

Red Storm Rising™

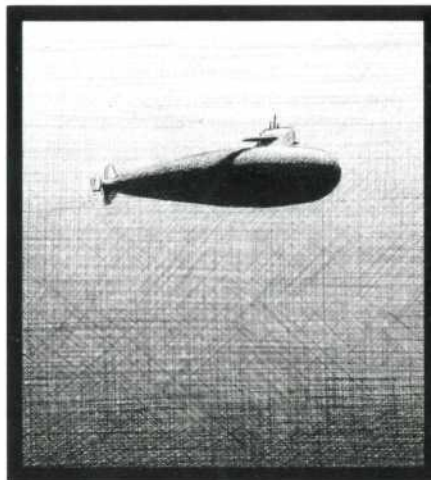


**The Gripping
Computer
Simulation.**

**Based On
The #1
Best-Selling
Book By
Tom Clancy.**

MICRO PROSE™
SIMULATION • SOFTWARE

Red Storm Rising™



Nuclear Attack Submarine Combat Operations

NAVEDCOM 443-M

Change 2 ; May 1989

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Preface by Tom Clancy

The submarine tactics with which most of us are familiar never really happened. We've all seen the dramatic movie representations of sweating men in the tight confines of a fleet boat's conning tower. But in fact the most effective work done by submarine commanders in WWII was conducted on the "roof," where they could use their higher surface speed to conduct "end runs," get ahead of their targets, then close in and fire at close range before escaping in the confusion.

Technology has changed all that, even while it was happening in the Second World War. Improved radar sets and continuous aerial surveillance chased the German U-Boats below the surface even at night. This denied them the mobility upon which they depended to close with their targets, and in doing so cost Germany her best chance of winning the Second World War.

Nuclear power and improved sonar technology changed things yet again in the 1950s. A nuclear-powered submarine can now outrun most surface ships, and modern passive sonar can actually out-range the radar used by American WWII submarines. It is not unusual today for a submarine to detect a surface ship, on sonar, at ranges over thirty nautical miles. Torpedoes, once relatively simple machines that ran a straight course until they hit a target or ran out of fuel, are now robotic kamikazes, programmed to search for their targets with active and passive sonars, then close on and destroy it with a half-ton (or nuclear) warhead. Or the submarine skipper can fire surface-to-surface cruise missiles that easily fly those thirty nautical miles.

But one thing has remained constant: the business of a submarine is stealth. Once detected, the enemy surface commander has more ships and weapons to use than the submarine. Helicopters with sonobuoys and dipping sonars — the submarine's deadliest enemy — can hunt and localize their quarry, then engage it with homing torpedoes of their own. You are safe only so long as you are undetected. Your only real advantage is invisibility. Submarine warfare is ambush, followed by evasion; a game of life and death played in three dimensions of cold, wet, unforgiving darkness.

The submarine's other enemy is another submarine. He lives in your environment, knows everything that you know, is trained, armed and equipped as you are. And enemy submarines are getting better. The Walker spy ring and foreign companies like Toshiba have given the Soviets priceless information and hardware with which they have been improving their ships and their training. Their mission is to sink you, to sink the other ships in your fleet, and to sink the merchant ships without which your country and the NATO alliance cannot survive. Simply put, the job of the United States Navy is to control the sea. The job of the Soviet Navy is to deny us the use of the sea. You can guess which is the easier mission.

You are the commanding officer of an American SSN, a nuclear-powered fast-attack submarine. The word has only just arrived from National Command Authority: Your country is at war. All during the spring of this year, while you prepared your boat

for her next deployment, the media was full of stories about the Spring of Promise, perhaps the long-hoped-for end of the Cold War, as East-West arms-control agreements reached fruition after generations of frustrating effort. Then only three days after you sailed on your deployment, something went wrong. Some disaster changed hopes of lasting peace to fear of a real, shooting war. You do not know what happened — SSN's don't get much in the way of news analysis — but none of that matters. Your country is at war, and war-fighting is what they pay you for.

You are thirty-nine years old. A graduate of the United States Naval Academy, you've worked your way up the ladder of your chosen profession: Nuclear Power School; Prototype School; Submarine Officers Basic School; Prospective Nuclear Engineer Officer School; Submarine Officers Advanced Course; Prospective Executive Officer Course; then, Prospective Commanding Officer School; and along the way you picked up a Masters Degree in Operations Analysis at the Navy's own Post-Graduate School at Monterey, California. You've served both on SSNs and SSBNs — the "boomers", the ballistic-missile submarines — but fast-attack was what you wanted, because fast-attack is where the action is. You've been an engineer, a navigator, then an XO. All this has a price. Endless cruises far from home, separations from your loved ones, mini-wars at AUTEC in the Bahamas, fleet exercises in mid-ocean, too many exams and tests to count, month-long strings of eighteen-hour days. But what that price has bought you is association with and respect from the finest men your country can make. You have spent seventeen years learning your craft, and six months ago you achieve a dream you've held since high school — command of your own SSN.

You are now the commanding officer of a ship of war, the most demanding and most god-like job in the world. You are responsible for the safety of your ship, for the lives of over a hundred men, and most of all, you are responsible for carrying out the missions assigned you by COMSUBLANT and COMEASTLANT. You know why you are here. You know what the job is.

You are about to find out how good you really are.

Contents

5	A Quick Start
7	Part I: The Operations Manual
8	Starting Options
11	Battle: Engaging the Enemy
12	Navigation
14	Sensors
21	Weapons
28	Evasion
31	Strategic Transit: the Norwegian Sea Theater
35	Part II: The Captain's Manual
36	Captain's Briefing: the Norwegian Sea Theater
40	Strategic Maneuvers
43	Sonar and Other Sensors
49	Stalking the Bear
52	Weapons & Attacks
58	Evasion & Escape
61	Russian Tactics
63	Part III: The Reference Manual
64	US Submarine Weapons
67	US Submarines
71	USSR Warships
94	Glossary
97	Designers' Notes
99	Credits

A Quick Start

The Manual: This manual is divided into three sections for convenient use. Part I gives specific instructions for all simulation displays and controls. Part II provides greater insight into the tactics, tricks and subtleties of the game. Part III provides background data on weapons, ships and boats involved.

When playing your first training scenario, you'll want to frequently reference the "Battle: Engaging the Enemy" section of this manual, on pages 11-30. This explains the meaning of each display, and how to operate your submarine in battle.

The Technical Supplement: The specific keys and other controllers used in RED STORM RISING vary with computer models. All terms printed in *italics* in this manual are defined in the Technical Supplement. Refer to the supplement for specific controls.

The Keyboard Overlay: This is provided for convenience in Battle. The keyboard overlay does NOT apply to Strategic Transit in the RED STORM RISING campaign.

Which Scenario?: We strongly recommend that you try a learning game before you tackle the full RED STORM RISING campaign.

What's Where

In your first game, you should make the following selections:

Year: 1992

Boat: Improved Los Angeles class

Challenge: Introductory

Scenario: Training Action (vs. either a November-class submarine or a Kashin-class destroyer; take your pick).

Getting Started: After a brief introduction, you'll find yourself in battle. Find the pause key (check the Technical Supplement or your Keyboard Overlay) and use it frequently as you learn. The Replay Battle key is also useful while learning — use it to review what happened to that point.

Experiment with Displays: Try each of the Primary Display and Secondary Display controls.

Find the Enemy: Next start looking for the enemy. Select Tactical Display and View Contacts. Read the section on Sensors (pages 14-20) for more information.

Sail Toward Him: Once you locate the enemy, move toward him. Try the navigation controls, referring to pages 12-14 in the manual for more details.

Fire Weapons: Now try firing weapons at the enemy. A Mark 48 torpedo is suggested. Make sure you're sailing "straight and level" at moderate speed (15 kts or less) before firing. Read the Weapons controls explanation on pages 21-27. Note that you can change commands and even directly control the torpedo unless its wire is cut or lost (page 24).

Further Training: Try a training scenario a few more times. Experiment with a surface ship opponent using Harpoon or Tomahawk missiles (page 25). Also experiment with evasion, learning to escape enemy torpedoes.

Learning Games

Battles & Campaigns

Battles: Once you've cut your teeth in the training scenarios, it's time to fight a "real" battle. Select one of the Battle simulations instead of a training action. Finding the enemy and identifying him can be challenging. In some cases, he may find you first. In extreme cases, you might sail right into an enemy attack (i.e., you are ambushed!). Don't get flustered. Evade enemy attacks as they come in, and meanwhile develop your contacts until you have sufficient information to launch a weapon.

After you've experimented with a variety of battles, you can select "a Chance Engagement", where you never know what you're up against. You may find adjusting your boat or the time period makes life more interesting here.

The Campaign: Although individual battles provide interesting, satisfying, and variable engagements, the ultimate RED STORM RISING experience is the campaign game. Here you experience the entire course of World War III.

The campaign includes the additional challenge of Strategic Transit. You receive various missions, must discern the enemy's intentions, which enemy force is your objective, and then maneuver into an advantageous attack position while avoiding detection. How well you maneuver in the Norwegian Sea Theater has a powerful effect on how the battle begins.

The campaign is arranged so that the Warsaw Pact's strategies and actions remain unpredictable. You can play the campaign again and again, experiencing new situations and challenges each time. There are literally billions of possible situations in the campaign game.

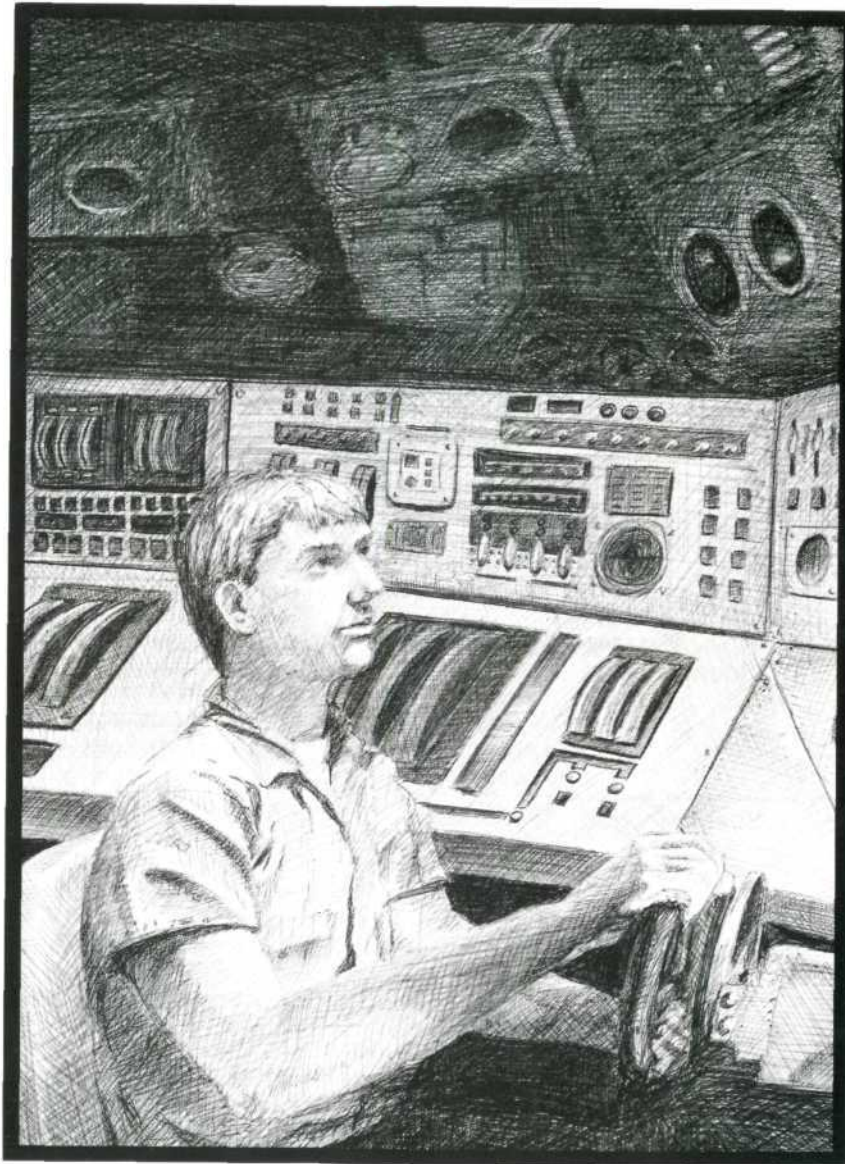
The Efficiency Rating, Medals, and Promotions

Efficiency Rating (ER): After each engagement RED STORM RISING updates your ER (Efficiency Rating) as a US Navy captain. The rating is the average of your performance to date. It takes into account the quality of the opposition including the specific types of ships engaged, as well as the type of boat you command, weapons available, and level of challenge. Successful completion of mission assignments in the "Red Storm Rising" campaign also improves your ER.

Decorations & Medals occur only in the campaign game, rewarding success in action. You need a high ER to qualify for a medal. In order from lowest to highest, the medals are: CM - Navy Commendation; BSV - Bronze Star for Valor; SS - Silver Star; DSM - Distinguished Service Medal; NC - Navy Cross; and CMOH - Congressional Medal of Honor.

Promotions: Modern submarine captains aren't promoted after each battle because a promotion means a new and bigger command. In wartime the navy prefers to keep experienced captains where they are, at their current rank, until either the war is over or a higher position opens up.

Part 1 The Operations Manual



Starting Options

RED STORM RISING has many options. To make a selection, move the *Controller* to highlight your choice, then press the *Selector*. Not all choices are available in all situations. Typically the *Controller* is your joystick, mouse, or cursor keys, while the *Selector* is the button or Return key. See the Technical Supplement for specific details.

The Year

You can select one of four time periods.

In 1984 Russian naval forces lack "stolen" western technology. However, your submarine is limited to weapons available at that time: the original Mark 48 torpedo and the Harpoon missile.

In 1988 the new Russian SIERRA and KILO class submarines appear, as well as the first fruits of the stolen technology from the west. However, you have the new Tomahawk missile and the improved Mark 48 ADCAP torpedo. This scenario represents the situation at the time of the action in the novel *Red Storm Rising*.

In 1992 a nuclear aircraft carrier joins the Russian northern fleet, while technological upgrades spread to more of their vessels. Meanwhile, the Sea Lance ASW missile and Stinger SAM masts are available to NATO.

In 1996 the Russian northern fleet continues to expand in size and virtually all frontline ships have received technology upgrades. Fortunately for the West, the first boats in the new Seawolf class are launched, carrying the new silent-launching ("Swim Out") Mark 48 torpedo.

Warship Identification Test

Examine the illustration on the screen, then compare it with the illustrations in Part III (Reference Manual) of this book (pages 71-93). You must correctly identify the picture. If you fail, you're restricted to training scenarios.

If you make a correct identification, enter your name by typing it on the keyboard and pressing the Return (or Enter) key. Your records will be saved under this name.

Boat Selection

You can select which class of nuclear attack submarine you wish to command. Classes are listed in order of completion, from the oldest (at the top) to the newest (at the bottom). As a general rule, the newer boats are quieter and have more weapons space. The Seawolf class is especially powerful, but not available until 1996.

Alternatively, you can allow the NMPC (Naval Military Personnel Command) detailer to give you a boat, as in the real navy. In this case, the type of boat you receive is partly chance, partly related to the number of submarines of that type currently in the Atlantic fleet.

Level of Challenge

Introductory challenge is recommended for your first few games. Compared to reality, enemy ships are easier to find and track, while your submarine is very resistant to damage and your crewmen quite expert.

Normal challenge is recommended for casual gaming. Compared to reality, enemy ships are slightly easier to find and track, while your submarine is fairly resistant to damage.

Serious is fully realistic in all respects. Enemy commanders are smart, and they use their torpedoes and sonars with considerable skill. This produces a complex and difficult game. Do not attempt this challenge unless you're thoroughly familiar and "up to speed" with all features and tactics.

Ultimate challenge is just as realistic as the "serious" level. In addition, we take a less optimistic view of submarine survivability (a single hit is more likely to sink you!), enemy Captains are very sharp, and your sonar crew is always indecisive: they won't make a positive contact identification unless you examine the acoustic signature and make the identification yourself. Do not attempt this challenge unless "Serious" seems like child's play.

There are three groups of scenarios. Training actions provide an easy learning environment and a place to test new tactics safely. Battle simulations are short engagements between you and a specific category of enemy force.

Red Storm Rising, the campaign, is the "ultimate" scenario, the "big time" where you take your boat to sea to fight in Tom Clancy's World War III. Like all scenarios, it can be played in various time periods, at various levels of challenge, and with the boat of your choice.

Training Actions are simulated engagements, arranged to make learning easier. In both scenarios Russian weapons do *no damage* to your boat. You can experiment with the displays and controls, try various tactics, etc., without risk or difficulty.

"vs. a November-class Submarine": This is a sample underwater battle against Russia's oldest front-line nuclear submarine. The level of challenge you select determines the location of the engagement: Introductory - in the open sea, Normal - in drift/floe ice, Serious - beneath pack ice, Ultimate - in the shallows.

"vs. a Kashin-class Destroyer": This is a sample battle against a mediocre Russian anti-submarine destroyer. The level of challenge you select determines the location of the engagement: Introductory or Normal - in the open sea, Serious - in drift/floe ice, Ultimate - in the shallows.

Battle Simulations test your mettle in various tactical actions. Battle Simulations provided include:

"a Duel": You go "one-on-one" with a Russian nuclear attack submarine. At higher levels of challenge, you will encounter some of the best subs in the world.

"the Cruise Missile Sub": You seek a cruise missile submarine. Higher challenges often add one or more escorting "guardians".

"the Wolfpack": You must duel with a group of Russian subs. They're operating together, using wolfpack tactics.

Scenarios

"the Boomer Bastion": You must find and destroy a Russian ballistic missile submarine, no easy task. To make matters worse, it's escorted by one or more attack subs.

"a Convoy": You have found a Russian resupply group. Once the escort is eliminated, you can have a field day with the transports.

"a Strike Group": You have intercepted a task force of Russian surface ships. Now you've got to engage them.

"an ASW Group": A Russian anti-submarine task force has been vectored into your area. Can you successfully hunt the hunters?

"a Carrier Task Force": You've stumbled into a submariner's dream: a Russian carrier task force. A chance at a Russian aircraft carrier is an opportunity you don't want to miss.

"a Chance Engagement": One of the above situations is selected randomly. This is a true test of your mettle in battle.

"Red Storm Rising", the campaign, is World War III, from first invasions to victory or defeat. This campaign lasts for many missions and hours. It is the "ultimate" RED STORM RISING scenario, with new and different events occurring each time. Beginners are urged to try a battle simulation or training action first.

Mission Orders

After a short introduction, you'll get your first Mission Orders. Read these orders carefully; they explain your current objective and may describe the enemies you could encounter.

In the Attack Center, the advent of modern computerized display and communications technology gives the captain real-time access to all the information he needs to conduct a tactical engagement. This information is assembled, integrated and streamlined by the computer to provide him with a concise picture of the situation. But even with all this assistance, it's the commander who must analyze the information, resolve ambiguities, fill in the missing pieces using his judgement and experience, and then make the key decisions that spell the difference between success and failure.

Battle: Engaging the Enemy

When your boat meets the enemy, "Battle" begins. The screen displays and controls for battle are sophisticated — modern submarine warfare is quite complex. The keyboard overlay is used here.

If you selected the "Red Storm Rising" campaign game option (see Starting Options, page 8), you begin at port rather than in battle. See the next section, "Strategic Transit", page 31, for details.

To familiarize yourself with the controls, start with a training scenario (enemy hits do no damage, so you can figure things out without being sunk!). Take things one section at a time and ignore those sections marked "Advanced"; you can return to them later.

Due to differences in computer equipment, keys are identified by a title in *italics*. Refer to your Technical Supplement or keyboard overlay to find the specific key on your keyboard. Frequent mention is also made of the *Controller*, which is usually the joystick, mouse, or cursor keys (depending on computer model), and the *Selector*, which is usually the trigger, button, or Return key (depending on computer model).

From time to time you may find suggestions and advice useful. Your tactical computer can analyze the situation to offer ideas at any time. Just press the *Help* key.

Advice from Your Computer

Pause: Press the *Pause* key to freeze the battle. Press this key again to resume the action. Purists should note that the battle runs in slightly accelerated real time; using this key is neither unrealistic nor "cheating".

Replay: This key reviews the entire battle, with each enemy vessel and action listed. At the "Introductory" level replay is available at any time, replaying the action so far. At all other levels of challenge, replay is allowed only at the end of the battle.

Useful Options

These special options are included for convenience and personal preferences.

Action Track Toggle: The animated views of weapon launches and attack runs can be turned off and on again with this key. Purists may wish to turn the track off, but those who play for enjoyment will want it on. Note that weapon launches are shown only at the "Introductory" level.

Aborting Commands: Many activities in battle require multiple key presses, sometimes including the use of the *Controller* and/or *Selector*. If you start an activity, then decide against it, there's no problem. Just start a new action. The old activity is "erased" from your computer system automatically if interrupted by a new one.

Of course, sometimes the same key is used in different activities. Then your computer can't discern the intention to change; the original action will continue if the entry is valid.

Other Options (Advanced)

Your computer screen simulates various consoles and displays in the Attack Center of a modern nuclear submarine. As captain, you have three display areas, into which you can "call up" information from fourteen different parts in the attack center. These three display areas are: the Navigation Display, the Primary Display,

Attack Center Consoles

and the Secondary Display.

Navigation Display: This information is always present.

Primary Display: You can select one of eight primary displays.

Secondary Display: You can select one of five secondary displays; some primary display selections automatically "bring up" a secondary display.

Sensors Functioning: Abbreviations indicate which sensors are operating:

A = Active Sonar

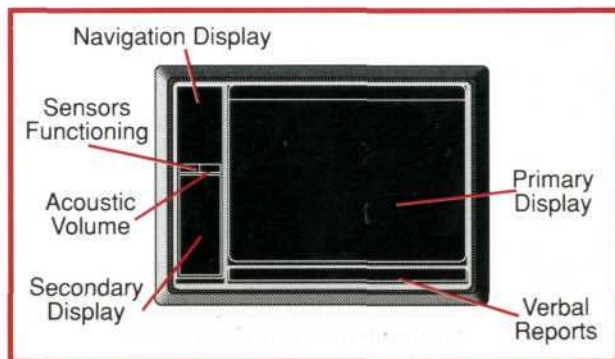
T = Towed Array

R = Radar

Passive sonar operates constantly. ESM (the radar receiver) runs automatically wherever your depth is 55' or less. See "Sensors" below for more details.

Acoustic Volume (AV) of your submarine, a measure of your loudness as you move through the water.

Verbal Reports: Crew reports and confirmation of your orders appear here.



Navigation

Navigation is the art of guiding your submarine through the water. This includes controlling your direction of travel, your depth, and your speed.

Navigation Display

This display informs you of how your boat is travelling.

Heading: Your heading, in degrees, on the compass. North is 000°, East is 090°, South is 180°, and West is 270°.

Speed: How fast you're travelling, in knots (kts). A "C" symbol indicates your propellers are cavitating (making large amounts of noise). As you go deeper, you can go faster and faster without cavitation.

Depth: This shows your current depth (in feet) beneath the surface. A special symbol indicates whether you're above or below the thermal "layer". The "layer" interferes with sound — keeping the "layer" between you and the enemy is a good way to hide.

Rudder: This shows the current course command. "STEADY" indicates you're running straight ahead.

Planes: This shows the current setting of your diving planes, which control the depth of the boat. "LEVEL" indicates you're running level (not changing depth).

Navigation Controls

Course: To set a course, press the *Set Course* key. The helmsman asks what course you desire. Type a three digit number, from 000 to 360, for the new course. The helmsman will acknowledge and turn the submarine onto that course. You can also enter one or two digits and press the Return key.

Depth: To change to a new depth, press the *Set Depth* key. The Helmsman asks what depth you desire. Type a three digit number, from 010 to 999, for the new depth. The helmsman will acknowledge and move the submarine up or down until it reaches the correct depth. You can also enter one or two digits and press the Return key.

Note: Modern nuclear submarines never surface during battle. There is no advantage to surface travel and numerous disadvantages. In fact, surfacing communicates "I surrender" to the enemy. Any captain who surrendered a high technology sub like yours would betray his nation in innumerable serious ways. Therefore, 010' is the minimum depth allowed in battle.

Speed: To change speed, press either the *Increase Speed* key or the *Decrease Speed* key. Your engines have seven power settings, from zero (engines stopped) to six (maximum speed). Each key press changes the power setting one level. The navigation display shows your speed through the water.

Note that a change in power translates slowly into an increase or decrease in speed. Also note that your speed in knots is faster when moving straight than when moving in a tight turn, or when damaged.

Emergency Turns: Instead of giving the helmsman a new course, you can give him specific turning orders. The first time you press the *Left Rudder* or *Right Rudder* key, the helmsman puts the boat into a 5° left or right turn. Each additional key press increases the amount of turn by 5°, first to 10°, then to 15°.

A 5° turn at slow or medium speeds is useful for maintaining your towed array (see page 15 for details). A 15° turn is useful in evading or decoying enemy torpedoes. Also, at maximum speed a 15° turn creates a knuckle in the water, useful in confusing torpedoes (see Evasion, page 29, below).

Straight & Level: If you wish to erase all course, depth, and emergency turn orders, press the *Straight & Level* key. This evens out your boat so it runs forward on its current heading, at its current depth.

Silent Running: Available only in some versions, this reduces your speed to the minimum power (4-6 kts) and turns off all active sensors.

Procedure: Press the *Tactical Display* key to put your location and all contacts (potential enemies) on your primary display. This map has five scales, from factor-2 (a local-area close-up) to factor-7 (a wide-area view), which you control with *Zoom* and *UnZoom* keys. See the Technical Supplement for details on map symbology.

Interpreting the Display: This "main display" is used frequently. Most captains favor it for observing the battle situation.

Enemy vessels first appear on this display as dim symbols. The direction is accurate, but usually the range is unknown. As your sensors collect more information over time, the accuracy of the position improves and the symbol changes color. Eventually the sensors determine whether the enemy is a ship, sub or sonobuoy, and finally the specific class. When detection data is good enough, the display plots a "course track" for that enemy, recording his movements. If you later lose contact the display

HEADING
236 DEG
SPEED
12 KNTS
DEPTH ↓
375 FT.
RUDDER
LEFT 5
PLANES
LEVEL

The Tactical Display

changes the symbol back to a dimmer "best guess" position.

The marks along the top of the display represent one nautical mile (2 Kyds) intervals.

Course tracks for all weapons running in the water (yours and theirs) also appear. You cannot see airborne enemies (missiles and helicopters) unless you are at periscope depth and turn on your radar.

Note: Dim, uncertain contacts frequently "bounce around" your display. A common error of novice captains is to put too much trust in dim, low-percentage contacts.

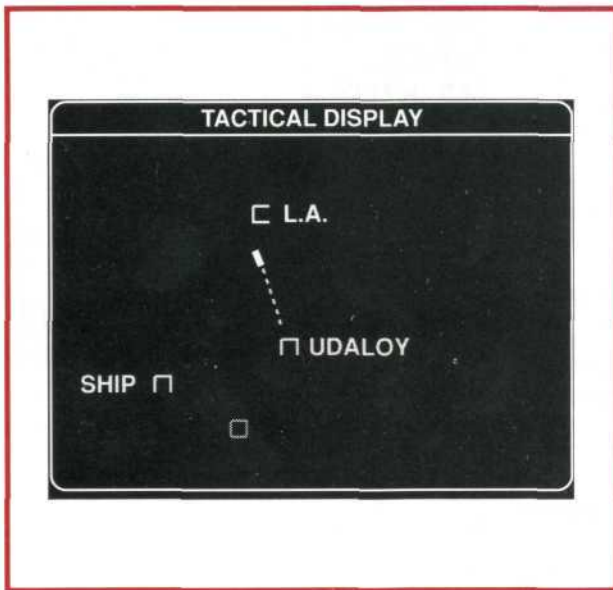
Map Overlay: Press the *Map Overlay* key for an overlay of water conditions. The key toggles this overlay on and off. The overlay shows acoustic absorption, depth of the shallows, or icepack pressure ridges, depending on the current situation.

Acoustic Absorption: In deep water (with or without drift ice) this map overlay (see *Map Overlay toggle* key) shows how local water conditions absorb sound. Darker areas with few dots absorb little sound, resulting in good sound transmission and reception. Lighter areas with more dots absorb more, causing poorer transmission and reception.

Shallows Depth: In shallow water, this map overlay (see *Map Overlay toggle* key) shows the depth of the water. Each digit represents one hundred feet of depth. For example, "3" indicates the bottom is 300' below the surface.

Sound transmission is better when the bottom is deeper, poorer when the bottom is shallow. More importantly, running into the ocean bottom will destroy your sub! Therefore it pays to use this overlay frequently.

Icepack: When operating under the Arctic icepack, this map overlay (see *Map Overlay toggle* key) shows the depth of ice "pressure ridges" descending deep into the ocean. The length of the ridge symbol indicates the depth of the ridge: 50', 100', 150' or 200' deep.



Sensors

Sensors are devices that find and track the enemy. "Passive" sensors constantly "listen" for enemy signals without emitting any betraying signals. "Active" sensors broadcast a signal and "listen" for the return. Active sensors function only if turned on, give detailed data quickly, but often reveal your location to the enemy.

Sensor data is processed by central computers, which update all displays automatically. Still, the results are often incomplete and almost always changing.

Contacts

This secondary display gives detailed information about any one "contact" (potential enemy) found by your sensors. The gradual collection and improvement of contact data is called a "TMA" (Target Motion Analysis).

Procedure: Press the *View Contacts* key to see current sensor data for a contact (potential enemy vessel). If more than one vessel is present, press the key again to see the next vessel (i.e., to cycle through the contacts).

Interpretation: When a tactical display is present (on the Primary Display), each time you press *View Contacts*, either all contacts but the current one disappear briefly or the central dot in its tactical symbol flashes.

In addition, the incoming sound from this specific contact is channeled to your display screen. The sound temporarily drowns out the normal sounds of your boat.

CONTACT: The type of enemy contacted. This progresses from totally unknown, to general type (ship or sub), to a specific ship class. The word "CONTACT" may change color to indicate whether the contact is continuing, or is lost (and the data deteriorating).

BEARING: The direction, in compass degrees, from you to the contact. Your course does *not* affect the bearing.

SENSOR: The left value is the signal strength received on your sensor, and which sensor has best reception (A=active sonar, P=passive sonar, T=towed array, R=radar). You don't see a contact until a signal strength of at least "8" is received, but once you've found the contact you can maintain it with a signal strength of "0" or higher. If signal strength is negative you have lost contact.

The right value is the signal strength the enemy's best sensor would get from your boat. This is known only if you know the enemy's specific class, and thus can predict what sensor equipment he has. When his predicted sensor value reaches eight (8) or more, he will "see" you.

Don't get complacent because no contacts show a "8" or higher sensor value. Your contact data still may be incomplete, and worse, there could be unseen enemies who already "have your number."

SOL (solution): The accuracy of your data. The highest possible accuracy is 99%, which still can be slightly inaccurate. Low percentage solutions are very unreliable.

CRS/SPD: The contact's course (in compass heading degrees) and speed (in knots).

RANGE: The range to the contact, in thousands of yards (i.e., 8 Kyds means 8,000 yards). In addition, the vertical arrow symbol indicates his position above or below the layer.

CONTACT
UDALOY
BEARING
167 DEG
SENSOR
27P -11A
SOL 87%
CRS /SPD
001 25
RANGE ↑
34 KYDS

Underwater sensors use sound to detect the enemy. They function regardless of your depth.

(P) Passive Sonar: Unless damaged by a weapon hit, this sensor is always functioning (no key controls its operation). Passive sonar gives the bearing to the enemy with great accuracy. In addition it lets you slowly determine the type of enemy ship. Once that is known, estimates of speed, course and range develop quickly.

(T) Towed Array: This long, computerized array of hydrophones is towed

Underwater Sound Sensors

Sensors Summary

Type of Sensor	Sensing Medium	Advantages	Disadvantages
Active Sonar	Water: Sound	<ul style="list-style-type: none"> • 1 ping gives range. • multiple pings give detailed data. 	<ul style="list-style-type: none"> • reveals position to enemy at longer ranges than it can detect them. • works best at 0 kts. • limited to 300° arc.
Passive Sonar	Water: Sound	<ul style="list-style-type: none"> • receives only, does not reveal position. • gives bearing fast. • longer range than active sonar in most conditions. 	<ul style="list-style-type: none"> • gives data slowly. • provides range last. • works best at 0 kts. • limited to 300° arc.
Towed Array	Water: Sound	<ul style="list-style-type: none"> • longer range than active or passive sonar in most conditions. • works best at 5 kts. • total 360° arc. 	<ul style="list-style-type: none"> • stops working during and after hard and/or fast turns, high speeds • stops working at 0 kts.
Active Radar	Air: Radar	<ul style="list-style-type: none"> • best, often only way to track aircraft or incoming missiles. • range equal to ESM. • unaffected by speed. 	<ul style="list-style-type: none"> • signal reveals position to all ships and planes in area, and to subs at mast depth.
ESM (Radar Receiver)	Air: Radar	<ul style="list-style-type: none"> • receives only, sends no revealing signal. • range superior to periscope/laser, can be superior to sound. • unaffected by speed. 	<ul style="list-style-type: none"> • mast may reveal position. • does not detect sub unless it is using Active Radar.
Periscope (with laser)	Air: Light	<ul style="list-style-type: none"> • sends no revealing signal to enemy. • can track aircraft with some difficulty. • unaffected by speed.. 	<ul style="list-style-type: none"> • mast may reveal position. • mast needs to be higher than ESM or Active Radar to achieve equal range.

("streamed") behind your boat. It functions only when trailing in a straight line or smooth curve. Any tight or fast turn causes "kinks" and "whiplash" that ruin reception. Similarly, if you come to a full stop, it goes slack and fails. You must maintain "seaway", a minimum speed of 4 to 5 knots, to keep the array functioning.

Because the towed array trails deep in the water, it always listens under the layer, even if your sub is above the layer.

The towed array functions like passive sonar, but is much more sensitive. It's one of your best and most useful sensors.

(A) Active Sonar: The *Active Sonar* key toggles this device on and off. One active sonar "ping" gives the exact bearing and range to a contact. Multiple pings establish the contact's course and speed. Unfortunately, these pings also reveal your location to the enemy.

Active sonar usually has a shorter effective range than passive sonar or a towed array.

The Baffles: Your boat's motion leaves an area of confused and disturbed water directly behind it. Sound travels poorly in this area, called "the baffles". It is about 60° wide (30° left and right of directly astern). See page 49 for more details

Your hull-mounted passive and active sonars are "blind" in "the baffles". Your towed array is unaffected by "the baffles", since it trails far to the rear, safely below the disturbed water.

Sea Conditions

This primary display provides a handy visual reference about current conditions at various depths. This information is valuable in estimating sonar performance.

Procedure: Press the *Sea Conditions* key for a graphic display of the basic conditions beneath the surface.

Transmission Index: The quality of sound travel at this location. The higher the value, the better sound carries.

Ambient Noise: The background ocean noise for this battle.

Factors in Sonar Sensoring

Factor	Effect
Acoustic Absorption	• The greater the absorption around sensor and/or target, the lower the contact value.
Surface Noise	• The greater the ocean surface noise, the lower the contact value, provided either or both vessels are near the surface. Icepack has the lowest surface noise, open sea or shallows is average, drift/floe ice produces very high noise.
Surface Duct	• If sensor and target are both in surface duct, contact value is increased; the stronger the duct, the greater the contact value.
Thermal Layer	• If sensor and target are on opposite sides of layer, contact value is reduced; the stronger the layer, the lower the contact value.
Water Depth	• The shallower the water, the lower the contact value. This only applies in shallow water.
Icepack	• The deeper the ice ridge, the lower the contact value.
Distance to Target	• The greater the range, the lower the contact value.
Direction Target Faces	• If target's broadside faces sensor, contact value is slightly increased (although the change is relatively small).
Speed of Target	• The greater the speed, the higher the contact value.
Quietness of Target	• The quieter the vessel design, the lower the contact value.
Speed of Sensor	• The greater the speed, the lower the contact value.
Quietness of Sensor	• The quieter the vessel design, the higher the contact value.
Quality of Sensor	• The better the sonar, the higher the contact value.

Sonar Sensing Values

All sensing is rated by "contact value".

A value of 8 or higher is needed to detect a previously unknown enemy.

A value of 0 or higher is needed to maintain contact with a known enemy.

Surface Duct: This boosts sound transmission above the layer (the stronger the duct, the better sound travels above the layer).

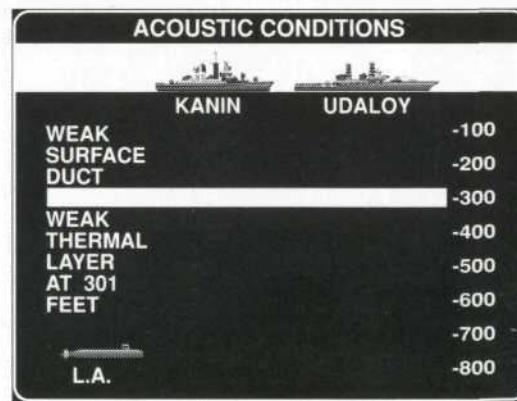
Thermal Layer: This determines how well sound passes across it (the stronger the layer, the poorer sound travels across it). The depth of the layer may vary a few feet from one location to another.

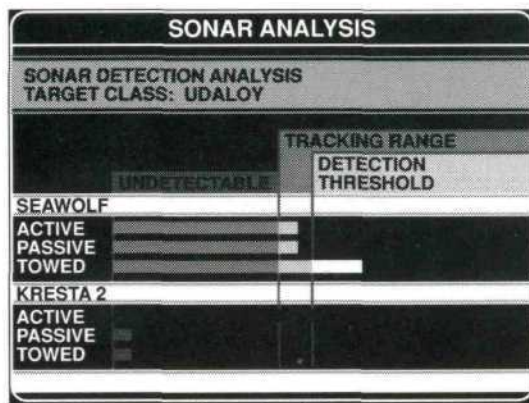
For more information about the sea and sound, see Part II (the Captain's Manual), Sonar and Other Sensors (pages 46 through 52).

Compare Sonar (Advanced)

Press the *Compare Sonar* key to see the capabilities of your sonars vs. those of an enemy ship, in current conditions. The enemy vessel displayed is the last one shown on your contact report. To compare sonars for different contacts, press the *View Contacts* key to cycle through various enemies.

Interpreting the Display: The top three lines are horizontal bar gauges showing the detection ability of your sonars (active, passive and towed). The bottom three lines are similar gauges for the enemy, provided the type of enemy ship is known.

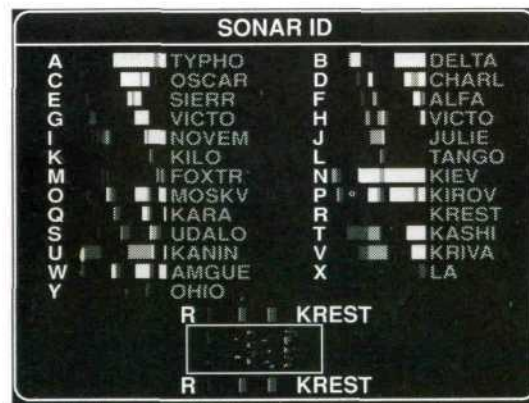




Each bar gauge is divided into three sections. The dark-colored, left side section is the range where sonar reception is too poor to detect or track an enemy. The small middle area, labelled "Tracking Range", is where sonar reception is good enough to track an existing contact, but not good enough to make a new contact. The larger right side area, labelled "Detection Threshold", is where reception is good enough to make new contacts or regain lost ones.

This display automatically takes into account current water conditions, depth, range, and "the baffles" for you and the contact. Therefore it can change quickly, as these variables change.

Tactics: This display is valuable if you're trying to "sneak up" on the enemy, or trying to "sneak away" again. It shows graphically how good your contact is, and how good the enemy's equipment is against you. Applying this information in battle is a complex art, see Part II (the Captain's Manual), Stalking the Bear (pages 49 through 51) for details.



Acoustic Signature (Advanced)

This primary display allows you to compare incoming sound data with data files on enemy ships. Normally your crew does this automatically for you. However, an experienced captain can make an identification faster than their crew, and at the "Ultimate" challenge level the crew insists on the captain examining the incoming sound before a specific ship class is identified.

Procedure: Press the *Acoustic Signature* key to visit your Sonar Room and see the incoming sound patterns. Once this display is visible, hold down the *Vessel Signatures* key while pressing a *Select Vessel* key to make a close comparison between an incoming sound and a specific ship. If you believe your identification is correct, then hold down the *Vessel Signatures* key again while pressing the *Confirm Choice* key.

Results: If your identification is correct, the contact solution % rises and the ship class is added to the contact data. If your identification is wrong, the contact solution % plummets and no ship class is displayed.

At the "Ultimate" challenge level you must make comparisons and select the vessel; your sonar operators will not do it for you.

Surface Sensors (Advanced)

These devices are mounted on periscopes ("masts") that rise out of the sail (once termed the "conning tower") of your sub. Periscopes and masts have a 60' elevation. They automatically rise to maximum height; therefore your depth controls how much shows above the water. For example, when you go to 45' depth, 15' of mast or periscope is visible above the water.

All of these devices must be above water to function. Furthermore, whenever a mast or periscope is above water, enemy radars *could* notice it and find you. The higher the mast, the more likely this situation. Thus wise captains use surface sensors only when absolutely necessary, for very short periods, and afterward quickly leave that area.

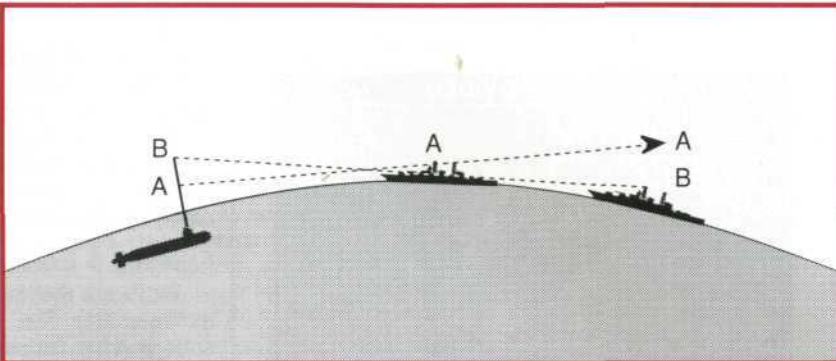
ESM Receiver: This is a sensitive, passive radar atop a mast. It tracks radar signals from enemy surface ships and aircraft. It runs automatically whenever your depth is 55' or less. As this mast rises higher, you can "hear" radar signals from enemies farther and farther away. Although it does not transmit signals, the enemy may spot the mast whenever it is above water.

(R) Active Radar: The *Active Radar* key toggles your radar set on and off. The radar set is atop a mast, which must be above water to function. Active radar gives an accurate plot of nearby surface contacts, helicopters, and airborne missiles. Its range depends on the height of the mast above water.

Active radar alerts any enemy ships, aircraft, or submarines with ESM masts elevated to your presence, provided they are within range.

Periscope & Laser: The *Periscope* key shows the view through your attack periscope. The lower area on the screen is a video of the view through the periscope. Below this is the current bearing of the periscope, and the range to the target (if any is in sight). This range, in yards, uses a built-in laser. Note that laser beams, per se, do not reveal your position.

Press the *View Contacts* key to automatically rotate the periscope to the bearing of a contact. If you have multiple contacts, each key press rotates the scope onto a new contact.



The Earth's Curvature

Visual sightings (including laser rangefinding), ESM reception, and Active Radar are all blocked by water. To see "around" the curve of the earth, a submarine's mast must be above the water.

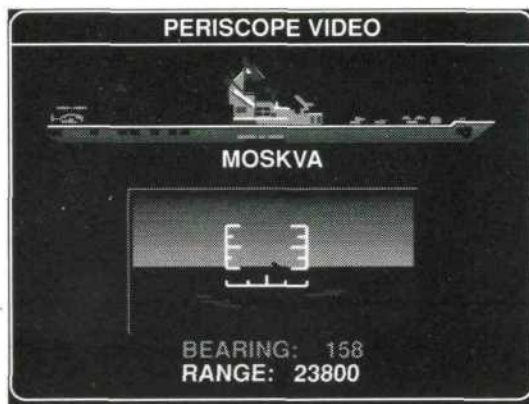
When the submarine's mast is raised to position "A" it can see enemy ship "A", but not "B". The mast must be raised higher, to "B", before enemy ship "B" is visible.

Visual light (including lasers) follows a virtually straight line. Radar waves, however, "bend" slightly with the curve of the earth, and can travel a tiny bit farther.

Mast Height & Maximum Range

Sub Depth	Maximum for Radar	Maximum for Lasers/Visible Light
55'	5 Kyds	2.5 Kyds
40'	20 Kyds	10.0 Kyds
25'	35 Kyds	17.5 Kyds
10'	100 Kyds	50.0 Kyds

Above are typical maximum visibility ranges at various depths. As depth decreases, the mast rises higher, increasing the maximum range. Radar ranges apply to both active radar and ESM.



Use the *Controller* to manually rotate the scope for a "naked eye" view. Most captains find manual rotation a dangerous waste of time. Press the *Identify Periscope Image* key to see a computerized image comparison with your ship data base.

Note: Maximum visual sighting ranges are less than radar. As a result, rising high enough for a periscope view of an enemy can significantly increase the risk of his radar spotting your scope above water.

Friendly & Enemy Contacts

Be aware that friendly ships and submarines may be found, as well as the enemy. The most likely friendly contacts are other NATO attack subs seeking the same enemy. In rarer cases, you may encounter NATO ballistic missile submarines that have strayed into the combat zone. It is always wise to identify a contact before firing on it. Otherwise, you may mistakenly attack, or even sink, friendly forces.

Ship Data Base

This puts "on-line" intelligence data about enemy vessels on your primary display.

Procedure: Press the *Ship Data Base* key to see the table of contents. Then press the appropriate letter key for the ship class that interests you.

Interpretation: The data base summarizes the detailed information found in Part III (The Reference Manual) on pages 71 through 93.

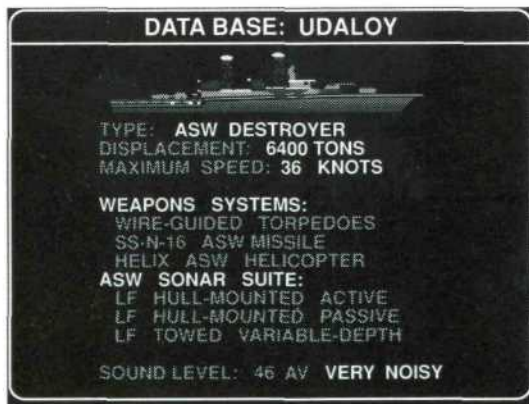
Type shows the basic purpose of the vessel, using standard US Navy terminology.

Displacement shows the overall size of the vessel. The larger the displacement, the more difficult it is to sink. Submarine displacements are for the boat submerged. Not all display systems show the displacement.

Weapons Systems shows the type of threats you could encounter. SS-N-14 and SS-N-16 missiles have homing torpedo warheads. Enemy ASW helicopters carry both sonobuoys and homing torpedoes. RBU rocket launchers (various models) fire a barrage of short-range explosive rockets.

ASW Sonar Suite shows the type of sonars carried. Lower frequency sonars are more effective than higher frequency types. Variable-depth (VDS) and towed array sonars are more effective than hull-mounted types. In addition, they can be streamed below the layer while the owner remains above it.

Sound Level indicates the acoustic volume (AV) of the vessel. The higher this value, the louder the vessel.



Weapons

To damage or destroy the enemy, you must use your weapons. All weapons are "intelligent": they have a homing system that "turns on" at a pre-planned point. From that point onward the weapon "sees" in a 90° arc ahead of it, seeking the nearest target. For additional details on tactics see Part II (The Captain's Manual), Weapons & Attacks (pages 52-57), or Part III (The Reference Manual), US Submarine Weapons (pages 64-66).

Ice & Missiles: All your weapons except torpedoes launch themselves from the sea into the air. In drift and floe ice conditions there is a 25% to 50% chance the missile may hit a piece of ice as it emerges from the water. This, of course, wrecks the missile. Similarly, the Sea Lance's torpedo warhead must drop back into the water at the activation point, and again there is a danger of hitting ice. The Stinger missile mast has similar problems: the mast may hit ice, wrecking the missile on it (but generally not the mast itself).

Beneath the arctic icepack a missile will always hit the ice. However, a close examination of the area (using Tactical Display and Map Overlay) may show "open water" areas amid the icepack. Missiles can be fired through these holes, and Sea Lance activation points can be set over a hole (allowing the Sea Lance warhead to drop into the water).

This secondary display shows the weapons available and the reserves in your magazine.

Viewing Weapon Status: Press the *Weapons Loadout* key to see the weapons currently loaded in your tubes. Press the key again to see the your ammunition reserves.

Loading an Empty Tube: If a tube is empty, reloading is a two step process:

1. Press *Load Tube* key.
2. Press the key that matches the weapon you'll load.

Empty tubes are always loaded in numerical order.

Changing a Loaded Tube: If a tube is full, changing the weapon is a three step process:

1. Press the *Load Tube* key.
2. Press the named key that matches the new weapon you wish to load in that tube.
3. Press the number key that matches the tube you wish to change.

Note that this procedure is different from reloading. Therefore, you should know whether a tube is empty or full before you try to load or change it. Watch the prompts carefully.

Notes: VLS tubes are present only on the improved Los Angeles class. They are loaded and unloaded only in port.

Most US Navy submarines have four torpedo tubes, but the upcoming Seawolf class should have eight. Weapons in tubes are listed in order, from top (#1) to

Weapons Loadout

WEAPONS	
TUBE 1	TOMAHAWK
TUBE 2	MARK 48
TUBE 3	TOMAHAWK
TUBE 4	HARPOON

Weapons Summary

Weapon Name	Avail. from	Designed Targets	War-head	Speed in kts	Range (Kys)	Controls Available
Mk 48	1984	Sub,Ship	large	40,55	0-40	wire, PAP homing, search
Mk 48 ADCAP	1988	Sub,Ship	large	40,60	0-40	wire, PAP homing, search
Mk 48 Swimout	1996	Sub,Ship	large	40,60	0-40	wire, PAP homing, search
Harpoon UGM	1984	Ship	mdm	560	6-120	PAP homing
Tomahawk TASM	1988	Ship	large	475	6-500	PAP homing
Tomahawk TLAM	1988	Land	large	475	6-1000	pre-programmed at port
Sea Lance/Mk 50	1992	Sub	small	625+	6-60	PAP homing, search
FIM-92A Stinger	1992	Aircraft	tiny	1260	0-6	PAP homing

Weapon Name: Common name of the weapon. Mk 48's are torpedoes, all others are missiles, although the Sea Lance has a Mk 50 torpedo as its warhead.

Avail. From: Scenario date the weapon is first allowed.

Designed Targets: Type of target the weapon was designed to attack. Sea Lance can be used to attack ships also, but results may not be very good. "Aircraft" includes helicopters. Land targets are not engaged in the "Battle" game, only during "Cruising".

Warhead: Destructive power of the weapon. The larger the warhead, the greater the chance of sinking a target. Stinger warheads, although tiny in comparison to others, are generally sufficient to destroy a helicopter or small planes.

Speed in kts: Weapon speed in its run to target. Actual missile speed is somewhat variable, value given is just the cruising speed. Torpedoes have passive and active speeds. By comparison, ships move 10-30 knots, subs 15-45 knots maximum speed..

Range in Kys: Minimum and maximum range of the weapon.

Control: Type of control systems on the weapon.

"Wire" means the launcher can control the weapon while it's running (provided the wire is intact), including reprogramming all other controls.

"PAP homing" means a pre-planned activation point (PAP) can be set, after which the weapon homes onto any target within a 90° arc ahead of it. If the weapon is jammed, it continues flying straight unless other controls take over (such as Wire or Search).

"Search" means that if the weapon is jammed and misses, it circles, searching for the target, trying to home and attack again.

"Pre-programmed at port" means the weapon has a guidance program loaded when the weapon itself is loaded onto your boat. It cannot be changed without returning to port for a new set of guidance software.

bottom (#4 or #8).

Stinger missiles are listed separately. When available they are always loaded.

Ammunition Supply: The weapons in your tubes and magazines are the entire ammunition supply on your boat. In Battle Simulation and Training Action scenarios you cannot replenish your ammunition. In the "Red Storm Rising" campaign you can use Strategic Transit to return to port (Holy Loch, Scotland) and replenish ammunition there.

The Mark 48 Wire-Guided Torpedo

Weapon Capabilities: Launched from a torpedo tube, this weapon is effective against subs and ships. After launching you can guide a torpedo to target unless its wire to your ship breaks or is deliberately cut; after that the torpedo follows a programmed attack plan.

Normal Mark 48's are available in 1984, then are replaced by the ADCAP in 1988. The Swimout is available to Seawolf class submarines only in 1996.

A torpedo can be launched at any depth. Minimum range is a few hundred yards, maximum about 40 Kys (40,000 yards). The torpedo cruises at 40-42 knots and has a maximum speed after activation of 55-60 knots, depending on the model (ADCAPs and Swimouts are faster).

Mark 48 torpedoes are complex but extremely effective weapons. The ability to control the weapon after launch means that if used properly, this torpedo will never miss.

Firing Procedure: Firing is a three step process:

(1) Press the *Fire Mk 48 Torpedo* key.

This does not fire the torpedo per se. Instead, it gives you access to the torpedo's guidance computer. The primary display switches to Tactical and a flashing square appears. This is the "pre-planned activation point" (PAP) for the torpedo.

(2) Use the *Controller* to position the PAP.

The pre-planned activation point (PAP) is where the torpedo will increase speed,

switch on its active sonar and begin seeking the enemy. At the bottom of the display is a readout of the current bearing and range to the PAP.

(3) Press the *Selector* to launch the torpedo.

Torpedoes are launched with compressed air. This "launch transient" temporarily increases your loudness by 8 AV. This could be enough to reveal your location to the enemy. Mark 48 Swimout torpedoes carried by the Seawolf class have no launch transient because they don't use compressed air.

The "On Board" Torpedo Guidance Computer: When launched, a Mk 48 torpedo travels at slow speed (about 40 knots) to the PAP. There its homing sonar switches on, speed increases to 55-60 knots, and it seeks an enemy within its 90° forward arc. Once it finds an enemy the torpedo automatically homes onto (steers toward) that target. If the torpedo homes on a target, then loses it (because the enemy maneuvered away, used a noisemaker, and/or a decoy), the torpedo circles around. It continues circling until it runs out of fuel or begins homing again.

The default depth setting for a Mk 48 torpedoe is to run at the depth it was fired from, and to circle left (L/Search) if it loses a target. To change these settings you must take control after launch (see the next section).

The Wire: Mark 48 torpedoes trail a fine wire behind them. This wire is "plugged into" the fire control computers on board your submarine. As long as the wire is intact you can change information in the torpedo's guidance computer, or even control the torpedo directly.

If the wire is broken, you lose control of the torpedo. It follows its last instructions blindly. Tight turns or high speeds by your sub often break the wire, and both together almost always break it. Radical maneuvers by the torpedo are much less likely to break the wire.

The current status of the wire ("W" for intact, "X" for broken) appears on the Torpedo Control secondary display (see below) after the word "SPEED:".

Taking Control: To control a running torpedo, press the *Torpedo Control* key. This puts Torpedo Control on the secondary display (i.e., detailed information about that torpedo). If multiple torpedoes are running, each *Torpedo Control* key press switches to the next weapon (i.e., cycles through them).


Torpedo Control Secondary Display: This display shows the following information about the torpedo:

TORPEDO NAME: Torpedoes are named A, B, C and D inside your weapons computer as they are launched. The computer cannot track more than four torpedoes at once.

TORPEDO STATUS: A torpedo starts inactive, headed toward its PAP (see below). It becomes "ACTIVE" when it reaches that point or is manually activated. Once active, if it finds a potential enemy it begins "HOMING". If the enemy uses a noisemaker or decoy to confuse the torpedo it is "JAMMED".

TIME TO RUN shows the number of seconds before the torpedo runs out of fuel.

Controlling a Mark 48 Torpedo (Advanced)

TORP A
-- -- -- --
TIME TO
RUN: 400
TIME TO
PAP: 120
SPEED: W
40 KTS
HEADING
164 DEG
L/SRCH 

TIME TO PAP shows the number of seconds before the torpedo reaches the current pre-planned activation point (PAP).

SPEED shows the current speed of the torpedo, in knots. In addition, "W" indicates the wire from the torpedo to your boat is intact, while "X" means the wire is broken.

HEADING shows the current course of the torpedo.

/SRCH indicates whether the torpedo will search left or right if it loses homing, and whether the torpedo is programmed to run above or below the layer.

THE WIRE: If the wire is broken, you cannot take control. A "W" in the Torpedo Control secondary display indicates an intact wire, an "X" indicates a broken wire.

Weapon Control: Pressing the *Weapon Control* key puts this screen on the primary display, and Torpedo Control on the secondary display (if it isn't there already). The Weapon Control display is similar to the Tactical Display (see above), except it automatically starts at factor-3 scale centered around the last *weapon* you had under control (the one now showing on the Torpedo Control display). Each time you press Torpedo Control the display shifts to a new torpedo. Thus the display gives you a "torpedo's eye view" of the situation.

If the torpedo is not yet active, the current PAP appears on this display. If it is off the display at the current scale, it appears on the edge to indicate the general direction.

Map symbols are the same as on the Tactical Display. A map overlay for water conditions is also available, just as on the Tactical Display.

Changing a Torpedo Program: If the torpedo is not yet active, when you press *Torpedo Control* you can either change the programmed guidance settings or manually activate the torpedo. Of course, the wire must be intact.

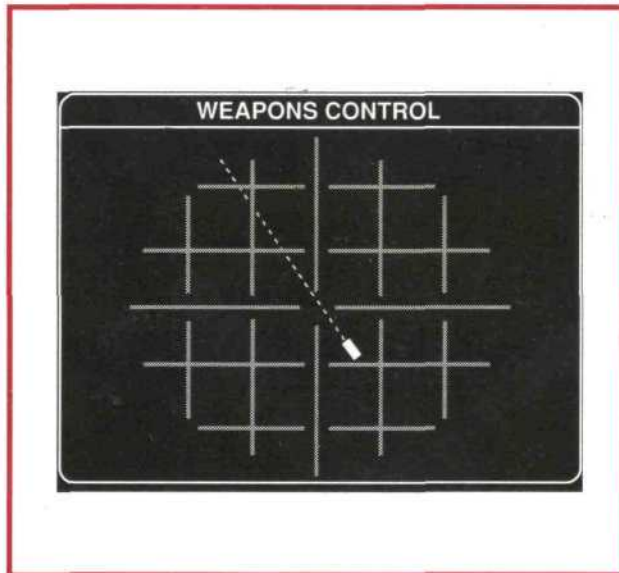
NEW PAP: You can use the *Controller* to move the PAP to a new position, then press the *Selector* to make the change.

NEW DEPTH: You can select a running depth by pressing the *Run Shallow* or *Run Deep* key. Shallow running torpedoes cruise 50' below the surface. Deep running torpedoes cruise about 50' below the thermal layer. When a torpedo is homing, it automatically moves to the depth of its target.

NEW SEARCH PATTERN: You can reprogram the search pattern by pressing the *L/ Search Pattern* or *R/ Search Pattern* key.

Manual Activation: You can manually activate a torpedo by pressing the *Activate Torpedo* key. When you do this the PAP is ignored and the torpedo activates immediately. It is now under direct guidance. Manual activation is possible only if the wire is intact.

Direct Guidance: After a torpedo is activated (either by reaching its PAP or by



manual activation), you directly control its movements as long as the wire remains intact.

Course: You can steer a torpedo using the *Controller*. Moving it left turns the torpedo to the left, moving it right turns the torpedo to the right. Leaving the *Controller* centered means the torpedo cruises straight ahead. However, its seeker is still running. Therefore the torpedo will home on any target it finds. You can override homing with direct left or right turn commands.

Depth: You can control the depth of the torpedo. Pressing the Run Shallow key moves the torpedo above the layer (to about 50' below the surface). Pressing the Run Deep key moves the torpedo below the layer (to about 50' below the thermal layer). If a torpedo begins homing, it automatically moves to the depth of the target.

Search Pattern: In manual guidance you cannot change the pre-programmed search direction (left or right) that occurs if the torpedo loses homing. Instead, pressing the *L/ Search Pattern* key or the *R/ Search Pattern* key starts that search pattern immediately, regardless of the current situation. The torpedo begins circling left or right, continuing until it homes on a target or gets a course command or runs out of fuel.

Cut the Wire: The *Drop Torpedo* key cuts the wire and drops all control of the torpedo, which disappears from your screens and computer controllers. The torpedo itself de-activates and quietly self-destructs, sinking to the bottom. This control is useful if you wish to clear your computer of hopelessly lost torpedoes (remember, you're limited to four at once).

Tactics: Using wire-guided torpedoes effectively is a fine art. For example, through judicious control and careful guidance, you can "sneak up" on an enemy with a torpedo, giving him virtually no warning before the weapon hits. For an in-depth discussion of torpedo tactics, see Part II (the Captain's Manual), Weapons & Attacks (pages 52 through 57).

General Capabilities: Both the Harpoon and Tomahawk use similar attack systems. Upon launching the missile rises to the surface, blasts into the sky from its waterproof canister, and flies at low altitude to the PAP. There it turns on radar guidance and seeks the nearest target within its 90° forward arc. As soon as it finds a target the missile steers toward that ship. Note that both the Harpoon and Tomahawk use radar guidance, and therefore cannot "see" enemy submarines.

Harpoons are available in all time periods, but Tomahawks are unavailable in 1984.

The missile shows on enemy radar when it leaves the water, but is very hard to track until it reaches the PAP. Once it activates it is easier to track and shoot down.

Harpoon UGM Capabilities: Launched from torpedo tubes, this missile is effective only against ships. It cannot be launched from depths below 300'. You must pre-program a course and activation point for this weapon; it cannot be controlled in flight.

Harpoon & Tomahawk Missiles

Minimum range is 6 Kyds, maximum range about 120 Kyds.

Tomahawk TASM Capabilities: Launched from either torpedo tubes or VLS tubes, this missile is effective only against ships. It cannot be launched from depths below 300'. Like the Harpoon, course and activation point must be pre-programmed. Minimum range is 8 Kyds, maximum range about 500 Kyds!

Tomahawk TLAM Capabilities: Effective only against land targets, these missiles cannot be used in a naval battle.

Firing Procedure: Firing a Harpoon or Tomahawk TASM is a three step process, and similar to firing a torpedo.

(1) Press the *Fire Harpoon* or *Fire Tomahawk* key.

This connects your shipboard fire control computers with the missile's guidance system. The pre-planned activation point (PAP) marker appears on your primary display.

(2) Use the *Controller* to move the PAP.

This determines the PAP where the missile starts seeking a target. It also determines the missile's initial course, since it flies straight to the PAP. At the bottom of the display is a readout of the current bearing and range to the PAP.

(3) Press the *Selector* to launch the missile.

Remember, missiles cannot be launched below 300' depth, and launches beneath ice may be ruined (see page 21).

PAP Suggestion: When beginning, set the PAP of a Tomahawk or Harpoon about 2/3rds of the distance to the target. This gives the missile a wide "search area". For more sophisticated techniques, see Part II (The Captain's Manual), Weapons & Attacks (pages 52-57).

Controlling Missiles: Once a missile is launched it's "on its own". You cannot make any changes or adjustments to the course or activation point.

Sea Lance Missiles

Capabilities: This missile, launched from a torpedo tube, is designed to attack subs. It could be used against ships. It cannot be launched from depths below 300'. Like other missiles, course and activation point are pre-programmed. Minimum range is about 6 Kyds, maximum about 60 Kyds.

The SeaLance is available from 1992 onward.

When the missile reaches its PAP, the warhead is released into the water. This warhead is the small Mark 50 homing torpedo. It immediately activates and begins circling, trying to find a target within its 90° forward arc. If no target is found, the torpedo continues circling, deeper and deeper, until it either runs out of fuel and sinks, or it finally finds a target.

When the torpedo homes on a target, it changes to the depth of that target and drives straight at it. If it loses the target, it goes back to circling.

The Mark 50 torpedo has a relatively small warhead. This makes it more effective against submarines than surface ships. Large submarines and most ships may take

two or more hits from this weapon before sinking.

Firing Procedure: A Sea Lance is fired just like a torpedo, Harpoon or Tomahawk. First, press the *Fire Sea Lance* key to "plug into" the missile's guidance computer. Then use the *Controller* to move the pre-planned activation point (PAP). Finally, press the *Selector* to actually launch the missile.

Controlling a Sea Lance: Once a missile is launched it's "on its own". You cannot make any changes or adjustments to the course or activation point, nor can you control or adjust the Mk 50 Torpedo.

Capabilities: This missile is effective only against helicopters. It is fired from a mast above water. Therefore, maximum launching depth is 55'. Entirely self-guided, it must be activated with a course before launching. Once launched it flies straight with an IR (Infrared) homer seeking aircraft emissions in a 90° forward arc. The first and nearest aircraft spotted causes the missile to change course and fly straight at the aircraft. If the aircraft dodges or jams the missile, it continues to fly straight until it finds another target or runs out of fuel (the latter is more likely!).

Minimum range is a few hundred yards, maximum range is about 6 Kyds. Note that this is *very small maximum range*.

Stinger mast mounts are available from 1992 onward.

Firing Procedure: Firing a Stinger is a three step process, like torpedoes and other missiles.

(1) Press the *Fire Stinger* key.

This activates the missile and puts the course marker on your primary display. Remember, you must be at 55' depth or less.

(2) Use the *Controller* to move the course marker.

The missile will fly automatically from your boat toward the course marker. Therefore, the course marker only shows the direction of flight. It is not a PAP, since the missile is launched active. At the bottom of the display is a readout of the current bearing and range to the PAP.

(3) Press the *Selector* to fire the missile.

This fires the missile. Before launching, check your firing conditions. The missile only has 6 Kyds range — make sure the target is in range! Also remember that ice can wreck the missile as it tries to launch.

Controlling a Stinger: Once a missile is launched it's "on its own". You cannot make any changes or adjustments to the course or target.

Stinger Missiles

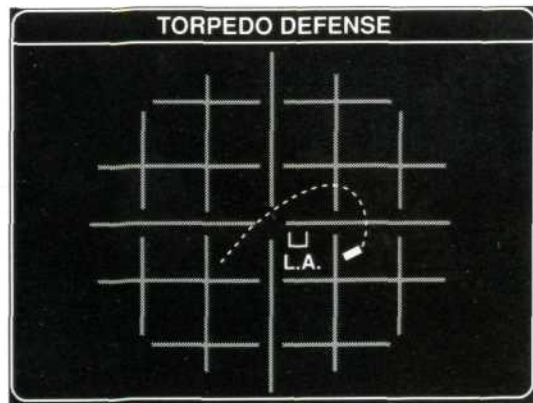
Evasion

Evasion Techniques Summary

Technique	Reload Speed	Defensive Effect
Knuckle	a 25+ kt turn	blinds homing torpedo if knuckle closer to torpedo, until torpedo's 90° facing runs past it; short duration.
Noisemaker	quite fast	blinds homing torpedo until torpedo's 90° facing runs past it; short duration.
Decoy	quite slow	torpedo homes on decoy if within 90° facing, <i>and</i> if decoy closer to torpedo.

The enemy may launch torpedoes at you, some of which are delivered long distances through the air by missiles. Fortunately, your sub contains noisemakers and decoys to help you avoid them. In addition, high-speed turns create water turbulence (called "knuckles") that confuse torpedoes.

A warning alarm sounds when a new threat is first located by your crew. In addition, if an enemy torpedo is homing on your boat, you'll hear "pings" on your hull.



Defense Display

Press the Defense Display key to see the location of nearby threatening weapons. Threat Weapons will appear automatically on your secondary display.

The Defense Display is similar to the Tactical Display, except it automatically starts at the factor-3 scale, providing a useful "close up" for observing and evading nearby torpedoes. The display is centered around your boat. The map symbology is the same as on the Tactical Display.

Threat Weapons

Press the *Threat Weapons* key to see a list of enemy torpedoes threatening your boat. There are four possible entries on this list, each with the following data:

BRG (Bearing): This indicates the compass direction from which the torpedo approaches. It also has a symbol showing whether the torpedo is currently above or below the layer.

RG (Range): This indicates distance from you to the weapon, in yards. Weapons begin homing at 2,000 to 4,000 yards, depending on sound conditions in the water. At 1,000 yards or less they are a very serious danger.

There are three techniques for "fooling" enemy torpedoes: noisemakers, knuckles and decoys. Each relies on the limited sonar abilities of a torpedo: its sonar only faces forward in a 90° arc (45° left and right of straight ahead).

Noisemakers: Press the *Noisemaker* key to drop this device directly behind your boat. A noisemaker jams a torpedo's sonar if (a) the noisemaker is fairly close to the torpedo, and (b) if the torpedo is facing toward the noisemaker. Jammed torpedoes may head straight into the noisemaker, or may try to steer around it. Unfortunately, once past it they usually circle and seek you once more.

Noisemakers are very small devices. Submarines carry a large number and can drop them fairly quickly. However, if you drop too many too fast, you may be temporarily out until the crew reloads the launcher.

Knuckles: If you make a tight 15° left or right turn at high speed, your sub may form a "knuckle" of turbulence in the water. The knuckle acts like a noisemaker, but lasts for less time. Furthermore, a knuckle is only effective if it is closer to the torpedo than your boat. If your boat is closer, the torpedo continues homing on you!

Decoys: Press the *Decoy* key to launch this device. A decoy travels straight ahead at 20 knots. It sends out and reflects sound signals that imitate your sub. Actually, the imitation is good enough to fool a torpedo, but is rarely good enough to fool a human sonar operator on a sub or ship.

A torpedo homes on a decoy instead of your sub only if (a) the torpedo is closer to the decoy than to you, and (b) the torpedo faces toward the decoy.

Decoys are launched from a special tube. Reloading and programming a new decoy takes considerable time. If you attempt to launch another decoy too fast, your crew will report that no decoy is ready (yet!).

When an enemy torpedo approaches, the standard maneuver is to drop a noisemaker, increase speed to maximum, and make a hard turn away. The torpedo will either blindly race through the noisemaker (in Introductory or Casual challenges) or make a curving course around it (in Serious or Ultimate challenges), then begin circling to re-acquire you.

If you get far enough away, fast enough, the torpedo may never "find" you again. Its maximum acquisition range to start homing is 2,000 to 3,000 yards, depending

Defense Equipment

THREATS

BRG ↑ 312

RG 3950

BRG

BRG

BRG

Evasive Tactics & Theories

on sonar conditions. For example, if the torpedo is on one side of the layer and you're on the other, the torpedo must be closer to find you, since contact is more difficult through the layer.

Sending out a decoy as you turn can be useful, since as the torpedo turns, it may see the decoy first and chase that instead of you. Many other tricks and maneuvers are possible, see Part II (The Captain's Manual), Evasion & Escape (pages 58-60) for details.

RBU Rockets: These extremely short-range multiple rocket launchers are carried on most Russian warships. Range varies from a few hundred to a few thousand yards, depending on the model (larger ships generally have longer ranged models). If a ship has your location, and is within range, it may fire a barrage of rockets directly onto your position. These weapons drop quickly through the water and explode around you. They rarely sink you, but often cause damage. The only escape is to prevent enemy ships from getting so close in the first place!

Damage Report

DAMAGE REPORTS

ACTIVE
SONAR

TORPEDO
TUBES

TOWED
ARRAY

If you are hit, press the *Damage Report* key to show which, if any, systems have been damaged. In general, if you take damage your computer will automatically display the damage report (anticipating your desires). Potentially vulnerable systems include:

ACTIVE SONAR, which means forward damage has knocked out that sonar system.

PASSIVE SONAR, which means hull damage has knocked out that sonar system.

TOWED ARRAY, which means the towed array has been broken and permanently lost (often through damage to its housing on the hull).

TORPEDO TUBES, which means there are casualties and flooding on forward decks port or starboard, including one of the torpedo rooms. Half of your tubes are out of action.

PROP LINKAGE, which means damage at the stern greatly slows your boat.

Starting Battles with Damage: If your boat has both passive sonar and its towed array damaged, at the start of a battle you'll discover that your active sonar is running. This is because an engagement begins when you first recognize an enemy presence. Since other sensor systems are damaged, this occurs when either (a) you make an active sonar contact, or (b) when a torpedo hits you. Naturally, your boat will "ping" frequently enough to avoid the latter situation.

Strategic Transit: the Norwegian Sea Theater

In "Strategic Transit" you maneuver your sub across hundreds of miles of ocean, seeking out your objective while avoiding enemy patrols.

You control "Strategic Transit" *only* if you selected the RED STORM RISING campaign game option (see Starting Options, page 8). In all other options you bypass this and go directly into "Battle" (see page 11).

The keyboard overlay provided is for use in battle only. Ignore it for Strategic Transit. The main controls for cruising are the *Controller* (typically the joystick, mouse or cursor keys, see the Technical Supplement) and the *Selector* (typically the trigger, button, or Return key).

You start the campaign at your home port, Holy Loch, on the western coast of Scotland (northern England). You will need to return here periodically, to replenish your ammunition and/or have damage repaired.

Weapons Handling: To add or subtract weapons from your boat, move the *Controller* to highlight "add" or "remove" on the appropriate weapon. Each press of the *Selector* adds or subtracts one weapon, changing the amount on board.

Selecting weapons for your sub is an important decision. The Mk 48 torpedo is an excellent all-around weapon, especially useful against submarines, particularly diesel/electric subs. The Sea Lance is primarily useful against nuclear subs. Tomahawk TASM missiles are excellent for use against surface ships, but may not be available, in which case carry Harpoon UGMs instead. Some Captains prefer the greater survivability of the Harpoon anyway. Tomahawk TLAMs are useful only if your objective is a land target. Stingers are always worth carrying if they're available.

Repairs: To repair a damaged system on your boat, move the *Controller* to highlight the repair you desire. Press the *Selector* to make the repair.

Returning to Sea: To leave port, move the *Controller* to highlight the "leave port" option and press the *Selector*.

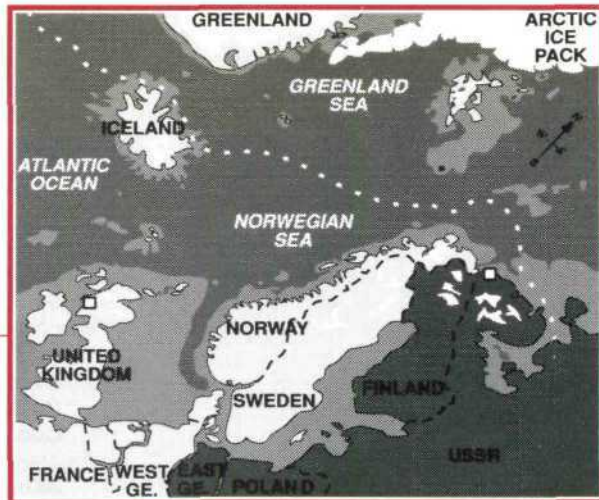
Warning: Your tubes are now unloaded! Pause to load them (see the next page for details).

Time: Be aware that weapons handling and repairs take time. While you're in port, the enemy may get far ahead of you. If you wait too long, you may discover that the enemy has achieved their goal and a new mission awaits.

Home Port

The Map

The map shows the northern waters between Greenland and Scandinavia (the "Norwegian Sea Theater"). During Strategic Transit your sub, enemy task forces, aircraft, and satellites move across the map at an accelerated rate (approximately one second equals one hour).



See the Technical Supplement for map colors and symbols.

Timeliness: The map shows only the latest sightings of enemy forces. Many times sightings of enemy forces are hours, sometimes days old. The map symbol changes color or shape to show the "age" of each sighting. It's unwise to place much trust in old sightings. As new sightings occur your map is automatically updated.

Goals: In general, your objective is to intercept and destroy a specific enemy force at sea. Unfortunately, more than one enemy force may be at sea! Finding the enemy, then moving into a good position for battle, requires both luck and skill. Refer to Part II (the Captain's Manual), Strategic Maneuvers (pgs 40-42) for more information and advice.

Cruising

Maneuver Options: You use the *Controller* to move your sub in any of eight directions. You normally travel at *cruising speed* (15 kts), but if you hold down the *Selector* while moving, you increase to *flank speed* (30 kts). In addition, you can *drift* (moving just a few knots) by not touching the controls.

Tactics: The slower you move, the further your sonars "hear" and the quieter your sub. As you move faster your detection range decreases while the enemy can hear you farther away.

Pause: To freeze time in your cruise, press the *Pause* key. This gives you access to the Attack Center where you can examine your ship, change weapons loading, review your orders, or save the game.

Keyboard Overlay: This is provided only for "Battle". Do NOT use the keyboard overlay controls when cruising.

Pause: The Attack Center

When you pause, or when you contact the enemy, the scene changes to the control room ("Attack Center") of your sub. Use the *Controller* to highlight an option, then press the *Selector* to make that choice.

Reviewing Mission Orders: You can examine the last orders received, to remind you of the current objective.

XO's Ship Status Report: Here you can examine the state of your boat and change the weapon loadouts in your tubes.

To change weapon loadout, first unload a tube by moving the *Controller* to highlight a tube and pressing the *Selector*. Then select the new weapon by moving the *Controller* to highlight the weapon and pressing the *Selector*.

Some submarine classes have special-purpose tubes or weapons. VLS tubes can only be loaded and unloaded at port. Stingers have a special weapons area in the sail with a mast launcher. Since this is a dedicated-purpose launcher, it is automatically loaded and readied.

Computer Log: This allows you to save the game.

Continue on Course: This returns you to Strategic Transit in the Norwegian Sea theater. This option is not available if you encountered enemy naval forces here.

Battle Stations: This option starts the battle. It's available only if you encountered

enemy naval forces here.

Before entering battle, make sure your torpedo tubes are loaded. In addition, make a habit to pause and set up a starting tube load immediately after leaving port. To do this, simply select the XO's Ship Status Report option, described above.

Are Your Torpedo Tubes Loaded ?

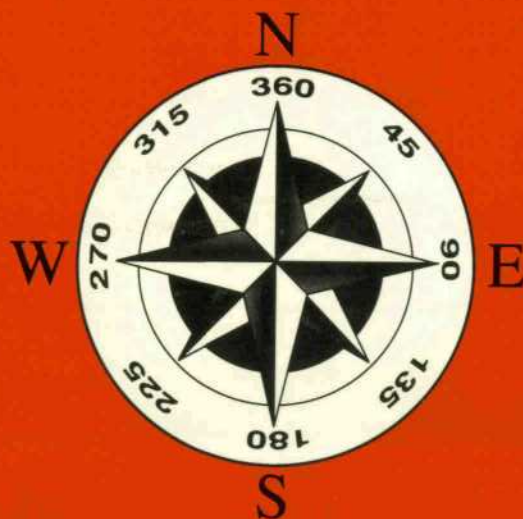
When you conclude a combat with any enemy forces you always uplink a combat report to COMSUBLANT. This happens automatically. If the enemy encountered was *not* your objective, you are informed of this and can continue under current orders. If the enemy encountered *was* the objective mentioned in your orders, the mission ends, results are shown, and new orders are issued to you.

Finishing Your Mission

If your target is enemy warships, you should do your best in battle. You won't get a second chance!

A red and blue bar gauge is displayed between missions, as news reports arrive before and after missions. If the dividing line on the gauge moves toward the "WP" (Warsaw Pact") end then the Pact is doing better. If it moves toward the NATO end, then NATO is doing better. If the dividing line moves entirely to one or the end, that side has a decisive advantage that will force the enemy to the negotiating table and end the conflict. Needless to say, you don't want the Pact to win.

Course of the War



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