



*A History of
Sea-Air Aviation*

*Wings Over
The
Ocean
part twelve*

By John M. Lindley

Although there were many naval officers who underestimated the role of the aircraft carrier during the 1920s and 30s, there were others, such as Adm. Reeves, who believed in the future of the carrier. Unlike the proponents of the battleship, who believed that the next war would be fought by gunnery duels between battle fleets in the tradition of Jutland, Adm. Reeves tried to experiment with new carrier tactics which would free the carrier from the battle line and give it a role as an offensive weapon. The battleship people argued that the vulnerability of the carrier to naval gunfire was a compelling reason against allowing the carrier to act independently of the battle line as *Saratoga* had done in 1929. While admitting that there was an element of vulnerability for the carrier in a possible duel between it and capital ships, Adm. Reeves wanted, nevertheless, to develop a fleet tactical organization which permitted independent carrier operations.

Instead of organizing the fleet on the basis of ship types, such as destroyers, cruisers and battleships to which the carrier was normally as-

signed, Reeves advocated organizing the fleet on the basis of the particular mission to be accomplished. All the naval forces necessary for this mission would also be under the tactical command of the man best qualified for the assignment. Ordinarily, U.S. Navy ships operated with others of the same type. This meant that, in practice, carriers such as *Langley*, *Saratoga* or *Lexington* were under the tactical command of either the commander of the battle forces or the commander of the scouting forces. Consequently the carriers would be stationed on the disengaged side of the fleet while the different groups of gun ships – battleships, cruisers and destroyers – engaged the enemy.

Adm. Reeves wanted to try a different form of tactical organization which would be based upon the task assigned and not on the ship types involved. This change would mix up the ship types, putting gun ships with carriers, usually with the former screening for the latter. All would operate together under a common officer in tactical command rather than taking their operational orders from the senior officer responsible for their particular ship type.

The assignment of big gun ships and carriers to a common officer in tactical command, in a given fleet operation, had the advantage of combining a concentration of heavy guns with the mobile striking power of carrier aircraft. Together these ships would form what is called a naval task force. Although the concept of task force organization existed before Reeves became Commander, Aircraft Squadrons, Battle Fleet in the late 1920s, it lacked meaning as an organizational form until he showed how effective it could be in the Fleet Exercise of 1929. That task force had consisted of only two ships, *Saratoga* and *Omaha*, but the

task forces of WW II would consist of as many as 16 carriers and dozens of escorts.

Even a rudimentary task force organization such as Reeves proposed caused considerable difficulty at first. Fast carriers were built to steam at 25-33 knots, but the battleships built before 1922 could make only 21 knots. Thus they could not generally be assigned to a fast carrier task force. Cruisers and destroyers had the speed to operate with fast carriers, but they had, as Admiral Ernest J. King discovered in 1939, little proficiency in taking screening stations around a carrier. Thus King learned that anytime he had cruisers and destroyers formed-up as a carrier screen, there always had to be plenty of signaling to deal with the confusion that resulted from a lack of doctrine and practice in carrier task force maneuvers.

These fleet maneuvers in the late 1930s showed that U.S. Navy carrier doctrine was somewhat uncertain and immature. Despite some problems in the development of doctrine, other carrier experiments at this time were more immediately successful and convincing. *Saratoga*, for example, refueled underway, from a fleet oiler, in June 1939. The ability of the logistics forces of the fleet to provide the fast carriers and their escorts with food, fuel and ammunition would be one of the noncombat triumphs of WW II. The subsequent development of underway replenishment techniques during the war was a very necessary part of

the emergence of the fast carriers as mobile, long-range strategic capital ships.

The problems and controversies raised by the uncertain role of the aircraft carrier in the fleet during the interwar period were neither superficial nor easily resolved. They involved the fundamental direction of development in the major navies of the world. The U.S. Navy was not alone in having these problems. The Japanese Navy, which was also expending considerable effort to develop the aircraft carrier as a weapons system and to integrate it into its fleet, also went through a similar period of uncertainty over carrier doctrine in the 1930s.

Adm. Moffett understood, perhaps better than anyone else at the time, the seriousness and significance of these problems in terms of technology, tactics, organization and doctrine. In 1926 Moffett wrote Adm. Joseph M. Reeves that the way to understand the hostility and criticism of the battleship people toward Naval Aviation was to compare it to the antagonism between

line officers and engineering officers in the nineteenth century. Moffett believed that this friction in an earlier period of great technological change in the U.S. Navy "was due to lack of knowledge and therefore lack of understanding. As soon as the line officers took up engineering and knew something about it, the friction and the misunderstanding ceased. It will be the same with aviation, but it will be a long time." In the phrase "lack of knowledge and therefore lack of understanding" Adm. Moffett probably meant personal knowledge and understanding of the principles of the steam cycle and the operation of steam plants on ships. In a broader sense, however, Moffett's phrase also means knowledge and understanding of the function of Naval Aviation, especially the fast carrier, in naval

operations; in short, an understanding of fast carrier doctrine. Doctrine provides the fleet with its "heading" in the use of its weapons. Since fast carrier doctrine was immature in the interwar period, the resentment and criticism of the carrier and Naval Aviation in general were hardly surprising.

Moffett not only understood why Naval Aviation had an uphill struggle for acceptance within the fleet; he also saw the impact that aviation would eventually have on the Navy. In a memorandum drafted for the Secretary of the Navy in 1931, Moffett explained that "The basis of power in a fleet is balance. As evolution in naval architecture occurs, the structure of the fleet must be changed in order to maintain this balance under the new conditions. The history of our Navy



Pearl Harbor, December 7, 1941



RAdm. W. A. Moffett

clearly demonstrates this point." For example, the development of the torpedo had meant, Moffett wrote, that "the whole structure of the fleet had to be changed in order to cope with the possibilities of the new weapon." Submarines were built to use torpedoes. Then navies built destroyers to defend against submarine attacks and to fire torpedoes at capital ships. To counter the threat of torpedo attack from destroyers, the naval powers had built fast cruisers. In addition they changed battleship design by adding an armor belt along the waterline of the battleship to reduce the effectiveness of the torpedo. At the same time that these changes had taken place in ship design, navies "entirely revised" fleet tactics to cope with the threat of possible torpedo attacks. "Today," Adm. Moffett pointed out, "we are in the midst of a similar evolution. The airplane has affected fleet tactics to an even greater degree than the torpedo . . ." Although Moffett did not elaborate on what he saw as the changes which the airplane had wrought in fleet tactics, the experiments with the fast carrier task force in the interwar period were certainly an example of one such change. The admiral's analogy between the changes in ship design and fleet tactics, brought about by the

torpedo and the changes caused by Naval Aviation and the fast carrier, is a key insight which helps significantly in understanding the problems of Naval Aviation in the period between the World Wars.

Changes in military technology, such as the introduction of a new weapon like the airplane or the aircraft carrier, subsequently produced changes in ship design and fleet tactics. Similarly, changes in tactics usually resulted in other kinds of changes in military organization, institutions or administration. These relationships may not have been very clear to naval leaders in 1939, but they would soon have ample opportunity to ponder the implications of these developments in the coming world war. Statistics alone gave some measure of the magnitude of these imminent changes. On August 31, 1939, the carrier strength of the major navies of the world stood as follows:

	Completed	Under Construction
Great Britain	7	6
Japan	6	2
United States	5	2
France	1	1
Italy	0	0

By the end of the war the United States alone had 28 large fleet carriers and 71 smaller escort carriers. The British carrier fleet also underwent similar expansion. No navy could add so many combatant ships of this type without also undergoing substantial changes in its organizational structure and tactical doctrines.

Just as ancient cavalymen had tried to sweep down unexpectedly upon their human foes, and Bellerophon and Pegasus had taken advantage of the mobility which the winged steed provided, so also the Japanese mounted a deadly surprise attack on Pearl Harbor with planes from six aircraft carriers. The Japanese air strike put five battleships of the Pacific Fleet out of action and forced the U.S. Navy to use its undamaged air-

craft carriers as capital ships. This near-crippling blow subsequently accelerated the transformation of the great battleship fleets of the United States, Great Britain and Japan into modern air navies, and it marked indelibly the point at which the centuries-old dream of aerial warfare came of age — on both land and sea.

Naval Aviation in World War II

When Hitler's armies rolled into Poland on September 3, 1939, they used the now famous blitzkrieg, a combination of tanks, infantry and tactical air support, to overwhelm the Polish defenders. Less than a week after WW II began in Poland, three British aircraft carriers, *Ark Royal*, *Courageous* and *Hermes*, went to sea with their escorts to hunt for German U-boats. They scored their first submarine kill on September 14, but U-29 fired two torpedoes into *Courageous* three days later, killing 1,779 officers and men. Following the loss of *Courageous*, the Royal Navy withdrew its large carriers from antisubmarine hunts because of their vulnerability to U-boat attack.

In the winter of 1939-1940 the land forces of Germany and the Allies settled into the "phony war" of no combat; but at sea the pace of operations only slowed. The British Force K trapped the Nazi "pocket battleship" *Admiral Graf Spee* in December in the harbor of Montevideo, Uruguay. When the German commander realized that his ship had no chance against a British force which included the carrier *Ark Royal* and several cruisers, he chose to scuttle his ship rather than take on such overpowering forces. The phony war ended on April 8, 1940, when the Germans invaded Denmark and Norway. During the brief period of combat in Denmark, 16 British *Skua* fighter-bombers attacked and sank the German light cruiser *Konigsberg*, which had been damaged by Norwegian shore batteries. This cruiser was the first major warship to be sunk in combat by the airplane. From Norway and Denmark the German armies stormed into the Low Countries and France. By the end of June 1940,

Hitler controlled key bases in Holland and Belgium, and the French Channel ports. He then ordered the Luftwaffe to destroy the British RAF prior to an invasion of England. Despite heavy losses in aircraft and pilots, the RAF, armed with its *Hurricanes* and *Spitfires* and a new weapon — radar — successfully held off the German aerial siege. The failure of the Luftwaffe to gain command of the air over Britain in the fall of 1940 forced Hitler first to postpone and then to abandon his plans for a cross-Channel invasion. Eventually he turned his attention eastward toward the Soviet Union, which he attacked in June 1941. Again the blitzkrieg quickly overpowered the defenders just as it had earlier in Poland and France.

While Hitler's armies were swiftly moving across the western plains of the Soviet Union, the military leaders of Japan were planning their Pacific Ocean strategy. They decided that in order to secure the necessary oil, rubber and other raw materials in the resource-rich East Indies, they would first have to destroy the United States Fleet at Pearl Harbor and the American and British military forces in their western Pacific bases such as Manila and Singapore. Drawing upon his experience with carrier-based aviation in the ongoing war with China, Admiral Isoroku Yamamoto of the Imperial Japanese Navy developed the plan for the carrier raid on Pearl Harbor. When that plan was executed on December 7, 1941, some 350 Japanese aircraft from 6 carriers sank 4 battleships, severely damaged another 4, and destroyed the bulk of the United States military aircraft on the island of Oahu. American losses also included 2,335 officers and men. Japanese losses amounted to only 30 aircraft and 55 aviators, mostly due to belated American antiaircraft fire.

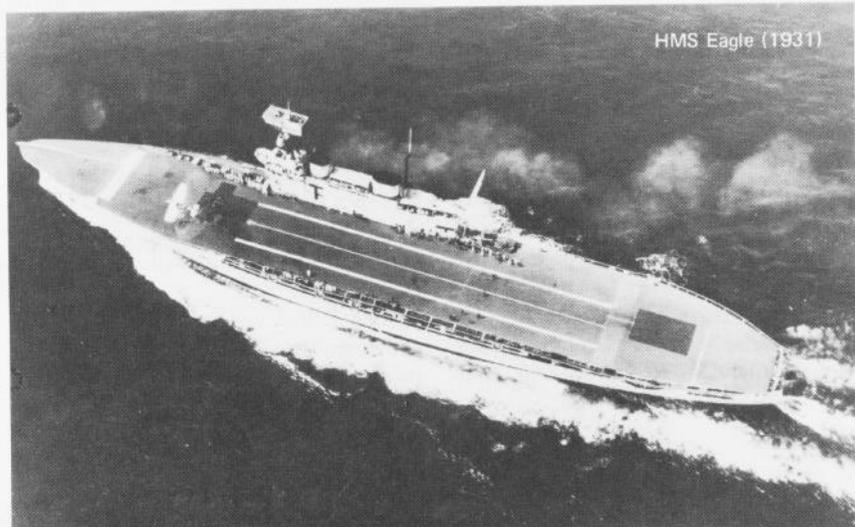
Almost simultaneously, the Japanese struck southward with attacks on U.S. forces under the command of General Douglas MacArthur in the Philippines, and American, British and Dutch forces on Wake Island, Guam, Hong Kong, Thailand, Singapore, North Borneo, Java and the Netherlands East Indies. The naval highlight

of this southern drive came on December 10 when land-based Japanese aircraft sank, with bombs and torpedoes, the British battleship *Prince of Wales* and the battle cruiser *Repulse* off the coast of Malaya. These Japanese G3M *Nell* bombers showed the world that in this war no capital ship would be safe from determined aerial attack unless it had its own aerial defenders and stout antiaircraft fire. Shortly after the British warships were sunk, Japanese bombers and *Zero* fighters caught USS *Langley* trying to ferry aircraft to Java and sank her, on February 21, 1942. In April, HMS *Hermes* fell victim to Japanese *Val* dive bombers off Ceylon. Thus, by the end of the first four months of the war in the Pacific, the Japanese had not lost a single major warship while their airplanes had sank five Allied battleships, one carrier, two heavy cruisers, seven destroyers and several other merchant ships, auxiliaries and small craft. In addition they had damaged three battleships and twelve other warships.

The initial German successes in Europe with the blitzkrieg and the Japanese victories in the Pacific with land and carrier-based airplanes emphatically demonstrated the revolutionary use of air power that would characterize WW II. Although the belligerents in WW I had used airplanes in both land and sea warfare, they had not fully exploited the aerial weapon. In WW II, however, both sides tried to make full use of their aircraft on both land and at sea. Thus the Germans had their Luftwaffe and the Japanese their carrier and Army air forces. In Europe, the Allies developed bombers

and long-range fighters for strategic bombing of the industrial heartland of Germany. At sea in the Pacific, the United States led the way in developing the fast carrier task force as a means for defeating the Japanese Navy. Consequently the history of sea-air aviation between 1939 and 1945 consisted of the global battle between the Axis and Allies for command of the sea and the air. In Europe that battle focused upon the combat between Axis submarines and Allied merchant convoys and their escorts; in the Pacific it centered upon the emergence of the aircraft carrier as the capital ship of modern air navies.

In the European Theatre the struggle for command of the sea had two basic dimensions: protection of merchant shipping and amphibious operations. Aviation played a crucial role in both areas. Since neither Nazi Germany nor Fascist Italy had operational aircraft carriers during WW II, seaborne aviation belonged to the Royal Navy and the U.S. Navy (the French carrier *Béarn* was never moved from Martinique after the Franco-German armistice of 1940). In the Atlantic and the Mediterranean the Axis fought the Allied merchant marine so vigorously with submarines, surface raiders and land-based aircraft that, in 1940 and 1941, the Royal Navy was hard pressed to keep open its Mediterranean sea lines. A key base in the maintenance of these east-west sea lines was the island of Malta. Malta served not only as a base for Allied traffic between the eastern and western Mediterranean, but also as an obstacle in the Axis lines of communication with



HMS Eagle (1931)

German General Erwin Rommel's forces in North Africa. Initially the British sent their carriers *Eagle* and *Ark Royal* to the Mediterranean to ferry convoys and aircraft to Malta. The old carrier *Argus* operated from Gibraltar in an effort to protect the sea lines between England and the "Italian lake." By September 1940 they had also assigned the new fast carrier *Illustrious* with her armored flight deck and radar to operations in the Mediterranean.

Illustrious immediately tried to ease some of the Axis pressure on Malta with a raid on the Italian port of Taranto. On November 11, 1940, 21 *Swordfish* torpedo bombers from the carrier attacked the warships in the harbor with bombs and torpedoes. Although the biplane *Swordfish* was inferior to many of its counterparts in the Axis and Allied air forces, it performed magnificently on this raid, sinking three out of the six Italian battleships, one cruiser and one destroyer in the harbor. Despite heavy anti-aircraft fire, the British lost only two airplanes.

When Hitler realized his Italian ally was struggling to drive the British naval forces from the Mediterranean, he sent his *Fliegerkorps X* to aid the Italians. Using gull-winged monoplane dive bombers (the Ju 87 *Stuka*), *Fliegerkorps X* evened the score with the British somewhat when it used these land-based airplanes to bomb *Illustrious* on January 10, 1941. Although she took six direct bomb hits, *Illustrious* somehow managed to stay afloat and retreat to Malta where she underwent emergency repairs while fighting off further attacks. Once repaired, the carrier slipped out of the Mediterranean through the Suez Canal. The departure of *Illustrious* left only *Ark Royal* in the Mediterranean. She performed gallantly until November 13 when U-81 torpedoed her while she was ferrying fighters to Malta. She sank before she could be towed to Gibraltar for repairs.

The battle to keep Malta alive continued into 1942. In early March, the Royal Navy delivered the first RAF *Spitfires* to that island, launching them from *Ark Royal* for the final

flight to Malta. The U.S. loaned the carrier *Wasp* to the British at this time and she similarly delivered more *Spits* to beleaguered Malta in April and May. In August, four Royal Navy carriers, *Eagle*, *Victorious*, *Indomitable* and *Furious*, tried to resupply the island in Operation *Pedestal*. Although the *Spitfires*, along with some of the merchant ships did reach Malta, this aid had a high cost: *Eagle* was sunk and *Indomitable* was severely damaged en route.

Between 1940 and 1942 Royal Navy carriers and merchant vessels ferried 718 single-engined aircraft to Malta. These missions kept the island going, despite frequent enemy air attacks. Malta remained a constant threat to Axis supply lines to North Africa. Only after the Allies invaded North Africa in Operation *Torch* (November 1942) did Malta experience any letdown in attacks on its line of supply.

The Allied battle against the U-boats and surface raiders in the Atlantic was just as dangerous and evenly fought as in the Mediterranean. A steady merchant marine supply line bringing food, raw materials and war supplies to Great Britain was essential. Thus the Germans set out to destroy that supply pipeline, just as they had in WW I. They were mostly unsuccessful with their surface raiders, especially their large warships, because the Royal Navy usually kept an aircraft carrier in home waters. Her airplanes kept the German capital ships holed up in port or immediately struck at them when they put to sea. When one of these dreadnoughts, such as the battleship *Bismarck*, did escape into the Atlantic to strike at merchant commerce, it was hunted down. In the case of *Bismarck*, RAF flying boats tracked her until *Swordfish* from *Ark Royal* could attack with torpedoes, May 26, 1941. Although this attack did not sink *Bismarck*, it did enough damage to her rudders, propellers and steering gear that Royal Navy surface ships overtook her the following day and sank her with torpedoes and naval gunfire.

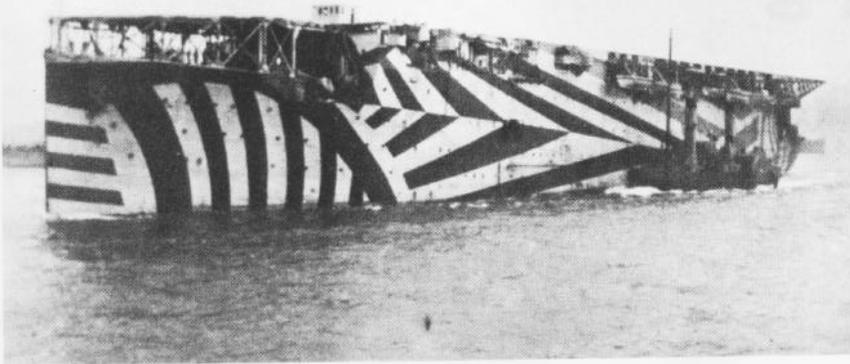
The Allied war with the U-boat, in contrast, usually did not involve dramatic fleet engagements. Instead the

Battle of the Atlantic was a war of statistics — merchant ship losses versus U-boats sank. If the submarine had won this battle, Britain would have been cut off and would probably have fallen to the Nazis. Fortunately for the Allies, the U-boat did not win the Battle of the Atlantic because the Allies eventually developed the weapons and tactics which defeated the submarine menace.

After Germany began WW II, President Franklin D. Roosevelt declared the neutrality of the United States and directed the Navy to begin a Neutrality Patrol in the Atlantic. The naval vessels involved in this patrol had orders to observe and report the movement of all foreign warships. The patrol lasted 27 months and included the ocean area from the northeast coast of South America to the high latitudes of the North Atlantic, extending about 300 miles out from the U.S. coastline. Within this area, the belligerents were forbidden to conduct military operations, thereby preventing U-boats from attacking neutral shipping. Although at first the Neutrality Patrol was not an offensive naval operation, by the fall of 1941 it had become an undeclared war against the U-boat as Roosevelt endeavored to take all steps "short of war to aid Great Britain."

During 1939-1940 the Royal Navy held its own against the submarine menace in the Atlantic but, beginning in 1941, their merchant ship losses began to grow. For example, one night in April 1941 a Nazi wolf pack sank 10 of 22 ships in one slow trans-Atlantic convoy. From the beginning the Allies had relied upon the battle-tested tactics of merchant convoys to shepherd vessels between the coastal waters of North America and England. They found in 1941, however, that even with warship escorts, they could not drive off or sink all the U-boats prowling the Atlantic. In addition they lacked a sufficient number of escort vessels to provide protection to all the merchant ships traveling the Atlantic. Consequently the Allies turned to air patrols to help fight the submarine.

The U.S. Navy established air stations in 1941 in Newfoundland,



Greenland and Iceland from which it flew long-range patrols and antisubmarine operations over the western stretches of the North Atlantic. The RAF flew its Sunderland flying boats on similar patrols out of Iceland, northern Ireland and England to cover the eastern portion of the northern transAtlantic route. Other air stations situated along the eastern U.S. provided air patrols over coastal waters of the Atlantic, Caribbean and Gulf of Mexico.

Initially the U.S. Navy used Consolidated PBY *Catalina* flying boats for these over-ocean patrol duties. It also used Martin PBM *Mariners* and Consolidated PB2Y *Coronados*. Some of these patrol bombers were slow and lacked the range of land-based aircraft. In addition, the flying boats could not fly with regularity during the winter months (roughly November to March) in the high latitudes of the Atlantic because extreme weather conditions

made takeoffs and landings difficult, even in a sheltered harbor area. Consequently the U.S. Navy modified Consolidated B-24 *Liberators*, which it got from the Army starting in the summer of 1942, for work as land-based patrol bombers. These four-engine airplanes, modified for antisubmarine missions, were designated PB4Ys in 1943. Joined by the twin-engine Lockheed PV *Ventura*, these land-based planes provided additional coverage in antisubmarine patrols by hunting for U-boats from new shore bases around the world.

While the U.S. Navy was building up these air patrol forces, the Germans launched an assault on merchant traffic along the eastern seaboard of the United States in January 1942. Operation *Paukenschlag* (roll of the drums) devastated the Allied merchant fleet and showed how inadequate the defending antisubmarine forces were. At one time the U-boats were sinking Allied merchant ships faster than they

could be replaced with new ones. German submarine crews later called this period "the happy time."

Gradually the Allies mustered their forces to fight back. Construction of escort vessels, such as destroyer escorts, took time, but these ships began to make their presence felt in late 1942 and 1943. Sonar, which the British called asdic, was improved. (This electronic device which used sonic echo-ranging to locate submerged U-boats had been perfected by the British and Americans during the interwar period.) Combined with better search tactics, sonar improved the record of Allied escorts against the wide-ranging wolf packs. By mid-1942 radar began to have an impact on the submarine battle. Mounted in surface ships or aircraft, it allowed the defenders to spot a surfaced U-boat long before it was visible to human eyes. With this advance warning, merchant vessels could take action to avoid a submarine; and surface or air units could attack the U-boat. The introduction of improved microwave radar in the spring of 1943 greatly increased the number of Allied submarine kills.

The introduction of the new electronic devices and the adoption of antisubmarine warfare tactics took time. While the Allies fought on the defensive, the toll of merchant ship losses rose so high it gravely threatened the overall war effort. In March 1943 alone, U-boats sank 108 ships totaling 627,000 tons. Only 15 submarines were lost during the same time. Just as the Battle of the Atlantic seemed most serious, the tide of losses began to turn in favor of the Allies. On May 1, 1943, Admiral Ernest J. King, Commander-in-Chief, U.S. Fleet, and Chief of Naval Operations, organized the U.S. Tenth Fleet, under his personal command. It combined and coordinated all antisubmarine warfare activities. This improvement in organization was matched by the arrival of more and more escort vessels from U.S. and British shipyards. Air patrols by *Catalinas* and modified *Liberators* also picked up, and they were joined by the Navy airship fleet, which by this time was well-organized and equipped.

To be continued

PB4Y

