NAVAL AVIATION NEWS

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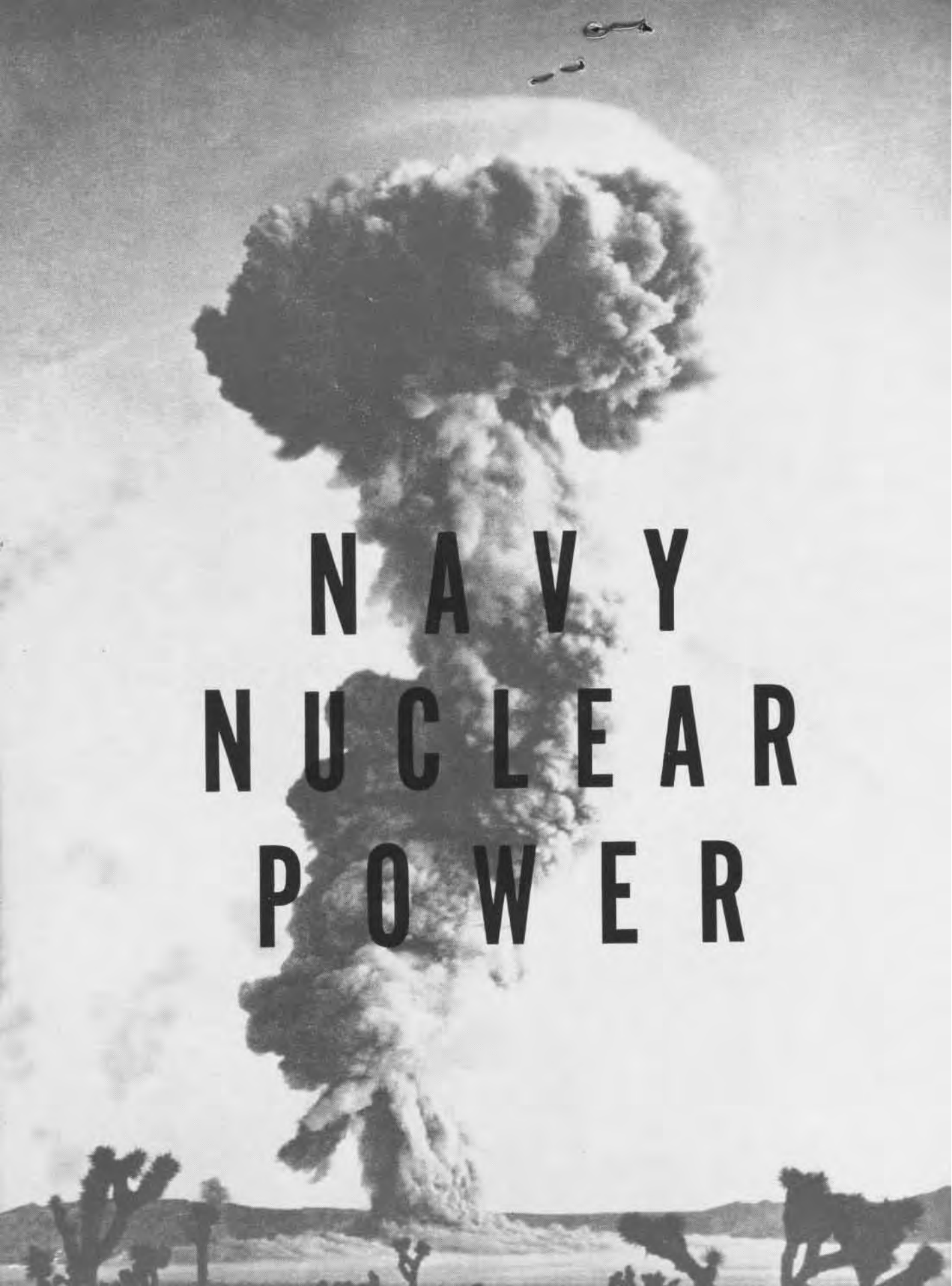


NAVY NUCLEAR POWER

NEW ATOMIC WEAPONS today can deliver at one blow what once took thousands of sorties to accomplish. In 1943, the Allied Air Forces in Europe attempted to annihilate Hamburg, Germany. During the week of 23 July, 3028 sorties were flown and 10,000 tons of bombs were dropped. Roughly 35% of the city was destroyed and there were 80,000 casualties. A little over two years later, on 6 August 1945, one bomber dropped one 20-kiloton nuclear weapon on Hiroshima, Japan. Much of the city was destroyed. There were an estimated 140,000 casualties as a result of the use of the first atomic bomb.

Since December 2, 1942 when Dr. Enrico Fermi intentionally opened our modern "Pandora's box," the increase in destructive power is almost incredible. That 20-kiloton bomb which destroyed 4.7 square miles of the city of Hiroshima, in the light of today's weapons, was only a beginning that was to be quickly dwarfed by the magnitude of later weapons. For example, a one-megaton bomb in an underground burst would hurl approximately 10 million tons of soil and rock upward from the earth's surface, or that of a single thermonuclear weapon could create a crater large enough to hold fourteen Pentagons.

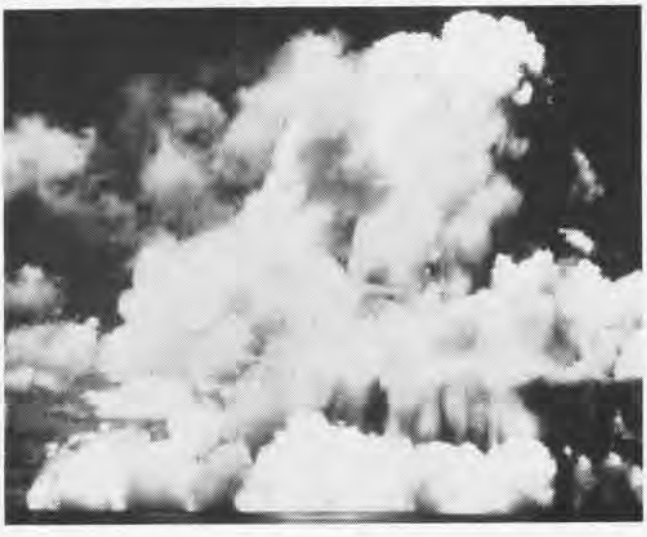
CRATER MADE *by one megaton burst at 50-ft. depth would be about 190 ft. deep, 1400 ft. wide. Millions of tons would be blown up.*

AS ITS PART in national defense, the Navy had to plan on warships geared to nuclear power with an offensive arsenal equipped with nuclear weapons in the kiloton to megaton range.

In March 1939 Dr. Fermi, an Italian physicist and Nobel prize-winner teaching at Columbia University, met with representatives of the Navy Department. He explained the military implications of nuclear fission with the hope that this laboratory phenomenon might receive some military backing and funds for research. The Navy representatives, because of the primitive stage of these discoveries and theories, decided that the Navy would like to be kept advised of progress, but offered no funds.

Not long thereafter, in October 1939, Albert Einstein, the renowned scientist famed for the Theory of Relativity, made an appeal to President Franklin Delano Roosevelt in the name of a group of scientists. This led to the setting up of the Manhattan Engineering District to which the Navy assigned certain key officers to aid General Groves who headed the program for the military.

SURGE CLOUD, *moving mile a minute on surface after Bikini underwater burst, reached 1800 feet, 3½ miles width, in four minutes.*



When two atomic bomb drops were made on Japan in 1945, two Naval officers served as bomb commanders or weaponeers. RAdm. W. S. Parsons, USN, then a Captain, served on the Hiroshima flight, and Capt. F. L. Ashworth, Jr., USN, then a commander, on the Nagasaki drop. These were bombs No. 2, called "Little Boy", and No. 3, called "Fat Man."

The war ended soon after, but research and development went on. To this end the Navy Department urged that a series of tests be conducted to determine the effects of nuclear weapons on ships. Only a very few military and scientific leaders understood the new weapons. This had led to wild speculation on the part of the general public and press as to the fantastic power of the new arsenal of weapons and the worth of a future Navy.

Senior officers in the Navy, aware of the effect this uninformed speculation could have on the Navy itself and the people, believed tests were vital. The Navy Department therefore made recommendations which eventually led to Operation *Crossroads* and the detonation of two bombs.

Bomb #1, known as test Able, was an airburst that sank five ships; bomb #2, known as test Baker, was an underwater shot that sank nine ships. These tests provided invaluable information to ship designers and pointed the way toward future design. Furthermore, scientists and the military services urgently needed information on nuclear effects for obvious reasons. Operation *Crossroads* was a sound beginning to continuing research.

EACH NEW science has its own vocabulary, and nuclear power is no exception. Certain terms need to be understood in terms of their use by the military, and here are a few of them.

The phrase, *special weapons*, within the Navy usually refers to fission and fusion weapons. Because of the implication that such weapons are "special" and therefore require special treatment, this term is falling into disfavor. A better term might be *nuclear weapons*.

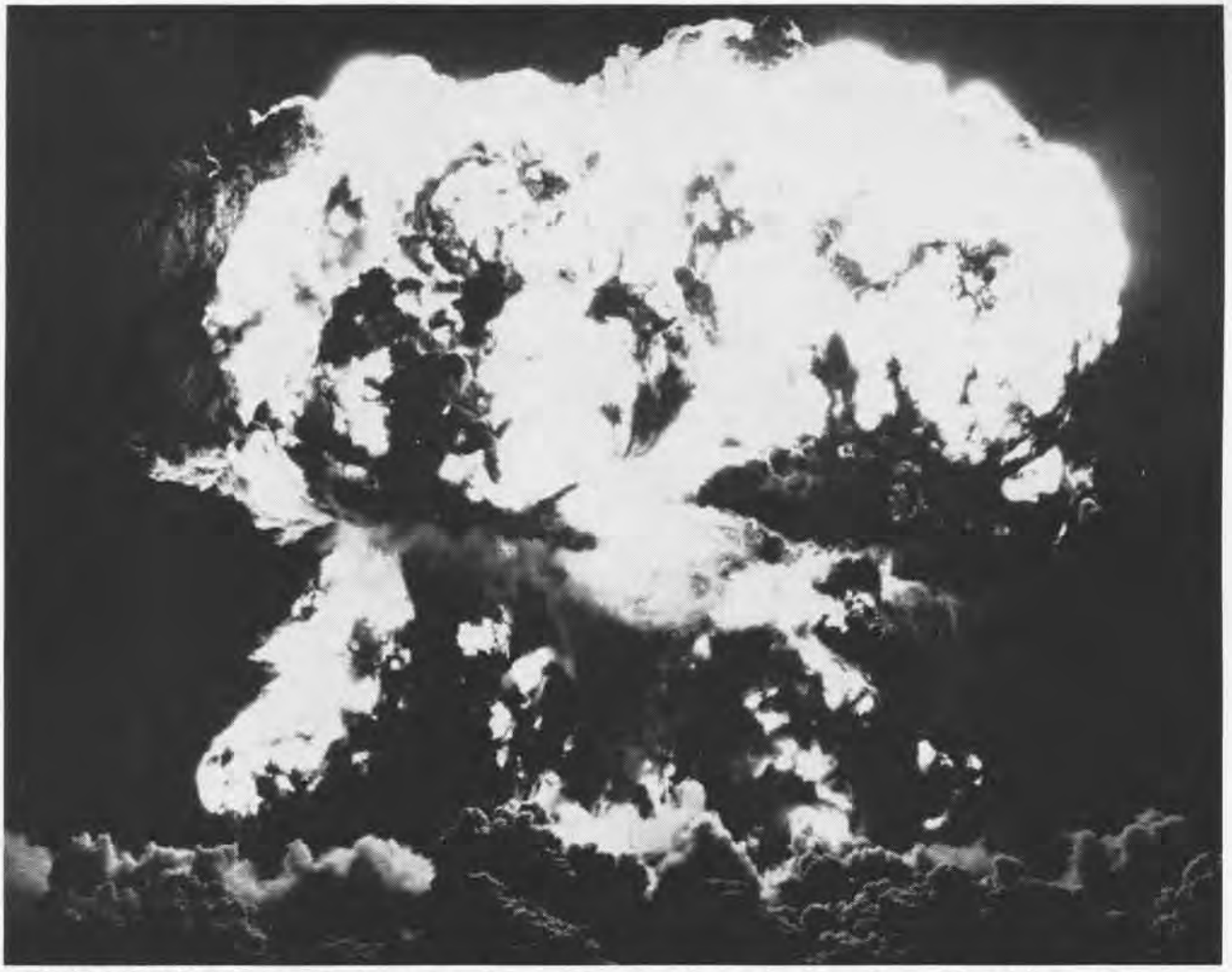
Yield stands for the energy released by nuclear weapons and is commonly given in the equivalent tons of TNT, kilotons (1000 tons) or megatons (one million tons).

The term *fission* or *nuclear weapon* designates a bomb or warhead which derives its energy from a nuclear reaction.

The term *fusion* or *thermonuclear weapon* is used to describe a bomb or warhead deriving a large portion of its energy from the kind of reaction its name indicates. This type of weapon may have yields up to 10 or 20 megatons.

The *warhead* is the payload of a weapon. It may be either a high explosive or nuclear device. The term warhead has, by custom, come to mean payload of a missile, rather than a bomb.

In the construction of the first atomic bombs, two radically different principles or designs were used. These principles were based on laboratory findings of the decade preceding the all-out effort of the Manhattan Engineering District. It was discovered that one isotope, a specific atom of an element of uranium or one of plutonium, would split into two roughly equal fragments if bombarded by neutrons. In the splitting, called fission, a small amount of mass would disappear. This mass was converted into energy in accordance with Einstein's prediction that mass and



A SPECTACULAR FIREBALL *lighted the pre-dawn darkness of Yucca Flats after a burst at the Nevada Test Site in September 1957. Whitney, the code name for the event, was detonated from a 500-foot tower and was one of the full scale nuclear tests of Operation Plumbbob.*

energy were interconvertible. Einstein's formula, $E = MC^2$ was the mathematical expression of this principle. Both designs used for the first bombs were based on the principle of creating a chain-reacting or "super-critical" mass of active material at the proper time.

In the "gun-type" bomb, two sub-critical masses or pieces of fissionable material were assembled into one critical mass. This might be done by taking a length of gun barrel, putting a piece of active or fissionable material at each end and when ready, firing them together with a charge of powder to assemble a critical mass quickly. Coincident with the formation of this super-critical mass, a source of free neutrons is required to trigger it.

The other method of achieving a critical mass is based on the implosion principle. In a fission weapon, the compression may be achieved by means of a spherical arrangement of specially fabricated shapes of ordinary high explosive. In a hole in the center of this system is placed a sub-critical sphere of fissionable material. When the high explosive is set off by means of a number of detonators on the outside, an inwardly-directed "implosion" wave is

AIR BURST *is characterized by dirt cloud sucked up by "afterwind." The temperatures generated approach those at the center of the sun.*

produced. When this wave reaches the sphere of uranium (or plutonium), it causes the latter to be compressed so that it becomes super-critical and explodes.

Another element that interested the scientist as a source of energy was hydrogen. Scientists believed that the fusion of hydrogen atoms in the sun was the source of much of the energy of the universe. A thermonuclear reaction is one in which the nuclei of atoms of low atomic weight (such as hydrogen) fuse or join together to form nuclei of heavier elements (such as helium), with the release of energy. This reaction requires a very high temperature in order that it may be triggered. The harnessing of this method of converting mass into energy led to the development of even more powerful bombs, which are part of the offensive power of the United States Navy. These are commonly called TN weapons and use both fission and fusion for energy.

The first atomic bombs set off provided considerable information on nuclear effects. Ninety-seven bombs have been detonated since 1945, some in Nevada and many others in the Pacific proving grounds. One purpose of the tests was to learn more about nuclear effects, and how the effects differed with each type of burst.

The four types of burst—air, surface, underground and underwater—actually do not have distinctive dividing lines in terms of effects. The effects gradually change as we run the gamut from an air burst to a subsurface burst. All nuclear bursts release blast, heat and nuclear radiation, but certain effects will be the principal damaging agent for a specific type of burst.

Blast appears in two forms: *static peak overpressure* that tends to crush a target, and *peak dynamic pressure* or wind force that imparts translational motion to targets. Peak overpressure and peak dynamic pressure are both measured in pounds per square inch.

Thermal radiation, which consists mainly of infrared and visible light, is completed in several seconds depending upon the size of the detonation. It starts fires, burns personnel, and will destroy aircraft at varying distances. This is measured in calories per square centimeter.

Nuclear radiation is divided into two categories: initial and residual. *Initial radiation*, consisting mainly of gammas (resembling X-rays) and neutrons, is emitted within a minute or so of the burst. Gamma radiation dosage is measured in "roentgens" and determined by Geiger counter.

For practical purposes, dosages are additive. Fifty per cent of the people exposed to 450 roentgens are expected to die, and 600 roentgens is considered to be a 100% lethal dose if received in a period of 24 hours or less as whole body radiation.

Blast or pressure waves initially travel at about the speed of sound, while thermal and nuclear radiation have the velocity of light, so there is practically never any time to take protective action against the latter two effects.

Fall-out has become a very familiar and ominous word in our time. *Residual nuclear radiation* is the result of radioactive particles and fission fragments that fall out over a large area from atomic bursts and is measured in roentgens per hour. This radioactivity decays in accordance with the relation of time to the minus 1.2 power ($t^{-1.2}$), so that a person entering an area one hour after detonation with a residual radiation intensity of 600 roentgens per hour would not receive 600 roentgens as a total dose unless he remained in the area about two hours and 15 minutes.

Neither initial nor residual radiation can be detected by the human senses. It must be measured by instruments, the most familiar of which is the Geiger counter.

REGULUS II, *designed especially to be carried by nuclear-powered submarines, is another important atomic weapon in Navy's arsenal.*

A4D SKYHAWK, *midget atom bomber, is the first modern carrier-based plane not to have folding wings. It can also carry missiles, rockets.*

The question may be asked as to whether blast, thermal, or nuclear radiation will be the primary effect of the various types of bursts. Contrary to popular opinion, nuclear radiation is not usually the most serious. For an air burst, blast and thermal radiation will cause damage and casualties to a greater distance than nuclear radiation. In addition, residual nuclear radiation or fall-out is militarily insignificant from a high air burst, as the radioactive particles are largely dispersed in the upper atmosphere.

The radii of blast and thermal effects are reduced in a surface burst as is the initial nuclear radiation, but craters are formed that can damage underground structures and residual radiation becomes an important consideration.

The amount of fall-out and the size of craters are increased from an underground burst while the blast, thermal, and initial radiation are subject to even further reduction.

AN ARTIST'S DRAWING *shows the Navy's ballistic missile, Polaris. It will carry a wide variety of warheads and have a 1500-mile range.*

UNDERWATER burst effects are similar to underground effects. Fall-out once again must be considered except in very deep underwater detonations which usually produce no fall-out.

One gets an idea of the magnitude of the energy released from the 20-kiloton bomb dropped over Hiroshima, by comparing it to the energy of a 100-hp gasoline engine running 24 hours a day for over 30 years. Again, 20,000 tons of TNT in one pile would be 10 feet long, 10 feet wide, one mile high.

With the power packed in these weapons, escape of the delivery vehicle and pilot takes on new dimensions. In delivering high explosive weapons, pilots have always used reasonable care not to get too close to the blast and pick up damaging fragments—though occasionally some pilots didn't get away fast enough and far enough. Nuclear weapons have changed all this. These pilots who in WW II brought back fragments in the fuselage would have no counterpart in a nuclear war. Pilots caught in the area of burst would not come back. Nuclear weapons have made a pilot's job more exacting, and a study of all aspects of nuclear weapons delivery is a must.

There are five categories of Navy delivery systems for nuclear weapons: gun delivery, free rockets, guided missiles, ballistic missiles, and manned aircraft. With the development of the Fleet Ballistic Missile (*Polaris*), the Navy and Marine Corps can use all five systems, but the current major delivery capability is with aircraft.

At the end of World War II, the Fast Carrier Task Forces had delivery aircraft that could handle any type of ordnance then stockpiled. Nevertheless, none of these planes could carry the nuclear weapons of that era. Some patrol bombers, such as the P2V which joined the Fleet in 1946, had an emergency capability. With the rapid advances in nuclear weapon design, it was necessary to develop improved aircraft and new delivery tactics to keep pace with the new weapons.

The Navy decided to build a new airplane, one that could carry an atomic bomb and operate from aircraft carriers. This airplane was North American's AJ-1 *Savage*. VC (or composite) squadrons were formed prior to the time these planes were delivered in order to train pilots in the delivery of the new weapon.

The AJ filled the need at that time by giving the Navy a delivery capability during an interim period. Yet it had a severe limitation. It was prop driven, except that it had one small jet engine for take-off and for run-in over the target. For the jet age with its requirement for better defenses against high flying bombers, a replacement was mandatory. This has been provided by the A3D, a twin-jet, all-weather, high speed carrier-based aircraft. Today the Douglas A3D has almost entirely replaced the AJ in the Fleet.

The VC units are now designated as Heavy Attack squadrons (VAH), and two wings have been formed. Heavy Attack Wing One is based at NAS SANFORD, Florida; VAH-2 at NAS WHIDBEY ISLAND, Washington. Many factors in the delivery of nuclear weapons had to be considered and solved. For instance, the effects of the weapon itself on delivery aircraft and pilots were unknown. In delivery of high explosive ordnance, there was no problem of pilot-plane escape in high altitude delivery. But this is not the case for nuclear weapons.

Two techniques were developed for high altitude delivery of nuclear weapons: visual and radar bombing with visual bombing planned only as an emergency capability. After the weapon was dropped, an escape maneuver had to be worked out, one that would give maximum separation distance between delivery aircraft and burst position.

Each delivery effect was carefully studied. In the light of the data collected as to the maximum level of the effect, it was possible to determine a flight level—a level at which the aircraft would be fit to fly other missions with a

GUN DELIVERY *of nuclear weapons is one of five methods used by Navy and Marine Corps. They are also equipped with conventional weapons.*

minimum of maintenance and the pilot suffer no lasting injury. In general, these problems have been solved, and the delivery capability proved in Nevada and the Pacific proving grounds during actual nuclear detonations.

Another delivery capability was available to the Navy as soon as weapons were developed. This was with smaller carrier aircraft, those used in WW II and the Korean War. But before these aircraft could be equipped with nuclear weapons, much work had to be done. New delivery techniques had to be developed, new equipment designed and built, and the effects of atomic explosions on these aircraft studied.

Two aircraft that appeared promising were the AD *Skyraider* series and the F2H *Banshee*. The AD-1 joined the Fleet too late to see service in WW II, but it won its spurs in the Korean War, as did the *Banshee*.

With these aircraft, two types of low altitude bomb delivery were developed. The dive or glide delivery consists of a pullout at such an altitude that the aircraft and pilot can safely escape. This is merely a modification of dive bombing techniques developed prior to WW II by Navy and Marine Corps pilots.

THE SECOND method is known as loft bombing, sometimes called LABS bombing (low altitude bombing system.) In the first variation of this maneuver, the bomb is released during a pull-up before the aircraft pitch angle reaches 90 degrees, the exact angle depending upon target distance, aircraft speed and bomb characteristics. This gives the bomb both a forward velocity (in the direction of airplane's flight path) and a vertical velocity, and effects a ballistic trajectory toward the target. After release, the delivery aircraft continues pulling through, followed by a half-roll maneuver, which results in a 180-degree reversal of direction and a high speed run-out from the target area.

Loft bombing eliminates the need for the aircraft to fly over what may be a heavily defended target. After release, the aircraft goes through a half cuban-8 maneuver which gives sufficient escape distance between bomb burst and aircraft at the moment of burst.

The sequence of operations for such a delivery is as follows:

1. The pilot sets the airplane on heading to the target, usually at a very low altitude.
2. When he is over the initial point, the pilot starts the intervalometer, a timing device on which run-in time from IP to pull-up is set.
3. At the pull-up point, indicated by the intervalometer, the pilot pulls back on stick, using a prescribed pull-up schedule.
4. When the pre-selected pitch angle is reached, the bomb is automatically released.
5. Pilot completes half cuban-8 and heads home.

Recent delivery aircraft in the light attack program are the F9F-8 *Cougar*, the A4D *Skyhawk*, and the FJ-4B *Fury*.

In the second variation of the maneuver, the bomb is not released until after the aircraft is past the target and the pitch angle exceeds 90 degrees. The bomb is pitched back toward the target and hoisted above the airplane's turning radius. No IP (initial point) is needed in this case, since the pull-up is initiated over the target rather than at a position short of the target required in the loft maneuver.

The Naval Antisubmarine Forces have also been provided with an atomic depth bomb. This weapon can be delivered by S2F, P2V, and P5M aircraft.

In the guided missile field, the Navy has a delivery capability with *Regulus I* and *II*. This aerodynamic cruise type vehicle can be launched from aircraft carriers, cruisers and submarines. Almost all missiles of the future Navy will have nuclear warheads, whether in the surface-to-surface, surface-to-air or other categories. These warheads will multiply the kill radius by a factor of 10 to 1000.

The Navy is not abandoning the capability of waging a conventional war with high explosive weapons. Nuclear weapons are simply an addition to the arsenal of the Navy, not a replacement for all older weapons. During the Suez crisis, for example, the Navy was the only service with an on-the-spot capability to fight a conventional war. This capability is essential in order to counter Soviet bloc "nibbling" tactics which fall short of all-out war.

Since the consequences of thermonuclear war become more and more catastrophic, the less desirable such a war is. The less attractive all-out war becomes, the more probable become small brush-fire wars similar to Korea. This increases the value of an on-the-spot task force with a flexible arsenal. What is required is a steady and continuous increase in the combat readiness of the Navy to fight all types of war—general or thermonuclear, small scale or limited nuclear war, and local war.

Soon the FBM (Fleet Ballistic Missile) *Polaris* will be operational, along with the ballistic missile submarine, the guidance system, and the TN warhead to make a complete weapon system. *Polaris* alone will be a powerful deterrent to the launching of a surprise ICBM (intercontinental ballistic missile) attack on the United States.

Nucleonics are creating a new Navy. Nuclear power is having a profound effect on ship propulsion, on the development of guided and ballistic missiles, and on the design of power plants for aircraft. The progress in research and production has one aim: insurance that the United States Navy can wage nuclear war and thereby effectively deter it.

THE FORRESTAL—*its men, guns, missiles and far-ranging aircraft—typifies Navy's mobile, global, nuclear and conventional capabilities.*

VAdm. Pirie is DCNO(Air)

Has Been Naval Aviator since 1929

Vice Admiral Robert Burns Pirie has assumed the duties of Deputy Chief of Naval Operations for Air replacing Vice Admiral William V. Davis who held the post since 1956.

Admiral Pirie was graduated from the Naval Academy in 1926. He was color company commander in that year. Three years later he was designated Naval Aviator. His first aviation duties with the fleet were in the carriers *Langley* and *Lexington*.

During World War II, he served with distinction on the staffs of such famous fighting Admirals as Towers, Bogan, and King. At the end of the war he returned to the Naval Academy to become the first head of the Department of Aviation, and returned again later as the Commandant of Midshipmen after a tour as commanding officer of the *Sicily*.

VADM. PIRIE HAS DISTINGUISHED CAREER

Adm. Pirie's most recent assignments before becoming DCNO(Air) have been Chief of Staff to Admiral Jerauld Wright, Commander in Chief of the Atlantic Fleet; Commander, Carrier Division Six in the Med with the Sixth Fleet; and Commander, Second Fleet and Commander Striking Force in the Allied Command Atlantic.

VAdm. Davis left Washington and the billet of DCNO(Air) to become Deputy Commander in Chief U. S. Atlantic Fleet.

Research Workers Honored

Helped Develop Solid Propellant

The Secretary of the Navy has honored three Navy research workers for contributions to the development of new solid propellants which are to be employed in the *Polaris*. In a ceremony at the Pentagon, the awards were conferred by Under Secretary Franke on Cdr. William J. Corcoran, Special Projects Office, Mr. Elliott Mitchell, Research Division, both of the Bureau of Ordnance, and Dr. Karl Klager, Aerojet General Corporation.

The Navy's long utilization of solid propellant rockets and a collaboration with Aerojet General which goes back to WW II have produced a vital breakthrough. The new solid propellant is now being manufactured in quantity at Navy facilities in Sacramento, California, operated by Aerojet General.

Cdr. Corcoran was awarded a Letter of Commendation for his contributing to the planning and guidance of research for propellant applications to *Polaris*. Mr. Mitchell received a Distinguished Civilian Service Award for his contribution to a search for propellant additives resulting in increased propellant energy.

Dr. Klager received the Navy Distinguished Public Service Award for his contribution and leadership in the selection of successful propellant formulations to achieve the desired balance of burning rate, physical properties, and specific impulse.

Program for Newcomers

USS Ranger Speeds Indoctrination

An indoctrination division, ready to familiarize new personnel with the mission, policies and routine of the ship, has been organized on CVA-61.

"I" Division, as it is called, has eased the problems of adaptation which confront even the veteran sailor who reports aboard such a massive ship as the CVA-61.

As new men report aboard, they are assigned to "I" Division for five days. During this time, they are given lectures on the ship's organization, regulations, disciplinary policies and departmental functions. A three-hour tour of the ship helps newcomers to familiarize themselves with the layout of the carrier.

Another function of the "I" Division is to place new non-rated personnel in jobs for which they are best qualified and in which they are interested.

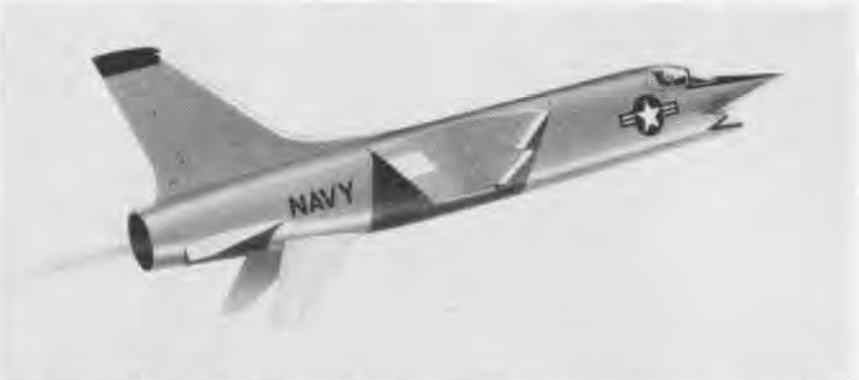
The program has improved the use of personnel and helped the new men to adapt themselves to *Ranger* life.

12,000th Jump Recorded

Same Chief Scored 5000th Jump

The 12,000th jump to be recorded at the parachute riggers "A" school, NATTU LAKEHURST, was made by William C. Begley, PRC. By coincidence, the same chief made the school's 5000th jump in 1949 while he was there as an instructor.

The Lakehurst parachute riggers school was established in 1924. It turns out graduates who are qualified to pack parachutes and life rafts for flying personnel and is the Navy's only parachute rigging school. Training includes maintenance and repair of 'chutes, rafts, life vests, exposure suits, safety and oxygen equipment.



'PUSH BUTTON FIGHTER' *is description hung on Chance Vought's Crusader III which made its initial flight recently at Edwards AFB test center. It is powered by the P&W J-75. An automatic flight control system enables a pilot to climb, cruise, hold and change heading and orbit by punching the appropriate button. Capable of "space edge" duty, the Mach 2 carrier-based fighter can carry Sparrow III or Sidewinder missiles in combinations, or other weapons. Two movable ventral fins, located near tail, extended horizontally in low-speed flight, are turned downward at nearly a 90° angle to give added stability during high speed flight.*

GRAMPAW PETTIBONE

Caught Flat-Footed

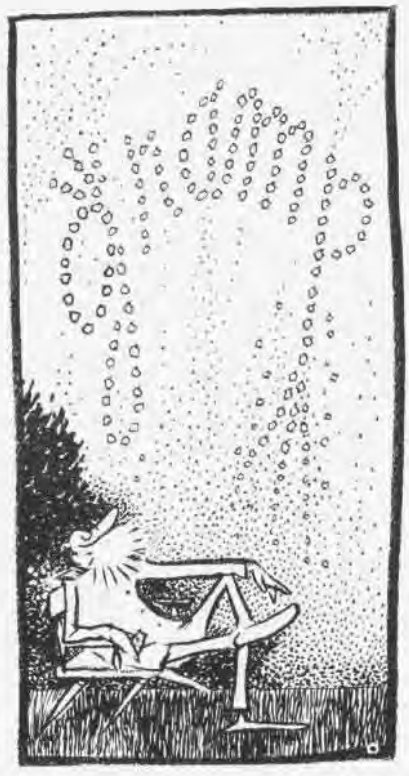
An R5D on an IFR clearance to Wake Island made a normal takeoff from an Okinawan base, using 15 degrees of flaps. The gear was retracted when a safe landing could no longer be made on the runway. An altitude of 100 feet and an airspeed of 115-120 knots had been attained when the crew chief reported that the number four engine was on fire.

Saying "We're going to belly in," the plane commander immediately chopped the throttles, pulled the props full back and cut the ignition to all engines. As the aircraft approached the ground, the pilot realized that he was going to hit the side of a hill. He called for full flaps, pulled back on the yoke, and put the aircraft into an extremely nose-high attitude, just missing a deep ravine and barely clearing a ridge. After initial impact the airplane bounced back into the air, then on final impact the fuselage split just aft of the crew's compartment, the wing tanks ruptured, the cargo doors opened, spilled gasoline caught fire.

Two minutes after final impact all 31 occupants had evacuated the burning airplane. The copilot went out his side window, closely followed by the cut and bleeding pilot who had sustained minor facial injuries. *Neither pilot had used shoulder harness during the takeoff.*

The accident board concluded that the pilot erred in judgment by electing to crash-land the airplane following discovery of the *engine* fire since there was sufficient altitude and airspeed for satisfactorily clearing the surrounding terrain on three engines and subsequently landing on the runway. The firewall shut-off valve to the number four engine should have been pulled regardless of the subsequent actions on the part of the pilots. The fire in the engine would probably have been extinguished had the firewall shut-off valve been pulled and the fire extinguisher system activated.

The board recommended that all



transport pilots be thoroughly schooled on the procedures to be followed in case of fire aboard multi-engine aircraft and that it be insured that they understand the performance characteristics of their aircraft under all flight conditions and configurations before being designated plane commanders.

Grampaw Pettibone Says:

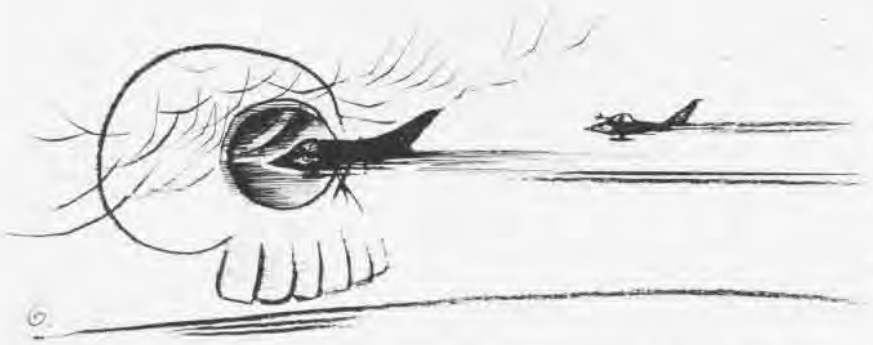
Great Balls of Fire! This lad gets an engine fire in one of his four engines and without further evaluation of the situation chops off *all* engines and makes a crash-landing in rough terrain. It appears to me he had a complete blackout of his thinkin' box. He didn't even have the presence of mind to actuate the firewall shut-off valve. And the copilot visually checked the fire *only one time* and then neglected to actuate the fire extinguishing system.

When asked why the engine shut-off valve was not closed to the number four engine, the copilot said he didn't have time and he was concentrating on shutting down all engines prior to landing. This reminds me of the lad who landed with his gear up because the sound of that durned gear warning horn at such a critical point in his landing approach was so blankety-blank distracting.

It's just plain miraculous that this fiasco didn't result in a multi-fatality tragedy. One passenger died three days after the accident, the others sustained only minor injuries.

The plane commander had 5500 flight hours, the copilot 4100. When gents with this kind of experience are caught this flat-footed, I'm really shook. They had long years of accident-free flying, but they lacked clear emergency thinking in the pinch. Only frequent training in simulated emergency conditions can prick that complacency bubble and keep a pilot on his toes and ready for the real McCoy.

Another thing, I'm getting mighty dad-burned tired of reading about pilots who refuse to recognize that shoulder harnesses were put in aircraft for a reason—*to be used*. There's absolutely no reason for their use not being SOP. OPNAV Instruction 3710.7A's wording leaves no doubt about it: "Each person's safety belt and shoulder harness shall be worn and tightened prior to takeoff and shall be continued in use until the completion of the flight, except when necessary activities require temporary removal." This durned well *includes* multi-fan transport-type drivers!



Led Astray

Two A4D-1 *Skyhawks* departed Cecil Field one afternoon on the final leg of a low level navigation flight from Guantanamo Bay, Cuba, to NAS OCEANA, Virginia.

The flight proceeded normally at an altitude of 500 feet until approximately 54 minutes after take-off when the ceiling lowered to 1000 feet in light rain. Twelve minutes later the weather deteriorated, and the chase pilot closed to a tight wing position to maintain contact with the flight leader. When the ceiling reduced to 150-300 feet with rain, visual contact between the two pilots was lost and the wingman slowed his aircraft to assure safe separation. Shortly thereafter, in the vicinity of Edenton, North Carolina, while flying at an indicated altitude of 100 feet and an airspeed of 320 knots, the wingman's *Skyhawk* flew head-on into a flock of large birds, a number of which struck the aircraft.

The cockpit filled with smoke and, as the pilot reached to turn off his pressurization, the aircraft struck an unknown object, possibly a ground obstruction. The density of the cockpit smoke increased, completely obscuring the instruments. The pilot added full throttle, pulled back on the stick, climbed into the overcast, and ejected at an altitude of about 2000 feet. He came down uninjured in a field; his aircraft crashed into a swamp.

After the two aircraft had become separated, the flight leader had climbed into the overcast, oriented himself on instruments, and contacted NAS OCEANA. He requested an instrument approach, utilized UHF direction finder steers, and broke out of the overcast a few miles short of Oceana.

At the time the flight first encountered weather significantly different from that forecast, both aircraft had sufficient fuel to proceed to several suitable airfields. When the weather markedly deteriorated in North Carolina, the flight was only 40 miles from MCAS CHERRY POINT where VFR conditions prevailed.

Prior to their departure from Cuba, the squadron commanding officer instructed both pilots that they should not make the flight unless the ceiling was above 2000 feet and the visibility considerably better than VFR minimums of three miles.

Grampaw Pettibone Says:

This kind of shenanigans makes me burn! The pilots risked their own lives and there's no telling how many others when their jets zoomed through the soup on a VFR clearance. Also, it durned well should have become crystal clear sometime before they hit the 150-foot ceiling and near-zero visibility that they were directly violating their CO's briefing instructions.

I've no quarrel with the junior birdman *for pulling up and ejecting* once he plowed into the flock of birds which were also flying at 100 feet in an effort to stay below the overcast, but the situation should never have deteriorated to this.

The flight leader, a lieutenant commander, should have canceled out the sandblower flight and diverted to Cherry Point. The wingman, a relatively inexperienced Ltjg, might well have shown enough good sense and spunk to recommend this, but it's understandable why he would rely on his leader's judgment and thus be led astray. But he still should have refused to fly formation before the weather became so bad that, in his own words, "I was more afraid of making a 180-degree turn at such a low altitude in the present visibility than I was of continuing to a briefed known destination."

The more I think about it the more convinced I am that both of these boys should be horse-whipped for thundering along at 100 feet and 300-plus knots in weather conditions so bad they lost each other! And the flight leader deserves some extra lashes!!

In view of the rain and ceiling conditions reported before take-off and the warm front along the route, it should have been evident that weather would have to be closely monitored in flight. Times have changed since the days when you could start down a muddy rutty road in an old Model T with reasonable assurance that you could back out again or bull your way through the mudholes. Safe operation of today's fast jets demands that canned decisions, some "what'll I do if this happens," be completed before the aircraft ever leave the runway.

Dear Grampaw Pettibone:

Come, come, Grampaw! Ever since reading the item "Squeeze Play" in your January issue, I have been waiting to see some further explanation of how the poor fellow lost part of his *right* ring finger through his indiscretion in resting his *left* hand on the windshield frame while closing his canopy on takeoff. Nary a word of enlightenment have I seen! Can it be that Grampaw pulls bloopers just like his unfortunate clients, or are there mysterious hazards to an aircraft cockpit that are beyond my 1100 ken?

Of course my *real* reason for writing this is to prove to you that surface sailors (even old fogies [he said it, I didn't—Gramps] of RAdms.) do read Naval Aviation News and your column—and gain thereby, I might add, much of interest and professional enlightenment.

—Rear Admiral, U. S. Navy

Grampaw Pettibone Says:

My first impulse was to say this was the first mistake I ever made, but I've already used that line. My second impulse was to comment thusly, "One thing's fer shure, it warn't easy!" But after mulling the problem over for awhile it became purty obvious that this lad was so shook by events that he had the wrong fingertip amputated.

POT-BELLIED WV-2 TOUCHES DOWN AT U. S. NAVAL STATION, ARGENTIA, NEWFOUNDLAND, AS IT RETURNS FROM BARRIER RADAR PATROL

BARRIER GETS NEW SQUADRON

THE NAVY has tightened its radar network over the Atlantic air and sea lanes by adding a third aircraft squadron to units already manning that segment of the North American early warning system.

The new airborne early warning squadron, VW-13, operating from NAS PATUXENT RIVER, will furnish flight personnel and aircraft for Atlantic Barrier radar patrols originating from NAS ARGENTIA, Newfoundland.

Airborne Early Warning Squadron Eleven, commanded by Capt. R. C. Lefever, is being permanently shifted from Patuxent River to Argentia. The squadron, commissioned in 1955, was the first Navy squadron to fly radar watch over the Atlantic Barrier and was initially stationed at Argentia.

The Atlantic Barrier is a shifting line between Newfoundland and an undisclosed point in the Atlantic, constantly patrolled by radar-equipped *Super Constellation* aircraft and versatile radar picket ships. A 70-ton WV-2, whose range and flight time is exceeded only by long-range bombers, normally carriers about 8000 gallons of fuel. On each flight it makes over the barrier, the men travel a distance equal to that of a transcontinental flight.

Functioning as seaward extensions of the Distant Early Warning Line, the Atlantic Barrier and its counterpart in the Pacific complete a protective radar shield circling from islands of the mid-Pacific across the northern perimeter of Canada and down to the vicinity of the Azores.

Addition of a third airborne early warning squadron to forces employed in the Atlantic Barrier will enable the Navy to further improve the effectiveness of the mobile oceanic radar curtain which has been maintained continuously since the first of July, 1956.

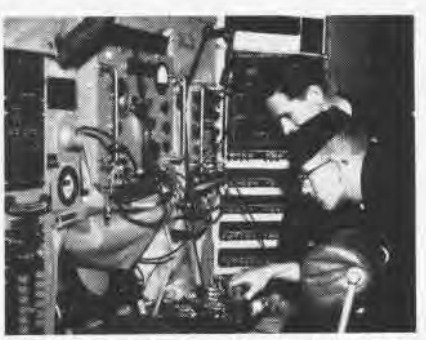
VW-13 will join its sister squadron, VW-15, at their permanent home base at the Patuxent River station. VW-15 has been temporarily on duty in Argentia since November, but will return to Patuxent River when relieved by VW-11. Both will rotate aircraft to Argentia for flying Barrier patrols.

Shifts of VW-11 to Newfoundland will add approximately 1,000 Navy men to about 2,500 already assigned to permanent facilities there, Capt. Paul Masterton, USN, Commander Barrier Atlantic, said. First segments of the squadron arrived in Argentia in April. Movement of the squadron involves aircraft of more than 1,000 personnel and 75,000 pounds of cargo.

Flying the barrier is hard work, but as one flight engineer said, "I've got almost a whole year in the air. It's about time I quit. But as long as I think the barrier is doing some good, I'll surely keep on flying."

MCCOLLUM, THIES ARE VETERAN PILOTS

RADAR CONTACT IS CAREFULLY PLOTTED



VW-15 TECHNICIANS REPAIR EQUIPMENT

HIGH ALTITUDE SEAT TESTS

A SERIES of high altitude ejection seat tests to determine the best means of overcoming the hazards of bailing out of aircraft at 70,000 feet have been run over California's Imperial Valley. Sponsored by the Bureau of Aeronautics, the tests have been conducted by North American Aviation's Columbus Division.

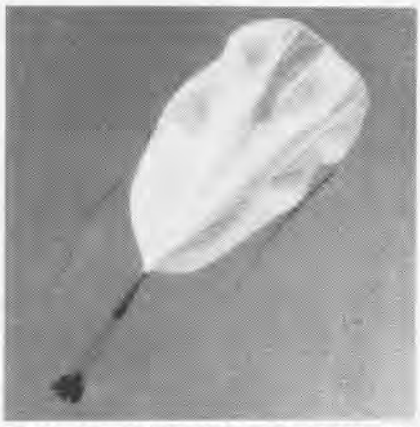
While jumping from a stricken aircraft has always ranked as a difficult undertaking, the additional problems attending a leap from extremely high altitude makes an ejection in the upper reaches doubly hazardous.

The extra effort required to get out of the plane, the critical need for oxygen, exposure to extremely cold temperatures and the shock caused by sudden opening of the chute are but a few of these problems.

A pilot in an open parachute at 50,000 feet faces a fall of approximately 30 minutes. Long before he descends to a "safe" altitude, he will be freezing and probably unconscious from lack of oxygen. Temperatures at such height are as low as 65 degrees below zero.

The obvious solution to this dilemma is to "free fall" through the dangerous regions. From 50,000 feet, a pilot can reach the ground in 3½ minutes. If his parachute is opened after a free fall of around two minutes, temperature and oxygen conditions should be safe for the remainder of the descent.

During the free fall maneuver which reduces the effects of exposure



SEATS ARE BORNE ALOFT TO 70,000 FEET

and lack of oxygen, still another major problem arises. Owing to excessive spinning and tumbling, an escaping pilot may be subjected to violent gyrations which force his blood to rush from the center of his body toward his brain and his extremities. This usually results in helplessness and eventual loss of consciousness.

Test seats, developed by North American, have been fitted with special "fins" and "drogues" designed to control the free fall and reduce the possibility of spinning and tumbling during the long plunge. To obtain data, three dummies fitted with cameras and telemetering equipment were borne aloft in the special seats by a helium-filled plastic balloon.

The number one seat with its dummy was ejected from the balloon at an altitude of 65,000 feet. Numbers two and three were ejected at an interval of 30 seconds after reaching an altitude of 70,000 feet.

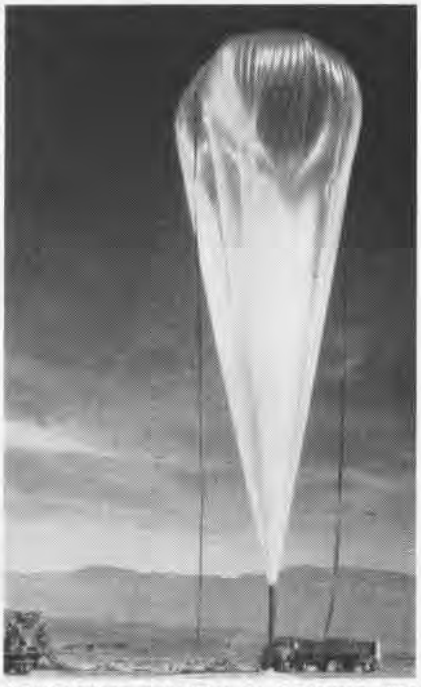
After a free fall to 10,000 feet, each dummy was separated from its seat. Seconds later its automatic parachute opened and it floated to the ground. Parachutes on each seat were set to open at 5000 feet.

Technicians involved in the tests operated from a ground station and from three special aircraft containing radio control equipment (to release the seats from the balloon) and various recording devices. Two of the airplanes contained photographic equipment.

The balloon that carried the test seats aloft was made of plastic about .002 of an inch thick. It measured 300 feet from top to the end of trailing antennae. At 65,000 feet it had a diameter of 120 feet and a capacity of 711,000 cubic feet of helium.

These highly successful tests are part of a series conducted to determine the problems that are likely to be encountered by pilots of tomorrow's ultrasonic aircraft. The aim is to design aircraft and aircraft equipment with a maximum of "built-in" safety for high altitude flight.

LIFELIKE DUMMY IS READIED FOR TEST



HELIUM-FILLED BALLOON IN MORNING SUN

PARACHUTE DROPS SEAT SAFELY TO EARTH

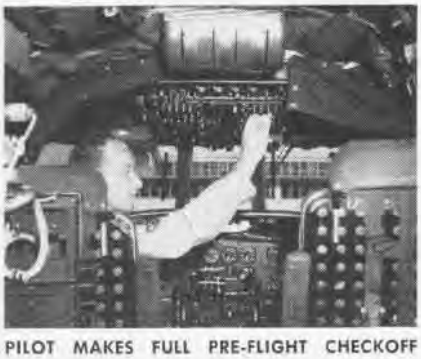
TRAINING FOR THE TEMPEST

By Ens. J. R. Beidler, VW-4

VW-4 HURRICANE HUNTERS RACE TOWARD THEIR SUPER CONNIE FOR FLIGHT INTO STORM

HURRICANE hunting is teamwork. It's one game in which the participants must not lose—failure doesn't earn a second chance.

But to the men of Airborne Early Warning Squadron Four (VW-4), the Navy's *Hurricane Hunters*, the job is much more than a game. It's a deadly serious business. Upon their ability to investigate and withstand a hurricane depend their own lives and the safety of thousands of island and coastal inhabitants who live in the paths of the extremely destructive tropical menaces.



PILOT MAKES FULL PRE-FLIGHT CHECKOFF

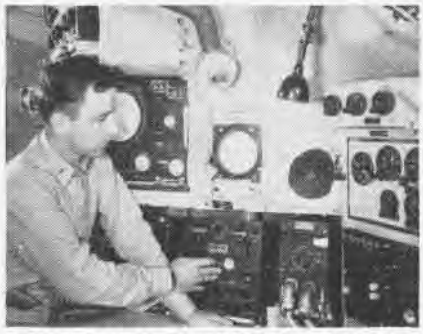
Early warnings made possible by the men who fly with WV-4, and their Air Force counterparts based in Bermuda, can prevent disasters, save lives and minimize property damage.

The VW-4 *Hurricane Hunters* are based at NAS JACKSONVILLE and are always on call to investigate weather disturbances in the Atlantic, the Caribbean Sea or the Gulf of Mexico. During the hurricane season, June 1 through November 30, the *Hunters* deploy one and often two aircraft to Puerto Rico to be nearer the area that has come to be known as the breeding ground of hurricanes.

The squadron has recently been equipped with WV *Super Constellations*. It is made up of more than 500 officers and men under the command of Cdr. Nicholas Brango who is considered one of America's foremost experts on aerial hurricane reconnaissance and tropical meteorology. Cdr. Brango, along with several other officers in VW-4, is a qualified Naval Aviator as well as a professionally trained and qualified meteorologist.

His experience includes penetrations into the "eye" of 18 hurricanes, and he has made major contributions to the establishment of the effective warning system which is in operation today. He has been affiliated with hurricane reconnaissance for more than eight years.

Now that the huge, radar-laden *Super Connies* have been assigned to the *Hurricane Hunters*, new techniques have been and will be developed for hurricane reconnaissance. Weather hunters still do not know everything that can be learned by use of the planes' electronic gear, which is so complex that it will take several more years of experience and experimentation to completely exploit it.



LORAN IS USED TO PINPOINT A POSITION

This season will be the first time the Navy has exclusively used the *Connies* for hunting and tracking hurricanes, even though radar has been used previously on weather flights.

When squadron pilots flew P2V *Neptunes*, they could penetrate storms as low as 300 feet above the water to gather needed weather data. The size of the *Super Connie* makes such low-level penetrations impractical, but the *Connie's* greater operating range, superior radar, and advanced weather equipment will help to compensate for the difference.

Many persons ask why, in this day of advanced knowledge and technology, has not some device been developed to *control* hurricanes, rather than find them, track them, and batten down against them. Others have inquired as to the feasibility of dropping an A-bomb or an H-bomb into one of the storms to break up its whirling fury. Such questions can best be answered by an explanation of the power within a hurricane.

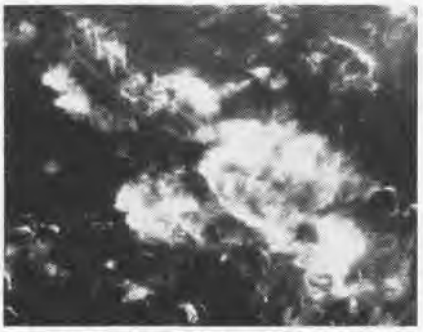
The hurricane's energy is continuous, using the heat energy released in the condensation of millions of tons

of water over many thousands of square miles. To drop an A-bomb into the hurricane to break it up would be like trying to reverse the flow of Niagara Falls by using an ordinary high pressure fire hose.

It has been calculated that the energy released in a typical hurricane is equal to that of two-and-a-half World War II type A-bombs exploded each second—or 200,000 of these bombs exploded every day—during the lifespan of a hurricane. It is doubtful that any type of any explosion would affect so powerful a storm, whose diameter ranges from 200 to 500 miles in area.

So it is still a matter of finding the storm, studying its habits, and warning those in its path to take cover.

NAVIGATORS PLOT IN A CELESTIAL FIX



MERCHANT SHIP IS LASHED BY HURRICANE

STORM IS STUDIED ON SCOPE OF RADAR

Such is the job of VW-4 and the Air Force *Hurricane Hunters*, but the job is not without its rewards.

The men of VW-4 enjoy a satisfaction rather uncommon to military units. Many men-o-war's-men are in an endless training cycle, preparing for what could possibly come about, and often personnel cannot see the logic and benefit behind the many hours spent at practice. They prepare for something they hope will never really happen and they may never realize the fruits of their efforts.

The *Hurricane Hunters* train for an enemy that is sure to appear each year. Their reward is the knowledge that through their early warning of hurricane menaces, lives may be saved, property damage can be minimized and research material gathered to help weather experts learn more about this destructive phenomenon.

The hurricanes are as fickle as their feminine namesakes in that no two are ever alike. Each one is a formidable enemy; vastly destructive, capable of deception, camouflage and sneak attacks. They are extremely mobile and flexible. No one man can anticipate such a foe, and for that reason that *Hurricane Hunters* train with one result in mind—success through teamwork.

Training within VW-4 does not begin or end at any time during the year. It is continuous. The program has no phases or interruptions because no one knows when a storm will strike.

Statistics support the theory that more than 90 percent of all hurricanes occur between June and November, with August, September and October considered peak months. But they can form at any time, as evidenced in 1955 when Hurricane Alice snapped all hands from their post-holiday winter doldrums the third day in January.

From basic pilot training in the *Super Connie* to ready room lectures on survival, the plane crews of the *Hunters* strive to keep teamwork at a constantly high peak. For training, as for operational flights, the men of a reconnaissance crew are divided into three distinct teams; basic flight, weather and radar.

The flight team includes the pilot, two copilots, non-pilot navigator, two co-pilot navigators, two flight engineers, two radiomen and two electricians. The weather team is made up of the flight aerologist or weather officer and his assistant, and two aerographer's mates. The CIC officer or radar officer, two assistant CIC officers, four air controllers and two electronic technicians form the radar team.

With different knowledge, skills and tasks, the three teams must work together to form a successful crew. Each man knows what is expected of him and a mistake on the part of one could mean failure of the mission and possibly disaster for all.

The busiest, and perhaps the most important, individual on the plane is the flight aerologist because the sole reason for the aircraft's venture into a hurricane is to provide a vantage point for this trained weather expert to observe and analyze storm conditions, then relay this data to the Fleet Hurricane Forecast Facility in Miami through the Joint Hurricane Warning Center.

Flight aerologists are qualified meteorological officers who have received formal training in meteorology at the U. S. Naval Postgraduate School, Monterey, Calif., or they are LDO Aerology officers who have obtained a great deal of practical experience and training in meteorology as aerographer's mates.

After joining the squadron, aerologists must complete a VW-4 syllabus which is geared to tropical meteorology and hurricanes. This supplements what the aerologist has learned at Postgraduate school or elsewhere.

Within the ground training syllabus the aerologist receives detailed instruction in weather and hurricane reconnaissance, radar reconnaissance, aerial navigation, aerial communications, aerial photography and interpretation, radar scope photography, translating radar scope indications into weather phenomena, and aircraft radar operation.

The "buddy system" is used by VW-4 aerologists for inflight training. Before going into a reconnaissance flight alone, a new aerologist accompanies an experienced man into a storm. In addition to this training flight, a weatherman gets practical training in radar reconnaissance, radar operation, and he goes through intensive ground training which prepares him for visual penetration and circumnavigation flights at various levels in all kinds of tropical storms and hurricanes.

Radar tracking and radar investigations of tropical storms, investigative flights into easterly waves and other areas of possible storm disturbance, special and routine weather reconnaissance flights for fleet exercises and research projects, and the use of inflight aerological instruments, navigational aids, radar equipment and aerial and radar photographic gear are all explained in the training program.

One of the unique talents an aerologist must cultivate is the ability to read winds from the surface of the water below him. From the state of the sea outside the storm circulation, he must be able to determine the direction and speed of the winds. This ability aids greatly in early warning to surface vessels which depend upon these reports to dodge the danger areas. The wind readings also help the plane's navigator in his dead reckoning of the aircraft's position.

When encountering the storm, he takes over the "conn" of the aircraft, much in the same manner as a bombardier on the final leg of a bombing mission. He determines at what altitude he get maximum information about the storm and, in cooperation with the pilot and CIC officer, directs the plane into and around the storm.

The aerologist must supervise the use of the "dropsonde," a weather instrument similar to the "radiosonde" used by ground weather stations except that it is dropped by parachute instead of carried aloft by balloon. The dropsonde determines air pressure, humidity and temperature of the air as it descends to the surface and sends the information back to the plane via short wave radio.

When he has compiled and analyzed all the data he can obtain, the aerologist sends out his storm report which includes the eye position, altitude winds, cloud coverage, cloud heights, surface winds, surface pressure, humidity, temperature and all other data which might be of use not only for operational forecasting but for research purposes as well.

This information is received by the Joint Hurricane Warning Service in Miami where the data is further analyzed and storm warnings are sent out to areas in the storm's path. (The Joint Hurricane Weather Center is comprised of Navy, Air Force and Weather Bureau personnel. Close coordination between the interdepartmental agencies is practiced at all times.)

INFO FROM RADAR IS PLOTTED ON CHART

Responsibility for the safety of the plane and its crew is in the hands of the plane commander. On his shoulders rests the decision whether to fly his plane into the storm or remain outside it. For this reason, the pilot must have a complete knowledge of his plane and keen understanding of the conditions he may encounter.

Taking charge of a multi-million-dollar aircraft even in normal flight is a large responsibility, but adding a 25-man crew and a raging hurricane requires decisions which must be carefully and intelligently made.

To qualify a man to make such decisions requires a great deal of training and experience. A WV plane commander must first be a pilot of proved ability. He must have special instrument rating, plus a minimum of 2000 hours flight time logged and he must complete the squadron training syllabus which consists of more than 25 training flights.

ELECTRONIC GEAR IS STRONG RIGHT ARM

Tropical weather experts explain to pilots the conditions within the storms to give the aviators an idea of how the storm will affect the airplane's performance.

Instruction by the aerologists starts in a general way and acquaints the pilot with the atmosphere and its general circulation. Next comes an explanation of air masses—how they are formed, how they move and are modified. Thunderstorms is the next topic, with the aerologist emphasizing the turbulence within them and explaining how they affect aircraft.

The first introduction to hurricanes comes with an explanation of easterly waves and areas of convergence. It is in these areas that tropical storms form. Following this, a description of tropical weather is given and reasons why these conditions exist are explained.

Hurricane structure and wind conditions are explained in later lectures, along with methods of reconnaissance used on flights. Here the pilots learn the penetration techniques used on reconnaissance flights. Each storm is a separate entity, defying comparison with any other. How to enter the storm in the most favorable quadrant is explained, with the pilot attempting to keep the winds on the aircraft's port quarter while flying into the hurricane's eye.

The pilot is next introduced to weather reports received by the weather office to aid him in his flight planning, along with familiarization in weather map interpretation. Finally he is instructed in the use of pressure pattern flying and altimetry, the science of measuring altitudes.

The most recent innovation to hurricane reconnaissance has been the introduction of CIC personnel and their electronic "eyes." The exclusive use of the WV *Super Constellation* has given radar a major role in storm probing. As yet, the full capability of radar's use in weather reconnaissance is not known; the 1958 season is expected to provide a great deal of knowledge about its potential. This does not mean that the use of radar must begin from scratch, because radar has been used in penetrations and storms surveillance over the past four or five years. Radar

has also provided a tremendous night-time capability for weather aircraft.

However, techniques for best using men and equipment in CIC are still being developed. One of the most difficult problems in developing these techniques is the lack of experienced personnel specifically qualified in weather problems. New men in CIC have been trained in air controlling and barrier operations but they have received no previous instructions in weather. As a result, the only way to train them is by assigning experienced men to help them master their equipment while actually probing a storm.

Facts about a storm, which experienced radar observers can supply, vary. Several operators can be assigned to track small precipitation areas within a storm which are believed to indicate the direction and speed of the surface winds. One operator can study the entire storm, noting the coverage of weather bands, while the man operating the height-finding radar can determine how high the storm goes and possibly the freezing level. A relief sketch of the storm's structure can then be made.

In addition to this information, radar observers can pinpoint the storm's geographic location if land is available on the scope. The direction and speed of movement of the storm can also be determined, but the task of immediate concern that radar performs is that it allows the CIC officer to direct the plane through the storm's "soft" spots. This minimizes the possibility of damage to the aircraft and its equipment as it approaches the areas of greatest turbulence during the reconnaissance.

Another important function carried out in CIC is radar scope photography. In the past, such films were not developed in time to be of immediate aid but due to present rapid processing methods, they can be the principal method of obtaining weather information from a radar scope in the future. These films will give the aerologist a permanent record of what he has seen and with the introduction of on-the-spot developing methods, his analysis of the storm can be more carefully made.

Radar scope films can be used in the plane's "bell-hop" system. This equipment will transmit the impressions on a negative to a receiving station within a radius of 100 miles and will enable the personnel in that station to view pictures of the storm taken only a few minutes earlier, when put into service.

A network of planes using this equipment could enable a reconnaissance plane to send pictures of the storm back to the Fleet Hurricane Forecast Facility in Miami while it was still in the hurricane's eye, several hundred miles away.

Navigation is also one of the most difficult tasks on a reconnaissance flight. Storms often originate far out in the Atlantic or in the southern regions of the Gulf of Mexico, outside the range of radio navigational aids and loran and out of radar range of the nearest land. This makes the navigator's job no different from that of other navigators except that when entering a storm area, wind shifts are encountered so frequently that an accurate dead reckoning is impossible.

Usually the only means the navigator has of determining the plane's position is with the use of celestial navigation. Within the storm, constant heading changes and varying strong winds make fixing the plane's position a necessity before an accurate position of the storm can be sent.

Celestial and other non-electronic methods of navigation are stressed within VW-4. The skills these men acquire while in flight training are supplemented by the squadron's own navigational instruction. In addition to junior pilot navigators, the squadron has also trained a number of pilot navigators who carry the brunt of the navigation chores and who specialize in navigation.

Fourteen-hour navigation hops into areas where planes are likely to be sent hunting hurricanes are frequent occurrences in VW-4. On these flights, navigators are required to shoot at least two three-star fixes and sun lines along with maximum use of electronic equipment. On reconnaissance flights the navigator is at all times responsible for as accurate a dead-reckoning position as possible.

The accuracy of the navigator's work must be good, for his location of the storm's position is of utmost importance in warning populated areas in its path.

Each man's job is important—from the ground maintenance crews right up to the pilot. Each man depends on other members of the crew for the final job to be done successfully. Each man depends on the others for his life. This is teamwork in its truest sense.

AEROLOGIST BRIEFS PLANE CREW BEFORE FLIGHT INTO A STORM

PHOTOS MADE IN A HURRICANE ARE ANALYZED AT JACKSONVILLE

FIGHTER SQUADRON THIRTY TWO

By LCdr. Roy Johnson, VF-32

I WAS FIRST introduced to flight simulators in the early days when the FH-1 *Phantom* was in progress. This simulator turned out to be quite a "panic box," for it threw an endless barrage of emergency and frequently illogical situations at fledgling pilots. As a result, many Navy pilots got the impression that all trainers and simulators were "panic boxes."

We could see that it had been inadvisable to include so many emergencies that it did not make learning easy or sound. We decided that something had to be done to revise the schedule and take some of the "panic" out of it.

To remedy the situation at VF-32, we have conducted a thorough investigation of the possibilities of the Operational Flight Trainer. From constant work with Link's F8U-1 OFT, we have learned it can duplicate virtually every known situation that might occur in flight. This has enabled us to use the operational flight trainer as a major part of our flight training program. Advantages in using the OFT, in addition to the training afforded, are that it requires no fuel and provides complete safety for the pilot.

We embarked on our F8U training program by acquainting our pilots with basic flight problems. We found that once you get a pilot to fly this simulator—get him used to it and get him to like it—our training problems became relatively simple.

A pilot's first flight in the trainer is a simple familiarization hop. All of

CDR. G. C. BUHRER, VF-32 CO, BRIEFS PILOT

the switches, dials, levers, controls, etc., are shown and explained to him, and he then makes a short routine flight.

Then we start with a few minor emergencies and progress until we have covered all the known emergencies that might occur in the F8U. After six basic hops, the new pilot is proficient in coping with emergency situations. If he is able to handle the situations we simulated in the OFT, we feel that he can handle like situations in the air, and he flies a comprehensive "check" flight in the aircraft. He is then assigned a spot in the squadron tactical organization.

From here on in, the primary responsibility for making this pilot combat ready rests with his division leader. The new pilot now begins to fly the more complicated hops requiring teamwork and flight coordination in the OFT.

For this training we decided to use a modified version of the "buddy" system. This system is one where the division or section leader is trained along with his wingman. We found that this method of training makes for improved flight integrity. Each knows what the other is likely to do in an in-flight emergency since one man acts as leader and flies the assigned mission, while the other stands at the simulator console to monitor procedures and pilot proficiency. The buddy system provides an excellent means of teaching the more complex procedures of F8U-1 flight. It also provides a good check on adherence to squadron doctrine.

After the simulated mission in the trainer, a thorough debriefing is held by the pilot who was at the console. Included in this debriefing is a discussion of the mission as well as an explanation, point by point, of how the emergencies should have been handled, if there were any errors in procedures. The flight leader serves only as an observer and the actual console operator introduces all of the failures and malfunctions.

This method of training is more realistic than other methods currently being used. It also does a good deal towards instilling teamwork. It further allows the wingman, when the flight leader is in the cockpit, to see

INSTRUCTOR K. R. BERTKA MONITORS SIMULATOR DURING HOP

LTJG. L. C. WIGGINS 'FLIES' IN SIMULATED F8U-1 COCKPIT

TRAINING OFFICER PRAISES SIMULATOR ADAPTABILITY AS BOGEY TRACK IS PLOTTED

TECHNICIANS TEST TRAINER COMPONENT

the correct way to continue the mission under adverse conditions. By watching the step-by-step process of compensating for failures, he not only learns the correct procedure, but also discovers the mission can be successfully consummated under seemingly impossible conditions. This builds his confidence in the aircraft.

The first step, navigation, begins with a simulated instrument cross-country flight. We then progress into the more complicated aspects of instrument flight, incorporating these into a total of four hops. The last and most difficult flight requires the pilot to go to an alternate, execute holding patterns, miss approaches, execute GCA pickups, experience loss of some radio gear, and solve any number of other difficulties which might occur on an actual IFR cross-country flight. Throughout this phase, the flight leader is always present at the console to monitor flight procedures and voice calls.

Following the navigation phase, we use the trainer to introduce our pilots to combat techniques. This phase is kicked off by the flight leader's explaining the procedure and then demonstrating it in the simulator, giving a step-by-step description over the radio. The whole intercept is plotted by the big "bug" at the console. When the flight leader feels that his wingman has the idea and can do the intercept, their positions are reversed and the wingman tries one.

At the completion of the problem, the wingman climbs out of the trainer and comes back to the plot. There the entire hop is discussed and errors are corrected. As soon as the pilot becomes proficient in making intercepts, the failures begin making their appearances again. Soon the pilot becomes confident of his own ability. There are no specified number of hops to this phase. They continue until the leader is convinced his wingman can complete the mission under any circumstances.

At some point in this phase, failures are introduced to test the pilot's judgment. If he does the correct things, he is considered to be qualified. If he continues the hop, the flight leader points out that the mission cannot be completed. The failures introduced are usually of a serious nature and the flight leader's comments are realistically brought to the pilot's attention as the trainer becomes uncontrollable. To determine just how effective our pilot ground training has been, we follow up on simulator training by taking the pilots up in the F8U itself.

Were it not for the simulator, it would be necessary to fly two aircraft in order to train one pilot, the second craft active as chase plane and lookout. This is not only an expensive way to train, but it also does not afford the close surveillance which is possible using the simulator.

Based on the excellent results we have had with the F8U-1 trainer, I would encourage all training officers to make every possible use of any OFT's they may have available. The VF-32 training program, based on the capabilities of the OFT and built around the buddy system, has helped us considerably in accomplishing our aims—to train effectively, realistically, safely and to foster cooperation between our pilots, in effect, to have two Naval aviators fly as if they were one.

The whole philosophy of training devices really has proved effective. It has given the pilots the kind of experience they need before they fly a new aircraft operationally. Just turn the page and see us in action.

A VERY GOOD BEGINNING. . .

FIGHTER SQUADRON THIRTY-TWO MEN AND PLANES GET READY FOR PRE-DEPLOYMENT EXERCISES AND ORI ABOARD USS SARATOGA

. . . PAYS OFF ABOARD THE SARA

CRUSADERS ARE POSITIONED FOR STEAM CATAPULT LAUNCHING

OFFICERS PAY CLOSE ATTENTION TO BRIEFING IN READY ROOM

ANGLED DECK LEFT BEHIND, A SUPERSONIC SORTIE COMMENCES

MIRROR SYSTEM VIEW OF F8U-1 IN THE GROOVE READY TO LAND

It was a big moment when the powerful Crusaders were loaded aboard the mighty Saratoga. Fighter Squadron 32, the first Fleet unit to receive the supersonic fighter, went to sea to try the F8U in its natural environment. Familiarization training preceded the pre-deployment exercises and operational readiness inspection. The final hurdle to the F8U's first-line sea-duty came when the ORI team gave the operational go-ahead. CVA-60 and CVG-3 of which VF-32 is a part are now in the Mediterranean. The big attack carrier, the aircraft and the men are an effective fighting force.

VF-32 PILOTS DISCUSS DAY'S EXPERIENCES OVER COFFEE CUP

IN-TAKE DUCT COVERS PROVIDE PROTECTION FROM THE SALT AIR

PLANES PARKED ON BOW, SARA ENTERS PORT AFTER WEEK AT SEA

SKIPJACK IS LAUNCHED

USS SKIPJACK, the nuclear-powered submarine with aerodynamic features, has been launched by the Electric Boat Company at Groton, Conn.

Adm. Arleigh Burke, Chief of Naval Operations, was present for the ceremony in which the 250-foot, 3000-ton submarine was christened by Mrs. George M. Mahon, wife of Congressman Mahon of Texas.

The Admiral described *Skipjack* as "another advanced naval weapon." It will be a significant milestone in the history of submarine development, he said, for *Skipjack* brings together two prime advantages for the first time—*Nautilus* power plus the *Albacore* hull.

"The combination of nuclear propulsion and a streamlined hull of new design will give *Skipjack* the greatest submarine performance of any ship presently in the fleet. *Skipjack* will have unmatched speed, endurance and underwater maneuverability," said Adm. Burke.

According to a General Dynamics Corporation statement, an aviator would be at home on the atomic submarine. Her operator will be called a "pilot," her cruises will be logged as "flights" and the submarine itself will be referred to as the "flying A-sub."

Skipjack will be controlled by a "joy stick" and while performing "hydrobatics," the pilot, copilot and other operators will be fastened into their seats with safety belts. The submarine is equipped with an automatic pilot and her revolutionary shark-shaped hull form was tested in a wind tunnel by the NACA.

The new submarine's fast underwater speed (in excess of 20 knots) is attributed to its hull shape, efficient use of a single propeller and the placing of diving planes on the sail (previously called conning tower).

Automation will take over on the *Skipjack* and relieve her crew of 75 officers and men of much routine drudgery. Electronic and hydraulic slaves will replace men in watching motors, air conditioning, refrigeration and gas systems as well as the nuclear power plant.

Individual electronic zone air control regulators will keep the air fresh and pure. Through means of scrubbers, the air will be continuously purified and recirculated to all areas.

During the launching ceremony, Adm. Burke announced that two fleet atomic submarines, the *Seawolf* and *Skate*, had recently established new endurance marks for continuous submerged operations. Each stayed submerged longer than 30 days, the longest known period in which man has been exposed to an artificial atmosphere under actual rather than laboratory controlled conditions.

The Electric Boat Company yards ("where atomic subs have become conventional") built and launched the *Nautilus*. Currently under construction there are the first Fleet Ballistic Missile submarine, which will mount the *Polaris* ballistic missile; the USS *Triton*, world's largest submarine and the most advanced picket submarine for early warning and defense against enemy aircraft; and USS *Tullibee*, a smaller high performance nuclear submarine especially designed for combat against enemy subs.

Namesake of the USS *Skipjack* is a fierce, steel-blue game fish which inhabits large areas of the seas. It is a deep-water fish known for its speed, aggressiveness, skill and endurance.

New CIC Course Convenes

Senior Officers to be Trained

The first Advanced CIC (Operations) Course convenes July 14 at the U. S. Naval CIC School, Glynco, to provide training which will prepare senior officers (Cdr. and above) to evaluate the entire tactical situation from information provided by the Combat Information Center.

Subsequent classes will convene every 13 weeks. Fifteen officers will be enrolled in each class.

Covering four weeks, the school's curriculum includes an introductory session in which operational planning, electronic warfare, antisubmarine tactics, offensive operations, nuclear warfare, air defense and amphibious operations are reviewed.

The course then covers maneuvering formations and dispositions, practical application of CIC in past, present, and proposed fleet exercises, and is concluded with an eight-hour analysis.

Supplementary instruction, outside the normal 40-hour week of formal, training, includes thesis preparation, private study, and recognition.

Selected experts from the Atlantic and Pacific Fleets, as well as from the office of the Chief of Naval Operations, will lecture from time to time.

Unrestricted line officers (code 1100 and 1300) will be selected for admission by the Chief of Naval Personnel. Officers who are being chosen to attend the course will become operations officers, assistant operations officers or CIC officers on fleet staffs, including major carrier divisions, cruiser divisions, amphibious groups and destroyer flotillas; others will report as operations officers aboard carriers or cruisers.

Top secret clearance is now required.

SUB-HUNTER VERSION *of Lockheed's prop-jet Electra is shown as it will look when configured for fleet use. As the Navy's first turbine-powered ASW plane, it will be fitted with four Allison Model T56 engines developing a total of 16,200 hp at takeoff. The bulge beneath the fuselage accommodates radar installation and the plastic-cone-shaped tail extension houses "MAD" unit which locates submerged metallic objects by noting deviations in normal magnetic fields.*

CLIMB RECORDS ARE SHATTERED

FLYING a delta winged F4D-1 *Skyray*, Marine Corps Major E. N. LeFaivre brought home a lot of bacon recently as he bettered five official world climbing speed records at Pt. Mugu, California. Four of the world's records, held formerly by France, had been set 16 February 1957 in a French jet, the Nord 1405 Gerfaut 88.

In a series of spectacular near-perpendicular climbs from a standing start, the Douglas jet fighter reached its highest goal of 15,000 meters (49,213 feet) in 2 minutes 36.05 seconds. There was no existing official record for the 15,000-meters climb. International time-to-climb speed records bettered by the standard production model F4D *Skyray* were:

1. Climb to 3,000 meters (9,842½ feet)—44.39 seconds.
2. To 6,000 meters (19,685 feet)—1 minute 6.13 seconds.
3. To 9,000 meters (29,527½ feet)—1 minute 29.81 seconds.
4. To 12,000 meters (39,370 feet)—1 minute 51.23 seconds.

MAJ. E. N. LEFAIVRE, USMC, SET FIVE WORLD RECORDS IN F4D SKYRAY AT POINT MUGU

F4D HELD 70° CLIMB ANGLE DURING RUNS

The same flight also established National records for all altitudes up to 15,000 meters.

During its performances, described as "all out drag races to specified altitudes in which the pilot's only competitor was the clock," the F4D was powered on its rocket-like ascents by a single Pratt & Whitney J-57-P8 turbojet engine.

Maj LeFaivre, BUAER F4D Project Officer, said each flight was a realistic demonstration of the plane's primary mission—to climb from carrier decks to high altitudes and to intercept and shoot down enemy aircraft with guns or missiles on a moment's notice.

On takeoff from the Point Mugu airstrip, the pilot revved the engine to maximum power, released brakes, fired off the afterburner and once sufficient forward speed had been gained, pulled the *Skyray's* needle nose skyward into a steep 70 degree climb. The veteran Marine pilot reached vertical climb speeds of nearly 650 miles per hour and experienced G-loads up to 2½ times his own weight.

Special instrumentation, including radar tracking devices, was used to clock each flight under the jurisdiction of Bert Rhine and Dr. W. S. Dixon, official representatives of the National Aeronautic Association of Washington. The results of the flights will be submitted to the *Federation Aeronautique Internationale* in Paris by NAA for official acceptance and publishing as world records.

The *Skyray*, which has been operated by Navy and Marine Corps squadrons from carriers and land bases for more than two years, is also used by the North American Air Defense Command at strategic points on the nation's defense perimeter as an all-weather interceptor. It still holds the official world speed records set in 1953 of 752.9 miles per hour over the classic three-kilometer, low level, straightaway course, and 728.11 miles per hour, the 100-kilometer (62.1 miles) closed course record.

The F4D-1 has a normal weight of 20,000 pounds and develops 16,000 pounds of thrust with afterburner.

Shangri-La Aids Orphans

Milk and Clothes Distributed

The aircraft carrier *Shangri-La* has distributed to Korean orphanages more than a ton of clothing and enough powdered milk for 14,400 glasses. During the carrier's Far Eastern cruise, six more tons of clothing will be given to refugees in Hong Kong and orphans in the Philippines and Japan.

When the *Shangri-La* was in Yokosuka, Japan, it was learned that orphanages in Korea were in immediate need of aid for their children. The powdered milk and clothing were sent immediately to Japan.

Members of the *Shangri-La* crew and Carrier Air Group 11 donated money to buy food, and, with the help of San Diego and El Centro citizens, the clothing was collected.

The Christian Children's Fund Garden Orphanage, the Hip Wah Primary School, and American Missions Relief Association, all of Hong Kong, are among the organizations receiving assistance from the *Shangri-La*.

BELL AIRCRAFT CORPORATION

This is the 15th in a special series of feature stories on the companies which have built and are building aircraft for the aeronautical organization of the Navy.

MODEL 47G HOVERS OVER BELL HELICOPTER CORPORATION PLANT, FORT WORTH, TEXAS

LAWRENCE D. BELL, founder of Bell Aircraft Corporation, built his first airplane in 1910. It was a model of one he had seen at the country's first aviation meet in Long Beach, California, that year.

Two years later, working for Glenn Martin, he demonstrated his ingenuity. He helped convert a pusher-type plane into one of the world's first bombers for Pancho Villa, Mexico's revolutionary leader.

Bell stayed with Martin until he joined Consolidated Aircraft in 1928. When Consolidated (now Convair Division of General Dynamics) moved to the West Coast in 1935, Larry Bell stayed in Buffalo and started Bell Aircraft Corporation.

When the company set out to design the first all-Bell airplane, one maxim was employed: "Choose your firepower, then build an airplane around it." The result was the 300 mph *Airacuda*, armed with two 37 mm. cannons and four .50 caliber machine guns, all remotely controlled. The Army Air Force ordered a limited quantity. The next design, the P-39 *Airacobra*, a 400 mph speedster that

THE NAVY L-39-1 SWEPTWING KINGCOBRA

carried a 37 mm. cannon in the nose, was in mass production by 1939. The XFL-1, carrier version of the P-39 and built under a Navy contract, was delivered early in 1941.

The Army Air Force P-63 *Kingcobra*, a high-altitude fighter, went into action in 1944. The Navy ordered two, designated the L-39-1 and 2, and used the extreme sweptwing configuration for supersonic research. Bell provided about 13,000 P-39's and 63's in all.

During WW II the company built the nation's first jet-propelled aircraft, the P-59 *Airacomet*, and the XP-77, the first all-plywood fighter.

At the war's end, Lawrence Bell was determined to work on missiles, electronics and rockets. But meanwhile, to keep his core of engineers and technicians together, and support plant overhead, the company turned out motorized wheelbarrows.

Bell became famous as the producer of the rocket-powered X-1, which made the world's first supersonic piloted flight in 1947. Bell X-1A, a later model also rocket-powered, reached 90,000 feet and Mach 2.5 in 1953 and 1954. It has been reported that the Bell X-2, with a liquid-propellant rocket motor, had reached an altitude of 126,000 feet and had been flown at a speed in excess of Mach 3.1, higher and faster than any plane in history, before its fatal crash in September 1956.

AUTOMATIC CARRIER LANDING SYSTEM VAN

Following the successful development of a small jet-powered VTOL research aircraft, Bell was given an Air Force contract to develop the X-14, which uses the jet deflection technique. Unlike "tail-sitter" types, the X-14 which has been undergoing test flights allows the pilot to remain in normal sitting position during all stages of flight.

The Bell Automatic Carrier Landing System, developed under a BuShips contract, was announced in 1956. Combining radio and radar equipment with an electronic computer, it has been used for more than 1,200 completely automatic landings in all weather conditions by jet fighters, large transports and light planes at a number of airfields. In August 1957, an F3D *Skynight* successfully flight-tested the system aboard the training carrier *Antietam*.

Bell Aircraft Corporation is renowned in the rotary-wing field. The primary growth and development of the Bell helicopter falls within the eventful period from Pearl Harbor to Panmunjom. The worth of the versatile machine was proved during the Korean conflict and the growth of the industry has been phenomenal since.

HSL, HUL, HTL GET LAST PIECES OF EQUIPMENT ON BELL'S FINAL ASSEMBLY LINE

Bell's venture into rotary wing started in 1941. After two years' development work, an experimental Model 30 was flying in 1943. This craft was superseded in 1945 by the first of the Model 47 series. Production was started the next year.

On March 8, 1946, the original Model 47, after an intensive test program, was awarded License NC-1H by the Civil Aeronautics Administration, the first time a helicopter was permitted under Federal license to carry passengers for "hire or reward."

The 47 has been in continuous production in both military and civilian configurations. There have been eight commercial models, most of which have had corresponding military versions. For example, the Model 47B was delivered to the Navy in 1947 as the HTL-1. The 47D-1, stripped of many refinements to permit a greater payload, was the HTL-4, which the Marines used so extensively in Korea.

One of the latest helicopters built by Bell for the Navy is the HTL-6, a basic training version of the 47G. It is equipped with skid or flotation landing gear and hydraulic boost control, a form of power steering.

In 1956 the Navy took delivery of the HUL-1, a larger version of the HTL-6. Several kits including floats for over-water operations, night flying equipment, internal hoist, long range ferrying gear and internal litters, are available for use with the 220-hp utility helicopter. The HUL-1 was used in the Antarctic during *Deepfreeze III*.

This summer, Bell will deliver the first helicopter specifically designed by a manufacturer for student primary and instrument training to Ellyson Field. Designated the HTL-7, it features side-by-side seating of pilot and instructor in new safety seats inside a roomy two-place cabin. The HTL-7 is powered by a Lycoming VO-435 engine rated at 240 hp for takeoff and 200 hp for continuous operation.

Bell's first departure from the single-rotor configuration is the HSL-1, the first helicopter designed specifically for anti-submarine warfare. Each of the two rotors incorporates the basic Bell principles characterized by the rigid two-blade rotor and automatic stabilizing bar. Equipped with dipping sonar, the HSL-1 carries lightweight homing armament for ASW. The copter can also be used for minesweeping.

In 1951 plans were made for separation of Bell helicopter activities from Bell Aircraft Corporation. A $3,000,000 plant was constructed in the Fort Worth, Texas area. Since January 1, 1957 the Helicopter Division has operated as Bell Helicopter Corporation, with Harvey Gaylord as president.

HTL-4 PROVED ITS USEFULNESS IN KOREA

CONTRACTOR TESTS THE HTL-7 TRAINER

HSL-1 TOWS 300-TON FLOATING DERRICK

Production at Fort Worth is devoted mainly to new models of the Bell 47, and experimental work with various craft of advanced design. These include the XH-40 turbine-powered helicopter and the XV-3 convertiplane.

Bell Helicopter is project coordinator for rotary-wing applications of the Army-Navy Instrumentation Program. A flight simulator, using the contact analog display, has already been designed and built by Bell.

Lawrence D. Bell died in 1956, while serving as Chairman of the Board of the company he founded. He left behind the parent organization, under the leadership of Mr. Leston Faneuf, President, and five subsidiaries. The tradition of revolutionary aircraft experimentation for which Bell was noted, prevails.

SIKORSKY'S HSS-1N FLOWN

A HELICOPTER capable of day and night flight under instrument conditions, now in production at Sikorsky Aircraft Division of United Aircraft Corporation, has been publicly flown at NAS CORPUS CHRISTI by Jack Stultz, a Sikorsky engineering test pilot.

The new helicopter, the culmination of seven years of research and development by Sikorsky engineers and the U. S. Navy, is the HSS-1N. The single-engine craft is the latest Navy version of the familiar Sikorsky S-58 which is widely used both for military and commercial operations.

Its instrument flight capability is expected to give the HSS-1N an unprecedented potential, particularly for a military mission such as anti-submarine warfare which is expected to be vastly improved by the new helicopter.

Sikorsky and Navy officials described the HSS-1N as a "major break-through" in helicopter flying. "For many years there has been a general belief that helicopters would never be suited for instrument flight," M. E. Gluhareff, Sikorsky's engineering manager, said. "Intensive flight tests of development versions of the HSS-1N have refuted this belief. Naturally, we are extremely pleased with this development to date, for we have long held that the helicopter must have an instrument flight capability to realize its full potential."

A major step toward instrument flight for helicopters was development of automatic stabilization equipment (ASE) which has been in producttion since 1954. In simplest terms, ASE is an electronic system which relieves the pilot of the necessity of making constant adjustments in control of the helicopter. It is similar to the autopilot of fixed wing aircraft except that it operates during all flight conditions to improve the helicopter's handling qualities. Expressed in another way, ASE allows the pilot to monitor the helicopter's performance in a comparatively relaxed manner. Thus ASE has made possible the stability required for instrument flying.

A number of additions and improvements in the basic HSS helicopter have led to the HSS-1N. These changes are seen chiefly in (1) incorporation of new radars to measure ground speed and altitude accurately; (2) improved flight instrument and cockpit arrangement; (3) addition of automatic engine RPM controls, and (4) introduction of an automatic "hover coupler." With the coupler, which uses the radar to determine ground motion, it is possible for the pilot to place the helicopter on automatic control at 200 feet altitude and 80 knots airspeed and automatically to come to a zero ground speed hover at a 50-foot altitude over a preselected spot.

RAdm. R. E. Dixon, Chief of the Bureau of Aeronautics, noted the joint contribution of the Navy, Sikorsky and the instrument industries to the HSS-1N. He said the new aircraft represents "a milestone on the road to all-weather capability".

The HSS-1N represents the combined efforts of many instrumentation subcontractors. Major contributors were Hamilton Standard of Windsor Locks, Conn., on the engine governor; Lear, Inc., Grand Rapids, Mich. and Donner Scientific, Concord, California, on the automatic control components; Ryan Aeronautical, San Diego, California and Sanders Associates, Nashua, New Hampshire, on Doppler radar; Raytheon of Waltham, Massachusetts and Sylvania, Buffalo, New York, on radio altimetry, and Sperry Gyroscope, Great Neck, Long Island, New York, on navigation components.

The HSS-1N is in production at Sikorsky's Bridgeport, Conn., plant. Delivery date and squadron assignments have not yet been announced.

THE LARGEST *of the Forrestal-type carriers, USS Ranger, sits high and dry in drydock at the Norfolk Naval Shipyard. Size of men under rudder (left), and bow (right), give an indication of the size of the mighty carrier. In six-week yard period, her longest since commissioning in 1957, Ranger got new coating on her aviation fuel tanks to reduce the hazard of rust particles entering the aviation fuel system. In addition to other structural, electrical, piping and sheet-metal installations, several 'habitability' improvements were made. They included a new CPO quarters, improvements in berthing and messing, and a new cooling system in ready room for flight clothing.*

VA-72 HAWKS FLY SKYHAWKS

DONAHUE, AD3, *gives VA-72 pilot the signal for engine start at Gitmo prior to launching the Skyhawk on a target bombing mission.*

ORDNANCE CREW *loads bombs on A4D-1. During Gitmo deployment VA-72 dropped over 3500 of these 25-pound practice bombs on targets.*

THE HAWK was chosen as Fighter Squadron 72's insignia in 1946 and proved to be a forecast of events to come. Ten years later the squadron, redesignated VA-72, received the first fleet-delivered A4D-1 *Skyhawks*.

VA-72 participated in the Fleet Introduction Program for the *Skyhawk*. For the past year and a half, it has served as a field training unit for selected Navy and Marine pilots from other squadrons throughout the fleet. They are integrated into the "fam" syllabus, given ground lectures, demonstrations of various components, and the first series of hops in the A4D-1.

In May of 1957, VA-72 qualified in both day and night carrier landings aboard USS *Saratoga* preliminary to their participation in the presidential cruise aboard CVA-60 on 9-10 June of that year. The pilots demonstrated for the President, Secretary of State, Secretary of Defense and other dignitaries the Navy's capability of low altitude weapons delivery. Afterwards, Secretary Wilson visited the ready room and discussed the great potential of the *Skyhawk*.

Late last summer, the present skipper, Cdr. C. R. Ruiz, took command and shortly thereafter the squadron moved to NAS OCEANA. Since that time there has been almost a 75% turnover in pilot personnel. An intensive training program was culminated by a very successful five-week deployment at Leeward Point Field, Guantanamo Bay, Cuba. While there the aviators gained experience in performing the "idiot loop" maneuver. Bombing deliveries included low and medium angle loft, over-the shoulder, high and low altitude dive. Over 3500 practice bombs were dropped on the target.

Constant practice developed a high degree of proficiency in the pilots. Line and ordnance crews functioned smoothly; efficient maintenance men readied the planes for the next hop with a minimum of ground time. With such teamwork VA-72 chalked up 655 flight hours in one month.

The A4D-2 was delivered shortly after the squadron returned to NAS OCEANA. The symbolic hawk seems to hold his head a little higher.

SKIPPER BRIEFS *pilots before hop. Cdr. Ruiz, second from left, passes the word to Ltjg. Cooper, LCdr. Gardner, Ens. Feltham.*

MCCLARON, AD1, *watches as pilots Ltjg. Fitch, Ens. Gravagna, Ltjg. Moss and Jaeger sign the important "yellow sheet" for aircraft.*

SUB HUNTERS ON THE PROWL

THE HUNTER—THIS CLOSE-UP OF THE S2F TRACKER SHOWS RADOME AND STINGER, EYES AND EARS OF THE PLANE, IN EXTENDED POSITION

SUBMARINE sighted off Long Island. Mission—find the sub and sink it!"

The word is passed in the VS-752 ready room. The briefing officer tells the tense pilots to open the confidential packets and familiarize themselves with code names, identification signals, radio frequencies and ordnance procedures. As they ask questions about the deadly mission, the pilots and crewmen check their survival gear and personal flight equipment. They slip into rubber immersion suits for protection from the cold water should an emergency cause them to ditch.

On the flight line S2F *Trackers* are turning up. Special radar equipment and electronic searching devices have been carefully checked. Homing torpedoes, depth bombs and sonobuoys are in place, ready for action.

One by one the S2F's take off. As soon as altitude is reached, a round inverted dome lets down from the underside of the plane, and a long boom slides out from the tail. These are the supersensitive eyes and ears of the *Tracker*. The radome that bulges from the belly of the fuselage scans the water for snorkels and periscopes that might break the surface. The stinger aft detects the presence of completely submerged submarines.

THE HUNTED—USS TIRANTE ASSUMES THE ROLE OF AN ENEMY SUBMARINE FOR VS-752

The search starts! Sonobuoys are dropped in a ring around the suspected area. Back and forth the planes fly using all the electronic equipment aboard to find the target.

A contact is made! Special instruments determine the bogie's probable course and speed, and the best pattern for dropping the homing torpedoes is calculated. Within seconds of the contact, it's "bombs away."

Anxiously the plane circles, the men seeking tell-tale evidence that will prove the torpedo has found its target. An air bubble reaches the surface. It's a hit! Mission accomplished, the aircraft return to base.

This drama is enacted regularly by the men of Anti-Submarine Squadron 752, attached to NARTU LAKEHURST. The training is not a half-hearted effort toward a simulated war game. Only the use of practice homing torpedoes keeps it from being the real thing for the crews of the target subs that operate with the squadron.

VS-752 is skippered by Cdr. C. L. Moutonet. During the week, he is a business man in a neighboring Jersey community. On drill weekends, he's the commanding officer of a crack military outfit. The squadron musters early Saturday morning. Instructions for the weekend duties are given and the crews assigned to their flights.

At the end of the muster the first flight crews report to the ready room to get the full details on the mission they are to fly. For example, the briefing officer tells them that USS *Tirante* (SS-420) is operating off the coast of Long Island. The sector can range in size from 10 to 100 square miles. Regardless of the area, the job is the same—find the sub and drop practice homing torpedoes on it.

THE TASK won't be easy. The submarine skipper is going to use every tactic in the book to evade detection. Not being located means as much to his men as finding him means to VS-752. If a hit is scored by the squadron, the submarine fires an air bubble through the torpedo tubes. If a torpedo is dropped and misses, the boat stays submerged and the aircrew starts all over again.

To keep the aircraft ready at all times for all missions, each crew member must be a specialist. The electronics technicians are responsible for the operation and maintenance of the complex searching gear. The ordnancemen are experts on the torpedoes and depth bombs; mechs keep the engines in top working condition.

The *Trackers* are specialists, too. They are built for the Navy by Grumman Aircraft Corporation to do one highly important job—trackdown and destroy enemy submarines. The S2F is a combination flying electronics lab and ammunition depot. Built for

PRACTICE TYPE DEPTH BOMB IS INSTALLED

carrier operation, the twin-engine plane is no speed demon. It was designed for hours of steady work with the radome and MAD stinger in extended position at a speed of less than 150 knots. When the equipment is retracted, the drag created by the slipstream passing over the surfaces of the searching devices is reduced, and the aircraft is capable of much higher speeds. The crew consists of pilot, co-pilot and two enlisted to operate electronic gear.

Reports in the past few weeks of unidentified submarine activity off the Atlantic Coast have made the American public aware of a potential underwater threat. For a long time, the Navy has been taking effective steps to counteract this menace. One of its principal roles in the defense of the nation is anti-submarine warfare. Part of this responsibility has been assigned to the Weekend Warriors of the Naval Air Reserve.

NARTU LAKEHURST's primary mission is ASW training. In the event of another national emergency, squadrons like VS-752 will be activated immediately to patrol up and

SONOBUOY IS LOADED ABOARD THE TRACKER

down the East Coast seeking and destroying enemy subs. The precision with which they carry out their task may well decide the face of many cities.

For this reason, every effort is now being made to guarantee that all taxpayers get full value for each dollar spent for national security.

PILOTS AND CREWMEN OF RESERVE VS-752 AT NARTU LAKEHURST MAN THEIR PLANES FOR A DEADLY SERIOUS SEARCH EXERCISE

NOTES ON NAVAL AIR RESERVE

CAMP FIRE GIRLS *assist Cdr. Dallas in making the final arrangements for VR-773's cruise.*

WARRANT OFFICER *E. G. Morris presents the clothing to children in Moroccan orphanage.*

VR-773 Takes Moroccan Cruise

Good will was combined with training when Los Alamitos-based Reserve Transport Squadron 773 spent its two-weeks active duty period at Port Lyautey, North Africa. As part of a national Meet the People program, the Camp Fire Girls of Long Beach, Calif. collected ten large cartons of clothing for the needy children of Mediterranean countries. VR-733, under the command of Cdr. Nicholas Dallas, volunteered to deliver the contributions.

While based in Morocco, VR-773 joined up with a regular Navy Fleet Tactical Support Squadron and helped with the task of flying supplies to U.S. Navy forces throughout the area.

VF-879 Trains Away From Home

For the first time since the transition from propellers to jets four years ago, Fighter Squadron 879 spent its annual 14-day training period away from NAS Oakland, its home base.

The *Banshee* squadron, commanded by Cdr. F. J. Friedenbach, went through a heavy training program at NAS North Island, which included 40 hours flight time per pilot, and practice in the latest fleet tactics. VF-879 also did instrument and night flying; strafing and gunnery; radar intercepts and navigation. There were 25 officers and 38 men on the cruise.

VF-879's LCDR. *Dean Thomas explains functions of F2H tail section at North Island.*

TWINS? NO! *Strickland and Cox of Oakland's VF-872 have same rate, age, height, schools.*

BLUE ANGEL TIGERS *temporarily take a back seat while a ZS2G-1 from NAS Glynco performs during the NARTU Jax air show that climaxed the Naval-Marine Air Reserve Week. Mayor Haydon Burns, by proclamation, asked the people of Jacksonville to salute the Weekend Warriors who have contributed so greatly to the national defense.*

TORNADO FUNNEL *hovering a short distance west of NAS Denver made a dramatic subject for alert Harold W. Oehlert, PH3, attached to ship's company. A short time after the picture was snapped it disappeared into the dark overcast. The photograph received extensive coverage through the wire services and television.*

Improved Tracker Ordered

$11,642,557 Contract is Awarded

An $11,642,557 contract has been awarded to Grumman Aircraft Corporation for the production of S2F-3 *Tracker* airplanes. The S2F-3 will be an improved version of the operational, carrier-based S2F-1, which was designed specifically for ASW missions.

Replenishment Mark is Set

Shangri-La and Graffias Take Part

The carrier *Shangri-La* and store ship *Graffias* have set a new fleet replenishment record, Commander Naval Air Force Pacific Fleet reports.

The two ships, both holders of the Battle Efficiency "E" awards, transferred 117 tons of provisions from the supply ship to the carrier in 31 minutes.

No attempt to surpass the record was considered when the operation began, since new, untried transfer methods were being used. The record transfer was at the rate of 226.4 tons per hour, topping the old fleet record of 218 tons per hour claimed by the *Shangri-La* and the *Vega* last year.

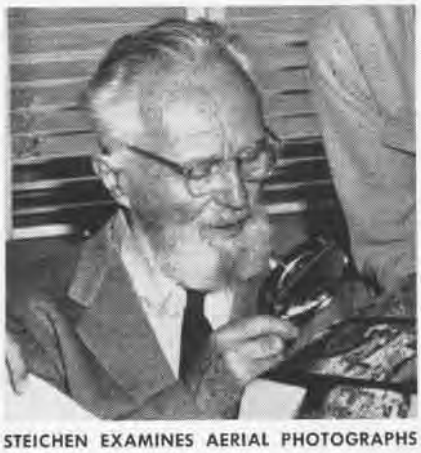
During the operation, newly developed flat-bed dollies were initiated for use in the carrier's hangar deck.

RAdm. L. B. Southerland, ComCarDiv-7 praised the men of both ships for their fine work and efficient handling of provisions in the record operation.

Steichen Visits Photo Lab

Surveys Photographic Lab Methods

Edward Steichen, world famous photographer, paid a visit to the Navy's Fleet Air Photographic Laboratory, Barber's Point, Hawaii. He was brought up to date on the methods of providing photographic services to Navy ships and air squadrons.



STEICHEN EXAMINES AERIAL PHOTOGRAPHS

The recognized Dean of Photographers held a Navy Captain's commission during WW II and directed the efforts of some 4000 photographers.

This was the first visit Capt. Steichen had made to Hawaii since the war. While there he was the house guest of Adm. Felix B. Stump, Commander in Chief, Pacific.

Steichen is now associated with the Museum of Modern Art, N. Y. He and his assistants scanned 2,000,000 photographs to produce "The Family of Man" seen thus far by five million.

RUBBER 'INFLATOPLANE' *being tested in joint Navy-Army project is put through paces by Goodyear Aircraft Corporation test pilot Dick Ulm. When collapsed, craft may be contained in trunk-size carton. Forty-two hp engine gives top speed of 70 mph; maximum operating altitude of 10,000 feet. Internal air pressure which shapes fuselage and wings measures seven psi after full inflation. The aluminum hydro-ski shown is attached to main landing gear.*

An Unusual Reenlistment?

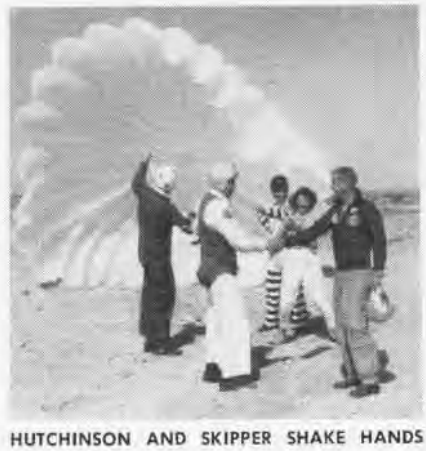
Chief, CO Jump to Ceremony Scene

Sailors have shipped over at the South Pole, aboard submarines, and under a variety of environments, but the feat of Chief Parachute Rigger D. T. Hutchinson bids fair to cop the title "most unusual."

Hutchinson, with 176 jumps to his credit, asked permission to be reenlisted immediately after parachuting to earth at Mount Signal, the Navy's live jump area near El Centro, Calif. Further, he talked his commanding officer into making his *first* parachute jump in order to arrive on the scene in a manner befitting Hutchinson's request.

Cdr. H. R. Fehr, on hand with the shipping articles to ship the chief over for another six years, said he enjoyed his jump and he intends to keep his men jumping.

Hutchinson's most recent duty assignments have been at the Parachute Rigger's School at Lakehurst and with VA-55, based at Miramar Air Station.



HUTCHINSON AND SKIPPER SHAKE HANDS

THE AVIATOR'S NEW FRIEND

THANKS TO the wonders of science, personnel and billet handling in the Navy will soon be so modernized that most of the guesswork will be removed. On 1 March 1959, the Navy Manpower Information System (NMIS) will be ready to put the right man in the right job at the right time. One of the biggest advantages of the new set-up is that each person will receive more individualized attention than was ever possible under the former, often cumbersome, method.

It's all done with electronics. The IBM 705, Model II, Electronic Data Processing Machine in the Bureau of Naval Personnel serves as the heart of the NMIS. This data processing center will be linked to IBM 650-equipped field installations in Norfolk, San Diego and Pensacola by the data transceiver network. Information on active duty personnel of the Atlantic Fleet, Pacific Fleet and continental shore activities respectively can be exchanged with BUPERS on telephone lines connected to transceivers.

Here's how the system will work. There will be master magnetic tape records in BUPERS on all active duty personnel. At the same time, complements, allowances, manpower requirements and allocation plans for all naval activities will be mechanically recorded. The IBM 705 will be able to coordinate the individual with the billet need with amazing speed, accuracy and timeliness.

For today's Navy, it is imperative that complex and expensive machinery like the F8U, the A3D and the WV-2 be manned and maintained by highly qualified people. Human life and the taxpayer's money are valuable commodities that should not be needlessly risked. Therefore, it is not enough merely to manipulate the 650,000 bodies on active duty; there must be a maximum of accurate and accessible material on each individual.

Processing the fantastic masses of data has proved almost impossible with manual methods, even combined with the present punch card system. Through circumstances completely beyond control, it's been easy to lose sight of an essential man. But with the 705, it will literally be impossible for one person to disappear under a mass of paper work. If he's needed, his number will come up, and all eyes will be focussed on his attributes.

In June 1955, the Secretary of the Navy directed Navy-wide action to explore the advantages of electronic data processing. A plan for the NMIS was approved by the Chief of Naval Personnel one year later. Since that time people from the Fleet, who have the straight operational know-how, have adapted it to Navy problems.

The progress in implementing this large-scale scheme has been fast. Last September, there was a try-out of the system which applied to all lieutenant aviators. Bugs were ironed out, lessons learned and improvements made to such an extent that it will be possible for NMIS to operate in record time.

Here's how some of the specifics will apply to 13xx type officers. Until last summer, each officer was supposed to submit annually, and at any other pertinent time, a NAVPERS form fondly known as the Officer Data Card. This entailed enumerating all previous duty stations, all schooling, all flight time.

It proved to be a wearisome chore. In some cases, flight time was merely estimated, entire billets dropped, and inaccuracies in personnel data existed. Since there was no official, up-to-date record in BUPERS, the assignment officer had to rely heavily on the information relayed from the individual. In filling the cockpit of an F8U, the back seat of an F4H or manning a carrier CIC room, guess work should be eliminated.

CAPT. N. C. GILLETTE, *Jr., left, receives best wishes of his instructor, Lt. C. I. Porter before making first helicopter solo hop. The captain took helicopter training before assuming command of USS Thetis Bay, CVHA-1.*

The magnetic tape can do this. The master record on each officer will consist of verified facts. Thus, flight time figures will be compared with OPNAV reports and any discrepancies ironed out before being recorded; each duty station, Navy school and billet qualification will be similarly checked. Moreover, these basic entries will continue to be updated from official sources. All the officer need ever supply is his duty preference.

The assignment officer, armed with definite manpower requirements and detailed manpower information, will be able to plan far in advance and, most important, will be able to concentrate on the individuals that fit the billet. By figuratively pushing one button, he will know 16 to 18 months in advance that in January 1960 the *Forrestal* will need two 13xx lieutenants CIC-trained; by pushing another, he will have a list of qualified lieutenants available for rotation around that date. From this list, he will make his selection, and he will also have ample time to arrange schooling for those officers who might need a CIC tour career-wise.

There are other benefits. Officers should have definite word on their next duty station six months before detachment. Furthermore, since there will be a constant exchange of information between BUPERS and each Fleet, a man will know his ultimate assignment at the time he is ordered to ComNavAirLant or Pac for transfer.

The 'eternal triangle' of detailing—the needs of the service, the career needs of the individual, his duty preferences—will still exist. However, by virtue of machine processing, each factor will receive far more efficient consideration.

No machine has made, or ever will make a decision concerning a Navy man. The NMIS is designed to help personnel planners, assignment officers and administrators to make better decisions because more precise data about each person's qualifications and preferences are available.

Trans-Atlantic Ferry Flight

Operation 'Pipe Line' Successful

A successful ferry flight of eight Navy single jet fighters across the Atlantic from NAS NORFOLK Virginia to NAS PORT LYAUTEY, Africa was flown by eight aircraft and 12 pilots. The flight, dubbed *Operation Pipe Line*, was a rapid replenishment exercise of ferrying planes from the United States to aircraft carriers operating with the Sixth Fleet in the Med.

To carry out the operation, Detachment Alpha of VF-61 was formed at NAS Oceana, with Cdr. Allard G. Russell as Officer-in-Charge. The detachment was composed of eight aircraft and 12 pilots: Four F3H *Demon* jets and seven pilots from the *Jolly Roger* Fighter Squadron 61; four F8U *Crusader* jets and two pilots from VF-174; based at NAS JACKSONVILLE, and two pilots from VX-3, NAS ATLANTIC CITY.

The eight fighters plus an R6D *Liftmaster* carrying maintenance personnel made the trip in seven days, travelling a route that included NAS BRUNSWICK, Me.; NS ARGENTIA, Newfoundland; NAF LAJES, Azores; NAS PORT LYAUTEY, North Africa, and thence to the *Saratoga*. Weather caused a two-day delay at Brunswick, and two aircraft were held up at the Azores, but continued on after repair.

During the 1300 miles trip to the Azores, the fighters were refueled in the air by four AJ tanker planes of VAH-7, based at NAS SANFORD, Fla.

Forced Landing Saves Boy

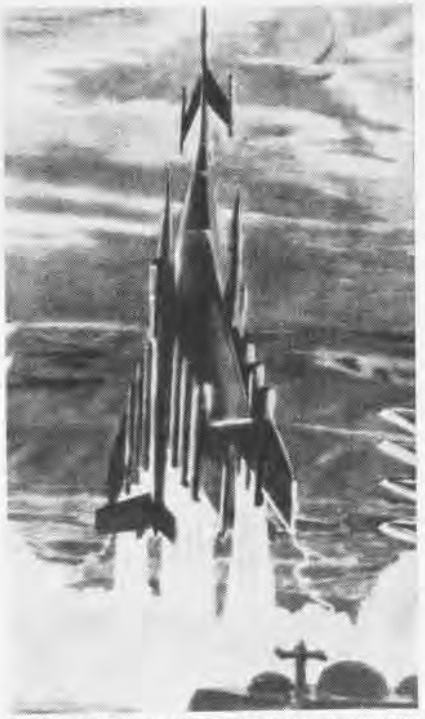
Nickel is Dislodged from Throat

The jolt and excitement which accompanied an emergency helicopter landing was credited with saving a child's life in California.

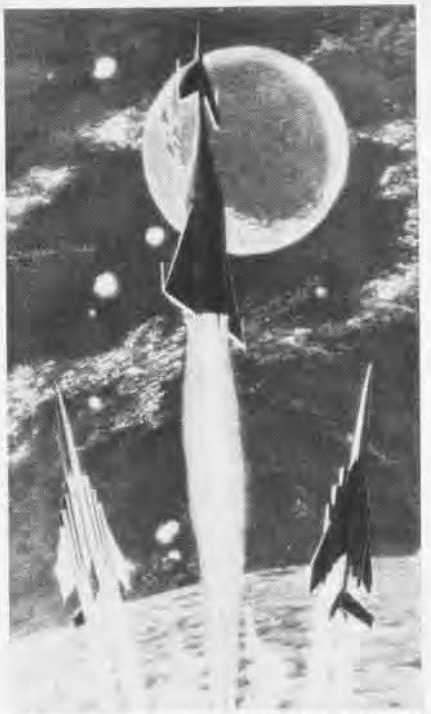
An HR2S helicopter of HMR-462 was flying Frank Couch, 2, from Twenty-nine Palms to Riverside, where a five-cent piece could be removed from his throat, when the pilot experienced engine failure at an altitude of 800 feet. He was able to land the helicopter with partial power.

The operations officer at Twenty-Nine Palms saw the helicopter in distress and dispatched an ambulance.

In the excitement of landing and being transferred from the helicopter to the ambulance, the coin, which was choking the child, became dislodged.



USSR ARTISTS SHOW NEW LOOK IN PLANES



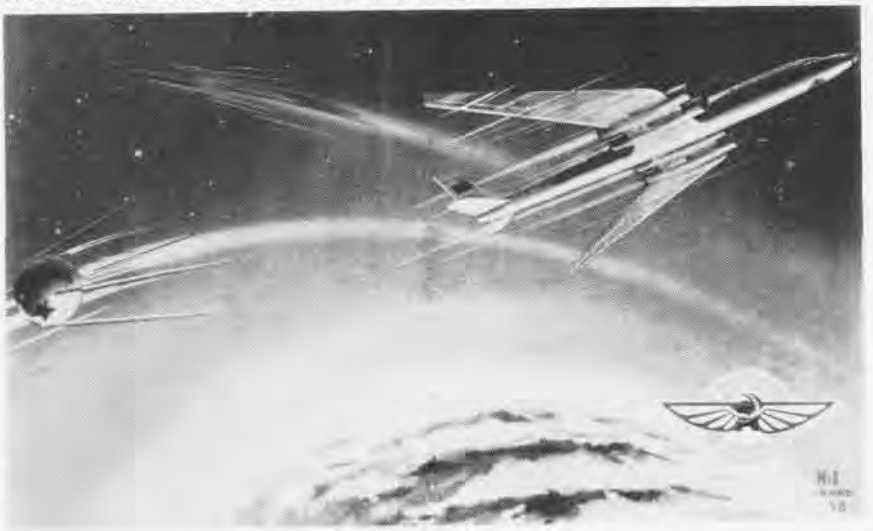
ONE ROCKET LAUNCHES TWO BIG BOMBERS

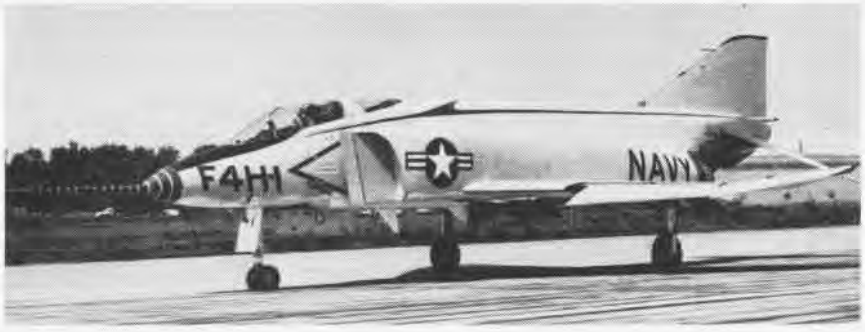
ARTISTS PORTRAY AIRCRAFT

THESE PICTURES in recent Soviet magazines give an indication of future designs that we may expect to see. Two six-engine bomber type aircraft are shown taking off with the boost of a single rocket. Such a method of launching two airplanes at the same time allows bombers to reach altitude with the smallest expenditure of fuel possible. The pictures indicate that such aircraft will be expected to operate at extremely high altitude at high rates of speed.

With its sharply swept wings, the jet transport shown below represents a distinct advance over existing types. Soviets have not displayed large four-jet transports comparable to the Boeing 707, and such an aircraft could meet their need for high speed transports.

SPUTNIKS AND FUTURE PLANE APPEAR ON FIRST 1958 ISSUE OF AVIATION MAGAZINE





LATEST NAVY JET, *the McDonnell F4H–1 taxies out (top) prior to first flight at Lambert-St. Louis Municipal Airport. Designed to fly at speeds better than twice the speed of sound, the two-place, carrier-based interceptor is powered by two GE J–79 jet engines. The new F4H features a 45-degree sweptback wing and a horizontal tail that slopes downward at 23 degrees to provide for superior handling characteristics at all speeds. The plane is 56 feet long with a wingspan of 38 feet 5 inches. Capable of all-weather operations, it will, company officials say, carry improved missiles and is rigged for conventional or nuclear bomb delivery.*

MAD MANUAL IS REVISED

The Aviation Training Division of the Office of CNO has published a Confidential manual entitled *Magnetic Airborne Detection* (Nav Aer 00-80T-55). It supersedes Nav Aer 00-80T-55 dated 1954 and includes the latest word on submarine MAD procedures and techniques.

By the year 1941, the airplane had proved itself as a powerful weapon for antisubmarine search and attack. This was true even with no detection means other than visual sighting, and with no ordnance other than conventional bombs and depth-charges. Radar extended the efficiency of search operations for surface U-boats, particularly during periods of low visibility and darkness, but no means existed for "seeing" a submarine from aircraft. The Navy therefore supported an extensive program of research to develop a reliable airborne detector sensitive enough to locate submarines positively at operationally useful ranges.

A submerged submarine can be detected in a number of ways by taking advantage of the fact that the submarine alters the normal properties of its environment. The submarine presents a reflecting surface to an acoustic beam; it distorts a flow of electric current; it changes the composition of the sea water; and it acts as a source of acoustic, electric and magnetic fields. Many of these effects have been used in the development of shipborne detectors or droppable detectors for use with aircraft.

However, only the magnetic field of the submarine is unaffected by the presence or absence of sea water between the hull and the point of measurement; therefore the use of this field provided one approach to the problem of detecting submerged submarines.

Research led to the production of several types of magnetic detectors for installation in aircraft. The first production model was designated MK IV-B2. Two of the early detectors were developed by the National Defense Research Committee; the Naval Ordnance Laboratory developed two others.

Operational use of MAD during WW II was limited since MAD was available in quantity only during the latter stages of the war. Nevertheless, many LTA and HTA patrols were flown with MAD aboard. Significant use of the gear was made in the establishment by PBY aircraft of a barrier at the Straits of Gibraltar during 1944. Several submarines were sunk as a result of initial MAD contact.

After WW II, development of MAD equipment, though reduced considerably, did continue. With the outbreak of the conflict in Korea, program activity was expedited so that MAD installations were available to fleet squadrons for operational use. More advanced systems are being developed.

The 1958 MAD manual is being distributed through the normal channels. Navy activities may obtain additional copies by submitting requests to the nearest supply point listed below, on form NavAer-140: NASD Philadelphia, NAS Alameda, Jacksonville, Norfolk, San Diego, Seattle or ASD, Naval Supply Center at Guam.

Argentinians at Brunswick

Trained in Maintaining Neptunes

Two officers and 11 petty officers of the Argentine Navy are taking three months of training in maintenance of the P2V-5F *Neptune* patrol bomber at NAS Brunswick, Maine. The Argentine Navy plans to purchase a number of the *Neptunes*.

All the men are top-notch technicians and engineers and upon their return to Argentina they in turn will instruct their shipmates in the maintenance of the P2V.

Two flight crews from Argentina took preliminary flight training in the P2V at NAS Corpus Christi, and then reported to VP-26 to continue advanced training. These men will also act as instructors when they go home.

RATCC 13

AIR TRAFFIC CENTER INCREASES SAFETY

ON DARK RAINY nights in the Patuxent area, a pilot likes to hear, "This is Patuxent RATCC. Can we be of assistance to you?"

In a darkened room workers, silhouetted by light from radar scopes and blue bulbs, guide a *Demon*, or search for an overdue aircraft, and check clearance on a *Crusader*.

RATCC (pronounced rat-see) is becoming a familiar word as such installations open up at Naval air stations. Radar Air Traffic Control 13 is the nerve center of flight operations at Naval Air Test Center, Patuxent River. It encompasses all air control facilities and personnel in one coordinated unit under the direction of Cdr. L. G. Norton.

The center consists of the former approach control, departure control and ground control approach (GCA) unit 13. Dating back to 1949, GCA #13 and now RATCC 13, has conducted more than 86,200 precision final approaches.

Since its commissioning 1 October 1957, RATCC-13 has saved at least 26 military aircraft in distress. In this short time, the Radar Center has paid for itself more than ten times over.

RATCC-13 is not confined to the Operations Tower, but has facilities at various locations on the station. Over 1000 yards from the tower is Red Hill, site of "Tipsy Dog" (AN/TPS-1D) medium range radar.

A portable unit about 1600 yards from Operations houses a ground control approach component with ranges of 12 miles on precision radar and 40 miles on search and rescue scanning. Near the GCA Unit is a short range component. Transmitters receive pulses from the radar sites and relay them to the control center by video cables. From the control center in the tower, assistance may be given aircraft from distances of 175 miles to final runway touchdown in near zero-zero weather conditions.

To operate and maintain RATCC-13 there are aircontrolmen and technicians, four officers, and two civilians. The technicians are supervised by the unit's maintenance officer, LCdr. F. W. Pollock. The division's Leading Chief is Chief Aircontrolman Wayne Nash.

Twenty-four hours a day, men of RATCC operate scopes and maintain equipment to keep planes throughout the Patuxent River area flying safely.

'TIPSY DOG' IS A MEDIUM RANGE RADAR

LEADING CHIEF WAYNE NASH AT LEFT ACTS AS SUPERVISOR DURING FLIGHT OPERATIONS

PRECISION RADAR SCOPE IS ADJUSTED

A MEMBER *of Air Development Squadron Six's parachute rescue team jumps from a ski-rigged single-engine Otter aircraft in the Antarctic (left) and comes to a safe landing at Ross Island (right). The team has accompanied VX–6 planes to the Antarctic during each of the first three phases of Operation Deep Freeze. Its mission is to drop to the site of a crashed plane in rugged terrain, where landing another aircraft or reaching survivors of the crash by surface vehicle would be impossible. Para-rescuers received training in New England before the operation began in 1955, but to date no jump rescues have been required. VX–6 is based at NAS Quonset Point.*

AF General Flies in A3D

Flight Made from USS Forrestal

Air Force Lt. Gen. G. W. Mundy rode a twin jet A3D Navy bomber from catapult to arrested landing aboard the carrier USS *Forrestal* when students of the Industrial College of the Armed Forces were treated to a demonstration of the Navy's air striking power off the Florida coast.

Heavy Attack Squadron Five, "the Savage Sons of Sanford," provided the *Skywarrior* in which the general flew.

100 Transosondes Launched

Balloons Transmit Weather Data

Navy meteorologists operating from the MCAF Iwakuni, Japan, have released the 100th Transosonde balloon since June 1957.

Purpose of the Transosonde (trans-ocean-sounding-device) balloons is the transmission of weather data. The balloons relay daily weather information which is vital for surface and air operations, especially in the Pacific. The balloon's mission aloft is to determine, with radar devices, the atmospheric pressure, interior temperature of the gondola, wind directions and wind velocity.

Fifty-five feet long, 40 feet in diameter and weighing only 60 pounds, each balloon is filled with 11,500 cubic feet of helium. The helium expands to 27,000 cubic feet by the time the balloon reaches its desired flying altitude of 30,000 feet. Balloons follow the west-to-east jet stream across the Pacific.

The 11-man team works under the direction of Ltjg. Richard C. Husted.

Forty Years in the Navy

Chief Hitesman Reenlists Again

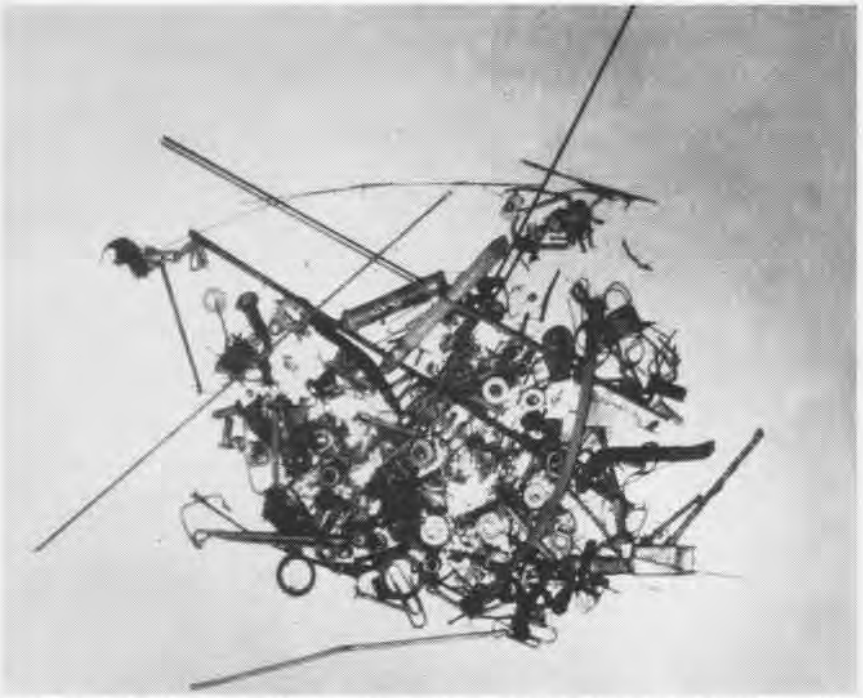
A Navy enlisted man who began his military career during WW I aboard the battleship *Virginia* has been awarded his 10th Good Conduct Medal.

He is Chief Aviation Machinist's Mate William Hitesman, leading chief with VA-55 at NAS Miramar.

On active duty since 1918, Chief Hitesman recently enlisted for another six years, saying, "If they still want me when this hitch is up in 1963, I'll surely sign up for another six years."

EMERGENCY WATER LANDINGS *have been proved feasible for the HUS-1 in water landing tests made by Marine Air Group 36, stationed at MCAS El Toro, California. Col. R. J. Johnson, commanding officer of MAG-36, became the first West Coast helicopter pilot to make such a landing with the pontoon-equipped "Hussy." At right, the colonel sets the "Hussy" down on Lake O'Neill at Camp Pendleton. First Lt. R. A. Bruton, flying with Col. Johnson, made the second landing (left). This modified HUS-1 permits landing at sea in emergencies and may also be used in rescue and search missions. The HUS-1A can land on relatively rough water and may be towed by surface craft at sea.*

FOREIGN OBJECT DAMAGE



'FOREIGN OBJECTS'—NOTE PAPER CLIPS—WERE PICKED UP FROM ONE PARKING AREA

EVER SINCE the military establishment began shifting from props to jets, airplanes have suffered a peculiar brand of indigestion called FOD or Foreign Object Damage.

Engines designed to breathe air have had to swallow nuts, bolts, paper clips, pencils, pebbles, cotter pins, springs, and a variety of small and large objects dropped or blown onto airstrips and either sucked into the jets' intakes or blown there by the props of conventional aircraft.

The result has been mid-air explosions, flameouts, aborted flights, fires on the ground and in the air, and excessive maintenance. The cost has been reliably estimated by the various services to be in the million-dollars-per-year category. Cost sheets on file in the headquarters of ComNavAirLant alone show overhaul and repair damage ranging from a 2.6 percent low to a 36 percent high on seven types of gas turbine engines, which could be attributed directly to FOD.

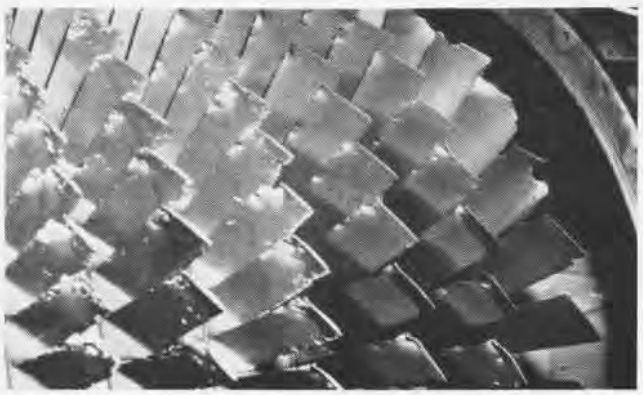
The problem has become more acute as lighter, more fragile working parts have been installed in late-model jet engines to cut down weight and increase the planes' performance.

Campaigns have been, and will continue to be, waged to make all hands aware of the consequence of littering the deck with trash, but the problem cannot be solved completely by such an approach. Some foreign objects are blown onto the strip by the wind.

A major solution to the FOD headache is the introduction at Naval Air Stations in the near future of Fruehauf Cole-Vac airfield vacuum cleaner equipment. Developed under an Air Force contract, one of these machines sweeps a million square feet per hour.

During recent acceptance tests of the Cole-Vac, an array of rivets, washers, bolts, nuts, screws, sheet stock, rocks and nails was laid out in the path of the sweeper. When the machine was driven at 15 mph, no trash remained in its path. At 29 mph, only 4.4 percent remained.

A smaller version of the same equipment is under development. When perfected, it will be used to sweep restricted areas, such as parking mats.



DAMAGE TO SKYHAWK ENGINE WAS CAUSED BY FOREIGN OBJECTS

FRUEHAUF COLE-VAC SWEEPER IN ACTION AT AN AIR FORCE BASE

LETTERS

SIRS:

To while away some of the non-flying hours during a recent 19-day operating period aboard the U.S.S. *Hornet*, the pilots of VA–214, the first F3H–2B squadron, revived one of the aviator's perennial conundrums, and also hassled a new one. The arguments grew so heated and the wagers so numerous, that an expert was sought to settle the issues. Fortunately, the *Hornet's* Commanding Officer, Capt. Thomas F. Connolly, USN, is not only a distinguished naval aviator and experienced test pilot but co-author of a text on aeroplane aerodynamics and a former Director of Test Pilot Training at Patuxent River. He agreed to present the answers in a ready room chalk talk. The audience ran the scheduled 50-minute talk 90 minutes.

The questions: (a) The old fledgling teether —What happens to a plane flying 100 knots into a 100 knot wind if the wind suddenly stops? (b) A jet-age type—Wind is calm at the surface gradually increasing to 100 knots from the West at 30,000 feet. Two identical planes take off simultaneously from the same field in opposite directions and fly the same IAS climb schedule, plane E headed East, plane W, West. Which will reach 30,000 first, or will they arrive simultaneously?

Even after Capt. Connolly's masterful and comprehensive explanation, the pilots split nine to six on their final opinions and the arguments rage on. This appears to prove: (1) The volunteers of 214 are free-thinkers, and (2) a clear grasp of Newton's Laws of Motion is not essential to the most difficult kind of operational flying. Anyhow the skipper of 214 collected on his bets.

Captain Connolly's answers? Briefly: (a) The plane stalls at the instant the wind stops. (b) Plane W will reach 30,000 feet first.

R. D. KING, CDR.
Commanding VA–214

* With a deadline to meet and the editor's slipstick at home in his footlocker, opinions were sought from several aerodynamic quiz kids. All agreed on the answer to Alpha—some differential opinions on Bravo were elicited. Care to comment?

A KILLER CONFESSES

From Safety Review

Frankenstein's monster was a powder-puff compared with me. He could wreak havoc in only one place at a time. I strike simultaneously in many places—again and again.

I'm a manmade scourge. Man created me, and I destroy him without compunction. He has developed serums and vaccines to control and eliminate natural diseases, but try as he might, he has been unsuccessful in his efforts to destroy me. I become more and more prevalent and destructive every year. I kill thousands of men, women, and children, and cripple many thousands more. I destroy property, wreck homes, and smash families. I have no regard for the rich or the poor, the healthy or the lame; they are all the same to me—my object is to damage and cause misery.

I can be stopped, not by one man, nor yet by a group of men. It's going to take all men as well as a tremendous change in everyone's attitude to do it. You see, I am an automobile accident—conceived by carelessness, nurtured on discourtesy, and born of speed and reckless disregard for moral obligations.

NORTH AMERICAN *Aviation A3J Vigilante, all-weather attack weapons system designed for carrier operations, is powered by two General Electric J79–2 engines, each of which develops 15,000 pounds thrust. Scheduled for its first flight this summer, the two-place aircraft was christened by Admiral Arleigh A. Burke, Chief of Naval Operations, during special ceremonies at Columbus. The A3J features boundary layer control, automatic bombing-navigation system.*

NAVAL AVIATION

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CONTENTS

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● COVER

USS Ticonderoga (CVA-14) loads an A4D aboard for VA-93. In the background is the USS *Princeton*.

● CREDITS

The article on Naval Nuclear Weapons, page one, was prepared by the Staff of the Special Weapons School, Norfolk, under the direction of LCdr. Kent L. Lee, USN. LCdr. Lee is now commanding officer of VA-46.

● SUBSCRIPTIONS

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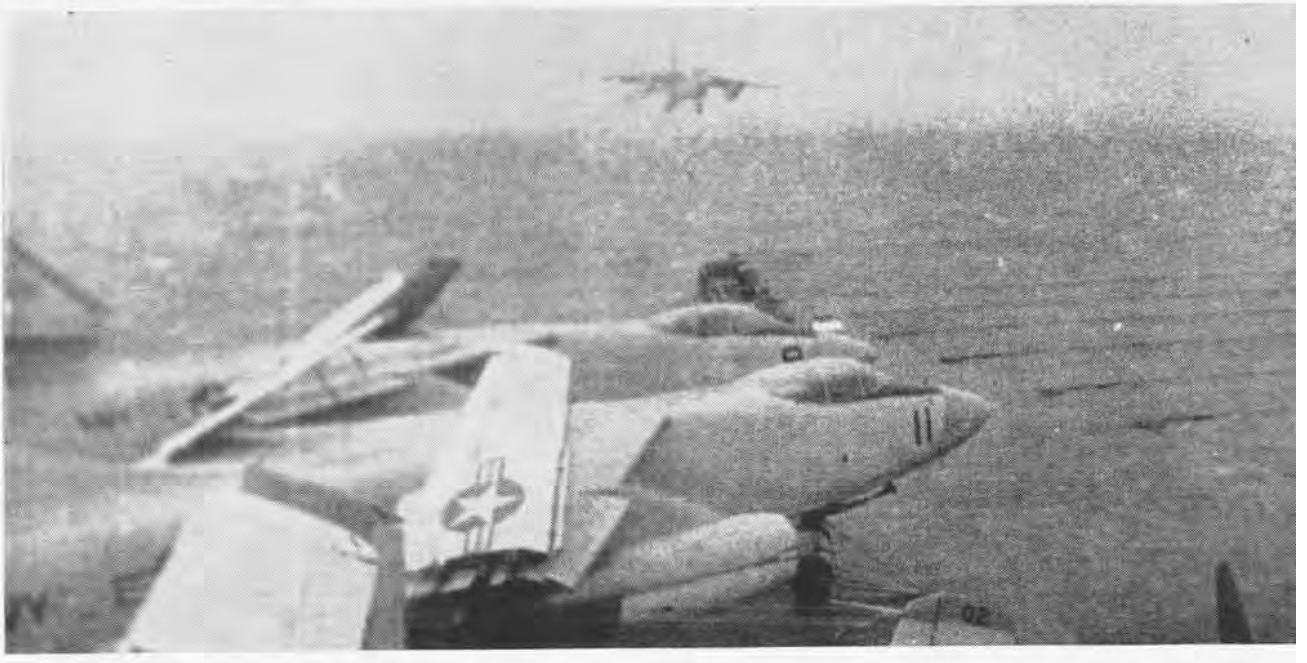
CCA COUNTERS FOUL WEATHER



Flight safety on aircraft carriers has many facets. CCA men are one of the main groups in the Fleet who make sure that Navy's jets and hard-hitting propeller aircraft come safely aboard the flattops. In foul weather, pilots can count on positive radar control of landing operations. In times of low visibility, the pho tographer often gives up, but here is an un usual and hard-to-get view of an aircraft unde Carrier Controlled Approach. A Skywarrio comes aboard the Forrestal as (below) J. R Campau, ACC, mans the final approach scope

ACCENT ON THE BIG WORDS

RESEARCH and DEVELOPMENT are big words in Naval Aviation. Its scientists and technicians are devoted to the improvement of airframes, engines, systems and to man's chances for survival under all conditions. The many stories of R & D appear regularly in Naval Aviation News—like the one (left) of Cdr. H. R. Fehr III, Officer in Charge of the Naval Parachute Unit, El Centro, California, who is shown taking his turn in a parachute test drop over California's Salton Sea. From such research is obtained vital information on lifesaving procedures and equipment. Get the story of the 'big words' while it's timely and useful. Subscribe to NANews today by sending your check or money order at once to the Superintendent of Documents, Government Printing Office, Washington, D.C.

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