FLYING SAFETY

UNITED STATES AIR FORCE

APRIL 1953

seeing RED in the cockpit
. . . page 2

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FLYING SAFETY

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Upcoming . . . in the weeks ahead we have some fresh slants on lightning strikes on aircraft in flight, survival in the jungles and tow-target techniques. Meantime, we'd like to call your attention to the parachute test article in this issue. If nothing else you should be a lot more 'chute conscious after reading about the testing techniques.

The problem of cockpit lighting is always good for an argument in pilot circles. Captain Schreffler, in his pitch for better lighting for more safety, comes up with a good approach to the issue and at the same time offers his own design for instrument panel lighting . . . but you read the story for yourself. It's a fine presentation and begins on the next page.

The Well Done for this month falls into the global bomber class . . . and covers the proficient handling of a B-36 emergency in flight. We would appreciate getting the good word on more well-dones when they do occur. Original art layout and a letter of commendation from the Director of Flight Safety Research goes to the pilot or crewmembers involved.

Air Force writers, professional or amateur are welcomed in the pages of FLYING SAFETY. Don't worry about your writing style, the editors will work it over for you. If you have an experience or an idea like Capt. Schreffler's on Page 2, send it along!

Here, an airborne team gets ready to make a desert jump. Turn to page 16 for the story.

. . . seeing

Pilots today after eight to ten ceptible to vision fatigue; bet

By Capt. P. A. Schreffler,

NIGHT flying dates back a long way in aviation history, and on the first flight, I imagine that intrepid airman was deeply concerned about his night vision. Pilots today are confronted with the same problems and slow progress has been made to alleviate poor cockpit lighting systems. It would be interesting to know how many night accidents have been caused by inadequate or incorrect use of cockpit lighting and actually charged up to more obvious causes.

I have been flying for 14 years and during the past 10 have accumulated over 1800 hours of night flight. I'm no different than any other pilot and my physical condition is at least average, but today, "I just don't see quite as well as I did 10 years ago." In most cases, experience compensates, for the difference but there are times when even the most experienced pilot just can't see all he should in a given length of time.

During the past 10 years, the speeds of aircraft have increased greatly. This factor limits the pilot's forward visibility and reaction-time ratio. Objects which could be seen for several minutes years ago now come into view in a few seconds because of this speed increase.

On aircraft manufactured during World War II, little has been done to improve the older type fluorescent systems.

RED *in the cockpit*

**years of flying service are much more sus-
ter cockpit lighting could ease the strain.**

Chief Pilot, 35th ATS, (MATS)

Commercial airlines today use fluorescent or ultra-violet lights as secondary lighting only, the original and aviation-wide cockpit lighting system being augmented by white and red instrument panel lights.

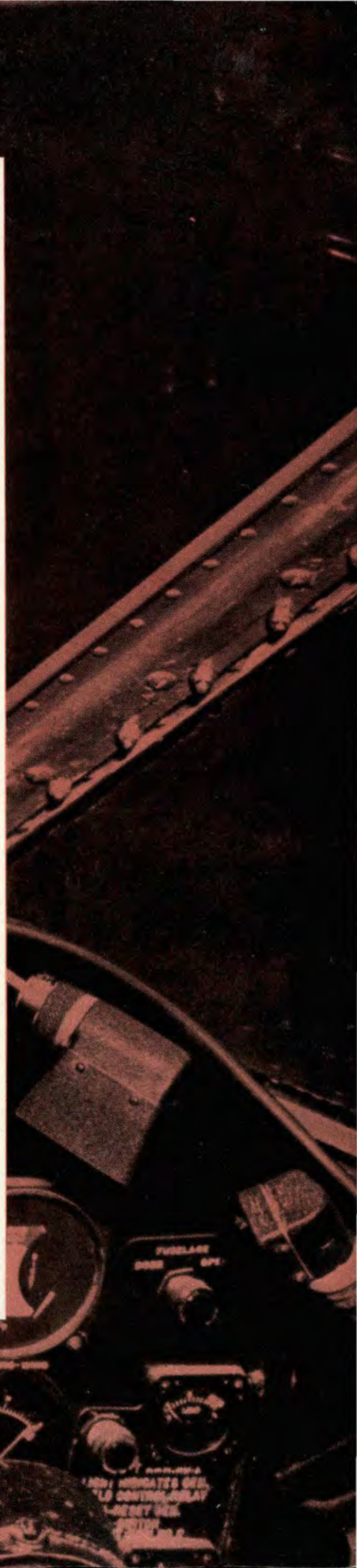
But in military aviation the fluorescent lights still prevail. All pilots know of the ever present "Blue Haze" in the cockpit at night, the "Blue Tinted Windshield" when looking for that other VFR aircraft in the pattern, that blind feeling when you try to read an instrument at the bottom of the panel. Attempts to add white lights to certain World War II transport type aircraft have helped in a definite move towards better cockpit lighting.

Typical Flight

But let us use a typical flight to illustrate the need for better internal lighting systems. Take for an example, an all night flight from Westover AFB, Massachusetts, to Harmon AFB, Newfoundland, with only the standard fluorescent system of a C-54 type aircraft. We'll start first in our crew positions with the "Before Starting Check List," which includes "Cockpit Lights—On." The remaining items are read, and the copilot engages the number 3 engine starter switch. Instantaneously the cockpit is completely dark, because the APU is unable to carry the load of all required electrical units. The engineer quickly grabs his flashlight to see if the instruments on number 3 engine are normal and in doing so innocently blinds either the pilot, the copilot or possibly both. All hands then scramble toward fluorescent switches to attempt raising the light intensity on the completely blacked out panel. With good luck this condition may only happen one more time during the starting sequence of the other engines.

Now we read the "Before Taxi Check List" and again the flashlight is employed so as to see what should be read. There are overhead lights, which, if turned on, completely remove from view any outside ramp activity.

Engine run-up on the taxiway near the end of the active runway is sometimes distracting, our age-dated cockpit lighting system is no match for the landing lights of the aircraft on the opposite side of the runway taxiing into position. With flashlights beaming, so as to clearly read the tachometer during mag check, we complete the "Before Take-off" check and await our ATC clearance. As the latter is copied, a climb restriction is added: "Make your climb from 2000 feet to 6000 feet VFR; if not possible, maintain a position VFR and advise." Right then and there a smart pilot would advise that he couldn't climb VFR since his night vision has already been pretty well destroyed, but anyway we'll go ahead.



We now line up the aircraft for takeoff and find that the runway lights, though the tower has them turned down to the lowest intensity, look like several hundred search lights all pointing in our cockpit. We quickly open the shields on six fluorescent fixtures in order to see our basic instruments clearly, and down the runway we go.

The C-54 becomes airborne and quickly overflys the end of the takeoff runway. A new hazard has now confronted us — too much cockpit light, limited forward visibility caused by that "Old Blue Haze," so the six fluorescent shields are closed and we climb toward the Gardner Intersection. After reaching 1,000 feet. the pilot asks for the "Climbing Check List." Flashlights again come into play and forward visibility is lowered to about the third rivet in front of the windshield (remember we're climbing VFR from 2000 to 6000 feet).

Shields Opened

You wonder if the inbound traffic from Gardner to Westover is encountering the same flashlight blindness while reading their "Cruise Descent" check list. So with a course that will keep you well right of the climb-out leg you blindly climb from 2000 feet to 6000 feet.

The weather is good and below are

Cockpit here shows shield lighting units as designed by Capt. Schreffler.

The eye physiologist can agree wholeheartedly with Captain Schreffler that a white and red floodlighting system would be superior to the present fluorescent system, according to H. W. Rose, M.D., Opthalmologist with the USAF School of Aviation Medicine. If adaptation of the eye should take place, the white light should always be used at the minimum brightness compatible with the flying task. The red light, whether it be floodlight or fluorescent, will be useful only if real night vision should be obtained . . . for example, under a moonless sky. But then it is superior to any other kind of illumination.

Orange fluorescent lighting is an acceptable compromise when red lighting is unobtainable.

seen a multitude of brightly lighted cities. In order to see the instruments clearly, the six shields are partly opened in an attempt to equalize outside conditions. Thus the "Blue Tinted Windshield" is now in effect to cause burning eyes and a very limited night vision.

Halfway on our route we encounter towering cumulus (not forecast) and with the high overcast and "Blue Haze" the cloud tops are "felt" before being seen. The cumulus grows in intensity and lightning flashes dance across the sky. The six lighting shields are opened again and even at best the fluorescent lights only slightly cancel the great brilliance of the lightning flashes. Naturally during this period internal cockpit vision is limited, but we manage to keep the aircraft somewhat straight and level.

"Between-layer" conditions now exist and we close all the six lighting shields and attempt to adjust the lights to a lower intensity by use of the fluorescent switches, instead of the shields. In doing so at least half of the lights go out completely and have to be restarted, and try as we may, we never do get a really comfortable level of lighting internally to compare with the outside black condition.

Continuing on, we start our descent at the gulf intersection and because of the reported weather, elect to make straight in range approach from St. Georges. Clearance is obtained and descent continued to 1500 feet at which time it is determined, by the lack of the light turbulence, that we are now beneath the overcast. It is fairly dark outside and even at 1500 feet, it is impossible to see the water surface below. If we turn down the lights so as to see outside, we can no longer see inside.

The "Cruise Descent" and "Maneuvering Descent" check lists are read. Overhead lights (hooded with red lenses) are used in place of the flashlight but the reflection on the windshield destroys even limited forward visibility.

About five miles out, we see the airport lights and landing clearance is requested. Now the lighting picture changes again because of the rapid increase of external light intensity. The six fluorescent switches are turned to "start" and the six shields partly opened to equalize inside and outside brilliance. As the engineer opens his shield, which illuminates the overhead panel, the cover comes off, leaving the bare bulb shining and almost completely blinding the three forward crewmembers.

Final Approach

After a little fumbling, the cover is replaced about the time final approach is reached. Gear is down and the hydraulic pressure visually checked. To do this a flashlight is used by the engineer because no lighting facility has ever been installed to illuminate hydraulic panel instruments on the C-54. So the copilot gets the benefit of the flashlight beam. With his vision now almost at zero, he attempts to observe the last few hundred feet of the final approach with little success.

Touchdown is good considering all vision factors. But as the C-54 stops for a turn off the runway, (and before the engineer can start the APU) all the fluorescent lights have again gone out because of low RPM and no generator output.

The first portion (five hours) of the normal 13-hour work period from Westover, Mass., to Lajes, Azores, is completed. Eyes are tired and nearly the color of the cockpit lighting system.

Now let us start the trip all over, this time with a modern white and red lighting system and the fluorescents used as a *secondary* unit only. While starting the engines, the white lights are employed and even though they might dim down slightly, they don't go out completely.

The check list is held and read close to the instrument panel to utilize the already present white lights. Runup is completed after the white lights are adjusted to conform with external light intensity.

As you line up for the takeoff run, you adjust the white lights to equalize the runway lights by turning *just one* control knob, and the takeoff run is started.

As the runway disappears under the nose, you switch to red lights and forward visibility is kept to a maximum with no loss of internal vision.

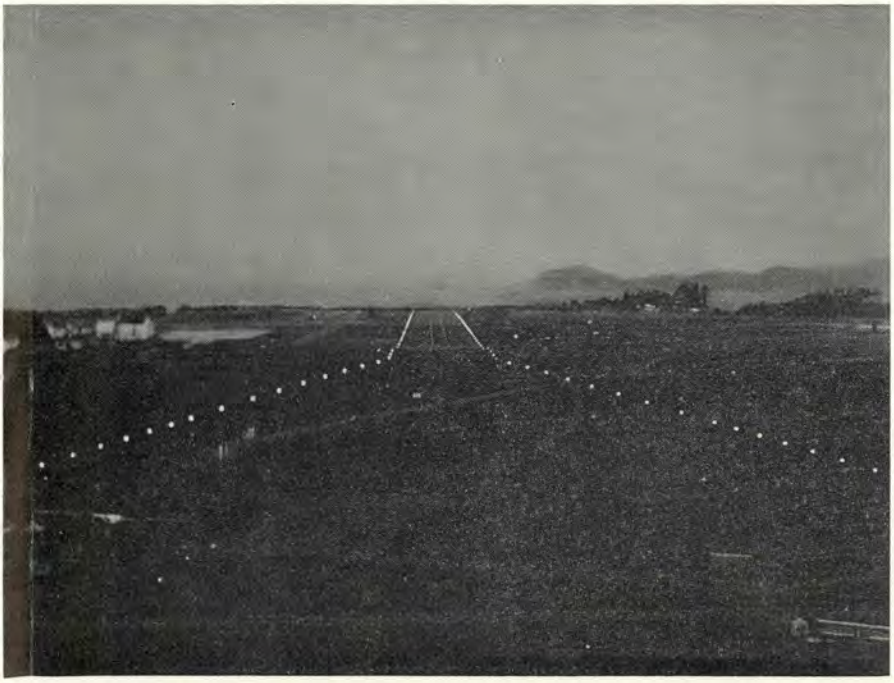
The climb-out check list is read by red light illumination and that VFR climb from 2000 to 6000 feet is easily accomplished.

At level off, the white lights are again used and adjusted to balance the glow from the brightly lighted cities below. As the flight continues and external light intensity decreases, the red lights can be used again. With maximum available forward visibility, cloud tops are plainly seen in ample time to fasten passengers down before turbulence is encountered. As the build-up grows, and the first indication of lightning is observed, the white lights are turned on and as lightning intensity increases white light brilliance is turned up to full. With the lights so adjusted, the brightest flashes are barely noticed.

Red Lights Used

In not too long a time, the turbulence subsides and Charlestown is passed, we now enter the area of between-layer conditions. The red lights are used again and our vision is soon adjusted to both external and internal conditions. The remainder of the flight is routine, the water surface is visible at 1500 feet, white lights are used in the pattern, with no overhead lights needed to read check lists.

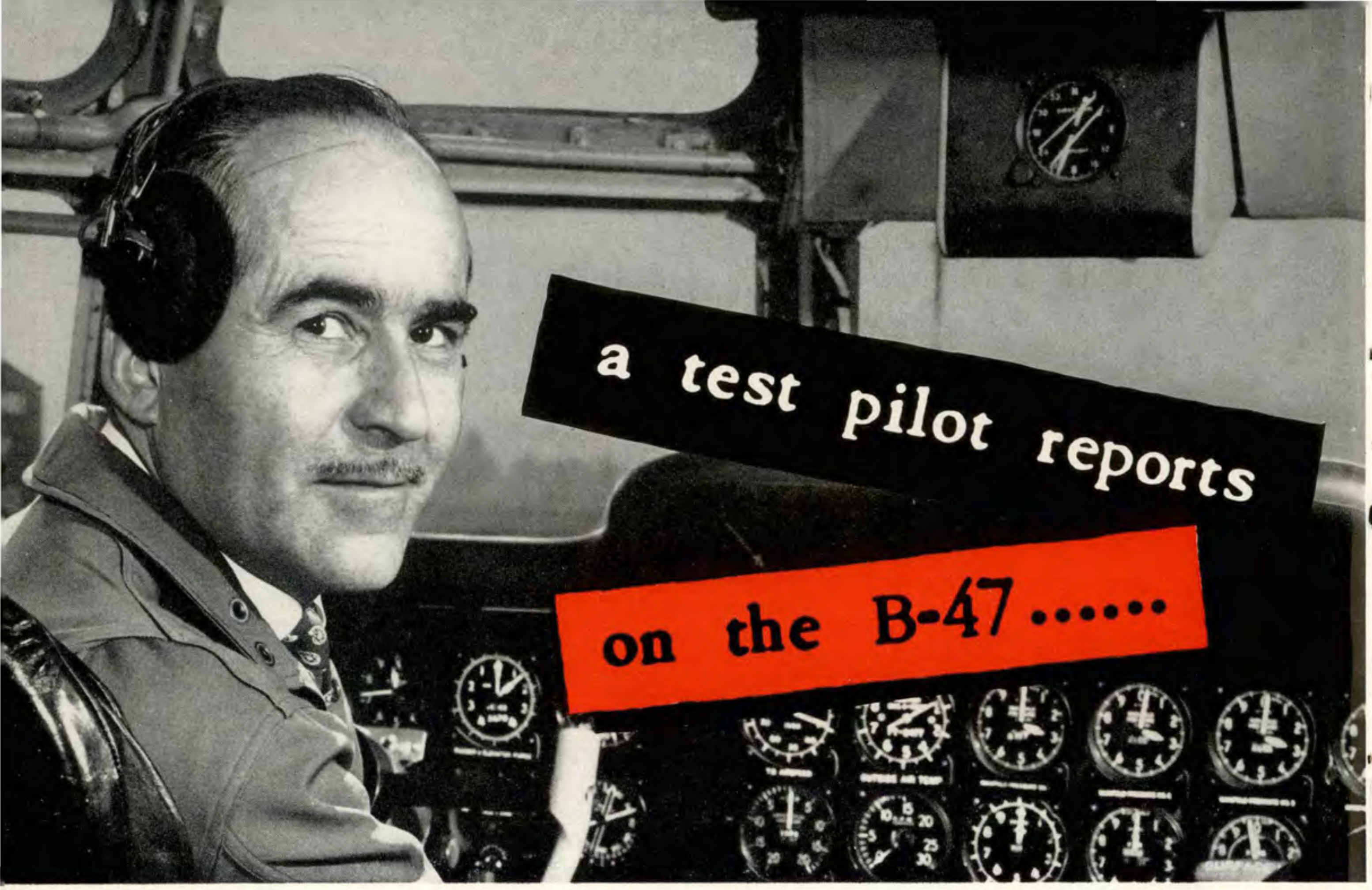
A good system of approach lighting can go with better cockpit lighting.



Although the examples cited are typical flights, they do illustrate many of the cockpit lighting problems confronting pilots. Installing a red and white cockpit lighting system is comparatively simple. I have designed and constructed a simple system made from available parts, and have personally flight-checked this equipment on trans-atlantic and trans-continental flight with great success. With some slight changes, this system could be installed in nearly all USAF aircraft. A better cockpit lighting system would offer these advantages:

- Eye fatigue is minimized on long flights.
- Color intensity is equalized on surface and cockpit lighting.
- Night vision is improved on over-water flights, or between cloud layers.
- In thunderstorm activity internal white lights prevent "lightning blindness."

From experiences gained in airline flying, pilots are assisted by installations of more adequate cockpit lighting. On commercial airlines the use of fluorescent lighting today is of a secondary or emergency nature. White lights should be used to duplicate "Outside the Cockpit" conditions. In other words, if you are flying over the New York area with its great array of lights, attempt to establish a white lighting level of equal intensity in the cockpit. Over the open water or between cloud layers, a red system is extremely beneficial, the intensity varied so as to create maximum forward visibility and maximum cockpit vision. Takeoffs from Island Bases which have standard white runway lighting is extremely difficult with only the fluorescent cockpit systems. With white lights adjusted in the cockpit to equalize the runway white lights, the takeoff run can be made with maximum vision. As the aircraft becomes airborne, and the runway lights disappear under the nose, the red light portion of the instrument panel lighting system is switched on and forward visibility is increased quickly by several miles. So, in summary, use white lights inside when white light prevails outside; use red lights internally during the absence of white external light, and at all times use fluorescent lights at a very low intensity as an emergency measure in case either white or red lights fail. ●



a test pilot reports on the B-47......

About the Author

John B. Fornasero, chief of Boeing Airplane Company's flight test section, has been an experimental test pilot for the B-17, B-29, C-97, B-50, Stratocruiser and the B-47 Stratojet since joining the company in 1943.

An accomplished pilot with approximately 7,000 hours of flight time, Fornasero started his career in the aircraft industry in the maintenance division of Ryan Aeronautical Company in San Diego and later became head of that department. He learned to fly in San Diego, became an instructor and then head instructor. He later became chief of the Ryan test pilots and was active in testing early models.

Before joining Boeing he also served as a test pilot for Fairchild Aircraft Corporation and was employed by the Civil Aeronautics Administration as a flight test engineering inspector.

He started with Boeing as a test pilot, later became project test pilot, and in the latter part of 1948 was made chief of flight test. The following year he transferred his activities from Seattle to Wichita, Kansas, as chief of flight test for the B-47 program, and remained with the Stratojets until last March, when he returned to his Seattle office.

He is the head of an exceedingly busy department which has put in more than 5,000 hours of test and research flying on the B-47 alone. At the moment, Boeing is conducting various test on four different models—the B-52, B-47, B-50 and B-29.

By John B. Fornasero, Chief of Flight Test, Boeing Airplane Company

FROM the very outset, flight testing of the Boeing B-47 Stratojet has been an exceedingly interesting business. For one thing, there have been the many new handling characteristics of this airplane, and for another, the swept-back jet has taken us to new horizons in bomber performance.

From the start, too, flying safety has been emphasized. From our early engineering studies to an unusually extensive pilot training program, safety has always been a major consideration. While the airplane was still on the drawing boards, designers were keeping in mind a prime requisite—it had to be fast but it had to be safe.

During early flight tests that the company made, we explored the major factors of safety operation as soon as we could and then went on to more detailed evaluation such as performance and airspeed checks and getting technical data that would confirm the wind tunnel predictions.

We also used a B-29 to simulate jet landing characteristics.

It was known that the typical flat landing approach of jet airplanes is, to a large extent, the result of high idling thrust of jet engines and lack of propeller windmilling drag combined with low airplane aerodynamic drag. So the engines of the B-29 were operated at the proper RPM with the props in fixed pitch, partial flap extension was used to simulate the B-47's stalling speed, and with essentially the same weight and braking available as on the B-47, a few answers were acquired.

Some Answers

One immediate answer was the importance of maintaining correct approach speeds. Another was that by so doing emergency landings could be made on moderate-length fields, if required. Since then, of course, both the drag 'chute and anti-skid device have been developed as further landing-safety aids.

Intensive training of flight crews for the B-47 has been conducted since the airplane was ordered into production, and because of that very intensity the impression apparently has arisen—especially on the part of the layman—that here is a terrifically tough airplane to fly. B-47 pilots, I believe, will refute that. True, like all jets, it is more demanding in the need for anticipation on the part of the pilot, and he must be right on his airspeeds and his approach altitudes and attitudes. The fact remains, however, that the typical pilot comment describing the 185,000-pound B-47 is that "she flies and handles like a fighter."

Intensive training of flight crews for the B-47 has been underway since the airplane went into production. Most pilots say, "she flies like a fighter."

A double wall that contains the pressure cell and allows the crew to be at the equivalent of 8,000 feet while flying at 35,000 feet, keeps a large amount of the sound out. The control surfaces are powered to overcome the enormous air loads at high speeds. The pilots need only exert a small force, which is transmitted to a boost package that interprets the force reaching it and translates it to degrees of displacement of the control surfaces. Vibration is practically nonexistent because of the enormous reduction of moving parts, including propellers, pistons, connecting rods and associated mechanisms.

As for comfort, heaters keep you warm and refrigeration systems keep you cool. In short, you are comfortable, at ease, and probably not quite as hard at work as some imagine. The main problem is navigation, since the radio stations go by so fast that you constantly are tuning the radio compass to keep track of them.

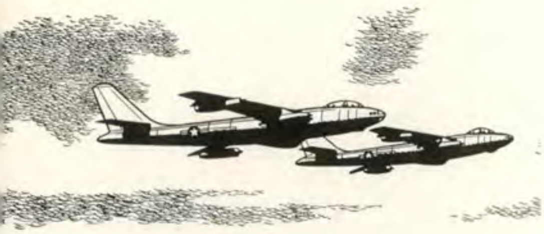
There is a very definite safety feature, too, in the manner in which the engines are slung in "pods" beneath the wings. During early design studies there was considerable concern over the vulnerability of jet engines to gunfire. It was felt that the fire hazard of engines contained wholly in the body was not acceptable, and as a result the manufacturer started studies on external nacelles and various alternate external locations on the wing.

With swept wings and the externally-mounted jet engines, the experimental XB-47 test models took shape and began to look very much like the present production airplanes. It was also discovered that the pod type jet engines, mounted under the thin wing, did not interfere with air flow around the wing, and allowed extremely high speeds for an airplane of this category.

Characteristics

Briefly, here are a few handling characteristics as they would appear to a pilot experienced in multi-engine operation who has also flown jet airplanes and is ready for checkout in the B-47.

The cockpit resembles that of a fighter because of the canopy and tandem seating arrangement. The pilot has exceptional visibility over the nose



Both the drag chute and the anti-skid wheel brakes slow the landing B-47.

and both sides, as well as above and aft. Flight controls are conventional, and have the large mechanical advantage required for emergency operation with power-servos off. The throttles are clustered together on the right stand for easy grip by one hand.

The instrument panel has the standard flight group and also the instruments for the six engines. The fuel panel is of the diagrammatic type, with gages, valves and warning lights. First impressions may be that the pilot is impossibly overburdened by six-engine operation, but several factors show this to be otherwise. Each jet engine is operated by only one lever affecting power, as against four controls on the usual reciprocating engine-propeller combination. In addition, the two or more controls on various cooling air outlets are all absent on jet engines. Standard systems have been designed to require a minimum of attention. Examples are a comparatively simple fuel system, flap retraction and extension speeds consistent with the airplane's requirements, thus avoiding the necessity of "milking" the flaps up or down, minimum longitudinal trim changes, and light stick forces for easy one-hand operation of the flight controls.

Takeoffs are made with full flap, and at the "unstick" point the airplane flies off the ground with the elevator near neutral, very similar to the B-17 or other tail wheel airplanes having a low ground attitude. One important point on takeoff is the comparatively long ground runs, particularly on hot days. This is due to the constant thrust characteristic of jet engines as well as the fact that the great power of the jet engine in flight permits high airplane loadings.

However, once airborne the critical emergency characteristics so notorious on over-loaded reciprocating engine airplanes are much better on a six-engine jet plane. Once in flight things get better in a hurry on the jet.

The characteristics of an airplane in rough air tend in the long run to have more eventual influence on a pilot's opinion than some of the more spectacular phases of flight. The B-47 is very much less disturbed by turbulence than non-swept wing bombers. One of the characteristics of swept wings is the load-relieving tendency of the wing tips, and in rough air wing flexibility is quite apparent. The pilots can see the wing tips and outboard nacelles "riding the bumps" while the cockpit is riding smoothly. Such a characteristic, of course, provides a more stable bombing — and riding — platform.

Faster Landings

By far the most training of jet pilots must be spent on the landing phases, a necessity because of several factors. The very high level flight speed requires a longer time for the airplane to slow down. The higher wing loadings possible in jet airplanes and the somewhat lower wing maximum lift result in higher stalling speeds.

Incidentally, stalling characteristics of the B-47 are good. Straight wing airplanes often have an abrupt stall, caused by the whole wing "letting go" at once, but this undesirable condition rarely exists on a swept wing where some sections hold on for a long time. Stall warning on swept wings is usually more pronounced, with a wider speed band, and because of this there is little excuse for inadvertent extreme stalls on the B-47.

Rapid descents from altitude are made with the landing gear down. The flaps are put full down in the landing pattern, which is slightly wider than for a B-29. On final approach the pilot must maintain the desired airspeed more carefully than on past airplanes to avoid using excessive amounts of runway and to still maintain an adequate margin over the stall.

Admittedly, one disadvantage of the tandem landing gear is that the speed range in which smooth landings can be made is more limited than on other types. It is obvious that with the tandem gear the airplane cannot be landed at a speed much higher than that for simultaneous contact of both gears. Touching the front gear first with an appreciable rate of descent will result in a bounce back into the air, or will at least prevent enough load being applied to the wheel to permit effective braking.

Why the tandem landing gear, anyway, it may be asked? For one thing, neither jet nacelles nor the wing are big enough for a main gear such as is required to carry the load of the B-47, but a gear retracting within the body is necessary. For another, a tricycle gear meeting this requirement has several disadvantages when applied to the B-47. It would make for a poor internal arrangement in that the main gears must be near the center of gravity, and when retracted in the body would be in the same place where the bomb load should be. Also, the tread would be narrow, giving poor protection to the wing tips.

As it is, the aft location of the rear gear affords increased protection to the tail and wing tips in a nose-high landing, while the wide tread of the outriggers provides good lateral stability.

All in all, with its simplicity, lack of vibration, smooth ride and comparatively low cockpit noise, the B-47 is a lot of airplane, and it appears that a lot of them are going to be flying in the future. ●

THINK before you blast that throttle

A REFLEX ACTION with most F-51 aviators is to "clean out" that Allison at the slightest indication of roughness . . . you know . . . "give it the needle, 3000 and 61 . . . regardless."

There is no need to panic the first minute that purring monster starts to hiccup! Many an airplane with swallowed valves or broken valve springs has made a safe, albeit rough, landing. For instance, a tow ship recently made three passes at the field trying to drop the target, and all this time the engine had swallowed a valve. The pilot didn't jam on power to "clean out" his engine, he just let it run as long as he could. Yet, just the other day, a pilot, moments after having had *full power* for takeoff, jammed on full power again to "clean out" a slight roughness in the engine.

Here the result was that all the coolant spurted out the stacks, with a forced landing to conclude the caper.

T. O. 01-60J-70 is quoted as follows: "After each 30 minutes of continuous cruise operations:

• Clean out engine at 61 in. Hg., 3000 RPM for one continuous minute;

• Before landing: clean out engine at 61 in. Hg., 3000 RPM for one continuous minute."

When you advance the throttle, move it smoothly. If you still have a rough engine after the clean out, reduce the power to the best operating setting and head for the nearest runway.

The coolant system of the V-1650 engine used in the F-51 gives concern to men who fly it. The reason is obvious, but not so obvious as the reason for engine failures, particularly those failures that produce a burning through the side of the engine, which usually burns out through the side of the block in the area adjacent to No. 5 cylinder, both "A" and "B" banks.

A personal theory concerning this, based upon an attempt to lengthen the life of the engine, is submitted for the consideration of FLYING SAFETY's readers.

The most important preflight check of the V-1650 engine is the check made of the coolant system contents, both header tank and after-coolant tank.

This check is made when the engine is cold and at this time, coolant is added when needed.

Coolant Level Low

Let us now examine the system and determine what would happen if the engine were run when the main coolant system level is low.

The engine is located in such a manner that the combustion chambers are not surrounded by coolant if the coolant level is low. This is due to the nose-high, tail-low attitude of the air craft when parked.

If the coolant is low enough it will barely prime the main coolant pump.

We now start an engine that is low by about five gallons of coolant. We build a fire in each cylinder and the engine operates, but there is nothing to carry away the heat.

The engine continues to operate, and the temperature increases.

The coolant pump throws small amounts of coolant into the system and this hits the white-hot cylinder walls and vaporizes.

The steam, in turn, creates pressure in the system, the coolant expands, and after several minutes of operation there is sufficient expansion to carry coolant around the cylinders and cool the engine.

But, the *damage* has already been done.

Hot spots have been created in the coolant jacket and surrounding areas. These do not immediately become apparent, but they cause trouble *later* when the engine is asked to deliver a maximum load.

Probably you are now wondering why such a condition should be permitted, if the mechanic performs the preflight check.

The answer is that the *mechanic* performs the preflight check, but when the aircraft goes cross-country and RONs at a field where F-51 maintenance may not be readily available, the *pilot* may start the engine the following morning without performing inspection of the coolant system.

We have found, both through personal experience and through a survey of F-51 mechanics, that a slight coolant leak, plus a wind to aid in evaporation, will lower the coolant level in the system by several gallons in a 12 to 18-hour period without an appreciable amount of coolant showing on the ramp under the airplane.

In my opinion, we can substantially reduce the number of failures on the V-1650 type engine if the pilots going cross country would check the contents of the coolant system before starting the engine.

Bear in mind that you just have to run an engine that is low on coolant *once* to start a chain of events leading to future trouble. ●

weather wring out..

INTO the thunderstorm headed the F-84-G. Plotted by a special radar control unit, and in constant communication with ground control, the pilot of the airplane called in to advise that he planned to make several penetrations of the cloud at various altitudes. One hour later the F-84 slid down through the overcast, and finished up a smooth GCA run with a night landing on a rain-slick runway.

The pilot, a member of the Phase V Test Section at Wright-Patterson Air Force Base, climbed out of the cockpit, checked his aircraft for damage, and went back to his office to write up the fifth phase tests on the flight.

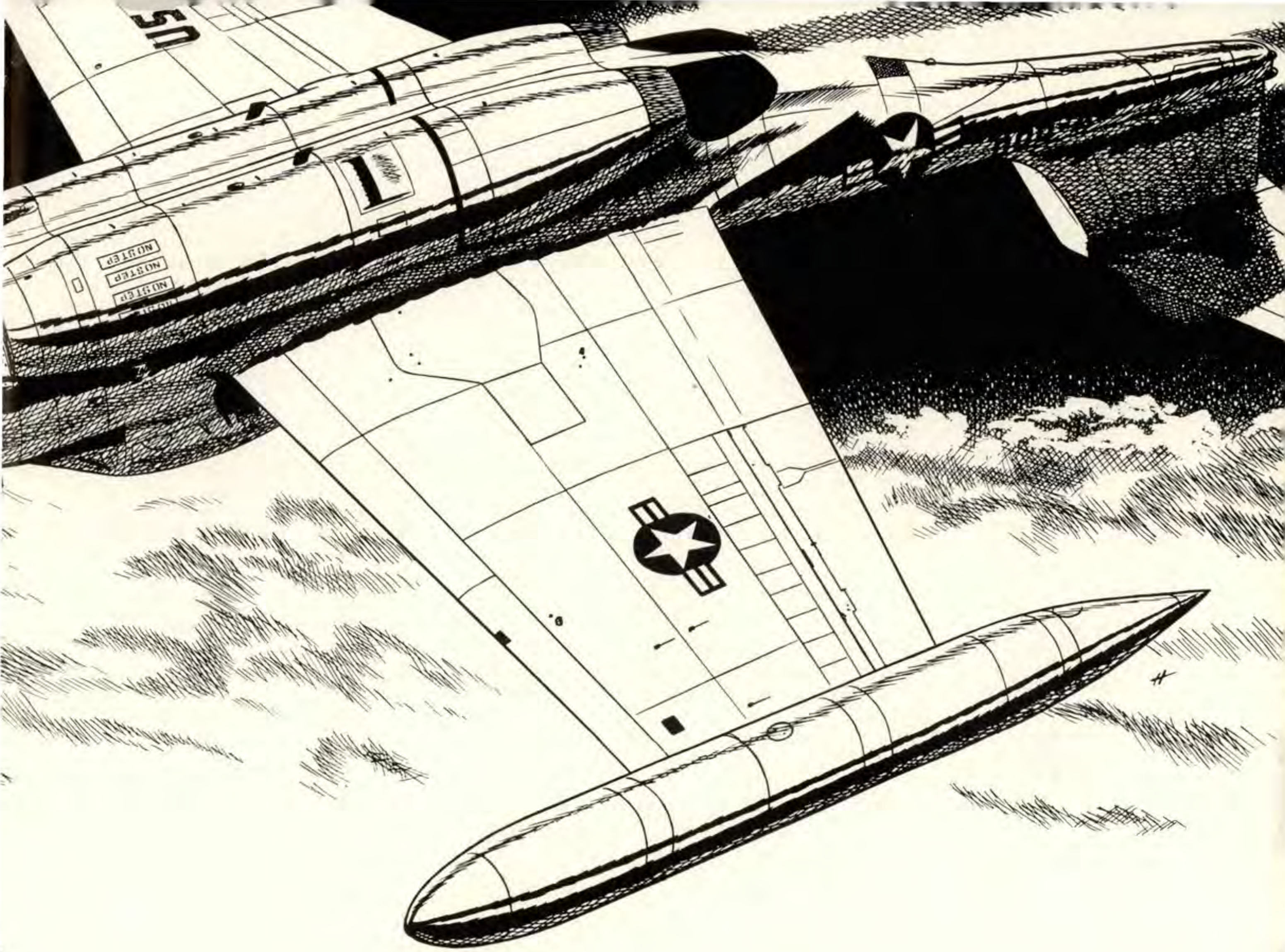
The mission of the Fifth Phase Test Section is to determine the all-weather capabilities and limitations of all new production aircraft. It is one link in the chain of exhaustive tests flown on all models and types of USAF aircraft from the L-19 to the B-47, to determine suitability for instrument flight.

Of equal importance to tactical units is the production of recommended pilot techniques and procedures for all phases of instrument flight which the aircraft mission requires. The ultimate goal is the achievement of an all-weather Air Force, capable of fulfilling the worldwide commitments of USAF combat units.

The Phase V Test Section participates in every stage of new aircraft development. When the aircraft is first proposed, two Phase V pilots are assigned, one as project officer, the other as an assistant project officer. The project officer is responsible for reviewing all the specifications of the proposed aircraft and decides whether or not they will meet the Air Force's needs, as they pertain to weather flying. The purpose of this is to get all the Phase V ideas on instrument needs into the plane design while it is still on the drawing board.

The project officer then goes to the mock-up board and acts as technical advisor on the all weather aspects of the aircraft. Here he will write up "requests for alterations" and submit them to the Board. Action must be taken by the Board on all write-ups either approving or disapproving the recommendations.

The third stage is the actual flying of the production aircraft at the factory. Evaluation tests are run, using all the standard test checks such as photo panels, wire recorders and radio to supplement the pilot's per-



sonal evaluation. A production model of the aircraft is then assigned to the Phase V Section and the project officer ferries it from the factory to Wright-Patterson.

After the tests are flown and the results compiled, two reports are written. One, the evaluation report, gives the findings of the tests from an instrument flying viewpoint, in outline form. Recommendations for changes and engineering data are included in this report.

The other report is actually the pilot's operating instructions, which are prepared and written for the "dash One" tech orders in the all weather section. This report is sent out to the field, after being thoroughly discussed and evaluated and approved by the Phase V Section. If necessary, the report is revised by the Operations Branch of the Flight and All Weather Test Division. The report is sent to the field prior to being printed in the tech orders so that tactical units will have the benefits of the findings as soon as possible.

Units Advised

Finally, the All Weather Indoctrination Board sends the same pilots that participated in the tests to the tactical units scheduled to receive the aircraft. These pilots give a complete briefing on all phases of the tests and the results. Their lectures are supplemented with performance charts, slides, movies and question periods. Pilots of the tactical organization have an opportunity to question the test pilots on anything contained in the operating instructions or on any specific phase of the test. They are told just what will and what will not occur with different power settings and configurations while on instruments. Instruments in the aircraft are evaluated for performance and the test data figures given in detail. These briefings are important, in that a pilot who will be flying a given aircraft under weather conditions has an opportunity to discuss it with people who have flown it in adverse weather.

Target data on the actual test flying is geared to three months with approximately 75 hours flight time on the aircraft. The tests are concerned strictly with instruments and instrument flying, with specific tests outlined for each flight. For example, an aircraft is flown at a specified configuration to determine exactly how much fuel is needed to make two GCA runs after a letdown from altitude. The fuel used in each stage of the operation and the time consumed for each stage is then included in the pilot's operating instructions for that aircraft so the pilot will know exactly when to start the letdown and how much fuel he will have in reserve after shooting two GCA's.

The test program is divided into three stages:

The first or preflight stage includes the general planning, the proposed flight schedule, provisions and requirements for the reports and instrumentation.

The second or flying stage is divided into three parts: transition, VFR tests and IFR tests.

The transition starts with the project officer and his assistant being checked out in the aircraft at the factory. After ferrying the aircraft from the factory they check out the other pilots in the section.

The test pilots are required to make assessments and evaluations of the new aircraft even during this transition period, particularly after the first flight, as it is felt that first impressions are extremely important. In this primary assessment, eight points are considered. In general terms, these boil down to visibility, ground handling characteristics, takeoff characteristics, general handling and stability, approach characteristics, instruments and navagational equipment limitations, and night flying.

After this preliminary assessment has been made, a detailed program based on the information already obtained is drawn up to decide the limits within which the tests are to be carried out.

The VFR stage is to determine techniques to be used in carrying out the various phases of instrument flight before the practical tests are run under IFR conditions.

In the IFR stage the techniques and procedures decided upon during the previous stage are first tried out under the hood. This is done to check the VFR results under conditions where, if anything goes wrong, rapid recovery can be effected by removing the hood or goggles. During these flights under the hood, a safety pilot is carried in multi-engine aircraft while a pacer aircraft is used for fighters.

Finally, the tests are flown under all possible types of IFR conditions, using the techniques perfected in the previous test flights.

Cross-Wind Landings Checked

Instrument takeoffs into the wind and cross-wind are made with various configurations and CGs used. Recommendations are made for the best trim settings both on takeoff and for initial climb after gear and flaps have been retracted. Climb to cruising altitude using different configurations, instrument settings and cockpit procedures are made many times to investigate and evaluate the aircraft's handling characteristics and the best trim settings.

Turns at low and high altitudes are performed with power settings varying from maximum continuous power to maximum cruise power and minimum allowable power. Determination is made of the maximum angle of bank allowable on instruments, best angle of bank, stability and control characteristics of the aircraft in an instrument turn, the IAS at the various power settings at cruise altitude, instrument turning errors, if any, and an evaluation is made of the flight instrument presentation.

Letdowns are gone into in great detail, and standards are established for the best letdown airspeeds, the proper aircraft configuration, the maximum safe letdown airspeeds and for the recommended rate of descent. Included in this stage of the flight tests are the best angle of bank during descending turns, time of descent and the overall handling characteristics of the plane during the letdown.

Great care is taken to establish complete approach procedures, giving the same data as described for the letdowns, for radio range, non-directional radio beacon, GCA and ILAS approaches. An important part of the approach tests is a recommended ceiling and runway length for GCA approaches and the establishment of missed approach procedures.

Other tests include all types of icing conditions and turbulence, thunderstorm penetrations, unusual maneuvers and acrobatics on instruments, simulated operational missions and emergency procedures. All these tests are run under every possible configuration and weight condition possible to determine the aircraft's handling characteristics in any situation.

Flight Safety Factors

There are many flying safety angles built into the test program. It goes without saying that all the Phase V pilots are extremely proficient in instrument and night flying. Typical demands on their flying skill include being told to hold the miniature aircraft on the artificial horizon exactly one-eighth of an inch above the lubber line or to hold an unwavering rate of descent and airspeed for a given length of time while maintaining a three-quarters needle width turn. That they can and do fly this kind of precision instruments is proved by the photo panels used to supplement the test pilot reports written up after each flight. This skill comes from the high experience level in the section and from the constant practice and careful transition given

Capt. R. M. Fernbaugh, Instrument Research engineer, prepares for test hop.

All test flights are monitored by Maj. O. W. Baron, Section Chief.

Project officers are given a thorough factory checkout before starting test program.

each pilot on each aircraft to be flown.

Another aspect of the safety angle is the factory checkout given the project officer and his assistant. They are thoroughly indoctrinated in all aspects of the aircraft by the factory's test pilots and engineers. Upon returning to the base the project officer makes out extensive questionnaires on the new aircraft and discusses the plane thoroughly with the other pilots in the test section. Pilots fill out the questionnaires and any mistakes are gone into thoroughly to insure that everyone is indoctrinated in all aspects of the aircraft. Rigorous cockpit checks are given before first flight, after which the main flight characteristics and all emergency procedures are reviewed again. Finally, the project officer goes to the tower and controls the entire first flight.

Check Lists Stressed

Check lists are continually stressed as all the Phase V test officers eventually fly most of the aircraft undergoing tests. While the project officers fly most of the tests on their assigned aircraft, supplemental flights are made by the others in the section to confirm and supplement their findings.

Another safety aspect is the excellent maintenance performed on each aircraft. An aircraft is given a real shakedown inspection before each flight, with the emphasis being on preventive maintenance. An example of the care given each aircraft is the preparation taken for a thunderstorm penetration test. Engineers in the structure lab make tests to determine the best penetration speed of the aircraft. Meanwhile the Phase V engineer runs independent tests to arrive at a figure which is cross-checked with the lab people. The test pilot is then briefed on their combined conclusions as to the proper penetration speed and told all the possibilities that may occur structure-wise in the thunderstorm under various conditions. In this respect, it has been found that a good rule-of-thumb penetration speed for most tactical aircraft is about 50 knots above stalling speed. However, this is not a steadfast rule for all aircraft.

All test flights are monitored on a two-way radio in the Section Chief's office. This enables him to check on all test flights from a safety angle as well as from a progress viewpoint. In the event of trouble, it is possible to make suggestions to alleviate or "fix" the condition as well as to change the test flight to meet possible emergency conditions.

An important part of Phase V work is the testing of old and new instruments in various aircraft. Frequently, new instruments are tested and evaluated in as many as seven aircraft before any final conclusions are drawn.

Pilots' Eyes Tested

Another test program of interest to pilots is the instrument research tests being conducted in conjunction with the Aero Medical Laboratory. It involves the placement of instruments in the instrument panel in relation to eye movements by the pilot. Movies are taken of a pilot's eyes while he is flying instruments to determine which instruments he looks at more often and between which instruments the greatest amount of cross-checking and eye-shifting is noted. Accurate charts are kept to show which instruments the pilot is most dependent upon under all conditions of instrument flight. On all test flights, pilots are given special questionnaires to fill out on instrument panel arrangement and on any new instruments, asking for suggestions and improvements.

The purpose of the tests is to establish a composite instrument panel for future aircraft designs that will best suit the majority of pilots. It also sets up an interim panel modification that ultimately results in established and standardized cockpit layout. ●

...VFR

..IFR

By 1st. Lt. Charles Konigsberg, 95th Fighter Interceptor Squadron, Andrews Air Force Base

DARKNESS had failed to lift the daytime siege of heat and the summer haze hung on like a hangover south of the Equator. Through the windows of his cab the tower operator could barely discern the navigation and fuselage lights of the F-94 flashing overhead even before he heard the call, "three-three-zero on the break." His reply was almost automatic. "Three-three-zero, you are cleared to land number two following a B-25 now on final. Call base."

The pilot acknowledged, "three-three-zero, roger." These were the last words heard from 330 that night —or any other night. The haze swallowed up the 94 and the pilot and radar observer it had carried on an intercept training mission.

Investigators could reach only one conclusion: The pilot had concentrated so on maintaining visual contact with the runway after his break that he had failed to check his altimeter or other instruments and had flown his airplane into the ocean on the downwind leg.

The young pilot had disobeyed what should be a cardinal rule of flying:

Don't try to fly contact and IFR at the same time.

When he broke from his initial approach and went over the water where there were no lights to give him horizon reference, he should have gone on instruments and remained there until he had established positive visual orientation on the downwind leg. In straining to look over his shoulder to keep the field lights in sight, he erred fatally. It takes little time to lose 1000 feet in a jet and this pilot ran out of altitude while his head was turned away from the instrument panel.

Consider Formation

At times, fortunately, this kind of story has a happier ending. Consider for a moment a flight of four, in loose formation, on a cross-country training mission. On course ahead a cloud layer is observed. Leisurely, three pilots begin to close in on the leader to stay tucked in while flying through the clouds. But No. 4 hasn't quite caught up when the other three enter the layer. He pulls off about 30° and immediately thereafter penetrates the layer. He is still looking in the direction the others have taken when he finds he cannot interpret his instruments quickly enough to prevent the steep spiral he enters so suddenly. But Dame Fortune is perched on his shoulder. He loses 3000 feet but he is now below the cloud layer and is able to level out his fighter visually.

In other circumstances, the No. 4 man might not have been so fortunate. Yet the incident could have been avoided had he gone on the gages before he actually encountered the instrument condition.

In the sudden transition from VFR to IFR there is an element of risk, particularly the risk of vertigo. It is wise, therefore, to go on instruments in advance of the necessity, it being virtually impossible to be contact and IFR simultaneously. Stay on the gages and believe in them until absolute VFR is re-established.

There is on record the story of the interceptor that descended through a hole in an overcast and let down into a transport flying just below the clouds. The hole was large enough to permit a VFR descent; hence, the pilot's action was legal. But several men and two aircraft were lost permanently because he preferred a hole in the overcast to an IFR letdown.

The heart of incidents such as these is that it reflects an inexperienced and immature attitude which many pilots have toward instrument flying.

Surely, an anachronism must exist.

....and in between

Current training and policy are much improved over precept and principle of the past. And yet this progress, it seems, inadvertently dictates that the hole in the overcast is to be preferred to instrument flight. To be sure, it is axiomatic that the best way to fly weather is to avoid it. But is the hazard of flying instruments greater when the alternative is the hole in the overcast, especially if that hole suddenly is filled with another airplane, or gives way to a cloud with a granite center?

This is not an attempt to advocate unwise, or even unnecessary, weather flying, although parenthetically it should be noted that the satisfaction one feels upon completing successfully an instrument flight and letdown under exacting conditions is one of the highest rewards of flying. But we do fall short of promoting a mature attitude toward flying weather.

Our instrument training and schools are excellent; our techniques are without peer. But after the pilot has attained the required level of proficiency in basic instruments and procedures, it is primarily the psychology with which he approaches the challenge of actual weather that determines — in many instances— whether he survives, and whether he saves or loses a valuable airplane.

Mature Attitude

To develop a mature attitude toward weather flying is not easy. One step might require that training schools conduct actual, supervised weather flying in addition to the in-and-out of thunderstorm flying so briefly accomplished now. The problem is not without solution, even for fighter pilots. The T-28 and T-33 are practical training aids when a qualified instructor is present. Moreover, it would be valuable were all pilot trainees—including single-engine men —to fly extended weather flights as copilots in multi-engine aircraft in order that they might acquire confidence in the gages.

Experience of this kind should teach the pilot to *think* IFR as well as to *fly* IFR. It should teach him that he can believe in his instruments, and it should teach him to use them. Apparently not all do. I recall a pilot who remarked, after a night training mission, that he was going back to his airplane to write up the fact that the turn and bank lights were out. Another pilot, who overheard the statement, exclaimed: "Holy cow! How do you ever notice those little things?"

Practical experience acquired in actual weather under competent supervision would be helpful to the young pilot in another way. It would teach him the importance of "visualization," that factor that the veteran weather pilot acquires and which enables him to know at all times his position in relation to the station and field on which he is letting down, not merely in terms of headings, distances, relative bearings and rate of descent, but "visually" in his mind's eye—as if he were performing the letdown VFR.

The new pilot who goes into multi-engine aircraft will have the benefit, usually, of an apprenticeship as copilot before he is called upon to command an aircraft under IFR conditions. He will have more time to learn and absorb at the knee of an expert.

But the young pilot, fresh from graduation, who goes into fighter aircraft will not have the same opportunity. Yet he has the right to expect supervision. By any other name, perhaps it will still spell out on-the-job training. I like to think of it as "supervised experience."

1000 JUMPS for

One for the money, two for the show—professional jumpers at the El Centro Parachute Test Center daily are making test jumps of new parachutes.

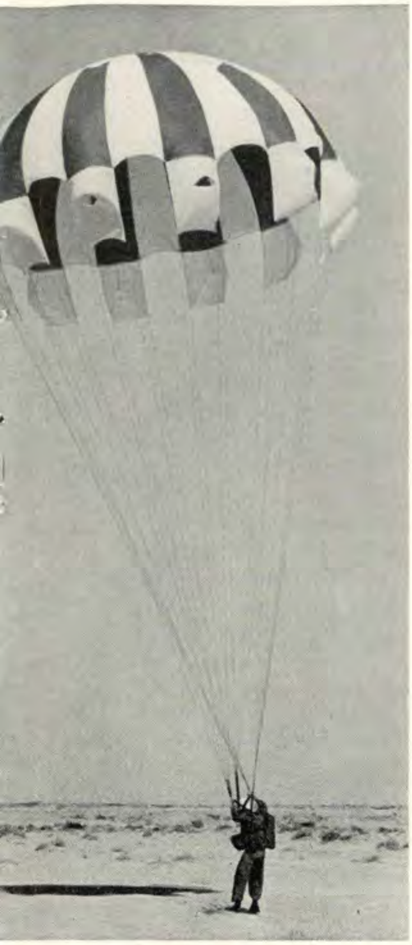
THERE are many ways to make a living that do not appeal to the average man. Few choose to make a career of fighting bulls or getting shot from a cannon. Not many relish getting paid for walking a tightrope, sans net, or exploring the ocean floor in a diver's suit. And high on the list of jobs people don't want is the career of parachute tester. The professional Air Force and Navy jumpers at El Centro, California, swear that test jumping is a pretty safe occupation; they point out that the 'chutes have been tested with weights before they jump them and that they have a safety 'chute on in case something goes wrong. All of which is very true, but from the laymen's viewpoint it still is a career that takes much moxie on a day-by-day basis.

The men making these test jumps are part of a joint Air Force-Navy team whose primary mission is to test new parachutes designed for service use. The Air Force unit is known officially as the 6511th Parachute Development Test Group and the Navy's official title is Navy Experimental Parachute Unit. The responsibilities of the joint Air Force-Navy operation are divided equally between the two services. The Air Force operates the 140-foot drying tower, whirl tower, paragun and instrumentation lab while the Navy runs the wind tunnel, textile lab and machine and metal shops and is responsible for taking pictures of all tests. The fabric shop and packing loft are operated jointly.

Typical Test Jump

A recent test jump illustrates the cooperation between the two services at the test center.

Primarily, the jump was made to



Safety

test a newly developed one-man life raft pack attached to a standard seat 'chute. This raft is designed for use in aircraft with restricted cockpit space. The aircraft used by the jump team was a Navy C-47 flown by Air Force pilots, with a Navy jump master and three Air Force jumpers. Two Navy boats stood by waiting to pick the men up after they bailed out over the Salton Sea, the area used for water jumps.

The two boats moved well away from shore, checked equipment and fired a signal flare to notify the aircraft that they were ready to pick up the first jumper. The first man out merely made a drift jump. That is, he jumped to determine the wind drift so that the pick-up boats could be in position to get the jumpers as soon as they hit the water.

The two men fitted out with the experimental equipment then jumped in turn after signal flares were fired. The test was to determine convenience of the pack for wear in aircraft —does it creep up the wearer's back, slip from side to side, is it comfortable; effect of opening shock—does the pack stay on the wearer's back, is the material strong enough to retain the raft during opening shock: and the effort and time to inflate and board the life raft. As a further test, one jumper, Warrant Officer Lawrence Lambert who is an experienced parachute tester, and the other, Lt. Col. John E. Blake, Executive Officer of the Air Force unit, made his first jump. By matching the speed of the experienced tester against that of a pilot making his first jump it was possible to determine the feasibility of using the raft as standard equipment.

Primarily both test units at El Centro are concerned with new ideas and new designs, new clothes and new ways of using 'chutes. Over the past few years dozens of new 'chutes have been tested and failed to meet the rigid service standards.

Both the Air Force and the Navy units, as well as testing 'chutes, run training programs for new jumpers. These embryo jumpers are chosen from the men assigned to the various sections of the two units. They may be riggers, carpenters, photographers or in any of several other support functions when they start to jump. That they don't all qualify for jump wings is fairly obvious. Some don't have the aptitude to make successful test jumpers, some decide they don't like it as a career, and some turn up plain scared. The first five Air Force jumps are made using a static line operated troop 'chute, which experienced jumpers claim is actually a lot rougher than a straight free fall because of initial shock.

Extensive Program

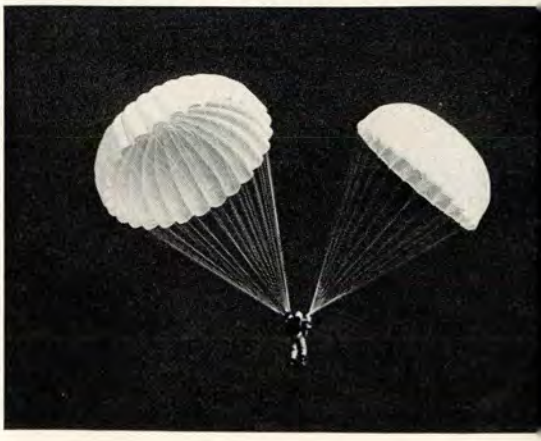
The need for these trainees is evident when the test program for any given 'chute is explained. These people don't just try out a 'chute ten times or so and then label it okay. They keep jumping it, first with dummies and then with live jumps, till they have at least 1,000 live jumps on it. After the 'chute has a thousand successful jumps on the log they admit it may be acceptable for service use.

Most of the land jumps are made in a desert target area about ten miles from El Centro while the water leaps are made in the Salton Sea. On any given day the jumps may cover a wide variety of tests ranging from trying new 'chutes and harnesses to checking a canopy quick release or a quarter bag over the skirt to slow the opening time. Most jumps are made at 3,000 feet, though some employ long free falls, and others are made below 1,200 feet.

During the test jump mentioned above, eight other men jumped as well as the drift jumper and the two testing the life raft. Several were men getting experience as jumpers, three were making their first jump and two others jumped wearing immersion suits. As with every other test jump, movies and stills were taken of all phases of the jump, from the time the men left the plane until they hit the water. These pictures are analyzed and often come up with some facts in variance with the jumper's reports. A jumper may feel sure that he was facing downward or in any other direction when the 'chute opened only to have the movies prove beyond a doubt that he was in a completely opposite position when the canopy popped open.

When the regular test men hit the ground, there are always plenty of witnesses available This is because the old pros who can't maintain balance after hitting the sand must furnish liquid refreshments for the rest

Jumper has popped his second chute during descent as a safety measure.



of the jumpers. Needless to say this is not a practice recommended for the average airman making a necessitated bailout. Another point of pride with the professional test boys is that they hit the 100-foot white bullseye inscribed on the desert floor.

Experienced jumpers say that no two jumps are ever alike. One test of a 'chute may show little opening shock and a rate of descent that allows the jumper to touch down and walk away with no more trouble than stepping off a high curb. Wind shifts and temperature changes a short time later may cause the same man jumping the same parachute to experience opening shock severe enough to cause brush burns on the arms or let him hit hard enough to knock the wind out of him as effectively as a punch to the solar plexus.

Dummy Drops

All new parachutes are subjected to stringent tests, some of them designed to destroy the 'chutes. Many tests are made using 200-pound, rubber covered dummies shaped like the human torso. When a dummy is dropped, a telemetering set is fastened into the neck of the torso. This set transmits on seven channels to technicians on the ground who interpret the data to show exactly what happens as the 'chute comes down. This data includes such information as what G forces the dummy is subjected to in opening shock, measure tension on the risers, time required for 'chute to open, duration of G forces on the dummy, and rate of descent.

An interesting facet of the program is the research in G forces. While the human body can withstand 100 G for a fractional part of a second, it can not sustain much lower forces for any appreciable time. Experiments now under way to reduce the opening time and consequently the initial G shock are being conducted in extended skirt 'chutes, chain enclosed packs and quarter bags.

The extended skirt 'chute means that the 'chute has a smaller overall opening and that the canopy extends down farther than most present 'chutes. It definitely cuts down initial shock when the 'chute opens and has been dropped successfully from low and high altitudes. The main obstacle in this 'chute is that the shroud lines won't untangle if they are twisted. Until this difficulty is ironed out the 'chute can't be accepted.

The chain enclosed pack incorporates a zipper in place of the old ripcord cable with locking pins and cones which held the cover on a 'chute. The zipper can be freed by disengaging one pin which is attached to a ripcord cable and steel springs built into the pack cover then throw it off the 'chute faster than the old method.

The quarter bag restricts the skirt of the chute until the lines and canopy are fully stretched and, in effect, prevents whip-cracking tendencies when the chute opens.

The Air Force also operates two other devices used to test parachutes at high speeds. One, the whirl tower, rotates an arm and a cable-suspended gondola at subsonic speeds and then releases a dummy. The parachute opens as the dummy is released and lands in the desert. Various 'chutes are tested for their ability to take high speed openings such as they would have after ejection from jets.

Birdseye view of a multiple test jump. Shown here are three opening phases of guide surface chute.

Recovery crew, technicians and cameramen stand by to pick up a test team completing a jump over the desert area.

A specially equipped B-26, with an ejection seat in the fuselage, behind the trailing edge of the wings is used for live ejection tests along with T-33's. This phase of the test program also tests 'chutes used to slow down ejection seats, ejection capsules and special 'chutes for drones and guided missiles.

Airborne Equipment

Not all of the work of the units is connected with personnel 'chutes. Experiments are also concerned with cargo drops and the proper 'chutes needed to drop the tremendous variety of airborne equipment now being used by the armed forces. Tiny 'chutes have been developed that can deliver a canteen or a survival kit to a stranded pilot and huge canopies have been used to lower safely heavy equipment.

Another outgrowth of the unit activity is the organization of an airborne rescue team. This team is used whenever a plane is down in the desert. Four test jumpers and two specially trained medics headed by the Navy's Warrant Officer L. T. Vinson are available in any emergency where a pilot is down.

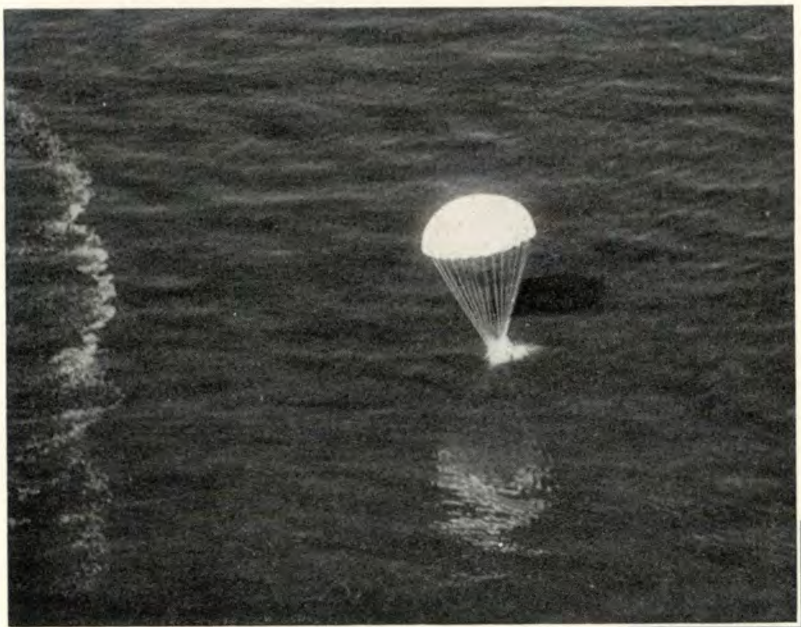
For the Air Force, the four chief jumpers or old pros are Warrant Officers Lawrence Lambert, Mitchell B. Kanowski, and Victor A. James, and S/Sgt. Walter T. White. For the Navy the head men are Warrant Officer L. T. Vinson, official jumpmaster of the base, and PR1 Clarence E. Stedham.

Lambert, Kanowski and Vinson, in an informal discussion, came up with some bailout procedures that can be of great value to the average pilot or passenger in USAF aircraft. The three are well qualified to pass out the straight poop on bailouts as they have over 500 jumps between them! Vinson with 336, Lambert and Kanowski with over 100 jumps apiece.

Bailout Tips

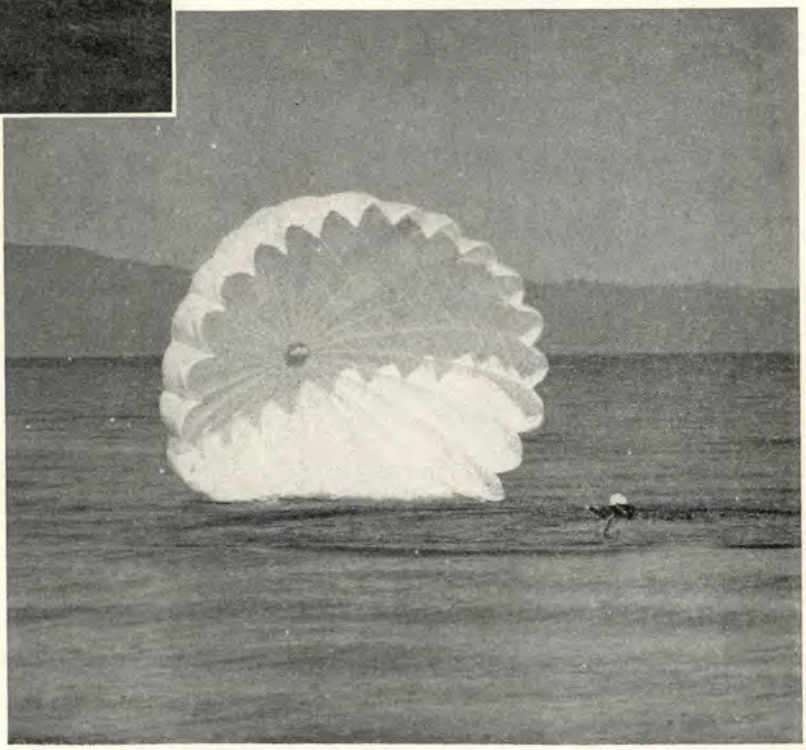
When getting out of an aircraft, use your hands to expedite and assist your exit from the plane, don't keep your hand on the ripcord. Lower the head and get the chin on the chest. This keeps the face and head out of the way of the risers as the 'chute opens and ensures that the jumper will be looking at the ripcord handle. If the ripcord is in view there will be no unnecessary clawing at the harness when ready to pull the ripcord. Legs are kept together to prevent the line from passing between the legs during 'chute opening. Depending on altitude, count about three seconds before pulling. If at low altitudes it may be necessary to pull early and if

Hitting the drink during tests made on new back pack life rafts.



The first man goes out a split-second after the jumpmaster gives the signal.

Jumper collapses chute and prepares to get out of harness after landing.



at high altitudes it is advisable to free fall down to at least 15,000 feet to avoid freezing or anoxia. El Centro jumpers count to three by saying one thousand, two thousand, three thousand.

The trio stated that when getting out of a cargo type aircraft with large doors the best method is to place both hands on the door frame and push off vigorously with the left foot. After pushing off with the left foot, try and swing the right foot out to execute a quarter turn which places the back to the slip stream. Then put head down and keep feet together and arms at the sides until ready to pull the ripcord.

When getting out of a plane with side hatches grasp the sides and catapult out in a rolling motion.

If using a bomb bay or bottom hatch roll out facing forward. This gives the jumper a rolling motion away from the plane.

When bailing out of a fighter or trainer not equipped with ejection seats, jump toward the trailing edge of the wing.

In every case, once clear of the plane keep feet together and elbows at sides to prevent somersaulting and try and open the 'chute when vertical.

On a 'chute with the D-ring on the left side of the pack they use this procedure. As stated previously, keep the head down with the chin on the chest, hook the left thumb under the ring and lift it clear of the body. Then grasp it with the right hand and pull it away from the body. Finally, using *both* hands vigorously pull the ring out and away.

Slipping a Chute

Much has been said at various times about slipping a 'chute but the men who ought to know say that it is an extremely difficult operation to perform for any length of time. A strong man may be able to slip a 'chute for 30 seconds or so but it is very tiring and should be used only when absolutely necessary.

To slip a 'chute pull down on two risers on the same side in the direction you wish to slip. Primarily, slipping should be used to avoid an obstacle such as wires, trees, buildings or bodies of water. Always slip to land short of the obstacle; don't try to get over it if there is a doubt as to clearance.

Try to land with the wind quartering 30 to 40 degrees at the back. This offset to the wind insures a roll on to the padded areas of the body upon landing.

One of the most important parts of a jump is the touchdown. The big thing to remember when about to hit is *to relax*. When approaching the ground, look out at a 45-degree angle, never down at the ground. Veteran jumpers claim that it is impossible to judge height when descending in a 'chute, and say most people get hurt by misjudging distance and trying to brace for impact.

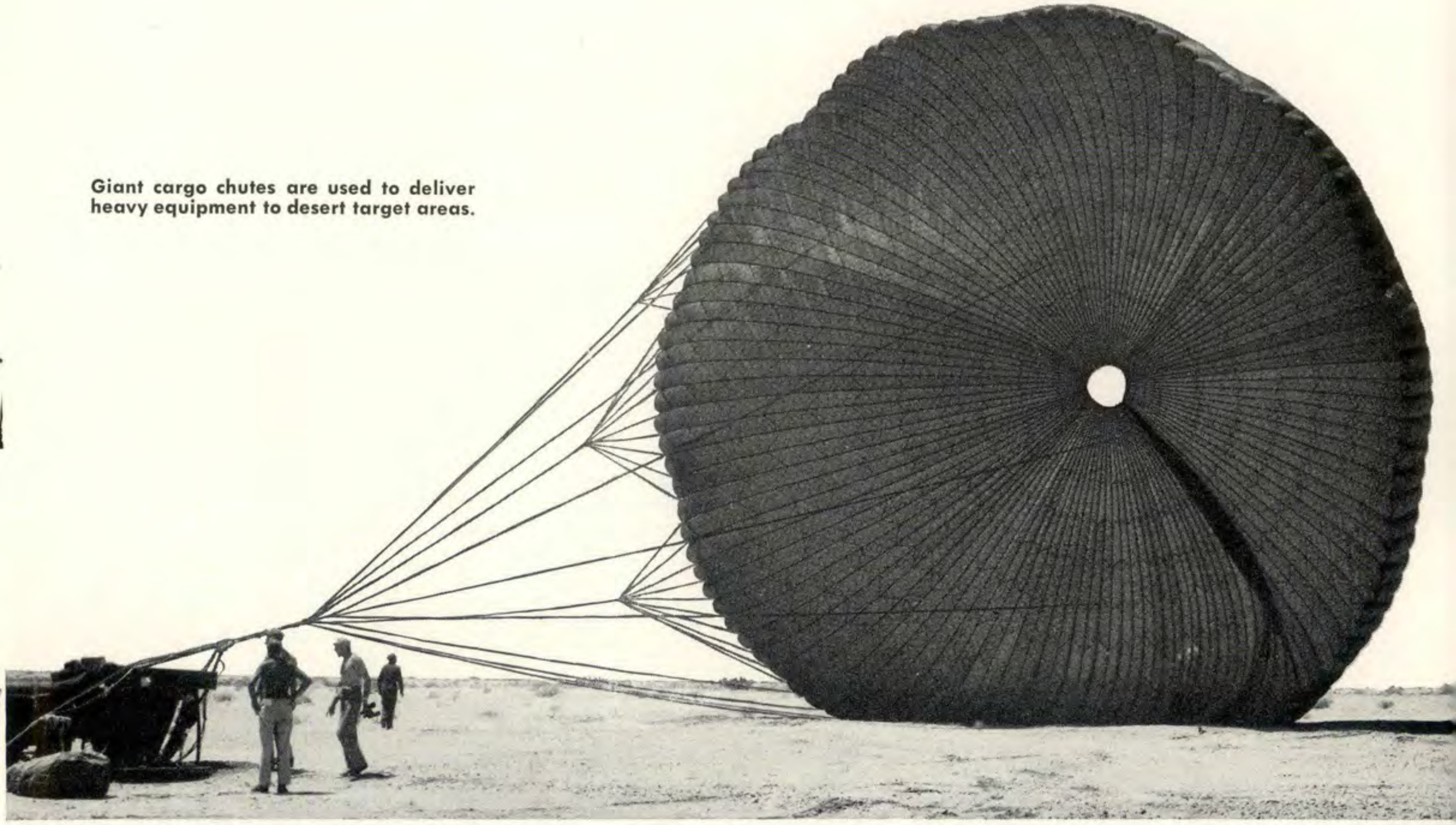
A jumper should try to hit on the balls of the feet and then crumple up and allow the body to sag to the ground, "Like a big, wet dishrag," according to Lambert. "Keep the feet no more than six inches apart and relax, you'll hit soon enough without straining for the ground," Vinson added.

When nearing the ground the big DON'T to remember is not to try and break the fall with either hands or feet. The two big faults of most jumpers are "reaching" and "handstanding." "Reachers" are those who stretch out one foot feeling for the ground and land with one leg rigidly extended. This usually results in a bad sprain or a break. "Handstand-

Less than a minute after landing the jumper paddles his life raft to the boat.

Test jump chutes are carefully inspected and checked before being packed by Air Force and Navy technicians.

Giant cargo chutes are used to deliver heavy equipment to desert target areas.



ing" consists of landing on the feet and then trying to break the fall with both arms extended down. This system is almost guaranteed to break something.

If being dragged, pull all the lines on one lower riser toward you; this will collapse the canopy. Remember—the new Class 3 harness has quick releases which disengage the canopy and prevent dragging.

Water Jumps

If the jump takes place over water it is more important to be prepared to get out of the 'chute upon contact. Get into the saddle or harness seat, grasp the harness at the right shoulder with the left hand and unbuckle the harness snaps with the right hand. The left arm across the body holds the jumper in the seat till all buckles are unsnapped after which the arms should be crossed and opposite sides of the harness grasped. Immediately after hitting the water throw arms over head and stiffen legs to disengage the harness and then inflate the mae west. This technique can also be of use when jumping over lands in high winds. Don't start to disengage the harness until you think you are between 300 to 500 feet.

If a tree landing is unavoidable, cross ankles, point toes down and keep legs together. Turn the face to one side and shield with arms. If any aid is possibly near, stay where you are till it arrives. Nothing is easier than falling out of a tree after making a successful jump.

A final word from the experts concerned clothing. Dress for the country you'll be operating over because if you do have to get out of an airplane things may get pretty rough before you're picked up, if you're not prepared. Be especially careful in your choice of shoes. High shoes not only prevent injuries when hitting the ground but are far better for walking after you're down. And walking is one occupation where it's better with the shoes on.

☆ *Don't forget to check your 'chute while you are still on the ground.*

☆ *Don't forget to check the fit of the 'chute. If you don't know how, ask the pilot.*

☆ *Don't carry it wrong. Carry and wear it the correct way.*

☆ *Don't use it for a stepping stone. Don't kneel or step on it.*

☆ *Don't get your 'chute wet. Protect it from oil, grease and water.*

☆ *Don't throw your 'chute on the ground. Treat it gently, lay it with the pack up.*

☆ *Don't forget your high altitude bailout procedure.*

☆ *Don't forget to fasten your bailout bottle and life raft to your person securely.*

☆ *Don't give the pilot an argument when he tells you to go. JUST GO.*

☆ *Don't leave the plane with your ripcord in your hand.*

EVEN fish gotta have oxygen. Nature has equipped them with a little gismo that extracts the oxygen out of water, and they can go tooling along the finny deep indefinitely . . . until they strike a bright lure. High up in the blue the only source of oxygen is your aircraft oxygen system. Without this hand equipment all sorts of crazy things happen. And you don't have to be cruising at 25,000 feet in order to see spots before your eyes . . . you can go ga-ga at altitudes of lesser magnitude.

Here's how it works out. We are all agreed that the best method of reaching your destination is by the continued use of the old noggin. In order for this appendage to function normally, it must have oxygen. When the pilot receives insufficient oxygen, the brain malfunctions and a state of emergency exists.

Your gray matter contains what it takes to increase the ability to control and coordinate processing of intelligence matters and higher functions of your body. Herein lies your conscious ability to think—the main teletype office which is the headquarters for the processing, cross-indexing and filing of all incoming messages. It also evaluates and approves all outgoing messages.

According to the medical men, the cells in the brain are the most active cells in our body. They require more food and more oxygen than any others. They don't carry a "reserve" supply of food or oxygen, and therefore are immediately impaired when the body suffers a lack of oxygen or energy food. A restriction in amount of oxygen flow to this section of the body causes various malfunctions in the brain which, in turn, produce such outward symptoms as poor coordination, mental aberrations, misinterpretation of audio and visual signals, increased emotional instability, personality changes and many other changes which might affect one individual more than another.

Comparison

Dependent upon the amount of oxygen restriction to the brain and the bodily physical condition of the individual, a severe impairment to the brain can be compared to the confusion that would result in the main teletype office if someone threw all the "immediate priority" messages into the air and kicked all the "in" baskets onto the floor.

The above layman's version leads us into a serious discussion of the importance of oxygen to the pilot in flight.

Paragraph 19 of Air Force Regulation 60-16 says:

"19. *Use of Oxygen.* Crewmembers will use oxygen when the cabin pressure altitude is 10,000 feet or above. Exceptions to the foregoing

OXYGEN
STAY CONSCIOUS

By Maj. James A. Jimenez, USAF, Directorate of Flight Safety Research

Oxygen is required to keep *our* engine running. Oxygen starvation is much like fuel starvation. Without it a state of emergency soon exists.

Under high pressures in the altitude chamber these men learn about the use of oxygen.

may be made for *aircraft not normally equipped with oxygen*, only when ascent to higher altitude is necessary to clear high terrain, provided that the altitude is not maintained for more than one hour. Crewmembers will be encouraged to use oxygen on prolonged flights when cabin pressure is over 8,000 feet; passengers, when the cabin pressure altitude is above 10,000 feet. In no case will an aircraft be flown above 14,000 feet without oxygen."

This paragraph has been very widely misinterpreted by the pilot. The last sentence, "In no case will an aircraft be flown above 14,000 feet without oxygen," has undoubtedly caused many a pilot, indirectly, to remember 14,000 feet as the maximum altitude to fly without oxygen.

In many organizations, perhaps in your own, you'll find pilots who won't hesitate to fly at altitudes above 10,000 and below 14,000 without oxygen. A general feeling of complacency has resulted over the years about oxygen use in the "danger zone," 10,000 to 14,000 feet. This complacency has arisen due to logistics problems in some organizations and due, in great part, to the ignorance of pilots and Ops officers in the dangers of flight without oxygen.

The greatest contributing factor to this ignorance is the fact that very few pilots who have been physically impaired by lack of oxygen have realized it! The most dangerous effect of oxygen-want is that the affected pilot is lulled into a false sense of well-being—a mental aberration such as might be compared to that of a person heavily loaded with an intoxicating alcoholic beverage. He feels "extremely well" and doesn't have the slightest idea that his judgment is off or that his coordination is affected. In extreme cases of oxygen-want, *he suffers from lack of memory*, his reasoning processes slow to zero, and if the truth were known, "he couldn't hit the ground with his hat!"

Not Humorous

Humorous as they may seem, the described effects are pathetically and dangerously true. Any flight surgeon will attest to their validity and add a few more thousand words about the subject which will make your hair stand on end.

He might add that though there are definitely defined stages of "hypoxic hypoxia," a person's tolerance to hypoxic conditions may vary from day to day, according to his physical and mental condition at the time that he suffers from oxygen-want.

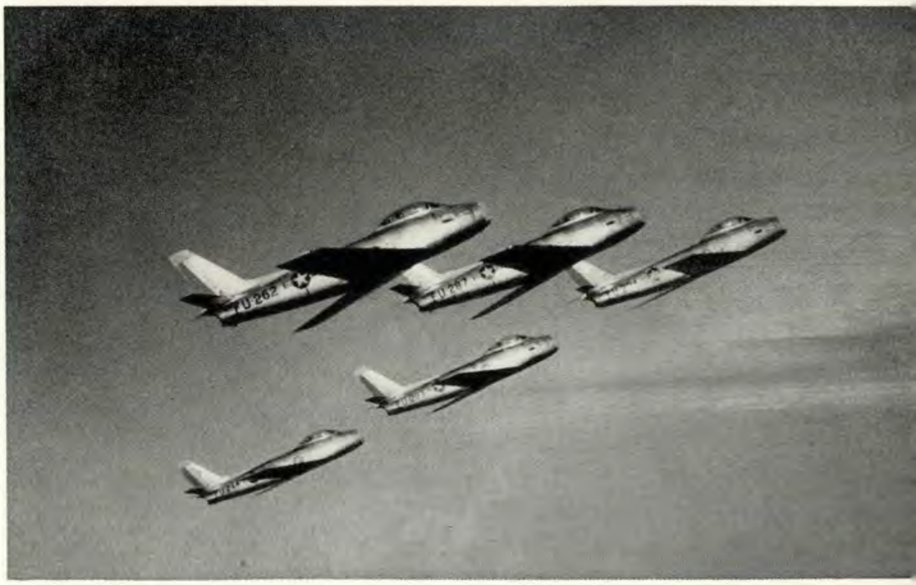
Two pilots, for example, sitting in the same cockpit, might exhibit entirely opposite reactions at high altitudes without oxygen. Individual variation in the ability to withstand hypoxia is considerable and accounts for variations in "ceilings." Physical fitness and acclimatization from residence at high altitude raise an individual's "ceiling," while apprehension and lack of adequate physiological compensation by the respiratory and circulatory systems lower it.

Inexperienced personnel collapse more frequently at intermediate altitudes than do experienced individuals. In this case, the factor involved is psychogenic. In other words, anxiety caused by a feeling of incapability would, in turn, reduce a pilot's ability to resist the effects of oxygen-want.

In an accident involving a C-47, a check of the pilot's IFR clearance disclosed that he had flown for approximately two hours and eight minutes at 10,000 feet on the last leg of his cross-country flight. In his last radio contact, the pilot stated that he was at 13,000 feet. With the time of the accident being fairly well established within five or ten minutes, it can be reasonably ascertained that he flew at 13,000 feet for twenty or twenty-five minutes. Severe turbulence and up and down-drafts in this area may have forced him from 13,000 feet down to 9,000 where he struck a mountain, or he may have erred in

Set for a high altitude mission, this pilot is ready to go on oxygen anytime.

Effective range of pressure-demand equipment is limited, but it may be used safely up to about 42,000 feet altitude.



judgment by descending prematurely to that level.

There are a number of other factors to consider, and the final report is not yet written, however, one other question must be considered. Was this pilot affected by lack of oxygen? No one can positively state that he was affected by lack of oxygen, but the possibility exists. Another very good factor to consider is that if suitable oxygen equipment had been available aboard the aircraft, the pilot might have elected to fly at a higher altitude above the mountains.

In another C-47 accident, the pilot was briefed on severe icing at 12,000 feet, but requested and received that altitude on an IFR clearance. The wreckage of this aircraft was later found at an elevation of 10,500 feet MSL on a mountainside. According to the pilot's last radio contacts, the accident occurred three hours and thirty minutes after the pilot received his IFR clearance.

Three hours and thirty minutes without oxygen at 12,000 feet—severe icing. There was no oxygen available in the aircraft. What could have prompted this pilot to fly at the minimum en route altitude on that airways when he had been briefed on severe icing at 12,000 feet? Obviously, the best altitude was on top at about 16,000 feet—with oxygen.

On this same day within a twelve-hour period, six other aircraft with oxygen aboard flew along this same airways at altitudes from 17,000 to 20,000 feet. They were on top of the overcast and encountered no difficulty. What effect do you think oxygen would have had on this flight? Would *you* have cleared at 12,000 feet in severe icing conditions if you had suitable oxygen equipment aboard? Would you, as clearing authority, have cleared this flight without oxygen?

Another pilot filed IFR over a mountainous route in December, 1951. The wreckage of his C-47 was located the following May on a mountain peak along the route. Heavy, clear icing was reported on the day of the flight between 6,000 and 12,000 feet. This pilot, without oxygen, was flying IFR at 10,000 feet, the minimum en route altitude on airways. He was considered a very experienced pilot by his organization, having a total of approximately 5,400 hours flying time of which almost 3,000 were in C-47's. What prompted him to fly at 10,000 feet in heavy icing, with strong crosswinds on an airways adjacent to a mountain peak which was 10,466 feet high? Do you think that he would have flown at a higher altitude if there had been suitable oxygen equipment aboard?

It is our opinion that many Air Force pilots today are requesting minimum en route altitudes on airways during IFR conditions solely because of lack of oxygen or oxygen equipment aboard the aircraft. It is also true, we believe, that many who won't accept the minimum altitude en route are flying at higher altitudes between 10,000 to 14,000 feet without oxygen. This practice, if continued, can mean sudden death to many more pilots. Therefore, it is important that suitable oxygen equipment and an adequate oxygen supply are maintained at all bases at all times.

Until this is done Air Force-wide, it would be well for all clearing authorities to read paragraph 19, Air Force Regulation 60-16, before okaying a clearance on an outbound aircraft.

Paragraph 42, AFR 60-16, says: "42. Restrictions on and Responsibility of Clearing Authority:

"a. *Requirements and Regulations.*

"The clearing authority will assure that the proposed flight is to be conducted under proper flight rules, that all applicable flight requirements and regulations are complied with, and that the aircraft is suitable and the pilot is qualified for the type of flight contemplated.

"*NOTE:* Every effort will be made by operations officers and Flight Service centers to advise all pilots of any deficiencies in their flight plans."

The responsibility for checking your oxygen supply, oxygen masks, and the operation of the oxygen system rests with you, as the pilot of the aircraft. In the first place, you never know when you may need that extra oxygen boost. What may start out as a few turns around the local area may end up as AI on the Form One, and you may need that O_2 to keep your mind alert and your eyes sharp. Second, you may feel that your cross-country flight won't take you above non-oxygen levels . . . but it *might.* Third, you may be one of those superman types who knows he can fly for hours above 8,000 feet and feel fine . . . but the ordinary man *can't.* Oxygen is supplied free by the United States Air Force. Doesn't cost you a cent . . . in fact it's the cheapest insurance a man can have.

oxygen at altitude

There are two ways in which to maintain an adequate oxygen intake at high altitude. One is by means of a pressurized cabin or a pressurized suit, which will provide a relatively high gas pressure both inside and outside the body. The other is by means of a pressure-demand oxygen system, which supplies oxygen to the lungs at a pressure slightly higher than that outside the body. Because the body can stand only a limited amount of internal pressure, the effective range of pressure-demand equipment is also limited. It may be used safely up to about 42,000 feet, and for emergency purposes up to 45,000 feet. In pressurized aircraft, pressure-demand equipment may be used up to 50,000 feet for very short periods.

The new D-1 regulator which is in use in a few airplanes is designed for use at altitudes up to 50,000 feet. It supplies a sufficient amount of oxygen at all altitudes up to 40,000 feet but from 40,000 to 50,000 makes a compromise on the amount of oxygen supplied between that which is necessary and physiologically endurable pressures involved. Were the proper pressure of oxygen delivered to the mask at altitudes above 40,000 feet, it would be extremely difficult to breathe under the necessary pressure; therefore the D-1 regulator is actually designed for limited emergency use only, between 40,000 and 50,000 feet. The D-1 regulator is fully automatic. ●

button.....

button.....

who's got the BUTTON?

AN OLD YUK, bruited about nurseries for the past several decades, makes capital of the fact that a horse-shoe nail, causing a courier to shed a shoe, can lose a battle, y'know!

This boffola, which undoubtedly kept the kiddies in stitches in the pre-space cadet era, points a moral that can be dove-tailed into the modern flying pattern . . . for the lack of a mike button check, a flying machine can be lost, including one each crew, to boot.

A tiny thing like a mike button, or an open key, inconsequential as it may seem, when multiplied by many examples of carelessness throughout the Air Force, can cause a great organization like AACS, to literally throw up its collective hands, and tell FLYING SAFETY, "please, maybe you can spread the word, and tell the troops what's happening every day on this subject."

Hardly a day goes by, they say, when a radio operator in the process of testing a set, will leave the mike keyed and the equipment on while he dashes over for a cup of coffee. He should know, as well as he knows his own name, that this open key can block out completely all transmissions on the local control tower's primary frequency. This, coupled with the possibility of a power failure or an equipment failure on the tower's secondary frequency, can set the stage for a fatal accident.

Light Gun Signals

When the two tower frequencies are out, light gun signals are the only remaining method of communication, and it is conjecture as to how many pilots are familiar with the various aldis lamp signals. For instance, do you know that light gun signals can be used only to approve or disapprove an action the controller *believes* the pilot of an aircraft *intends* to perform? Do you know that a light gun can be used only to send a general warning signal, but cannot explain the nature of the emergency? Put yourself in the controller's place, and imagine the confusion that would reign, if you had to work airplanes in the pattern, airplanes taxiing and vehicular traffic, with a vocabulary of "Yes," "No," and "Careful." A glamor gal can get along pretty well with these three words; but a control tower operator, definitely negative!

Hard to Find

Locating an aircraft with a stuck mike is in iteslf a chore. Every airplane on the ramp has to be inspected. If no aircraft radio is on, then the maintenance and repair hangars must be checked. Naturally this takes time, and every moment of enforced silence on a radio channel multiplies the possibility of an accident. Now let us look at the problem from the standpoint of the pilot in the air. Cruising at 35,000 feet; fat, dumb and sublimely happy, is one each jet jockey. He calls Alpha Tower to get local weather. He likes the forecast and decides to mill around for another thirty minutes. This works out fine, and everybody is happy except the tower operator. Roger the Lodger has left his mike button stuck in down (on) position, and has put every tower within the area on the air on 126.18 kc. This happy soul will continue to cause this kilocycle blackout until he decides to use his mike again, or until someone, in sheer desperation, homes in on his frequency and gives him The Word.

Now you purists among our readers (and we have hundreds of eagle-eyed subscribers) will say that the odds are high against all tower frequencies being out . . . so high that there is negative perspiration. It doesn't work out this way. Many airplanes carry only the primary frequency, and no other common tower frequency. Some carry the emergency frequency found in all towers. But there is the possibility that two pilots can be blocking two different tower frequencies at the same time. It's in the record that there have been times when four frequencies have been blocked simultaneously.

It is realized that spelling out these abuses won't eliminate the blocked frequency hazard. The solution to the problem lies with you who fly the airplanes. Make it a habit to check your key and check your mike after every transmission. Don't be a frequency hog . . . remember, someone else may want to get in on the party line! ●

Cross Feed

flying safety idea exchange

Proper Altitudes

I feel that the rules for proper altitudes covered in AFR 60-16, which are shown on the back cover of the November issue of FLYING SAFETY, are correct, but are not as complete as they might be, and that special emphasis should be placed upon the correct altitude under VFR conditions.

The results of a survey conducted on our base revealed that approximately 50 per cent of the pilots and students didn't realize that they are required to maintain definite altitudes while flying VFR in control zones and/or control areas (airways).

Our FLYING SAFETY department has initiated a program with the intentions of familiarizing all pilots with the regulations concerning proper altitudes. We have constructed charts using information obtained from CAA Flight Information Manual, CAR 60.32, AFR 60-16, and ATRC 60-10. This chart makes clear the various altitude requirements of the CAA.

Capt. Robert C. Shaw
Flying Safety Officer
3500th Pilot Trng Wg

Jato for B-29's

A B-29 accident occurred in North Africa recently which was caused by engine failure either during or immediately after takeoff. Apparently the pilot was unable to gain altitude so he attempted a crash landing straight ahead. However, in doing so, the aircraft struck a small concrete building, cartwheeled, and exploded. The loss was complete.

This accident is typical of other fatal B-29 accidents which have occurred under similar circumstances.

It is felt that the installation of six or eight JATO units on all B-29 aircraft, which could be used immediately in event of engine failure during takeoff, would furnish the required thrust for the pilot to recover from a very critical condition. It might be possible to install retractable JATO units which could be extended prior to all takeoffs and possibly for all two- or three-engine approaches just in case a go-around is necessary.

It is felt that the cost of installation of JATO units in all remaining B-29 aircraft would be very nominal in comparison to the loss of even one plane and crew.

Maj. Bernard B. Pasero
O&T Inspector
Hq 7th Air Div
APO 125, NY, NY.

Is You or Isn't You

If crystal balls really worked, there might be some justification for the blythe disregard of proper parachute discipline on the part of far too many airmen. Those characters who never wear or dump their harness right after takeoff are just the ones who end up on USAF Aircraft Accident Reports. Some of the jet jockeys who still have Class I or Class II harnesses without the new leg strap take-up hardware, fall into the same category. They pop the leg straps for comfort and leave them unsnapped.

Knowing that survival time — not often minutes, more often seconds— is always cut down more quickly than the aircraft disintegrates, these people are paying the limit for their dubious "old timer" exhibitionism.

Major Harold L. Strong

First Epistle to Pilots

Check thou the scriptures called Notam, Radio Facility Chart and Airman's Guide. The wise pilot in planning his flight overlooketh nothing; only a fool sticketh out his neck.

Use thy checklist. He that useth it not is vain and foolish;
He would fain become an old pilot but he is not qualified.

Beware thou the high mountain along thy route of flight;
It is exceedingly hard and smasheth to smithereens the unwary.

Verily I say unto you, the pilots' heaven filleth up
With those who practice not their instrument flying.

Lo! and it came to pass that the pilot sayeth unto his engineer:
"You keep the fans turning while I watch the railroad track."

Verily I say this leadeth to more work for the Chaplain
And collection of thy insurance. Take thy flying seriously.

Sit not on thy posterior and bore holes in the air.
Use every opportunity to improve thy technique.

Major George E. Tormoen

From the instructor's point of view there is unlimited visibility with the new shutter hood developed by Lt. Col. L. J. Mercure and Capt. A. H. Francis.

WELL DONE!

The failure to comply with T. O. 01-5EUB-103 (Red Border) dated 8 January 1951 nearly caused a major aircraft accident. The left inboard aileron trim push-pull rod which sheared during flight dropped down and wedged itself into the leading edge of the left aileron trim. The aircraft became practically uncontrollable and required superior flying skill plus the combined physical force of both pilots applied to aileron and rudder to prevent a crash.

Keep Current

NEWS AND VIEWS

• F-51 Retracted Tail-wheel—A possible way to meet the situation, providing the pilot knows his tail wheel is retracted, is to use the technique of keeping the tail of the F-51 off the ground as long as possible after landing so that airspeed is relatively low when the tail finally does touch down. This will reduce the magnitude of the yawing and rolling moments, due to lowered airspeed, thereby making the airplane easier to control with the brakes and decreasing the likelihood of serious damage if a ground loop does occur.

In any case, pilots may be reassured to know what causes the violent ground loop in this type of landing, since the F-51 is normally such a good airplane directionally after touchdown. *(R. D. VanDyke, Jr., Research Pilot, NACA)*

• Rapid Receipt of Weather Info.—Flight Safety often depends on the rapid reliable transmission of weather observations and advisories from the weather station, where they are made, to local units such as control tower and GCA, where they are used.

At several bases in ZI, this rapid transmission of reports is now accomplished by telautograph, a commercially leased telescriber device which transmits handwritten messages from one point to another over telephone lines. Rental costs, which are modest, are paid from base funds. The equipment is serviced by the owning agency, and for this reason its installation is limited to the ZI and within prescribed distances of company maintenance offices.

Air Weather Service is encouraging the use of this device by familiarizing base personnel with its advantages.

Appropriate use of this equipment is valuable for the promotion of flight safety. *(Air Weather Service)*

• Clouds Tell of Jet Stream—By carefully co-ordinated observation of cloud formations, weather stations across the country could establish the location and direction of the jet stream, a mysterious wind tunnel in the sky.

According to scientists, there are four "specific and rather spectacular cloud types" that are visual keys to the whereabouts of this high-speed stream that often doubles the speed of high-flying aircraft.

Field research shows that any three of the four tell-tale cloud formations, plus high cloud speeds and "coherent" patterns, may be used to determine the presence of these powerful winds.

At present it takes fairly complicated upper air soundings to locate this skein of winds that blows at speeds of from 80 to more than 200 miles an hour at altitudes of 20,000 to 50,000 feet. The stream moves at slower speeds at lower altitudes.

The four basic cloud formations are:

• Cirrus streamers, white feathery wisps with tufted trails, seen moving at high speeds and high altitudes.

• High cirrocumulus—small, white, rounded clouds in patches often scattered at random, but sometimes shifting rapidly to cirrus streamers with delicate wave patterns. They often take on tints of green and red near the sun.

• Altocumulus, fleecy, nearly stationary formations with lens-shaped clouds, piled layer upon layer at middle altitudes (about 20,000 feet). These clouds change rapidly, especially when sending snow in long streamers down wind. Such streamers are evidence of the high-speed movement of the air. Some of these formations also are tinted near the sun.

• Billowing altocumulus clouds which often extend from horizon to horizon, with parallel waves running at right angles to the direction of air flow.

Other tell-tale signs of the proximity of the major axis of the stream include:

Gustiness at ground level in about half the cases observed; persistent cool, crisp air; generally blue skies, with visibility unlimited; precipitation often limited to "sporadic sprinkles of rain or snow," and rapid changes in cloud cover, from one-tenth of the sky to nine-tenths and back again "in less than an hour."

Quick identification of this phenomenon is becoming increasingly vital to aviation and also to weather forecasting. ●

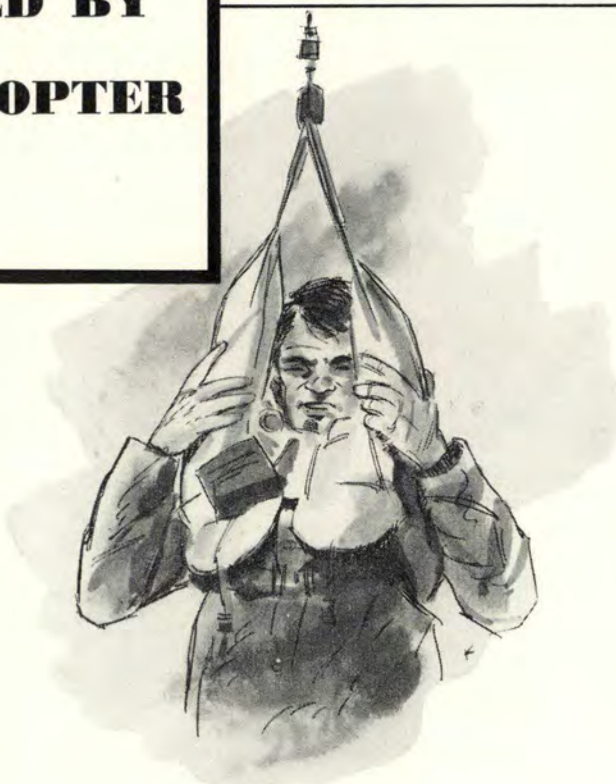
What won't they think of next!

HOW TO BE RESCUED BY A HELICOPTER

Normal position of rescue sling in water.

Slip rescue sling over shoulder and arms.

Put both arms down over rescue sling.



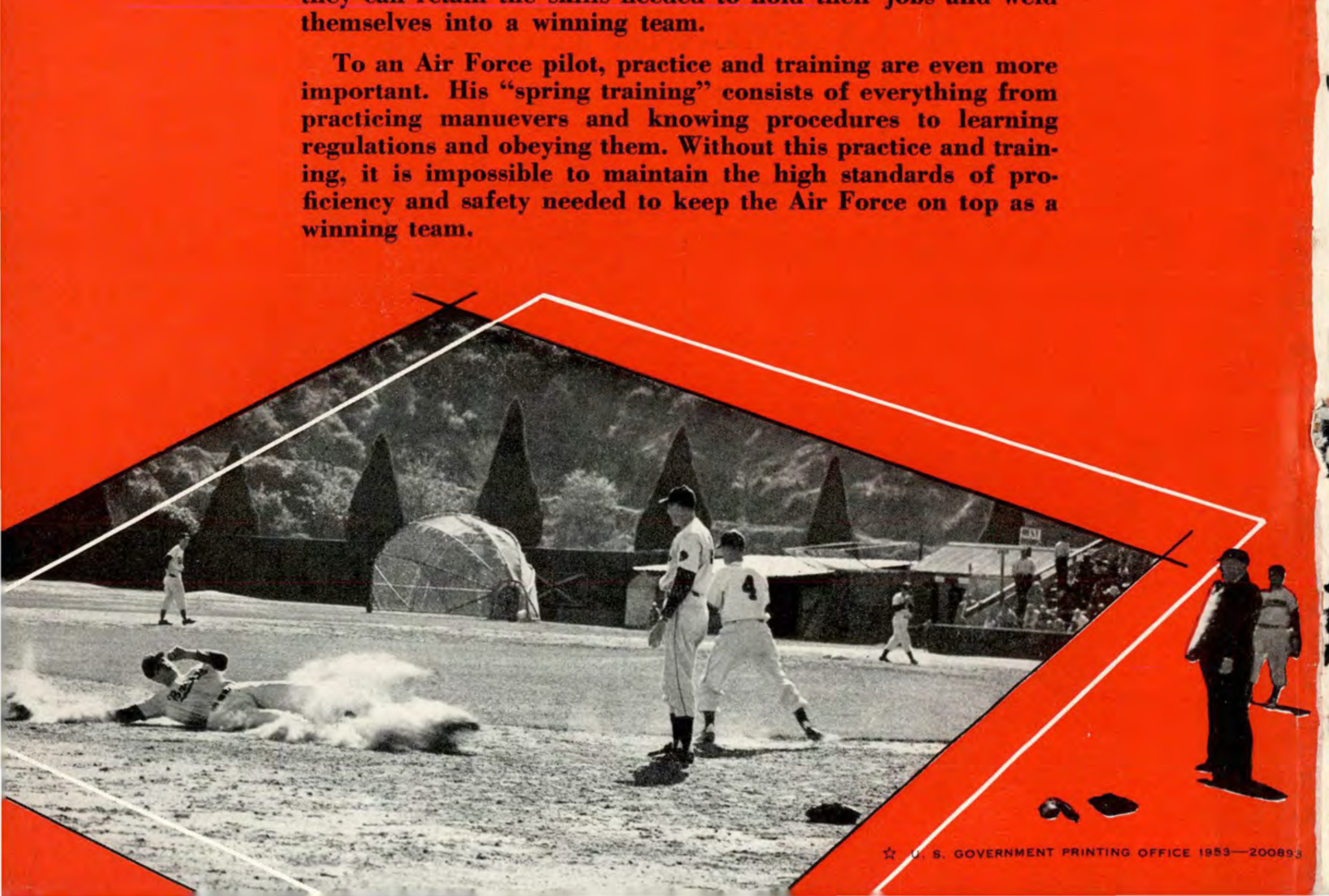
Position for hoisting.

Get in the GAME!

By sliding into third a ballplayer shows that he is making an all out effort to be safe. Be sure that you, as a member of the Air Force team, are making an equal, all out effort toward being safe.

Each year the major league ball clubs go to spring training camp for weeks of intensive practice. This practice includes everything from plain running to get the kinks out of winter-tightened legs to full scale inter-squad games and exhibitions with other clubs. Judging by this slide into third, the St. Louis Browns take their spring training seriously and are playing even their practice games for keeps. The ball players on the club, as professionals in a highly competitive field, know that it is only through practice and training that they can retain the skills needed to hold their jobs and weld themselves into a winning team.

To an Air Force pilot, practice and training are even more important. His "spring training" consists of everything from practicing manuevers and knowing procedures to learning regulations and obeying them. Without this practice and training, it is impossible to maintain the high standards of proficiency and safety needed to keep the Air Force on top as a winning team.



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