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# MANEUVER RULES

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NAVAL WAR COLLEGE

NEWPORT, R.I.

DEPARTMENT OF OPERATIONS

JUNE, 1933

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MANEUVER RULES

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DEPARTMENT OF OPERATIONS  
Naval War College  
Newport, R.I.  
June, 1933.



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*S. A. Taffinder*  
S.A. TAFFINDER  
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Secretary.

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



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INTRODUCTION

The rules for both Chart and Board Maneuvers are combined in this pamphlet. Generally, in each section the rules are grouped as follows: first, rules that apply to both chart and board maneuvers numbered from 1 to 99; second, rules that apply only to the Chart Maneuver numbered from 100 to 199; third, rules that apply only to the Board Maneuver numbered from 200 to 299.

A study of the pamphlet "THE CONDUCT OF MANEUVERS" in connection with this pamphlet will assist the student materially.



SECTION A - GENERAL RULES

Rule A-1. (a) Actual types of ships will ordinarily be used in the maneuver.

(b) The normal organization of forces and the data of individual ships will be as given in the current War College publications containing this data.

(c) The data for supposititious types will be stated in the problem.

Rule A-2. (a) Surface vessels are classified as to size as follows:

<u>Size Class</u>	<u>Displacement, tons</u>
Large	18,000 plus
Intermediate	8,500 - 17,999
Small	3,000 - 8,499
Destroyer	200 - 2,999

(b) All submarines and surface craft of 200 tons minus are classed as being of submarine size.

(c) All aircraft carriers are classed as large size for gunfire and visibility purposes.

Rule A-3. (a) The size of war vessels is usually expressed in terms of displacement, which is the actual weight of a vessel in tons of 2240 pounds. As the displacement of merchant vessels varies considerably according to their loading, the size of such ships is usually expressed in terms of tonnage, which is the measurement of the cubic capacity of the ships in tons of 100 cubic feet.

(b) The following definitions apply to war vessels:

(1) Standard displacement, as defined by the Washington treaty for purposes of limiting the size of new warship construction, is the weight of a ship manned and complete with full armament, equipment, stores and ammunition, but with no fuel or reserve feed water on board.

(2) In U.S. Navy practice, bunker fuel capacity is classified as

(1) full load; for coal burners, the full bunker capacity; for oil burners, 95% capacity



of all bunker spaces intended to normally used. For later oil-burners, this may be and usually is less than

(2) emergency full load; which is 95% of the total capacity of all spaces available for use as bunkers. But as most trials have been run with bunkers filled to two-thirds of full load, the following terms will be used in War College publications and rules:

(3) normal fuel capacity (usually two-thirds of maximum bunker capacity ) is that corresponding to normal displacement.

(4) maximum bunker capacity is the maximum amount that all bunkers will hold; for later oil-burners, the same as emergency full load.

(3) Normal displacement, for the purpose of these rules, is the weight of a vessel manned and complete with full armament, stores, equipment and ammunition but with only normal fuel.

(4) Full load displacement is the same as normal displacement except that the vessel has on board her maximum bunker capacity of fuel.

(c) The figures of displacement given in War College publications are those of standard displacement.

(d) The following definitions apply to merchant types:

(1) Displacement "light" is the weight of a vessel manned and equipped, but without stores, fuel, cargo or passengers.

(2) Displacement "loaded" is the weight of a vessel loaded with stores, fuel, cargo and passengers, up to her full load water line.

(3) Dead weight tonnage, or dead weight capacity, is the difference between displacement "light" and displacement "loaded". It is the useful carrying capacity of the vessel (including stores and bunker fuel) in tons



of 2240 pounds.

(4) Cargo tonnage is a measurement of cargo. It may be in terms of weight measurement, 2240 pounds to the ton, or of space measurement, 40 cubic feet to the ton.

(5) Gross tonnage is the interior volume of a ship in tons of 100 cubic feet. The exact basis for measurement differs in different countries.

(6) Net tonnage is gross tonnage less the additional spaces not available for passengers or cargo, such as machinery spaces, bunkers, crews' living compartments, etc.

Rule A-4. Vessels and aircraft are classed as to type in accordance with the table "Standard Nomenclature".

Rule A-5. (a) The unit of distance in the chart maneuver is the nautical mile, taken as 2,000 yards.

(b) The unit of range in the tactical maneuver is 1,000 yards.

(c) In all cases depths and heights are expressed in feet.

Rule A-6. The unit of speed is the knot; one nautical mile per hour.

Rule A-7. (a) Wind force will be expressed as one of the figures, 0 to 12, of the Beaufort scale, but for simplicity the wind velocity in knots will be taken as five times that figure. That is, for wind force 4, velocity is 20 knots.

(b) In the open sea, unless otherwise stated, the state of the sea corresponding to the various wind conditions will be considered to be as follows:

<u>Wind force</u>	<u>Sea</u>
0 - 3	Smooth
4 - 6	Moderate
7 - 9	Rough
10 - 12	Heavy

(c) Unless otherwise stated, the direction of the sea will be assumed to be the same as that of the wind.



Rule A-8. Unless otherwise stated, sunrise will be considered to be at 0600, sunset at 1800.

Rule A-9. (a) The maneuver rules are, in general, empirical rules intended to express in tangible form, easy of application, what will, on the average, occur in actual practice.

(b) Decisions of the Director should be in accord with the spirit of the rules, but may depart from the latter (1) when time does not permit of detailed application, or (2) when existing conditions fall within a certain category but closely approximate another category. For instance, if a certain penalty attaches to making a change of course of 30 degrees or more, the Director might properly apply this penalty to a change of 29 degrees.



SECTION B - CONDUCT OF THE MANEUVER

Attention is called to Section C, Chapter II, pages 32 et seq. of the pamphlet "THE CONDUCT OF MANEUVERS".

Rule B-1. (a) Preliminary to the maneuver each commander-in-chief will prepare a written estimate of the initial situation as stated in the problem, his plan of action, orders and, if appropriate, his instructions to his subordinates. His orders, instructions and plans he will transmit to his subordinates as under existing conditions, he might in actual practice, having due regard for the form and manner in which they could be so transmitted and the time required by the rules (Section E) for transmission.

(b) On receipt of his superior's orders, each subordinate commander will prepare a written estimate of the situation as of the time of receipt of such orders, together with his own plan, orders and instructions, and will similarly transmit the latter to his own subordinates.

(c) New estimates will be made during the maneuver as the situation changes or as may be required by the Director, and a final estimate at the completion of the maneuver.

(d) A copy of each estimate and any plan, orders, or instructions flowing therefrom will be furnished the Director for use as a guide in rendering decisions and clearing up minor contacts during the maneuver.

Rule B-2. The position and condition of all ships at the beginning of the maneuver will be as stated in the problem, or as may be modified by the Director.

Rule B-3. During the maneuver the commander of two forces not in sight of each other will be placed in separate rooms or otherwise separated so that each will gain no knowledge of the other's force except as permitted under the rules.

Rule B-4. Communication between players not assumed to be in the same ship will be only as provided in Section E of these rules.



Rule B-5. Announcements, claims, etc., will be made only by the proper persons as indicated in the rules.

Strategic

Rule B-100. Players will use as work-charts the chart or blue-print area prescribed in the problem or by the Director, and will use the scale of the chart or area or such scale as the Director may prescribe.

Rule B-101. (a) In all plottings, positions of the main body will be indicated by a dot within a small square; of other detachments and single ships, by a dot within a small circle.

(b) In case of a submarine submerged, a wavy line will be drawn over the position circle; in case of an aircraft in the air, a wavy line under the position circle. (See page 13, "The Conduct of Maneuvers").

Rule B-102. (a) Tracks of vessels proceeding on the surface will be drawn in full lines. Those of submarines submerged and aircraft flying will be drawn in dotted lines.

(b) All tracks will be labelled to show the ship or force, course and speed made good, and, by an arrowhead, the direction of movement. Each point of change of speed or course will be indicated, and will be labelled with the time of such change, and similarly each point where a submarine or aircraft leaves, or returns to the surface.

Players operating aircraft will submit tracings of the operation similar to example shown on page 14 of "The Conduct of Maneuvers". The speed and course noted on the tracing will be that made good, as in the case of surface craft.

Rule B-103. The length of each move will be as announced by the Director.

Rule B-104. When ready to make a move, the Director will

(a) Post an announcement showing:

- (1) Serial number of move;
- (2) Date and hour when move begins;
- (3) Date and hour when move ends;
- (4) Weather, visibility and sea during move;



(b) Set clock dial at the game time of the beginning of the move.

(c) Notify the players that the move is to be made.

Rule B-105. On the Director's signal for a move, each player commanding a force will note the data posted for the move, plot on his work-chart the movement of his force for the new move, transfer this record to a sheet of tracing paper, and submit this tracing to the Assistant Director for Plotting.

Rule B-106. Tracings will be made with black lead pencil. Each tracing sheet will have two latitude and longitude reference points, and the following legend in the upper right-hand corner, in colored pencil, blue for BLUE forces, red for opposing forces:

- (1) Serial number of move, followed by game time of move;
- (2) Composition of force (task name and actual forces);
- (3) Name of commander (game and actual);
- (4) Room.

Rule B-107. On receiving from the players the tracings for each move, the Assistant Director for Plotting will transfer to his own chart all movements for that move.

Rule B-108. When the Master Plot shows a contact, or when dispatches or other important events in the maneuver occur, the Director will

- (1) Set the clock to the appropriate game time.
- (2) Announce this setting to the players.
- (3) Decide the outcome of contact in accordance with predetermined plan of operations covering opposing forces and inform players concerned of the result permitting them, if necessary to modify their moves accordingly.
- (4) In case a contact is such that both units come in sight of each other simultaneously, give contact information first to the slower or weaker unit.

Rule B-109. When general engagement results, the Director may terminate the chart maneuver, decide the result himself or direct the continuation of the exercise as a Tactical Maneuver.

Rule B-110. The Director will advance the clock dial in such a way as to clear up successively the contacts resulting during a move, announcing to the players each advance in game time.



Rule B-111. Communications may be filed to be sent as of any time subsequent to that indicated by the clock dial.

Rule B-112. On receiving new orders or new information, a player will be allowed to alter his move subsequent to the game time of receipt of such orders or information.

Rule B-113. (a) For each group of vessels strategically concentrated as a united command the following records will be kept:

- (1) Statement of the problem;
- (2) Detail of officers assigned to handle the group, stating duties and game titles assigned each officer;
- (3) Orders, instructions, and plan of superior received preliminary to the maneuver;
- (4) The group commander's decision reached preliminary to the maneuver, with orders, instructions and plan based thereon;
- (5) Record of weather and sea conditions;
- (6) File of record of moves;
- (7) File of sent messages;
- (8) File of received messages;
- (9) File of estimates of situations;
- (10) Fuel account;
- (11) Track charts used.

(b) These records may be required by the Director at the end of the maneuver.

### Tactical

Rule B-200. (a) No players other than the movers will go on the board.

(b) Players commanding forces will keep a tactical plot of the action.

Rule B-201. (a) Conversations and discussions not pertaining to the maneuver should be avoided and the attention of all given to the maneuver in hand.

(b) Loud talking will not be indulged in while the maneuver is in progress.

(c) If gunfire is being measured on the board, conversation will cease entirely.

(d) A stroke of the Director's bell is a signal for silence.



Rule B-202. (a) When the limit of vision of a vessel under the existing conditions (reduced day visibility, night, submarines being submerged, smoke screen, etc.) does not permit the vessel to see all other vessels in the maneuver, the player handling that vessel will be permitted to see only such portion of the board as is actually within the limits of vision of his ship. (B-3).

(b) This should be accomplished by placing screens on the board to shut off his vision, or by placing him out of sight of the board and of any other player handling forces not in sight from his force, and having him make his moves on tactical plotting sheets.

(c) When a player thus separated from the board is moving on a plotting sheet, his moves are handled in the same way as in the chart maneuver, except that the Director may cause them to be transferred by the maneuver staff either to the maneuver board or to the Master Plot, or to both.

(d) Players thus separated from the board are given information in the same way as in the chart maneuver.

(e) The commander of a submarine will be permitted to see the board only when his craft is in surface condition and further when permitted by the Director.

Rule B-203. The length of a move is three minutes unless otherwise announced. (F-12).

Rule B-204. When the Director calls for a move to be turned in, each commander will promptly turn in a move blank showing exactly what the ships under his immediate command are to do during the impending move, together with such fire distribution, torpedo fire blank, mine laying blank, signals and dispatches, as will completely cover all action to be taken or messages to be sent during the move.

Rule B-205. If a move blank or other form turned in calls for a ship's doing more than she can actually do under the rules and the conditions then existing, the Move Umpire will return the form to the player for correction.



Rule B-206. In case of undue delay in turning in a move blank, the Director may require a force to continue as in the previous move.

Rule B-207. Ships on the board will not be moved until the Director orders the move to be made. All forces will then be moved promptly and in exact accordance with the move handed in, as approved by the Move Umpire.

Rule B-208. (a) A move which has been turned in may be altered, subject to the prior approval of the umpire.

(1) In the case of vessels whose action is being based upon the action of other vessels;

(2) In case a compelling factor develops during the move which could not have been foreseen when the move was turned in;

but vessels must in any case move for at least one minute in accordance with the move handed in.

(b) Except as provided in (a) of this rule, after a move has been handed in, no alteration or addition may be made with respect to action of vessels, use of weapons or smoke, or sending of communications during that move.

Rule B-209. Should a new move be ordered before damage has been determined, the value of gun fire, torpedo fire or similar offensive action will be appropriately revised when damage is known, but the Director will determine when to apply the effect of damage as to sinking or losing speed.

Rule B-210. (a) Tracks made on the board by vessels proceeding on the surface will be plotted in chalk; for vessels of the BLUE Fleet, in blue; for vessels of the opposing fleet, in red.

(b) The tracks of a single vessel will be plotted as a broken line. If more than one vessel proceeds on the same track, it will be plotted as a full line.

(c) End of move positions will be indicated by numerals in white chalk corresponding to the number of the move.



Rule B-211. Damage to ships is classed as (1) above-water damage, due to gunfire or bombs, and (2) under-water damage, due to torpedoes, mines, depth charges, bombs or ramming. Above-water damage and under-water damage differ in effect. (C-207, 208, 209; F-47; G-217, 218; J-22).

Rule B-212. (a) Lives of ships and absolute amounts of damage are expressed numerically, using as a unit the value of a 14" penetrative hit. (F-16).

(b) In notifying and in assessing the effect of damage, damage received will be expressed in per cent of original life. If this per cent is not an even multiple of ten, it will be reported as the next lower per cent which is an even multiple. That is 0% to 9% is taken as 0%; 10% to 19% as 10%; etc.

Rule B-213. (a) As soon as damage is determined, each commander will be notified of the state of damage of the vessels under his immediate personal command.

(b) A commander can ascertain the damage of ships of his own side not under his immediate personal command only by means of signal or dispatch to the commander of such ships.

(c) The state of damage of ships of one side will not be made known to players of the other side, except as per Rule F-47 (i).

Rule B-214. All damage received during a three minute move becomes effective at the end of the move in which received.



Rule C-1 - (a) Steam vessels are classed as to fuel as either -

- (1) coal burners, or
- (2) oil burners

(b) Steam vessels which burn both coal and oil are classed as follows:

- (1) in every respect as oil-burners, provided that at the time, in accordance with a decision previously made and recorded, they are burning only oil.
- (2) otherwise, so long as oil lasts, they are classed as oil burners with regard to the time and fuel required to raise and maintain reserve steam and to increase speed; for all other purposes, as coal burners.

Rule C-2. Normal sea condition obtains while making passage under conditions of -

- (1) smooth sea;
  - (2) clean bottom;
  - (3) normal draft;
  - (4) no damage;
  - (5) paravanes not out;
  - (6) not towing or being towed;
  - (7) not keeping station in formation;
- and, as regards rate of fuel expenditure.
- (8) maintaining reserve steam.

Rule C-3-(a) Engine speed is the speed in knots which a vessel would make in normal sea condition (See Rule C-2) at the number of revolutions being made.

(b) The maximum speeds given in the ship's data tables are maximum engine speeds.

(c) Speed through the water may be less than engine speed due to -

- (1) Sea effect (C-4);
- (2) Foul bottom (C-5);
- (3) Overdraft (C-6);
- (4) Damage;
- (5) Paravanes out;
- (6) Towing (C-7);
- (7) Keeping station in formation.

Rule C-4-(a) In moderate to heavy seas, engine speeds can not exceed the speeds designated "Engine Speeds Allowed" (E.S.A.) in the following table:

(b) For each of the conditions covered in this table, there is a loss due to the effect of the sea which is also tabulated.



Angle between sea and course, in degrees

Classification as  
per Rule A-2 (a) : 0 - 30 : 31-80 : 81-120 : 121-180

Moderate Sea					
Large	E.S.A.	(M)	(M)	(M)	(M)
	Loss	(2)	(1)	(0)	(0)
Intermediate	E.S.A.	(M)	(M)	(M)	(M)
	Loss	(2)	(1)	(0)	(0)
Small	E.S.A.	(31)	(M)	(M)	(M)
	Loss	(3)	(2)	(0)	(0)
Destroyer	E.S.A.	(26)	(30)	(30)	(M)
	Loss	(6)	(5)	(2)	(1)
Submarine	E.S.A.	(M-2)	(M-1)	(M)	(M)
		(3)	(2)	(1)	(0)
Rough Sea					
Large	E.S.A.	(20)	(26)	(M)	(M)
	Loss	(4)	(3)	(1)	(0)
Intermediate	E.S.A.	(18)	(23)	(28)	(M)
	Loss	(4)	(3)	(2)	(1)
Small	E.S.A.	(18)	(20)	(25)	(30)
	Loss	(5)	(4)	(3)	(1)
Destroyer	E.S.A.	(17)	(19)	(23)	(27)
	Loss	(7)	(5)	(3)	(2)
Submarine	E.S.A.	(M-3)	(M-2)	(M-2)	(M-2)
	Loss	(4)	(3)	(2)	(2)
Heavy Sea					
Large	E.S.A.	(10)	(12)	(15)	(18)
	Loss	(10)	(5)	(3)	(2)
Intermediate	E.S.A.	(10)	(10)	(12)	(16)
	Loss	(10)	(5)	(3)	(2)
Small	E.S.A.	(10)	(10)	(12)	(16)
	Loss	(10)	(8)	(5)	(3)
Destroyer	E.S.A.	(10)	(10)	(12)	(15)
	Loss	(10)	(10)	(6)	(3)
Submarine	E.S.A.	(10)	(10)	(10)	(12)
	Loss	(9)	(9)	(8)	(7)

M equals maximum individual speed.

(See Table in Rule C-8 (d))



Rule C-5 Because of fouling, speed made good is less than engine speed by an amount which varies with time out of dock and with place and character of service. The following empirical rules give approximate values for percent of speed reduction per month out of dock:

- (1) Ships at anchor, speed loss per month
  - in tropical waters, 4 to 10%;
  - in temperate zone, 2%.

(2) Underway one-third or more of the time;  
halve the above figures.

(3) Speed loss due to fouling can not exceed  
20% in temperate waters, 30% in the tropics.

Rule C-6 - (a) Overdraft, due to operating at a displacement greater than normal (See Rule A-3) will cause speed made good to be less than engine speed by an amount as follows:

$$R = L \times M$$

where R = percent of speed loss

L = overload, in percent of normal displacement

M = speed multiplier, with values:

<u>Engine speed</u>	<u>M</u>
12 minus	0
13-20	.1
21-25	.2
26-30	.3
31 plus	.4

(b) A vessel that has on board more than two-thirds of her maximum bunker capacity of bunker fuel is subject to this penalty for overdraft, which affects both fuel consumption and maximum speed that can be made good.

(c) No increase of speed will be allowed by reason of being at less than normal draft.



NOTE: The provisions of Rule C-6 (a), (b) and (c) do not apply to submarines.

Rule C-7 - (a) In towing, in smooth sea the speed made good is the engine speed of the towing vessel multiplied by the displacement of the towing vessel and divided by the aggregate displacement of the towing vessel and the tow.

(b) The speed made good in towing in smooth sea cannot exceed the following limits, based upon strength of towing gear and ability of vessels to ride the sea:

<u>Size of vessel towed</u>	<u>Limit</u>
Large	10 knots
Intermediate	12 knots
Small	12 knots
Destroyer or Submarine	14 knots

(c) In other than smooth sea the speed made good is reduced by the amounts given in parenthesis in the table of Rule C-4, taking the figure for the vessel towing or the vessel towed, according to which figure is the larger.

Rule C-8 (a) When a group of vessels is proceeding in formation at less than 1000 yards distance, all except the guide must have a reserve of speed in knots as follows:

<u>Engine speed being made</u>	<u>Reserve required</u>
10 minus	1
11-22	2
23-30	3
31-plus	4

The "Reserve Required" in this rule will be literally applied.

(b) This reserve of speed is the difference between the engine speed being made and the maximum speed immediately available with the boilers then in use.

(c) If the formation speed exceeds the limit thus set, the formation will be broken.

(d) This speed reduction is to be applied to the maximum smooth water speed of the formation. In moderate, rough and



heavy seas maximum speed is cut to the number of knots given for "Engine speed allowed" in the table in Rule C-4. In cases where both Rules C-4 and C-8 might be applied the rule giving the lowest speed is the rule to be used.

Rule C-9. Vessels capable of laying smoke screens are considered as equipped with apparatus which permits them to lay smoke screens without cutting down their speed.

### STRATEGIC

#### Fuel Expenditure

Rule C-100. As regards fuel expenditure, vessels are considered to be in port condition while main engines are not in use, and only the steam required for port use is being maintained. (C-103).

Rule C-101- Stand-by condition obtains while main engines are not in use, but steam above the requirement for port use is being raised or maintained. (C-105)

Rule C-102 - Sea condition obtains while the main engines are in use. (C-2, 104).

Rule C-103 - Port expenditure is at the rate given in the fuel expenditure tables under "Port use", prorating for fractional days. (C-100).

Rule C-104 - (a) Stand-by expenditures and sea expenditures are each computed in tons per hour for various engine speeds - (See Fleets).

(b) They are subject to increase for:

- (1) Additional steam (C-105);
- (2) Station keeping (C-106);
- (3) Fouling (C-107);
- (4) Paravanes (C-108).

Rule C-105 - While raising or keeping steam for more than the engine speed being made, fuel expenditure is increased as follows:



(a) For the purpose, consider vessels to be making ten knots if making that speed or less. Then

(b) For coal-burners,

- (1) if raising or keeping steam for only two knots above engine speed, - no increase;
- (2) if raising or keeping steam for more than two knots above engine speed, - increase 15%.

(c) For oil-burners,

- (1) if raising or keeping steam for only five knots above engine speed, - no increase.
- (2) if raising or keeping steam for more than five knots above engine speed, - increase 10%.

NOTE: Obviously, Rule C-105 does not apply to vessels with internal combustion engines.

Rule C-106 - For vessels keeping station in formation at distance of 1000 yards or less, except the guide, fuel expenditure is increased 3%.

Rule C-107- For foul bottom, fuel expenditure is increased by a percentage which is twice the percentage of speed loss determined by Rule C-5.

Rule C-108 - With paravanes out, fuel expenditure is increased 7%.

Rule C-109 - (a) For vessels which burn only oil or only coal, or which burn oil and coal in separate boilers, 100 tons of oil will be taken as equal in calorific value to 160 tons of coal.

(b) For vessels which burn coal and oil together in the same boilers, 140 tons of oil will be taken as equal to 190 tons of coal.

Increases of speed.

Rule C-110 - Coal burners require one hour to raise additional steam; oil-burners, one half hour. (See C-111 (c)).

Rule C-111 - (a) A vessel of destroyer or submarine size (A-2), under port conditions has enough steam for engine speed of one-half maximum, and can at any time take any engine speed up to this amount without charge for having raised or maintained additional steam.



(b) A steam vessel larger than destroyer size (A-2), under port conditions (C-100) cannot use her main engines until the necessary additional steam has been raised. (C-111 (a)).

(c) A vessel with internal combustion engine drive can immediately take any engine speed up to maximum.

Rule C-112 - Under sea conditions, if no additional steam is being maintained, steam vessels can increase speed as follows:

(a) Coal-burners:

- (1) If engine speed is three or more knots less than maximum, can increase two knots immediately.
- (2) If engine speed is within three knots of maximum, can increase one knot immediately.

(b) Oil-burners:

- (1) If engine speed is ten knots or more, can increase immediately to 75% of maximum speed.
- (2) If engine speed is within two knots of 75% of maximum, can increase immediately to 85% of maximum.
- (3) If engine speed is within two knots of 85% of maximum, can increase immediately to maximum.

(c) Further increases require additional time as prescribed by Rules C-110 and C-113. (See C-111 (c)).

Rule C-113 - (a) When maintaining additional steam, engine speed may be increased immediately to that for which steam is being maintained, except that coal burners require one-half hour to work up to speed when increasing to maximum speed from a speed below 90% of maximum.

(b) While working up to speed, the mean engine speed during this half-hour is the average of the engine speed at the beginning and that at the end of the half hour the fuel expenditure is that corresponding to the speed to which increasing. (See C-111 (c)).

Sustained Speed and Breakdown.

Rule C-114 - (a) The number of hours that a steam vessel can sustain engine speeds at or near maximum is as follows:



Engine Speed Made

Fuel:	Max	:Maximum:	1 Kt. below:	2 kts. below:	3 kts. below:
:	Speed	:	maximum	maximum	maximum
Coal:	12-17	: 4	: 24	: X	: X
	:18-23	: 4	: 8	: 24	: X
	:24-29	: 4	: 8	: 16	: X
	:30 plus:	: 4	: 6	: 8	: 24

Engine Speed Made

Engine Speed Made

Fuel:	Max	:Maximum:	1 Kt. below:	2 kts. below:	3 kts. below:
:	Speed:	:	maximum	maximum	maximum
Oil	:12-17	: 24	: X	: X	: X
	:18-23	: 6	: 12	: 24	: X
	:24-29	: 6	: 12	: 24	: X
	:30 plus:	: 6	: 12	: 16	: 24

(X) can be sustained as long as fuel lasts.

(b) After running at maximum or near maximum engine speed for the allowed number of hours, a steam vessel must slow for six hours to a speed not greater than that which she can maintain indefinitely, after which the original conditions again obtain.

Rule C-115 - (a) Vessels are classed with regard to kind of propulsion as

- (1) Reciprocating drive (R)
- (2) Turbine drive (T or G)
- (3) Electric drive (E), and
- (4) Internal combustion engine drive (I.C.)

(b) A vessel maintaining high engine speed incurs the following chance of breakdown for each hour of operation at such speed:

Engine Speed Made.

Drive	:Max.	:Maximum:	1 kt. below:	2 kts. below:	3 kts. below:
:	Speed	:	maximum	maximum	maximum
R	12-17	1/48	0	0	0
	18-23	1/24	1/96	0	0
	24-29	1/18	1/48	1/96	0
	30 plus	1/12	1/24	1/48	1/96
T.G.E.	12-17	1/48	0	0	0
	18-23	1/36	1/144	0	0
	24-29	1/24	1/72	1/144	0
	30 plus	1/18	1/36	1/72	1/144
I.C.	1-11	1/24	1/96	0	0
	12-17	1/18	1/48	1/96	0
	18 plus	1/12	1/24	1/48	1/96



See Rule I-7 for Submarine Breakdown.

(c) For second line vessels more than ten years old, the above chances are doubled.

(d) When moving a vessel at a high speed involving chance of breakdown, the player concerned will report the fact at once to the Director, giving maximum speed, speed being made, and number of hours. The Director will decide whether breakdown occurs and will assume the penalty therefor.



COALING

Rule C-116. - Unless otherwise stated, it is assumed that at the beginning of an operation all vessels have bunkers filled to full loaded capacity, and that all fuel vessels have full cargoes. (See Rule A-3).

In Port

Vessel Coaling		Vessel Coaled	
Type	Type	Max. number at one time	Max. rate per hour one vessel can receive. (Fraction of bunker capacity.)
AC	Any	2	1/8

At Sea

Vessel Coaling		Vessel Coaled			Time of maneuver	
Type	Type	Max. number at one time	Max. rate per hour one vessel Frac. of bunker capacity.	Sea	Speed while coal-ing.	Hrs. re-quired to take in tow, rig & cast off
AC	Any	1	1/20	S	5	2
				(M (R (H	Coaling impos- sible.	

NOTE: Coal burning vessels may take on board an excess of 10% of coal over their allowed coal bunker capacity, assuming this excess to be stored in fire rooms and other below-deck spaces and on deck.



Rule C-117

OILING IN PORT

Vessel Oiling		Vessel oiled			Time of maneuver
Type	Max. Delivery (Tons per hr.)	Type	Max. number at one time	Max. rate one vessel can receive (Tons per hour).	Hrs. required to come alongside connect up, and disconnect.
AO	500-1800	DD	6	200	1/2 per DD N.B. Use both sides of oiler simultaneously
AD	15-180	DD	4	200	do
Other than AO & AD	80-150 BB 60-230 CL 15 Misc.	DD	2	200	1/2
AO	500-1800	SS	6	15	1/2 per SS each side
AS	6-180	SS	4	15	do
Other than AO, AL AS	80-150 BB 60-230 CL 15 Misc.	SS	2	15	1/2
AO	500-1800	(Large Int. Small)	2	250	1
Other than AO	80-150 BB 60-230 CL 15 Misc.	do	1	do	1

Fuel-ing

Note; 292 gals. fuel oil equals one ton.

DISCHARGE CAPACITIES OF VARIOUS TYPES (GALLONS PER HOUR)

<u>Ship</u>	
BATTLESHIPS (Except MARYLAND and WEST VIRGINIA - - - -)	25,000
MARYLAND and WEST VIRGINIA - - - -	45,000
<u>CRUISERS</u>	
RICHMOND, CONCORD, OMAHA	
MILWAUKEE, CINCINNATI - - - -	19,000 (booster pumps)
All others	70,000 (booster and re-circulating pumps)
<u>DESTROYER TENDERS</u>	
DOBBIN and WHITNEY - - - -	55,000
BLACK HAWK - - - - -	12,000
ALTAIR - - - - -	9,900
MELVILLE - - - - -	4,400
<u>SUBMARINE TENDERS</u>	
HOLLAND - - - - -	55,000
CANOPUS (regular fuel oil)	32,000
CANOPUS (Diesel oil)	6,300
BEAVER - - - - -	19,000
ARGONNE - - - - -	15,000
BUSHNELL - - - - -	1,700
CAMDEN (Diesel oil) - - - -	2,700



TANKERS

KAWEAH Class - - - - - 220,000  
 PATOKA Class - - - - - 143,000  
 KANAWHA Class - - - - - 360,000

OILING AT SEA

Vessel Oiling

Vessel oiled  
 (B-Broadside  
 A-Astern)

Type	Max. Delivery (Tons per hr.)	Type	Max. Number at one time	Max. Rate one vessel can receive (Tons per hour).	Sea	Speed while oiling	Time in hrs. exclusive of pumping.
AO	500-1800	DD	2(B)	120	S	10	1/2
"	"	"	"	"	M	7 1/2	1/2
"	"	"	1(A)	50	R	6	3/4
"	-	"	-	-	H	Oiling impossible	
AD	15-180	"	2(B)	100	S.M.	10	1/2
"	"	"	1(A)	50	R	6	3/4
"	-	"	-	-	H	Oiling impossible	
AO	500-1800	SS	1(A) or 2(B)	15	S	7 1/2	1/2
"	"	"	1(A)	15	M	6 1/2	1/2
"	-	"	-	-	R) H)	Oiling impossible	
AS	6-180	"	AS with AO	15	SMR	AS with AO	
"	-	"	-	-	H	Oiling impossible	
Other than AO -AS	80-150BB 60-230CL 15-Misc.	DD or SS	1(B)	100 or 15	S.M.	5	1/2
"	"	"	1(A)	"	R)	Oiling impossible	
"	-	"	-	-	H)	Oiling impossible	
AO and other than AO	15 to 1800#	(Int Small	2(B)	100	S.M.	5	3/4
"	"	"	1(B)	"	R	3	1
"	"	"	1(A)	50	S.M.	10	1
"	"	"	1(A)	50	R	5	1 1/4
"	-	"	-	-	H	Oiling impossible.	

# See Table of Discharge Capacities various types, preceding page.



TACTICAL

Rule C-200. Unless otherwise stated, all vessels will be assumed to have steer for full speed.

Rule C-201. Speeds will in all cases be taken to the nearest half knot.

Rule C-202. (a) The speed of vessel in column formation cannot be intentionally decreased except in obedience to signal. Speed may be increased two knots or less in one move, without signal, without disorganization of the formation, provided that before the increase it was at least two knots less than the maximum formation speed.

(b) Vessels in simple formations other than column may alter speed two knots or less in one move without signal (C-8).

Rule C-203. (a) Surface vessels may not increase speed during a three-minute move by more than the number of knots given in the following table:

Maximum Individual Speed (as given in FLEET  
of as corrected for  
damage)

Size Class	19 minus	20-29	30 plus
Large	3	4	5
Intermediate	4	5	6
Small	5	6	8
Destroyer or Submarine	6	8	10

(b) Submarines on the surface can increase speed 8 knots in one three-minute move. Submarines submerged and awash can increase speed 5 knots in one three-minute move.

(c) By backing engines, any vessel can be stopped in three minutes from any speed. Unless engines are reversed, vessels cannot lose speed at a greater rate than shown by the table in (a) of this rule, depending on size of vessel.

Rule C-204. Any change of speed will be considered as being effected at a uniform rate during the move in which it is made. The speed used to locate the position of the ship



shall be the mean of the speed at the beginning and at the end of the move.

Rule C-205 - All losses of speed due to penalties are in percent of original maximum individual speed. The remaining speed is remaining maximum individual speed.

Rule C-206 - Except as provided in Rule B-209 and Rule F-47 (j) all losses of speed due to damage are completely effective at the end of the move in which the damage was received, and are permanent.

Rule C-207 - Underwater damage inflicts a loss of speed corresponding to the percent of damage due to the mine, torpedo, or bomb. (G-225, H-20).

Rule C-208 - Above water damage inflicts a loss of speed as follows:

<u>Above water damage - %</u>	<u>Speed loss - %</u>
0 to 29	0
30 - 49 (BB & CC)	0
30 - 49 (Others)	10
50 - 69	20
70 - 79	50

Rule C-209 - A vessel damaged 80% or more from all causes cannot make more than 5 knots.

Rule C-210 - To put over or take in paravanes, a vessel must run for 6 minutes at a speed of not more than 10 knots. While paravanes are over, course cannot be changed more than 30° in three minutes, without reducing the protective effect of the paravanes.

Damage  
speed  
loss



SECTION D - VISIBILITY, AUDIBILITY AND SMOKE SCREENS

I. VISIBILITY

(1) Natural Visibility.

Rule D-1.

(a) Natural visibility is that obtained without the use of artificial illumination. Conditions as to natural visibility will be classed as either day, night or twilight.

(b) Day condition obtains from sunrise to sunset. (A-8).

(c) Twilight condition obtains for a period following sunset and an equal period before sunrise. Unless otherwise stated, the length of each twilight period is one-half hour.

(d) Night condition obtains from the end of evening twilight to the beginning of morning twilight.

Rule D-2.

(a) Under either day, night or twilight conditions visibility will be further classed as either high, normal, low or fog.

(b) Visibility other than normal may be stated in the problem, or may be announced at any time by the Director.

(c) Unless otherwise stated, normal visibility will obtain.

Rule D-3.

(a) Range of visibility varies according to

- (1) Height of observer
- (2) Number and efficiency of lookouts
- (3) Character of object observed
- (4) Clearness of atmosphere
- (5) Amount of light.

Height of observer is assumed to be height of bridge at night and fore top in day time.

Natural Visibility of Vessels on the Surface and in the Air.

Rule D-4. The ranges of visibility of vessels on the surface and of aircraft in the air, under conditions other than fog and twilight, are as given in the following tables:



DAY - HIGH VISIBILITY

With high barometer: clear atmosphere: clear sky

Visibility is in miles. Where only one set of figures is given, object seen is not only visible at that range, but is recognizable as to general type. Where a second set is given, the one of less value is the range of recognition as to general type.

<u>Object seen</u>	<u>In Miles</u>							
	Seen from							
	<u>Vessels on surface</u>			<u>Sub. #</u>		<u>Aircraft #</u>		
	<u>Large</u>	<u>Small</u>	<u>Dest.</u>	<u>Sub.</u>	<u>peri-</u>	<u>scope</u>	<u>at Alt.</u>	<u>Ft.</u>
<u>SMOKE</u> - 8 plus	40	40	40	35	25		35	any
4 - 7	35	35	35	30	20		30	any
1 - 3	30	30	30	25	15		30	any
<u>VESSELS ON SURFACE</u>								
Large, Int.	25	22	20	16	13		25	( up
	19	16	14	10	8		15	(
Small	22	20	18	14	12		20	( to
	18	15	13	9	7		15	(
Dest.	20	17	15	11	9		20	( 10,000
	17	14	12	8	6		15	(
Sub.	8	7	7	4	3		10	5,000
	6	5	5	3	3		8	
<u>AIRCRAFT IN THE AIR</u>	: See Rule J-38.							

# For visibility from periscopes when unrestricted. Otherwise, use Rule D-10.

## NOTE: The figures given above for destroyers and submarines observed from aircraft apply with a condition of "smooth sea"; otherwise an aircraft can see and recognize destroyers and submarines on the surface at 15 and 7 miles respectively.

## Note: Distances that vessels may be seen by aircraft at greater altitudes than 10,000 feet are reduced one mile for each increase of 1000 feet in altitude, but distances shall not be reduced below two miles.

For Classification of Vessels, see Rule A-2.  
For Smoke, see Rule D-5.  
For Visibility of Periscopes and Submerged Submarines, see Rules D-8 and D-9.



DAY - NORMAL VISIBILITY

With high barometer: clear atmosphere: clear sky

Visibility is in miles. Where only one set of figures is given, object seen is not only visible at that range, but is recognizable as to general type. Where a second set of figures is given, the one of less value is the range of recognition as to general type.

<u>Object seen</u>	<u>In Miles</u>							
	<u>Seen from</u>							
	<u>Vessels on surface</u>			<u>Sub. #</u>	<u>Aircraft ##</u>			
	<u>Large</u>	<u>Small</u>	<u>Dest.</u>	<u>Sub.</u>	<u>peri-</u>	<u>scope</u>	<u>at Alt.</u>	<u>indicated. Ft.</u>
	<u>Int.</u>							
<u>SMOKE</u> - 8 plus	25	25	25	25	20		25	any
4 - 7	20	20	20	20	16		20	any
1 - 3	18	18	18	18	12		18	any
<u>VESSELS ON SURFACE</u>								
Large, Int.	14	13	12	10	8		15	{
	12	11	10	9	7		13	
Small	13	12	11	9	7		14	{ 10,000
	11	10	9	8	6		12	
Dest.	12	11	10	8	6		13	{
	10	9	8	7	5		11	
Sub.	7	6	6	4	3		8	5,000
<u>AIRCRAFT IN AIR</u>	: See Rule J-38							

# For visibility from periscopes, when unrestricted, otherwise use Rule D-10.

## NOTE: The figures given above for destroyers and submarines observed from aircraft apply with a condition of "smooth sea"; otherwise an aircraft can see and recognize destroyers and submarines on the surface at 8 and 5 miles respectively.

## NOTE: Distances that vessels may be seen by aircraft at greater altitudes than those listed in last column are reduced one mile for each increase of 500 feet.

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 For classification of vessels, see Rule A-2.  
 For smoke, see Rule D-5.  
 For visibility of periscopes and submerged submarines, see Rules D-8 and D-9.



DAY - LOW VISIBILITY

With low barometer: moist atmosphere: cloudy sky

Visibility is in miles. Where only one set of figures is given, object seen is not only visible at that range, but is recognizable as to general type. Where a second set of figures is given, the one of less value is the range of recognition as to general type.

Object seen	In Miles							
	Vessels on surface					Seen from		
	Large	Small	Dest.	Sub.	peri- scope	Sub. #	Aircraft #	Alt. #
Int.							At Alt.	indicated. Ft.
<u>SMOKE</u> - 8 plus	7	7	7	7	6		7	{ 6,000
4 - 7	7	7	7	7	6		7	
1 - 3	6	6	6	6	5		6	
<u>VESSELS ON SURFACE</u>								
Large, Int.	6	6	6	6	5		6	{ 5,000
	5	5	5	5	4		5	
Small	6	6	6	6	5		6	
	5	5	5	5	4		5	
Dest.	5	5	5	5	4		5	
Sub.	4	4	4	4	3		4	2,000
<u>AIRCRAFT IN AIR</u>	: See Rule J-38.							

#NOTE: For visibility from periscopes when unrestricted. Otherwise use Rule D-10.

## NOTE: Distances noted in table for visibility from aircraft and altitudes indicated in last column are variable and dependent on clouds and atmospheric conditions.

## NOTE: Distances that vessels may be seen by aircraft at greater altitudes than those listed in last column are reduced one mile for each increase of 500 feet.

-----  
 For classification of vessels, see Rule A-2.  
 For smoke, see Rule D-5.  
 For visibility of periscopes, and submerged submarines, see Rules D-8 and D-9.



NIGHT - HIGH VISIBILITY

With moonlight, clear sky, clear atmosphere, and horizon.

<u>Object seen</u>	<u>In Miles</u>						<u>Sub. : peri-:Aircraft scope:</u>
	<u>Seen from</u>						
	<u>Vessels on surface</u>						
	<u>Large:</u>	<u>Small:</u>	<u>Dest.:</u>	<u>Sub.:</u>	<u>Sub.:</u>	<u>peri-:</u>	<u>Aircraft</u>
	<u>Int.:</u>					<u>scope:</u>	
<u>SMOKE</u> - 8 plus	: 5	: 5	: 5	: 5	: 0	: See Rule J-38	
4 - 7	: 4	: 4	: 4	: 4	: 0	: "	
1 - 3	: 3	: 3	: 3	: 3	: 0	: "	
<u>VESSELS ON SURFACE</u>							
Large, Int.	: 3	: 4	: 5	: 5	: 0	: "	
Small	: 2½	: 3	: 4	: 4	: 0	: "	
Dest.	: 2	: 2½	: 3	: 3	: 0	: "	
Sub.	: 1	: 1½	: 2	: 2	: 0	: "	
Periscopes	: 0	: 0	: 0	: 0	: 0	: 0	
<u>Aircraft in air</u> (at 3000 ft. or less)	: 1/4	: 1/4	: 1/4	: 1/4	: 0	: See Rule J-38	

With moon less than 45° high, objects bearing in the moon's reflection can be seen twice the above distance. Aircraft in path of moon 1/2 mile only.

For classification of vessels, see Rule A-2.  
For smoke, see Rule D-5.



NIGHT - NORMAL VISIBILITY

With clear sky, clear atmosphere and horizon, but no moon

<u>Object seen</u>	<u>In Miles</u>						
	<u>Seen from</u>						
	<u>Vessels on surface</u>				<u>Sub.</u>	<u>Aircraft</u>	
	<u>Large</u>	<u>Small</u>	<u>Dest.</u>	<u>Sub.</u>	<u>peri-</u>	<u>scope</u>	
	<u>Int.</u>						
<u>SMOKE</u> - 8 plus	3	3	3	3	0	See Rule J-38	
4 - 7	2	2	2	2	0	"	
1 - 3	1½	1½	1½	1½	0	"	
<u>VESSELS ON SURFACE</u>							
Large, Int.	1½	2	3	3	0	"	
Small	1¼	2	2½	2½	0	"	
Dest.	1	1½	2	2	0	"	
Sub.	½	½	¾	¾	0	"	
Periscopes	0	0	0	0	0	0	
<u>Aircraft in air</u> (at 1000 ft. or less)	¼	¼	¼	¼	0	See Rule J-38	

For classification of Vessels, see Rule A-2.  
For smoke, see Rule D-5.



NIGHT - LOW VISIBILITY

With sky overcast, moist atmosphere, and no horizon.

<u>Object seen</u>	<u>In Miles</u>						
	<u>Seen from</u>						
	<u>Vessels on surface</u>				<u>Sub.</u>	<u>Aircraft</u>	
	<u>Large</u>	<u>Small</u>	<u>Dest.</u>	<u>Sub.</u>	<u>peri-</u>	<u>scope</u>	
	<u>Int.</u>						
<u>SMOKE</u> - 8 plus	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	0		See Rule J-38
4 - 7	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	0		"
1 - 3	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	0		"
<u>VESSELS ON SURFACE:</u>							
Large, Int.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	0		"
Small	1/3	1/3	1/3	1/3	0		"
Dest.	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	0		"
Sub.	1/10	1/10	1/10	1/10	0		"
Periscope	0	0	0	0	0		0
<u>Aircraft in air</u> (at 3000 ft. or less)	0	0	0	0	0		See Rule J-38

For classification of Vessels, see Rule A-2.  
For smoke, see Rule D-5.



Rule D-5.

(a) Coal burning vessels are considered to make smoke at all speeds.

(b) Oil burners are considered smokeless at speeds two or more knots below maximum, except that the smoke of groups of eight or more oil burners proceeding together at such reduced speed is considered to have the same visibility as the smoke of groups of coal burners four less in numbers.

At speeds within two knots of maximum speed, oil burners make the same smoke as coal burners.

(c) Vessels with internal combustion engine drive are smokeless.

Rule D-6.

(a) During the twilight periods (D-1) visibility ranges gradually increase or decrease, approximately in accordance with the following:-

(b) For this purpose, the twilight period is divided into five equal parts; in the case of the half-hour twilight usually assumed each division being of six minutes duration. The visibility obtaining during each period is based on the day and night visibility conditions obtaining, as follows:

<u>Period</u>	<u>Minutes before sunrise after sunset</u>	<u>Visibility</u>
1	25-30	1½ times night visibility
2	19-24	2 times night visibility
3	13-18	1/4 day visibility
4	7-12	1/2 day visibility
5	1-6	3/4 day visibility

(c) While the foregoing is a guide in determining visibility under twilight conditions, the Director will be free to decide in accordance with his judgment.



Rule D-7. Visibility under fog conditions is as follows:

From surface craft: Visibility will be within limits to be established by the Director.

From aircraft: Visibility is the same as from surface craft, if on, or very close to the water; otherwise, aircraft can see nothing of surface or sub-surface craft; but if above the fog can see other aircraft also above the fog, according to visibility conditions obtaining there.

Natural Visibility of Submerged Submarines.

Rule D-8.

(a) If a submarine complies with all of the following conditions, she will not be seen except as provided in Rule J-29 and D-8 (c):

- (1) Remains submerged at periscope depth or deeper.
- (2) Does not expose periscope when making more than three knots through the water.
- (3) Does not expose periscope within 1000 yards of surface or air craft.
- (4) Does not expose periscope longer at one time than allowed by the following table at the distances from nearest surface or air craft as indicated:

Sea Smooth, no white caps Wind 0-3		Sea Choppy with white caps Wind 4-5	
Distance (yds)	Time (sec.)	Distance (yds)	Time (sec.)
1000-2000	10 sec.	1000-2000	30 sec.
2000-4000	20 sec.	2000-4000	60 sec.
4000-6000	30 sec.	4000-6000	90 sec.

(b) If a submerged submarine does not comply with all of the above conditions, she will be seen by any surface or air craft within 6000 yards of her.

(c) When a submarine fires torpedoes at periscope depth, the swirl will be seen by any surface or air craft within 2500 yards in smooth sea (no white caps) or within 1500 yards in moderate sea (with white caps).

(d) One minute must intervene between periscope exposures except the interval before the firing exposure.



Rule D-9. Submarine periscopes are considered not visible at night.

Rule D-10.

(a) The commander of a submerged submarine will enter on his move blank:

- (1) Game time at which periscope is raised.
- (2) Whether an all around look or on what bearings he elects to look.
- (3) Duration of periscope exposure.

A look on each designated bearing requires ten seconds, and ten seconds is occupied in shifting from one ship or unit to another. For example: A 30 second exposure permits a ten second look on each of two bearings.

(b) A ten second all around look will give only the following information:

Bearings of vessels within 10,000 yards.  
 Range - whether nearer or farther than 6,000 yards.  
 Type - whether large, intermediate or small.

(c) For a ten second look on a designated bearing, the information will be as follows:

Within 7,000 yards:

- (1) Type and whether enemy or friend.
- (2) Compass bearing exact.
- (3) Target angle, center ship.

If actual target angle is (355°-5°, correct target angle (175°-185° will be furnished player.

" " " " " ( 6°-15° target angle to nearest 5° will be furnished player.  
 (165°-174°  
 (186°-195°  
 (345°-354°

" " " " " ( 16°-30° target angle to nearest 10° will be furnished player.  
 (150°-164°  
 (196°-210°  
 (330°-344°

" " " " " ( 31°-45° target angle to nearest 15° will be furnished player.  
 (135°-149°  
 (211°-225°  
 (315°-329°

" " " " " ( 46°-134° target angle to nearest 20° will be furnished player.  
 (226°-314°



(4) Range:

When actual range is .

- 7000 to 5000 range will be given within 1800 yards of actual range.
- 5000 to 2500 range will be given within 1000 yards of actual range.
- 2500 to 1500 range will be given within 500 yards of actual range.
- 1500 and less range will be given as accurately as it can be measured on plot.

(5) Speed:

Will normally be determined by the player from his plot. If given to the player, the accuracy of the information will be governed by the range and the number of observations taken.

7000 to 14,000 yards:

- (1) Approximate type, and in case of large vessels whether friend or enemy.
- (2) Compass bearing exact.
- (3) Target angles as above for range Within 7,000 yards.
- (4) Ranges. Within 2000 to 4000 yards of actual range. The inaccuracy varying with the range.
- (5) Speed. No information.

Above 14,000 yards:

- (1) Very general information as to composition of forces.
- (2) Compass bearing to nearest 5°.
- (3) Range. Given as above 14,000 yards.
- (4) No target angle.

(2) VISIBILITY BY ARTIFICIAL ILLUMINATION.

Illumination by Searchlights.

Rule D-11.

(a) Under conditions of Night High and Night Normal visibility, by the use of searchlights the ranges of visibility from the ship using the searchlights are made those of Night High Visibility as seen from a large or intermediate sized vessel; for Night Low Visibility the ranges become those of Night Normal Visibility as seen from a large or intermediate size vessel; for fog conditions searchlights do not improve visibility. For other



ships, not using searchlights and offset to one side of the searchlight rays, the ranges of visibility given above are increased by 50 per cent.

(b) A searchlight throws a beam against which a vessel may be silhouetted. For game purposes, for conditions of Night High or Night Normal visibility, this beam will be considered to be 6000 yards in length; for conditions of Night Low visibility 3000 yards in length; for fog 00 yards. If the vessel is projected against the searchlight beam within the length above prescribed and is not more than 8000 yards from the projected beam, the visibility of the silhouetted vessel for gunfire and recognition purposes is as follows:-

Searchlight Silhouette

Illumination for Gunfire Purposes.      Type can be made out.

Night High or Night Normal Visibility

Smoke and Large or Int. Vessels	9000 yards
Small	7500 "
Dest.	6000 "
Sub.	3000 "

Night Low Visibility

Smoke and Large or Int. Vessels	4500 "
Small	3700 "
Dest.	3000 "
Sub.	1500 "

(c) For fire effect when using searchlights see Rule F-43 (d)

Visibility of Searchlights and Gun Flashes.

Rule D-12.

(a) Under Night High and Night Normal visibility, searchlights are visible 30 miles, gun flashes 10 miles. Under Night Low visibility searchlights are visible 15 miles, gun flashes 5 miles.



(b) Under fog conditions, day or night, searchlights are visible to an observer in the direct ray of the light for a distance one mile greater than that at which the ship using the searchlight can be seen. The range of visibility of a ship in a fog will be determined by the Director.

Illumination by Star Shells and Parachute Flares.

Rule D-13.

(a) Star shell, fired from guns of 3" to 6" caliber, are burst by time-fuse action. Point of burst should be at an altitude of about 1500 feet.

(b) Parachute flares, dropped from planes at an altitude of not less than 3500 feet, drop 1500 feet before attaining full illumination.

(c) During illumination, star shell and flares drop 300 feet per minute, and drift with the wind.

Rule D-14. The allowance of star shell is as given in the "FLEETS".

Rule D-15. Weight of parachute flares is given in "AIRPLANE CHARACTERISTICS".

Planes may carry parachute flares up to the number indicated below:

VTs . . . . .	2 flares
VO . . . . .	4 "
VP, VT . . . . .	20 "
VS . . . . .	4 "

Supply of flares carried on ship or tender for each plane will be stated in the "FLEET" publications under "Bomb Allowance".

Whether or not a plane may carry bombs and parachute flares at the same time depends on the characteristics of the plane and the weight and bulk involved.



Rule D-16.

(a) While burning, the light from a star shell or flare is assumed to illuminate a circular area of water beneath it.

(b) The maximum horizontal range at which effective star shell can be burst, the diameter in miles of the circle of illumination, the duration in minutes of each illumination, and the minimum number of bursts per minute required to maintain illumination of a target, are as given in the following table. If the target is moving at high speed, a higher rate of fire is required.

	<u>Caliber</u>	<u>Range</u> (yards)	<u>Width</u> (miles)	<u>Time</u> (minutes)	<u>Bursts</u> per minute
Shell	6", 5 $\frac{1}{2}$ "	17,000	1/2	1	3
	5"	13,000	1/3	1/2	4
	4 $\frac{1}{2}$ ", 4"	8,000	1/3	1/3	6
	3"/50	7,000	1/4	1/4	8
	3"/23	6,000	1/4	1/4	8
Flares	--	--	1/2	5	1

(c) The rate of fire and horizontal range to be used will be stated by the player, as well as the bearing limits of any search spread.

Rule D-17.

(a) In using star shells or flares to illuminate a target for gunfire, or for searching an area, they must burst beyond the target not more than 8000 yards, and while burning must cross the line of sight.

(b) If the burst is from zero to 4000 yards beyond the target, the target is considered to be projected against the circle of illumination and conditions for gunfire, or recognition, are most favorable. If the burst is between 4000 and 8000 yards, the conditions are less favorable; beyond 8000 yards, the burst is considered to provide no illumination. Bursts short of the target obscure it if in the line of sight.



(c) If properly illuminated, as defined in (a) and (b) of this rule and Rule D-16, a target is visible for gunfire and recognition purposes, under night conditions other than fog, as given in the following table:-

Star Shell or Parachute Flares

(a) Burst 00 to 4000 yds. over Target	(b) Burst 4001 to 8000 yds. over Target
Illumination for gunfire purposes. Type can be made out.	Illumination for gunfire purposes. Type can be made out.

Night High or Night Normal Visibility

Object Seen

Smoke and Large, or Int.	15,000 yds.	9,000 yds.
Small	12,000 "	8,000 "
Dest.	9,000 "	6,000 "
Sub.	5,000 "	3,000 "

Night Low Visibility

Smoke and Large, or Int.	6,000 yds.	4,000 yds.
Small	5,000 "	4,000 "
Dest.	4,000 "	3,000 "
Sub.	2,000 "	1,000 "

(d) Ships, other than the target, may be illuminated or obscured, accidentally or by design, when subject to the conditions of this rule.

(e) Under fog conditions, use of star shell or flares does not improve visibility.

(f) The outside range limits of gunfire under various visibility conditions, when using star shells or flares, on various targets are established in the table given just above. The effectiveness of gunfire will further depend upon range, the size of the firing ship and the caliber of gun carried. Curtailment of fire effect on account of this night visibility effect is provided in Rule F-43 (d).



Rule D-18. In using star shell or flares for searching, an arc will be considered thoroughly illuminated only in case centers of bursts are separated by a distance of not more than the width of illumination of individual bursts. (See Rule D-16).

Rule D-19. When a vessel is under the direct illumination of parachute flares, under night conditions other than fog, planes can bomb her as accurately as by day, provided their altitude is not over 5,000 feet and they are below the flare.

Visibility of Star Shells and Flares.

Rule D-20.

(a) Under night conditions other than fog, star shells and parachute flares are visible 30 miles in Night High and Night Normal Visibility and 15 miles in Night Low Visibility.

(b) Under fog conditions, star shells and parachute flares are visible at a distance one mile greater than the natural range of visibility of a ship as determined by the Director.

Interference with Vision by Star Shells, Flares or Searchlights.

Rule D-21.

(a) Searchlight beams, if kept trained directly on the observer will cause serious interference with vision. This will adversely affect spotting of gunfire, torpedo control and maneuvering. The Director will decide the extent of this interference in all such cases.

(b) Star shell bursts or flares will, under certain conditions, completely obscure vision beyond the burst or flare. The use of star shell for this purpose must be in accordance with a definite plan and the player must satisfy the Director of the plan's effectiveness. See Rule D-17 (d).



AUDIBILITY

Through Air:

Rule D-25. (a) The normal ranges of audibility of gunfire and of destroyers proceeding at high speed (due to blowers), are as follows:

		Audibility range	
		Miles	1,000's of yards
GUNFIRE:	12" plus	20	40
	8"-11"	15	30
	6"-7"5	10	20
	4"-5"5	7	14
	3" minus	5	10
DESTROYERS		1	2

(b) When heading directly towards or away from the listener, the distance that an airplane may be heard is much less than when the plane is passing on a course at right angles. The ratio between these distances may be assumed as approximately 1 to 3.

The extreme distances that heavier-than-air craft will be considered audible to the naked ear when free from other noises follow:

- One VF, VO(2) - below 6000 feet altitude and within 2 miles.
- One VS, VT - below 8000 feet altitude and within 2-1/2 miles.
- One VP - below 10,000 feet altitude and within 3 miles.

In the case two or more planes are together add 2,000 feet to the altitude figures above and 1/2 mile to the horizontal distance figures.

(c) These ranges may vary according to wind, and according to local noise near the listener.

(d) If there is any wind, the ellipse marking the limit of audibility will be shifted down the wind a distance equal to the major axis times the wind force divided by 30.

(e) A vessel firing or under fire can hear through the air only one-quarter as far as normal.

(f) A destroyer proceeding at high speed can hear through the air only one-half as far as normal.



Rule D-26. The direction of a continued noise heard through the air can be told to the nearest multiple of 45 degrees.

Hydrophones:

Rule D-27. Hydrophones are assumed to be carried by vessels in accordance with Rule E-12 -- Table E-3.

Rule D-28. Use of Sound Receivers: (Underwater)

(a) Sound receivers are inoperative between relative bearings  $140^{\circ}$  to  $220^{\circ}$ , except with propellers stopped or under motors at slow speed.

(b) Sound receivers in surface craft can detect submarines running submerged only while such surface vessels coast after main engines have been stopped for two minutes.

(c) Sound receivers in surface craft can detect other surface craft which are making a speed of 8 knots or more when main engines of the listening vessel are operating up to speeds of 15 knots.

(d) Sound receivers in submarines can detect other submarines running submerged only when listening submarine is stopped or when running on electric motors.

(e) Sound receivers in submarines can detect all surface craft which are making a speed of 8 knots or more when the listening submarine is running on electric motors or on Diesel engines up to a speed of 9 knots.

Rule D-29. Ideal listening Condition:

Ideal listening condition is defined as follows:

Submarine:

submerged, 75 feet or less;  
speed, 0 to 5 knots;  
depth of water, 30 fathoms or less;  
hard bottom, reasonably level.  
No other sound except the one listened for.

Vessel on surface:

stopped, or  
coasting after main engines have been  
stopped for three minutes;  
sea smooth, 30 fathoms or less;  
hard bottom, reasonably level.  
No other sound except the one listened for.



Rule D-30. Distance and Bearing:

Subject to restrictions of Rule D-28 and under ideal conditions of Rule D-29, the sound receiver can detect and determine the bearing within  $4^{\circ}$  of a sound as follows:

<u>Listening Vessel</u>	<u>Vessel Heard</u>	<u>Distance Heard (Miles)</u>
(a) Submarine (Submerged, 0 to 5 knots)	large vessel	18
	intermediate	18
	small	16
	DD	14
	SS (on Diesels)	10
	SS (on motors, 5 kts. plus)	6
	SS (on motors, 5 kts. or less)	3
(b) Surface vessel (engines stopped)	SS (stopped, charging batteries)	3
	same as (a)	
	Moderate Sea, - small, DD and SS 1/2 distance in (a).	
	Rough Sea, - small, DD and SS sound receivers of no value.	

(c) Where conditions are not ideal, distances given in (a) and (b) of this rule will be reduced to not more than one half nor less than one tenth of values given, as may be determined by the Director.

Rule D-31. Identification of Types:

(a) Identity of single type of a vessel or vessels, can be determined at 1/2 the distances given in Rule D-30(a), (b) and (c).

(b) The number of vessels present can be counted on bearings from the listening vessel not less than  $10^{\circ}$  apart.

(c) If several types are present each type can be identified if separated from other types by a bearing from the listening vessel of  $10^{\circ}$  or more.

Radio Direction Finders

Rule D-32. (a) Radio Direction Finders are carried by vessels as shown by Table E-3(Rule E-14).

(b) Shore radio direction finder stations are listed in Navy Department Publications, which give also their arcs of calibration.

(c) In general, vessels of the Navy are supplied with one radio direction finder covering the range 100-1000 k.c.s. Note: This range may be increased in the not distant future.



(d) Ship radio direction finders are calibrated through 360 degrees. Shore radio direction finders are calibrated through only limited arcs.

Rule D-33. (a) A radio direction finder can obtain the bearing of any radio transmission, provided:

- (1) It is listening on the frequency used;
- (2) It is within half the limiting distance of the transmission (E-14);
- (3) The transmission lasts at least 30 seconds;
- (4) The listening vessel has all transmitting antennae open;
- (5) Bearing is within the arc of calibration.

(b) If transmission is on a frequency within 10 kcs of that on which the compass operator is listening, he can detect the transmission, tune to it, and obtain a bearing, provided that the transmission lasts at least two minutes.

(c) An SS can obtain very accurate radio bearings if transmission last long enough to permit swinging SS beam to bearing.

Rule D-34. (a) The limiting error for shore radio direction finders is assumed to be two degrees for frequencies lower than 1,000 kcs. (See Rule E-13). Shore radio direction finder bearings furnished players will therefore be taken to the nearest multiple of four degrees.

(b) The accuracy of ship radio direction finders varies greatly depending upon the type of ship and the location of the compass, and in each ship may vary in different arcs. For the purposes of the War College maneuver, the limiting error of ship radio direction finders will be taken as five degrees for frequencies below 1,000 kilocycles. Ship radio direction finder bearings furnished players will therefore be taken to the nearest multiple of ten degrees.



(c) It is assumed that the unilateral method of radio direction finder reception is not applicable to ships' radio direction finders, but that it can be used on shore. As far as ships' radio direction finders are concerned, therefore, it is not possible to determine with the radio direction finder a single radio transmission heard comes from a given bearing or from its reciprocal, but a series



of bearings, if plotted, will serve to indicate geometrically from which bearing radio signals from the same ship are received.

TACTICAL

SMOKE SCREENS

Rule D-200. (a) Smoke screens may be laid by any type of oil-burning vessel, or by any vessel or aircraft carrying special smoke apparatus or by aircraft carrying smoke bombs. (For smoke screens laid by aircraft, see Rule J-27).

(b) In order for a smoke screen to be so dense as to prevent vision, it must be laid by at least one CL or three other vessels not over 500 yards apart.

Rule D-201. (a) In order for smoke to lie on the water and not rise at once, atmospheric conditions must be favorable, and the relative wind as felt by the smoke-laying vessels must be 15 knots or more. (D-208).

(b) Atmospheric conditions at night are always favorable for smoke screens. Whether or not existing conditions by day are favorable will be stated in the problem or announced by the Director.

Rule D-202. When the conditions permit the laying of a screen, the screen will always lie, but as atmospheric conditions regulate the period during which the smoke will form an effective screen, the Director will decide, from time to time, whether or not the effective period as given in Rule D-206 should be increased or decreased. The effect of this decision will be applied by the Assistant Director for Moves and the decision will not be announced to the players.

Rule D-203. The Assistant Director for Moves must in every case be informed when the emission of smoke to form a screen is started and when it is stopped. The intention to smoke must be indicated on the Move Blanks.



Rule D-204. A smoke screen may be started at will (boats of group following motions of leader) or by signal. It may be stopped at will if the laying vessels are clear of the screen. If the laying vessels are operating in the screen, the emission of smoke may not be stopped except by signal.

Rule D-205. A smoke screen will not protect the vessels laying it during the three-minute move in which the laying is begun. It will, however, interfere with the gunfire of the smoking ships and of other ships between which it intervenes. After emission of smoke has ceased, the destroyers and other vessels will be protected by only the screen already laid.

Rule D-206. The smoke emitted during a move will be carried directly to leeward at the speed of the wind during three subsequent moves. During these three moves it is impenetrable; at the end of the fourth move, including the move in which it was first emitted, it is entirely dissipated. See also Rule D-202.

Rule D-207. The form of a smoke area at the end of a move during which smoking is begun shall be determined as follows:

(a) From the position of the leader at the beginning of the move draw a line in the direction in which the wind is blowing and equal in length to the distance a particle of smoke would travel during the move.

(b) Join the point last determined with the position of the leader at the end of the move. This line is the forward edge of the smoke area.

(c) Determine in the same manner a line for the rear vessel. This is the after edge of the smoke area.

(d) The smoke area lies between the lines (b) and (c) and the track of the vessels laying the screen, if in column, - otherwise, between these lines and the position of the formation at the end of the move.

Rule D-208. Having determined the smoke area by the application of Rule D-207 the smoke screen is effective if the line (b) has a length equal to or greater than 15 knots on the scale of the board. The smoke screen is ineffective if this length is less than 15 knots.



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SECTION E - COMMUNICATIONS



Means of Transmission	When used (D-day/N-night)	May transmit					May be used as shown if conditions permit						Notes				
		General Signals	Special Signals	Despatches	Writing	Conversation	Ship to Ship	Ship to Aircraft	Ship to Shore	Aircraft to Ship	Aircraft to Aircraft	Aircraft to Shore			Shore to Ship	Shore to Aircraft	Shore to Shore
<b>VISUAL</b> ~																	
1	Flags	D	**	(a)			**	o				o	o	(a) Speed flags	1		
2	Shapes	D		(b)			**	o				o	o	(b) Primarily as speed indicators. Not used at sea.	2		
3	Semaphore	D	o	**			**	o				o	o	Good only for short distances.	3		
4	Wigwag	D		*			*					*	*	Used for communicating between Army and Navy	4		
5	Flash, searchlight	D,N	**	o	**		**	**	*			*	**		5		
6															6		
7	blinker light	N	**	o	**		**	*	*			*	*		7		
8	blinker tube	N	**	o	**		**	o				o	o	May be either bright or dimmed	8		
9	hand flashlight	N	o	*	o				o	**	o			Used between aircraft at night.	9		
10	Pyrotechnics	D,N	**				*	o	o	*	*	o	o	Primarily emergency identification and maneuvering.	10		
11	Hand signals	D		*						**				Plane maneuvering signals by day	11		
12	Movements of Planes	D		**					o	**	o			Zooming or wiggling wings, special formation recognition signal.	12		
13	Deck & Ground signals	D		*			*					*			13		
<b>SOUND</b> ~																	
15	Above-water, gun	D,N		*			o	o				o		Usually used only to call attention.	15		
16	whistle	D,N	o	(d)	o		(d)	o						(d) Primarily for maneuvering signals	16		
17	voice	D,N	o	o	o	**	o	o				o	o	Hoover airphone still experimental	17		
18	Under-water oscillator	D,N	o	*	o		o							Of varying range and reliability. Used mostly by submarines	18		
19	Asdic	D,N	o	o	o		o							Still experimental. Not used in maneuver.	19		
<b>RADIO</b> ~																	
20	Radiotelegraph	D,N	*	o	**		**	(e)	**	(e)	(e)	(e)	**	(e)	**	(e) VFs may carry radiophone, but not radiotelegraph other	20
21	Radiotelephone	D,N	o	o	**	**	*	(e)	o	(e)	(e)	(e)	o	(e)	o	planes carry radiotelegraph, but not radiophone.	21
<b>WIRE</b> ~																	
22	Telegraph, cable	D,N	o	**				(f)				(f)	**	(f) Flagships in port may have special telegraph and phone	22		
23	Telephone	D,N	o	o	**			(f)				(f)	**	connection to shore communication office.	23		
<b>CARRIERS</b> ~																	
24	Postal Service, ord.	D,N			**		**					**	**	For routine mail.	24		
25	naval desp pouch	D,N			**								**	For urgent mail	25		
26	diplomatic pouch	D,N			**								**	For confidential or secret mail outside U.S.	26		
27	Intra-fleet mail	D,N			**	**	**							For routine mail	27		
28	Special messenger	D,N			**	**	**					**	**	For urgent mail.	28		
29	Officer messenger	D,N			**	**	**					**	**	For secret or very important mail	29		
30	Planes				*	o	o	*	*	o	o	o	o	For special use only.	30		
31	Pigeon	D			*		o			*		o	o	For special use only	31		

o - possible use. \* or \*\* - suitable use for means given in left column. \*\* - suitable means for sending class of communications given at top.

TABLE 'E-1'. MEANS OF TRANSMISSION.



No.	Means of Transmission	① * Maximum Distance		Max. number simultaneous Hoists or Circuits by each Means. ②										
				Combatant types, sizes **					Auxiliary types, size		Aircraft in air			
		Day	Night	Large	Intermediate	Small	Destroyer	Submarine	Large-inter.	Small, DD, SS	ZR, ZN	VP, VT, VS	VO, VF	
1.	FLAGS, large	10 <sup>(d)</sup>	-	5	4	4			4					
	intermediate	5 <sup>(d)</sup>	-				2		2					
	small	2 <sup>(d)</sup>	-					1						
2.	SHAPES	3	-	(a)	(a)	(a)	(a)	(a)	(a)					
3.	SEMAPHORES	2 <sup>(d)</sup>	-	4	3	3	2	1	2	1				
4.	WIGWAG	5 <sup>(d)</sup>	-	3	3	2	1	1						
5.	FLASH, searchlight, large	20 <sup>(d)</sup>	40	2	2				2					
	inter.	16 <sup>(d)</sup>	20			2	2			1				
	small	12 <sup>(d)</sup>	16	2			1	1						
6.														
7.	blinker light	-	10	1	1	1	1	1	1	1	1	1	1	
8.	blinker tube, undimmed	-	10 <sup>(d)</sup>	2	2	2	2	1	2	1				
	dimmed	-	2 <sup>(d)</sup>	2	2	2	2	1	2	1				
9.	hand flashlight	-	2 <sup>(d)</sup>	-								1	1	
10.	PYROTECHNICS	16	20	1	1	1	1	1	1	1	1	1	1	
11.	HAND SIGNALS	1	-	-								1	1	
12.	MOVEMENTS OF PLANES	(x)	-									1	1	
13.	DECK & GROUND SIGNALS	(x) <sup>(d)</sup>	-	15 <sup>(b)</sup>	-	-	-	-				1R	1R	1R
14.														
15.	GUN	(x)	(x)	1	1	1	1		1	1				
16.	WHISTLE	2	2	1	1	1	1	1	1	1				
17.	VOICE	(x)	(x)	1	1	1	1	1	1	1				
③ Max. number simultaneous Bridge Messages by any or all means.				6	3	3	2	1	2	1	1	1	1	

Notes: - (x) - as decided by umpire. 'R' - receiving only. 'S' - sending only.  
 (a) - speed indicators allowed in addition to flag hoists. Other shape hoists may be made in lieu of flag hoists. (b) Can be made only by carriers.  
 (d) - more or less directional. \* - Max. distances in thousands of yards and are estimated for favorable conditions. (see Rule E-2) \*\* - for class sizes. (see Rule A-2)

TABLE E-2. BRIDGE COMMUNICATIONS.  
 LIMITING DISTANCES & NUMBERS.



		RADIO																												
		TRANSMITTERS												RECEIVERS																
Use		Long distance	Long distance	Long distance	Medium or Long distance	Medium or Long distance	Medium and Long distance	Med. distance	Medium Force Comdrs.	Med. Aircraft	Med. distance	Med. distance	Battle Line	Aircraft	Aircraft	Aircraft	Aircraft	Aircraft	Aircraft	Low frequency	Combination High or Low	High frequency	Aircraft	Aircraft	Aircraft	Aircraft	Direction finder	Underwater Sound Apparatus		
Frequency in Kcs.		4000-18100	4000-26000	4000-26000	2000-3000 or 4000-18100 (a)	300-600 or 4000-18000 (a)	2000-18000	2000-4525	2000-4525 or 195-600 (a)	500-2000	195-600	175-600	100-500	545-1005	545-1000	545 or 585 or 1000-1465 (a)	285-600	300-600 or 4000-13575 (a)	300-605 or 3000-18100 (a)	10-1000	10-1000 or 300-30000	1000-30000	200-600	545-1000	500-1500	200-25000	100-1000	Transmitter	Receiver	
Distances in (j) miles (daylight)		2000	2000	3000	100	2000	200 or 2000	200	200 or 200	300	300	600	40	250	150	150	400	400 or 1000	500 or 2000	See Rule E-13						37	33	34	Rules D-29,30	
1.	Fleet (BB) Flagships		1	1			3		2	2	1	1								9	2	6					1	1	1	1.
2.	Force Flagships		1	1			3		2 <sup>(b)</sup>	2 <sup>(b)</sup>	1	1 <sup>(i)</sup>								9	2	6					1	1	1	2.
3.	BB and CC		1				3		1	2	1	1								7	1	6					1	1	1	3.
4.	CV and XCV		1	1			3		2	2	1									9	2	6					4	1	1	4.
5.	CA, CL, CF and XCL		1				3 <sup>(c)</sup>		1	2 <sup>(c)</sup>	1									7 <sup>(e)</sup>	1	6 <sup>(f)</sup>					1	1	1	5.
6.	DL, DD and DM					1		1				1									4						1	1	1	6.
7.	SF, SM and SC				1							1									2						1	1	1	7.
8.	SS					1															1						1	1	1	8.
9.	PG, PY and XPG						1				1	1									1						1			9.
10.	PG, PY, PE, PC, YP (under 1000 tons)									1											1								1	10.
11.	AD, AV, AS, AR and all auxiliaries assigned flags	1			1					1 <sup>(d)</sup>		1	1							5	1	3					1			11.
12.	AC, AE, AF, AH, AK, AO, AP, CM & corresponding conv. types						1					1	1									1								12.
13.	AT, AM, XAT and XAM											1									1									13.
14.	ZR																				1						1			14.
15.	VS (attached to CV, CA, CF)													1												1 <sup>(g)</sup>				15.
16.	VO (attached to BB)															1												1 <sup>(g)</sup>		16.
17.	VO (attached to CX, XCL)														1											1 <sup>(g)</sup>				17.
18.	VT, VB, VJ																1							1						18.
19.	VP																	1											1	19.
20.	VF														1 <sup>(h)</sup>														1	20.

- (a) Either frequency band but not both simultaneously.
- (b) On BBs, CAs, CFs, CLs and CVs. Others but one.
- (c) One less on XCL.
- (d) For vessels equipped with aircraft. Two on AV.
- (e) XCL has five only.
- (f) XCL has three only.
- (g) May be used as direction finder on same frequency.
- (h) One VF only per squadron so equipped.
- (i) On BBs only.

- (j) (1) Distance is maximum transmission in miles, under favorable conditions by day (Rules E-8, E-12).
- (2) At night maximum distance is double that given above.

TABLE E-3  
RADIO AND UNDERWATER SOUND COMMUNICATIONS



Table E-4

	<u>Coding</u> <u>Groups per minute</u>	<u>Heading and Call</u> <u>Minutes</u>	<u>Text</u> <u>Groups per minute</u>	<u>Decoding</u> <u>Groups per minute</u>	<u>Each Relay</u> <u>Minutes</u>	<u>Internal Delivery</u> <u>Minutes</u>
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Radio</u>						
Plain Language	-	1	20	-	(2) (3)	1 1
Plain Language (abbr)	-	-	20	-	(3) 1	1 1
Contact Code	15	-	20	15	(3) 1	1 1
General Signals	15	-	20	15	(3) 1	1 1
Code (Addressee present)	4	-	10	4	(3) 1	1 1
Code (Addressee not present)	4	1	10	4	(2) (3)	1 1
<u>Semaphore, Blinker, Searchlight</u>						
Plain Language	-	2	10	-	(2) (3)	1 1
Contact Code	15	2	10	15	(2) (3)	1 1
General Signals	15	2	10	15	(2) (3)	1 1
Code	4	2	10	4	(2) (3)	1 1
<u>Flag Hoists (Not more than 5 flags per hoist)</u>						

One minute per hoist, total time, up to normal readability given in Table E-2. For distances beyond normal readability, multiply the required one minute by the number of visual relays required to reach the addressee.



3-5  
1933

Plate 2-5

MESSAGE

FROM: **Comcrudiv Three** (Title) **CL-9** (Ship) **Jones** (Player) **W-11** (Room No.)

W-11 (Room No.)

TO BE FILLED IN BY UMPIRE

TO	Radio	Vis	Title	Player	Room No.	TOD	Time for-		Radio	Vis
							29			
"Q"-for Information.	Z		C-in-C BLUE	Smith	W-13	0729				
	Q		Combatfor	Black	W-15	0724				
	Q		Comscofor	White	W-26	0729			7	
"Q"-for Action.									7	
									1	
									3	
									5	
									7	
									1	
								<b>TOTAL</b>	<b>24</b>	

by reason of:

Delivery delayed by reason of:

SENDER INDICATE BY CHECK

Plain Lang	Radio <input checked="" type="checkbox"/>	Urgent	Exec. at (IX-IM)
Code <input checked="" type="checkbox"/>	Visual	Priority <input checked="" type="checkbox"/>	Kcs. 4105
Con. Code	Sound	Normal	Other Instructions
Gen. Sig.	Other	Nite	300

Until: \_\_\_\_\_  
Actual Time of release by Umpire: 1030, 4 Sept.  
UMPIRE'S FILE No. 234

0003. Enemy force previously reported again sighted on course two sixty speed ten point five position one nine two zero position six four four zero at seven hundred

Origin: 705

Time of Origin: 0705

USE BACK OF THIS BLANK FOR ADDITIONAL TEXT

Use DITTO PENCIL or DITTO RIBBON in making out this form

"Other Instructions" may include: for radio; limiting range; particular method of transmission; etc., for visual or sound; particular system of transmission, etc.



SAMPLE DISPATCH

Commander Jones, detailed as BLUE Commander, Cruiser Division Three, Flagship CL-9, is informed by the staff that he sights a large enemy force at 0700 in Latitude 19-20, Longitude 64-40. He recognizes this as the same force he has previously reported. He, therefore, uses letter code instead of contact code.

Crudiv Three is a unit of the BLUE Battle Force. He is in radio communication with the C-in-C by relay via his immediate superior, Commander Battle Force, 300 miles away, with whom he is in direct communication on 4105 Kcs (information contained in the BLUE Communication Plan). He desires this information to go also to the Commander Scouting Force, with whom the Commander Battle Force is in communication.

He fills out the top line of the form under "Title", "Ship", "Player" and "Room No.". Under the block labeled "To" he fills in under "Title", "Player" and "Room No." the names C-in-C BLUE, Com.Bat.For. and Com.Sco.For. with corresponding names of the players and room numbers. In the first column he enters "Z" opposite C-in-C BLUE for action, and "Q" opposite the other two, for information.

In the block called "Sender Indicate By Check", he checks "Code", "Radio" and "Priority". As the dispatch is not to be executed, he ignores the "Exec. at (IX-IM)". Under "Kcs", he fills in 4105, his channel of communication to the Commander Battle Force, his superior. Under "Other Instructions" he places "300", the distance he is from the Commander Battle Force.

In the large blank space, he writes the dispatch, filling out at the end under time of origin "0705". This completes the work of the player.



The Communication Umpire has the tasks of computing the times of delivery to the addressees. He first counts the groups of the text (including office and time groups). This is 29, which he may write in under "Time for". Turning to Table E-4, he computes the time of delivery to the action addressee, C-in-C BLUE, by filling out the column headed "Radio". As this is a coded dispatch, addressee not present, it can be coded at the rate of 4 groups per minute  $\frac{29}{4} = 7$ . He writes 7 opposite "Coding". As his superior is not present he writes 1 opposite "Call and Head". Opposite "Text" he writes  $\frac{29}{10} = 3$ . As there is one relay involved to C-in-C BLUE, he writes opposite relaying 1 plus 3 plus 1 = 5. Opposite "Decoding" he writes  $\frac{29}{4} = 7$ . Opposite "Delivery" he writes 1. The total is 24. Adding this to 0705 he gets 0729, the time of delivery to the C-in-C. He enters 0729 under TOD. As there is a relay involved also in the sending of the dispatch to the Commander Scouting Force, he writes 0729 under "TOD" opposite Com.Sco.For. As there is no relay involved for the Com.Bat.For. enter 0705 plus 24-5 = 0724.

As the frequency channels are clear there is no delivery delay. The actual time of release by the Umpire is indicated by "1030, 4 Sept.", the actual civil time of release, not game time. The Umpire's file number, the consecutive number of the dispatch passing through his hands, 234, is placed under "Umpire's File No."

The Umpire then fills out the "Umpire's Communication Record" (Form S-12). From left to right he enters as follows: Umpire's File No. (234), Originator (CCD-3), Time of Origin (0705), Sending Ship or Station (CL-9) Class (C), Addressees (C-in-C BLUE Z, Com.Bat.For. Q, Com.Sco.For. Q), Means (Radio), Method (R), Distance (300), Freq. (4105). The distance for relaying is a matter for the Communication Umpire to investigate, as is the frequency to be used. The Communication Umpire routes the message beyond the first relay, if communication is provided



by the plan in use. Game time of Transmission From (0713, 0713, 0713) To (0721, 0716, 0721). Time of Delivery (0729, 0724, 0729). Epitome, "Reporting position large enemy force 0705". Remarks, delays or interference, if any, in this case none.

This record provides a quick method by which the Communication Umpire can identify a message, or by which he can tell from the previous records whether a given frequency is busy. If frequencies are busy, the delivery time of the message must be delayed until it may be transmitted without interference. In such cases notation is made on the blank in the space provided.

If messages are handled by the Fleet Intercept Schedules, the Communication Umpire notes on the original blank the station sending it out and the time it is sent out. To such times is added the time for decoding, if any, relaying, if any, and one minute for interval delivery.

Finally, the message is delivered to the reproducer and sent out at the proper game time for delivery to the players named.



COMMUNICATION RULES

Rule E-1. It is assumed that vessels and aircraft participating in a game or maneuver possess adequate code and signal books for the communications contemplated in a projected operation.

Rule E-2. Messages are classified in accordance with the vehicle and form by and through which it is intended to effect a transmission of thought. These various classifications are as follows:

- (a) Plain Language
- (b) Code (includes Cipher when required).
- (c) Contact Code
- (d) General signal.

If it is desired to make signals for use in connection with radio bearings, the Text of the blank must be filled in as follows: "Test for ---- minutes", giving the time for which dashes are made for the purpose of testing.

Rule E-3. Messages are handled in the order of their relative importance. The normal order of precedence is as follows:

- (a) Urgent
- (b) Priority
- (c) Normal
- (d) Nite

This order of relative importance applies to messages sent by any one means, or any one radio frequency. It is customary for those making out communication plans to designate a special frequency, usually called a "radio circuit", for maneuvering signals. Such circuits are used for that purpose alone, except in an emergency. The "Battle Line Circuit" is an illustration.

A Contact Report should be designated as "Urgent" when the information is of such immediate importance as to take precedence over tactical signals and urgent messages. Normally, the abbreviated procedure used with the Contact Code gives a sufficient degree of precedence. A "priority" despatch merely indicates unusual emergency, sufficient to ensure its being sent before



any normal despatch. No despatch should be designated "Priority" without a definite and sufficient reason. Whenever practicable, despatches should be designated as "Nite". Priority and normal traffic will be expedited if these principles are observed, since otherwise costly interference is caused.

Contact reports and general signals are always sent in the "abbreviated form", but any despatch within the same formation can be sent in the abbreviated form if so desired. Continuous communication at short range is expedited thereby.

Rule E-4. Table E-1 shows the means, and the availability and suitability of each means for the purpose of effecting communications. These have been placed for convenience in five categories:- (1) Radio, (2) Visual, (3) Sound, (4) Wire and (5) Carriers.

Rule E-5. The various methods employed for the transmission of messages by radio-telegraph are:

- (a) Receipt (R)
- (b) No answer ('F' method or broadcast)
- (c) Intercept (I)
- (d) Repeat back (G)
- (e) Indirect or relay (M)

Rule E-6. All messages transmitted in a game or maneuver will habitually be drafted on the accompanying War College Form S-5 plate E-5.

Rule E-7. The following instructions will govern players in the use of the message form in drafting messages:-

(a) In the space following "From"; fill in title of originator. Example: "Combatships", "Comsubfor", etc.

(b) In the space titled "Ship"; fill in with the name of the ship that the originator is in. Example: "BB-6", "CL-5", etc.

(c) In the space titled "Player"; fill in with the name of the "Originator".



(d) In the space titled "Room No."; indicate the number of the room allocated to the "Originator" of the message for the game or maneuver.

(e) In the spaces following "To" fill in first column either "Z" for action, or "Q" for information.

(f) Fill in second column under "Title" with the titles of the addressees. Example: "Comstriking For"; "Comairbatfor", etc.

(g) Fill in third column under "Player" with name of addressee.

(h) Fill in fourth column under "Room No." with room number of addressee.

(i) In the columns under "Sender Indicate by check" check first column as to whether message is to be sent in plain language, code, contact code, or general signal.

(j) In the second column check as to whether message goes by radio, visual, or sound. If any other means is to be used, write in under "Other".

(k) Check next column as to urgent, priority, normal, or nite.

(l) Check next column as follows: If signal or message is to be executed on receipt strike out "(IX-IM)". If to be executed at a subsequent time, fill in time over "(IX-IM)".

If radio is used fill space marked "Kcs" with frequency taken from communication plan.

Under "Other Instructions" fill out method to be used (Rule E-5). If no method is indicated the receipt (R) Method will be assumed.

(m) The large blank space should be filled with the message, or signal. Text, unless otherwise directed, should be written in plain language. "Office reference and date" group will be employed in all dispatches except contact codes, general signals, and dispatches sent in the abbreviated form. The use of the "time of origin" is invariable, and will be filled out in place designated in lower right corner.



Rule E-8. The Maneuver Rules recognize the various factors which may impose limitations upon any one or all of the various facilities for communication, based upon the results of practical experience. They are designed, however, to adjust such limitations in a manner commensurate and adequate to the playing of a game or maneuver.

Favorable conditions for the transmission of messages will obtain when:

- (1) Vessels concerned are neither firing guns nor under effective gunfire.
- (2) Communication personnel and material are undamaged.
- (3) For visual communications, receiving vessels are advantageously placed and have clear view.
- (4) For flag signals, there is enough relative wind to make flags fly clear.
- (5) For flash communication using a beam visible only in one direction, sending vessel has little roll (or pitch)
- (6) For radio or sound communication, there is no interference and conditions are otherwise favorable, and, with respect to times of transmission, (E-16), when
- (7) Distance is equal to or less than the distances given in Table E-3 and footnotes.

Rule E-9. Communications being handled by a particular means may be handled without regard to those being handled by any other means, except in aircraft where the same personnel must handle both visual and radio.

Rule E-10. Vessels will be reduced in facilities for communication as result of above water damage in action; as may be adjudged by the Director.

Rule E-11. For interference to affect radio reception it must be on the frequency in use. The effect will vary in accordance with the strength of the sending vessel's and the interfering vessel's radio, as heard by the receiving ship. With



sending and interfering signals of equal strength as heard by the receiving vessel, messages can not be gotten through.

With respect to communication by oscillator, a similar problem is presented except that no consideration need be given to the matter of frequency. The effect of interference, however, is much greater and such messages can not be gotten through.

In any case, the Assistant Director of Communications will decide as to the effect of unfavorable conditions in regard to (a) transmission distances; (b) reduction in communication facilities due to damage in action; (c) reduction in number of simultaneous messages (E-9), (E-12); (d) increase in transmission times and imperfect reception.

Rule E-12. (a) Table E-2 shows for bridge communications -

- (1) Maximum transmission distances.
- (2) Maximum number of simultaneous hoists that can be made or bridge messages (incoming or outgoing) that can be handled at the same time by each means, as determined by limitations of equipment.
- (3) Maximum number of bridge messages, by any or all means, that can be handled at the same time, as determined by limitations of personnel.

(b) Table E-3 shows, for radio and for under-water sound communications.-

- (1) Maximum reliable transmission distances.
- (2) The number of transmitters and receivers available with the frequency range of each. As far as the instruments on board an individual ship are concerned unfavorable interference will be caused by any signal, incoming or out-



going, that is, on a frequency within 30 kcs of a receiver's setting. The number of messages that can be handled simultaneously by any vessel is therefore variable, depending upon the frequency adjustments of the instruments. In general, each operator has a transmitter and a receiver tuned to the same frequency, subject to transmission, reception and interruption on that frequency similar to a person in verbal conversation. The extra receivers may be used on "listening circuits", the frequencies of which differ by more than 30 kcs from any other frequency guarded. Subject to this limitation, the number of circuits that can be fully guarded, that is, with transmitter and receiver, is equal to the number of transmitters, and other frequencies can be guarded by "listening only" until the receivers are all in use. One operator may guard two "listening" frequencies by using "split-phone" method.

Rule E-13. The distances given in Table E-3 and footnotes are the maximum reliable transmission distances. These distances may, if desired, be reduced by the player, by a proportionate reduction in transmitter power, except that any signal can be read at fifteen miles and heard well enough to take a radio compass bearing at 30 miles. If communication distance is less than the maximum given in Table E-3, it is assumed that each player reduces power of transmission so that his signal cannot be read at a distance more than ten percent greater than



the actual distance of communication, or heard at a distance greater than 50 percent more than that actual distance. A full-power signal can be heard well enough for radio direction finder bearings at a distance 50 percent greater than the distance given in Table E-3, but no radio direction bearings whatever can be obtained on a signal of frequency greater than 1000 kcs.

Rule E-14. (a) Effective distance for radio will be reduced to one-half that otherwise determined when reception is by radio direction finder or by a plane.

(b) Submarines submerged to a depth greater than maximum periscope depth can neither transmit nor receive by radio.

(c) At maximum periscope depth or less, without showing periscopes, submarines (1) can receive high power low frequency (100 Kcs and below) shore stations at distances up to one-quarter of the reliable range of such station, (2) can receive strong signals on the intermediate frequencies (100 to 2000 Kcs), (3) can not transmit at low or intermediate frequencies (2000 Kcs and below).

(d) At maximum periscope depths or less, when showing periscopes, submarines can transmit and receive on high frequencies (2000 Kcs and above).

(e) By exposing a foot of the A frames and loop antennae, submarines can transmit and receive on the intermediate frequencies (100 to 2000 Kcs) with a range one-half of that when on the surface.

Rule E-15. When tactical or other signals require an executive sign to render them operative, unless such execution be designated by hour or position by the Originator, the time of execution will, in accordance with communication procedure, be fixed by the Communication Umpire. (When such signals are paralleled by other means, the first signal received will be taken as effective).



Rule E-16. (a) The computation of communication time for War College purposes is based upon average experience. The times given in these rules represent what is to be expected under favorable conditions. They are given in Table E-4. Delays may be assigned by the Director to cover unusual or unfavorable circumstances.

(b) The method of computation is based upon the following assumptions:

(1) That due to the presence on duty of the whole of the ship's coding board.

(2) That in accordance with the latest practice, the time of origin group at the end of every despatch is assigned in the communication office of the vessel, hence that time represents the time the despatch is delivered there for coding, if any, and transmission.

(3) That for normal despatches, the transmission time for the call and heading is one minute for radio and two minutes for visual despatches. (See (7) and (8)).

(4) That mixed letter code is transmitted at the rate of ten words per minute by any method.

(5) That plain language is transmitted at the rate of 20 words per minute by radio, and ten words per minute by visual methods.

(6) The nearest whole minute computed on the basis of (4) and (5) is taken as the transmission time.

(7) That all radio despatches within the command are sent in "abbreviated form" on circuits sufficiently well established that calling is not necessary. Hence for such messages the one minute delay mentioned in (3) is not charged.



(8) That contact reports and general signals are habitually sent by radio in abbreviated form and on well established circuits, hence for such despatches the one minute delay mentioned in (3) is never charged. Similarly, with the addressee present, code messages are not charged with the one minute delay.

(9) That each relay entails a delay equal to the time of transmission of the text, plus (in all cases and conditions) one minute for the call and heading, plus one minute for changing the heading and recording.

(10) That the time of internal delivery at the office of receipt is one minute.

(11) That the total time represents the number of minutes from the time that the despatch reaches the communication office on the transmitting ship until it reaches the action office on the receiving ship.

(c) In view of Rule E-16 (b) (2), the time of origin of an outgoing despatch, in answer to one incoming, can not be less than two minutes later than the time of delivery of the incoming despatch unless the outgoing despatch is a general signal.

(d) A period of five minutes is required to shift a transmitter from one frequency to another. If a spare transmitter in the same frequency band is available, this delay need not be charged. During this shift the transmitter is considered as out of commission.

Rule E-17. (a) Cable and land wire messages may be sent over existing lines, provided they do not traverse enemy country.

(b) A ship may send such a message one hour after arrival at the port where the message is to be sent, or it may be sent ashore at any time by any method available for transmission through a U.S. Naval Communication shore station.



(c) It must be addressed to a ship or station at a port or place named in the address, or to "Senafloat".

(d) It will be received at the place of address after an interval of two hours after sending.

(e) If any vessel or station of the same navy is in the port of address, the message will be delivered to the senior officer present one hour after its receipt.

(f) If the ship addressed is present, the senior officer present will forward the message to her immediately.

(g) If the ship addressed is not present, the senior officer present may relay the message under the same conditions as if it were an original message.

Rule E-18. The player detailed as Commander-in-Chief of either side, in other than purely tactical games, must ensure that the Communication Umpire is furnished with a complete communication plan for his forces. This plan must include the statement of facilities for communication with shore, especially in the matter of Intercept Schedules. Before Intercept Schedules can be used, the Communication Umpire must be advised of the list of stations participating, the times that each station broadcasts, the frequencies on which these stations are habitually to send and receive, and the apparatus present at each station. Subject to the provisions initially applied in the statement of the problem, the apparatus enumerated in Table E-3 may be used at shore stations with the characteristics and capabilities shown.

Rule E-19. The radio times given in Table E-4 are for messages transmitted by the "R" method or receipt method to eight or less receiving stations. If sent under other conditions, the transmission times will be increased as follows:

"R" - Increase one minute for each eight (or fraction thereof) additional receiving stations.

"F" or "I" - Double; assuming message transmitted through twice.

"G" - Multiply by number of recipients.



Rule E-20. (a) Communication times will be assigned by the Communication Umpire in accordance with Table E-4, subject to change by the Director when conditions are unusual or unfavorable.

(b) The Communication Umpire will report unusual circumstances to the Director. He will report to the Director when radio signals are sent which might be picked up by the radio direction finders or intelligence circuits of the opposing side.

(c) The Communication Umpire will route despatches as governed by prevailing conditions and by the communication plans furnished by the players. Discrepancies in the latter will be reported by him to the Director.

(d) The Communication Umpire will keep a file of the originals of all despatches, and keep up to date the "Communication Umpire's Record", Form S-12. After the critique, he will turn these records in to the Director.



SECTION F - GUNFIRE

Tactical

Rule F-1. The basic conditions for construction of fire effect tables and gunfire rules are:

- (a) The ship is firing by direct fire.
- (b) No other ship is firing at the same target.
- (c) The main battery only is in use.
- (d) The range has been established.
- (e) The ship is under normal fire.
- (f) The ship is on a steady course at a constant speed.
- (g) The target does not change course or speed.
- (h) The rate of change of range is small.
- (i) The target remains the same as during preceding move.
- (j) The fire of the ship is not divided.
- (k) There is no enfilade fire.
- (l) The visibility conditions are good; no spray; no smoke or gas interference; no sun glare.
- (m) Roll and pitch not excessive.
- (n) The ship is undamaged.

Rule F-2. (a) The fire effect for the basic conditions is as given in the fire effect tables and fire effect diagrams, expressed in terms of equivalent 14" penetrative hits, and based in each case upon:

- (1) Type and number of guns firing;
- (2) target size (A-2);
- (3) range (F-13);
- (4) spotting position (F-6), and
- (5) whether hits are penetrative (F-16).

(b) For conditions other than basic, the fire effect given in the tables and diagrams is subject to three successive corrections, each of them being an increase or decrease of a number of tenths.



(c) The effect on the potential volume of fire caused by the total above-water damage received, and directly proportional to it, is applied as a first correction, the result being the remaining normal fire effect.

(d) The net effect of conditions which principally affect the rapidity of fire is taken as a second correction. Applying this to the figure of remaining normal fire effect, the result is taken as the measure of fire effect delivered.

(e) The net effect of conditions which principally affect the accuracy of fire is taken as a third correction. Applying this to the figure of fire effect delivered, the result is taken as the measure of fire effect inflicted on the target ship.

(\*) Independently of the foregoing, the greater efficiency of gun fire of vessels originally built for combatant purposes as compared with auxiliaries and armed merchantmen is recognized, and the fire effect of the guns of the latter vessels will be reduced by 50% in computing the fire effect which they inflict.

Rule F-3. Ammunition allowance per gun is as given in the "FLEETS".

Rule F-4. (a) Fire control conditions are:

- (1) Gunlaying: (a) Pointer;  
(b) Director (F-5);  
(c) Stable zenith director and generated bearing (F-5);
- (2) Spot: (a) local control (F-6);  
(b) top spot (F-6);  
(c) plane spot (F-6, 7);
- (3) Method: (a) direct (F-8);  
(b) indirect (F-9);  
(c) barrage (F-10);  
(d) bombardment (F-11).



(b) The normal condition of gunfire is by director, top spot, direct fire.

(c) Move Blanks on which gunfire and fire distribution are recorded must indicate the kind of lay, spot and fire-control method in use.

Rule F-5. (a) Director fire is used by main, secondary and anti-aircraft batteries of large and intermediate size fighting types, and by main batteries of small size and of destroyer type fighting ships except where the latter are not fitted with director systems as indicated in the Fleets. (A-2). Destroyer type fighting ships not equipped with director systems and other vessels use only pointer fire. No distinction is made in the fire effect tables between director and pointer fire, but director fire is less penalized by certain favorable firing conditions.

(b) Capital ships with guns of 12" and above in caliber and certain late heavy cruisers have one stable zenith director each, for use with their main batteries only. No other ships have stable zenith directors. Except as provided in Rule F-9 (d), indirect and bombardment fire can only be used with stable zenith director.

(c) A capital ship receiving 70 per cent above-water damage can no longer fire by director or stable zenith director. Other vessels equipped with directors can no longer use director fire after receiving 50 per cent above-water damage. (F-47).

Rule F-6. (a) Accuracy of gunfire by direct fire (F-8) will vary according to spotting position used.

(b) The fire effect tables give fire effect for top spot and plane spot.

(c) For local control the direct fire of guns of 5.5 or larger caliber will be reduced as a third correction, as follows:



<u>Range</u>	<u>Penalty, tenths</u>
0-5	0
6-10	2
11-15	4
16-20	6
21-25	8
26 plus	10

(d) The fire of guns of 5" or smaller caliber will not be penalized for local control, as the fire effect tables for such guns are constructed for local control conditions.

(e) The possibility of confusing enemy spotting and fire control by utilizing a short range barrage from secondary battery is recognized and will be considered if appropriate plan is submitted by the player.

Rule F-7. (a) Plane spot may be used for the main battery fire of a director ship (F-5) provided

- (1) Definite assignments of spotting plane(s) for the ship and definite communication provisions



have been previously made.

- (2) at least one spotting plane allotted to that ship alone is in spotting position and can distinguish the ship's target and the ship's splashes.

(b) To be in spotting position a plane must be not farther from target than one mile less than recognition range as given in visibility tables and at an altitude of at least 1000 feet unless more than 20,000 yards from the target, in which case the altitude of the plane must be at least 1500 feet.

(c) A vessel receiving fifty per cent or more of gunfire damage (F-47) can no longer use plane spot.

Rule F-8. (a) Direct Fire is the method by which a ship fires on a selected target visible to her, and tries to keep the M.P.I. of her salvos on that target.

(b) Direct fire may be by either director fire or pointer fire.

(c) Direct fire is the condition for which the fire effect tables have been constructed. (F-1).

(d) At the Director's discretion, vessels of the destroyer class can be grouped together in divisions (or half flotillas) for purposes of scoring fire effect by direct fire on a single ship target or on a group target consisting of a division (or half flotilla) of destroyer-class vessels.

Rule F-9. (a) Indirect fire is the method by which a ship fires at a selected target not visible to her, and by detached observation, normally plane spot, tries to keep the M.F.I. of her salvos on that target.

(b) Ships using stable zenith directors and generated bearing (F-5) with plane spot (F-7) can use indirect fire on any target without requiring a point of aim.

(c) Other director ships using plane spot can use indirect fire provided

- (1) the target is fixed; not moving; and



- (2) a fixed point of aim is available, bearing within five degrees of the target; or
- (3) a clear sea horizon exists on the opposite bearing from the target.

(d) Indirect fire by stable zenith director and generated bearing differs from other methods of fire in regard to effect of visibility conditions, opening fire, shifting fire, enemy fire, change of course, and target change of course or speed. In addition to the penalties from any or all of these factors, the effect of indirect fire by stable zenith director and generated bearing will be reduced by four tenths as a third correction, to allow for imperfect control in azimuth.

(e) Subject to the above, and to F-5 (b), the effect of indirect fire is scored in the same way as that of direct fire.

Rule F-10. (a) Barrage fire is the method by which a ship fires with a fixed gun range in the direction of a selected point of aim visible from the firing ship, with the purpose of having the target or targets pass through the barrage thus laid.

(b) Barrage fire may be used with either pointer or director gun laying.

(c) Because of the artificialities connected with the handling and the scoring of Barrage fire by any other method, it will be scored the same as Direct Fire.

Rule F-11. (a) Bombardment is the method by which a ship fires into a certain area, with the purpose of inflicting damage on targets in that area. It may be used only against shore targets or vessels at anchor.

(b) Ships using stable zenith director and generated bearing can use bombardment fire to fire with predetermined compass bearings and gun ranges. All director ships can use bombardment fire provided auxiliary point of aim is available as a reference.

(c) Ranges and bearings, at which firing will occur for the beginning and for the end of the move, will be stated on the Move Blank in advance.

(d) Before employing Bombardment Fire, the player must give advance information to the Director of a satisfactory plan for its use.

(e) Method of handling and scoring the effect of bombardment is prescribed in Rule F-46.



Rule F-12. (a) Except as provided in Rules F-22 and 46 and in special cases to be determined by the Director, for gunfire purposes the positions of ships at the end of a move are considered to have been occupied during the entire move. For gunfire purposes all moves, of whatever length, will be divided into three minute increments unless smaller increments are necessary for scoring extremely short-range gun actions.

(b) For gunfire, the range, target angle and relative bearing of target (as affecting the portion of the battery that will bear) are taken at the end of the move.

Rule F-13. (a) Range, for gunfire purposes, is the distance in thousands of yards, from firing vessel to target.

(b) Actual ranges of 0 to 1500 yards are considered as a range of 1; 1500 to 2500, as a range of 2; and so on.

Rule F-14. (a) The maximum range imposed on each type of gun by its mounting is as given in the FLEETS.

(b) Vessels may fire at any range that is within this maximum, and will be credited with hits made at any such range.

Rule F-15. (a) The target angle is the angle between the line of fire and the keel line of the target ship. With the target broadside-on, target angle is 90; end-on, zero.

(b) For the purpose of determining whether hits are penetrative, the target angle will be recorded as the nearest even multiple of 15 degrees.

Rule F-16. (a) Penetrative hits are hits which can penetrate the armor of the target ship under existing conditions of range and target angle.

(b) Limiting ranges for armor penetration are given in the fire effect tables and diagrams.

(c) Penetration of deck armor is independent of target angle.

(d) For fire against armored ships under conditions where the armor can not be penetrated, the value of normal fire effect is as given in the tables for non-penetrative fire.



(e) For fire against armored ships under conditions where there is side penetration only, and for all fire against unarmored vessels, the value of normal fire effect is as given in the tables for penetrative fire.

(f) When long range plunging fire can penetrate armored decks with delay-action fuses, a larger proportion of vital target area is exposed than is the case when only side armor is penetrated at shorter ranges. It is assumed that 12" and larger guns have long-delay fuses; 7.5 to 10", medium delay; with 6" a slight delay permitting at least partial penetration where penetration occurs, and smaller guns, no delay. When, in fire against armored vessels with guns of 6" or larger caliber, there is either (1) deck penetration only, or (2) both side and deck penetration, the normal value of penetrative fire effect as given in the tables will be multiplied by the appropriate figure from the sub-joined table:

<u>Gun</u>	<u>Target size</u>	<u>Penetration</u>	
		<u>Deck</u>	<u>Deck and Side</u>
12" plus	Large	1.2	1.3
12" plus	Int., Small	1.1	1.2
7.5 - 10"	Any	1.1	1.2
6"	Int., Small	1.1	1.2

No increase for deck penetration will be allowed for fire against unarmored vessels, or for fire with guns smaller than 6" (A-2).

(g) In the figures given in the FIRE EFFECT DIAGRAMS, the above increase for deck penetration, or both side and deck, have been made.

Rule F-17. (a) For game-board purposes, to be considered as adjacent vessels, ships must be in the same formation, not more than 1500 yards apart, with no vessels intervening between them.

(b) Not more than three vessels can be considered together as adjacent vessels.



Rule F-18. (a) For direct fire, the range may be established at any range provided

- (1) the target is visible from the firing ship;
- (2) the range is within the maximum range of the battery (F-14);
- (3) the fire effect tables give more than zero effect.

(b) During the move in which gunfire is opened, one or more salvos may be required for ranging before the target is straddled. As a third correction, the fire effect for the opening fire move is reduced as follows:

<u>Range</u>	<u>Penalty</u> <u>tenths</u>	
	<u>Top spot</u>	<u>Plane spot</u>
0-5	0	0
6-10	1	1
11-15	2	2
16-20	4	3
21-25	6	4
26-30	9	5
31 plus	10	6

Rule F-19. (a) The range may be established by indirect fire, using either of two methods for getting on in deflection;

(1) by visual bearing; having the spotting plane take position between ship and target, in sight of both, and signal when on this bearing; (2) by radio bearing; having spotting plane take position over the target, or, in line between ship and target, and make radio signals on which the firing ship takes radio compass bearings. In either case range is established by the plane's making an initial estimate of range, then spotting on.

(b) The visual bearing method may be used provided

- (1) the range is within the maximum range of the battery. (F-14).
- (2) requirements of Rule F-9 are met;
- (3) plane can see and distinguish both firing ship and target;
- (4) firing ship can see and distinguish the bearing plane.

(c) The radio bearing method may be used provided

- (1) the range is within the maximum range of the battery. (F-14)



(2) requirements of Rule F-9 are met;

(3) firing ship is a BB or CC.

(d) In establishing the range by indirect fire, the fire of a ship for the move in which she opens fire is of no effect in scoring damage on the target.

Rule F-20. The range having been established and maintained by direct fire, the fire may at any time be continued by indirect fire, subject to Rule F-9.

Rule F-21. (a) If a stable zenith director ship (F-5) not using plane spot which is firing by direct fire and has established the range loses sight of her target, she may continue to fire, using indirect fire by stable zenith director and generated bearing, and basing her fire control on the assumption that the target holds the same course and speed as determined while in sight.

(b) Such continuation fire will have, during the first move after the target is lost to view, six-tenths of the value of direct fire, but no effect thereafter, unless continued as bombardment fire; or unless the target re-appears.

Rule F-22. (a) When, owing to the interposition in the line of fire of smoke, another ship, or other obstruction, the fire would be halted for all or part of a move, fire effect will be reduced, as a second correction, by a number of tenths proportional to the part of the move during which fire was masked. For game board purposes, vessels cannot fire directly over vessels of their own or larger size which are 1000 yards or less from them; or over vessels of smaller size which are 700 yards or less from them; and in any case only if the angle of elevation will carry projectiles well over such intervening ship.

(b) If during part of a move, a firing vessel has been headed so as to mask all or part of her battery, due to the limits of train, the Director will reduce her fire effect, as a second correction, by a number of tenths proportional to the loss of fire resulting therefrom.



(c) When four or more ships are firing in a single line of bearing of individual ships of less than  $165^{\circ}$  or more than  $195^{\circ}$  as measured from the guide and the guide's course, masking of fire between ships will occur and will increase progressively. In this case there will be imposed on gunfire, as a second correction, a penalty of one-tenth in each move after the second move since the line of bearing was taken. This penalty will be increased one-tenth in each successive move after the third until four-tenths is accumulated, when the penalty will remain constant at four-tenths.

NOTE: The "Formations and Maneuvers of the Battle Line" or "Battleship Tactical Instructions", provides certain battle formations designed to avoid this penalty.

Rule F-23. (a) A ship firing by direct fire which has established the range, thus determined her hitting ballistic, and then ceased fire, can re-establish effective direct fire more quickly than on her initial opening of fire, provided conditions are unchanged and the target is within the range of accuracy of her range-finders.

(b) A ship thus re-opening direct fire on the same or a new target is not subject to the penalty of Rule F-18, provided

- (1) new line of fire is within 15 degrees of that previously used;
- (2) new range is within 4000 yards of that previously used;
- (3) not more than fifteen minutes have elapsed since previous effective direct fire;
- (4) range is not greater than the following:

<u>Firing ship</u>	<u>Range</u>
BB or CC	25
Other large or intermediate fighting types (A-2, previously quoted)	15
Small fighting types (A-2, previously quoted)	10

- (5) ship has not been, throughout previous fire, and is not, on re-opening fire, subject to penalty for reduced visibility. (F-43).



(c) Except as provided in (a) and (b) of this rule, a ship firing by direct or indirect fire which has ceased fire for one or more moves must, on re-opening direct or indirect fire, re-establish the range. (F-18, 19, 22).

Rule F-24. With bombardment fire, the fire effect for the opening fire move is not subject to opening-fire penalty, except as provided in Rule F-25.

Rule F-25. When fire is opened by direct fire on a target which has just appeared in view of the firing ship, the time required to get the battery on in train and to get sights set will reduce the fire effect for that move, for surprise fire, as a second correction, three tenths. This is independent of Rules F-18 and F-23.

Rule F-26. (a) When direct or indirect fire is shifted to a new target, a penalty of three tenths at ranges above 11,000 yards two tenths from 6,000 to 10,000 yards, and one tenth from zero to 5,000 yards will be applied, as a second correction, to the fire effect for that move, unless the new target is adjacent to the old, in which case there is no penalty. (F-17).

(b) Direct or indirect fire will, in addition, be subject to the rules for opening fire (F-18, 19), provided

- (1) the difference of range from old to new target is over 4,000 yards; or
- (2) the change in target bearing is more than fifteen degrees; or
- (3) the new target is on a materially different course or speed from the old.

(c) With indirect fire, the fire of a battery can not be shifted more often than once in four moves.

Rule F-27. (a) To divide the fire of a battery on two targets, the guns firing on each target must be controlled as separate groups.

(b) Capital ships have duplicate primary systems of fire control and can, without loss of efficiency, fire their forward turrets as one group and their after turrets as another group.



Plane spot may be used for both groups, provided there is a plane to spot each group in accordance with the requirements of Rule F-7.

(c) Cruisers have duplicate director systems and can, without loss of efficiency, control two groups separately as follows:

- (1) Forward and After groups.
- (2) Port and Starboard groups.

In the Omaha type, when using combination (1) the casemate guns on the side opposite that on which the other guns of the group are firing can be fired with local control only. When using combination (2) both turrets may be grouped on either broadside, or one on each.

(d) Ships other than capital ships and CLs have only one primary system of fire control.

(e) The fire of groups in excess of the number thus permitted can be handled only by local control. (F-6).

(f) The torpedo defense battery of a capital ship may be divided into four groups, each group having separate control and Director fire. The two groups on a broadside may be combined into one.

Rule F-28. (a) Concentration of fire by day of two or more ships on the same target is subject to no penalty in case:

- (1) the fire is that of the main batteries of not more than three capital ships or three 8" cruisers in the same formation; or
- (2) fire is by direct method at ranges not greater than

<u>Caliber</u>	<u>Range</u>
12" plus	6
5½-11"	4
5" minus	3

- (3) fire is by bombardment method.

(b) Under any other conditions, with n ships firing on the same target, the fire of each will be reduced, as a third correction, by n tenths, unless the concentration is by a capital ship with one of any other type, or an 8" cruiser with one ship



having a battery of less than 8" guns, in which cases the capital ship and cruiser respectively will not be penalized.

(c) Bombardment fire is not subject to penalty for concentration.

Rule F-29. (a) The volume and accuracy of a ship's fire vary according to the amount of enemy fire directed against her. This effect of well-aimed enemy fire varies with (1) caliber of enemy guns; (2) frequency of enemy salvos; (3) number of guns per salvo; and (4) character of ship under fire.

(b) For game-board purposes, four degrees of intensity of enemy gunfire are considered, in which the enemy guns are of a caliber large enough to be suitable for the principal armament of a ship of the general type of the ship which is under fire -

- (1) Not under effective fire: enemy guns two or less.
- (2) Under less than normal fire: number of enemy guns less than normal battery for average ship; for BB or CC, three to six.
- (3) Under normal fire: number of enemy guns about that for normal battery for average ship; for BB or CC, seven to twelve.
- (4) Under concentration: under fire of two or more enemy ships, with total number of enemy guns more than for normal battery of average ship; for BB or CC, thirteen or more.

(c) The fire effect of a firing ship will be increased, as a second correction, two tenths if not under effective fire; one tenth if under less than normal fire.

(d) When under the concentrated fire of a number of guns equivalent to n batteries of a ship of her own general type, the fire effect of a ship's turret battery will be decreased, as a second correction by (n minus one) tenths; of all other guns, by n tenths; but n can in no case be greater than the number of ships actually firing on her.

(e) Independently of the foregoing, being under the fire of a number of guns smaller in caliber than those considered above will reduce the fire effect otherwise allowed for being under minor fire, as a second correction, one tenth, provided the volume of such minor fire is at least that of the following



number of guns:

<u>Caliber</u>	<u>Number</u>
7"5 to 10"	10
5" to 6"	14
under 5"	20

Rule F-30. (a) Change of course during a move by a firing vessel will reduce her fire effect by any method (F-4) for that move as follows, based on the number of degrees of aggregate change during the move.

(b) With pointer fire, for an aggregate change of ten degrees or less, no penalty, ~~unless imposed by (e) of this rule.~~ For an aggregate change of more than ten degrees, fire effect will be reduced, as a second correction, one tenth for each ten degrees in excess of ten; that is:

<u>Aggregate change, degrees</u>	<u>Penalty, tenths</u>
0-10	0
11-20	1
21-30	2
31-40	3
41-50	4
51-60	5
61-70	6
71-80	7
81-90	8
91-100	9
101 and more	10

(c) With director fire, for an aggregate change of thirty degrees or less, no penalty, ~~unless imposed by (e) of this rule.~~ For an aggregate change of more than thirty degrees, fire effect will be reduced, as a second correction, one tenth for each twenty degrees in excess of thirty; that is:

<u>Aggregate change, degrees</u>	<u>Penalty, tenths</u>
0-30	0
31-50	1
51-70	2
71-90	3
91-110	4
etc.	

(d) With indirect fire, fire effect will be reduced, as a third correction, by the same amount as in pointer fire, paragraph (b) of this rule.



Rule F-31. (a) If a target vessel changes course, the direct fire of the main battery of a BB, CC or CL on her will be reduced, as a third correction, in tenths as follows, based on speed of target and on change of course during the move away from the course at the beginning of the move:

<u>Net change</u>	<u>Penalty, at range of 16 or less at target speeds</u>			
	<u>6-10</u>	<u>11-21</u>	<u>22-29</u>	<u>30 plus</u>
15-30	0	0	0	1
31-44	0	0	1	1
45-59	0	1	1	2
60-74	1	1	2	3
75-89	1	2	3	4
90 plus	-	3	4	5

For ranges over 16, increase the above figures by one tenth, except with plane spot.

(b) For the fire of batteries other than the main batteries of ships listed in (a) above, increase by one-tenth the penalty prescribed in (a) of this rule.

(c) For indirect fire, double the penalty prescribed in (a) of this rule.

Rule F-32. If a firing vessel changes speed, her fire effect will be reduced, as a third correction, by the following number of tenths for each two knots change during the move:

<u>Fire</u>	<u>Penalty, tenths</u>
(1) Direct	1
(2) Indirect	1

Rule F-33. If a target vessel changes speed, except by reason of damage (Rule F-47), fire on her will be reduced, as a third correction, by the following number of tenths for each two-knot change during the move, provided the range is greater than 5,000 yards:

<u>Fire</u>	<u>Penalty, tenths</u>
(1) Direct	1
(2) Indirect	2



Rule F-34. (a) Large rate of change of range reduces the effect of direct fire, as a third correction, as follows, based on range and amount of change during a three-minute move:

<u>Range</u>	<u>Change, thousands yards per move</u>	<u>Penalty tenths</u>
1-5	2	0
	3	1
	4	2
6-20	2	1
	3	2
	4	3
21 plus	2	2
	3	4
	4	6

(b) For indirect fire, at any range:

<u>Change, thousands yards per move</u>	<u>Penalty, tenths</u>
2	3
3	6
4	9

(c) Change of less than 2 per move is not effective to reduce fire effect.

(d) Rate of change of range has no effect upon scoring of bombardment fire.

Rule F-35. Following a night visibility contact, a vessel firing at close range may experience very rapid change of relative bearing of the target, due to the relative course and speed of the ships and to the maneuvers of the firing ship. This may seriously interfere with the rapidity and accuracy of the fire, may interfere with the illumination, and may even make it impossible for the firing ship to pick up and follow the target with her battery.

At the Director's discretion, taking into consideration the above factors, penalties to reduce fire effect may be assigned as second and third corrections.

Rule F-36. (a) When, owing to the relation between the course and speed of a firing ship and the direction and force of the wind, gun gases, funnel gases, or funnel smoke from the firing ship or other nearby ships may drift across the line of fire, the fire of such ship is penalized, unless firing by



stable zenith director (F-5).

(b) The gas penalty, effective when gases but no funnel smoke so intervenes, is the reduction of fire effect, as a third correction, one tenth.

(c) The smoke penalty, effective if funnel smoke so intervenes, is the reduction of fire effect, as a second correction: by day, three tenths; by night, five tenths.

Rule F-37. (a) When, owing to the character and direction of the sea and wind with relation to the course and speed of a firing vessel, spray is thrown over gun positions, the fire of such vessel may be reduced thereby.

(b) The spray penalty is operative when the wind has a force of four or more, and its absolute (not relative) direction is from 15 degrees or more forward of the beam on the engaged side, or from dead ahead. It reduces fire effect, as a second correction, two tenths.

(c) For ships using director or stable zenith director fire, the spray penalty is not effective with regard to the fire of turret guns.

Rule F-38. (a) When the character and direction of the sea are such as to cause a firing vessel to roll more than usual, the effect on ammunition handling and gun pointing may slow the fire.

(b) The roll penalty is operative when the sea is from a direction between 15 degrees forward of the beam and 60 degrees abaft the beam. It reduces fire effect, as a second correction in tenths, as follows:

<u>Sea</u>	<u>Penalty</u> <u>For vessels of size</u>		
	<u>Large</u>	<u>Int.</u>	<u>Other</u>
Moderate	3	4	5
Rough	4	5	6
Heavy	5	6	7

(c) For vessels using director or stable zenith director fire, the roll penalty is two tenths less than the above.



Rule F-39. (a) When the character and direction of the sea are such as to cause a firing vessel to pitch more than usual, the effect of gun laying will reduce the fire effect.

(b) The pitch penalty is operative when the sea is from a direction 20 degrees or less from ahead. It reduces fire effect, as a second correction, in tenths, as follows:

<u>Sea</u>	<u>Penalty</u> <u>For vessels of size</u>		
	<u>Large</u>	<u>Int.</u>	<u>Other</u>
Moderate	1	2	3
Rough	2	3	4
Heavy	3	4	5

Rule F-40. (a) When the character and direction of the sea are such as to cause a firing vessel to yaw more than usual, the effect on gun laying will reduce the fire effect.

(b) The yaw penalty is operative when the sea is from a direction 30 degrees or less from astern. It reduces fire effect, as a second correction, in tenths, as follows:

<u>Sea</u>	<u>Penalty</u> <u>For vessels of size</u>		
	<u>Large</u>	<u>Int.</u>	<u>Other</u>
Moderate	3	4	5
Rough	4	5	6
Heavy	5	6	7

Rule F-41. When both main and second batteries of turret ships are firing on the same side, the direct fire effect of the main battery at night will be reduced for battery interference, as a second correction, three tenths; and the fire of the second battery firing on that side, day or night, by any method of fire (F-4), will be reduced, as a second correction, five tenths.

Rule F-42. (a) When a vessel is firing into the glare of the sun, the accuracy of her direct fire is reduced.

(b) The sun glare penalty is operative during the two hours after sunrise and the two hours preceding sunset, if sky is clear, when the target bears within fifteen degrees of the sun.

(c) With director fire, the sun glare penalty reduces direct fire effect, as a third correction, one tenth.

(d) With pointer fire the sun glare penalty is three tenths,







(2) Night - using star shells or flares.

Range in thousands of yards.	Max. Value 3d. multiplier in tenths.					
	BB & CC Main	CA, CV 8", 7" 5	CL & CV CF	DD & DL	BB Second.	Other Types
13-15	1	0	0	0	0	0
11-12	2	1	0	0	0	0
9-10	3	2	2	0	2	0
7-8	4	3	3	1	3	0
5-6	5	4	4	2	4	1
3-4	5	4	4	3	4	2
0-2	4	3	3	2	3	1
Additional if searchlights are used in combination with star shells or flares.						
7-8	0	0	0	0	0	0
5-6	1	1	1	1	1	1
3-4	2	2	2	2	2	2
0-2	3	3	3	3	3	3

(3) Night - using searchlights only.

Range in thousands of yards	Max. Value 3d. multiplier in tenths					
	BB & CC Main	CA, CV 8", 7" 5	CL, CV CF	DD & DL	BB second.	Other Types
10-12	0	0	0	0	0	0
9	3	2	2	0	2	0
7-8	4	3	3	1	3	0
5-6	6	5	5	3	5	2
3-4	7	6	6	5	6	4
0-2	7	6	6	5	6	4



Rule F-44. (a) When the target ship is silhouetted against the eastern horizon before sunrise or the western horizon after sunset, the firing ship will not be penalized for reduced visibility.

(b) This rule applies only during the twilight period, and when the target ship bears within 30 degrees of the sun.

(c) If due to haze or a cloudy sky during the sun-glare period (F-42), the target ship is silhouetted against the horizon, direct fire against her will be increased, as a third correction, two tenths.

Rule F-45. (a) With direct or indirect fire, when a ship other than the target ship is within the area where the salvos of the firing ship are falling, she is liable to damage by enfilade.

(b) To be subject to damage by enfilade, a vessel must be within 100 yards of the line of fire, and within 1200 yards of the target.

(c) Enfilade damage is scored as follows:

- (1) Determine whether hits on the vessel are penetrative or non-penetrative (F-16);
- (2) if conditions of target size (A-2) and penetration (F-2, 16) are not the same for target ship and enfiladed ship, translate the figure of fire effect delivered (F-2) upon the target ship into the corresponding figure of fire effect delivered upon the enfiladed ship.
- (3) apply as fire effect inflicted upon the enfiladed ship the following number of tenths of fire effect delivered against her, based on distance between target ship and enfiladed ship:



<u>Distance from target</u>	<u>Enfilade, tenths</u>
0-200	9
201-300	8
301-400	7
401-500	6
501-600	5
601-700	4
701-800	3
801-1000	2
1001-1200	1

Rule F-46. (a) In scoring bombardment fire, the positions of the M.P.I. at the beginning of the move and at the end of the move will be plotted, and these positions will be connected by a straight line which will be taken as the track of the M.P.I. during the move.

(b) A target which is found to have been within 1200 yards of this track, measured in either direction along the line of fire, and within 100 yards of the line of fire, will be subject to damage.

(c) The figure of fire effect delivered will be determined in the same way as for direct fire, taking in every case the figures for plane spot, and making first and second corrections appropriate to the actual conditions.

(d) The figure thus determined for fire effect delivered will not be subject to any third correction.

(e) The amount of fire effect inflicted upon a target within the salvo limits, as prescribed by (b) of this rule, will be in tenths of fire effect delivered, this number being based upon

- (1) proportion of move during which target has been within salvo limits as defined in sub-paragraph (b) above;
- (2) mean distance of target from M.P.I. during this time, using for this factor the enfilade table (F-45).

Rule F-47. (a) Damage to ships is classed as

- (1) above-water damage, due to gunfire or bombs;
- (2) under-water damage, due to torpedoes, mines, bombs, ramming or grounding.



(b) Only above-water damage inflicts a permanent reduction in gunnery effectiveness.

Each ten per cent of above-water damage reduces normal fire effect, as a first correction, one tenth. (F-2).

(c) Communication equipment and ability will be reduced according to the amount of above-water damage received. (Rule E-10).

(d) Any vessel, other than a capital ship, which has received 30% above-water damage shall lose 10 per cent of her original maximum speed.

(e) A vessel which has received 50 per cent above-water damage

(1) can no longer use director fire, except capital ships (F-5);

(2) can no longer use plane spot (F-7);

(3) loses all planes then on deck;

(4) can no longer fly planes off or on;

(5) if a capital ship loses 20 per cent of her original maximum speed; any other vessel loses an additional 10 per cent of her original maximum speed;

(6) if a submarine, can no longer submerge;

(7) if carrying mines, can no longer lay them;

(8) loses one-half her deck tubes and torpedoes on each side.

(f) A vessel which has received 70 per cent above-water damage

(1) if a capital ship, can no longer use director and stable zenith director fire (F-5);

(2) loses all deck tubes and torpedoes;

(3) loses an additional 30 per cent of original maximum speed.

(g) A vessel which has received 80 per cent damage from all causes can not make more than five knots.



(h) A vessel which has received 90 per cent damage from all causes is in sinking condition, dead in the water.

(i) When a vessel is 50 per cent damaged the Director may, at his discretion, inform the opposing players.

(j) At the Director's discretion, vessels of the destroyer type may be grouped as divisions (or half flotillas) for purposes of scoring damage. In such case, the individual vessels will be considered as having speed undiminished until sufficient damage has accrued on the group to destroy one vessel. The fire effect of the group will be penalized for above-water damage as specified in F-47 (b). Under-water damage in excess of the value of the life of one ship will not be scored against the group.

Rule F-48. (a) Fire of ship's guns against shore targets will be scored in the same way as against ship targets.

(b) For the purpose of evaluating the damage inflicted by gunfire upon a gun mounted on shore, such fire will be given the same effect as fire against a submarine. Such damage will have no effect until it reaches an amount equal to the assigned life of the gun, at which time the gun will be considered destroyed. Unless otherwise stated, life per gun will be, according to the nature of the gun's emplacement:

- |                              |    |
|------------------------------|----|
| (1) in the open              | 10 |
| (2) in temporary emplacement | 15 |
| (3) in permanent emplacement | 20 |

(c) Independently of the damaging effect of gunfire against a gun mounted on shore, such fire, while it continues, may more or less completely prevent the service of the shore gun. The amount of such neutralizing effect will be adjudged by the Director.

Rule F-49. (a) Fire of shore batteries against ship targets will be scored in the same way as that of ship batteries, except that to allow for the increased accuracy of shore batteries, for direct fire:



- (1) plane spot tables will always be used;
- (2) normal fire effect given by the tables will be multiplied by the following:

<u>Range</u>	<u>Multiplier</u>	<u>Range</u>	<u>Multiplier</u>
0-5	1.0	15	2.0
6	1.1	16	2.2
7	1.2	17	2.5
8	1.3	18	2.9
9	1.4	19	3.4
10	1.5	20	4.0
11	1.6	21	4.5
12	1.7	22	5.0
13	1.8	23	5.5
14	1.9	24 plus	6.0

- (b) A shore battery can use indirect fire provided
  - (1) plane spot is used; or
  - (2) target is visible from one established observation station.
- (c) Maximum ranges of shore guns are as follows:

<u>Caliber</u>	<u>Range</u>
16"	44
14"	35
12"	27
6"	19



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Note: For the convenience of Gun Fire Scorers, the penalties of many of the foregoing rules have been tabulated and put on a card. A copy of this card is reproduced on the next page for the benefit of the users of the Maneuver Rules.



# TABLES FROM GUNFIRE RULES

(PENALTIES ARE GIVEN IN NUMBER OF TENTHS)  
(RANGES ARE SHOWN IN THOUSANDS OF YARDS)

**TABLE (a)**

BATTERY INTER. PENALTY

BATTERY	DAY	NIGHT
MAIN	0	3
SECOND	5	5

**TABLE (b)**

SHIFT FIRE PEN.

RANGE	X
0-5	1
6-10	2
11+	3

**TABLE (j)**

TARGET CHANGE COURSE PENALTY

DEGREES CHANGE	(1) TARGET SPEED - KNOTS				(2)	(3)
	6-10	11-21	22-29	30+		
15-30	0	0	0	1	+1	Double (1)
31-44	0	0	1	1	+1	
45-59	0	1	1	2	+1	
60-74	1	1	2	3	+1	
75-89	1	2	3	4	+1	
90+	-	3	4	5	+1	

**TABLE (c)**

FIRE MASKED

- (1) LOSS PROPORTIONAL TO TIME MASKED.  
(2) LINE OF BEARING PENALTY ONE TENTH BEGINNING 3RD MOVE; ADDITIONAL TENTH EACH MOVE UP TO 4 TENTHS.

**TABLE (d)**

ROLL & PITCH PENALTY  
(NO PENALTY FOR SEA SMOOTH)

STATE OF SEA	SHIP SIZE			YAW OR Q.
	LARGE	INTERMEDIATE	SMALLER	
MODERATE	1	2	3	+2
ROUGH	2	3	4	+2
HEAVY	3	4	5	+2

- (1) BB, CC, CL MAIN BATTERY FIRE  
(2) RANGE OVER 16, TOP SPOT; AND OTHER THAN MAIN BATTERY OF (1).  
(3) INDIRECT METHOD:- DOUBLE THE PENALTIES OF (1).

**TABLES (k) & (l)**

CHANGE OF RANGE PENALTY  
(K) DIRECT METHOD (L) IND.

3 MIN RATE	RANGE			X
	0-5	6-20	21+	
2	0	1	2	3
3	1	2	4	6
4	2	3	6	9
5	3	4	8	10

**TABLE (m)**

DAY VIS. EFFECT  
(TOP SPOT ONLY)

VISIB. RANGE	MAX. VAL. 3RD MUL.
0	5
1	6
2	7
3	8
4	9
5	10

**TABLE (e)**

FUNNEL SMOKE PENALTY

DAY	NIGHT	(DIRECT METHOD ONLY)
3	5	

**TABLE (n)**

NIGHT VISIBILITY EFFECT - MAXIMUM VALUE 3RD MULTIPLIER.

RANGE	(1) STAR SHELL ILLUM.							(2) S.L. Ill. Add to (1)	(3) Nat. ill. subtract from (1)
	BB&CC Main	CA CV 7.5"	CL CV Cf	DD&DL	BB Second	Other Types			
13-15	1	0	0	0	0	0	-1	1	
11-12	2	1	0	0	0	0	-2	2	
10	3	2	2	0	2	0	-3	2	
9	3	2	2	0	2	0	0	2	
7-8	4	3	3	1	3	0	0	2	
5-6	5	4	4	2	4	1	+1	2	
3-4	5	4	4	3	4	2	+2	1	
0-2	4	3	3	2	3	1	+3	0	

**TABLES (f) & (g)**

FIRING SHIP CHANGE COURSE PENALTY

(F) POINTER FIRE

DEGREES CHANGE	X
0-1	0
11-20	1
21-30	2
31-40	3
41-50	4
51-60	5
ETC.	ETC.

(G) DIRECTOR FIRE

DEGREES CHANGE	X
0-30	0
31-50	1
51-70	2
71-90	3
91-110	4
111-130	5
ETC.	ETC.

**TABLE (h)**

LOCAL CONTROL PENALTY

RANGE	X
0-5	0
6-10	2
11-15	4
16-20	6
21-25	8
26-30	10
31+	10

**TABLE (i)**

OPEN FIRE PENALTY

RANGE	SPOT	
	TOP	PLANE
0-5	0	0
6-10	1	1
11-15	2	2
16-20	4	3
21-25	6	4
26-30	9	5
31+	10	6

**TABLE (o)**

ENFILADE, BOMBARDMENT FIRE

DIST. OF TARGET FROM PT. OF AIM	MAXIMUM EFFECT OF ORIG. FIRE
0-200	9
201-300	8
301-400	7
401-500	6
501-600	5
601-700	4
701-800	3
801-1000	2
1001-1200	1



SECTION G - TORPEDO FIRE

Report of Torpedo Data.

Rule G-1. (a) Complete data in regard to adjustments for torpedo fire will be submitted by players to the Torpedo Umpire at the beginning of a maneuver. This data will include the following as applicable:

(1) Type of fire to be used: curved fire ahead, virtual straight fire, straight fire, etc.

(2) Spread setting between torpedoes.

(3) Depth setting.

(4) Speed setting

(5) Other data as necessary.

(b) Any subsequent changes will be reported. The report must be made sufficiently in advance of an occasion on which torpedoes may be used that the changes in adjustments could be accomplished in the time available.

Tactical

Rule G-200. (a) The following types of torpedoes are used on the game board and chart maneuvers.

<u>Type</u>	<u>Speed</u>	<u>Range</u>
A	26	17,000
B	28 ✓	16,400
C	27 ✓	13,500
E	30	6,000
F	35	3,500
(X	27 ✓	15,000
G { Y	34	10,000
(Z	46	6,000

(b) Players turning in torpedo fire blanks will indicate on them what type of torpedo is being fired, and in the case of the variable-speed torpedo (type G) will further indicate what speed setting is used.



Rule G-201. Unless otherwise stated in the problem, the torpedo armament of vessels is as given in the "Fleets".

Rule G-202. Submerged tubes in submarines are installed in the fore-and-aft line. In other vessels they are installed at right angles to the fore-and-aft line.

Rule G-203. Submerged tubes cannot be trained in azimuth.

Rule G-204. Broadside above-water tubes may be brought to bear within  $30^{\circ}$  of the fore-and-aft line.

Rule G-205. Every torpedo is fitted with an angle-fire device by which it may be fired at an angle at  $90^{\circ}$  or less with the direction of the tube.

Rule G-206. Torpedoes cannot be fired from submerged tubes at a speed of ship in excess of 18 knots.

Rule G-207. Each tube is regarded as being loaded at the beginning of the maneuver.



Rule G-208. Reloads will be regarded as being equally distributed among tubes at the beginning of torpedo fire.

Rule G-209. Torpedoes which have been loaded into deck tubes may not be withdrawn during an action.

Rule G-210. Torpedoes may not be shifted between submerged and deck tubes, nor between forward and after tubes while underway.

Subject to the restriction of Rules G-207 and G-209, they may be shifted between starboard and port submerged tubes, (See Rule G-211).

Rule G-211. A vessel with broadside submerged tubes may fire torpedoes from each submerged tube at the rate of one torpedo per tube per move until the torpedoes at that tube have been exhausted. The torpedo on the other side may then be shifted, it requiring 2 moves to make the shift. The first of these torpedoes can then be fired in the third move and the others in every alternate move thereafter.

Rule G-212. A vessel with deck tubes and spare torpedoes may reload only under conditions when there is little motion on the ship due to either sea or rudder. The minimum time for such reload is fifteen minutes. (G-207, G-209).

Rule G-213. A submarine may in one 3 minute move fire all torpedoes that are loaded. A tube in any torpedo room may be reloaded whenever a tube is empty as follows: one tube in one 3 minute move, two tubes in two 3 minute moves, three tubes in three 3 minute moves, and four tubes in four 3 minute moves.

Rule G-214. Before a torpedo may be fired from submarines submerged the periscope must be exposed at least ten seconds; except that a submarine may fire entirely by sound subject to the limitation of accuracy given in Rule D-30.

Rule G-215. (a) Torpedoes are fired at the end of a three-minute move, except that in the case of submarines or other craft making a close attack the Director may permit firing singly at any time during the move.



(b) Data for torpedo fire will be obtained by players from their tactical plotting, and not from the board. (B-200).

(c) Torpedo fire blanks covering the torpedo fire of single vessels firing on their own initiative during or at the end of a move may be turned in after that move has been made, and before the next move has been called for. (B-208).

(d) Except as provided in (c) of this rule, torpedo fire blanks covering torpedo fire to be delivered during or at the end of a move must be turned in when the move is called for. (B-204).

Rule G-216. The condition (as to damage) of a vessel firing torpedoes is her condition at the beginning of the move at the end of which the torpedoes are fired. (See Rule G-220).

Rule G-217. (a) A vessel receiving 50% or more of above-water damage loses one-half of her deck torpedo tubes on each side.

(b) A vessel receiving 70% or more of above water damage loses all deck tubes.

(c) A vessel damaged 80% or more can not fire torpedoes.

Rule G-218. A vessel receiving 50% or more of under-water damage loses all submerged tubes.

Rule G-219. All torpedoes of a salvo fired from a division of vessels in formation are considered as having been fired from one point, the center of the division; except that at ranges inside 5,000 yards the commander of the firing ships may elect to have the torpedoes plotted as coming from the individual firing ship.

Rule G-220. (a) Of the total number of torpedoes intended to be fired from a surface vessel not under effective fire, 75% are considered to function properly throughout the run, fractions of a half or larger being counted as a whole, smaller fractions being disregarded.



(b) When surface vessels are under effective gun fire or when they fire from behind smoke screens on signal from an exposed leader, in each salvo 50% are considered to function properly throughout the run, a half torpedo being considered a whole.

NOTE:- Under exceptional conditions, such as vessels being under unusual concentration of fire, melees, frequent and large changes of course under fire, etc., the Director may, at his discretion, decrease the number of torpedoes that complete their runs to 25%.

(c) In the case of submarines, three-quarters of the total number of torpedoes fired will be considered to have run. Fractions one-half or greater will be considered as a whole, fractions less than one-half will be disregarded.

(d) In moderate to rough seas, torpedo depth settings of less than 15 feet may result in torpedoes functioning improperly.

Rule G-221. Torpedo fire is plotted on the Master Plot on which are drawn the firing points and the paths of the torpedoes which are considered to run, with arcs to show the length of run of the torpedoes during each three minute move.

Rule G-222. In a salvo of two effective torpedoes from a surface vessel, their paths are along the right and left dispersion limits. When the number of effective torpedoes is three or more, one torpedo is considered to run on the right limit of dispersion line, one on the left limit of dispersion line, and the paths of the remainder are equally spaced between them.

Rule G-223. (a) Under conditions where the discharge or the tracks of torpedoes may be seen, the Director will give appropriate information to the player or players concerned.

(b) A player receiving such information will be permitted to take appropriate action as of the time when he received it, if necessary modifying a move previously turned in or made. Unless otherwise prevented by existing conditions, he may start messages to maneuver his own ships or to warn other ships,



and may, in an emergency, cause his ships to maneuver independently as might be done on the initiative of their commanding officers.

Rule G-224. (a) The tracks and positions of vessels that may be endangered by torpedoes will be plotted on the Master Plot.

(b) From the plot of the tracks and positions of the torpedoes and of such ships as may be in torpedo water, and whose draft exposes them to danger, the Director will determine the number and allocation of torpedo hits basing his decision on either of the following methods:-

I. Consider each torpedo and each ship individually, and from a study of simultaneous positions determine when a hit is made.

II. In the case of a formation of ships endangered by a salvo of torpedoes, determine "L", the total length of that part of the formation through which torpedoes pass. Determine "N", the number of torpedoes that pass through this line, and "T", the total length of ship targets. Then the number of torpedo hits equals  $NT/L$ , taken to the nearest whole figure.

(c) The number of hits thus determined may be reduced, according to the Director's judgment, when the following conditions obtain:

- (1) The paths of the torpedoes are at least twice as far apart as the width of the target ships;
- (2) The ships have had sufficient warning of the approach of the torpedoes, have straightened out on a course paralleling the tracks of the torpedoes, can see these tracks, are maneuvering independently to avoid, and have enough speed and maneuverability to give them some measure of ability to keep clear of torpedo tracks.



(d) Under conditions favorable for dodging torpedoes, as set forth in the preceding paragraph, the chances of avoiding torpedoes are better when running away from them than when meeting them.

Rule G-225. (a) A torpedo hit inflicts under-water damage equal in amount to the following number of 14" penetrative hits:

Type G - - - - -	3.0	
Type A, B, C and F-21" - - - -	2.4	
Type E and F-18" - - - - -	1.8	(B-211, B-212).

(b) In its permanent effect upon the life and capabilities of vessels, torpedo damage is additive to damage from other causes and will be communicated to the damage recorder. (B-214, C-207, F-47, G-218, H-20).

Rule G-226. (a) In each case where a torpedo hits a vessel, there is some chance that the hit will be in the region of the propeller shafts and/or the rudder.

(b) The chance that a torpedo hit is in the propeller-shaft and/or the rudder area will be adjudged by the Director in accordance with the following table of chances, based upon the angle  $\theta$  which the track of the torpedo makes with the keel line of the ship, measured from ahead to the right through 360 degrees.

<u>Angle</u>	$\theta$	<u>Propeller shaft</u>	<u>Rudder</u>
0	360	0	0
45	315	1/10	0
90	270	1/5	1/20
135	225	1/2	1/10
180	180	4/5	1/5

(c) Independently of the speed loss inflicted under Rules C-207 and F-47, a torpedo hit in the propeller shaft area on one side of a vessel with two or more screws will thereafter reduce the vessel's maximum individual speed to three-fourths of that which she would otherwise have remaining to her under Rules C-207 and F-47.

(d) A torpedo hit in the propeller shaft area of a single screw ship, or hits in the propeller shaft areas on both sides



of a vessel with two or more screws, will render the vessel incapable of further self-propulsion.

(e) A torpedo hit in the rudder area of a ship will render her incapable of steering.

Rule G-227. A torpedo hit may cause a vessel to assume a temporary list, which will affect ability to use weapons, to fly planes on or off, and to maneuver. The amount, duration and effect of such temporary list will be adjudged by the Director. (F-47, H-21, J-22).



SECTION H - MINES

Rule H-1. (a) Mines used in War College maneuvers will be classified as to type, according to their method of use, as being either

A - anchored or

D - drifting;

and will be further classified as to kind, according to their method of firing, as being either

N - antenna

C - contact, or

O - observation.

(b) They will be designated as to type and kind by a two letter symbol, in which the first letter will indicate whether anchored or drifting, and the second letter whether antenna or contact.

(c) Mines carried by submarines may be suited for discharge either (1) from special mine trunks, or (2) from torpedo tubes. In designating these special types by symbol, the letters "M" for mine trunk, or "T" for torpedo tube, will be added as a third letter.

(d) Mines are not interconvertible as to type or kind.

Rule H-2. (a) Anchored mines may be either contact, antenna or observation.

(b) They may be laid in any depth of water up to 150 fathoms and may be set to ride at any desired depth below the surface, at low water slack.

(c) In a current, the slack-water submergence depth of anchored mines will be increased by an amount of dip which is, in feet, three per cent of the length of the mine anchor cable times the strength of the current in knots.

(d) With current of strength greater than 4 knots, anchored mines may drag, and upon dragging may become inoperative. Whether under these conditions all or any part have in fact dragged, and if so, whether all or any part of these have become inoperative, will be adjudged by the Director.



(e) By special manufacture, anchored mines may be made capable of use in greater depth than 150 fathoms and/or with anchors of increased holding power, but such special mines will not be used in War College maneuvers unless their possession is stated in the problem.

Rule H-3. (a) Drifting contact mines are considered to float on the surface.

(b) Drifting antenna mines are assumed to be of the type that remains suspended at a fixed depth below the surface, each mine being supported there by a small surface float to which it is connected by its antenna wire. Unless otherwise stated, the length of the suspending antenna wire will be taken as 30 feet.

Rule H-4. Contact mines are exploded either by actual contact of the mine case with a passing vessel, or as result of the water disturbance caused by the passage of a vessel close to the mine. The distance at which a vessel can thus explode a contact mine will be taken to vary from 3 to 10 feet, depending upon the amount of water disturbance, which in turn depends upon the size, underwater form, condition of bottom and speed of the vessel.

Rule H-5. (a) Antenna mines are exploded by contact of metal with either the mine case or the antenna wire. In addition, the mine itself also reacts as a contact mine.

(b) Anchored antenna mines have an antenna wire leading upward suspended from a small float and a section of the mine anchor line leading downward also acts as an antenna. Unless otherwise stated by the player, the length of the upper antenna wire will be taken as five feet less than the intended low water slack submergence depth of the mine, but not to exceed fifty feet; and the length of the downward antenna section of the anchor line will be taken as being twenty feet.

Rule H-6. (a) Mines are designed to become inoperative as follows:

(1) anchored mines, if they come adrift from their anchor gear;



(2) drifting mines, upon the expiration of a certain period after they have been laid.

(b) Unless otherwise announced, in accordance with the HAGUE Convention on this subject, the life of drifting mines will be taken as one hour. For the purposes of study, if permitted by the Director, they may be given longer life.

(c) It is to be expected that in any number of mines that are supposed to have become inoperative, some proportion will fail to do so. In each such case, this proportion will be determined by the Director.

Rule H-7. Some proportion of initially defective mines is to be expected and some proportion that become defective in time after being laid. With antenna mines, there may be some premature explosions during laying. These actual proportions may vary greatly in service, but, in the absence of abnormal factors, will be taken to average as follows, in per cent of the number originally laid:

	<u>Contact</u>	<u>Antenna</u>
Initially defective	5	10
Premature explosions	0	10
Subsequent defectives, per month	2	5

Rule H-8. The ratio of effectiveness of a group of mines is the ratio between (1) the total number originally laid, minus the number that have become inoperative (H-6), or ineffective (H-7, H-14) or have been exploded in service (H-16, H-17, H-18) and (2) the number originally laid.

Rule H-9. (a) Unless otherwise stated, the mine equipment of vessels is as given in the "Fleets".

(b) If not otherwise announced, a player having mine vessels may select the type of mine for each ship to carry, and in this case will inform the Director of his decision before the beginning of the maneuver.



Rule H-10. (a) Dummy mines are pieces of wood shaped and painted to resemble drifting surface mines when floating in the water.

(b) Surface vessels carrying mines may also carry, in addition to their true mine equipment, an equal number of dummy mines. Other vessels may also carry a limited number of dummy mines, as may be allowed by the Director.

(c) Players who elect to have their vessels carry dummy mines will so inform the Director before the beginning of the maneuver.

Rule H-11. (a) Mines floating on the surface can be seen from vessels on the surface up to 500 yards under ideal conditions of glassy sea, good height of eye and good light. Under any other conditions they cannot be seen at sufficient distance for vessels proceeding at moderate speed to avoid them.

(b) Aircraft can see floating mines under ideal conditions within a horizontal radius of 500 yards, provided they are at an altitude of not over 1000 feet and are at the time concentrating their attention on searching the surface under them for such purpose as the discovery of mines, torpedoes or submarines.

(c) Dummy mines have the same visibility as real mines floating on the surface, and cannot be distinguished from them at range greater than 50 yards.

(d) Antenna floats on the surface are visible under ideal conditions only 50 yards, and are only visible to aircraft from an altitude of 200 feet or less. Surface vessels proceeding at any speed cannot see them in time to avoid.

(e) Mines or floats below the surface are not visible.

Rule H-12. (a) Mine laying by surface vessels is visible under best conditions, at ranges up to 7,000 yards. Under less favorable conditions, this range will be reduced correspondingly.

(b) If premature explosions occur during laying, these will be visible at greater distances, but the cause of such explosions will not necessarily be evident.



Rule H-13. (a) Mines may be laid by surface mine vessels at intervals of three seconds or more, and at any speed up to 30 knots.

(b) Submarines can discharge mines at intervals of 15 seconds or more, but in the case of tube mines can load only one per tube, and to reload requires three minutes per tube.

(c) The time interval between mines to give certain spacings at various speeds is given in the following table:

Speed of layers	Time intervals between mines for different dis- tances apart.			
	(a) knots	(b) 600 ft.	(c) 500 ft.	(d) 400 ft.
10	36	30	24	18
11	33	28	22	17
12	30	25	20	15
13	28	25	18	14
14	25	21	17	13
15	24	20	16	12
16	23	19	15	11
17	20	17	14	10
20	18	15	12	9
22	16	14	11	8
25	14	12	10	7
28	13	11	9	7
30	12	10	8	6

Rule H-14. The explosion of a mine will destroy the effectiveness of other mines that are closer to it than about 250 feet.

Rule H-15. (a) Prior to beginning a chart or board maneuver each player having mines on board his vessels will furnish a memorandum to the Mine Umpire which will show:



- (1) Type of mines (See H-1)
- (2) Number on each vessel
- (3) If antenna mines, the length of antenna settings. If changes are made in these settings, the Mine Umpire must be notified a sufficient time before the mines are planted to permit such changes being made.

(b) In the Chart Maneuver, when mines are laid, the player handling the mine-laying ships will furnish to the Director a memorandum showing for each mine-laying operation:

- (1) date and hour of starting and stopping laying;
- (2) the vessels laying;
- (3) the formation and maneuvers used during laying;
- (4) the number of mines laid by each one, and the total laid during the operation;



- (5) the type and kind of mine laid; (H-1)
- (6) the number of lines of mines;
- (7) the interval between lines;
- (8) the spacing in each line;
- (9) the depth setting in each line;
- (10) any detail in which mines differ from the standard characteristics set forth in Rules H-2, H-3.

(c) During the time that mines are intended to be effective, he will also show on his chart and on tracings submitted to the Director the area and location of the field.

(d) In the Board Maneuver, a player laying mines will so state on the move blank for the vessel(s) concerned, and will also fill out the appropriate data on a minelaying blank and submit it to the Director.

(e) In either case the Director will have the mine area plotted on the Master Plot, and will decide as to the ratio of effectiveness. (H-8).

#### Paravanes.

Rule H-16 (a) Paravanes are assumed to be carried by all fighting ships of more than 3,000 tons displacement, by regular Navy auxiliary types of more than 5,000 tons, and by such merchant types as may be permitted by the Director. (A-2).

(b) To put over or take in paravanes, a vessel must run for six minutes at a speed of not more than ten knots.

(c) With paravanes out, a vessel cannot make more than 28 knots without losing them.

(d) For a vessel proceeding on a straight course, paravanes afford practically complete protection against anchored contact mines, and in the case of mines of this type as come within the spread of the paravanes, will cut their anchor lines and cause them to float to the surface. (See H-6(a)).

(e) If a vessel changes course in a minefield, paravanes are not complete protection against the possibility of swinging the ship's afterbody into a mine.



(f) (g) Paravanes are no protection against drifting surface contact mines, nor against antenna mines, whether drifting or anchored. Contact of a paravane with a mine antenna will cause the mine to explode, and, independently of any other damage it may do, will destroy that paravane.

Rule H-17. (a) If a vessel enters a mined area, the Director will have its track plotted on the Master Plot, and will determine the number of mine hits, if any, upon the vessel.

(b) Whether a vessel is endangered by a particular line of mines which it crosses depends upon:

- (1) the water levels spanned by the vessel's underwater structure;
- (2) the water level at which, or levels through which, the mines are operative, according to their depth of submergence at the time, and the vertical length of antenna wire, if any;
- (3) whether the vessel has paravanes out;
- (4) whether paravanes protect against the type of mine in use.

(c) When a single vessel proceeding on a straight course, crosses a single line of mines which subject it to danger, the chance of its hitting a mine will be determined as follows:

Let  $\underline{d}$  = distance between mines in feet

$\underline{e}$  = ratio of effectiveness (H-8)

$\underline{a}$  = angle between course of ship and line of mines

$\underline{w}$  = effective width of the ship in feet, which is the beam plus twice the distance of disturbance action as provided by Rule H-4

$\underline{d}'$  = effective distance between mines.

$$\underline{d}' = \underline{d} \sin \underline{a}$$

The chance of missing is:

$$\underline{m} = 1 - \frac{\underline{ew}}{\underline{d}'}$$



The chance of hitting is:

$$h = 1 - (1 - \frac{ew}{d'}) = \frac{ew}{d'} \dots \dots \dots I.$$

Natural sines

<u>Angle</u>	<u>Nat. Sin.</u>	<u>Angle</u>	<u>Nat. Sin.</u>	<u>Angle</u>	<u>Nat.Sin.</u>
10°	.17	40°	.64	70°	.94
20°	.34	50°	.76	80°	.98
30°	.50	60°	.86	90°	1.00

(d) If a vessel passes through successive lines of mines, where the chances in the several lines are different, due to different characteristics or to change of course between lines, the chances of missing and of hitting on all lines are:

$$M = m_1 \times m_2 \times m_3, \text{ etc.}$$

and  $H = 1 - M \dots \dots \dots II$

If the chances on n lines are the same, the chances of missing and of hitting on all n lines are:

$$M = m^n$$

$$H = 1 - M$$

$$= 1 - m^n$$

$$= 1 - (1 - \frac{ew}{d'})^n \dots \dots \dots III$$

(e) If a vessel is changing course while passing through a line of mines, her chance of missing in that line is reduced by reason of the fact that, while turning, her hull presents an increased effective width.

Rule H-18. (a) If a number of vessels cross a mine area, or if a vessel crosses a mine area a repeated number of times, then for the total number of vessel-traverses involved the total number of mine hits to be expected is determined by the sum of the chances of hitting on each vessel-traverse, except as provided in (b) of this rule.

(b) A vessel which crosses a mine area directly in the wake of another vessel of a size not smaller than itself has only a negligible chance of being hit.



Rule H-19. (a) When one vessel strikes a mine, other vessels in easy sight can see that she is mined or torpedoed.

(b) The Director will inform players accordingly and may permit them to modify the moves of such vessels.

Rule H-20. (a) A mine hit inflicts under-water damage equal in amount to three 14" penetrative hits. (B-212).

(b) In its permanent effect upon the life and capabilities of vessels, mine damage is additive to damage from other causes, and will be communicated to the damage recorder. (B-214, C-207, F-47, G-218, G-225).

Rule H-21. (a) Independently of the permanently damaging effect of mine hits, the shock effect of a mine hit will render a vessel incapable, for a period of three minutes thereafter, of using her weapons, of flying planes on or off, or of maneuvering.

(b) Independently of the foregoing, a mine hit may cause a vessel to assume a temporary list, which will affect ability to use weapons, to fly planes on or off, and to maneuver. The amount, duration and effect of such temporary list will be adjudged by the Director. (F-47, G-227, J-22).

Rule H-22. (a) A surface mine-laying vessel loses mines in the ratio of above-water damage received.

(b) A vessel receiving 50% above-water damage can no longer lay mines. (F-47).



**GENERAL**

The capacity of storage battery in ampere hours varies with the rate of discharge. The capacity at a 20 hour rate is approximately that at the 1 hour rate. Additional capacity can be obtained by gradually lowering the rate of discharge. The accompanying curve forms a ready means of calculating the remaining capacity in a submarine battery in terms of hours at various speeds.

**Directions for use.**

First select the horizontal line of figures, below the curve, which starts at the left with the 1 hour submerged speed of the particular submarine being considered. Thereafter use only this horizontal line of figures for speed.

(a) **Changing from a higher to a lower speed:** Pick the higher speed in the line of figures already selected at the bottom of the curve. On the vertical ordinate of the curve above this speed figure lay off with dividers the time run at this speed. This is most conveniently measured from the curve down to the figure showing the number of hours and fractions. With the dividers still set as above, move over to the vertical ordinate above the figure at bottom of curve giving the lower speed. Here, measure from the bottom up and the upper leg of the dividers will indicate the time which can be run at the lower speed.

(b) **Changing from a lower to a higher speed:** Pick the lower speed in the line of figures already selected. Note at the top of the curve above this speed the time that this speed could be used. From the time this speed has been used and the maximum time it could be used, compute the proportion of the battery charge that has been used. Subtract this from one to give the proportion of the battery charge remaining. Multiply this figure by the time indicated at the top of the curve above the higher speed desired and obtain the time for which this higher speed can be used. Note that if a battery charge has been completely exhausted neither that speed nor a higher speed can be used again even if the above method indicated a remaining capacity in going up from a lower speed.

**EXAMPLE**

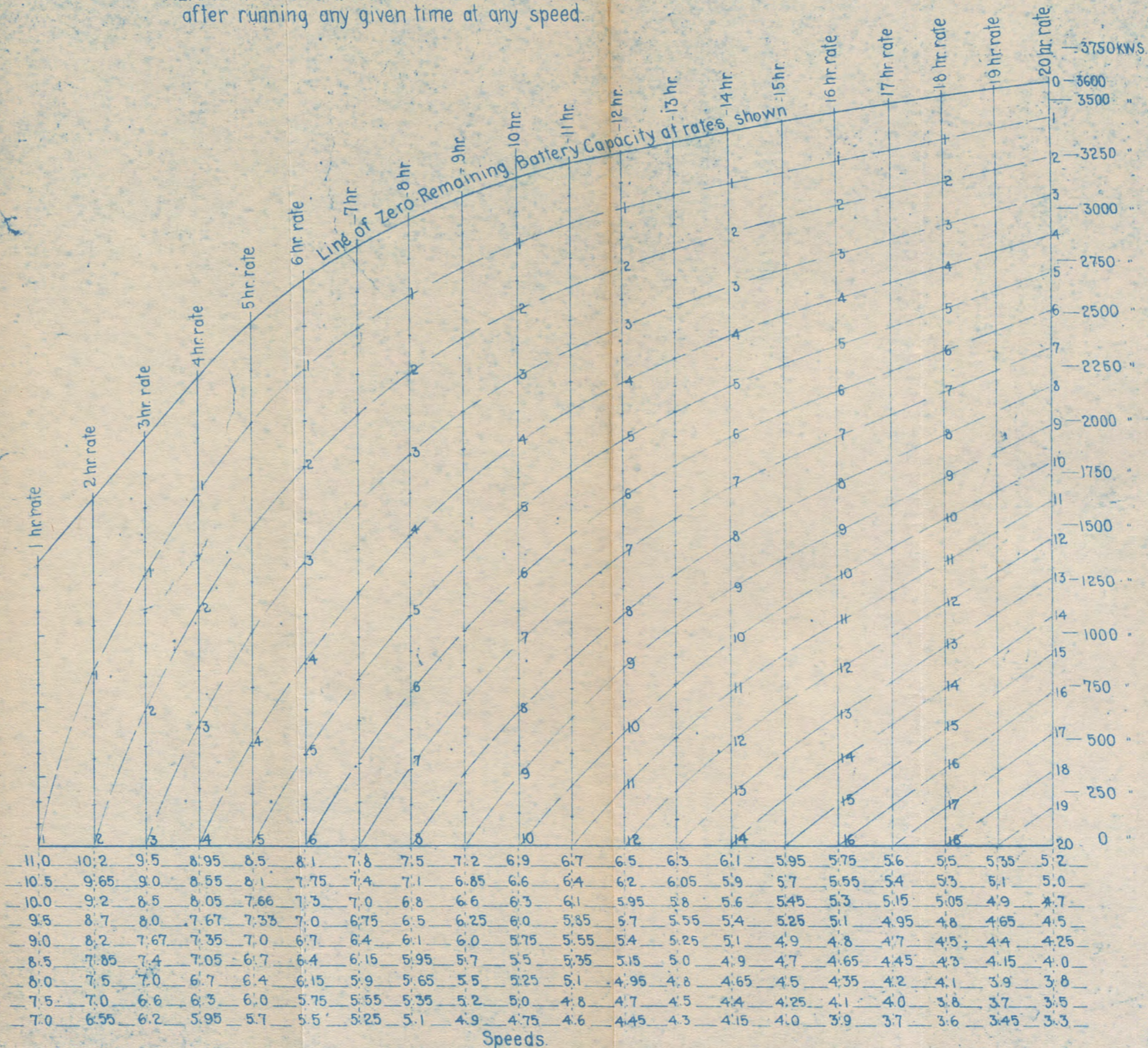
A submarine having a one hour speed of 10 knots starts out with a full battery and runs for 1 hour 30 minutes at 8.5 knots and then slows to 6.3 knots. All speed figures will be found in the horizontal line, below the curve, which starts with 10.0. Her higher speed was 8.5. On the ordinate above 8.5 in the line starting with 10.0 lay off 1-1/2 hours down from the curve. Transferring this distance over to the ordinate above 6.3 (still in line starting 10.0) and laying it off from the bottom up we find that the submarine can run 6 hours 55 minutes at 6.3 knots.

The submarine runs for 6 hours 55 minutes at 6.3 knots and then desired to make 10.0 knots. 6 hours 55 minutes minus 3 hours 55 minutes gives 3 hours that she could continue to run at 6.3 knots which we note from the curve is the 10 hour rate. She has then remaining a battery capacity of 3 divided by 10 or .3 of full capacity. As 10.0 knots is the 1 hour rate she can then make 10 knots for .3 x 1 hour or 20 minutes.

She runs for 20 minutes at 10.0 which completely exhausts her battery charge at that speed and then desires to find out how long she can run at the 20 hour rate which is 4.7 knots. Having completely exhausted the battery at the 10.0 knot speed we take the ordinate to the curve (whole or 1 hour length on this ordinate) and transfer this to the 20 hour or 4.7 knot ordinate and find that she can run for 12.5 hours longer at 4.7 knots.

**NOTE.** The above example has been picked to require no interpolation. In practice it will be necessary to interpolate but this can ordinarily be done by eye with sufficient accuracy.

Curve for Computing  
SUBMARINE SPEED AND ENDURANCE SUBMERGED  
and showing  
REMAINING STORAGE BATTERY CAPACITY  
after running any given time at any speed.





SECTION I - SUBMARINES

Rules regarding plotting positions and movements of submarines, surface or submerged, and regarding characteristics, surface speed, surface radius of action, armament, visibility, and communications of submarines have been given in the preceding sections.

In this section are given the special rules applicable only to submarines.

- - - - -

Rule I-1. A submarine underway is considered as being either in the surface condition or submerged. While in the surface condition, a submarine is always ready for quick dives.

Rule I-2. A submarine requires the following times to change condition:

- (1) From surface condition, underway with both engines to "Periscope under", i.e., to disappear, - one minute.
- (2) From submerged to surface condition at normal speed, - one minute.
- (3) Speed during the interval of changing from one condition to the other, - not over maximum submerged speed.

Rule I-3. The time a submarine is submerged shall be reckoned from the instant she begins to submerge until she begins to come to the surface.

Rule I-4. The necessary securing of the radio set can be done while flooding; preparatory to diving. While submerged, submarines may communicate by radio in accordance with Rule E-14.

Rule I-5. (a) Submerged speeds and radii for one hour and three hour rates are as given in the ships' data tables.

(b) A submarine, after running at full speed submerged for one hour, or at any high speed for the limiting radius, can by reducing speed continue to run for the times shown in the accompanying curve. It is therefore not necessary to "surface" after one hour at full speed.



Rule I-6. The time and fuel required for charging batteries will be obtained as follows:-

(a) When taking current from tender or shore base or when at rest on the surface using both engines to charge

% of charge	Time	Fuel expenditure as if submarine were making
100	8 hrs.	15 kts. for 2 hrs. then 8 kts. for 6 hrs.
90	6 hrs.	15 kts. for 2 hrs. then 8 kts. for 4 hrs.
75	4 hrs.	15 kts. for 2 hrs. then 8 kts. for 2 hrs.
37 $\frac{1}{2}$	2 hrs.	15 kts. for 1 hr. then 8 kts. for 1 hr.

If maximum speed is less than 15 knots then, where the above table calls for fuel expenditure as if making 15 knots, the fuel expenditure at maximum speed will be used.

(b) Using one engine to charge batteries while running on the surface with the other engine the above times will be increased 25%. The total fuel expenditure for both engines will be computed for a speed  $\frac{3}{2}$  that actually being made. In this case the maximum speed that can be made will be  $\frac{2}{3}$  of that which could be made if not charging.

(c) When running on both engines the batteries can be charged 5% per hour. The fuel consumption will be computed for a speed 25% greater than that actually being made. In this case the maximum speed will be 75% of that which could be made if not charging.

(d) In case the charge is taken from a tender, the fuel expenditure as computed above will be charged to the tender. If the tender uses coal as fuel the figures obtained above in fuel oil will be converted to coal on the basis of 140 tons of oil equalling 190 tons of coal.

Rule I-7. When submarines are cruising where fairly accurate station-keeping, at speeds greater than 60% of the maximum, is required, the following repair penalties will be applied:

(a) First 12 hours, no penalty.



(b) For each subsequent 6-hour period, 25% of submarines must slow for 1/2 hour to a speed not greater than 60% of their maximum. Penalties under this heading will continue until a period of 24 hours at rest for overhaul becomes available, at the end of which period, all boats will be considered as prepared to operate 12 hours again without penalty.

Rule I-8. Submarines are assumed to be fitted with Recognition Signal Ejectors, for the purpose of releasing colored smoke bombs when submerged. A submarine may be identified one minute after firing a recognition signal, when submerged.

Rule I-9. Vessels may lay depth charges at the following rate:

- If making 11 to 15 knots . . . . . 5 per min.
- If making 16 to 20 knots . . . . . 10 per min.
- If making 21 knots or more . . . . . 15 per min.

Rule I-10. When, on sighting a periscope, vessels proceed to the spot where it disappeared and then lay depth charges, damage will be assessed by the Director, who will base his decision upon (1) track and depth of submarine, (2) tracks of attacking vessels, (3) number, time(s) and position(s) of dropping depth charges, (4) depth setting used. Damage inflicted may include (1) disablement for a given number of hours, (2) rupture of outer hull, (3) rudder and/or propeller damage, (4) total destruction.

Rule I-11. For the purpose of the Maneuver Board, submarines may operate as a section either on the surface or submerged under command of a section leader, the section being normally composed of not more than three submarines.

Rule I-12. A submarine section can maneuver submerged with periscopes of all boats continuously exposed the same as on the surface, signals being communicated through the oscillator, follow the leader tactics can also be carried out without the use of signals. (Rules D-4, 5, 6, 7).



Rule I-13. A submarine section can maneuver submerged with periscopes not exposed subject to the following conditions:

- (a) Distance between submarines to be not less than 500 yards, such distance being taken before submergence.
- (b) Submergence to be on a line of bearing 90 degrees only.
- (c) They be restricted to the course on which they submerged and its reverse.
- (d) Each submarine to be able to run at any speed within its capabilities regardless of the others, in order to arrive at a proper firing position.
- (e) Reversal of course only to be made in case of passing ahead of target (or when patrolling before contact) and then only on oscillator signal from the section leader.
- (f) On reversing course all submarines to turn away from the direction of the enemy's approach, or, in case of patrolling before contact, all submarines to turn to starboard.
- (g) After attack, a section may continue in formation if desirable, and may, after reloading, again attack any target which crosses its path.
- (h) A formation cannot be formed or re-formed except on the surface.



SECTION J - AIRCRAFT

(a) General Notes.

The following rules pertaining to aircraft and their operations are merely for the purpose of serving as a guide in dealing with aircraft in war games. They should be construed in no wise as limiting the initiative of players in the employment of aircraft within their capabilities, but should such employment lead to artificialities or to operations beyond the endurance or capabilities of ordinary human beings, the Director may either exact severe penalties or rule that the operation is impracticable of accomplishment.

Players should have a working knowledge of the characteristics, performance and use of each class of aircraft, and a general knowledge of aircraft tactics. The table of characteristics and the rules in general are merely a guide and cannot be intelligently used without the above knowledge.

These rules are based on the best information obtainable and for average conditions but should not be considered literally as results that will always obtain in actual practice. In any case, where a particular rule obviously does not properly apply, the Director may change the application of that rule in order more realistically to fit the situation.

For instance, the rules relating to visibility represent ranges at which objects are visible to the eye, but in order to permit aircraft to employ the principle of surprise with which they are endowed, it cannot be expected that such swiftly moving objects will always be seen at the same definite range.

The Maneuver Rules concerning aircraft are laid down to give a fair basis for development of tactics and strategy, and also to emphasize certain characteristics of aircraft, such as their fragility of construction, liability to breakdown, and short life, as compared with other naval material. At the suggestion of naval aviators, breakdown penalties have been kept quite severe .



in an attempt to duplicate war time operation with average material, and to discourage excessive operation. It is well known that in peace time, airplanes can be made more reliable than these figures indicate.

In indicating the efficiency and accuracy credited any weapon under the rules it must be remembered that effectiveness is all relative and that the life assigned a battleship is probably as open to argument as is the effectiveness of the air, submarine or destroyer arm.

(b) Identification of planes

The following system has been placed in effect for the purpose of designating aircraft squadrons (Gen. Order 161 as amended by G.O. 179)

The system consists of (a) class designation, (b) Squadron identification number, (c) Assignment letter.

(1) Class designation.

		:Heavier :than air	: Rigid :Airship	:Nonrigid :Airship	:Kite balloon :and balloon
H-Ambulance	: VH	:	:	:	:
O-Observation	: VO	:	:	ZNO	: ZKO
F-Fighting	: VF	:	:	:	:
T-Torpedo and bomb	: VT	:	:	:	:
S-Scouting	: VS	: ZRS	:	ZNS	:
P-Patrol	: VP	: ZRP	:	ZNP	:
J-Utility	: VJ	:	:	:	:
N-Training	: VN	: ZRN	:	ZNN	: ZKN
B-Bombing	: VB	:	:	:	:
R-Transport	: VR	:	:	:	:

NOTE: Planes are designated as single, double or triple seaters, as follows:

VF(1), VO(1), VO(2), VO(3).

(2) Squadron identification number.

Each class of squadron will have a squadron identification number beginning with 1 and continuing in numerical series.

Example - VO-1, VO-2, VO-3, ZKO-1, etc. This class designation



and identification number never changes, and is similar to the fixed identification numbering of all naval vessels of all types.

EXISTING WEATHER AND OPERATING CONDITIONS

Rule J-1.

(a) The uneconomical employment of land planes or planes of poor seaworthy qualities in search operations when no definite information as to the location of the enemy is available and under conditions where forced landing would result in the loss of planes and personnel, make such employment liable to arbitrary decision by the Director. Such decisions will be made with due consideration to the existing conditions and may result in excessive losses or in inefficient search operations, or both.

(b) Planes operating in fog or darkness are subject to additional hazards on account of their lack of ability to see sufficiently far ahead during the various stages of such operations. These hazards exist during the take off, while in flight, and when attempting to land and they depend a great deal on the attending conditions which will be given due consideration by the Director.

(c) Under conditions of "bad weather", such as heavy rain, high winds, and low visibility, the Director may rule that "non-flying" conditions exist, and no planes of any type whatever shall take the air.

(d) Under less severe weather conditions, the Director may rule that flying is considered "hazardous", and under such ruling the percentages of failure shall be materially increased.



CHARACTERISTICS OF PLANES

Rule J-2.

(a) The pamphlet, "Airplane Characteristics", gives a list, together with tactical characteristics, of the various types of heavier-than-air craft employed in the U.S. Fleet.

Unless otherwise specifically stated, planes of similar type in foreign fleets will be assumed to possess the same characteristics as those listed.

(b) Additional weight penalty. The performances given in the above-mentioned pamphlet are based on the latest information available as to what might be expected from the various types of planes under normal conditions. When additional weights are carried on planes, fuel must be reduced by deducting the extra weight from the weight of fuel carried. To determine the reduction in hours of endurance - divide weight of fuel carried by endurance in hours, this gives weight of fuel consumed per hour; divide the extra weight carried by the weight of fuel consumed per hour and the result gives the reduction in hours of endurance.

(c) Time element. In planning flights of a duration near the total radius given, a margin must be allowed for such things as: delays in getting off and landing, unexpected adverse air conditions, errors in navigation, faulty instruments, etc. 15% if the total endurance in hours listed is considered adequate and reasonable.



GENERAL RULES FOR SEAPLANES AND LANDPLANES

Rule J-3.

(a) Seaplanes.

(1) All seaplanes can land, taxi and take off in smooth water.

(2) As surface of sea roughens, the type of seaplane with slower landing speed ordinarily has the greater chance of making safe landing. Having made safe landing, a seaplane can usually taxi and ride out the existing sea for several hours in winds below force 4.

A swell increases the difficulties in landing and taking off.

A seaplane wrecked in landing will be considered a total loss.

(3) Naturally the chances of safe take off and landing vary with the type of plane employed and the conditions of wind and sea. Safe take offs and landings may be practicable in the lee of land and in the slick of vessels when they will not be practicable in the open sea.

(4) All seaplanes can operate from shore bases and from tenders based in adequately protected waters.

(5) Any ship, including carriers, to which aircraft are regularly assigned may occupy the status of a tender. Vessels in this category are assumed to be equipped and stored with the type and quantity of ammunition, and supplies for reserving the planes so assigned.

(6) Any ship equipped with catapults may launch the regularly assigned planes or those similar thereto which she may carry in accordance with the rules applying to catapults.

(7) Seaplanes can be hoisted on board ship to which they are assigned without difficulty so long as sea is smooth. The problems of hoisting in or out seaplanes are somewhat



similar to those presented in the hoisting in or out of small boats except that seaplanes are more fragile, and require more care in handling.

(8) Ships hoisting in or out seaplanes at night must exhibit lights visible for 5 miles under normal conditions. Necessarily the risk of damage to the plane is greater at night.

(b) Land planes.

(1) Can take off only from land, from flying deck, or from vessels fitted with specially equipped catapults.

(2) Can land on flying decks of ships so fitted, or on flying fields.

(3) If lands in water will sink if not salvaged within 30 minutes; even though salvaged, that plane will not be considered again available for use during the period of the game.

(c) Amphibian planes may operate as either land or seaplanes and are subject to such rules as fit their character during the operations involved.

ORGANIZATION.

Rule J-4.

Prior to the maneuver the planes will be organized into Squadrons as suitable in accordance with standard practice and assigned to specific carriers and other base units. During the maneuver they will be operated in accordance with this organization. All changes must be approved by the director and will only be made to replace losses by similar types.

Subsequent to taking off, changes may be made in the tactical grouping provided the necessary signals can be interchanged and executed.

Under conditions of daylight and no fog, planes may rendezvous and assemble in groups in accordance with specific in-



structions, provided the place of rendezvous can be indicated by reference to some tangible and visible object.

Under conditions of darkness and no fog, planes may assemble and fly in tactical groups provided they take off and proceed to their assigned position in formation at intervals not exceeding one minute and that all planes display running lights.

CARRIERS AND TENDERS - OPERATIONS THEREFROM.

Rule J-5.

(a) Unless otherwise stated in the problem, the planes carried by vessels will be as given in the "Fleets".

(b) Aircraft tenders ordinarily do not carry any seaplanes. They merely provide mobile facilities for enabling planes to operate from temporary bases. The seaplanes attached to a tender usually proceed under their own power.

However, tender may carry their assigned quota of seaplanes on board if space is deemed available. In that event 20% of that quota is assumed to be the maximum which may be carried on deck in assembled condition.

(c) With respect to planes assigned to carriers their disposition in such vessels will be governed by the following assumptions:

(1) All of the planes assigned will be normally considered to be carried assembled ready for flight, except VT planes, which may be carried with wings folded if so desired, and must be so carried in the hangar when the hangar is filled to capacity.

(2) At least 1/4th of the planes will normally be carried on the flight deck. In this condition the hangar is full to capacity. This deck load may be stowed below, but it will require disassembly of planes.

(3) One-half of the planes can be placed on the flight deck in such a manner that both flying off and flying on can be accomplished while this condition prevails.



(4) Three-fourths of the planes can be placed on the flight deck in such a manner that either flying off or flying on, but not both simultaneously, can be carried on.

(4) a. All the planes may be carried on deck in such a manner that flying off may be done, but not flying on.

(5) If the numbers in various types of planes assigned a carrier, be varied for any reason, the space necessary for 1 VT will be sufficient for 2 VF (1), or vice versa; similarly the space necessary for 2 VO(2) equals 3 VF(1) or 2 VF(2) or 2 VS.

(6) In cases of emergency such as when planes from other ships land on the carrier, which already has its full complement on board, the carrier, by breaking down the planes and stowing them, can temporarily accomodate 12 VF(1) or 8 VO(2) or 6 VT, or 8 VF(2) in addition to its regular equipment. This is not to be considered as stowage space for carrying extra planes when leaving port.

(7) On each aircraft carrier there will be considered sufficient aviation personnel to man all planes regularly assigned.

(8) Twenty-five percent spares may be carried in crated condition for each squadron regularly assigned each carrier.

(d) (1) On carriers there are usually two elevators running from the flight deck to hangar deck. The forward elevator is large enough to take completely assembled, one of any type except VF(1) of which it may take two.

The after elevator is smaller and can take one VO(2) or VF completely assembled or one larger type plane with its wings removed or folded.

In general, a two place VF, a VO, a VB, a VJ and a VS are the same size.



(2) Planes can be brought up from hangar deck or taken down from flight deck in an assembled condition as follows:

2 VF - VS - VO every 2 minutes, or 1 of larger type every 2 minutes on the large size elevator.

(3) When a plane is brought from hangar deck to flight deck the following intervals of time will be required after plane arrives on deck before it can fly off - (this is to provide for the necessary man handling, starting and testing of motor and last minute adjustments that will be required:

10 minutes for VF(1), VF(2), VO(2), VS, VT.

(e) (1) Landplanes and amphibians carried on flight deck can be flown off during daylight on an average as follows:

1 VF, VS or VO(2) every 10 seconds.

1 VT every 15 seconds.

(2) Landplanes and amphibians carried on flight deck can be flown off during darkness provided lights are shown on deck in accordance with paragraph (g) on an average as follows:

1 VF, VS, or VO(2) every 30 seconds.

1 VT every minute.

(3) The above rates assume that preparations have previously been made. When no previous preparations, the rates may still be assumed to hold good, but 20 minutes shall elapse before flying off begins.

(f) (1) Carriers will be assumed to be equipped with one fixed catapult each, flush with flying deck and leading over the bow.

(2) Seaplanes carried on flying deck can be flown off at the rate of one, of any type, every twenty minutes. After launching seaplanes, 10 minutes will elapse before landplanes can be flown off.



(g) Carriers launching planes either from deck or catapult at night must show lights that will be visible to aircraft in the air for 3 miles and to surface craft for 2 miles.

(h) Carriers on which planes are landing at night must show lights that will be visible to aircraft in the air for 10 miles and to surface craft for 3 miles.

FLIGHT FROM DECK OF CARRIER

Rule J-6.

To fly off a plane from the deck of a carrier, the course of the carrier must, for all types of planes, be within 10° of the apparent wind. For all types of planes there must be a zero or positive wind force from the direction of take off. To take off, the plane must fly along the fore and aft line of the ship.

Planes may take off over the stern, provided the flying on portion of the flight deck is clear and the apparent wind force from astern is in accordance with the above.

If one half or more of the complement of planes is on the flight deck there must be a wind force over the deck of at least 15 knots to take off.

LANDING ON DECK OF CARRIER

Rule J-7.

(a) For an airplane to land on flight deck:

(1) carrier must head dead into or exactly down wind,

(2) and apparent wind must be from dead ahead and not less than 2 in force.

(b) Six minutes are required to get the ship steadied on correct heading with regard to the wind, before first plane can fly on.

(c) After getting ship on correct heading, one plane can fly on immediately.



(d) If ship remains on correct heading and apparent wind force and direction are as prescribed, successive planes can fly on at intervals of  $1\frac{1}{2}$  minute during daylight. In darkness, this time will be six minutes.

(e) Damage to flight deck. A carrier can no longer launch or receive planes after it has received 50% above-water damage or when its flight deck has been destroyed by bombs. (See Rule J-22). This does not necessarily prevent hoisting planes in or out as allowed in Rule J-19.

(f) Wind Effect. When the wind force over the flight deck is 8 or more the efficiency of handling planes, i.e. spotting, shifting, taxiing, etc., is reduced to 1/10th. When the ship is on a prescribed course preparatory to flying planes off or on and the wind force over the deck is 8 or more the time of handling for flying off is doubled, for flying on is quadrupled.

TABLE OF DAMAGE IN FLYING OFF OR LANDING

Rule J-8.

The chances that a plane may be wrecked during various conditions of flying off or landing are according to the following probabilities:

	<u>Sea Planes</u>								
	<u>Smooth</u>			<u>Moderate</u>			<u>Rough</u>		
	<u>VS</u> <u>VO</u>	<u>VT</u>	<u>VP</u>	<u>VS</u> <u>VO</u>	<u>VT</u>	<u>VP</u>	<u>VS</u> <u>VO</u>	<u>VT</u>	<u>VP</u>
Catapulting	.01 0	-	-	.01 0	-	-	.03	-	-
Landing	0	0	0	.03	.03	0	.15	.13	.10
Hoisting	0	0	.01	.01	.08	.08	.25	.40	.40
Taking Off	0	0	0	.03	.03	.01	.50	.50	.50
Lowering	0	0	.01	0	.08	.08	.25	.40	.40



Land Planes

Carrier, day, all types, all sea conditions	.01
Carrier, night, all types, all sea conditions	.06
Field, day, all types - - - - -	.001
Field, night, all types - - - - -	.03

LANDING WITH TORPEDO OR BOMB

Rule J-9. No plane while carrying a torpedo or any type of bomb will be permitted to land on board a carrier.

TIME REQUIRED PRIOR TO RENEWING OPERATIONS.

Rule J-10.

(a) Upon the completion of a flight, that plane will not be considered available for a subsequent flight until a period has elapsed that is sufficient for reservicing in accordance with the existing conditions.

The Director will adjudge the time required under special conditions. In the case of planes operating from aerodromes the minimum time required for the different types of planes will be as follows:

VP or VT ----- 1 hour for each 12 planes.

VS, VO or VF ----- 30 minutes for each 12 planes.

In the case of planes operating from carriers, reservicing and re-arming can take place simultaneously for a flight of not more than 12 planes. The time necessary will be 15 minutes after the last plane has landed for fuel and oil only.

For re-arming with bombs or torpedoes add  $\frac{1}{2}$  hour.

In general  $1\frac{1}{2}$  hours will be required to reservice, rearm and inspect each squadron at a landing field or aboard carriers in order to prepare for further operations.



In the explanatory note on "Rendezvous Hazard" note that the curve applies when there is a CHANGE of rendezvous. It does not apply when the original rendezvous is maintained.

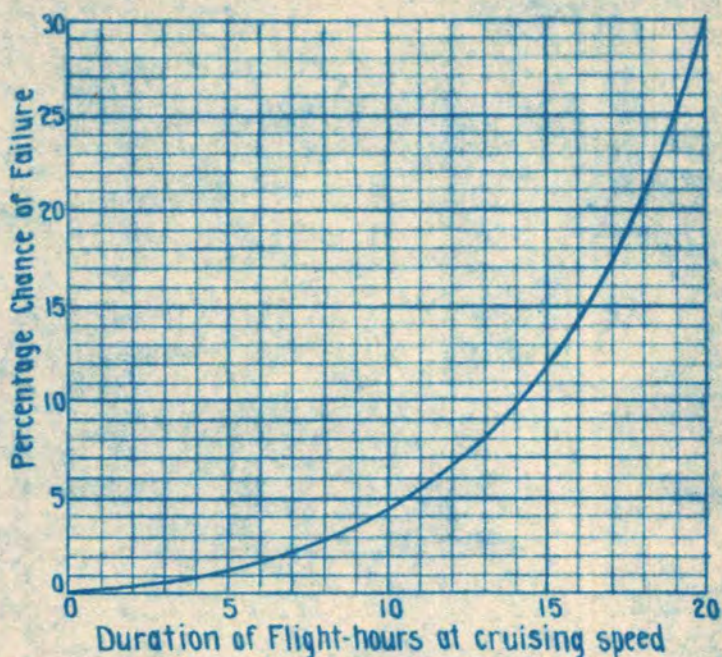
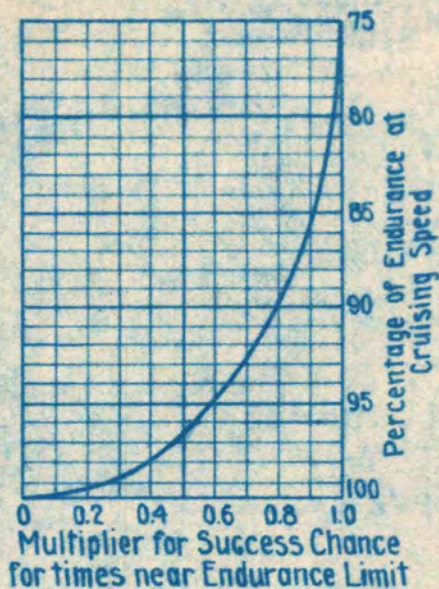
(b) Effect of continued use of planes. The continued use of planes increases the hazard of breakdown during flight or the necessity for periodic overhaul prior to flight. Morale of personnel has an effect on the operation of material. Unusually hazardous flying operations cause abnormal strain on personnel and this will tend to increase failure of material.

In order to give proper weight to fatigue factor, six hours flight time will be considered a normal employment period in any twenty four hours during continued operations. Planes and crews may under urgent conditions be worked 50% in excess of this time but will then be considered unavailable for operations on the following day. The above periods are doubled in the case of patrol planes when relief pilots are available.

(c) Aerial Breakdowns. The chances of breakdown are greater for long flights than for short flights. Breakdown hazard increases greatly with increase of operating speed, and also increases more rapidly as the plane approaches its endurance limit. Fuel and oil failures are likely to occur after the plane has flown beyond 75% of its rated endurance. The publication "AIRPLANE CHARACTERISTICS" is to be used for ascertaining the rated endurance of various types of planes, and then the Curves of Breakdown Hazards, accompanying this table, will be used to calculate the chance of breakdown.

Example: An O3U-3 flying for 3 hours, one hour at full speed. What is the chance of failure?

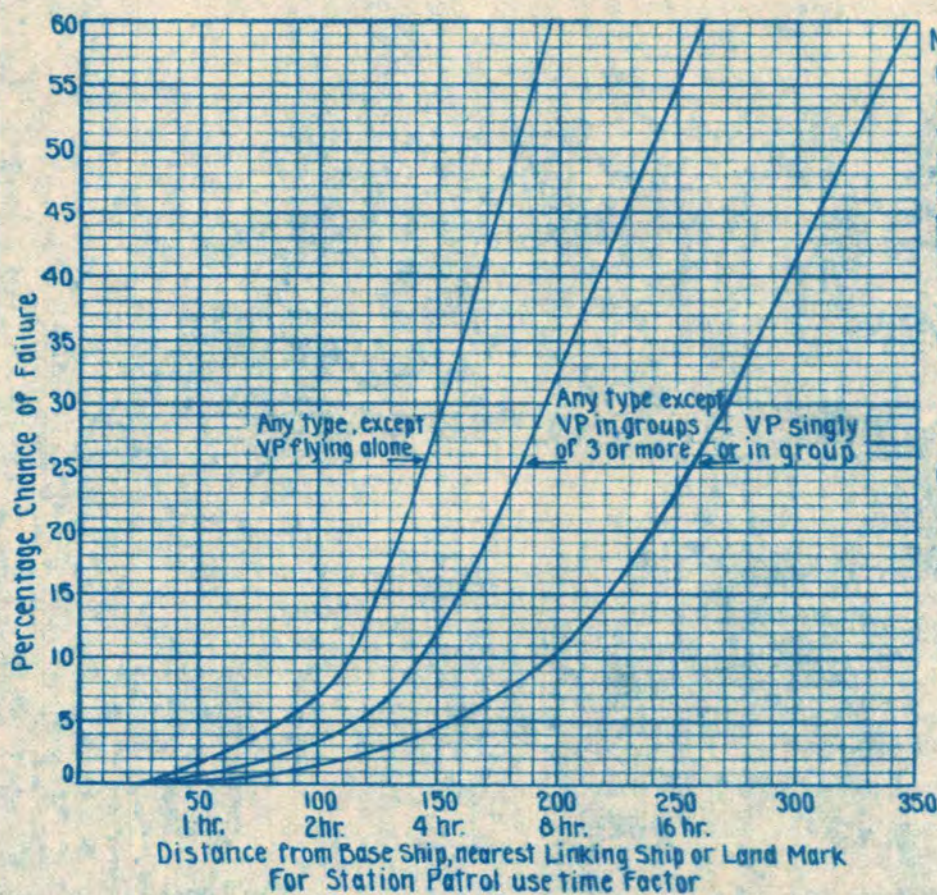




Notes:-

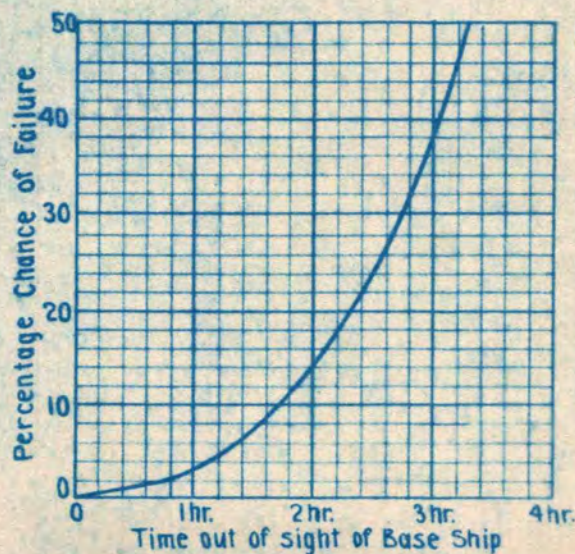
Convert time at full speed to equivalent hours at cruising speed by multiplying by  $\frac{\text{cruising endurance}}{\text{full speed endurance}}$

**BREAKDOWN HAZARD** see J-10-c



Notes:  
 Curves apply to plane making flight to a ship at sea without land mark or linking ships, but do not apply if flying to shore base on large island or group of islands or continent.  
 If flying to a small island reduce "percentage chance" by  $\frac{1}{2}$ .  
 If flying to base ship which is in company with Fleet of 12 or more ships reduce "percentage chance" by  $\frac{1}{2}$ .  
 If flying to a base ship which is in company with 3 to 12 ships reduce "percentage chance" by  $\frac{1}{4}$ .  
 For 3 or less ships in company curves apply.

**NAVIGATION HAZARD**



Notes:  
 Curve applies when one change of rendezvous is made. If rendezvous is changed more than once multiply by number of changes.  
 A "change of rendezvous" is a change greater than the range of visibility.

**RENDEZVOUS HAZARD**

**AIRPLANE RISKS.**



Solution: From the characteristic sheet we find that an O3U-3 has an endurance of 4.25 hours at cruising speed and 2.07 hours at full speed. One hour at full speed is therefore equivalent to 1 times 4.25 over 2.07 or 2.05 hours at cruising speed. Total equivalent hours at cruising speed is therefore 4.05 hours which is 95% (4.05 over 4.25) of its rated endurance. From the small curve we obtain a success chance multiplier of .6. From the large curve we find the chance of success for a flight of 4.05 hours to be 99%. Multiplying this by our correction of .6 we get the final chance of success to be 59.4% or the chance of failure is 40.6%. This calculation can be approximated very rapidly, or accomplished accurately by use of a slide rule. In the same manner, the curves of Navigation Hazard apply. For unusual weather conditions, see Rule J-1 (c) and (d).

ASSEMBLY - STAGES AND TIMES REQUIRED

Rule J-11.

(a) Planes larger than VFs are considered to be in three stages of assembly.

(1) Disassembled (planes in hold of carrier or in crates are in this condition).

(2) Partially assembled, wings folded. Only VT airplanes are capable of being carried in this condition and must be so carried in hangar when hangar is full to capacity. When hangar is not full to capacity, and when VT planes are on flight deck they may be in this condition if the player so elects.

(3) Assembled, ready for flight.

(b) One assembling crew can assemble from complete disassembly:-

1 VF or 1 VO or VS every 8 hours,

1 VT or 1 VB every 24 hours.

1 VP every 48 hours.



(c) One assembling crew can assemble (ready for flight) planes from condition of partial assembly (wings folded) as follows:

1 VT in 5 minutes.

(d) One assembling crew can reduce from condition of complete assembly to one of partial assembly (wings folded) as follows:

1 VT in 5 minutes.

(e) Each carrier may assemble 6 planes simultaneously. Each tender may assemble 2 VT or 1 VP simultaneously.

#### TIME CHECK OFF LIST.

##### Rule J-12.

Players will be required to keep track at all times of the disposition of planes on carriers in accordance with the rules affecting time required to fly off and on, time required to move planes from hangar deck to flying deck, and vice versa, time required to break out and assemble planes in storage and space available for planes on the various decks, and will keep Assistant Director for Air fully informed in the premises. A cross section paper check off list will be employed for this purpose.

#### REASONS FOR FLIGHT FAILURE.

Rule J-13 - The failure of a plane to complete its flight in accordance with original plans and return to its base may be due to:

- (a) Engagement with enemy.
- (b) Errors in navigation.
- (c) Conditions encountered enroute.
- (d) Material failure.
- (e) Ignorance of movement of its floating base.
- (f) Low morale.
- (g) Fatigue effect.



SPEED AND NAVIGATION.

Rule J-14.

(a) Speeds listed for aircraft are speeds through the air in knots.

(b) Speed and course made good will be considered as the resultant of

(1) Speed of aircraft through the air and course steered by aircraft.

(2) Force and direction of wind.

(c) Aircraft will be considered to navigate in accordance with standard practice.

When navigating by dead reckoning during daylight the drift angle is obtained through observation of surface of water employing the drift indicator or by dropping and observing navigational float lights. Errors in dead reckoning will be assigned by the Director considering the aerological conditions, length of flight, change of course, etc.

(d) Aircraft can navigate by dead reckoning at night provided navigational float lights are used. Navigation hazards are, however, greatly increased.

CEILING AND AIR CONDITIONS.

Rule J-15.

(a) On an overcast or cloudy day, the ceiling will be announced by the Director. Flight above ceiling will be ruled impracticable except to avoid attack in which case planes concerned will be ruled out of action for one hour.

(b) The wind may change in force and direction with altitude; conditions at different altitudes will be announced by the Director.



AERIAL COMBAT.

Rule J-16.

(a) Combats between planes will be decided by the Director, having due regard to number and types of planes actually engaged and other conditions obtaining at the time.

(b) The general considerations affecting combat between planes are as follows:

- (1) Planes engaged in aerial combat are in range one moment and perhaps out of range the next. One properly placed machine gun bullet may bring down any type of plane, but on the other hand a plane may sustain a large number of hits that do not reach vital spots.
- (2) In good visibility, ability to engage or break off an engagement is entirely with the planes that have superior performance.
- (3) Planes of equal performance can not expect to engage in combat unless there be a willingness to engage on the part of both or unless one is in a favorable position of greater altitude or for any reason can employ surprise tactics.
- (4) The amount of ammunition carried by aircraft is naturally limited due to its weight but it may be considered adequate for ordinary tasks and under normal conditions.
- (5) A land plane has the advantage over a seaplane of the same type due to relative speed and maneuverability.
- (6) A formation is stronger in both offense and defense than the same number of planes acting singly, but the maximum number of flexible-gun planes that can be handled as one fighting unit is 18; of fixed-gun planes, 9.



- (7) Planes with flexible guns flying only a few feet over the water are stronger in defense than at higher altitude.
- (8) Superior altitude is temporary advantage in the initial attack.
- (9) Should single planes engage, the ability of one to gain position to attack within the blind arcs of fire of the other will usually determine the result. Thus a VF attacking a VP at an altitude that permits the VF to maneuver freely (above 1000') may be successful, as the present VP type has blind arcs of fire.

(c) Losses sustained in aerial combat. Losses sustained in aerial combat may be determined by the air umpire in accordance with the assumptions and tables given below. These percentages may be varied to suit existing conditions, the percentages given being merely a guide to assist in making the decision.

ASSUMPTIONS:-

- (1) That a group of fighters attacking similar type in similar numbers will lose 15% in each individual attack.
- (2) That VC-VS-VB planes when attacked retain their defensive formation and employ one free machine gun each to repel attack.
- (3) That VP-VT planes when attacked retain their defensive formation, employ 2 to 3 free machine guns each to repel attacks but have slower speed and less maneuverability than types in (2).
- (4) That a maximum of two attackers can concentrate on one defender simultaneously, the third plane standing by to take any advantage offered.



- (5) That attacking planes have initial advantage of altitude and a certain element of surprise.
- (6) That a free machine gun in defense is more effective than a fixed machine gun in attack.
- (7) That a concentrated attack in ratios of two or three to one reduces percentage loss of attackers and increases percentage loss of defenders.

<u>Attackers</u>	<u>TYPES ENGAGED</u> <u>against</u>	<u>Defend-</u> <u>ers</u>	<u>RATIO</u> <u>ATTACKERS TO</u> <u>DEFENDERS</u>	<u>LOSS</u> <u>ATTACKERS</u> <u>%</u>	<u>LOSS</u> <u>DEFENDERS</u> <u>%</u>
VF		VF	Even	15	20
VF		VO-VS-VB	Even	20	10
VF		VT-VP	Even	40	20
VF		VF	2 - 1	10	30
VF		VO-VS-VB	2 - 1	15	20
VF		VT-VP	2 - 1	20	25
VF		VF	3 - 1	10	40
VF		VO-VS-VB	3 - 1	10	25
VF		VT-VP	3 - 1	20	30

VO-VS-VB when used in attack, only attain 75% of above damage on defenders. If defenders are VT-VP; if defenders are VO-VS-VB - 50%; if VF - 25%.

If VF (2) are defenders, reduce loss percentage 5% for high performance.



EFFECT OF ANTI-AIRCRAFT FIRE.

Rule J-17.

(a) The effect of anti-aircraft fire will be determined by the Director, having regard for

- (1) Number, type, formation, altitude, speed and maneuvering of planes.
- (2) Amount of warning received by firing ships
- (3) Number and type of guns firing.
- (4) Quality of anti-aircraft fire-control.
- (5) Steadiness of gun platform.
- (6) Condition of firing vessels as to damage.
- (7) Whether firing vessels are under fire.
- (8) Visibility conditions.

(b) Table of Anti-Aircraft Damage. In general it is considered that a division of battleships, cruisers, or an aircraft carrier when attacked and not under effective fire can develop a heavy A.A. fire. If under effective fire they can develop a moderate A.A. fire. Individual battleships and cruisers if not under effective fire may develop a moderate A.A. fire and if under effective fire a light A.A. fire.

In estimating the losses accruing to an attacking unit independent of counter attack by aircraft the following table may be employed varied as necessary to suit conditions.

PERCENTAGE CASUALTIES - AA FIRE

DEFENSIVE FIRE :	8000' plus:	5000'-8000':	Below 5000':	DIVE BOMB
LIGHT	: 05%	: 10%	: 20%	: 10%
MODERATE	: 10%	: 20%	: 30%	: 20%
HEAVY	: 20%	: 30%	: 40%	: 40%

If a dive bombing attack is coordinated with a sight bombing attack the percentage of AA casualties to the latter will be reduced one half.



CATAPULT

Rule J-18.

- (a) To launch a plane by means of the catapult, the vessel
- (1) may be on any heading if apparent wind force is five or less; except planes may not be launched with a down wind component.
  - (2) In wind of force 6 or more planes must be launched directly into wind.

(b) Planes can be launched from all vessels equipped with catapults, except carriers, at the rate of one plane per catapult every five minutes; and from carriers at the rate of one plane every twenty minutes.

(c) Any ship launching a plane during night must intermittently show light visible to aircraft in the air 3 miles.

(d) It is assumed that an SF can launch its plane by floating off, 10 minutes after coming to surface.

TO HOIST IN OR OUT SEAPLANES

Rule J-19.

(a) To hoist in or out seaplanes at sea a vessel must stop for the time required.

For the purposes of the game when a vessel stops for the above reason, the process of the vessel's slowing and regaining her original speed will be considered instantaneous.

(b) To hoist out seaplanes:-

- (1) The vessel must stop.
- (2) While stopped, provided wind force does not exceed 5, can hoist out a plane per crane from one side of vessel in 3 minutes and each succeeding plane per crane in 5 additional minutes.
- (3) When wind force is 5, 6 or 7 a penalty of 50% will be applied to hoisting out. With wind of 8 or more the penalty will be 100%.

(c) To hoist in seaplanes:-

- (1) The vessel must stop and, when wind force exceeds 2, must make lee.



(2) While stopped can hoist in on both sides provided wind force does not exceed 2, otherwise only on lee side a plane per crane in 15 minutes and each succeeding plane in 10 additional minutes.

(3) If wind is force 6 or more cannot hoist in planes.

(d) Seaplanes have an 80% chance of safe take off in the open sea in winds up to force 5. The percentage of failure in take offs in winds above force 5 will be determined by the Director.

#### GUN BLAST.

##### Rule J-20.

Planes subjected to the blast of guns will be more or less damaged. The Director will decide on the amount of damage, taking into consideration the size of the guns and the relative position of planes and guns.

#### AERIAL BOMBING

##### Rule J-21.

(a) The sizes of bombs at present supplied to aircraft are 2000 lb., 1000-lb., 500-lb., 116-lb., and 25-lb. Considering that these bombs approximate in weight the projectile fired by 16", 13", 10", 6" and 4" guns, respectively, discretion should dictate to the player the proper size bomb to be used against various objectives.

(b) Bombing methods. Bombing operations are at present conducted by two methods. These are known as "Sighting Bombing" and "Diving Bombing". In the former, the solution of the problem involves a consideration of the position, course and speed of the target, course, speed and altitude of the plane, and force and direction of the wind. By means of a bomb-sight and a coordination of effort between the bomber and the pilot, the proper point of release of the bomb is determined.



In Diving Bombing the pilot so places the plane in relation to its target that, in a diving maneuver, the plane is, in a large measure, a projectile, and approaches its objective on a collision course at extremely high speed. At the proper point, a bomb being released, continues the flight to the target.

Bombs of 1000 lbs., and less may be dropped by the "diving bombing" method. VT, VJ and VP planes are not capable of diving.

(c) Direct Bomb Hits. Under battle conditions; with adequate visibility, plane meeting with no resistance, and target on steady course and speed, the average percent of direct hits in bombing is given in the following tables.

(Note: These tables give average target practice performance arbitrarily reduced 25%.

#### BOMB HITS ON UNOPPOSED ATTACK

TABLE 1.

	<u>Bombing Altitude (ft).</u>									
<u>Target size</u>	2000:	3000:	4000:	5000:	6000:	7000:	8000:	9000:	10000	
Large :	26 :	24 :	23 :	21 :	20 :	18 :	16 :	14 :	12	
Int. :	19 :	16 :	14 :	13 :	11 :	10 :	9 :	8 :	7	
Small :	14 :	12 :	11 :	10 :	8 :	8 :	7 :	6 :	6	
Dest. :	8 :	5 :	4 :	3 :	2 :	2 :	2 :	1 :	1	
Sub. :	3 :	2 :	2 :	1 :	1 :	1 :	.5 :	.2 :	.1	

#### DIVING BOMBING

##### PERCENTAGE OF HITS

	<u>Altitude of Leveling-off. (Ft.)*</u>									
<u>Target size</u>	500:	600:	800:	1000:	1200:	1400:	1600:	1800:	2000	
Large :	54:	46:	45:	40:	36:	31:	28:	24:	21	
Int. :	42:	40:	36:	31:	28:	24:	21:	18:	16	
Small :	37:	34:	29:	25:	23:	20:	16:	14:	12	
Dest. :	17:	15:	12:	10:	8:	6:	5:	4:	2	
Sub. :	8:	8:	6:	5:	4:	3:	2:	2:	1	

\*Altitude of release is 600 feet higher.



Planes bombing from an altitude of 400 feet or less are destroyed by their own bombs (any size of or above 500 lbs.) provided they explode on the surface and with no provision for delayed action.

(d) The factors which may operate to reduce the above percentage of hits are (1) attack by other planes, (2) anti-aircraft fire, and (3) maneuvers of target during bombing approach.

(1) Attack by hostile planes during the approach may reduce the number of bombers and will unquestionably reduce the efficiency with which the remaining bombers complete their attack. It is assumed that defending planes discontinue their attack when bombers come under effective anti-aircraft fire.

The following table gives the effectiveness of an attack thus opposed as a percentage (expressed in decimals) of the effectiveness of an unopposed attack.

BOMB HITS ON ATTACK OPPOSED BY PLANES

TABLE 2

<u>ENEMY FIGHTERS</u>	<u>REMAINING EFFECTIVENESS</u>		
	<u>VF</u>	<u>VS(L)</u>	<u>VS(s)</u>
No. greater than bombing flight	.40	.50	.60
No. equal to bombing flight	.60	.70	.80
No. less than bombing flight	.80	.90	.90

(L - Landplane, S - Seaplane)

Note: This rule does not apply to an air battle which takes place before the bombers are actually in position to take up their approach or bombing course. An air battle, detached from the actual bombing operation, will be decided according to Rule J-16.



(2) If a bombing unit comes under effective anti-aircraft fire before releasing its bombs, the material damage to planes by such fire will be assessed under Rule J-17. Due to the effect of such fire on the efficiency of the personnel of the remaining planes in completing the attack, the loss in percentage of hits made by the remaining planes will further reduce the efficiency of the attack.

Regardless of the number of bombing planes lost, the effectiveness of the attack opposed by anti-aircraft fire is given in the table below as a percentage (expressed in decimals) of the effectiveness of an unopposed attack.

BOMB HITS ON ATTACK OPPOSED BY ANTI-AIRCRAFT FIRE

TABLE 3

Anti-Aircraft Fire	Remaining Effectiveness							Torpedo Attack
	Diving Bombing		Sighting Bombing					
Altitude (Ft)	500-2000	2000-2500	26-3500	36-4500	46-6000	6000-10000		
Light	.90	.82	.83	.84	.85	.86	.80	
Moderate	.70	.70	.73	.77	.80	.83	.70	
Heavy	.50	.57	.65	.70	.75	.80	.50	

(3) If the target maneuvers during the bombing approach, the accuracy of bombing will be somewhat reduced.

The efficiency of the attack under such conditions is given below as a percentage (expressed in decimals) of the efficiency of a similar attack in which the target maintains a steady course and speed.



TABLE 4  
TARGET MANEUVERS

Target Maneuvers	Remaining Effectiveness					
	Altitude : (Ft)	Large	Int.	Small	Des.	Sub.
Radical at high speed	500-1500:	1.00	1.00	.95	.90	.90
	1500-3500:	.93	.87	.82	.82	.85
	3500-6000:	.85	.75	.70	.70	.80
	6100-10000:	.80	.70	.65	.62	.75
Radical at low speed	500-1500:	1.00	1.00	.97	.95	.95
	1500-3500:	.95	.92	.91	.90	.90
	3500-6000:	.90	.85	.85	.85	.85
	6100-10000:	.87	.80	.80	.80	.80
Restricted at high spd.	500-1500:	1.00	1.00	.97	.90	.90
	1500-3500:	.95	.92	.91	.87	.87
	3500-6000:	.90	.85	.85	.85	.85
	6100-10000:	.85	.80	.80	.80	.80
Restricted at low spd.	500-1500:	1.00	1.00	1.00	1.00	1.00
	1500-3500:	.97	.95	.95	.95	.95
	3500-6000:	.95	.90	.90	.90	.90
	6100-10000:	.90	.87	.87	.87	.87

(4) The percentage of hits under good conditions as shown in the table under (c) above, multiplied by the percentage factor for reduced effectiveness of attack given under Rule J-21 (d) (1), (2) or (3) above, gives the final percentage of direct hits. In case conditions prevail in which it is proper to apply more than one of the percentage factors, the product of those which are applicable will be used.

(5) If any unusual conditions arise other than those given in tables 2, 3 and 4, or for which the tables are not properly applicable, the Director will decide the amount of increase or decrease in the effectiveness of the attack.

(6) Reduced visibility on Bomb Hits. Reduced visibility will not affect the accuracy of bombing provided the bomber can actually see his target. The altitude from which a sight bombing attack may be delivered will be limited by the ceiling published for the move unless otherwise decided by the director. The



minimum altitude from which a dive bombing attack can be initiated is 3000 feet.

(7) Night Bombing. In the case of night bombing, the Director will decide the amount of change, due to the low or reduced visibility, in any factors upon which the effectiveness of the attack depends. The wake from a vessel making 15 knots or more will materially aid a night bombing attack. Normally a night bombing attack under favorable visibility conditions will attain 50% of a similar daylight attack.

(e) Having determined, under (c) and (d) of this rule, the number of direct bomb hits on a target to be N, the following additional number of hits alongside will be allowed, depending on target size, and altitude of plane.

(Note: These tables give average target practice performance arbitrarily reduced 25%).



HITS ALONGSIDE  
(Total 0-30 ft. from ship's side)

TABLE 5

Sighting Bombing

Target size:	Altitude of Release (Ft.)									
	2000	3000	4000	5000	6000	7000	8000	9000	10000	
Large	.1 N	.11 N	.15 N	.19 N	.23 N	.27 N	.30 N	.34 N	.37 N	
Int.	.49 N	.56 N	.64 N	.71 N	.79 N	.86 N	.94 N	1.03 N	1.1 N	
Small	.98 N	1.1 N	1.3 N	1.4 N	1.6 N	1.7 N	1.8 N	1.9 N	2.0 N	
Dest.	1.2 N	1.6 N	1.9 N	2.2 N	2.5 N	2.8 N	3.0 N	3.2 N	3.4 N	
Sub.	2.3 N	2.7 N	3.2 N	3.6 N	4.0 N	4.5 N	5.0 N	5.5 N	6.0 N	

Diving Bombing

Target size:	Altitude of leveling off.* (Ft.)									
	500	600	800	1000	1200	1400	1500	1600	1800	2000
Large	.11 N	.14 N	.18 N	.23 N	.27 N	.32 N	.34 N	.36 N	.40 N	.45 N
Int.	.45 N	.47 N	.52 N	.56 N	.61 N	.65 N	.67 N	.70 N	.74 N	.79 N
Small	.79 N	.81 N	.85 N	.90 N	.95 N	.99 N	1.01 N	1.03 N	1.08 N	1.1 N
Dest.	1.24 N	1.26 N	1.30 N	1.35 N	1.39 N	1.44 N	1.46 N	1.48 N	1.53 N	1.57 N
Sub.	1.91 N	1.93 N	1.98 N	2.02 N	2.07 N	2.11 N	2.14 N	2.16 N	2.20 N	2.3 N

\*Altitude of release is 600 feet higher

Rule J-22. - Damage inflicted on vessels by bombs is expressed in 14" penetration hits and will be as follows, except under special circumstances:

Hit Values

Table 6

Bomb Character weight	Direct Hit					Under-water Damage Average 0-30 feet
	BB	CR	CL	DD	Aux.	
Explosive 2000 lb	1.08	1.42	1.50	2.20		3
Explosive 1000 lb.	0.54	0.71	0.75	1.10		1.58
Explosive 500 lb.	0.27	0.36	0.38	0.55		.75
Explosive 116 lb.	0.05	0.07	0.08	0.11		----
Fragmenta- tion. 25 - lb.	Effective through a radius of 50 feet against personnel and planes on deck or on land. Effective by direct hits on planes on water. May damage radio or cause fires. Will explode mines or depth charges by direct hits.					
Smoke 50 - lb	Six smoke bombs are required to make an effective smoke screen.					
Navigational Float- light 4 - lb.	One marks spot on surface of water for five minutes with smoke and flame.					

The value of a hit in destroying the life of a submarine will be the same as for a DD. In addition the Director may assign additional damage affecting its ability to submerge or to use its periscope, etc.



In the case of fragmentation bombs the Director, after determining the number of hits, will decide the nature and extent of damage inflicted.

BOMB DAMAGE.

Rule J-23. To summarize the above paragraphs of Rules J-21 and 22 for determining damage inflicted by bombs:-

(a) Above water damage. Formula for above-water damage by direct hits:

Number of bombs carried by bombing group x percentage of hits x hit value = damage inflicted. (Expressed in 14" penetration hits).

- (1) Number and size of bombs carried will be indicated by the player in command of bombing group.
- (2) To the percentage of hits "under good conditions" will be applied the factor for opposition to attack (See Rule R-21 (d)).
- (3) Hit values are given in Rule J-22.
- (4) Damage inflicted by direct hits is above-water damage and is expressed in 14" penetration hits.
- (5) The nature of the damage inflicted by fragmentation bombs will be decided by the Director.

(b) Under-water damage. After determining the above-water damage from direct hits, use Table 5 under Rule J-21 to determine what additional under-water damage is done by hits alongside.

Formula for under-water damage by hits alongside:

Number of direct hits x factor for hits alongside x hit value (average, 0-30 ft.) = damage inflicted (under-water).



BOMB DAMAGE TO FLIGHT DECK.Rule J-24.

It is assumed that:

- (a) One 2000 lb. or 1000 lb. bomb will destroy the flight deck of an aircraft carrier.
- (b) One 500 lb. bomb will destroy one half the flight deck, i.e., either the forward or after portion.
- (c) Such damage may be repaired in accordance with the following table:

TIME REQUIRED TO REPAIR FLIGHT DECK

Type of Hit	At Navy Yard or Base		By tender	By ships
	Permanent	Temporary	(Temporary only)	(Temporary only)
2000 lb. or 1000 lb.	30 days	10 days	15 days	20 days
500 lb.	20 days	7 days	10 days	15 days
Small bombs	10 days	1 day	1 to 24 hours	1 to 24 hours

- (d) Temporary repairs will permit flying planes on or off carriers in double the time required under normal conditions.
- (e) When flight deck is destroyed and until repairs are effected, carriers are restricted to cruiser operations.
- (f) When the forward half of flight deck is destroyed, and after two hours have elapsed, planes may fly on or off in double normal interval.
- (g) With the after half of deck destroyed, planes may not fly on but may fly off under normal conditions after an interval of 10 minutes.

AERIAL TORPEDO ATTACKRule J-25.

- (a) Torpedo plane attacks should be concentrated and if practicable should be made simultaneously with bomb attacks.
- (b) 60% of plane torpedoes fired are assumed to function properly throughout their run, unless curved fire is used, in which case only 40% run.



(c) Of the plane torpedoes that run, under good conditions: planes under no effective opposition, torpedoes fired at range not over 4000 yards with favorable track angle, and target not maneuvering radically at high speed, - the following per-cent will make direct hits on their selected targets:

<u>Target size</u>	<u>Per cent hits</u>
Large	50
Intermediate	45
Small	35
Destroyer	30
Submarine	25

(d) For unfavorable conditions the above percent of direct hits on the selected target(s) will be proportionately reduced by the Director.

(1) Torpedo Attack opposed. Attack by hostile planes during the approach may reduce the number of attacking planes TABLE 2, and may somewhat reduce the efficiency with which the remaining torpedo planes complete their attack, but it is assumed that defending planes discontinue their attack when attacking planes can come under effective gunfire.

In general a division of battleships, cruisers or an aircraft carrier not under effective fire will be able to develop heavy anti-aircraft fire when attacked by torpedo planes. If the ships are under effective fire a moderate anti-aircraft fire will be developed. (Table 3). Single battleships or cruisers not under effective fire will be able to develop a moderate anti-aircraft fire when attacked by torpedo planes. If the ships are under effective fire, a light anti-aircraft fire will be developed.

Torpedo planes attacking under conditions where a surprise attack is possible will be considered as encountering light anti-aircraft fire.



The condition of the target with respect to above-water damage will be considered by the Director in assigning the volume of anti-aircraft fire encountered.

Due to the effect of anti-aircraft fire on the efficiency of the personnel of the remaining planes, the percentage of direct hits made by torpedoes finally allowed to run will be reduced in the same proportion as the damage to the attacking unit.

If a torpedo plane comes within the probable limits of salvo patterns while dropping its torpedo, such plane will be subject to damage.

(2) Target Maneuvers During Torpedo Attack. If the target maneuvers radically during the approach and during the torpedo run, the normal percent of direct hits will be proportionately reduced, depending on target speed, amount of change of course, and range at which torpedoes are fired. In order for any reduction to be allowed for target maneuvers, the target must be making at least 15 knots and must be making frequent changes of course of more than 30 degrees. The percent of direct hits finally allowed will not be reduced to zero because of target maneuvers except in the extreme case of target speed over 30 knots with radical maneuvering and target range over 3,000 yards.

(e) Torpedo Tracks. The tracks of plane torpedoes that run but do not make direct hits on the target vessel(s) will be plotted by the Director, who will determine what additional hits are made on other vessels.

(f) Torpedo Hit Effect. The effect of torpedo hits for type E and F torpedoes is 1.8.



AERIAL GUNNERY OBSERVATION.

Rule J-26 - Planes may be employed for gunnery observation purposes in accordance with Rule F-7.

SMOKE SCREENS.

Rule J-27 - Smoke screens may be laid by aircraft by means of smoke bombs, or by means of special apparatus producing the "smoke curtain".

(a) Smoke Bombs weigh 50 lbs., each; can be dropped as low as 100 feet and as high as 5000 feet. Will smoke for 4 minutes.

(1) Planes may carry smoke bombs up to the number indicated below, provided weight conditions permit. Whether or not a plane may carry smoke bombs and other bombs at the same time depends on the characteristics of the plane and the weight and bulk involved. -

VF (1)	2 smoke bombs.
VO, VS	4 smoke bombs.
VP, VT	12 smoke bombs.

(2) In order for such a smoke screen to be so dense as to obscure vision between surface craft, it must be made by at least 6 smoke bombs not over 200 feet apart.

(3) Planes assigned to anti-submarine patrol may be equipped with sufficient marker smoke boxes for the indication of the presence of submarines to surface craft. These are very light and 4 may be carried in addition to other load.



(b) Aerial smoke screens are produced by the ejection of tetanium tetrachloride (F.M.) into the atmosphere. Planes assigned to this duty are divided into two classes:

- (a) Heavy Smokers.
- (b) Light Smokers.

Heavy smokers are of the VP or VT types. The equipment weighs approximately 1180 pounds and contains fifty gallons of F.M. The altitude for laying varies between 200 and 400 feet and is dependent on the speed and weather. Under normal atmospheric conditions the lower edge of the curtain will cling to the surface of the water, the upper edge rising to an altitude of 1000 feet and will remain opaque for about twenty minutes. Two heavy smokers can be depended upon to lay a satisfactory curtain 7000 yards in length.

Light smokers are of the VO-VS or VB type. The equipment consists of two tanks each containing 15 gallons of FM., one being mounted under each lower wing. The weight of each tank filled is approximately 250 pounds. A section of three light smokers can be depended upon to lay a curtain 2000 yards in length. If laid close to the water, the curtain will rise to a height of 200 feet and under normal atmospheric conditions will remain opaque for 20 minutes.

Smoke apparatus may be rigged in planes aboard carriers in two hours. In planes based on tenders 3 hours will be required. A refill of F.M. can be made in one hour. Planes cannot land aboard until F.M. has been discharged.

#### AERIAL PHOTOGRAPHY

Rule J-28. Photographs may be taken and prints made by planes except single seaters at any altitude up to their maximum, provided previous arrangements have been made.



Under normal conditions, such photographs will be considered to record vessels of intermediate or larger size to a maximum distance of 15 miles and to permit recognition of the above vessels as to type to a maximum distance of 10 miles.

10 minutes will be required to develop and print one photograph.

SUBMARINE SIGHTING BY PLANES.

Rule J-29. Submarines with periscope under, submerged to a depth of 60 feet, and mines submerged to a depth of 10 feet, can be seen from aircraft only under special and favorable conditions. These conditions are affected by the following, - depth and clarity of water, nature of bottom, condition of surface, light effect, altitude and relative position of observer. The Director will decide each case after considering the attending conditions.

Submarines submerged at sea with periscope under, do not offer a point of aim to bombing planes.

Delayed action bombs may be used against SS at any time.

TORPEDO SIGHTING BY PLANES

Rule J-30. The wake of torpedoes can be seen from aircraft detailed for observation, in general, as follows:

1. Can be seen best at altitude of 500-1000 feet over torpedo.
2. Can be seen at a maximum altitude of 7000 feet over torpedo.
3. Can be seen at an altitude of 5000 feet and a horizontal distance of 3 miles from torpedo provided sun is at back of observer. Cannot be seen under these conditions when observer is facing sun.
4. The wake cannot be seen in a moderate or rough sea.

The greater the depth of torpedo the more difficult to see.



PARACHUTE FLARES.

Rule J-31. Planes may carry parachute flares in accordance with Rule D-14.

NOISES OF AIRCRAFT.

Rule J-32. The noises made by planes may be heard by naked ear in accordance with Rule D-25. It is possible by gliding from suitable altitude to avoid being heard.

SOUND DETECTORS TO LOCATE AIRCRAFT.

Rule J-33. Sound detectors can locate approaching aircraft according to the following table.

<u>No. planes in flight</u>	<u>Located accurately yards</u>	<u>Located approximately yards</u>	<u>T</u>
1	11,000	20,000	
3	12,000	22,000	
7	13,000	25,000	
13	14,000	27,000	
18	15,000	30,000	

Ground winds decrease the ranges as follows:

<u>Wind Beaufort</u>	<u>Decrease range percent of above</u>
1	0
2	10
3	20
4	30
5	40, etc.



AIRSHIPS

Rule J-34.(a)

(1) Operate from hangars and mooring masts at land bases or from mooring masts on ships specially fitted, provided such ships are operating in waters that cause no undue motion to ship. Can make and maintain physical contact with airplane carriers in waters that cause no undue motion to ship for purposes of re-fueling, re-arming and transfer of personnel. The carrier can launch but not receive planes during this time.

(2) Can enter or leave hangar when wind is force 5 or less, provided direction of wind is within four (4) points of longitudinal axis of hangar.

(3) Can enter or leave hangar only with wind less than force 3 when direction of wind is more than four (4) points away from longitudinal direction of hangar.

(4) Can moor to mooring mast with wind from any direction and not exceeding force 7.

(5) Can land on the ground with wind up to force 6, provided men and facilities are available.

(6) Can remain in the air with wind of any force except in intense circular storm, or line squalls.

(7) The ZRS-4 type of rigid airship can carry, launch and recover up to 5 airplanes, VF type.

AIRSHIP RENEWED FLIGHT

Rule J-34 (b)

Upon the completion of a flight the airship will not be considered available for a subsequent flight until an interval has elapsed that is sufficient for reservicing in accordance with the existing conditions.



Under normal conditions this interval of time will be a minimum of 2 hours and a maximum of 24 hours, depending on the duration of the previous flight.

The Director will adjudge the time required under special conditions.

RADII OF AIRSHIP

Rule J-35.

Airships ordinarily have radii as follows:

Type	At speed of			
	40	45	50	70
ZR-3	:4500	: 4000	: 3000	: :
ZRS-4	: :	: :	: 9000	: 4200 :
non-rigid	: 800	: :	: 500	: :

DAMAGE TO AIRSHIP

Rule J-36.

A helium filled rigid airship can remain in the air and operate for a limited space with 30% of its gas capacity lost through gun fire. A loss of 40% of its gas capacity will bring it down a wreck.

RECOGNITION OF AIRCRAFT

Rule J-37.

The maximum distance that a plane can be recognized as to type and nationality usually depends on whether or not distinctive characteristics of the type appear in the silhouette presented to the observer. The Director will inform the player as the conditions warrant.



SIGHTING DISTANCE OF AIRCRAFT.

Rule J-38.

(a) Airplanes can be seen in the air from other aircraft at the horizontal distances given below, (figures in miles), provided the difference of altitude between the observer and the plane observed is not over 2000 feet, for greater differences of altitude decrease the figures in columns 1 and 2 below by one-half miles for each additional 1000 feet.

(1) Normal visibility:

Class seen	Number in group	Col. 1 Same altitude or higher than observer	Col. 2 Lower than observer
VP, VT	1	5	3
VP, VT	2-6	7	4
VP, VT	7 plus	8	5
VF, VS, VO(2)	1	4	2
VF, VS, VO(2)	2-6	6	3
VF, VS, VO(2)	7 plus	7	4

(2) High Visibility.

Add one mile to distances in foregoing table.

(3) Low Visibility.

Take  $\frac{1}{2}$  of distances in foregoing table.

(b) Airplanes can be seen by an observer on a surface vessel or on land 1 mile farther than the distances of column 1 above (visibility conditions having the same effect as in "(a)" and in "(2)" and "(3)").

Airplanes can be seen by submarine periscopes the same distance as by observers on surface craft, but the chances of seeing for each minute the periscope is observing are **accord-**



ing to the following table:

<u>Range</u>	<u>Chance</u>
Maximum	1 in 10
3/4 max.	1 in 8
1/2 max.	1 in 5
1/4 max.	1 in 3

(c) Distances that rigid airships may be seen will be considered to be one-third the distance farther than that which large vessels may be seen from aircraft under the various conditions of visibility.

Non-rigid airships may be seen one-third the distance farther than the distance at which intermediate sized vessels can be seen from aircraft.

(d) While the sun is visible, the above figures will be considerably reduced in the general direction of the sun from the observer; each case will be decided by the Director.

EXAMPLE (A):

At what horizontal distance will an observer in a plane at 10,000 feet see a formation of 4 VF at 4000 feet in normal visibility?

- (a) Column 2 ..... 3 miles
- Difference of altitude ..... 6000 feet
- Altitude factor ..... 4
- (b) Reduction in distance  $4 \times 1/2 = 2$  miles
- Horizontal distance seen: (a minus b) = 1 mile

EXAMPLE (B):

At what horizontal distance will an observer on a surface vessel sight a formation of 10 VT at an altitude of 13,000 feet in low visibility?

- (a) Column 1 ..... 8 miles
- (b) Observer on surface  
    (paragraph (b) above) add ..... 1 mile
- (c) (a plus b) ..... 9 miles
- (d) Corrected for low visibility  
    (par. (a) (3) above) .....  $4\frac{1}{2}$  miles
- Difference of altitude ..... 13,000 feet
- Altitude factor ..... 11
- (e) Red. in distance  $11 \times 1/2 = 5\frac{1}{2}$
- Horizontal distance seen (d minus e) = -1
- Formation cannot be seen.



EXAMPLE (C)

Which would sight the other first: A VO at 4000 feet  
or a destroyer?

Visibility - normal  
Moderate sea.

VO seen from DD:

(a) Column 1		4 miles
(b) Observer on surface add		1 mile
(c) (a plus b)		5 miles
Difference of altitude		4000 feet
Altitude factor		2
(d) Red in distance:	$2 \times 1/2 =$	1
( (c) minus (d) )	$=$	4

DD seen from VO:

(a) If at 4000 feet 8 miles

Therefore VO will sight the DD first.

AERIAL COMMUNICATIONS

Rule J-39.

Means of communication of aircraft and rules applying  
thereto are as set forth in the "E" section of the maneuver  
rules.



SECTION K - CHEMICAL WARFARE

NOTE: Although the reports of several international conferences have contained provisions against the use of asphyxiating and deleterious gases, only one - the Central American Convention for the Limitation of Armaments - has ever been ratified by all of the signatory powers. Thus, there is no international agreement in force among the major powers prohibiting the use of gas in spite of the fact that, to all outward appearances, the consensus of public opinion would seem to be opposed to its use. In 1921, the General Board of the Navy advocated the abolition of this form of warfare. Therefore, since there is no general international prohibition against the use of gas and in view of the fact that all the major powers maintain chemical warfare services for the purpose of studying the use of, and defense against, gas, it is considered desirable and necessary to include such study at this College.

Chemical Agents, When Used.

Rule K-1. In maneuvers at the War College, unless specifically prohibited by the Staff, chemical agents may be used at will by student belligerents, providing the following conditions have been met previous to the beginning of the maneuver and the Director so notified:-

(a) The student C-in-C or higher authority authorizes the use of chemical agents by his forces.

(b) Each student commander specifies the kind and quantity of chemical agents carried by the different types of ships and shore stations under his command. (Rules K-2, K-3, K-4).



Kinds of Chemical Agents.

Rule K-2. The kinds of chemical agents that may be used are as follows:-

<u>Agent</u>	<u>Symbol</u>	<u>Characteristics</u>	<u>Purpose</u>
(1) Mustard	HS	Persistent. Vesicant. Action slow. Detected by odor.	Casualty producing and making ships or land area untenable.
(2) Lewisite	ML	Persistent. Vesicant. Action more rapid. Neutralized by water. Detected by odor.	Casualty producing.
(3) Ethyl-di-chlorarsine	ED	Persistent. Vesicant. Action immediate. Detected by odor.	Casualty producing.
(4) CN solution	CNS	Persistent. Tear gas. Action immediate. Violent. Liquid. Non-detectable.	Harassing.
(5) Chloracete-phenone	CN	Non-persistent. Mild. Tear gas. Action immediate. Non-detectable.	Harassing.
(6) Diphenylamine-Chlorarsine	DM	Non-persistent. Irritant smoke. Severe. Sneeze gas. Action immediate. Detected by color by daylight.	Complete temporary disability.
(7) White phosphorus	WP	Smoke. Incendiary. Action immediate. Detected by odor and color.	Incendiary action creating heavy smoke. Casualty producing.

Method of Use.

Rule K-3. These agents may be used in the following ways:

CN By shell fire (all kinds except star shell). The agent replaces 10% of the bursting charge, without reducing the damage effect of the shell.

CNS }  
HS } By aircraft bombs, all sizes. These bombs have no damage  
ML } effect on material. They affect personnel only.  
ED }



HS  
MI  
ED  
CNS

By spraying from aircraft. Weight of loaded spray tank 500 lbs. Spray tank can be attached to any plane fitted with a bomb rack capable of carrying a 500-lb. bomb. Time to attach and detach - same as a 500 lb. bomb. On carriers and tenders these loaded spray tanks may displace the bomb allowances in the "FLEETS", weight for weight. Quantity of chemicals carried by shore bases will be enough for 3 flights of each plane so fitted, unless otherwise stated in the problem.

DM

By destroyers only. Laid in same manner as a smoke screen. Special apparatus to discharge through smoke pipes.

HS  
CNS  
WP

By shell fire (all kinds except star shell). These are special thin wall shells for use against shore objectives only. They may replace weight for weight all ammunition allowances. The effect will be determined by the Director.

Notification of Director.

Rule K-4. Before the beginning of the maneuver, student commanders will notify the Director what percentage of the number of shells and aircraft bombs, which are allowed in the "FLEETS", are loaded with chemical agents or displaced with spray tanks or thin wall shells; the kind of chemical agents so used; and which destroyers are fitted with DM laying devices.

Specifying Use of Chemical Agents.

Rule K-5.

(a) Student commanders will specify on their flight forms when chemical bombs or spray tanks are carried by planes and the kind of chemical agent with which they are loaded.

(b) Student commanders will specify on their move blanks when CN shells or thin wall shells are being fired, and when DM screens are being laid.

Rule K-6. To be effective, the shells, bombs, and spray must directly hit the target, or the target must pass through the DM screen.



Chemical Penalties, When Applied.

Rule K-7. Shells and bombs will hit in accordance with the rules of gun fire and aircraft bombing. When these hits accumulate to the equivalent of .25 14" penetrative hits within the contamination period (Rule K-13), chemical penalties will be applied in accordance with Rule K-10.

Chemical Spray.

Rule K-8. Chemical spray will hit under the following conditions:-

- (a) Plane altitude must be 200 feet or less with wind force 4 or less.

Plane altitude must be 100 feet or less with wind force 5.

Above wind force 5, no chemical spray will be effective under any conditions.

- (b) On ship target at least two planes spraying approximately simultaneously are required to hit.
- (c) On shore targets one plane may hit with spray. In which case the area covered by one 500 lb. spray tank will be 100 yards by 800 yards. To completely deny this area will require five planes using HS, in which case the area will be denied 10 days.

DM Screens.

Rule K-9. DM screens laid by destroyers will be plotted on the maneuver board in the same manner as any smoke screen. The quantity of DM carried by each destroyer is sufficient for 15 minutes emission. An emission of less than 3 minutes or by less than 3 destroyers will be ineffective. The conditions, under which the screen will lie, are those given in Rules D-201 (a), D-202, D-203, D-204, D-205, D-206, D-207, D-208. If it meets these requirements, the screen will be effective. The personnel of destroyers laying DM screens are assumed to be protected by masks in which case they are subject to the penalties of Rule K-10.



Chemical Penalties, Effect of.

Rule K-10. If the agent hits, as determined by Rules K-6, K-7, K-8 and K-9, the following will be the effect on the target during the contamination period (Rule K-13). It is assumed that all chemical agents, except DM at night, will give sufficient warning to permit complete individual protection by masks and clothing.

- (a) Gun Fire. (Main, secondary and A.A.) will be reduced by a second correction of two-tenths (.2) during first hour after being hit by gas; thereafter by four-tenths (.4) until contamination is removed. (See Rule K-13).
- (b) Maximum remaining individual speed will be reduced on a coal burning ship three-tenths (.3) during first hour; thereafter six-tenths (.6) until contamination is removed. No speed reduction will be made on an oil burning ship. (See Rule K-13).
- (c) All messages sent or received will have their time of delivery, doubled during the first hour, and quadrupled thereafter until contamination is removed. (See Rule K-13).
- (d) The times of plane handling on all ships will be doubled until contamination is removed.

DM Hitting at Night.

Rule K-11. If DM hits occur at night, the effect on the target will be as specified in Rule K-10; except that in the case of a surprise attack the penalties given in Rule K-10 will be doubled and the ship will be out of control for 9 minutes. Whether or no a surprise occurs will be at the discretion of the Director.

Increase of Fire Effect on a Contaminated Ship.

Rule K-12. The fire effect delivered by a ship firing at the contaminated ship will be increased as a second correction one-tenth (.1) during the first hour after the target is contaminated (Rule K-10) and two-tenths (.2) thereafter until contamination is removed. (See Rule K-13). This is due to reduced effectiveness of the damage control of contaminated target ship.



Time of Contamination.

Rule K-13. Contamination on ships will be removed in the following times after the last gas hits:-

- HS - 6 hours,
- ML - 3 hours,
- ED - 3 hours,
- CN - 1/2 hour,
- DM - 1/2 hour,
- CNS - 3 hours,
- WP - 3 minutes.

Length of Masking.

Rule K-14. Personnel cannot be continuously masked longer than twelve hours.



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