The "Super-Destroyer"

Some Facts Concerning the Origin and Development of the Flotilla Leader

By Hector C. Bywater

THE flotilla leader, which is a super-destroyer, is a new type of vessel developed during the recent war. These vessels are used to lead flotillas of destroyers into action. Being larger than destroyers they carry the essential facilities for a flotilla commander. They are better equipped for signaling and range-finding, carry a heavier battery, and a much more efficient radio equipment than a destroyer. They proved themselves to be very useful in the late war, and are now generally recognized as being required by modern organization for destroyer operations. Also, these larger vessels were found necessary for screening battle-cruisers, where the ability to maintain high speed in a seaway is a prime necessity.

The foregoing admirable summary of the functions of the flotilla leader is contained in the recommendations made by the General Board of the United States Navy for the building program of 1921. Five vessels of this type were included in the Board's program, which, however, has not been accepted by Congress, with the result that, for the next few years the United States Navy will have to do without a type of fighting ship which is possessed and highly prized by the other navies of the world. The flotilla leader is really an old type revived under a new name. It is the modern descendant of the "divisional torpedo-boat" and the "torpedo-gunboat" built during the closing decades of the 19th century, types which, in their turn, had sprung from the sea-going torpedo-boat and eventually became merged in the destroyer. The credit of having invented the flotilla leader must go to Germany, who some forty-five years ago ordered the "Zieten," a fast "torpedo aviso," from the Thames Ironworks of London. Although but 975 tons in displacement and barely 200 feet in length, she had a speed of 16 knots, remarkable for those days, and carried a powerful armament of four 4.7-inch breech-loading guns, with submerged tubes at bow and stern for ejecting the "fish" torpedo. The success of the "Zieten" led other powers to experiment with vessels of this type, from which there grew a very numerous family. It was only in Germany, however, that the original function of the "Zieten" as a leader of torpedo boats was kept steadily in view, though lack of funds prevented that country from perpetuating the type.

In 1906 tactical maneuvers held in the North Sea convinced the British Admiralty that the system of using destroyers in large flotillas of twelve to twenty boats necessitated the building of special leaders, or flag boats, from which the commodore in command could control his flotilla just as an admiral handles a squadron or fleet of battleships from his flagship. Since the ordinary destroyer did not offer sufficient bridge room, living accommodations, and other facilities for the commodore and his staff, it was considered necessary to design a vessel of larger dimensions, fitted up as a miniature flagship, and possessing superior qualities of speed and armament. The pioneer vessel of this type was the "Swift," ordered from Cammell-Lairds of Birkenhead, in 1906. She displaced 1,825 tons, was 353 feet in length and 34½ feet broad, and was equipped with turbine machinery of 30,000 S.H.P. to produce the then phenomenal speed of 35 knots, which was at least five knots more than the best British destroyer of the period could make. The trials of this vessel, which was launched in 1907, were watched with keen interest, as few engineers believed she would ever make her contract speed. But the first runs over

H. M. S. "Wallace," flotilla leader of "Scott" class; displacement 1,700 tons, making 37.7 knots at 45,500 horse-power. Armament: five 4.7-inch guns, six 21-inch torpedoes

the measured mile confounded the skeptics, for the best run at full power gave a maximum velocity of 38.3 knots—a world's record which remained unbroken for ten years. Her boilers were exclusively oil-fired, and the success of this innovation encouraged the British Admiralty to embody the liquid fuel system in their later destroyers. But this drawback to the "Swift" was her inordinate cost—£280,500 (\$1,402,500 at normal rate of exchange). For this sum three destroyers of ordinary type could be built, and consequently no further leaders were built until 1913, in which year the "Marksman" and "Lightfoot" were laid down. The "Swift" performed most valuable service during the war, and her dashing exploit in April, 1917, when, in

leaders of unprecedented size and power; and both Italy and Japan evolved some very striking designs. The new French naval program includes six 2,000-ton leaders, and the U. S. Navy Department is known to have prepared plans for vessels of the same type, though their construction has still to be authorized.

The accompanying table shows at a glance the principal features of representative flotilla leaders built, building, and projected for the world's navies.

It will be seen from the accompanying list that the German flotilla leaders easily surpassed their contemporaries in size and weight of armament. These twelve boats—"S-113-115," "V-116-118," "G-119-121," "B-122-124"—were designed to form an "Iron Division," primarily for the purpose of defending the "Heligoland Bight" against British raiders and mine-layers. They are of peculiar interest, illustrating as they do the radical change induced in the German conception of destroyer functions as the result of war experience. Before the war German naval officers attached minor importance to the gun armament of their torpedo craft. Logically enough, they insisted that the torpedo was the only weapon that counted in this type, and that every ton of available weight must be devoted to speed and torpedo tubes. It was not until a whole series of their boats had been sunk or badly mauled by the heavier gunfire of British destroyers that they departed from this rigid principle. All the German pre-war boats mounted 3.4-inch 22-pounder guns, which were soon replaced by the 4.1-inch 38-pounder with a semi-automatic breech-block, enabling a very high rate of fire to be maintained. Guns of this caliber were supplied to nearly all the boats built during the war, and proved superior in range and smashing power to the British 4-inch. But it cannot be said that the German destroyers ever took kindly to artillery duels, and to the end of the war they never used their guns to full advantage.

What the big super-leaders of the "V-116" class might have done can only be surmised, for none of them was commissioned in time to take an active part in the war. A great mystery has been made in Germany about these twelve boats and the details of them given in the above list have not previously been published. Five boats were completed in the spring of 1918 and ran their trials in the Baltic. Most of them exceeded the designed speed of 35 knots, but the great weight of armament and the immensely powerful machinery proved too much for the scantlings, and all five had to go into dockyard for extensive alterations, which were still incomplete at the date of the armistice. The four 5.9-inch guns were on high-angle mounts and could be used either for flat trajectory fire or against aircraft. The projectile weighed 101 pounds and contained an exceptionally powerful bursting charge, which would have proved most effective against such comparatively flimsy targets as destroyers. The torpedo armament was limited to four tubes, mounted in pairs amidships, but these fired the new 23.6-inch torpedo, which is the most powerful weapon of its kind in existence. Its warhead is charged with 616 pounds of T.N.T.—practically double the quantity of explosive carried in pre-war torpedoes—and it can travel a distance of 16,350 yards at a velocity of 28 knots. Since it would be impossible to manipulate torpedoes and tubes of this size by hand, the "V-116" and her sister boats had special motors for loading and training the tubes. They were also fitted with the latest appliances for controlling

Typical Flotilla Leaders of the Leading Navies at a Glance

	British		German	Japanese	Italian	
	GRENVILLE	WALLACE	V-116	AKIKAZE	AQUILA	LEONE
Number of boats in class...	6	12	12	5	4	4
Year of launch.....	1916	1918	1917	1921	1916	1920
Length over all, ft.....	325	329	360	350	315	360
Beam, ft.....	31¾	31¾	36	34	31	34
Displacement, tons.....	1,666	1,740	2,400	1,900	1,600	2,200
Shaft horse-power.....	36,000	40,000	55,000	50,000	44,000	42,000
Speed, knots.....	34	36	35	38	34	34
Fuel capacity, (oil) tons....	500	550	700	600	260	400
Armament: guns.....	4—4 in. R. F.	5—4.7 in. R.F.	4—5.9 in. R.F.	5—5 in. R. F.	3—6 in. R. F.	8—4.7 in. R.F.
Torpedo Tubes.....	4—21 in.	6—21 in.	4—23.6 in.	6—21 in.	4—18 in.	6—18 in.

company with the "Broke," she fell upon six German destroyers in the Dover Strait and routed them with heavy loss, will long be remembered. Shortly before that action her original armament of four 4-inch rapid-fire guns had been changed to one 6-inch and two 4-inch, so that she was a most formidable opponent for any destroyer. Various structural modifications have now brought her displacement up to 2,207 tons, but she is still good for 35 knots.

The value of the flotilla leader is evidenced by the fact that during the war period every naval belligerent, with the exception of the United States, built many vessels of this type. Great Britain added no less than 34 of them to her fleet; Germany laid down flotilla

German flotilla leader "V-116," of 2,400 tons, completed 1918. Speed, 35 knots for 55,000 horse-power. Armament: four 5.9-inch, one 3.4-inch (anti-aircraft); four 23.6-inch torpedoes

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stalled and these loaded directly upon dump cars which were hauled away by electric locomotives, trains being made up of five or six cars. Except where water was encountered in large volume, some of the tunnel crews made as high as 12 feet a day, and the work of drilling and mucking went on simultaneously. A heading, approximately 8 feet high and the full width of the tunnel, was carried approximately 7 feet ahead of the bench. As soon as the shooting from a preceding shift had been completed, the steam shovel men immediately commenced to load out the muck which had been blown back from the face. The machine men and chuck tenders at the same time start work on the top of the muck and shovel back the material which still remains on top of the bench. By carrying a short bench, it is possible to clear the same with a minimum amount of hand mucking, thus enabling the drilling in the face to proceed at the same time that the steam shovel is mucking out the heading. This makes it possible for the tunnel work to proceed through the entire 24 hours of a day.

At one of the tunnels a different method of work was adopted. Here the crews were divided into drilling and mucking gangs, and worked separately. A car was specially built upon which was mounted a column 17 feet high with a jack on each end, with 4 cross bars mounted on the same, the drills being mounted on the cross bars. By this method the entire face of the tunnel was drilled and shot before the steam shovel started to work, and each crew worked in shifts. By this method a maximum speed of 90 feet in one week was obtained. Considerable rivalry existed between the various crews, and as the progress made by each crew was posted, the men working in the different tunnels endeavored to outdo each other with the result that excellent progress was made in all departments.

The three penstock lines are of riveted steel pipe, 7 feet in diameter at the lower end and 8 feet in diameter at the upper end, at which point they are constricted into the mouth of the tunnel. A forebay 17 feet in diameter at the top, 80 feet in height and 40 feet in diameter at the top of the tunnel, has been excavated in solid rock a short distance from the outlet of the tunnel, where the penstock joins the same. The purpose of the forebay, from which a spillway leads to the river, is to take care of surges due to sudden increases and decreases in load at the plant.

From the power house a 110,000-volt transmission line about 75 miles in length carries the current to a point near Tulare Lake, where it is delivered to the distributing system for use where needed. Since the hydroelectric lines of all California companies have been connected up for emergency use, it is possible to send power generated at one point to any part of the State for use.

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the guns, including director aiming and firing mechanism. It is, however, doubtful whether all this cumbersome and intricate gear was suitable for vessels which were simply enlarged destroyers, and therefore exposed to the sort of rough and tumble fighting in which headlong dash counts for more than science. Moreover, experience in other navies shows that the 5.9-inch gun, with its 101-pound projectile, is much too heavy to be conveniently man-handled on the slippery decks of a boat which is moving all ways at once. In theory, the German "V-116" leaders ought to have made short work of any destroyers they were likely to meet in the North Sea; in practice they would probably have been beaten by the smaller British boats armed with the handy 4-inch and 4.7-inch gun.

A particularly formidable type of flotilla leader is represented by the five new

Japanese boats of the Akikaze class, building under the estimates for the current year. They will displace 1,900 tons and have a speed of 38 knots. Four, or possibly five, 5.5-inch 82-pounder rapid-fire guns will be mounted on the centerline, and all six torpedo tubes can be trained on either beam. A feature of these boats is their large fuel capacity, which is expected to give them a cruising radius of 3,500 sea miles at economical speed.

It will be seen that the modern flotilla leader approximates to the light cruiser in dimensions and armament. If the recent rate of progress is to be maintained, "boat" will soon become a misnomer, and we shall revert to the "torpedo cruiser" of thirty years ago, though on a much larger scale. In the destroyer and flotilla leader, as in every other type of fighting craft, each new demand for increased armament, speed and sea endurance involves a corresponding increase in size, and there is practically no limit except in the paying power of the nations concerned. But in every class of fighting ship there comes a stage of development which fulfils all reasonable requirements, and beyond which it is unnecessary to go. In the case of the flotilla leader this stage appears to have been reached in the smaller designs set forth in the table shown. War experience has demonstrated the all-round tactical efficiency of such vessels as the British Scott class, which, on the relatively modest displacement or 1,740 tons, combine in a high degree the essential qualities of a destroyer flagship. It is of interest to learn that a tentative design prepared at Washington last year provided for a vessel of 1,800 to 1,900 tons, of 37 knots speed, armed with four 5-inch rapid-fire guns and eight torpedo tubes.

Golf Without a Caddy

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in fact works out much more wisely than anticipated; when a few ounces can save upward of 25 tons as above, the ounces are certainly working at some high efficiency. Think of the perspiration and utter exhaustion that would overtake one were he compelled to go out and raise 25 tons to the height of 1 foot by hand twice a day. How much of either energy or inclination for golf would a man have after such an exertion, or by taking the stairs climb about 30 stories in one of our tall buildings twice a day? And this is exactly what caddiless golf has been doing to us without our ever suspecting it.

With the little device I have referred to, the simple act of resting the bag down on the ground causes it to develop legs which keep it upright and very stable, and with my eye on the ball and without looking around, I am able simply to reach back, grasping the bag, and the act of lifting it from the ground causes the legs to disappear and the bag looks like any ordinary "Sunday" bag and is little or no heavier.

Another point that I have found important is the following: We all know that "keep your eye on the ball" is even more necessary after the shot is made than while making it, if you have no caddy. It is then the player's job to watch the ball—certainly no caddy is watching it for him. Again, one often loses the lie of the ball in the rough while stooping down to get his sticks, thus causing exasperating delays. I have found that it is certainly of surprising convenience to have the sticks right at hand, standing upright "on their toes," so to speak; and to simply reach back, grasping the bag while watching your ball, and be off on the next stroke toward the drop long before the ball lights. This is of great aid in holding your position on the course and I find often aids a whole foursome to hold its position in play. The unerring location of, and getting right off on the ball is certainly an aid, both directly and indirectly, that can hardly be overestimated.