THE MASTERS COLLECTION™

By **EPYX**®

SUB BATTLE

SIMULATOR™

Instruction Manual

For use with the Commodore 64®*/128*™*, Apple II*® *Home Computers, IBM PC*® *and 100% compatible computers.*

Game Design by Digital Illusions

Table of Contents

"Welcome Aboard"

First of all, forget you're using a simulation. It's important that you believe that every strategic move you make may have real life implications—for your country, your crew, and your own life.

Many of the battle situations herein are those you will likely face during your own command. You're using the battle precedents of WWII to practice your critical decision making skills—the kinds of *active* decisions you will be forced to make hundreds of miles out at sea in the face of enemy deck guns, depth charges, and air assaults. And the *tactical* decisions you'll quietly face underwater and under pressure.

Remember, you should *know* your enemy. Study him. Study his ship—what kinds of munitions it carries and its capabilities. And, of course, study your own subs and weapons. You'll find all the information you need at the back of this manual.

Getting Started

Commodore 64®/128™

- Set up your Commodore 64/128 as shown in the owner's manual. (Note: If using a Commodore 128, set system to C64 mode.)

- You will be using the keyboard to play the game, refer to the COMMAND CARD and Appendix B for keyboard commands. You can also use the joystick for changing the direction of your view, plug the joystick into Port #2.

- Turn the computer and disk drive ON.

- Insert your **SUB BATTLE SIMULATOR**™ disk into the drive, label side facing up, cutout pointing towards the back.

- Type **LOAD** "∗", **8, 1** and press the **RETURN** key.

- Your WWII submarine simulation will automatically load and default to the **Target Practice** mode.

- You will be prompted to turn over the disk at the appropriate time.

With the Epyx FAST LOAD CARTRIDGE:

- After turning on the computer and disk drive, you just have to press the **C=** (Commodore) key and the **RUN/STOP** key to load the program.

Apple

- Set up your Apple home computer as shown in the owner's manual.

- You will be using the keyboard; refer to the COMMAND CARD and Appendix B for keyboard commands. If you are using a joystick, plug the joystick in as shown in the owner's manual. (Joystick is used to change the direction of your view only and is not required for play.)

- Insert your **SUB BATTLE SIMULATOR**™ disk into the drive, label side up, cutout pointing towards the back.

- Turn ON the computer.

- Your WWII submarine simulation will automatically load and default to the **Target Practice** mode. You will be prompted to turn over the disk to the other side at the appropriate time.

IBM PC® and 100% Compatibles

- Set up your IBM PC (or compatible) as shown in the owner's manual.

- Insert your DOS disk and turn ON the computer.

- When DOS is loaded, insert your **SUB BATTLE SIMULATOR** diskette, label side up, cutout facing toward the back.

- LOG ON to the drive containing the program disk by typing **A:** or **B:** and pressing **RETURN.**

- Type **SUB** and press **RETURN.** Your WWII submarine simulation will load and automatically default to **Target Practice** mode.

Note: The Epyx 500XJ is the only joystick that actually fits your hand. The fire button(s) are angled for your trigger finger for incredibly accurate, high speed action—and the highest game scores ever!

Objective

Your objective is to *command* a WWII submarine, *complete* a mission and *survive*.

Your action can take place in one of three modes:

- **Target Practice** against an enemy convoy

- **Single Mission** in a real combat setting

- **Wartime Command** over the course of the entire war

There are 60 different missions (24 American, 36 German) in addition to the target practice mode. American missions are very close to historical occurrences, while German missions are not as exact, since actual patrol records for the Germans were mostly destroyed at the end of the war. Missions fall into 4 general categories: Seek and Destroy, Rendezvous (pick up people/supplies, drop off coast watchers), Lifeguarding (picking up downed fliers), and Patrol.

Note: See STARTING SIMULATION and MISSION SIMULATIONS for further explanation of these modes.

Starting Simulation

Note: All controls shown in **color** are explained in the HELP REFERENCES section in Appendix B.

When you first boot **SUB BATTLE SIMULATOR**™ you will be in **Target Practice** mode. In this mode you can become proficient with the controls of your submarine, and gain experience in the tactics of submarine warfare.

Later when you feel confident of your abilities, you can embark on a combat mission. First press **CTRL** and **N** to select a new game. Then type **Y** (Use the **Cursor arrow keys** on the Apple and IBM) to end your current game and type the highlighted keys to make your selections. Select **Single Mission** (S), **Wartime Command** (W), or **Target Practice** (T), and your **Level of Play** (1 is easiest, 4 is most advanced). Next choose your **nationality** (German or American), and the **year** of your mission. Your game starts in 1942 if you choose an American Wartime Command, and 1939 if you choose a German Wartime Command. When all your choices have been made, press the ← key (**RETURN** for IBM and **SPACE BAR** for Apple) to start your Single Mission or Wartime Command. (See **Level of Play** chart on the back of the COMMAND CARD).

Note: All keyboard commands listed refer to all formats of **SUB BATTLE SIMULATOR**™ *unless otherwise noted*. If keys differ, Commodore 64/128 is listed first with Apple and IBM in parentheses following it.

Target Practice

At zero hour your heading is preset in the direction of the convoy. You will be warned (Battle Stations! Battle Stations!) that the enemy convoy is close, but it is not yet within range of your weapons. Take the following action:

- Press the **right arrow** (**CRSR** →) key, ( ] key for IBM) press repeatedly until the speed gauge reaches 21 knots. This will get you to the scene of the battle (within target range of the enemy). (See **Time Compression** on page 8 to reduce even more time.)

- Then, using the **Map View** to follow your progress, stay on the surface to catch up to the enemy convoy (**Zoom In** to the 7 Mile View by pressing the **Z** key). Use the navigation time to check the position of the enemy and to devise an overall strategy and angle of assault.

- When you are within range of the convoy you might want to slow your speed (and **Time Compression** if used), and make adjustments to your heading to strategically position yourself for attack. You can change your heading by using the , and . keys.

- Once an enemy ship comes into view, you can center it in your view from the *Tower, Binocular* or *Periscope Views*, by using the Keyboard Commands ; and : (**H** and **K** on Apple and IBM) or by moving the joystick left or right to move your view. When you are pointed directly at the target and the enemy is centered in your view, the **Target Data Computer** will automatically be activated. The **TDC** will give you an informational readout on the enemy ship. At this point you may want to match your heading to your view by pressing the **J** key. When a ship is in range (see listing of torpedo capabilities and ranges in Appendix D), press on the torpedo fire keys (depending on which way you're heading this could be the FWD or AFT torpedo key **T** or **Y**). Once you're closer you can fire a deck gun (press **G**) to inflict heavy damage. When the **Target Data Computer** displays "Planes in Range!", use the **F** key to fire your anti-aircraft guns on them (you need not be pointing directly at them to hit them). You can also use your anti-aircraft guns against ships at close range. Remember you only have so many torpedoes and rounds of ammunition (see **Transfer Torpedo** on p. 28)

  Hint: Position yourself in front of the enemy convoy and *Crash Dive* (press **RETURN** or **SPACE BAR** on Apple) to wait for them. Use your *Periscope* and *Sonar* to keep your eye on them as they advance. When the enemy is close enough, destroy as many of them as you can with your torpedoes. After the enemy convoy has scattered, *Surface* (press **RETURN** or **SPACE BAR** on Apple again) and destroy any remaining ships.

  *Refer to APPENDICES for specifics on all **VIEW DISPLAYS, GAUGES, CONTROLS**, and **INDICATORS**.

Mission Simulations

After you have practiced different strategies and tactics in the **Target Practice** mode you can try your hand at actually commanding specific

missions. You might want to start out with **Single Mission** to test the waters and then graduate to **Wartime Command** (multiple missions throughout an entire war) when you feel ready for the responsibility.

A new feature is introduced along with your new responsibilities: if you choose level one or two, you may use the **Navigator** which is accessed by pressing **CTRL-G**. Use this to get to the battle site more quickly. If you choose a higher **Level of Play** you must use the heading keys and **Map View** to navigate, and the **Time Compression Keys** (see page 27) to get to the battle site more quickly.

Single Mission

To play a **Single Mission**, first press **CTRL- N** to select a new game. Type **Y** to end your current game (use the **cursor arrow keys** on Apple and IBM) and type the highlighted keys to make your selections. Choose **S** to play a **Single Mission** and **1, 2, 3,** or **4** for your **Level of Play**. After you make your selections, take the following actions:

- Use the **N** key (**cursor arrow keys** on Apple and IBM) to choose either German or American as your captain's nationality (and the type of sub you will be commanding).

- Use the **Y** key (**cursor arrow keys** on Apple and IBM) to choose the year of your mission.

- Press the ← key (**RETURN** on IBM and **SPACE BAR** on Apple) to start your **Single Mission.**

Next you will receive top secret orders for your single combat mission. They will contain the specifics of that mission, along with the navigational coordinates necessary to reach your objective(s). At any time during the simulation you can refer to these orders by typing **CTRL-M** (**ALT-M** on IBM). Press **RETURN** (**SPACE BAR** on Apple) to begin the game.

*Refer to APPENDICES for specifics on all **VIEW DISPLAYS, GAUGES, CONTROLS**, and **INDICATORS**.

Wartime Command

You can play a full **Wartime Command** and progress mission-by-mission over the entire course of a war until you are either lost in action or the war ends in your theater.

First press **CTRL-N** to select a new game. Type **Y** (use the **cursor arrow keys** on Apple and IBM) to end your current game and type the highlighted keys to make your selections. Choose **W** to play a **Wartime Command** and **1, 2, 3,** or **4** to choose your **Level of Play**. After you make your selections, take the following actions:

- Use the **N** key (**cursor arrow keys** on Apple and IBM) to choose either German or American as your captain's nationality (and the type of sub you will be commanding).

- Enter your captain's name from the keyboard.

- Press the ← key (**RETURN** on IBM and **SPACE BAR** on Apple) to start your Wartime Command.

Your wartime service begins in 1939 if you selected **German** (Germany vs. America/Great Britain, Atlantic Theater). It begins in 1942 if you selected **American** (America vs. Japan, Pacific Theater).

You will next receive top secret orders for your first combat mission. They will contain the specifics of that first mission, along with the Navigational Coordinates necessary to reach your objective(s). You can refer to these orders anytime by typing **CTRL-M** (**ALT-M** on IBM). After you complete your first mission you will receive a **Performance Review** and further orders. And if you successfully complete at least one mission of a **Wartime Command** you will be recorded in the **Hall of Fame**.

*Refer to APPENDICES for specifics on all **VIEW DISPLAYS, GAUGES, CONTROLS** and **INDICATORS**.

General Operations

Navigation

Since the **Navigator** is only available in lower levels of play, it's important that we refresh your memory with regards to navigation.

You can navigate your submarine by using the *View*, *Heading*, and *Speed Gauges*. For long distances, the *Time Compression* mode can be used. Remember to check your *Coordinates* frequently and keep an eye on your position using the *Map Displays*. (See COMMAND CARD and Appendix B for Keyboard Commands.)

A vessel's position on earth can be expressed in terms of two angles called *latitude* and *longitude.* The north and south angle is called *latitude*. The line of 0 latitude is the equator, 90 degrees north latitude is the north pole, and 90 degrees south latitude is the south pole. The lines of *longitude* run from the north pole to the south pole, dividing the earth into a series of "orange slices."

The Atlantic theater of operations is shown below. A German boat could, for example, head out from Wilhelmshaven, 54°N, 8°E. The boat would head west, for the Greenwich Meridian, crossing into hostile waters about the time the longitude changed from E to W. The patrol area would be in the

north Atlantic, all in the western longitudes, after which the sub would head for 0 longitude and home to France or Germany. This boat would see eastern longitudes only as it approached bases in Germany or Italy, and would never see the southern latitudes at all. (See diagram below.)
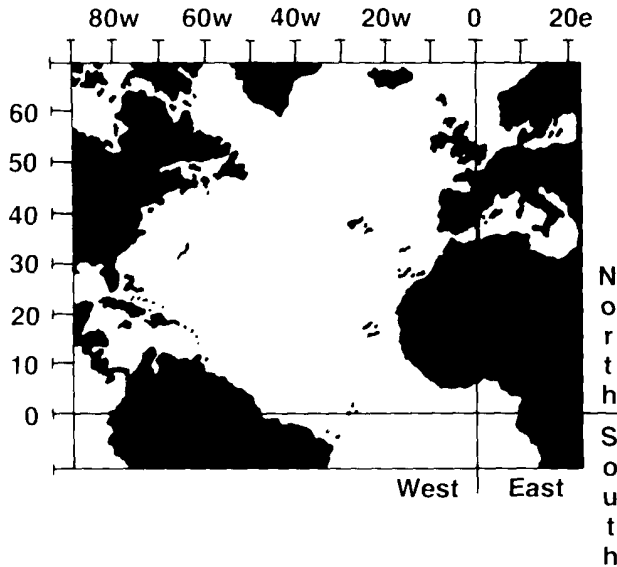
The American, on the other hand, wanders all over both sides of the international dateline and must know which hemisphere he is operating in at all times. For example, the position of Pearl Harbor, in the Hawaiian Islands, is at 21°N, 158°W, as can be seen below. If a sub commander were to make a little navigational error and find himself at 21°N, 158°E, he would find himself about 3000 miles from base and within easy aircraft range of Marcus Island, which for most of the war was occupied by the Japanese. A similar error placing the boat at 21°S, 158°W would leave the sub in the Tokelau Island group, also Japanese held. Either of the latter two positions would be good patrol areas for sinking Japanese shipping, but a disaster to a boat looking for fuel, food and shore leave. (See diagram on next page.)
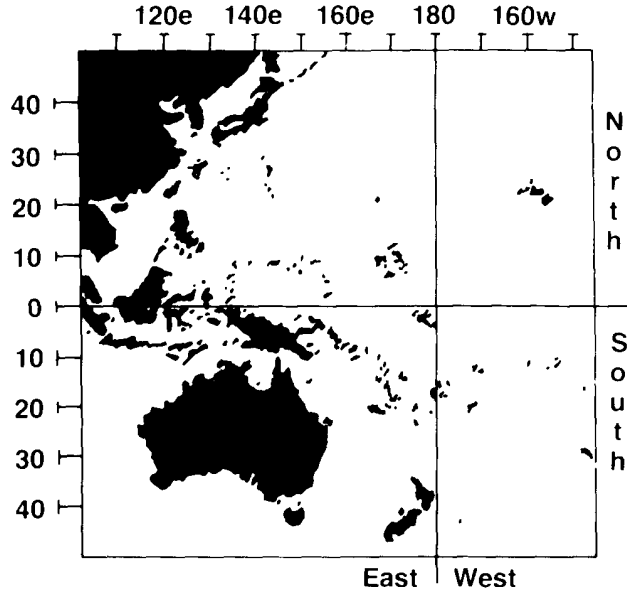
Time Compression

We want you to get as much training in actual battle as possible so we have included a time compression feature so that you can reach the scene of battle more quickly. This allows you to set either a 1 second = 1 second, 1 second = 5 seconds or 1 second = 30 seconds time compression during tactical operations, and a 1 second = 10 minutes or 1 second = 4 hours time compression for sailing to your assigned patrol area (see **Navigator** on page 25) or waiting on station. The 1 second = 10 minutes and 1 second = 4 hours time compressions can be activated only when you are surfaced, and far away from enemy ships or planes. If you run across the enemy your time compression will automatically decrease so that you have time to devise a plan of attack. Press **W** to increase **Time Compression** and **Q** to decrease it.

Saving/Loading A Simulation

Saving a Simulation

You can save your **Single Mission** or **Wartime Command** to another diskette. Press **Ɛ S** (**CTRL-D** for Apple; **ALT-S** for IBM). You must replace

the SUB BATTLE SIMULATOR diskette and replace with a formatted diskette on which to save your current simulation. You will be prompted to type a file name for your simulation.

Note: This feature is not available in **Target Practice** mode.

Loading a Saved Simulation

At any time you can load a previously saved simulation. Press **C L** (**CTRL-D** for Apple; **ALT-L** for IBM).You must replace your SUB BATTLE SIMULATOR diskette with the diskette on which the previously saved game was stored. Your **Single Mission** or **Wartime Command** will resume from the point it was saved.

Quitting

You may quit at any time by pressing **CTRL-Q** (**ALT-Q** for IBM). If you wish to later return to the same **Single Mission** or **Wartime Command**, you must save the simulation before quitting.

Historical Perspective

THE GERMAN U-BOATS

Unlike the Americans, the Germans had conducted a very successful submarine campaign in WWI. In WWII Admiral Doenitz, the supreme commander of the German Navy, intended to strangle England out of existence, and he nearly did. However, German aggressiveness was not sufficient to defeat superior Allied technology. The German high command wouldn't produce enough U-Boats, or develop enough new technology, while the Allies mass-produced merchantmen and escorts utilizing the latest technology. The mighty Type XXI submarine was, "Too little, too late" to stem the onslaught of Allied science and production capabilities. German missions were characterized by short, single object missions against superior enemy forces.

German Operations

Overview: The convoy battles of the Atlantic are characterized by large convoys being attacked by wolfpacks of submarines.

Strategy: The German U-Boat campaign was to cut off supplies to an island nation, England. The materials came from both the West (the Americas) and the South (Americas, Africa, Middle East, and Far East). Finished goods went North (to Russia) and South. Convoys mostly followed standard routes, as there were no islands.

Operations: Because of this the Germans would send their boats out to an area known to be near a shipping lane, and have the boats wait. In the evenings (when it was supposedly safe to surface), the boats would radio back to base in order to report what had happened during the day, and receive any new orders. However, when the boats radioed back to headquarters, Allied direction finders could triangulate their position and alert convoys in the vicinity.

Tactical: U-Boats would surface at night when they could avoid airplanes and look for the convoy that one of their sister boats had been tracking, or a Luftwaffe (German Air Force) search plane had spotted. When the convoy was sighted, the boat would approach the convoy on the surface and attempt to get off of the forward quarter (on either side). This was the most advantageous position to get a shot in at a convoy.

When within several thousand meters, the boat might submerge in order to reduce the possibility of being spotted. Normally, one to three ships would be attacked depending on their size, range, and perceived value.

When the sub was spotted by lookouts, radar, or sonar, diving was the only way out. The best a boat could do was go deep and stay silent, hoping the escorts gave up or ran out of depth charges.

German U-Boat Specifications

Type IID: was actually a European Coastal/Training boat, obsolete at the outbreak of the war. They saw action in the Baltic, Mediterranean, English Channel/North Sea, and Arctic regions.

Built: 50 units of all types (A, B, C, and D).

Size: 459.2' length, 52.5' wide, and 42.6' "tall".

Displacement: Amounted to 300 tons surfaced, 350 tons submerged.

Speed: Surface (diesel) was 13kts, and submerged (electric only) of 7kts.

Range: Reported as 5600nm at 8kts cruise. Submerged radius of 56nm at 4kts.

Misc. measurements: Crash dive of 25–35 seconds.

Weapons: 3 tubes forward, 5 torpedoes carried (total of 8), some 20mm.

Type VIIC: was the most common type of the war.

Built: Around 705 were built.

Size: 220' length, 20.3' beam, and 15.8' draught.

Displacement: of 781 tons surfaced, 871 tons submerged.

Speed: 17kts surfaced, 8kts submerged.

Range: (surfaced) of 5600nm, 18 hours on battery.

Misc. measurements: Crush depth of 590.4'.

Weapons: Consisted of a variety of 20mm and 37mm anti-aircraft guns, possibly a 88mm surface gun. Torpedoes were carried in four forward tubes and one aft. Twelve torpedoes were carried or 14 mines.

Type XXI: could have won the war if the production and design problems were worked out earlier, and resources committed to its exclusive production when it was early enough to make a difference! Introduced late in 1944 these were the accumulation of all lessons learned in the six years of submarine warfare. Streamlined hulls, more batteries, snorkel, and silent electric motors.

Built: Reported as 129 units.

Size: 252.6' long, 21.7' wide, and 20.3' draught.

Displacement: 1650 tons surfaced, 1820 tons submerged.

Speed: 15.5kts surfaced, 17.5kts submerged, 5kts on creep motors.

Range: 15,500nm surfaced, 365nm submerged (silent).

Misc. measurements: Dive depth assumed to be over 984'.

Weapons: Six 21" tubes forward, 2 twin 20mm gun turrets, 23 torpedoes carried, 17 torpedoes and 12 mines could also be carried.

THE AMERICAN SILENT SERVICE

American submarines were active during the entire war. Besides just attacking enemy merchant and naval shipping, American submarines flanked carrier task forces, provided lifeguard functions for pilots, did reconnaissance and provided taxi service to refugees and spies. These submarines were initially thwarted in their effectiveness by the defective Mk 14 torpedo. However, the aggressiveness of American senior fleet officers, prior knowledge of Japanese ship movements, improved torpedoes and the excellent quality of the boats themselves turned the tide in the Pacific. American missions were characterized by relatively long times at sea with more than one patrol area being assigned during the course of a mission.

American Operations

Overview: The character of submarine warfare in the Pacific theater was completely different than in the Atlantic. Here, individual submarines attacked smaller convoys that hugged coastlines, or fast moving naval units. There was a definite gap in the technology available to each side. The Japanese had very few radar sets, ineffective depth charges, but adequate sonar. They considered escort duty to be less honorable than serving on surface fleet units. Thus, the quality of the escort crewmen available was less than the average of the Japanese Navy.

Strategy: Since the U.S. Navy was reading the codes of the Japanese Navy, they almost always had the jump on them. Submarines would surface at night and wait for their coded radio instructions. The boats were concentrated in known shipping lanes, and vectored to their targets by the decoded Japanese transmissions. Generally, boats would spend about a month on station.

Operations: A boat would be given a geographic area to patrol, so they would not be attacked by friendly units. If a specific target would become known to Naval intelligence (from the deciphered Japanese communications) then this target would be assigned to various boats along the path of the target.

Tactical: When a target was spotted by a lookout or radar, the sub would try to get off of the port or starboard beam (just like the Germans), and wait until range was down below 3280′, if possible. In the case of multiple targets, a captain would not normally attack more than three. Since the Gato and Tench classes had rear torpedo tubes, there was a tactic which called for getting inside the convoy's perimeter and setting up four or so targets with both sets of tubes!

When detected, the American boats could go deeper than the Japanese normally set their depth charges to explode. Therefore, a battered American sub would make good its escape after the Japanese thought they had dropped enough depth charges to "do the job."

Other tactics included the "end run" attack, where the submarine commander would position the submarine in the path of the convoy, submerge as soon as they were sighted and wait quietly for them to approach. Timing of the convoy zigzags was critical, since the convoy could do a zig or zag at the last moment and throw off a torpedo shot.

American Sub Specifications

Gato/Tench Class: Was the mainstay of the fleet. These were in service the entire war.

Built: 73 of the Gato, and 31 of the Tench.

Size: 312´ length, 27´ wide, 15´ draught.

Displacement: 1526 tons surfaced, 2424 tons submerged.

Speed: 19.5 to 20.5kts surfaced, 9kts submerged.

Range: 10,000nm to 13,000nm at 14kts.

Misc. measurement: Carried 378 to 464 tons of fuel. Dive depth of 300 to 1000 ft.

Weapons: 6 torpedo tubes forward, 4 aft, with 24 torpedoes carried. Guns ranged from 3"/50 cal in 1941 to 5"/25 in 1944–1945. Also carried various combinations of 50 cal machine guns, 20mm and 40mm cannons.

S-Boats: Combat action was limited to the first year of the war.

Size: 211´ long, 21´ wide, 16´ draught.

Displacement: 854 tons surfaced, 1062 tons submerged.

Speed: 14.5kts surfaced, 11kts submerged.

Range: 5000 miles at 11kts.

Misc. measurements: Dive depth of 200´.

Weapons: Four 21" tubes forward, some had 1 tube aft. Some had a 4" gun, with a random number of machine guns of 50 and 30 cal.

Appendix A
Inside the Game Screen

Note: Screens are representative of the Commodore 64®/128™ version and may vary on other formats.

A Control Panel:
Various Controls and Indicators.

B Crew Speech Display:
Shows Communication from various crew stations.

C Gauges:
Shows View, Heading, Speed, and Depth.

D View Display Window:
(Tower View shown)

D1	Periscope View	D5	Radar Screen
D2	Binocular View	D6	Map Display
D3	Tower View	D7	Side Display
D4	Sonar Screen	D8	Status Readout

Control Panel (A)

Periscope Height

Diesel Engine/Electric Power Mode ——— DIESEL · SCOPE 24 · DIVE ——— Crash Dive/Surface Mode

Battery is being charged ——— CHARGE · AA GUN 82 · FWD T 13 · ——— Forward Torpedo # Remaining

Silent Running Mode ——— SILENT · DK GUN 56 · AFT T 06 · ——— Aft Torpedo # Remaining

Anti-Aircraft Gun and % of ammunition remaining

Deck gun and # of shells remaining
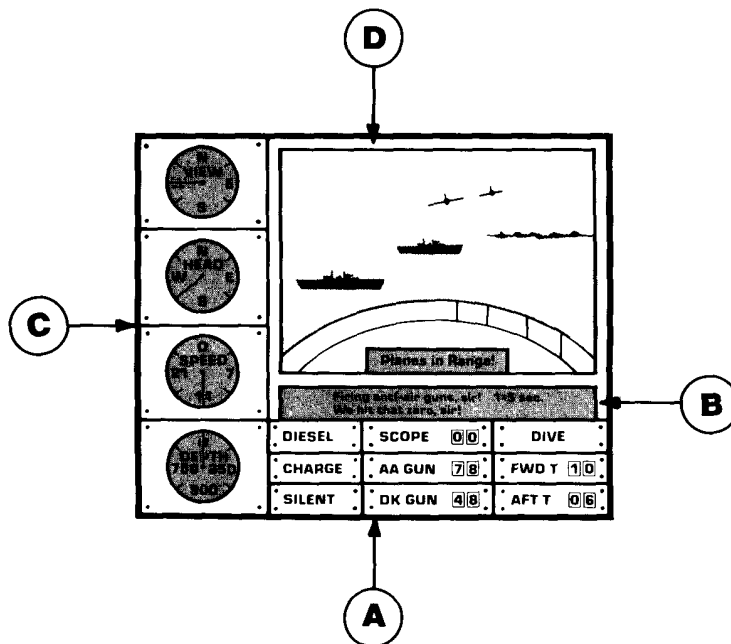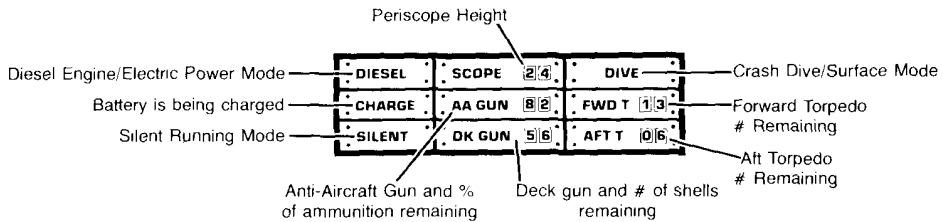
Crew Speech Display (B)

Any communication from a crew station or time compression changes will occur in this display.

Forward torpedo fired, sir! 1 = 5 sec. Tube 3 reloaded, sir!

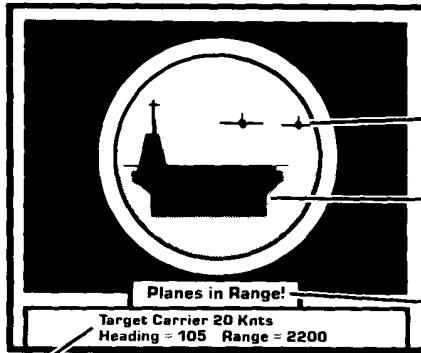## Gauges (C)

(View, Heading, Speed, Depth)

Degrees

VIEW

Control Setting Hand

Degrees

HEAD

Readout expressed in:

Knots

SPEED

Feet

DEPTH

Note: On all gauges there is a control setting hand which is positioned by using the proper Keyboard Commands (refer to Appendix B)
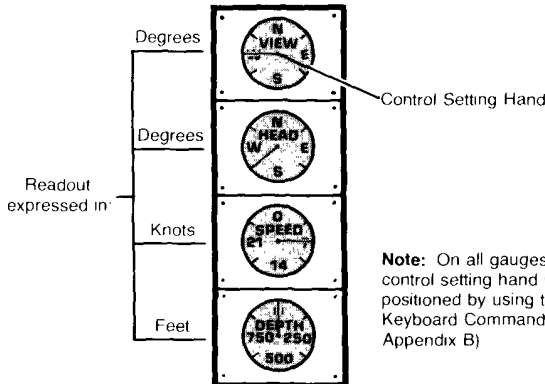
Use the Keyboard F1 or 1

Periscope View (D1)

(Normal or X7 Power)

Japanese Zeros

Center the target in window to engage the **Target Data Computer**

Planes in Range!
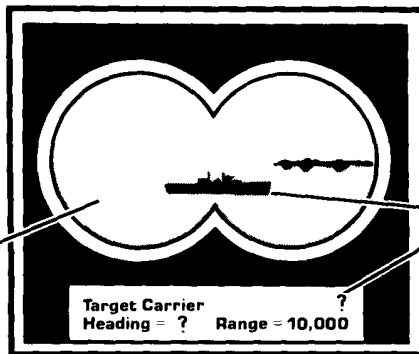
Target Carrier 20 Knts
Heading = 105   Range = 2200

Readout appears only when **Airplanes** are within range of **Anti-Air Guns**

Target Data Computer engaged.

Use the Keyboard F2 or 2

Binocular View (D2)

(X7 Power)

Unidentified enemy ship not yet in range on **Target Data Computer** readout

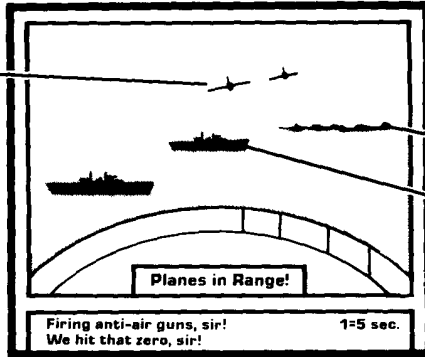Use the ; and : (**H** and **K**) keys to scroll View left or right.

Target Carrier   ?
Heading = ?   Range = 10,000

Tower View (D3)

(Normal)

Use the
Keyboard
F3 or 3

Approaching
enemy airplanes

Coastline

Enemy
target

Planes in Range!

Firing anti-air guns, sir!   1=5 sec.
We hit that zero, sir!

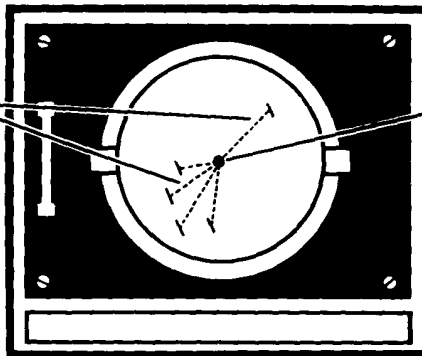## Sonar Screen (D4)

(6 Mile Maximum Range)

Use the
Keyboard
F4 or 4

Sonar tracings

Sub's relative
position

Use the
Keyboard
F5 or 5

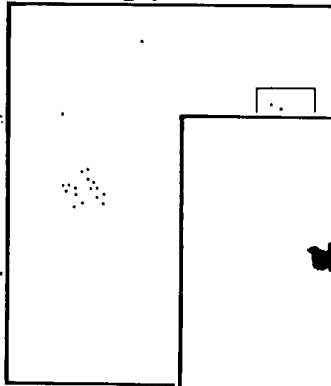Enemy convoy
appears as "blips"
on screen

Sub's relative
position
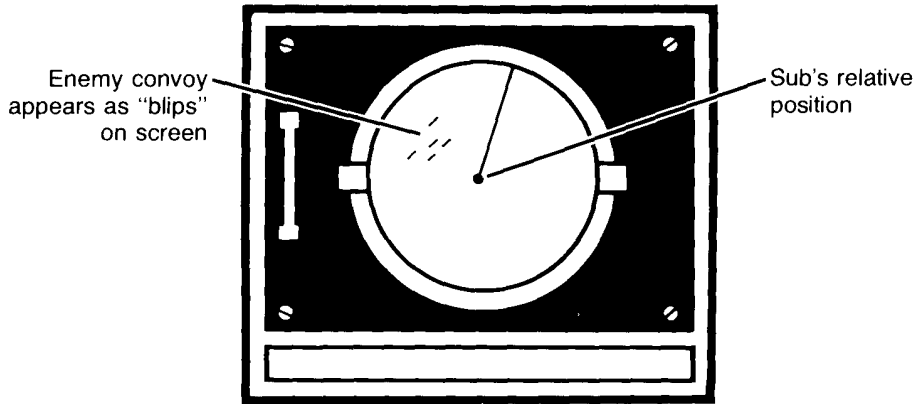
Map Display (D6)

(Zooming in and out)
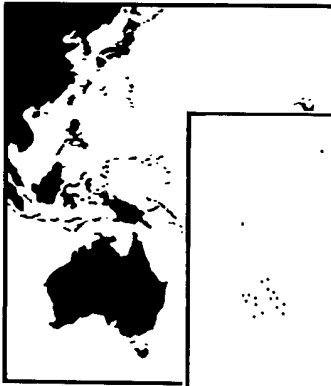
2000 Mile Map
(Full Theater)
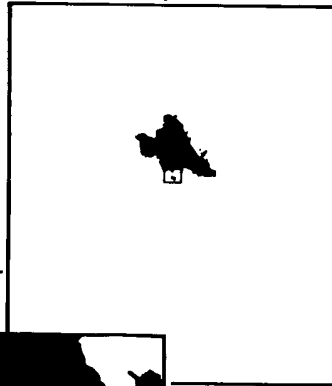
View Maps
Available:
7 mile
35 mile
175 mile
1000 mile
2000 mile

1000 Mile Map
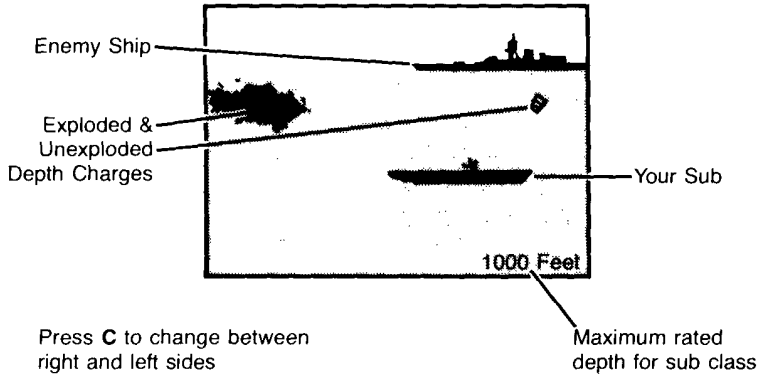(1/4 Theater)
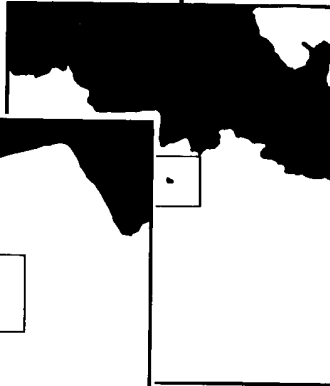
175 Mile Map
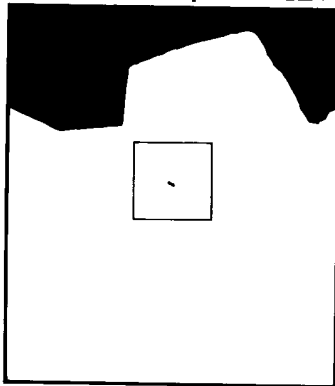
35 Mile Map

7 Mile Map

By pressing the **Map Display** key
(**F6** or **6**) you'll display one of
five available views. Pressing either
the **Zoom In** or **Zoom Out**
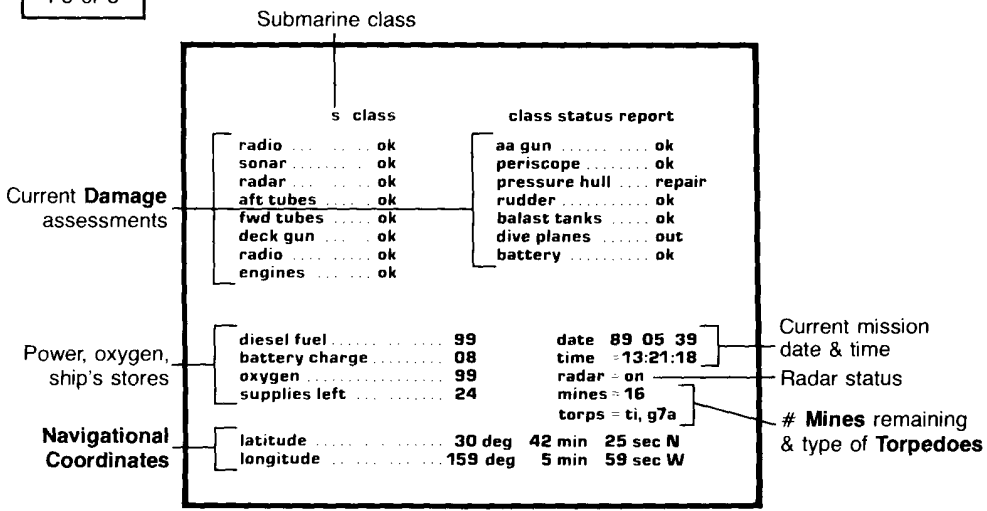key (**Z** or **X**) will display new
view levels.

Use the
Keyboard
F7 or 7

Enemy Ship

Exploded &
Unexploded
Depth Charges

Your Sub

1000 Feet

Press **C** to change between
right and left sides

Maximum rated
depth for sub class

Use the
Keyboard
F8 or 8

Submarine class

```
                 s  class                 class status report
     ┌  radio . . .  . . . ok        ┌  aa gun . . . . . . . . . ok
        sonar . . . . . . . ok          periscope . . . . . . . . ok
        radar . . . . . . . . ok        pressure hull . . . . repair
Current Damage  aft tubes . . . . ok       rudder . . . . . . . . . . ok
assessments     fwd tubes . . . . . ok     balast tanks . . . . ok
        deck gun . . . . ok          dive planes . . . . . . out
        radio . . . . . . ok         battery . . . . . . . . . ok
     └  engines . . . . . . ok

     ┌  diesel fuel . . . . . . . . . . 99      date  89 05 39 ┐
Power, oxygen,   battery charge . . . . . . . . 08    time  =13:21:18 ┘
ship's stores    oxygen . . . . . . . . . . . . . 99    radar = on
     └  supplies left . . . . . . . . 24    mines = 16
                                            torps = ti, g7a ┐
Navigational  ┌  latitude . . . . . . . . . . . . 30 deg  42 min  25 sec N
Coordinates   └  longitude . . . . . . . . . 159 deg  5 min  59 sec W
```

Current Damage
assessments

Power, oxygen,
ship's stores

Navigational
Coordinates

Current mission
date & time
Radar status

Mines remaining
& type of **Torpedoes**

EPYX

Appendix B

Help References

> * The **KEYS** listed are the same for C-64®/128™, Apple II®, and IBM PC®
> and 100% compatible computers **unless otherwise noted**. Function
> (F1–F8) keys refer to Commodore and IBM only.

KEY	HELP ITEM	DESCRIPTION
CTRL-A	Abandon Ship	Enabled only when your sub is in danger of sinking. This option is first presented on the *Crew Speech Display*. When used in conjunction with *Radio Your Position* and *Send SOS*, it will increase the likelihood of your survival.
	Ability of Enemy	Damage inflicting ability of the enemy increases with the *Level of Play*.
	Active Ports	*Home* and *Destination Ports* are shown on the *Map Display* as a small dotted rectangle.
	Airplanes	Shown in your current *Target Book*. Able to drop depth charges in Level 2 and above.
	Ammunition Indicators	A) *Torpedo* indicators give forward and aft torpedo room information regarding the number of torpedoes LOADED in tubes, and the TOTAL number of torpedoes remaining on board (reading from left-to-right). B) the *Anti-Air Gun* indicator shows the percentage of ammunition remaining. C) number of remaining *Mines* is shown in the lower right corner of the *Status Readout*.
F	Anti-Air Gun	Fires *Anti-Air Gun*. Available when "Planes in Range!" is shown in the WINDOW, or when a ship is targeted (planes are shot at first). Ammunition is reduced 1% each time the gun is fired.
F2,2 2 (Apple)	Binocular View	This is a X7 zoom available only on the surface. It is selected by pressing **F2** or **2** (or **V** while using the *Tower View*).

KEY	HELP ITEM	DESCRIPTION
B	**Charge Battery Switch**	Recharges your battery only when the diesel engine is engaged (on the surface).
CTRL-S	**Continue Game**	This "unfreezes" the game action if you have used *Suspend Game*.
? or /	**Coordinate Key**	Displays your current *Navigational Coordinates* on the *Crew Speech Display*.
RETURN SPACE BAR (Apple)	**Crash Dive/ Surface Key**	This is a toggle key. It takes you automatically to a depth of 100 feet or, conversely, to the surface. **NOTE: 0** key will *Trim Depth* (level your sub at your present depth).
	Crew Speech Display	A readout of the most recent information from the crew.
CTRL-M ALT-M (IBM)	**Current Orders**	This displays your current *Mission Assignment*.
	Damage	Damage is first reported on the *Crew Speech Display*. Degree of Damage increases with *Level of Play*. Above Level 1, the degree of damage can be absolute in a single step. *Status Readout* displays all current damage conditions. Damage repair time is slowed while you are in the *Silent Running* mode.
	Days on Station	A term that indicates the number of days patrolling within a specific tolerance (according to your *Level of Play*) of your assigned *Navigational Coordinates*. Completing this task, as ordered, will be reflected on your end-of-mission *Performance Review*. Each day you are on station, confirmation is given on the *Crew Speech Display*.
G	**Deck Gun**	Fires *Deck Gun*. Can only be fired while on surface. Number of shells remaining shown to the right of the *Deck Gun Switch*. Reloading time increases with the *Level of Play*.
	Depth Charges	Released from ships at any *Level of Play* and *Airplanes* above Level 1. Can be observed in the *Side Display* in the WINDOW.

KEY	HELP ITEM	DESCRIPTION
− or + − or = (Apple & IBM)	Depth Gauge	Use these keys to choose desired depth. **NOTE:** The − and + (− and =) keys increase or decrease the depth in 5 foot increments. The shift key when coupled with one of these, allows for 10 foot increments.
	Destination Port	Will be shown in the *Map Display* as a small dotted rectangle. Upon your arrival you will be notified with a dialog box and be given a *Performance Review* and further orders.
	Dud Munitions	*Torpedoes* and *Deck Gun* shells that fail to explode when fired. The number of dud rounds increases with the *Level of Play.*
E	Engine Selector Key	Toggle between diesel engines and electric power. Diesel is only available on the surface, while electric is always available. Electric is automatically engaged when diving or in *Silent Running.* Use of electric power causes a depletion of batteries, which can only be recharged on the surface by engaging diesel engines and typing **B**.
	GAUGES	The gauges show the current settings of the submarine controls. Settings can be changed with *Keyboard Commands*. **NOTE:** Using the shift key with a key command will increase the amount of change.
⌖ F CTRL-F (Apple) ALT-F (IBM)	Hall of Fame	This is a listing of Captains who have completed at least a Single Mission of a Wartime Command, and a summary of their combat achievements.
, or .	Heading Gauge	Use these keys to choose desired heading. **NOTE:** The , and . keys increase or decrease the heading in 1 degree increments. The shift key when coupled with one of these, allows for 5 degree increments.
	INDICATORS	Display specific submarine functions and special game features.

KEY	HELP ITEM	DESCRIPTION
	Level of Play	Controls the level of difficulty in the **Single Mission** or **Wartime Command** modes (refer to *Level of Play* chart).
	Lighting Indicator	The outside border of the screen shows the current surface lighting conditions (dawn/day/dusk/night).
F6,6 6 (Apple)	**Map Display**	Pressing the Map Display key allows one of five zoom levels in the WINDOW (7 mi., 35 mi., 175 mi., 1000 mi., 2000 mi.). Press the **Z** and **X** keys to Zoom In and Zoom Out on the Map Display. In the first three levels – your sub, enemy ships, and aircraft are shown in detail. The last two levels are commonly used to get an overall idea of your location and to rapidly change your position using the 4 hour *Time Compression* mode. In these last two levels your sub is indicated on the map with a blinking "+" symbol, while enemy ships are indicated by a blinking "x" symbol.
J	**Match Heading to View**	Changes your heading to match your current view. **NOTE:** "**Shift-J**" locks in this mode. As you change your view, your heading will automatically follow. This can be disengaged by using a Heading change key (, or .).
U	**Match View to Heading**	Instantly changes your view to match your current heading. **NOTE:** "**Shift-U**" locks in this mode. As you change your heading, your view will automatically follow. This can be disengaged by using a View change key (; or : / **H** or **K**).
M	**Mines**	Mines can only be deployed at a depth of 100 feet or less, using the *Keyboard Command* **M**. This detaches the mine from the sub leaving it moored at the depth you released it, with a delay before arming, based on your speed.

KEY	HELP ITEM	DESCRIPTION
CTRL-M **ALT-M** **(IBM)**	**Mission** **Assignment**	A dialog box will appear with both departure and destination information and your mission objectives. Radio contact from your headquarters may change your *Current Orders*, while you are enroute. At the end of your mission you will receive a *Performance Review*.
? or /	**Navigational** **Coordinates**	References a specific location on the surface of the Earth. Expressed in Degrees, Minutes and Seconds with a compass designation (N, S, E, W).
CTRL-G	**Navigator**	Only available in Levels 1 and 2. This enables you to quickly arrive at any destination once you have entered the *Navigational Coordinates*.
CTRL-N	**New Game**	This enables you to choose either the **Single Mission** mode or **Wartime Command** mode.
	Performance **Review**	Issued upon completion of any mission. This review focuses on how well you followed your *Mission Assignment* and your combat achievements. Success is the only tolerable substitute for not following orders!
9	**Periscope** **Depth**	Automatically brings you to periscope depth, with the periscope 5 feet above the surface (when fully extended).
	Periscope **Height** **Indicator**	Digital readout of the current periscope height above the conning tower.
↑ or ∗ **O or P** **(Apple &** **IBM)** **PgUp or** **PgDn** **(IBM)**	**Periscope** **Height Keys**	Raises or lowers the periscope. In Levels 1 and 2, the periscope is either fully raised or lowered. In Levels 3 and 4, the periscope is raised and lowered in 1 foot increments.
F1,1 **1 (Apple)**	**Periscope** **View**	Available in normal magnification, or X7 zoom by typing **V** on the keyboard.
R	**Radar** **Disengage/** **Engage**	Toggles the radar on and off or releases bubbles on German subs to confuse Allied sonar. The bubbles were generated by the equivalent of large seltzer tablets, but were largely unsuccessful.

KEY	HELP ITEM	DESCRIPTION
F5,5 **5 (Apple)**	**Radar Screen**	Available only when the periscope is above the surface, this tracks surface and air targets, within a 25 mile range.
CTRL-I	**Radio Your Position**	This automatically radios your current *Navigational Coordinates* to your headquarters. When used in conjunction with *Send SOS*, it will increase the likelihood of your survival in the event that you *Abandon Ship*.
	Ramming	*Damage* which results from ramming, increases with the *Level of Play.*
	Running Aground	Severe or absolute *Damage* can result! Disabled in the 4 hour *Time Compression* mode to allow you to travel long distances in a short amount of time.
	Sea State Effects	Enabled only at Levels 3 and 4. This "rocks" the sub at a rate based on the current Sea State.
CTRL-L	**Send Shore Party**	This is only able to be used when you are near a *Shore Party Destination*. Upon your arrival, you will be notified on the *Crew Speech Display.* This command launches a landing craft and small crew.
CTRL-E	**Send SOS**	This should be used whenever you *Abandon Ship.* When used in conjunction with *Radio Your Position,* it will increase the likelihood of your survival.
Cᴲ C **CTRL-C** **(Apple)** **ALT-C** **(IBM)**	**Ship's Log**	This gives a listing of your combat achievements.
	Shore Party Destination	Will be shown on the *Map Display* as a small dotted rectangle.
F7,7 **7 (Apple)**	**Side Display**	Shows the sub and it's relative depth. This can be displayed from the left or right side of the sub by using the *Side Display Toggle.* Best used for observing *Depth Charges* and nearby ship activity while submerged.

KEY	HELP ITEM	DESCRIPTION
C	**Side Display Toggle**	Toggles between left and right sub views.
S	**Silent Running Switch**	Used for evading enemy detection, this will engage electric power if not already engaged. This mode will slow down *Torpedo* reloading and increases *Damage* repair times.
F4,4 **4 (Apple)**	**Sonar Screen**	Tracks surface targets, within a 6 mile range, and is effected by *Weather Effects* and *Sea State Effects.*
Crsr →/ **Crsr ↓** **] or [** **(IBM)**	**Speed Gauge** **→ or ← (Apple)**	The Crsr → and ↓ (] and [) keys increase or decrease the speed in 1 knot increments. The shift key when coupled with one of these, allows for 6 knot increments.
F8,8 **8 (Apple)**	**Status Readout**	This display gives you the damage status of all major areas of your sub. Other sub data, *Sea State Effects, Weather Effects,* your location, and the data and time are also provided.
CTRL-S	**Suspend Game**	This "freezes" game action until you *Continue Game.*
	Target Data Computer (TDC)	When you center the enemy target in the *Periscope View, Binocular View,* or *Tower View* the TDC will give an informational readout, used to make tactical decisions.
@ **Q and W** **(Apple &** **IBM)**	**Time Compression**	This provides a way to speed up the action. You can choose from five available modes: 1 sec., 5 sec., 30 sec., 10 min., and 4 hour. In the 4 hour mode you will be limited to the *Radar Screen*, or, either the 1000 mile or 2000 mile *Map Display* in the WINDOW. In close proximity to the enemy you are limited to the 1 sec., 5 sec., or 30 sec. modes. In the 4 hour *Time Compression* mode, *Running Aground* is disabled.
	Time Compression Indicator	Displays the current *Time Compression* factor.
Q or W	**Time Compression Keys**	Slows down or speeds up *Time Compression.* **Q** slows down and **W** speeds up.

KEY	HELP ITEM	DESCRIPTION
T or Y	**Torpedoes**	**T** fires Forward Torpedo, **Y** fires Aft Torpedo. Torpedoes can only be fired at a depth of 80 feet or less. Using the *Target Data Computer* to 'center' on an enemy target gives you the best chance of a hit. Reloading times are slowed in the *Silent Running* mode and may also be slowed if you have sustained *Damage.* **NOTE:** The shift key used with **T** or **Y** will shoot the torpedo straight in the direction of your *view.*
F3,3 **3 (Apple)**	**Tower View**	This view is from the main conning tower and is only available while on the surface.
CTRL-T	**Transfer Torpedo**	This is the only way to move *Torpedoes* between the forward and aft torpedo rooms while at sea. This action is not instantaneous and can only be done if you have *Torpedoes* available.
0	**Trim Depth**	*Keyboard Command* '**0**' stops a depth change in progress, and levels your sub at your present depth.
I	**View Aft**	This key will change your View to look Aft (180° from forward). This is helpful for keeping an eye on the position of your enemies and launching aft torpedoes.
; or : **H or K** **(Apple &** **IBM)**	**View Gauge**	Use your joystick or Keyboard Commands to scroll your view left or right. **NOTE:** The **;** and **:** (**H** and **K**) keys increase or decrease the view angle in 1 degree increments. The shift key when used with one of these, allows for 5 degree increments.
F1–F8 **1–8** **(Apple)**	**VIEW DISPLAYS**	Visual and informational windows for your sub which appear in the WINDOW.
	Weather Effects	Enabled above Level 1 and increases with the *Level of Play.*
V	**X7 Power Key**	A) functions as a zoom from the *Periscope View,* and B) changes to the *Binocular View* from the *Tower View.*

KEY	HELP ITEM	DESCRIPTION
Z	**Zoom In**	This key inwardly zooms the *Map Display,* in the WINDOW, through a variable range—(from the 2000 mile to the 7 mile displays).
X	**Zoom Out**	This key outwardly zooms the *Map Display,* in the WINDOW, through a variable range—(from the 7 mile to the 2000 mile displays).

Appendix C

Glossary

Terms and Definitions

AFT: The rear portion of a seagoing craft.

ANTI-AIR GUNS: Any gun or cannon primarily used for defense against enemy aircraft. Typical examples were 30 and 50 caliber machine guns and 20mm cannons.

BALLAST TANKS: On a submarine, ballast tanks were used to hold various levels of seawater, causing the submarine to dive or climb in depth. Water was removed from the tanks by using compressed air and/or electric pumps.

BATHYTHERMOGRAPH: An instrument used to identify layers in water temperature as a function of depth.

BOW: The forward portion of a seagoing craft.

CONNING TOWER: A low observation tower on top of the submarine which also served as the primary entrance to the interior of the submarine.

CONTROL ROOM: The control center of the submarine. The Captain, Executive Officer, and engineer were all normally stationed in this part of the submarine. All primary control/detection systems (i.e., periscope, dive controls, steering, radar, sonar, etc.) were controlled from this area of the submarine. Typically located under the conning tower.

CONVOY: A group of ships travelling together.

DECK GUN: The primary surface weapon on a submarine. Typically this gun was a cannon of a 2″ to 4″ bore size.

DEPTH CHARGE: An explosive charge specifically designed to damage submarines. These weapons were dropped or thrown off the side of ships attacking submerged submarines. A typical charge contained 300 lbs. of high explosive and could have its depth set in 10 foot increments.
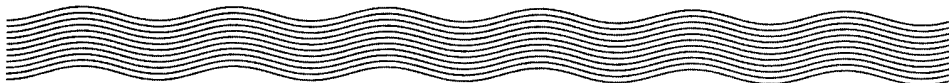
DIVE PLANES: These were moveable "fins" on the side of the submarine which were used to aid diving and climbing while moving in the water. Similar to flaps on aircraft, they would force the front of the submarine up or down while under power.

DUD: Either torpedoes or deck gun rounds could fail to explode on contact. When this happened, it was labeled a "dud" round or "dud" torpedo.

ESCORT: A class of ships designed to escort merchant and other unarmed shipping. Used to screen and defend these ships against submarines and other attacks.

FATHOMETER: An instrument used to determine the depth of water below the keel of the submarine.

KRIEGSMARINE: The German Navy.

LATITUDE: The lines on a map which measure your relative distance from the equator. These lines run left and right on maps oriented with North at the top and South at the bottom.

LONGITUDE: The lines on a map which measure your distance either East or West of Greenwich, England (the prime Meridian). These lines would be vertical on a map oriented with North at the top.

LUFTWAFFE: The German Air Force.

MINE: A stationary explosive designed to retard access to the area it is placed. Mines could either be contact or magnetically fused and were used to either "box in" or "fence out" enemy shipping.

PERISCOPE: An optical instrument that allows a submerged submarine to scan the surface. In 1944 the Night Scope with a built in radar antenna was introduced. The Night Scope made a major difference in night observations.

PRESSURE HULL: The outer part of the submarine which keeps the craft from being crushed by water pressure when submerged.

RADAR: A device used to identify the direction and distance of metal vessels which are out of visual range.

RADAR DETECTORS: A defense device used to detect radar usage by enemies. With prior knowledge, a submarine could dive before an attack could be made.

RAM: The process of striking another craft with your own.

SNORKEL: A device used to intake air while the majority of the submarine is submerged. Only used in a very limited way by the Germans during WWII.

SONAR: There are actually two types of sonar devices. The first is called "passive" sonar, which uses hydrophones to collect sounds, and which are then interpreted by a human operator to determine the distance, speed, and type of ship heard. The second type of sonar is a kind of underwater radar which uses high frequency sound waves and interprets the reflections. In the game these two are combined and treated as a passive type sonar.

SQUADRON: A group of warships assigned to a particular duty.

SUBMARINE: Any warship that can operate underwater.

TDC: An acronym for Target Data Computer, a mechanical device which was used to assist setting torpedo angle off bow direction on a moving target for maximum accuracy.

TIME COMPRESSION RATIO: The ratio that time is compressed for game play. (i.e., "1 second–5 seconds" means that for each real second that passes, 5 seconds have elapsed in the game.)

TORPEDO: A large self-propelled underwater projectile containing explosives. Used against shipping from submarines, destroyers, or patrol boats.

TUBE: The area of the submarine which held torpedoes ready to fire.

U-BOAT: A German submarine. German submarines were individually numbered instead of named, with a preceding "U". (i.e., U43, U89, etc.) A similar practice was used by the United States with the PT boats (i.e., PT-109).

Appendix D
Weapon Information

SHIP WEAPONS:

Note: These are the weapons your enemy ships will be carrying. Ship weapons have a much larger range due to longer barrels and sturdier gun/cannon mounts than similar weapons on submarines.

Type of Weapon	Rate of Fire	Range in Feet
50 cal. machine guns	250–650	4500–7500
20mm cannon	250–475	9000–12,000
40mm cannon	140–220	12,000–27,000
3" cannon or 72mm	15–20	39,000

| 4″ cannon or 88mm | 10–12 | 42,000–54,000 |
| 5″ cannon or 125mm | 10–12 | 39,000–54,000 |

SUB WEAPONS:

Type of Sub	Deck Gun	Anti-Air Guns
Type II–German	Actually none (at Levels 1 and 2 you get an 88mm cannon). Max range: 12,000 ft.	(2) 20mm light cannon. Max range: 4500 ft.
Type VII–German	88mm cannon. Max range: 12,000 ft.	(1–5) 20mm light cannon. Max range: 4500 ft.
Type XXI–German	Actually none (at Levels 1 and 2 you get an 88mm cannon). Max range: 12,000 ft.	(2–4) 20mm light cannon. Max range: 4500 ft.
S-Class–USA	3″ cannon. Max range: 10,000 ft.	(2) 50 cal. machine guns. Max range: 2500 ft.
Gato Class–USA	4 or 5″ cannon. Max range: 14,000 ft.	(2) 20mm + (1) 40mm light cannon. Max range: 4500 ft.
Tench Class–USA	5″ cannon. Max range: 14,000 ft.	(2) 20mm + (1) 40mm light cannon. Max range: 4500 ft.

Small cannons (50 cal, 20mm, and 40mm) were found in the deck and conning tower mounts. They were generally used against aircraft and small boats. Larger guns could do much more damage. The 5″ gun, for example, was capable of hitting 500-750 ton ships so hard that the ships were regularly destroyed by them.

TORPEDO SUMMARY TABLE

German:

Type	Propellant	Yrs in Use	Dud %	Fusing	Range	Speed
T1, G7a	Steam	1939–44	17	Contact	6900 ft.	40 knots
T2, G7e	Electric	1939–44	8	Contact	21,000 ft.	30 knots
T3, G7e	Electric	1943–45	25	Magnetic	21,000 ft.	30 knots
T5, G7a	Steam	1943–45	8	Acoustic	1920 ft.	24 knots

American:

Type	Propellant	Yrs in Use	Dud %	Fusing	Range	Speed
Mk 10	Steam	1941–43	16	Contact	10,800 ft.	36 knots
Mk 14	Steam	1941–43	62	Magnetic	13,800 ft.	46 knots
Mk 14	Steam	1943–45	13	Contact	13,800 ft.	46 knots
Mk 18	Electric	1943–45	6	Contact	12,000 ft.	29 knots

Appendix E

Target Book

Note: Study the descriptions of each ship and airplane in the following pages. The information will help you to recognize and know your enemies. Remember, the more you know about your enemies the better chance you have for survival and victory.

German Enemies:

Battleship   45000 tons   30 kts
no Depth Charges   Has Deck Guns

Carrier   35000 tons   35 kts
no Depth Charges   no Deck Guns

Destroyer   2060 tons   33 kts
Has Depth Charges Has Deck Guns

Escort   1900 tons   21 kts
Has Depth Charges Has Deck Guns

German Enemies (Continued)

Merchantman 6000 tons   14 kts
no Depth Charges   no Deck Guns

Patrol Boat   1170 tons   35 kts
Has Depth Charges Has Deck Guns

Tanker   10000 tons   18 kts
no Depth Charges   no Deck Guns

Transport   8000 tons   24 kts
no Depth Charges   no Deck Guns

Avenger   260 kts
no Depth Charges   Has Bombs

Catalina PBY   240 kts
Has Depth Charges Has Bombs

American Enemies:

Battleship   45000 tons   30 kts
no Depth Charges   Has Deck Guns

Carrier   35000 tons   35 kts
Has Depth Charges no Deck Guns

Destroyer   2200 tons   34 kts
Has Depth Charges Has Deck Guns

Escort   1280 tons   27 kts
Has Depth Charges Has Deck Guns

Merchantman 6000 tons   14 kts
no Depth Charges   no Deck Guns

Patrol Boat   950 tons   33 kts
Has Depth Charges Has Deck Guns

American Enemies (Continued)

Tanker   10000 tons   18 kts
no Depth Charges   no Deck Guns

Transport   10000 tons   24 kts
no Depth Charges   no Deck Guns

Aichi Seaplane   260 kts
Has Depth Charges Has Bombs

Zero   300 kts
no Depth Charges   Has Bombs

LIMITED WARRANTY