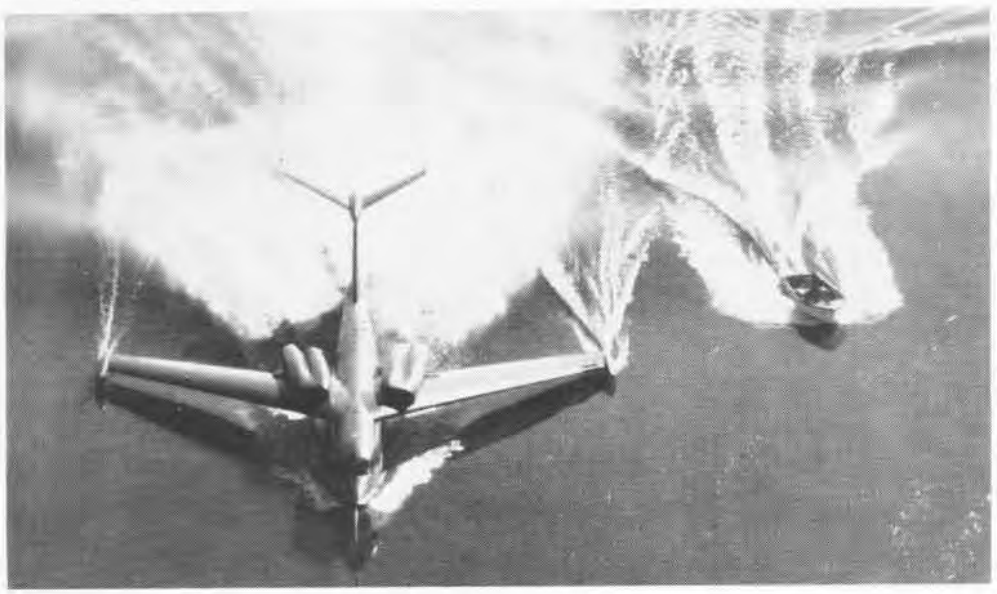
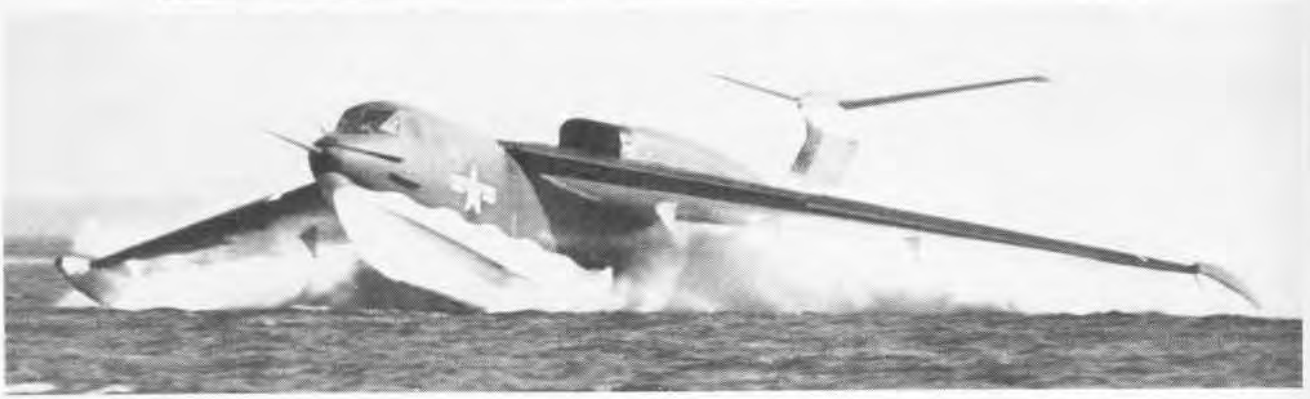
NAVAL AVIATION NEWS

39th Year of Publication

MARCH 1958

NavAer No. 00-75R-3





MIGHTY MARTIN SEAMASTER

Back in the air after being modified, the Martin YP6M represents a significant advance in anti-sub warfare. Designed to refuel from subs and tenders, the jet-powered giant can deliver either conventional or nuclear weapons against targets over 2000 miles from its mobile bases.

SORTIE INTO SPACE

THE NADC STORY

NAVY *full pressure suit lends unreal aspect as NADC "space man" debarks from gondola.*

MAN HAS ventured into space more than 500 times in the past year. He has experienced the bewildering and numbing grip of transverse "G's" associated with prolonged and steadily increasing acceleration as his rocket motors carry him well into the hypersonic speed range. He has experienced the critical loss of directional control following "burn-out" and has learned how to cope with the tendency of his sleek vehicle to oscillate as it flies almost weightlessly above the ionosphere.

He has programmed the re-entry phase of his flight to the narrowest of margins with a positive knowledge that both he and his aircraft can withstand the shuddering impact of collision with the stratosphere. He has also learned that the limiting factors, if encountered, will definitely result in airframe failure.

The story of how it was accomplished at the Naval Air Development Center, Johnsville, Pa., is a most unusual one—even in these times of spectacular achievement by man in his effort to breach the space barrier in a manned vehicle.

It is a dramatic tale, although one must search deeply and listen intently to discover drama in the dedication of men to a common purpose, men who are content to be hidden in the background of the launching site.

It is primarily a story of a joint effort—teaming the Navy, National Advisory Committee for Aeronautics (NACA), USAF, and North American Aviation, Inc., in a single space flight project. The Navy's role was one of immeasurable service to the project, and, as an unforeseen consequence, to the whole of aviation design, research and medicine.

It concerns the revolutionary X-15, sometimes described as a "hypersonic missile with abbreviated wings," and its pilot, Scott Crossfield, who is expected to rocket the X-15 more than 100 miles above the earth.

The conception and design of the X-15 is a story in itself. NACA, after two years of intensive study of the problems likely to be encountered in manned space flight, submitted a proposal to the Department of Defense for the construction of an airplane capable of extremely high speeds and altitude to permit desired exploration.

THE MEMORANDUM of proposal ended with a statement that the "accomplishment of this project is a matter of national urgency."

North American Aviation, Inc., winner of the subsequent bid competition was given the go-ahead signal to construct three airplanes. Thus the X-15 was brought into existence and, with NACA at the research helm, entered the static simulation flight phase.

The format for the actual flight has been precisely drawn. Crossfield, protected by a special space suit from the multiple adverse effects of flight above the ionosphere, will spend more than 72 hours in pre-flight preparation and count-down, and a little more than 10 minutes in making his epic journey.

He will, following "burn-out" of his rocket motors and a prolonged ride upwards, have penetrated through and beyond the four known spheres which lie between us and space.

With 97% of the earth's atmosphere

J. W. RABB, *top, L. Passavanti in booth during run. "Wheel" has auto/manual features.*

beneath him, as he finds a speed plateau almost beyond the effects of drag or gravity, he will most likely experience a variety of odd sensations. The most unusual of these may be a feeling that he has been there before.

In the Navy's Aviation Medical Acceleration Laboratory (AMAL) at Johnsville, with the X-15 in mockup and integrated with the AMAL centrifuge, Crossfield has literally been "out of this world" repeatedly as scientists have sought to effect a compatible man-machine merger.

The method for providing such an environment, wherein both man and machine can be subjected to practically all of the actual flight stresses and phenomena, has a fancy label—

GIANT AMAL *human centrifuge, believed to be world's largest, is first to afford pilot control. Dubbed "the Big Wheel," rotor arm and gondola can reach 180 mph in 7 seconds from dead stop.*

"Dynamic Control Flight Simulation." It means simply that a centrifuge, for the first time, can be controlled from its gondola by a pilot.

This latter capability, based on a "closed loop" integration or linkup of the centrifuge with the Johnsville RCA *Typhoon* analogue computer, one of the most elaborate in existence, was developed at NADC by personnel of both the AMAL and the Aeronautical Computer Laboratory.

The complex innovation, the only one of its kind known, stands as a singular contribution to the field of aviation research and medicine; and its future application is limited only by imagination.

The case history of the X-15 simulation program to date and of the computer-centrifuge combination, is a graphic portrayal of incredible results attained through close cooperation of many agencies. It is also a story of the blending of varied scientific skills and of the voluntary adoption of a 72-hour work week by all hands concerned with the project.

Following its design by North American, the X-15 plans were turned over to NACA which assumed the major research responsibility. NACA scientists and technicians at Langley Field subjected the half-missile, half-rocket test aircraft to exhaustive wind-tunnel experimentation in order to determine its flight characteristics, stress limitations and related data. Similar information concerning the X-15, which had been compiled by the manufacturer, was made available to the research group—a joint committee consisting of research specialists of NACA, North American, the Navy and USAF, and other agencies interested in the first manned space shot.

NACA and North American, during months of design and static analysis, had achieved a satisfactory understanding of the X-15's nature and its habits in and above the atmosphere. This understanding came mainly from two sources: analogue computers which had digested vast amounts of slide rule data, and static flight simulation of the X-15. From these two methods was derived the information which laid the ground rules for the pilot/X-15 merger.

For example, radical cockpit rearrangement of controls was deemed necessary. The need for a different panel display or cockpit instrumentation layout was another factor which cropped up during the phase of static flight simulation.

In all of this and with full awareness that the described research had

exceeded in its thoroughness any previous project of similar nature, the scientists ran into a variable that blunted their slide rules.

In the space trade, it's known as "acceleration environment." They knew what the X-15 would do. Now they became curious about the man—the pilot, Scott Crossfield.

It was this curiosity that set the stage for the Johnsville saga. At the request of NACA, the highly specialized research facilities of the Naval Air Development and Material Center under the command of RAdm. Selden B. Spangler, were made available to the group. Two of its many facilities were immediately involved in the X-15 project: the Aeronautical Computer Laboratory under Cdr. C. Fink Fischer, and "The Big Wheel" or mammoth human centrifuge of the Aviation Medical Acceleration Laboratory directed by Capt. H. G. Shepler, MC, USN.

The mission of AMAL best explains what the X-15 group hoped to establish at Johnsville. Verbatim, it is "to conduct research into the biological and physical effects of acceleration forces developed in aircraft under various operational situations; to conduct research in the general fields of aviation medicine, aviation physiology and human engineering with respect to aviation." This is a complicated task.

The heart of its mission is the centrifuge. Powered by a 180-ton, 4000-hp motor, the centrifuge 50-foot steel arm and gondola, weighing 84,000 pounds, are literally geared to explore all of the capabilities of system components, human and mechanical. Capable of acceleration to 180 mph in a little less than seven seconds from a dead stop, the unique and revolutionary gimbal system of the centrifuge permits continuous positioning of the gondola to achieve radial, tangential and vertical components of acceleration. In other words, no roller coaster could ever provide the sensation of going in so many different directions.

In addition, the gondola or pilot compartment is wired, not only for sound, but for television and a host of physiological recording devices which provide a permanent reference medium regarding man's reaction to G force.

Armed with the mathematical entity that was the X-15, the research group headed by NACA's Leonard Sternfield of the Langley Stability Research Division, descended on Johnsville to enter upon the human test phase. With them came Scott Crossfield, a veteran of test flight in the world's fastest vehicle, the X-2, and the odds-on choice for the proposed X-15 piloting mission.

The X-15 cockpit control assembly and instrument panel representation, which had been refined during the NACA tests, were installed in the centrifuge gondola. An exact duplication of cockpit control placement, manual and visual, was mandatory if any accurate evaluation of the pilot reaction factors was to be achieved.

Appointed Navy Project Engineer on the X-15 was Dr. Carl C. Clark of AMAL Biophysics Division.

Initial tests were begun with the adaptation of the movement of the centrifuge so as to provide acceleration forces corresponding to the exact flight profile or path of the X-15. This phase was termed the "open loop" or cam control of the centrifuge. Giant bake-

AUTHENTIC *X-15 mockup in gondola aided pilot and scientists during evaluation runs.*

lite cams were machined or notched in accordance with data supplied by a digital computer, and when inserted in the control mechanism of the centrifuge, guided the rotor arm and gondola in a manner calculated to impose the varying "G" forces the pilot would experience in actual flight. One shortcoming was realized. The pilot could not exercise control during this method of flight simulation. He rode as a passenger, sustaining the pre-programmed acceleration forces while responding to visual stimulation throughout the run. These responses measure a pilot's ability to function during the execution of a programmed flight profile.

In the case of Crossfield, constantly changing oscillograph displays in the gondola were introduced. Time devices measured his control responses to indicate his recognition of the changing displays. Restraint equipment, his

CENTRIFUGE *tests provided means of positive study of effect of restraint equipment on head, body, arms and legs of pilot. High "G" forces led to right hand console stick adaptation.*

CAPT. H. G. *Shepler, NAA pilot Scott Crossfield were key figures in AMAL space tests.*

ability to stay on the controls, and his scan pattern of the panel display during certain periods of extreme acceleration were tested. Information gained during this phase substantiated the need for major changes in cockpit design and the relocation of panel display instruments.

One of these changes developed by NACA will make Grampaw Pettibone sigh for the good old days. It was found that the standard control stick was impossible to use, and a right hand console control was devised to replace the legendary "joystick." Attached to the arm rest, the console control enabled the pilot to exercise control surface change by restrained wrist movement rather than unbraced arm movement during the simulated flights.

From a human engineering and physiological standpoint, Crossfield and the X-15 thus were advanced to the threshold of the desired man/machine merger in the AMAL laboratory.

The numerous runs in the centrifuge had reduced almost all the original variables concerning pilot toleration of acceleration force to known factors. They indicated that man was capable of performing normal functions in the X-15 during its planned journey into the fringes of space and return to a specific point on earth.

Because Crossfield had accomplished the test rides in the centrifuge as a passenger, one area of vague question persisted in the minds of the research specialists, the manufacturer and the pilot. This area concerned control.

Could man exercise the precise manual control necessary to keep the X-15 on its exacting flight profile? Could he employ the emergency measures available to him in the event the missile-rocket vehicle strayed from its flight path or commenced any one of a number of possible uncontrolled gyrations? Could the pilot apply a watchmaker's touch to the controls during the re-entry phase of the X-15, boresighting a narrow, slanting corridor which represents the only safe way home for the rocketing space bird?

X–15 PILOT *performance, physiological data were monitored, recorded for future study.*

He could and did, and the local development of the means for this remarkable accomplishment portends a seven-league boot advance in the field or aircraft research and design, or in any field where the effect of motion on man and mass is involved.

AMAL and NACA representatives had posed the final question. Could the centrifuge be rigged to allow total pilot control during the test phases of the X-15 flight profile? If so, it would eliminate the final variable.

This problem was addressed to another of NADC's facilities—the Aeronautical Computer Laboratory (ACL) headed by Cdr. Fischer. Under his direction was operated the RCA *Typhoon*, the big analogue computer. Designed to solve difficult differential equations as fast as they are presented, its previous value during the X-15 flight simulation had been in the design of centrifuge control cams. The cams reflected the electronic output from the analogue computer of thousands of unintelligible (to this writer) formulas which were provided by NACA and North American Aviation.

With the aid of a top assistant, Mathematics Consultant Morris Plotkin, the ACL Director tackled the proposition of pilot-computer-centrifuge control without recourse to precedent. It was a project requiring ingenuity and invention.

The fantastic numbers of engineering formulas derived from previous testing of the X-15 were first diagrammed to establish circuit patterns for the analogue computer. This, in itself, was a mountainous task, but under the brilliant supervision of Plotkin and the assistance of the University of Pennsylvania contractors, it was completed in record time. Every known factor involving the X-15 and its planned flight was given an electronic counterpart measured in fractions of voltage.

Airframe stress limitations, airspeed in the varying stages of flight, taking into account altitude and density, drag

GONDOLA *cameras provide record of pilot reactions. Subject sags under 6 "G" force.*

and its absence in the higher reaches, instrument response to all conditions, reaction of the airplane to control force —all of these were laboriously committed to the *Typhoon's* electronic memory. The almost continuous and successful operation of these electronic circuits was, in itself, an achievement.

While this was underway, Cdr. Fischer and his ACL staff undertook the problem of effecting the "marriage" of the computer to the centrifuge. At the computer source, an involved jury rigging of complex electronic gear was accomplished. Both by profound knowledge and trial and

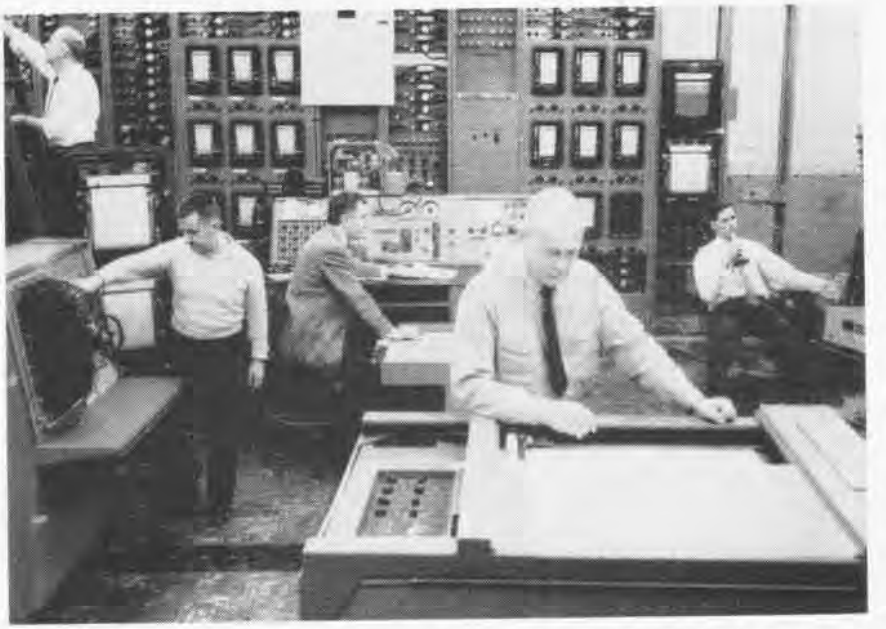
error, the analogue computer was readied for the linkup or "closed loop" integration with the centrifuge. Telephone land lines, rented at a monthly cost of a few dollars, completed the astounding innovation, and the first dynamic control flight simulation was made possible.

The discoveries made during the X-15 program may well be applied to future aviation research and development. The adequacy of controls, panel displays, pilot and aircraft responses can now be realistically evaluated before the aircraft itself is built.

In the X-15 project, which is still continuing, the pilot-computer control of the centrifuge revealed a problem area previously unencountered. Oscillation caused by misalignment of the motors was recognized as a possible adverse factor that might occur. Passage through the so-called "controllability barrier" required the implementation of new procedures. Orientation of the aircraft above the atmosphere showed the need for the introduction of additional controls. The re-entry phase of the flight profile, previously locked in by artificial means, warranted additional study after pilot-control runs as it became apparent that oscillation, yaw or pitch, of the aircraft in this region made structural failure a certainty.

At the conclusion of the dynamic control runs, wherein repeated successful flights were made by Crossfield, Capt. Iven Kincheloe, USAF, and Joseph Walker, NACA, who will eventually reach for even higher space in the X-15, the "crash" count of initial flight misadventures ran into a mythical loss of millions of dollars. With each such failure, a critical evaluation was made and changes, human and mechanical, were adopted to forestall repetition on the actual flight. It is the opinion of Johnsville's scientists that without these preliminary laboratory tests, the X-15's first venture into outer space would result in disaster.

DR. CARL *Clark, AMAL biophysicist, seated, headed X-15 project during rigorous tests.*



ACL PERSONNEL *man analogue computer control position during test run. Complex marriage of computer and centrifuge was masterminded by Cdr. C. F. Fischer, foreground. M. Plotkin, left.*

Approximately 54 variables concerning the man/machine tests were recorded on each flight. These, in permanent record form, enable scientists to effect comprehensive evaluation of performance capabilities of both man and machine while under acceleration and in realistic flight simulation.

The full effect of the joint research and evaluation effort by the Navy, NACA, USAF and North American, will be realized when the X-15 and its sister models are unleashed from their airborne launch rigs and perform actual test flights.

With NACA maintaining primary responsibility for all X-15 research flights, these initial steps into space, designed to demonstrate structural integrity and satisfactory performance of the propulsion and control systems, will be handled by North American.

Further flight tests will then be conducted by the USAF to establish the airplane's maximum speed and altitude capabilities, and to obtain data and experience in the design of future weapon systems.

Concurrent with the latter test phase, NACA's engineering research pilot contingent, headed by Joseph Walker, will conduct a flight research program.

The principle of dynamic control flight simulation as it was developed at Johnsville and employed during the X-15 project has opened a large door scientifically. ACL is now engaged in a program whereby the Johnsville centrifuge may be controlled from analogue computers anywhere in the U. S. by the simple expedient of a telephone land-line connection. Thus the paper stage equations of an embryo aircraft may be ground into a company computer in California, which in turn transmits the control impulses operating the Johnsville, Pennsylvania, centrifuge and, in turn, records the flight information results in California.

The crux of the Johnsville saga and its sortie into space may be summed up in the words of Dr. Clark, AMAL X-15 Project Engineer: "The computer-centrifuge flight simulation control, besides being a contribution to basic aerodynamic design, provides a realistic test of the reaction of man to his airplane. If they prove to be incompatible, we can't change the man, but we will know when and how to change the airplane."

GRAMPAW PETTIBONE

The Spider's Web

Upon reaching 110-120 knots during his takeoff roll, the pilot of an F9F-6 applied back pressure but could not get the stick past the neutral position. Midway down the 7000-foot runway, he elected to abort the takeoff just at the instant that the control stick became movable.

With about 2500 feet of runway remaining, the port tire blew out. The *Cougar* continued off the end of the runway, traversed the overrun, struck some large rocks and logs that sheared the starboard main gear and nose gear, and skidded into the edge of a bay, coming to rest with the engine running at idle and the tailpipe just clear of the water.

An inspection of the cockpit following the accident resulted in the discovery of the "spider" control lock still attached to the right rudder, although incorrectly, and to the stick. The wire loop at the stick had parted, allowing the controls to have free action.

Investigation by the accident board determined several different ways in which the spider lock can be attached to the rudder pedals. The correct method of attachment precludes the possibility of the pilot's placing his feet on the rudder pedals since the wire extends across the rudders diagonally, thereby permitting the pilot to feel it. However, with incorrect

attachment, it is possible for the pilot to place his feet on the rudders without contacting the wire. Also, in this position it is possible to kick off one or both of the hooks from over the top of the rudders. When the spider is installed improperly, with both hooks engaged, a limited amount of lateral stick control can be achieved. However, with one hook off and one hook on, complete lateral and fore-and-aft stick action can be had, providing the rudders are left free or are offset with the attached rudder aft.

Owing to the small number of qualified personnel available, plus the fact that the pilots were insisting that the aircraft be made ready in the most expeditious manner possible, the jet line chief decided not to complete new pre-flight sheets. Instead, he decided to make a visual inspection of the external portion of the aircraft while the pilot checked the cockpit, and, since the aircraft had not been flown after they were properly preflighted two days previously, to change only the date on the pre-flight sheets that had been completed at that time. Because of these circumstances, the crewman did not check to determine whether or not the spider control lock was installed.

The pilot, in an effort not to hold up the flight (other pilots in the four-plane section had indicated that they were ready to depart the line), elected not to perform the flying tail check. Had this check been performed in accordance with squadron doctrine, the pilot would have discovered the control lock in place regardless of how it was installed.

Before leaving the runway, the pilot decided to lock the brakes by actuating the emergency air bottle. However, owing to a loose connection in the air line, this action did not set the brakes.

The accident board concluded that the primary cause of the accident was the pilot's failure to check the aircraft controls sufficiently to determine whether they were completely free prior to attempting flight. Contributing factors were: *(1)* An error on the part of both the pilot and maintenance personnel in attempting to short cut pre-flight procedures to expedite the flight, *(2)* line maintenance personnel error in that the spider control lock was improperly installed, and *(3)* either maintenance personnel error or material failure or malfunction in that a nut securing the emergency air line to the brake fitting had either been left improperly secured by maintenance personnel, or had backed off after being secured, rendering the emergency braking system inoperative.

Grampaw Pettibone Says:

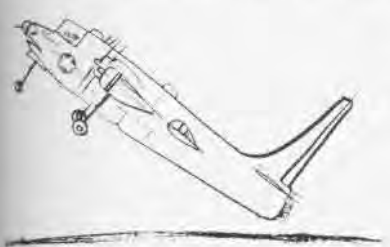
Make haste slowly lest you be caught in a web of circumstance. Many a life has been cut short by shortcuts.

Memo from Gramp

Sending pilots of single-place aircraft out for formation instrument practice during IFR conditions before they've thoroughly familiarized themselves with the aircraft during VFR conditions opens wide the door to vertigo alley and is like trying to teach a man to play ice hockey before he's learned how to skate.

Flap Flap

A P4Y-2 passed over the approach end of the runway at an altitude of 30 to 40 feet at a last-observed airspeed of 100 knots. The pilot chopped the throttles, whereupon the *Privateer*



stalled and dropped in hard, striking the runway tail first and forcing the tail skeg up through the deck plates. Immediately following the initial impact, the aircraft pitched forward, causing the main gear to contact the runway with tremendous force which caused buckling in the center fuselage and at the wing roots.

Not until the flaps were about to be retracted following the landing rollout and turn onto the taxiway did the pilots realize that *they had landed with only half flaps.*

Grampaw Pettibone Says:

Forgetting to put your aircraft—any aircraft—into the intended landing configuration is a lot like forgetting whether you're out with Shirley or Amy. It can only lead to trouble and some undesirable lumps.

The aircraft accident board stated that the pilot showed poor judgment in failing to take a wave-off from a dangerously high and slow landing approach and that his landing technique was unsatisfactory in that he allowed the aircraft to contact the runway in a nose-high, power-off, full-stalled attitude.

Understatements of the Month

The preliminary message reports of two recent aircraft accidents occurring at the same airfield and both involving *Banshees* on landing stated as follows:

Case One: BOTH MAIN STRUTS DRIVEN THROUGH WINGS, MAIN WING SPAR DAMAGED. Cause: EXCESSIVE SINK RATE.

Case Two: FUSELAGE BROKE AT COCKPIT X PORT WING TORN OFF X FIRE STARTED. Cause: HARD LANDING, STALLED ON APPROACH.

Lost and Found

During night operations aboard an aircraft carrier, an FJ-3M *Fury* jet was spotted on the port side of the flight deck aft of the number two elevator. The main landing gear had been chocked and placement of the nosewheel chain was in progress when the airplane started rolling toward the catwalk.

When the airplane started rolling, someone yelled "Brakes!" and the plane captain jumped back inside the cockpit in an effort to save the *Fury*. However, the aircraft's movement couldn't be stopped in time, and it was lost over the side.

After the accident the carrier turned back toward the area and, together with the plane guard destroyer, initiated a search that lasted throughout the night. At first light an air search was started, and about an hour later the missing plane captain was sighted by a search aircraft and picked up by a destroyer 11 hours after he had fallen overboard.

The errant aircraft had struck the water right side up and tail first. The plane captain had left the cockpit immediately and jumped into a life raft *that had been torn from the ship by the aircraft on its descent.*

Grampaw Pettibone Says:

This is *really* one for the books! The man was not strapped to the airplane, he couldn't swim, he wasn't wearing a life jacket, and the accident occurred at night.

In spite of the fact that personnel aboard the carrier were fairly certain that their man overboard was lost and couldn't be recovered, a well planned and thorough search was begun. It paid off in spite of tremendous odds.

★

1943
EL TORO
1958

★

MODERN FURY JETS FLY IN FORMATION OVER MARINE AIR STATION AT EL TORO

In late 1942 a peaceful valley, nestled in the mountains near Santa Ana, California, became a beehive of activity. Giant earthmovers and construction activities covered the 2339-acre tract that had once been fertile farm land. In just a few months, what had once been orange groves and bean fields, became runways, taxiways and aircraft parking space with giant hangars, mess halls, control tower and operations buildings springing up with other facilities that go into making a huge military city. And, on St. Patrick's Day, March 17, 1943, the El Toro Marine Corps Air Station was formally commissioned.

In the early years, thousands upon thousands of Marines poured into the new station. Pilots, fresh from flight training, were given their advance operational training in the Marine Corps' aircraft of that era, the F4U *Corsair*, the SBD *Dauntless* divebomber, the R4D and R5D transports and all the other aircraft that were used by Marine flyers. Aviation ground person-

COPTERS ARE USED IN MARINE AERIAL ENVELOPMENT TACTICS

THE BUSIEST SPOT ON THE STATION IS THE OPERATIONS TOWER

CORSAIR WAS ONE OF FIRST PLANES TO OPERATE FROM EL TORO

THE NEWEST JET PUT IN OPERATION IS DOUGLAS F4D SKYRAY

nel became used to round-the-clock training programs and made good their Leatherneck vow "to keep 'em flying."

Although used primarily as a training and staging point for Marine Corps aviation units, El Toro also served as a debarkation point for aviation personnel transferred to Marine combat squadrons in the Pacific. It wasn't long before El Toro earned the name of the "Gateway to the Pacific."

The number of aviation personnel at El Toro increased steadily as the war went on, and the skies overhead became the "Times Square" of western aviation with thousands of aircraft landing and taking off at El Toro. It is the opinion of high ranking military officials that during World War II the Marine Corps Air Station at El Toro had more than "served its purpose."

But El Toro was a temporary wartime installation and shortly after the great war's end the future of the huge base hung in the balance as the armed forces returned to peacetime strength. In fact, there was a question of allowing Orange County's largest military installation to revert to its original state of farmlands when the Korean Conflict broke out. And, with the continued threat of Communist aggression, El Toro was reevaluated as to its need in the future and became a permanent Marine Corps installation.

A PARACHUTE RIGGER CHECKS THE CHUTES

The mission of El Toro today is basically the same as it was 15 years ago. It is used primarily for advanced operational training and as a staging point of Marine Corps aviation units. It is still the gateway to the Far East for all Marine aviation personnel joining the First Marine Aircraft Wing, now in Japan, and other Marine aviation units in the Pacific.

The present Commanding General of El Toro is BGen. Frank H. Wirsig, a veteran Marine Corps pilot, who began his career in 1927.

El Toro is also the "home" of Aircraft, Fleet Marine Force, Pacific, commanded by MGen. Clayton C. Jerome, a veteran of over 35 years Marine Corps service.

From its Headquarters at El Toro, AirFMFPac performs manifold tasks. Its primary function is the training and support of Marine aviation units of the West Coast, the Pacific area and the Far East. It provides trained effective units for amphibious operations of Fleet Marine Forces and Naval forces afloat under direction of task force commanders, as well as for the defense of forward naval bases. It is responsible for effective replacements for carrier-based Marine air units in the Pacific. Its secondary function is to administer and supervise all Marine aviation personnel and activities of its subordinate units for the Pacific area.

The Third Marine Aircraft Wing, also based at El Toro under the command of MGen. Thomas G. Ennis, was commissioned on the anniversary of the Marine Corps, November 10, 1942, at Cherry Point, N. C. After its return from duty in the Pacific in WW II, it was decommissioned; but in 1952 it was recommissioned and based at MCAS Miami. In September 1955, the command post was moved to MCAS El Toro.

The Wing has under its command Marine Aircraft Group 36. MAG-36's helicopters were the first to train from the decks of the USS *Thetis Bay*, the world's first helicopter assault carrier.

El Toro is a complete city with barracks, mess halls, warehouses, swimming pools, riding stables, hospital, chapel, theater, service clubs and Marine Exchange. It has one of the most beautiful 18-hole golf courses in southern California.

Today, approximately 8000 men and women Marines and 1000 civilians, stationed at El Toro, enjoy the facilities that the giant air station has to offer. A friendly relationship between the civilian populace of Orange County and the El Toro Marines has existed since the early days.

To the north of the station lies the mecca of Hollywood and its many tourist delights, to the east are several mountain resorts and to the west are the many sunny Pacific beaches.

Two facilities, the Marine Corps Auxiliary Air Station at Mojave and the Marine Corps Air Facility at Santa Ana, are under the command of BGen. Wirsig, who also is commander, Marine Air Bases, Western Area.

From plows to *Panther* jets in 15 years! Developed from a bean patch in Orange County to become a modern all-weather air station, El Toro has a big place in national defense.

STRAIGHT TALKS ON TACTICS

FOUR OF TRAVELING TEAM: LCDR. GOUDIE, CDR. HOUSER, CAPT. GEIS, LCDR. SMITH

DURING the past year Air Development Squadron Three, based at NAS LAKEHURST, has been developing tactics for employment of the latest carrier fighter aircraft, the F8U *Crusader*, F11F *Tiger* and F4D *Skyray*. Normal procedure for passing the word on what they've learned to the operating forces is via Commander Operational Development Force reports and informal monthly newsletters.

In order to amplify the official written word with straight pilot-to-pilot talk, VX-3 formed a presentation team to discuss "Modern Fighter Tactics in Fleet Defense" with carrier squadron personnel at the Navy's major continental aviation bases.

A group of carrier pilots, headed by Capt. L. R. Geis, the Commanding Officer, made the presentation to Air Group Commanders, Staff Personnel of ComNavAirLant, ComNavAirPac, ComFair Jax, ComFairAlameda, ComFairQuonset, DirFltAir San Diego and numerous pilots of carrier squadrons at NAS OCEANA, CECIL FIELD, QUONSET POINT, NORTH ISLAND, MIRAMAR, and MOFFETT FIELD. The tour lasted two months.

The theme of VX-3's 'road trip' was *talking + writing = better know-how!* Such pertinent tactics as 'sight the target' technique, *Sidewinder* attacks, air-to-air refueling, full pressure suit flying, F8U intercept procedures and F4D all-weather tactics were presented. Discussion sessions provided an invaluable exchange of information for them.

VX-3's presentation team was composed of Cdr. W. D. Houser, LCdrs. G. Goudie, L. N. Smith, P. Miller, Jr., and Lt. F. J. Readdy. While on the West Coast, Capt. R. A. Beveridge, the Commanding Officer of VX-5, and Cdr. J. K. Beling, joined the group to include information on latest developments in the carrier jet attack picture.

Gunnery Meet Scheduled

Rockets will be Fired by Radar

More than 50 Navy and Marine fighter and attack squadrons are conducting competition in preparation for the All-Navy Air Weapons Meet scheduled for NAS EL CENTRO the week of April 14. Elimination trials on both coasts have almost been completed.

This year's meet will feature the first use of air-to-air rockets in Naval Gunnery competition. All-weather fighter pilots will launch their rockets by radar with the pilot never sighting his target during the run.

VA–16 Has 'Buddy Tanker'

In-flight Refueling is Scheduled

NAS OCEANA is providing regularly scheduled in-flight refueling service with the advent of VA-16's AD "buddy" tanker.

This "Flying A" tanker can be seen Monday, Wednesday and Friday afternoons giving training to pilots in in-flight refueling.

Lt. R. M. Hawkins and Ltjg. N. G. Marshall of VA-16 are primarily responsible for the training program.

ATTACK AIRCRAFT CARRIER *USS Bon Homme Richard (CVA-31) recently inaugurated a port and starboard double-refueling system for destroyers which escort the flattop while operating with the Seventh Fleet in the Far East. This procedure cuts the time the "Bonnie Dick" spends in refueling "tin cans." During the refueling, the carrier replenishes the destroyers with supplies and movies and also delivers mail and messages. The double-refueling system is now SOP.*

LO! THE POOR PASSENGER

There was a young sailor named Flail
Who, an itinerant Beech did hail;
When the pilot did shout,
"Hey you! Bail out!"
Flail dutifully searched for a pail. . . .

Admittedly, as limericks go, this won't crowd O. Nash; nor is there a factual basis for the incident versified. But it does lead us to comment on the sad state of affairs which exist in the dark spaces found aft of some uncommonly quiet cockpits.

For it is in these dark spaces where, on many a cross-country flight, dwells the PPP—Poor Petrified Passenger.

Case #1. An unwinged naval officer hitched a ride on a military airplane and after responding to the usual flight plan queries—à la Geneva Convention procedures: name, rank, file number—he was not approached again by the pilot or copilot—not even after the crash.

The passenger related that following an extremely long, bouncy take-off attempt accompanied by apparent argumentative consternation in the cockpit, the iron bird began shedding vital parts as it slid to a gearless, puckered-prop stop in the boondocks.

After considerable time had elapsed, a member of the crash-fire crew which had arrived on the silent scene, flung open the rear hatch and suggested that all hands abandon ship inasmuch as it was the end of the line, and there was a "small" chance of a conflagration. Ah so.

The copilot, by the way, reacted to the suggestion along with the PPP.

Case #2. Confusion reigned supreme in a P2V with both fans dead and pointed for a crash landing in one of our wetter great lakes. Ditching stations were determined by the "first-come-first-served" method, bailout decision was flung back from the cockpit as a matter of individual choice, and a hitch-hiking passenger had to assist a crew member who had donned his parachute harness vice versa. Adequate passenger briefing? Yes, there was none!

Case #3. And then there was the medical officer on his first ride at Corpus years ago who knew the HOW of the parachute theory, but was curious about the WHEN. "Don't worry, Doc," came the pilot's reply, "if we have to bail out of this bucket, I'm gonna yell 'jumpjump' and the first one is for you."

Years ago, when our esteemed colleague, Grampaw Pettibone, was a vigorous youth, a pilot could afford to strike the historical pose—strong, sure, and silent, an eagle with a mysterious look in his eye that bespoke knowledge of what lay beyond the far horizon. A tight-lipped titan of the throttle!

This pose was all "roger", or "romeo" (if you're current), because parachutes, survival gear, ditching stations, and probably passengers didn't exist. Old Tight-Lip was entitled to have his day.

Came then the era of events "which change and illuminate our times"—better and bigger airplanes, airports, parachutes, life rafts, emergency escape hatches and passengers. And thousands of pilots—strong, sure and some of them as silent as their legendary forbears!

Into the cloistered calm of clearance empires which sprung up throughout the airdale establishment, strode the passengers. Little ones, big ones, smart ones, otherwise ones—all of them with three things in common: (1) they wanted to go some place; (2) they would fly in anything; and (3) they had a child-like confidence in all pilots who flew anything to some place.

This confidence was well placed in a majority of cases. Victims of the exceptions had very little chance to talk.

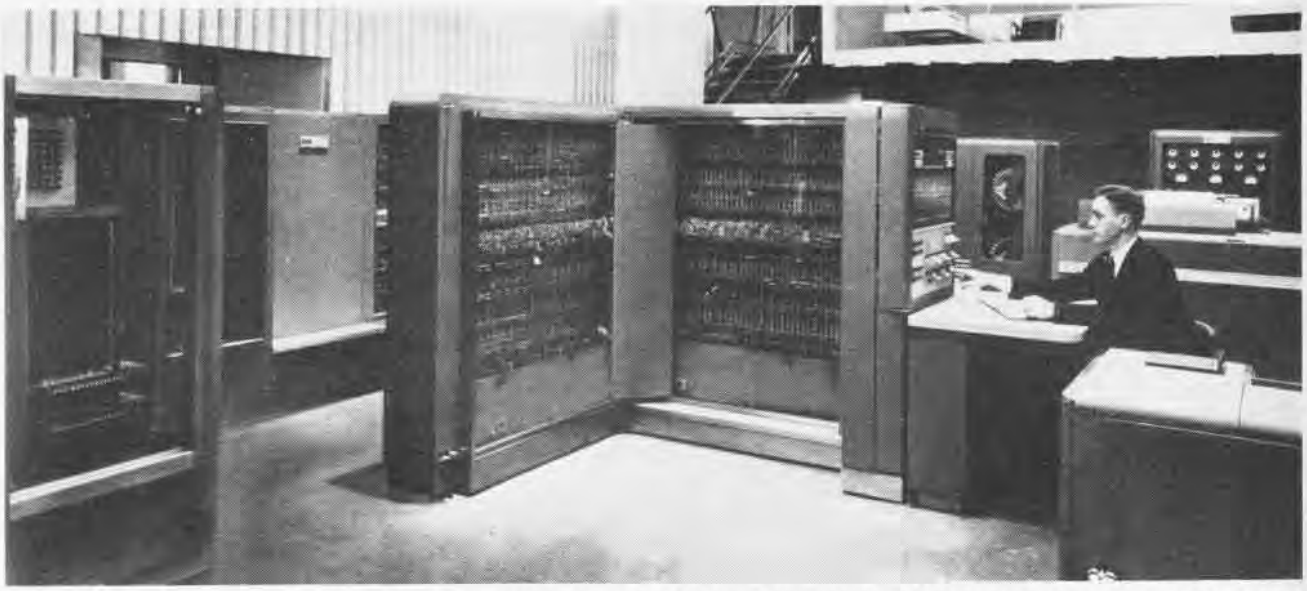
Back to cases. Continuing confidence and, most likely, survival can be attributed to one thing—knowledge.

The pilot who insures that his passengers are exposed to an adequate briefing on the essential items concerning the machine and the flight is doing everyone concerned a big favor. Comes an in-flight emergency, he has already waylaid most of the causes of passenger panic. He can busy himself in the cockpit knowing that his passengers:

1. Are wearing harnesses as he is.
2. Can snap on a chest pack and pull a "D" ring.
3. Are familiar with escape hatches.
4. Are mentally prepared to bail out.
5. Know how to jump if they have to.
6. If overwater, are familiar with ditching stations and are briefed on use of survival gear.

As for "Courtesy Info," it takes but a few seconds to put out the dope on cruise altitude, ground speed and ETA, and it makes for many pleasant hours for the lad behind the cockpit curtain who can't see where he's going, but has been cut in on the mysterious stuff that flights are made of.

That's the pitch, chaps. Be voluble before you fasten yourself in. Make time for passenger briefing. As the man said, "Take five for life."



THE 704 CAN HANDLE WEATHER DATA FROM THE WHOLE NORTHERN HEMISPHERE SHOWN IN OCTAGON PROJECTION AT BOTTOM OF PAGE

THIS 'NUMBERS RACKET' MAKES SENSE

To the layman, the whirr, stir, and clatter of modern machine calculation appears to be a study in advance magic. But to the scientist for whom automatic computation means doing a problem that might otherwise be insoluble in his lifetime, the IBM 704 is cause for applause.

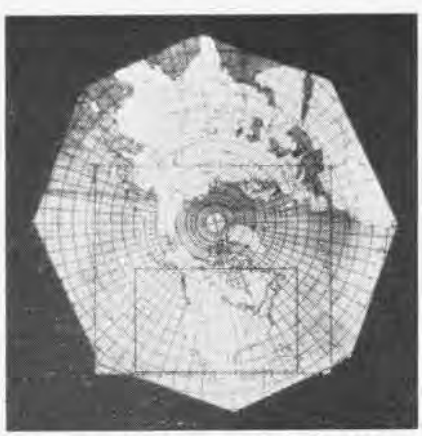
At the Joint Numerical Weather Prediction Unit, Suitland, Maryland, the 704 is in action. It is appropriately located in terms of turning out swiftly material which is of great value to agencies who use the same address—Weather Bureau, Air Force and Navy.

Hemispheric weather analysis is a joint effort of these three organizations. Also at Suitland is the Fleet Weather Central which serves the needs of the Navy using its own material and data obtained from the National Weather Analysis Center. Next door is the Hydrographic Office of the U. S. Navy which requires weather data for ice and ocean wave forecasting purposes.

All these weather agencies are in a position to gain advantage from the use of the 704 which can handle tremendous amount of data from greatly increased geographic areas. The incredible speed of the 704, its versatile and increased capabilities open areas of research heretofore closed.

In discussing the virtues of the 704 with a group of Navy meteorologists, Dr. George Cressman, head of JNWPU, described some of the problems which beset forecasters even when they have modern equipment—decked out in elegant gray—with which to cope with the eternal variations of weather.

The first big computer the Navy used at Suitland was the IBM 701 which went into operation in the spring of 1955. It produced regular barotropic forecasts at 18,000-foot levels, made special forecasts at other levels and produced new and very significant information on hurricane trajectories.

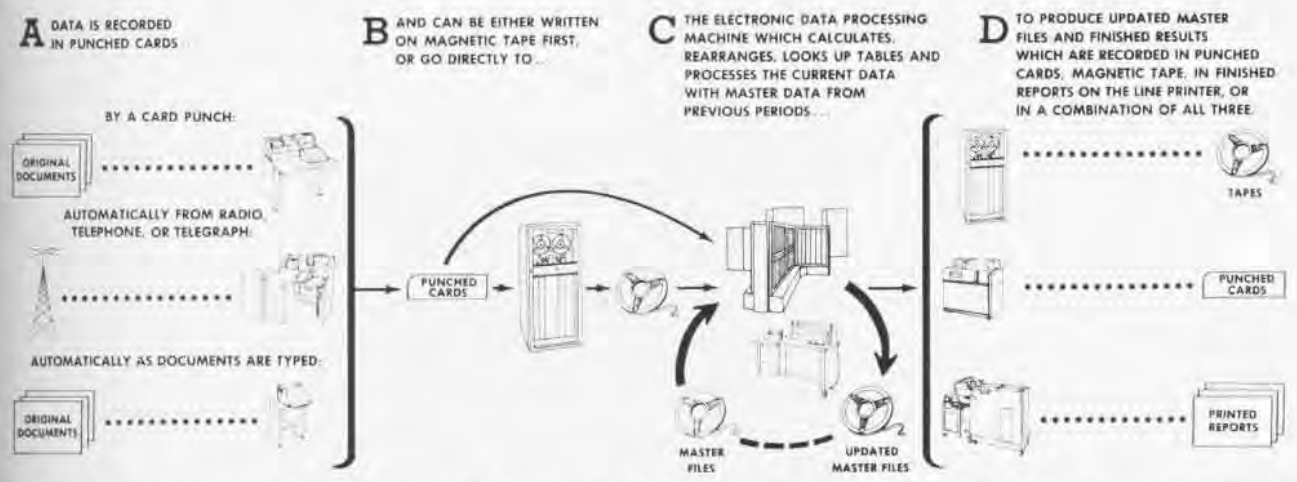


WEATHER DATA COMING IN FROM AREAS IN RECTANGLES COULD BE HANDLED BY 701. NEW 704 HANDLES DATA FROM OCTAGON.

By clearly demonstrating all that could be done with electronic computation, the 701 sealed its own death warrant. In the machine forecasting procedure, a grid of points is used. Greatest accuracy is achieved at the center of the grid with the largest errors found near the boundaries of the grid. In order to obtain accurate forecasts, a hemispheric grid was required with the edge almost at the equator where the inherent boundary errors are the least. But the 701 could not handle data on a hemispheric scale, and this spelled its doom.

The 704 is the last word, but the weather seems to be at least one step ahead of the experts. Even while the machine hums, beats a tattoo as cards are fed into it, responds in one component and then another, the weather is still in the making. Lights on the new IBM 704 go on and off appropriately, memory tapes turn fast enough to suggest sleight-of-hand, but the day will come when there'll have to be another machine with a bigger "brain" and faster electronic network. Its nerves frayed and cells irritated by the continued pressure of numerical forecasting, the 704 will go the way of the 701.

Each computer imposes special problems. The 704 is so up-to-date that it could not "understand" the 701, dis-



THE A-B-C-D OF ELECTRONIC DATA PROCESSING IS OUTLINED AS IT GOES THROUGH THE STEPS WHICH MAKE ANALYSIS POSSIBLE

playing some of the snobbishness of the *nouveau riche* toward less well heeled predecessors. Entirely new programming was required to start it on its complicated way. Fast, accurate, and involved, the Seven-O-Four is doing a twice daily forecast, develops a hurricane forecasting system and verifies the Transosonde trajectory forecast.

What scientists in atmospheric physics want to do is what they have always wanted to do—predict the weather. Dr. Cressman calls it "higher accuracy of basic forecasts." But weather prediction is a great deal more than just "fair and warmer." Once the basic weather pattern is forecast, all types of vitally needed derived products can be obtained: wave heights for efficient ship routing and passenger comfort and for military amphibious operations; optimum altitudes for plane safety, fuel economy and maximum passenger comfort; atmospheric conditions affecting communication linkages, etc. A special Navy development group has just been organized to take the basic JNWPU product and using machine methods apply it to special Navy problems.

During the time the 701 was in action at the Joint Numerical Weather Prediction Unit, all the teletype data in the form of synoptic weather reports, upper air reports from rawinsonde, and aircraft reports had to be sorted by hand, plotted on charts and carefully analyzed. Then the data were read, checked by hand, punched on cards and fed into the machine.

This tedious process, of course, slowed up everything, and while once that had been done, the computation could be made swiftly, it was clear that a horse-and-buggy feed-in system was holding back the traffic.

Now the IBM 704 is linked with teletype machines so that information from distant sources can be made available immediately to the 704. There are several ways in which this can be done depending upon the nature of the material. The teletype can be tied into a card-punching machine so that the IBM card, so familiar to anyone whose checks are made out under a similar system, is produced to form a permanent record of the transmitted information.

Once on the cards, the data can be handled in two ways: either the punch cards can be fed into the machine directly, adding their value to the store of data which make up the picture as a whole, or they can be fed into a magnetic tape storage vault.

When filed on the tape, the data can be read at any subsequent time at tremendous rates. The decision as to whether the cards are to be used directly or whether the data will first be transferred to tape depends upon the type of information and the frequency with which this information is used. Card reading is a relatively slow process. If, upon coming in, the data is not immediately needed by the machine, it is often economical to put it on tape, so that the minimum machine time is used in dealing with the data.

By the increased automation of weather reporting and analysis, the horse-and-buggy phase has been eliminated, and the forecasts and analysis of the weather go through with a bang.

What the country ever did without magnetic tape, posterity will probably find it hard to imagine. It ushered in the age of automation by making it possible for computers like the 704 to handle incredible quantities of data. Volumes of numbers and letters are reduced speedily to reels. The entire character capacity of a punched IBM card can be recorded on 0.4 of an inch of magnetic tape. One inch of tape one half inch wide will contain 200 characters.

The idea of "speed" takes on new dimensions when one considers that

- Magnetic tape is read and written at the rate of 15,000 characters per second.
- Magnetic drums, which are wide enough to take 20 tapes simultaneously, can be read and written at the rate of 25,000 characters per second.
- In 6.25 minutes a complete reel of 2400 feet of magnetic tape can be read or written on the IBM 704.

The product of the IBM 704, a weather map outlined in figures, is so extraordinary an achievement that one is tempted to compare it to the human brain. But what was stated in an article in *Naval Aviation News* in May 1955, is as true today as it was then: "This machine or any other electronic computer cannot stand any sort of comparison with the human brain. The machine can best be visualized as some sort of gigantic, fast, desk calculator. It is a stupid creature and cannot do anything for which it does not have detailed, explicit instructions."

PILOT'S NEW CAMERA EYE

FLIGHT TEST engineers at the Columbus Division of North American Aviation, Inc., need no longer rely on test pilots' eye-witness reports for data. Richard M. Wenzell, chief engineering test pilot, now wears a helmet chase camera. Three of the sets are now in use at Columbus where North American has centered its Navy development program.

The eight-pound unit contains two 50-foot reels of 16mm motion picture film, either black and white, or color. The reels are mounted in matched pairs of modified aircraft gun cameras, equipped with a sequence switch which permits instantaneous transfer from the right to the left camera.

Both cameras are equipped for finger tip reloading while the pilot is in flight. He can then record as much data as is required during any test flight. Feed and realignment of new film cartridges are accomplished by means of touch, using two posts located over his right ear position. The film may be adjusted to record action at 64, 32, or 16 frames per second. Time limits are one, two, or four minutes per reload.

The helmet chase camera has been used to record tank and stores separation from FJ-3 and FJ-4 *Fury* jet fighters produced at the Columbus Division. It is also useful for recording tuft studies showing air flow patterns; aircraft action in spin tests, high speed pullups and power application and drive brake effects. It was used once to record damage encountered by an airplane in flight, for study in the event an emergency landing proved unsuccessful. (It didn't.)

Special modifications of the shutters permit a speed of one five-hundredths of a second, or faster. From film so exposed, it is possible to print stills of sufficient quality for research use. This speed also makes it possible for the pilot, except in attitudes of high "G" loading, to photograph his own test instrumentation. "G" forces above four times gravity tend to make the unit unwieldy. A quick disconnect feature permits the pilot to abandon the whole installation in less than two seconds if an emergency develops.

A sighting mechanism and lens, with 49 adjustable positions, lowers itself into position when the pilot brings down his glare shield. Concentric rings guide his right eye to the photo area. The adjustment feature permits instantaneous adaptation from one man to another. The arrangement of the lens also permits binocular sight. With two units, on two pilots, either one may engage in test work while the other serves as chase airplane, making photos.

PILOT LOOKS THROUGH SIGHT OF CAMERA

Regulus II Missile Ordered
Evaluation and Production Pushed

An additional contract of approximately $26.2 million has been awarded to the Chance Vought Aircraft Company for continued evaluation and production of the *Regulus II* guided missile. Implicit in the contract are provisions for spare parts and special support equipment estimated at an additional 7.4 million dollars.

Regulus II has been flying since 29 May 1956. The first 20 launches were made as a recoverable missile with landing gear. The 11-ton, 57-foot surface-to-surface "bird" was launched successfully with rocket boost for the first time at Edwards AF Base on 13 November 1957. The 1000-mile-plus-range missile, designed to exceed speeds of Mach 2, was fired under a close approximation of shipboard conditions, making this test a major milestone toward introducing *Regulus II* to the Fleet. (See p. 18.)

Regulus II will fit into the weapons system concept of submarines in both oceans. A sub can rise to the surface and within minutes launch a nuclear warhead missile. It submerges immediately while the missile is guided to its target hundreds of miles away.

New Course at Pre-Flight
'National Power' is in Program

The U. S. Naval School, Pre-Flight, has added a permanent new course to its curriculum entitled "Foundations of National Power."

Purpose of the course is to give the Pre-Flight student a basic understanding of national and international situations in our world today.

Out of the 56 hours allotted to Naval Orientation, 28 hours are being devoted to the course, according to LCdr. D. M. Krueger, top instructor.

DELMAR HIGH-SPEED *target which appears to be zeroing-in on a VF-101 Skyray, was demonstrated recently aboard the USS Forrestal. The bomb-shaped target and special tow rig can be reeled out to lengths up to 20,000 feet and are used for all-weather intercept tactics training.*

THE 'BIRD' KEPT COMING BACK

ZERO! TWIN BOOSTER ROCKETS SEND SEVEN-TON REGULUS SCREAMING INTO THE SKY

THE BULLHORN boomed out its terse message: "Mark 17-minute warning!" It was nearly time, and the missile men were tense and ready. Like actors awaiting their on-stage cues, they endured the strain of the approaching "big moment."

This is true of any missile launch, but never before was the tension as gripping and unshakable as on that day at Point Mugu when "Old Indestructible" was launched for the 18th time.

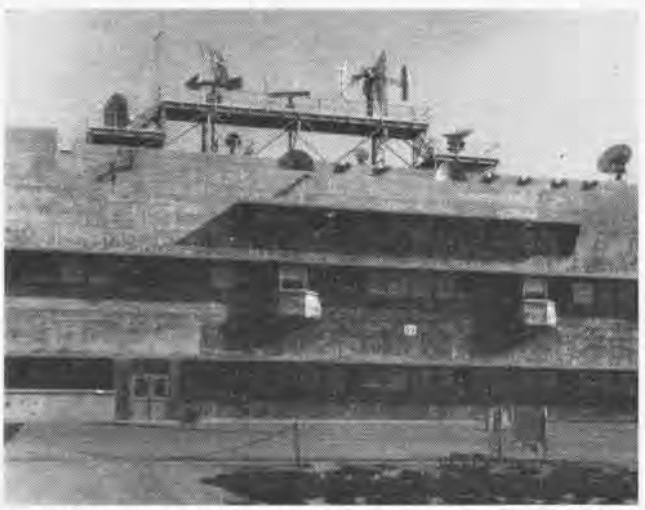
The "bird," a Chance Vought *Regulus I*, had been shot from the launcher, then recovered, then shot again through 17 firings. That day she sat on the launching pad, her blunt nose pointed confidently upward, ready to give it another "go."

Because of her past feats, the crews gave her the name, "Old Indestructible." After every test flight, she came back again.

IN CONTROL ROOM, COUNT-DOWN IS MADE

BACK AT MUGU, NAVY MISSILEMEN KEEP TAB ON SPEEDING SHAPE

IN RANGE CONTROL, SAILOR CHECKS CHANGING COURSE PATTERN



THIS IS 'BRAIN' OF POINT MUGU'S 4200 ACRE MISSILE CENTER

In the course of her 17 flights, the missile had accumulated an enormous amount of valuable test data that would have been lost had she failed to return. When something had gone wrong, she still came back, and her engineers were given a first-hand look at the trouble. Corrective action was taken; lessons were learned that could be applied to other missiles.

On every flight she had made, the "Old Indestructible" had been a "flying test bed," checking out new equipment that could never have been tested as efficiently on the ground.

Navy crews, officers and enlisted men who one day would be operating *Regulus* missiles from submarines, carriers, cruisers and other ships had trained with "the bird."

"Old Indestructible" took the punishment of test flight after test flight—maneuvering through every profile in the book and yielding technical data every trip. Even when pushed beyond her design specifications to lengths to which a missile would never be extended in wartime operational deployment, "Old Indestructible" kept coming back for more.

The Vought engineers and Navy missilemen at the Point Mugu Naval Air Missile Test Center in California had come to "know" this bird. She was almost human to them, an old friend they could count on.

Now she was just 17 minutes away from her 18th flight. Switches had been checked, the missile's circuits cleared of all previous commands. Radio commands were being fed to the multitude of electronic tubes making up the intricate brain of the test *Regulus*: "Throttle 60 percent." "Pitch Zero." "Bank zero. . . ."

The bullhorn boomed: "Mark 14-minute warning!" More signals poured out to the bird on the launcher: "Cycle throttle 90 percent." "Cycle pitch." "Cycle bank. . . ."

The count-down toward Zero, that climactic moment of launch when all hell seems to break, proceeded flawlessly.

Inside the "brain center" at Point Mugu, the atmosphere was charged with excitement. The center was crammed with firing sequence timers, instruments to record data from radar stations that would track the missile, computers, analyzers, plotting boards and a maze of other instruments.

The officers and enlisted men running the operation now were known only by code names: X-ray was the test conductor; Foxtrot, the ground control officer; Mike, the missile chief; Echo, the electrician; Sierra, the autopilot man.

This was a training as well as a test operation. New men were learning the weird intricacies of guided missile operations from crews already checked out.

Below the pad, in an electric jungle of cables and consoles, X-ray, the officer who would "push the pickle" and fire the *Regulus I* into the bleak sky hovering over Mugu, sat at his controls running through the check-out.

"Mark 10-minute warning! Rocket igniter installed." "Old Indestructible" approached her 18th crucial test. The crewmen at the launching pad looked at her quizzically: "How much more strain could the missile stand?"

When the engineers at Chance Vought Aircraft had designed the *Regulus I* for the Navy, they had envisioned a weapon that could be launched from submarines with stunning surprise against an enemy target. It would be able to fly at high speeds and great altitude, carrying a powerful warhead. This idea had tremendous tactical possibilities.

Both Chance Vought and the Navy had realized that there was a need for economy. Guided missiles are expensive and cost as much as jet fighters in the development stage. Economy was an urgent requirement. How long could a project survive if a missile were destroyed with every flight?

With that in mind, Chance Vought, with the encouragement of the Bureau of Aeronautics, had, from the start, designed a missile that could be recovered and flown again. It was the first missile so configured. Reliability experts backed this philosophy. They decided that if a missile could be made to fly at least three times, it would have paid for itself in terms of training and scientific data acquired.

Flight test vehicles (FTV's) like the "Old Indestructible" were equipped with tricycle landing gear so that they could be landed on a runway following each flight.

No one doubted that a missile could be recovered. But even the most optimistic Chance Vought engineer doubted that one could fly more than four times. It was too much to expect of so complex a machine. The failure of even the tiniest component could mean destruction. And every time a missile went off a rocket launcher, it was subjected by acceleration forces in excess of 65,000 pounds.

With a human pilot to take over in times of stress, the odds for recovery would have skyrocketed. But guided missiles must put their trust in glowing electronic tubes and automatic pilots.

"Mark five-minute warning! Check launcher for elevation. Remove rocket safety flag!" An enlisted man patted the side of the missile. On the bird's belly were patches upon patches, wounds of earlier flights. Her paint was scarred. Even her sturdy, clean-lined fuselage had been stretched under the impact of 17 rocket firings. "All hands clear the pad!" The time had nearly come for Flight 18.

CHANCE VOUGHT engineers and Navy experts were thinking of an earlier test vehicle, No. 9, that had once been the champion of missiles that do come back. She made, in all, 15 round trips and then was destroyed against a target on the 16th.

The Navy men who had taken over No. 9 after the bird's third flight were fresh from submarine duty. They'd had a certain amount of training in electronics, but could they hope to cope successfully with a guided missile—the most complex of all flying machines?

GROUND CONTROLLER AWAITS MISSILE'S ARRIVAL AT SAN NICOLAS

A cigar-smoking, powerfully built submariner, LCdr. William E. Sims, had harbored no doubts on that score. As skipper of Guided Missile Training Unit Five at NAMTC POINT MUGU, his job was to make skilled missilemen out of the green crew under his command.

Bad luck had dogged the men of GMTU-5. They had lost the first two birds assigned them. Morale had sagged. Lessons had been learned, even though the birds hadn't come back, but confidence suffered when missions failed.

Sims, with unbounded faith in the ability of the submarine enlisted man, was sure his crew would come through. No. 9 offered him his chance.

The bird had been in the middle of her third flight from Point Mugu when Sam Perry, a tall, sun-burned young engineer who then ran Chance Vought's operations in the field, walked up to Sims in the Flight Test Center. "Here," he said with a smile, "Sign this."

"I hereby accept delivery of *Regulus* missile FTV-9 at 35,000 feet over San Nicolas Island," Sims said and signed.

No. 9 was still hurtling through the skies over the Pacific, but from that moment on she belonged to GMTU-5.

MISSILE TOUCHES DOWN, HITTING THE RUNWAY AT A SPEED IN EXCESS OF 225 MPH. PARACHUTE BRAKE SLOWS MISSILE'S LANDING

REGULUS II IS DESTINED TO GO ABOARD SUBMARINES SUCH AS NAVY'S NUCLEAR-POWERED USS HALIBUT WHICH IS BEING CONSTRUCTED

On this third flight, No. 9 cracked up on the runway at barren, windswept San Nicolas 50 miles out at sea. She had made a perfect approach to the narrow strip, despite the tricky, nightmarish winds that swirl around the island, but on touchdown the parabrake which slows the missile's hurtling speed had failed to function.

Repairs to the damaged landing gear were made in the field, and GMTU-5 soon had the bird ready for another operation. She was transferred from Navy's sea test range at Point Mugu to the desert test center at Edwards Air Force Base, California.

No. 9 had proved that she could take it in that crack-up. While the Navy crew regularly worried each time No. 9 took off, she never let them down. Each time she came soaring back. GMTU-5 made hundreds of "reliability" runs with No. 9 on the ground, pouring the power to her hour after hour, actuating her landing gear, controls, autopilot, telemetering system and all her other vital parts. Lessons were learned and confidence soared.

Sims' faith in his submariners had paid off. No. 9 had been completely "sailorized." It had demonstrated that Navy crews could take even a complex aeronautical weapon like a guided missile and make it work.

But No. 9 and the *Regulus* program in general owed their success to more than the submariners who had initially gotten things going. The missiles were flown again and again and it became obvious that their versatility could be extended far beyond that required for submarine service as crews from other ships were trained.

Regulus could operate as well from aircraft carriers, cruisers, small surface ships and portable launchers ashore. As new missions continued to be discovered for the birds, crews from the Navy's surface ships started reporting to Point Mugu in order to be drilled in the use of the *Regulus*.

To the men with aviation rates, the submariners in the missile program were "the underwater air force," and a good-natured rivalry ensued. But airmen, surface sailors, and submarine men quickly learned to work together in a field that was exciting and new to all of them.

The great majority of the early crews from all three branches had trained on No. 9. They boasted of the bird's accomplishments, sweated out every operation, and pasted a set of miniature wings to her metal sheath as a badge of honor each time she returned.

When No. 9 made her 15th flight, she was checking out a new type of boost rocket, a new rocket bottle jettisoning system, and a new system of jettisoning the slippers on which she rode to the end of the rocket rail. In addition, she had given a new crew their first experience in the preparation and launching of a guided missile.

Data telemetered from the bird back to the technicians at Edwards, had told much of the story of the missile's flight, pouring out information over her channels. No. 9's telemetering system had brought news of success.

Under guidance of the control plane, she throttled back, extended the retractable landing gear and touched down to a perfect landing on the dry lake bed at Muroc. As soon as the wheels made contact with the ground, the bird's parabrake blossomed out to slow her tremendous speed.

The life of No. 9 had been so long that it has outlasted the development equipment originally put into it. Up to that time, no *Regulus* missile had flown as fast and as far. It was the first *Regulus* to use a 46-channel telemetering system and the first to fly successfully with automatic guidance.

As vital to the Navy as the training of crews and the collection of flight test data were valuable lessons learned well about logistics, tactics, maintenance and overhaul.

SINCE THE much-honored No. 9 was "splashed" on its 16th run, a new champion arrived, the "Old Indestructible," and it is now this bird that the crews ready for its 18th run.

"Mark four minute warning!" The bullhorn's booming voice gave assurance that the count-down was continuing on schedule. "Elevate the launcher!"

In four minutes, unless something went wrong, the bird would roar from the launcher in a blast of flame and smoke. Flight 18! What were the odds that she could succeed?

Zero hour neared. The engine of the "bird" was brought to life and filled the heavy atmosphere of the morning with its ear-jarring roar. The twin booster rockets which hugged the tail of the missile were precisely aligned and their igniters set to fire.

The last few seconds passed with agonizing slowness. "Five, four, three, two, one. ZERO! FIRE!"

In that split second anything could happen. This was the supreme test. The rocket bottles, with an ear-shattering roar, burst forth in a tremendous cloud of smoke and flame —68,000 pounds of thrust were added to the forces already coming from the bird's howling turbojet. This was more horsepower than any pilot could visualize.

The bird blasted from the launcher, boring into the sky at a steep angle. Still flickering with spasmodic flame, the big rocket booster bottles tumbled away.

"Old Indestructible" had made her 18th successful launch! The tension of her crew lessened perceptibly as the bird climbed swiftly to a rendezvous with the jet fighter circling above.

Swiftly the missile climbed and grew smaller until she was almost lost in the hazy atmosphere above. It was a good launch, clean and straight. "Old Indestructible" had withstood the ripping, tearing force of another "push" and was in her proper environment once more.

Smiles broke out on the faces of the spectators.

"No sweat," somebody said.

But that was only half the battle. The veteran missile, plying its way through the sky, attained its appointed altitude.

In the radar-sprouting block house, brain center of NAMTC POINT MUGU, the control officer began the preselected flight pattern the bird was to fly.

On their scopes, white-hatted sailors traced the progress of the missile over the vast restricted area of the ocean range. On the plexiglas plot board, crayon slashes marked the flight path of the out-of-sight missile.

At his land-locked cockpit, the controlling officer selected the maneuvers and gave electronic commands. The bird banked, turned, circled, climbed, descended, in accurate and obedient response. And, all the way, she telemetered back her technical data, adding to the store of knowledge this one missile had already contributed to the state of the art.

Now a critical moment arrived. In the vicinity of San Nicolas Island, a conglomeration of rock jutting from the Pacific, the missile began to descend. Here, on the runway installed between boulder and rocky crag, ground control would attempt to land the *Regulus I* once more.

The bird touched down, hitting the runway at a speed of more than 225 mph. On contact, a huge parachute billowed out behind the missile and as the wind caught the concave bowl, the bird slowed and finally rolled to a stop.

"Old Indestructibe" had done it again. Eighteen launchings under the brutal blast of its rockets. Eighteen complicated, twisting flight patterns. Eighteen touch-downs!

The trucks rolled out and technicians shut down the engine, rolled up the parachute, folded the wings, and towed the missile to the hangar where it would await transportation back to Point Mugu and "home."

When it arrived, proud missilemen watched a familiar ceremony. A small pair of golden wings was attached to the fuselage alongside the 17 others already there. Each symbolized a successful launch and recovery.

Even sophisticated missilemen could doff their hats to "Old Indestructible." Her record and flight time of more than 13 hours constituted a mark which possibly might never be equalled—at least not until the art of missilry was far more advanced. "Old Indestructible" met her end on the 19th firing.

But the missile, like hundreds of others of the *Regulus I* breed, had more than paid for itself in data and training. Recoveries had saved the taxpayer more than $100,000,000. And its tactical replicas, operational on submarines and cruisers, maintaining the capability of nuclear retaliation to support our international commitments, were in the Fleet sooner because of *Regulus I*'s rugged indestructibility.

Now Vought and the Navy are testing *Regulus II* at Edwards AF Base. A total of 23 flights have been made, of which one *Regulus II* has made six—so far the best.

HERE A REGULUS I LEAVES THE SUBMARINE, USS TUNNY, IN A TRAIL OF SMOKE AS IT SOARS INTO THE AIR DURING MANEUVERS IN PACIFIC

AIRCRAFT carriers are an indispensable part of the military forces of the United States. By continuing to build carriers at the rate of one a year, we will insure our Nation's capability of effectively providing support for our national policies in the cold war, in limited war, or in general war. In cold war by deploying U. S. airpower overseas without political involvement. In limited war as an attractive means of applying tactical airpower quickly, effectively and globally. In general war as a source of diversified, dispersed, highly mobile attack power, relatively invulnerable to long range missiles and requiring an uneconomical effort on the part of the enemy to counter. Represented here are the three classes of carriers now in commission: *Essex*, *Midway* and *Forrestal*. Gradually the Essex class will be retired as CVAN's join Fleet.

CARRIER PROGRESS

VERSATILE, MOBILE

AIR-SEA POWER

LET'S LOOK AT THE RECORD

Helicopter Steals March
20,000th Landing at Cubi Point

A helicopter crew from the USS *Princeton* stole a march on the jet jockeys at NAS CUBI POINT, P. I., when they whirled in and became the 20,000th aircraft to land on the airstrip. Twenty-three different types of aircraft were operating at the time from the air station.

Capt. C. E. Houston, CO of the station, congratulated the crew and presented them with a 25-pound cake in honor of the occasion. The cake was flown back to the *Princeton*.

Members of the crew were Lt. W. L. Lamb, pilot, Ltjg. J. F. Brancau, co-pilot, and A. C. Heim, airman.

WHEN THE 30,000TH *GCA approach directed by Unit 33, was made at Port Lyautey, Capt. J. L. Connihan, Commander U. S. Naval Activities watched the scope. AGC J. R. McCullough and LCdr. J. F. Kennedy "kibitzed."*

It's 50,000 for RATCC 18
Sherman Field Unit's GCA Mark

"Congratulations, sir, you have just completed the 50,000th approach on this unit."

The message was delivered by Bernard Williams, AC1, of Radar Air Traffic Control Center 18 to Cdr. H. E. Butterfield, Assistant O-in-C Basic Training Group 4, upon completion of a Ground Control Approach landing.

RATCC 18, now at Forest Sherman Field, was originally commissioned GCA Unit 18 at NAAS SAUFLEY FIELD in 1947. While there, over 38,000 approaches were made without incident.

The unit was moved to its present location in May 1956. It was redesignated RATCC 18 last year, and is a division of the operations department. Since the move, more than 11,000 approaches have been made without accident. Cdr. Odie Malone is Division Officer; LCdr. S. J. Harris, GCA Branch Officer.

At the present time radar trailers located on the field are used. However, a new center in the operations building is under construction. It will be completed late this year, and will be used jointly with CAA.

GSSO Runs A Safe Shop
No Personal Injuries Since 1950

One day after Christmas in 1950 a clerk in the General Stores Supply Office at NASD PHILADELPHIA slammed the top of a typewriter desk on her hands and fractured several fingers.

Since that day—seven years and nine million man hours later—the only blood to be shed in the GSSO plant by an employee was that which was given voluntarily to such organizations as the American Red Cross. No accidents serious enough to involve lost time have occurred on the job.

Makes 56,000th Landing
FJ–3M Fury Sets Kearsarge Record

LCdr. Ted Smyer, a veteran of 350 hours in *Fury* jet flight, flew an FJ-3M to make the 56,000th landing aboard the USS *Kearsarge*.

In 13½ years of carrier fighter operations, LCdr Smyer has flown the FJ-1, FJ-3 and FJ-3M for 85 total carrier landings. He is operations officer of the *Blue Knights* squadron, VF-53.

10,000 Safe Hours Flown
Squadron 3 at Whiting Sets Mark

Pilots of South Field's Squadron 3 at NAAS WHITING FIELD have completed 10,000 hours of basic training syllabus flight without an accident. Squadron Three is the first South Field unit to achieve such a safety record.

The record was attained in 219 days of flight operations which included weekends and holidays. Sorties totaled 6670 for an average of 1415 hours per month.

On foul weather days, students convened a kangaroo court to prosecute breaches of air discipline and safety. Further safety training consisted of lectures, required reading, safety posters and slogans, and constant exposure to safety magazines and publications designed to instill safety consciousness and a knowledge of emergency procedures in all the students at Whiting.

VF–173, ABOARD *the USS Randolph (CVA–15), has something to be proud of in having on its roster eight pilots who together have passed the 1000 carrier-landing mark in FJ–3 aircraft. Left to right, kneeling in first row, are Ltjg. Robert B. Arnold, Ltjg. John F. Steel, Ltjg. Robert W. Polsin, LCdr. Zeb V. Knott; and standing, left to right, are Ltjg. Henry C. Holt, Ltjg. Joseph M. Fugere, Lt. Jack L. Underwood, and Ltjg. G. F. Fritz. The banner proclaims their exploit.*

MARINES GET AIRSHIP ROLE

343-FOOT "NAN" SHIP 719 NOSES INTO MOBILE MOORING MAST AT CHERRY POINT

NAN SHIP 719, the Navy's largest blimp, has landed at MCAS CHERRY POINT, N. C., in the first of a series of training exercises designed to acquaint Marines with airship landing procedures and techniques.

The Chief of Naval Operation designated Cherry Point an LTA Emergency Landing Base to provide emergency landing facilities for airships of the Atlantic Fleet after the deactivation of NAS WEEKSVILLE, N. C., last September. Cherry Point was selected for its central location and available facilities.

Other bases with airship facilities are NAS GLYNCO, Ga.; NAS KEY WEST, Fla.; NAS SOUTH WEYMOUTH, Mass.; NAS LAKEHURST, N. J., and Kindley Air Force Base, Bermuda.

More than 60 Cherry Point Marines participated in the exercise and experienced their first landing of the helium-stuffed bird. Many of them who will make up the ITA Emergency Landing Team at Cherry Point got their first look inside the cabin during a tour of the ship.

They were shown the cockpit arrangement, navigation compartment, wardroom and crew's quarters. Nearly all the conveniences of home are provided for the blimp's normal operating crew of 18 to 21.

The successful landing and mooring was supervised by a nucleus ground crew from the "NAN" ship's squadron, headed by LCdr. L. J. Sindell. LCdr. R. Shannon piloted the blimp.

NAN Ship 719 is a member of Airship Squadron Three. Fleet Airship Wing One, based at NAS LAKEHURST. Its primary mission is submarine defense.

The 719 is of the same type as the NAN Ship 561 that established the world endurance record of 269 hours last year. The 8290-mile cruise that began at South Weymouth, Mass., included Newfoundland, the Azores, Spain, North Africa, Canary Islands, South America, Cuba and Key West without landing or refueling the blimp. It was completed in 11 days.

Crew members and the ground crew of the big windbag are quick to boast of its capabilities. Chief Aviation Pilot Brewster, one of eight enlisted blimp pilots in the Navy, claims "It is the safest thing in the air." He said lighter-than-air ships have known only two fatalities since 1946.

Observing the landing demonstration at Cherry Point were BGen. E. C. Dyer, Commanding General of MCAS CHERRY POINT, and Cdr. E. McCartney, operations officer and acting Chief of Staff, Fleet Airship Wing One.

General Dyer expressed his desire to have scheduled landing demonstrations and training to achieve maximum efficiency and readiness of the Marine LTA Emergency Ground Handling Crew.

● Engineering manhours required from the design to the production of one of today's heavy bombers are more than double the hours required for a World War II bomber.

Navy Aids Flood Victims
Food and Medicine Sent to Ceylon

The Navy rushed assistance to the island of Ceylon during the disaster which followed monsoon floods.

An R5D, based at NAS ATSUGI, Japan, flew to Colombo carrying food, medical supplies and equipment for water purification. Lt. Philip Levin, Medical Corps, and three hospital corpsmen were also aboard the transport. Their mission was to reduce the possibility of epidemics in the storm-damaged area.

USS *Princeton* (CVS-37) with 28 helicopters on board, went to the scene. The helicopters, HS-8 and two First Marine Air Wing squadrons, ferried supplies to distribution points

MEDICAL MEN SET OUT ON MERCY MISSION

ashore. The *Duxbury Bay* (AVP-38), and two destroyers also participated in the good will mission.

Close to three tons of vital materials were sent to the victims.

VAH-6 Goes to Whidbey
Six Heavy Attack Squadrons There

Heavy Attack Squadron Six, commanded by Cdr. Alton B. Grimes, has permanently transferred operations from San Diego to NAS WHIDBEY ISLAND, Washington. This brings the total of Whidbey-based heavy attack units to six.

Soon after the move, VAH-6 received its first contingent of the big high-altitude, long-range A3D *Skywarrior*. Until then it operated the AJ *Savage*, the bomber that could be landed aboard a carrier with "two engines turning and one engine burning."

Commissioned in January 1950, VAH-6 is the oldest West Coast based squadron of its type. It has been headquartered at San Diego since 1952. It consists of 38 officers and 272 men.

FERRY PILOTS (L. TO R.) MOFFIT, BROWN, THOMAS, BANKS, BOUDOUIN, HARD HATS IN HAND, SET OUT TO DO SOME TRAVELLING

HAVE HARD HAT, WILL TRAVEL

A LOOK at the log is sufficient!

Monday: Delivered F3H *Demon* from NAS OCEANA at McDonnell Aircraft to St. Louis. Proceeded to North American Aviation, Columbus.

Tuesday: Pilot tested, accepted and delivered a new FJ-4B *Fury* to NAS ALAMEDA, California. Directed by VR(F)-32 to take an F9F *Panther* to NATC CORPUS CHRISTI.

Wednesday: Reached Corpus Christi.

Thursday: Tested F8U1 in Dallas.

Friday: Delivered the *Crusader* to Cecil Field where he received instructions from VR(F)-31 to go to NAS JACKSONVILLE and deliver an S2F to Norfolk. Late Friday afternoon reached Norfolk.

Ahead of him was a weekend to get ready to report on Monday for still another week of going here, there and everywhere. Yet it is pilots like him who steadily make their rounds of delivery that enable Naval air to fulfill its mission.

One word describes the pilots and crewmen of Norfolk-based Aircraft Ferry Squadron Thirty-One. That word is "versatile." Their mission is "the safe and expeditious delivery of Naval aircraft." To perform this mission the pilots in VR(F)-31 are qualified to fly an average of 15 aircraft types. Some of them are qualified in more. Each crewman is also checked out in many types.

Neither pilots nor aircrewmen receive special training prior to being ordered to the squadron. Owing to the nature of the duty, mature, well-seasoned pilots with at least one tour of sea duty behind them are normally assigned. Upon reporting aboard, however, they undergo intensive and never-ending training. Because of the increasing number of jets, transition training is given top priority. Flight simulators, operational and mobile trainers, and factory facilities are used to keep pilots checked out and current in various aircraft. For multi-engine check-outs, the progression is the standard one from 2nd pilot to Plane Commander.

When an aircraft is to be transferred from the factory to the Fleet, from the Fleet to overhaul, storage, or any other destination, a VR(F) is notified. Pilots are then assigned as they become available. The aircraft are moved on a priority basis. Those going into storage, for example, are ferried when time permits, but all

NINE FACTORY-READY FURIES THAT WERE PICKED UP AND DELIVERED TO SQUADRONS ALL OVER THE COUNTRY ON THE SAME DAY

PRE-FLIGHT CHECK OF AN HSS-1 SLATED TO GO TO KEY WEST

THE SKIPPER IS GOING PLACES, TOO, THIS TIME IN A COUGAR

orders are picked up within 10 days.

VR(F)-31 works in close conjunction with its sister squadron, VR(F)-32, located at San Diego. Both squadrons are under ComNavAirLant operational control. In assigning aircraft to be ferried, VR(F)-31 controls pilots of both squadrons when east of Dallas, Texas. VR(F)-32 takes over in Dallas.

Although the ferry squadron flies practically every airplane in the Navy and Marine Corps at some time or other, it has only three aircraft assigned: two R4D's and one SNB. These are used to transport pilots to points where planes are ready for ferry, or to return pilots to Norfolk from destinations which have no return ferry available.

It is a gypsy life. Since pilots are on the road more than 80 percent of the time, it is classified as sea duty. No pilot ever comes to work without his travelling garb, and all must be ready to leave on a trip at a moment's notice, a trip that might take him anywhere and for an indefinite period.

R4D CREW PREPARES FOR SHUTTLE TRIP

Whether it is the latest 1000-mile-an-hour jet with its paint still wet, an old tired warrior going to pasture, a seaplane, whirlybird, trainer or four-engine patrol plane—Aircraft Ferry Squadron Thirty-One or its west coast counterpart will make the delivery.

The squadron Commanding Officer, Capt. Charles Wayne, attributes the excellent work his squadron is doing to the following factors: experienced personnel, constant training, hard work by all hands and safety consciousness. It adds up to versatility.

PILOTS CLARK, THOMAS DISCUSS SOME OF 25 TYPES THEY FLY

FERRY SQUADRON 31 HAS ITS OWN JET TRANSITION PROGRAM

FIFTEEN MEN *on an uphill trip. Chief Wareing, Oceana Strongman, pulls panel truck and men up incline with his teeth. Dentists said teeth were not injured; mechanics pronounced truck ok.*

THE MIGHTIEST MAN ABOARD

STRONG MAN *Wareing, father of six, winner of DEC in WW II and Air Medal in Korea.*

STRONGEST man at the Oceana jet station and very likely the strongest man in the Navy is John Wareing, ADC. On occasion he has lifted seven men weighing 1226 pounds, lifted the rear end of a 1951 Buick with his legs, the rear end of a pick-up truck while lying on his back, and has pulled a Navy panel truck up an incline by his teeth. There were fifteen men aboard.

Wareing's feats of strength have brought him a great deal of publicity. Many of the feats have never been duplicated by competitors as the chief continues to amaze his spectators.

On the television program, "You Asked for It," the chief held a 1951 Ford convertible dead in its tracks.

Now fulfilling his duties as Director of Physical Training and Recreation at Oceana, Wareing may be seen working out daily. He is active with many athletic groups and is an instructor in intramural basketball.

The Oceana strongman is still active professionally. He began training as a boxer at the age of 14, then in 1940 shifted to strength feats.

Wareing is married and the father of six children. His father, William D. Wareing, was a professional trainer and masseur to many of New York's more colorful personalities. He attributes success to the "will to do."

DETERMINATION *of auto (note spinning wheels) is no match for the sturdy Wareing.*

PUSH-UPS *can be simple, as demonstrated by Wareing, here hoisting Buick's sternsheets.*

Two Instructors Honored

Get Whiting Safety Commendation

Two South Field instructors at Whiting Field, Lt. Hugo L. Ecklund, Jr., and Ltjg. James M. Dougherty logged their 1000th accident-free syllabus hour. At the time of the record and commendation, both instructors were members of Squadron Three.

Lt. Ecklund has since reported to Tactical Air Control Squadron 21 and is now located at NAS NORFOLK, VA.

Anchor Chain Saves Jets

Serves as Arrested Landing Brake

Anchor chain, one of the oldest commodities in Naval tradition, plays a vital role in modern jet aviation. More than 70 jet planes have been saved during the past two years at NAS OCEANA, Va., through the use of anchor chains in arrested landings.

When a jet pilot informs the tower by radio that he has lost hydraulic pressure in flight and that he will not be able to apply brakes for a normal landing, the crash and salvage crew is alerted.

As the jet circles the field to expend its fuel, the ground crew mans stations for an arrested landing. Each man has a pre-arranged position. Within six minutes after receiving an alert, the crew rigs arresting gear to stop the plane completely.

A cable is extended across the runway. The cable is connected to anchor chain. On landing, the pilot engages the cable with his tail hook and begins dragging the chain.

Each foot of anchor chain exerts approximately 50 pounds of pressure.

The amount of anchor chain required to stop a plane is determined by the pilot's landing speed. A normal amount of chain is 300 to 400 feet.

If the tail hook fails to engage the cable, an over-run barrier at the end of the runway brings the aircraft to a stop. Thirteen planes have been saved in this manner at Oceana during the past 20 months.

Oceana has four runways equipped with arresting cable equipment. The cost of setting it up was approximately $200 per unit. With more than 70 planes saved to date, it is estimated that millions of dollars in aircraft damage has been saved. An undetermined number of pilots have been saved from death or serious injury.

VMF–122 Gets Crusaders

First Plane Arrives at Beaufort

VMF-122 at Beaufort, S. C. will be the first Marine unit to fly the F8U-1. One of a five-plane consignment of *Crusaders* has been delivered to the squadron by Chance-Vought.

Delivery of the F8U-1 marks the first step toward jet age conversion of Marine air striking power to fighters capable of speeds above 1000 mph. *Crusaders* have already been assigned to Navy squadrons in the Fleet.

The first *Crusader* assigned the Marine Corps went to Moffett Field, where a class of six Marine pilots from VMF-122 began a training course under the Navy's all-weather fighter squadron, VF-23. Similar groups will train with VX-3 at ATLANTIC CITY.

Point Mugu on Television

Air Missile Test Center Shown

Dave Garroway's television show, *Wide Wide World*, made a second visit to the Naval Air Missile Test Center, Point Mugu, on January 19. Fifteen minutes of the one and a half hour show featuring missile operations of the Army, Navy and Air Force, was devoted to the Navy's big test facility.

The NAMTC sequence, which gave a run down on missile operations at the Center, was opened by a sequence of overall shots of the Center, and was followed by RAdm. J. P. Monroe, Center Commander.

Films and table models of missiles tested at Pt. Mugu supplemented live shots of guided missiles in action. A live test shot of *Regulus I* and an air-to-air operation (partly filmed) wherein an F2H *Demon* attacked and "killed" an F6F jet drone target plane were included in the show.

Marine Pilots on Intrepid

Twenty-One Complete Carquals

Marine Attack Squadron 225 of MAG-14 climaxed the carrier phase of their squadron training with a week-long operations aboard the *Intrepid*.

Pilots and crew began field carrier work early last fall. In two and a half months, all pilots were able to qualify on a day and night basis using the new mirror landing system. A total of 6,212 day and night field carrier landings were logged before the cruise.

The attack unit was limited to one full day of flying because of exceedingly foul weather. But despite this, 21 of VMA-225's pilots were able to complete their daytime carquals.

Safety Program Successful

1957 was a Good Year for Whiting

From the standpoint of safety, 1957 was a record year for Whiting Field personnel. The 2567 military personnel stationed there are determined to keep it up.

Only two deaths resulted from traffic accidents in 1957 as compared with eight traffic deaths in 1956. There was also a marked decrease in injuries and loss of time owing to injuries.

Safety program at Whiting included reminders of highway safety in daily bulletins from the base commander, a traffic safety poster contest, constant safety plugs in the base paper and over radio.

Whiting plans to continue its varied safety program during this year.

DO-IT-YOURSELF *Guppy is displayed by Ltjg. William Hussar of VAW–11. He couldn't find a model of the plane he has flown for two years. Undaunted, he built an AD–5W in 60 hours, using BuAer weight and balance specs.*

PILOTS OF ATTACK *Squadron Sixteen, attached to Carrier Air Task Group 182 at NAS Oceana, operate in a demonstration of the famous special weapons' "Idiot Loop" with their new Douglas AD-6 aircraft models. The squadron, skippered by Cdr. R. W. Willis, went aboard the USS Yorktown in January for carquals and went to Guantanamo Bay for intensive weapons training.*

ATU–102 Safety Leader

No Accidents in Calendar 1957

ATU-102 at NAAS KINGSVILLE claims that it was one of only two Advanced Training Units in the Advanced Training Command that went through 1957 without an accident. In all, there are 16 flight training units at ten different commands, including Mainside, Cabaniss, Orange Grove, Chase, Port Isabel, Pensacola, Fla., Memphis, Tenn., and Olathe, Kansas.

ATU-102 has now exceeded 35,000 accident-free hours. Cdr. J. W. Lorch, OinC, said the goal would be 40,000.

The other accident-free unit was ATU-107 at Cabaniss Field. Both units used the T-28.

All units together compiled the best 12-month safety record in the history of the Advanced Training Command.

CAPT. C. L. *Westhofen, CO of NAS Los Alamitos, congratulates Cdr. B. C. Ames, BARTU-776 skipper, upon receipt of Noel Davis Trophy.*

LCDR. J. P. MARTINEAU *administers the Oath of Allegiance to his son, Robert, upon his enlistment in the Naval Air Reserve, NARTU Norfolk.*

TROPHIES, TRAINING AND TOURS

THE ANNUAL announcement of the Noel Davis Trophy winners is an occasion for celebrating among the Reserve Squadrons named. They look forward to receiving the plaque, concrete proof of the award.

Three squadrons at NAS Los ALAMITOS were recently honored at official presentation ceremonies. They were Air Wing Staff 77, BARTU 776, and Aviation Ground Unit 771, commanded by Capt. R. S. Garrison, Cdr. B. C. Ames and Cdr. C. S. Melvin.

East Bay Reservist Honored

For performance beyond the call of duty, L. E. Stromberg, AD1, received the Navy League plaque for East Bay Naval Reservist of the Year. He accepted it for his unit, VF-872.

Gus C. Nichandros, Navy League Committee Chairman, made the presentation. Capt. W. H. Weston, CO of NAS OAKLAND, and LCdr. R. H. Finlayson, squadron skipper who nominated him, praised Stromberg.

In addition to other achievements, Stromberg commuted for one year from Los Angeles—a matter of 900 miles a month—to chalk up a total of six years of perfect drill attendance.

Like Father, Like Son

It was a proud day for LCdr. Joseph P. C. Martineau when he administered the Oath of Allegiance to his 17-year-old son, Robert. Mr. Martineau, a veteran of 29 years active duty, is Maintenance Officer of Radar Traffic Control Center 35 at NAS OCEANA.

Robert is now an Airman Recruit attached to VS-863, the newest Anti-Submarine Squadron at Norfolk.

It Pays to Advertise

Ltjg. Leslie Morrissett is an ardent sports car racing enthusiast. He is also an energetic recruiter since he is a member of the NavCad-AOC Procurement Team at NAS GROSSE ILE. Last season he was very successful on Michigan courses in an Alfa-Romeo.

This year he hopes to break all records in his vocation and avocation in his Corvette decorated "Fly Navy."

EAST BAY *Naval Reservist of the Year, L. E. Stromberg, AD1, accepts coveted plaque on behalf of his squadron, VF-872 at NAS Oakland.*

LTJG. L. MORRISSETT *of the NAS Grosse Ile Procurement team, shows off his Alfa-Romeo, which did well in sports car racing circles.*

BETTY ROBERTS, *AN, stationed at NAS Olathe, is the first WAVE at that activity to be fully checked out to ride a TV–2 jet trainer.*

MAYOR CHARLES DAIL *of San Diego enjoys gift from NAS Seattle's VA–891. Cdr. J. Starkel, the CO, and LCdr. E. Lynch brought the treat.*

Olathe WAVE Rides High

Betty I. Roberts, an airman in the Information and Recruiting Department at NAS OLATHE, really has a claim to fame. Not only did she have a ride in a TV-2 jet trainer, but she told the country about the experience on a coast-to-coast radio program.

Betty had to go through two stages to qualify for a jet-ride. The first step consisted of going to 43,000 feet in a low pressure chamber, to make certain she could tolerate altitude.

Next, she went for a ride on the ejection seat trainer, to learn the correct procedure for escaping from an aircraft in case of emergency. For one-tenth of a second she pulled about nine G's.

A news reporter was on hand to make three-minute tape recordings of the check out process and flight. They were later played on the radio program Monitor. Betty took the flight with LCdr. J. R. Mills. She said she thoroughly enjoyed it and hopes to do it again sometime.

VP–741 Holds Mine Exercise

Teamed with Key West fleet air units, VP-741 engaged in a simulated mine-laying exercise in the Tampa Bay area.

The weekend drill, one of many in which reserve squadrons participate under the operational control of USN squadrons on both coasts, included an air defense drill.

The Jacksonville Reservists used four P2V-4 *Neptunes* for the mock operation at the mouth of the harbor.

Aerologists Tour Observatory

Six NAS DENVER aerologists made a field trip to Colorado University's high altitude observatory, located at 11,500 feet in Climax, Colorado.

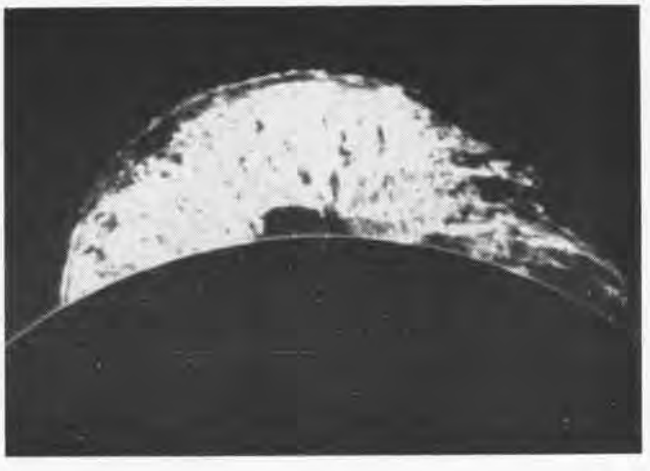
The group toured the radio-communication shack which houses a cosmic ray counter and radio transmitter. From there an alert can be short-waved to the Navy rocket installation at San Nicolas Island off the coast of California. This initiates launchings which must be so timed that the rocket arrives in the high atmosphere of the earth at, or near, the time of a solar flare in order to record data on the effects of the flare.

In the observatory, the aerologists saw a coronograph and a spectro-helioscope, used to observe the sun's atmosphere and face, respectively.

Cdr. J. F. Crotty and G. R. Heicher, AGC, of the station's aerology department made the tour with LCdr. G. Ford, Lt. N. J. McDonald, Lt. R. Joyce and Ltjg. Robert F. Brun of AWS-71.

CORONAGRAPH *is shown to Ltjg. R. F. Brun, NAS Denver aerologist, by Mr. Keith Watson, research staff member of Climax Observatory.*

ARC OF EXPLODING *gases, twenty times the earth's size, is reportedly the largest ever photographed. Climax machines recorded it.*



HMS VICTORIOUS MODERNIZED

BRITAIN'S HMS *Victorious*, veteran of famous WW II actions, has been rebuilt into a modern aircraft carrier at a cost of nearly $42,000,000.

The sixth modern carrier to join the Royal Navy since the war, she is fitted with an angled flight deck, steam catapults and mirror landing sights. Under the command of Capt. C. P. Coke, R.N., the ship was commissioned on January 14 and began sea trials early in February.

The angled deck (8¾ degrees angle) has been gained by extending the flight deck out for 41 feet on the port side, so that it overhangs the ship's side by 35½ feet. This 775-foot flight deck is strong enough to take the heaviest of Fleet Air Arm aircraft, including the new jet attack plane now being developed, the *Blackburn N. A. 39*. From the deck of the *Victorious* the first operational squadrons of *Scimitars*, low level strike aircraft, will be flown. The carrier is equipped to handle the *Firestreak* air-to-air missile which will be used as armament on new operational aircraft.

Two parallel track catapults are fitted forward with aircraft positioners and jet blast deflectors. Deck landing mirror sights are fitted port and starboard.

To supply power for the catapults, larger boilers of much higher output have been installed and the capacity of the ship's auxiliary machinery increased, including more steam dynamos and evaporating and air conditioning machinery. New larger capacity aviation fuel systems have been fitted with filters designed to give a much higher degree of purity to the fuel.

The immense radar antenna is located above the ship's island and is the first of its size to be mounted in a warship. It provides a shipborne air defense 3-D radar for aircraft. A complex semi-automatic electronic system collects and displays the information provided by this radar, enabling the Captain to see at a glance the tactical situation in any section of the sky for miles around.

The rebuilding of the *Victorious* has needed 800 miles of electric cables, 10,000 lighting points, 10 miles of ventilation trunking and 17,000 square yards of linoleum. It will gladden every sailor's heart, for it is a new type that needs neither polish nor scrubbing. Some 130,000 castings have been worked into the ship and 400,000 feet of tubular scaffolding were used while she was in dock.

For the first time in any ship of the British Navy there will be no need for hammocks; every man will have a bunk. A company of 2,057 (including 240 officers) will be accommodated.

More than 20 air squadrons served in *Victorious* during the war. There were actions against the *Bismarck* and *Tirpitz* in 1941, 1942 and 1944, convoy escort trips to North Russia and Malta in 1942, while the air group from the *Victorious* covered the North Africa landings in 1942. Her present captain served with the ship on the wartime Malta convoys.

On May 9, 1945, the *Victorious* was hit on the flight deck by a *Kamikaze* aircraft but within a few hours was in action again.

There have been three predecessors to the present modernized version of the 16-year-old HMS *Victorious*.

THE MODERNIZED VICTORIOUS NOW CARRIES FINEST SHIPBOARD RADAR INSTALLATION

Awards to Missile Experts

Developers of Terrier are Honored

The Director of the Applied Physics Laboratory, Johns Hopkins University, Silver Spring, Md., and four members of his staff have been given the Navy's highest public service award.

Distinguished Public Service Awards were presented by Dr. Ralph E. Gibson, Director of the Laboratory, Dr. Richard B. Kershner, Dr. Alexander Kossiakoff, Robert C. Morton, and Henry H. Porter. At the same time Meritorious Public Service Citations, the Navy's second highest awards, were presented to four other members of the staff: Alvin R. Eaton, Jr., Thomas W. Shepherd, Roland W. Larson, and Richard T. Ellis. This is the largest number of awards ever made by the Navy at one time to members of a single organization.

The awards were made in recognition of the outstanding contributions of these staff members to the development of the Navy's guided-missile *Terrier*. *Terrier* is a supersonic surface-to-air missile which may be fired from either shipboard or ground stations. It is operational in the fleet on the cruisers *Boston* and *Canberra* and the destroyer *Gyatt*. The cruisers *Topeka*, *Providence*, and *Springfield* now are being converted to carry the missile. The new aircraft carriers *Kitty Hawk* and *Constellation*, as well as a new class of guided-missile frigates, also will be armed with *Terrier*.

RAdm. F. S. Withington, Chief of the Bureau of Ordnance, presented the awards in a ceremony held at the Lab.

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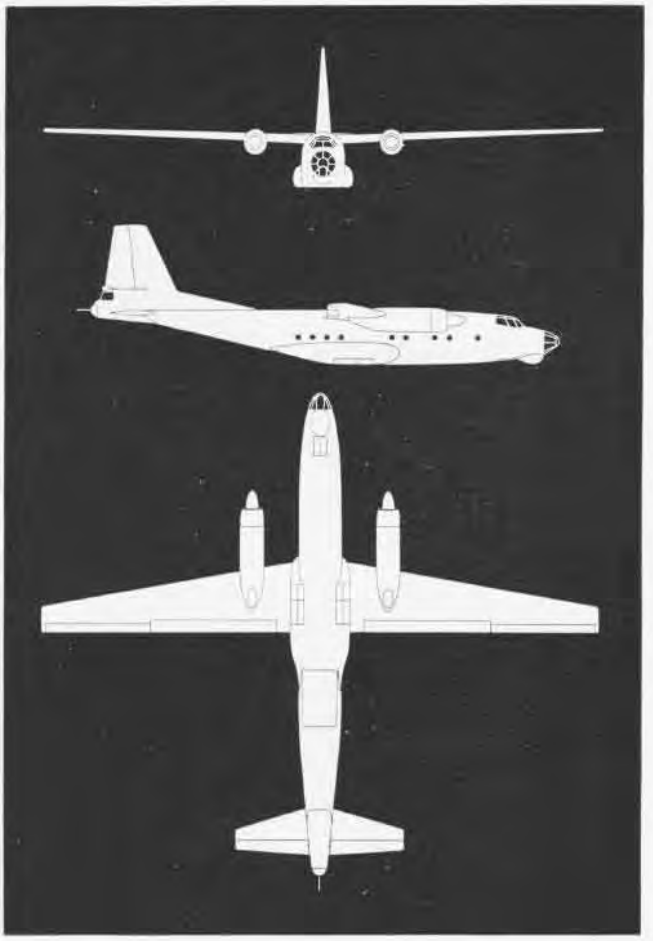
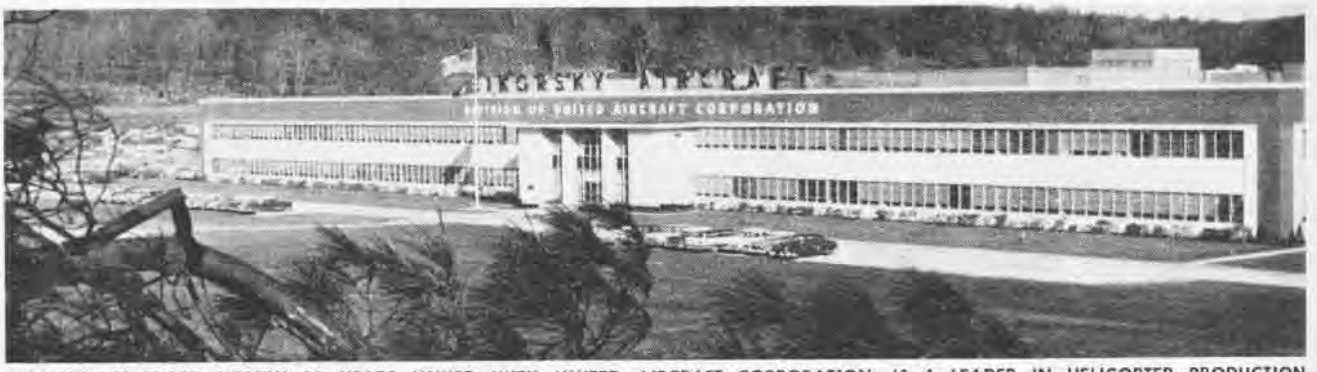
The Soviet's big new assault transport is designed to carry heavy loads at high speeds. With a gross weight of more than 70,000 pounds, Camp has a range of some 4000 nautical miles. Powered by twin turboprops, Camp has an appearance similar to that of the USAF C-123. Called the "Flying Whale" by the Soviets, it was designed by O. K. Ontonov.



TRANSPORT CAMP

★ ★ ★ ★ ★ ★ ★ ★ ★



SIKORSKY AIRCRAFT, NEARLY 30 YEARS LINKED WITH UNITED AIRCRAFT CORPORATION, IS A LEADER IN HELICOPTER PRODUCTION

BUILT BY SIKORSKY AIRCRAFT

TODAY HELICOPTERS beat their way across the sky with such regularity that it is hard to recall the time when they were regarded as an unreliable novelty. Many men have contributed to the development of the helicopter, but certainly one of the great pioneers is Igor I. Sikorsky. His name has become synonymous with helicopter.

The Sikorsky Aero Engineering Company was established in this country in 1923 by a group of *emigre* Russians. At their head was a man who had already achieved fame in aeronautics in his native land. Although Sikorsky first tried to build helicopters, his early success came in the design of conventional aircraft, the S2 and his S5 won him national recognition as well as F.A.I. license number 64.

Shortly before WW I, he embarked on an engineering project which gave the world its first multi-engine airplane—the four-engined *Grand*. This was followed by larger Sikorsky designs used as bombers in WW I.

The Russian Revolution in 1917 ended Sikorsky's career in his own country, and he fled to western Europe. After the Armistice, Sikorsky came to the United States, but not until 1923 did he again become fully engaged in an aeronautical career on Long Island.

First aircraft built by the young concern was the S-29A, a twin-engine transport. A number of aircraft followed, including the twin-engine S-38 amphibian for Pan American. The S-38 made several world's records for speed and altitude with specific loads.

With this success, the company moved to Stratford, Conn., in 1929

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The story of Sikorsky Aircraft is thirteenth in a series of articles on companies which have built and are building aircraft for the Navy.

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and became the Sikorsky Aviation Corporation, a subsidiary of United Aircraft. It is a division today.

Between 1928 and 1931, the U. S. Navy procured from Sikorsky 16 patrol and transport aircraft, seaplanes and amphibians.

All during the 30's, the Sikorsky Company engaged in the design and construction of large multi-engine amphibians and flying boats. In 1933, the S-40 was the largest amphibian in the world. Built for Pan-Am, it was powered by four 575-hp P&W *Hornet* engines. It could carry a score of passengers, 1000 pounds of mail and a fuel capacity sufficient for nine hours.

With the S-42, the company broke away from the familiar layout. No longer a biplane design, the monoplane wing with tapered extensions was carried by a neck on the hull and braced by parallel struts on each side. The lines of the metal hull had developed from those of the S-40, the original Pan American "Clipper Ship," but instead of the typical Sikorsky tail booms, the hull was extended to carry the monoplane tail unit with three fins and rudders.

By 1934, the S-42 had broken ten world's records for speed with payloads over specified distances and height. All through the 30's, the Sikorsky amphibians made their mark.

In 1939, 30 years after his first helicopter experiments as a youth in Russia, Igor Sikorsky flew his first successful helicopter—the now-famous VS-300—at Stratford, Conn.

The first "flight" gained an altitude of a few inches which lasted only for minutes, but it marked the birth of an entirely new era in Sikorsky's career. Each consecutive flight brought new solutions for the correction of difficulties. Finally, on May 13, 1940, Sikorsky left the ground on the first free flight of the VS-300. With this machine, Sikorsky established helicopter records, made the first amphibious helicopter flights, and brought to America the world helicopter endurance record by being in the air one hour and 32 minutes.

January 14, 1942 saw the first full-scale helicopter take to the air—the U. S. Army Air Forces' XR-4. The machine, about twice the size of the pioneering VS-300, had twice its power.

The XR-4 was powered by a Warner R-500-3 of 175 hp and featured a 36-foot main rotor. It weighed 1900 pounds empty and had a gross weight of 2449 pounds. The new helicopter was flown to Wright Field, Dayton, Ohio from Stratford, Conn., in a series of 16 hops covering 761 miles in 16 hours, ten minutes. This aircraft was ordered by the Army Air Forces, and the Navy obtained 23.

The R-4's were followed in 1944 by the XR-5, a larger and much improved design powered by a 450-hp Pratt & Whitney R-985-AN-5 *Wasp Junior* engine. The R-5, designated by the Navy as HO2S-1, featured a 48-foot main rotor and had a gross weight of

4800 pounds. The XR-6 returned to the smaller size of the R-4.

More than 400 of these three models were built for military use in WW II. They were used by the U. S. Army, Coast Guard, and the British Royal Navy and Royal Air Force.

In March 1946, Sikorsky Aircraft began testing its first post-war helicopter, the four-place S-51. A commercial modification of the military R-5, it had a speed of 103 mph, cruised at 80 mph, and had a service ceiling of 13,000 feet.

In the fall of 1946, the Navy took delivery of four S-51's, designated them HO3S and assigned them to duty with an Antarctic expedition.

A new model, the two-place S-52, was unveiled in November 1947. This model won a Navy competition for a four-place observation helicopter and was designated HO5S by the Navy. It was the first production helicopter to feature all metal blades for both main and tail rotors.

On 1 May 1949, Sikorsky began designing the S-55 (Army H-19) for the military services. This version carries a crew of two and ten passengers. Sikorsky Aircraft completed the H-19 in six months, and on November 4, the aircraft was demonstrated. The H-19 helicopter was produced for the Navy (HO4S) and Marines (HRS). Throughout the Korean war, this helicopter was used to carry cargo and complete military units to otherwise inaccessible combat positions.

The HO4S is powered by a Pratt & Whitney R-1340, has a cruising speed of 85 mph, reaches a high speed at sea level of over 100 mph, and climbs at sea level at the rate of 780 fpm. It is still being constructed in both military and commercial versions.

As a result of a design competition held in 1950, Sikorsky was awarded a Navy development contract for a multi-engine Marine assault-transport helicopter, Model HR2S-1. On 18 December 1953, the HR2S-1 (S-56) made its first flight, and in January 1954, this transport helicopter, capable of carrying 20 fully equipped troops was demonstrated. It is a five-bladed single rotor helicopter powered by two Pratt & Whitney R-2800 aircraft engines slung outboard of the fuselage on short wing stubs. Both the main rotor and small tail rotor fold for easy handling aboard aircraft carriers. It was first assigned to the Marine Corps in March 1957 for assault operations.

The HR2S is one of the first helicopters ever built with retractable landing gear, a feature contributing greatly to its speed. For instrument flight in bad weather, the giant helicopter carries an automatic pilot and anti-icing equipment.

In November 1956, the HR2S broke three international helicopter records for speed and altitude with payload. The aircraft flew 162.7 mph and achieved an altitude record of 7000 feet while carrying a payload of 13,250 pounds. It also set an altitude-with-payload record when it carried 11,050 pounds to a height of more than 12,000 feet.

As a result of a competition in 1951, Sikorsky Aircraft was selected to develop the HSS-1 antisubmarine helicopter introduced publicly in June 1954. A utility version used by the Marine Corps is designated HUS-1. The HSS, known commercially as the S-58, is a single main-rotor helicopter, larger than the S-55. Basic antisubmarine equipment in the HSS-1 is sonar gear which includes an electrical device which may be lowered while the helicopter hovers at low altitude.

The HSS-1 is powered by a single Wright R-1820 aircraft engine installed in the nose of the aircraft. The four all-metal rotor blades and four-bladed tail rotor fold manually for space-saving on the hangar deck.

The HSS-1 is in the 100-knot speed category. The commercial version of this helicopter, the S-58, is now in mail, cargo and passenger service in this country and in Europe. It carries 12 passengers and a crew of two.

It was not until May 1957 that Igor Sikorsky, engineering manager of the firm, retired. He is, however, still acting in a consultant capacity to United Aircraft Corporation.

His leadership in the field of rotary aeronautics has brought him honors and awards from colleges throughout the country and given him a high position in scientific and professional fraternities in his field.

In 1950, on behalf of the entire helicopter industry, Mr. Sikorsky received the Collier Trophy, presented by Harry S. Truman. Of Sikorsky, Thomas K. Finletter as Secretary of the Air Force said in 1952, "He is a milestone in the history of aviation."

What was started in the early twenties by a group of Russian *emigres* has come a long, long way. It is a distinguished example of what citizens with enterprise, imagination and a great capacity for work can accomplish.

NAVY IS TRYING OUT THE HR2S AS AN EARLY WARNING COPTER

A RESCUE HELICOPTER IS SHOWN ON DECK OF THE USS ORISKANY

FOUR STATIONS WILL CLOSE

FOUR NAVY and Marine Corps air stations are scheduled to be disestablished by the end of March, 1959, resulting in an annual saving of approximately $8,000,000.

Two major stations to be closed are NAS ATLANTIC CITY and MCAS MIAMI. In addition, NAAS EDENTON, N.C., and CABANISS FIELD, Corpus Christi, will be disestablished.

More than 7000 Navy and Marine Corps personnel will be available for reassignment. The 1100 civilian employees affected will receive transfer, placement, or reemployment rights in accordance with Civil Service regulations. Navy and Marine officials will help them locate work elsewhere.

The stations are being closed because of the necessity for reductions in aircraft, personnel, and associated bases in the Naval aviation establishment. A planned reduction in the Navy's pilot training rate is a major factor in the decision to close Cabaniss Field which is part of the Naval Air Training Command.

NAS ATLANTIC CITY will close about July 15, 1958. Confining air traffic in the Atlantic City area and restrictive air defense identification procedures which hamper training activities contributed to the decision to disestablish the station. The base is located on leased land and is primarily of World War II construction. The Navy does not feel that the expenditure of funds for continued operations would be justified.

Approximately 1800 military personnel will be transferred and about 315 civilians released as a result of the Atlantic City closure. An annual savings of more than $3,330,000 will result. The Air National Guard has indicated an interest in the facilities and the land will be subject to the right of recapture by the Navy in the event of mobilization.

MCAS MIAMI will be disestablished about October 15. Marine Corps activities there will be relocated but the Naval Air Reserve and Fleet Weather Central will remain as tenants. The three airfields which comprise the Marine station—Opa Locka, Masters and Amelia Earhart—will be declared excess with the right of recapture in case of mobilization.

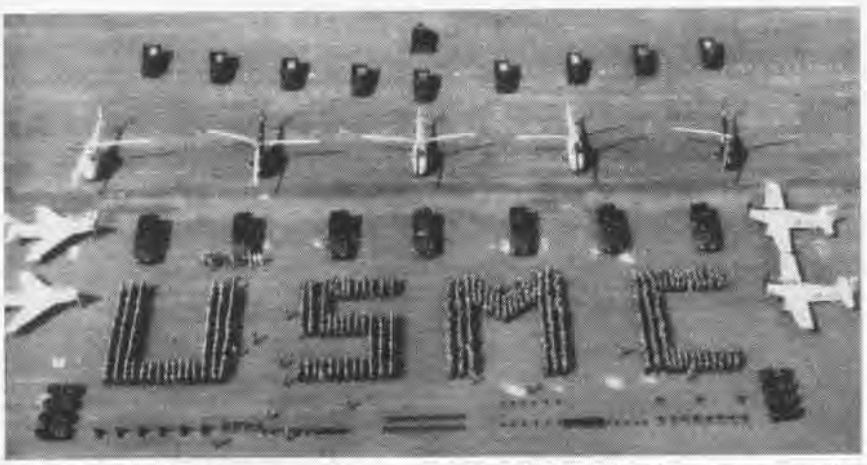
The expressed desire of the Dade County (Florida) Port Authority to acquire this property for civil airport use will be transmitted by the Navy to the Civil Aeronautics Administration and the General Services Administration for their action.

The Navy now owns 4066 acres of land at the Miami station. About 3135 military personnel and 493 civilian employees will be affected, and an annual savings of about $3,000,000 will result.

The Edenton station will be disestablished about March 31, 1959. Previous plans called for the relocation of Marine Corps activities there in 1959, to be followed by extensive modernization of the field for Navy use as an auxiliary in the Norfolk air base complex. Because the modernization would cost approximately $48-million, it was decided to disestablish the base as part of the required deductions in the Naval shore establishment. The base's 3283 acres of land will be declared surplus with the right of recapture.

However, if the city of Edenton has civic or industrial use for the land, the Navy would be willing to dispose of the property without restriction. The 1294 military personnel will be transferred to other Navy activities. About 138 civilians are employed at the base. The Navy will realize an annual saving of about $810,000 by closing Edenton.

Cabaniss Field will be disestablished by October 1. Approximately 1134 military personnel, supporting 102 student pilots, and 153 civilians will be affected. This disestablishment will save about $1-million per year.



ELEVEN HUNDRED *in Roman numerals comes out MC. MC stands for Marine Corps. Spelling out a giant "USMC" on the MCAS Kaneohe Bay runway are 1100 Marines, representing the number of reenlistments in the 1st Marine Brigade, FMFPac, during 1957. The display was arranged for General Randolph Pate, Commandant of the Marine Corps, during his visit to Hawaii. Money saved by this retention of personnel could buy the aircraft and weapons shown.*

ARMY 'SPYING' *machine being produced by Republic is an unmanned drone that has three interchangeable nose units for switching from photography to radar to infra-red. It can be launched "zero length" and is recoverable.*

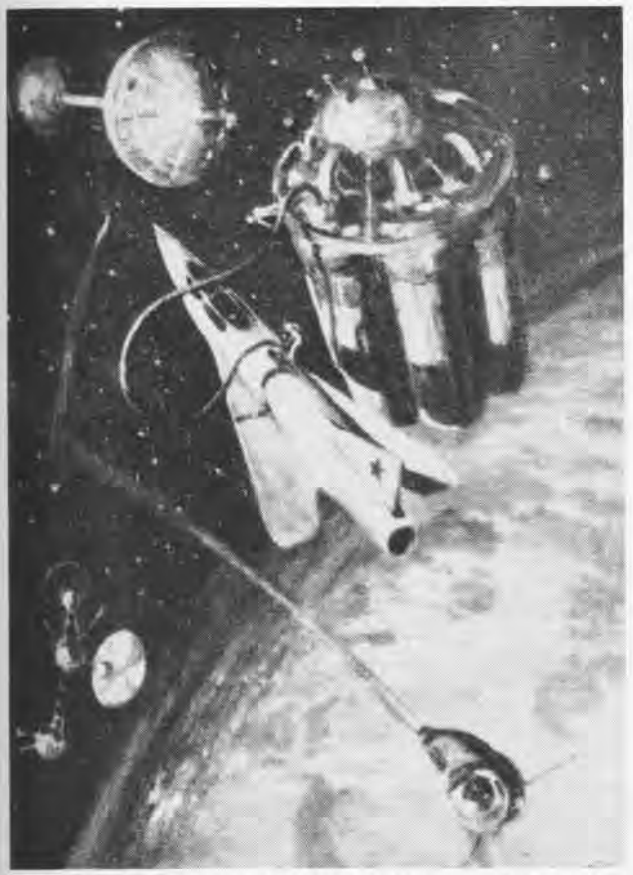
Antilles Command Formed

To Be Headed by RAdm. Gallery

A subordinate unified command has been formed under Admiral Jerauld Wright, Commander in Chief, Atlantic. The new command, designated the Antilles Defense Command, is headed by RAdm. Daniel V. Gallery, Commander Caribbean Sea Frontier the Commandant, IOND.

The Antilles Commander is responsible for coordinating defense matters of joint interest to all the U. S. uniformed services in the Antilles.

MOSCOW-MOON EXPRESS IMAGINED



PICTURE SHOWS SERVICING INTERPLANETARY SHIP ON A SPUTNIK

'INTERPLANETARY VILLAGE' AT HEIGHT OF 1670 KM IS IMAGINED

SPUTNIK I surprised most of the world, but Muscovite teen-agers took it in stride. After all, they'd been reading about it.

A beautifully illustrated book published in 1956, entitled *Pathway to Faraway Worlds*, was the Soviet's invitation to the younger set to interest themselves in the possibilities of space flight. Published by the State Publisher of Children's Literature in the USSR, the book was directed toward youth between the ages of 12 and 18.

Format, layout, and illustrations are designed to tease youngsters into reading and studying the book. The author, K. A. Gil'zin, a specialist in technical sciences, tries to answer questions children might have concerning current and future possibilities of interplanetary travel.

Topics include discussion of the solar system, scientific principles applicable to space travel, a recent history of advances in aviation and rocketry in the USSR and other nations, and the possibilities of progressing from rocketry to the "Kosmos Ship."

There is also a description of the composition and launching of the Earth satellite. The author goes on to discuss the problem of the mastery of space and begins with the first target the moon, suggesting means of getting there and then travelling to other planets. Various problems of space travel, especially the difficulty of landing and return are outlined.

A world of fantasy for would-be Gullivers in space is exploited. In the last part of the book, man in space is the theme and we see the establishment of lunar villages by using interplanetary vehicles. A story involving a group of young space travellers to the moon gives their imagined travels in great detail.

To challenge youngsters with the problem and the possibilities, the author describes the work that still lies ahead: "The Moscow-Moon express will complete its flight in 24 hours, or even in one night, the same period that it takes the train from Moscow to Leningrad. Of course, the organization of such courier flights will become possible only when a more powerful fuel is found, and obviously, only by means of refueling in flight. The most probable flight time will be on the order of two-three days. During all this time, the ship's engine will work for not more than 10 minutes: during take-off from the earth and landing on the moon. During the remainder of the flight, not one drop of fuel will be expended. Otherwise, interplanetary flight could be only a dream."

This book indicates that the USSR is determined that their young people will consider the realms of fantasy tantalizing enough to consider studying sciences appropriate to making flight in outer space a fact.

VA-212 Sets Loft Record

Fury Pilots Log 292 Runs in Day

Pilots of Attack Squadron 212, flying FJ-4B *Furies*, set a new all-time record for the most loft runs at NAS FALLON by a squadron. They made 292 runs in a single day's operations.

LCdr. Leo Krupp, VA-212 executive officer, was the pilot responsible for the record run. In setting the record, the *Rampant Raiders* averaged one run every two minutes.

LCdr. Thomas H. Cooper, VA-212 skipper, complimented squadron personnel for the excellent work they did. He said line, ordnance and maintenance crews in particular showed excellent teamwork that made his squadron the pride of Carrier Air Group 21.

Target Boom Developed

Permits Supersonic-Speed Gunnery

A low-cost tow target boom has been developed by North American Aviation for use with high-speed *Dart* targets. It is reported to provide realistic gunnery practice at supersonic speeds equal to those likely to be encountered by jet pilots.

The new device enables pilots to use conventional supersonic fighter planes to tow targets at speeds greater than Mach 1 (*NAN*EWS, Dec. 1957).

Called the North American Center Line Tow Target Boom, the device can be quickly installed on F-100-D *Super Sabres*. A few minor modifications fit it for installation on all other F-100 series aircraft.

The boom, 10 feet long, is made of chrome molybdenum alloy steel, with a diameter of two inches. It is fastened on the underside of the fuselage, a third of the way forward of the tail. In flight it lowers to about a 60-degree angle to snatch the target rope.

The boom swings up against the plane's belly when it is not in use. It can be re-cocked in the air and can be easily removed to restore the aircraft to its other operational uses.

AF F-104A Uses Air Jets

Slower Landing Speed is Allowed

Tornado-like blasts of air spurting from 110 tiny ducts on its razor-blade wings helps convert the Air Force F-104A *Starfighter* from supersonic speed to landing speed, according to Lockheed Aircraft Corporation.

The tiny air blasts, traveling eight times as fast as the most violent hurricane ever recorded by man, serve as boundary layer control to give the F-104 slower landing speeds and increased control.

Boundary layer control in this application is achieved by piping high-velocity air from the engine into the wing, where it is squirted from a slotted tube out over the upper surface of the trailing edge wing flap. Acting like a vane of air, these streams smooth out the air flow over the wing and provide greater lift and control.

THE LARGEST *and the smallest in the United States defense arsenal! The Navy 13,000 lb A4D, Skyhawk makes a striking contrast alongside the Air Force 450,000 lb. B-52 Stratofortress. The A4D is a tactical attack plane and can double in brass with a far-flung nuclear attack when its legs are lengthened by an aircraft carrier, just as are the B-52's with refueling assistance.*

NACA Forms New Group

Space Technology Aspects Studied

Dr. James H. Doolittle, chairman of the National Advisory Committee for Aeronautics, has announced the establishment of a special committee on space technology.

The new group is headed by Dr. H. Guyford Stever, associate dean of engineering at Massachusetts Institute of Technology. The space technology committee will have a total of about 15 members. Each one will be a leader in some aspect of the broad field.

In making the announcement of the new set-up, Dr. Dolittle said: "The special committee will assist the main committee materially in coordinating and bringing into sharper focus the substantial and increasing effort of the NACA on problems of flight beyond the atmosphere of the earth."

Rescue Team Jumps to Ice

Navymen Record Antarctic 'First'

Canopies of jungle gray silk blossomed to carry ten men to the snow at McMurdo Sound, Antarctica, in the Navy's first South Polar parachute jump. (Air Force TSgt. Richard Patton was the first American to make such a jump. He landed at the South Pole during *Operation Deep Freeze Two.*)

The jump was made to re-qualify members of McMurdo's Search and Rescue team who stand ready to aid downed fliers in the polar wastes.

Two planes of Air Development Squadron Six, the "Potent Penguin" squadron, carried the men to the jump site near New Zealand's Scott Base where wind and ground conditions were good.

The first group of five jumpers was flown by Lt. Robert M. Epperly in an R4D *Skytrain*. The second group flew in a DeHavilland *Otter* piloted by Ltjg. William E. Berrie.

Members of the para-rescue team were dressed in brightly-colored winter clothing which could be seen for a great distance on the white landscape.

They followed a test dummy to the snow. After landing safely they were picked up by helicopter and ferried back to their home base at McMurdo.

When they were picked up, members of the team said the landing on snow was "like landing in a flower bed."

FIRST PRODUCTION *model of the North American T2J all-purpose jet trainer rolls out of the plant at Columbus, Ohio. The T2J has a top speed of 429 knots at 25,000 feet and a stall speed of 67 knots. It is a mid-wing cantilever monoplane and is suitable for training in deck operations. The T2V is powered by a Westinghouse J-34 engine which is rated at 2400 pounds thrust.*

Space Problems Studied

Research is Pertinent to Polaris

Scientists of Lockheed's Missile Systems division are studying the sending of radio and radar signals across vast reaches of outer space.

Studies underway at the new Lockheed laboratory might pave the way for communication with manned space ships, according to Emanuel E. Blasi, head of the missile division's antenna and propagation department.

Areas to be covered include the effect of outer space's cosmic rays on radar and radio signals, the radar pattern presented by various space vehicle and missile shapes, the effect of the ionosphere on such signals, and the characteristics of various antennas when installed in missiles.

A shielded anechoic chamber or "electrical quiet room" produces electronic conditions to be found 300 miles in space by eliminating all stray electronic signals.

Much of the advanced research being done is in connection with the Navy's *Polaris* ballistic missile.

Aircraft Lights Tested

These are Not Flying Saucers

Residents of Lexington Park, Leonardtown, Baltimore, Washington, and points between, have been advised by the Naval Air Test Center at Patuxent River, Maryland, not to think they are seeing belated Christmas sleighs or flying saucers if strange lights appear.

NATC is testing several different kinds of aircraft lights designed to help avoid mid-air collisions. Lights will be in different colors and have varying degrees of brightness. All will be mounted on an R4D, while an R5D carries still and motion picture cameras to record the appearance of the lights.

Tests are carried out for the Navy by Applied Psychology Corp., Arlington, Va., under contract with BuAer.

'Steel-Whittling' Machine

First of Type at Lockheed Aircraft

Lockheed Aircraft Company has acquired the aviation industry's only machine that will whittle winged shapes with micrometric precision.

One of only four in existence, the Whaley "over-arm wing contour machine" fashions lift surfaces of wind tunnel models from all metals, including the hardest of all heat-treated steel. It is estimated that the use of the machine will speed model construction nearly 40 per cent.

Models subjected to ultrasonic speeds must withstand comparable aerodynamic loads. Steel has supplanted wood and aluminum in making model parts—wing and empennages—which encounter extreme stress and strain.

Developed and designed at the National Advisory Committee for Aeronautics, Langley AF Base, Va., the Whaley machine works steel with a minimum of template guidance at tolerances down to .003 of an inch. The machine cost more than $30,000 and will save more than that each year.

Nuclear Contract Awarded

Small A–Sub Power Plant Ordered

A $1,548,679 contract for propulsion equipment to be used in a small nuclear-powered submarine has been awarded Westinghouse Electric Corporation by the Navy.

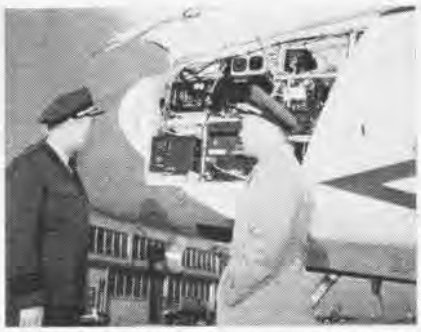
The land-based prototype of this submarine nuclear propulsion plant will be located near Windsor, Conn.

Combustion Engineering is the AEC's prime contractor for the design, development and construction of the entire submarine nuclear power plant and related supporting facilities. Electric Boat Division of General Dynamics Corporation will build the submarine at its Groton, Conn., shipyard.

The equipment contract awarded Westinghouse includes propulsion motor, propulsion turbine generators, propulsion control, ship utility turbine generators and steam condensing equipment.

Three Westinghouse Corp. plants in Pennsylvania will engage in the manufacture of the required equipment.

KAMAN HU2K–1 *utility helicopter which won BuAer design competition has retractable landing gear, four bladed main rotor equipped with "servo-flap" control system and will be powered by General Electric gas turbines. The Navy has awarded Kaman a $13-million contract for a prototype quantity of the new helicopters. It will succeed the HOK–1 and HUK–1 craft.*



CLIFTON, HODSON STUDY INSTRUMENTATION

New Seastar at Memphis

Jet Trainer is Now in Syllabus

At NAS MEMPHIS, the first of its Lockheed *Seastar* T2V-1's has arrived. Cdr. Norman D. Hodson, OinC, Naval Air Advanced Training Command Activity, accepted delivery from ferry pilot, Lt. A. P. Hawley.

According to Cdr. Hodson, the *Seastar* is scheduled to phase out the older Lockheed TV2 *Shooting Star* and the North American T28 *Trojan* at the Memphis training activity.

This activity was established in May 1955 to train Naval Aviators for all-weather and jet flight. When the *Seastar* arrived, Capt. Joe C. Clifton, a visiting former skipper of NAS MEMPHIS, was on hand to look it over with Cdr. Hodson. Both gave the new plane their approval.

Mach 17 Tube Designed

Shock Tube Aids Polaris Study

A shock tube capable of testing ballistic missile designs at speeds of 13,000 mph has gone into operation at the Lockheed Missile System division research and development laboratories.

The 40-foot-long tube produces shock waves which travel 17 times the speed of sound. It is being used for advanced design work on the *Polaris*.

Lockheed is the missile system manager of the *Polaris*, a solid propellant weapon designed to be launched from submarines. Several other firms are working on the program.

Dr. Daniel Bershader, head of Lockheed's missile division gas dynamics department, said the shock waves created by the new tube, together with the extremely high speed gas flow following them, will act upon model missiles in the tube much as the flow of air acts in conventional wind tunnels at higher speeds and temperatures.

He added that temperature and pressures generated in the shock tube will simulate those encountered by a long-range ballistic missile as it plunges from space to the earth's atmosphere.

P6M Gets Sperry System

New Automatic Pilot Delivered

The Martin Company and the Sperry Gyroscope Company jointly announced the first deliveries of an advanced flight control system for the P6M *SeaMaster*.

The Sperry SP-30 system provides for automatic precision control of an aircraft from a relatively slow 100 mph to sonic speeds. The fully transistorized SP-30 creates split-second sensing of minute deviations of a plane from its flight path. It has been designated standard equipment for the *SeaMaster*.

The P6M is a four-jet, 600 mph seaplane, equipped for mine-laying, bombing and photo-recon missions.

Weather Bureau Afloat

Aerologists Work in MSTS Ships

Twenty-four aerologists of the U. S. Weather Bureau, Department of Commerce, sail the Pacific in ships of the Navy's Military Sea Transport Service. The sea-going weather men are all volunteers and spend 70 percent of the year away from home. They gather data for use in forecasting weather along the West Coast and in long-range forecasting for the country.

The Bureau's Pacific Weather Project, started in 1955, has met with such success that aerologists now work in pairs aboard MSTS ships traveling to the Far East and Pacific Islands.

ANTHONY RIPPO PREPARES A RADIOSONDE

Since weather moves from west to east, conditions at sea are highly indicative of impending weather along the coast. Aerologists observe weather on the surface four times daily and launch a radiosonde balloon every 12 hours to gather data at altitudes up to 80,000 feet.

The information is radioed to the Weather Bureau in San Francisco. Detailed reports are sent to Washington for long-range use.

A similar project was started in the Atlantic about a year ago and is equally successful. At present, seven Weather Bureau technicians sail in MSTS ships to the Canal Zone, Cuba, Puerto Rico, and occasionally to Europe. There are plans being developed for expansion.

A PARA-RESCUE DEMONSTRATION *was conducted during an Air-Sea Rescue Show in Manila, Philippine Islands. The show was held by the Joint U. S. Philippine Armed Forces as part of that nation's Aviation Week celebration. A Navy HUP-2 helicopter, piloted by Lcdr. John R. Krone from Sangley Point Naval Station, picks up TSgt. Francis Dean, USAF, of the 31st Air Rescue Squadron. The two and a half hour show included parachute jumps and demonstration of JATO.*

THIS CAMERA INSTALLATION PROVIDES A METHOD OF ASSESSING ROCKET MISS DISTANCES

NEW CAMERA POD DESIGN

THE NAVAL AVIATION Ordnance Test Station, Chincoteague, Va., has developed a new aircraft camera suspension. Cameras are mounted directly to the wing or wing-platform adapter which allows for boresighting in azimuth and elevation. After the boresighting is completed, the camera and mount are enclosed in a streamlined wood fairing.

The 35mm cameras, Mod IVB synchronous-type made by Flight Research Company, are being used by the Avionic Test Department at NAOTS to obtain miss distance data for the firing of rockets. But they could also be used for the firing of guns and air-to-air missiles. Data are being assessed and the miss distances determined stereoscopically.

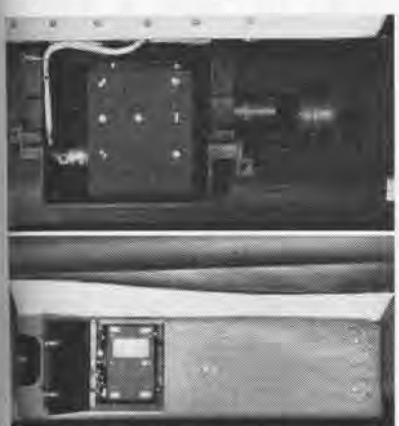
The streamlined camera pods do not materially affect the performance of the aircraft. The system is designed to give quick accessibility to the camera for boresighting and lens changing. Sway braces are not required to obtain and to maintain the proper boresight.

Another advantage of the installation is that the pods are free of vibration in flight, and consequently the improved quality of the photography makes the data reduction process easier and the results more accurate than would be possible with other camera installations.

The first installation of this type was made on an F9F-8B aircraft. The two vertical supports of an Aero 14 combination bomb rack and rocket launcher assembly were joined together with a fore and aft horizontal member. To this was attached a bracket assembly to support the camera and provide boresight adjustments.

The wood fairing was built in two parts, each half being built up of two-inch white pine planking and routed inside to accept its half of the camera and mount. Each half was shaped to an appropriate streamlined configuration. A film-loading door and lens port were added. Ease of fabrication and qualities of insulation made wood an appropriate choice for the fairing.

More than 25 successful flights have been made without camera failure, loss of boresight, or pictures blurred because of movement of the camera.



RESEARCH CAMERA UNIT FROM EITHER SIDE

Miss-Indicator Developed

NOL Device Will Help AA Gunners

Scientists at the Naval Ordnance Laboratory in Silver Spring, Md., have perfected a precision electronic device that tells anti-aircraft gunners how close their missiles came to the target. The device has been named "miss-distance indicator (MDI)."

Built to speed up the development of better anti-aircraft missiles and to intensify the training of missilry crews, the MDI is an automatic precision system that indicates the distance in feet by which the missile failed to hit the aircraft target.

The system can be applied equally well to rockets, supersonic missiles or conventional artillery shells.

The MDI is composed of three VHF radio units: a tiny transmitter in the missile, a receiver-recorder on board the missile launching ship, and a so-called "transponder" or relay station inside the target.

When the missile is fired, its transmitter signals both the transponder in the target and the receiver on the ship. At the same time, the transponder retransmits to the receiver on a different wave length the signal coming in from the missile.

The receiver compares the signal from the transponder with the signal coming direct from the missile. The difference between the two signals is recorded by a tracing that shows the distance between missile and target at the point of closest approach. The relative speed between missile and target is also shown.

The MDI is not intended for combat use since enemy aircraft would hardly oblige missile launching crews by mounting a transponder. As a training device for gun and missile crews, however, it is expected to result in a further improvement in the effectiveness of Navy anti-aircraft missile systems. Regular practice with NOL's device is bound to pay off.

The MDI has been exhaustively field tested and is now being packaged into a relatively lightweight portable kit for early use aboard Naval units.

BRONZE PLAQUE *of the ship's insigne was presented to USS Ranger (CVA-61) by North American Aviation. Cdr. R. P. Kline, executive officer, accepted it from Mr. Frank Compton. It will be on the superstructure.*

THE JENKINS TAKES THE CAKE. *Somewhere in the Pacific the USS Jenkins (DDE-447) pulled alongside the USS Princeton (CVS-37) for a topping off. Most refuelings at sea are just a lot of hard work. This one was different. A large sign greeted the thirsty ship reading: "We knew you were coming so we baked a cake. 100th DD fueled this cruise." The cake was transported by high line. Both crews exercised unusual caution in handling the sweet cargo.*

CAG-12 Leads in Landings

Six Pilots Join Lex Century Club

Carrier Air Group 12's latest deployment aboard the USS *Lexington* (CVA-16) was an active one. Cdr. Robert M. Elder, the Air Group Commander, led his pilots in carrier landings. Using the F3H, FJ-3, F9F and AJ-2, he chalked up 129, bringing his over-all total to 739.

Five other CVG-12 pilots joined the Lexington Century Club: Cdr. T. S. Sedaker and LCdr. R. N. Nelson of VF-121, Cdr. P. E. Payne, LCdr. D. H. Shelton and LCdr. E. M. Porter of VF-124. An additional 12 came close to membership with over 90 landings.

NAVAL AVIATION

Published monthly by Chief of Naval Operations and Bureau of Aeronautics to disseminate safety, training, maintenance, and technical data. Address communications to Naval Aviation News, Op-05A5, Navy Department, Washington 25, D. C. Office located in room 5E629 Pentagon; Telephone extensions 73685 and 73515.

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Four North American FJ-4 Furies on the wing over the sun-swept desert as Marine pilots engage in aerial maneuvers. FJ-4B version enables Fury to double as "buddy tanker." These aircraft came from MCAS El Toro, p. 8.

● SUBSCRIPTIONS

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● Printing of this publication has been approved by the Director of the Bureau of the Budget, 12 April 1955.

ONCE ABOARD THE SARA

Night and day Navy's jet aircraft take off from and land on the proud CVA–60, the USS Saratoga. Above, lights caught during a camera exposure form a striking contrast to the F11F–1 Tiger, a shadow in the night. Below, the Gruman Tiger is spotted on the flight deck.

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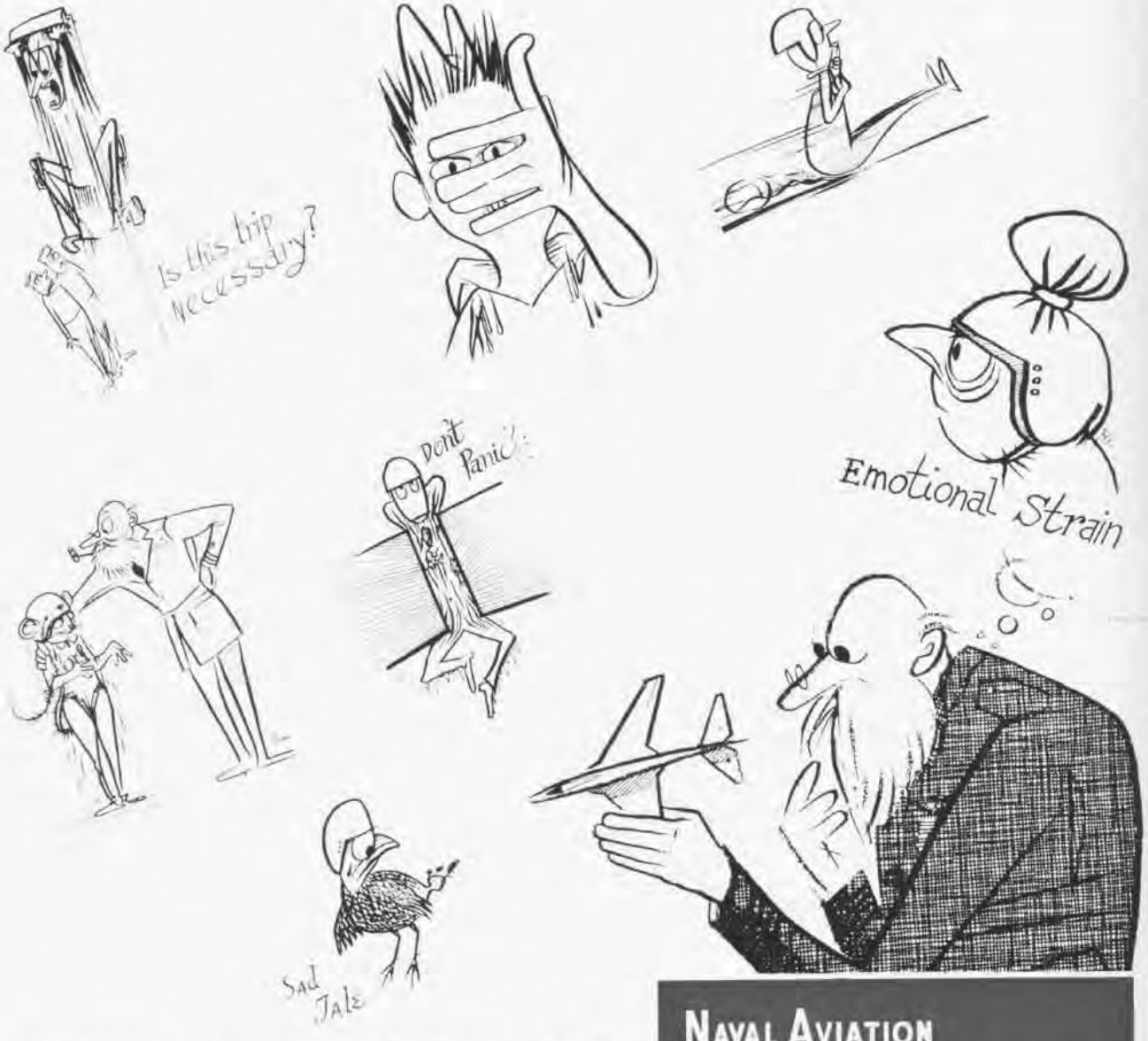

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