ACTION STATIONS!

NAVAL SURFACE COMBAT TACTICAL SIMULATION 1922-1945

OPERATIONS MANUAL
HISTORICAL NOTES
REFERENCES

Storm Computers/Conflict Analytics

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I. INTRODUCTION TO ACTION STATIONS!

"Three small cruisers in line ahead formation steamed in the calm waters of a South Atlantic sunrise. The air was clear, and as the brightness increased it became apparent that it would be a day with unlimited visibility.

'Smoke! Smoke, bearing green-45!'.

All binoculars on the bridge of the flagship swung about to search the indicated bearing.

'Can you make it out, Number One?' the Captain asked.

'Sir — yes — I think it is a Pocket Battleship!"

'Very Well, Number One, call away 'ACTION STATIONS!'"

ACTION STATIONS! is a tactical-level simulation of naval surface combat for the period 1922-1945.

ACTION STATIONS! began as a series of mathematical models designed to simulate individual aspects of naval warfare. The author, an active duty naval officer at the time assigned to the Center For Naval Analyses (a Federally Funded Research Corporation "Think Tank"), was interested in using computer artificial intelligence for tactical decision making. A simulation was needed to provide substance to theories. The World War II period was selected because of the wealth of unclassified data and combat experience.

It was evident early in the project that a very fine-grain, detailed simulation was required. More than in land combat, battles at sea can be greatly influenced by the smallest details. To simulate the command process a comprehensive model was developed to encompass the myriad factors which influence sea battles.

An important research resource was the wargame rules used at the U.S. Naval War College between 1922 to 1945. In this period wargaming was a major component in the education and research conducted at the College. By using comprehensive rules and "Fire Effect Tables", the War College was able to simulate, with considerable accuracy, the combat power of a warship under varied conditions.

However, without computing power the War College's mathematical models had to be simple. Damage assessment was primitive and deterministic. Even so, a single game would require teams of umpires, often over fifteen full-time professionals. But in spite of its limitations "The Game" was used so extensively and successfully that after World War II it was remarked that "only the kamikazi" was a surprise to the professional naval officers of the era.

ACTION STATIONS! has taken the wargames of the 1930's to their ultimate expression, incorporating modern computer modeling techniques (similar to those taught at the Naval Postgraduate School) with an enormous historical data base. Naval engagements can now be duplicated with outstanding fidelity.

ACTION STATIONS! is unique. Most commercial wargames have been written by programmers who concentrate on graphics and flash, and hope that their simulation is creditable. In ACTION STATIONS!, mathematical models of naval combat used by professional Operations Analysts were adapted for a commercial naval combat simulation. To ensure state-of-the-art presentation, programmers and computer scientists (employed by such companies as Compaq Computer and NASA) joined the project. As a result, ACTION STATIONS! is an unbeatable blend of accuracy and playability.

ACTION STATIONS! is easy to play. It runs from clear, organized menus which prompt you for orders and screens the response to prevent errors. Information is easily retrieved from "status boards" similar to those used on warships. The Battle Plot display is easy to use and flexible, using symbology similar to the US Navy's Naval Tactical Data System (NTDS). The commander can choose to direct each ship individually or to allow various "Automatic" computer options to help him fight his force.

Vast care has been taken to screen information - the "fog of war" is maintained by only showing information that a commander would reasonably have in the given battle situation. Every effort was made to retain the tension, look, and atmosphere of a warship's combat information center.

The heart of the simulation is the gunnery, torpedo and damage models. They are comprehensive and accurate, as you will see when reading through this manual. The test of a good simulation is

that it reflects reality, that it rewards proper decisions and penalizes mistakes in an accurate and realistic (rather than in an arbitrary) manner. There are few "fudge factors" included in this simulation: they are not needed.

The simulation was extensively tested against combat experience. For example, the Battle of the Denmark Straits was reenacted by duplicating the exact track of the ships, the weather, wind, environmental, and gunnery factors. The program deterministically scored its first hit on the Hood within 120 yards of where the hit actually occurred. Hit rates for the engagement were duplicated within 10%. ACTION STATIONS! is accurate.

The replayability in ACTION STATIONS! is enormous. 30 scenarios are included in the package, representing the majority of World War II engagements and many hypothetical situations. The "Computer Warrior" opponent is wily and unpredictable enough to allow satisfying play of each situation, either side, many, many times. A "Randomization" routine allows you to mix up the initial placement of ships in a scenario for a new look, and a "Scenario Builder" allows you to set up your own situations using a library of over 180 ship classes. Additionally, the "Scenario Generator" can create an infinite number of computer generated battles based on your desires. This is a game which you will play for YEARS.

For most people, there is an irresistable urge to break open the box and try to play without slogging through a 160 page manual first. Do it! Follow the QUICKSTART guide and you will be blasting away in minutes. However, eventually, come back to the manual and read it closely. It is the only way to get the most appreciation from the simulation.

Do not be intimidated by the size of the manual. A comprehensive manual was written so that you could understand the WHY as well as the HOW, and so that you could more thoroughly enjoy all the capabilities and features.

Confusion to your enemies!

Photo 1

II. QUICKSTART

This section contains a set of abbreviated instructions for those who want to begin playing without first reading the entire manual. So, assuming that you already understand basic naval terminology (see the GLOSSARY, Appendix A, and NAVAL BASICS, Appendix B, if you run into any difficulties), this section will demonstrate:

- How to load a scenario;
- Battle Plot symbology;
- How to enter course and speed orders;
- How to designate a target and open fire with guns;
- How to target and fire torpedoes.

We'll walk you through each process in "see-sailor-do" fashion. The example scenario will be the "Battle of the River Plate", the German pocket battleship GRAF SPEE v. the British cruisers EXETER, AJAX, and ACHILLES.

II.1. How to Communicate with the Program

- <RET> will stand for hitting the return or enter key.
- <ESC> will stand for hitting the escape key.
- You can move between menus using the arrow keys, or moving the mouse until your selection is highlighted.
- <RET> activates the selection which is highlighted in the menu. Clicking the left mouse button is the same as <RET>.
- If a number input is requested, enter the numbers, then <RET>.
- <ESC> will cancel the action without entry, and will back you out to the next higher menu. Clicking the right mouse button is the same as <ESC>.

For this run-through, "C:" will show what the computer prints on the screen. "P:" shows the player's response.

II.2. Loading the Program and Recalling Scenario

O.K., here we go. Begin with your normal computer start-up routine until you receive the DOS prompt. Insert the BATTLE disk in the appropriate drive.

P: BATTLE <RET>

C: (shows opening credits) - PLEASE WAIT. LOADING. . .

C: SECURITY CHECK

The program will ask you to enter a specific word from the manual. This is the only "copy protection" included, there to thwart software pirates who put games on bulletin boards. Our apologies for the inconvenience.

After a satisfactory security check:

C: INSERT FLEET DISK - PRESS ANY KEY

Remove the BATTLE disk, insert FLEET DISK: ATLANTIC, and hit

<RET>.

The screen will now show a window with the names of the available scenarios. Use the mouse or the arrow keys to highlight RVRPLATE.SCN, then press <RET>.

The response "INITIALIZING" will blink on the screen. When the computer is ready, it will echo the scenario name and the turn number.

C: RIVER PLATE TURN: 0
RANDOMIZE SHIP POSITION? Y/N

We are just going to hit the basics on this run, so we will be skipping a lot of options. Comprehensive explanations are provided later in the manual.

P: N

C: OPPONENT SELECTION
P: select COMPUTER OPPONENT

C: COMPUTER COMMANDS WHICH SIDE?
P: select RED

C: DO YOU WISH TO CHANGE THE COMPUTER SKILL LEVEL (Y/N)
P: N

II.3. The Action Menu

You are now in the ACTION menu. The bottom display gives time, mission, and environmental information.

The upper line is a menu of menus. Use the left and right arrow keys to select different menus, the up and down arrows to open them. Use the up/down arrow until your selection is highlighted, then <RET>. Note that each menu and selection has individual letters highlighted. Hitting that letter will also activate the selection.

II.4. The Battle Plot

Select the REPORTS menu. In that menu, select BATTLE PLOT.

C: DISPLAY OPTIONS
P: select SHIP
P: select GRAFSPEE

C: LAST RADIUS (KYDS):25
ENTER DESIRED RADIUS (5-200):

When you are asked for a numeric input the program prompts you with the acceptable limits. Just for experimentation, enter a value outside the acceptable range:

P: 1

C: ERROR RADIUS OUT OF RANGE

(ACTION STATIONS! is sailor-proofed - you don't have to worry about messing things up with a wrong keystroke.)

Now back to the demonstration - hit <RET> to clear the error message, and:

P: 21

The computer is now displaying the BATTLE PLOT. The symbology is similar to those used in the Naval Tactical Data System installed on most modern US warships. Section VI contains a key to the symbology. For now, the basics are:

- X,Y grid (i.e. standard Cartesian coordinate system)
- Circles are friendly ships
- Squares are enemy ships
- The larger the symbol, the larger the ship
- The line coming out of the circle/square is a vector: it points in the direction of travel, with the length proportional to the speed of the ship
- Friendly ships are numbered 1 to 49 and colored yellow
- Enemy ships are numbered 50 to 99 and colored red

If you wish to adjust the location of the Plot, it can be scrolled:

- ARROW KEYS: moves the center 1000 yards in that direction
- TAB, SHIFT TAB: moves the center 5000 yards right or left
- HOME, END: moves the center 5000 yards up or down
- PgUp, PgDn: changes to smaller or larger scale

II.5. Changing Course and Speed

The top line of the Battle Plot reads:

F1:MOVEMENT F2:GUNDIR F3:RNG/PNT F4:SEARCHLIGHT F5:SMOKE F6:STATUS F8:STARSHELL F9:TORPS

Hitting the indicated function key allows you access to menus and routines to give orders and get information directly from the Battle Plot. We'll demonstrate the basic functions and leave advanced capabilities for later.

Let's give the Graf Spee some movement orders:

P: <F1>

C: SHIPS or FORMATIONS
P: select SHIPS

The screen displays the ship's movement information. The line on top shows the command options: CHANGE COURSE, CHANGE SPEED, SALVO CHASING. Let's change course to 80 degrees(T).

P: select CHANGE COURSE

P: hit <RET> to select the Graf Spee (in multi-ship games all your ships would be listed in the box).

C: #1 GRAF SPEE - COURSE 130
DESIRED COURSE;
P: 80 <RET>

C: DIRECTION
P: select PORT

Notice that the display has been updated: rudder is now turned to port, and the ordered course is now 80. OK? Good. Now select CHANGE SPEED and walk through the menus to assign the Graf Spee a ordered speed of 26 knots.

To get back to the Battle Plot, hit <ESC> (depending on where you start, you may have to hit it more than once.)

Notice on the Battle Plot that the Graf Spee now has two vector lines - one for the current course and speed, and one in a contrasting color for the ordered course and speed. This is a valuable feature in larger battles to help you keep track of the orders you have issued.

II.6. Gun Director Control

From the Battle Plot:

P: <F2>

P: select MANUAL

P: select GRAF SPEE

P: select DIRECTOR ORDERS

You have now displayed the Gun Director status board. This lists all your gun directors and gives information on the guns which they control. Notice all your directors are NOT ASSIGNED and in READY status.

The Graf Spee has eight directors (numbered 1-8). A standard numbering convention is used for all ships: directors 1 and 2 are the Main and Alternate directors for the main battery, 3 to 6 are secondary battery directors, 7 and 8 tertiary battery directors. "Local control" directors 9-12 represent the local fire control capability of the gun mounts. Right now, we want to get the main director on a target:

C: ENTER DIRECTOR TO COMMAND (1-12)
P: 1 <RET>
P: select TRACK/FIRE
P: select the top target on the list (target "X")

C:MAIN Dir Assigned Target #X
P: <RET>

Looking on the Main Director status line, you can see that Target X bears 6 degrees relative at a range of 20.5 KYards (the glossary explains these terms). The director is now locked on target with a fire order.

We could assign other directors of other ships if we wished. However,

P: <ESC> <ESC> and we are in the Battle Plot

P: <ESC> and we are back to the Action Menu.

II.7. Executing A Turn

P: select OPTIONS menu.

P: select NEXT TURN

The computer will execute a 3 minute time period. When the gunfire phase is reached a new Battle Plot will be displayed and the program will pause. The program has automatically centered the Battle Plot on the ships which are engaged. However, if you would like to concentrate on a particular sector of the action the program will accept screen scrolling commands. When you are ready, hit <ESC>. Gunfire will be exchanged, with the Battle Plot showing tracers between firing ship and targets, explosions, and other information. When finished:

C: PRESS ANY KEY
P: press any key

C: DO YOU WISH TO SEE THE DETAIL REPORT (Y/N)
P: N

and we are back in the Action Menu.

II.8 Firing Torpedoes

It's time to try a little "Torpedo Action - Starboard". Go to the Battle Plot and pick a target, and let's see about putting a few torps in that fellow. Got it?

P: <F9>

P: select TFC COMPUTER

Before you launch, you need an idea of where to fire the torpedoes. We don't make you guess. On warships there is a Torpedo Fire Control (TFC) computer to perform this function. ACTION STATIONS! includes this capability, with the accuracies (and errors) inherent to the WW II-era equipment. The process you

will be required to make replicates the torpedo firing decisions made by the Torpedo Fire Control Officer.

We'll go through the ship-to-ship mode:

P: select SHIP TARGET

P: select GRAFSPEE

P: select the target ship

The computer will then read out data similar to the following:

C: BEARING 137 / RANGE 19.0
TARGET COURSE 45 / TARGET SPEED 19
ACCEPT? (Y/N)

(Your data may be different, depending on the action taken by AutoWarrior in the previous 3 minute turn.)

P: Y

C: POSSIBLE TORPEDO SETTINGS:

Setting	Speed	Max Range
Low	30	13.7
Medium	40	8.2
High	44	5.5

SELECT TORPEDO SPEED : [LOW] MEDIUM HIGH

The computer has listed the speed and range settings of the torpedoes mounted on the Graf Spee. Since our target is far away (over 19 KYds), choose the slowest/longest range setting:

P: select LOW

Now the solution comes up - in our example:

C: TORPEDO COURSE	: 101
TORPEDO RUN TIME	: 21 MIN
RANGE TO INTERCEPT	: 21 KYds
TORPEDO SPREAD AT INTERCEPT	: 366 YARDS WITH 1 DEGREE SPREAD
ANGLE TO TRACK	: 242 DEGREES

The torpedo course is 101 degrees true. The torpedo will need to run for 21 minutes to reach the intercept point 21 KYds from the launch point. If you fired a salvo with a one degree spread the torpedoes would be 366 yards apart at the point of intercept, with an intercept angle of 242 degrees.

Since the torpedo's maximum range (13.7 KYds) is less than the required 21 KYds the TFC is flashing a warning. Normally you would wait for a closer shot - but since we are just practicing, let's go through the mechanics of launching a spread. Get back into the Torpedo Menu (remember how?):

P: <ESC>

P: select LAUNCH

P: select GRAFSPEE

The Torpedo Launch Screen is now displayed. The screen displays the torpedo mounts, torpedoes available, and the bearings between which the mount can fire. Note the window at the lower right hand corner echos the last TFC solution.

To fire, follow the prompts and input the required data on mount to be fired, number of torpedoes, course, spread angle (spread angle is an advance topic, covered later), and torpedo speed. You can use the TFC data or enter your own estimates. When you are finished, go back to the Battle Plot - you will see the Torpedo symbol on the screen on the firing ship. When you execute the turn you will see the torpedo salvo speeding off on an intercept course.

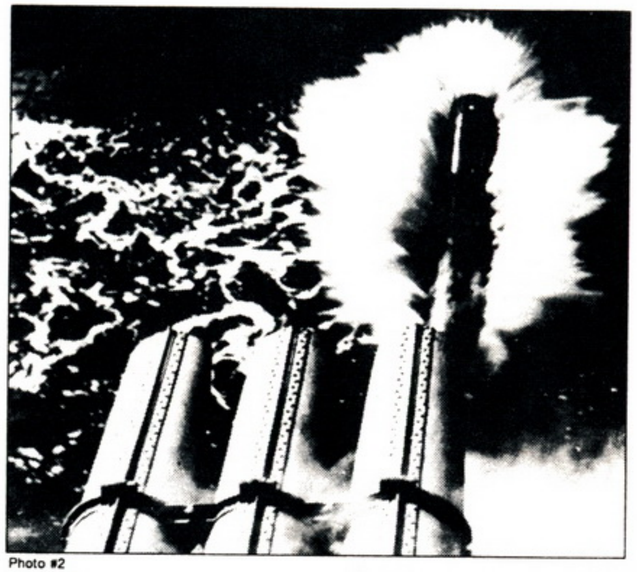


Photo #2

This completes the introductory "QUICKSTART" session - you can change course and speed, assign directors to targets and open fire, and launch torpedoes. You also see how things are generally done in ACTION STATIONS!:

- find what you want to do in the menu;
- enter desired numbers, usually followed by a <RET>;
- if you ever get lost, hitting <RET> will back you out of the process without doing any mischief.

Congratulations! You have mastered the basics and are ready to take command. Load up one of the scenarios and have at it! Enjoy!

HOWEVER —

Naval warfare is a complex subject, with a massive amount of information, technology and tactics to absorb. You are now ready to PLAY the "game"; read on to learn more about the subtlety of the "simulation".

III. LOADING AND STARTING ACTION STATIONS!

III.1. Computer Requirements

ACTION STATIONS! requires an IBM or IBM compatible personal computer with color monitor, Color Graphics Adapter (CGA) card, minimum 640 K RAM, and one disk drive. DOS 2.1 or later is required.

III.2. Components Inventory

Included is the ACTION STATIONS! MANUAL, the BATTLE disk, and three FLEET disks, for a total of 4 disks.

The BATTLE DISK contains the main data files and simulation programs. The three FLEET DISKS contain the data files for ship classes and many ready-to-play scenarios. Also included on the FLEET disks is the BUILD SCENARIO program which allows you to construct scenarios of your own design, and the GENERATE SCENARIO program which allows the computer to automatically construct scenarios to your specifications. The FLEET disks cover the Pacific theater (US and Japanese), the Atlantic (British and German), and the Mediterranean (Italian, French and Russian).

III.3. Backing up Your Disks

It is recommended that you copy the original disks and use the duplicates for playing. Save the original manufacturer's disks as a backup. ACTION STATIONS! is not copy protected.

Write protect tabs should be placed on all four disks. We will discuss later the ability to save "battles in progress" onto a spare disk.

III.4. Hard Disk Installation

ACTION STATIONS! can be played using a hard disk. Simply copy the contents of the disks into a single directory. (See section XIX.1. with regards to files DDF and DDFHARD.) When starting the simulation, begin from your hard drive prompt in that directory.

III.5. Starting the Simulation

Perform the normal startup procedure for your computer using DOS 2.1 or higher. If your computer does not automatically do so, ensure you enter the date and time information. ACTION STATIONS! uses this information to initialize the random number generator, so this information will ensure that each game will have a different universe of results.

When you receive the DOS prompt

A>

The player should place the BATTLE disk in disk drive A.

When ready, enter

BATTLE <RET>

The computer will then begin to read in the ACTION STATIONS! program and go through the game initialization routine.

For older machines with original IBM CGA cards, the displays might "flicker". In this case, begin the game from the DOS prompt and enter

BATTLE BIOS <RET>

The displays will come up slower, but without flicker.

III.6. Communicating with the Program

We will indicate what is shown on the computer screen with the identifier "C:" (for Computer). Your response will be indicated by "P:" (for Player).

In those cases where the computer pauses to allow you to read a message, hitting RETURN or ESCAPE will tell the computer to continue.

III.6.A. Keyboard

Most communication with the computer is through menu selections. The left and right arrow keys will highlight the desired menu. The down arrow key will activate the menu window, and the up/down arrow key highlights your choice, and RETURN (hereafter abbreviated as <RET>) activates your selection.

In most all menu titles and selections there is a single letter highlighted. Pressing that letter will activate that selection.

If you have entered a menu by mistake, change you mind, or decide not to take the action, hit the escape key (hereafter abbreviated as <ESC>). This will cancel the input and/or back you up one level of menu.

III.6.B Mouse

To select menu items, scroll the mouse until the desired selection is highlighted and press the left mouse button <RET>. To leave a selection press the left mouse button when the cursor is positioned on anything but a menu item, and <ESC>.

III.7. Security Check

After the introductory screen and credits are displayed the program will request a "security check". You will be asked to enter a specific word from the manual. This inconvenience exists as a form of copy protection. The ACTION STATIONS! team has spent over 10 man-years of effort to produce this work, invested their personal savings, and are compensated by sales, not

salaries. If ACTION STATIONS! is a success, then other products may become available: augmentations to ACTION STATIONS! for carrier warfare and an interlocking strategic campaign game are two possibilities. We kindly request your support.

III.8. Loading a Scenario

III.8.A Selecting the Scenario

After the security check is successfully fulfilled a blinking line will prompt:

C: Insert FLEET DISK and Press <RET> to Continue

Remove the program disk from drive A and insert the desired FLEET disk. Hit <RET>. With hard drive, just hit <RET>.

The screen will display a list of the available scenarios.

Highlight your selection and press <RET>. "INITIALIZING" will flash on the screen as the data is being loaded.

III.8.B Randomizing Initial Positions

After loading the computer will ask

C: RANDOMIZE SHIP POSITION? Y/N

The scenarios included are based on historical situations.

Initial positions (with a few exceptions) are a "snapshot" of the situation before combat commenced. After you play a scenario once or twice you will become familiar with the situation and some of the "fog of war" and "surprise factor" will be eliminated. Randomizing the initial set-up can restore this uncertainty and renew the freshness of the scenario — what if the enemy approached from a different area, or with a different formation?

Games "in progress" cannot exercise this option. This way if you are playing a game with a "friend" (perhaps by mail), and you have him trapped, and the game is saved to finish later, he (or she) cannot "randomize" themselves out of your trap!

First you are asked which side to randomize:

P: Y

C: 1- BLUE FORCE; 2- RED FORCE; 0- EXIT

Only one side can be randomized. If you really want to randomize both sides, we'll explain that later. Exit allows you to skip this option. Press 1,2, or 0 (<RET> is not needed).

There are two ways to randomize the force: first, by displacing the entire force a random distance in a given direction. The ships' relative positions and formation remain the same. It is as if the entire fleet was picked bodily out of the water and moved to a new location. This is called "RANDOMIZE STARTING LOCATION".

Second, we can scramble the relative positions of the formations; for instance, a line of ships which was leading the group may now be on the flank. This is called "RANDOMIZE FORMATION".

C: RANDOMIZE STARTING LOCATION (Y/N)

If you hit N the program will skip to the RANDOMIZE FORMATION option; otherwise:

P: Y

C: BIAS: 1- NORTH; 2-S ; 3-E; 4-W (0-EXIT)?

You now have the choice of moving the entire force bodily a random distance (between 0 and 10 thousand yards) either north, south, east, or west. Let's randomize the formation to the north:

P: 1

C: BIAS: 1- NORTH; 2-S ; 3-E; 4-W (0-EXIT)?

The computer will allow you to enter any number of randomizing directions until you enter "0" or <RET>. Each of the randomizations is additive, so you can randomize the position of the fleet a lot or just a little. You can center the randomization process in some particular direction, which is valuable when you are working with a scenario with a lot of islands or a coastline, or if you want to start the forces closer together or further away.

If you do not want to bias the randomization in any particular direction, just enter counterbalancing randomization directions. For example, if you enter a 1,2,3, and 4, then the position will now be located randomly in a box within 10,000 yards of the original set-up position.

Let's move on to the RANDOMIZE FORMATION part:

P: 0

C: 1- RANDOMIZE: RED FORCE : FORMATION?

If you input "1" the computer will then randomize the relative positions of the Red side formations within 10,000 yards of their original point. Individual formations will remain the same, but the relative positions of formations will change in the group. For example, consider where there is a line of destroyers on the flank of a battleship formation. The destroyers will still stay in a line ahead and on the same course and speed, but may be move ahead, behind, or on the other flank of the battleships.

RANDOMIZE FORMATION can only be done once.

For both these options, only units that are already in formations will be moved. Units with a maximum speed of less than 3 knots will not be randomized. Units like shore batteries, land targets, and anchored vessels will not be moved if either RANDOMIZE option is exercised.

If, at the end of the randomization process, a ship's position is

on land, the computer will automatically move it to the nearest water. This may result in interesting results - for instance, in the Narvik scenario (which is fought in a narrow Fjord), if you enter a large amount of randomization, ships may end up entirely outside of the fjord and out of the battle! Careful selection of the direction of bias can forestall this.

Now, we promised earlier to show you how to randomize both sides if you so chose. Do the following:

— randomize the Blue force;

— get into the Action Menu. Prior to executing any moves, save the scenario in a new file. This will save the scenario at "turn 0".

— restart. Retrieve the scenario you just saved. Now, randomize the Red Force. You're off!

III.9. Selecting Your Opponent

The computer will give you the choice of opponent. By selecting TWO PLAYER you allow the thrill of battle to be shared by another member of the Human Race. COMPUTER OPPONENT allows a one-player game, unleashing the ferocity of the AutoWarrior in your (formerly friendly) computer.

Default is COMPUTER OPPONENT. When the desired selection is highlighted, <RET>, or hit "T" (for Two player) or "C" (for Computer).

III.9.A Two Player Mode

This option allows two human players to command. The computer will ask for ACCESS CODE NUMBERS from each commander. Enter a number, followed by <RET>. The numbers will NOT be displayed on the screen, for security purposes. This access number will control who can retrieve information and give orders to each force.

If you desire to play a game where you command both sides, just select the two player mode and enter an easy access number for both sides, such as "1", or the first two digits of your social security number divided by the current price of IBM on the New York Stock Exchange.

A game that was begun in the Two Player mode will automatically go into the Two Player mode again. The same access codes will be required - this way play-by-mail is possible, or you can store a "face-to-face" game for later play with some assurance that your friend will not try a little midnight espionage.

III.9.B Computer Opponent Mode

Selection of this option activates the "AutoWarrior", a canny old salt with a rather ruthless (and sometimes unorthodox) approach to naval warfare. More is available on the characteristics of this commander later in the manual. You will be asked which side the computer is to command, and if you wish to adjust the computer's skill level.

The skill level is designed to alter the efficiency and combat effectiveness of the force commanded by the computer.

There are seven levels (-3 to +3) available. A skill level of "0" is the average historical level of an average commander and average force. Assigning the computer force a -3 gives it a poor force, and a +3 is the best force (with the numbers between giving intermediate shades of ability).

The skill rating influences gun and torpedo accuracy, tactics, damage control skills, sighting and tracking abilities and other capabilities.

This skill level is in addition to other factors - for example, an Italian force at skill level +2 is about equal equal to a British force at skill level 0 (Publisher: please DO NOT forward letters from enraged players accusing the author of bias. This is a legitimate historical judgement based on the battle performance of Italian equipment, and does not reflect their many instances of valor and heroism).

Games which are played against the Computer Opponent can be saved; when they are recalled, they can be resumed using either the Two Player or Computer Opponent modes, and the computer can command either side regardless of the original command assignments.

At the end of the process the computer will print CALCULATING, load additional parts of the program, and calculate the initial results of visual and radar searches.

At this point the loading and initializing procedure is complete and we can get on with the engagement!

IV. THE ACTION MENU

After the program loads and initializes the ACTION MENU will be displayed. This is "Main Street" - you can get anywhere in the program from here. If you get confused about where you are in the program, just keep hitting <ESC> and eventually you will return to the Action Menu.

Across the top is a menu of menus. An individual menu can be selected by using the arrow keys and pressing <RET> or by pressing the highlighted letter in the menu title.

The bottom section of the Action Menu indicates:

Side up - Red or Blue force, and the nationality (U.S., Japanese, British, German, French or Russian Fleets).

The name of the battle.

The mission assigned to the force.

Details on the current environmental conditions.

V. ENVIRONMENTAL FACTORS

V.1. Turn Number:

ACTION STATIONS! is a time-step simulation executed in turns representing 3 minutes of action. The turns are numbered sequentially. Initial setups begin with turn 0.

V.2. Day Number:

All scenarios begin on day 1. If the battle continues past midnight the game day will sequence to the next higher number.

V.3. Time:

The time of day uses the 24 hour military clock. 1:25 PM is indicated as 13:25.

V.4. Wind:

Both wind velocity and direction is indicated, velocity in knots and direction in degrees (true).

V.5. Light Conditions:

There are 6 conditions of daylight:

- DAWN - from 0530 to 0600
- SUNRISE - from 0600 to 0800
- DAY - from 0800 to 1600
- SUNSET - from 1600 to 1800
- TWILIGHT - from 1800 to 1830
- NIGHT - from 1830 to 0530

The sun is always considered to rise at 90 degrees true, and set at 270 degrees true.

Dawn, Twilight and Night operate under night rules of visibility. Starshells, searchlights, flares and shipboard fires will illuminate vessels.

Sunrise, Day and Sunset operate under the daytime rules of visibility. Flares, starshells and searchlights are ineffective (and the program will not allow access to them).

During Dawn and Twilight the sun is considered to be just under the horizon, and ships may be spotted by silhouette.

During Sunrise and Sunset the sun is on or just over the horizon. During those periods if the sun is behind the target glare will interfere with the spotting process and reduce gunnery efficiency. More on this in the GUNNERY section.

V.6. Sea State and Wave Direction

Sea State is a measure of the roughness of the seas. There are four sea states, in order of increasing severity:

- Light - flat and calm.
- Moderate - waves high enough to begin to interfere with the maneuverability of small vessels; platform steadiness begins to have an effect on gunnery controlled at local control stations.
- Heavy - waves high enough to interfere with the maneuverability of even the largest ship; platform steadiness degrades director-controlled fire.
- Rough - seas dangerous, having a serious affect on the maneuverability of all ships. Gunfire very seriously degraded.

The limitation of a ship's speed due to weather is a function of the size of the ship, the sea state, and the course of the ship with respect to the wave direction. This is a complex relationship determined by a detailed calculation; however, the following table will give you an idea of the severity of the effect:

MAXIMUM SPEED OF SHIPS IN VARIOUS SEA STATES

Ship class	Sea state: M	H	R
Battleship	40-46	30-36	20-26
Cruisers	34-38	24-28	14-18
Destroyers	30-32	20-22	10-12

The table does not include the effect of heading into the seas, which could reduce the maximum speed capability by as much as an additional 50%.

Do not be concerned about memorizing this table. The program automatically makes the proper calculations and, if the ship's speed is limited by weather to a speed less than the engineering plant maximum capability, a message will be printed similar to:

WEATHER LIMITED: MAX SPEED XX

V.7. Squalls

Rain and snow squalls are short and violent storms. When a squall appears, visibility is reduced markedly, radar performance drops and smoke screens will only last for three minutes.

In the Action Menu and Battle Plot you can get one of two messages relating to squalls: either

SQUALL APPROACHING or * SQUALL *

Squalls are generally short (15 minutes, although they can last longer or shorter).

VI. THE BATTLE PLOT

The Battle Plot is a graphic depiction of the positions of all the ships involved in the action, along with smoke, stack gasses, starshells, searchlights, torpedoes, and other action. It is based on the "Battle Plot", first used in the latter part of WW II as a part of the Combat Information Center concept.

The Battle Plot uses a Cartesian coordinate system (X-Y grid). North is to the top of the screen. Reticle marks are provided for perspective – the distance between each reticle tic is listed on the top of the display as the scale. The basic unit is the KiloYard, often abbreviated "K" or "KYDS" (1 KiloYard= 1000 yards).

VI.1. Displaying the Battle Plot

From the Action Menu, select REPORTS, then select BATTLE PLOT. You have the following options:

C: CENTER DISPLAY ON

SHIP; POINT; PREVIOUS POINT

CENTER ON SHIP allows you to center the screen on any ship in your force.

CENTER ON POINT allows you to center the screen on a grid point. The computer will tell you the previous X and Y position of the center of the screen and ask for new X-Y coordinates.

PREVIOUS POINT puts up the same plot as the last time the display was called.

For CENTER ON SHIP or CENTER ON POINT the program will ask for the RADIUS of the display. This is the distance from the center of the screen to the edge. The minimum radius is 5K, and the maximum radius is 200K.

The Battle Plot wil then be displayed. The center coordinates and scale are printed at the top. You can "scroll" the Battle Plot to change the location of the center or change the scale using the following commands:

- ARROW KEYS moves the center 1000 yards in that direction.
- TAB and SHIFT TAB moves the center 5000 yards right/left.
- HOME moves the center up 5000 yards.
- END moves the center down 5000 yards.
- PgUp changes to a smaller scale
- PgDn changes to a larger scale.

VI.2 Battle Plot Symbology

The chart screen uses symbology similar to that used by the

U.S. Navy's Naval Tactical Data System (NTDS) to give a clear, understandable display conveying the maximum amount of information with the minimum of clutter. With a little familiarization it will become second nature.

The background color of the plot is blue (during day actions) or black (during night actions).

A ship's position is marked by a circle (friendly ship) or a square (enemy ship). The size of the circle or square is proportional to the size of the vessel.

A vector line out of the center of the symbol indicates current course and speed. The line points in the direction of travel, and the length is proportional to the speed. A second (red) vector representing ordered course/speed will appear if a change is ordered or in progress – this allows you to keep track of the ships to which you have given course and speed orders.

Friendly ships are labeled with ship numbers between 1 and 49. Enemy ships are assigned numbers at random between 50 and 99. The computer will assign each enemy ship a target number when it is sighted. If a ship disappears from view and later reappears it will be assigned a new target number. This helps to preserve the "fog of war" and prevents ship identification by memorizing ship numbers.

Using Palette 2 (the recommended palette) and a standard IBM compatible computer, friendly ships are colored yellow. Enemy ships are colored red. There is one exception to this: during night visibility mode, if a ship is inside a star shell, flare, or ship's fire loom, it is colored green.

This color scheme may change with different monitors or computers, so the option is provided to change palettes to find the best display combination for your equipment.

Capsized ships are marked by a filled-in square.

During night actions, ships which have their searchlights on, are in a searchlight beam, or are on fire are circled.

Small arrows mark the position and course of torpedo spreads. "Friendly" torpedo spreads are always shown on the screen, while only those "enemy" torpedo spreads which your lookouts have sighted are displayed. Note that it is nearly impossible to sight torpedo spreads at night or in heavy or rough seas.

Terrain is indicated by filled-in green circles. Shallow water is within 500 yards (.5K) of the beach (marked by 3 rings of "breakers").

Smoke and stack gasses are shown in green. Starshells and aerial flares are yellow circles showing the area of the loom. (note: it is an idiosyncrasy of the graphics package that, if a lot of starshells are located in a small area, some might not be filled in

solid yellow. These are still fully-effective starshells.)

The Battle Plot subprogram screens information so only that information which would be available to that side is displayed:

* enemy ships will not be marked on the chart until they have been sighted;
* stack gasses will not be visible unless a ship is in position to sight it;
* enemy-launched torpedoes will only be displayed if sighted by a lookout.

Some things will be automatically visible to both sides regardless of range:

* smoke from burning ships, oil slicks, or smoke screens;
* star shells and aerial flares.

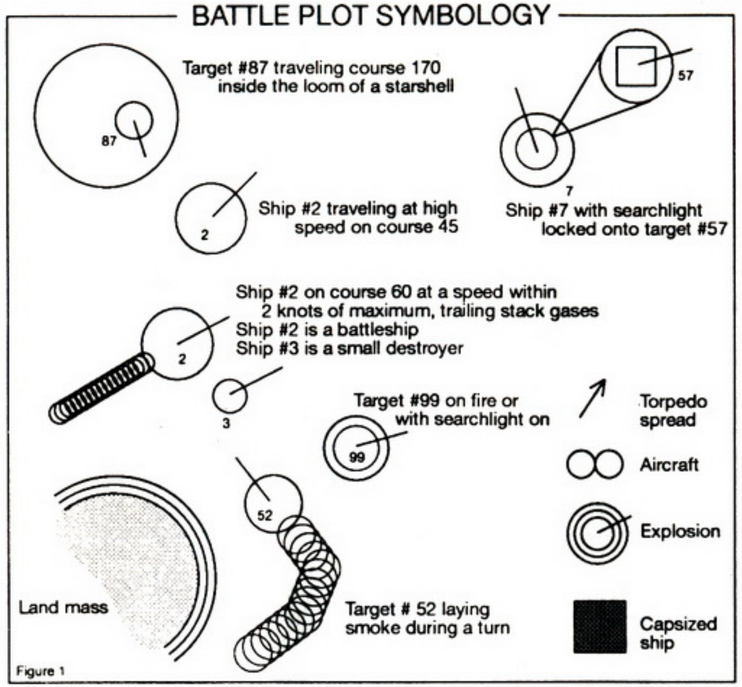


Figure 1

VI.3. Giving Orders and Getting Information From the Battle Plot

The top two lines of the Battle Plot is a menu of orders and reports which are accessible by using FUNCTION keys:

F1 – MOVEMENT: individual ship or formation movement orders

F2 – GUNDIR: gun director orders, gun mount assignments

F3 – RNG/PNT: Range/Bearing information, armor penetration data

F4 – SEARCHLIGHT: searchlight controls

F5 – SMOKE: smoke screen controls

F6 – STATUS: individual ship's status

F7 – TRACERS: display tracers on the Battle Plot

F8 – STARSHELLS: starshell controls

F9 – TORPS: torpedo controls

When the function key is pressed a window will drop down to allow you to give orders and get information. When completed, the Battle Plot will be returned to the screen.

For instructions on the information and orders possible through the function keys from the Battle Plot, consult:

MOVEMENT:	section VII.
GUN DIRECTOR/MOUNT:	section IX.
RANGE AND PENETRATION, STATUS:	section VIII.
SMOKE:	section XIII.
SEARCHLIGHTS,STARSHELLS	section XIV.
TORPEDOES:	section X.

F7 – TRACERS displays dotted lines between firing ships and targets. Enemy tracers are in red, friendly are in yellow. This allows you a quick check on your fire distribution and how the enemy is targeting your ships.

<ESC> exits the Battle Plot and returns you to the Action Menu.

VII. MOVEMENT

VII.1. Individual ships

VII.1.A. Course and Speed Changes

Individual ship movement orders can be initiated from the Action Menu ("MOVEMENT") or the Battle Plot ("F1").

The DISPLAY provides a summary of the current speed, ordered speed, rudder status, ordered and current course, and turn delay distance of all the ships in the force.

The top line shows the available options: Change Course, Change Speed, and Salvo Chasing. Either use the arrow keys to highlight the desired choice and hit <RET>, or press the highlighted letter in each option ('C', 'S', or 'L').

For course or speed changes you will be asked to select the ship, and then to enter the new course or the new speed. Courses are from 0 to 360 degrees true in increments of 1 degree. Speed is in knots.

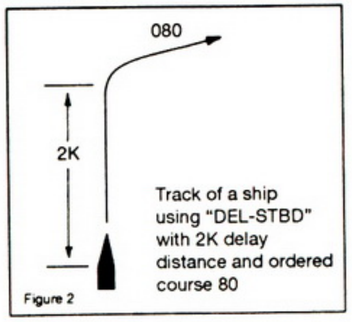
If you are changing course you will be asked for the direction of the turn. The selections are:

STBD (starboard, or to landlubbers, right)

PORT (left)

Del STBD (delayed starboard)

Del PORT (delayed port)



Track of a ship using "DEL-STBD" with 2K delay distance and ordered course 80

Figure 2

Delayed Starboard or Delayed Port gives you the capability to begin the turn after the ship has traveled an additional distance along the current course. This is useful for formation maneuvering or to unmask launchers for a torpedo attack. The program will tell you how far the ship would travel in the next turn (for example, 'MAX DEL DISTANCE THIS TURN 2.5K') and ask for the distance to delay before executing the turn. You may enter any value you desire, even if it is greater than the distance covered in the next move. The program will simply patiently measure off that distance and turn at the desired point, no matter how long it takes.

In ACTION STATIONS! all ships turn to a standard tactical diameter of 2000 yards. That works out to 1 degree for every 17.5 yards of forward movement. Turns may take one or more turns.

Standard acceleration/deceleration rates are 10 knots/3 minute

turn. Ships can move in reverse a speed up to 1/3 their maximum forward speed. Reverse speeds are ordered by entering a negative number for ordered speed. This is a useful capability if you are stuck in a fjord without enough room to turn around. Remember, though, that your rudder has the reverse effect.

VII.1.B. Salvo Chasing

Salvo chasing is a technique of steering the ship on an evasive course to throw off enemy gunfire accuracy (a full explanation is contained in Part C). Salvo chasing is either ON or OFF, as selected using the Salvo Chasing option.

Salvo chasing is only effective when the ship is going over 5 knots. Salvo chasing will automatically terminate under that speed. Base course will remain the same, but the distance traveled is reduced by 10% due to the extra drag of the rudder.

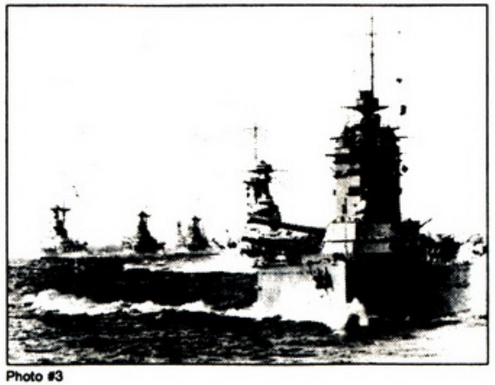


Photo #3

VII.2. Formation Orders

Assigning ships to formations helps to maintain better control of your forces, and allows you to give orders to many ships simultaneously.

The Formations status board informs you of the composition of your formations. Each side has seven formations, numbers 1-7 for the Blue force and 8-14 for the Red force. A formation can contain a maximum of eight ships. The Formation display for the Blue force might look like:

	FORM 1	FORM 2	FORM 3	FORM 4	FORM 5	FORM 6	FORM 7
1)	1	4	7	0	0	0	0
2)	2	5	0	0	0	0	0
3)	3	6	0	0	0	0	0

This shows which ships are assigned to each formation, and their order. For instance, the lead ship (position #1) in formation #2 is ship #4, followed by ship #5 in the second position and ship #6 in the third position.

The program screens your input so a ship cannot be in several formations at once. Each formation must have a leader assigned to position #1 for the formation to be active. A leader cannot be detached from the formation without dissolving the formation. Ships must be assigned to sequential positions – do not skip positions.

To give orders, first select the formation number. You will then be given the following menu of options:

1 – INITIALIZE FORMATION

This option allows you to assign ships to formations from scratch. The program will ask you to select the lead ship in the formation, the second ship, the third, etc., up to the maximum total of eight.

2 – ADD UNIT and 3 – REMOVE UNIT

These options allow you to individually add or detach units from a formation. The program will ask for the formation position.

- to add a unit to the formation, pick an empty formation position (denoted by a "0" in the formation list) and enter that number.
- to detach a unit, pick the unit's formation position (note that if the detached ship was from the middle of the formation that all the following ships will move up one position).
- to substitute one ship for another, pick the formation position and select the new ship. The new ship will assume that position and the old ship will be dropped from the formation.

Note that formation leaders (the #1 position) can only be changed by using the "dissolve formation" and "initialize formation" option.

4 – TURN SEQUENTIALLY

This option allows you to issue a turn order to all the ships in the formation. You will be asked for the new course and the direction of the turn. The program will tell the lead ship to turn immediately.

For each following position, the program will measure the distance to the lead ship and enter a "delayed turn" order to come to the same course. Thus, if the ships are in a line ahead formation, each of the ships will wait until the turn point to turn on the new course, preserving the line ahead. If the ships are not in a line ahead (say, in a line abreast or a line of bearing) then they will end up in a line of bearing. And if you issue this order to a scattered

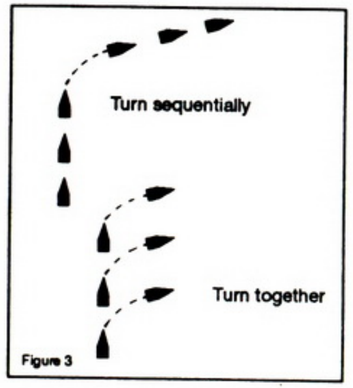


Figure 3

formation, it will remain scattered – more.

5 – TURN TOGETHER

This option issues a turn order to all the ships in the formation. The ships will turn immediately and simultaneously to the new course in the direction specified.

6 – SPEED CHANGE

This option allows you to change the speed of the ships in the formation. The speed change will be executed immediately. If the desired speed exceeds the maximum capacity of any ship in the formation (due either to the ship's maximum speed or to weather limitations) then a warning message will be printed and the ship will be ordered to its maximum speed.

7 – DISSOLVE FORMATION

This option automatically detaches all ships and deactivates the formation.

8 – LINE AHEAD

This option is designed to establish and maintain line ahead formations. When a formation is exercising this option an "L" will be printed next to the leader's number on the Formation status board. The program will automatically give orders to all ships in positions 2 to 8 to assume a line-ahead formation and follow the lead ship. Note that if the formation is not in a straight line ahead when the leader executes a turn, following ships will "cut the corner" in order to maintain formation alignment. Also, that ships with a delayed turn order in effect will execute that order prior to falling into formation.

VIII. REPORTS

The REPORTS menu provides access to large amounts of information in convenient and functional displays. The following options are available:

REPORTS, consisting of:
- LOOKOUT
- FLEET DEPLOYMENT
- FLEET READINESS
- FLEET BATTERY
- CURRENT HITS

BATTLE PLOT
DETAIL REPORT
SHIP STATUS
RNG/PENETRATION

LOOKOUT and SHIP STATUS are reports from individual ships. RANGE/PENETRATION is a ship-to-ship display. The rest are summary displays with information on the entire force.

VIII.1. Ship's Status

This display provides individual ship status, damage, and some fire control summary information. It contains about everything you could want to know about that vessel in a condensed display.

VIII.1.A. Weapons Status

The center and left sections provide weapons information. Included are main battery gun mount information and torpedo mount status.

The center window is of particular importance: it provides information on main battery gunnery performance for the previous three-minute turn.

The report consists of details on the guns on target, rounds expended in the last 3 minutes, and the Gunnery Officer's estimate of the number of hits he has scored. The estimate of hits may, of course, not be perfectly accurate – Gunnery Officers were notorious for overestimating the number of hits they achieved, while at times shells penetrated so deeply into the target ship before exploding that there was no indication to an outside observer that the ship had been hit.

Pressing F1 will provide the Gunnery Officer's report of the factors which impacted on gunnery accuracy or rate of fire, entitled GUNFIRE DEGRADATIONS. There are 31 different factors which can be reported. A complete explanation of all gunfire degradation factors is provided GUNNERY COMBAT, section XX.

VIII.1.B. Damage Status

A summary of the number of hits by size of shell hits is given on the lower right, along with torpedo hits. Other damage and engineering/damage control information is grouped in the upper right. Particular attention should be paid to the LIST figure –over 25 degrees is usually fatal. Other systems will display "damaged" or "destroyed" messages as appropriate.

VIII.1.C. Setting Battle Stations

"Battle Stations", "General Quarters", "Action Stations", and "Condition I" are all terms describing the maximum state of readiness for battle, with all stations manned and all hatches and openings shut. The status of Battle Stations is indicated in the block labeled "Bridge Status".

In most scenarios all ships begin at Battle Stations. However, in several the action commences with some or all ships in the force at less than full readiness – a good example is the Savo Island scenario, where the Japanese surprised and mauled an American force.

You cannot order your ships to go to Battle Stations. The program will automatically begin to set Battle Stations after the enemy has been sighted and a ship has broadcast a warning message. How quickly a ship is ready for battle depends upon when they know of the enemy's presence and the crew quality.

When a ship is not at Battle Stations it cannot fire torpedoes or give director or mount orders. After Battle Stations are set there is still a period of "surprise" where gunnery accuracy is reduced. It takes 3-30 minutes for a ship to reach full readiness, depending upon the initial degree of readiness and the crew quality.

VIII.2. Lookout/Radar

This screen reports the enemy ships which have been sighted by the designated ship. It includes the enemy target number, classification information, and visibility information.

The classification of a target progresses from UNKNOWN, to a type identification (BATTLESHIP, CRUISER, DESTROYER, AUXILIARY, MERCHANT), to an individual class identification (e.g. FLETCHER class). This process will be fairly rapid during daylight, and slower and more uncertain at night.

The display will also show the means of sighting the enemy. The "best" illumination or sighting means will be given. The hierarchy of sightings are:

Best: ON FIRE
LIGHT FROM TARGET
SEARCHLIGHTS
STAR/FIRE LOOM
SILHOUETTE STAR/FIRE
SILHOUETTE DAWN/TWILIGHT
VISUAL
RADAR
Worst: GUN FLASHES

A complete explanation of these is available in the Visibility section of the manual.

VIII.3. Fleet Deployment

This provides a single-screen summary of the locations of your units by grid position.

VIII.4. Fleet Readiness

This provides a single-screen summary of the watertight integrity, number of shell and torpedo hits, torpedoes available, maximum speed available, and main battery mounts destroyed for all the ships in your force. You can consult this display immediately after a turn to get a summary of which ships were hit, and then go to the individual ship's damage reports for amplification. If a ship's damage control capability is eliminated a report will not be available.

VIII.5. Fleet Battery

This screen provides a summary of the status of the Main Directors of your units –target, bearing and range, tracking or firing, and other information. This display is particularly valuable to ensure proper fire distribution. If a ship's Main Director has been destroyed a report will not be available.

VIII.6. Current Hits

This option provides a report on all the gunfire that was exchanged in the last 3 minutes. It includes the firing ship, the target, the number of guns and classification, and an estimate of the number of hits. The hit estimates are taken from the lookouts, so this report may vary from the report of the Gunnery Officer and can also be under– or over-estimates.

If a ship is hit by Enfilade fire, the number "99" will be printed instead of the number of guns.

Note – the data for this display IS NOT RECORDED when you exercise the "Save Game" option – this is to save disk space, because the possible number of entries is very high.

VIII.7. Detail Report

This report contains a summary of the action of the previous turn. It reports firing and target ship, explosions, torpedo hits, engineering breakdowns, capsized ships, successful engineering repairs, and other events. The Detail Report will be offered for review immediately after execution of a turn.

The Detail Report might report false torpedo hits. This reflects the fact that many more torpedo hits were reported by lookouts during surface actions than ever actually occurred. Often shell splashes were reported as torpedo hits (wishful thinking?). Since this influences the commander's assessment of how much damage he is inflicting on the enemy it is included in ACTION STATIONS!

VIII.8. Range/Penetration

This report provides bearing and range between two ships. It also provides information on the armor penetration capabilities of the spotting ship's guns against the target ship for penetrating vertical and horizontal armor at the current target angle. The Armor Penetration display provides the same type of information used by warship commanding officers to determine the most effective range at which to engage the enemy.

For vertical armor (e.g. belt), penetration will occur at distances closer than the listed range. For horizontal armor (e.g. deck), penetration will occur when the range is longer, because the angle of fall of the shell is steeper and is closer to a 90 degree angle with the armor, preventing "glancing blow" hits.

Photo #4

IX. GUN MOUNTS AND GUN DIRECTORS

Gun directors are designed to track targets and compute the gunfire solution. Gun mounts are electrically connected to the directors. The director controls the gun mount by transmitting bearing, elevation, and firing orders.

Some ships have many directors, while other ships (like auxiliaries or merchants) have none and control their gun locally.

In ACTION STATIONS!, directors are only capable of controlling one type of gun. This is not exactly accurate, as some German and U.S. ship had dual-purpose, dual battery directors. However, they were few and so that capability is not included. MAIN and ALT (alternate) directors control main battery guns. SEC (secondary) and ALT SEC (alternate secondary) directors control secondary battery guns, and TER directors control tertiary battery guns.

Gun mounts are assigned to directors, the director computes the firing solution, orders are transmitted to the gun mount, and the mount fires. This process is duplicated in ACTION STATIONS!

If directors were destroyed the gun mounts had their own rudimentary fire control equipment. This capability is duplicated by allowing guns to be assigned to "local control directors". For the main battery, these directors are called LOC MAIN A and LOC MAIN B, and for the secondary battery LOC SEC STBD and LOC SEC PORT. Tertiary batteries are not provided with means to fire under local control.

Both gun turrets and directors have arc of train limitations. The figure shows the relative bearing train limitations.

GUN DIRECTOR is available from either the Action Menu or the Battle Plot. When selected you will have two options, either AUTO or MANUAL.

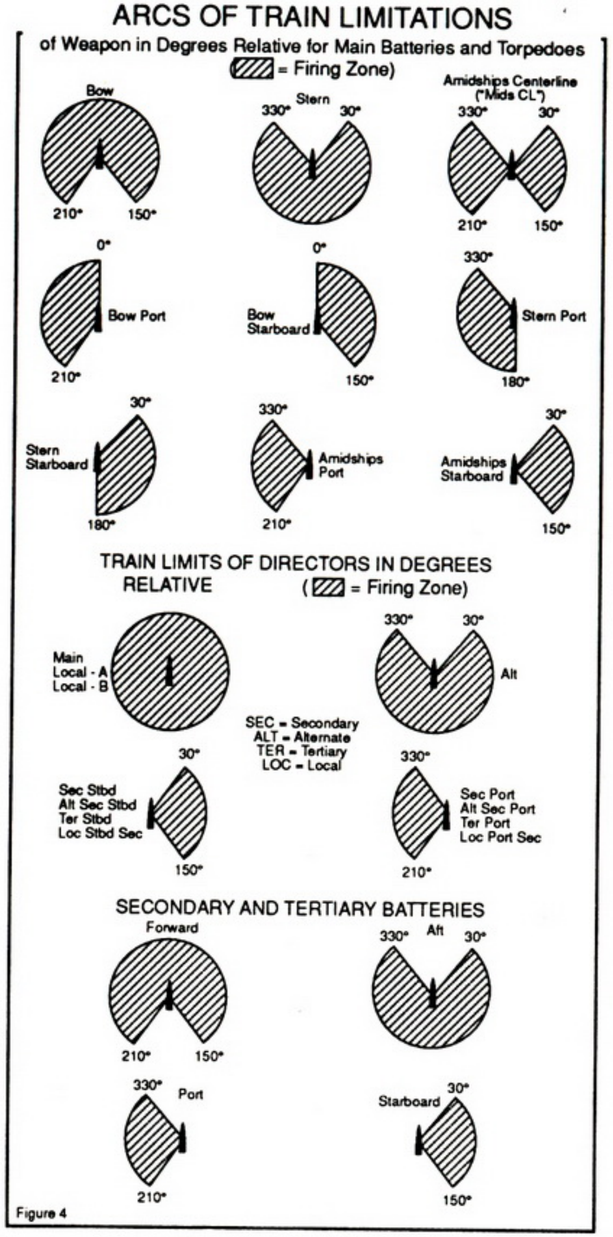


Figure 4

IX.1. Auto Director

The Auto Director allows you to delegate the authority of assigning all ships' directors to the Fleet Gunnery Officer, a billet filled by the computer. The program will assign your directors to targets. The order is only good for that turn – it may be selected each turn if you so desire. The directors will remain on their assigned targets until either they are manually or automatically reassigned, they are destroyed, or they loose sight of the target.

You have the option to have the directors either just track their targets, or to track and fire.

The "track" option is most valuable during night actions when you have not yet been spotted and do not want to reveal your presence by firing. This allows the directors to track the targets longer, which will increase their accuracy when they do open fire.

In the "open fire" option, the directors are instructed to open fire on targets that are within gun range. Distribution may be unorthodox – a battleship's guns will be directed against a destroyer if the opposing battleship is still out of range. Destroyers will not be fired upon if the range is greater than 20 K (precious little chance of hitting a DD at ten miles!).

The Auto Director order will only operate on directors that are controlling guns. Alternate directors and local control directors which are not controlling a battery are left in the "ready" status. Directors in "Illumination" mode will remain in that mode.

The Gunnery Officer tries to match the most appropriate size guns to the target, avoid over-concentrations, and distribute fire as best as possible. However, he does not take into account all tactical considerations. You may want to go back in the manual mode and review the assignments and change them as appropriate. Be careful issuing this order after you have assigned directors manually, because there is a possibility that the Gunnery Officer might shift your directors to different targets.

The Auto Director mode is the same program that the Computer Commander uses to assign directors to targets.

IX.2. Manual Control of Directors and Gun Mounts

The Manual option places you in direct command of the Directors and the Gun Mounts.

IX.2.A. DIRECTOR ORDERS

This display gives a one-screen summary of all the gun directors on the ship by battery. It provides information on the gun size of the battery, number of guns, current assignments of the directors, and target information.

This display is used to make tracking and targeting assign-

ments. The program will walk you through the process of selecting the director to be commanded, the command option and the target. One of the options is the "ILLUMINATION" mode – it is necessary to have a gun director controlling at least one gun in this mode before you can fire starshells.

IX.2.B. GUN ASSIGNMENT

This display is a summary of the main, secondary, and tertiary gun mounts on the ship. It gives the mount number, number of guns, arc of train, and the director controlling that mount. Secondary and Tertiary guns are not given by mount but by battery associated with the standard mount groups – port, starboard, forward, and aft.

From this display you can assign gun mounts to different directors. For instance, say you wanted to assign a main battery mount (#2) to the ALT (Main Battery Alternate) Director:

C: WHICH MOUNT?
P: 2

C: WHICH DIRECTOR?
P: select ALT

The program will update the screen display, and you can confirm that the required assignment has been executed. The computer will not allow you to "mismatch", i.e. assign main battery guns to secondary battery directors, or port side mounts to starboard side directors.

X. TORPEDO STATUS/ORDERS

From the Action Menu under CONTROLS, and from the Battle Plot by using F9, is TORPEDOES. When you enter this option, you are given three choices: TFC COMPUTER, LAUNCH, and RELOAD.

X.1. TFC Computer

"TFC" stands for Torpedo Fire Control. The TFC Computer calculates the direction to fire torpedoes based on your inputs or the inputs of your tracking team.

In ACTION STATIONS! the position of each torpedo is calculated individually. The torpedo salvo and all potential targets are calculated down to 3 seconds of time and less than a yard of accuracy to determine hits. Length, beam and target angle are taken into account. If a torpedo hits, the location on the hull is determined and damage calculated accordingly.

The first option is to select either a "ship" target or an "area" target. "Ship" is used when the target ship is visible to the firing ship, and your tracking team can provide range, bearing, and course and speed estimates. "Area" is used when you assume a target is in a particular location but cannot get an exact bearing and range – for instance, a target which has just disappeared behind a smoke screen. Estimates of the bearing, range, course and speed of the target must be provided based on examining the Battle Plot, intuition, or astrological forecasts. Hits are less likely using the area method unless you are firing at a large formation.

The inputs required for both options are very similar, so we will just demonstrate the Ship option in detail:

P: select SHIP
P: select the firing ship
P: select the target ship

C: BEARING 146 / RANGE 19.2/TARGET COURSE 45/
TARGET SPEED 19

ACCEPT? (Y/N)

Bearing and range information is accurate within a hundred yards and half a degree, the approximate accuracy of shipboard instruments of the era. Target course and speed estimates are from the crew's tracking team, and are of various accuracies depending upon crew quality, lighting conditions, and length of time the target has been tracked. Speed estimates are especially critical: for instance, a 1-knot error in target speed will result in a 100 yard difference in the calculated intercept point for a 3-minute torpedo run.

If you enter "Y", you are telling the TFC computer to accept the crew's estimate. If you do not approve the estimate press "N", and you will be prompted to enter your own data.

This feature is useful if you are anticipating that the enemy will make a course or speed change – for instance, the target is at the tail end of a line formation which is in the process of executing a turn.

After course and speed has been entered by either of these methods the speed and range capabilities of the torpedo are displayed.

After all information has been entered the TFC will give a solution: course for the torpedo, run time, intercept angle, and range to intercept point. The spread figure gives an indication of how far apart torpedoes in a salvo would be at the point of intercept if they were launched with a 1 degree spread between torpedoes.

The TFC computer can also calculate the "best course to intercept" for ships. For example, your destroyers want the course to close at the fastest rate on a battleline for a torpedo attack. Instead of using torpedo speed use the speed of the ship. Set the ship's course on the calculated torpedo course, and they will track toward the target on the best intercept course.

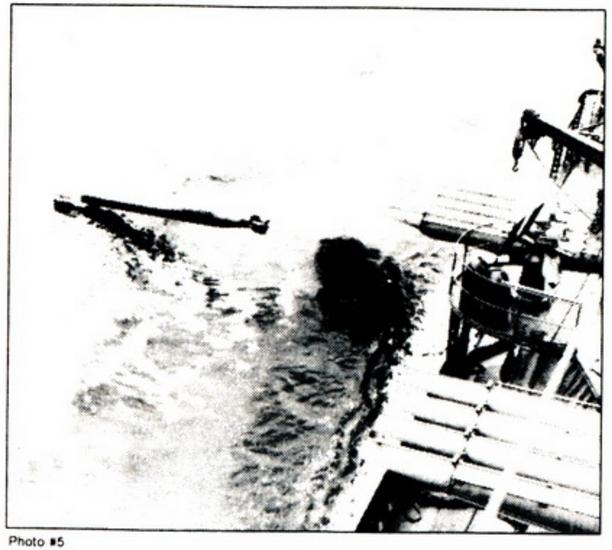


Photo #5

X.2. Launch

The launch option display shows the status of the torpedo launchers on the ship, number of torpedoes ready to launch, and the arc of train of the mount.

The far right column gives the time until the mount is ready to fire. Each mount can only fire one spread per turn, even if it fires only part of the torpedoes available. The mount cannot fire if reloading is in process.

To the bottom right is an echo of the last TFC solution, giving torpedo course, torpedo speed, and the distance between torpedoes at intercept if a 1 degree spread is used.

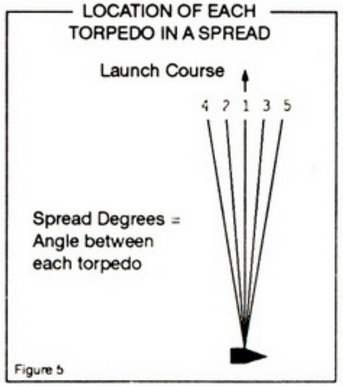


Figure 5

The program will ask:

- which mount to fire;
- the number of torpedoes to fire;
- the course of the center torpedo of the spread;
- the spread angle between torpedoes, in degrees and tenths;
- the speed setting.

At the completion the launch screen will be updated. The appropriate number of torpedoes will be gone and the mount "ready in" time set at 3 minutes. At this point you can either launch additional torpedoes from other mounts or hit <ESC> to return to the Torpedo Menu.

X.3. Reload

When you call for the Reload option, the computer first looks at all of your ships to see which have mounts which could begin reloading. A list of these ships is printed, and you will select the ship.

A summary display lists the torpedo mounts on that ship, along with ready times and reloads available. Select the mount and the number of torpedoes to be reloaded. You may perform either a full or partial reload.

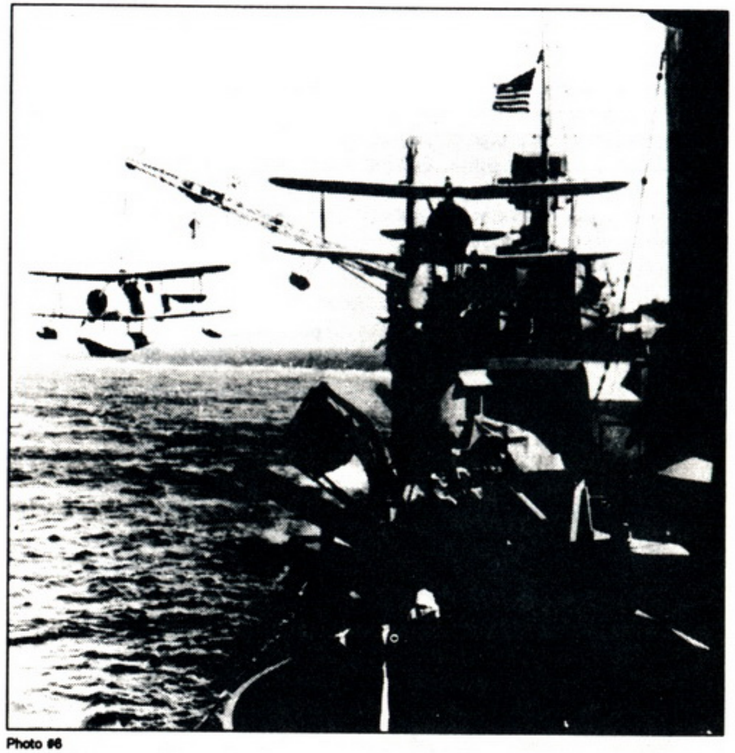


Photo #6

XI. AIRCRAFT

Since ACTION STATIONS! is primarily concerned with surface-to-surface combat, the role of aircraft is limited. Each side can have a maximum of two aircraft aloft. Aircraft are limited to reconnaissance and gunfire spotting missions. Aircraft cannot attack or be shot down.

From the Action Menu, select Controls, then select Aircraft. The display provides the current status of the aircraft airborne, and a list of ships with aircraft yet to be launched. The options are LAUNCH, JETTISON, and ORDERS/REPORTS.

XI.1. Launch

The launch option allows you to order aloft any aircraft which you may have on board ships or shore facilities. Aircraft launch from ships is a tricky event. Most aircraft were stored on the

catapult in the full force of wind and weather; plus, aircraft were such a fire hazard that they normally were kept in a "de-fueled" status. Consequently, aircraft were OFTEN not able to be launched when the commander wanted them. In ACTION STATIONS!, there is a 50% chance that a launch will be unsuccessful. Aircraft which are unsuccessful in the launch procedure are jettisoned.

If a launch is successful the aircraft will circle awaiting commands. Blue force aircraft are numbered 1 and 2, and Red Force aircraft are numbered 3 and 4. Select the position number by using the up and down arrow keys. If you assign a newly-launched aircraft the number of an airborne aircraft the airborne aircraft is removed from play.

Aircraft cannot be launched from a ship which is firing. There is no provision for aircraft recovery or refueling.

Aircraft all have a standard endurance of 180 minutes, and a standard speed of 120 knots.

XI.2. Jettison

If you have your full complement of aircraft aloft already (or, alternately, you do not desire to use the smelly, noisy contraptions) you can use the JETTISON option to throw the crates over the side. This will significantly reduce the fire hazard on board the ship.

XI.3. Orders/Reports

Once aircraft are flying and assigned an aircraft position number, they can be issued orders. The following options are available when ORDERS/REPORTS is called:

MOVEMENT – you move your aircraft by giving them a destination X and Y position. The pilot will automatically fly to that location at 120 knots and then circle until given another destination.

MISSIONS – there are two types of missions available:

- SPOT – the aircraft is assigned as a gunfire spotter for the main director of a ship. The aircraft must be within 10 K of the target. Aircraft spot will significantly increase gunfire accuracy at longer ranges, and is most effective when used with battleships or heavy cruisers. Spot missions are not possible under night visibility conditions.
- RECON – the aircraft is sent to the destination of your choice to search for enemy ships.

Aircraft can be reassigned missions in mid-flight.

RECON REPORTS – if an aircraft on a Recon mission discovers enemy ships it will send back a sighting report. The Detail

Report will indicate when a message is received. The sighting report will give the location, course, speed, and composition of the enemy force. The accuracy of the report is dependent upon how much the pilot had to drink prior to launch.

FLARES – when on night recon missions aircraft will carry 4 strings of three illumination flares. These flares can be dropped from the current position of the aircraft on a radial bearing. Aerial flares can be distinguished on the Battle Plot by the pattern of three overlapping circles of light in a line.

XII. COUNTERFLOODING/FLOOD MAGAZINES

From the Action Menu, select Controls, then Counterflooding. COUNTERFLOODING allows you to correct list by ordering Damage Control teams to flood spaces to balance water in damaged compartments. Selecting FLOOD MAGAZINE allows you to flood magazines and ammunition handling spaces to prevent ammunition explosions. A ship looses these capabilities if all Damage Control teams are eliminated.

XII.1. Counterflooding to Correct List

When this option is called a summary screen is displayed showing the current list condition on all your ships and the status of counterflooding. "Hit any key" will call the ship selection window, and then the counterflooding orders menu.

Counterflooding to correct list is an important function. List adversely effects the accuracy and rapidity of gunfire; and, if the ship lists too far, it will capsize. 25 degrees of list is normally the maximum range of stability for most warships. Most combatants lost during naval battles capsized before they sank.

Counterflooding has its penalty - after all, you are purposefully "sinking" your ship.

If counterflooding is in progress and the ship looses all its Damage Control teams, the flooding will continue until some enterprising sailor realizes that something is wrong and shuts the valves.

XII.2. Flood Magazines

In this option the program will print a summary of all ships that are on fire, the magazines which are threatened, and the number of rounds of ammunition contained therein.

If a fire is large or burns long enough the magazine temperature may rise sufficiently to cause a spontaneous detonation of the powder and destruction of the ship. A magazine which is empty (0 rounds) is not in danger of exploding.

Commanders can eliminate the possibility of magazine detonation by flooding the magazine. A flooded magazine will reduce the watertight integrity and freeboard of a ship by approximately 10% of the (original) unflooded watertight integrity, depending upon the size of the magazine.

XIII. NIGHT ACTIONS

Night actions are the "graduate level" scenarios in ACTION STATIONS! Ranges tend to be short, torpedoes deadly, and gunfire control challenging. Engagements tend to be quick and errors often irrecoverably fatal. Proper control of searchlights and starshell fire often is the difference.

XIII.1. Searchlights

All ships come equipped with searchlights with the same characteristics. The program will allow them to be used only during NIGHT, DAWN, and TWILIGHT turns. The maximum searchlight range is 12 K. If the searchlights do not lock on to a target they will remain on, but not searching, until ordered off or to commence another search. Searchlight orders for the next turn cannot be cancelled or countermanded. Searchlights will ignore targets already detected by an illumination quality higher than "illuminated by searchlight".

If a searchlight detects a target, it will lock on and continue to illuminate unless:

- The target goes out of searchlight range; or
- The target sinks; or
- The line of sight to the target is blocked by smoke or terrain; or
- The commander orders the searchlights OFF or to search another area.

Searchlight orders are given from the Battle Plot. Let's run through the procedure:

P: F4

P: select the illuminating ship

P: select searchlight ON

Now we are ready to tell the Ensign running the searchlights how wide an area to search and in what direction:

C: SEARCHLIGHT ORDERS FOR THE NEXT 3 MIN: WIDTH OF SEARCH (1-179) DEGREE(S)?
P: 60

C: CENTER BEARING?
P: 300

You have just ordered a searchlight search 60 degrees wide centered on a bearing of 300 degrees(T), or, from 270 to 330 degrees(T).

The computer "immediately" calculates the results of the 3-minute search (ah, the wonders of modern electronics). If you want to see if the search was successful, clear the screen (i.e. go back to the Action Menu) and call up the Battle Plot again - the ship with the searchlight on will have a white circle around it, and if it has locked on to a target you will see the "searchlight beam". However, other ships will not "see" the results until the turn is executed, so you will not be able to fire on the target with a ship that had not previously spotted the target.

XIII.2. Starshells

Now you can go for you Master's in Naval Warfare: starshells.

The prerequisite to firing star shells is that a director controlling one or more guns is assigned to the ILLUMINATION mode. The gun mount and the director must be able to bear in the direction of fire. The maximum range is 18 K (sector target) or 12K (ship target) or the range of the gun, whichever is less. You can fire at a range as short as 1K, but, be advised, you might be "showing off" in more ways than one.

Follow this "check list":

ASSIGN A GUN TO THE DIRECTOR

ASSIGN THE DIRECTOR TO THE ILLUM MODE

ENSURE GUN AND DIRECTOR CAN BEAR ON THE TARGET LINE

ENSURE THE GUN IS IN RANGE

It is not necessary to assign an entire battery to fire star shells, although you can if you wish. Only one gun is needed. Plus, any director can be used (including LOCAL CONTROL), so it is not a good idea to use your best directors - save them for tossing "bricks through the enemy's bridge windows". One of the best solutions is to assign one gun mount (or a secondary battery) to LOCAL CONTROL, assign that director to ILLUM mode, then issue the starshell orders.

Directors (and Local Control) can be placed in the ILLUM mode from the Chart Menu (F2, call up the ship and director, and select "ILLUMINATION"). This can also be done beginning from the Action Menu.

OK so far? Good - now let's fire our starshells.

There are two methods of firing starshells. First, is SECTOR ILLUMINATION. You do not have a target, but think that something is out there, so you fire a pattern off "into the brown" and hope you discover something.

From the Battle Plot, select F8; from the Action Menu, select Controls, then Starshells. Select the ship, and the program will confirm that you have a director-mount combination in ILLUMINATION mode:

C: #4 SEC PORT - STARSHELL COMPUTER * ON

*If you do not have a director in the ILLUM mode, the computer will print a polite note asking you to get your act together (which, of course, will not happen to US) - here goes:

P: select SECTOR

C: BEARING?
P: 270

C: RANGE /1 - 18/?
P: 15.4

You now have given orders for a starshell pattern to be fired (over the next 3 minute turn) at a bearing of 270 degrees(T) at a range of 15.4 KYDS. If you change your mind, it is possible to change the parameters of the pattern by repeating the routine, but it is not possible to cancel the pattern.

With the TARGET option the starshell computer is going to lock on to a target and fire starshells to illuminate it over the next three minutes. The firing ship must have the target in sight - in this case, let's brighten up the life of target #67:

C: #4 SEC PORT - STARSHELL COMPUTER * ON
P: select TARGET ILLUMINATION

P: select the desired target

C: OFFSET: 1-NORTH; 2-S; 3-E; 4-W; 0-NONE

The starshell computer is simplistic - unless told otherwise it would pop the starshell directly over the target. However, it is best sometimes to offset the burst point - in particular, if you want to catch other ships in the pattern, or to have the star burst a bit over the target to have a better chance of silhouetting should it maneuver. "OFFSET" allows you to move the burst point of the starshell 500 yards in the specified direction, north, south, east, west; or no offset at all.

XIV. EXECUTING THE TURN

When you have completed issuing all orders to your force and are ready to execute the next turn(s), from the Action Menu select the Options Menu; you can select either NEXT TURN or MULTIPLE TURNS.

NEXT TURN executes a single 3-minute turn.

MULTIPLE TURN allows the program to sequentially execute more than one turn. If you do not expect contact with the enemy for several turns, this option allows you to get up and stretch while the computer sorts electrons.

You will be asked how many 3-minute turns to execute. For example, entering "10" would have the computer execute 10 turns in a row, or 30 minutes of movement. You will then be asked to select a "stopping rule", either "Stop on Gunfire" or "Stop on Contact". If the selected condition occurs the program will not execute any additional 3-minute segments and will shift to the Battle Plot.

There are two stopping rules which are always in effect:

1. If any ship is hit by a torpedo (near misses don't count);

2. If any ship runs aground.

If there is gunfire during the turn the display will shift to the Battle Plot. If there is no gunfire, at the end of the last turn the program will return to the Battle Plot, centered on your largest combatant, with Battle Plot radius set at the limit of visibility.

For 2-player games, the Battle Plot display will be from the viewpoint of the player who last entered orders.

XV. CHANGING PALETTE

Change Palette is under the Option Menu. Change Palettes give you the option to change the colors used on the Battle Plot to suit your own taste and equipment. The default value is Palette 2.

XVI. SAVING GAMES

From the Action Menu select the Options Menu, and then select LEAVE/SAVE GAME. Following this path you will be given the option to:

END GAME, which will put you back in DOS;

STATISTICS, which will provide you with a statistical summary of the game results. After the STATISTICS screen is digested you will be placed back in DOS.

SAVE GAME.

The SAVE GAME option allows you to record the current situation, including all current and outstanding orders. After saving the game you have the option to immediately return to play, or quit and return to DOS.

Allow approximately 65K of disk space to save the larger scenarios.

WARNING - THE PROGRAM DOES NOT TEST FOR SUFFICIENT DISK SPACE. INSUFFICIENT DISK SPACE ON THE TARGET DISK WILL CAUSE PROGRAM TERMINATION AND LOSS OF THE SCENARIO.

The program allows you to store scenarios in files numbered 1 through 99. If you desire, use the DOS "RENAME" command with the suffix ".SCN" if you want to better label your files.

XVII. GAME STATISTICS

An optional branch prior to ending the game is the STATISTICS option. It is an option from the LEAVE/SAVE GAME menu.

The game statistics display gives a comprehensive breakdown of the number of hits on both sides, damage inflicted, and classifies each ship's final status as:

SUNK - a permanent loss.

CRIPPLED - a substantive loss, which at a minimum would take a year or more of shipyard work to restore to combat readiness.

HEAVILY DAMAGED - combat limited, requiring substancial shipyard-level repairs.

LIGHTLY DAMAGED - hit but not seriously - field repair only needed.

UNDAMAGED.

TOTAL POINTS is the total value of all ships on a side multiplied by 3.

DAMAGE POINTS is a total of the cumulative watertight integrity losses for each ship, weighted for the seriousness of the damage. Points damage to ships that are heavily damaged or crippled are multiplied by 2, and the value of a ship which is sunk is multiplied by 3.

A "Winner" is not announced for the action, for a very good reason: victory in a naval battle often has nothing to do with losses, but rather whether the mission was accomplished. Losses must be balanced against the objective - was it worth a battleship to stop that amphibious invasion, or to get that convoy through? This will make for marvelous post-game discussions with the media, your bartender and/or your opponent.

(The author will make such decisions for players for a small renumeration. Send the final situation game file and a stamped self-addressed envelope. The quality of the decision based on the size of the fee. All decisions final.)

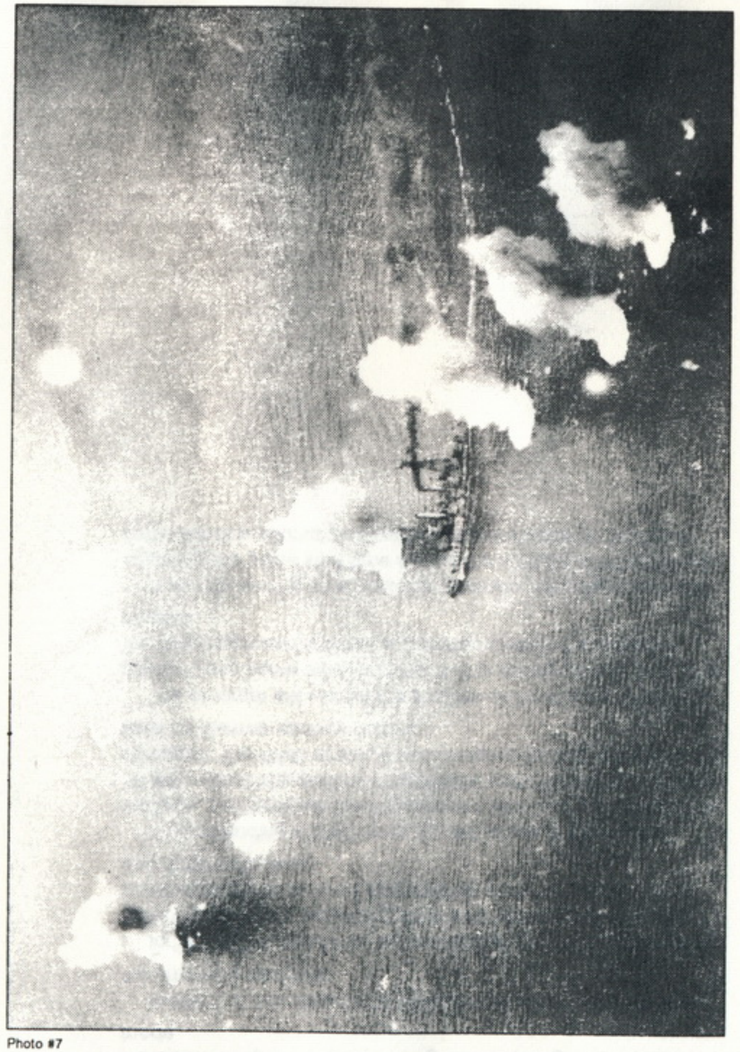


Photo #7

PART B: CREATING YOUR OWN SCENARIOS

XVIII. THE BUILD SCENARIO PROGRAM

The Build Scenario program allows you to create your own scenarios from scratch. Prior to starting, you should work out the situation and setup. Use a piece of graph paper and lay out the initial positions, complete with all the ships and islands, initial courses and speeds, etc., on a X–Y coordinate system.

To begin the Build Scenario program, go through your computer start-up routine until you have the DOS prompt, then type CSCENE <RET>.

Most of the instructions for the Scenario Builder are on– line. You can press F1 and receive context–sensitive help. The program will initially place you in the main menu. Press F1, and then use the PgUp and PgDn keys to review the command key functions.

In the main menu:

FILE allows you to retrieve scenarios for editing or begin creating a new scenario. EDITING allows you to edit the scenario currently in memory. You can also select SHIP and will be able to review ship files. VIEW allows you to see summary screens of information on either the scenario or specific ship files. SAVE and QUIT are for when you want to, ah, well, save or quit (don't you hate manuals that treat you like a 5–year old? Well, I betcha if I hadn't said that I would get a letter about it. Bear with us! Ed.)

When creating or editing a scenario, various screens will give the data currently in the scenario and ask for your input. You will be asked:

GENERAL ENVIRONMENTALS

Battle name

Nationality of the Blue and Red forces

Sea state and wave direction

Wind speed and direction

Day and night visibility

Squalls – interval and duration

Terrain – up to 10 terrain points can be placed on the BATTLE PLOT. Each point is defined by the center X,Y position, and the radius. All terrain points are circles, but it is allowed to overlap the circles, so almost any terrain form is possible.

Number of Blue Force and Red Force ships – there is a maximum total of 49 ships. Red force number + Blue force number must = total number of ships.

After you are satisfied with the data on a screen, go to the last data field and <RET>. The program will then check your inputs to ensure everything is correct, and then progress to the next screen.

The program will then go through the process of entering ship data. It will repeat the ship data input routine until all the ships (up to the number of Blue Force and Red Force ships which you specified) have been entered. The data needed for each ship is:

Ship class: here you select the two–letter code for the ship class file. A listing of the ship classes and their file codes are given in appendix D.

The ship's name – this can not be more than 8 characters long. You may have to abbreviate.

Current speed and course

X and Y position

Radar installed

Aircraft on board (if the ship has the capability). Aircraft must begin on board one of the ships or land bases.

Crew quality – this is a figure which you can enter to change the efficiency of the ship – it impacts on gun accuracy, damage control capabilities, torpedo reload times and other capabilities. –3 is a poor crew, +3 is a top crew, 0 is average. Intermediate values are allowed.

Formation and the ship's position in the formation . Note that all ships should be placed in a formation if you want the capability later to use the "randomize" function when you reload the scenario, because only ships in formation will be randomized. Things like shore batteries and anchored ships should not be placed in formations.

You will then be asked for the Blue Force and Red Force's mission. The mission selections are:

1 – STRIKE

2 – BATTLE

3 – ESCORT

4 – RAID

STRIKE mission is specified when a force is on a mission to attack a convoy or bombard shore facilities.

BATTLE mission is specified when a force is on a mission to engage another battle force.

ESCORT mission is specified if the force is assigned to escort a convoy or guard an anchorage or port.

RAID mission is specified when a small force is at sea with the object of attacking commerce vessels.

These missions are specified to give direction to the Computer Warrior. When commanding a STRIKE force, he will either avoid escorting ships or steamroller over them heading for the objective. If the defending force is too strong he will change to BATTLE mode.

In BATTLE, his object is to inflict the maximum casualties on the enemy at least loss.

In ESCORT missions he will maintain formation on convoys (or picket lines, if he is defending anchored forces or shore installations), attempt to cover all approaches, and intercept intruders and drive them away.

If commanding a RAID force, he will attack, feint, return, reattack, and continue the engagement with multiple approaches. He will retire if opposed by a significant escort force or if seriously damaged. The RAID strategy was designed to simulate the tactics used by German surface raiders.

The program will ask for the position of the objective (an X–Y position) and home base (another X–Y position) so that it can plan the initial approach and has a preferred direction to retreat if needed.

If you are setting up a historical scenario, you might consider adjusting the game start time so that the amount of time between battle sundown/sunup and game sundown/sunup is the same.

XIX. THE GENERATE SCENARIO PROGRAM

The GENERATE program creates a completely new game scenario based on parameters decided by the player.

Using this program, you can create an infinite number of battle situations. You can command either side. The "Fog of War" is intact, because you will not know the exact compositions, positions, or objectives of your opponent. The "replayability" of ACTIONS STATIONS! then becomes IMMENSE.

XIX.1. Installing Generate On A Hard Disk

Each of the FLEET disks contains a file "DDF", which informs the computer of the ships available on that disk. On the ATLANTIC Fleet disk is the file "DDFHARD". Section III instructed you to copy all the files from the four disks into a single directory. Go in to that directory, delete the file DDF ("DEL DDF"), and rename DDFHARD as DDF ("RENAME DDFHARD DDF").

XIX.2. Starting Generate

Go through your normal computer start-up procedure until you have the DOS prompt. Insert FLEET DISK: MEDITERRANEAN in the appropriate drive and type GENERATE <RET>. The program will load and you will soon see a menu screen giving you the adjustable parameters of the Scenario Generator.

XIX.3. General Information

The Scenario Generator begins with an open ocean area centered at grid coordinates X=0, Y=0. There are two "home base" islands, separated by approximately 160 nautical miles. Each home base island sports a rather powerful shore battery of 12-14" disappearing guns.

Blue forces are home based on the western island, and generally will have initial positions to the west of the center of the area. The Red force is based on the eastern island and set up also near their island. Next to each island each side has an "anchored objective" unit, representing an anchorage of amphibious and/or merchant shipping.

The only exception to the above is when either side is escorting a convoy. In that case neither side is given an anchored objective unit, and the ship initial positions are reversed (Blue forces east, Red forces west). The convoy would then have to traverse "hostile" waters to reach the protection of the shore battery on its base island.

XIX.4. Menu

The menu lists the game parameters which the player can control when GENERATE-ing a scenario. You can either give

specific values or let the computer choose them randomly.

To change a value, select the number and press <ret>. The computer will then ask for the required information, giving you allowable values.

1.. HOUR (24-HR CLOCK): This option allows you to select the time of day. Round number hours can be selected by inputting a number between 1 and 24. If you wish the computer to select the hour at random, input "0".

2. WIND VELOCITY can be selected between 1-44 knots. "0" and the computer will select the wind velocity at random.

3. WIND DIRECTION can be selected from 1 degree (true) to 360 degrees (true). "0" and the computer will select the wind direction at random.

4. SEA STATE varies between 1=light to 4=rough. "0" and the computer will select sea state at random.

5. SEA DIRECTION can be selected from 1 degree (true) to 360 degrees (true). "0" and the computer will select the sea direction at random.

6. VISIBILITY varies, 1=poor, 2=moderate, 3=excellent. "0" and the computer will select visibility at random.

7. SQUALLS indicates the possibilities of sudden rain squalls that cut visibility down to minimal levels. If you select "1", there will be no squalls; "2" and the possibility of squalls exists. "0" and the computer will decide if the possibility of squalls exist. If squalls are possible the program will randomly select time, frequency and duration.

8. TERRAIN indicates the possibility of other islands in addition to the two home base islands. "1" indicates that you do not desire any additional islands. Select "0" and the computer will randomly select between 0 to 8 additional islands of varying sizes and scatter them randomly throughout the area.

9. NATIONALITY allows you to select the fleet from which the Blue or Red side selects their forces. Forces will not mix fleets. If "0" is selected, then the nationality will be selected at random from the fleets available (see "FLEETS AVAILABLE" below). It is allowable to have the same nationality ships on both sides.

10. LARGEST TYPE DESIRED allows you to limit the forces selected to just destroyers ("3"), or just destroyers and cruisers ("2") - this option is particularly useful when a convoy game is desired (see "MISSION" below). Selection of "0" allows the computer complete freedom in selecting the sides. Note that specifying a type as the "largest type desired" does not guarantee that you will get that type, only that there is a chance that you will.

11. APPROXIMATE NUMBERS allows the player to specify the approximate numbers of warships contained on each side. "1" allows the computer to select the numbers, "2" is for 2-8 warships, "3" is for 9-15 warships, and "4" is for 16-22 warships. The shore battery, anchored objective, and any merchant ships are not counted against this total. Note that these numbers may be overridden by the "Force" selection (see "APPROXIMATE FORCE", below).

12. APPROXIMATE FORCE allows the player to select the balance of force between the two sides. It is expressed in terms of RED measured against the BLUE force, in percentage. For example, an input of "200" would mean that you desired the Red force to be twice as strong (200%) as the Blue force, while an input of "50" would mean that you desired the Red force to be half as strong (50%) as the Blue force. Force comparisons are calculated for each specific ship in the FLEET disk; however, as an estimate, 1 battleship generally equals 2.5 to 3.5 cruisers, and 1 cruiser generally equals 3 to 5 destroyers.

FORCE requirements will override the APPROXIMATE NUMBERS input. If you need more or less ships to make a force ratio, the program giveth, the program taketh away.

Shore batteries, anchored objectives and merchant shipping are not factored in to the force determination process.

13. CREW QUALITY allows the player to select the quality of the forces. Allowable values are "-3" (poor) to "+3" (elite). All of the ships will be given the specified value. "-10" allows the computer to randomly select the crew quality for each ship individually. In either case, merchant shipping crew quality is always average, and shore battery crew quality is good to elite.

14. AIRCRAFT allows the player to determine if ships have the possibility of carrying float planes. "0" and the computer will determine each ship's aircraft load randomly among those ships with aircraft facilities. "1" and there will be no aircraft in the scenario.

15. MISSION allows the player to determine the missions for the forces. "0", and the computer will select the mission at random. "1" is the STRIKE mission, "2" is the BATTLE mission, "3" is the ESCORT mission, and "4" is the RAID mission.

If ESCORT is selected, the computer will provide one or more groups of merchant shipping. If the number of warships is large the computer may just use the CONVOY unit, which is a single unit meant to represent large numbers of merchant shipping.

16. BATTLE STATIONS SET allows the player to select if the forces are alerted or not. "0" and the computer will assign this randomly; "1" indicates that the force is already at General

Quarters and is fully battle ready; "2" indicates that the force is not battle ready, and will take some time after the initial enemy sighting to have battle stations manned and be ready to engage.

17. RADAR allows the player to select the radar capability of the forces. There are three levels of radar equipment: level 1, 2 and 3. If one of these levels is selected it represents the MAXIMUM capability that the force has. For example, if "2" is selected, then that force's ships may be equipped with either level 1 or level 2 radar or have no radar at all, but it cannot have any units with level 3 radar. The higher the level, the better the radar.

If "0" for "RANDOM" is selected then there is a 33% chance that a ship will have some type of radar installed.

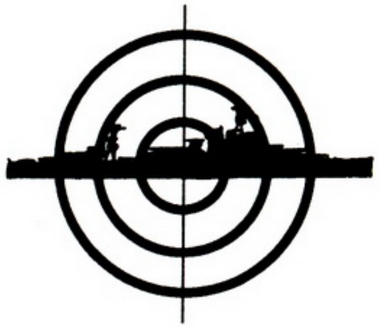
18. PROXIMITY OF FORCES allows you to select how near the forces are initially placed. "0" allows the computer maximum freedom to place forces. "1" (near) biases initial placement of forces close to mid-ocean, while "2" (far) biases initial placement closer to the islands. For escort missions, "near" places the convoys closer to their destinations, while "far" places them further away.

19. FLEETS AVAILABLE allows you to input which of the fleets you have available and wish the computer to choose from.

After all the parameters are selected, you hit RETURN from the main menu to have the computer begin the computational process. The program will stop when it has selected the fleet from which to draw the Blue force, and you will be asked to insert the appropriate disk; this process will repeat for the Red force. If the correct fleet disks are not inserted the program will abort. Hard disk users can just hit <RET> each time.

When the forces are selected and positioned the program will ask if you desire to name the ships of one force. If you have already decided which force you want to command you might like to name the ships at this point. Otherwise, the program will assign names based on the first seven letters of their class name, followed by a lower case letter. For example, if your force was assigned two HOOD class battleships and two BIRMINGHAM (BIRMGHAM) class cruisers, their names would appear as HOODa, HOODb, BIRMGHAc, and BIRMGHAd.

The program will then ask that you insert a storage disk and specify the game file. Remember, the program will overwrite any game already stored in that file, so be careful.



PART C: THE INTERNALS OF ACTION STATIONS!

XX. GUNNERY COMBAT

This section provides background information and details in naval gunnery in general, and the use of guns in ACTION STATIONS! It is sometimes technical in nature. You do not have to read and understand all of this material to enjoy the game—but it might help you better appreciate what is going on.

ACTION STATIONS! performs a complex calculation to determine the number of gunnery hits. It is designed to accurately reflect all the important conditions influencing accuracy, rate of fire and hit rate. A commander can get the most from his force when he takes them into account. An understanding of these factors can also give the player an insight as to why historical naval engagements were fought as they were, because these were the same factors which naval officers of the period considered when making tactical decisions. After reading this section, you will be better able to understand some of the "why's" of naval warfare.

The gunnery calculation has three components:

- STANDARD ACCURACY
- RAPIDITY OF FIRE
- ACCURACY OF FIRE

XX.1. Standard Accuracy

Standard Accuracy is the percentage of hits that a ship would achieve under "normal battle" conditions. These conditions are:

- course and speed of the target is steady;
- course and speed of the firing ship is steady;
- the target has been tracked for at least 6 minutes;
- the range is steady;
- visibility is clear;
- only one ship is firing on the target;
- only one ship is engaging the firing ship;
- calm seas with light wind;
- battleship–sized target;
- daylight;

and several other technical considerations. The Standard Accuracy tables used in ACTION STATIONS! are drawn from tables compiled during the late 1930's by the U.S. Naval War College and from British Naval Staff Estimates, with amplifications and modifications by the author to account for war experience and to adjust to a shell-by-shell accounting.

A major consideration in the creation of the Standard Accuracy tables was the dispersion of the salvo - how far apart the shells would spread from the aim point. One of the technical problems of naval gunnery was (and is) to limit dispersion. Microscopic differences in jump, gun droop, mutual atmospheric interference, bore sighting accuracy, shell seating, powder and tube temperatures (and over 55 other identified factors) would cause the shells in a salvo to spread. There was always something which resulted in a small unpredictable deviation in the flight of the shell.

The problem for the fire control system was to center the Mean Point of Impact of the salvo (MPI) on the target. Even with the MPI centered exactly, the dispersion was usually greater than the size of the target: for example, a battleship firing 16" guns in 8-gun salvos against another battleship at 20,000 yards could only expect 12% hits even with the MPI perfectly centered.

5" guns firing at 12,000 yards might expect a mean dispersion of 150 yards in range and 25 in deflection. When firing at a destroyer-sized target, broadside on, with MPI centered, a hit rate of 5.7% might be expected. If the target was end-on (i.e. "crossing the "T") the percentage drops to about 3.2% because the deflection dispersion is much greater than the beam of the target (Yes, crossing the "T" REDUCES your number of hits).

Another reason to limit dispersion related to spotting. At ranges over 10,000 yards a spotter has no real depth perception. The only way he can differentiate between "over" and "short" is if the bottom of the shell splash was blocked by the hull of the ship.

The spotting job was very difficult, especially when the target was "hull down" over the horizon and only the superstructure is visible. Usually several spotters indicated "over", "short", or "straddle". These votes were totalled and the majority decision fed into the fire control computer.

If the decision was "over", a spotting correction (Rc) was applied to the next salvo. Rc might be a constant amount pre-set by the ship's gunnery doctrine - if, say, 200 yards, then the guns stepped down a "ladder" of 200 yards each time an "over" decision was reached. That gave another reason for limiting dispersion - if one shell was a "wild shot" and spread 300 yards further than the MPI, and that was the one shell in line with the target and spotted by the observers as an "over", then an "over" salvo would be indicated when actually the MPI was well short of the target.

Accuracy curves are contained in the program for three classes of guns: small caliber (less than 5.5"), medium caliber (5.5" to 9.5") and large caliber (greater than 9.5"). These three classifications were established by grouping weapons with similar ballistic characteristics, where the angle of fall as a percentage of the

maximum theoretical range of the weapon was similar. With a similar angle of fall the effective target size seen by the shell is similar over the weapon class.

Once a ballistic "standard" was established for each class of gun, performance could be compared and a correction applied to the standard accuracy to reflect the merits of each gun.

For example, the standard weapon used to represent all medium class guns was the British 8"/50 m8. The German 8"/60 1934 C/34 weapon had a higher muzzle velocity, heavier shell, less dispersion and fewer shot anomalies, and thus was given an accuracy bonus correction. The Italian 8"/53 m1927 was mounted in pairs with the gun muzzles very close, which caused barrel whip and intershell shock wave interferences and resulted in a very high salvo dispersion and a large number of "wild shot" anomalies. This gun type was penalized in accuracy in comparison to the standard.

In this way all of the 69 types of guns in ACTION STATIONS! were analyzed. Corrections were applied to duplicate the wartime effectiveness of the gun mount. Appendix D is a print-out of the data.

XX.2. Rapidity of Fire Correction

Research in the naval archives in the US, Great Britain, and Germany discovered the "design maximum cyclic rate of fire" of ship's gun mounts. This is the maximum rate that the gun mount could sustain fire for a period of three minutes. Determining this was not straightforward because of the different ways data were recorded. For example, the British tended to record maximum cyclic rate of fire for the gun assembly and not the mount as a whole, while the Americans recorded the standard sustained rate at battle range, very different values. Consequently, the rate of fire of all weapons had to be converted to a standard.

Other factors were considered - for example, the 16" guns on the Nelson class battleships were limited in rate of fire by the speed of the ammunition hoists, and the British 14"/45 m7 suffered from such chronic mechanical breakdowns in all of its engagements that the gun mount was never able to deliver more than 70% of its theoretical maximum cyclic rate of fire. Extensive research was conducted to account for all the individual faults and merits of the gun mounts. When there were conflicts, battle experience was held to be the final arbiter.

A standard percentage of the maximum rate of fire was used to account for ranging systems. First a ranging salvo (or salvo pattern) would be fired, and the fall of shot spotted. A spot correction (range and deflection) would be entered and new ranging salvos fired. During this process rate of fire would remain low to

prevent wasting ammunition. When the MPI was on and the target "straddled", then the "range was established" and the rate of firing would go to maximum. When the salvos began to falling off target the process began anew.

This system, with variations, was used by most the major navies of the period. There were modifications, of course, for different circumstances: for example, in her famous engagement with the battle cruiser Kirishima the USS Washington stayed at maximum ROF (firing on one turret ready light) for the duration of the engagement, using a "constant rocking ladder", walking the salvos back and forth over the target, an appropriate method for the relatively short range and large target. However, generally, at longer ranges the rate of fire was lower due to the "wait time" as the spotters awaited the fall of shot - for large caliper guns the time of flight could be up to 75 seconds at maximum range.

After the ROF is corrected for range to target, there are other factors which are taken into consideration to determine the number of shell fired by the ship:

- the number of guns which can bear on the target. Each gun mount has an established arc of train limited by its placement on the ship.
- the fatigue of the crew - most weapons were loaded either entirely or partially by hand. Captains had to consider crew fatigue when fighting their ships. ACTION STATIONS! measures accumulated crew fatigue and degrades the rate of loading accordingly. It also accounts for "recovery time", when the ship is not firing for a period, allowing the crews to rest. Fatigue penalties can run as high as a 90% reduction of the standard rate of fire, with larger caliper guns less effected because of higher mechanization.
- ship changes of course—as a ship turns it lists—the angle on the deck tend to slow the loading process. In addition, the gunfire solution would loose accuracy during the turn due to gyro lag and other limitations. Most ships simply ceased fire during the turn and waited to steady on the new course and for the gyros and stable zeniths to settle. In ACTION STATIONS! a correction is applied to the rate of fire based on the size of the turn. Turn penalties range from 10% up to 90% for a 170 degree or larger turn. Penalties are greater for gun mounts firing under local control.
- ship changes of speed - a similar penalty is assessed, approximately 10% for each 2 knot speed change.
- if a ship is listing, rate of fire is reduced by approximately 4% for every degree of list.
- "surprise fire" is a condition when a target has not been

tracked by the director prior to opening fire. The director does not have a good plot of target course and speed. Additional ranging time is needed to establish the range and get the MPI centered and tracking. This is taken into account by a penalty of 30% until the track is established.

- concentration of fire on the firing ship - a ship's firing rate would slow if a large number of ships were firing on it. This is a physical as well as psychological effect - spray over the gun mounts from near misses delayed the loading of open mounts and obscured the gun train telescopes, and the shock of hits impacted on the "human element".

In ACTION STATIONS! the normal battle condition assumes that "equivalent fire" is on all ships - battleship on battleship, cruiser on cruiser, etc. A ship's gunfire is penalized or rewarded in proportion to the number of ships firing on it, the number of guns, and caliper. Bonus rate of fire and accuracy is given to a ship not under fire or under light fire only, while ships under concentrated fire are penalized.

- funnel smoke can effect the rate of fire by reducing the visibility of the target, causing a ship to "cease fire" if the target is obscured, or to fire more ranging salvos if it has difficulty seeing the fall of shot. Funnel smoke (called "stack gasses") is present when a ship is over 5 knots and within 3 knots of its maximum engine speed. Stack gasses are displayed on the Battle Plot. Rate of fire is penalized by 30% (daytime) or 50% (night) when stack gasses are in the line of sight between the target and the firing ship.
- weather conditions effect the rate of fire. Penalties are assigned when the character and direction of the seas effect gunlaying and ammunition handling in moderate, heavy and rough seas.
  - pitch penalty: in moderate seas small ships are penalized 30%, intermediate sized vessels 20% and large vessels 10%. If the sea is heavy, add 10% to the penalty; if it is rough add 20%.
  - the roll penalty is the same as the pitch penalty, except that guns firing under local control are assessed an additional 20% penalty.
  - yaw penalties are 20% greater than the pitch penalty.
  - a spray penalty is assessed when the wind is over 15 knots and the ship is heading within 30 degrees of the direction of the wind (i.e. into the wind). Unturreted guns and guns not using director fire are penalized 20%.
- if a friendly ship is within 5,000 yards of the firing ship and within 10 degrees of the line of fire a "masking" penalty is

assessed. This reflects the gunnery officer's concern that he might be required to pay for any damage he inflicts on a friendly ship. It also simulates the safety precautions taken to prevent that damage, including ceasing fire for a period if the ship crosses in the line of fire.

XX.3. Accuracy of Fire

The rate of fire calculation determines the number of "rounds out the barrel" - next we determine how many hit. The approach is the same: take Standard Accuracy (which is dependent upon gun type and range) and correct to account for the characteristics of the weapon and the conditions.

- An "open fire" correction is in effect for the first three minutes that a ship fires on a target. It varies with range, from 10% for a close range target to 90%.
- The open fire penalty is reduced if fire was shifted from an adjacent target. The new target must be within 2K range and 15 degree arc of train of the old target.
- radar used to supplement visual spotting will receive a bonus of between 10% to 30% depending upon the quality of the radar. If radar is used as the sole means of targeting a penalty of 20% to 50% is effected.
- at night, the quality of the target illumination effects the accuracy of fire. The following is the hierarchy of illumination, from the best to the worst:

  target on fire
  target's searchlight on
  target illuminated by searchlight
  target in starshell, flare or fire loom
  target silhouetted by starshell, flares or fires
  target silhouetted by dawn or twilight
  visual
  radar
  gun flashes sighted only

- spotter aircraft will increase a ship's accuracy by up to 20% at long ranges.
- if a battery is being controlled by two different directors a "split fire" penalty of 20% is assessed. An example would be if the forward main battery turrets are being controlled by the MAIN Director the after main battery turrets are being controlled by the ALT director.
- all fire under the control of any ALT director is assessed a penalty of 20% due to smaller rangefinders and less experienced fire control teams.
- an "over concentration" penalty will be exacted if more than

one ship is firing on the same target. This reflects the problems of sorting out each ship's fall of shot. Over concentration penalties are not effected for close range fire (10K for large caliper guns to 4K for small caliper guns). The penalty is approximately 10% for each "extra" ship firing at the target, and is exacted against all the firing ships.

- in night actions the secondary battery is penalized between 30-50% if the main battery is also firing, due to flash interference.
- guns firing under local control are penalized in accordance with the range to the target: 10% at 4K, up to 90% for over 25K.
- when the target changes course or speed it will disturb the firing solution and may "evade" incoming rounds. Changes of course and speed cause more fire control problems for the firing ship when the target ship is at higher speeds and at longer ranges. The accuracy penalty ranges from 10% to 40%.
- if the range is changing rapidly it is more difficult to track the target and establish the range. Range rate penalties vary, up to 80%.
- an "under-salvo" penalty is exacted if a ship is firing less than four guns on a target. With a smaller number of shells it is more difficult to determine the MPI of the salvo, and a single "wild shot" could impact on the estimate. Under salvo carries a 20% penalty at ranges over 12K, 10% if under 12K.
- the crew quality effects how well a ship shoots. Crew quality is entered as a number between -3 and +3 in the set- up portion of building a new scenario. This is converted into a -30% to +30% adjustment to the accuracy of fire.
- the size of the target is a factor. The standard accuracy hit percentage assumes a battleship-sized target. Target size corrections range from -60% for the smallest destroyers and torpedo boats to +20% for the largest superbattleships, and +30% or +40% for high-silhouette merchants and auxiliaries. PT boats and shore batteries are additionally compensated for their small size by including a proportion of "no effect" hits in the damage determination process.
- sun glint or glare off the surface of the sea occurs during sunset and sunrise. If the target bears within 30 degrees of the sun accuracy is penalized by 10%.
- during dawn and twilight a ship can be silhouetted on the horizon. If the target is within 60 degrees of the sun the firing ship receives an accuracy bonus of 20%.

- salvo chasing was a technique used to confuse gunfire solutions by constantly making course alterations into the fall of shot. However, the course changes also have a dramatic effect on the ship's own accuracy. Ships firing on targets which are salvo chasing will score approximately 20% less hits, while firing ships that are salvo chasing will have their accuracy degraded by 30%.
- when a ship is near the limits of day/night visibility, a penalty is exacted.

Remember to consult the Gunnery Officer's report (from the Ship's Status screen) so you can be reminded of the effect your tactical decision have on gunfire accuracy.

XX.4. Enfilade Fire

If two targets are close to one another both may be hit by the same salvo. Enfilade hits are indicated by a "999" in the "number of guns" column in the Current Hits report.

XX.5. Final Gunfire Calculation

The percentage penalties given above are approximations. The actual calculation works with an exponential equation. For example, a firing ship may accumulate 6.4 penalty points, entered into the formula

.87^6.4

yielding about a 40% total penalty.

A simplified version of the actual calculation would look like

(#guns)x(ROF)x(range correction)x(.87^ROF correction points)

to determine the number of shells fired, and

(#shells)x(standard accuracy)x(.87^ accuracy points)

to determine the number of hits.

If the result of the calculation is 2.36, 2 shells are hits and there is a 36% chance of a third hit. If the number was less than 1 – say, .57 – then that would be considered as a 57% chance of 1 hit.

To make things interesting another factor takes into account random chance. The number of hits can be reduced as much as 50% or increased as much as 75% at random.

Is this whole thing worth it? Try it and see. If you use your forces to optimize their gunnery while taking into account the torpedo threat you will learn much about the "way and why" naval warfare was conducted during World War II.

XXI. TORPEDO COMBAT

In section X the mechanics of operating the Torpedo Fire Control (TFC) Computer and firing and reloading torpedoes was explained. This section discusses some of the tactics of torpedo combat.

"'If you want to fill 'em with air, bomb 'em; if you want to fill them with water, torpedo 'em!' Such was the succinct appraisal of the torpedo made by a veteran pilot. And the superiority of the torpedo over bombs could be extended to cover the wide range of projectiles, for no weapon in the war proved half as destructive to enemy capital ships as the 'fish'" ..... from *U.S. Navy Bureau of Ordnance in WW II*

The torpedo proved to be the most destructive weapon employed against shipping in WW II. Ships known to be highly resistant to gunfire and bombs might be crippled by one torpedo. An effective torpedo strike delivered during a surface action can be the single most decisive event of the battle.

There is an inherent difficulty with the torpedo: hitting the target.

A comparison between gun and torpedo fire can illustrate the problem. A 28 knot torpedo will take 12.9 minutes to travel 12,000 yards, during which an 18-knot target will move 7,740 yards. Torpedo numbers are limited, and if fired in small numbers the target might be abie to maneuver to avoid them entirely. If the target makes a radical course change it can be over ten miles away from the originai point of intercept.

Compare this with the gun. A 14" shell at 23,000 yards has a time of flight of only 37 seconds with a mean velocity of 1220 knots. An 18-knot target would travel 370 yards. A gun has hundreds of projectiles, and can adjust fire based on the results of previous salvos.

The extreme destructiveness of the torpedo is balanced by the extreme difficulty in making hits.

Torpedo fire control was mostly automated. However, the human decisions, the TACTICS of torpedo fire were of vast importance. The effectiveness of a torpedo attack is primarily determined by the selection of the FIRING POINT, characterized by the range to the intercept point and target angle. The best firing point allows:

- the torpedoes to have sufficient range to reach the target, even if the target should alter course or if the initial course estimate was incorrect.
- the torpedoes to make as many hits as possible by attacking the length of the ship rather than end-on.

RANGE: the longest range that you can launch a torpedo and

hit depends upon the target course (i.e. the target angle relative to the firing ship) and target speed. This is called the "effective range" of the torpedo.

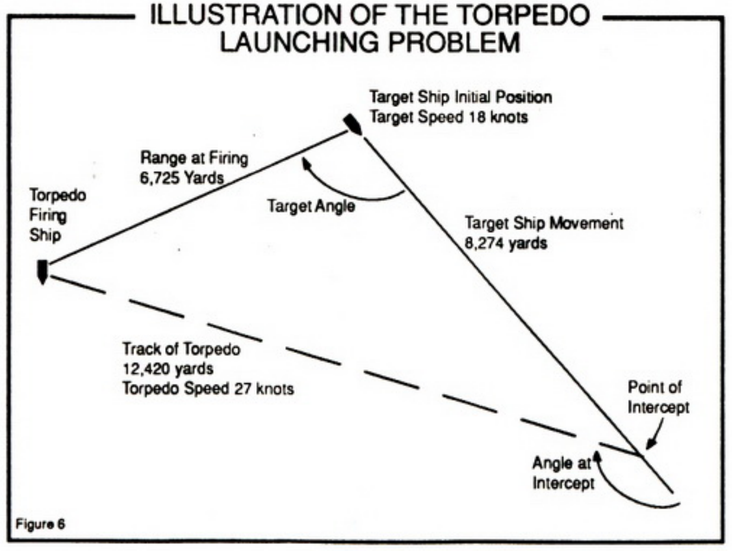


Figure 6

Figure 6 illustrates a poor launch position. The firing ship is abeam the target ship. At launch the range is 6,700 yards, but with a "tail chase" required the torpedo must travel almost twice that distance (12,000 yards) to reach the point of intercept. A launch from abeam or astern of the target must be made from a short initial range. This relationship reverses if the launching ship is ahead of the target - it is possible to launch at a much greater initial range and still have the torpedo intercept the target.

Figure 7 illustrates how the effective torpedo range would change with respect to target angle when launched against an 18-knot target. Torpedoes launched from inside the ellipse will reach the target. The different ellipses represent different torpedo types.

Hits are more likely when the torpedo track makes a 90 degree angle with the hull of the target, providing the largest target. The TFC computer provides you with the "intercept angle". An angle of 90 or 270 degrees means you are attack the target "broadside"

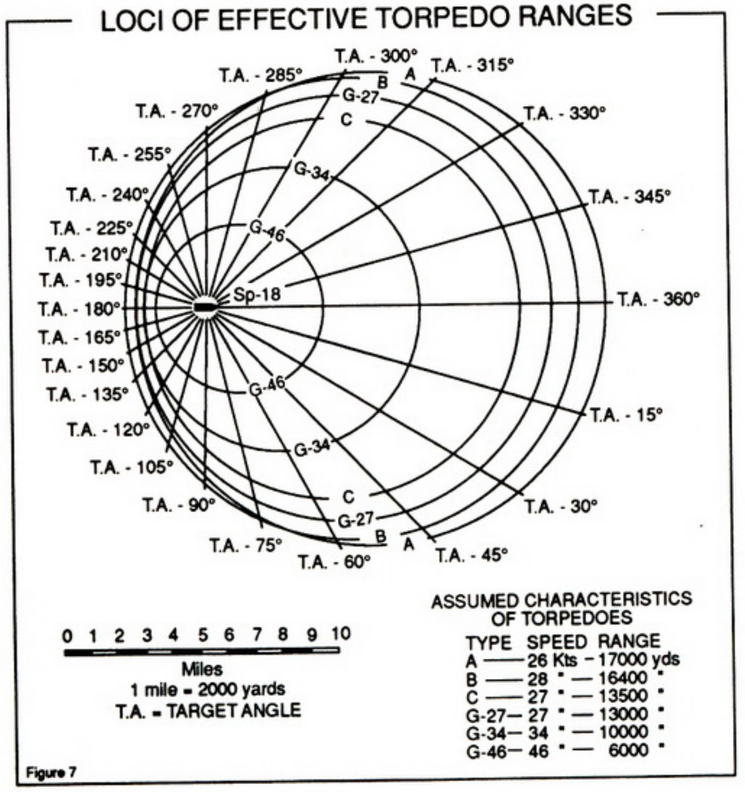


Figure 7

and have the largest effective target size; an angle closer to 0 or 180 degrees means you are attack the ship end-on, the narrowest part of the ship and the smallest target.

It can also be proven (we won't do it here- enough math!) that when the track makes a 90 degree angle with the target course the torpedo fire control solution is the most tolerant of errors in estimating target speed or course. Figure 8 shows a solution for this launch angle.

Torpedoes should be fired in salvos, launching large numbers simultaneously. This will sweep a large area, making evasion difficult and allowing for errors in the TFC solution.

Spread angles can be either small or large, giving a dense or wide pattern. Wide salvos threaten many ships, and allow for the

SOLUTION OF THE BEST TARGET ANGLE

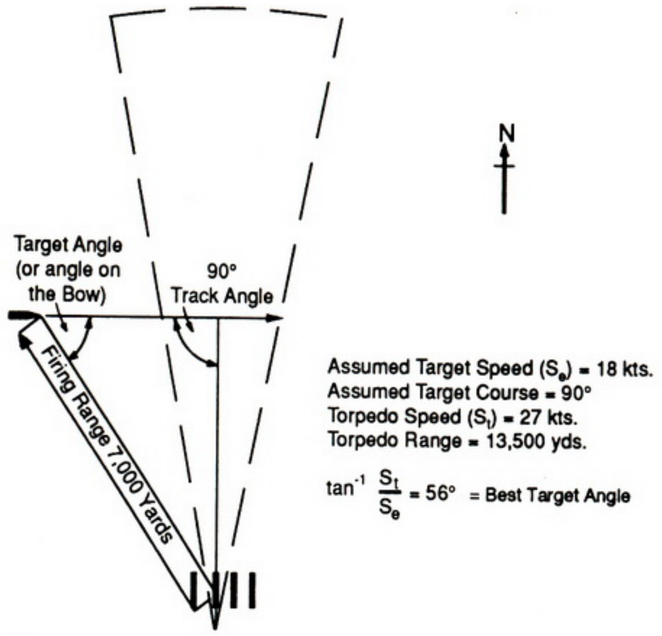


Figure 8

largest errors in estimating target course and speed. However, this increases the distance between each torpedo, leaving "holes" where ships can slip through. Dense salvos sweep a narrower area but give the maximum number of hits on each individual ship, and makes evasion by any ship caught in the torpedo area difficult.

The decision to launch a wide or dense spread depends upon the tactical situation — if the enemy is engaged, if they are trying to open or close the range, the relative amount of damage, the numbers of torpedoes available to the force, and many other considerations. It is not a trivial problem.

The TFC Computer calculates the distance between torpedoes at the point of intercept for a 1 degree spread. If you want your torpedoes spaced 250 yards apart and the TFC says that a 1 degree spread would place them 100 yards apart, then use a 2.5 degree spread angle.

A moderately wide pattern would be to space the torpedoes at about one hull length apart at intercept - which means you have a good chance to get at least one hit. Battleships are about 200 yards long (broadside), so a spacing of 150-200 yards might be appropriate for long-range applications. A dense pattern might be half or one-third a hull length apart.

In ACTION STATIONS! the torpedo course you set is for the center torpedo of the salvo. Torpedoes are then distributed left-right-left-right. Take this into account when planning torpedo patterns.

MULTIPLE SHIP TORPEDO SALVO

Salvo Firing, Individual Points of Aim, Narrow Pattern,
1.5° Spread, Single Broadside, 12 Torpedoes

Enemy sight bar course and speed. Course 90°, speed 18.
Target: Middle four ships of enemy formation.

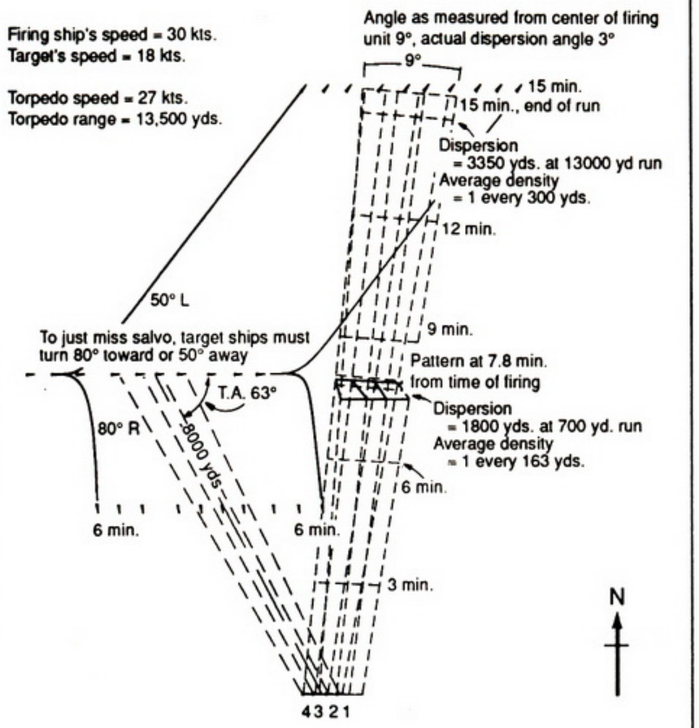


Figure 9

The fire control calculation is most sensitive to the speed estimate. A 1- knot speed estimate error means 100 yards for every 3 minutes of run - 15 minutes, a 500 yard error. Take this into account when you plan how far to spread your torpedoes. The calculated run time is included in the TFC computer output.

Firing torpedoes by groups of ships simultaneously can be very effective. Figure 9 illustrates a multiple-ship salvo, where four destroyers in line ahead formation fire 12 torpedoes with a 1.5 degree spread. This will give an average density of one torpedo for every 163 yards after a 7,000 yard run and a pattern width of about 1,800 yards. If the target ships are 200 yards long, any ship caught in the spread will be hit unless it maneuvers individually between the torpedoes. The enemy formation would have to turn 80 degrees to starboard or 50 degrees to port to ensure that they would evade the salvo. Turns of that magnitude severely penalize the effectiveness of their guns for the duration of the turn, and might force them away from the center of the battle just when they are needed. Just as important, the enemy ships would have a greatly restricted freedom of maneuver until the torpedos run past. A coordinated torpedo attack launched by another formation from another angle could have decisive effects.

This brings us to another point - coordinating torpedo attacks with gun engagements - but we will leave that topic for the Tactics section.

XXII. RADAR AND VISIBILITY - SEARCHING FOR THE ENEMY

At the bottom of the Action Menu are listed several factors important to the search process:

TIME
LIGHT CONDITION
DAY VISIBILITY RANGE
NIGHT VISIBILITY RANGE

The night range of visibility is a measure of darkness. The day range of visibility is a measure of air clarity. Both of these measures impact on visibility both at night and during the day.

XXII.1 Day Rules of Visibility

DAY VISIBILITY is the range which a battleship-sized target will be sighted. The range of sighting is adjusted based on the size of the ship. Smaller ships such as minesweepers, torpedo boats and trawlers are sighted at ranges up to 6,000 yards less than the day visibility range; superbattleships, auxiliaries and merchantmen at up to 4,000 yards more, while cruisers and other ships will fall in between. The drawing shows an example for visibility of 36,000 yards.

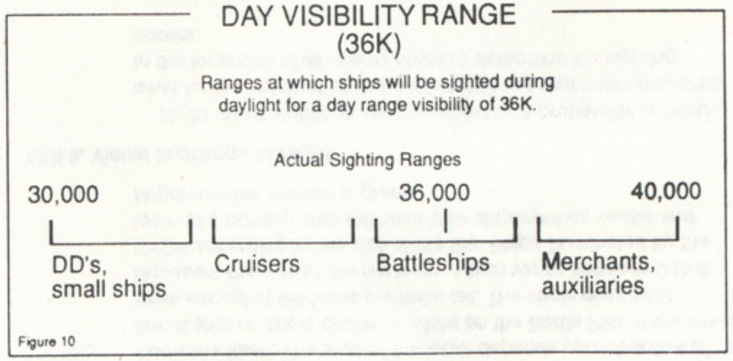


Figure 10

Day sightings are deterministic - if you are within visibility range of an opponent, you will always be sighted.

XXII.2. Smoke

Smoke comes from burning oil slicks, burning ships, or when a ship is purposefully ordered to make a smoke screen. Smoke will always be displayed on the Battle Plot regardless of visibility or the range to the nearest sighting ship, even if a smoke screen

segment is blocked from view by another smoke screen or island. Smoke is blown in the direction and velocity of the wind. Smoke can last up to 15 minutes in good weather, and 3 minutes in rain or snow squalls. Smoke will block the line of sight for optical tracking, but will not block radar line of sight.

XXII.3. Stack Gasses

Stack gasses will be seen coming from a ship traveling over 5 knots and within 3 knots of its maximum engine speed. Stack gasses can be seen by an opposing ship if it is within 1.5 times the range of visibility. Stack gasses do not block visibility. Smoke screens do not block sighting stack gasses. Stack gasses are blown by the wind. Stack gasses disperse after 3 minutes.

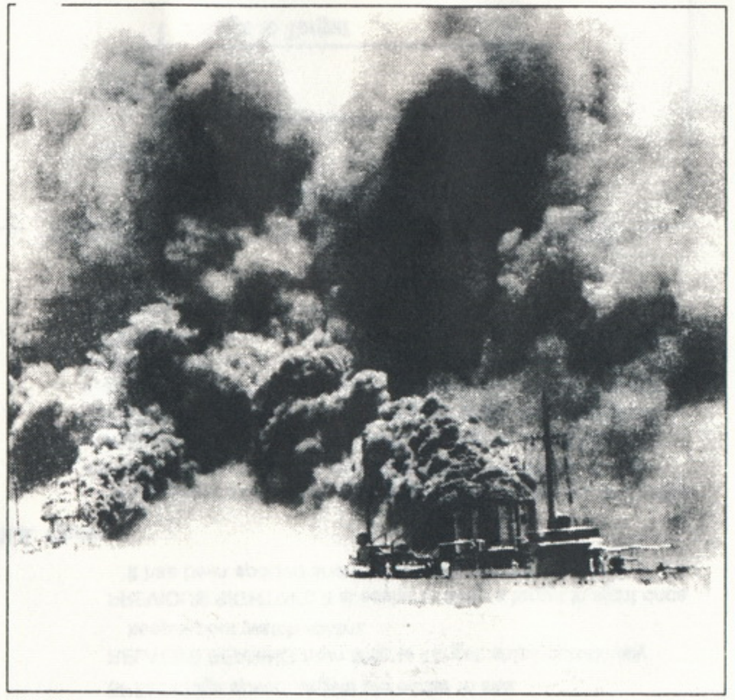


Photo #8

XXII.4. Night Rules of Visibility

The night rules of visibility are complex to account for many more possible conditions. The following are the various ways a ship can be sighted at night:

SHIP ON FIRE
SHIP'S SEARCHLIGHT ON
SHIP ILLUMINATED BY OTHER SHIP'S SEARCHLIGHT
SHIP IN STARSHELL OR FLARE LOOM
SHIP IN LOOM OF BURNING SHIP
SHIP SILHOUETTED BY STARSHELL, FLARE OR BURNING SHIP
SHIP SILHOUETTED BY DAWN/TWILIGHT
SHIP SPOTTED VISUALLY
SHIP SPOTTED BY RADAR
GUN FLASHES SPOTTED

The quality of the illumination has an effect on the accuracy of gunfire - for example, with all other factors equal you will score fewer hits when firing at gun flashes than when firing on a target illuminated by starshells. The higher up the above list, the "better" is the quality of illumination.

The Lookout report will list the sighting reason for each contact.

A ship can be sighted as a result of illumination by starshell, flare, searchlight, gun flashes, or by turning on its own searchlight, but only if an enemy ship has a clear optical line of sight to the target and the ships are within 1.5 times the air clarity range (day visibility range).

XXII.5. Searchlights

The instructions for operating searchlights is in Night Action, Section XIII. A ship with its searchlight on will be circled in white on the Battle Plot. If the searchlight is locked on to a target, a "cone of light" will be shown on the chart from the searching ship to the illuminated ship. The illuminated ship will also be circled in white.

XXII.6. Starshells and Flares

Starshells and flares can illuminate a target:

- by directly lighting the target (i.e. "in the loom")
- by silhouetting the target.

Starshells are shown as yellow circles on the Battle Plot. Flares are shown as three circles in line. The area inside the circle(s) is the loom area. In some cases the graphics package will not fill in

the circle and the starshell will be shown then just as a circle outline - those are still fully-effective starshells.

Depending upon the nationality, starshells can illuminate a radius of 2 K or 1.5 K.

If a ship is in the loom of a flare or starshell, the ship symbol, vector and ship number will be displayed in green.

XXII.7. Shipboard Fires

Shipboard fires can illuminate or shilhouette a ship as well as illuminate itself. The area of the loom depends upon the size of the fire. A ship on fire is circled in white on the Battle Plot. If the fire is large enough it will leave a smoke tail. The circle does NOT represent the size of the fire loom, which varies between 0 to 3 KYDS according to the size of the fire. Ships illuminated by the loom of a burning ship will have their ship symbol, vector and target number printed in green.

XXII.8. Visual Sightings At Night

Night visual sightings are probabilistic. A probability is calculated for the range of each possible sighting and then compared to the locations of all enemy ships to determine if a sighting occurs.

Photo #9

The probability of sighting is based on:

RANGE: the range listed under NIGHT VIS on the Action Menu is the range (under ideal conditions) that a battleship would be sighted 50% of the time per 3 minute visual search. The

be sighted 50% of the time per 3 minute visual search. The probability increases as range decreases.

TARGET SIZE: larger targets are easier to see.

SPEED: high speed targets are easier to see.

RELATIVE BEARING from Ship to Target: ships notoriously keep a poor watch astern.

PREVIOUS SIGHTING: it is easier to keep a target in sight once it has been spotted and the lookouts alerted.

XXII.9. Radar

Radar was continuously improved during this period, and ships were often retrofitted with new and better installations. Consequently, no attempt has been made to assign a single type of radar to a class of ship. In the scenarios, radar capabilities are assigned according to historical records. Using "Build Scenario", the player can assign any of 3 levels of performance to ships with radar. Using "Generate Scenario" the player can specify a number of options for radar installations.

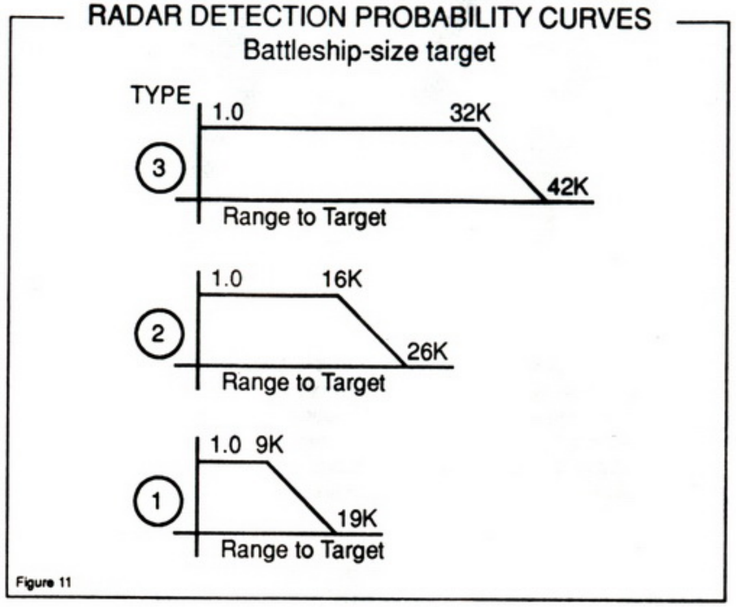


Figure 11

Radar sets are always considered to be "on", unless destroyed.

All radar installations are considered to have a "blind zone" due to superstructure masking. Targets cannot be detected by radar within 30 degrees of the ship's stern (150-210 degrees relative).

Figure 11 shows the probability of detection for the three radar types against a battleship-sized target. Probabilities of detection are adjusted to account for radar cross-section. Smaller targets will move the curve to the left, larger to the right.

Type 3 radar is approximately the performance of late-war US SG ("Sugar George") radars. Type 2 is the SG radar in inshore waters or the SC in open waters, while the type 1 is the SC in inshore waters. Early war Japanese, British and German radars should be considered as type 1; the best Japanese radar type 2, while the best German and British radar (late war) type 3.

Targets spotted by radar alone can be fired upon. When visual and radar are both available the fire is most accurate.

XXII.10. Terrain

Terrain Points (shown as circles on the Battle Plot) are considered perfect cones. Line of sight is blocked if it crosses terrain. Shore batteries and land targets can be sighted if they are on the forward surface of the cone as viewed from the sighting ship.

XXIII. CHARACTERISTICS OF SHIPS

The data base and models used to represent the ships in ACTION STATIONS! are detailed and comprehensive. Every ship class has been individually researched and the data base tailored to account for unique strengths, weaknesses and idiosyncrasies. A listing of the characteristics (with a few appropriate comments) might be interesting:

CLASS NAME — the class names given in CONWAY'S ALL THE WORLD'S FIGHTING SHIPS 1922-1946 is used as the standard, with some exceptions.

DIMENSIONS — length and beam, in feet

MAXIMUM SPEED — under combat conditions. This might vary dramatically from the "top speed" listed in some references, because they were usually quoting either design speeds or trial speeds. Trials speeds were often rigged, with the ship at a low load basis, so that the builder could qualify for bonus payments for exceeding contractual minimums. Many Italian and French ships fit this category.

Some of the scenarios have a low top speed for a unit, due to the ship's actual condition at the time of the battle. For example, in the Battle of Kolumbangara the cruiser Leander could barely make 28 knots due to an engineering casualty, while normally her top speed would be 32 knots.

TYPE OF TORPEDOES — assigned in accordance with historical records.

TORPEDO MOUNT CHARACTERISTICS — number of tubes, number of reloads, arc of train.

SEARCHLIGHT INSTALLATION

TARGET SIZE

SMOKE GENERATION CAPABILITY

RUDDER — status and operability

CREW QUALITY — this is a variable selected by the player when the scenario is constructed

GUN DIRECTORS — numbers and types

MAIN BATTERY MOUNTS — gun type, arc of train, number of guns, director connectivity, ammunition supply and source

SECONDARY BATTERY GUNS — arc of train, gun type, number of guns, director connectivity, ammunition supply

TERTIARY BATTERY GUNS — arc of train, gun type, number of guns, director connectivity, ammunition supply

ARMOR PLATING —

belt
belt next to engineering spaces
belt next to magazine
belt next to steering engine
deck
deck over magazine
deck over engineering spaces
deck over steering engine
turret glacis
turret top
secondary battery
conning tower
conning tower top
internal splinter armor and bulkheads
director armor
barbette armor
torpedo bulkheads
internal subdivision

AMMUNITION INVENTORY — forward main magazine, aft main magazine, amidships main magazine, secondary magazine, tertiary magazine, torpedo reloads

WATERTIGHT INTEGRITY AND FLOTATION — based on hull size, freeboard, internal subdivision, and hull member strength. In a few cases age of the ship is considered, under the assumption that as a ship gets older watertight subdivision (stuffing tubes, hatch gaskets, etc) deteriorates.

DAMAGE CONTROL ABILITIES AND EQUIPMENT

STEERING ENGINE STATUS

STATUS OF FIRES

ENGINEERING CAPABILITES AND REDUNDANCY — a composite which includes the number of main engines, number of boilers, number of emergency diesel generators, number of pump and auxiliary installations, and the internal subdivision between all the engineering spaces.

NUMBER OF AIRCRAFT ON BOARD — the data base includes a limitation on the maximum number of aircraft that can be carried. The player specifies the number actually on board when he creates the initial scenario.

SHELL HIT LOCATION — each ship is divided into 42 different zones. The probability of hitting each zone is individually tailored for each ship class.

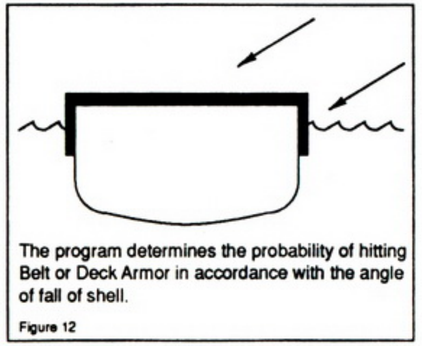
XXIV. DAMAGE AND DAMAGE CALCULATION

XXIV.1. Shell Hits

The gunfire portion of the program determines the number of hits scored on a target. Each shell type is rated for explosive power, armor penetration, dud rate and ballistic characteristics.

First, the angle of fall of the shell is calculated. The shell hit is located at random in accordance with the probability of hitting 42 different zones. A check is conducted to see if the armor protecting that zone (if any) is penetrated.

Armor penetration is determined by comparing the gun type, range, angle of fall, and the armor hit against pre-tabulated penetration tables. For vertical armor, the target angle of the ship also is included when the angle of armor presentation is calculated. The amount of armor which the shell can penetrate is reduced for non-normal incidence angle hits. This varies from full penetration for a 90 degree hit down to 50% armor penetration for 45 degree angle hits.



The program determines the probability of hitting Belt or Deck Armor in accordance with the angle of fall of shell.

Figure 12

The possibility of a dud is included. Dud shells are reduced in effectiveness for engine room and hull hits and other areas where explosive power is important. However, if a major piece of equipment is in the path of the dud it will be destroyed regardless. Sometimes duds are just as effective as exploding shells, and sometimes they do not inflict any damage whatsoever.

Hits on the bridge or other control stations can affect steering and director control. If the bridge is hit, control will be automatically shifted to secondary conn. A well trained crew can do this almost immediately. If secondary conn is hit, control will be transferred to local stations. This may take longer. While transfers are taking place speed and rudder orders are not possible, and orders for the directors to change targets may not be allowed.

When a control station is hit, incorrect signals may be sent to the rudder or the engines, causing the ship to turn, speed up or slow down - i.e "the helmsman was hit, and spun the wheel as he fell..."

If the rudder, steering gear room or steering internal communications circuits are damaged a "steering hit" message is included in the SHIP'S STATUS report (F9), and the ship will not accept

helm commands. The rudder will be jammed either dead amidships, to port, or to starboard.

XXIV.2. Fires

Fires are classified as (in order of decreasing severity) major fires, large fires, and fires, which consolidate the detailed gradiations of fire intensity contained in the program.

Fires "FWD" threaten the forward main battery magazine; fires "AFT" threaten the after main battery magazine. The longer a fire burns and the larger it is the greater the probability that a magazine will detonate. Flooded or empty magazines will not explode.

On some ships, such as the British Nelson class and the Japanese Tone class, all of the guns are mounted forward of the superstructure. Both the forward and after magazine are also located forward of the ship's superstructure. In those cases, consider the aftermost gun mounts and magazine the "stern" system. The above categories still apply to these ships, even though their physical layout is unusual.

"MIDS" fires can threaten amidships magazines, and also cause damage to engineering equipment, force abandonment of engine and boiler spaces, destroy secondary and tertiary battery gun mounts, explode ready service ammunition and destroy torpedo mounts.

If an aircraft is hit by shellfire, an amidships fire is almost inevitable. Players can forestall this by jettisoning unneeded aircraft before an engagement.

Commanders can accelerate the process of extinguishing fires by ceasing fire on all guns—this simulates releasing the gun crews to assist in the damage control effort.

XXIV.3. Progressive Damage

As damage levels rise there is an increasing chance that progressive flooding, internal smoke and fires, and other dread occurences will damage or force abandonment of gun and torpedo mounts, gun directors, searchlights, and other installations. This is a function of how badly a ship is damaged and how many damage control teams are remaining to control progressive damage. So, a ship might not be "hit" during a period, and still suffer loss of capabilities.

Damage control capabilities are also considered when determining if progressive flooding, fires, or general damage destroys equipment. When a ship looses all damage control capability, as signified when the number of damage control teams reaches 0, progressive damage is accelerated.

However, there are also "repair" functions going on, so capa-

bilities might also later be restored.

XXIV.4. List and Counterflooding

Whenever ships are damaged the possibility of off-centerline flooding exits, and the ship will list. List will effect gunfire rate of fire and accuracy. If list exceeds 25 degrees the ship will capsize. Most ships lost in WW II capsized before they sank, so list is a significant threat to the survival of a ship.

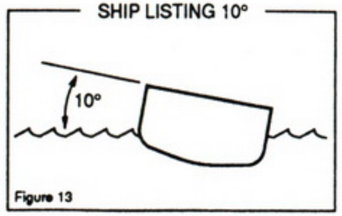


Figure 13

ACTION STATIONS! includes stability calculations for each ship class. List is reported to the player in the Ship's Status report.

As a ship floods and loses watertight integrity its stability is reduced. A given off-center flooding might cause twice the list to a severely damage ship than to a ship only lightly damaged. Also, note that all the list does not occur instantaneously - it takes time to flood a huge hull, even through huge holes!

Ships have the capability to correct list by counterflooding, which is the process of flooding tanks and compartments on the opposite side of the ship to balance the off-center weight. As the list increases, the counterflooding process is slower. This is because most ships counterflood using gravity rather than pumps, and as the ship lists the counterflooding inlets are not as far below the water and pressure is reduced.

Counterflooding has its disadvantage - after all, you are essentially flooding (sinking!) your own ship. You may correct the list, only to sink at an even keel.

Counterflooding orders are given from the Counterflooding Menu, accessible from the Action Menu.

XXIV.5. Torpedo Damage

In ACTION STATIONS! the track of each torpedo is individually calculated and compared with ship positions to a precision of 3 seconds and less than a yard. Torpedo hits are located in one of the following zones:

bow
under forward main battery gun mounts
amidships
under aft main battery gun mounts
aft
screws, rudders and shaft alleys

If the torpedo is not a dud the weight of explosives in the

warhead is compared with the resistance value of the passive underwater protection system at the location of the hit, and damage is calculated. Torpedo hits can destroy magazines, boiler and engineering compartments, screws, shafts, rudders, reduce watertight integrity, and generally mess up the internals of a ship. In addition, shock can cause damage to gun and torpedo mounts and gun directors. Very significant is the amount of list which can be caused - several torpedos hitting simultaneously on the same side can capsize a ship that ordinarily might have survived if it had time to counterflood and control the damage.

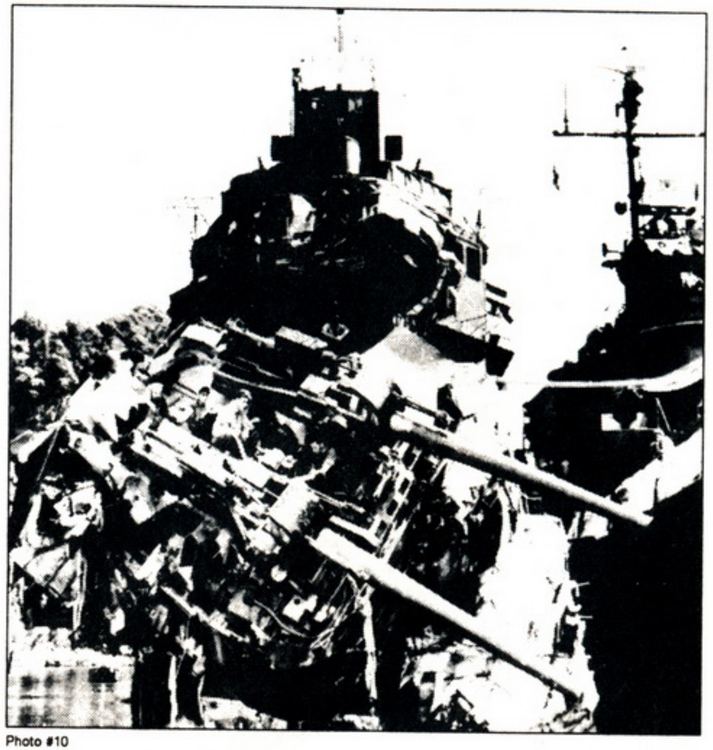


Photo #10

XXIV.6. Director Damage

Gun directors can be destroyed by shell hits, the shock of torpedo hits, progressive flooding or fires.

If a gun director is destroyed, then the gun mounts assigned to it will be automatically transferred to the appropriate alternate director:

Destroyed Director:	Mounts Transfer to:
MAIN	ALT
ALT	LOC MAIN A SEC PORT
ALT SEC PORT SEC STBD	ALT SEC STBD
ALT SEC PORT	LOC SEC PORT
ALT SEC STBD	LOC SEC STBD

If a ship does not have that director, treat it as if it were "destroyed" and go to the next director. Also, note that tertiary battery guns do not have local control facilities in the simulation.

XXIV.7. Damage Repair

Damage control teams can effect repairs on rudders and engineering facilities. To alert you of a repair, a "helm/engine repair" message is recorded in the Detail Report. Check the Ship's Status screen and see what miracles the engineers have wrought. Full steering or some speed capability may be restored.

XXIV.8. High Speed Engineering Breakdown

Operating a ship's engineering plant near maximum capacity increases the risk of breakdowns. The mean time between breakdowns varies with speed and the nationality of the ships. The risk of breakdown becomes most significant within 3 knots of ship's maximum speed.

XXIV.9. Hits On Shore Facilities

Shore facilities are considered as "large area targets". Firing ships usually cannot spot the pinpoint location of the target, but are firing at map coordinates or gun flashes.

The hits reported in the Current Hits Summary or the Main Director Reports are hits in the correct area of the target. However, they may or may not cause damage to the installation. Shore bombardment in this period was much a matter of luck - saturate the area and hope for the best.

XXV. NATIONAL DIFFERENCES

The parameters used in ACTION STATIONS! reflect average warship performance. However, in some cases the individual characteristics of a nation's warships were so unique that it was more accurate to include these differences.

ACTION STATIONS! includes modifying factors for the following nationalities:

1 – EARLY U.S. WW II (1941–42)

2 – UNITED STATES

3 – BRITISH

4 – JAPANESE

5 – GERMAN

6 – ITALIAN

The following table shows the modifications made to the standard parameters to account for national characteristics:

G= GOOD A= AVERAGE P= POOR

Nationality	Factor													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	A	P	P	G	A	A	P	A	A	A	A	A	G	A
2	A	G	A	G	G	G	A	A	A	A	G	A	G	G
3	P	A	A	A	A	P	P	P	A	A	A	A	A	G
4	A	A	A	P	A	A	A	A	P	A	G	G	G	P
5	A	A	A	G	G	G	A	A	A	A	A	A	G	G
6	P	A	P	P	A	P	P	A	A	P	P	P	P	P

FACTORS:

1—SHELL DUD RATE
2—TORPEDO DUD RATE
3—FIRE OCCURENCE RATE
4—STEERING/ENGINEERING REPAIR RATE
5—FIRE EXTINGUISHING RATE
6—PROGRESSIVE FLOODING EQUIPMENT VULNERABILITY
7—FIRE DAMAGE VULNERABILITY
8—MAGAZINE CATASTROPHIC EXPLOSION
9—STEERING VULNERABILITY
10—DAY GUNFIRE ACCURACY
11—NIGHT GUNFIRE ACCURACY/OPTICS
12—STARSHELL QUALITY
13—ENGINEERING PLANT RELIABILITY AT HIGH SPEED
14—OVERCOMING SURPRISE

ACTION STATIONS! also includes the French and Russian Fleets. There is insufficient combat data to properly evaluate the factors for those nationalities, so they are considered to be "average" in all areas.

XXVI. SINKING (ENEMY) SHIPS — A COMMENTARY ON LIMITED INTELLIGENCE

(subtitled: "Why hasn't the thing disappeared yet???")

Gun mounts assigned. Director tracking. On target. Open Fire! — And after a few turns the screen lights up with CONGRATULATIONS - you just sank the YAMATO!!!

A funeral dirge is played on the computer's synthesizer while an animated battleship (complete with life rafts and the ship's cook) settles below the waves.

That makes for an entertaining cartoon - and a lousy simulation. Why? Read on:

First, "sinking" ships do not always sink promptly. It takes time, often hours, to flood a huge hull. For instance, in the 1st Battle of Guadalcanal the Atlanta did not sink until over 12 hours after the battle.

Why is that important? Because in a naval action, especially at night, a commander has little indication as to how the enemy is faring. He can see a ship making high speed or maneuvering, he can see the ship fire its guns and he can count shell splashes, and can conclude that the enemy is still dangerous.

However, if he sees a ship that is "dead in the water", on fire, and silent, it does not mean that the ship will sink. It still may repair itself or be salvaged. The commander does not know when the enemy is finished, and so he fires just a few more broadsides at the target - rounds that could be more profitably directed against another ship.

An example: at the Battle of Empress Augusta Bay, almost the entire U.S. Task Force initially concentrated on the Japanese flagship Sendai. After a few minutes under a storm of fire the gallant light cruiser was in shambles and sinking, and the Americans' gunfire should have been shifted elsewhere. Eventually Sendai's reluctance to disappear below the waves induced the Americans to waste torpedoes on her.

At 1st Guadalcanal, the fact that the Hiei did not sink immediately caused the Japanese to risk other vessels in an attempt to stand by and save her.

"You've Sunk 'er!" messages and cute drawings may provide instant gratification to those easily entertained, but they introduce a false element to the simulation.

ACTION STATIONS! takes a strict approach. Each ship is assigned a value called "watertight integrity", representing a detailed assessment of the size and strength of the hull, internal subdivision, reserve buoyancy, freeboard, stability and other factors. The watertight integrity of the ship is reduced by shell

hits, torpedo hits, ramming, running aground, magazine and torpedo mount explosions, fires and progressive flooding. Watertight integrity can be restored by damage control teams, who also fight fires, stop progressive flooding, protect equipment from being destroyed by fire and flooding and provide reports of the ship's status to the commanding officer.

When a ship has lost all its watertight integrity, the program calculates how long it will take before it sinks. Depending upon the extent of damage it could stay afloat for hours or minutes. When additional damage occurs the program reassesses this time.

A ship is only known to be sunk when it disappears. Perhaps it might leave behind a burning oil slick.

Consequently, the player has the same problem as the real commander at sea, and he has the same tools with which to make the decision:

- is the target under power? check the vector coming out of the target symbol on the chart display.
- is the target firing? check the Battle Plot for tracers.
- how many hits has he taken? check the Ship's Status and the Current Hits report. Realize, though, that they might be inaccurate — the eyes play funny tricks on people who stare at targets 15,000 yards away.
- has the target capsized? check for the capsized ship symbol on the chart (a filled-in red square).
- is the target on fire? Ships on fire are circled in white on the Battle Plot. If the fire is large enough it will leave a smoke trail.

And, if the target is pounded and then disappears from the Battle Plot, well, you might begin to congratulate yourself - if, of course, he hasn't slipped behind a smoke screen, or your look-outs lost him in the dark, or he passed out of radar range, or a dozen other factors.

At the end of the battle you can always go to the "Statistics" option and get a detailed summary. If that cruiser that you were sure was finished shows up in the "heavily damaged" column instead of "sunk" - Well, then you have discovered the frustration of the real commanders who wished they could go back and put just one more salvo into the stubborn hulk!

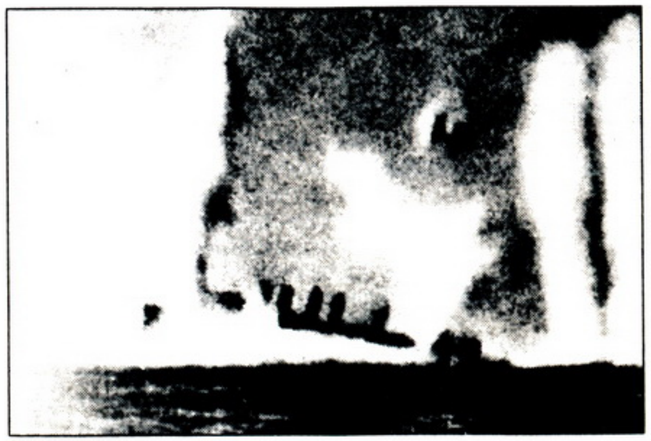


Photo #11

XXVII. THE COMPUTER WARRIOR

ACTION STATIONS! includes a computer opponent — crafty, cunning, ruthless, wise and not altogether humble. The Computer Warrior can be assigned to play either side. Roles are assigned during the loading phased of a scenario.

The Computer Warrior cannot be assigned to play games which were saved during a two-player game.

During the loading process the Computer Warrior can be assigned a skill level, varying between -3 (novice) to +3 (expert).

The Computer Warrior was designed with several objectives:

- to provide a tough, creditable, challenging opponent.
- to provide a variety of reasonable tactical responses to given situations.

Balancing these requirements was difficult. If the computer dealt with each situation with the "textbook" response play would be stereotyped and dry. Games would be repetitive and the challenge of the simulation would be gone. Instead, we have included the possibility of unorthodox maneuvers and daring (some would say foolhardy) tactics. When you load up, you do not know if you are going to get a pussycat or a tiger.

This approach does have its risk - after all, what may be a "daring" move in one scenario could equally be a "dumb" move in another. However, when we surveyed history, and saw the number of "dumb" (*really dumb*) things done by professional naval officers in actual combat, well, we could be tolerant of such excursions by the Computer Warrior. After all, one of the keys to

successful naval command is to take advantage of the enemy's mistakes. It may be that the Computer Warrior will give you a chance to practice that skill on occasion.

The Computer Warrior is programmed to operate within the reasonable realm of naval tactics. You will see one- and two-pronged attacks, destroyers and cruisers either screening the battle lines or operating independently, delaying actions, and a wide range of responses to the basic mission options. Gun battle tactics are primarily drawn from U.S. tactical manuals of the period, while torpedo tactics were drawn from Japanese doctrine publications recovered from the sunken cruiser Nachi near the end of the Second World War.

You have a considerable range of options if you find the Computer Warrior either too tough or too easy. You can change the skill level, or take the stronger or weaker side of the scenario and see if you can out-perform the historical result. In all, with 30 scenarios (that's 60 sides) to work through, you ought to be well employed for a few years of gaming...

XXVIII. TACTICS

Several years ago a reputable publisher designed a game on World War I naval combat. In the "Designer's Notes", the author stated that, in his "analysis", the role of the naval commander was encompassed by two questions: whether to run or to fight, and whether to close the range or open it.

In the Navy, such a statement is called a "Blivet" – that's defined as ten pounds of horse manure stuffed in a five-pound sack.

If you have gotten this far in manual, you recognize the fallacy of the statement. The naval warfare of the period was complex and demanding, forcing a commander to make critical decisions constantly — How do I distribute my fire? Should I lay smoke? Can I stay on a steady course to optimize my gunnery performance, or is the torpedo threat too high? Should I illuminate? How can I get to a torpedo launch position without loosing all my destroyers? Stack gasses are interfering with my fire — should I slow? Should I change course and present my armor at an angle to his fire for additional protection? What will that do to my closure rate? That cruiser has a jammed rudder — should I abandon or protect it? There are about a million more.

What we are going to attempt now is to give you a quick tour through the basics of naval tactics. It won't be fancy or comprehensive, but it will give you a way to structure your thinking, a starting point. There are some good books listed in the bibliography which can give you some more to chew on.

1. ONE-ON-ONE: SINGLE SHIP ACTIONS

In a single ship action, the object is to maximize your ship's advantages and place the enemy at a disadvantage. Let's look at daylight actions to begin with.

First, you have to analyze what you have to work with. Look at the armor protection on each of the ships, and the armor penetration capability of each side's guns. Check the Armor Penetration table in this manual and determine the limiting ranges of armor penetration and consult "RNG/PTR" from the Battle Plot or Action Menu. See if there is a range band where your guns can penetrate his armor while you are still protected from his guns. If so, that is the range that you want to establish and maintain.

Don't forget to take into account the target angle as the battle progresses — you can increase the "effective thickness" of your vertical armor by presenting it at an angle to the enemy, rather than broadside-on. However, this implies either a closing course or an opening course, which will make it harder to maintain the right range. And, if you end up changing course too often to maintain the range, your guns will not be able to steady on target and score.

The next factor you need to consider is the relative merits of the gun systems on each side. Larger guns have much more armor penetration, but fire much more slowly and have a smaller rate of hitting. Smaller guns have a smaller punch per shell but a higher rate of fire and a higher hit rate. With all else equal, if you have the smaller guns you want to close, to take advantage of the higher rate of fire and higher hit rate. At close range, a cruiser has a good chance against a battleship - it will get off two broadsides to the battleship's one, and even if it cannot get through the big armor plates it can chop up gun directors, steering gear, start fires, and blow holes in the unarmored portions of the hull. For instance, look at what happened at 1st Guadalcanal, where the Japanese lost a battleship to cruiser fire.

If you are the larger ship, you would like to keep the enemy at arms length, but you have also another consideration: ammunition supply. Big guns have small ammunition stockpiles, characteristically only 100 rounds or so per gun. If you keep the enemy too far away, you may run out of ammunition before you score enough hits for decisive effect. A good example of this is the battle of the River Plate: Graf Spee properly kept the faster-shooting British at arms length (where they could not penetrate her armor), but managed her main battery fire so poorly that she did not score sufficient hits to have a decisive effect on the battle. She was forced to break off the action because of ammo limitations.

In the absence of radar, smoke can be an asset to the weaker side. Lay a smoke screen and stay behind it - the other side now has a dilemma: is he getting away? If the big guy closes the smoke, you may be able to get to close quarters where your "rapid-fires" have the advantage; if he does not close the smoke, you have a chance to escape.

Also, if you are in a "one-on-many" situation, you might be able to use smoke to divide the battlefield so you can isolate and attack the enemy piecemeal.

Torpedoes usually have little chance to score in a one-on-one. Both sides have complete freedom of action, and may be doing a lot of bobbin' an' weavin', making it difficult to set up a torpedo shot. (At night, at closer ranges, this is of course different.) In single ship actions torpedoes serve mainly to deter a "charge" by the enemy or to try to force the enemy away while you retreat. Torpedoes can also come into play when smoke is used and a ship blunders into another at very close range.

Torpedoes really come into their own in squadron-size actions where ships are constrained to stay in formation, screen the heavies, cover the convoy or whatever.

So, in a one-on-one, keep the torpedoes ready but don't bet your lifeboat seat on them. Defensively, if you get hit by a torpedo

it will be a just reward for dumbness. Calculate how long it would take a torpedo to run from he to thee, and NEVER maintain course and speed for that duration!

2. NIGHT ACTIONS

In the war in the Pacific most the surface-to-surface actions were fought at night. Historians often reason that this was because of the dominance of the airplane during daylight hours. Many of them neglect to point out that the Japanese preferred night combat, trained for it, and actively sought night combat, even when they had air superiority. Why?

The key is the effect of visibility on the relative capabilities of warships.

The various naval treaties of the interwar years, and economic realities, forced Japan to inferiority in the numbers of battleships. However, Japan was given more freedom in cruiser and destroyer production. They reasoned that if they could use their cruisers and destroyers to whittle down the American battleship force, then they could engage in a decisive fleet action with a chance of success.

A cruiser's or destroyer's weapon of choice against a battleship is the torpedo. However, during daylight these smaller ships would have to run the gauntlet of miles and miles of gunfire in order to reach torpedo launch positions.

However, at night the battlefield is compressed. Visibility is low, and when you sight each other you might already be in torpedo range. To amplify this advantage the Japanese developed the Long Lance torpedo: long range, fast, and with twice the weight of explosives. So, the Japanese Navy trained hard for night actions, and the US Navy paid the price for their neglect in this area.

The key to Japanese night tactics, then, was to effectively employ the torpedo. It helped that they had designed special night optics which usually allowed them to sight the enemy first. Their command-and-control arrangements were flexible, allowing destroyers freedom of action and room for initiative.

American night action tactics were based on faulty concepts centered on the assumption of the absolute superiority of the gun. Torpedo tubes had actually been removed from U.S. cruisers in the belief that engagement ranges would be too long to allow effective use of the torpedo. Destroyers were kept on a short leash in tight screening formations and not allowed to probe in advance of the main body where they might find better opportunities for effective torpedo attacks.

One of the best way to learn how to properly handle a gun force in the face of a torpedo force is by example — and here it is suggested that you examine a track chart of the Battle of Empress Augusta Bay. The US commander cut loose his destroyers early to

allow them the opportunity to employ their torpedo batteries. They operated on the flanks, with the cruisers keeping the enemy busy in the center. The cruisers kept outside torpedo range, and countermarched several times (once even making a full figure "8"!) to confound the enemy's torpedo fire control and to avoid torpedo water.

Of course, at that range and with all that maneuvering the cruiser's gun batteries were less effective, but they did end up punishing the enemy in a 1 hour running gun fight. The U.S. commander compromised optimum gun tactics, but his course of action preserved his force and confounded the enemy. The Japanese commander was convinced that he was confronted by a force twice the strength. And, most importantly, the mission was accomplished.

3. FLEET ON FLEET

Books have been written on this topic – mostly bad ones. Unfortunately, most historians do not understand the equipment well enough to recognize good tactics from bad, and so there are many Blivets floating out in the world of "popular naval history". Those that master ACTION STATIONS! will be further along than most – ACTION STATIONS! requires you to use sound tactics or line the ocean floor. Of course, your mistakes will not be terminal, allowing you to progress up the "learning curve", a process denied to most naval officers of the period.

3.A. THE BATTLELINE

We cannot discuss all the different combinations of many v. many, so instead let's assume battleline v. battleline, with fairly balanced forces on each side.

First, look at the capabilities of your heavy ships as opposed to the capabilities of the enemy's, just as you did in the one-on-one battle. Is there a favorable range band? How do the guns balance out? This analysis will help define the basic conditions of the action.

The problem of decisive range again emerges: you may run out of ammo before you have achieved decisive victory. So, you have to recognize the limits of effective fire and work with them. The table below is taken from USF 21 CURRENT DOCTRINE CRUISERS 1941, a US Navy tactical doctrine publication:

ESTIMATED OUTER LIMIT FOR ACCURATE FIRE CONTROL - TOP SPOT

TYPE OF SHIP	BB	CA	CL	CL	CL
CALIBER OF GUNS	14" 16"	8"	6"	5.5"	5.1"
ships having:					
MOST MODERN CONTROL AND OPTICAL GEAR	22	20	18	16	14
RECENT CONTROL AND OPTICAL GEAR	20	18	15	14	13
OBSOLESCENT CONTROL AND OPTICAL GEAR	20	18	13	12	12

Battleline tactics are centered on the power of the gun. The battleships either win on their own strengths, or they engage and pin the enemy and limit the enemy's freedom of action to allow light forces to intervene with the torpedo. The former was the US and British battleline strategy, while the latter was the philosophy of the Japanese Navy.

The tactics of the battleline are not complex. The battleships must travel in close company, so that they will have a maximum arc of fire without interfering with other's line of sight to the target. The line formation is best suited for this. Ideally the line should steam on a regular course and speed with little maneuvering in order to maximize gunnery accuracy.

Splitting the battleline should only be done when you have a significantly superior force. You do not want to give the enemy the opportunity to concentrate on one wing of your force and destroy it piecemeal. This could happen suddenly if the enemy is proficient with smoke screens.

3.B. DESTROYERS AND LIGHT FORCES

Light forces can assist in the destruction of the enemy battleline in one of two ways: 1) it can physically score hits with gun or torpedo, or; 2) it can create a situation favorable to the friendly battleline, or unfavorable to the enemy battleline.

The weapon of choice for light forces against the battleship is the torpedo. However, torpedo hits are difficult to achieve. USF 33 CURRENT DOCTRINE DESTROYERS 1940 discusses the question: "In high visibility, a torpedo attack on enemy units free to maneuver at high speed rarely will succeed unless the enemy can be closed to very short range. The probability of reaching short range in the face of gunfire which materially outranges the gunfire of destroyers does not appear to be favorable."

The key words are "enemy units free to maneuver". When is an enemy unit not free to maneuver? If the maneuver would place him in an unfavorable tactical situation, such as allowing the opponent to concentrate on an isolated wing of the fleet; if the maneuver would place him in torpedo water; if the maneuver would result in the force facing a superior gun force/wing of the opponent; or when the battleline is *strongly engaged with the other battleline.*

This last is a key point. When strongly engaged, the battleline cannot afford an interruption of fire or interference with accuracy that would result from maneuvering - it might be the edge allowing the enemy to score decisive, unanswered hits. Maneuvering also may cause misalignment of the main body so that some of the line is at a significantly greater range from the opposing force, allowing the enemy to concentrate on one wing.

Another key situation is when the torpedo threat from light

forces becomes so serious that the battleline commander is forced to shift main battery fire from the enemy battleline to counter the threat. Heavy caliper guns are not efficient destroyer-killers because of their low rate of fire; plus, all the time they are away from engaging the enemy battleline allows the enemy "target practice" conditions.

Consequently, the intervention of light forces can be the decisive edge for victory.

Usually the destroyers should be organized into an inner and outer force. Destroyers in the inner area serve as reserves to meet enemy breakthroughs. During the engagement their primary task is the defense of the battleline. When an enemy attack develops they should move out and aggressively meet the attackers and contest control of the torpedo launching area. Only when necessary should they retire for support on the battleline, because the fire of the secondary batteries of the battleline is little greater than that developed by the destroyers, and it does not range far enough to be able to totally prevent enemy torpedo launch.

Destroyers in the inner screen may be ordered to attack the enemy battle line. However, the long distance to torpedo launching positions make this a difficult task. An alternative would have the destroyers in the inner area constantly moving out to replace the attack forces in the outer area which have expended their torpedoes.

Destroyers in the outer area are the attack forces. These forces should be positioned well in advance of the battle line. When the engagement course of the battle line is determined these destroyers should concentrate on the suitable flank, in advance of the enemy's battleline.

The commander must consider from where to launch the attack and the enemy's defensive forces prior to committing to the attack. Favorable areas are mostly in the sector from dead ahead to abeam of the enemy. Attacks from abaft the beam are unfavorable and should be initiated only in coordination with other forces attacking from the van, in order to limit the enemy freedom of action and to seize a favorable opportunity to launch if the enemy battleline should reverse course.

Destroyer attack forces should be supported by cruisers. The cruisers assist in clearing enemy light forces from the path of the attack and draw fire away from the destroyers. The destroyers should not seek gun action with enemy defending forces. Their objective is to avoid damage so they have full speed available and full torpedo firepower intact. In cases where the enemy has strongly posted a position with defending cruisers, an alternate launch point should be considered.

The destroyer attack should be coordinated with the fire engagement of the battlelines, attacks from different target angles, and other situations which would restrict the freedom of maneuver of the targets. Adequate forces must be concentrated to perform the assigned task, taking into account the opposition's defenses. Losses are inevitable on the approach. The range should be closed until losses begin to be unacceptable in terms of the remaining torpedo fi. epower.

In deciding when to attack, the commander is influenced by many considerations. If his battleline is superior to the enemy's the role of the light forces may be primarily defensive, to guarantee freedom of maneuver for his own line. If his battleline is inferior an offensive role may be required. In either case, offensive action should be aggressively sought when the enemy is inferior either in size of forces or quality.

Action must be coordinated. Independent action by light forces just because a favorable situation momentarily presents itself will often be fruitless.

Factors favoring the tactical offensive are:

- superiority of friendly light forces. This can either be an overall superiority or a local superiority which could inflict serious losses to the enemy without serious risk. This should be undertaken cautiously, because combat for combat's sake that does not contribute to the overall battle plan may pull forces out of position.
- faulty dispositions of the enemy light forces.
- inferiority of the friendly battleline strength.
- superior battleline strength but inferior battleline speed. The object of such an attack would be to "fix" the enemy battle line, or so limit its freedom of action to allow the friendly battleline to close to decisive range.
- positions to windward of the torpedo launching area. Smoke could be used to screen the approach of the light forces.
- low visibility. Any condition which allows light forces to close without being observed or taken under fire by defending forces should be seized in order to launch close range torpedo attacks.

Battle situations rarely cooperate in such things, so situations may develop requiring unsupported torpedo attacks or attacks from unfavorable target angles. The most common situation where this might be required is where the friendly battleline must break engagement to escape a superior enemy force. The objective of the attack is to turn or slow the enemy. In such a case, the following are of special importance:

- simultaneous attack by widely separated units make the enemy's fire distribution complicated and minimize the effectiveness of the enemy's maneuvers to avoid torpedoes.
- use of high speed and high closure rates.
- use of smoke.
- developing effective destroyer gunfire by a flexible approach formation.

For all attacks, the quickest way to reach a position within effective torpedo range is to steer a collision course with the target (the TFC computer can help you calculate this course - just run a torpedo intercept problem using the torpedo course that is closest to the destroyer's maximum speed). Formations of attacking destroyers should make a right angle with the line of sight to the target to prevent enfilade. Courses and formations may be varied to avoid enemy opposition, or to open firing arcs of the attack force to deal with opposition.

3.C. CRUISERS ON THE ATTACK: PRELIMINARY AND SIMULTANEOUS ATTACKS

Cruisers occupy the intermediate position in strength between battleships and destroyers. While powerful, their guns do not have sufficient armor penetration power to use them against the battleline at long or intermediate ranges. Some cruisers are armed with torpedoes, but they are not suitable for attacking the battleline because of the vulnerability of cruisers to battleship main battery fire - a destroyer is not a good target for large caliper guns, or worth the ammunition expenditure, but a cruiser is a justifiable target and well worth a few main battery broadsides. Cruisers are too valuable to expend in unsupported torpedo attacks.

Cruisers serve as the heavy gunpower of the light forces. The 8" batteries of heavy cruisers are primarily for the destruction of enemy cruisers. The 6" rapid fire batteries of light cruisers are designed to saturate and quickly destroy other light cruisers and destroyers.

Cruisers are used to support the attacks of light forces and to defend against opposing light forces. Their role is vital, particularly since the low rate of fire of battleship main batteries are unsuitable for use against small, high speed, rapidly closing targets like attacking destroyers.

These tasks require quick engagements and decisive results. Engagements at short ranges should be sought, particularly against destroyers. Neither time nor ammunition will allow engagements at over 20,000 yards for 8" gun cruisers or 16,000 yards for 6" gun cruisers. Decisive results can only be ensured by a large number of penetrative hits, so the armor penetration and the target angle of the opponent should be considered. Ammunition should

THE "APPLE CURVE"

Loci of Stations for cruisers defending battleline against destroyers where different types of torpedoes are used by destroyers

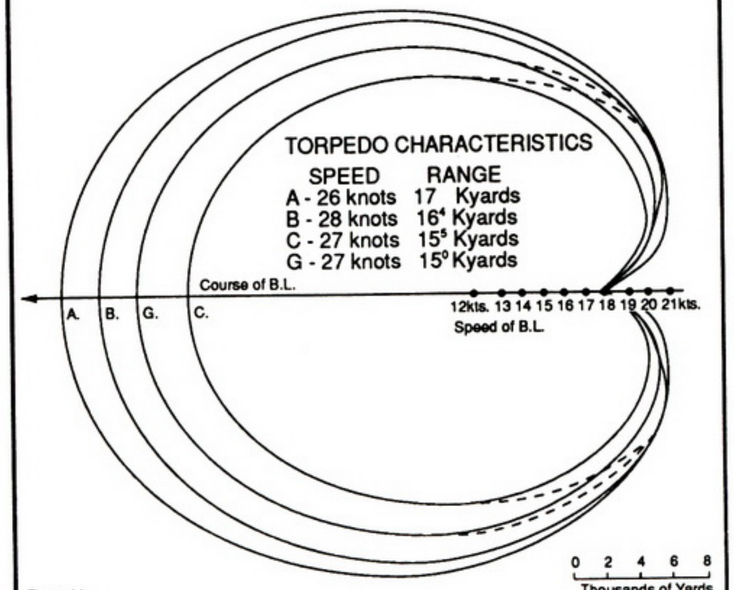


Figure 14

not be wasted – targets should be selected with care. Crew fatigue will mount in extended long range exchanges, so the crew's "fighting edge" should not be wasted in indecisive encounters before the "real thing".

The PRELIMINARY ATTACK is usually made by cruisers as a prelude to launching a destroyer torpedo attack. This attack is launched with cruisers alone. Only when the available strength in cruisers is inadequate should destroyers be included in this attack. When a destroyer is committed to a preliminary attack it should not be counted upon for later participation in a destroyer attack on the battleline, because the fight for control of the torpedo launching areas will undoubtedly be close range and deadly.

Destroyers participating in the preliminary attack should seize opportunities to use their torpedoes against defending cruisers. The initial disposition of the attacking force should be carefully made so that friendly vessels do not foul the torpedo lanes.

The object of the preliminary attack is to destroy and disperse enemy light forces. The attack may be before or after the deployment or engagement of the battleline. The destroyer attack should follow immediately, before the enemy has time to reinforce the area. The attack must be driven home to decisive ranges.

The object of the SIMULTANEOUS ATTACK is to clear the attack route of enemy forces in concert with the advance of the destroyer attack. It should be made with superior forces. Inferior forces should be used only when it is necessary to force the enemy battle line to maneuver or to counter enemy light forces which are threatening the friendly battleline.

Again, quick and decisive results are required. The tendency will be for all the forces to converge on the same area, resulting in a general melee. Covering cruisers should close the range and remain in the van of the attacking destroyers. When control of the launch point is established, they must depart the launch point to clear the torpedo lanes.

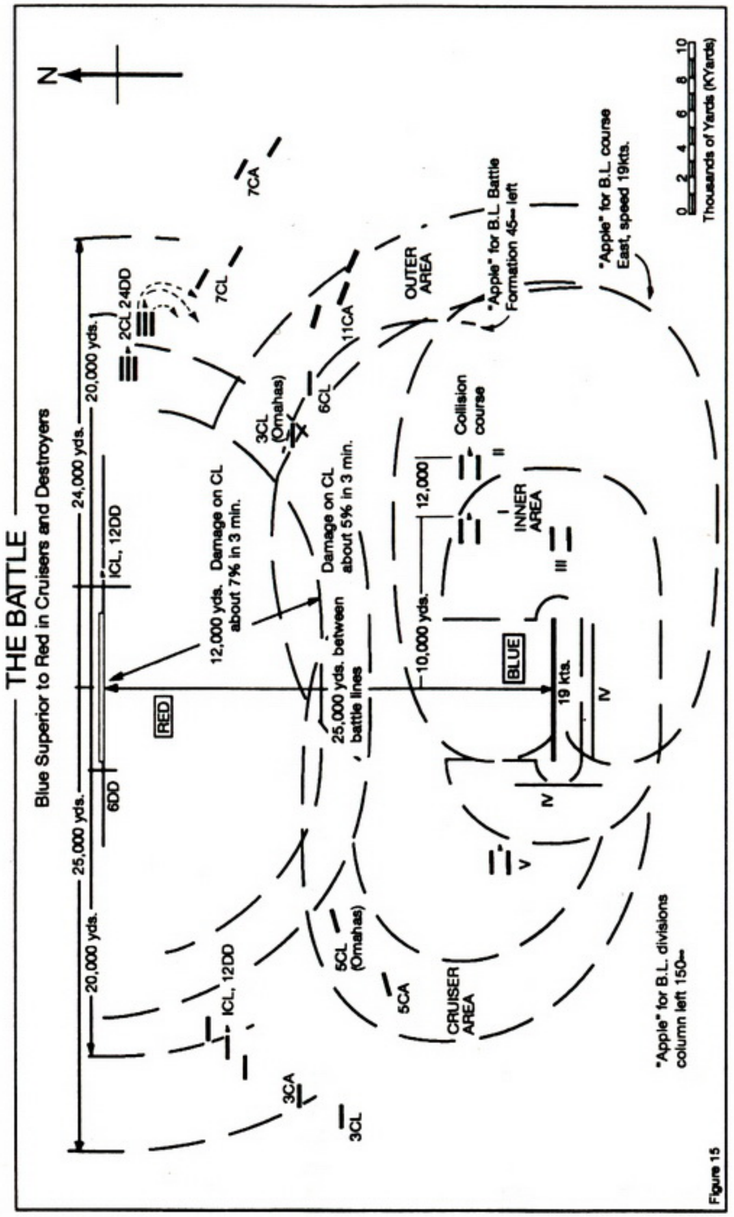
Heavy cruisers will normally operate in the outer area, and should support both preliminary and simultaneous attacks. Light cruisers should be divided between the inner and the outer area. Light cruisers in the outer area will operate in support of preliminary and simultaneous attacks. Light cruisers in the inner area may also support these attacks, but should not press home or risk serious damage since their primary responsibility is the defense of the battleline from enemy light forces.

3.D. LIGHT FORCES IN DEFENSE OF THE BATTLELINE

Battleship gunfire alone is generally not sufficient to repel enemy destroyer attacks, particularly of squadron size or larger. Light cruisers particularly designed for the destroyer-killer role (such as the American Brooklyn class) are the recommended force for the inner screen.

The object of the defending force would be the destruction of the attacking force before it can reach effective torpedo range. The proper stationing of this force is paramount. Figure 7, showing the loci of effective torpedo ranges, is a key indicator of the position that the defending forces should assume. Figure 14 shows a curve from US Navy publications (the "Apple Curve") which gives approximate stationing ranges required to defeat an enemy torpedo attack. It is the "effective torpedo range" curve modified to ensure defeat of a 30-knot destroyer force.

By interposing themselves between the attacking force and the battleline, defending cruisers can defeat attacking destroyers before they can launch their torpedoes. However, this may place them in an area where they can be engaged by the enemy battle line or enemy cruisers. In that case a command decision would be



necessary to determine if the tactical situation required them to pay the cost to maintain position.

3.E. THE BATTLE

Let's discuss two battle situations and illustrate them with a game scenario. In the first, Blue light forces will be superior to Red. In the second, Blue will be inferior to Red.

Figure 15 shows the first situation. Blue is superior in all categories of warships, and is seeking to press the action and destroy the enemy by the gunfire of the battleline. Blue light forces have been assigned a defensive role.

Blue initially assigns forces to the inner screen. DesRon (Destroyer Squadrons) III and IV make up this force, with DesRon V in reserve. DesRon I and II are available for the attack, and proceed to the outer area.

In order to determine the critical torpedo launching points which must be defended the Blue commander uses the Apple Curve for several potential courses of action. The first is along the deployment course; the second is on a course 45 degrees to the left, in the event that he wishes to rapidly close the range with the enemy battle line; and one is to cover a change in course to the left 150 degrees, anticipating an enemy countermarch. The Blue light forces in the outer area are assigned to these positions.

As Red light forces appear, the Blue light forces move along the Apple curves laterally, interposing themselves between the enemy and the battleline. If the Red light forces attack, Blue light forces are well positioned to defeat the attack.

The only area in question is the area covered by the secondary batteries of the enemy battleline. It would be impractical to station cruisers in this area because of the damage they would receive. This would be the best area for Red to launch torpedoes in an attack. The converse holds true - this would also be the best area for Blue DesRon I and II to pass for their own attack. In the event Red attacks through this area, the inner screen destroyers would be called upon to oppose the attack, along with cruisers converging from the flanks.

Let's look at the other situation.

Figure 16 is an engagement where Blue has the superior battleline, but is inferior in all classes of light forces. Blue wishes to engage closely with the battleline, but must meet the threat of the enemy light forces. To do this he uses the Preliminary Attack to draw enemy light forces into a premature battle. Since he cannot be strong everywhere, he decides to sacrifice freedom of action on the right flank by stationing only a weak force in that area, in order to be strong and maintain freedom of action on the left flank.

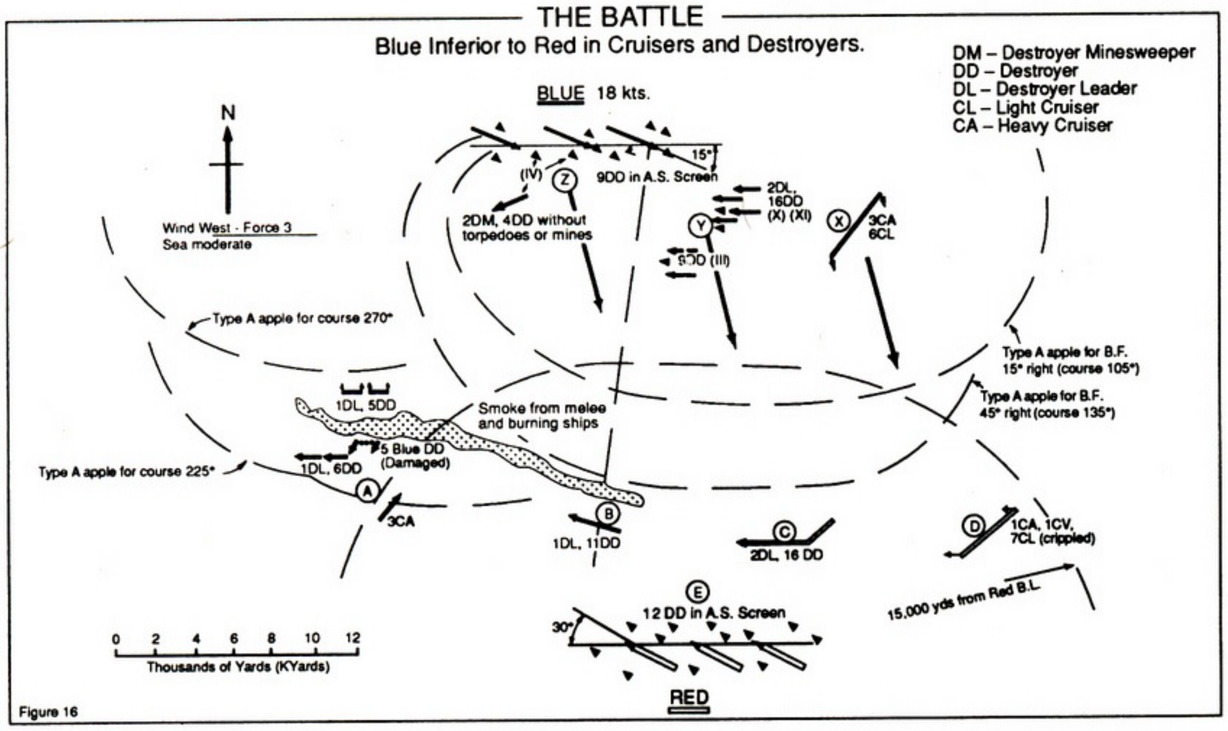


Figure 16

Figure 16 shows the situation after the Blue preliminary attack has made contact. Because an attack from such a forward bearing constitutes a serious threat to the Red line, Red has met the attack strongly by committing forces at points A, B, and C to the engagement.

Blue has lost freedom of maneuver in the direction of the preliminary attack. His attack forces were severely damaged and Red has a remaining superiority of light forces in the area. Any turn by the Blue Battleline in the direction of the engagement would place the Red light forces inside the Apple curve, screened by smoke, and in perfect position for a torpedo attack.

Otherwise, Blue has the situation under control, because he does not intend to turn in that direction. As the Blue battleline continues east more and more of the Red light forces are left behind and forced into an unfavorable tail chase position. Blue still has sufficient light force at positions X, Y and Z to effectively maintain his freedom of maneuver to the east and southeast. The Blue battleline can now engage the Red line with minimal hindrance from Red light forces.

This short discussion of tactics will not make you an expert — rather, it is designed to whet your appetite. All of the critical factors described are included in ACTION STATIONS! Enjoy.

APPENDIX A: GLOSSARY OF TERMS AND ABBREVIATIONS

ABAFT Aft of, as in "abaft the beam"

ACCELERATION The rate at which ships can speed up or slow down. In the simulation it is a standard (10 knots per turn) for all ship types.

ALT Alternate. It can refer to the alternate director of the ship, which is the backup director serving the main battery, or to alternate directors serving the secondary battery.

ALT SEC PORT The alternate director serving the secondary battery with an arc of train between 210 to 330 degrees relative.

ALT SEC STBD The alternate director serving the secondary battery with an arc of train between 30 and 150 degrees relative.

ALTERNATE DIRECTOR The alternate director is the backup director to the main director, controlling the main battery. It has an arc of train between 30 to 330 degrees relative.

AMIDSHIPS Condition when the rudder is aligned along the centerline of the ship, for straight movement. Also refers to the center area of the ship between the main battery gun mounts.

AMMO Ammunition

ARC OF TRAIN The angle through which a gun mount, torpedo mount or gun director can train and perform its function. The angle is measured in degrees relative to the bow of the ship. Abbreviated "arc".

AREA FIRE The process of firing star shells at an area (without having a definite target).

AUTO DIR An option whereby the computer assigns all the gun directors of your ships to targets.

AUX Auxiliary ship

BATTERY All of the guns of a single type on a ship are referred to as a battery. When a ship mounts several sizes of guns they are referred to as the main (or primary) battery (the largest), the secondary battery (the next largest), and the tertiary (the smallest). Most ships only have a primary and secondary battery.

BATTERY INTERFERENCE When a ship is firing more than one battery, the fire of one battery may interfere with the efficiency of the other. This is particularly true if the guns are open mounts (the blast impacts on crew efficiency) or during night combat (the muzzle flashes interfere with spotting the fall of shot.

BB Battleship

BC Battlecruiser

BEARING The direction of one point with respect to another. Bearings can be measured either as TRUE BEARINGS, where the reference is the compass (i.e. due north is 0 degrees, east 90 degrees, south 180 degrees et cetera) or RELATIVE BEARINGS. where the reference is the bow of the ship (i.e. straight ahead is 0 degrees, directly aft is 180 degrees, et cetera)

BEARING(R) relative bearing - see bearing

EXAMPLES OF RELATIVE BEARINGS

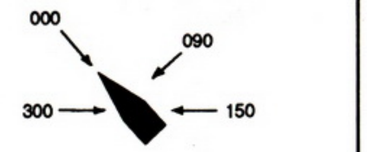


Figure 17

BEARING(T) true bearing - see bearing

BOW The front (pointy) end of the ship. Also refers to the arc of train from bearing 210 relative to 150 relative.

BOW PORT The arc of train from bearing 210 relative to 0 relative.

BOW STBD Bow starboard, the arc of train from 0 degrees relative to 150 degrees relative.

BRG Bearing

BRIDGE The primary control station for the ship - the captain's battle station.

CA Cruiser, usually a "heavy" cruiser mounting an 8" or greater main battery.

CANX Cancel. Pronounced "Can-X".

CAPSIZE When a ship looses stability and has sufficient off-center flooding it can roll entirely over (i.e. go "belly up"). The unit cannot fight or move, and will eventually sink.

CENTERLINE See CL

CF Counterflooding

CL Centerline. Also refers to the arc of train between 30 to 150 degrees relative and 210 to 330 degrees relative. Also is an abbreviation for a light cruiser.

COLLISION The process whereby two or more ships attempt to occupy the same space at the same time. If the center point of two ships are within 450 feet of each other at the end of a turn they are considered to have collided - not exactly always precise, but it is computationally fast; plus, he who cannot control his ships to that margin deserves what comes.

CONTROL STATION DAMAGE A hit on the bridge (or, if the bridge has already been destroyed, on the alternate or local control station) which temporarily paralyzes the command of the ship.

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COUNTERFLOODING The process of flooding compartments on the opposite side of damage to correct list and prevent capsizing. Also, the process of flooding a magazine which is threatened by fire to prevent it from catastrophically blowing up.

COURSE The direction a ship is heading, measured in degrees(T)

CRS Course

DAWN Between 0530 to 0600. The sun is not yet up, but there is sufficient light to silhouette a target against the eastern horizon.

DAY Between 0830 to 1730.

DD Destroyer

DEL Delay, used when referring to the delay distance before a turn order is executed

DELAY DISTANCE The distance traveled along the current course before a turn order is executed.

DELAYED TURN A turn order where a distance along the current course is traveled before the turn order is executed.

DEL-PORT A turn order where a delay distance is traveled before a turn to port is begun

DEL-STBD A turn order where a delay distance is traveled before a turn to starboard is begun

DIR Director; could also stand for direction (i.e "wind dir").

DIRECTOR A rotating device which controls the gunfire of gun mounts by sighting and tracking the target, computing the fire control solution and transmitting firing instruction to the gun mounts. Directors can serve only one type of gun, thus they are classified as main battery directors (#1-MAIN, #2-ALT), secondary battery directors (#3 SEC STBD, #4 SEC PORT, #5 ALT SEC STBD, #6 ALT SEC PORT), or tertiary battery directors (#7 TER STBD, #8 TER PORT).

DISAPPEARING GUNS A type of shore battery where the guns are protected behind earthen or concrete embankments and mounted on elevating carriages which rise above the embankment to fire and "disappear" to load.

ENFILADE HITS Enfilade is the condition when one ship is close to the line of fire between a ship and its target. If the enfiladed ship is close enough to the target, it may be hit by "over" or "short" salvos.

ENDUR Endurance

ENDURANCE The total time an aircraft's fuel supply will allow it to remain airborne.

FATIGUE A gunnery correction factor to account for the reduced efficiency of a gun and director crew due to prolonged firing.

FIRE CONTROL The process of directing the fire of guns or torpedoes against the target.

FLARES Illumination devices dropped from aircraft on parachutes to light an area and illuminate or silhouette ships.

FLOATATION Same as Watertight Integrity

FORMATION Ships that are assigned to a group so that orders can be simultaneously issued to all of them.

GLARE Condition when reflection of the sun off the water makes spotting difficult and reduces gunnery accuracy.

GUNFIRE DEGRADATIONS A list of those factors effecting the accuracy and rate of a ship's fire.

HEAVY CAL Heavy caliber, referring to guns above 9.5".

HEAVY SEAS Weather conditions where the seas are high enough to impact on the maneuverability of even the largest vessels, and where platform steadiness begins to degrade director-controlled gunfire accuracy.

HELM The control station for the ship's course and speed, located on the bridge or, in emergencies, in alternate control locations.

ILLUM Illumination. This abbreviation is used when placing gun directors into "illumination" (starshell fire) mode.

ILLUMINATION FIRE The process of assigning a director (controlling at least one gun) (or a gun mount in local control) to fire star shell to illuminate a target or an area.

INTERCEPT POINT See "point of intercept".

INTERCEPT RANGE The distance from the firing point of a torpedo to the point where it hits the target.

JETTISON To throw an aircraft over the side, and thus dispose of a fire hazard.

K Kiloyards

KILOYARD 1,000 yards

KNOT Standard measure of speed at sea. 1 knot is one nautical mile per hour. A nautical mile is 2,000 yards or 2 KYDS.

KYDS Kiloyards

L When this letter appears in the movement summary of a ship when issuing movement orders from the chart screen, or after the number of the lead ship in the formation summary display, it denotes that the ship is the leader of a line-ahead formation and that the following ships in the formation are ordered to automatically follow in the wake of the lead ship.

LIGHT CAL Light caliber, refering to guns under 5.3".

LIGHT CONDITION The visibility conditions due to the position of the sun: see NIGHT, DAWN, SUNRISE, DAY, SUNSET, TWILIGHT

LIGHT SEAS Flat and calm weather conditions

LINE ABREAST A line of Bearing where the bearing between ships is 90 degrees(R) or 270 degrees(R).

LINE AHEAD An arrangement of ships where one ship is following in the wake of another at a specified interval. These ships are usually assigned to the same formation.

LINE OF BEARING An arrangement where ships are in a line, but the course of the line is not the same as the bearing between the ships. These ships are usually assigned to the same formation.

LIST A measure of how far a ship is off from perfectly level. A 0 degree list is flat; anything over 25 degrees of list will usually result in the ship capsizing.

LOC Local control

LOCAL CONTROL When there are no directors to control a gun mount's fire, then the gun mount attempts to calculate its own fire control solution. This is called Local Control. Local control is inaccurate when compared to director controlled fire. Local control can also refer to any other

function controlled from an emergency station i.e. steering can be controlled from a local control station.

LOC MAIN A or LOC MAIN B A virtual director simulating the local control of main battery guns.

LOC PORT SEC A virtual director simulating the local control of secondary battery guns on the port side.

LOC STBD SEC A virtual director simulating the local control of secondary battery guns on the starboard side.

LOOM The area of light surrounding a starshell, aerial flare, or a ship on fire.

MAG Magazine

MAGAZINE Compartment used for storing ammunition.

MAIN Can either refer to the main battery (the largest guns on the ship) or the main director.

MAX Maximum

MANEUVERING Any change in course or speed of a ship.

MEDIUM CAL Medium caliber, refering to guns between 5.3" to 9.5".

MER Merchant ship

MIDS Amidships

MIDS PORT The arc of train measured from 330 degrees relative to 210 degrees relative.

MIDS STBD The arc of train measured from 30 degrees relative to 150 degrees relative.

MIN Minute or minutes

MISMATCH Attempting to assign a gun mount to an incompatible director i.e. assigning a main battery mount to a secondary battery director, or a port side mount to a starboard side director, etc.

MODERATE SEAS Seas where the wave size is large enough to impact on the maneuverability of smaller vessels, and reduce the accuracy of gunfire controlled at local control stations.

MT Mount

MULTIPLE TURN An option whereby the player can have the computer execute more than one 3 minute turn. Useful for scenarios where contact has not yet been made.

NIGHT Between 1830 to 0530

OPEN FIRE For the first turn after a ship first commences firing on a target the spotters are coaching the fire onto the target, and so gun accuracy is reduced.

ORD Ordered

OFFSET When firing starshells, it is often desirable to fire them slightly over the target and thus ensure a silhouette for the gunners. The OFFSET menu command allows the player to indicate the direction of the offset.

PITCH Motion of a ship which results when the sea is from a direction 20 degrees or less from ahead. Can effect gunnery or ship's maneuverability.

PITCH/ROLL/YAW A gunnery correction factor to take into account large amounts of ship's motion due to moderate, heavy or rough seas.

POINT OF INTERCEPT The geographic point where a torpedo spread meets the target ship.

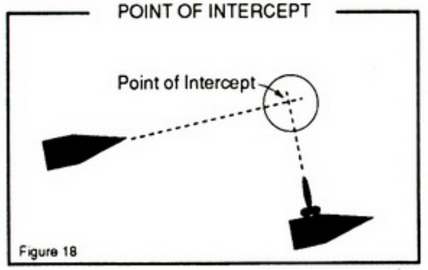

Figure 18

PORT Left

(R) When placed after the word BEARING, it indicates that it is a relative bearing.

RADAR Electronic ranging and detection device, capable of detecting ship up to the horizon.

RANDOMIZE The subprogram which redistributes the initial positions of ships in a new scenario.

RANGE The distance from one ship to another. In the game, ranges are always measured in thousand yard units, called KiloYards.

RANGE CHANGE A gunnery correction factor which accounts for rapid changes in the range between firing ship and target.

RELATIVE Bearing measured with respect to the bow of the ship.

RNG Range

ROLL The motion of a ship which results in moderate, heavy or rough seas when the sea is between 20 degrees of the bow to 60 degrees abaft the beam. It may impact on ship's maneuverability and gunnery accuracy.

ROUGH SEAS Weather conditions with dangerous waves, which seriously impacts on the maneuverability of even the largest ships, and seriously degrades all gunfire.

RUD Rudder

RUN TIME The time in minutes between firing a torpedo and when it is scheduled to hit the target.

SALVO CHASING Evasive maneuvering conducted by a target ship to avoid the salvos of the enemy. Basically the captain turns the ship towards the point where the last salvo fell on the theory that the firing ship will spot the miss and correct the fire away from that point. Salvo chasing interferes with the target ship's gunfire due to the constant turning, and also slows the rate of advance.

SEARCHLIGHTS Large lights mounted on board a ship, used to illuminate other ships at night.

SEC Secondary. Can refer either to the secondary directors or the secondary battery.

SEC CONN Secondary Control — the alternate ship control station, after the bridge.

SECONDARY BATTERY The second largest size of guns on a ship.

SECONDARY DIRECTOR A gun director used to control the fire of the secondary battery.

SECURE To stop or cease, as in "secure counterflooding".

SILHOUETTE The condition where a ship is seen by the contrast of its dark hull against a light background. Ships may be silhouetted against the light of dawn, sunset, starshells, or fires from burning ships.

SPD Speed

SPEED How fast a ship is going, measured in knots (nautical miles per hour). A ship going one knot will travel 100 yards every game turn (3 minutes).

SPLIT FIRE The condition when the fire of a single battery is divided and firing on different targets.

SPOTTING The process of sighting and tracking the target and correcting fire by watching the fall of previous salvos near the target.

SPRAY A gunnery correction factor which takes into account high winds whipping sea spray over gun crews and interfering with their serving the guns, or over director control instruments and interfering with the spotting process.

SPREAD More than one torpedo being fired from a mount on one turn — also called a TORPEDO SALVO

SPREAD ANGLE The angle between torpedoes being fired from a single mount or ship.

SPREAD DISTANCE The distance in yards between torpedoes of a single spread at the point of intercept.

SQUALL A short and fairly violent rain or snow storm, characterized by very low visibility.

STACK GAS When a ship is traveling over 5 knots and is within 3 knots of its maximum speed a visible cloud is usually seen from the stack. This cloud disperses rapidly, but it can interfere with spotting if it get between spotter and target. It also often can be spotted by the enemy before the ship is seen.

STAR Starshells.

STARBOARD Right. Also refers to the arc of train from bearing 30 degrees relative to 150 degrees relative.

STARSHELLS Shells containing a light-emitting flare and a parachute, fired to illuminate the enemy.

STARSHELL COMPUTER A special computer in the director or at gun mount local controls which controls starshell (or illumination) fire. A director can be in illumination mode or gunnery mode, but not both.

STBD Starboard

STERN The back (blunt) end of the ship. Also refers to the arc of train from bearing 30 degrees relative to bearing 330 degrees relative.

STERN PORT The arc of train from bearing 180 degrees relative to 330 degrees relative.

STERN STBD The arc of train from bearing 180 degrees relative to 30 degrees relative.

SUNRISE Between 0600 to 0800. The sun is on the horizon, causing glare problems when sighting targets to the east.

SUNSET Between 1600 to 1800. The sun is on the horizon, causing glare problems when sighting targets to the west.

(T) When placed after the word BEARING, indicates that it is a True bearing.

TACTICAL DIAMETER The diameter of the circle (or arc) made when a ship turns. In the simulation, it is a standard 2,000 yards for all ship types.

TAR Target

TARGET What you like to have, but don't want to be.

TARGET ANGLE The relative bearing upon which a target ship is presenting to an observer. For instance, if the

observer is broad on the starboard beam of a ship, the target angle is 90; broad on the port beam would be 270 etc.

TARGET MANEUVER A gunnery correction factor which accounts for the reduced accuracy of gunfire when a target changes course or speed.

TERTIARY BATTERY The third largest gun battery on a ship.

TERTIARY DIRECTOR A director controlling the tertiary battery.

TFC Torpedo fire control

TFC COMPUTER A program subroutine allowing the player to compute torpedo fire control launch courses, speed, and intercept ranges.

TORP Torpedo

TRACERS In game use, this term means the dotted lines which appear on the chart between firing ship and target ship. Red force firing ship tracers are red, Blue force firing ship tracers are yellow (depending upon the palette chosen).

TRACK The process of continuously measuring the range and bearing to a target, and computing its course and speed. The longer a director tracks a target, the more accurate are its course/speed estimates and the more accurate its fire.

TRAIN See Arc of Train

TRUE Bearing measured with respect to compass north. Also refers to the accuracy of ACTION STATIONS!

TURN The process of going to a new course. Standard Tactical Diameter for all ships types in the simulation is 2,000 yards.

TWILIGHT Between 1800 to 1830. The sun is under the horizon but there is still enough light to silhouette targets against the western horizon.

UNDER CONCENTRATED FIRE The ship is being fired at by more guns or larger guns than it carries itself.

UNDER SALVO If three guns or less are firing on a target from a ship it is more difficult to properly spot the Mean Point of Impact (MPI) of the salvo; consequently spotting effectiveness is degraded and gunnery accuracy is reduced.

VECTOR On the chart screen, the line coming from the ship's position if called the Vector. The direction the line points is the course of the ship, and the length of the line is directly proportional to the speed.

WATERTIGHT INTEGRITY A measure of the amount of damage to a ship's hull, and how close it is to sinking.

100% means the ship is intact, 10% means it is near sinking, etc.

WEATHER LIMITED This message indicates that the maximum speed of the ship is limited by the roughness of the sea.

X-POSIT The X position of a unit on the Cartesian coordinate system.

YAW The motion of a ship which occurs when the sea is from a direction within 30 degrees of the stern. In moderate, heavy or rough weather it may degrade ship's maneuverability and gunfire accuracy.

Y-POSIT The Y position of a unit on the Cartesian coordinate system.

APPENDIX B: NAVAL BASICS

This section provides some basic information for those not familiar with naval warfare during the period treated by ACTION STATIONS!

If you haven't, glance over APPENDIX A: GLOSSARY. It defines many naval terms, and some specialized terms which have particular meanings in ACTION STATIONS!

Warships are divided into types and classes. The traditional types of this period are:

BATTLESHIP: the largest of the combatants. It has huge naval guns (14", 15" and 16" are typical calibers), thick armor and moderate to high speed.

CRUISER: is an intermediate-sized vessel, with guns between 5.5" to 12", and lighter armor. These ships were large enough for independent operations, but not strong enough to match up against a battleship.

The DESTROYER is a smaller type of ship. It has small guns, high speed, and little (if any) armor. It packs a big punch by carrying a load of torpedoes, which can cripple or sink the largest warships.

Speed at sea is measured in KNOTS, standing for nautical miles per hour. A nautical mile is longer than a stature (land) mile - it is 2,000 yards long.

Ships underway maintain speed through the water. They will continue on a given course and speed unless orders are given to have them change. Ships are not like land units, which "sit in place" until you give them an order - they constantly are on the move, making the battle situation rapidly-changing.

A useful rule of thumb is that in a 3 minute period (the duration of a turn in ACTION STATIONS!) a ship will move 100 yards for each knot of speed.

Courses are measured in degrees. Due north is 0 degrees, east is 90, south is 180 etc. You make order intermediate courses down to the degree if you choose - for instance, you can order a course of 43 degrees, or a northeasterly course.

Guns on board a ship are placed in gun mounts, designed to have a wide arc of fire. However, since hitting your own ship is considered bad form, they are physically limited from pointing in some RELATIVE BEARINGS. A relative bearing is the bearing measured clockwise in degrees, with the bow of the ship the 0 degree reference.

In ACTION STATIONS! the arc of train is defined by the terms BOW, STERN, STARBOARD, PORT, AMIDSHIPS, AMIDSHIPS PORT, AMIDSHIPS STARBOARD, BOW PORT, BOW STARBOARD, STERN PORT AND STERN STARBOARD.

Guns on ships are sometimes of varying sizes. The largest guns are the MAIN BATTERY, the next largest the SECONDARY BATTERY, and the next largest the TERTIARY BATTERY.

In ACTION STATIONS! each main battery mount is individually depicted. They are identified by number, starting from the bow to the stern, with port side mounts traditionally given even numbers and starboard side mounts given odd numbers. However, to preserve memory and to make the simulation run faster the secondary and tertiary gun mounts are aggregated into four zones: guns which are mounted with BOW arcs, with STERN arc, with PORT arc or with STARBOARD arcs.

The gun directors is designed to control the fire of the gun batteries. Gun directors are turret-like devices located in a ship's superstructure, and have an arc of train defined just as main battery mounts. Gun directors can only control a specific battery, and only those gun mounts which are assigned to them. Gun mounts can be divided up among several directors and fire at different targets.

In ACTION STATIONS! there is a standard number scheme for gun directors:

Main battery gun directors:

#1 MAIN

#2 ALT

#9 LOC MAIN A

#10 LOC MAIN B

Secondary battery directors:

#3 SEC STBD

#4 SEC PORT

#5 ALT SEC STBD

#6 ALT SEC PORT

#11 LOC SEC STBD

#12 LOC SEC PORT

Tertiary battery directors:

#7 TER STBD

#8 TER PORT

Some ships may not be equipped all of these directors.

The directors labeled "LOC" are not really directors, but represent the capabilities of a gun mount to fire on targets under LOCal control, i.e. using fire control equipment installed on the gun mount. Local control "directors" are #9,10,11,and 12. Tertiary battery guns do not have local control capabilities. "LOC" directors are only considered destroyed when all the guns are destroyed.

APPENDIX C. CAVEATS

Creating this computer simulation for commercial use has been a challenge. Every effort was made to make it the most accurate product available — the assumption was that, for the intelligence level of those who are interested in such products, accuracy was valued more than cartoon graphics or pretty pictures. However, compromises were necessary to suit such factors as the memory size of home computers, speed of execution, and to allow a "human engineered" format designed for clarity appropriate to a civilian audience. Plus, a bit of "showmanship" to add flavor and excitement.

For those interested in the pure simulation aspects as well as those steeped in naval history, it is only just that the author outline those areas where the simulation is not exactly true-to-life. So, the following caveats apply:

- Smoke screens are displayed on the Battle Plot whether they can be seen or not. No test is made for smoke screen visibility. This compromise speeds execution and saves memory. With large numbers of ships most of the program execution time is consumed in the visibility model — to add smoke screen visibility would have been a bit too much. The result is that players must be aware that when they are playing a human opponent their smoke is visible, even if their ship is not. If you lay a smoke screen and intend to double back under its cover, then have the ship secure making smoke.

- Stack gasses are tested for the proximity of enemy ships. However, they are not checked for lines of visibility being blocked by smoke or terrain.

- Torpedoes are not checked for line of sight blockage by smoke, for the same reasons. Since the number of times a game situation would allow an enemy spread to be "sighted through a smoke screen" are few, this does not have a serious impact on the simulation.

- Shore bombardment and PT boats "hits" shown in the simulation are actually shells which land in the immediate area of the target. The program then determines which of these actually hit and damage the target. So, you may score 100+ "hits" on a "shore battery" and still find the battery potting away at you. Really what has been reported as "hits" has been shells falling in the 800'x800' vicinity of the target — the gun mount, director, and ammo handling facilities of the battery are much smaller (and hardened) and you may not have scored on them at all. The battery is silence either by a lucky "direct hit" on the gun mount embrasure, or by "cumulative damage" — disruption of the area, crew losses, power losses, etc. A cumulative damage figure is maintained (the equivalent of WTI for ships) and when this goes below 0% the battery will be silenced regardless if the guns have yet been "physically hit".

It should be noted that shore batteries are more vulnerable to plunging fire than to short range low angle fire.

- The greatest caveat in the simulation has to do with close range gunnery. The simulation is a "time-step" simulation in that an entire time period of 3 minutes is calculated at one time. So, three minutes of gunnery is "fired", the number of "hits" calculated, and then "scored" in the damage process. At longer ranges with only a few hits this works well. However, at closer ranges with many hits per turn it accentuates the lethality of ships' gunnery. In reality, some of the gun mounts might have been hit early in the 3-minute period, thus reducing the number of shells fired which would have reduce the number of hits. The increased lethality in the game makes close range actions (under 6,000 yards) more decisive than would actually have been the case.

- One comment on the Computer Warrior - he does not cheat. The information provided to the Computer Warrior subprogram is the same as what is provided to a human player - it does not get extra information on out-of-visibility locations of ships, damage levels, future orders or anything else.

The Computer Warrior does benefit in the sequence of execution: where the player enters director orders before the move is executed, the Computer Warrior enters his after execution of the move immediately before the gunnery process.The Computer Warrior can thus take advantage of new contacts and adjust for enemy countermoves. This was considered necessary for play balance. Although the Computer Warrior does a fair job of targeting, its criteria is to maximize the number of hits. It does not take into account the tactical situation. For example, an enemy destroyer might be further away than another target but in a better position to launch torpedoes. The Computer Warrior will ignore that risk factor in favor of a closer target.

Beyond that, every effort has been made to ensure that ACTION STATIONS! is a high-fidelity recreation of history. ENJOY!

APPENDIX D: DATA FILES

1. GUNNERY DATA

RANGE: in thousands of yards

ROF: maximum rate of fire in rounds per minute

AP: armour piercing capability (see AP table)

AC: accuracy: E-excellent; G-good; A-average; F-fair; P-poor

GUN	RANGE	ROF	AP	AC
USA				
18" (EXPERIMENTAL)	40.0	1.8	1	G
16"/45 1935 M6	36.9	2.0	4	A
16"/50 1919 M1/5	35.0	2.0	5	A
14"/45 M8/9/10	34.3	1.8	6	G
14"/50 M4	36.3	2.0	6	G
12"/50 1910 M7	23.5	2.4	9	F
12"/50 1940 M8	38.6	3.5	8	E
8"/55 M12/15	31.7	4.5	12	G
8"/55 M9/14	31.7	4.0	12	G
6"/53 1919 M18	26.7	6.0	13	P
6"/47 1933 M16	26.0	10.0	13	F
5"/51 M15	22.6	10.0	15	G
5"/38 1938 M12	18.2	18.0	17	G
5"/25 M13	14.5	14.0	19	F
4"/50 M8,9	20.7	16.0	19	F
3"/50 M10	13.0	10.0	21	P
JAPAN				
18.1"/45 1939 94th Yr	45.3	1.5	2	A
16"/45 1918	40.5	2.1	5	A
14"/45 1908	36.1	1.7	8	A
8"/50 1924	31.1	3.0	12	F
6.1"/60 1933	29.2	4.5	13	A
6"/50 1905	21.3	6.0	13	P
5.9"/40	20.0	6.0	14	F
5"/50 1915	20.7	6.0	14	A
5"/50 1926	20.1	12.0	16	A
5"/40 1930	16.2	12.0	17	A
4.7"/45 1927	17.5	10.0	16	F
3.9"/65 1938	21.3	18.0	19	A
GERMANY				
16"/47 1934	40.3	2.0	3	G
15"/47 1934	38.9	2.3	5	G
11"/54.5 1928	46.6	3.5	10	A
8"/60 1934	39.4	5.0	11	G
5"/45 1934	20.1	12.0	16	A
5.9"/60 1925	28.1	8.0	13	F
4.1"/65 1933	19.3	18.0	19	A
3.5"/76 1932	28.1	10.0	20	F
BRITAIN				
16"/45 M1	41.6	1.0	5	F
15"/42 M1	29.0	2.0	8	F
14"/45 M7	38.6	1.4	7	F

	RANGE	ROF	AP	AC
8"/50 M8	30.7	4.0	12	A
7.5"/45 M6	20.5	3.0	13	P
6"/50 M16,18	25.5	8.0	13	P
5.25"/50 1938 M1	24.1	10.0	15	F
4.7" M9	17.0	12.0	17	A
4.5" M1/3/4	20.8	12.0	17	A
4"/45 M16 1937	19.0	15.0	19	F
4"/40 M19	17.0	15.0	19	F
ITALY				
15"/50 1934	46.2	1.3	6	P
12.6"/43.8 1934	31.3	2.0	9	P
8"/53 1927	33.4	3.8	12	P
6"/55 1936	28.2	4.6	13	P
5.3"/45 1938	21.4	7.5	14	F
4.7"/50 1926	21.4	6.3	15	F
3.9"/47 1935	16.7	8.0	20	F
3.5"/50 1938	17.5	12.0	20	F
RUSSIA				
16"/50	41.6	1.0	5	F
12"/52 1912	27.0	1.7	10	F
7.1"/56 1934	38.8	5.0	12	A
5.1"/50 1936	27.0	10.0	16	A
4.7"/50	15.7	8.0	17	F
3.9"/56 1934	25.9	12.0	20	A
FRANCE				
15"/45 1935	46.2	1.3	6	P
13.4"/45 1912	27.3	2.0	8	F
13"/52 M33	32.8	2.5	8	A
12"/45 1906	27.0	1.7	10	F
8"/50 M24	33.4	3.8	12	P
6.1"/55 M21	23.3	5.0	13	F
6"/50 M30	23.2	6.0	14	A
5.5"/40 M23	20.5	5.5	14	P
5.5"40 M27	14.0	12.0	14	F
5.5"45	21.0	12.0	14	F
5.1"/40	21.9	5.0	19	A
3.5"/50	17.5	12.0	20	F

2. TORPEDO DATA

	(speed/range)		
	LOW	MED	HIGH
US MK 15	27/15	33/10	45/6
Long Lance	36/43.7	40/35	48/21.9
German G7a T1	30/13.7	40/8.2	44/5.5
British mk IX	30/12.4	35/10.5	35/10.5
Japanese 8th Year	28/21.9	32/16.4	38/10.9
Italian 21"	26/13.1	30/10	42/3.3
French 1929 D	37/13	40/9	45/7
French 1923 D	29/20	30/18	35/14

APPENDIX E: ARMOR PENETRATION

The amount of armor a gun can penetrate is a vital tactical consideration. The ideal situation would be to establish a range where your guns can penetrate the enemy's armor while his guns cannot penetrate yours.

The Armor Penetration Chart shows the amount of armor that a given gun class will penetrate for a given range. The gun class is listed down the left, the range across the top, and the matrix element is the amount of armor penetrated. For example, gun class 2 could pierce up to 35 inches of armor at a range of 6 thousand yards.

For longer ranges, the matrix lists 2 elements in a box, one number over another. For example, the entry for gun class 1 at 27,000 yards is 3.0 over 26.0. The upper figure (3.0) is the amount of horizontal armor (deck, turret tops etc) and the lower figure (27.0) is the amount of vertical armor (belt, barbette, etc) which would be penetrated.

When only one number is given it is because the angle of fall of the shell at that range is such that only that angle of armor is threatened. When both numbers are present there is the chance that either horizontal or vertical armor could be hit. In ACTION STATIONS! the ballistic path of the shells of each class gun is approximated for the given range and the probability of hitting either vertical or horizontal armor is approximated. A random number then selects the placement of the hit.

ACTION STATIONS! also considers the armor angle of installation. Angled armor installations are taken into accounted by adjusting the effective thickness of the armor. For instance, belt armor which is 10" thick and angled at 12 degrees would be accounted for by giving the ship an effective belt armor thickness of 12.4". The ship's statistics presented in this manual gives effective armor thickness - which might also be compensated for the quality of manufacture of the armor - so these values may not match the armor thickness given in standard reference books.

Another way to increase the angle of the armor to the shell path is to turn the ship so that the belt armor does not present a 90 degree angle. The amount of vertical armor which is penetrated by "glancing blow" shots can be reduced by as much as 50% - commanders can thus increase the effective thickness of their armor by carefully choosing their courses. This effect, of course, only occurs for vertical armor.

I wish to gratefully acknowledge the assistance of Dr. Nathan Okun of the Naval Weapons Center (China Lake) for his assistance in formulating this information.

ARMOR PENETRATION CHART: ARMOR RENETRATED (IN INCHES)

Gun Class	Range in Thousands of Yards																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	45.0	44.0	43.0	42.0	41.0	40.0	39.0	38.0	37.0	36.0	35.0	34.5	34.0	33.5	33.0	32.0	31.5	31.0	1
2	39.5	38.5	38.0	37.0	36.0	35.0	34.4	33.8	32.7	32.0	31.3	31.0	30.4	29.6	28.8	28.0	27.6	27.1	2
3	35.0	34.0	33.0	31.8	31.0	30.5	30.0	29.5	29.0	28.0	27.5	27.2	27.0	26.5	26.0	25.0	24.0	22.5	3
4	32.0	32.0	32.0	31.0	31.0	30.0	29.0	29.0	28.0	28.0	27.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	4
5	33.0	32.0	31.0	31.0	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	22.0	20.0	19.0	18.0	17.0	16.0	5
6	30.0	30.0	30.0	30.0	29.0	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	19.0	18.0	17.0	16.0	15.0	6
7	29.0	29.0	28.5	28.0	27.0	26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.0	14.0	7
8	27.5	27.0	26.0	25.0	24.0	23.0	22.0	21.0	20.0	19.0	18.0	17.0	16.0	15.5	15.0	14.5	14.0	13.0	8
9	25.0	23.0	21.0	21.0	20.5	20.0	19.0	18.0	18.0	17.0	16.0	15.0	14.0	13.5	13.0	12.0	11.5	11.0	9
10	25.0	23.0	21.0	21.0	20.6	20.3	20.0	20.0	19.0	18.0	16.0	15.0	14.0	13.5	13.0	12.0	11.0	10.5	10
11	16.0	15.0	14.0	13.0	12.0	11.0	10.0	9.9	9.6	9.3	9.0	8.5	8.0	7.6	7.3	7.0	1.3 6.6	1.3 6.3	11
12	13.0	12.0	12.0	11.5	11.0	10.5	10.0	9.5	9.0	8.0	7.0	6.5	6.0	5.5	5.0	4.5	1.2 4.0	1.4 3.8	12
13	11.0	10.0	9.0	8.0	7.2	6.3	5.9	5.4	5.0	4.7	4.5	4.3	4.1	4.0	1.0 4.0	1.2 3.9	1.3 3.8	1.5 3.7	13
14	9.0	8.0	7.0	6.2	5.5	5.1	4.8	4.5	4.0	3.8	3.4	3.3	3.2	3.1	3.1	3.0	3.0	2.8	14
15	8.0	7.0	6.0	5.2	4.5	4.3	4.0	3.8	3.5	3.3	3.2	3.1	3.0	2.9	2.8	2.7	2.6	2.6	15
16	7.5	6.3	5.3	4.5	4.0	3.8	3.5	3.3	3.1	3.0	2.9	2.8	2.7	2.6	2.5	2.4	2.3	2.3	16
17	7.2	6.1	5.0	4.0	3.5	3.3	3.0	2.8	2.5	2.3	2.0	1.8	1.5	1.3	1.2	1.1	1.0	1.0	17
18	6.5	5.3	4.5	3.8	3.3	2.9	2.6	2.3	2.1	1.9	1.7	1.5	1.5	1.3	1.2	1.2	1.2	1.2	18
19	4.5	3.6	3.3	2.9	2.6	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.2	1.2	1.1	19
20	4.0	3.4	2.8	2.3	2.0	1.8	1.5	1.3	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0	1.0	1.0	20
21	3.0	2.6	2.3	2.0	1.7	1.4	1.2	1.0	.6	.2									21

ARMOR PENETRATION CHART: ARMOR PENETRATED (IN INCHES)

Gun Class	Range in Thousands of Yards																			
	19	20	21	22	23	24	25	26	27	28	29	30	31	32	34	36	38	40	42+	
1	30.7	30.0	29.6	1.2 29.2	1.4 28.8	1.6 28.8	1.9 27.0	2.2 26.5	3.0 26.0	3.8 25.0	4.6 25.0	5.2 24.5	6.0 24.0	6.6 23.0	7.2 22.0	9.0 21.0	11.0	13.5	16.7	1
2	1.0 26.6	1.0 25.8	1.1 25.0	1.2 24.6	1.3 24.2	1.4 23.8	1.6 23.1	1.8 22.8	2.0 22.6	2.2 22.3	2.4 22.0	2.8 21.7	3.9 21.5	4.7 21.4	5.8 21.3	7.9 21.1	9.4	10.8	12.7	2
3	1.2 21.5	1.3 20.5	1.4 20.3	1.5 20.0	1.6 19.5	1.8 19.0	2.0 18.5	2.2 18.3	2.5 18.1	2.8 18.0	3.2 17.7	3.7 17.3	4.2 16.9	5.0 16.5	6.0 16.1	7.8 15.6	9.0 15.0	10.5	13.4	3
4	20.0	2.6 19.0	2.7 18.0	2.8 17.0	2.9 16.0	3.0 15.0	3.1 14.0	3.2 13.0	3.4 12.5	3.6 12.0	3.9 11.5	4.2 11.1	4.7 10.8	5.2 10.6	5.9 10.1	6.8 9.7	7.8 9.0	8.8 7.0	9.8 5.0	4
5	15.0	3.5 14.5	3.6 14.0	3.7 13.5	3.8 13.0	4.1 12.5	4.4 12.0	4.6 11.5	4.8 11.0	5.2 10.6	5.5 10.3	5.8 10.0	6.0 9.7	6.3 9.5	6.5 9.2	6.7 9.0	6.8	6.9	7.0	5
6	14.0	2.8 13.5	2.9 13.0	3.0 12.5	3.2 12.0	3.4 11.5	3.6 11.0	3.8 10.5	4.0 10.0	4.2 9.6	4.4 9.3	4.7 9.0	5.2 8.6	5.8 8.3	6.0 8.0	6.1	6.9	7.5	7.8	6
7	13.5	12.5	12.0	3.0 11.5	3.1 11.0	3.3 10.0	3.4 9.5	3.6 9.0	4.0 8.5	4.2 8.0	4.4 7.5	4.6 7.0	4.8 6.6	5.2 6.3	5.4 6.0	5.6	5.8	6.0	6.3	7
8	12.0	11.5	11.0	3.0 10.0	3.3 9.5	3.6 9.0	3.8 8.7	3.7 8.3	4.1 8.0	4.4 7.5	4.6	4.8	5.2	5.3	5.4	5.5	5.7	5.8	6.0	8
9	2.5 10.5	2.8 10.0	3.0 9.5	3.2 9.0	3.4 8.6	3.6 8.3	3.8 8.0	4.1 7.6	4.5 7.3	4.9 7.0	5.4 6.8	5.7	6.1	6.3	6.4	6.5	6.6	6.7	6.8	9
10	10.0	9.5	2.4 9.0	2.6 8.5	2.8 8.0	2.9 7.8	3.0 7.4	3.2 7.2	3.4 7.0	3.7 6.8	3.8 6.6	4.1 6.5	4.4 6.4	4.8 6.2	5.0 6.1	5.2 6.0	5.4	5.6	5.9	10
11	1.4 6.0	1.4 5.7	1.5 5.3	1.6 5.0	1.8	2.0	2.2	2.3	2.4	2.8	2.9	3.0	3.2	3.5	3.8	4.2	4.3	4.4	4.4	11
12	1.5 3.5	1.6 3.3	1.7 3.2	1.9 3.0	2.0	2.2	2.4	2.6	2.8	3.0	3.1	3.2	3.4	4.0	4.2	4.4	4.6	4.8	5.0	12
13	1.5 3.5	1.7 3.3	1.9 3.1	2.0 2.9	2.1 2.7	2.2 2.4	2.4 2.1	2.5 1.7	2.5 1.2	2.5 1.2	2.6 1.1	2.7 1.0	2.7 1.0	2.7	2.7	2.8	2.8	2.8		13
14	2.8	2.6	2.4	2.2	2.0	1.8	1.5	1.3	1.1	1.0										14
15	2.5	2.2	2.2	2.0	1.7	1.3	1.1	1.0	1.0											15
16	2.2	2.1	2.0	1.8	1.6	1.2	1.0													16
17	1.0	1.0	1.0																	17
18	1.0	1.0																		18
19	1.0	1.0																		19
20	1.0	1.0																		20

APPENDIX F: CREDITS

Research for the original wargame "BATTLE STATIONS!" was conducted by Alan D. Zimm, Nathan Okun, Andrew Smith and David Isby.

Research assistance provided by: Mr. Anthony Nicolosi, U.S. Naval War College Dr. Gibson B. Smith, National Archives Dr. D.C. Allard, US Naval Operational Archives

Basic data has been drawn from the 1936 "Maneuver Rules" from the Archives of the U.S. Naval War College, Newport, R.I. Some of the drawings and material for the "Tactics" section has been drawn from U.S. Naval War College Publication, "Cruisers and Destroyers in Defense of the Battle Line", 1936.

Transcripts/translations of Crown-Copyright records from the Public Records Office, United Kingdom Of Great Britain, appear by permission of the Controller of Her Majesty's Stationary Office.

German and Japanese documents used are translations of captured documents contained in the National Archives, Washington, D.C.

The assistance and advice on original game system design by Russell F. Powell and Andrew Smith, and assistance in developing the armor penetration charts by Nathan Okun, is gratefully acknowledged.

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APPENDIX G: BIBLIOGRAPHY

These references are provided as a sampling of what is available on naval warfare, and are listed here to provide guidance to those interested in looking deeper into the subject:

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APPENDIX H: PHOTOGRAPHIC CREDITS:

ON THE BOX: USS Iowa (BB-61) fires her 16" guns during exercises near Colon, Panama, 27 January 1987. Photo by PH3 William Holck. U.S. Naval Institute Photo Collection.

MANUAL COVER: USS California (BB-44) firing 5"/51 guns in night battle practice, 1933. U.S. Naval Historical Center.

1. "SMALL BOYS MAKE SMOKE" - USS Heerman (DD-532) and a destroyer escort lay a smoke screen to protect an escort carrier group from attacking Japanese Battleships during the Battle Off Samar, 25 October 1944. National Archives.

2. TORPEDO - strikes the water just after launch from starboard tubes of the USS Milwaukee (CL-5), circa 1925. Courtesy of Mrs. Donald Shull. U.S. Naval Historical Center.

3. BRITISH BATTLESHIPS - war maneuvers circa 1930. The battleship in the foreground is of the Nelson class, while the others are of the Queen Elizabeth and "R" classes. U.S. Naval Historical Center.

4. SALVO - USS Missouri (BB-63) firing a 6-gun salvo from her forward turrets, mid 1944. Note camouflage paint, the shells in the air at right and the concussion disturbance on the water. National Archives.

5. "TORPEDO AWAY!" - USS Dunlap (DD-384) firing a torpedo during exercises, 3 July 1942. National Archives.

6. SPOTTER AIRCRAFT - a Curtiss SOC SEAGULL being hoisted on to USS TUSCALOOSA (CA-37) after a patrol during a convoy escort mission to Iceland, September 1941. U.S. Naval Historical Center.

7. STRADDLE! - Target Ship IOWA (ex- BB-4) under fire by battleship guns during Fleet Exercises off Panama, early1923. Collection of VADM Dixwell Ketcham, USN (Ret). U.S. Naval Historical Center.

8. DESTROYERS - laying a smoke screen during fleet maneuvers, circa 1920. Photo by O.W. Waterman, courtesy of CAPT Alan Brown, USNR(Ret). U.S. Naval Historical Center.

9. SEARCHLIGHTS LOCKED ON - view of USS QUINCY (CA-39) taken from a Japanese cruiser at the Battle of Savo Island, 9 August 1942, showing the ship illuminated by Japanese searchlights. U.S. Naval Historical Center.

10. BATTLE DAMAGE - Damaged USS SELFRIDGE (DD-357) after the Battle of Vella Lavella, 6-7 October 1943. Photograph shows the forward 5"/38 twin mount wrecked by a Japanese torpedo hit. National Archives. U.S. Naval Historical Center.

11. DEATH OF A DESTROYER - a rare Japanese photograph which cleared up a mystery. The fate of the USS Pope (DD-225) was unknown until this picture was discovered in a Japanese propaganda booklet "Victory on the March". The caption read: "The British destroyer, the HMS POPE, seemed to have leaped into the air just before it went down." Note the shell splashes, presumably from medium caliper cruiser guns. National Archives.

APPENDIX I - DISK DIRECTORY

FLEET DISK - LANT contains ships of the German and British Navies, along with 9 historical scenarios. The **BUILD SCENARIO** program is also contained on this disk.

FLEET DISK - PAC contains ships of the American, Japanese and Dutch navies, along with 13 historical scenarios.

FLEET DISK - MED contains ships of the Italian, Russian and French navies, along with 8 historical scenarios. The **GENERATE SCENARIO** program is also contained on this disk.

The ship classes provided give broad coverage of the major classes of warships, and include many minor, one-of-a-kind, and hypothetical or "design only" ships. If you cannot find a particular ship class, check for the nearest equivilent. For example, there was little functional difference between the Japanese heavy cruiser classes FURUTAKA and the follow-up class AOBA, so the latter can accurately be represented by the FURUTAKA class data.

British Destroyers were build in "series", each series denoted by a letter. Several of these letter series were essencially the same ship class, and so the equivilent lettered series are grouped into one class in the game (example - code SZ will recall data for a ship which could be any of the S,T,U,V,W, or Z series of ships). In other cases, included classes are indicated by a name in parenthesis i.e. (also Xxxxxxx).

There are several unit files that are repeated on each FLEET disk. They include the merchant vessel classes, convoy, anchored objective, and shore battery units. They are duplicated on each disk for use with the GENERATE program.

The other miscellaneous units (shore batteries, PT boats, minesweepers, trawlers, etc.) are contained on the PAC disk.

COMMENTS ON SCENARIOS

The following comments are offered to aid your selection of scenarios. Only a limited amount of information is provided so as not to spoil the "fog of war" inherent in the initial encounter.

In most cases, detailed historical information was used for the order of battle, environmental conditions, and initial positions of the forces. Sometimes the initial positions of forces were adjusted for play balance; in other cases, only limited information was available, and so we made some estimates. Anyone with more detailed information (particularly on orders of battle) is invited to write to the author.

In several scenarios, ships are initially damaged or have reduced capabilities due to their condition at the time of the battle. Also, some ships may indicate "Damage Control Out", which reflects poorly trained crews with little damage control skill.

One way to enjoy these games is to go into them cold, without looking at each side's initial set-up or forces. That way you have some of the "fog of war" present in the actual engagements. Pick one side, assign the computer to command the other, and enjoy! We have included a recommendation on:

* which side to have the computer play for the "first time", to make it most challenging.
* the objectives of each side.
* the "threat axis" i.e. the direction from which the enemy will most likely (approximately) appear.

PAC DISK

BLUE force is US/Allies **RED force is Japanese**

HORANIU (night, DD v. DD and convoy, coastal) (HORANIU.SCN)

One of the lesser-known engagements in the Pacific, probably because of it's indecisive nature. The Japanese were escorting a convoy to Horaniu - they had just repelled an air attack and were scattered when intercepted by an American force. The Japanese escorts retired, the American force chased but could not catch, and when they returned to the area the Japanese Convoy had disappeared.

COMPUTER: EITHER
RED THREAT AXIS:090 **BLUE THREAT AXIS:270**
RED OBJECTIVE: CONVOY PROTECTION
BLUE OBJECTIVE: CONVOY DESTRUCTION

JAVA SEA (-day-night, CA v. CA and convoy, coastal) (JAVA_SEA.SCN)

The first decisive surface action of the Pacific war. A combined Dutch-British-Australian-American force attempted to fight past a Japanese escort force to attack an amphibious group. The US cruiser Houston was without her after turret due to previous damage. The Dutch commander of the combined Allied force made several key judgement errors which severely limited the effectiveness of his force, and suffered a severe defeat.

COMPUTER: RED
RED THREAT AXIS: 180 **BLUE THREAT AXIS: 000**
RED OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE OBJECTIVE: CONVOY DESTRUCTION

VELLA LAVELLA (night, DD v. DD and convoy, islands) (VLAVELLA.SCN)

Two widely-scattered US destroyer forces trying to intercept a Japanese convoy. A night action, but with very good visibility which

negated any advantage afforded by the early-model US radar installations.

COMPUTER: RED
RED THREAT AXIS: 090 **BLUE THREAT AXIS: 270**
RED OBJECTIVE: CONVOY PROTECTION
BLUE OBJECTIVE: CONVOY DESTRUCTION

EMPRESS AUGUSTA BAY (night, CA v. CA, coastal) (EMPAUGST.SCN)

A Japanese task force is escorting a convoy when it receives information of a US convoy. The Japanese convoy turns back while the warships steam at high speed to intercept. The US convoy is only a phantom - however, there is a US task force out to intercept them! A mid-ocean collision resulted in a donneybrook and a virtual draw.

COMPUTER: EITHER
RED THREAT AXIS: 160 **BLUE THREAT AXIS: 340**
RED OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE OBJECTIVE: ENEMY FORCE DESTRUCTION

VELLA GULF (night, squalls, DD v. DD, islands) (VELLA_GF.SCN)

A small Japanese force of destroyers on a resupply mission is intercepted by a US destroyer force. Low visibility and rain squalls give the advantage to the US radar, which allowed an early decisive unopposed torpedo strike.

(NOTE: because of space limitations this scenario is located on the MED disk.)

COMPUTER: BLUE
RED THREAT AXIS: 180 **BLUE THREAT AXIS: 000**
RED FORCE OBJECTIVE: TRANSIT SOUTH
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

KULA GULF (night, CL v. DD, islands) (KULAGULF.SCN)

A Japanese destroyer force on a resupply mission is surprised by a superior US task force. The Japanese ships are chopped up badly, but the Long Lance balanced the event by sinking one of the US cruisers.

COMPUTER: BLUE
RED THREAT AXIS: 090 **BLUE THREAT AXIS: 270**
RED FORCE OBJECTIVE: ESCAPE NORTH
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

KOLUMBANGARA (night, squalls, CL v. CL, islands) (KOLUMBGR.SCN)

Two task forces in a head-on collision. The US force had a few

radar equipped ships, but the Japanese had a radar warning device which served them better. One cruiser on the US side was limited in speed due to engineering troubles.

The initial brush was scored for the US force, but Japanese DDs reloaded torpedoes under cover of a rain squall and returned to score on two cruisers and a destroyer.

COMPUTER: EITHER
RED THREAT AXIS: 120 **BLUE THREAT AXIS: 330**
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

2nd GUADALCANAL (night, BB v. BB, islands) (2ND_GUAD)

The classic night battleship confrontation of the Guadalcanal campaign. A mixed and scattered Japanese force wants to bombard Henderson Field - a smaller US force interposed.

While the Japanese caught one US BB in searchlights and concentrated on her, another US BB was able to move up unobserved and decisively intervene with radar directed gunfire which left a Japanese Battlecruiser burning and out of control.

COMPUTER: RED
RED THREAT AXIS: 150 **BLUE THREAT AXIS: 330**
RED FORCE OBJECTIVE: BOMBARD LAND, ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: PROTECT HENDERSON

SUNDA STRAIT (night, CA v. CA + convoy, inshore) (SUNDA_ST.SCN)

When trying to escape the Japanese juggernaught early in the war, the cruisers Houston and Perth stumbled into a Japanese convoy and overwhelmingly strong escort. Houston still had her after turret out of action from a previous engagement.

In one of the bravest actions of the war the Houston and Perth were eventually trapped and sunk, but not until the Japanese suffered significant losses. Let the computer take the Japanese side and see if you can match the valor of the Houston and Perth's impossible battle.

COMPUTER: RED
RED THREAT AXIS: 020 **BLUE THREAT AXIS: 200**
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

1st GUADALCANAL (night, BB v. CA, islands) (1ST_GUAD)

A strong Japanese force intent upon the bombardment of Henderson Field was intercepted by a significantly weaker pick-up force

of assorted cruisers and destroyers. Some of the US ships had radar, but this advantage was negated by poor command arrangements and inexperienced teams. The Japanese for once did not spot the Americans until the range was point-blank, and a fearfully lethal melee resulted where the quick-firing gunnery of the American ships balanced out the deadliness of the Long Lance. Both sides suffered significant losses, but Henderson was successfully protected.

COMPUTER: EITHER
RED THREAT AXIS: 150 BLUE THREAT AXIS: 330
RED FORCE OBJECTIVE: BOMBARD HENDERSON
BLUE FORCE OBJECTIVE: DEFEND HENDERSON

SINGAPORE (dawn, BB v. BC + convoy. coastal) (SINGAPOR.SCN)

Another hypothetical "what if" scenario. Three days after Pearl Harbor the British dispatched the heavy ships of their Far Eastern Force to intercept a Japanese Amphibious force.

The British were attacked at sea by torpedo bombers, and lost the Prince of Wales and the Repulse.

If the air strikes had not been successful, the Japanese Commander intended to deploy cruisers and destroyers for a night sweep and torpedo attack. If they were unsuccessful, he had that force backed up by battlecruisers.

In this scenario we assume that the British have evaded the night sweep. They now have a decision - press on? retire? try to defeat the Japanese forces piecemeal? Where is everybody, anyway? If you liked the Sunda Strait scenario, you will be overjoyed by this suicidal search-and-attack situation.

COMPUTER: RED (Japanese)
THREAT AXES: UNDETERMINED
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: PLAYER'S CHOICE

SAVO ISLAND (night, CA v. CA + convoy, islands) (SAVO.SCN)

This stinging defeat of the American Navy is familiar to every student of naval warfare: a Japanese cruiser force penetrates a defended anchorage and inflicts disasterous losses on the surprised defenders.

COMPUTER: EITHER
RED THREAT AXIS: 120 BLUE THREAT AXIS: 300
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: PROTECT THE ANCHORAGES

CAPE ESPERANCE (night, CA v. CA, islands) (CAPE_ESP.SCN)

A Japanese cruiser force on a bombardment mission is intercepted by a defending cruiser force. Radar and a better command

structure allowed the US force to surprise and cross the enemy's "T".

COMPUTER: EITHER
RED THREAT AXIS: 180 BLUE THREAT AXIS: 000
RED FORCE OBJECTIVE: BOMBARDMENT
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

KOMANDORSKI ISLANDS (dawn, CA v. CA, convoy, open sea) (KOMNDRSK.SCN)

In this classic daylight action of the Pacific war, a US task force bent on intercepting a Japanese convoy finds them outnumbered by the convoy escort! A long-range action ensued until the Japanese force broke off due to low ammunition and fear of air attack. The Japanese commander was faulted for not closing to decisive range - however, US gunnery was better, and a closing target would have presented the US force with a good torpedo target.

(NOTE: at press time were were not yet sure we would have room for this scenario - the 31st. We list it here in the happy prospect that we will have room for it.)

COMPUTER: RED
RED THREAT AXIS: 180 BLUE THREAT AXIS: 000
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: SURVIVAL

LANT DISK - SCENARIOS

RED force is British BLUE force is German

RIVER PLATE (dawn, CA v. CA, open sea) (RVRPLATE.SCN)

Graf Spee v. Exeter, Ajax and Achilles. The German commander used his main battery poorly, splitting his fire and constantly shifting targets.

COMPUTER: EITHER
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY DESTRUCTION

DENMARK STRAIT (dawn, BB v. BB, open sea) (DENMRKST.SCN)

Hood and Prince of Wales v. Bismark and Prinz Eugen. Hood blew up early in the engagement leaving the novice Prince of Wales (still with dockyard workers and main battery faults) to fight alone. The Germans won this one, but a hit in Bismarck's fuel bunkerage eventually lead to her demise.

Now, what if the Hood hadn't blown up...

COMPUTER: EITHER
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: DISENGAGEMENT WITHOUT DAMAGE

PENANG (night, CA v. DD, islands) (PENANG.SCN)

Late in the war the Nachi was discovered leaving the Indian Ocean and heading for Singapore. Some British destroyers were in position to intercept, with cruiser reinforcements on the way. Nachi's lookout and bridge watch was inefficient, allowing the British destroyers to close and execute a spectacularly successful "star pattern" torpedo attack.

Here, Nachi has a problem – should she try to bull through the British destroyers, or play cat-and-mouse and look for an opening, with the possibility that the trailing British cruisers might catch up?

COMPUTER: RED
RED THREAT AXIS: 020 BLUE THREAT AXIS: 180
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: ESCAPE SOUTH

NORWAY (day, heavy weather, low visibility, BC v. BC) (NORWAY.SCN)

In the Norway Campaign there was a brush between a British and a German force. Because of heavy weather, high seas, snow squalls, high winds, and generally dreadful conditions the encounter was indecisive. This situation is almost like "hide and go seek" - and any more information would spoil the surprise.

COMPUTER: BLUE
THREAT AXES: UNDEFINED
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY LOSSES, MINIMIZE OWN DAMAGE

BEAR ISLAND (day, CL v. DD, open sea) (BEAR_IS.SCN)

During the Murmansk Convoy battles, the British cruiser Edinburg took a torpedo hit in the stern which crippled her.

She was directed under escort to Russia. An additional escort of Russian vessels was dispatched to meet them. A German force intercepted the Edinburg, sank her with torpedoes and silenced the escorting British destroyers for the loss of one of their own ships. The remaining Germans could have swept the sea clean, but the Russian ships arrived, and the Germans withdrew.

COMPUTER: RED
RED THREAT AXIS: 180 BLUE THREAT AXIS: 000
RED FORCE OBJECTIVE: SURVIVAL
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

CONVOY WS-5A (day, heavy seas, low visibility, CA v. CA +convoy, open sea) (CVY_WS5A.SCN)

In the days of "raider cruisers", the radar-equipped Hipper discovered a heavily-escorted British troop convoy. The usual rules of raider warfare applied - the Hipper must hit without being hurt herself. She tried to use her radar to maneuver for a torpedo attack, but was discovered by the escort and driven off.

COMPUTER: EITHER
RED OBJECTIVE: CONVOY PROTECTION
BLUE OBJECTIVE: CONVOY DESTRUCTION

BARENTS SEA (dawn, CA v. CL + convoy, open sea) (BARENTS.SCN)

Again on the Murmansk run, a heavily escorted British Convoy in the process of regrouping after a storm was intercepted by a strong force of German heavy vessels. Low visibility and moderate seas inhibited both side's efforts to find the other. The Germans wasted several opportunities to inflict decisive damage, in the main because they were under orders not to risk their ships to any critical damage. When one of their cruisers took an engine room hit they recalled their forces.

COMPUTER: EITHER
RED THREAT AXIS: 270 BLUE THREAT AXIS: 090
RED FORCE OBJECTIVE: CONVOY DEFENSE
BLUE FORCE OBJECTIVE: CONVOY DESTRUCTION, MINIMIZE OWN LOSSES

PQ-17 (day, hypothetical, BB v. BB + convoy, open sea) (PQ-17.SCN)

On the Murmansk run, convoy PQ-17 was a singular disaster. Under the threat of a sortie by a German battleship task force the British command ordered the convoy to disperse - almost all the ships were destroyed piecemeal by submarine and air attack.

In this scenario we hypothesize that the convoy did not disperse, and that the German surface forces did not turn back. The close escort cruisers must hold off the Germans until reinforcements arrive.

COMPUTER: RED
RED THREAT AXIS: 180 BLUE THREAT AXIS: 000
RED FORCE OBJECTIVE: CONVOY DEFENSE
BLUE FORCE OBJECTIVE: ENEMY DESTRUCTION, MINIMIZE LOSSES

NARVIK (day, DD v. DD + convoy, in a Fjord) (NARVIK.SCN)

After the German invasion of Norway a British destroyer force penetrated a fjord to strike at the invading force. It was a close-range battle with little room for maneuver for either side.

COMPUTER: BLUE
RED THREAT AXIS: 090 BLUE THREAT AXIS: 270
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

MED DISK

RED force is British BLUE force is Italian

GENOA (Hypothetical) (day, BB v. BB, coastal) (GENOA.SCN)

Early in the Mediterranean war the British conducted a successful battleship bombardment of Genoa. An Italian fleet sent to intercept lost track due to inefficient aerial reconnaissance. This scenario begins with the British force approaching Genoa, and the Italian force at sea. The British player must shell the port facilities (and perhaps even hit an Italian Battleship docked for repairs) and then retire; the Italian player must use his port defenses, and try to get the fleet into a position to intercept.

In this scenario, the situation is made more difficult for the British. In the actual battle, fog hid the British ships from the shore batteries, allowing them to bombard the harbor using their spotter aircraft to direct fire. In this scenario the British player will have to fight his way through the shore batteries and harbor defenses to get to his objective - but he cannot take too long, or he will be trapped.

COMPUTER: BLUE
RED THREAT AXIS: 000, 180 BLUE THREAT AXIS(FLEET): 000
RED FORCE OBJECTIVE: BOMBARDMENT, ESCAPE
BLUE FORCE OBJECTIVE: ENEMY DESTRUCTION

SPARTIVENTO (day, BB v. BB, open sea) (SPARTVTO.SCN)

The Italian Fleet went to sea to defend a convoy; the British Fleet was at sea for the same reason. They discovered each other, closed, exchanged calling cards and then withdrew with no significant damage to either side. Reading the history books published by both sides is amusing, because they both felt they were faced by a superior force!

COMPUTER: EITHER
THREAT AXES: UNDEFINED
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY LOSSES, MINIMIZE OWN LOSSES

CAPE SPADA (day, low visibility, CL v. CL, open sea) (CP_SPADA.SCN)

An Italian cruiser force stumbled into a British destroyer force and gives chase.

COMPUTER: BLUE
THREAT AXES: UNDEFINED
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY DESTRUCTION

FORCE K (night, CL v. CA + convoy, open sea) (FORCE_K.SCN)

This battle is a classic example of the effect of modern technology on the battlefield. The British Force K operating out of Malta was tasked to intercept a heavily-escorted Italian convoy destined to re-supply the Afrika Korps. By effective use of radar the British force was able to sink all the merchantmen in the convoy without loss.

COMPUTER: BLUE
THREAT AXES: UNDEFINED
RED FORCE OBJECTIVE: CONVOY DESTRUCTION
BLUE FORCE OBJECTIVE: CONVOY DEFENSE

CAPE BON (night, CL v. DD, coastal) (CAPE_BON.SCN)

Late in the Mediterranean war the Italians became increasingly desperate to get supplies through to North Africa, in some cases loading cruisers with hazardous deck cargos of fuel and ammunition for a high-speed runs through the British blockade. In this engagement Italian cruisers were intercepted by a radar-equipped British-Dutch destroyer force, to the severe discomfort of the cruisers.

COMPUTER: BLUE
RED FORCE OBJECTIVE: ENEMY DESTRUCTION
BLUE FORCE OBJECTIVE: ESCAPE SOUTHEAST

2nd SIRTE (day, heavy weather, BB v. CL + convoy) (2NDSIRTE.SCN)

The classic Mediterranean convoy action where a few British cruisers held off a vastly superior Italian task force. The Italian destroyers were slowed by heavy weather and could not get into position, and the Italian cruisers would not penetrate the British smoke screens for fear of torpedo attack. No ships were lost in this engagement, but it was a eventual victory for the Italians. During the engagement the convoy was forced to alter course away from it's destination so that they could not enter Malta under cover of darkness; all the convoy ships were discovered at sea the next day and sunk by aircraft. For this battle to be a victory for the British, he must not alter the convoy course any further south than 250 degrees(T).

COMPUTER: BLUE
RED FORCE OBJECTIVE: CONVOY PROTECTION ON COURSE 250-300
BLUE FORCE OBJECTIVE: CONVOY DESTRUCTION OR DIVERSION, MIN LOSSES

CALABRIA (day, BB v. BB, coastal) (CALABRIA.SCN)

One of the few full fleet actions of the war. The Italian force was superior in cruisers while the British force was superior in battleships. In the actual engagement the Italians could not capitalize on their cruiser superiority because of an early hit on one of their battleships which caused enough damage to decide them to withdraw.

COMPUTER: RED
RED THREAT AXIS: 210 BLUE THREAT AXIS: 030
RED FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION
BLUE FORCE OBJECTIVE: ENEMY FORCE DESTRUCTION

SHIP DATA FILES

The following data files gives vital information on the ship classes available in ACTION STATIONS!

KEY

CLASS NAME: The full ship name is given. In the program the name is abbreviated to an 8-space limit. The lower case letters indicate those left out in the abbreviation.

SPEED: in knots

DIMENSIONS: length and beam, to the nearest foot

A/C: maximum number of aircraft that can be carried

Pts: ship points, a measure of the watertight integrity of the ship

ARMAMENT: for the main battery, the first number is the number of turrets/mounts; then the number and size of guns. For secondary and tertiary battery guns, the number of guns and their size is indicated.

TORPS: number of torpedo tubes and number of reloads.

AMMO: number of rounds in the Forward, Aft and aMidships main battery magazine, then secondary and tertiary battery rounds.

ARMOR: in tenths of an inch KC-face hardened class A equivalent, adjusted for angle of presentation. BB= barbette, CT= conning tower, Int= Interior (splinter) armor, Tur= Turret face (glacis) - top, Mag= magazine belt and deck protection (total), Str= Steering belt and deck, SB= secondary battery. Note that destroyer gun shields with splinter protection only are considered as "0" armor for shell penetration purposes.

Information on zone percentages, torpedo protection, list and stability, and other damage internals are maintained as propriatory data. Information on magazine capacities is sometimes estimated. Anyone with documented information is invited to contact the author.

FLEET DISK: PACIFIC

In addition to U.S. and Japanese Fleet units, contains all auxiliary/shore units.

SHIP CLASSES

AUXILIARIES, MERCHANTMEN, AND SHORE BATTERIES FILE: MS

MERSHIPS CLASS AUXILIARY
("slow" cargo ship)
9 Knots, 450 Ft X 120 Ft, 0 A/C, 4 Pts, 0 Dir
ARMAMENT: 1 / 1 - 3 in//
// AMMO: MAIN: F 0 A 150 M 0

MERSHIPM CLASS AUXILIARY FILE: MB
("medium") 12 Knots, 450 Ft X 120 Ft, 0 A/C, 4 Pts, 0 Dir
ARMAMENT: //// AMMO: MAIN: F 0 A 0 M 0

MERSHIPF CLASS AUXILIARY FILE: MF
("fast")
18 Knots, 450 Ft X 120 Ft, 0 A/C, 4 Pts, 0 Dir
ARMAMENT: MAIN: 1 / 1 - 3 in//
// AMMO: MAIN: F 0 A 150 M 0

TANKER CLASS AUXILIARY FILE: TT
12 Knots, 450 Ft X 120 Ft, 0 A/C, 4 Pts, 0 Dir
ARMAMENT: MAIN: 1 / 1 - 4 in//
// AMMO: MAIN: F 1 A 150 M 1

PT BOAT FILE: PT
40 Knots, 8 Ft X 1 Ft, 0 A/C, 3 Pts 0 Dir
ARMAMENT: MAIN: 2 / 2 - 8 in//
2 - 0 Torps// AMMO: MAIN: F 1000 A 0 M 0

TRAWLER FILE: TW
17 Knots, 150 Ft X 27 Ft, 0 A/C, 1.14 Pts, 0 Dir
ARMAMENT: MAIN: 2 / 2 - 3 in/SEC: 2 - 8 in//
// AMMO: MAIN: F 0 A 0 M 200 //SB 400

LAND TARGet FILE: LT
(an area land target with minor defenses, for shore bombardment objective)
0 Knots, 0 Ft X 0 Ft, 4 A/C, 100 Pts, 0 Dir
ARMAMENT: MAIN: 1 / 1 - 3 in//
// AMMO: MAIN: F 100 A 0 M 0

ANCHored OBJVective FILE: AO
(a group of ships - 2 knots to prevent unrealistically long torp hits)
2 Knots, 540 Ft X 54 Ft, 0 A/C, 100 Pts, 0 Dir
ARMAMENT://
// AMMO: MAIN: F 0 A 0 M 0

Shore BATtery -5IN FILE: S5
0 Knots, 0 Ft X 0 Ft, 0 A/C, 50 Pts, 1 Dir
ARMAMENT: MAIN: 2 / 4 - 5 in//
// AMMO: MAIN: F 1000 A 0 M 0
ARMOR (X10) :Bel= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 40 - 0 ,Mag= 180 - 180 ,Str= 0 - 0 ,SB= 0

Shore BATtery -8IN FILE: S8
0 Knots, 0 Ft X 0 Ft, 0 A/C, 75 Pts, 1 Dir
ARMAMENT: MAIN: 2 / 4 - 8 in//
// AMMO: MAIN: F 1000 A 0 M 0
ARMOR (X10) :Bel= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 40 - 0 ,Mag= 180 - 180 ,Str= 0 - 0 ,SB= 0

Shore Battery -14IN FILE: SX
0 Knots, 0 Ft X 0 Ft, 0 A/C, 200 Pts, 1 Dir
ARMAMENT: MAIN: 2 / 4 - 14 in//
// AMMO: MAIN: F 1000 A 0 M 0
ARMOR (X10) :Bel= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 140 - 0 ,Mag= 180 - 180 ,Str= 0 - 0 ,SB= 0

Shore Battery -14IN FILE: SQ
0 Knots, 0 Ft X 0 Ft, 0 A/C, 100 Pts, 1 Dir
ARMAMENT: MAIN: 4 / 12 - 14 in//
// AMMO: MAIN: F 2000 A 0 M 0
ARMOR (X10) :Bel= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 140 - 0 ,Mag= 180 - 180 ,Str= 0 - 0 ,SB= 0

CONVOY FILE: CY
(represents an entire convoy)
11 Knots, 1200 Ft X 120 Ft, 0 A/C, 100 Pts, 0 Dir
ARMAMENT: MAIN: 2 / 4 - 3 in//
// AMMO: MAIN: F 200 A 200 M 0

MINESWEePer FILE: MW
17 Knots, 230 Ft X 33 Ft, 0 A/C, 1.74 Pts, 0 Dir
ARMAMENT: MAIN: 2 / 2 - 4 in/SEC: 2 - .8 in//
// AMMO: MAIN: F 0 A 0 M 200 //SB 300

UNITED STATES: BATTLESHIPS

NEVADA CLASS BATTLESHIP FILE: NE
(Features a combination of triple and double main battery turrets)
20 Knots, 575 Ft X 108 Ft, 0 A/C, 49.5 Pts, 6 Dir
ARMAMENT: MAIN: 4 / 10 - 14 in/SEC: 16 - 5 in//
// AMMO: MAIN: F 500 A 500 M 0 //SB 4800
ARMOR (X10) :Bel= 135 ,Deck= 45 ,BB= 135 ,CT= 160 Int= 15
Tur 180 - 50 ,Mag= 135 - 50 ,Str= 100 - 35 ,SB= 5

NEVADA 41 CLASS BATTLESHIP FILE: N1
(Post-Pearl Harbor modifications)
20 Knots, 575 Ft X 108 Ft, 3 A/C, 49.5 Pts, 6 Dir
ARMAMENT: MAIN: 4 / 10 - 14 in/SEC: 12 - 5 in/TER: 8 - 5 in//
// AMMO: MAIN: F 500 A 500 M 0 //SB 2400 //TB 2000
ARMOR (X10) :Bel= 135 ,Deck= 40 ,BB= 135 ,CT= 160 Int= 6
Tur 160 - 50 ,Mag= 135 - 40 ,Str= 100 - 40 ,SB= 8

NEW YORK CLASS BATTLESHIP FILE: NY
(Early 14" gun design with a turret amidships)
21 Knots, 565 Ft X 106 Ft, 3 A/C, 46.95 Pts, 8 Dir
ARMAMENT: MAIN: 5 / 10 - 14 in/SEC: 16 - 5 in/TER: 8 - 3 in//
// AMMO: MAIN: F 400 A 400 M 200 //SB 4000 //TB 2400
ARMOR (X10) :Bel= 120 ,Deck= 60 ,BB= 120 ,CT= 120 Int= 15
Tur 120 - 40 ,Mag= 120 - 60 ,Str= 60 - 30 ,SB= 80

MODified PENNSylvania CLASS BATTLESHIP FILE: PE
(Powerful main battery; good protection)
21 Knots, 600 Ft X 106 Ft, 4 A/C, 52 Pts, 8 Dir
ARMAMENT: MAIN: 4 / 12 - 14 in/SEC: 12 - 5 in/TER: 8 - 5 in//
// AMMO: MAIN: F 600 A 600 M 0 //SB 3000 //TB 3600
ARMOR (X10) :Bel= 140 ,Deck= 80 ,BB= 140 ,CT= 160 Int= 16
Tur 180 - 50 ,Mag= 140 - 80 ,Str= 140 - 80 ,SB= 5

SHIP CLASSES

PENNSYLVania CLASS BATTLESHIP FILE: PM
(Post-Pearl Harbor modifications)
21 Knots, 600 Ft X 106 Ft, 4 A/C, 53.5 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 12 - 14 In/SEC: 16 - 5 In//
// AMMO: MAIN: F 660 A 660 M 0 //SB 6600
ARMOR (X10): Belt=140 ,Deck=50 ,BB=140 ,CT=160 Int= 16
Tur 180 - 50 ,Mag= 140 - 50 ,Str= 140 - 50 ,SB= 25

New MEXICO CLASS BATTLESHIP FILE: NM
(Similar to Pennsylvanias, underwater protection differences)
21 Knots, 600 Ft X 106 Ft, 4 A/C, 52 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 12 - 14 In/SEC: 12 - 5 In/TER: 8 - 5 In//
// AMMO: MAIN: F 600 A 600 M 0 //SB 3000 //TB 3600
ARMOR (X10):Belt=140 ,Deck=80 ,BB=140 ,CT= 160 Int= 16
Tur 180 - 50 ,Mag= 140 - 80 ,Str= 140 - 80 ,SB= 5

COLORado MODified CLASS BATTLESHIP FILE: CO
(Pennsylvanias with 16" main battery)
21 Knots, 600 Ft X 106 Ft, 4 A/C, 52 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 16 In/SEC: 12 - 5 In/TER: 8 - 5 In//
// AMMO: MAIN: F 600 A 600 M 0 //SB 3000 //TB 3600
ARMOR (X10): Belt=140 ,Deck=80 ,BB=140 ,CT=160 Int= 16
Tur 180 - 50 ,Mag= 140 - 80 ,Str= 140 - 80 ,SB= 5

COLORADO CLASS BATTLESHIP FILE: CM
(Post-Pearl Harbor modifications)
21 Knots, 600 Ft X 106 Ft, 4 A/C, 53.5 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 8 - 16 In/SEC: 16 - 5 In//
// AMMO: MAIN: F 660 A 660 M 0 //SB 6600
ARMOR(X10):Belt= 140,Deck= 50,BB= 140,CT= 160 Int= 16
Tur 180 - 50 ,Mag= 140 - 50 ,Str= 140 - 50 ,SB= 25

SD-1917 CLASS BATTLESHIP FILE: SA
(The 1917 South Dakota class, cancelled Washington Naval Treaty)
23 Knots, 660 Ft X 106 Ft, 4 A/C, 63 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 12 - 16 In/SEC: 16 - 6 In/TER: 4 - 3 In//
2 - 12 Torps// AMMO: MAIN: F 400 A 400 M 0 //SB 4000 //TB 800
ARMOR (X10) :Belt= 136 ,Deck= 39 ,BB= 135 ,CT= 160 Int= 22
Tur 180 - 50 ,Mag= 160 - 70 ,Str= 80 - 60 ,SB= 10

LEXINGToN CLASS BATTLESHIP FILE: LX
(Battlecruisers, cancelled by Washington Naval Treaty)
32 Knots, 850 Ft X 105 Ft, 0 A/C, 62.25 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 16 In/SEC: 16 - 6 In/TER: 6 - 3 In//
4 - 12 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 3600 //TB 1800
ARMOR (X10) :Belt= 87 ,Deck= 43 ,BB= 140 ,CT= 160 Int= 15
Tur 140 - 50 ,Mag= 88 - 50 ,Str= 87 - 50 ,SB= 0

North CAROLINa CLASS BATTLESHIP FILE: NC
(Powerful, successful warship class)
28 Knots, 714 Ft X 108 Ft, 4 A/C, 58.85 Pts, 6 Dir
ARMAMENT:MAIN: 3 / 9 - 16 In/SEC: 20 - 5 In//
// AMMO: MAIN: F 1113 A 557 M 0 //SB 8800
ARMOR (X10) :Belt= 147 ,Deck= 77 ,BB= 160 ,CT= 160 Int= 6
Tur 160 - 70 ,Mag= 160 - 77 ,Str= 118 - 60 ,SB= 20

South DAKOTA CLASS BATTLESHIP FILE: SD
(This class features inset belt armor - a poor feature)
28 Knots, 666 Ft X 108 Ft, 4 A/C, 58.85 Pts, 6 Dir
ARMAMENT:MAIN: 3 / 9 - 16 In/SEC: 20 - 5 In//
// AMMO: MAIN: F 1113 A 557 M 0 //SB 8800
ARMOR (X10) :Belt= 29 ,Deck= 72 ,BB= 174 ,CT= 160 Int= 145
Tur 180 - 73 ,Mag= 160 - 77 ,Str= 118 - 60 ,SB= 20

IOWA CLASS BATTLESHIP FILE: IO
(Successful, powerful, robust battleship class)
33 Knots, 861 Ft X 108 Ft, 4 A/C, 67.55 Pts, 6 Dir
ARMAMENT:MAIN: 3 / 9 - 16 In/SEC: 20 - 5 In//
// AMMO: MAIN: F 1113 A 557 M 0 //SB 8800
ARMOR (X10) :Belt= 173 ,Deck= 138 ,BB= 174 , CT= 175 Int= 25
Tur 200 - 73 ,Mag= 173 - 138 ,Str= 135 - 62 ,SB= 20

MONTANA CLASS BATTLESHIP FILE: MN
(Iowa, lengthened to add a 16" turret, cancelled before war's end)
28 Knots, 890 Ft X 121 Ft, 4 A/C, 70.5 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 12 - 16 In/SEC: 20 - 5 In//
// AMMO: MAIN: F 1113 A 1113 M 0 //SB 8800
ARMOR (X10) :Belt= 221 ,Deck= 70 ,BB= 210 ,CT= 180 Int= 70
Tur 180 - 78 ,Mag= 290 - 80 ,Str= 180 - 70 ,SB= 20

ARKANSAS CLASS BATTLESHIP FILE: AK
24 Knots, 555 Ft X 106 Ft, 3 A/C, 46.5 Pts, 8 Dir
ARMAMENT:MAIN: 6 / 12 - 12 In/SEC: 16 - 5 In/TER: 8 - 3 In//
// AMMO: MAIN: F 400 A 400 M 400 //SB 4000 //TB 2400
ARMOR (X10) :Belt= 100 ,Deck= 47 ,BB= 110 ,CT= 120 Int= 10
Tur 120 - 40 ,Mag= 110 - 48 ,Str= 50 - 30 ,SB= 65

IV-2 CLASS BATTLESHIP FILE: IV
(Design study for the "maximum battleship", limited by Panama Canal)
25 Knots, 975 Ft X 108 Ft, 2 A/C, 77 Pts, 8 Dir
ARMAMENT:MAIN: 5 / 15 - 18 In/SEC: 20 - 6 In/TER: 6 - 3 In//
8 - 0 Torps// AMMO: MAIN: F 400 A 600 M 0 //SB 4000 // TB 1200
ARMOR (X10) :Belt= 160 ,Deck= 75 ,BB= 150 ,CT= 160 Int= 25
Tur 210 - 70 ,Mag= 185 - 75 ,Str= 160 - 50 ,SB= 10

SHIP CLASSES

UNITED STATES - CRUISERS

OMAHA CLASS CRUISER FILE: OM
(Obsolescent fire control, but a US cruiser with torpedoes!)
33 Knots, 550 Ft X 55 Ft, 2 A/C, 17.72 Pts, 2 Dir
ARMAMENT:MAIN: 6 / 10 - 6 In/SEC: 8 - 3 In//
6 - 0 Torps// AMMO: MAIN: F 1800 A 1200 M 0 //SB 16000
ARMOR (X10) :Belt= 30 ,Deck= 15 ,BB= 5 ,CT= 13 Int= 5
Tur 5 - 5 ,Mag= 30 - 15 ,Str= 30 - 15 ,SB= 0

PENSACOLa CLASS CRUISER FILE: PA
("Tin-Clad" cruiser built under treaty limitations)
32 Knots, 570 Ft X 65 Ft, 4 A/C, 21.36 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 10 - 8 In/SEC: 8 - 5 In//
// AMMO: MAIN: F 750 A 750 M 0 //SB 1200
ARMOR (X10) :Belt= 30 ,Deck= 10 ,BB= 8 ,CT= 13 Int= 0
Tur 25 - 15 ,Mag= 40 - 18 ,Str= 30 - 10 ,SB= 0

NORTHAMPton CLASS CRUISER FILE: NN
32 Knots, 582 Ft X 66 Ft, 4 A/C, 21.36 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 9 - 8 In/SEC: 8 - 5 In//
// AMMO: MAIN: F 933 A 468 M 0 //SB 800
ARMOR (X10) :Belt= 38 ,Deck= 10 ,BB= 15 ,CT= 0 Int= 0
Tur 25 - 15 ,Mag= 38 - 20 ,Str= 30 - 10 ,SB= 0

PORTLAND CLASS CRUISER FILE: PO
32 Knots, 582 Ft X 66 Ft, 4 A/C, 21.36 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 9 - 8 In/SEC: 8 - 5 In//
// AMMO: MAIN: F 933 A 468 M 0 //SB 800
ARMOR (X10) :Belt= 58 ,Deck= 25 ,BB= 15 ,CT= 13 Int= 0
Tur 25 - 15 ,Mag= 58 - 25 ,Str= 23 - 25 ,SB= 0

NEW ORLEAns CLASS CRUISER FILE: NW
32 Knots, 578 Ft X 62 Ft, 4 A/C, 23.65 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 9 - 8 In/SEC: 8 - 5 In//
// AMMO: MAIN: F 933 A 468 M 0 //SB 800
ARMOR (X10) :Belt= 58 ,Deck= 30 ,BB= 50 ,CT= 80 Int= 0
Tur 50 - 28 ,Mag= 58 - 30 ,Str= 50 - 30 ,SB= 0

BROOKLYN CLASS CRUISER FILE: BR
(Large and effective rapid fire gun battery - a destroyer killer)
32 Knots, 600 Ft X 62 Ft, 4 A/C, 22.89 Pts, 4 Dir
ARMAMENT:MAIN: 5 / 15 - 6 In/SEC: 8 - 5 In//
// AMMO: MAIN: F 2700 A 1800 M 0 //SB 1600
ARMOR (X10) :Belt= 56 ,Deck= 20 ,BB= 60 ,CT= 80 Int= 0
Tur 65 - 28 ,Mag= 56 - 20 ,Str= 56 - 20 ,SB= 0

ATLANTA CLASS CRUISER FILE: AA
(Anti-aircraft cruiser, deadly in close range v. destroyers)
33 Knots, 520 Ft X 53 Ft, 0 A/C, 17.77 Pts, 2 Dir
ARMAMENT:MAIN: 8 / 16 - 5 In/SEC: 8 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 2625 A 2625 M 1750 //SB 4000
ARMOR (X10) :Belt= 38 ,Deck= 13 ,BB= 13 ,CT= 25 Int= 0
Tur 13 - 13 ,Mag= 38 - 18 ,Str= 38 - 13 ,SB= 10

CLEVELANd CLASS CRUISER FILE: CL
(Brooklyn, substituting extra armor for one turret - top heavy)
32 Knots, 600 Ft X 64 Ft, 4 A/C, 21.84 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 12 - 6 In/SEC: 12 - 5 In//
// ARMAMENT: MAIN: F 1800 A 1800 M 0 //SB 6000
ARMOR (X10) :Belt= 53 ,Deck= 20 ,BB= 60 ,CT= 50 Int= 6
Tur 60 - 30 ,Mag= 59 - 20 ,Str= 47 - 20 ,SB= 8

ALASKA CLASS CRUISER FILE: AL
(The larger guns do not make up for the lower volume of fire)
33 Knots, 791 Ft X 91 Ft, 4 A/C, 50.43 Pts, 6 Dir
ARMAMENT:MAIN: 3 / 9 - 12 In/SEC: 12 - 5 In//
// AMMO: MAIN: F 660 A 330 M 0 //SB 6000
ARMOR (X10) :Belt= 80 ,Deck= 50 ,BB= 130 ,CT= 108 Int= 10
Tur 128 - 50 ,Mag= 80 - 50 ,Str= 110 - 40 ,SB= 0

UNITED STATES - DESTROYERS

FLETCHER CLASS DESTROYER FILE: FL
(The classic - powerful, durable, well-balanced)
35 Knots, 369 Ft X 40 Ft, 0 A/C, 5.4 Pts, 2 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 24 - .8 In//
10 - 0 Torps// AMMO: MAIN: F 850 A 1275 M 0 //SB 10000
ARMOR (X10) :Belt= 8 ,Deck= 5 ,BB= 0 ,CT= 5 Int= 0
Tur 5 - 5 ,Mag= 8 - 5 ,Str= 8 - 5 ,SB= 0

PORTER CLASS DESTROYER FILE: PR
(Tended to be top-heavy)
37 Knots, 372 Ft X 37 Ft, 0 A/C, 4.16 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 8 - 5 In/SEC: 10 - .8 In//
8 - 8 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 2000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 5 Int= 0
Tur 5 - 5 ,Mag= 8 - 0 ,Str= 0 - 0 ,SB= 0

GRIDLEY CLASS DESTROYER FILE: GR
38 Knots, 334 Ft X 36 Ft, 0 A/C, 4.7 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 5 In/SEC: 4 - .8 In//
16 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 800
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

FOUR PIPEer CLASS DESTROYER FILE: FP
(Officially "Wickes/Clemson" class, WW I vintage)
35 Knots, 310 Ft X 31 Ft, 0 A/C, 2.32 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4 In/SEC: 1 - 3 In//
12 - 0 Torps// AMMO: MAIN: F 200 A 200 M 400 //SB 200
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 8 - 0 ,Str= 0 - 0 ,SB= 0

FARRAGUT CLASS DESTROYER FILE: FT
36 Knots, 330 Ft X 35 Ft, 0 A/C, 4.46 Pts, 1 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 2 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 600 A 900 M 0 //SB 1000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MAHAN CLASS DESTROYER FILE: MH
36 Knots, 334 Ft X 35 Ft, 0 A/C, 4.69 Pts, 1 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 3 - .8 In//
12 - 0 Torps// AMMO: MAIN: F 600 A 900 M 0 //SB 800
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

SHIP CLASSES

SOMERS CLASS DESTROYER FILE: SO
(Porter class, without the large alternate gun director)
35 Knots, 371 Ft X 36 Ft, 0 A/C, 5.74 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 8 - 5 In/SEC: 10 - .8 In//
12-0 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 3000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 5 Int= 0
Tur 5 - 5 ,Mag= 8 - 0 ,Str= 0 - 0 ,SB= 0

SAMPSON CLASS DESTROYER FILE: SM
37 Knots, 371 Ft X 36 Ft, 0 A/C, 5.74 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 8 - 5 In/SEC: 10 - .8 In//
12 - 0 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 2000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 5 Int= 0
Tur 5 - 5 ,Mag= 8 - 0 ,Str= 0 - 0 ,SB= 0

SIMS CLASS DESTROYER FILE: SS
37 Knots, 341 Ft X 36 Ft, 0 A/C, 4.97 Pts, 1 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 3 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 600 A 900 M 0 //SB 1500
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 5 - 5 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

BENSON CLASS DESTROYER FILE: BE
36 Knots, 341 Ft X 36 Ft, 0 A/C, 4.97 Pts, 1 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 8 - .8 In//
10 - 0 Torps// AMMO: MAIN: F 600 A 900 M 0 //SB 4000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 5 - 5 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

BRISTOL CLASS DESTROYER FILE: BL
36 Knots, 341 Ft X 36 Ft, 0 A/C, 5.02 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 5 In/SEC: 6 - .8 In//
5 - 0 Torps// AMMO: MAIN: F 600 A 900 M 0 //SB 3000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 5 - 5 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

BENHAM CLASS DESTROYER FILE: BM
38 Knots, 334 Ft X 36 Ft, 0 A/C, 4.7 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 5 In/SEC: 4 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 1000
ARMOR (X10):Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

NETHERLANDS

DERUYTER CLASS CRUISER FILE: DR
32 Knots, 551 Ft X 51 Ft, 2 A/C, 15.08 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 7 - 5.9 In//
// AMMO: MAIN: F 750 A 1000 M 0
ARMOR (X10) :Belt= 30 ,Deck= 13 ,BB= 20 ,CT= 10 Int= 0
Tur 40 - 20 ,Mag= 30 - 13 ,Str= 20 - 0 ,SB= 8

JAVA CLASS CRUISER FILE: JV
(8 mount limit forced a consolidation into "twins" turrets)
30 Knots, 509 Ft X 53 Ft, 2 A/C, 14 Pts, 2 Dir
ARMAMENT:MAIN: 8 / 10 - 5.9 In//
// AMMO: MAIN: F 300 A 300 M 900
ARMOR (X10) :Belt= 30 ,Deck= 10 ,BB= 20 ,CT= 50 Int= 0
Tur 40 - 40 ,Mag= 20 - 10 ,Str= 0 - 0 ,SB= 0

VANGHENT CLASS DESTROYER FILE: VG
32 Knots, 307 Ft X 32 Ft, 0 A/C, 3.28 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 8 - 4.7 In/SEC: 2 - 3 In//
6 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 600
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

IMPERIAL JAPANESE NAVY - BATTLESHIPS

KONGO CLASS BATTLESHIP FILE: KN
(Actually a battlecruiser, British design)
30 Knots, 720 Ft X 101 Ft, 3 A/C, 47.25 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 8 - 14 In/SEC: 14 - 6 In//
// AMMO: MAIN: F 400 A 400 M 0 //SB
ARMOR (X10) :Belt= 80 ,Deck= 48 ,BB= 100 ,CT= 80 Int= 0
Tur 110 - 48 ,Mag= 80 - 48 ,Str= 30 - 30 ,SB= 60

FUSO CLASS BATTLESHIP FILE: FO
24 Knots, 689 Ft X 109 Ft, 3 A/C, 50.2 Pts, 8 Dir
ARMAMENT:MAIN: 6 / 12 - 14 In/SEC: 14 - 6 In/TER: 8 - 5 In//
// AMMO: MAIN: F 400 A 400 M 400 //SB 2800 //TB 2400
ARMOR (X10) :Belt= 120 ,Deck= 47 ,BB= 120 ,CT= 120 Int= 0
Tur 120 - 48 ,Mag= 120 - 48 ,Str= 30 - 30 ,SB= 60

TOSA CLASS BATTLESHIP FILE: KA
(Under construction when cancelled by Washington Naval Treaty)
26 Knots, 760 Ft X 100 Ft, 2 A/C, 58.4 Pts, 8 Dir
ARMAMENT:MAIN: 5 / 10 - 16 In/SEO: 20 - 5.5 In/TER: 8 - 5 In//
8 - 0 Torps// AMMO: MAIN: F 400 A 600 M 0 //SB 6000 //TB 2400
ARMOR (X10) :Belt= 127 ,Deck= 55 ,BB= 110 ,CT= 140 Int= 30
Tur 110 - 70 ,Mag= 129 - 60 ,Str= 90 - 55 ,SB= 10

AMAGI CLASS BATTLESHIP FILE: AM
(Another design study warship)
30 Knots, 820 Ft X 101 Ft, 2 A/C, 60.75 Pts, 8 Dir
ARMAMENT:MAIN: 5 / 10 - 16 In/SEC: 16 - 5.5 In/TER: 4 - 5 In//
8 - 0 Torps// AMMO: MAIN: F 400 A 600 M 0 //SB 6000 //TB 1200
ARMOR (X10) :Belt= 100 ,Deck= 40 ,BB= 110 ,CT= 140 Int= 30
Tur 110 - 70 ,Mag= 115 - 40 ,Str= 90 - 40 ,SB= 10

-13- CLASS BATTLESHIP FILE: 13
(design, predecessor of Yamato)
30 Knots, 900 Ft X 101 Ft, 2 A/C, 61 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8-18.1 In/SEC: 16-5.5 In/TER: 4-4.7 In/
8 - 0 Torps// AMMO: MAIN: F 360 A 360 M 0 //SB 3200 //TB 800
ARMOR (X10) :Belt= 149 ,Deck= 50 ,BB= 110 ,CT= 140 Int= 30
Tur 110 - 70 ,Mag= 150 - 50 ,Str= 110 - 50 ,SB= 10

YAMATO CLASS BATTLESHIP FILE: YA
(Hard to hurt. Slow guns, but when hit the target knows it!)
27 Knots, 840 Ft X 128 Ft, 6 A/C, 74 Pts, 8 Dir
ARMAMENT:MAIN: 3 / 9 - 18.1 In/SEC: 6 - 6.1 In/TER: 24 - 5 In//
// AMMO: MAIN: F 600 A 300 M 0 //SB 1800 //TB 7200
ARMOR (X10) :Belt= 207 ,Deck= 79 ,BB= 220 ,CT= 112 Int= 0
Tur 260 - 106 ,Mag= 194 - 79 ,Str= 142 - 79 ,SB= 10

NAGATO CLASS BATTLESHIP FILE: NO
25 Knots, 725 Ft X 114 Ft, 3 A/C, 57.39 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 16 In/SEC: 18 - 5.5 In/TER: 8 - 5 In//
// AMMO: MAIN: F 400 A 400 M 0 //SB 5400 //TB 2400
ARMOR (X10) :Belt= 118 ,Deck= 71 ,BB= 167 ,CT= 146 Int= 30
Tur 140 - 70 ,Mag= 118 - 70 ,Str= 70 - 30 ,SB= 10

IMPERIAL JAPANESE NAVY - CRUISERS

NAKA CLASS CRUISER FILE: NA
(sturdy and serviceable with a good war record)
35 Knots, 520 Ft X 47 Ft, 1 A/C, 10.39 Pts, 1 Dir
ARMAMENT:MAIN: 7 / 7 - 5.5 In/SEC: 2 - 5 In//
8 - 8 Torps// AMMO: MAIN: F 800 A 600 M 0 //SB 400
ARMOR (X10) :Belt= 20 ,Deck= 15 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 20 - 15 ,Str= 0 - 0 ,SB= 0

YUBARI CLASS CRUISER FILE: YU
(small, almost a large destroyer)
32 Knots, 450 Ft X 39 Ft, 0 A/C, 7.56 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 6 - 5.5 In//
4 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0
ARMOR (X10) :Belt= 20 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 5 - 0 ,Mag= 20 - 5 ,Str= 0 - 0 ,SB= 0

FURUTAKA CLASS CRUISER FILE: FA
(main battery not safely armored, but hull durable in a fight)
33 Knots, 595 Ft X 57 Ft, 2 A/C, 20.23 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 6 - 8 In/SEC: 4 - 4.7 In//
8 - 8 Torps// AMMO: MAIN: F 600 A 300 M 0 //SB 800
ARMOR (X10) :Belt= 30 ,Deck= 15 ,BB= 10 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 30 - 15 ,Str= 0 - 0 ,SB= 0

NACHI CLASS CRUISER FILE: NI
(With the Long Lance battery, excellent but poor turret armor)
33 Knots, 661 Ft X 68 Ft, 2 A/C, 24.07 Pts, 4 Dir
ARMAMENT:MAIN: 5 / 10 - 8 In/SEC: 8 - 5 In//
16 - 16 Torps// AMMO: MAIN: F 900 A 600 M 0 //SB 2400
ARMOR (X10) :Belt= 45 ,Deck= 25 ,BB= 15 ,CT= 15 Int= 0
Tur 15 - 10 ,Mag= 45 - 50 ,Str= 25 - 25 ,SB= 7

MOGAMI6 CLASS CRUISER FILE: M6
(Mogami with the original main battery guns - good, but top heavy)
36 Knots, 661 Ft X 68 Ft, 3 A/C, 22.4 Pts, 4 Dir
ARMAMENT:MAIN: 5 / 15 - 6.1 In/SEC: 8 - 5 In//
12 - 12 Torps// AMMO: MAIN: F 2000 A 1500 M 0 //SB 2400
ARMOR (X10) :Belt= 45 ,Deck= 15 ,BB= 10 ,CT= 15 Int= 0
Tur 10 - 10 ,Mag= 50 - 50 ,Str= 20 - 15 ,SB= 7

MOGAMI8 CLASS CRUISER FILE: M8
(8" gun conversion. Less top heavy, but guns give lower hit rate)
34 Knots, 661 Ft X 68 Ft, 3 A/C, 24.4 Pts, 4 Dir
ARMAMENT:MAIN: 5 / 10 - 8 In/SEC: 8 - 5 In//
12 - 12 Torps// AMMO: MAIN: F 900 A 600 M 0 //SB 2400
ARMOR (X10) :Belt= 45 ,Deck= 15 ,BB= 10 ,CT= 15 Int= 0
Tur 10 - 10 ,Mag= 50 - 50 ,Str= 20 - 15 ,SB= 7

TONE CLASS CRUISER FILE: TO
(a successful recce cruiser with fantail devoted to float planes)
35 Knots, 650 Ft X 60 Ft, 5 A/C, 26.85 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 8 - 5 In//
12 - 12 Torps// AMMO: MAIN: F 800 A 600 M 0 //SB 6400
ARMOR (X10) :Belt= 40 ,Deck= 20 ,BB= 30 ,CT= 30 Int= 0
Tur 30 - 10 ,Mag= 57 - 22 ,Str= 25 - 20 ,SB= 7

AGANO CLASS CRUISER FILE: AG
(economy design; good companion for DD in torpedo attacks)
35 Knots, 564 Ft X 50 Ft, 2 A/C, 16.8 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 6 - 5.9 In/SEC: 4 - 4.7 In//
8 - 8 Torps// AMMO: MAIN: F 800 A 400 M 0 //SB 800
ARMOR (X10) :Belt= 23 ,Deck= 8 ,BB= 10 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 23 - 20 ,Str= 0 - 0 ,SB= 0

KITAKAMI CLASS CRUISER FILE: KT
(40 torp tubes -approximated by 4 mounts of 5 tubes, 20 reloads)
36 Knots, 520 Ft X 47 Ft, 0 A/C, 11.14 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 5 In//
20 - 20 Torps// AMMO: MAIN: F 400 A 400 M 0
ARMOR (X10) :Belt= 20 ,Deck= 15 ,BB= 0 ,CT= 20 Int= 0
Tur 0 - 0 ,Mag= 20 - 15 ,Str= 0 - 0 ,SB= 0

TENRYU CLASS CRUISER FILE: TE
(obsolescent)
32 Knots, 458 Ft X 41 Ft, 0 A/C, 8.7 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 5.5 In//
6 - 0 Torps// AMMO: MAIN: F 200 A 400 M 200
ARMOR (X10) :Belt= 20 ,Deck= 15 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 20 - 15 ,Str= 0 - 0 ,SB= 0

IMPERIAL JAPANESE NAVY - DESTROYERS

KAMIKAZI CLASS DESTROYER FILE: KZ
(vintage WW I)
31 Knots, 329 Ft X 30 Ft, 0 A/C, 3.44 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 3 - 4.7 In//
6 - 0 Torps// AMMO: MAIN: F 100 A 100 M 100
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MUTSUKI CLASS DESTROYER FILE: MU
33 Knots, 329 Ft X 30 Ft, 0 A/C, 3.54 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4.7 In//
6 - 0 Torps// AMMO: MAIN: F 100 A 100 M 200
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MUTSUKIT CLASS DESTROYER FILE: MT
(Mutsuki modified as a high speed transport)
33 Knots, 329 Ft X 30 Ft, 0 A/C, 3.54 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 2 - 4.7 In//
6 - 0 Torps// AMMO: MAIN: F 100 A 100 M 0
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

FUBUKI CLASS DESTROYER FILE: FI
34 Knots, 378 Ft X 34 Ft, 0 A/C, 4.18 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 6 - 5 In/SEC: 2 - .8 In//
9 - 6 Torps// AMMO: MAIN: F 600 A 1200 M 0 //SB 200
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 10

HATSUHARu CLASS DESTROYER FILE: HA
34 Knots, 353 Ft X 33 Ft, 0 A/C, 3.37 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 5 - 5 In/SEC: 2 - .8 In//
6 - 6 Torps// AMMO: MAIN: F 600 A 1000 M 0 //SB 200
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

SHIRATSUyu CLASS DESTROYER FILE: SH
34 Knots, 353 Ft X 33 Ft, 0 A/C, 3.37 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 5 - 5 In//
8 - 8 Torps// AMMO: MAIN: F 600 A 1000 M 0
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

KAGERO CLASS DESTROYER FILE: KR
35 Knots, 381 Ft X 36 Ft, 0 A/C, 4.07 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 6 - 5 In/SEC: 4 - .8 In//
8 - 8 Torps// AMMO: MAIN: F 600 A 1200 M 0 //SB 500
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

YUGUMO CLASS DESTROYER FILE: YO
35 Knots, 384 Ft X 36 Ft, 0 A/C, 4.15 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 6 - 5 In/SEC: 4 - .8 In//
8 - 8 Torps// AMMO: MAIN: F 600 A 1200 M 0 //SB 2000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

SHIMAKAZe CLASS DESTROYER FILE: SK
(experimental, with advanced main propulsion machinery)
40 Knots, 410 Ft X 37 Ft, 0 A/C, 5.8 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 5 In/SEC: 2 - .8 In//
15 - 5 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 600
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

AKITSUKI CLASS DESTROYER FILE: AT
(surprisingly effective 3.9" rapid fire main battery)
33 Knots, 433 Ft X 38 Ft, 0 A/C, 5.4 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 8 - 3.9 In/SEC: 4 - .8 In//
4 - 4 Torps// AMMO: MAIN: F 1600 A 1600 M 0 //SB 2000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 8 - 8 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

CHITOSE CLASS AUXILIARY FILE: CH
29 Knots, 604 Ft X 62 Ft, 12 A/C, 13 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 5 In//
// AMMO: MAIN: F 1200 A 1 M 1
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 1

GERMAN - BATTLESHIPS

BISMARCK CLASS BATTLESHIP FILE: BI
(excellent - highly accurate but complex and fragile fire control)
29 Knots, 794 Ft X 118 Ft, 6 A/C, 63.75 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 15 In/SEC: 12 - 5.9 In/TER: 16 - 4.1 In//
// AMMO: MAIN: F 480 A 480 M 0 //SB 2800 //TB 4800
ARMOR (X10) :Belt= 126 ,Deck= 52 ,BB= 135 ,CT= 140 Int= 35
Tur 136 - 50 ,Mag= 126 - 67 ,Str= 126 - 45 ,SB= 39

TIRPITZ CLASS BATTLESHIP FILE: TZ
(Bismarck + torpedo tubes)
29 Knots, 794 Ft X 118 Ft, 6 A/C, 63.75 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 16 In/SEC: 12 - 5.9 In/TER: 16 - 4.1 In//
8 - 8 Torps// AMMO: MAIN: F 480 A 480 M 0 //SB 2800 //TB 4800
ARMOR (X10) :Belt= 126 ,Deck= 52 ,BB= 135 ,CT= 140 Int= 35
Tur 136 - 50 ,Mag= 126 - 67 ,Str= 126 - 45 ,SB= 39

OPQ-BC CLASS BATTLESHIP FILE: OP
(Battlecruiser designed for long range merchant raiding)
33 Knots, 825 Ft X 99 Ft, 4 A/C, 53.5 Pts, 8 Dir
ARMAMENT:MAIN: 3 / 6 - 16 In/SEC: 6 - 5.9 In/TER: 8 - 4.1 In/
// AMMO: MAIN: F 400 A 200 M 0 //SB 1200 //TB 2400
ARMOR (X10) :Belt= 71 ,Deck= 52 ,BB= 72 ,CT= 79 Int= 18
Tur 82 - 20 ,Mag= 90 - 40 ,Str= 40 - 15 ,SB= 20

H-CLASS CLASS BATTLESHIP FILE: HG
(solid design, obsolete underwater torp tubes, cancelled by war)
29 Knots, 870 Ft X 124 Ft, 4 A/C, 63.75 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 16 In/SEC: 12 - 5.9 In/TER: 16 - 4.1 In//
6 - 6 Torps// AMMO: MAIN: F 480 A 480 M 0 //SB 2800 //TB 4800
ARMOR (X10) :Belt= 128 ,Deck= 60 ,BB= 145 ,CT= 155 Int= 45
Tur 155 - 50 ,Mag= 126 - 67 ,Str= 126 - 45 ,SB= 39

H-44 CLASS BATTLESHIP FILE: H4
(huge, supposedly 20" guns. 18" in game- 20" never built, no data)
29 Knots, 1121 Ft X 167 Ft, 4 A/C, 94 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 18 In/SEC: 12 - 5.9 In/TER: 16 - 4.1 In//
6 - 6 Torps// AMMO: MAIN: F 480 A 480 M 0 //SB 2800 //TB 4800
ARMOR (X10) :Belt= 150 ,Deck= 60 ,BB= 150 ,CT= 155 Int= 45
Tur 155 - 60 ,Mag= 150 - 67 ,Str= 150 - 60 ,SB= 39

SCHARNHOrst CLASS BATTLESHIP FILE: SC
(The 11" guns will serve well in low visibility, short range fight)
32 Knots, 742 Ft X 100 Ft, 4 A/C, 54.4 Pts, 8 Dir
ARMAMENT:MAIN: 3 / 9 - 11 In/SEC: 12 - 5.9 In/TER: 14 - 4.1 In//
// AMMO: MAIN: F 630 A 315 M 0 //SB1800 //TB 5600
ARMOR (X10) :Belt= 138 ,Deck= 39 ,BB= 138 ,CT= 138 Int= 30
Tur 142 - 49 ,Mag= 138 - 39 ,Str= 50 - 30 ,SB= 0

GERMAN - CRUISERS

HIPPER CLASS CRUISER FILE: HI
32 Knots, 640 Ft X 70 Ft, 3 A/C, 31.25 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 12 - 4.1 In//
12 - 12 Torps// AMMO: MAIN: F 560 A 560 M 0 //SB 5040
ARMOR (X10) :Belt= 35 ,Deck= 13 ,BB= 32 ,CT= 24 Int= 12
Tur 63 - 28 ,Mag= 48 - 20 ,Str= 28 - 12 ,SB= 5

LEIPZIG CLASS CRUISER FILE: LE
33 Knots, 570 Ft X 50 Ft, 2 A/C, 16.2 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 9 - 5.9 In/SEC: 6 - 3.5 In//
6 - 0 Torps// AMMO: MAIN: F 360 A 720 M 0 //SB 800
ARMOR (X10) :Belt= 20 ,Deck= 8 ,BB= 12 ,CT= 39 Int= 10
Tur 12 - 12 ,Mag= 20 - 16 ,Str= 20 - 8 ,SB= 5

KOLN CLASS CRUISER FILE: KO
33 Knots, 570 Ft X 50 Ft, 2 A/C, 16.2 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 9 - 5.9 In/SEC: 6 - 3.5 In//
6 - 0 Torps// AMMO: MAIN: F 360 A 720 M 0 //SB 600
ARMOR (X10) :Belt= 20 ,Deck= 8 ,BB= 12 ,CT= 39 Int= 6
Tur 12 - 12 ,Mag= 20 - 16 ,Str= 20 - 8 ,SB= 5

EMDEN CLASS CRUISER FILE: EM
29 Knots, 509 Ft X 47 Ft, 0 A/C, 14 Pts, 2 Dir
ARMAMENT:MAIN: 8 / 8 - 5.9 In/SEC: 3 - 3.5 In//
4 - 0 Torps// AMMO: MAIN: F 480 A 480 M 0 //SB 1200
ARMOR (X10) :Belt= 20 ,Deck= 8 ,BB= 8 ,CT= 30 Int= 0
Tur 5 - 0 ,Mag= 20 - 8 ,Str= 0 - 0 ,SB= 0

M CRUISER CLASS CRUISER FILE: MG
(laid down, never completed)
35 Knots, 584 Ft X 56 Ft, 2 A/C, 19.6 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 5.9 In/SEC: 4 - 4.1 In//
8 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 1000
ARMOR (X10) :Belt= 20 ,Deck= 10 ,BB= 25 ,CT= 40 Int= 0
Tur 33 - 8 ,Mag= 20 - 10 ,Str= 0 - 0 ,SB= 5

SCOUT-CR CLASS CRUISER FILE: SP
(large destroyer classed as a "Scout" cruiser)
36 Knots, 476 Ft X 48 Ft, 0 A/C, 11.8 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 6 - 5.9 In/SEC: 2 - 3.5 In//
10 - 0 Torps// AMMO: MAIN: F 400 A 800 M 0 //SB 600
ARMOR (X10) :Belt= 0 ,Deck= 8 ,BB= 5 ,CT= 0 Int= 0
Tur 10 - 10 ,Mag= 8 - 8 ,Str= 0 - 0 ,SB= 5

GRAFSPEE CLASS CRUISER FILE: GS
(Pocket Battleship)
26 Knots, 617 Ft X 71 Ft, 2 A/C, 28 Pts, 8 Dir
ARMAMENT:MAIN: 2 / 6 - 11 In/SEC: 8 - 5.9 In/TER: 6 - 4.1 In/
8 - 0 Torps// AMMO: MAIN: F 300 A 300 M 0 //SB 1600 //TB 1800
ARMOR (X10) :Belt= 35 ,Deck= 18 ,BB= 39 ,CT= 59 Int= 17
Tur 55 - 41 ,Mag= 54 - 18 ,Str= 32 - 18 ,SB= 4

GERMAN - DESTROYERS

MAAS-Z1 CLASS DESTROYER FILE: MA
37 Knots, 374 Ft X 37 Ft, 0 A/C, 6.31 Pts, 1 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 8 - .8 In//
8 - 0 Torps// AMMO: MAIN: F240 A 240 M 120 //SB 2000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

Z-23 CLASS DESTROYER FILE: Z2
38 Knots, 400 Ft X 39 Ft, 0 A/C, 7.21 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 5.9 In/SEC: 14 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 240 A 240 M 120 //SB 4000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

G 1936A CLASS DESTROYER FILE: Z6
38 Knots, 400 Ft X 39 Ft, 0 A/C, 7.21 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 5 - 5.9 In//
8 - 0 Torps// AMMO: MAIN: F 240 A 360 M 0
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

G 1936B CLASS DESTROYER FILE: ZB
38 Knots, 400 Ft X 39 Ft, 0 A/C, 7.21 Pts, 1 Dir
ARMAMENT:MAIN: 5 / 5 - 5 In/SEC: 14 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 600 A 900 M 0 //SB 4000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MOWE CLASS DESTROYER FILE: MO
33 Knots, 281 Ft X 28 Ft, 0 A/C, 1.89 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 3 - 4.1 In/SEC: 1 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 100 A 200 M 0 //SB 200
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 8 - 0 ,Str= 0 - 0 ,SB= 0

T-1 CLASS TORPEDO BOAT FILE: T1
35 Knots, 270 Ft X 28 Ft, 0 A/C, 1.69 Pts, 0 Dir
ARMAMENT:MAIN: 1 / 1 - 4.1 In/SEC: 4 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 0 A 100 M 0 //SB 900
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 8 - 0 ,Str= 0 - 0 ,SB= 0

ITALIAN - BATTLESHIPS

VENETO CLASS BATTLESHIP FILE: VV
(high-velocity long range gun, but inaccurate)
30 Knots, 720 Ft X 102 Ft, 3 A/C, 59.75 Pts, 8 Dir
ARMAMENT:MAIN: 3 / 9 - 15 In/SEC: 12 - 6 In/TER: 12 - 3.5 In//
// AMMO: MAIN: F 600 A 300 M 0 //SB 2880 //TB 2400
ARMOR (X10) :Belt= 157 ,Deck= 58 ,BB= 138 ,CT= 94 Int= 16
Tur 100 - 39 ,Mag= 93 - 50 ,Str= 40 - 40 ,SB= 50

CAVOUR CLASS BATTLESHIP FILE: CR
(outclassed by all likely BB opponents, too slow to catch cruisers)
27 Knots, 524 Ft X 87 Ft, 1 A/C, 44.25 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 10 - 12.6 In/SEC: 12 - 4.7 In/TER: 8 - 3.9 In//
// AMMO: MAIN: F 500 A 500 M 0 //SB 2880 //TB 2400
ARMOR (X10) :Belt= 93 ,Deck= 50 ,BB= 91 ,CT= 102 Int= 16
Tur 100 - 33 ,Mag= 93 - 50 ,Str= 51 - 11 ,SB= 5

SHIP CLASSES

DUILIO CLASS BATTLESHIP FILE: DO
27 Knots, 524 Ft X 87 Ft, 1 A/C, 44.25 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 10 - 12.6 In/SEC: 12 - 5.3 In/TER: 10 - 3.5 In//
// AMMO: MAIN: F 500 A 500 M 0 //SB 2880 //TB 2400
ARMOR (X10) :Belt= 93 ,Deck= 50 ,BB= 91 ,CT= 102 Int= 16
Tur 100 - 33 ,Mag= 93 - 50 ,Str= 51 - 11 ,SB= 50

ITALIAN - CRUISERS

TRENTO CLASS CRUISER FILE: TX
(Treaty cruiser with inaccurate main battery mount)
31 Knots, 611 Ft X 64 Ft, 3 A/C, 24.75 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 16 - 3.9 In//
8 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 4800
ARMOR (X10) :Belt= 30 ,Deck= 20 ,BB= 40 ,CT= 40 Int= 0
Tur 40 - 20 ,Mag= 40 - 20 ,Str= 20 - 10 ,SB= 4

ZARA CLASS CRUISER FILE: ZA
(good design, but inaccurate main battery)
29 Knots, 570 Ft X 65 Ft, 2 A/C, 21.36 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 16 - 3.9 In//
// AMMO: MAIN: F 600 A 600 M 0 //SB 4800
ARMOR (X10) :Belt= 60 ,Deck= 30 ,BB= 6 ,CT= 60 Int= 0
Tur 60 - 15 ,Mag= 60 - 30 ,Str= 30 - 10 ,SB= 4

CADORNA CLASS CRUISER FILE: CA
(fragile, fast)
36 Knots, 527 Ft X 48 Ft, 2 A/C, 15.06 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 6 In/SEC: 6 - 3.9 In//
4 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 2800
ARMOR (X10) :Belt= 17 ,Deck= 8 ,BB= 8 ,CT= 20 Int= 0
Tur 8 - 8 ,Mag= 18 - 8 ,Str= 0 - 0 ,SB= 4

MONTECUCcoli CLASS CRUISER FILE: MX
(Cadorna with less speed, better protection)
34 Knots, 558 Ft X 51 Ft, 2 A/C, 16.74 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 6 In/SEC: 6 - 3.9 In//
4 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 2800
ARMOR (X10) :Belt= 33 ,Deck= 12 ,BB= 28 ,CT= 40 Int= 0
Tur 28 - 13 ,Mag= 28 - 13 ,Str= 0 - 0 ,SB= 4

duca d'AOSTA CLASS CRUISER FILE: FX
(better armor, but could not stand up to an 8" gun cruiser)
34 Knots, 558 Ft X 54 Ft, 2 A/C, 19.5 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 6 In/SEC: 6 - 3.9 In//
6 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 2800
ARMOR (X10) :Belt= 40 ,Deck= 14 ,BB= 40 ,CT= 40 Int= 0
Tur 40 - 14 ,Mag= 40 - 14 ,Str= 0 - 0 ,SB= 4

GARABALDi CLASS CRUISER FILE: GA
(best balanced of the italian cruisers)
31 Knots, 575 Ft X 59 Ft, 2 A/C, 18.14 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 10 - 6 In/SEC: 8 - 3.9 In//
6 - 0 Torps// AMMO: MAIN: F 1000 A 1000 M 0 //SB 2400
ARMOR (X10) :Belt= 43 ,Deck= 25 ,BB= 43 ,CT= 55 Int= 0
Tur 55 - 20 ,Mag= 43 - 22 ,Str= 0 - 0 ,SB= 0

REGOLO CLASS CRUISER FILE: RG
(fast enough to run down destroyers and run from cruisers)
40 Knots, 434 Ft X 45 Ft, 0 A/C, 10.82 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 8 - 5.3 In//
8 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

BANDe NERE CLASS CRUISER FILE: BN
(scout cruiser, could not make speed at battle loads)
30 Knots, 524 Ft X 48 Ft, 2 A/C, 14 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 6 In/SEC: 7 - 3.9 In//
4 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 2800
ARMOR (X10) :Belt= 10 ,Deck= 9 ,BB= 10 ,CT= 15 Int= 0
Tur 10 - 10 ,Mag= 10 - 10 ,Str= 0 - 0 ,SB= 4

ITALIAN - DESTROYERS

TURBINE CLASS DESTROYER FILE: TU
36 Knots, 300 Ft X 30 Ft, 0 A/C, 2.2 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 4.7 In/SEC: 2 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 400 A 400 M 0 //SB 400
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

NAVIGATORi CLASS DESTROYER FILE: NV
32 Knots, 351 Ft X 35 Ft, 0 A/C, 4.02 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 6 - 4.7 In/SEC: 6 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 400 A 400 M 400 //SB 1500
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

FOLGORE CLASS DESTROYER FILE: FE
38 Knots, 351 Ft X 35 Ft, 0 A/C, 4.02 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 4.7 In/SEC: 8 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 400 A 400 M 400 //SB 1500
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MAESTRALe CLASS DESTROYER FILE: ML
32 Knots, 334 Ft X 36 Ft, 0 A/C, 3.28 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 4.7 In/SEC: 6 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

ORIANI CLASS DESTROYER FILE: OR
38 Knots, 341 Ft X 34 Ft, 0 A/C, 3.9 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 4.7 In/SEC: 8 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //TB 2500
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

SOLDATI CLASS DESTROYER FILE: SL
34 Knots, 334 Ft X 36 Ft, 0 A/C, 3.66 Pts, 1 Dir
ARMAMENT:MAIN: 2 / 4 - 4.7 In/SEC: 8 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1500
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

SHIP CLASSES

GREAT BRITAIN - BATTLESHIPS

KING-GV CLASS BATTLESHIP FILE: KG
(too many compromises, defective in main battery turrets)
28 Knots, 714 Ft X 108 Ft, 4 A/C, 56.75 Pts, 6 Dir
ARMAMENT:MAIN: 3 / 10 - 14 In/SEC: 16 - 5.2 In//
// AMMO: MAIN: F 600 A 300 M 0 //SB 6400
ARMOR (X10) :Belt=140 ,Deck=50 ,BB=160 ,CT=30 Int= 20
Tur 160 - 59 ,Mag= 150 - 60 ,Str= 45 - 20 ,SB= 20

NELSON CLASS BATTLESHIP FILE: NL
(awkward and vulnerable design, low ROF sec/ter battery)
23 Knots, 700 Ft X 106 Ft, 4 A/C, 45.02 Pts, 8 Dir
ARMAMENT:MAIN: 3 / 9 - 16 In/SEC: 12 - 6 In/TER: 6 - 4.7 In//
2 - 12 Torps// AMMO: MAIN: F 285 A 285 M 285 //SB 1620 //TB 1050
ARMOR (X10) :Belt= 159 ,Deck= 36 ,BB= 150 ,CT=140 Int= 0
Tur 160 - 73 ,Mag= 171 - 63 ,Str= 50 - 60 ,SB= 20

Queen ELIZaBeTH CLASS BATTLESHIP FILE: QE
(WW I era, greatly modified, effective for its age)
24 Knots, 640 Ft X 90 Ft, 3 A/C, 52 Pts, 6 Dir
ARMAMENT:MAIN: 4 / 8 - 15 In/SEC: 20 - 4.7 In//
// AMMO: MAIN: F 424 A 424 M 0 //SB 8000
ARMOR (X10) :Belt= 130 ,Deck=25 ,BB=100 ,CT=110 Int= 10
Tur 130 - 51 ,Mag= 130 - 50 ,Str= 40 - 15 ,SB= 10

REPULSE CLASS BATTLESHIP FILE: RE
(low stability, poor underwater protection)
28 Knots, 794 Ft X 90 Ft, 4 A/C, 40.5 Pts, 6 Dir
ARMAMENT:MAIN: 3 / 6 - 15 In/SEC: 17 - 4 In//
8 - 12 Torps// AMMO: MAIN: F 504 A 252 M 0 //SB 1800
ARMOR (X10):Belt= 99 ,Deck= 55 ,BB= 125 ,CT= 110 Int= 20
Tur 110 - 41 ,Mag= 99 - 40 ,Str= 40 - 15 ,SB= 60

RSOVERGN CLASS BATTLESHIP FILE: RV
(WW I era, without needed modifications)
21 Knots, 600 Ft X 88 Ft, 3 A/C, 45.5 Pts, 8 Dir
APMAMENT:MAIN: 4 / 8 - 15 In/SEC: 12 - 6 In/TER: 8 - 4 In//
// AMMO: MAIN: F 320 A 320 M 0 //SB 1560 //TB 2000
ARMOR (X10) :Belt= 130 ,Deck= 30 ,BB= 100 ,CT= 110 Int= 10
Tur 130 - 51 ,Mag= 130 - 40 ,Str= 40 - 15 ,SB= 60

HOOD CLASS BATTLESHIP FILE: HO
(WW I era, lost before needed modifications were accomplished)
30 Knots, 810 Ft X 104 Ft, 0 A/C, 61.75 Pts, 8 Dir
ARMAMENT:MAIN: 4 / 8 - 15 In/SEC: 6 - 5.5 In/TER: 14 - 4 In//
4-12 TORPS//
// AMMO: MAIN: F 480 A 480 M 0 //SB 1200 //TB 3500
ARMOR (X10) :Belt=120 ,Deck= 45 ,BB= 120 ,CT= 110 Int= 15
Tur 150 - 50 ,Mag= 90 - 55 ,Str= 50 - 20 ,SB= 50

TERROR CLASS MONITOR FILE: TR
(Better suited to shore bombardment than ship-to-ship action)
12 Knots, 400 Ft X 88 Ft, 0 A/C, 14.4 Pts, 1 Dir
ARMAMENT:MAIN: 1 / 2 - 15 In/SEC: 4 - 4 In//
// AMMO: MAIN: F 200 A 0 M 0 //SB 600
ARMOR (X10) :Belt= 40 ,Deck= 20 ,BB= 80 ,CT= 60 Int= 10
Tur 130 - 43 ,Mag= 40 - 40 ,Str= 20 - 20 ,SB= 0

GREAT BRITAIN - CRUISERS

D-CL CLASS CRUISER FILE: DC
(Obsolescent WW I era)
29 Knots, 465 Ft X 47 Ft, 0 A/C, 9.7 Pts, 1 Dir
ARMAMENT:MAIN: 6 / 6 - 6 In/SEC: 3 - 4 In//
12 - 0 Torps// AMMO: MAIN: F 200 A 200 M 200 //SB 600
ARMOR (X10) :Belt= 30 ,Deck= 10 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 30 - 10 ,Str= 15 - 10 ,SB= 0

BiRmiNGHAM CLASS CRUISER FILE: BH
(Obsolescent WW I era)
29 Knots, 565 Ft X 65 Ft, 0 A/C, 18.6 Pts, 1 Dir
ARMAMENT:MAIN: 8 / 9 - 6 In/SEC: 5 - 4 In//
4 - 0 Torps// AMMO: MAIN: F 300 A 400 M 200 //SB 1000
ARMOR (X10) :Belt= 30 ,Deck= 15 ,BB= 20 ,CT= 30 Int= 0
Tur 0 - 0 ,Mag= 30 - 15 ,Str= 20 - 10 ,SB= 0

CAPETOWN CLASS DESTROYER FILE: CW
(WW I cruiser converted into an effective AA platform)
29 Knots, 452 Ft X 44 Ft, 0 A/C, 8.58 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 8 - 4 In//
// AMMO: MAIN: F 2400 A 2400 M 0
ARMOR (X10) :Belt= 30 ,Deck= 10 ,BB= 0 ,CT= 30 Int= 0
Tur 0 - 0 ,Mag= 30 - 10 ,Str= 0 - 0 ,SB= 0

EMERALD CLASS CRUISER FILE: ED
(Obsolescent WW I)
32 Knots, 535 Ft X 54 Ft, 1 A/C, 18 Pts, 1 Dir
ARMAMENT:MAIN: 7 / 7 - 6 In/SEC: 5 - 4 In//
16 - 0 Torps// AMMO: MAIN: F 200 A 300 M 200 //SB 1000
ARMOR (X10) :Belt= 30 ,Deck= 10 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 30 - 10 ,Str= 20 - 10 ,SB= 0

KENT CLASS CRUISER FILE: KE
(magazine protection good, but light side plating, vulnerable)
31 Knots, 590 Ft X 69 Ft, 1 A/C, 25.7 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 8 - 4 In//
8 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1800
ARMOR (X10) :Belt= 10 ,Deck= 13 ,BB= 0 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 40 - 10 ,Str= 10 - 10 ,SB= 0

LONDON CLASS CRUISER FILE: LO
(Improved Kent)
32 Knots, 591 Ft X 69 Ft, 1 A/C, 25 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 8 - 4 In//
8 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1800
ARMOR (X10) :Belt= 33 ,Deck= 15 ,BB= 0 ,CT= 10 Int= 0
Tur 10 - 15 ,Mag= 40 - 15 ,Str= 10 - 10 ,SB= 0

NORFOLK CLASS CRUISER FILE: NK
(Improved London with better turrets and ammo supply system)
32 Knots, 591 Ft X 69 Ft, 0 A/C, 25 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 8 In/SEC: 8 - 4 In//
8 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1800
ARMOR (X10) :Belt= 35 ,Deck= 15 ,BB= 10 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 40 - 15 ,Str= 10 - 10 ,SB= 0

SHIP CLASSES

EXETER CLASS CRUISER FILE: EX
(useful to show the flag)
32 Knots, 575 Ft X 59 Ft, 2 A/C, 16.78 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 6 - 8 In/SEC: 4 - 4 In//
6 - 0 Torps// AMMO: MAIN: F 600 A 300 M 0 //SB 800
ARMOR (X10) :Belt= 30 ,Deck= 15 ,BB= 0 ,CT= 30 Int= 0
Tur 10 - 10 ,Mag= 40 - 15 ,Str= 0 - 0 ,SB= 0

LEANDER CLASS CRUISER FILE: LR
(Poor ammunition supply limited main battery rate of fire)
32 Knots, 575 Ft X 59 Ft, 2 A/C, 14.4 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 8 - 6 In/SEC: 8 - 4 In//
8 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 800
ARMOR (X10) :Belt= 40 ,Deck= 13 ,BB= 10 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 35 - 20 ,Str= 15 - 15 ,SB= 0

ARETHUSA CLASS CRUISER FILE: AR
(smallest possible useful cruiser, outclassed by many DDs)
32 Knots, 500 Ft X 51 Ft, 1 A/C, 10.54 Pts, 4 Dir
ARMAMENT:MAIN: 3 / 6 - 6 In/SEC: 4 - 4 In//
6 - 0 Torps// AMMO: MAIN: F 800 A 400 M 0 //SB 800
ARMOR (X10) :Belt= 23 ,Deck= 10 ,BB= 10 ,CT= 0 Int= 0
Tur 10 - 10 ,Mag= 30 - 10 ,Str= 0 - 10 ,SB= 0

SOUTHAMPTON CLASS CRUISER FILE: SN
(Balanced design with good war record)
32 Knots, 5580 Ft X 62 Ft, 3 A/C, 20.24 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 12 - 6 In/SEC: 8 - 4 In//
6 - 0 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 2400
ARMOR (X10) :Belt= 45 ,Deck= 13 ,BB= 20 ,CT= 40 Int= 0
Tur 10 - 10 ,Mag= 45 - 20 ,Str= 15 - 15 ,SB= 0

EDINBURG CLASS CRUISER FILE: EG
(Improved Southampton, but MB guns still hand rammed!)
32 Knots, 612 Ft X 63 Ft, 3 A/C, 21.24 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 12 - 6 In/SEC: 12 - 4 In//
6 - 0 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 2400
ARMOR (X10) :Belt= 45 ,Deck= 20 ,BB= 20 ,CT= 40 Int= 0
Tur 40 - 20 ,Mag= 45 - 30 ,Str= 0 - 20 ,SB= 0

DIDO CLASS CRUISER FILE: DI
(very effective anti-aircraft cruiser)
33 Knots, 512 Ft X 51 Ft, 0 A/C, 10.9 Pts, 2 Dir
ARMAMENT:MAIN: 5 / 10 - 5.2 In//
6 - 0 Torps// AMMO: MAIN: F 1800 A 1200 M 0
ARMOR (X10) :Belt= 30 ,Deck= 10 ,BB= 10 ,CT= 10 Int= 0
Tur 5 - 5 ,Mag= 20 - 20 ,Str= 0 - 10 ,SB= 0

FIJI CLASS CRUISER FILE: FJ
(Improved Edinbaurg, fragile - one was sunk by 1 bomb hit)
33 Knots, 555 Ft X 62 Ft, 3 A/C, 21.1 Pts, 4 Dir
ARMAMENT:MAIN: 4 / 12 - 6 In/SEC: 8 - 4 In//
6 - 0 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 2400
ARMOR (X10) :Belt= 33 ,Deck= 20 ,BB= 10 ,CT= 40 Int= 0
Tur 20 - 10 ,Mag= 33 - 20 ,Str= 0 - 13 ,SB= 0

ABDIEL CLASS CRUISER-MINELAYER FILE: AB
34 Knots, 400 Ft X 40 Ft, 0 A/C, 8 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 6 - 4 In//
// AMMO: MAIN: F 800 A 400 M 1
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

GREAT BRITAIN - DESTROYERS

VW-DDs CLASS DESTROYER FILE: VC
(Robust WW I era design, excellent war record)
30 Knots, 310 Ft X 29 Ft, 0 A/C, 2.85 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4 In/SEC: 2 - .8 In//
6 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 250
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

AB-DDs CLASS DESTROYER FILE: BC
32 Knots, 320 Ft X 35 Ft, 0 A/C, 3.53 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4.7 In//
8 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

CDEF-DDs CLASS DESTROYER FILE: CC
32 Knots, 320 Ft X 35 Ft, 0 A/C, 3.78 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4.7 In/SEC: 4 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

GHI-DD CLASS DESTROYER FILE: GH
32 Knots, 320 Ft X 35 Ft, 0 A/C, 3.71 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4.7 In/SEC: 4 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 500 A 500 M 0 //SB 1000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

TRIBAL CLASS DESTROYER FILE: TC
33 Knots, 360 Ft X 36 Ft, 0 A/C, 5.04 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 8 - 4.7 In/SEC: 10 - .8 In//
4 - 0 Torps// AMMO: MAIN: F 1200 A 1200 M 0 //SB 3000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

JKLMN CLASS DESTROYER FILE: JK
32 Knots, 345 Ft X 36 Ft, 0 A/C, 4.66 Pts, 1 Dir
ARMAMENT:MAIN: 3 / 6 - 4.7 In/SEC: 14 - .8 In//
10 - 0 Torps// AMMO: MAIN: F 1200 A 600 M 0 //SB 3000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

STUVWZ CLASS DESTROYER FILE: SZ
32 Knots, 360 Ft X 36 Ft, 0 A/C, 5.06 Pts, 2 Dir
ARMAMENT:MAIN: 4 / 4 - 4.7 In/SEC: 14 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 4000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

O-DD CLASS DESTROYER FILE: OC
33 Knots, 345 Ft X 36 Ft, 0 A/C, 4.44 Pts, 1 Dir
ARMAMENT:MAIN: 4 / 4 - 4 In/SEC: 6 - .8 In//
8 - 0 Torps// AMMO: MAIN: F 800 A 800 M 0 //SB 2000
ARMOR (X10) :Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

SHIP CLASSES

FLOWER CLASS DESTROYER FILE: FR
16 Knots, 190 Ft X 19 Ft, 0 A/C, 2 32 Pts, 0 Dir
ARMAMENT: MAIN: 1 / 1 - 4 in//
// AMMO: MAIN: F 100 A 0 M 0 //SB 150
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

HUNT CLASS DESTROYER FILE: HT
26 Knots, 264 Ft X 29 Ft, 0 A/C, 2.41 Pts, 1 Dir
ARMAMENT: MAIN: 2 / 4 - 4 in/SEC: 6 - .8 in//
// AMMO: MAIN: F 400 A 400 M 0 //SB 2000
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

L 4-inch CLASS DESTROYER FILE: L4
(L class DD with 4" AA guns)
32 Knots, 345 Ft X 36 Ft, 0 A/C, 4.66 Pts, 1 Dir
ARMAMENT: MAIN: 4 / 8 - 4 in/SEC: 14 - 8" in//
10 - 0 Torps// AMMO: MAIN: F 1600 A 1600 M 0 //SB 3000
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

FRANCE - BATTLESHIPS

COURBET CLASS BATTLESHIP FILE: CT
(WW I era, very poor underwater protection)
20 Knots, 536 Ft X 87 Ft, 0 A/C, 36.7 Pts, 4 Dir
ARMAMENT: MAIN: 6 / 12 - 12 in/SEC: 22 - 5.5 in//
// AMMO: MAIN: F 400 A 400 M 400 //SB 3300
ARMOR (X10): Belt= 106,Deck= 32,BB= 110,CT= 118 Int= 16
Tur 114 - 39 ,Mag= 134 - 52 ,Str= 10 - 10 ,SB= 71

BRETAGNE CLASS BATTLESHIP FILE: BT
(WW I era, poor underwater protection)
20 Knots, 533 Ft X 87 Ft, 3 A/C, 43 Pts, 8 Dir
ARMAMENT: MAIN: 5 / 10-13.4 in/SEC: 14-5.5 in/TER: 8-3 in
// AMMO: MAIN: F 400 A 400 M 200 //SB 3400 //TB 2400
ARMOR (X10): Belt= 106,Deck= 27,BB= 98,CT= 124 Int= 18
Tur 98 - 28 ,Mag= 107 - 45 ,Str= 63 - 33 ,SB= 31

NORMANDY CLASS BATTLESHIP FILE: ND
(post-WW I design, never built. Quad turrets.)
20 Knots, 554 Ft X 88 Ft, 0 A/C, 43 Pts, 8 Dir
ARMAMENT: MAIN: 3 / 12 - 13.4 in/SEC: 24 - 5.5 in//
6 - 18 Torps// AMMO: MAIN: F 400 A 400 M 400 //SB 4800
ARMOR (X10): Belt= 118 ,Deck= 19 ,BB= 112 ,CT= 118 Int= 19
Tur 134 - 39 ,Mag= 118 - 39 ,Str= 63 - 33 ,SB= 47

LYON CLASS BATTLESHIP FILE: LY
(designed only. Heavy battery in quad turrets)
23 Knots, 617 Ft X 94 Ft, 0 A/C, 45.1 Pts, 8 Dir
ARMAMENT: MAIN: 4 / 16 - 13.4 in/SEC: 24 - 5.5 in//
6 - 18 Torps// AMMO: MAIN: F 400 A 800 M 400 //SB 4800
ARMOR (X10): Belt= 118 ,Deck= 19 ,BB= 112 ,CT= 118 Int= 19
Tur 134 - 39 ,Mag= 118 - 39 ,Str= 63 - 33 ,SB= 47

DUNKERQUE CLASS BATTLESHIP FILE: DK
(unusual design, 2 quad turrets forward)
29 Knots, 686 Ft X 102 Ft, 2 A/C, 46.5 Pts, 6 Dir
ARMAMENT: MAIN: 2 / 8 - 13 in/SEC: 16 - 5.1 in//
// AMMO: MAIN: F 400 A 400 M 0 //SB 7865
ARMOR (X10): Belt= 5 ,Deck= 51 ,BB= 136 ,CT= 105 Int= 102
Tur 130 - 59 ,Mag= 102 - 51 ,Str= 10 - 10 ,SB= 35

RICHELIEU CLASS BATTLESHIP FILE: RU
(2 quad turrets forward, better protection than Dunkerque)
30 Knots, 794 Ft X 108 Ft, 3 A/C, 57.9 Pts, 6 Dir
ARMAMENT: MAIN: 2 / 8 - 15 in/SEC: 10 - 3.9 in//
// AMMO: MAIN: F 416 A 416 M 0 //SB 2800 //TB 6500
ARMOR (X10): Belt= 5 ,Deck= 59 ,BB= 159 ,CT= 134 Int= 176
Tur 170 - 77 ,Mag= 176 - 75 ,Str= 10 - 10 ,SB= 50

FRANCE - CRUISERS

TROUIN CLASS CRUISER FILE: TI
(light protection makes this ship vulnerable to DD fire)
33 Knots, 575 Ft X 56 Ft, 2 A/C, 15.2 Pts, 4 Dir
ARMAMENT: MAIN: 4 / 8 - 6.1 in/SEC: 4 - 3 in//
12 - 0 Torps// AMMO: MAIN: F 600 A 600 M 0 //SB 800
ARMOR (X10): Belt= 0 ,Deck= 8 ,BB= 0 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 10 - 10 ,Str= 10 - 10 ,SB= 0

DUQUESNE CLASS CRUISER FILE: DQ
(build on TROUIN pattern, upgunned to 8" main battery)
33 Knots, 625 Ft X 62 Ft, 2 A/C, 21.4 Pts, 4 Dir
ARMAMENT: MAIN: 4 / 8 - 8 in/SEC: 8 - 3 in//
6 - 0 Torps// AMMO: MAIN: F 400 A 400 M 0 //SB 1600
ARMOR (X10): Belt= 10 ,Deck= 0 ,BB= 0 ,CT= 10 Int= 0
Tur 10 - 10 ,Mag= 10 - 10 ,Str= 10 - 10 ,SB= 0

SUFFREN CLASS CRUISER FILE: SF
(Duquesnes, trading 2 knots for better protection)
31 Knots, 606 Ft X 64 Ft, 2 A/C, 21 Pts, 4 Dir
ARMAMENT: MAIN: 4 / 8 - 8 in/SEC: 8 - 3.5 in//
12 - 0 Torps// AMMO: MAIN: F 400 A 400 M 0 //SB 1600
ARMOR (X10): Belt= 0 ,Deck= 10 ,BB= 10 ,CT= 110 Int= 23
Tur 10 - 10 ,Mag= 23 - 22 ,Str= 22 - 22 ,SB= 0

ALGERIE CLASS CRUISER FILE: AE
(good fundamental design)
31 Knots, 590 Ft X 65 Ft, 3 A/C, 21.1 Pts, 6 Dir
ARMAMENT: MAIN: 4 / 8 - 8 in/SEC: 12 - 3.9 in//
6 - 0 Torps// AMMO: MAIN: F 400 A 400 M 0 //SB 3000
ARMOR (X10): Belt= 48 ,Deck= 30 ,BB= 38 ,CT= 38 Int= 0
Tur 38 - 28 ,Mag= 48 - 30 ,Str= 38 - 30 ,SB= 0

BERTIN CLASS CRUISER FILE: BQ
(DD squadron flagship. Fast, poor sec bat arrangement)
34 Knots, 548 Ft X 53 Ft, 2 A/C, 11.1 Pts, 4 Dir
ARMAMENT: MAIN: 3 / 9 - 6 in/SEC: 4 - 3.5 in//
6 - 0 Torps// AMMO: MAIN: F 900 A 450 M 0 //SB 800
ARMOR (X10): Belt= 0 ,Deck= 10 ,BB= 0 ,CT= 10 Int= 0
Tur 5 - 5 ,Mag= 10 - 10 ,Str= 0 - 0 ,SB= 0

GALISaONnieRe CLASS CRUISER FILE: GE
(improved Bertin, with better protection)
32 Knots, 564 Ft X 57 Ft, 4 A/C, 16 Pts, 4 Dir
ARMAMENT: MAIN: 3 / 9 - 6 in/SEC: 8 - 3.5 in//
4 - 0 Torps// AMMO: MAIN: F 900 A 450 M 0 //SB 3000
ARMOR (X10): Belt= 40 ,Deck= 15 ,BB= 40 ,CT= 38 Int= 0
Tur 40 - 20 ,Mag= 40 - 15 ,Str= 0 - 0 ,SB= 0

SHIP CLASSES

FRANCE - DESTROYERS

CHACAL CLASS DESTROYER FILE: CQ
(main battery ROF slow)
34 Knots, 393 Ft X 37 Ft, 0 A/C, 4.25 Pts, 1 Dir
ARMAMENT: MAIN: 5 / 5 - 5.1 in/SEC: 2 - 3 in//
6 - 0 Torps// AMMO: MAIN: F 280 A 280 M 140 //SB 600
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0*

GEUPARD CLASS DESTROYER FILE: GD
(poor fire control and ROF limits effectiveness beyond 13K)
36 Knots, 404 Ft X 38 Ft, 0 A/C, 4.87 Pts, 1 Dir
ARMAMENT: MAIN: 5 / 5 - 5.5 in/SEC: 4 - .8 in//
6 - 0 Torps// AMMO: MAIN: F 280 A 280 M 140 //SB 2400
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

AIGLE CLASS DESTROYER FILE: AI
(also Vauquelin class. Better main battery)
37 Knots, 402 Ft X 39 Ft, 0 A/C, 4.88 Pts, 1 Dir
ARMAMENT: MAIN: 5 / 5 - 5.5 in/SEC: 4 - .8 in//
1 - 0 Torps// AMMO: MAIN: F 280 A 280 M 140 //SB 2400
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

FANTaSQUE CLASS DESTROYER FILE: FQ
(excellent general-purpose design)
37 Knots, 402 Ft X 39 Ft, 0 A/C, 5.01 Pts, 1 Dir
ARMAMENT: MAIN: 5 / 5 - 5.5 in/SEC: 4 - .8 in//
6 - 0 Torps// AMMO: MAIN: F 280 A 280 M 140 //SB 2400
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MOGADOR CLASS DESTROYER FILE: MR
(excellent design, but unreliable main battery mounts)
39 Knots, 430 Ft X 45 Ft, 0 A/C, 5.77 Pts, 2 Dir
ARMAMENT: MAIN: 4 / 8 - 5.5 in/SEC: 4 - .8 in//
10 - 0 Torps// AMMO: MAIN: F 560 A 569 M 0 //SB 2400
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

BOURSQUE CLASS DESTROYER FILE: BO
(a disappointment)
30 Knots, 327 Ft X 32 Ft, 0 A/C, 2.64 Pts, 1 Dir
ARMAMENT: MAIN: 4 / 4 - 5.1 in/SEC: 2 - .8 in//
6 - 0 Torps// AMMO: MAIN: F 250 A 250 M 0 //SB 1000
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

L'ADROIT CLASS DESTROYER FILE: LA
32 Knots, 331 Ft X 32 Ft, 0 A/C, 2.76 Pts, 1 Dir
ARMAMENT: MAIN: 4 / 4 - 5.1 in/SEC: 2 - .8 in//
6 - 0 Torps// AMMO: MAIN: F 250 A 250 M 0 //SB 1000
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

LE_HARDI CLASS DESTROYER FILE: LH
35 Knots, 366 Ft X 36 Ft, 0 A/C, 3.54 Pts, 2 Dir
ARMAMENT: MAIN: 3 / 6 - 5.1 in/SEC: 2 - .8 in//
7 - 0 Torps// AMMO: MAIN: F 250 A 400 M 0 //SB 1000
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

MELPOMENe CLASS TORPEDO BOAT FILE: MP.SHP
34 Knots, 250 Ft X 26 Ft, 0 A/C, 1.36 Pts, 0 Dir
ARMAMENT: MAIN: 2 / 2 - 3.9 in//
2 - 0 Torps// AMMO: MAIN: F 0 A 100 M 100
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

RUSSIA - BATTLESHIPS

GANGUT CLASS BATTLESHIP FILE: GT
(dreadful, unlivable, unsanitary, death trap)
23 Knots, 588 Ft X 81 Ft, 2 A/C, 31.25 Pts, 4 Dir
ARMAMENT: MAIN: 4 / 12 - 12 in/SEC: 12 - 4.7 in//
// AMMO: MAIN: F 300 A 300 M 600 //SB 1800
ARMOR (X10): Belt= 88 ,Deck= 14 ,BB= 80 ,CT= 100 Int= 20
Tur 100 - 50 ,Mag= 178 - 14 ,Str= 10 - 10 ,SB= 49

SoVyetskiy_SOYUZ CLASS BATTLESHIP FILE: SV
(Inspired by Italian designs, possibly improved, not launched)
30 Knots, 851 Ft X 129 Ft, 3 A/C, 59.7 Pts, 4 Dir
ARMAMENT: MAIN: 3 / 9 - 16 in/SEC: 12 - 5.1 in//
// AMMO: MAIN: F 600 A 300 M 0 //SB 2400
ARMOR (X10): Belt= 130 ,Deck= 60 ,BB= 130 ,CT= 180 Int= 10
Tur 130 - 60 ,Mag= 130 - 60 ,Str= 50 - 20 ,SB= 10

KRONShTaDT CLASS BATTLESHIP FILE: KH
(Inspired by Scharnhorst, laid down but not completed)
33 Knots, 817 Ft X 103 Ft, 4 A/C, 50.5 Pts, 8 Dir
ARMAMENT: MAIN: 3 / 9 - 12 in/SEC: 8 - 5.9 in/TER: 8 - 3.9 in/
/// AMMO: MAIN: F 600 A 300 M 0 //SB 1200 //TB 1600
ARMOR (X10): Belt= 90 ,Deck= 35 ,BB= 90 ,CT= 90 Int= 0
Tur 90 - 35 ,Mag= 90 - 35 ,Str= 45 - 18 ,SB= 5

PROFINTeRN CLASS CRUISER FILE: PN
(WW I hold-over)
22 Knots, 507 Ft X 50 Ft, 1 A/C, 9.4 Pts, 4 Dir
ARMAMENT: MAIN: 8 / 15 - 5.1 in/SEC: 6 - 3.9 in//
6 - 0 Torps// AMMO: MAIN: F 300 A 500 M 700 //SB 1200
ARMOR (X10): Belt= 30 ,Deck= 10 ,BB= 18 ,CT= 30 Int= 0
Tur 18 - 18 ,Mag= 30 - 10 ,Str= 15 - 5 ,SB= 0

Krasnyi_KAVKAZ CLASS CRUISER FILE: KK
(4 guns in single mounts - not a lot of punch)
29 Knots, 551 Ft X 51 Ft, 1 A/C, 15.1 Pts, 4 Dir
ARMAMENT: MAIN: 4 / 4 - 7.1 in/SEC: 6 - 3.9 in//
12 - 0 Torps// AMMO: MAIN: F 200 A 200 M 0 //SB 1200
ARMOR (X10): Belt= 30 ,Deck= 10 ,BB= 30 ,CT= 300 Int= 0
Tur 30 - 15 ,Mag= 30 - 15 ,Str= 0 - 0 ,SB= 0

KIROV CLASS CRUISER FILE: KV
(Italian inspired with strengthened hull. Serviceable.)
34 Knots, 584 Ft X 58 Ft, 1 A/C, 15.1 Pts, 4 Dir
ARMAMENT: MAIN: 3 / 9 - 7.1 in/SEC: 6 - 3.9 in//
6 - 0 Torps// AMMO: MAIN: F 600 A 300 M 0 //SB 1200
ARMOR (X10): Belt= 20 ,Deck= 20 ,BB= 20 ,CT= 30 Int= 0
Tur 30 - 20 ,Mag= 30 - 20 ,Str= 0 - 0 ,SB= 0

SHIP CLASSES

Maxim_GORKIY CLASS CRUISER FILE: GY
(Variation on Kirov)
35 Knots, 626 Ft X 58 Ft, 2 A/C, 16.7 Pts, 4 Dir
ARMAMENT: MAIN: 3 / 9 - 7.1 in/SEC: 6 - 3.9 in//
6 - 0 Torps// AMMO: MAIN: F 600 A 300 M 0 //SB 1200
ARMOR (X10): Belt= 20 ,Deck= 20 ,BB= 20 ,CT= 30 Int= 0
Tur 30 - 20 ,Mag= 30 - 20 ,Str= 0 - 0 ,SB= 0

CHAPAYEV CLASS CRUISER FILE: CV
(compares unfavorably with Clevelands on same tonnage)
34 Knots, 659 Ft X 65 Ft, 2 A/C, 21.1 Pts, 4 Dir
ARMAMENT: MAIN: 4 / 12 - 5.9 in/SEC: 8 - 3.9 in//
6 - 0 Torps// AMMO: MAIN: F 900 A 900 M 0 //SB 1600
ARMOR (X10): Belt= 20 ,Deck= 20 ,BB= 20 ,CT= 30 Int= 0
Tur 30 - 20 ,Mag= 30 - 20 ,Str= 0 - 0 ,SB= 0

RUSSIA - DESTROYERS

LENINGRaD CLASS DESTROYER FILE: LD
34 Knots, 418 Ft X 39 Ft, 0 A/C, 4.37 Pts, 2 Dir
ARMAMENT: MAIN: 5 / 5 - 5.1 in/SEC: 2 - 3 in//
8 - 0 Torps// AMMO: MAIN: F 200 A 200 M 100 //SB 200
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

TASHKENT CLASS DESTROYER FILE: TK
("Blue Beauty", Italian design, good)
32 Knots, 459 Ft X 45 Ft, 0 A/C, 5.2 Pts, 2 Dir
ARMAMENT: MAIN: 3 / 6 - 5.1 in/SEC: 6 - .8 in//
9 - 0 Torps// AMMO: MAIN: F 600 A 300 M 0 //SB 1500
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

GNEVNYI CLASS DESTROYER FILE: GI
32 Knots, 371 Ft X 23 Ft, 0 A/C, 3.1 Pts, 1 Dir
ARMAMENT: MAIN: 4 / 4 - 5.1 in/SEC: 2 - 3 in//
6 - 0 Torps// AMMO: MAIN: F 200 A 200 M 300 //SB 1000
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

STOROZheVoI CLASS DESTROYER FILE: SI
32 Knots, 370 Ft X 33 Ft, 0 A/C, 4.3 Pts, 1 Dir
ARMAMENT: MAIN: 4 / 4 - 5.1 in/SEC: 2 - 3 in//
6 - 0 Torps// AMMO: MAIN: F 200 A 200 M 300 //SB 500
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

OPYTYI CLASS DESTROYER FILE: OI
39 Knots, 387 Ft X 38 Ft, 0 A/C, 3.06 Pts, 1 Dir
ARMAMENT: MAIN: 3 / 3 - 5.1 in/SEC: 4 - .8 in//
6 - 0 Torps// AMMO: MAIN: F 150 A 300 M 0 //SB 1300
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

OGNEVOI CLASS DESTROYER FILE: OG
36 Knots, 383 Ft X 36 Ft, 0 A/C, 4.51 Pts, 2 Dir
ARMAMENT: MAIN: 2 / 4 - 5.1 in/SEC: 2 - 3 in//
6 - 0 Torps// AMMO: MAIN: F 280 A 280 M 0 //SB 300
ARMOR (X10): Belt= 0 ,Deck= 0 ,BB= 0 ,CT= 0 Int= 0
Tur 0 - 0 ,Mag= 0 - 0 ,Str= 0 - 0 ,SB= 0

APPENDIX J: BENEDICTION

Blessed be the Lord, my rock.
Who trains my hands for war,
And my fingers for battle;
My lovingkindness and my fortress,
My stronghold and my deliverer;
My shield and He in whom I take refuge;
Who subdues my people under me.
O Lord, what is man, that Thou dost take knowledge of him?
Or the son of man, that Thou dost think of him?
Man is like a mere breath;
His days are like a passing shadow.
Bow Thy heavens, O Lord, and come down;
Touch the mountains, that they may smoke.
Flash forth lightning and scatter them;
Send out Thine arrows and confuse them.
Stretch forth Thy hand from on high;
Rescue and deliver me out of great waters.

From "Psalm of David Prayer for Rescue and Prosperity" Psalm 144

VERSION 3.0 MANUAL SUPPLEMENT

The Amiga version of Action Stations contains all of the following:

Version 3.0 contains a number of changes, corrections, and augmentations. Many are minor – but in Naval Warfare "the Devil is in the Details", and so we have tried to adjust program performance and accuracy down to the fraction. Many of these changes were suggested by our customers – THANK YOU for all the great feedback.

NEW FEATURES OF V3.0: (keyed to manual paragraphs):

QUICKSTART: SECURITY CHECK: ***Clarification:*** We have simplified the security system. When you count lines, do not include any captions or lines in a chart or figure. All words begin a paragraph and are exactly five letters long. Enter the word **EXACTLY** as written, **including capital and small letters**. If the word is "Salvo", "SALVO" or "salvo" will not work.

QUICKSTART and APPENDIX I : ***Change:*** The scenarios RVRPLATE.SCN and VELLA_GF.SCN have been relocated to the BATTLE disk.

VI.2. Battle Plot Symbology: ***Addition:*** Arrows indicating wind direction (red) and sea direction (green) appear in the lower right corner of the Battle Plot.

VIII.1. Ship's Status: ***Addition:*** We have added a flashing "CF" next to the list angle readout to indicate when the ship is counterflooding.

Addition: In the "Weapons" display, we have added the line "Fatigue Main-Sec/Ter". This will give an indication of the fatigue level of the gun and fire control crews. If it is blank, the crews are fully rested; the grades will then progress from "A" (fresh), "B", "C", "D", to "E" (exhausted).

Addition: A detailed report from Damage Control Central of hit location can be obtained by pressing F9. It gives the type of damage suffered in the last three minutes. This data is not retained if you save the game and restart. "Splinter" indicates either a near miss that damages the ship with shrapnel, or a hit that did not penetrate armour.

VIII.1.A. Weapon's Status: ***Clarification:*** The "Gunfire Degredations" report also lists improved gunnery conditions: radar assist when the target is in sight visually, aircraft spot, and more. See "XX. GUNNERY COMBAT" for more details on interpreting these messages.

VIII.2. Lookout/Radar: ***Addition:*** Target course/speed and bearing/range data has been added.

VIII.3. Fleet Deployment: ***Addition:*** We have added ship type (battleship, cruiser, destroyer) to this display.

VIII.4. Fleet Readiness: ***Addition:*** We have added a column indicating hits in the last three minutes, in parenthesis.

VIII.6. Current Hits: ***Change:*** For convenience, the information on the Detail Report and the Current Hits display has been combined. The Current Hits display has been eliminated. The comments on Current Hits on page 37 now apply to the hits column of the Detail Report.

VIII.7. Detail Report: ***Addition:*** At the end of each turn the game will be checked for remaining force ratios and damage inflicted. "Surrender" will be demanded/offered as appropriate. It will be reported when all the warships on a side are eliminated.

IX.2.A. Gun Director Orders: ***Change:*** When you are asked to select the target, the display will only list those targets in the arc of train of the director.

X.2. Torpedo Launching: ***Addition:*** The "Auto Torpedo" option allows you to delegate the details of the torpedo launch to the (computerized) TFC Officer. When selected, you will be asked to designate the firing ship and the target ship. The most forward bank of torpedoes which can bear on the target will fire all its remaining torpedoes, set at the highest speed that will reach the intercept point and an appropriate spread angle.

XI.3 Aircraft Orders: ***Addition:*** When an aircraft is assigned a spotting mission, it will automatically go to the location of the target ship and maintain station.

Clarification: Spotter aircraft improve gunfire accuracy under the following conditions: 1) long range gunnery; 2) aircraft within 10k of the target; 3) Main Director; 4) no aircraft or ship equipment failure.

XV. OPTIONS MENU (CHANGING PALETTE): ***Clarification:*** The "Change Side" option is only activated when you are playing solitaire or against another human. It is not posible when playing the Auto-Warrior.

Addition: RETICLE ON/OFF allows you to turn on/off the reticle tics on the Battle plot.

Addition: DETAIL ON/OFF allows you to choose whether or not to automatically display the Detail Report after a turn.

XII. GAME STATISTICS: ***Clarification:*** The "hits" and "points lost" figures refer to damage on the force ie. "Red Hits" are hits taken by the Red side, and inflicted by the Blue side.

XVIII. BUILD SCENARIO: ***Clarification:*** It is not possible to change ship classes, or add or delete ships from established scenarios using the Build Scenario program. A separate program ("SWAP-ADD") will be written to swap ships or add ships to scenarios. The program will be available from *STORM COMPUTERS LTD.*

Clarification: A "Fleet Efficiency" value of 0.82 means that the force will be 82% efficient.

XIX. GENERATE: ***Changes:*** The Generate program has been upgraded, incorporating many suggestions.

Option 18 "Deployment Box" is a change. This option allows you to define the size of a square area for initial deployment. The default dimension is 30K x 30K; the limits are 20K x 20K to 80K x 80K. The Deployment Boxes of each side adjoin. Small Deployment Boxes will result in forces that begin together; larger Deployment Boxes gives the possibility of larger initial separation between forces. The two adjoining Deployment Boxes are located at random inside the total battle area. The Deployment Box dimensions will be enlarged automatically if an island impacts on the placement of forces.

Option 19 "Hard Drive" eliminates the pauses which were included for floppy disk users to change disks.

Option 20 "Manual Blue Force" provides the option to select your own force, and have the computer generate the opposing side. Only the Blue Force can be manually specified. You will be asked for the number of battleships, cruisers and destroyers in the force, and their ship file codes. If you specify an Escort Mission, the computer will generate the Convoy(s). Because of the limited disk space the program DOES NOT ERROR CHECK FOR INCORRECT DISKS OR FILE NAMES. Errors will give you the opportunity of beginning all over again from scratch (think of it as a challenge...).

XXIV.4. List and Counterflooding: ***Clarification:*** There have been requests for a "Damage Control Assistant" option which would automatically counterflood ships to even keel. It could be programmed easily enough – but we couldn't conceive of a situation when it would be appropriate. A better explanation of the counterflooding trade-offs will show why.

WHY COUNTERFLOOD: List reduces gun ROF and accuracy. There is also the risk of capsizing and losing the entire ship.

PENALTIES OF COUNTERFLOODING: Counterflooding adds weight to the ship, slowing it down. Depending on the tactical situation speed may be critical.

As a ship floods, stability also drops (ie. the same off-centre weight will cause more list). Counterflooding any heavily damaged ship is a risk. You have to balance the benefits of correcting list against the loss of stability.

PERILS OF COUNTERFLOODING: Counterflooding damaged tanks or spaces will allow progressive flooding which can damage other equipment (gun mount train motors, electrical cabling, fire pumps, engineering propulsion equipment, etc). The risk of progressive flooding and collateral equipment damage grows proportionately with the loss of overall watertight integrity.

If counterflooding is in progress and DC Central or all Damage Control Teams are eliminated, the flooding will continue, until a survivor of the DC teams realizes the problem and takes action.

EFFECTIVENESS OF COUNTERFLOODING: Long, narrow ships (destroyers, some light cruisers) have a shorter lever arm and fewer

off-centreline tanks, and so will take large amounts of flooding to correct small angles of list.

FRIENDLY HELP FROM YOUR OPPONENTS: If a ship is listing to port and the enemy is firing from starboard, you might want to wait and see if some of the enemy's shells will do the counterflooding for you. AutoWarrior will be pleased to assist.

CONCLUSIONS: The tactical situation must mold your decision. Different responses will be required when a ship is escaping from a night action, as compared to being committed in a desperate attempt to counter a daylight destroyer attack on your battleline. Like torpedo fire or flooding a magazine, counterflooding is a decision of great magnitude characteristically reserved for the Commanding Officer.

XXIV.6. Director Damage: ***Correction:*** The table in the box (page 91) should read:

MAIN	ALT
ALT	LOC MAIN A
SEC PORT	ALT SEC STBD
ALT SEC PORT	LOC SEC PORT
ALT SEC STBD	LOC SEC STBD

APPENDIX C.2: Changes: We have improved the gunnery algorithms to largely eliminate the caveat regarding close range gunnery.

APPENDIX D.1: ***Additions:*** We have added the following gun types:

	GUN	RANGE	ROF	AP	AC	
USA	16" /50 M7	42.3	2.0	1	G	Iowa Class
	8" /55	30.5	10.0	11	G	Des Moines
	5" /54	25.9	15.0	15	G	Montana
	20"	46.0	1.0	1	A	

The 16", 8", and 5" are class-specific weapons which we omitted in V1.0 to save space – silly us – and are included at the request of a small angry mob. The data for the 20" gun is hypothetical. Several designs (the German H-44, the British Incomparable, and a US IV-2 variant) specified 20" guns. The data files for Des Moines, the 20" Incomparable, and H-44 are included in the Supplementary Scenarios/Utilities disk, available separately from *STORM COMPUTERS LTD.*

APPENDIX 1-7: PENANG SCENARIO: ***Correction:*** The Japanese vessel is the Nachi class cruiser HAGURO, not the Nachi.

PRINT SCREEN: Text displays (but not the Battle Plot) may be printed by holding down the shift key and hitting the <print screen> key. You may get some odd symbols in place of lines and borders, but the information will be there. This does not work with all types of printers.

Again, thank you for purchasing *ACTION STATIONS!*

Confusion to your enemies!

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Hits on page 37 now apply to the hits column of the Detail Report.

VIII.7. Detail Report: ***Addition:*** At the end of each turn the game will be checked for remaining force ratios and damage inflicted. "Surrender" will be demanded/offered as appropriate. It will be reported when all the warships on a side are eliminated.

IX.2.A. Gun Director Orders: ***Change:*** When you are asked to select the target, the display will only list those targets in the arc of train of the director.

X.2. Torpedo Launching: ***Addition:*** The "Auto Torpedo" option allows you to delegate the details of the torpedo launch to the (computerized) TFC Officer. When selected, you will be asked to designate the firing ship and the target ship. The most forward bank of torpedoes which can bear on the target will fire all its remaining torpedoes, set at the highest speed that will reach the intercept point and an appropriate spread angle.

XI.3 Aircraft Orders: ***Addition:*** When an aircraft is assigned a spotting mission, it will automatically go to the location of the target ship and maintain station.

Clarification: Spotter aircraft improve gunfire accuracy under the following conditions: 1) long range gunnery; 2) aircraft within 10k of the target; 3) Main Director; 4) no aircraft or ship equipment failure.

XV. OPTIONS MENU (CHANGING PALETTE): ***Clarification:*** The "Change Side" option is only activated when you are playing solitaire or against another human. It is not posible when playing the Auto-Warrior.

Addition: RETICLE ON/OFF allows you to turn on/off the reticle tics on the Battle plot.

Addition: DETAIL ON/OFF allows you to choose whether or not to automatically display the Detail Report after a turn.

XII. GAME STATISTICS: ***Clarification:*** The "hits" and "points lost" figures refer to damage on the force ie. "Red Hits" are hits taken by the Red side, and inflicted by the Blue side.

XVIII. BUILD SCENARIO: ***Clarification:*** It is not possible to change ship classes, or add or delete ships from established scenarios using the Build Scenario program. A separate program ("SWAP-ADD") will be written to swap ships or add ships to scenarios. The program will be available from *STORM COMPUTERS LTD.*

Clarification: A "Fleet Efficiency" value of 0.82 means that the force will be 82% efficient.

XIX. GENERATE: ***Changes:*** The Generate program has been upgraded, incorporating many suggestions.

Option 18 "Deployment Box" is a change. This option allows you to define the size of a square area for initial deployment. The default dimension is 30K x 30K; the limits are 20K x 20K to 80K x 80K. The

Deployment Boxes of each side adjoin. Small Deployment Boxes will result in forces that begin together; larger Deployment Boxes gives the possibility of larger initial separation between forces. The two adjoining Deployment Boxes are located at random inside the total battle area. The Deployment Box dimensions will be enlarged automatically if an island impacts on the placement of forces.

Option 19 "Hard Drive" eliminates the pauses which were included for floppy disk users to change disks.

Option 20 "Manual Blue Force" provides the option to select your own force, and have the computer generate the opposing side. Only the Blue Force can be manually specified. You will be asked for the number of battleships, cruisers and destroyers in the force, and their ship file codes. If you specify an Escort Mission, the computer will generate the Convoy(s). Because of the limited disk space the program DOES NOT ERROR CHECK FOR INCORRECT DISKS OR FILE NAMES. Errors will give you the opportunity of beginning all over again from scratch (think of it as a challenge...).

XXIV.4. List and Counterflooding: ***Clarification:*** There have been requests for a "Damage Control Assistant" option which would automatically counterflood ships to even keel. It could be programmed easily enough – but we couldn't conceive of a situation when it would be appropriate. A better explanation of the counterflooding trade-offs will show why.

WHY COUNTERFLOOD: List reduces gun ROF and accuracy. There is also the risk of capsizing and losing the entire ship.

PENALTIES OF COUNTERFLOODING: Counterflooding adds weight to the ship, slowing it down. Depending on the tactical situation speed may be critical.

As a ship floods, stability also drops (ie. the same off-centre weight will cause more list). Counterflooding any heavily damaged ship is a risk. You have to balance the benefits of correcting list against the loss of stability.

PERILS OF COUNTERFLOODING: Counterflooding damaged tanks or spaces will allow progressive flooding which can damage other equipment (gun mount train motors, electrical cabling, fire pumps, engineering propulsion equipment, etc). The risk of progressive flooding and collateral equipment damage grows proportionately with the loss of overall watertight integrity.

If counterflooding is in progress and DC Central or all Damage Control Teams are eliminated, the flooding will continue, until a survivor of the DC teams realizes the problem and takes action.

EFFECTIVENESS OF COUNTERFLOODING: Long, narrow ships (destroyers, some light cruisers) have a shorter lever arm and fewer off-centreline tanks, and so will take large amounts of flooding to correct small angles of list.

FRIENDLY HELP FROM YOUR OPPONENTS: If a ship is listing to port and the enemy is firing from starboard, you might want to wait and see if some of the enemy's shells will do the counterflooding for you. AutoWarrior will be pleased to assist.

CONCLUSIONS: The tactical situation must mold your decision. Different responses will be required when a ship is escaping from a night action, as compared to being committed in a desperate attempt to counter a daylight destroyer attack on your battleline. Like torpedo fire or flooding a magazine, counterflooding is a decision of great magnitude characteristically reserved for the Commanding Officer.

XXIV.6. Director Damage: ***Correction:*** The table in the box (page 91) should read:

MAIN	ALT
ALT	LOC MAIN A
SEC PORT	ALT SEC STBD
ALT SEC PORT	LOC SEC PORT
ALT SEC STBD	LOC SEC STBD

APPENDIX C.2: Changes: We have improved the gunnery algorithms to largely eliminate the caveat regarding close range gunnery.

APPENDIX D.1: ***Additions:*** We have added the following gun types:

	GUN	RANGE	ROF	AP	AC	
USA	16" /50 M7	42.3	2.0	1	G	Iowa Class
	8" /55	30.5	10.0	11	G	Des Moines
	5" /54	25.9	15.0	15	G	Montana
	20"	46.0	1.0	1	A	

The 16", 8", and 5" are class-specific weapons which we omitted in V1.0 to save space – silly us – and are included at the request of a small angry mob. The data for the 20" gun is hypothetical. Several designs (the German H-44, the British Incomparable, and a US IV-2 variant) specified 20" guns. The data files for Des Moines, the 20" Incomparable, and H-44 are included in the Supplementary Scenarios/Utilities disk, available separately in January 1991 from *STORM COMPUTERS LTD.*

APPENDIX 1-7: PENANG SCENARIO: ***Correction:*** The Japanese vessel is the Nachi class cruiser HAGURO, not the Nachi.

PRINT SCREEN: Text displays (but not the Battle Plot) may be printed by holding down the shift key and hitting the <print screen> key. You may get some odd symbols in place of lines and borders, but the information will be there. This does not work with all types of printers..

Again, thank you for purchasing *ACTION STATIONS!*

Confusion to your enemies!