



Jim Larsen

Pistons to Jets

*Diamond
Anniversary* **75**th *Year of
Naval
Aviation*

Volume Two of a Commemorative Collection

Pistons to Jets

Edited by Captain Rosario Rausa

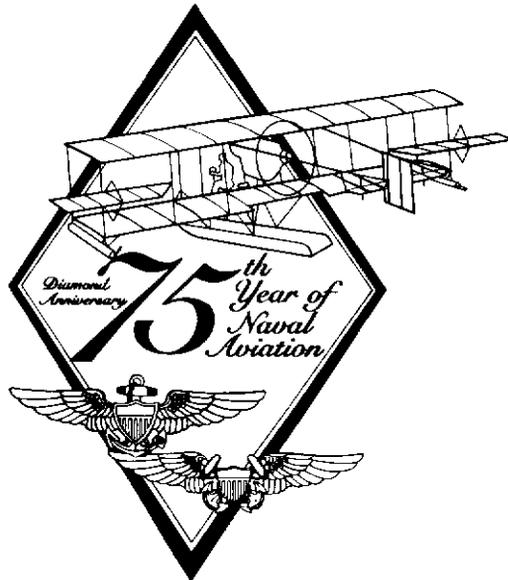
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Introduction

Engines are the hearts of airplanes. Before the age of powered flight, variations of balloons and gliders challenged the sky and scored some victories. With the introduction of power plants, aircraft became more obedient to the human beings who manipulated those engines than to the meteorological whims of the wind.

“Changes in hearts” — improvements, for the most part — enabled flying machines to go much faster, from 30 or so miles per hour to supersonic levels, in the span of a human lifetime.

Unlike mortal hearts, all of which bear the same design, aircraft power plants appeared in a vast assortment of shapes with varying capabilities through the years. Some failed to match expectations. Others exceeded them. Many performed yeoman service as advertised. All contributed to the continuously rising chart line of new technology. Common to the success of any engine, though, is the maintenance effort required to ensure that it functions properly. There isn't a Naval Aviator on the planet who doesn't owe a debt of gratitude to the mechanics. The folks with wrench in hand and a formidable combination of determination and knowledge have kept and continue to keep the motors purring in peace and war.

This monograph is dedicated to them.

Pistons



From foreground to background are a Skyraider, Panther, and Corsair. All three were used extensively during the Korean War.

to Jets

Some call it the most exciting sound of all — the roaring rush of burning wind from a jet engine. Up close it can crackle the eardrums. From a distance it still conveys power and might, like a sustained prelude to a thunderclap. The sound is dynamic, a living monument to man's continuing quest for new technological horizons.

It was not a common sound in U.S. Naval Aviation during WW II, but minds were laboring in various camps that would soon make it so.

In 1940, an Italian named Campini remained aloft for 10 minutes in a jet-propelled aircraft. In 1941, Great Britain plunged into development of jet planes. Toward war's end, Germany's twin-turbine ME-262 fighter was effective against Allied Forces. In fact, German expertise was to play a pivotal role in the development of jet aircraft after the conflict.

Though there were growing pains, the advent of turbine power paved the way for unprecedented performance in the aviation world.

Ed Heinemann, who the naval community would ultimately recognize as "Mr. Attack Aviation," was a pioneer aircraft designer. He played a key role in American aeronautical achievements, and designed both propeller and jet-powered aircraft. He and his Douglas Aircraft production team turned out the A-26 *Invader*, the SBD *Dauntless* and many others. In 1944, they conceived what was to become the A-1 *Skyraider*.

"We had the Wright R-3350 engine in the A-1," recalled Heinemann. "It produced 2,500 horsepower. Naturally, we wanted as much power as we could get but feared the dangers of too much torque. Excess twisting force of the engine would create difficulties. We tried counterrotating propellers on the TB2D but ran into problems. In the A2D *Skyshark*, a turbine drove counter-rotating props and torque was equalized, but reduction gear problems eventually doomed that aircraft. Ultimately, we went to pure jets. It was that barrier of too much torque that turned our concentration to jets in order to achieve



The FM-2 Wildcat was a ruggedly constructed, well-armed fighter.

greater performance."

Declared Heinemann, "I believe that if jets came first we might never have needed piston engines for aircraft. For the most part, jets do a much better job."

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In the Naval Aviation world, the time period from 1945 to 1952 was characterized by the proliferation of jet-propelled aircraft amidst the continuing employment of piston-powered machines. Following are highlights from that period, gleaned mostly from the pages of *Naval Aviation News*. They have been selected to depict only the nature of the Navy's transition to jets, not the details of it. There is minimum mention of prop aircraft, a fact certainly not intended to denigrate those machines that got us where we are.

I. Beginnings

The President of the United States proclaimed the end of the war in Europe on May 8, 1945, VE Day; in Japan, September 2, VJ Day. On September 10,

USS *Midway* (CVB-41), first of the 45,000-ton class aircraft carriers, was commissioned at Newport News, Va. In October, with an eye toward the heavens, the Bureau of Aeronautics (BuAer) established a committee to evaluate the feasibility of space rocketry.

Still, a period had begun which would be characterized by the problems of demobilization, organizational readjustment, and an uneasy international situation not in itself related to the outcome of the war. Demobilization was rapid. Ships were retired to a mothball fleet. Aircraft were placed in storage. Shore stations at home and abroad were deactivated. By the end of 1946, manpower dropped to a mere one-quarter of the WW II peak.

There was a clamoring for resources by the services and considerable disarray as a result. The value of carriers was questioned.

Despite these impediments, jet-propelled planes were considered the key to aviation's future and companies like Douglas Aircraft, Grumman, North American and McDonnell were creating new designs.

In the final days of WW II, government technicians made a concerted effort to gather up German and Japanese aeronautical reports before the enemy could destroy them. Much of this information was routed to the Office of Naval Intelligence in Washington and ultimately to BuAer for dissemination of all aeronautical research information. Thus, a data base of jet technology was established.

One set of documents detailed a German fighter designed to operate at 1,250 mph, 60,000 feet above the earth. The Siebel Aircraft Company in Halle had completed plans for a flight test model of what it designated the 8-346 supersonic plane. It would have been flown to an altitude of 33,000 feet by a mother ship, started upward vertically and released, firing off its two tail-mounted jets.

The Germans hoped to derive valuable scientific data on aerodynamic forces affecting aircraft at faster-than-sound speeds.

The 8-346's wing span was 30 feet. The wings were swept back 45 degrees. The pilot was to lie prone in the nose, permitting him to withstand up to 14 G's. The aircraft would land on skids at about 145 mph. Its pressurized chemically-heated cabin would be jettisonable, automatically or manually by the pilot.

Problems in jet plane development included airframe design for high-speed flight and achieving sufficient power

control for takeoffs and landings and other low-speed flight regimes. Jets required longer takeoff rolls and consumed fuel at a fearful rate, prompting concern by planners for operating range capabilities. Some elements advocated development of turboprop planes that combined jet engines and propellers. Turboprops remain popular today in larger planes but, for the most part, pure jets became the norm for tactical aircraft.

The Navy's first all-jet powered airplane, the design for which was developed in 1943, was the McDonnell FD-1 *Phantom*, a straight-wing carrier fighter powered by a pair of Westinghouse gas turbines. It weighed less than 10,000 pounds with a full combat load and could travel 500 mph. Range was 1,000 miles. It flew for the first time on January 26, 1945.

The first jet-propelled aircraft in the world was the Heinkel HE-178. It initially flew in Germany in August 1939. The first jet flight in England took place on May 15, 1941, when a Gloster-Whittle E-28 took to the air.

On October 1, 1942, the Bell XP-59, powered by a pair of General Electric I-16 engines, made the first jet-propelled flight by an aircraft in the U.S. The pilot was Naval Aviator No. 4967, Robert M. Stanley. He was a civilian at the time and chief test pilot for Bell Aircraft.

The Navy established its baseline for jet operations as April 21, 1943, the day

Captain Frederick M. Trapnell made the first jet flight in the Bell XP-59A *Airacomet*, at Muroc, Calif.

In 1945, Great Britain's Gloster *Meteor* held the world speed record of 606 mph. Designers were confident that bursting through the sound barrier was only a matter of time.

Grampaw Pettibone, who railed against brain deficiencies (inherent in some pilots) in a popular new *Naval Aviation News* safety column, described the case of an FR-1 *Fireball* landing:

"On November 6, 1945, while in the groove for a carrier landing, the pilot of an FR-1 (a fighter built by the Ryan Aeronautical Company with both a prop and jet engine) noticed a rapid decrease in rpm and manifold pressure in his reciprocating engine. Realizing he had little time to find and correct the trouble, he quickly started his jet engine. With the jet engine developing full power, he managed to complete the landing but, due to a faster approach speed than usual, the planner overshot slightly, engaging the last wire and the #2 barrier. Congratulations to the pilot for his quick thinking and skillful handling of an unusual emergency that surely prevented a much more serious accident." Added Gramps. "Another noteworthy fact about this incident is that, according to available information, it was the first jet-powered landing aboard a carrier."

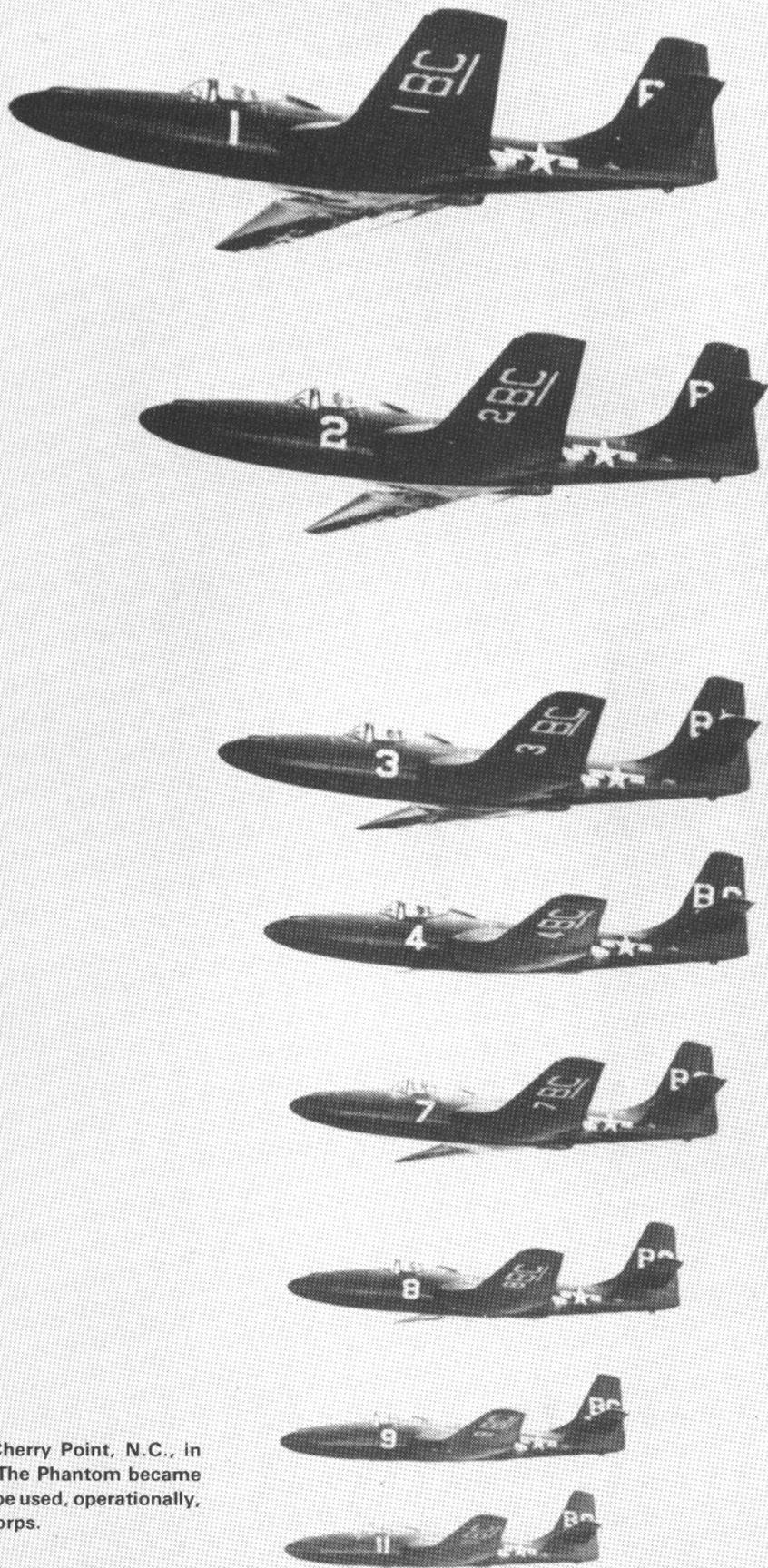
A British *Vampire* jet took off and landed on HMS *Ocean* on December 4, 1945, about a month after the *Fireball* event. It marked the first carrier landing and takeoff by a purely jet-propelled aircraft.

In March 1946, the *Fireball* joined elements of Air Group 74 aboard USS *Midway* off the coast of Labrador during Operation *Frostbite*. The FR-1 operated in frigid weather along with other wing aircraft including the relatively new Grumman F8F *Bearcat* and the HNS-1 helicopter by Sikorsky.

On July 21, 1946, Navy Lieutenant Commander James Davidson made five successful touch and goes aboard CVB *Franklin D. Roosevelt* in an FD-1 *Phantom*, signaling the first time an all-jet plane made a "fly-off" from a U.S. carrier.

An F8F lands at MCAS Quantico, Va. The Bearcat arrived late for WW II, but was a venerable part of the aircraft inventory in the late 1940s.





FH-1s from MCAS Cherry Point, N.C., in stair-step formation. The Phantom became the first jet fighters to be used, operationally, by the U.S. Marine Corps.



A VU-1 JD-1 photo mapping aircraft passes over Hawaii in November 1958.

Said Davidson, "Acceleration and deceleration were slightly less than in a conventional-type aircraft but there was no torque trouble, less noise, and speed and altitude were easy to maintain."

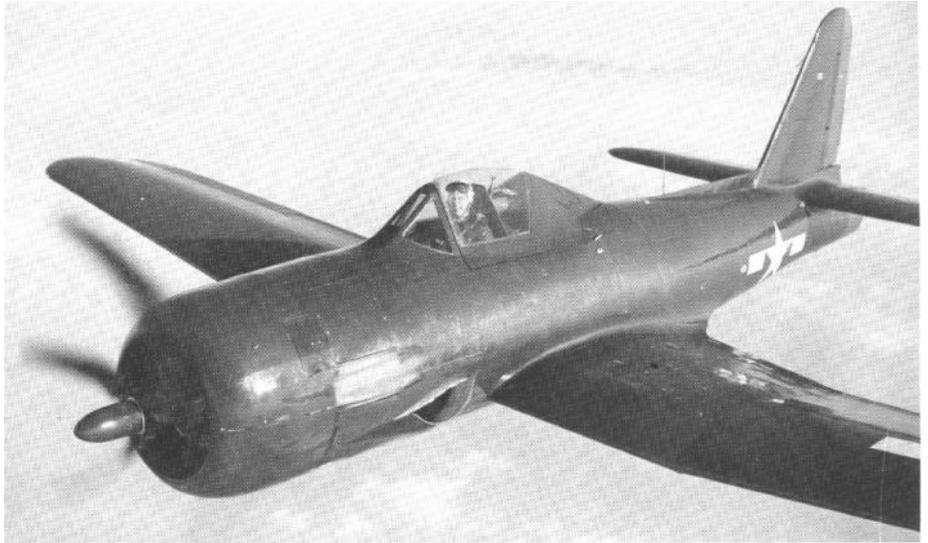
The Naval Research Lab was active utilizing the once-feared German V-2 rocket for experiments. Marking an incipient stage of space study, miniature laboratory type equipment was installed in the nose of the rocket and fired by Army ordnance technicians at White Sands, N.M.

Flying in 1946 were a pair of new jet fighters, the Vought XF6U-1 and North American's XFJ-1, the latter destined for great success in the air. The Naval Air Test Center (NATC), Patuxent River, Md., was the scene for much of the experimental work. Key problems with the new planes involved use of drag devices to enhance takeoff and landing characteristics. There was concern for the jet engine's slow response to throttle adjustments compared to its piston-engine counterparts.

Procedures called for the pilot to "take the cut" aboard the carrier just as in propeller planes. The engine's "spool up" time had to be taken into account when boltering or waving off. Eventually, jet pilots would be taught to fly their aircraft all the way "into the wires" with power on.

Tricycle landing gear on the jets presented some carrier operating problems. The prop types invariably featured conventional tail-sitting wheel arrangements. Deck crews had to readjust their thinking. Barrier arrangements had to be revised due to the tendency of the jets to slam down on the nose wheel after the hook had engaged the wire. All hands knew, however, that the jets were here to stay. The reciprocals would not disappear but they were destined to share flight lines and flight decks with the streamlined newcomers.

The first jet-powered patrol plane, the P4M-1 *Mercator*, flew in September 1946. It featured two nacelles, each housing a radial and a jet engine. Only 19 production models reached the fleet, beginning four years later. The aircraft weighed more than 83,000 pounds and had a top speed of 410 mph.



The Ryan XFR-4 Fireball had a reciprocating as well as a jet engine.

On October 30, 1946, Lieutenant Junior Grade A. J. Furtek became a jet-age hero. Assigned to the Naval Air Material Center to test ejection systems, he went aloft over NAS Lakehurst, N.J., in a JD-1 and was ejected out of the plane by two 600-grain powder charges by way of the British-designed Martin-Baker seat. The JD-1's altitude was 5,000 feet; speed, 250 mph. A fastener to the main chute which was attached to the seat fouled. Furtek fell 23 seconds to 1,500 feet but managed to detach himself from the seat and pull the rip cord of his own backup chute. Furtek was undismayed and the basic concept of the emergency egress system was considered valid. Ejectable cockpit capsules were also being considered, a technique used today on the USAF B-1 bomber and in NASA's space shuttles. However, ejection seats proved to be the most reliable and efficient means of escape from high-speed aircraft.

In a bit of understatement, an aviator observer in 1946 noted that "at very high speeds, the air flow over the wing and tail of an airplane begins to exhibit very peculiar characteristics." He was referring to the effects of compressibility and similar factors about which comparatively little was known.

In many ways, airplanes were entering a dimension of the unknown. Much had to be learned. So, while jets flew in the subsonic regime, experimental efforts

focused on the transonic and supersonic barriers. An example of these efforts was the D-558 *Skystreak*. The Douglas Company's Ed Heinemann and his design team combined with a small cadre of courageous test pilots and made landmark achievements operating from the desert runways of Muroc (later Edwards AFB), Calif. A straight-wing, red-colored experimental bird, the *Skystreak* weighed just under 10,000 pounds and flew for the first time in the spring of 1946. It continued a valuable series of flights that vastly expanded man's knowledge of high-speed, high-altitude aerodynamics. The aircraft was powered by a General Electric TG-180 turbojet which produced 4,000 pounds of thrust.

Meanwhile, the Bell Aircraft XS-1, developed for the Army Air Force, was contributing to the knowledge bank. Interestingly, some of its initial flights were made by Chalmers H. Goodlin, a former Navy pilot. The XS-1 was driven by four 6000-C4 rocket motors developed by the Navy and Reaction Motors located at the Naval Ammunition Depot in Dover, N.J. The engines burned ethyl alcohol and liquid oxygen at a rate which, at top speed, would consume four tons of fuel in two and a half minutes. Total thrust was 6,000 pounds. It was dropped from a B-29 mothership and achieved speeds of about 550 mph in early tests.

On November 11, 1946, Lieutenant Colonel Marion E. Carl, a legendary U.S.



The A2D Skyshark was a turboprop, attack aircraft. Reduction gear problems plagued the aircraft and, as a result, only seven were built.

Marine Corps pilot, flew a jet-propelled P-80A, making two catapult launches, four free takeoffs and five arrested landings aboard USS *Franklin D. Roosevelt*. These operations were part of carrier suitability tests that had begun in June 1945 with the delivery of P-80As to NAS Patuxent River, Md., site of flight test and evaluation work.

Carrier catapults were widely used during WW II for props and accommodated the new machines well. Catapults were considered the best answer to the slow acceleration problems of jet-powered aircraft. Also, in order for the jets to get aboard properly, landing signal officers were trained to issue the "cut" signal sooner in the groove because of some jets' floating tendency after the cut. Wave-offs had to be given quicker also to ensure adequate clearance altitude by the time the plane reached the ship.

The familiar warning emblazoned on flight deck bulkheads, BEWARE OF PROPELLERS, was accompanied by the caution, BEWARE OF JET BLAST.

Some radical techniques were offered to alleviate flight deck handling problems. One system would elevate the hazardous jet blast from the tail section over the heads of deck handlers. It employed a jointed nose wheel which could be "broken" into an elbow after the plane had been removed from the arresting gear. Thus, the aircraft's nose would drop into a kneeling position, not unlike a bow to the audience. The tail

would be raised enabling the plane to use its jet for taxiing without endangering personnel with blast effect. Another method used a deflector on the jet nozzle, forcing the blast upward away from scrambling deck crews.

The angled deck was years away. Existing barrier arrestment systems were designed to "catch" the big nosed props. Engineers developed a changeable system, one that could be modified to ensnare the main landing wheels of a jet but which could also be quickly shifted to act upon the engine of a conventional plane.

Since jets consumed much greater amounts of fuel, faster fueling methods had to be developed to keep turnaround times to a minimum. The Navy used regular aviation gasoline for its prop and jet turbines at the time. That would soon change and jet fuel would eventually require separate stowage cells aboard the carrier.

Jets stood lower to the ground, so rearming techniques had to be modified. Also, the limited endurance of jet planes demanded a more expeditious means of recovering and respotting them. Faster and more efficient tow tractors were needed to improve flight deck movements.

Maintenance of jet turbines and piston engines differed radically. Piston types required periodic checks, constant minor repair and parts replacement. However, the reciprocating engine had an advantage. It would operate for several hundred hours before it faced complete overhaul.

Jet power plants are much simpler and

contain far fewer parts, facts which pleased the mechanics. Overall engine life at the time, however, was much shorter than that of the piston engines. Complete overhaul or engine change was needed after comparatively short periods of running time. On the plus side, such engine changes took much less time than with reciprocating engines.

There were no jet trainers in 1947 but dual-seated types were high on BuAer's consideration list. Plans called for pilots to matriculate in the prop pipeline before moving up to jets.

McDonnell's XF2D-1 *Banshee*, later designated the F2H, flew for the first time on January 11, 1947. It resembled its *Phantom* predecessor but was powered by a pair of 24C Westinghouse turbojet engines, which provided 6,000 pounds of thrust, nearly twice as much as the *Phantom*.

Successor to the *Skystreak* was the D-558-II *Skyrocket*. Painted white for better visibility, it was designed to exceed the 680-mph speed of the earlier experimental plane. The *Skyrocket* was also powered by a Westinghouse 24C turbojet and a liquid rocket system manufactured by Reaction Motors, Inc. Fuel and landing gear were located in the fuselage instead of the wings as in the *Skystreak*. It featured swept-back wings and a jettisonable nose as a means of high-speed pilot escape. It had a photographic apparatus for recording flight instrument readings on motion picture film. Air pressure measurements were recorded automatically at 400 points on the wing and tail. Control forces and stresses in the structure were measured by more than 900 strain gages and oscillographs. The rocket motor had four cylinders that could be fired singly or together.

Another landmark fighter was the XFJ-1 *Fury*, by North American, which had flown for the first time on November 27, 1946. The next year a prototype version of the *Fury* reached Mach 0.87, a record for U.S. fighters that lasted awhile.

Commander E. P. Aurand, C.O. of VF-5A, set a speed record in an FJ-1 on February 29, 1948, when he raced 9,450 miles from NAS Seattle to Los Angeles in one hour and 58 minutes. He averaged 550 mph en route, thus

breaking by 16 minutes the previous record held by a P-80. VF-5A's X.O., Lieutenant Commander R. M. Elder, set another record by flying from Seattle to Mills Field, San Francisco, in one hour and 24 minutes.

Aurand landed his straight-wing *Fury* aboard the flight deck of USS *Boxer* on March 10, 1948. This was the first time an operational squadron landed a jet aboard a carrier. Elder also participated and, together, the jet pilots garnered 24 landings and takeoffs.

The squadron was also the first jet fighter unit to serve at sea under operational conditions. Later versions of the FJ compiled an eventful history and were flown by Marine Corps squadrons as well.

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To facilitate interim familiarization training for fighter pilots (until Navy jets became available in quantity) the Navy procured 60 Lockheed P-80s from the U.S. Air Force and designated them TO-1s. Powered by the Allison J33, the TO-1s were not equipped with arresting hooks or catapult fittings. The initial

The D-556-II Skyrocket carried jet-assisted takeoff (JATO) bottles, which were jettisoned from the aircraft after they burned out.

group consisted of single-seaters but the plane, which was later designated the T-33, soon became a tandem-place aircraft ideal for training purposes. VF-6A received 24 of the *Shooting Stars* while a number went to the Marine Corps' VMF-311.

On March 23, 1948, John Cunningham of England established an altitude record flying a modified De Havilland *Vampire* powered by a Ghost jet engine. He reached 59,492 feet during the 47-minute flight aided by cabin pressurization that kept him comfortable.

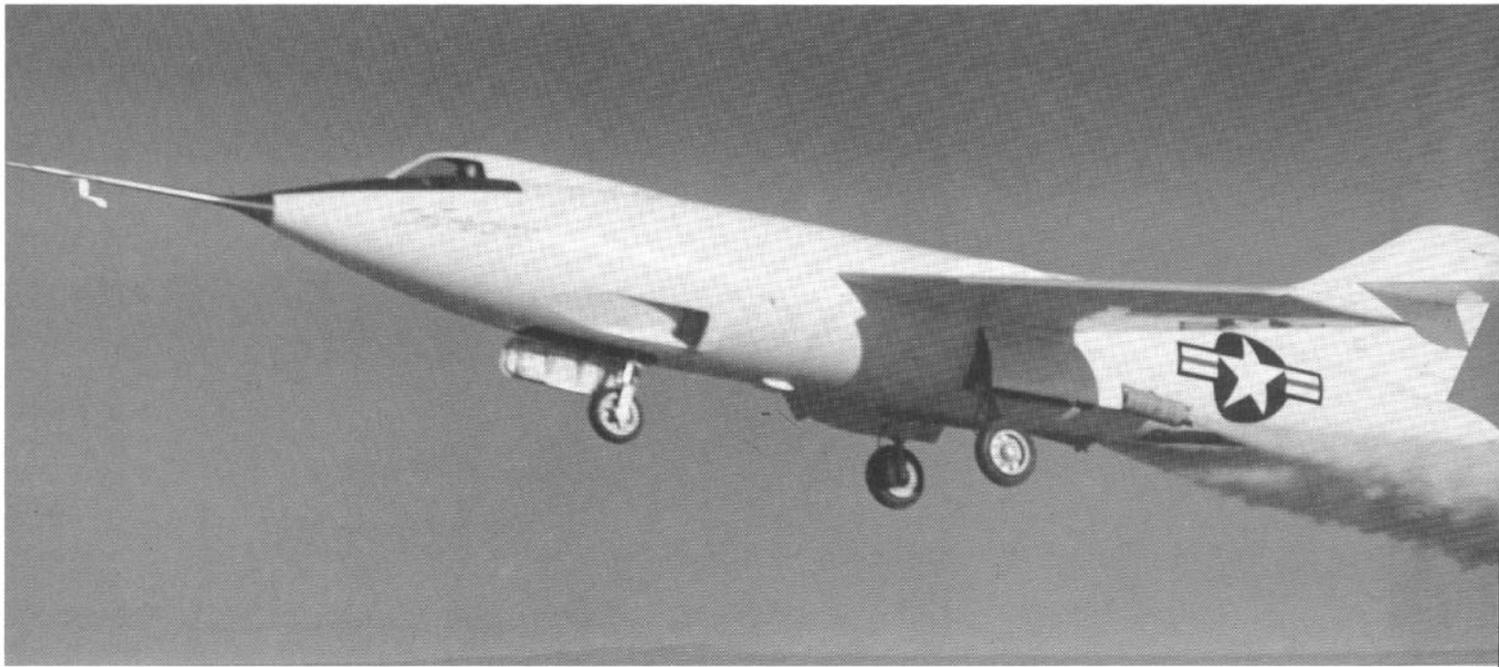
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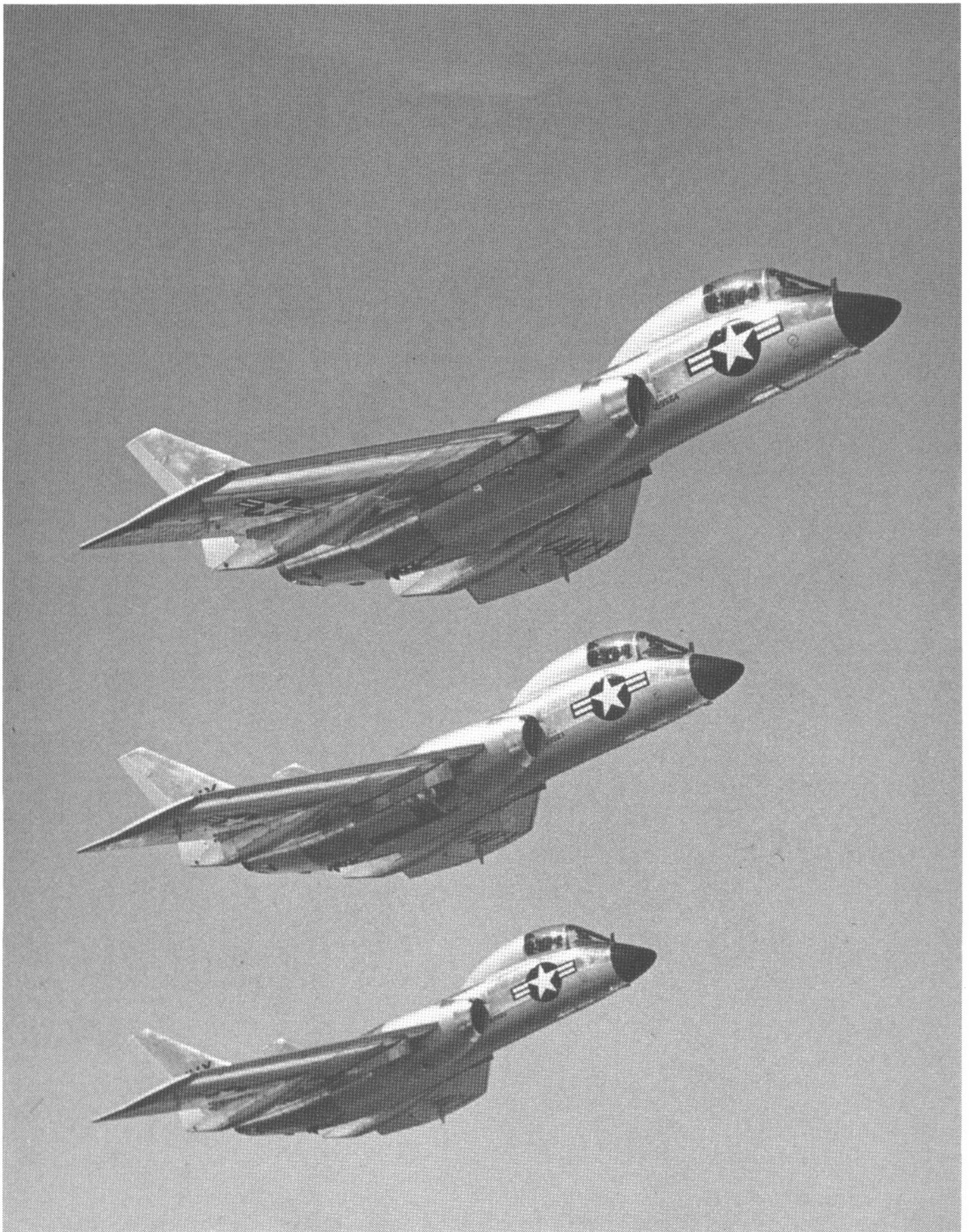
Early in the turbine age, the term "afterburner" meant a "fire built in the tail" of a jet. Chance Vought's F6U-1 *Pirate* had an afterburner system installed that provided a 30 to 50-percent increase in thrust. The afterburner system featured extension of the tailpipe into which fuel was injected and ignited. Enough unburned oxygen passed through the jet turbine and mixed with exhaust gases to permit combustion in the tailpipe. The burning took place behind the critical turbine blades where high temperatures existed without damaging moving parts. In the case of the *Pirate*, the afterburner system led to an eight-foot extension to the tailpipe.

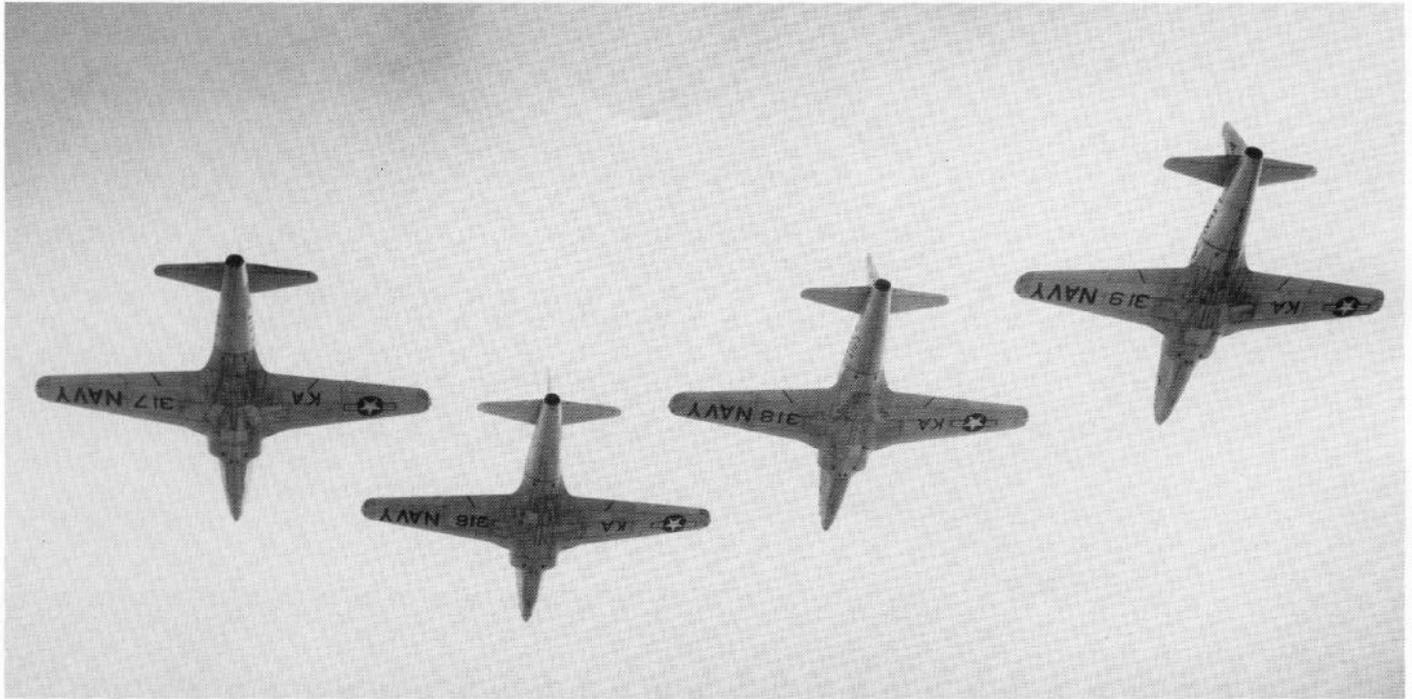


An F6U-1 Pirate from NATC Patuxent River, Md., in 1950. The Pirate had an afterburner which enhanced thrust by 30 percent.

In June 1948, the Bureau of Personnel sent dispatches to cognizant commands concerning a "return to active duty" program for flyers (and some ground officers) who left the service at the end of the war. As a result, 2,600 Naval Air Reserve officers were recalled to active duty on one-year contracts. Meanwhile, in 1948, the Navy had planned new-pilot output of about 1,000, including Navy, Marine Corps, Coast Guard and foreign students. For 1949, a training quota of 2,300 midshipmen, aviation cadets and USN pilots was planned, more than doubling the overall effort to keep pace with the growing importance of aviation for military purposes. Jets were increasing in value and, in a way, so were the men who flew them.







Shooting Stars were a training mainstay during the late 1940s and early 1950s. These are the TV-1 version.

Also in 1948, the Navy revealed 13 different types of aircraft, totaling 1,165, were to be purchased out of the \$653.5 million authorized by the Secretary of Defense from congressional appropriations. The Air Force was allowed to buy 2,100 planes. Included in the Navy's procurement package were 576 fighters — the F2H, F9F, F3D (a new night fighter), F6U and the F7U *Cutlass*, also new. Attack machines included the AD, Grumman's AF and Martin's AM *Mauler*. Eighty-two P2V *Neptunes* were ordered for patrol missions. Sixteen transports, Fairchild R4Os, Grumman JR2Fs, and some miscellaneous types were bought. Thirty-seven Sikorsky helos, HJSs and HO3Ss. were also ordered.

John Nicholas Brown, Assistant Secretary of the Navy for Air, chalked one up for the record books by becoming the first man in the secretarial level of the armed forces to fly a jet plane. Brown was

a passenger in a TF-80C *Shooting Star* during a demonstration flight out of NAS Patuxent River on July 30, 1948. Tony Levier, test pilot for Lockheed, builder of the TF-80C, was the pilot. Said Brown afterwards, "It was a wonderful experience. After we became airborne and had accelerated to cruising speed, all the regular sense of mechanical power, of which you are conscious in conventional aircraft, seemed to dissolve. You got a feeling of 'disembodied power.' The lack of vibration and lack of noise gave a sensation of pure speed."

During the International Air Exposition at New York's Idlewild airport in the summer of 1948, a trio of flag officers demonstrated that veteran pilots could handle jets as easily as propeller planes. Admirals D. V. Gallery, Apollo Soucek and E. A. Cruize together buzzed the field in FH-1 *Phantoms*, to the delight of 750,000 onlookers.

In one of the first of such tragic mishaps, a civilian mechanic at Muroc Air Base in California was killed when he walked in front of the air intake of an F-86 jet aircraft and was sucked in by the vacuuming air. The fighter's J35 engine was operating at military power at the time. That happened in 1946. Extensive tests established by BuAer began in 1948

at Patuxent River utilizing an FJ-1 to determine safe distances from the dangerous intakes of jet planes. This hazardous characteristic thus became one of the most critical concerns in jet aircraft operations, especially aboard crowded aircraft carrier flight decks.

The press got a good first look at Chance Vought's F7U-1 *Cutlass* at NATC Patuxent River in the fall of 1948. The swept-wing, tailless fighter flew for the first time on September 29. It had a maximum speed of about 680 mph.

The D-558-II *Skyrocket* experimental aircraft made numerous flights using only its primary jet engine before its rocket engine was installed and both power plants were called into operation on a single sortie. The needle-nosed speedster launched from the Muroc test base with both engines burning and became airborne after 2,400 feet of travel down the sandy runway. The rocket engine fuel was soon depleted but the jet engine kept the plane aloft for another 19 minutes. Douglas test pilot Gene May, who flew both the *Skyrocket* and its predecessor, the *Skystreak*, said, "The *Skyrocket* is a flight machine refined to the nth degree. It's extremely stable, yet as sensitive and light as an arrow. I thought the *Skystreak* was a dream plane but the rocket's flying qualities are without parallel."

◀ The F7U Cutlass had a wing span of 39 feet, 8 inches and could fly more than 650 mph.

A little competition is good for the soul. The question arose: Which is the best performing airplane, the jet-driven FJ-1 or the time-tested *Bearcat*. Cdr. Aurand, of VF-51 (formerly VF-5A), was not about to concede the capabilities of his squadron's *Furies* to anyone. As a result, *Bearcats* from VFs 113 and 53 squared off with Aurand's FJs and conducted five tests, the results of which follow.

First test: Two FJs and two F8Fs participated in a climb test from a standing start. The F8Fs were to use water injection but, due to malfunctioning, could only do so for a few minutes after takeoff. The best of the two *Bearcats* beat the two best FJs to 15,000 feet by more than a minute.

Second test: A zoom climb test was conducted with the two plane types. Both stabilized speed at full power at 1,000 feet. On signal, they commenced a climb. The FJ beat the *Bearcat* to 10,000 feet by 13 seconds. The F8F stalled trying to catch up with the jet going on to 15,000 feet.

Third test: Two weeks later, VF-51 pitted a *Fury* against a *Bearcat* at NAS San Diego to race to 25,000 feet above El Toro, 63 miles away. The FJ-1 arrived a minute and 40 seconds before the propeller plane.

Fourth test: This one simulated catapult launching climb performance. At 500 feet in flight with gear and flaps down, a climb was started on signal. The timing was stopped accidentally when the stop clock in the F8F became inoperative. The test was inconclusive but VF-51 said it felt the jet would have won this one, too.

Fifth test: A simultaneous takeoff was made. The *Bearcat* gained about 5,000 feet while the *Fury* was still on the ground and therefore could make a gunnery run on the jet immediately, if desired. In the test, the F8F got airborne and immediately pulled up to make the first pass. On the second pass, it fell behind the FJ and in the final race to 10,000 feet the FJ won by seven seconds and further increased its lead 15 seconds in climbing to 15,000 feet.

VF-51 pointed out that the *Fury* was being tested against the best characteristics of the F8F, i.e., rate of climb at low altitude. It contended the FJ-1 was far superior in other respects.

A pair of VMF-122 FH-1s took on fuel at Guantanamo Bay, Cuba, and were en route to NAS Roosevelt Roads, P.R., when their engines acted up and quit

almost simultaneously at 20,000 feet. The wingman, Master Sergeant Lytton Blass, managed to glide 60 miles before he discovered a soft beach and made a wheels-up landing on the sand.

First Lieutenant Shirley W. Reese, in the lead *Phantom*, descended along a 20-mile course and made a wheels-down, dead-stick landing on a dirt strip at La Romana, Dominican Republic. Power plant failures in both cases were caused by excessive water in the gasoline, the guilty party being the refueling truck at Guantanamo. Lt. Reese's bird flew again after his FH-1's fuel system was overhauled. Blass' *Phantom* got back into the air thanks to jet assisted takeoff (JATO) and some innovative maintenance work.

The Marines and Dominican Republic personnel lacked equipment to jack up Blass' *Phantom* so they dug holes in the sand under it, permitting the wheels to be lowered to a taxiing position. Then they cleared a short area from the holes to level ground, making it possible to pull the plane off its belly.

The *Phantom's* fuel system had to be overhauled and the inboard flaps replaced. The terrain was too soft for a normal takeoff. Two JATO units, weighing 200 pounds each and modified slightly to fit onto the fuselage, were shipped in. The center of gravity was necessarily moved to the rear, a special concern since the nose compartment was mostly empty.

Blass started up and began the takeoff



roll with JATO operating perfectly. He had difficulty keeping the nose down and the main gear left the ground after 100 feet of travel while the tail skid continued to drag on the sand. Nevertheless, after 320 feet and 12 seconds, the FH-1 left the ground. Blass jettisoned the JATO bottles and flew on to Ciudad Trujillo, D.R., for refueling.

The cause of the forced landings was not nearly so puzzling to the Dominicans as the takeoffs. One native said that "the plane could not remain airborne because they had lost their propellers."

On August 9, 1949, in the skies over Walterboro, S.C., Lieutenant J. L. "Pappy" Fruin made aviation history. The



An FJ Fury fires an air-to-ground Bullpup missile in 1961.

An F9F Panther is waved off USS Essex in July 1951.

VF-171 pilot became the first man in the U.S. to make an emergency ejection to escape a stricken airplane. He "punched out" while traveling at the fastest speed at which an ejection, experimental or real emergency type, had been made by any known living man. (During the war, German jet pilots had reportedly ejected from aircraft. Also, a British test pilot had ejected from a crippled machine some time before Fruin). Pappy was at 39,000 feet in an overcast en route to Cecil field, Fla. His F2H experienced icing difficulties and the *Banshee* fell off into a graveyard spiral.

His starboard engine had quit between 20,000 and 30,000 feet. As he recalled, his airspeed needle was indicating 40 knots above the plane's Mach needle. It was calculated that he was traveling at 600 mph. He felt severe buffeting and all other instruments were erratic. He jettisoned the canopy, grasped the two rubber handles, and yanked the curtain down over his face. Despite the speed, he did not black out when pitched into the airstream although his oxygen mask, helmet and shoes were blown off, and his Mae West became inflated, making it difficult to reach his parachute release ring. He opened his lap belt and kicked away from the seat with minimum difficulty. He gyrated somewhat during the free fall phase but, by placing his hand on his chest and compressing the

life jacket, could see the red parachute handle and he pulled the rip cord. He believed he was at 1,000 feet of altitude at that time. Pappy landed in a sitting position in salt water about 30 feet from swamp land. He began swimming toward shore but was slowed by a broken leg and other fractures. Fortunately, local citizens came to his aid and got him to a hospital. The aircraft plunged into deep water and was never located.

Fruin's ejection eclipsed an experimental ejection by the Air Force from an F-80 in level flight at 555 mph over San Francisco Bay.

San Diego-based Air Group Five was perhaps typical of similar units which flew both jets and props. By 1950, its *Bearcats* were being relieved by Grumman F9F *Panthers*. The switch to the "blow torch special," as the jets were called in some quarters, inevitably prompted comparisons. VF-111's Lieutenant Commander U. L. Fretwell said about the *Panther* his unit flew after shedding F8Fs, "The greatest difference I noticed was the lack of rapid acceleration when adding full throttle on takeoff and the touchy aileron boost control. The *Bearcat* could get off the ground in mere hundreds of feet and climb, seemingly, straight up. Not so the *Panthers*."

Lieutenant Junior Grade Carl A. Dalland noted that after being used to hearing the roar of a "conventional" engine, the quietness of the jet cockpit was astonishing. "Ordinarily, after a flight in a propeller-driven plane, the pilot comes down with his ears ringing. But in



the jets, all the noise shoots out the tailpipe. The pilot hardly hears a sound.”

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The second Navy pilot to use his emergency ejection seat to bail out of a stricken plane was Lieutenant Hugh J. Tate of VF-171, the same squadron which claimed the number one man to make such a bailout, Lt. Pappy Fruin. In May 1950, Tate ejected from his F2H near Jacksonville. Onlookers saw explosions as the *Banshee* seemed to come apart in the air while performing snap rolls. The aircraft landed on a highway near a beach. Tate had trouble with G forces before escaping but got a good chute and descended safely. He suffered only a bruise under his right eye when wind force tore the oxygen mask from his face.

Five days later, on May 24, Lieutenant Alden M. Pierpoint of VF-11, became the third flyer to eject when his F9F-2 flamed out at 37,000 feet over the Atlantic. Interestingly, Marine First Lieutenant L. E. Lovett of VMF-223, MCAS Cherry Point, was searching for Pierpoint when he discovered a heretofore missing wreck of an F4U near Sandy Hook, N.C. About 30 miles away, he located Pierpoint who was eventually collected by a Coast Guard helo and transported to Elizabeth City, N.C.

Korea

The Korean war erupted in the summer of 1950. Carrier aircraft went into action on July 3. USS *Valley Forge* with Air Group Five on board and HMS *Triumph*, a British flattop operating in the Yellow Sea, launched strikes on airfields, supply lines and transportation facilities in and around Pyongyang, northwest of Seoul. This signaled the first combat test for Grumman's jet-driven *Panther*. It was also the occasion for the first Navy kills in aerial combat when *Panther* pilots of VF-51, Lieutenant L. H. Plog and Ensign E. W. Brown, shot down two prop-powered Yak-9s on the first strike over Pyongyang.

In comparison to the forces engaged in WW II, Korea was a small war. No more than four large carriers were in action at one time. Yet in the three years of war, Navy and Marine props and jets flew 276,000 combat sorties, dropped 177,000 tons of bombs and expended 272,000 rockets. This was within 7,000 sorties of their WW II totals in all theaters and bettered the bomb tonnage by 74,000 tons and the number of rockets by 60,000. In terms of national air effort, the action sorties flown by Navy and Marine Corps aircraft rose from less than 10 percent in WW II to better than 30 percent in Korea.

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Lieutenant Carl C. Dace of VF-111 became the first American to use his ejection seat in the war when his F9F-2B was struck by antiaircraft artillery (AAA) while strafing at 400 knots, 2,000 feet over the ground. He was rescued at sea.

The first blind jet carrier landing also occurred in the early months of the fighting when Ensign Edward D. Jackson, in his VF-112 *Panther*, was speeding along at 100 feet over the terrain. He struck a cable strung across the Han River just below Seoul. The canopy was smashed and Jackson knocked unconscious for about 20 seconds. He came to in a steep climbing turn, blood from facial lacerations pouring down into his eyes impairing his vision almost 100 percent. He radioed his wingman, Ensign Dayl E. Crow, and requested attitude and direction instructions. He slowed his machine and flew 120 miles back to USS *Philippine Sea*. Crow issued commands like “left wing up,” “left rudder,” and “nose down” en route to the center.

On the downward leg, Lieutenant Junior Grade L. K. Bruestle, Air Group 11 LSO, dropped his paddles and talked Jackson down by radio. He gave him a “cut” and the plane landed right of center engaging the number five wire. A flight



An F2H-2 catapults from USS *Intrepid* in February 1955.



The F9F Panther first flew in 1947 and was the first Navy jet fighter in combat in Korea in July 1950.



A Blue Angel
F9F Cougar over
NAS Pensacola in 1959.

The A-3 Skywarrior recovers aboard USS America (CVA-66) in 1970.
The Skywarrior first appeared in the 1950s and remains in the
Navy's aircraft inventory today.



PH3 J. H. Kirchoff

surgeon jumped up to the cockpit immediately and managed to stop the flow of blood. Then, for the first time, Jackson saw the flight deck.

Seven days later, Jackson was launched on a test flight in his repaired plane and was back in action.

The Navy's flight demonstration team, the *Blue Angels*, had been flying the exhibition circuit since 1946 but it was now time for the more serious business of aerial warfare. The team flew its last exhibition at NAS Dallas on July 30, 1950, in *Panthers*, after which the pilots were sent to ComAirPac for further assignment. The tradition would be resurrected after the war but, even in the four-year span since its inception, it was estimated that 14,000,000 spectators had marveled at the skills of the *Blue Angels*.

In November, the carrier forces were tasked with cutting off Chinese Communist reinforcements from Manchuria by destroying the international bridges across the Yalu River. On November 9, during initial strikes against the bridges at Sinuiju, Soviet-built MiG-15s rose to oppose Navy planes. This assured the first encounter of Navy jets against MiGs. VF-111's C.O., Lieutenant Commander E. T. Amen, flying a *Panther*, scored one kill and became the first Navy pilot in history to shoot down a jet aircraft.

Back home in January 1951, in a milestone development, the Douglas XF4D-1 delta-wing fighter flew for the first time.

On April 2, 1951, two *Panthers* from VF-191, each loaded with four 250 and two 100-pound bombs, were catapulted from USS *Princeton* for an attack on a railroad bridge near Songjin. This marked the first Navy use of a jet fighter as a bomber.

Meanwhile, on the home front, a new dimension in jet aircraft was manifested in the innovative design of a twin-engine bomber, the A3D *Skywarrior*, by the Douglas Company. It had a gross weight of 60,000 pounds, making the *Skywarrior* the largest and heaviest ever projected for carrier use. In August 1951 another shipboard fighter, McDonnell's XF3H-1

Demon, completed its maiden hop. Test pilot Bill Bridgeman set a speed record over Muroc, Calif., when he flew the D-558-2 *Skyrocket* at 1,238 mph. That was on August 7. On the 15th, Bridgeman climbed to 79,494 feet, the highest altitude achieved by man that date.

The jets had long since proven themselves and, along with the venerable piston-powered planes, would flourish in the years ahead.

Still, Grampaw Pettibone was not reluctant to zero in on jet mishaps. Like their trusted predecessors, the jets provided fertile ground for Grampaw Pettibone's *Naval Aviation News* column. A sample of a jet accident follows:

"The pilot of an F9F made a normal start, completed his ground check and proceeded to the end of the duty runway. When his pretakeoff check of the emergency fuel system produced flameout symptoms, the pilot's wingman informed him that the *Panther* was on fire and that he ought to get out. As he stood there in wonderment, he suddenly heard the *Panther's* engine wind up. The plane weathercocked in the wind, heading down the runway.

The pilot ran to the aircraft and attempted to board it, but the access ladder was stowed and he was unable to

get back into the cockpit. He made several attempts to man the steed, but the plane was moving too fast and he had to let go.

The fighter accelerated to 150 knots. After traveling 6,000 feet, the nose wheel struck a slight rise in the runway surface and took off, climbing rapidly to 700 feet, thus becoming the first pilotless *Panther*. Sure enough, the F9F stalled and crashed into the bay off the end of the runway. Scratch one \$543,000 aircraft."

Marine ingenuity paid dividends at MCAS Cherry Point, N.C., in 1952 when cold weather formed sheaths of ice on VMF-122's F2H *Banshee*. First Lieutenant C. B. Lafayette, flight line officer, came up with a common sense idea. He had a jet taxi into a position so that its exhaust was aimed at a point between the tail and wing section of a second ice-bound plane. The heat of the exhaust whisked the ice from the aircraft without doing any damage. The process was repeated on the other side of the *Banshee*. The squadron was thus able to put an eight-plane formation flight of F2Hs in the air within a half hour of a possible scramble call.

VF-61's Lieutenant Junior Grade John



An F11F Tiger is towed off the deck elevator of USS *Forrestal* (CVA-59) in 1956.

P. Eells made history of sorts when he successfully landed his F9F-2 on USS *Franklin D. Roosevelt* with only the nose wheel and right main landing gear. When the port main gear failed to extend, Eells burned off his *Panther's* excess fuel, made the approach and got his cut. The *Panther* caught a wire and rolled forward on the nose and right main gear until forward motion was lost. The aircraft then settled onto its left wing tip tank, causing only minor damage.

In April 1952, following tests of the British-developed steam catapult conducted during the first three months of the year at Philadelphia, Norfolk, and at sea, the Navy announced that the catapult would be adopted for use on American carriers. First installation was slated for USS *Hancock*.

In late May 1952, the feasibility of the angled-deck concept was demonstrated in tests conducted on a simulated angled deck, aboard USS *Midway*, by test pilots flying both jet and prop aircraft.

In June, combined elements of the Air Force, Navy and Marine Corps virtually destroyed the electric power potential of North Korea with attacks on prime military targets which had been bypassed for nearly two years of the war. The two-day attack, which involved more than 1,200 sorties, was the largest single air effort since the close of WW II. It was also the first to employ planes from all of the U.S. services fighting in Korea.

Then, on July 11 and 12, in one of the major coordinated air efforts of the war, Navy, Marine, Air Force, Australian and British air elements launched a round-the-clock attack on the railroad yards and industrial facilities at Pyongyang.

Two days later, on the other side of the globe in Newport News, Va., the keel of the 59,000-ton supercarrier, USS *Forrestal*, was laid. It was the first of its class.

Struck by canopy fragments when his *Panther* took a hit near Wonsan, Ensign Floryan Soberski demonstrated a blind carrier landing with the help of his wingman, Lieutenant Francis J. Murphy, and a pair of LSOs, Lieutenant Lawrence A. Dewing and Lieutenant Junior Grade

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In February 1952, CNO approved a modification of the Project 27A carrier conversion program which provided an increase in the capacity of deck operating equipment. Changes included use of more powerful arresting gear, higher performance catapults and a replacement of the number three centerline elevator with a deck-edge type of greater capacity. Conversion of three *Essex*-class carriers incorporating these changes was completed in 1954 under Project 27C.

On August 29, the new UN philosophy of mass air attack was demonstrated once more by a record-breaking, around-the-clock raid on Pyongyang. The entire carrier air force of Task Force 77 teamed with the Fifth Air Force and the British to spread destruction on supply concentrations in and around the city.

In January of the new year, during tests aboard USS *Antietam*, the Navy's first angled-deck carrier, Captain S. G. Mitchell, the ship's C.O., landed in an SNJ. During the next four days, six aircraft models made landings, touch and goes, night landings and takeoffs in winds of varying force and direction.

Major John F. Bolt, USMC, downed his fifth and sixth MiGs while operating with the Fifth Air Force in Korea on July 11. He became the first Naval Aviator to attain five victories in jet aerial combat. The war was to end two days later.

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United Nations and communist representatives signed an armistice at Panmunjom, bringing hostilities to a halt, on July 27, 1952.

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Lieutenant Commander James F. Verdin set a world speed record of 752.943 mph over a three-kilometer course in an F4D *Skyray*. This was a first for a carrier aircraft in its normal combat configuration. On September 16, Douglas test pilot Bob Rahn broke the 100-kilometer closed-course record in the *Skyray* with a 728.114-mph mark. On December 3, the first successful test of super circulation (boundary layer control) on a high-speed airplane, an F9F-4 *Panther*, took place at Grumman's Bethpage, Long Island, facility. John Attinello, BuAer engineer, was credited with developing this practical application of a long-known aerodynamic principle.

II. Tactical Jet Missions

In spite of the Korean truce, peace in the world remained on unsteady footing in the last half of the 1950s. There were crises in the Far East, the Middle East, and a general deterioration in international relations. At the same time, a new importance was rendered to the traditional practice of deploying naval forces to trouble spots of the world.

There were also significant technological advances. In fact, Naval Aviation experienced changes that were as great as any in its history during this time. These improvements enhanced the speed, firepower, versatility and mobility of sea and air forces. Guided missiles began replacing guns, the capability to deliver nuclear weapons was increased, aircraft speeds jumped from sub to supersonic, the adaptation of nuclear power to aircraft was under investigation, and an increased knowledge of space gave evidence of its future effect on surface operations.

A new class of flattops was built and the carrier modernization program was completed. Carrier forces were thus strengthened and a new family of high-performance aircraft operated with them.

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A new class of flattops was built and the carrier modernization program was completed. Carrier forces were thus strengthened and a new family of high-performance aircraft operated with them.

On April 1, 1954, the first transcontinental flights in less than four hours were made by three VF-21 pilots in F9F *Cougars*. They traveled 2,438 miles from San Diego to New York, refueling in flight over Hutchinson, Kans. This was but the first of a succession of record-breaking hops that reflected a giant step forward in increasing jet aircraft performance. Early in 1955, an FJ-3 *Fury* from VF-33 scored a record when Lieutenant Commander W. J. Menby flew it to 10,000 feet from a standing start in 73.2 seconds. Less than a month later, McDonnell test pilot C. V. Braun piloted an F3H-1N *Demon* to 10,000 feet in 71 seconds. On February 23, Douglas' Bob Rahn reached 10,000 feet in 56 seconds in an F4D *Skyray*.

The Mirror Landing System, destined to make carrier operations substantially

safer, was successfully tested aboard USS *Bennington* on August 22. *Bennington's* C.O., Commander R. G. Dose, made the first carrier mirror landing in an FJ-3. Two days later, Lieutenant Commander H. C. MacKnight made the first night landing with the mirror, in an F9F-8 *Cougar*.

In order to increase range and overall performance capabilities, the Navy announced, in September, that all fighters in production should be outfitted with in-flight refueling gear, thus standardizing an operational procedure.

On October 1, *Forrestal*, first of four flattops of the "supercarrier" class, was commissioned at Norfolk.

PH3 M. Rizza



The last three operational TF-9F Cougars prepare to make a final launch off USS John F. Kennedy (CVA-67) in February 1974.

In early 1956, the all-weather F3H-2N *Demon* fighter arrived at NAS Cecil Field-based VF-14. VA-83 headed for the Mediterranean aboard USS *Intrepid* with its *Sparrow* /-equipped F7U-3M *Cutlass* aircraft, signaling the first overseas deployment of a naval missile squadron. At the end of March, the initial five nuclear-capable A3D-1 *Skywarrior* heavy attack bombers were delivered to VAH-1 at Jacksonville, Fla.

In July, VA-46 and its F9F-8s departed for the Sixth Fleet aboard USS *Randolph*. This unit was the first to deploy overseas with the *Sidewinder* missile. Deployment of this new weapon was extended to the Western Pacific a month later when VF-211 and its FJs joined the Seventh Fleet aboard USS *Bon Homme Richard*.

On July 31, Lieutenant Commander P. Harwood A. Henson, with Lieutenant R. Miars, demonstrated the performance capabilities of the *Skywarrior* when they made a 3,200-mile, nonstop, nonrefueling flight from Honolulu to Albuquerque, N.M., in five hours, 40 minutes. The A-3 averaged 570 mph.

In August, an F8U-1 *Crusader* captured the Thompson Trophy with a record speed of 1,015.428 mph. The *Crusader* was the first operationally equipped jet plane in history to fly faster than 1,000 mph.

Speed records continued to fall with regularity but not all aeronautical events were success stories. An F11F-1 *Tiger*, flown by Grumman test pilot Tom Attridge, shot itself down while conducting test firings off eastern Long Island by running into 20mm projectiles that it had fired only seconds before.

A historic milestone was marked on October 16 when five students received Naval Observer Wings. They became the first graduates of the Navigator-Bombardier School at NAS Corpus Christi, Texas.

The Suez crisis erupted into open warfare on October 29, 1956, and all major fleet units were sent to sea under maximum readiness conditions. The Sixth Fleet was ordered to evacuate U.S. nationals from the area. Aircraft provided cover and heavy combatant ships stood by while ships and Air Force transport squadrons went into Alexandria, Egypt; Haifa and Tel Aviv, Israel; Amman, Jordan; and Damascus, Syria. They



The F-4B Phantom II first flew in 1958 and provided yeoman service in Vietnam as a strike-fighter.

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evacuated more than 2,000 persons by November 3. Operations by the Sixth Fleet, in the area for several weeks, included the logistic support of the first UN International Forces which arrived in the area in November.

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On February 1, 1957, Lieutenant Commander Frank H. Austin, Jr., completed test pilot training at NATC Patuxent River, and became the first Navy flight surgeon to qualify as a test pilot.

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USS *Antietam* reported for duty to Chief of Naval Air Training at Pensacola, providing the command its first angled-deck carrier for flight training. The first T2V-1 *Seastar* jet trainer arrived at NAS Corpus Christi on May 27, further upgrading the training command.

In the fleet, a pair of *Crusaders* and two *Skywarriors* flew nonstop from *Bon Homme Richard* off the California coast to *Saratoga* off the Florida coast, in another demonstration of the increasing performance capabilities of sea-based jet aircraft.

Major John H. Glenn, Jr., astronaut and later senator, made history on July 16, 1957, when he flew an F8U-1P *Crusader* from Los Alamitos, Calif., to Floyd Bennett Field, N.Y., in three hours and 22 minutes, averaging 7,232 mph along the way. This was the first upper atmosphere supersonic flight from the West Coast to the East Coast and broke the transcontinental speed record.

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In August, flying a F3D *Skynight*, Lieutenant Commander Don Walker landed aboard *Antietam* in the Gulf of Mexico using the new Automatic Carrier Landing System. This inaugurated a sequence of shipboard tests of the apparatus which were designed to bring planes aboard in all weather conditions without help from the pilot.

At Patuxent River, Lieutenant Sydney Hughes, RAF, ejected intentionally from an F9F-8T flying just above the ground at 120 mph using the Martin-Baker ejection seat, then under evaluation by Grumman Aircraft.

In February 1958, the keel of the world's first nuclear-powered aircraft carrier, USS *Enterprise*, was laid in Newport News, Va. A month later, CNO approved a reorganization of carrier aviation that would create uniform air groups, provide a more permanent group assignment to ships, and permit a reduction of assigned units and aircraft without reducing combat readiness. The new organization also provided for a permanent replacement air group to be established on each coast. These units were made responsible for the indoctrination of key maintenance personnel, the tactical training of aviators, and for conducting special programs required for introduction of new models of combat aircraft.

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Reflective of the growing dominance of jet aircraft, an all-jet program in basic flight training began in May when 14 students reported to ATU-206 at Forrest Sherman Field, Pensacola, Fla., to fly the T2V *Seastar*.

That same month, four *Demons* and four *Crusaders* completed nonstop transatlantic crossings in Operation *Pipeline*, demonstrating that carrier aircraft could be delivered from the East

Coast to the Sixth Fleet in the Mediterranean expeditiously.

On May 27, 1958, the McDonnell F-4H-1 *Phantom II* flew for the first time. Thus began the career of one of the finest air weapons in the Navy/Marine Corps inventory.

Facts about the *Phantom*:

— In 48 seconds, the *Phantom II* can climb four miles to intercept enemy aircraft.

— With the throttles two-blocked, the F-4 consumes enough fuel in 60 seconds to drive an average American car more than 3,000 miles, and it carries enough fuel to drive that car about 35,000 miles.

— More than 643,000 fasteners are used to hold the *Phantom* together.

— Flight time from St. Louis to Chicago is 12 minutes.

— Its generators can push enough power through its 14 miles of electrical wiring to supply a subdivision of 30-40 homes with enough power to operate lights, washing machines, TV's, toasters, can openers, vacuum cleaners, etc.

— And speaking of vacuum cleaners, its engines at full bore draw in enough air to collapse a typical six-room house in two seconds.

— Painting one F-4 takes two days, 36 people and 28 gallons of paint, enough to cover seven six-room houses.

— The catalyzed epoxy paint withstands temperatures up to 450 degrees and is resistant to engine and hydraulic oil.

— It can slow to a mere 125 knots or streak through the sky at more than 1,300 mph. For routine travel, it eases along at 570 mph for more than 1,500 miles without refueling.

— On takeoff it can hold an external load of more than eight tons.

— Unrefueled range from carriers or existing suitable friendly bases allows the *Phantom* to carry its payload of ground strike weapons over 92 percent of the earth's surface.

In July 1958, while aircraft from *Essex* and *Saratoga* flew cover from long range and Sixth fleet ships stood by, amphibious units landed 1,800 Marines on the beach near Beirut to support the Lebanese government and to protect American lives. In the days following, land, sea and air reinforcements were sent to the area and order was maintained without incident. Tensions rose elsewhere, though, after Chinese Communists shelled the Kinmen Islands in August, renewing indications of naval activity in the Taiwan Straits. Seventh Fleet ships moved to the area to support the Republic of China in a firm stand against aggression. Tensions remained high and warlike action continued. Reinforcements, including aircraft carriers, were sent to the area. By October, the threat lessened and the situation was somewhat stabilized.

Speed, altitude and distance records continued. On January 24, 1959, Major J. P. Flynn and Captain C. D. Warfield of the 2nd Marine Aircraft Wing, flew nonstop without refueling, from El Toro, Calif., to Cherry Point, N.C., in A4D *Skyhawks*, covering 2,082 miles in four hours, 25 minutes.

In March, Aviation Cadet E. R. Clark soloed in a TT-1 *Pinto*, the first student in Naval Aviation history to solo a jet without previous experience in propeller aircraft.

In April, the *Bullpup* missile was first deployed overseas when VA-212, with FJ-4B *Furies*, sailed aboard *Lexington* to join the Seventh Fleet. The following August, VA-34, flying *Skyhawks*, departed from the East Coast aboard *Saratoga* to join the Sixth Fleet, extending *Bullpup* deployment to the Mediterranean.

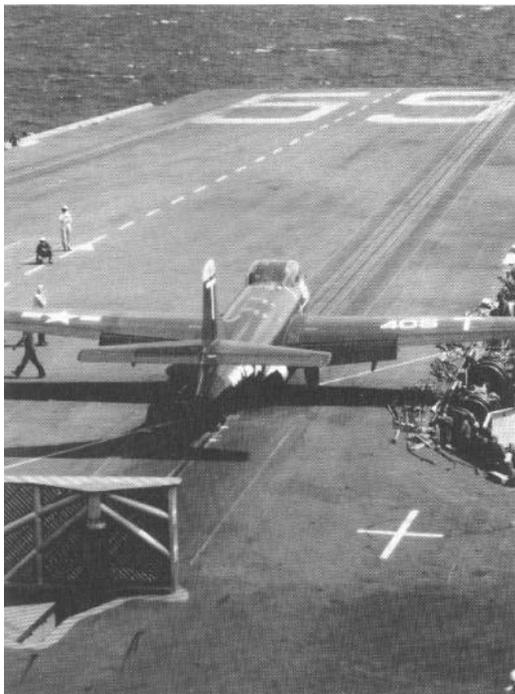
On August 25, 1959, a *Skywarrior* flown by Lieutenant Commander Ed Decker launched from *Independence* at a gross weight of 84,000 pounds. The A3D thus became the heaviest aircraft ever to take off from a carrier.

In November, during a student training flight at NAS Pensacola, 2nd Lieutenant David K. Mosher, USMC, and his instructor, Lieutenant Commander R. A. MacDonell, inaugurated use of the T2J *Buckeye* in basic training.

The *Phantom II* made its initial carrier trials in February 1960 aboard USS *Independence*. The supersonic, two-seat, twin-jet, all-weather interceptor featured long-range capabilities with conventional and nuclear bombs. The F4H first flew on May 27, 1958, and was subject to an exhaustive flight demonstration program. The aircraft was destined to play an instrumental role in the Vietnam fighting.

The year 1961 signaled the golden anniversary of Naval Aviation. In less than a lifetime, the aircraft inventory changed from fragile biplanes that cruised at 80 mph to jets that achieved supersonic speed with relative ease. One nuclear and two conventionally powered attack carriers joined the fleet that year. Before the decade of the sixties ended, two more attack carriers were commissioned.

The Navy's traditional role in controlling the sea was unchanged. A successful naval blockade was employed during the Cuban missile crisis. The round-the-world cruise of a nuclear-



An F3D jet fighter prepares to catapult off USS *Forrestal* (CV-59) in February 1956.

powered task force led by *Enterprise* and operations in the Indian Ocean carried the flag into many foreign ports. There were crises in Africa, the Middle East, Berlin and the threat of war in the Caribbean. In Southeast Asia, the U.S. responded to aggressive actions with retaliatory air strikes. War developed and the American commitment to it increased. The burden of the Navy's air war was carried by Seventh Fleet aircraft.

Nuclear Warfare

In 1943, the allied air forces in Europe tried to annihilate Hamburg, Germany. During one week in July, they flew 3,028 sorties and dropped 10,000 tons of bombs. Thirty-five percent of the city was destroyed. There were 80,000 casualties. Two years later, on August 6, 1945, a single bomber dropped one 20-kiloton nuclear weapon on Hiroshima, Japan. Much of the city was destroyed and 140,000 casualties resulted from the use of the first atomic bomb.

In the years that followed, these awesome weapons were refined, improved and eventually became a regular part of the arsenal.

By the late 1950s, aircraft were considered the key vehicle for "delivering" nuclear weapons.

The P2V *Neptune* joined the fleet in 1946 and could under certain conditions carry nuclear weapons, but the first Navy plane designed for this duty was the North American AJ-1 *Savage*. The *Savage* was prop-driven, except for a small jet engine for takeoffs and for run-ins over a target. The twin-jet *Skywarrior* became its replacement.

Two techniques were developed for high-altitude delivery of nuclear weapons: visual and radar bombing, with visual bombing planned only as an emergency backup measure. After the weapon was dropped, an escape maneuver was developed that would give maximum separation distance between delivery aircraft and burst effect.

Smaller aircraft also became nuclear weapon capable. Two of the most promising at the time were the prop-powered *Skyraider* and the *Banshee* jet. Two types of low-altitude bomb delivery were developed. The dive or glide delivery consisted of a pullout at such an altitude that the aircraft and pilot could safely escape. Secondly, there was loft bombing. Sometimes called LABS — low altitude bombing system — this procedure involved releasing the bomb during a pull-up before the aircraft pitch



An F-8 Crusader making a run against a Viet Cong stronghold in South Vietnam.

angle reached 90 degrees, the exact angle depending on target distance, aircraft speed and bomb characteristics. Loft bombing eliminated the need for aircraft to fly over what may have been a heavily defended target. After release, the aircraft flew a half Cuban-eight maneuver which provided sufficient escape distance from the blast.

In a variation of this maneuver, the bomb was not released until after the aircraft had passed the target and the pitch angle exceeded 90 degrees. The bomb was tossed back toward the target and hoisted above the airplane's turning radius. There was no need for an initial point (IP). The target was the IP. These maneuvers have been modified through the years and become sophisticated as technology improved.

The Navy was not abandoning its capability of waging a conventional war. Nuclear arms were simply considered an addition to the inventory of weapons, not a replacement for all older, time-tested bombs, rockets and the like. During the Suez crisis in 1956, for example, the Navy was the only service with an on-the-spot capability to fight a conventional style war.

With respect to the progress in research and production of nuclear weapons, the abiding philosophy was that these weapons provided insurance that the Navy could wage nuclear war and thereby effectively deter it.

On November 20, 1962, following a worldwide spell of international tension, an agreement was reached between the U.S. and the Soviet Union relative to the removal of missiles and bombers from Cuba. The naval blockade was discontinued and the ships at sea resumed normal operations.

Continued upgrading of carrier operations was manifested in the development of an automatic carrier landing system. On June 13, 1963, Lieutenant Commander R. K. Billings and R. S. Chew, Jr., of NATC Patuxent River, piloting an F-4 *Phantom* and an F-8 *Crusader*, respectively, made the first fully automatic carrier landing with production equipment, on board USS *Midway* off the California coast. The landings were made "hands off" with both flight controls and throttles operated automatically by signals from the ship. This event highlighted nearly 10 years of

research and development and followed, by almost six years, the first such carrier landing made with test equipment.

Vietnam

The war in Vietnam broke out in 1964. On August 5 the President ordered offensive action preserving the U.S. right to operate in international waters. Aircraft from *Constellation* and *Ticonderoga* attacked torpedo boats and their support facilities at five locations along the North Vietnamese coast. This marked the beginning of a costly combat era in which Navy carrier forces played a key role for the duration. Conventional arms were used throughout the war and, as they did during the Korean conflict, squadron planes flew cyclic operations from flattop to enemy territory and back almost daily. U.S. Marine Corps aircraft operating primarily from below the 17th parallel saw constant action in South and North Vietnam.

On June 17, 1965, while escorting a strike on the barracks at Gen Phu, North Vietnam, Commander L. C. Page and Lieutenant J. E. D. Batson, flying F-4B *Phantoms* of VF-21 aboard USS *Midway*, intercepted four MiG-17s. Each shot down one, scoring the first U.S. victories against MiGs in Vietnam.

The special capability of jets operating from relatively short airstrips was demonstrated on May 11, 1966, when a MAG-12 pilot in an A-4 *Skyhawk* made a catapult launch from the Marine Expeditionary Airfield at Chu Lai, Vietnam. It was the first combat use of the new land-based catapult capable of launching fully loaded tactical aircraft from runways less than 3,000 feet long.

In mid-May, USS *Intrepid* heralded its first day on the line by launching Carrier Air Wing 10, composed entirely of attack squadrons, against Viet Cong troops concentrations and supply storage areas around Saigon. The aircraft completed 97 combat sorties in a day.

In June, *Skyhawks* and F-8 *Crusaders* from USS *Hancock* made the first carrier strike against petroleum facilities in two years. This signaled the beginning of a systematic effort to destroy the Communists' petroleum storage system.

The first application of aerial mining in Vietnam took place on February 26, 1967. Seven A-6A *Intruders*, led by Commander A. H. Barrie of VA-35, planted mine fields in the mouths of the Song Ca and Song Giang rivers. The operation was aimed at stopping coastal barges from moving supplies into immediate areas.

Toward the end of April, carrier planes launched their first strikes on MiG bases in North Vietnam with an attack on Kep Airfield, 37 miles northeast of Hanoi. *Intruders* and *Skyhawks* from *Kitty Hawk* were principal planes. The A-6s attacked again the same night. While providing bomber cover during the first attack, Lieutenant Commander Charles E. Southwick and Lieutenant Hugh Wisely, in VF-114 *Phantoms*, each were credited with a probable MiG-17 kill.

On the home front, a new plane—the A-7A *Corsair II* — showed its capabilities when two of the jets, piloted by Commander Charles Fritz and Captain Alex Gillespie, USMC, made a transatlantic crossing from Patuxent River to Evreux, France. This established an unofficial record for long-distance, nonrefueled light attack jets. They flew 3,327 nautical miles in seven hours and one minute.

Meanwhile, an older plane was earning a reputation as a lifesaver in Southeast Asia. An NAS Whidbey Island, Wash., report, published in late 1968, described the value of the aircraft known as the "Whale," the A-3 *Skywarrior*.

At least 499 flak-damaged jets, valued at \$958.5 million, have made it back to their ships after air strikes over Vietnam because a "Whale" was in the air.

More than that number of Naval Aviators have not had to take the risk of ejecting because of a low fuel state.



Two heavily armed A-6A Intruders from USS Constellation (CVA-64) fly a combat mission over North Vietnam.

The Whales are KA-3B tankers. The men who fly them gave the swept-winged jets the nickname.

Skywarriors entered the early sixties as heavy attack bombers, the mission for which they were originally designed. Withdrawn from that assignment when their replacement, the A-6 *Intruders*, joined operational forces, the twin-jet *Skywarriors* were outfitted with a hose-reel assembly, pipes and a pump. They use their own internal fuel for replenishments.

The number of aircraft saved is probably much higher, since the period reported covers January 1, 1965, to August 1, 1968, and does not include

aircraft with low fuel states for reasons other than combat-connected missions.

Demonstrating the ability to project at sea expeditiously, a task group composed of the carrier *Enterprise* and screen was ordered to reverse course in the East China Sea on January 23, 1968, and to run northward to the Sea of Japan. USS *Pueblo* had been captured by the North Koreans. *Enterprise* and company operated off the South Korean coast for nearly a month. In CONUS four days later, six Naval Air Reserve carrier squadrons were activated in support of

the *Pueblo* emergency.

Top Gun

Top Gun, the Navy Fighter Weapons School at NAS Miramar, Calif., was formed in 1968, to improve aircrew proficiency in air-to-air combat. A Naval Air Systems Command study, prompted by a less than desirable kill ratio in the skies over North Vietnam, called for a higher level of weapons and tactics training. There was a need to shift all-weather fighter emphasis from heavy reliance upon radar to more eyeball-oriented tactics. In the beginning, the specially selected Top Gun instructors

flew stripped-down A-4 *Skyhawks* as "opposing" fighters in realistic practice engagements with "students" from other squadrons who flew their own unit aircraft.

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In February 1969, the Naval Air Systems Command issued a contract for development of the F-14A *Tomcat*, a variable-sweep wing fighter to succeed the F-4 *Phantom*.

On June 24, 1969, Lieutenant Dean Smith and Lieutenant Junior Grade James Sherlock of VF-103 in a *Phantom* from *Saratoga* made the first operational "hands-off" arrested landing with an AN/SPN-42 automatic carrier landing system.

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Vietnam fighting remained a priority as the decade of the seventies began but, in the next few years, the American public was to become increasingly aware of the country's critical dependence upon oil from foreign sources. An acute consciousness of the U.S. position as a two-ocean nation reemphasized the reliance upon the Navy to keep the sea lanes open to ensure the free flow of commerce.

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On March 28, 1970, the first North Vietnamese MiG kill occurred since a

November 1, 1968, bombing halt. Lieutenant Jerome E. Beaulier and Lieutenant Junior Grade Stephen J. Barkley, in a Constellation-based VF-142 *Phantom*, shot down a MiG-21 while they were escorting an unarmed reconnaissance plane near Thanh Hoa, North Vietnam.

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On April 10, the A-4M made its first flight at Palmdale, Calif. This version of the *Skyhawk* featured 50 percent more thrust than that of the first in the series, the A4D-1 of 1954. It was ideally suited for operations from short airfields in forward areas, a factor that made the plane especially valuable to the Marine Corps.

In late September, as a result of the Jordanian crisis caused by Palestinian commando attempts to unseat the monarchy in Amman, USS *Kennedy* joined *Saratoga* and *Independence* in the Mediterranean, followed by seven other U.S. Navy ships, including USS *Guam*. This strengthened the Sixth Fleet to some 55 ships which served as a standby force in case U.S. military protection was needed for evacuation of Americans and as a counterbalance to the Soviet Union's growing Mediterranean fleet.

Back on the other side of the globe the U.S. responded to an attack on an unarmed reconnaissance aircraft on November 21 and 22. Two hundred planes conducted protective reaction air strikes against North Vietnamese missile and antiaircraft sites south of the 19th parallel.

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The F-14A, piloted by Grumman test pilots Robert Smyth and William Miller, made its first flight on December 21 at Grumman's Calverton Field, Long Island, N.Y.

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In January 1971, Task Force 77, the Attack Carrier Striking Force, Seventh Fleet at the core of Yankee Station operations, interdicted the Ho Chi Minh Trail and provided air support for allied ground forces in South Vietnam.

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Marine Corps/Navy's first AV-8 *Harrier* was accepted by Major General Homer S. Hill, USMC, at Dunsfold, England, on January 6, 1971. The *Harrier* was the first vertical short takeoff and landing (V/STOL) fixed-wing aircraft ever accepted for use as a combat aircraft by U.S. armed forces. Later in the month, the Navy's newest carrier-based electronic warfare aircraft, the EA-6B *Prowler*, entered service with VAQ-129 at NAS Whidbey Island. A derivative of the two-place A-6 *intruder*, the *Prowler* was lengthened to accommodate four aircrewmembers.

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In the war zone, *Hancock*, *Ranger* and *Kitty Hawk* planes flew more than 3,000 sorties in January, most of them bombing type missions in Laos. A-6 *Intruders* and *Corsair IIs* were particularly effective in attacks against the heavy flow of supply-carrying trucks. Estimates were that the enemy was putting close to 1,000 trucks per day on the roadways.

By late February, strike sorties were averaging 122 per day because of the continuing truck movements, estimated at 1,400 a day. On March 10, *Ranger* and *Kitty Hawk* set a record 233 strike sorties for one day and went on during the ensuing six-day period to mark up a strike effectiveness record that exceeded



An A-7 Corsair II receives fuel from a Skywarrior in 1971.

Search and Rescue

recorded performances by Task Force 77 during the previous three-year period. On March 31, strike sorties launched by the carriers during the month totaled 4,535, of which nearly 4,500 were ordnance-delivery sorties. These figures were up by more than 1,000, respectively, over the previous month. Over 680 "seed" (land mine type weapons) and interdiction missions were flown during the months with unknown results. About 75 percent of the interdiction missions, however, obtained one or more road cuts while implanting seeds.

Interdiction flights in great numbers characterized Vietnam action from the carrier-based jet's vantage point.

Weather seemed to be the only foe to stifle Yankee Station efforts. In July, *Oriskany*, *Midway* and *Enterprise* served intermittently on station but operations during the month were disrupted when the flattops evaded three typhoons — *Harriet*, *Kim* and *Jean*.

Back home, the jet-powered S-3A *Viking*, the Navy's newest ASW aircraft, made its official rollout at the Lockheed-California Company's Burbank facility on November 8. This plane was designed to replace the venerable but aging S-2 *Tracker*.

Also in CONUS, Commander George White from NATC Patuxent River became the first Navy test pilot to fly the F-14A *Tomcat*. By the end of 1971, nine of the fighters were assigned to various test programs.

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On December 15, 1971, VMA(AW)-224, part of Carrier Air Wing 15 on board USS *Coral Sea*, arrived on Yankee Station. The unit was the first Marine Corps squadron to fly combat missions into North Vietnam from a carrier operating on Yankee Station.

On January 19, 1972, Lieutenant Randall Cunningham and Lieutenant Junior Grade William Driscoll in an F-4 of VF-96 off USS *Constellation* shot down a MiG-21. This action took place during a protective reaction strike in response to earlier AAA and SAM firings from an area which had menaced an RA-5C reconnaissance plane and its escorts.

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On January 21, 1972, the S-3A *Viking* conducted its maiden flight in California. The sub hunter met the Navy's requirements for a 400-knot-plus aircraft with a 2,000-mile range capability.

Countless rescue stories emanated from the war in Southeast Asia. The following one had a happy ending.

Drama and an air of uneasiness filled the Gulf of Tonkin early one summer morning as men from HC-7, the carriers *Saratoga* and *Midway*, and the frigate *Dewey* combined efforts to retrieve a Navy pilot downed more than 20 miles inside North Vietnam.

Lieutenant James R. Lloyd had launched in his A-7 from *Saratoga* on a routine bombing mission over North Vietnam at 2015 the previous evening. An hour later, things were not quite as routine. "It was just after dark and I had dropped my ordnance over some trucks moving south near Vinh," related the VA-105 pilot.

"Suddenly I had an indication of a SAM firing. It was a definite lock-on, coming at me at 12 o'clock.

"I maneuvered to avoid the SAM. The next thing I heard was a thud on my left wing and I went into a hard left roll. I looked and saw big metal sheets of my wing coming off. I really wanted to bring the aircraft out over the water. I tried to do it with the rudder but my stick was frozen. Then my plane went into a full nose-down dive, so I ejected."

Lloyd said he does not remember falling. "I just wanted to get to my radio to let them know I was alive. When I came down, I started running away from the burning plane. (I could feel the heat during my descent.) I remember hearing chickens and pigs; even the dogs barked funny. It was my state of mind, I guess," he said.

According to Lloyd, after he safely parachuted, people were running all over the countryside. "I could hear at least 300 people and see over 100. At one time some of them came within six inches of me. The men near me had guns and were firing randomly. I knew it was bad. I hid in a bush but they never did beat the one I was hiding in. My green flight suit blended in well with the vegetation."

Using his hand-held radio, Lloyd communicated with other Navy jets still overhead. "I told them that there were people in the area, that I was scared and wanted to be picked up."

Lloyd recalled that people were constantly talking and he knew he had to be quiet and furtive, and that he had to work northeast up a small hill. "Everyone

I encountered was shouting," he said. "I don't know if it was my imagination or not, but I heard my name mentioned three or four times. It could mean something in Vietnamese."

The most horrifying chapter of the adventure occurred when two men actually found Lloyd as he lay entwined in a bush.

"Something was said and I figured it was all over for me," said Lloyd. "I didn't know what to do; I just didn't move. They jabbed me in the back with a barrel of a rifle, two times, I guess. Something was said again and I heard footsteps running.

I figured one guy was standing guard. I knew I had to get away. I slowly rolled over to see who he was. To my amazement, both were running up the hill. I got up. I guess they thought I was either dead or injured. I ran like hell."

While the North Vietnamese ran north for help, Lloyd ran northeast. When automatic weapons fire began to whiz over his head, he started to crawl. "I crawled because I could see the horizon and I could feel where I was going. But the stench of the rice paddies was unbelievable."

Lloyd then moved two miles further north and, when he heard more voices, dove into a rice paddy. People came within five feet of him this time but passed by without noticing him. Seeing his chance, he again made contact with the planes above him.

"I told them to bring in the helicopter," Lloyd continued. "They tried to bring it in earlier, but they never would have made it. Calling off that first helo was probably the biggest decision of my life."

"When I was talking to the planes above, I wanted to know who I was talking to. It gets awful lonely down there," sighed Lloyd. "I found some more brush to hide in, and it was then I realized how I ached, how I stunk."

While Lloyd was on the ground, air and surface search and rescue units were far from idle. When the 27-year-old Naval Aviator ejected from his *Corsair II*, his wingman immediately assumed duties as air on-scene SAR commander, and *Dewey* became the surface SAR control ship, coordinating the efforts of the surface units and controlling the aircraft that completed the rescue.

Air intercept controllers aboard *Dewey* were kept busy during the five-hour rescue mission. RD1 Paul Moss controlled all aircraft operating inland which provided surveillance, ground suppression and the pickup of the

downed pilot. At the same time, RDC Wilmon Crowe and RD1 Antonio St. James controlled all jet aircraft operating off the coast, and RD2 James Barnett handled the reserve helicopter assets.

Chief Crowe directed in-flight refueling for 16 aircraft during Lloyd's ordeal and the destroyer *Hepburn* provided refueling for the rescue helicopter.

At 2:45 a.m., Lloyd was able to see the HC-7 SAR helo. I started to vector him in," explained Lloyd. "He had his lights on and I never thought he would do that. It made him a sitting duck. He was taking fire from all over the place. He circled the area and wanted me to show him where I was."

The SH-3A, with Lieutenant Harry J. Zinser as aircraft commander, made one approach. Lloyd jumped up in an attempt to catch the hook but missed. Helo pilot Lieutenant William D. Young then made another pass.

"This time he landed about 100 feet from me and I just ran like hell toward that beautiful single Big Mother," said Lloyd. "I just dove in."

Other crew members in the *Sea King* included crew chief AT3 Douglas G. Ankney and AMAN Mathew Szymanski, the helo's gunner who answered the

enemy's ground fire with rounds from his machine gun.

HC-7, home-based at NAS Imperial Beach, Calif., was involved in many rescue missions, most of them over water. Not since 1968 had a squadron helo gone so deep into enemy territory on a rescue mission. Most of the rescue helicopter's journey into North Vietnam was done at low altitudes and over rough mountainous terrain. "It would have killed us if we had hit a mountain or a tree," says Zinser.

When the *Sea King* returned to the carrier, a jet pilot who had been overhead during the rescue mission told the helo crew that they had been taking anti-aircraft fire at point-blank range when they touched down to pick up Lloyd.

"It was an outstanding effort by all involved," said the overjoyed Lloyd who suffered minor injuries. "It's just fantastic what so many people will do to save one life. I'm very impressed at the Navy's all-for-one, one-for-all effort."

Reactionary Air Strikes

On April 6, 1972, heavy air raids were conducted against North Vietnam, the first since October 1968 when a halt was

called on such attacks. Since that halt, the U.S. air effort had concentrated on interdicting soldiers and supplies moving along various routes into South Vietnam. Except for protective reaction strikes and a five-day operation at the end of 1971, called *Proud Deep*, very few heavy attack missions had been flown into North Vietnam. The U.S. reactionary raids were prompted by a massive invasion of South Vietnam by six North Vietnamese divisions. The objectives of these raids were the destruction of all North Vietnamese aggression supporting resources; harassment and disruption of enemy military operations; and reduction and impediment to movements of men and materials through southern North Vietnam.

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The Marine Corps demonstrated its long-range punch when elements of two *Phantom* squadrons, VMFA-115 and VMFA-232, flew into Da Nang from Iwakuni, Japan, on April 6 as part of the reinforcing effort in support of South Vietnamese troops, particularly around QuangTri. VMFA-212 arrived from Kaneohe, Hawaii, eight days later.



An A-7A Corsair II armed with bombs prepares to launch from USS Constellation (CVA-64).

An example of Naval Air action against enemy positions inside central and South Vietnam during North Vietnam's spring offensive took place the last six days of April as *Hancock's* VAs 55, 164 and 211 struck enemy-held territory around Kontum and Pleiku and *Constellation's* VAs 146, 147 and 165 hit areas around the besieged city of An Loc in support of South Vietnamese troops, some only 40 miles outside the capital of Saigon.

Operations by Navy and Marine Corps aircraft expanded significantly throughout April. Nearly 5,000 Navy sorties in the South and 1,250 in the North were flown in the month. The Marine Corps flew 537 sorties in the South Vietnam area. The dramatic increase in Navy flights was supported by four Western Pacific carriers. *Coral Sea* and *Hancock* were on Yankee Station when the North Vietnamese's spring offensive began. *Kitty Hawk* and *Constellation* were ordered to the scene at the beginning of the month. As the days progressed in April, the Navy effort grew from 240 to more than 300 sorties a day.

The Navy unveiled the first night carrier landing trainer at NAS Lemoore on May 4, 1972. The device permitted pilots to simulate A-7E landings on carrier decks.

At 0840, on May 9, during Operation *Pocket Money*, *Intruders* and *Corsairs* from *Coral Sea*, with an EKA-36 in support, departed the vicinity of the ship. They were to execute a mining mission against the outer approaches to Haiphong Harbor. Their "time on target" was to be precisely 0900 in order to coincide with the President's public announcement in Washington that mines had been seeded. Commander Roger Sheets, wing commander, led the three A-6s, which were USMC planes from VMA-224. They headed for the inner channel of the harbor. The A-7Es, led by Commander Len Giuliani, consisted of six aircraft from VA-94 and VA-22. They were tasked with mining the outer segment of the channel. Each aircraft carried four Mk 52-2 mines.

Captain William Carr, USMC, bombardier/navigator in the lead A-6, established the critical attack azimuth

and timed the mine releases. The first was dropped at 0859 and the last of the field of 36 mines at 0901. All mines were set with 72-hour arming delays. This permitted merchant ships time for departure or a change in destination consistent with the President's public warning.

Thus began a mining campaign that planted more than 11,000 Mk 36-type destructors and 108 of the special Mk 52-2 mines over the next eight months. These missions played a large role in ultimately bringing about a stop to the war.

On May 10, *Linebacker I*, a heavy strike operation against targets throughout North Vietnam, evolved. An outgrowth of the President's mining declaration, which also stated that the U.S. would make a maximum effort to interdict the flow of supplies, the operation lasted five and a half months.

The 10th was the most intensified air-to-air combat day of the entire war. Navy flyers shot down eight MiGs. A VF-96 F-4, while engaged in aerial combat over Haiphong, shot down three of them, the first triple downing of enemy MiGs by one plane during the war. Lt. Randy Cunningham was the pilot, Ltjg. William Driscoll, his RIO. Coupled with January 19 and May 8 downings of two MiGs, this feat made Cunningham and Driscoll the first MiG aces of the Vietnam conflict.

The scope of the air war changed on May 18, 1972, when the Uong Bi electric power plant near Haiphong was struck. This signaled the beginning of strikes on targets formerly avoided, including power plants, shipyards and the Haiphong cement plant.

Beginning in late May, Navy night operations were conducted on a regular basis. In the ensuing two months, night strikes constituted 30 percent of the total Navy attack effort in North Vietnam. *Corsairs* and *Intruders* performed the bulk of this night work.

On August 5, a Naval Air Test Center pilot made the first fully automated landing aboard *Ranger* in an F-4J *Phantom*. The test landing device linked the aircraft's controls with a shipboard computer and enabled the *Phantom* to land with the pilot's hands off the controls.

The first two F-14 *Tomcat* squadrons were formed at NAS Miramar. VF-1 and VF-2, formerly disestablished units, were reactivated to receive the Navy's first new fighter plane in 14 years. The F-4 *Phantom*, introduced in 1958, was its immediate predecessor.

The war in Vietnam was winding down. The U.S. ended all tactical air sorties above the 20th parallel on October 23, 1972, and brought *Linebacker I* operations to a close. This goodwill gesture was designed to promote peace negotiations. But on December 18, *Linebacker II* was initiated after Paris peace talks were stalemated. *Linebacker II* ended on December 29 when the North Vietnamese returned to the peace table. Operations involved heavy bombing of the north above the 20th parallel. Also, there were mine reseeding missions and concentrated strikes against surface-to-air missile and anti-aircraft artillery sites, enemy army barracks, petroleum storage areas, the Haiphong naval and shipyard areas and railroad and truck stations. Navy tactical air attack sorties in *Linebacker II* were centered around Hanoi and Haiphong.

An example of an attack squadron at work in combat is contained in the following account of A-7 equipped VA-56 aboard *Midway*. The squadron ended its seventh period on the line on December 23, 1972.

Flying with CVW-5 since April, the squadron recorded 180 days on the line, flew more than 5,500 combat hours, made more than 3,000 sorties and completed 2,090 day and 781 night carrier landings. Pilots amassed 6,301 hours. VA-56 conducted strikes against such targets as the Haiphong, Ninh Binh, Ha Tinh, Kien An, Tam Da and Thanh Hoa bridge complexes; the Haiphong, Vinh, Doung Nham and Nam Dinh petroleum areas; and the Gia Lam railroad yards across the Red River from Hanoi. Other actions included mining operations and protective flights for four search and rescue missions, including one at night inside North Vietnam, and one for two Air Force officers downed off the coast. During the line periods, four of the squadron's A-7Bs were lost to AAA and SAM missile fire. Two pilots were taken prisoner, one was listed as missing in action, and one was retrieved.

Air Warfare

No air combat mission can be described as typical. Each takes on a character of its own. The following report, therefore, gives only a glance at Vietnam aerial activities but it reflects the nature of air warfare circa 1967.

When they completed their strikes against the Dong Phong Thuong military storage and transshipment complex in North Vietnam, Navy pilots wrapped up what was then the biggest carrier-based assault of 1967 on enemy supply routes.

Considered by Navy sources to be one is located midway between Hanoi and Vinh on a 150-mile rail line that connects the cities.

Dong Phong Thuong was a marshaling

point for southbound supplies carried by road and rail from Hanoi, and by barges from Haiphong. It was also a major stockpile area for communist war material.

To knock out the complex, aircraft were launched on two-day coordinated strike missions from the carriers *Kitty Hawk*, *Coral Sea* and *Ticonderoga*. F-4 *Phantoms*, F-8 *Crusaders*, A-4 *Skyhawks* and A-6 *intruders* battered the target area.

Primary objectives included two rail bridges and a 200-foot pontoon bridge spanning the nearby Song Lau River, a ferry, five warehouses, four cave storage areas and supply routes.

But there were also other targets. The missions, some of them described by

returning pilots, went as follows:

On the first day, planes from CVW-9 aboard *Tico* struck the railroad bridges, scoring missile hits on the spans and cutting the rail line. Commander Billy Phillips led strike aircraft armed with air-to-surface missiles and Commander Ed McKellar headed a group carrying 1,000-pound bombs. The railroad spur just south of the main bridge was hit by Lieutenant Norman Morton, Lieutenant Junior Grade Kwang Yum and Lieutenant Junior Grade Bill Cain, all from VA-192.

VF-194 pilots Lieutenant Commander Dave Morris and Lieutenant Junior Grade Jack Allen bombed the railroad spur near the main line. "I was pulling out on my bombing run. I looked back at



Lt. Cdr. Jerry Breast

Smoke churns skyward as an A-4 Skyhawk from USS Oriskany (CVA-34) attacks an enemy target in North Vietnam in September 1967.

the target and could see that we knocked out a junction of the spur," Ltjg. Allen reported later.

Lieutenant Junior Grade Joe Phaneuf, also assigned to VF-194, was flying as fighter escort for a photo mission over the target. "I saw considerable damage to the railroad spur," he said.

Air-to-surface missiles and rockets were used to silence radar and antiaircraft sites surrounding the target. They were struck by VA-192 pilots Lieutenant Commander Mike Estocin, Lieutenant Jud Springer and Lieutenant Junior Grade Richard Millson. Several other AA and radar sites were either hit or forced to shut down by pilots on advance missions.

The next day, the railroad bypass bridge was heavily damaged by *Black Falcons* of VA-85 flying from *Kitty Hawk*. Thousand-pounders, dropped from their *Intruders*, sliced up the span.

"We dropped a number of bombs on the bridge and destroyed at least one span, and maybe more," Lieutenant Byron Hodge recalled. Another VA-85 pilot, Lieutenant Junior Grade Roger Brodt, said, "As I pulled off, I checked our hits and they looked real good. The whole bridge was covered with smoke. You couldn't even see it. Everyone hit the area fast. We were in and out almost before the enemy knew what was coming."

Skyhawks from VA-112 streaked in on a cable bridge and inflicted heavy damage with 500-pound bombs. "We hit the southern end of the bridge," Lieutenant Junior Grade Carl Jadrnicek said later. "I was the last in on the target and I had a bird's-eye view of our bombs coming off as they hit the bridge. I looked back on the area after I pulled out and could see it burning on the southern abutment."

Bomb assessment photography taken by reconnaissance pilots after the strikes showed that all three bridges were knocked out and the ferry sunk. Two warehouses were completely destroyed, three heavily damaged.

As a bonus, a number of boxcars from three trains — trapped on a spur by previous strikes — were destroyed or derailed.

After the missions were over, rail lines were reported out in six places, including the entrance and exit to the transshipment complex.

Besides silencing many AA batteries protecting the complex, the pilots also knocked out several surface-to-air missile facilities. Some of the Naval

Aviators watched a SAM, launched during an attack, miss its target and explode near a lightly populated area outside the target zone.

Pre-strike photography had indicated that most of the civilian population had evacuated the area while the military complex was being built up during the months before the strike.

Commander Dick Powell, who led the second-day, afternoon strike, said, "The last I saw of the missile, it was heading for earth. I rolled in and had a good bead on the bridge and dropped my bombs. As I pulled out of my run, I looked back and could see a lot of smoke. Even with heavy ground fire from gun batteries, we got in and out without a scratch."

Some were not so fortunate. A VA-85 *Intruder* crew, leading the first *Kitty Hawk* strike, was shot down after it dropped a section of the first rail bridge attacked.

From June 1965 through December 1972, Navy and Marine Corps pilots had shot down 56 MiGs. Air-to-air engagements were abundant in 1972. The Navy/Marine Corps flyers downed 24 MiGs during the year. The 57th and last enemy fighter shot down was a MiG-21 by *Midway's* VF-161 on January 12, 1973.

A Vietnam cease-fire was announced on January 23 and came into effect on the 27th. The carriers *Oriskany*, *America*, *Enterprise* and *Ranger* were on Yankee Station and cancelled all combat sorties. Dating from U.S. involvement beginning in 1961 and terminating on January 27, 1973, the Navy lost 529 fixed-wing aircraft and 13 helicopters to hostile action. The Marine Corps lost 193 fixed-wing planes and 270 helicopters to enemy action. Also on the 27th, Operation *Homecoming*, the repatriation of American POWs, began. This evolution lasted until April 1. The Viet Cong released 591 POWs, 566 of whom were military personnel. Of this number, 145 were Navy personnel. Naval Aviation personnel accounted for 144 of the 145.

Combat sorties did continue, however, in support of the Laotian government at its request. This assistance had no relationship with the Vietnam cease-fire.

After intensive bombing for more than six months, the U.S. ended its combat involvement in Cambodia on August 15, 1973.

III. Power Projection

By the mid-1970s there was a declining material inventory in the Navy and difficulty in retaining experienced personnel. Even so, the F-14 *Tomcat* fighter was introduced and the Marine Corps accepted the AV-8 *Harrier*, capable of vertical and short takeoffs and landings. The F/A-18 *Hornet* was also under development. Two nuclear supercarriers were commissioned in the 1970s, USS *Nimitz* and USS *Eisenhower*.

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The end of a career was marked on February 4, 1974, when one of the Navy's most popular jets, the Grumman TF-9J *Cougar*, made final flights with VT-4 during student carrier qualifications aboard USS *Kennedy*.

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On February 20, VS-41 accepted its first S-3A *Viking*, officially replacing the S-2 *Tracker*. Meanwhile, Fighter Squadrons 1 and 2 aboard *Enterprise* sailed from San Francisco, marking the initial deployment of the Grumman F-14 *Tomcat*, the Navy's newest fighter.

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On May 12 through 14, 1975, *Coral Sea* aircraft flew protective air strikes against Cambodian mainland naval and air installations after an American merchantship, SS *Mayaguez*, with 39 crewmen aboard, was illegally seized in international waters by a Cambodian gunboat controlled by the Communist Khmer Rouge.

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On August 1, 1975, an old aircraft made a new record when a KA-3B *Skywarrior* attached to VAQ-208 completed the longest nonstop flight ever made by a carrier-based tactical jet aircraft. The flight originated at NS Rota, Spain, and ended at NAS Alameda, Calif. The A-3 covered a distance of 6,100 miles and lasted 13 hours.

In January 1976, the Navy awarded an initial funding contract to the McDonnell Douglas Corporation to begin full-scale development of the F-18 air combat fighter.

In early March, a pair of VS-22 *Vikings* landed aboard *Saratoga* off the Italian coast, completing the first Atlantic crossing by the S-3A. The planes departed NAS Cecil Field, Fla., and stopped en route at NAS Bermuda, NAF Lajes and NS Rota.

A Navy task force headed by Japan-based *Midway* made a show of force on August 21, 1976, off the coast of Korea in response to an unprovoked attack on two U.S. Army officers who were killed by North Korean guards on August 18. *Midway's* response was in support of a U.S. demonstration of military concern vis-a-vis North Korea.

On May 4, USS *America* transited the Suez Canal, the largest warship ever to do so. CV-66 was the first U.S. carrier to travel through the canal since June 1, 1967, when USS *Intrepid* navigated the waterway.

On January 13, 1977, when two AV-8A *Harriers* landed aboard *Roosevelt*, it may have been the first time in Naval Aviation history that a fixed-wing aircraft made a bow-on, downwind landing aboard a carrier at sea. This landing, with jets facing aft, demonstrated that V/STOL aircraft could land aboard a carrier without many of the conditions necessary for fixed-wing, non-V/STOL aircraft.

On April 21, 1977, *Roosevelt* returned to the U.S. from its last overseas deployment prior to her decommissioning on October 1, 1977. FDR was the first carrier to launch a jet plane on July 21, 1946.

On November 9, 1978, the Marine Corps' newest light attack aircraft, the AV-8B, flew for the first time at McDonnell Douglas Corporation in St. Louis, Mo. The B version of the *Harrier* has more than double the payload and radius of its predecessor, the AV-8A. Nine days later, the F/A-18 *Hornet* made its first flight from the same plant. The *Hornet* has a combat radius of more than 550 miles and a ferry range of more than 2,000 miles.

The Navy took delivery of the last A-4 *Skyhawk* from McDonnell Douglas on February 27, 1979, setting a record for the longest production run for any U.S. military aircraft. Built as an attack bomber and as a two-place trainer, the A-4 had been in continuous production for 26 years. The final *Skyhawk* off the production line was an A-4M destined for Marine Corps squadron VMA-331. It was the 2,960th *Skyhawk* manufactured by McDonnell Douglas.



The U.S. Marine Corps' AV8A Harrier, received in 1971, was the first V/STOL, fixed-wing plane accepted for combat use by U.S. military forces.

On October 30, 1979, the *Hornet* made its first landings at sea aboard USS *America*. During five days of sea trials 32 traps were recorded.

On November 18, *Midway* and escort ships, which had been operating in the Indian Ocean, arrived in the northern part of the Arabian Sea in connection with a crisis in Tehran, Iran, that ignited on November 4. One Naval Aviator and 14 Marines were among more than 60 Americans taken hostage in the U.S. embassy there.

Sunset came for another venerable jet aircraft, the RA-5C, on November 20 when the last *Vigilante* in the Navy made its final flight. The RA-5C, built by North American, was the Navy's only all-weather, carrier-based reconnaissance aircraft. With this last sortie, the entire reconnaissance inventory of 156 *Vigilantes* was phased out.

On December 3, *Kitty Hawk* joined *Midway* in the North Arabian Sea. The two carrier forces provided the U.S. with A-6 and A-7 attack aircraft and F-4 and F-14 fighters, which could respond to a variety of situations if called upon during the Iranian crisis.

During 1979, Navy carrier forces responded to five crisis situations around



An SH-3G Sea King pulls in divers training for aircrew readiness at NAS North Island.

the world. The following carriers responded for contingency operations due to the Iranian problems: *Constellation* (North and South Yemen); *Saipan*, (Nicaraguan turmoil); *Nassau*, (Russian combat troops in Cuba); *Kitty Hawk* (Korea); and *Midway* and *Kitty Hawk* (North Arabian Sea).

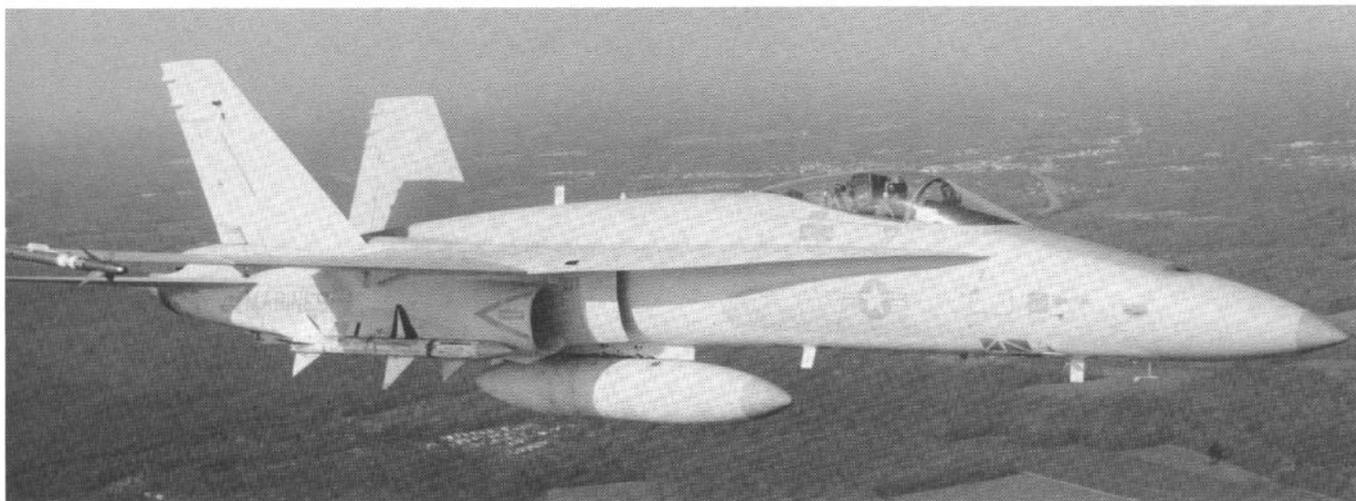
The Navy provided the sharp edge of America's power projection sword.

First Hornet Squadron

On November 13, 1980, VFA-125, the Navy's first F/A-18 *Hornet* squadron, was established at NAS Lemoore, Calif. The new unit was tasked with training Navy and Marine Corps personnel to fly and maintain the *Hornet*.

By the end of 1980, carrier operations conducted in connection with the Iranian crisis consisted of 10 tours by eight attack carriers in the Indian Ocean/Arabian Sea. The carriers accumulated a grand total of 723 days on station. Those with over 100 contingency days on station during the year included *Eisenhower*, with two tours totaling 199 days; *Midway*, with two tours representing 118 days; *Constellation* 110 days; and *Nimitz* 108 days. Other carriers involved in contingency operations in the Indian Ocean were *Coral Sea*, *Ranger*, *Independence* and *Kitty Hawk*.

A test pilot at the Naval Air Test Center, NAS Patuxent River, Md., flies an F/A-18 *Hornet* during Board of Inspection and survey trials.



On February 19, 1981, Fighter-Attack Squadron 125 (VFA-125) became the first squadron to receive the F/A-18 *Hornet*.

AV-8B *Harriers* were deployed as a Marine Air Group aboard an amphibious assault ship, USS *Nassau*, for the first time on April 13. MAG-32, composed of VMAs 231 and 542, began a Sixth Fleet deployment.

The *Blue Angels* celebrated their 35th Anniversary on June 15, 1981. The Navy's Flight Demonstration Squadron flies A-4 *Skyhawks*.

Two *Tomcats* from VF-41 aboard *Nimitz* made the headlines when they shot down a pair of Libyan SU-22 *Sukhoi* aircraft over international waters on August 19. The F-14s were on a reconnaissance mission for a missile firing exercise being conducted by U.S. ships from two carrier battle groups when they were fired on by the Libyan planes. The CVW-8 fighters were piloted by Commander Hank Kleemann and Lieutenant Larry Muczynski with their respective RIOs, Lieutenants Dave Venlet and Jim Anderson.

During 1981, Naval Aviation units and carrier forces were clearly visible around the globe. They responded to a number of crisis situations. These included the

hostage situation in Iran, contingency operations in the Indian Ocean, tension between Israel and Syria over Lebanon, the assassination of President Sadat of Egypt, and Vietnamese boat refugee rescue efforts.

On January 8, 1982, the F/A-18 *Hornet* made its first fully automatic landing on a simulated carrier deck field at NATC Patuxent River, Md.

USS *Carl Vinson*, third *Nimitz*-class carrier and the Navy's fourth nuclear-powered carrier, was commissioned on March 13.



The Skyhawk flying Blue Angels pass San Francisco's Golden Gate Bridge.

On June 30, one of the last photographic squadrons, VFP-63, was disestablished. The only F-8 and photographic squadrons still in existence at the time were reserve squadrons VFPs 206 and 306.

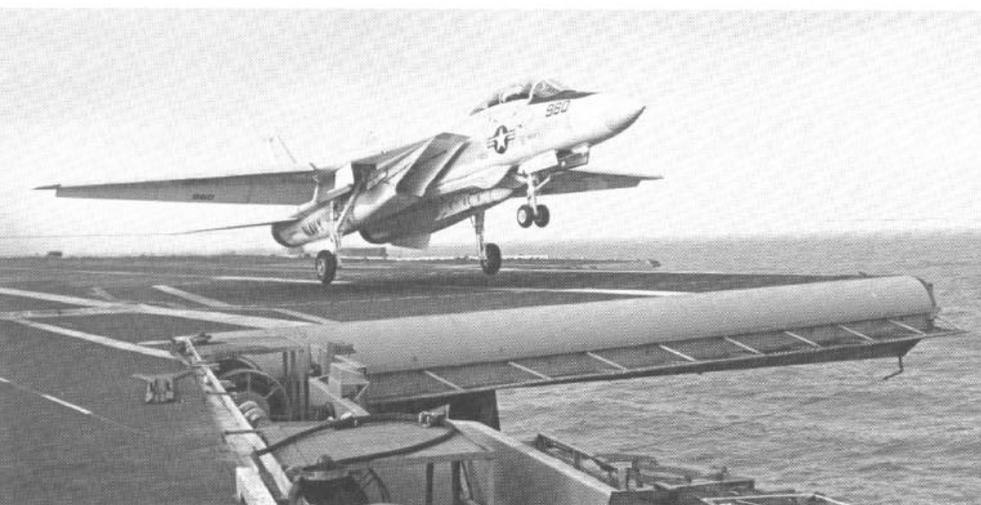
In late June, the greatest concentration of U.S. Naval Air power in the Mediterranean Sea took place when the battle group of *Forrestal* and *Independence* joined with *Eisenhower* and *Kennedy*. These ships and supporting elements steamed together in the eastern Mediterranean for several days before *Ike* and *JFK* departed for the U.S.

In late September, the Naval Air Systems Command awarded to McDonnell Douglas, teamed with British Aerospace and Sperry, a pre-full-scale development contract for the undergraduate jet flight training system designed around the *Hawk* aircraft.

October 28, 1982, signaled the 30th anniversary of one of the Navy's most venerable planes, the A-3 *Skywarrior*. The aircraft had operated as a heavy-attack bomber, radar trainer, electronics reconnaissance platform, tanker, electronics jammer, photoreconnaissance platform, airborne weapons test bed and VIP transport.

USS *Carl Vinson*, the newest addition to the carrier fleet, began an odyssey that epitomized Naval Aviation in 1983. Beginning March 1, with CVW-15 aboard, the ship circled the world on the carrier's maiden voyage. The ship traveled 60,000 miles over the Atlantic Ocean, Mediterranean Sea, Indian Ocean, South China Sea, Sea of Japan and the Pacific, visiting four continents in the process. The deployment served to display U.S. Naval Air power and its

An F-14A *Tomcat* performs touch and goes aboard USS *Forrestal*.



ability to respond to crises in all parts of the globe.

An older carrier, *Coral Sea*, did likewise but in a counter-clockwise direction departing San Francisco on March 21. The ship met *Vinson* in the Indian Ocean, bringing together the newest carrier in the fleet and one of the oldest. *Coral Sea*'s home port changed from Alameda, Calif., to Norfolk, Va.

In late March, fighter-attack squadrons were redesignated strike-fighter squadrons.

VFs 201 and 202, Naval Reserve fighter squadrons flying the F-4N *Phantom*, participated in *National Week '83* exercises, marking the first time that tactical air reserve units conducted joint operations with the Sixth Fleet. The squadrons deployed from NAS Dallas, Texas, to NAS Sigonella, Sicily — via NAS Oceana, Va.; Gander, Newfoundland; Lajes, Azores; and Rota, Spain.

In August 1983 the White House announced the names of the Navy's next two nuclear-powered aircraft carriers, under construction at the Newport News Shipbuilding and Dry Dock Co. *Abraham Lincoln* (CVN-72) is scheduled for delivery in 1989 and *George Washington* (CVN-73) in late 1991.

On August 29, the first flight of the AV-8B *Harrier II* production model was conducted at the McDonnell Douglas plant in St. Louis.

Grenada and Lebanon

U.S. forces experienced combat in 1983 in two parts of the world, Grenada and Lebanon. Beginning on October 25, A-7 *Corsairs* from CVW-6's VA-15 and VA-87 aboard USS *Independence* flew close air support missions for about a week, assisting in the U.S. invasion of Grenada. The recently-established Marxist government in Grenada had shown signs that it would allow the island to become a Cuban-Soviet outpost. The invasion succeeded.



An S-3A Viking, painted in bicentennial colors, banks over Southern California in 1976.

Robert L. Lawson

Independence entered the spotlight again in December along with *Kennedy* and its air wing, CVW-3, this time in the Mediterranean as part of the peacekeeping force positioned off the Lebanese coast. The Marine Corps barracks in Beirut had been bombed on October 23, killing 241 U.S. servicemen. A second attack killed 58 French soldiers, also part of the United Nations force in the area.

Tensions rose. Navy F-14s which made periodic photoreconnaissance runs over rebel positions around Beirut were occasionally fired on despite warnings from the U.S. government. Therefore, in a concerted effort on December 4, *Kennedy* and *Independence* planes struck Syrian anti-aircraft gun and missile sites and other targets. Opposition was heavy. A VA-85 *Intruder* was shot down. Lieutenant Mark A. Lange, the pilot, perished. Bombardier/navigator Lieutenant Robert O. Goodman survived but was captured by the Syrians. He

became the first POW in Naval Aviation since the end of the Vietnam conflict 10 years earlier. Commander Ed Andrews, Commander CVW-6, led the attack. His A-7 was hit by enemy fire but he ejected and was rescued from coastal waters.

The two aircraft represented the first loss of Navy fixed-wing aircraft in combat since Vietnam.

VA-85's Lt. Goodman, NFO aboard the A-6 shot down during the attack on Syrian targets on December 4, 1983, was returned to the U.S. on January 4.

On January 12, the first AV-8B *Harrier* of a projected order for 336 of the V/STOL aircraft, was received at MCAS Cherry Point, N.C., by VMAT-203. With over 25 percent of the structural weight composed of carbon epoxy composite material, the AV-8B offers twice the payload and radius of its predecessor, the AV-8A.

The newly configured S-3B Viking made its first flight at Lockheed's Palmdale, Calif., facilities in mid-September. The latest version of the *Viking* features improved avionics and weapons systems, including the *Harpoon* missile.

The Navy signed a contract to initiate full-scale development of the T-45TS jet flight training system by McDonnell Douglas in October. The system's aircraft, the jet-powered T-45, will replace the T-2Cs and TA-4Js used by the training command in the intermediate

and advanced phases of jet flight training.

VF-301's acceptance of its first F-14 *Tomcat* in October marked the introduction of the F-14 into the Naval Air Reserve Force as part of the Navy's total force defense concept.



Marine A-4M Skyhawks in echelon. A-4s first flew in 1954.



On October 27, the nuclear-powered carrier USS *Theodore Roosevelt* (CVN-71) was launched at ceremonies at Newport News Shipbuilding. A week later, the keel was laid for USS *Abraham Lincoln* (CVN-72). *Lincoln* will be followed by USS *George Washington* (CVN-73).

In a typical example of power projection, USS *Nimitz*, with CVW-8 embarked, sortied in response to national tasking on November 30. After the Cuban government denied the U.S. Coast Guard permission to tow a U.S. vessel which had lost power and drifted into Cuban waters, a brief show of force by *Nimitz* diffused the incident.

Throughout 1984, Navy carriers and their air wings deployed to five key global areas: the Atlantic and Indian Oceans, the Western Pacific, the Mediterranean Sea, and off the Central American coast.

Jet technology continued to be fine-tuned in 1985, and the contributions of jet aircraft to Naval Air's storehouse of power highlighted the year.

On January 30, VMA-331, the first of eight AV-8B *Harrier II* squadrons, was established at MCAS Cherry Point, N.C. This transition from the A-4M *Skyhawk* marked the beginning of tactical service for the Marine Corps' newest V/STOL aircraft. By September, the *Bumblebees* had received their authorized full complement of 15 aircraft and had completed their first weapons training deployment.

The AV-8B, an improved version of the AV-8A, has increased range and payload. Extensive aerodynamic and systems changes have achieved accurate, first-

An R. G. Smith painting of a T-45 Hawk.

pass weapons delivery; improved vertical and short takeoff and landing capability; and reduced pilot workload.

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The first two operational F/A-18 *Hornet* squadrons on the East Coast flew into their new home at NAS Cecil Field, Fla., on February 1 from NAS Lemoore, Calif., where their personnel were trained on the new strike fighter. The arrival of the VFA-131 and 132 aircraft marked a major step toward replacing the Navy's A-7E *Corsair IIs* and the Marine Corps' F-4 *Phantom IIs*.

The F/A-18 deployed overseas for the first time on February 21. USS *Constellation* (CV-64), with VFAs 113 and 125 embarked, became the first aircraft carrier to have *Hornets* assigned to its air wing. The 20 F/A-18s replaced two squadrons of A-7E *Corsair IIs*. In addition to performing both the fighter and attack roles, the *Hornet* is easier to maintain, which reduces maintenance man-hours per flight hour by 50 percent over other carrier-based aircraft.

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An EA-3B (BuNo 146451) from VQ-1 Det C aboard USS *Carl Vinson* (CVN-70) turned 25 years old on February 25. Dubbed "Aging Beauty," this *Skywarrior* has recorded over 12,000 flight hours and completed over 1,100 arrested landings. These milestones serve as testimony to the durability of this venerable jet aircraft.

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The Navy's tactical training program was expanded on April 29 when the first three *Kfir* fighters from Israel were accepted by VF-43 at NAS Oceana, Va. The East Coast adversary squadron will eventually operate 12 of the delta-winged fighters, which resulted from the marriage of the basic French *Mirage 5* airframe and the American General Electric J79 engine. VF-43 also operates A-4s, F-5s, T-38s and T-2s.

The One Navy concept got a boost on October 19 when eight F/A-18s were delivered to VFA-303, NAS Lemoore, Calif., the first Naval Reserve squadron to transition to *Hornets*.

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Navy technical evaluation of the S-3B *Viking* began in October 1985. Lockheed's S-3B features improved avionics and weapons systems, including a new acoustic processor, expanded electronic support measure coverage, increased radar processing, a new sonobuoy receiver system, electronic countermeasures, and the *Harpoon* missile.

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On October 10, 1985, America fought back against terrorism — and won. After three days of terror, tragedy and intrigue, President Ronald Reagan gave the go-ahead to bring the hijackers of an Italian cruise liner, *Achille Lauro*, to justice after they killed a U.S. passenger aboard the ship.

Four F-14 *Tomcats* from USS *Saratoga* (CV-60) intercepted the getaway plane, a chartered EgyptAir 737 jetliner. A Navy E-2C *Hawkeye* surveillance aircraft radioed the 737 to follow the Navy planes to Sigonella, Sicily, where Italian authorities took the four hijackers into custody.

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The evolution from pistons to jets has been technologically significant, and scientific advancements continue to expand the capabilities of jet aircraft. These sophisticated weapon systems — teamed with other state-of-the-art naval aircraft — comprise a winning combination of air power to maintain Naval Aviation's supremacy of the skies.

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F-14A Tomcats "salute" USS Nimitz (CVN-68) as the carrier is relieved after spending 144 days on station in the Indian Ocean.

