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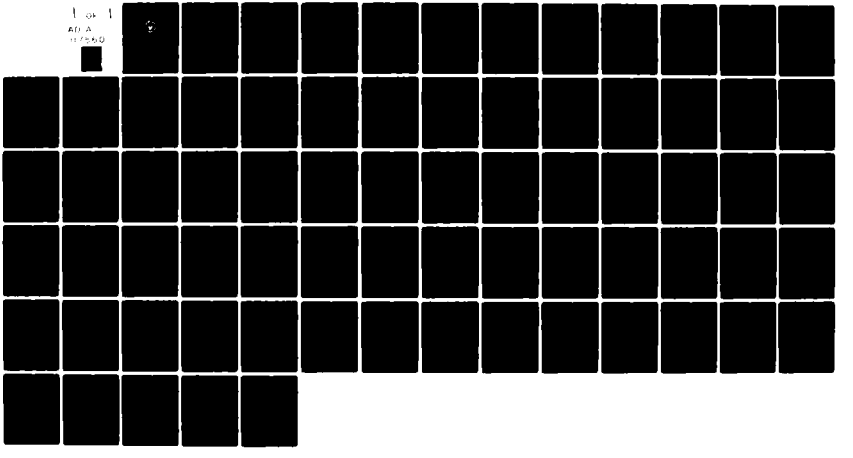

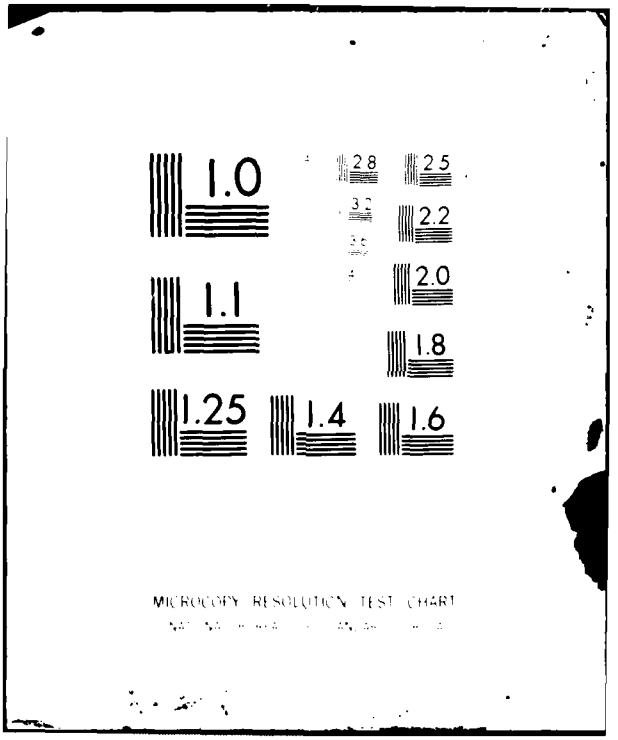
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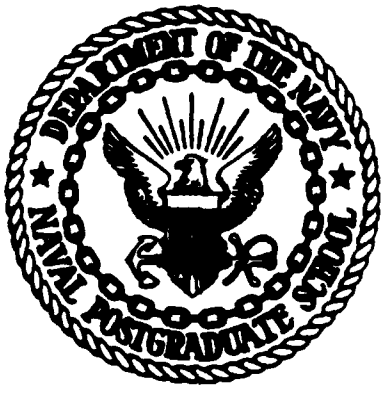

THESIS

SEATAG EXTENSION

by

Francis A. Devereux

March 1982

Thesis Advisor: Alvin Andrus

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. A117360 / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SEATAG EXTENSION	5. TYPE OF REPORT & PERIOD COVERED Master's Thesis; March 1982
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Francis A. Devereux	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940	12. REPORT DATE March 1982
	13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

SEATAG, weapons effectiveness, cruise missiles, table top war games, naval combat, weapons systems, damage assessment, detection and classification, naval air combat

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The SEATAG EXTENSION will revise and suggest optional and alternative rules for the game SEATAG: A Sea Control Tactical Analysis Game. Alternative rules are proposed for damage assessment, detection, classification, targeting, weapon's effectiveness, and ASMD close in weapon systems. Air-to-air combat tables have been revised to include the latest additions to both the United States and Soviet naval aircraft inventories. Optional rules will incorporate electronic warfare, battle damage repairs, miniature ship model combat, and use of the Tomahawk cruise missile. All revisions,

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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optional rules, and alternative rules are placed in a pullout section for addition to the SEATAG binder.

A

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SEATAG EXTENSION

by

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Lieutenant, United States Navy
B.S., United States Naval Academy, 1976

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

from the

NAVAL POSTGRADUATE SCHOOL
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ABSTRACT

The SEATAG EXTENSION will revise and suggest optional and alternative rules for the game SEATAG: A Sea Control Tactical Analysis Game. Alternative rules are proposed for damage assessment, detection, classification, targeting, weapon's effectiveness, and ASMD close in weapon systems. Air-to-air combat tables have been revised to include the latest additions to both the United States and Soviet naval aircraft inventories. Optional rules will incorporate electronic warfare, battle damage repair, miniature ship model combat, and use of the Tomahawk cruise missile. All revisions, optional rules, and alternative rules are placed in a pullout section for addition to the SEATAG binder.

TABLE OF CONTENTS

I. INTRODUCTION

SEATAG: A SEA CONTROL TACTICAL ANALYSIS GAME, is a game that simulates a war at sea between BLUE and RED forces. SEATAG is an unclassified and noncomputerized game developed by the Center for Advanced Research at the Naval War College, Newport, R.I. Initially SEATAG was used as a research and analytical tool to explore tactical employment concepts for the Harpoon anti-ship missile. Later it was apparent that a simple table top game had research, analysis, training, and education potential for many other applications. The latest version of SEATAG available for use is the second edition published in 1978.

With the introduction of new and improved weapon systems into the United States and USSR navies, SEATAG has become outdated. The purpose of this thesis is to write a SEATAG EXTENSION that will revise the 1978 edition of SEATAG to utilize present weapon systems and improve the game as a realistic combat model. The SEATAG EXTENSION purposely does not computerize nor classify the game since this would diminish the value of the game as a shipboard training aid.

A. SEATAG EXTENSION

Optional rules to SEATAG that the SEATAG EXTENSION proposes in this thesis will provide the participants of the game with the following new capabilities:

1. miniature ship model combat rules
2. electronic warfare rules
3. repair of battle damage

Additionally the SEATAG EXTENSION will provide optional rules or clarification to present SEATAG rules in the following areas:

1. damage assessment
2. detection and classification
3. targeting
4. ASMD close in weapon systems

Utilization of the optional rules will add a greater degree of complexity and realism to the play of the game. No new or optional rules need be used. The players will determine which optional rule to utilize in the game in order to add the desired additional realism.

Chapter II compares the 1978 edition rules of SEATAG to the additional optional rules proposed in the SEATAG EXTENSION. Addressed in detail will be the proposed optional rules that will fill the voids in the second edition of SEATAG. Additionally the optional rules on alternative methods of detection, damage assessment, and targeting will be discussed. Clarification of the rules in SEATAG concerning the use of close in anti-missile defensive weapons will also be addressed. Chapter II also provides the users with the advantages and disadvantages of using the optional rules in SEATAG.

Chapter III will contain the author's opinions, ideas, and findings on SEATAG and the proposed optional rules. A brief summary of the major topics of Chapter II will also be addressed in the author's remarks. Areas for additional work, study, and concern will also be noted.

Appendix A is a self-contained SEATAG EXTENSION. Appendix A is a "pull out" section to be added to the SEATAG binder. This "pull out" section will revise the present edition of SEATAG with respect to present day weapon systems. Additionally this section contains all the optional rules, combat tables, flow charts, and detection tables proposed in this thesis.

II. THE SEATAG EXTENSION

The SEATAG EXTENSION will not change the game SEATAG in great detail. The SEATAG EXTENSION adds modern weapon systems, provides optional rules, and clarifys existing rules to the 1978 edition of SEATAG. The addition of modern weapon systems capability into the game updates the sea control aspect of SEATAG to naval combat to the present day. Optional rules provide the players with greater realism and resolution of the game as desired. Clarification of present rules concerning close in anti-missile defensive weapons will be addressed.

A. MODERN WEAPON SYSTEMS

SEATAG needs revision in the areas of modern aircraft, air weapon systems, and cruise missile systems. The addition of these modern weapon systems is necessary to update SEATAG into a simulation of present day naval warfare. These revisions do not require the use of any of the new optional rules. They simply update the present game.

1. Modern Aircraft

The BLUE force commander will now have added the F-14, F-18, and AV-8A fighter aircraft. The AV-8A will provide the BLUE commander with a VSTOL capability he presently does not have in the present edition of SEATAG.

The RED force commander will have the MIG-21, MIG-25, and MIG-27 fighter aircraft available. Additionally the Backfire bomber will be added to the RED forces aircraft inventories. The bomber will provide the RED force commander with a fast long range threat to the BLUE forces.

New FIGHTER DUELS and FIGHTER AIRCRAFT ENGAGEMENT TABLES that utilize these modern aircraft are provided in Appendix A. These new tables should be used instead of the present ones in the 1978 edition.

2. Air Weapon Systems

The F-14 has a capability to engage air targets at long range. The AWG-9 weapon system on the F-14 provides the BLUE force commander the realistic capability to control additional air space with his CAP. Present combat tables in SEATAG are not suitable to handle long range air to air combat. Included in Appendix A is a special combat table that addresses the F-14's capability to engage air targets at long range. This table should always be utilized if F-14 aircraft are employed.

3. Modern Cruise Missiles

BLUE forces should have the ability to utilize the Tomahawk cruise missile in a naval engagement. This missile should be classified as having a medium warhead (500 lbs) for damage purposes. The addition of the Tomahawk cruise missile will give the BLUE forces a long range highly accurate cruise

missile. A pen and ink change to TABLE IV-1 in the present edition of SEATAG is all that is required to incorporate the Tomahawk cruise missile into the game.

B. OPTIONAL AND ALTERNATIVE RULES

There are several optional rules proposed for the game players to utilize in the playing of SEATAG that inject greater realism into the game. Unfortunately as realism is added to the game, the game rules become more complex and the game flow more restrictive. The optional rules proposed can be utilized independently so that control of the realism and complexity is entirely with the game participants.

1. Miniature Ship Model Rules

The 1978 edition of SEATAG does not have any rules that utilize miniature ship models. SEATAG is a sea control game that provides the players no guidance in conducting a tactical battle. The miniature ship model rules proposed in the SEATAG EXTENSION fills this void.

On the commercial market today are several modern naval combat games that utilize 1/2400 or 1/3600 metal ship models. The rules of these games are generally complicated, cumbersome to use, and time consuming to learn. The miniature ship model rules in the SEATAG EXTENSION will provide the players a framework of rules so that ship models can be "maneuvered and fired" quickly. A flat surface and a ruler is all that is required to utilize these rules.

When the miniature rules are being used, game time is moved ahead in one minute intervals. Players first move their ship models and then allocate the ship's weapon systems to defensive or offensive modes. An interaction of weapon systems takes place, damage is assessed and game time advanced one minute.

The miniature ship model rules will provide the game players a tactical version of SEATAG. This tactical version enables greater detailed resolution of the interaction between opposing forces. Indeed this added dimension will enhance the game's value as a training aid and increase its recreational aspect.

2. Electronic Warfare

The present edition of SEATAG does not provide for electronic warfare in anti-ship cruise missile defense. Navies today utilize electronics along with chaff and flares to distract an anti-ship cruise missile from its intended target. This method of a "soft kill" has been integrated into the SEATAG EXTENSION as an optional rule.

Missiles and ships are assigned an E.W. rating. Ratings are compared and a random number is drawn to determine if the missile is allowed to attack its target. In Appendix A an E.W. combat table is provided along with cruise missile and ship type E.W. ratings.

Utilization of this rule with game play is highly recommended. The burden of drawing an additional random

number is insignificant when compared to the added realism provided by this rule.

3. Repair of Battle Damage

The present rules in SEATAG do not address the repair of battle damage. This is a major weakness in the game. The capabilities with regard to damage control is excellent in both the United States and Soviet navies. Both navies have skilled personnel and spare parts on board. It is therefore unrealistic not to include battle damage repair. Although the rules to repair battle damage are simple, they represent many complex factors. Ships will be assigned a number of damage control parties based upon ship type of each force. At the end of each engagement these damage control parties will be allowed to repair damage points, weapon systems, and sensors. The disparity between BLUE and RED forces with the number of skilled personnal and quantities of spare parts aboard has been taken into account in design of the repair rules. Appendix A provides the optional repair rules as well as the number of repair parties per ship type.

Damaged vessels can be pulled out of action, repaired, and reengage the enemy at a later time. These optional rules will give the game a new dimension. SEATAG is now changed from a single engagement game into a possible multibattle compaign spanning extended time intervals. It is highly recommended that this rule be utilized often.

4. Damage Assessment

Figure IV-1, in SEATAG, computes battle damage in terms of explosive warhead weight and returns a percent capability remaining in the areas of mobility, defense, and offense with regard to the ship's systems. The capability remaining is now a multiplier used to degrade the ship's sensors, speed, and weapon capabilities.

An alternative means of damage assessment is proposed in the SEATAG EXTENSION. Each ship is assigned a maximum number of damage points receivable based upon its displacement. The greater the total of cumulative damage points a ship receives the higher the probability that a weapons system or sensor is lost. This alternative means of damage assessment is in terms of systems destroyed instead of percent of capability remaining. The ship's maximum speed will still be determined by a percent of capability based upon remaining damage points. As before ship's speed will be reduced in increments when the remaining damage points receivable fall below the 75, 50, 25, and 10 percent levels.

Appendix A to this thesis will provide all the rules and tables to determine probablistically which weapons or sensors are destroyed. Special damage that includes fire, flooding, weapons control, and mobility has been also added to the alternative damage tables.

In general, battle damage tends to destroy the ship's sensors and weapon systems in "whole units." Damage in the bow of a ship would not necessarily effect the aft gun mount or air search radar on the mast. This new method of damage assessment is more realistic. It also incorporates some of the uncertainties of warfare into the game. The disadvantage of this alternative method is the extra time required to compute the damage received and the additional bookkeeping necessary.

Figure III-3 in SEATAG provides torpedo, missile, and gun effectiveness, and assumes that all weapons of the same type have the same effectiveness. This is a poor assumption.

Appendix A provides the players with realistic specific weapon systems effectiveness versus specific targets. Unclassified publications were utilized in the determination of weapon system effectiveness. This information has been compiled into easy-to-use reference tables. Different tables are provided for the majority of BLUE and RED surface to surface, surface to air, air to surface, and ASW weapons systems. Each weapon system has been assigned a damage point value compatible with the alternative rules.

Utilization of the weapon effectiveness tables in Appendix A provides realistic weapon system interaction without an increase of complexity. These weapon effectiveness tables should be used even when the ultimate damage assessment rules are not being utilized.

5. Detection and Classification

The present edition of SEATAG provides Figure III-2 as the detection and classification curve for both passive and active sensors. A weakness of this detection and classification curve is that there is always at least a 10 percent chance of not detecting the enemy force regardless of the range.

Appendix A of the SEATAG EXTENSION provides separate detection tables for passive sensors, air search radars, surface search radars, and surface ship detection by visual means. The height of the radar antenna is taken into account for a ship's surface search radar capabilility and a ship's "height of eye" is taken into account for visual detection. Ships are assigned to four groups for purposes of detection; carriers, cruisers, destroyers, and patrol boats. The range indicated in the tables is the range at which detection occurs.

The number of alternative detection tables is increased primarily to the four groups of ship types. The visual detection tables provide the game a capability that is not present in the second edition of SEATAG. To utilize these tables, possibly four additional random numbers will have to be drawn.

These alternative detection tables are for just that, detections. Classification after detection will occur when

additional information is received from passive sensors or visual means. This is indeed more realistic than Figure III-2.

The realism provided by the detection tables far outweighs the requirement to draw additional random numbers. These alternative detection tables should be utilized frequently.

6. Targeting

SECTION III.F and TABLE III-5 in the 1978 edition of SEATAG provide the targeting rules for missile vs. ship engagements. An alternative method of targeting is proposed in the SEATAG EXTENSION. This alternative method will cause missiles to target carriers, AOE's, and other large ships twice as often as a smaller ship. Utilizing TABLE III-5 one will consider a carrier or any other large ship as two ships in determining random targeting for cruise missiles. This is because modern anti-ship cruise missiles tend to home on the target with the largest radar cross section area. This added realism can be injected into the game with very little difficulty or added complexity. This alternative method of targeting should be used frequently.

7. ASMD Close In Weapon Systems

Figure III-7 incorporates a ship's ability to utilize ASMD close in weapon systems in combating incoming cruise missile threats.

Optional rules in the SEATAG EXTENSION suggest that only one-half of the ship's close in weapon systems (missile or gating gun) should be utilized against incoming cruise missiles.

These close in weapon systems have a limited arc of fire due to the ship's superstructure. Realistically a ship must maneuver to unmask its close in weapon system batteries to engage an incoming missile threat.

The use of this optional rule will not increase the complexity of the game. This rule should be utilized frequently.

The revisions and prosed rules in the SEATAG EXTENSION will add realism and complexity to the game. Players may utilize some or all of these rules as well as their own methodology at the discretion of the game director.

III. SUMMARY

The use of the optional and alternative rules proposed in the SEATAG EXTENSION will increase the realism of the game. This added realism is offset by the use of complex rules that slow the flow of the game.

Optional rules and tables that should be used frequently are (1) the electronic warfare rules, (2) targeting rules, (3) aircraft combat tables, (4) detection tables, (5) weapon effectiveness tables, and (6) ASMD rules. These six additions will increase the game's realism and capabilities without adding significant complexity to the game.

Proposed alternative rules concerning damage repair and damage assessment require more bookkeeping than is necessary in the present 1978 edition of SEATAG. The players that desire the added capabilities that these rules provide should be gratified by the added realism.

The new outcome tables and added details represent the author's opinions on how SEATAG should simulate modern naval combat. An area that this thesis did not address was weapon system saturation. Calculations were done to determine the maximum number of targets that an anti-aircraft missile system could engage. Two tables are provided at the end of the pullout section. These tables are intended to stimulate

interest in the area of weapon system saturation and possible additional optional rules for SEATAG.

Provided in the pullout section is a blank ship card. This card should be utilized when using the proposed rules. The card should be covered with plastic so that a grease pencil can be used to record damage and weapons expenditure. Also in the pullout section is a table that generates random numbers on two six sided dice.

SEATAG was designed as a table top game that was suitable for shipboard use. A table top game is one that is portable and requires little space or resources for game play. The revisions and optional rules as suggested by the SEATAG extension do not diminish the table top appeal of SEATAG while expanding the capabilities and realism of the game.

SEATAG EXTENSION PULLOUT SECTION

TABLE OF CONTENTS

Targeting: When anti-ship cruise missiles target a group of vessels, large ships (CVN, LHA, AOE, etc.) are twice as likely to be targeted than a smaller vessel. When using TABLE III-5 large vessels are counted as two ships.

ASMD Weapons: A ship under attack by anti-ship cruise missiles is allowed to utilize one-half of its close in weapon systems. Additionally only one of the available systems may engage any individual incoming missile.

Detection: Detection can occur by passive sensors, active sensors, or by visual means. The detection tables indicate the range at which detection occurs.

Passive Detection: If a unit has passive sensors aboard and another unit is radiating active sensors, the passive unit is entitled to a passive detection. TABLE A-1 is used. A random number is drawn and the radiating active sensor will be detected at the indicated range. The passive unit will receive information to as which active sensor is radiating and general bearing (not range) of the active unit.

Active Detection: If a unit is radiating an active sensor it is entitled to a detection. A random number is drawn and the proper active detection table will indicate the detection range. The active unit then receives the bearing, range, cruise, speed, and altitude of the contact. Note that there are specific tables for BLUE and RED active sensors and the surface search radar detection tables take into account "height of radar" for both the active unit and the contact.

Visual detection: Every surface ship is entitled to a visual detection. A random number is drawn for each unit. At the indicated range the unit is informed to as what it "sees." Note that these tables take into account height of eye of both the detecting unit and the contact.

Classification: Classification of a contact can only occur by visual means or by passive sensor detection.

Electronic Warfare: The weapon effectiveness tables provide the E.W. rating for missiles. A ship's E.W. rating is determined by the following criteria:

Rating A: modern electronic suite with automatic systems that utilize chaff or flares.

Rating B: electronic suite with some automatic and some manual systems that utilize chaff or flares.

Rating C: manual systems that utilize chaff or flares.

Rating D: no capability.

A missile with an E.W. rating of 'B' can not be affected by a ship's electronic warfare rating. Missiles with an E.W. rating of 'A' can be affected by a ship's electronic warfare rating. TABLE A-6 will determine the outcome between a missile with a rating of 'A' and a ship's E.W. rating.

DAMAGE ASSESSMENT

Damage Points (DP): Damage points are based upon warhead weight for missiles. Gun system DP are based upon shell weight, rate of fire, and range. The weapon effectiveness tables provide the DP for each weapon system.

Vessel Survivability: A vessel's capability to receive and survive damage points is based upon its displacement. The maximum number of DP that a vessel can receive is its displacement divided by fifty.

$$\text{MAX DP} = \frac{\text{displacement}}{50}$$

Submarines and merchant vessels, because of structural considerations, receive only half the DP's its displacement warrants.

Damage: Damage to a vessel is in terms of total DP's received.

Vessel Mobility: The speed of a vessel is dependent upon the damage the vessel has received. Vessel mobility is decreased at the 0, 25, 50, 90, and 100 percent levels of damage in the following percentages.

Damage (%)	SPEED-KTS
0	MAX SPEED
25	3/4 OF MAX SPEED
50	1/2 OF MAX SPEED
75	1/4 OF MAX SPEED
90	DEAD IN WATER
100	SUNK

Damage Ratio: The damage ratio is used in the determination of the number of system hits a damaged vessel receives in the turn. The damage ratio is equal to the total DP's received this turn divided by the additional DP's required to sink the vessel.

$$\text{damage ratio} = \frac{\text{DP's received this turn}}{\text{required additional DP's to sink vessel}}$$

Determination of System Hits: The determination of which systems are destroyed is a two step process. The number of system hits must first be determined and then when systems are destroyed.

To determine the number of system hits a vessel has received use TABLE A-7. Draw a random number. The number under the random number column and the corresponding damage ratio line is the number of system hits a vessel has received.

To determine which system has been destroyed utilize TABLE A-8.1 or TABLE A-8.2 dependent upon the type of weapon that damaged the vessel. Draw a random number. The random number is altered as dictated by the modifiers. The system destroyed is indicated by the modified random number.

If there is more than one of the type of system to be destroyed on the vessel randomly determine which system is destroyed. If the system to be destroyed is not on the vessel, or already has been destroyed, draw additional random numbers until the vessel receives damage. Each damaged vessel will receive the number of system hits as determined by TABLE A-7.

Fire and flooding hits damage the vessel additionally as indicated in TABLE A-8.4. Every 30 minutes that the fire or flooding is not out or controlled a random number is drawn and modified. TABLE A-8.5 will indicate the status of the fire or flooding. A vessel may have any number of fire or flooding hits per turn.

Control hits are determined by TABLE A-8.3. A random number is drawn and the proper chart indicates the damage.

Damage Repair (D.R.): Each vessel is assigned the number of D.R. parties as indicated below:

BLUE: CVN-13, CG-6, DD/FF-4, SUB-2, Merchant-2, P.G.-1

RED: CVH-9, CG-5, DD/FF-3, SUB-1, Merchant-1, P.G.-1

D.R. parties may be utilized to repair weapon systems, fire control radars, sensors, damage points, control flooding and put out fires.

D.R. parties are used as directed in TABLE A-8.5 to combat fire and flooding.

A D.R. party, after being assigned for one hour to repair any F/C radar, weapon, sensor, or speed hit is entitled to a one time only attempt to restore the destroyed system to operational status. This chance of success for a BLUE D.R. party is 35% and for a RED D.R. party is 25%.

For each hour a BLUE D.R. party is assigned to repair damage points, five damage points are repaired. A RED D.R. party repairs 3 damage points each hour. D.R. parties are not allowed to repair more than half of the total damage points received by the vessel.

Weapons Effectiveness: The weapon's effectiveness for both the BLUE and RED forces are described in the various tables. These tables may be utilized with the sea control rules as well as the miniature rules.

Weapon systems may not engage targets more than system saturation limits allow. Units may not exceed missile magazine capacity with regard to expenditures. All gun magazines considered adequate for at least 30 turns of expenditure.

When a weapon systems scores a hit on an air target, the air target is considered destroyed.

Tomahawk Cruise Missile: The Tomahawk cruise missile is to be considered as having a medium warhead when Figure IV-1 is used.

TABLE TOP MINIATURES RULES

SCALE - Three inches represents one nautical mile or 2000 yards.

TURN - Each turn is one minute of game time. Each turn consists of a movement phase and a fire phase.

RANGE - Range between ship models is measured from mast to mast.

MOVEMENT PHASE - Each movement phase a ship model is allowed to move a distance (in inches) dependent upon its present speed. This distance is equal to:

$$\text{ship speed} * \frac{3}{20}$$

To simulate the turning characteristics of a ship, course changes are accomplished in legs of 45° or fractions thereof. Dependent upon vessel size, the ship model will have to travel a minimum distance along its first 45° leg before being allowed to start another 45° leg.

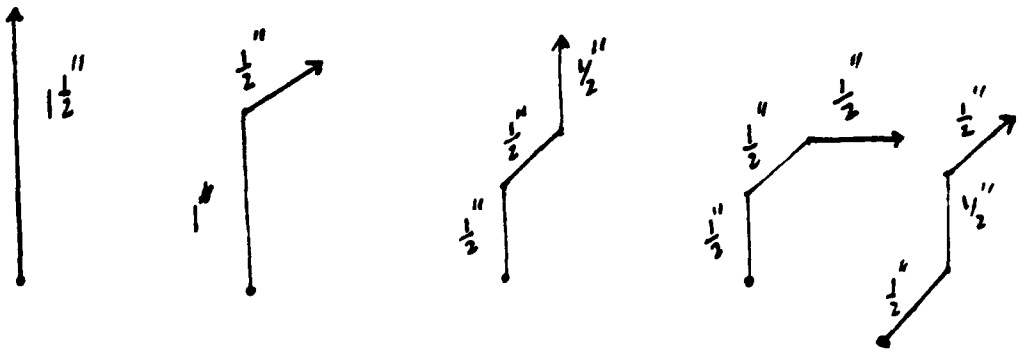
A speed to distance conversion table is provided for the player's convenience.

During the movement phase players move their models simultaneously.

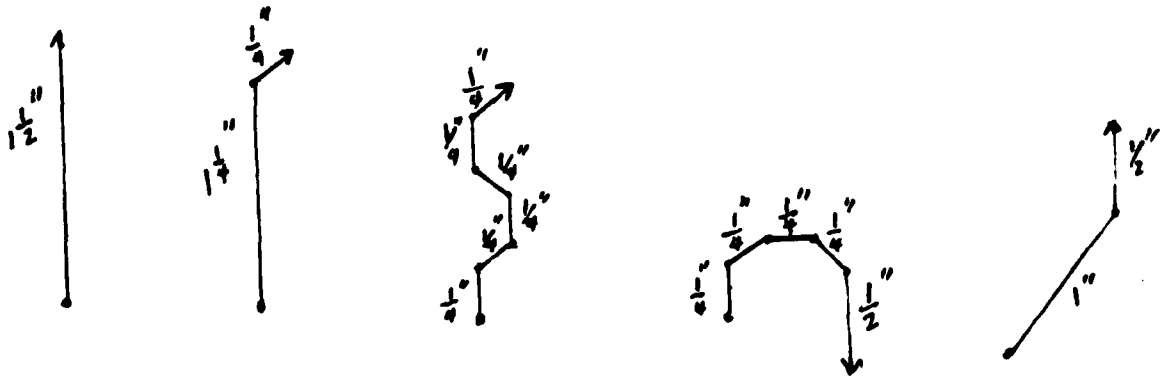
VESSEL SIZE	MIN. DISTANCE (IN.) PER 45° LEG
CV, Large Vessel	1/2"
DD, CGN, FF	1/4"
SUB-Submerged	1/8"
SUB-Surfaced	1/2"

EXAMPLES

CVN - SPEED 30 KNOTS
DISTANCE TRAVELED IN 1 MIN. TURN - 1 1/2"



DDG - SPEED 30 KNOTS
DISTANCE TRAVELED IN 1 MIN. TURN - 1 1/2"



FIRE PHASE - The fire phase occurs simultaneously at the end of each movement phase.

Players secretly note which of the ship model's weapon systems will be used offensively and defensively.

Incoming missiles must survive the defender's EW rating.

Notes are now compared. Weapon systems assigned to the defense of the ship are now employed against the incoming threat.

Determine if uncountered threats score a hit on the ship model.

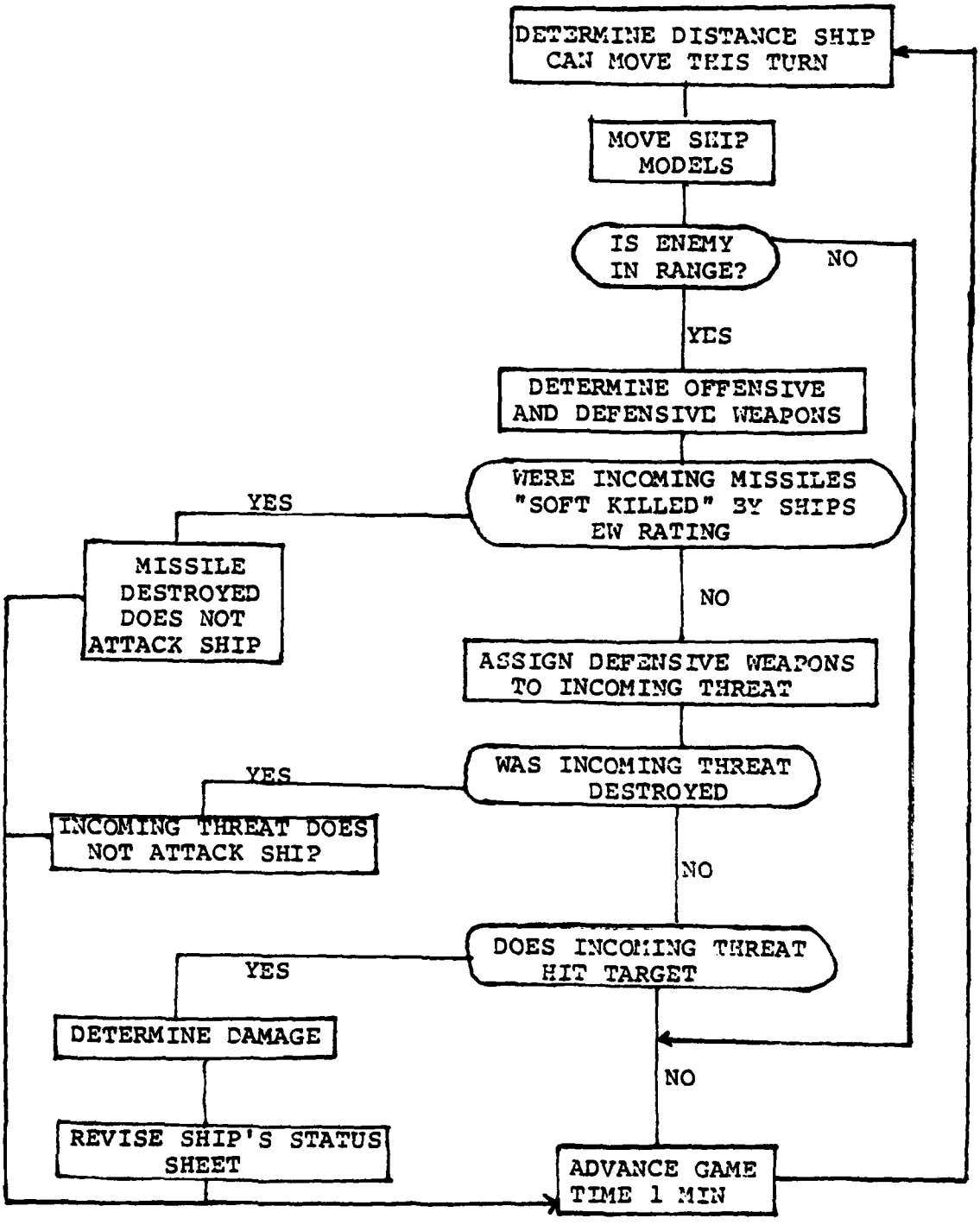
Determine and record damage to each vessel.

Record that one minute of game time has expired.

Next Movement Phase.

Note that only weapon systems that can be brought to bear on the target or threat can be utilized.

FLOW CHART FOR SHIP MODEL TURN



TABLE

SHIP'S SPEED TO DISTANCE (IN.) PER TURN

SHIP'S SPEED (KNOTS)	DISTANCE PER TURN (INCHES)	SHIP'S SPEED (KNOTS)	DISTANCE PER TURN (INCHES)
40	2	20	1
39	2	19	1
38	1 7/8	18	7/8
37	1 7/8	17	7/8
36	1 3/4	16	3/4
35	1 3/4	15	3/4
34	1 3/4	14	3/4
33	1 5/8	13	5/8
32	1 5/8	12	5/8
31	1 1/2	11	1/2
30	1 1/2	10	1/2
29	1 1/2	9	1/2
28	1 3/8	8	3/8
27	1 3/8	7	3/8
26	1 1/4	6	1/4
25	1 1/4	5	1/4
24	1 1/4	4	1/4
23	1 1/8	3	1/8
22	1 1/8	2	1/8
21	1	1	1/16

TABLE A-1

PASSIVE DETECTION TABLE

RANDOM NUMBER	SURFACE SEARCH RADAR (SHIP)	AIR SEARCH RADAR (SHIP)	AIRBOURNE RADAR
96-99	45.0	375	425
91-95	40.0	350	400
76-90	37.0	325	375
50-75	35.0	300	350
25-49	32.0	275	325
10-24	30.0	250	300
05-09	28.0	225	275
00-04	25.0	200	250

Random number indicates range of passive detection.

TABLE A-2

RED AIR AND AIR/SURF RADAR DETECTION TABLE

RANDOM NUMBER	AIR SEARCH RADAR (SHIP)	BEAR D BIG BULGE RADAR	HORMONE 'B' BIG BULGE RADAR
96-99	200	180	135
91-95	190	170	130
76-90	180	160	125
50-75	170	155	120
25-49	160	150	115
10-24	150	145	110
05-09	140	140	105
00-04	130	130	100

Random number detects range (NM) RED detect's BLUE's forces.

TABLE A-3

BLUE AIR AND AIR/SURF RADAR DETECTION TABLE

RANDOM NUMBER	AIR SEARCH RADAR (SHIP)	E-2C AIR/SURF SEARCH RADAR	S-3A P-3C	F-14 AWG-9 RADAR
96-99	220	200	170	150
91-95	210	195	165	145
76-90	200	190	160	140
50-75	190	185	155	135
25-49	180	180	150	130
10-24	170	175	145	125
05-09	160	170	140	120
00-04	150	165	135	115

Random number indicates range (NM) BLUE radar detects RED's forces.

TABLE A-4.1

CV RADAR DETECTION TABLE

RANDOM NUMBER	TARGET CV	CG	DD/FF	P.G.
96-99	25.0	23.5	22.5	20.0
91-95	24.0	23.0	22.0	19.0
76-90	23.5	22.5	21.5	18.5
50-75	23.0	22.0	20.0	18.0
25-49	22.5	21.5	19.0	17.5
10-24	22.0	20.0	18.5	17.0
05-09	21.5	19.0	18.0	16.5
00-04	20.0	18.5	17.5	16.0

Random number indicates range (NM) that CV detects ship type.

TABLE A-4.2

CG SURFACE RADAR DETECTION TABLE

RANDOM NUMBER	TARGET CV	CG	DD/FF	P.G.
96-99	23.5	22.5	21.5	19.0
91-95	23.0	22.0	21.0	18.5
76-90	22.5	21.5	20.0	18.0
50-75	22.0	21.0	19.0	17.5
25-49	21.5	20.0	18.5	17.0
10-24	21.0	19.0	18.0	16.5
05-09	20.0	18.5	17.5	16.0
00-04	19.0	18.0	17.0	15.0

Random number indicates range (NM) that CG detects ship type.

TABLE A-4.3

DD/FF SURFACE RADAR DETECTION TABLE

RANDOM NUMBER	CV	CG	DD/FF	P.G.
96-99	23.0	22.0	21.0	18.0
91-95	22.5	21.5	20.0	17.5
76-90	22.0	21.0	19.0	17.0
50-75	21.5	20.0	18.0	16.5
25-49	21.0	19.0	17.5	16.0
10-24	20.0	18.0	17.0	15.0
05-09	19.0	17.5	16.5	14.0
00-04	18.0	17.0	16.0	13.0

Random number indicates range (NM) that DD/FF detects ship type.

TABLE A-4.4

P.G. RADAR DETECTION TABLE

RANDOM NUMBER	CV	CG	DD/FF	P.G.
96-99	18.5	17.5	16.5	15.5
91-95	18.0	17.0	16.0	15.0
76-90	17.5	16.5	15.5	14.5
50-75	17.0	16.0	15.0	14.0
25-49	16.5	15.5	14.5	13.5
10-24	16.0	15.0	14.0	13.0
05-09	15.5	14.5	13.5	12.5
00-04	15.0	14.0	13.0	12.0

Random number indicates range (NM) that P.G. detects ship type.

TABLE A-5.1

CV VISUAL DETECTION TABLE

RANDOM NUMBER	CV	CG	DD/FF	P.G.
96-99	21.0	19.5	17.0	15.5
91-95	20.5	19.0	16.5	15.0
76-90	20.0	18.5	16.0	14.5
50-75	19.5	18.0	15.5	14.0
25-49	19.0	17.5	15.0	13.5
10-24	18.5	17.0	14.5	13.0
05-09	18.0	16.5	14.0	12.5
00-04	17.5	16.0	13.5	12.0

Random number indicates range (NM) that CV visually detects ship type.

TABLE A-5.2

CG VISUAL DETECTION TABLE

RANDOM NUMBER	CV	CG	DD/FF	P.G.
96-99	21.5	18.5	16.5	14.5
91-95	21.0	18.0	16.0	14.0
76-90	20.5	17.5	15.5	13.5
50-75	20.0	17.0	15.0	13.0
25-49	19.5	16.5	14.5	12.5
10-24	19.0	16.0	14.0	12.0
05-09	18.5	15.5	13.5	11.5
00-04	18.0	15.0	13.0	11.0

Random number indicates range (NM) that CG visually detects ship type.

TABLE A-5.3

DD/FF VISUAL DETECTION TABLE

RANDOM NUMBER	CV	CG	DD/FF	P.G.
96-99	18.0	17.0	15.5	13.0
91-95	17.5	16.5	15.0	12.5
76-90	17.0	16.0	14.5	12.0
50-75	16.5	15.5	14.0	11.5
25-49	16.0	15.0	13.5	11.0
10-24	15.5	14.5	13.0	10.5
05-09	15.0	14.0	12.5	10.0
00-04	14.5	13.5	12.0	9.5

Random number indicates range (NM) that DD/FF visually detects ship type.

TABLE A-5.4

P.G. VISUAL DETECTION TABLE

RANDOM NUMBER	CV	CG	DD/FF	P.G.
96-99	14.5	13.5	12.5	11.5
91-95	14.0	13.0	12.0	11.0
76-90	13.5	12.5	11.5	10.5
50-75	13.0	12.0	11.0	10.0
25-49	12.5	11.5	10.5	9.5
10-24	12.0	11.0	10.0	9.0
05-09	11.5	10.5	9.5	8.5
00-04	11.0	10.0	9.0	8.0

Random number indicates range (NM) that P.G. visually detects ship type.

TABLE A-6

EW TABLE FOR MISSILES EW RATING 'A' VS SHIPS

RANDOM NUMBER	SHIP EW RATING A	SHIP EW RATING B	SHIP EW RATING C	SHIP EW RATING D
51-99	NE	NE	NE	NE
40-50	EW KILL	NE	NE	NE
30-39	EW KILL	EW KILL	NE	NE
20-29	EW KILL	EW KILL	NE	NE
10-19	EW KILL	EW KILL	EW KILL	NE
00-09	EW KILL	EW KILL	EW KILL	NE

NE: No effect

EW KILL: Missile aborted

NOTE: Missiles with EW rating 'B' are not affected by ship's EW rating.

TABLE A-7

DETERMINATION OF NUMBER OF CRITICAL HITS

DAMAGE RATION	RANDOM NUMBER DRAWN				
	00 - 19	20 - 39	40 - 69	70 - 89	90 - 99
.05	0	0	0	0	0
.1	0	0	0	1	2
.2	0	1	1	2	3
.3	1	1	2	3	4
.4	1	2	3	4	5
.5	2	3	4	5	6
.6	3	4	5	6	7
.7	4	5	6	7	8
.8	5	6	7	8	9
.9	6	7	8	9	10
1.0	7	8	9	10	10
1.2	8	9	10	10	10
1.3	9	10	10	10	10

NOTE: Each Shrike or AS-9 hit one additional critical hit.

Each 500 lb. cluster bomb hit (3) additional citical hits.

* * * Round down ship's damage ratio to damage ratio line, i.e., for damage ratio of .68 use .6 ratio line.

TABLE A-8.1

SYSTEM HIT TABLE (NON-TORPEDO)

RANDOM NUMBER DRAWN	SYSTEM HIT DESCRIPTION
00-04 OR LESS	LOSE 1 F.C. RADAR
05-09	REDUCE EW RATING ONE LEVEL
10-19	LOSE AIR SEARCH RADAR
20-29	LOSE SURFACE SEARCH RADAR
30-39	LOSE 1 GUN MOUNT
40-49	LOSE 1 SSM MOUNT
50-59	LOSE 1 ASW MOUNT
60-69	LOSE 1 AAW MISSILE MOUNT
70-80	MINOR FIRE
81-85	CONTROL HIT USE TABLE 8.3
86-90	MINOR FLOODING
91-95	REDUCE SPEED 1 LEVEL MINOR FIRE, MINOR FLOODING
96-99 OR MORE	REDUCE SPEED 2 LEVELS MAJOR FIRE, MAJOR FLOODING

MODIFIERS

CLUSTER BOMB	-20
SHRIKE	-80
AS-9	-80
GUN (LONG RANGE)	-05
GUN (SHORT RANGE)	+05
AIRCRAFT STRAFING	-05

Add or Subtract the indicated modifiers to the random number drawn.

TABLE A-8.2

SYSTEM HIT TABLE (TORPEDO)

RANDOM NUMBER DRAWN	SYSTEM HIT DESCRIPTION
00-10	MINOR FIRE, MINOR FLOODING
11-30	MINOR FIRE
31-50	MINOR FLOODING
51-70	MAJOR FLOODING
71-90	LOSE 1 SPEED LEVEL MAJOR FLOODING
91-90	LOSE 2 SPEED LEVELS MAJOR FIRE, MAJOR FLOODING
96-99	LOSE 3 SPEED LEVELS MAJOR FIRE, MAJOR FLOODING

TABLE A-8.3

BLUE AND RED FORCES CONTROL HITS

RANDOM NUMBER DRAWN	RED FORCES CONTROL HIT
00-25	LOSE ALL GUN BATTERIES
26-49	LOSE ALL MISSILE BATTERIES
50-79	LOSE ALL ASW BATTERIES
80-89	LOSE (1) DC PARTY
90-99	BRIDGE HIT MAINTAIN COURSE/SPEED 2 MIN.

RANDOM NUMBER DRAWN	BLUE FORCES CONTROL HIT
00-59	CIC HIT LOSE ALL DETECTION/WEAPONS CONTROL
60-79	BRIDGE HIT MAINTAIN COURSE/SPEED 2 MIN.
80-99	LOSE (1) DC PARTY

TABLE A-8.4

FIRE AND FLOODING TABLES

FIRE LEVEL	DAMAGE POINTS		
	PG	CG, DD, FF	CV, CVH
FIRE OUT	0	0	0
MINOR	5	10	30
MAJOR	5	20	60
OUT OF CONTROL	10	40	120

FLOODING LEVEL	DAMAGE POINTS		
	PG	CG, DD, FF	CV, CVH
CONTROLLED	0	0	0
MINOR	5	10	20
MAJOR	5	20	40
PROGRESSIVE	10	30	80

TABLE A-8.5

FIRE AND FLOODING OUTCOMES

RANDOM NUMBER DRAWN	FIRES TABLE
20 OR LESS	FIRE INCREASES 1 LEVEL; TAKE DAMAGE
21-89	NO CHANGE
90-99	FIRE DECREASES 1 LEVEL

MODIFIERS

CV, AO, AE	-20
RED FORCES	-05
EACH D.C. PARTY ABOVE 1	+10

RANDOM NUMBER DRAWN	FLOODING TABLE
10 OR LESS	FLOODING INCREASES 1 LEVEL; TAKE DAMANGE
11-79	NO CHANGE
80-99	FLOODING DECREASES 1 LEVEL

MODIFIERS

CV	-10
RED FORCES	-05
EACH D.C. PARTY ABOVE 1	+10

Roll every 30 minutes for each fire or flooding hit that is not out or under control.

Add or Subtract the indicated modifiers to the random number drawn.

TABLE A-9.1

BLUE FORCES SURFACE TO SURFACE MISSILE SYSTEMS

MISSILE SYSTEM	RANGE (NM)	% HIT CHANCE	POINT DAMAGE	MISSILE EW RATING	NUMBER FIRED PER MINUTE
TOMAHAWK	275	95	60	A	8
HARPOON	60	90	46	A	8
BPDMS SEA SPARROW	4.0	20	5	B	4
NATO SEA SPARROW	6.0	40	5	B	4
SM1MR	6.5	50	5	B	2
SM1ER	17.5	50	5	B	2
SM2MR	15.0	60	5	B	2
SM2ER	40.0	60	5	B	2
TALOS	32.0	40	15	A	2

TABLE A-9.2

BLUE FORCES AIR TO SURFACE ORDNANCE

WEAPON SYSTEM	RANGE (NM)	% CHANCE TO HIT	POINT DAMAGE	EW RATING
TOMAHAWK	300	95	60	A
HARPOON	90	90	46	A
500 LB BOMB	---	25	12	---
750 LB BOMB	---	25	18	---
1000 LB BOMB	---	25	24	---
2000 LB BOMB	---	25	48	---
LASER & TV HOMING BOMBS	30	95	1000 LB OR 2000 LB BOMB	B
WALLEYE II	35	90	120	B
BULLPUP B	9.5	80	60	B
SHRIKE	9.0	95	SPECIAL	B
5" ZUNI ROCKET	1.5	35	5	B
20 MM. VULCAN	---	55	20	---
500 LB CLUSTER BOMB	---	50	SPECIAL	---

TABLE A-9.3

BLUE FORCES SURFACE TO AIR MISSILE SYSTEMS

MISSILE SYSTEM	RANGE (NM)	AIRCRAFT	MISSILE EW 'A'	MISSILE EW 'B'
BPDMS SEA SPARROW	8.0	20	05	NE
NATO SEA SPARROW	13.5	40	25	10
SM1MR	13	60	45	30
SM1ER	30	60	45	30
SM2MR	30	75	60	45
SM2ER	75	75	60	45
TALOS	65	60	45	30

Number in Aircraft/Missile boxes indicates % for system to score a kill against incoming threats.

Dependent upon detection range, target speed, and missile system range unit may be entitled to multiple salvos against incoming threats.

NE: No effect

TABLE A-9.4

BLUE FORCES ANTI-AIRCRAFT GUN SYSTEMS

GUN SYSTEM	RANGE (NM)	AIRCRAFT	MISSILE EW 'A'	MISSILE EW 'B'
5"/38	5.0	25	10	NE
5"/54 MK39	8.0	50	35	20
5"/54 MK42	8.0	50	35	20
5"/54 MK45	8.0	70	55	40
3"/50	4.5	15	05	NE
3"/62 MK75	6.5	60	45	30
PHALANX 20 MM/76	.8	80	70	55

Number in Aircraft/Missile boxes indicates % for system to score a kill. Gun systems are entitled to one opportunity per turn to shoot down an incoming air threat.

NE: No effect

TABLE A-9.5

BLUE FORCES SURFACE GUN SYSTEMS

GUN SYSTEM	RANGE (NM)			% CHANCE TO HIT (PER BARRELL)			DAMAGE POINTS (PER BARRELL)		
	SHORT	MED	LONG	SHORT	MED	LONG	SHORT	MED	LONG
16"/50	7	14	21	60	30	10	320	160	80
5"/38	3	5	7	60	40	20	12	6	3
5"/54 MK39	4	8	11	70	50	30	28	14	7
5"/54 MK42	5	9	13	70	50	30	44	22	11
5"/54 MK45	5	9	13	80	55	35	36	18	9
3"/50	2	4	6	35	15	5	8	4	2
3"/62	3	6	9	70	50	30	24	12	6
8"/55 MK71	6	11	16	80	40	20	80	40	20

Gun range has been divided into short, medium, and long range. Surface gun systems are entitled to one opportunity per turn to score a hit against a surface target.

TABLE A-10

RED AND BLUE FORCES ASW WEAPONS

WEAPON SYSTEM	RANGE (NM)	% CHANCE TO HIT	*POINT DAMAGE	FIRING RANGE
SS-N-14 400 MM TORP	30	60	30	2 PER MIN
RBU 1200	1	60	7	EVERY MIN
RBU 2500	1.5	65	5	EVERY 2 MIN
RBU 6000	3.25	65	5	EVERY MIN
RBU 600	1.25	70	11	EVERY 2 MIN
RBU 1000	1.25	70	11	EVERY MIN
TYPE B 533 MM TORP	5	80	45	2 PER MIN
DEPTH CHARGE	---	20	30	---
ASROC MK46 TORP	5	70	8	2 PER MIN
ASROC MK46 NT TORP	5	75	8	2 PER MIN
MK48 TORP	25	90	60	EVERY MIN

* Double point damage if submarine is not at periscope depth.

TABLE A-11.1

RED FORCES SURFACE TO SURFACE MISSILE SYSTEMS

MISSILE SYSTEM	*RANGE (NM)	% CHANCE TO HIT	POINT DAMAGE	MISSILE EW RATING	NUMBER FIRED PER MINUTE
SS-N-1 SCRUBBER	13.5	40	5	A	2
SS-N-2B STYX	13.5	60	80	A	2
SS-N-2C	40.0	65	80	A	2
SS-N-3 SHADDOCK	25/250	70	90	A	2
SS-N-7	30.0	70	90	A	8
SS-N-9	40/150	85	23	A	2
SS-N-12	25/300	85	105	A	2
SS-N-14	30.0	60	30	B	2
SS-NX-19	60/260	90	105	A	2
SA-N-1	8.0	40	5	B	4
SA-N-2	10.0	20	10	B	4
SA-N-3	10.0	70	5	B	4
SA-N-4	10.0	80	5	B	4
SA-N-6	25.0	75	18	B	4

* Longer range requires external targeting.

TABLE A-11.2

RED FORCES AIR TO SURFACE ORDNANCE

WEAPON SYSTEM	RANGE (NM)	% CHANCE TO HIT	POINT DAMAGE	EW RATING
AS-1 KENNEL	80	70	60	A
AS-2 KIPPER	115	75	200	A
AS-3 KANGAROO	350	70	460	A
AS-4 KITCHEN	380	90	200	A
AS-5 KELT	170	80	200	A
AS-6 KINGFISH	380	80	200	A
AS-7 KERRY	5.5	85	12	B
AS-9	55	90	SPECIAL	B
100 Kg BOMB	---	20	6	---
250 Kg BOMB	---	20	15	---
500 Kg BOMB	---	25	30	---
57 MM ROCKET	1	55	5	---
23 MM OR 30 MM GUN	---	45	7	---

TABLE A-11.3

RED FORCES SURFACE TO AIR MISSILE SYSTEMS

MISSILE SYSTEM	RANGE (NM)	AIRCRAFT	MISSILE EW 'A'	MISSILE EW 'B'
SA-N-1	17	40	25	10
SA-N-2	19.5	35	20	05
SA-N-3	20	60	45	30
SA-N-4	8	70	55	40
SA-N-5	8.5	30	15	00
SA-N-6	50	80	65	50
SA-N-7	30	80	65	50

Number in Aircraft/Missile boxes indicates % for system to score a kill against incoming threats. Dependent upon detection range, target speed, and missile system range unit may be entitled to multiple salvos against incoming threats.

TABLE A-11.4

RED FORCES ANTI-AIRCRAFT GUN SYSTEMS

GUN SYSTEM	RANGE (NM)	AIRCRAFT	MISSILE EW 'A'	MISSILE EW 'B'
76 MM AUTO	8.0	65	50	35
100 MM/60	4.0	60	45	30
30 MM ROTARY	1.5			
23 MM ROTARY	1.5			
76 MM/60	7.5	55	40	25
130 MM/58	9.0	50	35	20
57 MM/70	3.25			
57 MM/80	2.8			
130 MM/50	8.0	40	25	10
45 MM/85	3.25			
100 MM/50	5.0	30	15	01
100 MM/56	3.25			
85 MM/50	3.25			
30 MM/65	1.5			
37 MM/63	1.5	35	20	05
25 MM/60	1.5	20	05	NE

Number in Aircraft/Missile boxes indicates % for system to score a kill. Gun systems are entitled to one opportunity per turn to shoot down an incoming air threat.

TABLE A-11.5

RED FORCES SURFACE GUN SYSTEMS

GUN SYSTEM	RANGE (NM)			% CHANCE TO HIT			DAMAGE POINTS		
	SHORT	MED	LONG	SHORT	MED	LONG	SHORT	MED	LONG
152 MM/57	5	10	14	60	30	10	90	45	23
130 MM/58	5	10	14	70	50	30	54	27	13
130 MM/50	5	10	14	60	30	10	54	27	13
100 MM/50	3	5	7	60	30	10	32	16	8
100 MM/56	2	4	6	60	30	10	28	14	7
100 MM/60	2	3	4	85	60	45	30	15	8
85 MM/50	2	3	5	70	50	30	4	2	1
76 MM/60	3	6	8	60	30	10	32	16	8
76 MM AUTO	4	6	8	70	50	30	44	22	11
57 MM/70	2	3	4	60	30	10	16	8	4
57 MM/80	1	2	3	60	40	20	16	8	4
45 MM/85	2	3	4	60	30	10	4	2	1

Gun range has been divided into short, medium, and long range. Surface gun systems are entitled to one opportunity per turn to score a hit against a surface target.

TABLE A-12

FIGHTER DUELS

F-4N VS	RANDOM NUMBER		
MIG-21	00-34	35-84	85-99
MIG-23	00-39	40-79	80-99
MIG-25	00-49	50-84	85-99
MIG-27	00-60	61-89	90-99
YAK-36	00-22	23-89	90-99
OUTCOME	BLUE SHOT DOWN RED CAN REENGAGE	RED SHOT DOWN BLUE CAN REENGAGE	NEITHER SHOT DOWN OUT OF WEAPONS

F-14 VS	RANDOM NUMBER		
MIG-21	00-19	20-89	90-99
MIG-23	00-34	35-84	85-99
MIG-25	00-39	40-79	80-99
MIG-27	00-49	50-84	85-99
YAK-36	00-15	16-89	90-99
OUTCOME	BLUE SHOT DOWN RED CAN REENGAGE	RED SHOT DOWN BLUE CAN REENGAGE	NEITHER SHOT DOWN OUT OF WEAPONS

TABLE A-12 CONT.

AV-8A VS	RANDOM NUMBER DRAWN		
MIG-21	00-55	56-89	90-99
MIG-23	00-65	66-89	90-99
MIG-25	00-80	81-94	95-99
MIG-27	00-89	90-94	95-99
YAK-36	00-35	36-79	80-99
OUTCOME	BLUE SHOT DOWN RED CAN REENGAGE	RED SHOT DOWN BLUE CAN REENGAGE	NEITHER SHOT DOWN BOTH OUT OF WEAPONS

F-18 VS	RANDON NUMBER DRAWN		
MIG-21	00-15	16-89	90-99
MIG-23	00-19	20-84	85-99
MIG-25	00-34	35-84	85-99
MIG-27	00-39	40-79	80-99
YAK-36	00-05	06-95	96-99
OUTCOME	BLUE SHOT DOWN RED CAN REENGAGE	RED SHOT DOWN BLUE CAN REENGAGE	NEITHER SHOT DOWN OUT OF WEAPONS

*NOTE: Unengaged fighters because of the lack of enemy fighter aircraft are entitled to a "free shot" at the surviving enemy fighter aircraft from the stochastic outcome. Aircraft entitled to a "free shot" utilize the fighter duels table but can not be shot down nor run out of weapons. After the "free shot" proceed to the next stochastic evolution.

TABLE A-13

BLUE FIGHTER AIRCRAFT ENGAGEMENT OUTCOMES

		RANDOM NUMBER DRAWN			
F-4N VS	BEAR & BACKFIRE	00-09	10-69	70-89	90-99
	BADGER	00-09	10-59	60-79	80-99
	HORMONE HELD	---	00-89	---	90-99
	CRUISE MISSILE	---	00-39	---	40-99
F-14* VS	BEAR & BACKFIRE	00-07	08-75	76-94	95-99
	BADGER	00-07	08-65	66-89	90-99
	HORMONE HELD	---	00-94	---	95-99
	CRUISE MISSILE	---	00-45	---	46-99
F-18 VS	BEAR & BACKFIRE	00-05	06-79	80-96	97-99
	BADGER	00-05	06-75	76-94	95-99
	HORMONE HELD	---	00-97	---	98-99
	CRUISE MISSILE	---	00-49	---	50-99
OUTCOME OF ENGAGEMENT		FIGHTER SHOT DOWN	OPPOSING AIRCRAFT OR MISSILE SHOT DOWN	MISSILE ABORT. TARGET NOT SHOT DOWN	FIGHTER DISENGAGES NEITHER SHOT DOWN

*F-14 AWG-9/Phoenix System Table A-14.

TABLE A-14

F-14 AWG-9/PHOENIX MISSILE SYSTEM

		Random Number Drawn		
F-14 VS RANGE (40-60) NM	FIGHTER	00-49	50-69	70-99
	BOMBER	00-39	40-79	80-99
	CRUISE MISSILE	00-85	---	86-99
F-14 VS RANGE (20-39) NM	FIGHTER	00-60	61-79	80-99
	BOMBER	00-45	46-85	86-99
	CRUISE MISSILE	00-90	---	91-99
F-14 VS RANGE (10-19) NM	FIGHTER	00-65	66-85	86-99
	BOMBER	00-50	51-90	91-99
	CRUISE MISSILE	00-95	---	96-99
OUTCOME OF ENGAGEMENT		TARGET SHOT DOWN	MISSILE ABORT. TARGET NOT SHOT DOWN	MISSILE MISSES

TABLE A-15

RED FIGHTER AIRCRAFT ENGAGEMENT OUTCOMES

		RANDOM NUMBER DRAWN			
MIG-21 VS	A-6	---	00-15	16-35	36-99
	EA-6/KA-6	---	00-15	16-35	36-99
	A-7	00-07	08-30	31-64	65-99
	S-3	---	00-55	56-79	80-99
	E-2/C-2	---	00-85	---	86-99
	SH-3/SH-2	---	00-85	---	86-99
	P-3C	---	00-85	---	86-99
MIG-23 VS	A-6	---	00-19	20-39	40-99
	EA-6/KA-6	---	00-19	20-39	40-99
	A-7	00-05	06-34	35-64	65-99
	S-3	---	00-59	60-79	80-99
	E-2/C-2	---	00-89	---	90-99
	SH-3/SH-2	---	00-89	---	90-99
	P-3C	---	00-89	---	90-99
MIG-25 VS	A-6	---	00-24	25-50	51-99
	EA-6/KA-6	---	00-24	25-50	51-99
	A-7	00-03	04-40	41-75	76-99
	S-3	---	00-65	66-89	90-99
	E-2/C-2	---	00-95	---	96-99
	SH-3/SH-2	---	00-95	---	96-99
	P-3C	---	00-95	---	96-99

TABLE A-15 CONT.

RED FIGHTER AIRCRAFT ENGAGEMENT OUTCOME

		Random Number Drawn			
MIG-27 VS	A-6	---	00-30	31-70	71-99
	EA-6/KA-6	---	00-30	31-70	71-99
	A-7	00-01	02-50	51-89	90-89
	S-3	---	00-75	76-97	96-99
	E-2/C-2	---	00-97	---	98-99
	SH-3/SH-2	---	00-97	---	98-99
	P-3C	---	00-97	---	98-99
YAK-36 VS	A-6	---	00-09	10-39	40-99
	EA-6/KA-6	---	00-09	10-39	40-99
	A-7	00-09	10-29	30-64	65-99
	S-3	---	00-49	50-79	80-99
	E-2/C-2	---	00-79	---	80-99
	SH-3/SH-2	---	00-79	---	80-99
	P-3C	---	00-79	---	80-99
OUTCOME OF ENGAGEMENT		FIGHTER SHOT DOWN	OPPOSING AIRCRAFT SHOT DOWN	MISSILE ABORT. TARGET NOT SHOT DOWN	FIGHTER DISENGAGES NEITHER SHOT DOWN

MISSILE SYSTEM SATURATION

SINGLE LAUNCHER AND SINGLE DIRECTOR

TARGET SPEED (MACA)

CONTIN-UOUS FIRE

SM1ER OR SM2MR

.75		1.0		1.5		2.0		3.0	
MISSILE # THAT KILLS	TOTAL MISSILES FIRED		TOTAL MISSILES FIRED		TOTAL MISSILES FIRED		TOTAL MISSILES FIRED		TOTAL MISSILES FIRED
1	3	1	3	1	3	1	3	1	3
2	3	2	3	2	3	2	3	2	3
3	4	3	4	3	4	3	4	3	4
4	5	4	5	4	5	4	4	4	4
5	6	5	6	5	5	5	5	--	--
6	7	6	6	6	6	--	--	--	--
7	7	7	7	--	--	--	--	--	--
8	8	8	8	--	--	--	--	--	--
9	9	--	--	--	--	--	--	--	--
10	10	--	--	--	--	--	--	--	--

TARGET'S SPEED

SHOOT-LOOK-SHOOT

.75	1.0	1.5	2.0	3.0
MAX. # SALVOS	MAX. # SALVOS	MAX. # SALVOS	MAX. # SALVOS	MAX. # SALVOS
7	6	4	3	3

USE OF SIX SIDED DICE

SUM TWO SIX SIDED DICE	NO.	R.N.	IND. NUMBER
	2	03	03
	3	09	06
	4	17	08
	5	28	11
	6	42	14
	7	58	16
	8	72	14
	9	83	11
	10	92	08
	11	97	06
	12	99	03

To generate a random number roll two six sided dice. The R.N. column that corresponds to the sum of the two dice is the random number drawn.

The IND. Number column is used to generate a randon number not found in the R.N. column. The IND. number column represents the probability of rolling the sum on two six sided dice.

EXAMPLE: Random number of 28 or less is needed to score a hit. Roll two six sided dice. If sum is 5 or less a hit is scored.

EXAMPLE: Random number of 20 or less is needed to score a hit. Roll two six sided dice. If the sum is a 6 or a 7 a hit is scored.

SHIP NAME	SHIP TYPE		BLUE/RED
WEAPON NAME	NUMBER	AMMO	F/C RADAR

SENSORS	RANGE	NOTES:

DAMAGE POINTS						SHIP E.W. RATING
0%	25%	50%	75%	90%	100%	
KTS	KTS	KTS	KTS	KTS 0	SUNK	NUMBER OF R.P.

EXAMPLE

SHIP NAME	SHIP TYPE		BLUE/RED
Spruance	DD		
WEAPON NAME	NUMBER	AMMO	F/C RADAR
MK 45 5"/54	2		MK 86
NATO SEA SPARROW	1	8	MK 91
ASROC MK 46 TORP	1	36	
MK 32 SVTT MK 46 TORP	2	14	
HARPOON MK 141 LCH	2	8	

SENSORS	RANGE	NOTES:
SPS 55	80	
SPS 40	240	
SQS-53 SONAR		

DAMAGE POINTS						SHIP E.W. RATING
0%	25%	50%	75%	90%	100%	B
0	39	78	117	140	156	
KTS	KTS	KTS	KTS	KTS		NUMBER OF R.P.
33	25	17	9	0	SUNK	4

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