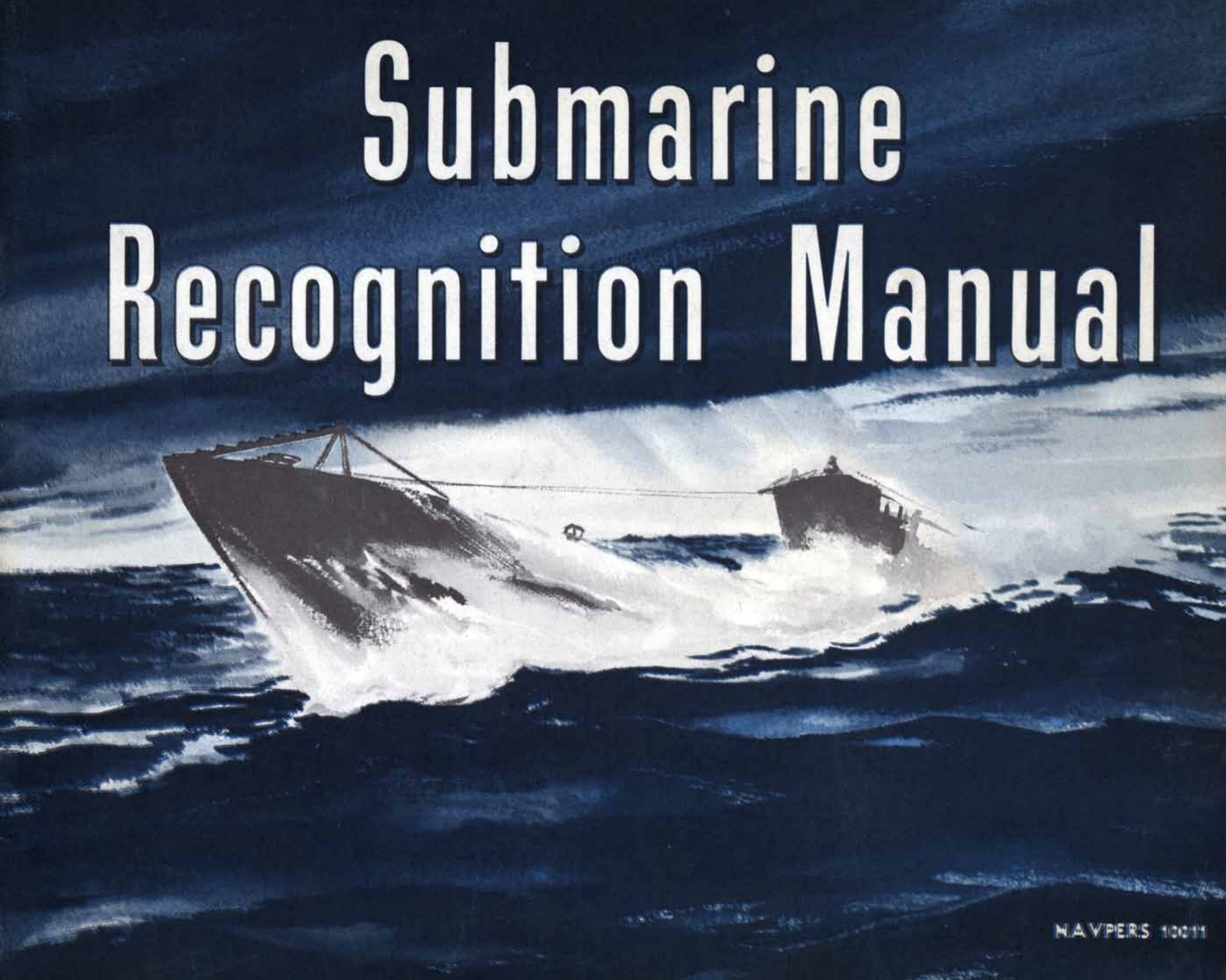
# Submarine Recognition Manual



NAVPERS 10011

# REPORTING PROCEDURE FOR SUBMARINE CONTACTS

## HOW TO REPORT

Military—In accordance with appropriate instructions of the respective services.

Civilian—In accordance with current procedures of the CIRVIS/MERENT program or to the nearest naval or military command.

## WHAT TO REPORT

1. Submarines or objects thought to be submarines. Include:
2. Position and time of sighting.
3. Amplifying information.

## PHOTOGRAPHS

Every effort should be made to take as many photographs of the submarine or object as possible. Undeveloped film or prints and negatives should be forwarded with a letter report or other identifying information to the *Director of Naval Intelligence, Pentagon, Washington 25, D.C.*

## NAVAL COMMANDS

Appropriate Naval commands are located in:

BOSTON—Commandant, 1st Naval District.

NEW YORK—Commandant, 3d Naval District.

PHILADELPHIA—Commandant, 4th Naval District.

NORFOLK—Commandant, 5th Naval District.

CHARLESTON, S.C.—Commandant, 6th Naval District.

NEW ORLEANS—Commandant, 8th Naval District.

SAN JUAN—Commandant, 10th Naval District.

SAN DIEGO—Commandant, 11th Naval District.

SAN FRANCISCO—Commandant, 12th Naval District.

SEATTLE—Commandant, 13th Naval District

PEARL HARBOR, Hawaii—Commandant, 14th Naval District.

BALBOA, C.Z.—Commandant, 15th Naval District.

KODIAK, ALASKA—Commandant, 17th Naval District.

TOKYO, JAPAN—Commander Naval Forces, Japan.

LONDON—Commander Naval Forces, Eastern Atlantic and Mediterranean.

Other Naval Commands are conveniently located.

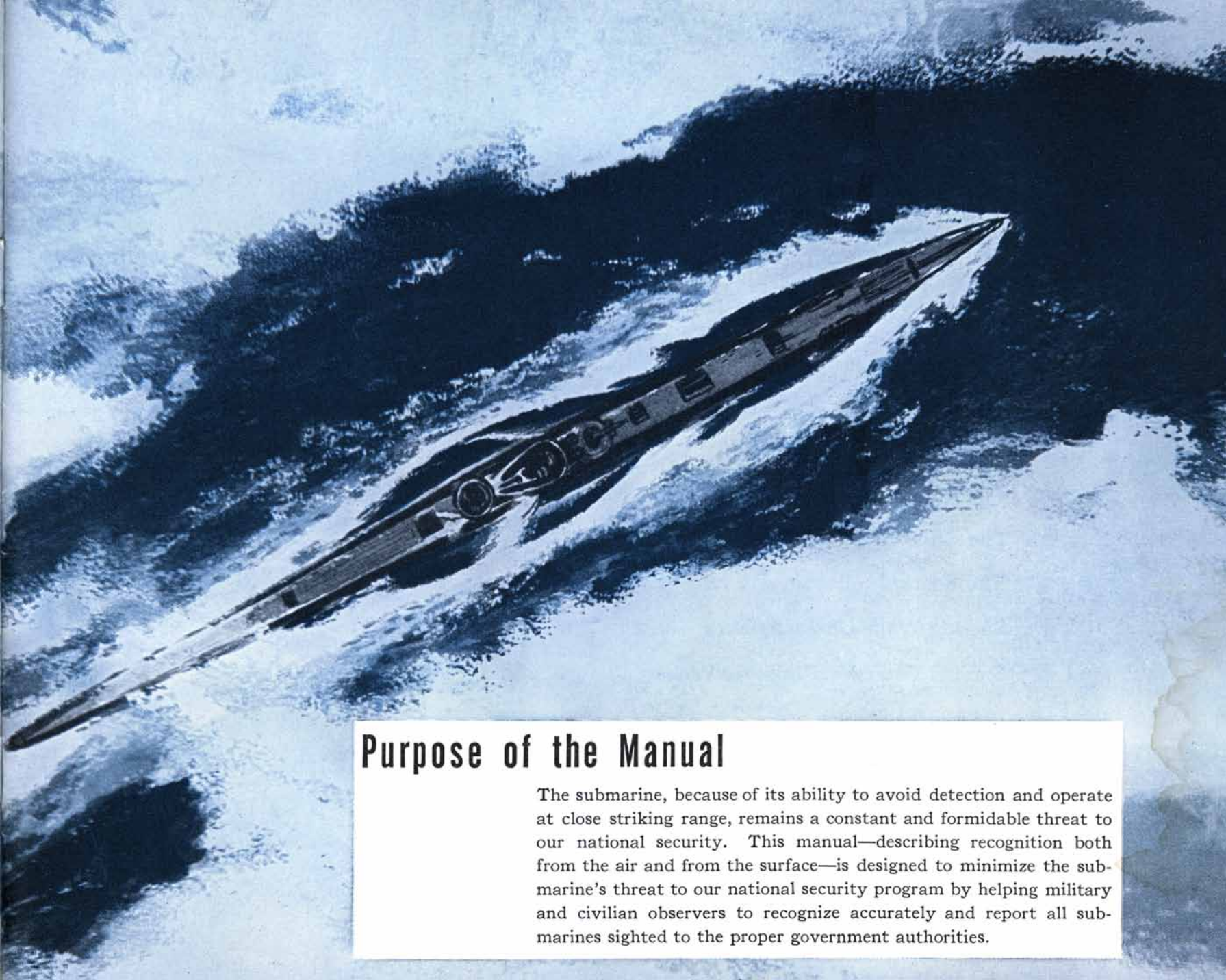
Coast Guard Offices are located in most U.S. seaports.

## TAKE PHOTOGRAPHS OF THE SUBMARINE!

This Manual Revises and Supersedes "Submarine Recognition Manual" (OPNAV P31-102).

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. — [redacted]

1999.32



# Purpose of the Manual

The submarine, because of its ability to avoid detection and operate at close striking range, remains a constant and formidable threat to our national security. This manual—describing recognition both from the air and from the surface—is designed to minimize the submarine's threat to our national security program by helping military and civilian observers to recognize accurately and report all submarines sighted to the proper government authorities.

# Contents

# Part I


From the Air . . . . . 3

Wake Characteristics . . . . . 4

Submarine Vs. Surface Craft . . . . . 5

The Effect of Speed on Wakes . . . . . 6

The Effect of Altitude on Visibility . . . . . 7

The Snorkel . . . . . 8

Snorkel Wake Characteristics . . . . . 9

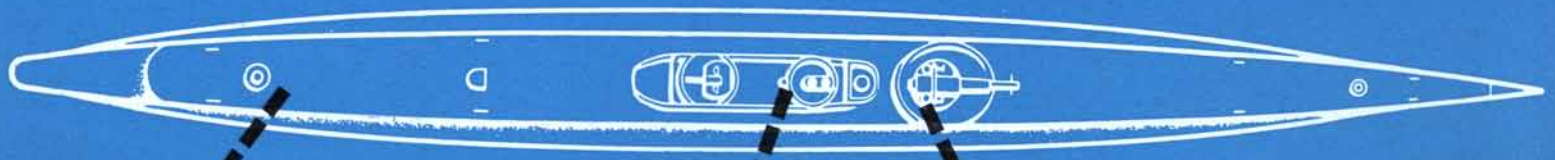
Snorkel Wake Vs. Periscope Wake . . . . . 10

Submarine Diving . . . . . 11

Whales Are Easily Confused with Submarines . . . . . 12

Other Elements Easily Confused . . . . . 13

# From the Air



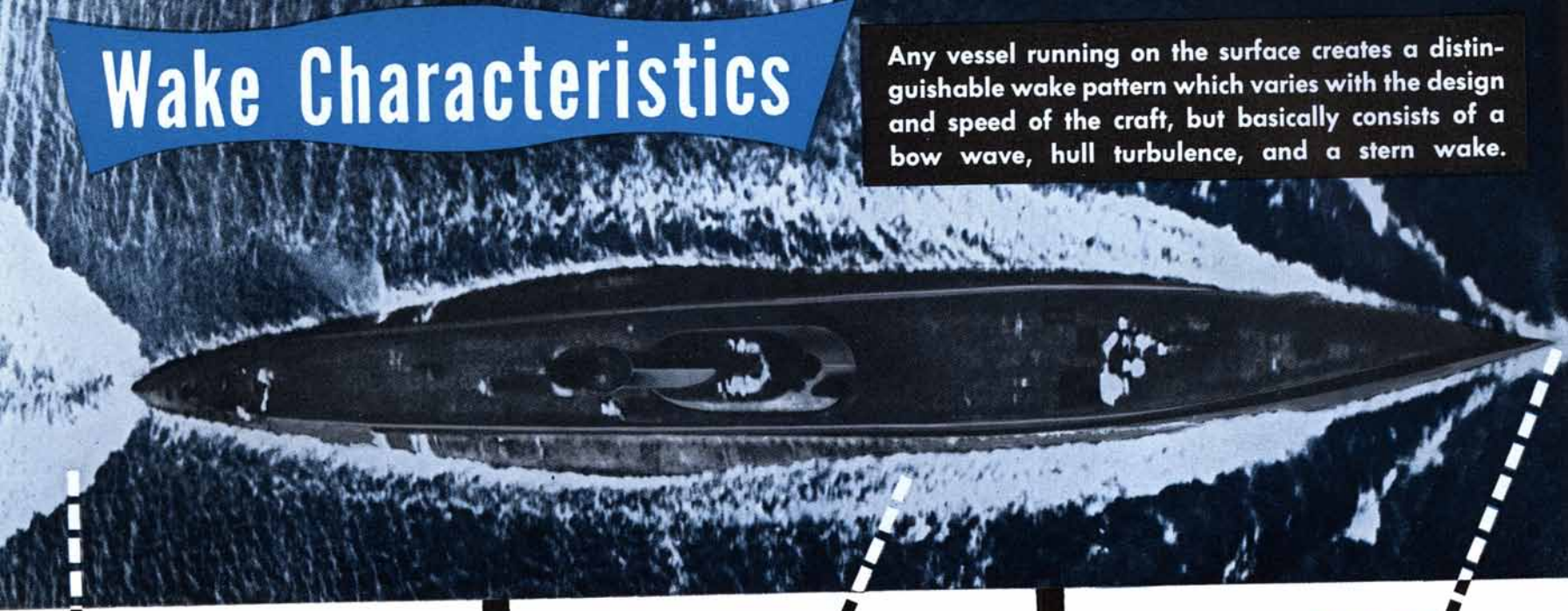
The submarine has a narrow deck over a long, dark hull — most of which is under water even when the vessel is surfaced. The stern is narrow — often coming to a point.

The conning tower is approximately amidships. Extending above it when in use are the periscope, snorkel and other operational gear.

The exact positioning of the deck guns varies with the specific type of submarine, but are usually fore and aft of the conning tower. These guns may include anti-aircraft, as well as calibres ranging as high as 5″ to 6″.

# Wake Characteristics

**Any vessel running on the surface creates a distinguishable wake pattern which varies with the design and speed of the craft, but basically consists of a bow wave, hull turbulence, and a stern wake.**





**STERN WAKE**
A churning water disturbance that streams out at a wide angle to the submarine.

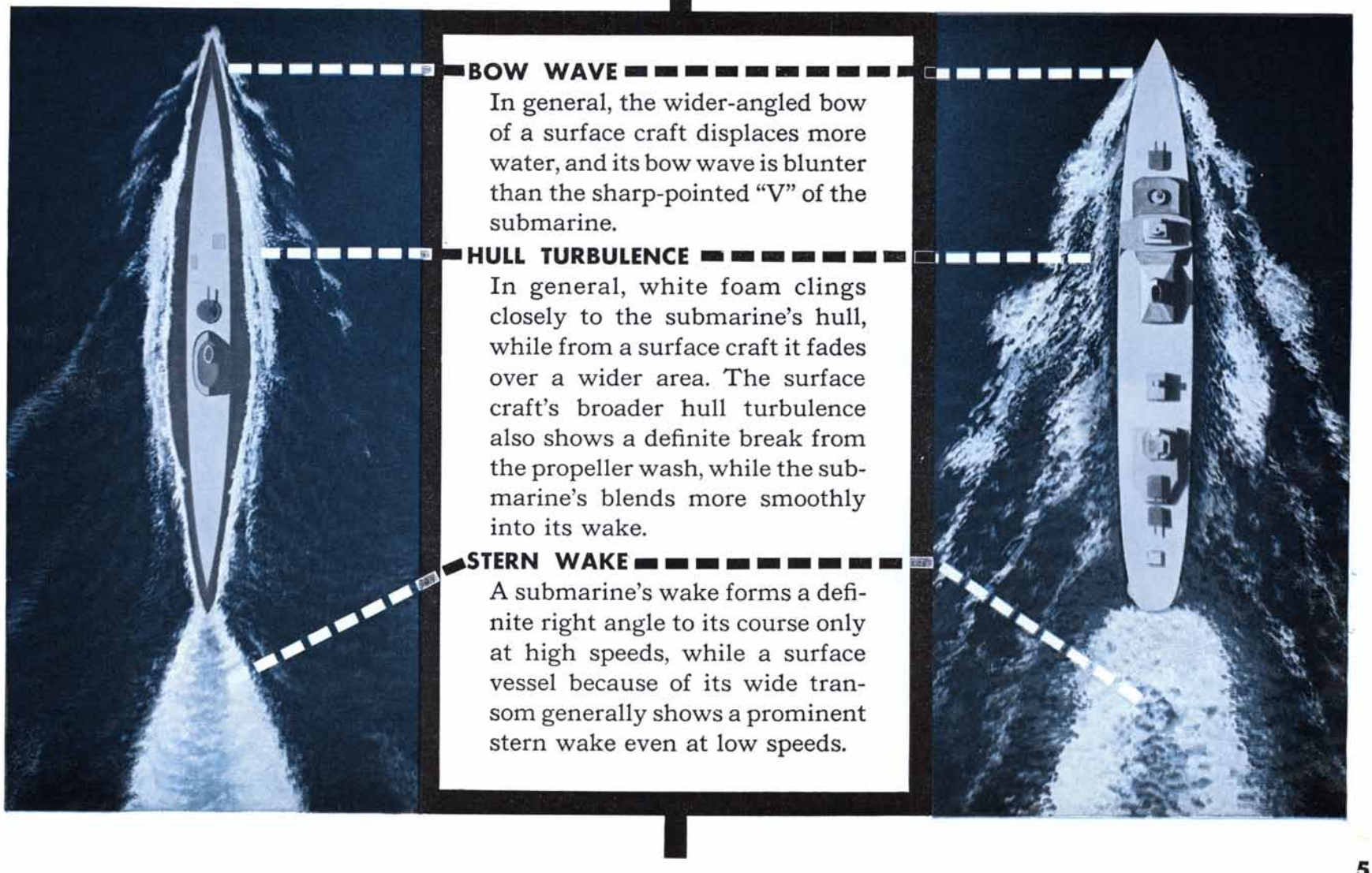


**HULL TURBULENCE**
Disturbed water which outlines the vessel's hull in foam.



**BOW WAVE**
A sharp, acute angle wave which opens from the bow.

# Submarine Vs. Surface Craft...



**BOW WAVE**

In general, the wider-angled bow of a surface craft displaces more water, and its bow wave is blunter than the sharp-pointed "V" of the submarine.

**HULL TURBULENCE**

In general, white foam clings closely to the submarine's hull, while from a surface craft it fades over a wider area. The surface craft's broader hull turbulence also shows a definite break from the propeller wash, while the submarine's blends more smoothly into its wake.

**STERN WAKE**

A submarine's wake forms a definite right angle to its course only at high speeds, while a surface vessel because of its wide transom generally shows a prominent stern wake even at low speeds.

# The Effect of Speed on Wakes...

## 6 Knots



Practically no stern wake, but hull is outlined in foam.

## 10 Knots



Skin turbulence blends into wake, track lengthens, bow wave becomes visible.

## 15 Knots



Hull turbulence and propeller wash are separate.

## 20 Knots

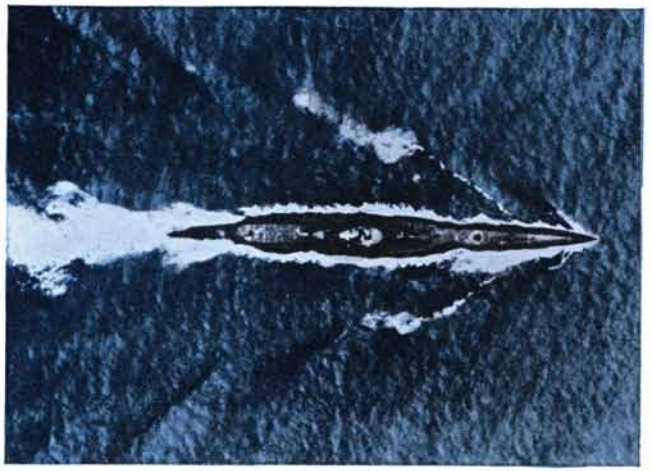


Bow wave becomes a better defined acute angle.

# The Effect of Altitude on Visibility...

- Under favorable weather conditions, increases in altitude tend to sharpen the definition of wake patterns. The only other change effected by increasing altitude is a proportionate reduction in scale.

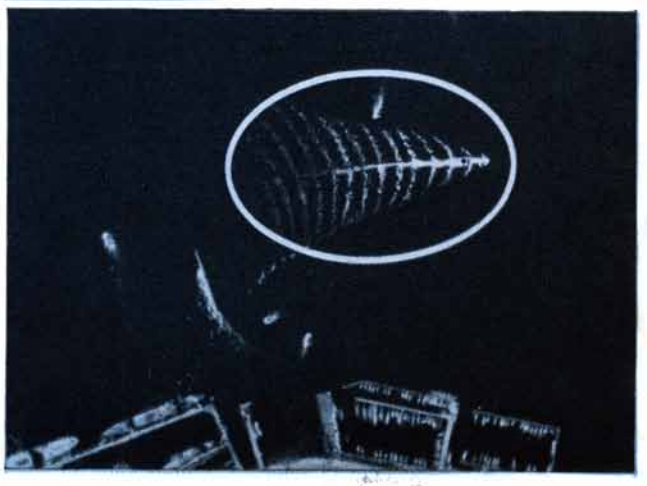
**500 Ft.**



**5,000 Ft.**

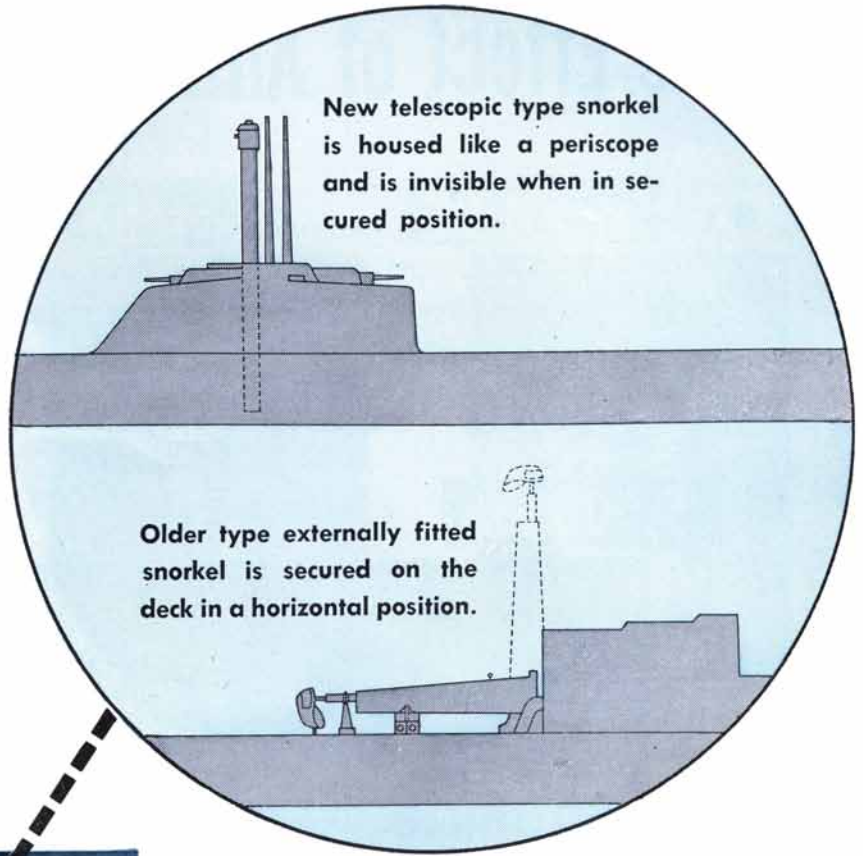


**15,000 Ft.**



# Snorkel

World War II illustrated the effectiveness of the snorkel type submarine. Its ability to remain submerged for indefinite periods of time makes detection increasingly difficult and strengthens its position as an offensive weapon, so look particularly for submarines operating under this device. When reporting, if at all possible, state whether submarine is a snorkel or conventional type.



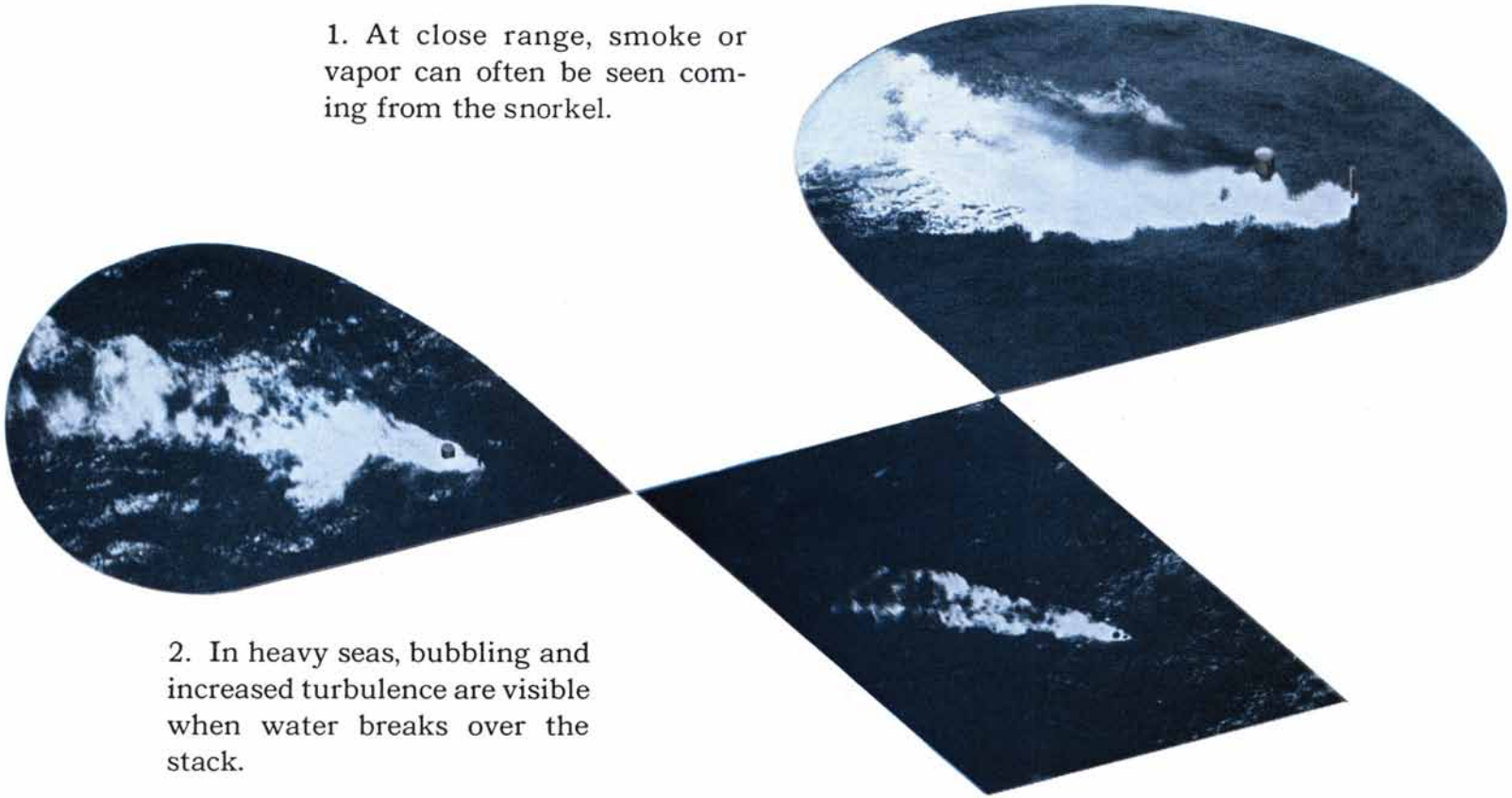

**Snorkel in Operation:**



The periscope is generally located a few feet forward of the snorkel and is extended in most cases when the snorkel is in operation.

# Snorkel Wake Characteristics...

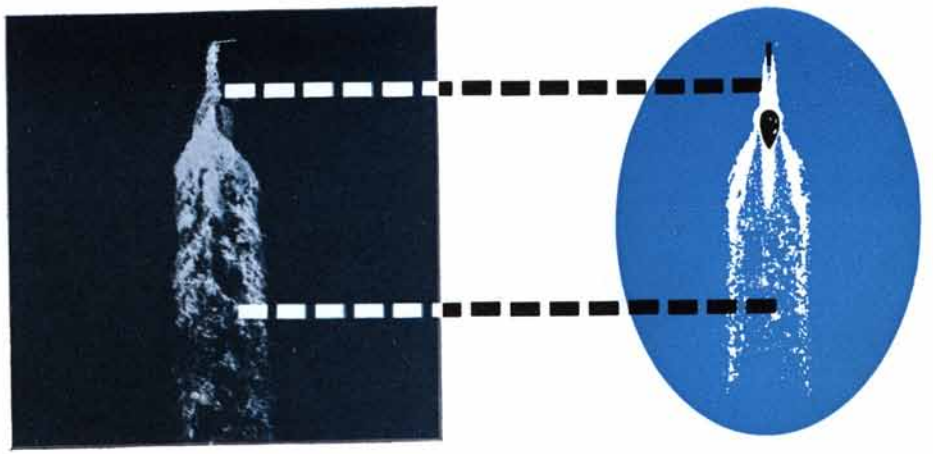
1. At close range, smoke or vapor can often be seen coming from the snorkel.



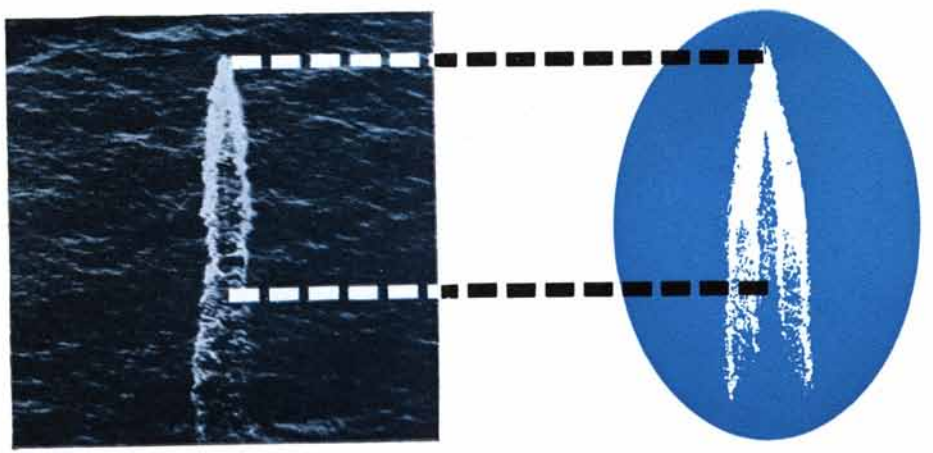
2. In heavy seas, bubbling and increased turbulence are visible when water breaks over the stack.

3. Under good visibility conditions, two distinct objects can be detected within the turbulence — one the periscope, the other the snorkel.

# Snorkel Wake Vs. Periscope Wake...



A small wake caused by the periscope precedes the main body of the wake. The snorkel's larger stack causes increased turbulence giving a wider and more irregular angle to the wake.



The periscope creates only a small wake with sharp, feather-like waves. Very little turbulence appears in the center of the wake.

# Submarine Diving



4 seconds



20 seconds



40 seconds



60 seconds

To avoid being spotted, a submarine can dive within a period of seconds. However, in so doing it leaves a water disturbance that remains visible for several minutes afterwards.

# Whales are Easily Confused with Submarines...

Whales and blackfish, in general appearance, are surprisingly like submarines and when surfaced also create similar water disturbances. However, in one respect they are different — they leave no trailing wake.



Sub



Whale



Sub



Whale



Sub



Whale

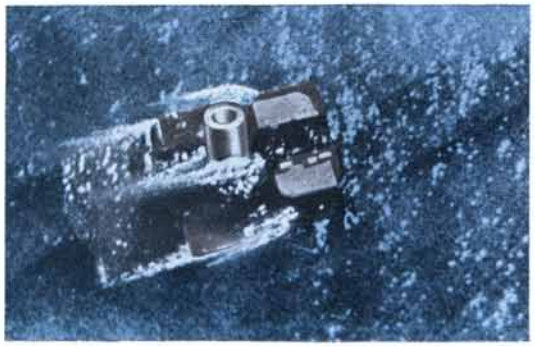
# Other Elements Easily Confused...

Oil slicks, wind slicks, etc., are often mistaken as indicating the presence of a submarine. Examine all such water disturbances, but make your evaluation carefully.

**Wind Slick**



**Wreck**



**Land Spot**



**Oil Slick**



# Contents Part II


From the Surface . . . . . 15

Surface Craft Are Often Mistaken for Subs . . . . . 16 & 17

Whales Are Easily Confused With Submarines . . . . . 18

Other Elements Easily Confused . . . . . 19

# From the Surface...



The streamlined submarine shows a long, low, clean deck line.

The conning tower is generally the most prominent feature of a submarine. Extending above it when in use are the periscope, snorkel and other operational gear.

Deck guns are generally placed on raised platforms or on the main deck forward and/or aft of the conning tower.

# Surface Craft are Often Mistaken for Subs...

**Surface Craft**



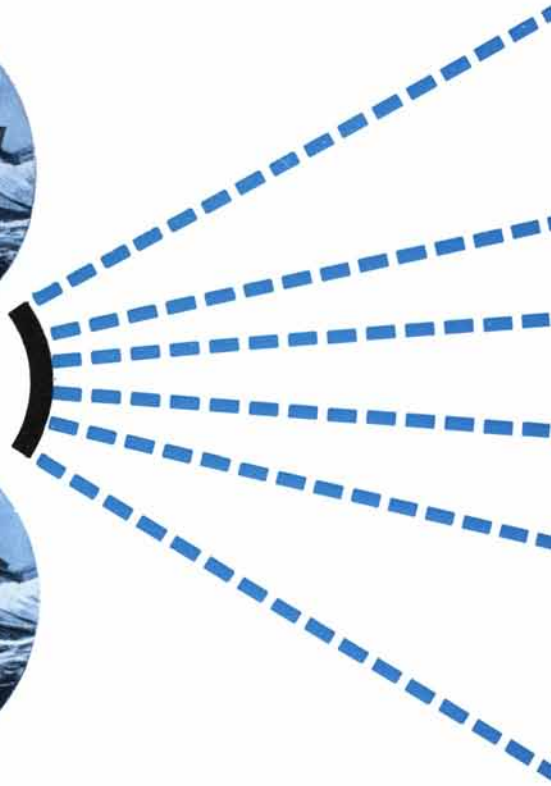


At a distance a surface vessel, with superstructure amidships and hull partially obscured by swells, closely resembles a submarine.

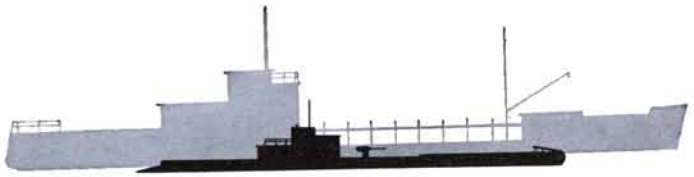
**Submarine**







Make your evaluation carefully, but don't overlook the possibility of a refueling submarine hidden in the shadow of a merchant vessel.















# Whales are Easily Confused with Submarines...

When surfacing or submerging the whale might easily be mistaken for a submarine, and its spouting may resemble snorkel exhaust vapor. However, close observation distinguishes the whale by its intermittent spouting and, where visible, its broad flukes (tail).



Sub



Whale



Sub



Whale



Sub



Whale

# Other Elements Easily Confused...

Water disturbances may indicate the presence of a submarine, and should be investigated. Wrecks, shoals and tide-rips cause turbulence that may resemble submarine or periscope wakes. Flotsam — particularly swab handles — may resemble periscopes, but can be identified by their vertical motion.

**Bell Buoy**



**Swab Handle**



**Oil Slick**



**Wreck**



# Contents Part III


Recognition of Type and Nationality Is Important . . . . . 21

U.S.A. . . . . 22–24

Russia . . . . . 25–26

Britain . . . . . 27

France . . . . . 28–29

Communist China . . . . . 29

Egypt and Italy . . . . . 30

Portugal, Greece, and Sweden . . . . . 31–32

Turkey . . . . . 32

Netherlands and Norway . . . . . 33

Spain and Poland . . . . . 34

Brazil, Japan, and Denmark . . . . . 35

West Germany, Peru, and Argentina . . . . . 36

Rumania, Chile, Thailand, and Yugoslavia . . . . . 37

Identify These Wakes . . . . . 38

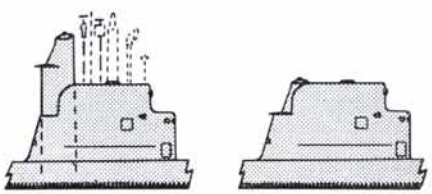
# Recognition of Type and Nationality is Important...

## Look for:

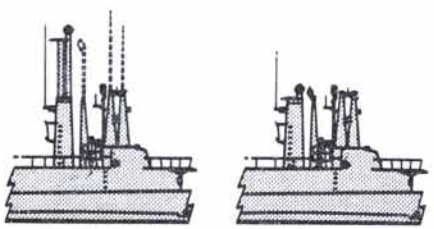


1. Location, size and type of conning tower.
2. Distinctive bow.
3. Gun platform details.
4. Distinctive markings, numerals, letters, colors, etc.
5. Indications of Snorkel installations.
6. Unusual curve or break in the deck line.

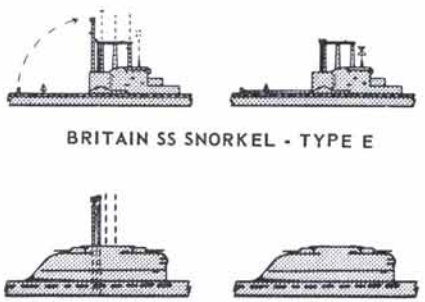
**NOTE:** Wire cutters a optional—depending upo operational use.



US SS SNORKEL - TYPE A

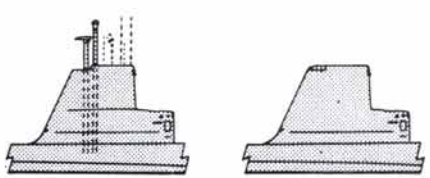


US SS SNORKEL - TYPE C

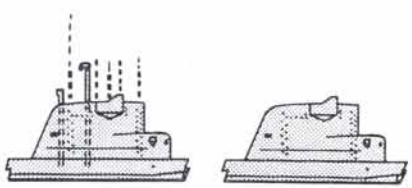


BRITAIN SS SNORKEL - TYPE E

EX-GERMAN SS TYPE XXI SNORKEL - TYPE F



US SS SNORKEL - TYPE B



BRITAIN SS SNORKEL - TYPE D

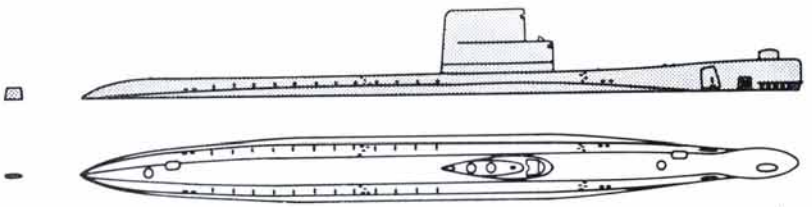


EX-GERMAN SS TYPE IX-C SNORKEL

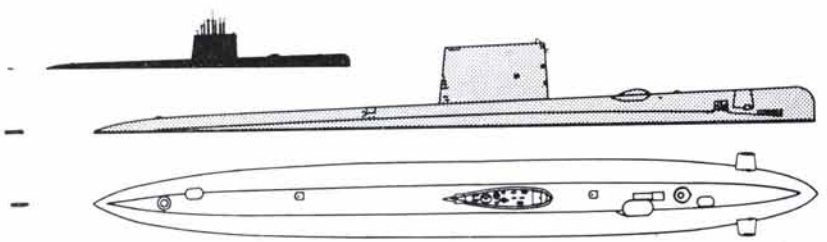
# U.S.A.



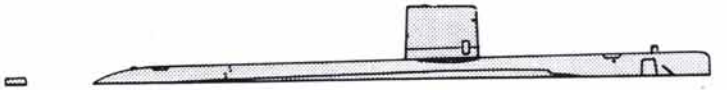
SSN SKIPJACK - PROVISIONAL DRAWING 252[1]



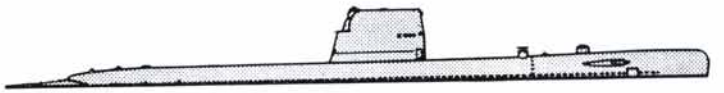
SSN SEAWOLF 338[1]



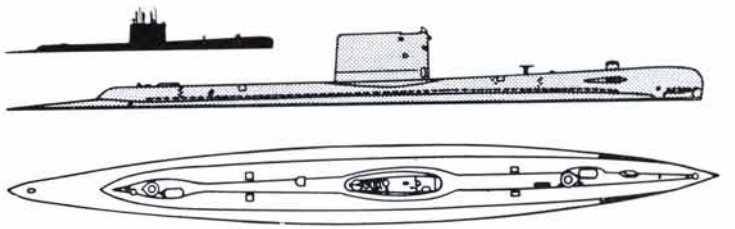
SSN NAUTILUS (Silhouette shows NAUTILUS with snorkel and periscopes raised.) 320[1]



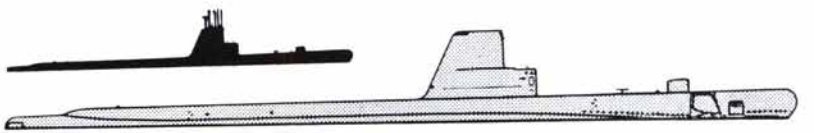
SSN SKATE CLASS 261[1]



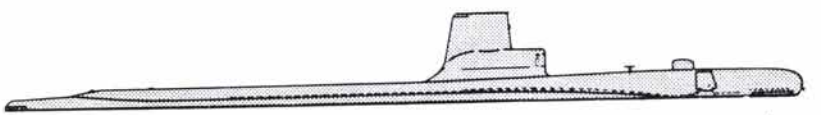
TANG CLASS 268[1]



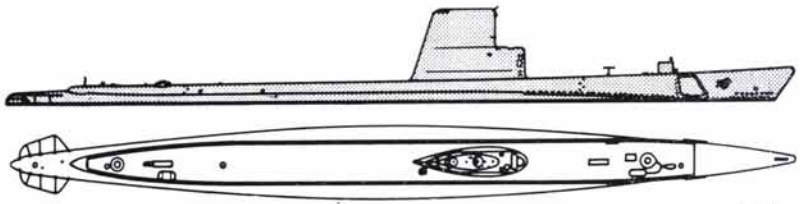
TANG CLASS - (Silhouette shows snorkel and periscopes raised.) 268[1]



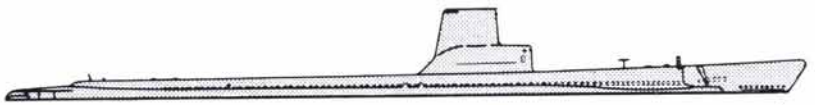
"GUPPY" - (Silhouette shows snorkel and periscopes raised.) 306[1]



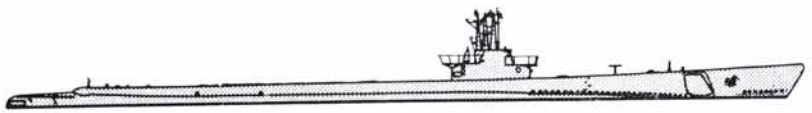
"GUPPY" 306[1]



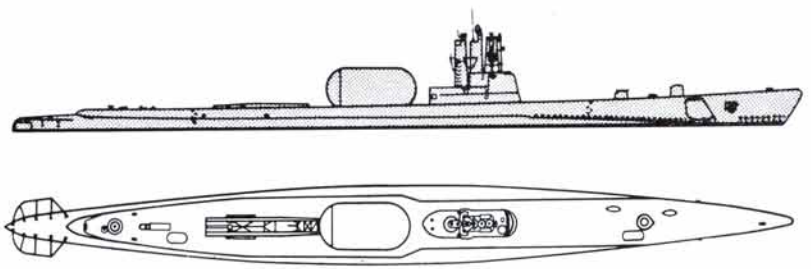
"FLEET-TYPE SNORKEL" 312[1]



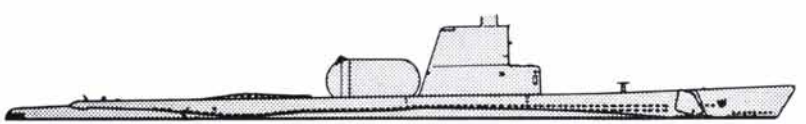
"FLEET-TYPE SNORKEL" 312[1]
(Some may mount deck gun aft of conning tower.)



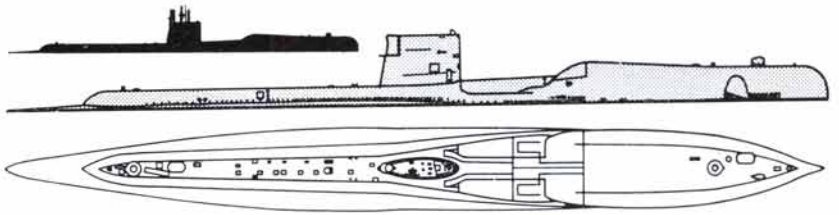
"FLEET-TYPE" BALAO CLASS - with all guns removed 312[1]



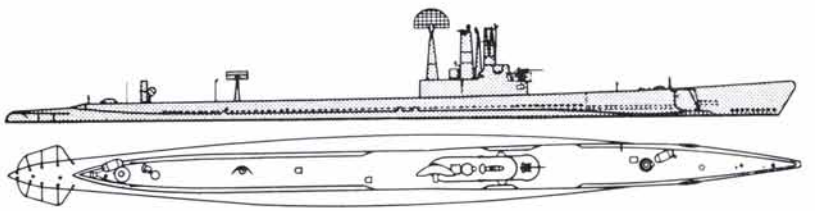
SSG (Guided Missile) - 1st variation 312[1]



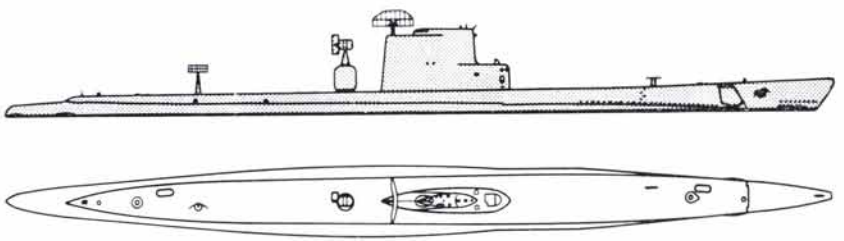
SSG (Guided Missile) - 2nd variation 312[1]



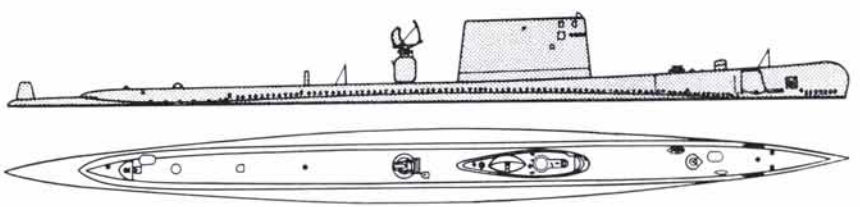
SSG GRAYBACK CLASS (Silhouette shows snorkel and periscopes raised.) 319[1]



SSR (Radar Picket) - 1st variation 312[1]

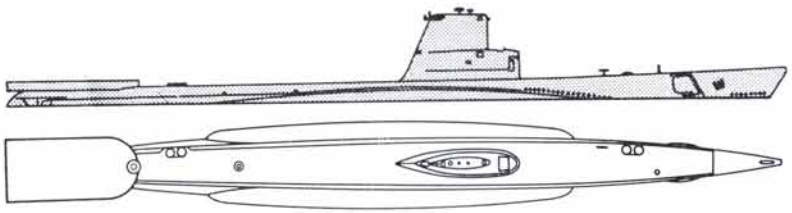


SSR (Radar Picket) - 3rd variation 341[1]

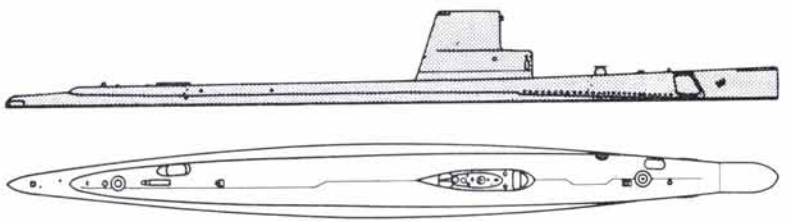


SSR (Radar Picket) - 4th variation 350[1]

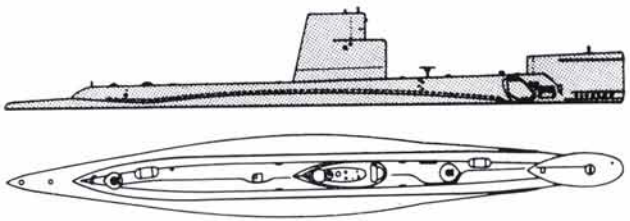
# U.S.A. cont'd



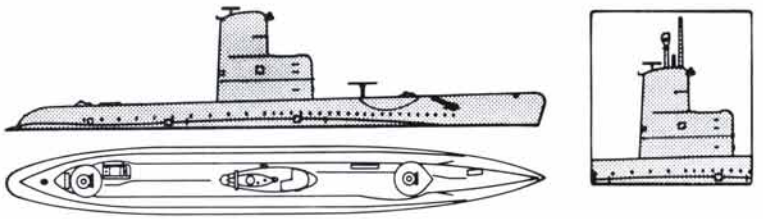
AO(SS) - Tanker Submarine 312'



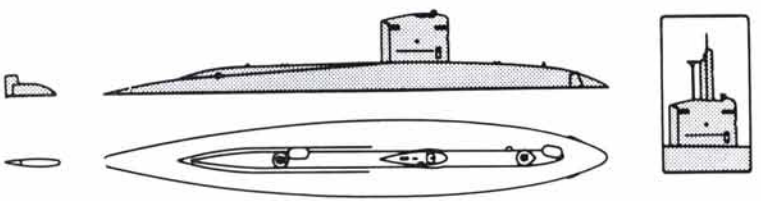
SSK TYPE II CONVERSION (Anti-Sub.) 312'



SSK 1 CLASS (Anti-Sub.) 196'

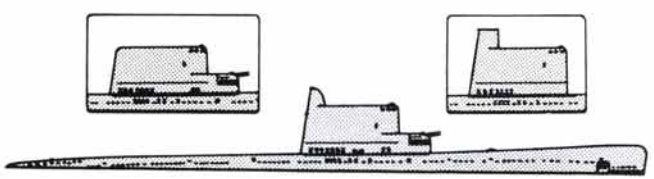


SST 1 CLASS (Inset shows periscopes and snorkel raised.) 130'

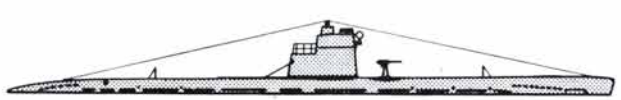


AGSS ALBACORE (Inset shows periscopes raised.) 203'

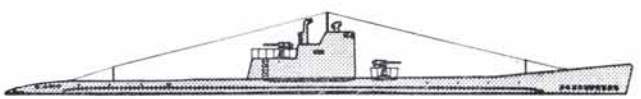
# U.S.S.R.



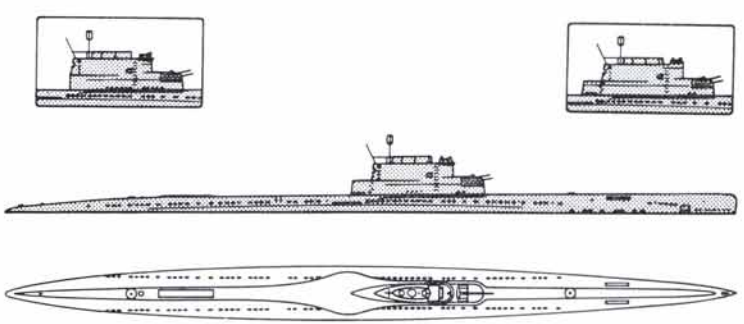
"Q" CLASS (Insets show conning tower variations.) 165[1]



"M-V" CLASS (Some may have deck gun removed.) 175[1]

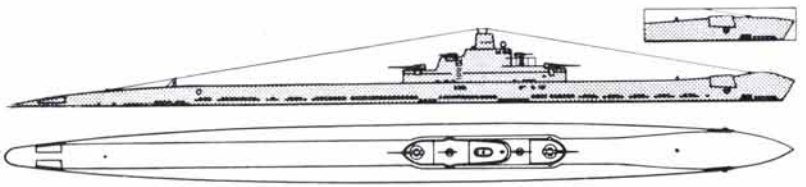


"SHCH IV" CLASS 200[1]

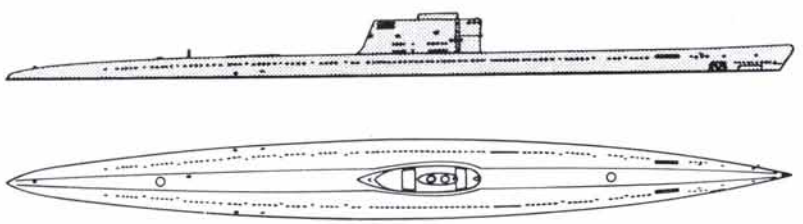


"W" CLASS - 1st variation (Insets show conning tower variations; deck guns, once mounted just aft of conning tower, have been removed.) 240[1]

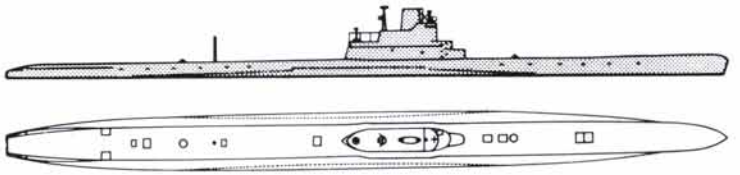
# U.S.S.R. cont'd



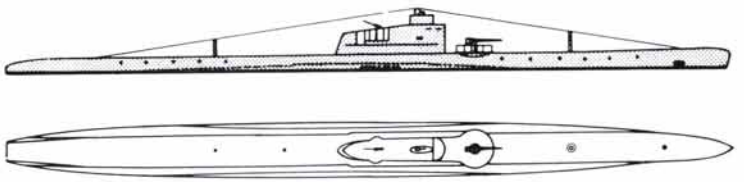
"K-1" CLASS (Inset shows bow variation) 320'



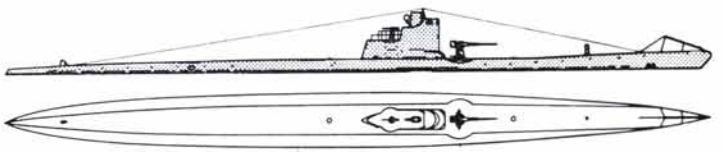
"Z" CLASS 290'



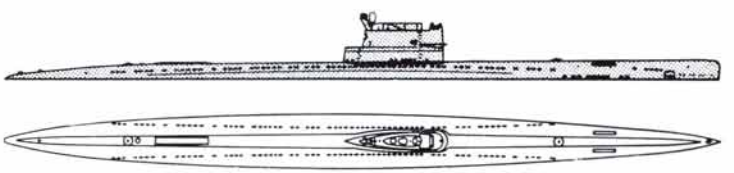
"L-III" CLASS 266'



"L - II" CLASS 266'

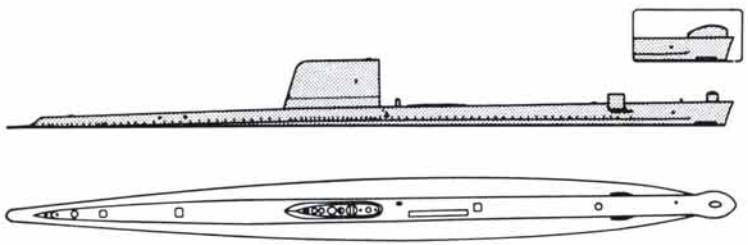


"S-1" CLASS 255'

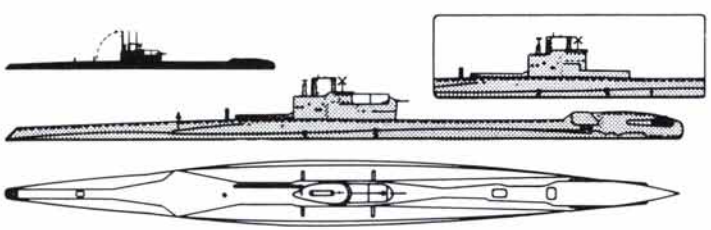


"W" CLASS - 2nd variation 240'

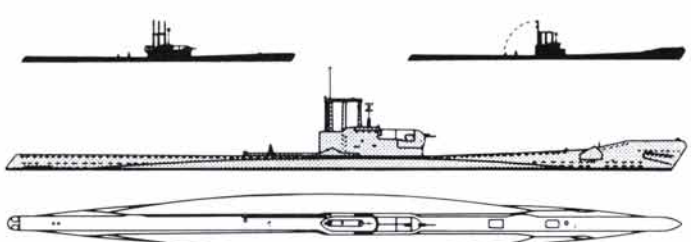
# Britain



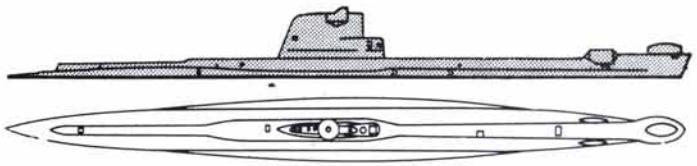
PORPOISE CLASS (Inset shows bow variation.) 295[1]



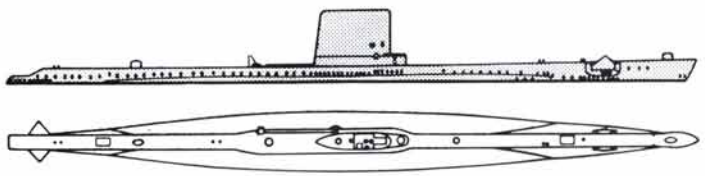
TRITON CLASS (Inset shows conning tower variation, silhouette shows snorkel and periscopes raised.) 274[1]



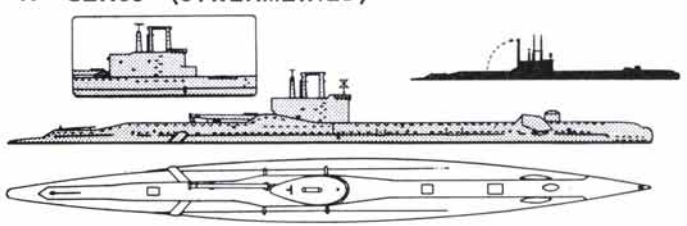
"A" CLASS - 1st variation (Silhouette at left shows AMPHION with periscopes raised, silhouette at right shows snorkel raised.) 282[1]



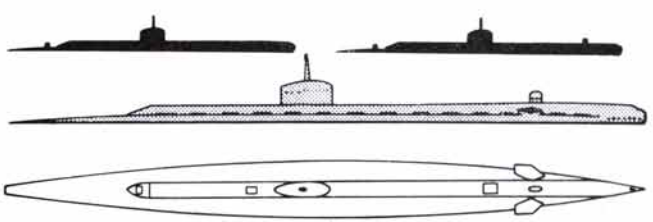
"T-CONVERSION" 285[1]



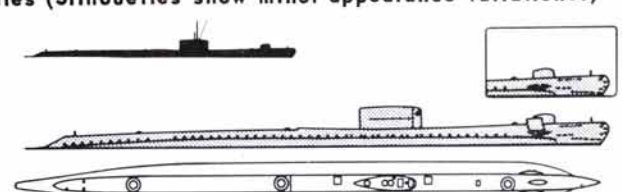
"A" CLASS - (STREAMLINED) 282[1]



"1940 S" CLASS (Inset shows conning tower variation, silhouette shows snorkel and periscopes raised.) 217[1]

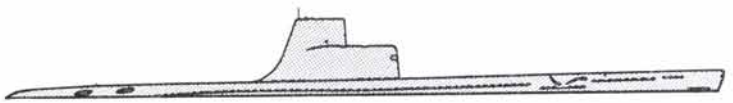


"1940 S" CLASS - As modified for target and training duties (Silhouettes show minor appearance variations.) 217[1]

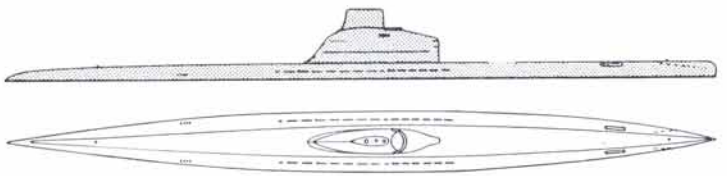


EXPLORER CLASS (Inset shows bow-planes lowered, silhouette shows periscopes raised.) 225[1]

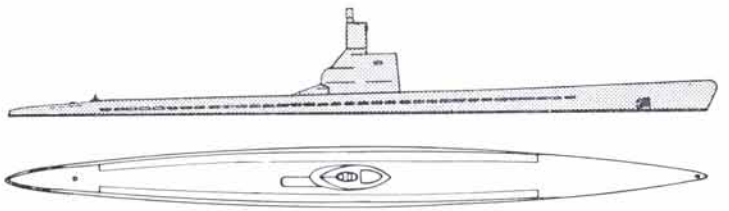
# France



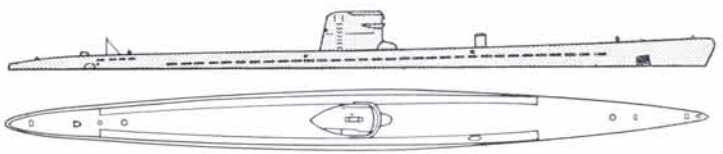
NARVAL CLASS 256[1]



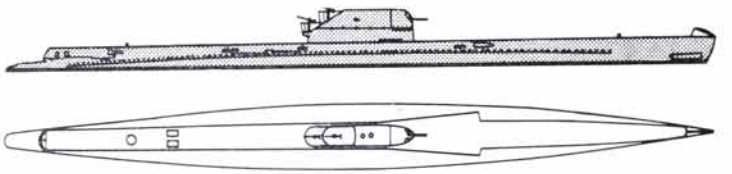
ROLAND MORILLOT (German "TYPE XXI" CLASS modified.) 252[1]



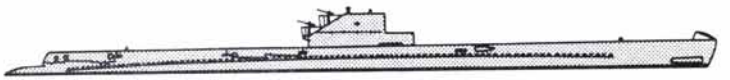
BOUAN (German "TYPE IX-C" modified.) 252[1]



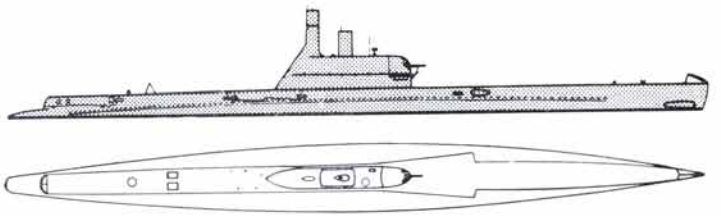
BLAISON (German "TYPE IX-B" modified.) 252[1]



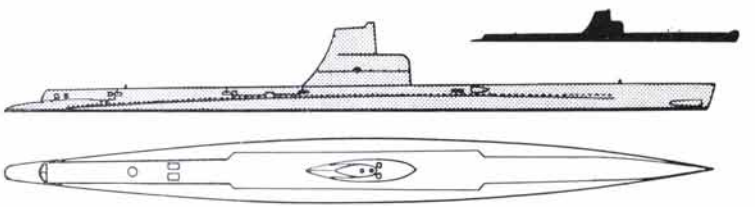
L'AURORE CLASS - 1st variation 241[1]



L'AURORE CLASS - 2nd variation 241[1]

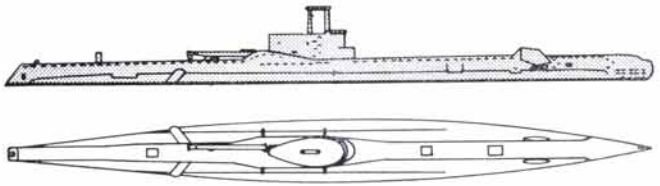


L'AURORE CLASS - 3rd variation 241[1]

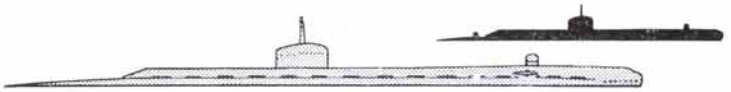


L'AURORE CLASS - 4th variation (Silhouette shows minor bow variation.) 241[1]

# France cont'd



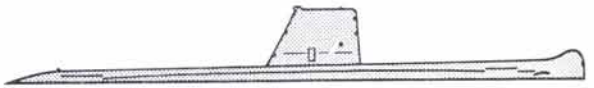
SIRENE (British "1940 S" CLASS) 217'



British "1940 S" CLASS - As modified for target and training duties. 217'



DAPHNE CLASS - PROVISIONAL DRAWING 190'

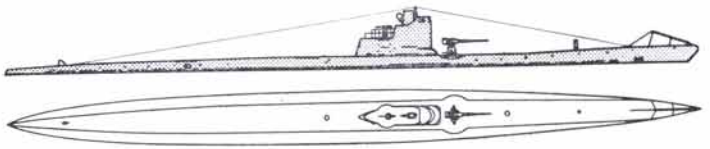


ARETHUSE CLASS 162'

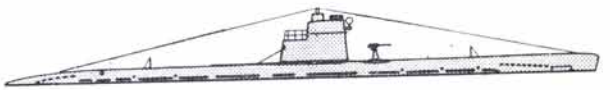
# Communist China



Soviet "W" CLASS 240'

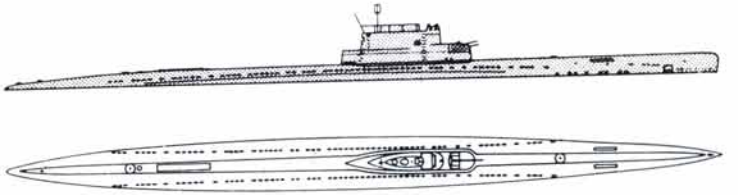


Soviet "S-1" CLASS 255'

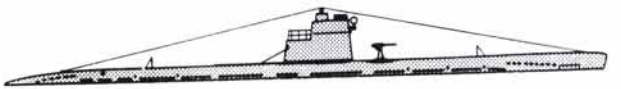


Soviet "M-V" CLASS 175'

# Egypt

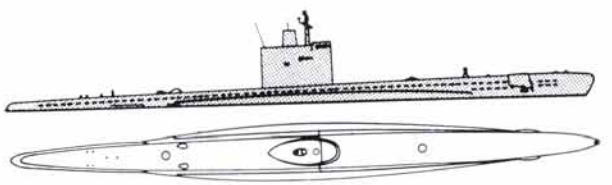


Soviet "W" CLASS 240[1]

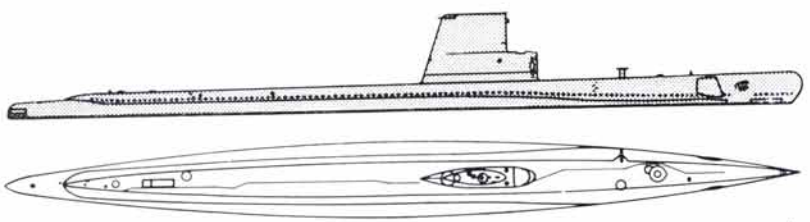


Soviet "M-V" CLASS 175[1]

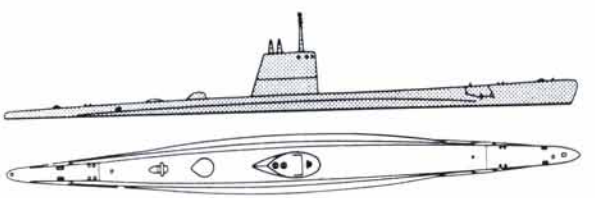
# Italy



VORTICE (TRITONE CLASS modified) 207[1]

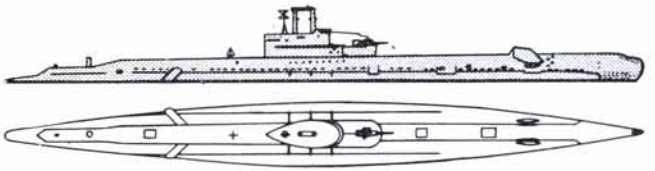


U. S. GATO (SS 212) CLASS - Modernized 308[1]



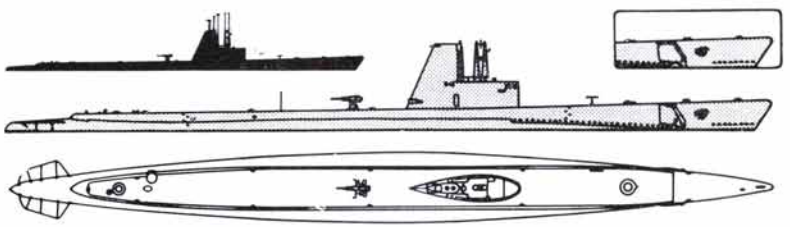
GIADA (ACCIAIO CLASS modified) 197[1]
Note: Italy also has the BARIO,
a TRITONE CLASS submarine. Appearance is unknown.

## Portugal



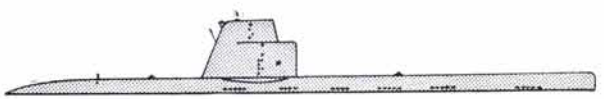
British "1940 S" CLASS 217'

## Greece

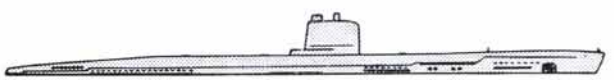


U. S. GATO CLASS - POSEIDON, inset shows bow of AMFITRITI. (Silhouette shows snorkel and periscopes raised.) 312'

## Sweden

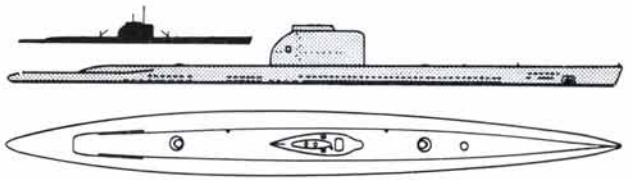


HAJEN CLASS 215'

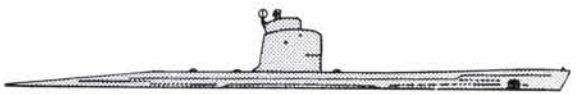


NÄCKEN CLASS 204'

# Sweden cont'd

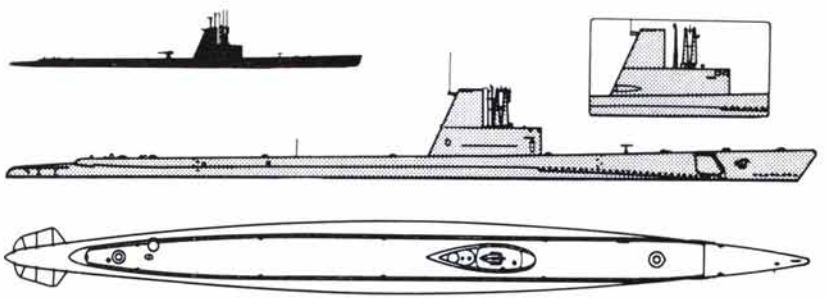


SJÖLEJONET CLASS (Silhouette shows periscopes raised.) 204'

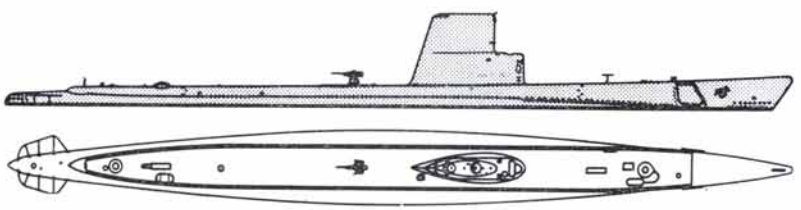


"U" CLASS 164'

# Turkey

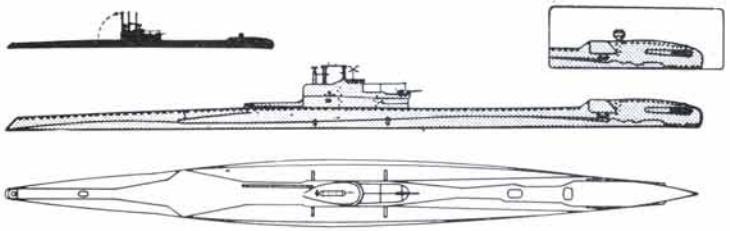


U. S. GATO (SS 212) CLASS - Modernized (Some units carry deck guns; arrangement varies, see silhouette. Inset shows conning tower variation.) 312'

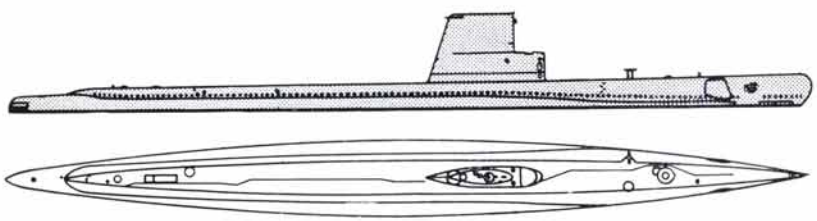


U. S. "FLEET-TYPE SNORKEL" 312'

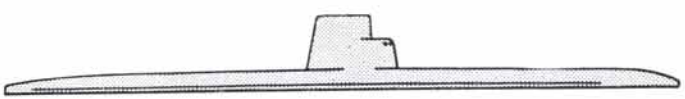
# Netherlands



British TRITON CLASS (Inset shows bow variation, silhouette shows snorkel and periscopes raised.) 274'

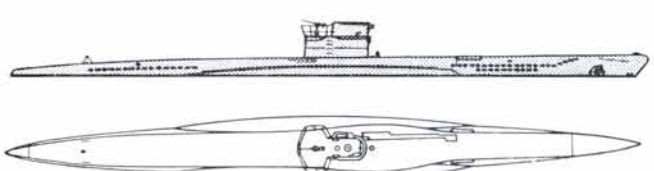


U. S. BALAO (SS 285) CLASS - Modernized 308'

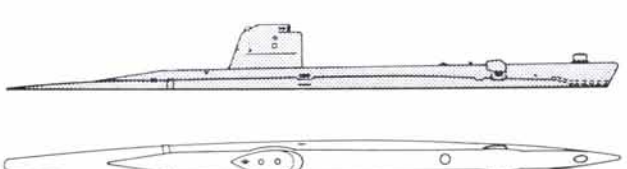


DOLFIJN CLASS - PROVISIONAL DRAWING 240'

# Norway

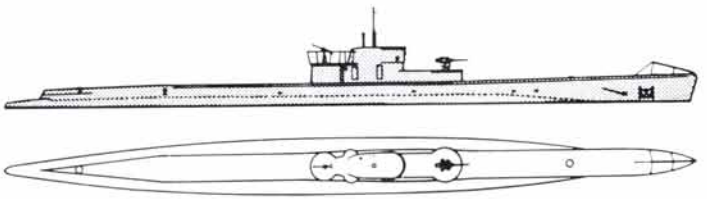


German "TYPE VII-C" CLASS 221'

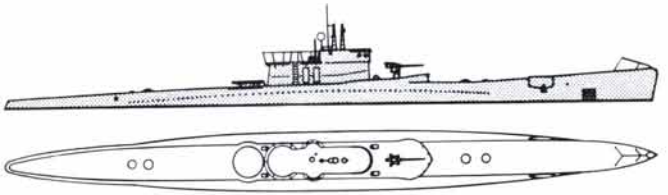


British UNITY CLASS - Modified 197'

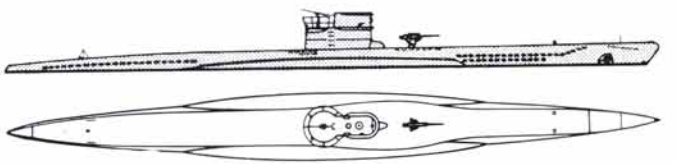
# Spain



"D-1" CLASS 276'

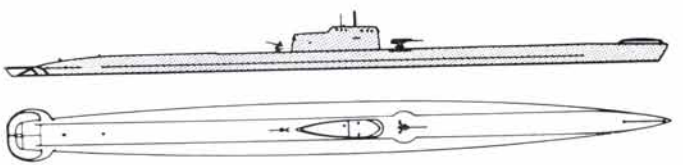


Italian ARCHIMEDE CLASS 231'

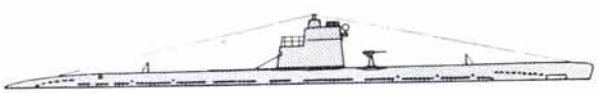


G-7 (German "TYPE VII-C" CLASS) 221'

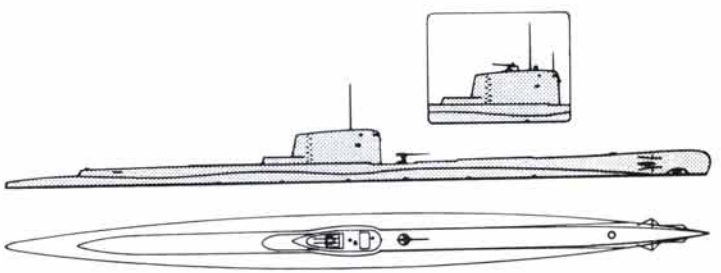
# Poland



WILK CLASS 256'



Soviet "M-V" CLASS (May have deck gun removed.) 175'

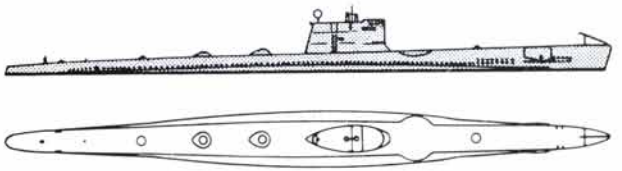


SEP (Inset shows AA mount in elevated position.) 275'

## Brazil

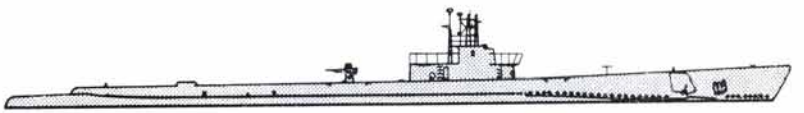


U. S. GATO CLASS 312'



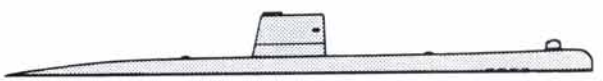
Italian PERLA CLASS (May have bow net cutters removed.) 198'

## Japan



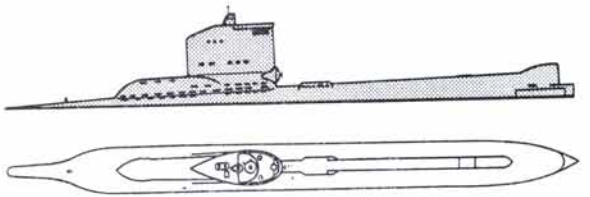
KUROSHIO (U. S. GATO CLASS) 312'

## Denmark



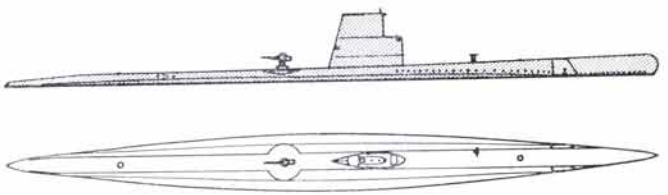
DELFINEN CLASS - PROVISIONAL DRAWING 167'

# West Germany

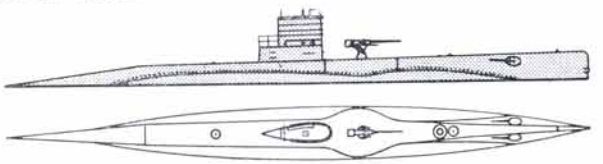


"TYPE XXIII" CLASS - Modified 114'

# Peru

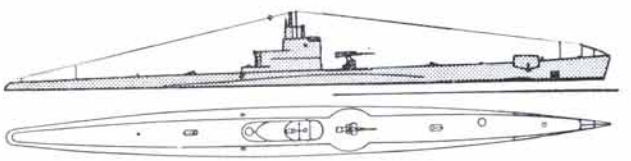


TIBURON CLASS 243'



"Modified R Boat" CLASS 200'

# Argentina

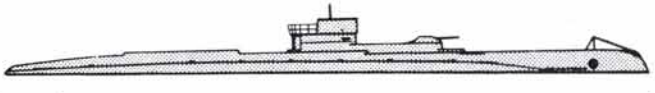


SALTA CLASS 227'

## Rumania

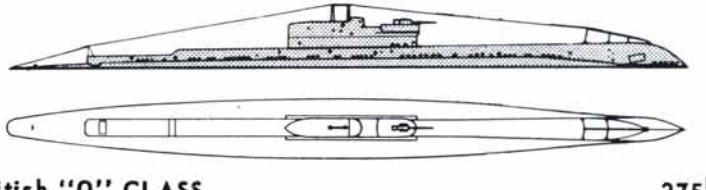


MARSUINUL 190'



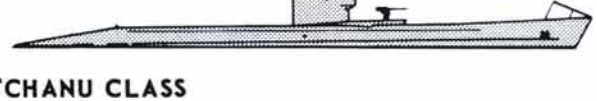
DELFINUL 225'

## Chile



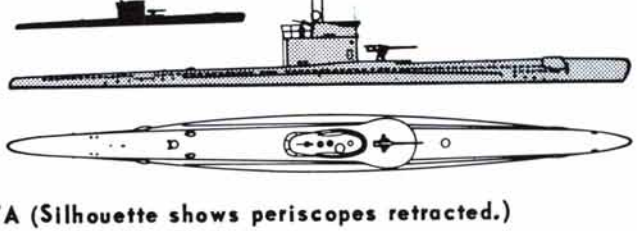
British "O" CLASS 275'

## Thailand



MATCHANU CLASS 167'

## Yugoslavia



SAVA (Silhouette shows periscopes retracted.) 207'

# Identify these Wakes...



1



2



3



4



5



6



7



8



9



10

1. Wreck
2. Oil Slick
3. Submarine
4. Whale
5. Submarine
6. Whales
7. Submarine
8. Surface Craft
9. Wreck
10. Submarine



GPO 16—75165-1

...and don't forget,

TAKE PHOTOGRAPHS!