

Game Commands

Abort Mission	CTRL+D
Options Menu	CTRL+O
Pause	CTRL+P
Music On/Off	CTRL+M
Music Up or Down	ALT+] or ALT+[
Sound Up or Down	CTRL+] or CTRL+[
Quick Save	ALT+S
Quit to DOS (confirm first)	CTRL+Q or ALT+X
Quit to DOS (don't confirm)	CTRL+ALT+DEL

View Commands

Select/Deselect Target	SPACEBAR
Identify Target	I
View Left	<
View Right	>
Set View to Heading	V
Set Heading to View	H
Raise/Lower Scope (in chart)	ALT+P
Zoom Periscope Mag.	Z
Torpedo Camera	F10
Padlock View	ALT+F2

Additional Commands

Man/Unman AA Gun	A
Man/Unman Deck Gun	D
Check Battery Level	B
Check Fuel Level	F
Check Remaining Oxygen	O
Check Buoyancy Gauges	G
Launch BOLD	CTRL+R
Increase Time Compression	+
Decrease Time Compression	-
Reset Time to 1/1	ENTER
Repeat Last Message	BACKSPACE
Abandon Ship	J

Command Screens

Control Room	F1
Periscope	F2
Binoculars	F3
Bridge	F4
Charts	F5
Torpedoes	F6
Damage Report	F7
Radio Room	F8
Captain's Log	F9

Maneuvering

Dive Planes Up	↑
Left Rudder	←
Straight and Level	Keypad 5
Right Rudder	→
Dive Planes Down	↓
Engine Speed	1...6
Crash Dive	C
Periscope Depth	P
Surface Boat	S

Torpedo Firing

Open IDC	T
Fire Tube	CTRL+1...CTRL+6
Stopwatch	W

Courtesy United States Naval Institute

Voice Tube

Note: Some selections have quick key equivalents.

Chief Engineer

- Periscope Depth [P]
- Crash Dive [C]
- Blow All Tanks
- Surface [S]
- Damage Report
- Oxygen Remaining [O]
- Deploy/Stow Snorkel

All Stations

- Abandon Ship

Engine Room

- Battery Level [B]
- Fuel Level [F]

Sound Room

- Report Contacts
- Depth Under Keel
- Record Player

Radio Room

Torpedo Room

- Report
- Launch BOLD [CTRL]+[R]

Watch Officer

- Man/Unman AA Gun [A]
- Man/Unman Deck Gun [D]
- Report Contacts
- Identify Target [I]
- Rig for Silent Running

Radio Messages

- Status Report
- Request Orders
- Contact Report
- Battle Results
- *SOS*
- Request Escort

Courtesy United States Naval Institute

Speech Recognition Commands

(Press the M key or microphone icon before speaking)

Submerged Operations

ALARM!
DIVE! DIVE!
STRAIGHT AND LEVEL
MAKE DEPTH [X X X] METERS
COME TO PERISCOPE DEPTH
UP PERISCOPE
DOWN PERISCOPE
RIG FOR SILENT RUNNING
SECURE FROM SILENT RUNNING
DEPLOY SNORKEL
STOW SNORKEL
BLOW ALL TANKS
COME TO SURFACE

Maneuvering

ALL AHEAD [ONE THIRD/TWO THIRDS/
FULL/ FLANK]
ALL BACK
ALL BACK EMERGENCY
ALL STOP
SET SPEED [X X] KNOTS
[LEFT/ RIGHT] STANDARD RUDDER
[LEFT/ RIGHT] FULL RUDDER
RUDDER AMIDSHIPS
NEW COURSE [X X X] DEGREES

Operate Weapons and Other Gear

T-D-C
MARK TARGET
IDENTIFY TARGET
FIRE [X]
MAN [DECK/ A-A] GUN
SECURE [DECK/ A-A] GUN

Courtesy United States Naval Institute

Status Reports

REPORT CONTACTS
REPORT WATER IN BILGE
REPORT COMPRESSED AIR
REPORT OXYGEN REMAINING
REPORT BATTERY LEVEL
REPORT FUEL LEVEL
REPORT COURSE
REPORT DAMAGE
REPORT DEPTH
REPORT SPEED
REPORT DEPTH UNDER KEEL
CLEAR

Change Locations

BRIDGE
BINOCULARS
CHART ROOM
TORPEDO ROOM
RADIO ROOM
CONTROL ROOM

See the README file for any additional speech commands.

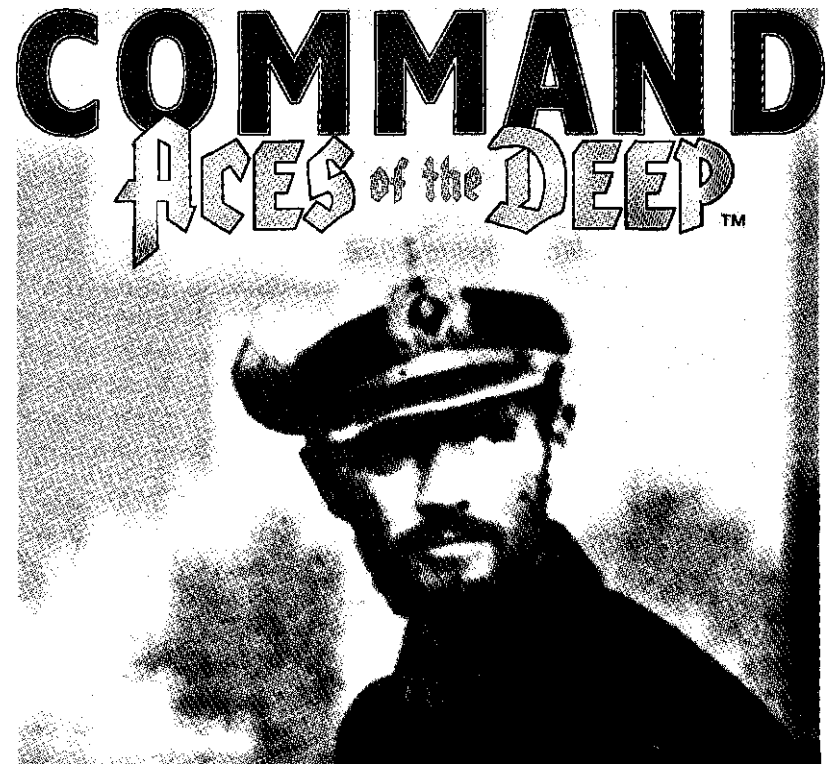
Courtesy United States Naval Institute

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Contents

Introduction.....	2
About This Manual.....	3
Installing and Starting the Game.....	4
Speech Recognition Commands (Windows 95 only).....	6
Operating the Deck Gun Manually.....	10
Troubleshooting.....	11
Customer Service.....	19
Technical Support.....	21



SIERRA

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Introduction

Welcome to *Command: Aces of the Deep*. This latest version of the renowned *Aces of the Deep* U-boat simulation combines the updated CD version and its on-line manual with the full Expansion Disk (including its Mediterranean and Type XXI gameplay). Most importantly, this version brings you all new high-resolution SVGA graphics, exciting new deck gun action, and, for Windows 95 users, breakthrough speech recognition technology from IBM. Now you can speak your combat commands, and experience a whole new level of gaming immersion and intensity.



About This Manual

Your game packet includes three manuals. Here's where to go for what:

This *Command:Aces of the Deep* booklet tells you how to install and configure your game for both Windows 95 and Windows 3.1. It also shows you how to use the new speech recognition (Windows 95 only) and deck gun features.

The *Aces of the Deep* manual launches you with a detailed Tutorial. Its "Ashore" section describes how to navigate the game menus and the sophisticated on-line manual, and its "At Sea" section details the many game commands you'll use to command your U-boat in action.

The *Aces of the Deep Expansion Disk* manual describes additional features: Mediterranean missions, the Type XXI U-boats, and using the Type XXI's sonar and radar.

NOTE: For Installation, Troubleshooting, or Customer Service information, refer to this *Command:AOD* booklet only. Some of this information in the other manuals is now outdated.

For additional install, troubleshooting, or gameplay updates, refer to the README file in the Sierra Program Group or folder.

Installing and Starting the Game

Installing for Windows 95

1. Start Windows 95.
2. Insert the *Command* CD into the CD-ROM drive.
3. When the *Command* install screen appears, follow the on-screen instructions.

Starting the Game - Windows 95

1. Start Windows 95.
2. Insert the *Command* CD into the CD-ROM drive.
3. Click on the Start Game option when it appears.

Installing for Windows 3.1

1. Start Windows 3.1.
2. Insert the *Command* CD into the CD-ROM drive:
3. From the Program Manager FILE menu, select RUN.
4. In the RUN window, type **d:\setup** and press [Enter] (assuming d is your CD-ROM drive name).
5. Follow the on-screen instructions.

Note: *Command* will install the latest Microsoft Win32s and WinG extensions to Windows 3.1, if you don't have them already. They improve your Windows processing and graphics performance.

Starting Game - Windows 3.1

1. Start Windows 3.1.
2. Insert the *Command* CD into the CD-ROM drive.
3. Open the Sierra Program Group.
4. Double-click on the *Command* icon to start the game.

Additional Windows Setup

During installation, TEST SYSTEM checks to make sure your computer can run the game correctly. If you have trouble starting *Command* after installing it in Windows 3.1, check the Troubleshooting section on page 11. Additional game information may be presented in the *Command* README file.

After game installation, the Setup & Uninstall program in the Sierra Program Group lets you re-install the game, re-test your computer, uninstall the game, register, or view detailed Support and Troubleshooting information. To start it, just double-click on the Setup & Uninstall icon.

Speech Recognition

Commands (Windows 95 only)

In *Command: Aces of the Deep* for Windows 95, most of the U-boat operations you normally would control using the keyboard or mouse can now also be performed using your voice. Connect a microphone to your sound card and calibrate it, select "Speech Recognition On" from the Options Menu while at sea, and you are ready to go.

Note: Microphone not included.

Please consult on-line manual for a list of recommended microphones.

Calibrating Your Microphone

1. Plug the microphone into your PC's sound card following manufacturer's directions.
2. Start *Command:AOD*. From the File Menu, select "Set Microphone Threshold."
3. Follow the on-screen instructions. Note: Try to calibrate under external noise conditions similar to those you expect to encounter when playing the game. You may need to recalibrate from time to time, particularly if ambient noise conditions near your computer change.

Using Speech Recognition

Once your mike is calibrated, start *Command:AOD* and enable the feature. Just select "Speech Recognition On" from the Options Menu while at sea (press [Ctrl]+[O] or select Options from the Menu Bar).

The speech recognition software employed in *Command:AOD* (IBM's VoiceType) already recognizes the voice commands listed on the following pages. It does not have to be "trained."

Before speaking, press the Microphone icon or the [M] key. Speak the commands naturally, with the microphone about one inch from your lips.

Voice Commands

Once enabled, the speech recognition feature can use the following commands. X indicates a variable where you substitute a numerical value (for meters, knots, degrees etc.) When speaking numbers, use only the numbers 0-9, pronouncing 0 as zero. For example pronounce "Make Depth 150 Meters" as "Make Depth One Five Zero Meters," and so forth. You need not speak leading zeroes: eg., say "Nine Degrees," not "Zero Zero Nine Degrees."

Submerged Operations

ALARM! (Crash Dive)

DIVE! DIVE! (Commence dive)

STRAIGHT AND LEVEL (Level off at current depth)

MAKE DEPTH [X X X] METERS (Bring the boat to ordered depth)

COME TO PERISCOPE DEPTH (Bring the boat to appropriate depth)

UP PERISCOPE (Raise the Scope and go to it)

DOWN PERISCOPE (Lower the Scope, go to Control Room)

RIG FOR SILENT RUNNING (Slow to silent speed, secure loose gear, etc.)

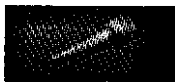
SECURE FROM SILENT RUNNING (Resume speed preceding Silent Running)

DEPLOY SNORKEL (If your boat has one. Go to snorkel depth, deploy snorkel, switch to diesels)

STOW SNORKEL (Stow snorkel, switch to electric motors if underwater)

BLOW ALL TANKS (Emergency surface)

COME TO SURFACE (Come to the surface)



Maneuvering

ALL AHEAD [ONE THIRD/ TWO THIRDS/ FULL/ FLANK] (Set engine telegraph to given value)

ALL BACK (Put engines in low-speed reverse)

ALL BACK EMERGENCY (Put engines in full-speed reverse)

ALL STOP (Stop engines)

SET SPEED [X X] KNOTS (Come to ordered speed)

[LEFT/ RIGHT] STANDARD RUDDER (Normal turn left or right)

[LEFT/ RIGHT] FULL RUDDER (Turn hard to left or right)

RUDDER AMIDSHIPS (Center the rudder—stop turning)

NEW COURSE [X X X] DEGREES (Bring the boat to ordered course)

Operate Weapons and Other Gear

T-D-C (Brings up Torpedo Data Computer)

IDENTIFY TARGET (Describe target)

MARK TARGET (Select current target)

FIRE [X] (Fire given torpedo tube)

MAN [DECK/ A-A] GUN (Prepare gun)

SECURE [DECK/ A-A] GUN (Remove crews from ordered guns)

Status Reports

REPORT CONTACTS (Have Sound Operator report hydrophone contacts)

REPORT WATER IN BILGE (Brings up gauge for water in the boat)

REPORT COMPRESSED AIR (Brings up Compressed Air gauge)

REPORT OXYGEN REMAINING (Oxygen gauge)

REPORT BATTERY LEVEL (Battery Level gauge)

REPORT FUEL LEVEL (Diesel Fuel gauge)

REPORT COURSE (Brings up Compass)

REPORT DAMAGE (Go to Damage Report)

REPORT DEPTH (Depth gauge)

REPORT SPEED (Brings up Engine Telegraph and Speed gauge)

REPORT DEPTH UNDER KEEL (Gives water depth at current location)

CLEAR (Remove current pop-up gauge from display)

Change Locations

BRIDGE (Go to the Bridge Screen)

BINOCULARS (Use Binoculars)

CHART ROOM (Go to charts)

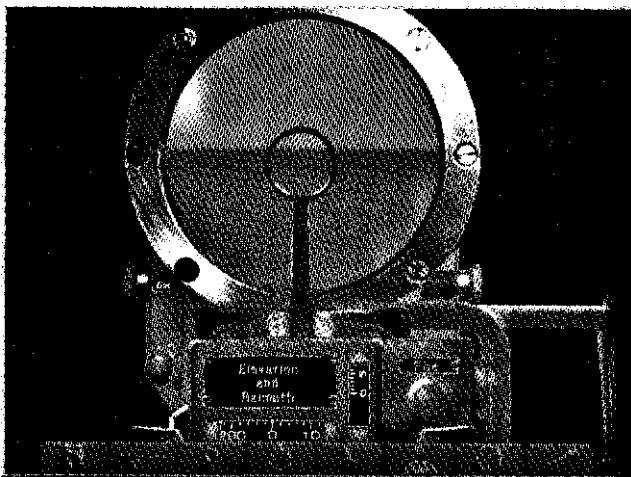
TORPEDO ROOM (Go to Torpedo Management Screen)

RADIO ROOM (Go to Radio Room)

CONTROL ROOM (Go to Control Room)

Operating the Deck Gun Manually

You may let your crew aim and fire the deck gun automatically (the default setting), or operate it manually yourself. To operate the deck gun yourself, first select "Fire Deck Gun Manually" from the Options Menu. When you select "Man Deck Gun" from the Voice Tube Menu, via hot key [D], or by voice command, you then open the Deck Gun screen—looking through the sights of the deck gun.



Simply aim the gun at the vessel you wish to attack and fire. (You do not need to "select" a target.) Click on the horizontal dial to change the gun azimuth (direction), and the vertical dial to change its elevation (barrel angle, and hence range). Hold the mouse button down to move the gun rapidly in the indicated direction.

To fire the gun, click on the bright red Fire button to the right. When the button is dark, the gun cannot be fired. (It will be dark if the gun is being reloaded, or is seriously damaged.) Correct your aim by watch-

ing for splashes or explosions. If you see neither of these after a shot, you are probably aiming high, and the splash of your falling shot is behind the target.

To change the view magnification, click on the magnification control on the left.

To go back to automatic deck gun command, return to the Options Menu and deselect the "Man Deck Gun" option.

Troubleshooting

Problems you may have running the game are likely addressed in this section, in the on-line manual, or in the *Command:AOD* README file (in the Sierra Program Group/Folder or on the CD). You can also check the Sierra BBS or your on-line provider for post-release information.

Problem: I have installed *Command* on a compressed drive, and it does not run.

Possible solution: *Command* may need more disk space. Compression software expects to compress files by a ratio of 2 to 1 or more. However, many *Command* files will not compress much. This means you may need to free up to twice as much space as the compression software estimates.

Problem: When attempting to launch *Command* in Windows 3.1, I keep getting an "Out of Memory" error message.

Possible solution: Try closing all other programs or screen savers before launching *Command*. If that doesn't do it, try making a Boot Disk. The Boot Disk Maker in the Sierra Program Group or Folder will create an boot disk optimized to run *Command*.

Simply double-click on the Boot Disk Maker icon, and follow the on-screen instructions. NOTE - you will need a blank disk for your A: drive to create a boot disk.

Problem: My computer has at least 8 megabytes of memory, but even after creating a boot disk, I still receive a message saying that I do not have enough memory to run the game.

Possible Solution: Your boot disk may require further modifications to load your device drivers correctly into upper memory. See the "Customizing the Boot Disk" section, or consult your computer system manual or manufacturer for assistance.

Problem: I have a SCSI drive and *Command* does not work properly.

Possible Solution: There are incompatibilities between SMARTDRV.SYS and certain SCSI drives. Do not use SMARTDRV.SYS for *Command* if you have a SCSI drive. You may also need to load your ASPI drivers. For more information on specific drivers, please consult your SCSI controller documentation or hardware documentation.

Error Messages

General Protection Fault: Try updating both your Windows Video Driver and your Windows Sound Card drivers. Contact your video card and sound card manufacturer for more information.

Not Enough Memory to Run This Application: Try closing all other programs or screen savers before launching *Command*. If that doesn't do it, try making a Boot Disk.

Configuring Windows 3.1 Memory

Even if you have the minimum 8MB of RAM, *Command: Aces of the Deep* may not run correctly unless the RAM is configured (set up) correctly for the game. If *Command* DOES NOT start correctly, pull down the Help menu from Program Manager, and select the About Program Manager option. If Program Manager indicates you are low on memory (80% or below), try closing all other applications and screen savers before starting the game. If that doesn't work, try creating a boot disk.

Freeing up Memory

1. If you cannot run *Command* in Windows 3.1 because of low memory, try making a Boot Disk, as described below. A boot disk is a fast and effective way of freeing more memory to run the game.
2. If you continue to have problems even with a boot disk, try customizing the boot disk's AUTOEXEC.BAT and CONFIG.SYS start-up files. See "Customizing the Boot Disk," below, for details.
3. Consult your DOS and memory manager software documentation for detailed information about system memory and how to optimize it.

Making a Windows 3.1 Boot Disk

A boot disk is the simplest way to configure your computer's memory for running *Command*. The Boot Disk Maker in the Sierra program group makes creating a boot disk easy. Once you have a boot disk, you just put the boot disk in your floppy drive and restart the computer to configure its memory correctly.

Although the Boot Disk Maker does a very good job of configuring most systems, it may not be able to properly recognize every possible sound card, mouse,

or disk-controlling device driver. This means that you might have to make additional changes to the boot disk to get the program running. If you are having trouble starting the game, try making a Boot Disk—it can't hurt. If it does not work, however, proceed to the "Customizing the Boot Disk" section, below.

You can use the Boot Disk Maker program to format and create a *Command* boot disk for your computer's A: drive. Before you start, have a blank or formattable floppy disk for your A: drive ready. (Any files on it will be erased.)

1. From Windows, double-click on the SIERRA program group.
2. Double-click on the "Boot Disk Maker" icon in the Sierra program group.
3. The Boot Disk Maker will guide you through the process—follow the on-screen prompts carefully all the way through. Insert the blank diskette into your A: drive when prompted. The Boot Disk Maker will use DOS commands to format the floppy disk and write all the necessary start-up files to it.

Using a Boot Disk

The Windows boot disk you have created contains a stripped-down version of your usual start-up files. You must start (or restart) your computer with the boot disk in the A: drive for it to work. (Note: a boot disk will work only in the A: drive).

1. Place the boot disk in the A: drive and start the computer. (If your computer is already running, exit Windows and restart the system with your PC's Reset button, or use [Ctrl]+[Alt]+[Del] from the keyboard.)
2. The computer will start up using the boot disk's memory configuration. If necessary, start Windows by typing WIN at the DOS prompt (assuming

the boot disk has not started Windows for you.) Double-click on the Sierra Program Group, then double-click on the *Command: Aces of the Deep* icon.

Customizing Your Windows 3.1 Boot Disk

To customize a boot disk for your specific system, you can edit the CONFIG.SYS and AUTOEXEC.BAT start-up files on a boot disk created by the Boot Disk Maker, or create a new Boot Disk from scratch. CONFIG.SYS and AUTOEXEC.BAT are simple text files that you can edit using your MS-DOS EDIT utility, the Windows Notepad, or your preferred word processor in its text-only mode. On your hard drive, these files tell your computer how to arrange its memory for normal operation. On the boot disk, these files tell your computer how to arrange its memory specifically for running *Command*.

Warning: Manually altering the CONFIG.SYS and AUTOEXEC.BAT start-up files can be a trial and error process. When opening a file to edit, triple-check to MAKE SURE you are working with the files on your boot disk in the A: drive. Otherwise, you may change the CONFIG.SYS and AUTOEXEC.BAT files on your hard drive instead, which in turn may impair the normal operation of your system.

(If you prefer to create a boot disk from scratch, you will need a freshly formatted system diskette for your A: drive. (See your MS-DOS manual for details on how to create a system diskette. You can then create a new CONFIG.SYS and AUTOEXEC.BAT from scratch right on the boot disk.)

Compare the CONFIG.SYS and AUTOEXEC.BAT files on your boot disk to the following examples. Differences may indicate places where you can remove a driver, load it into upper memory, or change a device switch to use less memory. As always, refer to

your system reference manuals if unsure about anything.

These examples show a "minimum configuration" that will let you run *Command* on most PCs. The lines in your start-up files will differ according to your system's drivers and directory names, and the version of MS-DOS you use. (NOTE: Parentheses indicate comments that are NOT part of the file.)

Sample Boot Disk CONFIG.SYS File

```
DEVICE=C:\DOS\HIMEM.SYS
```

```
DEVICE=C:\DOS\EMM386.EXE NOEMS
```

(You may use a different memory manager)

```
DOS=HIGH,UMB
```

(Loads DOS into Upper Memory)

```
FILES=30
```

```
BUFFERS=20
```

```
BREAK=ON
```

```
LASTDRIVE=Z
```

```
DEVICEHIGH=C:\DOS\DBLSPACE.SYS /MOVE
```

(Only if using DBLSPACE. See "Disk Compression Drivers," below.)

```
DEVICEHIGH=C:\DRV\CDROM.SYS/D:MSCD001/P:220
```

(See "CD-ROM" Drivers, below.)

Sample Boot Disk AUTOEXEC.BAT file

```
@ECHO OFF
```

```
PROMPT Command Boot Disk $P$G
```

(Added by Boot Disk Maker)

```
PATH=C:\WINDOWS
```

```
SETCOMSPEC=C:\COMMAND.COM
```

(Will use your actual COMMAND.COM location)

```
C:\DOS\MSCDEX /D:MSCD001
```

C: (Changes to hard drive.)

WIN (Starts Windows 3.1)

CD-ROM Drivers

To run *Command: Aces of the Deep* from the CD, you'll need to include a CD-ROM line in both the CONFIG.SYS and the AUTOEXEC.BAT files of the boot disk. Refer to your CD-ROM manual for your specific details.

The Boot Disk AUTOEXEC.BAT file needs an MSCDEX line. Depending on your CD-ROM type, it should look much like one of the following:

```
C:\DOS\MSCDEX /D:MSCD001
```

```
LH C:\DOS\MSCDEX /D:MSCD001
```

```
LOADHIGH /L14429 C:\DOS\MSCDEX /D:MSCD001
```

The Boot Disk CONFIG.SYS file needs a CD device driver line. Depending on your CD-ROM type, it should look much like one of the following:

```
DEVICE=C:\DRV\CDROMDRV.SYS /D:MSCD001 /P:220
```

```
DEVICEHIGH /L14652 =C:\DRV\CDROMDRV.SYS /D:MSCD001 /P:220
```

```
DEVICEHIGH=C:\DRV\CDROMDRV.SYS /D:MSCD001 /P:220
```

We recommend that you use the latest version of MSCDEX.EXE to insure the best CD access. As of this writing, the current version of MSCDEX is 2.23.

Note: If you have a SCSI CD-ROM drive, you may need to manually load the ASPI drivers in the CONFIG.SYS file before the computer will recognize your CD-ROM drive. Consult your hardware documentation.

Disk Compression Drivers

If you use disk compression on your hard disk, you must include the correct disk compression driver statement on your boot disk, or your mouse or other drivers may not load correctly. The example CONFIG.SYS shows the correct statement if you are using the MS-DOS DBLSPACE utility.

If you are using Stacker 3.1 or later, use the following line instead:

```
DEVICEHIGH=C:\STACKER\STACHIGH.SYS
```

For other utilities, refer to your manual or contact the manufacturer for complete instructions.

Additional Boot Disk Instructions

If you have a modem, you can download additional boot disk instructions from the Sierra Bulletin Board Service, or BBS. The file to download is BDALL.EXE or BDALL.ZIP (BDALL.ZIP is compressed—you will need the PKUNZIP shareware utility to open it). After downloading this file, select the instructions that will best match your system and program needs. In the U.S., the BBS number is 206-644-0112; in the U.K., the BBS number is (44) 734 304227.

Customer Service

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Sierra On-Line guarantees your satisfaction with any question or problem concerning our games. Contact the following customer service centers for direct sales and general game information. In the U.K. and Europe, use these contacts for replacement CDs and Technical Support as well.

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(For U.S. technical support, see page 21.)

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Contents

Getting Started

<i>Using This Manual</i>	5
<i>System Requirements</i>	6
<i>Installing Aces of the Deep</i>	8
<i>Changing Sound Settings</i>	9
<i>Running Aces of the Deep</i>	9
<i>Controls</i>	9

Game Play

<i>Tutorial</i>	10
<i>Ashore</i>	18
<i>Single Mission</i>	20
<i>Realism Settings</i>	25
<i>Career Options</i>	29
<i>At Sea</i>	40
<i>Command Screens</i>	41
<i>Buttons</i>	58

Appendices

<i>A. Troubleshooting</i>	71
<i>B. Configuring Memory</i>	73
<i>C. Customer Services</i>	81
<i>D. Selected Bibliography</i>	86
<i>E. Glossary</i>	90
<i>F. Credits</i>	92
<i>G. Index</i>	94

Captain Johann
Mohr, skipper of
U-124, returns
from patrol.



Getting Started



Using This Manual

This manual helps you get the most out of *Aces of the Deep CD* quickly:

Getting Started shows you how to install and start the game.

Game Play provides a Tutorial mission, and a complete reference for the game's set-up menus, simulation controls, and on-line documentation.

The **Appendices** offer troubleshooting, memory configuration, and customer service information.

The **On-Line Manual**, available by clicking ON-LINE MANUAL from the Main Menu, provides the **Historical Overview, U-boat Tour, Maps, and Video Library**.

Changes to the Manual

Any changes made to *Aces of the Deep CD* after the manual was printed will be outlined in the README file. To view the file, simply change to the drive and directory where the game is installed, type **readme**, and press [ENTER].

Notes on the CD Version

The CD version includes the full Crew Speech Pack, on-line documentation not available in the DOS version, as well as historical films and video footage of interviews with former U-boat commanders and crew.

You have three installation options with the *Aces of the Deep CD* version: Minimum Install, which takes about 200 KB hard disk space. Medium Install (about 4 MB), and Full Install (about 11 MB). Selecting the Full

Install puts all simulation files on your hard disk to provide the best possible game performance.

Also included on the CD version is a sampler containing demos of the newest games from Sierra and Dynamix. Run these to see the best of what's new or coming soon to a software dealer near you! To see the product demos, change to the \DEMO directory on the *Aces of the Deep* CD, type **demo** [ENTER], and follow the on-screen instructions. Note: You need Windows 3.1 to run these.

You will also find the ImagiNation Network (INN) sample installation on the CD. The INN is the premier interactive on-line entertainment service. If you have a modem, you can connect to the INN and play games with all sorts of people from all over the country (usually at local phone rates). This sampler lets you access the network and offers a limited membership. To install, change to the *Aces of the Deep* CD, type **fun** or **inn** [ENTER], and follow the on-screen instructions.

System Requirements

Minimum

To run *Aces of the Deep*, you will need the following minimum software and hardware:

- IBM® PC® compatible computer with an 80386 DX33 or better processor, and at least 4 megabytes (MB) of random access memory (RAM).
- Microsoft® MS-DOS® version 5.0 or above.
- Memory manager (EMM386 [included with MS-DOS 5.0 and above], QEMM-386™, or equivalent).
- Hard disk. The amount of hard disk space required for *Aces of the Deep CD* depends on the installation option you choose: Minimum (about 200 KB), Medium (about 4 MB), or Full Install (about 11 MB). If your system uses some type of disk compression

utility, such as Stacker™, you will need approximately double the indicated hard drive space (since the game files will not compress as much as your compression software will estimate).

- SVGA graphics card or VESA driver and color monitor for the on-line manual.
- Microsoft compatible mouse.
- MPC-1 (or better) CD-ROM drive.

Recommended

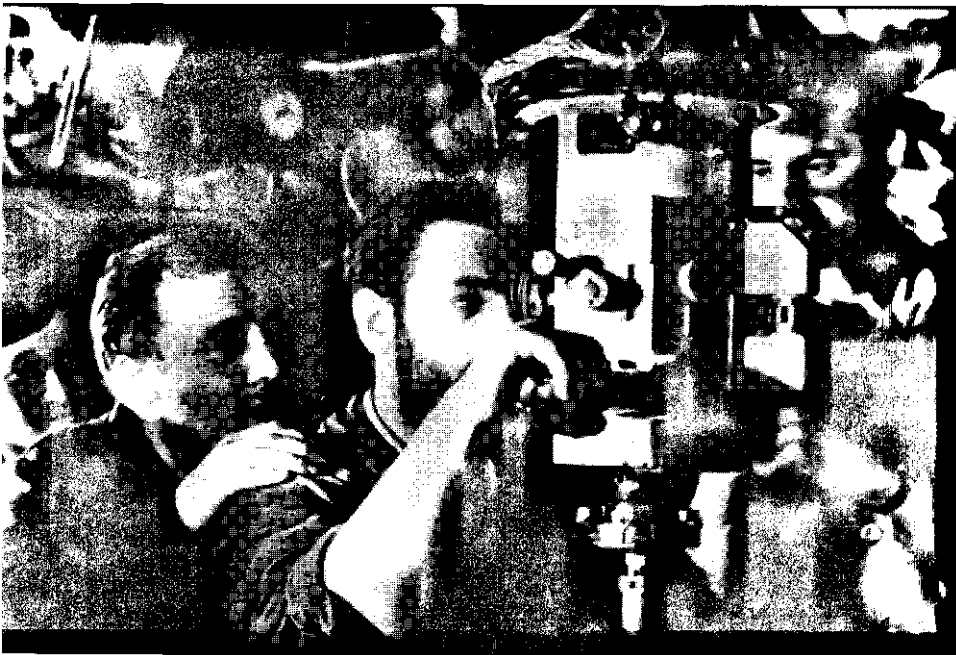
- Sound Blaster™ or 100% compatible sound card.
- SmartDrive disk caching software (included with Microsoft MS-DOS 5.0 and above), if you have more than the minimum 4 MB of RAM.
- 486/33 or better processor.

Memory Requirements

Even if you have the minimum 4MB of RAM, *Aces of the Deep* may not run correctly unless the RAM is configured (set up) correctly for the game. If the game does not start correctly, use the MS-DOS MEM command to check your memory configuration—from MS-DOS, type **mem** and press [ENTER].

You need about 3,320 kilobytes (KB) of free memory to run *Aces of the Deep*. MS-DOS 6.0 or later shows this as "Total Free Memory." If you have MS-DOS 5.0, add "Largest executable program size" (free conventional memory), "bytes free EMS" (free expanded memory), and "bytes available XMS" (free extended memory). Together, they must add up to 3,400,000 bytes (3,320 KB) total free memory. If you do not have enough free memory, you probably have resident or "background" programs and device drivers taking up memory that the game needs.

The simplest way to set up your system's memory correctly is to use the Install program to create a "boot disk." For more information, please see Appendix B, "Configuring Memory."



Courtesy National Archives

In this famous image, the captain of a Type VII checks the periscope view while the control room crew looks on. This photo was widely distributed in Germany and was even placed on a postage stamp.

Installing Aces of the Deep

The *Aces of the Deep* Install software automatically optimizes the game settings according to your computer's speed, graphics, sound board, and input devices. You can use Install to specify the game's default location on the hard drive, change preferences, and make a boot disk.

These instructions assume that you are using hard drive C, and CD-ROM drive D:. If not, please substitute as appropriate.

1. After booting (starting) your machine, insert the *Aces of the Deep* CD into the CD-ROM drive.
2. Type the appropriate drive letter (usually D:) and press [ENTER].
3. Type **install** [ENTER].
4. Follow the on-screen instructions.

Changing Sound Settings

After installation, you can change the sound device the game will use. Follow these steps:

1. Change to the directory in which you installed *Aces of the Deep*.
2. In the *Aces of the Deep* directory, type **soundset** [ENTER].
3. Use the menu selections to test or change the sound settings, save, and exit to MS-DOS.

Running Aces of the Deep

1. If you are using the Minimum or Medium install, start your PC and insert the *AOD* CD into the CD-ROM drive.
2. Change to the directory where you installed *Aces of the Deep* CD.
3. To run the game, type **aod** and press [ENTER]. To move past the title screen, click the mouse or press [ENTER] or [SPACE].

Controls

All you need to play *Aces of the Deep* is your mouse. Use the mouse to control the pointer, or "cursor," on the screen, and click on buttons, menus, controls, arrows to select items or perform an action. For most commands, just point to the item and click the left mouse button once, or "click." A few actions require you to "drag" the mouse (hold the left button down while moving the mouse) or use the right mouse button "right-click." Most commands also have keyboard shortcuts. Keys are shown in brackets: [ENTER], [F1], [CTRL]+[X] are examples.

Note: To start *AOD* without sound or music, type **aod -s** [ENTER]. This can also save you about 200k of RAM.

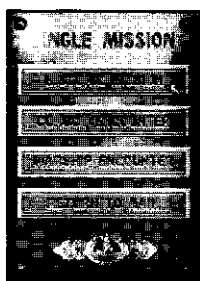
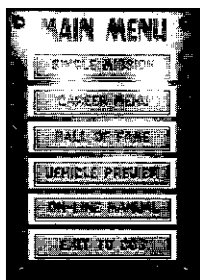
GAME PLAY

Tutorial

The following "Tutorial" section introduces *Aces of the Deep* through a step-by-step orientation tour as you set up and initiate a convoy attack. This is a good way to learn U-boat command procedures. (Actually, you can learn by playing any mission type, but use the easier Encounter Options and Realism settings until you know your way around.)

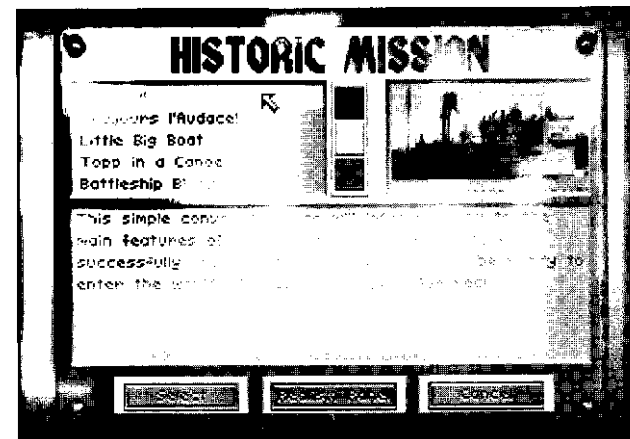
For a menu-by-menu description of each mission selection function, see the "Ashore" section beginning on page 18. U-boat controls are described in "At Sea," starting on page 40.

- A. First, install *Aces of the Deep* (AOD) as described on page 8.
- B. After AOD is installed, go to the directory in which you installed AOD, type **aod** and press [ENTER] to start the game. (To skip the title sequence, press [SPACE].) After the title sequence, you will see the Main Menu.
- C. To start the tutorial, select SINGLE MISSION, and then HISTORIC MISSION.

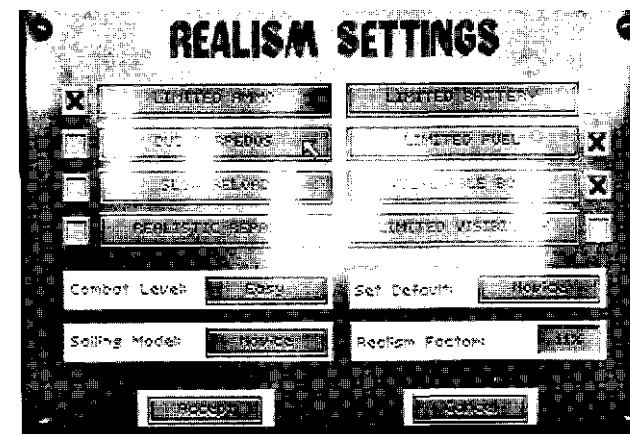


Mission Setup

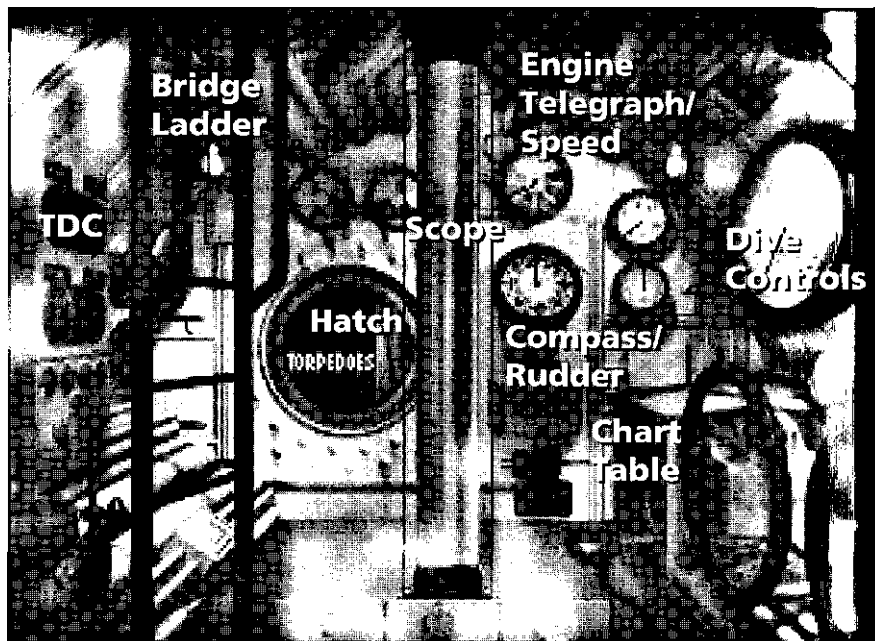
In the Historic Mission screen, click on the first mission, TUTORIAL, to highlight it and read its descriptive text. As with the Historical and Career missions, the TUTORIAL mission conditions (number of ships, aircraft, weather, etc.) are pre-defined. It is dusk, March 1, 1941, and you are commanding a Type VIIC U-boat. The Allies have yet to deploy effective radar or anti-submarine tactics, so you may conduct a night surface attack. Your boat is operating alone, and the sea is calm. (In the Convoy and Warship Encounters, you may define these and other mission conditions variables yourself.)



To adjust the realism settings, click on the REALISM button. The more options you select (X), the more realistic and difficult the mission becomes. For now, use the default settings—press DONE to return to the Historic Mission screen.



With the Tutorial mission highlighted, click the SELECT button. You will then see the Mission Briefing screen, which recaps your mission selection. To continue, click ACCEPT. After a few seconds, you will see the Control Room of your U-boat.



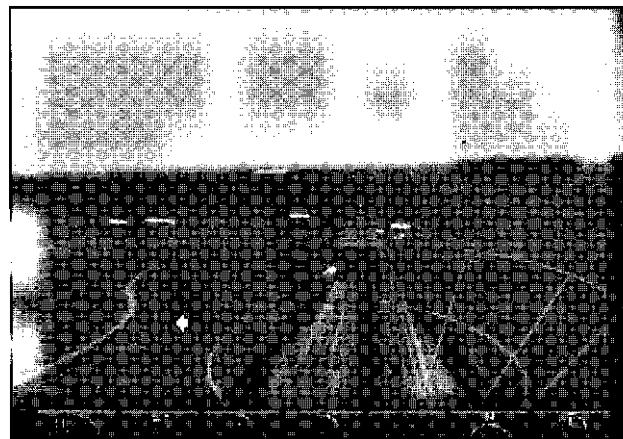
Voice Tube Stopwatch Clock

Control Room

For a quick tour, move your mouse cursor through the Control Room from the left. (You can control the entire mission with the mouse, and many controls also have key commands.) You'll see labels appear as you point to the TDC (Torpedo Data Computer), the Bridge ladder, and the hatch leading to the Torpedo Room, Radio, Damage Report and Captain's Log. In the middle is the Scope, and to the right of that are the Engine Telegraph/Speed controls (top) and Compass/Rudder controls (bottom). The large Dive Controls are on the right bulkhead. Just below (on Type VII boats) is the Chart table. The command buttons along the bottom provide other controls: the Voice Tube (to give crew commands). Stopwatch (for timing torpedo runs) and the Clock (for time compression). Different buttons appear in other screens.

Bridge

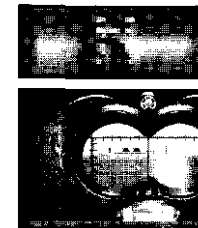
By now, you should have received a contact report from your Watch officer. Click on the ladder to go to the Bridge and investigate. From the Bridge, click the mouse to scan the horizon for ships: click near the middle of the screen (small cursor) to scan slowly, and click near the edge (big cursor) to scan quickly. If you see ships, click on the Binoculars button, and scan with the binoculars to locate the ships again—you'll see their relative compass bearing below the eyepiece. Click on the Engine button at the bottom—the engine room telegraph—and click AHEAD FULL. Then click on the Compass button and drag the compass indicator to the target bearing. Your boat will begin to head directly for the target. Right-click to close the Compass and Telegraph display. Click the far-left "ladder" button to return to the Bridge view.



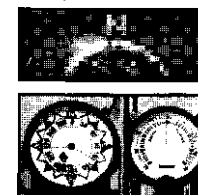
Clock

From the Bridge, click on the Clock button. The clock shows the time (in 24-hour notation) and lets you speed time up while getting into position, and slow it down again when ready to attack. Click the right-hand scroll bar arrows or press the [+] key until the display shows 32X or so. (Each click greatly increases the speed: be careful with time compression, or you may zip right past the convoy.) Press [ENTER] to return to 1X time.

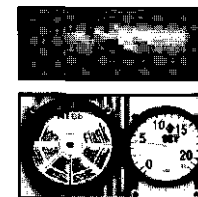
Binoculars



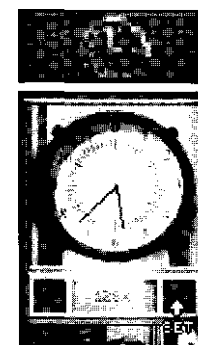
Compass

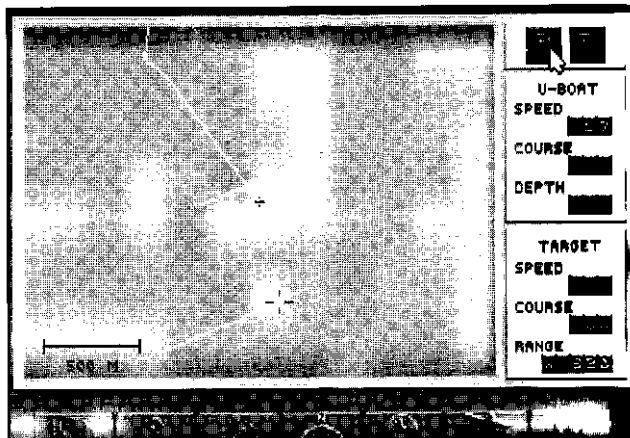


Engine (Propeller)



Clock

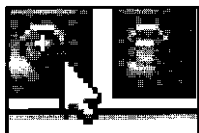




Tactical Chart

To see a "map" view of the convoy as you approach, press [F5] to open the tactical chart. This display helps you see the convoy's zigzags and true course, range, and can also show where the largest targets and escort ships are if you zoom in close. Click the magnifying glass buttons to zoom in and out. By clicking the Compass button here, you can adjust your intercept course more accurately. Now click the Globe button on the far right. This gives you the strategic chart you'll use to navigate to and from base in Career missions. For now, click the Globe button again to return to the tactical chart.

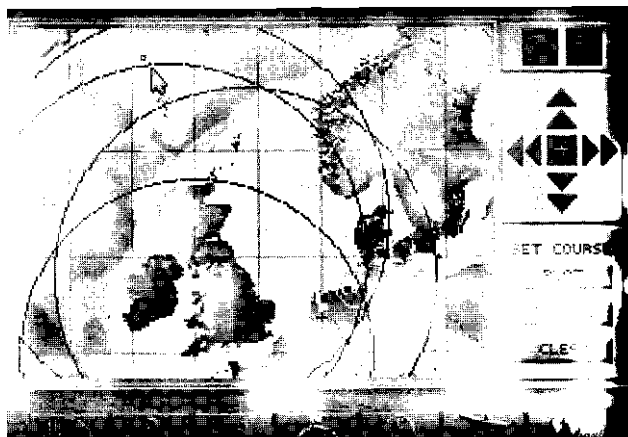
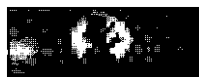
Magnifying Glass buttons



Compass



Globe



Setting Up the Attack

While stalking the convoy, you can switch directly between the Chart [F5] and the Binoculars [F3] to monitor target course and range. You want to pull even with or ahead of the convoy at a safe distance (5,000 meters or so), and then angle in from the side to firing range (under 1,000 meters). Remember, the Binoculars bearing display is relative—a reading of 90 degrees means you are looking 90 degrees starboard of the bow, regardless of your boat's compass heading. When you start getting close, click on the Clock button to slow down time again to 1X (normal). Keep an eye on the escort—if you see an escort suddenly head for you, your surprise attack is blown. At any time, you can press [CTRL]+[P] to Pause the game if you need a moment to decide your next move.

Clock

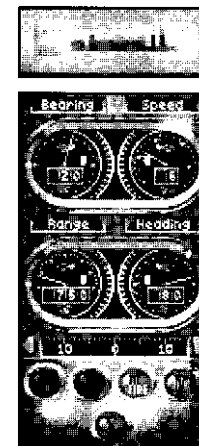


Aiming with the TDC

When your U-boat is to the side of the convoy, go to the bridge Binoculars view [F3]. Locate a ship in the vertical crosshair and press [SPACEBAR]. This selects the target, distinguishing it with a red crosshair and entering its data into the TDC. Click the Torpedo button to see this TDC data, which includes target bearing (relative to your boat's heading), speed, range, and actual compass heading (if within range). The crosshairs grow brighter the longer the target is selected, showing the increasing accuracy of the firing data. To see your Watch Officer's estimate of the selected target vessel's type and gross tonnage, press [I].

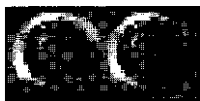
Before firing, you want the U-boat pointed within 20 degrees of the target for best accuracy. (To turn toward a selected target you're currently viewing, press [H]—this turns your heading to the current view. To change the view to the current heading, press [V]) You want to be between 300-1,000 meters from the target, and perpendicular to it—check your firing angle using the chart.

Torpedo



Fire

When the firing conditions are acceptable, click the red fire buttons I and II on the TDC. You can switch to the chart to see the torpedoes' course, and switch back to the binoculars in time to watch them hit (if your aim was true) or watch through the "Torpedo Camera" [F10]. Two torpedo hits will sink all but the largest ships.



Evade

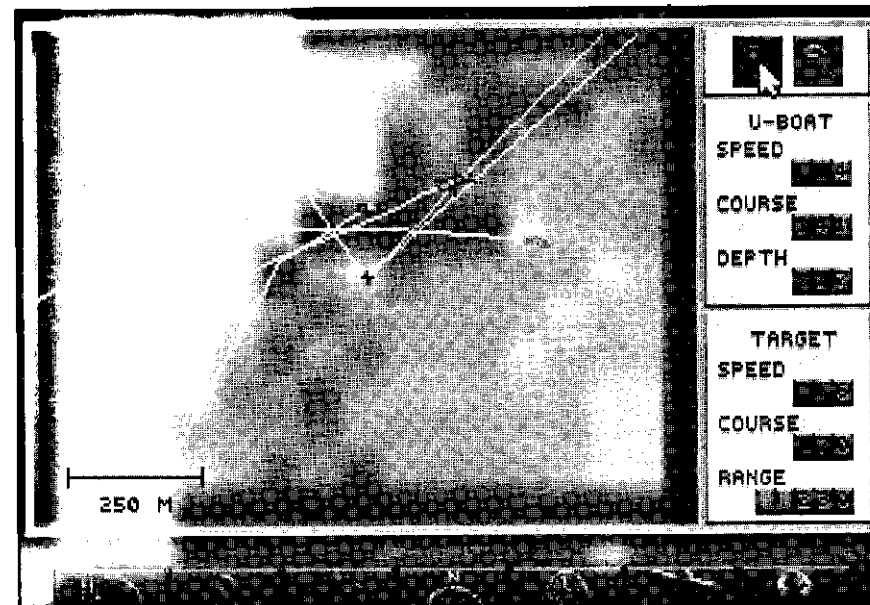
Once your first "eel" hits, the escorts will be alerted and will try to attack you quickly. In many night attacks early in the war, you can evade slower escorts on the surface by using your speed and the chart to outmaneuver them. You may be able to line up and sink other targets while the escorts pound the wrong area to a froth. If the escorts are cornering or overtaking you, you should dive before their deck guns hit your boat and prevent you from diving (track them in the TDC to check range).

Diving

If forced to dive, return to the control room [F1]. Click the Voice Tube button, select CHIEF ENGINEER, and order CRASH DIVE. You may also click the Dive Controls and drag the depth indicator to the desired depth. Below 150 meters, depth charges will have little chance of hitting you (this changes later in the war). Once you reach your depth, go to your Engine ("propeller" button) and reduce speed to Ahead 1/3—this will reduce your engine noise so the escort hydrophones cannot detect you as readily, but gives you enough headway to turn.

Go to the chart. You should see the escort charging to the point where it saw you last. If you make it safely below, the escort will start "pinging" with ASDIC (sonar) pulses as it tries to box you in with its search patterns. Keep turning your boat end-on to these pulses to reduce your echo. You can also use the noise of the merchant

ships to cover your sounds. Using depth and the chart, and constantly angling away from the escort, you should be able to slip away fairly soon. You may then surface and make another approach on the convoy, or retire from the engagement.



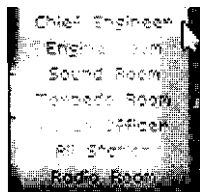
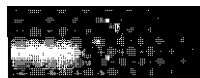
Ending the Mission

Any Single Mission where you sink a ship and get away is a good one. The mission will continue as long as you maintain contact with the enemy—if you lose contact with the enemy ships or sink them all, the mission ends. (Naturally, the enemy can end your mission by sinking or capturing *you*.)

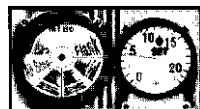
In Career mode, you end missions (war patrols) by navigating back to a friendly base and radioing for an escort into the harbor.

You can also end missions in progress by selecting ABORT MISSION from the Simulation Options menu ([CTRL]+[O]), or by pressing [CTRL]+[D]. If you abort the mission while engaged in combat, however, your mission score will be zero.

Voice Tube



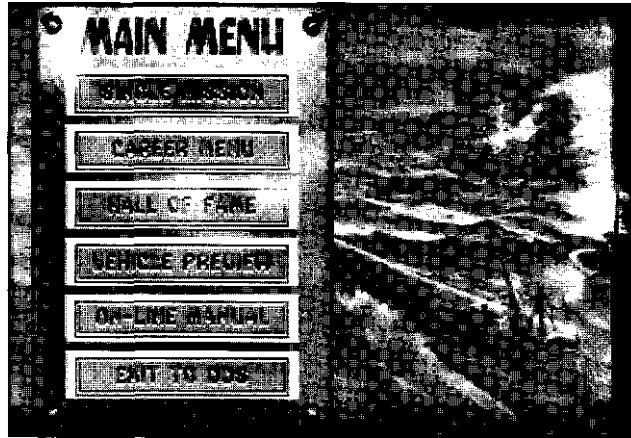
Engine (Propeller)



Ashore

Main Menu Overview

This section introduces the AOD mission setup options, starting with the main menu. Each subscreen is described in detail on the following pages. For a guided tour of the U-boat, try the preceding "Tutorial" section. For a U-boat control reference, see "At Sea" starting on page 40.



Single Mission

Launch one U-boat combat mission at a time, selecting all aspects of the mission conditions and setup. Single missions get you into specific convoy, warship, or historic actions quickly, and are scored independently. (See page 20 for more.)

Career Menu

Undertake an entire career as a German U-boat commander, starting with assignment to your first command. Your career will be composed of patrols, each a series of actions that correspond to the actual circumstances, technology, and events in the Battle of the



Wolfgang Luth, second highest scoring U-boat ace, and his new bride.

Courtesy National Archives

Atlantic. Career scores are cumulative, accounting for performance on all missions. (See page 29 for more.)

Hall Of Fame

Review your highest-scoring single missions and careers. You may also view profiles of the most famous historic U-boat aces. (See page 35 for more.)

Vehicle Preview

View the ships and planes you will encounter on patrol, and learn to recognize them from any direction or distance. The more familiar you are with appearance and capabilities of the enemy units, the better your chances of surviving your encounters with them. (See page 36 for more.)

Exit To DOS

Leave *Aces of the Deep* and return to DOS.

Single Mission

The options on this menu let you undertake one combat mission at a time, and give you control of each mission's setup. If you select CONVOY ENCOUNTER or WARSHIP ENCOUNTER, you may select the number of ships, time of day, weather, as well as the difficulty and realism levels you will encounter. In a HISTORIC MISSION (including the TUTORIAL), the mission options are predetermined, but you may still adjust the realism settings.



To begin the selected mission using the current Encounter Options (page 22) and Realism Settings (page 25), click SELECT. This takes you to the mission briefing, which will describe your objectives for this mission. You may CANCEL from the Mission Briefing and return to your mission menu. If you ACCEPT the mission, you will go to sea in your U-boat.

Note: If you abort a mission ((CTRL)+[D]) while engaged in combat, your mission score will be zero.

Single missions begin with your boat near the enemy, and end when you lose contact with the enemy or are killed or captured. When your mission ends, you will see the Patrol Summary screen, which shows the number of ships you sank, their cumulative gross tonnage, and your mission score based on your achievements, mission difficulty, and realism factor. Unlike Career missions, you cannot save a Single Mission in progress.

Mission Types

This section describe the types of missions you will encounter in AOD Single Missions or Careers.

Historic Mission

The screen lets you experience an actual historical U-boat action from the Battle of the Atlantic. The mission conditions and forces will be those of the actual battle, but now you will be commanding the U-boat. Also included is the Tutorial mission, which guides you step by step through an example convoy action. (The "Tutorial" section starts on page 10.)



The menu at the upper left lists the available missions. Click on the mission name to highlight it and see its corresponding description below. To see other missions on the list, click on the scroll bar arrows.

Convoy Encounter

On this mission type, you will intercept a convoy and attempt an attack.

Warship Encounter

On this mission type, you will intercept and attempt to attack a group of Allied warships. Warships are much faster than convoys — often faster than your U-boat — and are always heavily guarded and risky to attack.

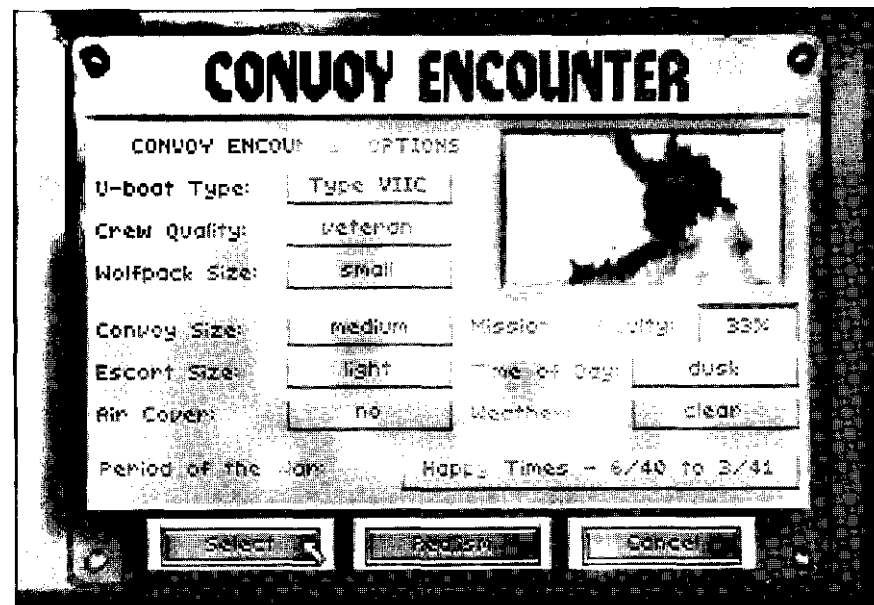
Encounter Options

When you select a Single Mission Convoy or Warship Encounter, you may change the encounter options that, together with the Realism Settings you select, will affect the difficulty and scoring potential of your mission. The same options are available in both Encounter types, except WARSHIP TYPE replaces CONVOY SIZE in the Warship Encounter screen.

To change a default encounter option, first click that option button to open its menu. Double-click the option you want, or highlight the option and then click the SELECT button. Long option menus have scroll bars: click the arrows to see other options. The CANCEL button takes you back to the previous menu without changing the setting.

U-boat Type. Choose which type of U-boat you will command for this encounter. Selecting a Type II U-boat will increase the difficulty of this encounter, since these smaller U-boats were not as fast as the larger Type VII and Type IX boats, and carried fewer torpedoes. See the on-line manual for details on each type and variant.

Crew Quality. Choose the quality of the crew of your U-boat. Crews may be GREEN, VETERAN, or ELITE. Skilled crews are able to crash dive more quickly, reload



torpedoes more rapidly, etc. The more highly skilled your crew, the less difficult your mission will be.

Wolfpack Size. Select the size of the U-boat pack attacking the enemy ships: NONE, SMALL (2-3), MEDIUM (4-6), or LARGE (6 or more). The more U-boats there are to gather at the convoy, the less likely it is that the escorts will be able to concentrate on you.

Convoy Size. (Convoy Encounter only). Choose the size of the convoy you wish to attack: SMALL (5-15), MEDIUM (20-35), or LARGE (40-60). Larger convoys decrease the mission difficulty since they provide more targets and their escort perimeter is easier to penetrate.

Warship Type. (Warship Encounter only). Select what kind of warship group to attack: a CRUISER, BATTLESHIP, or CARRIER group. This option defines the main target in the warship group, the one you should try to sink. All warship attacks are difficult. There is no greater glory for a U-boat skipper than to sink one of the enemy's priceless capital ships. However, warship tonnage is not

Note: You must radio in convoy contacts to gather a wolfpack.

added to your tonnage list, since your primary mission is to sink merchant shipping.

Escort Size. Select the number of warships escorting the target: NONE, LIGHT (2-3), MEDIUM (4-6), or HEAVY (7+) escorts. The more escorts there are, the easier it will be for them to detect and attack you successfully. Increasing the escorts greatly increases the mission difficulty: it is very difficult for even the most skilled skipper to evade a coordinated attack by several escorts.

Air Cover. Choose whether or not your target will have air cover: YES or No. Anti-submarine aircraft will make operations much more difficult for your U-boat, subjecting you to the constant threat of sudden attack.

Mission Difficulty. This displays the relative difficulty of the mission encounter options you have currently selected, indicated as a percentage. The tonnage you sink on a given mission is weighed against the Mission Difficulty, Realism Factor, and other variables to determine your mission score.

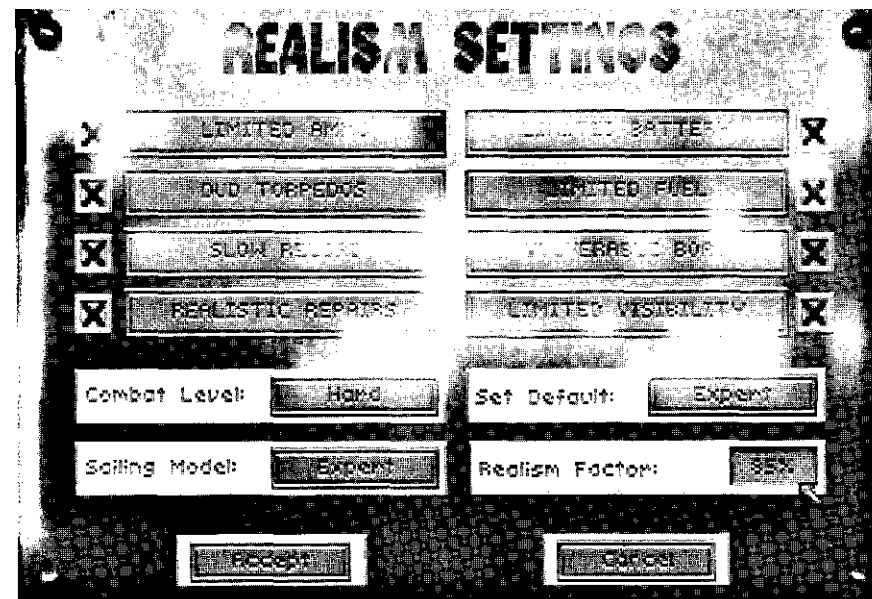
Time of Day. Select what time of day the mission simulation begins: DAWN, DAY, DUSK, or NIGHT. Early in the war, U-boats conducting night attacks on the surface are almost invisible. Later, radar makes night approaches much more difficult.

Weather. Select the weather conditions for the mission scenario. You may choose from CLEAR, OVERCAST, CLOUDY, or STORMY. Inclement weather reduces visibility, which usually favors the U-boat (but also conceals approaching aircraft).

Period of the War. Choose the time period in which the encounter will take place. Different periods will present different advantages and challenges to the player (see the "Historic Overview" for details). In general, the later in the war, the more difficult the mission will be. Note: You may select Encounter Options that do not correspond historically to the selected period (i.e., selecting a Type VII C in 1939, before they were available).

Realism Settings

This screen lets you determine how realistic and difficult your mission conditions will be, and is available for both Single Mission and Career play.



You may set the default realism level at NOVICE, INTERMEDIATE, or EXPERT to match your level of experience. You may also turn the specific realism settings on or off, and set general difficulty settings for COMBAT and SAILING independently. Once you have defined your Realism settings, press ACCEPT to continue with your mission setup using those settings, or press CANCEL to return with no change in the default settings.

You may switch the following eight specific realism settings on ("X") or off (blank) by clicking on them. Each box selected increases the Realism Factor of your mission, and thus also increases your potential score in proportion to its relative difficulty. Once you begin a mission or war patrol, you cannot change the realism settings until your return.

Limited Ammo—If selected, this setting limits your submarine to the actual number of torpedoes your U-boat type could carry historically: 14 for a Type VIIC, for example. Running out of torpedoes effectively ends your offensive mission, and indicates a good time to return to base. Turning this setting off gives you an unlimited number of torpedoes.

Dud Torpedoes—If selected, this setting subjects you to an historically accurate percentage of "dud" torpedoes: some of your torpedoes will go too deep, explode early, or fail to explode even if they hit a target. The percentage of duds on a given mission depends on the period of the war in which the mission takes place. Turning this selection off means your torpedoes always work if you aim and fire them correctly.

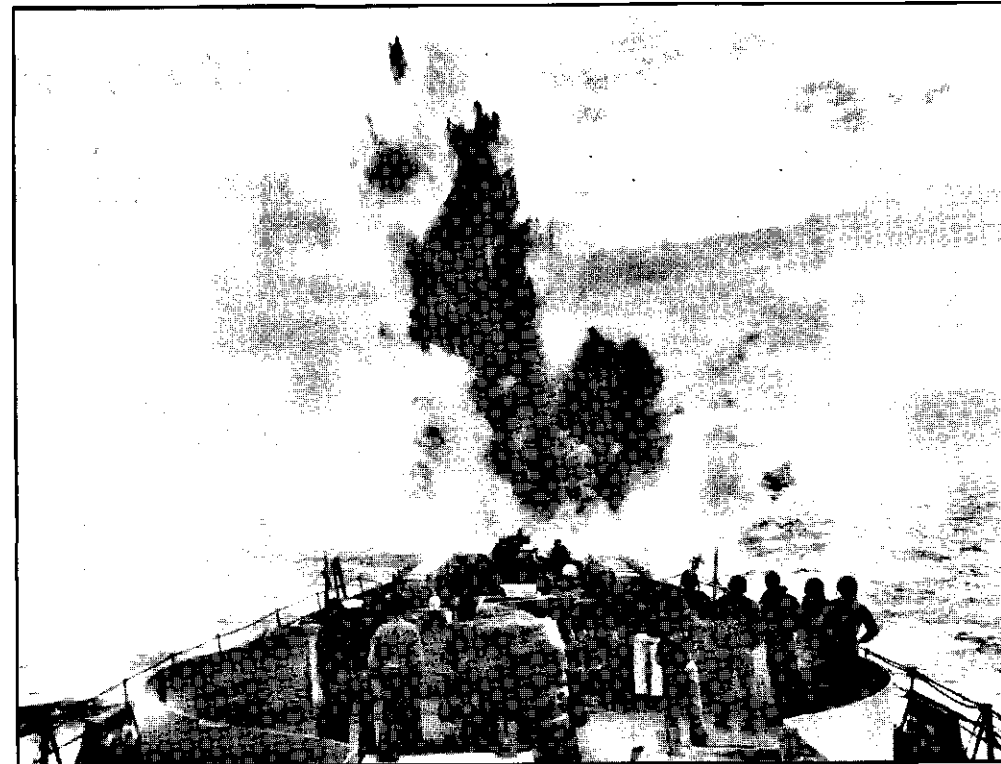
Slow Reload—If selected, this setting imposes realistic torpedo reload times on your crew. If you switch it off, you can reload torpedoes much more rapidly than was actually possible. On either setting, better crews reload the tubes faster.

Realistic Repairs—If selected, this setting makes damage repairs at sea much more realistic. Some repairs may put you out of action for days—others may force you to surface, or return to base in Career missions. If you switch this option off, you will be able to repair any damage to your U-boat relatively quickly.

Limited Battery—If selected, this setting models the U-boat's consumption of battery power realistically. (If you run out of battery power when submerged, you may sink!) If you switch this option off, you will not run out of battery power.

Limited Fuel—If selected, this setting models the U-boat's consumption of diesel fuel realistically. You will have to monitor fuel carefully, or you might run out in mid-ocean. If you switch this option off, your sub will not run out of diesel fuel.

Vulnerable Boat—If selected, this setting makes your U-boat vulnerable to damage from enemy weapons.



Courtesy National Archives

Depth charge exploding behind an American escort vessel.

If this option is not selected, your boat cannot be damaged by enemy depth charges, torpedoes, hedgehogs, or guns.

Limited Visibility—If selected, this setting limits your [F5] tactical chart to show only those ships currently visible from the bridge as indicated by the red ring. At more difficult combat settings, the chart will not show ships beyond the visible horizon, and won't show any ships if you submerge below periscope depth. If you switch this option off, all vessels in your area will be visible on the tactical display.

Combat Level—This setting determines your general advantage, if any, in offensive and defensive action. For example, it affects visibility, the accuracy of your torpedo targeting computer and of your deck gun and AA fire, as well as the damage caused by your weapons' hits.

It also determines how easy you are to spot on radar, how much damage your boat suffers from an enemy hit, and how much information is displayed on your tactical chart (including ASDIC pings and torpedo tracks). On the EASY setting, your boat is relatively hard to hit, while you can hit and sink enemies rather easily. On MEDIUM or HARD, your advantage is reduced. On EXPERT, you have no advantage.

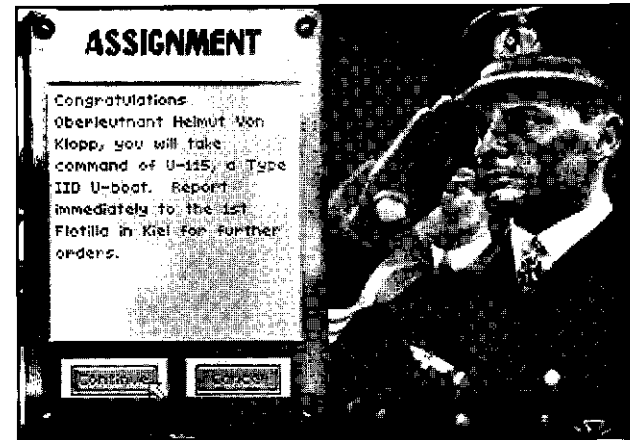
Sailing Model—This setting determines the realism of your U-boat's maneuverability, a critical factor in avoiding enemy attacks. Specifically, it affects how long it takes your boat to crash dive, change depth by a given number of meters, or complete a turn at a given speed. The NOVICE setting makes your boat much more maneuverable than historical boats, while EXPERT models maneuvering rates realistically.

Set Default—This setting lets you define all your Realism Defaults with a single selection. The options are NOVICE, INTERMEDIATE, and ADVANCED. You may still modify the individual default settings as you wish.

Realism Factor—This setting displays the realism level (and scoring potential) of the realism settings you have currently selected. This level is expressed as a percentage, with 100% as a maximum. Your mission score is determined as follows: tonnage (or warship sinkings) are combined with your selected realism factors and mission difficulty (Encounter Options). At 100%, your achievements at sea can be scored at their highest potential value. You will see your score in the Patrol Summary screen that appears at the end of each mission.

Career Options

Select CAREER to begin or resume a career as a U-boat commander in the German Navy, the *Kriegsmarine*.

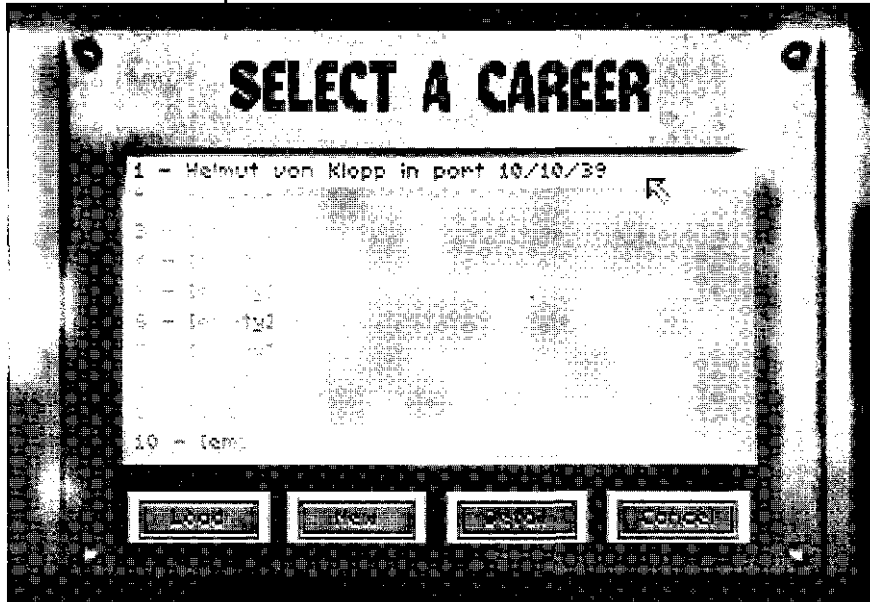


Careers begin with your assignment to your first command. Your career will then be composed of war patrols. Each patrol is a mission that corresponds to the actual circumstances, technology, and events of that period in the Battle of the Atlantic. You will sail from historical bases and navigate the hazardous course to your patrol area. Following radio orders from BdU (U-boat Headquarters) or engaging targets of opportunity, you may encounter enemy convoys or warship groups and then return to base.

Between patrols, you may relax on well-deserved shore leave. You may also be assigned to a new base or U-boat, be decorated for your victories, or be promoted. If you succeed and survive, your weapons will become better, and your crew more proficient—as will those of the enemy. You may become a legendary skipper, competing for medals and glory and the top ranking in the Hall of Fame. You may end up in an a prison camp. Or you and your crew may end up in a dark iron tomb on the cold floor of the Atlantic. Your luck and skill as a commander will decide.

Select a Career

This screen lets you create a new career (captain), load an existing career to continue, or see details of existing careers. Initially, the career roster will be empty. You may save multiple careers for each captain you create, but you can have no more than 20 saved careers at a time.



Load. To load an existing career to continue, click on the career to highlight it, and then click LOAD. A Career labeled "At Sea" will resume the war patrol at sea from the point it was saved. A Career labeled "In Port" is between patrols, and will resume from the Career menu (page 31).

New. To create a new career, click the NEW button on the Select a Career screen to open the New Career screen. Type your captain's name in the Your Name box exactly as you want it to appear. Then click on the STARTING PERIOD button to select when your career will begin. You may then select the personal emblem that

will decorate your U-boat conning tower: click the arrows next to the emblem window until the emblem you want is displayed.

When your selections are complete, click SELECT to go to the Assignment screen. Here you will be given the number and type of your new U-boat and assigned a base of operations for your first patrol. You may CANCEL to return to the Select a Career screen, or CONTINUE to go to the Career Menu (see below).

Detail. Click this button to see details on the progress of the current career. Click DONE to exit.

Cancel. Click this button to return to the Main Menu

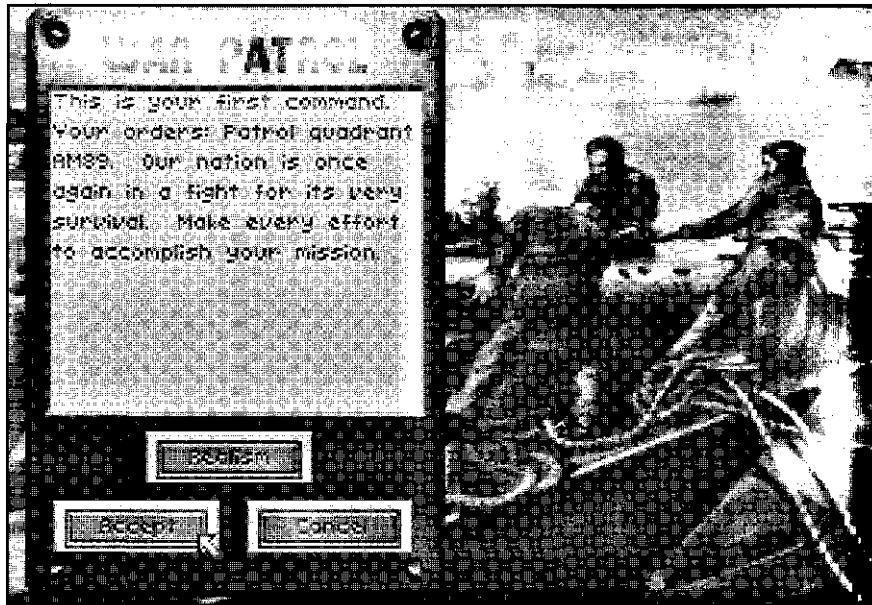
Career Menu

Once you start a career, or resume one saved "in port," you will play from this menu.



War Patrol

This option sends you first to a mission briefing. Here you may review the mission objectives for this patrol and adjust your Realism settings. When ready to ship out, click ACCEPT to leave port and go to sea on your next War Patrol.

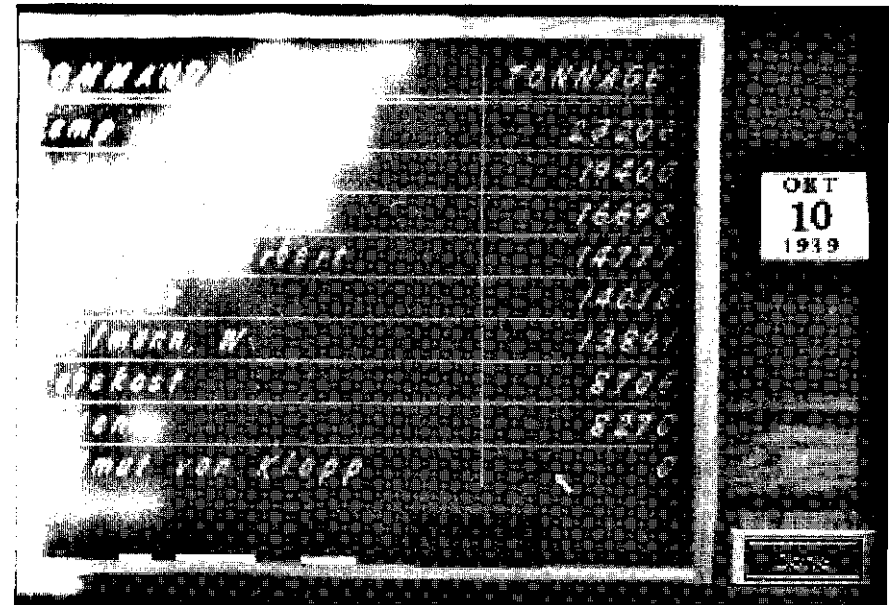


War Patrols differ from Single Missions in that you must make the journey to your patrol area (using the Strategic Chart to navigate) before engaging in assigned missions. To end a patrol (after you run out of torpedoes or targets, or run low on fuel), you must return to the escort perimeter of your base (green circle on strategic chart) and request an escort to finish the mission. You can also end missions in progress by selecting ABORT MISSION from the Simulation Options menu ([CTRL]+[O]), or by pressing [CTRL]+[D]. If you abort the mission, however, your mission score will be zero.

Tonnage Leaders

This screen will give you a list of the top U-boat skippers up to the current month. This lets you compare your performance against that of the historic aces.

With enough sinkings, your current captain's name may some day top this list.



Nightclub

This is your chance to relax between patrols with your fellow U-boat captains in the company of the lovely Elise, sweetheart of the U-boats.

Here you may pick up interesting gossip, rumors, and current war news from your comrades. Click NEXT to hear the next bit of "news," and click DONE when you've heard enough. Be careful, though...you cannot believe everything you hear in a bar.

View Career

Select this option to see the war record of the current captain. The screen displays totals for patrols, tonnage, sinkings, and score, as well as a list of sinking by date, and any decorations awarded to the captain. You can also access this screen with the DETAILS button in Select a Career.



Courtesy United States Naval Institute

June 1942. Captain Erich Topp is back safe from another war patrol. He wears his brand new Knight's Cross around his neck.

Save Game

Select this option to save the current career when you are "in port" between patrols. If you already have 20 careers saved, you will need to replace a previous career to make room. You may also save your career at sea during a mission (if you are not in combat with the enemy) using the SAVE GAME option on the [CTRL]+[O] pop-up menu. Using this option, you just click on a blank slot or existing career to replace it with the current career. Enter a description for the saved game and press [ENTER].

Return to Main

Exits the Career Menu and returns you to the Main Menu.

Hall of Fame

Use this screen's options, available from the Main Menu only, to compare your current performance with your earlier missions or with the greatest submarine commanders of the Battle of the Atlantic.

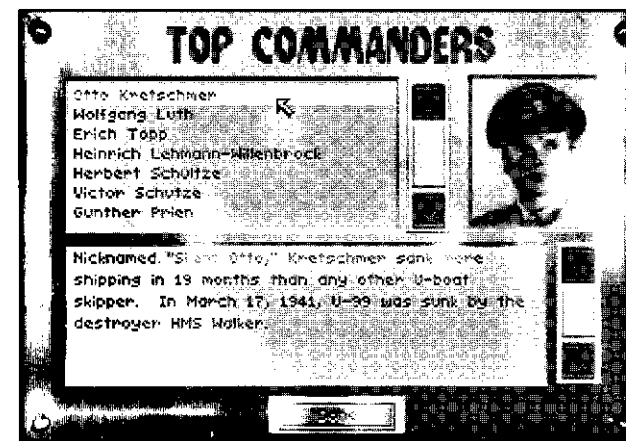
The primary mission of the U-boat forces is to sever the ocean supply routes to England. Accordingly, your performance is scored by factoring the cargo tonnage or warships you sink with the overall mission and realism difficulty.

Top Missions—This screen shows you a list of your highest-scoring single missions, ranking them by tonnage, ships sunk, and score. Click the **DETAIL** button to see a more detailed list of ships sunk; click **DONE** to exit.

Top Careers—This screen lists your highest final career scores by name, tonnage, ships sunk, and score. For more information about the career, click the **DETAIL** button; click **DONE** to exit. Careers are eligible for the top career list when you finish the war, are killed, captured, or you retire.

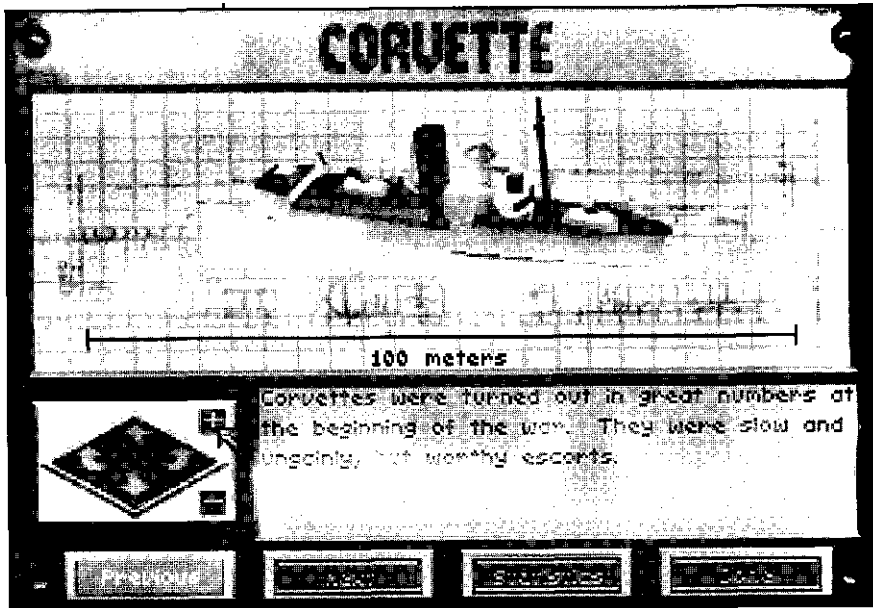
Historic Aces—This screen profiles the most successful historic U-boat aces. You may click on an ace's name to see his picture and a brief description of his war record.

Return to Main—Exit the Hall of Fame and return to the Main Menu.



Vehicle Preview

This screen displays views, descriptions, and statistics for the ships, aircraft, and submarines featured in the simulation.



Click on the arrow buttons on the right or left to rotate the vehicle horizontally; click on the up and down arrow buttons to rotate the vehicle view vertically. Click on the "+" or "-" buttons to zoom the view in or out.

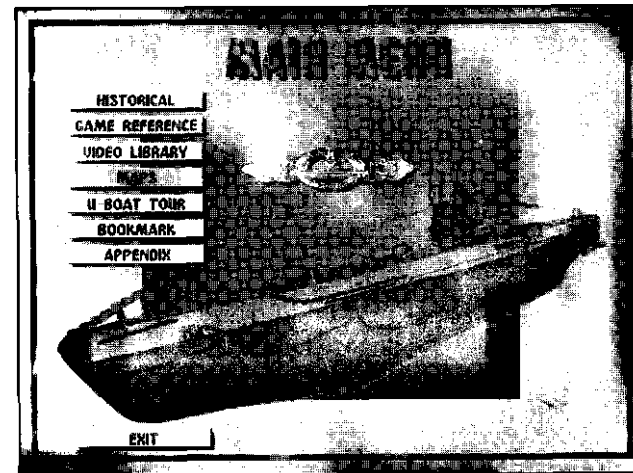
Click the STATISTICS/DESCRIPTION button to learn about the vehicle's history and capabilities.

Click NEXT or PREVIOUS to see other vehicles, or click DONE to return to the Main Menu.

On-Line Manual

The *Aces of the Deep* CD includes a complete on-line manual featuring all user documentation and historical text. It also includes interactive war maps, a submarine tour, and a video library including interviews with former U-boat commanders and crew, as well as historical film footage from the period. You open the on-line manual by clicking the ON-LINE MANUAL button on the AOD CD main menu.

The entire manual can be mouse-controlled. Just click the button for the option you want. You can also use the [TAB] key to cycle through buttons, [ENTER] to select an active button or option, and [Esc] to back up.



Historical provides an historical overview of the Battle of the Atlantic.

Game Reference provides an on-line version of the Game Play documentation, detailing all screens and functions of *Aces of the Deep*.

Video Library provides direct access to film footage and video interviews with former U-boat personnel. Simply click on a name and select the interview segment you want to see, and the video window will open. Press the BEGIN button to start the video. You can exit the video

at any point and return to the preceding menu by clicking the END button or pressing the [Esc] key.

Maps has two map displays. The Main Map shows the location of major events during the war on a map of the Atlantic. Click on the hot spots to see a pop-up description. Period Maps show the sinkings during the different periods of the conflict. Click on the arrows to see other periods.

The **U-boat Tour** provides a guided tour of a Type VIIU-boat. Click on an area of the U-boat to see a photograph close-up and a text description.

Bookmark returns you to the last page on which you set the bookmark. On any page of the on-line manual, you may click the bookmark button to save your place. Click BOOKMARK on the main menu to return. To reset the bookmark, click the button at another place. Note: You can have only one active bookmark at a time.

Appendix provides troubleshooting, memory configuration, and customer service information, as well as a bibliography, glossary, and credits.

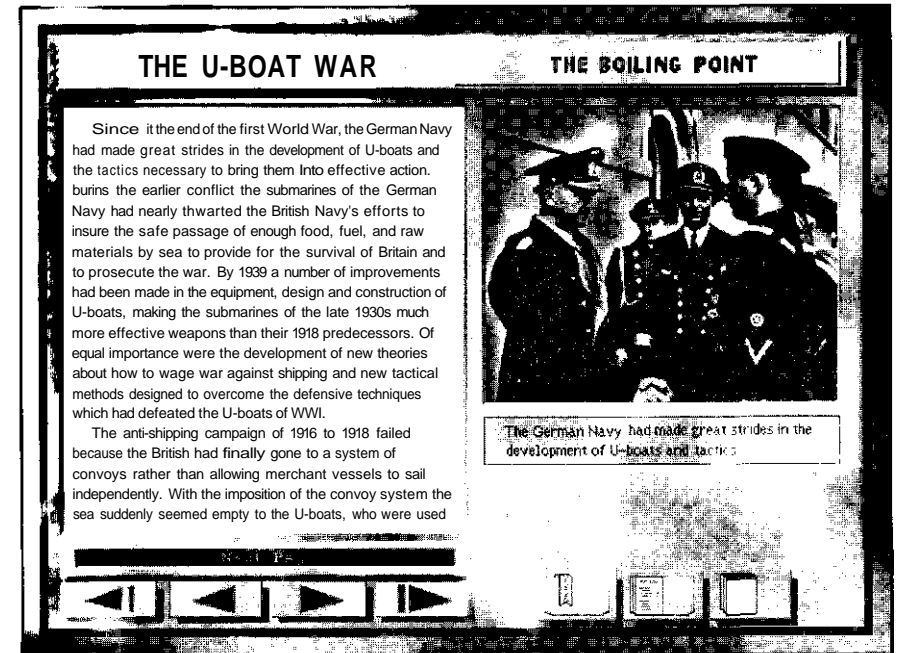
Exit returns you to the *Aces of the Deep* CD Main Menu.

Page Screens

The Game Reference, Historical, and Appendix sections use the same basic page screen shown below. Click the arrow buttons to move between pages and articles. You can also press [Pg Up] or [Pg Dn] to go to new pages, and [SHIFT]+[PG UP] or [SHIFT]+[PG DN] to go to new articles. Click the colored text links on the page to go to related material.

Title Bar. Shows the title of the current section and article.

Text Links. Blue-highlighted text on the page shows a link to a related article or film clip. As you point to the highlighted text, the mouse cursor will change to a Book icon if the link is to another article, or a Movie Camera



Arrows

Bookmark

Table of
Contents

Closed
Book

icon if the link is to a related video clip. Click the mouse to see the article or video. (After viewing a video, you will return to the current page.)

Arrows. Click these to move to the previous or next page or article. If there is no such page or article, the arrows are light gray.

Set Bookmark. Click this button to set the bookmark on this page. Click the BOOKMARK button on the main menu to return to this page later.

Exit to Contents. Click on the "Table of Contents" button to return to the section contents.

Exit to Game. Click on the "closed book" button to return to the AOD main menu.

Exit to DOS

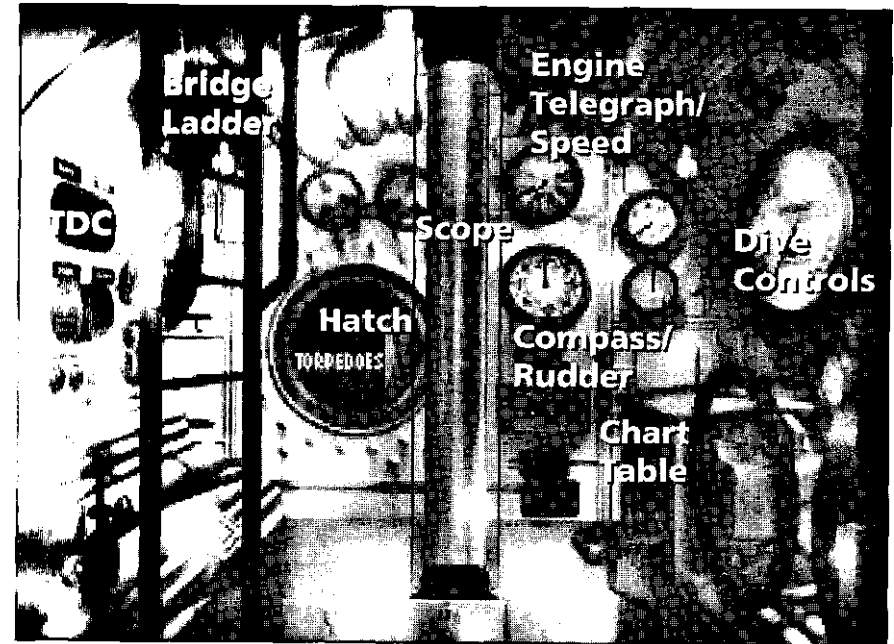
This Main Menu option lets you leave *Aces of the Deep* and return to DOS.

At Sea

Once you have chosen to undertake either a Single Mission or a career War Patrol you will receive a Mission Briefing summarizing your initial orders. After you click ACCEPT to end the Briefing, your boat puts to sea.



At sea, you can move to the different areas of the boat (see Command Screens) and give commands with the mouse. Many commands have keyboard equivalents as well. Command screens also have a row of command buttons across the bottom that provide related functions. See "Buttons" (page 58) for command button functions.



Voice Tube Stopwatch Clock

Command Screens

Control Room

The Control Room is the command center of your U-boat, and the place where you begin each mission at sea. You can access it throughout the boat by pressing [F1] or by clicking the Control Room command button found in most other screens. The Control Room provides point-and-click access to most of the command screens and controls you use to maneuver your boat and conduct attacks. As you point to each area of the Control Room, you will see the name of the corresponding screen or control appear: Torpedo Data Computer (detailed on page 64), the ladder leading to the Bridge (page 44), and the hatch leading to the Torpedo Room (page 54), Radio Room (page 52), Damage Report (page

57) and Captain's Log (page 51) screens. Dividing the Control Room is the Periscope. Just to the right of the periscope are the Engine Telegraph/Speed (page 61) and Compass/Rudder controls (page 59). On the right bulkhead are the Dive Controls (page 60), used to submerge or surface the boat. On Type II and Type VII boats, the Chart table (page 46) is below the Dive Controls; on Type IXs, the Chart table is on the left, behind the ladder.

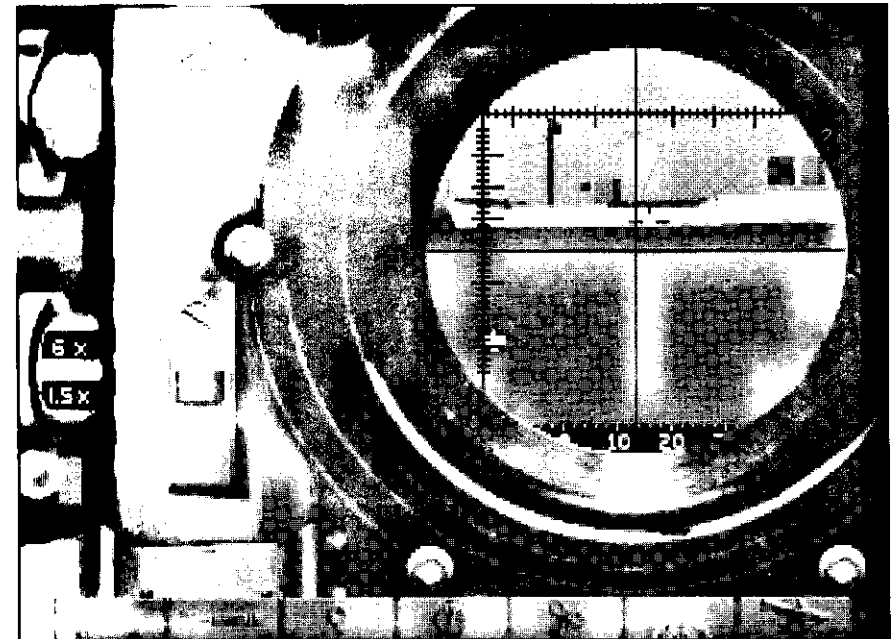
The Control Room has the following command buttons: Voice Tube, Stopwatch, and Clock. Different buttons appear in other screens: all are described in the "Buttons" section (page 58).

Periscope

You can access the Periscope from the Control Room by clicking the periscope column, or by pressing [F2] when the boat is at periscope depth or surfaced. It allows you to scout the horizon or conduct attacks while submerged. Keep in mind, however, that the periscope can be spotted by lookouts or radar, especially if the water is smooth or the moon is behind you, and that your visibility and speed are greatly reduced at periscope depth. Also, you are vulnerable to ramming or air attack at periscope depth. Take quick peeks to update your target contacts, and lower the scope as you move into position.

To scan the horizon with the periscope, click the arrow cursor right or left near the middle of the screen (small cursor) to scan slowly, and click near the edge (big cursor) to scan quickly (or use the [<.] >.] keys). The periscope has two magnification settings: click on the knob at the far left of the eyepiece to change the setting between 1.5X and 6X, or press [Z] for Zoom.

You can select a ship you see in the periscope to input its targeting data (bearing, speed, range, and heading) into the Torpedo Data Computer, or TDC. To select a target, center the periscope on the target and



Control Room TDC Voice Tube Stopwatch Engine Compass Dive Controls

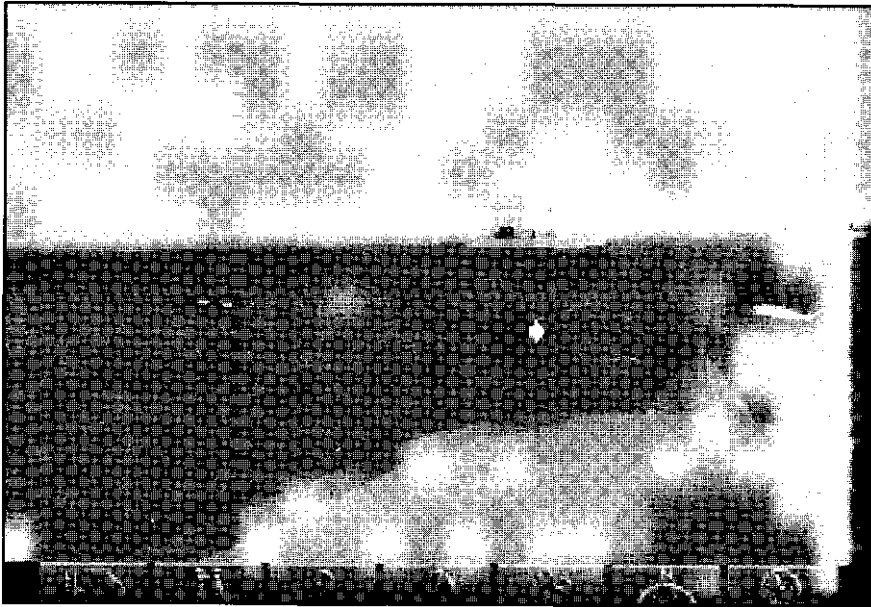
press [SPACEBAR]. This selects the current target (indicated by a red cross) and sends its data to the Torpedo Data Computer. (When surfaced, you may also select targets using the Binoculars or by clicking on them in the Tactical Chart.) To "padlock" the selected target (keep it centered in the periscope), press [ALT]+[F2]. To break the lock, select another view.

The bearing indicator at the bottom of the eyepiece displays the bearing of the current view relative to the bow of your boat (not your compass heading).

The Periscope screen also uses the following command buttons: Control Room, TDC, Voice Tube, Stopwatch, Engine, Compass, and Dive Controls. See "Buttons" (page 58) for details. Related quickkeys: Periscope Depth [P]; Crash Dive [C]; Set Heading to View [H]; Set View to Heading [V]; Identify Target [I]; Surface [S]; Zoom View [Z].

Note: From the tactical chart, you may order your watch officer to raise/lower the periscope with [ALT]+[P].

Note: To go to periscope depth, press [P].

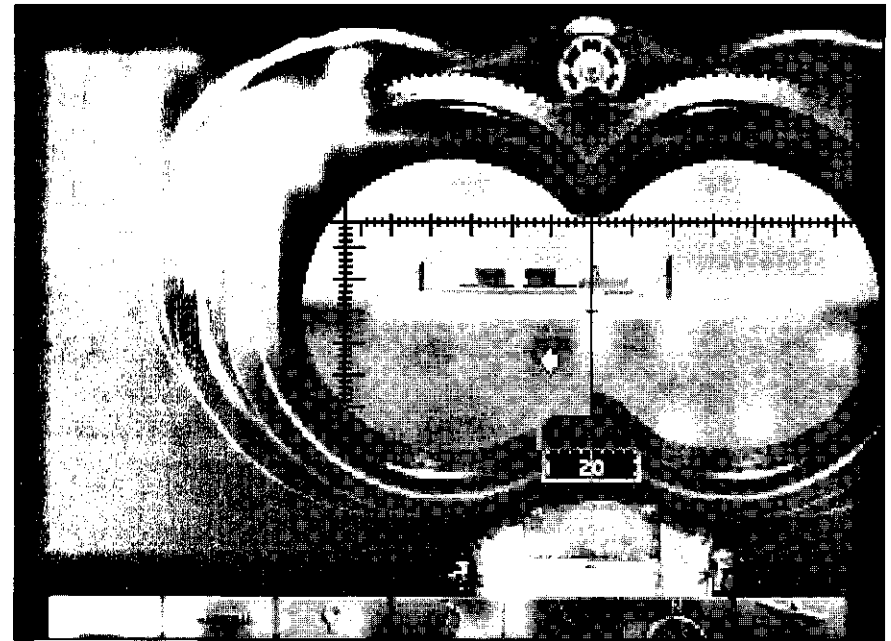


Control Room Binoculars Voice Tube Stopwatch Engine Compass Clock

Bridge

When your boat is surfaced, you can access the Bridge from the Binoculars or the Bridge ladder, or by pressing the [F4] key. It provides a panoramic view of the surrounding ocean from the conning tower, and allows the best vantage point for spotting aircraft. Facing forward, you will see the smoothly pointed bow; facing astern, you will see the railing around your anti-aircraft gun platform.

As with the periscope, click the arrow cursor to scan the horizon right or left: click near the middle of the screen (small cursor) to scan slowly, and click near the edge (big cursor) to scan quickly (or use the [<.] [>.] keys). The Bridge uses the following command buttons: Control Room, Binoculars, Voice Tube, Stopwatch, Engine, Compass, and Clock. See "Buttons" (page 58) for details. Related quick keys: Crash Dive [C]; Set Heading to View [H]; Set View to Heading [V]; Identify Target [I]; Man/Unman AA Guns [A]; Man/Unman Deck Gun [D].



Bridge TDC Voice Tube Stopwatch Engine Compass Dive Controls

Binoculars

Accessed via the Bridge or the [F3] key when your boat is surfaced, the Binoculars provide a magnified (7X) view of the horizon, and, like the Periscope, function as a target bearing transmitter for torpedo attacks. As you do with the Bridge and Periscope view, click near the middle of the eyepiece (small cursor) to scan the horizon slowly, and click near the edge (big cursor) to scan quickly (or use the [<.] [>.] keys). You cannot change the Binoculars magnification level.

Below the eyepiece is a gauge showing the relative bearing of the current view. For example, a reading of 90 degrees means you are looking 90 degrees (due starboard) of the bow, regardless of your boat's compass heading.

To select a target ship in the Binoculars, move the center vertical crosshair over the target and press [SPACEBAR]. This selects the current target (indicated by a red cross) and sends its data to the Torpedo Data

Computer (TDC). To "padlock" the selected target (keep it centered in the binoculars), press [ALT]+[F2]. To break the lock, select another view. The longer a target is selected, the more accurate the TDC data will be (crosshairs brighten).

The Binoculars screen uses the following command buttons: Bridge, TDC, Voice Tube, Stopwatch, Engine, Compass, and Dive Controls. See "Buttons" (page 58) for details.

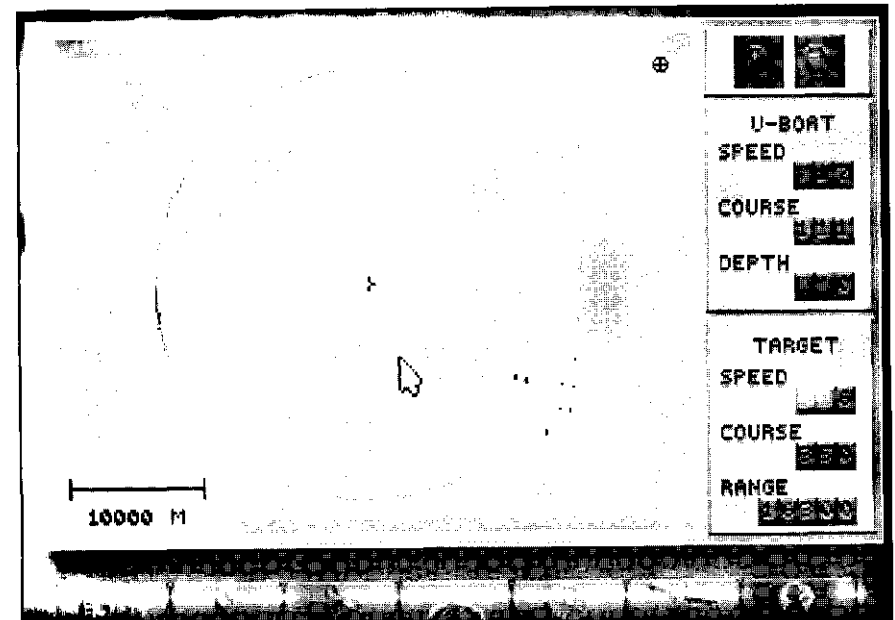
Related quick keys: Crash Dive [C], Set Heading to View [H]; Set View to Heading [V]; Identify Target [I]; Man/Unman AA Guns [A]; Man/Unman Deck Gun [D].

Charts

Accessed from the Control Room or [F5], your Tactical Chart displays a "map view" of the nearby tactical situation, while the larger scale Strategic Chart helps you navigate long distances. To switch between the Tactical Chart and Strategic Chart, click on the Globe button (far right) or press [F5]. The other Chart command buttons are Control Room, Voice Tube, Engine, Compass, Clock, and Dive Controls. See "Buttons" (page 58) for details. Related quick keys: Up/down periscope [ALT]+[P]; Identify Target [I]. (Must be at periscope depth; watch officer performs both.)

Tactical Chart

The tactical chart displays the vessels, ocean, and land in your immediate area. It is always centered on your U-boat and oriented to compass North. Your boat is marked with a black cross, and surrounded by a red circle showing your approximate range of visibility. (If the Limited Visibility realism setting is disabled, you can see all ships in the chart range, regardless of the weather, time of day, or whether you are submerged or not.) If you dive, your dive point is marked with a red square.



Control Room Voice Tube Engine Compass Clock Dive Controls Globe

The charts are animated to provide tactical updates in real time. The tactical chart automatically plots and displays all visible ships, and displays their wakes to highlight course changes. It also displays hydrophone contacts from your sound room as lines along the contact bearing: bright red for high-speed screws (escorts), and gray for low-speed screws (merchant ships), and white for convoys. Similarly, when an enemy is using ASDIC or SONAR to find your boat, you will see the directional "pings" of its underwater search pattern as it tries to locate you (except in Expert Combat mode). You can pick up hydrophone contacts far beyond visual range.

Zoom. Click on the Magnifying Glass buttons to zoom the chart scale in "+" and out "-." The tactical chart has several display scales from 50 meters to 20,000. For larger-scale views, use the Strategic chart (Globe button).

Scale. The scale bar (lower left) displays the chart scale at a given zoom level. For example, at 100 M, the bar represents a distance of 100 meters.

Note: your U-boat must be stopped or moving slowly to use the hydrophone.

U-boat. These indicators display your U-boat's current SPEED (in knots), COURSE (compass heading), and DEPTH (in meters).

Target. These indicators display the current estimated SPEED, COURSE, and RANGE (in meters) of the selected target vessel. Estimate accuracy varies with crew experience, your selected Combat level, and how long the target is selected. To select a target ship from the tactical chart, click on it. (You can also select the ship from the Periscope or Binoculars.) The selected ship will be marked with a red cross, and its estimated target data will be input to all ready torpedoes.

Periscope. If you have selected Limited Visibility, your target data will "fade" when you submerge unless you regularly check the periscope or surface to keep the contact current. To have your watch officer raise or lower the periscope from the chart and update the contacts, press [ALT]+[P]—you will see a periscope icon on the upper right of the chart as long as the scope is up. Press [ALT]+[P] again to lower it.

Note: Don't leave the periscope up, or it will be spotted.

Strategic Chart

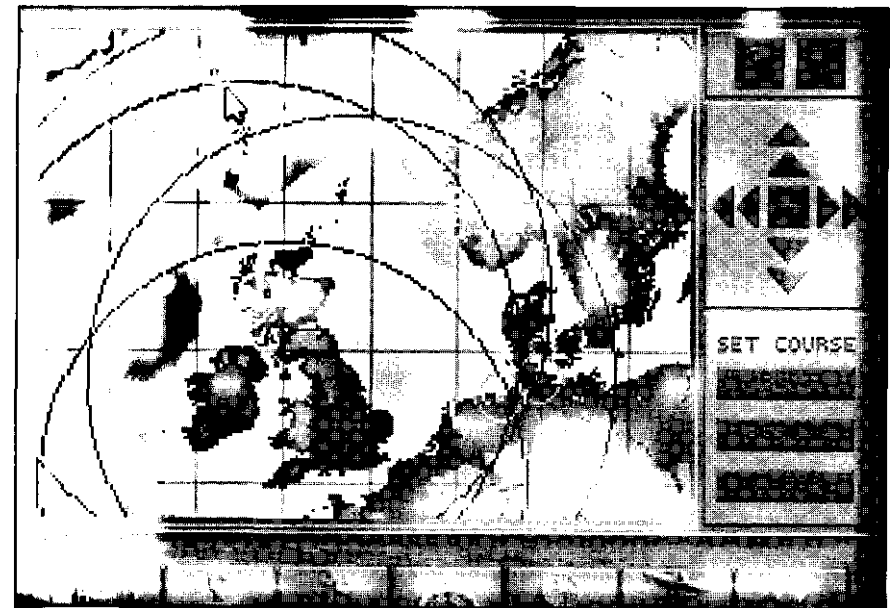
The Strategic chart shows you events on an oceanwide scale, and allows you to plot a course to join up or avoid them.

Note: Use your AOD printed chart to locate patrol quadrants quickly.

Coordinates. The chart will display the latitude, longitude, and *Kriegsmarine* patrol quadrant coordinates of your current mouse cursor position whenever you click on the chart. Use this feature to fix your position and plot courses.

Zoom. As in the tactical chart, click on the Magnifying Glass buttons to zoom the chart scale in "+" and out "-."

Scroll buttons. To center the chart on your sub, click on the U-boat button. To scroll the chart North, South, East, or West, click on the corresponding arrow buttons



Control Room Voice Tube Engine Compass Clock Dive Controls Globe

surrounding the U-boat. The inner arrows scroll slowly, and the outer arrows scroll quickly.

Set Course. These buttons allow you to plot courses all around the North Atlantic. You draw a course as a series of legs, or line segments, with the PLOT function.

PLOT. To set a course, first change the Zoom level to where you can see your destination. Click the PLOT button. Now when you move the mouse cursor, you will see a line stretching between the cursor and your boat's current location. At lower left, the chart will now display the cursor's location in longitude, latitude, and *Kriegsmarine* patrol quadrant, and the PLOT button will now read ENTER.

Ideally, you can plot a straight line course to your destination. (Prevailing winds and currents are not factors.) However, you will usually have to plot the course in segments (legs) to avoid enemy coastlines, aircover, or formations. As you move the cursor to the next navigation waypoint, a valid course is shown with a light gray line. (If the line crosses land, it turns red.) Click at the

waypoint, and the line turns dark gray to set the course for that leg. Continue setting waypoints until you have plotted the course to your destination. To lock in the course, right-click the final waypoint or click on the ENTER button.

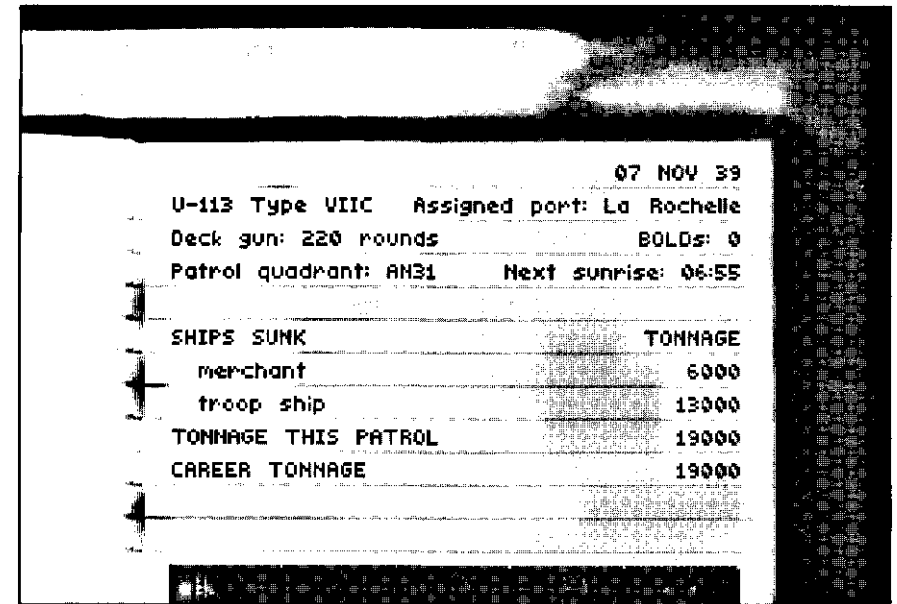
Your boat will now undertake that course until you interrupt with new orders or reach your destination. You can use the Clock to compress time on your journey: it returns you to normal time if your lookouts spot a target or threat. Note: Your navigator will inform you of arrival at your destination, but your boat continues on its last heading and speed until you give new orders.

RESUME. If your U-boat's course is interrupted (you spot a target or are jumped by aircraft, for example), you may return to your course afterward by clicking on the "Resume" button.

CLEAR. To erase a set course, click on the CLEAR button.

Strategic Chart Symbols

- Your U-boat is a red square. Click the U-boat button to center the map on your sub.
- Other U-boats appear as light yellow squares.
- Enemy convoys and warships appear as black or gray squares. Black squares indicate current, reliable contacts. At easy combat levels, contact courses are displayed as white lines. At more difficult combat levels, the course plots disappear, and the black contacts soon fade to gray (become less reliable) if not updated by new intercepts or shadowing reports.
- Enemy air bases appear as blue squares. Each base is surrounded by a blue circle indicating the reported scope of its air patrols. (As escort carriers become more common later in the war, you can expect air attack anywhere.)
- Friendly bases appear as green squares within a green circle. If your U-boat is within one of the green circles, you may radio for a friendly vessel to escort you into the base. This is how you end a War Patrol in the Career mode.

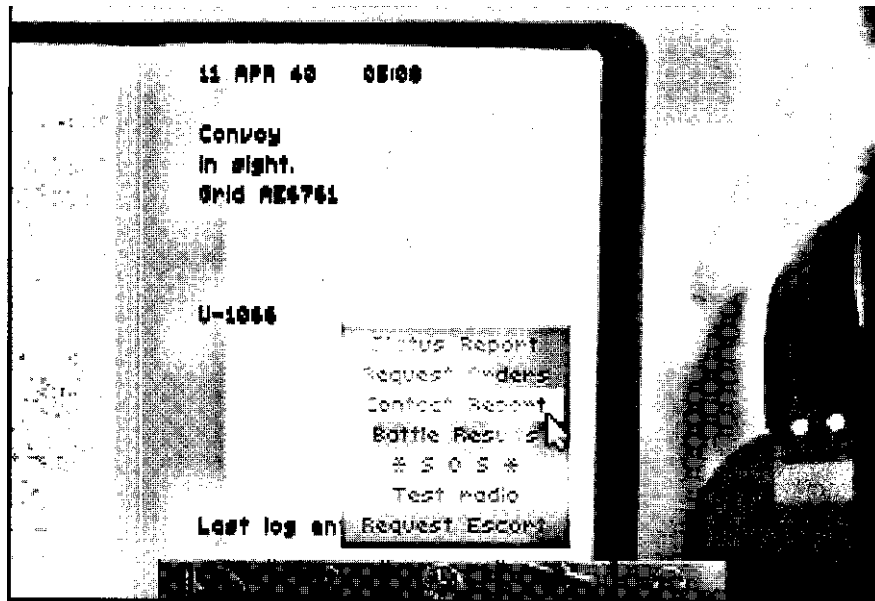


Control Room Voice Tube Stopwatch Clock Radio

Captain's Log

The Captain's Log (accessed from the Control Room hatch or by pressing [F9]) displays the name of your captain (in Career mode), the current date, the number and type of the current U-boat, and its home port. It also shows the number of deck gun rounds and BOLD canisters remaining, and the current patrol quadrant (location), along with the times for the next sunrise or sunset. Below that, the log records a complete list of ships sunk, with the type and tonnage of each vessel sunk for this single mission or for your career (in Career mode).

In Career mode, your log may be many pages long. Click on the left-hand page to page back through the Log, or the right-hand page to page forward. The Captain's Log uses the following command buttons: Control Room, Voice Tube, Stopwatch, Clock, and Radio. See "Buttons" (page 58) for details.



Control Room Voice Tube Clock Dive Controls Radio

Radio Room

Accessed from the Control Room hatch or by pressing [F8], the Radio Room lets you send, receive, and log various messages from U-boat Headquarters (BdU) and other U-boats by clicking on the Radio button. (You cannot use your radio below periscope depth.) It may take a while for a response—your radio mate will alert you when a message is received. Note: Later in the war, any radio use may be detected by Allied HF/DF. Other Radio Room command buttons are the Control Room, Voice Tube, Clock, and Dive Controls. See "Buttons" (page 58) for details.

Note: All reports include current date, time, U-boat number, and patrol quadrant (grid).

Orders and information are tracked in the Radio Log for the duration of your patrol. On long patrols, your radio log may be many pages long. Click on the left-hand page to page back through the Log, or the right-hand page to page forward.



Courtesy National Archives

Hydrophone gear in the sound room of U-505.

Message Options:

Status Report—Inform BdU of fuel status, torpedoes remaining, and location. (See Torpedo room for complete torpedo inventory.)

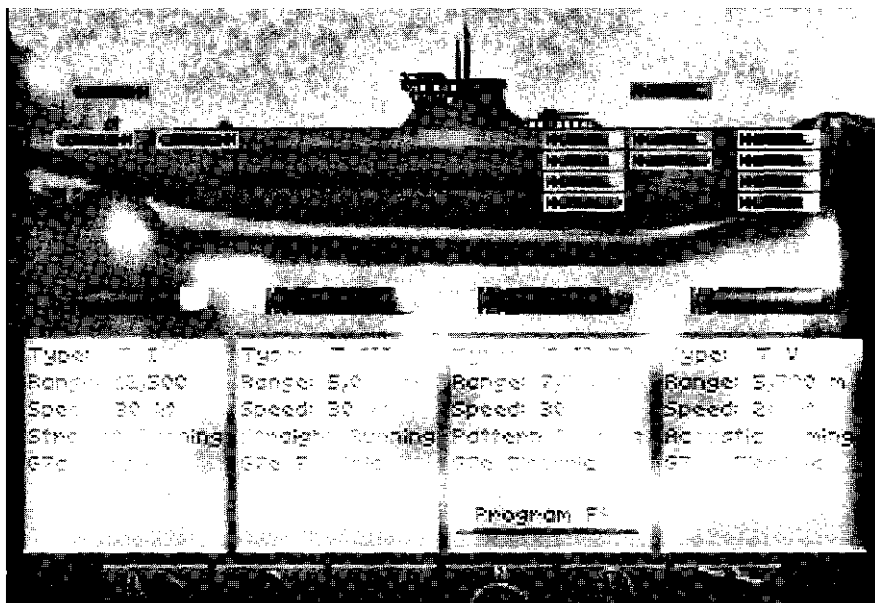
Request Orders—Request new or additional orders from BdU on a arrival at a designated area.

Contact Report—Report or update an enemy ship sighting. This will help BdU and other U-boats coordinate a wolf pack attack on the contact.

Battle Results—Reports type, number, and estimated tonnage of any sinkings to date on this patrol. Sinkings you report are added to your record, even if you do not survive the patrol. See "Captain's Log" (page 51) for Career sinkings.

SOS—Broadcasts "Attacked! Sinking!" Sending an SOS is your only chance of being assisted or rescued by friendly forces.

Request Escort—Asks for an escort ship or minesweeper to guide you into a friendly base. You must be within the range of a friendly base's escorts (green circle on strategic map). This is how you end a War Patrol in Career mode.

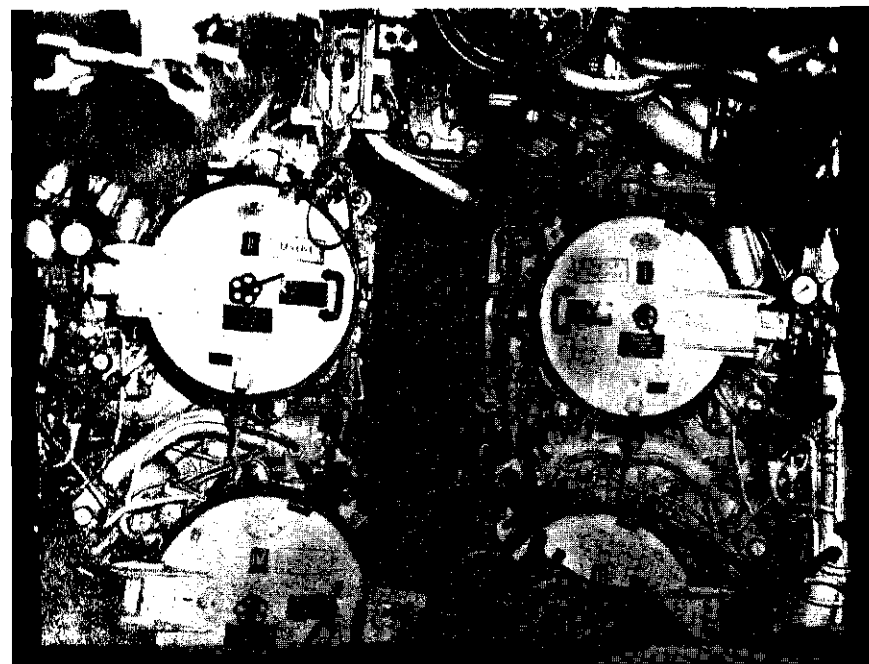


Control Room Voice Tube Engine Compass Clock Dive Controls

Torpedoes

Accessed from the Control Room hatch or by pressing [F6], the Torpedoes screen helps you manage torpedo moving and reloading. (You will use the TDC—Torpedo Data Computer—to fire torpedoes.) The Torpedoes screen uses the following command buttons: ControlRoom, VoiceTube, Engine, Compass, Clock, and Dive Controls. See "Buttons" (page 58) for details.

The U-boat diagram displays your current torpedo location and status. Depending on your boat type, you may have torpedoes located in bow and stern torpedo firing tubes, interior storage slots (inboard of the torpedo tubes) and external storage slots (shown above deck). Torpedoes that are ready to move or fire are shown with a green background. If a torpedo is being moved to or from a tube, both the tube and storage slot will have a yellow background until the transfer is complete. To see how much longer the transfer will take, point to the firing tube ("Status" cursor) and click, and the mate will tell you the time remaining. (You may



Courtesy National Archives

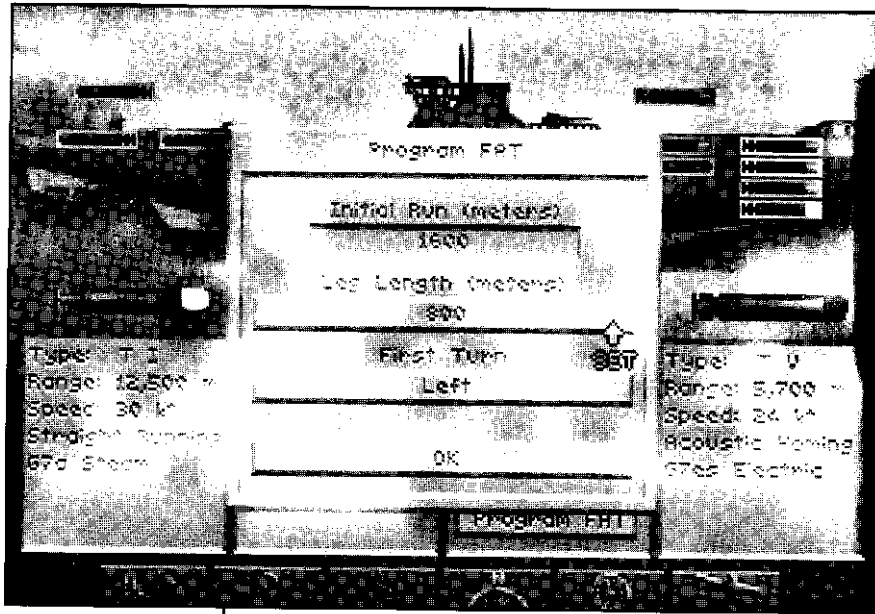
The forward torpedo tube interior doors on a Type IX U-boat.

not cancel a transfer in progress.) A damaged tube is shown in red, and is unusable until repaired.

You may make torpedo loading automatic by enabling the Autoreload function (see "Simulation Options," page 69). If you prefer to manage torpedoes yourself, turn Autoreload OFF and use the following procedures.

To load a torpedo from storage to an available firing tube (empty, green) click on a stored torpedo (green background) to select it, then click on the empty tube. Both "slots" will turn yellow to indicate the transfer is underway, and the torpedo mate will tell you how much time loading will take.

You may move externally stored torpedoes inboard at either end. Be aware that your deck hatches must remain open throughout the transfer, and you will not be able to dive for up to two hours. Also, you may not transfer internally stored torpedoes to the other end of the boat.



Control Room Voice Tube Engine Compass Clock Dive Controls

The available torpedo types increase during the course of the war. You may have up to four types: each will be described below the sub diagram. See "U-boat Weapons" in the on-line manual for details.

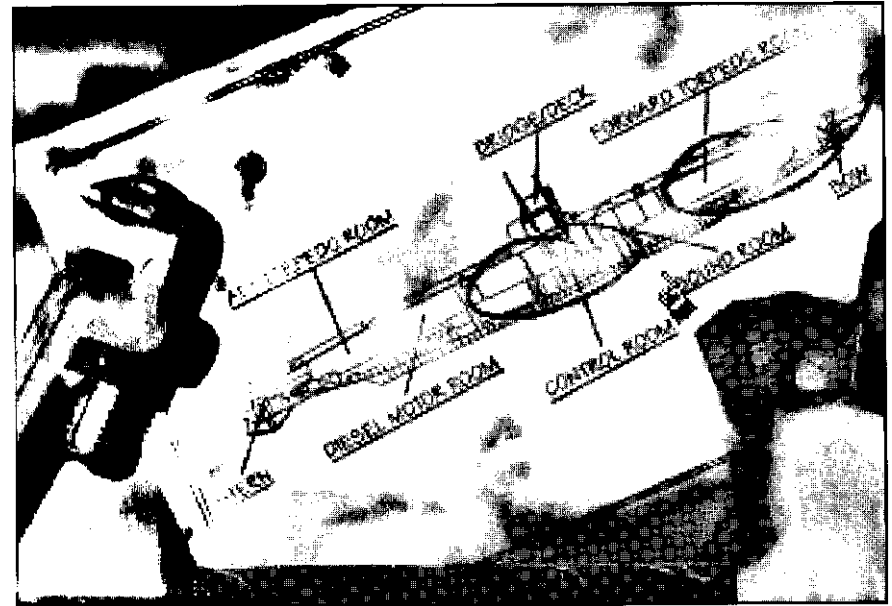
Program FAT—If you are carrying FAT torpedoes, you can click this button to view or change the default running pattern of all your FATs. (FATs became available later in the war.) If a FAT misses on its initial run, it will run a large zigzag to the left or right until it hits something or depletes its batteries.

Initial Run (Meters)—This is the distance the FAT will run straight before starting a zigzag pattern. This entry should be the distance to your initial target or greater.

Leg Length (Meters) — This defines the width of the zigzag pattern: either 800 or 1,600 meters.

First Turn—After its initial run, the FAT turns to the left or right to start the zigzag. Make this turn into the main body of the convoy to maximize odds of a hit.

Note: Once you fire a FAT, dive or steer clear of its pattern—it doesn't care what it hits.



Control Room Voice Tube Stopwatch Clock Dive Controls

Damage Report

Accessed from the Control Room hatch or by pressing [F7], the Damage Report screen shows you a blueprint of your boat, with any damaged areas circled in red. To see a list of the damaged equipment in a circled area, click on the area. You can then click on the listed item(s) to see a report of the damage severity, estimated repair time, status, and notes relevant to operations. You may continue to monitor repairs as they are being completed. Not all items could be repaired at sea—at higher levels of realism, you may have to return to base before some items can be fixed. The Damage Report screen provides the following command buttons: Control Room, Voice Tube, Stopwatch, Clock, and Dive Controls. See "Buttons" (page 58) for details.

Buttons

This section describes (in alphabetical order) the gray command buttons that appear throughout the simulation to provide access to controls, menus, or other screens or areas of the boat: Binoculars, Bridge, Clock, Compass, Control Room, Dive Controls, Engine, Globe, Headphones, Stopwatch, TDC, and Voice Tube. Most of these buttons appear in several screens. Click the button to access the associated control or areas. When done with the control, you may right-click or press [Esc] to close the display, or leave it open—the next screen or control you open will replace it.



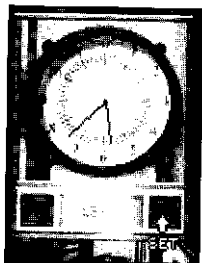
Binoculars [F3]

On the Bridge, click this button to bring up the Binoculars and the surface targeting sight. See the "Binoculars" command screen section for details on using the Binoculars and tracking surface targets. Related quick keys: Crash Dive [C], Set Heading to View [H]; Set View to Heading [V]; Identify Target [I]; Man/Unman AA Guns [A]; Man/Unman Deck Gun [D].



Bridge [F4]

In the Binoculars screen, click this button to go to the Bridge view. See the "Bridge" Command Screen section for details on Bridge operations. Related quick keys: Crash Dive [C], Set Heading to View [H]; Set View to Heading [V]; Identify Target [I]; Man/Unman AA Gun [A]; Man/Unman Deck Gun [D].



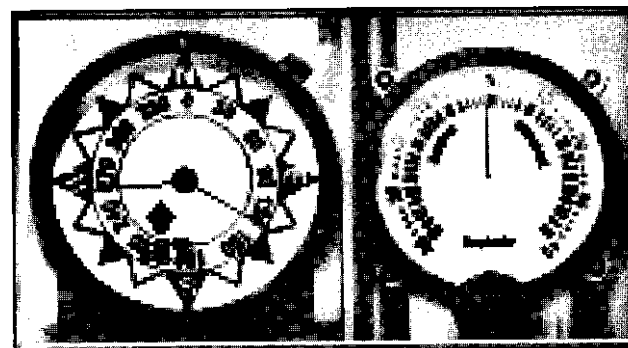
Clock

Click this button to see the local time in military notation (0-12 for am, 13-24 for pm) and to check or set the current level of time compression. Related quick keys: [+] to increase or [-] to decrease time compression, [ENTER] to set to 1:1.

To set/change time compression, click on the clock's scroll bar arrows—compression may be set from 1 to 4096 by powers of two. Time compression is automatically halted if your crew spots a new enemy target or threat. Higher levels of time compression may not always be available due to the combat situation or your PC's computing capacity.

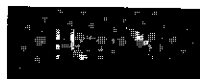
Compass

Click this button to access the interlinked Compass and Rudder controls. You may also access these controls directly from the Control Room (middle right). Related quick keys: Right Rudder (right cursor or keypad [6]); Left Rudder (left cursor or keypad [4]); Center Rudder [5].



The Compass shows your current course as a red line, and your ordered course (if different) as a blue line. To change course, click on the Compass "rose" in the desired direction, and a blue line will appear to mark the new heading. The boat will then come around to the chosen compass heading automatically. (Note: the boat must be underway to change course.) In contrast, the Rudder lets you manually set the boat's rudder from 1-40 degrees port (left/red) or starboard (right/green). The vertical red line shows a straight rudder: click on the desired number of degrees rudder left or right, or press [4] or [6] on the numeric keypad. Once the rudder is set, it keeps turning the boat until you recenter the rudder. To recenter the rudder, click on the rudder's red center

line, click on the Compass, or press the center key [5] on your numeric keypad.



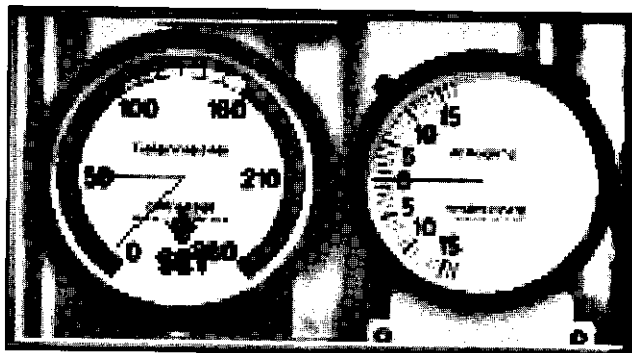
Control Room [F1]

Click this button to go straight to the Control Room. The various screens and controls you can access from the Control room are described in their specific sections.



Dive Controls

Click this button to access the interlinked Depth Gauge and Dive Plane (Inclinometer) controls and change the boat's depth. These controls are directly available on the right bulkhead of the Control Room. Related quick keys: Crash Dive [C]; Periscope Depth [P]; Surface [S]; and Dive Planes Up [8], Down [2], Level [5].



Depth Gauge. The Depth Gauge shows the current depth of the boat as a red line, and the ordered depth (if different) as a blue line. To move the boat to a specific depth, click on that depth: a blue line will appear there, and the boat will make its best climb or descent to the indicated level. Safe depths are shown in the green part of the gauge, and you may descend to depths in the yellow range if your pumps or hatches are not seriously damaged. Your boat is not rated for depths marked in red—if you descend into the red, you risk discovering your particular U-boat's crush depth first-hand. Note: you may make the boat descend or ascend without

forward motion, as long as you have sufficient compressed air and working pumps. To ascend immediately to the surface, Blow Tanks (from Voice Tube—Chief Engineer).

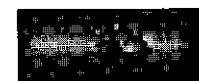
Akin to the rudder, the Inclinometer shows the up or down angle of the dive planes (hydroplanes), the small horizontal "wings" on the boat that allow it to use engine thrust to dive or climb through the water when submerged. To set the dive planes manually, press the Up arrow [8] or Down arrow [2] keys on your numeric keypad, and press [5] to level off. In a crash dive, the Engineer puts the engine at flank speed and sets the dive planes to drive the boat deep quickly. A crash dive continues to 150 meters, unless you select another depth. If you order crash dive from below 150 meters, the dive continues (past crush depth!) unless you select a specific depth to level off.

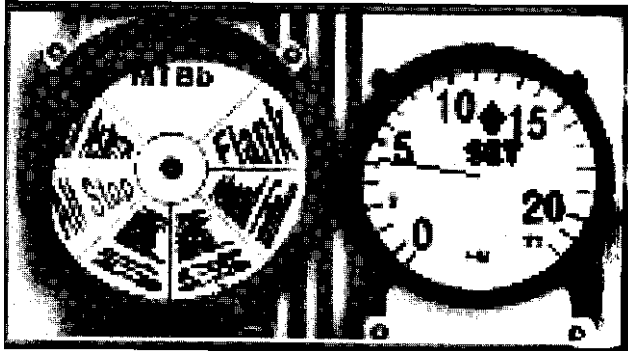
Note: The speed with which your boat can change depth depends on your boat's speed, your crew quality, and your Sailing Model settings. It takes a long time to surface from a great depth, even if you blow your ballast tanks. If you have an emergency, such as a severe leak, or chlorine gas contamination from cracked battery casings, you may not have time to reach the surface. Also, outside pressure may prevent your pumps from ejecting water from the boat, and the bilges will begin to fill—the only remedy is to come up to a depth that allows the pumps to work.

Engine

Click this "propeller" button to access the interlinked Engine Room Telegraph and Speed Gauge controls. You may also access these controls directly from the Control Room (upper right). Related quick keys: Battery Gauge [B]; Fuel Level [F], Engine Setting [1]...[6].

Together, these controls set your U-boat's speed. Click on the Telegraph or press number keys [1] through [6] to order your diesel engines or electric motors to a





given direction and power level setting: Full Astern, All Stop, Ahead 1/3, Ahead 2/3, Ahead Full, or Flank (emergency). Alternatively, click on the Speed Gauge to set a specific speed in knots, and the Telegraph will shift to the appropriate settings. The boat's actual speed depends on if you are surfaced, submerged, or damaged. It also depends on your Sailing Level realism selection.

Note: By default, the boat runs on diesel engines when surfaced and electric motors when submerged. Low speeds conserve fuel. When your boat is submerged, higher engine settings are more easily detected by enemy hydrophones. Flank speed on the electrics will deplete the batteries in about one hour. If you lose power, you will be unable to run your pumps, and will have no power to drive the boat to the surface.



Globe

In the Charts screens, click this button or press [F5] to switch between the Tactical Chart and the Strategic Chart. See the "Chart" section, page 46, for details on using the charts.

Radio Headphones

Click this button to choose the type of radio message to send. Where appropriate, the response to your message will appear in the radio log.

Radio Message Options:

(Note: All reports include current date, time, U-boat number, and location.)

Status Report—Inform BdU of fuel status, torpedoes remaining, and location. (See Torpedo room for complete torpedo information.)

Request Orders—Request new or additional orders from BdU on a arrival at a designated area.

Contact Report—Report or update an enemy ship sighting. This will help BdU and other U-boats coordinate a wolf pack attack on the contact.

Patrol Results—Reports type, number, and estimated tonnage of any sinkings to date on this patrol. Sinkings you report are added to your score even if you are sunk later in the mission. See Captain's Log for Career sinkings.

SOS—Broadcasts "Attacked! Sinking!" Sending an SOS is your only chance of being assisted or rescued by friendly forces.

Request Escort—Asks for an escort ship or minesweeper to guide you into a friendly base. You must be within the range of a friendly base's escorts (green circle on strategic map). This is how you end a War Patrol in Career mode.



Stopwatch [W]



Click this button or press [W] to see estimated run time and status for all fired torpedoes.

Whenever torpedoes are launched, your crew will mark the status of each on the stop watch as follows: Black mark=torpedo has over one minute to go; Blue mark=torpedo should hit when the sweep second hand reaches the mark; Red mark=past due to hit—a probable miss or dud. At higher realism levels, this may be your only indication that a torpedo has missed the target.



Torpedo Data Computer (TDC) [T]

Click this button to access the Torpedo Data Computer, or TDC. This panel is also directly available on the left bulkhead of the Control Room, but you will normally operate it from the Binoculars or Periscope.

The TDC gives you information about your selected target, calculates the proper torpedo firing angle or "solution," and allows you to fire "spreads" of torpedoes. It continually updates target information on the selected ship for all torpedoes. (To select a target, you must center it in the Binoculars or Periscope and press Spacebar, or click on it in the Tactical Chart.) Note: TDC data is supplied by your lookouts—its accuracy depends on your crew's experience, and how long you have been tracking this particular target.

Bearing—Indicates in degrees the direction to the selected target relative to your boat. 0 or 360 degrees is straight ahead, 90 degrees is off the starboard beam, 180 is due astern, etc.. Although advanced torpedoes can follow course changes of up to 135 degrees, your firing tube(s) should be aimed within 20 degrees of the selected target to give the "eel's" gyroscopes the best chance of guiding it accurately the rest of the way.

Note: Your targeting crosshairs will brighten as the data becomes more accurate.

Speed Indicates the estimated speed of your target in knots. Fast, agile targets such as warships can be difficult to hit with anything less than a perfect firing solution.

Range—The estimated range to the selected target in meters. Torpedoes must run at least 250 meters before their detonators are armed. Beyond that, distance increases the difficulty of the shot.

Heading—The estimated current heading of your selected target. Expect convoys to change course frequently. Plan your firing solution so the torpedoes hit the target at as close to a right angle as possible, and avoid head-on or tail shots if you can.

Fire Buttons—The numbered button lights at the bottom of the TDC show the status of your corresponding torpedo tubes. Ready tubes are bright red. Tubes that are empty or being loaded are dark red. To fire a ready torpedo using the current TDC data, click the corresponding tube's button.

The number of torpedo tubes depends on your U-boat type: the top row shows forward tubes, and the bottom row shows stern tubes (if any). A Type II boat has three forward tubes only; a Type VII has four forward tubes and a fifth stern tube; a Type IX has four forward tubes and two stern tubes.

Offset—Torpedoes fired together will normally follow the same track to the target, differing only by the movement of your boat between launches. While you always want to fire your first eel straight, you may also fire subsequent torpedoes in a "spread," each with a slightly different course, to ensure a hit. To define a spread, use the Offset "dial" just above the Fire Buttons. Zero represents center, the TDC bearing; click the arrows on the dial sides to offset this bearing by X degrees for the next torpedo.



Voice Tube

Click this button, available in all command screens, to give or delegate orders to crew members in other sections of the boat. You'll first select the crew member/area, and then the specific order, from the menus that open. To cancel a voice command, right-click or press [Esc]. Options that don't apply to your particular boat or mission will be grayed-out (not available). Related quick keys are shown next to the appropriate commands. Note: To see the last voice message to you, press [BACKSPACE].

Chief Engineer

Periscope Depth—Submerge (or rise) to periscope depth. Quick Key = [P]

Crash Dive—Dive as rapidly as possible: flood tanks, down dive planes, flank speed. Continue diving to 150 meters unless told otherwise. Quick Key = [C]

Blow All Tanks—Rise as rapidly as possible: blow out ballast water with compressed air, elevate dive planes, flank speed. Quick Key = [Alt]+[B]

Surface—Bring the boat to the surface. Quick Key = [S]

Damage Report—Go to Damage Report screen.

Oxygen Remaining—Show how much breathable air is inside the U-boat. Quick Key = [O]

Deploy Snorkel—(if equipped with snorkel). Go to snorkel depth and raise snorkel. This device, available towards the end of the war, allows U-boats to pipe down air from the surface to run diesel engines while submerged. The snorkel lets you travel submerged without draining batteries, but its large head may be spotted visually or by radar more easily than the periscope. Note: You must keep your speed under seven knots for the snorkel to work properly.

Stow Snorkel—(if equipped with snorkel). Lower snorkel and switch to electric motors.

Engine Room

Battery Level—Shows amount of remaining battery power. (If you have selected the Unlimited Battery realism setting, you will always have a full battery charge.) Quick Key = [B]

Fuel Level—Shows amount of remaining diesel fuel. (If you selected the Unlimited Fuel realism setting, you will always have full diesel tanks.) Quick Key = [F]

Sound Room

Report Contacts—Report current or last hydrophone contact. You must be running slowly to use hydrophones. Also, hydrophones work very poorly below 200 meters.

Depth under Keel—Report distance between keel and bottom. Use to check diving room, and avoid running aground.

Record Player—Select a record to pipe through the boat for the crew.

Torpedo Room

Report—Brings up Torpedoes screen.

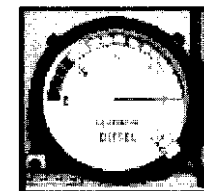
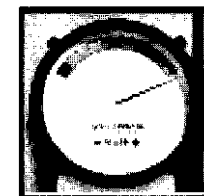
Launch BOLD—Launches a bubbling canister that interferes with ASDIC.

Watch Officer

Man/Unman AA Guns—Orders men to antiaircraft (flak) guns. AA fire is automatic. Quick Key = [A]

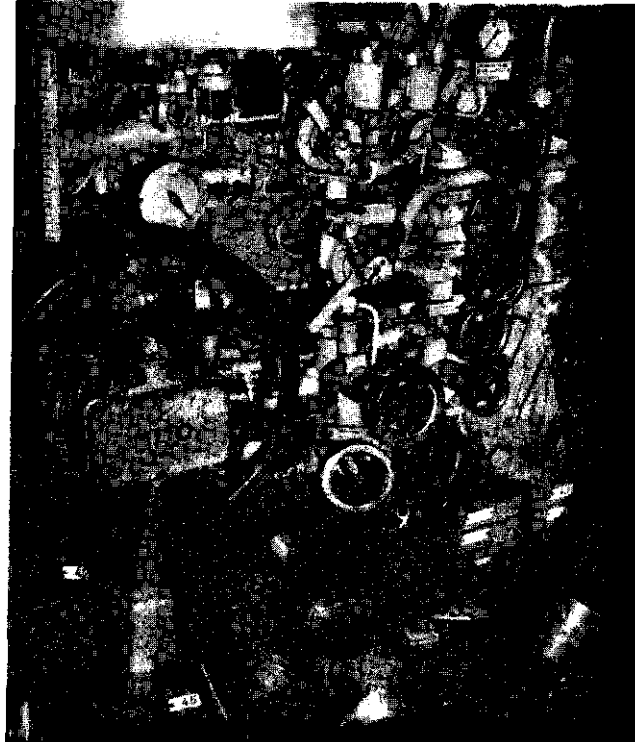
Man/Unman Deck Guns—Prepares deck gun for firing, for boats that have one. Once a target is selected, firing will continue until the target is destroyed, a new target is chosen, or you order the gun abandoned. Quick Key = [D]

CEO of the DEEP



Note: Deck gun and AA gun accuracy are impaired by time compression. The greater the compression, the less accurate your fire will be.

Diving plane
control station and
valveabroadU-505



Courtesy National Archives

Report Contacts—Report current or last contact.

Identify Target—Estimates vessel type and gross tonnage of currently selected target. The estimates improve at close range. Quick Key = [I]

Rig for Silent Running—Must be submerged. Lower speed to two knots, turn off pumps and ventilation, and send non-essential personnel to bunks.

All Stations

Abandon Ship—If your boat is on the surface or in shallow water, your crew will abandon the vessel as best they can. This usually results in your capture, but you may be rescued if you radio an SOS first.

Radio Room

Opens Radio Room screen.

Simulation Options Menu



At any point in the simulation (at sea), you may access the following options by pressing [CTRL]+[O] and clicking on the appropriate button. The simulation is paused until you select OK to close the Options menu.

- **Music On/Off**—Turns the music sound track on or off. Also [CTRL] + [M]
- **Sound Effects On/Off**—Turns all simulation sound effects on or off.
- **Engine Sound On/Off**—Turns the engine sound effect on or off.
- **Crew Speech**—Requires installation of additional Speech Disk. Turns the crew speech sound effect on or off, and toggles between languages.
- **Torpedo Screen On/Off**—Turns the torpedo firing animation on or off.
- **Torpedo Autoreload On/Off**—If turned on, Autoreload automatically reloads empty torpedo tubes with the next available torpedo (selected by shortest reload time). With Autoreload turned off, you manage all aspects of torpedo reloading yourself in the Torpedoes screen [F6].
- **Calm Ocean On/Off**—This setting overrides the weather simulation, providing you with smooth sailing as long as it is turned on.
- **Status Line On/Off**—This setting displays your current course, speed, depth, depth under keel, and time compression settings in the upper left of the simulation screen as long as it is turned on. [CTRL]+[I]
- **Load Game**—Careers only. End current mission, resume previously saved career.
- **Save Game**—Careers only. Save current mission (must not be in combat with the enemy.) If the Saved Careers list is full, select an earlier career to overwrite. You may add descriptive text to help you select the mission later.
- **Abort Mission**—Abort current mission and return to the menus. Note: If you abort on a war patrol, you will lose any score earned on the mission so far.
- **Quit to DOS**—Exit immediately to DOS.
- **OK**—Close the Options menu and return to the simulation.

Note:

CTRL+] OR CTRL+[
adjusts sound
volume.

ALT+] OR ALT+[
adjusts music
volume.

Quick Reference

Control Room	[F1]	Man/Unman AA Gun	[A]
Periscope	[F2]	Check Battery Level	[B]
Binoculars	[F3]	Crash Dive	[C]
Bridge	[F4]	Man/Unman Deck Gun	[D]
Charts	[F5]	Check Fuel Level	[F]
Torpedoes	[F6]	Set Heading to View	[H]
Damage Report	[F7]	Launch BOLD	[Ctrl]+[R]
Radio Room	[F8]	Identify Target	[I]
Captain's Log	[F9]	Fire Tube	[Ctrl]+[1]...[Ctrl]+[6]
Torpedo Camera/ Victim View	[F10]	Check Remaining Oxygen	[O]
		Periscope Depth	[P]
Increase Time Compression	[+]	Surface Boat	[S]
Decrease Time Compression	[-]	Blow Tanks	[Alt]+[B]
Reset Time to 1/1	[Enter]	Open TDC	[T]
Repeat Last Message	[Backspace]	Set View to Heading	[V]
Select/Deselect Target	[Spacebar]	Zoom Periscope Mag.	[Z]
View Left	[<.]	Padlock View	[Alt]+[F2]
View Right	[>.]	Raise/Lower Scope (in chart)	[Alt]+[P]
Status Line	[Ctrl]+[I]	Stopwatch	[W]
		Abort Mission	[Ctrl]+[D]
Dive Planes Up	[↑]	Options Menu	[Ctrl]+[O]
Left Rudder	[←]	Pause	[Ctrl]+[P]
Straight and Level	Keypad [5]	Music On/Off	[Ctrl]+[M]
Right Rudder	[→]		
Dive Planes Down	[↓]	Quit to DOS (confirm first)	[Ctrl]+[Q], [Alt]+[X]
Engine Speed	[1]...[6]	Quit to DOS (don't confirm)	[Ctrl]+[Alt]+[Del]

APPENDICES



Appendix A Troubleshooting

Problem: I have installed *Aces of the Deep* on a compressed drive, and it does not run.

Possible solution: AOD may need more disk space. Compression software estimates available disk space using an expected compression ratio of 2 to 1 or more. However, many AOD files will not compress much. This means you may need to free up to twice as much space as the compression software says.

Problem: After upgrading to MS-DOS 6.0, I can no longer run AOD. I keep getting an "Out of Memory" error.

Possible solution: If you have installed MS-DOS 6.0 and run the MemMaker utility, it may have configured your computer's memory so that there is no longer enough conventional memory to run AOD. See your MS-DOS 6.0 manual, or try the Boot Disk option in the INSTALL program.

Problem: My computer has at least 4 megabytes of memory, but even after creating a boot disk, I still receive a message saying that I do not have enough memory to run the game.

Possible Solution: Your boot disk may require further modifications to load your device drivers correctly into upper memory. See the "Customizing the Boot Disk" section, or consult your computer system manual or manufacturer for assistance.

Problem: My mouse is not responding.

Possible Solution: Your mouse driver may not be loaded for MS-DOS programs. You will need to edit the AUTOEXEC.BAT or CONFIG.SYS files on the boot disk to include your mouse driver. See "Mouse Drivers," page 79.)

Problem: I have a SCSI drive and *AOD* does not work properly.

Possible Solution: There are incompatibilities between SMARTDRV.SYS and SCSI drives. Do not use SMARTDRV.SYS for *AOD* if you have a SCSI drive.

Problem: I am getting vertical white bars or other graphic anomalies in the game.

Possible Solution: You may be using a mouse driver that is not fully compatible. *AOD* requires a 100% Microsoft compatible mouse.

Error Messages

This section offers possible solutions for error messages you may encounter.

YOU NEED XXX MORE BYTES OF FREE MEMORY AVAILABLE TO RUN THIS GAME. Try using a boot disk.

CRC ERROR.

DATA ERROR READING DRIVE (A or B or C or D)

SECTOR NOT FOUND READING DRIVE (A or B or C or D)

These mean you have a faulty game disk or CD, and should return it for a replacement.

ASSERT ERROR...

The program cannot load a file because of insufficient memory, or because the file is missing or corrupted. You should be able to avoid this by keeping your files in the default directories and configuring your PC correctly for the game.

Appendix B Configuring Memory

Even if you have the minimum 4MB of RAM, *Aces of the Deep* may not run correctly unless the RAM is configured (set up) correctly for the game. If *Aces of the Deep* DOES NOT start correctly, use the MS-DOS MEM command to see if you need to free up some of your computer's memory. From MS-DOS, type mem and press [ENTER].

You need about 3,320 kilobytes (KB) of free memory to run *Aces of the Deep*. MS-DOS 6.0 or later shows this as "Total Free Memory." If you have MS-DOS 5.0, add "Largest executable program size" (free conventional memory), "bytes free EMS" (free expanded memory,) and "bytes available XMS" (free extended memory). Together, they must add up to about 3,400,000 bytes (3,320 KB) total free memory. If you do not have enough free memory, you probably have resident or "background" programs and device drivers taking up memory that the game needs. This means you will need to free up memory for *AOD* by reconfiguring or removing one or more of these programs.

Freeing up Memory

1. If you cannot run *AOD* because of low memory, try the Install program's "Make Bootable Floppy Disk" option as described below. A boot disk is a fast and effective way of freeing more memory to run the game.
2. If you continue to have problems even with a boot disk, try customizing the bootdisk's AUTOEXEC.BAT and CONFIG.SYS start-up files. See "Customizing the Boot Disk," below, for details.

3. Consult your DOS and memory manager software documentation for detailed information about system memory and how to optimize it.

Creating a Boot Disk

A boot disk is the simplest way to configure your computer's memory for running *AOD*. The *AOD* Install program has a "Make Bootable Floppy Disk" option that makes creating a boot disk easy. If you set it up successfully, all you will have to do is put the boot disk in your floppy drive and restart the computer to configure its memory correctly and launch the game.

Although the "Make Bootable Floppy Disk" option does a very good job of configuring most systems, it may not be able to properly recognize every possible sound card, mouse, or disk-controlling device driver. This means that you might have to make additional changes to the boot disk to get the program running. If you are having trouble starting the game, try "Make Bootable Floppy Disk"—it can't hurt. If it does not work, however, proceed to the "Customizing the Boot Disk" section, below.

"Make Bootable Floppy Disk" Option

You can use the Install program to format and create a *AOD* boot disk for your computer's A: drive. Before you start, have a blank or formattable floppy disk for your A: drive ready. (All files on it will be erased.)

1. Run the Install program from your hard disk's AOD directory, or from the CD.
2. From the Installation Choices window, select "Make Bootable Floppy Disk."
3. The Install program will guide you through the process—follow the on-screen prompts carefully. Insert the blank diskette into your A: drive when prompted. Install will use DOS commands to format the floppy disk and write all the necessary start-up files to it.

When the process is finished, exit the Install program. You can then re-boot your computer with the boot disk in the A: drive.



Using a Boot Disk

The boot disk you have created with the Install program's "Make Bootable Floppy Disk" option contains a stripped-down version of your usual start-up files. You must start (or restart) your computer with the boot disk in the A: drive for it to work. (Note: a boot disk will work only in the A: drive).

1. Place the boot disk in the A: drive and start the computer. (If your computer is already running, exit any programs and restart the system with your PC's Reset button, or use [Ctrl]+[Alt]+[Del] from the keyboard.)
2. The computer will start up using the boot disk's memory configuration. (If you created the boot disk with the Install program from within the AOD directory, it will also try to start the game automatically.) Otherwise, start the game manually by entering **aod** as usual in your AOD directory. (To return your computer to its normal setup later, just restart it again without using the boot disk.)

Customizing Your Boot Disk

To customize a boot disk configuration for your specific system, you can edit the CONFIG.SYS and AUTOEXEC.BAT start-up files on the boot disk the install program created, or create a new Boot Disk from scratch. CONFIG.SYS and AUTOEXEC.BAT are simple text files that you can edit using your MS-DOS EDIT utility, the Windows Notepad, or your preferred word processor in its text-only mode. On your hard drive, these files tell your computer how to arrange its memory for normal operation. On the boot disk, these files tell your computer how to arrange its memory specifically for running *AOD*.



Courtesy National Archives

A depth charge leaves its launcher.

Warning: Manually altering the CONFIG.SYS and AUTOEXEC.BAT start-up files can be a trial and error process. When opening a file to edit, triple-check to MAKE SURE you are working with the files on your boot disk in the A: drive. Otherwise, you may change the CONFIG.SYS and AUTOEXEC.BAT files on your hard drive instead, which in turn may impair the normal operation of your system.

If you prefer to create a boot disk from scratch, you will need a freshly formatted system diskette for your A: drive. (See your MS-DOS manual for details on how to create a system diskette.) You can then create a new CONFIG.SYS and AUTOEXEC.BAT from scratch right on the boot disk.

Compare the CONFIG.SYS and AUTOEXEC.BAT files on your boot disk to the following examples. Differences may indicate places where you can remove a driver, load it into upper memory, or change a device switch to use less memory. As always, refer to your system reference manuals if unsure about anything.

These examples show a "minimum configuration" that will let you run AOD on most PCs. The lines in your start-up files will differ according to your system's drivers and directory names, and the version of MS-DOS you use. (NOTE: Parentheses indicate comments that are NOT part of the file.)

Sample Boot Disk CONFIG.SYS File

```

DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\DOS\EMM386.EXE
(You may use a different memory manager)
DOS=HIGH,UMB
(Loads DOS into Upper Memory)
FILES=30
BUFFERS=20
BREAK=ON
LASTDRIVE=Z
DEVICEHIGH=C:\MOUSE\MOUSE.SYS
DEVICEHIGH=C:\DOS\DBLSPACE.SYS/MOVE
(Only if using DBLSPACE. See "Disk Compression Drivers," below.)
DEVICEHIGH=C:\DRIVE\CDROM.SYS /D:MSCD001 /P:220
(See "CD-ROM" Drivers, below.)

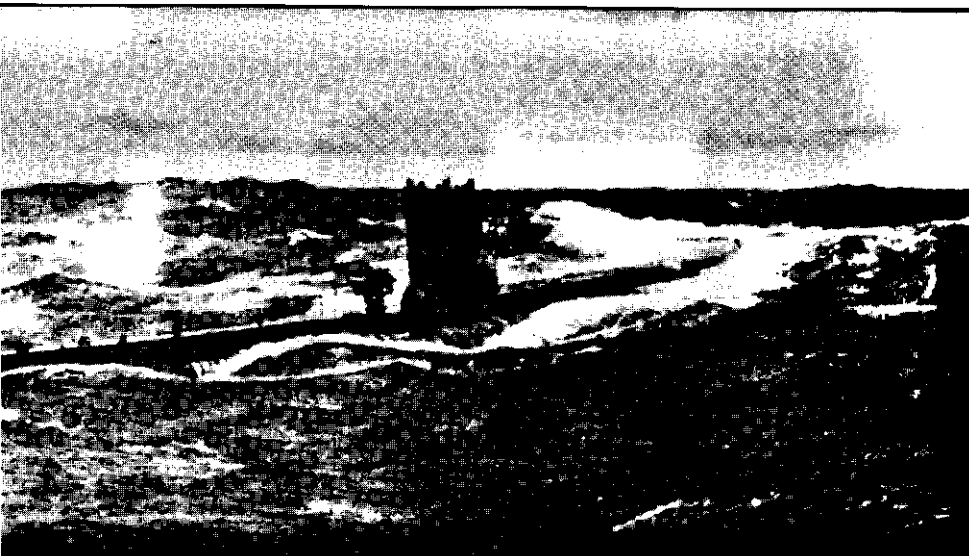
```

Sample Boot Disk AUTOEXEC.BAT file

```

9ECHO OFF
PROMPT AOD Boot Disk $P$G
(If you are working with files created with "Make Bootable Floppy Disk.")
PATH=C:\DOS
SET COMSPEC=C:\COMMAND.COM
(Will use your actual COMMAND.COM location)

```



Courtesy National Archives

One of the more than seven hundred Type VII U-boats built in German shipyards during the Second World War.

LOADHIGH C:\MOUSE\MOUSE.COM

(Only if you do not use MOUSE.SYS in CONFIG.SYS. See "Mouse Drivers.")

C:\DOS\MSCDEX /D:MSCD001

(See "CD-ROM Drivers.")

C:

(From "Make Bootable Floppy Disk." Changes to hard drive.)

CD C:\DYNAMIX\AOD

(From "Make Bootable Floppy Disk." Changes to current AOD directory.)

aod

(From "Make Bootable Floppy Disk." Starts/AOD.)

To disable a line in one of your start-up files, you can just type REM in front of it. For example, REM DEVICEHIGH=C:\MOUSE\MOUSE.SYS will disable the mouse driver. To re-enable it, just take the REM back out again.

Mouse Drivers

If you have a mouse, the Install program will have assumed that you want to be able to use it with AOD, and put a mouse statement on the boot disk. This means you should have one mouse driver line in either your CONFIG.SYS or AUTOEXEC.BAT file—but not both! For example:

DEVICEHIGH=C:\MOUSE\MOUSE.SYS (Used in the CONFIG.SYS file only)

LOADHIGH C:\MOUSE\MOUSE.COM (Used in the AUTOEXEC.BAT file only)

If you have a different mouse driver name (MOUSE.EXE, IMOUSE, GMOUSE, HPMOUSE, etc.) or if you keep the driver in a different directory (C:\MSMOUSE, C:\DRIVERS, etc.) the path and driver name will be different. See your mouse manual if unsure.

Mouse Hints

Use MOUSE.SYS rather than MOUSE.COM or MOUSE.EXE, if possible. MOUSE.SYS is smaller and takes less memory. Make sure you do not have a mouse driver line in both the CONFIG.SYS or AUTOEXEC.BAT files. If you do, remove one, because you are needlessly loading two mouse drivers into memory.

CD-ROM Drivers

To run *Aces of the Deep* from the CD, you'll need to include a CD-ROM line in both the CONFIG.SYS and the AUTOEXEC.BAT files of the boot disk. Refer to your CD-ROM manual for your specific details.

The Boot Disk AUTOEXEC.BAT file needs an MSCDEX line. Depending on your CD-ROM type, it should look much like one of the following:

C:\DOS\MSCDEX /D:MSCD001

LH C:\DOS\MSCDEX /D:MSCD001

LOADHIGH /L14429 C:\DOS\MSCDEX /D:MSCD001

NOTE: We recommend that you use the latest version of MSCDEX.EXE to insure the best CD access. As of this writing, the current version of MSCDEX is 2.23.

The Boot Disk CONFIG.SYS file needs a CD device driver line. Depending on your CD-ROM type, it should look much like one of the following:

```
DEVICE=C:\DRV\CDROMDRV.SYS/D:MSCD001/P:220
DEVICEHIGH=C:\DRV\CDROMDRV.SYS/D:MSCD001/P:220
DEVICEHIGH/L14652=C:\DRV\CDROMDRV.SYS/D:MSCD001/P:220
```

Disk Compression Drivers

If you use disk compression on your hard disk, you must include the correct disk compression driver statement on your boot disk, or your mouse or other drivers may not load correctly. The example CONFIG.SYS shows the correct statement if you are using the MS-DOS DBLSPACE utility.

If you are using Stacker 3.1 or later, use the following line instead:

```
DEVICEHIGH=C:\STACKER\STACHIGH.SYS
```

For other utilities, refer to your manual or contact the manufacturer for complete instructions.

Additional Boot Disk Instructions

If you have a modem, you can download additional boot disk instructions from the Sierra Bulletin Board Service, or BBS. The file to download is BDALLEXE or BDALL.ZIP (BDALL.ZIP is compressed—you will need the PKUNZIP shareware utility to open it). After downloading this file, select the instructions that will best match your system and program needs.

In the U.S., the BBS number is 206-644-0112; in the U.K., the BBS number is (44) 734 304227.

Reminder: For the boot disk to work, you must REBOOT your computer with the boot disk in your A: drive. Place the boot disk in drive A: and press your PC's Reset button, or [Ctrl]+[Alt]+[Del]. Your computer will now reboot, using the start-up files on the boot disk in A:. Have a great time!

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Courtesy National Archives

Reinhard Hardegen wears his newly-awarded Knight's Cross, February 1942.

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Appendix D

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Courtesy National Archives

ACES of the DEEP

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Appendix E

Glossary

AA. Antiaircraft.

abeam. To the side of the boat.

aft. To the rear or stern of the boat.

ASDIC. For Anti-submarine Detection Investigation Committee, the name given to the British gear for locating submerged U-boats with sound pulses.

ASW. Antisubmarine warfare.

ballast. Weight, usually cargo or sea water, used to control the buoyancy of a boat.

BBC. German manufacturer of U-boat machinery.

BdU. *Befehlshaber der Unterseeboote.* U-boat command, or Admiral Donitz specifically.

beam. Side of the boat, as in starboard beam, port beam.

bearing. Angle of an object relative to the bow of the boat. 0 or 360 is straight ahead, 90 degrees is directly starboard, 180 is straight astern, and 270 degrees is directly to port.

bilge. Tank(s) at the bottom of the boat for collecting seepage water.

BOLD. Bubble-emitting canisters that could be ejected by hunted U-boats to mask submarine noises.

bow. Front end of the boat.

compass. The compass heading describes a direction on a circle divided into 360 degrees where 0 or 360 is North, 90 degrees is due East, 180 is due South, and 270 degrees is due West.

course. Path of a vessel. A course may consist of several sections, or legs, each on a different heading.

crash dive. Emergency dive.

crush depth. Depth at which the U-boat's pressure hull will fail. Actual crush depth for any particular boat is unknown—finding out kills you.

displacement. Size of a ship, measured by the tons of sea water it displaces (a ton being 35 cubic feet). Can be expressed as light (empty) or load (fully loaded) displacement.

dive planes. Horizontally mounted fins on the U-boat's external hull used to help the boat dive or climb.

eel. Slang for torpedo.

gross register tonnage (GRT). Total volume of a ship measured in units of 100 cubic feet. BdU measured U-boat performance using GRT sunk.

heading. The compass direction in which a vessel is currently traveling. Use the Compass to determine the U-boat's heading; use the TDC to determine a selected target's heading.

hedgehogs. Forward-firing antisubmarine weapon used by escorts that fires a tight pattern of contact fused mortar bombs.

HF/DF. Allied gear for locating the source of a radio transmission.
hydrophone. Underwater directional microphones for passive sound detection.

hydroplane. Same as dive plane.



Courtesy National Archives

ACES of the DEEP

Otto von Bulow, skipper of *U-404*. He and his boat were attacked and sunk by aircraft in the Bay of Biscay, July 28, 1943.

keel. Bottom edge of the boat.

knot. Rate of one nautical mile per hour.

nautical mile. Approximately 1.15 statute miles.

pressure hull. Cylindrical main hull protecting the U-boat's crew and internal mechanisms—surrounded by streamlined external hull.

range. Line-of-sight distance.

Rudeltaktik. German for pack tactics, or wolf pack.

silent running. Operating with minimal noise to avoid detection on enemy hydrophones—low speed, no unnecessary activity, etc.

snorkel. Retractable pipes fitted to later U-boats that brought air into the engines, and let exhaust out, allowing the boats to run on diesels while submerged.

stern. Rear end of the boat.

telegraph. Signal device between the control room and engine room.

TDC. Torpedo Data Computer. Electromechanical computing device that inputs targeting data estimates for a selected target directly into the guidance mechanisms of all ready torpedoes.

trim. Maintaining a state of neutral buoyancy at a given depth.

VLR. Very long range; used to describe special patrol aircraft modified with extra fuel capacity.

wabos. From German *wasserbomben*—depth charges.

waypoint. Intermediate course destination usually marked by a change in heading.

Appendix F

Credits

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Crew Speech Production.....Sher Alltucker, Jan Moorhead, Ken Rogers

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Editing.....Dennis Kilgore

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Videography.....Marty Dobelmeier, Dale Tendick
Video Editing.....Adam Falk, Westcom Creative Group

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Admiral Otto Kretschmer, Gerd Thater,
Hans-Georg Hess, Jurgen Oesten, Otto Westphalen,
Wilhelm Grap
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Special Thanks

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Harry Cooper, Sharkhunters Intl.
National Archives
Admiral Otto Kretschmer
Wilhelm Grap
Oregon Chapter of U.S. Submarine Veterans of WWII
United States Naval Institute
Submariners International
Kate Kloos and the Dynamix Marketing Department
Goldstar Team
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Appendix G

Index

A

abandon ship, 68
 air cover selection, 24
 anti-aircraft gun, 67
 ASDIC, 47
 autoreload torpedoes,
 55, 69

B

battery level, 67
 bearing,
 of target, 48
 sub, 48, 59
 to target, 43, 45
 Binoculars, 45
 blow tanks, 66
 boot disk, 74
 Bridge, 44

C

Captain's Log, 51
 careers
 menu, 31
 new, 30
 save, 34
 top, 32
 charts, 46
 clear course, 50
 clock, 58
 combat level setting, 27
 compass, 59
 contact report, 53
 Control Room, 41
 Convoy Encounter, 22
 coordinates, chart, 48
 crash dive, 66
 crew quality setting, 22
 customer services, 81

D

damage report, 57
 deck gun, 67
 decorations, 33
 default realism
 settings, 28
 depth under keel, 67
 description, vehicle, 36
 diesel gauge, 67
 dive controls, 60
 dud torpedoes
 selection, 26

E

end mission, 20, 32
 engine controls, 61
 error messages, 72
 escorts
 size selection, 24
 types, 36
 exit to DOS, 70

F

FAT torpedoes, 56
 fire torpedoes, 16, 64

G

getting started, 5
 Globe button, 62
 guns, 67

H

Hall of Fame, 35
 headphones button, 63
 Historic Aces, 35
 Historic Missions, 21

I

identify target, 68
 installation, 8

limited ammo, 26
 limited fuel, 26
 limited visibility, 27
 log, captain's, 51
 log, radio, 52

M

magnification,
 periscope, 42
 medals, 33
 memory, 73
 messages, 53
 mission setup, 20
 nightclub, 33

O

oxygen remaining, 66

P

period of war selection, 24
 periscope, 42
 plot course, 49

R

radio, 52
 realism factor setting, 28
 Realism Settings, 25
 realistic repairs
 selection, 26
 repairs, making, 57
 report contacts, 68
 request escort, 32, 50, 53
 resume course, 50



Courtesy United States Naval Institute

Captain Otto Kretschmer wears his Knight's Cross with Oak Leaves. He later won the Crossed Swords as well, but the award had to be presented to him in a POW camp.

S

sailing model setting, 28
 scale, chart, 47
 scoring, 28, 36
 sim. options menu, 69
 single mission, 20
 slow reload setting, 26
 snorkel, 66
 SOS, 53
 speed
 control, 61
 target, 48
 U-boat, 48
 statistics, vehicle, 36
 status report, 53
 strategic chart, 48
 sunrise, sunset time, 51
 surface command, 66
 system requirements, 6

T

tactical chart, 46
 target
 data, 64
 selection, 42, 45
 TDC, 64
 technical help, 71
 time of day selection, 24
 tonnage leaders, 32
 top careers, 35
 top missions, 35
 torpedoes
 autoreload, 55, 69
 firing, 64
 loading, 54, 55
 types, 56
 troubleshooting, 71
 tutorial, 10

U

U-boat
 selection, 22
 types, 36

V

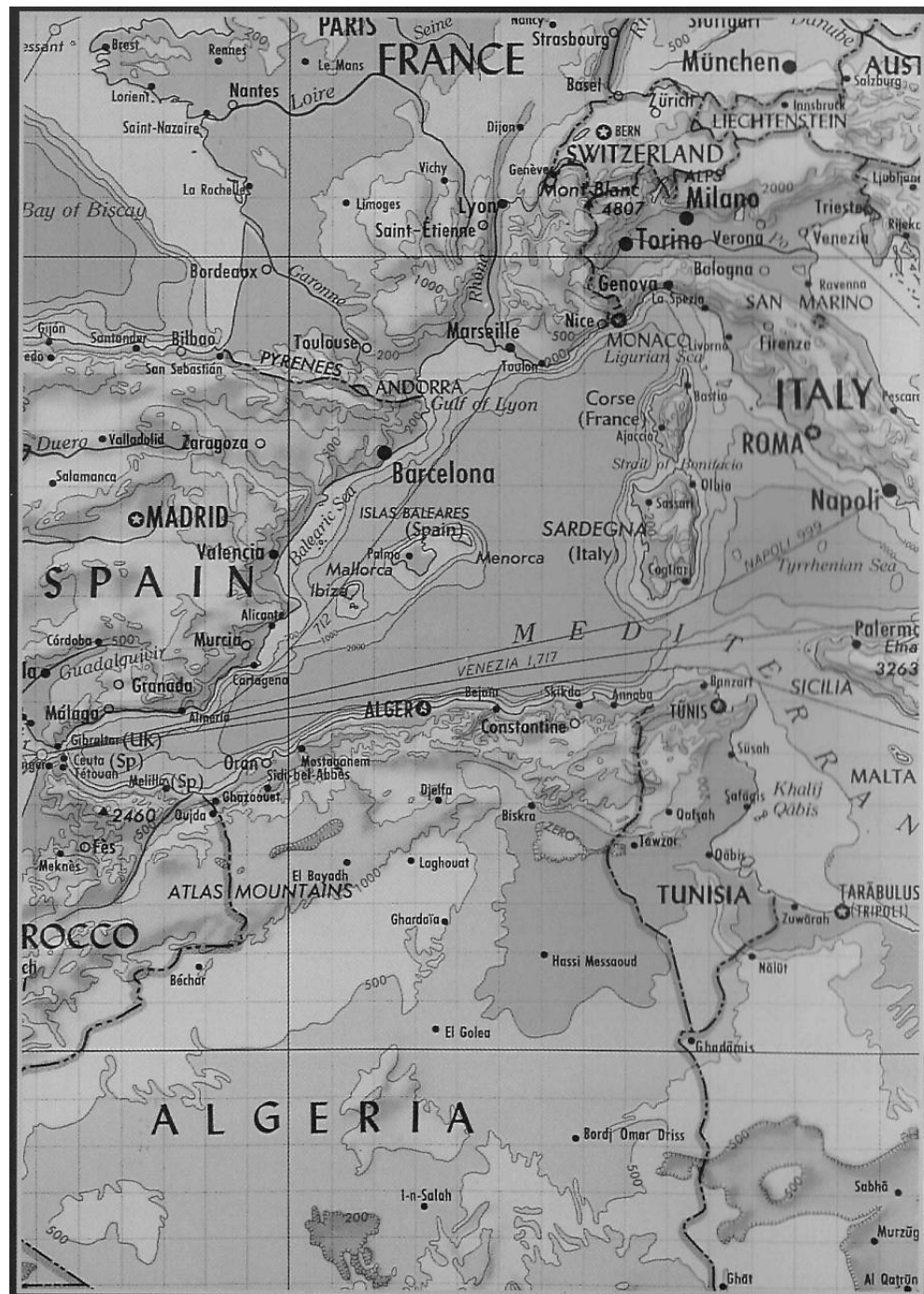
vehicle preview, 36
 Voice Tube, 66
 vulnerable boat
 setting, 26

W

war patrols, 31
 Warship Encounter, 22
 weather selection, 24
 wolfpack size, 23

Z

zoom,
 periscope, 42
 charts, 47



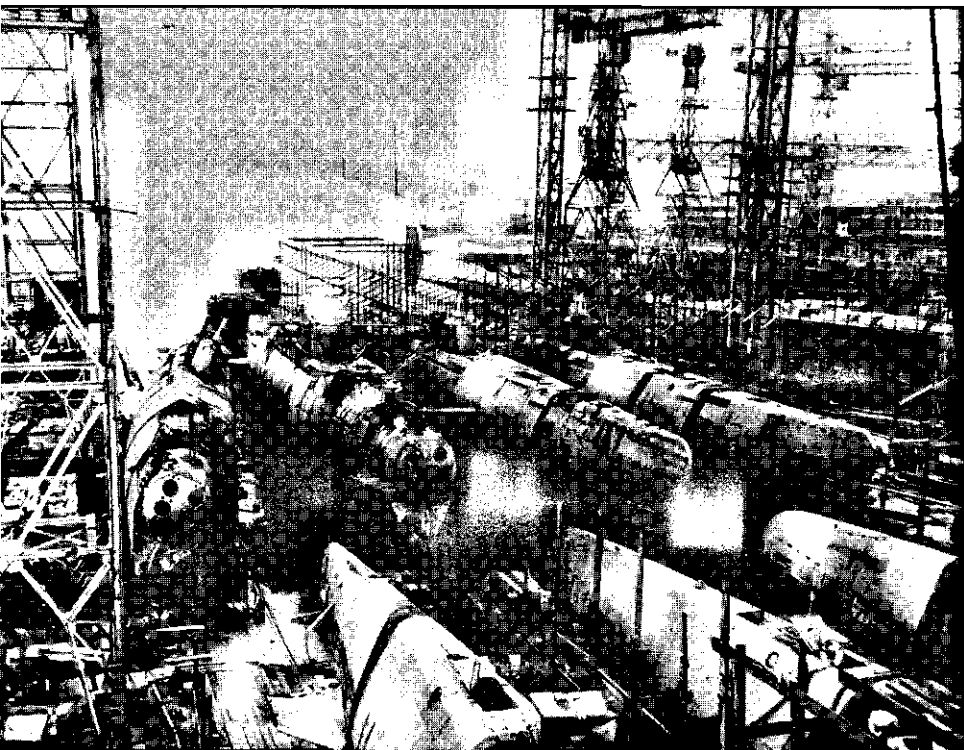
GRIPPING WWII
U-BOAT COMBAT
NEW WEAPONS
NEW WATERS



ACES of the DEEP

EXPANSION DISK





National Archives

Type XXI U-boats under construction at the Deschimag submarine yard, Bremen.

Preceding page: A British light cruiser, part of a convoy escort entering the Grand Harbor at Malta.

Contents

Welcome to the Aces of the Deep Expansion Disk.....	3
Installation.....	3
New Features	
<i>Mediterranean Historic Missions.</i>	.4
<i>Mediterranean Careers.....</i>	.4
<i>New Gauges.....</i>	.4
<i>Type XXI U-boat.....</i>	.5
<i>New Torpedoes.....</i>	.6
<i>Sonar.....</i>	.8
<i>Radar.....</i>	.8
Historical Overview	
<i>The Other U-boat War.....</i>	10
<i>Type XXI: The First True Submarine.....</i>	22
2 Credits.	.31

Welcome to the Aces of the Deep Expansion Disk



The *Aces of the Deep* Expansion Disk adds to the selection of missions, U-boats, torpedoes, and patrol areas you have encountered in the *Aces of the Deep* (AOD) simulation.

This guide will help you install the Expansion Disk and learn its features. To learn how to play *Aces of the Deep*, or to find customer service and technical help, refer to your *Aces of the Deep* manual.

System Requirements

Before you can install this expansion disk, you must have already installed *Aces of the Deep* or *Aces of the Deep CD*. Installing the expansion disk will require about 4 megabytes (MB) of hard disk space.

Installation

1. After starting your PC, insert your *Aces of the Deep* Expansion Disk into the appropriate drive.
2. Type the appropriate drive name (usually **A:**) and press [ENTER].
3. Type **install** [ENTER].
4. Follow the on-screen instructions to install the expansion files to the correct directory on your hard drive.

After installation, start **AOD** or **AODCD** as before.

Customer Service Updates:

For Sierra/Dynamix software sales and returns, write Sierra On-Line Direct Sales, P.O. Box 3404, Salinas CA, 93912 (mark returns ATTN: Returns).

The Direct Sales fax is 408-644-2018.

You can now call 206-644-4343 to reach Automated Technical Support or a Technical Support Representative.

Sierra now provides on-line technical support via CompuServe, America Online, and the Sierra BBS only.

To reach the Sierra/Dynamix forum on CompuServe, use GO SIERRA.

New Features

After installing the expansion disk, the new features will be fully integrated with the simulation.

Mediterranean Historic Missions

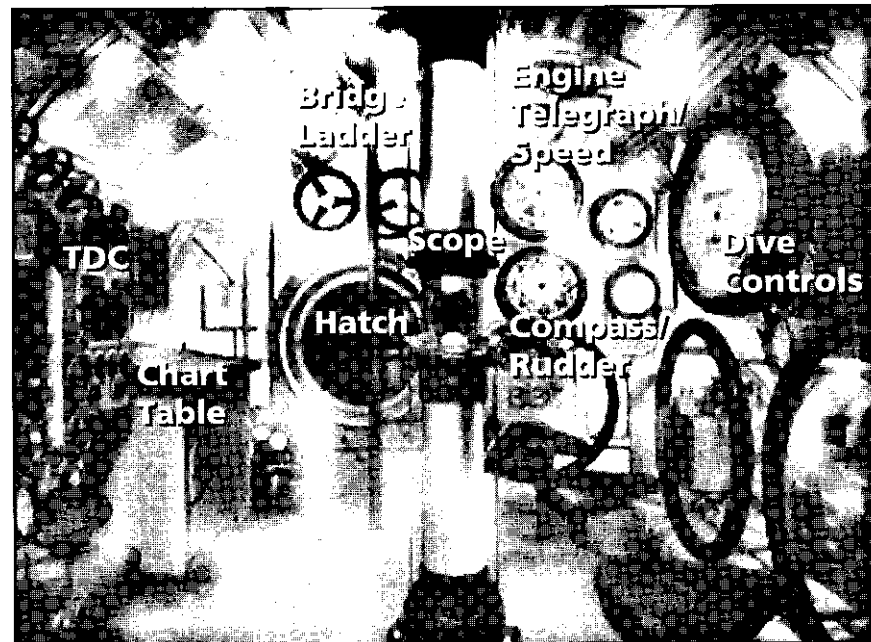
There are six new Historic Missions that take place in the Mediterranean. To undertake one of these missions, first select SINGLE MISSION from the main menu, and then open the Historic Missions screen. Click on a mission title to preview it and see if it is set in the Mediterranean. To begin the highlighted mission, press the SELECT button. Remember, the conditions for historic missions are pre-determined—if history is to change, it's up to you.

Mediterranean Careers

You will not be ordered to the Mediterranean during your career, but you may navigate to and enter the Mediterranean on your own at any time. Once you enter the Mediterranean, however, the eastbound current through the Straights of Gibraltar will make it practically impossible to leave again in that U-boat. (You still may be transferred out of the Mediterranean to a new Atlantic command.) Use the current and the cover of darkness to enter through the Straights. Before June 1940, there will be no Mediterranean bases—you will have to try to return to a French base for refueling and new torpedoes. After June 1940, you can end missions at La Spezia, Italy, and after January 1942, at Salamis, Greece.

New Gauges

All U-boats have two new gauges, available by pressing [G], or from the Chief Engineer Voice Tube menu as BUOYANCY GAUGES. The gauge on the left shows the compressed air available for blowing ballast tanks. The one on the right shows the level of water in the boat.



The Type XXI Control Room.

Type XXI U-boat

In this simulation, the Type XXI U-boat becomes available in Careers in January, 1943. (Historically, design work began on the XXI in late 1942, but it was not deployed operationally until April 1945, just before the end of the war.) To take command of one in a Single Mission, select TYPE XXI from the U-boat Type menu in the Convoy Encounter or Warship Encounter menu screens.

You may be assigned a Type XXI in any Career that lasts past January 1943, if your performance merits it. Keep in mind that Type XXIs are extremely costly, and only the most accomplished and privileged commanders will be assigned to one. See the "Type XXI" section starting on page 22 for more.

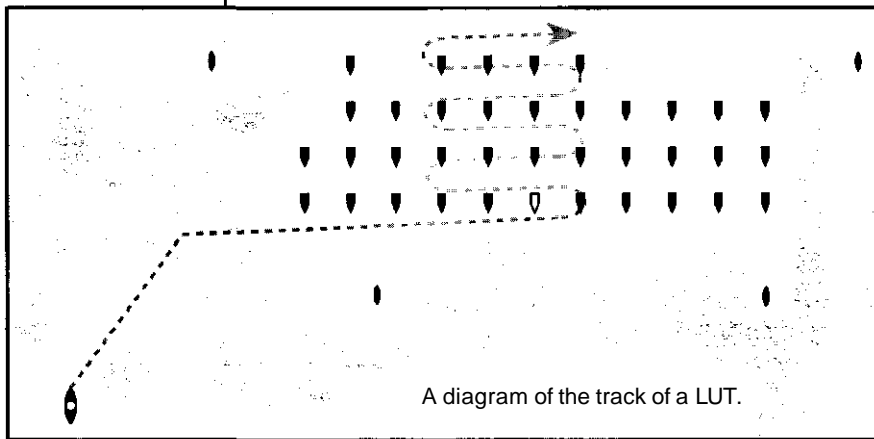
New Torpedoes

This expansion disk provides two new torpedo types for use with the Type XXI U-boat exclusively. Check the Torpedo Room [F6] once the mission begins to see how many of each you have on board.

T VI LUT (G7e) Pattern Running Torpedo

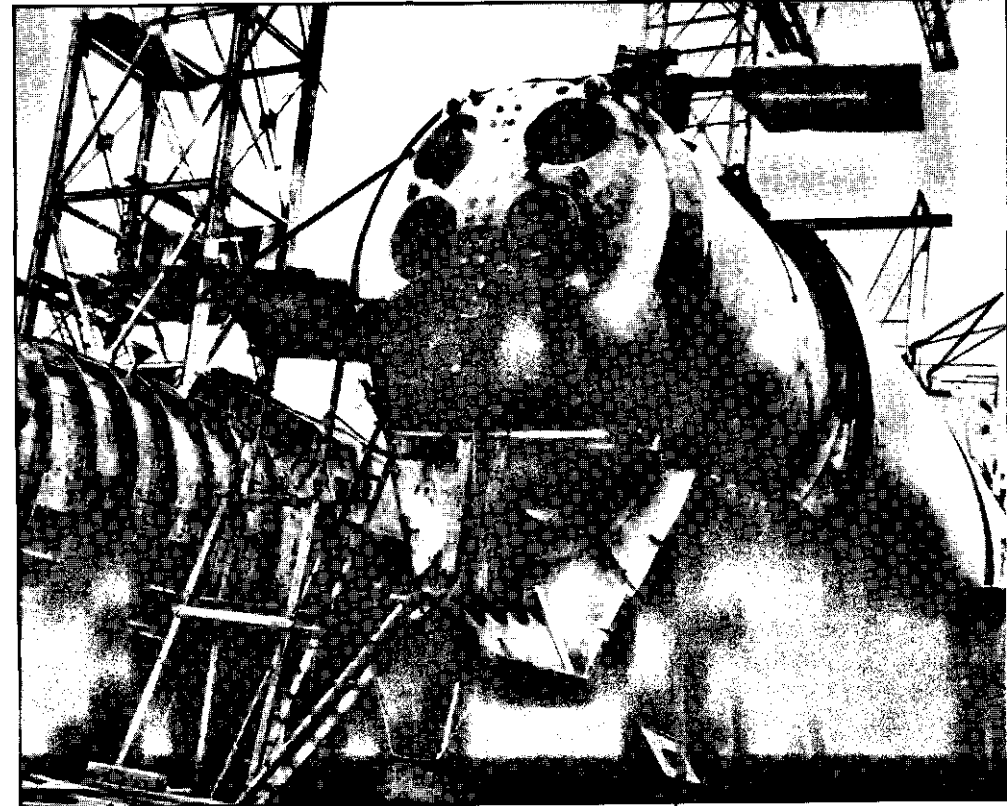
Range/Speed: 7.5 km at 30 kt

Warhead: 300 kg



The LUT (Lagen Unabhangiger, or "position-independent," Torpedo), is an improvement on the earlier FAT. Its programmable approach pattern includes a second run leg and angle, which allows it to cut across the course of the convoy from any firing angle, and provides a much better chance of hitting a target. The Type XXI can fire the LUT on a sound bearing only, from depths down to 100 meters.

Program the LUT's run pattern using the Torpedo Room's PROGRAM LUT window. For best effect, you want the final zigzag pattern to cut directly across the convoy's course.



National Archives

T XI Gnat II (G7es) Acoustic Homing Torpedo

Range/Speed: 5.7 km at 24 kt

Warhead: 274 kg

The "Gnat II" acoustic homing torpedo tracks a wider range of ship noises than the Gnat I, and is less likely to be distracted by Allied noise decoys. The Gnat II also can be fired by the Type XXI on a sound bearing while submerged. (Historically, the Gnat II was never tested in combat, but it promised to be much more deadly than its predecessor.)

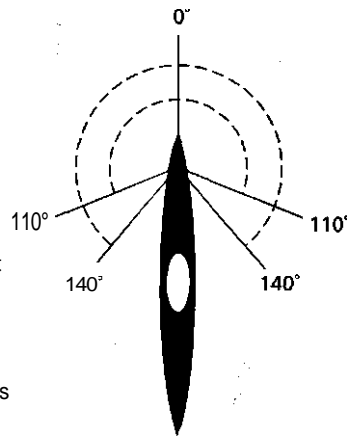
The forward end of a Type XXI without the external hull in place. The six bow torpedo tubes are clearly visible at the front of the pressure hull.

Sonar



Sonarbutton

Type XXI U-boats are equipped with an active sonar. Mounted in the front of the conning tower, the SU "Nibelung" sonar allows you to actively "ping" with sound impulses to detect and fire on surface targets while submerged. The equipment can determine target ranges accurately at over 8 kilometers, at submerged speeds of up to 11 knots. It covers an arc of 110 degrees aft on both sides of the bow, increasing to 140 degrees at low speeds (under 6 knots).

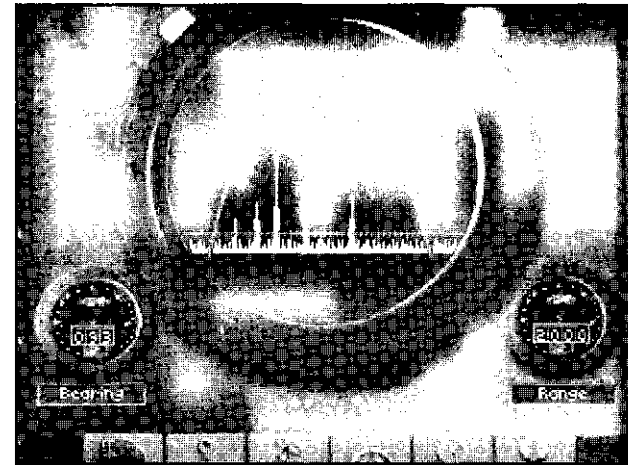


The sonar equipment covers an arc of 110 degrees aft on both sides of the bow, increasing to 140 degrees at low speeds (under 6 knots).

Note: Sonar is not effective at speeds over 11 knots. Keep in mind that active sonar is inherently noisy: using it will alert Allied ships to your presence, and continued use can pinpoint your location for the escorts.

When used in conjunction with the superb GHG passive listening hydrophone, the Type XXI's listening and location system is decades ahead of any other sonar system in the world. Use the sonar contact to aim acoustic homing or pattern-running torpedoes accurately while safely submerged.

To use the sonar, go to the [F5] Tactical Chart display. Rely on your hydrophones for an initial "passive" contact. Click on the hydrophone bearing line to the target you want. The line will turn blue. Turn the sub towards the hydrophone contact, and then click the sonar "ping" icon below the chart. If the sonar impulse finds a contact, the contact's bearing and range will be fed into your TDC (Torpedo Data Computer).



Note: Activate the radar by pressing [R], or from the Watch Officer Voice Tube menu.

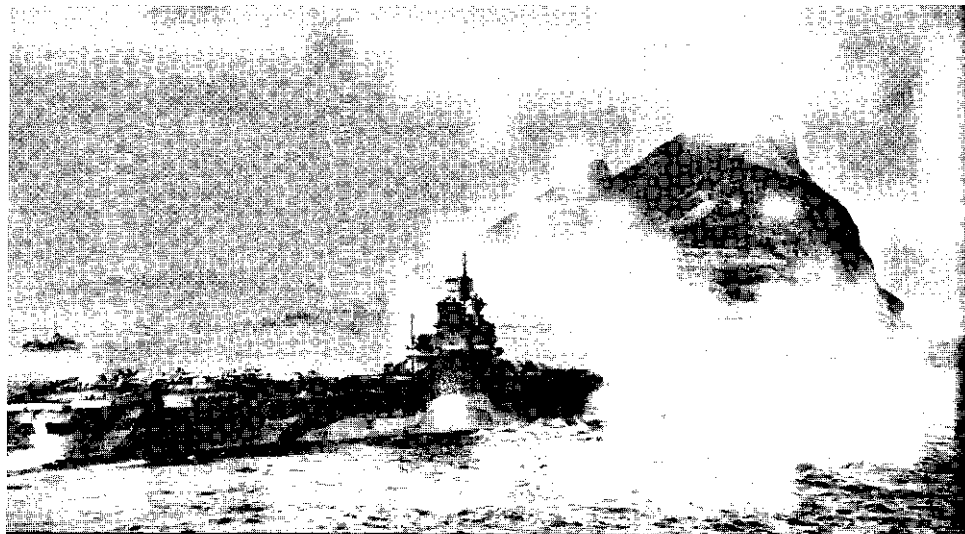
Radar

Type XXI U-boats are also equipped with radar. In contrast to the sonar suite, the U-boat radar equipment is several years behind Allied gear. Nonetheless, the "Hohentwiel" antenna and its associated transmitter/receiver provide you with some early warning of enemy ships and aircraft. It can reliably detect surface targets at ranges of up to 7.5 km, and aircraft out to about 10 km.

Activate the radar via the Watch Officer Voice Tube menu, or by pressing [R]. (Radar will not work while you are submerged, even at periscope depth.)

Once you start the radar, it sweeps the entire horizon automatically, and reveals contacts as signal "spikes" on the green band display. The spike size shows the size of the contact(s). The spike's location on the green band indicates approximate range. (From left to right, the band represents ranges of 0-10 kilometers in half-kilometer increments.) The readout at the bottom left provides the closest contact's absolute (compass) bearing. The readout at the lower right shows the range to the nearest contact in meters. The radar will continue to operate until you dive, or go to another screen.

Note: Allied HF/DF radio detection gear can intercept the radar signal at greater range than the radar can detect a target. Using it is a calculated risk, especially in the heavily guarded North Atlantic.



Imperial War Museum

Aircraft carrier *HMS Formidable* exercising with destroyers off Gibraltar, 1943. Thanks to forces like this, the Mediterranean was a one-way trip for German subs.

Historical Overview

The Other U-boat War

The German U-boat Command (*Befehlshaber der U-boote*—BdU) had many good reasons not to send U-boats into the Mediterranean.

In the first place, operations in the Mediterranean detracted from the effort in the Atlantic, which the U-boat Command felt was the decisive theater of the war. To maintain 20 boats on patrol in the Mediterranean, for instance, required that over 40 boats be assigned to that theater. Up to one half of the boats committed would normally be in transit on their way to or from the patrol area, not to mention those boats undergoing normal maintenance at their bases. Passage into the Mediterranean also meant inevitable losses in transit. The High Command would have to send extra boats into the Mediterranean to make up for expected

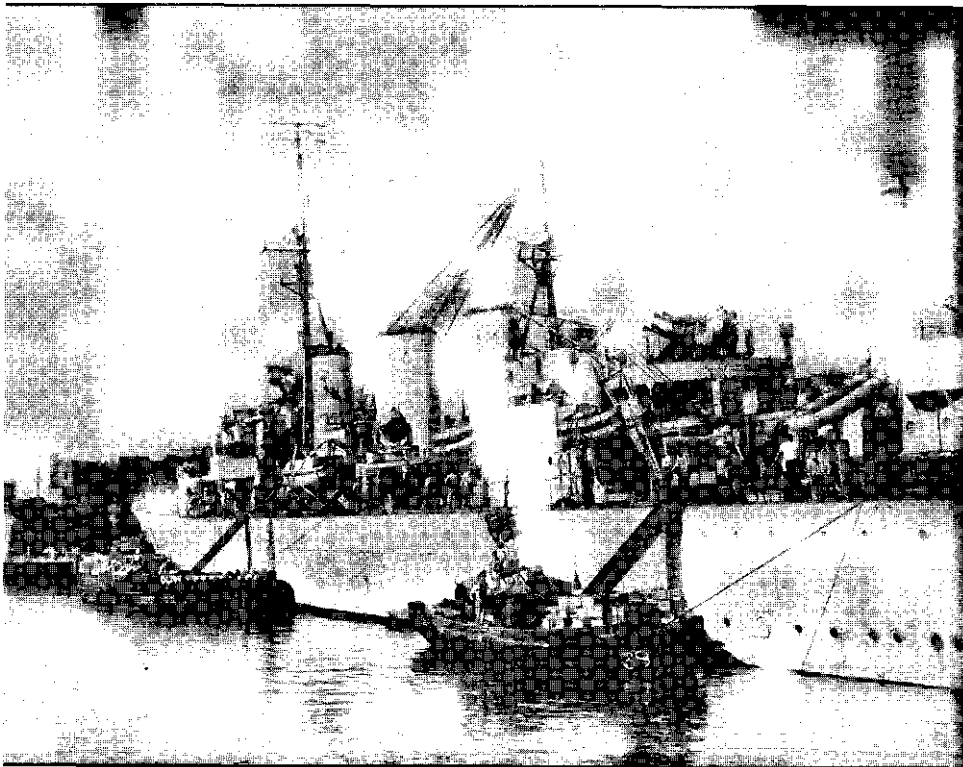


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HMS Indomitable guarding a Malta-bound convoy, August 1942. This picture was taken from another carrier, *HMS Victorious*.

losses. Even if there had been enough boats for the Atlantic campaign (which there were not), siphoning 40 or 50 boats into another theater would cripple that effort.

BdU also felt that the Mediterranean was a trap for submarines. Passing through the narrow Straights of Gibraltar into the Mediterranean was difficult, but leaving the Mediterranean via that 15-mile-wide gauntlet was virtually impossible. A very strong current (about 7 knots) ran west to east through the Straights. Boats entering the Mediterranean could use this current to advantage, but boats attempting to leave could not do so submerged, since the current equaled the best submerged speed of a U-boat. A surface transit west to east past the heavily guarded British base at Gibraltar, even at night, was just barely possible. Heading the other direction meant that U-boats were slow even on the surface, and would be unlikely to escape the strong air

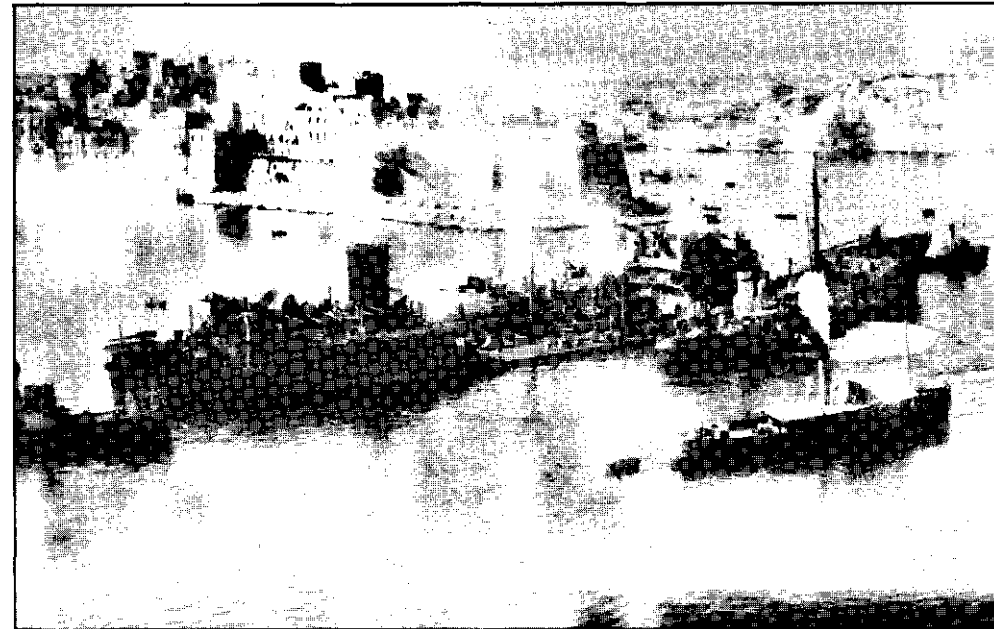


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The British mine-laying cruiser *HMS Welshman* unloading supplies at Malta, 1942. Malta was the strategic key to the central Mediterranean.

and sea patrols in and around the Straights. These conditions meant that any boat that entered the Mediterranean, even to help overcome a temporary crisis, was permanently lost to the Atlantic campaign.

Once inside the Mediterranean, conditions were still not favorable for U-boat operations. For one thing, there were few merchant vessels in the wartime Mediterranean, and those encountered were likely to be small. Convoys were few, and those that sailed did so under very heavy escort, which usually included aircraft carriers. There were plenty of warships to shoot at, but these were always difficult targets because of their high speed and strong escorts. Furthermore, the Mediterranean Sea itself was small and shallow, and its waters were clear. It was therefore more difficult for U-boats to



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hide from pursuit. Finally, none of the operational zones of the Mediterranean were outside the range of Allied aircraft. U-boats were subject to attack from the air whenever they were on the surface.

These considerations prompted U-boat Headquarters to protest vigorously when, early in September, 1941, Hitler ordered the High Command of the Navy to send U-boats into the Mediterranean. The strategic situation in that theater, however, in particular the critical need to maintain supply lines to Rommel's Afrika Korps, outweighed BdU's concerns. The Germans also sent a strong air flotilla to Sicily to help neutralize the British base at Malta, from which many of the ships and planes that were attacking German supply lines sortied. At the end of September, the first six Atlantic U-boats entered the Mediterranean Sea. Four more followed early in November. Command arrangements were quickly set up, and U-boat bases established in southern France, Italy, and Greece.

The American tanker *S.S. Ohio* limps into Malta, August 1942. En route with desperately needed aviation fuel, she was bombed and torpedoed by German planes, and had a dive bomber crash into her as well. Her captain, D. W. Mason, was presented with the highest civilian honor: the George Cross.

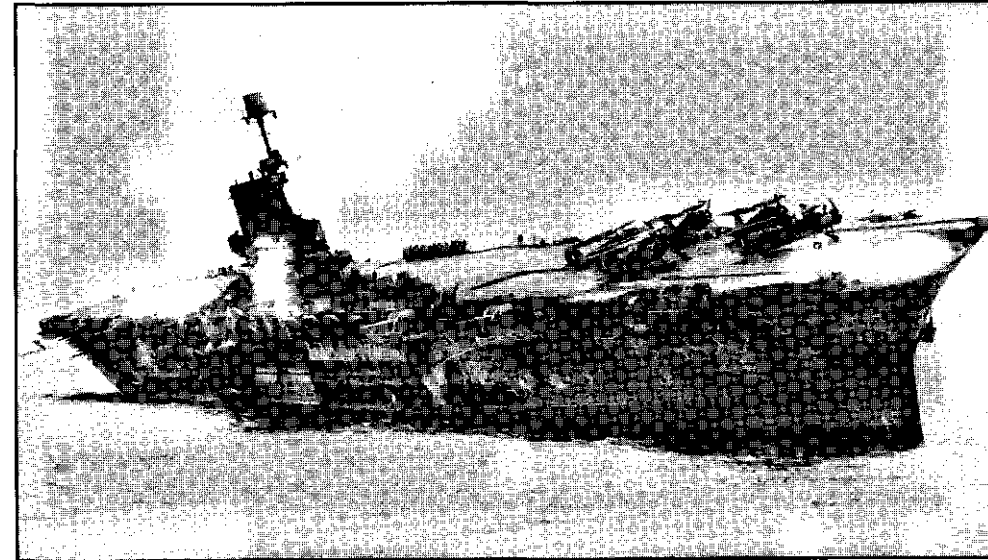
The Battleship Killers: Italian Frogmen in WWII

For the most part, the Italian navy was ineffective in World War II. But one branch of the Italian underwater service performed brilliantly: Italian frogmen were the best in the world. In the days before SCUBA gear, Italian swimmers, miniature submarine operators, and suit divers set the standard for operations in this medium.

Two operations in particular illustrate their skill. For years, frogman teams spied on and infiltrated the British base at Gibraltar from the neutral Spanish harbor of Algeciras across the bay. From underwater doors in an Italian merchant vessel interned in Algeciras harbor, Italian frogmen swam into Gibraltar to spy and place explosive charges. While several ships were reportedly damaged by these operations, the real accomplishment was the ongoing intelligence on British fleet and cargo movements in this heavily guarded base.

Far more spectacular was the attack against the main British fleet base at Alexandria, Egypt. On the night of December 19, 1941, the Italian submarine *Scire*, under the command of Prince Borghese, approached the British base and launched three "Maiali" miniature submarines. SLC 222, piloted by Lieutenant V. Martellotta, penetrated the harbor and attached itself and its explosive charge to the tanker *Sagona*. SLC 221, with Lieutenant L. Durand de la Penne, approached and attacked the battleship *Valiant*, while SLC 223 under Lieutenant A. Marceglia found the battleship *Queen Elizabeth*. The resulting explosions sent both battleships to the bottom of the harbor, while the third explosion damaged the *Sagona*. and the destroyer *Jervis*. With one stroke, the Italian frogmen crippled the British fleet in the eastern Mediterranean. The sunken vessels were later raised and repaired, but it was years before they rejoined the fleet.

German naval strategy had always considered the Mediterranean an Italian area of responsibility, and it was the naval and submarine forces of Italy that had been carrying on the sea war against the British Mediterranean Fleet. The Italian surface fleet, however, was no match for its British counterpart. Italy's submarine forces, although more professional than the surface navy, suffered from poor equipment and lacked an aggressive doctrine. Italian submarines, for example, did not have a diesel air intake tube leading to the conning tower, relying instead on air valves located on the hull. In heavy weather, the Italian subs were forced to leave the conning tower hatch open to provide an adequate supply of air to the diesel engines. When water entered the boat through this open hatch, it often damaged

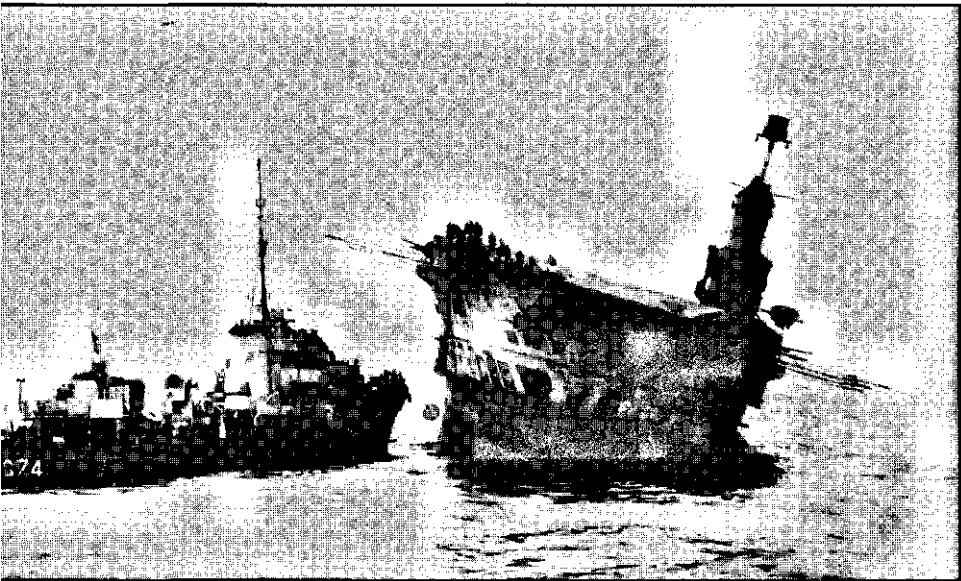


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equipment aboard, especially electrical equipment. Despite these handicaps, the Italian submarine force had waged fairly effective war against the Allied fleets, sinking three light cruisers, two destroyers, and a British submarine, as well as nine of the scarce merchant vessels. In addition, another light cruiser, one other destroyer, and two more merchant ships were damaged in the year before the introduction of German submarine forces into the Mediterranean.

The dispatch of experienced German U-boats and crews to the Mediterranean had an immediate effect. On November 13, *U-81* (Leutnant Guggenberger), operating east of Gibraltar, found the British carrier *Ark Royal* and sank her with a single torpedo hit. Twelve days later, *U-331* under Leutnant Freiherr von Tiesenhausen located the battleship *Barham* in the eastern Mediterranean and put a salvo of torpedoes into her, causing the battleship to capsize and explode with great loss of life. By the end of the year, the German submariners had added a light cruiser, a corvette, and 12 merchant ships to their total. These losses, coupled with the effective interdiction campaign mounted by the German air forces in Sicily, mine-laying efforts directed

HMS Ark Royal listing to starboard as a result of the torpedo from *U-81*. Despite a gallant effort on the part of her crew, this most famous of all British carriers finally sank almost within sight of Gibraltar Harbor and safety.

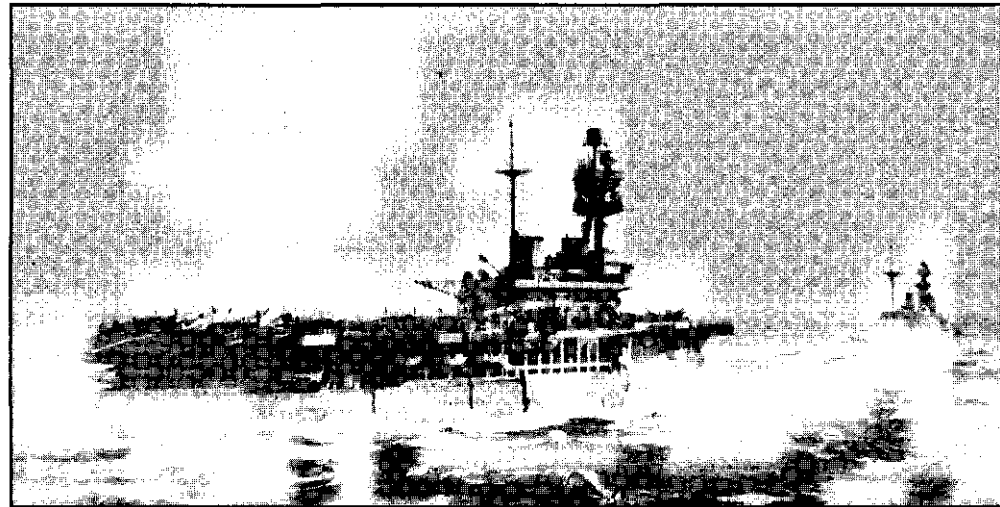


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November 14, 1941. A destroyer comes alongside *HMS Ark Royal* to remove the last of her crew.

at Allied ports, and further contributions by the Italian forces, took much of the pressure off Rommel's supply lines. By January 1942, the Afrika Korps was ready to resume the offensive.

The naval situation in the Mediterranean was in stalemate for much of 1942. The U-boats, now in greater numbers than ever before, continued to prey on Allied merchants and warships. In August, for example, *U-73* got a lucky salvo off against the 22,600-ton British carrier *Eagle*, sinking her. The Allies, on the other hand, patiently built up their forces, including large numbers of radar-equipped patrol aircraft. They also resumed their attacks on the supply lines to the German and Italian armies fighting in Africa. Axis supply shortages began to occur, and gradually got worse. The great battles in the Western Desert led to a German advance almost to Alexandria, the main British fleet base in the eastern Mediterranean. The British army held, however, and began to ready itself for a counterattack. The longer German supply lines caused by the advance were once again vulnerable, and by November the supply situation for the Afrika Korps was growing desperate.



Imperial War Museum

The British carrier *HMS Eagle* and a battleship of the Queen Elizabeth class at sea, 1942.

November, 1942, was the turning point for the war in the Mediterranean. In late October, the British Eighth Army under General Montgomery launched a massive and meticulously prepared attack against the German and Italian forces before Alexandria. By November 4, the Allied army had breached the Axis front, forcing the decimated Afrika Korps into headlong retreat, and ending the threat to Egypt. As the German forces retreated towards Tunisia, more and more of the North African coast came under Allied control. The Allies quickly established air and sea bases in this area, making submarine operations in the eastern Mediterranean difficult.

As the German and Italian armies were being driven from the eastern Mediterranean, a new threat developed far to the west. On November 8, the Allies mounted a massive amphibious landing on French North Africa from Morocco to Algeria. Operation Torch, as this landing was known, came as a complete surprise to the Germans, who had to scramble to bring forces to bear against this new threat. The primary response came from the U-boat arm. All available submarines were vectored against the landing sites. The goal was to disrupt the supplies to the Allied armies in the west. This

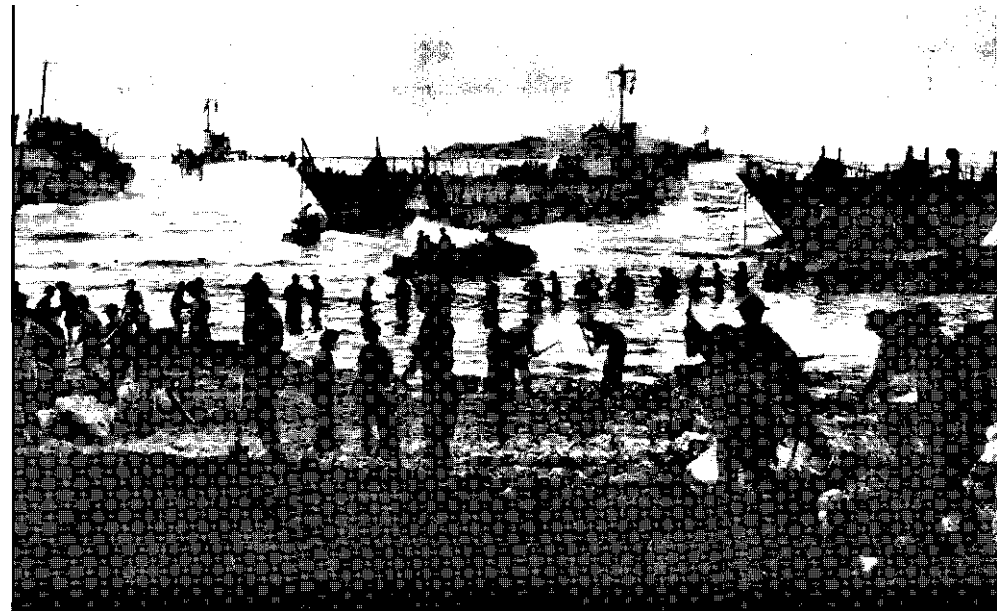


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Merchant ships in the harbor at Algiers unloading cargo into lighters, January 1943.

would give the German High Command time to fortify and reinforce Tunisia, maintaining this position as a bridgehead into Africa and preventing the Allies from establishing control of the entire North African coast. The effort failed, however, and the Allied armies quickly closed in on Tunisia. By May, 1943 the Axis armies there were forced to surrender.

The loss of the North African coast made U-boat operations in the Mediterranean more difficult than ever. There were now dozens of Allied air bases stretching the length of the sea, from which hundreds of radar-equipped planes sortied to hunt U-boats. It was also clear that the Allies planned further operations. In July came Operation Husky, the Allied invasion of Sicily. Despite hard fighting and a well-conducted defense, Messina, the last Axis position on the island, fell to advancing American armored units by August 17. In the face of overwhelming Allied air and sea superiority, the



Imperial War Museum

German defenders successfully evacuated across the Straits of Messina to Italy.

One of the primary results of the loss of Sicily was political. Benito Mussolini, who had been in power in Italy since 1923, was forced to resign. Italian politicians and military leaders now began to negotiate with the Allies for an Italian surrender. By September 3, the documents were signed, but the announcement was delayed to prevent a German takeover of Italy. Word leaked to the Germans, however, and the German army quickly established itself in key positions in Italy, disarming and sometimes interning the Italian army. That same day, the first Allied landings in Italy took place.

Allied air and naval strength in the Mediterranean was now overwhelming. U-boat operations from La Spezia and Salamis could be carried out only with the greatest difficulty, and successful attacks on shipping or on naval forces were becoming rare. The grim German resistance to the Allied advances in Italy prolonged the U-boat campaign, but by May, 1944, with the fall of

July 10, 1943. British soldiers unloading stores onto a Sicilian beach as part of Operation Husky, the invasion of Sicily.



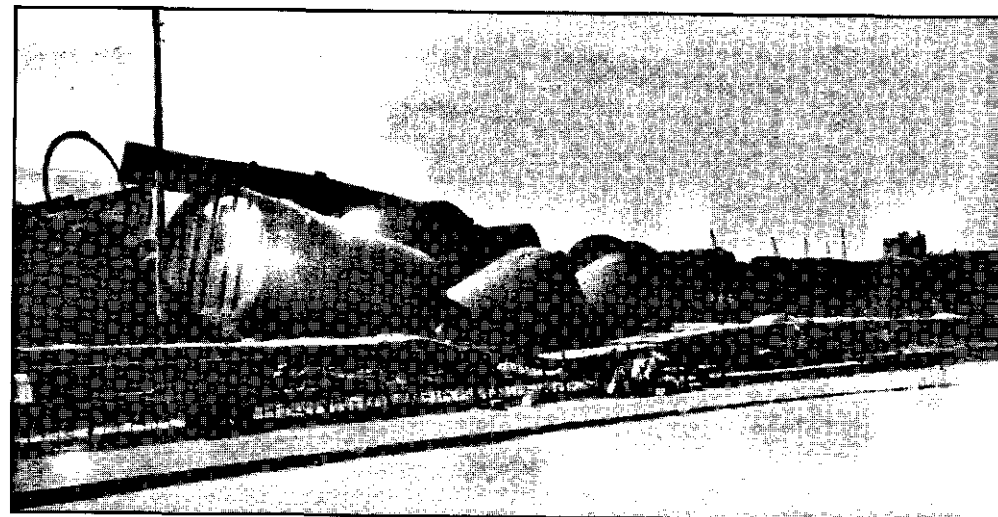
National Archives

A Type XXI hull section at the back of an assembly plant. Because Allied bombing often interfered with the transport of the various hull sections from their places of manufacture to the assembly yard, shipyards were forced to hand-build spare hull sections to replace those delayed or destroyed in transport.

Rome imminent, it was clear that there was nothing further to be gained by submarine operations in the Mediterranean. The last U-boat attack in the Mediterranean took place on May 19, 1944, when Kapitanleutnant (Lieutenant Commander) Luhrs in *U-453* attacked and sank the 7,147-ton British freighter *Fort Missanabie*.

Despite some tactical successes, the U-boat campaign in the Mediterranean must be judged a failure. The strategic task of the U-boat force was to cut the sea routes that linked Britain to the wider world. U-boats were designed to sink merchant vessels, and there were precious few of these targets available in the Mediterranean. The Allies could absorb the warship losses there because of their tremendous superiority over the naval forces of the Axis. Operations in the Mediterranean made only a minimal contribution to the main task, and compromised the Atlantic battle.

To give but one example of how this diversion affected the larger campaign, consider the situation at

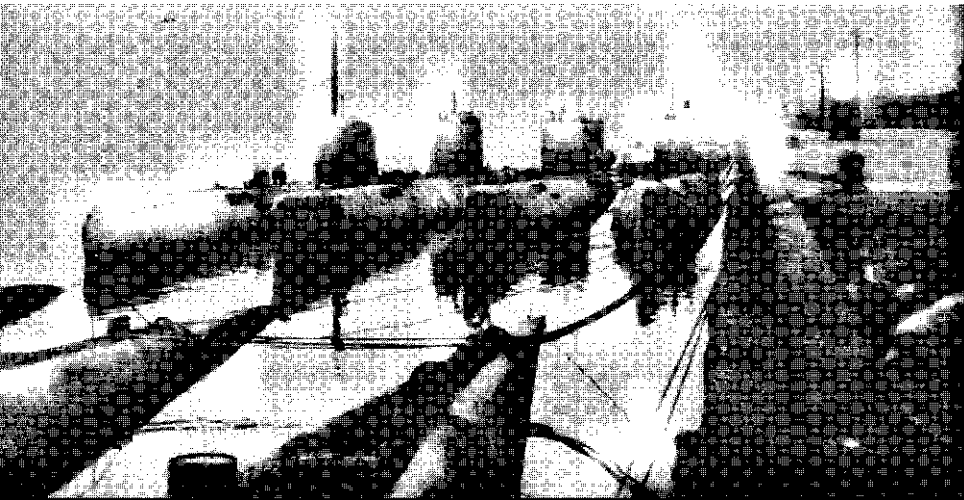


National Archives

Type XXI U-boat hull sections at the Blohm and Voss shipyard, Hamburg. Allied bombing interfered seriously with Type XXI construction and assembly.

the start of Operation Drumbeat, the campaign against shipping along the American east coast which opened in January, 1942. Because of commitments in the Mediterranean and the area just west of Gibraltar, the U-boat Force was able to send only five boats against the United States. During a time when every U-boat dispatched west against the U.S. coast was setting new records for sinkings, almost 40 U-boats, some of them the large Type IXs, were tied down in relatively unprofitable operations in and near the Mediterranean. The highest sinking totals of the war were established by a force that never exceeded 12 boats in the operational area. Had extra boats been available for operations in the Atlantic, sinkings would surely have been greater.

Germany needed to concentrate all of its resources on the decisive front. The Mediterranean U-boats were continually harassed from the air and sea, and despite some successes sinking Allied warships, they made almost no contribution to the tonnage war against the merchant convoys. In sending U-boats to the Mediterranean, Germany essentially blunted one of the most effective strategic weapons it possessed.



Imperial War Museum

Surrendered Type XXI U-boats at Loch Ryan, Scotland in 1945.

Type XXI: The First True Submarine

Type XXI

Crew: 57

Length: 76.7 m

Displacement: 1,621 tons surfaced, 1,819 tons submerged

Top Speed: 15.6 kt surfaced, 17.2 kt submerged

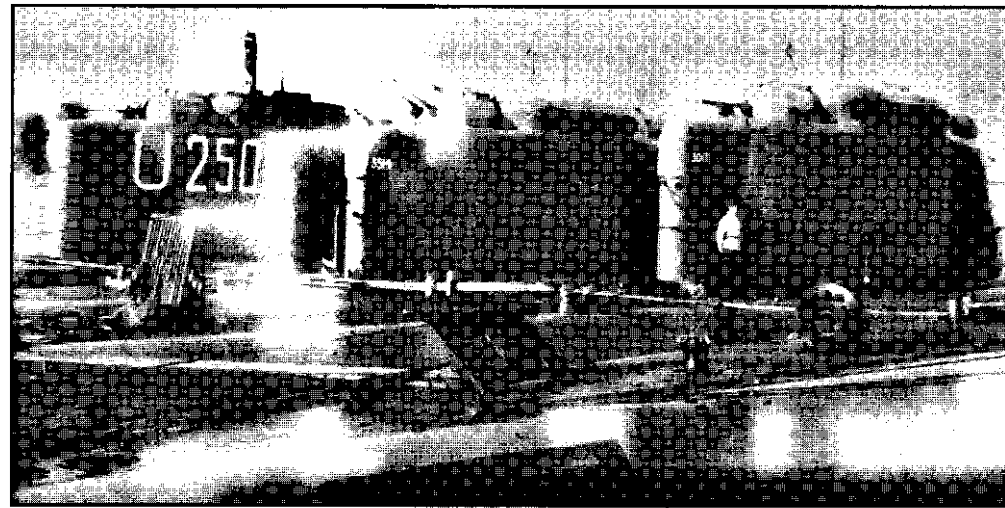
Range: 11,150 nm at 12 kt surfaced, 285 nm at 6 kt submerged

Dive Depth: 200 meters (test depth)

Torpedo Tubes: 6 (bow)

Guns: 2 twin 2-cm. antiaircraft cannon

The Type XXI U-boat was the first submarine designed to spend most of its time underwater. Besides the improved underwater performance due to its huge battery capacity, the Type XXI had new and improved active and passive sonar systems, a radar set, a hydraulic semi-automatic torpedo loading system, turret-mounted antiaircraft guns, new torpedoes, a schnorkel for underwater battery recharging, and the ability to fire its weapons on sound bearings alone from depths to 100 meters. In addition, the Type XXI could dive to previously



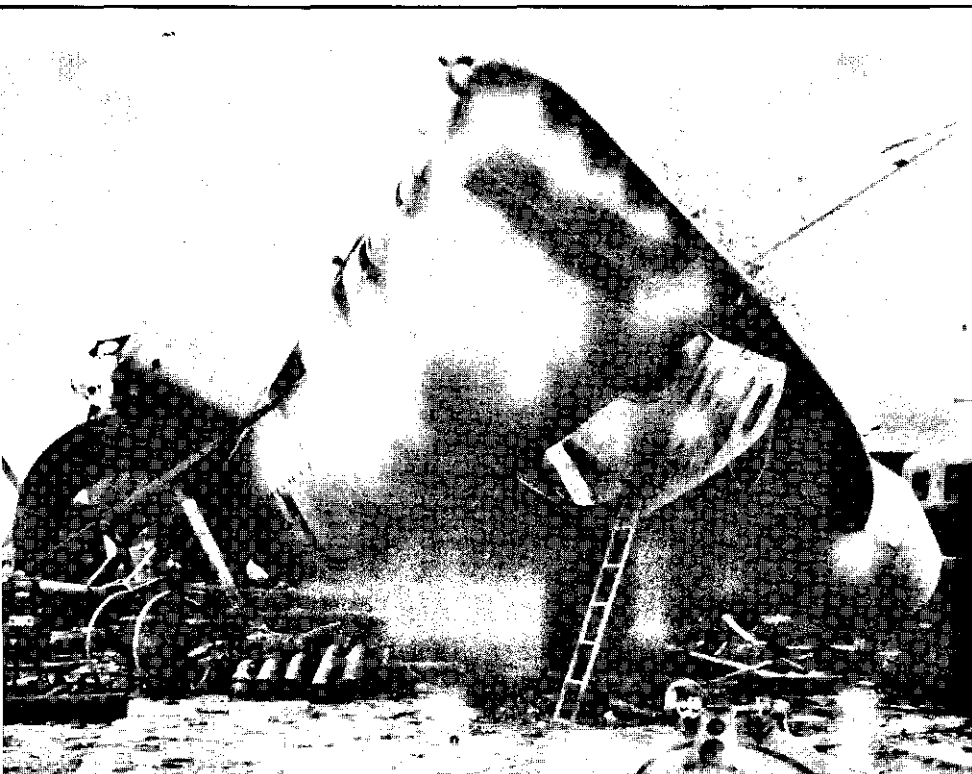
Imperial War Museum

unheard-of depths (over 300 meters). With its batteries fully charged, the Type XXI could travel underwater at its top speed for four hours. It also featured several improvements to crew comfort, including a large freezer, showers, and a heating and air conditioning system. Far ahead of its time, this revolutionary craft entered production too late to fire a torpedo in anger. When the war ended, however, over 100 of them were in various stages of training and fitting out. The story of its development poses one of the most interesting "might-have-beens" of the war.

By late 1941, it was already clear that the U-boats were losing ground to increasingly numerous and sophisticated Allied escort forces. In particular, the slow underwater speed and short submerged endurance of the Type VII and IX boats were handicaps that would soon doom the U-boat fleet. Continued success in the Battle of the Atlantic would require new submarine designs capable of high underwater speeds.

German scientists and engineers had been working on the problem for years, and had already proposed several new technological solutions. The most promising of these was the brainchild of Professor Hellmuth Walter—the use of hydrogen peroxide as a fuel. Walter

Another view of the Type XXI boats in Allied hands at Loch Ryan. From left to right, they are U-2502, U-3514, and U-3017.



National Archives

A late-model Walter boat destroyed by Allied bombing. Several different hydrogen peroxide-fueled designs were built, but none became operational.

designed a closed-cycle hydrogen peroxide engine for submarine use that promised fantastic increases in underwater speed. As early as 1939, Admiral Donitz, head of the U-boat arm, approved an experimental project to build a small hydrogen peroxide boat. This prototype (named *V80*) attained unprecedented submerged speeds of up to 26 knots.

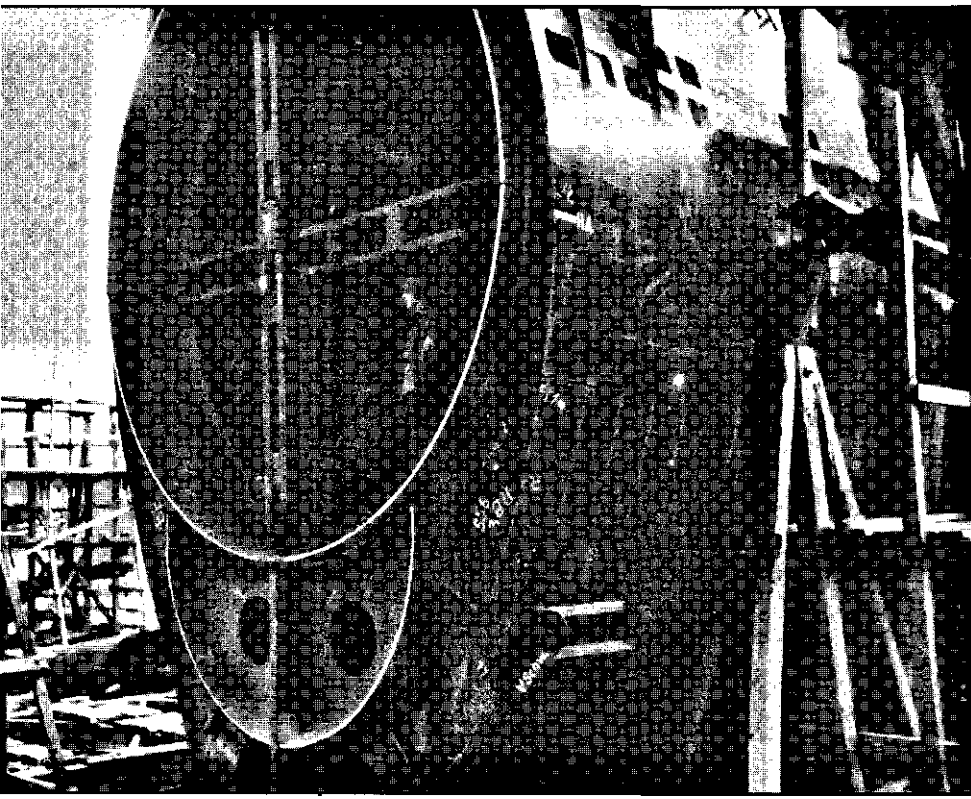
With the success of *V80* apparent, permission was given to build larger prototypes. But the hydrogen peroxide system was not without problems. Chief among these was hydrogen peroxide's extreme corrosiveness, which caused great difficulties in handling and storing the material. The containers for the chemical, for example, had to be lined with rubber to prevent damage to the tanks. The Walter system also required huge amounts of the chemical, which meant that any operational design would have to be huge as well. Even the

production of the hydrogen peroxide itself was a problem. Germany had only one facility capable of manufacturing industrial quantities of hydrogen peroxide, and the output was far too small to provide fuel for a vast fleet of submarines. If the Walter system was to be used, a great deal more plant capacity would have to be constructed.

The Walter prototype was shown to the commander of the German navy in February, 1942, but aroused little interest. The main objection from the naval staff was that the shipyards were already fully employed in constructing proven U-boats such as the Types VII and IX. The staff resisted the idea of switching construction to an untried experimental design. To resolve the outstanding issues of design and construction, Admiral Donitz called a meeting at his Paris headquarters for November, 1942.

At this meeting, Professor Walter presented his design for a full-sized operational U-boat that would use his hydrogen peroxide system for propulsion. To overcome the fuel storage problems, Walter designed a vessel with two pressure hulls, one above the other in a "figure 8" structure. The lower level would serve as a single huge hydrogen peroxide tank, while the upper hull would contain crew, weapons, and machinery. Although technically feasible, it was quickly apparent that there would have to be a great deal of further work on the Walter design before it would produce an operational U-boat. Germany simply did not have the industrial capacity to build conventional boats to meet immediate wartime needs, as well as new designs using unproven and complex technologies.

This meeting might have ended the attempt to develop high-speed U-boats. However, two engineers at the meeting, Schurer and Bracking, suggested an alternative. If all the submarine force wanted was more underwater power, why not simply fill the lower part of the Walter double-hull design with conventional storage batteries? A quick calculation demonstrated the

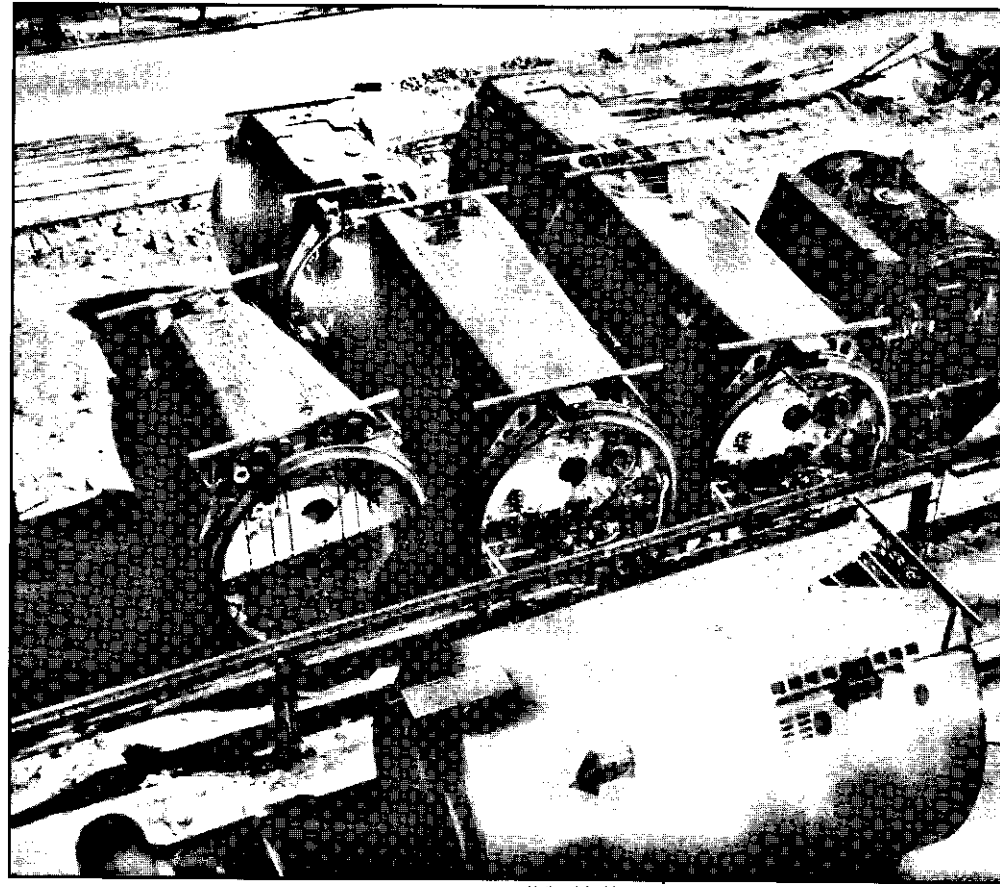


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One of the hull sections of a Type XXI U-boat at the Blohm and Voss shipyard, Hamburg. The "figure 8" pressure hull configuration characteristic of the Type XXI is clearly visible.

feasibility of the idea. The theoretical work was completed by January, 1943, and a detailed plan and a set of working drawings were ready by July. On Friday, August 13, 1943, permission was granted to start production.

The new design, now officially known as the Type XXI, included several other innovations in addition to the new battery layout. The torpedo loading procedure was to be partially mechanized with a new hydraulic loader, which would greatly reduce torpedo reloading times. The torpedo tubes were modified to allow firing weapons at depths to 100 meters, and several new torpedo designs proposed to make use of them. A new depth-keeping system was installed that used water pressure to help regulate depth. Crew comfort was improved with the addition of large freezers to help keep food fresh. Also in the works was a new electronic



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sensor suite, including radar, radar warning receivers, new underwater listening gear, and an active sonar.

All of these innovations added to the projected construction time of the boat, however. Admiral Donitz, unhappy with the current schedules, contacted the new Reich Armaments Minister, Albert Speer, to see if the schedules could be accelerated. The Armaments Ministry proposed a new assembly-line construction method, in which the various sections of each new boat would be constructed at a number of sites, and then transported to the shipyards by barge for final assembly and welding. These widely-scattered production lines also would be less vulnerable to Allied bombing, which was already starting to interfere with production of many materials.

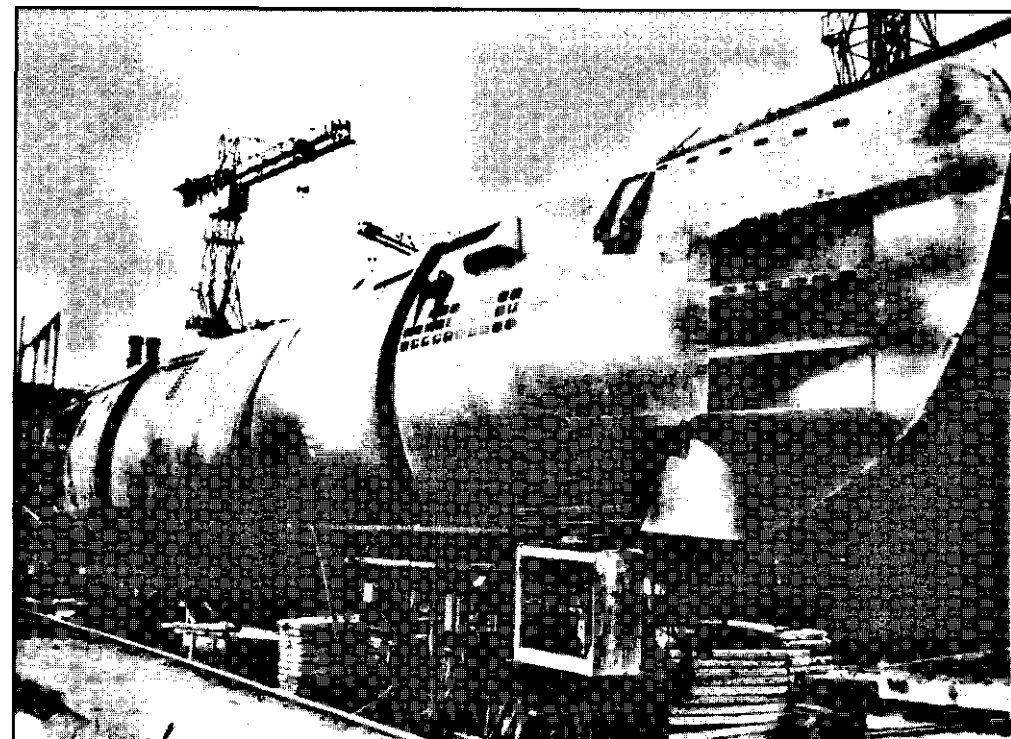
Unassembled hull sections for the Type XXI U-boats. The assembly-line construction technique adopted for the Type XXI made it possible to build these large craft in a fraction of the time it took to construct earlier models.



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The business end of an uncompleted Type XXI at the U-boat assembly facility in Hamburg, 1945.

On May 12, 1944, considerably ahead of the original production schedule, the first Type XXI U-boat (*U-2501*) was launched at the Blohm and Voss shipyard in Hamburg. There were a number of teething troubles associated with the new boat, largely because no prototype had been constructed. The first several boats to come off the ways were therefore used to test the concept and suggest changes and refinements that could be applied to boats still under construction. Considerable time was spent training crews and working up each boat before assigning it to combat duty.



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The various hull sections of this Type XXI are in place, but not yet welded together.

The first operational Type XXI U-boat, *U-2511*, commanded by Korvettenkapitan Adalbert Schnee, was not ready to sortie until March 18, 1945. Minor damage and incidental problems kept *U-2511* in port in Norway for a further month and a half. The boat did not actually put to sea until the end of April, just days before the end of the war. KK Schnee received the surrender order of May 4, 1945, while at sea. When he ran across a British flotilla protecting the cruiser *Norfolk*, however, Schnee could not resist mounting a mock attack. The high underwater speed and very quiet operation of *U-2511* made it easy to penetrate the heavy escort screen. Schnee approached the cruiser until it filled his periscope, then broke off the attack and dove away to safety.

