Naval Aviation

NEWS

42nd Year of Publication

APRIL 1961

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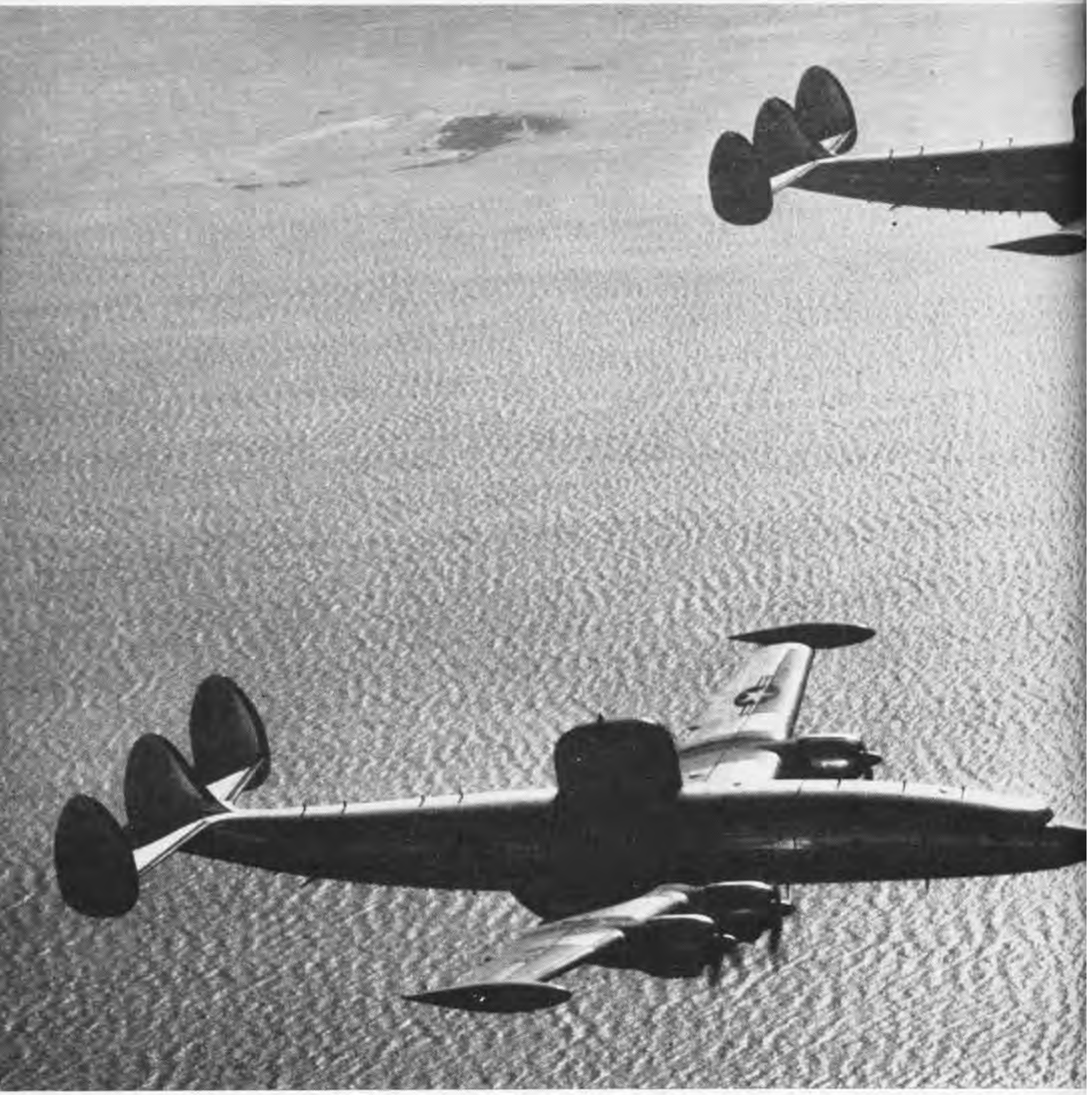

'AROUND-THE-CLOCK PROTECTION'

Monumental mark was set in March as 10,000th barrier flight was logged by Airborne Early Warning Wing, Atlantic. Six year tally by VW-11, 13, and 15 represents 120,000 flight hours, equivalent of 50 trips to moon and back. Wing's mission is to provide warning of surface or air targets crossing an invisible line stretching from Argentia to the vicinity of the Azores. VW-13's Cdr. Eugene E. Thies was high man of the squadron with 190 barrier flights to his credit.

NAVAL AVIATION

NEWS

FORTY-SECOND YEAR OF PUBLICATION, APRIL 1961

■ IN THIS ISSUE

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NAVAL AVIATION NEWS

'Old-Timer' Visits Antietam
Helped Push Eugene Ely's Plane

Clayton W. Gillespie, MMC, USN (Ret.), who helped push Eugene Ely's plane on the fantail of the USS *Pennsylvania* in January 1911, visited the USS *Antietam* a month ago just "to see the Navy in action again."

The *Antietam* was operating off the Corpus Christi, Tex., area in the Gulf of Mexico qualifying future Naval Aviators in carrier landings.

Chief Gillespie recalls the day on the USS *Pennsylvania* in San Francisco Bay when Ely landed on the fantail which was rigged with a platform for that purpose. This was the first landing on a Navy warship. Chief Gillespie and about eight other seamen shook hands with Ely after his historic landing aboard the *Pennsylvania*.

Chief Gillespie entered the Navy in 1909, made CPO in 1919, and after travelling thousands of miles over the world's seas, retired in 1938. He volunteered for active duty in WW II and served in a communications facility on the West Coast. He participates with Naval Reserve Surface Division 8-73 in Corpus Christi.

Oriskany Launches F8U-2N
VF-124 Skipper Pilots Crusader

The F8U-2N was launched for the first time on the West Coast from the flight deck of the USS *Oriskany*. It was piloted by Cdr. Vincent F. Kelley, commanding officer of VF-124, the first Navy squadron to be assigned this new aircraft.

The modified model of the F8U *Crusader* carries four instead of two *Sidewinder* missiles, has greater fuel capacity, and is capable of greater speed as a result of the improved J-57.

VF-124 was embarked on *Oriskany* to qualify fleet replacement pilots in the *Crusader*. The squadron is at present part of Carrier Air Group Twelve.

A3J-1 Undergoes A-tests
Trials Are Part of BIS Evaluation

An A3J *Vigilante* has been flown to the Naval Air Special Weapons Facility at Kirtland AF Base for six months of testing.

It was flown in by LCdr. John Burkholder, NASWF project officer for the A3J. His assistant is Marine Maj. H. E. Roland, and Ens. R. M. Hite will be the bombardier-navigator.

NASWF will evaluate the plane's special weapons capabilities, characteristics, and equipment as part of the Board of Inspection and Survey requirements before it joins the Fleet.

Eagle to 'Fly' at Mugu Soon
To be Biggest NMC Test Program

Evaluation of *Eagle*, Navy's newest air-to-air missile, is scheduled to get underway at Naval Missile Center, Point Mugu, this summer. The program is expected to be the biggest

HIGH ABOVE *the South China Sea soars a flight of Fighter Squadron 211 Crusaders, flying combat air patrol for the USS Lexington. Leading this flight is Lt. Bob Aslakson. The other two pilots are Lt. Harry Holmes and Ltjg. Jack Davis. The photo was taken by Lt. Jack Douglas of VCP-63, OinC of the photo detachment. VF-211 participated in a weapons demonstration for high ranking officers of Southeast Asian nations, performing sonic booms, strafing runs and firing Sidewinder missiles. Cdr. H. C. Lovegrove, Jr., is squadron C. O.*

WHEN A SHIP COMES HOME, *the "Welcome" sign is out for Dad. Gleeful children eagerly await the arrival of the 30,000-ton attack carrier USS Intrepid at Norfolk. Thousands of other Navy dependents greet the ship after its six-month deployment with the 6th Fleet in the Med.*

ever undertaken at the Naval Missile Center.

Bendix Corporation, prime contractor for *Eagle*, plans to have 220 employees on the project at Point Mugu. An equal number of Navy and Civil Service personnel are also slated to work on the program.

An *Eagle* systems laboratory, being constructed at Point Mugu for use by Bendix, will make it possible to simulate launchings and thus reduce the number of missiles which must be expended in actual live tests.

Cougar jet drones and supersonic KD2U's will be used as targets in actual firings. The first launches will be made from a modified A3D *Skywarrior*.

Eagle, a long-range air-superiority weapon, is a weapons system within itself. The launching aircraft flies in the general direction of a target, and the radar guidance of the missile system seeks it out.

Douglas Corporation is designing the F6D *Missileer* as the *Eagle*-launching aircraft. It is a compact, efficient, subsonic aircraft with ability to remain airborne for long periods of time.

Again, 'Alas, Poor Yorick'
Hamlet Scene Played for 'Ham'

"Ham" is the new star of the monkey kingdom, no question about that. When he made his 155-mile-high trip in a *Mercury* capsule, they hung a star on his cage and darned near vice versa.

But as Ham basks today in the scientific spotlight, his name up in lights on the marquee of the space frontier, somewhere in the zoological world broods an earlier star of simian spacemanship.

His stardom came in 1951, when he soared 80 miles up in an Aerojet-General *Aerobee* rocket, and came back, monkeydom's first successful round trip.

Aerojet personnel called him "Yorick," and they knew him well indeed in those early days a decade ago. And Yorick knew THEM well, too.

For ten days prior to his trip, they gave Yorick test doses of a drug they used to "anesthetize" him for the actual voyage. He became so fond of these test tranquilizers he would jump in delight at mere sight of the needle bearers.

Out of deference to his species, attendants speculated only privately, behind his back, that he had a monkey on it.

Regardless, tranquilized tourist or not, he made his famous first flight ten years ago, long before this particular Ham became a household word.

And today, nit-picking around a zoo somewhere like a fading ex-matinee idol, scrapping for peanuts with the rest of the pack, poor Yorick, alas, surely must be brooding over the fickleness of fame—and contemplating science's new premium, Ham on wry terms.

Carrier PCO is Decorated
Contributed to Success of Polaris

The prospective commanding officer of USS *Constellation*, Capt. Thomas J. Walker, III, has been presented the Navy Commendation Medal for his contribution to the *Polaris* Fleet Ballistic Missile system.

The award was presented by VAdm. Frank O'Beirne, ComNavAirLant, at NAS NORFOLK.

Capt. Walker was head of the Ship Operations and Test Branch in the Special Projects office before receiving orders to command the *Constellation*.

READY TO PERFORM *in a series expected to include 80 appearances during the Golden Year of Naval Aviation, the famed Blue Angels pose for the cameramen at Pensacola after their return from five weeks of intensive training at Key West. From left, they are Lt. Dan MacIntyre, Marine Capt. Doug McCaugher, Cdr. Zeb Knott, team leader, Lt. Bill Rennie, LCdr. Ken Wallace and Lt. Lou Chatham. They have top billing for Naval Air Reunion in Pensacola.*

GRAMPAW PETTIBONE

Close Shave

While proceeding to the marshall point one dark night for their scheduled recovery aboard the big attack carrier, their "home away from home," a couple of A4D's, popping in and out of clouds, were completely immersed in a heavy haze layer.

The wingman got vertigo so bad that he had to break off and orientate himself on his flight instruments. In consternation he discovered he had only 800 pounds of fuel remaining. Only 11 minutes before he had read 4400 pounds during a fuel check with his leader. This could only mean a fuel cell float valve had stuck and that he could no longer transfer wing fuel. The gauge was right!

The carrier was told of the trouble and an immediate ready deck requested. This was a real shaker because the deck was already spotted for another launch and some fast shifting was required. CCA received an "affirmative" from PRIFLY, and as the carrier deck became a scene of bustling activity, the A4D descended in a no speed brake idle approach and turned inbound on final recovery bearing.

At four miles he was instructed to "dirty up" and at three miles descended to 600 feet. At two miles the pilot reported "ship in sight" and at one mile started his descent to the mirror glide slope. At 400 feet, he called

"Meatball 100 pounds," and then a few seconds later, "She just quit."

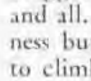
As the air filled with cries of "Eject! Eject!" from just about everyone who had been tensely following this sweat-in-the palms drama, the flash of the Rapec seat was seen from the carrier.

The plane guard destroyer flashed its searchlight to the crash site and close aboard was the chute just settling in the water.

The pilot had hit the water only seconds after pulling the curtain and had no time to prepare for the water entry. He released the right rocket jet fastener, but couldn't locate the left one. The chute was billowing out and dragging him, so he inflated his flotation gear and pulled in on the risers, collapsing the chute, but becoming entangled in the shroud lines.

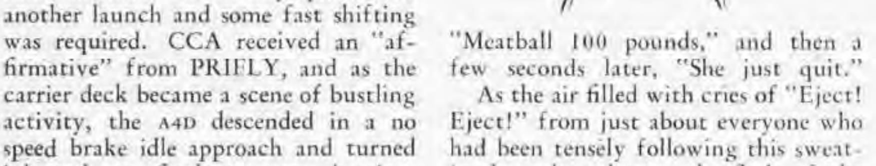
By now he felt completely exhausted but managed to grab a line thrown to him from the destroyer, which had now come up alongside. As they pulled him in, the parachute, still attached, began to drag him under and he had to let go of the line. He felt himself sinking, felt sure he was going to drown, made a last ditch effort to get his knife out, but lost consciousness at this point.

A watchful destroyer officer, seeing him sink, dove over the side and swam to his rescue in the rough seas! Reaching the pilot, he kept him afloat and dragged him back to the ship, 'chute and all. The pilot regained consciousness but both were by now too weak to climb a cargo net which had been thrown over the side so they just grimly held on to it. The parachute was pulled aboard by grappling hooks, and the pilot hauled up by his chute risers, uninjured but waterlogged. His rescuer was then pulled aboard by the destroyer crewmen.



Grampaw Pettibone says:

Sufferin' catfish! What a tale this was to read! This lad tried all the way and was mighty cool when things were as tight as a situation can get. A goodly amount of this coolness was occasioned by his absolute reliance on the Rapec seat which has an advertised ground level capability with zero lanyard attached. Here it worked at 250 feet and 110 knots with a sink rate already established. It's a good seat, but why try it to the limit of its capabilities? He actually delayed his descent four or five minutes while he explained his fuel problem to his C.O. and tried a couple of suggested remedies. This cost him precious fuel and was nearly a fatal error.



ILLUSTRATED BY Osborn

Getting rid of that chute in the water is the most important job a downed pilot has to accomplish. He had a knife and should have used it. You must never relax the effort to cut it free, just because rescue seems near. Filled with water and attached to you, its gonna get you sure. Might as well have your feet set in a barrel of cement. Ol' Gramps takes his hat off to Ltjg. Hildebrand of the USS *Hyman*. He's a man any of us would like to have around when things are all tensed up. That DD was RIGHT THERE when it was needed.

Obstacle Course

Four S2F's were scheduled to deck launch at midnight on a routine ASW mission. Take-off was delayed while two downed helos were struck below and the carrier deck was readied for the fixed wing launch. Number 1 man could see he had plenty of deck run available although the pitch black night would mean "on the gauges" even before lift off.

Take-off run after getting the GO signal was normal and the pilot noted as he passed the island structure that he had almost 70 knots. He commenced to rotate before reaching the No. 1 elevator and felt the nose wheel leave the deck. Just as the S2F started to fly off, a terrific jolt was felt and the nose pitched down! Swiftly recovering his nose attitude, the pilot climbed the sturdy plane straight ahead and as it reached 1500 feet, leveled off to determine what the trouble had been.

There was no structural damage apparent to the crew although they had a hydraulic failure with pressure reading zero. The starboard brake lines were severed and were the obvious cause of the failure.

The ship now came up on the radio and informed them that the guard rail on No. 1 elevator had been up during their take-off and they were to divert to a nearby NAS. Another S2F which had taken off immediately after them was assigned as escort to the beach. The rest of the launch was cancelled.

Arriving over the airfield, they lowered the landing gear by the emergency method, had it visually checked, and landed safely, dropping the tailhook to engage the abort gear on the runway for an easy stop.

Grampaw Pettibone says:

There'd been a lot of work done on those elevator stanchions in the 90 minutes prior to this deck launch, and they had been visually checked down by the Flight Deck Chief just 15 minutes prior to the launch. No one knows who raised those stanchions. However, the flight deck was NOT visually checked for obstructions between launching of three helos and striking two other helos below. Chocks and tie-downs SHOULD be removed after a helo launch, but there was no positive check done to make SURE of a clear deck. This was almost a fatal error. Deck launches are faster, but at night a catapult shot is surer. Even a blown tire at night can get hairy.

Double Play

At 1955 one winter night, a young ferry pilot arrived over NAS QUONSET in his trusty AD-6. The weather on the hop up from Norfolk had been excellent, although it was a pitch dark night. He had eaten an excellent meal before departure, and was feeling mighty fine. It was one of those GOOD nights—so far.

The tower cleared him to the duty runway, informed him the wind was calm, the runway was dry with braking action excellent, although the whole area was otherwise pretty well snowed under. The pilot asked for the runway lights to be turned up in intensity and commenced his approach.

Coming in over the water toward the runway end, it seemed like a pretty black hole, so he held off his touchdown until he reached an FCLP set-up about 700 feet down the runway. These lights extended for only 300 feet of his rollout, and as he looked out the left side for distance markers, he saw none.

Runway lights seemed few and far between, and suddenly the approach lights on the far end of the runway loomed up brightly dead ahead! Braking his AD heavily, the pilot shot off the end of the runway, rolled swiftly through 130 feet of snow packed 10 to 14 inches deep, struck a bare patch, dug in the propeller and flipped over inverted!

Hanging in the straps, the pilot called the tower to inform them of his accident, and they sounded the crash alarm. Cutting all the switches, he waited patiently and was freed in a few minutes by the crash crew.

A few facts brought out in the investigation: The runway in use is 4000 feet long and 500 feet wide. It is dark on the left side because it is intersected by two other runways. There is only one runway distance marker at 3000 feet. The 1000-foot one, lost in the hurricane of Sept. 1960, had not been replaced. The pilot didn't know how long the runway was, and had not bothered to ask the tower for this info. This station has an 8000-foot runway. The wind was calm—one knot.

Grampaw Pettibone Says:

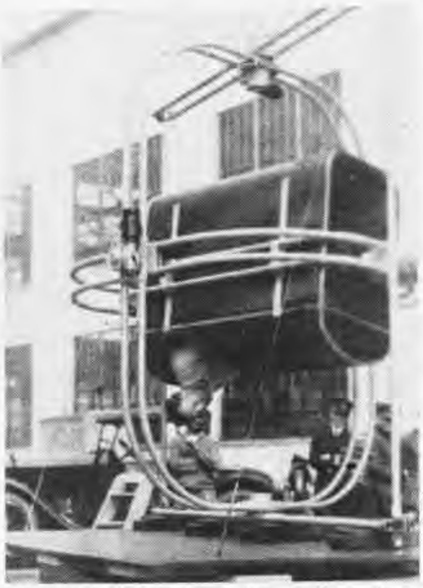
Jumpin, Jehosaphat! Both this young man and the tower must have flipped their wigs! The pilot GOOFED by going in on a strange runway without checkin' its length, and not taking a wave-off when things looked wrong on final. If he'd checked his pubs, he'd have KNOWN they had an 8000-footer! With no wind, your ground speed on rollout shrinks up 4000 feet in a hurry. He set up his own accident.

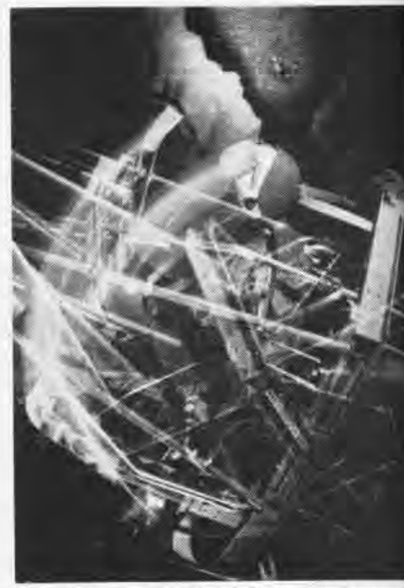
How the tower could clear a TRANSIENT to land without passing out a little info just plain beats me! When the wind is calm, the BEST runway should be used—that's what all that concrete was poured for. A good alert, sharp, fast thinkin' air controlman team in the tower could PREVENT many of our pilot error accidents. It was a DOUBLE PLAY—pilot to tower and out!

The Sleep Walkers!

Berth of a Notion: 610 Project

TRAINING LEGACY OF LUIS DE FLOREZ





1919 NOVELTY *at Pensacola was this earliest training device (l) which acclimated basic flight students to flat-on-your-back attitudes. Starting in approximate position, but with vastly different purposes and results, is space age simulator used in Project Mercury training.*

A FEW of the moderately-aged F6F/F4U jockies of yesteryear were wont to tell a tale of WW II about a carrier pilot from North Dakota who petitioned one of our largest aircraft corporations regarding the manufacture of the ultimate gadget—a panic button.

"Four settings, gentlemen," he wrote, "will do nicely: very bad weather, very bad navigation, very bad engine, and very bad luck!"

As the story goes, the lighthearted engineers of the corporation dispatched the requested item posthaste. However, instead of four, they had supplied 81 settings plus one catch-all setting clearly marked: "Extreme Emergency."

The instructions accompanying the beautifully machined item defined the latter circumstances as "a time when all hope was lost, viz., iron bird on fire, flat on thy back at 50 feet, canopy jammed, fatal impact imminent."

Implementation of the wondrous device, the instructions further spelled out, would at once place the user in his favorite pub with his favorite blonde far from the hazards of whatever was hounding him when he hit the button.

It might be mentioned that in due course of events the hero of this portion managed to get himself surrounded by a bunch of zealous *Zekes* and was last seen barreling-in, on fire and inverted, etc. Whether or no he used the extreme provision of the device per the company instruction is, to this day uncertain. However, a good friend of his—and this is a bit farfetched—claims he saw him the day of his official demise, in a Bismarck, N.D. pub—with a blonde.

With all due respect to the "X" Aircraft Corporation and the pilot, the request for the Panic Button had been grievously misdirected. Had it been sent to 610 H Street N.E. in Washington, D. C., many specialists in the mechanical art of conditioning pilots for such horrible circumstances as aforementioned would have turned to promptly and most likely made the gadget an item of standard issue.

The 400-odd gentlemen who dwelt there were preeminently qualified to deal with such matters.

Banded together by Cdr. Luis de Florez, USNR—in civilian life an internationally known engineer—the group was identified as the Special Devices Division, Bureau of Aeronautics. From 1941 on to the end of the war, the division devoted itself to the design of anything that might save lives or equipment.

In its ranks were educators, engineers, lawyers, architects and businessmen. Its members were qualified in such diversified fields as optics, psychology, medicine, and even magic. The unit grew from a contingent of two to a division of 500 with contract facilities involving 15,000.

The mission of the SDD was to develop methods by which green young men could be taught to fly, shoot, navigate, bomb and perform other combat duties—and do these without danger and at minimum expense.

In the beginning, the Special Devices undertaking was a novel experiment with little precedent upon which thumb rules could be based. De Florez, brought in by RAdm. J.H. Towers, the Chief of BuAer, for the purpose of shortening and improving the training course of pilots and crewmen, had availed himself of a quick look at British innovations before settling down in a garage at the 610 address.

TRADEMARK OF SIMULATION *effort in WW II was gunnery trainer. Ability of pilots to use airplane as gun platform was fundamental consideration given earliest attention by de Florez team. With realistic training on ground, Navy pilots downed enemy at rate of 22-1.*

RECOGNITION MODELS, *photos used at Kaneohe in 1944. Globe is "cone of fire" training aid.*

BOGUS BLIMP *is trainer at Lakehurst in 1943. Operator could create various flight effects.*

WW II BOMBARDIER *at Jax keeps eye/hand sharp with this sweat-producing simulator.*

RADIO CITY DISPLAY *of Navy Special Devices during WW II drew highest attendance in history of Science Museum; focused public attention on value of pioneer program. Unexpectedly, display proved powerful recruitment stimulus. Rehabilitated servicemen manned exhibits.*

WAVE AT LEFT *monitors relatively simple Link trainer console at Corpus Christi in 1942. Familiar trainers are still in use today.*

A3J INSTRUCTOR'S *console, circa 1961, overwhelmingly reflects complex nature of simulation and flight today. Link device is trailerized.*

Human Engineering, *per se*, was yet to be coined as a label for the science of man/machine relationships. To de Florez, who had already built a reputation in the great outside world for making machines work for man, the training project was to be the most challenging and fruitful of his noteworthy career.

For his MIT graduation thesis in 1912, de Florez measured the thrust in flight of propellers on a Wright B seaplane. His first job was that of engineer for the Burgess Company in Marblehead, Mass. This was exciting and enthralling, but financially a washout, so de Florez managed to hire himself out to a small organization which had spent many futile years in an attempt to make gasoline out of kerosene. His quick, patented solution—high temperature "cracking"—started a whole new approach to the problem of gasoline manufacture, and the young engineer was sent to England to establish the first of many cracking plants he was to build and operate.

While in England during the early days of WW I, he was credited with the invention of two devices which the British and other nations later were pleased to have in hand: a useful anti-aircraft gunsight and a flame thrower. He was also able to produce "Toluol" which was used by the hard-pressed British in the manufacture of TNT.

De Florez's inventions are numerous. Thirty-nine of them, developed for aircraft or as training devices, were given to the Navy. In the big and highly remunerative world of oil, he has contributed such widely used items as the de Florez Cracking Process, Temperature Control Systems, Vertical Furnace and Safety Drilling System. In aviation, he still holds a patent on de Florez blind flying methods, automatic pilots, etc.

When he was tapped for the Special Devices assignment, de Florez had just won his Naval Aviator wings at the ripe, young age of 51. One of his contemporaries recalls that de Florez reported to Pensacola in his personal and plush Beechcraft. With everything grounded by miserable weather at Pensacola on his arrival, he shot a successful approach and landing and checked in with an enthusiastic announcement that he was ready to start flight training. De Florez completed the 11-month course in seven weeks, losing some 20 pounds in the process.

Returning to Washington de Florez took an initial grant of $50,000 which was obtained at the behest of RAdm. Towers and promptly poured it into the Navy's first training devices, maintenance films.

From this humble beginning the pace quickened, and so did the funding. Following Pearl Harbor, $10 million was appropriated for the design and production of more than 450 training devices of every description. In the last year of the war, the budget was $57 million.

One of the earliest urgent requirements handled by the SDD wizards involved pilot techniques in the PBM, a twin engine seaplane which was building a bad reputation because of its awkward, often fatal single-engine characteristics on take-off. Since actual practice of the emergency was foolhardy, the first experience gained by pilots and crewmen was the real thing and an alarming accident rate called for remedial action which would teach proper handling techniques without risk of men or equipment.

The trainer, designated Device 2-F, was the first electronic flight simulator. It was an exact duplicate of the real flying machine's essential control spaces and afforded simulation of any mission or emergency condition imaginable. To pilots who had been subjected to flight in the 2-F, single engine emergencies in the PBM eventually became minor incidents rather than certain disasters.

Early emphasis was also placed on gunnery trainers, the most widely used being Device 3A2 which simulated aerial gun combat so realistically some veterans climbed out of the trainer dripping with sweat and thoroughly shaken. It was no surprise to the 610 H St. engineers that Navy pilots were splashing enemy pilots in 1944 at a ratio of 15 to one and in 1945 at a rate of 22 to one.

One of the favorite training devices developed in the period was a B-24 bombardier compartment which was so exacting in detail that from the Norden bombsight to its odor, any difference from the real thing was impossible to detect. With characteristic foresight, the 610 synthesists had oiled certain parts of the device to simulate the sweet, oily smell of a bomber's interior.

This particular device was exceedingly popular for another reason. First of its type to be fully air-conditioned, student and scientist alike found the life of a bombardier a pleasant one in hot, muggy Washington. Actually the air conditioning provided the chill environment crews would experience at altitude, thus requiring the wearing of gloves and warm, bulky clothing which made the simulation as realistic as possible.

From the N. E. Washington Emporium of Ersatz flowed designs for more than 450 training devices, ranging in cost from three-quarter million dollars to a few cents a copy. Such devices as mechanical gunnery instructors, synthetic turrets, instrument and flight engineer panels, and bombing trainers were placed in operation at naval air stations, training centers, advanced bases and aboard Fleet ships.

The division developed recognition trainers, a device for studying the trajectory of machine gun bullets and small peepshow affairs which taught all viewers how to do such things as the laundry or drive nails.

De Florez spearheaded methods of teaching aerology with three dimensional weather charts and navigation instruction in a device which resembled the inside of a small planetarium. In addition, the hard driven associates of the indefatigable "Mr. Training Device" came up with a process of making extremely accurate terrain models from aerial photos—a process that proved invaluable to many users in all theaters of the WW II effort. Shipboard trainers were designed to meet the demands of a rapidly expanding anti-aircraft training program. Field training devices were provided to worldwide activities for schooling in communications, radar, recognition and crew cooperation.

Upon the request of ComAirLant to develop and engineer equipment for use in the anti-sub warfare campaign, a number of devices for this specialized warfare were brought into being. Some of these made possible training in rocket firing, combating the sonic homing torpedo and in anti-submarine searches at night.

Other major projects at the 610 location centered on landfall techniques and specialized amphibious training devices.

One program, little known but as vital as any supported by SDD, placed many of the training devices in more than 30 Naval hospitals for use in rehabilitation of combat casualties. Such devices as the Fixed Gunnery Deflection Trainer, in addition to an inherent amusement factor, provided a means for restoration of muscle coordination and judgment.

Probably the best remembered gadget to emerge from the busy garage was a multiple pulse counter. The requirement which caused its birth is lost, but its effect may be noted in the words of an engineer who had a finger on it. "It was designed to take care of 100 patients simultaneously—and could too. It should have been a boon to hospitals and nurses everywhere, but at the end of the war, the Navy was still trying to figure out a use for it."

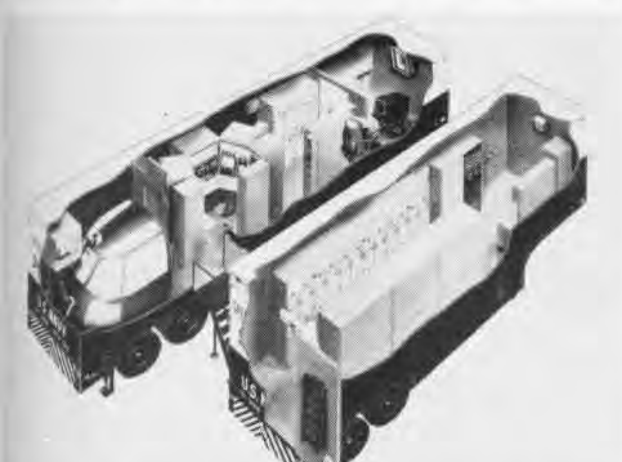
The extraordinary achievements of Special Devices Division were signally honored in 1944 with the presentation of the Collier Trophy to Capt. de Florez. The trophy committee's award was: "For his contribution to the safe and rapid training of combat pilots and crews."

One of de Florez's last actions as head of SDD and before his return to inactive duty, was the relocation of the division now under the Office of Research and Inventions to new headquarters at the former Guggenheim Estate, Port Washington, N.Y.

In 1946 its name was changed to the Special Devices Center and in 1956 to its present title, U.S. Naval Training Device Center.

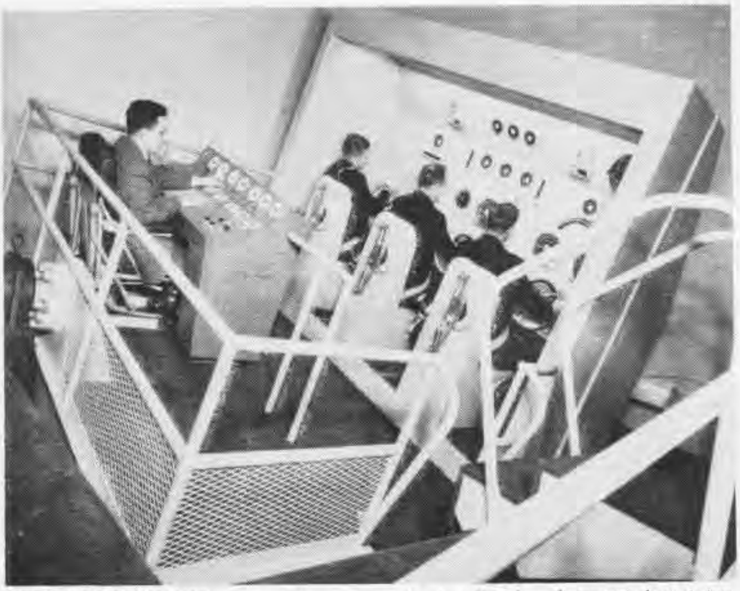
Today, under the command of Capt. E.C. Callahan, some 700 engineers, scientists, psychologists, technicians, and liaison officers from all services work on projects ranging from a cardboard Morse code pocket blinker costing two cents to a multi-million dollar weapons system complex used for training aircraft crews.

Charged with the responsibility of providing a vast range of training devices and simulators to keep all of the nation's Armed Forces trained to the peak of combat readiness, recent Center undertakings include a Submarine Target Simulator, an Army Tank Turret Trainer, a Human Disorienta-



MOBILE TRAILER *concept, now applied to all weapons systems trainers, permits move of integrated devices to any site. Above is the new HSS-2.*

NEWEST CONCEPT, *UDOFTT, can simulate submarine or space vehicle by use of digital techniques. Here pilot readies for jet flight.*



NTDC DEVELOPMENTS *cover entire range of operational and practical training. Above, joystick attachment to submarine simulator banks in realistic response.*

CAPT. E.C. CALLAHAN *(R), TDC Director, briefs Capt. J.E. Aymond, ONR, on features of target trainers.*

tion Device and a whole series of Operation Flight G Trainers, including the F4H and A2F.

The Center's simulators and training aids cover the entire scope of operational and practical training. They vary in design and use from the very simple to the very complex. Some are designed for mass training, some for individual training, and others for team training. But they are all designed to serve one purpose—to insure more effective training. The Center's training device program includes responsibility for research, development, production, installation, maintenance and modification of air, sea, subsurface, land and space trainers.

The Naval Training Device Center has pioneered in developing tools in the field of flight safety. These tools have undoubtedly contributed to a lower aircraft accident rate in the Navy and their full impact on this vital program still remains to be determined. These advance tools are now playing a significant role in the conditioning of space astronauts. But research pioneering is not new to the human engineers at the Center. For example, the world's largest human centrifuge was developed by the Center and installed at NADC JOHNSVILLE and the Human Disorientation Device was constructed for the School of Aviation Medicine. In addition, a whole series of High Altitude Pressure Chambers including one now under construction which will simulate altitudes up to 250,000 feet are products of the scientists from the Center.

The Center is also responsible for numerous research tools in the field of education and training. Such research projects as that conducted by teaching by television, back in 1948-49, was another "first." The results of this study are still being reaffirmed by numerous studies conducted by leading educational institutions and national foundations.

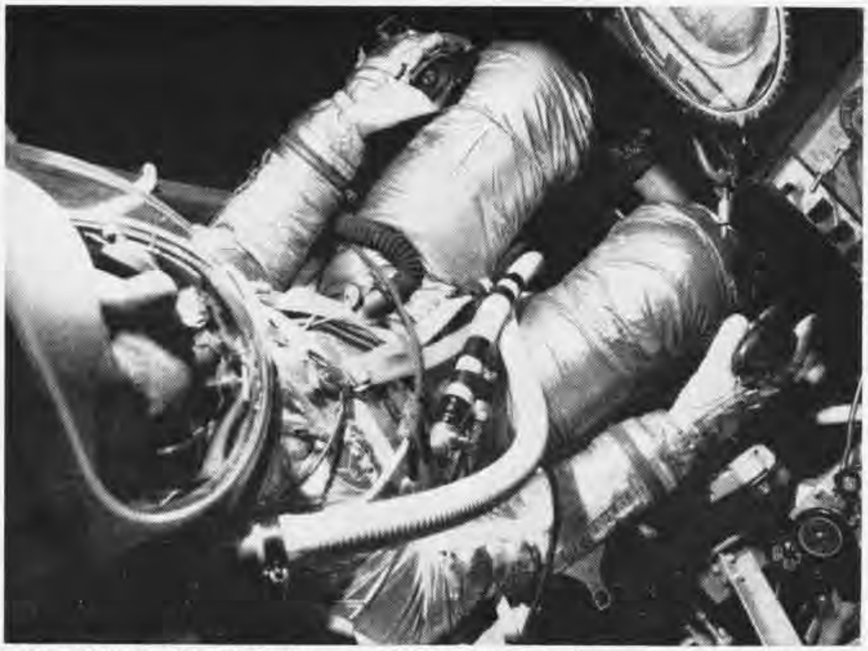
Not all of the Center's research, development and productive activity is directed toward the making of synthetic training devices. Many training situations can be effectively solved by the fabrication of training aids that

LINK DC-8 *simulator in use by United Air Lines at Denver shortens training time and cost. De Florez participated in this development.*

MOBILE PHOTO TRAINER *serves dual purposes in checkouts of F8U-1P pilots and maintenance personnel. Cost of operation is negligible.*

do not require simulation or synthesizing of the complete environment or hardware. These Training Aids, which may or may not resemble the operational equipment, are designed to illustrate or demonstrate principles and theory of operation.

In the Training Aid Category are animated training panels, mock ups, specially developed or modified projectors, animated or static overlay transparencies, models, recordings, etc. Such devices as the Full Pressure Suit Demonstrator, Device 9U104; Liquid Oxygen Demonstrator, Device 2G11; and many other classroom type training aids are designed to train personnel in safety procedures, trouble shooting techniques, recognizing sounds as are encountered in sonar and ECM signals. Still other devices such as the Cockpit Procedure Trainers and Ejection Seat Trainers, do not provide a full range of simulation, but train personnel in procedures, manipulation, feel and "knobology."



LCOL. JOHN GLENN, *USMC, Mercury Astronaut, attired in full space regalia, is subjected to Mercury type acceleration and low pressure profiles in gondola of Navy's human centrifuge.*

Human Engineering is a new concept in the man-machine relationship, vigorously pursued at the Center in fabricating most of its training devices. Typical of Human Engineering research are Center studies on high speed flight safety information for pilots, and pilot safety factors. The Center recently completed space evaluation research on two studies titled, "The Center of Mass of Man" and "The Physiology of Flight."

A far cry from the very first project is the multi-million dollar *Polaris* Weapons System. To be housed in a three-story structure, the *Polaris* trainer will simulate diving, surfacing, cruising, emergencies and launching, thus enabling the complete indoctrination of the "Blue" and "Gold" missile crews of nuclear powered subs without their going to sea.

As it was some 20 years ago, the manufacture of "Panic Buttons" is in full progress. Unlike the lad from North Dakota, if you have a brainstorm, channel it to Port Washington and let the rest of us benefit from your inspired requirement. It may be just what they're looking for.

In closing, we can report that the indefatigable Luis de Florez, now 72, is still immersed in training device projects and is a consulting engineer to Douglas Aircraft Corporation. His insistence that a DC-8 simulator precede the production of the prototype paid off in some interesting dividends. It was the first instance of a simulator coming into being in advance of the actual model and thus afforded an early check on assembled engineering data. In addition, valuable pilot experience gained in the use of the Link DC-8 simulator was employed in the first flight of the giant jet transport.

Of the WW II Special Devices Division, his memories are of incredible people with incredible ability and energy whose output was a major contribution to the war effort. "All except one project," he muses, "that 'pulse counter'—but they will find a use for it someday."

SUPER SIMULATOR *at NADC Johnsville is world's largest human centrifuge. By linking it with "Typhoon" computer, flight profiles were enacted for NASA's X-15 and Mercury programs.*

MATING MEN TO MACHINES

The engrossing tale of the World War II undertakings of the 610 H Street N.E. group and the high state of the art of simulation as practiced since then at Port Washington would be incomplete without the following definitive discussion on Applied Human Engineering by RAdm. Luis de Florez. On these pages are some of his pointed comments which are fully developed in the "Encyclopedia of Science and Technology," published by McGraw-Hill Book Company, Inc., in 1960.

Q. Adm. de Florez, more and more we hear reference being made to the "human engineering" aspects of a new airplane or a new weapon system. Since you have been one of the Navy's, and one of the nation's, pioneers in this field, would you explain what is meant by human engineering.

A. The area of knowledge which deals with the studies and relationship of the natural capabilities and limitations of the biological man to machines and systems pertains to the field of "Human Engineering" or "Human Factors Engineering."

This field is primarily one of engineering which necessarily involves many other scientific areas, such as anatomy, physiology, psychology, biology, and anthropology in order to understand the capabilities and limitations of the human machine. Other less tangible areas of knowledge must also be brought to bear, such as spiritual and emotional values which we recognize but about which we know relatively little in a quantitative, engineering sense.

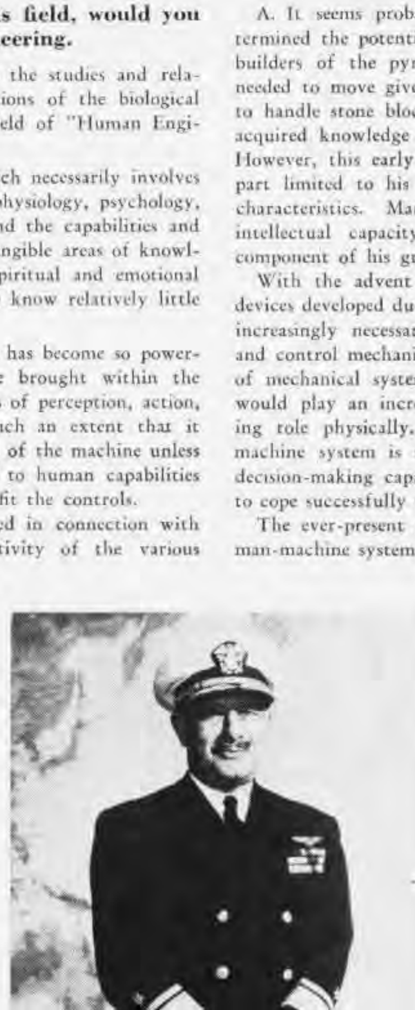
We have reached the point where the machine has become so powerful and so complex that its controls must be brought within the capabilities of the operator. The human faculties of perception, action, reaction, and decision can now be taxed to such an extent that it is no longer possible to develop the full potential of the machine unless the control of the machine is not only tailored to human capabilities but the operators are selected for capabilities to fit the controls.

The types of information which are developed in connection with Human Engineering studies include the sensitivity of the various human sense receptors, characteristics of the human movements, dimensions of body and limbs, the power and speed of reaction, ability to make decisions, problem-solving capabilities, endurance, resistance to fatigue, reaction to training, experience, the effects of climate, food, clothing, etc.

Q. Generally, how have Human Engineering principles been employed?

A. Human Engineering directs itself to such problems as the design of displays and controls, the layout of work spaces, and the control of special environmental factors affecting operators' performances. Also factors such as the legibility of scale markings, pointers, and the need for better visual presentation of readings of instruments.

We recognize now that man can no longer serve efficiently when too many variables must be considered to visualize mentally an operational situation quickly and where errors may prove to be fatal, as for instance, in flight navigation and tactical operation of high speed aircraft. There the allowable time for mental consideration of facts is literally telescoped by speed. This realization is leading to important developments in the use of computers for assembling and weighting data and in the presentation of the whole operating situation in a more naturally recognized form, such as a pictorial presentation.



Rear Admiral Luis de Florez, USNR (Ret.)

Q. From a historical standpoint, the man-machine relationship to which you refer has existed for centuries. What implications may be drawn from your knowledge of some of these early achievements?

A. It seems probable that the shipbuilders of old must have determined the potential of the galley slaves and that the architects and builders of the pyramids found out the number of men or beasts needed to move given quantities of sand and how many were needed to handle stone blocks. Military leaders, to be successful, must have acquired knowledge of the capabilities and endurance of their troops. However, this early knowledge of man's capability was for the most part limited to his physical attainments rather than his intellectual characteristics. Many centuries had to pass before man's unique intellectual capacity was recognized as an increasingly important component of his growing physical power through machines.

With the advent of the steam engine and the many mechanical devices developed during and after the Industrial Revolution, it became increasingly necessary to rely on human intelligence to plan, guide and control mechanical efforts. It became evident that in the growth of mechanical systems involving man as a component, man himself would play an increasingly important role mentally and a diminishing role physically. In short, the indispensable part of the man-machine system is not man's brawn, but his intelligence, initiative, decision-making capability, and ability to adapt himself and his work to cope successfully with circumstances beyond his control.

The ever-present and growing problem in the development of the man-machine system is that of combining the evermore complex products of scientific progress with the even more complex human organism on which we rely for purpose and guidance.

Q. How about man himself, Admiral de Florez?

A. The physical characteristics of the individual—the human machine—have remained virtually unchanged since the earliest evidence of the existence of man and will not change for countless generations to come. On the other hand, the man-made machine is capable of ever-increasing power, scope, and speed of operation. We must consider, therefore, man's capabilities as a *constant* in contrast to the unending *progression* of the machine he creates. We must recognize, however, that the machine at best is a slave which can serve only to implement man's will and to amplify his power and that man, himself, limited as he may be, must be called on to supply the intelligence and initiative to develop the machine's potential and purpose.

If our machines must be manned by the average human being, their operation will be governed by the man's average capabilities which may be influenced by mental stress, fatigue, and sudden change. Consequently, the average man's capabilities under all conditions must be analyzed, measured, and the resulting knowledge made available to the designer to take advantage of our scientific developments.

Q. Admiral, this leads us dangerously close to a query on women drivers, but since we're in the flying business, we'll play it safe. Will you cite some examples to show how human engineering has been used to mate the aviator with the airplane?

A. Let us consider instrument flying which requires reading several instruments simultaneously to obtain a mental picture of the attitude of the aircraft, its speed and direction in both the vertical and horizontal plane. There are instruments for "Turn and Bank," "Rate of Climb," "Air Speed," "Compass" or the "Artificial Horizon-Directional Gyro" combination. The readings of other instruments must be taken periodically (altimeter, time, engine instruments, radio signals, etc.) to maintain both flight and course to destination. Calculation must also be made currently for navigation purposes and to determine ground speed, fuel consumption and remaining range, etc.

The ability to take, comprehend and react correctly to all these simultaneously received stimuli not only requires much training but constant practice, because this information supplied to the brain is not in a form which we can assimilate naturally. Add to all this the constant need for checking the progress of the mission itself and the ever-decreasing time available due to increasing speeds, and we finally reach the human limits beyond which we begin to reap failures and casualties.

The estimate of the pilot's mental limits is a Human Engineering consideration. Though the instrumentation may be adequate technically, the task of coordinating and visualizing the meaning of many instruments mentally becomes humanly too great for reliability.

Q. What do you see as a solution?

A. The solution lies in resorting to a small relatively simple electronic computer to collect, assemble and assess the readings of the individual instruments, radio signals and predetermined factors governing the flight and displaying the total result pictorially. The flight instruments produce a picture on a television tube or its equivalent portraying a horizon (as in visual flight) and a simulated path, portrayed as part of the picture, along which the pilot flies. The path which is generated by the flight instruments and the electronic guidance leads to the pre-set destination. The navigational data instruments generate a moving mark on a transparent terrain map (or Mercator projection) to give the position of the aircraft at all times. The results of fuel consumption and speed calculations by the computer show up as circles of diminishing radius around the aircraft position mark to denote the range remaining.

The pilot can thus be provided with a picture which he can comprehend naturally without effort or calculation and which gives him the necessary current information to fly to his destination. He is relieved of burdensome, time consuming calculation and can devote his attention to his prime function, which is to carry out his mission effectively and to cope with any unforeseen circumstances. Thus the control of the machine has been tailored to the operator's capabilities.

Q. That's a fairly complete run-down on the Army-Navy Instrumentation Program, isn't it?

A. Yes. The ANIP program, while not yet perfected, provides the most logical solution for providing immediate information to the pilot automatically.

Q. When did the Navy first become aware that the weapons of war were surpassing man's capacity to use them?

A. In the early stages of World War II, it became evident that the advanced war devices created by scientists and engineers fell short of their potential simply because of the shortcomings of the average military operator. This led to the U. S. Navy's program of "Synthetic Training," a branch of which was designed as "Human Engineering."

Q. Admiral, you are probably even better known to most of our readers for your contributions in the field of synthetic training than in human engineering. How would you define the relationship between these two fields?

A. To me they are not separate fields. They are two ways of approaching one problem, that of matching the machine and the man. The human engineer concentrates on making the machine compatible with human abilities and characteristics. The synthetic training people attack the problem from the other side by providing devices to develop the operator's ability to cope with the machine, and do it in the safest and most economical way.

As we strive for the highest quality in design and material for the aircraft, we must match it with the highest quality of human characteristics and skill, to insure maximum returns. The need for large numbers of pilots or operators is diminishing in proportion to the increase in striking power, whereas the need for competence and skill in individual pilots is increasing.

During WW II, one of the most successful simulator projects was that of the combat information centers installed at St. Simmonds and used for the training and selection of personnel to man the carrier combat information centers. The centers were constructed in exact replica of those aboard ship, for each type of ship, fitted with actual service equipment, radio, radar, telephone, plotting board, squawk boxes, etc. The signal fed into the equipment could be generated synthetically or by target aircraft. With this equipment, the instructors could make the students work problems, meet emergencies and carry out operations so closely resembling combat conditions that the transition of students to actual service could be readily effected. This was one of our most profitable ventures.

Q. At what point in the production of a new weapons system should the simulator be ordered?

A. Since any new weapon or weapon systems project requires several years for completion, the actual value of the device and its optimum method of operation cannot be developed from a strategic and tactical aspect until it is actually functioning. If, however, the proposed operating characteristics of the weapon in question can be simulated accurately and faithfully, a study of its capabilities and its utilization can begin long before the real weapon or system is completed.

Q. Admiral, what do you see for the future of human engineering?

A. Progress in science and technology has endowed mankind with virtually unlimited physical power. With the versatile power of the internal combustion engine, the conquest of geographical barriers by the airplane, the boundless communications made possible by electronics, and now atomic energy with all its ramifications, man has to shoulder a gigantic responsibility for he now has the power to perform miracles or produce catastrophe.

Whether man will benefit the world or destroy himself will depend more on his spiritual progress than his ability to create new machines. Aside from the philosophic aspects of man's scientific progress, the future of which neither the scientist nor engineer can foresee, there looms the prosaic danger of simple mistakes which can misdirect his magnified physical power or fail to apply it when needed.

There exists a great opportunity to utilize synthetic warfare and the Human Engineering data for future planning and tactics to aid in solving our national defense problems. However, it is not possible to create all the synthetic equipment needed immediately, nor to construct such equipment once and for all. We should rather initiate a continuous development in this field, changing and modifying synthetic devices and equipment as new war equipment and concepts appear over the horizon to permit current study of the results from the Human Engineering aspects.

New Squadron is Forming
VAH-10 Will Train at NAS Whidbey

A new Heavy Attack Squadron VAH-10, will be commissioned 1 May at NAS WHIDBEY ISLAND to bolster the attack carrier striking forces of the Pacific Fleet.

While home-based at Whidbey Island, the squadron will train pilots and aircrewmen in radar bombing, navigation, and carrier landings. When pronounced operationally ready, VAH-10 will be deployed with Pacific Fleet carrier task forces.

VAH-10 will fly A3D *Skywarriors*, the largest jet aircraft ever to be operated from ships at sea. The A3D is designed for long-range, all-weather, radar bombing missions far inland.

DCNO(Air) Praises Record
Moffet GCA Unit Logs 150,000th

Logging its 150,000th precision ground controlled approach, the GCA unit at NAS MOFFETT FIELD drew a "Well Done" from VAdm. R.B. Pirie, DCNO(Air).

Lt. Dale R. Vandermolen of VA-192 made the record approach in an A4D, with LCdr. Robert C. Jackson, the RATTC Watch Officer.

Last August, RATTC MOFFETT set a record of 2627 GCA approaches.

BULLPUP-ARMED A4D-2N OF VA-46 AT CECIL

VA-46 Fires Live 'Bullpups'
Lt. W.H. Byng Sets Highest Mark

Attack Squadron 46 became the first jet attack squadron in the Fleet Air Jacksonville area to fire live *Bullpup* air-to-surface guided missiles.

The squadron was notified it had been selected as a *Bullpup* carrier in October. In November, a Martin field representative moved a *Bullpup* trainer-simulator into the "Clansmen's" ready room and training began.

Each pilot was graded on 16 test runs so a measure of proficiency could be obtained. Lt. W.H. Byng, squadron safety officer, rated highest with an average error-from-target of 11:57 feet. All other squadron pilots were considered *Bullpup*-qualified by the end of the training period.

Attack Squadron 46, flying A4D-2N *Skyhawks*, is a unit of Carrier Air Group Ten, now deployed aboard the *Shangri-La* in the Mediterranean area.

Pilots who fired live *Bullpups* were Cdr. H.J. Tate, squadron skipper, LCdr. C.Y. Dellinger, LCdr. C.R. Long, Lt. W.H. Fleischmann, Lt. J.H. Kirkpatrick, Lt. W.H. Byng, and Ltjg. J.L. Buckley.

FIRST BABY *born at NAS Atsugi, Japan, in the 50th Year of Naval Aviation was made honorary Naval Aviator. He is Gregory A. Steiner, son of HM1 and Mrs. Joseph R. Steiner. Welcoming new pilot is Capt. James A. Masterson.*

'Hydra' Paper Delivered
Project 'Father' Addresses IAS

LCdr. John E. Draim read his paper entitled "Analysis of the Vertical Floating Launch of Rockets" to the Institute of Aerospace Sciences.

His paper reviewed the history of the *Hydra* project, and pointed out that in addition to safety and low cost, sea launch may be as efficient as pad launch. At present, sea launch is a promising way to make an equatorial launch and thus take maximum advantage of the rotational velocity of the earth.

According to the paper, sea launch may have advantages in gaining velocity. The water acts like a coiled spring to help the rocket on its way. Draim said that in preliminary tests a *Hydra*-launched rocket had 34% more velocity at the time it cleared the surface of the sea than the same rocket would have after the same distance of travel from a conventional launch pad.

LCdr. Draim, active in developing the *Hydra* concept for sea launch of heavy space boosters, was graduated from the Naval Academy in 1949. After a year of destroyer service, he went to flight training, thence to a fighter squadron. Postgraduate train-

UNUSUAL STERN FIRST *entry into Yokosuka dry dock is made by USS Hancock. Only one other carrier in the history of the Ship Repair Facility there had made a stern first entry before Hancock. That was USS Bennington in 1956. Hancock was docked in her unusual position to permit work on after part of the ship. Stern section of angle deck carriers is more easily available to workers and to crane service in that particular position. Note LCVP's in tug roles.*

ing in aeronautical engineering at Monterey filled the next two years. He was selected for a third year at MIT and was graduated with an M.S. degree in 1956. In 1958 he reported to the Naval Missile Center, Point Mugu, after two years flying FJ-3's in VF-73, based at NAS QUONSET PT.

ENS. EARL CLARK *became first Naval Aviator to report to an operational squadron as an all-jet trained student. On reporting to VA-76 he had completed training in the TT-1, T2V-1, F9F-8 at Pensacola and Chase Field.*

Polaris Effort Is Rewarded
Citations Top Navy Norm for Year

Tribute to the success of the Navy's *Polaris* program was paid with the presentation of 89 military and civilian awards to members of the Navy's Special Projects Office in what is believed to be the largest blanket citation on record for a single accomplishment.

Thirteen officers received the Navy Commendation Medal and nine the Navy Letter of Commendation. The 67 Superior and Meritorious Civilian Service Awards which were given engineers, technical assistants and secretaries represented more such awards than are normally given throughout the entire Navy in a year's time.

Twenty-seven higher awards had been given earlier to military and civil service members of Special Projects who head major program segments.

Maximum-plus Helo Hours
HMR-363 Records 152% Utilization

Marines of HMR-363 wrung 152 per cent use out of their HUS-1 and HRS-3 helicopters in January, flying 380 hours more than normal for a month.

Eight HUS-1's and 11 HRS-3's were flown 1110 hours, compared to a norm of 730 hours.

Fifty-six pilots from the squadron and 12 from attached units at El Toro flew to accomplish the unusual feat.

SKIPPER, *Exec. and 100 others from USS Currituck donated blood to the Santo Tomas Blood Bank in Panama City. Shown here are Cdr. G.L. Bliss, Dr. Alberto Bissort, blood bank director, and Capt. C.A. Bolam.*

'Operation Art Work' Opens
Will Make Nation-wide Circuit

To dramatize the 50th Anniversary of Naval Flight, Lew H. Glaser, President of Revell, Inc., has turned over 15 original paintings from the company's art collection.

Valued at $30,000, the exhibit of paintings of aircraft carriers and historic airplanes, is being put on exhibit for one year by the U.S. Navy. It is estimated that more than 20,000,000 people will see the exhibit in this period. It is being shown at museums, the New York Coliseum, Naval Air Stations, and at various community celebrations of the 50th Anniversary of Naval Aviation.

The exhibit was unveiled 25 January at the Naval Aviators Ball. From there it was flown to Chicago by the Navy for the beginning of the tour.

At the conclusion of the year's tour, Glaser will present a group of the paintings to Frank G. Jameson, President of the Navy League.

Ten nationally known artists were commissioned by Revell to do the original paintings, among them John Steel, Jack Leynnwood and George Akimoto.

Inventor is Awarded $3000
Doppler System Works in Transit

Winner of NASA's first cash award for invention is Dr. Frank T. McClure, chairman of the research center at the Johns Hopkins' Applied Physics Laboratory. He was presented $3000 for his invention of a Satellite Doppler Navigation System.

Dr. McClure's invention became the basis of the Navy's navigational satellite program, Project *Transit*.

Under the terms of the Space Act, anyone is eligible for such an award if the contribution is used to further develop space and aeronautical activities in the United States. Applications are evaluated by the Inventions and Contributions Board of the NASA.

MCAF SANTA ANA *crash crew demonstrates capability of new mobile crane which has just arrived. The 150,000-pound crane prepares to lift a 26,000-pound HR2S-1 helicopter. It can lift and move a 40-ton load. Faster and more efficient than the smaller one now in use to clear runways of accidents, the LSW crane will be used for helicopter repair and construction work. Santa Ana Marines received schooling on the crane's operation from a factory representative.*

ADVANCED TRAINING OF THE NAO'S

THE TEAM *of Pilot and Naval Aviation Officer (NAO) is shown in cockpit of a twin jet all-weather fighter during Radar Intercept Officer advanced training course at Glynco, Georgia.*

As you read this, the first of those officers who were recruited and trained specifically as Naval Aviation Officers (NAO's, Code 135X) under the new program will be reporting to Fleet units for service. NANews last looked in on the NAO's as the first class was completing Basic Training at Sherman Field, Pensacola, last September. On graduation, the first class scattered for Advanced Training. Here is the story of the training.

Prospective Navigators report to Training Squadron 29 at Corpus Christi for 16 weeks of intensive instruction in all phases of aerial navigation. Students receive 240 hours of contact classroom instruction—two-thirds on navigation—and more than 70 flight hours of practice.

They learn all types of navigation from dead reckoning, the most ancient, to polar navigation.

After six basic practice navigation flights in the R4D Flying Classroom the students are ready for their final examination which involves an extended overwater cross-country flight. Students navigate to such places as the Canal Zone, Puerto Rico, Bermuda and Norfolk.

Students who successfully complete the course receive Observer "Wings of Gold" designating them as Naval Aviation Observer (Navigator).

Some of the newly graduated navigators report directly to the Fleet to patrol, weather, anti-submarine, VW or VR squadrons for duty. Those slated for duty as VAH Bombardier/Navigators or as VCP/VAH Photo/Navigators will receive an additional five months intensive training at one of the two Heavy Attack Training Units. In Fleet squadrons the NAO's will serve in such aircraft as the A3D, P5M *Marlin* seaplane, WV-2 *Constellation*, P2V *Neptune*, R7V or R6D transports, and the North American's Mach 2 A3J *Vigilante*.

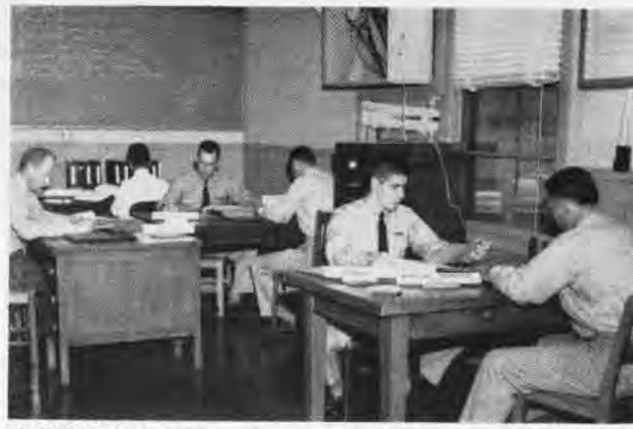
Other new Navigators, approximately a third, do not go directly to the Fleet, but are ordered to Glynco, Ga., for further training, where they join with other NAO's coming directly from Basic for the eight-week CIC Cornerstone Course and one of the three advanced courses.

The Cornerstone Course provides the Naval Aviation Officers with thorough indoctrination in CIC theory and practice. They not only learn what goes on in an operating surface CIC; they also lay a foundation for more advanced airborne training.

THEORY IS LEARNED *in Corpus Christi classroom where NAO's receive grounding in all phases of aerial navigation during 16-week course.*

PRACTICE IS GAINED *in the air. Students navigate 70 air hours, including extended overwater navigation flights to Bermuda, or other ports.*

AIR CONTROL *is practiced by NAO student in eight-week Cornerstone Course completed by all Glynco students before specialized training.*



MAINTENANCE *students solve administrative problems in "mock maintenance office," a part of 19-week Electronics/Maintenance Course.*

Before reporting to Glynco, students were tagged for one of the three advanced courses. Selection is based on student aptitude, preference, and on the "needs of the Service."

Students slated for the AEW/ECM Evaluator's Course receive 7.3 weeks of additional instruction in classrooms, synthetic devices, and in the air. The training builds sound airborne CIC qualifications on the fundamentals mastered in the previous course. Climax of the program is 84 hours of airborne instruction in the WV-2 aircraft during which students practice various CIC functions, including actual control of aircraft on intercept missions.

In the ASW Tactical Evaluator Course, students receive 5.2 weeks of instruction and practice designed to prepare them to fill ASW Tactical Evaluator billets in VP squadrons. They fly 16 hours in the WV-2 to indoctrinate them in the use and interpretation of radar information.

The third course, the Radar Intercept Officer's Course, trains the man behind the scope in the Mach 2+ *Phantom II,* now in squadron service. Students fly in both the WV-2 and the F3D *Skyknight*. They receive 30 flight hours which give them the fundamentals needed to absorb the advanced training given by the Fleet RAG squadrons prior to final assignment.

Not all NAO's serve in the air. Future maintenance managers attend a 19-week course in electronics and general aviation maintenance given at the Naval Air Technical Training Center in Memphis.

The five major phases of the training include: Airframes and Hydraulics, Powerplants (both jet and reciprocating), Avionics (electronics), General Administration, and Maintenance Administration.

The Avionics phase is a course within a course. It consists of 344 hours of avionics equipment, basic theory of electricity, fundamentals of radar, navigation aids, aircraft instruments, and electrical systems.

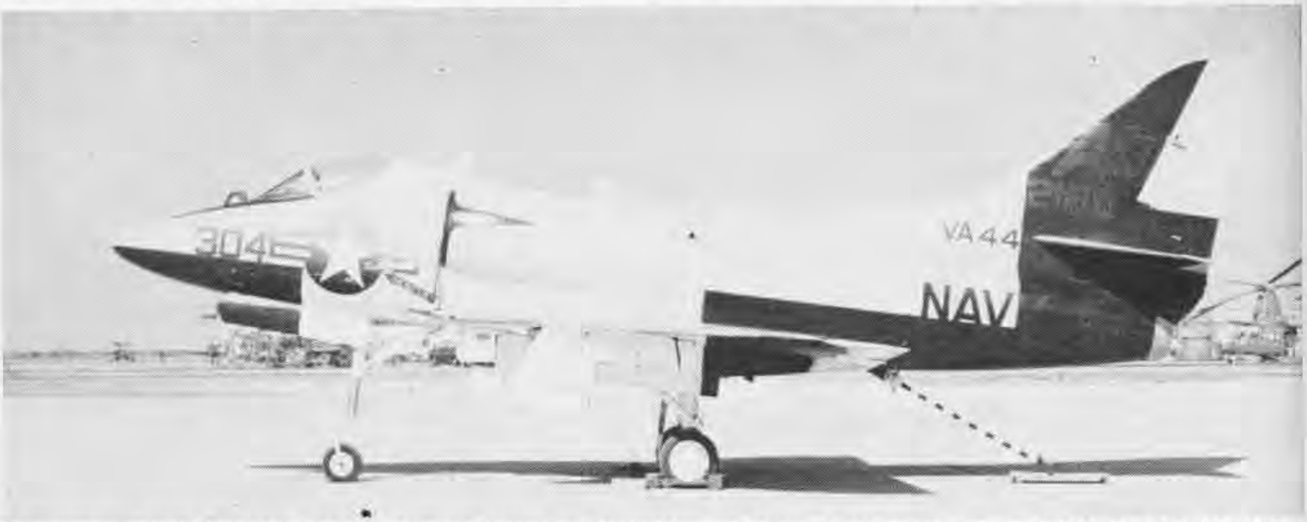
In the Maintenance Department Administration phase, students receive a thorough drilling in use of the publications which are the "tools" of the Maintenance Officer: maintenance instructions, allowance lists, etc.

Completion of any of the advanced courses provides the NAO with the fundamental knowledge required to make a vital contribution as a member of the first line team that is Naval Aviation. The training also provides the solid foundation on which the officer can build a career limited only by his own initiative and ability.

FUTURE MAINTENANCE *officers receive 344 hours of electronics from basic theory of electricity to electronic aids, electrical systems.*

POWERPLANTS *phase gives the NAO introduction to theory and operation of jet engines and what it takes to keep them mission-ready.*

U. S. NAVY JETS WEAR LOUD COATS



NAVY'S NEW HIGH VISIBILITY PAINTS ARE THE RESULT OF CONSTANT RESEARCH IN AN EFFORT TO DECREASE MID-AIR COLLISIONS

By Marie Pfeiffer, BuWeps

IN TODAY'S split-second Navy jet operations, the brilliant flash of fluorescent orange against a sky, land, or sea background is a major contribution to mid-air safety.

The Navy, as a means of avoiding collisions in the nation's airways, is attempting to make its speediest jet aircraft as readily seen as its slowest trainers by bright coats of color applied over the combat camouflage. From long experience with aircraft color schemes, the Navy has learned that bright and easy-to-spot colors can cut down the incidence of air collisions. Records show that the majority of collisions occur during the daylight hours, and generally within about four miles of an airport.

More than 2600 Navy training airplanes have already been given a "split" fluorescent orange-white paint treatment. Statistics on air collisions gathered by the Naval Air Training Command, where the conspicuous color combination is used on all its aircraft, have indicated a definite decline in accidents of the type directly caused by failure to sight close flying aircraft. Of further significance is the fact that the Naval Aviation accident rate of fiscal 1960 hit an all-time low, 1.94 per 10,000 flight hours, a 25% drop from the previous year. While improvement may be ascribed in part to better jet engines and new techniques for their upkeep, it is also attributable to factors, such as the high visibility color schemes now used on aircraft, and increased safety consciousness.

Studies were begun as far back as the early 1950's toward increasing visibility of high-speed aircraft by improved non-fluorescent color schemes. These studies for the old BuAer by the Naval Air Material Center (Air Crew Equipment Laboratory), Philadelphia, Pa., indicated that contrasting dark and light colors, such as blue and silver, would provide improvement in aircraft detectability.

In WW II, camouflaged aircraft became the primary need, and work with bright "split" colors was deferred. Need for higher aircraft visibility returned twofold when the post-war years saw the introduction of high performance jets into the Fleet. Using data obtained from the earlier NAMC studies, a new series of experiments at the Naval Air Training Command, Pensacola, Fla., brought notable progress in improved non-fluorescent color schemes. Yellow proved most promising in increased visibility on small trainers, as the T-28, and International orange-white split colors on larger trainers and utilities, as the SNB's and JRB's.

In the search for the optimum for heavy air traffic conditions, the Naval Research Laboratory started work in 1952 with paint companies on a fluorescent mixture which would be effective for twilight and low visibility flying. At that time, the best life expectancy of luminosity was about 35 days. Beyond that point, the fluorescent qualities of the paint diminished, and replacement was required. The short life of this fluorescent paint made it impracticable for use on Navy aircraft. However, out of this research effort, the Navy's program for anti-collision fluorescent colors was born.

Research continued at NRL and in pigment manufacturers' laboratories to extend the durability of the fluorescent pigment then reaching the market for use in certain non-military short-life items, such as auto bumper strips and advertising displays.

After the Korean war, the Navy decided to keep Fleet aircraft in camouflage colors as a "readiness" implement for any emergencies. Thus a removable, high visibility paint was needed which could be put on aircraft over their normal or camouflage colors, and taken off easily by solvents without disturbing the underlying protective finish. This phase of the development was conducted by the Aeronautical Materials Laboratory, NAMC.

The new paints behaved so well in application and durability—particularly in Operation *Deep Freeze* in 1955—that in 1956, CNO authorized these solvent-removable but still non-fluorescent high visibility color schemes for carrier type aircraft operating in localities of high density air traffic in the continental United States and its possessions, at the discretion of Type Commanders. The high visibility colors were applied over the permanent combat color.

Within a short period, Navy's fluorescent paint development had progressed to the point where a brightness of six months durability appeared practical. The time was now considered ripe for wider Naval use. Documents were drawn up to regulate quality and best procedures for application. An experimental 500 gallons were purchased and applied to transports and training aircraft operating out of NAS ANACOSTIA, NAS NORFOLK and NAS JACKSONVILLE.

By 1958 two types of fluorescent paint had been developed, and specifications for them were issued. One was a solvent-removable type developed by AML, which would be easily removed and re-applied without effect on the underlying finish when the brightness dropped to an unacceptable level. The advantage of this type was that it permitted retention of the underlying camouflage color scheme on aircraft which may be temporarily assigned to training use, but which must remain capable of deployment to combatant forces on short notice. The other type was one which could not be so readily removed, but for which more experience existed as a result of service applications in the past on a variety of aircraft. Fading characteristics of the two types of paint under the same exposure conditions were essentially similar.

Plans called for application of the permanent type paint by O&R Departments on aircraft undergoing overhaul, and application of the solvent-removable type by operating activities or their supporting maintenance activity.

There were two alternatives in the selection of the fluorescent paint colors: red-orange and yellow-orange. Although the latter is more "visible" at greater distances, it fades to a light yellow at a considerably faster rate. On balance, the yellow-orange was determined to provide less visibility over an extended period than the red-orange fluorescent paint. The selection of red-orange has proved the wisest choice after several years of experience with it on thousands of aircraft.

All four-engine and two-engine transport landplanes in the Naval Air establishment which operate predominantly within the confines of the continental United States (including Hawaii and Alaska) are now painted with the fluorescent finish. These include transports used for research and development, test and related support missions. All training, proficiency and utility planes, all UF aircraft, all fixed-wing aircraft and helicopters assigned to search and rescue work, and patrol type aircraft assigned to training are painted along wings, nose, tail, and fuselage with the fluorescent red-orange color (with the all-over yellow pattern in the case of small trainers). HSS helicopters used in anti-submarine operations are now being finished with fluorescent red-orange on the nose and pylon.

IN COLOR U.S. NAVY AIRCRAFT LOOK AS SMART AND BRIGHT AS ANY KING'S HUSSARS

To assess the effectiveness of the present color schemes, the Navy has contracted for formal studies with the Federal Aviation Agency and with university laboratories to supplement the technical work being conducted on a continuing basis by the Air Crew Equipment Laboratory, NAMC. Psychological effects of aircraft colors and schemes have also been studied.

Under the ACEL program, special studies also have been concentrated on the target visual acquisition ranges at the periphery of the pilot's vision, as opposed to the frontal vision; on the checking out of the visual pick-up of various color schemes as compared with red-orange and white; on the psychological effects of colors; and on improving the visibility of propeller tips of helicopters.

The Navy now feels it has a good fluorescent paint specification which will provide a brightness for as long as 12 to 15 months, if prescribed thickness is adhered to.

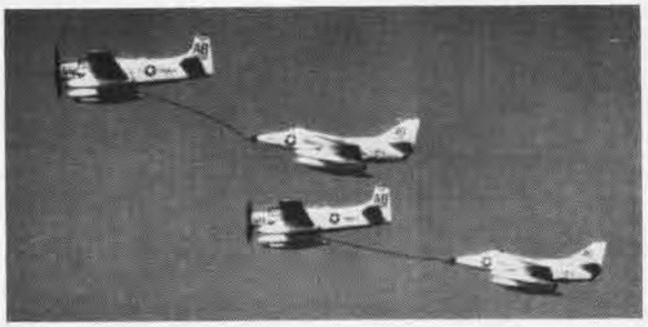
Current BuWeps planning envisions a fully camouflaged combat aircraft for possible emergency or wartime use, except in staging areas or congested air space, since the low detectability of a camouflage color scheme would cause aircraft so painted to become hazardous to other aircraft.

FOR WHAT distance can a pilot figure on seeing the other aircraft painted in fluorescent red-orange and white? The detectability of aircraft, however painted, is complicated by altitude, lighting conditions, and the pilot's own search habits. Over the last four years, BuWeps has been cooperating with the FAA at its Atlantic City, N. J., facility in order to determine the quantitative improvement obtainable by using fluorescent paint.

The FAA has set up equipment and observers over a measured course (hillocks one half mile apart), with the horizon blocked off to avoid an undesirable reference plane, to determine the anti-collision effectiveness of high visibility color schemes on aircraft flying overhead. This operation, showing actual visibility distance, is expected to provide a large mass of data on detectability of aircraft.

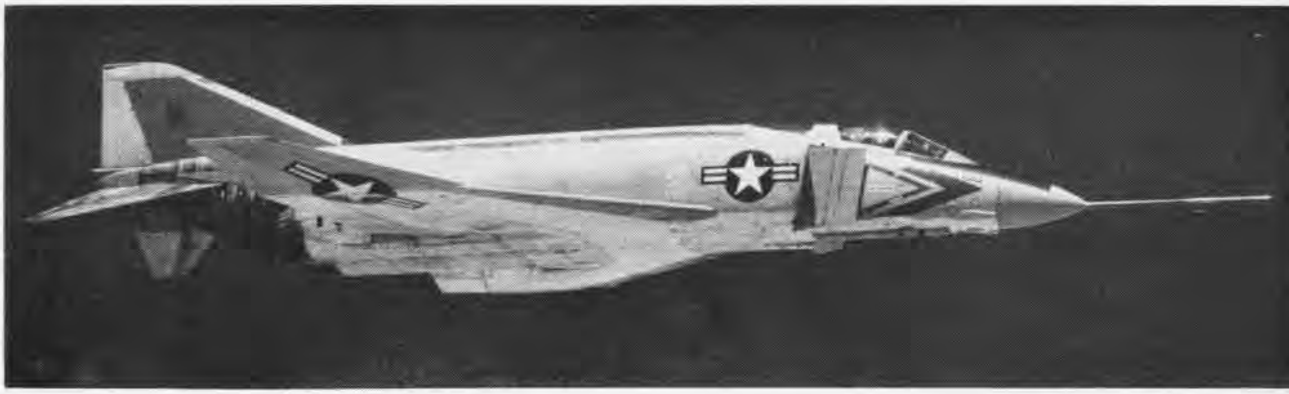
In view of experience gained so far, it is believed that the new fluorescent finishes will diminish the high cost in lives and material caused by aircraft accidents. Navy planners are dedicated to the continuing mission of increasing Naval Aviation safety.


AB
NAVY



A well known figure in Atlantic and Mediterranean circles these days is the attack carrier, USS Franklin D. Roosevelt now deployed with the Sixth Fleet. Squadrons that fly from her decks are VF-11, VF-14, VA-12, VA-14, detachments from VAW-12 and HU-2. A Sixth Fleet veteran, the carrier was put into commission after World War II on Navy Day, 27 October 1945.

ROSEY-GRAVURE



50 Years of Naval Aircraft

FIGHTERS—MONOPLANES AND JETS

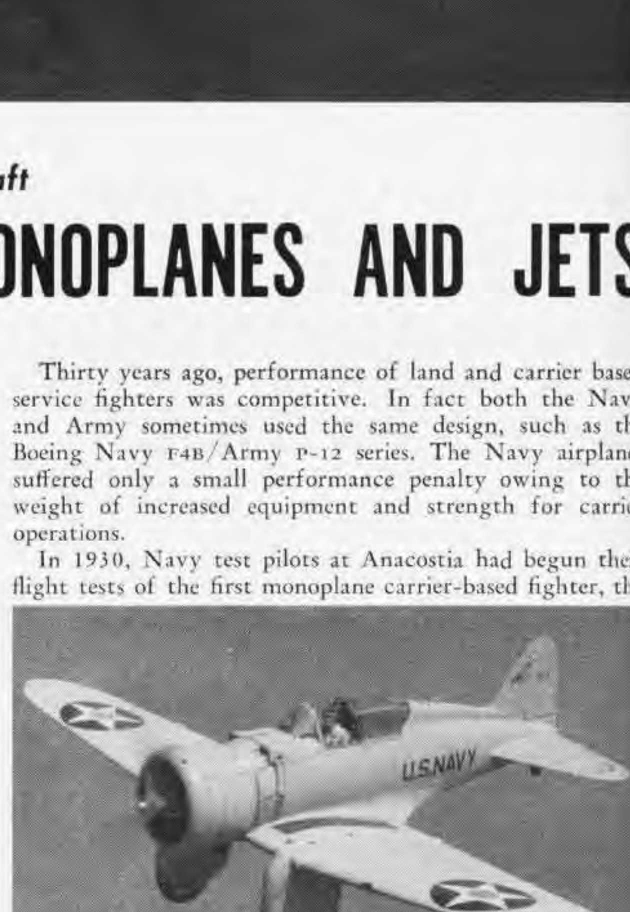
THE McDONNELL F4H-1, now going into operational service, represents the attainment of a long sought goal in the development of carrier-based fighter aircraft. On 25 September 1960, Cdr. J.F. Davis set a new closed course speed record of 1390.21 mph for 100 kilometers flying the *Phantom II* shown above. This third world record for altitude and for speed around extended closed course distances set by Navy and Marine pilots in the F4H, demonstrated the performance capabilities of this Mach two plus fighter. A two-place, all-weather carrier fighter, its performance, (speed, altitude, and range or "cycle time,") is competitive with that of any current fighter aircraft.

In past years attempts to produce Navy fighter designs with a two-man crew and/or night or all-weather combat capability have almost always resulted in aircraft with performance inferior to that of their single-place, day fighter contemporaries. And in the jet age, the performance of land-based fighters has generally led that of their carrier-based counterparts. With the great strides made during the past decade in both aircraft design features and carrier catapult and arresting gear, the design challenge to provide equivalent performance has been met with the F4H-1.

CURTISS XF12C-1 *of 1933; with 625 hp twin-row Wright, this 5630 pound fighter reached 213 mph. It was later redesigned as XSBC-1.*

Thirty years ago, performance of land and carrier based service fighters was competitive. In fact both the Navy and Army sometimes used the same design, such as the Boeing Navy F4B/Army P-12 series. The Navy airplanes suffered only a small performance penalty owing to the weight of increased equipment and strength for carrier operations.

In 1930, Navy test pilots at Anacostia had begun their flight tests of the first monoplane carrier-based fighter, the



NORTHROP XFT-1 *was early experimental low-wing fighter. High speed was 231 mph in 1935 tests with 625 hp Wright, 3840-pound weight.*

all-metal, parasol-wing Boeing XF5B-1. It, too, had its Army twin, the XP-15. Navy tests showed no over-all improvement in performance over production F4B biplanes.

Many new design features were incorporated in succeeding Navy fighters: larger air-cooled powerplants, including the early twin-row engines, with streamlined NACA type cowlings and controllable-pitch propellers; retractable landing gears; wing flaps; and fully enclosed cockpits.

Two-place fighter designs attempted to combine these features to achieve a defensive fighter with performance comparable to that of single seaters. These included one monoplane, the Curtiss XF12C-1, a parasol wing airplane with folding wings which were new to Navy fighters.

However, the margin of performance of the single-seat fighters was such that these heavier two-place fighters were considered more suitable as scout-bombers.

Single-place fighter designs initiated during this period also included monoplanes. By 1936, halfway through Naval Aviation's 50 years, two low-wing experimental models had been tested: the Boeing XF7B-1 with retractable landing gear and the Northrop XFT-1 with fixed gear. Modified and retested, they, as well as the Curtis XF13C-1 high-wing monoplane, were found generally suitable as carrier fighters. However, their advantage in speed did not offset the greater maneuverability and climb performance advantages of the Grumman biplanes.

TYPICAL *of World War II F4F/FM's, Grumman F4F Wildcat with 1200-hp Twin Wasp weighed 7400 pounds, attained 318 miles per hour.*

The Army did put monoplane fighters into service during this period, the Boeing P-26's. Without the need for compromises to provide carrier suitable landing speeds, combat performance was superior to that of biplanes.

In late 1935, the Navy initiated two new competitive fighter projects: the Brewster XF2A-1 monoplane and the Grumman XF4F-1 biplane. As these projects progressed, other designs were tested, such as the Curtiss model 75 being procured by the Army as the P-36. The two new designs were re-evaluated, and it became evident that with higher horsepower air-cooled engines, the biplane would no longer be superior because of the considerably greater speed of the monoplane. The Grumman project was started over again as the XF4F-2, like the F2A a midwing monoplane.

These two experimental fighters were being flight-tested in 1938. By this time, carrier-based dive and torpedo bomber monoplanes were in production. Along with the XF2A-1 and XF4F-2, the Seversky (now Republic) NF-1 carrier fighter, a company-sponsored prototype based on the Army P-35, was subject to the trials. The F2A was selected for production, with considerable aerodynamic improvement to be incorporated, based on full scale wind tunnel tests conducted by the NACA. The XF4F-2, returned to Grumman for complete redesign, re-emerged as the XF4F-3, prototype of the *Wildcat* series, with what became the typical Grumman squared-off planforms.

The F2A-1's became the first monoplane fighters to go into squadron service when they were assigned to VF-3 late in 1939. Not entirely satisfactory, they were later withdrawn, and improved F2A-2's were placed in production.

Both the F2A and F4F designs were continuously modified during this period on the basis of European combat

CYCLONE-POWERED *Brewster F2A-2, used for fighter training in 1942, weighed 5940 lbs. Its speed was 325 miles per hour with 1200 hp.*

experience. Armament was finally increased from the long standard two forward-firing guns, and gunfire protection was added. While increased engine horsepower ratings maintained the maximum speed, other aspects of performance were adversely affected—particularly in the F2A series. Production of the F2A's ceased.

While these projects were proceeding, it was evident that increased performance and armament were required. Three new programs were initiated which resulted in prototypes that were tested before our entry into WW II. Each was based on a different concept. The Vought XF4U-1 was designed around the new P&W *Double Wasp* engine and featured an inverted gull wing. The Grumman XF5F-1, with two Wright *Cyclones*, had an abbreviated fuselage and twin tails. Based on the Army's P-39 design, the Bell XFL-1 used the *Allison* V-12 liquid-cooled engine behind the pilot, driving the propeller through an extension shaft.

The two latter types showed outstanding features, but their unconventional design led to new problems and the XF4U-1 was selected for production. With some redesign, including armament of six wing-mounted guns, it became the famous Vought *Corsair* of WW II and later years.

As war clouds loomed, other fighter designs were started. They included the Grumman XF6F-1, another *Double Wasp*-powered design intended to be a replacement for the F4F on Grumman's production lines; and the Curtiss XF14C series, large fighters using supercharged powerplants for higher altitude capability.

After some initial difficulties, the F6F went on to become the *Hellcat* series, which shared the carrier fighter job with the Corsairs through the latter portion of WW II. Problems and delays with the engines to be used resulted in only the XF14C-2 with a Wright R-3350 driving contraprops finally reaching the flight test stage.

With our entry into the war, production of the *Wildcat* by Grumman was accelerated, and General Motors was selected as a second source, building duplicates of the F4F-4 as the FM-1. Production programs for the *Corsair* and *Hellcat* were also pushed, *Corsairs* being built by Goodyear as the FG's and Brewster as F3A's. With improvements in powerplants, all three series continued in production through the war, FM-2's serving as escort carrier fighters.

New programs and design modifications were initiated to provide advanced fighters, many of them emphasizing certain aspects of performance. The short range of existing fighters resulted in design of large, long-range types. In-

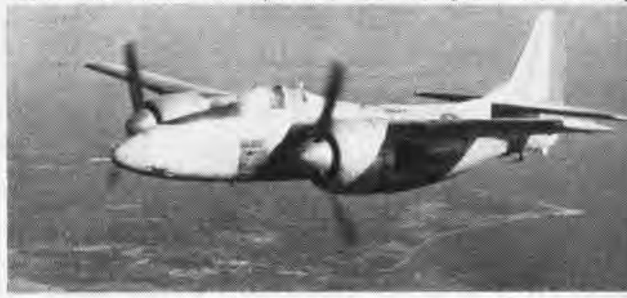
GRUMMAN 'SKYROCKET,' *the experimental XF5F-1, had two 1200 hp Cyclones. With 9750 pound weight, it reached 348 miles per hour.*

IN 1941 TESTS, *Bell XFL-1 'Airbonita' with 1150 horsepower liquid-cooled Allison V-12 engine reached 333 mph; weight was 6740 lbs.*

CORSAIRS SHARED *honors with F6F's. F4U-4 served from late WW II on. Its speed was 446 mph; weight, 12,420 lbs; horsepower, 2380.*

F6F HELLCATS *were standard WW II carrier fighters; F6F-5 weighed 12,740 lbs, reached 380 mph with 2250 horsepower Double Wasp.*

CURTISS XF14C-2 *used 2300 hp turbo-supercharged Wright R-3350; speed of 398 mph was reached by this 14,950-lb high altitude fighter.*



GRUMMAN XF7F-1, *19,500-lb Tigercat prototype, reached 398 mph with two 1800 hp Wrights; production F7F's had Double Wasps.*

creases in performance at higher altitudes, speed, and armament were also considered necessary. With improved airborne radar, night fighters were also attractive.

The new designs were all destined to miss combat. However, the radar-equipped night fighter versions, particularly the *Hellcats*, saw extensive service in later Pacific operations. Improved armament, cannons in place of machine guns and ground attack rockets also saw wide use.

In the early war period, the Grumman XF7F-1 and Boeing XF8B-1 were designed as large long-range fighters. The F7F followed the lead of the F5F in being a twin-engine type, using *Double Wasp* engines and featuring tricycle landing gear. It eventually reached production as the F7F *Tigercat* and remained in Marine Corps service as a night fighter in Korea. Showing lines familiar from the Army Air Force's Boeing bombers, the F8B was one of the early designs using the P&W *Wasp Major* four-row, 28-cylinder, radial engine, in this case driving a contraprop.

Impressed with the nimble performance of the Japanese fighters, engineers designed the XF8F-1 to provide a rugged, minimum-weight compact fighter. During the years between WW II and the Korean action, the success of this effort was amply demonstrated by the *Bearcats* in service.

Another fighter program was ahead of its time; today the XF5U-1 would be called an STOL fighter. With a circular wing planform and large, slow-speed, articulated propellers, its design promised an exceedingly large operating speed range, with maximum speeds similar to other fighters. A full scale flight research model, the V-173, was built. Evaluation showed it to be generally satisfactory. However, problems with the powerplant installation, including the propeller's gearing and drive shafts on the much higher powered fighter doomed the project.

Early in the war, the Navy was interested in the possibilities of turbojet engines. A study contract led to development of the first Westinghouse jets. Army Air Force progress was also monitored. Two carrier fighter designs using jets were initiated early in 1943. One resulted in the twin jet McDonnell *Phantom*. The other, with a more immediate objective in view, was the Ryan XFR-1 *Fireball*, intended as a possible FM replacement. It had a Wright *Cyclone* in the nose and a jet engine in the aft fuselage.

To obtain early flight evaluation of jet fighters as potential carrier-based aircraft, two AAF Bell YP-59A's, service test models of the first U.S. jet, were tested at NATC PATUXENT RIVER, beginning in January 1944. Problems of jet engine operation on close-packed carrier decks, flight characteristics with the low power available at low airspeeds, and other characteristics were evaluated.

Limitation of the early jet engines and aircraft brought about another project with composite power, the Curtiss XF15C-1. A large general purpose fighter, it used the British *Halford* (DeHavilland) jet engine, built in this country by Allis-Chalmers, plus a P&W *Double Wasp*.

While looking to these advanced designs using jet engines for the future, a project was inaugurated to provide a production fighter with greatly increased performance at lower altitudes. Use of an F4U-1 *Corsair* as a test bed for the *Wasp Major* engine sparked the idea of incorporating this new powerplant in production *Corsairs*. As one of the *Corsair* producers, Goodyear undertook this re-design program, and the XF2G-1 prototypes were flying in 1944.

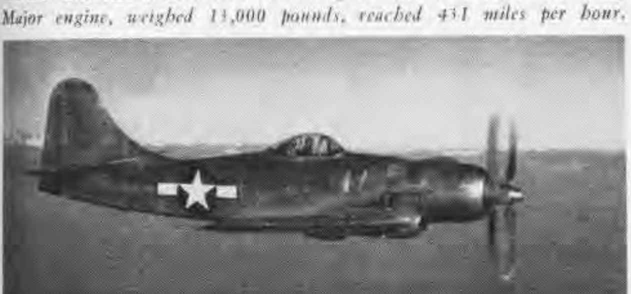
Two other reciprocating-engine projects were included in WW II efforts. While all Navy fighter designs used air-cooled engines, the outstanding performance of the AAF's North American P-51 series with Packard-built liquid-cooled *Merlins* led to testing of a Navy version of the P-51, including carrier trials. Tests were successful, but the P-51's advantages were not sufficient to overcome preference for air-cooled engine types. The other project was the GM XF2M-1, intended as an FM replacement.

Toward the end of the war, and in the early postwar period, the Navy fighter program was realigned. Any planned production of reciprocating engine models still in the flight test stage was cut off, though production F2G's, as well as the XF8B-1 and XF15C-1 were evaluated. The XF2M-1 was cancelled just before flight test. The FR-1's saw limited squadron service. F7F's, F8F's and F4U's re-

RYAN FR-1 FIREBALLS, *composite powered with a 1400 horsepower Cyclone and a 1610-pound thrust General Electric jet engine, weighed 9960 pounds, did 404 mph on both engines. FR's were first Navy design using jet engine to reach squadron service in late 1945.*

GOODYEAR F2G's *were Corsairs redesigned with 3000-hp P&W Wasp Major engine, weighed 13,000 pounds, reached 431 miles per hour.*

NAVY TESTS *of the AAF YP-59's in 1944 showed 386 mph speed. Each had G.E. 1620-pound thrust engines. Weight was 10,500 pounds.*



BOEING XF8B-1 *was a 17,500-pound long-range fighter. It did 411 mph with a Wasp Major driving contra-props, had internal bomb bay.*

F8F-2 WAS IMPROVED *Bearcat; weight was increased to 10,426 lbs, speed was 388 mph with 2500 hp Double Wasp. F8F-1 did 421 mph.*

mained in production, both as day and night fighters. The XFD-1 jet program continued.

New turbine-powered fighter projects were initiated. The XF2R-1 was an FR-1 with a GE TG-100 turboprop replacing the *Cyclone*. Production was planned, but engine cancellation terminated the project before flight tests were completed. Jet projects included the XF2D-1, based on the XFD, but using larger Westinghouse jets; the XF6U-1 with one of these engines; the North American XFJ-1 using an Allison/GE jet engine; and the Grumman XF9F-1 night fighter with four Westinghouse jets.

During 1946 another jet night fighter design, the Douglas XF3D-1 (McDonnell's FD and F2D became the FH and F2H), a large, two place, twin-jet was undertaken. The XF9F-1 night fighter project was subsequently replaced with the -2, a single place day fighter with the British Rolls Royce *Nene* jet engine.

Several AAF fighters were used for special purposes in postwar years. Included were a few Northrop P-61's as F2T-1's for Marine night fighter training. Additional P-59's, as well as Lockheed P-80A's modified for carrier operations were used for further jet evaluation. Bell P-39's were also used, as F2L-1K's, for drone work.

With the FH's, FJ's, and F6U's going into limited production, the XF2H-1, XF9F-2/-3 and XF3D-1 in various stages of development and testing, studies to apply the aerodynamic advances of WW II to higher performance fighters led to design programs for the XF7U-1, XF4D-1,

VOUGHT XF5U-1 *would currently qualify as STOL. A speed of 476 mph was expected with two turbo-supercharged 1600 hp R-2000's.*

McDONNELL PHANTOM, *the FH-1, with two J-30's, was production version of first jet design for Navy; weighed 9970 lbs, flew 485 mph.*

EARLY VOUGHT *jets were F6U-1 Pirate and F7U-1 Cutlass, both using J-34's with afterburners. Later -3 Cutlasses saw wide service use.*

CURTISS XF15C-1, *last of Curtiss-Navy fighters, had composite power 2300 hp Double Wasp Plus Halford H-1B 2700-pound thrust jet.*

NAA *FJ-1 did 588 mph with 4000-lb J-35; XFJ-2B, modified F86E prototype for sweptwing Furies, attained 678 mph with 6000-lb J-47.*

RYAN XF2R-1 *was all-turbine powered version of FR Fireball; GE TG-100 turboprop rated at 1700 shaft hp replaced Cyclone in nose.*

McDONNELL F2H-2 *Banshee saw extensive service in Korea. With two 3250-lb Westinghouse J-34 engines, it reached a speed of 590 mph at a combat weight of 15,640 pounds. Originally a day fighter, design was modified to become Navy's primary all-weather fighter.*

XF3H-1 and XF10F-1. These envisioned the use of advanced, afterburner-equipped jet engines and such features as delta or swept wings and tailless arrangements.

In 1948 the FJ-1 *Furies* and FH-1 *Phantoms* were in squadron service. The tailless XF7U-1 *Cutlass* made its first flight, the first of the advanced jet fighters to reach this stage. Use of FJ's and FH's by Navy and Marine squadrons, and flight tests of the XF7U-1 highlighted the many problems still to be solved.

When the jets entered combat in Korea, the F9F *Panthers*, F2H *Banshees* and F3D *Skyknights* flying from Navy carriers and Marine bases were all straight wing aircraft; outclassed by AF and North Korean sweptwing fighters. Night fighters were still largely F4U-5N *Corsairs*.

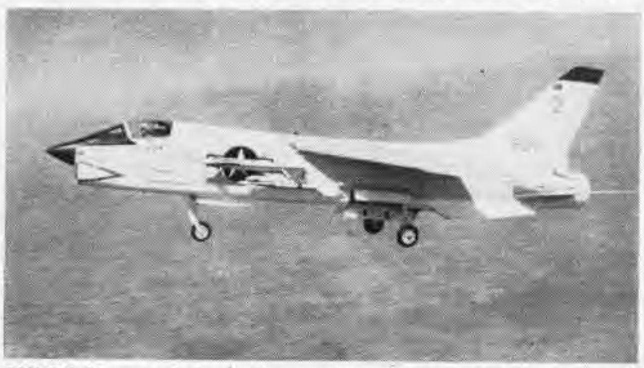
GRUMMAN F9F-2B *in Korean operations was typical of Panther series. With 5000-lb thrust P&W J-42, weighing 14,235 lb, flew 576 mph.*

DOUGLAS SKYKNIGHT, *the 2-place F3D-2 night fighter, reached 530 mph at a combat weight of 21,370 lbs with two 3400-lb J-34's.*

THE DEMON, *McDonnell's transonic J-71 powered F3H-2, is currently the principal all-weather fighter with carrier air groups, can be armed with Sparrow III or Sidewinder missiles, rockets, guns. As was the F3D above, this Demon serves with VF-14's Top Hatters.*

EARLY DOUGLAS *F4D-1 Skyrays went into service with Marines. This all weather, J-57-powered fighter is noted for its rate of climb.*

F11F-1 TIGER, *Grumman's supersonic fighter, has A/B J-65. This one ran into shell fired from its own guns, "shot itself down."*



F8U-2N IS *current production version of supersonic Chance Vought Crusader series; has limited all-weather capability, uses P&W J-57.*

CRUSADER III, *Chance Vought F8U-3, was single-place, missile armed Mach 2-plus all-weather fighter, powered by P&W J-75 engine.*

VARIABLE SWEEP *wings were a feature of transonic Grumman XF10F-1 Jaguar. Designed around Westinghouse J-40, it flew in early 50's.*

With the advanced Navy jet programs delayed by changes in concepts and other factors, the *Panthers* were redesigned into the sweptwing *Cougar* series while the AF F-86E was adapted for carrier service as the sweptwing FJ *Fury* series. All-weather versions of the F2H series, meanwhile, had finally replaced the F4U-5N's in all-weather squadrons.

From these events of the early fifties to the present day, progress has been made in rapid strides as supersonic day fighters, the F8U-1 and F9F-9 (F11F-1) were carried from the drawing board to carrier decks.

Most of these decks, including those of the new *Forrestal* class carriers, were angled, with steam catapults of increased capacity replacing the hydraulic types.

Air-to-air guided missiles passed into the service use stage, greatly increasing the range and effectiveness of fighter armament. More complex fire-control systems, necessary for all-weather combat, particularly with jets using missiles, entered service with the F4D-1's and F3H-2 series. The first supersonic, missile armed, all-weather fighter, the F5D-1, did not reach production, being terminated in favor of emphasis on other projects.

Two Mach 2 programs, the F4H-1 and F8U-3, were both pushed. Both incorporated such recent improvements as boundary-layer-control on the wings to reduce carrier landing speeds, and many improvements in design and equipment dictated by experience with the jet fighters in service.

The F4H-1 was selected, and the accomplishments of the *Phantom II* during the flight development stage show that its early promise will be fulfilled. (The series continues.)

McDONNELL'S PHANTOM II, *two-place Mach 2-plus fighter with twin J-79's, can fly strikes in addition to all-weather fighter role.*

K.O. GUNDERSON HANGS UP HAT

THROUGH SIDEBOYS TO LIFE WITH HORSES

Aviation Chief Machinist's Mate Knute O. Gunderson has retired from the Navy at NAS Whidbey Island with 37 years of Naval Aviation service behind him.

With a letter of appreciation from the Secretary of the Navy in his pocket, the old salt headed for his ranch in the Washington hill country to break and sell wild horses.

Naval Aviation was just short of its thirteenth birthday when young Gunderson joined its ranks. He carried the nickname "K.O." as a result of his ring exploits as a Great Lakes boot. "I was a big farm boy, over six feet tall and strong as an ox when I went through boot and aviation machinist's school in Great Lakes in 1923-24," he recalls.

"I took on three boxers and put two in the hospital. One of them was a professional, so after that, no one would fight me."

He showed some of the same stamina at age 58 when he caught and broke a wild horse, trained it to work with a police dog, and sold the horse to Clyde Beatty in 1952.

The old timer carried his little green folding continuous service record (now obsolete) throughout his 37 years in Naval Aviation. It shows he was a plank owner of the first carrier *Saratoga*, that he helped put in commission, USS *Wasp*, USS *Monterey*, USS *Bennington* and USS *Yorktown*. His first carrier was the *Langley*, his last the *Antietam*.

Among his acquaintances were a lieutentant (junior grade) named "Jocko" Clark, a lieutenant commander named Mark Mitscher, a Capt. Yarnell and a Cdr. Kenneth Whiting, a student aviator named "Bull" Halsey, and a few others whose exploits are known to most Americans.

His citations show the signatures of SecNav William B. Franke, Jonas Ingram, James Forrestal and others.

He served in shipboard and patrol squadrons which flew such early model aircraft as HS-2L's F5L's, PN-7's, -9's and -10's; and later, PBY's and PBO's. It was from a plane of his squadron that the famous "sighted sub—sank same" message was flashed.

Looking back, Gunderson says he wouldn't take a million dollars for the experiences he has had and the places he has seen during and since the days when a first class petty officer earned $84 per month, with an extra $15 per month for commuted rations.

To the youngsters, this advice: "I've done my part to keep the planes flying; now it's up to you to carry on."

New Transmitter in Texas
Surveillance Will be Augmented

The gap in the Navy silent satellite detection system stretching across the southern part of the United States will be plugged this year by one of the world's largest transmitters. Built under U.S. Naval Research Laboratory direction 35 miles southwest of Wichita Falls, Texas, near Archer City, the 560,000-watt device will be five times as powerful as the largest television transmitter and will feed one of the world's longest antennas.

Radio Corporation of America, Camden, N.J., is supplying the powerful new transmitter. Antenna Systems Incorporated, Hingham, Mass., has been selected to design and build the mile-long transmitting antenna. The RCA equipment, composed primarily of standard commercial transmitter equipment modified and arranged to meet the Navy's requirements, will feed power into the antenna. The latter will consist of nine sections—each measuring approximately 576 feet long by 24 feet wide—arranged so that one can be inoperative without affecting the others.

DAHLGREN CENTER *projects an up-to-the-minute display of satellite orbits on map.*

The present Navy Space Surveillance System, built by NRL, has been in operation for two and one half years. The eastern complex extends from Georgia to the Mississippi River, and the western complex stretches from California to New Mexico, with a blind spot between them. Satellites which can now make an undetected pass between the two complexes will be spotted by use of the new transmitter station, working with existing receivers.

Each complex of the NRL-developed system presently consists of a transmitter situated midway between two receivers spaced 500 miles apart. Data from the receivers, picking up signals bounced off a satellite, are automatically sent to the Space Surveillance Operations Center at Dahlgren, Va., for processing. The U.S. Navy Space Surveillance System is integrated into the continental defense system under the control of the North American Defense Command.

EATING HATS *is sometimes sweeter than swallowing words, discovered brand-new Cdr. T. E. Smithey who would "eat his hat" if promoted. Capt. C. D. Simonsen of FAW-6 makes him keep to his rash promise—with cake.*

HOT AIR BALLOON SYSTEM TESTED

NAVAL RESEARCH has turned back the clock 200 years to the days of early ballooning and is experimenting with hot air balloons.

Principal advantages of the hot air balloon are economy of operation, greater load capacity, and greater flexibility in ascending and descending without requiring the use of ballast. Research on a hot air balloon system is being conducted by Raven Industries, Sioux Falls, S.D., under contract to the Office of Naval Research.

A series of tests was climaxed successfully when a hot air balloon was piloted to 9000 feet in a two-hour flight from the Stratobowl, Rapid City, S.D.

Although heating the air inside a balloon to provide lift was the original method of flying balloons, this method suffered from the severe restriction that the air inside the balloon must be continually heated to maintain lift. Interest has been revived lately with the development of new fuels and portable burners, together with the advent of lighter and stronger materials.

A large burner is used to accomplish initial inflation on the ground. A portable burner, fed from propane gas tanks, is carried inside the mouth of the balloon. Turning this burner up or down controls the ascent and descent of the balloon in the manner of an elevator. A high flame sends the balloon upward while a lower flame slows ascent, levels off the balloon, or brings it down. Lower portion of the balloon is fireproofed with glass cloth.

The research work at Raven is under the direction of Edward Yost, who began exploring hot air balloon systems while at General Mills, Minneapolis, Minn., under ONR contract. Mr. Yost also serves as test pilot for the balloon system, making the flights while suspended in a swing seat with a backrest as his feet rested on a trapeze bar.

In the recent flight he limited his ascent to 9000 feet. At the time, he was rising at the rate of 1000 feet per minute and estimated that he could have reached 20,000 feet. When he was descending at a rate of nearly 900 feet per minute, he stopped within 300 feet, after turning up the burner.

Another advantage of the hot air system is the ease in preparing for launch. The entire process required only 35 minutes in the test flight. About half that time was needed to unpack and lay out the balloon to the point of lighting the initial inflation burner. Seventeen minutes after this burner was lit, the balloonist was airborne.

YOST TEST-FLIES THE HOT AIR BALLOON

The balloon presently being used in the experimental manned flights is made of nylon with a Mylar plastic laminate. About 40 feet in diameter, the balloon measures 27,000 cubic feet and can carry a maximum load of 600 lbs. to 15,000 feet. It is re-usable, and more flights will be made with the same balloon. Approximate cost of fuel in operating a hot air balloon of this size with present equipment is estimated at one dollar per hour.

EXCHANGE PILOT, *Lt. Jack Finney, USN, strikes traditional stance beside F-105D after qualifying as "combat ready" in all phases of the USAF tactical fighter. He is with 4526th Training Squadron at Nellis AF Base., Nev.*

Supersonic Drones Ordered

Air Force to Get Navy Targets

Chance Vought has received a $3,260,849 contract to produce additional KD2U-1 supersonic drones for Navy and Air Force use, continuing the conversion of *Regulus II*-type missiles begun more than a year ago.

The contract will provide additional KD2U-1's as targets for *Bomarc* missiles in the Chance Vought Range Systems operations in Florida. The Air Force, by this contract, will acquire its drones from the Navy.

The 57-foot targets are equipped with landing gear and are recovered after a mission and reused, with consequent savings to the taxpayer. Chance Vought will convert tactical versions of the *Regulus* into KD2U-1 target drones by installing the landing gear and making other internal changes. CV will complete two flight test versions of the missile.

Approximately half of the parts in a tactical missile are reusable when it is converted into a target, and more than 95 per cent of a flight test missile is usable in a drone.

Major changes include deletion of non-essential equipment and instrumentation from the flight test version and the addition of photographic and electronic scoring and radar augmentation equipment. Fuel and warhead provisions will be removed from the airframe, and a recovery system composed of a tricycle landing gear and a drag parachute will be substituted.

Drone vehicles do not carry inertial navigation gear and instrumentation. They are equipped with simplified components which reduce their cost.

Logs 100,000th Approach

GCA Unit 19 at Chase Joins Elite

GCA Unit 19 at Chase Field has joined the ranks of units which have passed 100,000 approaches. It was placed in commission in 1947.

NavCad Wayne E. Handley, flying an F9F-8T *Cougar* with his instructor, 1st Lt. Melvin J. McIntyre, heard Controller M.C. Closs, AC1, say, "You are now on final approach. Do not acknowledge any further transmissions. You are on glide path, on course." These familiar instructions marked approach number 100,000.

GCA 19 was commissioned at Oakland and moved to Corpus Christi in 1950. It went to Chase Field in 1954.

MR. GURLEY AND HIS 'GURLEY-BIRD'

By Richard W. Wood, JO1

A MAN on a motor-scooter defying convention and all the laws of gravity several hundred feet in the air —this is what the "Gurley-bird" in flight appears to be, and people stare in disbelief. In reality, the Gurley-bird is a unique one-man flying machine contrived by the ingenuity plus the 17 years of flying experience of LCdr. Marion L. Gurley, Assistant Flight Training Officer (VS) at NAS SOUTH WEYMOUTH, Mass.

"That contraption will never fly!" is the stereotyped remark heard by its builder hundreds of times, and it is the exact opinion one forms as he contemplates the "G-bird" on the ground. But it is an opinion rapidly changed when LCdr. Gurley strides out of Operations after filing his "local," runs through a full pre-flight . . . kicking the tires and all . . . winds her up, climbs aboard, moves his little craft free of the chocks with his feet, taxies off, and suddenly is airborne.

The gaping stares of onlookers are proof that, although seeing is believing, they still don't believe it. The Gurley-bird really does fly!

LCdr. Gurley has 50 hours certified log book time in his G-bird and has reached a 2000-foot altitude with it.

There isn't a thing about the G-bird to even suggest it would fly; no wings, no fuselage, no inside, no outside. It looks like a Go-Kart with big ideas.

Constructed of a slender aluminum frame which is practically invisible to the eye a few feet away, its fuel system consisting of tubing fitted into two five-gallon oil cans attached to the frame behind the bucket seat, it rolls along on three wheelbarrow wheels. Its ground brake is nothing more than a pine board which rubs against the front wheel when he steps on it. Its 20-foot rotor blade is so thin it droops as if it were made of soft cardboard. Its propeller is small enough for LCdr. Gurley to carry around in one hand.

It is the most delicate possible application of the principle of the Autogiro. Its rotor blade spins freely and has absolutely no lifting pitch. As the machine moves forward, its presentation to the air causes the motor to spin faster. When the speed of the rotor equals or exceeds that which is

OWNER PUTS *G-bird through its paces to demonstrate to skeptics its airworthiness.*

needed to lift the weight of man and machine, up it goes.

Once it is airborne, it behaves like any conventional aircraft.

Its appearance is the absolute denial of airworthiness, yet despite its appearance, the G-bird is as airworthy as any of the Navy planes LCdr. Gurley flies professionally. Its lifting rotor contains a safety margin of some 450 pounds; proportionately far more than is built into the rotor of a large conventional helicopter.

The G-bird is powered by a sturdy two-cycle, four-cylinder engine, stronger than those that transported World War I pilots over Germany.

A dependable built-in parachute feature exists in the rotor which can bring the pilot down safely, anywhere there is 40 square feet, should the engine conk out. This was accidentally tested and proved recently when the G-bird, at 1500 feet, flew into a bird

LCDR. GURLEY *demonstrates bird on deck. Note two 5-gallon cans which carry supply of fuel.*

and the prop disintegrated. The engine died, and without any power, the rotor blade above let him down safely.

The present G-bird is the second machine constructed by LCdr. Gurley. On the first, built at NAS NEW ORLEANS, the rotor was controlled by a simple bar which made it fly exactly opposite to the control pattern in which he had been trained.

He found his reflexes had become too automatic through his years of flying experience to make the sudden and effective change necessary. Results of this reversal made it imperative that he reconstruct the controls, so that his stick produced the results he had long ago learned to expect.

His first craft was put out of commission when, rolling along the landing strip, he struck a pot-hole that tilted his whirling rotor so that it struck the pavement and splintered. About a year was lost in re-design and reconstruction to overcome the possibility of ground accident.

LCdr. Gurley's most loyal supporter in his G-bird operations is his wife, Melba, who also is a G-bird enthusiast. She recently became the first woman ever to fly this particular version of Autogiro when, never having flown before, her husband undertook to teach her to fly the G-bird.

He hitched his machine to the rear of his car on a boom and let Mrs. Gurley familiarize herself with the principles of flight as he hauled the craft into the wind.

In almost no time, she developed the feel of the rotor and the rudder and gained confidence that she could handle the frail little vehicle.

Although she has not yet flown it higher than 10 or 12 feet off the ground, she has never worried about her safety. With three and a half hours logged, she has earned an accredited solo license and will be flying the G-bird at higher altitudes soon.

LCdr. Gurley now has the parts to build either a "Mrs. G-bird" or a dual bird, so he and Mrs. G can make trips together.

His longest flight project has been to NAS Quonset Point, R.I., a 60-odd mile trip from South Weymouth, but with his two full hours fuel capacity, others are planned for the near future.

SPACEMONK SENDS *Spacechimp Ham a greeting and a gift. Monkey Baker, the simian who rode a Jupiter missile about 360 miles above the earth 29 May 1959, decided Ham, latest space traveller, needed a Naval Aviation license plate to remind him that Naval Aviation's Golden Year will be celebrated at NAS Pensacola June 6 to 11 at Fiesta of Five Flags. Displays of aircraft, flight demonstrations and homecoming of thousands of Navy pilots will mark occasion.*

CAPSULE RIVALS RUBE GOLDBERG

AN INTRICATE space capsule has been developed at the Naval Missile Center, Pt. Mugu, Calif., in which a chain of reactions rivaling a Rube Goldberg creation is set off during the descent to earth.

The capsule has proven successful in drops from high altitude aircraft although it has not yet been launched in a missile. It is designed for use in recovering small payloads from high altitude probes and was developed in support of projects of the Center's Astronautics Department.

Re-entry reactions begin when the tremendous heat created by the friction of passing through the earth's atmosphere at supersonic speed triggers two electrical contacts. This completes a circuit that fires an explosive charge. The charge shoots a projectile which knocks the "lid" off the top of the capsule. The projectile falls into the ocean and explodes. This makes it possible to get a "fix" with sonar-type equipment on the approximate point of impact of the capsule.

Meanwhile, back at the capsule, things are literally "popping." As the "lid" flies off, it pulls out a parachute. Pieces of loose metal foil fall to earth in a ticker-tape-like shower when the chute opens.

This foil, called "radar chaff," makes a target for radar antennae of the recovery forces as it falls to earth. The parachute is coated with radar reflecting material and performs additional duty as a radar target.

The parachute is in two stages, a pilot chute and the main chute. When the main chute exerts tension on the capsule it "uncorks" a radio antenna, which has been rolled up like a steel tape. A transmitter then sends signals over a radius of 150 miles.

The final reactions take place after the capsule splashes into the ocean. The water completes another electrical circuit which closes cutters on the lines holding the parachute in order to cut the capsule free.

The water also dissolves a plastic material holding sea dye. The dye is in tubes tied to a line so that the dye won't be dissipated in one big "blotch," most of which would be wasted beneath the surface. As the tubes drift with the current, the dye extends over a greater area.

Shell of the capsule is a linen-bonded plastic (phenolic nylon), a material especially developed for the Missile Center by Aerojet-General.

This material vaporizes at a temperature of 2000 degrees F., a temperature far exceeded during re-entry. However, the material shields the inside of the capsule from these temperatures by a process called ablation.

This term describes a technique of heat shielding that relies on skin temperature to remove or vaporize the outside surface before the heat can be conducted through the material. This might be visualized by thinking of a man escaping burning after spilling a hot cup of coffee in his lap by slipping out of his pants.

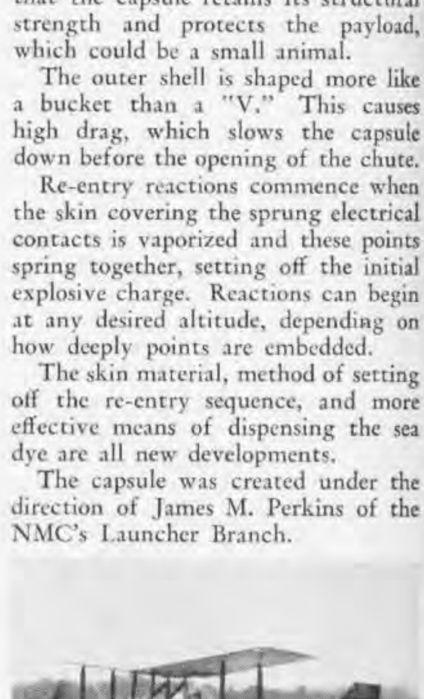
Only the vaporizing outer skin is heated to an extreme temperature although an inch or more of the material may be dissipated depending on the altitude of the launch. The insulating ability of the material insures that the capsule retains its structural strength and protects the payload, which could be a small animal.

The outer shell is shaped more like a bucket than a "V." This causes high drag, which slows the capsule down before the opening of the chute.

Re-entry reactions commence when the skin covering the sprung electrical contacts is vaporized and these points spring together, setting off the initial explosive charge. Reactions can begin at any desired altitude, depending on how deeply points are embedded.

The skin material, method of setting off the re-entry sequence, and more effective means of dispensing the sea dye are all new developments.

The capsule was created under the direction of James M. Perkins of the NMC's Launcher Branch.



LATEST TURBINE-POWERED *aircraft is flown. It is a British "Currie Wot," powered by Rover Co. Ltd. TP60 engine designed for automobiles. Company's 60 and 90 hp engines are said to be world's smallest turboprop acft. engines.*

BOEING-VERTOL HELICOPTER 'BOUGHT'

CARGO ON STANDARD *pallets or litters can be pulled aboard by hydraulic winch at a rate of two tons in three minutes, by one operator.*

IN DEMONSTRATIONS *using mock-up, a radio jeep is backed up rear ramp of the HRB-1. Stowed cargo booms serve as guides for jeep driver.*

Boeing-Vertol's model 107 helicopter has been named winner of a competition for an assault transport helicopter. Its Navy-Marine designator will be HRB-1.

The tandem rotor system helicopter will be powered by twin GE T58-8 turbine engines. In its ultimate configuration, the HRB-1 can operate in all weather conditions from ships and remote areas. Thus it will fulfil Navy requirements for a troop and cargo weapons system for Marine use.

In announcing the HRB-1's acceptance (its competitor was the Sikorsky HR3S-1), a spokesman described Boeing Vertol craft as a significant advancement in assault helicopter development.

An "off the shelf" aircraft, the commercial 107 already is in production for the New York Airways. The prototype was first flown in April 1958. It has since logged more than a thousand flights.

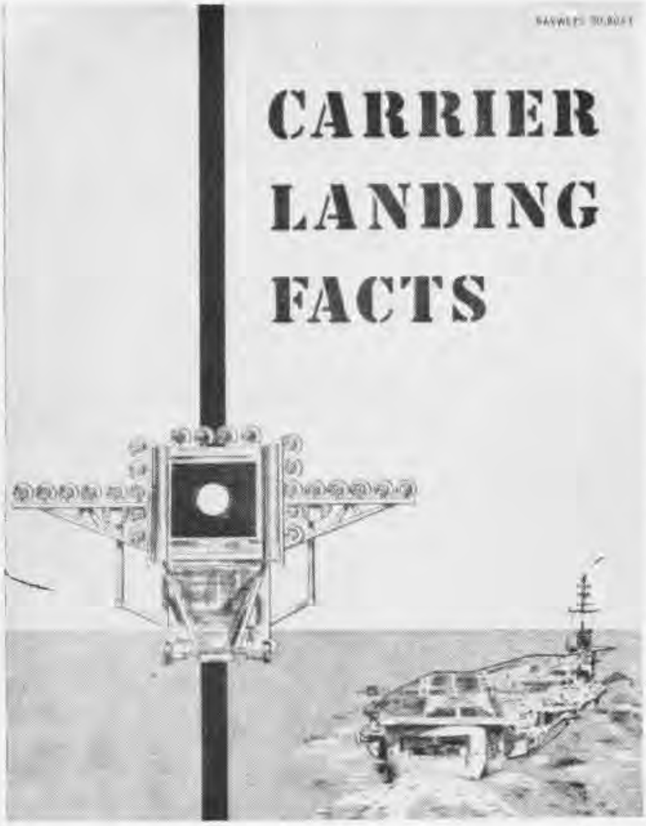
A partial mock-up of the military version was used to demonstrate the integrated cargo loading and unloading capability. Design of the system is based on the requirement to load and unload cargo in three minutes or less by one man.

The HRB-1's fuselage has a static 4½-degree nose-up attitude. To load, standard pallets or baskets can be pushed aboard easily on built-in rollers or pulled in by use of an infinitely variable hydraulic winch built into the helicopter.

Under favorable conditions a unique unloading technique can be used. It is the "taxi drop" method; i.e., the pilot makes use of gravity to unload cargo out of the rear ramp of the helicopter as he taxies on the ground.

When the helicopter is used as a cargo carrier, its troop seats are folded against the sides of the fuselage with the cargo ramp extensions stowed on the floor beneath them. In the stowed position, the cargo ramp extensions act as guides for the wheels of vehicles that are to be driven aboard the HRB-1.

LAST SCHEDULED *jet aircraft to land at or fly from NAS Anacostia was this A4D-2N from NATC Patuxent River. Station does not expect to handle further jet traffic before it closes gates and makes the shift to its new site at nearby Andrews AFB. The A4D was flown by LCdr. E.V. Crangle. It was in Washington to participate in the Inaugural Parade. For same parade, Anacostia received its first—and very likely its last—visit by an F4H-1 Phantom II.*



CARRIER LANDING FACTS, NAVWEPS 00-80J-1, the first of a new series of information booklets for pilots, has been released by the Aviation Training Division of the Office of the Chief of Naval Operations and is now being distributed. The new product is the do-it-yourself manual for landing jets equipped with angle of attack indicators aboard modern carriers with angled deck and mirror—or its successor, the Fresnel Lens.

An unusually readable presentation which is a bit more formal than the familiar Sense Pamphlet series, but stays well clear of the heaviness of pilot handbooks, the manual contains a wealth of technical information and detail. The book is profusely illustrated with cartoons, technical illustrations, graphs, diagrams, and highlighted line drawings.

This latest release is recommended not only for those who are practicing the art of carrier landings, but also for those who merely want to "keep in the know" in this most engaging field. Of angled decks, mirrors and angle of attack gear which have revolutionized the carrier landing pass, fundamental and full treatment is given: "The word today is *constant glide path*, power on, no cut until the hook has the wire . . . .

"On the deck, there is a 4x4-foot mirror, slightly concave, installed on the port-side deck edge just forward of the last pendant. Farther aft on the port side are located the mirror's source lights. These are focused onto a single spot (known as the "meatball") on the concave mirror. The reflection of these lights bounces off the mirror's surface, forming an optical glide path for the pilot to follow on down. It amounts to a quick and accurate altitude signal . . . .

"On either side of the mirror, there's a horizontal bank of green datum lights midway up the mirror. The idea is to keep the meatball lined up with the datum lights."

According to the book, landing a fast jet on a carrier is simple if "three items get your undivided attention: (1) angle of attack . . . (2) lineup . . . (3) . . . *meatball.*

"Basically, the best advice is *don't flare and don't dive for the deck.* Fly the mirror . . . all the way down to the wire."

The optical glide path is a significant step forward in carrier aviation, particularly for night operation. "Some pilots make better landings at night than they do during daylight. The reason seems to be that when they can't see the deck, they've *got* to trust the mirror and there's less temptation to make unneeded changes in glide path."

The pamphlet discusses the limitations of the mirror as well as its virtues. Reflections of the sun, pitching deck and mechanical failure are still problems. The new book covers each of these problems and how to cope with them in meticulous detail.

A relatively new device covered in the fact pamphlet is the Fresnel Lens system, now operational on *Ranger* and *F.D. Roosevelt* and planned for eventual replacement of the mirror on all attack carriers.

The Fresnel Lens employs an internal light source. Each lens is composed of five lens cells stacked one above the other. Instead of the meatball, the pilot will see a solid yellow bar of light stretching across the lens. The green datum lights, red wave-off lights, and green lights on top for signalling cuts for prop planes are arranged as with the conventional mirror.

Three complete units are mounted along the port side of the ship with the datum lights even with the flight deck. Pri Fly will select the unit to be used depending upon the differing hook-to-eye dimensions of the approaching aircraft.

According to *Carrier Landing Facts*, the lens has several advantages over the conventional mirror. Elimination of the separate light source prevents blinding flight deck personnel during night ops. Since it is not a mirror, the lens is not troubled by reflections of the sun behind the pilot and stabilization has been improved somewhat. Also, being lower, "the lens offers no obstruction to waist catapult operations, off center landings to port, or wave-offs."

Chapter 6 is devoted to the angle of attack indicator system. "Angle of attack is the only consistent means of indicating an approach to a stall under all conditions of flight." While the ideal airspeed for a landing approach will depend on the weight of the aircraft—which may vary normally up to 3000 pounds, and more in emergencies—the ideal angle of attack will always be the same.

The system gives three types of indications: an angle of attack indicator gauge with a moving needle, an approach indexer mounted above the instrument panel which uses a light signal display, and three "tattle-tale" lights on the outside of the aircraft for the LSO. The pilot's indexer lights give a more sensitive indication than the LSO lights, so he should normally be able to catch small deviations before they are flashed to the LSO.

The pamphlet's main point can be summarized:

Maintain the prescribed angle of attack or airspeed.
Keep the meatball centered.
Line up with the centerline of the angled deck.

ALAMEDA SKILL LICKS A PROBLEM

ALAMEDA HAS SUCCEEDED IN REBUILDING LIQUID OXYGEN CONTAINERS FOR $50 EACH

HEART OF an aircraft's liquid oxygen system is a vacuum bottle, commonly called a converter. Without this double-walled container, the liquid would soon boil, return to its gaseous form and the system fail.

Since each converter costs $855 and commercial repair costs about 60% of the original cost, O&R ALAMEDA, backed by BUWEPS, tackled the job of finding and developing a repair procedure. Today the vacuum bottles are rebuilt for about $50 each.

It is no easy task to pump the normal atmosphere out of the annular space. To get some idea of the problem, envision a two-story building the

TUBE IS ATTACHED TO LOX CONTAINER

size of the Pentagon with the bottom story full of ping pong balls. Somewhere on the lower deck is a hidden machine slowly producing more balls. Alameda's task is equivalent to sucking up all those little spheres through the ceiling to the second deck via a small pipe. As the number of balls increases on the second deck, the greater is the possibility that the balls will get back to the first deck.

The machine producing the balls has to be found and turned off. When the balls are all out, the pipe has to be permanently capped off without letting any slip back. In this analogy, the ping pong balls simulate the molecules in the atmosphere, and the machine producing the balls is similar to the chemical action of some compounds which continually generate gaseous molecules.

In the Alameda procedure, a six-inch, oxygen-free, annealed copper tube is brazed to the converter to attach it to the vacuum pump. To keep heat at a minimum so as not to destroy the plating on the inside walls of the converter, it is brazed with a low temperature, high gold content rod while simultaneously insulating the adjacent area. To prevent foreign material from accumulating inside the cavity during the welding operation, an inert gas is forced through the tube.

After attaching the tube, the assembly is secured to the vacuum machine, and pumping down commences. Seventy-two hours of continuous pumping may be required to reach the specified standard of .0000002 milimeters of mercury (equivalent to the earth's atmosphere 1000 miles up).

A mechanical pump is used to extract the first "easy to get" volume. Then a diffusion pump in combination with the mechanical takes over to extract all the stray "hard to get" molecules. During the pump-down, an oven warms the converter to 350°/425° C. to energize the molecules and thus increase the speed with which they can be drawn out.

To attract these activated molecules out of the converter and to prevent their bouncing back, a trap is set near the diffusion pump. They race toward metal plates, chilled by liquid nitrogen, and are impounded when they strike.

If a converter fails to follow the normal pressure-drop pattern, it is checked for leaks. The operator sprays a fine stream of helium over the outside surface, and when it passes over a hole, the helium is drawn through the vacuum chamber into the machine. The machine reacts to this foreign gas by giving an audible signal and a visible reaction on a gauge. Back-tracking with the spray, the operator pinpoints the hole. Holes are welded with heli-arc and low temperature rods.

If however, no leaks can be detected, the presence of a particle of some foreign substance which is "out-gassing" is indicated. Pumping must continue until the material is gone.

When the desired vacuum level is reached, the tube is pinched off. High leverage bolt cutters with special jaws shear the malleable tube and form a perfect seal.

After a 30-day waiting period, the converter is filled with liquid oxygen and the amount of dissipation is recorded. Normal loss is two pounds in 24 hours. Any drop greater than 2.5 pounds in 24 hours means rejection. Recovery rate at Alameda for repaired converters has been over 75%.

Sound simple? It is—now that the procedure is fixed—but it took six months for the Material Division of Engineering, Plant Maintenance people, and the mechanics of the Cryogenics Shop to come up with the answer. Working with the Kinney Company of New Jersey, they had to develop a machine to do the job.

They did—and they have the satisfaction of knowing today that there's hardly a "ping pong ball on the first deck of the Pentagon."

NEVER A DULL DAY IN ANTARCTICA

NAVY PILOTS have faced all kinds of hazards while flying over the Antarctic continent during Operation *Deep Freeze*, but it took a Marine pilot to come up with the topper.

His hazard? An impending maternity case.

This story started when Air Development Squadron Six, which supports civilian scientific studies in Antarctica, was asked to fly some supplies to a four-man New Zealand party of geologists camped at Mt. Field in the Victoria Mountains, 220 nautical miles from McMurdo Sound.

Foul weather delayed the flight. Capt. Thomas E. Morrow drew the mission and then was shocked to learn the absolute necessity of reaching the New Zealand party as quickly as possible. His first clue came when a male husky dog named Lindsay was manifested on his cargo list.

When he asked why the dog was coming along, and learned the answer, he blanched. Lindsay was being flown in as a replacement for Suzy, a husky bitch soon to produce a litter. Suzy was to be returned to the comparative comfort of New Zealand's Scott Base.

Weather permitted launching of the ski-equipped UC-1 *Otter* a day later and Capt. Morrow took the controls —nervously, he said later.

Also aboard were 1500 pounds of cargo, a dog handler who offered Capt. Morrow some assurance, a plane captain named Vernon M. Leslie, AD2, and Louis R. Mathis, PH1, who went along to photograph scenes of the camp.

When Capt. Morrow eventually arrived, another weather delay created havoc with his nerves. Suzy already had produced five pups. The cargo was offloaded, Suzy and her progeny were taken aboard, and the plane took off for the flight to McMurdo.

In flight, Capt. Morrow repeatedly called back to Leslie and Mathis over the plane's intercom system, asking of the dog's condition. Suzy became airsick twice and gave birth to one more pup.

In all, six were born, but only three survived.

Shortly after he returned to McMurdo, Capt. Morrow discovered that the camp had been following closely his unusual worry. When he entered the wardroom he encountered "all sorts of solicitous comments." He took them all in good grace.

SUZY RESTS DURING HER FLIGHT ORDEAL

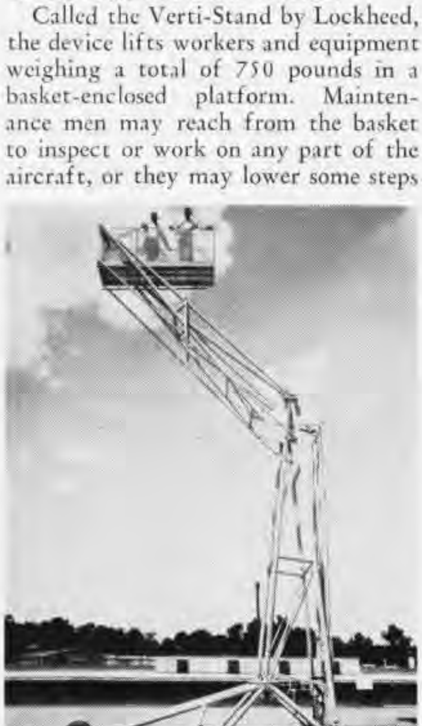
"But," he stated emphatically, "I'll floor the first man who calls me a midwife!" Nobody called his bluff.

High Stand for High Tails

Verti-Stand Lifts A/C Workers

A sky-reaching stand that will enable maintenance men to get at aircraft high tails has been obtained by the Navy for use in servicing aircraft at Quonset Point, R.I., Patuxent River, Md., and other stations.

Called the Verti-Stand by Lockheed, the device lifts workers and equipment weighing a total of 750 pounds in a basket-enclosed platform. Maintenance men may reach from the basket to inspect or work on any part of the aircraft, or they may lower some steps from one end of the basket and step onto the backbone of the airplane.



PLATFORM RISES 41 FEET INTO THE AIR

The Verti-Stand is operated with air pressure. Air moving through the Keller motor at the base of the stand drives the gear, which turns a giant screw to raise and lower the basket platform in an arc. Air controls are located both at the base of the stand and in the basket, permitting workers in the air or on the ground to operate the work platform.

The stand, which weighs 4200 pounds, is mounted on rubber-tired wheels which are locked with automobile brakes.

The Verti-Stand will be used to service such planes as the C-130, the P3V-1 and the *Constellation*.

Coldest Roads on Earth

Seabees Speed Antarctic Traffic

A 12-man team of Navy Seabees who compacted parking areas for spectators at the Squaw Valley Winter Olympic Games now is speeding operations in the Antarctic.

Chief Warrant Officer Victor Young's crew began the Antarctic season by building a roadway on the sea ice of McMurdo Sound which permits traffic to move along at 40 mph.

Trucks and tracked vehicles ferrying passengers and cargo between the camp and the airfield can cover the four-mile distance in less than half the time it once took.

The crew's next job was to harden a 300x8000-foot ski-way on the barrier ice of the Ross Ice Shelf. This was necessary because the natural ice strip began to deterioriate before the airplanes had completed their missions.

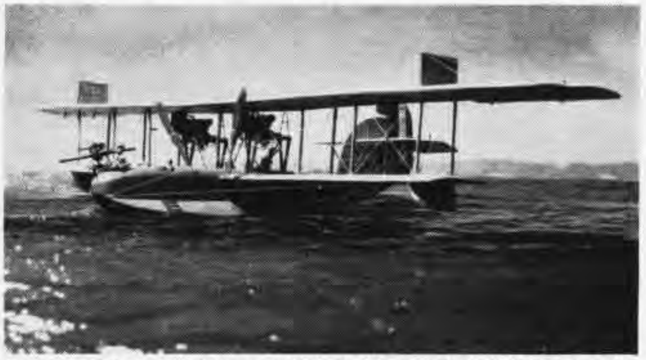
That task finished, Young's Seabees built a four-lane compacted road from the ski-way to the camp. One of the more difficult aspects of this job was encountered in solving the 10-foot altitude difference between the compacted strip and the level of the natural ice. Here a water hardened snow ramp 100 feet long and 80 feet wide was built to join the two surfaces.

Final job of the season was to build an experimental snow-compacted runway at right angles to the ski-way. VX-6 airplanes, including the four-engine C-130BL *Hercules*, will run tests with wheeled landings and take-offs on the strip. From these tests it will be determined whether or not a snow compacted runway would be operationally feasible for Antarctic planes.

VP-22 FLEW P2V NEPTUNE BUNO 131507 FROM FORMOSA IN 1958

P2V BUNO 140430 WAS FLOWN FROM BRUNSWICK, ME., BY VP-11

CURTISS HS2L BUNO A-1837 FLEW OVER LONG ISLAND IN 1918



NAVAL ACFT FACTORY F5L BUNO A-3871 OFF NEWPORT IN 1921

HE BUILDS MODEL NAVAL AIRCRAFT

NAVAL AVIATION to most of us is a way of life, but to Paul R. Matt of Temple City, Calif., it is a hobby. He is an airplane model enthusiast.

On this page are several aircraft photos; some of authentic craft and some of Naval Aviation fan Matt's models. Before reading further, quiz yourself and answer:

Of the two P2V *Neptunes* across the top, which one is real and which is a model? Just below the pair of *Neptunes* is a pair of planes that goes quite a way back in Naval Aviation history. Of the Curtiss HS2L at left, BuNo. A-1837, and the F5L at right, BuNo. A-3871, which one(s) are real aircraft photos and which are models? Remember, no cheating.

On the P2V's, the one at left is a model, the right is actual. Of the flying boats, both are models.

The two-column shot below shows Matt's collection. All done in solid wood and 1:48 scale, they are:

Hanging left to right: Curtiss SBC-4 and O2C-1, Grumman F3F-2, Vought SB2U-2, Martin T4M-1, Curtiss F6C-3, Vought O2U-1 and SBU-1.

On glass shelf from left: Vought F8U-1 *Crusader*, Boeing F4B-4, Curtiss F11C-2, Boeing FB-5, Curtiss A-1, Loening OL-9, Burgess-Dunne, Consolidated NY-2, Vultee SNV-2 and Vought VE-7/9.

Bottom shelf from left: Curtiss C-2, MF, HS-2L, Navy F5L, Consolidated PBY-5A and a Lockheed P2V-5.

The lifespan of Naval Aviation throughout its 50 years is covered in the collection, though several types are yet to be built. The Curtiss A-1 was the first type purchased by the Navy; the Chance Vought *Crusader* still is a mainstay in the carrier fleet.

WITH TWO DOZEN MODELS NOW ON THE SHELF, MATT HAS MANY OTHERS IN THE WORKS

MOTION CREATED BY AQUA THERM UNIT CAUSES WATER TO GNAW AWAY AT THICK ICE

UNUSUAL ACTIVITY IN HIS DOMAIN PROVOKES CURIOSITY OF THIS LOCAL INHABITANT

ICEBREAKER BREAKS WITHOUT A BOW

EAST COAST USA was battling its worst winter in years. Newspapers in Washington were speculating on possible damage from severe freezes on the Potomac River and Chesapeake Bay. Civilian tugs and Navy craft worked to free troubled merchantmen.

Meantime, in the Antarctic, newly developed gadgets were making mincemeat of real sea ice. Called Aqua Therms, the devices are run by electric power which turns propellers.

In trials at McMurdo Sound, two small pits were gouged in the eight-foot-thick sea ice and submersible Aqua Therm units were installed in the holes. A generator provided power.

The motors began to churn, creating motion in the cold sea water, the moving water began to eat away at surrounding ice from the bottom. A 26x80-foot strip was cleared in 185 hours, then an area 200x80 feet was cleared of ice at a rate of 123 cubic feet per hour.

Results of the test must be studied, but witnesses were impressed at the machinery's apparent effectiveness. While the device obviously will not replace icebreakers on big jobs in the near future, it shows promise of success in the clearing of smaller areas.

VAH-5 Savage Sons Excel

Place 4 to 6 on Totem Pole Monthly

Heavy Attack Wing One has established rules for determining monthly who is the most proficient bombardier-navigator in the Atlantic Fleet.

To qualify for Top Ten consideration, a bombardier must complete a minimum of four record scored runs on an approved radar bomb scoring site in a given month. Runs can be high altitude, above 30,000 feet, or of the pop-up variety.

Heavy Attack Squadron Five has dominated the Top Ten, or Totem Pole, since its inception in 1958. Since last July, the *Savage Sons* have accounted for four to six of the top bombardiers monthly, placing 22 out of a possible 50.

Six heavy attack squadrons and 90 bombardiers are monthly competitors.

VCP-63 SKIPPER, *Capt. E. G. Schwab, becomes target for photo squadron's cameras after completing 500th hour in F8U-1P. VCP-63 furnishes a photo detachment on each attack carrier which deploys in the Western Pacific.*

LATEST *in category of unusual shipping-over ceremonies featured Ronald G. Campbell, HM2, taking the oath for six years at a simulated altitude of 65,000 feet in MCAS El Toro's pressure chamber where he works under BuMed.*

MARINES SHOW SHORT FIELD CAPABILITIES


IN 15 MINUTES, COMBAT ENGINEERS LAY DOWN 50-FOOT ALUMINUM RUNWAY SECTION


R4Q BRINGS IN MOBILE ARRESTING UNIT

THE SHORT field capabilities of Marine Aviation were dramatically demonstrated during an hour-long show staged by the Second Marine Aircraft Wing at MCAS CHERRY POINT.

More than a dozen high-performance aircraft — jet fighters, attack planes, photo-reconnaissance craft and propeller-driven transport and tanker vehicles—took part in the performance.

The short field concept, officially termed SATS (Short Airfields for Tactical Support), is one which makes it possible for Marine pilots to operate closer than ever to the troops they support. A completely air-transportable airfield was on public display.


AFTERBURNER GIVES F4D SHORT FIELD TAKE-OFF CAPABILITY


SKYHAWK USES JATO THRUST IN 'SATS' SHOW AT CHERRY POINT


GIANT GV-1 TANKER ROARS DOWN MOBILE RUNWAY; 520-FOOT TAKE-OFF ROLL IS SAME DISTANCE REQUIRED FOR ITS LANDING

LETTERS

SIRS:

The Retired Naval Personnel Newsletter of January 1961 informs us "graybeards" that 1961 is the "Golden Anniversary of Naval Aviation." This reminds me. . . .

I entered the Naval Academy in May 1911. Sometime early that summer a number of boxes made their appearance in the armory. After they were unpacked and their contents assembled, it turned out to be the first airplane I ever saw. We plebes walked around and around it as it sat on the armory floor, getting as close to it as we were permitted.

One evening about 5:00 P.M., or thereabouts, the plane was dragged out on the Parade Field about midway between the armory door and the sea wall. Lines were passed through the runners. These were married and about 15 or 20 plebes manned each set of lines. One plebe on each set was told off as an anchor man. We were told that when the pilot called out, "Cut!" we should drop on our faces on the grass. The anchor men were instructed to hang on to one part of the line in order that the lines would unreeve themselves from the runner. Whoever the pilot was I do not now remember. Somehow, I think it was John Rodgers. Anyway, whoever he was, he marched out bravely —and he *was* brave, too!—equipped with puttees and goggles and perched himself on the little seat.

The engine was started up and away it went —putt, putt, putt—that's the way it sounded, too. I think its horsepower was somewhere in the neighborhood of 45 or 50 horses. When everything was all set, we plebes "manned the drags" and took off down the field as hard as we could go. In due course the pilot sang out the magic word, "Cut!"— and down we went. The lines unreeved and the plane was off for a flight of about 15 or 20 minutes circling over the Severn and Bancroft Hall in graceful turns—the first airplane flight I ever saw! What a thrill!

On this occasion I was some sort of a casualty for when I fell to the ground, my mouth lit on somebody's heel; the impact cut my lips and my mouth was a black-and-blue sight for the next week or so. People have gotten Purple Hearts for less!

What progress we have made! Time and time again when jetting about the country at a high rate of speed, I recall the Navy's humble beginnings in aviation—and recall, too, how I *helped* with the black-and-blue mouth.

JOHN L. MCCREA, VADM., USN (RET.)
Boston, Mass.

RODGERS (C), B-1 AT ANNAPOLIS, 1911

SIRS:

Thanks for the story, "Submarine Hunters of the Midwest" which appeared in your February issue.

The story was written by William J. Kiernat who also shot the pix used in the feature and which were forwarded as a "by-line" item.

What happened?

CDR. ART SOLBERG
NAS MINNEAPOLIS

¶ Now you tell us! Herewith one belated by-line. Send more.

SENIOR AVIATORS, N. B.

Many senior aviators—those who have held designations for 20 years or more and have reached age 45—have taken action to cancel the extra aviation risk premium in their insurance policies on the false premise that they are prohibited from flying in other than a passenger status. Such action may cause future hardship to beneficiaries in case of injury or death in an aircraft accident.

The laws and regulations governing entitlement to incentive pay for the performance of hazardous duty specifically require that the individual possess competent orders to duty involving flying, requiring participation in aerial flight. OPNAV Inst 3710.15C modified this requirement somewhat for aviators designated 20 years or more by relieving them of the requirement to fly a minimum of four hours/month for their "flight pay." The instruction also prohibited any Category IV aviators from flying for proficiency purposes only. Operational or administrative flying was not prohibited. Any Category IV aviator could be directed to perform aerial flight in other than a passenger status at any time and upon very short notice.

All aviators should be cautioned against any action which might jeopardize the aviation coverage contained in their insurance plans. The above information has been passed along to several insurance companies that have checked with the DCNO (AIR) for an interpretation.

CREDITS

The photograph of the XF12C-1 on the lead page of the Fighter story in this issue, and the views of the F11C-2 and XF3J-1 aircraft in the March issue were provided by Warren M. Bodie of San Jose, California.

SIRS:

I have just finished reading your Article "Around the United States in 47 Days" appearing in the Anniversary Edition of Naval Aviation News.

One of the pilots on this flight was my father, then Lt. George T. Owen. This was one of many flights made by him during his long and distinguished career as a Naval Aviator.

I have forwarded a copy of this issue to RAdm. George T. Owen, now retired. I'm sure he too will find it most interesting.

NANCY OWEN HUBBA[illegible]
Lynnhaven, Va.

Naval Air in Azalea Fete
50th Anniversary is Highlighted

Naval Aviation is participating in Norfolk's eighth Azalea Festival April 10-16, highlighting the 50th year of naval progress in the air.

The festival takes on a dual military flavor by combining the salute to Naval Aviation and its annual tribute to countries of the North Atlantic Treaty Organization. The custom of honoring NATO began with the festival in 1954, two years after the establishment of headquarters of the Supreme Allied Command, Atlantic, in Norfolk.

Queen Azalea VIII, Miss Lynda Bird Johnson, daughter of Vice President and Mrs. Lyndon B. Johnson, will reign with her court of 14 NATO princesses and their entourage.

Three formal balls for Naval Aviators 11 April open the festival celebration dances in the Tidewater area. The 1961 queen will make appearances at the affairs in the Officers' Clubs of NAS OCEANA, NAS NORFOLK and NS NORFOLK.

In addition to the balls, other events honoring the 50th Anniversary include the christening of a Naval transport plane, "City of Norfolk," a reception on the USS *Independence*, participation of the Naval Aviation Choir at various events, and Navy units and bands in the coronation parade.

An outstanding attraction is planned, the first appearance of the Navy's newly formed Parachute Demonstration Team, popularly known as the Chuting Stars, shown on the covers of this issue.

VAdm. Frank O'Beirne, Commander Naval Air Force, U.S. Atlantic Fleet, will address festival officials, naval and civilian dignitaries, at a dinner given by the City of Norfolk officials.

SQUADRON INSIGNIA

From Atsugi to Gitmo, the 'Blue Diamonds' of VA-146, led by Cdr. J. R. Saulk, have demonstrated their ability to deliver the punch, whatever the weapon used. Now reforming at Miramar after a West Pacific cruise aboard USS Oriskany (CVA-34), VA-146, part of Carrier Air Group-14, is continuing in the high tradition established since its commissioning at NAS Miramar in February 1956.

MEMORABLE MILESTONES

CWO Lewis T. Vinson, USN, of the Naval Parachute Facility, El Centro, holds two records as he stands in the bright sun of the California desert. One, of course, is the record of 50 years of Naval Aviation as reported in our January issue. And which, by the way—if you checked the front cover closely—he was calmly perusing from 3000 feet on down after a free fall from 12,500 feet. The other is his 800th parachute jump which he had just made as a member of the Navy's newly-formed Parachute Exhibition Team, the Chuting Stars. Scheduled for major events across the nation commemorating the 50th Anniversary of Naval Aviation, the Chuting Stars, led by Lt. Mel Greenup, USNR, will make their first appearance at Norfolk this month as participants in the Eighth Annual Azalea Festival.

NAVAL 50th ANNIVERSARY 1911 1961 AVIATION

NAVAL AVIATION
NEWS