NAVAL AVIATION

NEWS

Shadows Throw Light

Identify . . . or Else!

Teamwork in TBF's

July 15, 1944

RESTRICTED

"I let him have it!"

● In his first tussle with Jap planes, Aircrewman Baxter got ready to open up on *Oscar*, but instead put the finishing touch to *Zeke* trailing his SBD.

Naval Aircrewmen pack a nasty wallop—Nobody knows it better than the Japs

"...MY TRACERS SEEMED TO BE HITTING"

"ZEKE FELL UNDER OUR PORT HORIZONTAL FIN"

"...SAW IT SPIN, GO STRAIGHT INTO WATER"

After scoring direct hit on a Jap AK, this fighting Aircrewman got the last word in an argument with a Zeke

● ARTHUR BROWN BAXTER, ARM1c, was rudely interrupted just as he was about to open up on the first Jap plane he had ever seen thru his sights. It was an *Oscar*, Army fighter, bearing about 150 degrees relative. Just as Baxter was ready to open up he saw tracers coming at his SBD from dead astern.

They came from a Jap *Zeke*. It had a slight altitude advantage and was making a no-deflection stern run.

"I let him have it, and my bullets seemed to be hitting. Then his bullets started hitting, too," Baxter said afterward.

At 300 feet the Jap began to vibrate slightly and seemed partially out of control, but it kept right on coming in to a point less than 50 feet from where Baxter sat, pouring out the lead.

"I didn't see how he could keep from crashing into us, but my pilot did a sharp turn to the right, the *Zeke's* nose fell, and it went under our port horizontal fin," Baxter said.

"That was the last I saw of it, but the pilot saw it pull up within a mile, spin, and go straight into the water from 800 feet."

On the way back to the carrier, Baxter relaxed by counting the bullet holes in the port wing of his SBD plane. He counted 26, and found 4 more—all 20 mm.—when he got back on the carrier deck. The action took place near Roi last December, after the plane in which Baxter was the gunner and radioman had scored a direct hit on a Japanese cargo vessel.

NO. 4 OF A SERIES

Aircrewmen have what it takes!

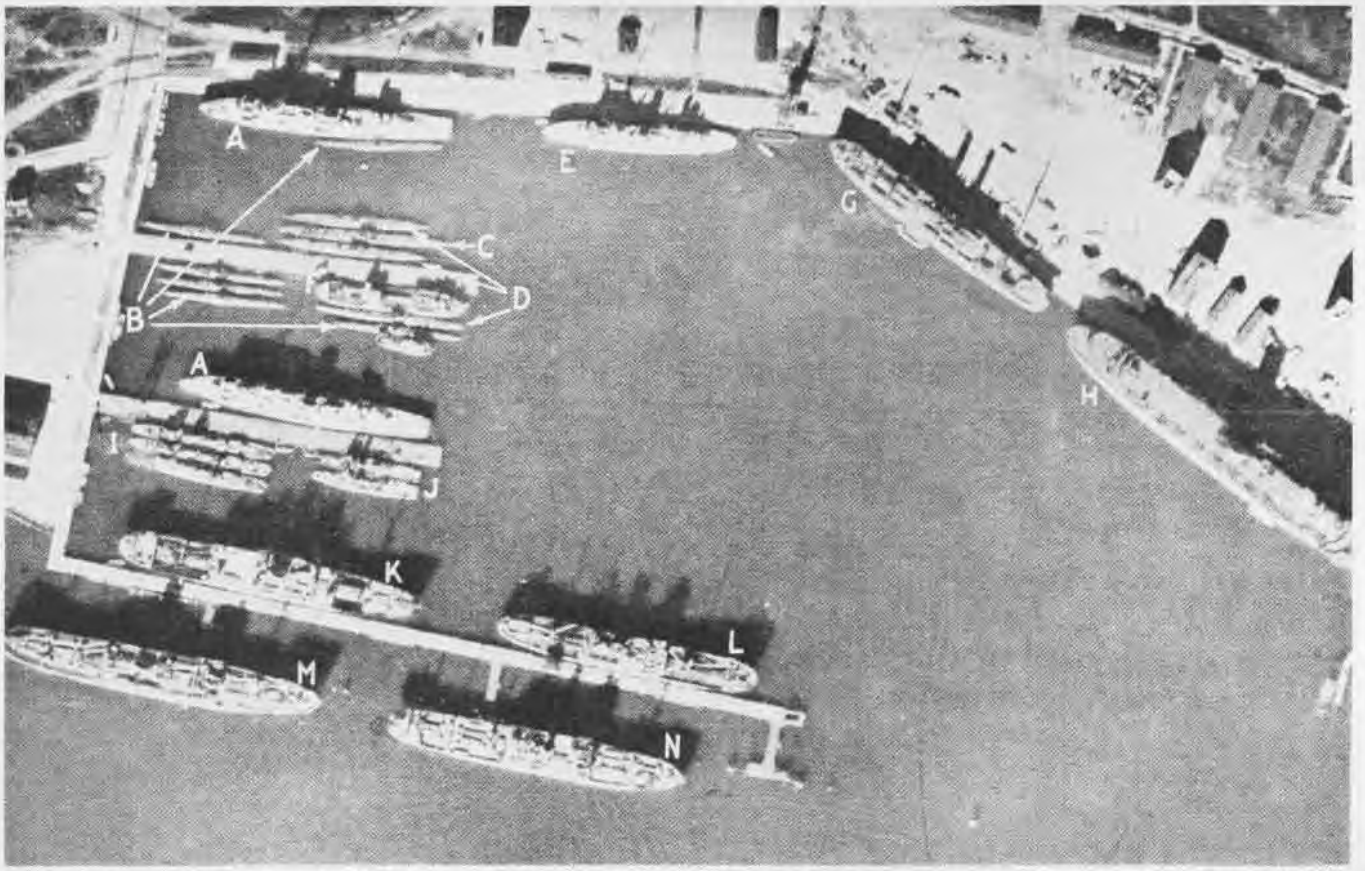
PHOTO INTERPRETATION

SHADOWS THROW LIGHT

PHOTO INTERPRETERS regard shadows as highly important sources of military information in their analysis of aerial reconnaissance photographs.

A shadow may be defined as an accurate projection of a solid upon a screen, which may be the earth's surface or another body or a combination of the two. Shadows are particularly helpful in the identification of man-made features. In ground plan, shadows are frequently much larger and more distinctive in color tone than the objects which cast them, and thus serve as pointers directing attention to those objects. Tall slender objects, such as smokestacks, water towers, storage tanks, or radio and radar installations, frequently would be almost indistinguishable but for their shadows. The value of shadows in determining three dimensional form naturally has definite limitations. Shadow form always must be studied in relation to the ground plan of the building or object. Only for objects of simple and regular form do shadows register a profile view which may be regarded as anywhere near reliable.

SHADOW LENGTHS give a measure of relative height, but actual height can be determined by comparison with the shadow length of an object whose height is known. If the day and hour of exposure are known, actual height can be calculated directly from the shadow length. There are many times when shadows are valuable, but usually they only suggest size or shape.

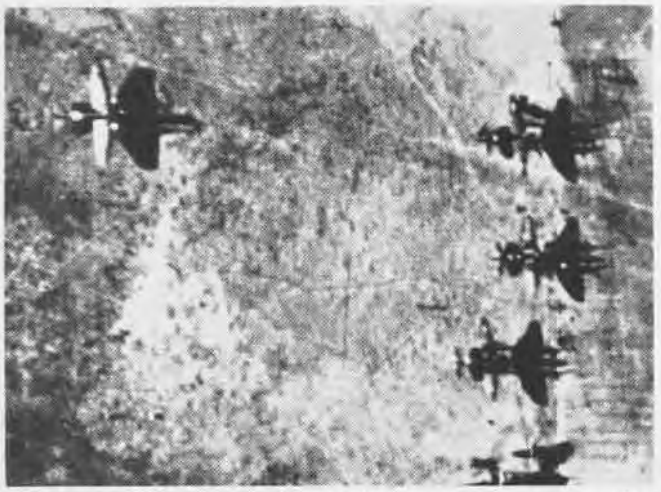


THESE AXIS VESSELS LYING IN A NAZI-OCCUPIED PORT PRESENT AN INTERESTING ARRAY OF SHADOWS AND OUTLINES FOR PHOTOGRAPHIC INTERPRETERS

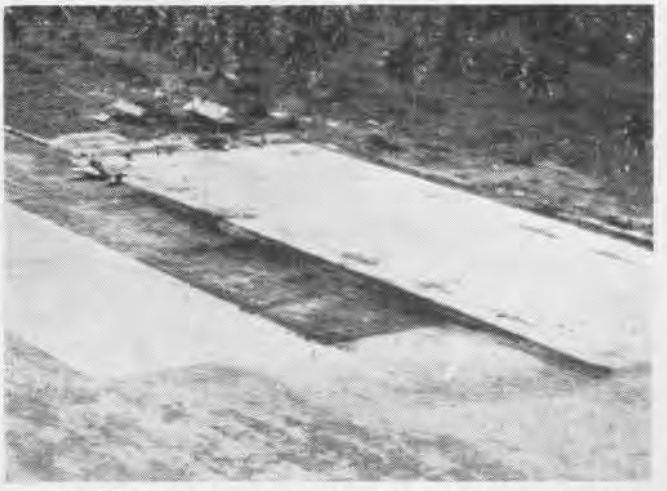
ABSENCE OF SHADOWS MAY IDENTIFY FAKE PLANES PAINTED ON RUNWAY

SEEN FROM THE AIR, in full sunshine, a natural shadow is almost always the blackest thing on earth. It is possible in certain angles and conditions of light to produce, with perfectly matt black paint, a dummy shadow as dark or even darker than a real shadow, but these conditions are rare. It is a good working rule to say that, whereas black paint will often photograph and look surprisingly light in tone, a real shadow looks nearly total black. This shadow sometimes may be the clue to some strategic enemy radio station, may be the deciding factor in identifying a ship or plane from vertical photographs, or may provide valuable profile information in reconstructing measured drawings or models of ships or planes.

On the other hand, absence of shadows may indicate fake planes painted on a runway or parking strip. These always appear perfectly flat and two-dimensional when viewed through a stereo viewer. Fake shadows may be placed on the ground, but these can be spotted in a series of photographs, as they do not change with the sun. In black and white photos, shadow is highly important. Even though relief may be negligible, most objects cast shadows that throw extra light on the shape of the object seen in vertical view.



Axis planes parked on an airfield in Italy cast black shadows that highlight salient details meaningful to photo interpreters



Deception failed here. It is easy to distinguish the fake planes painted on the parking strip as they are casting no shadows

IN PLAN VIEW, SHADOW MAY BETRAY MORE DETAILS THAN OBJECT ITSELF

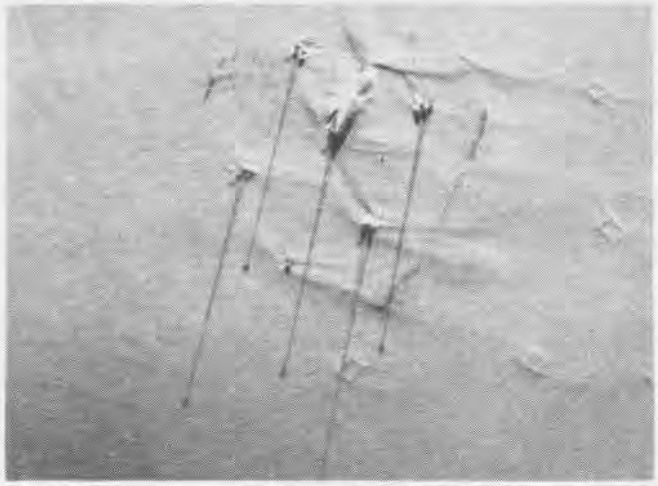
IN TRYING to identify an individual object or area that has a characteristic appearance in aerial photographs, it is important to consider shape, relative size, the tone it appears, and the shadow which it casts.

Often shadows will reveal more detail than the plan views themselves. This is especially true in the case of ships, bridges, towers, etc., where the mass of detail is lost in the plan view. An outstanding example of the use of shadow for extra information is shown in the photograph of the bridge (*right*).

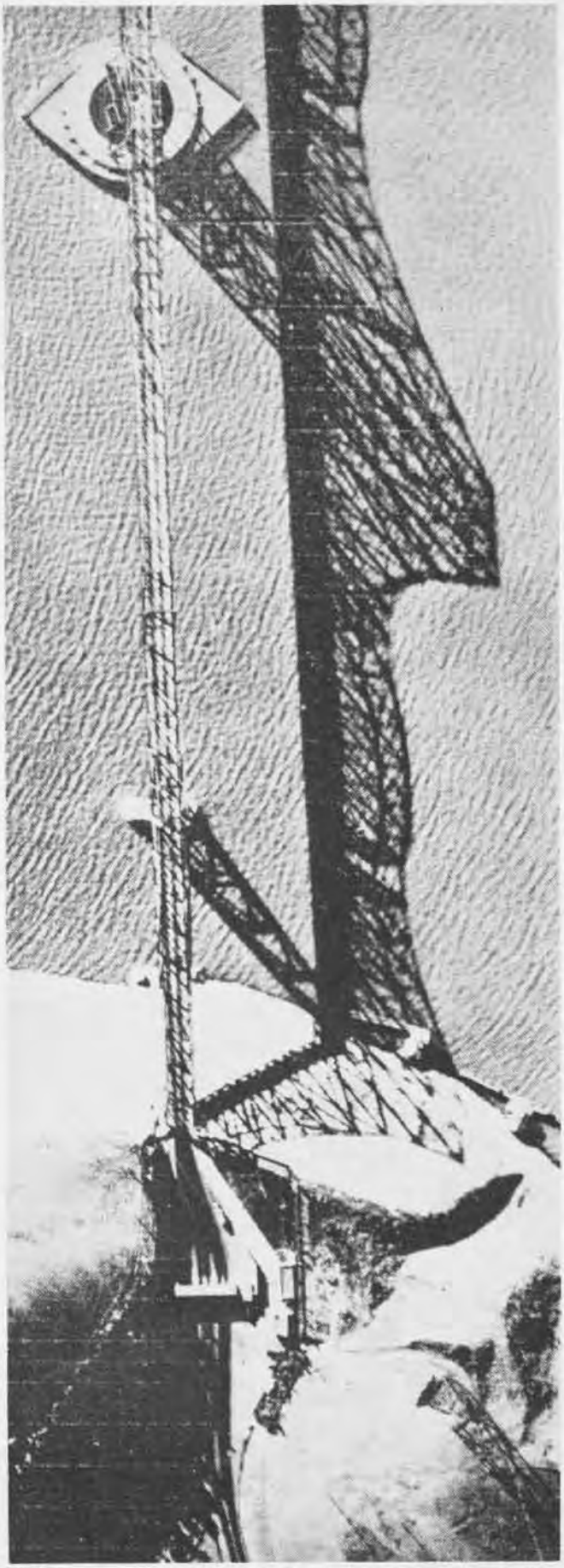
Approximate height of an object can be ascertained from a comparison of the length of its shadow with that of the shadow of some object of known height. Pictures taken in the early morning or late afternoon are extremely useful for this reason. Shadow length gives an accurate value for relative height only when the shadow is cast on relatively flat ground and the base of the object is visible and vertically beneath the point or edge where the shadow begins. The latter conditions are fulfilled by buildings with vertical walls occurring at the center of the photograph and by tall, slender objects such as trees and smokestacks in all parts of the photo except along a line through the center point, parallel to the shadow direction in picture being studied.

BY THE APPLICATION of certain formulas, the photo interpreter is able to determine the height of an object from the length of its shadow in an aerial photo. This procedure assumes that the shadow falls on level ground, and that the earth is a sphere. In order to apply this formula, date and time of photography and latitude and longitude of photography must be known. There also is a graphic method for determining the direction of north from the direction of shadows on aerial photographs.

Time of day at which exposures are made is dictated partly by necessity and partly by consideration of visibility and shadow effect. In some cases photographs may be made early or late in the day purposely to reveal minor surface irregularities through lengthened shadows. In other instances the same area may be rephotographed at different times of day to obtain maximum information through the changing of shadow effects. Lighting at the time of photography can play all kinds of tricks with ground shapes.



Long shadows on snow clearly mark radio installation in night photo of Jap-held Paramushiru Island. Altitude is 10,000 feet



Shadows often reveal more detail than plan views themselves. Striking example of this is the vertical picture of the bridge

CAMOUFLAGE IS WORTHLESS WHILE SHADOWS OF OBJECTS TELL STORY

KNOWLEDGE of shadows is very important in all camouflage work. A plane or truck parked in the middle of a field will attract immediate attention, while one parked at the edge of the field in the confusing shadows of a hedge row or clump of palm trees will be less conspicuous. The Japs often build structures around trunks of palm trees so that the shadows from the jagged branches will break up the rectangular outline of the building below. It also is possible to break up the shadow of an isolated vehicle or building by placing it where its shadow will fall on surfaces that distort it, such as rocks, low bushes or broken ground.

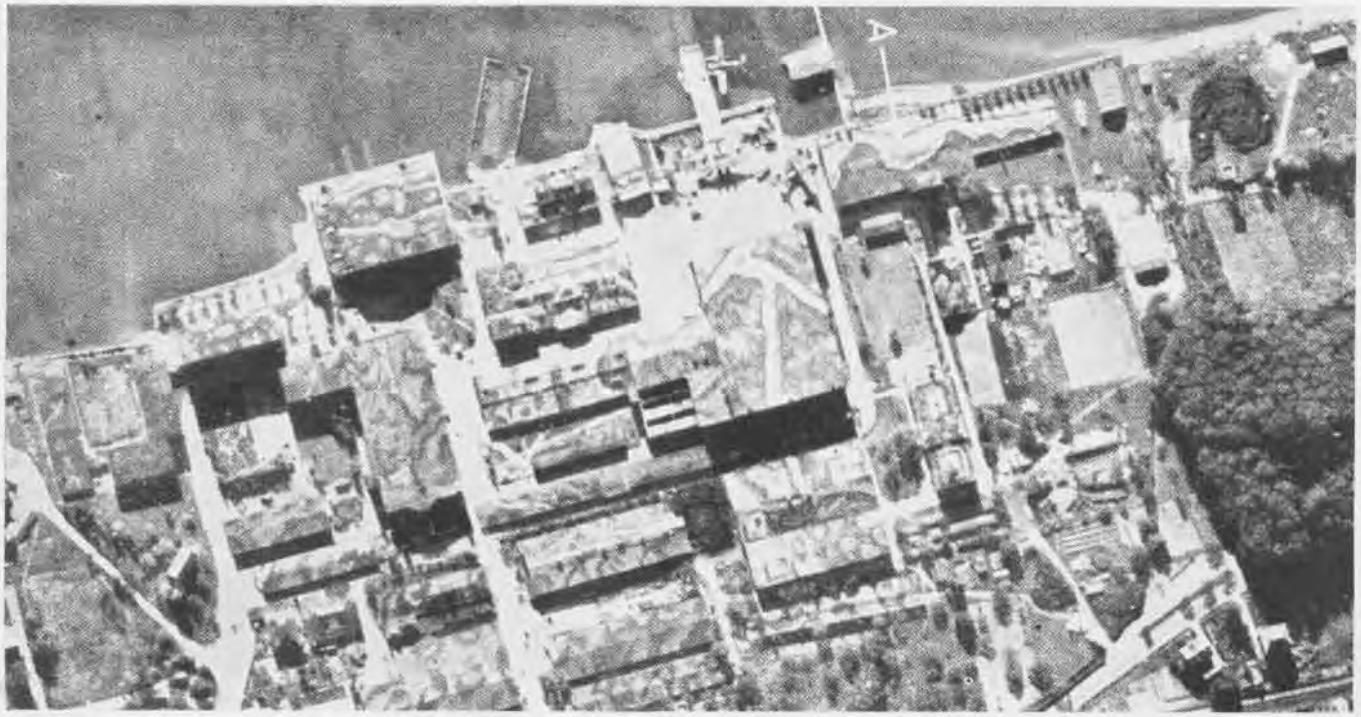
In field camouflage the importance of paint usually is overestimated. There is no magic in disruptive or dazzle-painting as such. The round top of a group of fuel storage tanks can be painted in geometric patterns of some kind, conceived to blend them into the natural surroundings. But that is not enough. These tanks will cast strong shadows and spot the installation immediately in an aerial photograph. Shadows must be killed in order to make the tanks less conspicuous.

In aerial photographs all strong contrasts of light against dark or dark against light are striking. A tank parked on the sands in the desert may be painted carefully to simulate the local color of the desert, but the inky blackness of its shadow on the sand will be a dead giveaway. By observing this fact in studying aerial photographs, Allied forces learn valuable information which can be applied in our own camouflage methods.

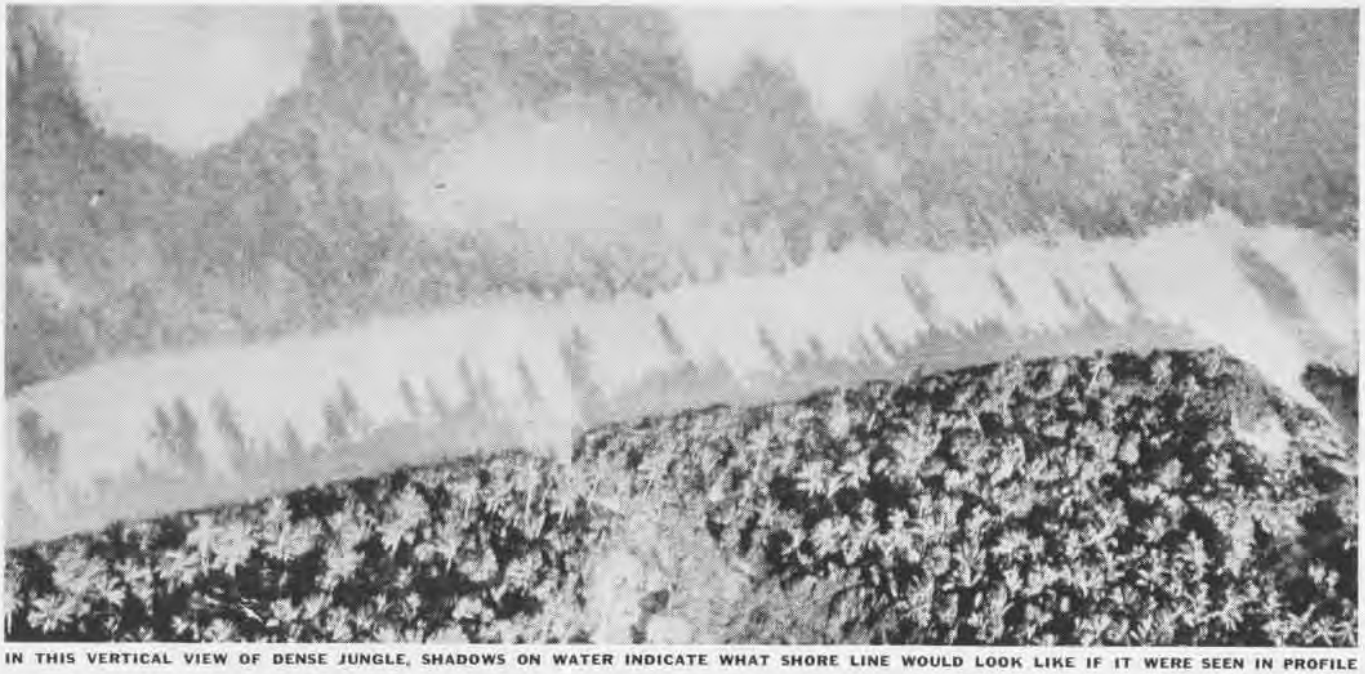
Task number one in the problem of camouflaging anything in an exposed location is to kill the shadows. This is more important than worrying about color of the paint or lightness of the surface in this case. Vehicles can be parked near any form of desert vegetation, such as camel grass, which throws some shadow of its own. Obviously objects placed on or near strongly marked parts of any pattern attract the eye less than the same objects farther removed from these strong features. Shadows of clumps of vegetation mingle with those of the parked vehicles and break up their rigid outlines. If there is no vegetation in sight, properly garnished nets used intelligently may help out.

VERTICAL VIEW OF OBJECTS WITHOUT SHADOW CHALLENGES IMAGINATION

SAME OBJECTS WITH SHADOWS CAN BE RECOGNIZED INSTANTANEOUSLY



THIS NAZI BASE WAS CAMOUFLAGED TO RESEMBLE A SEASIDE RESORT, BUT STRONG SHADOWS THROW BUILDINGS INTO THREE-DIMENSIONAL RELIEF



IN THIS VERTICAL VIEW OF DENSE JUNGLE, SHADOWS ON WATER INDICATE WHAT SHORE LINE WOULD LOOK LIKE IF IT WERE SEEN IN PROFILE

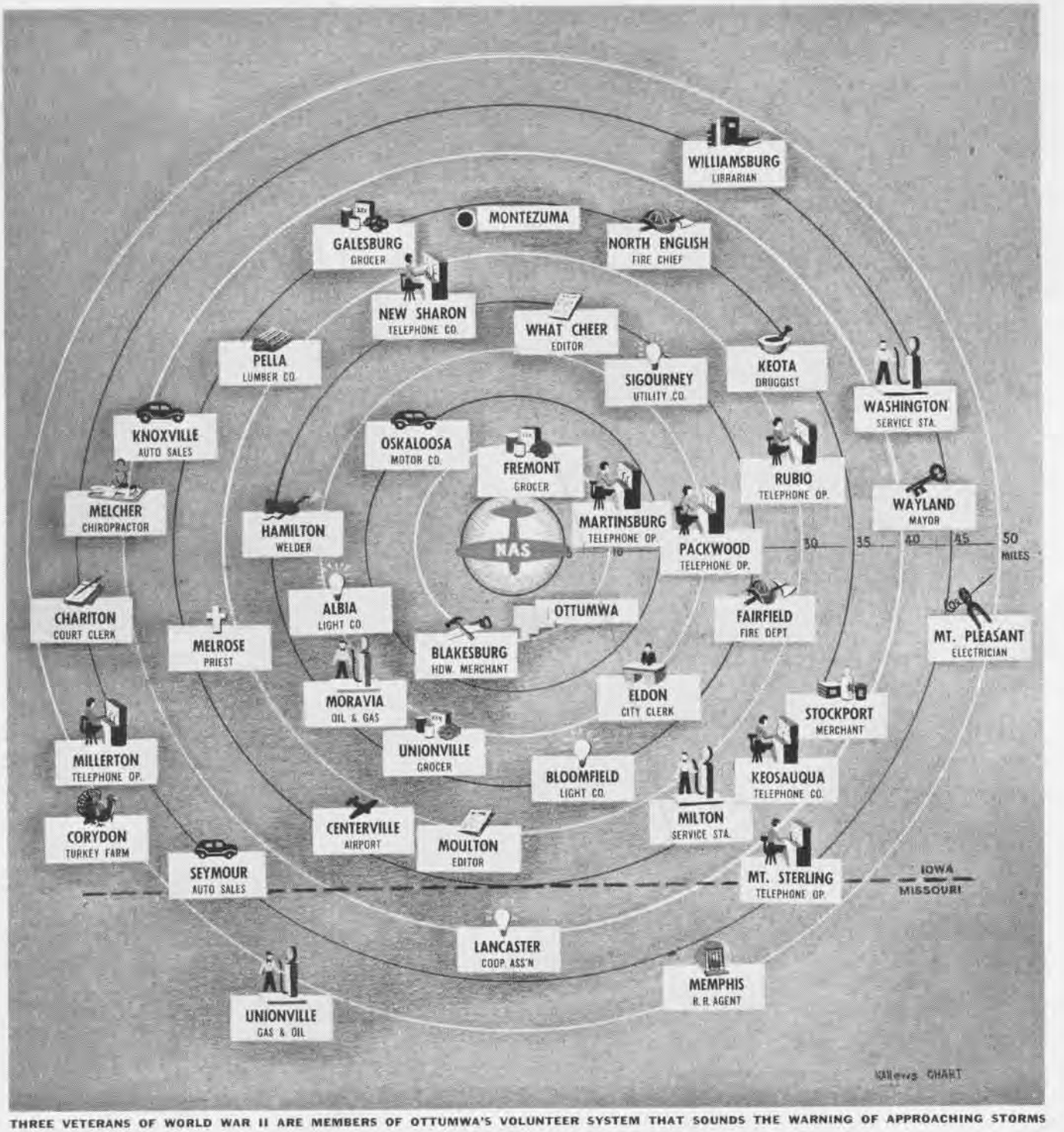
SHADOW EFFECTS PLAY BIG ROLE IN MAPPING FROM AERIAL PHOTOS

THE MOST WIDESPREAD USE of aerial photos has been for various types of mapping. In peacetime this includes many projects of an engineering nature. The evolution of a new branch of science, "aero-geology," has revolutionized geologic methods.

To the casual observer a vertical photo has the appearance of a pictorial map, and, if strong shadow effects are present, it may even simulate the appearance of a shaded relief map. The amount of detail shown far exceeds that which it is possible to show on any map of comparable scale, and individual trees, rocks, trails and other minor features are revealed clearly. Slight differences in surface coloration related to variations in soil, vegetation and moisture conditions are disclosed, and the minute details of natural patterns, such as those of stream systems, are brought into view. Under the stereoscope the topography stands forth in three dimensions and small relief features are recognizable.

The application of aerial photos to military use is manifold, including tactical studies of terrain, detection of camouflage, procurement of information as to enemy installations and activities, planning of bombing attacks and the surveying of results, and the execution of work in military engineering and military geology. It is highly important in the preparation of various military maps. To a considerable degree these applications represent an extension and combination of normal peacetime use of photos to a war use.

SHADOWS ACCENTUATE RELIEF FEATURES OF MOUNTAINOUS TERRAIN, BRINGING TO ATTENTION SMALL DETAILS WHICH MIGHT BE MISSED OTHERWISE



THREE VETERANS OF WORLD WAR II ARE MEMBERS OF OTTUMWA'S VOLUNTEER SYSTEM THAT SOUNDS THE WARNING OF APPROACHING STORMS

Citizens Warn Air Station of Storm Danger

NAS OTTUMWA—This station will not be caught in an unexpected thunderstorm if members of the thunderstorm warning network have any say.

This volunteer corps of patriotic Iowa and Missouri citizens was organized by the station's aerology office to provide advance warning of any meteorological disturbance that might endanger NAS personnel and planes.

The network is a circle with a radius of 50 miles extending from the center at NAS Ottumwa. Membership in the warning system comprises a cross-section of American life—grocers, librarians, clergymen, telephone operators, newspapermen, filling station operators.

The value of the warning system was established shortly after its organization. At 1300 Sunday, April 23, the network reported an approaching thunderstorm, and all planes were secured. A moderate storm, with strong gusts, passed over the air station at 1400, with no damage at all to aircraft.

▶ *CNO COMMENT*—A hearty pat on the back to the aerological officer for making excellent use of available facilities.

GRAMPAW PETTIBONE

Don't Always Follow the Leader

Following the example of other local traffic at a small airfield without a control tower, a JRF-5 pilot attempted a 45-degree cross-wind landing. Rudder and brake could not overcome a tendency to weathercock. The plane went off the runway into sand and nosed over.

Analyzing the accident later, the pilot said:

"In this landing, poor judgment as to runway selection was made and the approach was too fast for such a small runway. In the future, I will not attempt cross-wind landings regardless of traffic conditions. If a long runway is available, the throttle can be used in a slight cross-wind landing but the brakes and rudder cannot be relied upon."

Out of Its Class

Returning from a routine free gunnery practice, a pilot obtained permission to make dummy runs on the other planes in a TBM formation in order to give his turret gunner training in dry sighting. Approaching from above and on the port quarter, the pilot dove toward the group, intending to pull up in a steep wing-over so the gunner could get a shot at the rear planes. The maneuver, however, brought him to a near-inverted position, too close above the formation to follow through in the wing-over. To avoid a collision, he tried to roll on over and scoop out in an exaggerated barrel roll. Soon after passing the inverted position, the left wing failed. The plane crashed in an inverted spin.

Grampaw Pettibone says:

The TBM is *NOT A FIGHTER!*

Torpedo bombers are restricted from most acrobatic maneuvers by Technical Order 84-42. Wing-overs and vertical turns are the only maneuvers permitted and then only when torpedoes and bombs are not carried. A comparison of permissible accelerations for fighters and torpedo planes should convince any pilot that even these maneuvers must be carefully executed. Control must be smooth because you can break any airplane with abrupt control movements. Use the accelerometer to train yourself to stay on the safe side of the designed stress limits during glide pullouts, steep turns and the other authorized maneuvers.

Every plane is designed to withstand certain load factors and structural failure is very apt to occur if it is stressed beyond these limits. You can't tell by the size of a plane how much punishment it will stand, but you can easily find out by looking up the technical orders concerned. Anybody who exceeds these restrictions is apt to end up as a horrible example.

Night Landing Crash

A PBM pilot was on a routine night convoy coverage flight when his instrument panel fluorescent lights failed and the Flux-Gate Compass became inoperative. The failures could not be repaired in flight so the pilot decided to return to base. To supply light on the instrument panel, he turned on the pilot's cockpit spot light which resulted in a glare and a reflection of light on the windshield. After flying the beam back to base, the pilot immediately commenced a let-down, but became confused as to his position during the final approach and flew into an ammunition mound short of the landing area. All but two of the crew were killed.

The investigating board was of the opinion that, after becoming confused as to his exact position in his approach, the pilot should not have attempted to continue the landing but should have taken immediate action to orientate himself, definitely and correctly. There was sufficient fuel aboard to circle for several hours and the pilot easily could have requested additional lighting of the area. There was no hurry to land.

Another error that is believed to have contributed materially toward the crash was the pilot's usage of the spot light. Due to the glare of this light in the cockpit and the reflection on the windshield, neither co-pilot nor pilot was able to see the obstruction lights near the landing area and consequently was unable to determine the plane's exact position in relation to these obstructions. The pilot should not have turned on the spotlight but should have used a hand-held flashlight (which was available) with the beam directed through a piece of dark cloth. (*Note*: Action is being taken to install red cockpit spotlights in all patrol planes.)

Any bright white light will destroy night vision very quickly while the process of adapting one's eyes to darkness is relatively much slower. Night flying pilots should brush up on TN 19-44.

"For Want of a Nail"

For want of a pillow in back of a short pilot his rudder control was lost; for want of rudder control his directional control was lost; and for want of directional control he ran into another plane and the use of both was lost—all for want of a pillow!

Be Warned!

Grampaw Pettibone says:

An F4F pilot usually gets hurt when his wheel crank slips out of his hand. The injuries are quite similar to those which used to happen when a model T Ford backfired while being cranked.

Both the CO and Exec got a broken arm from the first F4F-3 shipped to a squadron in the Pacific. Since then there have been a large number of fractures and bruises from the same cause.

One aviator claimed that every *Wildcat* pilot had to get hit once before he learned to respect his wheel crank. I hate to believe this, but it looks like he may be right.

But why must we learn the painful way?

Don't Just Sit There

It sure is comfortable to relax. But remember, there is a time and place for everything. This is the sad story of a pilot who chose the wrong time and wrong place for his resting.

An SBD-5 made a normal landing, but had a flat tire. Although the pilot knew other planes were coming in, he allowed his plane to remain just where it stopped on the runway. The control tower called him in vain. Then what? You guessed it! The next plane to land collided with him.

Since all pilots have been instructed previously to taxi off the runway in case of a flat tire, the Trouble Board assigned 100 percent error to the pilot for disobedience of orders.

Airplane Doctors

Grampaw Pettibone says:

Before a doctor closes an incision after an operation, a nurse accounts for each instrument, clamp, sponge and piece of gauze to be sure nothing is sewed up inside the patient.

Certainly an expensive airplane, with the lives of the entire crew at stake, is entitled to the same check before an overhaul is buttoned up.

Remove all plugs and masking tape from open lines before re-connecting them.

Be sure all connections are properly seated and tight.

See that all cotter keys and safety wires are in place.

When you finish a job, make a thorough search and see that you haven't left any tools, nuts, bolts or rags lying around. In the first place, never leave such things lying around. Use trays—as all good mechs and doctors do.

Don't ever consider an overhaul job finished until you can say "I'd be willing to fly that plane myself!"

Danger Areas

An SBD pilot, flying at 4,000 feet about three miles off the Atlantic coast, suddenly heard "a noise similar to a loud clap of the hands." Inspection in the air failed to show anything wrong. Upon returning to base, the pilot discovered a jagged hole about three inches long and an inch wide in the leading edge of the wing.

When the wing was removed, an unexploded 20 mm. high explosive incendiary projectile was found on top of the auxiliary gas tank. The nose fuse of the shell had been sheared off when it entered the wing. It was believed that a serious accident was prevented only because the shell had reached its maximum range and was tumbling when it hit.

The Trouble Board reported that the accident proved to the pilots of this squadron that firing notices must be studied while on the ground and danger

areas given a wide berth in the air. In order to make it easy for the pilots to do this, the squadron has now adopted the old Navy custom of having all local danger areas plotted on a large map. The map is kept up to date by the navigator and is hung in the ready room where pilots can take a good look at it before each flight.

Grampaw Pettibone says:

You don't get the Purple Heart for getting wounded on a friendly firing range!

Firing notices are issued for your protection. Believe what they say—and don't wait to do so until somebody in the squadron gets hit.

"It Was Then Too Late"

A TBM-1C was in the groove about 1,000 yards down-wind from the field, altitude 400 feet, airspeed 100 knots. Here's the pilot's story of what happened:

"When I applied the throttle after obtaining 18 inches of manifold pressure, it went the full length of the quadrant with no response from the motor. It seemed to me that I could make a normal landing, but when I throttled back the engine did not cut. The next thing that entered my mind was that I would overshoot the field or go over on my back when trying to brake it down after landing. While thinking this, I banked slightly to the right to clear the field and to attempt a water landing. Then I realized I could have cut the switch and made a normal landing on the field. Of course, it was then too late. I made a fair water landing and the three of us were rescued in a matter of minutes."

The Trouble Board agreed that the pilot could have landed on the runway by cutting the ignition switch and making a dead stick landing. Because he did not, one TBM was recommended for striking and salvage.

"I Was in a Hurry"

Here is an aviation cadet's story of how he cracked up an SNJ:

"I was scheduled as a fill-in on an authorized division tactics flight. As a result, I was in a hurry. The plane captain was sitting in the plane with the engine running. I signed the yellow sheet. Seeing that the controls were unlocked, I taxied out without testing them. With little wind blowing, I had no need for the ailerons in taxiing and did not use them. I met my division on the mat and took off in a three plane section.

"After I climbed to 100 feet altitude, the tower told me that something was wrong with my aileron. I immediately checked my aileron control. My wing went down and my plane started losing altitude. Seeing that I would be unable to effect a recovery, I turned the gas selector valve to the 'off' position. The plane hit the ground and came to rest with the engine torn off, the left wing badly buckled and the fuselage parted at the aft cockpit."

The trouble? The wooden blocks had not been removed from the ailerons.

The plane captain and the pilot were held equally responsible for this accident; the former for negligence in turning an airplane over as ready for flight with the ailerons locked, and the latter for neglecting to check his airplane (particularly the major controls) prior to take-off.

Disciplinary action was taken!

Search Planes Collide

During search for a downed airplane, a section of three torpedo planes sighted an object in the water and dropped a smoke light. While waiting for the crash boat to arrive, the planes let down to 500 feet and circled the marker. The pilots concentrated so intently on keeping the smoke light in sight, however, that they neglected to watch out for each other.

Three men were killed when two of the planes collided.

Grampaw Pettibone says:

An airplane is terribly vulnerable in the air. Most collisions are fatal and the only safeguard is your *eternal vigilance.*

REAR-PROJECTION SLIDE FILM CABINET AT NORMAN BRINGS TECHNICAL TRAINING AIDS DIRECTLY INTO THE SHOP WHERE MECHS ARE AT WORK

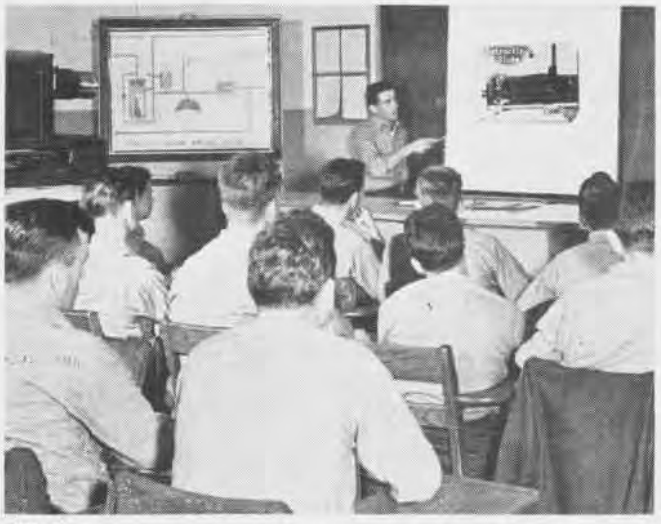
Schools Make Proper Use of Training Film

PROPER presentation and use of training films, integrating them directly into the courses of study, is being stressed by schools to improve aviation training.

The Naval Air Technical Training Command was one of the first to recognize need for utilization and supervision of the film program. As a result, films today are scheduled into the syllabi of courses, presented in an interesting way, by instructors who know film use.

The program involves review and selection of applicable films and scheduling in the course of study. Many old films have been revised and new ones produced to fill the needs of schools. Conference boards were set up to recommend methods of making the training film program fit closely with needs.

In places where showing films in an auditorium is inappropriate, projection boxes, such as illustrated with this article, are put right next to the men at work. Instructors are trained in proper use of film to get the teaching across.



Slide films are used in conjunction with charts, mock-ups and other training devices to teach technical students ordnance data

Individual classroom library of slide films is kept up by training officer who adds new rolls and takes out those now obsolete

BE PREPARED IN DRESS AND EQUIPMENT FOR THE TYPE OF COUNTRY OVER WHICH YOU MUST FLY, WHETHER OVER TROPICAL SEAS OR ARCTIC WASTES

HAZARDS

Knowledge helps to overcome a variety of physical, biological hazards

PHYSICAL and biological hazards take a heavy toll of stranded men even when food and water are available. A knowledge of how to surmount them will give you confidence and diminish your hardships.

Loss of salt from sweating is a main cause of heat stroke and heat exhaustion. If salt is not available, several swallows of ocean water a day will help replace the salt lost by sweating and will not be harmful to you if you drink plenty of other water.

Sunstroke is usually preceded by dizziness, nausea and headache. The face is flushed, skin hot and dry and body temperature high. For treatment, lie in the shade with head higher than the rest of the body; drink water with salt in it and bathe head and body.

In heat exhaustion the skin is clammy and the temperature normal or below. Drink salt water, lie in the shade with head low and cover up to keep warm.

While adjusting to tropical conditions go easy until you determine the kind of food and quantity of water and the amount of exercise you need to keep fit.

Long exposure to salt water may result in sores and swelling. Fats or greases help to prevent them. Immersion foot is caused by continued immersion of the feet in cold water or by continued hiking in wet cold footgear. Pain is followed by swelling and numbness and often sores. Always keep your feet as dry as possible. Don't wear tight boots or socks. In treatment, don't rub the feet or apply heat directly.

In extreme cold, wear a number of garments that can be taken off and put on to regulate heating and chilling. Control of sweating is essential; wet clothes increase your chances of freezing. Freezing of face, feet and hands is an ever-present danger. Don't rub frozen parts or expose them to heat rapidly but use approved first aid method.

FIGHT MOSQUITOES, FLIES BUSY DISEASE CARRIERS

THE SOURCES of greatest danger are not always the most apparent. Many of the small forms of life can cause more real discomfort and danger than cold or a scarcity of food and water. They may be irritating in themselves, but their greatest danger lies in the fact that through their bites they transmit various weakening and frequently fatal diseases. The general information which follows is designed to tell you what to expect from them, how to evaluate the danger and how to take precautionary measures against them.

Malaria, for example, is transmitted to man by some species of infected Anopheles mosquitoes and not by any other kind of mosquito. An area which is free of Anopheles mosquitoes or one which may have such mosquitoes but which has not been inhabited by man for some time will be free of malaria.

Take every possible precaution against malaria. The greatest danger is in regions with large native populations which may be infected. Since mosquitoes can readily bite through light cloth, keep your clothing loose except at ankles and wrists. A mosquito head net is a most important piece of emergency equipment, since your face and neck are the most difficult parts of your body to protect. A net also does duty against black flies and other insect pests. Mosquito repellents are also very useful. At your base or station they are available from the dispensary or the medical officer.

The Anopheles mosquito is identifiable by the fact that it rests with its tail end pointing upward at an angle. It is active only in the early evening and at night, but it is well to take precautions in areas of heavy shade. Because of its night-feeding characteristics, it is advisable in malaria regions to get a camp made and mosquito netting arranged before dark. A head or tent net should always be used for protection against Anopheles mosquitoes while sleeping. Also use the anti-malaria drugs, or quinine, as directed by your medical officer.

THE AEDES mosquito transmits yellow fever and is largely responsible for transmission of dengue fever. Unlike the malaria-carrying Anopheles, the Aedes bites at any time of day or night. Your shots protect you against yellow fever which is most common in the Caribbean, West Africa and in parts of Central and South America. Dengue fever is transmitted like yellow fever. It is weakening but seldom fatal. It is widespread in the tropics and subtropics. The mosquitoes which transmit it seldom range more than a quarter of a mile from the little pools where they breed (in tin cans, tree-holes and the like) but they are especially abundant near human habitations.

Filariasis is a round-worm infection transmitted by mosquitoes in the tropics and subtropics. Occasionally affected portions of the body develop abnormal swelling which may reach huge proportions. There is at present no effective treatment of the infection.

SURVIVAL HINTS—NO. 13

This is the thirteenth in a series of articles condensed from How to Survive on Land and Sea, *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.*

▶ Black flies or buffalo gnats may transmit filarid worms and are found throughout the world in wet forested areas.

▶ Various biting deer flies and horse flies are abroad only in the day and may be numerous in regions where there are hoofed animals.

▶ No-see-ums or punkies are tiny flies found in fresh and salt water areas throughout the world. They have an itching bite. Some species may carry filarid worms. If these gnats are abundant, move on; they seldom fly more than half a mile from breeding areas.

Sand flies are tiny moth-like flies that bite at night. They can pass through ordinary netting and are disease transmitters in such widely separated areas as Colombia and the Peruvian Andes, the Mediterranean, India, Ceylon and China. They transmit verruga, pappataci and kala-azar fever. These flies seldom fly more than ten feet above the ground and they dislike air currents.

Tsetse flies are found only in central and south tropical Africa. While some species transmit a sleeping sickness which may be fatal, the proportion of those infected is very small and so is the chance of contracting the disease. All tsetse flies require shade and usually bite only during the day.

Screwworm flies are found in the Americas, especially the tropics, and are most likely to be abundant in the vicinity of unburied corpses and animal carcasses. They are active during the day and often deposit their eggs in wounds. Danger is greatest when sleeping in the open as the flies also deposit their eggs in the nostrils, causing severe pain and swelling. Stupefy the maggots with chloroform, then remove them with forceps. Where these flies are numerous, don't sleep during the day in the open without covering your face or using a net. Blowflies with somewhat similar habits may be encountered in parts of Africa, India, Australia and the East Indies.

Bot fly larvae bore into the skin, producing boil-like lesions. Apply wet tobacco to the open boil to kill the larvae and remove them by squeezing.

Salt water sores on legs of an Army airman, one of seven who were rescued by a U. S. destroyer after seven days on a life raft. Sores such as these may cause much misery

FLEAS, LICE, TICKS AND CHIGGERS ARE PESTS THAT DELIGHT IN CHEWING GROUNDED AIRMEN

FLEAS are small wingless insects that move about by jumping and live on warm-blooded animals. In some areas their bites may transmit extremely dangerous diseases such as plague and endemic typhus. Fleas that live on rodents, particularly rats, can transmit plague after feeding on plague-ridden rodents. Plague, a fatal bacterial disease, is apt to be contracted only in regions where epidemics are flourishing. It persists among rodent populations in various parts of the world and occasionally breaks out in epidemics.

If you must make use of rodents as food in plague-suspect areas, hang up the animals as soon as they are killed and do not handle them until they get cold. Fleas soon leave dead animals.

The tiny chigoe, jigger or sand flea occurs in immense numbers in tropical and subtropical countries, particularly in dust near human habitations. The females burrow into the skin usually on the legs, feet and under the toe nails where they produce painful sores. The flea appears as a black speck under the skin and may be dug out with a sterilized needle or knife. Precautions against fleas include use of derris or louse powder and (in areas of sand flea infestation) wearing tight-fitting leggings or boots.

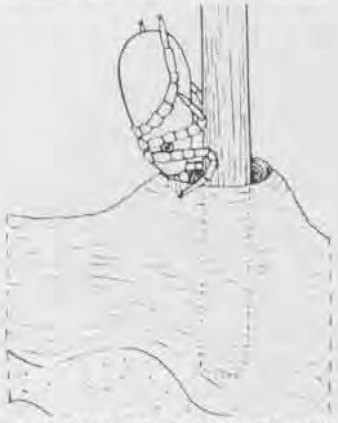
Lice or cooties are wingless bugs that live and feed on birds and mammals. They infest men living under unsanitary, crowded conditions. You need not worry about becoming infested with them in the wilds. Their greatest danger lies in transmission of such diseases as typhus, trench fever and relapsing fever.

Both the lice and their eggs, which may be deposited on hair or clothing, must be killed. Control measures include use of general-issue louse powder, exposure of clothing to direct sunlight for a few hours, washing frequently.

BEDBUGS are found throughout the world, being most abundant in temperate regions. They are brown wingless bugs with flattened bodies. They feed on human blood when available and they have a characteristic disagreeable odor. They will leave bedding spread in bright sunlight.

Ticks are distributed over much of the world and are especially numerous in the tropics and subtropics. The hard wood ticks are found chiefly in wooded or brushy areas; the soft or leathery ticks in caves, around rocky ledges and in nests and burrows of animals. Both types may transmit disease, but fortunately the percentage of ticks that are infected is in most areas extremely small.

Hard ticks, which may cause secondary infection or transmit Rocky Mountain spotted fever or tularemia, are reasonably easy to guard against. In temperate regions they are numerous only in late spring and summer and are found in the woods away from direct sunlight. Since it takes several hours for most hard ticks to bite, a thorough check of your body and clothing two or three times a day will eliminate the danger of disease infection.



CHIGGER (GREATLY ENLARGED) DIGS INTO SKIN

Soft ticks bite quickly and fill with blood in 10 to 60 minutes. They may transmit relapsing fever, a weakening but not fatal disease.

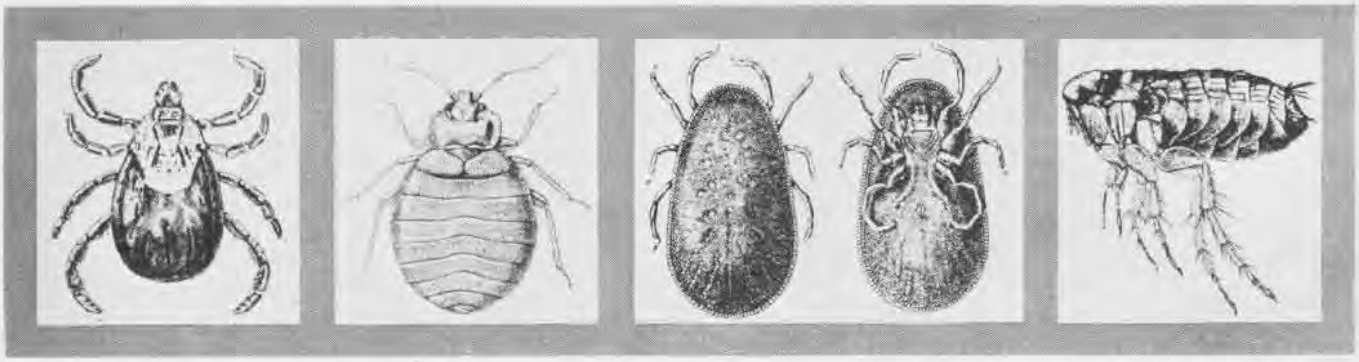
In examining yourself for ticks, look particularly at hairy portions of the legs and body and where clothing is tight.

Don't crush ticks on the body and be sure to get the head out or it may cause infection. A lighted cigarette or match held close to the tick will cause it to loosen its grip. Kerosene or oil has the same effect.

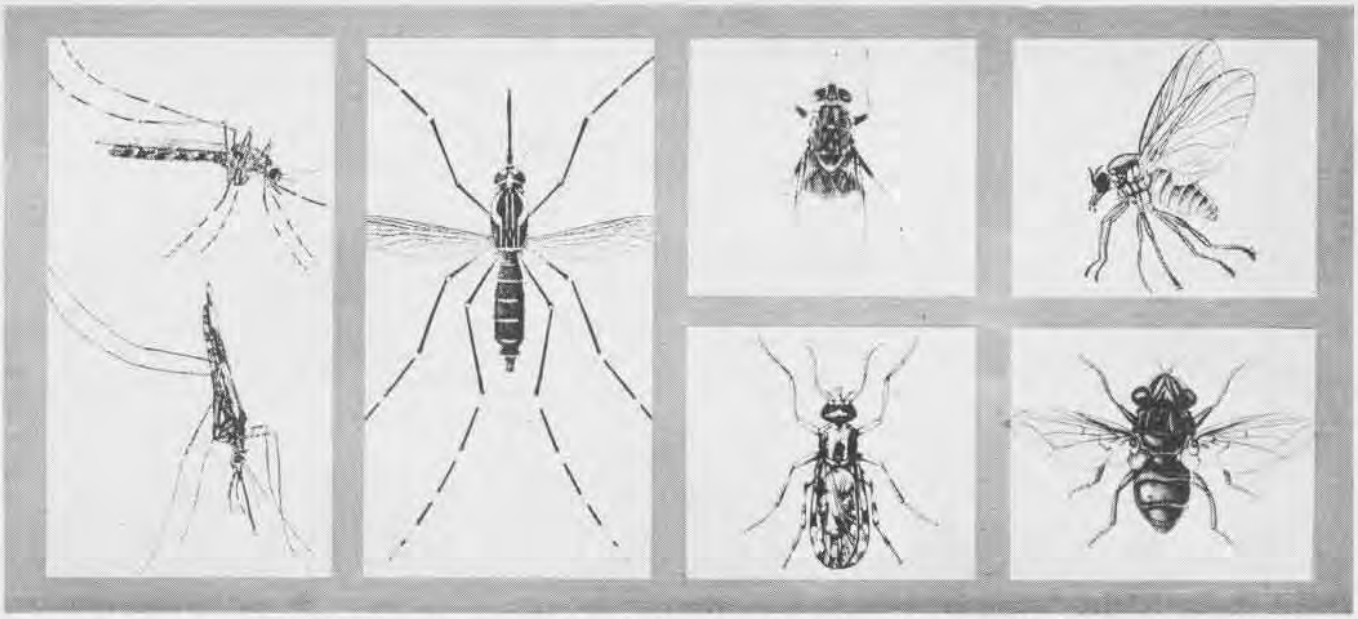
Rocky Mountain spotted fever is found in many areas of the United States. It has a high mortality rate, but is comparatively rare. Closely related tick-borne diseases occur in the Mediterranean area, Brazil and elsewhere. Tularemia, a bacterial disease of rodents which can be contracted either from insect bites or through contact with infected animals, is present in the United States, Europe, Japan and Russia, but is not common. Don't handle or prepare or eat rodents that were noticeably sick or sluggish when killed.

MITES and chiggers are so tiny that some are almost invisible to the eye. They cause annoyance and irritation through their bites or through the diseases they transmit. They include the human itch mite which causes various skin diseases such as scabies, Norwegian itch and barber's itch; and the harvest mites or chiggers which cause irritating sores and may transmit Japanese river fever or Kedani fever in certain areas of the Far East, including South Pacific islands. Human itch mites infest the skin and live beneath the scabby crusts made by their burrowing and feeding. They are particularly prevalent in areas where people live in crowded or unsanitary conditions.

Washing in strong soap, followed by application of sulphur ointments, will help eliminate mites and chiggers after exposure to them. To protect against chiggers before exposure, dust fine sulphur or louse powder on your skin and inside your clothing, particularly around the ankles. Tucking trousers inside boots or leggings also is a preventative.



A ROGUES' GALLERY OF INSECTS (FROM LEFT TO RIGHT), WE HAVE THE HARD TICK, BEDBUG, SOFT TICK AND THE FLEA. THEY'RE ALL ENEMIES



(Top) Common mosquito, (Bottom) malaria mosquito—notice tail in air, (Right) yellow fever mosquito. All three drink blood

(Top) tsetse fly and black fly, (bottom) sand fly and human bot fly. Men are like juicy steaks to these disease-carrying pests

AVOID SPIDERS, LEECHES, SCORPIONS AND FLATWORMS

Spiders in general are not particularly dangerous. Even the bite of the much advertised tarantula is not fatal or even serious. The black widow spiders of the southern half of the United States, together with tropical members of the same family, should be avoided. Their bites cause severe pain and swelling. All are of a dark color marked with white, yellow or red spots.

Scorpions are usually small, but some are as long as eight inches. They sting with the tail spine, usually only when molested. Their stings are extremely painful, but seldom fatal. Since they hide in daylight and are active at night, they may take refuge from light in shoes or clothing. In areas where they are found, shake out your clothing and knock your shoes bottom up before putting them on.

Bees, wasps and hornets usually sting only in self-defense. The stings of an aroused swarm may be dangerous. Varieties in the tropics range from small stingless bees to large militant ones which should be avoided even when in desperate need of food. Some tropical ants also sting severely and attack in numbers, but they can be avoided by moving.

SCREWWORM AT HOME AND HAVING A FINE TIME

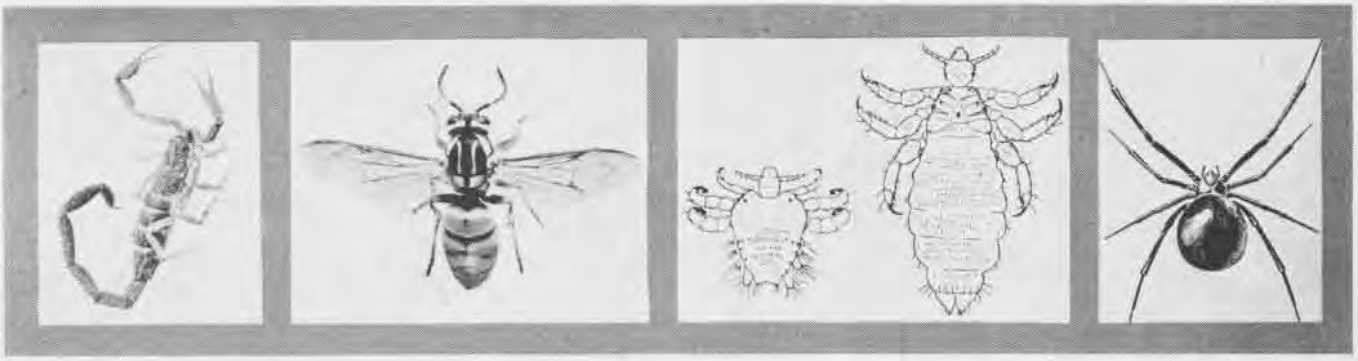
Blood sucking land leeches are common in wet areas, particularly during the rainy season in Borneo, Sumatra, India, Ceylon and the Philippines, the South Pacific islands, Malay States, Australia and in various parts of South America. Remove them by touching with a lighted match, cigarette or wet tobacco, and protect yourself by wearing trousers tucked inside laced boots.

Blood flukes, or flatworms, are found in sluggish fresh water in Africa, parts of tropical America, Asia, Japan, the Philippines and other Pacific islands. Flukes penetrate the skin, live in the blood vessels and escape painfully through the bladder or feces.

Hookworm is common in the tropics and subtropics. It is acquired by going barefoot in areas where human excrement is found. There is no danger from hookworm away from human dwellings.

Parasitic skin diseases (athlete's foot is one) are common in the tropics. The best protection against them is frequent washing and changing of clothing, and frequent bathing with plenty of soap. To treat an infection, wash with strong soap, soak the affected part in salt water and use approved disinfectants.

IN THE NEXT ISSUE: FINAL INSTALLMENT



(FROM LEFT TO RIGHT) SCORPION—STINGER IN THE EMPENNAGE, WASP—DITTO, LICE—LOVE COMPANY, AND BLACK WIDOW SPIDER—BAD ACTOR

WE FLY THE MARINERS

AIR COMBAT CREWS ARE SPECIFICALLY TRAINED IN TEAMWORK AND OPERATION OF GIANT PBM'S

EIGHT ENLISTED MEN and three newly commissioned officers, who not many months ago may have been students, clerks, farmers or barbers, are turned into a well-coordinated combat aircrew within eight weeks at NAS Banana River. How eleven individuals with varying backgrounds, and from widely scattered sections of the country, are welded into a well-functioning team is the story of their training.

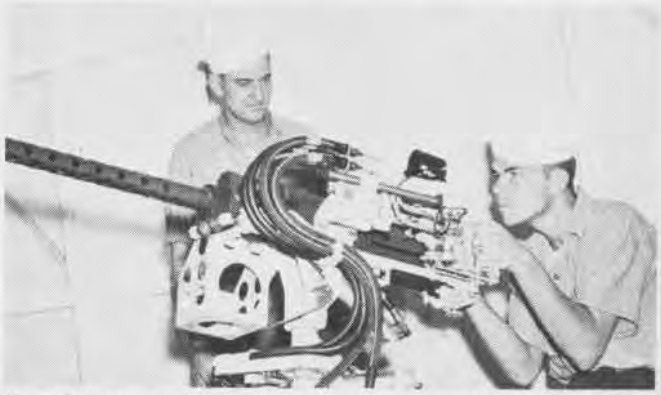
Although both officers and enlisted men had previous aviation experience, they are completely new to the PBM *Mariner*. Student officers come from Corpus Christi or Pensacola; the enlisted men from Yellow Water or Purcell aerial gunnery schools.

At the end of the first two weeks, enlisted men are divided into groups of eight, with one, who is an aviation machinist's mate, third class or higher, selected as plane captain in each group. The other seven are divided as follows: second mechanic, first radioman, second radioman, ordnanceman, and three aerial gunners. Upon arrival of the three pilots, the full combat aircrew is formed and the intensive eight-week program of training begins.

The first phase of their work is conducted in the PBM mock-up room so crew members and pilots can familiarize themselves with the intricate mechanism of the huge seaplane. This gives members of the crew an opportunity to get acquainted with each other and the foundation for good teamwork is laid.

DURING the second phase, the crew flies half a day and goes to ground school the other half day. Among the subjects covered in ground school are U-boat habits, navigation, bombs and bombing, search and patrol, turret maintenance, beaching and launching. Flights made include bounce, night landings, navigation, and gunnery runs.

Patrol bomber goes "over the side" into the waters of the Banana River preparatory to take-off on an instrument training flight. Similar problems are encountered in other parts of the world



Combat aircrewmen learn fine points of manipulating a .50 caliber waist gun mount for time when Jap planes get within range. Ability to make every shot count is acquired through practice

DID YOU KNOW?

Brakes Deserve Longer Life

Check List Is Aimed at Abuses

To reduce maintenance difficulties and accidents due to wheel and brake failure, BuAer points out that more attention must be paid to proper use of airplane landing brakes.

Repeated excessive applications cause increased temperature to dangerous degrees, resulting in complete breakdown of brake structure, failure of brake drum and wheel structure, blowing of tires and tubes. In extreme cases, complete wheel and brake installations are destroyed by fire.

Landing gear brakes are intended for use when stopping or manipulating airplanes on the ground. Under normal conditions, there is no need for prolonged use of brakes to control the plane when taxiing. It is generally known that personnel drag brakes while taxiing, use them consistently to speed up turns, and stop the plane quickly.

Such abuses *should be discontinued*, and the following are to be observed insofar as practicable.

1. With landing wheels remaining in slipstream (extended), sufficient time should be allowed to elapse between landings, to permit adequate time for cooling between hard applications of the plane's brakes.
2. With landing wheels retracted into wheel wells, sufficient time should be allowed to elapse between landings, to allow for cooling between brake applications.
3. Full advantage should be taken of length of runway during landing roll, so that brakes can be used as little and as lightly as possible when stopping airplane.
4. Parking brake should not be set while brakes and wheels are in heated condition.
5. Brakes should not be dragged when taxiing, either intentionally or inadvertently. Personnel should be sure that toe pressure is not applied when operating rudder pedals.

To prevent damage during landing of aircraft equipped with disc type brakes, such brakes will not be set and locked during flight. However, objectionable vibration caused by rotation of landing wheels not so equipped with disc type brakes may be stopped by momentary application of brakes.

Wheels on airplanes having retractable landing gear are normally prevented from rotating when gear is retracted either by nature of gear design or by special snubbing devices. If snubbing devices are found to function improperly, repairs should be made as soon as possible. Technical Note 49-42 should be read by aircraft personnel.

25 Years ago this month, in July, 1919, platforms on turrets of additional battleships for launching land planes were authorized. Platforms installed on Nos. 2 and 3 turrets on *Pennsylvania, Arizona, Oklahoma, Nevada* and *Idaho*. These platforms extended out to the ends of the guns. Canvas hangars were provided, designed to be portable and quickly disassembled. This type of launching proved successful, but impractical. It interfered with sighting, unbalanced the guns and was not easily disassembled, requiring about 20 minutes. Turret platforms already were installed aboard the *Texas* and the *Mississippi* as shown in photo.

July 29, 1919. NC-4 flight-official report by Comdr. J. H. Towers: "It is recommended that all the personnel of the NC division under my command be given a letter of commendation and that Lt. Comdr. R. E. Byrd, USN, to whom is largely due the credit of developing and trying out the many new devices for navigation purposes, which were of inestimable assistance to the commanding officers, be also given a letter of commendation for his share in the success of the transatlantic flight." Commander Towers was in command of the entire NC flight. Out of the three planes the NC-4 alone completed its flight.

TBM GUNNER LOST FOR 12 DAYS

On the way to our target, we rendezvoused over X Island. Lieutenant M. tested the wing guns on our TBM, and found they were both out of commission. He called his crew.

"Pilot to gunner. Whadda' say we go in anyway? Oke?"

"Oke."

We made our run on the target and dropped all the bombs. As we pulled away, I noticed the fabric off the tail was flapping around. The tip of the right wing was gone and the hydraulic system out. I hadn't seen any ack-ack breaking close to us and I hadn't felt any bomb blast or bomb fragments enter our plane. I don't know what happened.

After I reported to Lieutenant M., I glanced over my shoulder and saw a *Zero* banking to the right. He put a long burst into us. The turret went dead. The ICS went dead. I looked down to see if the radio gunner had been hit. He was dead, too.

We lost altitude rapidly, and I knew we were going to make a water landing. I threw out the escape hatch. The left wing dipped into the water, and the plane settled back. I jumped out on the wing, got the life raft out, and the ship went down. I didn't have time to go up and look at Lieutenant M., but he never made any attempt to come out of the cockpit.

The fighters were still dog-fighting overhead, so I left the raft folded until the sky was clear of fighters. It must have been 10 or 15 minutes. I opened the raft, pulled the ration kit aboard and started rowing away from land. I rowed most of the afternoon, and about 1500 a strong wind came up. I was trying to keep the stern of the raft into the waves when a big one rolled the raft over. I had already untied the ration kit and, by the grace of God, it caught under the back seat of the raft along with my parachute harness. My pistol, flight jacket, and Mae West went overboard.

Late in the afternoon of the first day, I opened the ration kit. The 6 cans of water were the most valuable of the contents, and I rationed myself to one can a day. The seventh and eighth days I went without, but it rained the following evening and I caught 2 cans of water off the back seat of the raft. A few days later a shower blew up, then a storm. I salvaged 2½ cans that time.

As diversion from the food rations, I treated myself to turtle meat on the eighth day. The turtle was swimming in the shade of the raft, so I grabbed, skinned, and ate him. In fact, I ate everything but the head, guts and skin. Not bad, either!

My flare gun and flares were all OK, and I shot all the flares at PV's flying patrol. I saw the first one on the third day at about 2 miles away at an altitude of 800 to 1,000 feet. I saw another one the next day, and on the eighth day a PV came right over the raft. I saw eight *Venturas* in all, but three were out of range.

I was finally picked up by Dumbo, and none too worse for the wear. I had two shrapnel wounds, a tiny one in my right forearm and one about the size of a quarter in my right leg. There were two dry packets of sulfanilimide in the first-aid packet and I used half a packet per day for four days. The arm wound had stopped bleeding by the time I got into my raft, and my leg wound stopped bleeding after I washed it off with salt water and applied sulfanilimide. There was a dry bandage in the kit which I used to bind up my leg wound. The arm wound became infected about the third day. I squeezed a splinter of iron out and that was the last time it bothered me.

During my 12 days at sea I lost 26 pounds, but after being hospitalized for a few days, I was ready to go again!

BEST ANSWERS

Australia

Pick the best choice to complete the statements below, then check your answers on page 48.

1. **The national capital of Australia is—**

- ☐ *a*–Melbourne
- ☐ *b*–Sidney
- ☐ *c*–Darwin
- ☐ *d*–Canberra

2. **In area Australia is approximately—**

- ☐ *a*–one-half as large as the U. S.
- ☐ *b*–twice as large as the U. S.
- ☐ *c*–the same size as the U. S.
- ☐ *d*–one-fourth as large as the U. S.

3. **The population of Australia is—**

- ☐ *a*–less than that of New York City
- ☐ *b*–about that of New York State
- ☐ *c*–about that of Japan
- ☐ *d*–about that of England

4. **Most of the people of Australia live—**

- ☐ *a*–on farms
- ☐ *b*–on sheep ranches
- ☐ *c*–in the cities
- ☐ *d*–in the bush country

5. **It is highly complimentary when Australians call someone a—**

- ☐ *a*–"bloody fine burstud"
- ☐ *b*–"saucey chap"
- ☐ *c*–"rotten dinkum"
- ☐ *d*–"shikker"

6. **Australia's casualties in World War I were about—**

- ☐ *a*–equal to those of the U. S.
- ☐ *b*–twice those of the U. S.
- ☐ *c*–one-half those of France
- ☐ *d*–equal to those of Austria

7. **When an Australian calls someone a "Collins Street Squatter" he means a—**

- ☐ *a*–millionnaire
- ☐ *b*–early settler
- ☐ *c*–drug store cowboy
- ☐ *d*–panhandler

SB2C MAINTENANCE

Technical Training Command spurs Helldiver line technique at Navy school in Memphis

NATTC MEMPHIS—A select body of students is receiving specialized instruction in how to maintain the Navy's *Helldivers* at SB2C Line Maintenance School recently set up here by the Naval Air Technical Training Command. The course, stretching over an intensive five weeks, is the first of its kind in the Navy and is an addition to AMM, AOM and ARM schools already in operation at the Technical Training Center.

Students are naval and Marine Corps officers and enlisted men from U. S. and British Fleets. They receive latest and speediest maintenance techniques from Curtiss-Wright factory-trained instructors and naval officers chosen from the AMM school staff.

Their work is performed in classrooms and shops, and portable shelters have been erected to make sure that foul weather does not interrupt progress of work outdoors. Instructors freely employ charts and training aids, and periodic visits to the Curtiss-Wright factory keep them abreast of latest techniques and changes.

In five weeks the *Helldiver* is broken down and studied, nut by nut, bolt by bolt, a week apiece being allotted to POWER PLANTS, HYDRAULICS and OPERATION and two weeks to STRUCTURES. Trainees do the actual maintenance of propellers and controls, involving removal, cleaning, embalming, stowing, installation, etc. Hydraulic covers landing gear, wing fold, bomb bay doors, landing and driving flaps, trouble shooting. Two thorough weeks are devoted to structures, and the final week covers operation from the plane captain's standpoint, and comprehensive review.

Training in line maintenance covers all the structural aspects of the plane. Students above adjust wing slats, one of many jobs

Installation of tail wheel and arresting gear assembly comes under Structures; Hydraulics, Power Plants, Operation also are studied

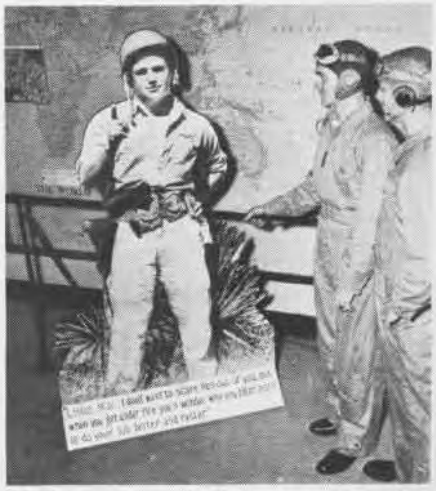
DOPE ON JAPS

ACI library gives pilots information on foe; maps help keep up with war

MAKING A PILOT a *combat pilot*, so that he flies automatically and can spend his time trying to out-think the enemy, is a goal for operational training. Before he can get on with his out-smarting job, however, he must know more than the enemy does—and there the air combat information officer enters the picture.

A successful *combat* pilot must know not only more of the general technique of flying, but also must excel in his own tactics, know the enemy's favorite tricks and the comparative armament of both planes. In general, he must know more about the Jap than the Jap knows about him. In cooperation with ground training and flight instructors, ACI provides students with every possible facility for learning things that will help them out-think enemy pilots.

To outsmart the enemy, a pilot must know more about the abilities, armament and flying performance of his plane and that of his foe; ACI officers put such data at his disposal



ACI library has no bookish atmosphere, but has geographical, aeronautical information

Maps of battle areas, bulletin board and recognition material adorn walls of air combat information room at NAAS Cecil Field, while pilots read latest "word" in NANEWS and other aviation publications; flight board on wall keeps men posted on day's events in the squadron

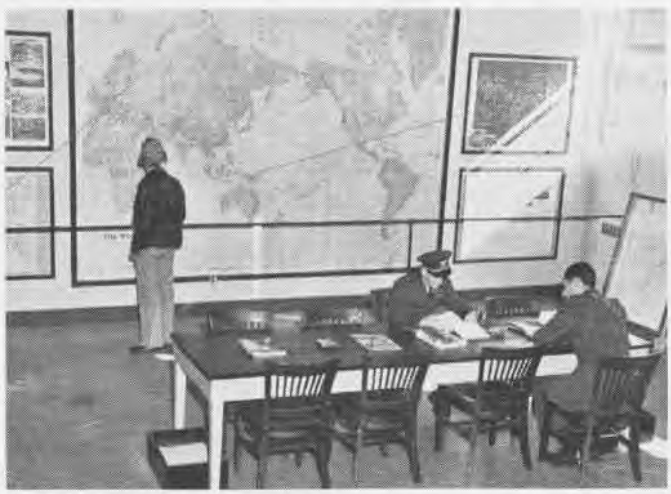
A TYPICAL ACI library, such as the one at NAAS Cecil Field, gives the student access to a wide variety of classified reports and publications of the Navy. As soon as he arrives, he is introduced to ACI facilities via a specially prepared pamphlet telling him the difference between a pilot and a good combat pilot. It stresses the necessity for all naval officers continuing, throughout their careers, their efforts for self-education. It also tells the pilot about facilities at Cecil that are for his use, during his spare time when he isn't flying his SBD around the countryside.

A carefully selected assortment of material, such as that dealing with tactics and plane performance, has been put up in special folders and is required reading for all students. The volume of this reading is not large and can be read in a few minutes between flights, on rainy days and at other odd moments. Presentation of material is made so as to make it as attractive as possible.

ALL THE MATERIAL in the library is catalogued so pilots can pick out topics of special interest. The ACI office also contains a current situation plot on all theaters of war, together with news clippings posted on appropriate charts, so that in 10 minutes' time a visitor can catch up with current military doings anywhere in the world. A special chart of the Pacific area is maintained, with blue and red pins indicating major strategic military installations of the enemy.

IN ADDITION to library activities, ACI officers give a series of lectures to each flight of pilots and gunners. These cover such topics as "Survival Intelligence," "Military Geography of the Atlantic, European and Asiatic Areas," "Briefing and Interrogation of Pilots and Aircrewmen," "Strategy in the Pacific," "Conduct if Captured," "The Japanese People," and "Anti-Submarine Warfare." All are subjects which any Navy pilot will find extremely valuable some day when he goes up against the real article. Knowledge beforehand, however, has saved many lives.

ACI has two goals: *First*, to make the students want to learn to be good *combat* pilots and, *second*, to provide them with all necessary means, wrapped up in the most attractive package possible.



Large-sized maps of the world help embryo combat pilots keep up with the war's trends; library provides voluntary education data

ACI library must give these fliers facts on the enemy which are not provided in regular classrooms; tactics are explained in lectures

PBJ DITCHING EXPERIENCE

REPORTS OF SUCCESSFUL DITCHINGS *generally reveal shortcomings which all survivors vow will never happen again. This is an expensive way to prepare ditching procedure, and those who do not survive are not around to benefit. Variations in procedure, in these cases, run all the way from jettisoning MF coils to lighten plane to spending the night in a life raft with seriously wounded personnel, not knowing first-aid kit is part of equipment.*

THE AIRCRAFT was a PBJ; the mission, photo reconnaissance. There were extra crew members, but no provision for additional ditching stations or escape exits.

SEQUENCE

Aircraft took off from an advance combat field to photograph two objectives. First objective was photographed without incident. Second objective bore out reports it was strongly defended: upon arrival, aircraft got a heavy burst alongside, blowing off after escape hatch, opening a large hole in the deck, wounding FLIGHT ENGINEER and REAR GUNNER.

Aileron control was lost, and the lower half of starboard engine shot away. Loss of aileron control caused the plane to start a tight turn to left and PILOT, thinking it was port engine gone, started feathering the port propeller. He discovered his mistake and corrected by use of rudder and trim tabs, then feathered starboard prop.

Meanwhile, PILOT had discovered that his plane was smoking and trailing oil and his remaining engine overspeeding. To stop overspeeding, he had to reduce manifold pressure to a point where he was losing 300 feet per minute. At the same time, he was trying to stretch his glide beyond the range of shore batteries.

CO-PILOT had contacted a rescue facility and gave a running set of positions, receiving a garbled acknowledgment. Meantime, PHOTOGRAPHER had applied a tourniquet to FLIGHT ENGINEER'S leg, which was bleeding profusely.

Since the interphone had been knocked out and no ditching bill was available, the crew, left to its own resources, did surprisingly well. Stations are shown below.

LANDING

Slight impact as tail dragged, followed by sudden and violent impact about 100 feet beyond.

CO-PILOT, desiring to release life raft as expeditiously as possible, pushed his seat back to shorten his reach as soon as the tail hit water. On second impact, he and the seat were projected forward, wedging his foot between seat and control column.

PILOT, BOMBARDIER and RADIO OPERATOR abandoned ship via forward escape hatch. CO-PILOT was in an agonizing position, but extricated himself before the cockpit had completely filled with water. REAR GUNNER (wounded) and CAMERAMAN escape via rear exit. FLIGHT ENGINEER, not only a large man but wounded as well, made a successful exit via the small side window.

IN THE WATER

Upon exit, it was discovered that life raft had been released, was back by the tail, inflating in an inverted position. PILOT dived into the water and, with the help of CREW MEMBER, righted the raft and checked its tendency to overinflate. In the meantime, RADIO OPERATOR, who could not swim, was discovered 30 to 40 feet ahead of the plane, with a life jacket which would not inflate. He was rescued by CO-PILOT and BOMBARDIER-NAVIGATOR. They screwed down the cap of the cartridge container, and life jacket inflated.

While this was going on, CREW were being peppered by shore batteries. The two wounded men were put aboard raft. BOMBARDIER manned the paddles, CAMERAMAN went ahead towing and guiding the party, while the remainder served as pushers. The CREW were disappointed in making only a mile through the swells in the 55 minutes before Dumbo arrived.

Actually, little more could be expected of an outboard motor!

The CREW were first spotted by a PBJ formation returning from a strike, and shortly thereafter by a PV. Sighting aircraft were so emphatic in their notification of sighting the CREW that their zooms provided partially effective spotting for the shore batteries. But the firepower of the standby planes was a real consolation.

RECOMMENDATIONS

PILOT—Plane circling survivors near enemy territory should make wide circles and not buzz raft, as this reveals exact position to enemy shore batteries.

CO-PILOT—Before the shock of crash landing, check to make sure you are free and out of the path of any equipment that might pin you down.

Life rafts should be inflated once a week to prevent deterioration of fabric cover (*Comment*: Not in accordance with existing BuAer instructions on subject. Lack of suction devices for completely exhausting the air may result in inflation in flight. Aviation equipment officer should have equipment ready for immediate use.)

ALL CREW—Hesitating at first to admit their shortcomings, they decided, in the interest of saving other crews, to make a clean breast and confess insufficient knowledge and practice in ditching procedure.

In this case, deficiency caused no injuries or fatalities, but crew feel that ditching could have been effected more rapidly, and their chance to escape bettered, if each man had been assigned a definite responsibility and procedure, so that everything would have been accomplished automatically, precluding possibility of leaving anything undone. They recommend that crews frequently talk about ditching among themselves, so that all members are at all times familiar with every detail.

Identify

...OR ELSE!

PILOTS IDENTIFY

Proper Identification Helps Cut Down Toll of Lives Lost Through Our Ships Shooting Own Planes

THE LIVES of too many of our men have been lost in this war to our own guns because of lack of appreciation of the importance of *identification*. Our own vessels have been attacked, and aircraft and small surface craft lost because of a breakdown in recognition *and* identification.

Navy and Army emphasis on recognition has cut the toll of our own men and material, taken by our own guns, tremendously. But recognition can't do the whole job. Particularly when it comes to airplanes. They fly too fast, and the danger of letting a hostile plane slip in on a ship or shore position is too great, for the men who man the guns depend on *recognition* alone. What's more important to you as a flier, the chances of your getting shot down by "friendly" guns are far too great for you to want to depend on the other fellow's recognizing *you*.

It's up to the plane to *identify* itself. If it's friendly, it must *act friendly*. That's the logical way of doing it anyway, now isn't it?

Good Pilots Sometimes Neglect Safety Rules

GEORGE FORGETS TRAINING

Let us consider the case of Lieutenant George Spelvin, naval aviator. Spelvin was perfectly normal during most of his career in the Navy, and did the things you would expect a normal man to do.

When he passed the Marine guard at the naval air stations where he trained, he always showed his identification card to the sentry, even though the sentry had seen him dozens of times and they knew each other by sight. He knew the Marine guard was obligated to fill him full of holes if he refused to *identify* himself, even though the guard *recognized* him.

If it was late at night when George got home on week-end leave, he always *identified* himself to his wife by a whistle code, even though he was sure she could *recognize* his footsteps on the stair. George's wife kept a pistol in the apartment for protection, and George figured his *identification* signal might be extremely helpful in case her *recognition* was faulty.

Most of the people in the bank where George kept his money *recognized* him; but he always carried his *identification* pass book, just in case a new teller happened to be on duty that day.

In other words, when George had to be sure people knew him, he hoped for recognition, but he *depended* on identification. *He made himself known.*

But when George got in the Fleet, how he changed!

George was pretty good on recognition. He knew a friendly battleship, carrier, cruiser or destroyer when he saw one, and he was close to 4.0 in flash quizzes on planes. He was so good on recognition that he expected everyone else to be good. One day while on patrol, George sighted the U.S.S. *Opossum*. He had been briefed that the *Opossum* would be in the area. He recognized her at once, and he completely forgot about *identification* and breezed blithely in to buzz the deck. "George was a great guy," they say about him back home. Yes, George WAS!

HOW TO GET A PROMOTION

Then take the case of Lieutenant John Erewhon, George's friend. John wasn't so good on recognition. And he didn't believe in taking chances.

"It's up to a friendly plane or ship to make me know it's friendly," was his general attitude. Which might have been all right if John had only known the correct identification signals himself.

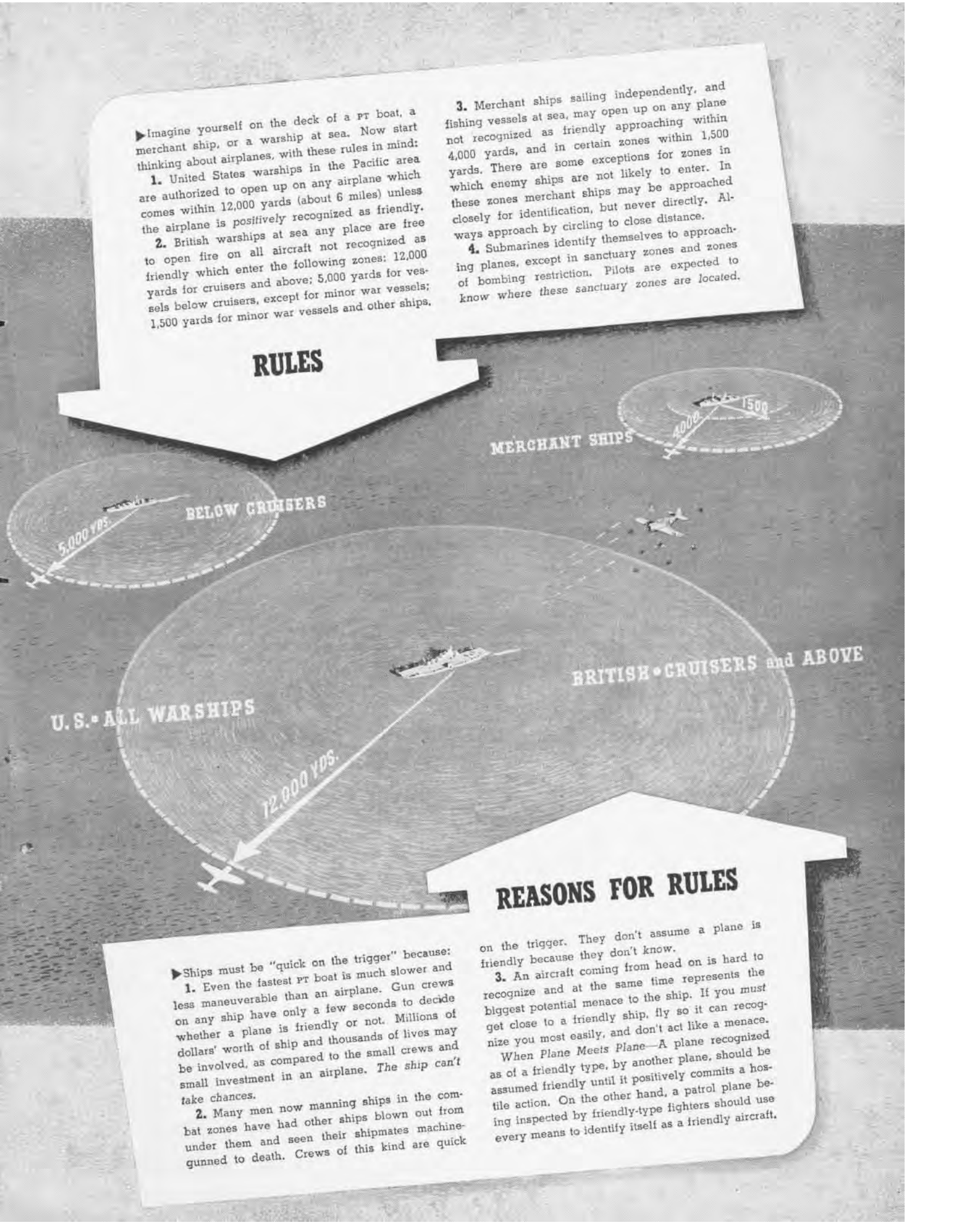
It was bad enough when he shot up the PBY after its crew had fired a pistol with the proper combination of colored stars, in order to let him know it was friendly. John said he thought the PBY was one of those the Japs had captured, and that it was acting unfriendly because it got down close to the water! Fortunately, he quit shooting before he had done much damage.

But when John dropped a bomb uncomfortably close to a rescue submarine in a totally restricted area—well, that was too much. The Captain just glared when John explained he thought the sub was an enemy destroyer.

"Your *briefing* told you there was a total bombing restriction zone, and where it was," the Captain said. "Good *navigation* should have told you you were in the restricted zone. *Recognition* would have kept you from making the mistake, anyway. The sub even challenged you in plenty of time, but you didn't know the challenge letter and were too excited to notice. *Horse sense* should have told you something was wrong when the other planes in your squadron didn't go in on the ship you tried to bomb."

Erewhon is now the assistant first lieutenant at NAS Jackrabbit in the U. S.

"Recognition" here means your own efforts in recognizing planes or ships as friendly or hostile. "Identification" covers procedure you follow to make certain that friendly planes or ships do not open up on you.



RULES

▶Imagine yourself on the deck of a PT boat, a merchant ship, or a warship at sea. Now start thinking about airplanes, with these rules in mind:

1. United States warships in the Pacific area are authorized to open up on any airplane which comes within 12,000 yards (about 6 miles) unless the airplane is *positively* recognized as friendly.

2. British warships at sea any place are free to open fire on all aircraft not recognized as friendly which enter the following zones: 12,000 yards for cruisers and above; 5,000 yards for vessels below cruisers, except for minor war vessels; 1,500 yards for minor war vessels and other ships.

3. Merchant ships sailing independently, and fishing vessels at sea, may open up on any plane not recognized as friendly approaching within 4,000 yards, and in certain zones within 1,500 yards. There are some exceptions for zones in which enemy ships are not likely to enter. In these zones merchant ships may be approached closely for identification, but never directly. Always approach by circling to close distance.

4. Submarines identify themselves to approaching planes, except in sanctuary zones and zones of bombing restriction. Pilots are expected to know where these sanctuary zones are located.

REASONS FOR RULES

▶Ships must be "quick on the trigger" because:

1. Even the fastest PT boat is much slower and less maneuverable than an airplane. Gun crews on any ship have only a few seconds to decide whether a plane is friendly or not. Millions of dollars' worth of ship and thousands of lives may be involved, as compared to the small crews and small investment in an airplane. *The ship can't take chances.*

2. Many men now manning ships in the combat zones have had other ships blown out from under them and seen their shipmates machine-gunned to death. Crews of this kind are quick on the trigger. They don't assume a plane is friendly because they don't know.

3. An aircraft coming from head on is hard to recognize and at the same time represents the biggest potential menace to the ship. If you must get close to a friendly ship, fly so it can recognize you most easily, and don't act like a menace.

When Plane Meets Plane—A plane recognized as of a friendly type, by another plane, should be assumed friendly until it positively commits a hostile action. On the other hand, a patrol plane being inspected by friendly-type fighters should use every means to identify itself as a friendly aircraft.

WAYS TO IDENTIFY

1. IFF (Identification, Friend or Foe). The important thing is to use it at the prescribed times, and to use the proper channel for the area or situation.

2. Follow prescribed route or method of approach.

3. In certain situations, flying with landing gear down.

4. Voluntary furnishing of correct identification signals, or response to challenge with correct signals.

Types of Identification Signals

Airplane identification signals other than IFF and "prescribed route and method of approach" include:

1. *Pyrotechnical* (fireworks) signals. Use of a pistol to fire cartridge containing combination of colored stars.

2. *Flashing* signals. Involves use of signal lights and Morse code to flash a single letter repeatedly. At night color combinations may also be used.

▶ Don't wait to be challenged. It's the responsibility of an airplane coming within range of warships (or friendly merchant ships) to *initiate* identification procedure. Let them know who you are!

You must know the challenge letter for the area and time period in which you are operating, so you can respond to it correctly and promptly. Under conditions of reduced or poor visibility, you may fly into the firing zone of friendly ships without realizing it. Then your split-second recognition and reply may save your life.

If you do accidentally or necessarily come within AA range of warships, or merchant ships in convoy:

1. Give the identification signal, and employ every other possible means of identification from a position down sun.

2. Keep more than 4,000 yards away from the nearest ship until your identification signals have been answered.

3. Fly at an altitude of at least 800 and not more than 4,000 feet, in level flight. (Subject, of course, to cloud and visibility conditions.)

4. If flying over a convoy, make your identification signal to the nearest escort vessel. If the convoy is scattered or visibility is bad, make your signal to at least two escort vessels and make it clearly.

Merchant Ships Alone—If, while at sea, you find it necessary to fly near a friendly merchant ship or fishing vessel sailing alone, remember that the ship is extremely vulnerable and the crew knows it. And remember that the ship doesn't know and can't read your identification signal. Merchant vessels are provided with an identification system for use with naval ships and aircraft. Unless you KNOW these signals, do not attempt to exchange signals with a merchant ship.

If you do know merchant ship procedure, follow through on it. Don't challenge, receive a reply, and then fail to identify yourself.

If you do not know identification procedure used by merchant ships, assume that the shape of your plane and the fact you are flying in a friendly manner are the only means the ship has of knowing you are friendly. Therefore:

1. Stay more than 4,000 yards away, unless you must go in.

2. If you must approach, present a beam view, down sun.

3. Don't go straight in. Close the distance gradually, by circling.

SUMMARY—PILOTS' RULES

1. Don't fly over or near any ship you don't have to fly over. On one battleship there will be a score of 5-inch dual-purpose AA guns and literally hundreds of 20 and 40 mm. guns trained on you all the time, ready to fire at a split-second's notice. The ship is under orders to shoot down any plane it doesn't *know* to be friendly. A merchant ship may be slow on recognition, a blank on your own identification signals, and chock full of men who have been bombed and strafed from the air.

2. Don't fly over any friendly shore gun positions you don't have to fly over. Those guns are all aimed at *you* too, and the men behind them are likely to have had less experience in recognizing Navy planes than on ships.

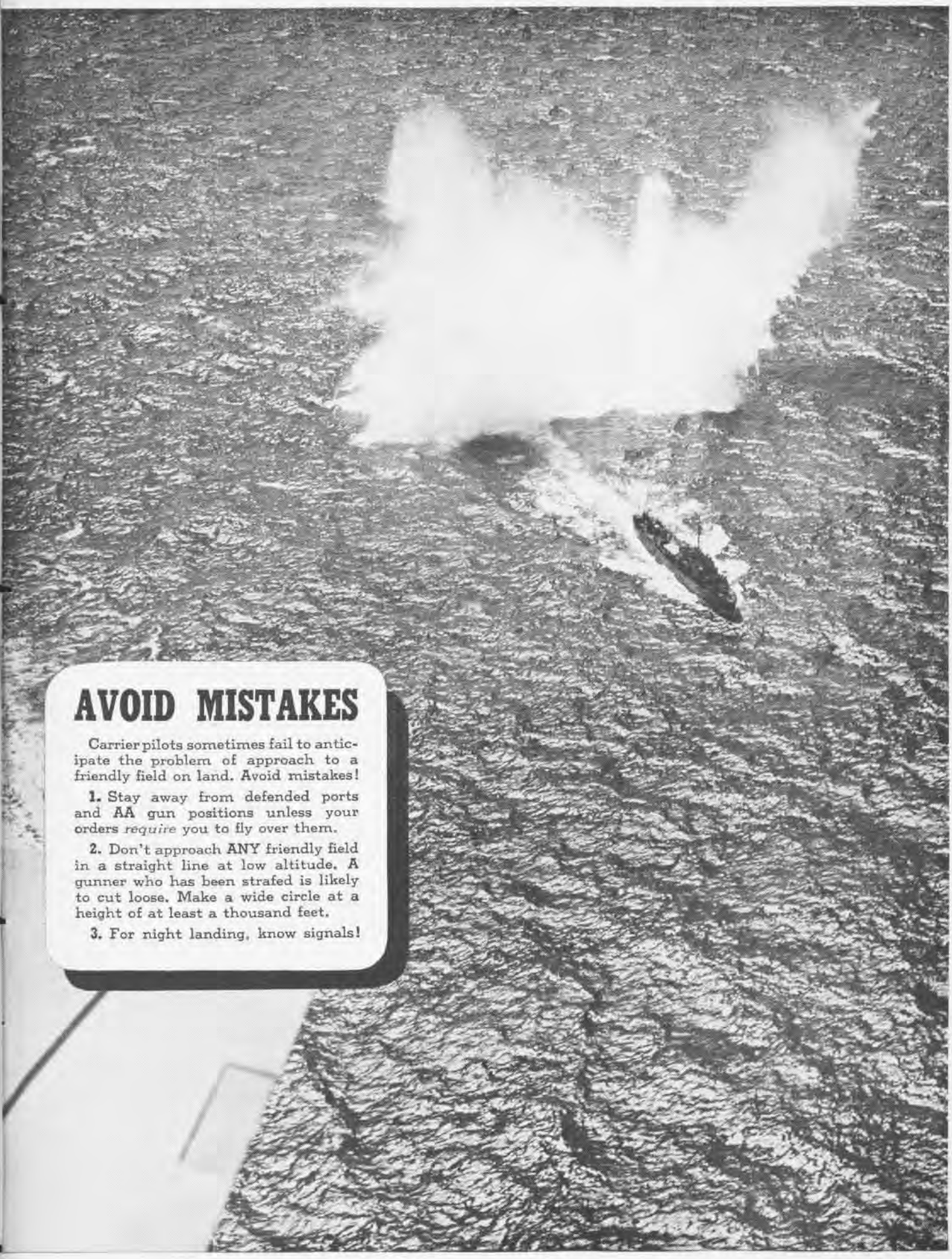
3. When you *are* near friendly ships or land guns, *act friendly*. Identify!

4. If you're manning a fighter plane and are inspecting a patrol plane which you *know* is one of our types but which you *think* may be enemy-manned, give the plane a chance to identify itself, and be sure before you shoot. You have the advantage, and the plane probably is manned by men on our side.

5. If you're manning a patrol plane, and one of our fighters comes out to look you over, *identify yourself*. Our planes *have* fallen into enemy hands. Let the fighter know yours isn't one!

6. Know the identification procedure, including all challenges and responses, for the area and period in which you are flying. Write them down.

LET'S STOP THIS BUSINESS OF SHOOTING DOWN EACH OTHER AND GETTING SHOT DOWN



AVOID MISTAKES

Carrier pilots sometimes fail to anticipate the problem of approach to a friendly field on land. Avoid mistakes!

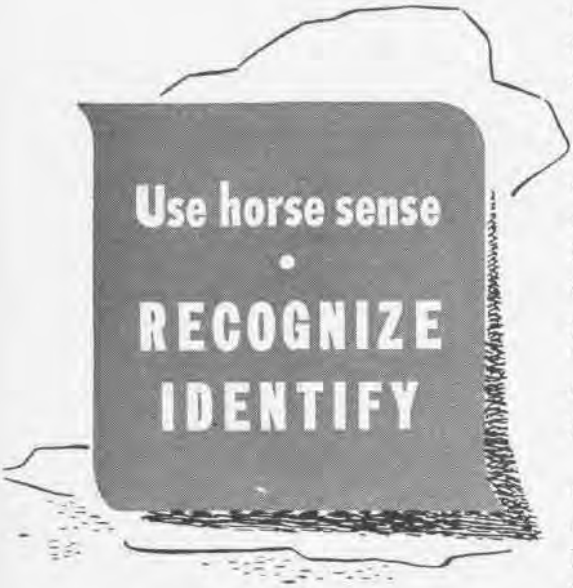
1. Stay away from defended ports and AA gun positions unless your orders *require* you to fly over them.

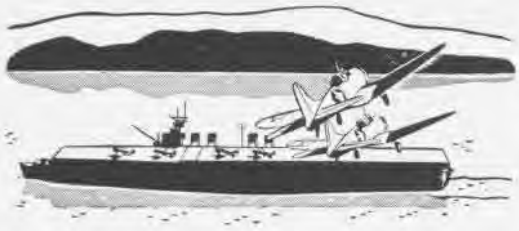
2. Don't approach ANY friendly field in a straight line at low altitude. A gunner who has been strafed is likely to cut loose. Make a wide circle at a height of at least a thousand feet.

3. For night landing, know signals!

SHIPS CHALLENGE

Fighting Ships Begin Firing as Soon as Plane Gets in Range if It Neglects to Identify Itself





THE MEN on fighting ships must think in terms of identification, as well as the men who fly airplanes.

Some of the pilots shot down by our own guns have done everything they could and should do to identify themselves, and still were shot down. They were victims of failure of the men in control of the guns to know identification procedures.

Knowing a *little bit* about identification isn't enough. The method of using effective systems may be changed to meet local tactical requirements. Or one system may fail to function, making use of an alternate necessary, by plane or ship. Or failure of a watch may cause a pilot to give correct signals *for the wrong period.*

If you know all the systems well, you may be able to save a disaster by catching the other man's mistakes, as well as to avoid mistakes of your own. It's like the good automobile driver who handles his own car well and makes allowance for the fact that a certain percentage of cars he meets on the road will be in the poor drivers' hands. Prevent accidents by *knowing* identification.

IDENTIFICATION is complicated by the fact that some highly important types of signals are rarely used and may be neglected.

Signals and procedure used in challenging strange ships are an example. Allied navies now operate almost unopposed in some ocean areas. Occasions for challenging strange ships are few. But until *all* Axis ships are put out of commission, every ship must be ready to challenge or identify at any time by any method. Victory in battle may depend on it.

The established procedures are safety measures. But a challenge used incorrectly may serve only to draw the fire of one friendly ship on another; or to let the enemy open fire first.

Rules for challenge and identification are laid down in classified publications which should be studied repeatedly. All those on watch must be checked to see that they know exactly what signals are in force. This necessity is underlined by the following rule:

"... The correct action on receiving no reply to identification signals is to open fire."

That is why you must be sure that your signals are correct and are seen, and that your ship is alert to see signals from other ships, to *know* whether they are correct or not, and to *take the correct action* quickly. Recently two American ships exchanged salvos because both were challenging and neither used signals strong enough to be seen by the other ship!

Challenges are never made to vessels known to be friendly. Such an act belongs in the same category as sticking a gun in the ribs of an armed friend and saying, "Boo! Who are you?" The chances of a sad mistake are too great. The challenge is reserved for cases of doubt. There are other ways of identifying yourself to known friends who may be in doubt as to your identity, but have not yet challenged.

And of course it's imperative to be ready for action when you challenge a strange ship. While your challenge tells a friendly ship that you are friendly, it also tells an enemy ship, just as quickly, that you are hostile. A reasonable time, but only a reasonable time and the shortest reasonable time, should be allowed before opening fire. Exact knowledge of all the means of identification in use may save you either from firing on a friendly ship or being fired on by it: or from being fooled by the enemy's faking our signals.

Imagine yourself in the other man's place (and that includes the enemy). What would you do in an attempt to confuse an enemy ship? What would you do if you were in a plane approaching a friendly formation, and part of your identification gear had gone bad? What would you want a friendly ship to do, if you were the pilot of a friendly plane? Figuring out answers to questions like these will help you *act* when the time comes.

The man who has to run for the signal book in order to determine whether a reply to a challenge is correct or not, may find out only in time to drop the book overboard to keep the enemy from capturing it!

Remember These Things About Planes

1. The pilot travels anywhere from 6 to 66 times as fast as the ship down below him. If visibility is poor, he may be over the ship before he has seen it.

2. Information on ship movements isn't always up to date. The pilot may not expect you to be in the position he finds you in.

3. The pilot can't see through his engine, fuselage, or wings. His vision is obstructed, and he has a lot of things to do in addition to looking around. If he has a crew, they can help, but the pilot of a single-seater has to do it all himself.

4. A pilot coming on a ship or formation about which he is uncertain has a terrific responsibility. If it is friendly, he must leave it alone. If it isn't friendly, the pilot must report it and (under some circumstances) attack immediately. The pilot has to *act*, and if he's wrong, a lot of people, including himself, may get hurt unnecessarily. The ship has a responsibility, as well as the plane.

5. If visibility is low, escorting airplanes may have to close the ship or convoy, to maintain contact.

6. Airplanes can carry only a limited amount of certain types of identification materials. For this and other reasons, they must depend on ships "passing the word" to each other. The plane can't identify itself to every ship in the Fleet.

7. Under most conditions, a fighter plane in close pursuit of an enemy has a much better chance of shooting him down than the ship's guns have. Continued firing, in such a case, may result only in shooting down your own fighter and letting the enemy get away.

8. A plane coming back from a mission may be badly shot up, and have wounded personnel aboard. Under such conditions, normal identification procedure may be impossible. *Understand the varied problems of the pilot.*

Ships Have Responsibility to Planes

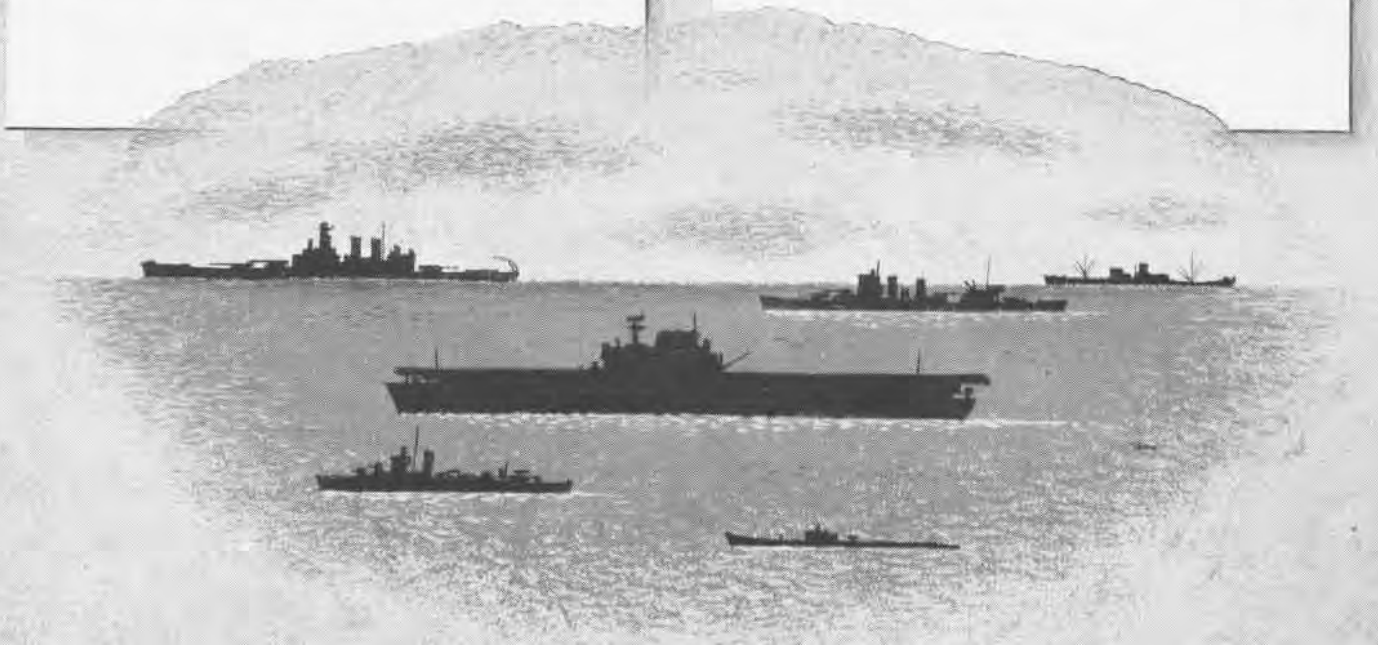
The major responsibility is that, once identification procedure is initiated, *you must follow through with it.* The plane should identify itself and, if it doesn't, it's up to the ship to challenge. But remember:

1. If the plane does identify itself first, it's up to the ship to respond.

2. If the ship challenges and the plane replies properly, the ship must complete the procedure. Don't leave the pilot wondering whether he's been identified as friendly, or not. He knows hundreds of guns are trained on him, and until you tell him so, he has no way of knowing they won't open up. Furthermore, in the Pacific area complete identification procedure assures the pilot the ship is friendly as well as telling the ship the plane is friendly. Failure to complete the procedure may result in your ship getting bombed or strafed by one of our own planes.

3. Another important responsibility of the ship is that of knowing *all the ways* by which a friendly airplane may indicate its friendly character.

4. For PT boats, here's this added bit of wisdom: Every means of identification is additional assurance against one of those tragedies in which Allied planes and patrol craft shoot each other full of holes. A signal pistol, properly used, may prevent one of these all-Allied shooting parties. It's only common sense to see that pyrotechnic signals and a pistol are readily at hand, and to know the proper signals for the existing period. It's true that some of our planes have fallen into enemy hands, but using a pistol signal won't increase your chance of getting strafed or bombed by one of those, and it may keep you from getting bombed or strafed by your old high school chum, or from shooting him down and being "so sorry" about it all. Think it over carefully.



TORPEDO CRAFT MUST BE EXPERT IN RECOGNITION

TORPEDO-PACKING craft, and those that may be mistaken for them, have to be keen on identification. Torpedo-carriers must get in firing position on unrecognized ships, and be alert to *identify* if the ship proves friendly. Craft that may be mistaken for torpedo-carriers must be careful not to get in positions which may be interpreted as hostile. A lamb mistaken for a wolf usually ends up just as dead as the wolf would have been.

WHILE special pyrotechnical signals are provided for use of submarines in identifying themselves to friendly aircraft, many submarines simply dive when any aircraft is sighted outside the zones of bombing restriction, and do not use the identification signal. The friendly plane is left with no clue as to identity.

"SUBMARINE MEN tend to underestimate airplane speeds," commented one veteran flier. "They decide that firing a flare is unnecessary because of the distance of the plane, but are actually in great danger. The pilot will attack unless procedure is followed."

Who Must Identify First?

1. Submarines are responsible for establishing their friendly character to surface craft and to all aircraft except in areas of bombing restriction. There the sub may use surface challenge procedures under specified conditions.

2. Aircraft must establish their own friendly character to all warships except submarines, and are responsible for observing all specified bombing restrictions. Aircraft do not challenge warships, but may challenge merchant vessels in certain areas and with proper briefing. Aircraft do not challenge other aircraft, but should be ready to identify themselves to other aircraft when the situation calls for it. This is especially true of long distance patrol craft which may come into unexpected contact with friendly fighters.

3. Minor war vessels are responsible for identifying themselves to major war vessels except subs.

4. All ships bear the responsibility of positively identifying themselves to the shore defense system when approaching or passing near any friendly ports.

Read New Sense Pamphlet Which Spreads Word on Recognition and Identification

SUMMARY—IDENTIFICATION

1. Remember that ships have responsibilities in identification, to planes, as well as planes to ships. Both must be discharged.

2. The best way to avoid being a central figure in one of those tragic duels between our own craft—and the only sure way to avoid it—is to know all the rules on identification, challenging and the like, and to make sure that all the possible signals for a specific period are available to the men who are on watch during that period.

3. Since *knowing* isn't enough unless you're ready to act, drill yourself by anticipating various types of situations which may arise . . . and then see if you know the right answers, quickly.

4. Always keep in mind that airplane speeds are infinitely greater than those of the surface or subsurface craft to which you are accustomed, and try to "look at the situation with the eyes of the man in the plane." That will help you decide what you, the man on the ship, should expect, and do at the time.

5. Be sure that your equipment is in good condition for use of any authorized means of identification or challenge, on an instant's notice. Be sure that it can be seen. And that the men who will have to handle it know how to use it correctly and quickly.

6. PT boats and patrol planes should be prepared to use pyrotechnical and other means of identification, to fighter and other planes.

7. Once identification procedure is initiated by either party, follow through quickly in the proper manner.

RECOGNITION, IDENTIFICATION, AND HORSE SENSE PREVENT FRIEND SHOOTING FRIEND

TECHNICALLY SPEAKING

Safety Reminder Is Given

Light Flashes Workers' Message

NAS NEW ORLEANS—As a reminder to men using grindstones to protect their eyes with safety goggles, this station has devised a simple box-like contrivance equipped with a light that flashes on automatically when the grindstone is switched on, cautioning workers.

MESSAGE FLASHES ON AS GRINDSTONE OPERATES

The message on the box is punched out on a regular stencil machine and can be replaced with others from time to time to keep safety uppermost in minds of persons using equipment such as this grindstone.

▶*BuAER COMMENT*—**This is a practicable idea and worthy of use. Box face should be glass covered so grit does not get in. Interior bulb should be red.**

Worn Arresting Hooks Fail

Inspect, Replace Worn Hooks

Reports have been received in BuAer of Model F6F-3 airplane arresting hooks engaging flight deck fittings with subsequent failure of hook. Examination of used F6F hooks shows the toe to be worn to a sharp edge due to hook being inadvertently lowered and dragged on hard surfaced runways. With hook worn in this manner, engagements with fittings would be anticipated.

Lowering of F6F hook during field landings is believed to be caused by inadvertent tripping of the arresting hook switch when reaching for the microphone. The microphone bracket is being relocated on current F6F production airplanes by the contractor to correct this condition. NAS Quonset Point local change No. 5 also has been issued to provide relocation of microphone bracket on service airplanes undergoing overhaul.

The arresting hook toe contour on all models of carrier airplanes should be frequently inspected and hooks which are worn sufficiently to change the toe contour should be replaced.

SIMPLE RELEASE TOOL HELPS OPEN PLANE HOOD

Device Releases Enclosure

May Assist in Saving a Pilot

U.S.S. HOGGATT BAY—An officer on this carrier has developed a handy tool for releasing pilot's cockpit enclosures which are jammed, especially valuable in crashes where it is necessary to speed removal.

In plane crashes on the flight deck the enclosure frequently is slammed shut and the pilot, injured or dazed, cannot open it from the inside. If he is seriously hurt or the plane afire, it is vital to get it open immediately, but in many cases it is impossible to push hard enough with the thumb to release the hood from the outside.

The device to effect this release consists of an ordinary file handle, two inches of half-inch rolled steel. It makes a valuable addition to the deck crash kit.

▶*BuAER COMMENT*—**The enclosure release is sometimes hard to open. This is a good suggestion for an emergency tool. The device or a screwdriver would seem to be a handy article around the flight deck.**

Time-Saver Helps Grinder

Clips Attached to Torque Arm

CLIPS SIMPLIFY WORK ON GRINDING MACHINE

NAS OTTUMWA—A time-saving device to simplify operation of the Hall seat grinding machine so that one operator can handle two or three machines simultaneously has been developed.

The attachment is for holding the torque arm on the machine and involves two clips (*A* and *B* in photo) which are secured to the machine. The torque arm is held by the proper clip. Neither operation of the machine nor trueness of the seats is impaired.

[DEVELOPED BY S. V. EMBLIN, AMM3C]

Use New Type Crash Trucks

Latest Fire-Fighting Equipment

NAS GROSSE ILE—Two new Bean high-pressure crash trucks have been added to the facilities of the station. The trucks are the latest in fire-fighting equipment and operate at a nozzle pressure of 600 pounds, carrying 435 gallons of water in a tank.

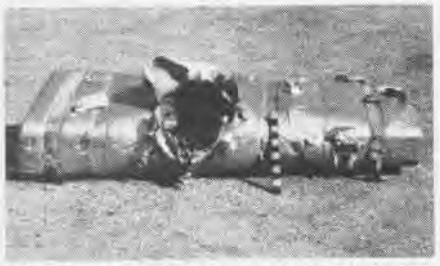
Every gallon of water, when properly discharged through the Bean fire gun, has at least ten times the fire-fighting efficiency of the same amount of water used at ordinary fire-fighting pressures.

Bullets Blast Japanese Tank

Missile Opens up Huge Hole

Tests conducted recently at Dahlgren Proving Ground of Mk 1 wing fuel tanks from a Japanese *Oscar* showed them unable to withstand .30 cal. AP or .50 cal. AP bullet impacts. As the accompanying picture shows, a tremendous hole was blown in the tank when it was hit by one .50 cal. bullet.

The missile made only a small round hole when it entered the 42-gallon tank, but on exit it blasted a 16" hole, indicating the tank hardly could be classed as bullet-proof or self-sealing. The tank was made of a ductile metal-



JAP WING FUEL TANK IS BLASTED BY .50 CAL.

lic material and four layers of natural rubber totaling ¼" in thickness were applied externally to the tank structure. A layer of absorbent material, resembling cotton waste, was placed between the rubber material and the thin fabric outer covering.

This construction placed the tank in the category of the absorbent type fuel tank as distinguished from the later "leak-proofing" type in the Oscar Mk 2.

How to Fly F4U From Spin

BuAer Cites Remedial Moves

Recommendations by manufacturers of F4U-1 airplanes on ways to pull the plane out of spins are cited here for information of all pilots. Information is based on flight tests conducted by Chance Vought Aircraft.

It is the contractor's opinion, after thorough investigation of spinning characteristics of F4U-1 airplane, that voluntary spins should not be permitted. Although successful recoveries were made from normal spins of four turns both left and right, in the clean condition, control forces required for recovery (stick full forward, rudder full against spin) approached the pilot's capabilities after approximately two and a half turns in the overload condition.

If a normal spin is inadvertently entered, the following steps for recovery should be initiated immediately:

1. Apply full opposite controls SHARPLY, leading with opposite rudder and follow by applying FULL forward stick. Apply ailerons AGAINST the spin.

2. Hold FULL reversed controls until rotation stops and airplane assumes normal diving attitude.

3. Ease plane out of ensuing dive. Do not pull stick back too rapidly as a high speed stall may result requiring more altitude for recovery.

4. Rate of rotation probably will increase after full opposite controls are used. Don't be alarmed, this is a good sign and recovery is starting.

5. Use tabs if forces are too heavy, especially the elevator tab. It is effective in reducing push forces during spin recovery.

6. Oscillation is present in left spins. The nose oscillates between a position varying from approximately on the horizon to 40 to 50 degrees below the horizon. This does not mean that a flat spin is developing. Recovery will be normal. Recovery will be faster if controls are reversed when the nose is at the steeper angle in the oscillation.

7. If pilot is unable to hold full opposite controls and stick walks back, return controls with spin for brief interval, and repeat full recovery control.

It has been found that full forward stick (against stick stop) is most essential for spin recovery in this airplane. Make certain that *full* reversed controls are held until recovery is effected.

Pilots Abandon Plane Only If Low

It is suggested that the F4U-1 in a well-developed spin should be abandoned *only* if full recovery controls cannot be applied and held, and/or the plane reaches an altitude below 3,000'. Altitude loss for recovery from four-turn spins at a gross weight of 11,500 lbs. with the airplane in the clean condition is estimated to be approximately 2,000 to 2,500', including the additional turns for recovery and recovery dive to level flight.

Tests have been conducted in two turn spins, using neutral ailerons, and recoveries were effected with no difficulty. Use of ailerons against the spin during recovery, however, consistently improved recovery characteristics by approximately ¼ to ⅜ of a turn. Ailerons against the spin were used in effecting recovery from all spins of more than two turns, due to improved recovery characteristics.

Attention of all flying personnel is invited to T.O. 30-44, *Model F4U-1, F4U-2, FG-1 and F3A-1 Airplanes Restrictions on Maneuvering*, which prohibits voluntary spinning of these model airplanes. The discussion above does *not* alter nor modify the existing prohibition of voluntary spinning of the F4U type airplane as contained in this order, but presents information for use in the event of involuntary spins.

Bungee Starter Improved

Engine Turned Two Revolutions

VMD 354—Owing to the shortage of Eclipse cartridge starters and the trouble encountered with the Breeze cartridge starters, the engineering officer of the VF division designed and made an improvement on the standard bungee starter as listed class 89, in ASO catalog, which is not strong enough

PULL ENGINES THROUGH WITH BUNGEE STARTER

to turn the 2,000-hp engine of an F6F a sufficient number of times for starting.

The material used in the device includes the following items:

a. Two boots for propeller tips

b. Three strands of ⅝-in. elastic cord, 50 ft. long

c. 75 ft., 1 in. diameter line

It is advisable to have at least 75 ft. between the end of the shock cord and the tow car to insure safe operation. The rope between blade 1 and 2 as shown in photograph has a piece of ⅝-in. elastic cord installed for the purpose of keeping a tension on blade 2 boot. The slack in the rope between blade 1 and 2 is necessary to insure the safe and proper release of first boot.

Following instructions are recommended for the proper and safe operation of the bungee starter:

1. Install boot on blade 1, second boot on blade 2.

2. Place main tow rope over propeller hub.

3. Care must be taken to place propeller blade 1 in the position as shown in picture.

4. End of 75-ft. tow line is fastened to car and the slack taken up.

Although the bungee cord can be stretched to two and a half times its length, it is recommended to stretch the 50-foot bungee cord to 110 ft.

The tow car must come to a stop.

5. Signal then is given to the man stationed below the port wing, well out of the line of danger, to turn the prop about 12 to 16 ins. by means of the rope looped over blade 2, as shown in photograph.

6. Starting procedure of the engine remains the same.

Tests with ignition switch off indi-

cate that the single boot bungee turns the R-2800 engine one revolution or less. The double boot starter turns the same engine about two revolutions. The double boot starter appears to be quite satisfactory in every respect.

[Designed by Warrant Officer Otto C. Viewig.]

▶ *BuAER COMMENT*—**This method is considered to be a great improvement over the bungee starter described in TN 22-40 for engines with three and four-bladed propellers. Steps are being taken to cancel this technical note and cover all information on bungee starters in a Power Plant Accessories Bulletin which is to be issued.**

Navy Standardizes Aircraft

Names Listed According to Use

The Navy has issued a circular letter standardizing the division of naval airplanes, airships, gliders, helicopters and drones into classes according to their use.

Class designations cover single engine aircraft unless modified by symbols (H) or (M). VG type aircraft have been assigned to the VJ class and the VG class eliminated. Modifying symbols in parenthesis are: H, heavy or 4-engine; M, medium or 2-engine; L, landplane; S, seaplane.

Class designations are listed below, minus obsolete models. They are distinct from and not to be confused with aircraft squadron designations.

Class	Class Designation	Aircraft Models
1. Heavier-than-air fixed wing		
Fighters (V)	VF	F6F, FM, F4U, FG, F3A, F4F, F2G
	VF (M)	F7F, FT
Scout bombers	VSB	SB2C, BTD, SBF, SBW, SBD
Torpedo bombers	VTB	TBF, TBM, TBY
Observation-scout	VO/VS	OS2U, OS2N, OY, SC
Patrol bombers	VPB (HL)	PB4Y
	VPB (ML)	PBJ, PV
	VPB (HS)	PB2Y
	VPB (MS)	PBM, PBY-5A, PBY, PBN, PB2B
Transports	VR (HL)	R5D, RY
	VR (ML)	RB, R5C, R4D, R3D, R5O
	VR (HS)	PB2Y-3R, B314, JR2S, JRM
	VR (MS)	PBM-3R
Utility	VJ (M)	JM, BD, JRB, JRC, JRF, J4F
	VJ	J2F, GB, GB, AE
Training	VSN (M)	SNB
	VSN	SNJ, SNV, NH
	VN	N2S, N2T
Drones (VK)		
Target (Training)	VKN	TDC-2, TDD, TD2C, SO3C
Gliders (VL)		
Training	VLN	LNE
Transport	VLR	LRW
2. Heavier-than-air rotary wing		
Helicopters (H)		
Observation	HO	HO3S, HO2S
Training	HN	HNS
Transport	HR	
3. Lighter-than-air		
Airships non-rigid (ZN)		
Training	ZNN	ZNN1, ZNN9, ZNNK
Patrol & Escort	ZNP	ZNPK, ZNPM

AVIATION ORDNANCE

INQUIRIES SHOULD BE ADDRESSED TO THE CHIEF OF BUREAU OF ORDNANCE

Electric Gun Charger Remedies Jams

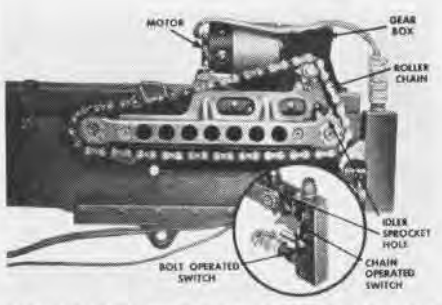
BuOrd's latest contribution to the Society for the Reduction of Insurance Premiums for Combat Airplane Crews is an electric gun charger which possesses a comforting aptitude for automatically clearing a machine gun of stoppages resulting from misfiring or jamming.

Its action is identical with that performed manually by the operator under similar circumstances; namely, engaging of the bolt stud of the gun, drawing it backward, and allowing it to snap forward, thereby placing a new round of ammunition in the barrel chamber. This operation is automatically repeated as often as necessary to clear the gun and restore it to firing condition. At present these electric chargers are contemplated only for certain turret installations.

The charging mechanism consists in part of a loop of bicycle-type chain passed over three sprockets, arranged in the form of a triangle. One of these sprockets is driven by an electric motor, while the remaining two act as guides for the chain. A pawl attached to the chain engages the gun bolt stud whenever the charger is actuated. As the electric motor drives the charging mechanism through its cycle, the pawl, traveling along its triangular path, moves the bolt rearward, thus beginning the clearing operation described above.

Operation of the gun charger is relatively simple. As long as the bolt is making intermittent contacts with a bolt-operated switch, the charger remains in operation. When a stoppage occurs, the electrical system automatically releases a surge of electrical power to the charger motor which thus is instantly energized and operates the chain mechanism. As long as the firing switch is in the "on" position, this cycle of operation is automatically repeated until the gun fires.

Official nomenclature for this charger is Electric Gun Charger Mark 3 and Mark 3 Mod 1. The Mark 3 is mounted on the top and left-rear side of the gun; the Mark 3 Mod 1 is mounted on the top and right-rear side. The control box may be located remotely at any convenient spot on the plane. For mounting on a control panel, the control box is furnished broken down into its functional parts and this assortment of parts is known as a "disassembled unit."



ELECTRIC GUN CHARGER FIXES JAMS WITH EASE

A precaution to be observed is that the first round of a belt must not be loaded into the barrel chamber by use of the firing switch, since the gun will start firing if the firing switch is held closed. Further information on the charger is contained in O.P. 1114, covering description and operation.

BuOrd Gets New Station for Tests

In October 1943, it became apparent that the facilities available for development of rockets and aircraft weapons were inadequate. Early in November, Bureau of Ordnance requested the Secretary of the Navy to take over an area of approximately 800 square miles composed of the Indian Wells Valley and adjacent mountains to the north and east for a naval ordnance test station. The mission of the station as set forth in this letter was stated to be as follows:

"The station will have as its primary function the research, development and test of weapons with emphasis on those of aircraft; at the present time, that of rockets. The station will have the additional function of furnishing primary training, especially aircraft, in the use of newly developed weapons. At the present time, this will apply mainly to instruction in the use of rockets."

The station was established by the Secretary of the Navy on November 8, and temporary facilities were erected at high priority to permit early commencement of aircraft rocket training operations.

At the present time there are approximately 3,500 people living in the Indian Wells Valley, of which there are nearly 2,000 construction workers, 150 CalTech personnel and 600 naval personnel housed in temporary quarters. The remainder are families and residents of the towns of Inyokern and Ridgecrest.

Aviation Ordnance Development Unit No. 1 was commissioned in San Diego in February and is now in the process of moving to this station. CASU 53 was commissioned at this station in March.

Aircraft rocket ranges, targets, observation posts, camera emplacements, and pill boxes have been constructed for both training and experimental purposes. Two temporary ground rocket ranges, a plate battery range, and magazines have been built and a rocket propellent extrusion plant is now under construction as well as an experimental air field. Permanent housing construction is going ahead rapidly at the present time.

The Secretary of the Navy recently designated the air facility "Harvey Field," after the late Lt. Comdr. Warren W. Harvey, USN, class of 1924 at the Naval Academy, an outstanding naval aviator and postgraduate in naval aviation ordnance.

POWER PLANTS

Pull Prop Through Before Starting

During idle engine periods, oil and/or fuel may accumulate in intake pipes, intake ports, and cylinder combustion chambers, especially of the lower cylinders. If this liquid is not removed prior to starting attempts, piston connecting rods may be bent, cracked, or broken; pistons and rings may be broken or damaged; and other engine damage may result because of the non-compressibility of the liquid in the cylinder combustion chambers.

To reduce the possibility of damage to an engine during starting attempts, the following pre-starting precautions shall be taken:

a. When an engine has stood idle for one hour or more, the propeller shall be pulled through at least two complete revolutions by hand in normal direction of rotation. (*Note:* Pulling the engine through in a direction opposite to normal rotation may pump liquid into intake parts and pipes, which will in turn re-enter the cylinder combustion chambers upon starting attempts.)

b. If abnormal effort is required to turn the propeller, do not force it. Remove spark plugs from lower cylinders to drain probable accumulation of liquid.

c. If a large quantity of liquid is drained in the event of removal of spark plugs, it is desirable to loosen and drain those intake pipes which are so located that they may have trapped liquid. Take necessary precautions to see that all trapped liquid is removed.

d. If it has been necessary to remove spark plugs and/or intake pipes, the propeller shall be pulled through at least two complete revolutions in the direction of normal rotation after spark plugs and intake pipes have been secured in place.

During the starting operation, considerable liquid fuel may be introduced into the lower cylinders, especially if the supercharger drain valve is not operating correctly. Drain valves should be inspected at regular intervals to make sure they are operating correctly. During the starting procedure fuel should be judiciously introduced to the engine to prevent an excessive accumulation of liquid fuel. When starting procedures will permit, it is advisable to leave pressure carburetors in idle cut-off until the engine commences firing.

A recent trouble encountered with water injection installations has been the possibility of accidentally introducing water into the induction system with the engine stopped. Besides the danger of hydraulicing a lower cylinder at the next start, water in the cylinders presents a corrosion problem. Accidental injection of water will occur if the throttle is opened far enough to operate the war emergency power switch, and the battery switch is on. Leaving the mixture control in idle cut-off will not prevent this accidental injection of water. Be careful in opening the throttle to the W.E.P.

An Oxygen Duration Chart

Coordinates Pressure, Altitude

Pilots of combat aircraft often find it desirable to know the duration of their oxygen and to have the figures readily available at all times without calculation. Technical Order No. 18-44 supplies the desired information in the form of a graph. Aviation equipment officers, however, may find it more expedient to tabulate the facts desired from the graph onto a chart which may be mounted in the aircraft.

The form of endurance chart illustrated was submitted to BuAer by the Medical Officer of Air Group 20. The chart clearly shows how the variable factors of pressure and altitude may be coordinated into a convenient arrangement to give number of hours of oxygen remaining in the F6F-3 airplane. A separate group of endurance figures is supplied for the conditions DILUTER ON and DILUTER OFF.

OXYGEN DURATION CHART FOR F6F-3

PRESSURE READING		HOURS OF OXYGEN REMAINING				
DILUTER ON	1800 lbs	10	9	6	5	6.5
	1500 lbs	8	7.2	4.8	4.1	5.2
	1200 lbs	6	5.4	3.6	3.1	3.9
	900 lbs	4	3.6	2.4	2	2.6
	600 lbs	2	1.8	1.2	1	1.3
ALTITUDE in 1000's of Ft.		15,	20,	25,	30,	35,
DILUTER OFF	600 lbs	.5	.7	.8	1	1.3
	900 lbs	1	1.3	1.6	2	2.6
	1200 lbs	1.6	2	2.4	3	3.9
	1500 lbs	2	2.6	3.2	4	5.2
	1800 lbs	2.7	3.3	4	5	6.5

300 lbs. PRESSURE
STAY BENEATH 10,000 FEET

514 cu.in. bottle-AN6004-1 Dilutor Demand Regulator

These figures are approximate representations of a pilot's oxygen consumption, since they are based upon an average inspiration of 10 liters/min.—a condition arising during routine flight where only a mild amount of activity is required. Under stress of combat, however, oxygen economy is markedly decreased and, therefore, actual oxygen duration may be considerably less than indicated in the chart.

Special Small Boats Parts

BuShips Gives Requisition Tip

One of the principal problems in maintaining the special small boats assigned to naval aviation shore establishments is procurement of engine and hull spare parts.

All small boats are under the cognizance of BuShips, although they are supplied to naval aviation shore establishments on recommendation of BuAer with the approval of the Chief of Naval Operations. Requisitioning of small boats spare parts from BuAer will result in delays. BuShips has supplied the following information to help speed up the ordering process:

Special small boats include the following types:

a. 18' Air driven rescue boats
b. 29', 36', 45', 63', 104' Aircraft rescue boats
c. 60' Bomb target boats
d. 38' Buoy boats
e. 33', 35' Plane rearming boats
f. 20', 24' Plane personnel boats
g. 25' Pneumatic barges
h. 37', 45' Picket boats
i. 17' Line handling boats

Spare parts distribution centers have been set up all over the world and subject material is furnished automatically and continuously in quantities proportionate to number of boats to be serviced in areas covered by distribution centers.

Activities for which the Naval Supply Depot, Mechanicsburg, is the spare parts distribution center should request hull and engine parts from Mechanicsburg. Requests for complete engines should be made by letter to BuShips.

All other activities should request materials, including complete engines, from their cognizant spare parts distribution centers, which are responsible for obtaining requested material not in stock.

There are no hull parts catalogues for special small boats. Therefore, in requesting spare hull parts, not only should a complete description of the part required be given, but BuShips hull number and BuShips engine serial number of the boat must be included also.

▶ Engine parts catalogues are furnished aboard each boat. These parts should be requisitioned by the catalogue part number, BuShips hull number and BuShips engine serial number.

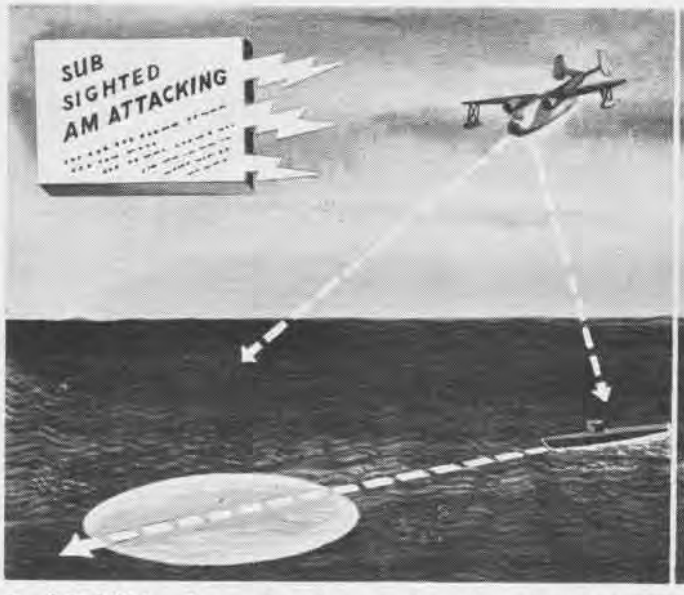
Design Deck Pendant Hook

Quick Release Is an Advantage

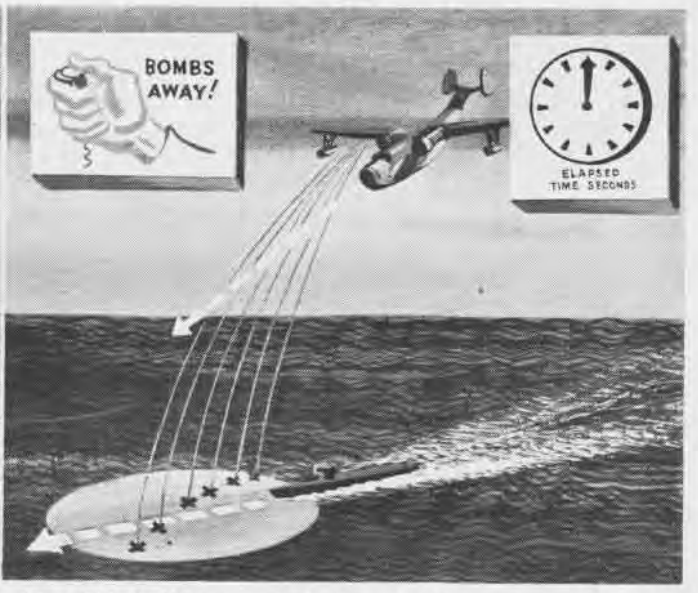
Experience on the U.S.S. *Casablanca* confirms the necessity for a quick releasing hook to make cross-deck pendants fast to flight deck securing tracks. The hook is of particular value on CVE class vessels which have a cross-deck pendant across the after elevator.

The quick release tensioning hook designed by a member of this vessel's arresting gear crew is believed to be superior to other hooks in that it enables flight deck crews to make the pendant taut quickly without retrieving.

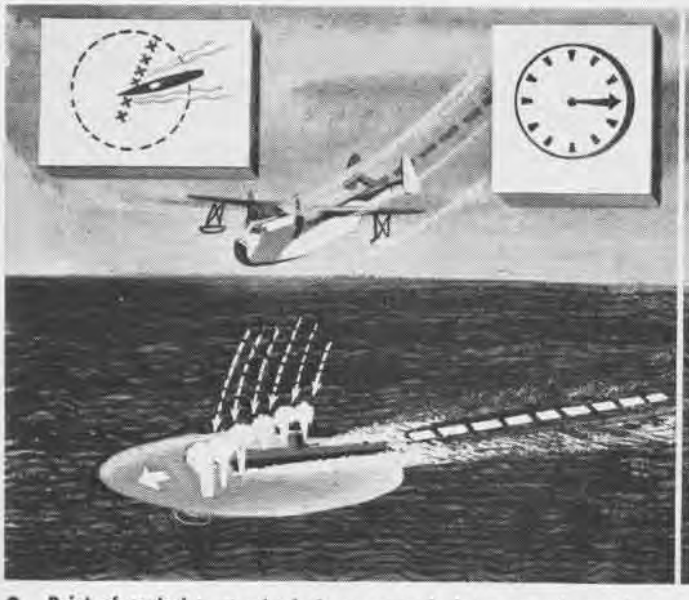
SO YOU WANT TO SINK A JAP OR NAZI SUBMARINE?



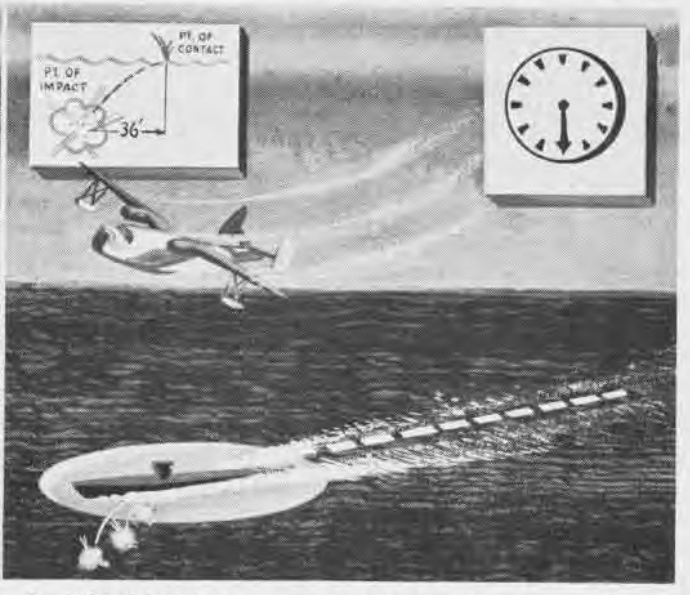
1. Sub sighted and normal surface attack is planned. Sub (200 ft.); speed 17 knots (28 ft. per second); intervalometer set for six-bomb stick, 60 ft. spacing. Pilot projects the aiming circle



2. Point of release is reached when sub advances to position where conning tower is six seconds (168 ft.) from center of the aiming circle. That's the spot you want, so press that pickle



3. Point of contact is reached three seconds later as sub reaches position where conning tower is 84 ft. from center of circle. As bomb stick strikes water, first bomb hits edge of aiming circle



4. Point of impact, three seconds later, has the sub dead center in the circle. Bombs complete underwater travel, a perfect straddle with three and four. Point of aim determines results

[NANEWS CHART DEVELOPED FROM SKETCHES BY ENS. T. B. HOWELL, A-V(N), USNR, PATROL SQUADRON 204]

(Continued)

Full tension of retrieving is so great that most devices bind and won't operate. It is difficult to retrieve partially and, furthermore, if the accumulator has been bled off to permit pulling the wire out, there is no pressure immediately available for tensioning.

The pendant, secured at one edge of the deck in a steel bar S-hook, is dropped into the bight of the tensioning hook. The hook is positioned on the tie-down track to take up slack in the wire, and the lever arm is pulled back until it lies upon the deck. The pendant is as taut as though it had been retrieved and may be freed by merely throwing the lever and lifting the wire clear.

[DESIGNED BY ARTHUR J. ROMINE, AMM2C]

▶ ***BuAER COMMENT*—Generally, if it eliminates work, safely, any device is worth using. It should be noted, however, that the toggle lever shown is capable of accidental release by a man's foot, which might lead to difficulty in handling airplanes on the elevator if released at the wrong time. The need for a quick release hook, if found to be general, will result in issuance of a tool of this kind under BuAer Section E spares allowance. Recommendations in this regard were requested by BuAer comment upon the hook used on U.S.S. *Bunker Hill* appearing in the April 15 issue (p. 33) of NANews.**

¶ The pilot of a TBF making a controlled forced landing after his engine had been badly damaged in a raid tried the experiment of having both his crewmen get into the radioman's compartment. It was a tight fit, but the landing was made carefully and all three men in the plane abandoned ship without difficulty. The technique could be used only in event of controlled landing.

SURVIVAL QUIZ

Correct answers on page 48

1. All lizards—
- ☐ *a*–can be eaten
- ☐ *b*–cannot be eaten
- ☐ *c*–are poisonous
- ☐ *d*–are non-poisonous

2. Malaria is transmitted by an infected—
- ☐ *a*–Aedes mosquito
- ☐ *b*–Anopheles mosquito
- ☐ *c*–fly
- ☐ *d*–flea

3. Many plants store food (starch) in underground parts. This is especially true of—
- ☐ *a*–mountain plants
- ☐ *b*–aquatic plants
- ☐ *c*–valley plants
- ☐ *d*–animal plants

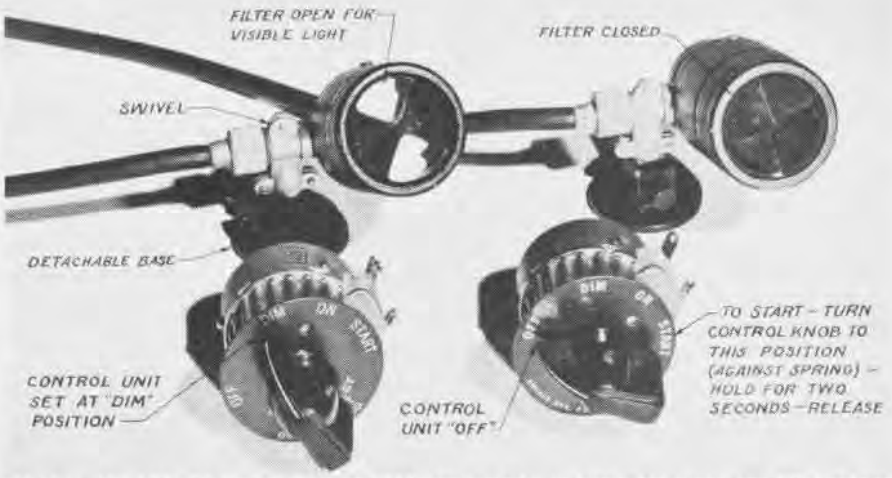
4. In the Arctic Sea, the most widely available water source is old salt-water ice, which can be distinguished from salt ice by its—
- ☐ *a*–sharp appearance
- ☐ *b*–bluish color
- ☐ *c*–gray color
- ☐ *d*–milky color

5. Pandanus fruits are found—
- ☐ *a*–along the shores of atolls and volcanic islands
- ☐ *b*–in the mountains
- ☐ *c*–in native gardens
- ☐ *d*–inland along rivers

6. The best drinking coconuts are—
- ☐ *a*–green nuts
- ☐ *b*–ripe nuts
- ☐ *c*–sprouted nuts
- ☐ *d*–nuts growing near water

7. The best method of escape from any medium that will not support your weight is to—
- ☐ *a*–walk out
- ☐ *b*–swim out
- ☐ *c*–fight your way out
- ☐ *d*–move quickly

8. The general principle for testing questionable foods is to—
- ☐ *a*–eat large quantities
- ☐ *b*–leave the food alone
- ☐ *c*–taste a small quantity and await reactions
- ☐ *d*–detect disagreeable odor



ULTRA-VIOLET COCKPIT LIGHTS CAN BE USED EFFICIENTLY IF THEIR FEATURES ARE UNDERSTOOD

BuAer Adopts Red Lighting

Visible Light May Be Obtained

Most effective use of the AN3038 ultra-violet cockpit lights can be obtained when all personnel understand several features of the lighting fixtures. One important feature is the provision for obtaining visible light.

The fixture is equipped with two ultra-violet filters, each having two open sectors. In twilight, when there is no need for personnel to be dark-adapted and when instruments are hard to see, visible light may be obtained by rotating the filter housing so that open sectors of the filter are superimposed.

In complete darkness, visible light will reduce dark-adaptation and each light should be checked to make certain that filters are completely closed.

The second feature is the rheostat dimming control. When in complete darkness the control must be set back so the instruments are just bright enough to see. Greater brightness than this creates glare and reduces dark adaptation.

When the dimming control is set at the brightest position, lamps are operating at more than their rated current. If operated continuously at this brightness the lamp life will be shortened. In some cases, where lights are installed at great distances from the instruments, it may be found that personnel will operate the lamps at maximum continually.

If, in such cases, lamp replacements become a problem, it is suggested that a 10-ohm 10-watt resistor be placed in the lead from the battery to the control unit. This will reduce the maximum lamp current to about its rated value.

Another feature is the detachable base which permits the fixture to be used as a portable light. There should be little need for this feature and its frequent use is discouraged.

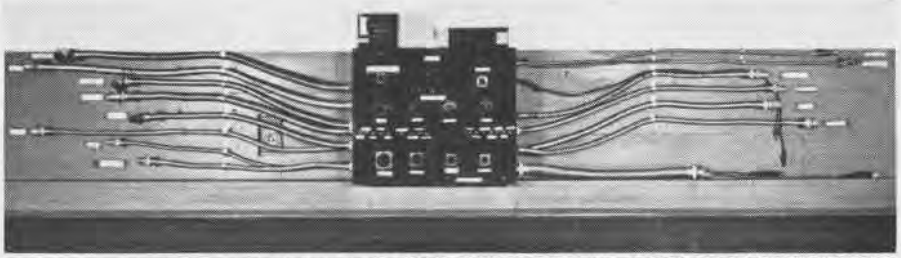
The last feature is the swivel adjustment. The base clamps should be screwed up as tight as possible with the light adjusted to point in the most favorable direction. If the light is allowed to swivel freely it will most probably point in the wrong direction.

BuAer has developed a new red, incandescent instrument-lighting system of the indirect type which, since it uses red light, permits even better dark adaptation than the ultra-violet fluorescent type. The new system is being installed in new aircraft but, since no general changeover in planes now using ultra-violet equipment is contemplated, all personnel operating that type of light should strive for maximum efficiency by understanding their fixtures.

Test Panel Saves Trouble

Hedron 9-2 Gets New System

HEDRON 9-2–Nicknamed "Lew's Octopus" because its many cables resemble tentacles, a test panel rigged by an aviation electrician's mate is proving a time-saver for maintenance men.



"LEW'S OCTOPUS" TEST PANEL PERMITS QUICK CHECKING OF MOTOR-DRIVEN AIRCRAFT EQUIPMENT

The "octopus" permits quick checking and servicing of motor-driven equipment before installation in aircraft. Since all required instruments and cables are kept together and labeled, no last-minute searching is necessary.

Constructed for testing PBM and PB2Y-3 airplane electric motors, and made entirely from salvaged parts and materials, the panel is simple to operate. This is done as follows:

1. Mount the motor to be tested on or near the bench
2. Connect the quick-disconnect plug
3. Close the switches
4. Read the meters

The load is best applied to the motor by its driven equipment, but when that method is impractical a prony-brake, or equivalent simulated load, may be used.

Attention is called to marking each plug, switch and meter for the exact motor being tested. This procedure reduces errors and permits new or incompletely trained personnel to operate the panel with minimum danger to the equipment and to themselves.

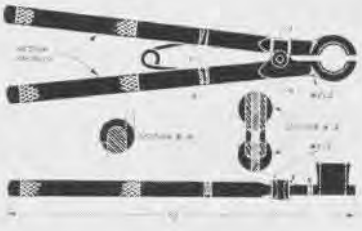
[Designed by W. B. Lewis, AEM3c]

▶ *BuAER COMMENT*—**Permanent test equipment of this nature should expedite checking out of motors as all needed plugs, wiring, meters, switches, etc., are always at hand. Also, labeling of plugs, meters and switches reduces errors. However, this setup is limited in use to only the airplanes for which it is designed and the allocation of parts, particularly meters, may not be justified at activities maintaining several different types of airplanes.**

Conduit Tool Is Invented

Worker Wins Prize for Idea

NAS Corpus Christi—A simply constructed but effective little tool has been developed at this station under the beneficial suggestion program to facilitate conduit and reshaping.



CONDUIT RESHAPING TOOL WINS WORKER A PRIZE

Frequently in aircraft electrical work, ends of aluminum or other soft metal conduit become battered and misshapen in service. In the past this condition was corrected by removing the cable from the conduit and forcing into the conduit a rod whose diameter approximated true inside diameter, a process consuming considerable time.

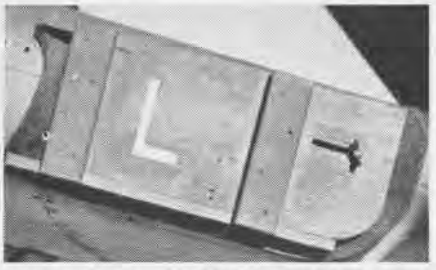
With the introduction of the reshaping tool it is possible to reshape conduit without removing the cable from the conduit and without disturbing cable installation on the plane. The tool allows for expansion to fit over the cable, then by closing the jaws the projecting part of the jaw is inserted into the conduit. Jaws of the tool then are expanded and the reshaping operation is completed by turning the tool about the conduit until roundness is obtained.

[Developed by James A. Parten]

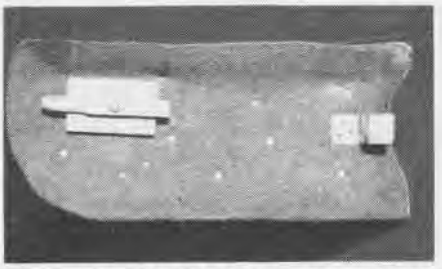
Marines Solve Dust Problem

Shield Protects F4U Intake Duct

MCAS Mojave—Air-borne dust particles picked up by high winds of this area have made dust shields mandatory for air intake ducts on F4U-1 aircraft.



DUST SHIELD ON F4U PROTECTS INTAKE DUCTS



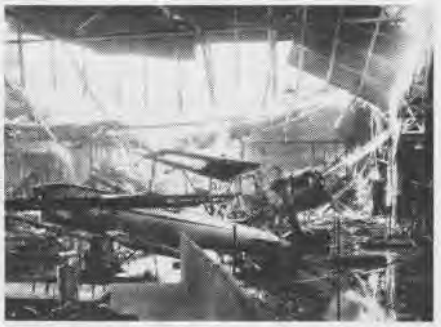
INSIDE VIEW OF SHIELD SHOWS CONSTRUCTION

The group has constructed and installed a shield which has proved highly satisfactory, and reduced the number of planes grounded for cleaning. Previous expenditure of man-hours used to remove dust particles from the induction system of the engines also are saved. Shields have been painted a brilliant red so they will be very conspicuous.

It Could Happen in Navy

"Dope" Blast Wrecks Planes

Explosion of a barrel of "dope," a special fluid used for spraying airplanes, set fire to an airport in California, destroying seven planes and damaging three others, as shown in the accompanying picture taken after the fire was extinguished.



DOPE EXPLOSION DESTROYS PLANES IN HANGAR

BuAer TN No. 4-42, dated January 6, 1942, advises that cellulose nitrate and cellulose acetate dopes, formerly used on naval aircraft, are replaced by cellulose acetate butyrate dope which has fire-resisting qualities. However, this newer dope is still a fire hazard and dangerous if not properly handled.

Ordnance Device Adopted

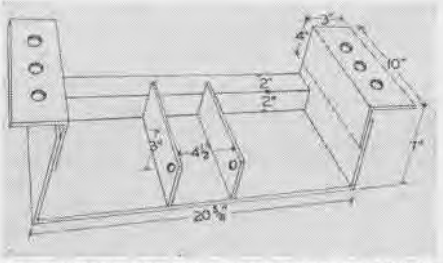
Simplifies Job of Boresighting

MCAS Mojave—Faced with the problem of finding a tail jack for the boresighting range that would be easy to operate and yet permit minor adjustments, group ordnance devised an attachment for Mark 2 type bomb and torpedo truck which simplifies the job of leveling plane.

Made from scrap, the device consists of one piece of ¼" steel approximately 30"x10", two pieces of ¼" steel 3"x8", two pieces of angle iron with 3" and 4" flanges, one piece of angle iron with 2" flanges and 20" long, and a few large bolts.

The 10"x30" piece is bent at both ends to form a channel approximately 20" wide. To the upturned ends of this piece are bolted or welded the 4" flanges of 3"x4" angles. Holes are drilled in these pieces to correspond to holes in the lift bracket of truck.

The 2" angle iron is welded to one side of the base. Two pieces of 3"x8" are welded to the base to form a channel 4½" wide. There are several ways to secure the tailwheel in this channel. The method adopted was merely to drill a pair of holes at the ends of the pieces forming the channel to permit insertion of a bolt or rod.



ATTACHMENT FOR MK 2 BOMB-TORPEDO TRUCK

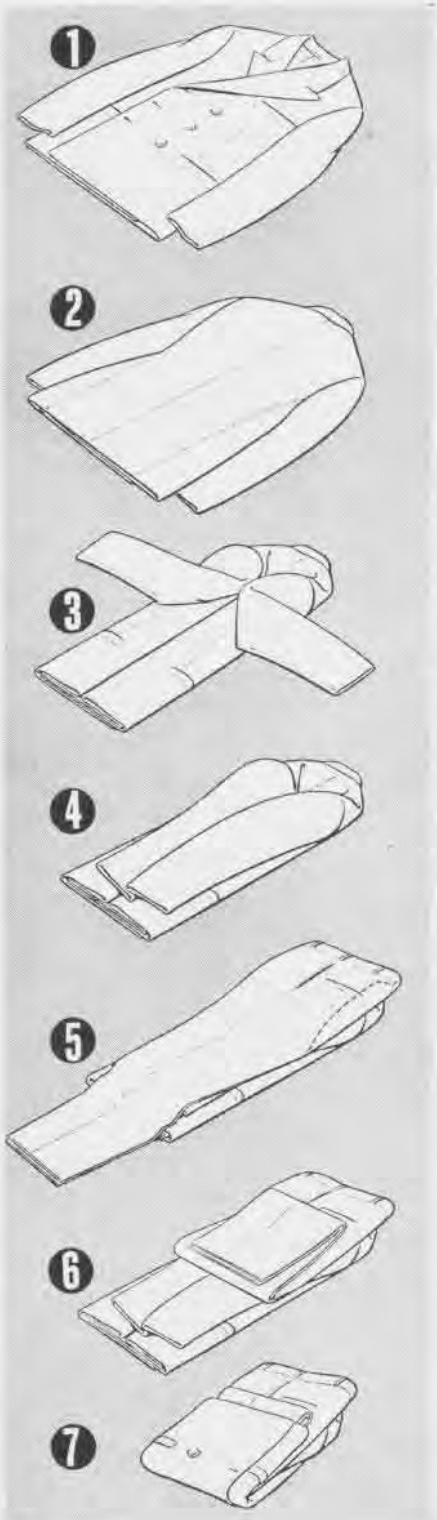
The installation of the device does not require any changes in bomb truck and because of its mobility, the job of leveling a plane for boresighting is greatly simplified.

▶ *BuOrd COMMENT*—**For information on a similar adaptor, Mark 2 type bomb and torpedo truck, see BuOrd publication OTI V6-44, and dated 18 February 1944.**

How to Fold Navy Uniforms

"Seapack" Keeps Them Neat

The Navy's *Seapack* luggage, available at naval air stations, has been designed to carry uniforms with little or no wrinkling so that trim appearance can be maintained in accordance with naval dress traditions. Instructions in suitcases, reproduced here, show a practical way to fold uniforms in the new improved model *Seapack* Ditty Box.



Camouflage Comes Off Fast

NATS Strips Paint From Planes

NAAS Oakland–Thirty R4D planes have been stripped of their Navy or Army camouflage since the project was started by Air Transport Squadron Four on January 22. Two R5D's also have been stripped.

In addition to actual removal of paint, the job entails painting of control surfaces, application of new insignia and numbers, and waxing the entire surface. The stripping crew recently hung up what is believed to be a Navy record in stripping an R3D for the low approach group.

This plane was turned over to the crew one afternoon at about 1300. Fourteen hours later the paint stripping proper was completed. Fifty hours after starting the job, the controls had been painted, replaced, and rigged, insignia had been added, the plane had been waxed and the shining aircraft turned back to the pilot.

Removal of camouflage paint brought with it the problem of polishing to prevent corrosion. The most practical method found thus far involves a polish with a plastic base, applied with an electric buffer and sheepskin disc which produces a mirror-like finish.

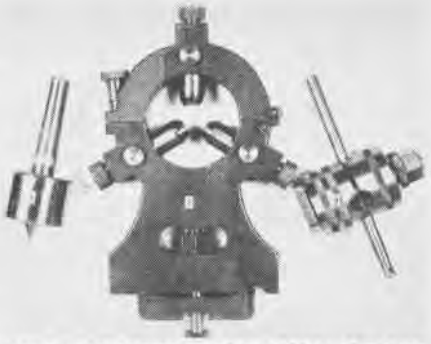
In removing the paint from planes, great care must be exercised, otherwise the aluminum coating will be removed, creating additional corrosion problems.

▶ *BuAER COMMENT*—Attention of all activities operating unpainted aircraft is invited to paragraph 7 of TO 8-44, which gave warning that a high order of maintenance would be necessary to keep aircraft in a polished and corrosion-free condition. Insofar as various methods of accomplishing this are concerned, no definite procedure has been established since practically every commercial airline has its own method which appears to do the job satisfactorily. The following necessarily general comments may prove helpful:

1. Removal of paint. The chart NavAer ENG EQ and MAT No. 2 dated January 1, 1944, should be consulted for information on methods, materials and operating conditions for paint strippers which are stocked by ASO for use of naval activities. If it is desired to use materials not covered thereon, it is urged that activities consult with NAMC to insure use of non-corrosive and non-toxic materials. For actual stripping operations, where some mechanical scrubbing is found necessary, it is recommended that bristle brushes or sharpened pieces of scrap transparent plastic material be used to avoid all possibility of scratching the metal. Use of steel scrapers, steel wool, sandpaper or any other abrasive which would scratch the airplane's skin is considered to be poor practice.

2. Washing. NavAer ENG EQ and MAT No. 2 should again be consulted for information on readily available washing materials. The washing operation should be performed as frequently as practicable with particular attention given to flap and wheel wells and to all surfaces exposed to exhaust gases, where corrosive agents collect.

3. Polishing. Probably the most readily available polish is self-polishing wax conforming to specification C-71. Many commercial automobile polishes, such as Auto-Groom, Simoniz Wax, etc., probably will serve well but C-71 material should be easier to obtain. For actual polishing, there is no substitute for "elbow grease." Mechanical polishers or buffers will do the job but there exists possibility of trapping small hard particles under the rapidly revolving pad which could lead to extensive damage.



LATHE ACCESSORIES MADE BY LOCAL A&R SHOP

Accessories Made Locally

Galley Stove Lids Used by A&R

MCAS El Toro–Machine shop accessories have been manufactured by this station to conserve material, train personnel and overcome procurement difficulties. Salvaged cast iron from scrapped galley stove lids was used to make all items except ball bearing live center (1), the boring bar (3), and minor parts of the lathe steady rest (2).

Other surface plates and some special jigs have been manufactured out of scrap cast iron. Figures 1, 2, 4, 5, and 6 are parallels; 3 and 8, surface plates; 7, V-block; 9, extension bar.

▶ *BuAER COMMENT*—From a conservation standpoint, BuAer considers such practice highly desirable and urges all activities to utilize scrap materials, whenever practicable, in local manufacture of accessories to be used in machine shops.

ACCESSORIES MADE FROM GALLEY STOVE LIDS

SHORE STATIONS

▶NAAS Corry Field—Two former members of the crew of the U.S.S. *Enterprise* who survived 34 days adrift in the South Pacific are now working side by side at this station. The two are Gene Davis Aldrich, ARM1c, and Anthony J. Pastula, AOM1c. The two were members of the crew of a plane which became lost from the *Enterprise* prior to the first assault on the Marshall and Gilbert Islands and was forced down at sea. During the 34 days at sea they had only a coconut, two fish and a small bird to eat. They finally landed at Danger Island only 24 hours before a devastating hurricane hit the area.

▶MCAS Santa Barbara—A new type of volunteer has joined the Marine guard detachment at this station. The volunteer, a nameless baby seal, waddled out of nearby San Diego harbor and onto a Marine sentry post late one afternoon. He took up his station atop a truck-inspection platform and except for one brief interruption has been on duty since.

The interruption came when well-meaning Marines, who had fed the visitor at his post, escorted him to the water's edge, thinking he would go on furlough. Instead, the seal retraced his steps and resumed his duties on the platform. It is expected that he will remain on duty until given orders to report to his new station at the San Diego zoo.

▶NAS Jacksonville—Men lost in the jungle in this war have told how they existed on bark of trees and insects, but here's a true story of how an airplane sustained flight on salad oil, vouched for by an AMM1c, now at this station, who was a member of the flight crew.

It happened about four hours out of Hawaii when a PBY developed an oil leak. There was nothing to do but land at sea. The crew contacted a destroyer and took all the salad oil they had on board. They repaired the oil leak, put in salad oil and flew back to the base.

▶MCAS Mojave—A two-star general pouring sea water into a huge, fresh-water pool out in the Mojave desert was an unusual scene at this station recently. The general was the new commanding officer of MarFairWest and the pool was the new combat training tank. The sea water came from the San Diego harbor and was symbolic of the ocean which the Marines must overcome.

The tank is the only Marine pool on the West Coast that is covered completely. It has a large arched roof without pillars, and the sides are glassed-in. The tank is 75 feet by 50 meters, with a 15 foot high platform at the deep end for "abandon ship" drills. Rubber life rafts give further practical training to Marines learning how to stay alive in emergencies at sea.

▶Blimp Squadron 24—Escort vessels around here are mighty cooperative, but an EV commander hit a new all-time high recently. A couple of pigeons were released by Lt. W., command pilot of the K-28 on escort duty, and thirty minutes later when he was preparing to leave his mission, he blinked the escort commander for his position. After supplying the information, the surface craft blinked:

"Don't you feed your pigeons?"

Somewhat nonplussed, Lt. W. assured the EV that he does feed his pigeons (or somebody does) and the ship blinked:

"One of your pigeons stopped to visit us and had his dinner."

"Did you," blinked back Lt. W., "make it into pigeon pie?"

"No," admitted the EV. "We are too short on flour."

Anyway, to put a happy ending to the tale, records show the visiting bird finally got back to NAS (LTA) Weeksville, but two hours behind the first pigeon.

▶MCAS El Centro—Writing out the 10,000th money order from the MCAS post office, a Navy mail clerk issued it to himself for the sum of one cent. Costing 10 cents, which is the minimum for money orders, he will keep it as a souvenir. The first money order was issued in January 1943, and since that time, a total of $346,667.01 has been spent for them.

▶NAS Norfolk—Right in the middle of the station, in the supply department's scrap yard, is a melting plant which has already saved Uncle Sam thousands of dollars since it went into operation last January. It is used to melt airplane scrap into ingots. Direct shipment of the ingots, instead of bulky scrap, saves valuable shipping space, transportation charges and labor. The melting unit recently completed its first half million pounds of aluminum ingots.

▶NAAS Bronson Field—John M. Morris, 45, leading man, aircraft mechanic general of this station's A&R Department, has received his third cash award for devices originated or improved to expedite production methods. His latest product is a tail wheel oleo strut spacer for SNJ-4 planes, a device which holds the oleo in the proper space for setting the tension on the tail. Previously he had received awards for a gas tank drain and a center section stand and turning device.

▶NAS Jacksonville—Bluejackets from this station recently received an SOS in the form of a letter. It read . . . "Dear Sailors, I know this is going to sound strange, but we students of Junior College are having a contest. The one that gets the most letters or cards from sailors gets a prize of $175 in War Bonds. Won't you help this girl win that contest?"

▶NAS Brunswick—Softball is the leading sport on the station at the present time although soccer occupies much of the spare time of British squadrons aboard. The British softball teams make up what they lack in knowledge of the fine points of the diamond sport with vigorous competition. In fact, they have made an addition to the time-honored game that amazes their American opponents. Instead of scooping hot grounders out of the dirt, the Britons trap them with their feet.

▶NAS Pensacola—Employes of the A&R shops here celebrated D-day by working an extra hour without pay to show their support of the boys who made the landings. Approximately 2,560 civilian employes on the day shift and 90 percent of the night shift worked the extra hour.

▶NAS Sanford—The first issue of *Sanfly*, station newspaper, made its debut early in June. It is published twice monthly and carries a complete calendar of various activities.

▶NAS Sanford—Engineers working on the auxiliary air field for this station say construction crews battle against great odds. One man tells of being captured by two mosquitoes who manhandled him and discussed dragging him to the swamps. They decided against it, however, for fear some of the bigger fellows might take him away from them.

▶NAS Brunswick—The recreation department has had to place a time limit of 24 hours on weekdays and 48 hours on weekends for borrowing its fishing equipment, so great is the demand by station Isaak Waltons. Although goodly numbers can be seen with their fishing gear, hurrying to the shore, lake or stream, no one has yet been seen hurrying home with a fish. This is a mystery that only a fish could solve.

TOKYO TALKS

—To Japanese Areas

Japanese production of minerals essential to manufacture of steel and steel alloys in 1943 fell short of quotas set by Premier Hideki Tojo's government, with one exception.

According to statistics, production of iron ore in 1943 reached only 89 percent of the quota for the year; iron sand ore, 60 percent; chromium, 72 percent; and tungsten, 94 percent. Production of manganese ore alone exceeded the official quota by 2 percent.

—To Manchuria

Warnings against Allied propaganda have been directed to residents of occupied Manchuria. "Britain and the United States will continue to persist in trickery and to cause discord and suspicion among the East Asiatic peoples." Spokesmen also attacked the Allies' "resort to the 'divide and rule' principle."

—To Japan

At a rally designed to spur the home front to greater production efforts, the Japanese people were warned that the United States and Great Britain had demonstrated an "impatience to end the war in a short time." "Boldly enough, the tempo of their advance has risen acutely." A pledge was taken by the entire crowd, "We pledge to unite our spirits, to give our faithful best, to toil and moil and to push on toward the strengthening of the fighting power and the crushing of the Anglo-Americans."

—To Japan

"Japanese arms manufacturers must cast aside all their old ideas, and at all costs quickly strengthen Japan's production camp. There is the question of quality. Up to now our men have been fighting with inferior weapons. Manufacturers have fondly imagined the arms we produced were of excellent quality. We must realize the planes we have produced are inadequate, and make a further effort to beat the enemy in the technical war. Suppose we have 200 planes to the enemy's 300 and our 200 shoot down 200 of the enemy. In the meantime the other 100 enemy planes can be bombing our positions in the rear and destroying our production areas. It is absolutely essential to possess superiority in numbers."

—To Japan

The commander-in-chief of the Japanese combined fleet has been killed in action. He "died at his post in March of this year while directing general operations from an airplane at the front."

—To Japanese Areas

The latest attempt to inspire an increase in war production was a two-day contest for carpenters, plasterers and common laborers to show their superior skills during the war.

The contest took place on the grounds of an airplane factory, and brought together 114 men from all parts of Japan to compete in group and individual trials of occupational skills.

—To Japan

Japan has launched a drive "to stir all Buddhists to action" in support of the war. In launching the drive, the Education Minister spoke of the "bitter and acute" war situation and said that the responsibilities of the religious men are "heavy and great."

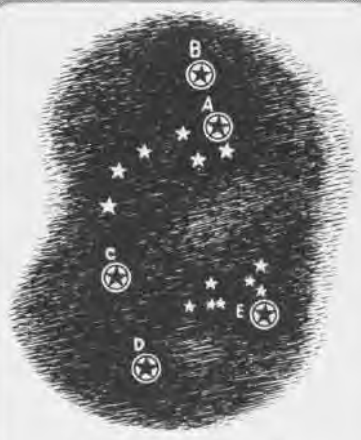
"The value of the drive to strengthen religion during the war is affecting all quarters. I hope that religious men themselves will show their resolve in the unity of total efforts, guide the thoughts and lives of the people, especially the 10,000,000 Buddhist believers, harmonize a firm and indomitable national consciousness, and perfect spiritual solidarity, and thus bring about completion of the increase of fighting strength."

—To Japan

"Large quantities" of Japan's "idle" spinning machines are being converted into lathes and other types of machine tools in an effort to step up Japan's war production, "especially in aircraft."

There was no indication as to what influence this conversion of spinning equipment would have on the Japanese textile industry, whose production output has caused some concern in Japan. A few months ago, "textile bottlenecks" were causing "difficulties" in supplying Japanese forces. Eliminating the bottlenecks was said to be "considered a matter of necessity."

SHOW ME THE WAY TO GO HOME



Star Identification

Identify the lettered stars:

A .....

B .....

C .....

D .....

E .....

(Answers on page 48)

PHOTOGRAPHY

Shortage of 16-mm. Film Magazines

The demand for film loaded in 16-mm. magazines, type A-6 and type G, has become so great that the manufacturer is unable to meet it. While the supply of 16-mm. film itself is critical, the supply of 16-mm. empty magazines into which the film is to be placed is even more so. BuAer, therefore, is attempting to supply the manufacturer with empty magazines even though they are damaged. Upon receipt of the magazines, the manufacturer will recondition them and reload them with fresh film.

It is requested that every naval unit within the continental limits which has excess empty magazines in its possession, return them as promptly as possible to the Resident Inspector of Naval Material, Rochester, N. Y.

Those activities in the Pacific Ocean area may return their excess magazines to Naval Air Station, Pearl Harbor, from which point they will be reshipped to Rochester, in accordance with existing instructions.

Pack Kodachrome in Aerial Film Can

An interesting report on this subject was made by a Naval Field Medical Photographic Unit operating in a tropical area. They have exposed and returned to BuAer over 250 rolls of 16-mm. Kodachrome film without loss of a single roll.

It was found that cans for 9½" x 75' aerial film would hold ten rolls of Kodachrome. The cans are strong and light, and when sealed with waterproof adhesive tape may be immersed in water or exposed to torrential rain without danger to the film. The raw stock is packed in the cans and after exposure, returned to the cans. Silica gel is added as a hygroscopic agent. The can is sealed with waterproof adhesive and returned by the fastest transportation available for processing.

▶ *BuAER COMMENT*—**Navy and Marine Corps Combat Photographic Units use a similar method for exposed film. If no silica gel is available, dried rice, which has been warmed in an oven to remove excess moisture, will be satisfactory.**

▶ Excellent motion pictures have been made by the Marine Combat Photo Units showing the Gilbert and Marshall Islands invasions. Some of these are the most outstanding motion pictures of actual combat ever made. The Marine photographers move right in with the attacking troops and their pictures are packed with action.

▶ Recently a commercial airline experienced a fire in the baggage compartment of one of its airplanes due to the breaking of a photo flash lamp carried in a passenger's baggage. If properly packed for commercial shipment, in standard containers, these bulbs do not present a hazard. This difficulty seems to have been caused from loose bulbs in the luggage.

PIX QUIZ WHAT DO YOU KNOW ABOUT LIFESAVING AND FIRST AID?

QUICK THINKING and a clear head go hand-in-glove with lifesaving and first aid. When emergencies arise, there's no time to go for the book and study the situation through. It's often a case of now or never for the victim. Know what to do and how to do it. Test your knowledge with these questions, then turn to page 48.

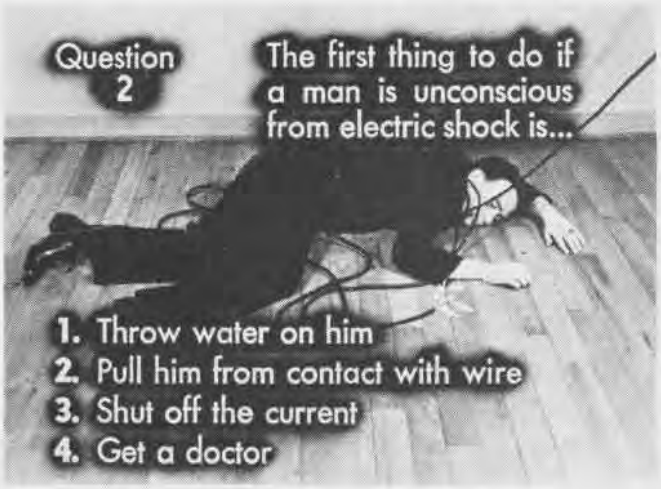
[QUESTIONS FROM VISUAL QUIZ FILM NO. 34, LIFESAVING & FIRST AID]

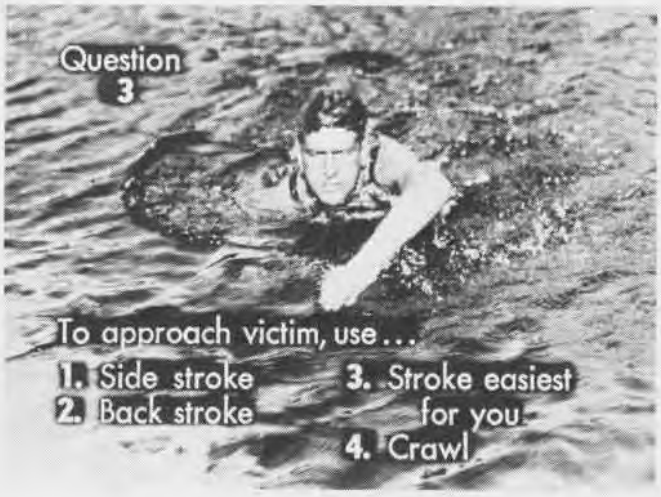
Write your answers here

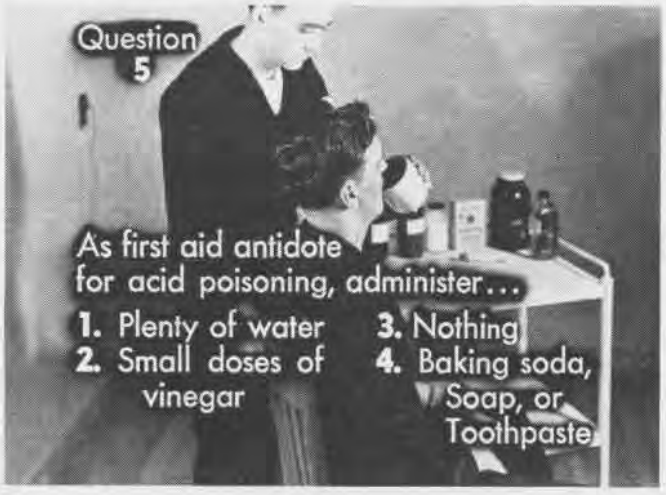
1. ..... 4. .....

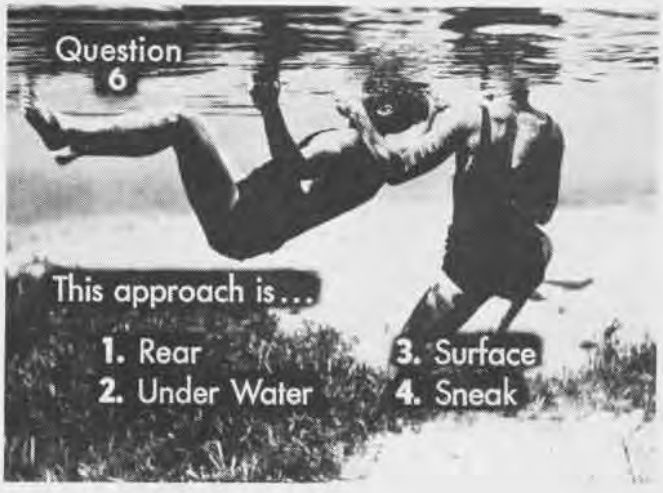
2. ..... 5. .....

3. ..... 6. .....









THE TBF *Avenger* torpedo bomber, with its crew of three—pilot, turret gunner and radioman-tunnel gunner—has proved itself to be one of the most effective instruments of naval warfare. The basis for its success lies in a rugged, well designed plane and in the training of its combat crew

TBF TEAMWORK

ACKNOWLEDGED as the world's best torpedo bombers, TBF and TBM *Avengers* are among the most rugged and versatile combat airplanes ever built. They are manned by some of the world's finest airmen.

Since the time a little more than two years ago when the *Avenger* first went into action, it has compiled a formidable combat record. It has left a trail of ships sunk or damaged, blasted enemy ground installations and (though its guns are primarily defensive) aircraft downed in the air and shot up on the ground.

The Grumman-designed and built TBF and its twin, the General Motors-built TBM, fly both from carriers and land bases. In addition to torpedo bombing, they are used for high altitude, glide and skip bombing, anti-submarine warfare and scouting, not to mention mine laying. They have flown against the Japs in all the great raids and air battles in the Pacific—including Midway, the Bismarck Sea, Guadalcanal, Santa Cruz, Munda, Bougainville, Rabaul, Marcus, Wake, Tarawa and the Gilbert Islands, Kwajalein and the Marshall Islands, Truk, Saipan and Palau. And the *Avengers* also have played a potent rôle in licking German submarine packs in the Atlantic while guarding large Allied convoys.

WELL-ARMED, well-armored and carrying loads as big as those of many larger bombers, the *Avenger* has the lowest rate of loss of any plane in the forces. A workhorse of the Fleet, the *Avenger* is combat-tested.

THOROUGH TRAINING READIES PILOTS AND AIRCREWMEN FOR THE FLEET

THE AVENGER has the armor, armament, speed and range to get pilot, gunner and radioman anywhere—and back again. But the reason it has proved so effective in lambasting the enemy and returning on schedule is not only the character of Navy pilots and aircrewmen but the training they get before they go into combat. It takes 18 months to train an *Avenger* pilot, nine months to train an aircrewman.

When he reaches NAS Miami or NAS Ft. Lauderdale, the two air stations specializing in the training of torpedo bomber fighting men, the student pilot is a veteran of more than a year of training and more than 200 hours in the air. He has been through flight training, has won his wings, and in operational training goes on to develop his skill as a combat pilot.

His ground school studies include aerology, air combat information, bombing, communications, radio and radar, navigation and instrument flights in the Link trainer, engineering, gunnery, recognition and Fleet operations. In the air he flies on familiarization hops alone in the TBF and goes on to field carrier landings, formation flying in three-plane sections and six-plane divisions, individual and formation torpedo attacks, high altitude, glide and skip bombing, gunnery runs and the tactics employed during actual combat.

WHEN THEY MEET their pilots at NAS Miami or NAS Ft. Lauderdale, the *Avenger* aircrewmen also have had thorough preliminary training. They have been through boot camp and they have had four and a half months of specialized training at a Naval Air Technical Training Center which qualifies each student in one of three specialties—ARM, AOM or AMM. They have received their basic gunnery instruction at one of three Naval Air Gunners Schools—at Purcell, Yellow Water, or Hollywood, the latter specializing in turning out gunners exclusively for TBF's and TBM's. In the final phase of training they continue with ground school studies and go on to learn to man TBF guns and equipment in the air. It is in the air that they develop the fine coordination of the combat team. Ground crew training is absolutely essential, but there is no substitute for aerial experience.

GOOD GUNNERY PROTECTS AVENGERS AGAINST ENEMY FIGHTER ATTACKS

STUDENTS get their first taste of free gunnery at the Naval Air Gunners School, learning the basic fundamentals under the direction of officers with years of gunnery experience. In the first two weeks of the five weeks' course at NAGS Hollywood, for example, the student learns the basic elements of sighting and ordnance. He hears lectures on sighting and practices sighting in the 3-A-2 synthetic trainer in which, with a machine gun "firing" a beam of light, he "shoots down" planes flying across a movie screen. At the shotgun range he shoots spade-grip and turret-mounted shotguns at incoming multiple-angle clay pigeons, learning to track and lead a moving target. In basic ordnance he meets the .30 and .50 cal. BAM guns—Browning Automatic Air-cooled Machine Guns—learning how to work the guns, clean and care for them and how to fix them when they jam. He also studies ammunition, sights and electrical switches, from both theoretical and practical angles.

In the third week, the student gunner moves up to the performance range. Here he learns more advanced ordnance, including boresighting, further practice in stripping and in fixing malfunctioning guns and turrets. Finally, with a well-developed theoretical and practical knowledge of his weapons, the student goes to the firing line to develop his marksmanship. He fires thousands of rounds with the .30 and .50 cal. guns at both moving and stationary targets from both moving and stationary platforms, thus learning in practice the sighting and tracking problems of free gunnery.

HE LEARNS to snake into the armor-plated Grumman turret and to operate it with speed and smoothness while using the Mk. 9 reflector sight. He crouches in mock-ups of the TBF tunnel and learns from the same position he will use in the air. He learns by easy stages until he can get hits with the turret mounted .50 firing on a banner target towed at variable speeds up to 60 knots over the Hollywood electric rabbit track.

In addition, he gets his first instruction in bombs, torpedoes and pyrotechnics. And along with his gunnery training he studies visual and radio communications and recognition of aircraft and ships. He also has a daily period of athletics, hand-to-hand combat or swimming and water safety. On graduation from NAGS he wears the air gunner's sleeve insignia. He knows his guns, but he's not yet an aerial gunner ready for combat.

NAGS graduates move on to the second stage of their operational training at NAS Miami or NAS Ft. Lauderdale. They are divided into squadrons of 20 men composed of two sections of ten men. The ARM's in one section become radio operators who double as tunnel gunners. The AOM's and AMM's in the second section become turret gunners. A radioman and a turret gunner are assigned to each pilot and their training as a combat team begins. After the first week of the eight weeks' course, each combat team spends a half-day in ground school and a half-day in the air every work day.

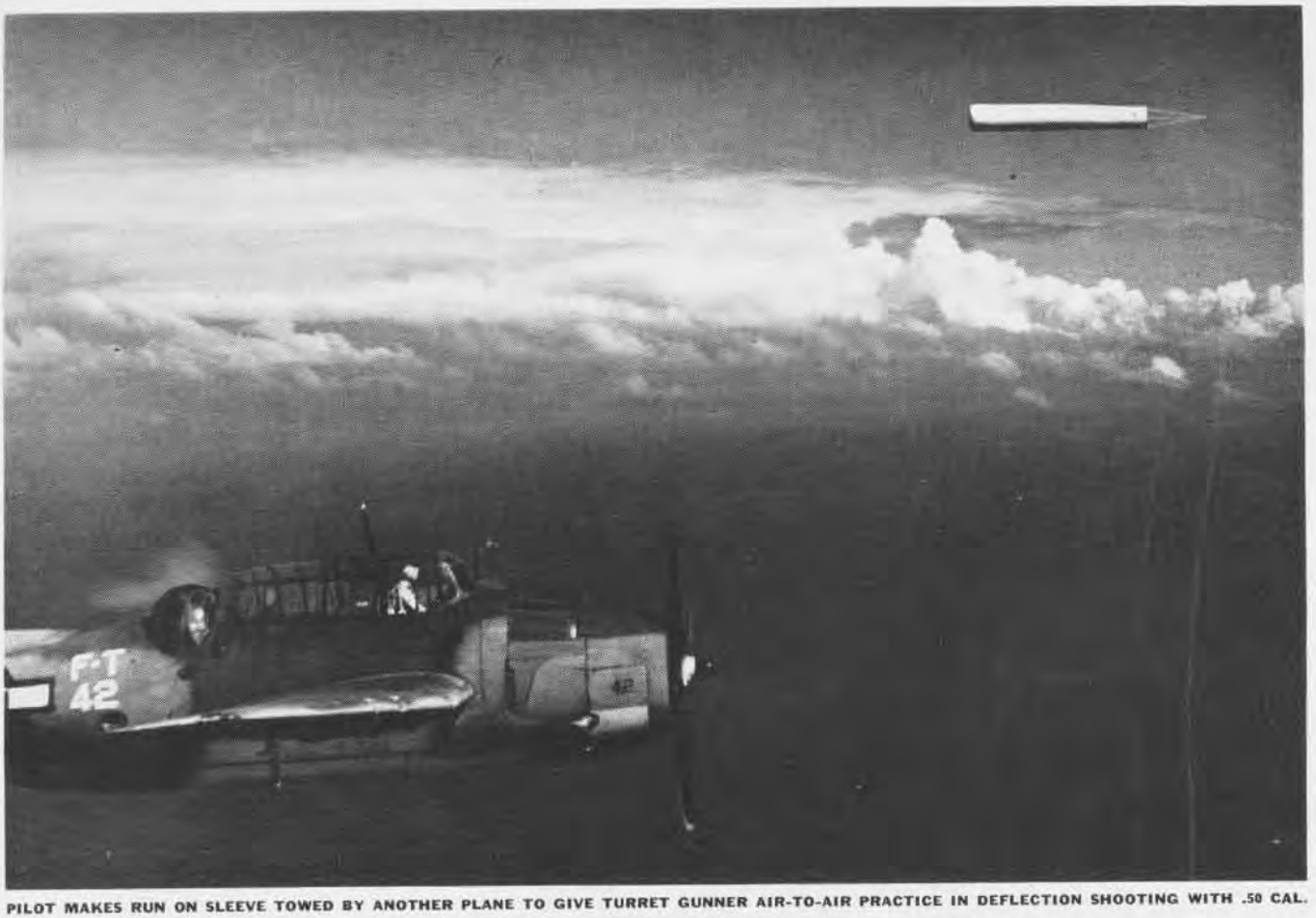
GROUND SCHOOL for aircrewmen includes more work with their .30 and .50 cal. guns and the Grumman turret, advanced sighting, position firing, ammunition handling, aircraft bombs and fuses, as well as flares, lights, smoke signals and aerial photography. The student gets a bomb and torpedo checkout, radio checkout, engineering instruction dealing with the maintenance, construction and characteristics of the TBF. With their pilots, the crewmen spend half-day periods on the line with the plane captains learning TBF maintenance. They continue their study of communications and receive radio instruction, both on the ground and in the air. Out at the gunnery range on a beach along the Atlantic they fire more thousands of rounds at a sleeve target towed at varying speeds, angles and altitudes by a TBF.

In the air, the students fly on torpedo runs, practice high altitude, skip and glide bombing and get frequent gunnery practice in air-to-air firing on a sleeve target and in strafing a slick dropped at sea.

Throughout the course, student aircrewmen must maintain a 3.0 average, both in ground school and in the air or be washed out of training. At the conclusion of the course they get the coveted silver wings of combat aircrewmen. Then, while their pilots go to another station for carrier landing qualifications at sea, the new aircrewmen receive fifteen to twenty days' leave. They return to duty at a new base, where they join up with their pilots again and the combat teams are formed into squadrons, assigned to carriers.

Instructor watches over student gunner at .50 cal. machine gun on pattern firing range of Hollywood gunnery school. The gunner learns to control barrel-whip and shoot groups of 12" or less

Gunnery instructor who observes student practice from tow plane checks gunners' hits on sleeve following air-to-air gunnery hop. Gunners fire thousands of rounds to learn deflection shooting



PILOT MAKES RUN ON SLEEVE TOWED BY ANOTHER PLANE TO GIVE TURRET GUNNER AIR-TO-AIR PRACTICE IN DEFLECTION SHOOTING WITH .50 CAL.

STUDENT IN GRUMMAN TURRET FIRES .50 CAL. MACHINE GUN AT SLEEVE TARGET TOWED OVER RANGE AT HIGH SPEED BY A LOW FLYING AVENGER

MARINE PILOT, A VETERAN OF PACIFIC COMBAT, BRIEFS STUDENT PILOTS AND AIRCREWMEN BEFORE STARTING OUT ON DIVISION GUNNERY FLIGHT

IN OPERATIONAL TRAINING PILOTS LEARN FLEET TEAMWORK TACTICS

FIRST OF ALL, the pilot of a torpedo bomber must be able to fly his plane. But he must be able to do much more. His primary job is to complete his mission. After that he must get back to his carrier. As the skipper of an expensive and valuable unit of the U. S. Navy, he has heavy responsibilities to the Fleet. He also has heavy responsibilities to his aircrewmen. The *Avenger,* pilots will tell you, is an honest plane with no tricks, but it is big and rugged and takes flying. And the pilot must not only be able to fly, he must be able to fly so that he plants his bombs and torpedoes where they aren't wasted. He must be an expert flying artilleryman. This requires skill, timing and a cool and calculating eye.

There is probably no one busier than a torpedo bomber pilot during his run. For in a few brief moments he must get his plane in position, estimate speed and angle of the target, check his own speed, altitude and angle of approach, wait for the enemy ship to commit itself in its evasive maneuvers, set his torpedo director, fly true long enough to get the torpedo away and then get going away from there in a hurry. He must do all this while maintaining his position in the attack formation going in and in the defensive formation going away from the target.

In combat, timing and teamwork is of the essence, both among the crew members of the individual plane and among the planes in a squadron. The pilot gets the best training that experience and ingenuity can devise. He learns not only to use his plane as a deadly weapon, but as a unit in a precision trained team. The squadron leader as quarterback depends on him to play his position with coolness and skill. For the success of a mission and the lives of the men in the other planes as well as the lives of his own crew, depend on the pilot's ability to do his job through thick and thin.

Landing signal officer guides student in field carrier landing. Pilot learns carrier technique before qualifications at sea

Pilot goes over flight plan with his aircrewmen before take-off. When they know all the details of a mission it promotes teamwork

Pilot, aircrewmen check their life raft before going up on hop. They know the wisdom of a periodic check of all safety equipment

AIRCREWMEN DEVELOP THE SKILLS NEEDED IN TBF COMBAT TEAMWORK

ON THE GROUND each aircrewman does the jobs called for by his rating, whether it is aviation radioman, aviation ordnanceman or aviation machinist. In the air, the pilot and the other aircrewman depend on him to perform a specific set of duties. The turret gunner, either an AOM or AMM, is concerned primarily with guarding the airplane while in flight. Immediately after the take-off, he checks his gun and turret by firing and working them. If a malfunction exists in either, he must be able to correct it in flight. He then assumes an alert status, searching the skies aft and on the beam for enemy aircraft and ships at all times. He maintains communication with pilot and tunnel gunner through the interphone. If attacked, he informs the pilot and mans his .50 cal. gun to drive off or shoot down the enemy. On low level missions, if the pilot gives his OK, he may strafe such surface targets as ships, barges and ground installations.

On most long flights, particularly scouting or patrol missions, the turret gunner changes positions and posts of duty with the radioman-tunnel gunner. Thus he must know the radioman's job as well as his own for combat efficiency.

The radioman's job is just that. While in flight, his is the responsibility of keeping all radio and associated equipment functioning properly at all times. His knowledge must be sufficient for him to operate this vital equipment as it should be operated, for in heavy weather or at night, he may have to bring the plane home with it. His pilot and turret man depend on him to know his aerial trade in the pinches.

WHEN THE PILOT prepares to drop bombs, depth charges or torpedoes, the radioman must arm them and check and recheck intervalometer, switches and dials and keep the pilot informed. Then he may have to become a photographer and stand by the cameras to obtain pictures from the turret and camera gun. When attacked, he turns gunner and mans his .30 cal. machine gun in the tunnel to protect the *Avenger's* tail and belly. If he knows his business—and *Avenger* aircrewmen know theirs—he may get himself a *Zero*. In any case, the extremely high rate of fire makes the .30 cal. stinger a weapon which commands full respect from attacking planes. On low level attacks, the tunnel man may also have the chance to strafe planes on the ground.

With two aircrewmen who can perform these varied but essential duties, the pilot up forward can feel free to tend to his flying and his attacks, safe in the knowledge that the plane is well manned and protected against any eventuality. The pilot must be able to depend on his crew at all times.

Aircrewmen learn to load torpedoes into capacious belly of TBF. It may be part of the day's work when they get out in the Fleet

Aircrewman works on line under watchful eye of plane captain to acquire a knowledge of the airman's friend—his power plant

Division of torpedo bombers flies over a sub chaser on anti-submarine patrol. The *Avengers* have found good hunting in the Atlantic where they have sunk many a skulking German U-boat

This U-boat is sinking after an *Avenger* attack. Forty-four of the crew were picked up and put aboard the baby flat-top whose planes presented Davy Jones with another one of Hitler's raiders

AVENGERS LEAVE TRAIL OF AXIS VICTIMS WHEREVER THEY OPERATE

THE VERSATILE TBF's and TBM's are part of the complement of all aircraft carriers, such as CV's, ACV's and the CVE's. They fly missions as varied as aerial warfare itself. The *Avengers* torpedo ships. They carry anything from incendiaries to a dozen 100-lb. fragmentation bombs or a single block buster for attacks against land bases. They carry depth charges for attacks against submarines or mines for laying in enemy waters. Or they can carry extra bomb bay fuel tanks for long range scouting. In all of these operations, the *Avenger* has proved its mettle time and time again.

Just as pilot and aircrewmen are a combat team and TBF's formed in divisions are a larger team, so the TBF's, with their running mates, the fighters and dive bombers, form a still larger and vastly more effective combat team. Each type of aircraft performs its specialized task, contributing its part to the most devastating form of air-sea warfare.

In a typical strike against enemy shipping, F6F fighters fly escort for the bombers. Before the bombers go in, the *Hellcats* strafe the targets to silence AA fire. The dive bombers then hit the targets just as the *Avengers* release their lethal fish. Meanwhile, some of the fighters stay upstairs to knock off any enemy fighters that may appear. Others go in with the bombers as close cover and for more strafing. It is these teamwork tactics—also applied to ground targets—which have cost the Japanese heavily in ships and softened up enemy bases in preparation for landings by Allied amphibious forces. It was these coordinated powerhouse tactics which enabled Torpedo 9, for example, to make successive torpedo attacks on Kwajalein, Truk and Palau without the loss of a single torpedo plane. That's the TBF!

F6F HELLCAT FIGHTERS CARRYING EXTRA FUEL IN BELLY TANKS ESCORT AVENGER TORPEDO BOMBERS AND DAUNTLESS DIVE BOMBERS ON A STRIKE

Four torpedo wakes are visible in this dramatic action picture taken from a TBF during an *Avenger* attack on enemy shipping at the great Japanese naval base of Truk in the Carolines. Two torpedoes show erratic wakes, probably owing to shoals in the water near shore. A third has found its mark, its TNT-packed warhead ripping the guts out of a Japanese freighter. The fourth torpedo—the wake is shown in the right foreground—passed astern of the already doomed ship and hit the one in the left background. This combat photograph vividly illustrates the trickiness of torpedoes as well as their deadly effect. Against ships, a torpedo is the most potent weapon in the aerial armament. They hit where it hurts most—below the waterline. It takes great skill to plant a "pickle" so that it will connect with a maneuverable target. That the Navy pilots who fly *Avengers* know how is shown by the fact that in a single raid on Truk they got 21 torpedo hits on Japanese ships. The *Avengers*' visit was one of the most unpleasant Tojo has received at his great Pacific base.

LETTERS

SIRS:

It is requested that the office of Special Assistant to the Secretary of the Navy be placed on the distribution list to receive the NAVAL AVIATION NEWS.

This publication will be a fruitful source of information to this office and to the liaison officer with DCNO (Air) and BuAer for the Navy Management Program.

SPECIAL ASSISTANT TO THE SECRETARY OF THE NAVY

Washington, D. C.

SIRS:

In response to your call for comments from carriers, I have a few words to put in the mouth of Grampaw Pettibone. That "Jap fighter acting as a bomber" on the back cover of your May 1, 1944, issue is the Jap dive bomber called *Judy*. I understand it may, on occasion, act as a figher.

ENSIGN, USN
Gunnery Office

U.S.S. *Enterprise*

¶ That simplifies the war: it's a bomber acting as a bomber.

SIRS:

It is requested that as many copies as you deem possible up to two hundred be sent this command of the pictures appearing on page 33 of the May 1 issue of NAVAL AVIATION NEWS.

VB-105

FPO, New York

SIRS:

On March 30, a headquarters squadron pilot, flying an SBD-5, participated in practice rescue work by dropping a collapsible rubber life raft with a dropping and inflating device. This was developed by the G-3 section of this group from an idea illustrated in the March 15 issue of NAVAL AVIATION NEWS. The result of this operation was very successful and should prove to be very advantageous in the rescue of pilots and crews down at sea.

COMMANDING OFFICER
MBDAG 45, MCAS

Santa Barbara, Calif.

From: The Island Commander, Navy No. 825
To: Publications Division, BuAer
Via: Atoll Commander, Navy No. 3233
Subject: NAVAL AVIATION NEWS, request for

1. It is requested that this command be placed on the mailing list for the subject named publication. It is further requested that this command be furnished with all previous 1944 publications of NAVAL AVIATION NEWS.

COMMANDER

¶ The above letter illustrates how the chain of command operates out in the wide reaches of the Pacific.

SIRS:

I was interested in your article on "Jap Searchlights" in the June 1 issue and noted that you published as your first photograph a Jap soldier standing beside a "Jap" searchlight with the very plain maker's tag of "Sperry," scarcely a Japanese armament concern. That picture certainly is a pictorial comment on the follies of the U. S. before December 7, 1941. Live and learn, I guess, is the only comment.

CAPTAIN, USMCR

Navy V-12 Unit
Western Michigan College
Kalamazoo, Mich.

SIRS:

It is requested that the undersigned, who still maintains an interest in naval aviation, be placed on the mailing list to receive the very interesting publication entitled NAVAL AVIATION NEWS.

THOS. T. CRAVEN
Vice Admiral, USN

Superintendent,
N. Y. State Maritime Academy

SIRS:

On page 6 of NANEWS for May 15, in the article about giving the helicopter the designation "H," you state: "U for lighter-than-air (airships)." Is this a change from the "Z" of long use, or an error?

LIEUTENANT, USNR
Engineering & Experimental Officer
NAS Richmond

¶ Typographical error. "Z" is correct.

CONTENTS

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PUBLICATIONS

The following Technical Notes and Orders have been cancelled

TECHNICAL NOTES

75-43	*Cancelled by TN 29-44*
67-43	*Cancelled by TN 23-44*
59-43	*Cancelled by TO 40-44*
14-43	*Cancelled by Misc ltr dated 4/27/44*
8-43	*Cancelled by TO 40-44*
7-43	*Cancelled by TN 30-44*
77-42	*Cancelled by TN 44-44*
30-42	*Cancelled by TN 19-44*

TECHNICAL ORDERS

35-44	*Cancelled by TO 71-44*
27-44	*Cancelled by TO 69-44*
17-44	*Cancelled by TO 66-44*
5-44	*Cancelled by TO 26-44*
136-43	*Cancelled by TO 74-44*
135-43	*Cancelled by TO 46-44*
123-43	*Cancelled by TO 40-44*
115-43	*Cancelled by TO 9-44*
112-43	*Cancelled by TO 58-44*
109-43	*Cancelled by Misc ltr dated 3/4/44*
108-43	*Cancelled by TO 14-44*
107-43	*Cancelled by TO 27-44*
104-43	*Cancelled by TO 13-44*
91-43	*Cancelled by TO 12-44*
89-43	*Cancelled by TO 40-44*
40-43	*Cancelled by TO 32-44*
19-43	*Cancelled by Misc ltr 3/7/44*
12-43	*Cancelled by Misc ltr 5/24/44*
9-43	*Cancelled by TO 24-44*
98-42	*Cancelled by TO 17-44*
89-42	*Cancelled by TO 28-44*
87-42	*Cancelled by Misc ltr 3/7/44*
79-42	*Cancelled by TO 30-44*
62-42	*Cancelled by TO 61-44*
56-42	*Cancelled by TO 15-44*
41-42	*Cancelled by Misc ltr 2/29/44*
30-42	*Cancelled by TO 64-44*
11-41	*Cancelled by TO 54-44*
42-40	*Cancelled by TO 54-44*

The following Flight Safety Bulletins have been issued since 1 May 1944:

FLIGHT SAFETY BULLETINS

12-44	*Precautions Regarding Take-offs and Use of Flaps.*
13-44	*Precautions Regarding Flutter.*
14-44	*Wheels-Up Versus Wheels-Down Forced Landings.*
15-44	*Service Weight and Balance Control.*
16-44	*Approaches on Planes of Transport Type and Unscheduled Combat Tactics.*
17-44	*Tower Responsibilities.*
18-44	*Visual Signals for Closed Targets.*
19-44	*Cockpit Commands.*
20-44	*Oil Pressure During Inverted Flight, Loss of.*

ANSWERS TO QUIZZES

• SURVIVAL QUIZ (on page 34)

1.a 2.b 3.b 4.b 5.a 6.a 7.b 8.c

• BEST ANSWERS (on page 16)

1.d 2.c 3.a 4.c 5.a 6.a 7.c

• STAR IDENTIFICATION PROBLEM (on page 38)

A—Dubhe B—Polaris C—Arcturus
D—Spica E—Regulus

• LIFESAVING AND FIRST AID QUIZ (on page 39)

1.2 2.3 3.3 4.4 5.4 6.1

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

A MARINE CORPS air station reports developing its own collapsible life raft from an article illustrated in March 15 issue.

Developed from an idea in Naval Aviation News

▶ You may enjoy thumbing through the pages of NANEWS to pick up little ideas of interest here and there. But are methods and procedures developed by *your* activity also appearing in it?

▶ Squadrons and stations are finding it pays not only to take, but also to GIVE, in the pages of NANEWS, reaching Navy and Marine Corps air activities in every theater of operation throughout the world.

▶ If you have developed technical, safety or survival procedure that works, let others benefit by reporting it promptly, completely to NAVAL AVIATION NEWS. It is the clearing house of new ideas worked out where experience counts . . . in training, practice, operation. For prompt delivery, send material direct to NANEWS by addressing envelope as shown below.

NAVAL AVIATION NEWS

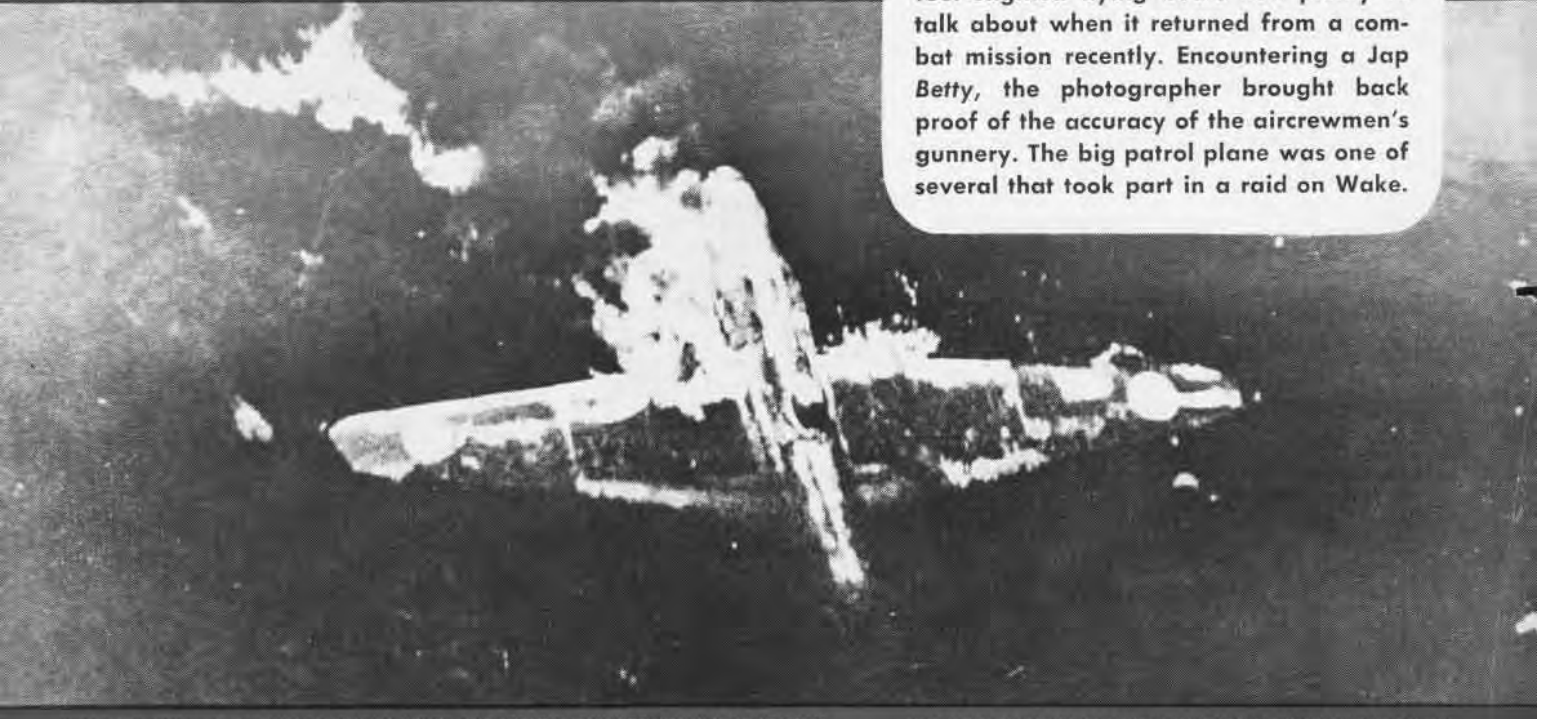
25TH YEAR · FORMERLY BUAER NEWS · FIRST PRINTED 1918

ADDRESS TO *Chief of Naval Operations, Naval Aviation News, Navy Dept., Washington 25, D. C.*

NAVAL AIR IN THE PACIFIC

NAVY PB2Y *Coronados* are prepared for action when they go out on a long search mission. The crew of one of the big Navy four-engined flying boats had plenty to talk about when it returned from a combat mission recently. Encountering a Jap *Betty*, the photographer brought back proof of the accuracy of the aircrewmen's gunnery. The big patrol plane was one of several that took part in a raid on Wake.

1. FOUR-ENGINED CORONADO SEARCH PLANE SPOTS JAP BETTY IN CENTRAL PACIFIC



2. ENEMY BOMBER EXPLODES, BURNS AFTER SUCCESSFUL GUNNERY RUN BY THE PB2Y

3. CLOUDS OF SMOKE MARK THE SPOT WHERE BETTY CRASHED