

Hiding Ships with Paint

How protective coloring causes Fritz much waste of torpedoes. It is camouflage at its best

By Robert G. Skerrett

THE gun afloat, whether upon a naval craft or an armed merchantman, drives the submarine to cover beneath the waves when it approaches its prey close enough to discharge the torpedo. The U-boat commander must, therefore, keep track of his moving target. At best, a periscope is a poor substitute for the naked eye or the binocular vision made possible by good field glasses. The periscope is one-eyed, and this entails very definite and unsatisfactory limitations. These facts must be kept in mind in order to evaluate the real purpose of marine camouflage.

Marine camouflage differs radically from camouflage ashore where the character of the background facilitates concealment. It is a simple thing to cloak a gun with a screen of foliage or to mottle it with paint so that its contours disappear. The ship afloat, except through the agency of a smoke screen, cannot veil its identity. Under certain conditions of light, the vessel stands vividly silhouetted against the sky, and even when the atmospheric contrast is not so sharp, the ship can be seen rather distinctly though painted a single tone of gray.

Atmospheric gray and paint-brush gray are two fundamentally different things so far as vision or visibility is concerned. The latter is the product principally of black and white pigments, while the atmospheric gray is a vibratory effect resulting from the movement of red, green, and violet rays of light. The quality of this gray alters from hour to hour as one or the other of these chromatic rays predominates, and, manifestly, no single pigmentary gray could accommodate itself to these changes. Finally, the character of a ship is indicated by her body form and her upper works—details that are emphasized by high lights and strongly contrasting shadows.

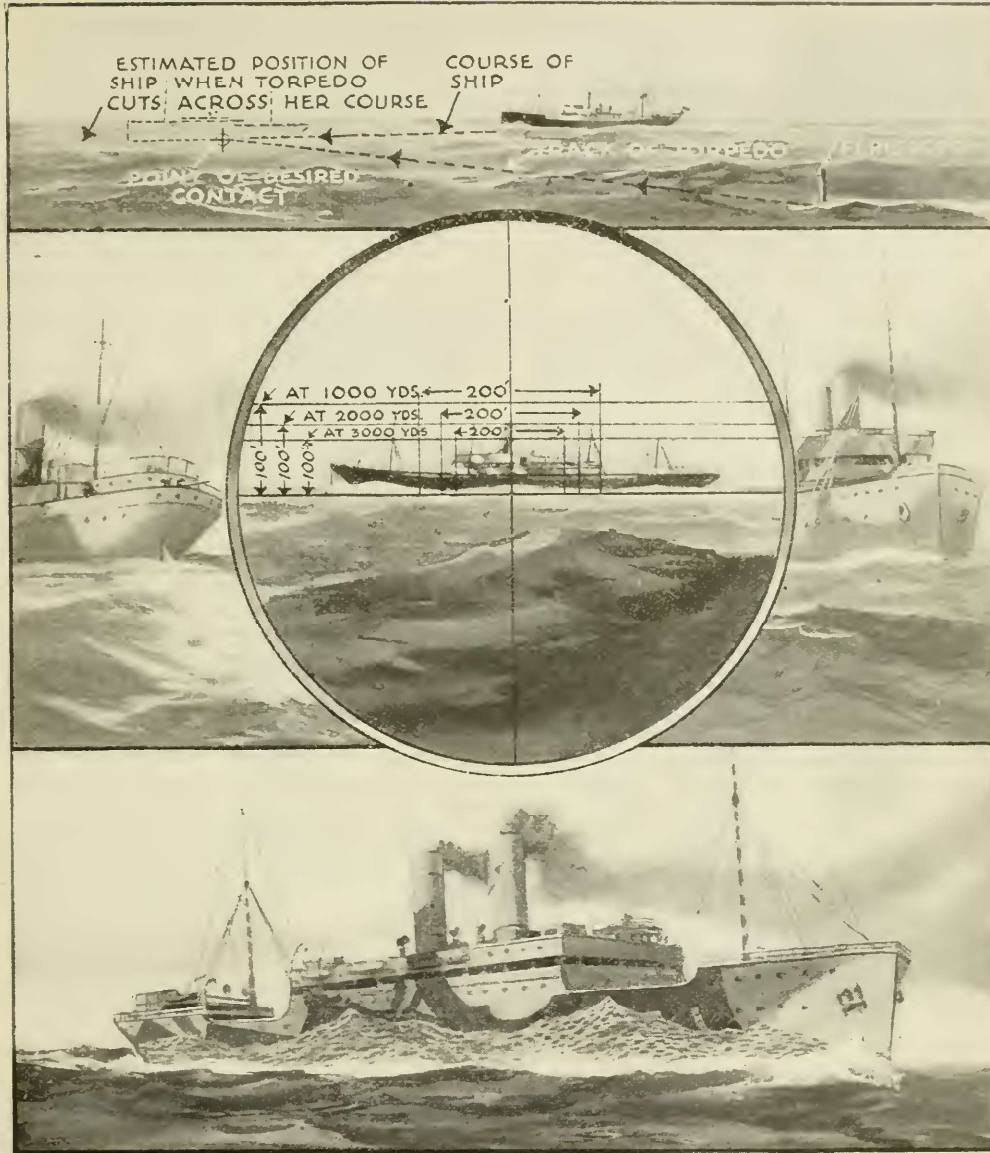
The submarine in the barred zones seeks to close in upon its quarry during

the dusk of early morning, or the close of day or after nightfall, especially if the moon helps to make the enemy craft discernible. The camoufleur therefore tries to reduce the visibility of vessels during the periods of dim or half light, and, curiously enough, the more scientific of these men employ really vivid coloring for the purpose. They paint their ships with apparently meaningless splotches of strong pink, blue, and green. The patches become prominent agreeably to the predominating light ray at the time, and serve to obliterate those familiar details or forms for which the observer looks. Not only that, but normally shaded areas are purposely painted light, and the visual effect is flat and confusing. There is dazzle and loss of definition in fairly strong light, and, during periods of twilight, atmospheric vibration induces a gray tone that is so nearly akin to the sea background that craft painted in this marked fashion actually become invisible at a mile!

Upon the field of a periscope there are a number of horizontal lines as well as vertical ones. The horizontal lines are spaced to represent a prescribed height at distances say of 1,000, 2,000, or 3,000 yards, while the vertical lines are spaced to indicate definite intervals at those different distances so as to determine the speed of a vessel passing across them. The U-boat commander, in order to launch his torpedo with a fair chance of hitting his target, must know how far off the enemy ship is, whether her course is bringing her closer or taking her away, and approximately how fast she is moving. With these factors fairly gaged, the torpedo is pointed far enough ahead of the target to allow for its time of flight and the advance of the enemy craft.

The commander of the submarine must also be able to measure the height of his quarry from her true waterline to the top of her smokestack, which is a reasonably

Mimicry on the High Seas



Camouflage at Sea

The first illustration shows how closely related the problems of a submarine commander are to those of a duck hunter. He must estimate the speed and course of his target and shoot enough ahead to allow for them. The centre picture shows the appearance of a ship at 2,000 yards, seen through the periscope of a submarine under ideal conditions. The range is determined by the height of the smokestack above the waterline. The two side illustrations are examples of the way the camoufleur changes the light and shade on the hulls, funnels, etc., of vessels, thereby confusing an observer both as to the length of the ship and the angle of her approach or departure. The ordinarily high lights are toned down, and the naturally dull portions are thrown

up by painting them in bright colors. At the bottom is seen a complete camouflaged boat, and one that was painted by a master-hand. The whole idea is to give the impression of a sinking ship, and to merge the ship proper into the background. It will be noticed that the dark shaded patches on the hull would convey, at a distance, the impression of a funnel and waterlogged hull, while the sham "sea" merges into the real sea and makes it appear that the alleged steamer is in a sinking condition. This particular instance is a most ingenious one. A more common one is to paint the hull of a smaller vessel of radically different dimensions on the hull of the boat, or to "paint off" the stern and raise up the apparent waterline.

constant figure in the run of commercial freighters, and may be pretty accurately estimated in the cases of other larger merchant ships or well-known types of naval vessels. Any coloring that will tend to obliterate the actual waterline or conceal or confuse the top of a steamer's smokestack will deceive the observer in his effort to determine the distance or range of his target, and, therefore, throw him out in calculating how far his torpedo must travel in order to score. Also, any coloring that destroys the outlines of the ship and makes it hard to observe her movement across the periscope's vertical lines so as to estimate her speed, will introduce another element of error.

It has been determined by careful investigation that the eye tires in the course of a minute or two when watching a moving target steadily through a periscope even in broad daylight; and the eye so fatigued becomes erratic in judging both range and speed. It should be evident, then, that marine camouflage as we have developed it in this country is calculated to hasten visual fatigue and to so bewilder the U-boat commander, when he can see one of our vessels, that his torpedoes will be likely to go wide of their mark. We may change the old adage "To err is human, to forgive divine" to "To err is human to increase the error is angelic" in this case.

Save Gasoline With This Device for Controlling Engine Temperature

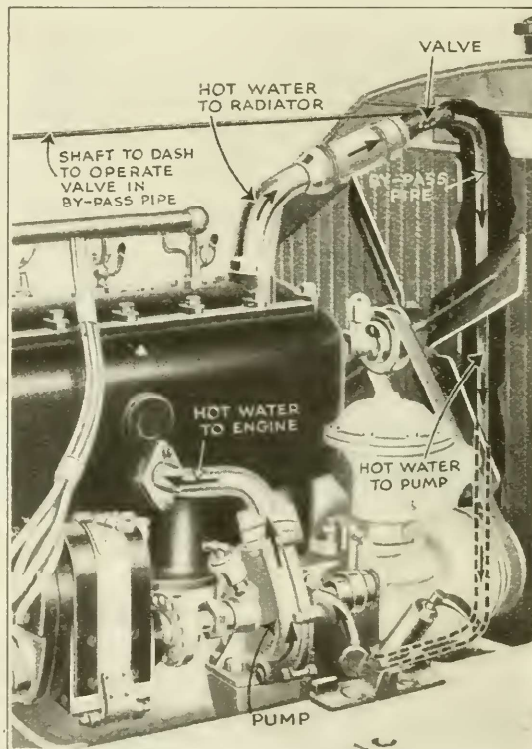
GASOLINE is not what it was five years ago. It is becoming heavier, so that it is more and more important to control engine temperatures automatically. Otherwise the fuel will not be properly vaporized and gasoline will con-

dense in the manifolds and cylinders and destroy the greasing properties of the lubricating oil. The by-pass arrangement shown in the accompanying sketches is a simple way of controlling the temperature.

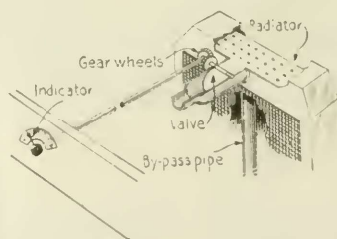
Inside of the radiator at the rear is a separate vertical pipe. This pipe enters the lower radiator tank at the bottom. An elbow at the top of the pipe has a plain shutter valve which can be opened or closed so that the water returning from the engine can be sent to either the vertical

pipe or to the top tank of the radiator. The operation of the valve is controlled by the car driver by means of a rod and two meshing gears so that in cold weather only a portion of the cooling water may be sent through the radiator or all of it through in hot weather when additional cooling is required.

This little improvement will add greatly to the starting-up capabilities of the car, particularly in cold weather, as the gasoline is always easily vaporized.



An arrangement that makes sure of the vaporization of the heavier gasoline of these days



Details of mechanism for actuating the valve from dash