Evolution of Aircraft Carriers

THE EARLY ATTACK CARRIERS

We have hit the Japanese very hard in the Solomon Islands. We have probably broken the backbone of the power of their Fleet. They have still too many aircraft carriers to suit me, but soon we may well sink some more of them. . . . We are going to press our advantages in the Southwest Pacific and I am sure that we are destroying far more Japanese air planes and sinking far more of their ships than they can build.'—Franklin D. Roosevelt, President of United States, 1942.

At the outbreak of World War II, the United States had in commission seven aircraft carriers and one escort carrier. USS Langley, the experimental ship officially classed as CV-1, had been assigned to duty as a seaplane tender on September 15, 1936.

After the abrogation by Japan from disarmament treaties, the U.S. took a realistic look at its naval strength. By Act of Congress on May 17, 1938, an increase of 40,000 tons in aircraft carriers was authorized. This permitted the building of USS Hornet (CV-8) and USS Essex (CV-9). On June 14, 1940, another increase in tonnage was authorized. Among the ships built under this program were the Intrepid and the new Yorktown.

On July 19, an additional 200,000 tons for carriers was authorized. Adm. H. R. Stark, then Chief of Naval Operations, reported to the Secretary of the Navy: "In June 1940, the Congress granted the Navy an 11% increase in combat strength and, in July, a further increase of approximately 70%. When these ships and aircraft are completed, the U.S. Navy in under-age and over-age ships will include 32 battleships, 18 aircraft carriers, 91 cruisers, 325 destroyers, 185 submarines, and 15,000 airplanes.

By Scot MacDonald

"From 1921 to 1933, the United States tried the experiment of disarmament in fact and by example. This experiment failed. It cost us dearly in relative naval strength—but the greatest loss is time. Dollars cannot buy yesterday. Our present Fleet is strong, but it is not strong enough."

Additional tonnage was authorized December 23, 1941 and July 9, 1942. CV-9 was to be the prototype of an especially designed 27,000-ton (standard displacement) aircraft carrier, considerably larger than the Enterprise and smaller than the Saratoga. These were to become known as the Essex class carrier, although this classification was dropped in the '50s.

On September 9, 1940, eight more of these carriers were ordered and were to become the Hornet, Franklin, Ticonderoga, Randolph, Lexington, Bunker Hill, Wasp and Hancock, CV-12 through -19, respectively. Reuse of the Lexington, Wasp and Hornet names was in line with the Navy's intent to carry on the traditions of the fighting predecessors: Lexington (CV-2) was lost in the Battle of the Coral Sea in May 1942; Wasp (CV-7) was sunk September that year in the South Pacific while escorting a troop convoy to Guadalcanal; Hornet (CV-8) was lost the following month in the Battle of Santa Cruz Islands.

It is appropriate to comment here that the ships' names at commissioning date did not all bear the same name at the date of their programming. Names were changed during construction. Hornet (CV-12) was originally Kearsarge, Ticonderoga (CV-14) was

FIGHTER AIRCRAFT of Air Group 9 are parked aboard the aircraft carrier Essex during her shakedown cruise in the Caribbean in 1943. During WW II, U.S. shipyards built and Navy commissioned 16 sister ships. Including post-war production 24 Essex class were commissioned.
the Hancock, Lexington (CV-16) was Cabot, Wasp (CV-18) was Oriskany, and Hancock (CV-19) was originally Ticonderoga.

Last two of the 13 originally programmed CV-9 class aircraft carriers, Bennington (CV-20) and Boxer (CV-21), were ordered on Dec. 15, 1941.

In drawing up the preliminary design for USS Essex, particular attention was directed at the size of both her flight and hangar decks. Aircraft design had come a long way from the comparatively light planes used in carriers during the Thirties. Flight decks now required more takeoff space for the heavier fighters and bombers being developed. Most of the first-line carriers of the pre-war years were equipped with flush deck catapults, but owing to the speed and size of these ships very little catapulting was done—except for experimental purposes. With the advent of war, airplane weights began to go up as armor and armament got heavier; crew size aboard the planes also increased. It was inevitable, noted the Bureau of Aeronautics toward the war’s end in 1945, that catapult launchings would become more common under these circumstances. Some carrier commanding officers reported that as much as 40 per cent of launchings were effected by the ships’ catapults.

The hangar area design came in for many conferences between Bureaus and much more official correspondence. Not only were the supporting structures to the flight deck to carry the increased weight of the landing and parked aircraft, but they were to have sufficient strength to support the tricling up of spare fuselages and parts (50 per cent of each plane type aboard) under the flight deck and still provide adequate working space for the men using the area below.

“At present,” noted the Bureau of Construction and Repair in April 1940, “it appears that a few of the smaller fuselages can be triced up overhead in locations where encroachment on head-room is acceptable, and that the larger fuselages will have to be stowed on deck in the after end of the hangar. The number to be stowed will depend upon the amount of reduction in operating space in the hangar which can be accepted.”

Capt. Marc A. Mitscher, then Assistant Chief BuAER, answered: “The question of spare airplanes is now under reconsideration in correspondence with the Fleet and the results decided upon will have a bearing in the case of CV-9.”

A startling innovation in CV-9 was a port side deck edge elevator in addition to two inboard elevators. Earlier, BuAER experimented with a ramp arrangement between the hangar and flight decks, up which aircraft were hauled by crane. This proved too slow. BuSHIPS and the Chief Engineer of A.B.C. Elevator Co., designed the engine for the side elevator. Essentially, it was a standard elevator, 60 feet by 34 in platform surface, which travelled vertically on the port side of the ship. Capt. Donald B. Duncan, Essex’s first commanding officer, was enthusiastic. After the first four months of operation after commissioning, he wrote to BuAER:

“The elevator has functioned most satisfactorily in all respects and it is desired to point out some of the operational advantages realized with this type of elevator.

“Since there is no large hole in the flight deck when the elevator is in the ‘down’ position, it is easier to continue normal operations on deck, irrespective of the position of the elevator. The elevator increases the effective deck space when it is in the ‘up’ position by providing additional parking room outside the normal contours of the flight deck, and increases the effective area on the hangar deck by the absence of elevator pits.”

USS RANDOLPH (CV-15) was the 13th Essex class carrier to be commissioned. She was the first of these carriers to enter combat without returning to the builder for post-shakedown work. She participated in the Iwo Jima, Okinawa, and Third Fleet operations against Japan in 1945.
The elevator performed well, its machinery less complex than the two inboard elevators, requiring about 20 per cent fewer man-hours of maintenance. Capt. Duncan recommended that consideration be given using two deck edge elevators, one on each side. BuAER, in forwarding the recommendation to BuShips, offered another advantage for consideration: a conventional elevator suffering a casualty while in the “down” position “would leave a large hole in the flight deck while the deck edge type would cause only minor and non-critical loss of flight deck area.”

BuShips, obviously pleased with the operational performance of the new elevator—the first of its kind—reluctantly turned down the recommendation, however. The Bureau noted that the addition of a starboard deck-edge elevator would not permit an Essex class aircraft carrier to transit the Panama Canal. Any other location for a second such elevator would involve structural and arrangement changes too extensive to be considered.

On April 28, 1941, keel for the USS Essex was laid at Newport News Shipbuilding and Dry Dock Co. On October 2, the following year, her prospective commanding officer filed his first weekly progress and readiness report to the Chief of Naval Operations. He noted that there was marked speed-up of work on the ship during the preceding month and estimated that the ship would probably be delivered on February 1, 1942.

"There are certain items that have been authorized for installation on the CV-9-19 class carrier," he said, "but will not be accomplished on this vessel prior to delivery." The ship was launched July 31, 1942.

Adm. Walter S. Anderson, president of the dock trials and inspection team of CV-9 on December 23, 1942, noted a few of these discrepancies in his report:

"Due to late authorization of a number of changes arising out of recent war experiences, the volume of uncompleted hull work was greater than normal. . . . The Board regrets that the catapults for this vessel were not delivered in time for installation, as military value of the vessel would be much improved thereby. . . . Only the starboard flight deck track was installed . . . . This class of carriers is designed to include cruising turbines as part of the main drive turbine installation. However, due to production difficulties and as a result of efforts to expedite delivery, cruising turbines were omitted. Space and connections for their future installation are provided and this can be accomplished with very little alteration . . . ."

Nevertheless, the Board was pleased and impressed with progress on construction of the Essex. Adm. Anderson recommended acceptance of the ship. “On 31 December 1942,” he said, “only slightly over 20 months will have elapsed since keel-laying, which is, in the opinion of the Board, a record worthy of commendation. This indicates a high degree of cooperation between the Supervisor of Shipbuilding, the Newport News Shipbuilding and Dry Dock Co., and representatives of the officers and men of the ship’s company.” On the last day of 1942, USS Essex was commissioned.

Capt. Duncan was proud of his new command, but not so impressed as to ignore certain discrepancies that still existed. The ventilation system, for instance, was less than satisfactory. BuShips sent representatives to the ship to assist in correcting discrepancies, during sea trials March 1 in the North Atlantic and, a month and a half later, when the ship was again at Norfolk and still had complaints.

As other CV-9 carriers were launched, the complaints continued to be registered. BuShips investigated the ventilation system as installed in USS Intrepid (CV-11) and outlined corrective measures in future carriers of the class.

Requested to comment on the adequacy and operation of the trash burner installed in the Essex, Capt. Duncan started off quietly enough. "It is most unsatisfactory," he said. Then
he warmed to his subject. "It is doubtful if it could be worse. It is in the very center of the office spaces. There is no satisfactory place for collection of trash waiting its turn to be burned. All of it has to be carried through the passageways in the vicinity of the departmental offices. The heat from the trash burner when it is operating (which is not often because it is usually broken down) is such as to make the surrounding spaces almost untenable.

"The design of the trash burner is poor. Its construction is worse. The ship had not been in commission a month before it practically fell apart. The brick work fell down, the door fell off and it suffered other casualties too numerous to mention. It has taken constant attention from the Engineer's force to keep it operating at all and the heat generated in the compartment in which it is located is such that it is physically impossible for men to stay in it for continuous operation."

The trash burner was redesigned.

Lexington was commissioned on February 17, 1943, followed by Yorktown on April 15, Bunker Hill on May 25, Intrepid on August 16, Wasp on November 24, and Hornet on November 29 that year. In 1944, Franklin was commissioned on January 31, Hancock on April 15, Ticonderoga on May 8, Bennington on August 6, and Randolph on October 9. The last of the programmed 13 CV-9's, Boxer, was commissioned on April 16, 1945.

The lighting system installed in the Lexington came under the scrutiny of BuShips. Generally, it was considered inadequate—"in intensity and quality"—in many passageways and compartments, in addition to the running, signal, and anchor lights. A survey of the system produced the following action on the outside lights: the ahead masthead light was relocated to the forward edge of the forecastle (frame 92), the ahead range light was moved forward and shielded from illuminating the deck below, the astern masthead light was moved higher, so as not to interfere with gunnery, and the astern range light was removed.

Nineteen more Essex-class ships were ordered or scheduled, starting with ten of them on August 7, 1942. They were Bon Homme Richard (CV-31) Kearsarge (CV-33), Oriskany (CV-34), Reprisal (CV-35), An-
separation of carriers under attack not only provided a protective screen for each, but also dispersed the targets and divided the enemy's attack. Combat experience in those early operations did not bear out the theory and new proposals for tactical deployment were the subject of much discussion. As the new Essex and Independence class carriers became available, these new ideas were put to the test.

The Independence class carriers—light carriers, designated CVL's—were products of an effort to increase this country's sea-going air strength in the early days of the war. Nine keels to light cruisers of the Cleveland class were laid down at the New York Shipbuilding Corp. yard at Camden, N. J., three of them before the war started. They were to have been the Amsterdam (CL-59), Tallahasee (CL-61), New Haven (CL-76), Huntington (CL-77), Dayton (CL-78), Fargo (CL-85), Wilmington (CL-79), Buffalo (CL-99), and the Newark (CL-100). They eventually became the Independence, Princeton, Belleau Wood, Cowpens, Monterey, Langley, Cabot, Bataan, and the San Jacinto, CVL's 22 through 30, respectively.

Naming and designating these last four sometimes went through a rigorous and confusing metamorphosis. Neither Cabot nor Bataan encountered any difficulty. The names and designations were reached in June and July 1943 without attending problems. But Fargo was named Crown Point (CV-27) when the decision was reached to convert her to an aircraft carrier. Then, on July 15, 1943, her name was changed to USS Langley and she was given the designation CVL. (Actually, all these cruiser-to-carrier conversions were originally designated CV's when the decision to convert was made; all were redesignated CVL's on the same day.)

The Newark (CL-100) had a rougher time of it. On June 2, 1942, she was changed to CV-30; on June 23, her name was changed to Reprisal, which she kept for a little over six months. On Jan. 6, 1943, her name was again changed, to San Jacinto.

The light carriers displaced 11,000 tons standard. In design, the bridge was box-like in appearance, with a small crane forward. They had four stacks, paired off in twos, on the starboard side, aft of the island. These stacks angled out from the hangar deck and rose vertically above the flight deck level.

As the Essex and Independence class carriers joined the Fleet in increasing numbers, it was possible to operate several carriers together, on a continuing basis, forming a carrier task group. Tactics changed. Experience taught the wisdom of combined strength. Under attack, the combined anti-aircraft fire of the task group carriers and their screen provided a more effective umbrella of protection against marauding enemy aircraft than was possible when the carriers separated. When two or more of these task groups supported each other, they constituted a fast carrier task force.

The first attempt to operate a multi-carrier group occurred on August 31, 1943, during a raid on the Japanese-held island of Marcus. Task Force 15, which conducted the raid, consisted of Yorktown (CV-10), Essex (CV-9) and Independence (CVL-22), the cruisers Nashville and Mobile, the battleship Indiana, and ten destroyers. Aircraft were launched from the carriers at a point approximately 130 miles north of the island.

On October 5-6, 1943, RAdm. Alfred E. Montgomery led Task Force 14 on a second raid on Wake Island. The task force was comprised of two task groups, operating a total of six aircraft carriers—Essex, Yorktown (CV-10), Lexington (CV-16), Independence, Belleau Wood, and Cowpens—seven cruisers and 24 DD's, the largest carrier task force yet assembled.

In the course of the two-day strikes, ship handling techniques for a multi-carrier force, devised by RAdm. Frederick C. Sherman's staff, were tested under combat conditions. Adm. Chester W. Nimitz, then Commander in Chief, Pacific Fleet, dispatched his congratulations. “The thorough job done on Wake by planes and ships of your task force will have results reaching far beyond the heavy damage inflicted.”

The words were prophetic. Lessons learned from operating the carriers as a single group of six, as two groups of three, and three groups of two, provided the basis for many tactics which later characterized carrier task force operations. With the evolution of the fast carrier task force and its successful employment in future operations, the rising sun of the east began slowly to sink in the west.