

USS ENTERPRISE (CVAN-65), the most powerful aircraft carrier, (CGN-9) while in the Mediterranean. The nuclear-powered aircraft carrier is the first and only such carrier in any Navy of the world operates here with the nuclear-powered missile cruiser USS Long Beach

## Evolution of Aircraft Carriers

# CVA'S BUILT TO MEET MODERN NEEDS

'Events of October 1962 indicated, as they had all through history, that control of the sea means security. Control of the seas can mean peace. Control of the seas can mean victory. The United States must control the seas if it is to protect our security and support those countries which, thousands of miles away, look to you on this ship and the sister ships of the United States Navy.'—President John F. Kennedy, addressing the crew of USS *Kitty Hawk* (CVA-63) on June 6, 1963

THE DRAMATIC EVENTS of October 1962 to which President Kennedy referred were the missile build-up in Cuba and the immediate U.S. reaction to this threat. This was one of a series of incidents occurring since World War II that endangered the democratic way of life, incidents effectively neutralized by the presence of powerful U.S. carrier forces in the area.

The versatility of the current U.S. carrier fleet is largely due to the operation of what the press has labeled "super-carriers," heavy duty aircraft carriers of the size, power, and potency of the *Forrestals* and the nuclear-powered *Enterprise*. They had a difficult birth.

In April 1945, owing to lessons learned from their experience in com-

By Scot MacDonald

bat, Carrier Task Force Commanders requested heavier and larger aircraft to accomplish war missions. An informal board was appointed to consider the carrier requirements of the U.S. Navy. The hulking CVB's of the *Midway* class, which were readying for commission and combat duty, provided a stopgap supply to the needs of the Task Force commanders. The Ship Characteristics Board made various studies of the problem, and it was decided that the project should be made a design study for the 1948 shipbuilding and conversion program. Given the designation "6A Carrier Project," one of the carriers was slated to be built in the 1949 construction program.

Between 1945 and November 1948, some 78 different designs were made before final acceptance. On June 24, 1948 Congress passed the Naval Appropriations Act of 1949. This provided funds for construction of the carrier. The contract was awarded Newport News Shipbuilding and Dry Dock Company.

In the planning stage, the new carrier was to weigh 65,000 tons and have a 1030-foot flight deck, a 130-foot waterline beam, and four catapults. Architects went back to original *Langley*, *Ranger* and *Long Island* designs by sweeping the flight deck clear of an island structure. Instead, the carrier was to have had a small island on an elevator apparatus, to be lowered during flight operations. This was one

answer to a BU SHIPS objection to the flush deck design, predicated on the fact that a satisfactory method of disposing of stack gases had not been developed.

All elevators were to be along the sides of the ship, with a large elevator at the extreme after end of the flight deck. Added strength of the flight deck was to be made possible by reducing the openings in the hangar sides, so that the ship, from the keel to the flight deck, could be considered as a unit, from the standpoint of strength. This would permit the operation of aircraft well over 100,000 pounds. Adm. Marc Mitscher greatly influenced formation of the project, having been

aircraft carrier. At that time, criticism of the entire concept of carrier warfare was again voiced by some military leaders. The carrier's keel was laid at Newport News on April 18. On April 23, the views of the Joint Chiefs were sent to SecDef and on that same morning Secretary Johnson ordered work on the carrier stopped. Secretary of the Navy John L. Sullivan resigned in protest the next day.

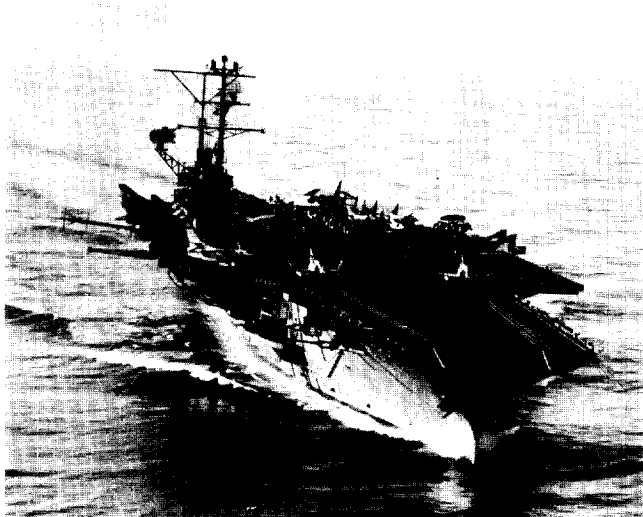
There was no new carrier construction in 1950. However, mid-year events caused Navy planners again to renew requests for heavy-duty carriers. On June 25, 1950, North Korean forces invaded the Republic of Korea. Two days later, President Truman an-

of the new aircraft carrier known as the *United States*, the construction of which was discontinued April 23, 1949, or the aircraft carrier authorized in Public Law 3, Eighty-Second Congress, first session, it shall be named the *Forrestal*."

At Newport News, the new carrier was designated Hull Number 506. Her keel was laid on July 14, 1952.

Mr. Charles P. Roane, Supervising Naval Architect, Aircraft Carrier Type Branch, BU SHIPS, commented on the *Forrestal* in the November 1952 issue of BU SHIPS *Journal*:

**"The *Forrestal* incorporates all of the developments from the other carriers, plus those learned from the**



THE FIRST of her class, *Forrestal* profited from lessons learned from post-war designs, particularly from the cancelled CVB-58.



A CRUSADER is launched by a powerful catapult system installed in *Forrestal*. Angled deck resulted from experiments in USS *Antietam*.

one of the Task Force commanders who recommended heavier, more versatile carrier aircraft.

In July 1948, construction of the carrier was approved by Congress and President Truman. In March the following year, the President authorized the name for the new carrier; when commissioned, she would become USS *United States* (CVB-58).

The events of April 1949 occurred with stunning swiftness and to this day are subject of discussion in some military and political circles. On April 13, funds were approved by the House of Representatives. Two days later, Secretary of Defense Louis Johnson wrote to General Eisenhower, then temporary presiding officer of the Joint Chiefs of Staff, requesting that the Joint Chiefs review the need for a new

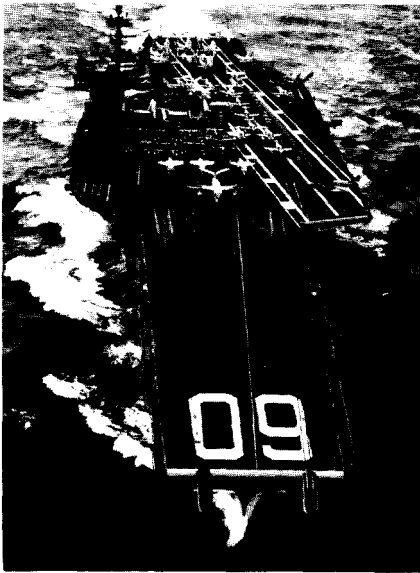
nounced he had ordered sea and air forces in the Far East to give support and cover to Republic of Korea forces and ordered the Seventh Fleet to take steps to prevent an invasion of Formosa. On July 3, carrier aircraft went into action in Korea. USS *Valley Forge*, with Air Group Five, and HMS *Triumph*, operating in the Yellow Sea, launched strikes on airfields, supply lines and transportation facilities around Pyongyang, northeast of Seoul.

On July 12, 1951, the Navy Department announced a contract for a new large aircraft carrier (CVB-59), to be built at Newport News. On July 30, Congressional action approved the contract. A joint resolution from Capitol Hill proclaimed:

"Be it resolved that when and if the United States completes construction

*United States*. The increase in size of the *Forrestal* over the *Midway* class comes about as a normal development in aircraft carrier design. With four catapults instead of the usual two and four airplane elevators instead of the usual three, aircraft operations from this ship will be greatly improved.

"The new design was planned to meet added requirements, such as the servicing and starting of jet aircraft, maintaining the electronic appliances on the aircraft in a ready-to-go condition while the plane is on the deck, blending of aircraft fuels to get a fuel which can be used in jets without sacrificing the gasoline capacity, and a flush deck where the navigating bridge can be lowered or raised to suit operating conditions. Stacks comparable to the *Ranger* will be used. New type steels, the result of years of development, will go into the construction."



USS SARATOGA, sister ship to CVA-59, was designed to have greater hp than Forrestal.

The flush deck design barely left the drawing board before it was changed. This design was advanced to provide optimum landing area and to eliminate the hazard of island superstructure offered by the axial deck. At the end of W.W. II, however, the British developed the angled deck concept and operated lightly constructed twin-engine attack planes from the marked-off deck of a British carrier. U.S. Navy pilots conducted similar test on the *Franklin D. Roosevelt* and the decision to modify the flight deck of a U.S. carrier was made. Accordingly, the *Antietam* was reconfigured, landings and takeoffs were made using a variety of aircraft, and a final detailed report on the evaluation of the "canted" or angled deck revealed that the operational trials met with a high degree of success. As a result of these experiments, the Navy ordered a redesign of the deck and operating arrangements on the *Forrestal* and all future carriers, as well as reconfiguring many of the existing carriers during scheduled modernization periods.

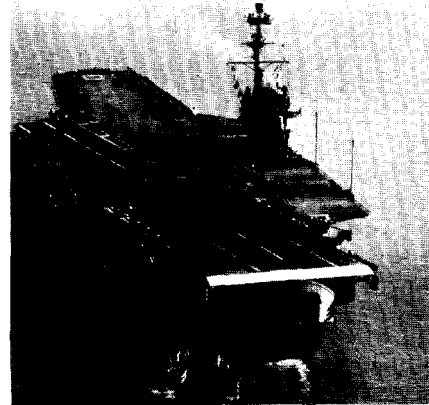
When Secretary of the Navy Dan A. Kimball announced the awarding of a contract to Brooklyn Naval Shipyard for the construction of USS *Saratoga* (CVA-60), he said it would be similar to the *Forrestal*. But design improvements in machinery since *Forrestal* installation were ordered to give *Saratoga* a somewhat higher speed.

"The importance attached to this carrier [*Saratoga*] by the Navy Department," Secretary Kimball said, "is emphasized by the Navy's sacrifice of other combatant ships in the 1953 program in order that a second large carrier can be added to the Fleet.

"Although the ships sacrificed are urgently needed to augment the battle readiness of the Fleet, the Navy decided that the need for the large aircraft carrier is even more urgent in terms of national security."

*Forrestal* was launched on December 11, 1954, and christened by Mrs. James Forrestal. The ship was commissioned at Norfolk Shipyard on October 1, 1955. The carrier had an overall length of 1036 feet, a width of 252 feet, and nearly four acres of flight deck. She displaced 59,650 tons and had a horsepower rated over 200,000, and a speed over 30 knots. Four steam catapults were installed. She had a complement of 3500 officers and men, including the air group.

Assistant Secretary of the Navy (Air) James H. Smith, Jr., spoke at the commissioning ceremonies. "If our way of life is to survive," he said, "we must maintain these two alternate military postures: the first is to maintain a powerful and relatively invulnerable reprisal force which will signal a potential enemy to stop, look and listen before he risks an all-out atomic war. The second is to insure that we ourselves will not be forced to change the character of a limited war because of fear of ultimate defeat in a series of them. Fortunately, we need not maintain a completely separate set of forces for each posture. In this ship and the variety of aircraft she can service we combine the two, and we add the multiplier of the ability to appear quickly



USS RANGER'S after flight deck was altered slightly to provide a longer overall length.

at any one of the many far-flung trouble spots. This is economy of force, achieved without sacrifice of our objectives."

USS *Saratoga* was christened at New York Naval Shipyard on October 8, 1955. A few token feet of water were splashed into the new ship's dry-dock to "launch" her officially. She was essentially similar to *Forrestal* but was designed to develop considerably more horsepower. She was commissioned April 14, 1956.

Sister ship *Ranger* (CVA-61) had one outstanding exception to distinguish her when she was commissioned August 10, 1957. The angle of the after flight deck was altered slightly, giving her an overall length of 1046 feet, as compared to the 1039 of *For-*



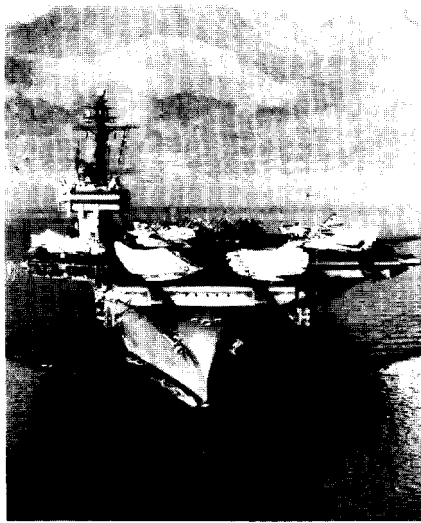
USS INDEPENDENCE was commissioned at New York Naval Shipyard, the fourth aircraft carrier of the Forrestal class. This aircraft carrier had increased arresting gear capability installed.

restal. Another innovation, an all-welded aluminum elevator, was installed on the port side, replacing the conventional steel types used on other *Forrestal*-class carriers. To expedite her building, work was started in a smaller dock. About four months later, when the *Forrestal* was launched, the partially completed *Ranger* hull was floated into the larger facility.

CVA-62, the USS *Independence*, was constructed in Drydock 6 at New York Naval Shipyard, her stem at the head of the drydock to facilitate material delivery over a truck ramp leading from the head of the dock to the hangar deck at the stern. The island and associated sponson "were not installed in order to avoid blocking off the large traveling crane. In August, the extraordinarily complex job of transferring her to Drydock 5 was accomplished smoothly and efficiently.

*Independence* was commissioned at the New York Naval Shipyard on January 10, 1959, the fourth carrier of the *Forrestal* class to join the Fleet.

*Kitty Hawk* (CVA-63) and *Constellation* (CVA-64) were essentially designed along the *Forrestal* lines but developed into a separate class, the *Kitty Hawk* class. The major difference is missile capability. Both CVA-63 and -64 are armed with *Terriers*. The fuel capacity in the *Kitty Hawks* is a little greater than the *Forrestals*, while avgas capacity is a little less. The angled part of the flight deck is some 40 feet longer and the catapults



USS KITTY HAWK, with *Terrier* missile capability, became the first of a new class CVA.

and elevators have greater capacities. USS *America* (CVA-66), now being built at Newport News, will have an even longer angled deck than any of the predecessors. Placed in the *Kitty Hawk* class, she is scheduled to be completed in late 1964.

On February 4, 1958, Secretary of the Navy William B. Franke announced that the world's first nuclear-powered aircraft carrier was to be named USS *Enterprise* to perpetuate the WW II carrier and her six predecessors. On that same day, the keel of the carrier was laid at Newport News.

On September 24, 1960, Adm.

Arleigh Burke, then CNO, delivered an address during launching ceremonies, in which he described the new carrier.

"This new *Enterprise*, the largest ship ever built, of any kind, by any nation, will be the eighth Navy ship to proudly bear that name. Her forbears have left an enviable record, a record of courageous, distinguished service.

"We are looking at a major advance in the art of nuclear engineering. . . . The problems which were solved, the know-how that was developed in order to build this ship, represent a tremendous contribution to our knowledge of the military and industrial uses of nuclear energy.

"Her eight powerful nuclear reactors would enable the *Enterprise* to cruise 20 times around the world without refueling. Her great endurance and her advanced hull design would allow the ship to make this extraordinary journey at sustained high speed, exploiting to its utmost the seagoing advantage of mobility."

From the very first, it was obvious that designers and builders of Newport's hull No. 546, the *Enterprise*, had hit the jackpot. For the first time, RAdm. F. S. Schultz, Assistant Chief BU SHIPS, noted the customary builder's trials of a major combat ship were eliminated, and the ship was presented to the Navy for acceptance trials on her first trip to sea.

*Enterprise* returned to the shipyard after her six-day Navy acceptance trials in the Atlantic. A giant broom



USS CONSTELLATION (CVA-64), sister ship to *Kitty Hawk*, fires a *Terrier* missile. Basic design of the *Kitty Hawks* is of the *Forrestal* class. The angled area of flight deck is some 40 feet longer than the *Forrestals*, and catapults and elevators installed have greater capacity.

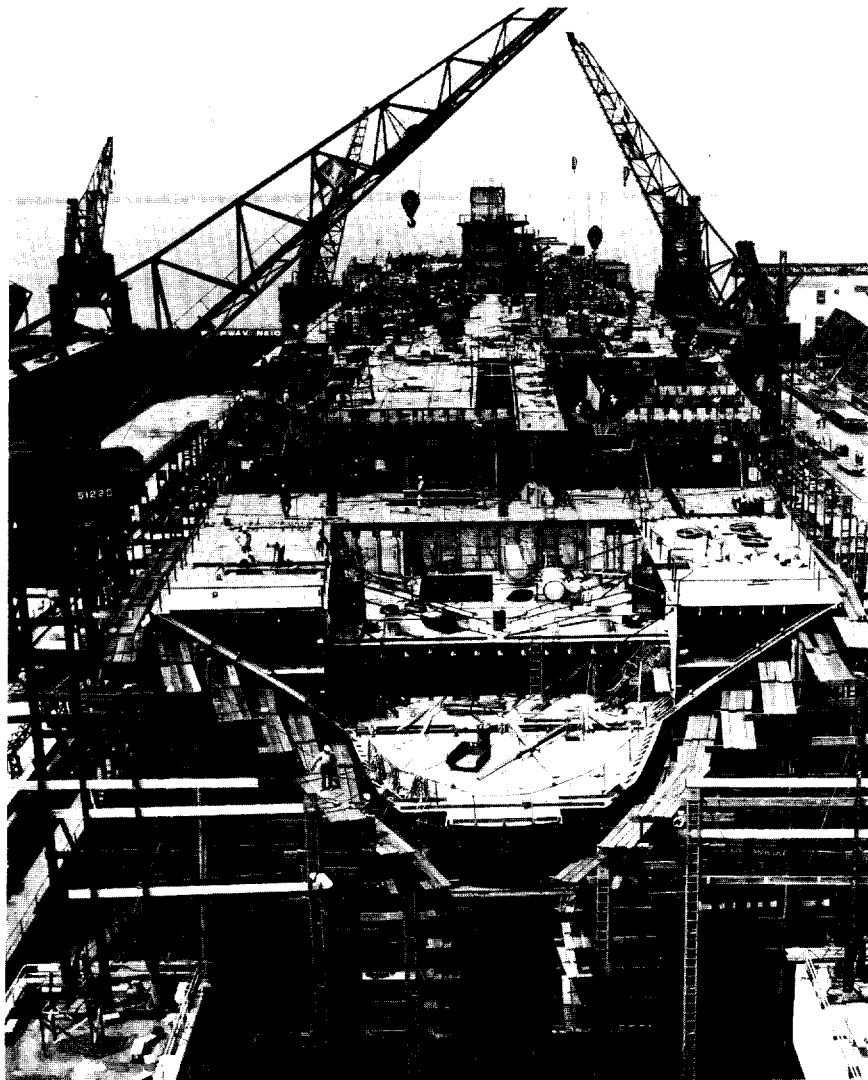
was affixed to her masthead to signify a clean sweep of the trials. Capt. W. M. Ryan, President of the Naval Board of Inspection and Survey, stated:

"The ship generally performed in an excellent manner. The cleanliness and upkeep were outstanding. The fine workmanship throughout the ship reflects great credit upon all hands concerned with its building. Like all new ships there are bugs which must be worked out, but we feel that there is nothing that cannot be overcome."

The plant for the nuclear-powered aircraft carrier was designed under supervision of VAdm. Hyman Rickover.

Designated CVA(N)-65, *Enterprise* was commissioned on November 25, 1961, at Norfolk, with Capt. V. P. dePoix commanding. The world's first nuclear-powered carrier has a length of 1040 feet between perpendiculars and an extreme breadth of 252 on the flight deck. Each of the four deck-edge elevators cover about 4000 square feet. *Enterprise* is the first carrier to have elevators for pilots in lieu of escalators. She displaces 85,350 tons.

The communications equipment on the carrier is believed to be the largest assortment ever assembled on any ship. Besides more than 1800 telephones, there is the complexity of numerous



**UNDER CONSTRUCTION** at Newport News is USS America (CVA-66). The island being built midships, will be moved to the starboard side of the carrier when sponsons are attached to hull

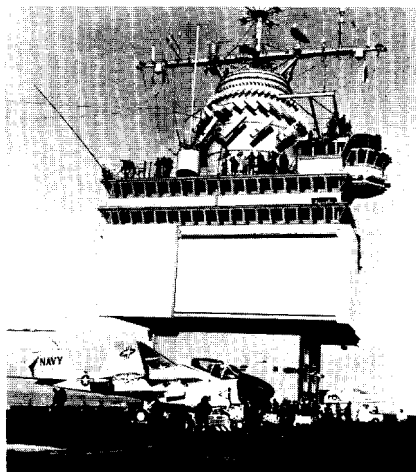
The *Enterprise* is equipped with four type C-13 steam driven catapults with an energy potential of 60,000,000 foot-pounds. With this power, an aircraft weighing 78,000 pounds can be accelerated to 160 mph from a standing start, in a distance of 250 feet. All of the aircraft aboard can be launched at the rate of one every 15 seconds while using all four cats.

The size of *Enterprise's* island structure was dictated by the size of the two radar screens that flank each of its four sides. This newly developed radar system is the most powerful to be installed on a floating platform, according to Capt. de Poix. Its far-reaching, three-dimensional capability is enhanced by its height above the water line. The silhouette is distinctive.

"Propulsion and control characteristics of the ship offer great tactical flexibility," said Capt. de Poix in mid-1962. "There are four rudders, one almost directly astern of each propeller. This provides excellent maneuverability at all speeds as well as tactical diameters in turns which compare with much smaller ships. . . ."

"Her ability to launch a strike on the enemy from one position, recover, and launch another 24 hours later from an unpredictable position more than 800 miles away from her previous strike position will constantly be a factor in causing the enemy to utilize protective forces that could be deployed elsewhere.

"If a show of force is required, *Enterprise* can be on distant station in a shorter period of time than any other ship in the Fleet."



**DOMINATING** feature of *Enterprise's* silhouette is her box-like island, prickling antennae.

radio circuits, teletypes, a pneumatic tube arrangement to carry messages from one station to another, and numerous announcing systems, several of which have speakers throughout the ship. She is the first ship of the U.S. Navy's Atlantic Fleet to have the Navy Tactical Data System installed.