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# DAMAGE TABLES

## SEACOAST ARTILLERY AGAINST NAVAL VESSELS

PREPARED UNDER THE DIRECTION OF THE COMMANDING GENERAL,  
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## DAMAGE TABLES

### SEACOAST ARTILLERY AGAINST NAVAL VESSELS

#### 1. Introduction.

a. This discussion concerns the computation and use of damage tables. Damage tables are a tabulation of the theoretical number of shots required to destroy different types of vessels under various circumstances. They are used principally to investigate the destructive power of long range seacoast artillery against armored naval vessels.

b. Damage tables do not take into consideration the destructive effect of hits on the superstructure of ships. Hits of this category may cause considerable, and even disabling, damage to the superstructure, fire control systems and communication systems of modern ships.

c. Seacoast artillery guns cannot defeat the armor of a ship under all conditions. Explosive projectiles that completely penetrate the armor and detonate in the vitals of a ship are of more destructive value than hits that explode on the outside. It is necessary, therefore, first to investigate armor attack to determine under what conditions armor can be defeated.

#### 2. Armor and armor piercing projectiles.

a. Types of armor. There are two main types of armor used for the protection of modern fighting ships, face-hardened armor and non-face-hardened armor. Each is designed to resist the type of attack to which it will be subjected.

(1) Face-hardened armor, called Class A armor, is installed upright to form side wall protection to naval vessels. This armor is designed particularly to resist the penetration of projectiles which strike at small angles from the normal to the plate. It must have a hard surface capable of deforming the projectile at impact and a tough back to absorb the shock of the blow.

(2) Non-face-hardened armor, called Class B armor, is applied horizontally for protection of the deck and the tops of important

installations. It is used mainly where the line of impact of the projectile is at a large angle from the normal to the plate, and it is intended to dish or give upon impact and deflect the projectile.

b. Armor piercing projectiles are made from the finest quality of high carbon, nickel-chrome steel. They are designed especially to penetrate modern naval armor so that the maximum damage will be caused by the explosion of the projectile.

### 3. Armor attack.

a. Governing factors. Many factors affect the armor piercing ability of a projectile. Among these are the obliquity of the line of impact, the type of armor, and the weight, diameter and velocity at impact of the projectile.

#### b. Obliquity.

(1) General. The angle of obliquity is the angle between the line of impact and the line normal to the face of the plate at the point of impact. It will be assumed in this discussion that Class A armor is exactly vertical at all times and that Class B armor is exactly horizontal at all times; any roll or list of the ship is ignored.

(2) Target angle. The target angle is the acute angle between the vertical plane containing the gun-target line and a vertical plane parallel to the longitudinal axis of the ship. In the present damage tables, target angles are grouped for convenience into three sectors:  $0^\circ$  to  $30^\circ$ ,  $30^\circ$  to  $60^\circ$ , and  $60^\circ$  to  $90^\circ$ . Computations for each sector are made by using the mid-angle of the sector; the mid-angle will henceforth be called the target angle.

#### (3) Obliquity formulas. Let

$\theta$  = angle of obliquity

$\omega'$  = angle of fall as listed in firing tables

T = target angle

Then it can be proved that the angle of obliquity is given by the appropriate one of the following formulas:

(a) For an end section (Class A armor) -  $\cos \theta = \cos \omega' \cos T$

(b) For a side section (Class A armor) -  $\cos \theta = \cos \omega' \sin T$

(c) For the deck (Class B armor) -  $\theta = 90^\circ - \omega'$

g. Penetration is the depth of entry of the projectile into the armor as measured perpendicular to the surface. Perforation is complete penetration of the armor plate. The formula for penetration used in this discussion is

$$t = \left[ \frac{.5 w V}{1022 d .75 KM_0} \right]^{10/7}$$

where t = penetration in inches

w = weight of the projectile in pounds

V = velocity of the projectile at impact in feet

per second (obtained from the firing tables)

d = diameter or caliber of the projectile in inches

$KM_0$  = an armor factor K times an angle multiplier  $M_0$

K serves as a measure of the efficiency of the armor;

$M_0$  adjusts for the obliquity. Both of these factors

are obtained by experiment. Figure 1 is a graph of the values of  $KM_0$  against values of  $\theta$ . This is

based on the most recent information available to the Ordnance Department.

d. Limiting obliquity. Numerous experimental firings against Class A armor one-half or more calibers thick (i.e., one-half as thick as the diameter of the projectile) have shown that, when the obliquity becomes as great as approximately thirty degrees, most of the projectiles are broken up. Hence, regardless of the formula given in subparagraph 3 g, above, hits upon Class A armor one-half or more calibers thick will not be considered perforative if  $\theta$  exceeds thirty degrees.

g. Method of calculation of penetration. The penetration formula in subparagraph 3 g, above, is used to determine the ranges at which the armor under investigation will be perforated. The values given in Table

A are assumed for the thickness of armor on modern naval vessels. The general procedure is to search by 5000-yard increments in range until two ranges are found, one of which gives less and the other more penetration than the assumed thickness of armor. The range at which the exact thickness of armor will be perforated is then found by linear interpolation. (The exception of subparagraph 3 d must be noted.) In cases where it seems desirable, the increments of range mentioned above can be taken as smaller than 5,000 yards, and this has been done in several of the present damage tables.

#### 4. Zone of immunity.

a. Definition. The thickness of Class A armor that a given projectile will penetrate decreases as the angle of fall increases. On the other hand, for Class B armor, the thickness of armor that will be penetrated increases as the angle of fall increases. It is impractical to install sufficient armor to make a vessel immune to perforation by gun fire under all conditions. However, modern naval vessels are provided with enough armor to create a zone in range where guns most likely to be encountered will not produce perforative shots. This zone is called the zone of immunity. The lower limit of the zone of immunity is the maximum range at which Class A armor will be perforated and the upper limit is the minimum range at which Class B armor will be perforated. Outside the zone of immunity either Class A or Class B armor or both will be perforated. In the zone of immunity neither Class A armor nor Class B armor will be perforated. For some projectiles against some vessels there is no zone of immunity; this occurs if the maximum range for Class A perforation is greater than the minimum range for Class B perforation.

b. Method of determination. The zone of immunity is determined from the calculations described in subparagraph 3 g, above.

#### 5. Fire effect values of hits.

a. In discussing fire effect, it is necessary first to assign a destructive value to each type of hit. As a basis for comparison of different types of hits, the value of a Class A perforative hit from a

12-inch gun is arbitrarily taken as 1.00. On the basis of this assumption and empirical evidence obtained mostly from the results of engagements between British and German vessels during the years 1914-1918, Table B gives the fire effect values of hits from various seacoast guns. The low angle fire column under Class B is to be used for all angles of elevation less than the elevation corresponding to the maximum range of the gun, except in the case of mortars.

b. On the basis of empirical evidence obtained mostly from the Battle of Jutland, Table C gives the total fire effect value necessary to destroy different types of vessels.

c. Table B and Table C, when used together, give the number of hits theoretically necessary to destroy a given vessel by means of armor piercing projectiles from a given gun.

#### 6. Fire effect values of shots.

a. General. In comparing various types of weapons, it is necessary to know the potential fire effect value of a shot, as distinguished from the fire effect value of a hit. The potential fire effect of a shot is obtained when the probability of hitting is multiplied by the fire effect value of a hit.

b. Components. For each shot, there is the possibility of hitting either the Class A or the Class B armor. When the value of a hit is not the same for both armors, it is necessary to determine separately the two components of the fire effect value of a shot. Each component is obtained by multiplying the corresponding value of a hit and the probability of hitting. The potential fire effect value of a shot is the sum of its Class A and Class B components.

c. Assumptions concerning presentation of target. In the general case, it is necessary to determine separately the probability of hitting the deck and the side or end section for each target angle. The determination of the probability of hitting when the target is other than bow on or broadside is a long and tedious task. Fortunately, accuracy is not

unduly sacrificed by computing the probabilities of hitting the bow-on or broadside targets and then using these probabilities as the probabilities for obtaining various types of Class A and Class B hits in the different target angle sectors. The probabilities to be used in each case are tabulated in Table D.

d. Other assumptions concerning target.

(1) Size of target. The target is assumed to be a rectangular parallelepiped of the approximate dimensions of the vulnerable part of the actual vessel. The assumed dimensions of typical targets are given in Table E.

(2) Danger spaces. In computations, the danger spaces on the surface of the water are used instead of the corresponding sections of the material target. Their dimensions are obtained by projecting the various parts of the profile of the target upon the waterline using the slope of fall as listed in the firing tables as a direction for the parallel rays.

(3) Center of dispersion. The center of dispersion is assumed to be on the surface of the water directly below the geometrical center of the deck. This assumption must be carefully noted in the use of damage tables. In the damage tables no account is taken of trial shots; the damage tables assume that trial fire has been completed and that the center of dispersion has been correctly placed.

(4) Probable errors. The width and length of the dispersion zone depend upon the size of the deflection and range probable errors. The probable errors used in the following set of damage tables were obtained in general from Table I of TM 4-235, Coast Artillery Target Practice. In those cases where Table I of TM 4-235 did not give data at all ranges, a method of extrapolation was used. In the case of Firing Tables 6-E-1, 155-W-1, 8-I-1, and 16-E-1, where no target practice data are yet available, the probable errors used were the proving ground probable errors given in the firing tables. This fact is noted on the proper page of the damage tables.

g. Calculation of probability of hitting. For a given situation, it is necessary to calculate the probability of hitting the danger spaces corresponding to the Class A and Class B armor of the bow-on and broadside targets. The danger spaces are rectangular in shape with their sides parallel and perpendicular to the gun-target line. Therefore, by determining the probability factors as explained in paragraph 137 of FM 4-10 (Seacoast Artillery Gunnery) and entering the probability table (Table II-A) in that manual, the probability of hitting the required parts of the target may be obtained. If this probability is now multiplied by the fire effect value of the corresponding hit, the potential fire effect value of a shot is the result. It is to be noted that the Class A and Class B components must be added, as explained in subparagraph 6 b, above.

7. Shots to destroy. The number of shots of fire for effect to destroy a given target at a specified range in a given target angle sector is obtained by dividing the potential fire effect value of a shot (subparagraph 6 g) into the total fire effect required to destroy the vessel (Table C). In the present set of damage tables, the computations were made in each target angle sector for every 5,000 yards of range and for the two adjacent 1000-yard entries where a change takes place in the value of either a Class A or a Class B hit. The remainder of the table was completed by linear interpolation. In the case of some of the shorter range guns, the calculations were made for every 3,000 or 4,000 yards of range instead of every 5,000.

8. Arrangement of damage tables. The present damage tables have been calculated by the methods just described. Each page gives the number of shots of fire for effect to destroy the target for the indicated combination of gun, projectile, charge, and target. The typical targets of each gun are included. If there is a zone of immunity, it is indicated for the ranges tabulated by the area inclosed in broken lines; if there is no zone of immunity, that fact is noted. Unless there is a note to the contrary, the probable errors used are those of Table I, TM 4-235. No figures are given in these damage tables for high angle fire. The

number of shots of fire for effect to destroy the target has been given to only two significant figures whenever the number is greater than 100. Damage tables for certain obsolescent and limited standard projectiles have been omitted; if they are needed, they will be prepared by the Coast Artillery Board upon request.

9. Use of damage tables.

a. General. In the use of damage tables, the method of their construction must be borne in mind. They are based upon various assumptions, a list of which is given in paragraph 10 for ready reference. Because of these assumptions, the numbers appearing in the damage tables cannot be taken literally and they must not be interpreted as the actual results to be expected under combat conditions. They can, however, be used for purposes of comparison, and this is their main use.

b. Tactical use. Groupment commanders who direct the fire of long range seacoast artillery emplaced at widely dispersed points should draw up harbor charts showing for different areas and certain angles of approach of the target which battery would have the most destructive effect on the target. Such charts would be an aid in making decisions relative to the assignment of targets.

c. Use in maneuvers. For maneuver purposes all seacoast artillery units should be informed as to the number of theoretical shots required to destroy various types of vessels; umpires also will use this information. The information is generally furnished to the unit in the form of a curve on a chart. The horizontal scale is range and the vertical scale represents shots to destroy the target. Points are plotted directly from 0° - 30° target angle column of the damage tables, and the best representative smooth unbroken curve is drawn through the points. This curve is used for all target angles. As a convenience, an auxiliary vertical scale is added showing the time of fire of the battery in minutes, assuming a normal rate of fire.

10. List of assumptions used in calculating the damage tables.

- a. Armor piercing projectiles are used.
- b. All Class A armor is exactly vertical, and all Class B armor is exactly horizontal; there is no roll or list of the ship.
- c. The mid-angle may be used for each target angle sector.
- d. The figures concerning thickness of armor, fire effect values of hits, life of vessels in terms of fire effect value, probabilities of hits, and dimensions of targets tabulated in Tables A, B, C, D, and E apply.
- e. The data given by Figure 1 and the penetration formula of subparagraph 3 g, above, (as qualified by subparagraph 3 d) apply.
- f. The center of dispersion is located on the surface of the water directly underneath the geometrical center of the target.
- g. The probable errors of the gun are determined as described in subparagraph 6 d (4).
- h. The normal error curve governs the dispersion of the shots of the gun.

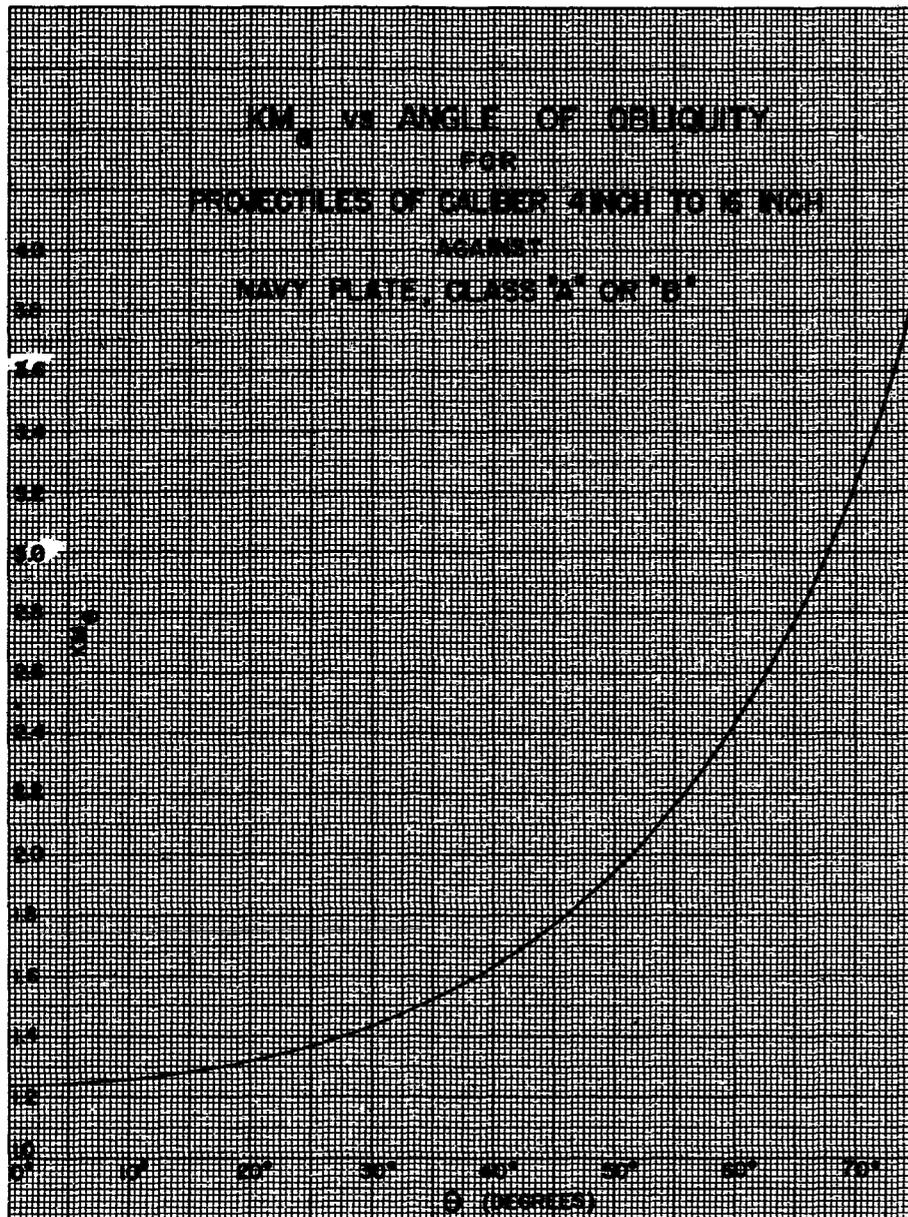


FIGURE 1  
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TABLE A  
 ASSUMED ARMOR THICKNESS IN INCHES

| Type of Vessel     | Class A armor | Class B armor |
|--------------------|---------------|---------------|
| Battleship (BB)    | 14            | 6             |
| Heavy cruiser (CA) | 4             | 2             |
| Light cruiser (CL) | 3             | 2             |
| Destroyer (DD)     | none          | none          |

TABLE B  
 ASSUMED FIRE EFFECT VALUES OF HITS

| Caliber of gun | Typical of Target | Weight of projectile | Perforative hits |                                 | Non-perforative hits |
|----------------|-------------------|----------------------|------------------|---------------------------------|----------------------|
|                |                   |                      | Class A          | Class B<br>Low angle High angle |                      |
| 16             | BB<br>CA          | 2340<br>2240<br>2100 | 2.00             | 2.67<br>3.33                    | 1.00                 |
| 14             | BB<br>CA          | 1660<br>1560<br>1400 | 1.50             | 2.00                            | .75                  |
| 12             | BB<br>CA<br>CL    | 1045<br>824<br>700   |                  | *1.67                           |                      |
| 12             | BB<br>CA<br>CL    | 1070<br>975<br>870   | 1.00             | 1.33                            | .50                  |
| 10             | CA<br>CL          | 617                  | .60              | .80                             | .30                  |
| 8              | CA<br>CL          | 260                  | .30              | .40                             | .15                  |
| 6              | CL<br>DD          | 108<br>105           | .30              | .40                             | .15                  |
| 155-mm         | CL<br>DD          | 100                  | .30              | .40                             | .15                  |

NOTE: \*Based on the 12-inch gun.

TABLE C

ASSUMED LIFE OF VESSELS IN FIRE EFFECT VALUE

| Type of Vessel | Fire effect value to destroy |
|----------------|------------------------------|
| Battleship     | 25.00                        |
| Heavy cruiser  | 15.00                        |
| Light cruiser  | 9.00                         |
| Destroyer      | 1.80                         |

TABLE D

ASSUMED PROBABILITIES FOR CLASS A AND CLASS B HITS

| Section of Target | Target Angle Sectors |           |           |
|-------------------|----------------------|-----------|-----------|
|                   | 0° - 30°             | 30° - 60° | 60° - 90° |
| End, Class A      | Bow-on               | Zero      | Zero      |
| Side, Class A     | Zero                 | Broadside | Broadside |
| Deck, Class B     | Bow-on               | Broadside | Broadside |

TABLE E

ASSUMED DIMENSIONS OF TARGETS

| Type of Vessel                     | Deck<br>(yards) | Hull (yards) |             |
|------------------------------------|-----------------|--------------|-------------|
|                                    |                 | Above water  | Below water |
| Battleship                         | 32 x 160        | 10           | 4           |
| Heavy cruiser and<br>light cruiser | 20 x 130        | 8            | 4           |
| Destroyer                          | 10 x 80         | 5            | 2           |

DAMAGE TABLE

6-inch Gun, M1897-M1908, 108-lb. A.P. Projectile

Firing Table 6-C-2

DESTROYER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 7            | 6         | 6         |
| 3000                             | 8            | 7         | 7         |
| 4000                             | 8            | 7         | 7         |
| 5000                             | 9            | 9         | 9         |
| 6000                             | 10           | 10        | 10        |
| 7000                             | 14           | 15        | 15        |
| 8000                             | 17           | 19        | 19        |
| 9000                             | 25           | 28        | 28        |
| 10000                            | 33           | 36        | 36        |
| 11000                            | 46           | 49        | 49        |
| 12000                            | 58           | 62        | 62        |
| 13000                            | 79           | 81        | 81        |
| 14000                            | 100          | 100       | 100       |
| 15000                            | 130          | 130       | 130       |
| 16000                            | 160          | 150       | 150       |
| 17000                            | 200          | 180       | 180       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

6-inch Gun, M1897-M1908, 108-lb. A.P. Projectile

Firing Table 6-C-2

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 30           | 60        | 30        |
| 3000                             | 31           | 60        | 30        |
| 4000                             | 31           | 60        | 30        |
| 5000                             | 35           | 67        | 34        |
| 6000                             | 39           | 73        | 37        |
| 7000                             | 51           | 97        | 51        |
| 8000                             | 62           | 120       | 65        |
| 9000                             | 91           | 170       | 98        |
| 10000                            | 120          | 220       | 130       |
| 11000                            | 170          | 310       | 190       |
| 12000                            | 210          | 390       | 240       |
| 13000                            | 320          | 500       | 300       |
| 14000                            | 390          | 600       | 600       |
| 15000                            | 520          | 750       | 750       |
| 16000                            | 640          | 900       | 900       |
| 17000                            | 820          | 1100      | 1100      |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

6-inch Gun, M1900-M1903-M1905, 108-lb. A.P. Projectile

Firing Table 6-C-2

DESTROYER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 7            | 6         | 6         |
| 3000                             | 8            | 7         | 7         |
| 4000                             | 8            | 7         | 7         |
| 5000                             | 9            | 8         | 8         |
| 6000                             | 10           | 9         | 9         |
| 7000                             | 12           | 12        | 12        |
| 8000                             | 14           | 14        | 14        |
| 9000                             | 19           | 19        | 19        |
| 10000                            | 23           | 24        | 24        |
| 11000                            | 31           | 32        | 32        |
| 12000                            | 38           | 39        | 39        |
| 13000                            | 48           | 50        | 50        |
| 14000                            | 58           | 60        | 60        |
| 15000                            | 74           | 75        | 75        |
| 16000                            | 90           | 90        | 90        |
| 17000                            | 110          | 100       | 100       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

6-inch Gun, M1900-M1903-M1905, 108-lb. A.P. Projectile

Firing Table 6-C-2

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 30           | 60        | 30        |
| 3000                             | 31           | 60        | 30        |
| 4000                             | 31           | 60        | 30        |
| 5000                             | 35           | 64        | 32        |
| 6000                             | 38           | 68        | 34        |
| 7000                             | 47           | 82        | 43        |
| 8000                             | 55           | 96        | 51        |
| 9000                             | 71           | 120       | 69        |
| 10000                            | 87           | 150       | 86        |
| 11000                            | 110          | 200       | 120       |
| 12000                            | 140          | 240       | 150       |
| 13000                            | 200          | 300       | 200       |
| 14000                            | 240          | 360       | 240       |
| 15000                            | 310          | 450       | 310       |
| 16000                            | 380          | 530       | 380       |
| 17000                            | 450          | 640       | 450       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

6-inch Gun, 105-lb. A.P. Projectile

Firing Table 6-E-1

DESTROYER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 6            | 6         | 6         |
| 3000                             | 7            | 6         | 6         |
| 4000                             | 7            | 6         | 6         |
| 5000                             | 8            | 6         | 6         |
| 6000                             | 9            | 7         | 7         |
| 7000                             | 10           | 7         | 7         |
| 8000                             | 11           | 8         | 8         |
| 9000                             | 13           | 10        | 10        |
| 10000                            | 15           | 12        | 12        |
| 11000                            | 17           | 14        | 14        |
| 12000                            | 22           | 19        | 19        |
| 13000                            | 28           | 24        | 24        |
| 14000                            | 33           | 29        | 29        |
| 15000                            | 40           | 36        | 36        |
| 16000                            | 46           | 42        | 42        |
| 17000                            | 53           | 49        | 49        |
| 18000                            | 63           | 58        | 58        |
| 19000                            | 72           | 66        | 66        |
| 20000                            | 82           | 75        | 75        |
| 21000                            | 95           | 87        | 87        |
| 22000                            | 110          | 98        | 98        |
| 23000                            | 120          | 110       | 110       |
| 24000                            | 130          | 120       | 120       |
| 25000                            | 140          | 140       | 140       |
| 26000                            | 140          | 150       | 150       |
| 27000                            | 150          | 160       | 160       |
| 27520                            | 160          | 160       | 160       |

NOTES: There is no Zone of Immunity for this Damage Table.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

6-inch Gun, 105-lb. A.P. Projectile

Firing Table 6-E-1

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 30           | 60        | 30        |
| 3000                             | 30           | 60        | 30        |
| 4000                             | 31           | 60        | 30        |
| 5000                             | 31           | 60        | 30        |
| 6000                             | 35           | 61        | 31        |
| 7000                             | 40           | 63        | 31        |
| 8000                             | 44           | 64        | 32        |
| 9000                             | 54           | 75        | 39        |
| 10000                            | 63           | 86        | 46        |
| 11000                            | 73           | 97        | 53        |
| 12000                            | 92           | 120       | 72        |
| 13000                            | 110          | 150       | 91        |
| 14000                            | 130          | 180       | 110       |
| 15000                            | 150          | 210       | 130       |
| 16000                            | 210          | 260       | 260       |
| 17000                            | 240          | 310       | 310       |
| 18000                            | 280          | 360       | 360       |
| 19000                            | 310          | 400       | 400       |
| 20000                            | 350          | 450       | 450       |
| 21000                            | 400          | 530       | 530       |
| 22000                            | 450          | 600       | 600       |
| 23000                            | 190          | 310       | 310       |
| 24000                            | 200          | 330       | 330       |
| 25000                            | 220          | 350       | 350       |
| 26000                            | 230          | 360       | 360       |
| 27000                            | 240          | 380       | 380       |
| 27520                            | 250          | 390       | 390       |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

155-mm Gun, 100-lb. A.P. Projectile

Firing Table 155-W-1

DESTROYER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 6            | 6         | 6         |
| 3000                             | 6            | 7         | 7         |
| 4000                             | 6            | 7         | 7         |
| 5000                             | 6            | 8         | 8         |
| 6000                             | 6            | 8         | 8         |
| 7000                             | 6            | 11        | 11        |
| 8000                             | 7            | 13        | 13        |
| 9000                             | 7            | 16        | 16        |
| 10000                            | 7            | 18        | 18        |
| 11000                            | 9            | 22        | 22        |
| 12000                            | 10           | 25        | 25        |
| 13000                            | 12           | 29        | 29        |
| 14000                            | 13           | 32        | 32        |
| 15000                            | 16           | 37        | 37        |
| 16000                            | 18           | 41        | 41        |
| 17000                            | 21           | 46        | 46        |
| 18000                            | 23           | 50        | 50        |
| 19000                            | 28           | 55        | 55        |
| 19200                            | 29           | 56        | 56        |

NOTES: There is no Zone of Immunity for this Damage Table.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

155-mm Gun, 100-lb. A.P. Projectile

Firing Table 155-N-1

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 2000                             | 30           | 30        | 30        |
| 3000                             | 31           | 30        | 30        |
| 4000                             | 31           | 31        | 31        |
| 5000                             | 32           | 31        | 31        |
| 6000                             | 37           | 66        | 33        |
| 7000                             | 41           | 76        | 40        |
| 8000                             | 46           | 85        | 46        |
| 9000                             | 50           | 95        | 53        |
| 10000                            | 63           | 110       | 110       |
| 11000                            | 67           | 130       | 130       |
| 12000                            | 72           | 160       | 160       |
| 13000                            | 76           | 180       | 180       |
| 14000                            | 80           | 200       | 200       |
| 15000                            | 90           | 230       | 230       |
| 16000                            | 100          | 270       | 270       |
| 17000                            | 110          | 300       | 300       |
| 18000                            | 120          | 330       | 330       |
| 19000                            | 53           | 170       | 170       |
| 19200                            | 54           | 180       | 180       |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

8-inch Railway Gun, MK VI, Modification 3A2,  
260-lb. A.P. Projectile, Normal Charge

Firing Table 8-I-1

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 34           | 34        | 34        |
| 6000                             | 38           | 41        | 41        |
| 7000                             | 42           | 48        | 48        |
| 8000                             | 45           | 56        | 56        |
| 9000                             | 49           | 63        | 63        |
| 10000                            | 53           | 70        | 70        |
| 11000                            | 56           | 79        | 79        |
| 12000                            | 59           | 160       | 93        |
| 13000                            | 62           | 170       | 110       |
| 14000                            | 65           | 190       | 120       |
| 15000                            | 68           | 200       | 130       |
| 16000                            | 73           | 220       | 150       |
| 17000                            | 78           | 240       | 170       |
| 18000                            | 39           | 140       | 140       |
| 19000                            | 42           | 150       | 150       |
| 20000                            | 45           | 160       | 160       |
| 21000                            | 56           | 180       | 180       |
| 22000                            | 67           | 200       | 200       |
| 22180                            | 69           | 200       | 200       |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

8-inch Railway Gun, MK VI, Modification 3A2,  
260-lb. A.P. Projectile, Normal Charge

Firing Table 8-I-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target:

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 57           | 110       | 57        |
| 6000                             | 63           | 130       | 70        |
| 7000                             | 70           | 150       | 82        |
| 8000                             | 76           | 170       | 95        |
| 9000                             | 83           | 190       | 110       |
| 10000                            | 89           | 210       | 120       |
| 11000                            | 96           | 230       | 140       |
| 12000                            | 100          | 260       | 160       |
| 13000                            | 110          | 280       | 180       |
| 14000                            | 120          | 310       | 210       |
| 15000                            | 130          | 340       | 240       |
| 16000                            | 140          | 380       | 380       |
| 17000                            | 140          | 410       | 410       |
| 18000                            | 64           | 230       | 230       |
| 19000                            | 70           | 250       | 250       |
| 20000                            | 75           | 270       | 270       |
| 21000                            | 91           | 300       | 300       |
| 22000                            | 110          | 330       | 330       |
| 22180                            | 110          | 330       | 330       |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice  
Probable Errors were used in the computation of this Damage  
Table.

DAMAGE TABLE

8-inch Railway Gun, MK VI, Modification 3A2,  
260-lb. A.P. Projectile, Supercharge

Firing Table 8-I-1

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target:

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 34           | 38        | 38        |
| 6000                             | 38           | 45        | 45        |
| 7000                             | 43           | 51        | 51        |
| 8000                             | 47           | 58        | 58        |
| 9000                             | 52           | 64        | 64        |
| 10000                            | 56           | 71        | 71        |
| 11000                            | 64           | 85        | 85        |
| 12000                            | 72           | 99        | 99        |
| 13000                            | 80           | 110       | 110       |
| 14000                            | 88           | 130       | 130       |
| 15000                            | 96           | 140       | 140       |
| 16000                            | 110          | 160       | 160       |
| 17000                            | 120          | 170       | 170       |
| 18000                            | 140          | 320       | 200       |
| 19000                            | 160          | 350       | 220       |
| 20000                            | 170          | 380       | 240       |
| 21000                            | 190          | 410       | 270       |
| 22000                            | 210          | 430       | 290       |
| 23000                            | 100          | 270       | 190       |
| 24000                            | 110          | 250       | 200       |
| 25000                            | 130          | 260       | 260       |
| 26000                            | 140          | 270       | 270       |
| 27000                            | 160          | 280       | 280       |
| 28000                            | 170          | 280       | 280       |
| 29000                            | 190          | 290       | 290       |
| 30000                            | 200          | 300       | 300       |
| 31000                            | 240          | 330       | 330       |
| 32000                            | 270          | 350       | 350       |
| 32980                            | 310          | 380       | 380       |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice  
Probable Errors were used in the computation of this Damage  
Table.

DAMAGE TABLE

8-inch Railway Gun, MK VI, Modification 3A2,  
260-lb. A.P. Projectile, Supercharge

Firing Table 8-I-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 57           | 120       | 63        |
| 6000                             | 64           | 140       | 74        |
| 7000                             | 72           | 160       | 86        |
| 8000                             | 79           | 180       | 97        |
| 9000                             | 87           | 200       | 110       |
| 10000                            | 94           | 220       | 120       |
| 11000                            | 110          | 250       | 140       |
| 12000                            | 120          | 280       | 160       |
| 13000                            | 130          | 320       | 190       |
| 14000                            | 150          | 350       | 210       |
| 15000                            | 160          | 380       | 230       |
| 16000                            | 190          | 430       | 270       |
| 17000                            | 220          | 480       | 300       |
| 18000                            | 240          | 530       | 340       |
| 19000                            | 270          | 580       | 370       |
| 20000                            | 320          | 630       | 430       |
| 21000                            | 360          | 670       | 470       |
| 22000                            | 390          | 710       | 510       |
| 23000                            | 180          | 390       | 390       |
| 24000                            | 200          | 410       | 410       |
| 25000                            | 210          | 430       | 430       |
| 26000                            | 230          | 440       | 440       |
| 27000                            | 260          | 460       | 460       |
| 28000                            | 280          | 470       | 470       |
| 29000                            | 310          | 490       | 490       |
| 30000                            | 330          | 500       | 500       |
| 31000                            | 390          | 540       | 540       |
| 32000                            | 440          | 590       | 590       |
| 32980                            | 520          | 630       | 630       |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

10-inch Gun, 617-lb. A.P. Projectile

Firing Table 10-B-1

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 16           | 16        | 16        |
| 6000                             | 24           | 22        | 22        |
| 7000                             | 31           | 28        | 28        |
| 8000                             | 39           | 35        | 35        |
| 9000                             | 46           | 41        | 41        |
| 10000                            | 54           | 47        | 47        |
| 11000                            | 83           | 68        | 68        |
| 12000                            | 110          | 89        | 89        |
| 13000                            | 140          | 110       | 110       |
| 14000                            | 170          | 130       | 130       |
| 15000                            | 110          | 110       | 110       |
| 16000                            | 150          | 140       | 140       |
| 17000                            | 190          | 170       | 170       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

10-inch Gun, 617-lb. A.P. Projectile

Firing Table 10-B-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 27           | 27        | 27        |
| 6000                             | 39           | 37        | 37        |
| 7000                             | 52           | 47        | 47        |
| 8000                             | 64           | 58        | 58        |
| 9000                             | 77           | 68        | 68        |
| 10000                            | 89           | 78        | 78        |
| 11000                            | 140          | 110       | 110       |
| 12000                            | 180          | 140       | 140       |
| 13000                            | 230          | 180       | 180       |
| 14000                            | 280          | 210       | 210       |
| 15000                            | 190          | 180       | 180       |
| 16000                            | 260          | 240       | 240       |
| 17000                            | 320          | 290       | 290       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 975-lb. A.P. Projectile, Non-Stacked Charge

Firing Table 12-F-3

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 10           | 10        | 10        |
| 6000                             | 13           | 13        | 13        |
| 7000                             | 16           | 16        | 16        |
| 8000                             | 18           | 19        | 19        |
| 9000                             | 21           | 22        | 22        |
| 10000                            | 24           | 25        | 25        |
| 11000                            | 31           | 31        | 31        |
| 12000                            | 20           | 30        | 30        |
| 13000                            | 26           | 36        | 36        |
| 14000                            | 33           | 41        | 41        |
| 15000                            | 39           | 47        | 47        |
| 16000                            | 50           | 56        | 56        |
| 17000                            | 62           | 65        | 65        |
| 18000                            | 73           | 74        | 74        |
| 19000                            | 85           | 83        | 83        |
| 20000                            | 96           | 92        | 92        |
| 21000                            | 120          | 110       | 110       |
| 22000                            | 140          | 130       | 130       |
| 23000                            | 160          | 140       | 140       |
| 24000                            | 190          | 160       | 160       |
| 25000                            | 210          | 180       | 180       |
| 26000                            | 250          | 220       | 220       |
| 27000                            | 290          | 260       | 260       |
| 28000                            | 330          | 300       | 300       |
| 29000                            | 370          | 340       | 340       |
| 30000                            | 410          | 380       | 380       |
| 30100                            | 410          | 380       | 380       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 975-lb. A.P. Projectile, Non-Stacked Charge

Firing Table 12-F-3

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 16           | 17        | 17        |
| 6000                             | 21           | 22        | 22        |
| 7000                             | 26           | 27        | 27        |
| 8000                             | 31           | 32        | 32        |
| 9000                             | 36           | 37        | 37        |
| 10000                            | 41           | 42        | 42        |
| 11000                            | 52           | 51        | 51        |
| 12000                            | 34           | 50        | 50        |
| 13000                            | 44           | 60        | 60        |
| 14000                            | 55           | 69        | 69        |
| 15000                            | 65           | 79        | 79        |
| 16000                            | 84           | 93        | 93        |
| 17000                            | 100          | 110       | 110       |
| 18000                            | 120          | 120       | 120       |
| 19000                            | 140          | 140       | 140       |
| 20000                            | 160          | 150       | 150       |
| 21000                            | 200          | 180       | 180       |
| 22000                            | 240          | 210       | 210       |
| 23000                            | 270          | 250       | 250       |
| 24000                            | 310          | 280       | 280       |
| 25000                            | 350          | 310       | 310       |
| 26000                            | 410          | 360       | 360       |
| 27000                            | 460          | 420       | 420       |
| 28000                            | 520          | 470       | 470       |
| 29000                            | 630          | 600       | 520       |
| 30000                            | 680          | 710       | 630       |
| 30100                            | 680          | 710       | 630       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 975-lb. A.P. Projectile, Non-Stacked Charge

Firing Table 12-F-3

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 26           | 54        | 27        |
| 6000                             | 30           | 63        | 33        |
| 7000                             | 34           | 72        | 38        |
| 8000                             | 37           | 80        | 44        |
| 9000                             | 41           | 89        | 49        |
| 10000                            | 68           | 110       | 110       |
| 11000                            | 84           | 130       | 130       |
| 12000                            | 100          | 150       | 150       |
| 13000                            | 120          | 180       | 180       |
| 14000                            | 130          | 200       | 200       |
| 15000                            | 150          | 220       | 220       |
| 16000                            | 190          | 260       | 260       |
| 17000                            | 230          | 300       | 300       |
| 18000                            | 280          | 330       | 330       |
| 19000                            | 320          | 370       | 370       |
| 20000                            | 360          | 410       | 410       |
| 21000                            | 440          | 480       | 480       |
| 22000                            | 530          | 550       | 550       |
| 23000                            | 610          | 620       | 620       |
| 24000                            | 700          | 690       | 690       |
| 25000                            | 780          | 760       | 760       |
| 26000                            | 940          | 850       | 850       |
| 27000                            | 1100         | 930       | 930       |
| 28000                            | 470          | 530       | 530       |
| 29000                            | 540          | 600       | 600       |
| 30000                            | 630          | 660       | 660       |
| 30100                            | 630          | 660       | 660       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

## DAMAGE TABLE

12-inch Gun, 975-lb. A.P. Projectile, Stacked Charge

Firing Table 12-F-3

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 9            | 9         | 9         |
| 6000                             | 11           | 11        | 11        |
| 7000                             | 14           | 13        | 13        |
| 8000                             | 16           | 15        | 15        |
| 9000                             | 19           | 17        | 17        |
| 10000                            | 21           | 19        | 19        |
| 11000                            | 26           | 24        | 24        |
| 12000                            | 17           | 23        | 23        |
| 13000                            | 21           | 27        | 27        |
| 14000                            | 26           | 32        | 32        |
| 15000                            | 30           | 36        | 36        |
| 16000                            | 38           | 42        | 42        |
| 17000                            | 46           | 49        | 49        |
| 18000                            | 55           | 55        | 55        |
| 19000                            | 63           | 62        | 62        |
| 20000                            | 71           | 68        | 68        |
| 21000                            | 89           | 82        | 82        |
| 22000                            | 110          | 97        | 97        |
| 23000                            | 120          | 110       | 110       |
| 24000                            | 140          | 130       | 130       |
| 25000                            | 160          | 140       | 140       |
| 26000                            | 190          | 170       | 170       |
| 27000                            | 220          | 200       | 200       |
| 28000                            | 240          | 220       | 220       |
| 29000                            | 270          | 250       | 250       |
| 30000                            | 300          | 280       | 280       |
| 30100                            | 320          | 280       | 280       |

NOTE: There is no Zone of Immunity for this Damage Table.

## DAMAGE TABLE

12-inch Gun, 975-lb. A.P. Projectile, Stacked Charge

Firing Table 12-F-3

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 15           | 16        | 16        |
| 6000                             | 19           | 19        | 19        |
| 7000                             | 23           | 22        | 22        |
| 8000                             | 26           | 26        | 26        |
| 9000                             | 30           | 29        | 29        |
| 10000                            | 34           | 32        | 32        |
| 11000                            | 43           | 39        | 39        |
| 12000                            | 28           | 38        | 38        |
| 13000                            | 35           | 45        | 45        |
| 14000                            | 43           | 53        | 53        |
| 15000                            | 50           | 60        | 60        |
| 16000                            | 64           | 70        | 70        |
| 17000                            | 78           | 80        | 80        |
| 18000                            | 92           | 90        | 90        |
| 19000                            | 110          | 100       | 100       |
| 20000                            | 120          | 110       | 110       |
| 21000                            | 150          | 130       | 130       |
| 22000                            | 180          | 160       | 160       |
| 23000                            | 210          | 180       | 180       |
| 24000                            | 240          | 210       | 210       |
| 25000                            | 270          | 230       | 230       |
| 26000                            | 310          | 260       | 260       |
| 27000                            | 350          | 300       | 300       |
| 28000                            | 390          | 330       | 330       |
| 29000                            | 450          | 480       | 410       |
| 30000                            | 500          | 540       | 470       |
| 30100                            | 540          | 540       | 470       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 975-lb. A.P. Projectile, Stacked Charge

Firing Table 12-F-3

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 25           | 52        | 26        |
| 6000                             | 28           | 57        | 29        |
| 7000                             | 31           | 63        | 33        |
| 8000                             | 34           | 68        | 36        |
| 9000                             | 37           | 73        | 39        |
| 10000                            | 60           | 84        | 84        |
| 11000                            | 72           | 100       | 100       |
| 12000                            | 84           | 120       | 120       |
| 13000                            | 96           | 140       | 140       |
| 14000                            | 110          | 150       | 150       |
| 15000                            | 120          | 170       | 170       |
| 16000                            | 150          | 200       | 200       |
| 17000                            | 180          | 220       | 220       |
| 18000                            | 210          | 250       | 250       |
| 19000                            | 240          | 270       | 270       |
| 20000                            | 270          | 300       | 300       |
| 21000                            | 340          | 350       | 350       |
| 22000                            | 400          | 400       | 400       |
| 23000                            | 470          | 460       | 460       |
| 24000                            | 530          | 510       | 510       |
| 25000                            | 600          | 560       | 560       |
| 26000                            | 710          | 640       | 640       |
| 27000                            | 810          | 710       | 710       |
| 28000                            | 360          | 380       | 380       |
| 29000                            | 410          | 430       | 430       |
| 30000                            | 460          | 470       | 470       |
| 30100                            | 460          | 470       | 470       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

12-inch Gun, 1070-lb. A.P. Projectile, Non-Stacked Charge

Firing Table 12-K-2

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 10           | 10        | 10        |
| 6000                             | 13           | 13        | 13        |
| 7000                             | 16           | 16        | 16        |
| 8000                             | 19           | 19        | 19        |
| 9000                             | 22           | 22        | 22        |
| 10000                            | 25           | 25        | 25        |
| 11000                            | 17           | 26        | 26        |
| 12000                            | 23           | 32        | 32        |
| 13000                            | 28           | 38        | 38        |
| 14000                            | 34           | 43        | 43        |
| 15000                            | 39           | 49        | 49        |
| 16000                            | 51           | 59        | 59        |
| 17000                            | 62           | 68        | 68        |
| 18000                            | 74           | 78        | 78        |
| 19000                            | 85           | 87        | 87        |
| 20000                            | 97           | 97        | 97        |
| 21000                            | 120          | 110       | 110       |
| 22000                            | 140          | 130       | 130       |
| 23000                            | 170          | 150       | 150       |
| 24000                            | 190          | 160       | 160       |
| 25000                            | 210          | 180       | 180       |
| 26000                            | 250          | 210       | 210       |
| 27000                            | 290          | 240       | 240       |
| 28000                            | 310          | 260       | 260       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 1070-lb. A.P. Projectile, Non-Stacked Charge

Firing Table 12-K-2

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 16           | 17        | 17        |
| 6000                             | 21           | 22        | 22        |
| 7000                             | 26           | 27        | 27        |
| 8000                             | 31           | 32        | 32        |
| 9000                             | 36           | 37        | 37        |
| 10000                            | 41           | 42        | 42        |
| 11000                            | 29           | 43        | 43        |
| 12000                            | 38           | 53        | 53        |
| 13000                            | 47           | 63        | 63        |
| 14000                            | 56           | 72        | 72        |
| 15000                            | 65           | 82        | 82        |
| 16000                            | 84           | 98        | 98        |
| 17000                            | 100          | 110       | 110       |
| 18000                            | 120          | 130       | 130       |
| 19000                            | 140          | 140       | 140       |
| 20000                            | 160          | 160       | 160       |
| 21000                            | 200          | 190       | 190       |
| 22000                            | 240          | 220       | 220       |
| 23000                            | 280          | 250       | 250       |
| 24000                            | 320          | 280       | 280       |
| 25000                            | 360          | 310       | 310       |
| 26000                            | 430          | 350       | 350       |
| 27000                            | 480          | 480       | 420       |
| 27600                            | 520          | 520       | 440       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 1070-lb. A.P. Projectile, Non-Stacked Charge

Firing Table 12-K-2

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 26           | 55        | 27        |
| 6000                             | 31           | 66        | 33        |
| 7000                             | 35           | 77        | 40        |
| 8000                             | 40           | 88        | 46        |
| 9000                             | 44           | 99        | 53        |
| 10000                            | 49           | 110       | 59        |
| 11000                            | 78           | 130       | 130       |
| 12000                            | 96           | 160       | 160       |
| 13000                            | 110          | 180       | 180       |
| 14000                            | 130          | 210       | 210       |
| 15000                            | 150          | 230       | 230       |
| 16000                            | 190          | 270       | 270       |
| 17000                            | 230          | 310       | 310       |
| 18000                            | 280          | 350       | 350       |
| 19000                            | 320          | 390       | 390       |
| 20000                            | 360          | 430       | 430       |
| 21000                            | 450          | 500       | 500       |
| 22000                            | 540          | 570       | 570       |
| 23000                            | 630          | 640       | 640       |
| 24000                            | 720          | 710       | 710       |
| 25000                            | 810          | 780       | 780       |
| 26000                            | 960          | 890       | 890       |
| 27000                            | 430          | 450       | 450       |
| 27600                            | 460          | 500       | 500       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

12-inch Gun, 1070-lb. A.P. Projectile, Stacked Charge

Firing Table 12-K-2

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 9            | 10        | 10        |
| 6000                             | 11           | 12        | 12        |
| 7000                             | 14           | 14        | 14        |
| 8000                             | 16           | 16        | 16        |
| 9000                             | 19           | 18        | 18        |
| 10000                            | 21           | 20        | 20        |
| 11000                            | 14           | 20        | 20        |
| 12000                            | 18           | 24        | 24        |
| 13000                            | 22           | 29        | 29        |
| 14000                            | 26           | 33        | 33        |
| 15000                            | 30           | 37        | 37        |
| 16000                            | 39           | 44        | 44        |
| 17000                            | 47           | 51        | 51        |
| 18000                            | 56           | 58        | 58        |
| 19000                            | 64           | 65        | 65        |
| 20000                            | 73           | 72        | 72        |
| 21000                            | 90           | 86        | 86        |
| 22000                            | 110          | 99        | 99        |
| 23000                            | 130          | 110       | 110       |
| 24000                            | 140          | 130       | 130       |
| 25000                            | 160          | 140       | 140       |
| 26000                            | 190          | 160       | 160       |
| 27000                            | 220          | 190       | 190       |
| 27600                            | 240          | 200       | 200       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 1070-lb. A.P. Projectile, Stacked Charge

Firing Table 12-K-2

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 16           | 16        | 16        |
| 6000                             | 20           | 19        | 19        |
| 7000                             | 24           | 23        | 23        |
| 8000                             | 27           | 26        | 26        |
| 9000                             | 31           | 30        | 30        |
| 10000                            | 35           | 33        | 33        |
| 11000                            | 24           | 34        | 34        |
| 12000                            | 31           | 41        | 41        |
| 13000                            | 37           | 48        | 48        |
| 14000                            | 44           | 54        | 54        |
| 15000                            | 50           | 61        | 61        |
| 16000                            | 64           | 73        | 73        |
| 17000                            | 78           | 85        | 85        |
| 18000                            | 92           | 96        | 96        |
| 19000                            | 110          | 110       | 110       |
| 20000                            | 120          | 120       | 120       |
| 21000                            | 150          | 140       | 140       |
| 22000                            | 180          | 160       | 160       |
| 23000                            | 210          | 190       | 190       |
| 24000                            | 240          | 210       | 210       |
| 25000                            | 270          | 230       | 230       |
| 26000                            | 330          | 260       | 260       |
| 27000                            | 360          | 370       | 310       |
| 27600                            | 390          | 380       | 330       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

12-inch Gun, 1070-lb. A.P. Projectile, Stacked Charge

Firing Table 12-K-2

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 25           | 52        | 26        |
| 6000                             | 29           | 59        | 30        |
| 7000                             | 32           | 65        | 34        |
| 8000                             | 36           | 72        | 39        |
| 9000                             | 39           | 78        | 43        |
| 10000                            | 43           | 85        | 47        |
| 11000                            | 67           | 99        | 99        |
| 12000                            | 80           | 120       | 120       |
| 13000                            | 94           | 140       | 140       |
| 14000                            | 110          | 160       | 160       |
| 15000                            | 120          | 180       | 180       |
| 16000                            | 150          | 210       | 210       |
| 17000                            | 180          | 240       | 240       |
| 18000                            | 220          | 260       | 260       |
| 19000                            | 250          | 290       | 290       |
| 20000                            | 280          | 320       | 320       |
| 21000                            | 350          | 380       | 380       |
| 22000                            | 410          | 430       | 430       |
| 23000                            | 480          | 490       | 490       |
| 24000                            | 540          | 540       | 540       |
| 25000                            | 610          | 600       | 600       |
| 26000                            | 710          | 680       | 680       |
| 27000                            | 320          | 350       | 350       |
| 27600                            | 350          | 370       | 370       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

12-inch Gun, 870-lb. A. P. Projectile

Firing Table 12-L-4

LIGHT CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 9            | 9         | 9         |
| 6000                             | 11           | 11        | 11        |
| 7000                             | 13           | 13        | 13        |
| 8000                             | 16           | 14        | 14        |
| 9000                             | 18           | 16        | 16        |
| 10000                            | 20           | 18        | 18        |
| 11000                            | 28           | 24        | 24        |
| 12000                            | 36           | 29        | 29        |
| 13000                            | 43           | 35        | 35        |
| 14000                            | 51           | 40        | 40        |
| 15000                            | 30           | 37        | 37        |
| 16000                            | 39           | 45        | 45        |
| 17000                            | 48           | 53        | 53        |
| 18000                            | 58           | 62        | 62        |
| 19000                            | 67           | 70        | 70        |
| 20000                            | 76           | 78        | 78        |
| 21000                            | 97           | 96        | 96        |
| 22000                            | 120          | 110       | 110       |
| 23000                            | 140          | 130       | 130       |
| 24000                            | 160          | 150       | 150       |
| 25000                            | 180          | 170       | 170       |
| 26000                            | 210          | 180       | 180       |
| 27000                            | 240          | 240       | 220       |
| 27500                            | 240          | 260       | 240       |

NOTE: There is no Zone of Immunity for this Damage Table.

## DAMAGE TABLE

12-inch Gun, 870-lb. A.P. Projectile

Firing Table 12-L-4

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 15           | 15        | 15        |
| 6000                             | 19           | 18        | 18        |
| 7000                             | 22           | 21        | 21        |
| 8000                             | 26           | 24        | 24        |
| 9000                             | 29           | 27        | 27        |
| 10000                            | 33           | 30        | 30        |
| 11000                            | 46           | 39        | 39        |
| 12000                            | 59           | 49        | 49        |
| 13000                            | 71           | 58        | 58        |
| 14000                            | 84           | 67        | 67        |
| 15000                            | 51           | 62        | 62        |
| 16000                            | 67           | 76        | 76        |
| 17000                            | 83           | 89        | 89        |
| 18000                            | 98           | 100       | 100       |
| 19000                            | 110          | 120       | 120       |
| 20000                            | 130          | 130       | 130       |
| 21000                            | 160          | 150       | 150       |
| 22000                            | 190          | 210       | 170       |
| 23000                            | 220          | 250       | 210       |
| 24000                            | 260          | 290       | 240       |
| 25000                            | 290          | 330       | 280       |
| 26000                            | 340          | 370       | 320       |
| 27000                            | 390          | 420       | 370       |
| 27500                            | 410          | 440       | 390       |

NOTE: There is no Zone of Immunity for this Damage Table.

## DAMAGE TABLE

12-inch Gun, 870-lb. A.P. Projectile

Firing Table 12-L-4

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 25           | 51        | 26        |
| 6000                             | 27           | 55        | 28        |
| 7000                             | 29           | 58        | 29        |
| 8000                             | 32           | 63        | 63        |
| 9000                             | 36           | 72        | 72        |
| 10000                            | 39           | 80        | 80        |
| 11000                            | 71           | 100       | 100       |
| 12000                            | 83           | 120       | 120       |
| 13000                            | 96           | 140       | 140       |
| 14000                            | 110          | 160       | 160       |
| 15000                            | 120          | 180       | 180       |
| 16000                            | 150          | 210       | 210       |
| 17000                            | 190          | 250       | 250       |
| 18000                            | 220          | 280       | 280       |
| 19000                            | 260          | 320       | 320       |
| 20000                            | 290          | 350       | 350       |
| 21000                            | 370          | 420       | 420       |
| 22000                            | 450          | 480       | 480       |
| 23000                            | 520          | 550       | 550       |
| 24000                            | 600          | 610       | 610       |
| 25000                            | 680          | 680       | 680       |
| 26000                            | 780          | 780       | 780       |
| 27000                            | 880          | 880       | 880       |
| 27500                            | 930          | 930       | 930       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

14-inch Gun, 1560-lb. A.P. Projectile

Firing Table 14-A-2

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 10           | 10        | 10        |
| 6000                             | 10           | 11        | 11        |
| 7000                             | 11           | 13        | 13        |
| 8000                             | 11           | 14        | 14        |
| 9000                             | 12           | 16        | 16        |
| 10000                            | 12           | 17        | 17        |
| 11000                            | 15           | 21        | 21        |
| 12000                            | 17           | 25        | 25        |
| 13000                            | 20           | 30        | 30        |
| 14000                            | 22           | 34        | 34        |
| 15000                            | 25           | 38        | 38        |
| 16000                            | 29           | 46        | 46        |
| 17000                            | 34           | 54        | 54        |
| 18000                            | 38           | 61        | 61        |
| 19000                            | 43           | 69        | 69        |
| 20000                            | 47           | 77        | 77        |
| 21000                            | 56           | 92        | 92        |
| 22000                            | 64           | 110       | 110       |
| 23000                            | 73           | 120       | 120       |
| 24000                            | 81           | 140       | 140       |
| 25000                            | 90           | 150       | 150       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

14-inch Gun, 1560-lb. A.P. Projectile

Firing Table 14-A-2

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 17           | 34        | 17        |
| 6000                             | 19           | 37        | 19        |
| 7000                             | 20           | 41        | 21        |
| 8000                             | 22           | 44        | 23        |
| 9000                             | 23           | 48        | 25        |
| 10000                            | 25           | 51        | 27        |
| 11000                            | 30           | 63        | 34        |
| 12000                            | 35           | 75        | 42        |
| 13000                            | 40           | 86        | 49        |
| 14000                            | 45           | 98        | 57        |
| 15000                            | 50           | 110       | 64        |
| 16000                            | 58           | 130       | 79        |
| 17000                            | 66           | 150       | 95        |
| 18000                            | 74           | 170       | 110       |
| 19000                            | 110          | 190       | 190       |
| 20000                            | 120          | 220       | 220       |
| 21000                            | 140          | 250       | 250       |
| 22000                            | 160          | 280       | 280       |
| 23000                            | 170          | 320       | 320       |
| 24000                            | 190          | 350       | 350       |
| 25000                            | 210          | 380       | 380       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

14-inch Gun, 1400-lb. A.P. Projectile

Firing Table 14-B-2

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 10           | 10        | 10        |
| 6000                             | 12           | 12        | 12        |
| 7000                             | 14           | 14        | 14        |
| 8000                             | 16           | 15        | 15        |
| 9000                             | 18           | 17        | 17        |
| 10000                            | 12           | 18        | 18        |
| 11000                            | 15           | 23        | 23        |
| 12000                            | 18           | 28        | 28        |
| 13000                            | 20           | 32        | 32        |
| 14000                            | 23           | 37        | 37        |
| 15000                            | 26           | 42        | 42        |
| 16000                            | 31           | 51        | 51        |
| 17000                            | 35           | 60        | 60        |
| 18000                            | 40           | 70        | 70        |
| 19000                            | 44           | 79        | 79        |
| 20000                            | 49           | 88        | 88        |
| 21000                            | 57           | 99        | 99        |
| 22000                            | 65           | 110       | 110       |
| 23000                            | 73           | 120       | 120       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

14-inch Gun, 1400-lb. A.P. Projectile

Firing Table 14-B-2

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 17           | 33        | 17        |
| 6000                             | 19           | 37        | 19        |
| 7000                             | 21           | 41        | 22        |
| 8000                             | 22           | 46        | 24        |
| 9000                             | 24           | 50        | 27        |
| 10000                            | 26           | 54        | 29        |
| 11000                            | 30           | 63        | 35        |
| 12000                            | 45           | 74        | 74        |
| 13000                            | 52           | 89        | 89        |
| 14000                            | 59           | 100       | 100       |
| 15000                            | 66           | 120       | 120       |
| 16000                            | 77           | 150       | 150       |
| 17000                            | 88           | 170       | 170       |
| 18000                            | 98           | 200       | 200       |
| 19000                            | 110          | 220       | 220       |
| 20000                            | 120          | 250       | 250       |
| 21000                            | 140          | 290       | 290       |
| 22000                            | 160          | 320       | 320       |
| 23000                            | 180          | 360       | 360       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

14-inch Gun, 1400-lb. A.P. Projectile

Firing Table 14-C-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 10           | 10        | 10        |
| 6000                             | 12           | 11        | 11        |
| 7000                             | 14           | 13        | 13        |
| 8000                             | 15           | 14        | 14        |
| 9000                             | 17           | 16        | 16        |
| 10000                            | 19           | 17        | 17        |
| 11000                            | 12           | 17        | 17        |
| 12000                            | 13           | 19        | 19        |
| 13000                            | 14           | 22        | 22        |
| 14000                            | 15           | 24        | 24        |
| 15000                            | 16           | 26        | 26        |
| 16000                            | 18           | 30        | 30        |
| 17000                            | 20           | 34        | 34        |
| 18000                            | 21           | 37        | 37        |
| 19000                            | 23           | 41        | 41        |
| 20000                            | 25           | 45        | 45        |
| 20200                            | 25           | 45        | 45        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

14-inch Gun, 1400-lb. A.P. Projectile

Firing Table 14-C-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 17           | 34        | 17        |
| 6000                             | 19           | 36        | 18        |
| 7000                             | 21           | 38        | 20        |
| 8000                             | 22           | 40        | 21        |
| 9000                             | 24           | 42        | 22        |
| 10000                            | 35           | 46        | 46        |
| 11000                            | 37           | 52        | 52        |
| 12000                            | 39           | 58        | 58        |
| 13000                            | 42           | 64        | 64        |
| 14000                            | 44           | 70        | 70        |
| 15000                            | 46           | 76        | 76        |
| 16000                            | 50           | 87        | 87        |
| 17000                            | 53           | 98        | 98        |
| 18000                            | 57           | 110       | 110       |
| 19000                            | 60           | 120       | 120       |
| 20000                            | 64           | 130       | 130       |
| 20200                            | 65           | 130       | 130       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

14-inch Gun, 1560-lb. A.P. Projectile

Firing Table 14-D-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 10           | 10        | 10        |
| 6000                             | 11           | 11        | 11        |
| 7000                             | 9            | 11        | 11        |
| 8000                             | 10           | 12        | 12        |
| 9000                             | 10           | 13        | 13        |
| 10000                            | 11           | 14        | 14        |
| 11000                            | 12           | 16        | 16        |
| 12000                            | 13           | 18        | 18        |
| 13000                            | 14           | 20        | 20        |
| 14000                            | 15           | 22        | 22        |
| 15000                            | 16           | 24        | 24        |
| 16000                            | 18           | 27        | 27        |
| 17000                            | 19           | 31        | 31        |
| 18000                            | 21           | 34        | 34        |
| 19000                            | 22           | 38        | 38        |
| 20000                            | 24           | 41        | 41        |
| 21000                            | 27           | 45        | 45        |
| 21500                            | 28           | 47        | 47        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

14-inch Gun, 1560-lb. A.P. Projectile

Firing Table 14-D-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 17           | 34        | 17        |
| 6000                             | 19           | 36        | 18        |
| 7000                             | 20           | 38        | 19        |
| 8000                             | 22           | 39        | 21        |
| 9000                             | 23           | 41        | 22        |
| 10000                            | 25           | 43        | 23        |
| 11000                            | 27           | 48        | 27        |
| 12000                            | 29           | 53        | 30        |
| 13000                            | 31           | 58        | 34        |
| 14000                            | 33           | 63        | 37        |
| 15000                            | 45           | 69        | 69        |
| 16000                            | 49           | 79        | 79        |
| 17000                            | 52           | 89        | 89        |
| 18000                            | 56           | 100       | 100       |
| 19000                            | 59           | 110       | 110       |
| 20000                            | 63           | 120       | 120       |
| 21000                            | 70           | 130       | 130       |
| 21500                            | 73           | 130       | 130       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

## DAMAGE TABLE

14-inch Gun, 1400-lb. A. P. Projectile

Firing Table 14-E-3

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 20           | 10        | 10        |
| 6000                             | 20           | 11        | 11        |
| 7000                             | 20           | 12        | 12        |
| 8000                             | 21           | 12        | 12        |
| 9000                             | 21           | 13        | 13        |
| 10000                            | 21           | 14        | 14        |
| 11000                            | 23           | 17        | 17        |
| 12000                            | 25           | 20        | 20        |
| 13000                            | 26           | 23        | 23        |
| 14000                            | 28           | 26        | 26        |
| 15000                            | 30           | 29        | 29        |
| 16000                            | 34           | 35        | 35        |
| 17000                            | 37           | 41        | 41        |
| 18000                            | 41           | 47        | 47        |
| 19000                            | 44           | 53        | 53        |
| 20000                            | 48           | 59        | 59        |
| 21000                            | 54           | 67        | 67        |
| 22000                            | 60           | 75        | 75        |
| 23000                            | 67           | 84        | 84        |
| 24000                            | 73           | 92        | 92        |
| 25000                            | 79           | 100       | 100       |
| 26000                            | 89           | 110       | 110       |
| 27000                            | 99           | 120       | 120       |
| 28000                            | 110          | 140       | 140       |
| 29000                            | 120          | 150       | 150       |
| 30000                            | 130          | 160       | 160       |
| 31000                            | 160          | 180       | 180       |
| 32000                            | 180          | 200       | 200       |
| 33000                            | 210          | 230       | 230       |
| 34000                            | 230          | 250       | 250       |
| 35000                            | 260          | 270       | 270       |
| 36000                            | 300          | 300       | 300       |
| 37000                            | 340          | 330       | 330       |
| 38000                            | 380          | 410       | 340       |
| 38800                            | 420          | 450       | 420       |

NOTE: There is no Zone of Immunity for this Damage Table.

## DAMAGE TABLE

14-inch Gun, 1400-lb. A. P. Projectile

Firing Table 14-E-3

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 23           | 33        | 17        |
| 6000                             | 25           | 35        | 18        |
| 7000                             | 27           | 37        | 19        |
| 8000                             | 28           | 40        | 21        |
| 9000                             | 30           | 42        | 22        |
| 10000                            | 32           | 44        | 23        |
| 11000                            | 36           | 52        | 28        |
| 12000                            | 41           | 60        | 33        |
| 13000                            | 45           | 68        | 39        |
| 14000                            | 50           | 76        | 44        |
| 15000                            | 54           | 84        | 49        |
| 16000                            | 62           | 97        | 58        |
| 17000                            | 69           | 110       | 67        |
| 18000                            | 96           | 130       | 130       |
| 19000                            | 100          | 150       | 150       |
| 20000                            | 110          | 160       | 160       |
| 21000                            | 120          | 180       | 180       |
| 22000                            | 140          | 210       | 210       |
| 23000                            | 150          | 230       | 230       |
| 24000                            | 170          | 260       | 260       |
| 25000                            | 180          | 280       | 280       |
| 26000                            | 200          | 310       | 310       |
| 27000                            | 220          | 340       | 340       |
| 28000                            | 250          | 380       | 380       |
| 29000                            | 270          | 410       | 410       |
| 30000                            | 290          | 440       | 440       |
| 31000                            | 340          | 510       | 510       |
| 32000                            | 160          | 260       | 260       |
| 33000                            | 180          | 280       | 280       |
| 34000                            | 210          | 310       | 310       |
| 35000                            | 230          | 330       | 330       |
| 36000                            | 270          | 360       | 360       |
| 37000                            | 310          | 390       | 390       |
| 38000                            | 350          | 420       | 420       |
| 38800                            | 380          | 440       | 440       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

**DAMAGE TABLE**  
**14-inch Gun, 1560-lb. A.P. Projectile**  
**Firing Table 14-G-2**  
**HEAVY CRUISER TARGET**

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 20           | 10        | 10        |
| 6000                             | 20           | 11        | 11        |
| 7000                             | 20           | 12        | 12        |
| 8000                             | 21           | 12        | 12        |
| 9000                             | 21           | 13        | 13        |
| 10000                            | 21           | 14        | 14        |
| 11000                            | 23           | 17        | 17        |
| 12000                            | 24           | 19        | 19        |
| 13000                            | 26           | 22        | 22        |
| 14000                            | 27           | 24        | 24        |
| 15000                            | 29           | 27        | 27        |
| 16000                            | 33           | 32        | 32        |
| 17000                            | 36           | 38        | 38        |
| 18000                            | 40           | 43        | 43        |
| 19000                            | 43           | 49        | 49        |
| 20000                            | 47           | 54        | 54        |
| 21000                            | 53           | 62        | 62        |
| 22000                            | 59           | 70        | 70        |
| 23000                            | 65           | 77        | 77        |
| 24000                            | 71           | 85        | 85        |
| 25000                            | 77           | 93        | 93        |
| 26000                            | 88           | 100       | 100       |
| 27000                            | 98           | 120       | 120       |
| 28000                            | 110          | 130       | 130       |
| 29000                            | 120          | 140       | 140       |
| 30000                            | 130          | 150       | 150       |
| 31000                            | 150          | 170       | 170       |
| 32000                            | 180          | 190       | 190       |
| 33000                            | 200          | 210       | 210       |
| 34000                            | 230          | 230       | 230       |
| 35000                            | 250          | 250       | 250       |
| 36000                            | 300          | 280       | 280       |
| 37000                            | 350          | 310       | 310       |
| 38000                            | 400          | 330       | 330       |
| 39000                            | 450          | 360       | 360       |
| 40000                            | 500          | 390       | 390       |
| 41000                            | 610          | 530       | 530       |
| 42000                            | 720          | 670       | 670       |
| 42279                            | 750          | 710       | 710       |

NOTE: There is no Zone of Immunity for this Damage Table.

**DAMAGE TABLE**  
**14-inch Gun, 1560-lb. A.P. Projectile**  
**Firing Table 14-G-2**  
**BATTLESHIP TARGET**

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 23           | 33        | 17        |
| 6000                             | 25           | 35        | 18        |
| 7000                             | 26           | 37        | 19        |
| 8000                             | 28           | 39        | 20        |
| 9000                             | 29           | 41        | 21        |
| 10000                            | 31           | 43        | 22        |
| 11000                            | 35           | 50        | 27        |
| 12000                            | 39           | 58        | 31        |
| 13000                            | 44           | 65        | 36        |
| 14000                            | 48           | 73        | 40        |
| 15000                            | 52           | 80        | 45        |
| 16000                            | 59           | 94        | 55        |
| 17000                            | 66           | 110       | 65        |
| 18000                            | 74           | 120       | 74        |
| 19000                            | 81           | 140       | 84        |
| 20000                            | 88           | 150       | 94        |
| 21000                            | 99           | 170       | 110       |
| 22000                            | 110          | 190       | 120       |
| 23000                            | 120          | 210       | 140       |
| 24000                            | 160          | 240       | 240       |
| 25000                            | 180          | 260       | 260       |
| 26000                            | 200          | 290       | 290       |
| 27000                            | 220          | 320       | 320       |
| 28000                            | 240          | 350       | 350       |
| 29000                            | 260          | 380       | 380       |
| 30000                            | 280          | 410       | 410       |
| 31000                            | 330          | 460       | 460       |
| 32000                            | 380          | 500       | 500       |
| 33000                            | 430          | 550       | 550       |
| 34000                            | 480          | 600       | 600       |
| 35000                            | 530          | 650       | 650       |
| 36000                            | 270          | 350       | 350       |
| 37000                            | 310          | 390       | 390       |
| 38000                            | 350          | 430       | 430       |
| 39000                            | 390          | 460       | 460       |
| 40000                            | 430          | 500       | 500       |
| 41000                            | 520          | 590       | 590       |
| 42000                            | 610          | 680       | 680       |
| 42279                            | 640          | 710       | 710       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 1

Firing Table 16-A-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 16           | 11        | 11        |
| 6000                             | 19           | 14        | 14        |
| 7000                             | 9            | 13        | 13        |
| 8000                             | 10           | 15        | 15        |
| 9000                             | 11           | 17        | 17        |
| 10000                            | 12           | 19        | 19        |
| 11000                            | 13           | 21        | 21        |
| 12000                            | 14           | 23        | 23        |
| 13000                            | 16           | 32        | 26        |
| 14000                            | 17           | 34        | 29        |
| 14450                            | 18           | 35        | 30        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 1

Firing Table 16-A-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 27           | 31        | 31        |
| 6000                             | 29           | 36        | 36        |
| 7000                             | 30           | 41        | 41        |
| 8000                             | 32           | 45        | 45        |
| 9000                             | 33           | 50        | 50        |
| 10000                            | 35           | 55        | 55        |
| 11000                            | 37           | 61        | 61        |
| 12000                            | 40           | 68        | 68        |
| 13000                            | 42           | 74        | 74        |
| 14000                            | 18           | 38        | 38        |
| 14450                            | 18           | 39        | 39        |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 2

Firing Table 16-A-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 14           | 10        | 10        |
| 6000                             | 17           | 12        | 12        |
| 7000                             | 19           | 14        | 14        |
| 8000                             | 11           | 13        | 13        |
| 9000                             | 12           | 15        | 15        |
| 10000                            | 12           | 16        | 16        |
| 11000                            | 13           | 18        | 18        |
| 12000                            | 14           | 20        | 20        |
| 13000                            | 15           | 21        | 21        |
| 14000                            | 16           | 23        | 23        |
| 15000                            | 17           | 25        | 25        |
| 16000                            | 19           | 28        | 28        |
| 17000                            | 19           | 35        | 30        |
| 17540                            | 21           | 37        | 32        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 2

Firing Table 16-A-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 27           | 29        | 29        |
| 6000                             | 28           | 33        | 33        |
| 7000                             | 30           | 37        | 37        |
| 8000                             | 31           | 40        | 40        |
| 9000                             | 33           | 44        | 44        |
| 10000                            | 34           | 48        | 48        |
| 11000                            | 36           | 53        | 53        |
| 12000                            | 38           | 58        | 58        |
| 13000                            | 41           | 62        | 62        |
| 14000                            | 43           | 67        | 67        |
| 15000                            | 45           | 72        | 72        |
| 16000                            | 49           | 78        | 78        |
| 17000                            | 19           | 39        | 39        |
| 17540                            | 20           | 40        | 40        |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 3

Firing Table 16-A-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 13           | 9         | 9         |
| 6000                             | 15           | 11        | 11        |
| 7000                             | 17           | 12        | 12        |
| 8000                             | 11           | 12        | 12        |
| 9000                             | 12           | 13        | 13        |
| 10000                            | 12           | 14        | 14        |
| 11000                            | 13           | 16        | 16        |
| 12000                            | 14           | 18        | 18        |
| 13000                            | 15           | 19        | 19        |
| 14000                            | 16           | 21        | 21        |
| 15000                            | 17           | 23        | 23        |
| 16000                            | 18           | 25        | 25        |
| 17000                            | 19           | 26        | 26        |
| 18000                            | 20           | 28        | 28        |
| 19000                            | 21           | 29        | 29        |
| 20000                            | 22           | 31        | 31        |
| 20960                            | 23           | 38        | 33        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 3

Firing Table 16-A-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 16           | 28        | 14        |
| 6000                             | 29           | 30        | 30        |
| 7000                             | 30           | 33        | 33        |
| 8000                             | 32           | 36        | 36        |
| 9000                             | 33           | 39        | 39        |
| 10000                            | 34           | 42        | 42        |
| 11000                            | 36           | 47        | 47        |
| 12000                            | 38           | 51        | 51        |
| 13000                            | 41           | 56        | 56        |
| 14000                            | 43           | 60        | 60        |
| 15000                            | 45           | 65        | 65        |
| 16000                            | 48           | 69        | 69        |
| 17000                            | 50           | 73        | 73        |
| 18000                            | 53           | 76        | 76        |
| 19000                            | 55           | 80        | 80        |
| 20000                            | 22           | 40        | 40        |
| 20960                            | 23           | 41        | 41        |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 4

Firing Table 16-A-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 11           | 8         | 8         |
| 6000                             | 14           | 9         | 9         |
| 7000                             | 10           | 10        | 10        |
| 8000                             | 11           | 11        | 11        |
| 9000                             | 11           | 12        | 12        |
| 10000                            | 12           | 13        | 13        |
| 11000                            | 13           | 14        | 14        |
| 12000                            | 14           | 16        | 16        |
| 13000                            | 15           | 17        | 17        |
| 14000                            | 16           | 19        | 19        |
| 15000                            | 17           | 20        | 20        |
| 16000                            | 18           | 21        | 21        |
| 17000                            | 19           | 23        | 23        |
| 18000                            | 20           | 24        | 24        |
| 19000                            | 21           | 26        | 26        |
| 20000                            | 22           | 27        | 27        |
| 21000                            | 23           | 29        | 29        |
| 22000                            | 24           | 31        | 31        |
| 23000                            | 25           | 32        | 32        |
| 24000                            | 26           | 34        | 34        |
| 24540                            | 27           | 35        | 35        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Howitzer, 2100-lb. A.P. Projectile, Zone 4

Firing Table 16-A-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 5000                             | 15           | 27        | 14        |
| 6000                             | 18           | 29        | 16        |
| 7000                             | 20           | 32        | 17        |
| 8000                             | 23           | 34        | 19        |
| 9000                             | 25           | 36        | 20        |
| 10000                            | 34           | 38        | 38        |
| 11000                            | 36           | 42        | 42        |
| 12000                            | 38           | 45        | 45        |
| 13000                            | 40           | 49        | 49        |
| 14000                            | 42           | 52        | 52        |
| 15000                            | 44           | 56        | 56        |
| 16000                            | 46           | 60        | 60        |
| 17000                            | 48           | 64        | 64        |
| 18000                            | 51           | 68        | 68        |
| 19000                            | 53           | 72        | 72        |
| 20000                            | 55           | 76        | 76        |
| 21000                            | 59           | 79        | 79        |
| 22000                            | 23           | 39        | 39        |
| 23000                            | 24           | 40        | 40        |
| 24000                            | 25           | 42        | 42        |
| 24540                            | 26           | 43        | 43        |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, 3/4 Charge

Firing Table 16-B-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 7            | 11        | 11        |
| 11000                            | 8            | 13        | 13        |
| 12000                            | 9            | 15        | 15        |
| 13000                            | 10           | 16        | 16        |
| 14000                            | 11           | 18        | 18        |
| 15000                            | 12           | 20        | 20        |
| 16000                            | 13           | 23        | 23        |
| 17000                            | 15           | 26        | 26        |
| 18000                            | 16           | 29        | 29        |
| 19000                            | 18           | 32        | 32        |
| 20000                            | 19           | 35        | 35        |
| 21000                            | 21           | 39        | 39        |
| 22000                            | 24           | 44        | 44        |
| 23000                            | 26           | 48        | 48        |
| 24000                            | 29           | 53        | 53        |
| 25000                            | 31           | 57        | 57        |
| 26000                            | 35           | 63        | 63        |
| 27000                            | 40           | 68        | 68        |
| 28000                            | 44           | 74        | 74        |
| 29000                            | 49           | 80        | 80        |
| 29570                            | 51           | 83        | 83        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, 3/4 Charge

Firing Table 16-B-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 18           | 34        | 18        |
| 11000                            | 20           | 39        | 21        |
| 12000                            | 22           | 43        | 25        |
| 13000                            | 23           | 48        | 28        |
| 14000                            | 25           | 52        | 31        |
| 15000                            | 33           | 58        | 38        |
| 16000                            | 36           | 66        | 66        |
| 17000                            | 39           | 74        | 74        |
| 18000                            | 42           | 83        | 83        |
| 19000                            | 45           | 91        | 91        |
| 20000                            | 48           | 99        | 99        |
| 21000                            | 54           | 110       | 110       |
| 22000                            | 60           | 120       | 120       |
| 23000                            | 65           | 140       | 140       |
| 24000                            | 71           | 150       | 150       |
| 25000                            | 77           | 160       | 160       |
| 26000                            | 32           | 83        | 83        |
| 27000                            | 36           | 91        | 91        |
| 28000                            | 41           | 98        | 98        |
| 29000                            | 45           | 110       | 110       |
| 29570                            | 48           | 110       | 110       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, 7/8 Charge

Firing Table 16-B-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 7            | 10        | 10        |
| 11000                            | 8            | 11        | 11        |
| 12000                            | 9            | 13        | 13        |
| 13000                            | 9            | 14        | 14        |
| 14000                            | 10           | 16        | 16        |
| 15000                            | 11           | 17        | 17        |
| 16000                            | 12           | 20        | 20        |
| 17000                            | 14           | 22        | 22        |
| 18000                            | 15           | 25        | 25        |
| 19000                            | 17           | 27        | 27        |
| 20000                            | 18           | 30        | 30        |
| 21000                            | 20           | 34        | 34        |
| 22000                            | 23           | 37        | 37        |
| 23000                            | 25           | 41        | 41        |
| 24000                            | 28           | 44        | 44        |
| 25000                            | 30           | 48        | 48        |
| 26000                            | 34           | 53        | 53        |
| 27000                            | 38           | 58        | 58        |
| 28000                            | 43           | 62        | 62        |
| 29000                            | 47           | 67        | 67        |
| 30000                            | 51           | 72        | 72        |
| 31000                            | 60           | 82        | 82        |
| 32000                            | 68           | 91        | 91        |
| 33000                            | 77           | 100       | 100       |
| 34000                            | 85           | 110       | 110       |
| 35000                            | 94           | 120       | 120       |
| 35910                            | 100          | 130       | 130       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, 7/8 Charge

Firing Table 16-B-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 16           | 31        | 16        |
| 11000                            | 18           | 35        | 19        |
| 12000                            | 20           | 39        | 21        |
| 13000                            | 21           | 42        | 24        |
| 14000                            | 23           | 46        | 26        |
| 15000                            | 25           | 50        | 29        |
| 16000                            | 28           | 57        | 34        |
| 17000                            | 31           | 63        | 39        |
| 18000                            | 34           | 70        | 43        |
| 19000                            | 37           | 76        | 48        |
| 20000                            | 47           | 85        | 85        |
| 21000                            | 52           | 96        | 96        |
| 22000                            | 58           | 110       | 110       |
| 23000                            | 63           | 120       | 120       |
| 24000                            | 69           | 130       | 130       |
| 25000                            | 74           | 140       | 140       |
| 26000                            | 82           | 150       | 150       |
| 27000                            | 90           | 170       | 170       |
| 28000                            | 98           | 180       | 180       |
| 29000                            | 43           | 91        | 91        |
| 30000                            | 48           | 100       | 100       |
| 31000                            | 55           | 110       | 110       |
| 32000                            | 62           | 120       | 120       |
| 33000                            | 69           | 120       | 120       |
| 34000                            | 76           | 130       | 130       |
| 35000                            | 83           | 140       | 140       |
| 35910                            | 90           | 140       | 140       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, Full Charge

Firing Table 16-B-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 8            | 9         | 9         |
| 11000                            | 9            | 10        | 10        |
| 12000                            | 9            | 11        | 11        |
| 13000                            | 10           | 13        | 13        |
| 14000                            | 10           | 14        | 14        |
| 15000                            | 11           | 15        | 15        |
| 16000                            | 12           | 17        | 17        |
| 17000                            | 13           | 19        | 19        |
| 18000                            | 15           | 21        | 21        |
| 19000                            | 16           | 23        | 23        |
| 20000                            | 17           | 25        | 25        |
| 21000                            | 19           | 28        | 28        |
| 22000                            | 22           | 31        | 31        |
| 23000                            | 24           | 35        | 35        |
| 24000                            | 27           | 38        | 38        |
| 25000                            | 29           | 41        | 41        |
| 26000                            | 33           | 45        | 45        |
| 27000                            | 37           | 50        | 50        |
| 28000                            | 41           | 54        | 54        |
| 29000                            | 45           | 59        | 59        |
| 30000                            | 49           | 63        | 63        |
| 31000                            | 57           | 69        | 69        |
| 32000                            | 65           | 76        | 76        |
| 33000                            | 74           | 82        | 82        |
| 34000                            | 82           | 89        | 89        |
| 35000                            | 90           | 95        | 95        |
| 36000                            | 100          | 100       | 100       |
| 37000                            | 110          | 110       | 110       |
| 38000                            | 130          | 120       | 120       |
| 39000                            | 140          | 130       | 130       |
| 40000                            | 150          | 140       | 140       |
| 41000                            | 180          | 170       | 170       |
| 42000                            | 210          | 200       | 200       |
| 43000                            | 250          | 220       | 220       |
| 44000                            | 280          | 250       | 250       |
| 44680                            | 300          | 270       | 270       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, Full Charge

Firing Table 16-B-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 15           | 29        | 15        |
| 11000                            | 17           | 32        | 17        |
| 12000                            | 18           | 35        | 19        |
| 13000                            | 20           | 37        | 20        |
| 14000                            | 21           | 40        | 22        |
| 15000                            | 23           | 43        | 24        |
| 16000                            | 26           | 49        | 28        |
| 17000                            | 28           | 55        | 32        |
| 18000                            | 31           | 61        | 36        |
| 19000                            | 33           | 67        | 40        |
| 20000                            | 36           | 73        | 44        |
| 21000                            | 41           | 82        | 50        |
| 22000                            | 46           | 92        | 56        |
| 23000                            | 50           | 100       | 63        |
| 24000                            | 55           | 110       | 69        |
| 25000                            | 60           | 120       | 75        |
| 26000                            | 75           | 130       | 130       |
| 27000                            | 86           | 140       | 140       |
| 28000                            | 98           | 150       | 150       |
| 29000                            | 110          | 160       | 160       |
| 30000                            | 120          | 170       | 170       |
| 31000                            | 130          | 190       | 190       |
| 32000                            | 57           | 110       | 110       |
| 33000                            | 65           | 120       | 120       |
| 34000                            | 73           | 120       | 120       |
| 35000                            | 81           | 130       | 130       |
| 36000                            | 93           | 140       | 140       |
| 37000                            | 100          | 150       | 150       |
| 38000                            | 120          | 150       | 150       |
| 39000                            | 130          | 160       | 160       |
| 40000                            | 140          | 170       | 170       |
| 41000                            | 170          | 200       | 200       |
| 42000                            | 200          | 220       | 220       |
| 43000                            | 220          | 250       | 250       |
| 44000                            | 250          | 270       | 270       |
| 44680                            | 270          | 290       | 290       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2340-lb. A.P. Projectile, 3/4 Charge

Firing Table 16-C-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 7            | 11        | 11        |
| 11000                            | 8            | 13        | 13        |
| 12000                            | 9            | 14        | 14        |
| 13000                            | 10           | 16        | 16        |
| 14000                            | 11           | 17        | 17        |
| 15000                            | 12           | 19        | 19        |
| 16000                            | 13           | 22        | 22        |
| 17000                            | 14           | 25        | 25        |
| 18000                            | 16           | 27        | 27        |
| 19000                            | 17           | 30        | 30        |
| 20000                            | 18           | 33        | 33        |
| 21000                            | 21           | 36        | 36        |
| 22000                            | 23           | 40        | 40        |
| 23000                            | 26           | 43        | 43        |
| 24000                            | 28           | 47        | 47        |
| 25000                            | 31           | 50        | 50        |
| 26000                            | 35           | 55        | 55        |
| 27000                            | 39           | 61        | 61        |
| 28000                            | 43           | 66        | 66        |
| 29000                            | 47           | 72        | 72        |
| 30000                            | 51           | 77        | 77        |
| 31000                            | 59           | 85        | 85        |
| 32000                            | 66           | 93        | 93        |
| 32400                            | 69           | 96        | 96        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Gun, 2340-lb. A.P. Projectile, 3/4 Charge

Firing Table 16-C-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 18           | 33        | 18        |
| 11000                            | 20           | 38        | 21        |
| 12000                            | 22           | 42        | 24        |
| 13000                            | 23           | 47        | 27        |
| 14000                            | 25           | 51        | 30        |
| 15000                            | 27           | 56        | 33        |
| 16000                            | 30           | 63        | 38        |
| 17000                            | 33           | 70        | 43        |
| 18000                            | 35           | 76        | 48        |
| 19000                            | 38           | 83        | 53        |
| 20000                            | 48           | 94        | 94        |
| 21000                            | 53           | 110       | 110       |
| 22000                            | 58           | 120       | 120       |
| 23000                            | 62           | 130       | 130       |
| 24000                            | 67           | 140       | 140       |
| 25000                            | 70           | 74        | 74        |
| 26000                            | 34           | 79        | 79        |
| 27000                            | 37           | 84        | 84        |
| 28000                            | 41           | 90        | 90        |
| 29000                            | 44           | 95        | 95        |
| 30000                            | 48           | 100       | 100       |
| 31000                            | 54           | 110       | 110       |
| 32000                            | 61           | 120       | 120       |
| 32400                            | 63           | 120       | 120       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2340-lb. A.P. Projectile, 7/8 Charge

Firing Table 16-C-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 7            | 10        | 10        |
| 11000                            | 8            | 11        | 11        |
| 12000                            | 9            | 12        | 12        |
| 13000                            | 9            | 14        | 14        |
| 14000                            | 10           | 15        | 15        |
| 15000                            | 11           | 16        | 16        |
| 16000                            | 12           | 18        | 18        |
| 17000                            | 14           | 21        | 21        |
| 18000                            | 15           | 23        | 23        |
| 19000                            | 17           | 26        | 26        |
| 20000                            | 18           | 28        | 28        |
| 21000                            | 20           | 31        | 31        |
| 22000                            | 23           | 34        | 34        |
| 23000                            | 25           | 38        | 38        |
| 24000                            | 28           | 41        | 41        |
| 25000                            | 30           | 44        | 44        |
| 26000                            | 34           | 48        | 48        |
| 27000                            | 38           | 53        | 53        |
| 28000                            | 42           | 57        | 57        |
| 29000                            | 46           | 62        | 62        |
| 30000                            | 50           | 66        | 66        |
| 31000                            | 58           | 72        | 72        |
| 32000                            | 66           | 77        | 77        |
| 33000                            | 75           | 83        | 83        |
| 34000                            | 83           | 88        | 88        |
| 35000                            | 91           | 94        | 94        |
| 36000                            | 100          | 110       | 110       |
| 37000                            | 120          | 120       | 120       |
| 38000                            | 130          | 130       | 130       |
| 39000                            | 150          | 150       | 150       |
| 39260                            | 150          | 150       | 150       |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Gun, 2340-lb. A.P. Projectile, 7/8 Charge

Firing Table 16-C-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 16           | 31        | 16        |
| 11000                            | 18           | 34        | 18        |
| 12000                            | 20           | 38        | 20        |
| 13000                            | 21           | 41        | 23        |
| 14000                            | 23           | 45        | 25        |
| 15000                            | 25           | 48        | 27        |
| 16000                            | 28           | 54        | 31        |
| 17000                            | 30           | 60        | 36        |
| 18000                            | 33           | 67        | 40        |
| 19000                            | 35           | 73        | 45        |
| 20000                            | 38           | 79        | 49        |
| 21000                            | 43           | 89        | 56        |
| 22000                            | 48           | 99        | 63        |
| 23000                            | 53           | 110       | 70        |
| 24000                            | 58           | 120       | 77        |
| 25000                            | 63           | 130       | 84        |
| 26000                            | 66           | 140       | 90        |
| 27000                            | 86           | 150       | 130       |
| 28000                            | 39           | 83        | 83        |
| 29000                            | 44           | 89        | 89        |
| 30000                            | 48           | 94        | 94        |
| 31000                            | 55           | 100       | 100       |
| 32000                            | 61           | 110       | 110       |
| 33000                            | 68           | 120       | 120       |
| 34000                            | 74           | 120       | 120       |
| 35000                            | 81           | 130       | 130       |
| 36000                            | 93           | 140       | 140       |
| 37000                            | 100          | 150       | 150       |
| 38000                            | 120          | 160       | 160       |
| 39000                            | 130          | 170       | 170       |
| 39260                            | 130          | 170       | 170       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

## DAMAGE TABLE

16-inch Gun, 2340-lb. A.P. Projectile, Full Charge

Firing Table 16-C-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 8            | 9         | 9         |
| 11000                            | 9            | 10        | 10        |
| 12000                            | 9            | 11        | 11        |
| 13000                            | 10           | 12        | 12        |
| 14000                            | 10           | 13        | 13        |
| 15000                            | 11           | 14        | 14        |
| 16000                            | 12           | 16        | 16        |
| 17000                            | 13           | 18        | 18        |
| 18000                            | 15           | 20        | 20        |
| 19000                            | 16           | 22        | 22        |
| 20000                            | 17           | 24        | 24        |
| 21000                            | 19           | 27        | 27        |
| 22000                            | 22           | 30        | 30        |
| 23000                            | 24           | 32        | 32        |
| 24000                            | 27           | 35        | 35        |
| 25000                            | 29           | 38        | 38        |
| 26000                            | 33           | 42        | 42        |
| 27000                            | 37           | 46        | 46        |
| 28000                            | 40           | 50        | 50        |
| 29000                            | 44           | 54        | 54        |
| 30000                            | 48           | 58        | 58        |
| 31000                            | 56           | 64        | 64        |
| 32000                            | 64           | 70        | 70        |
| 33000                            | 72           | 75        | 75        |
| 34000                            | 80           | 81        | 81        |
| 35000                            | 88           | 87        | 87        |
| 36000                            | 100          | 96        | 96        |
| 37000                            | 110          | 110       | 110       |
| 38000                            | 130          | 120       | 120       |
| 39000                            | 140          | 130       | 130       |
| 40000                            | 150          | 140       | 140       |
| 41000                            | 170          | 160       | 160       |
| 42000                            | 200          | 180       | 180       |
| 43000                            | 220          | 190       | 190       |
| 44000                            | 250          | 210       | 210       |
| 45000                            | 270          | 230       | 230       |
| 46000                            | 300          | 250       | 250       |
| 47000                            | 340          | 280       | 280       |
| 48000                            | 370          | 300       | 300       |
| 49000                            | 410          | 330       | 330       |
| 49140                            | 410          | 330       | 330       |

NOTE: There is no Zone of Immunity for this Damage Table.

## DAMAGE TABLE

16-inch Gun, 2340-lb. A.P. Projectile, Full Charge

Firing Table 16-C-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 15           | 29        | 15        |
| 11000                            | 17           | 32        | 17        |
| 12000                            | 18           | 34        | 18        |
| 13000                            | 20           | 37        | 20        |
| 14000                            | 21           | 39        | 21        |
| 15000                            | 23           | 42        | 23        |
| 16000                            | 25           | 47        | 27        |
| 17000                            | 28           | 52        | 30        |
| 18000                            | 30           | 58        | 34        |
| 19000                            | 33           | 63        | 37        |
| 20000                            | 35           | 68        | 41        |
| 21000                            | 40           | 76        | 46        |
| 22000                            | 44           | 85        | 52        |
| 23000                            | 49           | 93        | 57        |
| 24000                            | 53           | 100       | 63        |
| 25000                            | 58           | 110       | 68        |
| 26000                            | 66           | 120       | 76        |
| 27000                            | 74           | 130       | 85        |
| 28000                            | 81           | 140       | 93        |
| 29000                            | 89           | 150       | 100       |
| 30000                            | 97           | 160       | 110       |
| 31000                            | 49           | 93        | 74        |
| 32000                            | 56           | 100       | 80        |
| 33000                            | 63           | 110       | 86        |
| 34000                            | 70           | 110       | 91        |
| 35000                            | 77           | 120       | 97        |
| 36000                            | 83           | 130       | 100       |
| 37000                            | 98           | 130       | 130       |
| 38000                            | 110          | 140       | 140       |
| 39000                            | 120          | 160       | 160       |
| 40000                            | 130          | 170       | 170       |
| 41000                            | 150          | 190       | 190       |
| 42000                            | 170          | 200       | 200       |
| 43000                            | 200          | 220       | 220       |
| 44000                            | 220          | 230       | 230       |
| 45000                            | 240          | 250       | 250       |
| 46000                            | 270          | 280       | 280       |
| 47000                            | 300          | 310       | 310       |
| 48000                            | 330          | 340       | 340       |
| 49000                            | 370          | 370       | 370       |
| 49140                            | 370          | 370       | 370       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, 2/3 Charge

Firing Table 16-D-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 7            | 13        | 13        |
| 11000                            | 8            | 15        | 15        |
| 12000                            | 9            | 17        | 17        |
| 13000                            | 10           | 20        | 20        |
| 14000                            | 11           | 22        | 22        |
| 15000                            | 12           | 24        | 24        |
| 16000                            | 13           | 28        | 28        |
| 17000                            | 15           | 31        | 31        |
| 18000                            | 16           | 35        | 35        |
| 19000                            | 18           | 38        | 38        |
| 20000                            | 19           | 42        | 42        |
| 21000                            | 22           | 47        | 47        |
| 22000                            | 25           | 53        | 53        |
| 23000                            | 28           | 58        | 58        |
| 24000                            | 30           | 63        | 63        |
| 24530                            | 32           | 66        | 66        |

NOTE: There is no Zone of Immunity for this Damage Table.

DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, 2/3 Charge

Firing Table 16-D-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 26           | 39        | 39        |
| 11000                            | 28           | 45        | 45        |
| 12000                            | 30           | 51        | 51        |
| 13000                            | 31           | 58        | 58        |
| 14000                            | 33           | 64        | 64        |
| 15000                            | 35           | 70        | 70        |
| 16000                            | 38           | 80        | 80        |
| 17000                            | 41           | 90        | 90        |
| 18000                            | 44           | 100       | 100       |
| 19000                            | 47           | 110       | 110       |
| 20000                            | 50           | 120       | 120       |
| 21000                            | 57           | 130       | 130       |
| 22000                            | 24           | 68        | 68        |
| 23000                            | 26           | 72        | 72        |
| 24000                            | 29           | 77        | 77        |
| 24530                            | 30           | 79        | 79        |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

## DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, Full Charge

Firing Table 16-D-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 8            | 9         | 9         |
| 11000                            | 9            | 10        | 10        |
| 12000                            | 9            | 11        | 11        |
| 13000                            | 10           | 13        | 13        |
| 14000                            | 10           | 14        | 14        |
| 15000                            | 11           | 15        | 15        |
| 16000                            | 12           | 17        | 17        |
| 17000                            | 13           | 19        | 19        |
| 18000                            | 15           | 21        | 21        |
| 19000                            | 16           | 23        | 23        |
| 20000                            | 17           | 25        | 25        |
| 21000                            | 19           | 28        | 28        |
| 22000                            | 22           | 31        | 31        |
| 23000                            | 24           | 33        | 35        |
| 24000                            | 27           | 38        | 38        |
| 25000                            | 29           | 41        | 41        |
| 26000                            | 33           | 45        | 45        |
| 27000                            | 37           | 50        | 50        |
| 28000                            | 41           | 54        | 54        |
| 29000                            | 45           | 59        | 59        |
| 30000                            | 49           | 63        | 63        |
| 31000                            | 57           | 69        | 69        |
| 32000                            | 65           | 76        | 76        |
| 33000                            | 74           | 82        | 82        |
| 34000                            | 82           | 89        | 89        |
| 35000                            | 90           | 95        | 95        |
| 36000                            | 100          | 100       | 100       |
| 37000                            | 110          | 110       | 110       |
| 38000                            | 130          | 120       | 120       |
| 39000                            | 140          | 130       | 130       |
| 40000                            | 150          | 140       | 140       |
| 41000                            | 180          | 170       | 170       |
| 42000                            | 210          | 200       | 200       |
| 43000                            | 250          | 220       | 220       |
| 44000                            | 280          | 250       | 250       |
| 44680                            | 300          | 270       | 270       |

NOTE: There is no Zone of Immunity for this Damage Table.

## DAMAGE TABLE

16-inch Gun, 2100-lb. A.P. Projectile, Full Charge

Firing Table 16-D-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 15           | 29        | 15        |
| 11000                            | 17           | 32        | 17        |
| 12000                            | 18           | 35        | 19        |
| 13000                            | 20           | 37        | 20        |
| 14000                            | 21           | 40        | 22        |
| 15000                            | 23           | 43        | 24        |
| 16000                            | 26           | 49        | 28        |
| 17000                            | 28           | 55        | 32        |
| 18000                            | 31           | 61        | 36        |
| 19000                            | 33           | 67        | 40        |
| 20000                            | 36           | 73        | 44        |
| 21000                            | 41           | 82        | 50        |
| 22000                            | 46           | 92        | 56        |
| 23000                            | 50           | 100       | 63        |
| 24000                            | 55           | 110       | 69        |
| 25000                            | 60           | 120       | 75        |
| 26000                            | 75           | 130       | 130       |
| 27000                            | 86           | 140       | 140       |
| 28000                            | 98           | 150       | 150       |
| 29000                            | 110          | 160       | 160       |
| 30000                            | 120          | 170       | 170       |
| 31000                            | 130          | 190       | 190       |
| 32000                            | 57           | 110       | 110       |
| 33000                            | 65           | 120       | 120       |
| 34000                            | 73           | 130       | 130       |
| 35000                            | 81           | 130       | 130       |
| 36000                            | 93           | 140       | 140       |
| 37000                            | 100          | 150       | 150       |
| 38000                            | 120          | 150       | 150       |
| 39000                            | 130          | 160       | 160       |
| 40000                            | 140          | 170       | 170       |
| 41000                            | 170          | 200       | 200       |
| 42000                            | 200          | 220       | 220       |
| 43000                            | 220          | 250       | 250       |
| 44000                            | 250          | 270       | 270       |
| 44680                            | 270          | 290       | 290       |

NOTE: The area enclosed by the broken lines is the Zone of Immunity.

DAMAGE TABLE

16-inch Gun, 2240-lb. A.P. Projectile, 2/3 Charge

Firing Table 16-E-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 6            | 10        | 10        |
| 11000                            | 6            | 12        | 12        |
| 12000                            | 7            | 14        | 14        |
| 13000                            | 7            | 15        | 15        |
| 14000                            | 8            | 17        | 17        |
| 15000                            | 8            | 19        | 19        |
| 16000                            | 9            | 22        | 22        |
| 17000                            | 9            | 26        | 26        |
| 18000                            | 10           | 29        | 29        |
| 19000                            | 10           | 33        | 33        |
| 20000                            | 11           | 36        | 36        |
| 21000                            | 11           | 38        | 38        |
| 22000                            | 11           | 41        | 41        |
| 23000                            | 11           | 43        | 43        |
| 24000                            | 11           | 46        | 46        |
| 24910                            | 11           | 48        | 48        |

NOTES: There is no Zone of Immunity for this Damage Table.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

16-inch Gun, 2240-lb. A.P. Projectile, 2/3 Charge

Firing Table 16-E-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 21           | 31        | 17        |
| 11000                            | 21           | 35        | 20        |
| 12000                            | 26           | 39        | 39        |
| 13000                            | 27           | 45        | 45        |
| 14000                            | 27           | 50        | 50        |
| 15000                            | 28           | 56        | 56        |
| 16000                            | 30           | 65        | 65        |
| 17000                            | 31           | 74        | 74        |
| 18000                            | 33           | 82        | 82        |
| 19000                            | 34           | 91        | 91        |
| 20000                            | 36           | 100       | 100       |
| 21000                            | 15           | 43        | 43        |
| 22000                            | 15           | 47        | 47        |
| 23000                            | 15           | 52        | 52        |
| 24000                            | 15           | 56        | 56        |
| 24910                            | 15           | 60        | 60        |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

16-inch Gun, 2240-lb. A.P. Projectile, Full Charge

Firing Table 16-E-1

HEAVY CRUISER TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 7            | 8         | 8         |
| 11000                            | 7            | 8         | 8         |
| 12000                            | 7            | 9         | 9         |
| 13000                            | 7            | 9         | 9         |
| 14000                            | 7            | 10        | 10        |
| 15000                            | 7            | 10        | 10        |
| 16000                            | 7            | 11        | 11        |
| 17000                            | 8            | 12        | 12        |
| 18000                            | 8            | 14        | 14        |
| 19000                            | 9            | 15        | 15        |
| 20000                            | 9            | 16        | 16        |
| 21000                            | 10           | 18        | 18        |
| 22000                            | 10           | 20        | 20        |
| 23000                            | 11           | 21        | 21        |
| 24000                            | 11           | 23        | 23        |
| 25000                            | 12           | 25        | 25        |
| 26000                            | 13           | 27        | 27        |
| 27000                            | 14           | 29        | 29        |
| 28000                            | 16           | 31        | 31        |
| 29000                            | 17           | 33        | 33        |
| 30000                            | 18           | 35        | 35        |
| 31000                            | 19           | 37        | 37        |
| 32000                            | 20           | 39        | 39        |
| 33000                            | 21           | 42        | 42        |
| 34000                            | 22           | 44        | 44        |
| 35000                            | 23           | 46        | 46        |
| 36000                            | 23           | 48        | 48        |
| 37000                            | 24           | 50        | 50        |
| 38000                            | 24           | 51        | 51        |
| 39000                            | 25           | 53        | 53        |
| 40000                            | 25           | 55        | 55        |
| 41000                            | 24           | 56        | 56        |
| 42000                            | 23           | 57        | 57        |
| 43000                            | 21           | 57        | 57        |
| 44000                            | 20           | 58        | 58        |
| 45000                            | 19           | 59        | 59        |
| 45155                            | 16           | 59        | 59        |

NOTES: There is no Zone of Immunity for this Damage Table.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.

DAMAGE TABLE

16-inch Gun, 2240-lb. A.P. Projectile, Full Charge

Firing Table 16-E-1

BATTLESHIP TARGET

Shots of Fire for Effect to Destroy the Target

| Ranges<br>Use nearest 1000 yards | Target Angle |           |           |
|----------------------------------|--------------|-----------|-----------|
|                                  | 0° - 30°     | 30° - 60° | 60° - 90° |
| 10000                            | 14           | 25        | 13        |
| 11000                            | 15           | 26        | 14        |
| 12000                            | 16           | 27        | 15        |
| 13000                            | 17           | 29        | 15        |
| 14000                            | 18           | 30        | 16        |
| 15000                            | 19           | 31        | 17        |
| 16000                            | 20           | 34        | 19        |
| 17000                            | 21           | 37        | 21        |
| 18000                            | 22           | 41        | 24        |
| 19000                            | 23           | 44        | 26        |
| 20000                            | 24           | 47        | 28        |
| 21000                            | 25           | 52        | 32        |
| 22000                            | 27           | 57        | 35        |
| 23000                            | 28           | 62        | 39        |
| 24000                            | 30           | 67        | 42        |
| 25000                            | 31           | 72        | 46        |
| 26000                            | 33           | 78        | 51        |
| 27000                            | 35           | 84        | 55        |
| 28000                            | 37           | 90        | 60        |
| 29000                            | 40           | 95        | 65        |
| 30000                            | 48           | 100       | 100       |
| 31000                            | 20           | 56        | 56        |
| 32000                            | 21           | 58        | 58        |
| 33000                            | 22           | 61        | 61        |
| 34000                            | 22           | 63        | 63        |
| 35000                            | 23           | 65        | 65        |
| 36000                            | 23           | 67        | 67        |
| 37000                            | 24           | 69        | 69        |
| 38000                            | 24           | 70        | 70        |
| 39000                            | 25           | 72        | 72        |
| 40000                            | 25           | 74        | 74        |
| 41000                            | 24           | 74        | 74        |
| 42000                            | 23           | 74        | 74        |
| 43000                            | 22           | 75        | 75        |
| 44000                            | 21           | 75        | 75        |
| 45000                            | 20           | 75        | 75        |
| 45155                            | 19           | 72        | 72        |

NOTES: The area enclosed by the broken lines is the Zone of Immunity.

Proving Ground Probable Errors rather than Target Practice Probable Errors were used in the computation of this Damage Table.