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1843

Serial No. 8

## **Red Fire Effect Tables**

*Cancels Edition of June, 1932.*

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DECLASSIFICATION OF WWII RECORDS

**Naval War College  
Newport, R. I.  
Department of Operations  
June, 1933**

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*S. A. Taffinder*  
S.A. TAFFINDER  
Captain, U.S. Navy  
Secretary.

NAVAL WAR COLLEGE  
Newport, R.I.  
1 June, 1933

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RED FIRE EFFECT TABLES

Naval War College  
Newport, R.I.  
June, 1933.

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or Military Service.

EXPLANATION OF TABLES

1. These tables give the effect of single guns, under normal conditions, in terms of equivalent 14" penetrative hits per three-minute move.

2. To use a table, in the case of the fire of a particular type of gun against a particular class of target ship, -

(1) determine whether shots are penetrative, for which purpose enter the armor penetration table for that gun with arguments:

- (a) armor of target ship
- (b) target angle, and
- (c) range.

(2) select appropriate fire effect for one gun from fire effect tables using as arguments:

- (a) size class of target
- (b) whether shots are penetrative
- (c) kind of spot, and
- (d) range.

(3) multiply this figure for the effect of one gun by the number of guns firing. The result is the aggregate normal fire effect of the battery with no allowance yet made for deck penetration.

3. Where a single set of figures are shown they apply to both plane spot and top spot.

4. When in fire, against armored vessels, with guns of 6" or larger caliber, there is either (1) deck penetration only, or (2) both side and deck penetration, the normal value of penetrative fire effect as given in the tables will be multiplied by the appropriate figure from the subjoined table:

Gun	Target size	Penetration	
		Deck	Deck & Side
12" plus	Large	1.2	1.3
12" plus	Int., Small	1.1	1.2
7½ - 10"	Any	1.1	1.2
6"	Int., Small	1.1	1.2

No increase for deck penetration will be allowed for fire against unarmored vessels or for fire with guns smaller than 6".

5. Fire Effect Diagrams have been constructed from the Fire Effect Tables giving the normal effect of BLUE ships upon RED and ORANGE ships of similar type. These diagrams can be conveniently used in place of the Fire Effect Tables where applicable.

GUN DATA

The following data on RED guns is based on the latest information available.

Where two ranges are given, the first is the theoretical range - table range; the second, the figure used at the War College as representing the estimated practical range in thousands of yards.

<u>Caliber</u>	<u>Weight of Projectile</u>	<u>M.V.</u>	<u>Maximum Elevation</u>	<u>Maximum Range Tables</u>	<u>Maximum Range Practical</u>
16"/45	2048	2575	40°	40000	38
15"/42	1920	2450	(a) 20°	24300	23
			(b) 30°	30300	29
			(c) 45°	35700	35
13 1/2"/45	1400	2500	20°	23800	23
8"/50	257	2800	70°	28000	27
6"/50	100	3100	35°	22700	22
			(d) 70°	23800	23
6"/45	100	2800	30°	19200	18
5 1/2"/50	82	2775	30°	17600	16
4 1/2"/50	50	3000	85° A.A.	18650	18
4 1/2"/45	50	2650	30°	15300	14
4"/50	31	2750	30°	15100	14
			(e) 35°	15900	15
4"/45	31	2650	85° A.A.	16100	15
3"/45	16	2500	85° A.A.	12100	11

(a) Guns of BB 9-18, CC 2-3.

(b) Guns of CC 4, BM 2, 3.

(c) Guns of BM 1.

(d) NELSON, RODNEY and LEANDER type cruisers.

(e) TERROR.

FIRE EFFECT TABLE - RED 16"/45

Muzzle Velocity 2575 f.s.  
Weight of Projectile 2048 lbs.  
Maximum Range 38.

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
3"	---	---	---	---
4"	---	---	---	---
5"	---	---	---	35
5:75	---	---	---	31
6"	---	---	---	30
7"	---	---	37	27
8"	36	35	30	22
9"	32	30	25	18
10"	29	27	22	15
11"	27	25	19	X
12"	25	23	17	X
13"	23	21	15	X
13:5	22	20	14	X
14"	22	19	X	X
15"	20	X	X	X
16"	19	X	X	X

DECK ARMOR

Thick- ness	Range
1:00	7
1:50	11
2:00	14
2:25	15
2:40	16
2:75	18
3:00	19
3:65	22
3:68	22
3:75	23
4:00	24
4:13	25
4:39	25
4:57	26
4:82	27
5:18	28
6:25	32

Penetration of INCLINED ARMOR

7"	34	33	31	25
----	----	----	----	----

Inclined 10°

- (---) No limit within maximum range of gun.  
( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.

LARGE TARGETPENETRATIVENON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	5.930		3.925	
2	5.770		3.821	
3	4.669		3.088	
4	3.550		2.350	
5	2.701		1.787	
6	2.087		1.381	
7	1.640		1.084	
8	1.310		.866	
9	1.071		.709	
10	.838		.587	
11	.750		.496	
12	.635		.420	
13	.534		.354	
14	.450		.298	
15	.331		.252	
16	.324		.214	
17	.284		.188	
18	.248		.164	
19	.219		.145	
20	.193		.128	
21	.163	.170	.109	.113
22	.138	.152	.092	.101
23	.116	.136	.076	.090
24	.094	.122	.062	.081
25	.074	.111	.049	.073
26	.055	.101	.036	.067
27	.036	.091	.024	.060
28	.023	.083	.015	.055
29	.013	.075	.009	.050
30	.006	.070	.004	.046
31	.000	.064	.000	.041
32		.058		.038
33		.054		.036
34		.050		.033
35		.045		.030
36		.041		.027
37		.038		.025
38		.035		.023



INTERMEDIATE TARGETPENETRATIVENON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	5.929		4.760	
2	5.524		4.435	
3	3.817		3.064	
4	2.551		2.050	
5	1.875		1.505	
6	1.427		1.145	
7	1.103		.886	
8	.881		.707	
9	.738		.593	
10	.618		.496	
11	.517		.415	
12	.433		.348	
13	.364		.292	
14	.305		.245	
15	.257		.206	
16	.218		.175	
17	.185		.148	
18	.162		.130	
19	.143		.115	
20	.128		.103	
21	.108	.114	.086	.091
22	.091	.101	.073	.081
23	.075	.089	.060	.072
24	.060	.080	.048	.064
25	.045	.071	.036	.057
26	.031	.064	.024	.051
27	.020	.058	.016	.047
28	.011	.053	.008	.042
29	.005	.048	.004	.039
30	.000	.045	.000	.036
31		.041		.033
32		.038		.031
33		.035		.028
34		.033		.026
35		.031		.025
36		.028		.023
37		.027		.022
38		.025		.020

SMALL TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	5.930		5.010	
2	5.313		4.494	
3	3.150		2.660	
4	1.992		1.684	
5	1.447		1.221	
6	1.120		.946	
7	.866		.732	
8	.690		.584	
9	.574		.485	
10	.480		.406	
11	.405		.342	
12	.339		.287	
13	.287		.242	
14	.246		.208	
15	.207		.175	
16	.173		.146	
17	.146		.124	
18	.128		.108	
19	.112		.095	
20	.099		.084	
21	.084	.088	.070	.074
22	.071	.080	.060	.067
23	.058	.071	.049	.060
24	.045	.064	.038	.054
25	.033	.058	.028	.049
26	.021	.053	.018	.044
27	.012	.048	.010	.041
28	.005	.044	.004	.037
29	.000	.040	.000	.034
30		.037		.031
31		.033		.028
32		.030		.025
33		.027		.023
34		.025		.021
35		.023		.019
36		.021		.018
37		.020		.017
38		.019		.016

PENETRATIVE

DESTROYER TARGET

SUBMARINE TARGET

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	5.929		1.650	
2	3.178		.789	
3	1.642		.443	
4	1.070		.280	
5	.775		.200	
6	.580		.147	
7	.450		.110	
8	.368		.084	
9	.298		.064	
10	.243		.050	
11	.197		.041	
12	.162		.033	
13	.131		.027	
14	.106		.023	
15	.085		.018	
16	.068		.014	.015
17	.055		.011	.012
18	.048		.009	.010
19	.041		.007	.009
20	.036		.006	.008
21	.029	.031	.005	.007
22	.025	.028	.004	.007
23	.020	.025	.003	.006
24	.015	.023	.002	.006
25	.010	.021	.001	.005
26	.006	.019	.000	.005
27	.002	.018		.005
28	.000	.016		.005
29		.015		.004
30		.013		.004
31		.012		.000
32		.011		
33		.009		
34		.008		
35		.007		
36		.006		
37		.005		
38		.004		

FIRE EFFECT TABLE - RED 15"/42

Muzzle Velocity 2450 f.s.  
Weight of Projectile 1920 lbs.

Maximum range with present mounts

CC 4, BM 2, 3 29

BB 9-18, CC 2-3 23

BM 1 35

Maximum range with 30° elevation 29

Maximum range with 45° elevation 35

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

DECK ARMOR

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
3"	---	---	---	---
4"	---	---	---	32
5"	---	---	34	27
5"75	---	---	31	23
6"	---	34	30	22
7"	32	30	26	19
8"	27	26	22	16
9"	24	23	18	13
10"	22	21	16	X
11"	21	19	14	X
12"	19	17	12	X
13"	18	16	X	X
13"5	17	15	X	X
14"	17	15	X	X
15"	16	X	X	X
16"	15	X	X	X

Thick- ness	Range
1"00	5
1"50	9
2"00	12
2"25	13
2"40	14
2"75	16
3"00	17
3"65	20
3"68	20
3"75	21
4"00	22
4"13	22
4"39	23
4"57	24
4"82	25
5"18	26
6"25	29

Penetration of INCLINED ARMOR

7"	25	25	23	18
----	----	----	----	----

Inclined 10°

- (---) No limit within maximum range of gun.  
( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.

LARGE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	4.976		3.055	
2	4.915		3.019	
3	3.860		2.436	
4	3.074		1.884	
5	2.358		1.446	
6	1.799		1.103	
7	1.401		.859	
8	1.128		.692	
9	.921		.565	
10	.766		.470	
11	.641		.393	
12	.540		.332	
13	.451		.277	
14	.375		.230	
15	.313		.191	
16	.264		.162	
17	.224		.137	
18	.196		.120	
19	.176		.108	
20	.157		.096	
21	.135	.141	.083	.087
22	.116	.128	.071	.078
23	.098	.115	.060	.070
24	.079	.102	.048	.062
25	.061	.091	.038	.056
26	.044	.082	.028	.051
27	.030	.074	.018	.045
28	.018	.066	.011	.040
29	.010	.060	.006	.037
30	.004	.055	.003	.034
31	.000	.051	.000	.031
32		.046		.028
33		.043		.026
34		.039		.024
35		.036		.022

INTERMEDIATE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	4.976		3.762	
2	4.710		3.560	
3	3.255		2.459	
4	2.242		1.695	
5	1.665		1.259	
6	1.250		.944	
7	.968		.732	
8	.773		.585	
9	.630		.477	
10	.521		.394	
11	.440		.333	
12	.364		.276	
13	.301		.228	
14	.250		.189	
15	.211		.160	
16	.177		.134	
17	.149		.113	
18	.131		.099	
19	.117		.088	
20	.106		.080	
21	.091	.096	.068	.072
22	.077	.085	.058	.064
23	.063	.076	.048	.057
24	.049	.066	.037	.050
25	.037	.059	.028	.045
26	.025	.053	.020	.041
27	.016	.048	.012	.036
28	.008	.043	.006	.032
29	.004	.037	.003	.028
30	.000	.032	.000	.024
31		.029		.021
32		.024		.018
33		.021		.015
34		.018		.013
35		.015		.012

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SMALL TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	4.985		4.020	
2	4.510		3.636	
3	2.689		2.169	
4	1.717		1.386	
5	1.269		1.022	
6	.969		.782	
7	.740		.596	
8	.595		.480	
9	.490		.396	
10	.403		.325	
11	.340		.274	
12	.283		.228	
13	.233		.192	
14	.200		.162	
15	.170		.137	
16	.145		.117	
17	.124		.100	
18	.103		.087	
19	.095		.076	
20	.083		.066	
21	.068	.072	.056	.059
22	.053	.065	.047	.053
23	.048	.059	.039	.047
24	.033	.054	.031	.043
25	.028	.049	.022	.039
26	.018	.044	.014	.036
27	.010	.040	.008	.032
28	.004	.036	.003	.029
29	.000	.032	.000	.026
30		.029		.023
31		.026		.021
32		.023		.019
33		.020		.016
34		.018		.014
35		.017		.013



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RED 15"/42

PENETRATIVE

DESTROYER TARGET

SUBMARINE TARGET

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	4.983		1.703	
2	2.880		.806	
3	1.469		.436	
4	.961		.280	
5	.704		.201	
6	.516		.145	
7	.401		.107	
8	.330		.080	
9	.269		.059	
10	.218		.047	
11	.173		.037	
12	.138		.030	
13	.114		.025	
14	.091		.021	
15	.073		.017	
16	.059		.012	.013
17	.047		.009	.010
18	.039		.008	.009
19	.033		.007	.008
20	.028		.005	.007
21	.024	.025	.004	.006
22	.019	.022	.003	.006
23	.015	.019	.002	.005
24	.010	.016	.002	.005
25	.007	.015	.001	.004
26	.004	.013	.000	.004
27	.002	.012		.004
28	.000	.011		.004
29		.010		.004
30		.009		.004
31		.008		.000
32		.008		
33		.007		
34		.006		

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RED 8"/50

FIRE EFFECT TABLE - RED 8"/50

Muzzle Velocity 2800 f.s.  
Weight of Projectile 257 lbs.

Maximum range: 27

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thickness	90° or 0°	75° or 15°	60° or 30°	45°
1"	---	---	---	---
2"	---	26	24	19
3"	22	20	17	14
3:5	19	18	15	12
4"	17	16	14	10
5"	15	14	12	8
5:75	13	12	10	6
6"	13	12	10	X
7"	11	10	7	X
8"	10	9	X	X
9"	9	X	X	X
10"	X	X	X	X

DECK ARMOR

Thickness	Range
1:00	9
1:40	13
1:50	14
2:00	18
2:25	20
2:40	21
2:75	22
3:00	24
3:65	26
3:68	26
3:75	27
4:00	27
4:13	X

Penetration of INCLINED ARMOR

7"	9	8	X	X	Inclined 10°
----	---	---	---	---	--------------

- (---) No limit within maximum range of gun.  
( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.









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RED 7.5/45

FIRE EFFECT TABLE - RED 7.5/45

Muzzle Velocity 2750 f.s.  
Weight of Projectile 200 lbs.

Maximum range: 20



LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	---	---	---	---
2"	---	20	18	12
3"	15	14	12	8
3:5	13	12	10	6
4"	11	10	8	5
5"	9	8	6	3
5:75	8	7	5	X
6"	7	6	4	X
7"	6	5	X	X
8"	5	X	X	X
9"	4	X	X	X
10"	X	X	X	X

DECK ARMOR

Thick- ness	Range
1:00	11
1:40	15
1:50	15
2:00	19
2:25	20
2:40	X

Penetration of INCLINED ARMOR

7"	5	4	X	X
----	---	---	---	---

Inclined 10°

- (---) No limit within maximum range of gun.  
( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.

LARGE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.189		.597	
2	2.178		.593	
3	1.788		.488	
4	1.402		.382	
5	1.024		.280	
6	.753		.205	
7	.585		.160	
8	.466		.127	
9	.372		.101	
10	.306		.083	
11	.242		.067	
12	.218		.059	
13	.187		.051	
14	.161		.044	
15	.134		.037	
16	.111	.114	.030	.031
17	.090	.097	.024	.026
18	.073	.081	.020	.022
19	.057	.068	.016	.019
20	.042	.055	.012	.015

INTERMEDIATE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.189		.894	
2	2.090		.854	
3	1.468		.600	
4	1.032		.418	
5	.730		.298	
6	.531		.217	
7	.405		.165	
8	.314		.129	
9	.253		.103	
10	.209		.085	
11	.174		.071	
12	.147		.060	
13	.128		.052	
14	.110		.045	
15	.092		.038	
16	.075	.077	.030	.031
17	.060	.064	.024	.026
18	.050	.055	.020	.022
19	.039	.046	.016	.019
20	.028	.037	.012	.015

SMALL TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.189		1.024	
2	2.002		.938	
3	1.217		.570	
4	.785		.368	
5	.563		.264	
6	.409		.192	
7	.310		.145	
8	.246		.115	
9	.198		.093	
10	.163		.076	
11	.134		.063	
12	.114		.054	
13	.099		.046	
14	.086		.040	
15	.070		.033	
16	.057	.059	.027	.028
17	.047	.051	.022	.024
18	.037	.042	.018	.020
19	.028	.035	.013	.016
20	.021	.029	.010	.013

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PENETRATIVE

DESTROYER TARGET

SUBMARINE TARGET

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.189		2.860	
2	1.436		1.480	
3	.726		.787	
4	.436		.390	
5	.292		.242	
6	.211		.186	
7	.158		.143	
8	.125		.106	
9	.097		.084	
10	.079		.063	
11	.066		.051	
12	.053		.039	.040
13	.044		.031	.033
14	.035		.025	.027
15	.029		.019	.022
16	.021	.022	.013	.016
17	.017	.018	.009	.012
18	.011	.013	.007	.010
19	.009	.011	.004	.007
20	.006	.009	.002	.004

FIRE EFFECT TABLE - RED 6"/50

Muzzle Velocity 3100 f.s.  
Weight of Projectile 100 lbs.

Maximum Range NELSON, RODNEY, and LEANDER type cruisers	23
Maximum Range all others	22

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	---	---	22	18
2"	16	15	13	9
3"	11	11	9	6
3:5	10	9	7	5
4"	9	8	6	X
5"	7	6	X	X
5:75	6	5	X	X
6"	6	X	X	X
7"	X	X	X	X

DECK ARMOR

Thick- ness	Range
1:00	13
1:40	17
1:50	18
2:00	21
2:25	22
2:40	23
2:75	X

Penetration of INCLINED ARMOR

7"	X	X	X	X
----	---	---	---	---

Inclined 10°

- (---) No limit within maximum range of gun.  
( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.

LARGE TARGETPENETRATIVENON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.237		.552	
2	2.212		.545	
3	1.830		.448	
4	1.456		.359	
5	1.111		.274	
6	.835		.206	
7	.629		.155	
8	.481		.117	
9	.387		.095	
10	.321		.079	
11	.269		.066	
12	.220	.227	.054	.056
13	.175	.188	.043	.046
14	.141	.158	.036	.039
15	.108	.129	.027	.032
16	.082	.106	.020	.026
17	.060	.087	.014	.021
18	.043	.072	.011	.018
19	.030	.059	.007	.014
20	.020	.050	.005	.012
21	.012	.042	.003	.010
22	.006	.035	.002	.009
23	.003	.029	.001	.007



INTERMEDIATE TARGETPENETRATIVENON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.237		.850	
2	2.124		.807	
3	1.500		.570	
4	1.063		.404	
5	.790		.300	
6	.584		.222	
7	.434		.165	
8	.335		.124	
9	.263		.100	
10	.218		.083	
11	.183		.070	
12	.150	.152	.057	.059
13	.118	.127	.045	.048
14	.094	.106	.036	.040
15	.073	.087	.028	.033
16	.055	.071	.021	.027
17	.041	.059	.015	.022
18	.029	.048	.011	.018
19	.020	.039	.008	.015
20	.013	.032	.005	.013
21	.008	.027	.003	.010
22	.004	.023	.002	.009
23	.002	.020	.001	.007

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RED 6"/50

SMALL TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.240		.984	
2	2.033		.894	
3	1.245		.548	
4	.821		.361	
5	.612		.269	
6	.450		.198	
7	.333		.147	
8	.255		.112	
9	.206		.090	
10	.170		.075	
11	.143		.063	
12	.116	.120	.051	.053
13	.091	.099	.040	.044
14	.072	.083	.031	.036
15	.055	.068	.024	.030
16	.041	.056	.018	.024
17	.031	.047	.013	.020
18	.021	.038	.010	.017
19	.014	.032	.007	.014
20	.010	.027	.004	.012
21	.006	.023	.002	.010
22	.002	.018	.001	.008
23	.000	.015	.000	.007

PENETRATIVEDESTROYER TARGETSUBMARINE TARGET

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	2.240		3.698	
2	1.402		1.672	
3	.726		.870	
4	.436		.533	
5	.287		.357	
6	.212		.247	
7	.168		.181	
8	.136		.137	
9	.109		.106	.108
10	.089		.081	.085
11	.070		.063	.068
12	.055	.057	.046	.053
13	.041	.045	.032	.039
14	.031	.036	.022	.030
15	.023	.029	.016	.024
16	.016	.023	.010	.018
17	.011	.018	.006	.014
18	.007	.014	.004	.011
19	.004	.011	.002	.009
20	.002	.009	.001	.008
21	.001	.007	.000	.006
22	.000	.006		.005
23		.005		.004

FIRE EFFECT TABLE - RED 6"/45

Muzzle Velocity 2800 f.s.  
Weight of Projectile 100 lbs.

Maximum Range 18

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	---	---	---	16
2"	15	14	11	7
3"	9	8	7	5
3.5"	8	7	6	4
4"	7	6	5	X
5"	5	5	X	X
5.75"	5	4	X	X
6"	4	X	X	X
7"	X	X	X	X

DECK ARMOR

Thick- ness	Range
1'00	11
1'40	15
1'50	16
2'00	X

Penetration of INCLINED ARMOR

7"	X	X	X	X
----	---	---	---	---

Inclined 10°

- (---) No limit within maximum range of gun.  
( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.

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RED 6"/45

LARGE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1.790		.442	
2	1.765		.435	
3	1.357		.334	
4	1.020		.252	
5	.729		.180	
6	.537		.132	
7	.410		.101	
8	.326		.080	
9	.264		.065	
10	.219		.054	
11	.182		.045	
12	.150	.155	.037	.038
13	.120	.129	.030	.032
14	.098	.110	.025	.027
15	.076	.090	.018	.022
16	.057	.074	.014	.018
17	.042	.061	.009	.014
18	.031	.052	.007	.012

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RED 6"/45

INTERMEDIATE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1,790		.680	
2	1,710		.650	
3	1,110		.422	
4	.744		.282	
5	.518		.197	
6	.377		.143	
7	.284		.108	
8	.221		.084	
9	.178		.068	
10	.148		.056	
11	.124		.047	
12	.102	.105	.039	.040
13	.083	.089	.032	.034
14	.067	.075	.026	.029
15	.052	.062	.019	.023
16	.039	.050	.015	.019
17	.027	.040	.011	.015
18	.017	.032	.003	.012

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RED 6"/45

SMALL TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1.791		.787	
2	1.621		.713	
3	.921		.405	
4	.573		.252	
5	.402		.177	
6	.290		.127	
7	.218		.096	
8	.173		.076	
9	.140		.061	
10	.116		.051	
11	.096		.042	
12	.080	.083	.035	.036
13	.063	.069	.028	.030
14	.050	.058	.022	.026
15	.038	.047	.017	.021
16	.029	.039	.013	.017
17	.022	.033	.010	.014
18	.015	.028	.006	.011



PENETRATIVE

DESTROYER TARGET

SUBMARINE TARGET

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1,791		2,364	
2	1,005		1,133	
3	.453		.616	
4	.296		.379	
5	.204		.258	
6	.144		.176	
7	.106		.126	
8	.084		.094	
9	.068		.068	.069
10	.054		.051	.054
11	.044		.040	.044
12	.033	.034	.031	.036
13	.025	.027	.023	.029
14	.019	.022	.017	.023
15	.013	.017	.012	.018
16	.009	.013	.008	.014
17	.007	.010	.004	.010
18	.005	.008	.002	.008

FIRE EFFECT TABLE - RED 5!5/50

Muzzle Velocity 2775 f.s.  
Weight of Projectile 82 lbs.

Maximum Range 16.

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	---	---	---	13
2"	12	11	9	5
3"	7	7	5	3
3:5	6	5	4	2
4"	5	4	3	X
5"	4	3	2	X
5:75	3	2	X	X
6"	X	X	X	X

DECK ARMOR

Thick- ness	Range
1:00	12
1:40	15
1:50	15
2:00	X

Penetration of INCLINED ARMOR

7"	X	X	X	X
----	---	---	---	---

Inclined 10°

- (---) No limit within maximum range of gun.
- ( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

Limiting ranges for penetration of deck armor are inner, or minimum, ranges at which penetration will occur.

LARGE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1.938		.462	
2	1.925		.459	
3	1.558		.371	
4	1.195		.285	
5	.851		.203	
6	.617		.147	
7	.465		.111	
8	.364		.087	
9	.286		.068	
10	.237		.056	
11	.195		.047	
12	.160	.165	.038	.039
13	.129	.139	.031	.033
14	.104	.117	.026	.028
15	.080	.095	.019	.023
16	.061	.079	.015	.019

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INTERMEDIATE TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1,938		.716	
2	1,846		.682	
3	1,275		.471	
4	.874		.323	
5	.604		.223	
6	.433		.160	
7	.321		.118	
8	.247		.091	
9	.194		.072	
10	.160		.059	
11	.133		.049	
12	.110	.113	.041	.042
13	.088	.095	.033	.035
14	.070	.079	.026	.029
15	.055	.065	.020	.024
16	.041	.053	.015	.020

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SMALL TARGET

PENETRATIVE

NON-PENETRATIVE

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1.938		.834	
2	1.768		.762	
3	1.044		.450	
4	.670		.288	
5	.456		.196	
6	.334		.144	
7	.247		.106	
8	.193		.083	
9	.151		.065	
10	.125		.054	
11	.104		.045	
12	.083	.087	.037	.038
13	.068	.074	.030	.032
14	.053	.061	.023	.026
15	.041	.051	.018	.022
16	.031	.042	.013	.018

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PENETRATIVE

DESTROYER TARGET

SUBMARINE TARGET

Range	Top Spot	Plane Spot	Top Spot	Plane Spot
1	1.940		3.440	
2	1.209		1.388	
3	.584		.728	
4	.370		.447	
5	.243		.302	
6	.167		.218	
7	.120		.161	
8	.092		.120	
9	.073		.086	.088
10	.056		.063	.066
11	.044		.046	.050
12	.034	.035	.035	.040
13	.025	.027	.025	.031
14	.019	.022	.018	.024
15	.015	.018	.013	.019
16	.011	.015	.009	.015

FIRE EFFECT TABLE - RED 4V7/50 A.A.

Muzzle Velocity 3000 f.s.  
Weight of Projectile 50 lbs.

Maximum Range 18



LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	16	15	13	8
2"	8	8	6	X
3"	6	5	X	X
4"	4	X	X	X
5"	X	X	X	X

( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target	Destroyer Target	Submarine Target
1	1.672	1.672	1.672	1.672	4.086
2	1.652	1.585	1.520	.970	1.905
3	1.263	1.034	.858	.432	.925
4	.901	.659	.505	.257	.558
5	.626	.438	.339	.167	.366
6	.435	.304	.235	.108	.237
7	.319	.220	.169	.078	.166
8	.242	.164	.127	.057	.122
9	.188	.127	.100	.043	.091
10	.149	.101	.079	.033	.068
11	.119	.080	.063	.026	.050
12	.096	.065	.050	.020	.037
13	.073	.050	.038	.015	.027
14	.055	.037	.029	.011	.020
15	.042	.029	.022	.008	.015
16	.032	.021	.017	.005	.012
17	.024	.016	.012	.003	.009
18	.016	.011	.009	.002	.007

NON-PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target
1	.406	.597	.692
2	.401	.566	.629
3	.307	.370	.356
4	.219	.235	.209
5	.152	.157	.141
6	.106	.109	.098
7	.077	.079	.070
8	.059	.059	.053
9	.046	.046	.041
10	.036	.036	.033
11	.029	.029	.026
12	.023	.023	.021
13	.018	.018	.016
14	.013	.013	.012
15	.010	.010	.009
16	.008	.008	.007
17	.006	.006	.005
18	.004	.004	.004

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RED 4V7/45

FIRE EFFECT TABLE - RED 4V7/45

Muzzle Velocity 2650 f.s.  
Weight of Projectile 50 lbs.

Maximum Range 14

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	---	---	13	9
2"	8	8	6	X
3"	5	5	X	X
4"	4	X	X	X
5"	X	X	X	X

(---) No limit within maximum range of gun.

( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target	Destroyer Target	Submarine Target
1	1.045	1.045	1.045	1.035	2.552
2	1.033	.990	.950	.605	1.190
3	.790	.648	.536	.270	.585
4	.564	.412	.315	.161	.350
5	.386	.274	.212	.104	.228
6	.272	.190	.146	.067	.148
7	.199	.137	.106	.049	.104
8	.151	.102	.080	.035	.076
9	.117	.080	.062	.027	.056
10	.093	.063	.049	.021	.043
11	.074	.050	.039	.016	.031
12	.059	.040	.031	.012	.023
13	.045	.031	.024	.009	.017
14	.034	.023	.018	.007	.013

NON-PENETRATIVETOP SPOT

Range	Large Target	Int. Target	Small Target
1	.254	.373	.433
2	.251	.354	.394
3	.192	.232	.226
4	.137	.147	.131
5	.094	.098	.088
6	.066	.068	.061
7	.048	.049	.044
8	.037	.037	.032
9	.028	.029	.026
10	.023	.023	.020
11	.018	.018	.016
12	.014	.014	.013
13	.011	.011	.010
14	.008	.009	.008

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RED 4"/50

FIRE EFFECT TABLE - RED 4"/50

Muzzle Velocity 2750 f.s.  
Weight of Projectile 31 lbs.

Maximum Range TERROR 15  
Maximum Range Others 14



LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	13	12	10	7
2"	7	7	6	4
3"	5	4	4	X
4"	3	3	X	X
5"	2	X	X	X
5"75	X	X	X	X

( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target	Destroyer Target	Submarine Target
1	.896	.896	.896	.895	2.313
2	.881	.846	.810	.490	1.062
3	.650	.533	.442	.235	.508
4	.454	.332	.255	.120	.296
5	.305	.216	.167	.077	.194
6	.215	.151	.116	.052	.130
7	.160	.110	.085	.038	.092
8	.122	.083	.065	.028	.070
9	.095	.064	.050	.021	.054
10	.076	.052	.040	.016	.040
11	.060	.041	.032	.013	.029
12	.048	.032	.025	.010	.022
13	.037	.025	.020	.008	.016
14	.028	.019	.015	.005	.012
15	.022	.015	.012	.004	.009

NON-PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target
1	.209	.314	.373
2	.206	.296	.348
3	.152	.186	.184
4	.106	.116	.106
5	.071	.076	.070
6	.050	.053	.049
7	.037	.039	.035
8	.029	.029	.027
9	.022	.022	.021
10	.018	.018	.017
11	.014	.014	.013
12	.011	.011	.010
13	.009	.009	.008
14	.007	.007	.006
15	.005	.005	.005

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RED 4"/45 AA

FIRE EFFECT TABLE - RED 4"/45 AA

Muzzle Velocity 2650 f.s.  
Weight of Projectile 31 lbs.

Maximum Range 15

LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	13	12	10	7
2"	6	6	5	X
3"	4	4	X	X
4"	3	X	X	X
5"	X	X	X	X

( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.

PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target	Destroyer Target	Submarine Target
1	1.434	1.434	1.434	1.434	2.698
2	1.412	1.357	1.300	.786	1.700
3	1.040	.854	.708	.377	.813
4	.727	.532	.408	.193	.477
5	.488	.346	.268	.124	.310
6	.345	.242	.187	.083	.208
7	.256	.176	.136	.060	.147
8	.196	.133	.104	.044	.111
9	.152	.103	.080	.033	.086
10	.121	.082	.064	.026	.065
11	.096	.065	.051	.020	.047
12	.077	.052	.041	.016	.034
13	.059	.040	.031	.012	.025
14	.045	.031	.024	.009	.019
15	.035	.024	.018	.006	.014

NON-PENETRATIVE

TOP SPOT

Range	Large Target	Int. Target	Small Target
1	.335	.502	.598
2	.330	.475	.541
3	.243	.299	.295
4	.170	.186	.165
5	.114	.121	.112
6	.081	.085	.078
7	.060	.062	.057
8	.046	.046	.043
9	.035	.036	.033
10	.028	.029	.027
11	.022	.023	.021
12	.018	.018	.017
13	.014	.014	.013
14	.011	.011	.010
15	.008	.008	.008

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RED 3"/45 AA

FIRE EFFECT TABLE - RED 3"/45 AA

Muzzle Velocity 2500 f.s.  
Weight of Projectile 16 lbs.

Maximum Range 11



LIMITING RANGES FOR ARMOR PENETRATION

Penetration of VERTICAL ARMOR  
at Target Angles of

Armor Thick- ness	90° or 0°	75° or 15°	60° or 30°	45°
1"	7	7	X	X
2"	X	X	X	X

( X ) No penetration at any range within maximum range of gun.

Limiting ranges for penetration of vertical armor are outer, or maximum, ranges at which penetration will occur.





