FLYING SAFETY

UNITED STATES AIR FORCE

MARCH 1956

BOUNCING THRU the BOONDOCKS

Page Four

FLYING SAFETY

VOL. TWELVE NO. THREE

● The finer points in taking off in an F-86 are covered by one who should know, on page 22.

● Page 14 relates an experience that possibly could happen to any of us. The pilot involved is with us today only because he was thoroughly familiar with his equipment and procedures.

● Besides being beautiful to see, contrails are an aid to defense. The story is on page 26.

Beware—Twister at work. See page 10.

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USAF PERIODICAL 62-1

How Well Can You Remember ?

If you miss more than four, better thumb through some back issues. And don't peek at the answers.

JANUARY

1. The ice on most arctic lakes is thicker and stronger than salt water ice.
   a. True
   b. False

2. How many aircraft can RAPCON handle safely in their landing pattern at one time?
   a. 9
   b. 3
   c. 5

3. The maximum angle of bank attainable with the turn knob of the F-86D autopilot is:
   a. 45-50 degrees
   b. 80-90 degrees
   c. 25-35 degrees

4. The odds are 21 out of 100 that if you have an accident in a T-33, it will be of what type?
   a. Undershoot or hard landing
   b. Fuel starvation
   c. Overshoot

5. How many feet above normal unloaded position is the B-52 wing capable of flexing?
   a. 10 feet
   b. 17 feet
   c. 22 feet

FEBRUARY

6. In flying the F-100C with external stores, lighting the afterburner, will cause the nose to pitch:
   a. Up
   b. Down
   c. Stay neutral

7. What is the maximum design speed for the drag chute in the F-100C?
   a. 180 knots
   b. 220 knots
   c. 150 knots

8. Before reaching final approach, what is the best IAS for the F-100 emergency landing pattern?
   a. 220 knots
   b. 180 knots

9. Your chances are better if you have to land a jet fighter on unprepared ground surfaces with the gear. . . .
   a. Down
   b. Up

10. Prior to flight, the timer on the automatic type parachute is pre-set to open at. . . .
   a. 3000 feet above highest terrain
   b. 1000 feet above highest terrain
   c. 5000 feet above highest terrain

MARCH

11. Where and when does the zone of tornadic activity start?
   a. In October in the northeast states
   b. In February in the southeast states
   c. In May in the central states

12. Which type of contrail remains visible for the longest period of time?
   a. Aerodynamic
   b. Engine exhaust

13. You can get tired from doing nothing. This type of fatigue is called?
   a. Dynamic
   b. Static

14. What UHF channel is used for direct pilot-to-forecaster weather information?
   a. Channel 1
   b. Channel 9
   c. Channel 13

15. At what position would placement of tailpipe segments on F-86s increase nosewheel lift-off speed?
   a. 6 o'clock
   b. 12 o'clock
   c. 3 o'clock

ANSWERS

1.	a	4.	a	7.	a	10.	c	13.	b
2.	b	5.	c	8.	a	11.	b	14.	c
3.	a	6.	b	9.	a	12.	b	15.	b

SAFETY

a Product of Proficiency

Colonel Willis E. Beightol
Chief, Flying Safety, Hqs MATS

ANYONE WHO TRIES to define flying safety in terms of its essential elements soon becomes aware that it is divided into many facets. It is very difficult to place them in any order of importance. However, the matter of proficiency and its safety implications should rate high on any pilot's flying list.

An accurate observation, although slightly mixed up in expression, seems to define this subject. "Proficiency is what, if you have enough of, you won't get into trouble as quick as when you think you have plenty until an accident shows you didn't."

Everyone has at least a general concept of the practical meaning of proficiency, so let us turn our attention to the answers of some questions which are intended to provoke some serious thinking about your own individual state of proficiency.

How do we normally rate ourselves as to our skill level of proficiency? First of all, we have an annual proficiency check. Often we get this check at the same time as our annual flight check although the two tests should be at different times. What does this proficiency check tell us? Simply this: At that particular time, under almost ideal conditions and with an IP who will keep us out of trouble, we are capable of operating that particular airplane within acceptable limits. We can get the machine into the air, perform certain basic maneuvers and demonstrate, in

To fly safely and complete your mission in an efficient manner, proficiency in the type aircraft should be rated high on the list.

Practice steps up proficiency. Each phase of flying must be covered. Notice feathered props.

a rather loose manner, some familiarity with the emergency procedures. The final blessing is then given by means of a signature on a certificate. You have it made for another year. But, have you, really?

Are you honestly confident that you can cope with combinations of adverse and unforeseen factors your experience tells you exist? It is of little consequence to rationalize that you used to be able to hack anything, nor does it follow that once you have been through some rough encounters you can get through them again.

Why is this so? Because your proficiency is not the same, particularly if you are occupying a position that limits you solely to readiness-type flying training.

That annual proficiency check should be more than just an inconvenience to get out of the way. Consider the check instead as a way of determining where your flying is weak and needs strengthening.

The word practice may be trite but no one can deny that proficiency comes from practice.

A person in an aircraft who knows the pilot has flown the route often in the recent past and under harsher conditions rightfully feels secure. The pilot is proficient; he is practiced. Practice then provides a second clue to our skill level.

When was the last time you practiced a particular phase of flight? How much time did you spend doing it, and were you really certain that you could accomplish it safely under the stress of critical conditions?

Practice steps up proficiency. A baseball player who has a low batting average probably practices more intently than does his team-mate who leads the league in batting. The ball player's proficiency is tested every time he comes to bat and if he strikes out, he gets another chance. No one but you can know your batting average precisely and, if you strike out, there is seldom another chance.

Here are some ways in which we can enhance our proficiency. First of all we can make each hour that we fly count for some type of practice even if it is simply making a position report in a concise professional manner or re-acquainting ourselves with the contents of the Radio Facility Charts and other flying manuals.

Next, as we practice each phase of flying, we can be critical of our own abilities, and if we are having difficulty or if we are not completely confident that the particular item is mastered, let's ask for assistance. It's a wise man who knows his limitations.

Proficiency then is that which you know you have and not what you think you have. ●

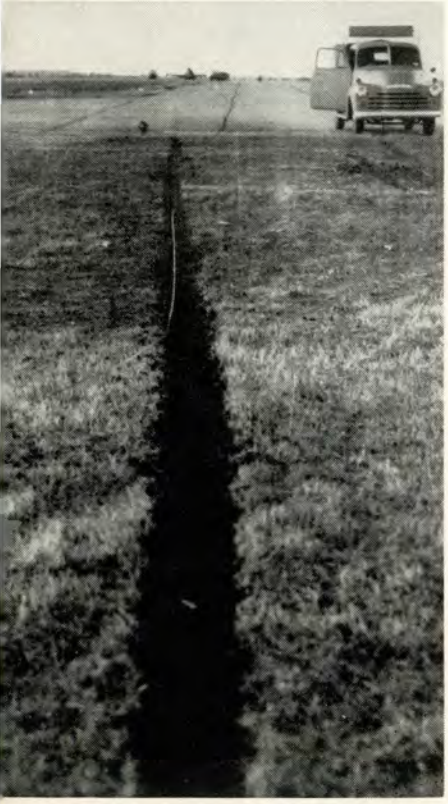
Colonel Beightol graduated from flying school in 1939 and served in World War II on both sides of the globe. He received the DFC for his part in the first low-level raid of the Ploesti oil fields. In the Pacific he was assigned to the 33d Bomb Wing.

In February 1954, as a Task Force Commander of the 5th Strategic Reconnaissance Wing, Colonel Beightol participated in the first and only non-stop flight from Japan to the U. S. East Coast.

Colonel Beightol is a graduate of Michigan State College and attended the Air War College prior to his present assignment with MATS.

Bouncing Thru the

Here is a story on undershoots. This category of accidents has reached number one on the "hit" parade. Don't you join the throng.



To land one in the toolies
is no fun indeed.

I undershot the runway
and clobbered up my steed.

I quit flying on the final
when I thought I had it made.

So now I'm a statistic
thank the Lord that I'm not daid.

YOU MAY NOT THINK much of our poem but at least it might make you conscious of the fact that this problem of plowing up the daffodils at the approach end of the runways is getting to be contagious.

It's happening in the Far East, the Near East, the North, South and West; yes, it's happening all over. Seemingly, it makes no difference whether the runway is bordered with snow or rimmed with clover. It's still happening almost daily.

Before this discussion gets down to some concrete facts (pun intended), scrounge around your ready room or base operations and take a quick glance at the article entitled "That Magic Area," published in the July 1955 issue of FLYING SAFETY. There is a veritable gold mine of information in there on how to set up a safe landing. The author points out that you should fly your machine right down to the threshold of the runway. Control your descent, enter the magic area at the proper airspeed and you will never land short.

Now for some facts.

Do you know who is tiptoeing through the tulips the mostest? None other than pilots with 500 hours of total time or less. But don't think that the old hands aren't contributing to this particular statistical column, too.

Does the length of runway have anything to do with undershooting? No. Statistics show that with jet aircraft, almost 75 per cent of the undershoot accidents occur on runways of 7000 feet or longer.

Non-emergency Undershoots

The landing phase of flying claims the highest number of all accidents.

Pilot misjudged distance. Landed 100 feet short. Nose gear plowed up sod, then folded.

Throttle applied too late. Landed 50 feet short in construction area. Left, note impact marks. Plane rolled to edge of runway and both main gears sheared. Right, see lip.

Boondocks

The bouncing ball, opposite page and above shows how this T-33 finally settled down.

And in this category the dubious honor of claiming first priority goes to non-emergency undershoots.

So what can be done about it? Like a competent physician who endeavors to halt the outbreak of an epidemic (and brother, undershoot accidents are approaching that stage), let's list the causes and sift out some possible solutions or remedies.

To get at this undershoot problem, you lovers of flying will recall the wildlife movies of the migrant duck who is returning to his nest in the north after a sunny winter down south. He enters the initial penetration, pitches out, lowers his webbed landing gear and is all set up to sit down nice and soft.

Then, the next frames of this movie show him skimming along the icy surface of the pond on his derriére, frantically clawing to regain his balance. He usually winds up by hitting a crash barrier composed of four or five of his fine feathered friends who shake themselves disgustedly and look down their long bills at him.

As you recollect this humorous action, let's carry on a bit further. As

Pilot failed to maintain sufficient altitude and airspeed to compensate for gusty wind conditions. T-33 struck wooden warning fence, above, bounced and slid to stop.

The F-86D slid on its external fuel tanks and nose gear for approximately 1500 feet.

far as is known, there are no statistics on the landing accident rate of ducks. However, even ducks can misjudge their approaches and end up in the boondocks. They, too, goof up their rate of closure with their landing strips. They go through a lot of the same thinking patterns as you do in setting up a landing. The one big factor that they don't have to worry about though, is carrying enough power on their final to negotiate a go-around, if necessary. Now that you have received your wild life lesson, let's look into what is causing these costly undershoots.

Faulty Rate of Closure

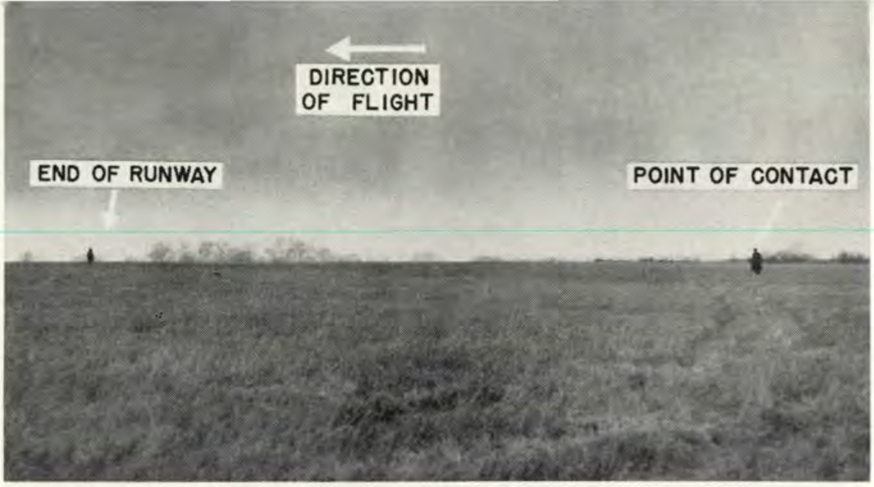
Topping the list is misjudged distance. Couple this with a faulty rate of closure with the runway and you and the duck are in the same predicament. Again, the duck is better off. All that he has to do is to dip his head downward a few inches and he picks up flying speed, pronto. Not so with you, if you're flying jets. If you are not carrying enough power to bring you to the threshold, then the back side of the power curve plus a high rate of sink is going to give you trouble in large quantities.

Strange as it may seem, in propeller-driven aircraft, it feels as if the airspeed jumps six to ten miles per hour when we apply the throttle when we are low on an approach. In reality, the increase in power results in increased lift provided by the propeller slipstream over the wings of the aircraft.

In jets, the situation is different. There is a five-to-ten-second lag from the time of throttle application to the

Tell-tale evidence of undershooting is shown below. Wooden warning barrier, sand overrun and snow, all show touchdown imprints.

Too low on final. Above, main gear touched first in snow, forcing nose gear down. Slid 1500 ft.



The B-47 settled short of the runway. The left outrigger struck the soft ground causing the main left gear to roll in the dirt for 50 feet. The left outrigger doors contacted the runway during the last 300 feet of landing roll as the pods bend downward. Approach too low, flat.

response of power to gain a few additional knots of airspeed. It is this lag that accounts for many accidents.

Associated closely with misjudging distance as a cause factor is stalling, insufficient power or incorrect altitude. The drivers of jets outdo the reciprocal airplane guiders by a ratio of 30 to 1, in this category.

Failure to Level Off

Amazing as it may seem, failure to level off, roundout or flareout properly follows the stalling out cause factor in undershoot accidents. As one old timer has stated, "I don't know about this misjudging or stalling business. I think pilots have just stopped flying their aircraft while still on final. They say to themselves, 'Here I am, safely down from umpteen thousand feet'."

As if landing was not critical enough, getting into a stirred-up mess of air caused by jet or prop wash crops up as a cause factor. How long has it been since you've kicked rudder and . . . nothing? This sensation is a sure enough sweat-popper-outer. If you have any control over your landing sequence, don't be like the L-17 pilot who tangled with a B-36 slipstream. He resembled the proverbial sparrow caught in the middle of a badminton game.

Here are some other dudes in this field of human cause factors in undershoot accidents: Failing to compensate for wind conditions, failure to see collision objects, insufficient use of flaps and landing not aligned with the runway.

Cargo type aircraft have racked up some dillies in undershooting, but a slight change in traffic pattern has all but eliminated their bugaboo.

It used to be common practice for a transport pilot, calling in for landing instructions from an overwater flight, to ask for a straight-in approach. Then, PRANG! Wha' hoppen? Here's the answer.

Perception judgments resulting from long periods over water are misleading. The same thing applies to flights at night over terrain with no visible horizon. So the remedy in these cases is to circle the field one or more times. This permits a pilot's eyes to adjust to the local terrain features and allows depth perception to become normal. This circling procedure is mandatory now when landing at many bases.

What's the Solution?

Of course, there are other causes for undershooting. The ones covered here are some of the major areas. Like our capable physician who analyzes the probable causes of a sickness and then begins his remedial action, let's see what possible solutions are being studied to whip this undershoot problem.

One possible solution is painting a touchdown point 500 to 1000 feet from the approach end of the runway to serve as a landing target. This brings up two schools of thought.

The desire of a pilot to set an aircraft down on the first few feet of a runway is commendable as a demonstration of skill, but is expensive if an error in judgment or an emergency occurs. To set the aircraft down at the suggested touchdown point would demonstrate the same ability, while leaving an adequate margin for faulty calculation or any other unanticipated flight emergencies.

A rebuttal to this theory is that an attempt to train a pilot to land on other than the extreme end of the runway might establish a fixation that would be hazardous if he made approaches on shorter landing areas. It is possible that pilots will attempt to land on these designated marks or points regardless of altitudes or airspeed, resulting in an additional accident potential. And so it goes.

Some bases use frangible picket fences or small evergreen bushes in the overrun areas to act as deterrents against landing in this area.

Other bases use a runway mobile control unit and grade traffic patterns and landings of individual pilots of their organization. In line with this procedure, still other bases have expanded this idea to include the use of motion pictures of landings. The theory being that every pilot, knowing that his landing is being filmed, will concentrate upon doing the best job possible. By establishing sound flying techniques in the pattern, final approach and flareout, it is believed that a pilot will continue these behavior habits every time that he lands.

Wind-Shear Problem

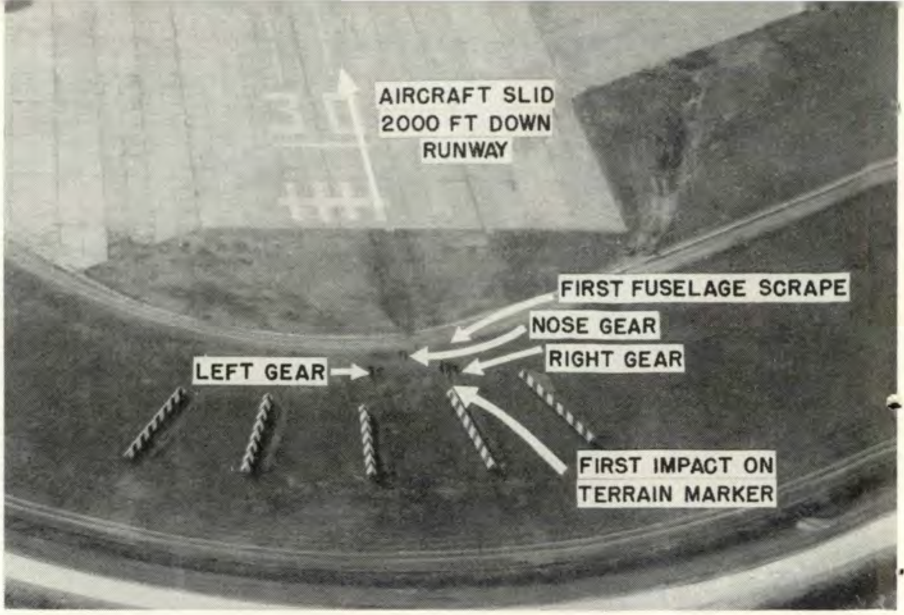
In addition to various solutions, another angle being studied is the wind-shear problem connected with landings. (FLYING SAFETY will treat this subject thoroughly in a future issue.) Briefly, a lot of unexplainable undershoot accidents point to this weather phenomena. A pilot can be coming in for a grease job, landing into a good reliable headwind, when zingo, he enters into a wind-shear area where the headwind changes into a tailwind and he's in for trouble. Pilots that say "I had it made" are absolutely right. They had it made and can't understand why they went into the ground.

A recommendation that might fit some if not all human cause factors is a program to indoctrinate all pilots in the limitations of their visual system in estimating distance, speed and rate of closure and the importance of taking these limitations into account in setting up a landing. Basically, this boils down to something like the automobile driver reaction series that show a driver how his depth perception and reaction time compare with the speed and stopping distance of his vehicle.

Secondly, emphasis should be placed on the necessity of maintaining adequate thrust until touchdown is assured, and that when indicated, a go-around can be initiated before minimum altitude is reached.

This whole package of undershooting needs constant vigilance right up to the threshold—whether flying VFR or IFR.

It's important to be in that magic area at the right airspeed in conventional type aircraft; it's a necessity in jet aircraft. ●



". . . the landing lights revealed the wooden embankment markers. The C-124 hit 170 feet from the end of runway, shearing nose and main gears."

". . . the airplane continued down the runway, sliding on its fuselage before it stopped. The pilot erred in his judgment and undershot the runway."

WELL DONE

Captain
George H. Normand

582d Air Resupply Group
RAF Station, Molesworth, Hunts, England

KNOWLEDGE ★ TRAINING

CAPTAIN GEORGE H. NORMAND and his C-119 crew completed a very thorough walk-around inspection. The local transition mission would be for four hours.

The copilot was making the takeoff from the right seat and the C-119 became airborne in an excessively nose-high attitude. Captain Normand, thinking that the copilot simply had overcontrolled the elevators, tried to help him lower the nose. To keep the nose down required extreme pressure on the yoke and when the aircraft did not respond to trim, Captain Normand advised the copilot to pull the autopilot emergency release.

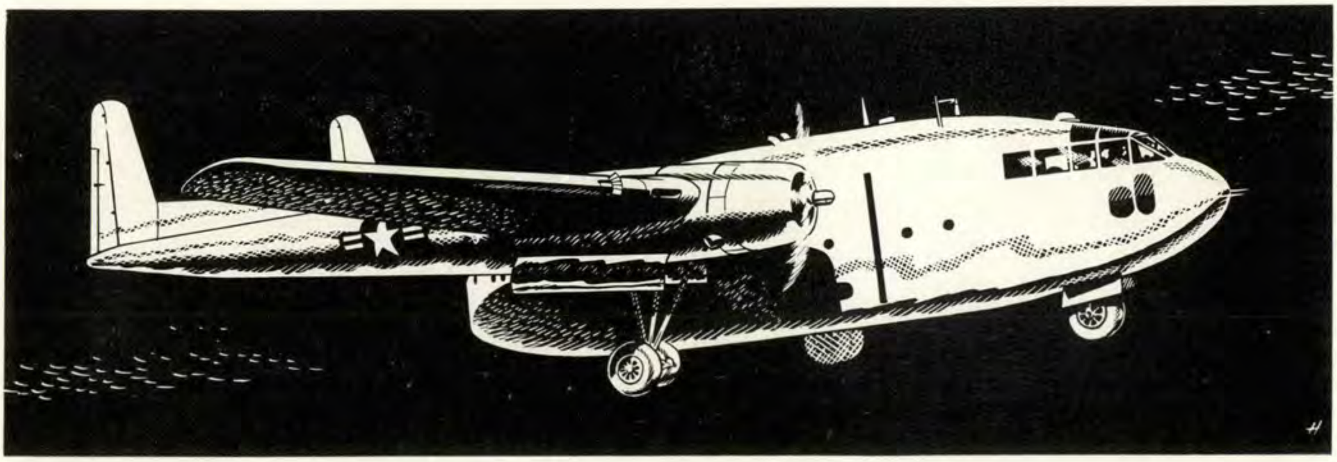
Despite all of the forward pressure that Captain Normand could exert, the big transport started to climb again. He called for the copilot, navigator and crew chief to help hold the control column forward and advised the radio operator to declare an emergency.

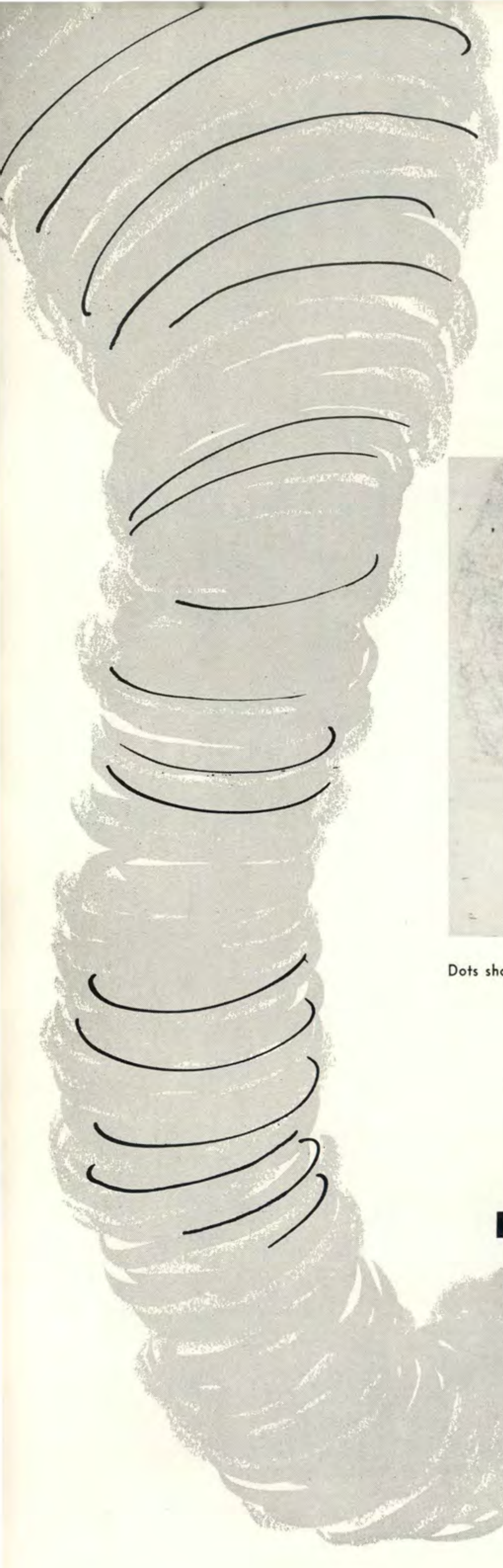
The landing gear was left in the down position to make the aircraft more "nose heavy." The crew chief tried to tie the control yoke forward with a tie-down rope. This failed. Unsuccessful attempts were made also to prop the yoke forward with a one-inch board. With both Captain Normand and the copilot bracing their knees against the control column, level flight could be maintained at 90 knots airspeed. They flew for 40 minutes in this manner. Aileron movement was impossible and only gentle turns could be made by Captain Normand, who used one foot at a time on the rudders.

The crew voted in favor of remaining with the aircraft and with everybody assisting, the heavy C-119 was landed safely.

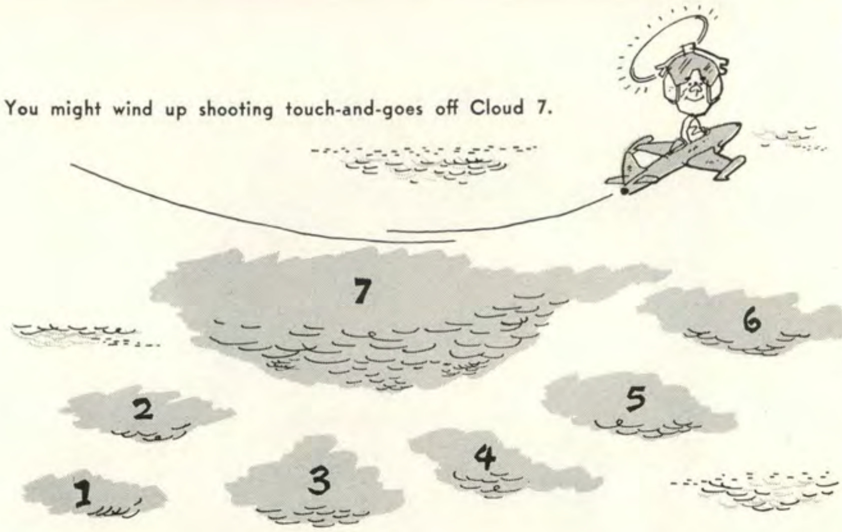
Inspection revealed that the elevator trim tab was jammed in the full nose-up position.

Good judgment, excellent knowledge of the aircraft's performance and a high degree of coordination and teamwork saved the lives of this crew. Well Done!





You might wind up shooting touch-and-goes off Cloud 7.



Dots show where tornadoes occurred. Central Plains area is "tornado alley." Plan your flight.

The tornado season is upon us. If you have no desire to tangle with one, perhaps this article has the answer.

Tale of the Twister

". . . he came nose to nose with the thing."

I BELIEVE IT IS SAFE to say that you have never flown through a tornado. You may have flown into one, but nobody, I mean nobody, has ever flown through one. Furthermore, of those who have merely flown into one, the vast majority are now getting their flying time shooting touch and goes off of Cloud Number Seven.

One exception to this is the incident involving Colonel H. R. Thyng and his flying machine. (FLYING SAFETY, July 1954.) Colonel Thyng unfortunately came nose to nose with a twister at some twenty odd thousand feet. Thyng entered the thing with a T-33 strapped securely in place. However, man and machine were torn every way, including loose, and the good colonel was spewed out the bottom of the twister, sans 33.

Now, all of this is not too difficult to imagine when one considers that the winds in and about a tornado range from zero to 300 plus mph. Also, figure that subject big wind may contain everything from young milk cows to old fence posts and things get kind of messy, especially for flying aircraft.

Actually, there is only one way to treat a tornado . . . steer clear of it. This is really not too difficult a task, provided you play your cards right. All that is required is to be somewhat familiar with the tornado frequency pattern, geographically and seasonally; and, most important of all, know about the service available to you through the Severe Weather Warning Center.

If it's any consolation, you can fly around Hong Kong about anytime and be reasonably sure that you will not tangle with a tornado, for 99 per cent of all tornadoes occur in these United States. Further, the chances of dancing with a twister in Walla Walla are almost as remote as in Hong Kong, for the vast majority of the beasties prowl around the central southern plains states and the southeastern states bordering the Gulf of Mexico.

The reason tornadoes occur in this more or less restricted area is easily explained. (That's what the man said.) It is simply that only in this area is required distribution of the weather elements, necessary for tornado formation, met with any frequency. The warm, moist air from the ground to eight or ten thousand feet is provided by the southerly flow from the Gulf of Mexico. The necessary over-riding, dry and cooler air is provided by the strong westerly flow across the Rockies. This precise sequence of events and elements is necessary to produce tornadoes and in no other area in the world is this sequence met so often.

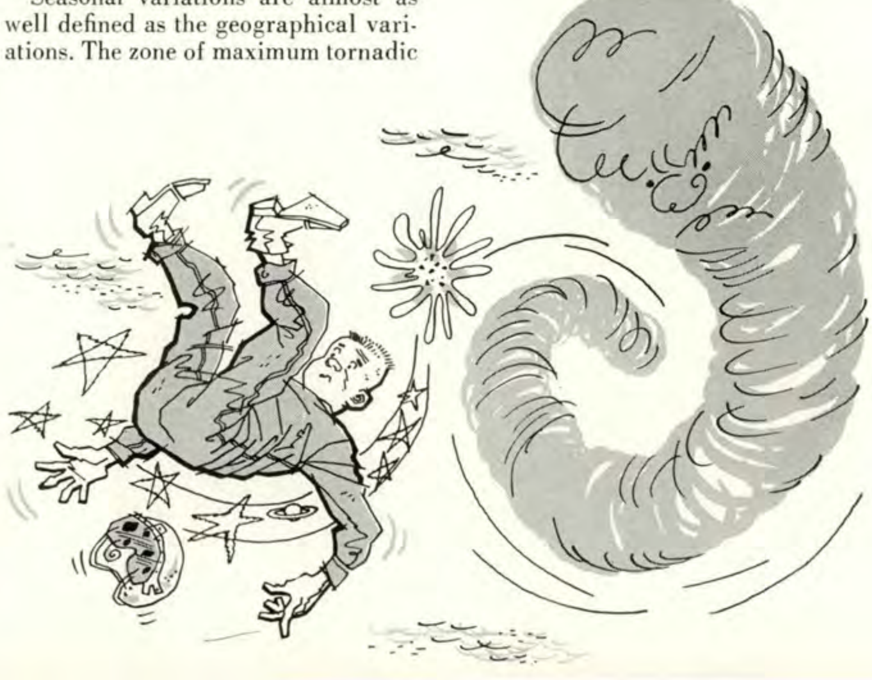
Seasonal variations are almost as well defined as the geographical variations. The zone of maximum tornadic activity starts in the southeastern states in February and shifts northwest during March and April. In May and June, the center is in Oklahoma, Kansas and Iowa. After October, tornado occurrence declines very rapidly. The cycle then returns in February, starting in the southeast, and here we go again.

Now that you are soundly indoctrinated on the general tornadic situation, let's get specific.

There is a special kind of teletype sequence available in your base weather station. It is prepared by a group of Air Weather Service experts

Severe weather warning expert, Major Robert Miller, started forecasting twisters in 1948.

"...he was spewed out the bottom, sans 33."



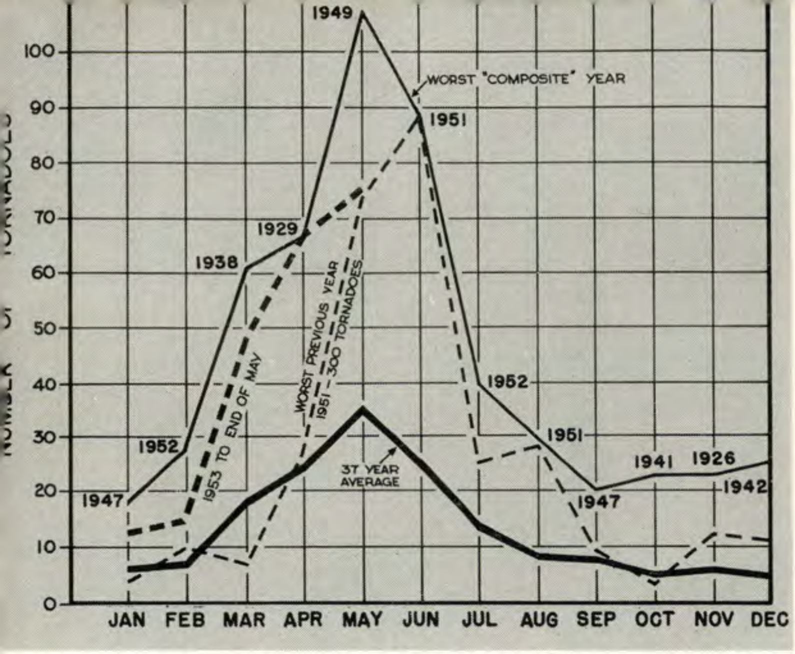


Chart shows monthly tornado frequency from January 1926-May 1953.

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EMERGENCY ALCKT
DE TIK2 2
Y 2816Ø4Z
FM SEVERE WEATHER WARNING CENTER TINKER AFB
TO ALCKT
BT
WWUS TIK2 2816Ø5Z
SEVERE WEA ADVIS NR 71Ø.
A... GNRL INFO... REF PRELIM OTLK AND ADVIS 7Ø9. PREV
INDCTD SQLN ACTV 153ØZ FAM-ARG-ELD-9ØW AEX CONTG EWRD NR
2ØK WITH TSTMS INCRG IN NMBR-INTNSTY DRG PRD 18-2ØZ.
INDCTNS SCND LN TSTMS WL DVLP NR 19-2ØZ VCNTY LN VIH-
LIT-LCH MVG E 25-3ØK. SCTD OVRNG TSTMS INCRG AFTN TO NE
OF VIH-CHA LN OVR NERN MO SRN 2/3RDS ILL-WRN KY-CNTRL
TENN WITH CNSDRBL AP- 1/4SFC AND ALFT.

B... SVR WX AREAS... RVS PREV AS FLWS. FLWG AREAS XPCTD
INCLUDE MR SVR OF TSTMS ASSOC SYSTMS PART A ABV.
1... VALID 18-ØØZ... BOUNDED 5ØE LIT-BWG-4ØS MSL-6ØSSW
MLU-5ØE LIT. LCL TRW+. OCNL 1/2-ISLTD 3/4A SFC. LCL
+35 ISLTD G6Ø. SVR TURBC 4ØABV.
2... VALID 2Ø-Ø3Z... ALG AXIS PIA-5ØSW EVV AND 6ØETHR
SIDE. LCL TRW+A. 1/4 ISLTD 1/2. LCL /30 ISLTD G5Ø.
SVR TURBDC 8ØABV.

C... TORNADOE AREAS... ISLTD TORNADOES FCST 18-ØØZ
TN AREA AL
IN AREA ALG AXIS 5ØWSW GVS-3ØNE MKL 4ØETHR SIDE.
BT
28/1615Z TIK2
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Fig. 1. A severe weather advisory sequence looks like this.

who forecast all severe weather, up to and including tornadoes. This outfit is headed up by Major Robert C. Miller, undoubtedly the champion tornado and severe weather forecaster in the United States. He and his boys have been forecasting twisters with amazing accuracy since 1948.

When they say that there is going to be a tornado within a specific area, batten down the hatches. Eighty-one per cent of the time they are right. They can forecast a tornado within a 150-mile area, 88 per cent of the time and when they forecast a thunderstorm, they miss only once out of a hundred times.

Now when you have an outfit like this going for you, it's downright dereliction of duty not to make use of their services.

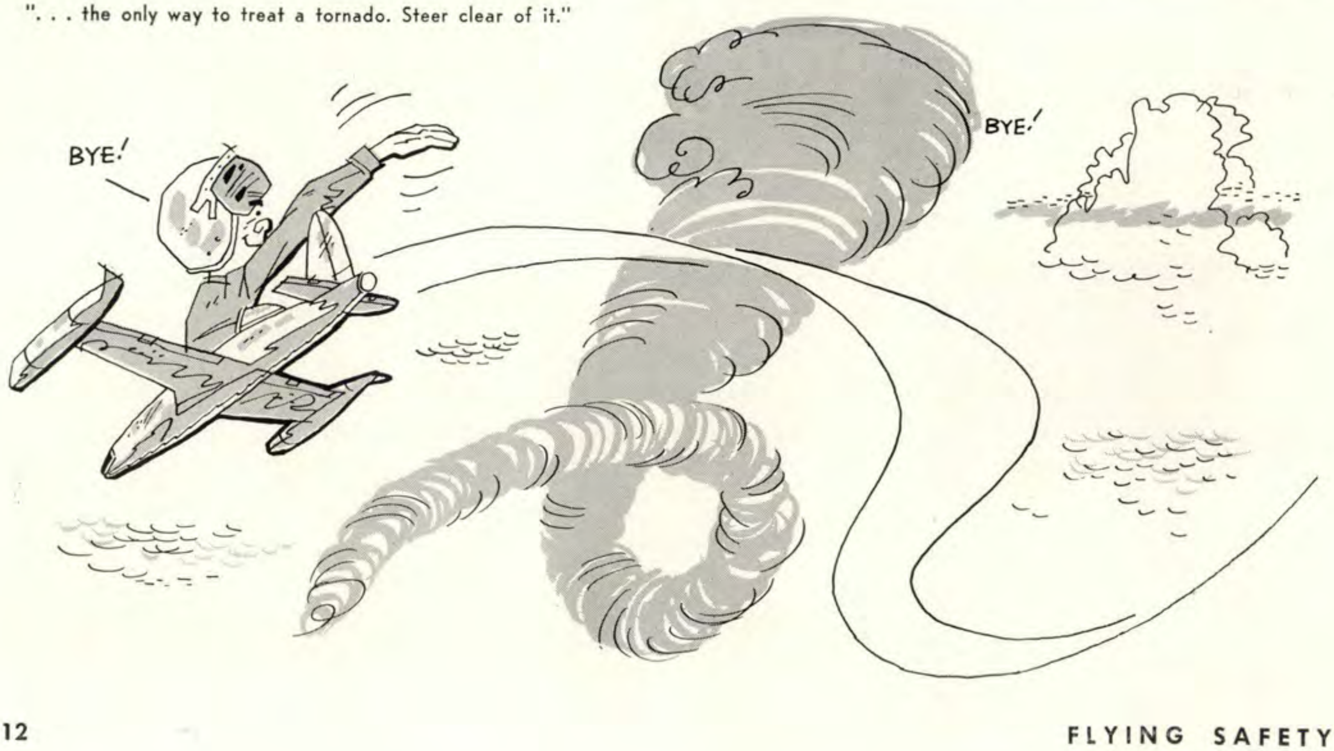
During tornado season, a number of these special teletype sequences are sent out each day. The first one carries a preliminary outlook for the day, and the frequency of subsequent reports depends upon the situation.

The Severe Weather Warning Center sequence is composed of four sections. The first (A) gives general severe weather information. The second (B) outlines the actual severe weather areas, not to include tornadoes. The third part (C) gives the tornado areas and the fourth section (D) carries any remarks.

Figure 1 is a reproduction of an actual SWWC sequence report. If you are unable to read this type of report, don't worry about it. Just be sure to ask the man who sits in your base weather station. He will decipher it for you.

The twister season is just about on us, so consider yourself warned. If you care to tangle with one, "Be my guest," (but please, not in Uncle Sugar's airplanes). If you don't, just read and heed those Severe Weather Warning Center sequence reports. ●

". . . the only way to treat a tornado. Steer clear of it."



Keep Current

NEWS AND VIEWS

New Console—Control tower operators at Air Force bases soon will have a more efficient control console from which to perform their duties.

The new console, called the Universal Control Tower Console, enables tower operators to control runway lighting, keep posted on weather information, log flight plans, maintain radio contact with aircraft and keep in touch with the radar approach control station or other control agencies in their operating sector.

Destined to become standard equipment, it was designed and built by engineers of ARDC. It can utilize high or low frequencies, VHF or UHF. It can be adapted to any future navigational aids. ●

★ ★ ★

Record Flight—McDonnell Aircraft Corporation's experimental "convertiplane" smashed the world's speed record for helicopter type aircraft on its first conversion flight. The XV-1 embraces a new concept of flight, combining the vertical flight characteristics of a helicopter with the speed and range of a conventional fixed-wing aircraft. An overhead rotor similar to those on helicopters is used for vertical flight. A pusher-type propeller and the aircraft's wings permit forward flight. The rotor is driven by pressure jets — one at each tip of the three blades. The aircraft recorded a speed of 120 mph. ●

Below, personnel of a pilotless bomber squadron prepare to perform a simulated launching of a TM-61 Martin Matador missile somewhere in Europe. Right photo shows some major parts on production line.

Alphabet Soup—Effective 1 March 1956, five letters in the phonetic alphabet will change. The words Cocoa, Metro, Nectar, Union and Extra will be changed to Charlie, Mike, November, Uniform and X-ray.

These changes will be adopted and implemented within USAF for use in all communications. All commands will be directed to use the new ICAO phonetic alphabet. ●

★ ★ ★

Automatic Computor—The first engineering model of "Air Traffic Control Central" is undergoing tests at Clinton County AFB, Ohio. Popularly known as Volscan (FLYING SAFETY, April 1954), this model includes equipment that will provide automatic control instructions for 14 aircraft simultaneously.

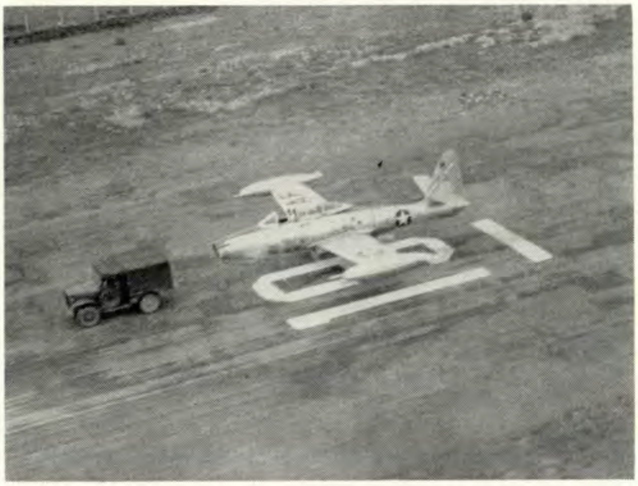
In 1952, automatic tracking and computing equipment first was tested. Six experimental channels provided approach instructions for six aircraft arriving at approximately the same time. More than 2600 actual flights by test aircraft were made to determine the accuracy of the automatic equipment.

These current tests will be aimed at improving the rate at which aircraft can arrive safely at an airport. This rate is improved when control instructions are computed automatically for the operator.

The equipment selects for each aircraft the earliest possible time of arrival which is consistent with the speed of the aircraft and which does not conflict with other planes already scheduled. An automatic coupler then continually computes control orders for each aircraft so it will arrive on schedule within a precise interval.

The computor accomplished this spacing by "heading" control, which is the automatic issuing of minor offset headings for the aircraft to fly when it is necessary that it be delayed. ●

The problem. How to get the four F-84s off the old fighter strip? The decision. Fly the aircraft out, using JATO on takeoff run. Right, ". . . he cut the bottles in a third of the way down the strip."



ONE TWO THREE . . . . BLOOP

Here is an example of how knowledge through training saved an aircraft and probably the pilot. You may say that number four man was just plain lucky. But it's amazing how knowledge of your aircraft and emergency procedures contribute to "luck" when the chips are down.

LAST SUMMER, WE HAD an incident occur here that may be unique in the Air Force insofar as jet short field takeoffs go. It all started when a flight of four F-84Gs were unable to land at Clark Field after a sudden rainstorm developed and the ceiling dropped to 300 feet, with ½ mile visibility.

The flight attempted to hold, in a clear area, until the storm passed, but fuel became critical. A landing had to be made immediately, and the flight leader took his boys over to Poro Point, an old, abandoned fighter strip. He dragged the field and then went in and landed. The rest of the flight followed; all four planes got down without even a blown tire.

Now this, in itself, was a fair accomplishment as the strip was composed of gravel and old asphalt, and was only 3936 feet long. But, although the aircraft were landed safely, another problem loomed ahead. How were the four fighters to be recovered?

After some discussion, a decision was made to fly the aircraft out, using Jato on the takeoff run. And right here is where things got real hairy.

After the Jato bottles were installed, the four F-84s taxied to the end of the strip and ran up to 100 per cent.

Above, ". . . the F-84 gained speed rapidly with the white plume trailing behind it." Below, ". . . at the last moment, he pulled heavy F-84 off."

A C-47 was parked approximately $\frac{1}{3}$ of the way down the strip, and each pilot was to cut the Jato in when he reached this spot. The first three planes got off without incident, but the fourth pilot ran head-on into trouble during his takeoff roll.

By the time he reached the C-47, the aircraft was moving at a good clip, but when he cut in the Jato, nothing happened! The bottle didn't fire. The pilot was faced with two choices: abort, or try to fly the plane off. He chose the latter and held the plane down until the last second and then horsed it into the air. The aircraft became airborne and staggered over a 55-foot hill which was immediately off the end of the runway. As he came across the hill, he dumped the nose slightly and let the plane settle a little until it was about 15 feet above the ocean. Gradually, the airspeed built up and the pilot was able to climb and join the rest of the flight. It couldn't have been closer, and I doubt if many F-84 drivers have taken off in a much shorter distance and cleared better than 50 feet. Incidentally, the runway temperature was 91 degrees, and don't discount the rough runway surface, which didn't help the takeoff roll a bit. ●

"Nothing" can be dangerous!

Colonel K. E. Pletcher
Commander, USAF Hospital, Carswell AFB.

FLYING SAFETY is indebted to Col. Pletcher for preparing this article. The story originally appeared in "Combat Crew," a publication directed toward the combat crewmen of our Strategic Air Command. The article has been reprinted in several base and command publications; however, FLYING SAFETY feels that information such as this cannot be repeated too often.

You can get tired doing a lot of almost nothing. Far left photo—heavy flying clothing and cramped working space induces fatigue. Pilot, left photo, shows effect of static fatigue induced by little exercise. Above, exertion produces dynamic fatigue. Tiredness leads to inefficiency.

CAN YOU GET TIRED from doing almost nothing? This question is not facetious. Its simple, correct answer "Yes" is at least partly, and may be completely, the explanation for a number of aircraft accidents. These accidents have cost the Air Force millions of dollars, and what is infinitely more important—lives. Your own continued well-being may depend on an understanding of the peculiar type of fatigue which is an occupational hazard to any pilot or aircrewman.

It is not difficult to understand feeling sleepy, following lack of sufficient rest. It is not difficult either to imagine being tired after a game of basketball or 18 holes of golf. It is much more difficult to accept the fact that you may be so tired as to be dangerously inefficient after a prolonged period of relative inactivity. Such, however, is the case. It just doesn't fit the generally understood picture of how you get tired.

Tiredness or fatigue, in all its aspects, is a complex entity and does not lend itself easily to pat scientific explanation. We can consider it, however, in practical terms which will serve the purpose of this discussion. In these terms then, what is fatigue? It is a physiological state of tiredness, exhaustion or lassitude which may or may not cause its victims to be aware of its presence.

True or False

There is a kind of fatigue which may be called subjective or "apparent" fatigue. This is a mental fog which may cause you to comment, "I feel tired." Almost everyone has experienced it. It is usually brought on by boredom but actually has no physiological or chemical basis. It disappears rapidly and completely under the stimulation of interest or attention to tasks at hand. This may be called false fatigue, for it is really a state of mind rather than a condition of the body. The other kind of fatigue is true fatigue. This is a physiological state, and the result of changes in body chemistry and physiology; therefore, it cannot disappear or be dissipated under the stimulus of interest or attention. This is the fatigue which is significant and can be very dangerous.

True fatigue can be produced in either of two ways. One way to produce it is by hard or prolonged physical effort. This is familiar to everyone who has participated in active sports and is easy to understand. The other way that true fatigue can be produced is less understandable. This is the production of fatigue by inactivity or stasis such as is encountered on long-range aerial missions during which very little physical activity is possible. Named by the way it is produced, the first type of true fatigue may be called "dynamic fatigue" and the second type is called "static fatigue."

Cause Factors

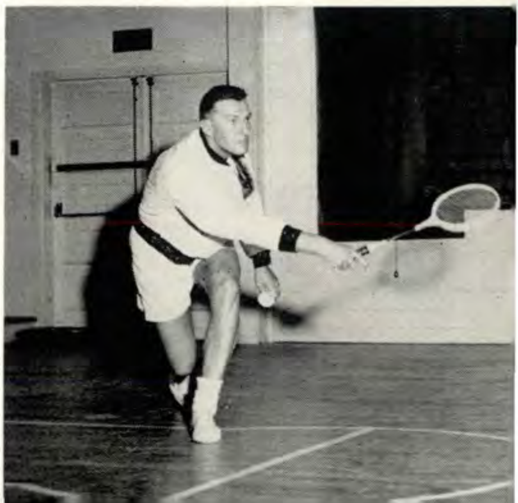
To repeat, true fatigue can be produced in two ways: by physical exertion—dynamic fatigue; by lack of physical exertion—static fatigue.

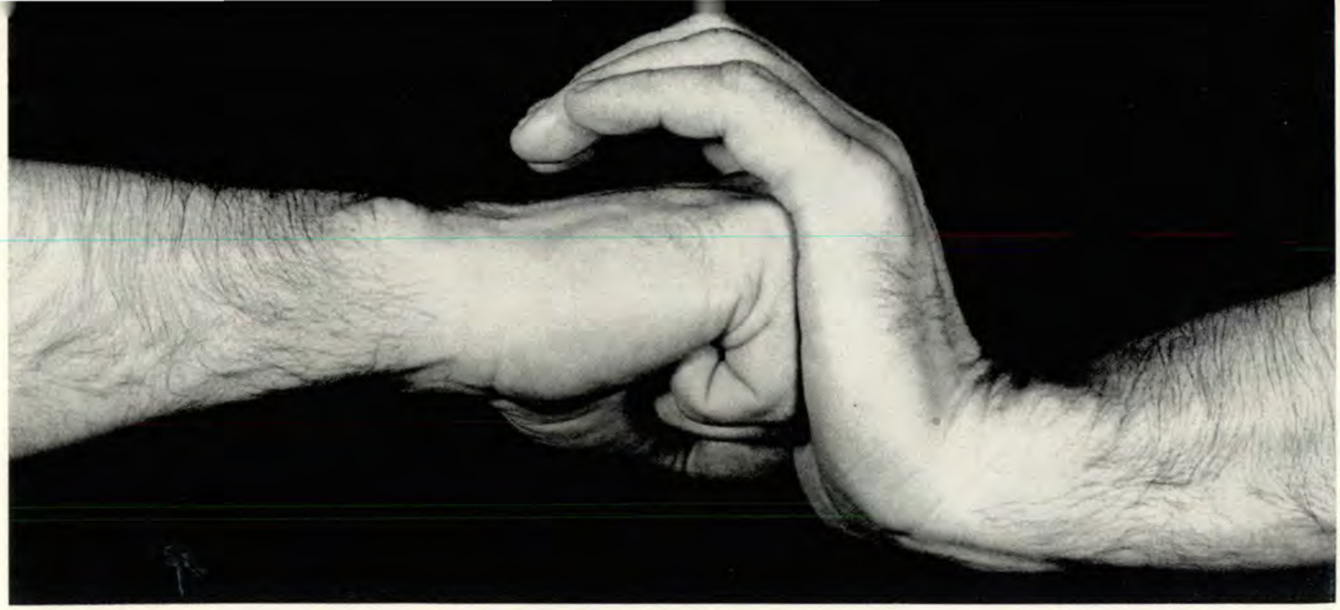
This is a paradox, but it is correct. Since we easily can understand cause and effect in dynamic fatigue we shall consider, from this point on, static fatigue alone through a series of questions and answers. Remember that both dynamic and static fatigue produce similar changes in body chemistry and hence in physiology and effective function.

How does static fatigue develop? Static fatigue is slow to develop and is insidious in onset. Consequently, individuals so fatigued may not realize they are functioning way below par. Although other factors may be present in producing this type of fatigue, the principal causes are:

- Lack of adequate preflight rest. In this case some static fatigue is present at takeoff.
- Long "time-out-of-bed" prior to takeoff. This aggravates any effects of too little rest.
- Inadequate inflight rest. In multiplace aircraft this means relief from crew duty and sleep. It is quite dif-

Staying in shape is one way to fight fatigue.





During long flights, take "antagonistic muscle" flexing type of exercises often.

ferent from lack of physical activity while awake and performing necessary crew duty.

• Very little physical activity. This results in lowered body metabolism, fewer and shallower respirations, slowed circulation and a relative stasis of body fluids. The combination of these causes waste products to pile up.

• Prolonged exposure to a very dry atmosphere. The relative humidity of pressurized aircraft cabins at high altitude is remarkably low. This results in a large loss of fluid from the body. There is an apparent loss through urination. Less apparent, or not apparent at all, is a large loss of fluid through perspiration and respiration. In the dry cabin atmosphere perspiration evaporates rapidly and you may lose, in a 24-hour period, as much as two quarts or more of water just by perspiring and breathing. No sweat, eh?

• Loss of salt without adequate replacement. This occurs principally as a result of perspiration.

• Prolonged exposure to relatively low oxygen tension. In other words, there is present in everyone a mild but significant hypoxia.

• Prolonged exposure to noise and vibration. All aircraft, to a greater or lesser extent, expose their occupants to mixed frequencies and intensities of noise and vibration. Over a number of hours such exposure contributes considerably to the development of static fatigue. This is in spite of the fact that pilots and other aircrew members are accustomed to these exposures and do not particularly notice or become disturbed by them.

What does static fatigue do to you? In non-technical terms, it will:

• Make you feel drowsy, irritable, bored, or all three.

• Make you less attentive to what is going on around you.

• Make you drowsy in a very insidious sort of way. This may be observed by suddenly waking to an awareness of your surroundings without knowing that you have dozed off to sleep.

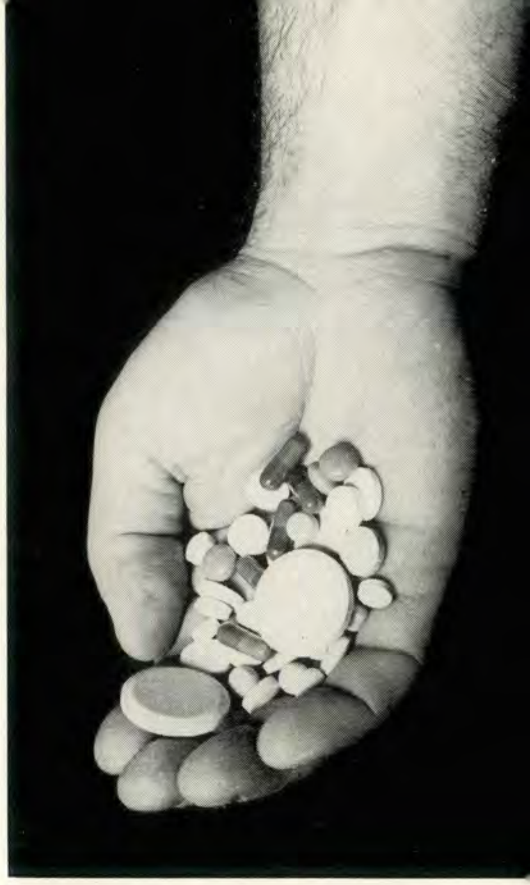
• Cause you to adopt a "So What?" or "Let it drift" attitude. This is a state of contentment with things as they are and a reluctance to alter the status quo.

• Make you slow to react to rapidly changing situations.

It is needless to elaborate on the

To assure ample fluid intake, drink water, milk, fruit and vegetable juices.

Scheduled rest periods for all crewmembers is possible in large aircraft.



Routine use of drugs is dangerous.

danger of any one or any combination of these effects of fatigue as they relate to flying. Critical phases of flight demand maximum attention, relaxed alertness and the ultimate in crew coordination to insure safe and effective operation. It requires little imagination to visualize what could happen when even one key crewmember is ineffective as a result of any of these things.

Preventive Action

What can you do to prevent or overcome static fatigue? There are a number of things which are effective both in preventing and combating static fatigue. Perhaps it is best to list them and discuss each, briefly:

• Assure adequate preflight rest. Get at least eight hours of sleep prior to a long flight.

• Make all efforts to have a minimum "time-out-of-bed" prior to flight. This is admittedly a difficult thing to control, but improved operational techniques and practices can insure that this time will be minimal.

• In multiplace aircraft, schedule rest periods for all crewmembers during long flights. This is a matter of crew discipline and many times is dependent on the leadership abilities of the aircraft commander. We have found that properly suspended hammocks afford the best means of inflight rest. Hammock occupants, too, are relieved from the tiring effects of vibration during their periods of rest.

• Take muscle flexing or "antagonistic muscle" type of exercises several times during long flights. This type of exercise is similar to that advocated by various people in the muscle building business. It is based on the fact that almost every muscle in the body has an antagonist. Thus, you may attempt to flex the forearm at the same time resisting this movement by tensing the muscle at the back of the arm whose action is to straighten or extend the forearm rather than flex it. Another such exercise consists of placing the fist of one hand into the palm of the other and pushing while resisting the push with the open hand. Another is "walking in your shoes." This consists of moving the toes of each foot alternately as though walking barefoot. Tense and relax thigh muscles alternately. These exercises, which may be performed in very limited space, tend to overcome stagnation of body fluids and assist in alleviating fatigue.

• Assure ample fluid intake. The drinking of water, milk and especially canned vegetable and fruit juices is most desirable. These provide a much needed replacement of water, sugar and salt throughout the period of flight. Tea and coffee, while providing fluid, perhaps sugar and stimulation, are diretic and cause the loss of more fluid through relatively increased urination.

• Eat small amounts of solid food at more frequent intervals rather than eating large amounts at one time. This eating habit can be acquired during flights and is eminently more satisfactory than the ingestion of a large meal which accentuates the effects of fatigue.

• Breathe 100 per cent oxygen for several separate five-minute intervals during the last 30 or 45 minutes of flight or prior to other critical phases of flight. This increase in the percentage of oxygen breathed will help the body tissues wash out the piled-up waste products and greatly facilitate both mental and physical activity.

• Don't use drugs. All of us perhaps are unwilling to exert an effort we think a pill will accomplish for us. Drugs are mentioned only to advise against their routine or habitual use. The effects of the same drug are varied among different individuals as well as in the same individual on different occasions. Thus, predictability of reaction to drugs of this nature is poor and their use may be dangerous rather than helpful. For maximum effort or all-out missions, specific drugs might be considered for use under strict medical supervision. Routinely, no.

Remember that you can get tired doing a lot of almost nothing. Remember that you may not be aware you are tired. Remember that this tiredness—a true fatigue—can render you dangerously inefficient as a combat crewmember. You can and should do something to prevent or overcome this peculiar occupational fatigue of pilots and aircrewmen on long missions. ●

REX SAYS

THE WAY I figure this predicament of being disoriented, misplaced or lost is just to come right out and admit it. Let a DF station get a fix on you. Then they can inform Flight Service of your plight and together, they probably can get you down safely.

At least that is what I did a while back and I thought Rex might be able to pass the word to some other poor timid soul who might be ashamed to let somebody know that he is roaring around the area not knowing exactly where he is.

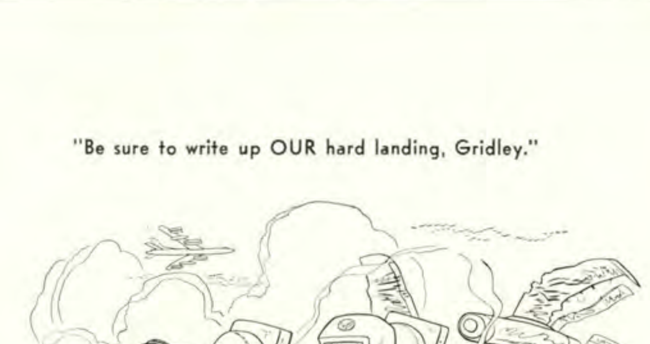
Anyway, I was somewhat uncertain of my position and had only 20 minutes of fuel remaining. I called what I thought was the nearest control tower for assistance. The operator gave me a heading to fly and meanwhile alerted Flight Service. By doing this, another tower in the vicinity very comfortingly horned in and made contact with me.

I checked my fuel and about this time I thought that I was going to have to get ready to "leave home." Just then, I was advised that I should have the airfield in sight ahead of me. Sure enough, there it was. I landed and checked the fuel. There was less than five minutes remaining.

As I said previously, I figure that by telling somebody that I was lost, instead of hem-hawing around about it, I got down safely.

***REX SAYS**—You figured correctly. There certainly isn't any stigma attached to saying you're lost, if you are lost. This DF procedure has saved many necks as well as expensive flying machines.*

"Be sure to write up OUR hard landing, Gridley."



I AM A PERSONAL equipment officer at my base. I've fitted many a pilot with an oxygen mask and am well acquainted with the paragraph of AFR 60-16 which delves into the use of oxygen. So when I hitched a ride on this B-25 one night going back to California, I was interested in seeing how the crewmembers complied with the reg.

Incidentally, for those of you who have the idea that you can over-use oxygen, I have discussed the pros and cons about using 100 per cent oxygen, with medical people. It seems that a guy would have to breathe it continuously for several days before any toxic effect would show up.

Anyway, I sat up front with the crew chief and as luck would have it, there was an oxygen mask hooked in near my seat.

I saw the look of surprise on the crew chief's face as I strapped the mask on after I had fastened my safety belt.

We took off and climbed to 12,000 feet before leveling off to cruise. I lounged back. Neither the pilot nor copilot made a move to strap on their masks. I noted that their individual masks were connected and accessible.

Throughout the flight, I noticed heads begin to nod as the pilots fought sleep. I thought to myself, "A little whiff of oxygen would help out about now." I kept a wary eye on them just to make sure that they both didn't conk out simultaneously.

Five hours later, I heard the tower operator give them their final landing instructions.

I remembered a statement that I often make to pilots. "The use of 100 per cent oxygen for 15 minutes during the last hour of a long flight is recommended, especially at night. It increases visual acuity and also their depth perception."

Well, neither pilot even looked at his oxygen. The landing itself was a bit bouncy.

Over a cup of coffee, I chanced a remark about their not using oxygen for I know that they saw that I had been using it. The reply? "No sweat in a B-25. Never even think of it most of the time."

So be it. But these type jokers should wise up if you ask me.

REX SAYS*—Wonder how many non-oxygen users there are tooling around the night skies? Under certain conditions oxygen is a must. And* in a B-25. Never even think of it.

★ ★ ★

A BUDDY AND I were heading home from a navigational proficiency flight in a T-33. Just as we arrived over the high cone, we overheard a pilot contact the tower for a UHF/DF steer, but the tower did not have UHF/DF equipment.

The pilot was trying to describe the airfield below him. He was telling the tower the number of runways, the headings of the runways and the general layout of the field. However, there were several airfields in the vicinity that conformed to the description being given by the pilot and the tower was unable to assist him.

We had obtained our clearance and had started our penetration when it occurred to me that we might be able to give the lost jockey a steer with our airborne UHF/DF set (ARA-25).

We called the tower and volunteered our assistance. The pilot gave us a short count and we obtained a relative bearing on the aircraft prior to beginning our penetration turn.

We gave the pilot a heading to fly and upon completing our penetration, entered traffic for a normal landing. Since the pilot had not sighted the field yet, we gave him another steer while we were on initial. This second steer was just prior to pitch-out and we were not certain of its reliability. In order to confirm our second steer, we provided a third steer during the landing roll. The pilot sighted the field while we were taxiing in.

REX SAYS*—This deed for the day puts you at the head of the class. Familiarity with and proper use of equipment stamps you and your buddy as being "professional types."*

REX SPECIALS

AIR TRAFFIC CONTROL surveillance radars are equipped with moving target indicator features, but these features do not permit radar to see aircraft during heavy precipitation. Thunderstorm showers and wet snow cause "radar clutter" to such an extent that air traffic control capability sometimes is limited severely. Maintaining radar identification of aircraft under these conditions can be difficult.

Some pilots have developed a false sense of security when being controlled with radar because they are not aware of this limitation.

★ ★ ★

"WHO INVENTED UHF radio, anyway? I never had any trouble with VHF." How often have you heard that statement during sessions of hangar flying? I have heard a lot of it, and I feel that perhaps a little discussion of the facts might help to cool off some hot tempers and frayed nerves.

Every radio, even your Dick Tracy wrist radio, needs an antenna. UHF radio operates something like an electric eye. For all practical purposes the receiving antenna must be able to see the transmitting antenna. Now if you go out to the ramp and put your eye in the same location as the UHF antenna on your aircraft, the chances are that you cannot see the tower. If that antenna cannot see the tower's antenna (which could be in a different location than the tower), you cannot talk to control personnel. This may not be completely true on the ground because the signals are so strong that they often bounce off hangars and find their way between antennas. However, there are no hangers in the air (ordinarily) and you must have line of sight to have communications.

Now, airborne antennas are located in different places on different aircraft and if your antenna is in the tail-cap you cannot communicate when the fuselage is between the tail-cap and the ground station. If you have a belly antenna you cannot communicate when turning into the station. You must remember also that every ground station has a cone of silence, therefore, you cannot swap talk while directly over a ground station.

So much for line of sight troubles. Now, what can be done today? Recognize the limitations and the equipment becomes quite adequate. Do not try to make contact while in a position which shields the antenna and you will remain calm and satisfied with your equipment.

There is also an "ace in the hole" which many pilots do not realize. Your VOR receiver is a fine VHF communications set. Simply tune in the desired tower or GCI frequency on the omni-control box and you can hear ground instructions clearly.

The UHF problem noted here has not been overlooked by the boys at Wright-Patterson Air Force Base. The Communications and Navigation Laboratory has an extensive program in effect, to solve this problem, but until the solution arrives in the field, be sure that you know the limitations of your equipment. This is the only way to get the best use. ●

OFF and RUNNING

Every takeoff is different. Knowing your airplane and what to do in case of emergency are "musts." Keep these in mind.

Bob Hoover, Test Pilot, North American Aviation

THE BEST insurance available to a pilot is a complete knowledge of the airplane he is flying, its capabilities and its limitations. Takeoffs are a particular source of accidents. Here are some things to keep in mind when you point the nose of your F-86 down the runway.

Flight Control System

With the advent of the hydraulic flight control system, some accidents occurred because pilots were unfamiliar with the new system. They did not realize that a heavier pull force was required at low speeds if the airplane was out of trim than on airplanes with a conventional flight control system. This is because the stick force on airplanes with the irreversible hydraulic flight control system remains the same regardless of the air load on the control surfaces.

However, when flying an airplane with hydraulic flight controls, you should remember that you always have control even with a runaway trim in the full forward or aft direction. The force required to maintain control is always within the capabilities of the pilot. This does not mean that the airplane should be flown if an obvious trim failure is known. However, should the trim run away during the takeoff roll at a point where the airplane could not be safely stopped, there would be no particular problem in taking off and making a normal landing.

When briefing pilots, I have recommended the following check prior to the next flight. With the engine running, or an external source of power plugged in, run the trim full forward and visually check the stabilizer position while pulling the stick full aft, noting that full travel can be obtained.

Many pilots have been taught that if the airplane is held in a three-point attitude during the takeoff run for a prolonged time, the airplane will arrive at a negative angle of attack and cannot be taken off. This is not true. Again, it is a matter of understanding the flight control system in F-86s.

Everyone realizes that a very small stick movement maneuvers the airplane quite well at 400 or 500 knots. Yet, at takeoff and landing speeds, the amount of stick movement and resulting stabilizer - elevator movement required are considerably greater. Therefore, the greater the speed, the more control effectiveness or controllability available. In flight test, takeoffs have been made in F-86s at much higher speeds than are recommended. In every case, the takeoffs were made without difficulty.

Nosewheel Lift-off

A number of takeoff accidents have occurred because the pilot was unable to obtain nosewheel lift-off at a given airspeed or at a given distance down the runway. A variety of conditions

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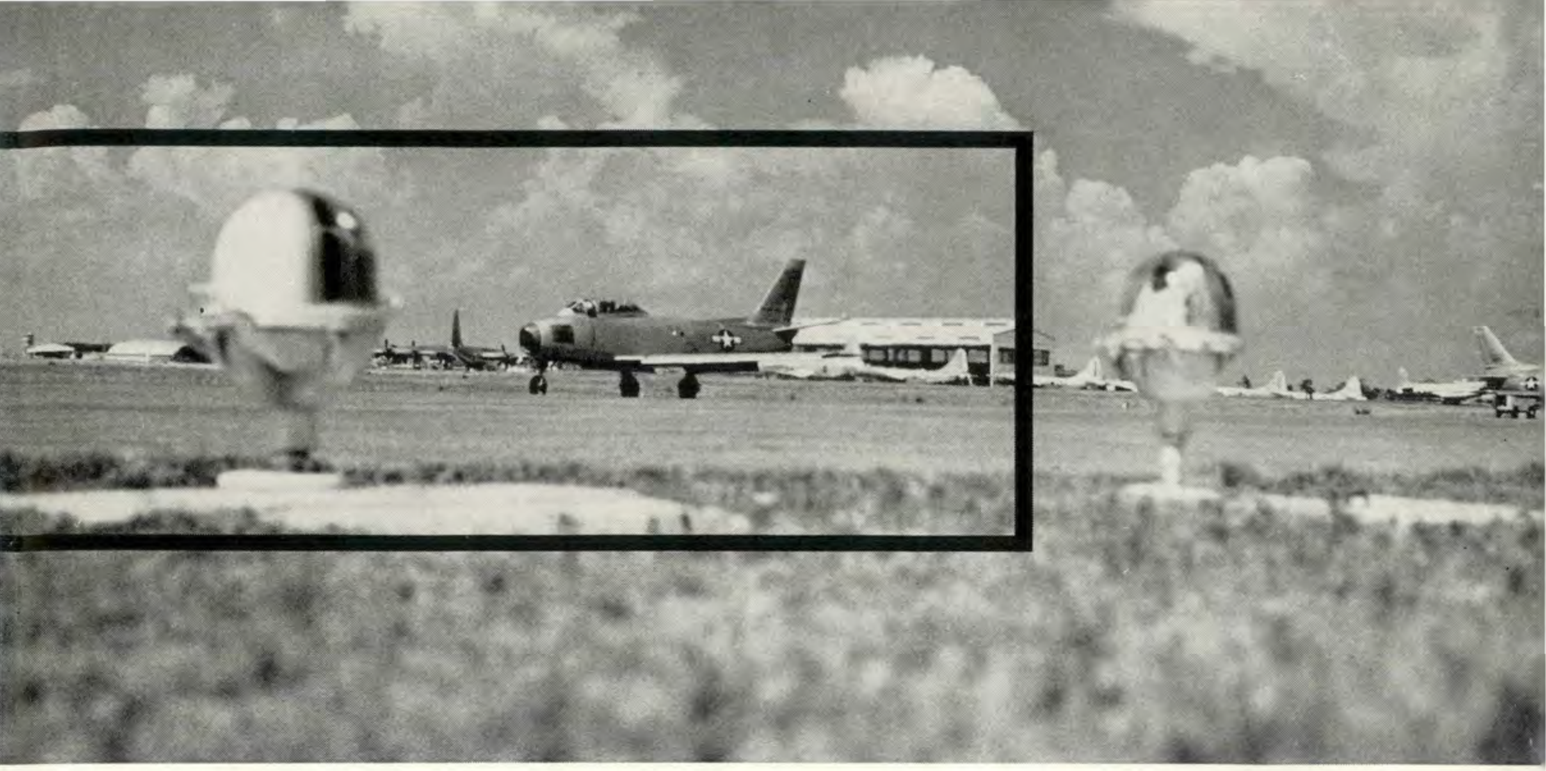
Bob Hoover is a graduate of both the Air Force and Navy test pilot schools. He was a Spitfire pilot in World War II, and became a flight test pilot at Wright Field after the war. For the past 5½ years he has been assigned to numerous flight test projects at North American Aviation. He also has conducted pilot indoctrination briefings and flight demonstrations on North American aircraft.



could delay the nosewheel lift-off. For example, the external store configuration makes a great deal of difference; the heavier the gross weight, the higher the airspeed before nosewheel lift-off.

Incorrect placement of tailpipe segments on F-86A, F-86E, F-86F and F-86H aircraft also can delay nosewheel lift-off. It is the pilot's responsibility during the walk-around to check that segments are placed correctly. Segments at the 12 o'clock position would increase the speed considerably at which nosewheel lift-off takes place, regardless of the external store configuration. The correct way to add segments is given in the Flight Handbooks.

Dragging brakes have delayed nosewheel lift-off during the takeoff run on some F-86H airplanes. (I have not heard of this occurring on other F-86 series.) The dragging brakes create a nose-down moment which delays the nosewheel lift-off speed. When this occurs, the pilot has a sensation of being glued to the runway. However, it takes considerable braking to prevent nosewheel lift-off. For example, at 150 knots it takes more than 50 per cent of the maximum available braking to prevent the nosewheel from coming off. When the airplane breaks free of the runway, the sensation is similar to that of being catapulted. I do not know of any takeoff accidents resulting from dragging brakes. A recent engineering change was proposed to eliminate the dragging brake problem on takeoffs.

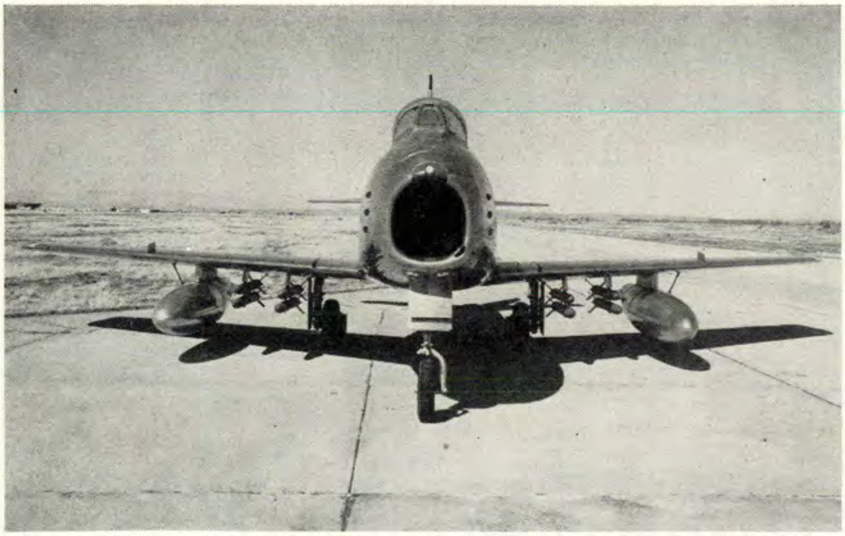
Pilot should check airspeed, engine RPM, tailpipe temperature in delayed nosewheel lift-off.

Nosewheel lift-off could, conceivably be delayed by a forward center of gravity. However, if the CG is kept within normal limits, nosewheel lift-off is not a problem.

In all cases of delayed nosewheel lift-off, the pilot should check the airspeed immediately, the engine RPM and the tailpipe temperature. Accidents have occurred when tailpipe temperatures or engine RPM dropped and the pilot aborted the takeoff. My own suggestion is that the throttle should not be chopped when the tachometer or tailpipe temperature indication is the sole indication of power failure.

Power Loss

With a limited amount of experience, a pilot can tell whether or not



Above, external stores calls for different takeoff technique. Below, pilot makes sure he doesn't assume too steep attitude.

In formation takeoffs, below, extreme caution should be taken when slatted and solid leading edge F-86s are both scheduled.

he has a rapid loss of thrust, although it is true that a gradual decrease of power is difficult to detect without instruments. If you have an actual sudden drop in tailpipe temperature, you can rest assured that the RPM will follow rapidly. With most of the airplanes I've flown, the noise level of the airplane, as well as the failure to accelerate at low speeds, definitely aids in the detection of a rapid loss of power.

If engine power loss occurs during takeoff on F-86A, F-86E and F-86F aircraft, the pilot must select manually the emergency fuel system before the RPM drops to 80 per cent. If the engine RPM falls below 80 per cent, the takeoff must be aborted because there would not be enough time to first retard the throttle to idle and then switch to the emergency fuel system and advance the throttle slowly to prevent compressor stall.

Aborting Takeoffs

Many pilots choose a point on the runway with the thought in mind that if the airplane is not airborne at this point, the takeoff should be aborted. This thinking has merit if you fly the same airplane day in and day out with a consistent external loading and from the same runway or field at a constant temperature. Thrust varies from one engine to another. Normally, you fly an airplane clean one day, with stores another. Temperature varies from day to day and throughout the day, also the field elevation is different at each base.

For these reasons, the Flight Handbook Appendix charts must be consulted for a reliable takeoff point. Personally, I cannot mentally calculate exactly what my takeoff run should be without consulting these charts. Yet, even though the charts are consulted, a certain margin should be allowed for differences in pilot flying technique.

Most of us have determined through experience that on a cold day a jet engine produces considerably more thrust, and on a hot day, less thrust. However, the thrust ratings on an engine are based on standard day temperature. The charts in the back of your Flight Handbook consider the temperature effect on thrust.

You should never forget the possibility of a shift in wind direction during your takeoff run. Normally, you would not expect a wind shift of sufficient magnitude to cause trouble during takeoff. Yet, there have been cases when a direct crosswind shifted to a quartering tailwind of considerable velocity.

6-3 Solid Leading Edge

The 6-3 solid leading edge was put on some F-86 aircraft because of certain advantages it offered in air-to-air combat. (See "The Edge in Performance," FLYING SAFETY, November 1955.) However, this gain in performance was not achieved without some sacrifice. As a result, the recommended nosewheel lift-off and takeoff speeds for airplanes without slats are distinctly greater than those for airplanes with slats.

In the early days of the Korean conflict, it was recommended that nosewheel lift-off be accomplished as soon as possible to avoid shake and possible damage to the nosewheel steering mechanism from the rough runways. This recommendation was applicable to slatted-wing F-86s but could lead to disaster if applied to an airplane with the 6-3 solid leading edge. Prematurely lifting the nosewheel and holding the airplane in a very steep, nose-high attitude prolongs the ground roll considerably. The resulting ground stall is indicated by failure of the airplane to lift, and loss of acceleration.

If the pilot realizes that he has assumed a nose-high attitude and has as much as 1000 feet of runway available, he can drop the nose and gain approximately 10 knots within an additional 1000 feet of roll. At that time, the airplane should have sufficient speed to become airborne.

In an F-86F with four external stores, I found it possible during a maximum performance takeoff test to roll for as much as three miles without becoming completely airborne while holding the stick full aft and assuming a nose-high attitude (stalled). Occasionally, the airplane would lift off the ground slightly and then experience a yaw and roll before

For a reliable takeoff point, make sure you consult the Flight Handbook appendix charts.

sinking back to the ground. This test was conducted from a dry-lake bed.

The pilot who assumes too steep an attitude and fails to realize it until he is beyond the point where he can drop the nose to gain more speed still has the opportunity of jettisoning all external stores. This should get the airplane airborne instantly, since the airplane can attain a speed of approximately 130 to 135 knots in this steep attitude. Of course, this speed is insufficient for takeoff under a heavy gross weight condition. Yet, for the clean airplane, this speed is quite adequate for lift-off.

Several accidents have occurred as a result of the lead airplane having slats and the wing airplane having a solid leading edge. The slatted leading edge airplane will become airborne at a lower speed and with less takeoff roll than is possible with a solid leading edge. After the lead airplane becomes airborne, instinct causes the pilot of the second airplane to pull back on the stick to break ground. This can lead to the hazards encountered when an excessive nose-high attitude is assumed in a solid leading edge airplane. Extreme caution should be exercised on takeoff when the slatted and solid leading edge airplanes are scheduled together for formation flying.

These are some of the items you should remember to avoid trouble during takeoffs. Knowing your airplane and what to do in case of emergency will eliminate many of the takeoff difficulties.

- Check for maximum stabilizer deflection.
- Check for maximum stabilizer rotation rate.
- Check for correct takeoff trim.
- Check tailpipe temperature adjusting segments for correct position.
- Consult charts for takeoff distance based on your field elevation, field temperature, wind conditions and external load configuration.
- Note proper takeoff speed for configuration, and recommended nosewheel lift-off speed. Do not pull the nose high prior to recommended takeoff speed.
- If stall is encountered, drop nose momentarily to unstall, and then complete takeoff (6-3 leading edge).
- If stores are installed and stall is encountered on takeoff run, proceed as stated above, except jettison stores if insufficient runway is available (6-3 leading edge). ●

Major Brent F. Walker, 3d Weather Gp, Ent AFB, Colo.

Contrails are beautiful to behold; they are useful, too. They could well mark the path of an aggressor toward our defensive perimeter. Here is an article that will give you the low-down on a high-up flight phenomena.

★ ★ ★

CONDENSATION TRAILS are a familiar sight both to pilots and the public. The word contrail is now a part of the layman's language, and may invade Mr. Webster's realm at any time.

You may not have given them much thought, as you crane your neck upwards and watch airborne Rembrandts deftly inscribe their artistry across the heavens, but these wispy, flowing streamers have a peculiar importance to the defense of the United States.

Enemy Tipoff

These plumes, which appear magically behind a streaking aircraft are actually defense aids. Their existence may be the only tipoff to the presence of an enemy armada over our defensive perimeter.

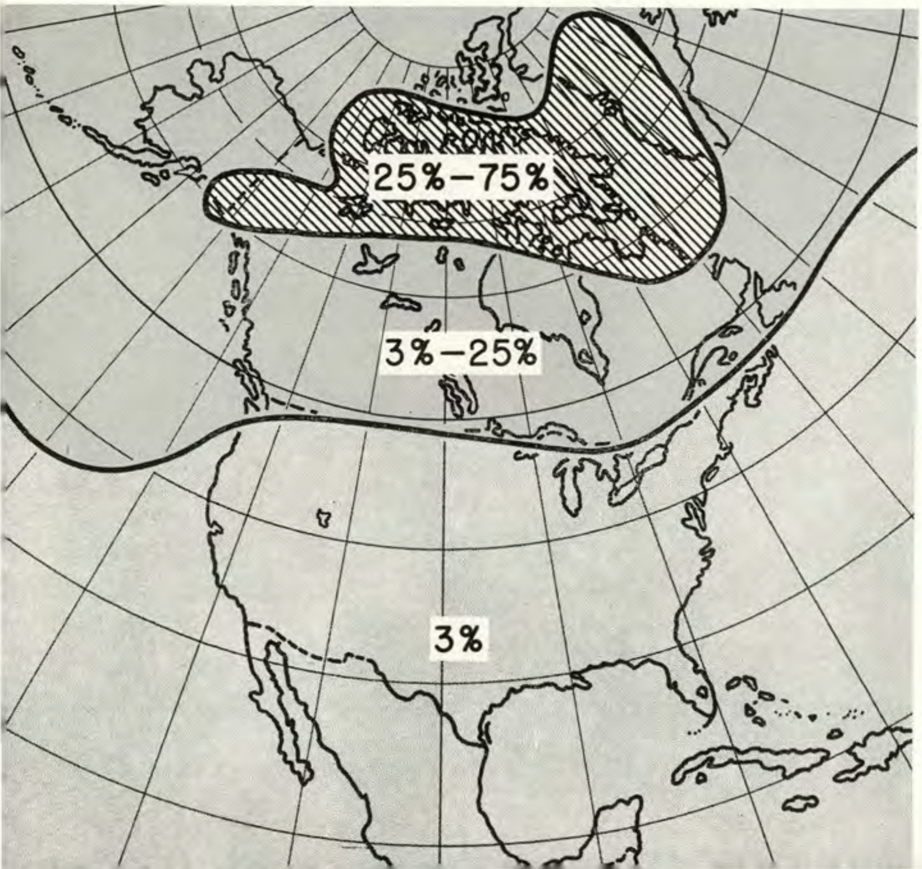
Actually, there are two kinds of contrails: Aerodynamic and engine exhaust. Both are a result of supersaturation of the air with moisture in the wake of an aircraft.

Before you are carried away with the serenity of it all, you ought to know how these vapor scarves are formed; how the Air Defense Command is assisting the Air Weather Service in obtaining information on them, and how they could possibly be used as an initial clue that an aggressor had committed himself.

If you've pulled some G in a sharp pull-out or in a high speed turn, your wingtips or, in bygone years, your propeller blade tips formed aerodynamic trails. This type of trail fades very rapidly.

If you've tooled around the area this winter or last summer at high altitudes and have seen your path etched lingeringly across the blue sky, you have formed the other type; an engine exhaust contrail.

Below and opposite page maps depict contrail probability in July.



Forming of Contrails

The forming of contrails depends upon three basic factors: Temperature, pressure and relative humidity of the air into which exhaust gases are expelled. The lower the temperature and pressure and the higher the relative humidity, the more likely it is that contrails will form.

If the air in the wake of an aircraft becomes saturated with water vapor, and if it is cold enough, water droplets will form and will freeze as soon as they have formed. Excess water vapor will begin immediately to adhere to the ice particles without going through the liquid states. The resulting concentration of ice crystals is enough to make the trail distinctly visible for a long period of time.

**Contrails leave your mark for all to see.
Actually they are an important defensive aid.**

Project Cloud Trail

Actual data on these factors have not been available in the past. To obtain and provide this information on contrail probability, clear air turbulence and cirrus clouds, the Air Defense Command has set up Project Cloud Trail with the Air Weather Service, MATS.

Under this project, 38 fighter-interceptor squadrons collected data once daily over 24 upper air meteorological stations in their vicinity. Taking off within an hour or two of the release of the 153OZ RAOB (radio aerial observation balloons), aircraft were vectored to a point 25,000 feet above the upper air station. Starting at this altitude, they climbed to maximum altitude. En route, they observed the heights of layers at which condensation trails occurred and reported if they were continuous, intermittent, pronounced or faint. Also, they observed heights of cirrus and haze layers and the presence of turbulence of any type.

This information enabled AWS to determine the accuracy of its method for estimating contrail occurrence.

With this knowledge then, ADC is in a position to supplement its radar eyes with human eyes.

As a means of detection, contrails are important because the aggressor's meteorologists cannot forecast accurately the probability of contrail formation at the place of penetration. This, of course, is a definite advantage to a defender.

Tactical surprise can be minimized, if not nullified, by only one aircraft in an entire operation leaving a visible contrail.

Visible Evidence

On clear moonlight nights and most days from shortly before dawn until shortly after dusk, the existence of contrails will assist the use of day fighters as well as all-weather fighters in waging an attack against an aggressor aircraft.

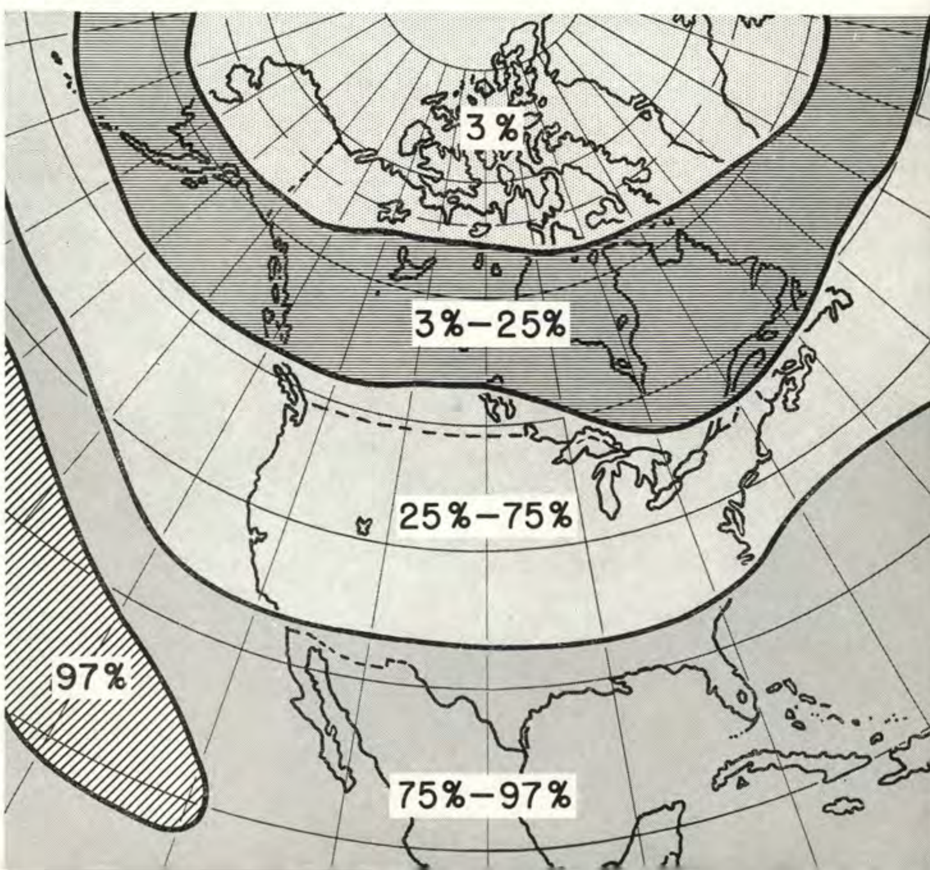
The enemy can jam radar as effectively as he desires but if he is pulling contrails, it all goes to naught, for they will leave visible evidence of his passage through the sky.

Contrails can reduce the effectiveness of infra-red radiation emanating from the tailpipe of a jet aircraft. Contrails can make it difficult for the seeking device to "see" the target from astern. This, of course, may be a disadvantage for the interceptor pilot employing a weapon with an infra-red head, should he be closing in a stern chase.

Also, contrails can seriously restrict the visual sighting of a rear firing gunner.

This all adds up to the fact that through the use of contrails, possibly the interval between the scramble and the tally-ho may be reduced. This could mean the difference between interception and destruction or evasion and bombs-away. ●

In the two maps, note the reversal with height. Trends are seasonal.



LUCKY 13

Lt. Col. Alexander Kouts, Hqs Air Weather Service

WHAT SORT OF a flight was it? It was like any other flight—not too bad, not too good. Overhead there was a blanket of cirrus that had pulled over him about five minutes back, and below him the village and city lights could be seen occasionally through the increasing murkiness of ground-hugging clouds. This was not according to the picture given him before takeoff. Things were beginning to foul up a little down there. It was nice to fly over the stuff but like all things that go up, he must come down. It was time now to worry about just that.

He must be within range of Maxwell Air Force Base. What was that UHF channel they briefed him on? Thirteen, that was it. With a twist of the UHF selector knob he called, "Maxwell forecaster, this is Air Force Jet 10912. Over."

A moment of silence and then—"Air Force Jet 10912, this is Maxwell forecaster. Go ahead."

"This is Air Force Jet 10912, at 33,000 feet, estimating Andrews at 2135. Give me the Andrews *forecast* weather."

"This is Maxwell forecaster. Roger, stand-by, out."

He relaxed once again. Hope he doesn't take too long. He couldn't stay on this channel forever. Things sure have changed for the better. A pilot could now get a running weather briefing while en route to his terminal. This is a far cry from the old days. His thoughts were interrupted by the Maxwell forecaster calling him again. He answered quickly.

"This is Maxwell forecaster. Andrews weather for 2135 Central is 300 overcast, visibility 1/8 mile with steady, light rain. No improvement expected for the next three hours. Alternates, if needed, are Donaldson, Langley or Maxwell, and all will be above 3000 feet and three miles visibility. Over."

Time for decision—lucky he called in. Weather must have rolled in at Andrews sooner than expected. After acknowledging the forecaster's call, he decided to land at Maxwell.

Yes, it was a flight like any other flight, but something had been added: Pilot-to-Forecaster Service.

The service referred to in this instance was not like that provided at some bases over the past years, where — under emergency conditions — pilots could talk directly with the forecaster through the remote VHF facilities of the control tower. This is a brand new service. It affords a separate pilot-to-forecaster UHF frequency to be used, without restriction, for all types of aircraft.

The facility which allows for this service is designed to provide one UHF channel for direct service from Air Weather Service detachments. It consists of a single-channel transmitter and receiver with remoted speaker and microphone (SFEL Package FA-1-02), located in the forecaster's working space in the weather station. The equipment is installed, maintained and flight checked by Airways and Air Communications Service.

The UHF channel is monitored continually by the forecaster for your calls. Normally, this service will be on a frequency of 344.6 mc, with a power output of approximately 100 watts. Overseas locations may be forced onto other frequencies.

There are approximately 100 pilot-to-forecaster facilities programmed for the ZI which in effect will provide excellent coverage for weather service for cross-country flying almost everywhere in the United States. There should be at least 25 completed installations by the time you read this, with the remainder to follow in short order. Facilities have been programmed also for overseas locations.

Reference to the bases that are equipped with this pilot-to-forecaster service can be made in the Radio Facility Charts. For example, Hill AFB, Utah, lists in the "Remarks" section, the letters, PFSV. Translated, this means pilot-to-forecaster service available. You will find, also, the above letters applicable to the older type, VHF, services still in operation.

Why this super service? The answer is quite obvious. It has long been recognized by many that weather service must be stepped up for jet type aircraft. Jet aircraft must have weather information before descending from altitude. Further, ARTCs are not yet fully geared to provide the prompt type of en route service required by jet aviation. This program fills this need.

To get the most help from this facility, here are a few rules:

- Since you must guard ARTC frequencies, the forecaster cannot originate service. Ask and you shall receive.
- Check Radio Facility Charts before departure for en route and operating pilot-to-forecaster facilities. NOTAMS will tell you if the facility is inoperative. A little insurance goes a long way.
- Be sure to ask for what you need. An observation is past history; a forecast covers current and impending events. This is important. Ask for a forecast.
- Volunteer a pilot weather report. One assist deserves another.
- Weather forecasters only provide weather information. They do not provide operational decisions. Be the master of your own fate.

By increasing the use of inflight weather service through direct pilot-to-forecaster contacts, it is believed that a definite contribution to greater flying safety will be made. ●

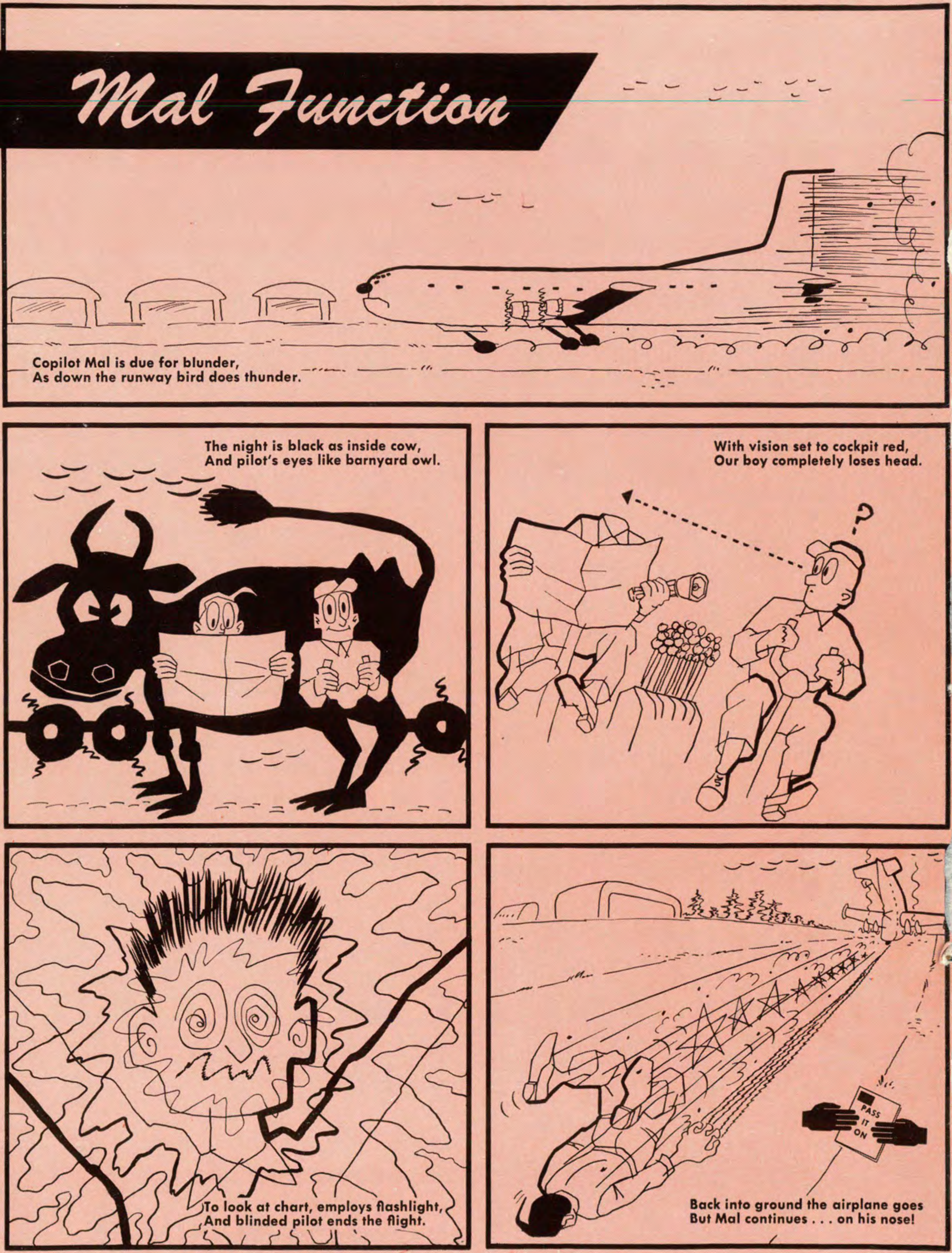
Stations with PFSV

Channel 13 — 1 Dec 55

Brookley	Carswell
Clovis	Dover
Forbes	Foster
Hamilton	McGuire
Hill	Sedalia
Hunter	Fairchild
Loring	Travis

TIRED ?

Besides looking pretty, this little gal isn't doing much. But did you know that you can get tired from doing almost nothing? Your own continued well-being may depend on a better understanding of this peculiar type of fatigue. It is an occupational hazard to all pilots. The details are on page 11.



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