



This manual has been scanned by the
Vickers MG Collection & Research
Association

www.vickersmachinegun.org.uk

If it is of use, please make a donation at:

https://www.paypal.com/cgi-bin/webscr?cmd=s-xclick&hosted_button_id=NKSHEDAMHTJ3G

(Crown copyright reserved)



RANGE TABLE

100

303-INCH VICKERS MACHINE
GUN

1931

*This Range Table supersedes 26 Manuals/277 copies of which
should be destroyed.*

INDEX.

PAGE

Range Table	1
Table of lifts, safety angles, minimum clearances, air temperature and barometer corrections	2
Wind values	4
Wind correction graphs—	
Instructions for using the graph	4
Wind correction graph, ranges 800 to 2,000 yards ...	6
Wind correction graph, ranges 2,000 to 2,800 yards ...	7
Scale for conversion of oblique to true bases (facing) ...	8
Instructions for using the scale	8
Displacement table (facing) ...	8
Instructions for using the table	8
Influence of ground upon beaten zones	9
A formula for determining angle of sight	10
V.I. graph	11
Chart for firing up or down hill	11
Graph for calculating quadrant elevation and clearances ...	12
<i>Allowance for Moving Targets</i>	<i>10</i>

By Command of the Army Council,

60458 6°50'
H. J. Greedy

THE WAR OFFICE,
 26th May, 1931.

RANGE TABLE.

1

1	2	3	Slope of descent.		5	6	7	8	9
			As an Angle.	As a Gradient.					
Range.	Tangent Elevation.	As an Angle.	As a Gradient.	Height of Lowest Shot below Centre of Coep.	Height of Coep.	Dimensions of Horizontal Beaten Zone.		Time of Flight.	
						Width.	Length.		
yds.	° ' "	° ' "	One in	yds.	yds.	yds.	yds.	secs.	
100	0 3	0 4	890'0	—	—	—	—	—	
200	0 7	0 9	323'0	—	—	—	—	0·2	
300	0 11	0 15	230'0	—	—	—	—	0·4	
400	0 16	0 22	166'0	—	—	—	—	0·6	
500	0 22	0 30	115'0	1'1	2'2	2'3	700	0·8	
600	0 28	0 40	80'0	1'8	2'9	2'8	600	1'0	
700	0 35	0 52	60'1	1'9	3'7	3'5	525	1'25	
800	0 43	1 7	51'3	2'4	4'7	3'8	450	1'5	
900	0 52	1 25	45'4	3'1	6'1	4'3	375	1'75	
1000	1 2	1 45	32'4	4'0	8'0	5'0	300	2'0	
1100	1 14	2 10	26'4	4'8	9'7	6'0	270	2'3	
1200	1 27	2 38	21'7	5'4	10'7	7'0	240	2'65	
1300	1 41	3 11	18'0	6'7	11'3	8'0	210	3'0	
1400	1 57	3 49	15'0	8'0	12'0	9'0	180	3'4	
1500	2 15	4 32	12'6	9'4	12'8	10'0	160	3'8	
1600	2 35	5 20	10'7	7'0	13'9	11'3	150	4'2	
1700	2 57	6 14	9'2	7'7	15'4	12'7	145	4'7	
1800	3 21	7 14	7'9	8'7	17'4	14'0	140	5'2	
1900	3 47	8 21	6'8	10'0	19'0	15'3	135	5'8	
2000	4 16	9 36	6'0	11'8	23'5	16'7	130	6'4	
2100	4 48	10 59	5'1	14'1	28'1	18'0	140	7'1	
2200	5 23	12 31	4'5	17'0	33'9	19'3	150	7'8	
2300	6 1	14 13	4'0	20'5	40'9	20'7	160	8'6	
2400	6 42	16 6	3'5	24'6	49'2	22'0	170	9'5	
2500	7 27	18 11	3'1	29'5	59'1	23'3	180	10'5	
2600	8 18	20 30	2'7	35'5	71'0	25'0	190	11'7	
2700	9 10	23 6	2'4	42'7	85'4	26'7	200	13'0	
2800	10 10	26 3	2'1	51'5	103'0	28'3	210	14'4	

(B31/55) 25000 8/31 W.O.P. 6458

TABLE OF LIFTS, SAFETY ANGLES, MINIMUM CLEARANCES, AIR TEMPERATURE AND BAROMETER CORRECTIONS.

1	2	3	4	5	6	7	8
Range.	Tangent elevation.	Lifts (100 yards).	Safety angle.	Minimum clearance.		Correction for 10° F. decrease in temperature of air (normal = 60° F.).	Correction for 1° decrease in barometer reading (normal = 30 ins.).
yds.	° ' "	mins.	° ' "	yds.	metres.	mins.	mins.
100	0 3	4	0 21	11	10	0	0
150	0 5	4	0 17	11	10	0	0
200	0 7	4	0 15	11	10	0	0
250	0 9	5	0 13	11	10	0	0
300	0 11	5	0 11	11	10	0	0
350	0 14	6	0 9	11	10	0	0
400	0 16	6	1 01	11	10	0	0
450	0 19	6	1 03	11	10	0	-1
500	0 22	7	1 08	11	10	0	-1
550	0 25	7	1 04	11	10	0	-1
600	0 28	7	1 02	11	10	0	-1
650	0 32	7	1 05	12	11	0	-1
700	0 35	8	1 09	13	12	+1	-1
750	0 39	8	1 03	14	13	+1	-1
800	0 43	9	1 07	15	14	+1	-1
850	0 47	9	1 02	16	15	+1	-1
900	0 52	10	1 07	17	16	+1	-1
950	0 57	11	2 03	18	17	+1	-1
1000	1 0	12	2 10	20	18	+1	-2
1050	1 6	12	2 17	21	19	+1	-2
1100	1 14	13	2 25	23	21	+1	-2
1150	1 20	14	2 34	25	23	+2	-2
1200	1 27	14	2 44	27	25	+2	-2
1250	1 34	15	2 54	29	26	+2	-2

TABLE OF LIFTS, &c.—continued.

1	2	3	4	5	6	7	8
Range.	Tangent Elevation.	Lifts (100 yards).	Safety angle.	Minimum clearance.		Correction for 10° F. decrease in temperature of air (normal = 60° F.).	Correction for 1° decrease in barometer reading (normal = 30 ins.).
yds.	° ' "	mins.	° ' "	yds.	metres.	mins.	mins.
1300	1 41	15	3 0	31	28	+3	-3
1350	1 49	17	3 13	33	30	+3	-3
1400	1 57	18	3 24	35	32	+3	-3
1450	2 05	19	3 35	37	34	+3	-3
1500	2 13	20	3 47	40	37	+3	-3
1550	2 22	21	4 0	43	39	+3	-4
1600	2 30	22	4 14	46	42	+3	-6
1650	2 38	23	4 28	49	45	+3	-6
1700	2 47	24	4 43	53	48	+4	-6
1750	2 55	25	4 59	56	51	+4	-6
1800	3 04	26	5 16	60	55	+4	-6
1850	3 14	27	5 34	64	59	+4	-7
1900	3 23	28	5 53	69	63	+5	-8
1950	3 33	29	6 13	74	68	+5	-8
2000	3 43	30	6 34	80	73	+6	-9
2050	3 53	31				+6	-10
2100	4 04	32				+7	-11
2150	4 15	33				+7	-12
2200	4 26	34				+8	-13
2250	4 37	35				+8	-14
2300	4 49	36				+9	-15
2350	5 01	37				+10	-17
2400	5 13	38				+11	-19
2450	5 26	39				+12	-20
2500	5 39	40				+13	-21
2550	5 52	41				+14	-24
2600	6 06	42				+15	-26
2650	6 20	43				+16	-28
2700	6 35	44				+17	-30
2750	6 50	45				+18	-33
2800	7 05	46				+19	-35
2850	7 21	47				+21	-39

WIND VALUES.

(Approximate.)5 m.p.h.
Flaps.
(Gentle breeze.)15 m.p.h.
Straight.
(Fresh.)10 m.p.h.
Does not fall.
(Moderate.)25-30 m.p.h.
Rises.
(High wind.)

50 m.p.h. (Gale.)

WIND CORRECTION GRAPHS.

To read the wind correction graph:—

Estimate the strength of the wind in miles per hour (*see above*). Note whether it is along the line of fire, or if inclined to it, its approximate inclination, viz., $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ or a full right angle to the line of fire.

Note where the range curve intersects the inclination of the wind curve.

Note the reading on the scale at the bottom of the graph vertically below the point of intersection. This gives in minutes the allowance for direction required for a 20 m.p.h. wind. The allowance for elevation for a 20 m.p.h. wind is obtained from the scales at the sides of the graph, the readings being taken horizontally opposite the point of intersection. The scale on the left gives the allowance required in minutes, that on the right in yards.

These allowances are reduced or increased in proportion to the actual strength of the wind as compared with a 20 m.p.h. wind.

That for direction will be "Right" or "Left" according as the wind is **from** the right or left.

That for elevation will be plus or minus according as the wind is blowing towards or away from the firer.

Example:—

Range—1900 yards.

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

From graph 20 m.p.h. wind requires—

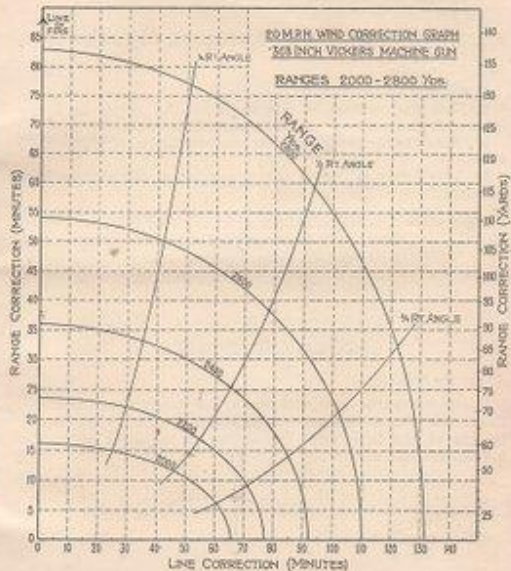
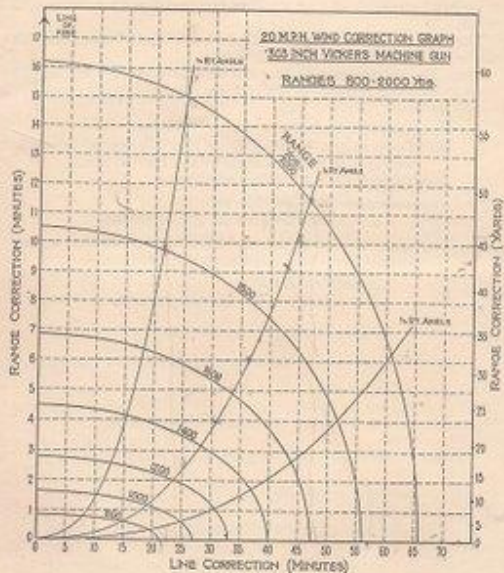
allowance for direction 24'

" for elevation 12' (or 50 yards).

30 m.p.h. wind requires one and a half times this allowance. Therefore allowances required are—

Direction Left 36'

Elevation — 18' (or—75 yards).



SCALE FOR CONVERSION OF OBLIQUE TO TRUE BASES.

To use the scale.

- i. Measure the angle T.O.G.
- ii. Note the position of this angle on the upper or lower lines of degree readings at the bottom of the scale.
- iii. Note the figure against this angle on the top ("Per cent.") scale.
- iv. This figure will give the proportion of the oblique base which will equal the true base.

Example.—Base 80 yards long at an angle of 143° .

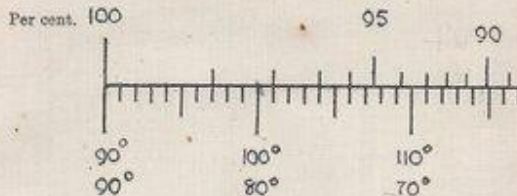
From scale 60 per cent. of oblique base = true base.

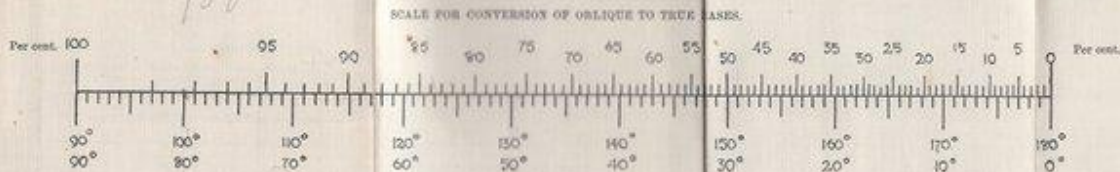
Therefore true base = 48 yards.

DISPLACEMENT TABLE.

To use the table.

Opposite the true base and under the range, note the angle. Set the director at this angle in accordance with the note at the bottom of the table and give angles to the guns as in the normal director method.





DISPLACEMENT TABLE.

True base.	Range.																True base.																																	
	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500																																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																	
35	178	0	178	10	178	20	178	30	178	40	178	50	179	0	179	10	179	20	179	30	179	40	179	50	180	0																								
40	177	40	0	177	50	0	177	0	177	10	177	20	177	30	177	40	177	50	178	0	178	10	178	20	178	30	178	40	178	50	179	0																		
45	29	177	40	177	50	0	177	0	177	10	177	20	177	30	177	40	177	50	178	0	178	10	178	20	178	30	178	40	178	50	179	0																		
50	30	17	20	69	177	50	0	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240																		
55	118	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300																		
60	40	176	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300																	
65	20	69	176	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300																
70	0	30	69	176	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300															
75	175	40	10	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340															
80	30	175	50	10	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340														
85	10	30	175	50	10	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340													
90	174	50	30	40	0	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340												
95	30	0	30	175	50	10	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340												
100	20	174	50	10	40	175	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340									
105	0	30	0	30	0	20	40	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340								
110	173	40	20	174	40	10	20	175	50	0	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340							
115	30	0	30	174	50	20	40	175	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340							
120	10	173	50	20	60	0	20	40	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340							
125	173	50	30	0	30	174	50	10	30	175	50	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340				
130	30	30	30	113	50	30	40	0	20	40	174	50	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340			
135	10	0	30	0	30	0	30	174	50	10	30	40	174	50	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340		
140	0	173	40	30	113	50	20	40	0	20	30	40	174	50	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	
145	171	50	30	10	40	0	30	174	50	10	20	30	40	175	50	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340
150	30	10	0	30	113	50	20	40	0	10	20	30	40	175	50	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340

N.B.—When director is on RIGHT of gun line set angle taken from the table on the "I" scale.
When director is on LEFT of gun line set angle taken from the table on the "II" scale.

INFLUENCE OF GROUND UPON BEATEN ZONES.

Table for calculating the reduction (or increase) of a beaten zone falling upon a forward (or reverse) slope.

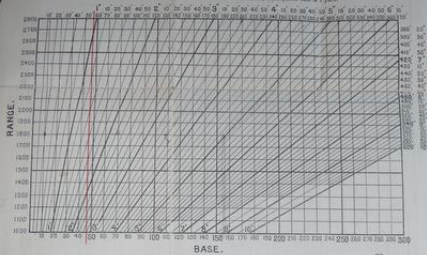
Range in yards	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
<i>Gradient of Ground.</i>													
<i>Forward Slope—</i>													
1/8.5 ..	.07	.12	.18	.23	.28	.33	.40	.54	.61	.68	.74	.79	.82
1/12 ..	.09	.15	.21	.26	.31	.37	.44	.54	.61	.68	.75	.80	.83
1/20 ..	.15	.21	.27	.32	.38	.44	.52	.61	.70	.78	.83	.87	.91
1/30 ..	.20	.27	.34	.40	.47	.54	.63	.73	.82	.91	.94	.96	.98
1/50 ..	.28	.36	.44	.51	.59	.67	.78	.89	.96	.99	.99	.99	.99
1/100 ..	.35	.44	.53	.61	.70	.79	.90	.99	.99	.99	.99	.99	.99
Flat ..	1	1	1	1	1	1	1	1	1	1	1	1	1
<i>Reverse Slope—</i>													
1/100 ..	..	..	1.00	1.30	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50
1/50 ..	..	..	..	..	1.00	1.33	1.66	2.00	2.33	2.66	3.00	3.33	3.66
1/30 ..	..	..	..	..	..	..	1.74	2.25	2.75	3.25	3.75	4.25	4.75
1/12 ..	..	..	..	..	..	..	..	3.13	4.00	4.87	5.75	6.62	7.50
1/8.5 ..	..	..	..	..	..	..	..	..	4.22	5.31	6.40	7.50	8.59

*Example (Forward Slope).—*Range, 2000 yards; gradient of forward slope on which the shots are falling is found to be 1 in 20; the beaten zone at 2000 yards is 120 yards long; from the table, the factor in the vertical column under "2000", opposite "forward slope 1/20" is 0.78. The beaten zone on the slope will be $120 \times 0.78 =$ say, 90 yards.

Range, 600 yards; gradient of forward slope on which the shots are falling is found to be 1 in 20; the beaten zone at 600 yards is 60 yards long; from the table, the factor in the vertical column under "600", opposite "forward slope 1/20" is 0.16. The beaten zone on the slope will be $60 \times 0.16 = 9.6$ yards.

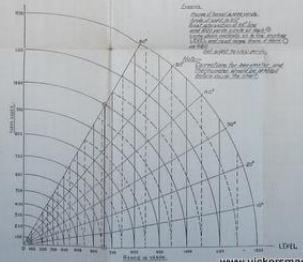
1. The angle is shown by the diagonal line drawn to the point of intersection of the required base line (vertical) and the range line (horizontal).
2. Both base and range must be taken in the same unit of measure, i.e. both in yards or both in metres.
3. The smallest range for H.E. given on the graph is 1,000 yards. Therefore, if the range is less than 1,000 yards a convenient multiple of the range must be found and the same multiple applied to the base (see V.I.).

- Example:
- (1) Given, range 800 yards and base 20 yards. Find the angle.
A convenient multiple is 2.
Then, range 1,600 yards and base 40 yards give the angle 2° 7', which is the angle required.
 - (2) Given, range 10 yards and angle 1° 10'. Find the base.
A convenient multiple is 20.
Then, range 200 yards and angle 1° 10' give a base 20 yards.
Therefore, the required base is 1 yard.



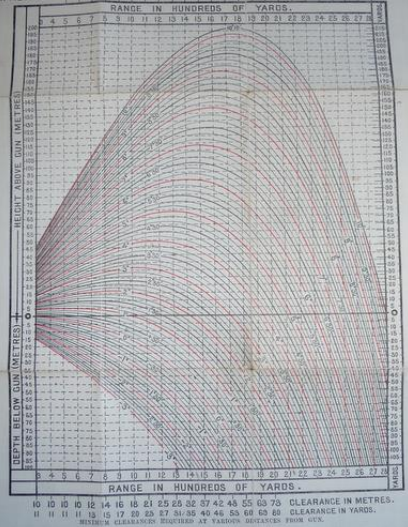
Note—The following formula will give approximately the information supplied by the above graph—Angle in minutes = $A = \frac{VI}{III} \times 2.60$, where VI = vertical interval or base in yards or metres, III = Range or distance in yards or metres, and both are measured in the same unit.

Chart for '303 Mark VII for Firing Up or Down Hill.



Graph for Calculating Quadrant Elevation and Clearances.

(CURVE REPRESENTS CENTRE SHOTS)
DEPTH OF LOWEST SHOT BELOW CENTRE OF GUN AT VARIOUS DISTANCES FROM GUN
IN YARDS 1 7 10 23 27 30 33 40 47 53 60 67 73 80 87 93 10 133 167 20 25 30 35 42 48
IN METRES 1 6 18 24 25 27 30 37 43 46 55 61 67 73 80 85 91 102 153 183 23 27 32 38 44



How to Use the Graph.—To Find Q.E.—To find range and run up on a certain scale to height of target above or below gun. The curve passing that point gives required Quadrant Elevation.

To Find Clearances—Follow the 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 destruction). This gives clearance in yards (right-hand scale) or metres (left-hand scale), from centre shot to ground.