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FLYING SAFETY

UNITED STATES AIR FORCE

The ADIZ Story . . . . Page 2

FLYING SAFETY

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Department of the Air Force
The Inspector General USAF
Major General Victor E. Bertrandias,
Deputy Inspector General

Brigadier General Richard J. O'Keefe
Director
Directorate of Flight Safety Research
Norton Air Force Base, California

Maj. Philip A. Watson, Jr.
Acting Supervisor of Flight Safety
Publications

This month our cover symbolizes the close coordination that exists between the detection and the interception phases of the ADC network.

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SUBSCRIPTIONS

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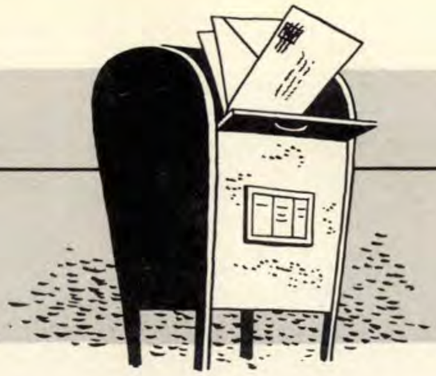

CROSS FEED

LETTERS TO THE EDITOR

Another Safety Record

Twelve consecutive months of flying both combat and training missions without a single accident was the flying safety record set recently by members of the famed Para-Dice Squadron, 3rd Bomb Wing, Korea.

Lt. Col. Lawson Clary, Commander of the B-26 night intruder unit which completed more than 13,000 hours of flying during their safety-record year, lays claim to no secret formula and says, "We've been as careful as possible to see that our people are thoroughly checked out and know their jobs and equipment."

High quality and "best" are traditions with the famous squadron, which, in 1927, was commanded by a young Lieutenant named Hoyt S. Vandenberg.

Office of Information Service
Hqs FEAF, APO 970

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Down Boy!

I would like to point out an obvious discrepancy in your magazine that could easily lead to other people doing the same thing. I am referring to the picture accompanying the article "Best Test" on page 28 of the July 1954 issue of FLYING SAFETY. This picture illustrates a gentleman (assumed) blowing back into his regulator. That's fine, and as we teach, *but*, the picture also shows something else that is verboten and that is the caps covering the inhalation valves in his mask have the arrow pointing "up." I don't know how that could have happened for the caps are distinctly marked with the arrow pointing at the word "down," which I believe means "down." I hope no one has, in the meantime, seeing the picture turned theirs up, for the covers are to prevent moisture and gunk from collecting and probably freezing. The moisture won't drain with the arrows pointing "up," which foils their purpose. They also protect the sensitive inhalation valves from dust, a necessity at this station and many others.

M/Sgt Perry W. McGlynn
Aviation Physiological Training
Webb Air Force Base, Texas

The Sergeant's absolutely right. This serves to emphasize the importance of thorough oxygen preflight checks before every flight.

★ ★ ★

Useful PEST

Congratulations on your article "May I Ride With You?" which appeared in the July issue of *Flying Safety Magazine*. The lack of complete meeting of the minds between aircrew and passengers on many flights has undoubtedly produced unsafe conditions for persons concerned. The passenger's viewpoint as portrayed in this article should certainly be an eye opener for many of us pilots.

The extra trouble and responsibility involved in properly preparing "hitchhikers" for a safe flight might cause many of us to classify them as pests were it not for the fact that this extra preparation provides for a safer and more pleasurable flight for all aboard. Unquestionably, there is not a pilot in existence who would enjoy feeling responsible for an unnecessary passenger death caused by improper preflight briefing.

The word PEST itself, incidentally, provides a convenient mnemonic check list for both pilots and passengers alike to insure that a reasonable briefing has been given in regard to emergency procedures. For example:

P – PERSONAL EQUIPMENT (Insure correct fit and knowledge of use of parachute, mae west, etc.)

E–ESCAPE (Adequate briefing of routes and methods of escape from the aircraft in event of bailout, ditching or crash landing.)

S – SIGNALS (Explanation of signals to be used and correct action to take when signals are sounded, i.e., alarm bell, interphone, etc.)

T – TERRAIN (Briefing of terrain over which the flight will be made, and the proper parachute landing, rendezvous system and survival procedures for same.)

Maybe "hitchhiker" flights would be a bit safer for all concerned if pilots would give a thought to PEST, and passengers would PESTer their pilot for adequate briefings.

Captain John K. Higdon
Headquarters, 27th Air Division
Norton Air Force Base
California

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ACIC Charts

We, of Westinghouse Electric Corp. Air Arm Division, have a keen interest in the article "Facility Charts—Jet Size" by Col. R. W. Philbrick (FLYING SAFETY, June, 1954). We would greatly appreciate information from your office as to how to obtain these charts.

Additionally the jet letdown charts entitled "U. S. Air Force—U. S. Navy Pilot's Handbook, Jet—Eastern United States," with revision mailings would appreciably aid our program as well as add immeasurably to our flying safety program.

Your magazine is avidly read by all of our pilot staff and is contributing to our flying safety by its many interesting and informative articles.

Thank you for the courtesy extended in our behalf in procuring the above mentioned charts.

J. W. Tyler, Chief Pilot
Westinghouse Electric Corp
Air Arm Division

When bogeys are up, ADC will find out

Who?

THE WAIL of the warbler alarm smashed into every corner of the alert hangar and into the calm of the ready room. Talking ceased, magazines tumbled to the floors, cigarettes were left to burn themselves out in their ashtrays — Scramble Red One and Red Two!

Two F-86D pilots raced down the steps and ran to their waiting aircraft. Ground crews had started the APUs and were standing by to strap the pilots into their seats. The alert hangar doors had opened and the deafening thunder of the jets mounted until, less than three minutes from the initial alarm, two "Dogs" roared into the black of night to hunt out an unidentified intruder.

The flight leader switched his UHF to the proper channel for his waiting GCI controller and wondered, "Is this just another of our aircraft off course as it penetrates the ADIZ? Or maybe it's a friendly airliner coming into the coastal ADIZ from Hawaii ahead of schedule. Well, we'll soon find out." He knew all too well that it could also be a hostile aircraft.

The odds are against this unidentified plane's being hostile. Good odds, but no bets are taken on this situation until the F-86s determine if it's a sure thing or not. Interception of friendly aircraft has become routine with many ADC pilots, but these pilots also are aware of the importance of the air defense mission.

To carry out this mission the Air Defense Command has organized three Air Defense Forces in the continental United States: Eastern Air Defense Force, Continental Air Defense Force and Western Air Defense Force. Each operates independently of the others, the idea being that should any one be partially knocked out, the others would not be affected and could continue operation.

Each of these forces is divided into Air Divisions, Wings, Groups and Squadrons. Each division has its own organization of radar stations, interceptor bases, control centers, filter centers and ground observer posts, all working together to build a formidable wall around our nation's boundaries.

Assigned in a supporting mission, but in the role of a major teammate of the Air Defense Command, are the anti-aircraft artillery units of the Army which are equipped with anti-aircraft guns and ground-to-air guided missiles.

The Alaskan ADIZ, which extends from Point Barrow to the southernmost tip of the Aleutian Islands, and the Hawaiian Islands ADIZ, which covers almost 200,000 square miles of the Pacific also have a paramount responsibility in the defense of our outlying territories.

Since ADC cannot know what is in the mind of an intruder or upon what basis he might decide to launch an air attack, ADC must be prepared to go into action seconds after it receives a warning of the approach of unidentified aircraft. Its operations are divided into four distinct phases: detection, identification, interception and destruction. The success of each phase is dependent directly upon the success of the preceding phase. A description of these functions gives a concise and comprehensive picture of the goal and workings of the system:

• Detection — The Air Defense Command relies on an extensive network of radar stations and the volunteer services of the Ground Observer Corps to detect unknown aircraft.

• Identification — A system of zones of controlled flight areas has been devised along the boundaries of the United States and around certain vital areas of the interior. These are called Air Defense Identification Zones (ADIZ). All aircraft flying through an ADIZ are required by law to file a flight schedule in advance of their penetration. (The only exception to this law would be small, civilian aircraft who stay below 4000 feet above the ground and do not penetrate the ADIZ from a foreign country or an oceanic area.) Use of these flight schedules by those engaged in identifying aircraft detected by radar or by ground observers, reduces the problem considerably.

• Interception — When the aircraft under observation cannot be identi-

- Left, after the alert hangar doors opened, the deafening thunder of jet engines mounted as two interceptors roared away to hunt out an unidentified intruder.
- Above, every aircraft is tracked on a plotting board in a Combat Operations Center as controllers stand by ready to scramble fighters at a moment's notice.
- Below, a GOC post, an important member in the ADC team. Manned by volunteers, thousands of these observation posts help fill gaps which radar cannot plug.

fied readily by correlating its proposed flight plan with the radar pick-up, interceptors are scrambled, and a visual inspection is made to ascertain its identity.

• Destruction — If the aircraft is identified as hostile, it must be destroyed. Today this destruction would be accomplished through the use of air-to-air rockets which are automatically fired by the electronic brains of the interceptor.

Although training for all four phases goes on daily, there are many instances each month where actual scrambles are called to intercept unidentified aircraft penetrating an ADIZ. Air Defense Command will never be able to gamble on the identity of any of these intruders, for there is too much at stake to take any unidentified aircraft situation for granted. So far, all of the "unknowns" have been friendly aircraft which have not followed the outlined procedures for ADIZ identification.

Facts compiled concerning the violations of the various ADIZs show that almost all violations have resulted from ignorance of the proper reporting procedures governing flights into and within the zones. Although this information is readily available to pilots through the Radio Facility Chart or the Supplementary Flight Information Manual, many still fail to follow the prescribed procedures.

It is not only the wasted effort and expense resulting from violating the ADIZ that should concern all pilots, but also the subsequent repercussions. For military pilots a violation of this nature could result in a court-martial punishable by dismissal from the service, two years imprisonment and forfeiture of all pay and allowances. Civilian pilots are liable to a fine of $10,000 and one year in prison.

Obviously, spending a little time to understand the proper procedures is well worth the effort. The mechanics of filing flight plans and reporting positions when planning a flight involving an ADIZ are basic and easy to remember.

Filing a Flight Plan

DVFR flights have to be filed prior to takeoff whenever a VFR flight will enter or operate within an ADIZ. The flight plan will include the route to be followed and the altitude to be flown while within the zone. The same is true of a flight which will penetrate a Canadian ADIZ (CADIZ) if the flight is to be conducted at an altitude above 4000 feet.

The flight plan can be filed either in writing or by telephone with the appropriate aeronautical facility, and once filed, it should not be changed or altered in any way except in an emergency. If it does become necessary to revise your flight plan, transmit the change immediately in an effort to avoid possible interception.

Position Reports

Position reports will be given prior to entering an ADIZ. The report will include time, position and altitude at last reporting point along flight path *prior* to penetration and the estimated time over the next reporting point. If compliance with this is impractical, time, position and altitude of penetration should be given at least 15 minutes prior to entering. While within the ADIZ, position reports will be given at least once each hour. When leaving an identification zone you are not required to render a position report unless, of course, you are entering another ADIZ.

These procedures apply to DVFR flights or IFR flights off airways, involving the ADIZ. For IFR flights within Air Traffic Control areas you are only required to use the standard IFR procedures.

ADIZ Tolerances

If you find that you will have a deviation of more than five minutes from your expected time of penetration, or will be 10 miles off course of expected point of penetration or 20 miles off course of penetration of a coastal ADIZ, immediately transmit this information to the nearest point. A deviation of any more than these limits constitutes a violation, and a scramble will be ordered to intercept your aircraft.

There are times when an interception may be ordered through no fault of the pilot of the intercepted aircraft. This could happen if an in-flight emergency was encountered which necessitated changing the proposed flight plan, or if the communication channels did not forward the flight plan to the proper agencies in time for them to anticipate penetration.

In the event you are ever intercepted, never try any evasive action. Maneuvers of this type will be considered hostile acts, and the pilot of the interceptor would be within his rights to carry out the final phase of the ADC system — destruction.

Remember, the interceptor pilot's mission is to identify the violating aircraft and he can do this only if he is allowed to come alongside and visually note your aircraft numbers. In the event you are intercepted at night, never shine signal lights, flashlights or spotlights at his aircraft. He knows where you are, and the lights will only blind him. A blinded pilot could miscalculate, and a mid-air collision might be the result.

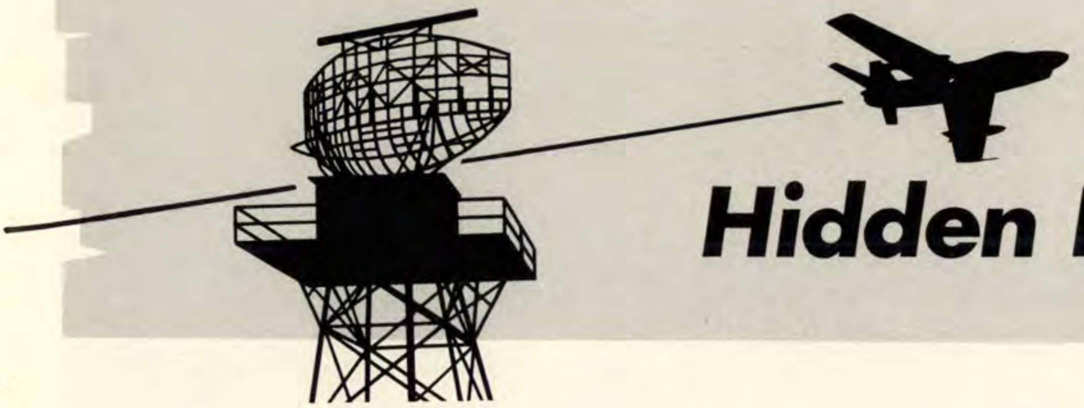
Following an interception, the interceptor pilot may be unable to obtain a clearance for your aircraft. In this case, he will signal for you to follow him by rocking his wings. This means that you are still classified as "unknown." Any prolonged, unescorted continuance of your flight through the ADIZ as an "unknown" could lead to an unhappy and early ending for your flight.

Every pilot in the Air Force today should know how to file a flight plan and how to make proper position reports. The only additional information he must know before flying through an ADIZ is when and where to apply this information. It sounds easy, it is easy. Yet scrambles are still daily occurrences throughout the Air Defense Command.

But let's return to our two F-86s who have just returned to the alert hangar to fill out their reports. What did they find on their mission? You guessed it. A USAF aircraft penetrating an ADIZ without proper clearance.

The boys had another rather rough night of weather flying, an elusive target and a GCA landing through a low layer of fog, but they aren't through for the night yet. Information about the violation has to be recorded immediately so that reports can be sent through channels to the various commands to insure that action will be taken to prevent recurrence. The pilot of this aircraft is about to learn the importance of proper procedures, the hard way. There may not be another time for him. ●

International cooperation is the by-word as a Canadian WAF and a USAF airman track aircraft inside the ADIZ on a plotting board in a Combat Operations Center.



Hidden Help

LAST December FLYING SAFETY printed the results of the original meeting at McChord Air Force Base, held for the purpose of establishing definite procedures for utilizing the air defense radar nets as an assist for lost or distressed aircraft. At that time a definite procedure had been developed for use in the Northwest area only, now emergency procedures for radar assistance for aircraft in distress are in effect in the entire Air Defense system.

The Air Defense Command's radar network is operational on a round-the-clock basis with coverage throughout the Air Defense Identification Zones and extended adjacent areas. Its radar and communication facilities have the inherent capability of assisting aircraft which are lost or in distress, and procedures are being adopted utilizing this capability.

Aircraft in distress can be directed to an area of VFR conditions, controlled through a safe instrument letdown or, in the event of no radio contact, aircraft can be intercepted and led to a landing area.

The radar control system has adequate communication facilities and can work distressed aircraft with operational radio transmitter and receiver through CAA installations or direct on VHF (121.5 mc) or UHF (243.0 mc) emergency channels. Procedures also have been established for use in the event the distressed aircraft experiences radio failure (transmitter or receiver or both) and are outlined in the back of the facility chart.

In the event of an emergency, radar assistance can be improved upon if pilots would follow some of the accepted procedures. Remember, radar is restricted to line-of-sight coverage, so it follows that altitude is a very essential commodity.

Climbing to the emergency altitude or at least out of the soup, on top, is a good way to keep clear of possible high terrain and other aircraft as well as enhancing the chances of a radar pickup. You also will be expected to have your landing lights on along with your IFF equipment, if installed. When radio contact is established, the pilot should give his estimated position, type of aircraft, altitude, speed, endurance remaining, state of emergency and assistance desired. Remain on the radio frequency on which contact was made until advised otherwise and comply precisely with the instructions received.

If the distressed aircraft without radio contact is intercepted, an attempt should be made to contact the interceptor pilot on the emergency frequency. Even though your radio seemed inoperative before, contact may now be possible because of the proximity of aircraft. If contact is made, describe your emergency and indicate what assistance is desired. If no radio contact is made, get in trail formation and follow the interceptor. It is well to remember that if the interceptor is a jet type aircraft, a minimum of 160 knots IAS is required. Upon making visual contact, the interceptor will turn on landing and navigation lights, inform the controller of the intercept and lead the aircraft in accordance with the radar controller's instructions. The advantage of being VFR for the intercept is obvious, for actual IFR conditions may prevent the distressed aircraft and the interceptor's joining in formation. During IFR conditions the final decision as to whether a closure to a visual contact can and should be made rests with the interceptor pilot.

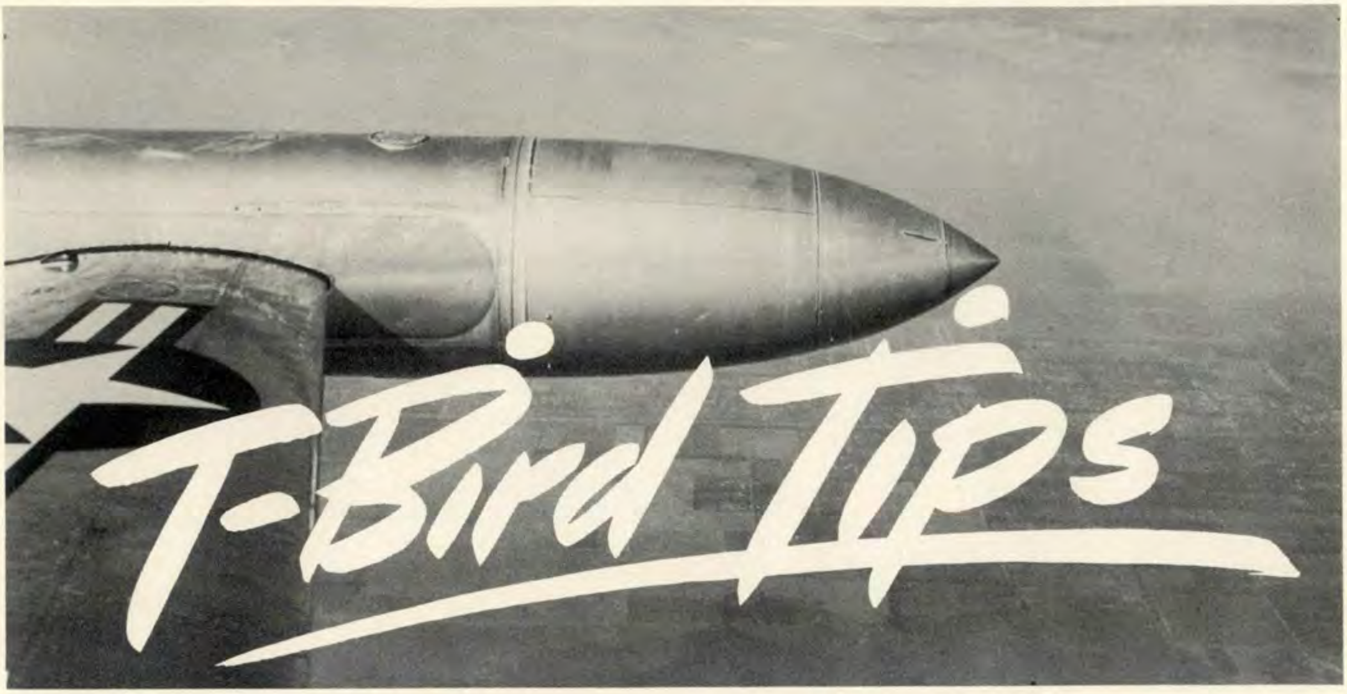
It may be necessary for the interceptor to break formation prior to leading the aircraft out of the emergency. Under these circumstances the interceptor pilot will do one of the following:

- Request the distressed aircraft to continue the initial course indicated by switching its lights from steady to blinking and again to steady prior to breakaway. This signal may be used to head the aircraft toward an area of VFR conditions where a landing can be made without further assistance.
- Request the distressed aircraft to resume the distress orbit by switching lights from steady to blinking, maintaining formation for 30 seconds prior to breaking away with lights still blinking. This procedure will be used, for example, to hold the aircraft while another interceptor is being vectored to it.

Except to divert the distressed aircraft from high terrain or to request identifying turns, the radar controller will not direct the aircraft in a manner different from the directions of the ARTC agency responsible for the aircraft. The radar station will maintain direct communications and will coordinate with that agency throughout the entire operation.

Use of the described procedures for testing purposes may be authorized by receiving approval directly from Radar Control on 133.20 mc or 364.2 mc, or from the Air Defense system through either Military Flight Service or CAA facilities.

The Air Defense Command certainly is not attempting to take over the control of, or responsibility for, aircraft in emergency. If required, the radar network is at your service; however, its primary function is not assisting distressed aircraft. Assistance and actual intercepts in particular are last chance attempts to avoid a possible disaster. ●



By Maj. James A. Jimenez, Review and Analysis Group, D/FSR

A SAGE once remarked, "Experience is the best teacher." The expression still holds true, but it's very likely that the word *experience* has taken on a new look. In the field of military flying we not only think of experience in terms of flying hours but also in training hours. Flying experience becomes an intricate hodgepodge of link trainers, simulators, system mock-ups, dash one handbooks and T.O.s, lectures, briefings, bull sessions, magazine articles and, ah yes, flying. Give a man the right dosage of each of the aforementioned, with a few other little details, and he winds up as an important and vital cog in a highly technical and mechanized outfit — the U. S. Air Force.

In this article I'm going to go over some of the "little details" which are not always covered in T.O. publications or local SOPs. Some of these details or tips come from experience the hard way, and others from a few of the "old hands around the ranch." It is hoped that these tips will help some of you T-Bird pilots learn the easy way and keep you from having accidents.

Let's review a couple of malfunctions which often have been the cause of accidents or of some pretty hairy incidents in the T-33A. Some of you undoubtedly have had tiptank troubles or have heard of other pilots who have. Our accident files contain numerous cases wherein both tiptanks failed to feed, setting up a situation which the pilot couldn't handle.

In some instances the aircraft engine flamed out before the pilot could find a place to set 'er down. In other cases, the pilot tried to land with both tips full and landed short of the runway because he didn't fly the aircraft at a higher airspeed commensurate with the heavy fuel load. In still other cases the aircraft was landed at the proper airspeed, but the pilot was unable to stop the aircraft on the runway. He either overshot the landing or attempted landing on a runway which was just too darn short for the T-Bird with this fuel configuration. I could go on and on, but let's stop now and figure out what other choices were available to the pilot in the above instances. Three choices come to my mind immediately:

1) Correct the malfunction and proceed as planned. If unable to effect proper feeding of the tiptank fuel, then you must —

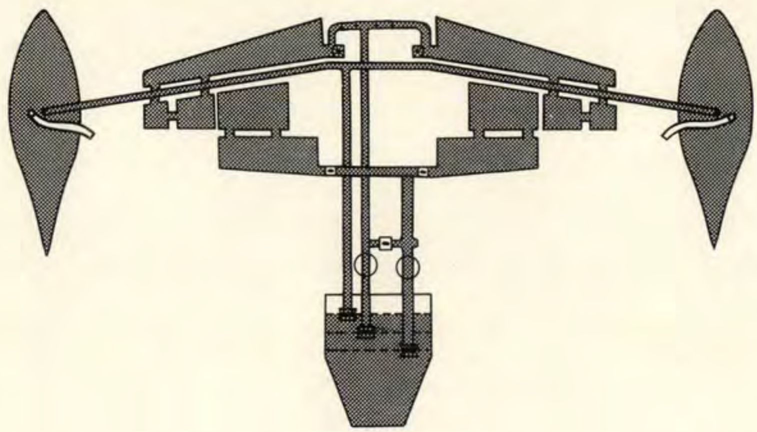
2) Change your present flight plan and proceed to the nearest suitable airport which you can reach safely without danger of a flameout en route, and then —

3) Determine whether you have enough runway available to land with two full tiptanks. If the answer is no, jettison the tiptanks in a designated area or other suitable place and make a normal landing without tiptanks.

Some of you may ask, "How do you get both tiptanks to feed during flight?"

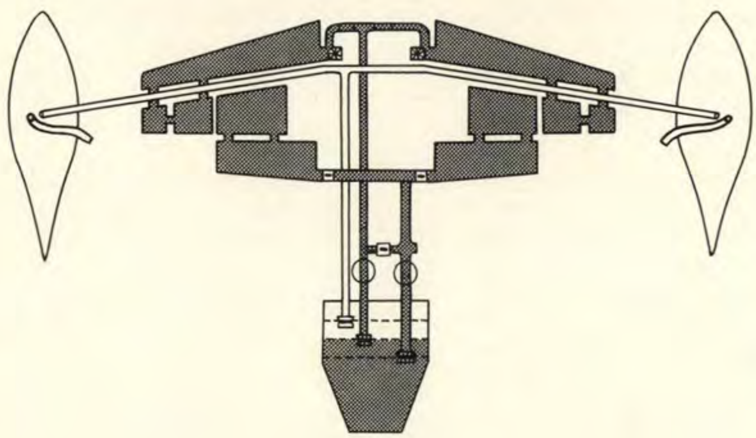
Analyze the problem carefully. If the tiptank fuel warning light is on, normally it means that the tanks are not being pressurized properly. In this event, there is little that you can do except proceed as outlined in (2) and (3) above. If the tiptank warning light is not on, the tiptanks are pressurized, but something is restricting fuel flow from the tiptanks to the fuselage tank. This something is usually a *stuck tiptank fuel float valve.* If it is a stuck float valve you have no problem. All you have to do is figure out some way to move the valve, and you're back in business. The best method of dislodging the valve is to slosh the fuselage tank fuel in such a manner that it will strike the float valve and move it back to its proper position. This can be accomplished by turning on the leading edge fuel tank switch and filling the fuselage tank as high as possible. The reason for this is that the tiptank float is located at the highest point in the fuselage tank, with the leading edge tank float valve at the next high-

Diagrams show fuselage tank fuel levels with tips, leading edge and wing tanks feeding.

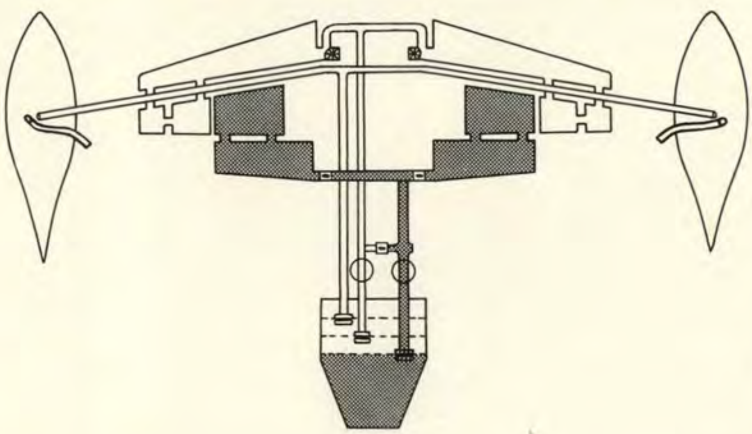


Above, note fuselage tank level when all tanks are full.

Below, note fuselage tank level when tiptanks are empty.



Below, note fuselage tank level with tips and leading edge tanks empty.



est level, just below the tiptank float valve. However, in the T-33A, SN 53-4886 and subsequent series, the wing tank float valve is the next highest valve. In these aircraft, turn on the wing tank fuel switch to fill the fuselage tank as high as possible.

After the fuselage fuel gage indicates that the fuselage tank is at its highest level, gently lower the nose of the aircraft straight ahead and make a slightly accelerated pullout, imposing approximately two positive G. After the pullout, level off gently, being careful to avoid negative G with a resultant flameout. Do this several times. As you bob up and down, the fuel in the fuselage tank will slosh back and forth and usually will dislodge the stuck float valve.

Next, turn off the leading edge or wing tank switch, whichever one you used, and check to see if the tiptanks are filling the fuselage tank. If the fuselage fuel gage indicates that the tank is filling, then your troubles are over. A note of caution, however, while you are bobbing up and down across the sky, stay on a heading which will take you to the nearest suitable airport. Utilize your internal fuel load judiciously and use maximum range power settings. It may be possible that you can't get the tiptanks to feed because of some other malfunction.

While we're on the subject of simultaneous malfunction of both tiptanks, let's go back along the flight path and see if we can find out exactly *when* they began to malfunction. In many instances the tiptanks were not feeding at time of takeoff! Then why did the pilot take off?

In many T-33 checklists used throughout the Air Force the emphasis appears to be placed on the tiptank warning light rather than on checking the fuselage fuel tank indicator. Many pilots, particularly during formation takeoffs, quickly will give their flight leader the OK sign for takeoff at the moment that the tiptank warning light goes out, signifying pressurized tanks. This is not a good habit to acquire. It is equally necessary to insure that tiptank fuel positively is being fed to the fuselage tank! Cross-check the fuselage fuel gage to see if you're getting fuel from the tips before takeoff.

When one tiptank fails to feed during flight, the situation is more serious. Usually there is nothing that the pilot can do in flight to get it to feed. In this case it is evident that the tiptank float valve is operating properly, since one tank is feeding. The trouble then usually can be traced to a loss of pressure within the malfunctioning tank, caused by a loose fuel cap or a loss of pressure or restriction within the fuel line, sniffle valve or pressure regulator. There are still a few people who teach various home remedies which they claim will cause the tiptank to feed, provided that the malfunction is not caused by a loose fuel cap. And there may be a very few instances where these remedies work, depending upon the circumstances. The only recommended procedure, however, is to close the cabin pressurization vents. Pressurization for the cockpit and tiptanks is obtained through inter-connected lines leading from the engine compressor. If insufficient pressure is being routed to one or both tiptanks, it is sometimes possible to increase the pressure to the tips by shutting off the cockpit pressurization vents. The windshield defroster control valve should also be closed. This enables all available pressure to be diverted to the tiptanks. Do not attempt any steep turns, accelerated pullouts or any unusual maneuvers, they won't help.

If the tiptank malfunction cannot be corrected, jettison the full or partially full tank in a suitable area. If you cannot release the tiptank and lateral control cannot be satisfactorily maintained down to an airspeed of 130 knots, leave by the nearest exit. If a landing is absolutely necessary, slow-fly the aircraft and determine the lowest airspeed at which you can safely maintain lateral control. Do not turn off the aileron boost control. *Do not stall the aircraft!* Do not make steep turns. If you have to turn at all, use only a very slight bank during the turns. Do not bank into the direction of the partially full tank or you may not be able to lift the wing for roll-out. If there is a fuel differential of 100 gallons or more between the left and right tiptank, the aircraft cannot be controlled laterally except at high speeds. Do not attempt to land with this differential unless it is impossible to bail out.

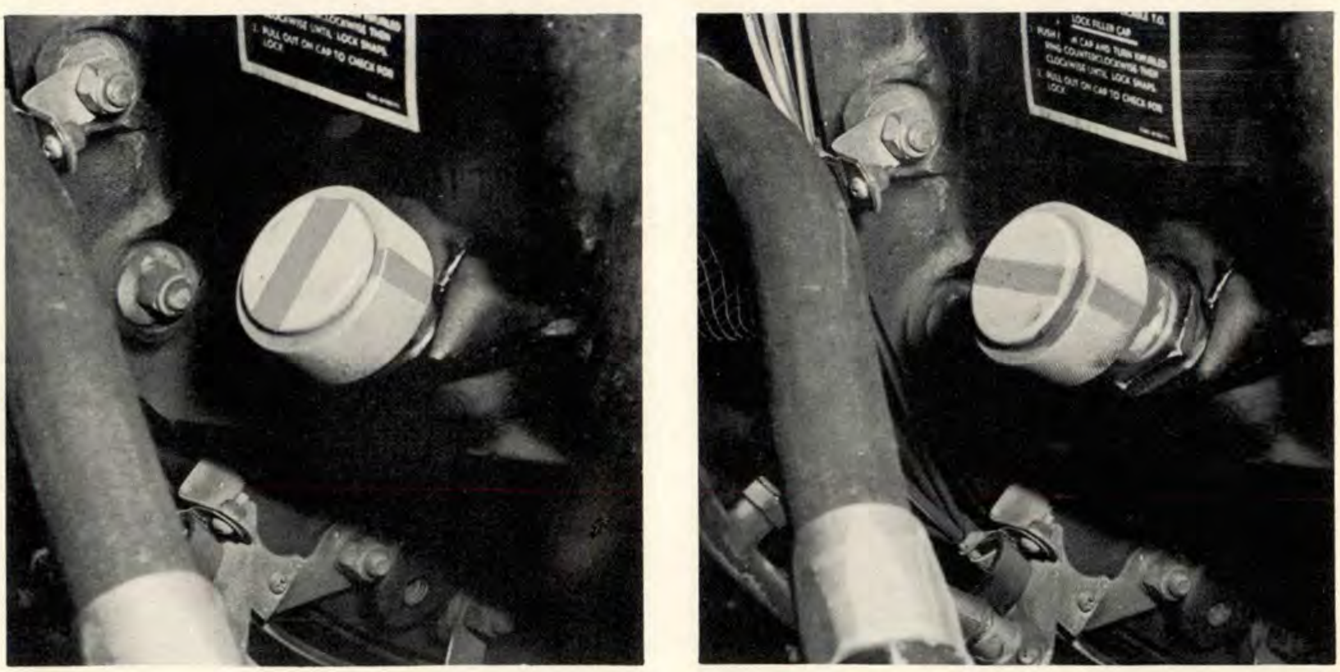
The Wright Air Development Center is presently testing and considering a dump valve installation for each tiptank which will enable the pilot to dump the fuel in a few seconds. Until that time, treat the tiptanks with the greatest of respect. Check those fuel caps closely. When you encounter a tiptank which feeds more slowly than the other during flight, write it up so that maintenance people can correct the trouble before it becomes the cause of an emergency.

Another little item which has tripped up many a T-33 pilot is mismanagement of fuel. Some of the oldest pilots have had emergencies because of a simple malfunction of the liquidometer float arm in the fuselage fuel tank.

There are several cases in the files about the pilot who neglected to cross-check the fuel warning lights against the fuel totalizer and fuselage fuel gage. In a couple of instances, the fuel warning light blinked on over the tiptank switch or main wing tank switch, but the pilot was patiently waiting for the fuselage fuel gage needle to drop down from the full mark. These guys were rudely awakened by a strange "blurp," and then came the sheer and utter silence denoting flameout.

These pilots had accidents because they weren't sharp enough on air-start procedures or because the flameout occurred at too low an altitude. Don't let it happen to you. Keep track of your fuel at all times. Every time a set of fuel tanks goes dry and the warning light comes on, check the totalizer and the fuselage fuel gage to see if they all agree.

For example, I set the fuel totalizer at 810 gallons when the aircraft is fully serviced with fuel, figuring that approximately three gallons will be used for the engine start which will not be reflected on the totalizer. The tiptanks hold 460 gallons. If I didn't touch another fuel switch in the cockpit, I'd expect the tiptanks to register



Left, the oil cap is down and in place on filler neck but not locked. Note the position of the painted aligning marks, indicating an unlocked condition. Right, painted aligning marks now indicate a locked condition, but oil cap is loose on filler neck. Cap must be fitted tightly, with markers aligned.

empty when the fuel totalizer had dropped to approximately 350.

I check the leading edge and wing tank fuel pumps prior to takeoff, however, by pumping approximately five gallons with each set of pumps into the fuselage tank. Now I know that the totalizer should hit close to 340 when the tips go dry. If the totalizer and the tiptank light don't check with each other, I'm immediately suspicious. I make the same check when the wing and the leading edge tanks register empty.

It's always possible for one of the fuel boost pumps to go out and the malfunction will not become known until the pertinent fuel warning light comes on over the leading edge or wing tank switches. When this happens, subtract the total amount you normally would have when the light comes on from the amount now registered on the totalizer. This will be the amount no longer available.

For example, you know that when the main wing tank fuel is exhausted, the totalizer should read approximately 195. If the wing tank warning light comes on when the totalizer reads 250, you had better plan to land earlier than you anticipated, because you are now 55 gallons short.

Now on to a couple of little items which cause accidents, but definitely. First, there's a slight headache known as the oil filler cap check. The oil cap check has presented such a problem that a Flight Safety supplement T.O. (IT-33A-1W) has been printed to insure that pilots are aware of the importance of the filler cap security. The oil cap check has been a part of the visual inspection requirements in the T-33 dash one handbook for a long time, but we still have instances of pilots groping for the runway with a cockpit full of dense blue oil smoke.

If you have long arms, you probably have no real difficulty in reaching down through the plenum chamber to check security of the oil cap during the visual inspection before takeoff. If you have short arms, you might belong to the fraternity of pilots who can barely touch the oil cap, much less check it for security. If you are short-armed, you are one of the guys most likely to have an accident because you didn't check it. Don't get lulled into a false sense of security. Do whatever it takes to insure that the cap is secured. Remember that it is possible for the yellow aligning lines on the oil filler neck and oil cap to be aligned when the cap is actually unfastened. The only positive check is to grab the cap and see if it comes off. If you can barely manage to touch the cap, don't jiggle it around with your fingers; you'll run the danger of unlocking it. If necessary, have your crew chief open up the right upper or lower engine access door so that you can make a positive check of the cap. Stay at that spot until the air-lock fasteners are again hooked up and recheck them for security.

The latest information from Wright Air Development Center indicates that a curved extension is being devised for the oil filler neck and will be forthcoming in the near future. In the meantime, be smart. REACH FOR THAT OIL CAP!

In addition to the check of the oil cap, you can further increase your assurance against smoke in the cockpit by properly closing off the "foot warmer" and "head warmer" vents in the rear cockpit during the visual inspection prior to engine start. If you're the student pilot and the guy in the back seat is the IP, disregard the vents. He'll close them if smoke enters the cockpit. But if you are going solo or the guy in the back is other than an experienced T-33 pilot, be sure to shut off the vents in the rear cockpit. If smoke comes pouring in, all you have to do is close your own front cockpit vents and dump the cabin pressure and you have no sweat. Incidentally, I recommend that the head warmer vents in both front and rear cockpits be closed during takeoff. It's not easy to fly the airplane with your left hand while kicking at the foot vent levers and the cabin pressure dump valve, then reach behind you with your right hand for the not-easily-accessible head vent lever.

Before you take off, run the engine up to 100 per cent rpm and make your routine check of engine instruments and insure that tiptanks are feeding. During this time, look down at the foot warmer vents and check for smoke. If you're on 100 per cent oxygen, as you should be, you probably wouldn't smell any smoke that might be entering the cockpit.

Another essential item in the T-Bird is a good flashlight! It might be a great temptation to slip a pencil type flashlight in your flying suit or jacket sleeve at night, but don't do it unless you back it up with a reliable GI flashlight or its equivalent. Your pencil light will serve you in the cockpit, but it won't help you when you're wondering about the position of the aileron trim tab on a dark night. A good strong flashlight will be worth its weight in gold if you should ever experience uneven tiptank feeding under these conditions.

In conclusion, a couple of other tips might bear mentioning. One of these concerns the delicate subject of ballast in the nose of the bird. If your aircraft has an APX-6 radio set and gun ammunition cans installed in the nose, you won't be concerned with any ballast problems.

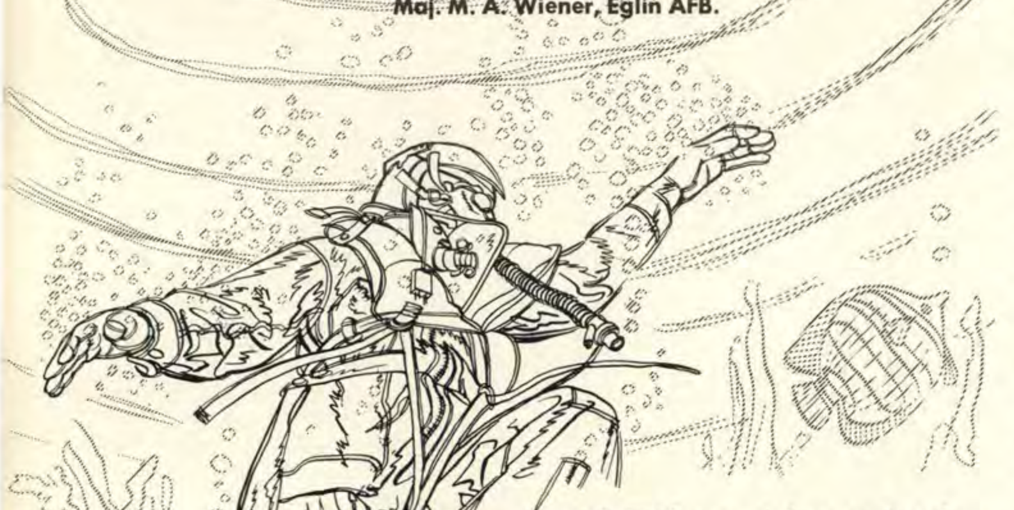
However, if your T-33A is used primarily as an administrative aircraft or for other duties not involving some phase of gunnery, it is possible that the ammunition cans and the APX-6 may be removed. In this event you may be the unlucky one to attempt takeoff with excessive personal baggage crammed into the nose section. With the ammunition cans and APX-6 removed, the T-Bird can hold two nearly-full B-4 bags plus several other bulky items. With this extra ballast the nose gear has a decided tendency to remain glued to the runway during takeoff. If it is absolutely necessary to make a flight with this much baggage in the nose section, it is recommended highly that you weigh the baggage and delete a corresponding amount of lead ballast.

The last tip is for those pilots who might have occasion to sit in the front cockpit of the T-33A and observe while someone is under the hood in the rear cockpit. There have been a couple of accidents because neither pilot noticed uneven feeding of the tiptanks. The pilot in the rear cockpit can't always detect whether he is using excessive aileron trim while he is under the hood. If you are in the front cockpit, keep glancing to the left and maintain a close watch on the aileron trim tab. If you detect an unusual amount of trim, take control of the aircraft for a minute and make a check to see if you're having tiptank trouble or plain pilot technique trouble. If you don't, you may be in for a terrific thrill when you ask the other pilot to demonstrate a steep turn while under the hood.

We all know that the old T-Bird is a good, reliable piece of flying machinery. But, even as you and I, sometimes it can get a little out of whack and not function properly. Most of you may never have to use these tips but remember, most of them were learned the hard way, and this experience passed on to you is like money in the bank. ●

100% below H_2O

Maj. M. A. Wiener, Eglin AFB.



IT WAS one of those perfect days for flying. Blue sky, warm but not hot, about a 12-knot wind, and an interesting mission to fly. The pilot assigned to the flight went about the routine of filling out the clearance and getting his weather briefing with zest; this business of flying jet fighters was really living. He checked his equipment before going out for the preflight — maps, computer, helmet, gloves—everything okay. Wait a minute, need a Mae West at this base, takeoff is over water and part of the mission is an over-the-water flight. All set now, let's get cracking, want to be airborne at the scheduled time.

Out to the plane, walk-around check with the crew chief, look at the Form One and climb in. Get settled in the seat, oxygen mask fitted and tight, cockpit check made, start up, recheck everything and away we go.

At the end of the strip the pilot made his runup, called the tower and taxied into position. As he came in with the throttle and started to roll, he could see the blue waters of the ocean at the end of the runway. He broke ground, pulled his gear and started a climb-out.

Suddenly it happened. Right off the end of the runway. The engine surged once, twice, and then no more thrust. A nice spot to be in — no altitude, not much airspeed and only a few fleeting seconds to try emergency procedures. Nothing to do but ditch straight ahead — can't seem to get the canopy off — have to try manually after setting her down. Quick call to the tower stating that this is an emergency, that he is ditching off the end of the runway.

The man in the tower alerted the crash circuit and watched as the aircraft settled into the water amid a screen of spray. The plane floated, low in the water, but the pilot couldn't seem to get out. Gradually it sank beneath the surface. A minute passed that seemed to stretch into hours; another; two, five — a helicopter hovered over the roiled water but it was too late now, or was it? Almost 10 minutes after the plane disappeared, sudden activity could be seen in the water. The helicopter lowered the sling and pulled up a dripping object. Couldn't be the pilot — no man could stay under water for over nine minutes and live, or could he?

Fifteen minutes after the emergency occurred the pilot was standing in base operations, dripping, bedraggled but unhurt. He had spent a good portion of that time underwater but he got out with only a ducking. The question might well be asked, "Does the Air Force have some new Jules Verne-type equipment that enables a man to breathe under water?"

The answer is no! The hero of our hypothetical case (but it could have happened) only had to do two things in order to keep breathing under water for over nine minutes, or considerably longer if necessary.

He had to have his oxygen regulator set on 100 per cent and he had to have a good, tight fit of his oxygen mask. Nothing else. No special equipment, no newly designed breathing apparatus, just a standard issue Air Force A-13A or A-14 oxygen mask and the knowledge of how to use it if an occasion arises.

The possibility of emergency underwater breathing, using the standard oxygen equipment installed in U. S. Air Force aircraft, was first brought to the attention of the Air Force through a research report by L/Cmdr Arthur L. Hall, USN, assigned to the U. S. Naval School of Aviation Medicine. His report was published in July 1952. It pointed up the fact that it was possible for an aircrew member to breathe under water by using the aircraft oxygen equipment after sinking with his aircraft following a ditching.

Hall's report summarized a series of experiments he made using standard oxygen equipment attached to an airplane seat. The experimental unit and subject were dunked in Pensacola Bay over the side of a boat. All possible attitudes in relation to the water surface in which a crewmember might find himself were used by attaching lines to the bottom of the seat. The depth of the oxygen regulator in relation to the man's body was also varied, while each of eight subjects was submerged to a depth of 33 feet in one series of tests and to 65 feet in another.

Hall found that varying the position of the regulator affected a man's ability to inhale and exhale. When the regulator was above the base of the neck, negative pressure was built up inside the mask and made it more difficult to inhale. When the regulator was lowered to a position below the base of the neck the subject had some trouble exhaling because of the built-up positive pressure. The best regulator position was found to be as near the base of the neck as possible.

The Naval School of Aviation Medicine stated that the results of these experiments showed, "That if a pilot keeps his oxygen mask on and connected to his aircraft oxygen supply, with his regulator on DILUTER OFF (100 per cent) when a water landing is imminent, his oxygen equipment should protect him for an extended period of time if normal escape from the airplane is impossible for mechanical reasons, physical injury or if he loses consciousness on impact."

As so often happens, sister services have much the same operational problems in many theaters. The Air Force and the Navy both carry out extensive overwater missions, and the possibility of an unexpected dunking is an ever-present possibility in the operations of both.

Consequently, the Air Force decided that a series of experiments paralleling those of the Navy were warranted in order to test AF equipment and to determine the feasibility of its use under similar conditions. Headquarters USAF directed that the Air Force Operational Test Center (APGC), Eglin AFB, assume the responsibility for an exhaustive study and analysis of the possibilities of underwater survival.

Careful evaluation of findings and incorporation of them into sound recommendations that could be disseminated to all Air Force agencies concerned were also directed.

Flying Safety Magazine was alerted and asked to be the medium for spreading the word, and at Eglin and the Pensacola Naval Air Station, the editors had an opportunity to learn first hand just how well this newly discovered system of self-rescue works.

The one primary requirement for self-preservation following an emergency ditching is clearly spelled out in the AFOTC recommendation that followed evaluation of the test program. It could well be covered in a single word. *Training!* Possibly that sounds like a disagreeable word to many of you. Just remember though, a few minutes of the proper training may keep you in business long enough to collect that retirement check one of these fine days.

The Air Force Operational Test Center has this to say about the feasibility of underwater breathing: "Use of standard installed equipment will work beyond any manner of doubt. We recommend, however, that an indoctrination program be initiated in the use of this standard oxygen equipment for emergency breathing under water for all rated personnel and aircrew members. First hand knowledge is superior to theoretical discussions, and in knowledge lies ability."

In commenting on the test program, Colonel Walter B. Putnam, Commander, Air Force Operational Test Center, said, "These tests and their results have shown that the Air Force has a new capability for a piece of presently installed equipment at no additional expense and with no additional weight penalty. It requires only the knowledge of how to use it, which, in turn, involves training of aircrews in this emergency underwater breathing technique.

"There is no question that in many instances this new technique can and will save the lives of Air Force personnel during ditching emergencies, if properly employed."

Basically, there are four factors that must be considered and understood when using installed oxygen equipment for underwater breathing. First and foremost, it is mandatory that the oxygen mask be fitted properly. If you're spending a goodly part of your time tooling around the blue at high altitude, it's a cinch that your mask will fit properly. If it fits upstairs it will do the job under water.

The next factor may be a bit on the psychological side and is a lot easier to recommend than actually do, but, if you're ever faced with an actual ditching and you've got to ride the old blow-torch down for a few feet under the drink, then it's a *must* that you remain calm. Easy to say? You bet. Hard to do? You bet again, and

Experiments proved that standard installed oxygen equipment can be used for underwater breathing, provided that the mask is tightly fitted and the regulator is switched to 100%.

we'll raise you. However, if you are given the chance actually to try out the system, you'll be a believer too, and that's why we're stressing the necessity for training.

The third must on this list is that of setting the oxygen regulator on 100 per cent. You've got to do it, even if time is short. If you'll stop and think for a moment you'll remember that with the regulator on DEMAND you're getting a percentage of oxygen and air, mixed properly for the

The Navy "Dilbert Dunker" is a mocked-up cockpit used to simulate ditching conditions.

Fully clothed, wearing a chute and Mae West, students hit water at approximately 27 knots.

Upon contact, the "Dunker" flips over and sinks. Students free themselves and swim out.

existing altitude. That's great while airborne but not worth a tinker's you-know-what when you suddenly subject the mixing valve to H_2O. Get it? Okay, remember, *the regulator must be set on 100 per cent oxygen.*

The last factor involves the bailout bottle. Most of you automatically will think of that little beauty as a first-aid helper in case of an unexpected dunking.

The only advice we can give you on that score is *don't use it.* The reason is very simple. It won't work. The bailout bottle cannot be used under water, because normal breathing will reduce the pressure in the breathing tube enough to allow water to enter the one-way valve at the end of the oxygen hose.

A series of controlled tests were conducted both in a pool and in the Gulf of Mexico. Admittedly, the AFOTC people didn't deliberately fly a few first-line fighters into the drink in the interest of science, but it was possible to simulate actual ditching conditions in some mighty wet water, and a lot of lessons were learned.

Almost all of the volunteers suffered mild attacks of claustrophobia at first. It's a perfectly natural reaction, and all of us are subject to the same feelings when faced with the realization that we're suddenly going to be removed from our natural environment and placed in a position where all light, air and personal contact is something no longer available. Although this isn't strictly true, the feeling is there. It's a case of the unknown, and that's our worst enemy.

To the man who ditches, the shock of entering the water is sometimes a bit severe. However, he now has the most important factor in his favor. He can still breathe. Maybe the impact and the cold will take his breath away momentarily. Probably it will. But, as soon as he starts to function normally again, he won't be faced with the horrible necessity of holding his breath (if there's any left to hold), and that spells the difference between a successful evacuation of the aircraft and failure.

It should be noted that both test volunteers and pilots who have ditched report that it is somewhat difficult to breathe as the aircraft (or test seat) descends lower and lower. This, however, is natural, and there's no reported case of anyone giving up the attempt even though it was a trifle difficult.

It has also been found that the deeper one descends, the more rapid the breathing will become. But, with the diluter on 100 per cent and things pretty much in your favor, go ahead and puff.

Most of us have done quite a bit of swimming and diving at one time or another. Probably in the old mud hole when young and in the average pool a bit later in life. The point is that normally you've had pretty good vision while under water. Don't let this fool you. If you ever dunk a plane in deep water, you're going to be blind as the proverbial bat after sinking for about 10 feet. Consequently, you'll have to go through all of the releasing motions by feel. This may sound silly too, but remember, you must disconnect the hose last.

The Air Force Operational Test Center would like to see a very comprehensive underwater training program aimed at those who might be saved by knowing how to use their oxygen equipment underwater. The recommendation is that a unit be employed similar to the famous "Dilbert-Dunker" currently used by the Navy. There's a good reason for this feeling too. Dilbert really simulates many of the factors encountered during an actual, unexpected dunking. The shock is there, snapping the driver against the belt. As the simulator hits the water, it flips over and starts to sink in an inverted position. And, it's right then that the pilot has to get busy, unstrap himself, kick free and then swim to the surface.

Such training establishes two very important impressions. Personnel learn that they can ditch if necessary and ride the plane down while they get themselves free of the aircraft and at the same time, they can continue to receive life-giving oxygen from the system. Once such a demonstration has been experienced, it will never be forgotten. Knowledge then takes the place of blind, unreasoning panic, and a successful evacuation of the plane can be an assured fact.

Interestingly enough, all flight personnel at Eglin AFB are currently being indoctrinated in this new survival program by a series of lectures included in the physiological training program, and in the near future will participate in simulated ditchings.

The best thing about this entire test program or programs as established by the USAF and the Navy is that the findings are not based on experimental data alone. This is one time when skeptics can't say, "Sure, it sounds great, but all the tests were made under ideal, controlled conditions. Things might be different if a pilot is faced with an actual ditching and has to go down with his aircraft."

There are two known cases, both involving Navy pilots, where the men went down with their aircraft, used their standard installed oxygen equipment, and got out okay.

One pilot, flying a Cougar, crashed into the water a short distance from his carrier. The aircraft hit at about a 45-degree angle of attack and sank immediately. The pilot got out of the plane after it had sunk about 15 feet and after being submerged for several minutes.

In relating how he got out he stated, "While I was struggling to clear the cockpit, I had 100 per cent oxygen on and could feel the positive pressure on my face."

Another pilot, flying a Panther, had a similar experience. His plane hit the water in a nose down attitude and sank in an inverted position. He was able to get out only because he was given enough additional time to disentangle himself from his aircraft as it was sinking. Without a good fit on his mask and the regulator on 100 per cent he would have drowned.

In describing his experience the pilot said, "After the initial shock of the crash, I opened my eyes and saw only white, foaming water. I reached with both hands to unfasten my safety belt and shoulder straps. While doing this, I experienced considerable turbulence and pressure on my eyes and ears. I thought I had cleared the cockpit after being tossed back and forth but my chute caught on something and pulled me deeper. Just as I started for the surface, I struck some part of the aircraft. I finally reached the surface and bobbed under again momentarily. I treaded water and began looking for the helicopter."

On the other hand, research has turned up some cases where it is definite that if the pilots involved had been aware of the full capabilities of their oxygen equipment they would have survived.

In one instance the pilot of a fighter lost his engine shortly after takeoff. It happened so quickly he was unable to retract his gear. The aircraft hit on the wheels, bounced and landed in a shallow pond. Upon contacting the surface, it flipped and landed on its back in about five feet of water. The canopy stuck and the pilot was unable to get out of the plane. The crash crew was able to extricate the man in less than 15 minutes after the plane hit the water, but it was too late — he had drowned.

In a similar accident, the pilot of a World War II fighter ditched in a swampy area. The plane was observed to go down, and help arrived in a few minutes. When the rescuers arrived, they found that the plane was on its back in a few feet of water, with the canopy resting on the muddy bottom. Although the pilot was soon pulled from the water, he did not survive.

A third pilot, who ditched in the ocean, was more lucky. His plane sank immediately after ditching, but he was able to evacuate the aircraft at an estimated 30 to 40 feet. He believes that if he had known that his oxygen equipment would have enabled him to breathe under water, he could have gotten out much sooner. He commented, "I struggled furiously, trying to free myself from the cockpit. I remembered to hold my breath but felt frantic at being trapped in a sinking aircraft. I didn't take the few seconds necessary to plan my actions — just tugged and pulled haphazardly to get free." He was fortunate to pull loose, although dragged deep enough to rupture an eardrum in the process.

In the first two instances the pilots could have been saved if the emergency underwater breathing technique had been discovered at the time of their accidents. And in the third case the pilot could have been spared a harrowing few minutes that he will never forget.

Incidentally, a word of warning to you skin diving aficionados. This equipment is not recommended for underwater fishing or diving. Salt water corrodes the regulator and will cause the rubber diaphragm to deteriorate after initial use. And this doesn't even consider the physiological aspects of using oxygen over long periods of time or the cost of the oxygen and equipment. The equipment is invaluable in an emergency but just don't try to use it to furnish the *piece de resistance* at a fish fry. ●

Maj. Murray A. Wiener

Chief, Equipment Branch
Support Services Div., AFOTC

A native of New York state, Major Wiener has spent a large part of his life in the Arctic and Antarctic wastes.

During 1937-38 he was with the MacGregor Arctic Expedition in Northwest Greenland. 1939 saw him journeying to Little America with Rear Admiral Richard E. Byrd, and he didn't return to civilization until May of '41. Early in 1943 the Army Air Corps selected Wiener to establish a rescue organization for the North Atlantic Wing of ATC and this was followed by a similar chore for the Alaskan Wing.

The years of 1947-48 found him back in the Antarctic as an Air Force observer for the Navy's OPERATION HIJUMP, and following this little stint he went to the Alaskan Air Command as Chief, Arctic-Polar Branch where he officiated as project officer for a number of training films dealing with Arctic survival.

Finally, he managed to get to the ZI for a tour of duty and wound up in Hq USAF as Chief, Flying Services Branch, Support Services Division, DCS/D, and in November of 1952 was reassigned to Eglin AFB.

★ WELL DONE ★

CAPT. METZROTH and CAPT. ROBERTS
809th ABG, Mac Dill AFB

Captain Robert J. Metzroth was the IP on a B-29 with a student pilot in the left seat. While the student pilot was making a hooded instrument takeoff, number four engine ran away, but an airspeed of 120 mph had already been attained, and the aircraft was committed to takeoff. Attempts to control the engine with the propeller toggle switch were unsuccessful as the aircraft became airborne. Captain Metzroth had taken over control of the aircraft, and number four engine was feathered since it was overspeeding beyond design limits. At this time runaway turbos occurred on both number two and three engines.

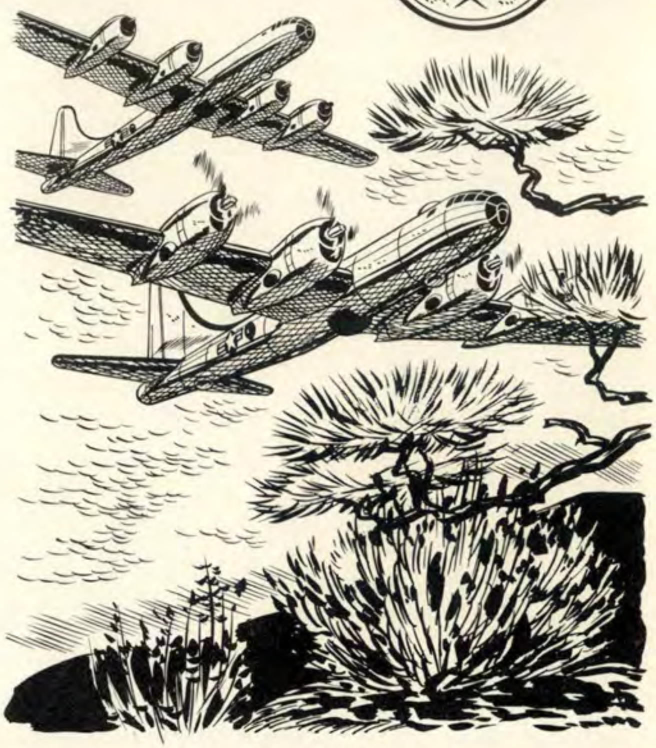
Captain Metzroth was unable to gain altitude because of the limited power conditions, but a decision was made to avoid a crash landing, if possible, due to the congested area and rugged terrain. Landing gear and flaps were retracted and Metzroth was able to keep the B-29 airborne at an altitude of approximately 50 feet. Barely missing

CAPT. FRANK F. JENKINSON
3510th FTW, Randolph AFB

It was a routine, in-flight refueling training mission. Captain Jenkinson was in the right seat of the KC-97 with a student pilot at the controls. Following 22 hookups, both wet and dry, Captain Jenkinson was informed that the B-47 recipient was going to drop back to exchange crew positions before resuming training. While waiting, Captain Jenkinson felt a severe impact.

He looked out the right window and saw that the B-47 was up close and had struck the tanker's right wing. The No. 4 propeller had received extensive damage, resulting in severe vibration throughout the aircraft. No. 4 was shut down and feathered but the vibration continued. It was assumed that the No. 3 propeller also had been damaged, and normal feathering procedure was carried out for that engine.

The tanker shuddered and fell off on the right wing at approximately 190 mph indicated. With the aid of the

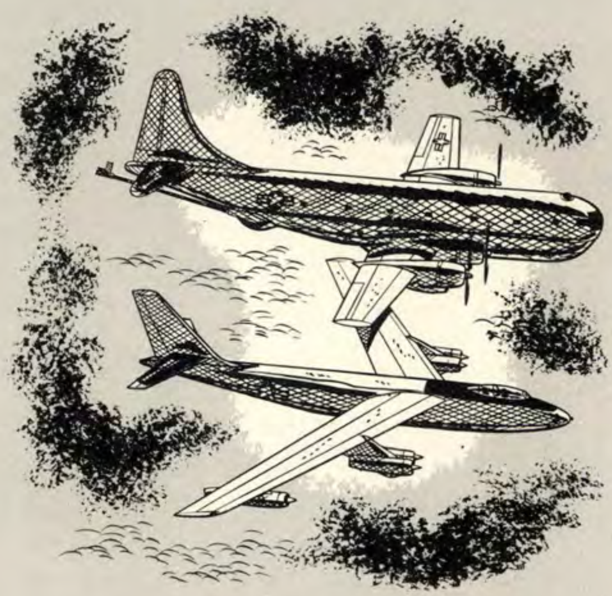


trees and other obstructions, he decided to attempt flying the aircraft through a series of low valleys ranging between the hills in an effort to gain altitude.

Captain James W. Roberts, IP of another airborne B-29, realized the predicament of the other aircraft and went to its assistance. Flying just above and behind the crippled aircraft, Captain Roberts radioed instructions on maneuvering the aircraft to avoid oncoming obstructions and high terrain. The airspeed of the crippled aircraft at this time was 130-135 mph, which was still below desired engine-out speed. The aircraft was at such a low altitude that the propellers were just above the tree tops.

By following Captain Roberts' navigating instructions and because of his superior knowledge of the aircraft, Captain Metzroth finally managed to increase airspeed to 170 mph and succeeded in accomplishing a wide 360-degree turn back to the field. All aircraft in the traffic pattern had been cleared from the area and the aircraft was brought in to a successful landing.

The skill and judgment exhibited by both pilots are evidence of their professional competence and proficiency.



student, Captain Jenkinson righted the aircraft, but level flight could not be maintained. Jenkinson remained in his seat to attempt to hold a level platform and ordered crew bailout. Following bailout of his entire crew, Captain Jenkinson found that he had some control of the aircraft between 190 and 200 mph. With No. 4 slowly windmilling in reverse, the pilot headed toward the nearest suitable airfield. The right wing dropped several times, but each time recovery was made and flight continued.

By lowering flaps in increments of five degrees, the pilot determined that with 35 degrees of flaps the aircraft could be controlled at 160 mph, gear down. He decided to attempt a landing. Captain Jenkinson put the aircraft on automatic pilot and moved to the left seat so that nosewheel steering could be available.

A wide descending approach was made for left-hand traffic, the pilot still holding 160 mph. The aircraft touched down and was allowed to slow considerably before brakes were applied. Approximately 40 minutes had elapsed between the time of collision and the successful landing.

Again knowledge and training paid off.

Beginning of the N

IN CASE you haven't noticed, the B-25 has been undergoing a face lifting. The old girl is being rewired, refitted and, upon modification completion, redesignated the B-25N. She has taken on a little additional weight (some 600 pounds), but it's worth every pound of it in useful devices and pilot comfort.

To start with, the engine fire extinguishers are now located in the rear of each engine nacelle. There is a spring-loaded inspection plate located on the outboard side of each nacelle, designed to make checking for extinguisher pressure an easy task during your walk-around. The actuating switches in the cockpit are conveniently located to the right and left side of the control pedestal for the right and left engines respectively.

Another innovation is the installation of engine fire warning detectors. The fire warning light is located on the left side of the instrument panel, with a test switch on the pedestal.

The instrument panel is standardized, with the flight instruments logically arranged on the left, and the engine instruments on the right. Gone is the eye penetrating purple haze of the fluorescent lights during night operation. The new cockpit lighting consists of red lights installed in small shields over every instrument on the panel. There are three red side panel lights on both the right and left sides of the cockpit, along with two detachable, red map reading lights. For those of you who frequent areas of thunderstorms complete with blinding lightning, there is a white, overhead thunderstorm light located between the pilots.

For additional lighting there are four (two on each side) small red floodlights that light up the instrument panels and control pedestal so that you can really see what you're looking for. The quality of the new lighting is summed up in the words of one pilot, who stated, "This is the first time I have ever flown at night and been able to read any instrument on the panel with just a glance." Spare bulbs are readily available in an overhead storage case in the gunner's compartment.

The entire electrical system has been reworked and the various switches and meters rearranged. The electrical panel, formerly located in the gunner's compartment, has been condensed and moved to the copilot's panel just under the engine instruments. Now, the voltmeter, loadmeter, generator and inverter switches are within easy reach of the pilots. There are three panels of circuit breakers located in the gunner's compartment. Rheostats for the anti-icing equipment have been relocated on an overhead panel positioned between the pilots.

Individual heaters are located in the passenger, gunner and pilot compartments. Heater switches for each compartment are on the copilot's electrical panel. Three heater overheat-lights are located in the center of the instrument panel. Rheostats in each of the three compartments control the temperatures.

There are many other changes that will become apparent to the pilot upon entering the driver's seat.

One such change is designed to eliminate the possibility of actuating the wrong fuel shut-off valve in the event of an emergency. The valves, formerly positioned in-trail beside the pilot, are now located on the right and left sides of the control pedestal.

The landing light switches have been isolated on the control pedestal to prevent the possibility of inadvertently hitting the wrong switch during night operation.

Two seats complete with safety belts have been installed in the gunner's compartment and can be used for passengers, students or extra crewmembers. A new oxygen distribution system has been incorporated to provide four separate diluter demand type oxygen regulators in the pilot and gunner compartments. The regulators are positioned beside each of the four crew positions to facilitate individual regulation of oxygen by crew members.

The one additional change that you may run into, and one that radically alters the operating procedures and limits of the new "N," is the replacement of the Holley carburetors with Bendix carburetors. This particular modification is an innovation to the program, and was only recently initiated to help prevent possible engine flooding because of excessive fuel pressure. (See article entitled *Off For Landing* which appeared in the September issue of *Flying Safety Magazine.*)

Determining if the "N" you are about to fly has a Holley or Bendix carburetor is a good trick. It can be done without tearing into the engine cowling, but it is recommended that, until all the B-25s are Bendix equipped, the aircraft be placarded locally to indicate what carburetor is installed. Changes in operation of the B-25 resulting from this installation are important and should be reviewed by all crew members.

Fuel Pressure Check

There is a change in the fuel pressure requirements. During engine operation, the fuel pressure should be 21-23 psi with a minimum of 17

and a maximum of 25 pounds per square inch. Prior to starting the engines, a preflight should be made to determine proper operation of the fuel booster pump system. To accomplish this check, the booster pump switch should be in NORMAL, and the fuel pressure gage should indicate 9 to 10 psi. Next, move the switch to the emergency position and check for a fuel pressure of 21 to 23 psi. It is important to remember that malfunction of the fuel booster pump system could be caused by excessive voltage, so be sure that the meter indicates approximately 28 volts.

Carburetor Heat and Filters

The carburetor heat controls mechanically operate the carburetor air doors and have two positions, NORM (normal) and ICING. With the controls in the NORM position, the ram air doors in the center of the air scoops are opened to admit ram air into the induction systems. Moving the controls toward the ICING position, gradually closes the ram air doors and simultaneously opens the preheat doors from the preheat ducts.

Before the engines are started, a check should be made to make certain that the controls are in the NORM position. With the engines operating, and with the controls in the NORM position, the carburetor air temperature should be within 6°C of the outside air temperature. If a temperature differential of over 6° is noted, check the system to determine that the ram air doors are fully opened and the preheat doors fully closed.

During engine runup, at 1800 rpm, move the controls to the ICING position momentarily and observe a carburetor air temperature increase.

A filter has been installed in each carburetor air system which may be utilized by actuating the carburetor air filter switch located on the control pedestal. The switch, when moved from the NORMAL to FILTER position, hydraulically opens the filter doors and blocks off the ram air, admitting all the engine air supply through the filters. An indicator light located above the switch is illuminated when the switch is in the filter position. No carburetor heat is available when operating on filtered air as that portion of the scoop is blocked off by the filter air door.

Use of the filters has no great effect on engine operation up to the critical altitude of the airplane. For a given manifold pressure the engine will develop the same power with or without the filter in operation. The only instance when performance will be improved by using ram air instead of filtered air is when the throttles are fully opened and still higher manifold pressure readings are permissible.

The switch should be in the NORMAL position prior to starting engines. After starting, the engines filter operation may be checked by setting 30 inches of manifold pressure with

The electrical panel, formerly located in the gunner's compartment, has been condensed and repositioned on the copilot's panel. Generator, inverter switches now are more accessible.

Above, the pilot's panel has been redesigned to present a logical arrangement of necessary switches. Left, engine fire extinguishers are relocated in nacelles.

Switches on the pedestal have been rearranged, and fuel shut-off valves placed on either side.

the filter switch in NORMAL. When the instruments have stabilized, turn the filter switch to the FILTER position and note a decrease in manifold pressure of approximately ½ inch Hg. Return the switch to NORMAL and the manifold pressure should return to 30 inches Hg.

Takeoff Power Technique

Full throttle stops are not installed on the Bendix carburetor and caution must be taken to prevent excessive manifold pressure during takeoff. Advance the throttles smoothly and stop them when the desired manifold pressure has been attained. At sea level the throttles should be advanced to a maximum of 44 inches Hg. For takeoff from fields above sea level, decrease the manifold pressure ½ inch Hg for each 1500 feet above sea level.

Heat Procedures

It is recommended that carburetor heat be used for approach, landing and taxiing whenever the outside temperature is 12°C or lower. When cruising through icing conditions, the normal procedures apply. Caution should be exercised to never allow carburetor air temperatures to exceed 40°C, or detonation may occur.

Stopping Engines

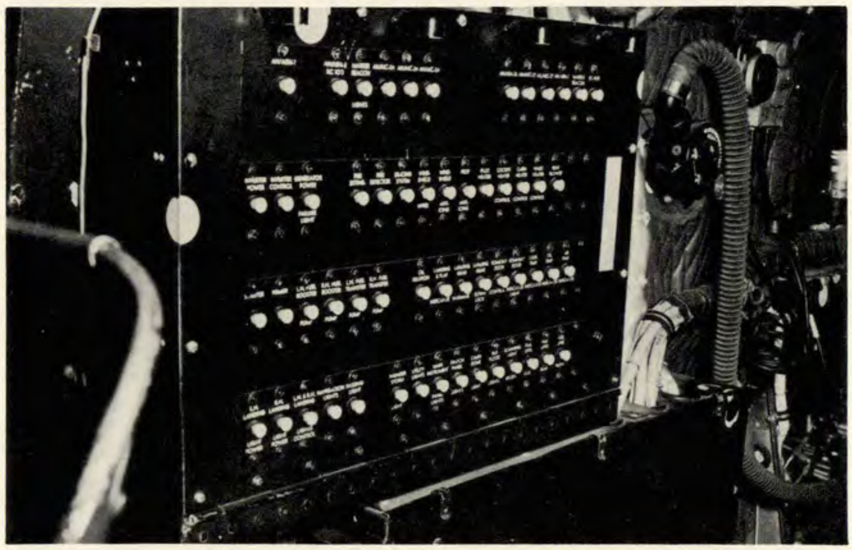
The engine stopping process is the same as for other models with one exception. After placing the mixture controls in the cutoff position, do not advance the throttles as the engine stops. Advancing the throttles will actuate the accelerating pumps and inject additional charges of fuel into the induction system. This may result in incomplete engine cutoff, severe backfire or an induction fire.

Filter Malfunction

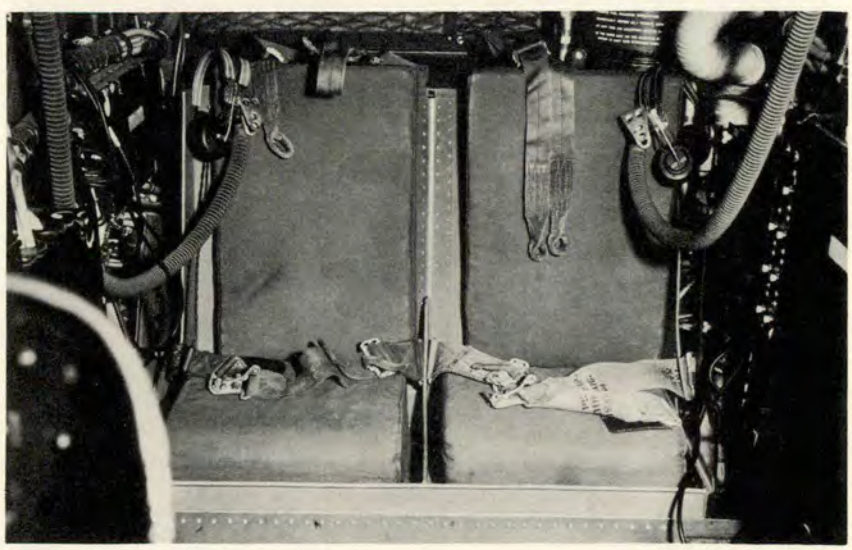
In the event of a sudden increase in manifold pressure (one to three inches Hg) during stabilized filter operation, leakage or a loss of hydraulic pressure should be suspected. If a loss of hydraulic pressure is experienced, the filter doors automatically return to the unfiltered position. When this occurs, the carburetor air filter switch should be returned to the NORMAL position immediately to prevent loss of hydraulic fluid.

All in all the new B-25 is quite an airplane. From the newly installed lighting equipment to the engine fire detectors, modifications were made with an eye to reliability, utility and greater comfort. ●

New cockpit lighting consists of red lights installed in small shields over every instrument on the panel. Shields pull down to facilitate easy bulb replacement from handy overhead box.



Above, a main circuit breaker panel is located in the gunner's compartment. Below, two seats equipped with headsets, mikes and oxygen can be used for passengers, students or extra crew.



DON'T Just Sit There!

"THE ejection itself was no sweat. Remembering a friend who had been conked on the head, I ducked mine, jettisoned the canopy and then with head back, arms on the armrests and feet in the stirrups, I pulled the seat trigger.

"The next thing I knew I was tumbling in the breeze. After that the sensation was one of floating pleasantly through the air. About that time I figured I'd better get the chute open so gave a long pull on the "D" ring. For the first time I felt I'd really had it. The canopy didn't blossom, and I thought I'd been saddled with a blooper! Then I looked down and saw the seat was still with me. The strange part was that the seat seemed weightless – as if it weren't attached to me. As I unfastened the lap belt, the seat seemed to fly off, but I still kicked it away to be sure we separated.

"A sudden jolt – not too bad – and I looked up to see the canopy blossom out. Believe me, after all I'd thought of during the few previous moments – that was mighty beautiful nylon.

"The chute oscillated some, but nothing to worry about. Everything was very quiet on the way down, and the descent was almost fun. The landing wasn't exactly like the best of General Gavin's, but I made a fairly creditable showing and came out of it with nothing more than a bruised knee and elbow."

This pilot committed a serious error which fortunately did not result in injury. He has numerous comrades who have had very similar experiences. In fact, many pilots seem to have a strong urge to pull the ripcord first. This plus the fact that many men do not sense that the seat is still attached to them have caused about 11 per cent of ejectees' pulling the ripcord before opening the lap belt and separating from the seat!

The unfortunate fact is that many of our friend's compatriots have not had as much altitude and thus have had insufficient time to figure out what was wrong, release the seat and get the chute open before ground contact. At low altitudes the hazard of trying to open the chute before releasing the seat is considerable. Another hazard is that of having the chute becoming fouled on the seat after the seat is released. Such fouling has occasionally resulted in very rapid descents and subsequent injury. In one case after the seat caught in the shroud lines it rotated in the breeze, causing the canopy size to become progressively smaller. Had the pilot not had a knife which enabled him to cut the entangled shroud lines and finally release the seat, a successful landing would have been doubtful.

True, there have been a few whose chutes actually opened while they were still strapped in the seat, and three men have landed successfully still strapped in the seat. But you can only push your luck so far!

Of course the automatic lap belt is designed to preclude incidents of this type. When the belt is used with a properly timed (two seconds) automatic parachute, the chances of successful escape from aircraft are greatly enhanced, particularly at low altitudes. Then, too, during ejections below 2000 feet, T. O.'s instruct that when proper body position can be maintained, and the lap belt is not automatic, the belt should be released prior to ejection. Following this procedure would also eliminate the problem of manually releasing the seat at low altitudes.

Unfortunately, until all ejection seats are equipped with automatic lap belts, manual opening of the lap belt will be required during ejection escape. Experience shows that many men either forget to or cannot release the lap belt when ejection occurs below 2000 feet.

Unless training emphasizes unfastening the lap belt before pulling the "D" ring, the figure of 11 per cent who followed the wrong procedure is not likely to lower significantly.

Make a habit of going through your emergency escape procedures frequently, particularly if you fly more than one type aircraft. But don't stop in your training when you've pulled the seat trigger – go ahead and simulate separating the lap belt and subsequent pulling of the parachute "D" ring.

A true story behind one of the lowest successful ejections ever made best illustrates our point. This happened so quickly and the pilot popped out of his plane so low that there was not even a splinter of a second to waste. With swift and perfect sequence he left his seat and deployed his chute. Many congratulated him on his luck. However, the members of his squadron were not in the least surprised by his success. They rather expected it. As his squadron leader explained, "He practiced a lot. More than anyone here, I guess. He always said if he ever had to use the seat he wasn't going to make a mistake." ●

JET Aural Null

HIGH up on the list in the interesting-statements-we-have-heard department is that of a young jet pilot who commented recently, "The static was so bad that I couldn't tune in the station on my radio compass in either the ANTENNA or COMPASS position. If I hadn't received some steers to another field, and if GCA hadn't picked me up, I would have had to eject."

The truly amazing part of his statement is that the pilot never considered trying the LOOP position to home in using aural null procedures. Although he admitted that he had received instruction in aural null procedures during his training, he stated, "I never gave it a thought. It's too complicated a procedure for a jet aircraft and I don't think I could hack it."

Needless to say, this lad has since been convinced and is spending some time in practice, so that next time he will be able to hack it.

As a result, FLYING SAFETY asked the Pilot's Instrument School (Jet), at Tyndall AFB to prepare an article on aural null procedures, incorporating any special tips or techniques as taught at the school. Here's the word from the boys who know.

Tuning the Station

Complete knowledge by a pilot of aural null procedures is considered essential since the ANTENNA and COMPASS positions are unreliable when flying in ice-crystal areas, in regions of precipitation static or in the vicinity of thunderstorms. Under any of these conditions the azimuth needle may fluctuate excessively or give erroneous readings, even assuming that signals can be received.

When tuning in for aural null work, select the ANT position, turn up maximum volume and attempt to tune in by ear with the CW-VOICE switch on VOICE. After identifying the station, select the LOOP position and switch to CW. Rotate the loop until the maximum signal is received, re-tune for maximum readability and adjust for proper tone level. If it is not possible to tune in on the ANT position initially because of excessive static or the loss of the phasing antenna, start the tuning process on LOOP and VOICE. Then tune in the desired frequency, adjust volume, rotate the loop for maximum reception, re-tune and identify the station, switch to CW and re-tune for maximum readability and solid tone.

Orientation and Time

To save time, ambiguity and time-to-the-station should be solved simultaneously. The first step is to take up and maintain a constant slaved-gyro heading. Next, locate the null by rotating the loop until the null is found. Adjust the null width, using volume control, to approximately five to eight degrees. Remember, the width is controlled by adjusting the volume; a volume increase narrows the null, a decrease widens it. Keep in mind however, that if the aircraft is too far from the station, the null will be more than five degrees wide, even though maximum volume is being used.

Next step is to find where the station is in relation to the aircraft and how many minutes out it is. Place the needle on the wingtip position after noting the number of degrees and direction to be turned to place the null on the nearest wingtip position. (If the null is located between 0 and 90 degrees or 180 and 270 degrees the shortest turn to place it on the wingtip is to the left. If it is between 90 and 180 degrees or 270 and 360 degrees the shortest turn is to the right.)

Next, turn to the new slaved-gyro heading computed to place the null on the wingtip. Hold this heading until a 10-degree change in the null position has been noted. Be sure that an accurate time check is made during the 10 degrees of null change. If the null moves to the right, the station is to the right; if it moves to the left, the station is to the left. Once station ambiguity is solved, aircraft orientation must be maintained.

To get time to the station use the formula: time to station equals 60 times number of minutes flown between bearing change over degree of bearing change. For example, if it took one minute to change 10 degrees the formula is set up as $\frac{60 \times 1}{10}$ or six minutes from the station. But if it took only 50 seconds to change 10 degrees, the formula is then set up $\frac{50}{10}$ or five minutes. In jet aircraft, where possible, it is desirable to work at least five minutes from the station because of high speeds and rate of turn.

An important point to remember is that the turn back to the station will be over 100 degrees. Originally, when the null was on the wingtip, the aircraft was 90 degrees from the station; 10 degrees must be added for the bearing change, and at least five more degrees must be added to account for the radius of turn as the aircraft is turned to the station.

At Tyndall, students are taught that as a rule of thumb, if the aircraft is five minutes or more from the station five degrees must be added to the total degree change on the slaved-gyro to return the null to the nose on an inbound heading; 10 degrees added if four minutes out; 15 degrees if three minutes out, and 20 degrees if two minutes out. Thus, to turn to a station that is located to the left and five minutes out, a change of heading to the left of 105 degrees must be made. (90 degrees plus 10 degrees plus 5 degrees.) In a T-33, a fairly accurate distance-from-station can be computed by figuring the speed as six miles per minute. Thus, if the aircraft is five minutes from the station, it is 30 miles out when traveling at about 300 knots.

Home in to the station by keeping the null on 0 degrees and maintaining a constant slaved-gyro heading. If there is no crosswind, a few minor corrections will be sufficient to home on the station. In all cases, remember to control the null width by decreasing volume when inbound.

By maintaining a constant heading a crosswind soon will become apparent when the null moves left or right of 0 degrees. When a null change of two to five degrees is noted, a corrective turn is made in the direction the null has moved, to re-intercept the desired track. (If the null moves to the right, the corrective turn is to the right; if the movement is left, the turn is left.

The turn must be sufficient to return the aircraft to the desired track and *must be greater than the number of degrees of drift.* The extent of this correction depends on the distance from the station, true airspeed, existing crosswind and how quickly it is desired to return to track.

For example, if the aircraft is five degrees off track, 60 miles from the station, it is five miles from the correct position, and a larger angle of interception should be used to return it to the desired track quickly to allow more time for determining drift correction. However, if the aircraft is in closer to the station, say five miles, and the null indicates a five-degree departure from the desired track, the aircraft is less than one-half mile from the desired position; therefore a smaller angle of interception is advisable to prevent overshooting on the correction.

A rapid departure from the desired track indicates a strong crosswind when the aircraft is 60 miles from the station; but this same rate of departure when the aircraft is only 30 miles from the station indicates that the crosswind is about half as strong. After estimating the angle of interception necessary to return to track, use the slaved-gyro as the primary instrument for directional control. When the turn toward the desired track is completed, the null will be on the opposite side of the 0 degree position and can be used to determine whether the correction is large enough to regain the desired inbound track.

When the deflection of the null is the same as the angle of interception, the aircraft is back on the desired track. A turn is then made to the desired heading plus or minus an estimated correction for drift. It will be necessary to lead this turn slightly because of the radius of turn of the aircraft. The amount of lead needed depends on the distance from the station, existing crosswind, the number of degrees to be turned, true airspeed and the rate of turn used. A pilot should use his judgment as to the amount of lead necessary, based on the rate at which the aircraft is returning to track.

After regaining the desired track and making an estimated wind correction, if the null moves back toward the nose, the wind correction is insufficient. In this case a correction is made back to track again and a larger correction is established into the wind. If the null moves away from the nose position, the correction is too large. In this case, a turn is made parallel to the desired track and held until the wind drifts the aircraft back to the desired track. When the null indicates that the aircraft is back on track, a smaller drift correction into the wind is applied.

Station Passage

There are four methods of determining station passage. One of the best methods, if a proper time check from the station has been made, is to place the needle on a 90-degree position when you are approximately one minute from the station. Hold desired track on the slaved-gyro, after having narrowed the null to three to five degrees by controlling the volume while inbound. Then when station passage occurs, the null will be on the wingtip position.

Another indication of station passage is the constant narrowing and then a definite widening of the null. However, at higher altitudes the null does not narrow rapidly as the station is approached, nor does it widen quickly after passage. Between 20,000 and 40,000 feet it may take as long as three minutes after passage for a definite widening of the null.

Below 20,000 feet, when the aircraft passes directly over the station, the null may disappear and reappear quickly. If this occurs, look for an immediate widening of the null. In static or during a change in heading disappearance of the null is not necessarily indicative of station passage unless the null widens immediately. If the volume is unchanged, null widening indicates that the aircraft is moving away from the station.

A third way to recognize station passage is by a definite movement of the null away from the nose position when the aircraft passes to either side of the station while on a constant heading. It is possible to follow the null completely around to the tail position.

The last method of recognizing station passage is when there is an apparent shift of the null from one side of the nose to another when the aircraft passes close to, but not directly over, the station. In this case the null stays slightly to one side of the nose position and then disappears. If it reappears quickly on the other side, without a change in heading, the station has been passed.

The best indications that a station is being approached are:

- The rapidity with which the volume must be turned down to maintain a constant null width. (Remember, at high altitudes the null doesn't narrow or widen rapidly, and should be monitored constantly.)
- When using a commercial station or Adcock range station, the voice or range signals become audible above the carrier wave, regardless of the altitude of the aircraft.

If interference is so great that station recognition is virtually impossible, turn 30 degrees to the right of the track heading. If the null moves closer to the 0-degree indication, the station has been passed. If it moves away from the 0-degree indication, the station is still ahead.

Penetrations and low approaches using aural null procedures are exactly the same as those used in ADF procedures. Aural-null letdowns are emergency procedures, and should be used when no other method is available. The choice of procedures is left to the pilot's discretion.

One final tip, as taught at Tyndall, might come in handy some day. If the static is so great that it is impossible to get the null aurally, turn the volume on the set full up and then turn the selector switch on the jack-box off of COMPASS. With the station tuned in and the volume on maximum, the minimum needle deflection on the station tuner indicates a 15 to 20-degree null which can be used as a last resort to home in by flying that needle visually, keeping it at minimum deflection position.

Aural-null is excellent emergency insurance. Learning the techniques and practicing the procedures until you are sure you can perform them capably can pay you dividends in the future. ●

New Magazine Rack—The people in the Base Flying Safety Office at Tyndall AFB believe in getting the word to the troops. They know that each month the Air Force spends many dollars on publications to give information on new techniques and developments to pilots and maintenance personnel. They also know that for various reasons sometimes these publications don't reach all those who may need them most.

To get maximum dissemination of this material, new magazine racks were built and put up in such strategic places as base ops, Officers' Club, pilots' lounges, all operational sections and in maintenance squadrons.

Actually the racks were designed to fulfill four functions. They have eight holders for magazines, thus assuring that both current and pertinent material is available at all times. On each side of the rack there is space for a poster depicting a current accident prevention program topic. A billboard at the top will point up a significant feature article in one of the publications or can be used for the flying-safety-slogan-of-the-week. At the base of the rack is a mail slot, a pencil and paper for Tyndall personnel to make any suggestions toward improving equipment, facilities or standard procedures.

The racks are serviced weekly with new material, and action is taken on all suggestions as soon as possible.

Novel magazine rack was designed at Tyndall.

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Blue prints for this magazine rack can be obtained by writing the Base Flying Safety Officer, Tyndall AFB.

★ ★ ★

Turbo-Prop Transport — The first military turbo-prop transport, designated the YC-130, has been unwrapped by the Lockheed Aircraft Corporation and is ready to undergo early phase flight testing at Edwards AFB. As the first transport aircraft initially designed to utilize turbo-prop power, the YC-130 is expected to fly faster and higher than any existing military transport now in service with the Air Force.

A low-to-the-ground fuselage and a high, upswept tail permits truck-bed loading. The tandem landing gear and sleek nacelles housing four Allison T-56 engines, each rated at 3750 hp, are outstanding configuration features of the aircraft.

The aircraft was designed for a variety of jobs including tactical and logistical support, as well as air evacuation and ambulance plane operations. The hold will contain as much as 20 tons of equipment. It will be used also, for assault and support missions right to the front lines and for carrying troops and materiel for forward airstrip delivery or parachute drop.

The plane has a wing span of 132 feet, is 95 feet long and 38 feet high. It is pressurized to fly at high altitudes to obtain maximum efficiency of operation.

★ ★ ★

The New C-123B — Fairchild flew the first production model of the new USAF C-123B Avitruc assault transport recently in an initial test flight of more than two hours.

The C-123B is a high-wing monoplane in the 200 mph class with a top speed of over 240 miles per hour. It

Four 3750 hp turbo-prop engines power the YC-130. Note upswept tail for rear-end loading.

is powered by two P&W R-2800 engines developing 2500 hp at takeoff and has a range of 850 statute miles with a payload of 16,000 pounds.

With a crew of two the C-123B is capable of airlifting and landing 61 combat troops and their equipment. It also can carry 50 litter patients, six ambulatory or walking patients, five nurses and more than 1300 lbs of equipment needed for medical evacuation missions.

★ ★ ★

F-89s At Thule—F-89 all-weather interceptors were assigned to Thule Air Base this August, the U. S. Air Force announced recently.

The first twin-jet fighters already have arrived at the Air Force's northernmost defense post, deep within the Arctic circle.

Move of the F-89s to Thule was effected by a re-assignment of personnel and aircraft of the 74th Fighter-Interceptor Squadron, formerly based at Presque Isle AFB.

★ ★ ★

New Jet Transport — Boeing's new jet transport prototype, which made its maiden flight 15 July, already has been flown to altitudes above 42,000 feet and speeds of more than 550 miles per hour.

A total of 15 hours, 46 minutes in the air was logged the first eight days of the intensive test program. On the third flight, tests were conducted at operational altitudes and speeds during which the airplane was climbed to 42,000 feet and flown at speeds above Mach .8.

Longest flight to date was the sixth flight during which the transport remained in the air for just five minutes short of four hours of comprehensive testing.

A company-released progress report on the flight-testing program revealed that it is progressing extremely well and is running ahead of schedule.

To date, the airplane has been climbed at maximum rate to operational altitude, and has been cold-soaked at high altitude to determine that all parts of the aircraft function at low temperatures.

With airbrakes extended on its wings and landing gear down, the plane has descended a mile a minute during tests of fuel tank vents; it has been stalled to test its control and flying characteristics in that condition and it has been banked at various angles to determine the quality of its lateral control at all speeds. A brief check has been made to see if the aircraft could stay in formation with the B-52 as it would during an aerial refueling.

Built in 1947 as an F-80A, this jet made aviation history. Over a period of seven years, it became the first jet trainer, the T-33, and later the first all-weather jet interceptor, the F-94.

The C-123 is designed to operate from hastily prepared, unpaved areas.

The 707 jet transport is shown with the four-segment wing flaps down.

ON ARCTIC acreage 900 miles from the North Pole, Northeast Air Command airmen have proved once again that the bold art of taming frontiers did not die with the dispatch of the last hostile redskin to the happy hunting ground.

The newly conquered unknown in this case was not polar real estate, but the air masses above it. Aerial pioneers from the 59th and 318th Fighter Interceptor Squadrons working out of Thule Air Base, Greenland, proved for the first time that jet fighter interceptors can operate effectively north of the Arctic Circle.

In the summer of 1952 four F-94Bs took off from Otis AFB, Massachusetts, and pointed their radomes toward Thule Air Base, 2800 miles to the north. This, the first single engine jet migration into the very far north, included refueling stops at Presque Isle, Maine; Goose Bay, Labrador; and Narsarssuak and Sondrestrom, Greenland.

As is true with all firsts, the four aircrews embarked on their historic flight minus valuable information and equipment. No previous jet fighter routes had been established so they had to work out their own flight plan. No Arctic survival kits were available. The Mark IV anti-exposure suits had not yet hit the field. No one knew how jet inflight instruments would react north of both the Arctic Circle and the magnetic North Pole. (Thule lies roughly 600 miles north of the magnetic North Pole.) At that time, there were no air rescue facilities north of Sondrestrom. Locating alternate landing fields was no problem, because there were none north of Goose Bay, Labrador.

The known factors were something less than rosy. The weather along their chosen route can get monumentally lousy on short notice. The open sea in the Davis Strait and Baffin Bay is shocking-cold anytime, and the first mistake in airmanship in the Arctic may well be your last one.

Near the end of the leg from Goose Bay to Bluie West One at Narsarssuak, the flight encountered their first trouble in the form of heavy weather. An SA-16 from BW-1 solved this issue by meeting them 60 miles out and leading them in through the alternate approach in Brede Fjord. This is a dandy little affair in the form of a narrow corridor with solid rock walls over a half mile high. When I asked one wingman what his first impression of the Brede approach was, he replied, "I didn't get one. I was too busy flying formation on that SA-16 driver, who kept warning me against spreading out too far and ramming the large size boulders uncomfortably close to my starboard tiptank."

Detachment #1 of the 59th Squadron touched down at Thule Air Base on September 9th and inked in another page in USAF history books. The first all-weather jet fighter interceptors had reached their new home on top of the world.

From here on out the 64th Air Division (Defense) with its headquarters at Pepperrell AFB, Newfoundland, began calling the signals.

In the nine months that followed, Detachment #1 maintained the most northerly air defense unit on the North American Continent. During this period the 59th Fighter-Interceptor Squadron was transferred to Goose Air Base, Labrador. From there crews rotated to Thule every three months to pull the rugged North Pole patrol.

Operating on a base built upon more than a thousand feet of permafrost and on the doorstep of 867,000 square miles of Greenland Ice Cap is a fine way to separate the men from the boys.

Thule is an instrument manufacturer's nightmare. The magnetic variation there hovers in the neighbor-

FROSTY FRONTIER

By Capt. Eldon B. Severson, 64th Air Division (Def)

hood of 80 degrees. I say hovers because the lines of magnetic variation converge in that area to a point where an aircrew may encounter changes of between 20 to 30 degrees in the process of making a normal airborne intercept. Any lubrication on machine gun parts will freeze them tighter than a miser's purse. For days on end 100 mph winds whip in off the marshmallow hued ice cap to the east, blotting out everything in blowing powdered snow. These big blows are known as "Phase Threes." When one comes along, everyone gets indoors and reacquaints himself with a can opener and C-Rations. No one travels anywhere without padding his frame with pounds of Arctic clothing and felt "bunny boots." In spite of all this, the 59th Fighter Interceptor Squadron chalked up an accident-free record. In nine months of operation, not a single birdman laid an egg with a 59th tag on it. This is fittin' material for the record books, too.

Chapter II of the Thule jet fighter story was written by the 318th Fighter Interceptor Squadron. After a 24-day journey, which entailed 11 hops and 5477 miles, the 318th arrived and took charge in July 1953.

By now the latest in alert hangars, maintenance shops and housing was available. Skilled ground support personnel went to work with the idea that they had the most important jobs in the Air Force — and they did. F-94s and T-33s were airborne around the clock, and those guys on the flight line no one hears enough about were largely responsible for it. The 318th, in the year spent in Santa Claus' backyard, had an average aircraft in-commission rate well above the average for similar type units stationed in the Zone of Interior.

Left, an F-94 runs up in darkness at noon.

Center, mid-day refueling operations at Thule.

Below, care of personnel equipment is a must.

The improvement in base facilities didn't change the operational flying end of the business. The only recovery stations other than Thule Air Base are ice strips at Alert and Eureka. The weird weather is not likely to change in our time. A guy who spends too much time dreaming of little Nell at home instead of aviating every minute, can get in real trouble.

It has been said that Thule is a two-day tour, one day and one night. From November to February aircrews log night time only. The sun just doesn't bother to come up for three months. From late April to August, the reverse is true. It is strictly a daytime operation. You can pick up a pretty fair suntan at three o'clock on a July morning. In spite of the fact that the biggest block of ice in the world surrounds Thule, the humidity there compares with that of the hot, dry Arizona desert.

Much has been said about the paralyzing cold in the Arctic. It is, of course, an ever-present danger. Subzero temperatures, however, are not the climatic factor which has the hardest impact on personnel stationed above the Arctic Circle. The two periods of constant daylight and darkness are the most difficult for a new assignee in the Arctic to accustom himself to. During these periods, the unnatural absence of sunrise and sunset tends to develop what amounts to a weather fixation serious enough to dull the senses. Anyone exposed to this situation will discover that it takes plenty of will power to stay sharp, and sharp you must be in this area where cold-hearted Mother Nature is unforgiving of carelessness.

A short time ago the "Dragons" of the 318th packed up their footlockers after completing a year in the shadow of the Ice Cap. It was a great year for them and for the United States Air Force. They racked up 7313 hours of flying time, made 5261 jet landings and earned the reputation of being one of the best jet fighter interceptor squadrons in the USAF. Part of the credit for this splendid record belongs to sound maintenance practices.

Rated personnel were the targets for 33 pilot proficiency tests. Eight hundred and twenty-five questions were taken from the T-33A and F-94B Pilot Handbooks, AFR 60-16 and the 318th's Standing Operating Procedures. One hard landing marred an otherwise accident free record.

The final tally shows the 318th with a low major accident rate and clean slate in the minor accident column. When one considers that these gents were earning their wages in the toughest territory in the world, with no previous experience in the Arctic to draw on, they did a great job of airplane driving.

The 318th's jet professionals during their Thule tour were also instrumental in establishing the Air Force's coolest gunnery range, over Baffin Bay, 50 miles west of Thule. In conjunction with this, the 318th's Armament Systems Section conducted a comprehensive ground school with major emphasis on cold weather operations. It paid off in accident prevention and the accomplishment of the unit's gunnery training goal. Armament Specialists learned the trick of bore sighting aircraft with the thermometer reading 30° below zero. Smooth teamwork between air and ground personnel made it possible for more than 900 successful gunnery sorties to be flown. The Baffin Bay Range was also the training sight for the Northeast Air Command's entry in the 1954 Air Force Fighter Gunnery and Weapons Meet.

There is no doubt anymore that jet fighters are effective in the Arctic. Hard-helmeted jet jockies in "The Eyes of the North — the 64th" attest to that daily. It is too early to make a sound analysis of the true magnitude of this recent victory over an unknown. However, this we can assume . . . that the work of a few talented Air Force airmen has benefited mankind as a whole. Whether in peace or war, the millions of square miles which make up the polar region north of the Arctic Circle, and which until recent years were considered as a useless wasteland, are a very important part of this globe.

Travel in and out of the far north is best accomplished by air and we are better prepared to traverse this area at jet speed, thanks to the winged pioneers in the 59th and 318th Fighter Interceptor Squadrons. ●

Average annual number of days with fog

FOG and Low Stratus

By Capt. Gerald M. Breen, Hq, AWS

IN THE words of the English novelist Charles Dickens, fog, wherever it appears, is a "dingy cloud come drooping down, obscuring everything." An airfield souped in by ground fog is not an ideal place to land. Pilots must be especially watchful of this weather element, particularly in the early morning hours.

Fog is really a stratus cloud cover that forms at the ground or so close to it as to affect seriously the surface visibility. It may form either by cooling to the dewpoint temperature or by the addition of water vapor until the dew-point temperature is equal to the actual temperature.

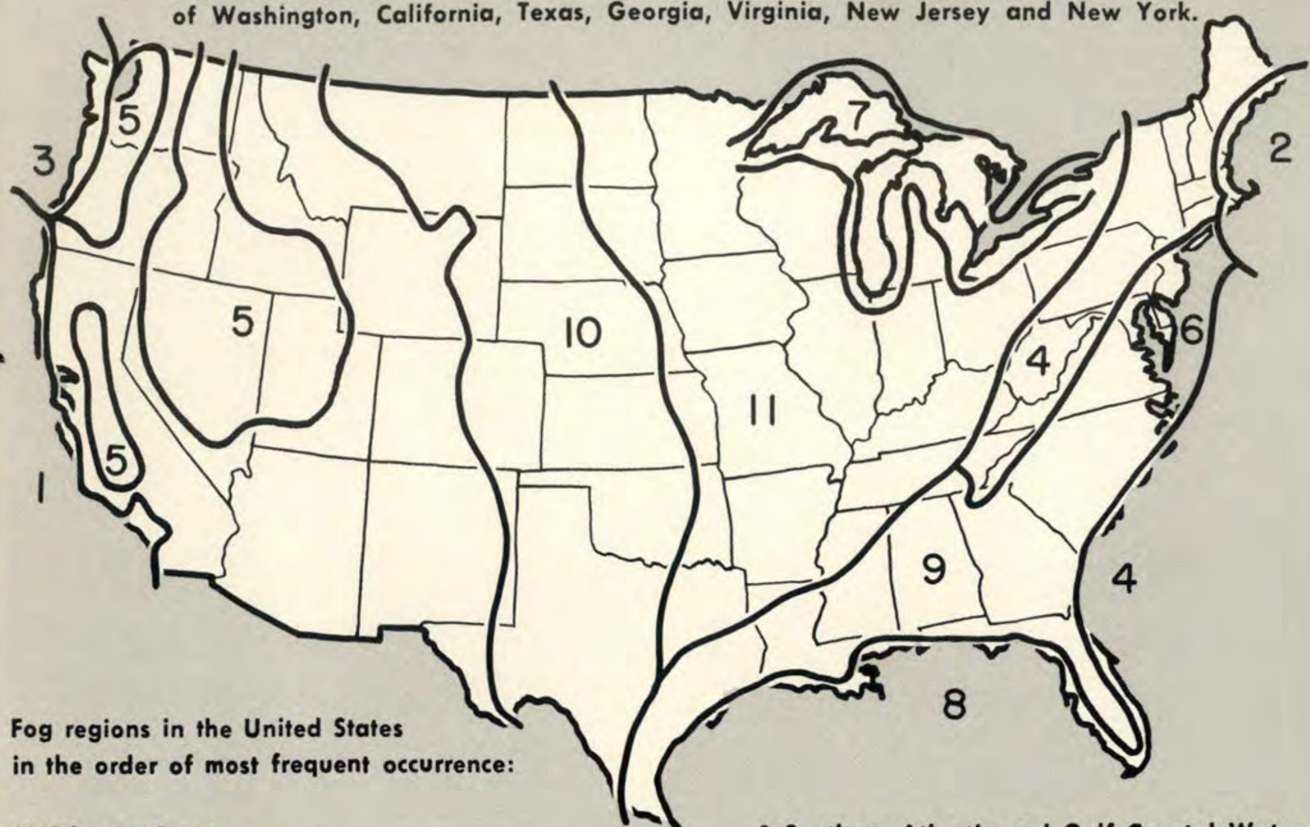
Whatever the cause of the particular fog, its presence means restricted visibilities. Fast-moving planes near the ground have been involved in needless accidents because fog was not considered seriously. An analysis of the aircraft accidents involving fog during the years 1947 through 1953 emphasizes that restricted visibility was a predominant factor in such occurrences as landing on unsuitable terrain, landing short of the runway or running off the end of it, and accidents on GCA approaches.

Of the total aircraft fog accidents during the above period, 54 per cent occurred in California, Washington, Texas, Georgia, Virginia, New Jersey and New York. These states are situated in regions of most frequent fog occurrence, as seen by reference to the accompanying maps.

The maximum of fog frequency does not occur necessarily in winter at all land stations nor in summer at all maritime stations. The formation of fog, especially over land, depends very much on local peculiarities, which may bring about great changes in the fog frequency over small areas.

Low stratus clouds are formed by the same surface contact cooling and radiational cooling of the lower atmosphere that produce fog. The lift-

Highest frequency (54%) of aircraft accidents involving fog occur in the states of Washington, California, Texas, Georgia, Virginia, New Jersey and New York.



Fog regions in the United States in the order of most frequent occurrence:

1. California Coast
2. New England Outer Coast
3. Northern Pacific Coast Line
4. Appalachian Valleys
5. Pacific Coast Valleys
6. Middle Atlantic Coast
7. Great Lakes
8. Southern Atlantic and Gulf Coastal Waters
9. Gulf and Atlantic Coastal Plain and Piedmont
10. Great Plains
11. Ohio, Missouri and Upper Mississippi Valleys

ing of fog either by solar heating of the ground or by wind turbulence produces a low stratus as its first effect. The formation of low stratus is particularly favored by direct radiational cooling from the top of a layer of moist air in the absence of higher cloud cover.

Along the coast line of Southern California, shallow, low-lying stratus clouds, called high fog, are an extensive type of nighttime and early morning cloudiness. Because of the varied elevation of the land, cities near the Pacific Ocean may have a low overcast of stratus clouds, while the crests of the hills are socked-in by the high fog. On the other hand, the cities may be smothered in fog, while the hilltops are in the sun. When the stratus clouds settle to the ground, flying conditions around Los Angeles become difficult. Planes are forced to land farther away from the coast line. Fortunately, nature has compensated somewhat by providing areas that are relatively free of fog and still located close to the metropolitan district.

Sea fog occurs from the cooling of sea air over a cold ocean current. It often has its best development near land; for example, on the coast of California, where sea air passes over the cold California current producing persistent summer fogs.

The land and sea-breeze fog is of frequent occurrence in summer along the eastern coast of New England. Its formation comes with light westerly winds. The westerly current is warm, and the cooling over the sea quickly produces condensation which, in the slight movement prevailing, must take place at the surface. Under these conditions afternoon sea breezes are likely, and the fog is brought inland.

Land and sea-breeze fogs are, by their very nature, coastal phenomena. They occur only on those coasts having light land breezes in warm, moist air and therefore only on eastern coasts of continents. These fogs occur in summer only, particularly in early summer when the oceans are still cold. They can occur also over large inland bodies of water such as the Great Lakes.

Almost all fogs occurring over the land are caused basically by radiation cooling of the lower moist air. Ground fog, the simplest example of a radiation type, is a shallow but usually fairly dense fog through which sky or stars are directly visible overhead. It is formed as the result of a single night of radiation cooling. Radiation fogs have their maximum occurrence at the time of year when there is a considerable amount of water vapor present and the air is cooled by nocturnal radiation. In the Ohio, Missouri, Upper Mississippi and Appalachian valleys, this type of fog occurs from September through autumn to December.

Another type of radiation fog is that termed high-inversion. High-inversion fog is essentially a winter phenomenon and, like all radiation fogs, occurs only over the land. It is the result of long-period cooling, characteristic of continents outside the tropics in winter. Superimposed on this, of course, are the radiation effects of each night. Often the high-inversion type may become high fog, or low stratus cloud, during the day, changing to a dense fog at night.

The best example of the high-inversion type of radiation fog in the United States is supplied by the winter fog in the low valleys of the Pacific Coast. High-inversion fogs are the most persistent and tenacious to be found anywhere in the United States. This type of fog often continues without interruption for several days at a time.

Tropical-air fog differs from sea fog in that it depends simply on the gradual cooling of air as it moves from low latitudes poleward over the ocean, and not on the cooling by passage over a cold current. In wintertime, "pea soup" fog occurs when maritime tropical air is circulated northward from the warm Gulf of Mexico. As the air travels from the south, it is cooled to saturation in its lowest 1000 feet by contact with frozen ground or colder water over which it passes. Regions of greatest "pea soup" fog frequency are the Middle Atlantic Coast in April and the Southern Atlantic and Gulf coastal waters in January and February.

Steam fog occurs over rivers, often when the air has been cooled by radiation, and tends to form radiation fog near the river as well as steam fog on the river. In general, steam fog is quite shallow, extending into the air 50 to 100 feet, but deep enough to interfere with takeoff and landing. Over the Great Lakes the principal occurrence of steam fog is in midwinter when the cold continental air passes over the lake waters, which have a temperature slightly above freezing. In the spring and early summer, when the atmosphere is rapidly becoming warmer, the lake waters retain much of their winter chill; and in autumn, when the first cold-air outbreaks come down from the north, the lakes still have the warmth of summer.

Advection-radiation fog forms by nighttime radiational cooling in air that has come inland from the sea during the day. Air of high humidity coming from a warm water surface is cooled by radiation during the night. This fog occurs mainly in the late summer and autumn in the Gulf and Atlantic coastal plain regions and the Piedmont area.

In regions where the land slopes gradually upward, such as on the Great Plains of the United States and Canada, fogs sometime form as a result of the cooling of the air (by an expansion during which no heat enters or leaves) as it moves to the higher elevation. The surprising feature of upslope fogs is that they can develop and maintain themselves in strong winds. The more rapidly the air moves up the slope, the faster will be the cooling process. Upslope fogs prevail chiefly during the months of April and September.

There is little difference between warm and cold front fog as each is formed from moisture of falling precipitation. However, since the precipitation band associated with a cold front is much more restricted in area than that of a warm front, the post-cold-front fogs are less widespread.

In fact, it is only a cold front which has become quasi-stationary, that has an extensive fog area associated with it. In the stable continental polar air masses of the midwestern United States stratus or fog forms for some distance behind almost all cold fronts that have produced moisture in the form of general precipitation.

Prewarm-frontal fogs offer the greatest obstacle to operation of scheduled flying during winter months in the southern and eastern United States. When stable continental polar air of winter is overrun by precipitating warm air masses, fogs or very low stratus form. The distribution of fog in the Ohio, Missouri and Upper Mississippi valleys is dependent on the effects of air drainage, proximity of rivers and other water bodies, city smoke and industrial areas.

When fog is mixed with smoke and other air contaminants, the result is a thick, sooty cloud called smog. Heavy smogs frequent smoke-filled industrial areas when weather favorable for fog lasts over a period of several days.

Regardless of the area or type, fog spells restricted visibility and trouble. Your destination may be clear as a bell when you take off, but if fog is a possibility, be ready. Your best friend in such a case still will be a good alternate. ●

FOG REGION	MAXIMUM FOG OCCURRENCE	KIND OF FOG
California Coast	July, August	Sea (air mass, advection)
New England Outer Coast	June	Land and sea breeze, (air mass, advection)
Northern Pacific Coast Line	July, August	Sea (air mass, advection)
Appalachian Valleys	September	Ground (radiation)
Pacific Coast Valleys	October thru January	Radiation (high inversion)
Middle Atlantic Coast	April	Sea and tropical air (air mass, advection)
Great Lakes	May, October	Land and sea breeze (air mass, advection), steam fog; advection-radiation
Southern Atlantic and Gulf Coastal Waters	January, February	Sea and tropical air (air mass, advection)
Gulf and Atlantic Coastal Plain and Piedmont	September, October	Advection-radiation
Great Plains	April, September	Upslope (adiabatic expansion), post-frontal (cold front)
Ohio, Missouri and Upper Mississippi Valleys	September thru December	Ground (radiation), prefrontal (warm front)

make this a Merry Christmas

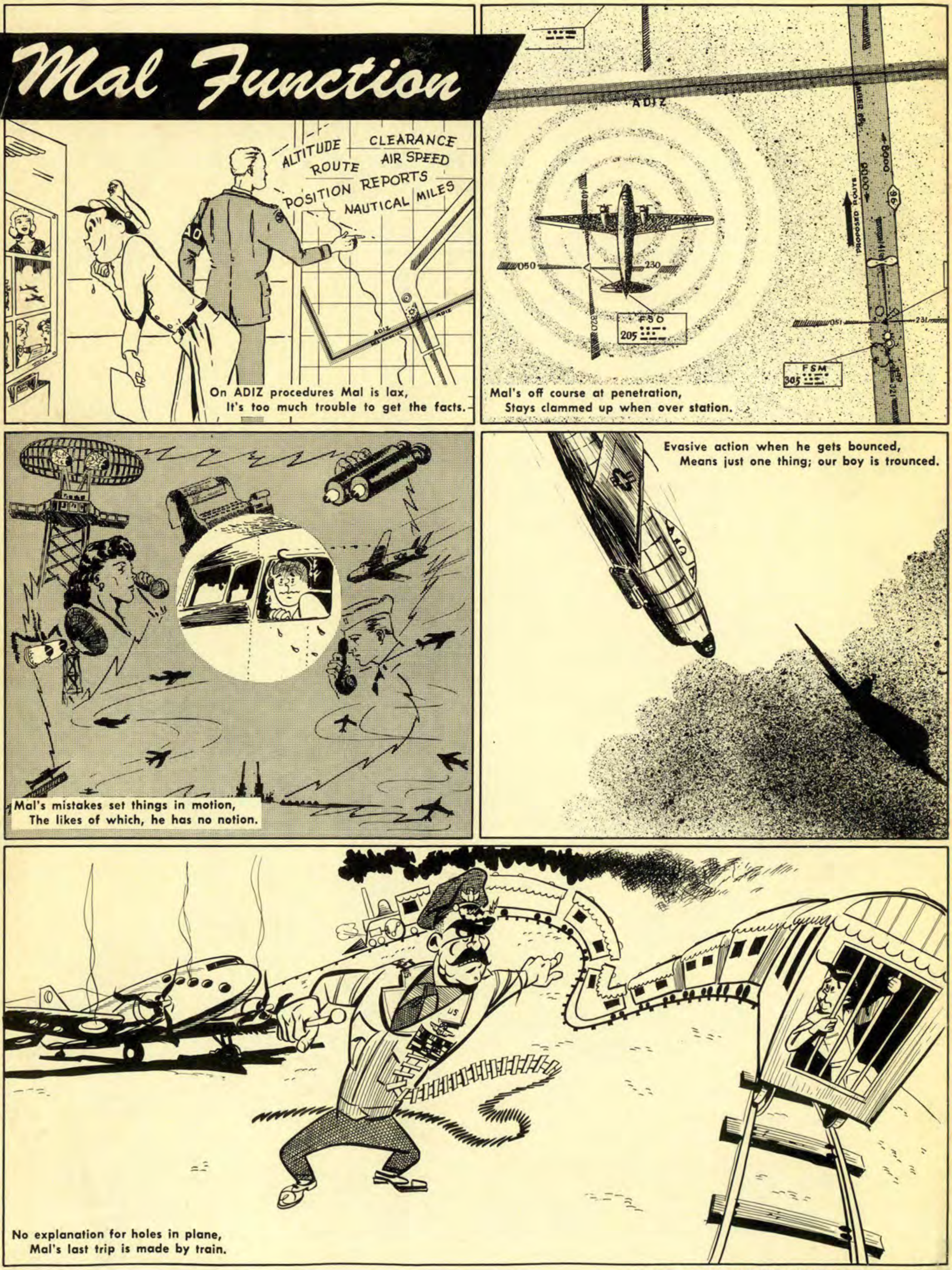
Once more we are on the threshold of a holiday season and thousands of service personnel will be going home for a few days with their loved ones.

You, as an Air Force pilot, have a tremendous responsibility whenever you fly, whatever the season. But during the coming holidays, when you are likely to be transporting many service people, stop and think before you leap. Don't spoil the festive season by a touch of "get-home-itis."

Although AFR 60-1 prohibits flights solely for the convenience of individuals or groups, you must remember that thousands of flights will be scheduled for military purposes. Some space will be available for the Christmas hitch-hikers. After a flight is scheduled, consider well your responsibility both to your passengers and to yourself.

Plan your flight. Fly your plan.

Make this a Merry Christmas for all.



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