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RANGE TABLE  
OF THE  
303-INCH VICKERS MACHINE  
GUN.

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1926.

Col. E. J. Mooney,  
N. B. DRAGOONS.

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THE WAR OFFICE (S.D. 2),  
December, 1925.

RANGE TABLE.

303 Vickers gun, Mark VII. ammunition.

1 Range (Yards).	2 Tangent Angle.	3 Slope of descent.		4 Height in Yards of Lowest Shot below Centre of Cone.	5 Height of Cone in Yards.	6 Dimensions in Yards of Horizontal Beaten Zones.		7 Time of Flight (Seconds).
		As an Angle.	As a Gradient.			Width.	Length.	
100	1° 11'	1° 11'	100	—	—	—	—	—
200	2° 22'	2° 22'	200	—	—	—	—	—
300	3° 33'	3° 33'	300	—	—	—	—	—
400	4° 44'	4° 44'	400	—	—	—	—	—
500	5° 55'	5° 55'	500	—	—	—	—	—
600	7° 10'	7° 10'	600	—	—	—	—	—
700	8° 25'	8° 25'	700	—	—	—	—	—
800	9° 40'	9° 40'	800	—	—	—	—	—
900	10° 55'	10° 55'	900	—	—	—	—	—
1000	12° 10'	12° 10'	1000	—	—	—	—	—
1100	13° 25'	13° 25'	1100	—	—	—	—	—
1200	14° 40'	14° 40'	1200	—	—	—	—	—
1300	15° 55'	15° 55'	1300	—	—	—	—	—
1400	17° 10'	17° 10'	1400	—	—	—	—	—
1500	18° 25'	18° 25'	1500	—	—	—	—	—
1600	19° 40'	19° 40'	1600	—	—	—	—	—
1700	20° 55'	20° 55'	1700	—	—	—	—	—
1800	22° 10'	22° 10'	1800	—	—	—	—	—
1900	23° 25'	23° 25'	1900	—	—	—	—	—
2000	24° 40'	24° 40'	2000	—	—	—	—	—
2100	25° 55'	25° 55'	2100	—	—	—	—	—
2200	27° 10'	27° 10'	2200	—	—	—	—	—
2300	28° 25'	28° 25'	2300	—	—	—	—	—
2400	29° 40'	29° 40'	2400	—	—	—	—	—
2500	30° 55'	30° 55'	2500	—	—	—	—	—
2600	32° 10'	32° 10'	2600	—	—	—	—	—
2700	33° 25'	33° 25'	2700	—	—	—	—	—
2800	34° 40'	34° 40'	2800	—	—	—	—	—
2900	35° 55'	35° 55'	2900	—	—	—	—	—
3000	37° 10'	37° 10'	3000	—	—	—	—	—
3100	38° 25'	38° 25'	3100	—	—	—	—	—
3200	39° 40'	39° 40'	3200	—	—	—	—	—
3300	40° 55'	40° 55'	3300	—	—	—	—	—
3400	42° 10'	42° 10'	3400	—	—	—	—	—
3500	43° 25'	43° 25'	3500	—	—	—	—	—

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## MINIMUM CLEARANCE AND SAFETY ANGLES.

*Overhead fire.*

Range to own troops.	Minimum clearance.		Safety angle.
	yards.	metres.	
100 yards	11	10	6 21
200 "	11	10	8 16
300 "	11	10	2 17
400 "	11	10	1 51
500 "	11	10	1 38
600 "	11	10	1 31
700 "	13	12	1 39
800 "	15	14	1 47
900 "	17	16	1 57
1,000 "	20	18	2 11
1,100 "	23	21	2 25
1,200 "	27	25	2 43
1,300 "	31	28	3 2
1,400 "	35	32	3 23
1,500 "	40	37	3 47
1,600 "	46	42	4 14
1,700 "	53	48	4 44
1,800 "	60	55	5 16
1,900 "	69	63	5 52
2,000 "	80	73	6 34

## INFLUENCE OF GROUND UPON BEATEN ZONES.

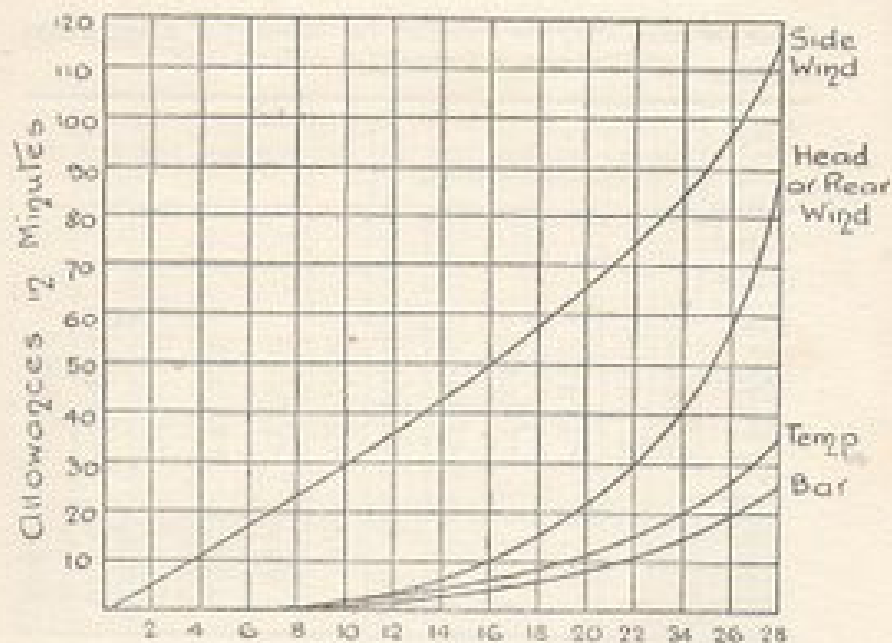
Table for calculating the reduction (or increase) of a beaten zone falling upon a forward (or reverse) slope.

Range in yards	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800
	Gradient of Ground.											
Forward Slope—												
1/8°	.07	.12	.18	.28	.38	.48	.54	.61	.68	.74	.79	.82
1/12°	.10	.16	.26	.36	.47	.54	.61	.68	.75	.80	.83	.88
1/20°	.16	.21	.32	.44	.59	.67	.73	.78	.83	.87	.89	.91
1/30°	.20	.26	.38	.51	.66	.72	.78	.81	.84	.86	.88	.89
1/100°	.48	.61	.73	.86	.93	.93	.94	.95	.96	.97	.97	.98
Flat	1	1	1	1	1	1	1	1	1	1	1	1
Reverse Slope—												
1/100°	..	..	1.60	1.30	1.20	1.15	1.09	1.07	1.05	1.04	1.03	1.02
1/30°	..	..	..	..	1.50	1.33	1.23	1.16	1.13	1.09	1.07	1.06
1/20°	..	..	..	..	..	..	1.74	1.45	1.32	1.23	1.17	1.12
1/12°	..	..	..	..	..	..	..	2.13	1.87	1.63	1.38	1.23
1/8°	..	..	..	..	..	..	..	..	2.22	1.81	1.45	1.34

Example (Forward Slope).—Range, 2,000 yards; gradient of forward slope on which the shots are falling is found to be 1 in 20; the beaten zone at 2,000 yards is 130 yards long; from the table, the factor in the vertical column under "2,000", opposite "forward slope 1/20" is 0.78. The beaten zone on the slope will be  $130 \times 0.78$ —say, 100 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 0.18. The beaten zone on the slope will be  $60 \times 0.18$ —10 yards.

GRAPH OF ALLOWANCES FOR CLIMATIC VARIATIONS.



Range in Hundreds of Yards.

Side wind curve } are for 20 miles an hour wind.  
 Head or rear wind curve }  
 Temperature curve is for a variation of 20° from normal (60° F.).  
 Barometer curve is for a variation of 1 inch from normal (30 inch)  
 at mean sea level (M.S.L.).

TANGENT ANGLES FOR INTERMEDIATE 50 YARDS.

Range in yards.	Tangent angle.	Range in yards.	Tangent angle.
150	5'	2250	5° 41'
250	9'	2350	6° 21'
350	14'	2450	7° 4'
450	19'	2550	7° 52'
550	25'	2650	8° 44'
650	32'	2750	9° 41'
750	39'		
850	48'		
950	57'		
1050	1° 8'		
1150	1° 20'		
1250	1° 34'		
1350	1° 49'		
1450	2° 6'		
1550	2° 28'		
1650	2° 46'		
1750	3° 9'		
1850	3° 34'		
1950	4° 2'		
2050	4° 32'		
2150	5° 5'		

## LIFTS. (100's AND 50's.)

Range.		Lift in minutes.	Range.		Lift in minutes.
From.	To.		From.	To.	
100	200	4'	150	250	4'
200	300	4'	250	350	5'
300	400	5'	350	450	5'
400	500	6'	450	550	6'
500	600	6'	550	650	7'
600	700	7'	650	750	7'
700	800	8'	750	850	9'
800	900	9'	850	950	9'
900	1000	10'	950	1050	11'
1000	1100	12'	1050	1150	12'
1100	1200	13'	1150	1250	14'
1200	1300	14'	1250	1350	15'
1300	1400	16'	1350	1450	17'
1400	1500	18'	1450	1550	19'
1500	1600	20'	1550	1650	21'
1600	1700	22'	1650	1750	23'
1700	1800	24'	1750	1850	25'
1800	1900	26'	1850	1950	28'
1900	2000	29'	1950	2050	30'
2000	2100	32'	2050	2150	33'
2100	2200	35'	2150	2250	36'
2200	2300	38'	2250	2350	40'
2300	2400	41'	2350	2450	43'
2400	2500	45'	2450	2550	48'
2500	2600	49'	2550	2650	52'
2600	2700	54'	2650	2750	57'
2700	2800	60'			



## V.I. GRAPH.

- The angle is shown by the diagonal line nearest to the point of intersection of the required base line (vertical) and the range line (horizontal).
- Both base and range must be taken in the same unit of measure, i.e., both in yards or both in metres.
- The smallest range (or 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 used and the same multiple applied to the base (or V.I.).

### Examples:

(a) Given, range 800 yards and base 30 yards.

Find the angle.

A convenient multiple is 2.

Then, range 1,600 yards and base 60 yards gives the angle  $2^{\circ} 9'$ , which is the angle required.

(b) Given, range 50 yards and angle  $1^{\circ} 10'$ .

Find the base.

A convenient multiple is 20.

Then, range 1,000 yards and angle  $1^{\circ} 10'$  gives a base 20 yards.

Therefore, the required base is 1 yard.

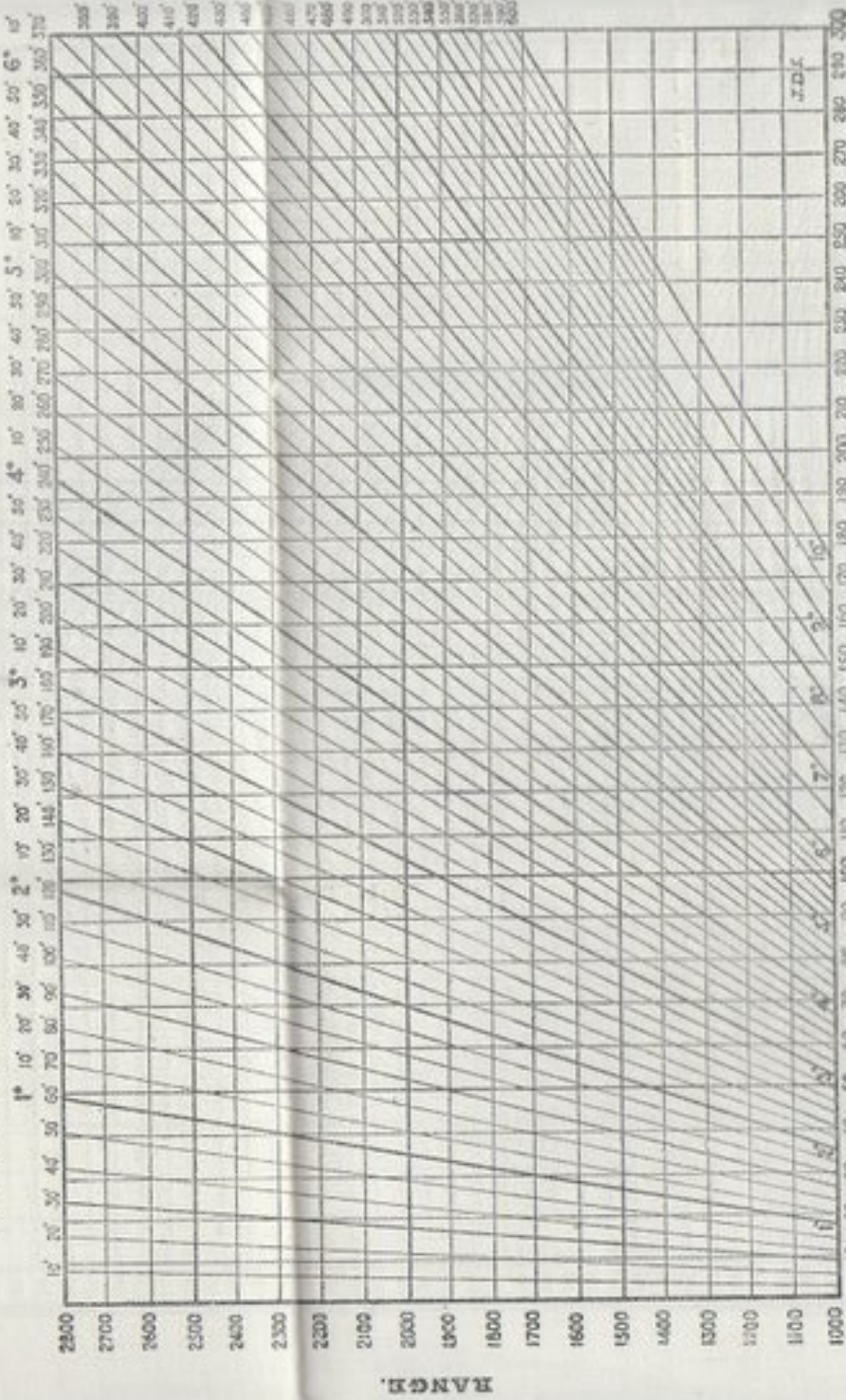
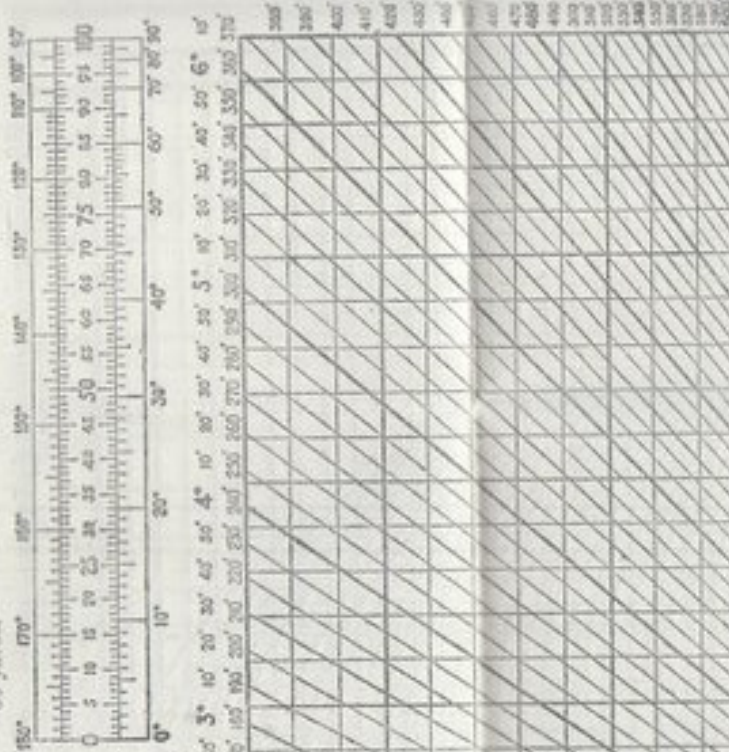
Scale for the conversion of OBLIQUE bases to TRUE bases.

This is used as follows:—

- Measure the angle of obliquity.
- Note the position of this angle on the **TOP** or **BOTTOM** lines of figures on the Scale.
- Note which figure on the centre line of figures comes opposite the angle measured.
- This figure will give the proportion of the oblique base which will equal the true base.

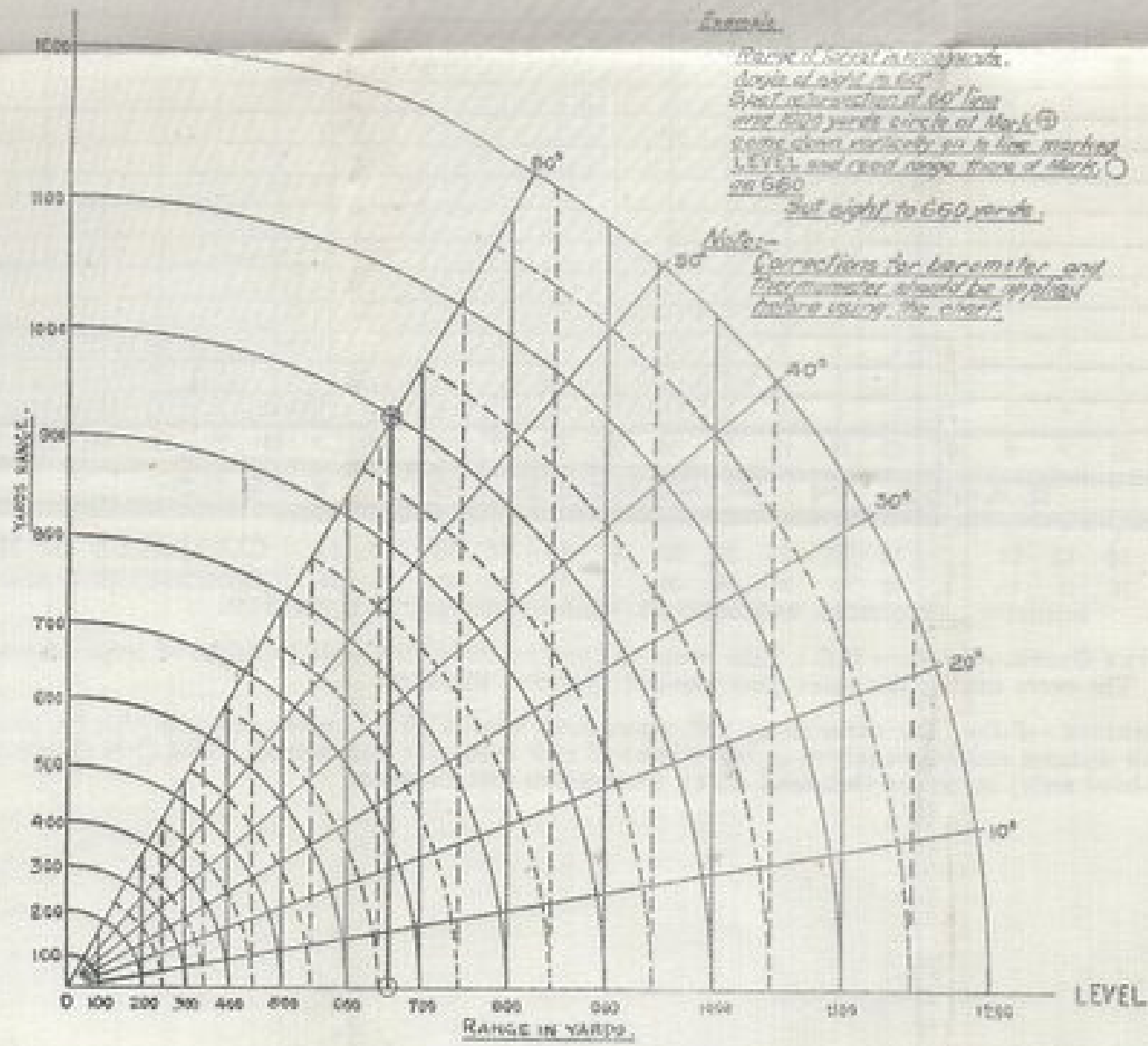
Example:—Base 80 yards long at an angle of  $125^{\circ}$ .

From scale, 75 % of oblique base equals true base, which is 60 yards.



B.S. 52.

Note.—The following formula will give approximately the information supplied by the above graph:—Angle in minutes =  $A = \frac{R}{B} \times 5.400$ , where VI = vertical interval or base in yards or metres.



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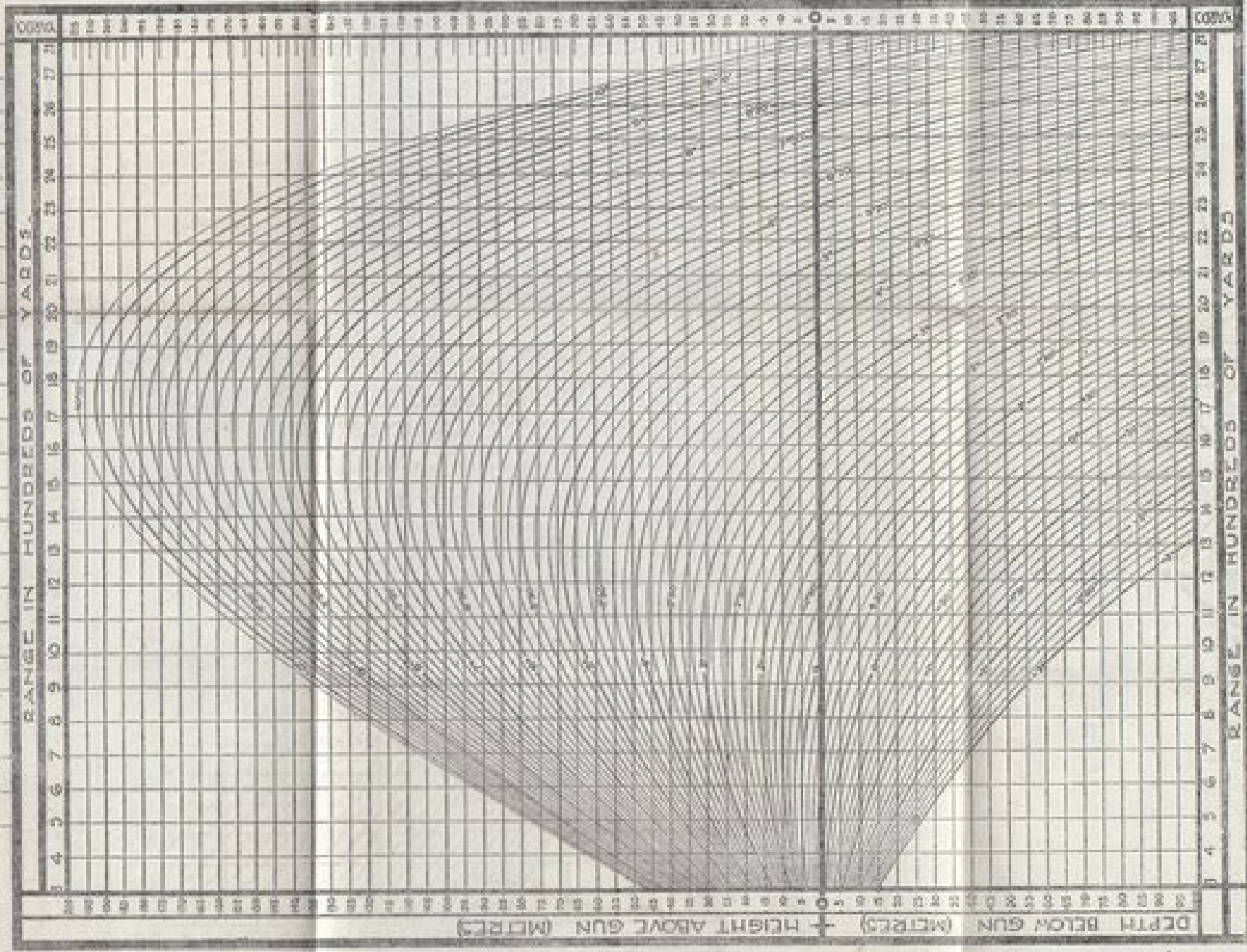


Graph for Calculating Clearance of Ordnance Ammunition

(CURVES REPRESENT CENTRE SHOTS)

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

IN YARDS	17	20	23	27	30	35	40	47	53	64	73	80	87	93	107	117	122	133	143	153	163	173	183	193	203		
IN METRES	14	18	21	25	27	30	37	43	48	55	61	67	73	80	85	93	102	113	123	133	143	153	163	173	183	193	203



10	10	10	12	14	16	18	21	25	28	32	37	42	48	55	63	73	CLEARANCE IN METRES
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	CLEARANCE IN YARDS
MINIMUM CLEARANCES REQUIRED AT VARIOUS DISTANCES FROM GUN.																	

How to Use this Graph.—To Find Q.E.: Take range and run up on vertical scale to height of target 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 shows distance and height (above or below gun) of own troops (or obstructions). This gives distance in yards (or odd-number yards) or clearance (or clearance in yards).

