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NOT TO BE PUBLISHED.



**RANGE TABLE FOR  
·303-INCH  
VICKERS MACHINE GUN  
(USING MK. VII AMMUNITION)  
1943  
(AUSTRALIA)**

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RANGE TABLES .303 in. MK.VII AMN. m.v. 2440 f.s.

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RANGE TABLE.

1	2	3		5	6	7		9
		Slope of descent				Dimensions of Horizontal Beaten Zone		
		As an Angle	As a Gradient				Width	
Range	Tangent Elevation			Depth of Lowest Shot below Centre of Cone	Total Depth of Cone			Time of Flight
yds.	" "	" "	One in	mins.	yds.	yds.	yds.	secs.
100	0 3	0 4	390.0	—	—	—	—	0.2
200	0 7	0 9	382.0	—	—	—	—	0.4
300	0 11	0 15	230.0	—	—	—	—	0.6
400	0 16	0 22	156.0	—	—	—	—	0.8
500	0 22	0 30	115.0	7	2.2	2.3	700	0.8
600	0 28	0 40	86.0	9	3.0	2.8	600	1.0
700	0 35	0 52	66.1	9	3.7	3.3	525	1.25
800	0 43	1 7	51.3	10	4.7	3.8	450	1.5
900	0 52	1 25	40.4	12	6.1	4.5	375	1.75
1000	1 2	1 45	32.4	14	8.0	5.0	300	2.0
1100	1 14	2 10	26.4	15	9.7	6.0	270	2.3
1200	1 27	2 38	21.7	15	10.7	7.0	240	2.65
1300	1 41	3 11	18.0	15	11.3	8.0	210	3.0
1400	1 57	3 49	15.0	15	12.0	9.0	180	3.4
1500	2 15	4 32	12.6	15	12.8	10.0	160	3.8
1600	2 35	5 20	10.7	15	13.9	11.3	150	4.2
1700	3 57	6 14	9.2	16	15.4	12.7	145	4.7
1800	3 21	7 14	7.9	17	17.4	14.0	140	5.2
1900	3 47	8 21	6.8	18	20.0	15.3	135	5.8
2000	4 16	9 36	5.9	20	23.5	16.7	130	6.4
2100	4 48	10 59	5.1	23	28.1	18.0	140	7.1
2200	5 23	12 31	4.5	27	32.9	19.3	150	7.8
2300	6 1	14 13	4.0	31	40.9	20.7	160	8.6
2400	6 42	16 6	3.5	35	49.2	22.0	170	9.5
2500	7 27	18 11	3.1	41	59.1	23.3	180	10.5
2600	8 16	20 30	2.7	47	71.0	25.0	190	11.7
2700	9 10	23 6	2.4	54	85.4	26.7	200	13.0
2800	10 10	26 3	2.1	63	103.0	28.3	210	14.4

TABLE OF LIFTS, ETC.

1	2	3	4	5	6	7	8	9	10
Range	Tangent Elevation	Lift (100 yds.)	Safety Angle	Equivalent Range	Minimum	Clearance	Crest Clearance Angle	Correction Temperature (see footnote)	Correction Barometer (see footnote)
100	1	1	1	1	1	1	1	1	1
150	1	1	1	1	1	1	1	1	1
200	1	1	1	1	1	1	1	1	1
250	1	1	1	1	1	1	1	1	1
300	1	1	1	1	1	1	1	1	1
350	1	1	1	1	1	1	1	1	1
400	1	1	1	1	1	1	1	1	1
450	1	1	1	1	1	1	1	1	1
500	1	1	1	1	1	1	1	1	1
550	1	1	1	1	1	1	1	1	1
600	1	1	1	1	1	1	1	1	1
650	1	1	1	1	1	1	1	1	1
700	1	1	1	1	1	1	1	1	1
750	1	1	1	1	1	1	1	1	1
800	1	1	1	1	1	1	1	1	1
850	1	1	1	1	1	1	1	1	1
900	1	1	1	1	1	1	1	1	1
950	1	1	1	1	1	1	1	1	1
1000	1	1	1	1	1	1	1	1	1
1050	1	1	1	1	1	1	1	1	1
1100	1	1	1	1	1	1	1	1	1
1150	1	1	1	1	1	1	1	1	1
1200	1	1	1	1	1	1	1	1	1
1250	1	1	1	1	1	1	1	1	1
1300	1	1	1	1	1	1	1	1	1
1350	1	1	1	1	1	1	1	1	1
1400	1	1	1	1	1	1	1	1	1
1450	1	1	1	1	1	1	1	1	1
1500	1	1	1	1	1	1	1	1	1
1550	1	1	1	1	1	1	1	1	1

TABLE OF LIFTS, ETC.—Continued

1	2	3	4	5	6	7	8	9	10
Range	Tangent Elevation	Lift (100 yds.)	Safety Angle	Equivalent Range	Minimum	Clearance	Crest Clearance Angle	Correction Temperature (see footnote)	Correction Barometer (see footnote)
1600	1	1	1	1	1	1	1	1	1
1650	1	1	1	1	1	1	1	1	1
1700	1	1	1	1	1	1	1	1	1
1750	1	1	1	1	1	1	1	1	1
1800	1	1	1	1	1	1	1	1	1
1850	1	1	1	1	1	1	1	1	1
1900	1	1	1	1	1	1	1	1	1
1950	1	1	1	1	1	1	1	1	1
2000	1	1	1	1	1	1	1	1	1
2050	1	1	1	1	1	1	1	1	1
2100	1	1	1	1	1	1	1	1	1
2150	1	1	1	1	1	1	1	1	1
2200	1	1	1	1	1	1	1	1	1
2250	1	1	1	1	1	1	1	1	1
2300	1	1	1	1	1	1	1	1	1
2350	1	1	1	1	1	1	1	1	1
2400	1	1	1	1	1	1	1	1	1
2450	1	1	1	1	1	1	1	1	1
2500	1	1	1	1	1	1	1	1	1
2550	1	1	1	1	1	1	1	1	1
2600	1	1	1	1	1	1	1	1	1
2650	1	1	1	1	1	1	1	1	1
2700	1	1	1	1	1	1	1	1	1
2750	1	1	1	1	1	1	1	1	1
2800	1	1	1	1	1	1	1	1	1

Col. 9. Corrections are given for 10°F. decrease in temperature of air. Normal 60°F.  
 Col. 10. Corrections are given for 1" decrease in barometer reading. Normal 30".

## INSTRUCTIONS FOR USING WIND TABLE.

To read the table :—

Estimate the strength of the wind in miles per hour. Note whether it is along the line of fire, or from a flank, *i.e.*,  $\frac{1}{2}$ ,  $\frac{1}{4}$  or at a full right angle to the line of fire.

Note the readings in the table against the range and under the wind directions, for direction on the left half of the table, and for range on the right.

These are the allowances for a 20 m.p.h. wind, and they are reduced or increased in proportion to the actual strength of the wind.

Example :—

Range—1900 yards.

Wind—30 m.p.h. from left rear at  $\frac{1}{4}$  right angle to the line of fire.

Correction for direction—

- $1\frac{1}{2}$  times 25 minutes.
- 35 minutes (to left).

Correction for range—

- $1\frac{1}{2}$  times 12 minutes.
- 18 minutes (subtract).

Rule :—

For a **HEAD** wind **ADD**.

For a **REAR** wind **DEDUCT**.

## WIND TABLE (Wind 20 m.p.h.)

1	2	3	4	5	6	7	8	9
	Correction for direction in minutes				Range correction in minutes			
Range	Right Angle	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	Head or Rear
yds.								
500	13	12	9	5	0	0	0	0
600	15	14	11	6	0	0	0	0
700	18	17	13	7	0	0	1	1
800	22	20	16	8	0	1	1	1
900	24	22	17	9	0	1	1	1
1000	27	25	19	10	1	1	2	2
1100	30	28	21	11	1	2	2	2
1200	33	31	23	13	1	2	3	3
1300	36	34	25	14	1	3	3	4
1400	40	37	28	15	2	3	4	4
1500	43	40	30	16	2	4	5	6
1600	47	43	33	18	3	5	6	7
1700	51	47	36	20	3	6	8	9
1800	56	52	40	21	4	7	10	10
1900	61	56	43	23	5	9	12	13
2000	66	61	47	25	6	11	15	16
2100	71	66	50	27	8	14	18	20
2200	77	71	54	29	9	17	22	23
2300	84	78	60	32	11	21	28	30
2400	92	85	65	35	14	25	33	36
2500	100	91	71	38	17	32	42	45
2600	110	102	78	42	21	38	50	54
2700	121	112	85	46	26	49	64	69
2800	132	122	93	50	32	59	77	83

## LENGTHS OF BEATEN ZONES ON SLOPING GROUNDS.

1	2	3	4	5	6	7	8	9	10	11	12	13
Slope	Range											
	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
Forward—												
Slope of—												
7° 1/8 ...	40	50	60	60	70	70	80	80	100	120	150	170
6° 1/10 ...	50	60	70	70	70	80	80	80	100	130	150	170
5° 1/12 ...	60	70	70	80	80	80	90	90	110	130	150	180
4° 1/15 ...	70	80	80	90	90	90	90	100	120	140	160	180
3° 1/20 ...	90	90	100	110	110	100	100	100	120	140	160	190
2° 1/30 ...	130	130	130	130	130	110	110	110	130	150	170	190
1° 1/60 ...	190	180	180	160	140	130	130	120	140	160	180	200
30' 1/115 ...	350	310	240	190	160	140	130	120	140	160	180	200
Horizontal ...	600	450	300	240	180	150	140	130	150	170	190	210
Reverse—												
Slope of—												
30' 1/115 ...			460	290	210	170	150	140	160	170	190	210
1° 1/60 ...			400	250	190	170	150	170	180	200	220	230
2° 1/80 ...					350	200	170	180	200	210	230	240
3° 1/80 ...						260	190	190	200	210	230	240
4° 1/15 ...								230	230	230	240	250
5° 1/12 ...								300	290	250	250	260
6° 1/10 ...									290	280	270	270
7° 1/8 ...										340	320	290

The slope of the ground is considered with reference to the line of sight.

## INSTRUCTIONS FOR USING V.I. TABLE (pp.10-11).

The angle is printed along the top of the table, the range (or H.E.) down the left side and the base (or V.I.) in the body of the table.

*Examples:—*

1. Given—Range 800 yards and base 30 yards.  
Against 800 yards—28 yards is 2 degrees.  
2 yards is 10 mins.  
So —30 yards is 2 degs. 10 mins.
2. Given—Range 1,300 yards and angle 7 degs. 20 mins.  
Against 1,300 yards—7 degs. is 159 yards.  
20 mins. is 8 yards.  
So —7 degs. 20 mins. is 167 yards.

## ALLOWANCE FOR MOVING TARGETS.

At ranges between 800 and 2,000 yards:—

Multiply the target speed in miles per hour by 5.

This gives the angle in minutes which the target will travel during the flight of the bullet.

*Example:—*

Target speed—12 m.p.h.

Fire ahead by 60 minutes (1 degree).

For targets moving obliquely across the line of fire, a proportion of this allowance should be given.

Below 800 yards, an allowance of 15 or 30 minutes will be sufficient.

V.I.  
Instruction for

1	2	3	4	5	6	7	8	9	10	11
	Minutes					Degrees				
	10	20	30	40	50	1	2	3	4	5
yards										
100	1	1	1	1	1	2	3	5	7	9
200	1	1	2	2	3	3	7	10	14	17
300	1	2	3	3	4	5	10	16	21	26
400	1	2	3	5	6	7	14	21	28	35
500	1	3	4	6	7	9	17	25	35	44
600	2	3	5	7	9	10	21	31	42	52
700	2	4	6	8	10	12	24	37	49	61
800	2	5	7	9	12	14	28	42	56	70
900	3	5	8	10	13	16	31	47	63	79
1000	3	6	9	12	15	17	35	52	70	87
1100	3	6	10	13	16	19	38	58	77	96
1200	3	7	10	14	17	21	42	62	84	105
1300	4	8	11	15	19	23	45	68	91	113
1400	4	8	12	16	20	24	49	73	98	122
1500	4	9	13	17	22	26	52	79	105	131
1600	5	9	14	19	23	28	56	84	112	140
1700	5	10	15	20	25	30	59	89	119	148
1800	5	10	16	21	26	31	63	94	126	157
1900	6	11	17	22	28	33	66	99	133	166
2000	6	12	17	23	30	35	70	105	140	175
2100	6	12	18	24	31	37	73	110	146	183
2200	6	13	19	25	32	38	77	115	154	192
2300	7	13	20	27	33	40	80	120	161	201
2400	7	14	21	28	35	42	84	126	168	209
2500	7	15	22	29	36	44	87	131	174	218
2600	8	15	23	30	38	45	91	136	182	227
2700	8	16	24	31	39	47	94	141	188	236
2800	9	16	24	33	41	49	98	147	195	244
2900	9	17	25	34	42	51	101	152	202	253
3000	9	17	26	35	44	52	105	157	209	262

Note.—A V.I. Graph will be found

TABLE.  
use on page 9.

yards	12	13	14	15	16	17
	Degrees					
	6	7	8	9	10	
100	10	12	14	16	17	
200	21	24	28	31	35	
300	31	37	42	47	52	
400	42	49	56	63	70	
500	52	61	70	78	87	
600	63	73	84	94	105	
700	73	86	98	110	122	
800	84	98	112	126	140	
900	94	110	126	141	157	
1000	105	122	140	157	175	
1100	115	134	154	173	192	2
1200	125	147	168	188	208	2
1300	136	159	182	204	227	1
1400	147	171	195	220	244	1
1500	157	183	209	236	262	1
1600	168	195	223	251	279	1
1700	178	208	237	267	297	1
1800	188	220	251	283	314	1
1900	199	232	265	298	332	1
2000	209	244	279	314	349	1
2100	220	257	295	330	367	1
2200	230	269	307	346	384	1
2300	241	281	321	361	401	1
2400	251	293	335	377	419	1
2500	262	305	349	393	436	1
2600	272	318	363	408	454	1
2700	283	330	377	424	471	57
2800	293	342	391	440	489	55
2900	304	354	405	456	506	53
3000	314	367	419	471	524	52

at rear of this booklet.

# A FORMULA FOR DETERMINING ANGLE OF SIGHT.

$$\text{Angle of sight (in minutes)} = \frac{(A_1 \times GO) + (A_2 \times OT)}{GT}$$

Where T is the target, G the gun line, O the O.P.

And where—

$A_1$  is the angle of sight from G to O in minutes.

$A_2$  is the angle of sight from O to T in minutes.

$A_1$  and  $A_2$  must be provided with their proper signs before being placed in the formula, i.e., "+" for angles of elevation, "-" for angles of depression.

*Example* :-

Angles of sight are measured by director :-

To target—Depression 5'.

To pivot gun—Depression 3'.

The angle of sight from G to O is opposite in sign to that from O to G, and is therefore elevation 3'.

OT = 1,900 yards, OG = 150 yards, GT = 2,000 yards.

The required angle of sight in minutes.

$$180 \times 150 + (-5 \times 1,900)$$

$$= \frac{2,000}{180 \times 150 - 5 \times 1,900}$$

$$= \frac{270}{20} = + \frac{175}{20} = \text{approx. } 9' \text{ elevation.}$$

Angle of sight = 9' elevation.

# TABLE FOR CONVERTING OBLIQUE TO TRUE BASES.

Against the oblique base (OG) in the left column, and under the angle TOG in the upper heading, read the range correction in yards. Correct the range OT by this amount to obtain the range GT.

Against the oblique base and under the angle TOG in the lower heading read the true base in yards.

*Example* :- Oblique base 95 yards. Angle TOG 0145 degrees. True base is 54 yards. Range correction is 78 yards.

	Range Correction																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
Oblique Base	80	80	75	74	65	60	50	50	41	40	35	30	25	20	15	10	5	0	0	0	0	0
Oblique Base	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200
Oblique Base	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215
Oblique Base	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230
Oblique Base	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245
Oblique Base	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260
Oblique Base	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275
Oblique Base	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290
Oblique Base	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305
Oblique Base	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320
Oblique Base	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335
Oblique Base	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350
Oblique Base	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365
Oblique Base	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380
Oblique Base	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395
Oblique Base	305	310	315	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410
Oblique Base	320	325	330	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425
Oblique Base	335	340	345	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440
Oblique Base	350	355	360	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455
Oblique Base	365	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470
Oblique Base	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485
Oblique Base	395	400	405	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500
Oblique Base	410	415	420	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515
Oblique Base	425	430	435	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530
Oblique Base	440	445	450	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545
Oblique Base	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560
Oblique Base	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575
Oblique Base	485	490	495	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590
Oblique Base	500	505	510	515	520	525	530	535	540	545	550	555	560	565	570	575	580	585	590	595	600	605

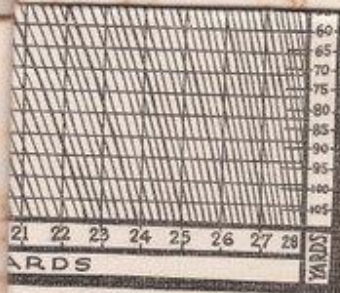


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) and Clearances



**CLEARANCE IN METRES**  
**CLEARANCE IN YARDS**

**ES FROM GUN**

height of target above or below gun.  
ation.

vertically above a point plotted to show  
obstruction). This gives clearance in  
metre shot to ground.

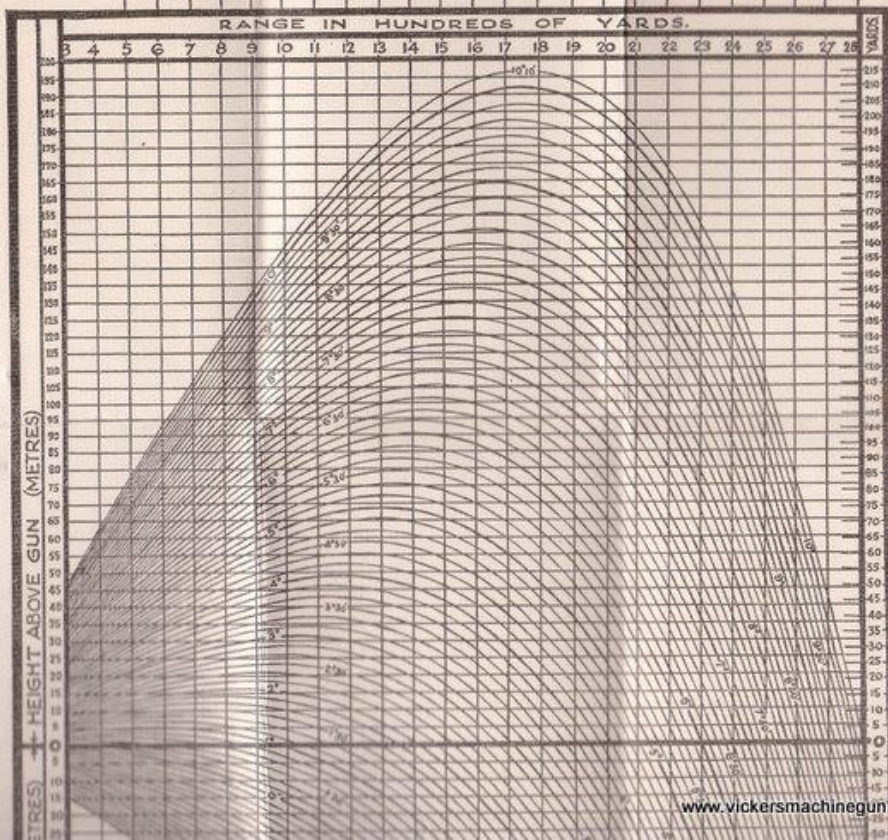


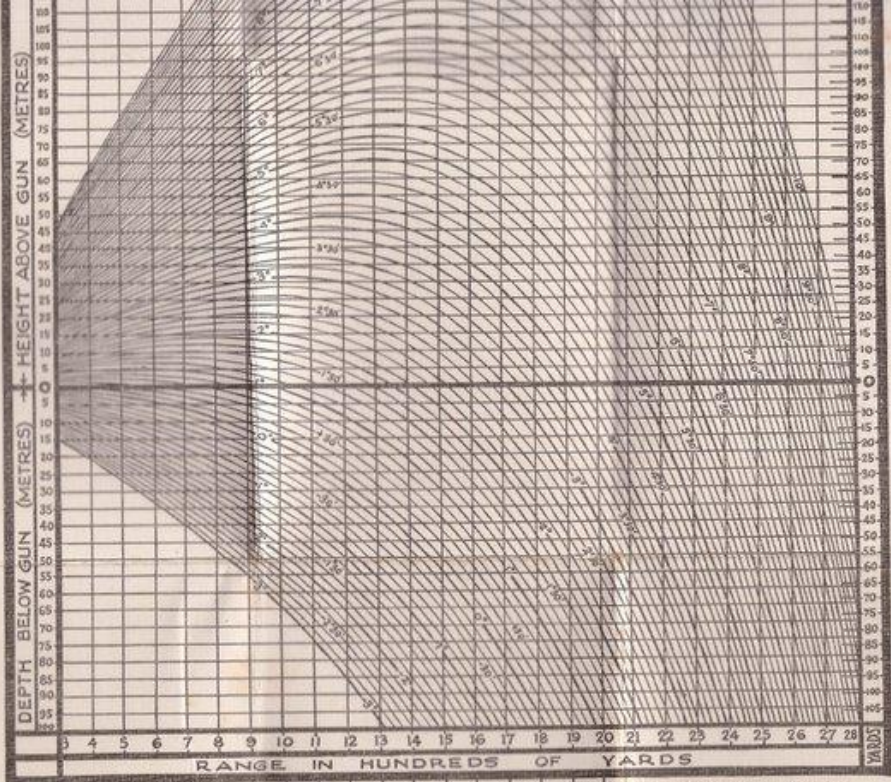
Graph for Calculating Quadrant Elevation (Angle of Fire and Clearances

(CURVES REPRESENT CENTRE SHOTS)

DEPTH OF LOWEST SHOT BELOW CENTRE OF CONE AT VARIOUS DISTANCES FROM GUN

IN YARDS ..	17	20	23	27	30	33	40	47	53	60	67	73	80	87	93	10	113	167	20	25	30	35	42	48
IN METRES	1.6	1.8	2.1	2.5	2.7	3.0	3.7	4.3	4.8	5.5	6.1	6.7	7.3	8.0	8.5	9.1	12.2	15.3	18.3	23	27	32	38	44





**HOW TO USE THE GRAPH**—To find Q.E.: Take range and run up on vertical scale to height of tar et above or below gun. The curve cutting this point gives required Quadrant Elevation.

**TO FIND CLEARANCE**—Follow this curve along, and ascertain at what height it passes vertically above a point plotted to show distance and height (above or below gun) of own troops (or obstruction). This gives clearance in yards (right hand scale), or metres (left hand scale), from centre shot to ground.

### V.L. GRAPH

NOTES—The angle is shown by the diagonal line nearest to the point of intersection to the required base line (vertical) and the range line (horizontal).

The lowest range (or HE) given on the graph is 1,000 yds. Should a range less than 1,000 have to be considered, a convenient multiple of the range must be used and the same multiple applied to the base (or VI). Examples:—

(a) Range 800. Base 30 yds.  
Angle required.  
Convenient multiple is 2.  
Range 1,600. Base 60 yds.  
Gives Angle of  $2^{\circ} 9'$ .

(b) Range 60 yds. Angle  $1^{\circ} 10'$ .  
Base required.  
Convenient multiple is 20.  
Range 1,000 yds. Angle  $1^{\circ} 10'$  gives base of 20 yds.  
Therefore required base is 1 yd.

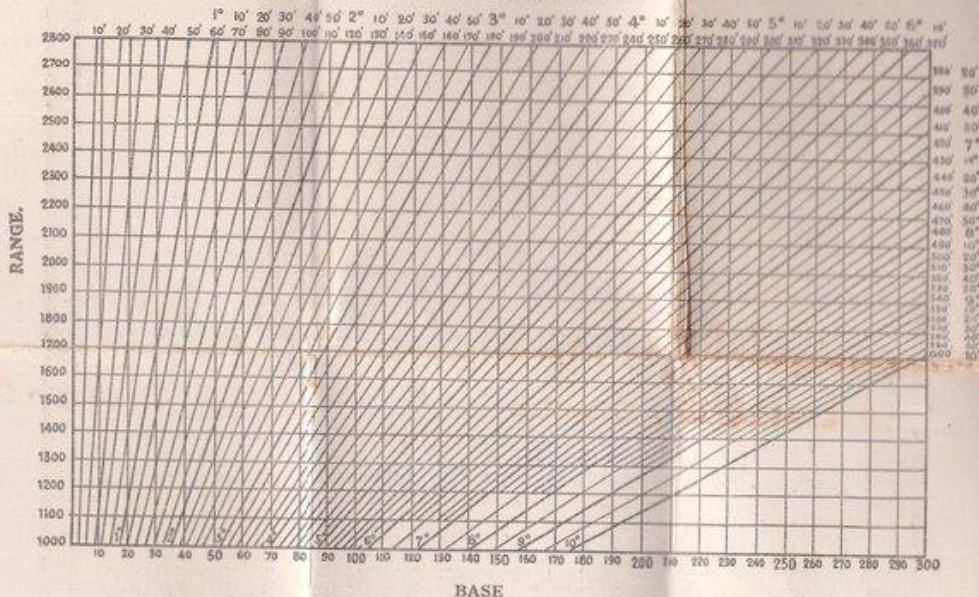
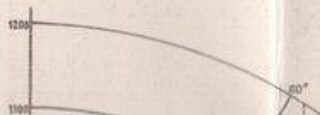


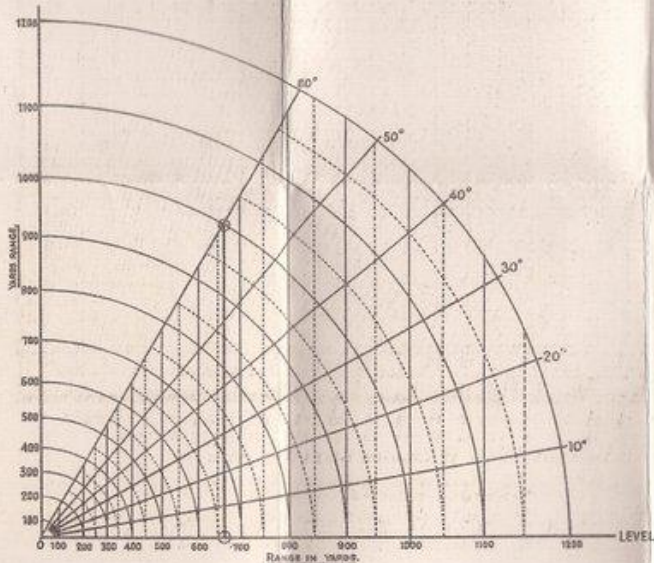
CHART FOR .303 MARK VII FOR FIRING UP OR DOWN HILL





BASE

CHART FOR .303 MARK VII FOR FIRING UP OR DOWN HILL



EXAMPLE :-

Range to target 1,000 yds.

Angle of Sight 60°.

Spot intersection of 60° line and 1,000 yds. circle at mark  $\odot$ . Come down vertically on to the LEVEL, and read range at mark  $\circ$  = 660.

Therefore set sight at 650.

NOTE -

Corrections for Barometer and Thermometer should be applied before using the Chart.