



NAVY PLANES BOMBED AND STRAFED JAP MERCHANTMEN IN MARSHALLS



BILLOWY SMOKE REFLECTS DILEMMA OF VESSEL ATTACKED BY BOMBER



JAP SMALL CRAFT INHERITED SHARE OF BOMBING BY NAVY PLANES



NAVY MASTHEAD LEVEL ATTACKS HIT AND FIRED SHIPS NEAR ATOLLS



VESSELS SUNK OFF MARSHALLS NO LONGER SERVE JAPANESE EXPANSION



HITS ON AIRDROMES IN MARSHALLS WHITTLED DOWN JAP RESISTANCE

# NAVAL AIR IN ACTION

Kwajalein Atoll had been "prepared" for invasion, but not in a sense that worked to the advantage of the Jap defenders. Long before the February 1 Navy-commanded attack on Kwajalein's sprawling islets, planes of the U. S. Fleet had subjected the terrain and surrounding waters of the Atoll to a crescendo of relentless bombing. Navy bombers damaged aircraft runways, gun positions and installations and sank or wrecked Jap shipping.



## JAPANESE SHRINES

**S**HINTO WORSHIP, Japan's native cult, has spread over the Pacific area to every remote island occupied by Imperial troops. Sacred shrines, dedicated to the spirits of emperors, celebrated warriors, loyal servants of the emperor or ancestors of patriarchal families, have been established every place the flag of the rising sun is to be found.

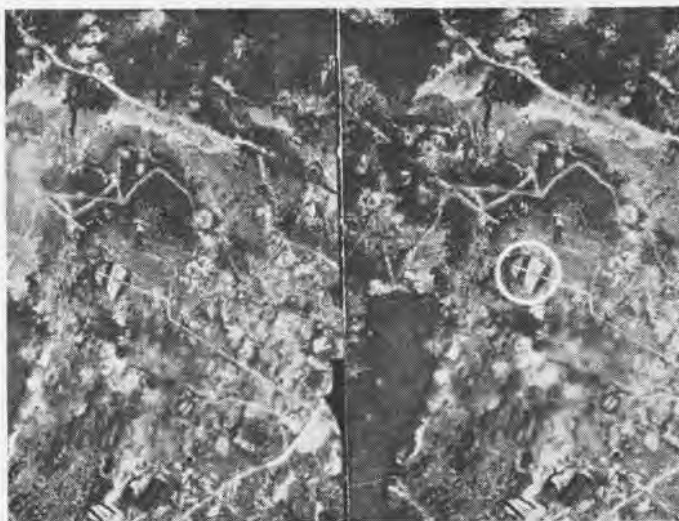
The Shinto shrine is the building for Shintoism which has prevailed in Japan since ancient times. This cult is a kind of religion which came from ancestor worship, and it has dominated the spiritual life of the Japanese nation. Even after Buddhism and Confucianism were introduced from the continent, Shintoism harmonized with them and was well preserved accordingly. Sacred shrines have been preserved unchanged in their original forms, evidence of the persistent worship of the whole Japanese nation in this ancient and traditional ceremony.

When eminent people died, the early Japanese preserved their relics as objects of worship, placing them in miniature wooden temples which were replicas of the original palace or dwelling place. Japan now has over 150,000 of these shrines, sacred places quite without relation to the changes of mundane life. These temples are dedicated to the spirits of the departed, the word *Shinto* meaning "the way of the gods." Thus the essence of the cult is the worship of ancient, deified ancestors.

**I**N ANCIENT TIMES, when a man died, he was believed to live in the world, or at least to be always in touch with worldly affairs. "Devotion to the memory of ancestors is the mainspring of all virtues," to quote a Japanese source which explains why the Navy, Marines, Coast Guard and Allied forces are striving to make every Jap happy by sending him to "meet his ancestors."



Ground shot of Shinto shrine at main camp on Kiska shows how unobtrusive the sacred Japanese worshipping place actually is



Vertical stereo of same spot reveals why photo interpreters must recognize shrines so precious bombs will not be wasted

## PHOTO INTERPRETERS MUST LEARN TO RECOGNIZE JAPANESE SHRINES

SHINTO SHRINES are not military objectives, yet it is important for photo interpreters to know the characteristics of the temples in order to distinguish them from more vital installations at Japanese bases. Luckily there are certain characteristics which help identify these shrines although the midget houses on the altar are usually too small to be seen in aerial reconnaissance photographs.

The shrine is always approached by a well-kept path. The arched gateway, called *torii*, is formed of two upright pillars and two horizontal beams and stands at the entrance to the shrine precinct. This *torii* is not only the most common and the most conspicuous emblem which characterizes a Shinto temple, but also is an indispensable adjunct to it. The altar,

with its delicately carved doll-size house attached, is placed at the end of the pathway on a raised terrace with stone steps leading to it. Contrary to popular belief, shrines do not necessarily face in the direction of Tokyo. In general, installations at island bases are purely functional and free from embellishments, although the Jap cannot resist adding a few decorative and artistic touches.

TYPICAL INSTALLATIONS were those found on Kiska where the Japs had constructed five such shrines in different areas. These varied in size from the well-established one at the main camp, which showed up well in aerial photos, to small portable models. At the main camp shrine, the approach walk led over carefully graded terraces, through a polished cedar *torii* and up five stone steps to a paved area containing the delicate structure of the shrine itself. On each side of the steps were five-inch U. S. Navy shells which had failed to explode, the duds adding a touch of irony to the decorations. Other shrines were smaller but well kept.



Jap shrine at South Head on Kiska was placed near 75 mm anti-aircraft battery



An effort was made to conceal shrine on North Head from lens of aerial cameras



Torii gateway, terrace, stone steps and altar are typical of all Shinto shrines

# GRAMPAW PETTIBONE

## Return to Base Immediately

While proceeding to the target for dive bombing practice, an SBD-4 pilot noticed a drop in oil pressure and power. He elected to continue the flight, however, and after the first dive, was not able to get sufficient power to climb back up for another dive. Not until then did he decide to return to base. Complete engine failure seven miles short of the field made a water landing necessary. The plane was lost. The pilot fortunately escaped without a scratch and his rear seat man was only slightly injured.

► **COMMENT**—Although power plant failure did occur in this case, poor judgment on the part of the pilot was responsible for the loss of the aircraft. To attempt to continue flight in the face of engine malfunctioning, except in the case of emergency, is a ridiculous and inexcusable decision for any pilot to make. He should return to base immediately while a deferred forced landing is still possible. In nearly every case, prolonged flight will aggravate the engine trouble. Even if a forced landing is successfully executed after complete failure, the engine will undoubtedly be severely damaged.

## Pre-Flight Check

A normal take-off was made by a PV-1. At 150 feet altitude it was seen to nose over into a steep glide to the ground where it crashed and burned, causing the deaths of the entire crew. Upon investigation it was discovered that the bolt which attached the forward end of the push-pull tube to the elevator quadrant had fallen out due to the previous loss of the securing cotter key and castle head nut. As a result, the pilot had no elevator control.

It developed that a machinist's mate, during the course of the last 30-hour check, had failed to inspect the entire security of the control cable attachments and fittings. According to his knowledge of the system, he would



have had to remove the armor plate and sand bags before he could have made a visual inspection of the connection of the forward end of the push-pull tube to the elevator quadrant. He elected to consider this part of the control system inaccessible and made no mention of his omission on the report form. He was considered a responsible mechanic by his immediate superior, so no check was made of his work.

It could not be determined at what time the cotter key and castle head nut worked loose, but after the 30-hour check the airplane was flown only once before the crash. Evidence strongly indicated that had the control system been carefully and completely checked in accordance with the 30-hour check form, this tragic accident would not have happened.

► **COMMENT**—The station concerned has taken remedial action to insure against the recurrence of a similar accident. The commanding officer states:

"The bolt which attaches the elevator push-pull rod to the elevator control wire quadrant is now inspected by use of a long-handled mirror which is placed through the lightening holes in the bulkheads at fuselage stations 508 and 522. This inspection is very simple and requires only that the elevator be held in the 'up' position. When the elevator is in the 'up' position the elevator push-pull rod is moved aft, thereby facilitating an inspection of the forward attaching bolt by use of the mirror and flashlight."

Pilots in this squadron are now making their own inspection of this attachment as part of the plane's regular pre-flight check.

## Blind Canyons

**Case 1.** An SBD pilot was on a familiarization flight over a South Pacific island recently when he decided to descend to a low altitude and fly up a canyon. The canyon narrowed rapidly and suddenly came to an end with steep cliffs blocking further flight. Realizing that it was impossible to fly over the cliffs, the pilot attempted a 180° turn, but the canyon was too narrow to permit this and the plane crashed with fatal results.

**Case 2.** Upon encountering broken clouds which capped the ridges in his vicinity, a ferry pilot decided to proceed below the cloud base. He let down and began following a transcontinental highway. All went well until the climbing road entered a narrow ravine. Here the pilot found the cloud base extending to the ground. He then attempted to turn around but, upon realizing the



ravine was too narrow, he elected to make an immediate landing in a small clearing. The landing was not very successful.

 **Grampaw Pettibone says:**

These are not pilots' nightmares! They are actual case histories and help prove that you can't just sit there and fly without thinking. You must use foresight or you, too, will find yourself in a blind canyon some day.

## Check-Outs

With an experienced pilot coaching from the rear seat, a 260-hour pilot was being checked out in a J2F-5. After two successful touch-and-go landings, another approach was made and, upon contacting the runway, the airplane groundlooped, causing major damage.

In his endorsement to the trouble report, the wing commander said: "Touch-and-go landings do not serve the purpose of teaching new pilots how to land strange types of aircraft. It has therefore been directed that, henceforth, the use of the touch-and-go type of practice landing be discontinued dur-



ing the initial stages of the check-out. Each landing will be a complete evolution involving taxiing out, take-off, landing, rolling to a stop and taxiing back again for another circuit. When complete familiarity with the ground handling characteristics has been achieved then only should touch-and-go landings be permitted."

### Senseless Risks

Two flight instructors finished their naval aviation careers under the following circumstances:



a. They were performing acrobatic maneuvers in an N2S-3 which was specifically restricted to instrument flying.

b. These acrobatic maneuvers were being conducted below the altitude specified by regulations.

c. Neither pilot was wearing his shoulder harness. Because the airplane had almost recovered from a spin when it crashed, the administrative report stated that injuries might not have been fatal if shoulder harnesses had been worn.

*Gram paw Pettibone says:*

Isn't that an awful price to pay for a bit of thoughtless fun!

And the sad part is that this isn't an isolated case; many another aviation career is being snuffed out just as senselessly. What's more, these unnecessary deaths will continue just as long as some pilots think they are so hot they don't need to pay any attention to flight regulations and safety instructions.

If there were only some way to pound into the thick skulls of such aviators the fact that safety rules aren't issued to hamper pilots, but to protect them. Each one is the result of many years' experience and is based on the proved limitations of both airplanes and pilots.

### Will Power

After night glide bombing practice a three-plane section of sbv's was circling the field at 800 feet prior to break-up for landing. They flew into a rain squall and the leader apparently did not shift to his instruments in time. He began losing altitude rapidly and steepened his turn, and without any apparent effort to recover from this dan-



gerous attitude, flew into the ground. The No. 2 man followed him in, but the No. 3 man realized their descent was taking them too low and recovered at about 200 feet.

This is, by no means, an unusual type of accident. Some pilots evidently lack the will power necessary to shift immediately from "contact" to "instruments" when the conditions demand. This transition involves psychological factors which are impossible to reproduce accurately in synthetic training. If you cannot shift from "contact" to "instruments" at a moment's notice without letting the element of surprise upset you, you may meet the same fate as the sbv pilots mentioned above. Excellent training is obtained by flying through broken or scattered clouds, necessitating frequent transitions from "contact" to "instruments." (This is not authority for cloud flying in unauthorized areas.)

It is also good practice to refer to your instruments frequently while on "contact." Then if you should unexpectedly fly into some condition of reduced visibility you are better able to shift to instrument flight immediately. It is much easier to maintain control of your plane on instruments while it is in normal flight than it is to recover from some unusual position on instruments.

After you have learned how to fly on instruments, then it is merely a matter of will power, self control and practice. When the time comes and you find yourself in instrument weather for the first time and with no safety pilot, don't get panicky. Relax, you know what to do. Your airplane doesn't change its flying characteristics when it is in a cloud, so it's up to you to make yourself fly the plane just the way you have been taught in instrument flight procedure.



### Mid-Field Charlies

After completing a precision landing check, a primary student in an N2S-3 landed near the circle to pick up his check pilot. The overconfident instructor (over 1,000 hours) then climbed in the front cockpit and attempted a take-off from *mid-field*. The airplane became airborne but insufficient runway remained to gain enough altitude to clear obstructions at the end of the field. With a violent, low-altitude turn, the pilot managed to avoid collision with a farm house but was then



confronted with telephone wires which he tried to fly under. He was only partly successful; the airplane crashed into a cluster of trees and burned.

*Gram paw Pettibone says:*

Now isn't that a sweet exhibition for a full-grown instructor!

How can we expect students to be safe solo fliers if they learn unsafe flying habits from some of their instructors and check pilots?

As far as I am concerned, it is much worse for an instructor to pull a dumb stunt like the above than for anyone else. It isn't enough to tell your student what is right and wrong. You can tell 'em till you are blue in the face, but unless you practice what you preach, it doesn't mean a thing. As the Chinese say, "One example is worth a dozen lectures."

### Not Safe for Solo

At 4,000 feet, directly over his home field, an F6F pilot experienced complete engine failure. A badly muffed approach landed him on the fairway of a golf course, 300 yards short of the airport, resulting in major damage.

*Gram paw Pettibone says:*

Looks as though this pilot either had lost the precision landing technique he had developed during training or he wasn't familiar with the glide characteristics of this airplane.

Only by practice can you "keep your hand in" on precision landings. And of course you know that every airplane has its own special glide characteristics.

Smart pilots make some power-off approaches as soon as they start flying a new type plane so they know what to expect in an emergency. Then they continue to make a power-off landing once in a while just to keep in practice. (They also remember to blimp their engines during these glides.)



## SKETCHES BY A NAVY ARTIST

Scene above was sketched at a Joint Operation Control Board, Caribbean area; lower left, squadron gunnery practice at San Juan; lower right, ACMM plane captain



# DID YOU KNOW?

## Deliver Grass Seed to Italy Try to Control Volcanic Deposit

Army Air Forces Air Service Command will plant tons of grass seed in Italy as a means of controlling volcanic dust, a substance which has proved injurious to aircraft engines. Examination of engines in the early days of the Italian campaign showed damage caused by volcanic dust particles present in Italian soil. Dust is the result of erosion.

The first of 50 tons of grass seed was delivered overseas by air transport, and subsequent shipments have gone by cargo vessel. Extensive areas in Italy will be seeded during the rainy season. Grass is expected to provide a protective cover, keeping dust out of the air.

## Navy Gives Insignia Rules More Men May Wear Air Wings

The Navy has broadened restrictions on enlisted men who are eligible to wear aircrewmen's wings by setting up a "probationary" period of up to 12

months during which aircrewmen graduates of operational training may wear such insignia.

Heretofore, only aircrewmen who had served three months as a regularly assigned member of the aircrew of combatant aircraft of Fleet or sea-frontier forces could wear the silver wings. The new provisions state that operational training graduates "who are qualified as combat aircrewmen" could wear the insignia but the privilege expires after 12 months if they have not qualified in accordance with provisions of the original requirements for aircrewmen set forth by BuPers letter 173-43.

A commanding officer can revoke the right to have the wings at any time prior to such time as the insignia has been earned permanently.

## Prop Creates Vapor Trails Carrier Plane Photo Is Unusual

Vapor trails created by high-flying bombers over England are a common sight, but to see such trails under sea level atmospheric conditions is unusual.

A photograph received from an aircraft carrier showed a *Hellcat* poised for the take-off on its deck. The "aura" was caused by motion of its propeller, combined with just the correct type of atmospheric conditions to bring about



HELLCAT'S PROPELLER MAKES VAPOR TRAILS

the condensation of moisture which comprised the trails.

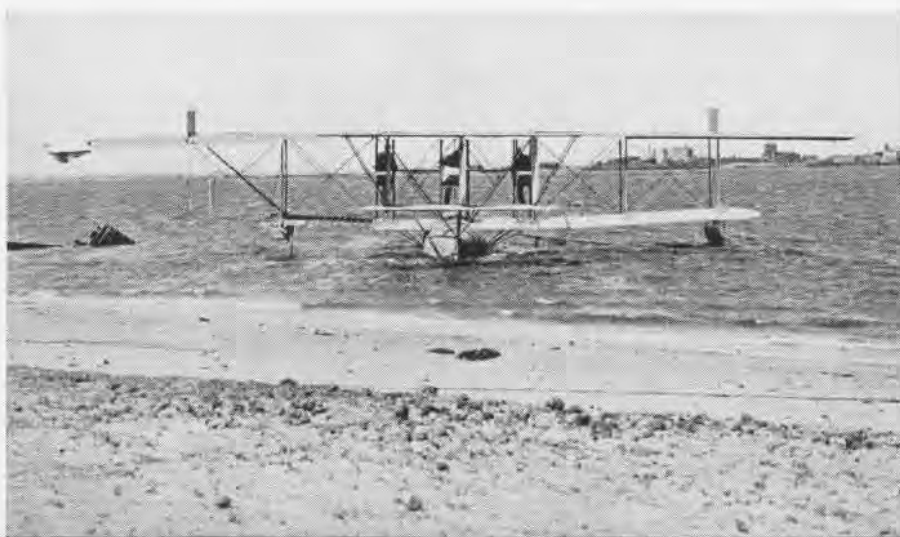
Rapid change of pressure and consequent drop in temperature at the propeller tips resulted in the phenomenon, which rotated in accord with the blades, moving aft along the fuselage, giving depth and perspective to the effect.

## Ratings for Airship Riggers Qualifications of Job Are High

Qualifications for airship rigger ratings, recently established by the Navy for its lighter-than-air enlisted men, have been announced. Airship rigger, third class, must be familiar with operation of an airship, pressure maintenance, fabric repairs, cables and terminals, seamanship, instruments, ordinance, weigh-offs, adjustable parts, life-saving equipment, and signals.

Requirements for airship rigger, second class, include hangar watch, mast watch, rigging, valves, maintenance crew management, controls and equipment, upkeep rigging, and gas tests. First class requirements include free ballooning, rigging, purging, purity readings, mooring mast erection, weather, landing wheel assembly, and safety precautions.

Chief airship rigger requirements include non-rigid airship familiarization, mobile mooring masts, salvage parties, handling, overhaul, and aerodynamics.

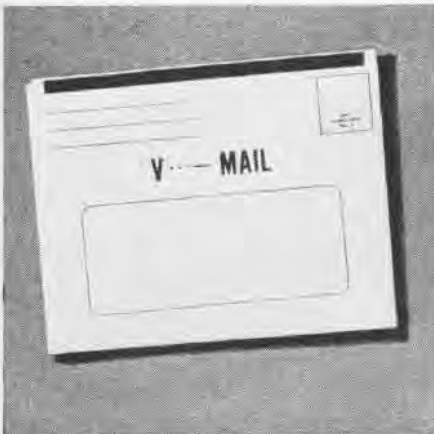


25 Years ago this month, the NC-1 suffered wing damage while at anchor during a gale. Outer wing sections of the NC-2 were installed on the NC-1, otherwise all four planes would have departed from Rockaway on the trans-Atlantic flight. A fourth Liberty engine later was added to the NC-2, and this plane was successfully flown with a total weight of 29,600 lbs., a net increase of 1,600 lbs. Other historical events in naval aviation during March, 1919, included return of the first Marine aeronautic company from the Azores and inauguration of Marine Corps aviation operations in Haiti.

## Use V-Mail, Navy Warning May Cancel Air Mail Service

The Navy has warned that sending of personal mail overseas by air would be discontinued if greater use were not made of V-mail. A letter to all ships and stations from Chief of Naval Operation declared overseas operations were taxing air mail facilities so greatly that regular letter service by that method might have to be suspended.

V-mail takes up less than two percent of the space and weight of regular



ADVANTAGES OF V-MAIL OUTWEIGH OTHER TYPES

mail. It receives first transportation consideration over all mail except officer messenger and official registered air mail. If regular letters are not sent by air mail they reach destination by ship.

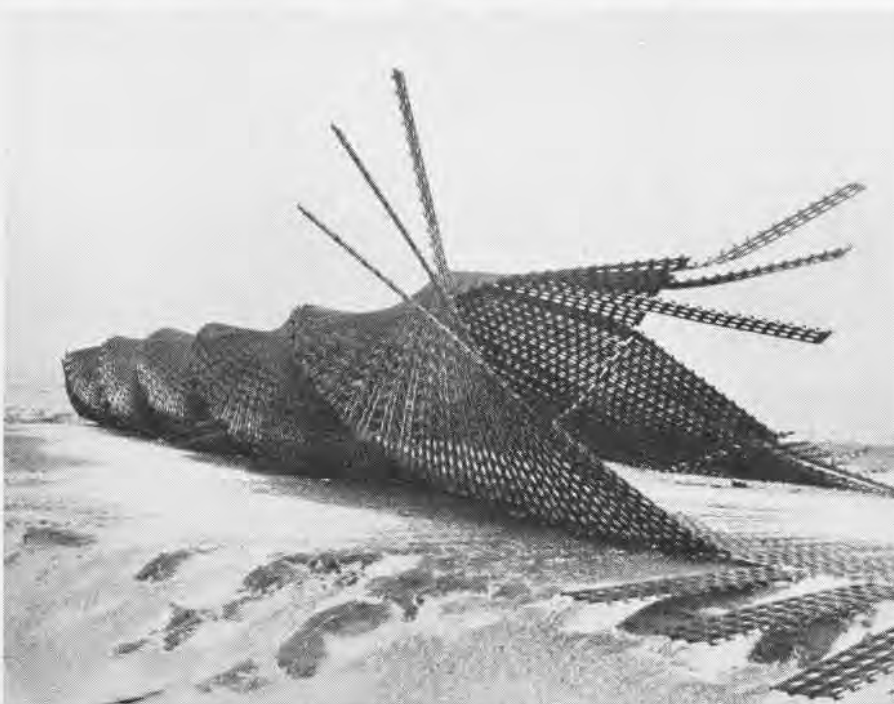
## Airplanes Modified for RN Work Is Done at Roosevelt Field

For well over a year the British Modification Center at Roosevelt Field has been modifying American-built aircraft, making changes in radio, oxygen and bomb bay equipment, to meet the operational requirements of the FAA.

The changes are mainly a matter of fitting British type radios, modifications of bomb bays of bombers to enable them to carry British single lug bombs, and the installation of British type oxygen equipment. There are also a number of small modifications which are necessary because British naval multi-place aircraft always employ an observer in the rear cockpit who is responsible for navigation and aircraft communications.

Design work of Roosevelt Field modifications is done by British and American draftsmen under the supervision of a civilian Chief Engineer. NAF Philadelphia or a sub contractor approved by BuAer manufactures necessary parts. U. S. Navy technicians or the firm of Roosevelt Field, Inc., install the parts.

During 1943 the proportion of aircraft dispatched in an unmodified state became smaller and smaller as the organization became "grooved in." In December the output of aircraft was 100 percent modified. Approximately 50 percent of all aircraft delivered to the Royal Navy pass through this center.



AN INDICATION as to how strong wind blows in the Aleutian Islands is shown in this photograph of a steel landing strip mat. Wind whipping in from Bering Sea lifted the heavy steel runway matting off a frozen snow-covered hardstand at the edge of the runway and twisted it into a giant roll geometrical in pattern, resembling a huge screw. [IMPACT.]



"It is believed by this vessel that the Journal of Recognition is the most interesting and the best of its type published so far in this war . . ."

—Commanding Officer of DD

# JOURNAL OF RECOGNITION



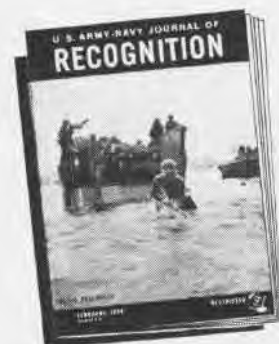
The best way to keep posted on plane, ship and armored vehicle characteristics is to read *Journal of Recognition* regularly every month. This smartly designed, easy-to-read magazine is published monthly by CNO's Aviation Training Division for Army, Navy and Marine Corps. It contains accurate, up-to-date information covering the whole field of recognition, with emphasis on enemy types and models.



**COMMANDERS!** The *Journal* is distributed monthly to Army, Navy and Marine Corps activities throughout the world, and to Allied forces. But sometimes, owing to factors beyond control, your activity's quota of copies may not reach you regularly.

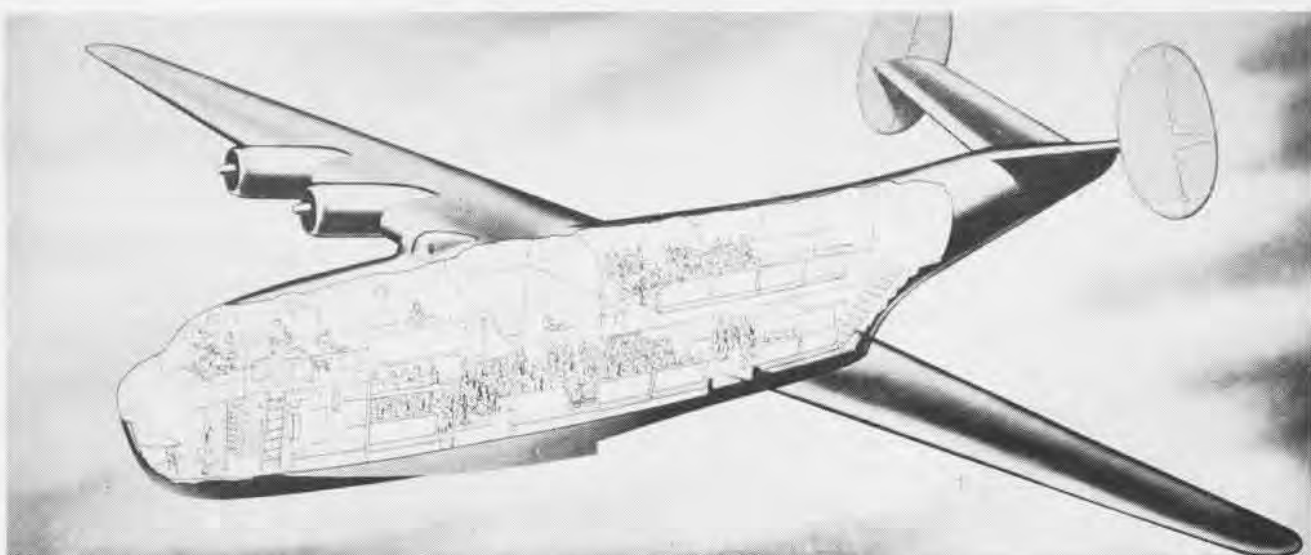
► If you are not receiving *Journal of Recognition* regularly, do something about it!

► Make sure your personnel are receiving and reading *Journal of Recognition* for its timely value in familiarizing all with characteristics and changes that occur in the recognition field.



**NA News recommends as REQUIRED READING!**





World's largest flying boat, the *Mars*, shown in cross-section, has a fully equipped galley and sleeping quarters for 32

men. By jamming them in close, many more men could ride in plane. Navy has ordered 20 more of 70-ton giant planes

## "FLYING BOXCAR"

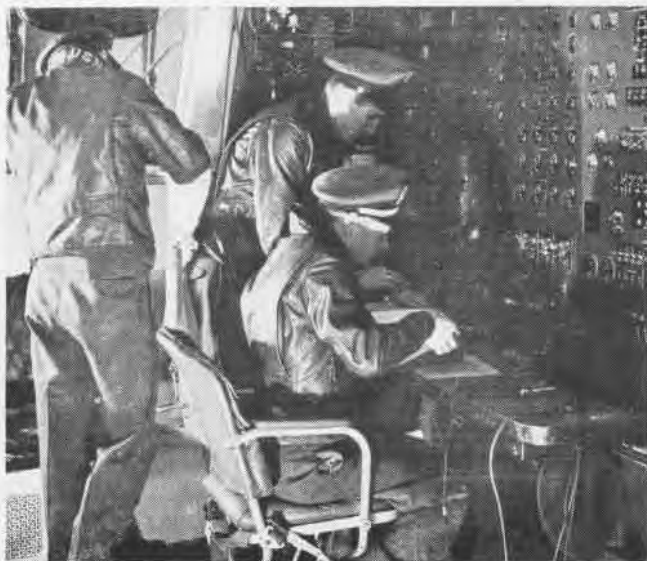
AFTER MANY MONTHS of testing, the giant Martin *Mars*, world's largest flying boat, has proved itself sea and airworthy as a troop or cargo transport. The Navy has ordered 20 more of the aircraft, to be turned over to Naval Air Transport Service for shipment of vitally needed men and material to war zones. Weighing 70 tons, with a wingspread of 200 feet and cargo capacity of a 14-room house, the *Mars* is two-thirds again as big as the largest flying boat now in service with NATS. It has a fully equipped galley and sleeping accommodations for 32 men. In an emergency it could carry many more than that. *Mars* won its spurs by a record-shattering flight from Patuxent River, Md., to Natal, Brazil, following this up with another record round trip from Alameda to Pearl Harbor.



Spaciousness of huge plane is graphically shown in picture looking forward from engine control panel to pilot cockpit



Radio "shack" of the *Mars*, behind the pilot's cockpit, has ample room; operator has 24 contact points inside the plane



Engineers of the *Mars* must watch dozens of dials to keep tab on how its four engines are operating; 3 men handle the job

## NAS Bond Buying Goes Up Allotments Increase Percentages

The seven major naval air stations remain near the top of the Navy bond purchasing parade and have substantially improved their status in regard to bond purchases by civilians who are taking advantage of the payroll savings plan.

On February 1, 95.8 percent of civilian personnel were investing 13.2 percent of their pay in bonds. The average monthly War Bond investment among these civilians was \$25.09.

Uniformed personnel in the aeronautics organization also stand high. In a recent Navy Department bond contest, 76 percent of BuAer personnel registered allotments. The average of the department as a whole was 70 percent.

## Jap Rations Are Adequate Simple Diet Very Easily Digested

Analysis by Navy medical authorities of Jap army rations captured on Kiska showed it was planned to be easily digestible yet nourishing and full of vitamins, a simple but adequate diet. When they lack milk and meats which provide the important vitamin Riboflavin, Japs feed their men seaweed as a substitute, mixing it with other foods to make a stew. Rice and enriched flour issued by the Japanese were found to be of good quality.

A considerable quantity of dehydrated food is used, different in flavor from American products but nutritionally efficient. Vitamin pills are provided where diets are deficient. Dried

onions, taro root, peas, beef stew, condensed milk, hard tack and even candy were among other foodstuffs used by the enemy.

## NATS Turns in a Rush Job Transport Mine-Sweeping Gear

Commander and crew of a Naval Air Transport Service plane have been commended for rushing three and a half tons of urgently needed mine-sweeping equipment from Norfolk to Sicily via Greenland and Iceland.

The B5D aircraft from VR-1 took five days to deliver the equipment to Palermo, so that Nazi mines could be swept from the harbor and American ships land there. En route, when the aircraft was flying over the frigid North Atlantic, heating equipment broke down. Temperatures fell to 20° below and men had to rely on their fur-lined Arctic suits to pull them through.

When ice on the windshield destroyed pilot vision during a landing approach, a crew member held an electric hot plate against glass to melt ice.

## New Carrier to Get Plaque Use Armor Plate From Jap Tank

When the new aircraft carrier *Tarawa* is launched it will carry on it a polished bronze plate engraved with makeshift tools and mounted on a piece of armor plate from a captured Japanese tank on *Tarawa*. It is simply inscribed, "Plate from Japanese Tank Destroyed at *Tarawa*, 20-22 November 1943. Presented to U.S.S. *Tarawa*." Work on the plaque was done by a Marine corporal with two sharpened steel files.



HOW TO GET a quick ticket to Valhalla is illustrated in the picture, above left, showing how NOT to install torpedoes in a TBF's bomb bay. At least two of the three ordnancemen securing the tin fish are taking chances with their lives. If they should make a slight mistake in the shackling process and cause the torpedo to fall, one or both could be badly injured beneath it. The picture at the right shows a better method of loading and safely securing the heavy gear

## Make ATR's Complete!

Frequently BuAer is powerless to aid in eliminating the recurrence of aircraft trouble because of the incomplete form in which Aircraft



Trouble Reports are sent in by activities. It is pointed out that in numerous cases the descriptions or analyses of circumstances are too sketchy or inadequate to support decisions reached by examining boards.

A case in point is the report excerpted by NAVAL AVIATION NEWS below, which describes a forced landing in an F4U resulting in a major overhaul. Part of the pilot's statement is reproduced:

### PILOT'S STATEMENT

In reference to forced landing of aircraft, said landing occurred after normal take-off and after aircraft had attained 4,200-foot altitude. At this altitude the motor sputtered once, ran smoothly for a few seconds and then in my opinion stopped entirely; although it did cough and the propeller continued to rotate. Instrument readings did not change from normal.

Appended to this was the complete text of the Trouble Board that investigated the crash:

### TROUBLE BOARD

Board does not recommend any further investigation as the crash was a result of bad plugs

What supporting evidence led to this conclusion remains a mystery to BuAer, particularly in view of the fact that, according to the pilot's statement, there was no conclusive evidence that complete engine failure resulted, since "instrument readings were normal."

This case, with numerous others in BuAer's files, points to the imperative need for complete and detailed reports. Activities are urged by BuAer to take this into consideration when writing ATR's.



FISHING WITH A BARK LINE. IT IS ALL THE SAME TO THE FISH ON THE HOOK



A NATIVE CRUSHING DERRIS ROOT TO USE FOR POISONING FISH IN A STREAM



USE THIS SIMPLE METHOD TO TWIST STRIPS OF BARK INTO A FISHING LINE



GATHERING FISH POISONED BY MIXING DERRIS INTO THE WATERS OF A POND



# FISHING FOR FOOD

## Streams or ponds in any country contain a variety of food

ANIMAL FOOD may be in the form of fish, birds, mammals, insects, mollusks and so on. It is in general more nourishing than wild plant food and often more available; thus a knowledge of the animals you can eat, where to look for them and how to catch them, will increase your chance of survival in an emergency.

LOOK upon bodies of fresh water as food reservoirs, and when lost or stranded in any type of country, try to strike a river or stream. Generally speaking, animal life is more abundant in water than on land, and often is easier to get. You can catch fish with crude equipment or with none at all if you know how.

Different species of fish may feed at different times, but in general, early morning and late afternoon are the best times to fish with bait. Fishing is usually good just before a storm breaks. Jumping minnows and rising fish are feeding signs.

It is usually easier to locate fish in small streams than in large streams or lakes. Peer into the water away from the sun, or reflections will make it impossible to see fish.

► In streams, fish usually congregate in pools and deep calm water. Small rapids, the tail of a pool, eddies below rocks or logs, are likely places to fish.

► Fish the mouths of small tributary streams when the main streams are high or muddy. Fish seek shelter here at such times.

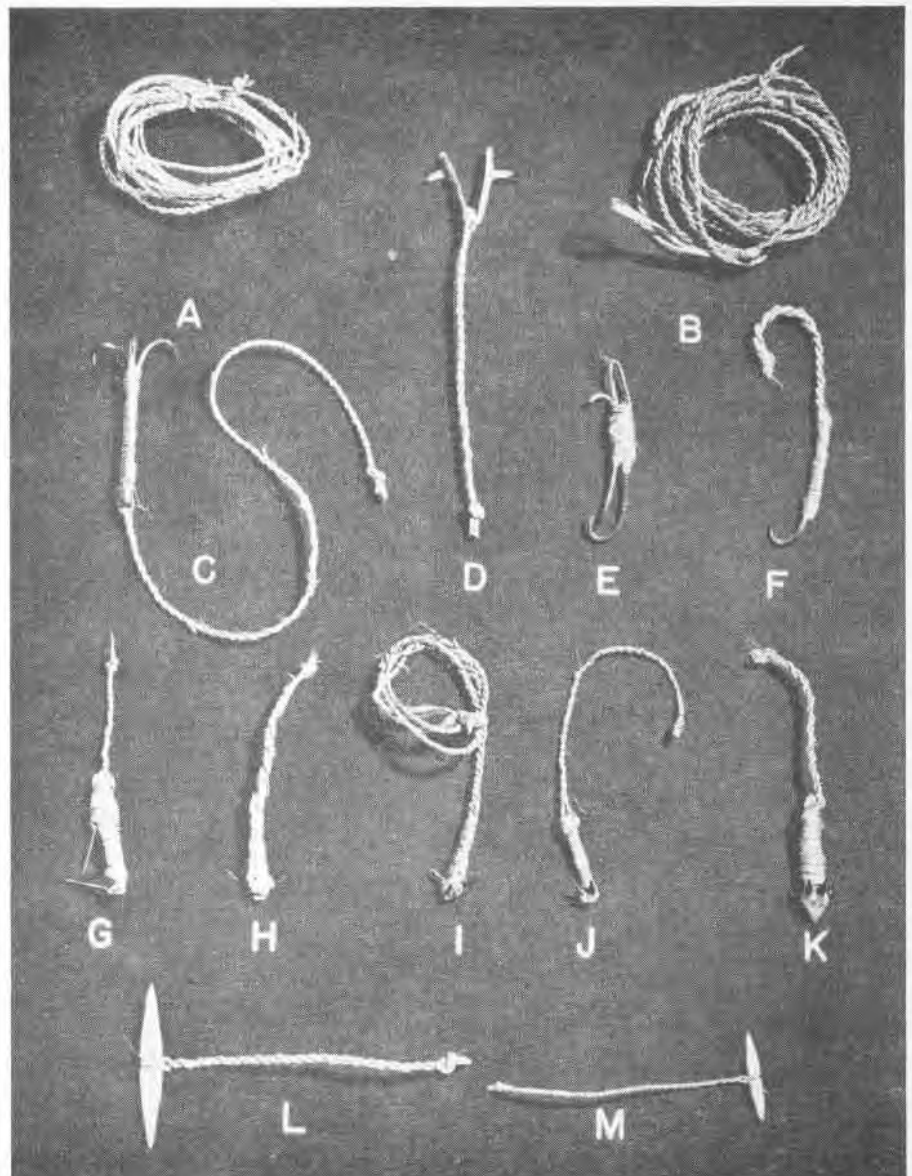
► When streams are low and the weather is hot, fish congregate in the deepest pools. At such times fish are more likely to hide under rocks. In cool weather fish keep to shallow water warmed by the sun.

Experiment with bait. Look for it in the water. Insects, crayfish, worms, wood grubs, small minnows and fish eggs are all good. So are the intestines, eyes and flesh of other fish. Fruits are seldom good bait. After catching your first fish open it and examine the stomach. See what it was feeding on and try to duplicate the food for bait. Usually other fish will eat same food.

Hooks can be made from pins, needles, wire or any piece of available metal; out of wood, coconut shell, bone, thorns, flint, sea shells or tortoise shell.

Lines may be made from a variety of plants. Inner bark of trees is best. Plant fibres and bark may be rolled into a line by twisting the fibres together. Secure the knotted ends of two strands

of fibre to a solid object. Holding a strand in each hand, twist them clockwise and then cross one above the other counter-clockwise. Continue adding fibres to lengthen the cord and keep it uniform in thickness. Two strands twisted in this manner are four times as strong as one strand, and a 20 or 30-foot line can be made in an hour.



Fish hooks. *a, b.* Bark Lines; *c.* Triple Thorn Hook; *d.* Gorge Hook made from Thorny Vine; *e.* Latch Barb Hook; *f.* Plain Thorn Hook; *g.* Straight Thorn Hook with Latch; *b, i, j, k.* Thorn Hooks made from Rattans and Trees; *l, m.* Wooden Gorge Hooks

# NATURE PROVIDES THE FOOD, BUT IT REQUIRES SOME KNOWLEDGE AND INGENUITY TO CATCH IT

THESE are many ways of catching fish. Some are more effective than the use of hook and line. If you have extra hooks and lines, bait and set them overnight. Fasten your lines to low-hanging branches that will bend when a fish is hooked; otherwise you may lose hook, line and fish.

Catching fish with the hands is most successful in small streams with undercut banks or in cut-off channels where clear shallow ponds are left by receding flood waters. Reach under the bank or rocks and move your hand slowly. When you feel a fish, work your hand gently toward his head, grasping him firmly behind the gills.

Where fish are large and numerous, spearing works well. Any straight sapling with a solid core will serve as a spear. Fashion a point and harden by lightly charring it in fire. Bamboo, though hollow, is excellent. Two points should be shaped just beyond a joint. If time and facilities are available, spearheads of bone, shell, or stone may be shaped, or heavy thorns may be used. A knife or bayonet tied to a shaft is also good. Many species of fish can be speared at night with the aid of a torch.

A scoop net can be made from a piece of mosquito netting, a perforated parachute, clothing, the cloth-like material at the base of coconut leaves, or a knotted mesh of hibiscus or coconut fibres. Stitch or tie these along a circular frame made by bending together the ends of a forked sapling.

It is often possible to catch fish in small pools by trampling about until the water is muddy. The fish will come to the surface and can be scooped out with a net, speared or grabbed with the hands.

Throughout warm regions of the world natives use various plants for poisoning fish. The most common method of using them is to crush the plant parts (most often roots) and mix them in water. Drop large quantities of the crushed plants into the head of a pool or small stream and within a short time the fish rise helpless to the surface. The poison is usually rotenone. It is harmful to cold-blooded animals, but the fish killed by it may be eaten without ill effects.

Commercial derris or rotenone has no effect if dusted over the surface of a pond. It must be mixed with water to a malted milk consistency, then distributed in the pond. If the concentra-

tion is strong it will work in two minutes at a temperature of 70° F., or it may take an hour at 50° F. It is not practical in water below 50° F. An ounce of 12 per cent rotenone will kill every fish for a half a mile down a small stream. After putting in the poison follow slowly down the stream and pick up the fish as they come to the surface, sink to the bottom or swim crazily to the bank. A stick dam or obstruction will aid you in collecting fish as they float down stream.

## SURVIVAL HINTS—NO. 5

*This is the fifth in a series of articles condensed from How to Survive on Land and Sea, new U. S. Naval Institute textbook issued by Aviation Training Division of CNO. Individual copies may be purchased from the U. S. Naval Institute, Annapolis, Md.—Ed.*

► Lime thrown in a small pond or tidal pool will kill the fish in the pool. Burn coral and sea shells to obtain lime.

► Fish can be shot with a gun. Aim well under them. A hand grenade thrown into a stream or school of fish will furnish all you can eat.

► When ice is clear enough for fish to be seen, you can stun them by striking the ice with a large rock or the butt end of a log. Chop a hole and pick up the fish. This method is most effective in shallow water. When water is deep and the ice thick, cut a hole and fish through it.

Eels are fish with a snake-like appearance. They are found throughout the world in both fresh and salt water. They are smooth skinned and swim under water. Snakes are scaled and usually swim on top. Eels are excellent eating. They can be caught in muddy water or at night by using the methods described for other fish. Like catfish, they should be skinned before cooking.

Skin frogs before cooking them, as many species secrete irritating and poisonous fluids from their skins. Particularly avoid those marked with yellow and red. Frog legs are a delicacy, but there is no reason why you shouldn't eat the entire body.

Newts, salamanders and other amphibians are found in some of the places where you find frogs. They can be seen swimming in the water or crawling on the forest floor at night. In daylight they can be caught by looking under rocks in streams, damp woods and under rotting logs. All of them are

harmless. They inhabit fresh water only. The best way to catch them is with a dip net. Skin and gut them, but avoid eating parts that contain glands.

Mollusks such as land and water snails, and bivalves similar to our fresh water mussel, are found the world over. All of them are edible, but they should never be eaten raw. They may carry parasites causing serious diseases or be contaminated from polluted water. Streams and rivers are the best places to look for them.

Crabs, crayfish, lobsters, shrimps and prawns are found in fresh water throughout the world. All of them are probably edible, but they spoil rapidly and some contain harmful parasites. They should always be cooked. The salt water forms can be eaten raw with little danger, provided they are fresh.

Fresh water crabs and crayfish can be scooped up in a dip net. Many species are nocturnal and can be caught at night. This is particularly true of land crabs. All the meat within the skeleton of crabs, crayfish and lobsters can be eaten, but the gills are usually discarded, since they are the first to spoil.

Fresh water shrimps are abundant in tropical streams. They can be seen swimming or found clinging to branches or vegetation in the water. Look for them along a stream where the water is shallow and sluggish. The shelled tail is the part most commonly eaten.

Prawns will rise to a light at night and can be scooped off the surface of the water.

Fresh water snakes frequent sluggish water, rocky, muddy and vegetation covered banks, piles of driftwood and overhanging bushes. All of them are edible, some delicious, but caution should be used in securing them, as the bites of some are fatal. Land snakes, including the poisonous species, are also edible.

LIZARDS are found almost everywhere. They can be clubbed, and are easily snared with a grass or bark noose on the end of a stick. Remove their skins and broil or fry the meat. There are only two poisonous lizards and they are confined to the American Southwest, Mexico and Central America; their flesh, however, can be eaten. Crocodiles and alligators are also good to eat. Skin them by first heating over a fire to loosen the plates.

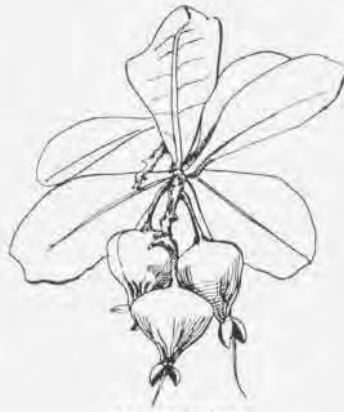
Turtles are found over most of the land areas of the temperate and tropical zones and in nearly all the waters of the earth. They are all edible. Small fresh water ones can be grabbed or clubbed or caught on hook and line. Don't grab the large turtles. They may bite.

**IN NEXT ISSUE: BIRDS AND BEASTS FOR FOOD**

# TROPICAL FISH POISONING PLANTS



ANAMIRTA COCCULUS



BARRINGTONIA



DUBOISIA



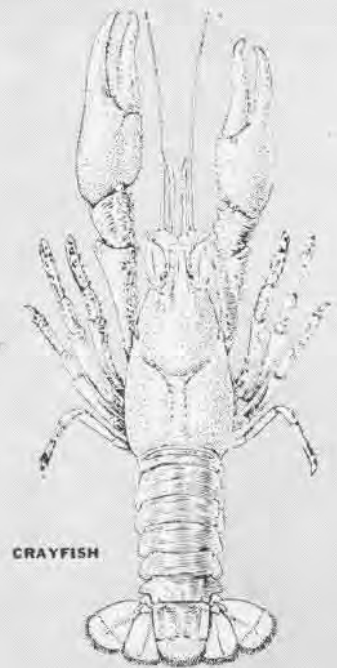
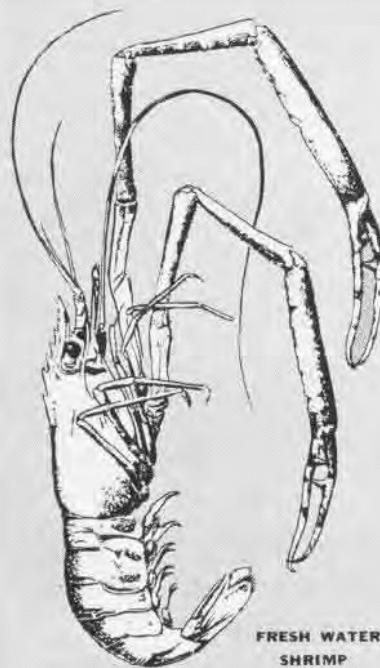
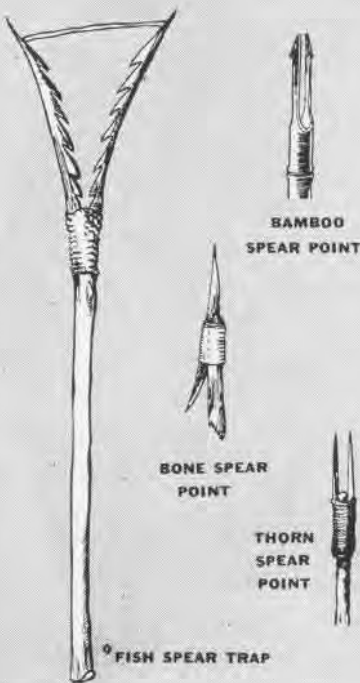
DERRIS ELIPTICA



CROTON TIGLIUM



TEPHROSIA





## MARINE PILOT PROFITS FROM PREVIOUS DUNKING IN DRINK

### MARINE CORPS REPORT

*A MARINE LIEUTENANT led the second section of a division furnishing high cover for SW's and TB's. Their target was enemy anti-aircraft positions. At exactly the same time the bombers made their attack, the high cover was engaged by numerous Zeros.*

AS I LEVELED off after shooting the third Zero, I saw an F4U with a Zero on its tail. They dove down under me from my port side. All I had to do was a high side to get a 45-degree deflection shot. I fired and the Zero burst into flames and spun on down. I pulled back up again and there were many Zeros around. One passed in front of me from the left at about 45 degrees. I gave it the works, and saw pieces fly from its aileron, go into a deep spin, but didn't smoke or burn.

I knew my oil line had been hit because oil was covering the left side of my hood, so I headed for home. I put my nose down and throttled back in

hopes of relieving the engine of all possible strain. My engine froze when I was midway between two islands at 3,000 feet. I knew I was going down so I took the clock from the dashboard, but could find nothing else that I could salvage. When my engine froze, I put my plane into a loop, and at the top of the loop bailed out.

I made the mistake of having my parachute leg-straps too loose, and when the parachute opened, it gave me a terrific jerk and the straps bruised my right thigh and caused painful skin abrasions. As I floated down, I saw my plane dive into the water. It made a terrific roar which sounded like the engine was running again.

On landing in the water, I got free of my parachute and inflated my boat. I remembered the trouble I had before in trying to get into my boat after inflating it, so this time I got aboard, then inflated it. This worked much better than the other method.

I pulled in my wet parachute, hoping to wring it out and use it for cover. I

cut the shrouds from the chute and tied my pack to the boat so that they would not be lost in case the boat capsized. I immediately took my gun apart, cleaned and oiled it with a small bottle of oil that I carried in my pack. I then bailed the water out of the boat and started rowing in the direction of X island, but made no headway.

I PADDLED continuously until about three o'clock, trying to beat the wind, but made little headway. It was terribly hot, and I was pretty well exhausted. I covered myself up as well as I could with my sail, and attempted to get some rest. As I was dozing off, I heard something zooming overhead, looking up just in time to see a large bird—Albatross, I think—light on my toe. I played possum with it for awhile just to see what it would do, then ventured to move a bit, but the bird didn't seem to be alarmed, and it stayed there completely unconcerned. I put my hand out to stroke its head, and instead of flying away, it bit my finger and shook it like a puppy shaking a rag. However, it didn't hurt.

I first saw a PBY, four P-40's and seven F4U's about 1530. They passed within five miles, but didn't see me. I put a portion of my sea marker in the water and fired three tracers out of my pistol, but to no avail. When I first saw them I was quite jubilant, but when I saw them turn away, my spirits hit a low ebb, and I pictured myself spending the night in the boat.

The bird was still with me when the search planes passed, but soon after, evidenced the lack of house training, so I shooed it away. It didn't want to leave, and I had to knock it off into the water in order to persuade it to leave.

AFTER the searching party and the bird had left me, I thought I would try my luck at fishing, so I took out my fishing paraphernalia, used pork rind for bait and threw my line overboard. The fish weren't as friendly as the bird, as I got no bites at all.

About 1730 I saw search planes coming back in my direction so I again put out my sea marker, tried to use my mirror as a reflector, waved my sail and yelled like hell. The F4U's zoomed me, the PBY circled, dropped a smoke bomb and came down to pick me up.



# SHORE STATIONS

► **NAS PASCO**—Aiding the cities of Kennewick and Pasco to exceed their quotas in the Fourth War Loan drive, ten enlisted men from this station presented a variety show that netted \$62,000 in War Bond sales at the Liberty Theater in Pasco.

► **NAS GROSSE ILE**—The new training pool at NAS Grosse Ile is one of the finest swimming pools in operation at the present time. It is 75' x 175' and will accommodate 400 people for recreational periods. A schedule of swimming instruction periods has been arranged so that all hands will have two sessions per week. Instructions are given in all forms of water skills, abandon ship drills, use of clothing and debris for support, life-saving work and warfare aquatics. Approximately 4,000 instruction hours are given each week.



► **NAS MEMPHIS**—The Commissary Department has been conducting numerous experiments in an effort to improve the coffee served at this station. Following are the basic conclusions drawn: Coffee made by filtrator and filter sheet process is superior in clearness and quality to that made in urns with a coffee bag, and the beverage holds its flavor without acquiring a stale, old taste. This eliminates the drainage of half-filled urns and the constant preparation of fresh coffee. Maintenance problems on mobile and removable filtrator and filter sheet equipment also are negligible, saving many man-hours in repair work.

► **NAS GLENVIEW**—In cooperation with the Fourth War Loan drive, NAS contributed, as an exhibition at State and Madison Streets in Chicago, a new SB2C1 Curtiss *Helldiver*. Two pilots, who only recently returned from combat zones, spoke of combat experiences and demonstrated some features of the plane. In their two-hour appearance the pair sold more War Bonds than did a famous Hollywood movie star who had appeared on an earlier two-hour show.

► **NATC PENSACOLA**—Squadron 8-C, based at Whiting Field, has completed over a year of flight training without a single injury to student or instructor personnel due to aircraft accidents. During this period squadron flew a total of 67,380.2 hours, of which 48,171.9 hours were training students. Since the squadron's formation in August, 1942, there has been only one aircraft accident resulting in injury to flight training personnel. The acci-

dent occurred the day squadron was commissioned, and involved an instructor and student. The instructor is again on duty with squadron and student has been with the Fleet as a pilot for many months.

► **MCAS EL CENTRO**—Two SBD's attached to bombing and gunnery school were taxiing to take-off area when the tower changed the course to one, necessitating a different taxi route. Pilot of lead plane, although he did not respond to radio calls, finally saw the red light from the tower, stopped and proceeded to turn around. Pilot of second plane, oblivious to radio calls, red lights and even to airplane in front of him, crashed head on into the first plane. Result: two badly mangled aircraft. Cause: pilot error, negligence and just plain doping off.

► **NATC PENSACOLA**—A number of portable auxiliary electric power units for use "on the line" or elsewhere away from a convenience current source have been placed in operation at the A&R Department, at Pensacola.

Capable of furnishing current sufficient for trouble-shooting or test operation of an airplane's electrical equipment, including radio, without starting the plane's engine, each unit is made up of a small single-cylinder, air-cooled gasoline engine. It is connected by a v-belt to a standard aircraft generator. The engine is mounted on a casted chassis for easy portability.

► **NAS MEMPHIS**—Final tabulation of the aviation gas used at this activity during the calendar year ended 31 December 1943 reveals that the total is 5,458,268 gallons. This huge gallonage, if delivered at one time, would require a train five miles long, composed of 685 tank cars, and would be sufficient for an automobile to completely circle the earth ten and one-half times. If applied to a Stearman Trainer (N2S) flying at normal cruising speed, this same gallonage would permit a huge armada of 13,400 planes to fly from this activity to Washington, via Kansas City, and return.



► **NAS MIAMI**—The Conservation Officer has a salvage program functioning which equals that of any other naval air station in the country. Each division has designated an officer to serve as its Conservation Officer. Materials salvaged include iron and steel scrap, copper, lead, engine steel, brass, light scrap iron, aluminum, rubber, rope, grease, tin cans, ignition wire, paper, bags, vegetable containers, wood and card-

board boxes, plexiglass, cartridge brass and laundered rags. Material salvaged from September 1 to December 31, 1943, included 228,700 lbs. of light scrap iron, 27,595 lbs. of rubber, 2,612 bags, 4,344 vegetable containers, 1,205 wood boxes and 400 lbs. of plexiglass.

► **NATS PACIFIC**—This command is not without its occasional laugh, which helps to relieve the staff from its woes and wrinkles. After a recent night flight made with a RBM for the purpose of determining suitability of night seadrome lighting at NAS Honolulu, the pilot experienced difficulty in picking up a buoy in a flat calm. An A-V(s) officer passenger aptly described the pilot's frantic manipulation of throttles, switches, flaps, et al, as "a drunk fumbling in his pockets for something he hasn't got."

► **NATC PENSACOLA**—A practice field used by Squadron 2-B, NAAS Saufley Field, has taken on the appearance of a gala lawn party, thanks to the local power company's imaginative attempt to prevent aircraft from flying into its power lines.



The wires cross an apparently unobstructed approach to the field. Although students were warned of their presence, some persisted in landing low over the area. This naturally resulted in some extremely bad landings—plus increased work for the A&R Department and the power company's line crews.

To eliminate the hazard, the company painted the poles barbershop red and white and extended between them a colorful line of red and white pennants.

► **NATS WEST COAST**—An innovation in the office of the ood is a pair of "walkie-talkie" sets, a portable radio device enabling the ood to maintain communications with any roving watches which he may detail during emergencies. Officially termed a Transceiver Unit, these sets are issued by Special Devices of BuAer. They were used recently during a windstorm to keep the ood informed as to the progress of measures being taken with regard to securing the airplanes.

► **NAS NORMAN**—Coffee bars are to be established at the flight line for all hands, under the sponsorship of the Navy Wives Club. Two wooden structures on either side of the operations tower, formerly used as shelters for the line crews, will house the "java bars." The volunteer workers plan to start serving coffee at mid-morning and will remain open until flying is secure.



► **NAS BRUNSWICK**—A British fighter plane was sitting on the end of the runway awaiting permission to take off when an emergency landing was requested. The control tower turned its attention to the plane making the emergency landing request and ignored the repeated signals from the impatient fighter pilot. At last, with exasperation much in evidence, the Briton called, "This is plane No. so-and-so. If you receive me, rock your tower." When at last all was squared away and the fighter was given permission to take off together with the other members of its squadron, the tower had the last word. As the squadron passed directly overhead, the tower spoke up, "If you receive me, rock your squadron." There was laughter in every cockpit of the British squadron.

► **MCAS CHERRY POINT**—An experimental course in aerial photography has been inaugurated at Cherry Point for women Marines. The training program is comparable in theory and assignments to the school of photography at Pensacola. Women completing the course will be qualified to relieve men for assignment to combat units. Col. Ruth Cheney Streeter, MCWR, recently inspected their work.

► **NATC PENSACOLA**—February 2 marked the thirtieth anniversary of the first airplane flight the Navy ever made at Pensacola.

On that day in 1914, Lieutenant John H. Towers, USN, and Ensign Godfrey Chevalier, USN, took off from Pensacola Bay in one of Curtiss' hydroplanes and stayed aloft for 20 minutes. It was 13 days after they had arrived in Pensacola aboard the U.S.S. *Mississippi* to put in operation the U. S. Aeronautic Station, as the Naval Air Station was first called.

Lieut. Towers is now Vice Admiral in command of the Pacific air forces, and Ensign Chevalier is the man honored by Chevalier Field. It was not until 1921 that land-plane training was begun here.

► **NAS CLINTON**—Recreational facilities for enlisted personnel at this station were augmented by an additional service club in Sayre, Okla., opened recently under sponsorship of the Sayre chapter of American Red Cross. The two USO clubs organized in Elk City and Clinton to care for the needs of NAS men and WAVES have been redecorated, and the Salvation Army Red Shield Club in Clinton continues to offer much-needed service.

In addition, work has been completed on the enlarged auditorium on the base, and the station has been added to the Victory Circuit of USO Camp Shows. All-station shows also are planned, and work is progressing on plans for a series of weekly smokers which will feature boxing and wrestling matches.

The station soon will acquire a set of curtains for the new auditorium stage. These include blue main curtain, blue grand and silver cyclorama. Complete lighting system including border lights, olivettes, spots and floods will be installed.

## TOKYO TALKS

### —TO JAPAN

"Our forces again have made clear to the world the might of our naval and air power which is supreme in the world." This boast came at the end of a broadcast which had reiterated the claim that 221 Allied planes had been "shot down or damaged" over Rabaul with a total Japanese loss of three planes and two ships. Meanwhile, the Japanese *Domei* agency said in a dispatch that "especially in its productive capacity, resources, factory facilities, and so forth, is America superior, both in quality and in numbers" of planes and ships. "No matter how many ships are sunk or how many planes drop to the ground, they will still come on overwhelmingly," the dispatch said and then urged workers to greater efforts.

### —TO THE SOUTHWEST PACIFIC

Tokyo declares that, at the beginning of the war, the ratio of plane losses was 20-to-1 in favor of Japan, that the ratio declined to 4-to-1 after the Rendova operation, and has now increased to 10-to-1.

### —TO NORTH AMERICA

"If the American and British commands harbor the thought that they can save themselves by resisting to a certain point and then surrendering to the Japanese in order to bask under . . . traditional hospitality . . . they may as well abandon such an idea. There is nothing in the code of a Japanese warrior that allows a soldier to save himself after fighting. Japanese chivalry does not apply at this stage."

### —TO JAPANESE AREAS

Closely following reorganization of Japanese aircraft production control and a shakeup in the army air force, the Japanese navy has appointed a new chief of naval aviation headquarters. Tokyo radio said Rear Admiral Yasuo Tanaka had relieved Rear Admiral Yashu Yasuba, who was transferred to the naval technical research laboratory.

### —TO LATIN AMERICA

"The Japanese hospital ship *Yoshina Maru* was subjected to outrageous bombing by an enemy plane with no damage to the personnel of the ship." The "bombing," which another broadcast claims was made by "North American planes," is termed a "deliberate attack," and it is added that "the enemy's illegal bombings of our hospital ships already have been committed more than 10 times."

### —TO EAST ASIA

Tokyo announces Japan calls to the colors most ex-servicemen formerly exempted, and urges those definitely exempt to volunteer.

### —TO GERMANY

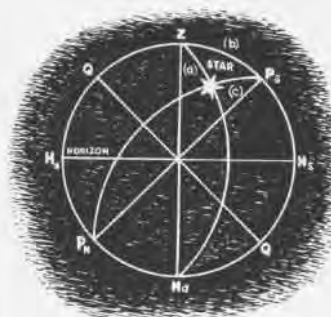
Lopping 99 years off an estimate of the war's duration made last June by Japan's propaganda director, Tokyo radio told the German people that Japan expects the Axis to win "final victory" in 1944. The new prediction was attributed to the director of the "Patriotic Committee of Japanese Authors." Declaring that Japan intends to launch a "decisive offensive" this year and claiming that the disparity in American and Japanese production would "evidently come to an end very soon," Tokyo told the Germans that "over here, as in Europe, the year 1944 is considered the year of final victory."

[Last June 8 the Tokyo domestic radio quoted the director of the "Patriotic Committee of Japanese Authors" as telling the Japanese that 1943 was "a most important time" and that "if we do not win during this time, it will remain for us to do so during the next 100 years."—Ed.]

### —TO EAST ASIA

The Japanese have organized an "Old People's Association for the Encouragement of Longevity" and dedicated it to activities which might "prolong the average life of the Japanese to 100 years and thereby increase the Japanese population to 500,000,000." By-laws specify that men between 60 and 69 be admitted as "ordinary members," those of 70 to 79 as "regular members," while those over 80 will be accorded "honorary membership." Men under sixty may connect themselves with the association as "probationary members."

### SHOW ME THE WAY TO GO HOME



## Man Is Not Lost

From this diagram, using a protractor, answer the following questions:

1. What is the latitude of the observer? .....
2. Is the star circumpolar at this latitude? .....
3. Is the declination of the star north or south? .....
4. If the local hour angle of the star is  $40^\circ$  W and the azimuth angle of the star is  $045^\circ$ , what is the Zn of the star? .....
5. What name is given to the side (a) of the astronomical triangle? .....

(Answers on page 40)

it was decided to depart from the original premise of knitting or weaving wire cloth for the electrical elements and to apply wires to the surface of finished lightweight cloth. This would eliminate the necessity for making innumerable soldered connections at the ends of individual wires. By this method it was found that fashioned suits could be tailored to give improved fit and comfort to the wearer. After several not-so-successful attempts to use fabric, researchers decided to investigate leather as an outer shell material. Leather has worked so satisfactorily that it is now used in all Navy heated suits.

After several designs had been produced and a few of each tested, a composite design was prepared, incorporating all improvements suggested by operational activities. Twenty-five heated outfits, consisting of suits, boots, and gloves were issued to each of six carriers. Several squadrons of flying boats were also equipped. From service reports received from these activities, minor changes were made. The Navy standardized the suit in 1940, and few changes have been made since then.

#### **Meets Normal Weather Conditions**

Present equipment is designed to meet normal cold weather operating conditions and should not be considered inefficient if wearer gets cold at  $-65^{\circ}$  F. Restriction on heat of suit is determined by available current in airplane which can be utilized for this purpose. Wiring of suits is arranged to draw 180 to 200 watts, and airplane characteristic charts have been prepared accordingly. If resistance to lower temperatures is desired, it will be necessary to change original wiring installed in suit. This has been done in some suits for cold room work by buttoning in an auxiliary wired lining. Suits as manufactured consist of goatskin outer shell, wool flannel inner lining, and lining of airplane cloth on which heating wires are attached. This combination without current will keep wearer comfortable at ordinary ground temperatures.

Suit is connected directly to outlet installed in airplane. A standard plug is attached to free end of lead wire supplied with each suit. On opposite end of lead is a quick disconnect plug, whereby suit may be disconnected from airplane in case of parachute jump. A three-way switch is installed between quick disconnect plug and suit to control current to suit. Gloves and boots have a single heat only, while suit has low, medium, and high heats. An additional snap connection is incorporated in a flap on the chest for attachment of electrically heated sleeve for oxygen tube, electrically heated goggles, etc.



NAVY STANDARDIZED ELECTRICALLY HEATED SUIT IN 1940, AND FEW CHANGES HAVE BEEN MADE

NAVAL AVIATION

# NEWS



Taxi Signals  
Jap Shrines  
Did You Know?

Mar. 15, 1944  
RESTRICTED



# TAXI SIGNALS

Navy, Marine and Army Air Forces Adopt New Plane Handling System



Taxiing signals are adopted officially for use on shore bases or aboard aircraft carriers at sea; Lucite wands are attached to flashlights for signaling at night, using same signals as approved for operations during daylight hours

# Navy Makes New Taxiing Signals Official

**N**EW TAXI SIGNALS for handling of aircraft on the ground or on carrier decks have been adopted as official and put into effect by the Navy and Army.

Standard signals were drafted after many months of consultations between Navy, Marines, Army Air Forces, and representatives of British Royal Navy and Royal Air Force. Investigators sought the ideas of hundreds of pilots, line chiefs, operations officers and enlisted men before arriving at each of the signals to be used. The final result was a set of signals which was deemed to represent the best judgment of all concerned. It has been put into operation.



Avenger comes in on coral-paved landing strip at Espiritu Santo, with taxi signalman directing pilot to parking spot

Taxi signalmen occupy the same important place in handling of aircraft as do the landing signal officer with his fluttering paddles, or the dispatcher with his checkered flag. Because carrier decks are often overcrowded, close parking of planes to make the most of available space is an important item. The signalman's job takes on as much importance as the dispatcher or landing signal officer in the big task of keeping carrier aircraft operating.

To help the "traffic cop" in his work, the Navy has produced a wand which can be attached to any two or three-cell small-head flashlight. The wand consists only of a 4 1/2" piece of colorless Lucite about a half-inch in diameter with screw threads on one end. The other part of the device is a black plastic disc fitted to take the threading and to fit into the flashlight in the place ordinarily occupied by its lens.

During night operations, wands are used the same as the hands in daytime, giving the identical daytime signals. The only exception is that the EMERGENCY STOP signal, which is clenched fists in the daytime, becomes CROSSED WANDS at night (since this is the only way to *clench* them).

Before the present standard signals were adopted, various carriers, squadrons and naval air stations used all manner of signals to direct their planes after they had landed. At night

some used a red bulb in one flashlight and green in the other. Under the new system, should it become necessary to cut down the light intensity of the Lucite wands under battle conditions, blue, amber, or even red bulbs may be used, but *identical-colored bulbs must be used in wands*. Different-colored wands are not needed at night, any more than different-colored hands are needed during day.

Additional wands, as needed, may be ordered from the nearest supply point on *BuAer Allowance List "A."* Their designation is WAND, LUMINOUS SIGNAL—NAF88 593-1, Stock number (R) 17-W-100 and should be ordered accordingly.



Signalman motions to pilot of OS2U to taxi toward him as he stands on ramp at Pensacola; signals are same on land or sea

## CARRIERS NEED EXPERT SIGNALMEN

**N**O. 1 COMMANDMENT for the taxi signalman is always to stand where the pilot can see him. The best test of this is whether the signalman can see the pilot's eyes. Hiding under the nose of the plane, or under a wing, has proved most bothersome in keeping the pilot from seeing the signals.

So the standard position is slightly ahead of the plane and in line with the left wing tip. Aboard aircraft carriers or in certain crowded airfields it may be necessary to taxi planes from the right wing tip to insure clearing the island or certain other fixed objects. From either position the fool-proof test is whether the signalman can see the pilot's eyes.

Where heavy traffic requires it, a flagman with a checkered flag will be stationed on the landing field to direct the pilot to the signalman. In cases where large planes are towed, the taxi signalman stands so that he can catch the attention of the pilot and the driver of the towing vehicle at the same time. When necessary, an additional crewman will be stationed at the opposite wing tip. This man will give any necessary signals to the chief signalman, who is the only one who can direct the pilot and tow-vehicle driver.

Besides the importance of orderliness and safety on carriers or landing fields, a good taxi signalman is valuable for the psychological effect on pilots landing on a strange field after fighting heavy weather or on a carrier after a tough combat mission. A tired pilot does not feel like struggling around parking a plane—he welcomes a good signalman to pick him up as soon as his wheels touch and direct him to his allotted parking place.

The second requisite for the signalman to keep in mind is that his motions must not only be seen, but they must be understood. Every signalman on every Navy carrier or land base must use the same signal to designate the same operation. Most of the signals are almost self-evident in their clarity. The average signalman probably will not have to do much memorizing, since he probably has been using most.

## TWO BOOKLETS ON TAXI SIGNALS



**P**ROPER USE OF LUCITE NIGHT SIGNALING WANDS already has been distributed to aviation activities. Issued by Aviation Training Division of CNO, the booklet describes the proper method of assembling and using the Lucite signaling wands for night operations. Illustrations in color show proper night signals for use with the new wands.

**T**AXI SENSE, another of the series of "Sense" pamphlets, is being prepared for distribution and will be sent out shortly to all units. Written in the humorous tone of other pamphlets, it describes how the official day and night signals were drafted and how taxi signalmen use them to direct "traffic" on airfields or carrier decks the most efficiently.

The EMERGENCY STOP signal should be used only in extreme cases. It was designed to be the strongest signal in the book and should be employed only when necessary to stop the plane immediately, even if this means running the danger of nosing it over. Carriers may find it necessary to use this signal more often than land bases.

Necessity for standardized signals is important nowhere so much as aboard an aircraft carrier, where planes take off and land in such narrow space and must be parked wing-tip to wing-tip. A carrier's ability to get its planes into the air fast in an emergency or to land them aboard following an engagement depends considerably on the skill of its taxi signalman.

If it cannot handle these operations with a minimum of confusion it runs the danger of being caught unprotected by a swift enemy attack. Aboard carriers, taxi signalmen are stationed every 50 or 100 feet along the flight deck, each assigned to handle planes as they pass through his particular "beat" or sector.

After the plane passes him, the signalman turns over command to the next man by pointing toward him with both hands, passing the pilot along the deck somewhat like a guest proceeding along a receiving line at a formal ball.



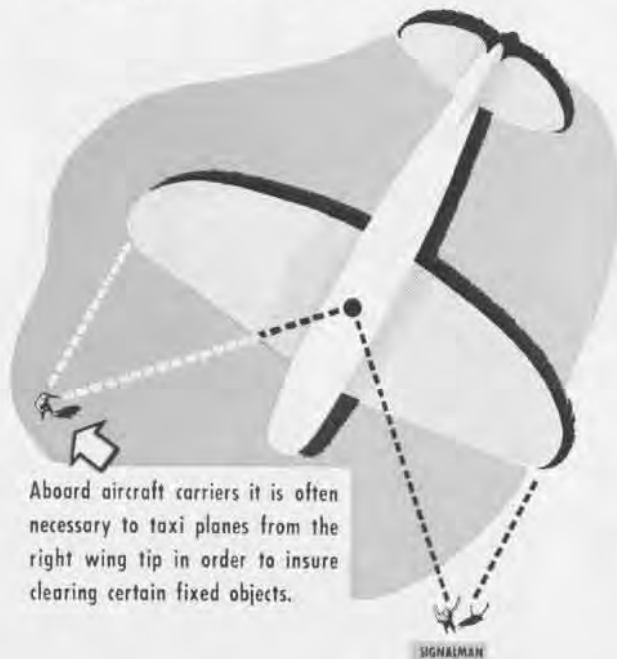
**DAY** Typical taxi signalman tells pilot to stop his plane by holding up both hands with palms forward, on a level with his face, as shown in picture.

**NIGHT** Signalman operating at night holds two Lucite wands in same position as during daytime to indicate stop. Pilot must follow directions implicitly.



## NAVY USES 20 STANDARDIZED SIGNALS FOR DAY OPERATIONS

DAY OR NIGHT, afloat or ashore, the same signals are in use by the Navy, Marines or Army Air Forces for taxiing of aircraft. The signals reproduced in color on these four pages have been adopted officially by those services for use by signalmen who handle movements and parking of planes on carriers or on shore airfields. The motions or positions of the hands are uniform, whether the aircraft is landed after a night flight or whether it is in daytime, whether it is on water, on a carrier deck or on land. The signals were approved only after considerable research and conferences with pilots, signalmen and all concerned with taxiing of aircraft. Each signal is easily understandable and logical if executed correctly in a position where the signalman is plainly visible to the pilot. As illustrated below, the correct spot for the taxi signalman to take is slightly ahead of the plane and in line with the left wing tip. Aboard aircraft carriers it is often necessary to taxi planes from the right wing tip to insure clearing certain fixed objects like the island.





**RIGHT TURN**

desired wing around with regular  
"Ahead"—point at opposite brake.



**SLOW DOWN**

Downward patting motion,  
hands out at waist level.



**STOP**

Hands upraised and held in  
simple "policeman's stop."



**INSERT CHOCKS**

Hands, thumbs pointed in,  
swept together at waist.



**THUMBS UP**

O. K. to start engines, or taxi.  
"Thumbs Down"—don't!



**START ENGINES**

Clockwise cranking motion,  
pointing at proper engine.



**SPREAD WINGS**

Arms in hugging position,  
then swept out to sides.



**LOWER WING FLAPS**

Hands flat together, then  
opened wide from wrists.



**RAISE WING FLAPS**

Hands, opened wide from  
wrists, suddenly closed.



**UP HOOK**

Right thumb jerked up to  
meet horizontal left hand.



**OPEN COWL FLAPS**

Hands, flat against sides  
of head, "opened" forward.



**TURNOVER  
OF COMMAND**

Both hands pointed at next  
succeeding taxi signalman.



## SIGNAL WANDS GUIDE TAXIING AT NIGHT

► **THE WAND ITSELF** consists of a 4½" length of colorless Lucite rod, screwed into a black bakelite base. It fits onto the standard small-head Navy flashlight (either the two- or three-cell), in place of the regular lens. To assemble the complete wand, simply remove the metal cap of the flashlight, take the lens out of the cap, slide the cap down over the wand, and screw cap and wand onto the flashlight.



► **IF THE WANDS** being assembled or already in use have not been "sanded," take a piece of fairly coarse sandpaper and sand the Lucite rod, first with lengthwise strokes, then "around," and finish up by sanding the tip end of the rod. This sanding acts like frosting a light globe—it makes the rod glow more evenly along its length. Sanding the tip protects the night pilot's eyes from any sudden glare. (Don't sand the *base* end of the Lucite rod—the end toward the flashlight bulb! This end must remain clear and polished so that the light from the bulb can enter the wand.) Lucite will get smooth again after a certain amount of handling, so the sanding operation will have to be repeated from time to time. Whenever too much light is coming out of the end of the wand and not enough out of the sides, reach for the sandpaper and give it the once over again.



► **DURING NIGHT OPERATIONS**, use wands just the same as hands during the daytime, giving the identical daytime signals. (The only exception is that the wands are crossed to "clench" them for the night "Emergency Stop.") Don't try to make it difficult; simply use the wands as night-visible "hands." Any psychology student will recognize at once the advantage of having identical day and night signals. During night operations, the pilot really "sees" the signalman's hands giving the regular daytime signals to which his mind and eyes are accustomed. Standardization of signals is most vital.



### COME AHEAD

*Reversing motion; rapidly shows plane speed desired*



### EMERGENCY STOP

*Regular "Stop" with fists clenched (wands crossed).*



### PULL CHOCKS

*Hands, thumbs pointed out, swept apart at waist level.*



### LOCK TAIL WHEEL

*Hands overhead in V, then suddenly brought together.*



**LEFT TURN**

*Pull desired wing around with regular "Come Ahead"—point at opposite brake.*



**RIGHT TURN**



**SLOW DOWN**

*Downward patting motion, hands out at waist level.*



**STOP**

*Hands upraised and held in simple "policeman's stop."*



**CUT ENGINES**

*Hand drawn across neck in "throat-cutting" motion.*



**INSERT CHOCKS**

*Hands, thumbs pointed in, swept together at waist.*



**THUMBS UP**

*O. K. to start engines, or taxi. "Thumbs Down"—don't!*



**START ENGINES**

*Clockwise cranking motion, pointing at proper engine.*



**FOLD WINGS**

*Arms, from straight out, swept in to hug shoulders.*



**SPREAD WINGS**

*Arms in hugging position, then swept out to sides.*



**LOWER WING FLAPS**

*Hands flat together, then opened wide from wrists.*



**RAISE WING FLAPS**

*Hands, opened wide from wrists, suddenly closed.*



**UNLOCK TAIL WHEEL**

*Hands together overhead, then opened to form a V.*



**UP HOOK**

*Right thumb jerked up to meet horizontal left hand.*



**OPEN COWL FLAPS**

*Hands, flat against sides of head, "opened" forward.*



**TURNOVER OF COMMAND**

*Both hands pointed at neck succeeding taxi signalman.*



# DRY RUN

THERE ARE few aviation pilots who have not, at some time during their career, experienced the ill effects of planesickness. The following experience of a Technical Observer who went through some first-time maneuvers in the rear cockpit of an SNJ should stir memories. It was written by DEAN COFFIN of Detroit, the victim.

PASS the poisoned brandy, children, and daddy will tell you all about flying. Well, not all, but certainly something about what a civilian feels like in an SNJ rear seat, making a beam attack on a bomber, and high and lowside attacks, bow runs, and loops.

Now this committee on gunnery was supposed to climb aboard a *Catalina* and watch some dry runs made on it by fighters. This was the start of the session. Coffin has been shooting the breeze with a dive bomber pilot named Ed. He was on the *Enterprise*, yes, and he dropped an egg on the Kaga on that fine day at Midway. Ed knows how to fly, they say around here, even though he does scare the boys on the ground once in a while.



I got Ed in the corner and fast talk him into letting Coffin ride behind him, instead of flying aboard the *Cat*. It's a deal, he says.

Lunch . . . eat lightly, Dean old boy . . . or maybe if you eat a lot, you won't black out . . . say, how many c's on you in a beam attack? . . . better ask someone what to do. . . "Hey, Ed—what do you do to counteract c's?" . . . "Relax." . . . "Oh." . . . Well, maybe eat a little. Chicken sandwich, glass milk, ice cream . . . let's see, now—to slip a chute toward the shoreline, pull on the lines that are on the shore side. . . . Mae West jackets you blow up by pulling that little cord. . . . I won't have any trouble.

We get coveralls, a Mae West, sign my life away as a Technical Observer, I get a helmet, earphones, and a chute. Ed is very careful in details. He checks the chute over closely, adjusts the straps, checks the release wires under the cushion, then works on his own. Everything is

hunky. The SNJ is buzzing outside. We walk out from the Ready room and climb aboard. This is gonna be f-f-f-f-f-un.

The chute pack beneath me fits nicely into the metal seat. Hatch cover is open. Check it. It is locked in position. Plug in the earphones. Press the switch on the mike and try it. It works. Some kind of garble comes back from Ed. Sounds like Donald Duck. Well, can't hear that—but what's it matter. Ed leaves the dual con-



trol in position so I can watch what's happening. Damn that parachute strap. It's falling off my shoulders. So is the other one. I feel naked, kind of. Here we go. Taxi down the field, square away on the runway, and here we go.

Hey, Coffin, is your safety belt on? Yeah. There it is. Ground is moving by, stick moves forward a little, then back a little, and back. Up we go, with a nice, easy lift. Man o' man, it's lovely. We bank and turn.

Here comes Bill Peters off the ground behind us. He is flying on our wing today. He was with Ed on the *Enterprise*. They've done this before. Out we go, now, toward the gulf. Airspeed 130, altitude 900. I can read all the dual gauges in front of me. Not bad, keep your feet off those rudder pedals. Okeh. Now let's see, what in the hell am I going to hang onto when we start nosing down in those breakaways? Two rods there. That's the stuff. They'll be fine. Coffin, you're a stupe. Why in hell did you tell Ed to do a loop—or anything he wanted to do. Maybe you're in for it and don't know. Skip it.

LOOK there—the sea is big and blue and stippled, shining in the sun. The white Florida beaches rim it like platinum grips for a sapphire. Flying is lovely. I can't get enough of it—at the moment.

Ed is pointing. There's our PBY, a big comfortable looking *Cat*, lazing nicely along at 100 knots. Bill Peters is off our starboard, wing and wing with us, sitting out there and laughing at Ed, making movies with his hands. Ed talks to the PBY. I hear him over my phone a little.

The pilot watches us come in, and we fly along under his wing. Here's this big, blotch-painted, pregnant mother ship above us, standing quietly still, and the two SNJ's snuggle in under the wings. Kind of sweet. The port blister on the PBY is filled—about four or five guys looking down. We wave back and forth.

Our wings waggle. We drop below, now, and swoosh across beneath the big beautiful bird above us, then climb, climb, climb, until the mother ship looks kind of small down there. She stays on course, and I look down over the side, watching her. The sea is a deep blue beneath her, and above the sky is turquoise. It's hazing up a bit where we are now, getting a little thick.

Now we're above her. The wings waggle. Ed's ready. Bill's SNJ comes across beneath us and we peel off. Here we go, now, down, down. It's a highside pass. Now let's see, where am I? Hey, don't look over the side, Coffin, or you'll be lost. Look at the *Cat*. There she comes, right up to meet us—bigger and bigger and bigger. My God, now, when's he going to pull out of this thing. Hey, Ed, you're gonna hit it—hey—hey.



I guess he's gonna pull up now . . . isn't he? Hey! The big boat flashes past over my head. A thousand small threads attached to my cheeks start tugging, tugging, tugging, pulling my skin down to my feet. Now what in hell are those? Two small boxes are floating in the air in front of me—I mean they are. They are radio parts, and they just float there. I reach out and pick one out of the air, just like plucking a cherry from a tree. Am I nuts? Oh, let's see, we dove out of that attack, and left these radio parts in the air, we went down so fast. They came right out of a bin beside me. I reach down and pull them off the deck and stow them. During every attack the rest of the hour, those parts floated in front of me.

Now, let's see, where are we? Oh yeah—we've been climbing, off to the port side of the *Cat* now, and looking down. Gee, this is the—hold on, here we go—right wing down. Stick moves over. Nose down.

Faster . . . faster. Airspeed 160 . . . 180 . . . 190 . . . 200 . . . 210. Here comes our baby, turning slightly and getting bigger and bigger. Guess we'll run right into that old baby. What the hell—who cares. Come on, Ed, just kiss it a litt—Ugh, here comes that dive. Ummm. Pull up knees, and shout. That's it. Y-y-y-ow! There comes those strings, pulling my skin down, now. Funny feeling inside—woosh. Feel a little faint. That was a good one, eh? Sure. Yeah.

Now up we go again, and look around. I feel better. Across there is Bill, just starting down on his run. I count the seconds he's on the target. A highside beam run, 5, 6, 7, 8—about 8 seconds he was on the target. Well, that's a pretty slow bomber, and he didn't get a bead on her until he was part way into the run. What's that, sweat? Yup.

Now BILL comes up and up and slides nicely into position on our left wing. The RBV is down there on our left, below. We lose altitude. Only the flying boat floats up, up, up, until now she's about 100 feet overhead up there. . . . Now we come at her from below. Up, up, we go. Here she comes, floating into us—all green and blue and sea stains. We drift up into her, in we come, closer, closer, and—ugh! There's that damn dive again. My safety belt tries to bisect me. I grunt mightily. The radio parts pop up out of that bin and start floating again. Ugh. Boy, I don't like this part of it now. Feeling kind of faint—say, that was vanilla ice cream at lunch. I can taste it. Now listen, Coffin, you are not gonna? No, I'm not gonna. Shucks, a snap.

I move my arm out to wipe the sweat off my face. The slip stream catches it and slaps it back against the cowl around the cockpit. Watch out for your arms, you dope. Now—wipe, wipe. Jeest, I'm not doing so good. Hey! What's happening now? I look out, the dark blue is revolving now and I'm lost. Lost, lost. Hold onto those rods, kid. Can't you find the Cat? Look around. Everything's turning.



Oh, there she is, up above us a little. Looks like a tail run on her. Yup . . . now you know where you are, eh, Dean old boy. Right. This is a snap. If you stay oriented like this, you won't be sick. Will you? Nope. I hope.

Here she comes. Closer, closer, closer. My God, we're nosing down now, 50 feet away. No—ugh. Here come the radio parts—floating, floating. And I'm floating, floating. If I could get a little pump to shoot the blood back into my face, I'd be all right. But it's all collected in my shoes. My legs are heavy. Whoosh.

Ed looks back and laughs. I give him the old OK sign. Circle the thumb and forefinger. Hunky dory, Ed. Let's have some more. (Shut up, you fool. Quit showing off.)

Now we make some more passes . . . high and low . . . quarters and beams. Then—Ed looks back. "Loop," he shouts. Yea, boy. Loop. Grab the rods. Airspeed creeps up, up, whistling around the ship. Then stuff comes by overhead, first turquoise, then some hazy stuff, then some of that dark blue-green stuff. There's those wrinkles in the ocean, right over my head. Well, what do you know, eh?



Ed looks back again when we're out of it. He grius. "Okeh?" Ush hugh. Whoops, here's that vanilla. He watches me. I point at my face. Over we go on our side. Heave . . . and heave . . . and heave. Blah. The slipstream is kind. It tears it away from you. No problem there. I try leaning out to miss the ship and me, but the blast tugs at my glasses. Well now. . . . Good Lord. Well, what do you know. Coffin, you're a siss. Well, what do you know. Ed smiles, then looks a little grim. Aw nuts. Bill hauls up alongside, slightly below. Ed holds his nose and points at me. Peters holds his nose and points at his



rear seat man. Well, there are two of us, then. His rear seat is an enlisted man with flying hours. Aw nuts. I'm a mess. The cockpit is a mess. And I feel like two of the new pennies.

WE COME IN for a landing. The air is warmer. My strength comes back and I holler I'm all right. The interphone doesn't work very well, I guess. Ed nods and we keep coming in. We pass the field once, then in we come—a nice steep turning dive, and down we go, coast a little, and there's the strip. Hmmm. Back on ground. Coffin, you're a siss. How am I going to live this one down? I break the belt across my legs, and take my glasses off. We come into the line, stop, and the engine conks out.



The ground crew comes out to take the ship. They look at Ed, then me, then off goes one. He comes back with a bucket. I know what that means. So I sigh, and get out of the Mae West and the chute and go to work with the water and the rags. Dry run? Nuts.

## BEST ANSWERS

### XVIII—Storms and Fronts

Pick the best choice to complete the statements below, then check your answers on page 40.

1. When warm air is unstable, violent thunderstorms in an almost continuous line are most likely to be produced by a—

- a—rapidly moving cold front
- b—slowly moving warm front
- c—warm front occlusion
- d—slowly moving cold front

2. In early summer a pilot in Alabama notices that the afternoon air is warm and moist to great heights, and the weather map shows a long, narrow, low pressure trough extending southwestward across Alabama. Under such conditions, he should be on the lookout for—

- a—chinook winds
- b—tornadoes
- c—tropical cyclones
- d—monsoon winds

3. At a warm front—

- a—colder air under runs warmer air
- b—warmer air under runs colder air
- c—colder air over runs warmer air
- d—warmer air over runs colder air

4. A pilot watches the following sequence of clouds overhead: cirrus, cirrostratus, altostratus, nimbostratus, cumulonimbus. He should know that a—

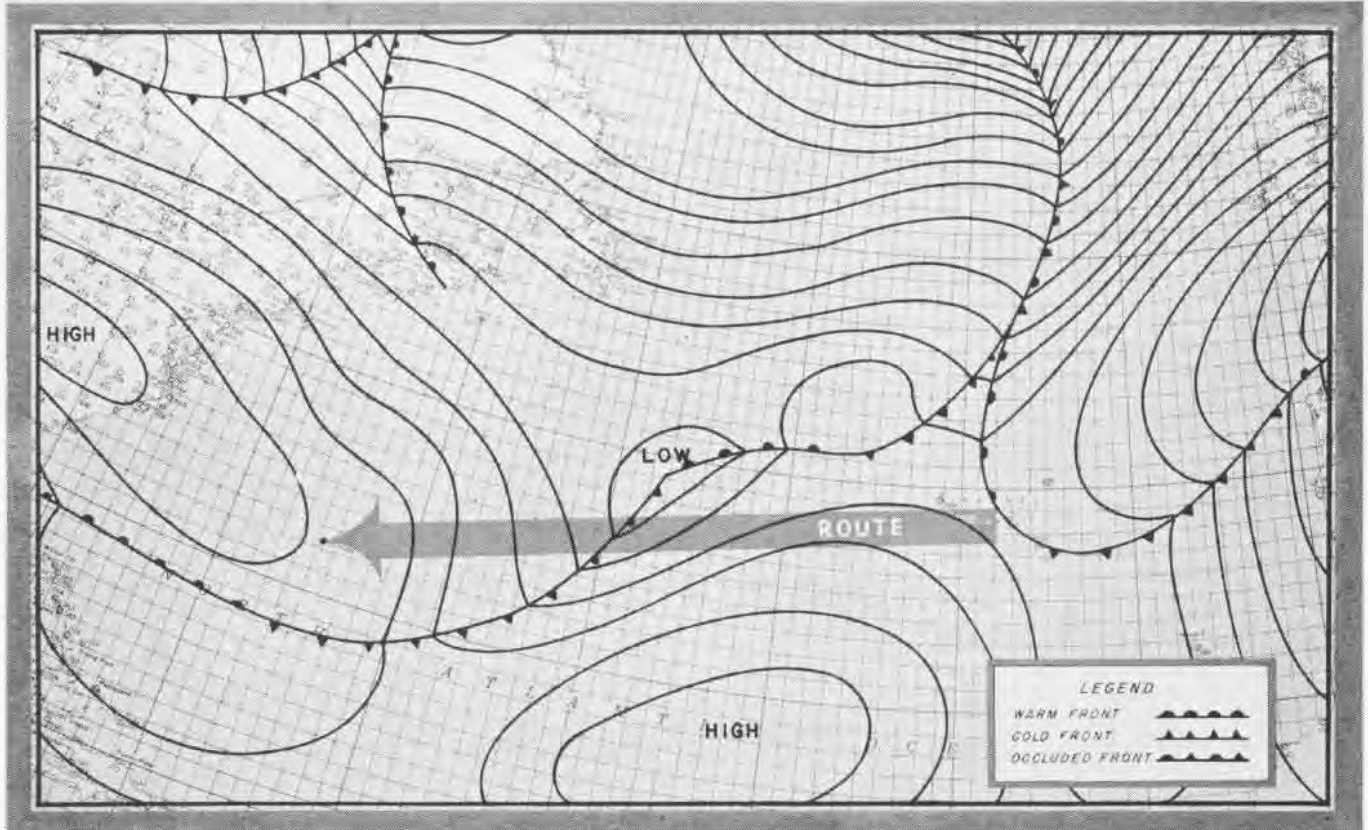
- a—warm front is approaching, with warm air stable
- b—fast-moving cold front is approaching
- c—warm front is approaching, with warm air unstable
- d—slow-moving cold front is approaching, with cold air unstable

5. A pilot sees from the weather map that he must fly through the area ahead of an advancing warm front. The hazards he is most likely to encounter if he flies at low altitudes are—

- a—low ceilings and poor visibility
- b—strong variable winds
- c—sudden showers
- d—severe turbulence

6. Pilots based at Pensacola or in Cuba or Puerto Rico should be most on guard for tropical hurricanes during—

- a—late spring and early summer
- b—late summer and early fall
- c—late fall and early winter
- d—late winter and early spring



## LIGHTNING CAN DAMAGE PLANES

**L**IGHTNING seldom if ever causes damage to a metal airplane. However, the accompanying photographs show an exception to this general rule. Pictures were taken recently after an R5D-1 had completed a flight from the Azores to Bermuda.

Lightning struck the aircraft when it was flying in the region of a cold front at 8,000 ft. in broken cumulonimbus clouds. Flight encountered mixed rain and snow, which resulted in a nearly complete communications blackout owing to precipitation static. Considerable thunderstorm activity was noted in the area. Temperature was approximately 24° F.

The lightning burned off four wick-type static eliminators, burned holes in and fused the metal on each wing tip. While damage did not seriously hamper craft's flight characteristics, it did result in lost time for minor repairs, extra work and expense, and communications failure which could have been quite serious.

Lightning is defined as the flash of light caused by a discharge of atmospheric electricity. In itself, lightning is among the least understood of all weather phenomena. In general, those who have studied lightning agree on the following explanation, but most of the points have never been proved.

It is known that the most favorable conditions for the development of lightning (and thunderstorms) are:

1. In connection with a cold front (squall line)
2. In connection with strong convectional activity not associated with a front

A cold front or squall line is simply the boundary between a mass of warm air and a mass of cold air, both masses moving in such a direction that the cold replaces the warm air.

**R**EQUISITES for strong convectional activity, not associated with a cold front, are a sufficiently large supply of moisture in the air, and unstable air. In order to be unstable, the rate at which the air would cool must be greater than 5.5° F. per 1,000 ft. of rise, up to the condensation level, and over 3.2° F. per 1,000 ft. after level is reached.

► When either of the conditions, 1. or

2., is met, strong vertical currents are generated in the air and cumulus clouds are formed. Upon complete development of these clouds (shown by an anvil-shaped top) they are known as cumulonimbus clouds.

**R**AINDROPS formed in the cumulus clouds are subjected to the strong vertical currents which exist in the cloud, and large drops are broken up into smaller ones. The small ones may reform and be broken again and again. Each time the drops are subdivided the various parts are charged positively and the surrounding air is negatively charged. As the process continues, the drops (charged positively) are concentrated in the lower front portion of the cloud, while other portions consist mostly of negative charges, thus building up a high potential difference within the cloud itself. In addition, although no actual proof exists, it is thought that friction between snow and ice crystals in upper portion of cloud produces a charge, leaving the uppermost portion (anvil) positively charged.

In this manner all possible ways in which lightning occurs are produced: between two separate clouds, from cloud to earth, or within one cloud.

# Fliers Should Avoid Thunderstorm Regions

AIR OFFERS a high resistance to electricity, but if the air is ionized, electricity can pass much easier. It is known that the air is ionized, and that lightning follows this ionized path. Just how this is done is not known definitely, but it is thought that small charges are emitted from one area toward the other, ionizing the air for a short distance between the two. This process is repeated several times, extending the area of ionization farther and farther until finally the resistance between the two oppositely charged areas is relatively low. At this time the remaining charge passes between the two.

It is known definitely that lightning is not a single flash, but a rapid series of flashes, each following the path of its predecessor and each successive flash being longer. This has been proved conclusively by photographs and tends to bear out the theory explained in the preceding paragraph.

Owing to "persistence of vision," and to the fact that flashes follow each other very rapidly, casual observation makes it seem that only one flash occurs. Most common of all types of lightning is where flash occurs within one cloud. Rarest is between two separate clouds.

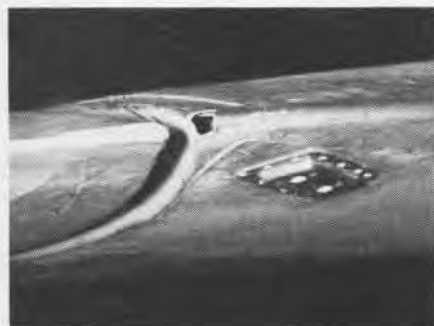
FROM this brief article it is quite evident that enormous forces, both electrical and mechanical, exist in any area of thunderstorm activity. While it is true that aircraft are seldom severely damaged by lightning, it is still good sense to avoid flying through these areas if possible. In addition to the danger from lightning itself, other real perils, including severe turbulence, hail, and icing, are encountered. In order to avoid thunderstorms, fly around them if isolated. If this is impossible, determine the direction in which the line of storms is moving, select area of least violent activity, go through at right angles.



LIGHTNING, AMONG THE LEAST UNDERSTOOD OF ALL WEATHER PHENOMENA, PACKS POWERFUL PUNCH



LIGHTNING PERFORATED LEFT WING & AILERON



R5D-1'S RIGHT WING AND AILERON WERE STRUCK

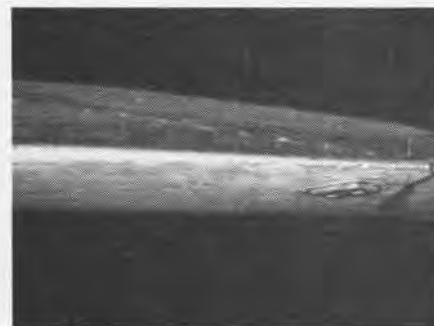


PHOTO REVEALS DAMAGE TO PLANE'S LEFT WING

# PUBLISH TECHNICAL LIBRARY

## Strikers for aviation rating get new study material

Off the presses this month is a series of twenty-seven new books tailored especially for aviation-enlisted men. Covering subjects which the various ratings need to know to perform their aviation duties and prepare for advancement, this new series represents the joint endeavor of the Naval Air Technical Training Command and the Training Division of the Bureau of Naval Personnel. It is a definite departure from previous course and rating books for aviation enlisted men.

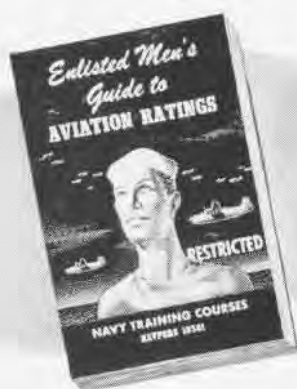
In appearance, the books have a bright, snappy look. Blue and white covers depict various technical jobs in

Naval Aviation. Also, "something new has been added" inside the books. Whatever the subject—radio, electricity, metal work, airplane maintenance, power plant maintenance, ordnance, parachute, aerology—every aspect of the aviation story is loaded with adventure. Technical advisors, writers, editors, and illustrators have joined together to make these books as lively reading as the subjects themselves. The treatment of technical material is simple, straightforward, down-to-earth, with the purpose of making the "know-how" interesting and enjoyable.

Like all course and rating books, the

aviation series is published to help enlisted men prepare for advancement in rating. But, because so many aviation ratings are new since Pearl Harbor, and because so many of them require information on the same subjects, it was decided to publish the aviation series according to *subjects* rather than according to *ratings*. The striker for an aviation rating has a *reading list* of several books.

All sixteen aviation ratings start with *Introduction to Airplanes* to get straight on nomenclature of Naval Aviation, aerodynamics, types and parts of airplanes, handling and aviation seaman-



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Initial distribution of books will be made to all aviation training and operational units. Future shipments to individual activities will be filled by appropriate naval warehouse upon receipt of request from commanding officer of an activity, specifying NAVPERS number, as well as the corresponding title of publications desired.



NAVPERS 10303



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# FOR AVIATION ENLISTED MEN

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AMMC, AMMP and AMMF) are specifically offered *Airplane Structures, Aircraft Engines, Aircraft Hydraulic Equipment, Aircraft Instruments, Aircraft Fuel Systems, and Aircraft Propellers.*

## WHERE TO ORDER BOOKS

*Vessels and activities in the east coast area address Training Division, Bureau of Naval Personnel, Washington, D. C. Vessels and activities in the west coast area address Educational Officer, Eleventh Naval District, San Diego. Vessels and activities in the Fourteenth Naval District area, address Educational Officer, Pearl Harbor, T. H.*

AOM (including the recent subdivisions of AOMB and AOMT) are represented with *Aircraft Armament, Aircraft*

*Fire Control and Aircraft Munitions.* PM have the volume titled *Parachutes* which also includes information in life rafts, life jackets and flight gear. AERM and PUOM have two volumes, respectively, titled *Aerology* and *Photography.*

All in all, the new series of course and rating books represents a technical library for aviation enlisted men. It is recommended that the series be available in all aviation shops for ready reference. The degree of a man's knowledge determines his qualification for 3/e, 2/e, 1/e and Chief. Moreover, a specialist should have the opportunity to find out how his job relates to other jobs. That is one reason why the new aviation series is written in a down-to-earth style for more enjoyable reading.



NAVPER 10306



NAVPER 10311



NAVPER 10312



NAVPER 10313



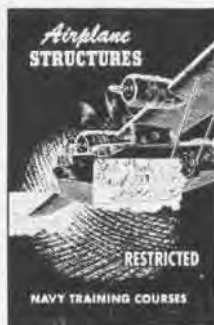
NAVPER 10314



NAVPER 10315



NAVPER 10323



NAVPER 10331



NAVPER 10332



NAVPER 10333



NAVPER 10334



NAVPER 10335



NAVPER 10343



NAVPER 10351



NAVPER 10361



NAVPER 10362



NAVPER 10371



NAVPER 10372



# TECHNICALLY SPEAKING

## Marines Improve the Rocker New Technique Saves on Boxes

MCAS CHERRY POINT—Necessity of replacing cracked rocker boxes on SBD-5 cylinders 1-2 and 9 has been eliminated here. Cracking of rocker boxes secured to baffle plate by an elastic nut occurs because no allowance has been made for expansion of cylinders.

Instead of replacing the damaged part, MAG uses a rat tail file to enlarge the hole in the direction of the cylinders and substitutes a castellated nut for the elastic stop nut.

The rocker box is then secured to the baffle plate by pulling the nut to a snug fit and using a cotter key.

► **BuAER COMMENT**—This infers that cracked rocker boxes are used. Total failure of cracked rocker boxes may result after being subjected to further vibratory stresses incident to operation or may cause further oil leakage. Cracked rocker boxes should not be used. R1820 Engine Bulletin 335 dated 29 July, 1943, and revised 30 September, 1943, prescribes proper corrective action to be taken for trouble with cracking of rocker boxes on R-1820-60 engines.

## Makes Photography Simple K-20 Camera Results Are Good

Pilot indoctrination in the use of Fairchild K-20 aerial cameras will eliminate most of the unfavorable and discourag-

Instructions for use of Fairchild K-20 aerial camera are given as follows:

1. Check for proper filter, attached to front of shutter by means of bayonet lock. Minus blue for sunlight with slight haze and red 25 A for bright sunlight and very hazy.

2. Set the shutter for proper speed, 1/500th, 1/250th, 1/125th second. Speeds are adjusted by means of a knurled knob on front of shutter housing; another knob

EXPOSURE GUIDE

Filter	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
None	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
Blue	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
Red	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
Green	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
Yellow	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
Orange	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024
Black	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1	2	4	8	16	32	64	128	256	512	1024

NOTE: 1. 1/500 - 1/250 - 1/125 - 1/60 - 1/30 - 1/15 - 1/8 - 1/4 - 1/2 - 1 - 2 - 4 - 8 - 16 - 32 - 64 - 128 - 256 - 512 - 1024

2. 1/500 - 1/250 - 1/125 - 1/60 - 1/30 - 1/15 - 1/8 - 1/4 - 1/2 - 1 - 2 - 4 - 8 - 16 - 32 - 64 - 128 - 256 - 512 - 1024

3. 1/500 - 1/250 - 1/125 - 1/60 - 1/30 - 1/15 - 1/8 - 1/4 - 1/2 - 1 - 2 - 4 - 8 - 16 - 32 - 64 - 128 - 256 - 512 - 1024

### SIMPLE EXPOSURE CHART AIDS PHOTOGRAPHERS

adjacent to it is used to set diaphragm openings. Check exposure guide for speeds with filters.

3. Open view-finder by pressing down on leaf spring, repeat same to close.

4. Check film counter.

5. Wind camera by pushing handle all the way forward and then to normal position.

6. Hold camera firmly against chest, so that back of magazine is pressed against chin; keep elbows close to side of your body. Any part of the body above waist line that may rest against airplane (camera, elbows, hands) will cause vibration, resulting in movement to pictures.

7. Trip shutter by squeezing and not jerking the trigger firmly.

8. For further details refer to instruction book in camera case. This is an aerial camera; do not try to use as a ground camera. It is focused for 175 feet and beyond. Its use is for military purpose only, and not to be used for personal photography. It is important to fill in enclosed blanks with proper data. *Pictures without proper identification have no value.* (Data include exposure number, shutter speed, lens, filter, altitude, description of picture, plane number, date and signature of photographer.)

► **BuAER COMMENT**—The K-20 camera is provided for all patrol, observation, and scouting activities. In addition to getting good prints, it should be remembered that full and accurate description of picture, including exact location, what specifically is shown and event where applicable, is just as essential.

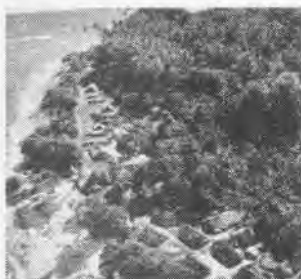
## Install Aerograph on SNB Results Are Satisfactory in Test

MCAS CHERRY POINT—A new aerograph installation on SNB-1 aircraft has been designed by the aerological section at this station.

Framework is constructed of 1/2" chrome tubing and measures 17" x 18", cross braced on sides. Bottom four corners of frame are built up to fit curvature of turret hatch cover, to which it is attached by means of four 3/8" bolts, secured by wing nuts inside plane. Aerograph is suspended within the cage by eight double loops of 1/8" bungee, attached at each corner of frame. Each double loop (not stretched) is 3 1/2" long and harness clamps used to hook onto aerograph area an additional 3 1/2". Entire assembly can be installed or removed by two men in less than a minute.

Tests of the installation have shown that resulting instrument record is more accurate than those obtained from other installations on different type planes tried at this station. Ventilation of the instrument is exceptionally good and pilots report flight characteristics of plane are not impaired.

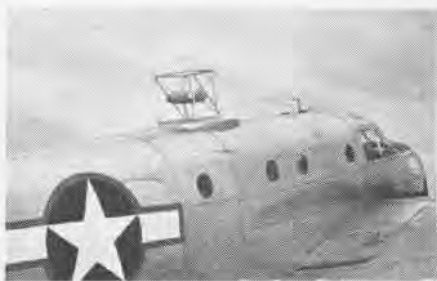
► **CNO COMMENT**—This aerograph installation appears to be excellent, in that ventilation of instrument is very good and mounting is located where heating effects of engines do not interfere with recording elements. Plans for an approved type installation for single engine, service type aircraft may be obtained upon request to CNO. Activities using different type installations are invited to send details to CNO.



BY USING EXPOSURE GUIDE ATTACHED TO K-20 CAMERA, PILOTS CAN OBTAIN EXCELLENT RESULTS

ing results attributed to use of this equipment, a patrol squadron in the South Pacific area discovered in making a thorough test.

Photographers prepared a simple exposure guide card to correspond with type film loaded in camera along with a sheet of instructions for pilot, also containing a log of pictures taken. With these simple aids, quality of photographs was improved and results highly satisfactory as shown in reproductions.



FIT AEROGRAPH CAGE ON TURRET HATCH COVER

## Design Tube Beading Tool Beads Tubing in One Operation

NAS CORPUS CHRISTI—A time-saving beading tool for aluminum alloy tubing has been designed by a civilian employee here. Purpose of tool is to make a bead of uniform size, on tubing, in one operation. This is accomplished by clamping tubing in a block fitted with a recess the size and shape of bead.

Tube is cut off and trimmed at end of block, then punch is inserted and struck one or two times with hammer. Action upsets tubing into recess, forming a perfect bead.

Old method required one block for cutting and filing tubing, then removing it, and inserting it in another block for beading. This operation was performed by inserting a tool into block, and, by leverage, forcing tube into recess. Owing to small diameter of lever and force applied, lever often broke. Quality of bead often depended upon evenness of applied force and hence was subject to operator's ability.

New device saves about 30 percent of time formerly required for small diameter tubes, as only one set of blocks need be used.

[DESIGNED BY WALTER A. GREER]

## Engine Heater Is Designed New Carriers Will Use Device

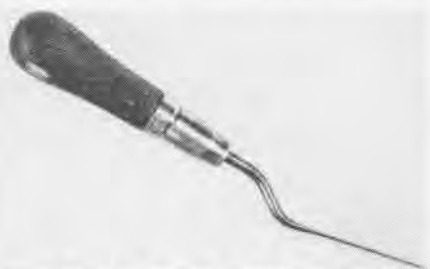
The Bureau of Aeronautics has developed a new engine heater, designed for use on newer carriers, to accomplish heat maintenance or warm up aircraft engines prior to starting while operating in cold climates.

New carriers which are not wired to

It is a "direct" and mixed air heater, burns high octane gasoline, is equipped with electric spark ignition system and has a 24-volt motor which drives centrifugal fan and air compressor.

## Helps in Removing Nipples Tool Extracts Fittings of Tank

NAS SAN DIEGO—A tool for removing metal fittings from nipples of self-sealing tanks on F4F and FM airplanes has been developed by an A&R shop employee as a result of the beneficial suggestion program. The device has proved to be a time saver and has



USING TOOL AS WEDGE, RUBBER IS LOOSENEED

eliminated necessity for returning tanks to factory to have new nipples installed.

The tool is composed of heat-treated steel with suitable handle. In operation, tool is used to loosen rubber nipple from metal fitting to which it clings in a semi-vulcanized state. Loosening is accomplished by inserting tool between wall of fitting and rubber nipple. Using the instrument as a wedge, rubber can be carefully broken away from fitting with no damage to nipple, while heretofore many were torn from tanks because no tool was available.

## F4F Trouble Shooting

Pilots of F4F type airplanes are still experiencing trouble when the engine "loses rpm" while propeller is in AUTOMATIC. If rpm cannot be increased by switching to MANUAL, it may be necessary to nose down to increase airspeed and thereby increase engine rpm.

When in fixed high pitch, if the nose is pulled up, it tends to stall the airplane, prop and engine. At 116 knots IAS, 1420 engine rpm can be attained with 30.0" Hg manifold pressure, which is sufficient power to maintain altitude.

through Bureau of Ships. Using an aircraft (fighter) generator type 1001-3, spec. G-24-A, contract 83011, 14.5 volts dc output, radio can be made to operate as far as 500 miles through stationary setup.

Generator is mounted on jeep and propelled from a double pulley on fan-drive shaft. Ratio of double fan pulley gives sufficient revolutions to produce full power from generator through voltage regulator, with jeep rolling at 20 mph. Two 12-volt 100 AMH batteries floating on line connected to power supply of rcs equipment give continuous operation for about 10 hours.

A volt ammeter mounted on dash will indicate changing rate and voltage of batteries. A 12-foot whip antenna made at NAS Alameda is mounted on right rear side of jeep. Excellent results were obtained while running at 35 mph. Voice communications were



OFFICERS HOLD NEW RAYON SURVIVAL CHART OF RABAUL AREA WHICH GIVES MORE DETAIL ON PACIFIC ISLANDS SHOWN IN LARGE LIFE RAFT MAP

# WATERPROOF CHARTS

SIX WATERPROOF CHARTS printed on rayon the size of a handkerchief have been issued for distribution to enlisted men, pilots, and passengers in naval aircraft operating in South and Central Pacific areas in the event they are forced down at sea.

Each chart has maps on both sides, thus making available detailed data on 12 separate districts of the Pacific Ocean where U. S. planes fly. To be handed out through air combat information officers, the new maps supplement larger waterproof charts put out by BuAer for placement in all life rafts.

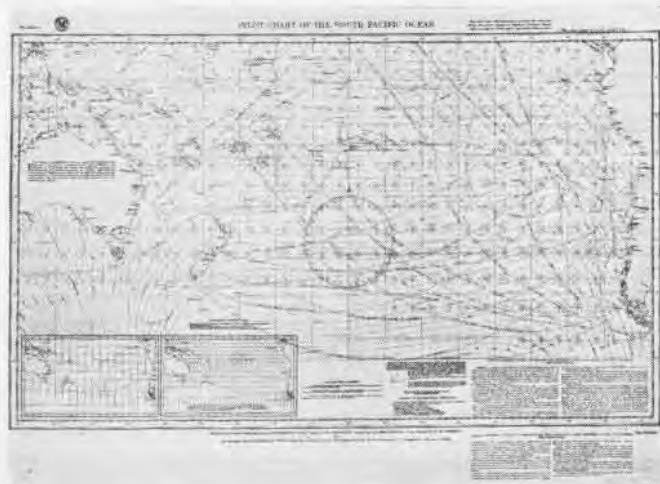
BuAer's four maps show summer and winter seasonal winds and currents in the North and South Pacific and North and South Atlantic. The chart placed in the life raft depends on the area where it is to be used. They are stowed in drop-type life rafts or in the case of the "pararaft," while the new survival charts go in a pilot's pocket.

Services Section of the Air Intelligence Group of Division of Naval Intelligence produced the handkerchief-type charts in cooperation with Hydrographic Office. They measure 12 3/4" x 15 3/4". Cloth on which they are printed

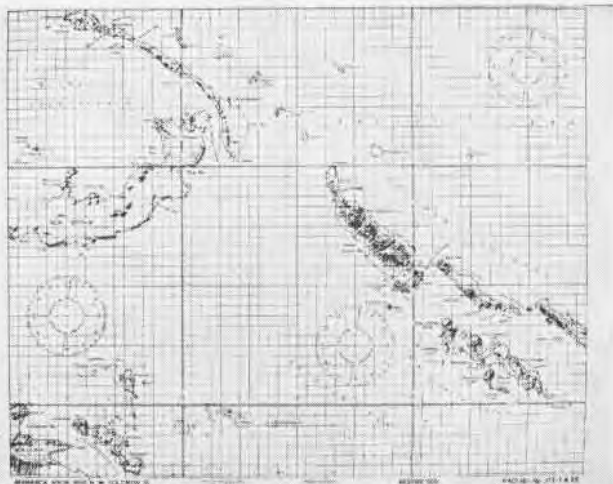
was tested successfully for mildew, fading, and salt water immersion.

ACI officers will issue to pilots and other flying personnel the correct survival chart of the area or areas where they will be operating. The new restricted charts cover the eastern Caroline Islands, Marshalls, Gilberts, Solomons, Bismarck Archipelago, New Hebrides and New Caledonia, Fijis, Ellice, Phoenix, Samoa, Hawaii and Upper Line Islands.

► Initial distribution of the survival charts has been made to all CV, CVL and CVE carriers operating in the Pacific, the operational information sections of ComAirPac, ComFair West Coast, ComFair Alameda, ComFair Seattle, and ComSoPac naval air combat information.



LIFE RAFT CHART GIVES WIND, OCEAN CURRENTS OF LARGE AREA



"HANDKERCHIEF" CHART ISSUED TO PILOTS, CREWMEN, PASSENGERS

## Paint Matched Receptacles Prevents Possible Interchange

Nose arming and bomb release electrical receptacles on PBV-5 type airplanes may be easily identified by a system of markings suggested by NAS Quonset Point. Flange of the nose arming receptacle and top of its mating plug are painted yellow, while flange of bomb release receptacle and top of its mating plug are painted red.

This identification is necessary because if the plugs were inadvertently interchanged, bombs would be released as soon as arming switch was moved into ARM position, regardless of the position of release switch.

## Construct Life Raft 'Bomb' Can Be Attached in Two Minutes

MAG 33—A simple and efficient device for dropping life raft to fliers forced down at sea and unable to salvage raft from their own plane has been developed by the engineering officer of VMSB-332.

Made from a 500-lb. sand-fillable bomb case and a few scraps of sheet bar stock, it can be carried in conventional manner on center bomb rack of any SBD airplane equipped with smoke tank gate valve release cable and handle installation.

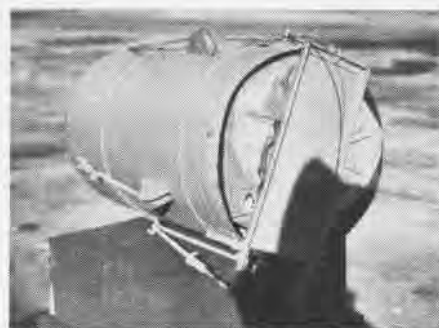
Designed so that it can be fabricated by squadron personnel in any metal-smith shop in a few hours, it carries standard MK II two-man life raft and can be installed, ready for use, in two minutes.

To construct aerial life raft container, tail fin assembly is cut off 3½" back of rear supporting band. Door, 6" wide, is constructed of ½" x ½" angle iron. It extends 2" below bomb case, is hinged at bottom and when closed is under tension of ¾" diameter bungee so designed as to snap the door open when catch at top of case is released.

Sheave blocks are made from 14 gauge black sheet iron brazed to outside of bomb case, slightly forward of rear supporting band. Holes for bungee are cut in case just under sheave blocks. Four hooks, made of ¾" rod and bent so there is ½" clearance inside the bend of hook, are brazed 2" forward of front supporting band. Upper



BUNGEE TENSION EJECTS CONTENTS OF CASE



DOOR SWINGS OPEN WHEN BOMB IS RELEASED

two hooks are set low enough to clear bomb sway braces on plane. Bungee runs from one hook, through sheave, across diameter of case, through opposite sheave and up side of case to opposite hook—is under little tension.

Release, in the form of a simple catch, is actuated by a 5/16" cable, 18½" long, which runs to the clevis on end of gate valve release cable. In in-

stalling life raft, plate on CO<sub>2</sub> bottle is at the bottom of raft, resting against door plate. Raft can be dropped simply by pulling handle installation.

►BuAER COMMENT—BuAer has initiated development of droppable pneumatic and rigid (folding) boats. These boats are being designed for CV and VPB type aircraft and will eliminate necessity for special containers or for use of extra dropping gear.

(Succeeds list of January 20, 1944)

19 February 1944

### THE FOLLOWING SHOWS THE NUMBER AND DATE OF ISSUE OF THE LAST SERVICE AND OBSOLESCENT AIRPLANE BULLETINS AND CHANGES (CONTRACT CHANGES ARE NOT INCLUDED)

Airplane	Bulletin	Date	Change	Date
F4F-3	45	11-29-43	137	11-30-43
F4F-4	41	11-29-43	101	1-9-44
F4F-7	13	11-29-43	40	11-30-43
F6F-3	31	2-3-44	48	1-23-44
FM-1	22	11-29-43	45	12-29-43
F4U-F3A-FG	34	1-26-44	98	1-26-44
JRF-5	4	7-23-43	7	2-4-44
N2T-1	4	10-9-43	30	12-1-43
OS2N-1	28	1-27-44	32	9-9-43
OS2U-1	47	1-27-44	61	4-1-43
OS2U-2	59	1-27-44	73	4-1-43
OS2U-3	53	1-27-44	62	9-9-43
PV-1	30	1-28-44	100	1-18-44
PV-3	7	1-28-44	11	12-20-43
PBM-3	33	11-2-43	108	1-15-44
PBM-3C	32	1-15-44	65	1-30-44
PBM-3R	28	1-15-44	103	1-15-44
PBM-3S	12	2-1-44	37	1-30-44
PBV-5	42	12-28-43	145	1-1-44
PBY-5A	49	2-10-44	134	1-15-44
PB2Y-3	25	2-2-44	124	1-30-44
PB2Y-3R	24	2-2-44	108	1-29-44
PB4Y-1	35	2-3-44	67	1-22-44
R4D-1	22	2-6-44	21	1-6-44
R4D-2	8	2-6-44	3	1-6-44
R4D-3	13	2-13-44	14	1-6-44
R4D-4	9	2-6-44	2	1-6-44
R4D-5	12	2-6-44	6	1-6-44
R5D-1	11	2-1-44	57	1-13-44
R5C-1	7	1-19-44	33	2-6-44
SBD-1	57	1-18-44	104	12-24-43
SBD-2	62	1-21-44	113	12-24-43
SBD-3	80	1-21-44	147	1-25-44
SBD-4	35	1-21-44	58	1-25-44
SBD-5	34	1-21-44	48	1-25-44
SBD-6	3	1-5-44	3	1-25-44
SB2A-4	13	1-23-44	91	12-7-43
SB2C-1	27	2-6-44	27	2-6-44
SB2C-1C	12	1-6-44	11	1-7-44
SNB-1	12	1-6-44	18	1-27-44
SNB-2	10	10-14-43	11	1-21-44
SNJ-1	11	1-26-44	13	8-6-43
SNJ-2	12	1-26-44	18	1-5-44
SNV-1	15	1-6-44	46	2-3-44
TBF-TBM	80	1-13-44	177	2-3-44

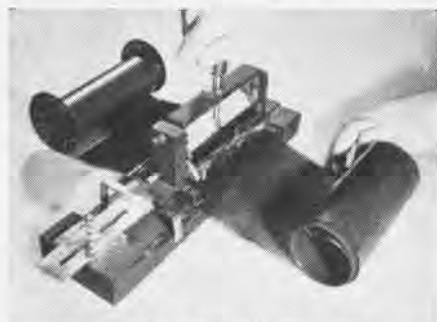


## PHOTOGRAPHY

PHOTOGRAPHIC DIVISION BUAE

► Photographers operating at advanced bases will be greatly interested in specifications and plans for Quonset hut type photo labs. Floor plans are 20' x 60' including an extension for housing heating or air-conditioning equipment, depending on whether *Arctic* or *Tropical* version is to be installed. Laboratories were planned primarily for outlying bases. However, on certain bases where a critical situation exists, they may be procured upon approval of Chief of Naval Operations. Bureau of Yards and Docks supplies all building equipment, heating or air-conditioning, plumbing, and electrical wiring, and Bureau of Aeronautics supplies all photographic equipment on regular requisition.

► A small hand-operated stamping machine for inking titles on each exposure of aerial roll film will be of special interest to interpreters and photographers of units



STAMPING MACHINE TITLES AERIAL ROLL FILM

doing reconnaissance work. The present machine is being purchased by BuAer and will be sent to larger units at the earliest possible date.

► A new Photographic Technical Bulletin entitled "Storage of Unexposed Sensitized Photographic Materials" attacks the problems of *temperature* and *humidity* at photographic supply depots as well as operating units in unfavorable geographic locations. It supersedes a previous bulletin and gives a wider coverage of the subject.

► A very informative report on "Operation of a Photographic Laboratory in the Southwest Pacific Area" has been received from VS64. Comments entered on the routing slip as this letter moved through the Photographic Division read: "Very good. These boys know what it is to think in practical terms."—Procurement and Distribution Section. "This outfit has sent in some superb photographs, both as to quality and subject matter. It shows what a small outfit can do under the right, positive approach."—Still Pictures Section.

The Director of Photography desires to emphasize that the main source of information on photographic problems throughout the Navy is obtained from such letters and the remarks page on the "Quarterly Photographic Report." Contributions should be sent to Photographic Division of BuAer.

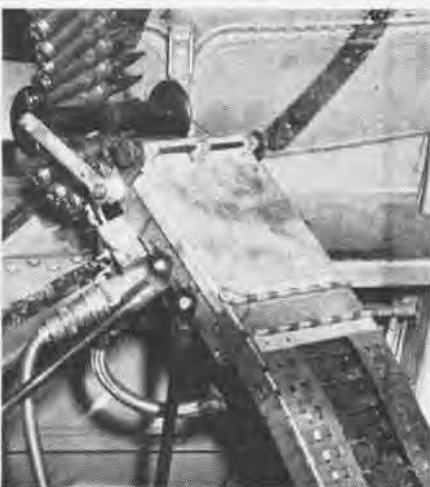
## Improved Gun Feed System Relocate and Add Assist Chute

As a result of an investigation at NAS Patuxent River, it has been determined that the continuous feed system for side waist guns in PBV-5 type aircraft can be improved by relocating assist feed units along the feed path to a position 8 in. closer to gun mount post.

This change is accomplished by addition of a short piece of feed chuting,



IMPROVES PBV SIDE WAIST GUN FEED SYSTEM



RELOCATE ASSIST FEED UNITS 8 IN. CLOSER

reduces the load imposed upon gun feed mechanism and tends to eliminate gun stoppages. Change will be incorporated in later production models.

## Use Two Compressor Units Torpedoes Topped Off in a Hurry

Torpedoes may be topped off in one-half normal time during an emergency by the simple expedient of using a charging tee, which can be manufactured in local shops, it has been reported by Field Torpedo Unit 6. Charging tee permits use of two air compressor units acting simultaneously.

## PUBLICATIONS

Write to PUBLICATION SECTION BUAE

The symbols AN, NAVAER or ATO appear on all technical handbooks. Besides being code letters for filing and identification purposes, they designate type of publication.

► NAVAER means handbook has been prepared by Navy or manufacturer to cover equipment for Navy.

► ATO (Army Technical Order) indicates handbook has been written by Army or manufacturer to cover equipment for Army. When Navy buys equipment from Army, it also buys, revises, and distributes ATO's. These books were prepared for Army and may contain specifications and procedures contrary to Navy practice.

► AN indicates handbook has been prepared in accordance with specifications agreed upon by Army, Navy, and British. Handbook contains all information required by all three services, including separate material specifications and procedures of each service.

### AN Program Has Many Advantages

Before inauguration of the AN handbook program, manufacturers were often required to furnish three separate books for a single piece of equipment. Since preparation of each handbook required from fifty to one hundred thousand man-hours, manufacturer's work is now cut to less than one-half.

In many cases the Navy purchases equipment manufactured originally for Army. In the past it has been necessary to revise completely existing handbooks prepared for Army, or have new handbooks written. Under the AN program, original handbooks are prepared in accordance with Army-Navy specifications and are therefore acceptable to Navy without alteration. Navy is thus able to purchase acceptable handbooks with equipment.

### Books Well Written and Illustrated

Writers of specifications for preparation of AN handbooks had the advantage of experiences of Army, Navy, and British to guide them. On the basis of these experiences, the three services were able to devise a set of specifications which called for complete, readable, and scientific presentation of information. The AN handbooks contain instructions written by writers of scientific textbooks, photographs taken and retouched by professional photographers, and drawings and diagrams drawn by skilled draftsmen and illustrators. Information is assembled and published by experienced layout and advertising men whose aim is to produce a book which can be read easily. As all handbooks are converted into AN books, personnel in the field will no longer be required to wade through pages of poorly arranged text and badly reproduced shop drawings. Furthermore, when personnel have become familiar with the framework of AN handbooks, they will find it easy to locate information needed.

# RADIO ALTIMETERS GUIDE PILOTS IN FLIGHT

## Eliminate errors in barometric pressure type instruments

**R**ADIO ALTIMETERS now being installed in most types of naval aircraft go a long way in answering the bromidic question: "How high is up?" according to the Airborne Coordinating Group, Naval Research Laboratory. This is more than a "Baby Snooks" question to most pilots, particularly if their mission happens to be laying a torpedo gently in the water. Height above water is pretty important in those cases, and the old seagoing practice of heaving out the lead line is not much help.

The barometric altimeter, which measures the difference of air pressure and translates this into feet, develops many errors because of the lack of uniform variations. The radio altimeter, which gives height above the terrain, uses radio waves for its yardstick and is not subject to climatic variations.

The working of these altimeters is comparatively simple. Two small antennas are mounted on the plane's belly. One transmits a radio wave which, when it hits a surface, bounces back. The reflected signal is then picked up by a second antenna. The time lag is measured by the radio circuit, trans-

lated into feet, and transmitted as a reading of height-above-surface on a meter attached to the instrument panel. This altitude also is reported to the pilot by a series of lights. The antennas must point downward to give a reading.

Present production models are not, however, blind landing equipment, although they may be used for such a purpose in emergencies. The error at low altitude is approximately 5 feet. Bearing this in mind, under certain conditions it is possible to use the equipment to make power landings.

**T**HE LIGHT SYSTEM of altitude indication is used in flight at fixed altitude, as in torpedo laying. An altitude limit switch provides for settings at various fixed heights. A white light gives the pilot the signal when he is "in the groove." If the plane falls below the fixed limit, a red light shows; if it climbs above the limit, a green light appears.

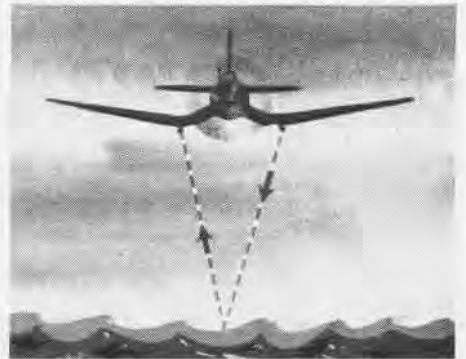
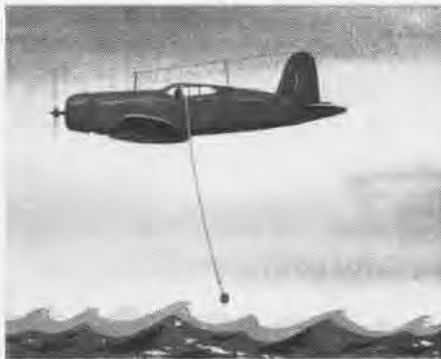
Because water is a better reflector of radio waves than land, it is comparatively easy to determine beach crossings which cause the needle of the indicator

to waver and drop. In the South Pacific, some pilots have used the radio altimeter to indicate clearings in the jungle. The needle will waver over jungles but will steady down when a clearing is below.

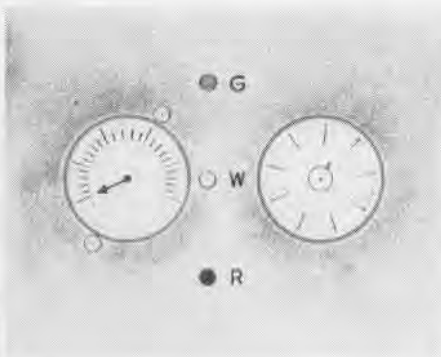
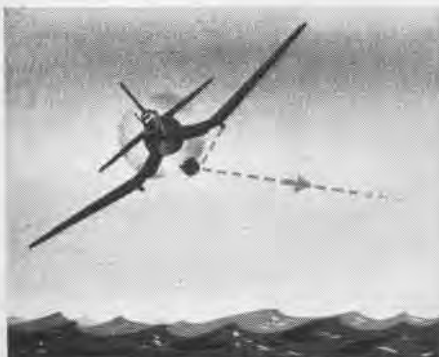
As with other instruments, it is necessary to know all the "angles" of radio altimeters. In a recent case a bomb was hung inboard of the transmitting antenna on a fighter. The pilot was at a loss to understand why on bank turns to port he got good readings, but received none on high bank turns to starboard. The bomb's position interrupted the radio path to the surface, blocking transmission. Similarly, a large hull on a seaplane might block the radio path when flying near water.

**R**ADIO altimeters are well worth the weight they add to a plane. They are handy instruments when the going is tough. It is well to emphasize that a radio altimeter is a *terrain clearance indicator*, not something to show height above sea level, except when flying over the sea. Dilbert would get pretty dizzy trying to keep the meter steady on a regular cross-country hop.

Radio waves reflected back to plane from earth's surface give nearly accurate terrain clearance reading



OLD SEAGOING PRACTICE OF DETERMINING HEIGHT ABOVE WATER HAS NO PLACE IN MODERN COMBAT; RADIO ALTIMETER IS PILOT'S SUREST GUIDE



LOW-HANGING BOMB BLOCKS PATH TO SURFACE LIGHT SYSTEM INDICATES ALTITUDE LIMITS AT 200 FT. OVER LAND, METER IS UNSTEADY

# ELECTRICALLY HEATED FLYING SUITS

## BuAer has worked steadily on flight clothing development

THE DEVELOPMENT of electrically heated flight clothing has extended over a period of approximately 12 years. It was initiated by a chance meeting of a BuAer representative with an inventor who had developed a non-kinking wire which he was trying to sell to a rubber company.

One of the demonstrations was made by heating a piece of cloth woven from wool-covered wires with the ends of the wires connected to form an electric circuit. The possibility of weaving or knitting fabrics from this wire, which could be tailored into garments to provide supplemental heat, was discussed.

Owing to complications in connecting the ends of all the wires to provide current flow, the preliminary garments were crude, bulky, and shapeless. The first garments consisted of a rectangular piece of cloth with a center hole for the neck. The ends hung down the front and back of the wearer and were tied together at the sides. A few of this original vest design, together with glove and boot inserts, were issued to the U.S.S. *Ranger* for one of its early cruises. Personnel reported favorably on the efficiency of this equipment, but were not impressed with the tailoring features.

BuAer prepared and tested several experimental suit and undergarment designs in order to decide whether it would be better for electrically heated

MODERN FLIGHT conditions have imposed new requirements for adjusting and maintaining proper balance between body heat production and heat loss. If this balance becomes disturbed, nature attempts to restore it either by shivering to increase heat through involuntary muscular action and accelerated blood circulation or by sweating to reduce heat through evaporation.



Personnel comfort cannot always be met by use of ordinary flight clothing. Long flights at high altitudes or at extremely low temperatures have emphasized the need for an auxiliary means of replenishing heat losses, instead of depending upon natural body heat and attempting to conserve this warmth by thick clothing of heat-retaining material. The greater portion of body heat loss, about 75 percent, is dissipated from the surface through radiation, conduction, or convection, while the rest is lost through expired air from the lungs in normal breathing and by evaporation of moisture from the skin in insensible perspiration. There will be, therefore, an appreciable loss of heat under extreme and prolonged operations, even though heavy body covering is worn by the aviator.



equipment to consist of auxiliary garments to be worn under regular flight clothing or of complete self-contained garments. It was decided that an integral electrically heated suit would be better, and 24 were ordered—half single-piece and half two-piece.

### Heat Distribution Was Unsatisfactory

Elements of these suits were made removable, so that they could be replaced readily. Two standard uniform sizes of inserts were arranged so that

only two repair parts had to be carried in stock. However, wearers immediately stated that heat distribution was not satisfactory with these standardized shapes. Cold spots occurred in parts of the body not covered by the wires. The two-piece suit proved more satisfactory from the standpoint of fitting all personnel, but the one-piece suit had more good points. It was warmer, and could be manufactured more economically, and connections were simplified.

After these preliminary experiments,



SIMPLE CONNECTION JOINS GLOVES TO SUIT



ACCESSORIES MAY BE ATTACHED TO CHEST FLAP



SNAPS CONDUCT CURRENT TO AVIATOR'S BOOTS

# ORDNANCE

INQUIRIES SHOULD BE ADDRESSED TO THE CHIEF OF BUREAU OF ORDNANCE

## Navy Suspends Large Depth Bomb Use

Reports of premature explosions of small depth bombs when aircraft crash or are "ditched," and of premature explosions of large depth bombs, have led to suspension of the use of large depth bombs in low altitude work. Instead, BuOrd has developed a small depth bomb that will take a fuse (AN-Mark 230) that requires air travel to arm.

Accordingly, distribution of the Mark 54 350-lb. rpx loaded depth bomb has been started to cv's. A few 325-lb. Mark 53 INT depth bombs will be loaded for distribution to BB's, CA's and CL's.

Premature explosions of depth bombs in crashes may be attributed to fuse action as service explosives are tested to insure that they will not detonate from shock on striking water at usual bombing velocities. Crash velocities generally are well below striking velocities in normal bombing operations.

If a premature explosion is instantaneous, it is probably due to a nose fuse. If there is appreciable delay, it is probably due to a hydrostatic fuse. However, the thwartships hydrostatic fuse will function with very little delay if an armed bomb falls in the water tail first—i.e., so the water entry holes face direction of motion.

It is necessary in installing arming wires to the hydrostatic fuse that this be carefully done, as reports of crashes would indicate that arming wires had been snagged loose from fuses when the plane nosed over on its back or crashed in an inverted position. In such cases, bomb and bomb shackles could readily pull loose from the shackle retaining hooks.

## New AA Target Simulates Dive Bomber

Anti-aircraft target, Mark 18, at present under manufacture for distribution about March 15, is designed to be used as a target simulating the attack of a dive bomber and give gunners valuable practice in shooting at maneuvering targets.

It is essentially a miniature glider about six feet long, with a wingspread of about 10 feet. Wings fold into the body of the target when at rest and are released by a timing device.

This target is released from the wing bombrack of a plane at an altitude of four to five thousand feet and dives at an angle of approximately 80°, attaining a speed of about 200 knots. At this point the wings unfold and the target recovers from dive.

It glides to earth in a series of gliding and swooping spirals. It is expected that

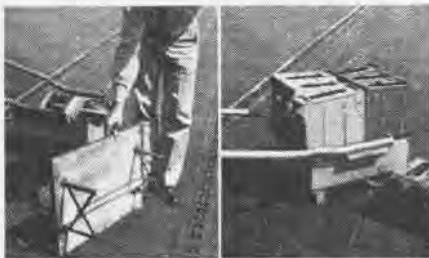
this target will have greatest use by anti-aircraft training centers.

## Data Cards Shipped With Each AN Bomb

Bomb data cards have been supplied with each AN bomb shipped from depots for the past year to insure that the latest information concerning fusing arrangements and air travel to arm fuses is available. However, reports have been received that these cards are not available. All activities receiving bombs should check to see that these data cards are supplied (they normally are shipped in a fuse cavity) and should request them of the naval ammunition depot supplying the bombs.

## Lex Uses Skid for Moving Ammunition

The *Lexington* has designed an adapter or tray for the bomb skid, Mark I type, to expedite handling of .30 and .50 cal. machine gun ammunition, either in cases or



BOMB SKID ADAPTER DEVELOPED BY LEXINGTON

aircraft ammunition boxes. The tray is made for quick mounting to the skid.

The tray consists of a sheet steel plate riveted to an angle-iron frame about 27" long and 19½" wide. Cross-braced extension legs are welded to underside of the sheet steel plate for mounting to the bomb skid. Legs extend about 7½" from the steel plate and are about 22 in. apart.

In addition to saving time in handling ammunition, the *Lexington* reports that its use has resulted in a reduction in the attrition rate of aircraft ammunition boxes due to handling. Complete details for construction of the tray are included in an N. Ord. OTI-V, to be issued by BuOrd.

## Data Sheet Tells How to Improve Lift

Browning aircraft machine guns now are required to lift belt loads far in excess of loads for which these guns originally were designed. OTI GV35-43 contains information on modifications which have been made to increase belt-lifting capacity of Cal. 30 and Cal. 50 guns and outlines a "check-off" and "tune-up" procedure which definitely will improve belt-lifting capacity of many guns now in use.

Strict application of procedures outlined in this OTI will pay dividends—especially in heavily loaded wing gun and continuous feed installations where that last ounce of extra pull is needed to prevent a stoppage.

## Disinsectizing Navy Aircraft Quantity Dosages Are Listed

Efforts to prevent transportation of *Aedes aegypti*, *Anopheles gambiae* and other mosquitoes that infect flight personnel and transmit malaria from one country to another have been carried on by the Navy for some time. Shortly after the United States' entry into the war, the Chief of the Bureau of Medicine and Surgery advised commanders and commanding officers of measures that had been adopted to fumigate airplanes returning from malarious regions.

More recently, an aviation circular to naval air transport activities (ACL.NO. 1-44, Jan., 1944) directed the use, at stated intervals, of mosquito netting, insect repellent, fly sprayers and pyrethrum-freon-insecticide for the protection of transient plane crews and passengers en route through such regions.

Supplementing this, Flight Division of DCNO (Air) has released to NAVAL AVIATION NEWS the quantity dosages of insecticide that should be used in spraying various types of airplanes.

Compartment	Amount of Insecticide
-------------	-----------------------

### PBY-5A TYPE PLANE

Tail	2 cc
Waist	.3 cc
Living	.3½ cc
Mechanic	.2 cc
Navigation	.5 cc
Pilot's	1½ cc
Bomber's	1 cc

### PBM-1 TYPE PLANE

Bomber's	1 cc
Galley	.4 cc
Lower Fuel Tank	1 cc
Passageway	.3 cc
After Bunk Room	1½ cc
Forward Bunk Room	1½ cc
Washroom	¼ cc
Waist	.2½ cc
Tunnel Hatch	.3 cc
Flight Deck	.4 cc

### PBM-3 TYPE PLANE

Flight Deck	.4 cc
Bomber's Compartment	1 cc
Galley	.3 cc
Passageway	1 cc
Head	.1 cc
Forward Bunk Room	2½ cc
Passageway	½ cc
After Bunk Room	.2 cc
Auxiliary Engine Room	1 cc
Waist	6½ cc
Tail Section	.3 cc

## ANSWERS TO NOMENCLATURE QUIZ

on inside back cover

1.2 2.5 3.3 4.3 5.2 6.5

Visual quiz films are available from BuAer's Special Devices Division. Standard slide film versions may be obtained from Training Films.





## Fliers to Get Summer Jersey Suits Too Hot, Activities Report

BuAer has developed and procured a lightweight knitted cotton jersey to be worn for hot weather flying. It is the pull-over type with long sleeves and a low knitted collar that fits snugly about the neck. Two breast pockets are provided for carrying miscellaneous small articles. Jersey matches Byrd cloth in color and may be worn with flying garments or lightweight trousers.

Jerseys have been delivered and may be obtained in the usual manner by submitting routine requisitions. This jersey should not be confused with jerseys issued to personnel of carrier flight



BUAER HEEDS PLEA FOR LIGHTER FLYING GEAR

deck crews and may be identified by referring to Navy Aeronautical Specification M-593, Jerseys, Cotton, Knit, Aviators'. These stock numbers should be used in ordering:

Size 38—R37-J-167-38      Size 42—R37-J-167-42  
Size 10—R37-J-167-40      Size 44—R37-J-167-44  
Size 46—R37-J-167-46

The summer flying jersey was developed after activities operating in tropical areas complained that their summer flying suits—Byrd cloth coveralls—were too hot.

## Vacuum Jug Tops Procured BuAer Gets Non-Rusting Type

Bureau of Aeronautics has secured non-rusting stoppers for vacuum jugs, spigot-type, one-gal. capacity, to replace original stoppers and caps which were made of steel, electro-tin plated.

Owing to natural acids contained in

certain types of food, especially hot soups and hot and cold beverages, rust deposits accumulated on the inside and outside of stoppers and caps, making them unsanitary. The steel in original equipment was used because of critical shortages of certain basic metals.

The material situation is no longer acute and procurement has been effected for a quantity of aluminum stop-

pers and brass chromium plated caps as replacements on the jugs, Stock No. R63-J-800. Activities requiring replacements should make routine requests via regular supply channels for the following: Stock No. R63-C-100, caps, brass, chromium plated for use with vacuum jugs, one-gal. capacity; R63-S-5150, stoppers, aluminum, complete with rubber gasket for use with jugs.

(Succeeds list of January 13, 1944)

### LATEST NUMBERS OF ENGINE, AUXILIARY POWER PLANT, ACCESSORY AND PROPELLER BULLETINS

February 16, 1944

Engine	Bulletin	Date	Engine	Bulletin	Date
<b>Pratt &amp; Whitney</b>			<b>Lycoming</b>		
R-985	174	Being issued	R-680	9	Being issued
R-985	177	9-22-43	R-680	10	1-10-44
R-985	179	Being issued	R-680	11	Being issued
R-985	180	1-27-44	R-680	12	2-2-44
R-1340	197	1-10-44	<b>Ranger</b>		
R-1535	216	Being issued	V-770	22	1-28-44
R-1535	218	Being issued			
R-1535	219	9-22-43			
R-1830	339	Revision	<b>General Engine</b>		
		No. 1 dated	<b>Bulletin</b>		<b>Date</b>
		1-4-44	24		Being issued
R-1830	346	Revision	25		1-10-44
		No. 1 dated	26		1-11-44
		1-6-44	27		Being issued
R-2000	42	Being issued	28		1-2-44
R-2000	44	Being issued	29		1-8-44
R-2000	46	Being issued			
R-2000	55	Revision	<b>Auxiliary Power Plant</b>		
		No. 1 dated	<b>Bulletin</b>		<b>Date</b>
		1-6-44	3. Supplement No. 1		12-6-43
R-2800	113	1-14-44	10		11-6-43
R-2800	114	1-28-44	11		1-21-44
R-2800	115	1-12-44			
R-2800	116	1-17-44	<b>Propeller Bulletin</b>		<b>Date</b>
			<b>Hamilton Standard</b>		
<b>Wright</b>			11		1-20-44
R-760	81	Supplement	12		1-20-44
		No. 1 dated	13		1-26-44
		1-10-44	<b>Curtiss</b>		
R-760	82	1-4-44	3		12-22-43
R-975	21	Supplement			
		No. 1 dated	<b>General Propeller</b>		
		1-10-44	<b>Bulletin</b>		<b>Date</b>
R-1820	340	Supplement	2		9-8-43
		No. 1 dated	7		1-16-44
		1-10-44			
R-1820	343	9-23-43	<b>Accessory Bulletin</b>		<b>Date</b>
R-1820	345	11-13-43	1		1-24-44
R-1820	346	1-6-44	2		Being issued
R-1820	347	Being issued	3		2-3-44
R-1820	348	1-4-44	4		1-31-44
R-2600	108	Supplement			
		No. 1 dated	<b>General Starter</b>		
		1-10-44	<b>Bulletin</b>		<b>Date</b>
R-2600	110	10-20-43	1		Being issued
R-2600	111	10-27-43			
R-2600	112	Being issued			
R-2600	113	Being issued			
R-2600	114	1-21-44			
R-2600	115	2-5-44			
R-3350	20	Supplement			
		No. 1 dated			
		1-10-44			
<b>Continental</b>					
<b>None</b>					

# LETTERS

Sms:

In connection with the article on electrically heated flying suits (this issue), submitted by Equipment and Materials



Branch, I thought you would be interested in Mrs. Tillie Powell. She is 83 years old and operates a sewing machine for the company which produces electrically heated flying suits for the Navy. Her on-the-job record is one of the company's best.

Mrs. Powell was born in Canada the first year of the U. S. Civil War and came to this country when she was a child. She is believed to be one of the oldest active war workers.

LIEUTENANT, USNR

Washington, D. C.



Sms:

The enclosed letter was written by a man who did not desire to take parachute training but eventually went through the course and graduated in good standing.

NAVAL AIR TECHNICAL TRAINING  
COMMAND

Chicago

Just a few lines to let you know that my work with life saving gear is coming along fine, and I'm ever thankful that you, well, sort of guided me to a swell rate.

Now to let you know why I'm writing these few lines. I want to thank every one of your instructors, for as it is, today at about 1430, a new pilot, in a new SB2C (Curtiss *Helldiver*), took off for its initial test hop before being sold to the Navy. It was up for approximately 20 minutes, when the engine conked out, at about 1,000 feet. The pilot hit the silk at 800 feet. He rode the silk down, and landed without a scratch. The plane, when it crashed, exploded and the wreckage covered an area of about two city blocks. The prop was imbedded in a tree about 45 feet up, and the engine was buried in the ground about 8 feet. The explosion was heard by us on the base four miles away.

I packed that chute, and I guess nobody better than I realize now the importance of proper packing.

I just want to thank you and the members of your staff. The parachute No. 34844, a seat service type, will receive a gold star. If I had my way about it, you and your group of instructors would receive the same. Thank you again.

## BEST ANSWERS

to questions on page 25

1.a 2.b 3.d 4.c 5.a 6.b

## ANSWERS TO NAVIGATION PROBLEM

on page 16

1. 45°                      4. 225°  
2. No                        5. Co-altitude or Zenith distance  
3. South

NOTE: Tolerances of two or three degrees from the answers are considered correct.

Sms:

During the dreary morning hours of a tour of duty as officer of the day I am taking this opportunity to congratulate you on your excellent publication. I have just finished reading the 15 January 1944 issue, and admire your choice of subject matter as well as your style of presentation, particularly Grampaw Pettibone's terse commentary.

In the spirit of constructive criticism, the following remarks are offered. In my assignment as personal equipment officer at this station, my duties place considerable emphasis on altitude flying technique and use of related equipment. Therefore, my first reaction to your illustrations on pages 36 and 37 of the above issue was to note that you show the oxygen mask worn in a manner which apparently does not allow the wearer to turn his head completely around without placing stress on the oxygen breathing tube coupling.

It has been our experience that this coupling does not always give the desired 10 pound (approx.) release pull, and could easily become disconnected if worn as shown. At high altitudes the wearer might easily lose consciousness before he became aware of the mishap.

I should also like to draw your attention to the remark accompanying illustration 5 on page 37. Clearance between the mask and the bridge of the nose will defeat the purpose of fitting the mask to the person's face, inasmuch as we allow a maximum of 10 percent leakage in the mask (5 percent for operations above 30,000 ft.).

These comments may seem like hair-splitting, but I have noticed in the past that there is a tendency of a fraction of military personnel to pick up poor techniques from such slight inaccuracies as these. In the case of high altitude operations, the resultant loss of tactical efficiency may well be fatal to the sortie.

1ST LIEUTENANT,  
Army Air Forces

Roswell, N.M., Army Air Field

¶ The lieutenant's comments are well taken on both counts.

1. The wearer of an oxygen mask should position the quick-disconnect so that there is enough slack in the accordion tubing to permit him to move his head freely in all directions with a minimum of load on the quick-disconnect. Ordinarily the oxygen mask wearer will also be wearing a parachute harness. It is much easier to fasten the

oxygen breathing tube support clip to the parachute harness than to a leather jacket as in the illustrations.

2. The caption under illustration 5 should be clarified. It didn't mean that an actual space should be left between the mask and the wearer's nose. It did mean that the type 14 mask, when properly fitted, rides low on the nose and not well up toward the bridge, thus providing better integration with goggles than any previous mask.

## List Electrical TO's and TN's Gives Current Reference Data

The following is the current list of technical orders and technical notes concerning operation, installation and maintenance of generators, motors, motor alternators, voltage regulators and control panels, effective as of Feb. 15, 1944.

### GENERATORS

- TO No. 9-44 *Eclipse Series 310, 314, and 1308 Generators, Securing Flexible Coupling Against Axial Displacement.*  
TO No. 3-44 *Electrical Connections to Generators Equipped with Terminal Boards.*  
TO No. 134-43 *Conversion of Generator Type 2CM70B5.*  
TO No. 92-43 *Locking of NEA-20 Generator Constant Speed Clutch.*  
TO No. 70-43 *Failure of Mounting Flange Screws in Various G.E. and Electric Auto-Lite Generators.*  
TN No. 67-43 *Brushes for the Eclipse P-2 Generator.*  
TO No. 66-43 *Oil Drain Holes in NEA-3 Generator.*  
TN No. 55-43 *Failure of the Field Lead in Eclipse P-2 Generators.*  
TN No. 53-43 *Burning of the Positive Lead of the 2CM70B5 Generator.*  
TO No. 73-42 *Maintenance of Aircraft Generators and Generator Control Equipment.*  
TN No. 27-42 *Interchangeability of Generator Equipment for Service Aircraft.*  
TN No. 3-42 *NEA Generator Bearings and Clutches.*  
TN No. 24-41 *Service Instructions on Eclipse Generators and Control Boxes.*

### MOTORS

- TN No. 74-43 *Lear Avia Inc. Model CM-C178-5 Cowl Flap Motor.*

### MOTOR ALTERNATORS

- TN No. 5-42 *Motor Alternator Units for Radio Power Supply.*

### VOLTAGE REGULATORS

- TO No. 69-43 *Conversion of the G.E. 3GBD-1A18 Voltage Regulator.*  
TN No. 3-43 *Generator Voltage Regulators Carbon Pile Type.*

### CONTROL PANELS

- TN No. 4-43 *Conversion of NF Type Control Boxes to the 111924 Chokebox.*  
TN No. 24-41 *Service Instructions on Eclipse Generators and Control Boxes.*

### GENERAL

- TN No. 43-42 *Ground Operation of Electrical Equipment.*



**PIX QUIZ**

WHAT DO YOU KNOW ABOUT

# WARSHIP NOMENCLATURE?

**Question 1**



Telemotor is used in connection with:

1. Direction Finder
2. Steering Mechanism
3. Automatic Pilot
4. Communication System
5. Speed Indicator

**Question 4**

Where is the Fantail located:



1. Amidships
2. On Conning Tower
3. Aft
4. Forward
5. On Superstructure

**Question 2**

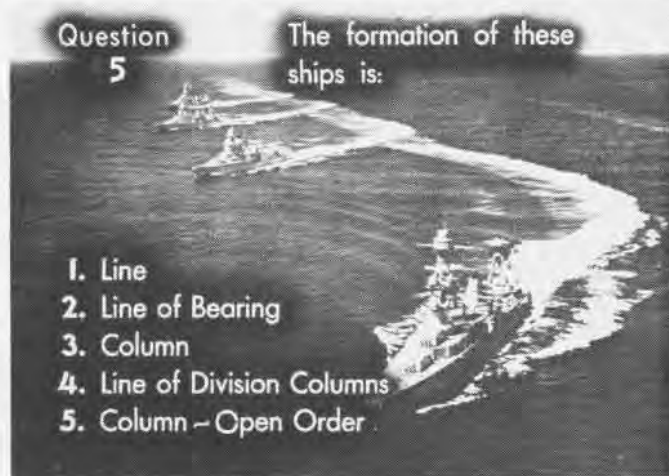
This ship is firing her:



1. Star Shells
2. Light A.A. Machine Cannon
3. Torpedo Tubes
4. A.A. Battery
5. Main Battery

**Question 5**

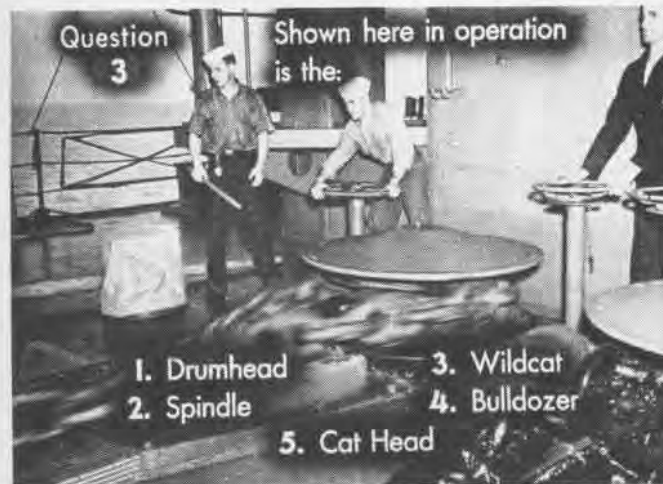
The formation of these ships is:



1. Line
2. Line of Bearing
3. Column
4. Line of Division Columns
5. Column - Open Order

**Question 3**

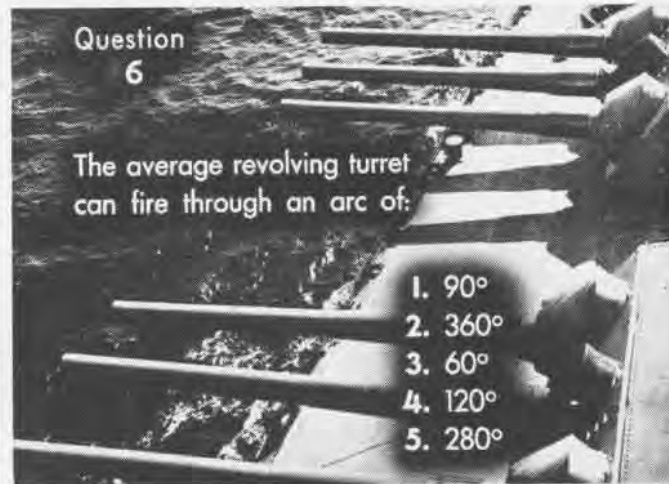
Shown here in operation is the:



1. Drumhead
2. Spindle
3. Wildcat
4. Bulldozer
5. Cat Head

**Question 6**

The average revolving turret can fire through an arc of:




1. 90°
2. 360°
3. 60°
4. 120°
5. 280°

**T**HE NAVY is full of men who, before they entered the service, never saw a ship—or for that matter, any large body of water. These former landlubbers had plenty to learn about warship nomenclature before they took their places with the Fleet. They undoubtedly had to answer questions similar to these. All Navy personnel, regardless of billet, should know the parts of the ship. Try this, then see page 38.

(QUESTIONS FROM VISUAL QUIZ FILM NO. 11, WARSHIP NOMENCLATURE)

Write answers here

1	4
2	5
3	6



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