

USS HORNET (CVS-12)  
Puget Sound Naval Shipyard, Sinclair Inlet  
Bremerton  
Kitsap County  
Washington

HAER NO. WA-34

HAER  
WASH  
18-BREM,  
3-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record  
National Park Service  
Western Region  
Department of the Interior  
San Francisco, California 94107

# HISTORIC AMERICAN ENGINEERING RECORD

HAER  
WASH  
18-BREM,  
3-

## U.S.S. HORNET (CVS 12)

HAER No. WA-34

Previous Names: USS HORNET (CVA 12) and USS HORNET (CV 12).

City and State Location: Naval Inactive Ship Maintenance Facility of Puget Sound Naval Shipyard, Sinclair Inlet, Bremerton, Kitsap County, Washington.

Builder: Newport News Shipbuilding and Drydock Co.

Builder location: Newport News, Virginia. Keel laid August 3, 1942. Launched August 30, 1943.

Designed by and built for: United States of America, Department of the Navy

Vessel type: Aircraft Carrier.

Original use: Aircraft Carrier. Commissioned November 29, 1943.

Present Use: Stricken Naval vessel. Offered, but not accepted, to a non-profit organization for museum/memorial use. Currently awaiting disposal by scrap sale.

Current condition: Poor.

Owner: United States of America, Department of the Navy

Significance: Designated a National Historic Landmark in December 1991 on the basis of her participation in the Pacific Theater during World War II, and for her participation in the recovery of the Apollo 11 and 12 command modules in 1969.

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Washington, DC.

Date: June 1992

### SIGNIFICANCE

Subsequent to the unsuccessful efforts of the U.S.S. HORNET Historical Museum Association to obtain the ship as a donation, *Hornet* was designated a National Historic Landmark in December 1991 on the basis of her participation in the Pacific Theater during World War II, and for her participation in the recovery of the Apollo 11 and 12 command modules in 1969. *Hornet* was one of 24 Essex Class aircraft carriers constructed during World War II and one of 81 aircraft carriers (CVs, CVLs and CVEs) to serve in the Pacific Theater (December 1941 to June 1945). Although a late entry to the war, aircraft launched from *Hornet* conducted strikes against the Japanese fleet and shore facilities between March 1944 and May 1945. *Hornet* was also one of several Naval vessels to recover manned space capsules from Pacific Ocean splashdowns in the 1960s.

### PRINCIPAL DIMENSIONS AT CONSTRUCTION

Standard displacement	27,200 tons
Length between perpendiculars	820 ft
Overall length (extreme bow to extreme stern)	872 ft
Beam at waterline	93 ft
Beam at flight deck	96 ft
Frame spacing	4' 0"
Draft above bottom of keel at full load	27' 6"

Dimensions reflecting the *Hornet's* final configuration are identified in the Booklet of General Plans, which are reproduced as part of this HAER documentation package and included in the project field records.

### AIRCRAFT CARRIER HULL DESIGNATIONS

"CV" was the original hull designation for an aircraft carrier. "CV" is not an acronym. Aircraft carriers with the "CV" hull designation include: Langley (CV 1), two ships of the Lexington (CV 2) Class, Ranger (CV 4), three ships of the Yorktown (CV 5) Class, Wasp (CV 7), twenty-four ships of the Essex (CV 9) Class {including *Hornet* (CV 12)}, three ships of the Midway (CV 41) Class, four ships of the Forrestal (CV 59) Class and four ships of the Kitty Hawk (CV 63) Class. Nuclear propelled aircraft carriers are designated as "CVN".

Different hull designations were assigned to Essex Class ships as their primary missions roles changed in the 1950's and 1960's. "CVA" represents a specialized attack mission. "CVS" represents a primary role in Anti-Submarine Warfare (ASW) support. It is noted that the Midway Class original hull

designation was "CVB" for "heavy aircraft carrier" and that the original designations of the Forrestal and Kitty Hawk (which is really an improved Forrestal) Classes were "CVA".

During the World War II mobilization effort, merchant ships were converted to aircraft carriers under a very austere program. They were designated as escort carriers "CVE" whose primary role was that of convoy air and submarine defense. This included: Long Island (CVE 1), eleven ships of the Bogue (CVE 9) Class, four ships of the Sangamon (CVE 26) Class, Charger (CVE 30), fifty ships of the Casablanca (CVE 55) Class and seventeen ships of the Commencement Bay (CVE 105) Class. Also, light-cruiser hulls were converted during 1942-43 to light fleet carriers "CVL", which included nine ships of the Independence (CVL 22) Class and two ships of the Saipan (CVL 48) Class.

#### COMPARISON OF ESSEX CLASS TO PRECEDING AND FOLLOWING CLASSES OF AIRCRAFT CARRIERS

The Yorktown and Wasp Classes preceded the Essex Class and the Midway Class followed. Three Yorktowns were built 1934-41, Yorktown (CV 5), Enterprise (CV 6) and Hornet (CV 8). (The CV 8 was the Hornet of Doolittle's Raid on the Japanese mainland, April 1942, and was subsequently sunk at the Battle of Santa Cruz on October 27, 1942.) The Yorktowns were the first carriers to be designed on the basis of operational experience with the fleet and were essentially the design adopted for the Essex Class. One Wasp Class ship was built 1936-40, Wasp (CV 7). The design of the Yorktown and Wasp Classes were carried out in parallel and were limited by the tonnage limitations of the Washington Naval Treaty and the Vinson-Trammell Act of 1934. The Yorktown Class were 20,000 ton standard displacement (25,500 tons full load) carriers with a design capacity of 90 aircraft. However, by 1939, actual capacity was reduced to 81 individually larger aircraft. The Wasp was a 15,200 ton ship (18,500 tons full load) with a design capacity of 70 aircraft. CV 8 was authorized in FY39 as a follow-on Yorktown Class carrier when additional carrier tonnage was allowed after the 1936 expiration of the Washington Naval Treaty. The Yorktowns provided protection against 6-in shellfire, included a 708 x 80 foot flight deck, hangar and flight-deck catapults, three aircraft elevators, eight 5-in/38 guns, four quadruple 1.1-in guns and forty 0.50-cal machine guns. The greatest shortcoming of the Yorktown design was that fire and engine rooms did not alternate, so that a torpedo penetrating the poor underwater protection could immobilize the ship.

The Essex Class was designed after the Washington Treaty expired in 1936, hence they were considerably larger (27,200 tons

standard displacement, 34,900 tons full load) than the previous Yorktowns. The requirement for larger displacements was driven by the need to operate a larger air group of larger new generation aircraft, and the corresponding increased fuel capacity requirements. However, the pressure to accelerate the pre-war Naval build-up dictated that the Essex design would be based on the earlier, treaty-bound Yorktown class. Given the very short time between design and the beginning of construction, only a limited number of changes from the Yorktown Class could be made. The Essex Class introduced alternating engine and boiler rooms which provided protection against underwater damage that might penetrate the limited side protection, which was only slightly improved over that of the earlier Yorktown Class. They included some deck protection against bombs, whereas the earlier carrier class had been armored primarily against shellfire. The Essex Class, however, were not large enough to accommodate the armored flight deck of the later Midway Class. The Essexes were also among the last generation of US warships to be designed without major provisions for radar.

The Midway Class consisted of three ships; Midway (CV 41), Franklin D. Roosevelt (CV 42) and Coral Sea (CV 43). The Midway Class represented major innovations in aircraft carrier design. They proved to be the ultimate development of the built-up hangar and flight deck concept, and provided extensive armor protection above the hangar deck level, thereby ensuring a massive increase in size (47,400 tons standard displacement, 59,900 tons full load) over the Essex Class. While aircraft capacity increased 50 percent over the Essex Class, the significant increase in ship size was driven by the requirement for superior protection while maintaining speed requirements. Construction of the three Midway Class ships occurred from 1943 to 1947.

#### ESSEX CLASS HISTORY

Thirty-two Essex Class Aircraft Carriers were authorized for construction, beginning in Fiscal Year 1940. Twenty-four were completed (seven after the end of World War II), two were scrapped prior to completion and six were never started. The Essex Class was more notable for their proven effectiveness, reliability and the large numbers constructed than for any design innovation. Of the twenty-four Essex Class carriers completed; eleven ships (including *Hornet*) were involved in combat operations in the Pacific Theater. *Hornet* did not suffer any extensive shipboard damage as that which occurred to some of her sister ships. USS *Essex* (CV 9), USS *Intrepid* (CV 11), USS *Franklin* (CV 13), USS *Ticonderoga* (CV 14), USS *Randolph* (CV 15), USS *Lexington* (CV 16), USS *Bunker Hill* (CV 17) and USS *Hancock* (CV 19) were damaged from enemy bombs and/or Kamikaze attacks,

resulting in many crew deaths on these ships. Due to extensive sub-compartmentation in the design and crew damage control efforts to save attacked ships, none of the Essex Class carriers were lost at sea during World War II.

Eventually, seventeen of the carriers were stricken from the Naval Vessel Register between 1964 and 1976 and have been sold for scrap. Four of the carriers (including *Hornet*) were stricken in 1989 and are authorized for scrapping and three others have been donated to non-profit organizations for use as memorials. The latter three include: ex-Yorktown (CV 10) in Charleston, SC, ex-Intrepid (CV 11) in New York City and ex-Lexington (CV 16 / AVT 16) in Corpus Christi, TX. *Hornet* is nearly identical to the existing configuration found on ex-Yorktown, ex-Intrepid and ex-Lexington.

#### HORNET AS A CV

*Hornet*, as with the other Essex Class carriers, was built with a welded steel hull protected by 4 inch thick side armor belts, 2-1/2 to 2-3/4 inch main deck plating and 3/4 to 1 inch plating around various compartments. The steering gear compartment was enclosed by 4 inch Class B armor on the sides and with 5 inches at the top. However, the flight deck was essentially devoid of armor plating. The wood surfaced flight deck, shown in HAER photograph no. WA-34-121, was pierced by two 48.25 x 44.25 foot hydraulic aircraft elevators, one forward and one aft, each with a 28,000 lb capacity and a 60 x 34 foot deck edge elevator on the port side that could be stowed vertically for transit through the Panama Canal. Mark 4 arresting gear consisted of four steel wire ropes fitted transversely across the aft flight deck. *Hornet* and the earlier Essex Class ships were constructed to handle aircraft landings over the bow (while the carrier was running astern at up to 20 knots) and to launch over the stern from the hangar deck. However, the practice of landing over the bow did not prove successful during World War II and the forward landing gear was removed. The flight deck overhung the forecastle deck and a stern gallery deck, the configuration of which is shown in HAER photograph nos. WA-34-120 and WA-34-121. Roller doors pierced the hull at the hangar deck port and starboard, allowing propeller-driven aircraft to warm up in the hangar and facilitate faster take-off operations.

The island superstructure, on the starboard side amidships, had five levels which included a communication platform at the flight deck level, the flag bridge, navigating bridge, a deck atop the pilothouse that mounted single 20mm gun mounts and Mark 51 directors, and the air defense platform which included a quadruple 40mm platform and 24 inch searchlights. HAER

photograph no. WA-34-123 shows a forward port view of the island in April 1945, before the two flight deck 5-inch, 38 caliber gun mounts were removed. The boiler uptakes stack trunked through the superstructure and vented aft of the island. The stack carried an SC-2 long range air search radar antenna. The island also mounted two Mark 37 directors, one forward and one aft, each fitted with Mark 4 radar. *Hornet* carried a tripod foremast, which was fitted with an SK-1 long range air search radar antenna, YE homing beacon, SG-1 surface search radar antenna, an SM low angle air search/height finding radar antenna, and the ensign staff with a servicing platform. *Hornet* also carried long-wire antenna arrangements on the starboard edge of the flight deck, forward and aft of the island.

Design armament for the Essex class was twelve 5-inch, 38 caliber guns, on four twin mounts and four single mounts on the gallery, thirty-two 40mm guns on eight quadruple Mark 4 mounts, and forty-six 20mm Oerlikon guns on single mounts. Fire control was provided by the two Mark 37 and eight Mark 51 directors. By the war's end, *Hornet's* armament was augmented to a total of seventeen 40mm gun mounts after a 1944 refit. The Essex carriers were built to accommodate 36 F6F-3 (Grumman Hellcat) fighters, 37 SB2C (Curtiss Helldiver) reconnaissance bombers, and 18 TBF (Grumman Avenger) torpedo bombers, or 91 aircraft. The designed crew complement for ship and aircraft was 268 officers and 2,363 enlisted personnel.

*Hornet* was powered by eight 565 psi, 850°F Babcock & Wilcox boilers (shown in HAER photograph nos. WA-34-112, 115 & 116) and was propelled by four 150,000 shaft horsepower Westinghouse geared steam turbines (shown in HAER photograph no. WA-34-108 and WA-34-109) on 4 shafts. Maximum speed was 33 knots. *Hornet* carried 6,330 tons of fuel with an endurance of 15,000 nautical miles at 15 knots.

*Hornet* was the first aircraft carrier to be given a multi-color camouflage scheme. In 1943, *Hornet* was adorned with Measure 33/3A, which was an open design using various dark blue, grey and green tones, shown in HAER photograph no. WA-34-122. Subsequently, *Hornet* wore Measure 22, which was Navy Blue below the waterline and Haze Grey above. Post-war colors returned the carrier to Haze Gray.

#### SHIP'S ARRANGEMENTS

*Hornet* had seventeen levels. The five levels of the island superstructure principally contained the main command and navigating positions together with sea cabins for the senior bridge officers, a shelter for the flight deck crews and the

boiler uptakes. Immediately below the flight deck, the gallery deck provided most of the additional accommodation required close to the flight deck and bridge, including the state rooms for senior officers and the pilots' ready rooms. Other areas of the gallery deck were occupied largely by aviation and communication related workshops and stores. Between the gallery and main decks, the forecastle deck largely contained officers' staterooms. The hangar occupied the majority of space on the main deck with the most of surrounding compartments used for aircraft maintenance. Below the main deck, the 2nd and 3rd decks were largely occupied by crew accommodations and spaces for associated services, such as galleys. The 4th deck consisted mainly of storage spaces including several large compartments for stowing aviation equipment and spare parts, along with some crew berthing. Below the 4th deck, the machinery compartments and the torpedo protection system occupied the majority of space. Located forward and aft of the machinery spaces on the 1st and 2nd platform decks and in the Hold were the ship and aircraft ordnance magazines, the gasoline tanks, the damage control headquarters, the main gyro room and the Combat Information Center, along with various storerooms. The double and triple bottoms consisted of the wing tanks of the torpedo protection system and storage tanks for ship's fuel and fresh water.

A thorough description of Essex Class design and arrangements, with detailed drawings, is contained in John Roberts, Anatomy of the Ship Series: The Aircraft Carrier Intrepid, Conway Maritime Press Ltd., 1982.

#### CV 12 OPERATIONS IN World War II

Originally named *Kearsarge*, CV 12 was renamed as *Hornet* a few months after her keel was laid to honor CV 8, sunk by the Japanese at Santa Cruz in October 1942. After an accelerated shakedown cruise between Norfolk and Bermuda, the new *Hornet* departed for the Pacific war zone to join Task Force 58 in the Marshalls. *Hornet* saw continuous duty from March 1944 through May 1945 and participated in the following Pacific Theater campaigns:

- Phase three of the Asiatic-Pacific Raids of March-April 1944 as part of Fast Carrier Force TF-58 with USS Yorktown (CV 10), USS Bunker Hill (CV 17), USS Wasp (CV 18), USS Enterprise (CV 6), USS Lexington (CV 16), USS Essex (CV 9) and eight other CVL's. *Hornet's* air groups and squadrons struck against Japanese targets on the islands of Palau and Woleai on March 29-30, Wadke-Sarmi and Sawar on April 8-13, and Truk, Satawan, Ponape, Moen, Eaton and Dublon on April 29-May 1.



- New Guinea and Marianas, June 1944, as part of Fast Carrier Force TF-58 with USS Yorktown (CV 10), USS Bunker Hill (CV 17), USS Wasp (CV 18), USS Enterprise (CV 6), USS Lexington (CV 16), USS Essex (CV 9) and eight other CVL's. *Hornet's* aircraft assisted in the attack and occupation of Saipan on June 11. Attacks were launched against Guam, Rota, Volcano and Bonin Islands on June 12, and against Iwo Jima and Chichi Jima on June 16 and June 24.
- Battle at Philippines, June 19-20, 1944, as part of Fast Carrier Group TG-58 with USS Yorktown (CV 10), USS Bunker Hill (CV 17), USS Wasp (CV 18), USS Enterprise (CV 6), USS Lexington (CV 16), USS Essex (CV 9) and eight other CVL's. U.S. forces engaged the Japanese fleet in a two-day air battle over the Philippine Sea which resulted in 392 enemy aircraft destroyed while U.S. aircraft losses totaled 29.
- Air strikes against Guam and the Bonins, July 1944.
- Air strikes against southern Palau Islands, September 9-17, 1944. Air strikes against Manila Harbor and airfields, September 21-24, 1944.
- Air battle at Formosa, October 1944, as part of Fast Carrier Force TF-38 with USS Wasp (CV 18), USS Intrepid (CV 11), USS Hancock (CV 19), USS Bunker Hill (CV 17), USS Essex (CV 9), USS Lexington (CV 16), USS Franklin (CV 13), USS Enterprise (CV 6) and eight other CVL's. Sorties were sent against Okinawa, Formosa and Northern Luzon, October 10-19.
- Invasion of Leyte, October 1944, as part of TF-38 with USS Wasp (CV 18), USS Intrepid (CV 11), USS Hancock (CV 19), USS Bunker Hill (CV 17), USS Essex (CV 9), USS Lexington (CV 16), USS Franklin (CV 13), USS Enterprise (CV 6) and eight other CVL's. *Hornet's* aircraft struck Japanese shipping in Ormoc Bay, Leyte on October 11.
- Air strikes against shipping in Manila Harbor on November 13-14 and against Subic Bay and Lingayan Gulf on November 19, 1944.
- Liberation of Philippines, December 1944, as part of TF-38 with USS Yorktown (CV 10), USS Wasp (CV 18), USS Lexington (CV 16), USS Hancock (CV 19), USS Essex (CV 9), USS Ticonderoga (CV 14), USS Enterprise (CV 6) and seven other CVL's. *Hornet's* aircraft struck targets on Luzon on December 14-16.
- Battles around Japanese home islands, February-April 1945,

as part of TF-58 with USS Wasp (CV 18), USS Bennington (CV 20), USS Enterprise (CV 6), USS Franklin (CV 13), USS Randolph (CV 15), USS Essex (CV 9), USS Bunker Hill (CV 17), USS Hancock (CV 19), USS Yorktown (CV 10), USS Intrepid (CV 11) and six other CVL's. *Hornet's* aircraft took part in the Fifth Fleet Raids against Honshu and the Nansei Shoto on February 15, 16 and 25. Her aircraft also supported the assault and occupation of Iwo Jima from February 15 through March 1. Aircraft from *Hornet* and other carriers attacked shipping at anchor in Kure and Kobe naval bases beginning March 19. On April 7, TF-58 engaged three ships of the Japanese fleet in the South China Sea. *Hornet* and USS BENNINGTON were credited with assisting USS Yorktown (CV 10) in the sinking of the 45,000 ton battleship Yamato. By April 30, *Hornet* had launched over 4000 combat sorties in 32 days and the ship was under attack more than 105 times.

*Hornet*, as part of TG-38, encountered a typhoon east of Okinawa on June 5, 1945 which collapsed 25 feet of *Hornet's* forward flight deck, rendering the ship incapable of launching aircraft over the bow. Damage to the bow is shown in HAER photograph no. WA-34-124. *Hornet* proceeded to San Francisco where damage was repaired during an overhaul at Hunter's Point Naval Shipyard beginning July 7. World War II ended prior to completion of the overhaul. Beginning September 13, 1945, *Hornet* participated in the "Magic Carpet Fleet", transporting servicemen from Guam and Pearl Harbor to San Francisco. *Hornet* remained at Hunter's Point Naval Shipyard from February 1946 until decommissioning on January 15, 1947. *Hornet* was retained as an inactive ship at the Bremerton Pacific Reserve Fleet.

*Hornet's* record of damage to the enemy during World War II showed 688 enemy planes destroyed in the air, 742 destroyed on the ground and 1 carrier, 1 cruiser, 10 destroyers and 42 merchant ships sunk. *Hornet*, Essex, Yorktown, Lexington and Bunker Hill were among the Essex Class carriers receiving a Presidential Unit Citation for operations in the Pacific Theater. *Hornet* earned the Asiatic-Pacific Area Campaign Service Medal with 7 battle stars, but was the least decorated of these five ships. USS Essex entered the Pacific Theater with strikes against enemy positions beginning in August 1943 and supported every major subsequent Pacific engagement, earned 13 battle stars and was eventually scrapped. USS Yorktown (CV 10) also commenced strikes in August 1943, was credited with sinking 118 ships and destroying 2,358 aircraft and ground installations, and earned 11 battle stars. USS Lexington commenced strikes in September 1943 and earned 11 battle stars. USS Bunker Hill commenced strikes in November 1943, incurred significant attack damage, earned 11 battle stars, was eventually scrapped and has been largely

forgotten.

"Battle Stars" is the unofficial but customary name given to the engagement stars awarded for wartime service. An engagement star is a star authorized for actual combat in an operation or engagement. An operation is a series of connected military actions occupying a specific but generally broad area and time, and may involve many clashes with the enemy. An engagement is an action with the enemy taking place within a restricted time and area, and of sufficient intensity and significance to justify recognition. For World War II, there were 41 Asiatic-Pacific stars authorized. In addition to battle stars for general operations, a battle star was awarded to a ship for each submarine it sank, and a battle star was awarded to a submarine for each of its war patrols.

#### HORNET AS A CVA

Beginning May 12, 1952, *Hornet* underwent a modernization and conversion at the Brooklyn Navy Yard. Under the SCB-27A modification program, *Hornet* received a strengthened flight deck to handle jet aircraft and improved arresting gear. The island superstructure was streamlined with integration of the bridge and smokestack, the flight deck 5"/38 gun mounts forward and aft of the island were removed, all single 20mm and quadruple 40mm mounts were removed and the forward elevator was enlarged to a 70 square foot area. Also, the Mark 37 fire control system was replaced with a Mark 25 system, hydraulic catapults were upgraded to the H Mark 8 design, the side armor at the waterline was removed, various fittings were installed to permit operation of jet aircraft, three standby rooms for aircrews were transferred below the flight deck level and an escalator was installed between the standby rooms and the flight deck. The reconfigured flight deck and enclosed "hurricane" bow is shown in HAER photograph no. WA-34-126 and the escalator is shown in HAER photograph no. WA-34-26. One of the pilots' ready rooms is shown in HAER photograph no. WA-34-61 showing seats, map boards and filing cabinets. Blisters were added to the hull, which increased the beam at the waterline to 101 feet, to compensate for the weight added during this modernization and prior alterations.

On September 11, 1953, USS *Hornet* was recommissioned as an attack carrier (CVA 12). A eight-month global cruise began in May 1954. On June 24, 1954, Chinese communist fighter planes attacked and were promptly shot down by aircraft launched from the *Hornet* in search of a downed British airliner. In 1955, *Hornet* conducted a Western Pacific (WESTPAC) deployment between May 4 and December 10. In January 1956, *Hornet* commenced an

overhaul at Puget Sound Naval Shipyard which included construction of an angled flight deck and an enclosed hurricane bow. The ship's profile at this time is shown in HAER photograph no. WA-34-125. Two WESTPAC deployments were subsequently conducted in 1957 and 1958.

#### HORNET AS A CVS

In August 1958, *Hornet* commenced a four-month overhaul and conversion to an anti-submarine warfare carrier (CVS), which included internal modifications to accommodate embarked helicopters and installation of AN/SQS-23 bow mounted sonar. Two WESTPAC deployments were conducted prior to a 1961 overhaul at Puget Sound Naval Shipyard. After a 1962 WESTPAC deployment, a Jan-Feb 1963 repair availability at Long Beach Naval Shipyard removed three additional 5"/38 gun mounts.

After another WESTPAC deployment, *Hornet* underwent a 7-month FRAM II (Fleet Rehabilitation and Modernization) overhaul in June 1964 where the boilers and main propulsion gear were completely overhauled, air conditioning was added to electronic spaces and the ship was equipped with Gemini Space Recovery communications facilities.

In October 1965, *Hornet* arrived in the South China Sea to conduct search and rescue missions with SH-3A Sea King helicopters in support of the strike aircraft flying from the attack carriers on station off Vietnam. Marine A-4 Skyhawks from *Hornet* also strafed designated Viet Cong targets in South Vietnam. The ship during this time is shown in HAER photograph no. WA-34-127. After a cruise to Australia and the South Pacific, *Hornet* returned to San Diego in March 1966. Additional combat support operations off Vietnam were conducted in 1967 and the ship completed an overhaul at Long Beach Naval Shipyard in 1968.

In June 1969, *Hornet* was assigned as primary recovery ship for Apollo 11. *Hornet* recovered the Columbia command module on July 24, 1969 with Neil Armstrong, Edwin Aldrin and Michael Collins on board. HAER photograph no. WA-34-128 shows the Apollo 11 crew through the window of the mobile quarantine van being congratulated by President Nixon. The astronauts within the quarantine trailer were ferried to Pearl Harbor, where the trailer was transferred to an Air Force C-141 cargo plane and flown to Ellington Air Force Base. The event was repeated in November 1969 for Apollo 12. For historical perspective, it is noted that USS Lake Champlain (CVS 39) recovered the Freedom 7 capsule with Alan Shepard, the first American in space. Lake Champlain also recovered Gemini 5 and was eventually scrapped.

USS Wasp (CVS 18) recovered Gemini VII, which had conducted the first rendezvous with another manned spacecraft, Gemini VI. Wasp also recovered Gemini IX and was eventually scrapped. Essex, Intrepid, Bennington and Kearsarge also recovered Mercury, Gemini and Apollo capsules.

In June 1970, Hornet was again decommissioned and placed in the Bremerton Pacific Reserve Fleet (now known as the Naval Inactive Ship Maintenance Facility, Bremerton, WA) for retention as a mobilization asset and possible future reactivation. Her final topside configuration as an active ship is shown in HAER photograph nos. WA-34-129 and WA-34-130.

#### DESCRIPTION OF THE HYDRAULIC CATAPULT SYSTEM

HAER photograph nos. WA-34-80, 81, 82, 83, 90 and 93 show the Type H (Hydraulic) Mark 8 catapult system installed when Hornet was decommissioned, which replaced the H Mark 4 originally installed. Hydraulic catapults were installed in Yorktown, Wasp, Essex and Midway Class aircraft carriers (although different versions) and were later phased out with the development of the steam catapult. In fact, six other Essex Class carriers were upgraded to the C 11 steam catapult design. The hydraulic catapult consisted of nine design versions, designated by Mark series, of increasing design capacity based on the state of development and changing aircraft weight and speed launching requirements. Increasing the design capacity was limited by the weight and inertia of the mechanism, and by the strength of the wires through which the force was transmitted. The H Mark 4 was the Essex Class catapult with a design capacity of launching aircraft up to 18,000 pounds at 78 knots.

Hornet was one of nine Essex Class carriers whose catapults were upgraded under the SCB 27A program to the H Mark 8 catapult. This post-war high-capacity hydraulic catapult had an aircraft launching capacity of 16,000 pounds at 105 knots or 62,500 pounds at 60 knots. The H Mark 8 catapult consisted of a hydro-pneumatic engine with a ram diameter of 20.5 inches (figure 1, item 16) below deck from which a wire rope transmission drove a shuttle (figure 1, item 2) along a track (figure 1, item 3) in the flight deck to tow and accelerate an aircraft moving on its own landing gear. The wire rope transmission consisted of two 1-1/2 inch towing cables (figure 1, item 5) in a sheave (figure 1, item 17) arrangement which multiplied the speed and stroke of the ram mechanically. Hence, the 15 foot power stroke on the engine ram was converted into a power stroke on the shuttle of 150 feet. Power was achieved when compressed air in four air flasks (figure 1, item 9) of 70.7 cubic feet each and 3500 psi maximum operating pressure was discharged into the oil-air accumulator (figure 1,

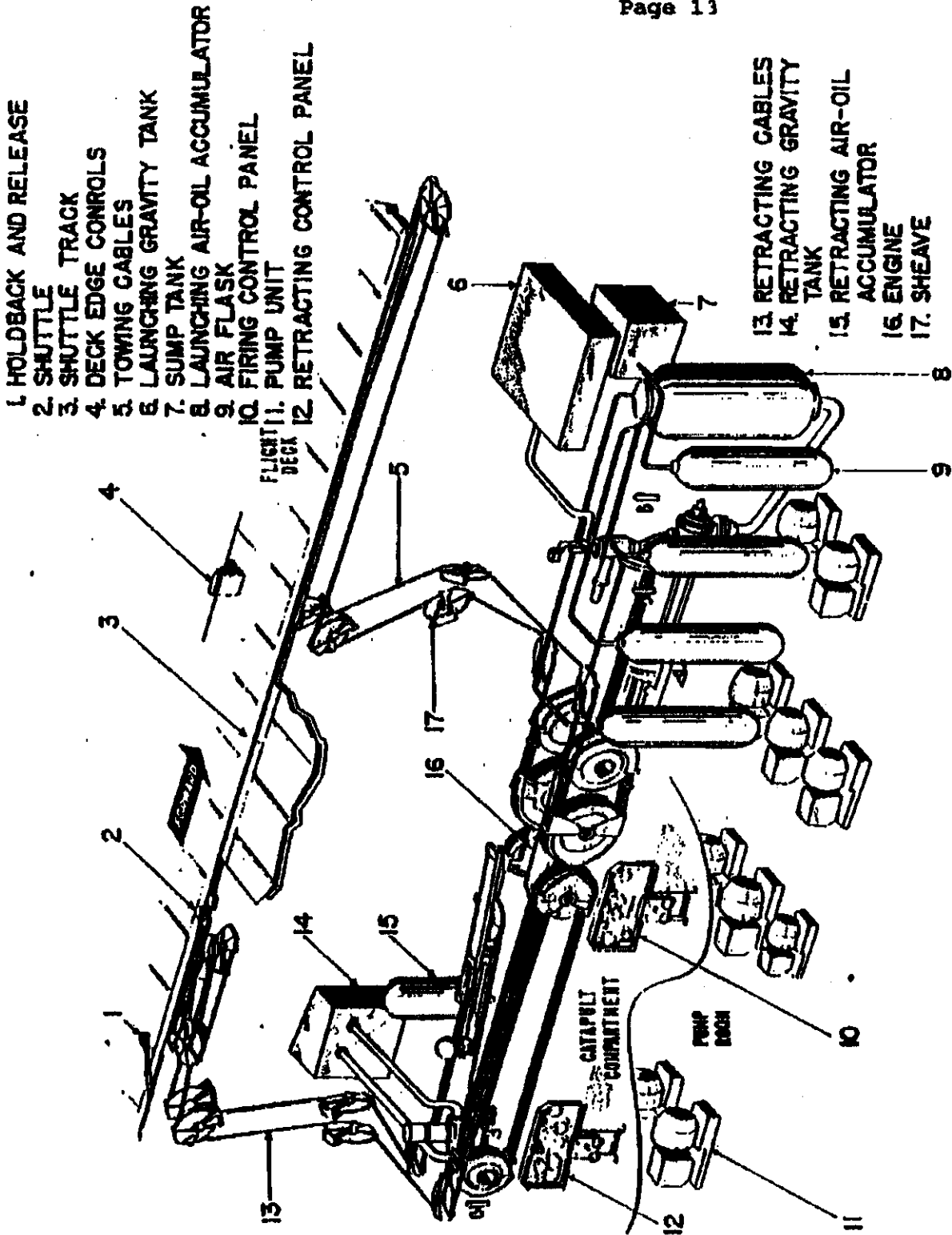
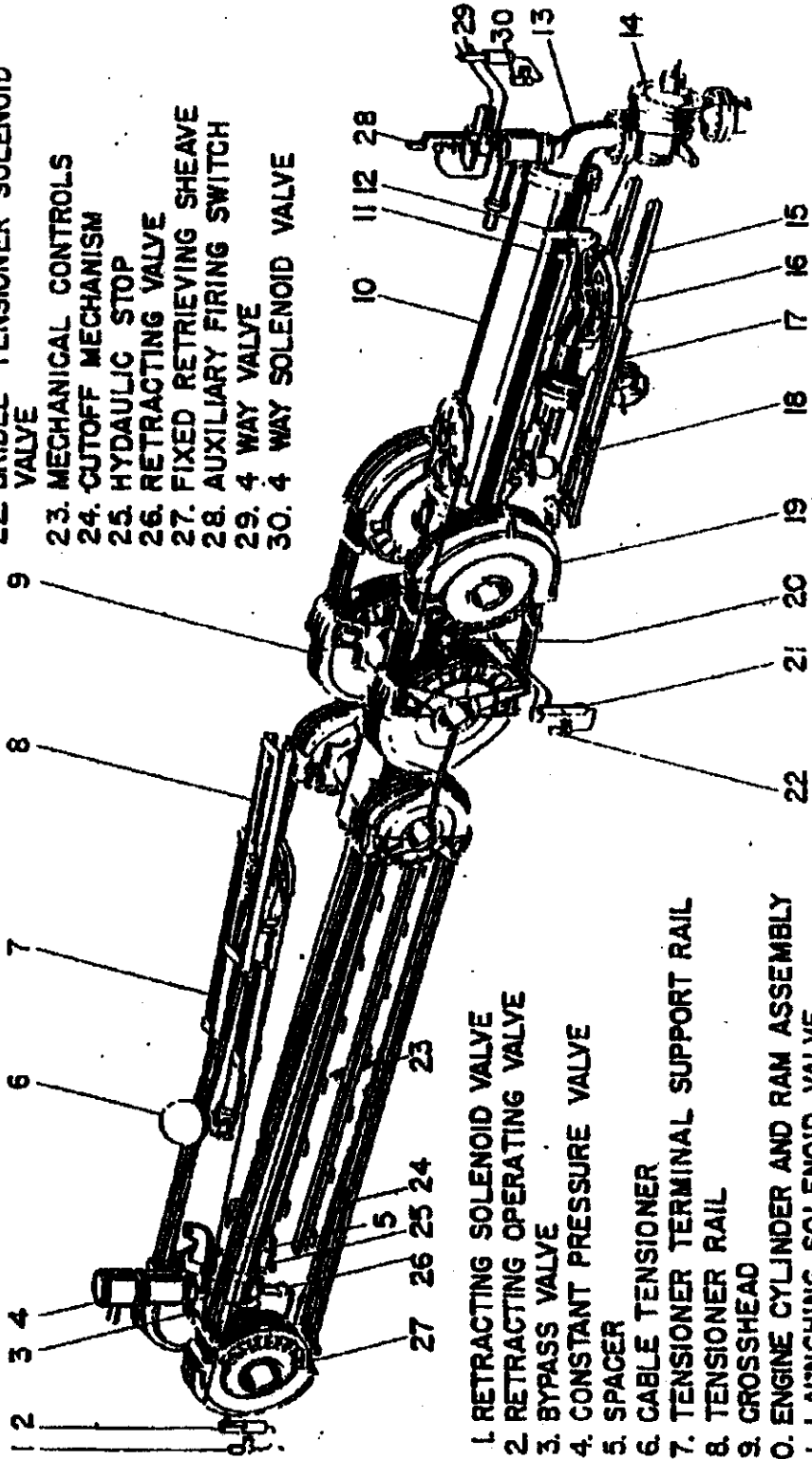


Figure 1 - H8 Catapult

- 20. BRIDLE TENSIONER
- 21. BRIDLE TENSIONER OPERATING VALVE
- 22. BRIDLE TENSIONER SOLENOID VALVE



- 23. MECHANICAL CONTROLS
- 24. CUTOFF MECHANISM
- 25. HYDAULIC STOP
- 26. RETRACTING VALVE
- 27. FIXED RETRIEVING SHEAVE
- 28. AUXILIARY FIRING SWITCH
- 29. 4 WAY VALVE
- 30. 4 WAY SOLENOID VALVE

- 1. RETRACTING SOLENOID VALVE
- 2. RETRACTING OPERATING VALVE
- 3. BYPASS VALVE
- 4. CONSTANT PRESSURE VALVE
- 5. SPACER
- 6. CABLE TENSIONER
- 7. TENSIONER TERMINAL SUPPORT RAIL
- 8. TENSIONER RAIL
- 9. GROSSHEAD
- 10. ENGINE CYLINDER AND RAM ASSEMBLY
- 11. LAUNCHING SOLENOID VALVE
- 12. LAUNCHING OPERATING VALVE
- 13. ELBOW AND CHECK VALVE
- 14. PISTON VALVE
- 15. CABLE EQUALIZER RAIL
- 16. CABLE EQUALIZER
- 17. CABLE WHIP DAMPER RAIL
- 18. CABLE WHIP DAMPER
- 19. FIXED TOWING SHEAVES

Figure 2 - H8 Catapult Engine

item 8), displacing 275 gallons of hydraulic oil into the engine (figure 1, item 16), resulting in the ram power stroke. The force of the high pressure through the engine and wire rope transmission provided the aircraft a starting peak acceleration at maximum pressure of 5 g (one g is equal to 32.17 ft/sec<sup>2</sup>), and an average acceleration in a full speed shot of 3.26 g. The launching and retracting systems were separate, each with its own fluid, accumulator, pumps and tankage. The catapult brake was combined with the retracting system. A bypass valve (figure 2, item 3) allowed the retracting oil spent during the previous launch cycle to exhaust freely into a gravity tank (figure 1, item 14) during the power stroke, but closed for the brake stroke. This diverted oil through a constant pressure valve (figure 2, item 4), throttling the oil to brake the engine crosshead (figure 2, item 9). Thus, the brake stroke on the ram was an additional 4 feet, 40 feet at the shuttle, and the retracting stroke was 19 feet, 190 feet at the shuttle. Each catapult system was capable of launching aircraft at a minimum 32 second interval.

#### DESCRIPTION OF THE ARRESTING GEAR SYSTEM

HAER photograph nos. WA-34-41, 42, 43, 44, 45 and 46 show the Mark 5 arresting gear system installed when Hornet was decommissioned, replacing the earlier Mark 4 system. The Mark 4 arresting gear system was the standard for World War II carriers, with a capacity of 10,000 pounds at 60 knots. The Mark 5 system was rated for 30,000 pounds at 78 knots and could absorb about three times as much kinetic energy as the Mark 4 system. The Mark 5 system consisted of an air flask (figure 3, item 12), air-oil accumulator (figure 3, item 11), control valve (figure 3, item 10), arresting engine (figure 3, item 13), and 1 inch or 7/8 inch arresting cables (figure 3, items 1 and 15) in a sheave (figure 3, item 15) arrangement. The arresting cables stretched across the aft flight deck for the aircraft's arresting hook to engage. When an aircraft engaged the arresting cable reeved to the engine and pulled it out, hydraulic fluid was expelled into the accumulator through the control valve which throttled the hydraulic fluid. The aircraft came to a rest at the end of the runout needed, approximately 100 feet, to transform its kinetic energy into work done against the throttling. The control valve then permitted reversing the hydraulic oil flow to restore the whole system to its battery position. In the case of the earlier axial-flight deck arrangement, a barrier was erected to protect the parking area forward from aircraft missing the arresting gear cables.



- 1. DECK PENDANT
- 2. YIELDING ELEMENT OR CAM OPERATED DECK PENDANT SUPPORT
- 3. BARRIER CABLES
- 4. CONTROL CABLE
- 5. SUPPORTING PENDANT
- 6. DECK EDGE SHEAVES
- 7. YIELDING ELEMENT CONTROL SYSTEM
- 8. BARRIER STANCHION CONTROL SYSTEM
- 9. RETRIEVING CONTROL SYSTEM
- 10. CONTROL VALVE
- 11. ACCUMULATOR
- 12. AIR FLASK
- 13. MARK 5 ARRESTING ENGINE
- 14. FAIRLEAD SHEAVE
- 15. PURCHASE CABLE
- 16. MARK 5 BARRIER STANCHION

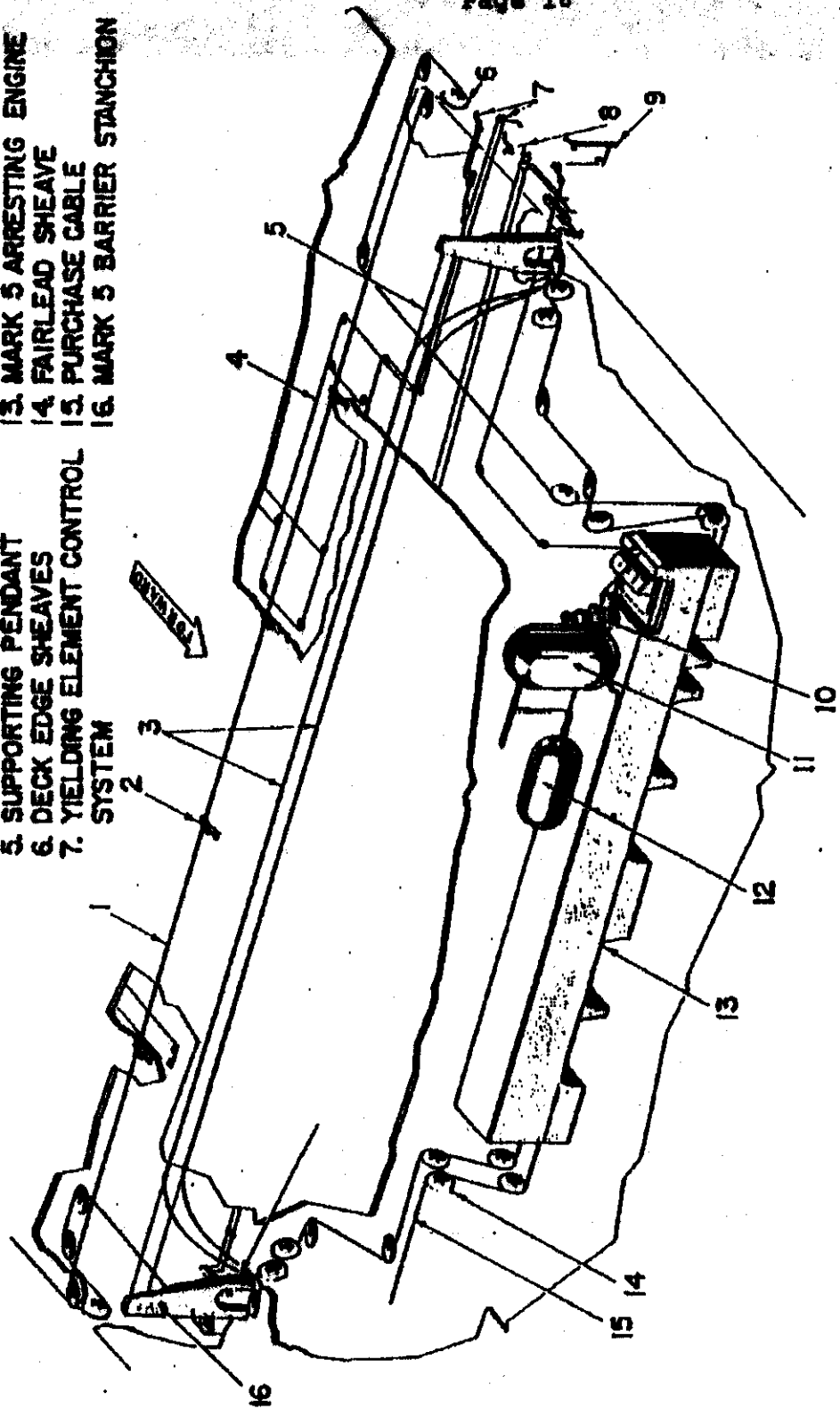


Figure 3 - Mark 5 Arresting Gear

DESCRIPTION OF OTHER COMPARTMENTS

Many compartments on board *Hornet* are not unique to aircraft carriers and are similar in function and outfitting to any other Naval ship. The Pilot House is shown in HAER photograph nos. WA-34-35 and WA-34-36 showing the helm, engine order telegraph, speed indicator, aft gyro repeater, forward gyro repeater, radar scope and various communication circuits. The secondary conning station is shown in HAER photograph nos. WA-34-52 and WA-34-53 showing and engine order telegraph, helm, radar and gyro repeaters. The Combat Information Center is shown in HAER photograph no. WA-34-49 showing various types of radar units, plot tables and plotting boards. Damage Control Central and the Damage Control Plotting Room is shown in HAER photograph nos. WA-34-105 and WA-34-106 showing plotting boards, flooding and fire alarm systems, draft gauge, director switches and receiver switches.

As with all Naval ships berthing compartments, messing facilities and heads are separated by rank. The function and outfitting of berthing compartments is typical of other Naval ships, however, the size or numbers of the spaces are larger due to the larger crew. The Commanding Officer's cabin is shown in HAER photograph no. WA-34-48. The Executive Officer's stateroom is shown in HAER photograph no. WA-34-78. A senior officers' stateroom is shown in HAER photograph no. WA-34-40. Junior officers' staterooms are shown in HAER photograph nos. WA-34-57 and WA-34-58 showing a typical arrangement. A typical Chief Petty Officers' berthing space is shown in HAER photograph no. WA-34-69. A typical enlisted crews' berthing space is shown in HAER photograph no. WA-34-51. Heads are shown in HAER photograph nos. WA-34-50, 66, 67 and 68. A Chief Petty Officers' lounge is shown in HAER photograph no. WA-34-71 showing a coffee mess, ice cream cooler, ice cream machine and scuttlebutt. A crews' mess deck is shown in HAER photograph no. WA-34-87 showing a coffee maker, ice cream freezer, tables and scuttlebutts. The Officers' galley is shown in HAER photograph no. WA-34-79 showing a reach-in refrigerator, griddles, serving line, coffee maker, milk machine and counter tops. Chief Petty Officers' galley is shown in HAER photograph no. WA-34-70 showing a serving line, steam kettles, griddles, cutting table, dishwasher, mixing table and reach-in refrigerator. A crews galley is shown in HAER photograph nos. WA-34-84, 85, 86 and 87 showing griddles, ovens, counter tops, mixing machines, deep sinks, steam kettles, a coffee maker, an ice cream freezer, table and scuttlebutts. While a flight suit mess and galley is unique to an aircraft carrier, the outfitting is similar to that for other personnel as shown in HAER photograph nos. WA-34-54 and WA-34-55.

Other compartments similar in function and outfitting to almost all Naval ships of the time include the following. The Bake Shop is shown in HAER photograph no. WA-34-89 showing a kneading table, ovens, dough mixer, bread racks and rising cabinets. The ship's Laundry space is shown in HAER photograph nos. WA-34-97 and WA-34-98 showing washing machines, water extractors and dryers. The Tailor Shop is shown in HAER photograph no. WA-34-99 showing two steam presses. The Dental Office is shown in HAER photograph no. WA-34-88 showing a dental chair and components. The Barber Shop is shown in HAER photograph no. WA-34-72. The Ship's Store is shown in HAER photograph no. WA-34-77 showing counters and shelving.

Other compartments (also not unique to aircraft carriers) are similar in function and outfitting and would also be found in other larger ships such as battleships, cruisers and large amphibious ships. The Medical Department is shown in HAER photograph nos. WA-34-75 and WA-34-76 showing a portable X-Ray unit, operating table, cabinets, lockers, X-Ray viewing screen, lights and emergency lighting. The Print Shop is shown in HAER photograph no. WA-34-94 showing printing presses. The Brig is shown in HAER photograph nos. WA-34-95 and WA-34-96. The Cobbler Shop is shown in HAER photograph no. WA-34-100 showing a finishing machine, stitching machine, sewing machine, storage shelves, a work bench and a shoe tree stand.

There are some graffiti paintings on board *Hornet* that were all likely applied in the late 1960's. Peanuts characters painted on arresting gear engines are shown in HAER photograph no. WA-34-42, 44, 45 and 46 showing Snoopy making an approach to land on the carrier, Snoopy making an arrested landing, a portrait of Lucy and Charlie Brown and a portrait of Linus. A painting is applied to the bulkhead of compartment C-0202-AL titled "Tonkin Gulf Yacht Club", shown in HAER photograph no. WA-34-47. A cat was painted on the starboard catapult, as shown in HAER photograph no. WA-34-82. Roadrunner and Apollo were painted on the bulkhead of No. 3 Fireroom, as shown in HAER photograph no. WA-34-111. A plant and cup rack painting of Snuffy Smith in the No. 1 Auxiliary Machinery Room is shown in HAER photograph no. WA-34-114. A painting titled "Hell's Half Acre" was applied to the hatch leading to the No. 2 Fireroom, as shown in HAER photograph no. WA-34-117.

#### CURRENT CONDITION AND APPEARANCE OF HORNET

At the time of *Hornet's* decommissioning in 1970, the ship was retained at the Navy Inactive Ship Maintenance Facility, Bremerton, WA as a "mobilization" asset, preserved for potential future reactivation. The ship's 1970 inactivation consisted of

extensive preservation work, including underwater hull preservation, blanking of hull penetrations below the water line, cleaning and preservation of tanks and bilges, draining of boilers and piping systems, application of preservative compounds on machinery and equipment, sealing weather-deck doors, hatches, scuttles, vent duct openings and stacks, installation of dehumidification and cathodic protection equipment, and installation of fire and flooding alarms. Some of the dehumidification machines which were no longer serviceable were left on board as shown in HAER photograph nos. WA-34-19, 20, 21, 23, 24 and 25. The dehumidification system consisted of nine zones throughout the ship, maintaining the air in the internal compartments at 40 percent relative humidity. Dehumidification huts were also installed to protect radars, gun fire control directors and the remaining gun mounts on the gallery deck as shown in HAER photograph no. WA-34-15. Due to the design of the roller doors on the port and starboard sides of the hangar deck, the hangar deck could not be provided with effective dehumidification protection and there is extensive paint exfoliation as shown in HAER photograph nos. WA-34-23 and 24. The flight deck was preserved with a protective layer of tar and the port aircraft elevator was removed and stored on the flight deck as shown in HAER photograph nos. WA-34-1, 2, 3, 4, 5, 6, 7 and 8.

Periodic external preservation was conducted while the ship was a mobilization asset, hence, the exterior hull above the waterline and the island is in fair condition with small accumulations of bird droppings. After 22 years of inactivation, extensive marine growth is attached to the underwater hull, likely to be five feet thick. The anchor windlass and steering systems have numerous hydraulic leaks. Cabling throughout the ship, particularly in the main and auxiliary machinery spaces, show evidence of advanced insulation deterioration. Lighting throughout the ship does not provide minimum levels of illumination. There are numerous area of deteriorated or missing insulation. Numerous watertight doors and hatches are warped and out of adjustment. Countermeasures washdown systems are deteriorated. Hangar deck roller doors are severely corroded.

During the *Hornet's* inactive status as a mobilization asset, equipment and parts were cannibalized to support emergent requirements of active fleet when such material was not available within the Navy supply system. As a mobilization asset, payback requisitions were provided back to the ship but not reinstalled. Subsequent to being stricken from the Naval Vessel Register, these payback requisitions were returned to the supply system and the ship was extensively stripped of equipment and material that could be used elsewhere in the Navy or at other government

agencies. As an example, a partial list of equipments removed includes:

- Radial arm drill presses.
- Forced draft blowers.
- Firemain valves.
- Draft gage manometers.
- Numerous pumps and motors.
- Bridge wing chairs.
- Chart tables.
- File cabinets.
- Safes.
- Lockers.
- Battle lanterns.
- Lube oil coolers.
- Ship service turbine generator rotors and reduction gears.
- Steam strainers.
- Mark 37 gun fire control system parts.
- AN/SQS-23 sonar equipment.
- Various machine shop equipment.
- Ready room furniture.
- Miscellaneous furniture.
- Aft gyrocompass.
- Anchor windlass motor brakes.
- Portable deck and handling gear.
- All ASCAN, TACAN, ECM, LORAN C and SATNAV combat systems equipments.

The following systems are obsolescent: Electrical and interior communications equipment, electrical distribution system, "M" type boilers, combat systems communications, magazine sprinkler systems, CIC equipment, special weapons stowage areas, armory, landing force locker, fire protection systems, berthing and sanitary facilities, medical and dental departments, food service equipment and furnishings and all aviation facilities.

Items of historical value such as the ship's bell were removed and shipped to the Curator of the Navy. The ship's World War II score board is currently on display at the National Museum of Naval Aviation, Naval Air Station, Pensacola, Florida.

The ship's drawings are held in archives by Puget Sound Naval Shipyard. It is known that some good drawings of the Essex Class may be obtained from the following commercial source: The Floating Dry Dock, Kregsville, Pennsylvania, 18333, Tel: (215) 381-2001.

#### HORNET DISPOSAL EFFORTS

A 1981 study of Essex Class carrier reactivation requirements determined that *Hornet* was not suitable for potential reactivation to support A-4 aircraft with a limited modernization package, however, her existing material condition might warrant utilization in another application in support the build-up to a 600 ship Navy. However, no program was ever implemented. In October 1987, a material inspection by the President, Board of Inspection and Survey (PRESINSURV) found *Hornet* unfit for further service since all installed systems were obsolete and the ship did not meet current habitability, safety and pollution abatement requirements. In December 1988, the Carrier Programs Division (OP-55) of the Chief of Naval Operations (CNO) concurred that obsolescence had made *Hornet* and the other three remaining Essex Class CV's unfit for modernization or reactivation and recommended their disposal. *Hornet* was stricken from the Naval Vessel Register in 1989 by the Secretary of the Navy and was immediately made available for donation to a non-profit organization for use as a memorial or museum ship under Title 10 U.S.C. Section 7308. The *Hornet's* disposition status as a "Donation Hold" prevented disposal actions, such as stripping and demilitarization work, from being accomplished. The U.S.S. HORNET Historical Museum Association was the only group to pursue obtaining the *Hornet*, but was unable to secure the financial backing for the project. The U.S.S. HORNET Historical Museum Association had been formally notified by the Secretary of the Navy that they were required to provide an acceptable plan which addressed mooring of the ship and providing for its financial responsibility in order for the Navy to proceed with donating it as a memorial, in accordance with Chief of Naval Operations Instruction (OPNAVINST) 4770.5E. Extensions to the Donation Hold were granted several times at the request of the U.S.S. HORNET Historical Museum Association. The final extension for donation applications expired on January 31, 1992, two years beyond the original Donation Hold expiration date, whereupon CNO authorized disposal of *Hornet* by scrap sale.

#### NATIONAL ARCHIVES PHOTOGRAPHIC COLLECTION

The Still Photographs Branch of the National Archives in Washington, D.C. maintains an extensive collection of 14 million period photographs, including all Naval vessels. Several hundred photographs of the ex-*Hornet*, its aircraft and personnel are on file, depicting daily life and combat operations during World War II, during the 1950's and 60's, and the Apollo 11 and 12 recoveries in 1969.

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