE
RANGE AND CARRIES
THE PROJECTILE
TO THE LEFT.

WIND INCREASES THE
RANGE AND CARRIES
THE PROJECTILE
TO THE LEFT.

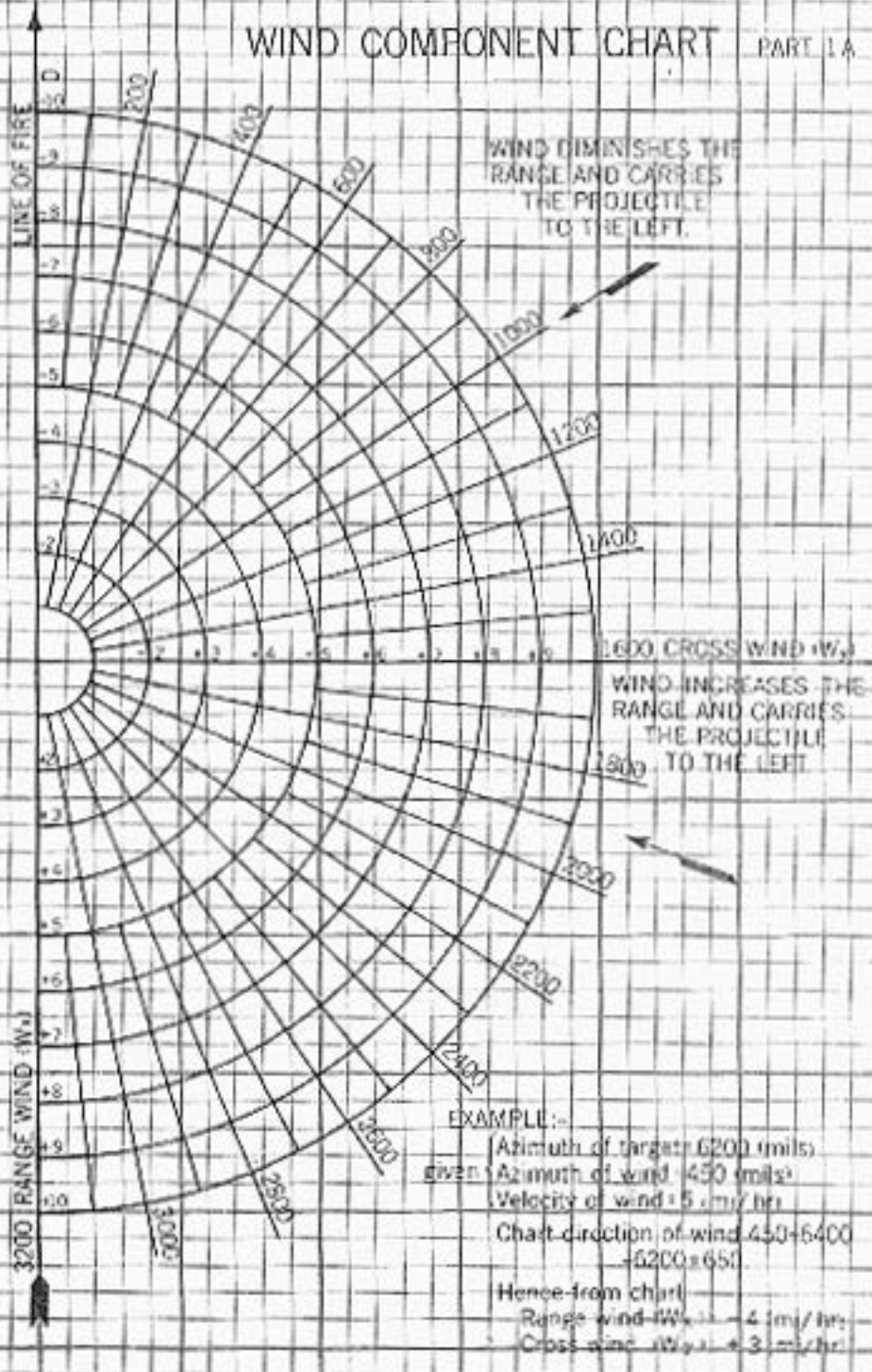
EXAMPLE:-

(Azimuth of target: 6200 (mils)
given Azimuth of wind: 450 (mils)
Velocity of wind: 5 (mi/hr)
Chart direction of wind: $450 + 6400$
 $= 6850$

Hence from chart

Range wind (W_x) = 4 (mi/hr)

Cross wind (W_y) = 3 (mi/hr)



PART 1B.

THERMOMETRIC FORMULA

0.2° F. = DECREASE IN TEMPERATURE FOR 100 FT. INCREASE IN ALTITUDE

0.2° F. = INCREASE IN TEMPERATURE FOR 100 FT. DECREASE IN ALTITUDE

DENSITY FORMULA

0.3% = DECREASE IN AIR DENSITY FOR 100 FT. INCREASE IN ALTITUDE

0.3% = INCREASE IN AIR DENSITY FOR 100 FT. DECREASE IN ALTITUDE

PART 1C

1 yd = 0.91440 meters

YARDS	0	10	20	30	40	50	60	70	80	90
0	0	9.1	18.3	27.4	36.6	45.7	54.9	64.0	73.2	82.3
100	91.4	100.6	109.7	118.9	128.0	137.2	146.3	155.4	164.6	173.7
200	182.9	192.0	201.2	210.3	219.5	228.6	237.7	246.9	256.0	265.2
300	274.3	283.5	292.6	301.8	310.9	320.0	329.2	338.3	347.5	356.6
400	365.8	374.9	384.0	393.2	402.3	411.5	420.6	429.8	438.9	448.1
500	457.2	466.3	475.5	484.6	493.8	502.9	512.1	521.2	530.4	539.5
600	548.6	557.8	566.9	576.1	585.2	594.4	603.5	612.7	621.8	630.9
700	640.1	649.2	658.4	667.5	676.7	685.8	695.0	704.1	713.2	722.4
800	731.5	740.7	749.8	759.0	768.1	777.2	786.4	795.5	804.7	813.8
900	823.0	832.1	841.2	850.4	859.5	868.7	877.8	887.0	896.1	905.3
1000	914.4	923.6	932.7	941.8	951.0	960.1	969.3	978.4	987.6	996.7

METERS TO YARDS

PART 1D

1 meter = 1.0936 yd.

METERS	0	10	20	30	40	50	60	70	80	90
0	0	10.9	21.9	32.8	43.7	54.7	65.5	76.6	87.5	98.4
100	109.4	120.3	131.2	142.2	153.1	164.0	175.0	185.9	196.8	207.8
200	218.7	229.7	240.6	251.5	262.5	273.4	284.3	295.3	306.2	317.2
300	328.1	339.0	350.0	360.9	371.8	382.8	393.7	404.6	415.6	426.5
400	437.4	448.4	459.3	470.2	481.2	492.1	503.1	514.0	524.9	535.9
500	546.8	557.7	568.7	579.6	590.5	601.5	612.4	623.4	634.3	645.2
600	656.2	667.1	678.0	689.0	699.9	710.8	721.8	732.7	743.7	754.6
700	765.5	776.5	787.4	798.3	809.3	820.2	831.1	842.1	853.0	864.0
800	874.9	885.8	896.8	907.7	918.6	929.6	940.5	951.4	962.4	973.3
900	984.2	995.2	1006.1	1017.1	1028.0	1038.9	1049.9	1060.8	1071.7	1082.7
1000	1093.6	1104.6	1115.5	1126.4	1137.4	1148.3	1159.2	1170.2	1181.1	1192.0

METERS TO YARDS

PART 1E

ANGULAR CONVERSION TABLE - DEGREES TO MILS

Degrees	0	1	2	3	4	5	6	7	8	9
0	0	18	36	53	71	89	107	124	142	160
10	178	195	213	231	249	267	284	302	320	338
20	355	373	391	409	427	444	462	480	498	516
30	533	551	569	587	604	622	640	658	676	693
40	711	729	747	764	782	800	818	836	853	871
50	889	907	924	942	960	978	996	1013	1031	1049
60	1067	1084	1102	1120	1138	1156	1173	1191	1209	1227
70	1244	1262	1280	1298	1316	1333	1351	1369	1387	1404
80	1422	1440	1458	1476	1493	1511	1529	1547	1564	1582
90	1600	(Conversion Factor, 1° = 17.77778 mils)								

PART 1F

NATURAL TRIGONOMETRIC FUNCTIONS

Mils	N. Sin	N. Cos	N. Tan	N. Cot
0	0.0000	1.0000	0.0000	-
50	.0491	.9989	.0491	20.355
100	.0980	.9952	.0985	10.153
150	.1467	.9892	.1483	6.741
200	.1951	.9808	.1989	5.027
250	.2430	.9700	.2505	3.992
300	.2903	.9569	.3033	3.297
350	.3369	.9415	.3578	2.795
400	.3827	.9239	.4142	2.414
450	.4276	.9040	.4730	2.114
500	.4714	.8819	.5345	1.871
550	.5141	.8577	.5994	1.668
600	.5556	.8315	.6682	1.497
650	.5957	.8032	.7416	1.348
700	.6344	.7730	.8207	1.219
750	.6716	.7410	.9063	1.103
800	.7071	.7071	1.0000	1.000
850	.7410	.6716	1.103	.9063
900	.7730	.6344	1.219	.8207
950	.8032	.5957	1.348	.7416
1000	.8315	.5556	1.497	.6682
1050	.8577	.5141	1.668	.5994
1100	.8819	.4714	1.871	.5345
1150	.9040	.4276	2.114	.4730
1200	.9239	.3827	2.414	.4142
1250	.9415	.3369	2.795	.3578
1300	.9569	.2903	3.297	.3033
1350	.9700	.2430	3.992	.2505
1400	.9808	.1951	5.027	.1989
1450	.9892	.1467	6.741	.1483
1500	.9952	.0980	10.153	.0985
1550	.9989	.0491	20.355	.0491
1600	1.0000	0.0000	-	0.0000

PART I

TABLE OF PROBABILITY FACTORS

$$\text{"Prob."} = \frac{2}{\pi} \int_0^F e^{-t^2} dt \quad \text{at where } \frac{t}{.476935} = \text{Factor}$$

Factor	Prob.	Factor	Prob.	Factor	Prob.	Factor	Prob.
0.01	0.0000	1.00	0.5000	2.00	0.8257	3.00	0.9670
0.05	0.0039	1.05	0.5212	2.05	0.8332	3.05	0.9693
0.10	0.0078	1.10	0.5410	2.10	0.8433	3.10	0.9714
0.15	0.0099	1.15	0.5521	2.15	0.8530	3.15	0.9734
0.20	0.1073	1.20	0.5817	2.20	0.8632	3.20	0.9751
0.25	0.1239	1.25	0.6008	2.25	0.8739	3.25	0.9765
0.30	0.1604	1.30	0.6194	2.30	0.8792	3.30	0.9776
0.35	0.1887	1.35	0.6375	2.35	0.8871	3.35	0.9782
0.40	0.2127	1.40	0.6582	2.40	0.8945	3.40	0.9787
0.45	0.2385	1.45	0.6719	2.45	0.9016	3.45	0.9791
0.50	0.2640	1.50	0.6893	2.50	0.9083	3.50	0.9795
0.55	0.2893	1.55	0.7042	2.55	0.9146	3.55	0.9798
0.60	0.3143	1.60	0.7195	2.60	0.9205	3.60	0.9800
0.65	0.3369	1.65	0.7343	2.65	0.9261	3.65	0.9802
0.70	0.3622	1.70	0.7485	2.70	0.9314	3.70	0.9804
0.75	0.3871	1.75	0.7621	2.75	0.9364	3.75	0.9805
0.80	0.4106	1.80	0.7753	2.80	0.9411	3.80	0.9806
0.85	0.4336	1.85	0.7879	2.85	0.9454	3.85	0.9807
0.90	0.4562	1.90	0.8000	2.90	0.9495	3.90	0.9808
0.95	0.4793	1.95	0.8116	2.95	0.9534	3.95	0.9809

Explanation: "Prob." is the probable proportion of shots falling in an interval of width F times the fifty percent zone (or 2σ times the probable error) with center of impact in the middle of the interval; F is the "probability factor".

Example:

Given: Zone, normal to line of fire, 40 yd. wide, 60 yd. from center of impact.

Probable error in range, 50 yd.

To determine probable proportion of hits in zone.

For $(50 + 40)$ - zone, $F = \frac{2(50 + 40)}{2(50)} = 2$, hence from table,

Prob. = .82

For (50) -zone, $F = \frac{2(50)}{2(50)} = 1.2$, hence from table, Prob. = .58

Subtracting, Prob. for the two zones which together satisfy the condition, = .82 - .58. Hence, prob. for either one of the two possible zones defined, is $1/2 (.82 - .58) = 12\%$.

A less accurate but frequently more convenient approximation is given by the "Dispersion ladder":

Center of impact

4 P.E. 3 P.E.		2 P.E. 1 P.E.		1 P.E. 2 P.E.		3 P.E. 4 P.E.			
1/2%	1 1/2%	7%	15%	25%	25%	15%	7%	1 1/2%	1/2%

This gives differences in Prob. for even integral multiples of the probable error.

PART 12

TABLE OF SLOPE COEFFICIENTS

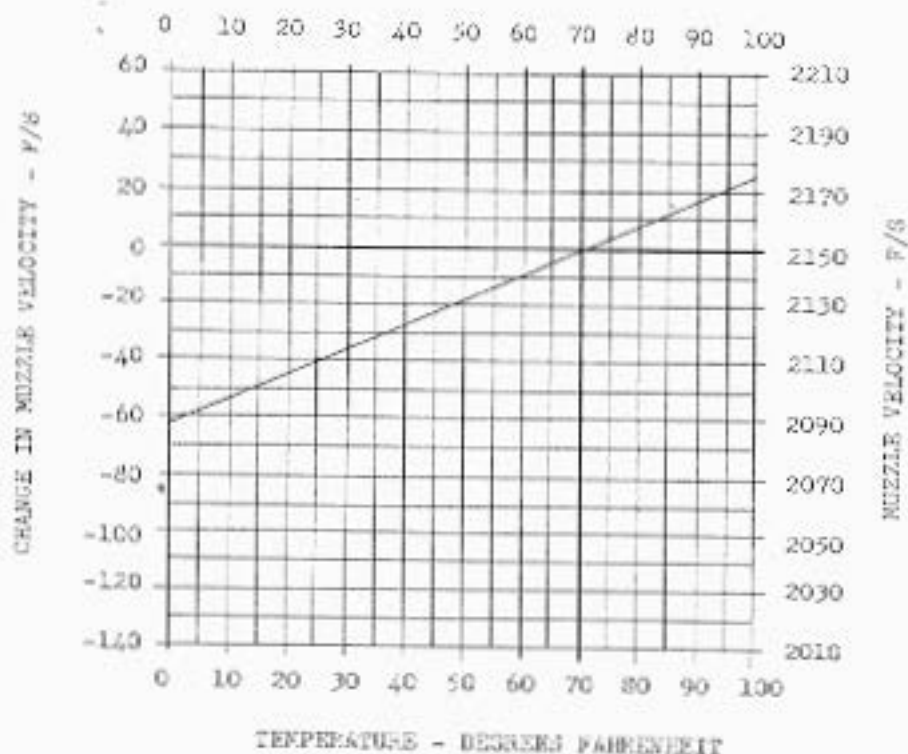
 $\sin \alpha / \sin (\alpha - n)$

		n, positive (relative forward slope)										
		1 10	2 20	3 31	5 51	10 102	15 152	20 201	30 297	40 388	50 472	1,000
50		.81	.71	.62	.53	.33	.25	.20	.15	.12	.10	.05
100		.93	.83	.77	.65	.50	.40	.34	.26	.21	.18	.10
150		.94	.88	.83	.75	.60	.50	.43	.36	.29	.25	.15
200		.95	.91	.87	.80	.67	.58	.51	.42	.36	.32	.20
250		.96	.93	.89	.83	.72	.63	.57	.46	.41	.37	.25
300		.97	.94	.91	.85	.75	.68	.61	.52	.46	.42	.30
350		.97	.95	.92	.88	.79	.71	.65	.57	.51	.47	.36
400		.98	.95	.93	.89	.81	.74	.69	.61	.55	.51	.41
500		.98	.95	.95	.92	.83	.76	.71	.67	.62	.58	.53
600		.99	.97	.96	.93	.87	.83	.78	.72	.67	.64	.57
700		.99	.98	.97	.94	.90	.85	.82	.76	.72	.69	.62
800		.99	.98	.97	.95	.91	.86	.85	.80	.77	.75	1.00
900		.99	.98	.98	.96	.93	.90	.88	.84	.81	.79	1.22
1000		.99	.99	.98	.97	.94	.92	.90	.87	.85	.84	1.50
1100		.99	.99	.98	.98	.95	.94	.92	.90	.89	.88	1.67
1200		1.00	.99	.99	.99	.97	.95	.94	.93	.92	.93	2.41

		-n, positive (relative reverse slope)										
		1 10	2 20	3 31	5 51	10 102	15 152	20 201	30 297	40 388	50 472	
50		1.25	1.69	2.67								
100		1.11	1.28	1.44	2.03							
150		1.07	1.16	1.25	1.31	3.09						
200		1.05	1.11	1.13	1.34	2.02	4.11					
250		1.04	1.09	1.14	1.25	1.67	2.52	5.06				
300		1.03	1.07	1.11	1.23	1.50	2.03	2.99	94.95			
350		1.02	1.06	1.09	1.16	1.39	1.74	2.31	6.46			
400		1.02	1.05	1.08	1.14	1.32	1.59	1.97	3.78	31.39		
500		1.02	1.04	1.05	1.13	1.24	1.41	1.63	2.38	4.33	19.31	
600		1.02	1.03	1.05	1.09	1.18	1.30	1.45	1.89	2.98	4.44	
700		1.01	1.03	1.04	1.07	1.14	1.24	1.35	1.65	2.10	2.86	
800		1.01	1.02	1.03	1.05	1.12	1.19	1.27	1.49	1.80	2.24	
900		1.01	1.02	1.03	1.04	1.09	1.15	1.22	1.39	1.60	1.90	
1000		1.01	1.01	1.02	1.04	1.08	1.12	1.18	1.31	1.47	1.68	
1100		1.01	1.01	1.02	1.03	1.06	1.10	1.14	1.24	1.37	1.53	
1200		1.00	1.01	1.01	1.02	1.05	1.08	1.11	1.19	1.29	1.41	

n = Slope with respect to line of site (percent and mils) (n = n'-s/300). Directions. Multiply range probable error (from range table) by coefficient shown above. Here α denotes the angle of fall (measured to line of site) (for practical purposes equal to the range table angle of fall which is its value for site 300 m, i.e., for a level trajectory); n', the quadrant angle of slope, positive for forward slope (ground rising in enemy direction), and negative for reverse slope (ground falling in enemy direction); s=300, the angle of site, positive for target above gun, negative for target below gun; n(n-n'-s/300), the slope relative to the line of site. NOTE: The quadrant angle of fall, $\alpha' = \alpha - s/300$. EXAMPLE: Given target on reverse slope between contour lines 130 ft., and 140 ft., mean distance between contours = 67 ft., site = -20 mils, (s = -200), angle of fall (tabulated) = 250 mils, range probable error (in range table) = 93 yards. Then, n'(in percent) = $100 \frac{(130-140)}{67} = -15(\%)$ or -152 mils, n' = -s/300 = -152(-20) = -132 mils. Interpolating between 1.67 (for 102 mils) and 2.52 (for 152 mils), slope coefficient = $1.67 + \frac{20}{50} \times 0.85 = 2.18$. Hence, range probable error to be used = $2.18 \times 93 \text{ yd.} = 191 \text{ yards.}$

CHANGE IN MUZZLE VELOCITY FOR TEMPERATURE OF POWDER DIFFERENT FROM NORMAL



DIRECTIONS: - Enter chart with temperature of powder. Follow vertical line to the slanting line; from there follow the horizontal line either to the left edge of the chart, where the change in muzzle velocity may be read or to the right edge where the corrected muzzle velocity may be read.

EXAMPLE: - Suppose temperature of powder is 59° F. Standard muzzle velocity is 2150 f/s. From the chart, the change in muzzle velocity is -10 f/s and the muzzle velocity to be expected is 2140 f/s.

Charts for CHANGE IN MUZZLE VELOCITY FOR TEMPERATURE OF POWDER DIFFERENT FROM NORMAL will be found on the following pages:

For the Shell, H.E., 240 lb., M103:

Normal Charge Page 12

Supercharge Page 68

For the Shell, A.P., 260 lb., MK.XX and
Shell, T.P., 260 lb., MK.XVIII:

Normal Charge Page 140

Supercharge Page 196 *

PART 2a

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51, MOD. 1

Normal Charge - 2150 f/s

Supercharge - 2840 f/s

DRAWING OF FUZED PROJECTILE



PART 2a-1

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MCB. 1

NORMAL CHARGE - BASE SECTION

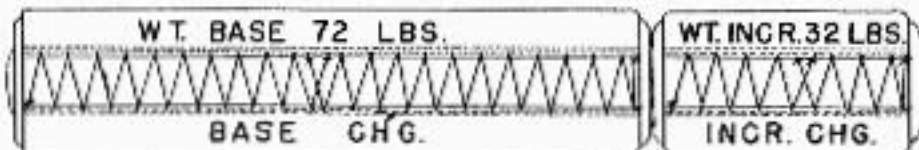
MUZZLE VELOCITY 2150 F/S

TABLES A - K INCLUSIVE

JUMP = +1.0 MINUTE

The ballistic coefficients listed in this table are based on the drag function $G_2 + 0.040$.

DRAWING OF CHARGE



SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Range	Elevation		Change in elev for 100 yd change in range		Change in range for 1 mil 1 min change in elev		Max-imum ordinate	Termi-nal velocity
	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
yd	mil	deg min	mil	min	yd	yd	ft	ft/s
0	-0.2	0 01	1.1	3.6	94	28	0	2150
100	+0.8	+0 03	1.1	3.6	94	28	0	
200	1.8	0 06	1.1	3.6	93	28	0	
300	3.0	0 10	1.1	3.7	93	28	1	
400	4.0	0 13	1.1	3.7	92	27	1	
500	5.0	0 17	1.1	3.7	92	27	2	2093
600	6.2	0 21	1.1	3.7	91	27	3	
700	7.2	0 25	1.1	3.7	91	27	4	
800	8.4	0 28	1.1	3.8	90	27	5	
900	9.4	0 32	1.1	3.8	90	27	6	
1000	10.6	0 36	1.1	3.8	89	26	8	2038
1100	11.8	0 40	1.1	3.8	89	26	10	
1200	12.8	0 44	1.1	3.8	88	26	12	
1300	14.0	0 47	1.1	3.9	88	26	14	
1400	15.2	0 51	1.2	3.9	87	26	16	
1500	16.4	0 55	1.2	3.9	87	26	18	1986
1600	17.4	0 59	1.2	3.9	86	25	21	
1700	18.6	1 03	1.2	3.9	85	25	24	
1800	19.8	1 07	1.2	4.0	85	25	27	
1900	21.0	1 11	1.2	4.0	84	25	30	
2000	22.2	1 15	1.2	4.0	84	25	34	1936
2100	23.4	1 19	1.2	4.0	83	25	38	
2200	24.6	1 23	1.2	4.1	83	24	42	
2300	25.8	1 28	1.2	4.1	82	24	46	
2400	27.0	1 32	1.2	4.1	82	24	50	
2500	28.2	1 36	1.2	4.2	81	24	55	1888
2600	29.6	1 40	1.2	4.2	80	24	60	
2700	30.8	1 44	1.3	4.2	80	24	65	
2800	32.0	1 49	1.3	4.3	79	24	70	
2900	33.2	1 53	1.3	4.3	79	23	75	
3000	34.6	1 57	1.3	4.3	78	23	81	1842
3100	35.8	2 01	1.3	4.3	78	23	87	
3200	37.2	2 06	1.3	4.4	77	23	93	
3300	38.4	2 10	1.3	4.4	77	23	99	
3400	39.8	2 15	1.3	4.4	76	23	106	
3500	41.0	2 19	1.3	4.5	76	22	113	1797

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 Mod. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Angle of fall		Slope of fall	Deflection due to drift		Ballistic coefficient	* Probable error in R		Time of flight	Range
(01)	(02)	(03)	(04)	(05)	(06)	(07)	(08)	(09)	
mil	deg min	1 on—	mil	deg		yd	yd	sec	yd
0	0 00		0	0.00	5.53	36	0	0.0	0
1	0 04	850						0.1	100
2	0 08	423						0.3	200
4	0 12	281						0.4	300
5	0 17	210						0.6	400
6	0 21	167	0	0.00	5.53	36	0	0.7	500
7	0 25	138						0.9	600
9	0 30	117						1.0	700
10	0 34	102						1.1	800
11	0 39	91						1.3	900
13	0 43	82	0	0.00	5.54	37	0	1.4	1000
14	0 47	74						1.6	1100
15	0 52	67						1.7	1200
16	0 56	62						1.9	1300
18	1 01	58						2.0	1400
19	1 05	54	0	0.00	5.54	38	1	2.2	1500
20	1 10	50						2.3	1600
22	1 14	47						2.5	1700
23	1 19	44						2.6	1800
24	1 23	42						2.8	1900
26	1 28	40	0	0.00	5.55	39	1	2.9	2000
27	1 33	38						3.1	2100
28	1 37	36						3.2	2200
30	1 42	34						3.4	2300
31	1 47	33						3.5	2400
33	1 52	31	0	0.00	5.55	40	1	3.7	2500
34	1 57	30						3.8	2600
36	2 02	29						4.0	2700
37	2 07	27						4.2	2800
39	2 12	26						4.3	2900
40	2 17	25	-1	-0.05	5.56	41	1	4.5	3000
42	2 22	24						4.7	3100
43	2 26	24						4.8	3200
45	2 33	23						5.0	3300
46	2 38	22						5.1	3400
48	2 44	21	-1	-0.05	5.56	42	2	5.3	3500

* This is the Proving Ground Probable Error.

SHELL, H.B., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Range	Elevation		Change in elev for 100 yd change in range		Change in range for 1 mil 1 min change in elev		Maximum ordinate	Terminal velocity
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
yd	mil	deg min	mil	min	yd	yd	ft	f/s
3500	41.0	2 19	1.3	4.5	76	22	113	1797
3600	42.4	2 24	1.3	4.5	75	22	120	
3700	43.8	2 28	1.3	4.5	75	22	126	
3800	45.0	2 33	1.4	4.6	74	22	136	
3900	46.4	2 37	1.4	4.6	73	22	144	
4000	47.8	2 42	1.4	4.6	73	22	152	1754
4100	49.2	2 47	1.4	4.6	72	21	161	
4200	50.6	2 52	1.4	4.7	72	21	170	
4300	52.0	2 56	1.4	4.7	71	21	179	
4400	53.4	3 01	1.4	4.7	71	21	188	
4500	54.8	3 06	1.4	4.8	70	21	196	1712
4600	56.2	3 11	1.4	4.8	70	21	208	
4700	57.8	3 16	1.4	4.9	69	20	218	
4800	59.2	3 20	1.5	4.9	69	20	229	
4900	60.6	3 25	1.5	5.0	68	20	240	
5000	62.0	3 30	1.5	5.0	68	20	251	1670
5100	63.6	3 35	1.5	5.0	67	20	262	
5200	65.2	3 40	1.5	5.1	66	20	274	
5300	66.6	3 45	1.5	5.1	66	20	286	
5400	68.2	3 50	1.5	5.2	65	19	299	
5500	69.6	3 55	1.5	5.2	65	19	312	1629
5600	71.2	4 00	1.5	5.2	65	19	325	
5700	72.8	4 06	1.6	5.3	64	19	339	
5800	74.4	4 11	1.6	5.3	64	19	353	
5900	76.0	4 17	1.6	5.4	63	19	367	
6000	77.4	4 22	1.6	5.4	63	19	382	1588
6100	79.0	4 28	1.6	5.4	62	18	397	
6200	80.6	4 33	1.6	5.5	62	18	412	
6300	82.4	4 39	1.6	5.5	61	18	428	
6400	84.0	4 44	1.6	5.6	61	18	444	
6500	85.6	4 50	1.7	5.6	60	18	461	1548
6600	87.2	4 56	1.7	5.6	60	18	478	
6700	89.0	5 01	1.7	5.7	59	18	495	
6800	90.6	5 07	1.7	5.7	59	17	513	
6900	92.4	5 12	1.7	5.8	59	17	531	
7000	94.0	5 18	1.7	5.8	58	17	550	1509

SHRELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Angle of fall		Slope of fall	Deflection due to drift		Ballistic coefficient	Probable error in R (ft)		Time of flight	Range
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
mil	deg min	1 cm—	mil	deg		yd	yd	sec	yd
48	2 44	21	-1	-0.05	5.56	42	2	5.3	3500
50	2 50	21						5.5	3600
51	2 55	19.9						5.6	3700
53	3 01	19.3						5.8	3800
55	3 06	18.7						6.0	3900
56	3 12	18.1	-1	-0.05	5.57	43	2	6.2	4000
58	3 18	17.5						6.3	4100
60	3 24	17.0						6.5	4200
62	3 30	16.5						6.7	4300
63	3 36	16.1						6.8	4400
65	3 42	15.6	-1	-0.05	5.57	44	2	7.0	4500
67	3 48	15.2						7.2	4600
69	3 55	14.8						7.4	4700
71	4 01	14.4						7.5	4800
73	4 07	14.0						7.7	4900
75	4 14	13.6	-1	-0.05	5.58	45	2	7.9	5000
77	4 21	13.2						8.1	5100
79	4 27	12.9						8.3	5200
81	4 34	12.6						8.4	5300
83	4 41	12.3						8.6	5400
85	4 48	12.0	-1	-0.05	5.58	46	3	8.8	5500
87	4 55	11.7						9.0	5600
89	5 03	11.4						9.2	5700
91	5 10	11.1						9.4	5800
94	5 17	10.9						9.6	5900
96	5 25	10.6	-1	-0.10	5.59	47	3	9.7	6000
98	5 33	10.3						9.9	6100
100	5 40	10.1						10.1	6200
103	5 48	9.9						10.3	6300
105	5 56	9.6						10.5	6400
108	6 04	9.4	-2	-0.10	5.60	48	3	10.7	6500
110	6 12	9.2						10.9	6600
112	6 21	9.0						11.1	6700
115	6 29	8.8						11.3	6800
117	6 37	8.6						11.5	6900
120	6 46	8.4	-2	-0.10	5.60	49	3	11.7	7000

* This is the Proving Ground Probable Error.

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Range	Elevation		Change in elev for 100 yd change in range		Change in range for 1 mil 1 min change in elev		Maximum ordinate	Terminal velocity
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
yd	mil	deg min	mil	min	yd	yd	ft	ft/s
7000	94.0	5 18	1.7	5.8	58	17	550	1509
7100	95.8	5 24	1.7	5.8	58	17	569	
7200	97.6	5 30	1.7	5.9	57	17	589	
7300	99.2	5 35	1.8	5.9	57	17	609	
7400	101.0	5 41	1.8	6.0	56	17	629	
7500	102.8	5 47	1.8	6.0	56	17	650	1470
7600	104.6	5 53	1.8	6.1	56	16	671	
7700	106.4	5 59	1.8	6.1	55	16	693	
7800	108.2	6 06	1.8	6.2	55	16	715	
7900	110.0	6 12	1.8	6.2	54	16	738	
8000	111.8	6 18	1.9	6.3	54	16	761	1432
8100	113.8	6 24	1.9	6.3	53	16	785	
8200	115.6	6 31	1.9	6.4	53	16	809	
8300	117.6	6 37	1.9	6.4	53	16	834	
8400	119.4	6 44	1.9	6.5	52	15	859	
8500	121.2	6 50	1.9	6.5	52	15	885	1395
8600	123.2	6 57	1.9	6.6	51	15	911	
8700	125.2	7 03	2.0	6.6	51	15	938	
8800	127.2	7 10	2.0	6.7	50	15	966	
8900	129.2	7 16	2.0	6.7	50	15	994	
9000	131.2	7 23	2.0	6.8	50	15	1022	1358
9100	133.2	7 30	2.0	6.9	49	15	1051	
9200	135.4	7 37	2.0	6.9	49	14	1081	
9300	137.4	7 44	2.1	7.0	48	14	1111	
9400	139.4	7 51	2.1	7.0	48	14	1142	
9500	141.6	7 58	2.1	7.1	48	14	1174	1322
9600	143.6	8 05	2.1	7.2	47	14	1206	
9700	145.8	8 12	2.1	7.2	47	14	1239	
9800	148.0	8 20	2.2	7.3	46	14	1273	
9900	150.2	8 27	2.2	7.3	46	14	1307	
10000	152.4	8 34	2.2	7.4	46	14	1342	1287
10100	154.6	8 42	2.2	7.5	45	13	1378	
10200	156.8	8 49	2.2	7.6	45	13	1414	
10300	159.0	8 57	2.3	7.6	44	13	1451	
10400	161.2	9 04	2.3	7.7	44	13	1489	
10500	163.6	9 12	2.3	7.8	44	13	1527	1253

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Angle of fall			Slope of fall	Deflection due to drift		Ballistic coefficient	# Probable error in R Df		Time of flight	Range
(01)	(02)		(03)	(04)		(05)	(06)	(07)	(08)	(09)
mil	deg	min	1 in—	mil	deg		yd	yd	sec	yd
120	6	46	8.4	-2	-0.10	5.60	49	3	11.7	7000
123	6	55	8.2						11.9	7100
125	7	03	8.0						12.1	7200
128	7	12	7.8						12.3	7300
131	7	21	7.7						12.5	7400
133	7	30	7.5	-2	-0.10	5.61	50	4	12.7	7500
136	7	39	7.3						12.9	7600
139	7	49	7.2						13.1	7700
142	7	58	7.1						13.3	7800
145	8	08	6.9						13.5	7900
148	8	18	6.8	-2	-0.10	5.62	52	4	13.8	8000
151	8	28	6.7						14.0	8100
154	8	38	6.5						14.2	8200
157	8	49	6.4						14.4	8300
160	8	59	6.3						14.6	8400
164	9	10	6.2	-2	-0.15	5.62	53	4	14.9	8500
167	9	21	6.1						15.1	8600
170	9	32	6.0						15.3	8700
173	9	43	5.8						15.5	8800
176	9	54	5.7						15.7	8900
180	10	05	5.6	-3	-0.15	5.63	55	4	16.0	9000
183	10	16	5.5						16.2	9100
186	10	28	5.4						16.4	9200
190	10	40	5.3						16.6	9300
193	10	52	5.2						16.9	9400
197	11	04	5.1	-3	-0.15	5.64	56	4	17.1	9500
201	11	16	5.0						17.3	9600
204	11	29	4.9						17.6	9700
208	11	42	4.8						17.8	9800
212	11	55	4.8						18.0	9900
216	12	08	4.7	-3	-0.15	5.65	58	5	18.3	10000
220	12	21	4.6						18.5	10100
224	12	34	4.5						18.8	10200
228	12	48	4.4						19.0	10300
232	13	01	4.4						19.2	10400
236	13	15	4.3	-3	-0.20	5.66	59	5	19.5	10500

* This is the Proving Ground Probable Error.

SHELL, H.R., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Range	Elevation			Change in elev for 100 yd change in range		Change in range for		Maximum ordinate	Terminal velocity
						1 mil	1 min		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
yd	mil	deg	min	mil	min	yd	yd	ft	ft/s
10500	163.6	9	12	2.3	7.8	44	13	1527	1253
10600	165.8	9	20	2.3	7.9	43	13	1566	
10700	168.2	9	27	2.3	7.9	43	13	1606	
10800	170.7	9	35	2.4	8.0	42	13	1647	
10900	172.8	9	43	2.4	8.0	42	13	1689	
11000	175.4	9	51	2.4	8.1	42	12	1731	1221
11100	177.8	9	59	2.4	8.2	41	12	1774	
11200	180.3	10	07	2.4	8.3	41	12	1818	
11300	182.6	10	15	2.5	8.3	41	12	1863	
11400	185.0	10	24	2.5	8.4	40	12	1909	
11500	187.6	10	32	2.5	8.5	40	12	1955	1191
11600	190.0	10	41	2.5	8.6	40	12	2002	
11700	192.6	10	49	2.5	8.7	39	12	2051	
11800	195.2	10	58	2.6	8.7	39	12	2100	
11900	197.8	11	07	2.6	8.8	39	11	2150	
12000	200.4	11	16	2.6	8.9	38	11	2201	1163
12100	203.0	11	25	2.6	9.0	38	11	2253	
12200	205.6	11	34	2.7	9.1	38	11	2306	
12300	208.2	11	43	2.7	9.1	37	11	2360	
12400	211.0	11	53	2.7	9.2	37	11	2415	
12500	213.8	12	02	2.7	9.3	36	11	2471	1138
12600	216.4	12	11	2.8	9.4	36	11	2528	
12700	219.2	12	21	2.8	9.5	36	11	2586	
12800	222.0	12	30	2.8	9.5	35	11	2645	
12900	224.8	12	39	2.8	9.6	35	10	2705	
13000	227.8	12	49	2.9	9.7	35	10	2766	1115
13100	230.6	12	59	2.9	9.8	35	10	2828	
13200	233.6	13	08	2.9	9.9	34	10	2891	
13300	236.7	13	18	2.9	9.9	34	10	2956	
13400	239.4	13	28	3.0	10.0	34	10	3022	
13500	242.4	13	38	3.0	10.1	33	10	3089	1095
13600	245.4	13	48	3.0	10.2	33	10	3157	
13700	248.4	13	59	3.0	10.3	33	10	3226	
13800	251.4	14	09	3.1	10.4	33	10	3296	
13900	254.6	14	19	3.1	10.5	32	10	3368	
14000	257.8	14	30	3.1	10.6	32	10	3441	1079

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Angle of fall		Slope of fall	Deflection due to drift		Ballistic coefficient	* Probable error in R and EM		Time of flight	Range
(00)	(01)	(02)	(03)	(04)	(05)	(06)	(07)	(08)	(09)
mil	deg min	100—	mil	deg		yd	yd	sec	yd
236	13 15	4.3	-3	-0.20	5.66	59	5	19.5	10900
240	13 29	4.2						19.7	10600
244	13 43	4.1						20.0	10700
248	13 58	4.1						20.2	10800
253	14 12	4.0						20.5	10900
257	14 27	3.9	-4	-0.20	5.66	61	5	20.8	11000
261	14 42	3.8						21.0	11100
266	14 57	3.8						21.3	11200
270	15 12	3.7						21.5	11300
275	15 27	3.7						21.8	11400
279	15 43	3.6	-4	-0.20	5.67	63	5	22.1	11500
284	15 59	3.5						22.3	11600
289	16 15	3.4						22.6	11700
293	16 31	3.4						22.9	11800
298	16 47	3.3						23.1	11900
303	17 03	3.3	-4	-0.25	5.68	65	6	23.4	12000
308	17 19	3.2						23.7	12100
313	17 36	3.2						24.0	12200
318	17 53	3.1						24.2	12300
323	18 10	3.1						24.5	12400
328	18 27	3.0	-5	-0.25	5.69	67	6	24.8	12500
333	18 44	3.0						25.1	12600
338	19 02	2.9						25.4	12700
343	19 19	2.9						25.6	12800
349	19 37	2.8						25.9	12900
354	19 55	2.8	-5	-0.30	5.70	69	6	26.2	13000
359	20 13	2.7						26.5	13100
365	20 31	2.7						26.8	13200
370	20 50	2.6						27.1	13300
376	21 08	2.6						27.4	13400
381	21 27	2.5	-5	-0.30	5.72	71	6	27.7	13500
387	21 46	2.5						28.0	13600
392	22 04	2.5						28.3	13700
398	22 23	2.4						28.6	13800
404	22 42	2.4						28.9	13900
409	23 01	2.3	-6	-0.35	5.73	73	7	29.2	14000

* This is the Proving Ground Probable Error.

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE 1

Range	Elevation		Change in elev for 100 yd change in range		Change in range for		Maximum ordinate	Terminal velocity
					1 mil	1 min		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
yd	mil	deg min	mil	min	yd	yd	ft	ft/s
14000	257.8	14 30	3.1	10.6	32	10	3441	1079
14100	260.8	14 41	3.2	10.7	32	9	3515	
14200	264.0	14 51	3.2	10.8	31	9	3590	
14300	267.2	15 02	3.2	10.9	31	9	3667	
14400	270.4	15 13	3.2	11.0	31	9	3745	
14500	273.8	15 24	3.3	11.1	30	9	3824	1066
14600	277.0	15 35	3.3	11.2	30	9	3905	
14700	280.4	15 46	3.3	11.3	30	9	3987	
14800	283.8	15 57	3.4	11.4	30	9	4070	
14900	287.2	16 09	3.4	11.5	29	9	4155	
15000	290.6	16 20	3.4	11.6	29	9	4241	1057
15100	294.0	16 32	3.5	11.7	29	9	4329	
15200	297.4	16 43	3.5	11.8	29	9	4418	
15300	301.0	16 55	3.5	11.9	28	8	4508	
15400	304.6	17 07	3.6	12.0	28	8	4600	
15500	308.2	17 19	3.6	12.1	28	8	4693	1051
15600	311.6	17 31	3.6	12.2	28	8	4788	
15700	315.2	17 43	3.6	12.3	27	8	4885	
15800	319.0	17 56	3.7	12.4	27	8	4983	
15900	322.6	18 08	3.7	12.5	27	8	5085	
16000	326.4	18 21	3.7	12.6	27	8	5185	1048
16100	330.2	18 34	3.8	12.7	26	8	5290	
16200	334.0	18 47	3.8	12.8	26	8	5395	
16300	337.8	19 00	3.8	13.0	26	8	5500	
16400	341.6	19 13	3.9	13.1	26	8	5605	
16500	345.4	19 26	3.9	13.2	26	8	5715	1048
16600	349.4	19 39	3.9	13.3	25	8	5825	
16700	353.4	19 52	4.0	13.4	25	7	5940	
16800	357.4	20 06	4.0	13.6	25	7	6055	
16900	361.4	20 19	4.0	13.7	25	7	6170	
17000	365.4	20 33	4.1	13.8	24	7	6290	1049
17100	369.6	20 47	4.1	13.9	24	7	6410	
17200	373.8	21 01	4.2	14.0	24	7	6535	
17300	377.8	21 15	4.2	14.2	24	7	6660	
17400	382.0	21 30	4.2	14.3	24	7	6785	
17500	386.4	21 44	4.3	14.4	23	7	6910	1052

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Angle of fall			Slope of fall	Deflection due to drift		Ballistic coeffi- cient	* Probable error in R DR		Time of flight	Range
(00)	(01)			(02)	(03)		(04)	(06)		
mil	deg	min	1 on—	mil	deg		yd	yd	sec	yd
409	23	01	2.3	-6	-0.35	5.73	73	7	29.2	14000
415	23	20	2.3						29.5	14100
421	23	39	2.3						29.8	14200
426	23	59	2.2						30.1	14300
432	24	18	2.2						30.5	14400
438	24	38	2.2	-6	-0.35	5.74	75	7	30.8	14500
444	24	58	2.1						31.1	14600
450	25	18	2.1						31.4	14700
456	25	38	2.1						31.7	14800
462	25	58	2.1						32.0	14900
467	26	18	2.0	-7	-0.40	5.75	78	7	32.4	15000
473	26	38	1.99						32.7	15100
479	26	58	1.96						33.0	15200
485	27	18	1.93						33.4	15300
491	27	39	1.91						33.7	15400
497	27	59	1.88	-7	-0.40	5.76	80	7	34.0	15500
503	28	19	1.85						34.4	15600
509	28	40	1.83						34.7	15700
515	29	00	1.81						35.0	15800
521	29	21	1.78						35.4	15900
527	29	41	1.76	-8	-0.45	5.77	83	8	35.7	16000
534	30	01	1.74						36.1	16100
540	30	22	1.72						36.4	16200
546	30	42	1.69						36.7	16300
552	31	03	1.67						37.1	16400
558	31	23	1.65	-8	-0.45	5.79	86	8	37.4	16500
564	31	43	1.63						37.8	16600
570	32	03	1.61						38.2	16700
576	32	24	1.58						38.5	16800
582	32	44	1.56						38.9	16900
588	33	04	1.54	-9	-0.50	5.80	89	8	39.2	17000
594	33	24	1.52						39.6	17100
600	33	44	1.50						40.0	17200
606	34	04	1.48						40.3	17300
612	34	24	1.46						40.7	17400
618	34	44	1.44	-9	-0.50	5.81	92	8	41.0	17500

* This is the Proving Ground Probable Error.

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Range	Elevation		Change in elev for 100 yd change in range		Change in range for		Maximum ordinate	Terminal velocity
					1 mil	1 min		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
yd	mil	deg min	mil	min	yd	yd	ft	f/s
17500	386.4	21 44	4.3	14.4	23	7	6910	1052
17600	390.6	21 59	4.3	14.5	23	7	7040	
17700	395.0	22 13	4.3	14.7	23	7	7175	
17800	399.4	22 28	4.4	14.8	23	7	7310	
17900	403.8	22 43	4.4	15.0	23	7	7445	
18000	408.2	22 58	4.5	15.1	22	7	7580	1056
18100	412.6	23 13	4.5	15.2	22	7	7720	
18200	417.2	23 28	4.5	15.4	22	6	7865	
18300	421.8	23 44	4.6	15.5	22	6	8010	
18400	426.4	23 59	4.6	15.7	22	6	8155	
18500	431.0	24 15	4.7	15.8	21	6	8305	1061
18600	435.8	24 31	4.7	16.0	21	6	8455	
18700	440.6	24 47	4.8	16.1	21	6	8610	
18800	445.4	25 03	4.8	16.3	21	6	8765	
18900	450.2	25 19	4.9	16.4	21	6	8925	
19000	455.0	25 36	4.9	16.6	20	6	9090	1066
19100	460.0	25 53	5.0	16.8	20	6	9255	
19200	465.0	26 09	5.0	17.0	20	6	9420	
19300	470.0	26 26	5.1	17.1	20	6	9590	
19400	475.0	26 44	5.1	17.3	19	6	9760	
19500	480.2	27 01	5.2	17.5	19	6	9935	1071
19600	485.4	27 19	5.2	17.7	19	6	10110	
19700	490.8	27 36	5.3	17.9	19	6	10290	
19800	496.0	27 54	5.4	18.2	19	6	10470	
19900	501.4	28 13	5.4	18.4	18	5	10660	
20000	507.0	28 31	5.5	18.6	18	5	10850	1077
20100	512.6	28 50	5.6	18.8	18	5	11040	
20200	518.2	29 09	5.6	19.1	18	5	11240	
20300	523.8	29 28	5.7	19.4	17	5	11440	
20400	529.6	29 47	5.8	19.6	17	5	11650	
20500	535.6	30 07	5.9	19.9	17	5	11860	1083
20600	541.4	30 27	6.0	20.2	17	5	12070	
20700	547.4	30 48	6.1	20.5	16	5	12290	
20800	553.6	31 08	6.2	20.9	16	5	12510	
20900	559.8	31 29	6.3	21.2	16	5	12740	
21000	566.2	31 51	6.4	21.6	16	5	12970	1088

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE 4

Angle of fall		Slope of fall	Deflection due to drift		Ballistic coefficient	* Probable error in R DE		Time of flight	Range
(01)	(02)		(03)	(04)		(06)	(07)		
mil	deg min	1 in—	mil	deg		yd	yd	sec	yd
618	34 44	1.44	-9	-0.50	5.81	92	8	41.0	17500
624	35 04	1.42						41.4	17600
630	35 24	1.40						41.8	17700
636	35 44	1.38						42.2	17800
642	36 05	1.37						42.6	17900
648	36 25	1.35	-10	-0.55	5.82	95	8	42.9	18000
654	36 45	1.33						43.3	18100
660	37 05	1.32						43.7	18200
666	37 26	1.30						44.1	18300
672	37 46	1.29						44.5	18400
677	38 06	1.27	-11	-0.60	5.84	98	9	44.9	18500
683	38 26	1.26						45.3	18600
689	38 46	1.24						45.7	18700
695	39 06	1.23						46.1	18800
701	39 26	1.21						46.5	18900
707	39 46	1.20	-11	-0.65	5.85	102	9	46.9	19000
713	40 06	1.19						47.3	19100
719	40 27	1.17						47.7	19200
725	40 47	1.16						48.1	19300
731	41 07	1.14						48.6	19400
737	41 28	1.13	-12	-0.70	5.86	106	9	49.0	19500
744	41 49	1.11						49.4	19600
750	42 09	1.10						49.8	19700
756	42 30	1.08						50.3	19800
762	42 51	1.07						50.7	19900
768	43 12	1.06	-13	-0.70	5.88	109	9	51.2	20000
774	43 33	1.05						51.6	20100
780	43 54	1.04						52.1	20200
787	44 15	1.02						52.5	20300
793	44 37	1.01						53.0	20400
799	44 58	1.00	-13	-0.75	5.89	113	10	53.5	20500
806	45 20	0.99						53.9	20600
812	45 42	0.98						54.4	20700
819	46 04	0.97						54.9	20800
825	46 26	0.96						55.4	20900
832	46 48	0.95	-14	-0.80	5.91	118	10	55.9	21000

* This is the Proving Ground Probable Error.

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE A

Range	Elevation		Change in elev for 100 yd change in range		Change in range for 1 mil 1 min change in elev		Maximum ordinate	Terminal velocity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
yd	mil	deg min	mil	min	yd	yd	ft	f/s
21000	566.2	31 51	6.4	21.6	16	5	12970	1088
21100	572.6	32 12	6.5	22.0	15	5	13210	
21200	579.2	32 34	6.7	22.5	15	4	13450	
21300	586.0	32 57	6.8	23.0	15	4	13700	
21400	592.8	33 21	7.0	23.5	14	4	13960	
21500	599.8	33 44	7.1	24.1	14	4	14220	1094
21600	607.0	34 09	7.3	24.7	14	4	14490	
21700	614.4	34 34	7.5	25.4	13	4	14770	
21800	622.0	35 00	7.7	26.1	13	4	15070	
21900	629.8	35 26	8.0	26.9	13	4	15370	
22000	638.0	35 53	8.3	27.9	12	4	15680	1101
22100	646.4	36 22	8.6	29.0	12	3	16010	
22200	655.2	36 52	9.0	30.2	11	3	16350	
22300	664.4	37 23	9.4	31.6	11	3	16710	
22400	674.0	37 55	9.9	33.2	10	3	17090	
22500	684.2	38 29	10.5	35.2	9	3	17500	1110
22600	695.0	39 05	11.2	37.7	9	3	17930	
22700	706.6	39 44	12.1	41	8	2	18390	
22800	719.2	40 27	13.2	45	8	2	18900	
22900	733.4	41 15	14.9	51	7	2	19480	
23000	749.6	42 10	17.9	60	6	2	20140	1127
23100	769.4	43 17	22	74	5	1	20980	
23200	798.8	44 56					22200	
23240	832.2	46 49					23620	1153

SHELL, H.E., 240 LB., M103

FOZE, P.D., M51 MOD. 1

NORMAL CHARGE - N.V. 2150 f/s

PART 2a-1 TABLE A

Angle of fall			Slope of fall	Deflection due to drift		Ballistic coeffi- cient	* Probable error in R DE		Time of flight	Range
(00)	(01)			(03)	(04)		(06)	(07)		
mil	deg	min	1 on—	mil	deg		yd	yd	sec	yd
832	46	48	0.95	-14	-0.80	5.91	118	10	55.9	21000
838	47	11	0.94						56.4	21100
845	47	33	0.93						57.0	21200
852	47	56	0.91						57.5	21300
859	48	19	0.90						58.1	21400
866	48	43	0.89	-15	-0.85	5.93	123	10	58.6	21500
873	49	07	0.88						59.2	21600
880	49	31	0.86						59.8	21700
887	49	56	0.85						60.4	21800
895	50	21	0.83						61.0	21900
903	50	47	0.82	-16	-0.90	5.95	129	10	61.6	22000
911	51	14	0.81						62.3	22100
919	51	41	0.79						63.0	22200
927	52	09	0.78						63.7	22300
936	52	38	0.76						64.4	22400
945	53	09	0.75	-17	-0.95	5.98	136	11	65.2	22500
955	53	42	0.73						66.0	22600
965	54	16	0.72						66.9	22700
976	54	52	0.70						67.9	22800
988	55	32	0.69						68.9	22900
1001	56	18	0.67	-18	-1.00	6.02	145	11	70.1	23000
1017	57	13	0.64						71.6	23100
1041	58	33	0.61						73.8	23200
1067	60	00	0.58	-20	-1.10	6.10	157	11	76.2	23240

* This is the Proving Ground Probable Error.

SHELL, H.B., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE B

TARGET BELOW GUN - RANGE EFFECTS IN YARDS

Height of Target Feet	Map Range - Yards									
	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
-10	505	197	143	110	88	73	62	53	26	40
-20	516	397	287	220	177	147	124	106	92	81
-30	932	599	432	332	267	221	186	159	138	121
-40		803	579	445	357	295	249	213	184	162
-50		1009	727	559	428	370	312	267	231	203
-60		1217	876	673	539	445	375	321	278	244
-70		1428	1027	788	631	521	439	375	325	285
-80			1179	904	724	597	503	430	372	326
-90			1333	1022	817	674	567	484	419	367
-100			1488	1141	911	750	631	539	466	408
-110			1644	1260	1005	827	696	594	515	449
-120			1802	1380	1100	905	761	649	561	491
-130			1961	1501	1196	984	827	705	609	533
-140				1623	1292	1062	892	761	657	574
-150				1745	1389	1141	957	816	705	616
-160				1868	1487	1220	1023	872	753	658
-170				1992	1585	1300	1090	929	802	701
-180				2117	1684	1380	1156	985	851	744
-190				2244	1784	1461	1223	1042	900	786
-200				2372	1884	1541	1290	1099	949	829
-220					2086	1704	1426	1214	1048	915
-240					2291	1869	1563	1330	1147	1001
-260					2499	2037	1701	1446	1247	1088
-280					2709	2205	1841	1564	1348	1176
-300					2922	2377	1982	1683	1449	1263
-320						2550	2125	1803	1551	1351
-340						2725	2269	1923	1654	1440
-360						2902	2414	2045	1758	1530
-380						3081	2561	2168	1862	1620
-400						3262	2709	2291	1967	1710
-420						3445	2859	2415	2072	1801
-440							3010	2540	2179	1893
-460							3163	2667	2287	1986
-480							3317	2795	2396	2079
-500							3473	2925	2505	2172

SHELL, H.E., 240 LB., M103

FOUR, P.D., M91 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE B

TARGET BELOW GUN - RANGE EFFECTS IN YARDS

Map Range - Yards									Height of Target
6000	6500	7000	7500	8000	8500	9000	9500	10000	Feet
36	32	29	26	23	21	19	17	16	-10
72	64	57	51	46	42	38	34	31	-20
108	96	86	77	69	62	56	51	47	-30
144	128	114	102	92	83	75	68	62	-40
180	160	143	128	115	104	94	85	78	-50
216	192	172	154	138	125	113	102	93	-60
252	225	201	180	162	146	132	120	109	-70
288	257	230	206	185	167	151	137	125	-80
325	290	259	232	209	188	170	154	140	-90
361	322	288	258	232	209	189	171	156	-100
397	354	317	284	255	230	208	188	171	-110
434	387	346	310	279	251	227	206	187	-120
471	419	375	336	302	272	246	223	203	-130
507	452	404	362	326	294	265	240	219	-140
544	484	433	388	349	315	284	257	234	-150
581	517	462	414	373	336	303	275	250	-160
619	550	491	440	396	357	322	292	266	-170
656	583	521	467	420	379	342	310	282	-180
693	616	550	493	443	400	361	327	298	-190
731	649	579	519	467	421	380	344	313	-200
806	716	639	573	515	464	419	380	345	-220
882	783	699	626	563	507	458	415	377	-240
958	850	759	680	611	551	498	451	410	-260
1035	918	819	733	659	594	537	486	442	-280
1112	986	879	787	707	637	576	522	474	-300
1189	1054	940	841	755	681	616	558	507	-320
1267	1123	1001	895	804	725	655	593	539	-340
1345	1192	1062	950	853	769	695	629	571	-360
1423	1261	1123	1004	902	813	734	665	604	-380
1502	1330	1184	1059	951	857	774	701	637	-400
1581	1399	1246	1114	1000	901	814	737	670	-420
1661	1469	1307	1169	1050	946	854	774	703	-440
1741	1539	1369	1224	1099	990	894	810	735	-460
1821	1609	1432	1280	1149	1035	934	846	768	-480
1902	1680	1494	1336	1199	1079	974	882	801	-500

SHELL, H.B., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE B

TARGET BELOW GUN - RANGE EFFECTS IN YARDS

Height of Target Feet	Map Range - Yards								
	10500	11000	11500	12000	12500	13000	13500	14000	14500
-10	14	13	12	11	10	9	8	8	7
-20	28	26	24	22	20	18	17	16	15
-30	43	39	35	32	30	28	25	23	22
-40	57	52	47	43	40	37	34	31	29
-50	71	65	59	54	50	46	42	39	36
-60	85	78	71	65	60	55	51	47	43
-70	99	91	83	76	70	64	59	55	51
-80	114	104	95	87	80	74	68	63	58
-90	128	117	107	98	90	83	77	71	66
-100	142	130	119	109	100	92	85	79	73
-110	156	143	131	120	110	102	94	87	81
-120	171	156	143	131	120	111	103	95	88
-130	185	169	155	142	130	120	111	103	95
-140	200	183	167	153	141	130	120	111	103
-150	214	196	179	164	151	139	128	119	110
-160	228	209	191	175	161	148	137	127	118
-170	243	222	203	186	171	158	146	135	125
-180	258	236	216	198	182	167	154	143	132
-190	272	249	228	209	192	177	163	151	140
-200	286	262	240	220	202	186	172	159	147
-220	315	289	265	243	223	205	189	175	162
-240	344	315	289	265	243	224	207	191	176
-260	374	342	313	287	264	243	224	207	191
-280	403	368	337	309	284	262	242	223	206
-300	432	395	362	332	305	281	259	239	221
-320	462	422	387	355	326	300	277	256	236
-340	491	449	411	377	346	319	294	272	251
-360	521	476	436	400	367	338	312	288	265
-380	551	503	460	422	388	357	329	304	280
-400	580	530	485	444	408	376	347	320	295
-420	610	557	510	467	429	395	365	337	311
-440	640	584	534	490	450	414	382	353	326
-460	669	611	559	512	470	433	400	370	342
-480	699	638	583	534	491	453	418	386	357
-500	729	665	608	557	512	472	436	403	372

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE B

TARGET BELOW GUN - RANGE EFFECTS IN YARDS

Map Range - Yards									Height of Target
15000	15500	16000	16500	17000	17500	18000	18500	19000	Feet
7	6	5	5	5	5	4	4	4	-10
14	13	12	11	10	10	9	8	8	-20
20	19	17	16	15	14	13	13	12	-30
27	25	23	22	20	19	18	17	16	-40
34	31	29	27	25	24	22	21	20	-50
40	37	35	33	31	29	27	25	24	-60
47	44	41	38	36	34	31	29	28	-70
54	50	47	44	41	38	36	34	32	-80
61	57	53	49	46	43	40	38	36	-90
68	63	59	55	51	48	45	42	40	-100
75	70	65	60	56	53	49	46	44	-110
82	76	71	66	62	58	54	51	48	-120
88	82	76	71	67	62	58	55	52	-130
95	88	82	77	72	67	63	59	56	-140
102	95	88	82	77	72	67	63	60	-150
109	101	94	88	82	77	72	68	64	-160
116	107	99	93	87	81	76	72	68	-170
122	113	105	98	92	86	81	76	72	-180
129	119	111	104	97	91	86	81	76	-190
136	126	117	109	102	96	90	85	80	-200
150	139	129	120	112	105	99	93	88	-220
163	151	140	131	123	115	108	102	96	-240
177	164	152	142	133	125	117	110	104	-260
190	176	164	153	143	134	126	118	111	-280
204	189	176	164	153	143	134	126	119	-300
218	202	188	175	163	152	143	135	127	-320
232	215	200	186	173	162	152	143	135	-340
245	227	211	197	184	172	161	152	143	-360
259	240	223	208	194	181	170	160	151	-380
273	253	235	219	204	191	179	169	159	-400
287	266	247	230	215	201	189	178	168	-420
301	279	259	241	225	211	198	186	176	-440
316	292	271	252	235	220	207	195	184	-460
330	305	283	263	246	230	216	203	192	-480
344	318	295	274	256	240	225	212	200	-500

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - N.V. 2150 f/s

PART 2a-1 TABLE B

TARGET BELOW GUN - RANGE EFFECTS IN YARDS

Height of Target Feet	Map Range - Yards								
	19500	20000	20500	21000	21500	22000	22500	23000	23500
-10	4	3	3	3	3	3	2	2	
-20	7	7	6	6	6	5	5	4	
-30	11	10	10	9	8	8	7	7	
-40	15	14	13	12	11	10	10	9	
-50	18	17	16	15	14	13	12	11	
-60	22	21	19	18	17	16	15	13	
-70	26	24	23	21	20	19	17	15	
-80	30	28	26	25	23	21	20	18	
-90	35	31	30	28	26	24	22	20	
-100	37	35	33	31	29	27	25	22	
-110	41	39	36	34	32	30	27	24	
-120	45	42	40	37	35	32	29	26	
-130	49	46	43	41	38	35	32	29	
-140	52	49	47	44	41	37	34	31	
-150	56	53	50	47	44	40	37	33	
-160	60	57	53	50	47	43	39	35	
-170	64	60	57	53	50	46	42	37	
-180	68	64	60	57	53	48	44	40	
-190	71	67	64	60	56	51	47	42	
-200	75	71	67	63	59	54	49	44	
-220	83	78	74	69	64	59	54	49	
-240	90	85	80	75	70	65	59	53	
-260	98	93	87	82	76	70	64	58	
-280	105	100	94	88	82	76	69	62	
-300	113	107	100	94	88	81	74	67	58
-320	120	114	107	100	93	86	79	72	62
-340	128	121	114	106	99	92	84	76	67
-360	135	128	120	113	105	97	89	81	72
-380	143	135	127	119	111	103	94	85	76
-400	150	142	134	125	117	108	99	90	80
-420	158	149	141	132	123	114	104	94	85
-440	166	156	147	138	129	119	109	99	90
-460	174	164	154	144	135	125	114	103	94
-480	181	171	161	151	141	130	119	108	98
-500	189	178	167	157	147	136	124	112	103

SMELL, H.E., 240 LB., M103

FOZB, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE C

TARGET ABOVE GUN - RANGE EFFECTS IN YARDS

Height of Target	Map Range - Yards									
Feet	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500
10	-300	-194	-141	-109	-88	-73	-62	-53	-46	-40
20	-594	-386	-281	-217	-175	-145	-123	-105	-91	-80
30	-883	-575	-420	-325	-262	-217	-183	-157	-137	-120
40		-762	-557	-432	-348	-289	-244	-209	-182	-160
50		-947	-693	-537	-434	-360	-304	-261	-227	-199
60		-1130	-827	-642	-519	-430	-364	-313	-272	-239
70		-1310	-960	-747	-604	-501	-424	-365	-317	-278
80		-1488	-1092	-851	-688	-571	-484	-416	-362	-318
90			-1223	-954	-771	-641	-543	-467	-406	-357
100			-1352	-1056	-854	-710	-602	-518	-451	-396
110			-1480	-1158	-937	-779	-661	-569	-495	-435
120			-1607	-1259	-1019	-847	-719	-620	-540	-474
130			-1732	-1359	-1101	-916	-778	-670	-584	-513
140			-1856	-1458	-1182	-984	-836	-721	-628	-551
150			-1979	-1557	-1263	-1052	-894	-771	-672	-590
160				-1655	-1343	-1119	-952	-821	-715	-628
170				-1753	-1423	-1187	-1009	-870	-759	-667
180				-1850	-1503	-1254	-1066	-920	-802	-705
190				-1946	-1582	-1320	-1123	-970	-846	-743
200				-2041	-1660	-1386	-1180	-1019	-889	-781
220				-2230	-1816	-1517	-1292	-1116	-973	-856
240				-2417	-1970	-1648	-1404	-1212	-1057	-930
260					-2122	-1778	-1515	-1307	-1140	-1004
280					-2272	-1906	-1625	-1403	-1224	-1078
300					-2421	-2033	-1735	-1498	-1307	-1152
320					-2568	-2159	-1843	-1591	-1389	-1225
340					-2714	-2284	-1950	-1684	-1471	-1298
360					-2858	-2408	-2056	-1777	-1553	-1371
380					-3000	-2530	-2162	-1869	-1634	-1443
400						-2651	-2267	-1961	-1715	-1515
420						-2771	-2371	-2053	-1796	-1587
440						-2889	-2475	-2144	-1877	-1659
460						-3006	-2578	-2235	-1958	-1731
480						-3122	-2680	-2326	-2039	-1802
500						-3237	-2781	-2416	-2119	-1873

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE C

TARGET ABOVE GUN - RANGE EFFECTS IN YARDS

Height of Target Feet	Map Range - Yards								
	6000	6500	7000	7500	8000	8500	9000	9500	10000
10	-35	-31	-28	-25	-23	-21	-19	-17	-15
20	-71	-63	-57	-51	-46	-41	-37	-34	-31
30	-106	-94	-85	-77	-69	-62	-56	-51	-46
40	-141	-126	-113	-102	-92	-82	-74	-67	-61
50	-176	-157	-141	-127	-114	-103	-93	-84	-77
60	-211	-188	-169	-152	-137	-124	-112	-101	-92
70	-246	-219	-197	-177	-159	-144	-130	-118	-107
80	-281	-250	-224	-202	-182	-164	-149	-135	-123
90	-316	-281	-252	-227	-204	-184	-167	-152	-138
100	-350	-312	-280	-252	-227	-205	-186	-169	-154
110	-385	-343	-307	-276	-249	-225	-204	-186	-169
120	-419	-373	-334	-301	-272	-246	-223	-202	-184
130	-454	-404	-362	-326	-294	-266	-241	-219	-200
140	-488	-435	-390	-351	-317	-287	-260	-236	-215
150	-522	-465	-417	-375	-339	-307	-278	-253	-230
160	-556	-495	-444	-400	-361	-327	-296	-269	-245
170	-590	-525	-471	-425	-384	-347	-314	-285	-260
180	-624	-556	-499	-449	-406	-368	-333	-302	-275
190	-657	-586	-526	-474	-429	-388	-351	-319	-290
200	-691	-616	-553	-499	-451	-408	-369	-335	-305
220	-758	-677	-608	-548	-495	-447	-405	-368	-335
240	-825	-737	-662	-597	-539	-487	-441	-401	-365
260	-892	-797	-716	-645	-583	-527	-477	-433	-395
280	-958	-857	-770	-694	-627	-567	-513	-466	-425
300	-1024	-916	-823	-742	-670	-606	-549	-499	-455
320	-1090	-975	-876	-789	-713	-645	-585	-531	-484
340	-1155	-1034	-929	-837	-756	-684	-620	-564	-514
360	-1220	-1092	-982	-885	-799	-723	-656	-596	-543
380	-1285	-1150	-1034	-932	-842	-762	-691	-628	-573
400	-1349	-1208	-1086	-979	-885	-801	-726	-660	-602
420	-1413	-1265	-1138	-1026	-927	-839	-761	-692	-631
440	-1477	-1322	-1189	-1073	-970	-878	-796	-724	-660
460	-1540	-1378	-1240	-1119	-1012	-917	-831	-756	-689
480	-1603	-1435	-1291	-1165	-1054	-955	-867	-788	-718
500	-1666	-1491	-1341	-1211	-1096	-993	-902	-820	-747

SHELL, H.E., 240 LB., M103

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NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE C

TARGET ABOVE GUN - RANGE EFFECTS IN YARDS

Map Range - Yards									Height of Target
10500	11000	11500	12000	12500	13000	13500	14000	14500	Feet
-14	-13	-12	-11	-10	-9	-8	-8	-7	10
-28	-26	-24	-22	-20	-18	-17	-16	-15	20
-42	-38	-35	-33	-30	-28	-25	-23	-22	30
-56	-51	-47	-44	-40	-37	-34	-31	-29	40
-70	-64	-59	-55	-50	-46	-42	-39	-36	50
-84	-77	-71	-66	-60	-55	-51	-47	-43	60
-98	-90	-83	-77	-70	-64	-59	-55	-51	70
-112	-102	-94	-87	-80	-74	-68	-63	-58	80
-126	-115	-106	-98	-90	-83	-77	-71	-66	90
-140	-128	-118	-109	-100	-92	-85	-79	-73	100
-154	-141	-130	-120	-110	-101	-94	-87	-81	110
-168	-154	-141	-130	-120	-110	-102	-95	-88	120
-182	-166	-153	-141	-130	-120	-111	-103	-95	130
-196	-179	-164	-151	-139	-129	-119	-110	-102	140
-210	-192	-176	-162	-149	-138	-128	-118	-109	150
-224	-205	-188	-173	-159	-147	-136	-126	-116	160
-238	-218	-200	-184	-169	-156	-145	-134	-124	170
-251	-230	-211	-194	-179	-166	-153	-141	-131	180
-265	-243	-223	-205	-189	-175	-162	-149	-138	190
-279	-256	-235	-216	-199	-184	-170	-157	-145	200
-306	-281	-258	-237	-219	-202	-187	-173	-160	220
-334	-306	-281	-258	-238	-220	-203	-188	-175	240
-361	-331	-304	-280	-258	-238	-220	-204	-189	260
-389	-356	-327	-301	-278	-257	-237	-219	-203	280
-416	-381	-350	-322	-297	-275	-254	-235	-218	300
-443	-406	-373	-343	-317	-293	-271	-251	-232	320
-470	-431	-396	-364	-336	-311	-288	-266	-246	340
-497	-455	-418	-385	-356	-329	-304	-281	-261	360
-524	-480	-441	-407	-376	-347	-321	-297	-275	380
-551	-505	-464	-428	-395	-365	-337	-312	-289	400
-577	-529	-487	-449	-415	-383	-354	-327	-303	420
-603	-553	-509	-470	-434	-401	-371	-343	-317	440
-630	-578	-531	-490	-453	-419	-387	-358	-332	460
-656	-602	-554	-511	-472	-437	-404	-374	-346	480
-683	-626	-576	-532	-492	-455	-421	-389	-360	500

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PART 2a-1 TABLE C

TARGET ABOVE GUN - RANGE EFFECTS IN YARDS

Height of Target Feet	Map Range - Yards								
	15000	15500	16000	16500	17000	17500	18000	18500	19000
10	-7	-6	-6	-5	-5	-5	-4	-4	-4
20	-14	-13	-12	-11	-10	-10	-9	-8	-8
30	-20	-19	-17	-16	-15	-14	-13	-13	-12
40	-27	-25	-23	-22	-20	-19	-18	-17	-16
50	-34	-31	-29	-27	-25	-24	-22	-21	-20
60	-40	-37	-35	-33	-31	-29	-27	-25	-24
70	-47	-44	-41	-38	-36	-34	-32	-30	-28
80	-54	-50	-47	-44	-41	-38	-36	-34	-32
90	-61	-57	-53	-49	-46	-43	-40	-38	-36
100	-68	-63	-59	-55	-51	-48	-45	-43	-40
110	-75	-70	-65	-60	-56	-53	-50	-47	-44
120	-82	-76	-71	-66	-62	-58	-54	-51	-48
130	-88	-82	-76	-71	-67	-63	-59	-56	-52
140	-95	-88	-82	-77	-72	-67	-63	-60	-56
150	-101	-94	-88	-82	-77	-72	-68	-64	-60
160	-108	-101	-94	-88	-82	-77	-72	-68	-64
170	-115	-107	-100	-93	-87	-82	-77	-72	-68
180	-122	-113	-105	-98	-92	-86	-81	-77	-72
190	-128	-119	-111	-104	-97	-91	-86	-81	-76
200	-135	-126	-117	-109	-102	-96	-90	-85	-80
220	-148	-138	-128	-119	-112	-105	-99	-93	-88
240	-162	-150	-139	-130	-122	-115	-108	-102	-96
260	-175	-162	-151	-141	-132	-124	-117	-110	-103
280	-188	-175	-163	-152	-142	-133	-125	-118	-111
300	-202	-187	-174	-162	-152	-143	-134	-126	-119
320	-215	-199	-185	-173	-162	-152	-143	-135	-127
340	-228	-212	-197	-184	-172	-162	-152	-143	-135
360	-242	-225	-209	-195	-182	-171	-161	-152	-143
380	-255	-237	-221	-206	-193	-181	-170	-160	-151
400	-268	-249	-232	-217	-203	-190	-179	-169	-159
420	-281	-261	-243	-227	-213	-200	-188	-177	-167
440	-294	-273	-255	-238	-223	-209	-197	-186	-175
460	-308	-286	-266	-249	-233	-219	-206	-194	-183
480	-321	-298	-278	-260	-243	-228	-215	-203	-191
500	-334	-310	-289	-270	-253	-238	-224	-211	-199

SHELL, H.E., 240 LB., M103

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PART 2a-1 TABLE C

TARGET ABOVE GUN - RANGE EFFECTS IN YARDS

Map Range - Yards									Height of Target
19500	20000	20500	21000	21500	22000	22500	23000	23200	Feet
-4	-3	-3	-3	-3	-3	-2	-2	-2	10
-8	-7	-6	-6	-6	-5	-5	-4	-4	20
-11	-10	-10	-9	-8	-8	-7	-7	-6	30
-15	-14	-13	-12	-11	-10	-10	-9	-8	40
-19	-17	-16	-15	-14	-13	-12	-11	-10	50
-23	-21	-19	-18	-17	-16	-14	-13	-11	60
-27	-25	-23	-21	-20	-18	-17	-15	-13	70
-30	-28	-26	-25	-23	-21	-19	-18	-15	80
-34	-32	-30	-28	-26	-24	-22	-20	-17	90
-38	-35	-33	-31	-29	-26	-24	-22	-19	100
-42	-39	-36	-34	-32	-29	-26	-24	-21	110
-45	-42	-39	-37	-35	-32	-29	-26	-23	120
-49	-46	-43	-40	-37	-34	-31	-28	-25	130
-52	-49	-46	-43	-40	-36	-33	-30	-27	140
-56	-53	-49	-46	-43	-39	-36	-32	-28	150
-60	-57	-53	-49	-46	-42	-38	-34	-30	160
-64	-60	-56	-52	-49	-45	-41	-36	-32	170
-68	-64	-60	-56	-52	-47	-43	-39	-34	180
-71	-67	-63	-59	-55	-50	-46	-41	-36	190
-75	-71	-66	-62	-58	-53	-48	-43	-38	200
-83	-78	-73	-68	-63	-58	-53	-47		220
-90	-85	-80	-74	-69	-63	-58	-52		240
-97	-92	-86	-81	-75	-69	-62	-56		260
-105	-99	-93	-87	-80	-74	-67	-61		280
-112	-106	-100	-93	-86	-79	-72	-65		300
-120	-113	-106	-99	-92	-84	-77	-69		320
-127	-120	-113	-105	-98	-90	-82	-73		340
-135	-127	-120	-112	-103	-95	-86	-78		360
-142	-134	-126	-118	-109	-100	-91	-82		380
-150	-141	-133	-124	-115	-106	-96	-86		400
-157	-148	-139	-130	-121	-111	-101	-90		420
-165	-155	-146	-136	-126	-116	-105	-94		440
-172	-162	-152	-142	-132	-121	-110	-99		460
-180	-169	-159	-148	-137	-126	-115	-103		480
-187	-176	-165	-154	-143	-132	-120	-107		500

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PART 2a-1 TABLE D

WEIGHT OF PROJECTILE
EFFECTS IN YARDS OF RANGE DUE TO VARIATIONS IN

Range Yards	Variation in Weight of Projectile - Per Cent										
	-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5
1000	+22	+18	+13	+9	+4	0	-4	-9	-14	-19	-24
2000	+40	+32	+24	+16	+8	0	-8	-16	-25	-34	-43
3000	+54	+43	+33	+22	+11	0	-11	-22	-34	-45	-57
4000	+64	+51	+39	+26	+13	0	-13	-26	-40	-53	-67
5000	+70	+56	+42	+28	+14	0	-14	-29	-44	-58	-73
6000	+72	+58	+44	+29	+15	0	-15	-30	-45	-60	-75
7000	+69	+56	+42	+28	+14	0	-14	-29	-44	-59	-74
8000	+62	+50	+38	+26	+13	0	-13	-27	-41	-55	-69
9000	+52	+42	+32	+22	+11	0	-11	-23	-36	-48	-61
10000	+39	+32	+25	+17	+9	0	-9	-18	-28	-38	-49
11000	+22	+19	+15	+10	+5	0	-6	-12	-19	-26	-34
12000	+2	+3	+3	+2	+1	0	-2	-5	-8	-12	-17
13000	-19	-14	-9	-6	-3	0	+2	+3	+4	+4	+3
14000	-41	-31	-22	-14	-7	0	+6	+11	+16	+20	+24
15000	-62	-48	-35	-23	-11	0	+10	+20	+29	+37	+45
16000	-82	-64	-47	-31	-15	0	+14	+28	+41	+53	+65
17000	-101	-79	-58	-38	-19	0	+18	+35	+52	+68	+83
18000	-118	-93	-68	-45	-22	0	+21	+42	+62	+81	+99
19000	-134	-106	-78	-51	-25	0	+24	+48	+71	+93	+114
20000	-152	-120	-88	-58	-28	0	+27	+54	+80	+104	+128
21000	-174	-137	-101	-66	-32	0	+31	+61	+89	+116	+142
22000	-203	-159	-117	-76	-37	0	+36	+70	+102	+132	+161
23000	-247	-193	-142	-92	-45	0	+43	+84	+123	+159	+194
23500		-216	-159	-104	-51	0	+49	+96	+141	+184	+224

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PART 2a-1 TABLE E

NOTATION OF THE TABLE, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 0°

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+2-	+4-	+6-	+8-	+9-	+9-
2000	0	+4-	+8-	+12-	+15-	+17-	+17-
3000	0	+6-	+12-	+18-	+22-	+24-	+25-
4000	0	+8-	+16-	+23-	+28-	+31-	+32-
5000	0	+10-	+19-	+27-	+33-	+37-	+38-
6000	0	+12-	+22-	+31-	+38-	+42-	+44-
7000	0	+13-	+24-	+34-	+42-	+47-	+49-
8000	0	+14-	+26-	+37-	+45-	+51-	+53-
9000	0	+15-	+28-	+39-	+48-	+54-	+56-
10000	0	+15-	+29-	+41-	+50-	+56-	+58-
11000	0	+16-	+30-	+42-	+52-	+58-	+60-
12000	0	+16-	+31-	+44-	+54-	+60-	+62-
13000	0	+17-	+32-	+45-	+55-	+61-	+63-
14000	0	+17-	+32-	+45-	+55-	+62-	+64-
15000	0	+17-	+33-	+46-	+56-	+63-	+65-
16000	0	+17-	+33-	+47-	+57-	+64-	+66-
17000	0	+17-	+33-	+47-	+58-	+65-	+67-
18000	0	+18-	+34-	+48-	+59-	+66-	+68-
19000	0	+18-	+34-	+48-	+59-	+66-	+68-
20000	0	+18-	+34-	+48-	+59-	+66-	+68-
21000	0	+18-	+34-	+48-	+59-	+66-	+68-
22000	0	+17-	+33-	+47-	+57-	+64-	+66-
23000	0	+15-	+28-	+40-	+49-	+55-	+57-
23240	0	+12-	+23-	+32-	+39-	+43-	+45-
	180	195	210	225	240	255	270
	360	345	330	315	300	285	270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the tables use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

PART 2a-1 TABLE E

NORMAL CHARGE - M.V. 2150 f/s

ROTATION OF THE EARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 10° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+2-	+4-	+6-	+7-	+8-	+9-
2000	0	+4-	+8-	+12-	+14-	+16-	+17-
3000	0	+6-	+12-	+17-	+21-	+24-	+25-
4000	0	+8-	+16-	+22-	+27-	+31-	+32-
5000	0	+10-	+19-	+27-	+33-	+37-	+38-
6000	0	+11-	+22-	+31-	+38-	+42-	+43-
7000	0	+12-	+24-	+34-	+42-	+46-	+48-
8000	0	+13-	+26-	+37-	+45-	+50-	+52-
9000	0	+14-	+27-	+39-	+48-	+53-	+55-
10000	0	+15-	+29-	+41-	+50-	+55-	+57-
11000	0	+16-	+30-	+42-	+51-	+57-	+59-
12000	0	+16-	+30-	+43-	+53-	+59-	+61-
13000	0	+16-	+31-	+44-	+54-	+60-	+62-
14000	0	+17-	+32-	+45-	+55-	+61-	+63-
15000	0	+17-	+32-	+45-	+55-	+62-	+64-
16000	0	+17-	+33-	+46-	+56-	+63-	+65-
17000	0	+17-	+33-	+46-	+56-	+63-	+66-
18000	0	+17-	+33-	+47-	+57-	+64-	+67-
19000	0	+18-	+34-	+48-	+58-	+64-	+67-
20000	0	+18-	+34-	+48-	+58-	+64-	+67-
21000	0	+18-	+34-	+48-	+58-	+65-	+67-
22000	0	+17-	+33-	+46-	+56-	+63-	+65-
23000	0	+15-	+28-	+39-	+48-	+54-	+56-
23240	0	+12-	+22-	+31-	+38-	+42-	+44-
	180	195	210	225	240	255	270
	360	345	330	315	300	285	270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, B.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE E

ROTATION OF THE EARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 20° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+2-	+4-	+6-	+7-	+8-	+8-
2000	0	+4-	+8-	+11-	+14-	+16-	+16-
3000	0	+6-	+11-	+16-	+20-	+23-	+23-
4000	0	+8-	+15-	+21-	+26-	+29-	+30-
5000	0	+10-	+18-	+25-	+31-	+35-	+36-
6000	0	+11-	+21-	+29-	+36-	+40-	+41-
7000	0	+12-	+23-	+33-	+40-	+44-	+45-
8000	0	+13-	+25-	+35-	+43-	+48-	+49-
9000	0	+14-	+26-	+36-	+45-	+51-	+52-
10000	0	+14-	+27-	+38-	+47-	+53-	+55-
11000	0	+15-	+28-	+40-	+49-	+55-	+57-
12000	0	+15-	+29-	+41-	+50-	+56-	+58-
13000	0	+16-	+30-	+42-	+51-	+57-	+59-
14000	0	+16-	+31-	+43-	+52-	+58-	+60-
15000	0	+16-	+31-	+43-	+53-	+59-	+61-
16000	0	+16-	+31-	+44-	+54-	+60-	+62-
17000	0	+16-	+31-	+44-	+54-	+61-	+63-
18000	0	+17-	+32-	+45-	+55-	+61-	+64-
19000	0	+17-	+32-	+45-	+55-	+62-	+64-
20000	0	+16-	+32-	+46-	+56-	+62-	+64-
21000	0	+16-	+32-	+46-	+56-	+62-	+64-
22000	0	+16-	+31-	+44-	+54-	+60-	+62-
23000	0	+14-	+27-	+38-	+46-	+51-	+53-
23240	0	+11-	+21-	+30-	+37-	+41-	+42-
	180 360	195 345	210 330	225 315	240 300	255 285	270 270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MCD, 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE E

ROTATION OF THE EARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 30° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+2-	+4-	+5-	+6-	+7-	+8-
2000	0	+4-	+7-	+10-	+12-	+14-	+18-
3000	0	+6-	+11-	+15-	+18-	+21-	+22-
4000	0	+7-	+14-	+20-	+24-	+27-	+28-
5000	0	+9-	+17-	+24-	+29-	+32-	+33-
6000	0	+10-	+19-	+27-	+33-	+37-	+38-
7000	0	+11-	+21-	+29-	+36-	+41-	+42-
8000	0	+12-	+23-	+32-	+39-	+44-	+45-
9000	0	+13-	+24-	+34-	+42-	+47-	+48-
10000	0	+13-	+25-	+36-	+44-	+49-	+50-
11000	0	+14-	+26-	+37-	+45-	+50-	+52-
12000	0	+14-	+27-	+38-	+46-	+52-	+54-
13000	0	+14-	+27-	+38-	+47-	+53-	+55-
14000	0	+15-	+28-	+39-	+48-	+54-	+56-
15000	0	+15-	+28-	+40-	+49-	+54-	+56-
16000	0	+15-	+28-	+40-	+49-	+55-	+57-
17000	0	+15-	+29-	+41-	+50-	+56-	+58-
18000	0	+15-	+29-	+41-	+51-	+57-	+59-
19000	0	+16-	+30-	+42-	+51-	+57-	+59-
20000	0	+16-	+30-	+42-	+51-	+57-	+59-
21000	0	+16-	+30-	+42-	+51-	+57-	+59-
22000	0	+15-	+29-	+40-	+49-	+55-	+57-
23000	0	+13-	+24-	+34-	+42-	+47-	+49-
23240	0	+10-	+19-	+27-	+34-	+38-	+39-
	180 360	195 345	210 330	225 315	240 300	255 285	270 270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE E

ROTATION OF THE EARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 40° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+2-	+4-	+5-	+6-	+7-	+7-
2000	0	+4-	+7-	+10-	+12-	+13-	+13-
3000	0	+5-	+10-	+14-	+17-	+19-	+19-
4000	0	+6-	+12-	+17-	+21-	+24-	+25-
5000	0	+8-	+15-	+21-	+25-	+28-	+30-
6000	0	+9-	+17-	+24-	+29-	+32-	+34-
7000	0	+9-	+18-	+26-	+32-	+36-	+37-
8000	0	+10-	+20-	+28-	+35-	+39-	+40-
9000	0	+11-	+21-	+30-	+37-	+41-	+43-
10000	0	+11-	+22-	+32-	+39-	+43-	+45-
11000	0	+12-	+23-	+33-	+40-	+45-	+46-
12000	0	+12-	+24-	+34-	+41-	+46-	+47-
13000	0	+13-	+24-	+34-	+42-	+47-	+48-
14000	0	+13-	+25-	+35-	+42-	+47-	+49-
15000	0	+13-	+25-	+35-	+43-	+48-	+50-
16000	0	+13-	+25-	+36-	+44-	+49-	+50-
17000	0	+14-	+26-	+36-	+44-	+49-	+51-
18000	0	+14-	+26-	+37-	+45-	+50-	+52-
19000	0	+14-	+26-	+37-	+45-	+50-	+52-
20000	0	+14-	+26-	+37-	+45-	+50-	+52-
21000	0	+14-	+26-	+37-	+46-	+51-	+52-
22000	0	+13-	+25-	+36-	+44-	+49-	+50-
23000	0	+11-	+22-	+31-	+38-	+42-	+43-
23240	0	+9-	+17-	+24-	+30-	+34-	+34-
	180 360	195 345	210 330	225 315	240 300	255 285	270 270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE E

ROTATION OF THE BARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 50° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+2-	+3-	+4-	+5-	+6-	+6-
2000	0	+3-	+6-	+8-	+10-	+11-	+11-
3000	0	+4-	+8-	+11-	+14-	+16-	+16-
4000	0	+5-	+10-	+14-	+18-	+20-	+21-
5000	0	+6-	+12-	+17-	+21-	+24-	+25-
6000	0	+7-	+14-	+20-	+24-	+27-	+28-
7000	0	+8-	+16-	+22-	+27-	+30-	+31-
8000	0	+9-	+17-	+24-	+29-	+32-	+34-
9000	0	+9-	+18-	+25-	+30-	+34-	+36-
10000	0	+10-	+19-	+26-	+32-	+36-	+38-
11000	0	+10-	+19-	+27-	+34-	+38-	+39-
12000	0	+10-	+20-	+28-	+35-	+39-	+40-
13000	0	+11-	+21-	+29-	+35-	+39-	+41-
14000	0	+11-	+21-	+29-	+36-	+40-	+41-
15000	0	+11-	+21-	+30-	+36-	+40-	+42-
16000	0	+11-	+21-	+30-	+37-	+41-	+42-
17000	0	+11-	+21-	+30-	+37-	+41-	+43-
18000	0	+11-	+22-	+31-	+38-	+42-	+43-
19000	0	+11-	+22-	+31-	+38-	+42-	+44-
20000	0	+11-	+22-	+31-	+38-	+42-	+44-
21000	0	+11-	+22-	+31-	+38-	+42-	+44-
22000	0	+11-	+21-	+30-	+37-	+41-	+42-
23000	0	+9-	+18-	+26-	+32-	+35-	+36-
23240	0	+7-	+14-	+20-	+25-	+28-	+29-
	180	195	210	225	240	255	270
	360	345	330	315	300	285	270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE E

ROTATION OF THE EARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 60° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+1-	+2-	+3-	+4-	+4-	+5-
2000	0	+2-	+4-	+6-	+7-	+8-	+9-
3000	0	+3-	+6-	+9-	+11-	+12-	+13-
4000	0	+4-	+8-	+11-	+14-	+16-	+16-
5000	0	+5-	+10-	+14-	+17-	+19-	+19-
6000	0	+6-	+11-	+16-	+19-	+21-	+22-
7000	0	+6-	+12-	+17-	+21-	+23-	+24-
8000	0	+7-	+13-	+19-	+23-	+25-	+26-
9000	0	+7-	+14-	+20-	+24-	+27-	+28-
10000	0	+8-	+15-	+21-	+25-	+28-	+29-
11000	0	+8-	+15-	+21-	+26-	+29-	+30-
12000	0	+8-	+16-	+22-	+27-	+30-	+31-
13000	0	+8-	+16-	+22-	+27-	+31-	+32-
14000	0	+8-	+16-	+23-	+28-	+31-	+32-
15000	0	+8-	+16-	+23-	+28-	+31-	+32-
16000	0	+8-	+16-	+23-	+28-	+32-	+33-
17000	0	+9-	+17-	+24-	+29-	+32-	+33-
18000	0	+9-	+17-	+24-	+29-	+33-	+34-
19000	0	+9-	+17-	+24-	+30-	+33-	+34-
20000	0	+9-	+17-	+24-	+30-	+33-	+34-
21000	0	+9-	+17-	+24-	+30-	+33-	+34-
22000	0	+8-	+16-	+23-	+29-	+32-	+33-
23000	0	+7-	+14-	+20-	+24-	+27-	+28-
23240	0	+6-	+11-	+16-	+20-	+22-	+22-
	180 360	195 345	210 330	225 315	240 300	255 285	270 270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

PART 2a-1 TABLE E

SHELL, H.E., 240 LB., M103
FUZE, P.D., M91 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

ROTATION OF THE EARTH, EFFECTS IN YARDS OF RANGE DUE TO

Latitude 70° (North or South)

Azimuth of Target - Degrees

Range Yards	0 180	15 165	30 150	45 135	60 120	75 105	90 90
1000	0	+1-	+2-	+2-	+3-	+3-	+3-
2000	0	+2-	+3-	+4-	+5-	+6-	+6-
3000	0	+2-	+4-	+6-	+7-	+8-	+9-
4000	0	+3-	+5-	+7-	+9-	+10-	+11-
5000	0	+3-	+6-	+9-	+11-	+12-	+13-
6000	0	+4-	+7-	+10-	+12-	+14-	+15-
7000	0	+4-	+8-	+11-	+14-	+16-	+17-
8000	0	+5-	+9-	+12-	+15-	+17-	+18-
9000	0	+5-	+9-	+13-	+16-	+18-	+19-
10000	0	+5-	+10-	+14-	+17-	+19-	+20-
11000	0	+5-	+10-	+15-	+18-	+20-	+21-
12000	0	+6-	+11-	+15-	+18-	+20-	+21-
13000	0	+6-	+11-	+15-	+19-	+21-	+22-
14000	0	+6-	+11-	+16-	+19-	+21-	+22-
15000	0	+6-	+11-	+16-	+19-	+21-	+22-
16000	0	+6-	+11-	+16-	+20-	+22-	+22-
17000	0	+6-	+11-	+16-	+20-	+22-	+23-
18000	0	+6-	+12-	+16-	+20-	+22-	+23-
19000	0	+6-	+12-	+17-	+20-	+22-	+23-
20000	0	+6-	+12-	+17-	+20-	+22-	+23-
21000	0	+6-	+12-	+17-	+20-	+22-	+23-
22000	0	+6-	+11-	+16-	+19-	+21-	+22-
23000	0	+5-	+10-	+14-	+17-	+19-	+19-
23240	0	+4-	+8-	+11-	+13-	+14-	+15-
	180 360	195 345	210 330	225 315	240 300	255 285	270 270

Azimuth of Target - Degrees

NOTE: For the argument at the top of the table, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.B., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE Fa

MUZZLE VELOCITY, EFFECTS IN YARDS OF RANGE, DUE TO INCREASE IN

Range Yards	Increase in Muzzle Velocity - Feet Per Second							
	10	20	30	40	50	60	70	80
1000	9	18	27	36	44	52	60	68
2000	18	35	52	69	86	102	118	134
3000	26	52	77	102	127	151	175	198
4000	34	68	101	134	166	198	229	260
5000	42	83	123	163	203	242	281	319
6000	49	97	145	192	238	284	330	375
7000	56	111	165	219	272	325	377	428
8000	62	124	184	244	304	363	421	479
9000	68	136	203	269	335	400	464	527
10000	74	148	221	293	364	434	504	573
11000	80	159	237	314	391	467	542	616
12000	85	170	253	335	417	498	578	658
13000	90	180	268	356	443	529	614	699
14000	95	190	283	376	468	559	649	738
15000	100	199	297	395	492	588	683	777
16000	105	208	311	413	515	616	716	815
17000	109	218	325	432	538	643	748	852
18000	114	227	339	450	561	671	780	889
19000	118	236	353	469	584	699	813	926
20000	123	246	367	488	608	727	846	964
21000	128	255	381	507	631	755	878	1001
21500	131	260	389	517	644	770	895	1020
22000	134	266	398	528	657	785	912	1039
22500	137	273	407	539	670	800	930	1059
23000	141	280	417	552	685	818	951	1082
23500	145	289	430	569	706	842	978	1111
24000		301	450	596	738	876	1013	1148
24500						923	1060	1194
25000								
25500								

PART 2a-1 TABLE Fa

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

MUZZLE VELOCITY, EFFECTS IN YARDS OF RANGE, DUE TO INCREASE IN

Increase in Muzzle Velocity - Feet Per Second							Range
90	100	110	120	130	140	150	Yards
76	84	92	99	106	113	120	1000
150	165	180	195	209	223	237	2000
221	244	266	288	309	330	351	3000
290	320	349	378	406	434	462	4000
356	393	429	465	500	535	569	5000
419	463	506	548	590	631	672	6000
479	529	579	627	675	723	770	7000
536	592	648	703	757	811	864	8000
590	652	714	775	835	894	953	9000
641	709	776	842	908	973	1037	10000
690	763	835	907	978	1048	1117	11000
737	815	892	969	1045	1120	1194	12000
783	866	948	1029	1110	1190	1269	13000
827	915	1002	1088	1173	1258	1342	14000
870	963	1055	1146	1236	1325	1414	15000
913	1010	1107	1203	1298	1392	1485	16000
955	1057	1158	1259	1359	1458	1556	17000
997	1104	1210	1315	1420	1524	1627	18000
1039	1151	1262	1372	1482	1590	1698	19000
1081	1198	1313	1428	1543	1656	1769	20000
1123	1244	1364	1484	1603	1721	1838	21000
1144	1267	1389	1511	1632	1752	1872	21500
1165	1290	1415	1538	1661	1784	1905	22000
1187	1314	1441	1566	1691	1816	1939	22500
1211	1340	1469	1596	1723	1850	1975	23000
1242	1372	1502	1631	1760	1887	2013	23500
1281	1412	1543	1674	1803	1930	2056	24000
1327	1460	1593	1725	1854	1981	2106	24500
1381	1518	1653	1786	1917	2046	2171	25000
			1878	2013	2146	2274	25500

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE Pb

MUZZLE VELOCITY, EFFECTS IN YARDS OF RANGE, DUE TO DECREASE IN

Range Yards	Decrease in Muzzle Velocity - Feet Per Second							
	10	20	30	40	50	60	70	80
1000	-9	-19	-29	-38	-48	-58	-68	-78
2000	-18	-37	-56	-75	-94	-113	-133	-153
3000	-27	-54	-81	-109	-137	-166	-195	-224
4000	-35	-70	-105	-141	-178	-215	-253	-291
5000	-42	-85	-129	-173	-217	-262	-308	-354
6000	-49	-100	-151	-202	-254	-307	-360	-414
7000	-56	-113	-171	-229	-288	-348	-408	-469
8000	-63	-126	-190	-255	-321	-387	-454	-522
9000	-69	-139	-209	-280	-352	-425	-498	-572
10000	-75	-151	-227	-304	-382	-461	-540	-620
11000	-81	-162	-244	-327	-410	-494	-579	-665
12000	-86	-173	-260	-348	-437	-527	-617	-708
13000	-91	-183	-275	-369	-463	-558	-654	-750
14000	-96	-193	-290	-389	-488	-588	-689	-791
15000	-101	-203	-305	-408	-512	-617	-723	-829
16000	-105	-212	-319	-426	-535	-644	-754	-865
17000	-110	-221	-332	-444	-557	-670	-785	-900
18000	-114	-229	-345	-462	-579	-697	-816	-935
19000	-119	-239	-359	-480	-602	-725	-848	-972
20000	-124	-249	-374	-500	-627	-754	-883	-1012
21000	-129	-258	-389	-520	-653	-786	-921	-1057
21500	-132	-264	-398	-533	-669	-805	-943	-1083
22000	-135	-271	-408	-547	-687	-827	-969	-1113
22500	-138	-278	-420	-563	-708	-854	-1000	-1150
23000	-142	-287	-434	-582	-733			
23500	-147							

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE Pb

MUZZLE VELOCITY, EFFECTS IN YARDS OF RANGE, DUE TO DECREASE IN

Decrease in Muzzle Velocity - Feet Per Second							Range
90	100	110	120	130	140	150	Yards
-88	-99	-110	-121	-132	-143	-155	1000
-173	-194	-215	-236	-258	-280	-302	2000
-254	-284	-315	-346	-377	-409	-441	3000
-330	-369	-408	-448	-489	-530	-571	4000
-401	-448	-496	-544	-593	-643	-693	5000
-468	-523	-579	-635	-691	-749	-807	6000
-531	-593	-656	-719	-783	-848	-913	7000
-590	-659	-729	-799	-870	-941	-1013	8000
-647	-722	-798	-875	-952	-1030	-1108	9000
-701	-782	-864	-947	-1030	-1114	-1199	10000
-752	-839	-927	-1016	-1105	-1195	-1286	11000
-800	-893	-987	-1081	-1176	-1272	-1369	12000
-847	-945	-1044	-1144	-1245	-1346	-1448	13000
-893	-996	-1100	-1205	-1311	-1417	-1524	14000
-936	-1044	-1153	-1262	-1373	-1484	-1596	15000
-976	-1089	-1202	-1316	-1431	-1547	-1663	16000
-1015	-1132	-1250	-1368	-1487	-1606	-1727	17000
-1055	-1176	-1298	-1420	-1543	-1666	-1791	18000
-1097	-1222	-1348	-1475	-1603	-1732	-1861	19000
-1142	-1273	-1405	-1538	-1672	-1807	-1943	20000
-1194	-1332	-1472	-1612	-1754	-1898	-2043	21000
-1224	-1367	-1512	-1657	-1804	-1953	-2105	21500
-1259	-1407	-1557	-1708				22000
							22500
							23000
							23500

SHELL, H.E., 240 LB., M103
 FUZE, P.O., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE 0a

AIR DENSITY, EFFECTS IN YARDS OF RANGE, DUE TO DECREASE IN
 (59° F. and 29.5 + in.)

Range Yards	Decrease in Air Density - Per Cent							
	1	2	3	4	5	6	7	8
1000	1	1	1	1	1	2	2	2
2000	2	3	4	4	5	6	7	8
3000	3	5	8	10	12	14	17	19
4000	5	9	14	18	23	27	32	36
5000	8	15	22	29	37	44	51	57
6000	11	21	32	42	53	63	73	83
7000	15	29	43	57	72	86	99	113
8000	19	38	56	75	94	112	130	148
9000	24	48	71	95	118	141	164	187
10000	30	59	88	117	145	173	201	229
11000	36	71	106	140	174	208	242	275
12000	42	83	125	165	205	246	286	325
13000	48	96	144	191	238	285	331	377
14000	55	110	164	218	271	324	377	430
15000	62	123	184	244	304	364	424	484
16000	68	136	203	270	337	404	471	538
17000	74	148	222	296	370	444	517	591
18000	80	160	241	321	401	482	562	642
19000	86	173	260	346	432	518	605	691
20000	93	186	279	372	464	556	648	739
21000	100	200	299	398	496	593	690	786
22000	108	215	321	426	530	633	735	836
23000	117	232	346	458	569	678	786	893
24000	126	251	374	495	615	733	849	963
25000							928	1053
26000								

SHELL, H.B., 240 LB., M103

FUZE, P.D., M51 MOD. 1

PART 2a-1 TABLE Gb

NORMAL CHARGE - M.V. 2150 f/s

AIR DENSITY, EFFECTS IN YARDS OF RANGE, DUE TO DECREASE IN
(59° F. and 29.5 + in.)

Decrease in Air Density - Per Cent								Range
9	10	11	12	13	14	15	16	Yards
2	2	2	2	3	3	3	3	1000
9	10	11	12	14	14	15	16	2000
22	24	27	29	32	34	36	38	3000
41	45	49	54	58	63	67	71	4000
64	71	78	85	92	99	106	113	5000
93	103	113	123	133	143	153	163	6000
127	141	154	168	181	194	208	221	7000
166	184	201	219	236	253	270	287	8000
210	232	254	276	298	319	340	361	9000
257	284	312	338	365	391	417	442	10000
308	341	374	406	438	469	500	531	11000
364	403	441	479	517	554	590	628	12000
423	468	512	556	601	644	687	731	13000
483	535	586	637	688	739	789	839	14000
544	603	662	720	778	837	895	952	15000
605	671	738	804	870	936	1002	1067	16000
665	738	812	886	960	1033	1107	1180	17000
723	803	883	964	1045	1125	1206	1286	18000
778	864	950	1036	1122	1208	1295	1381	19000
830	921	1012	1102	1192	1282	1372	1462	20000
881	977	1071	1165	1258	1351	1443	1534	21000
936	1035	1133	1230	1325	1420	1514	1607	22000
998	1102	1204	1305	1405	1503	1600	1695	23000
1076	1186	1296	1403	1509	1613	1715	1815	24000
1176	1298	1417	1535	1650	1764	1876	1986	25000
					1973	2102	2229	26000

SHELL, H.B., 240 LB., M103
 FUZE, P.D., M51 MOD. 1.
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE Gb

AIR DENSITY, EFFECTS IN YARDS OF RANGE, DUE TO INCREASE IN
 (59° F. and 29.5 + in.)

Range Yards	Increase in Air Density - Per Cent							
	1	2	3	4	5	6	7	8
1000	-1	-1	-1	-1	-2	-2	-2	-2
2000	-2	-3	-4	-4	-6	-7	-8	-8
3000	-3	-5	-8	-10	-13	-16	-18	-20
4000	-5	-9	-14	-19	-23	-28	-33	-37
5000	-8	-15	-22	-30	-37	-44	-52	-59
6000	-11	-22	-32	-43	-55	-65	-76	-86
7000	-15	-30	-44	-59	-75	-90	-105	-119
8000	-20	-39	-58	-77	-97	-118	-138	-157
9000	-25	-49	-74	-98	-123	-149	-174	-199
10000	-30	-60	-91	-121	-152	-183	-214	-245
11000	-36	-72	-109	-145	-182	-219	-257	-294
12000	-42	-85	-128	-170	-213	-257	-302	-346
13000	-49	-98	-147	-196	-246	-297	-348	-399
14000	-56	-111	-167	-223	-279	-336	-393	-450
15000	-62	-124	-186	-248	-311	-374	-437	-500
16000	-68	-136	-204	-272	-341	-409	-478	-547
17000	-74	-148	-222	-296	-370	-444	-518	-593
18000	-80	-160	-240	-320	-400	-480	-560	-641
19000	-86	-173	-260	-347	-434	-521	-607	-694
20000	-94	-188	-281	-376	-470	-565	-660	-755
21000	-101	-202	-304	-407	-509	-614	-718	-823
22000	-109	-219	-330	-442	-555	-669	-784	-900
23000	-118	-237	-358	-481	-604	-729	-856	-984
24000	-128	-258						

SHELL, H.E., 240 LB., M103

FOUR, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE Gb

AIR DENSITY, EFFECTS IN YARDS OF RANGE, DUE TO INCREASE IN
(59° F. and 29.5 + in.)

Increase in Air Density - Per Cent								Range
9	10	11	12	13	14	15	16	Yards
-3	-3	-3	-3	-4	-4	-4	-4	1000
-10	-11	-12	-13	-15	-16	-16	-17	2000
-23	-25	-28	-30	-33	-36	-38	-40	3000
-41	-46	-51	-56	-60	-65	-70	-74	4000
-66	-74	-81	-89	-96	-104	-112	-119	5000
-97	-108	-119	-130	-141	-152	-164	-175	6000
-134	-149	-165	-180	-196	-211	-227	-243	7000
-177	-197	-218	-238	-259	-280	-301	-322	8000
-225	-251	-277	-303	-329	-356	-383	-410	9000
-277	-309	-341	-373	-406	-439	-473	-506	10000
-333	-371	-409	-448	-488	-527	-568	-608	11000
-391	-435	-481	-527	-573	-619	-666	-713	12000
-449	-501	-554	-606	-659	-712	-765	-819	13000
-507	-566	-624	-682	-741	-801	-861	-921	14000
-563	-627	-691	-754	-819	-884	-950	-1015	15000
-616	-685	-755	-823	-893	-963	-1033	-1103	16000
-668	-742	-817	-890	-965	-1040	-1115	-1189	17000
-721	-801	-882	-961	-1041	-1121	-1202	-1282	18000
-781	-868	-956	-1042	-1129	-1216	-1304	-1392	19000
-850	-946	-1042	-1139	-1235	-1332	-1429	-1526	20000
-929	-1035	-1142	-1249	-1357	-1465	-1574	-1684	21000
-1017	-1135	-1254	-1374	-1496	-1618	-1741	-1864	22000
-1113	-1244							23000
								24000

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE B

TEMPERATURE (ELASTICITY), EFFECTS IN YARDS OF RANGE
 (59° F.)

Range Yards	Temperature of Air - Degrees Fahrenheit											
	0	10	20	30	40	50	59	60	70	80	90	100
1000	-8	-5	-3	-1	0	1	0	0	-1	-2	-4	-7
2000	-12	-7	-3	0	1	2	0	1	-1	-4	-9	-15
3000	-12	-6	-1	+2	3	3	0	1	-3	-8	-15	-23
4000	-8	-2	+2	5	5	4	0	1	-5	-12	-21	-32
5000	+1	+5	8	9	8	5	0	0	-7	-16	-28	-42
6000	13	15	16	15	12	7	0	0	-10	-22	-36	-52
7000	29	29	27	23	17	9	0	-1	-13	-28	-45	-63
8000	49	46	40	32	23	12	0	-1	-17	-35	-54	-75
9000	73	65	55	43	30	15	0	-2	-21	-42	-64	-88
10000	100	87	72	55	37	18	0	-3	-25	-49	-74	-101
11000	129	110	90	68	45	22	0	-3	-29	-56	-84	-114
12000	159	134	108	81	54	26	0	-3	-33	-64	-95	-128
13000	189	158	126	95	63	30	0	-3	-37	-71	-105	-140
14000	217	180	143	107	70	33	0	-3	-40	-77	-113	-149
15000	241	198	156	115	75	35	0	-4	-42	-80	-117	-153
16000	258	211	165	120	77	36	0	-4	-43	-80	-116	-150
17000	265	215	167	121	77	36	0	-3	-41	-76	-109	-140
18000	259	209	161	116	74	34	0	-3	-37	-69	-98	-125
19000	239	192	148	106	67	31	0	-2	-33	-61	-86	-110
20000	206	166	129	93	59	27	0	-3	-30	-55	-79	-101
21000	167	137	108	79	51	24	0	-3	-29	-54	-79	-103
22000	139	118	95	72	48	23	0	-3	-30	-58	-87	-117
23000	155	132	108	82	55	27	0	-3	-34	-66	-99	-134
24000	272	222	173	126	81	38	0	-3	-41	-75	-108	-140

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE Ia

REAR WIND, EFFECTS IN YARDS OF RANGE, DUE TO

Range Yards	Rear Wind - Miles Per Hour									
	5	10	15	20	25	30	35	40	45	50
1000	0	0	0	0	0	0	0	0	0	0
2000	0	1	1	1	2	2	2	2	3	3
3000	1	2	3	4	5	6	6	7	8	9
4000	2	4	5	7	9	11	12	14	16	18
5000	3	6	9	12	15	18	21	24	28	31
6000	5	9	14	18	23	28	33	37	42	47
7000	7	13	19	26	32	39	46	52	59	66
8000	9	17	26	35	43	52	61	70	78	87
9000	11	22	34	45	56	67	78	90	101	112
10000	14	28	43	57	71	85	99	113	127	141
11000	18	35	53	71	88	105	123	140	157	174
12000	22	43	65	86	108	129	150	170	191	211
13000	26	53	79	104	130	155	180	204	229	253
14000	31	63	94	124	154	184	213	242	271	299
15000	37	74	110	146	181	216	250	284	317	350
16000	43	86	128	170	211	251	291	331	369	407
17000	50	99	148	197	244	291	337	382	427	471
18000	58	114	170	226	280	334	386	438	489	540
19000	66	131	194	257	319	380	440	499	557	615
20000	75	149	221	292	362	431	499	565	631	696
21000	84	167	249	329	408	485	561	636	710	782
22000	94	187	278	368	456	542	626	710	792	871
23000	105	208	309	408	506	602	695	787	877	964
24000	117	231	343	452	560	667	771	872	971	1067
25000							863	976	1087	1196

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE 1b

HEAD WIND, EFFECTS IN YARDS OF RANGE, DUE TO

Range Yards	Head Wind - Miles Per Hour									
	5	10	15	20	25	30	35	40	45	50
1000	0	0	0	0	0	0	-1	-1	-1	-1
2000	0	-1	-1	-1	-2	-2	-3	-4	-4	-4
3000	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
4000	-2	-4	-5	-7	-9	-11	-13	-14	-16	-18
5000	-3	-6	-9	-12	-15	-18	-21	-23	-26	-29
6000	-5	-9	-14	-18	-23	-27	-31	-35	-40	-44
7000	-6	-13	-19	-26	-32	-38	-44	-50	-57	-63
8000	-9	-18	-26	-35	-43	-51	-59	-68	-77	-85
9000	-11	-23	-34	-45	-56	-67	-78	-90	-101	-112
10000	-14	-29	-43	-57	-72	-86	-101	-115	-130	-144
11000	-18	-36	-54	-72	-90	-108	-127	-145	-164	-182
12000	-22	-44	-67	-89	-112	-134	-157	-180	-204	-227
13000	-27	-54	-81	-108	-136	-164	-192	-220	-249	-278
14000	-32	-64	-97	-130	-163	-196	-230	-264	-299	-334
15000	-38	-76	-114	-153	-192	-232	-272	-313	-354	-396
16000	-44	-89	-133	-179	-225	-272	-319	-367	-415	-464
17000	-51	-103	-155	-208	-261	-316	-371	-427	-483	-540
18000	-59	-119	-179	-240	-302	-365	-429	-494	-560	-626
19000	-67	-136	-205	-275	-347	-420	-494	-569	-646	-723
20000	-76	-154	-233	-314	-396	-480	-565	-652	-741	-831
21000	-86	-174	-263	-355	-449	-545	-643	-743	-846	-951
22000	-96	-195	-296	-400	-506	-616	-729	-845	-966	-1092
23000	-108	-219	-333	-451	-573	-700	-833	-971	-1117	-1271
24000	-123	-247								

SHELL, H.E., 240 LB., M107

FUZE, P.D., M51 MOD. 1

PART 2a-1 TABLE J

NORMAL CHARGE - M.V. 2150 f/s

CROSS WIND EFFECTS

Range Yards	In Mils					In Degrees				
	Cross Wind - Miles Per Hour									
	10	20	30	40	50	10	20	30	40	50
1000	0.2	0.3	0.5	0.7	0.9	0.01	0.02	0.03	0.04	0.05
2000	0.3	0.6	1.0	1.3	1.6	0.02	0.04	0.05	0.07	0.09
3000	0.5	1.0	1.5	2.0	2.5	0.03	0.06	0.08	0.11	0.14
4000	0.7	1.4	2.1	2.8	3.5	0.04	0.08	0.12	0.16	0.20
5000	0.9	1.8	2.7	3.6	4.5	0.05	0.10	0.15	0.20	0.26
6000	1.1	2.2	3.3	4.5	5.6	0.06	0.13	0.19	0.25	0.31
7000	1.3	2.7	4.0	5.4	6.7	0.08	0.15	0.23	0.30	0.38
8000	1.6	3.1	4.7	6.3	7.8	0.09	0.18	0.26	0.35	0.44
9000	1.8	3.6	5.4	7.3	9.1	0.10	0.20	0.31	0.41	0.51
10000	2.1	4.1	6.2	8.3	10.4	0.12	0.23	0.35	0.47	0.58
11000	2.3	4.7	7.0	9.4	11.7	0.13	0.26	0.40	0.53	0.66
12000	2.6	5.3	7.9	10.5	13.1	0.15	0.30	0.44	0.59	0.74
13000	2.9	5.8	8.8	11.7	14.6	0.16	0.33	0.49	0.66	0.82
14000	3.2	6.4	9.6	12.9	16.1	0.18	0.36	0.54	0.72	0.90
15000	3.5	7.0	10.5	14.0	17.5	0.20	0.39	0.59	0.79	0.99
16000	3.8	7.6	11.4	15.2	19.0	0.21	0.43	0.64	0.85	1.07
17000	4.1	8.1	12.2	16.3	20.4	0.23	0.46	0.69	0.92	1.15
18000	4.3	8.7	13.0	17.3	21.7	0.24	0.49	0.73	0.98	1.22
19000	4.6	9.2	13.8	18.3	22.9	0.26	0.52	0.77	1.03	1.29
20000	4.8	9.7	14.5	19.3	24.2	0.27	0.54	0.82	1.09	1.36
21000	5.1	10.2	15.3	20.3	25.4	0.29	0.57	0.86	1.14	1.43
22000	5.4	10.7	16.1	21.5	26.8	0.30	0.60	0.91	1.21	1.51
23000	5.9	11.7	17.6	23.4	29.3	0.33	0.66	0.99	1.32	1.65
23240	6.2	12.3	18.5	24.7	30.9	0.35	0.69	1.04	1.39	1.74

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE K

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 0°

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10000	+0.1-	+0.1	0.0	0.0	0.0	-0.1+	-0.1+
11000	+0.1-	+0.1-	0.0	0.0	0.0	-0.1+	-0.1+
12000	+0.1-	+0.1-	+0.1-	0.0	-0.1+	-0.1+	-0.1+
13000	+0.1-	+0.1-	+0.1-	0.0	-0.1+	-0.1+	-0.1+
14000	+0.2-	+0.1-	+0.1-	0.0	-0.1+	-0.1+	-0.2+
15000	+0.2-	+0.2-	+0.1-	0.0	-0.1+	-0.2+	-0.2+
16000	+0.3-	+0.2-	+0.1-	0.0	-0.1+	-0.2+	-0.3+
17000	+0.3-	+0.3-	+0.2-	0.0	-0.2+	-0.3+	-0.3+
18000	+0.4-	+0.3-	+0.2-	0.0	-0.2+	-0.3+	-0.4+
19000	+0.5-	+0.4-	+0.2-	0.0	-0.2+	-0.4+	-0.5+
20000	+0.6-	+0.5-	+0.3-	0.0	-0.3+	-0.5+	-0.6+
21000	+0.7-	+0.6-	+0.4-	0.0	-0.4+	-0.6+	-0.7+
22000	+0.9-	+0.8-	+0.5-	0.0	-0.5+	-0.8+	-0.9+
23000	+1.4-	+1.2-	+0.7-	0.0	-0.7+	-1.2+	-1.4+
23240	+1.7-	+1.5-	+0.9-	0.0	-0.9+	-1.5+	-1.7+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 0°

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE K

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 10° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
4000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
5000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
6000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
7000	-0.1+	-0.1+	-0.1+	-0.1+	-0.2+	-0.2+	-0.2+
8000	-0.1+	-0.1+	-0.1+	-0.2+	-0.2+	-0.2+	-0.2+
9000	-0.1+	-0.1+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
10000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.3+	-0.3+
11000	-0.2+	-0.2+	-0.2+	-0.2+	-0.3+	-0.3+	-0.3+
12000	-0.2+	-0.2+	-0.2+	-0.3+	-0.3+	-0.4+	-0.4+
13000	-0.2+	-0.2+	-0.2+	-0.3+	-0.4+	-0.4+	-0.4+
14000	-0.2+	-0.2+	-0.3+	-0.3+	-0.4+	-0.5+	-0.5+
15000	-0.2+	-0.2+	-0.3+	-0.4+	-0.5+	-0.5+	-0.6+
16000	-0.2+	-0.2+	-0.3+	-0.4+	-0.5+	-0.6+	-0.6+
17000	-0.1+	-0.2+	-0.3+	-0.4+	-0.6+	-0.7+	-0.7+
18000	-0.1+	-0.2+	-0.3+	-0.5+	-0.7+	-0.8+	-0.9+
19000	0.0	-0.1+	-0.3+	-0.5+	-0.7+	-0.9+	-1.0+
20000	0.0	-0.1+	-0.3+	-0.6+	-0.8+	-1.0+	-1.1+
21000	+0.1-	0.0	-0.3+	-0.7+	-1.0+	-1.2+	-1.3+
22000	+0.2-	+0.1-	-0.2+	-0.7+	-1.2+	-1.5+	-1.6+
23000	+0.5-	+0.4-	-0.1+	-0.8+	-1.5+	-2.0+	-2.1+
23240	+0.9-	+0.6-	0.0	-0.8+	-1.7+	-2.4+	-2.6+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 10° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE K

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 20° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
3000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
4000	-0.1+	-0.1+	-0.1+	-0.2+	-0.2+	-0.2+	-0.2+
5000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
6000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.3+
7000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+
8000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.4+	-0.4+
9000	-0.3+	-0.3+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+
10000	-0.4+	-0.4+	-0.4+	-0.4+	-0.5+	-0.5+	-0.5+
11000	-0.4+	-0.4+	-0.4+	-0.5+	-0.5+	-0.5+	-0.6+
12000	-0.4+	-0.4+	-0.5+	-0.5+	-0.6+	-0.6+	-0.6+
13000	-0.5+	-0.5+	-0.5+	-0.6+	-0.7+	-0.7+	-0.7+
14000	-0.5+	-0.5+	-0.6+	-0.7+	-0.7+	-0.8+	-0.8+
15000	-0.5+	-0.6+	-0.6+	-0.7+	-0.8+	-0.9+	-0.9+
16000	-0.6+	-0.6+	-0.7+	-0.8+	-0.9+	-1.0+	-1.0+
17000	-0.6+	-0.6+	-0.7+	-0.9+	-1.0+	-1.1+	-1.2+
18000	-0.6+	-0.7+	-0.8+	-0.9+	-1.1+	-1.2+	-1.3+
19000	-0.6+	-0.7+	-0.8+	-1.0+	-1.2+	-1.4+	-1.5+
20000	-0.6+	-0.7+	-0.9+	-1.1+	-1.4+	-1.6+	-1.7+
21000	-0.5+	-0.6+	-0.9+	-1.3+	-1.6+	-1.8+	-1.9+
22000	-0.4+	-0.5+	-0.9+	-1.4+	-1.8+	-2.1+	-2.2+
23000	-0.3+	-0.5+	-0.9+	-1.5+	-2.2+	-2.7+	-2.8+
23240	-0.1+	-0.3+	-0.9+	-1.7+	-2.5+	-3.1+	-3.3+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 20° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE K

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 30° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
2000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
3000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
4000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
5000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+
6000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.4+	-0.4+
7000	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+
8000	-0.4+	-0.4+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+
9000	-0.5+	-0.5+	-0.5+	-0.5+	-0.6+	-0.6+	-0.6+
10000	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.7+	-0.7+
11000	-0.6+	-0.6+	-0.7+	-0.7+	-0.7+	-0.8+	-0.8+
12000	-0.7+	-0.7+	-0.7+	-0.8+	-0.8+	-0.9+	-0.9+
13000	-0.8+	-0.8+	-0.8+	-0.9+	-0.9+	-1.0+	-1.0+
14000	-0.8+	-0.8+	-0.9+	-1.0+	-1.0+	-1.1+	-1.1+
15000	-0.9+	-0.9+	-1.0+	-1.0+	-1.1+	-1.2+	-1.2+
16000	-0.9+	-1.0+	-1.0+	-1.1+	-1.2+	-1.3+	-1.4+
17000	-1.0+	-1.0+	-1.1+	-1.3+	-1.4+	-1.5+	-1.5+
18000	-1.0+	-1.1+	-1.2+	-1.4+	-1.6+	-1.7+	-1.7+
19000	-1.1+	-1.2+	-1.3+	-1.5+	-1.7+	-1.9+	-1.9+
20000	-1.1+	-1.2+	-1.4+	-1.6+	-1.9+	-2.1+	-2.2+
21000	-1.2+	-1.3+	-1.5+	-1.8+	-2.1+	-2.4+	-2.5+
22000	-1.2+	-1.3+	-1.6+	-2.0+	-2.4+	-2.7+	-2.8+
23000	-1.1+	-1.3+	-1.7+	-2.3+	-2.9+	-3.3+	-3.4+
23240	-1.0+	-1.2+	-1.8+	-2.5+	-3.2+	-3.8+	-4.0+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 30° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE K

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 40° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
2000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
3000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
4000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+
5000	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+
6000	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.5+	-0.5+
7000	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+
8000	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+
9000	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+
10000	-0.7+	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+
11000	-0.8+	-0.8+	-0.9+	-0.9+	-0.9+	-0.9+	-1.0+
12000	-0.9+	-0.9+	-1.0+	-1.0+	-1.0+	-1.1+	-1.1+
13000	-1.0+	-1.0+	-1.1+	-1.1+	-1.2+	-1.2+	-1.2+
14000	-1.1+	-1.1+	-1.2+	-1.2+	-1.3+	-1.3+	-1.3+
15000	-1.2+	-1.2+	-1.3+	-1.3+	-1.4+	-1.5+	-1.5+
16000	-1.3+	-1.3+	-1.4+	-1.5+	-1.6+	-1.6+	-1.7+
17000	-1.4+	-1.4+	-1.5+	-1.6+	-1.7+	-1.8+	-1.9+
18000	-1.5+	-1.5+	-1.6+	-1.8+	-1.9+	-2.0+	-2.1+
19000	-1.6+	-1.6+	-1.7+	-1.9+	-2.1+	-2.2+	-2.3+
20000	-1.7+	-1.7+	-1.9+	-2.1+	-2.3+	-2.5+	-2.6+
21000	-1.8+	-1.8+	-2.0+	-2.3+	-2.6+	-2.8+	-2.9+
22000	-1.8+	-1.9+	-2.2+	-2.6+	-2.9+	-3.2+	-3.3+
23000	-1.9+	-2.0+	-2.4+	-2.9+	-3.4+	-3.8+	-4.0+
23240	-1.9+	-2.0+	-2.5+	-3.2+	-3.9+	-4.4+	-4.5+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 40° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103

FUZE, P.D., M51 MOD. 1

PART 2a-1 TABLE E

NORMAL CHARGE - M.V. 2150 f/s

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 50° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
2000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
3000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
4000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+
5000	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+
6000	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+
7000	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+
8000	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+	-0.8+
9000	-0.8+	-0.8+	-0.8+	-0.8+	-0.9+	-0.9+	-0.9+
10000	-0.9+	-0.9+	-0.9+	-0.9+	-1.0+	-1.0+	-1.0+
11000	-1.0+	-1.0+	-1.0+	-1.1+	-1.1+	-1.1+	-1.1+
12000	-1.1+	-1.1+	-1.2+	-1.2+	-1.2+	-1.2+	-1.3+
13000	-1.2+	-1.2+	-1.3+	-1.3+	-1.4+	-1.4+	-1.4+
14000	-1.4+	-1.4+	-1.4+	-1.5+	-1.5+	-1.6+	-1.6+
15000	-1.5+	-1.5+	-1.5+	-1.6+	-1.7+	-1.7+	-1.7+
16000	-1.6+	-1.6+	-1.7+	-1.8+	-1.8+	-1.9+	-1.9+
17000	-1.7+	-1.8+	-1.8+	-1.9+	-2.0+	-2.1+	-2.1+
18000	-1.9+	-1.9+	-2.0+	-2.1+	-2.2+	-2.3+	-2.4+
19000	-2.0+	-2.1+	-2.2+	-2.3+	-2.5+	-2.6+	-2.6+
20000	-2.1+	-2.2+	-2.4+	-2.5+	-2.7+	-2.8+	-2.9+
21000	-2.3+	-2.4+	-2.6+	-2.8+	-3.0+	-3.1+	-3.2+
22000	-2.4+	-2.6+	-2.8+	-3.1+	-3.4+	-3.6+	-3.7+
23000	-2.6+	-2.8+	-3.1+	-3.5+	-3.9+	-4.2+	-4.4+
23240	-2.7+	-2.8+	-3.2+	-3.8+	-4.4+	-4.8+	-4.9+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
Azimuth of Target - Degrees							

Latitude 50° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
 FUZE, P.D., M51 MOD. 1
 NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE X

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO

Latitude 60° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
2000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
3000	-0.3+	-0.3+	-0.4+	-0.3+	-0.3+	-0.3+	-0.3+
4000	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+
5000	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+
6000	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+
7000	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+	-0.7+
8000	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+
9000	-0.9+	-0.9+	-0.9+	-0.9+	-1.0+	-1.0+	-1.0+
10000	-1.0+	-1.0+	-1.1+	-1.1+	-1.1+	-1.1+	-1.1+
11000	-1.2+	-1.2+	-1.2+	-1.2+	-1.2+	-1.2+	-1.2+
12000	-1.3+	-1.3+	-1.3+	-1.3+	-1.4+	-1.4+	-1.4+
13000	-1.4+	-1.4+	-1.5+	-1.5+	-1.5+	-1.6+	-1.6+
14000	-1.6+	-1.6+	-1.6+	-1.7+	-1.7+	-1.7+	-1.7+
15000	-1.7+	-1.7+	-1.8+	-1.8+	-1.9+	-1.9+	-1.9+
16000	-1.9+	-1.9+	-1.9+	-2.0+	-2.1+	-2.1+	-2.1+
17000	-2.0+	-2.1+	-2.1+	-2.2+	-2.3+	-2.3+	-2.3+
18000	-2.2+	-2.2+	-2.3+	-2.4+	-2.5+	-2.6+	-2.6+
19000	-2.4+	-2.4+	-2.5+	-2.6+	-2.7+	-2.8+	-2.8+
20000	-2.6+	-2.6+	-2.7+	-2.8+	-3.0+	-3.1+	-3.1+
21000	-2.8+	-2.8+	-2.9+	-3.1+	-3.3+	-3.4+	-3.5+
22000	-3.0+	-3.0+	-3.2+	-3.5+	-3.7+	-3.9+	-4.0+
23000	-3.3+	-3.4+	-3.7+	-4.0+	-4.3+	-4.5+	-4.6+
23240	-3.4+	-3.6+	-3.9+	-4.3+	-4.7+	-5.0+	-5.2+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 60° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.

SHELL, H.E., 240 LB., M103
FUZE, P.D., M51 MOD. 1
NORMAL CHARGE - M.V. 2150 f/s

PART 2a-1 TABLE K

ROTATION OF THE EARTH, DEFLECTION EFFECTS IN MILS DUE TO
Latitude 70° (North)

Range Yards	Azimuth of Target - Degrees						
	0 360	30 330	60 300	90 270	120 240	150 210	180 180
1000	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+	-0.1+
2000	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+	-0.2+
3000	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+	-0.3+
4000	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+	-0.4+
5000	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+	-0.5+
6000	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.6+	-0.7+
7000	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+	-0.8+
8000	-0.9+	-0.9+	-0.9+	-0.9+	-0.9+	-0.9+	-0.9+
9000	-1.0+	-1.0+	-1.0+	-1.0+	-1.0+	-1.0+	-1.0+
10000	-1.1+	-1.1+	-1.2+	-1.2+	-1.2+	-1.2+	-1.2+
11000	-1.3+	-1.3+	-1.3+	-1.3+	-1.3+	-1.3+	-1.3+
12000	-1.4+	-1.4+	-1.4+	-1.5+	-1.5+	-1.5+	-1.5+
13000	-1.6+	-1.6+	-1.6+	-1.6+	-1.6+	-1.7+	-1.7+
14000	-1.7+	-1.7+	-1.8+	-1.8+	-1.8+	-1.8+	-1.8+
15000	-1.9+	-1.9+	-1.9+	-2.0+	-2.0+	-2.0+	-2.0+
16000	-2.1+	-2.1+	-2.1+	-2.2+	-2.2+	-2.2+	-2.2+
17000	-2.3+	-2.3+	-2.3+	-2.4+	-2.4+	-2.5+	-2.5+
18000	-2.5+	-2.5+	-2.5+	-2.6+	-2.7+	-2.7+	-2.7+
19000	-2.7+	-2.7+	-2.8+	-2.8+	-2.9+	-3.0+	-3.0+
20000	-2.9+	-2.9+	-3.0+	-3.1+	-3.2+	-3.3+	-3.3+
21000	-3.1+	-3.2+	-3.3+	-3.4+	-3.5+	-3.6+	-3.6+
22000	-3.4+	-3.5+	-3.6+	-3.8+	-3.9+	-4.0+	-4.1+
23000	-3.8+	-3.9+	-4.1+	-4.3+	-4.5+	-4.7+	-4.8+
23240	-4.1+	-4.2+	-4.4+	-4.7+	-5.0+	-5.2+	-5.3+
	180 180	150 210	120 240	90 270	60 300	30 330	0 360
	Azimuth of Target - Degrees						

Latitude 70° (South)

NOTE: A negative sign means that the effect is to the right; a positive sign, to the left. For the argument at the top of the tables, use the sign that precedes the number; for the argument at the bottom, the sign that follows the number. Azimuth is measured clockwise from the North.