AEROSPACE

SAFETY

UNITED STATES AIR FORCE

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AEROSPACE SAFETY

CONTENTS

1 • A PMV Report

2 • Fuel Management

6 • Where The Accident Begins

8 • Winter Worries

11 • Slippery Runways

12 • Requiem For A Chopper

14 • Rex Riley's Cross Country Notes

16 • The IPIS Approach

17 • F-100 Wing Slat Preflight

20 • Green Light For Safety

21 • Missilanea

22 • Where Are The White Scarfs?

25 • Wind Gusts

26 • Aerobits

IBC • Well Done

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FALLOUT

THE 45-DAY WONDER

Absolutely great — both cartoons and story! (July issue) Seems like a long time since we were able to laugh at ourselves. That trend could be our greatest danger. *Really* — it was great!

Maj D. K. Jones
Director of Information
Hamilton AFB, Calif

Many thanks for your complimentary remarks. A skilled artist is an invaluable asset. Dave Baer is one of the best!

SEE-THRU CIGARETTE LIGHTERS

There have been several items and articles written recently concerning the hazards and potential fire problems involving the "See Thru Cigarette Lighters" which require rotation to obtain fuel for ignition (one reference, "Molotov Cocktails," August MATS Flyer).

Although this was a flying safety item previously, a check of our crews revealed that several were in possession of these lighters and not aware of their potential hazards.

We are making this an item of local interest and plan to include a reference in our passenger briefings.

I recommend that you consider either removing this type of lighter from Exchange and Terminal facilities, or attach a removable tape specifying danger and restriction for use in aircraft.

Maj Challen P. Hunt
Chief, Safety Office
Griffis AFB, New York 13442

There has been a lot of publicity on the hazards of these cigarette lighters under reduced atmospheric conditions, such as encountered in flight. Nevertheless, we still hear about incidents involving these lighters. The kind Major Hunt refers to has a fluid reservoir that supplies the wick. These are usually plastic and the owner can see how much fluid is left in the tank. The decreased pressure at altitude causes the fluid to leak and when the thing is lit, a handful of flame may result. This is bad enough in a transport, but imagine the plight of a fighter pilot if this should occur. Maybe the old fashioned match wasn't so bad after all!

Another possibly hazardous lighter has come to our attention. It's a non-rechargeable, throw-away butane lighter. Tests have shown that these leak at high altitude and when lit may throw an extremely long flame. The big danger, of course, is the normal reaction to immediately get rid of a hazard such as a ball of flame in your hand. Then look out!

A PMV REPORT

13th Air Force Accident Prevention Topics, 1965

How's the private motor vehicle accident picture? Improving, but still not good. The following, adapted from a numbered Air Force safety publication, does an outstanding job of analyzing their problem and offering recommendations for improvement.

Private motor vehicle accidents continue to be one of the major sources of military disabling injuries. Four-wheeled vehicles recorded the greatest increase in accidents during 1964 as compared with 1963. Factual as this is, operation of two-wheeled vehicles is considered to have the greatest accident potential since most all mishaps result in personal injury to the operator and/or passenger.

Strangely enough, analysis reveals that sub-standard roads, vehicle defects, inclement weather, restricted visibility, or hours of darkness had little or no direct relationship to the number of private motor vehicle accidents reported during 1964.

Excessive speed for conditions, failure to yield right of way and plain inattention on the part of the vehicle operator were the predominant primary causes of private motor vehicle mishaps. It was noted that in many instances, vehicle operators failed or were not coordinating driving ability with existing or developing road and traffic conditions. Particularly alarming was the large increase in the number of reportable accidents involving drinking and/or fatigue on the part of the operator.

If the upward trend in private motor vehicle accidents is to be halted, and it must, then commanders must personally insure that:

- The Motor Vehicle Traffic Supervision Program outlined in AFR 125-14, 20 Dec 1962, as supplemented is fully and impartially implemented.
- The two-wheeled motor vehicle controls are strictly adhered to.
- Safety personnel develop and publicize an educational "DEFENSIVE RIDING PROGRAM" so as to foster a sense of moral responsibility on the part of passengers to insure safe, prudent, operation of all vehicles by the operator. This program should supplement the defense driving program conducted as a part of the command motor vehicle accident prevention program.
- Sound corrective action is taken in the event of a vehicle mishap to minimize the possibility of a similar accident. Where warranted, consideration should be given to judicious use of disciplinary/administrative action.

It is not intended to infer that the foregoing recommendations will provide a panacea for all of our private vehicle accident problems; however, they will provide the basic ingredients for an organized approach to our problems. As a means of further emphasizing their personal interest in this area of accident prevention, commanders should consider requiring a personal letter of circumstances from each private motor vehicle (two and four wheeled) operator involved in an accident. The letter of circumstances could include all the facts surrounding the mishap, as well as specific actions the operator will take to preclude similar occurrences in the future. Such letters of circumstances could be forwarded to the commander concerned through command channels to assure that all supervisory personnel are aware of the mishap. ★

FUEL MANAGEMENT

EFFICIENT FUEL MANAGEMENT IS THE PILOT'S PROBLEM, BUT IT ALSO INVOLVES OTHERS: SUPERVISORS, MAINTENANCE PEOPLE, QC SPECIALISTS AND MANUFACTURERS OF THE TOOLS WHICH THE PILOT MUST USE TO PROPERLY DO HIS JOB.

Fuel is – or should be – one of the most vital considerations for pilots conducting any flight. More sweat has probably been expended over this one item than any other single thing in flying. This was true for the first military aircraft and, despite all the changes that have taken place, is just as true today.

With our sophisticated systems, highly trained pilots and wealth of facilities, it would seem that "running out of gas" shouldn't happen anymore. But it does. Fortunately, it is usually possible to pinpoint the cause factor and, consequently, to do something about preventing this from claiming any more of our crews and aircraft.

In analyzing the record for 1964 and the first four months of this year, it is apparent that there has been some heads-up piloting, weak supervision and some pretty poor information published in the hand books relative to fuel management. This adds up to the word *preventable* and that's what most of the accidents are that are labeled Pilot Factor–fuel mismanagement. There were 11 major accidents and five incidents under this label during the time period mentioned. There were seven ejections and eight aircraft totally destroyed. Worst of all there were three fatalities.

In four cases the aircraft crashed on final approach with the runway in sight. Two of these were fatal to the crew. Four of the pilots had to make deadstick landings, one of which ended in major damage to the aircraft.

Five commands were involved not including the ANG.

Usually it is possible to pin the primary cause factor of an accident. But this doesn't always mean that you can prevent future accidents of the same type by attacking the specific cause. Behind this cause there may be a complex of contributing factors that do not always lend themselves to easy analysis. For example, an accident investigation board might do a very thorough job and reach a conclusion that is rational, valid, and difficult to disprove. But if this same board should investigate a dozen similar accidents, it might begin to see a picture that goes beyond the immediate cause of the accidents.

In analyzing the major accidents in which fuel starvation induced by the pilot was determined to be the primary factor, we found that five out of 11 of these involved pilots who were either relatively inexperienced as pilots or new to the aircraft involved. This would appear to imply lack of familiarity with the aircraft performance or inadequate checkout procedures.

There was one clear-cut case, and the possibility of another, in which information in the Dash One was inadequate and, in fact, misleading.

Lack of, or faulty, supervision creeps in too often.

Now, to back up what we say, let's look at some of these accidents and incidents with an eye toward shedding a little more light on a problem that is as old as the airplane.

During an air-to-air dart mission, one member of the flight called that, due to bingo fuel, he was returning to base. The leader acknowledged, and although this was a relatively inexperienced pilot in this aircraft, he was not concerned because the aircraft should have had plenty of fuel to return safely. Short of the base and near Field X the pilot saw that he couldn't make it and announced that he would land at Field X. While maneuvering to enter the pattern his aircraft flamed out and he ejected — safely.

The primary cause of this accident was attributed to pilot factor, in that during descent the pilot inadvertently left the throttle in extended afterburner which resulted in rapid depletion of fuel and flameout.

While this pilot was new to this aircraft, the F-105F, he had a great deal of experience in the F-100 and was considered highly qualified in that bird. Why then would he make such a gross error in another type? The contributing factors point to the *Whys* behind the apparent cause. The F-105F extended afterburner stop was designed to operate in a movement opposite to that of other models of the F-105. It could therefore be inadvertently actuated to the "Extended" range by an inexperienced pilot, and there is no positive visual indication in the cockpit to indicate that the engine is operating in afterburner.

The Dash One was deficient in that to illustrate the throttle quadrant it contained a picture of the F-105D quadrant instead of that on the F model. (This was corrected in the new combined F-105-F-105D Dash One dated March 1965.) They're different. Also there was very limited information in the manual relative to afterburner operation and it was misleading as to the amount of thrust in extended afterburner compared with military power. Nor did the manual mention that the fuel quantity gages are accurate only in level, stable flight. There were other deficiencies in the manual.

F-101F

Two crewmembers were killed when an F-101F crashed short of the runway after running out of fuel. During an intercept mission an emergency was declared due to low fuel. The intercept director gave the pilot a choice of three fields at which to recover and the pilot chose the one with which he was familiar. Enroute, he passed one of the other fields, a 7500 foot municipal runway. Weather was clear with 50 miles visibility.

At 52 miles from his intended recovery base the pilot gave his fuel as 900 pounds. He repeated 900 pounds at 30 miles and again at 18 miles when he canceled IFR and said he had the field in sight.

The aircraft was cleared to land. As it approached the field the tower operator saw that it was lined up with the wrong runway so he advised the pilot to make a correction. He made the turn, which put him on a close downwind, then a tight left turn to base. During this turn he lost most of his altitude. As the pilot decreased the angle of bank the nose rose to an estimated 35-45 degree pitch angle and the aircraft struck the approach lights and crashed. Neither the pilot or the RO attempted to eject.

There was very little fire which indicated practically no fuel aboard. When the engines were examined during the accident investigation both were estimated to have been turning at about 5 to 20 per cent rpm.

This flight was briefed for the mission and recovery at the base where the crash occurred with normal fuel reserve. The aircraft should have landed with more than

FUEL is the lifeblood of an aircraft engine. Manage it wisely.

Eleven serious accidents in sixteen months due to fuel starvation indicates a serious

500 pounds of fuel. Investigators concluded that the pilot failed to monitor fuel consumption during the supersonic phase of the intercept. However, indications were that there was sufficient fuel for the landing if, at the last minute, the pilot hadn't boxed himself into a corner by lining up with the wrong runway. This led to high thrust and consequently high fuel consumption at low altitude during the turns to line up with the runway, which exhausted what little fuel he had left. Prior to that he'd played it pretty cool by keeping his altitude until reaching an appropriate position for descent to the base. Hindsight being so good, however, we can see where if he'd held off the descent for a bit longer his fuel situation would have been better at termination and he might have been a little calmer during those last couple of minutes when he made the fatal error.

Whether experience had a bearing on this accident is hard to say. The pilot had jet experience then spent four years as a GCI controller during which time he flew the T-33 and U-3. He did not fly at all during the year preceding his assignment to 101s. Prior to this flight he had accumulated just under 60 hours in the bird, was considered combat ready but was not being used on five minute alert because of his low time in the F-101.

F-84F

This one concerns a highly experienced, highly qualified pilot who made some initial mistakes that caused a forced landing and who then became the victim of circumstances that led to a major accident.

The mission was a low altitude photo recon in an RF-84F out of a strange base. After about 45 minutes of flight, the wing and forward booster pumps pressure warning lights and the main tank low level warning light came on. The pilot checked the tanks and found that he had 1800 pounds in the external tanks and 1100 pounds in the main tank. Both wings and the forward tank indicated empty. This indicated that the external tanks had ceased to feed after transferring about 1000 pounds. This was the first fuel check the pilot had made since takeoff.

With the fuel in the external tanks unavailable, the pilot declared an emergency and asked for vectors to a pre-selected alternate field. As he approached the field, the engine was surging and fuel flow fluctuating. Although expecting an immediate flameout, he stayed with the bird and got it on the end of the runway, a 5000 foot strip with no barrier. He immediately got the nose down and pulled the drag chute handle but the chute did not deploy. Although the anti-skid appeared to be working, he was unable to stop and because of a built up area and highway straight ahead, he veered to the left off the runway. The nose gear collapsed and the aircraft received major damage.

Although there was materiel failure which caused the external tanks to not feed, the pilot failed to recognize this because he did not make any checks of his fuel until the warning lights came on. Despite his long experience in other aircraft, he had only 40 hours in the RF-84F. When faced with the emergency he suddenly found that the cockpit seemed completely foreign, indicating that he was somewhat less than intimately familiar with the aircraft.

Another pilot, not so fortunate, lost his life in a similar situation when he was unable to transfer fuel. The aircraft was an F-84 on a cross-country, when the pilot determined that he had a fuel problem, although he never stated the exact trouble. He crashed while trying to get to a base for an emergency landing ("Lucky 64," AEROSPACE SAFETY, August 1965).

F-100D

An F-100 pilot had to leap out during a night low level mission when the aircraft flamed out due to fuel starvation. Again, external tanks apparently were not feeding. The accident was laid on the pilot because:

- The drop tank empty light didn't come on, indicating that fuel was not feeding.
- These tanks should have been empty from the first check point of the second low level route.
- At this point, when the light did not illuminate, the pilot should have recognized the situation.

During these night missions which combine visual and instrument flight, cockpit lights are generally turned low to improve the pilot's outside vision. It's possible that, with the lights turned very low, the fuel gage needle can be misread. In this case it was theorized that the pilot, at a check point, may have been reading the wrong end of the needle, which was at 6000 pounds while the actual reading was 1000 pounds.

This aircraft had a history of fuel system trouble, primarily the right drop tank. Although this may have had nothing to do with this accident, there is an indication that Maintenance had not really solved the problem although there had been 11 write-ups during the preceding five months. All had been corrected. The point is, was a real fix ever accomplished? Or was the maintenance a case of fighting brush fires without getting at the real cause?

T-33

At 39,000 feet the T-Bird jock was getting turbulence, so he asked for and received a descent to three *problem.*

In four cases the aircraft crashed on final approach with the runway in sight. Two of these were fatal to the crew.

five zero. He also realized that he was dropping behind his flight plan fuel and time. He requested destination weather, got it: BELOW MINIMUMS. He requested clearance to another base, then changed his mind when he learned the RCR was three. His next request to Center was for the "nearest acceptable alternate." When he was 140 miles from there he decided he couldn't make it. At this point he declared an emergency and, with the assistance of Center, proceeded to attempt a landing at another base. He descended from three five zero, arrived at 3700 feet 20 miles out and initiated a GCA approach. At 2000 feet – on course and on slope – the bird flamed out. The pilot ejected at about 800 feet.

Primary cause: Pilot factor in that he delayed selecting a suitable emergency field and he used poor technique in descending too soon, which resulted in fuel starvation.

There have been some incidents that came within a hair of being full-fledged, grownup accidents. That they weren't is attributed more to luck than to anything else.

Item: During a C-119 local transition flight, the crew was making touch and go landings. At about 300 feet on climbout, Nr 2 began backfiring and losing power. The engine was shut down, tower advised. Then in the closed pattern, Nr 1 began to develop the same symptoms. This, of course, indicated that there indeed was something wrong and that *something* might not be in the engines. Sure enough, the IP discovered the fuel selectors were on the inboard tanks, which indicated EMPTY. Nr 1 fuel selector was changed to the outboard tank and the engine came in loud and strong. The crew made no attempt to restart Nr 2, and made a good single engine landing.

Item: During a chase mission at 5000 feet and speeds between 400 and 530 KIAS, the fuel low level warning light for the left engine of a T-38 illuminated with about 200 pounds remaining. The pilot turned toward the base, about 15 miles away, then the right side light came on. He called the tower and asked for a straight-in and was at about 1500-2000 feet on final with gear and flaps when the left engine flamed out. Fortunately, the right engine kept turning and a single engine landing was accomplished. Just as the aircraft was turning off the runway the right engine quit.

When the aircraft was refueled it was found to be completely dry. Nevertheless, with the tanks empty, the left gage read 80 pounds and the right gage 70 pounds. There are also some discrepancies in the T.O.s and an AFTO 22 was being submitted which may clarify these.

Item: A T-28 with two pilots aboard ran out of fuel and was landed by moonlight on an un-opened, partially constructed highway. The landing was good with no damage or injuries.

These pilots were lulled into a false sense of security by the fuel gage which indicated 200 pounds when, in fact, the tanks were dry. However, analysis of the flight plan revealed that there was not enough fuel aboard for the planned power settings; the wrong chart was used for planning the flight; the crew deviated from recommended power settings; fuel requirements for the major portion of the flight were not computed on the flight log.

Item: On a U-10 flight the fuel pressure dropped, then the engine quit. The pilot switched tanks but couldn't get a re-start and made a forced landing in a field – no damage or injuries. The flight was being conducted on the right aux tank instead of main tanks. When this tank was empty the bird quit and the crew couldn't get it started.

All of the mishaps of this kind that occurred during the time period covered have not been briefed. For example, the F-100 pilot that received a GCA waveoff and decided to go to another base because of weather. When he departed the first base the flight was doomed – the aircraft just couldn't make it on available fuel. It didn't, but the pilot got out via the ejection route.

There was an F-101 from which the crew barely escaped in time when it ran out of fuel on final. The pilot hadn't been flying the bird very long, but his RO was highly experienced.

Eleven major accidents in 16 months due to fuel starvation indicate a serious problem. The cost is prohibitive, as indicated by the loss of three lives and several millions of dollars worth of aircraft, not to mention combat capability. While the solution of this problem is not confined to the following, correction of these inadequacies would appear to be a big step toward prevention of this kind of accident.

- Insist on better quality instruments. Fuel gages have been notorious for giving readings other than what is actually in the tanks.
- Improve quality control of rework of instruments.
- When repeat discrepancies occur in a system, make sure that the fix is really a fix and not merely a treatment of the symptom.
- Improve familiarization and checkout procedures for pilots transitioning into different type aircraft.
- Maintain closer supervision over new pilots and newly transitioned pilots. ★

Next time you make a precision approach, remember this is where many USAF accidents begin.

where the accident begins

Do most fighter pilots leave the precision glide slope about a mile out on final approach? We think they do – and we think we know why. More important though, is the possibility that many fighter people do it without realizing that they do or why they do.

We think it's very important that all fighter pilots understand the reasons behind this intuitive departure, because some of you will be sitting on an accident board some day with a responsibility to explain why another pilot did this–and why it led to an accident.

Here is the typical accident you will be dealing with. It will be a fighter or trainer undershoot out of a precision instrument approach. You will probably have GCA tapes, and they will establish that the pilot was warned that he was "too low for a safe approach, etc." The pilot will testify that this is true; he did leave the glide path, but only after he had the approach zone in sight. Thus, it is obvious that the total responsibility for the bash belongs to the pilot. After all, he was visual, and he had full control over a properly functioning aircraft. If it didn't look right to him, he should have gone around. The fact is that he didn't, so it must have looked all right to him. About all this leaves you with is the conclusion that his judgment was bad.

Most such accidents do enter the books just that way. Pilot error: faulty judgment during visual flare-out.

As a board member representing fighter operations, you owe it to yourself and your brother pilots to try to find the *total* cause of such accidents. The pilot error factor won't help a soul as far as preventing another one like it. How do you profit from hearing that someone did something that you already know you wouldn't do? Particularly something as intangible as misjudgment!

Take it further–dig deeper. Try to find out whether he really believed he could hack the landing or whether he felt that he had to. Chances are that there were some elements of tension present that induced him to press a little harder than he might normally push to get the bird on the ground on that particular pass. Such things as low fuel, rapidly deteriorating weather and minor malfunctions have been evident in the past.

If you can find a little clutch factor of this sort, you

Fig. 1

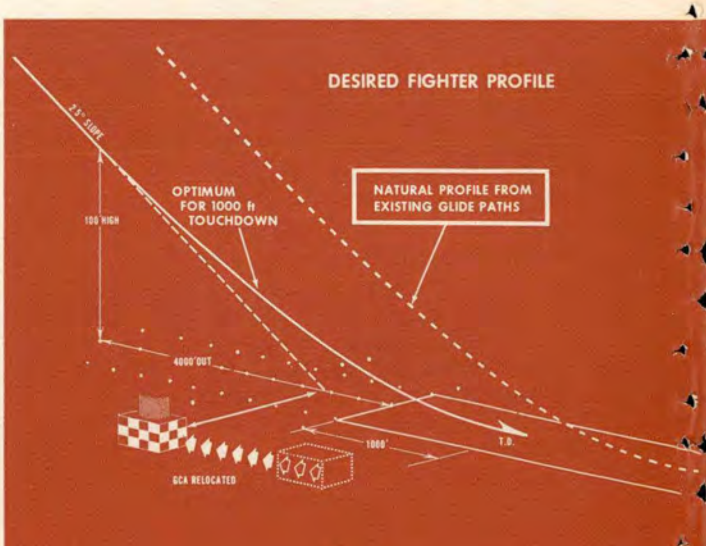


Fig. 2

have half of a valuable contributing cause. Now, we'll give the other half on a platter. It is simply that our precision approach aids, in their present configurations, provide less than optimum assistance to fighters. We're referring to the fact that a fighter pilot can't use precision glide path information in the final mile or so of his approach, because it would keep him too high to land in the prescribed touchdown zone.

Now all fighter pilots seem to realize this because they all drop below glide path as they begin their visual maneuvering for landing. But just knowing this and accepting it as a fact of life is not going to help protect anyone from parlaying this little maneuver into an undershoot accident.

What we need to do is define and understand the problem so that everyone will know exactly what he is up against when things get tense.

The Landing Profile. Back in 1960, ASD (then WADD) ran a flight test program to determine the relationship between the GCA Glide Path Intercept Point (GPIP) and actual touchdown point, in century series fighters. In this test the pilots remained hooded until reaching 100 feet. They then raised the hood and put the bird down as soon as they could. The average for the 62 runs was 1800 feet beyond GPIP. One landing ran 2400 feet beyond.

We've diagramed that average in Figure 1. This diagram is useful to us because we can draw some accurate measurements from it, and even support some conclusions about the normal landing requirements of fighter aircraft.

For instance, the test report concluded that if a pilot stays on glide path and approach speed to an altitude of 100 feet, he can expect to touch down about 1800 feet past GPIP. We can also measure the distance between the start of the visual landing effort and the touchdown point, and conclude that it takes over 4000 feet of distance to accomplish a landing, if you start from 100 feet.

Wouldn't you also agree that, if a pilot wants to touch down at the 1000-foot point on a given runway, he should make an effort to be at about 100 feet at a point about 4000 feet back from his intended touchdown point (Fig. 2)? This seems real reasonable to us.

Next, since touchdown zones are always defined by directive, and the requirements of the airplane are pretty well fixed, wouldn't it be nice if the precision glide path would steer you right to a point about 100 feet above runway elevation about 4000 feet before touchdown?

They don't you know. Figure 3 shows that if you lay out the landing profile with the touchdown point at 1000 feet and then plot a 2½ degree glide slope with the GPIP at 750 feet, the glide path passes well over our 100-foot "key" point. About 60 feet high by our calculations.

Most of us have hardly ever noticed the minor correction required to compensate for this 60 feet. And there's good reason for this—most of us had the approach lights in sight at least a half mile from them. A sixty-foot adjustment spread over a half mile is nothing.

But how about a situation where you can't leave the glide path until about one-half mile from threshold, which is right over the "key" point? Not all approach lighting goes out the full 3000 feet and some of the runways our people are using today don't have any at all.

At 180 knots you're traveling 300′/sec, and already descending at a rate of 800′/min. To make a 60 foot correction within 1000 feet of travel, you'd have to increase your rate of descent by 1100′/min. Obviously that's too violent. If you can begin 2000 feet before key point, you can spread the correction over about seven seconds. That's a descent increase of 550′/min, or a total of 1350′/min. during the correction.

Now that really isn't much of a dive, but it is steep enough to tempt a power reduction by a pilot who is looking at a short wet runway. This is where an undershoot accident can begin. If a pilot pulls off too much power in this pushover, he may run out of speed before reaching threshold. If he pushes over too steeply, he may hit an approach light during flareout. Obviously, a little of each can lead to the same results.

Give this point some thought next time you shoot a precision approach. Make your own assessment of the influence that a precision glide path has on your final visual maneuvering. We think you'll find that its importance varies inversely with runway length and visibility—being no problem at all on long runways that have lights and strobes stretching 3000 feet out from threshold, but presenting a major challenge on approach to a short runway with minimum lighting.

Just recognizing a problem of this sort is worth a lot. As a pilot, it will help you to avoid getting sucked in by a bad situation. As an accident investigator, it may help you to understand why someone else had an accident. It can do even more for staff planners: Headquarters USAFE and the Royal Canadian Air Force have already moved many of their precision aids (GPIPs) closer to threshold to give their fighters a better break. Air Defense Command is studying the problem closely. We at the Directorate of Aerospace Safety are too—we'll keep you informed. ★

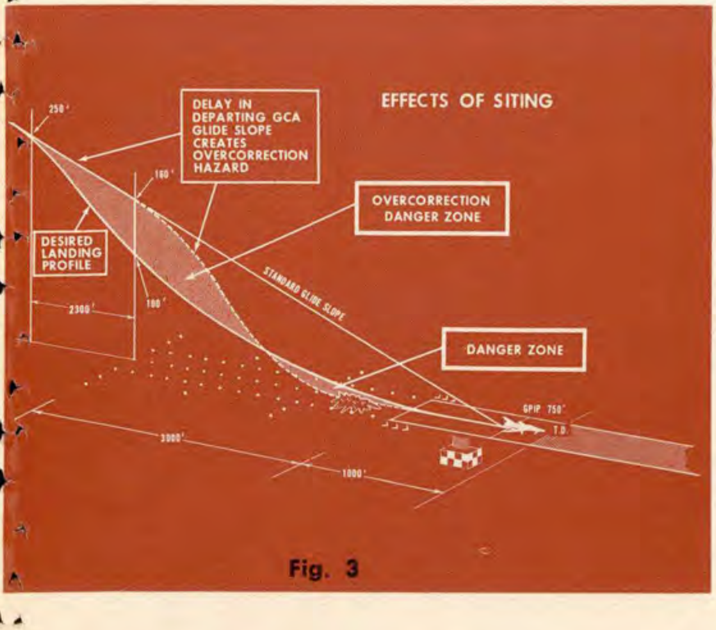


Fig. 3

WINTER WORRIES

Earmuff and overcoat time is arriving and with it the problems that accompany icy ramps and runways, low ceilings, frost bitten fingers and all the other discomforts and hazards we have to contend with. Experience and ingenuity have given us the equipment and knowledge to operate safely, but we have to *use* them and be especially watchful to prevent the kinds of mishaps that are peculiar to this season.

Flight accident prevention in the winter starts on the ground – perhaps more so than during any other time of the year. This is the season when we call upon our maintenance people to the utmost: often they are working under the most adverse conditions, yet the requirements of their trade are most exact.

Pilots must be able to depend on the performance of their instruments during approaches through murky weather; they will be depending on proper operation of brakes, nose wheel steering, and drag chutes more on slippery runways. Their fate may also rest with the men who operate the machines that clear ice and snow from runways, taxiways and ramps. Barriers must be properly maintained to prevent freezing of the mechanisms. The pilot will have to contend with a lot of other problems: freezing rain, blowing snow and ice crystals, structural ice, engine ice, carburetor ice on recips.

We said flying accident prevention, especially in winter, begins on the ground. Aircraft preparation, therefore, is extremely important. Let's consider some of the things that must be accomplished before the aircraft ever gets off the ground.

Maintenance, as well as Operations, can make good use of the weather forecaster. He can be of great assistance in helping maintenance people prepare for adverse conditions before they arrive. Consult him.

A major problem during this season is the removal of snow, ice and frost from aircraft surfaces. Procedures are spelled out in T. O. 00-60B-1. Deicing fluid is a 3:1 mixture of ethelyne glycolpropylene glycol, MIL-A-8243A. This material is somewhat toxic so certain precautions are necessary: Avoid getting it on your skin and in your eyes, and it should not be used in heat and vent systems since it may produce toxic fumes.

Deicing fluid is very effective when used on frosty or icy aircraft surfaces and, indeed, may be applied prior to these conditions developing. It should not be used as a preventive when snow is expected, except in conjunction with protecting covers. If the aircraft is outside, with no protection, and snow is expected, do not apply deicer fluid as a preventive since it will form a mixture with the snow that can become exceedingly hard to remove. Freezing rain may dilute the fluid or wash it from the surfaces, so keep this in mind when this condition exists.

On snowy surfaces, first remove the snow with a soft brush or broom – never use a sharp instrument of any kind – then apply the deicing fluid. In general the solution is sprayed from the top of the aircraft down and from the leading edge of the wings aft. Do not allow deposits to build up in control surface openings, vents and hinges. Water and slush in control surface cavities may freeze solid, especially in flight at extremely cold altitudes, and lock the controls.

Cleaning the snow from an aircraft can be hazardous because of the slippery surfaces. Ramps, workstands, ladders should be used as much as possible to minimize workers walking on slippery surfaces.

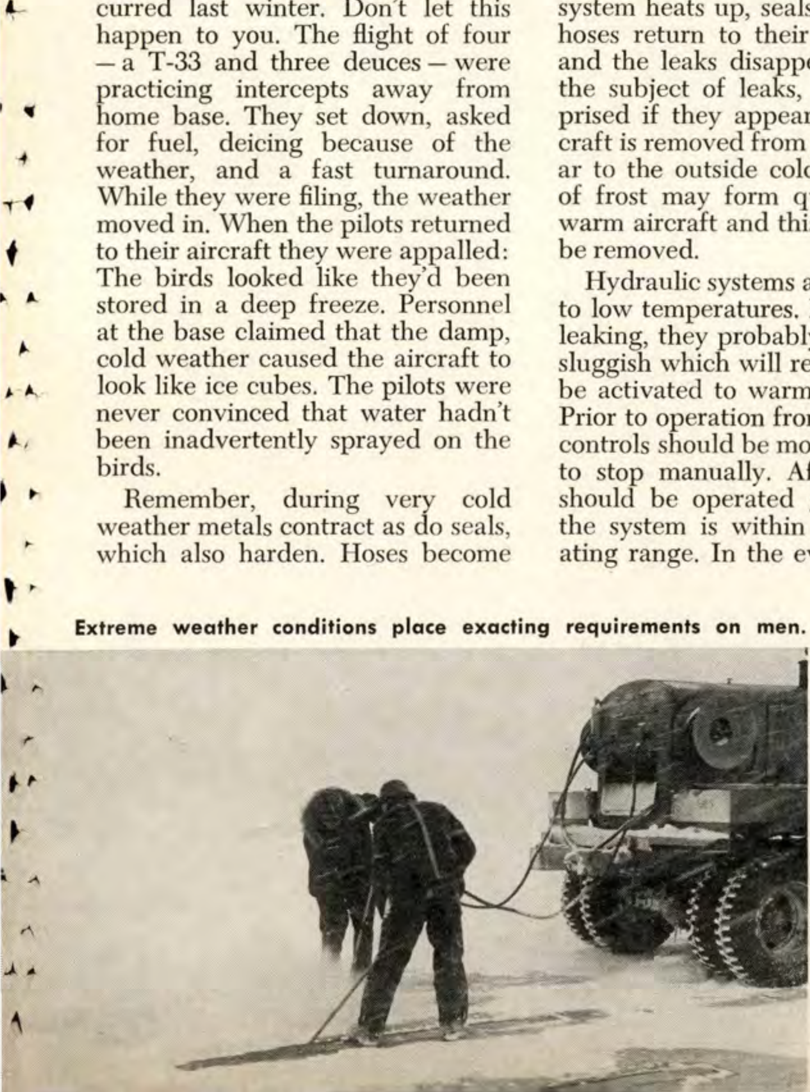
Frequently repeated applications of deicer will be necessary to remove hard deposits. When aircraft will be operating on slushy taxiways and runways a protective coat ing of fluid will be needed on the under surfaces of wings, ailerons and horizontal stabilizer. This will help prevent slush from sticking.

While on the subject of deicing, we'll pass on an incident that occurred last winter. Don't let this happen to you. The flight of four – a T-33 and three deuces – were practicing intercepts away from home base. They set down, asked for fuel, deicing because of the weather, and a fast turnaround. While they were filing, the weather moved in. When the pilots returned to their aircraft they were appalled: The birds looked like they'd been stored in a deep freeze. Personnel at the base claimed that the damp, cold weather caused the aircraft to look like ice cubes. The pilots were never convinced that water hadn't been inadvertently sprayed on the birds.

Remember, during very cold weather metals contract as do seals, which also harden. Hoses become brittle and damage easily. Leaks in fuel, hydraulic and pneumatic systems may develop. These leaks normally are minor and as soon as the system heats up, seals, O rings and hoses return to their normal state and the leaks disappear. While on the subject of leaks, don't be surprised if they appear after an aircraft is removed from a warm hangar to the outside cold. Also a coat of frost may form quickly on the warm aircraft and this may have to be removed.


Some aircraft have overcoats which protect surfaces from ice and snow.

Hydraulic systems are susceptible to low temperatures. In addition to leaking, they probably will become sluggish which will require them to be activated to warm up the fluid. Prior to operation from the cockpit, controls should be moved from stop to stop manually. After that they should be operated gingerly until the system is within normal operating range. In the event that controls are bound with snow or ice, this must be removed and the area dried.

Extreme weather conditions place exacting requirements on men.


Doors and access panels may be frozen shut. An application of deicer around the edges will normally make these easy to open. But remember that panels and doors stored in a warm hangar may not fit properly on an aircraft that has spent the night outside.

Landing gear struts may require special attention. Use care in towing over rough ice and snow when it is very cold and grease in the wheel bearings is stiff. Heating is not recommended because it may cause moisture to condense, which can impair lubrication and subsequently freeze.

If gear struts are partially collapsed don't be surprised. This is generally no problem, but keep struts, hydraulic pistons, valve plungers, gear switches and torque arms free of dirt, snow and ice. This can be done by brushing them, then applying deicer. Then clean these parts and apply a light coat of fluid to prevent formation of ice.

Now for a few don'ts:

• Don't allow deicing fluid to contact bearings; it may dilute the grease.

• Don't heat aircraft interiors before removing snow from the fuselage. This may cause the snow to melt with subsequent refreezing.

• Don't tighten cables and nuts too much when the temperature gets below $-15°$ to $-20°$ F. When the aircraft warms, expansion may cause failure.

Oil dilution and proper engine heating is important for reciprocating engines. When they are first started it may be necessary to motor each engine to reduce excessive hydraulic, engine and alternator oil pressures. Operate at idle until oil pressure stabilizes in the operating range. AC generator frequency will normally remain high until the constant speed drive is warmed up. Don't place the generator on the bus until the frequency stabilizes at accepted values.

Never operate nosewheel steering while the aircraft is stationary. Since this system may be sluggish, make gentle turns initially.

While taxiing avoid maneuvering near other aircraft and stay away from deep snow and slush to prevent buildup of moisture which may freeze on takeoff.

Just a word about carburetor ice. Despite the Dash One, training, articles in safety magazines and experience, this continues to be a problem. Let's see if we can't finally lick it. The time for carburetor heat is *before* not after the ice forms. Watch the gage. If it's in the green, okay, but you've got to watch it, especially when operating at low power, such as during letdown and approach.

For aircraft in flight the most serious problem usually is structural ice. We are bound to get it at times but, like a hangover, it's easier to prevent than to remove. Whenever possible, avoid known icing conditions. Use heat and anti-icing fluid judiciously before ice forms.

During the winter months one of the pilot's main concerns is staying ahead of the weather. Failure to do so has resulted in many a tragedy. METRO is ready to help, so get on 344.6 and find out what conditions are ahead. Planning becomes extremely important. Stretching fuel is like playing Russian Roulette, when the destination has freezing rain and the fuel gage tells you your alternate is impossible or just marginal. This may be pretty basic advice, but it is repeated because every winter there are a few who failed to get the word.

Every pilot knows that weather is changeable and that sometimes it changes amazingly fast. Consider the following incident and imagine that you were trying to get into this base rather than out. While the aircraft was running up prior to takeoff, visibility dropped to one-sixteenth mile in fog. The pilot taxied back to the ramp. Meanwhile nearly half an inch of ice formed on the props, nacelles and wings. Most of it was blown off during runup but reformed during taxi-back. Earlier the weather was generally clear with the temperature ranging from 30 to 34 degrees. During a 45 minute period visibility went from clear to one-sixteenth with humidity at 100 per cent, then to one-fourth mile and finally cleared.

SURVIVAL

This winter some pilots and perhaps other crewmembers will have to bail out. This may occur, as in the past, in extremely cold, remote areas. Personal equipment people, therefore, must exert extra care to assure that survival kits are complete and that radio batteries are not permitted to deteriorate. Crews flying in cold areas must attend to obtaining and using proper winter clothing. Now is the time to bone up on survival techniques.

A word of caution that has been repeated many times but too often goes unheeded: Aircrews flying from warm southern bases to northern bases should be prepared for the worst. It is easy to be lulled by a warm climate to forget that your route may take you over areas of arctic-like temperatures, even though your destination might have a fairly high thermometer reading. Kirtland, for example, might be reporting in the 60's but those hills around it may be down in the 20's or below.

If you fly a transport you have additional responsibilities. Passengers generally wear clothing suitable to the climate in which they live. A light uniform, low-cut shoes and a person accustomed to a mild climate do not add up to a very good survival risk.

This article is not all-inclusive. It is intended to hit some of the high spots — hazards that have caught up with the unwary in the past. We believe that accidents are no more prevalent in the winter than during any other part of the year. We know that there are more hazards, and that the price of prevention is awareness of these hazards and performance that prevents them from becoming accidents. Have a good winter and be around next year to read the next article of this kind. ★

Slippery Runways

Maj Guy J. Sherrill, Directorate of Aerospace Safety

This seems an appropriate time to suggest a review of landing techniques before winter comes and "μ" goes all to pot. (μ-friction coefficient.)

Over the years, and particularly over the summer months, the word has been out to let 'em roll to the end and save on brakes and tires. This, combined with 12,000-foot runways and human nature, has resulted in habitually long landings. After all, why sweat out an exact approach speed, a precise touchdown, and prompt chute deployment when all it means is adding a bunch of power to get to the prescribed turnoff point? Consequently, we find ourselves grossly out of practice for landing on the slickeries.

Now you may feel that this only happens to other people, that you can always summon up your incomparable skill and instant reaction time without benefit of practice and pre-conditioning, and that you always do better in the clutch. If so, our 10,000-foot runway at Norton will stay pretty dry until December. Come on out, or down, as the case may be, and browse through the statistics of those who felt likewise. Otherwise, get with the Dash One and work out some unit procedures to practice slippery runway techniques while the sun still shines.

Refamiliarize yourself with such terms as RCR, aerodynamic braking, hydroplaning, and coefficient of friction. Knock off those increments of final approach IAS you've been arbitrarily adding for mama, each ankle-biter, and old Ish. Think through, and practice, use of back stick after the nosewheel is on the runway to give you both additional drag and increased brake effectiveness.

While you're working on this subject, a word about barrier philosophy is also in order. This magazine recently pictured a group of smiling pilots obviously proud of the fact that they had become enmeshed in arresting gear. The caption further stated that several other unit pilots had also achieved the same distinction but were not available for the photographer. Bah and humbug!! Anytime half the pilots of a unit have stopped in the barrier, facilities, operations—or maybe both—leave a lot to be desired and should be corrected. The availability of reliable arresting gear cannot be considered a panacea for substandard facilities, poor operational policies, or inept pilot technique. If you've done everything possible and still have to take the cable, be thankful it's there, but unless you're wearing brown shoes and gold wings, arresting gear engagement has not become an accepted and admirable manner for routinely stopping an airplane.

As a sterling example of what can be accomplished by exact flying, the troops in Alaskan Air Command have been routinely operating Deltas for years from a 6600-foot strip with a 14-foot dike immediately adjacent to each end. This runway, 240 NM from the nearest alternate, is frequently subject to very low RCR's, low ceilings, and heavy crosswinds. Yet, there has been but one cable engagement! These pilots profess no secrets beyond exact final approach speeds, precise touchdown point, and published stopping procedures. But perhaps of more importance is that they follow their peerless techniques on every landing, even on Eielson's 14,600′ superhighway. Their short field, slippery runway capability is therefore always immediately available.

In other words, the subject is summed up by our poet laureate as follows:

When the weather's hot and humid
Sloppy landings are merely stupid.
But when the frost is on the punkin',
That's no time for Delta dunkin'. ★

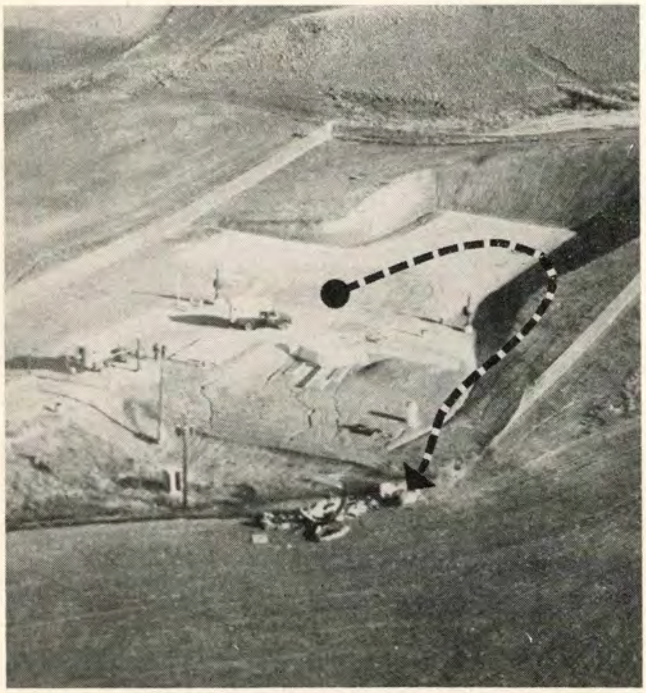


Photo at left shows flight path of helicopter. Extent of wreckage is shown above and below. All aboard escaped although some received burns.

Requiem for a Chopper

Maj Thomas J. Slaybaugh, Hq USAFE

Study these photographs. A stark tale of tragedy unfolds. The heavy chopper started to lift off the graveled surface, proceeded toward the embankment at the right of the picture, faltered, moved to the left, struck the fence, crashed into the ground short of the power lines, settled on its side and caught fire.

The cabin door was on top. Occupants unlatched it. They could not get the door open. Melted nylon began dripping from straps inside the cabin. One of the pilots crawled through a cockpit window broken out in the crash. He ran around and pulled the cabin door free. All crewmembers and passengers escaped.

The board reported that the primary cause factor for this accident could not be unconditionally determined due to the extensive fire damage following the accident. They reported, however, that the most probable cause was pilot factor, in that a loss of aerodynamic lift caused by a reduction of rotor RPM, probably induced by improper pilot technique, was indicated. They reasoned that reduction of rotor RPM was probably caused by either inattention of the pilot to his power indicating instruments and subsequent over demand upon the rotor due to excessive use of collective pitch, or to a too rapid application of pitch which, in effect, called for more power than the turbines were capable of producing. In either case, the aircraft would be placed behind the power curve and into a flight condition from which it was impossible for the instructor to make a safe recovery. The board recommended that all pilots flying this type helicopter be briefed that, under maximum performance operation, optimum pilot and aircraft performance is necessary, and that the use of engine instruments is essential for establishing power settings.

ADDITIONAL FINDINGS

Although, in the opinion of the board, the following findings did not contribute to the accident, they included them in their final report:

Obstruction or terrain hazards that make such areas as this incompatible with approach or landing safety for this type helicopter are not taken into consideration. The only criteria is that the transverse and longitudinal slope will not exceed four per cent. They suggest such criteria be reviewed and the necessity of including terrain and obstruction clearance be considered.

Presently, cleaning fuel filters is left up to individual opinion during even numbered phase inspections. They recommend that fuel filter cleaning be made mandatory during these inspections.

The present checklist does not provide the pilot with a takeoff checklist for intermediate stops. They recommend that the checklist be revised to provide such a section.

After impact passenger efforts to evacuate the burning aircraft were frustrated due to inability to reach the emergency release handle or open the door after actuating the normal opening handle of the passenger/cargo door. They recommend that consideration be given to either relocating the emergency release, where passengers can get at it regardless of the position of the fuselage, or providing additional emergency release devices.

Efforts of the passengers to get out of the fuselage and escape from the fire by using the pop-out windows and emergency escape hatches were foiled because nylon seat backs covered these exits. The board suggested that leaving strategic areas of egress uncovered by seat back webbing during passenger carrying operations be evaluated.

Several passengers received third degree burns during escape from the aircraft due to contact with molten fragments of nylon from the seats and interior materials. It was suggested that an evaluation be made relative to replacing nylon materials with a material less hazardous to personnel in a fire environment.

Work has been done on compressor stator blades, but documentation of this work was not made in the 781-A, nor was the required inspection performed or documented. Necessity for an operational check was known, but was not entered in the 781. On this matter the board recommended proper recording of all aircraft discrepancies, subsequent maintenance to clear such discrepancies and the necessity of inspection by a qualified inspector.

Tear down reports failed to disclose materiel cause factors. ★

Rex Riley

CROSS COUNTRY NOTES

WINTER WORRIES

An aircraft was damaged last winter and an F-6 refueling unit destroyed by fire and explosion because of ice clogging vent tubes on top of the refueler. Instructions stenciled on the refueling units direct that manhole covers be removed when pumping oil or fuel below 25°F. This was not done and ice clogged the vent tubes which resulted in collapse of the unit.

Life without ice would be dreary indeed, but if Rex had his druthers he would prefer it in the form of little cubes. In other forms it often causes all kinds of trouble. Last winter, for example, a pilot of an F-106 had to abort. No sweat, there was the cable out ahead. Unfortunately, ice not in the form of little cubes got into the act. The ice formed in the fairlead tube of the BAK-6 immobilizing the purchase cable to the extent that when the aircraft engaged the barrier the cable failed. During installation of the barrier, provisions for proper drainage of surface water from the vicinity of the mouth of the fairlead tubes had not been provided. To advise Civil Engineering to make a check of barriers for a similar condition might be trite, but if this had been done prior to the mishap related above, it might never have occurred.

Arresting barriers installed at Air Force bases are there for the purpose of stopping aircraft in an emergency. But if they will stop an aircraft, they are also capable of stopping other vehicles. Here's a case.

One afternoon last winter at an overseas base, snow had accumulated to the point where it became necessary to remove it from the active runway. A snowplow was dispatched along with an observer in a pickup truck. Since the snowplow was not radio-equipped, the truck with radio was required to maintain contact with the tower.

After several passes up and down the runway, the plow caught the arresting cable and slowed to a stop. The airman in the pickup was about 40 feet behind the plow. For a moment the pickup driver was distracted by a tire waving in the air (tire was attached to the barrier cable). When he looked back he saw the plow had stopped. The airman jammed on the brakes and tried to turn but was unable to avoid hitting the snowplow. He received minor injuries.

The factors involved in this mishap may serve to alert personnel at some of our bases this winter:

• Driver of the pickup was not experienced in driving on icy surfaces.

• Visibility was poor.

• Pickup driver was following close behind the snowplow instead of to the side.

• Pickup was not equipped with chains or snow tires.

• Pickup had no seat belts.

THE CASE OF THE LEFTOVER BOLT. Immediately after the big jet had been taxied out of the parking area a sharp-eyed ground crewman spotted a ¼-inch hex-head bolt, 3½-inches long, near one of the wheel chocks. The aircraft was stopped and inspected for loose objects or obvious missing bolts. Nothing unusual was observed. Takeoff was made on schedule. Soon after flap retraction, a light to moderate elevator buffet was experienced between 200 and 300 knots. Buffet intensified as power was applied and back pressure placed on the control column for climb. Buffet decreased when power was retarded and the aircraft flown straight and level. A controllability check was made and all buffet ceased when flaps were extended to 30 degrees. Controls were normal. Landing was uneventful. The aircraft was isolated and when the controls were thoroughly inspected the inboard hinge bolt of the left inboard aileron tab was missing. Right, a ¼-inch, hex-head, 3½ inch bolt is used in the inboard hinge.

IMPROPER HANDLING OF CARGO. The following incident falls in the "What Makes Rex Mad" category. During off loading of a C-124, the loadmaster and airfreight personnel discovered a box leaking an unidentified liquid. When the box was turned over, the special handling label identified the contents as acetic acid. The package had been stowed under and along with general cargo. When the box was opened, investigators found a one-gallon bottle with a broken plastic stopper taped in place. The position of the box placed the bottle on its side. The tape appeared to be standard O.D. tape which was also used to tape the box containing the bottle. About a quarter of the fluid had leaked out of the bottle onto the hatch of the rear compartment and then into the rear compartment causing considerable damage. The crew was not briefed on the presence of "Special Handling Cargo." AFM 71-4 covers packaging and loading of caustic materials. Rex suggests some boning up on the provisions of this manual.

KUDOS. Occasionally Rex reads reports of aircraft damaged on the ground because of high winds accompanying storms. Usually the explanation given is an "Act of God." Well, here's a case where a base suffered severe damage but through proper precautions did not lose a single aircraft.

A squall line with severe thunderstorms hit Perrin Air Force Base during midafternoon on June 15. The wind, gusting at times to 60 knots, damaged nine buildings, tore six dock pilings loose from their concrete footings at Lake Texoma, blew two trailers off their blocks and inflicted other damage. The aircraft were well secured and none was damaged. Good work!

FOUNDATION FOR SUCCESS. RC-130A Passing through 15,000 feet, during descent, fire warning lights for Nr 3 and Nr 4 engines illuminated, simultaneously with the master fire warning light. The scanner reported tailpipe vibrations on Nr 3. The crew followed Dash One procedures in shutting down Nr 3, then Nr 4. An emergency was declared and subsequently a two engine landing was accomplished.

Successful handling of an emergency, without injury or damage, is always commendable and generally is due to decisions based upon knowledge of equipment and operator capabilities. Qualified crewmembers completely familiar with their equipment are our best insurance in any emergency situation. Some emergencies allow time to seek and obtain advice from specialists, but when fire warning lights illuminate, the decision must be made now!

With indications of a dire emergency, this crew took the action that, to them, was the safest course open. They waited until they got on the ground to discover that Nr 1 and Nr 2 power plants were fully capable of normal operations. It was then that they discovered that phase A and D bulbs on Nr 3 engine and phase A and B bulbs on Nr 4 engine were defective.

I congratulate this crew on their success.

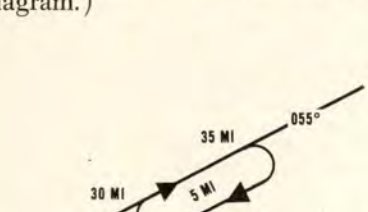
From a safety standpoint, taking timely action to minimize the hazard and landing at the nearest suitable base is in accord with approved accident prevention procedures. Also from the safety standpoint, such incidents should provide added incentive to continue the search for more reliable fire warning systems. ★

THE IPIS APPROACH

By the USAF Instrument Pilot Instructor School, (ATC)) Randolph AFB, Texas

Q. You are given a clearance to hold right hand on the 360 radial between the 10 and 16 mile DME fixes. Do you hold outbound with the 16 mile DME fix as the holding fix, or inbound with the 10 mile DME fix as the holding fix? *(Captain John E. Hubbard, 4th ATS, McChord AFB, Wash.)*

A. Your clearance does not provide sufficient information. Holding instructions should be issued in accordance with the ATC Procedures Manual, AT P 7110.1B. A TACAN holding clearance should contain the following minimum information: (1) Direction of holding from the fix, (2) holding fix, (3) radial, (4) leg length in miles, and (5) direction of turns only if left turns are to be made. For example: "AF Jet 12345 hold southwest, 35 mile DME fix, Mather TACAN 055 radial, 5 mile legs." Notice that the direction of holding is geographical from the holding fix, i.e., holding is accomplished southwest of the fix but northeast of the station. (See diagram.)



Q. When performing a teardrop entry into the holding pattern, should a course or a heading be maintained during the outbound portion of the maneuver? *(Major Tom Reed, Bunker Hill AFB, Ind.)*

A. The teardrop entry to the holding pattern is designed to place the aircraft on or close to the inbound holding course. This can be more accurately accomplished by flying a course than a heading. The bearing pointer, CDI, or a combination of both, can be used effectively to intercept and maintain the outbound course. The turn inbound should not be delayed if the course interception has not been completed when reaching the prescribed limits. If no positive course guidance is available (TACAN fix, intersection, etc.) a heading should be flown to parallel the teardrop course.

HOT

Q. My initial ATC clearance from Ground Control included a "Podunk SID." After takeoff I receive a radar vector which takes me off the Podunk SID route. Am I still required to conform to the SID altitude restrictions?

A. The first and most logical answer is to ask the controller for clarification. However, AFR 55-106, para. 6a(2), directs the pilot to conform to the exact routings, altitudes, and specific restrictions as shown on the SID or as amended. Since you have not received amended altitude information, you should conform to the published SID altitude. The controller should state his intentions when he issues the amended routing. REMEMBER – if there is any doubt, ask the controller!

Q. You are flying the VOR/ILS, RWY 17-2, to Blytheville AFB (High Altitude, SE). On the 110 degree portion to intercept either the 352 radial or the localizer, you know your drift. Should you apply this known drift to the 110 degrees? *(Captain Frank P. Trammell, 93 ARS, Castle AFB, Calif.)*

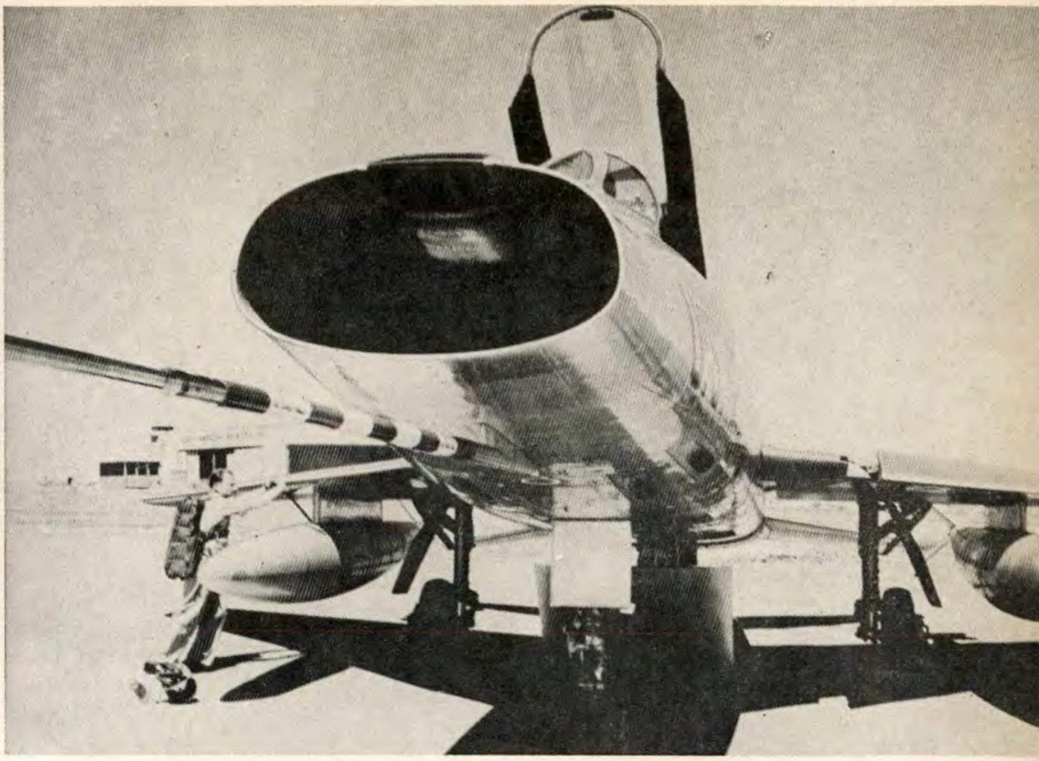
A. Yes. The actual path of your aircraft over the surface should conform as closely as possible to the published penetration.

POINT TO PONDER

During the preflight planning phase of a standard instrument departure, try comparing the SID with an instrument approach procedure chart for the airport. Obstructions in the area may not be printed on the SID, but are immediately apparent on the approach chart. Also, information such as minimum safe altitude 25 NM or emergency safe altitude 100 NM may be handy in case of an emergency after takeoff. Bearings and distance to NAVAIDs in the vicinity of the airport can be determined from the approach chart, and in the absence of published ground check points, could be used to check your VOR, TACAN, or ADF equipment. In addition to contributing to your knowledge of the SID route, you have familiarized yourself with the approaches available for landing immediately after takeoff. Have the approach chart readily available during the departure. ★

F-100 WING SLAT PREFLIGHT

Capt James P. Gammon, Jr.
Reprinted from — Nellis AFB Fighter Weapons Newsletter
Art supplied by — No American Avn



Although the wing slats on the F-100 may retract and extend smoothly, other factors such as alignment and proper clearance are essential to correct slat operation.

Is there a bird in your unit that reacts a little strangely — or even downright nasty — during high performance maneuvers? Does it have a tendency to yaw, roll, or snap — or require an abnormal amount of rudder to maintain coordinated flight while operating in critical, or even near-normal, angle of attack areas? If the answer to any of these is in the affirmative, then the problem may be traced to one of two possible major sources. The first cause can be classified as a case of ham-fisted airplane driving. Assuming that more than just one or two individuals have experienced an unexpected "thrill" with the particular machine in question, we will eliminate pilot-induced causes and look elsewhere. It then must be the airplane.

Flight control rigging will often draw a jaundiced eye, but what about those leading edge wing slats? Can you be sure that they are actually in good operational shape simply because with little effort, they retracted and extended smoothly during the walk around inspection? Though the principle upon which they operate is indeed simple, they are in fact a bit more complicated, and far more critical, than most jocks might realize.

The following description of an operationally-oriented preflight of the leading edge slats is based on data extracted from T.O. 1F-100D-2-5. It is not our place nor intent to qualify a set of go-no-go conditions, but rather provide ops types with some guide lines to assist in determining if the behavior of a cranky bird is in fact due to the wing slats, or some other rigging problem.

There are five leading edge slats on each wing. Numbers 1, 2 and 3 are interconnected to form the inboard set, and numbers 4 and 5 are similarly joined to make up the outboard set. The illustration at right denotes the system used to identify each slat numerically.

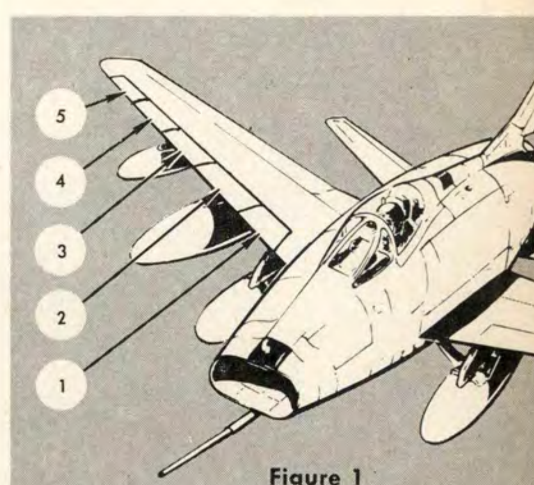


Figure 1

leading edge slat preflight

1 Push inboard and outboard slats into the retracted position and check for alignment with wing. The trailing edge of the slat should be flush with the wing leading edge (see Fig. 1). Number four and five slats should have forward track stops which will position them out approximately ¼ inch for the outboard end of the number five slat graduating to ½ inch for the inboard end of number four slat. Check that all four track stops are contacting their respective track rollers on Nr 4 and 5 slats.

2 Release the slats and check the alignment of Nr 3 and 4 slats fully extended. Figures 2 and 3 indicate the tolerance of misalignment between Nr 3 and 4 slats.

3 Check installation and freedom of movement of all slat track bearings and side rollers. Side rollers are installed on Tracks 2, 4, 6, 8, and 9. Refer to Figures 4 and 5 for tolerances. The slats must move easily without binding or rubbing.

4 With slats extended, check that interconnecting spacers are free and full-floating. Coating may build up which prevents free movement.

5 Make visual check of bumper washers. Missing or badly worn bumper washers should be replaced. Bumper washers are installed on the outboard section of Nr 1 slat, the inboard and outboard sections of Nr 2 slat, the inboard section of Nr 3 slat and the outboard section of Nr 4 slat and the inboard section of Nr 5 slat.

6 Check clearance between Nr 3 and Nr 4 slats. The clearance should be .218 to .343 inch, and should be the same as the clearance between the same two slats on the opposite wing. The measurement should be taken between the outer-

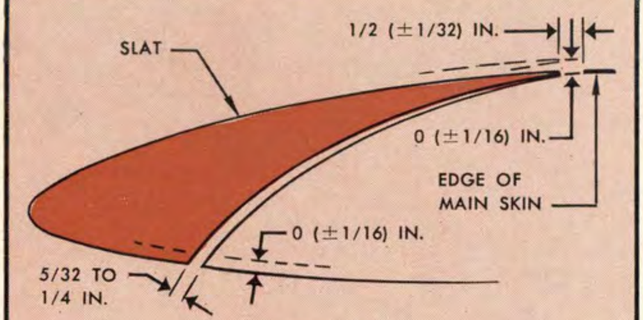


Figure 2

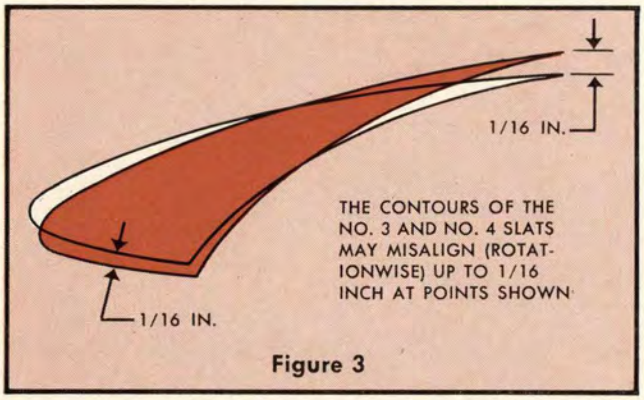


Figure 3

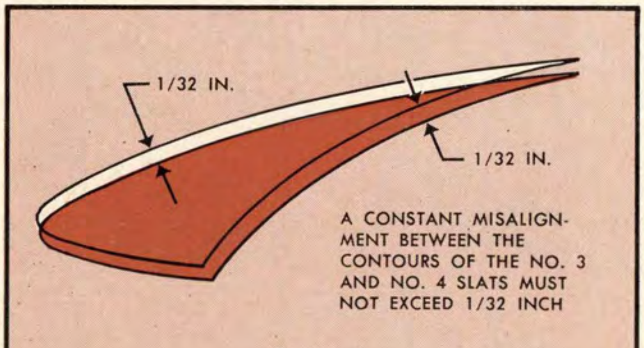


Figure 4

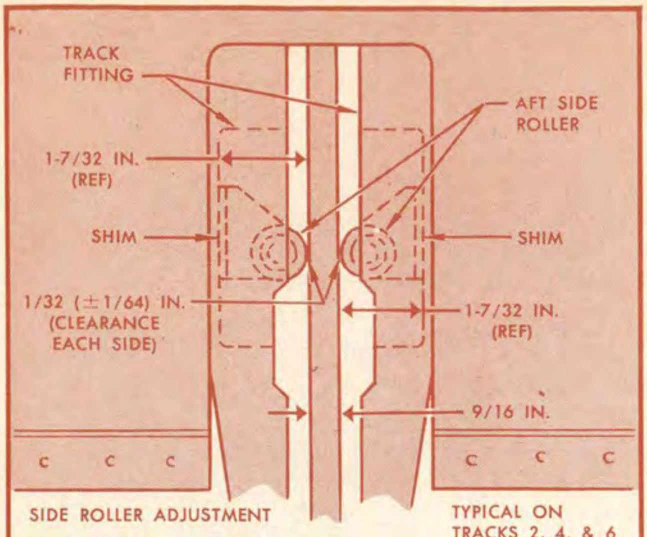


Figure 5

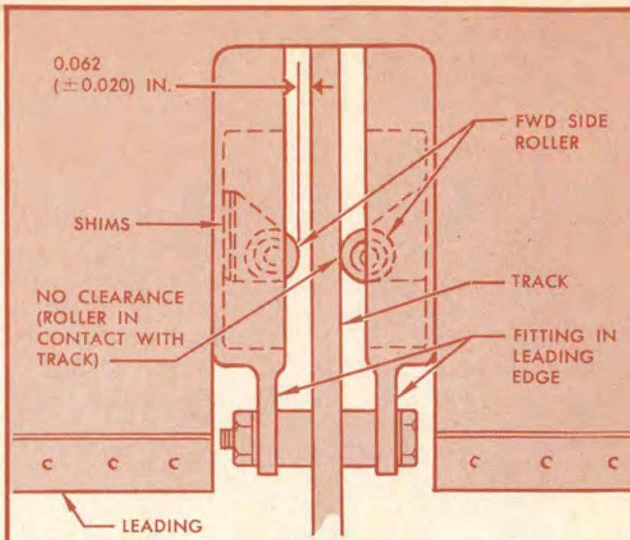


Figure 6

most part of the Nr 3 slat and the innermost part of the Nr 4 slat, not considering the rollers or rub strip on the Nr 4 slat. The clearance should be checked with the slats in the extended position and in the retracted position (see Fig 6).

NOTE: The Nr 3 slat may be either of two lengths, depending on its part number (192-17203-201 and -202 slats are ⅛ inch shorter than 192-17203-1, -2, -101, or -102 slats). It makes no difference which slat is used on a given airplane, as long as the same length is used on each side, and it is given proper consideration during adjustment of the slats.

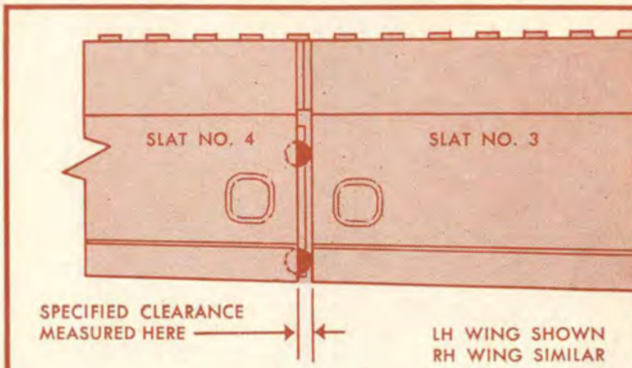


Figure 7

7 All tracks contain rubber cushions (leading edge slat track bumper assembly) to reduce shock when they bottom in their extended position. If these bumpers are missing or deteriorated they should be replaced.

8 Proper slat operation requires clean tracks, rollers, and bearings. They should be cleaned as often as necessary with a clean, lint-free cloth dampened in stoddard solvent (federal specification P-S-661). Special care should be used to keep solvent out of the inner parts of all rollers and bearings.

Isolating aircraft rigging problems is at best a difficult, and almost always, time consuming task. A thorough preflight will often provide the means of nipping in the bud a wing slat discrepancy that could later prove to be not only somewhat disconcerting, but plain dangerous. And if the bird still displays those "weird" flying characteristics after passing such a meticulous slat inspection, at least the flight line and field maintenance crews will know where *not* to look.

Good maintenance is a two-way street. On the operations side of the fence, the squadron pilot is in effect an important factor in any quality control program. If the pilot possesses a detailed knowledge of the airplane, and is capable of entering detailed, intelligent write-ups when things aren't as advertised, then the odds are that maintenance will follow suit and furnish the high caliber product expected. ★

GREEN LIGHT for safety

Lt Col Curtis N. Mozley
Directorate of Aerospace Safety

"The Safety Program is every one's responsibility." A commander, to remain a commander, must be fully aware of this basic fact; a supervisor, to be qualified as a supervisor, must be a strong supporter of the expression; and most important of all, the safety officer must be the prime instrument in spreading this philosophy.

Why is it then, that people from all these areas who have been grouped together for the purpose of surveying and aiding others in functions of command and supervision, tend to forget?

The safety officer is charged with a responsibility, but is given no authority. He and his people cannot direct that unsafe practices be changed or that hazardous conditions be corrected. He can, and must, advise the commander that situations needing corrective action do exist. He can document these shortcomings and should take follow-up steps until the deficiencies have been alleviated, but he can't direct the action.

A major function of any commander is direction of the proper authority, be it Maintenance, Operations, Civil Engineering. It is then up to the agency having the capability, personnel, and authority to correct these shortcomings. The discovery of a safety discrepancy doesn't necessarily indicate that the safety officer, or his people, are derelict in meeting their responsibilities. If the discrepancy has been documented and the agency with the corrective capability is aware of its existence, it is the responsibility of the surveyor to place the blame where it belongs.

The tendency to make the safety officer the scapegoat during safety surveys does not enhance the safety program, but it does breed complacency among those directly responsible for taking immediate priority action to correct these discrepancies.

An effective commander will use his safety officer as an extension of himself. He is the commander's eyes and ears for safety; he has the responsibility to point out hazardous conditions to the commander. No one wishes to be a party to an accident or the agency that permitted an injury to occur. With the pressures of maintenance, operational commitments, et cetera, it takes a separate staff member to monitor all staff functions to insure that these tasks are being accomplished.

A prime requisite of a commander is to recognize what a safety officer worth his salt can do for his organization. You can bet money, marbles, or chalk that back of a good unit with a good commander is a good safety officer.

The job of a safety officer is one dealing with intangibles. It is mainly a function of selling one's self. If the job is done right, there are no statistics to show how many accidents were prevented or how many people weren't injured! Proper plaudits are few and far between, but the practice of condemning the safety officer for a discovered safety discrepancy when he has done his job, indicates that the discoverer isn't doing his job. If the safety officer hasn't pointed out the discrepancy, hasn't brought it to the attention of the proper corrective authority, hasn't done what he can to get it corrected, then fine, put the "monkey" on his back! BUT, if he has done all he can, then the responsibility should be placed where it truly belongs. Even if, in answer to the report write-up, the responsible agency corrects the discrepancy, nobody remembers the horse that ran second. They only remember that the safety program was written up or briefed as "running at slow speed." The safety officer and his people then have a tougher nut to crack – for who listens to a loser?

Inspections, surveys, staff visits are fine management tools. The old bit about "not seeing the forest for the trees" sometimes is true. A different viewpoint, another interpretation, a cross-talk from experience, a passing-on of how comparable units operate, or a "nuts and bolts" inspection – are all beneficial if accepted in the intent given. However, they must be accurate and attention focused on true causes, not generalized or lumped into a catch-all just for the sake of expediency.

We must support the safety officer and his people. Who knows all the mishaps that have not occurred because they have done their job? They must have the backing of all of us and the continued green light to carry on their most needed services. ★

Missilanea

WATCH THOSE CONNECTIONS – Every missile system in the Air Force inventory has had its share of troubles with electrical connectors, due principally to the presence of moisture, foreign matter, or bent pins. AFM 127-201, Missile Safety Handbook, pages 8-16, states:

> "28. Connectors will be examined (before mating) for dirt, moisture, excessive solder, corrosion, metal filings, breaks, and bent pins. The parts of the connector will be wiped carefully before mating. When not in use, they will be capped or covered.
>
> "29. Connectors will not be unduly forced to mate since forcing may bend pins to positions in which short circuits will occur. Mismating or using oversized probes will be avoided since pins may be bent or the socket holes enlarged."

TO 21M-LGM-25C-2-9 goes even further, with requirements which could be applied to systems other than Titan II. The TO requires that all electrical connectors be inspected and purged by:

- Using a magnifying glass and extension light to inspect electrical connectors for foreign material (especially metallic particles), corroded or bent pins, pin hole damage, evidence that connector was wet, and physical damage.
- Replacing damaged connectors; on ordnance items, the entire item will be replaced.
- Cleaning dirty connectors, other than ordnance items, with a lint free cloth or a brush. If this is not satisfactory, they will be blown out with compressed nitrogen gas.
- Removing dirty connectors on ordnance items and cleaning them in the surveillance and inspection area.

Most of the problems experienced with electrical connectors can generally be eliminated by diligently following the above cited instructions. To do so requires little added effort, since it only involves the practice and development of good work habits. It could result in greatly reduced incident and hazard reports.

Willie Hammer
Directorate of Aerospace Safety

PERSONNEL ERROR vs. SUPERVISION – The lack of supervision is probably one of the greatest causes of personnel error and can be categorized into crew member error, maintenance error, and supervisory error. In 1964 crew member error was responsible for only about seven per cent of all accidents in air-launched missiles; maintenance was charged with 26 per cent of all accidents in surface-launched missiles, and supervision was the cause of five per cent of all accidents in surface launched missiles.

Personnel error is the one area where Wing and Squadron Commanders can and must assert themselves. Supervision is the tool they can best employ to combat personnel error. It is a proven fact that aggressive leadership and command interest produce lower accident rates. However, each year, the number of accidents attributed to supervisory error increases. Does this mean that the quality of supervision is less effective today than it was in the past? Actually, the reverse is true. We have learned to more readily recognize poor supervision as an accident cause factor.

Supervisory inculcation of proper policy and procedure is the answer. Frequently, it is difficult to determine supervision as the true cause factor in a particular accident or incident, yet it could have been prevented by adherence to established policy and proper current procedures.

As equipment becomes more complex, results of accidents prove to be more serious and costly. The trend can be expected to continue as man's quest for more sophisticated systems dictates even more pressure on operations, maintenance and supervision.

As reflected by the above referenced percentages, errors on the part of maintenance personnel do cause accidents. Most causes of materiel failure can be traced to human oversight or, in retrospect, lack of foresight. Some materiel deficiencies may not be the direct result of human error, but warnings of an impending mishap are generally evident–if only the signs are recognized. Operational hazard reports, incident reports, missile hazard reports, and AFTO Forms 22 are tools which should be used by supervisors to identify these warnings. If properly evaluated, these reports signal an impending accident; however, they are not the only source of warning signs. Materiel failure data, if viewed from a safety standpoint, will serve the same purpose. Agencies charged with support and design functions can be most effective here.

Emphasis on supervision down to the lowest level is the answer to reduction in our accident/incident rate. Recognize this fact and errors will decrease!

Major R. L. Mahynske
Directorate of Aerospace Safety

WHERE ARE THE WHITE SCARFS?

Maj Russell S. Buker, USAF Aerospace Pilot School, Edwards AFB, Calif.
(Reprinted from USAF Instructor Journal, Hq ATC)

The white scarf and goggles with a side order of champagne and women has been the standard Hollywood version of a test pilot since the days of Clark Gable and Spencer Tracy. The late-late movie still features these two drinking and loving their way through dangerous test flights, and people must wonder why there is so much training and experience required to become an astronaut.

This Hollywood version of a test pilot never did exist and anyone who visits the Aerospace Research Pilot School (ARPS) at Edwards AFB, California, knows why. They will see here a group of dedicated young men, with at least a bachelor's degree in an engineering science and 1500 hours of flying time, learning how to become test pilots. They will also see them spending 12 to 14 hours a day working to complete a 12-month course that consists of approximately 600 academic classroom hours and 400 flying hours. Obviously then, there is a vast difference between the celluloid test pilot and the aerospace student who will be tomorrow's astronaut.

The Aerospace Research Pilot School is a unique institution that trains Air Force, Navy, NASA, NATO, and civilian test pilots. It consists of the Experimental Test Pilot Division and the Aerospace Research Pilot Division. This article will feature the mission of the Experimental Test Pilot Division which comprises the first six months of the course.

The Experimental Division is a slightly compressed version of the old Test Pilot School that was founded in 1941. Colonel Chuck Yeager is a graduate of this early course and is now the commandant of the school. His highly qualified staff consists of graduates from the school (top 10 per cent of their class) with engineering degrees, and average of 5000 hours of flying time, and flight test experience in development programs including the T-38, F-101, F-104, F-106, B-58, C-141, and many others.

TRAINING TRANSLATORS

The job of the Test Pilot Division consists of converting a pilot who has an engineering degree into a qualified engineering test pilot. This may seem a straightforward job on the surface, but there is a large difference between the two. The main problem is communication, and it may be said that the first six months of the course is spent teaching these pilots a new language. They have to be able to tell a design aeronautical engineer what is wrong with the flight characteristics of an aircraft in *his* language, and at the same time be able to explain highly complicated mathematics in language that a squadron pilot will understand. The job, therefore, is to bridge this gap and have one person that can test fly the aircraft and discuss its aerodynamic characteristics with either an engineer or another pilot.

The instructor's classroom is unique. He teaches on the chalkboard and in the cockpit. This is different from any other flying school in the Air Force, where academics and flying are taught by separate instructors. It is the predominant factor in the success of the school and the reason it produces outstanding graduates. The ability to demonstrate under actual conditions the highly complicated mathematics discussed in the classroom is a valuable tool that instills confidence in the student. It also enables the instructor to see if his lectures have been effective, and points out areas that need more emphasis.

There are three factors that make a good test pilot. First, he must

Training takes many forms: celestial navigation, classroom, flying, space flight simulation. Reward may be future trip to the moon, even the planets.

have a complete understanding of airplane aerodynamics. These principles consist of the performance of an aircraft (takeoff, climb, cruise) and the basic stability and control characteristics (handling qualities, maneuverability, control system harmony and ability to perform the mission). Second, he must have sound judgment in order to plan the mission properly and acquire the most data possible with a high degree of safety. Finally, he must be able to perform the complicated flight test techniques that are used to collect data. This seems to indicate that almost any Air Force pilot could qualify for the job if he spent some time studying aerodynamics, but this is not true. It is true that Air Force pilots have sound judgment and are precision flyers, but the present system of training pilots and using them later in operational squadrons does not lend itself to individual thinking. Today, pilots learn how to fly using the same method they did in grade school to learn their multiplication tables. In fact, before a pilot can check out in an aircraft, he has to be able to parrot emergency procedures verbatim in order to pass the written test that allows him to start flying the aircraft. Furthermore, if he encounters an emergency after he has checked out in the aircraft and does not handle it in the prescribed manner of the checklist, he is open to criticism and possible reprimand.

THE "SCHOOL SOLUTION": *WRITE* THE BOOK!

This type of training is not conducive to testing aircraft. Many times the checklist has not been written. Emergencies have to be handled by the pilot because of what he knows and not "by the numbers." This means that one of the primary steps is to have the student realize that there is no "school solution" to most of his problems. The solution to a flying or academic problem has to come from his knowledge of the system involved and not from the book. In fact, his job after graduation will be to *write* the book on the aircraft that he is testing. This places a great responsibility on him, so from the start of the course he is constantly placed in pressure situations that will *make him think*.

The first three months are devoted to the performance testing of aircraft. It consists of teaching the academics of lift curves, shock waves, and engine theory. The flight test techniques that accompany this theory define the performance flight envelope of the aircraft. The exploration of this envelope is performed by moving from point to point. It does not consist of taking an aircraft to its maximum altitude and airspeed on its first flight. In fact, the first flight on a new plane is usually composed of a takeoff and landing. No new flight is planned until the data from the previous flight have been examined and it has been determined beyond a shadow of a doubt that it is safe to continue. This is where good judgment and maturity are required, and snap decisions are not tolerated. The point by point progress of the X-15 test program and the current space program are good examples of this principle. This fantastic success and safety records of these programs attest to the veracity of this method.

The requirement for precise flying is also stressed at all times, since data gathered have to be obtained under perfect conditions. It is sometimes required to stabilize the aircraft at one altitude and one airspeed for two minutes or more in order to record accurate rpm, fuel flow, and engine temperatures. These data are used to determine the best cruise power for cross country flying. Another test requires that the aircraft be placed in a turn at full power holding a constant airspeed and altitude. The resulting data are used to determine the turning performance of the aircraft, and requires extreme precision.

Stability and control is covered in the second three months. It teaches the student how to determine good and bad handling quali-

Major John Prodan operates the complex controls of the T-27 Space Flight Simulator at the Aerospace Research Pilot School.

ties of an aircraft. The squadron pilot usually takes what has been designed in an aircraft control system and spends most of his time getting used to anything that is unusual. An extreme example of bad control design would be to have a pilot pull on the stick to go down and push to go up. This would be intolerable of course, but nevertheless *could be adapted to* by a pilot. Another discrepancy would be to have a 5-pound force required to move the elevator surface, and at the same time have a 10-pound force put the aircraft in a four g pull up. These examples are ridiculous, yet designs almost as bad as these have been found in some aircraft and test pilots have refused them.

Another area taught in stability and control is the proper way to conduct a spin program. Most modern aircraft have poor spin characteristics. The academics involved are highly complicated and involve algebraic equations describing six degrees of freedom. The equations can be used to predict the proper control positions that should be used to effect recovery, and are a highly useful tool. The proof of the equations can only come from flying the aircraft and actually trying them out. The student uses the academics to determine the best recovery procedure for the T-33A and then flies a test program in this aircraft to determine the spin characteristics and best recovery characteristics for that aircraft. He is taught the safe way to approach a dangerous test program such as the spin test. He also learns to be able to verbally describe the spin characteristics of the T-33A which include altitude lost per turn, time per turn, airspeed change per turn, and general aircraft gyrations during the spin.

Picture yourself in the cockpit of a T-33A in a spin that is rotating one turn every four seconds and try to read the altitude, air speed and time at the end of each turn *plus* remember the various gyrations that have gone on during the turn. Add to this the responsibility of having to write a report that would be used to put the procedures you have developed for recovery into a publication for all of the pilots in the Air Force to read and use, and you have an example of the pressure that the student is under every day!!

The final result of all of the data collected both quantitatively and qualitatively is presented in a formal, published technical report. This is the portion of the course that takes the extra two hours per day. The student is required to interpret all the data he has collected, either by photo panel or oscillograph, reduce it, and present it on appropriate plots. He is also required to discuss these data and present his opinion on the performance and handling characteristics of the aircraft that these data describe. There can be no areas where the discussion disagrees with the data. This is where the student learns that he must be consistent in what he says and what the data show. He has to track down any discrepancies and be completely convinced that he is right. He also finds that precision flying helps his analysis and presentation, since poor gathering techniques lead to poor data and inconclusive results.

When the student has completed the first six months of the course he has been exposed to approximately 20 areas of flight testing. He has had to plan and execute complicated missions on a limited fuel supply and still get all of the data required. During all of this, he has had to maintain geographic orientation, and look out for other aircraft. He has had to handle simulated emergencies and finally, worry about a grade on the flight from the instructor in the rear seat. After the flight has been completed, he has to reduce the data, present it in a written report and receive a grade for this. He has had daily pop quizzes to contend with, and a weekly 2-hour quiz which covers all of the academics and flying theory that has been presented that week. Finally, most of the students have to go home to a wife and family and try to solve those problems, too!

Though the demands upon our students are great, it should be noted that the reward for this hectic six months is also a large one: the test pilot is now eligible for a mission into space.

Where are the white scarfs? If you bring one to the Aerospace Research Pilot School, leave it hanging in the closet. The job of a test pilot demands hard work and complete dedication with little publicity. The publicity is for the Hollywood actors. ★

Leafing through 1964 aircraft accident briefs we were struck with the number of times and the number of ways in which surface wind gusts had played a part in aircraft damage. Thinking we might do better in the months ahead if we were to emphasize this problem, we recount problems of 1964:

Let's start with the Gooney Bird. I suspect that a brief like this could have been written at least once every year since we've had this old Air Corps standby:

Training. GCA Approach. Gusty winds and turbulence reported to pilot. Pilot allowed aircraft to touch down in overrun. Aircraft made two 360 degree turns before coming to a stop. It's opinioned the primary cause stemmed from the pilot's failure to maintain adequate airspeed. The gusty winds are given a contributory assist as is the copilot for failure to monitor the airspeed and warn the pilot.

Picture the rodeo-like gyrations on this one: A B-47 jock bounced on his bird on first try and started a go around. Next touchdown was right wing first, followed by a veer off the runway into parked aircraft. The 12 knot crosswind was given as contributory.

A B-52 pilot undergoing upgrading training was about to make a nose low touchdown. The IP took control, but the aircraft hit and bounced. A landing gear failed in this accident, due to materiel fatigue, a hard landing and gusting winds.

There was one case in which surface winds for the incoming storm were forecast to be below evacuation limits. The forecast was correct. The tied down aircraft rode out the winds, but a nearby building didn't fare so well. Pieces blew off, damaging the tied down aircraft.

In another case people with a need to know didn't get the word. The base ops officer failed to insure proper dissemination of a severe weather warning, aircraft were not adequately tied down and 90 knot winds blew an aircraft into a fire truck.

And weather doesn't stick to the rules. Three aircraft were damaged when thunderstorm winds exceeded forecast velocities and two aircraft were blown into a third.

Neither the pilot nor flight engineer of a transport completed the checklist prior to leaving the aircraft. The aircraft was not properly secured and later was blown into a civilian transport.

A sudden, violent gust of wind damaged controls of a parked aircraft.

An accident occurred during an attempted go around after a downwind, crosswind touchdown on an icy runway. The dangerous landing conditions had not been passed to the pilot by supervisory personnel.

Touchdown was 12 feet short, three feet below runway level when the aircraft stalled in gusty wind conditions.

Gusts of at least 72 miles per hour during a thunderstorm caused aircraft to jump chocks and collide with other aircraft and flight line buildings.

Despite reportedly adequate tiedown measures, an aircraft was damaged when a hurricane struck a base.

A jet fighter jock failed to heed the minimum control speed warning, got too slow during a crosswind landing and lost control.

And sometimes it is the other guy's fault. One of our aircraft was damaged when a taxiing civilian aircraft was blown into it.

Well, there you are. Obviously, from the 1964 experience, we have a wind vs. airplane problem. Here are some old, old suggestions — still good.

- Get the wind word out and take precautionary measures as necessary.
- Land on runways most nearly aligned into the wind — shouldn't be the pilot's headache, but if you don't like what the guys in the high glass house select for you, make 'em change it. If you don't hack it, *you'll* get the scratches and primary blame.
- Follow Dash One procedures as to amount of flaps, adding one-half the gust factor to your airspeed, etc.
- If the airplane starts flying you, cob it and go around.
- Don't land or takeoff with a thunderstorm over or adjacent to the field.
- Stay alert! Think of what you're doing now, not what you did last night, or what you hope to do tonight.
- Don't experiment — go to an alternate. ★

WIND GUSTS

Maj Thomas J. Slaybaugh, Hq USAFE

Aerobits

CHECKLISTS. Checklists are sometimes annoying, but, over the years, we've found them to be necessary. The human mind just doesn't always remember every item of a particular procedure. Case in point: An A-1E pilot attempted to take off with rudder gustlock in place. The pilot received second-degree burns in the ensuing fire, and the aircraft was seriously damaged. Item 8b2 of the Exterior Inspection checklist is *"Remove gustlock."*

CLIPPED – After an engine flamed out in flight, an investigation turned up an unidentified metal object fused to the fuel shutoff terminals. Some research revealed the object to be an earphone cord hold-down clip from an HGU-2A/P helmet. When a check around the base was made it was found that a number of these were missing from helmets and that probably many of them were being lost in cockpits. How's the clip situation at your base?

TWO LOW PASSES–Aviation history is liberally sprinkled with the exploits of military pilots who have flown, or attempted to fly, under bridges, down the main street of the old home town, along the beach for the benefit of the bathing beauties and last but not least, victory rolls at minimum altitude. The majority of these pseudo-heroics escape detection since they go unreported. The following accident brief is a classic example of a willful violation of both regulations and good judgment. This incident was well publicized because a million-dollar fighter and two fighter pilots went down the tube. The accident board recommended that this mishap be brought to the attention of all USAF pilots through publication of a brief in AEROSPACE SAFETY.

The accident investigation revealed that the crash site was near the home of the front seat pilot. Moreover, the wife of this pilot observed the crash. At the time of the accident she was riding a horse in an area close to her home.

The widow said that the aircraft made two low passes and crashed on the second one. Other witnesses confirmed the low passes and loss of control. Further questioning revealed that this pilot had made it a practice to fly by his home. He had done this at other bases in various types of aircraft, solely to impress his wife.

It is most unfortunate that these other occasions went undetected or unreported. A stiff reprimand for one of the earlier violations might have created a lasting impression and cooled his desire for flat-hatting.

What did he gain by a low pass in an unauthorized area? Nothing! What was lost? Two lives!

Violations of flying regulations must be handled severely by all commanders. We cannot condone the loss of valuable aircrew and aircraft, especially when they are the result of adolescent impulses.

Lt Col Eugene P. (Gus) Sonnenberg
Directorate of Aerospace Safety

BOOT CATCHER – Insignificant things sometimes cause one heck of a lot of trouble. A while back a pilot reported the heels of his boots were binding on the rubber matting installed under the rudder pedals. The matting was there to provide a nice appearance and to protect the paint on the metal under the pedals.

With his feet on the brakes, this pilot experienced no trouble, but when he moved his feet down on the pedals the binding occurred. After the rubber was removed, the pilot's feet slid back and forth okay. The organization that owned this airplane, a '135, removed the rubber matting. However, we're passing this on as a warning in case someone decides to dress up other birds with similar material.

PAY ATTENTION—Lack of attention was responsible for a couple of recent incidents, neither of which developed into anything serious but which adequately points out that a moment of inattention might be disastrous.

• A T-33 flamed out. The pilot descended to FL 200, got a restart and completed the flight successfully. What happened was that the pilot allowed the fuselage tank to deplete and neither the pilot nor the navigator noticed the tip and fuselage low level lights come on (the pilot had dimmed them prior to flight). Fatigue was considered to be a factor since the pilot had only three hours sleep before the flight, after working a full day and flying to a staging base.

• During penetration to a GGA downwind the crew of a B-52 was advised of another aircraft in the area at an unknown altitude. Copilot in the left seat called for flaps down but the IP, sitting in the copilot's seat, leaning forward to scan for the other aircraft and talking on the radio, moved the drag chute lever instead. The gunner announced chute deployment and it was jettisoned before becoming full open. Cause: IP preoccupation.

CHOPPER WRECKAGE—The accident scene was indeed unpleasant. Wreckage of an H-3, almost totally destroyed by fire, was located less than 300 feet from the point of liftoff. Looking at the wreckage gave me that sick feeling in the pit of my stomach which soon turned to amazement and then relief to know there were no fatalities.

My purpose for being at this holocaust was to help determine what caused it so that the same catastrophe would not occur elsewhere. Upon looking at the surrounding area, my immediate concern was directed toward the helipad from which the unfortunate flight originated. Not only was it marginal in size for a large twin-jet helicopter, it was not stabilized to prevent FOD; it had obstructions (such as hills, chainlink fence, high-tension lines, poles and antennae) and ditches adjacent to all sides.

Combined with the high elevation, variable wind currents around the steep, sloping hills, and maximum performance takeoff requirements, operation from this helipad demanded perfection in every respect. Yet the mission—transporting passengers and cargo to and from a launch facility—was considered routine. In this instance, rotor decay occurred almost immediately after the big helicopter lifted off the pad, and there was no place to set it down safely. Thus, the Air Force lost a $750,000 aircraft and several of its airmen were injured.

My reason for bringing this accident to your attention is to suggest a closer look at the conditions under which you are operating. Fixed-wing aircraft are not routinely operated from runways that require maximum-performance takeoffs on every departure; *let's expect the same margin of safety for our rotor-wing aircraft.*

Lt Col Robert E. Englebretson
Directorate of Aerospace Safety

Aerobits

STUBBORN CUSS, WASN'T HE?—How often have you heard the term, "he was an accident looking for a place to happen?" Especially after the guy pranged the machine and the word was out that all was not well, that the investigation brought out irregularities in procedures, training, compliance with directives, and so forth. In other words, the accident happened because people goofed.

Now, it is probably safe to assume that all of us in the flying business have at one time or another been in the category of "an accident looking for a place to happen." Those who have profited by the forgiven mistakes can undoubtedly pass on experiences to those who are just now, or have in the recent past, chosen military aviation as a career. But, what about the lad who doesn't seem to profit from his, or the mistakes of others? What about the guy who's too stubborn to see the light? What about the individual who has just recently survived a situation that could have been disastrous, perhaps not to his physical being but most certainly to his professional well being.

Take the case of a 29-year-old Air Force captain with about 1800 total flying hours accumulated during the past seven years, who was taxiing a C-54 when hydraulic troubles developed. According to the incident report, nosewheel steering was lost just after the aircraft had landed and cleared the active runway. *The pilot continued taxiing, using brakes for steering* (perhaps this was a fall-back to most of his experience which was in single engine aircraft without nosewheel steering available). Then when Nr 2 engine began leaking hydraulic fluid, he shut the engine down but *continued taxiing!* After he turned into the parking area brakes were "suddenly" lost and effective steering could not be accomplished with differential power. Finally, to avoid collision with three parked fighter aircraft, the emergency airbrake system was activated and the aircraft stopped.

Investigation revealed a ruptured hydraulic pressure line on Nr 2 engine which caused complete depletion of the aircraft hydraulic system. Corrective action required replacing the pressure line, purging the brake system, and reservicing the hydraulic system. After this, the mission continued. Incidentally, the mission was a passenger and parts pick-up at the base where this incident occurred.

Now the questions begin: Has this pilot profited from this experience? Does he fully comprehend the cause? Does he understand his mistake? Does he appreciate his good fortune? And many others equally appropriate. If the answers are affirmative, it seems logical to conclude that the Air Force has probably gained a wiser pilot whose future should be brighter. But, if the answers are in the negative, this lad may become one of those accidents that found a place to happen.

Whether it was stubborness, bad judgment or ignorance which caused this pilot to continue taxiing in spite of all indications that the aircraft should have been stopped as soon as nose steering was lost, it is hoped that the pilot benefited from this experience. It is also hoped that the pilot's organization is not responsible for generating pressures that would cause a man to ignore operating instructions for the urgency of a low-priority peacetime mission. And finally, it is hoped that standardization in this pilot's unit is of the caliber that would not only identify but correct unsafe practices such as this. In any event, publishing this unheralded event should serve as a reminder to both new and old heads that the incident which goes almost unnoticed may well be the indicator of a catastrophe to come. ★

Lt Col James S. Keel
Directorate of Aerospace Safety

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WELL DONE

CAPTAIN ROBERT J. O'GRADY

482 FIGHTER INTERCEPTOR SQUADRON, SEYMOUR JOHNSON AFB, N. C.

Captain Robert J. O'Grady was scheduled for a routine maintenance test flight in an F-102, following completion of a periodic inspection.

Preflight, emergency fuel check, runup and takeoff were satisfactory. The climb to altitude, including ascending checks, was uneventful. At 26,000 feet, approximately 16 miles south of the base, Captain O'Grady proceeded with the emergency fuel check by retarding the throttle and switching to emergency fuel. The engine immediately flamed out. Repeated airstart attempts in both emergency and normal systems were unsuccessful during the glide toward home plate. Immediately after flameout Captain O'Grady advised Seymour Johnson Tower of his emergency and declared his intention to land from a flameout pattern. At 16,000 feet over the field, the gear was extended and checked. Additional airstarts were attempted without success. At low key, the ram air turbine was extended while the pilot maintained 220 KIAS. Further airstart attempts were discontinued in order to concentrate on final approach positioning and touchdown point. Airspeed was reduced to 200 knots prior to flare. A smooth touchdown approximately 1200 feet past mobile was accomplished, the drag chute deployed, and landing roll out completed.

Investigation disclosed that the engine fuel control had failed during the changeover from the main system to the emergency system.

The professional skill and superior flying ability displayed by Captain O'Grady, coupled with his accurate analysis of the problem, enabled him to successfully handle this emergency. WELL DONE! ★

help prevent