

688 ATTACK SUB

USER MANUAL





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WELCOME ABOARD

There are only two kinds of ships: submarines and targets...

You are hereby given command of a nuclear-powered attack submarine, the world's most powerful and versatile ocean-going defense weapon. You are now a hunter/killer, a predator of the deep. You play a silent, sometimes lethal game of hide and seek. Every minute you make countless decisions that may have grave consequences for you, your crew...even your country.

About the Game

You command an American Los Angeles or Soviet Alfa class submarine. You prowl through a dark, undersea world, carrying out dangerous missions that require predatory cunning and bold action. In peacetime, you track and hunt potential enemies. In war, you ambush enemy convoys and defend your warships; stalk ballistic missile submarines and duel other hunter/killers; strike at inland targets from enemy waters and live to tell about it.

All the major systems of a modern attack submarine — sonar, weapons, navigation, helm, radio and periscope — are at your disposal. Over 40 separate controls let you feel what it's like to operate the world's most sophisticated — and deadly — defense technology. At the same time, crew transmissions and pictures remind you that as captain you manage men as well as machines.

688 Attack Sub turns the most up-to-date technical information available concerning subs into one of the hottest games on the market. Whether you play the computer or challenge a friend to a modem game, you'll get hours of pleasure from *688 Attack Sub's* exciting graphics, fast pace, attention to detail and variety of player options.



Using This Manual

— This manual was written for IBM or IBM-compatible computers. If you're using another type of computer, some commands and features described in this manual may be different or unavailable on your computer system. If you're using any computer *other than* an IBM or IBM-compatible computer, please read the Command Summary Card included in the package for information specific to your computer.

The manual is both an introduction to the *688 Attack Sub* simulation and a reference manual. It's divided into two parts so you don't have to read it all the way through in order to start playing.

Chapters 1-2: Introduction to 688— The first two chapters are designed to get you into the game quickly and painlessly. By no means do you have to read both chapters — if you're the type of player who doesn't like to read manuals, follow the step-by-step instructions in Chapter 1 and you'll be ready to choose a mission and begin play. However, the fastest way to get your finger on the launch button is to let the Quick Start Guide in Chapter 2 lead you through the first mission, TORPEX '89. By showing you how to set up an attack on several decommissioned warships, the Quick Start Guide will introduce you to the sub's controls and basic game concepts.

Chapters 3-7: Captain's Reference — Refer to these chapters only when you need to know about something specific — missions, controls, tactics, or ship and weapon specifications.

Getting Started

— To play *688 Attack Sub*, you need a computer with at least one floppy drive and 384K of free memory. Your system must be running on DOS 2.0 or higher.

— *688 Attack Sub* has an unusually large number of detailed screens, bitmaps and text: in fact, over two megabytes of information, all of which had to be compressed several times to fit onto the floppies included in the package. The result is **YOU CAN'T PLAY FROM THE ORIGINAL 688 DISK(S)**. Instead,



an install program on your original 688 disk creates a copy of the game from which you'll play. The install program configures the game to your current system. If you upgrade your system, you should create a new copy of the game. The time it takes to make a copy of the game varies depending on your hardware. Although the process can take up to several minutes, we felt the extra time was a fair trade for the game's stunning graphics and fine detail.

5.25" users: You'll find two disks in the package: Disk #1 and Disk #2. During installation, you'll have to swap these disks.

3.5" users: The entire game has been packed onto one disk. Whenever you're asked to insert an *original* Disk (#1 or #2), insert the single disk included in the package.

Installing *688 Attack Sub* on a Hard Disk

To copy all the files from the original 688 disks to your hard disk, do the following:

1. Turn on your computer and wait for the DOS prompt.
2. Insert the original Disk #1 in drive A or B.
3. Type **A:** or **B:** (whichever drive the original disk is in) and press **<Enter>**.
4. Type **INSTALL** and press **<Enter>**. On slow machines, you may not see anything on your screen for about a minute.
5. You'll be asked what kind of disks you want to install the game on. Type **1** and press **<Enter>** to install the game on your hard disk.
6. Next, you'll be asked where the original Disk #1 is. Type **A** or **B** (whichever drive the original Disk #1 is in) and press **<Enter>**.
7. The machine will want to know which drive on your hard disk you're going to install *688 Attack Sub* on. The default drive is C. Press **<Enter>** to install the game on drive C, or type the letter of the drive you want to install it on, then press **<Enter>**.
8. Finally, you'll need to name the directory that the game will be stored under. "688" is the default name. Press **<Enter>** to name the directory "688", or type in a new name and then press **<Enter>**.
9. The install program will tell you when to take out Disk #1 and insert Disk #2. When the installation is complete, put away the original disks for safekeeping.



When you want to start playing:

1. If you have a mouse, plug it in and load your mouse driver. If you're using a Covox Speech Thing™, plug it in, too.
2. Type **CD** and the name of the directory that the game is stored under (for instance, if you chose the default name, "688", you'd type **CD\688**). Press **<Enter>**.
3. At the prompt, type **688** and press **<Enter>**.
4. Type in the number for the monitor and color adapter appropriate to your computer: **1** for EGA, **2** for Tandy 1000, **3** for CGA, **4** for VGA-MCGA, **5** for Hercules.
5. Type in the number of the sound adapter appropriate to your computer: **0** if you only have an internal speaker; **1** if you have an Ad Lib™ board; **2** if you have a Covox Speech Thing. What you hear depends on what you have. If you only have an internal speaker, you won't hear the title music but you'll still get sound effects (however, a Tandy computer with Enhanced Sound Capability gives you both). The Ad Lib board reproduces the title music the best, but relies on the internal speaker for sound effects. The Speech Thing reproduces both reasonably well. A Tandy with Enhanced Sound Capability and an Ad Lib Board will give you the best sound quality for the game.
6. Press the **spacebar** to go directly to the MISSION SELECTION screen.

Installing 688 Attack Sub on Floppy Disks

YOU CAN'T PLAY FROM THE ORIGINAL 688 DISKS, so you'll have to install the game on floppy disks from which you can play. Please format *one* of the following configurations of disks before you do anything else:

- A) two 5.25" 360K floppy disks
- B) one 5.25" 1.2MB or one 3.5" MB floppy disk
- C) two 3.5" 720K floppy disks

See your DOS manual if you don't know how to format disks. If you get one of these messages during installation or game play, do the following:

Insert the disk with batch file
and press any key when ready

You should insert your
copy of 688 Disk #1

Insert disk with command com:

You should insert your
DOS disk



To install the game on your blank disks, do the following:

1. Boot your system with DOS (2.0 or higher).
2. Insert the original 688 Disk #1 in drive A or B. Type **A:** or **B:** (whichever contains the original disk) and press <Enter>.
3. Type **INSTALL** and press <Enter>. On slow machines, you may not see anything for about a minute.
4. You'll be asked what kind of disks you want to install the game on. Type the number of the disk configuration that's appropriate to you: **2** if you have one 5.25" 1.2MB or one 3.5" 1.44MB floppy disk; **3** if you have two 5.25" 360K floppy disks; or **4** if you have two 3.5" 720K floppy disks. Press <Enter> to choose the disk configuration.
5. The machine will ask if you have these disks ready at this time. Press <Enter> if you have the blank disks ready. If not, return to DOS by typing **NO** and pressing <Enter>.
6. Follow the onscreen instructions. You'll have to swap disks from time to time. When the installation is complete, put away the original disks for safekeeping.

You only need one drive to play. When you're ready to start:

1. If you have a mouse, plug it in and load your mouse driver. If you're using a Covox Speech Thing, plug it in, too.
2. Insert your *copy* of Disk #1 into drive A or B.
3. Type **A:** or **B:** (whichever contains the copy), then press <Enter>.
4. Type **688** and press <Enter>.
5. At the prompt, type in the number for the monitor and color adapter appropriate to your computer: **1** for EGA, **2** for Tandy 1000, **3** for CGA, **4** for VGA-MCGA, **5** for Hercules.
6. At the next prompt, type in the sound adapter appropriate to your computer. Type in the number of the sound adapter appropriate to your computer: **0** if you only have an internal speaker; **1** if you have an Ad Lib board; **2** if you have a Covox Speech Thing. What you hear depends on what you have. If you only have an internal speaker, you won't hear the title music but you'll still get sound effects (however, a Tandy computer with Enhanced Sound Capability gives you both). The Ad Lib board reproduces the title music the best, but relies on the internal speaker for sound effects. The Speech Thing reproduces both reasonably well. A Tandy with Enhanced Sound Capability and an Ad Lib Board will give you the best sound quality for the game.



7. Press the **spacebar** to go directly to the MISSION SELECTION screen.

Commanding 688 Attack Sub

The *688 Attack Sub* simulation is divided into levels. At the top level is the CONN (Conning Tower), the game's main menu. From the CONN you can go to different *stations*. Each station is identified by its own icon which appears as your cursor passes over the area.

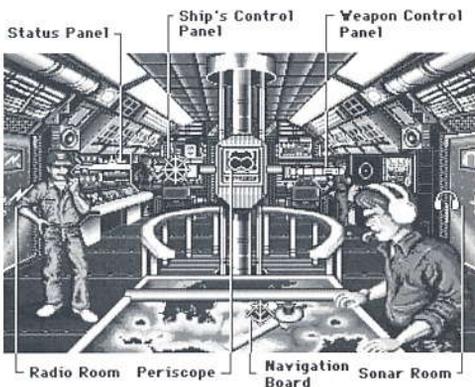


Figure 1.1: 688 CONN

At each of the stations are controls for different parts of the sub. Some of the controls are clustered into *control groups*; for instance, the controls for the sound filter, active sonar and towed array make up the Sonar Control group.

The stations and their controls are "hot spots", areas that perform functions. You give commands by moving the cursor to a hot spot and pressing <Enter> or clicking a mouse button. There are two ways to move the cursor:

Using a mouse: A mouse (with a Microsoft®-compatible mouse driver) is by far the easiest way to play the game. Your cursor will change color and/or shape when it's over a hot spot. Click any button on your mouse to select that function. If you encounter problems with your mouse, you may have to disconnect it and use the keyboard to move the cursor. Turn to p. 34 for information on disconnecting the mouse.



Using the keyboard: Move the cursor using the <Tab> key and the arrow keys. Pressing <Tab> while holding the <Shift> key down moves through the groups in reverse. Use <Tab> or <Shift> + Tab to tab through the different control groups; then use the right and left arrow keys (← →) to move the cursor between positions within a control group. The up and down arrow keys (↑ ↓) will move the cursor through all the controls regardless of their groupings (↑ moves the cursor to the left; ↓ moves the cursor to the right).

688 Attack Sub also has quick keys that instantly move your cursor to a station or a function. On every screen, each control group has been assigned a number — the **number keys** will move your cursor to the control groups you see onscreen. The **function keys** (<F2>-<F10>) take you to the submarine's stations. Within each station, different controls have been assigned **letter keys** (for example, pressing **R** at the Ship's Control Panel will move your cursor immediately to the rudder control).

For the game's keyboard interface, see the table on the back inside cover of this manual.

In the rest of the manual, "select" means moving your cursor to a station or control *and* activating it by pressing <Enter> or clicking the mouse button.

Choose a Mission, Configure 688

Choose a mission (mission descriptions begin on page 18). Once you select a mission, the CONFIGURATION PANEL comes up. Set the sound, play level and whether you want to play by modem (see p. 29 for information on configuring your computer). Select **BEGIN GAME** to start your mission.

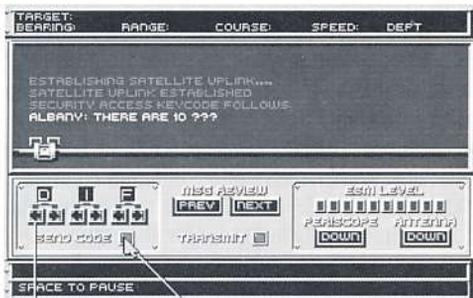
If you plan on using the *Quick Start Guide to TORPEX '89* in the next chapter: On the MISSION SELECTION screen, select **688** from the column next to TORPEX '89. Once you've selected the TORPEX '89 mission, the CONFIGURATION PANEL will come up. Make sure to set the CONFIGURATION PANEL as follows:

1. Select **NO MODEM** game.
2. If you have a Covox Speech Thing, select the port your unit is plugged into (**LPT 1:** or **LPT 2:**). Otherwise, select **DEFAULT**.



3. Set the play level on **BEGINNER**.
4. Select **BEGIN GAME** to start playing. You start in the sub's CONN. Before you do anything else, you must enter a Security Access Keycode (see below).

Enter the Security Access Keycode



1. Select letters with arrows
2. Select SEND CODE

Figure 1.2: Radio Room

You're in the sub's CONN. You can take your time: the game always pauses when you're in the CONN, except in modem games. Select the Radio Room by moving your cursor with the mouse or the **<Tab>** key until it changes into the Radio Room icon. Enter the Radio Room by pressing **<Enter>** or any button on your mouse while the Radio Room icon appears (you could also have pressed **R** or **F2** to go to the Radio Room). You're given the name of a Los Angeles class submarine and the beginning of a sentence (in the example in Figure 1.2, the code is "ALBANY: THERE ARE 10 ???"). Starting on page 18, you'll find paragraphs marked with the names of Los Angeles class submarines. Find the name of the sub — they're in alphabetical order — then look at the paragraph that's directly to its side. Find the sentence fragment you see onscreen, then enter the first three letters of the next missing word. For example, the next missing word in the sentence asked for in Figure 1.2 is DIFFERENT (p. 18). DIF would be the letters you'd enter into the boxes on the screen.



Use the arrows below the boxes to enter the letters. When you have the letters in the right sequence, select **SEND CODE**. If you've transmitted the correct security code, you will receive your mission orders. *688 Attack Sub* will tell you if you've sent an invalid code and will put you back in the CONN. If this happens, go to the Radio Room to try again. You have as many tries as you want.

Quitting the Game

To quit the game, select **EXIT** from the CONN. You'll be given a choice of playing another mission, continuing your last mission, or exiting to DOS. Select **EXIT TO DOS**.

How to Get Help

You can get on-line help for all the controls with the Help feature. Press <F1> within each station or from the CONN to get explanations of each feature. Press the **spacebar** to advance through the help screens. Before you dive into the first scenario, try using the help key to take a "walking tour" of your sub. When you're done, you'll at least have a nodding acquaintance with all of the game's controls.



2

QUICK START GUIDE TO TORPEX '89

As a quick start to *688 Attack Sub*, we'll run through the first mission, TORPEX '89. Playing the mission should acquaint you with most of the game controls and a few of the strategies. In TORPEX '89, you're the captain of the *Los Angeles* (SSN 688) on a torpedo exercise in the Faeroe Island chain. Your mission is to sink three decommissioned warships without being detected.

During the exercise you'll give commands by moving the cursor to the sub's controls and clicking your mouse button or pressing <Enter>. You can move the cursor by a variety of means. Turn to p. 6, *Commanding 688 Attack Sub*, to learn the mouse and keyboard interface. For the sake of simplicity, we'll use the word *select* to mean a two-step process: 1) moving your cursor to a station or control; and 2) activating the station or control by pressing <Enter> or a button on your mouse.

If you find yourself completely clueless about a station, a term, or a control, press <F1> for help or go to the appropriate section in the manual. If the telephone rings or some other crisis comes up, you can put the game on pause by going to the CONN. When you're reading what to do next in the exercise, go to the CONN so you won't lose valuable game time.

1. Select Exit

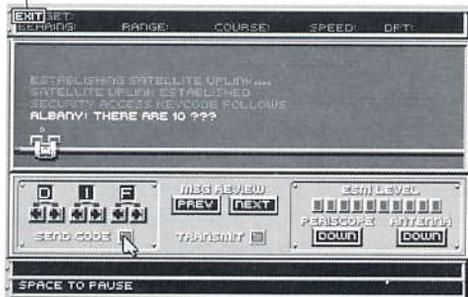


Figure 2.1: Radio Room



1. **Exit the Radio Room.** If you followed the instructions under Getting Started in Chapter 1, you've already a) selected TORPEX '89 from the MISSION SELECTION screen; b) configured 688 to your computer on the CONFIGURATION PANEL; and c) entered in the Security Access Code and received your mission orders. You should now be in the Radio Room of the *Los Angeles*. Go to the CONN by selecting **EXIT** in the top left-hand corner of the screen.
2. **Tour the CONN.** You are now in the submarine's CONN. This is the main menu of the game — from here you can go to any of the submarine's control stations. Press **<F1>** to get the locations and descriptions of each of the stations (within each station, **<F1>** will tell you what all the controls do). When you're done with the tour, select the Periscope icon.

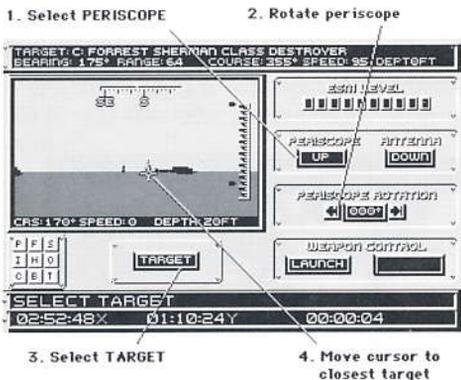


Figure 2.2: 688 Periscope

3. **Go to the Periscope.** You are now at the periscope station. Look at the map. You probably see a number of "X"s. These are sonar contacts that your sonar operator is picking up. At this point, he doesn't know what the contacts are or their range, depth or speed. In this mission, you won't have to worry about unidentified contacts until your sonar operator can identify them. You'll be receiving sonar contacts and they can be anything from enemy subs to schools of fish. The ocean's filled with sounds — the only reliable sounds are the ones your sonar operator



can positively identify. (In combat, however, you might make more guesses.)

Sonar is not the only way to get positive identification of a target — if it's a surface ship, you can view it with your periscope. Right now you're at periscope depth (20 ft), so go to the **PERISCOPE** button and select it. Rotate the periscope until you see the destroyers. Select **TARGET**. A crosshair-cursor will appear in the viewing window. Place the cursor on the closest ship and press **<Enter>** or click the mouse button. Notice the target information that fills the bar at the top of the screen. Now take a look at the top-down map by selecting **T** on the 9-button map display control in the lower left corner of the screen. At least one of the "X"s should have turned into a letter. This means that you have a firm fix on the target's location. If you can't see the letter, the target may be outside the map area. Select **O** on the map display control until you get a bigger view of the map. While your periscope is still up, return to the **CONN** by selecting **EXIT**.



1. Select SET

2. Set waypoint near targeted ship

Figure 2.3: Navigation Board

4. **Set a waypoint.** While your periscope is giving you a firm fix on your targets, go to the Navigation Board so you can set the auto-pilot to steer your sub toward your targets. Select **SET** from the **WAYPOINT CONTROLS**. A crosshair-cursor will appear on the map. Using the mouse or the cursor keys, move the crosshair to a point near your targets. Press



<Enter> or the button on your mouse to select that point. A number will appear marking the waypoint.

Now that you know the general direction you should be going, return to the Periscope station and lower the periscope to avoid being detected by surface radar. You may immediately lose the target information at the top of the screen. Don't worry about it. After your sonar man has listened for a few minutes, he'll get another fix on the target with his passive sonar.

- See page 53 for a brief discussion of passive sonar.



Figure 2.4: Ship's Control Panel

5. **Set the throttle and depth.** Even when the ship's auto-pilot is on, you're still in control of the speed and depth of your sub. Go to the Ship's Control Panel by pressing <F4>. Set the THROTTLE on **2/3**. Select **150 FT** under AUTO FUNCTION. The crew will bring the sub to that depth. You could also have done this manually using the DIVE PLANE CONTROL.



Figure 2.5: Weapon Control Panel

6. **Load torpedoes.** Torpedoes are never stored armed and ready in a sub's torpedo tubes. Consequently, you must give an order to ready them. Go to the Weapon Control Panel by pressing <F7>. Torpedo tube 1 should already be selected (the box around the number will be high-lighted). Press **R** or **4** to move the cursor to the box and press <Enter> or click a mouse button to arm and load the torpedo. Place your cursor on the next tube and press <Enter> once to select the tube, then once more to arm the torpedo. Do this for all four torpedo tubes. The two auxiliary tubes hold noisemakers — don't bother loading them, you won't need them in this mission. The weapon's officer will inform you when each of the torpedoes is armed. The torpedo icons will also turn a darker color, indicating that they're ready to fire.
- See page 57 for a brief discussion of noisemakers.



1. Select TOWED ARRAY

Figure 2.6: Sonar Room

7. **Deploy Towed Array.** Now press <F8> to go to the Sonar Room. Select TOWED ARRAY. A towed array is a long cable with a series of microphones along its length. The towed array will improve your sonar operator's listening capabilities but will limit the sub's top speed.

- See page 47-48 for a brief discussion of towed arrays.



1. Select TIME

Figure 2.7: Navigation Board

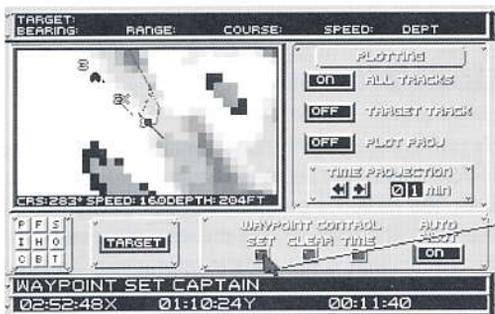
8. **Compress time.** If your sonar man doesn't have a fix on the destroyers, you'll have to wait. This can take a few minutes. If you're impatient, go to the Navigation Board and select **TIME** under **WAYPOINT CONTROLS**. This speeds up the time. Keep your hand over the <Enter> button. When your sonar man has a fix on one of the targets, deactivate the time compression by pressing <Enter>.



Figure 2.8: Weapon Control Panel

- 9. Target and launch.** Go to the Weapon Control Panel. If the ships are no longer targeted, select **TARGET** again and move the cursor on the map to the ship you want to attack. If the range is under 10 miles (the maximum range of a *688 Attack Sub* torpedo), you can go ahead and fire a torpedo. Check that the box around torpedo tube 1 is highlighted. If it isn't highlighted, select it once. Now select **LAUNCH**. It will take more than one torpedo to sink a destroyer, so wait about 10 seconds, then select **LAUNCH** again. If you're still out of range (10 miles or more), you'll have to move in on the targets. This may require setting your engine on a higher speed.

The sonar man will confirm if and when the torpedoes have reached their target. If you think it's worth the risk of detection (and in beginner mode, it probably is), you can go to periscope depth and raise your periscope to confirm a hit (the blood and guts brand of captain does this just to watch the flames rise). Fire torpedoes until the ship sinks (the letter will disappear from the map).



1. Set up next attack by setting more waypoints

Figure 2.9: Navigation Board

10. **Set up your attacks on the next ship.** If you're lucky, you're already in range to strike your next target. If you're unlucky, you'll have to set new waypoints to attack the other two ships. Remember that you can set up to nine different waypoints and your sub will go to each of them in numerical order.
11. **End of exercise.** The exercise ends when you sink all three ships or after 15 minutes have gone by. This is when you receive warm praise or a sound verbal lashing from your superiors. Don't worry if you didn't do too well this first time around. Run through the exercise again — the controls will begin to become second nature and your performance will improve immediately.

You've been introduced to most of the submarine's controls. There are only a few more that you haven't actually used. You might want to take a few moments to read up on these as well:

- Plot Projection p. 43
- Sonar Computer pp. 46-47
- Sonar Control pp. 47-48
- Torpedo Control pp. 50-51
- Status Panel p. 51



3

MISSIONS

ALBANY

688's perilous missions try the true mettle of a submarine captain. There are 10 different missions set in the geographical powder kegs of the world's oceans. The missions progress chronologically from a cold war state of mutual distrust to total war. The challenge of the earlier missions is one faced daily by submarine commanders: determining if a situation is threatening while trying to avoid ambiguous gestures that could lead to a shooting match with foreign submarines. (Of course, in *688* you're free to "resolve" conflicts in any way you like.) The later missions put the commander's abilities as a hunter/killer to the test. In general, the missions become more and more difficult — as the war heats up, each side becomes more and more merciless in their hunting.

In each mission, the action unfolds within only a small portion of the full mission map. This "playfield" is usually an area of tactical interest to one or both sides. If a player wanders too far away from where the action is, the game will come to an end and a message from your CINC (Commander-in-Chief) will inform you that you missed the boat. The idea is to keep players from going off on wild goose chases where nothing will challenge them.

ALBUQUERQUE

The following brief mission descriptions give you the necessary background information that you won't get from your onscreen mission orders. You can choose to command an American *688* or a Soviet *Alfa*. Both subs have their advantages and disadvantages, but neither sub's abilities outweigh the value of a cunning commander. A note on playing by modem: you can choose to play by the mission objectives described here, or you can set your own. There are no special objectives when playing by modem. Whatever objectives you declare are valid — even something as unsophisticated as "turn the other guy into canned tuna". The worse thing that can happen is that your CINC will scold you for your runaway battle lust — and even *he* can be silenced by the <Esc> key.



Torpex '89



Figure 3.1: Faeroe Islands — Norwegian Sea

ASHEVILLE

688: Your superiors are going to look over your shoulder a few more times before they let you sail off with a billion dollar sub. In this training exercise, you only have 15 minutes to sink three decommissioned Forrest Sherman class destroyers and prove that you're commander material. Your attack must come swiftly and silently. Navy helicopters will be attempting to locate your sub, so don't advertise your position with a lot of active sonar or by leaving your periscope out of the water for too long.

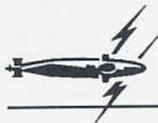
Torpedoes: 22 Mark 48 ADCAP Torpedoes

Missiles: 2 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6

700: You command the *Dallas* (SSN 700) in a joint training exercise with the *Los Angeles*. In this mission, you earn your commander's respect by beating your colleague to the draw. Sink three of the five de-commissioned warships to win the competition. You can play this on your own (against a computer-run *Los Angeles*) or by modem. Both subs are equipped with the above weapons.

Modem: TORPEX '89 is the only mission in which you and your modem opponent can match Los Angeles class subs against each other. One side commands the *Los Angeles* and the other commands the *Dallas*. For the sake of game balance, neither side has missiles in the modem game.



Shake 'Em

See Figure 3.1 for map of location

ATLANTA

688: American and Soviet naval forces sometimes practice ASW (Anti-Submarine Warfare) techniques on each other, rehearsing, as it were, for the real thing. The experience the crews gain and the information gathered on enemy tactics apparently make these high-tech games of superpower hide-and-seek worth the risk. In this mission, a Soviet sub is tracking you. The navy brass sees their own pride and budgets on the line, so the pressure's on *you* to shake this Russian sub. (See pp. 52-59, Submarine Warfare, for tips on maneuvers you can try.) You must lose the Soviet sub for a period of at least 3 minutes in order to be declared successful — this means that the Alfa can't detect you as an "X" (see p. 38, Sonar Contacts). The mission will end once you've successfully evaded your opponent for the 3 minutes or after the 20 minute time limit is up.

Torpedoes: 8 Mark 48 ADCAP Torpedoes

Missiles: 4 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6

AUGUSTA

ALFA: As in every Navy, the only way up the ladder is by making your superiors notice you. Prove that American high-tech equipment is no match for Soviet training and you'll make a big impression on the fleet admiral. Since you're practicing for real war, you must track the 688 in such a way that you'd be able to destroy him if this were a combat situation. This means you may not lose contact with the 688 for any period longer than 3 minutes (to keep "contact" on the 688, it must appear as an "X" or a letter on your map display — see p. 38, Sonar Contacts). Don't lose contact on the 688 at the last minute or you lose. You must be close enough to the 688 that you could fire on him and easily hit him (see pp. 58-59, Evading Torpedoes, for ranges). Try and stay in the baffles (p. 59) of the 688 to stay undetected as long as possible.

Torpedoes: 8 Type 53 Torpedoes

Noisemakers: 4

Modem: In the modem game, the 688 has 20 torpedoes and the Alfa has 18.



Sub Ops



Polyarnyy

Figure 3.2: Barents Sea

ALFA: After a week-long operational test in the Barents Sea, you're ordered to execute routine ASW (Anti-Submarine Warfare) maneuvers before returning to your home port of Severomorsk. Since imperialist submarines sometimes try to follow outbound Soviet subs as they leave home waters, you are given the job of "securing the port" — i.e., chasing off any intruders. If you use active sonar ("pinging"), enemy subs will know you're there and you'll scare them off (see p. 47, TARGETING PULSE). Be careful, though — spying subs may interpret pings from a long-distance as a prelude to a torpedo attack...at which point they may decide to actively defend themselves. Your best bet is to get *as close as you can* (under one mile) before you actively "ping" them. At very close range, the risk of being damaged by their own torpedoes is too great — they'll be forced to simply run away.

Torpedoes: 18 Type 53 Torpedoes

Noisemakers: 4



Mumar Cadaver

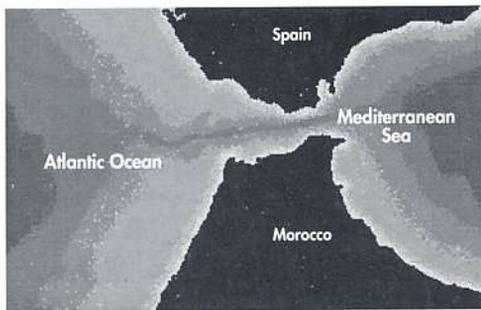


Figure 3.3: Strait of Gibraltar

BALTIMORE

688: The White House is blaming the Libyans for recent acts of terrorism. To punish these “international criminals”, a 688 is ordered to sink four Libyan oil tankers as they exit the Strait of Gibraltar. The tankers are under the protection of Libyan warships. Remember that the Strait is filled with traffic, so don’t put the U.S. in a bad light by sinking non-Libyan ships.

Torpedoes: 20 Mark 48 ADCAP Torpedoes

Missiles: 4 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6

Escape

See Figure 3.3 for map of location

BATON ROUGE

688: Your crew is fatigued from month-long operations in the Mediterranean, so you’re less than happy when your commander reports that there are Soviet submarines waiting to “accompany” you out of the Strait of Gibraltar. The Navy wants you to make a lasting impression on the Russians — you must pass through the western edge of the Strait undetected by Soviet subs. (The Soviets shouldn’t have contact on you when you reach the Atlantic. See p. 38, Sonar Contacts.)

Torpedoes: 20 Mark 48 ADCAP Torpedoes

Missiles: 4 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6



ALFA: While returning home from tour duty, your sub is suddenly ordered back to the Strait of Gibraltar where you'll wait to intercept an American attack sub. Intelligence sources observed a 688 in an Italian port and expect it to exit the Mediterranean soon. You must keep contact on the 688 as it enters the Atlantic (see p. 38, Sonar Contacts). Also, you must be at a range at which you could easily destroy the 688 if you had to (see pp. 58-59, Evading Torpedoes, for ranges). Try to be sly about this...active sonar will not only make your presence known, it could be regarded as hostile action.

Torpedoes: 18 Type 53 Torpedoes

Noisemakers: 4

Modem: This mission provides a good battlefield for a one-on-one hunt and kill scenario. However, even if you throw out the mission objectives and just play "to the death", you should concentrate on moving to the west so you won't wander out of the playfield and end the mission abruptly.

Goulash

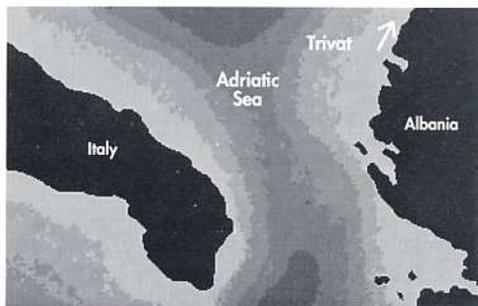


Figure 3.4: Mouth of the Adriatic Sea

688: Under new leadership, Yugoslavia attempts to reform their economy and widen their autonomy. To do so, they have chosen a capitalist model and have asked for NATO's support. Perceiving a Yugoslavian alliance with NATO as a threat to themselves and the other Warsaw Pact nations, the Soviets invade Yugoslavia and attempt to set up a naval blockade. The U.S. and Italy agree to provide Yugoslavia with covert military aid. A Los Angeles class submarine is assigned as escort to provide maximum protection with a



minimum of exposure. Your job is to get six cargo ships north to Trivat before the rebellion is completely crushed. The Soviet warships have orders to sink first, ask questions later — if they get close enough, your cargo ships are history. You can try to lead the warships away, or you can make the seas safe for free trade by destroying the warships before they're in range of the cargo ships. The bottom line is: the cargo ships must get northeast safely.

Torpedoes: 20 Mark 48 Torpedoes

Missiles: 4 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6

Cat Walk



Figure 3.5: Kunashir Passage

BOSTON

688: Sparked by the Yugoslavian conflict, a limited war in Europe begins and quickly escalates into World War III. Your 688 has been assigned to patrol an area north of Japan — an important sea lane through which a number of Soviet SSBN's (nuclear-powered ballistic missile submarines) travel. A Soviet SSBN has reportedly left Vladivostok the day before and is entering your patrol sector. It may be under the protection of a Soviet attack submarine (SSN). Your main objective is to destroy the SSBN — think of any SSN's you encounter as dessert. Since slow-moving SSBN's can be extremely difficult to detect, a Seahawk helicopter will try to aid you in locating it. If the helicopter finds the boomer, it'll drop a "marker" buoy in its vicinity. The marker buoy floats on the ocean surface and transmits a sonar "ping", informing you that it's over the general location of the SSBN. Your sonar officer will inform you when he detects a marker buoy. When you get the



message, you should go to a depth of 150 ft or less so that you can target the marker buoy. Note the bearing and distance of the buoy: if you're too far away to launch torpedoes, make a course for the buoy; if the SSBN is close enough, launch torpedoes and direct them to the buoy's location, then set the torpedoes on a search program.

Torpedoes: 20 Mark 48 Torpedoes

Missiles: 4 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6

ALFA: Virtually all Soviet ships entering or leaving the main port of Vladivostok must traverse the Kunashir passage. This strategically critical "choke point" connecting the Sea of Japan with the Pacific is a likely place for an American attack on the outbound SSBN you've been ordered to protect. If it comes down to combat, don't confuse the SSBN with the 688. Make sure *you* know what you're firing on, because your torpedoes won't! The sonar analyzer will help you distinguish contacts and keep you from firing on friendlies (see pp. 46-47, Sonar Computer).

Torpedoes: 18 Type 53 Torpedoes

Noisemakers: 4

Modem: This mission can also be played by modem.

Surprise Party

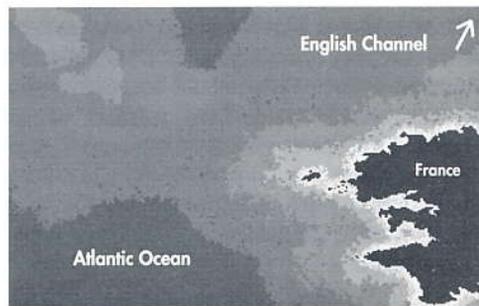


Figure 3.6: Edge of the Celtic Shelf



BREMERTON

688: The war is heating up. NATO is sending a large battle group to the Norwegian Sea from the south in support of their current forces. The Norwegian Sea is of vital significance to both sides — it represents the only access the Soviet Northern Fleet has to the Atlantic Ocean. If NATO can keep the Soviet Northern Fleet “bottled up” in its home ports, American and European shipping can continue delivering preciously needed arms and supplies with minimum harassment. Your orders are to escort the reinforcements to the north and protect them from Soviet submarine attack.

Torpedoes: 20 Mark 48 Torpedoes

Missiles: 4 Submarine-Launched Harpoon Anti-Ship Missiles

Noisemakers: 6

ALFA: Your orders are to patrol your sector and proceed to attack any enemy vessels you encounter. You stumble onto a large battle group and must *single-handedly* engage the American ships. Good luck.

Torpedoes: 18 Type 53 Torpedoes

Noisemakers: 4

Modem: Since the Alfa is at a clear disadvantage in this mission, the stronger player should take the Soviet side as a handicap.

Homecoming

See Figure 3.6 for map of location.

BUFFALO

688: In order to keep the war effort rolling, America must keep the sea lanes to Western Europe open. As in two previous world wars, American shipping forms convoys protected by warships. Your 688 is assigned to counter any naval assaults on a convoy destined for France. In the event of an attack, you'll have to quickly perceive what the biggest threats to the convoy are and deal with them first.

Torpedoes: 16 Mark 48 Torpedoes

Missiles: 8 Sea Lance Missiles

Noisemakers: 6

ALFA: The Soviet Stavka realizes that it only has to cut off the American supplies to Europe and the war will come to an effective halt, perhaps resulting in total victory for the Soviets. The massive Soviet submarine force



is sent to sea to cripple the U.S. Navy. This time, your Alfa and an Oscar class SSGN (nuclear-powered cruise missile submarine) wait in ambush for a NATO convoy.

Torpedoes: 18 Type 53 Torpedoes

Noisemakers: 6

Modem: The sheer number of targets in the water make this an exciting — and difficult — scenario. With the Americans at a slight disadvantage, stronger players should take the American side to balance the game.

Hit and Run

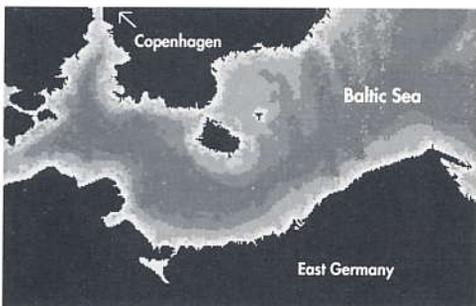


Figure 3.7: Baltic Sea

CHICAGO

688: As the war between East and West escalates, the Navy decides that forward defense is the only way to force the Soviets to back off. Forward defense attempts to cripple or intimidate the enemy by attacking long-range targets behind enemy lines. The next step is to destroy inland targets — in this mission, you've been sent to the Baltic Sea to deliver a load of Tomahawk cruise missiles that will take out Soviet nuclear weapons facilities. When the scenario begins, you're just off the coast of East Germany. One of the first things you should do is raise your periscope to confirm your location. Switch to top-down map by selecting **T** on the map display control. Zoom out by selecting **O** until you see a letter on the top-down map. The letter is a pre-set waypoint for your Tomahawk missiles: this is the target you'll be firing your missiles at. (Cruise missiles such as the Tomahawk get their bearings by



comparing computerized maps with the local terrain — what you're doing is providing the missile with its first landmark, which the missile will use as a reference point to guide itself to its target.) With your periscope still raised, select **TARGET**. You have only 5 minutes to fire ALL four missiles. Don't get too far away from the coast or you'll lose the targeted waypoint for the missiles. After you fire the missiles, you must rely on your own cunning to escape through the narrow, heavily patrolled passage out of the Baltic Sea.

Torpedoes: 20 Mark 48 Torpedoes

Missiles: 4 Submarine-Launched Tomahawk Cruise Missiles

Noisemakers: 6



4

GAME CONTROLS

Configuring 688 to Your Computer

Once you've selected a mission, you can adjust the following on the Configuration Panel:

Sound: If you have a Covox Speech Thing, select the port your unit is plugged into (LPT:1 or LPT:2) — otherwise, leave **DEFAULT SOUND** highlighted.

CINCINNATI

Play Level: *688 Attack Sub* comes with two play levels — **BEGINNER** and **STANDARD**. You can choose play levels only when you're playing against the computer. *Modem games are automatically set on STANDARD.*

BEGINNER — Gives you certain advantages: you're quieter; your sonar is more powerful than your opponent's; your sub can take more damage; and your raised periscope isn't as noticeable by surface radar.
STANDARD — You and your opponent have normal capabilities.

Modem: Select **NON-MODEM** if you want to play against the computer. To play against a modem opponent, see p. 30, *Playing By Modem*.

Exit: There are three ways to exit the Configuration Panel:

BEGIN GAME — Begins the mission you selected on the Mission Selection screen.

MISSION SELECTION — Returns you to the Mission Selection screen.

EXIT TO DOS — Quits *688 Attack Sub* altogether and returns you to DOS.

Note: *Whenever you change the settings on the Configuration Panel, 688 Attack Sub saves the new configuration as your default setting.*



CITY OF CORPUS CHRISTI

Playing by Modem

Both computers will have to meet the specifications on p. 2 of this manual. Both players must have manuals and play disks of their own.

688 Attack Sub can be played using two Hayes®-compatible modems with a minimum of 1200 BAUD or one null modem cable. In both instances, one player will have to be designated the “originator” and the other the “answerer”. The originator sets up the game and initiates the call (the originator also foots the bill if there are any phone costs).

There are a few things you should know about playing against a modem opponent. There are no pauses in a modem game. Any time spent in the CONN is time wasted. Learn the Function keys and use them often to save time. Also, time compression has no effect — game time runs normally.

Using Modems

Preliminaries (both parties):

1. Choose one player to be the “originator” and the other to be the “answerer”. Decide which mission you’d both like to play. Only missions 1, 2, 5, 7, 8, and 9 may be played by modem. While you’re at it, decide who gets what side (Los Angeles or Alfa).
2. Load *688 Attack Sub* and select your mission.
3. At the CONFIGURATION PANEL, each player should select the communication (serial) port his or her modem line is connected to (**MODEM GAME ON COM 1:** or **MODEM GAME ON COM 2:**).

What the originator does:

1. Enter your opponent’s phone number under SET TELEPHONE NUMBER. There are 11 slots for standard phone numbers: enough for a seven digit phone number, a three digit area code, and a single digit prefix (for example, a “1” for long-distance calls). Select **UP** or **DOWN** above and below the boxes to set the numbers. If you don’t need 11 digits (i.e., your call is local), leave the extras blank at the end of the number.



2. If you're using any special long-distance rate numbers like those offered by Sprint, M.C.I. and other companies, dial them now and wait for the second dial-tone. *The modem must detect a dial tone to start. You can only use special long-distance rate numbers that leave you with a dial tone so the modem can dial your opponent's phone number.*
3. Select **ORIGINATE**. Your computer will now try to establish communication with your opponent's computer (a window will appear indicating that the machines are attempting to communicate). If the call is successful, the message window will disappear and the scenario will begin. If the call does not go through, a message will appear telling you so. Select **OK** to have the computer try again.

DALLAS

What the answerer does: You have a choice of letting your computer answer the phone or answering it yourself. If you're going to let the computer answer the phone, select **AUTO-ANSWER** and wait for the computer to make the connection (a message will appear telling you when this happens). If you want to answer the call manually, wait for the phone to ring, then select **MANUAL ANSWER**.

If you can't seem to establish any communication between the modems:

Check the following:

- A) Have you entered the right phone number? If it's wrong, some confused soul is getting a very irritating noise at the other end. Select **CANCEL** and reset the phone number, then **ORIGINATE** again.
- B) Did you select the correct communication port? Check to see which port your modem is connected to and compare it with what you selected on the **CONFIGURATION PANEL**.
- C) Are you and the other player clear on who's answering and who's originating? If you're both selecting **ORIGINATE**, you won't get anywhere.
- D) Is your modem working right? Check your modem manual to see that it's hooked up properly and you're using it correctly. If you're getting a dialtone but your modem refuses to dial, make sure the Carrier Detect (CD) setting isn't "forced on". On most modems, Carrier Detect is switch #6 — it should be in the "up" (or off) position.



If you get cut off: Your computer will send you a message telling you it's no longer communicating with your opponent's computer. Select **OK** to have the computer attempt to re-establish contact or **CANCEL** to return to DOS.

Sending messages to your opponent: When you're playing by modem, you can use the Radio Room to chat with your opponent. You can be at any depth and you don't need to use your antenna. Select **TRANSMIT** and type your message on the keyboard. Pressing <Enter> turns off the transmit mode and sends the message.

Playing another mission: After a mission, *688 Attack Sub* will maintain a connection between you and the other player so you can play another game without redialing. The game ends in the Radio Room so that the players can type messages to each other and arrange for another game (see "Sending messages to your opponent" above). Decide what mission you want to play and who is going to originate the call (either player can originate). Both players must select **EXIT** from the top left corner of the Radio Room. A message window will appear in the middle of the screen. Each player should select **PLAY AGAIN**, then select the new mission. The originator selects **ORIGINATE**. The answerer selects **MANUAL ANSWER**. (The modems will know they're connected and the game will begin without one of the modems needing to dial.)

GROTON

Quitting the game (READ THIS!): The game ends in the Radio Room. Select **EXIT** from the top left corner. A message window will appear in the middle of the screen. When you've played all the modem games you're going to play for that day, select **EXIT TO DOS**. You *must* return to DOS in order to break the modem connection. If you don't, the computer will still maintain contact with the other modem...even if you've gone on to play a new mission against the computer! That can add up to big bucks if the call was long-distance!

HELENA

Getting cut off during your game? Does your phone have "call waiting"? If it does, you may be getting phone calls during your games which disrupt the modem connection. You can temporarily stop your "call waiting" service so that other calls won't interrupt your game. In many areas, you can do this by dialing ***70** on a touch-tone phone or **1170** on a rotary phone *before* you "originate" or "answer". "Call waiting" will be cut off for the duration of a



single call (i.e., your game). Note that these numbers may vary depending on your location. Consult your phone company for the numbers in use in your area.

Connecting the modems with a telephone cable: If your computers are near each other (i.e., in the same room), it's *sometimes* possible to connect your modems using regular telephone cable. Plug one end of the cable into the jack marked "WALL" or "LINE" on your modem. Plug the other end into the jack marked "WALL" or "LINE" on the other player's modem. *Whether this works depends entirely on the kinds of modems you have.* Some modems search for a dial tone before establishing contact with the other computer. Obviously, a telephone cable by itself won't produce a dial tone, so this method won't work with these kind of modems (if this is the case, you should invest in a null modem, available at computer or electronic stores).

Using a Null Modem Cable

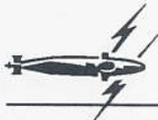
You can also play a modem game using a "null modem". A null modem is a cable that transmits information from your computer's communication port to that of your opponent's. You don't need modems at all when you use a null modem cable — however, the two computers must each have a free serial port connection and be near enough to connect with the null modem cable. Ask your computer dealer for details on where you can get a null modem cable. (See Appendix A for the specific wiring information.)

HONOLULU

Preliminaries (both parties): With your computers off, connect the two computers with the null-modem cable. Turn on the computers, load the game, and go to the CONFIGURATION PANEL. Select the communication (serial) port your null-modem line is connected to (**MODEM GAME ON COM 1:** or **MODEM GAME ON COM 2:**).

What the originator does:

1. Select **MISSION SELECTION** and choose the mission. The side that you (the originator) selects is the side you'll play.
2. Select **ORIGINATE**.



What the answerer does:

1. Wait for the other player to "originate" the contact.
2. Select **MANUAL ANSWER**.

Other Game Controls

Russian Script On/Off

The Alfa's controls are in a pseudo-Cyrillic script to remind you that you're a *Soviet* officer fighting for world socialism. However, we realize that this attempt to add flavor may be distracting to some players, so we made it an optional feature. To turn the pseudo-Cyrillic script off, go to the CONN and press <Ctrl>-R. To turn it back on, return to the CONN and press <Ctrl>-R again.

Sound On/Off

Toggle the sound on and off by pressing <Ctrl>-N. In some circumstances, you may want to turn the sound off for a while. Depending on how fast your computer is, sound effects may slow down the rate at which your machine is updating the information on your maps. In some circumstances, this can be critical. For example, if time compression is on, the information lost while a sound is being produced could make a big difference.

Surrender (modem games only)

There may come a time in a modem game when the only conclusion you foresee consists of you and your sub scattered across several miles of ocean floor. Rather than watch your crew get transformed into fish food, you can surrender by pressing <Ctrl>-K. It's not the most honorable way to go, but it does deny the other player the satisfaction of hearing his torpedoes rip into your hull.

Turning Off Your Mouse

If you're having trouble with your mouse, you can turn it off without having to disconnect it. Press <Ctrl>-A to turn the mouse off altogether. The mouse will still be enabled for other software. To turn the mouse back on, you must exit to DOS and reboot the game.



Boss Key

You're at work, and you're escaping the dull monotony of whatever it is you're supposed to be doing with a quick game of *688*. Just then, you hear the familiar footsteps of your boss drawing closer. Rather than anxiously awaiting the painful attitude adjustment he or she is going to inflict on your head, press <F10>. This will pause the game and replace the screen with a bogus DOS prompt. Wander off to the coffee machine or make it look like you're doing something of vital importance to the company. When the offending supervisor is out of view, press <F10> again to resume the infinitely more interesting game. Kids, this works just as well with the parental unit.



5

SUBMARINE CONTROLS

Most of the submarine controls are the same for both American and Soviet subs — they look different, and may be on different areas of the screen, but they do the same things. The older Soviet Alfa class sub is missing some high-tech equipment, such as the contour imaging display; any exceptions pertaining to the Alfa are noted in the descriptions.

Reading Your Displays

HOUSTON

As an attack boat, your primary role is to stalk enemy vessels. To successfully do this, you must *constantly* be aware of your position and course relative to those of your target(s). Since in a submarine you can't actually see anything around you, you can orient yourself with the aid of top-down maps and the contour imaging display.

Top-down maps are available at all stations except in the Radio Room — where only your location and target information are at hand — and at the Status Panel. Contour imaging is available at all stations except the Radio Room, Status Panel and Periscope. At the Periscope, the map window becomes your periscope view when you raise the periscope. (Note: *the Alfa isn't equipped with contour imaging.*)

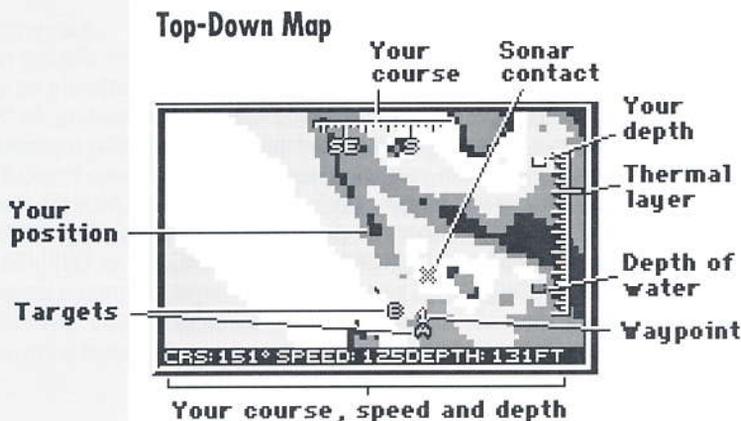


Figure 5.1: Top-Down Map

HYMAN G. RICKOVER

The top-down map gives you aerial perspectives of the area your submarine is traversing and displays information collected by your sonar and periscope. The area can be viewed from ten different ranges using the zoom feature. On the 688, select **I** and **O** from the Map Display Controls to zoom in and out. To zoom in and out on the map aboard the Alfa, select **DN** and **UP**. Selecting the zoom buttons repeatedly moves you quickly through the magnifications. Your submarine is the fixed point in the center of the screen (except at some of the highest zoom levels). Other information on your maps include:

Ocean Depths

Different shades on your map designate different depths. The darker the shade, the deeper the water. (MCGA and VGA graphics modes will display more layers between light and dark.) Depth can vary from 0 to greater than 2000 ft (since very few submarines can actually dive below 2000 ft, the exact depth of really deep ocean doesn't matter). Always stay aware of the average depth of the water you're sailing through (see Heads-Up-Display below). It's possible to run aground — somewhat embarrassing for a submarine commander. To cross the shallowest waters (the lightest color on your top-down map), you'll have to surface.

INDIANAPOLIS



Sonar Contacts (letters)

When you first receive a sonar contact, the ship's computer displays the contact as an "X". An "X" means that you only know what direction the sound came from. The target's range, speed and depth are still a mystery. An "X" *always* appears halfway between you and the edge of the display regardless of the zoom level. When your sonar operator gets a fix on a target, it's assigned a letter so you can keep track of it. Letters always mark the exact location of a target. The sonar operator still may not know exactly what the target is. If he doesn't, UNKNOWN SURFACE CONTACT or UNKNOWN SUBMERGED CONTACT will be displayed in the target information bar and the target's letter will appear dark. When the sonar operator positively identifies the target, the letter will turn a lighter shade. If a contact is lost and regained, it may be assigned a new letter.

Waypoints (numbers)

Waypoints (destinations) that you've set are displayed on the map as numbers (see Waypoint Controls, p. 43-44, on how to set and clear waypoints).

Contour Imaging Display



Figure 5.2: Contour Map



JACKSONVILLE

In *688 Attack Sub*, the *Los Angeles* is equipped with a device called a “side scanning sonar” that produces a contour image of the ocean floor. This is useful when traveling near the ocean floor. A sophisticated, high-frequency sonar beam scans the ocean terrain around the bow, port and starboard of the submarine. The beam’s high-frequency and short range make it virtually undetectable by other ships’ arrays — *there are no penalties for using the contour imaging system*. With the sonar information, a computer generates an image of the ocean terrain around the sub. Oval shapes designate sonar contacts. The larger the oval, the closer it is to your sub. The ovals are assigned letters, too, which always correspond with the letters displayed on the top-down map.

To turn on the contour imaging display, select **C** from the map display control on the left side of the screen. Use **P**, **F** and **S** to look to port, forward and to starboard. (Note: *the Alfa isn’t equipped with contour imaging*.)

Heads-Up-Display (HUD)

KEY WEST

The HUD is an overlay on the map that lets you quickly refer to your sub’s course and depth. A compass is displayed along the top of your view screen. The white triangle in the middle of the line is your sub’s current course. The vertical gauge along the right side of the view screen shows your depth relative to the ocean floor. The top marker on the left side of the gauge is your sub’s current depth. The bottom marker is the depth of the ocean directly below you. Thermal layers are marked by longer lines on the right side of the depth gauge. Always stay aware of how close you are to the ocean floor — keep a safe distance between you and the bottom marker or you may end up with a ruptured hull. In the top left hand corner, the HUD will also tell you what direction your periscope is currently pointing.

When you first boot the game, the HUD will be activated. If it’s in the way of a target you’re viewing, you can turn the HUD on and off by selecting **H** from the 9-button map display control of the 688. On the Alfa, select **HUD** to turn the display on and off.



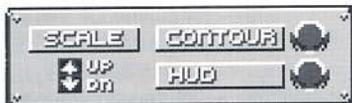
Map Display Control

The 688 has contour imaging, and the Alfa doesn't. Consequently, the 688 has more map controls than the Alfa.



688 Map Display Control

- Port** — Look to port in contour imaging or periscope view.
- Forward** — Look forward in contour imaging or periscope view.
- Starboard** — Look to starboard in contour imaging or periscope view.
- In** — Zoom in on top-down map.
- Heads-Up-Display** — HUD on/off.
- Out** — Zoom out from top-down map.
- Contour Imaging Display** — Turn contour imaging on.
- Bottom** — Bottom contours on/off (top-down map only).
- Top-Down Map** — Turn top-down map on.



Alfa Map Display Control

- UP** — Zoom out on top-down map.
- DN** — Zoom in on top-down map.
- CONTOUR** — Bottom contours on/off.
- HUD** — Heads-Up Display on/off.

Target Information

In the box at the top of the screen is the target information:

```
TARGET: A: FORREST SHERMAN CLASS DESTROYER  
BEARING: 185° RANGE: 27 COURSE: 315° SPEED: 93 DEPT: 0FT
```

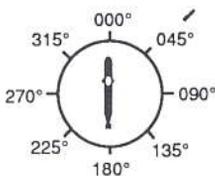
In a typical combat situation, your map will be showing several sonar contacts. Some may have been identified; others may still be undetermined. Choose the **TARGET** command to find out what your sonar operator has determined about the various objects in the water. The things the sonar operator is trying to determine are:



LOS ANGELES

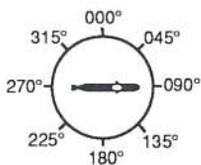
TARGET: What the target is. If the sonar operator doesn't know yet, "UNKNOWN CONTACT" will appear here. Sometimes the sonar operator will know whether the contact is on the surface or submerged — in this case, "UNKNOWN SURFACE CONTACT" or "UNKNOWN SUBMERGED CONTACT" will appear here.

BEARING: Where the target is *in relation to your submarine*. It is important to understand the difference between bearing and course. In determining a ship's course, the northern point of the compass is the reference point (000° is North; 180° is south; etc.). In determining your target's bearing, *your submarine* is the reference point. Your bow (the tip of your ship) is 000°; the location of all other vessels in the water are reckoned from this point. Moving clockwise, 090° is to your right (starboard); 180° is behind you (stern); and 270° is to your left (port).



In the figure above, the bearing of the torpedo is about 045°.

RANGE: How far away the target is from your ship. This is measured in nautical miles (nm).



COURSE: What direction on the compass the target is headed. When reckoning course, North is 000°. In the figure to the left, the sub's course is 090°.

SPEED: How fast the target is going. This is measured in knots.

DEPTH: How deep the target is. This is measured in feet.

Information Bar

The crew reports to you from time to time to tell you when something has happened. Crew reports and messages run from right to left along the information bar directly below the station's controls. If for some reason a message has to be repeated, the message will not scroll from right to left — instead, an audible "click" will tell you that the message currently in the information bar is being repeated. Long strings of messages may interrupt your game. You can make messages go by faster by pressing the **spacebar**.



LOUISVILLE

Location and Time

On the information bar at the base of the screen are your sub's current map coordinates. To the right of these is the number of minutes that have elapsed during your current mission. Mission time runs twice as fast as real time when time compression is activated (this is a rough approximation; the exact ratio depends on the speed of your computer). Time compression isn't available in modem games.

Radio Room

All missions begin and end in the Radio Room where you receive your CINC's warm praise or cold shoulder. However, this isn't the only function of the Radio Room...

EXIT — Returns you to the CONN.

PERISCOPE — Raises or lowers your periscope. You must be at periscope depth (20 ft) to raise your periscope.

ANTENNA — Raises or lowers your antenna. You must be at periscope depth (20 ft) to raise your antenna.

Message Review

If messages from the crew are rolling by too quickly and you think you missed something critical, you can review the messages in the radio room. Select **PREV** to review the previous recorded message. It will appear in the message bar, only darker than the current messages coming from your crew. **NEXT** will scroll you forward through the recorded messages until you come to the latest message.

Transmit

If you forgot your mission objectives, you can review your mission orders *during* the mission by selecting **TRANSMIT** and typing **MISSION**. You must be at periscope depth and your antenna must be up.

MEMPHIS



MIAMI

When you're playing by modem, you can use **TRANSMIT** to chat with your opponent. For this, you can be at any depth and you don't need to use your antenna. Select **TRANSMIT** and type your message on the keyboard. Pressing <Enter> turns off the transmit mode and sends the message.

Navigation Board

EXIT — Returns you to the CONN.

Plotting

ALL TRACKS — Select this to view the tracks of all the targets displayed on the screen. The tracks appear as small dots. The closer the dots are to each other, the slower the target is moving. All tracks will be black except the track of the current target, which will appear as a lighter color (red on most screens).

TARGET TRACK — Displays the target's track only.

PLOT PROJECTION — Select this to see where you and a target will be in a given amount of time assuming you both maintain your present course and speed. You have to use this in conjunction with the **TIME PROJECTION** feature. Enter the number of minutes you want to project into the **TIME PROJECTION** slots. Now select **PLOT PROJECTION**. A light marker will show you what your position will be in the selected amount of time *if* you maintain your present speed and course. A dark marker will show the currently selected target's projected position. You can now direct torpedoes to go to the projected point (see Torpedo Control on pp. 50-51).

TIME PROJECTION — See **PLOT PROJECTION** above.

Waypoint Control

A waypoint is a destination for your sub. Selecting waypoints activates the auto-pilot, which will steer your sub to each of the waypoints in the order you selected them. The auto-pilot won't set your speed for you. It will adjust the speed down to make turns efficiently and quietly. After making the turn, the auto-pilot will return to the previously set speed. (Note: the auto-pilot is programmed not to return to **FLANK** speed — if you were at **FLANK** speed and you make a turn, the auto-pilot will only return you to **FULL**.) The auto-pilot won't control your depth, either, so make sure you're not too close to

MINNEAPOLIS- SAINT PAUL

NEW YORK CITY



the ocean floor. A waypoint is cleared only when you've reached it or when you've selected **CLEAR**.

SET — You can only set waypoints while viewing the top-down map. When you select this command, a crosshair-cursor will appear in the viewing window. Move the cursor to where you want your sub to go and press <Enter> or any mouse button. A number will appear on your map marking the waypoint. You may select up to nine waypoints. The ship's auto-pilot will guide the sub to each waypoint in numerical order.

CLEAR — Erases the last waypoint you set.

TIME — Turns on the time compression feature, making game time go by twice as fast (this is a rough approximation: the exact ratio depends on the speed of your computer). Use this to speed up the game during longer transits. Press <Enter> to return to normal time.

NEWPORT NEWS

AUTO-PILOT — Turns the auto-pilot on or off. The auto-pilot will only function if you have set at least one waypoint. Changing the rudder will automatically turn *off* the auto-pilot. Changing your depth or speed won't effect the auto-pilot. (Note that the auto-pilot is oblivious to the ocean depth. It won't take you to a higher depth if you're about to smash into the bottom of the ocean.) If something comes up and you have to change your course manually using the rudder (thus turning your auto-pilot off), you can always head back to a waypoint as long as it's still set. Simply turn the auto-pilot back on.

TARGET — When you select this, a crosshair-cursor will appear on the viewing window. Move the crosshair-cursor with the **Tab** key or mouse to the target (typing the letter of a target will also move the crosshair-cursor). As you move the cursor to each of the targets on the screen, all available information on the target appears in the TARGET INFORMATION box at the top of the screen. Select a target by pressing <Enter> or clicking a mouse button. Launched torpedoes will head for whichever target is currently selected. Once the torpedoes are launched, however, you are free to target any other contacts in the water.



Ship's Control Panel

EXIT — Returns you to the CONN.

Cavitation Level Gauge

This gauge monitors the noise produced by cavitation. Cavitation results from partial vacuums that form around the propeller blades when the propeller is moving faster than the water around it can follow. Since the bubbles produced by cavitation are very noisy, you want to avoid it as if it were death itself. Two factors are involved here: acceleration and depth. Quick acceleration causes your propeller to spin faster than normal, which spells more noise. Depth effects the cavitation level, too. Since water pressure increases with depth, partial vacuums don't form as readily around your propellers the farther down you go. You can avoid high cavitation levels by not setting your speed at FLANK or REVERSE. (Note: *This gauge isn't available on the Alfa.*)

Dive Plane Control

Controls the rate at which you dive and surface. Lowering the handle releases air from the ballast tanks, filling the tanks with seawater and causing the sub to dive. Raising the handle releases compressed air into the ballast tanks which blows out the water and causes the sub to rise. How far you lower or raise the handle determines how fast you dive or rise — for instance, raising the handle a few degrees will cause the sub to rise very gradually, while raising the handle all the way will cause the sub to rise quickly.

Auto Functions

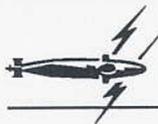
Use the auto functions so you can order the crew to change your depth without having to monitor the dive plane.

150 FT — Brings you to a depth of 150 ft.

PERISCOPE DEPTH — Brings you to periscope depth (20 ft).

EMERGENCY SURFACE — Brings you to the surface at maximum rate. This can be quite noisy. Do as it says and only use this in emergencies.

AUTO-PILOT — See AUTO-PILOT, p. 44.

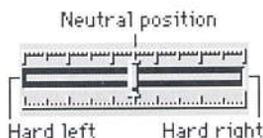


OLYMPIA

ENGINE CONTROL — Set your speed with the engine control or throttle. The numbers represent fractions or percentages of your total power output. You *can't* go to STD (standard), FULL or FLANK at depths of 100 ft or less because you'd be making far too much noise for your own good. Use FLANK speed to accelerate quickly, but remember that higher speeds have their penalties — not only do you become more audible to enemy sonar at high speeds, you can't hear as much over your own engines and the water flowing over your hydrophones. Part of the real art of submarining is knowing when you should use high speeds and when you should cut your engines completely. REV (reverse) will slow you down quickly but is *extremely* noisy (the sub's propellor is spinning opposite its normal direction, which produces a *lot* of cavitation, especially between 0 and 100 ft).

OMAHA

RUDDER — The rudder changes the ship's course *provided you're moving forward*. The control is incremented, which means you can control the rate



at which you change course. The farther you move the handle to the left or right, the "harder" (i.e., more severe) the turn. Remember that activating the rudder will turn off the auto-pilot.

Sonar Room

EXIT — Returns you to the CONN.

Sonar Computer



Figure 5.5: Sonar Analyzer

PASADENA

ANALYZE — All ships, submarines, torpedoes and marine life make distinctive sounds. Each of these sounds has a sound "signature" or frequency pattern that distinguishes it from other sounds. Use the frequency analyzer



to display the sound signature of your current target. The horizontal line of the gauge represents the audible frequency spectrum (left being the low frequency end and right being the high frequency end). The vertical line represents the degree of sound received in that part of the frequency spectrum. Different objects will “peak” in different parts of the spectrum. Figure 5.5 shows where different objects *tend* to peak in the sound spectrum. As you can see, ships tend to make more noise in the low end of the frequency spectrum; torpedoes in the higher end. Keep in mind that the above diagram is only a rough approximation — there are exceptions. To get positive identification, you must be able to recognize the individual sound signature of an object. This takes experience. Remember, it can be well worth your while to know the signatures of torpedoes and enemy subs when you’re surrounded by “unknown contacts” and you need to act fast!

Sonar Controls

FILTER — Sound waves travel at many frequencies in the ocean. Generally, you’ll want to have the filter set on **BAND PASS** so you can monitor all of them. However, in critical situations, you may have to set this on **HIGH PASS** to filter out everything except high frequency noise. Torpedo engines make noise in the high frequency range, and torpedo sonar arrays usually emit high frequency “pings” when actively searching for a target. Set the filtering device on **HIGH PASS** when you want to see just torpedoes on your map display.

TARGETING PULSE — The targeting pulse is your active sonar. Selecting this directs your sonar officer to send a sonar “ping” which temporarily informs you of everything that’s ahead of you. The problem is, it also alerts just about everything to your presence. (See p. 53 for a brief description of active sonar.)

TOWED ARRAY — The towed array is a long cable with a series of microphones along its length that heighten the sub’s listening capabilities. Figure 5.6 shows the relative listening capabilities of a submarine with a towed array and without.

PHILADELPHIA

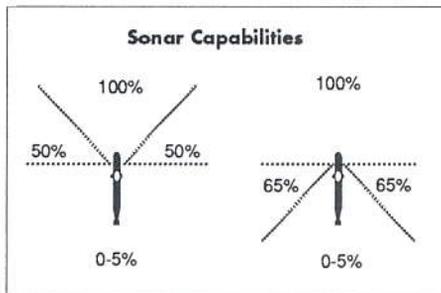


Figure 5.6: Increased Sonar Capabilities With Towed Array

The disadvantage to dragging towed arrays is that they oscillate at high speeds (creating a good deal of noise) and produce drag. For these reasons, towed arrays limit the sub's speed: 2/3 in the 688; 50% in the Alfa.

PHOENIX

Towed arrays can be over 2000 ft long. Consequently, the towed array must be reeled out. As you can expect, this takes a matter of minutes. Select **TOWED ARRAY** once to deploy the towed array. Select it again to retrieve it. Situations may arise in which you absolutely must accelerate quickly despite the fact that your towed array is deployed. In these situations, you will be given the choice of cutting the array's cable or not. Once you've cut your towed array, it's gone for the rest of the mission.

TARGET — Targets a vessel. (See **TARGET**, p. 44).

Periscope

(Note: There is no contour imaging at the Periscope station. **C** on the map controls only returns you to periscope view.)

EXIT — Returns you to the **CONN**.

ESM Level

ESM stands for Electronic Sensing Measures. This gauges how strong your

PITTSBURGH



opponent's search radar is at your location. Enemy radar can detect not only your raised periscope but the wake it leaves in the water. This is true for a raised antenna as well. The stronger the ESM signal, the faster you'll be detected. Always lower your periscope or antenna as soon as you can.

PERISCOPE — Raises and lowers your periscope. You must be at periscope depth (20 ft) in order to do this. Watch the ESM level to keep your chances of detection low. When you raise your periscope, the map display window will turn into your periscope view. You can switch back and forth between your map display and your periscope view: select **T** from the map controls to switch to the top-down map, then select **C** to return to periscope view.

PERISCOPE ROTATION — Use the arrows to rotate the periscope. The direction of the periscope is relative to the bow of your submarine (the bow is 000°).

ANTENNA — Use this to raise or lower your antenna so you can communicate with satellites to receive mission orders and transmit messages. You must be at periscope depth (20 ft) in order to do this. While your antenna is up, watch the ESM level to keep your chances of detection low.

TARGET — Targets a vessel (see **TARGET**, p. 44).

LAUNCH — Launches a torpedo, noisemaker or missile (whichever is currently selected at the Weapons Control Panel).

Weapons Control Panel

EXIT — Returns you to the CONN.

Torpedo Tubes and Auxiliary Tubes

The 688 is outfitted with four main torpedo tubes (at the bow) and two auxiliary tubes (amid ship) for noisemakers. The Alfa has six torpedo tubes at the bow only, but the sixth tube launches noisemakers (until you run out, at which point it launches torpedoes). Armed weapons aren't stored in the torpedo tubes, so you have to order your crew to load torpedoes. First select the torpedo tube you want to arm by moving the cursor to that tube. You



must arm each tube individually. Press the activate button to highlight the tube's number. Press the activate button again to start the arming cycle (an icon of the type of torpedo in the tube will appear). When the weapon is ready to fire, the weapon icon will change colors. The weapons officer will also inform you that the torpedo is ready to launch.

Missile Selection

Though the more recent ships of the 688 class are equipped with vertical launch tubes for missiles, the *Los Angeles* itself fires its missiles from its torpedo tubes. Since the room aboard a submarine is limited, only a small number of missiles may be carried. The number and type of missiles are pre-selected for each mission and are listed in Chapter 3, Missions (pp. 18-28). Missiles are loaded and launched the same way torpedoes are. Select the missile box, then select it again to initiate the arming cycle. The missile icon will appear as long as you still have missiles on board. When the icon turns a darker color, it's ready to fire. Select **LAUNCH** to fire the missile. Missile specifications begin on p. 64.

TARGET — Targets a vessel (see **TARGET**, p. 44).

LAUNCH — Launches a torpedo, noisemaker or missile (whichever is currently selected).

Torpedo Control

The Torpedo Control functions let you guide torpedoes to a target or location or set them on an active search program. This is useful if your torpedo seems to have "lost" its target or in those situations where you don't have a firm fix on an enemy vessel that you want to try and take out.

A launched torpedo has a guidance-wire connecting it to your sub. The guidance-wire is 7.5 nm long; once it's cut, you can no longer control the weapon. The weapons officer will inform you when a torpedo has gone off course. The torpedo marker on the map will change to a darker color (red on most machines). A torpedo with a cut guidance-wire will seek a target until it detonates or runs out of fuel.

PROVIDENCE

**SAN
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SELECT — If you've launched a torpedo and you want to control it, you must first press **SELECT**. A crosshair-cursor will appear in the viewing window. Use the **Tab** key or mouse to select the torpedo you want to control, then press **<Enter>** or click a mouse button. Now select one of the following:

SEARCH — Sets the torpedo on active search. The torpedo will run a search pattern and begin emitting sonar pings to help it find a target.

DIRECT — Select this and a crosshair-cursor will appear on the map. Move the cursor to where you expect your target to be if it maintains its course and press **<Enter>** or click a mouse button. Directing a torpedo will only send the torpedo to a specific location — that in itself isn't enough. When the torpedo's near its destination, you have to set it on **SEARCH** so it will look for a target. If you don't initiate a search pattern, your torpedo will drift until it runs out of fuel.

DETONATE — Your own torpedo may lose its original target and end up locking on you or a friendly ship. In a situation like this you may decide it's safer to just blow it up. Make sure the torpedo is at a safe range — it doesn't have to actually hit something to do damage.

SCRANTON

Status Panel

EXIT — Returns you to the CONN.

TOPEKA

SELECT — Your crew will tell you when a severe hit or scraping the bottom has damaged one of the ship's systems. If you need to review the damage your sub has taken, press **SELECT** repeatedly to scroll through the status of each of the ship's systems. All systems will read "OK" unless you've sustained damage. If the system has been damaged, the status bar will tell you its operational condition in percentages. For example, a hard hit to the stern could damage the ship's engines. The status might read: "Engines 75% operational". This would mean you couldn't go faster than 3/4 of your top speed. The diagram shows the sub's major systems — any major systems that have been damaged will be highlighted. (Note: *No diagram is available on the Alfa.*)

Remember that a damaged system is damaged *for the duration of the mission*. In combat, your crew is too busy running the sub to repair anything. At any given moment, you have to make do with what you have.



6

SUBMARINE WARFARE

A submarine isn't much more than an air-bubble enclosed by one or more metal shells (hulls) and designed to move underwater at great depths. All submarines must do certain things: submerge, move forward, navigate and monitor their surroundings. Therefore, they share certain design features.

Propulsion — Submarines need power sources to propel them forward and to provide energy for subsidiary systems such as life support, lighting, navigation, weapons control, the periscope, etc. Internal combustion engines, like automobile engines, require air to burn fuel and are therefore unsuitable for use while underwater. Two sources of power have proven themselves effective for submarine propulsion, and both have their advantages and disadvantages. **Conventional submarines** use electric batteries while underwater, but these run down with use and must be recharged by diesel engines. To do this, the submarine has to return to the surface, at which point it becomes fair game for anybody who wants to shoot at it (it's diesel engines make it pretty audible to enemy sonar, too). Despite this disadvantage, conventional submarines remain popular among a majority of the world's navies — they're cheap, simple to operate, and virtually silent when running on battery power.

Nuclear-powered submarines use a nuclear reactor to heat water, which in turn drives a steam generator. They don't need to recharge batteries, which nicely eliminates unsavory things like range limitations and the need to surface. However, nuclear-powered submarines are costly and require greater expertise to operate. Only large navies with huge resources can maintain nuclear-powered submarines in their fleets. Nuclear-powered submarines have one disadvantage: the pumps they need to cool their reactors make them noisier than conventional submarines. However, their ability to remain submerged for literally years makes this a suitable risk.

Submersion — Submarines submerge by flooding **ballast tanks** with seawater, which causes the submarine to lose buoyancy and sink. To surface, compressed air is blown into the ballast tanks, forcing the seawater back



out again. Ballast tanks can be located within the pressure hull or between the pressure hull and the outer hull. Some submarines have “saddle tanks”: streamlined tanks fitted to the outside of the hull. **Diving planes** (fin-like appendages located on the sides near the bow or on the sail) control the angle of the dive.

Sensors — A submarine’s most important sensors are its sonar and periscope. Since the periscope can only be used near the surface, the modern submarine must rely almost totally on sonar for its sensing. Sonar stands for Sound Navigation Ranging and works on the principle that all objects in the water produce sound waves or reflect them and are thereby subject to detection.

Active sonar devices actively emit sound waves (the legendary sonar “ping”), which are reflected back by objects in the water. Sensitive receivers on board the sub pick up the reflected waves, which are then interpreted by sonar operators using processing devices. Active sonar devices are usually **bow-mounted**, though some submarines (such as the 688) also have **conformal arrays** that run along the sides of the sub, giving greater all-around sensing. Active sonar, though limited by the characteristic features and noises of the ocean, can give you a lot of critical information about the objects directly before you. The major drawback of active sonar is that it alerts just about everything in the vicinity of your presence.

Passive sonar uses sensitive listening devices called **hydrophones** to pick up sound waves that are already moving through the water. Passive sonar has the advantage of not alerting everyone to your presence. Unfortunately, it’s something more of an art than a science, requiring sophisticated spectrum analyzers, powerful microprocessors, intuition, and, most importantly, *time*. Passive sonar capabilities can be greatly increased with the use of a **towed array**, a long, tapered cable with many hydrophones on it. While a towed array is helpful, it limits a submarine’s speed and maneuverability. Towed arrays are not effective in hard turns, and the fact that they oscillate at high speeds (and create noise) limits the overall speed of the submarine.



Submarine Classifications

The U.S. Navy typically classifies submarines in two ways. The first is by the role the submarine is designed to fulfill. Traditionally, the submarine's strategic purpose has been to **hunt and attack enemy surface vessels**, whether merchant or military. While this is still a primary function, technological innovations have given the submarine new roles. Refined sensors now allow submarines to **hunt and attack enemy submarines**. Finally, those submarines outfitted with long-range cruise and ballistic missiles can **strike at land-based targets**, too.

The role a submarine performs determines what kinds of weapons it carries. Attack submarines such as the *Los Angeles* generally carry mines, cruise missiles of various sorts, and torpedoes. A few classes of submarines, such as the Charlie and Oscar classes of the Soviet Union, are primarily cruise missile platforms. Ballistic missile submarines typically carry long-range ballistic missiles and a small number of torpedoes for defense.

Another way to classify a submarine is by its means of propulsion. Submarines are typically conventional or nuclear-powered (see "Propulsion" above). Thus we have the following classifications:

SS	Conventional attack submarine
SSN	Nuclear-powered attack submarine
SSB	Conventional ballistic missile submarine
SSBN	Nuclear-powered ballistic missile submarine
SSG	Conventional guided missile submarine
SSGN	Nuclear-powered guided missile submarine

The Ocean Environment

Since the ocean doesn't allow much light in, submarines are "blind" in the most literal sense. Consequently, submarines rely on sound to gain information about the things around them. Sound waves travel through water at speeds roughly four times greater than they do through air. Solid objects in the water reflect sound waves, and a sonar operator with a good listening device can listen to the sound waves and determine a number of important things about an object that's near him: what it is, its location and speed, etc.



However, the art of sonar is by no means simple. The ocean is a dynamic environment, a fact that has, for better or for worse, direct consequences on a sonar operator's ability to pick up sound waves. There are several factors which affect the transmission of sound waves, but the most important is water density. Sound waves in water of a consistent density would travel in a straight line, but sound waves moving from an area of water with a certain density into an area of water with a different density will *bend*. Two important factors affecting the density of water are temperature and pressure.

Water Temperature — Cold water, of course, is denser than warm water. Sound waves traveling from warm water into cold water will bend toward the bottom of the ocean (a **negative gradient**), while sound waves traveling from cold to warm will bend toward the surface (a **positive gradient**). The temperature of water decreases with depth, but not as gradually as you might expect. Instead, the ocean at any given time will be made up of several **thermal layers**. The water is normally warmest near the surface, forming a **surface duct** that can be tens to hundreds of feet deep depending on your location. Below the surface layer the temperature drops gradually with depth until it reaches another thermal layer (the **thermocline**). The temperature falls quite rapidly below the thermocline until it reaches a thin layer near the bottom (the **permanent thermocline**).

Water Pressure — The greater the pressure, the more dense the water. Water pressure increases the deeper you go, so sound waves bend up with depth.

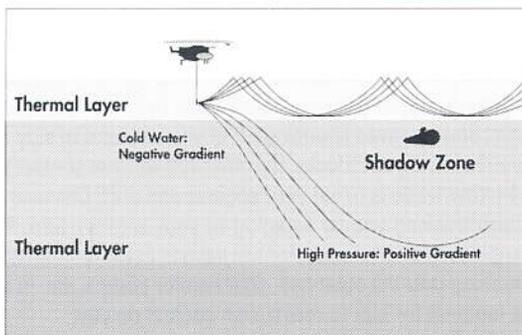


Figure 6.1: Thermal Layers



Using the Ocean Environment to Your Advantage — The complexity of the ocean environment and its effects on sonar can provide the submarine captain with numerous “hiding places” and the sonar operator with numerous headaches. Sound waves are typically “trapped” between thermal layers, forming long **sound channels**. A submarine trying to escape detection can often cross a thermal layer and stand a good chance of evading enemy sonar. Even within a sound channel, a submarine is not easily detected. Look at Figure 6.1 above. Part of the effect of bending sound waves is that they tend to fall into a more or less single, or **convergent**, path. Convergent paths produce extensive areas where no sonar waves penetrate. These areas, called **shadow zones**, can be exploited by submarine captains — a submarine lurking in a shadow zone will be virtually invisible to enemy sonar. *There's no way to know whether you're precisely in a shadow zone or not*, but your best bet is to hide just below the thermal layer. Tactically, this is a good place to be anyway: it allows you to quickly move between thermal layers and thus gives you an easy way of “dodging” the enemy's sonar.

Evading Submarines

There's no foolproof way of evading a submarine that's pursuing you. If your submarine is faster, you can outrun the other sub over the long run — however, this tactic gives the other sub plenty of time to call in help or, in combat, to fire torpedoes and destroy you (the noise you create at top speed also makes you a great target). It's better to try and out-manuever the other sub.

The first step is to do something that will make the other sub temporarily lose contact on you. You can do this in a number of ways. As mentioned above, slipping across a thermal layer gives the other sub a weaker return signal (the sound waves bouncing off of you will tend to stay in the thermal layer you're in). If you're lucky, the other sub will lose contact with you altogether. Another tactic is to cut your engines and drift. Chances are, the enemy has been tracking you by listening to your engines turn. When you cut your engines, his sonar operator will have to listen for something else: the water rushing over the outer hull, your reactor pumps, etc. In any case, it will take a moment for him to reestablish contact on you.



Once you think the other sub has lost contact on you, change course. The more unexpected the new course is, the better. You can turn to the side, turn 180° from the other sub's course and duck under him, or attempt to circle around and start tracking *him*. Combining maneuvers is effective, too. You can cut and drift, change course, drop below a thermal layer, then change course again and silently speed off. The more imaginative and complex the move, the better your chances of survival.

Using Noisemakers

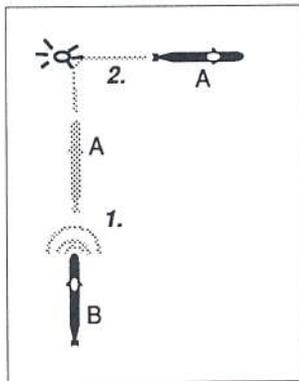


Figure 6.2: Using Noisemakers

the same time, A makes a hard turn to either the right or the left (in this case, the right). Sub A can now use other maneuvers: he can dive below a thermal layer, or, while he's still drifting, he can circle around and attempt to hide in sub B's baffles.

In combat, against torpedoes or submarines, noisemakers can only help you survive. However, in peacetime, it may not be such a good idea to release noisemakers in order to evade another submarine. Since noisemakers are released by compressed air through torpedo or auxiliary tubes, the other sub has no way of knowing whether you're launching a noisemaker to evade him or a torpedo to kill him! He might answer your call by launching several torpedoes in your direction.



Evading Torpedoes

Torpedo Limitations — There are no foolproof ways of evading torpedoes. Modern torpedoes are intelligent and capable of recognizing decoys and executing search programs. However, all torpedoes have limitations which a knowledgeable submarine captain can exploit. Like a submarine, a torpedo relies on sonar to pinpoint its target; however, the torpedo's relatively small size limits the area it can sense. Its **cone of vision** — the area it actually "sees" or senses — is small (perhaps only 20° wide directly in front of it) compared to a submarine's. If a submarine captain can quickly maneuver his ship out of the torpedo's narrow cone of vision, the torpedo will have to initiate a search program in order to try and find him. Torpedoes are fairly "stupid" in the sense that their reactions to a lost target are very mechanical. A torpedo doesn't have the facility to "guess" where the target went when it escaped the torpedo's sight. The torpedo can only initiate a pre-programmed search pattern, which might very well take it in the wrong direction, giving the submarine a chance to slip away.

Torpedoes are also limited by the amount of fuel they can carry. This gives them a maximum **range** — a point at which they run out of fuel and sink to the bottom, where they self-destruct. In reality, torpedo ranges vary from type to type. However, in *688 Attack Sub*, all torpedoes have a range of 10 nm (see Designer's Notes, p. 68). This makes it possible to outrun torpedoes in certain circumstances.

Like submarines and ships, torpedoes also have a maximum **Rate-of-Heading-Change (RHC)**. The RHC is nothing more than how tightly the torpedo can make a turn. A torpedo's RHC is pretty good in comparison to a ship's, but a torpedo can't turn on a dime — after all, it's swimming at speeds greater than 45 kts! A submarine captain can maneuver such that the torpedo is forced to turn in order to keep the target in view. If the torpedo's RHC can't compensate for the change in the target's course, the torpedo may "overshoot", losing the target altogether.

Responses to a Torpedo Attack — Figure 6.3 shows three evasive measure zones (A, B and C), each demanding a different response on the part of the submarine captain. The numbers represent the approximate ranges of the torpedoes — notice that the range at which an evasive measure should be



taken depends largely upon the torpedo's bearing. For example, if the torpedo's bearing is 000° , you'd have to take action sooner than if the torpedo were coming from behind. Why? Because at 000° , you and the torpedo are headed for each other — the gap between you and the torpedo is closing fast.

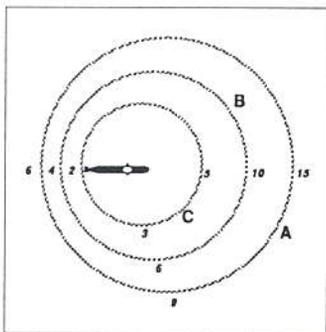


Figure 6.3: Evading Torpedoes

A) At long range, you should turn and out-run the torpedo. **All torpedoes in the game have a range of 10 nm.** You only need to stay ahead of the torpedo for a few miles and it will run out of fuel.

B) At medium range, turn so your sub is heading 90° away from the torpedo's course (choose the shortest path to get there). If you're real lucky, you'll escape the torpedo's narrow cone of vision, which will force it to initiate a search program to look for you.

C) At short range, the best you can do is turn so your sub is heading 150° or 210° away from the torpedo's course (choose the shortest path to get there). Hopefully you'll escape the torpedo's cone of vision or turn so fast that the torpedo will "overshoot", giving you time to make a clean get away.

The Baffles

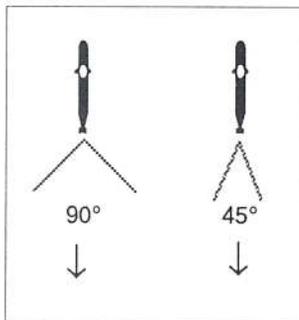


Figure 6.4: Baffles

Both the wake a submarine leaves as it moves through the water and the rotation of the screw (propellor) disrupt the transmission of sound directly behind the sub. The "baffles" are, in effect, the submarine's blind spot. Even a towed array, though diminishing the size of the baffles, does not completely eliminate the problem. The experienced captain stays aware of the fact that he senses virtually *nothing* to a narrow area astern.



7

TECHNICAL REFERENCE

Submarines

Although you can only play a Los Angeles or Alfa, other submarine classes make their appearances in one or more of the missions. The following specifications will help you know what you're up against should you encounter one of these submarines. For the sake of convenience, we've chosen to call the Soviet subs by their USN designations, even when you're commanding the Alfa. Since very few players speak Russian, this probably won't be missed much. Note that some of the specifications have been altered to balance game play, particularly the maximum depth of certain Soviet submarines (see p. 68, Designer's Notes).

Class	Nat.	Type	Max. Speed	Max. Depth	Noise Level	Weapons
AKULA	USSR	SSN	45 kt	1800 ft	Above Average	Type 53, Type 65 SS-N-16 A/S
ALFA	USSR	SSN	42 kt	1800 ft	Above Average	Type 53
CHARLIE II	USSR	SSGN	24 kt	1800 ft	Average	Type 53 SS-N-9
FOXTROT	USSR/ Other	SS	16 kt	800 ft	Low	Type 40, Type 53
KILO	USSR	SS	16 kt	1200 ft	Very Low	Type 53
LOS ANGELES	US	SSN	37 kt	1500 ft	Low	MK 48 ADCAP Harpoon, Tomahawk, Sea Lance A/S

continued next page



Class	Nat.	Type	Max. Speed	Max. Depth	Noise Level	Weapons
OSCAR	USSR	SSGN	35 kt	1800 ft	Average	Type 53, Type 65 SS-N-16, SS-N-19
TRAFALGAR	UK	SSN	32 kt	1500 ft	Low	Spearfish, Harpoon
TYPHOON	USSR	SSBN	24 kt	1800 ft	Above Average	Type 53, Type 65 SA-N-5, SS-N-16 A/S
VICTOR III	USSR	SSN	32 kt	1800 ft	Below Average	Type 53, Type 65

Weapons

The following weapons are used in the game by or against submarines. Those multitude of weapons used by ships against airplanes, missiles, land targets or other ships are not described here since they have little impact on the submarine commander. Weapons flagged with icons are actually used in the game by the 688 or Alfa. All other weapons described here appear in the game but are used by ships or other subs.

Torpedoes

688 Attack Sub was designed to be a “hot” game, demanding quick responses and daring moves on the part of players. Real submarine combat may be intense, but all truth told, there’s a lot of waiting for things to happen — courses to be plotted, contacts to be identified, missiles to fly... A computer game can’t reproduce this aspect of naval combat and still call itself a game: the excitement has to be of the grab-you-by-the-shirt-collar variety. With this in mind, the entire game was “scaled down” so that the ranges at which things happen were greatly reduced (see p. 68, Designer’s Notes). The result was that *all* torpedoes (Soviet and American) were given an artificially short range of 10 nm.



Torpedo	Nat.	Range	Max. Speed	Payload	Notes
MK 32	US/ Various	10 nm	40 kt	150 kg warhead	Though somewhat obsolete, this anti-submarine torpedo still finds use in many of the world's navies, primarily aboard escort ships.
MK 46	US	10 nm	40 kt	44 kg warhead	The Mk 46 is a deep-diving, high-speed ASW torpedo capable of multiple search patterns and re-attack. It can be launched from surface ships and aircraft or be carried by ASROC missiles.
MK 48 ADCAP	US	10 nm	52.5 kt	267 kg warhead	The Mk 48 ADCAP (advanced capabilities) program was begun to counter the operational characteristics of newer Soviet subs such as the Alfa. The result of the program was a faster, deeper-diving torpedo with better acoustics and electronics.
MK 50 ALWT	US	10 nm	40 kt	45 kg directed energy warhead	The Mk 50 Advanced Lightweight Torpedo (ALWT) is the successor to the Mk 46 torpedo. Most torpedo warheads have a large payload that blasts outward in all directions. The directed energy warhead uses a smaller, directed blast to "punch" a hole through the ship's hull. This requires even more precise delivery systems so that the directed blast won't just glance off the side but will actually penetrate the ship's hull.
Spearfish	UK	10 nm	60 kt	directed energy warhead	Like the Mk 48 ADCAP, the Spearfish was developed in direct response to improved Soviet submarine technology (in particular the Alfa). This heavyweight torpedo is faster, more accurate and capable of greater depths than its predecessor. The Spearfish also uses a directed energy warhead (see Mk 50 above).

continued next page



Torpedo	Nat.	Range	Max. Speed	Payload	Notes
Type 40 406 mm	USSR	10 nm	Unknown	100 kg warhead	This relatively new, lightweight torpedo is currently in use with light destroyers and other sub killers. It may also be found aboard certain Soviet nuclear submarines.
Type 53 533 mm 	USSR	10 nm	47.5 kt	400 kg warhead	533 mm has been the standard caliber used by the Soviet Navy and its allies for many years.
Type 65 660 mm	USSR	10 nm	47.5 kt	900 kg warhead	This heavyweight torpedo was only recently developed and many ships are currently being refitted to accommodate its larger diameter.



Missiles

Missile	Nat.	Range	Max. Speed	Payload	Notes
ASROC Anti-Submarine Weapon	US	2-10 km	Classified	Mk 46 Torpedo	The ASROC (Anti-Submarine Rocket) is the principal ASW weapon of the US Navy and is popular with over ten other countries. The ASROC consists of a ballistic rocket carrying an Mk 46 torpedo. The rocket drops the torpedo by parachute at a pre-determined point near the target. Once underwater, the torpedo homes in on the target. By quickly placing a torpedo in the vicinity of the target, the ASROC reduces the submarine's reaction time to the attack, increasing the likelihood of scoring a hit.
Harpoon SLCM	US	130 km	0.9 Mach	570 lb high- energy warhead	Must be at periscope depth and have positive identification of your target before you can launch this weapon.
Tomahawk SLCM	US	460 km (anti-ship)/ 2600 km (land attack)	475 kt	1000 lb high- energy warhead	Must be at periscope depth and have positive identification of your target before you can launch this weapon.
SS-N-14 Anti-Submarine Weapon	USSR	55 km	0.95 Mach	See Notes	The SS-N-14 (Silex) is a ship-launched A/S missile believed to carry a homing torpedo or low-level nuclear warhead to its target.
Sea Lance ASW Stand- Off Weapon	US	Classified	Classified	Classified	The Sea Lance was designed to give American attack submarines an edge over Soviet subs by extending their normal torpedo range. The missile is launched from a submerged submarine. As the missile clears the surface, a rocket motor is ignited which carries the payload (a torpedo) to the target. As the missile re-enters the water, the homing device on the torpedo activates and begins searching for a target. Exact figures for the Sea Lance are currently not available. Testing is scheduled for July 1989.



Ships

As a submarine commander, you need to know as much about your targets as you do about your own submarine. A ship's noise level will give you an idea of how easily it can be tracked, while its type, size and maximum speed will tell you how easily it can evade your attack. The kinds of weapons a ship carries are also important — they determine what the ship can do to your torpedoes and missiles as well as your submarine. Armed ships generally rely on a three-point system of defense against incoming missiles and torpedoes. Surface-to-air missiles (SAMs) and anti-torpedo missiles are the first line of defense, typically being employed against long range targets. If missile defense is unsuccessful, guns will be used. Phalanx and chaff make up the last line of defense. Ships will attempt to protect each other as well as themselves, firing at missiles and torpedoes destined for other ships. Keep this in mind when setting up attacks on convoys and battle groups — take out warships first. Be wary around any ships carrying depth charges, depth bombs, and anti-submarine (A/S) torpedoes or missiles (ASROC and SS-N-14's). The latter are particularly dangerous because of their long-range.

Class	Nat.	Type	Max. Speed	Noise Level	Weapons
CARGO	Various	—	20 kt	Very High	—
FORREST SHERMAN	US	DD	20 kt	High	Not applicable in scenario
IOWA	US	BB	35 kt	High	Guns: 9 16 in/50 guns; 12 5 in/38 guns; 4 MK 15 20 mm CIWS SLCMs: Tomahawk, eight quad launchers SSMs: Harpoon, 4 quad launchers
KARA	USSR	CG	34 kt	Above Average	A/S Missiles: SS-N-14, 2 quad launchers Depth Bombs: A/S/anti-torpedo depth bombs, 2 RBU 6000 12-barrelled trainable launchers

continued next page



Class	Nat.	Type	Max. Speed	Noise Level	Weapons
					Guns: 4 76 mm/59 guns; 4 30 mm Gatling guns SAMs: SA-N-6, 6 launchers; SA-N-4, 2 twin launchers; SA-N-3, 1 twin launcher
KIDD	US	DDG	33 kt	Above Average	A/S Missiles: ASROC missiles A/S Torpedoes: MK 32, 2 torpedo tubes Guns: 2 MK 16 20 mm CIWS 6-barrelled Phalanx SAMs: SM-1 ER, 1 MK 13 dual-purpose launcher SSMs: Harpoon, two quad launchers
KIROV	USSR	BC	33 kt	High	A/S Missiles: SS-N-14, 1 quad launcher A/S Torpedoes: Type 53, 10 torpedo tubes Depth Bombs: A/S/anti-torpedo depth bombs, 1 RBU 6000 12-barrelled trainable launcher, 2 RBU 1000 six-barrelled trainable launchers Guns: 2 100 mm guns; 8 30 mm Gatling guns SAMs: SA-N-6, 12 launchers; SA-N-4, 2 twin launchers SSMs: SS-N-19
KONI	USSR/ Various	FF	29 kt	Average	A/S Torpedoes: Type 40, four torpedo tubes Depth Bombs: A/S/anti-torpedo depth bombs, 2 12-barrelled RBU 6000 trainable launchers Depth Charges: Depth charges, two racks Guns: 2 100 mm twin guns Mines: Capacity for 20 SAMs: SA-N-4, 4 twin launchers
MER- CHANT	Various	—	20 kt	High	—
NIMITZ	US	CVN	33 kt	High	Guns: 4 MK 16 20 mm CIWS six-barrelled Phalanx SAMs: Sea Sparrow

continued next page



Class	Nat.	Type	Max. Speed	Noise Level	Weapons
OLIVER HAZARD PERRY	US	FFG	29 kt	Above Average	A/S Torpedoes: Mk 32 A/S torpedo, two triple torpedo tubes Guns: 1 76 mm/62 MK 75 gun; 1 20 mm CIWS MK 17 six-barrelled Phalanx SAMs: SM-1 ER, 1 MK 13 dual-purpose launcher SSMs: Harpoon, 1 single MK 13 launcher
SACRAMENTO	US	AOE	26 kt	High	SAMs: Sea Sparrow, 1 MK 29 system
SLAVA	USSR	CG	12 kt	Above Average	A/S Torpedoes: Type 53 torpedoes, 8 torpedo tubes Depth Bombs: A/S/anti-torpedo depth bombs, 2 RBU 6000 12-barrelled trainable launchers Depth Charges: Depth charges, two racks SAMs: SA-N-6, 8 launchers; SS-N-4, 1 twin launcher SSMs: SS-N-12
TANKER	Various	—	16 kt	Very High	—



Aircraft

Aircraft	Nat.	Max. Speed	Mission Endurance	Notes
Lockheed P3C Orion	US	415 kt	16 hours	This four-engined, land-based plane has served the US Navy well as an ASW patrol aircraft. With its onboard radar, forward-looking infra-red, MAD equipment and sonobuoys, the PC3 Orion is used to detect, track and, if necessary, destroy enemy submarines.
Sikorsky SH-60B Seahawk Helicopter	US	126 kt	3 1/2 hours	Carried by a variety of cruisers, destroyers, frigates and special helicopter-carriers, the Seahawk acts as the forward sensors of the ship-based LAMPS III ASW system. With its search radar, towed MAD system, sonobuoys and dipping sonar, the helicopter provides raw data for the parent ship's onboard processors. The Seahawk also carries two Mk 46 lightweight torpedoes, making it a serious threat to enemy submarines.

Designer's Notes

By Paul Grace

When John, Randy, and I started *688 Attack Sub*, we wanted to design a game where the strategic and tactical decisions that confront the player occur at a reasonably exciting pace. An attack sub isn't a jet fighter, of course, but we felt that a submarine game's potential for excitement and serious challenge was at least equal to that of an air combat simulator—and given the things that today's billion-dollar subs can do, the potential might even be greater.

However, creating a submarine game that's both reasonably accurate as a simulation yet exciting enough to play as a game presents certain problems. For example, a long-range (two-speed) torpedo can travel up to 40 miles, at speeds between 20 and 50 knots. Its run time could easily end up being more than 30 minutes long. If we change the game scale so that this is compressed to a reasonable time frame for a game (say one



or two minutes “real time”), then the speed of a helicopter (or worse, a missile) is so great that it can’t even be represented!

To overcome this difficulty, we had to throw out “conventional” game design theories (as might be published in trade journals) and invent something truly radical. By selecting a “combat range” on the order of 15 miles, we’ve brought real excitement to an otherwise slow process. The game scale is such that ships move at a reasonable rate, torpedo run times are short enough to provide a fast feedback loop without the need for too much time compression. (In fact, by using this technique, time compression runs the entire game, not a simplified statistical model.) The bad news is: many weapons have incorrect maximum ranges.

Furthermore, (or, as we say at Electronic Arts, Farthermore,) we had to simplify several features present in modern submarine warfare. Some of these modifications were trivial (modern SONAR sounds more like a “warble” than a “ping”). Other modifications had real game impact — for example, we decided to place the appropriate weapons on board your vessel at the start of each mission, which improved the play balance of the missions greatly. The US enjoys some strong advantages in weapons, and we wanted to focus on specific problems facing hunter-killer commanders, not the intricacies of weapons selection. For similar reasons, we left out nuclear “superweapons” that would rob you of long-term satisfaction. You’ll have to pretend you’ve used them all up, you’re stuck with what you have...

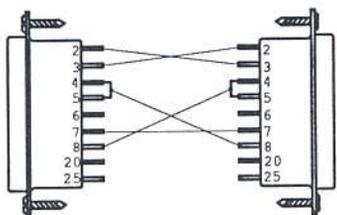
Please, NO telephone calls regarding the top speeds of the various submarines modelled in the game. The published data in Jane’s Defense Weekly seems ludicrously low, while other sources would have us towing water-skiers behind our beloved Los Angeles. We picked what we felt were reasonable speeds, and then balanced the game around those speeds.

Good hunting,
Paul Grace

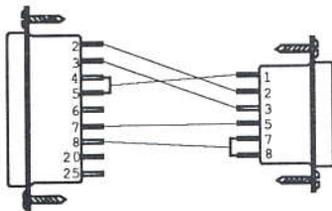


APPENDIX A

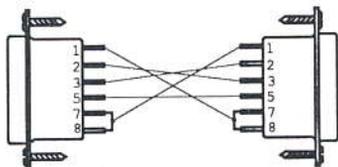
The kind of null modem cable you'll need depends on the number of pins *both* computers have in their serial ports. Most serial ports have a 25-pin male connector, but some have only 9-pins. Both you and your opponent should check your machines to see how many pins your serial ports have. Your modem cable will have to be constructed with female connectors to fit the serial ports on both machines. There are three possible configurations for your null modem cable:



25-pin to 25-pin



25-pin to 9-pin



9-pin to 9-pin

Figure A: Null-Modem Connections



GLOSSARY

AOE	Fast combat support ship
A/S	Anti-submarine weapon
ASROC	Anti-submarine rocket
ASW	Anti-Submarine Warfare
Baffles	Turbulent water caused by the wake of a submarine and the turning of its screw. Because turbulence negatively affects sonar transmissions, submarines are "blind" to a narrow area directly behind them.
BB	Battleship
BC	Battle cruiser
Beam	The extreme width of a ship's hull
Bearing	The direction of a target in relation to your sub (the nose of your sub = 000°)
BF	<i>Baltijskij Flot</i> (Russian for Baltic Fleet)
Boomer	Slang term for SSBN's
Bow	Forward end of the ship
Cavitation	Partial vacuums forming around the blades of the propellor due to fast acceleration and/or shallow waters. Cavitation is extremely noisy.
CG	Guided missile cruiser
Chaff	Strips of metal foil shot into the air to distract incoming missiles. Used by surface ships as a last ditch defense.
CHG	Light aircraft carrier
CINC	Commander-in-Chief
CMF	<i>Cherno Mokoj Flot</i> (Russian for Black Sea Fleet)
CONN	Conning Tower; the elevated platform above the deck used on early submarines for attack direction and navigation. Today it refers to the control room where these functions are now performed.
Course	The direction you're pointing in relation to the compass (North = 000°)
CVN	Multi-purpose aircraft carrier (nuclear-powered)
DD	Destroyer
DDG	Guided missile destroyer
ESM	Electronic Sensing Measures
FF	Frigate
FFG	Guided missile frigate
Glavnyi	Short for <i>Glavnokomanduyushchij</i> (Russian for Commander-in-Chief)



HUD	Heads-Up-Display; a monitoring system that projects compass and depth readings onto the Map Display Window
Hydrophones	Microphones along the hull of a submarine that transmit sound waves to a sonar operator.
LANTFLT	Atlantic Fleet
MAD	Magnetic Anomaly Detector
MEDFLT	Mediterranean Fleet
NATO	North Atlantic Treaty Organization
PACFLT	Pacific Fleet
PLA	<i>Podvodnaya Lodka Atomnaya</i> (Soviet designation for SSN's)
PLARB	<i>Podvodnaya Lodka Atomnaya Raketnaya Krylataya</i> (Soviet designation for SSBN's)
Port	Left
RBOC	Rapid Bloom Off-board Countermeasures; a counter measure system for surface ships used against incoming missiles. The RBOC system consists of a number of mortars firing chaff cartridges.
SAM	Surface-to-Air Missile
Screw	Propellor
SF	<i>Severnyj Flot</i> (Russian for Northern Fleet)
SLBM	Submarine-Launched Ballistic Missile
SLCM	Submarine-Launched Cruise Missile
Sonar	<i>Sound Navigation Ranging</i> ; a device that detects the presence and location of underwater objects by sending out sound waves and monitoring their echo.
SS	Conventional attack submarine
SSB	Conventional ballistic missile submarine
SSBN	Nuclear-powered ballistic missile submarine
SSG	Conventional guided missile submarine
SSGN	Nuclear-powered guided missile submarine
SSN	Nuclear-powered attack submarine
Starboard	Right
Stern	Back end of a ship
TOF	<i>Tikhij Okeanskij Flot</i> (Russian for Pacific Fleet)
Towed Array	A long cable with microphones that enhances a surface ship or submarine's passive sonar capabilities.
Waypoint	A destination for your sub that your auto-pilot will head for when active.



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If you have questions about the game, our Technical Support Department can help. If your question isn't urgent, please write to us at: Electronic Arts, Technical Support, P.O. Box 7578, San Mateo, CA 94403-7578

Please be sure to include the following information in your letter:

- Product name
- Type of computer you own
- Any additional system information (like type and make of monitor, video card, printer, etc.)
- Type of operating system or DOS version number
- Description of the problem you're having

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KEYBOARD COMMANDS

<Enter> Initiate command

Cursor Keys

Tab Tab through control groups (one direction only)
← Move between positions within a control group (to the left)
→ Move between positions within a control group (to the right)
↑ Move between controls regardless of groups (to the left)
↓ Move between controls regardless of groups (to the right)
<Shift> plus any of the above keys reverses the direction

— — — — — **You can play the entire game with the above six keys.**

Quick Keys

F1 Call up help screen
<Esc> Exit help
spacebar Go to next help screen
F2 Go to Radio Room
F3 Go to Status Panel
F4 Go to Ship's Control
F5 Go to Periscope
F6 Go to Navigation Board
F7 Go to Weapon Control
F8 Go to Sonar Room
F9 Go to CONN
F10 Boss Key
1-9 Go to a specific control group
0 Go to EXIT
X Go to EXIT

Ship's Control Panel

R Rudder control
E Engine control
D Dive plane control
. Auto pilot
5 Auto Function
1 Display Controls

Navigation Board

G Target
W Set waypoint
K Clear waypoint
Q Time compression
. Auto pilot
4 Plotting Controls



Weapon Control Panel

G	Target
R	Torpedo tubes
A	Auxiliary tubes
M	Missile tubes — 688
L	Launch
2	Torpedo Control
3	Torpedo Control — Alfa
1	Display Control

Periscope

G	Target
U	Periscope up/down
N	Antenna up/down
L	Launch
-	Rotate periscope left
=	Rotate periscope right
1	Display Control

Sonar Room

G	Target
3	Analyze
2	Sonar Controls — 688
4	Sonar Controls — Alfa
1	Display Control

Radio Room

A	Antenna up/down
P	Periscope up/down
S	Send code
T	Transmit
2	Message Review

Status Panel

S	Status
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Map Keys

P	Look to port in contour mode*
F	Look forward in contour mode*
S	Look to starboard in contour mode*
I	Zoom in on top-down map
H	Heads-Up-Display on/off
O	Zoom out on top-down map
C	Contour Imaging Display on/off*
B	Bottom contours on/off
T	Top-down map on/off*

* *Not available on the Alfa*

Game Controls

<Ctrl>-R	Pseudo-Cyrillic on/off
<Ctrl>-N	Sound on/off
<Ctrl>-A	Disconnect mouse
<Ctrl>-K	Surrender (modem game only)

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MANUAL BY DAVID LUOTO
EDITED BY Z.J. YEE

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P.O. Box 7578 • San Mateo, CA • 94403-7578 • (415) 572-ARTS