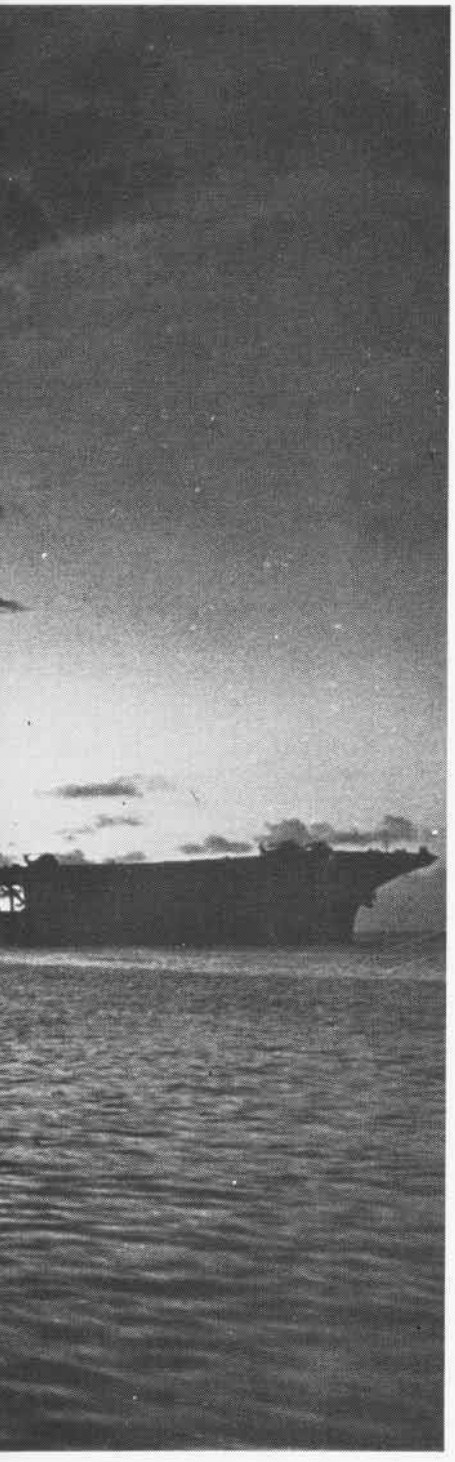
NAVAL AVIATION NEWS

JANUARY 1972

'With increased opportunity for youth to have its say and to assume greater share of leadership responsibility through early promotion, our procedures and tactics will become more imaginative and less stereotyped, thus adding to the problems our Soviet counterparts must consider in planning for their operations.' — Admiral Elmo R. Zumwalt, Jr., CNO



NAVAL AVIATION NEWS

FIFTY-FOURTH YEAR OF PUBLICATION

FEATURES

THE STAFF

COVER

One of the S-3A Viking escape system tests, on a four-mile track at NWC China Lake, Calif., was captured in this action photograph. The test sled used consisted of an actual four-place S-3A cockpit section with its canopy.

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EDITOR'S CORNER

The recent anniversary of Navy's Flight Demonstration Team, the Blue Angels, brought forth this story from Admiral Matthias B. Gardner, USN(Ret.), 74, now living quietly at Pensacola, Fla.

"It all began at NAS Anacostia with the defection of Al Williams," is the way he begins the story of the Navy's first official flight team.

Reeling off names like Ernie Pyle, David Ingalls and Claire Chennault, the early pilot describes an era when it was a tremendous accomplishment just to fly an aircraft upside down. (The admiral was once described as "the only pilot in the world other than Williams who so far has mastered the inverted falling leaf maneuver.")

"In the late 1920's, Lt. Alford J. Williams, Jr., the Navy's foremost acrobatic pilot, was keenly interested in a seaplane racer. He wheedled Admiral Moffett into putting as much money into the aircraft as the Bureau of Aeronautics could afford.

"He never got it off the water." Gardner laughs. "They came up with so many expensive 'fixes' that Adm. Moffett threw up his hands and said, 'No more.' Al got mad and quit."

Lt. Gardner was the logical successor. For a couple of years, the Curtiss Marine Trophy races had been held at Anacostia where he was operations officer. Williams' aircraft, specially rigged so that it would fly upside down, was in his care.

"I asked him if he'd mind if I took it out and exercised it," Gardner continues. "He agreed and I fooled around the back country practicing all the things he did and inventing some of my own. Word sort of got around and, so when Al quit, Commander John Howers, assistant chief of BuAer, called and wanted me to do the solo flight for the Curtiss derby races.

"I had only been practicing for about a month, and the idea of performing in front of 100,000 people 'where you had to be right ten times out of ten' gave me some anxious moments." But he admits he put on a creditable performance.

A newspaper account of that day described the specialty he inherited from Williams:

"His greatest contribution to the afternoon's program of remarkable aviation events was an inverted falling leaf, the feat performed by Lt. Williams early in May as his swan song to Naval Aviation.

"The inverted falling leaf is described by Lt. Williams as the last aerial maneuver possible with the present-day airplane. It was the last stumbling block in the way of complete mastery of the air — the last remaining position in which an airplane could be placed in flight.

"The inverted falling leaf is a maneuver attended by the greatest hazard to the unwary pilot, since each downward, sideways swoop of the plane, upside down as it is, is the beginning of the deadly inverted spin, recovery from which is exceedingly difficult.

"In this maneuver, Lt. Gardner, flying with his head hanging toward the ground and the wheels of his little single-seater fighter pointing to the sky, zigzagged toward the earth in a series of rocking sideslips, oscillating from side to side."

After that show, Adm. Moffett directed Gardner to form a three-man team. This was the spring of 1930.

Lt. A. P. Storrs III, a former member of a squadron team, The Seahawks, was one of those selected. The third member was Lt. Frederick M. Trapnell. Gardner became the leader.

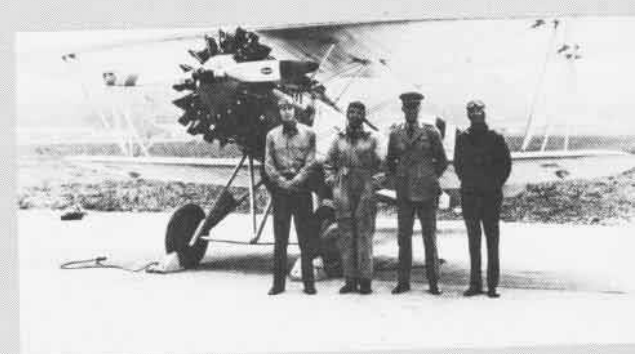
The next problem was a name. Ernie Pyle, aviation editor on the Washington Times, helped by organizing a contest. The name selected (submitted by Pyle's girl friend according to Gardner) was the Three Flying Fish.

The Flying Fish, in their F6C-4 air-cooled Curtiss Hawks (equipped with special fuel and oil systems to perform the upside-down maneuvers), put on quite a show. Their specialty was a section roll. Flying in a V formation, the leader executed a slow roll, ending upside down. The wing planes also executed a 360° roll, ending upside down, one above and one below the leader. They performed loops, spins and barrel rolls, and, of course, the falling leaf.

The team performed in 1930 at the National Air Races at Chicago, the Gordon Bennett at Cleveland and an air show in Trenton, N.J., and on several occasions in the Washington area.

The Flying Fish stayed together through the winter and spring of 1930-31; then the team was disbanded when all three were detached from Anacostia.

It was to be more than 15 years before today's Navy Flight Team, the Blue Angels, was organized.



Trapnell, Storrs, unknown individual and Gardner

NAVAL AVIATION NEWS
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New Summer Flight Suit is being Evaluated

WARMINSTER, Pa.—Comfort and safety are the essential features of the new summer flying coverall designed at the Naval Air Development Center (NADC).

Two thousand five hundred suits are being evaluated on both coasts. They are lightweight, fire resistant and easy to care for.

The sage green, one-piece garment is made of a synthetic polyamide fabric which is a high-temperature-resistant nylon. It does not support combustion, will not melt at high temperatures and does not char below 700° F. The fabric also has a smooth supple surface and excellent abrasion resistance.

To insure comfortable fit, the suit comes in 18 sizes. It also has expandable fatigue-type pockets which can be moved to various places on the suit for added versatility. The new coverall needs no special care and can be laundered in a washer and dryer without reducing its flame retardant properties.

NADC expects to make some minor changes based on evaluation and predicts that the suit will be in general fleet use in about a year.

New Role for VT-26

BEEVILLE, Texas—Following his final solo hop in the TF-9J, Ltjg. J. T. Peterson became the last student to complete the advanced training syllabus with VT-26 at NAS Chase Field. All future training within VT-26 will consist of the basic flight training syllabus in the T-2C *Buckeye*. The training stages will remain much the same as the advanced syllabus, but they will not be as detailed.

Isbell Winners Named

WASHINGTON, D.C.—The Chief of Naval Operations has announced the FY 1971 winners of the Isbell Trophy for overall excellence and superior performance in air ASW.

Winners in the Atlantic Fleet are: HS-5, VP-49 and VS-28; in the Pacific, HS-2, VP-48 and VS-29.

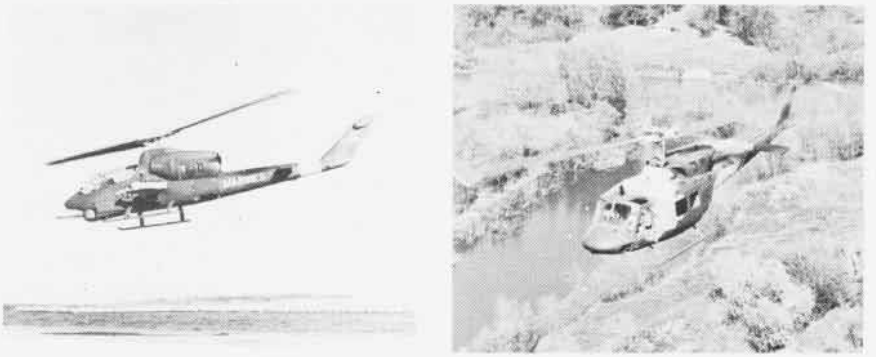
Pioneer Squadron Formed

LAKEHURST, N.J.—Helicopter Antisubmarine Squadron 15, a new type Naval Aviation unit and this country's first sea control ship squadron, was formally commissioned October 29 by Vice Admiral Maurice F. Weisner, DCNO (Air Warfare), at NAS Lakehurst.

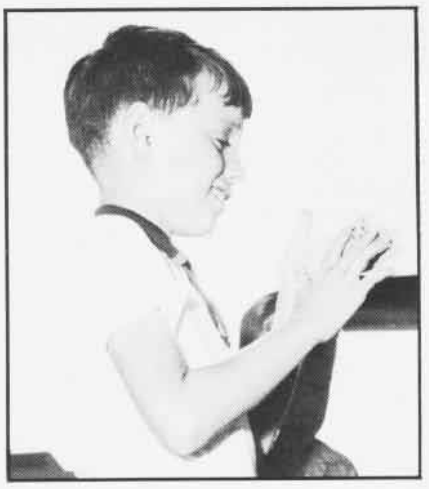
A pioneer squadron, HS-15 will help develop new sea control tactics to counter the growing threat posed by the continued buildup of the Soviet Union's missile-firing surface and underseas fleets. The squadron will eventually operate off still-to-be-built sea control ships which it will help to design, according to Commander William P. Franklin, HS-15 C.O.

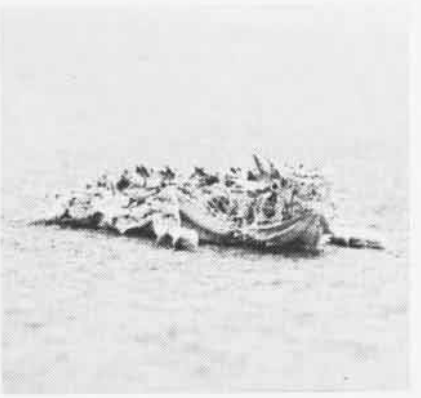
Initially equipped with jet-powered, twin-engine SH-3G *Sea Kings*, the squadron is slated to exchange them next year for a later model carrying more highly sophisticated electronic sensors and weapons.

The principal mission of the new squadron will be the protection of underway replenishment groups, amphibious groups, convoys and those task groups which do not have aircraft carriers in company.



The AH-1J Cobra, left, and UH-1N 'Twin Huey', right have completed formal BIS service acceptance trials and are currently undergoing accelerated service testing at NATC Patuxent River, Md. Both helicopters are powered by T400 Twin Pac turbine engines developed by United Aircraft of Canada; if one engine fails, the other produces sufficient power for cruise.





The smile on the face of young Mike Hoff repays everyone who had a part in finding and delivering Sam, his new friend, to him.

Great Horned Toadies

There was some doubt that AN Sam could make it. His appetite had not been up to par and he was beginning to look downright undernourished. And then there was the trip, 2,000 miles from Corpus Christi to Jacksonville in an S-2.

But Sam had his orders—issued by Rear Admiral B. D. Holder, who runs the Advanced Air Training Command. They read: "proceed via Navy air and report to Michael Hoff, Orange Park, Fla., for duty involving diversion, entertainment and love."

Sam, a horned toad, was being delivered to nine-year-old Mike Hoff. Mike's father, LCdr. Michael Hoff, Sr., a Navy pilot, has been missing in action for almost two years, shot down over Laos. Mike's "big brother" heard Mike wanted a horned toad for his birthday and stepped in to help.

PO1 Rodney R. Hughes, who has been acting as a "substitute father" for Mike, contacted Lt. Gordon E. Garthe, Protestant chaplain at NAS Corpus Christi, who began searching for a suitable toad. Several weeks later and after many fruitless calls to pet shops, Chaplain Garthe received Sam from a schoolteacher who found him on her doorstep.

All that remained was to get him to Florida. VT-28 had a training flight to Jacksonville coming up and Chaplain Garthe asked permission to put the unusual cargo aboard.

Lt. Lewis Laurito, pilot who was to take Sam, had some reservations. What about the altitude? The temperature? Could Sam make it? But the S-2 took off and Sam was on his way. And apparently with no ill effects.

And young Mike Hoff's birthday wish had come true. His second-best wish, anyway. —JOC Jim Teague

Blues Tour Orient

EL CENTRO, Calif. — The *Blue Angels* ended a successful tour of the Orient recently and received four new members when they returned home last month.

Making their first appearance in Japan, the *Blues* performed for six days at the 1971 Japan International Aerospace Show in Nagoya before a crowd of 250,000. Following its stay in Nagoya, the team moved on to Misawa, a largely agricultural area 300 miles north of Tokyo where it performed for an estimated 30,000 local citizens. Taiwan was its last stop before returning to winter headquarters at NAF El Centro, Calif. On returning, the team received its newest leader when LCdr. Don Bently relieved Commander Harley Hall.

Three other new members are Capt. John Murphy, USMC, and Lieutenants Steve Lambert and Larry Watters.

Marines Name Top Pilot, NFO for '71

WASHINGTON, D. C. — In a ceremony last fall at the annual reunion of First Marine Aviation Force Veterans Association, Maj. David G. Vest was named winner of the Alfred A. Cunningham Award as Marine Aviator of the Year (1971) and Capt. John D. Cummings was designated Marine Flight Officer of the Year and recipient of the Robert G. Robinson Award.

Maj. Vest was honored for his service with Marine Air Weapons Training Unit, Pacific, and cited for conceiving, writing, supervising and instructing a highly technical fighter syllabus, and for his efforts in the area of air-to-air tactics.

Capt. Cummings won his award for his service with Marine Air Training Branch, 2d MAW, where he developed aircrew coordination techniques and worked on tactics which allow fighter aircraft to approach enemy aircraft undetected, with all weapons simultaneously brought to bear. The latter contribution has been incorporated in the F-4 tactical manual.

The Alfred A. Cunningham Award is named for the Marine Corps' first Aviator and Naval Aviator #5. The Robert G. Robinson Trophy, a new award, is named in honor of the Marine who received the Medal of Honor for bravery as an aerial flight gunner in WW I while serving with the First Marine Aviation Force in France.

A-6 Trainers Modernized

WHIDBEY ISLAND, Wash. — Recent improvements in Detachment Whidbey FAETUPac's aircrew training capability were the modernization of two A-6 operational flight and weapons systems trainers and the installation of a permanent low-pressure chamber.

Modernization includes the addition of two electronic counter-measures systems and modification of cockpit instrumentation. With the modified trainers, the crews use actual operating procedures to maintain flight aerial navigation, tactical missions and flight emergency proficiency.

The low-pressure chamber which replaces an obsolete portable unit doubles the training capacity from seven to fourteen, and can simulate altitudes

up to 100,000 feet (Navy training doesn't normally exceed 70,000 feet). In it crewmen are exposed to pressure breathing, hypoxia and trapped-gas expansion malfunctions and are given the opportunity to employ corrective measures for the particular problem involved. Hospital corpsmen accompany each class into the chamber.

Navy regulations require all aircrewmen to qualify in the low-pressure chamber every three years.

Change of Command

NAPLES, Italy — Vice Admiral Gerald E. Miller has assumed command of the U.S. Sixth Fleet in the Mediterranean. He relieved Vice Admiral Isaac C. Kidd, Jr., who has commanded the Fleet since August 1970. VAdm. Miller previously commanded the Second Fleet, and VAdm. Kidd, who will don his fourth star, has been ordered to new duty as Chief of Naval Material, Washington, D.C.

Milestone for HS-1

QUONSET POINT, R.I.—Helicopter Antisubmarine Squadron One, homeported at the naval air station, celebrated its 20th anniversary during the month of October.

The first helicopter squadron in the Navy to be assigned an antisubmarine warfare role, HS-1 was commissioned on October 3, 1951, at NAS Key West.

HS-1 moved to Quonset Point in September 1970 as part of the consolidation of Atlantic Coast ASW air-units and commands.

Today the squadron's mission is to train pilots, aircrewmen and maintenance personnel to the maximum level of combat readiness in rotary wing carrier ASW techniques. Each year, the squadron trains more than 100 pilots and 200 enlisted personnel, flying in excess of 7,000 hours.

HS-1, flying the SH-3A, D and G *Sea Kings*, is led by Commander Jesse B. Morris, Jr.

Unit Cited for Safety

NORFOLK, Va. — Headquarters Squadron, Headquarters, FMFLant, has been awarded the FMFLant Commanding General's Aviation Safety Award for FY 71 for amassing 3,404 accident-free flight hours.

Since its last major accident in March 1956, the squadron has flown more than 50,500 consecutive accident-free hours.

Led by Lieutenant Colonel Daniel Prudhomme, the HedRon is currently flying the C-131 Convair Liner, C-54 *Skymaster*, VH-34 *Seahorse*, T-28 *Trojan* and US-2 *Tracker*.

The first F-14 on the West Coast arrived at the Pacific Missile Range on October 30 for extended equipment and installation tests. Integration of the avionics/weapons systems and flight development will be done by Grumman; Hughes Aircraft will test the Phoenix missile control system; both will be monitored by the Naval Missile Center. Four additional Tomcats will join the pre-production model for the tests which are scheduled for completion in 1973.

Winning Entry for CCGLant

NAS NORFOLK, Va. — The Atlantic Fleet Combat Camera Group was presented the Grand Award of the International Film and TV Festival in New York. A multi-media presentation entitled "Struts, Propwash and Salt Spray," CCGLant's winning production, was in competition with over a dozen multi or mixed media productions.

Tracing 60 years of Naval Aviation, the presentation employs three screens, 12 slide projectors, three 16mm motion picture projectors and is totally pre-programmed by a sophisticated digital memory system.

Scripted and directed by PH2 Philip J. Fraga, with production assistance by PHC Conrad J. Wiitala, the production was completely produced by Navy enlisted personnel. PHCS Don Timmerman served as sound editor and motion picture advisor while PH2's Don Middleton and Gene Thompson produced graphics and copy slides.

LCdr. Robert D. Baer, commanding officer, accepted the award.

The festival, now in its 14th year, is the leading annual event of the professional film and TV industry that encompasses all phases of film production, filmstrips, industrial films, television and cinema commercials up to film introductions, lead-in titles, public service TV programs and multi-media productions.

Britannia Trophy Awarded

JACKSONVILLE, Fla.—The Britannia Trophy has been awarded to Ltjg. Emile A. Borne, a replacement pilot with VA-74 at NAS Cecil Field. He received the annual British Royal Navy award for attaining the highest weapons score while attending Naval Air Advanced Training. The award is made in appreciation of the training given British pilots by the U.S. Navy during the Korean Conflict.

The presentation was made by Rear Admiral J. D. Treacher, Royal Navy, aboard the British carrier, HMS *Ark Royal*, which was visiting this area.

GRAMPAW PETTIBONE

And Then There Was One

An F-4J *Phantom II* and an A-4E *Skyhawk* launched from a West Coast air station on a two-plane, day syllabus tactics flight. The F-4 was piloted by a lieutenant (fleet replacement pilot) with an instructor RIO in the rear seat. An instructor pilot was flying the *Skyhawk*.

The two aircraft proceeded to the tactics area—over water adjacent to the coast. During tactics maneuvering, the RIO noted his pilot was having difficulty keeping visual contact with the other aircraft.

While the pilot was maneuvering his *Phantom* at 20,000 feet (with the aircraft decelerating through 400 knots), and twisting around in the cockpit to retain—or regain—visual contact, the forward canopy left the aircraft.

The instructor RIO experienced rapid decompression and sudden severe windblast. He couldn't see the pilot or contact him on ICS. He surmised the pilot had ejected. Thinking he was alone in the aircraft, the RIO ejected, using the lower ejection handle. The ejection worked as advertised, and he was picked up by helo and returned to base uninjured.

The *Phantom* pilot made an uneventful return to home base—minus his forward canopy and his RIO. Investigation indicated inadvertent actuation of the front canopy handle, probably by a pencil or pen in the shoulder pocket of the pilot's flight suit.

Grampaw Pettibone says:

Sufferin' catfish! Seems to me that this RIO was in a heck of a hurry to get out of his machine. At 20,000 feet in controlled flight, this lad should'a taken stock of things before assuming the driver had ejected. That pilot and everyone in his unit ought'a "read and heed" all the information put out by the Safety Center on pencils/pens in the shoulder pocket of F-4 drivers' flight suits. One recent Safety Center publication recommended a "fix" in the form of a flap over that pocket. Good idea.

Come on lads, let's do more than *file* our safety publications!

The Setup

Following flight planning and briefing, a lieutenant junior grade instructor and his ensign student manned their TF-9J *Cougar* for a cross-country to NAS Gulf Coast. Preflight, takeoff and climb to altitude were without incident. Airborne over another NAS, the pilot contacted destination Metro and received the weather as 300 feet obscured, one-half mile visibility in heavy thunderstorms—with no immediate improvement forecast.

The instructor decided to land at the NAS he had just passed and wait for improved weather at his destination. The landing, on a wet runway with a crosswind, was uneventful. Following refueling and about a two-hour delay, the instructor and student again made an uneventful departure for NAS Gulf Coast, where the weather had improved. Since the flight was of relatively short duration, the pilot held his wing transfer of fuel, hoping to dump fuel at his destination.

The *Cougar* entered GCA and began dumping while in VFR conditions. Turning base leg, the internal fuel was at 4,000 pounds; so, the pilot requested a 360° in order to burn up more fuel, also requested braking action from the GCA controller. GCA, after checking with the tower, reported there were no reports but that the runway was "fairly dry." The fuel was still at 3,500 pounds as they turned into final.

The student flew the GCA approach and the instructor took over at one and one-half miles. The landing was on speed followed by aerodynamic braking and use of wheel brakes, at which time the aircraft skidded. The instructor dropped his hook, preparing for a long field arrestment if it proved necessary, while continuing what he described as light brakes. At this time, the port tire blew and the aircraft drifted left— the right brake and rudder had no effect. The aircraft left the runway. The port mainmount of the *Cougar* struck the arresting gear housing, collapsing the port main gear, and the aircraft came to rest 50 yards from the edge of the runway. The uninjured pilots exited their damaged aircraft.

Investigation revealed that, although within limits, the aircraft was very near gross landing weight. And there were puddles of water on the runway.

Grampaw Pettibone says:

Holy mackerel! What the heck kind of a report is "fairly dry" — does it mean "partially wet"? I can't get upset at this lad who initially displayed some darn good judgment in diverting to another field and waiting for better weather. But I can't understand how we allow personnel to lull our pilots into complacency. There is something lacking in the training and supervision of a tower operator who puts out "bum dope" — on runway conditions, particularly when it contributes to an accident. This brings up a number of questions: Where was the tower supervisor? Why wasn't the tower operator *aware* of runway con-

ILLUSTRATED BY Oglom

ditions? Who is responsible for keeping the tower informed? the operations officer? the OOD? Can this situation exist at your NAS? Check it out! It takes everyone's cooperation to make a safe flight!

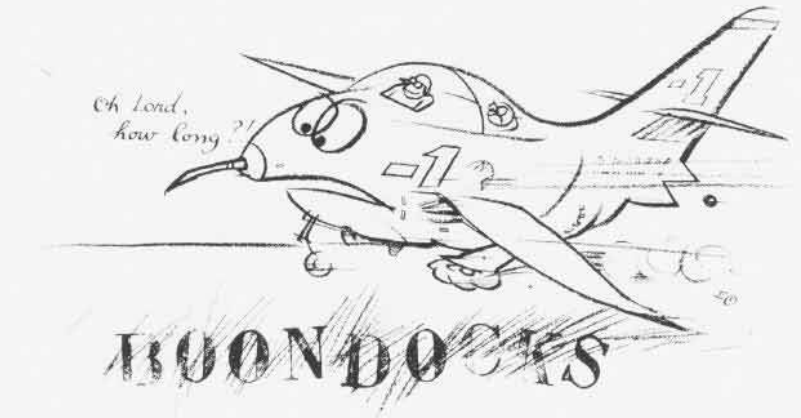
Would You Believe VFR?

The lieutenant ferry pilot was delivering a UH-1N *Huey* from NAS Midwest to NAS Atlantic Coast. During one of his en route stops, a phone call home revealed a close relative was in the hospital, so he decided to RON at a civilian field—in order to visit the sick relative.

Following the visit and six hours' sleep, he and his enlisted crew member arose at 0630, ate breakfast and arrived back at the field at 0710. The pilot conducted a preflight and completed a VFR flight plan to his ultimate destination with an en route fuel stop.

He obtained his weather brief, via the radio of a Cessna 150 on the deck, by contacting the flight service station approximately 35 miles away. The airport manager estimated the weather at the field as 200 feet scattered, 400 feet broken and one to two miles' visibility. (This was substantiated by a pilot report ten minutes after the *Huey* took off.) The poorest weather forecast for the route was for a station 20 miles away which was forecasting 800 feet overcast, visibility two miles with light rain and fog; occasionally 400 overcast, visibility one mile in light rain and fog.

The lieutenant and crew member manned the aircraft, conducted pretakeoff checks and departed VFR at 0815. The *Huey* climbed to 500 feet on an easterly heading. When approximately ten miles out, the pilot spotted a low cloud layer and descended to 300 feet AGL in order to stay VFR. After passing under the clouds he climbed to 500 feet again. About 15 miles out, another low cloud layer appeared, and the pilot descended to 200 feet AGL and slowed to 80 knots. At this time, the helo entered IFR conditions. (There was a five-degree disparity between the pilot and copilot attitude gyro.) At 200 feet, the pilot, now suffering from an extreme case of vertigo, descended again, attempting to regain VFR conditions. The crew member saw that the aircraft was rapidly approaching the trees and told the pilot of the impending ground contact. He immediately initiated a high flare, which decreased his forward speed. The aircraft gained a five-to-ten-knot aft motion and hit the trees, tearing off 15 feet of the tail boom and coming to rest on a heading of 300°, 30° left wing down, four feet off the ground, and supported by trees and vines. The uninjured crew left the aircraft as a small fire developed in the aft section. An outside witness notified the local fire department; the pilot and crew member were examined at a local hospital and released.

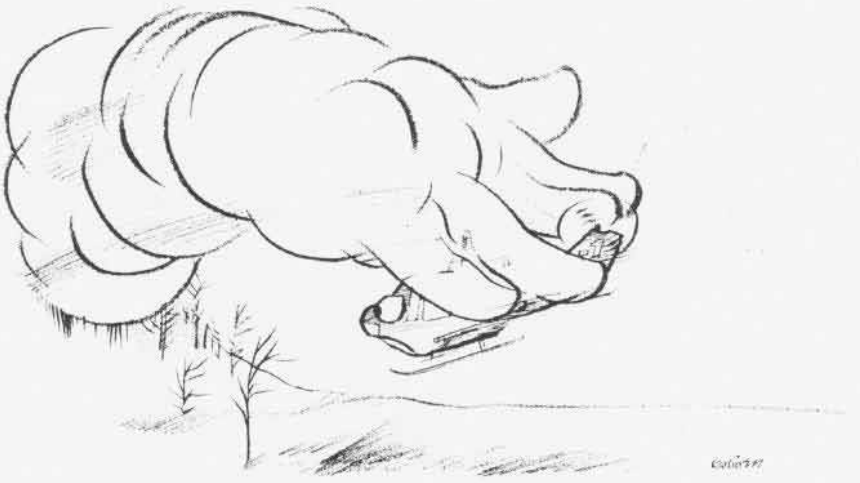


Grampaw Pettibone says:

Dad blasted! In spite of all the "tales of woe" we have seen about aviators trying to sneak under the weather — they are still doing it! With the type of weather existing and forecast, it was sheer stupidity — of the highest order — to attempt this flight VFR.

In addition, this lad, knowin' that he was going to be flyin' at minimum altitude on this trip, didn't even bother to write down terrain heights or clearances on his preflight card! I don't believe it!! This pilot's instrument experience compares with the least I've ever seen for a gent of his seniority level! To top it off, his unit issued him an instrument card — when he hadn't met even the minimums. (Sounds like a supervisory problem.) And one gent tried to alibi that by pointing out the number of night helo combat hours the pilot had! I sure don't remember anything in 3710.7F about nighttime substituting for instrument time. If the fellas who set up this instrument requirement felt there was a correlation between nighttime and instrument time, I guess it would'a been mentioned in the General NATOPS. The instrument time required in OpNavInst. 3710.7F is a *minimum*, and every aviator should have more, but at least, that!

There were just too many things wrong with this whole fiasco. And, in addition to pilot factors and supervisory problems, the pilot had a medical problem. Goes ta show ya. Accidents don't just happen, they are caused!



The Smart and The Dumb

By LCdr. Paul N. Mullane

In the dim light of pre-dawn, men move quickly and precisely as they perform functions vital to their ship's mission. The ship is an aircraft carrier turning into the wind to launch aircraft assigned to one of the attack squadrons on board. In rapid succession, A-6 *Intruders* are catapulted into the growing light of early morning, each carrying not only a greater weight of destructive ordnance than any previous carrier-based attack aircraft, but also a greater variety of weapons than ever before.

The plain old iron bomb is still there, lodged on its assigned stores station among its more sophisticated neighbors—the "smart" weapons. For that is one of the terms used in describing the capabilities of today's air-to-surface weapons. In addition to the traditional categories of bombs, rockets and missiles, an ordnanceman now distinguishes between "dumb" and "smart" weapons.

However, even the dumb bomb has changed considerably from its WW II or Korean War ancestor. It is slimmer and sleeker, reflecting its low drag characteristics. Members of the Mk 80 series are now employed by Navy and Marine squadrons in the majority of bombing operations. These bombs, due to the relatively light weight of their casings, contain a greater amount of high explosive for their overall weight than their predecessors. They may be fitted with conical fins for conventional delivery, or with retarding fins which allow high speed aircraft to conduct low level bombings without the normal danger from ricocheting bombs or bomb fragments. An Mk 80 series bomb, equipped with retarding fins, is labeled *Snakeye*. After fin opening is initiated by a spring under each fin, they are then opened to full deployment by the airstream.

While they may be called dumb bombs, this series has capabilities beyond those usually associated with this type of ordnance. Mk 80 bombs may be fuzed in nose or tail with mechanical and electrical fuzes. When an electrical fuze is used, the pilot is able to select, in flight, the type detonation suited to the target he plans to attack. If a troop concentration is to be neutralized, a proximity setting may be selected. If a surface burst is desired, the instantaneous setting may be picked. If penetration is needed, a delayed action selection may be made. Each of these options may be made in turn as various targets present themselves.

There are four sizes of bombs in the Mk 80 series: Mk 81, 250 pounds; Mk 82, 500 pounds; Mk 83, 1,000 pounds; and Mk 84, 2,000 pounds.

The Mk 81 is 74 inches long, 9 inches in diameter and contains 100 pounds of high explosive. It has been used mainly by Marine Corps aircraft for close air support against enemy troop concentrations and light vehicles and in landing zone preparation. The Mk 81 is classified as a blast/frag type and may be delivered by any Navy or Marine attack aircraft, as well as the F-4 and F-8E.

The next in the series, Mk 82, is the most common dumb bomb in the Navy, making up 90 percent of free-fall ordnance dropped from naval aircraft in Vietnam. It is also the bomb normally fitted with *Snakeye* fins. Employed against general targets, including vehicles, supply dumps and troops, it weighs a little over 500 pounds and is 87 inches long and nearly 11 inches in diameter.

The second most widely employed free-fall weapon in recent use is the Mk 83, which contains 445 pounds of high explosive in its 985-pound total weight. It measures just short of 10 feet in length and 14 inches in diameter and is used primarily against harder targets than its smaller brothers. Bridges, roads, lightly armored vehicles, dug-in positions and reinforced bunkers are on the receiving end of this weapon.

The last and largest of the series, the Mk 84, is in the 2,000-pound category. It is a foot and a half in diameter and over 12½ feet long. The Mk 84, though seldom used, has good penetration qualities. Among its objectives are bridges, roads and deep tunnels. Like all others in the series, it may be delivered by the A-4, A-6, A-7, F-4 and F-8E.

A feature soon to be introduced in the Mk 80 series is thermal protection characteristics. Because of the inherent danger involved when heavily armed aircraft are exposed to flight deck fire, a program was established to reduce the cook-off problem. After a number of materials were studied and numerous tests conducted, a thermal protective coating of ablative material was selected for application to the exterior of the bomb casings. The non-coated Mk 82 would normally explode in about four minutes when engulfed in a fuel fire. The same bomb, coated with current thermal protective materials, will remain inert for at least nine minutes and then, in most cases, will deflagrate instead of exploding.

Follow-on development is planned for an improved series of bombs. Though R&D has not yet begun, this new series is expected to have increased accuracy, improved aerodynamics, better penetration and a more efficient fragmentation pattern. This series is referred to as the Advanced General Purpose Bomb (AGPB). While the Mk 80 series represents a Korean War-era design which has been continuously modified to meet changing battlefield conditions and aircraft delivery capabilities, the AGPB will be a completely new design. In addition to improved thermal protection, it will have improved handling and storage characteristics. Planned as "all up" weapons, these bombs will reduce manpower requirements by eliminating component handling and will simplify loading and storage problems by commonality of warheads with other weapons.

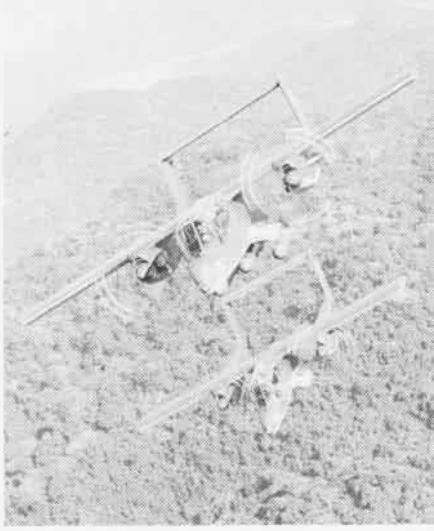
Three sizes are planned: light, medium and heavy, approximately 500, 1,000 and 2,000 pounds.

The lightweight AGPB will be of the blast/frag type designed for close air support, to be used against enemy troops, vehicles, supply dumps, light structures, hastily prepared bunkers, and antiaircraft gun and antiair missile sites. It may also be used for landing zone preparation. Any aircraft capable of dropping the Mk 80 series can deliver AGPB's. The light AGPB may be fuzed to provide instantaneous or delayed detonation or a low airburst.

The medium size AGPB is designed for moderate penetration and can be fuzed to explode upon impact or with varying degrees of delay. Its targets will include fortifications, buried ammunition dumps, hardened gun sites or aircraft shelters, bunkers, bridges, roads, dams and power plants.

The last and biggest of the series, the heavy AGPB, is a demolition blast type bomb designed to knock out the same targets as the Mk 84.

Ordnancemen aboard Kitty Hawk move MK 82 Snakeye-configured bombs to attack planes for next strike. A-4, below, delivers Snakeyes while A-6, opposite, drops conical fin bombs.



Bronco, above, carries three FAE landing zone preparation bombs over Vietnam. At left, Corsair II's move toward launch position with loads of Rockeye anti-tank cluster bombs.

All the bombs described so far are expected to remain intact until striking their target. The next are not. These are the dispenser-type bombs. *Rockeye* is perhaps the best known of this type. *Rockeye* consists of a dispenser case containing a large number of bomblets, tail fins and a fuze. It is carried and dropped in the same manner as the Mk 80 series. On release of the bomb from the aircraft, an arming wire initiates the time-delay cycle in the fuze. When the fuze is actuated, it opens the forward end of the dispenser casing and the airstream separates the two halves, releasing the bomblets. The bomblets provide area coverage against tanks, vehicles, light material and supply areas. Each bomblet contains a small, shaped explosive capable of penetrating several inches of steel. Though primarily aimed at armored vehicles, the bomblets yield enough fragmentation to offer an anti-personnel capability. Again, all attack aircraft can deliver *Rockeye*.

A follow-on weapon which is presently nearing introduction to active service is the Anti-Personnel/Anti-Material (APAM) bomb. This is also a cluster bomb which uses the *Rockeye* dispenser and is filled with a much greater number of target-discriminating bomblets. APAM bomblets are smaller and, while they do not have quite the penetration ability of the *Rockeye* bomblets with respect to armor, they possess a capability which *Rockeye* cannot match. As each of the bomblets impacts in the target area, the type surface they hit determines how they react. On striking a hard target, an instantaneously fuzed, shaped charge blasts through the nose of the bomblet. If, however, a soft surface, such as sand or dirt is struck, a small rocket motor is actuated boosting the bomblet back into the air where a fragmentation airburst is achieved.

A third dispenser-type bomb rounds out this group of weapons. The CBU-55, Fuel-Air Explosive (FAE), is a new "all up" cluster weapon designed for landing zone preparation. It is composed of a dispenser shape housing three FAE containers and is opened by a time delay fuze. At the pre-selected time, the individual FAE's are released in a pre-set stick deployment. A contact fuze on each FAE container initiates the dispersion of a fuel cloud and, at the same time, disburses detonators which set off the explosive. FAE bombs provide an explosion which clears land mines, booby traps and vegetation. It also destroys any light material in the target area and neutralizes concealed troops. The CBU-55 was developed for use in Vietnam by helicopters and slow flying, fixed wing aircraft (OV-10's of VAL-4).

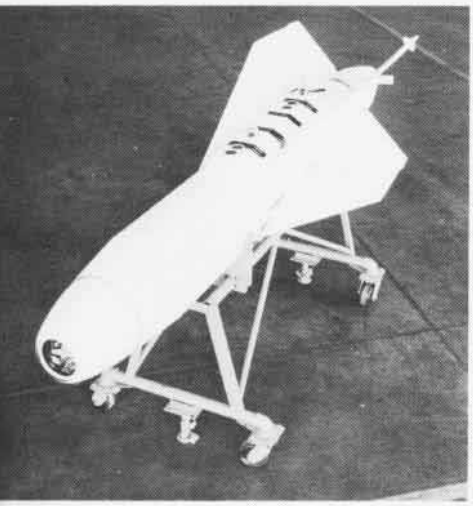
Not all free-fall weapons, however, are dumb bombs; there are a few smart ones in this category. One of the better known is *Walleye* which is an electro-optical guided weapon developed by the Naval Weapons Center at China Lake, Calif. Initial design studies for *Walleye* began in 1958, and in 1966 a production contract was awarded. *Walleye* is a medium range glide bomb used against general land targets, including bridges, buildings, caves and other structures. It may also be used against ships and other waterborne targets. *Walleye* can be launched from high or very low altitudes. It gives the delivery aircraft standoff protection and at the same time provides much greater accuracy

CBU-55 releases fuel containers which disburse explosive clouds, clearing hazards to helicopter landings. Walleye, right, homes, directed by self-contained TV guidance, on its objective.

than conventional delivery. Its standoff range within the delivery envelope is governed largely by the pilot's ability to acquire and identify the desired target. Once this is done, the pilot matches visual acquisition to the presentation on the TV scope in his cockpit. The TV image is fed from the electro-optical camera in the *Walleye's* nose. When the bomb is released, it glides toward target on four stubby wings, correcting its approach path through a self-contained guidance system that homes in on the target's image. The result has been an outstandingly accurate weapon, achieving a very high percentage of direct hits.

Walleye, which has a blast/frag warhead, comes in two sizes: *Walleye I* with an approximately 1,000-pound warhead, and *Walleye II*, with an approximately 2,000-pound warhead. *Walleye I* has been in service since 1967. Plans call for the first *Walleye II* to be placed aboard Navy aircraft carriers in the near future. *Walleye I* is a little over 11 feet long, has a diameter of 15 inches and a wingspan of 45 inches. Its bigger brother, *Walleye II*, is somewhat longer than 13 feet and is 18 inches in diameter. Though its wingspan is 51 inches, an extended range version with larger wings is being developed.

Another improvement now under development will incorporate data link into the weapon to enable the pilot to lock on and release his bomb at a general target area or complex, thus allowing the aircraft to depart the area at a greater distance from the target. Data link will permit the pilot to control the weapon from launch to target impact. Once released, *Walleye* is powered by a self-contained ram air turbine that provides electrical power supply to guidance and control



This composite photograph illustrates Walleye homing in on high priority target in SEAsia.

units. *Walleye* is used by USN, USMC and USAF aircraft. In the Navy, *Skyhawks* and *Corsair II's* carry *Walleye*.

One more smart bomb completes the inventory. This is the USAF-developed laser guided bomb (LGB), which will enter Navy service shortly. The LGB takes the standard Mk 82 and Mk 84 dumb bomb and adds a strap-on laser guidance unit together with glide and control fins.

A combination seeker and guidance section is mounted on the forward end. Integral parts of this unit are canards which serve as the control surfaces for the LGB. Enlarged tail fins provide the extended glide range required to make this an effective weapon against a broad spectrum of moving or point targets. The LGB is used in conjunction with a laser illuminator which is normally located with a ground or airborne forward air controller. A typical example of its use might work as follows: Friendly troops are pinned down by a well dug-in enemy or attacked by an enemy tank force; radio contact is made with nearby Marine attack planes armed with LGB's; the ground forces direct the aircraft to the vicinity and illuminate the target with laser equipment; the pilot must then acquire the target visually or by using his laser search set; then, when within the delivery "basket," he drops the LGB which homes in on the illuminated target; and shortly thereafter there is a loud explosion (instantaneous or delayed as selected by the pilot before release).

The next air-to-surface weapons to be considered are those with self-contained motive power as compared to the gravity-powered weapons just discussed. The first group, termed rockets, like dumb bombs, is considered separately from missiles which are just smart rockets. The simplest of this category is the well known 2.75" Folding Fin Aerial Rocket (FFAR) which is in use in all the armed services. Though originally designed for an air-to-air role in the post-WW II years, the 2.75" FFAR has now assumed an air-to-surface mission with the incorporation of different fuzing and warhead characteristics. Warheads are available in several varieties to provide blast, demolition, fragmentation or smoke effects. The latter is primarily designed to emit smoke for target marking purposes, but has been found to have useful incendiary side effects. The 2.75" rocket is used against a wide range of targets, including personnel, vehicles, parked aircraft, radar sites, and fuel, ammunition and military supply storage areas. Its low spin rocket motor makes it a good standoff weapon for helicopters and slow fixed wing aircraft.

The FFAR consists of a fuze, warhead, and motor which includes igniter, nozzle and fin assembly. It varies in overall length from 53 inches to 63 inches, depending on the warhead attached. Warheads also vary in weight. There are 10-pound and 17-pound anti-personnel/anti-material blast types, 10-pound and 5-pound white phosphorous marking smoke types, and an anti-personnel flechette-type warhead. The flechette warhead contains approximately 2,200 darts,

Close-up of the 2.75" FFAR 19-place rocket launcher illustrates striking power available to attack aircraft. A-4, below, launches FFAR's during WestPac deployment.

VA-25 ordnanceman checks Zuni rockets in wing-mounted pod aboard Coral Sea prior to tactical mission assigned by Seventh Fleet.

in a hollow aluminum body, that are fired forward at the appropriate moment by a fuzed charge. Navy aircraft carry and launch 2.75" FFAR's in either 7 or 19-tube limited-reusable launchers. A program is currently under way to provide the 2.75" rocket with a wrap-around folding fin system which allows a rocket motor of increased length to fit within the present dimensions, providing greater range.

The second rocket in the Navy's inventory is *Zuni:* a five-inch-diameter, 110-inch-long launcher-contained weapon available with a number of warheads. *Zunis* are stored, shipped, carried in flight and fired from a four-round cylindrical launcher. A special two-round launcher is provided for F-8's.

Warheads available for *Zuni* include a general purpose (GP) warhead which provides blast and heavy fragmentation, and has point detonating delay or proximity fuzing. A high explosive, anti-tank shaped charge warhead provides penetration of several inches of armor or several feet of concrete. A directed fragment head increases lethality up to five times over the older GP version, and a white phosphorous warhead is used for its incendiary effect as well as target marking ability. Another *Zuni* warhead carries a flare capable of providing one-million-candlepower illumination at four to five miles ahead of the launching aircraft.

Zuni was designed to replace the WW II-era HVAR rocket and, like that weapon, it also has a solid propellant motor. *Zuni,* like the 2.75" FFAR, has folding fins and a fairly flat trajectory. It was approved for operational use in 1957 and shortly thereafter went into mass production. *Zuni's* targets include gun emplacements, missile launchers, trains, truck convoys, barges, submarines and small ships, fuel storage and supply dumps, rail yards, radar stations and power plants, among many others.

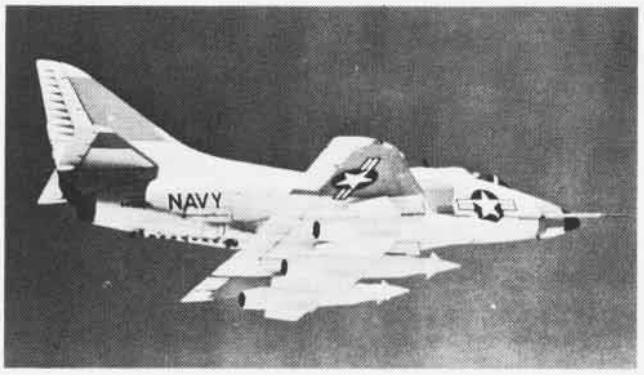
The next category of air-to-surface launched weapons are the smart rockets, termed missiles. There are six missiles: four that are currently in use and two that are in various stages of development. They are *Bullpup, Bulldog, Condor, Harpoon, Shrike* and *Standard ARM.* The oldest of those now in use is *Bullpup* which originated from a Korean War requirement for a standoff weapon to be used in dive bombing, that would also give increased accuracy. Though Navy and Marine planes proved very effective in the close air support and interdiction role in Korea, the loss of aircraft due to ground fire and even from the blast of their own bombs proved too costly. In 1951, a study to find a better method, led eventually to the development of *Bullpup,* which allows the pilot to guide the missile onto the target and still pull out of his dive at a much higher altitude.

Bullpup is composed of three sections: a guidance section in the nose with a radio receiver and directional control equipment, a 250-pound or 1,000-pound warhead section in the center, and a liquid hypergolic fueled engine at the rear. (Some solid-fueled 250-pound *Bullpups* are also in the inventory.) Four fin-like wings provide aerodynamic lift. The three sections are assembled in the field to form a complete weapon. The tail section also contains two flares which give off a bright orange light which the pilot, as the "computer" in the system, uses to visually guide the missile to its destination. He does this by continuing his dive, following the missile and sending radio command signals to correct its flight path as it speeds at over Mach 2 toward its target. The missile receiver relays the radioed signals to a control package which actuates four control vanes located on the nose section.

Bullpup may be launched between 5,000 feet and 40,000 feet at a distance of five to ten miles from the target. The launching aircraft is normally still three miles from the target at the time of impact.

The 250-pound warhead is available in two forms, one designed primarily for its blast effect, and a modified version which is fitted with a collar of ball bearings, used as an anti-personnel weapon, and equipped with proximity fuzing to provide an airburst 15 to 20 feet above ground level. The 1,000-pound *Bullpup,* like its smaller companion, is primarily a demolition weapon intended for use in air support of ground forces against hard targets or for interdiction missions against enemy supply and communication lines.

The smaller *Bullpup* is ten feet long and a foot in diameter while the larger version is over 13 feet in length and nearly 18 inches in diameter.



Early models of Bullpup are mounted on FJ-4 Fury during test operations at Point Mugu. Right, A-4 carries three large model Bullpups.

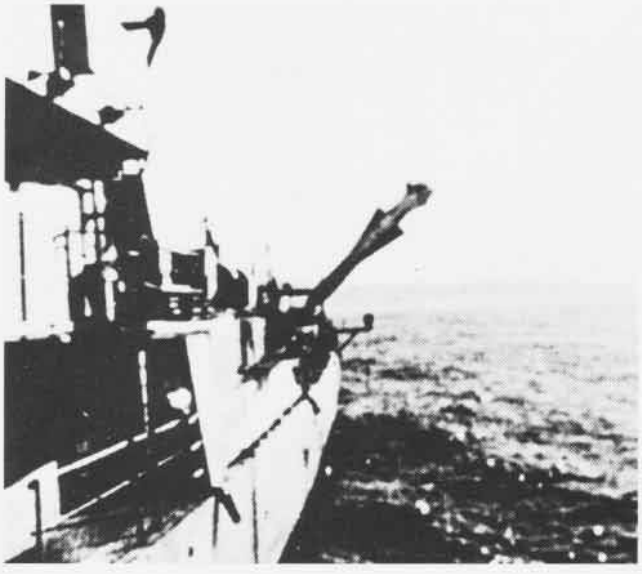
The next step in *Bullpup* development became known as *Bulldog*. This is a standard 250-pound warhead *Bullpup* with a new nose section containing a laser guidance system. It provides more accurate delivery on a specific target—designated by a forward air controller (FAC)—and gives the delivery aircraft a greater standoff range, avoiding small caliber ground fire. The laser system also allows a higher level of control for use in close proximity to friendly ground troops. Close support delivery of *Bulldog* involves teamwork between the FAC and the pilot. The FAC who may be airborne, but who is normally located on the ground, locates and identifies a target and requests air support. When the aircraft enters the area, the FAC illuminates the target with a portable laser designator, while the pilot, flying toward the target area, initiates seeker scan. On locating the illuminated target, the pilot aligns his plane as necessary and launches the *Bulldog* which homes in on the unlucky laser-designated objective.

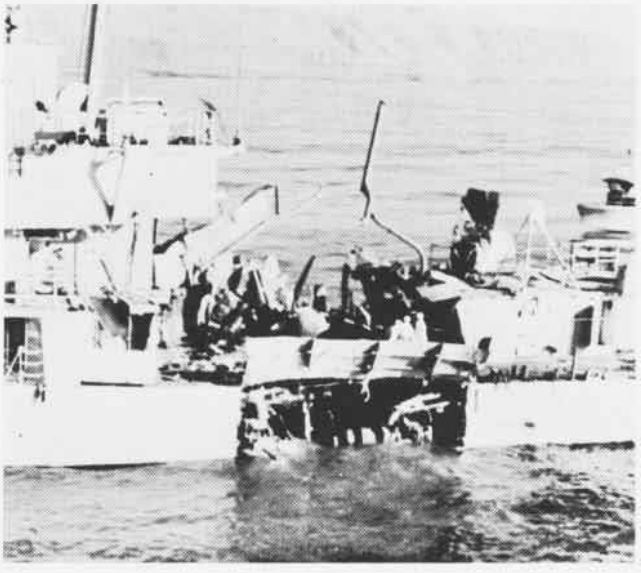
The next step along this line of development is the *Condor* missile now under development and testing. It is somewhat larger than *Walleye* and has a warhead over twice as large as the smaller *Bullpup*. Its high explosive is behind an electro-optical seeker combining automatic and command control guidance in a data link equipped system. A solid rocket motor and control fins complete the missile.

Condor's mission will be to attack a broad spectrum of high value tactical targets, heavily defended by antiaircraft guns and/or surface-to-air missiles and requiring a long-range standoff missile. Attack with any of the previously mentioned weapons requires prior visual acquisition of the target by the pilot. He must penetrate the air defenses along the attack route and then in the attack phase enter an area of intense antiaircraft defenses to deliver his weapon. Conventional delivery tactics in this environment can lead to heavy attrition of attacking aircraft and at the same time result in degraded accuracy. To be effective in this situation, a missile with greater standoff range and a high order of accuracy is needed. *Condor* is designed to be launched against a specific target, fly to its objective in any of a variety of cruise altitudes and approach trajectories and make course corrections as directed. It will be capable of coping with specific defense configurations, weather conditions and target characteristics.

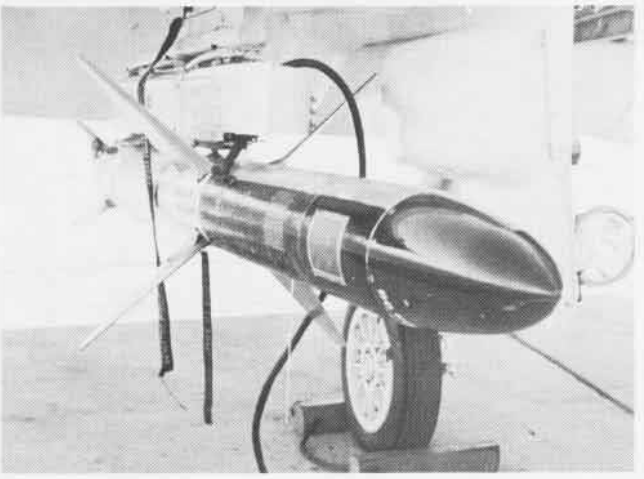
After launch, *Condor* follows a programmed flight path, its progress monitored by the launching aircraft. Search and automatic lock-on to the target may be accomplished remotely.

Condor may receive automatic or manual override instructions to alter heading or altitude. After target acquisition, *Condor* takes over, homing automatically with a subsequent capability for aim point readjustment.

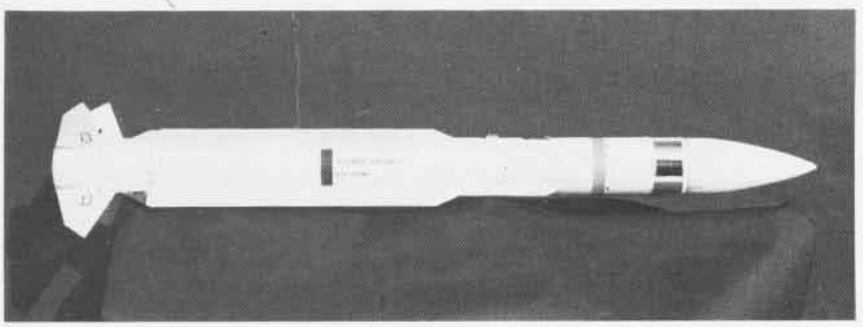




Condor is designed to attack high value targets that lie in heavily defended areas, homing automatically or under remote guidance.



Shrike anti-electronic-radiation missile homes on a wide variety of frequencies to carry out its mission against enemy air defenses.



Harpoon anti-ship missile, at top, is shown in its ship-launched form. It is air launched without the rear booster shown here. Standard ARM, lower photo, is the latest anti-radiation missile in the Navy's inventory. It provides greater standoff range than the Shrike.

Circular error probability in automatic mode is expected to be well within lethal range of the warhead.

Launch may be made at all altitudes within the *Intruder's* capability at ranges well beyond intensive target protection. Successful contractor demonstrations were completed during the first part of FY 72. Operational evaluation of the *Condor* missile system is expected to be completed in early FY 73 with subsequent procurement and fleet introduction.

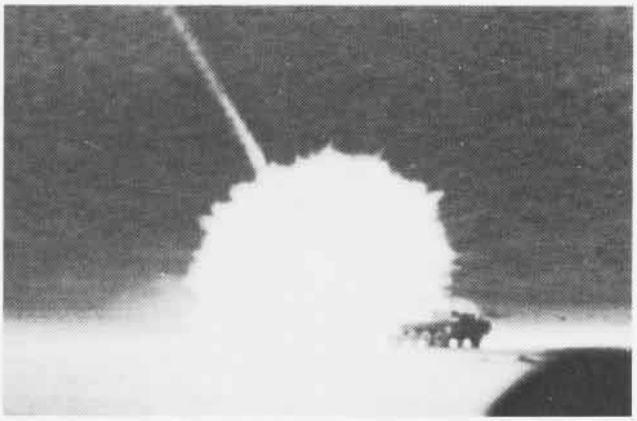
Harpoon is another missile being designed which will have an air-to-surface mission. Planned as an anti-ship weapon, *Harpoon* will come in both air-launched and ship-launched versions. In the air-delivered model it will consist of the missile and an aircraft command and launch subsystem. Its terminal guidance is an active radar type, selected for its ability to locate a target and remain locked on it under all weather conditions and sea states, through an ECM environment and in spite of evasive maneuvering by the target. The mid-course guidance unit will provide the necessary accuracy in flight path to place *Harpoon* at a point where seeker acquisition may take place. A turbine engine provides the propulsion needed to deliver a high explosive penetrating warhead at a standoff range sufficient to protect the launching aircraft from antiaircraft missiles.

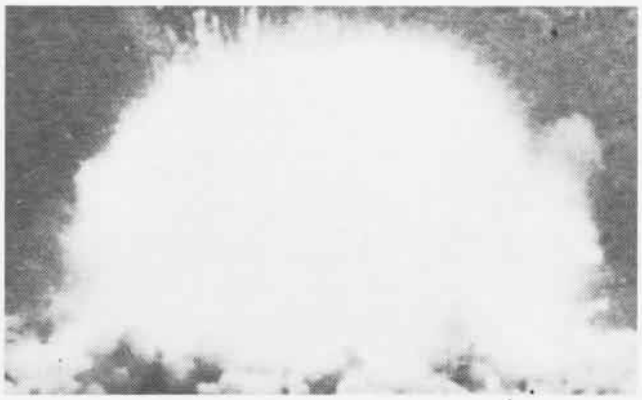
A contract for *Harpoon's* engineering design was awarded in June 1971. Launching tests are expected to take place during FY 73.

Two more missiles complete air-to-ground weapons. Both are designated as anti-radiation missiles, designed to home in on and destroy enemy radar systems, including fire-control radars for antiaircraft guns and surface-to-air missiles as well as other air defense radars.

The first, *Shrike*, is currently in fleet use. The ten-foot long, eight-inch diameter, solid propellant, motored missile delivers a fragmentation warhead at a speed of Mach 1.5 above launch speed. It has demonstrated good reliability.

Shrike may be delivered from a variety of aircraft in various attitudes





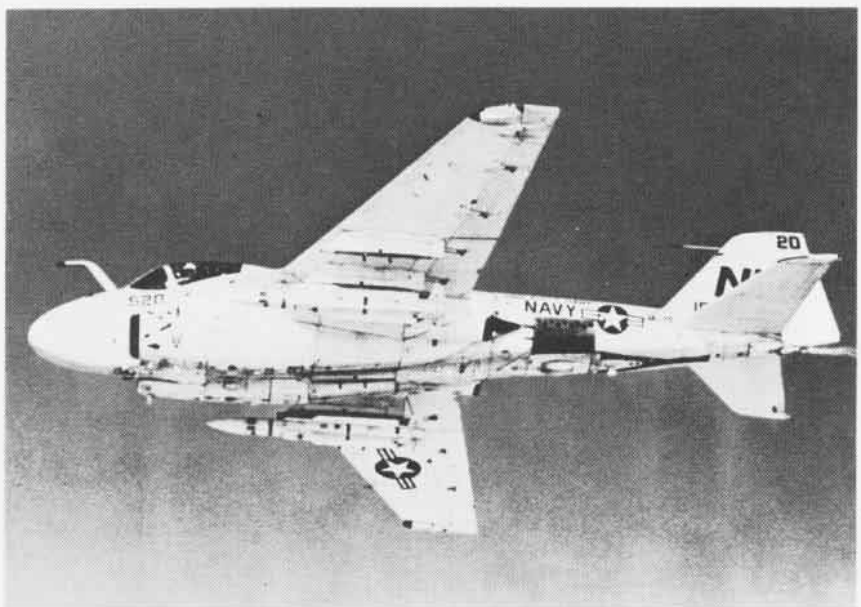
Condor missile is tested against trailer-mounted radar at desert test site, above, with dramatic results. VA-75 Intruder from Kitty Hawk, below, carries two Standard ARM missiles while on a tactical flight over SEAsia.

from climb to dive, with no altitude limitations for launch. It may be launched from distances of greater than 25 miles. *Shrike* utilizes a passive homing guidance system which covers a variety of preselected frequencies.

The second anti-radiation missile currently in the inventory is *Standard ARM*, an all-weather, solid-rocket-propelled system with a standoff range of up to 60 miles.

Standard ARM, close to 15 feet in length and 13.5 inches in diameter, has a 42.5-inch wing span and an ordnance section 50 percent larger than *Shrike*. Its speed is in the supersonic range and it is carried by the A-6 *Intruder*. Early versions had limited frequency coverage but a new model now in production will provide a broad-band capability.

This mix of free-fall, glide bombs, rockets and missiles gives U.S. Navy attack aircraft a wide spectrum of weapons with which they may most effectively carry out their assigned mission. Whether the target calls for a dumb bomb or a sophisticated long-range standoff missile, naval aircraft are provided the right weapon.



Return Alive

Story and Photos by PHC William M. Powers

The bewhiskered, unkempt airman sat on the ground close to the shore where the Pacific surf rolled gently over the sand. In his lap was a homemade crab net he had just constructed of sticks and parachute shroud lines.

Though tired and wanting rest, hunger pangs spurred him to get up, go out on a nearby jetty and begin catching food. He and the other students going through survival training would get nothing to eat that evening if they did not catch it themselves.

The training prepares Navy airmen to cope with an eventuality they hope will never materialize — survival in a hostile environment. (A hostile environment includes being forced down over enemy territory, in an uninhabited countryside or a combination of both.)

In either instance the requirements for survival are basically the same: find enough food and water to stay alive and communicate with friendly forces to effect rescue. These survival techniques are taught at North Island by the Fleet Airborne Electronics Training Unit, Pacific (FAETUPac).

"Our main task is survival training for aircrewmen and pilots, but we also provide training for all personnel going to Vietnam," says Commander Russell McJunkin, Jr., director of survival training.

"We teach techniques for survival worldwide: we don't care where it is, the rules for staying alive are basically the same in any area."

While emphasis is currently placed on survival in Southeast Asia, FAETUPac also has a cold weather course during winter at a base in the Northwest, and a local course that teaches airmen how to extricate themselves from a parachute harness while in the water.

Survival training students attend a five-day course which begins at North Island and finishes in Warner Springs, Calif., a remote area 85 miles from San Diego. They are taught first aid, shelter construction and land navigation, plus pickup and communications procedures with rescue aircraft.

The majority of American airmen leaving disabled aircraft are rescued within 24 hours, so the training is

geared to short-term survival. While a downed airman may be carrying some food and water with him, he is taught to conserve it for last ditch emergencies, which means that in a survival situation water must be found, if not food.

"In a SAR [search and rescue] situation, a pilot is likely to be in a state of shock, which creates a tremendous thirst," Cdr. McJunkin continues, "and water is always needed to combat this problem."

Because it is short, the five-day course immediately injects students into a survival situation. Typically, an airman might live in the same flight suit for the five days and carry nothing more than a knife, a piece of parachute and some shroud line.

With these bits and pieces of equipment he learns to fashion traps and snares, build simple shelters, find and consume food foreign to the palate of the average, well fed American, and most important — find water where, seemingly, none exists.

To students who grow fatigued during alternating classroom and field sessions, instructors bluntly say: "You'd better listen carefully, because this information could save your life."

Instructors learn how effective their training is by listening to tape recorded interviews conducted with airmen who have been downed in SEAsia. Through this feedback, training is modified to include information not previously taught, or to emphasize something experience indicates needs more work.

Though direct air engagements with the enemy are declining, survival training will not be discontinued.

"As long as people fly, there is a possibility of needing to survive in a hostile or uninhabited area," Cdr. McJunkin concludes.

"People who thoroughly know their equipment, and have a knowledge of survival techniques, will have more confidence in their ability and a much greater chance to come back alive."

On the opposite page, following the survival axiom, "If it walks, crawls, wiggles or slithers, it's on the menu," a student prepares to eat his dinner, top, while another probes a likely hole in search of a tasty rattlesnake, left; students receive rescue pickup training, right. Above, a student weaves a simple crab net from parachute shroud lines, and others pitch camp, below.

HOW FLAT IS FLAT

If you have ever wondered how flat flat really is, Mobile Calibration Complex One, MCAS Iwakuni, Japan, can tell you.

"Measurement standards to determine flatness can be tested to within five-millionths of an inch," explains GySgt. Joseph C. Czech of the quality assurance branch. "That tolerance doesn't seem to mean much until you consider five-millionths of an inch in relation to one inch—that's like trying to compare the thickness of a piece of paper to the height of the Empire State Building."

But that five-millionth is one of many measurements required to keep aviation test equipment operating correctly and accurately in order to evaluate the intricate systems on jet aircraft.

MCC-1 came into being in an effort to shorten the length of time it took to return aviation test equipment which had been sent out of Vietnam for calibration.

The answer was an in-country calibration complex (nicknamed IC3 or *Icecube*) which became operational in the Republic of Vietnam in 1967.

By SSgt. Ron Pittman

When test equipment from 1st MAW squadrons was returned, calibration completed, in ten days instead of the former two or three months previously required, *Icecube* became a reality.

When the 1st MAW returned to MCAS Iwakuni in April 1971, *Icecube* was reestablished at MCC-1.

"Our accuracy, speed and economy were proven in Vietnam; our mobility was established when the complex moved to Japan," says OinC CWO-3 William H. Welch.

A constant temperature of 70° and a humidity factor of 50 percent must be maintained in the 12-van complex which is completely self-contained. "Because the test equipment being calibrated here is so delicate, the temperature must remain constant, within a few degrees, in order for the calibration to be completely accurate," says SSgt. James R. Franklin of production control.

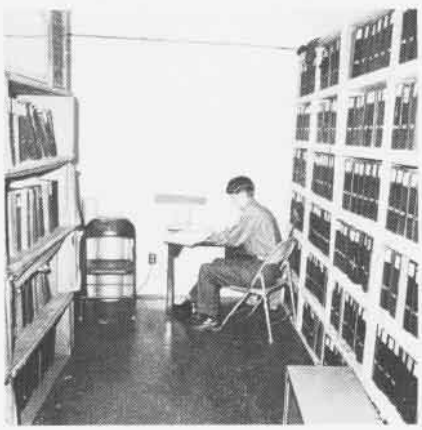
Staffed by 28 Marines and four civilians, the complex is capable of about 900 different calibration measurements on more than 1,300 items of aviation electronic test equipment.

"We have a special type of person working here," says MSgt. Ron Garland, complex supervisor. "These men have attended over 16 weeks of basic avionics school at Memphis, Tenn. Then, if they qualify, they may attend the ten-week Aviation Test Equipment Calibration Repair School at Denver, Colo., and if they are fully qualified repair men and in the top ten percent of their class, they are chosen for this type of work."

The calibration complex, working from statistics established by the National Bureau of Standards, is capable of calibrating test equipment, which, in turn, measures such items as five-millionths of an inch on an ejection seat pin, one billionth of a second of time and one-ten-thousandth of a watt of radio frequency power.

To do the job, an up-to-date, 10,000-volume publication reference library is maintained.

Items too large or too heavy to be transported to the complex, such as a jet engine test stand, are calibrated on-site with portable equipment.



The electrical portion of the 12-van complex, left, can measure up to one-ten-thousandth of one watt of electrical power. Above left, a technician prepares for the final adjustment on a piece of aviation test equipment using the Time Standards Clock. The clock is capable of measuring to within one-millionth to the eleventh power of a second of time. Above right, MCC-1 maintains a 10,000-volume publication reference library to provide necessary facts.

Museum Memberships

By the summer of 1973 the Naval Aviation Museum may well be installed in its new building— with the assistance of generous friends.

The new building will be constructed in increments so as to provide unlimited growth potential and to enable the museum to function earlier than had previously been planned. At present, the temporary building housing the museum provides only 8,500 square feet of space, severely limiting the number of artifacts, memorabilia and aircraft which can be displayed. The new building will provide approximately 150,000 square feet of space and will enable many more artifacts and aircraft (presently stored or "mothballed" for lack of exhibit space) to be exhibited.

Cost of the building is estimated at $4 million; the first increment, estimated at $1.5 million, is scheduled for construction as soon as sufficient funds are received. Pledges of almost $1 million have been received.

In order to raise the balance, the Naval Aviation Museum Association, Inc., is encouraging tax deductible donations from Naval Aviation personnel and aviation minded citizens.

Donors will receive memberships in the museum association in accordance with the following schedule:

Charter memberships will be in the name of one person, for the sum of $1,000. Names of charter members are engraved on individual plaques and displayed in the museum.

Organizational memberships are available for a $500 donation. The names of organizational members will be engraved on individual shields on display in the museum.

Life memberships are issued to individuals for a $100 donation with each name engraved on a shield and displayed in the museum.

In Memoriam memberships are $100 and the names are also displayed.

Annual memberships for individuals are $10 a year. Names of annual donors are entered in the Museum's Log.

Donations should be made payable to and forwarded to the Naval Aviation Museum Association, Inc., NAS Pensacola, Fla. 32508.

IWAKUNI'S FUEL PIT

Story by SSgt. Ron Pittman
Photos by GySgt. Ned Broussard

Marine Air Base Squadron 12's fuel pit at MCAS Iwakuni, Japan, could probably place high in a "gas station of the year" contest if volume was the deciding criteria.

Although the Marines of Tactical Airfield Fuel Dispensing System (TAFDS) do not go in for cleaning windshields or checking oil, they do pump more than 10 million gallons of fuel a year into jet aircraft of the 1st MAW.

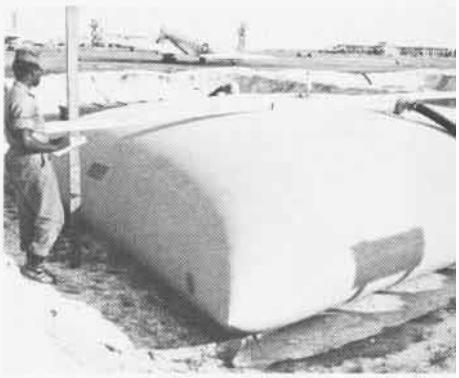
TAFDS provides an around-the-clock rapid refueling system that allows a pilot in a combat situation to land his plane, taxi to the fuel pit and take off again with a full tank — all in 15 minutes. The dispensing system employs six 10,000 gallon collapsible bladders to store fuel. The fuel is trucked to the TAFDS from storage tanks located aboard the station. Auxiliary engines supply pressure to pump the liquid from the bladder to a waiting jet. The $62-thousand system can maintain a steady pressure of 350 gallons per minute and fuel as many as six aircraft at a time.

In keeping with the concept of rapid deployment, the system is completely mobile and can be packed and ready to move within 24 hours.

One officer and 19 men comprise the TAFDS crew; each man is a graduate of the four-week bulk fuel school at Camp Pendleton, Calif.

One unique part of the system's apparatus is its filtering system. Fuel is recycled through all lines daily and at least four samples are tested before pumping begins and, during the dispensing stage, fuel is filtered three times before reaching the aircraft.

An area of paramount importance to TAFDS is safety. According to the officer in charge, 1st Lt. Robert A. Mohlin, "Safety can become an old subject, but when we are working around jets equipped with high frequency radar equipment packing enough energy to ignite fuel vapors, safety becomes a way of life."



The fuel level in a 10,000-gallon holding tank is checked, top right. Marine monitors fuel quantity gauge as a VMA-211 Skyhawk refuels at the pits, above. Right, TAFDS OinC checks out fuel filter for the system.

SKY

Originally designed to meet WW II requirements for a carrier-based, single-place, long-range, high performance dive bomber/torpedo-carrier, the *Skyraider* was ordered in July 1944 as the XBT2D-1. In April 1945, one month after its first flight, it was evaluated at NATC, and in December 1946, after redesignation to AD-1, delivery of the first AD to a fleet squadron was made to VA-19A.

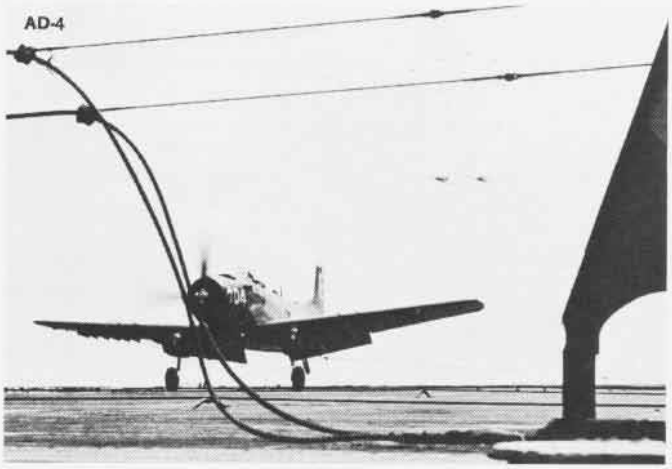
Though the *Skyraider* was produced too late to take part in WW II, it became the backbone of naval air attack forces in Korea, with the first AD's going into action from USS *Valley Forge*. Its ability to employ a wide variety of weapons allowed it to be used against nearly all Korean targets, earning the *Skyraider* the reputation of the most effective close support aircraft in the world at that time.

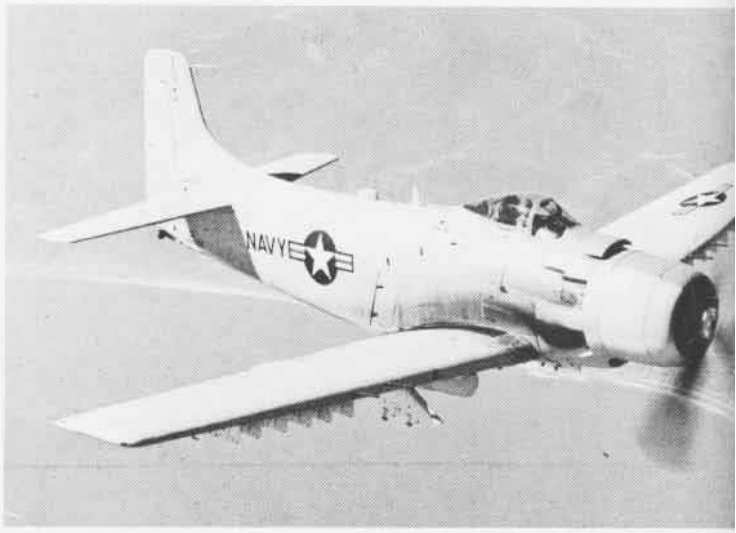
Skyraiders continued in first line service well into the Vietnam conflict, where they once again became star performers in a close air support role. By this time, the *Skyraider* had picked up a new designation. It had become the A-1 in the 1962 redesignation of naval aircraft. The last *Skyraider* left active service late in 1971.

Throughout its long life, the *Skyraider*, in addition to earning many nicknames, including *Able Dog* and *Spad*, was produced in a wide variety of models calling for a regular alphabet soup of designations. The AD-1's and AD-2's were also produced with ECM equipment, and had an operator behind the pilot as the AD-1Q and AD-2Q. The AD-3 came in four basic variants: AD-3, AD-3N, night attack; AD-3Q, electronic countermeasures; and AD-3W, an AEW radar-toting model. AD-4's and AD-5's were also built in N, Q and W versions. AD-4B's, with a tactical nuclear weapon capability, were produced and some AD-4's were modified to AD-4L's (winterized). AD-4N's saw modification to AD-4NA (day attack) and AD-4NL (winterized). The lengthened AD-5 featured side-by-side seating in the cockpit. Other variants were produced over the years in small numbers. AD-6's and AD-7's completed the series. The last of 3,180 *Skyraiders* was built in 1957. With the redesignation of naval aircraft in 1962, AD-5's became A-1E's, and AD-6's and -7's became A-1H's and J's, respectively. The *Skyraiders* still serve in SEAsia with the U.S. and Vietnamese Air Forces.

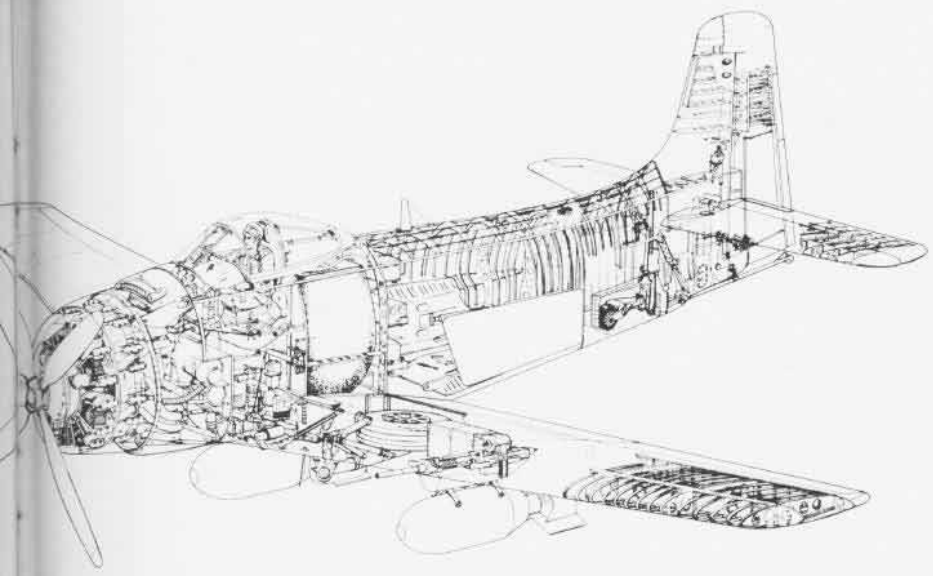
AD-3W

AD-4





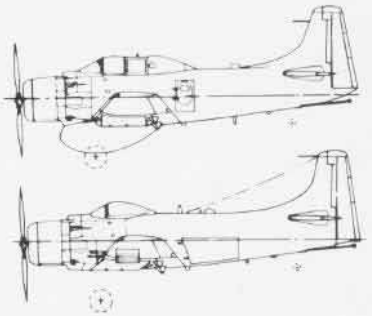
RAIDER



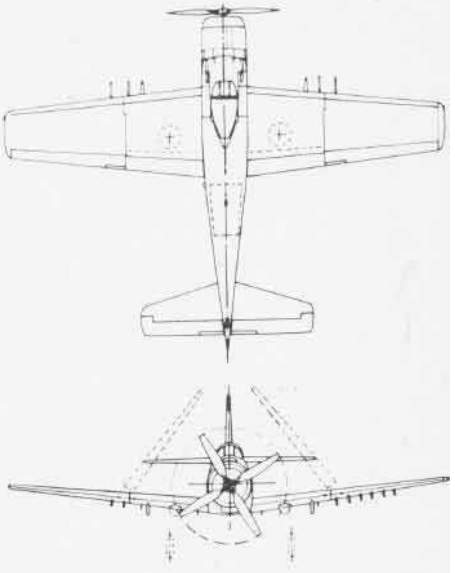
Length	
AD-1, 2, 3	38'4"
AD-4, 6, 7	38'10"
AD-5	40'0"
Height	
AD-1, 2, 3	15'5"
AD-4, 5, 6, 7	15'8"
Wing span	50'0"
Engine	Wright R-3350
Maximum speed	300+ kts.
Service ceiling	27,000+ ft.
Combat range	1,100+ nm.
Payload	8,000 lbs.
Armament	
AD-1, 2, 3	Two 20mm guns, bombs, rockets, torpedoes carried externally.
AD-4, 5, 6, 7	Four 20mm guns and increased external stores capacity.

AD-6

AD-5Q



AD-5W



AIMS

Abbreviations or "shortening" of words seem to have always been with us. The Greeks used abbreviations on coins and statuary and, although not everyone can tell what the letters stand for, most know that SPQR and Rome are eternally linked. As time and man's languages advanced, it became apparent that by taking the initial letters of several words, an entirely new word could be coined, like the WW I vintage term ANZAC — Australian and New Zealand Army Corps. By the outbreak of WW II, aided by the abbreviation-loving Roosevelt administration, pronounceable abbreviations flourished — so much so that in 1943 the word *acronyms* was given to these combinations. Today our language abounds with acronyms. To the uninitiated, they are mysterious babel; to the informed, they trigger a reaction — identity.

Take AIMS, for example. It is an acronym and, if you haven't heard of it, you soon will. AIMS is a project designed to provide equipment and subsystems to Navy and Marine units that will:

- **Increase the number of codes available on the identification transponders (Mode 3/A) from 64 to 4,096 to better improve radar air traffic control.**
- **Minimize clutter on ground surface radar display units by use of sidelobe suppression techniques.**
- **Improve military IFF system.**

To find out more about AIMS, *NANews* interviewed Captain A. L. Stapp, Naval Material Command deputy project manager for air control and identification systems, and asked him to define the acronym and the project.

AIMS is an acronym of acronyms: the A is for ATCRBS (Air Traffic Control Radar Beacon System); I is for IFF (Identification Friend or Foe); M is for the Mark XII Identification System; S is for System and reflects sundry AIMS configurations. AIMS is an improved identification process for aircraft and ships. It has two objectives: to satisfy civil (FAA) requirements for air traffic control (ATCRBS) through the installation of transponders and automatic altitude reporting equipment and to provide an improved military (Mark XII) IFF system which includes the mode for the positive identification of friendly aircraft.

Is any portion of the program in effect today?

Yes, quite a bit of the equipment is flying, although FAA has not made it mandatory, in the civilian sense, to have the "new equipment." They do

'.... has two objectives: to satisfy FAA requirements for air traffic control and to provide an improved military IFF system for the positive identification of friendly aircraft.... We are presently engaged in a retrofit program to put AIMS in over 5,000 of our aircraft. By the deadline date, which is only a year away, we expect to complete about 4,000 of these, or approximately 80 percent of the retrofit effort.'

propose to make it mandatory on January 1, 1973. By new equipment I mean the improved transponder with 4,096 different codes as compared to the transponder currently in use with only 64 codes. The equipment also includes Mode C for automatic altitude reporting. If FAA makes this equipment mandatory for flight in the national air space, as we expect it to, then *any* aircraft — military and civilian — that does not have this equipment will not be allowed to fly."

Can you elaborate on the military side of the project?

Yes, AIMS is a tri-service project. All three services must fly in the national air space and therefore must adhere to FAA requirements as I have explained. There is also a need for identification, in a military sense, for military purposes. In this sense, the initial operational capability of the Mark XII, which is a secure IFF system, is planned for this month and full operational capability will follow later.

Will these two systems, ATCRBS and Mark XII IFF, be installed in all military aircraft?

ATCRBS will go into practically every aircraft. Any aircraft that flies into a terminal area or above 10,000 feet will have to adhere to FAA regulations. This means the installation of ATCRBS. Not every military aircraft will have the Mark XII installed. Trainers, for instance, will not be required to carry it, but if the aircraft has a definite wartime mission and may be required to operate in a hostile environment, the Mark XII will be required.

How far along are we in meeting the goals of the program?

As far as the FAA ATCRBS requirement is concerned, the Navy is behind the power curve in meeting this goal. According to our current estimates, about 85 percent of our aircraft will meet this requirement by January 1973. We are presently engaged in a retrofit program to put AIMS in over 5,000 of our aircraft and this means that by the deadline date, which is only a year away, we expect to complete about 4,000 of these, or approximately 80 percent of the retrofit effort.

To put the equipment in the aircraft is a major undertaking — it can take up to 2,600 man-hours during progressive aircraft rework (PAR) at one of our naval air rework facilities. That is an extreme example; in some models, the required equipment can be installed in 50 to 100 man-hours. But it still remains a fact that to install this equipment in several thousand aircraft in this short period of time is a mammoth undertaking. As I said, we project that 80 percent will be retrofitted. What we must do is ensure that that 80 percent does indeed make the

deadline and, at the same time, try to do better, if at all possible. It has to be this way because I do not think that we really want to live with the restrictions that we will face in 1973.

To accomplish this retrofit effort is going to require the cooperation of the operational command which will have to make the required aircraft available. About half of the retrofit will be done during the scheduled PAR cycle; the other half, and this is where the cooperation is needed, will be done by field teams or drive-in modification on site at a naval air station, for example. This effort will require a lot of coordination by the Naval Material Command and a great deal of cooperation by the fleet operating commands.

Are there any other aspects of AIMS that would be of interest to the Naval Aviation community?

AIMS equipment will be going aboard ships — carriers, of course, destroyers, cruisers — in varying amounts. Ships that have an antiair warfare (AAW) mission will be given a full suite of the Mark XII IFF system so that they can interrogate aircraft. Those ships without an AAW mission will be given the transponder portion of the Mark XII so that they can identify themselves to aircraft or other ships via the secure system mode. These ships are primarily submarines and auxiliary types.

The Navy is also installing the equipment aboard ground stations so that they can function in the same manner as FAA's ground stations — interrogating aircraft by means of the improved ATCRBS, identifying the aircraft and determining its altitude. This will give the Navy an improved air traffic control capability but, as I have said, the primary effort at this time is to get AIMS airborne.

What led to the AIMS project? How did it evolve?

I believe it was in 1961 that President Kennedy directed that something be done to improve the nation's air traffic control capability. Project *Beacon*, begun in that period, was a government study to determine methods of improving air traffic control. The study revealed that with improved transponders and automatic altitude reporting great advances could be made in the area of aviation safety.

As for the military portion of AIMS, it is embodied in the Mark XII (which evolved from the Mark X) system. This system provides the military, for the first time, with a secure means of positively identifying friendly aircraft. It is the first secure IFF system; by secure I mean that interrogations and replies are in cryptographic — codes — and these codes are rapidly changed; thus, they are secure from enemy exploitation.

Has the installation of the AIMS equipment begun?

Yes, as early as 1965, the first AIMS transponder was installed in an aircraft as it left the production line. Three years later, the first AIMS altimeter was incorporated in production. In 1969, there was a very modest start in the aircraft retrofit program, taking existing planes and installing AIMS equipment in them during the PAR cycle. This latter program is just now beginning to get under way in a meaningful sense.

We have retrofitted over 550 aircraft since 1969. This is a small percentage of the total retrofit effort of something over 5,600.

Just this year alone, the Navy has a plan to retrofit over 3,800; the goal is to accomplish this — and then some.

If this goal is met, then the total AIMS-equipped aircraft population will be roughly 85 percent, including those 550 retrofitted since 1969.

As for ships, those with an AAW mission are having the equipment (Mark XII) installed when they go in for regular overhaul. The first system was installed aboard USS *Long Beach*. USS *Kitty Hawk* has just completed an overhaul and she now has her own system. The target date for the shipboard installation of the Mark XII is in approximately five years.

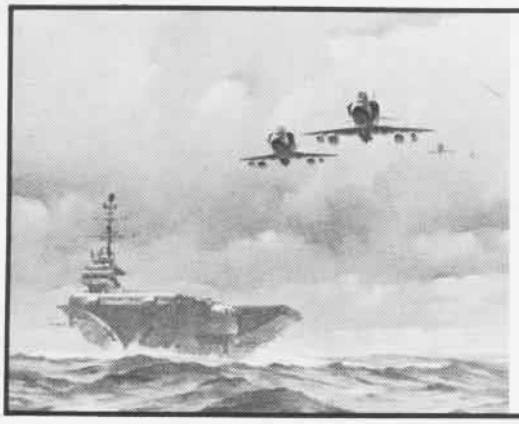
The first installation of ground equipment, the TPX-42 interrogator, is scheduled for February 1972 and will continue over the next three years. This involves primarily ATCRBS; there is no Mark XII planned for Navy ground, although some Marine units are scheduled to receive it.

'To accomplish this retrofit effort is going to require the cooperation of the operational commands which will have to make the required aircraft available. We want to make the members of the Naval Aviation community aware that we are trying to meet a deadline and, unless they become aware and make their needed contributions, the chances of making that deadline are not very good.'

This is AIMS, a program which will result in greatly improved air traffic control and military IFF systems only with the cooperation of all participants.

In the words of Captain Stapp, "We want to make the members of the Naval Aviation community aware that we are trying to meet a deadline and, unless they become aware and make their needed contributions, the chances of making that deadline are not very good. We have got to get the word out on what AIMS is all about and what we are trying to do."

The word is out.



at Sea with the Carriers

ATLANTIC FLEET

Saratoga (CVA-60)

While visiting *Sara*, at anchor in the Bay of Naples, Secretary of the Navy John H. Chafee took advantage of the opportunity to award eight commendation medals and 12 achievement medals to crewmen who were involved in recovery operations of an engineering casualty that the ship experienced last August.

"To those involved, my heartiest congratulations," said Mr. Chafee, noting that the ship regained full engineering capability in a month's time without having to undergo major shipyard repair.

He also presented the Navy Commendation Medal to ADAN Ronald H. Avery, VA-37, for his action in preventing the probable loss of an A-7A *Corsair II*. The aircraft, fully loaded with fuel and three tons of ordnance, was rolling, unmanned, toward the deck edge when Avery noticed it, jumped into the cockpit and applied the brakes, stopping the aircraft from going off the flight deck.

Forrestal (CVA-59)

A family tradition was continued aboard *Forrestal* when SA Kerry Barfield became the fourth Barfield brother to serve aboard.

He was greeted at the ship's quarterdeck by his brother, BM2 John A. Barfield.

BM2 Barfield was the first of his family to serve aboard *Forrestal* and, in ten years, he has served with all of his brothers. It was November 1961 when John, then a seaman apprentice, first reported aboard. A little over two years later, in April 1964, he was joined by SA Don Barfield. In April 1965, BT3 William Barfield joined John and Don.

Don, the second to arrive, was the first to leave, in 1967, after two Mediterranean cruises. John stayed on, reenlisted, and attained his present rank. In November 1967, he was transferred to Roosevelt Roads, P.R., leaving William alone, temporarily, aboard *Forrestal*.

Forrestal was without a Barfield when William left in May 1968. But, in January 1971, John returned to *Forrestal* for another tour and, ten months later, brother Kerry checked aboard. [We can't help but wonder if there are any more Barfield boys.]

BM2 John Barfield welcomes his brother, SA Kerry Barfield, aboard Forrestal. The younger man is the fourth Barfield to serve aboard.

Independence (CVA-62)

A Norwegian Air Force captain flew in an American Navy jet from *Independence* recently during Allied Naval Operation *Royal Knight* in the North Atlantic. Captain Einar Christian Smedsvig was the RIO aboard a VF-33 *Phantom* piloted by Lt. Thomas G. Hardy.

"The takeoff was fantastic," said the Norwegian pilot. "I thought the landing would be more of a jerk, but the takeoff acceleration surprised me more."

Lt. Hardy said, "Captain Smedsvig could easily have been the pilot. He was quite familiar with the *Phantom*."

The plane's mission in *Royal Knight* was a combat air patrol about 40 miles north of the ship, on station to intercept Soviet reconnaissance aircraft. "We didn't see any," Lt. Hardy added.

Smedsvig, who has flown the Norwegian F-5 *Freedom Fighter* for three years, is attached to Norwegian Squadron 331, Bodoe Airfield, Norway, which is located above the Arctic Circle about halfway up his country's Atlantic coast.

One of two liaison officers from Bodoe, he observed the carrier's role in the exercise. The main objective of *Royal Knight* was to provide training for Allied naval forces in maintaining their operational readiness in the North Atlantic.

Two *Phantoms* were launched from *Independence* in the North Sea; it looked like a routine combat air patrol, but one hour and 40 minutes later when their scheduled recovery began, two blue *Phantoms* sporting Royal Navy markings showed up in their place and trapped aboard.

Commander Bill Knutson, CAW-7, with his RIO, Lt. Skip Giesting, and LCdr. Bill Kirkconnell, commanding officer of VF-102, and his RIO, LCdr. Marv Seay, cross-decked to HMS *Ark Royal*. The aircraft from 892 Fighter Squadron, embarked in HMS *Ark Royal*, reciprocated by providing *Independence* with CAP protection. After a quick lunch and refueling, they were launched back to *Ark Royal*. The fighter crews were taking part in the exchange of CAP missions.

CVA-62 broadcast a live television show and exceeded by over $9,000 the $14,875 goal set for the ship in the annual Combined Federal Campaign.

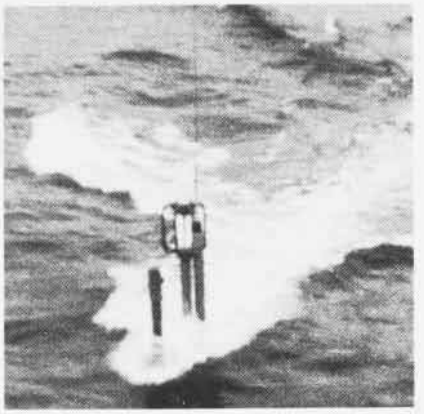
The live telethon on the ship's closed-circuit television system was part of an effort to complete the fund-raising drive in one day. The drive netted $24,004.09 in cash and payroll allotments from 1,879 personnel.

Intrepid (CVS-11)

Intrepid returned to Quonset Point in October after one of the safest and most successful deployments in her long history.

During the six-month deployment, the carrier, commanded by Captain Charles S. Williams, Jr., operated in the Eastern Atlantic, Mediterranean and North Baltic and Norwegian Seas, and crossed the Arctic Circle four times while steaming approximately 45,000 miles.

CVS-11 included in her operations



While participating in Intrepid's ASW operations in the North Atlantic, a VS-31 crew photographed this Soviet submarine.

two NATO exercises and two bilateral exercises. One bilateral exercise involved units of the Sixth Fleet and French Naval Forces and the other combined Norwegian navy ships with *Intrepid* and her escorts. The first NATO exercise, *Rusty Razor*, occurred in May. The week-long exercise took place between Portugal and England, and involved naval forces from Britain, Portugal, Canada, The Netherlands and West Germany.

The second exercise, *Royal Knight*, involved more than 35 ships and 100 land and carrier-based aircraft from Canada, the United Kingdom, Norway, The Netherlands and West Germany. The British aircraft carrier, HMS *Ark Royal*, participated along with *Intrepid* and *Independence*.

The *Big I* also acted as the mother ship for the task group as she delivered over 1.2 million gallons of fuel during the deployment and was frequently called on to provide technical assistance to the accompanying escorts.

CVSG-56, *Intrepid's* embarked air group, led by Commander William H. Reed, flew over 7,000 hours of around-the-clock ASW operations during the exercises without sustaining a major accident.

Wasp (CVS-19)

The 95,000th arrested landing was made by LCdr. C. L. Hanson, pilot, ship's catapult and arresting gear officer, and Lt. R. A. Weir, copilot, assistant combat information center officer, in *Wasp's* C-1A which brought aboard 2,200 pounds of mail.

America (CVA-66)

When Rear Admiral Donald D. Engen, ComCarDiv-4, came aboard for an official visit, he brought with him a Meritorious Unit Commendation from the Secretary of the Navy.

The 77,800-ton carrier and her previously embarked air group, CVW-9, earned the award for service in SEAsia from May 25 to November 8, 1970, while conducting sustained operations in support of TF 77.

Admiral Engen presented the commendation to Captain T. B. Russell,

A Soviet KA-25 Hormone helicopter, left, flies alongside Intrepid accompanied by an SH-3D Sea King from HS-11. The role of interceptor was relinquished to the helicopter crew because the foreign aircraft was a rotary-winged visitor and not a faster aircraft.

commanding officer, as CVA-66 steamed with the Sixth Fleet in the Med.

You've heard of that cigarette lighter that never misses in umpteen-eleventy tries. Well, it doesn't hold a candle to *America's* bow catapults and their crews.

The V-2 division bow cat crew chalked up *America's* 50,000th bow cat launch without a catapult malfunction on October 13 while the big attack carrier steamed in the Med. The aircraft making the 50,000th cat shot was an EKA-3B *Skywarrior* from VAQ-135, home-based at NAS Alameda, Calif.

The record bow launch also marked the 78,407th launch without a catapult malfunction for all four of the ship's steam cats. The Norfolk-based carrier has not suffered an operational catapult malfunction since she was commissioned in January 1965. Of course, the cat crew celebrated the occasion with the traditional cake-cutting.

The *Marauders* of Attack Squadron 82 chalked up over 1,900 landings aboard *America* to qualify 19 centurions: Commanders Mac Gleim, C.O., Tom Scott, X.O., and Don Sumner; Lieutenant Commanders Snuffy Smith, Bo Smith, and Al Miller; Lieutenants Ed Walsh, Tom Wieland, Garry Tabbert, Rick Brydges, J. J. Ryan, Shedd Webster, Al Schwark, Charlie Sapp and Bruce Page; and Ltjg. Ray Thomas. LCdr. Al Miller is a double centurion aboard *America*, having made it the first time on a previous cruise.

PACIFIC FLEET

Ranger (CVA-61)

Good will ran high when HMS *Blake*, a helicopter cruiser, visited San Francisco as the guest of *Ranger*. For the 11 days while *Blake* was tied up at Fisherman's Wharf, the two crews exchanged receptions, picnics, tours and informal get-togethers.

The visit by the British ship was part of British Week celebrations in San Francisco—an event centering on improving British trade with the United States. *Ranger's* C.O., Captain H. P. Glindeman, Jr., and *Blake's* Captain Ronald Butt participated in most of the week's events.

Securely lashed to a boatswain's chair, SA Jerry Way paints America an MUC ribbon.

At the end of the British sojourn, it was evident that many sailors from both navies had become good friends.

There was more than the usual exchange of white hats and currency. Throughout the visit, *Ranger* sailors spent much of their free time aboard the British ship—where hospitality is the keynote and heavy British beers and ales are the beverages of the day. And, when *Blake* sailors visited *Ranger*, they were duly impressed by the huge aircraft carrier, which is currently in drydock at the San Francisco Naval Shipyard.

Tripoli (LPH-10)

Tripoli, currently an active member of the Seventh Fleet Amphibious Force, chalked up helicopter landing #27,000 when two members of HMM-165 made the historic landing: Capt. J. M. Gammon, squadron C.O., and ABH2 D. J. Montalbano, landing signalman. *Tripoli* was conducting training while en route from Okinawa to the Philippines.

Constellation (CVA-64)

"KCON marathon, Spencer speaking." The man on the phone was IC1 Art Spencer of KCON radio aboard *Constellation*. One day in October, Art went on the air for his daily country and western show, and 77 hours later he emerged, a little hoarse and with bloodshot eyes, but still smiling —with an AFRTS record for continuous broadcasting and over $2,400 in contributions for the Combined Federal Campaign.

Art got the idea from an article in *Navy Times* relating the story of how an AFRTS broadcaster in Guam had set a 54-hour record. It seemed like the perfect gimmick to raise a little money for charity, so Spencer began offering to play selections for a dime apiece.

The stunt got much bigger as word spread and the whole ship got into the spirit. On the first night, the 60-man Marine detachment donated over $130, requesting everything from *The Marine Corps Hymn* to *A Boy Named Sue*. The five-man administration office of RVAH-11 kicked in $30 and challenged other offices to match that total.

One lieutenant commander shaved his beard for $100. Other stunts included a tug-of-war (the losers paid), and an egg-eating contest.

And so it went for three full days. All over the ship, people talked about the marathon. Art's phone buzzed, and the contributions rolled in.

Midway (CVA-41)

Capt. James M. Morgan, USAF, joined a group of very select Air Force pilots as he successfully landed his RF-8G aboard *Midway* to become a CVA-41 centurion.

Capt. Morgan has been deployed with VFP-63 since April 1971. The *Midway* detachment obtains intelligence photos in support of the U.S. effort in Vietnam. He received his F-8 familiarization at VF-124, NAS Miramar. While completing the flight photo syllabus, he served as flight officer for the squadron and is now the operations and flight officer for Detachment Three.

The tragic story of Mrs. Jacqueline Collum and her four children stricken with an incurable disease caught the attention and sympathy of the members of the crew of CVA-41, and QM3 Lester H. Johnson proposed that a collection be taken. $1,505 was raised by putting a collection can at each pay line. Johnson said, "I like to help people if I can and, besides, when I was small, I was ill and some people came to my mother's aid to take care of me."

Midway, commanded by Captain William L. Harris, Jr., is the flagship for ComCarDivOne.

PHCS V. O. McColley

VS-33...11 Years and

Story and Photos by PHC Ron Oliver

In September 1971, Antisubmarine Squadron 33 completed 11 years and 68,000 hours in the air without an accident. Commander W. D. Bodensteiner, C.O. of the North Island-based unit, says of the squadron's success story, "Safety is 90 percent maintenance. Trained pilots know how to fly safely, but if their aircraft are not maintained properly. . . .

"Our safety officer is Lt. R. C. Wolter. He's like a little beaver; he's everywhere."

ADCS T. R. Smith, squadron maintenance control chief, expresses it differently. "I won't release any aircraft I wouldn't fly in. When you sign off a job, you are signing for a human life.

"Good maintenance starts with the man who turns the first nut and bolt and ends with the man who makes the final inspection—the men who take pride in their work and have an interest in their jobs."

The success story of VS-33 is the story of the squadron officers and men, pilots and maintenance personnel.

Counting

Opposite page: VS-33 Trackers fly over CVS-14; lower left, Cdr. Bodensteiner and Lt. Wolter discuss squadron safety; lower right, AT3 Tom Drake checks electronic gear. Above, AE3 Robert Thomas cleans the searchlight dome on an S-2E; top right, AZAN John Hall checks status of aircraft maintenance; and, bottom right, ADR2 Richard McMaster contributes his share to VS–33's record.

THE SELECTED AIR RESERVE

Wave Reservist

Mrs. Francis R. Heth, who served in the Navy as an air controlman before being released in 1961, took advantage of new Navy regulations and became the second Naval Air Reserve Wave with dependent children to enlist. She is a disbursing clerk first class in NARDiv Atlanta, Ga.

ASW War Games

Carrier Antisubmarine Air Group Reserve 80, led by Commander Thomas A. Stanley, participated in three days of ASW exercises in October off the coast of Southern California. CVSGR-80 and other Reserve units alternated with fleet units in detection, localization and weapons employment exercises. The "enemy" they tracked and attacked was the submarine USS *Caiman*.

Participating squadrons and units included North Island-based VS-81, VAW-88 and OpCon Unit 12H2; HS-84, Imperial Beach; HS-85 and VS-82, Alameda; VP-65, Point Mugu; and VP-91, Moffett Field.

From Start to Finish

When Maj. John M. Tivnan, USMC, flew UH-34 number 150240 from NAS Glenview, Ill., to Davis-Monthan AFB in Arizona, it was like saying goodbye to an old friend. He was delivering to the "boneyard for old planes" the helicopter that he had, as a pilot with Marine Medium Helicopter Squadron 264 at New River, N.C., picked up in 1963 from the Sikorsky Aircraft Factory, Stratford, Conn. After that, of course, Maj. Tivnan and #150240 parted company. They both served tours of duty in Vietnam, but not together, and ultimately both arrived at Glenview. The flight to Davis-Monthan brought them to their final parting.

Maj. Tivnan is commanding officer of Headquarters and Headquarters Squadron at the 4th MAW.

Marine Air Support

Marine Air Support Squadron Four lived up to its name and role of providing support by topping a previous Reserve record during the unit's annual two weeks' active duty.

The Air Support Radar Team (ASRT) guided 164 radar-controlled bombing runs at MCAS Yuma, Ariz., during eight days of operations. The ASRT record-setters, consisting of a 31-man team headed by Major D. A. Posluszny, eclipsed the previous mark of 104 controlled runs.

The team transported their AN/TPQ-10 radar control bombing system equipment to Yuma where they amassed 125 hours of TPQ operations, dropping 77 MK-76 bombs during 164 runs. All bomb drops were made by Reserve pilots flying A-4C *Skyhawks* of VMA-134.

Beechcraft is airlifted to NARTD Olathe, Kan., by CH-54 Skycrane to be used as a training aid by Navy and Marine Air Reservists.

While ASRT personnel were setting their bombing run mark at Yuma, other squadron members were participating in Operations *Hill Country* and *Pike Pole* at Camp Pendleton, Calif. The Direct Air Support Center, with five officers and 14 enlisted Air Reservists from El Toro, supported the Marine amphibious unit exercises during two weeks of active duty.

Close Support

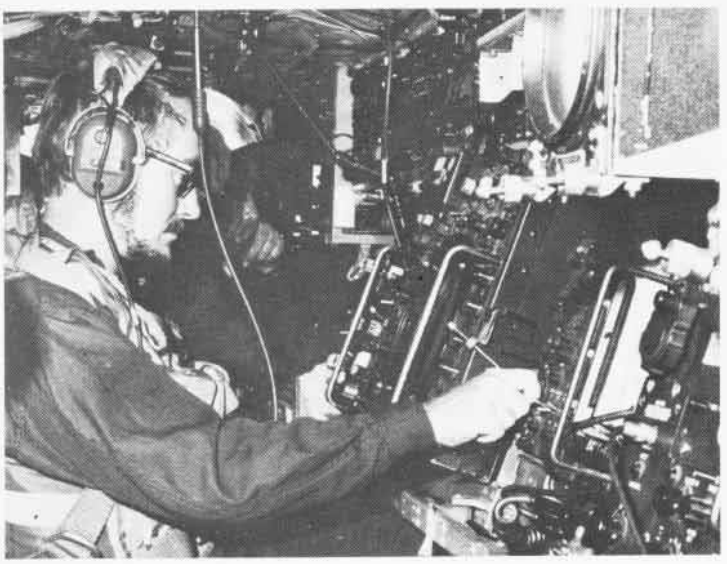
Tactical Air Control Squadron 40R1, NARTU Norfolk, Va., deployed for its annual two-week cruise at Roosevelt Roads, Puerto Rico, to provide tactical air support for Marine Air Group 43 which consists of two F-8 squadrons and two A-4 squadrons. MAG-43 numbers over 1,100 Marine Air Reservists and Marine Air Reserve training detachment personnel.

TacRon personnel were transported from Roosevelt Roads to the Vieques Close Air Support Range by VC-8 helicopters and had at their disposal an S-2 for controlling air operations at the Vieques range.

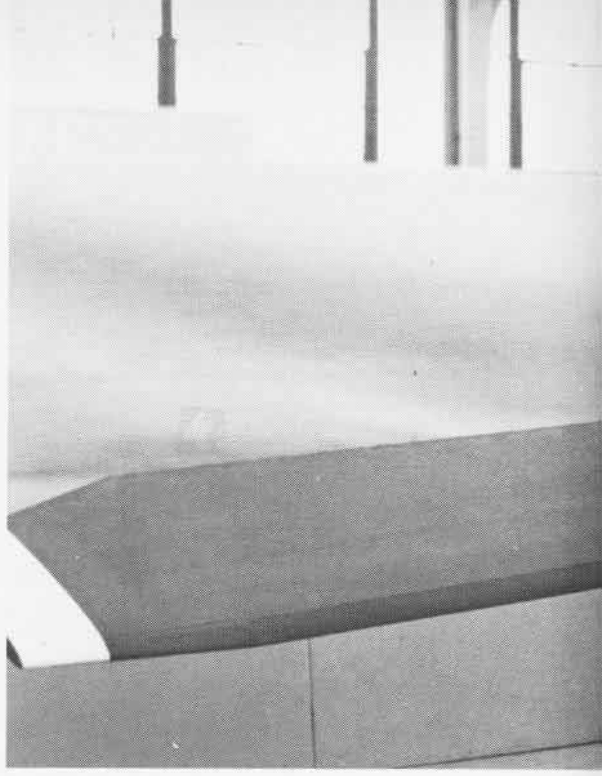
Air control crews were rotated every two days in order to give each air controller an equal share of practical experience. Once on the range, they coordinated and directed close air support on a series of targets which included control towers, revetments and mock convoy and troop movements. The airborne controller would mark the targets with smoke flares and then call for the strike aircraft.

Trans-Pacific Drills

Travel from Hawaii to San Diego for Air Reserve meetings? Absurd? Commander R. Bruce Green, C.O. of NARDiv H-1 at NARTU North Island, Calif., doesn't think so — and he does just that. He pays the cost of the trip via commercial air with his drill pay, plus a little extra. Cdr. Green is an aviation ground officer, a billet that does not exist in Hawaii. As C.O. of the unit, he feels obligated to continue his trips until his tenure is concluded or he joins a Reserve unit in Hawaii—a Reserve surface unit. There are no Naval Air Reserve groups there.



According to Captain David S. Ailes, Commander, Naval Air Reserve Forces, Point Mugu, the most important objective of the Naval Air Reserve is to achieve a state of readiness comparable to that of the fleet. To that end, tactical squadrons are geared to deliver all-weather air strikes and pinpoint, track and destroy enemy submarines. Their readiness is ensured by Reserve Training Units (RTU's). These special manpower pools train air and ground crewmen so they are able to step right into vacant billets, thus keeping the squadrons up to full strength at all times. The training is realistic — Air Reserve trainees fly the same planes, practice underwater escape in true-to-life ditching drills, and put in long hours of instruction in ASW tactics and aircrewmanship. They tackle the job by working as long as 16 hours a day if necessary and — suddenly — they are good at it.

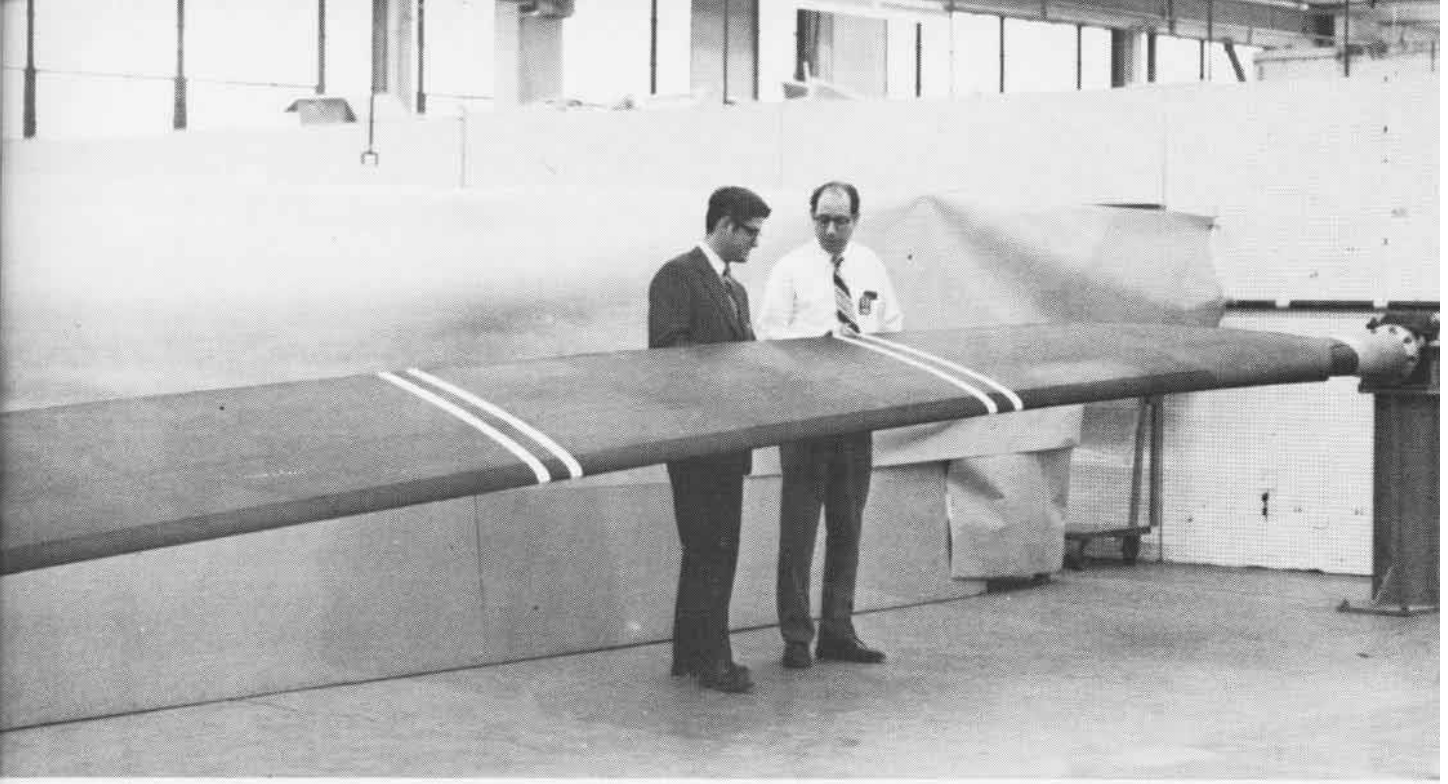


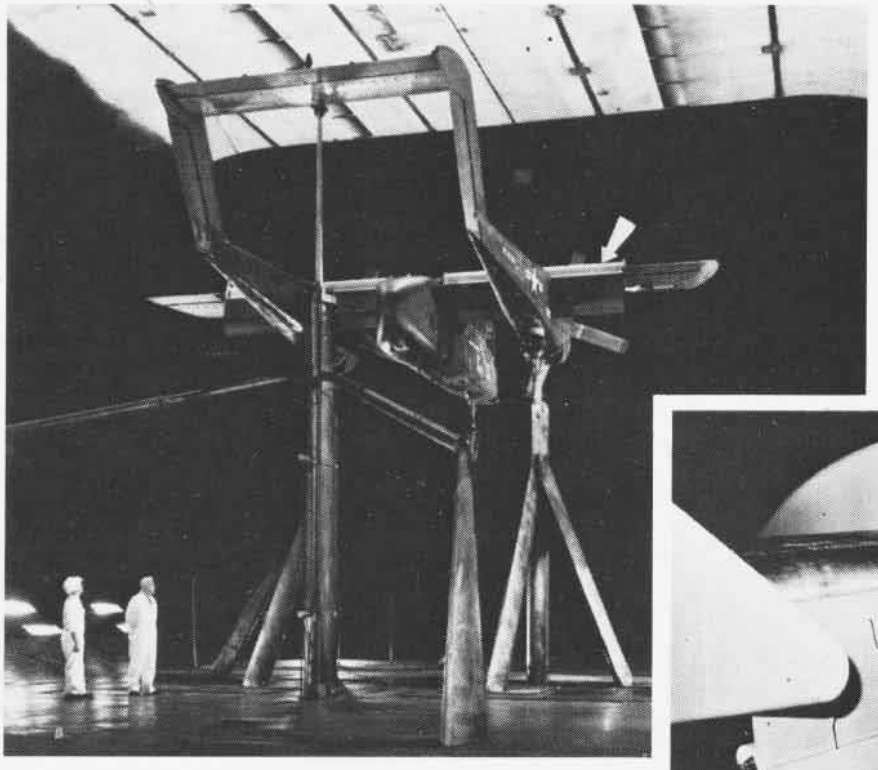
Greater Lift

Under a $2.9 million Navy contract, Sikorsky is testing an improved 32-foot rotor blade, the longest yet produced with titanium spar. The new blade, which will be used on the CH-53, has a fiberglass skin, removable tip cap and honeycomb pockets. It is expected to increase hover performance by as much as 4,000 pounds and blade thrust by nearly four percent.

To Move a Mountain

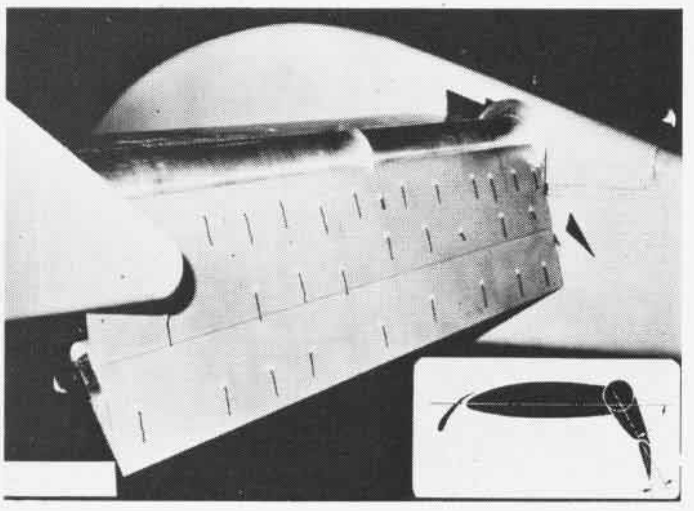
. . . or create that impression, PH2 Carter Sawtell's camera caught CVAN-65 approaching Rio de Janeiro.

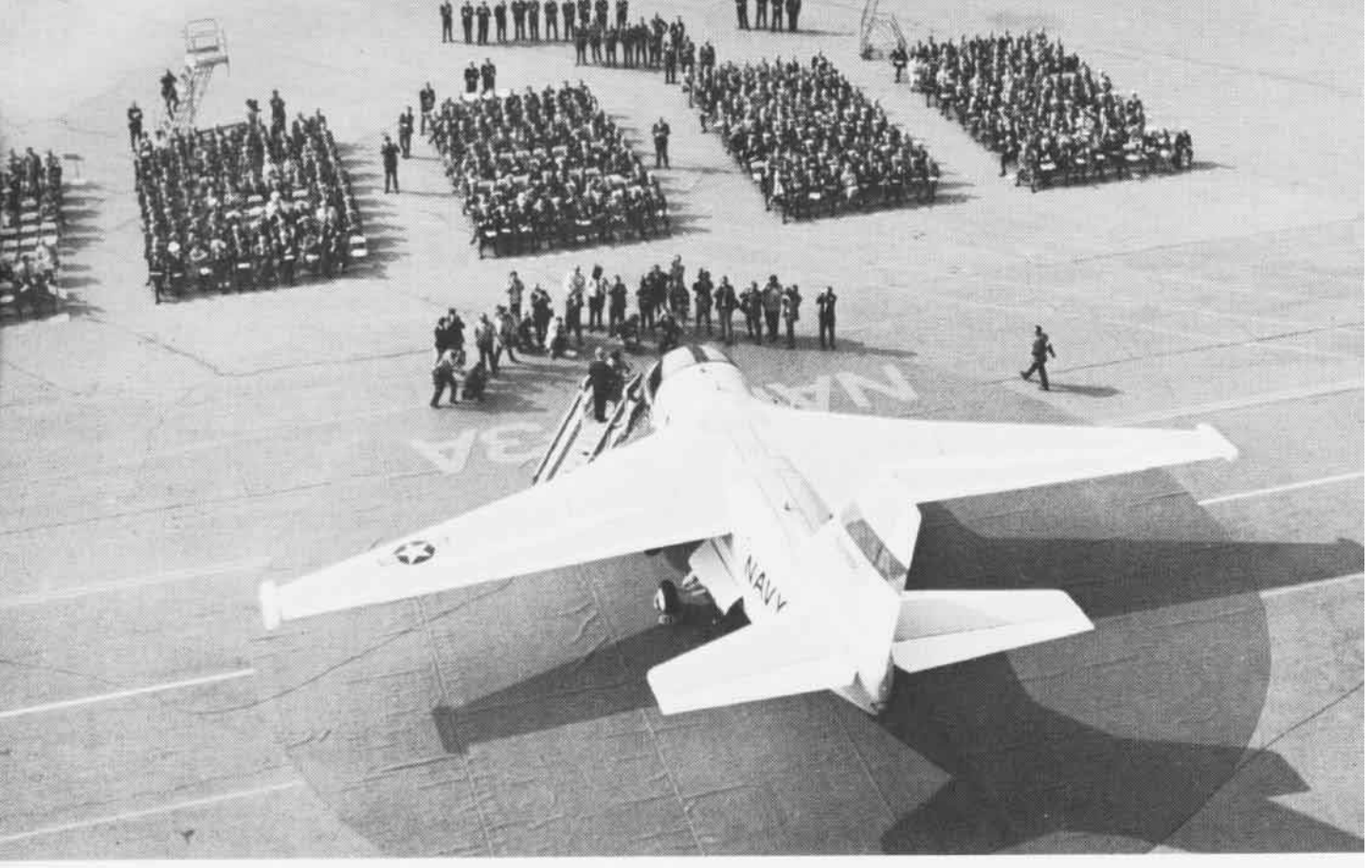




New High Lift

A rotating cylinder flap, one of a number of new high lift concepts, is being tested on an OV-10A Bronco by NASA at the Ames Research Center for possible application to STOL aircraft. Cylinder extends above surface of flap and when rotated rapidly in the direction of the airflow over the flap, it provides a marked increase in lift.





A Sea Rover for ASW

By JOC Dick Benjamin

First flight.

These words seem to have a magical tone to them and create a noticeable excitement in everyone connected with, or who has an interest in, a new Navy air weapons system.

Even though innumerable tests have indicated that the aircraft should fly trouble free, its first flight is an event that first proves its airworthiness and culminates several years of hard work dating back to a time when the plane was just a seed of thought in someone's imagination.

True, there is still much to be done before the aircraft is considered an unqualified success — first flight, evaluation of flying qualities, avionics assessment, Navy preliminary evaluations and BIS trials — and is accepted for fleet delivery. But for those involved, the tension, apprehension and excitement created by that first flight might be compared to that of an *Apollo* moon shot or the opening kickoff by the home football team.

January 14 is the scheduled date for the first flight of the S-3A *Viking*. All one has to do is walk into the project office at the Naval Air Systems Command headquarters to feel the excitement in the air — and for good reason. The *Viking* is an *exciting* aircraft.

Designed to locate and destroy enemy submarines and provide surface surveillance, the carrier-based S-3A will replace the S-2 *Tracker* series which will have been in the Navy's inventory for 20 years by the time the *Viking* joins the fleet in 1974.

Operationally, the *Viking* represents a leap forward from the S-2, and is a fitting complement to the P-3 *Orion*, its land-based counterpart. The S-3A carries a complex and highly integrated avionics system and, in some respects, will have greater capabilities than the larger P-3. Together, they constitute a potent challenge to the submarine threat of the 1970's and beyond.

Carrier dimensions, such as elevator size and hangar deck clearance, have dictated the S-3A's size, but in no sense does this constrain the aircraft operationally. It has a high wing with a 15° sweep that folds like the S-2's, a large vertical tail that folds sideways for overhead clearance, and a fat fuselage to accommodate the avionics system. It has a fuselage length of 53'4", a wing span of 68'8" and a height of 22'9". Folded, the dimen-

Aerial view of rollout ceremony for Lockheed-built S-3A Viking, left. Mrs. Thomas R. McClellan, wife of Rear Admiral T. R. McClellan, ComNavAirSysCom, christens the Viking as Robert A. Fuhrman, Lockheed-California Company, assists, right. The first S-3A, below.

sions are 49'5", 29'6" and 15'3", respectively.

Normal ASW takeoff weight will be approximately 42,000 pounds, with a maximum landing weight of 37,700 pounds and a carrier approach speed of approximately 100 knots.

The aircraft is powered by General Electric TF-34-2 turbofan engines. Development models have been running in test cells for two years, and others have been test flown on a modified B-47 since February 1971. The pressurized jet is designed to operate above 35,000 feet at speeds in excess of 300 knots during search operations, and to have a combat range of more than 2,000 nautical miles. It will be capable of flying at better than 400 knots, its rate of climb from sea level is programmed at over 4,200 feet a minute, and its ferry range is in excess of 3,000 nautical miles.

By comparison, the propeller-driven S-2 operates in a search mode under 10,000 feet at 135 knots, has a top speed of 210 knots and a combat range of 850 miles.

At gross takeoff weight, the S-3A will be able to operate effectively from any carrier. It can be launched downwind from the standard steam catapult and can climb on one engine at over 500 feet per minute from a wave-off at maximum landing weight.

Once a target submarine is localized, the two high-bypass, 9,000-pound-thrust turbofans will enable the *Viking* to operate just as efficiently at low altitudes and slow speeds as it does in the search phase. Ten of the new aircraft embarked aboard a carrier under the new CV concept will be capable of patrolling much more of the ocean than a present-day ASW air group.

The key to the S-3A's effectiveness as an ASW weapons system is its avionics system. The sensors, navigation, communications and armament subsystems all support and respond to the heart of the system — the processing and control equipment.

This hardware includes a large capacity, high speed, general purpose AN/AYK-10 digital computer, a multichannel acoustic processor and an auxiliary memory which consists of both airborne drums and a digital tape recorder. Together, these elements receive raw digital and analog informa-

tion, examine it, process it as appropriate and automatically pass the results along to some other part of the system, or to a human operator, for use or further analysis.

Among the jobs performed by this equipment are the preflight systems readiness check, navigation, tactical data processing, weapon trajectory calculations and inflight identification of malfunctions within the system.

Elements of the communications subsystem include both UHF and HF, secure and clear voice, and data link. Also included is an all-weather carrier landing system which will enable the aircraft to land "hands off" in any weather.

In the non-acoustic ASW avionics package are the ASQ-81 magnetic anomaly detector (MAD), APS-116 ASW radar, broad-band passive electronic counter measures system (ECM), and a forward-looking infrared scanner. Sonobuoys to be employed will be the SSQ-53 DIFAR and the SSQ-50 CASS buoys, in addition to conventional LOFAR sonobuoys.

A very accurate Doppler/inertial system will provide necessary navigational information. Navigation will be simplified through the use of the computer which will keep track of the aircraft's position. The completely passive, bearing only, sonobuoy reference system will pinpoint the location of each sonobuoy and eliminate the need to overfly and visually sight it in the water — a first in Naval Aviation antisubmarine warfare.

The fuselage-stowed main landing gear is similar to that of the F-8 *Crusader*, and the nose gear is patterned after that of the A-7 *Corsair II*. Engine pylons, located close inboard, minimize asymmetrical thrust with one engine out and allow stores' pylons to be located immediately inboard of each wing fold line.

Good slow speed performance calls for a lightly loaded wing with lift augmentation devices. This is achieved wth leading edge flaps and single-slotted, Fowler-action trailing edge flaps. The *Viking's* excellent maneuverability results from an optimum combination of conventional control surfaces and a unique spoiler system.

The *Viking* is capable of carrying airborne ASW weapons in sufficient numbers and types to provide an effective payload. In addition to special weapons, the aircraft can carry torpedoes, missiles, mines and rockets.

The plane has a unique ejection system enabling safe ejection (from zero speed, zero altitude to the maximum speeds and altitudes of the flight envelope) for each of the four crew members. The S-3A is also capable of an emergency descent from maximum to final approach altitude in less than two minutes. All critical flight systems have a backup.

The S-3A's four-man crew includes the pilot, copilot, tactical coordinator (Tacco) and sensor operator (Senso), who will probably be an enlisted aviation ASW operator.

A cathode ray tube (CRT) situation display provides the pilot a ground-stabilized plot showing the elements of the tactical situation he needs to

accurately fly the aircraft in response to the Tacco's instructions. The copilot, who also has a CRT display, handles the communications and navigation equipment and the non-acoustic sensors. As the tactical situation progresses toward localization and attack, the copilot progressively concentrates his efforts on the magnetic anomaly detection system, and acts as safety observer for low altitude flight.

The tactical coordinator, using a large multi-purpose CRT display, maintains the tactical picture and directs the entire crew in carrying out the tactical mission. Although he normally will maintain a ground-stabilized situation plot, he can also control any sensor and view its output, enabling him to share the tasks of the other crew members.

Two CRT displays help the Senso evaluate acoustic information. The large main display is physically identical with the Tacco station display, and an auxiliary display is located just above it. Together, the two displays provide a flexibility that allows the sensor operator to examine many channels of information and simultaneously view a variety of types of information. A key element of the *Viking's* avionics system is its acoustic information processing. As submarine targets become quieter, it is important to become more adept at extracting useable information from the noise background that is ever present in the sea.

For ease of maintenance, the *Viking* has computerized diagnostic routines which can be exercised while airborne, and is compatible with the Navy's new automatic tester, VAST (versatile avionic shop test).

The performance characteristics of the S-3A make it suitable for adaptation to tanker and cargo aircraft, ASW command and control craft, and airborne early warning and electronic warfare missions. There are no immediate plans, however, to make other versions of the aircraft.

Lockheed Aircraft Corporation is prime contractor for the *Viking*, and is responsible for manufacturing, assembling and integrating all systems. The company is teamed with the Vought Aeronautics Division of LTV Aerospace Corporation, Univac's Federal Systems Division of Sperry Rand Corporation and numerous subcontractor vendors.

Vought is making the wings, engine

Interior views of the S-3A show pilot's position, opposite top; sensor operator's, opposite bottom; copilot's, above; and tactical coordinator's, below. Photo at left shows the aircraft's avionics system with the T-shaped general purpose digital computer in the rear.

pods, tail assembly and landing gear, and Univac is manufacturing the general purpose digital computer.

The Lockheed contract for the *Viking* is a bit unique in itself. It contains special features intended to assure better control of costs, reduce technical risks, obtain price protection for future production and achieve key development milestones prior to proceeding with production. The S-3A contract is the first within the Department of Defense to contain the milestone concept.

In this new concept, the contract defines certain areas of development — milestones — that the contractor must achieve to the satisfaction of the government before development can proceed to the next point.

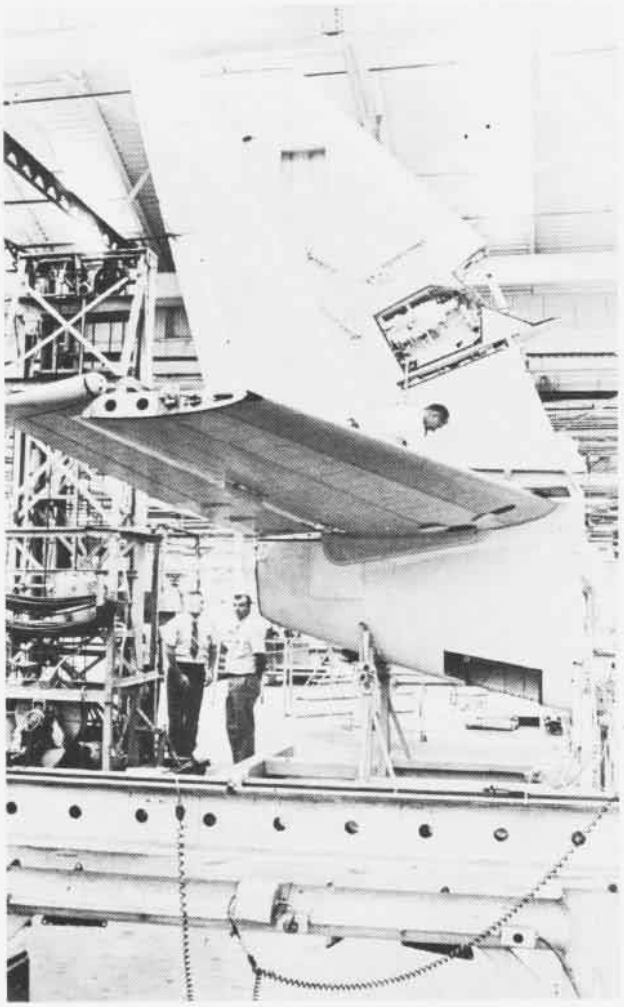
Previous DOD contracts have specified that development points must be reached by a certain date, which cannot always be accomplished. The milestone concept, however, uncouples these events from a strictly calendar schedule by setting tentative completion dates. If a milestone is delayed, the completion date is slipped day-by-day until the development problem is solved. Only then does the Navy exercise its option to proceed.

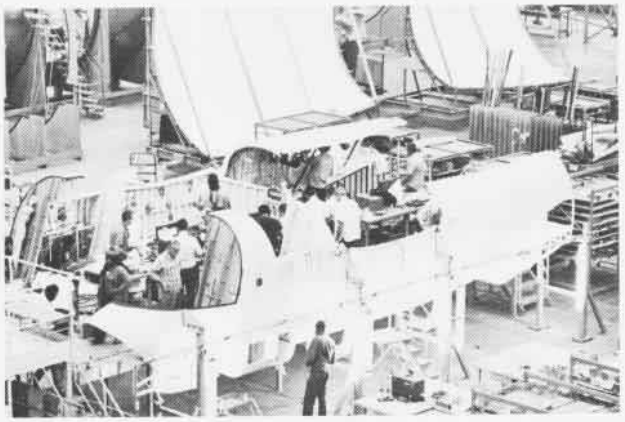
Also in the contract are options which allow the Navy to buy an anticipated number of aircraft — known as production lots — during each year of production through FY 75. A ceiling has been established on the cost of the aircraft during each production year, allowing for inflation and rising costs. Each year's lot is separately priced, and there is no interconnection, interaction or carry-over from lot to lot. The price set for each of these lots cannot be increased over the contract maximum, but if production costs go down, the price can be negotiated downward.

These options are known as variable quantity options, and they allow the Navy to vary the number of aircraft purchased each year from one-half to one and one-half times the anticipated requirement. This means that the Navy may order, from FY 72 through FY 75, less than 100 or more than 300 production aircraft, and literally any number between those two limits.

If the Navy decides to buy other than the anticipated number of aircraft during any production year, the variable-quantity pricing formula still dictates the maximum price to be paid for the aircraft. But the government must order within the quantity limitation before the expiration of the option date to keep this protection.

Still another provision of the con-





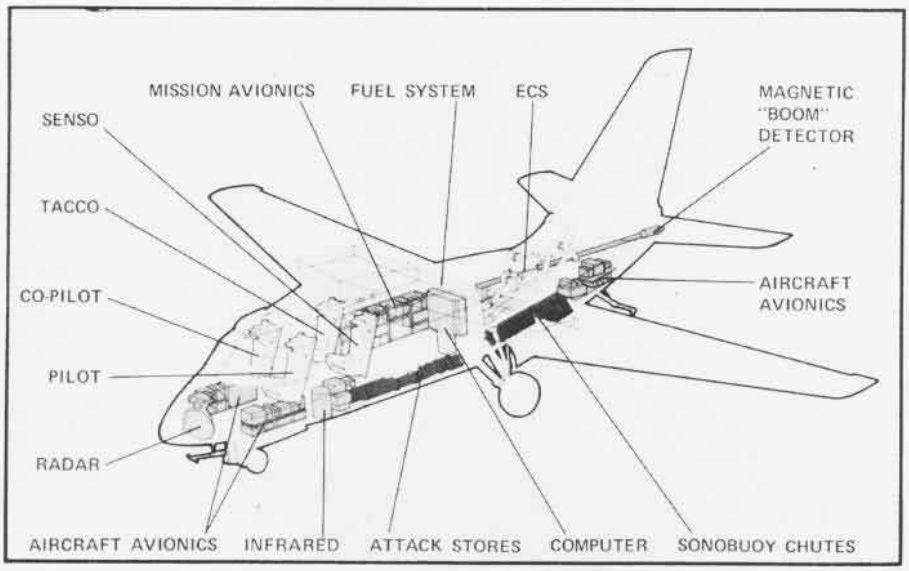
tract allows the government to arbitrarily slip any option date up to a maximum of four months without cause. Government furnished equipment, however, must still be supplied to the contractor.

Minimum performance levels must also be met or the government has no obligation to accept the aircraft. The Navy can either require the contractor to make a fix on the aircraft or come up with an acceptable reduction in price. Also included are provisions for liquidated damages for late delivery. Delivery of BIS aircraft, for example, is a complete systems event and will be the sole contractual milestone for Lot V. If this milestone is not made, damages can be assessed against the contractor.

It all adds up to what Captain Fred H. Baughman, the S-3A project manager (*NANews*, November 1971, page 8), calls a giant step forward for carrier-based antisubmarine warfare systems. According to Capt. Baughman, the *Viking* is a potent challenge to the undersea threat of the late 1970's and represents a system which will be flexible enough to gracefully accommodate technical changes, improvements and innovation.

Yes, the *Viking* is an exciting aircraft. It should prove to be just as exciting to those who will be flying it as it is to those who are working to get it built and into the fleet.

Time is drawing close when the S-3A will begin proving itself, and that beginning is with its first flight.



Vought engineers work on S-3A Viking's aft body and tail, opposite left. Photo at opposite right top shows fuselage assembled in half shells to provide extra work space for installing wiring and plumbing. First S-3A nears completion, opposite right bottom. Model of S-3A is prepared for wind-tunnel flutter testing, above. Cutaway at left shows interior arrangement.

Letters

Camouflaged Phantoms

I have been, since last January, compiling material on the F-4 *Phantom II* to aid me in writing a book about this fighter.

I would like to solicit help from any of your readers who have flown this aircraft or who may have photos or slides which they could lend or exchange. While I am interested in all facets of the *Phantom's* service in the Navy, I am particularly interested in contacting anyone who may have photos or slides of *Phantoms* with unusual markings or paint schemes. For example, a number of F-4G's attached to VF-213 aboard USS *Kitty Hawk* sported a trial camouflage of dark green late in 1966; I'd like to hear from any readers who may have pictures of aircraft in that color scheme.

Stephen Riley
18 Wheatfield Gardens
Belfast BT 14 7HU
Northern Ireland

Well . . .

In the August 1971 issue of *Naval Aviation News* under "Letters" you show a picture of Captain John Orill presenting a WW I wooden propeller to Captain Grover Walker. You inquired if any of your readers could identify it.

I question that the propeller was made for the military as stated, inasmuch as there was no identification on it. To my knowledge all propellers manufactured for the military had identification stamped or impressed on the hub. As an example, my WW I wooden propeller has the following impressed on the hub:

P
SE 5091
LH
N 1527
Navy insignia POR

Karl H. White
144 K Street
Seaside Park, N.J. 08752

Right!

The November edition of *NANews* contained an article on page 3 entitled "Pacific E's are Awarded." Under squadron winners were listed HS's 2 and 3 at NAS Imperial Beach. The correct information should be: HS-2 and HC-3. I believe the distinction is important in this case for two reasons.

First is the completely different mission assigned to these squadrons and, secondly, this is the first year that helicopter combat support squadrons have competed for the E.

W. C. Lauer, Cdr.
Naval War College
Newport, R.I. 02840

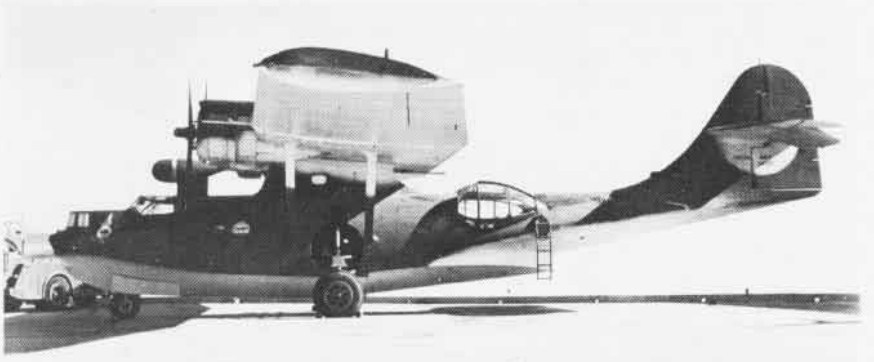
Again, we are only as good as our source.

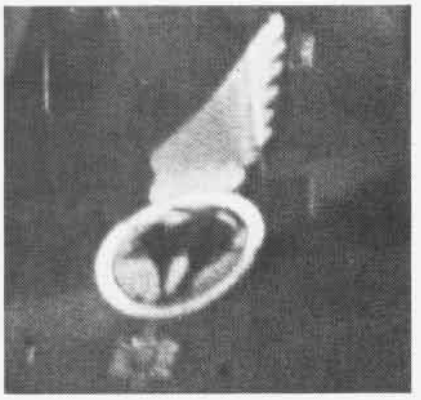
Who's Embarrassed?

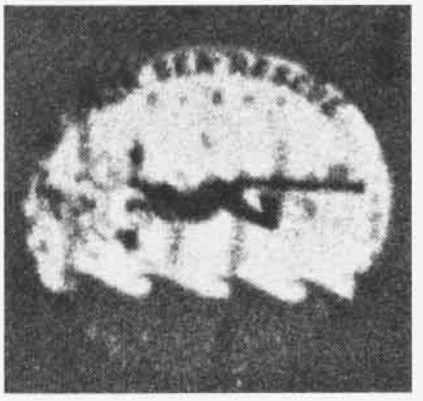
The November edition of *Naval Aviation News* contained a highly unusual comment in "Editor's Corner." To our knowledge, the subject Combat Efficiency E is the first to be awarded to any VT in the history of the Naval Air Training Command.

Imagine our embarrassment when talk in the ready room revealed that VT-29's combat efficiency may frankly leave a little to be desired. Although we are in our 13th accident-free year, our T-29's and C-117's, are not as maneuverable as we would like, and our combat training is way behind schedule. Therefore, we respectfully submit our recommendation that VS-29 be given the recognition that it so rightfully deserves.

B. W. Spencer
VT-29
NAS Corpus Christi, Tex. 78419







During research for the PBY series of articles for the AAHS *Journal*, the photograph above turned up in a group of negatives loaned me by Gordon Williams of Seattle. He took the picture at the San Francisco CGAS in 1945.

The plane appears to be black above, but the white lower surfaces negate the effect if it is a *Black Cat* painted for night operations. The absence of national insignia is intriguing, as is the presence of the two unit (or crew) insignia on the hull.

My research to date has produced very little information and no photos of South Pacific *Black Cats*. This is difficult to understand in view of the publicity enjoyed by these operations. Anything *NANews'* readers can contribute will be appreciated.

Material loaned will be carefully handled, copied and promptly returned. Full credit will be given for any used.

Any help with this puzzle will fill some of the voids remaining in the *Catalina* story which I am attempting to pull together for publication.

Wm. E. Scarborough, Capt., USN(Ret.)
119 Turtle Cove Lane
Huntington, L.I., N.Y.

SQUADRON INSIGNIA

VAW-121

NAS Norfolk-based Carrier Airborne Early Warning Squadron 121, led by Commander W. T. Miesse, was commissioned April 1, 1967. Flying E-1B's, VAW-121 has three detachments deployed, aboard Wasp (CVS-18), Intrepid (CVS-11) and Roosevelt (CVA-42), serving a dual role on CVS-CVA carriers.

NAVAL AVIATION NEWS