AEROSPACE
SAFETY
UNITED STATES AIR FORCE

JANUARY 1966

TAKEOFF

see page one

AEROSPACE SAFETY

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FALLOUT

WHERE THE ACCIDENT BEGINS

The article "Where the Accident Begins" (November issue) describes the optimum glide slope for all types of j[illegible] craft. Visit a SAC base and wat[illegible] bomber or tanker making a GCA fo[illegible] full stop or touch-and-go. The pattern is identical to the flight path you have described (i.e., departing the glide slope when transitioning from hooded to visual flight).

If you can locate a copy of the Visual Glide Slope tests (published by FAA, NAFEC, Atlantic City, N.J.), you will find graphic proof that the glide slope is departed between 100 and 200 feet. The tests include every type of modern aircraft both civil and military.

There is no question in my mind that moving the GPIP closer to the threshold will cut down on undershoot landings. If you should meet a "Doubting Thomas," take him out on the overrun of any airfield; the number of tire burns short of the runway threshold will open his eyes very quickly.

Maj Robert R. Hall
Director of Safety
Hq 810 Strat Aerosp Div
Minot AFB, N.Dak 58703

* * * * *

Your article "Where the Accident Begins" was fine as far as it went, but why stop with a discussion of the instrument approach? What about VASI? Since the system was first installed at Eglin I have been fighting a losing battle attempting to convince non-fighter people that the VASI approach was not for fighters, using essentially the same data that you did. (The F-4 is excluded, of course.) A few kind words for the anti-VASI fighter pilots would be appreciated.

Frustrated Fighter Pilot

* * * * *

The article "Where the Accident Begins" is an excellent article but I would like to urge some caution on implementing the conclusions.

The conclusion shown in Figure 3 is that the standard glide slope is 60 feet above the desired landing profile at a distance of 3000 feet. The reader might naturally decide that if this is true, the best procedure would be to hold 60 feet low on the glide path. I suspect that many pilots already are doing this.

Now, if the staff planners move the glide path intercept point closer to the end of the runway, a hazard develops. The pilots who fly 60 feet low would now be 60 feet below the desired landing profile and may have a terrain clearance problem during the final phase of the approach.

Let's move all the GPIPS at once or else not move any. The average pilot will never know whether the GPIP has been moved or not and may get in trouble. Of course, theoretically, he should never fly the lower safe limit or below but experienced, real world pilots approaching a short, wet runway are going to fly on the low side.

Lt Col Gerald T. Rogers
APGC (PGOZF) Eglin AFB, Fla

The response to this article has been a bit surprising—several calls in addition to letters. We learned that: (1) All aircraft with high approach speeds have the same problem; (2) SAC Flight tested the B-58

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TAKEOFF

We still lose an occasional bird on takeoff because the pilots do not really know what to expect from their aircraft under strange or unusual conditions.

We had three classic examples of accidents in 1965 that should not have happened.

One was an F-100 on a high altitude, heavy weight takeoff. Acceleration was slow, apparently slow enough to worry the pilot. When he rotated—at proper speed—he watched the airspeed meter closely. He said it froze—stopped cold at rotation speed. He had not perceived any thrust loss, nor did his instruments indicate any trouble to him. But it didn't feel right and it apparently wasn't accelerating, so he aborted. He broke through the MA-1 barrier and bashed the bird.

Another was a T-38 abort accident, wherein the student pilot applied all of his training so precisely that he embarrassed our education and training system. This troop had calculated everything to a tee. He had an aiming acceleration check speed of 117 knots, and a firm reject speed in mind. At his estimate of the 2000-foot mark, he was 17 knots short of his aim speed. The pilot aborted—exactly what he had been briefed to do under the circumstances.

The accident itself stemmed from his inability to stop in time, with a barrier failure figuring in the reasons why. The pilot bought the blame all right; he wasn't fast enough in implementing his abort decision. But the corrective action was to put up marker flags to provide a true reference for the start and finish of a 2000-foot acceleration check. This would seem to prove that there's no sense in teaching people to use a 2000-foot check unless you also provide them with a practical 2000 foot speed trap.

The third accident involved another type of scare—buffet on takeoff. This was a T-33 with which the pilot had no complaint until he rotated for liftoff. When he did, it felt like it was stalling. He lowered the nose and checked his speed. It read 120, but he left the nose down until he read 125, then rotated for another try. It wanted to fly, but it was buffeting as though it were stalling. Not having an acceptable explanation for this serious symptom, he aborted. Same story on the stop.

Let's analyze this one first while the situation is fresh in mind. We know of only one set of circumstances under which this type of accident can occur. This is when the pilot is nervous and is behind rather than ahead of his airplane.

There are any number of things that can put a man on edge and that's all we want to imply here—that something was bugging the pilot prior to rotation.

Whatever the background, when the pilot rotated, he felt buffeting and it felt like pre-stall buffeting to him. So he treated it like pre-stall buffeting and aborted because he could neither correct nor explain it.

Now we're going to suggest that what this pilot felt was speed board buffeting. That's the only thing on a T-33 that feels anything like pre-stall buffeting on takeoff. Yes, we know that this buffeting is so light at rotation that you'd hardly notice it—we've been there, too. But we've never had it happen when we were scared, and that can make a big difference.

Anxiety comes from doubt—which is the same as saying that the unexpected induces fear. If this pilot, or the others it has happened to, had been confident of their status at rotation, this minute buffeting could never have spooked them.

This confidence we speak of comes from the normal and proper series of events and checks that precede rotation. If a man is paying reasonable attention to things like his weather briefing, the filling out of his 175, and the starting and runup symptoms of his bird, he has a good feel for what to expect. If his situation is unusual, such as flying out of Buckley, Colorado Springs or Albuquerque for the first time, the average pilot would be checking things more closely than he might ordinarily. Certainly, he will pay attention to his acceleration check.

Now if all of these inputs have been received and stored in an open mind, and if each symptom and check has registered an O.K. in that mind, then the pilot is proceeding in confidence. A symptom like buffeting would cause him to think all right, but the thinking process would be precisely opposite to that of the man who begins his analysis from a basis of complete surprise or anxiety.

The pilot who is ahead of the situation *knows* that the airplane is all right, so he starts looking for silly little things that he might have forgotten, things that could account for the undesirable symptoms.

The pilot who is behind the bird—or just not with it in this particular instance—has to base his decision on the symptoms alone. He doesn't have six or eight O.K.'s fresh in his mind to temper the shock of a negative symptom. It may even be that he has a few prior negatives stored there instead.

Suppose, for example, that the bird he was flying really was something of a dog. Suppose he had had trouble on a previous takeoff or approach and suspected that his airspeed indicator was less than accurate. Or that previous accel checks had been low. Or that the engine had made strange noises. Or that he was the type of guy who never bothered with fine details but often wondered what would happen to him in a pinch.

Whatever the specifics in any particular case, a thing like speed boards—or an overheat light—or a rumble—or jet wash—or runaway trim—or open gun bay doors—or a blowout—can break up a pilot who is behind the bird, but be a profitable incident to the one who *knows* what's going on.

Everything said so far applies to the F-100 as well. But in fairness to the pilot, we will point out that our system does not contain adequate education and training programs to assure that all pilots get all necessary facts before they are turned loose. We'll show you what we mean.

Your Flight Manual is your only source of factual data. And it is data oriented. Everything you have to know about takeoff performance is presented in two charts; the takeoff ground run and the normal acceleration charts.

These charts provide quick reference answers to very complicated questions, but the answers don't do a thing for you unless you understand exactly what these calculations are telling you. Let's use an example.

You're an average sea level pilot from an average base. That means your base has from 10,000 to 13,000 feet of runway and an elevation of less than 1000 feet. The only variables you normally face are temperature and humidity, and gross changes occur only seasonally rather than daily. For all practical purposes, your airplane will perform today exactly like it did yesterday. You don't really have to calculate anything. You have a good "feel" for performance at your home patch. You know that you'll have X knots as you pass mobile, or as you pass the 2000-foot stripe or marker. You know the bird will be ready to fly as it reaches the mid-field turnoff or some other familiar reference point. You know that if you're on a max gross takeoff, it's going to take a little longer. But most important, you know that you've got more runway than you'll ever need, so you have no need at all for computing precise takeoff data. If the engine runs, you'll make it off. And if the engine is so bad that there is an obvious extension of the roll, you'll have them look at it when you get back.

The biggest trouble with flying by feel is that it can become too much of a habit. Most of us are so sharp we can walk into base ops after an RON, read the pressure altitude and runway temperature off the forecaster's board, write down the takeoff distance and check speed, then confirm it by a quick reference to our checklist charts. And what's more, we can make it good with the aircraft. That is, 98 per cent of us can, 98 per cent of the time.

About two per cent of us get trapped by this eyeball technique every year. We don't all prang, but we all get a thrill. We get to see and feel things we've never seen or felt before, like seeing the end of a runway coming up and feeling that the bird isn't going to hack the necessary 30 knots in the few remaining feet of runway.

This can only happen under one specific set of circumstances. It can only happen because we failed to draw an accurate picture in our mind of what our takeoff *should* look like, so we could compare it to what it *does* look like as it progresses. In other

what you have available.

Student pilot aborted takeoff in T-38, missed barrier, had accident. Accel check marker may have prevented this mishap.

words, if we *know what to expect,* there can be no real surprises.

It isn't enough just to calculate the takeoff distance and write it down. You haven't done a thing until you compare what it should take to what you have available.

Suppose you were to stop at Buckley (Denver) for fuel on a cross country. Just how impressed are you with the difference in takeoff performance that will exist when you leap off?

They have two runways there, one is 8000, the other 11,000. Normal ground run for a T-33 on an 80° day would be about 6500 feet. The 2000-foot accel check speed for a 6500-foot run is 75 knots. The Handbook allows a 10K-tolerance on check speed, unless this would extend your roll past 90 per cent of the runway length.

In this case, a 10-knot discrepancy at 2000 feet would extend your ground roll by 2500 feet or so. Did you get that? You couldn't even accept standard tolerances on an 8000-foot runway, and a 10-knot discrepancy at 2000 feet will push your takeoff distance out to 9000 feet or more.

What does that mean to you in terms of feel? Have you ever sat out a takeoff run at half of normal acceleration rates? On a normal summer day at home—a 90° day—you'd expect 88 or 90 knots at 2000 feet and you'd be lifting off at 4000. At Denver or Colorado Springs, you'd have from 85 to 95 knots at that distance and have 4000 or more yet to roll. Do you have any idea what it feels like to gain only 5 knots in 1000 feet? Particularly when you're looking at the end of the runway?

The answer to these questions is important only to people who depend on the eyeball system. They are least impressed by the charts and most impressed by the dynamics of experience.

These are the guys who start pulling on the stick as the barrier comes into view. By the time they get 100 knots (in a T-33) they've got a tail scraping attitude — which means they have halved an acceleration rate that was already half of normal. Now they can look at the airspeed meter for 5 full seconds and it will advance only three knots. Meanwhile, another 1000 feet will go by. If you had a five knot gust coming down the runway, it could quit at that moment and make you believe you lost two knots over that 1000 feet. That's more than a man can take unless he's very well prepared for the traumatic experience of a high altitude takeoff in a thrust marginal airplane.

The responses to such situations have been many and varied. Some abort, some press on and settle back down as they retract the gear. At least one T-33 rolled 9000 feet at Buckley, had two-pilot confirmation of 125 knots, climbed to better than 50 feet, then settled right back down on the overrun because it "felt like it was stalling." The dive boards were down when this bird touched down. That's a fact.

In the case of the F-100 this year, the pilot rotated and checked his airspeed. He said it wasn't accelerating. What happened, we suspect, was that his eyeball computer gave him a reject signal because he had neglected to reprogram it for a tense situation.

Had he looked up the facts (and understood them) he would have had two positive performance checks and an air of confidence to protect him from the shock he got at rotation. He would have known what EPR to expect, and it would have been confirmed prior to roll. A 2000-foot acceleration check would have reconfirmed the engine performance and also told him what to expect at computed takeoff distance. If the accel check is low, the roll is going to be longer.

Finally, even our Handbooks warn us about the price of early rotation and over-rotation. That's the worst thing you can do under these circumstances, even though perhaps the most natural.

As for the T-38 pilot, we sympathize with him. He represents the other end of the spectrum. He was not yet free to use his head; he had to go by the book. He had the accel check data cold and the abort decision came right straight from part 2 of appendix 1. His only trouble appeared to be that the performance charts don't make a sufficient allowance for switching from the page on takeoff to the page on aborts.

This points up a cute little paradox for us as we become more and more professional. Our training programs demand more of procedures and less of judgment, while reality demands exactly the opposite. ★

Survival

Survival is a subject that has been written about, talked about, taught and demonstrated until it would seem that every Air Force aircrewman ought to be an expert on it. In fact, many pilots have attended survival school on a ratio of something like four or five times their number of years of service. There are arctic, tropic, desert and sea survival schools in the various commands plus base schools and the big one at Stead. So what can be said that's new?

Let's look at this subject a little differently, not with the idea of putting the schools or the experts out of business, but with strict realism. First a slight review: many aircrews attend survival school one or more times a year. How much do they remember of what the instructor taught and showed them? This, of course, varies with the individual, and we're pretty sure that retention ranges from practically nothing to some lads who have stored in their craniums almost all they were taught.

Instructor ability certainly has something to do with what the students remember. Interest is another factor. Too many of us still have the "it can't happen to me" attitude, and since it doesn't happen to very many, who can argue with this too much? Then when the student is taken out in the boondocks to "live" a survival situation, is he really motivated as to the possibilities, or does he merely reflect on the discomforts and look forward to returning to civilization?

There may be no typical "survival situation" but since it's winter, let's consider a hypothetical case based on situations in which real people have found themselves. After bailing out, our subject lands in a cold, remote piece of real estate well off the main street of civilization. It's a pitch black night and the wind is blowing snowflakes horizontally across the wilderness. Let's say our subject is sound of wind and limb but somewhat clanked up. He's alone, uncomfortable, apprehensive and convinced that he's the only human being within 50 miles. Now there are a number of actions that he can take, some of them foolish.

Here's where we want to get a word in. Land survival today, assuming you are not in a combat zone, should not be as complicated as it was a few years ago. On land, over one half of all survivors are rescued in less than one hour. There have been only 37 cases in recent years when the survival time exceeded 24 hours. (This applies to Air Force crewmen only.)

So what's the problem? There are two people who can make or break you under survival conditions. Number one is you — the guy with the problem. The other one is the personal equipment specialist. First, let's consider you.

Man has been surviving under the most adverse conditions for thousands of years and he continues to do so today. Animals do quite well in the most severe climatic conditions. So why can't you? Agreed, if you were to be stuck stark naked

is often attributed to knowledge, will to live or Act of God. But how about the battle of....MAN AGAINST HIMSELF

into the arctic wilderness with no tools to work with, your chances would be pretty poor. But that is not the way it will be. You'll have clothing — the amount and type to be decided by you alone — you'll have a parachute, a survival kit and a certain amount of know-how gained during attendance at the aforementioned survival schools.

As for the survival kit, it contains many items, most of which you probably won't need. If you've got an ounce of brains — and we're convinced you are really a pretty smart guy — you'll be dressed for the climatic conditions in which you are flying. Then, the frosting on the cake. Although not all of us have the URT-21 locator beacon, most do who are operating in cold climates. This little goodie can and probably will be the major factor in determining how soon you'll be rescued. Then you've got another radio, probably a URC-11. It, too, will come in handy, as a beacon or for voice communications with rescuers. But don't do as one pilot recently did — have them both going at the same time. Conserve one of them, preferably the URC-type and keep it warm inside your jacket until you need it. Meanwhile the URT-21 can be beeping its message to the people looking for you.

To go back a bit, be sure, if it's at all possible, to let someone know your situation. Get off the MAYDAY as soon as possible after recognizing your emergency. Usually there's sufficient time. And give as accurate a position as possible in case radar doesn't have you.

Now there's a lot of good stuff in the survival kit for an extended stay in the wilderness, so we are not knocking the kit or any of its contents. But Rescue will probably have you out of there so fast that you won't need many of the items in the kit. This is not to say, however, that you should leave the kit behind.

Now we know it sounds kind of ridiculous to tell a man who's scared, cold and lost to remain calm. But if you really think about it, before the emergency happens — like right now — we think you'll agree that keeping your senses and not panicking can mean the difference between life and death. This was very tragically demonstrated only a short time ago and it cost us the lives of two crewmen to learn this lesson. Why not fix in your mind right now that, "if I find myself in a survival situation, the very first thing I will do is fight off any panic and impulse to act without first reasoning out what it is I want to do." If you can do this, your battle is practically won. Then if you can simply manage to keep warm, you've got a real fine chance. This applies whether you are intact or injured. If you are injured you'll be uncomfortable, and it might be more difficult to regain your composure. But fight for it, and this goes back to pre-planning and implanting in your own mind the idea that panic is your worst enemy.

Food and water are, of course, necessities of life. But if you miss a few meals, you won't die. In fact, you can go for quite awhile without a bite to eat, and water won't become critical for a couple of days. We realize there's food and possibly water in the survival kit, but again we don't think they are really necessary very often.

We said there were two people primarily responsible for your survival. Number two is the personal equipment man. The biggest thing he can do for you is make sure your radios are in working order when you leave his shop. If the radios are no good, then you might need everything you've got in that kit and then some. But with the URT-21 going for you from the time your parachute opens, and the URC available on the ground, rescue has been reduced to a fairly simple process. So has survival, because you probably won't have to endure a hostile environment for very long.

So what have we said here? Nothing new, we admit. But we wish we'd said it a couple of years ago, before two crewmen died on a cold winter night within a few hundred yards of homes where help was immediately available. ★

UP OUR WAY

Capt John S. Kranz, 317 Fighter Interceptor Squadron, APO Seattle 98742

Up here in Alaska, we get about as much snow, nasty weather, frigid temperatures, and the whole nine yards of winter problems as anybody. But let's be honest — winter conditions produce pretty much the same problems at your base as they do at mine. There may be a difference in degree, but, by and large, the cold season bugs us all in the same stubborn areas.

We haven't learned how to change the weather yet, but over the years we have learned to live with really severe conditions. And not only just live, but we've gotten to the point where there's a pretty respectable operation going on.

The difference between success and failure, hack or no hack, often depends upon a series of individually minor procedures. But the point to keep in mind is that where winter is concerned, you tend to find out real fast if your procedures aren't adequate. Our experience with arctic conditions has led to most of our winter operation procedures. Where we didn't have to learn the hard way, good common sense guided us. And in those areas not covered by either experience or common sense, we're still learning.

So how about comparing notes with me? I'll lay out the way we do it, and you take a look at how it compares with your operation.

The first commandment in winter operation is "Plan Ahead." You just can't do things as easily as in warm surroundings. Make what you do count. Allow time for delays due to adverse conditions. This includes such considerations as leaving home in plenty of time to get to work. If you are thinking that's a pretty simple concept, I agree. But each year a lot of jobs never get started because we are hurrying to "get at it."

A big part of Plan Ahead is represented in what you wear. If you are flying in a hostile climate — dress for it. If you have to be outside, why not be comfortable? If you were dressing for a hunt or even, perish the thought, ready to start a cold weather survival trek (school style), you know darn well you'd lay on the clothes. There really isn't much difference. You never know when it may be your turn to survive in the tules. So be ready for it.

O.K., we're off to a flying start. We gave ourselves plenty of time to get to work, and we are dressed for the conditions. Now let's examine our procedures affecting the flying operation.

The Dash One contains a wealth of guidance in the cold weather operation section. Nothing beats a good preflight inspection, but remember what happens to your preflight when your rear end is freezing? Right, so include that bit of personal experience as justification for the bulky but warm form you create on the ramp. You can anticipate delays, such as low struts, snow and ice removal, seals leaking, and frozen starters. But while you are checking the bid, also be watchful for frostbite on yourself and others. In a nutshell, make a good preflight and don't rush yourself into accepting a potentially bad situation. We all know how true it is that a good preflight is the only safe way to begin a flight. In the winter, when everything seems aimed at making life miserable, we emphasize the preflight inspection. How about your operation, and how about you?

Incidentally, there is no reason why you should accept an aircraft ladder that doesn't have anti-slip surfaces. More than one jock has found himself out of a job because he slipped off a ladder. Eliminate this real hazard.

Let's look at our aircraft taxi operations. All of us who have had personal experiences with cold country taxi problems may join in a chorus of Amen. If you don't think there's much skill, procedure and luck involved in handling certain winter ramp conditions, I humbly suggest you haven't been there. This can be one of your roughest winter problems. We often have RCR readings as low as 04, and occasionally less on our airfields. Under these conditions, you must do it right. You've got to take it easy. Keep in mind that when the reading is low, you have only a small percentage of the control over the aircraft that you are used to in normal conditions. You can't stop very quickly and sometimes you wonder if you can stop at all. Don't depend on brakes for directional control. With most of our birds, you only succeed in sliding a wheel, instead of turning a corner. Nose wheel steering is your best bet, but it's not very difficult to lose control here by sliding it also. So we have these rules. *Take it slow. Be smooth. Enter a turn gradually. Don't jab the brakes or steering or you'll "break loose."* If your bird starts sliding in the curves, you know you're too fast, and too late. It's better to shut down than ride it out at idle. Chances are you'll stop quicker by eliminating even idle thrust. But better yet, don't get all bent out of shape in the first place. The real pro knows when to creep.

Remember there's no judgment involved in sliding off a taxiway. It all depends on how you set it up. There is a point beyond which we don't operate. When the ramp is presenting an unacceptable hazard, we don't fight it. Stand down. If your operation can't afford this luxury, you may have more problems than just winter weather. Chances are you can make the time up later — safely.

Here are a few procedures that we use:

- Minimum spacing of 300 feet between taxiing aircraft.
- Use emergency fuel to lower idle RPM.
- Go *slow* and be extremely alert.

When taking the active runway, you may anticipate really slippery conditions. The surface has been heated by engine runups in takeoff position and then cooled down again after departure. It all means one thing — ice. We normally have the leader of a flight of two take the inside of the runway. Then if the wingman slides, while getting into position, he doesn't slide into the leader. And don't forget to have wing tip and nose tail clearance while you're at it. To prevent a swing into the leader by the wingman during runup, we hold off on wing runup until the leader has gone. A snow or ice covered runway is no place to practice formation takeoffs. The odds are all bad. You can't get a good runup, usually, because the wheels won't grip at full mil. If there is much crown to the runway, you tend to slide if you get over to the side. All things considered, it seems unnecessarily risky. We don't do it. The leader, however, must not run up his engine until the wingman has passed behind and is clear. It is bad form to blow ice and snow at your friends. After the lead aircraft rolls, watch out for reduced visibility. The engine exhaust can turn out pretty good ice fog if the conditions are right. And as the exhaust blast is pointed down during aircraft rotation, snow clouds or alcohol mist are usually formed. Depending upon crosswind, all of these phenomena can block your view completely. Wait until your path is clear before rolling.

It's when the pitot heat doesn't work that we realize how nice it was. It's when the canopy is iced over that we remind ourselves to check the anti-ice and defrost system before each flight. In winter weather you can expect to need your all-weather accessories. From experience you know that once an icing condition has started, it takes more time than you like to clear it up. Super cooled canopies and windscreens react very slowly when you turn the NESA and canopy anti-ice on—after the fact. So check the systems before flight and then use them to prevent ice and frost accumulation. Keep an eye out for throttle icing. Move the throttle occasionally, especially during penetration, and if it feels like it's stiffening, select a power setting that will bring you home. Watch your fuel feeding. Who needs surprises when you're 400 to 500 miles out? Stay on top of the situation. Get behind and the penalty can be pretty severe.

I always plan on going to an al-

Planning is the key to safe winter operations. Allow time for delays. Slick runways, taxiways, and ramps present hazards that can be overcome only by extra care and knowledge of procedures and equipment.

UP YOUR WAY continued

ternate. You've heard that statement before? O.K., but let me explain. In our particular situation in Alaska, of the fields suitable for jet operation, the shortest distance between any two is 222 NM and the longest is 440 NM. Obviously you don't make a missed approach, point toward an alternate and use that few hundred pounds extra you've saved for mother and the kids to squeak you through. No, you've planned your fuel, expecting to divert. The point is this. The same factors — fog, wind, snow storm, barrier engagement, blown tires, or an accident — that can close my runway can also close yours. Expect the worst, and you can handle it. And I'm sure you agree that if alternate fuel is available but not required, there are a lot of practical uses for it. How about your GCA's? Do either you or the controller need any practice? You can find a good use for that extra fuel.

Keeping tabs on the current and trend weather at your destination and alternate is just plain good sense. Why then isn't it also good sense to be current on your published missed approach? It is, of course, yet each year we read about a ding, probably caused by lack of familiarization with the chart. It's rough trying to make a missed approach while reading it at the same time. Again, we can refer to our original concept of plan ahead. Know your field.

Regardless of the type of landing pattern, whether overhead or box or straight-in, the object is to get the bird on the ground. In the grip of winter, however, the problem often is how to get stopped. If your field is short, and some of ours are mighty short, you rely on the best technique you can muster to put her on. To get really good, and that includes consistent, results from a short field approach or minimum run landing requires practice. You are flying a lot closer to max performance curves while executing the minimum run maneuver than you normally experience. Changes in gross weight are much more noticeable. The margin of error is smaller. Simply stated, it takes a bit of skill. So give your minimum run landing some practice before you really have to use it. Get a good idea what it feels like at various gross weights and configurations. Do you have much float when you chop the power? To find out where you will touch down at minimum airspeed from a given approach airspeed, try it first on a long runway and use a point well down the actual runway as the "foot one" of your short field. Unless you have been doing minimum runs right along, I think you will be surprised. I know you can spike it on, but that's not what you're after. Remember, roll-out distance is a function of touchdown airspeed. Work for the right airspeed at the right place. Aim well down on your practice minimum runs since you inherently are much more susceptible for a short landing as you approach the optimum. It does take skill and hard work. Respect the recommended Dash One procedures, and you'll find the minimum run landing really works for you. Ignore the cold hard facts of aerodynamics and you are in trouble. The goal we shoot for is the time that our drag chute fails, and we know the landing is as good as we can do — even if we had planned on not using the chute.

There are bound to be occasions when everything turns sour. To ignore this fact is to ignore historical data. We've all faced it, or will face it. Low on fuel, low on weather, short on runway, and looking at a strip of ice. Don't spend precious time in a futile effort to create traction that isn't there. When you're not *sure* you can get the bird stopped, you are a perfect candidate for the barrier. After all, what do you really lose if you call for the barrier? Either your estimate was wrong in the first place and you get stopped prior to the barrier, or you stand a good chance of a successful engagement and save. You win either way. If you kid yourself, perhaps due to false pride, that you can get the bird stopped and don't need the barrier — and pass it up, you are pretty short on options. It is unfortunate when individuals are reluctant to use the barrier for fear of censure. How does your operation approach barrier engagements? It's worth more than a passing thought.

Well, how do our notes compare? Perhaps some of our experience would have to be modified to fit your particular equipment and situation. The philosophy of winter operation, the basic concept, however, should tie in pretty closely. Our objective is safety. During winter, safety is an individual responsibility, perhaps more so than during any other season. ★

Watch your fuel feeding. You don't need surprises when you're 400 to 500 miles out. And always plan on an alternate.

THE IPIS APPROACH

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

Q. How long can I descend to make a circling approach at a base where circling minimums are published as 400 feet and one mile, such as Olathe NAS or Corpus Christi NAS?

A. Air Force pilots are governed by two regulations to determine weather minimums. AFR 60-16 states that minimums will be as published but in no case lower than those published in AFR 60-27, Instrument Approach Procedures. AFR 60-27 lists absolute circling approach weather minimums as 500 foot ceiling, one mile visibility. An Air Force pilot then must comply with the 500 foot minimum even when the published minimum is 400.

One way to remember absolute minimums as they apply to Air Force pilots is the abbreviation "CATSLIP."

C = Circling = 500/1
A = ADF or VOR straight-in = 400/1
T = TACAN = 300/1
S = Surveillance Radar = 300/1
L = Localizer Only (ILS) = 300/1
I = ILS = 200/½
P = Precision Radar = 100/¼

Q. After level-off at FL 350, my altimeter reads 35,150 with position error applied. Can I now reset the altimeter to read 35,000 for ease in maintaining altitude?

A. This technique is not recommended. Throughout a flight numerous altitude/airspeed changes may be required. Each change would require the pilot to reset his altimeter to 29.92 plus or minus pre-takeoff altimeter corrections, accomplish the altitude/airspeed change with the altitude adjusted to compensate for position error, then reset the altimeter to read the assigned altitude.

By resetting the altimeter it would be very easy to forget to apply the pre-takeoff corrections to subsequent altimeter settings, particularly during descent through the appropriate flight level and/or prior to landing. There is less chance for error if you maintain the appropriate altimeter setting and indicate the altitude required with the position error applied.

Q. Some TACAN penetrations have a holding pattern depicted with the IAF at the outbound end of the holding pattern, e.g., Westover AFB, JAL TACAN-2; McConnell AFB, JAL TACAN-1, etc. If I am cleared for the penetration and approach but still inbound to the holding fix on the reciprocal of the holding course, can I fly a teardrop to the extremity of the pattern and turn inbound to the IAF?

A. Yes. When using TACAN the teardrop can be flown to the extremity of the pattern. The 1½ minute maximum time outbound does not apply. Protected airspace will not be exceeded since the pattern selection chart contained in ATP 7130.7, Holding Pattern Criteria, provides pattern/template information applicable to both time and DME patterns. When using the tear drop and the holding pattern is extremely long, such as the McConnell pattern (15 NM), you could fly the entire leg length on the 30 degree heading. This may be desirable for aircraft with a high holding airspeed and large radius of turn. However, for slower airspeeds the 30 degree heading (if flown to the extremity of the pattern) would produce more displacement than is needed for the turn to the inbound course. In this situation fly the teardrop until you are adequately displaced, then turn to parallel the holding course and proceed to the outbound limit of the holding pattern.

POINT TO PONDER

In the September 1965 IPIS Approach feature, we answered a question concerning the minimum authorized altitude when flying IFR/VFR on top on airways. The answer given was that AFR 60-16 VFR minimum altitudes would apply if so desired. Additional questions on this subject have indicated that this may not be true in all cases.

For example, in order to maintain the centerline of the airway, adequate navigation signals are required. A flight along airways below the MEA (Minimum Enroute Altitude) could be receiving adequate signal strength; however, this would not be guaranteed. NOTE: Flight below the MEA down to the MOCA (Minimum Obstruction Clearance Altitude) is authorized within 22 NM of the VOR facility or when operating in a radar environment with radar vectors.

In addition, low altitude flight considerably below the MEA could be out of controlled airspace, since the base of the controlled area for airway purposes may be located anywhere from 700 feet above the surface up to 500 feet below the MEA.

If it is necessary to fly lower than authorized IFR altitudes, probably the best answer is a well-planned VFR flight in VFR conditions. ★

ROUGH?

Or is it tough?

Robert Chernoff, AFSC, Eglin AFB, Florida

I've heard tell that flying is rough! But have you ever tried to maintain a roughly flown aircraft? Before you get your hackles up, I don't mean to say that those of you who fly rough are poor pilots. Heck no! Let's face it, if our aircraft can't be flown roughly, then they'll probably not be much use to us under combat conditions.

But there are all kinds of rough flying. There's the man on the stick, who is rough by nature; then there's rough flying caused by turbulent weather; and, of course, there's the infrequent, but most exacting, rough flying demanded during combat.

Whatever the reasons are, let's talk about rough flying – period.

As a rule, the pilot and aircrew have a difficult and exacting job to perform. Aside from the glory, the sense of freedom and well-being that is part and parcel of being airborne, there is the ever-present attention to detail, the focus on the mission and sweating out the variables from the norm that occur ever so often.

Now let's take a quick look at the ground-borne maintenance people. At this point, there are some who are already disdainful; but before you snub your nose, don't forget that this is the crew that really keeps you airborne; this is the team that draws knuckle-blood to keep you serviceable; and this is the cadre that works around the clock to keep you safe.

But you know the ground maintenance people can keep you as safe and serviceable as you want them to. It's true, we have maintenance and inspection handbooks out the gazoo to help accomplish our mission. In fact, there isn't a day goes by that we don't receive an armful of time compliance tech orders to further improve our aircraft. Add to this: flight safety supplements, regulations, SOPs, NOTAMs, bulletins, contractor poop sheets, flying safety meetings, reports and forms. You might say, "Brother, you can't miss!" *But brother*, we *are* missing!

Let's cite only one example, that of a recent flight of a specially and highly instrumented cargo type aircraft. The takeoff and climb out were normal. Twenty minutes after reaching altitude, the countdown was made and the instrumentation went whirring on its merry way. All the specialists were at their stations. The pilot and copilot were intent on their course. The technicians and scanners were making notes, adjusting equipment and punching buttons. Ahead and on the designated flight path loomed the wide swath of a thunderhead. Avoidance was unthinkable – too much was at stake on this mission. Everyone buckled in and within three minutes all Hades broke loose.

For the next five minutes, through sickness and apprehension, the wings flexed like paper. Longitudinal and lateral yaw was so violent that a seat bracket cracked. Next, a large section of cowling whipped by the right scanner's crew cut and gyrated through space like a fledgling duck. As the thunderhead was passed, everyone breathed a sigh of relief and appraised the loss of cowling as a factor which should not deter the mission. At this point, it was discovered that a "key" black box was out of commission. The data essential to the mission was now unobtainable, so naturally the flight was terminated.

After the aircraft had rolled to a stop, the crew returned to their offices very sadly — oh, so sadly. The last man out was the pilot. He wasn't hilarious either. It seems as though it was *his* seat bracket that broke and the seat belt tore the zipper right out of his pants during the peak of the turbulence. The ground crew walked around the aircraft and noticed the missing cowling. Review of the AFTO Form 781 indicated three discrepancies "Cowling lost during flight from number 3 engine," "Computer power supply inoperative" (black box), and "Pilot's seat bracket broken."

Within three hours a new cowling section was fitted to number 3 engine, a new black box was installed and checked O.K. and the seat bracket was repaired. A postflight inspection was completed and the aircraft was serviced and put to bed for the night.

The next day, the same mission was scheduled again. During an apparently normal flight, the left aileron broke away and flapped for a few seconds. In this few seconds, the trailing edge of the wing was battered to a pulp and then the aileron sailed away. Needless to say, control of the aircraft was on the difficult side. By dint and sweat, and certainly by skill, the aircraft was landed safetly.

The results of the investigation disclosed that two of the three hinge points for the aileron broke because of fatigue. A look-see at the right aileron disclosed one hinge broken and cracked skin. But how could this be? There were only 14 hours on the aircraft since new! Naturally, further interrogation revealed the one *undisclosed* and *unwritten* factor — "extremely violent turbulence, abnormal forces on surfaces during flight." And guess what. A thorough inspection by X-ray produced the interesting negative of the main spar in the left wing featuring a 30 per cent chord crack. You can bet the flight crew was shocked. Even the maintenance people had visions of a court martial for negligence of duty.

Well, there's no doubt that "negligence" was involved; but who was negligent, and of what? Was it the pilot for flying into the thunderhead? Was it the ground crew for failing to perform thorough maintenance? Or was it a combination? Well, maybe it could be all of these reasons.

As it turned out, the data to be acquired from the mission was critically needed. It was an operation representing an investment of almost a million dollars, besides being number one priority of national defense significance. So, in a way, the aircrew should be commended for their courage.

But what about the maintenance gang? There's no doubt that all of their work was above reproach. How could anyone justly demand even the sharpest maintenance crew to expect catastrophic damage, hidden completely from view, on a new aircraft with only 14 hours of time? Yet, there was the undertone of negligence. Would you blame a doctor for incompetence if he could not cure your ailment when you wouldn't even give him a clue as to your symptoms? Sure, if he sticks to it, he can probably diagnose your ailment in time; but sometimes "time" can mean your life!

It's no different in the case of our aircraft. In time, the maintenance "doctors" would have found all the troubles themselves. But in this case, too, time is on nobody's side. Yes, there was negligence—negligence of the pilot to correctly assess his flight and to record proper and accurate entries on the AFTO Form 781. Had he noted, "Encountered extremely violent turbulence. Suspect structural damage," there's no doubt that a thorough inspection of the whole airframe would have detected cracked aileron hinges and many other serious deficiencies.

Your maintenance people can't be detectives and inquisitors after every flight. If they were, you wouldn't even get your minimums let alone accomplish missions. By the same token, they're not mind readers. If you've got troubles, tell them and write them in the forms. Writing it in the forms is like signing an insurance policy. Once you're insured, the maintenance people aren't about to have you killed so that they'll have to pay off. They're going to be doubly sure to keep you safe and alive.

The AFTO Form 781 is there for the pilot to record and for the crew chief to record — for each other's benefit. Use the form. It is the only and surest means to inform maintenance of problems encountered during flight. Accurate and legible recording of deficiencies will permit maintenance to return a better and safer aircraft. ★

THE INSIDE STORY ON.....
DRAG CHUTES

When a drag chute on an F-100 airplane fails to deploy, the control system or door release mechanism is generally to blame. Recently, however, there have been a rash of drag chute deployment failures caused by the chute hanging up on various components as described in the following report excerpts.

• "Upon return from a cross-country mission, the drag chute failed to deploy. Drag chute hung up on broken liner hinge."

• "Drag chute failed to deploy on landing. Inspection revealed that the drag chute pack was snagged on a sharp corner of the drag chute liner door. Sharp edge of door had not been rounded to prevent this type of malfunction."

• "Drag chute failed to deploy. Liner bag caught and hung on a liner box patch rivet. Rivet was not properly seated."

• "Drag chute failed and just the pilot chute deployed. Primary cause attributed to the drag chute deployment bag being hung up on the drag chute retaining spring. The knotted end of the bridle that attaches to the outside of the deployment bag was wedged in the retaining spring."

• "Drag chute failed to deploy on landing. Investigation revealed that one pilot chute shroud line was caught on the cotter key which safeties the drag chute cable to the drag chute risers. This condition prevented main chute deployment. Cotter key was found to be too long and not bent sufficiently to prevent accidental hang-up."

The foregoing malfunctions are the result of improper maintenance and questionable inspection methods. When conscientious effort is spent on the proper adjustment of the drag chute control system to ensure its reliability, it is discouraging to experience a failure just because of a protruding rivet or an overlength cotter pin. Therefore, on the drag chute installation procedure, take an extra minute or so to check the drag chute compartment area for the improper installation of raw stock items such as rivets, cotter pins, etc., which could prevent chute deployment. ★

North American Aviation
Operation & Service News

PERSONAL EQUIPMENT NOTES

THE D-RING IS BACK – If you have taken more than casual note of your parachute for the past six or eight years, you will recognize the picture on the left (A) as that of the old familiar ripcord grip known to many as the D-ring. The picture on the right (B) may also be familiar to a few as the old "mousetrap" between the D-ring and the chest strap ejector snap hook. If you are in a bit of a hurry to get your harness off and clear the bird after a hard day in the cockpit, you may pull the ejector arm on the chest strap and let it snap back on the D-ring. Then, when you reboard without checking your harness too carefully, you can rehook the chest strap without clearing the fouled lever arm.

Figure A

Figure B

By popular demand, the "T" handle ripcord grip is being banished. Although it cannot be denied that the old/new D-ring gives you a bigger and better target for the zero lanyard hook, the return to the D-ring will revive some of its shortcomings. So, until it can be revamped, give it a look and keep it out of entanglement with the chest strap.

INSTALLATION OF THE D-RING RIPCORD – A recent message from a fighter wing points out that installation of the D-ring ripcord in accordance with TO 14D1-2-607, 14 June 1965, does not require a D-ring pull test during the 120-day inspections and repack. Therefore a hazard may exist if the pocket is sewn tighter than the 12-18 pound pull test tolerance. Personnel of the Wing discovered one D-ring that took a 48-pound straight pull. They recommend a one-time pull test, per TO 14D1-2-81, pages 5-17, par E, and Figure 5-15. Sounds like a good suggestion. ★

FAA ADVISORIES

Walter J. Wrentmore, FAA Liaison Officer, Directorate of Aerospace Safety

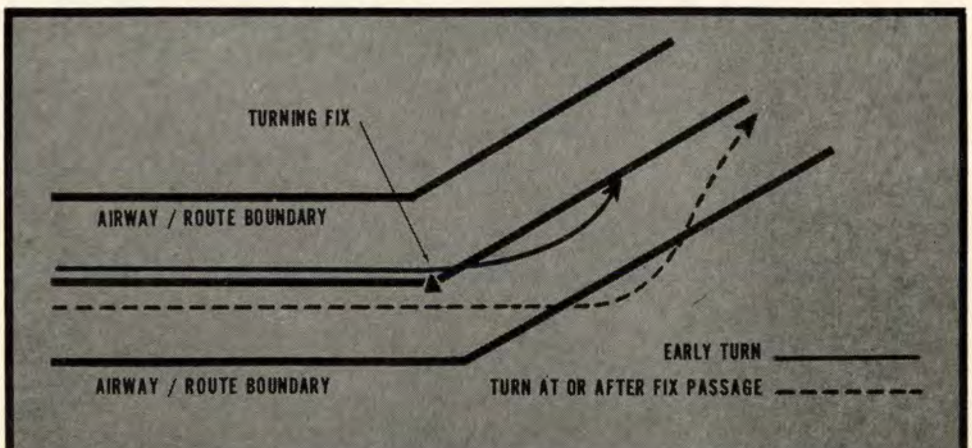
COURSE CHANGES WHILE OPERATING UNDER INSTRUMENT FLIGHT RULES BELOW 18,000 FEET MEAN SEA LEVEL. FAA Advisory Circular, AC 90-28, reminds pilots making course changes that routings prescribed in air traffic control clearances must be adhered to as closely as possible in order that flight paths will remain within airway/route boundaries during enroute and terminal flight operations.

In the development of the two-level airspace structure which became effective September 17, 1964, the Federal Aviation Agency considered the probability of aircraft exceeding the airway/route boundaries while making course changes. The normal navigational aid spacing for airways/routes below 18,000 feet MSL is 80 nautical miles and the airspace area to be protected has a total width of 8 nautical miles, 4 nautical miles each side of centerline, within 51 nautical miles of the facility. Beyond 51 nautical miles the 4.5 degree accuracy factor determines the width of the airways/routes (approximately 2 miles in total width every 13 miles). It was evident that aircraft operating in excess of 290 KTAS could exceed the normal airway/route boundaries depending on the amount of course change required, wind direction and velocity, the character of the turning fix (distance measuring equipment, overhead navigation aid, or intersection), and the pilot's technique in making a course change. For example, a flight operating at 17,000 feet MSL with a TAS of 400 knots, a 25 degree bank, and a course change of more than 40 degrees would exceed the width of the airway/route, i.e., 4 nautical miles each side of centerline. As a result, the FAA (1) took action to assure proper obstruction clearances for all known turning operations, and (2) provided additional instrument flight rules (IFR) separation protection for turns.

In the airspace at and above 18,000 feet MSL additional IFR separation protection is provided for turns. However, in the airspace below 18,000 feet MSL, where operations in excess of 290 KTAS are less prevalent, the provision of additional IFR separation in all course change situations for the occasional aircraft making a turn in excess of 290 KTAS creates an unacceptable waste of airspace and imposes a penalty upon the preponderance of traffic which operate at low speeds. Pilots of aircraft are required to adhere to airways/routes being flown. Special attention must be given to this requirement during course changes. Each course change consists of variables that make the technique applicable in each case a matter only the pilot can resolve. Some variables which must be considered are turn radii, wind effect, airspeed, degree of turn, and cockpit instrumentation. The use of any available cockpit instrumentation such as distance measuring equipment may be utilized by the pilot to lead his turn when making course changes. This is consistent with the intent of FAR 91.123 which requires pilots to operate along the centerline of the airways and along the direct course between navigational aids or fixes.

Turns which begin at or after fix passage may exceed airway/route boundaries. The following illustration contains an example flight track depicting this, together with an example of an early turn.

Pilots are reminded that special attention must be given to the matter of making course changes so as to adhere as closely as possible to the airway/route being flown. ★

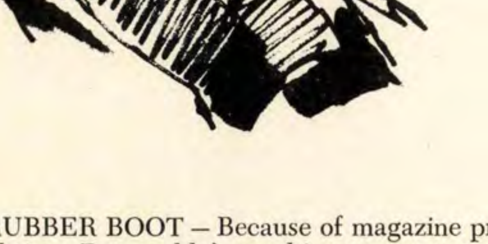


Rex Riley
CROSS COUNTRY NOTES

RUBBER BOOT — Because of magazine production lead time, Rex couldn't get this message out as quickly as he wished, but there still may be those who haven't got the word.

A TWX from WRAMA indicated that a rubber boot that should be installed over the switch activating pin of the URT-21 may be missing. Beacons UR'd for this deficiency worked correctly after installation of the boot. Here's what WRAMA advises:

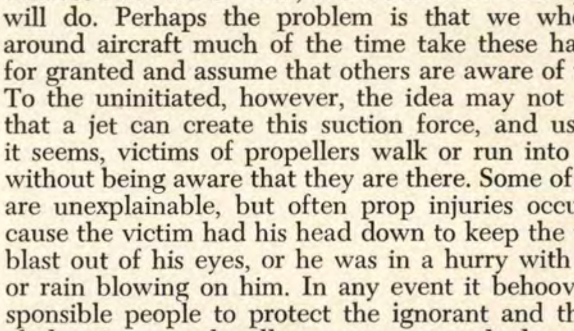
• Failure to install rubber boot in switch assembly is a production quality control problem and will be considered in any future production. As for the Beacon sets already in service, it is recommended that each Beacon be checked to determine if boot is installed in switch assembly. Any Beacons not having boot installed will be removed from service and shipped to FB2065 Robins AFB, Ga.



• Inspection will be accomplished during normal inspection interval of AN/URT-21. Remove the automatic activation button (disconnect the battery if not in a screen room) and determine if rubber boot is in place. This will be difficult in view of the fact that the boot is dark gray in color and partially hidden by the leaf spring; however, the boot has a hexagonal base, part of which upon close observation can be seen underneath the leaf spring.

• Above information is being published as a supplement to TO 12R5-2 URT-21-2.

PEOPLE AND PROPELLERS — Several deaths and injuries during the past few months due to people walking into propellers remind Rex that, although we are in the jet age, we still have this old, old problem. All aircraft engines are dangerous when they are running. Jets will try to ingest an unwary person, the exhaust blast can be fatal, and we all know what props will do. Perhaps the problem is that we who are around aircraft much of the time take these hazards for granted and assume that others are aware of them. To the uninitiated, however, the idea may not occur that a jet can create this suction force, and usually, it seems, victims of propellers walk or run into them without being aware that they are there. Some of these are unexplainable, but often prop injuries occur because the victim had his head down to keep the windblast out of his eyes, or he was in a hurry with snow or rain blowing on him. In any event it behooves responsible people to protect the ignorant and this includes aircrews who allow passengers to deplane while engines are running.



Several incidents and a couple of accidents recently indicate that wake turbulence was associated if not the direct cause. For example, an F-101 pilot was descending through 5000 feet when the aircraft suddenly rolled sharply as a result of flying into wake turbulence from an aircraft that had just departed the base. After the aircraft landed, several items were found to be damaged: lower gear door assembly, 25 per cent missing; MLG strut door, 75 per cent missing; flipper door, 25 per cent missing.

In the June 1965 issue of FAA's Aviation News there was an excellent brief article entitled "The Invisible Hazard — Wake Turbulence." Here are some items gleaned from that article. (The term wake turbulence includes wingtip vortices as well as prop wash, jet wash, downwash, etc.)

Large, heavy aircraft can generate a vortex core with a roll rate of 80 degrees per second. Between the vortices an aircraft could encounter a downward flow of air of 1000 to 1200 fpm. Wing vortices are not generated until the wing produces lift; conversely, when the wing stops generating lift, during landing, vortex formation will cease.

The hazards of encountering wake turbulence are, of course, much greater for light aircraft than for most military aircraft. But some of our aircraft fit in the "light" category and we have had some problems with 0-1s and other light planes encountering wake turbulence. Even some of our fighters have run into trouble lately, at least one on landing, not to mention the F-101 incident related above.

Unfortunately the pilot penetrating for an approach may not know that another aircraft has crossed his flight path within a few minutes. But during approaches and takeoffs other aircraft will usually be evident and the pilot can take the necessary precautions.

PACKAGING — Rex recently received a short item with the recommendation that it be used in this magazine. It told about an incident in which a T-33 pilot picked up a couple of small boxes at an air freight terminal for transport to his home station. He put them in the back seat and leaped off. At about 25,000 feet he looked in the mirror and discovered that one of the boxes had swollen to about twice its original size. Seems this package was in barrier material, MIL-B-131, a moisture-vapor-water proof material that provides de-humidified preservation for delicate equipment when properly sealed.

Rex hasn't heard of this specific problem before, but if it can be a hazard it is worth mentioning. Obviously this package was air tight but the container was not non-expandable. Pilots cannot be expected to know the characteristics of all packaging materials, so it behooves transportation types to use some discretion in shipping such items.

OIL BURNERS — Near misses involving aircraft flying Oil Burner routes are frequent enough to be of serious concern. At these altitudes, the offenders are generally light aircraft and chances are that many of the pilots never heard of these low level routes and are completely ignorant of the fact that the times they are in use can easily be obtained. SAC pilots just have to take it for granted that civilian aircraft will occasionally invade their low level domain and keep their eyes open at all times for this possibility.

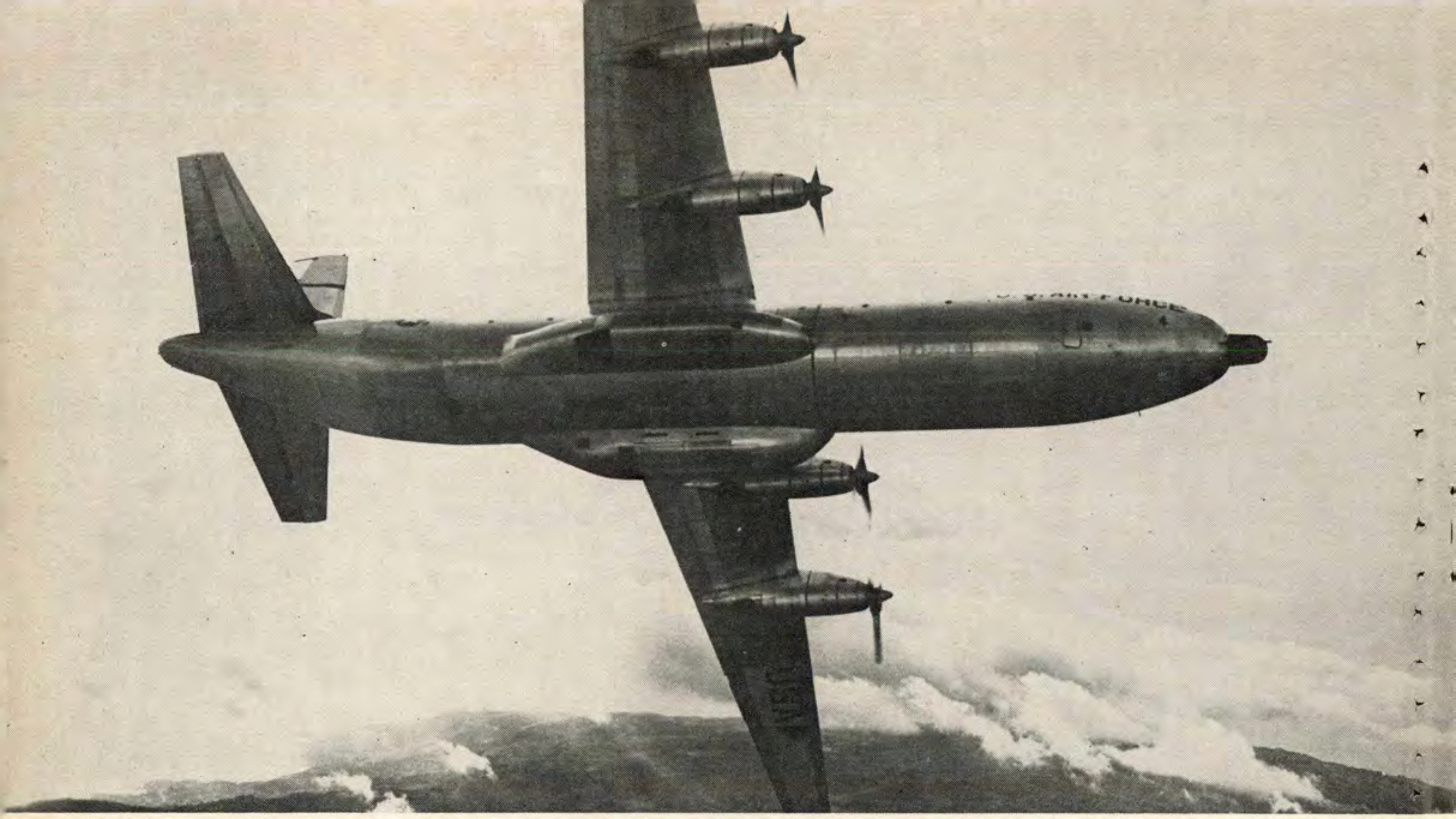
While this is a continuing problem, intrusion by military aircraft shouldn't be. Yet a recent OHR related a near miss between a B-52 and an F-84. The fighter made a sharp turn at about 2000 feet away, but the bomber pilot stated that there wasn't a thing he could have done to prevent a collision if the fighter hadn't turned. Air Force and ANG pilots should be well aware of these low level routes and can easily determine whether they are in use. A collision, or even a near miss, is finding out the hard way.

ACCESS DOORS — Shortly after takeoff, the pilot of an F-102 heard a noise, then noticed that an access door on the right forward side of the aircraft had come open. Moments later the door came off and went up and over the radome and into the left engine intake. The pilot got the bird down right away. Although there was only slight skin damage, a latching pin was ingested by the engine, which required an overhaul.

No sign of materiel failure appeared so it was assumed that the door was not properly locked. The aircraft had been preflighted several hours prior to takeoff, then was serviced through the access door by a different maintenance man who could not recall latching the door. The pilot's walk-around was at night with a flashlight and he apparently did not see that the door was not latched. The crew chief did not accompany the pilot on his walk-around.

As a result of this mishap, the unit took the following steps:

- When a door forward of the air intakes has been opened for maintenance or servicing, an entry will be made in the aircraft forms and the bird will be placed on a red cross. This *must* be signed off by a qualified maintenance supervisor after he has inspected the doors.
- The crew chief will accompany the pilot on all walk-around inspections. ★



taping the accident

The C-133 Cargomaster joined the Air Force inventory some eight years ago. Since then, there have been several major accidents — four of which occurred over water with little or no wreckage found. The causes are still undetermined.

As a result of these accidents, the Air Force grounded the C-133 fleet and began an exhaustive research program to evaluate the flight characteristics of the aircraft and performance of its systems. Another action was the decision to install a flight recorder.

Flight recorder could be the key to solving accidents such as this.

The system selected was the Lockheed Ejectable Flight Recording System (LERS), which measures and records some 89 parameters. The recorder is contained in a package mounted in the tail cone and is designed to survive a crash on land or water.

For years Lockheed has built and supplied flight recorders for the airlines. However, these record only four parameters, valuable in the investigation of several airline accidents, but not suitable to the needs of the Air Force. They had also been experimenting with more sophisticated units aboard a TWA 707 and an Air Force B-52, so when the Air Force went shopping for a recorder system, the company was ready.

USAF specifications required measurement of a large number of items and retention of aircraft and system performance for a specified time. The unit, as installed, provides a continuous recording of data with the last 15 hours always on tape. A four-channel voice recorder always contains 30 minutes of conversation.

Another USAF requirement was that the recorder be recoverable and that it contain a beacon to guide searchers to the scene of an accident. Various methods were investigated, with the final configuration providing an ejectable unit (crash position indicator — CPI) that would stay with the aircraft in a crash on land but be ejected in the event of a water crash. Water pressure activates hydrostatic switches that start a gas generator which ejects the recorder-beacon package. The pilot has a switch with which he can eject the package at any time. The equipment is designed to withstand fire and shock during a land accident.

The system works essentially as follows: Transducers monitor the required items, e.g., acceleration, position of flight controls, indicated airspeed — 89 in all, and feed signals to a signal converter and multiplexing unit. This unit converts and multiplexes the output into six composite signals representing 45 data points sampled once every three seconds.

A data recorder electronics unit accepts the multiplexed signals and converts them to frequency modulated outputs acceptable to the recorder.

The recorder contains a tape cassette with 900 feet of mylar magnetic tape. Half the tape width is used while running in each direction and provides a 15 hour recording. The smaller voice recorder uses a continuous loop of one-quarter inch tape.

Units are being installed in all C-133's by Lockheed teams at Travis and Dover AFB's. Lockheed engineers will maintain the recorder system in the field and provide tape readout and analysis service.

While the LERS was bought primarily for accident investigation, the future of data recording systems for other purposes looks bright. At a Flight Recorder Conference last August, representatives from nearly every command discussed Air Force requirements for flight data recording systems. Five commands had submitted QOR's (Qualitative Operational Requirements) for such systems, although their requirements varied considerably. Essentially, the needs ranged from relatively simple recorders to more complex systems requiring base-level computers.

Conclusions reached were, briefly:

- A survivable flight data recorder (FDR) was needed immediately on certain aircraft for accident analysis purposes.

- An expanded system in the future could provide data to be used in daily operations to improve maintainance and operations.

Future uses to which FDR's can be put might be diagnosis and analysis of trends affecting engine and other systems' performance. Failures can be anticipated and repairs accomplished at some predetermined point in time.

Other uses can be foreseen; for example, the information could be produced on punched tape to be fed directly into a computer or telemetered from the aircraft to ground stations for quick repair and turnaround at the next point of landing. The concept could be carried farther, e.g., the ordering of spares and for inventory purposes and automatic resupply. Or, an expanded system could provide readouts on the engineer's panel for inflight diagnosis and possible correction of malfunctions.

This, however, is speculation about possibilities for the future. Present hardware installed in the C-133 is designed to:

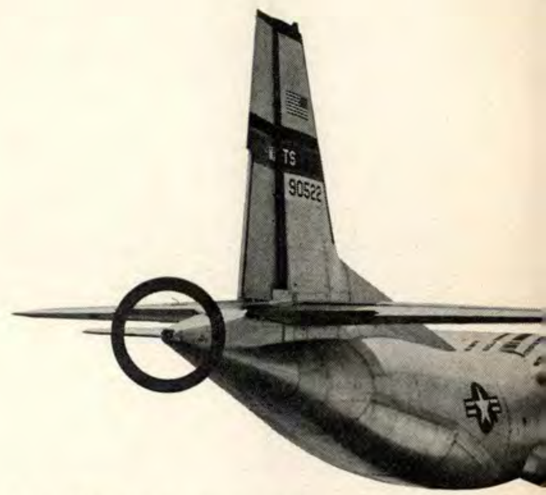
- Measure performance of 89 different items.

- Record this information continuously, with the last 15 hours of the record always on the tape along with the last 30 minutes of voice conversation on the voice tape.

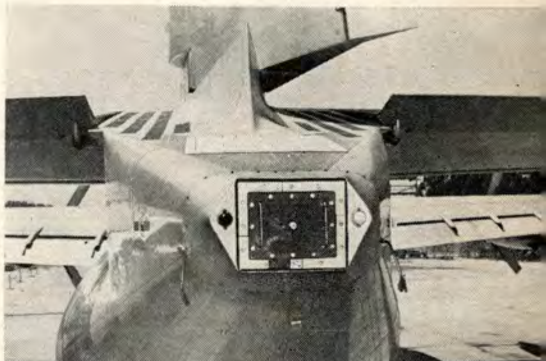
- Eject when an aircraft crashes in the water and broadcast for a minimum of 48 hours on guard channel.

- Remain with the aircraft during an accident on land for retrieval by accident investigators.

We hope, of course, that this system will never be put to test in a C-133 accident. But it is good to know that, should a disastrous accident occur, there will be something that will point to the cause, or at least provide the necessary clues to determine the cause. We think that the LERS, and similar systems, have a tremendous future and that these capabilities should be exploited to the utmost, not only in accident investigation and prevention, but in improved maintenance and supply and, consequently, higher operational efficiency. ★



Tail installation of ejectable flight recorder is shown in these photos.



your money's worth

Capt Robert K. Strickland,
317 Fighter Interceptor Squadron,
APO Seattle 98742

The runway was wet but the braking action was good and the heavy fighter easily responded to brakes and drag chute. As the speed slowed, I cautiously engaged nosewheel steering and guided the bird off the runway. The low hanging clouds hid the nearby mountains and a light mist frosted the canopy. I had every reason to feel a sense of accomplishment. I had just successfully handled an airborne emergency in a century series fighter at its most vulnerable moment — takeoff — and under marginal weather conditions. The ultimate criteria of both bird and pilot down safely had been met and now I could adjourn to operations to spin my latest war story.

As the adrenalin began to subside, a feeling of displeasure crept forward, however, and I couldn't deny it. I had felt it at various times before but now it hung on in spite of my efforts to shake it.

To the layman, there is a difference between a job done to meet standards and one that is completed with competence and skill. With the addition of experience, the job can be outstanding. Only at this point should the performer call himself a true professional. I felt I had reached this zenith, yet I felt a definite sense of inadequacy. I had accomplished the mission — but professionally? To enlighten you, let me recap my experience.

It all began with an early morning air defense exercise. Planes were assigned and I set up for a five-minute response. Since there were several pairs of fighters and staggered target times there was some delay between scrambles. I was Nr 2 in the second flight to go. This is where my problems began.

When my flight was scrambled, I dashed out to the bird and jumped in. The crew chief was there with helping hands but nothing went right. The harness was twisted and a parachute strap got hung under the seat. These nuisances delayed me some and the start was slower than normal. For some reason the carefully memorized scramble checklist deserted me at that moment and I fumbled my way around the cockpit in quiet desperation, fervently hoping to cover at least the most important items. Finally it seemed I was ready, but by now my leader was well ahead of me and again I found myself behind — this time literally.

Fortunately there was an ATC hold on the runway and I was able to catch up. The weather was none too pure — 400 feet broken with one mile in rain and snow — and the added traffic for the exercise backed up the control problem a bit. At this point, I went to the written checklist for a final check and all looked good. I even had a few spare moments to give the radar set a brief check and fine tune. The tower cleared us to departure control finally and Nr 1 rolled almost immediately. By now I was checking my engine gages and when the leader rotated, I released brakes.

My afterburner lit with a comforting push and the gages all showed green. As soon as I rotated, I started cross checking the flight instruments. When I was definitely airborne I flipped the gear handle up and concentrated on the flight instruments. The gear horn and light came on with annoying speed and I called departure control. By this time I was well into the weather and noted the ice that suddenly developed on the wind screen. Airspeed was beginning to build satisfactorily but the gear horn kept up its unholy racket. Just my luck, I thought, as I came out of burner and popped the boards, now I've trapped the gear. As the airspeed diminished, I leveled off and started feeding in trim; at the same time I cycled the gear. No trouble getting three down but something definitely wasn't coming up. The emergency up system didn't help any nor did the ice that was rapidly collecting on the windscreen.

I was faced with two choices. I could stay out of the way until everyone else got off, then land, or I could turn around right then and go home, landing before the next flight was scrambled. Visions of ice inches thick caked to whatever I had hanging influenced my choice. I asked departure control for a vector to the final approach course and explained my problem. Precise instructions came immediately in a confident professional voice. Since my first problem was solved – what to do? – I now had another: landing this bird at near maximum gross weight under marginal weather conditions. Such a landing presents no real problem, but it does require precise flying.

The directions from approach control were accurate and timely. Unfortunately, my flying didn't respond in kind. I had plenty of excuses. The trim was slow, the gear was down, the heading indicator was off, *ad infinitum*. Actually what it boiled down to was me. I let the aircraft slop around under the excuse that when the time came to be precise I would really get serious and peg those needles. I wasn't off much, but I wasn't on much either. I didn't take the trouble to really concentrate and get everything fully under control. Precise control was not an absolute necessity, but it would give me a definite advantage.

After I turned on the ILS final, I did get serious and pegged the needles and everything turned out okay, as I related earlier. The problem though wasn't really solved, it was just temporarily by-passed. I had allowed human frailty to overcome professional performance. I was relying on experience to bring me through a situation that required not only experience but skill, which incidentally aren't synonymous here. Would a second emergency have exceeded my experience level? Could I have handled the two as successfully? I've been in the fighter business for many years and I have about 2000 hours of single engine jet time in my Form 5. Even so, that does not allow me the luxury of complacency in any flying situation, whether it be a full blown emergency or a routine cross country flight.

It is human nature to overlook small errors especially when we know we aren't being evaluated. This attitude must be overcome if we are to call ourselves professionals. We in the Air Force who fly must regard ourselves as the finest group of professional pilots in the world, then stand ready to prove it at a moment's notice. It is part of the heritage of the USAF and one needs only to read a daily newspaper to realize the "moment's notice" has already come for many of our contemporaries. All the IP's and FE's in the Air Force cannot improve the breed one bit, if the desire and devotion don't come from within.

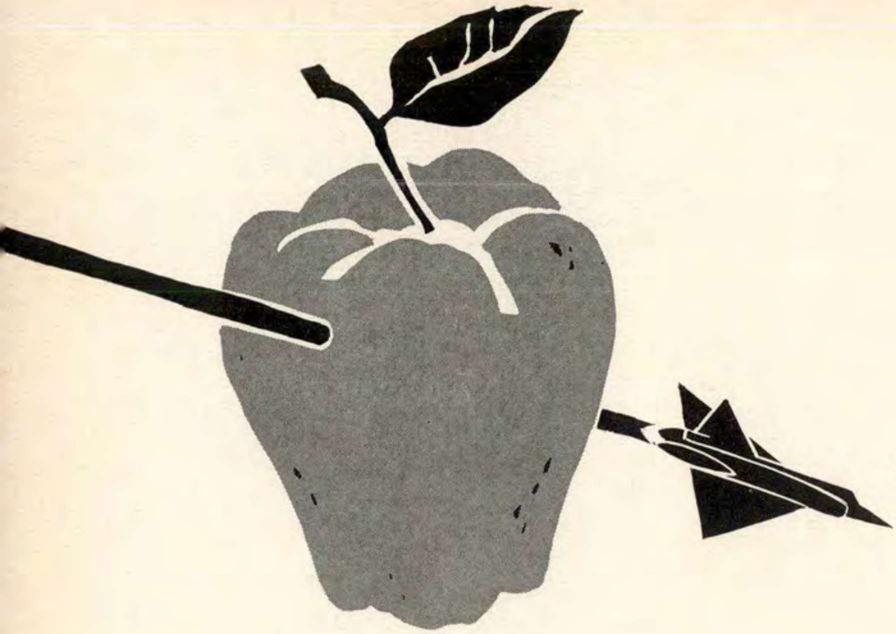
Those of us in single seat aircraft who fly everyday have less than constant individual supervision. The responsibility lies with the individual to constantly evaluate and criticize his own performance. We know when we've done a good job. We also know when we haven't done so well. Fortunately, these times rarely come to the public eye, but WE know and that should be reason enough for improvement. A few extra minutes in the Dash One every day and a little more attention to detail in the simulator will pay large dividends later. Those low level sightseeing tours could be much more valuable if they were spent in the GCA pattern. Don't be satisfied with an average approach. Try to make each one outstanding.

There are many diversionary activities in the life of an Air Force pilot today. These same diversions are available to professional people in other fields. However, I would like to feel that, should I need the services of a professional artisan, he would be able to provide more than just an *average* performance. It's like "wanting your money's worth," be it services or goods. This same criterion we should apply to our flying. Whether we have chosen the military for a career or an interim job, we owe it to ourselves and to our country to do the best job possible. Besides, flying is one of the very few professions where one's first mistake is likely to be his last.

The next time you fly, take a critical look at your performance. Is your climb speed right on the money? or do you let it vary with

the thought "who knows or cares?" Are you maintaining assigned altitude or just flying VFR on top? Did you set your altimeter to 29.92 at the right altitude or wait 'til you leveled off? How were your voice procedures? AFR 60-16 has some very specific guidelines for certain situations. Do you abide by them, or just slop through with a few "ah's" and a "Roger" or two? Have you practiced an SFO recently? How about your formation? Do you fly the standardized position or do you have your own? Ever discussed it with Stand Board? How was your last penetration?

If you were a flight examiner, how would you rate the performance of the last man you flew with – either in a two seater or on his wing? How would you rate *your* last flight? As a professional pilot, would that rating suit you? ★



WILLIAM

Competing aircraft on ramp at Tyndall AFB. Ground crewman races to prepare his aircraft for a mission. Loading specialist checking Falcon missle.

TELL 1965

Lt Col John M. Vargo,
73 Air Div (ADC), Tyndall AFB, Fla.

All the ingredients for a safety officer's nightmare were present during the 1965 U.S. Air Force Fighter Interceptor Weapons Meet last October at Tyndall AFB, Fla., but, in the final analysis, it was the biggest and safest of all William Tell events.

There were no accidents – in the air or on the ground.

Rough weather, accelerated flying missions, extensive missile-armament loading operations, rescheduled sorties and cliff-hanging suspense were some of the ingredients which faced both aircrew and ground crew members. There were more missiles and armanent fired during this eight-day meet than by all of the rest of the combined Air Defense Command during the same period.

Torrential downpours, line squalls, strong crosswinds and low ceilings added realism and IFR conditions to the supersonic sharpshooters. Florida's typical weather was temporarily invaded by a near hurricane tropical storm. Squalls, thunder and lightning, plus unpredictable gusty surface winds tested the tactical effectiveness of our all-weather fighter interceptors, aircrews and ground support teams.

Safety-conscious officials, with a keen eye on the capricious Gulf Coast weather, were finally forced to scrub some sorties, thus jamming rescheduling requirements for make-up missions. When the sun finally broke through with VFR conditions, it was an accelerated "GO" in continuation of competition firing. Fortunately, nobody was caught with his canopy down, thanks to on-target forecasting by Detachment 5, 32d Weather Squadron at Tyndall. They pinpointed the storms before the meet opened, accurately plotted their movements and were able to correctly predict the outcome. This enabled the "decision makers" to make sound decisions – a hurricane evacuation at this time would have involved hundreds of aircraft and would necessarily have delayed or forced a postponement of the meet.

As with all William Tell activities, advance safety planning began many months before the meet officially opened on October 1. Every potential safety problem area was probed, scrutinized, dry-run and closely monitored during actual operations. In addition, four missile experts from within the Air Defense Command augmented the Tyndall AFB safety staff in monitoring overall activities in this major operation.

Pivotal area for safety functions was the 4756 Air Defense Wing's office of the Chief of Safety under Captain Bobby G. Huggins. Ground safety – a key factor in the success of any program – was directed by Mr. Leo G. Miller, also with the Tyndall safety office. Captain Huggins enjoyed a participant's role, as well as a safety officer's, when he piloted several F-102 photo missions with cameramen from a television network.

During this meet the word "safety" was considered a misnomer. In itself it would hardly express the scope of the Air Defense Command's accident prevention effort. Primary concern was not safety for safety's sake, but the acceleration of mission accomplishment through increased operational effectiveness. Safety was the keynote; however, it was implanted as a nonidentifiable factor in the preparation of this meet. It literally was a product and integral part of an efficiently planned, supported and executed mission.

Safeguards were designed into the competition rules. For example, exacting performance became mandatory before the Range Safety Officer would clear an interceptor to fire, judges assessed penalties against ground crews who compromised ground safety procedure during loading, and chase aircraft monitored in-flight phases of intercepts.

How successful were we? Well, this is difficult to answer. To properly evaluate the overall effectiveness of a safety program requires an innate understanding of the principles of safety management and objectives. How successful is, to some degree, a difficult task to measure because there are no cut and dried criteria, yardsticks or formulae for evaluating specific, objective-type achievements in safety. This is necessarily so because it deals principally with an intangible product – the accident that did *not* happen. The fact is we didn't have a single accident. Who can argue with success?

First place in the F-102 category was captured by the 32d Fighter Interceptor Squadron (FIS) from Camp New Amsterdam, The Neth-

WILLIAM TELL continued

erlands. Its victory over the 59th FIS of Goose Bay, Labrador, ended a brilliant duel when the final winner crossed the wire just in front of his competitor. Final score showed 8782 of a possible 11,000 for the 32d – 642 ahead of the 59th runners-up.

The victory was especially sweet for the 32d representing the United States Air Force in Europe. It was the first time the unit has ever competed here and also marked the first time that foreign aircraft controllers were part of a winning effort in the biennial event. A team of five Royal Netherlands Air Force ground control intercept specialists directed the 32d pilots to their targets.

An even closer scramble was settled late Thursday when the 71st FIS of Selfridge AFB, Mich. stormed back to take first place in the F-106 Delta Dart category. The Wolverine State pilots added 850 points to squeeze past the 5th FIS from Minot AFB, N.D. by just 130 points.

From a possible 11,900 points, the 71st finished with 8,612 while the North Dakota unit ended with 8482.

A "first" was set when foreign controllers directed USAF interceptors.

Winning team captains with Lt Gen Thatcher, ADC Commander.

The 331st FIS from Webb AFB, Tex., entered the winner's circle in the F-104 Starfighter category with a final tally of 7342 points. The Texans finished competitive action with a 1090 lead over the 319th FIS of Homestead AFB, Fla.

The F-104's were shooting for a possible 10,500 points. Both units ended action with heavy flying schedules which added 825 points to the Floridians' total. But, that wasn't enough as the Texans did some fancy shooting of their own to grab 650 final and deciding points.

Competition in the F-101 Voodoo category ended with cliff-hanging suspense and the narrowest margin of victory. The 62d FIS, K.I. Sawyer AFB, Mich., edged past the 13th FIS, Glasgow AFB, Mont., by 115 points when the Michigan unit splurged for 1290 points in their final missions.

Their brilliant last-ditch effort was necessary to dislodge the Montana pilots who grabbed 1175 in their curtain-lowering operations. Final scores for both units, who were competing for a possible 12,400 points, showed 9198 for the 62d FIS and 9083 for the 13th FIS.

Brigadier General Thomas H. Beeson, Commander of the 73d Air Division and host for the '65 event, said, "There were no losers in this worldwide fighter interceptor weapons meet. They came here from across the nation, Canada and Europe to test men and machines under grueling conditions as realistic to war as possible. They did just that and in doing so with a flawless safety performance, once again demonstrated to the people of North America that its air defense mission is in good hands . . . each man participating in this giant Air Defense Command operation has my gratitude for making it the biggest, best, and above all – the safest fighter interceptor weapons meet on record." ★

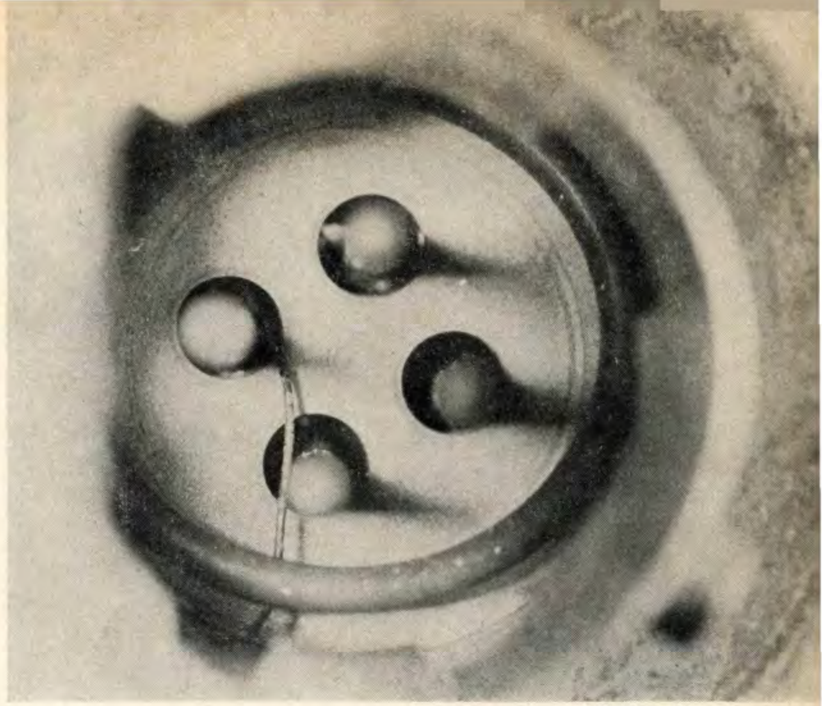


Figure 1

Ready? Safe?

Lee Watts, Systems Engineer

Strategic Systems, Martin Co—Denver Div

Is the integrity of your missile flight critical circuits intact? Will all systems perform as programmed? Are you SAFE from inadvertent ordnance firing? The answer to these questions is very likely, "yes IF all the missile electrical connectors are clean and free of contamination."

Missile weapon systems have experienced malfunctions directly attributable to metallic contamination within electrical connectors, which indicate improper inspection and/or inadequate cleaning procedures. Periodic checkouts will detect nearly all modes of failure of missile circuits; however, certain faults can go undetected. These faults result in flight failure or inadvertent firing of missile ordnance.

Ordnance connectors are particularly susceptible to contamination due to their small size and design. Small metallic particles, 0.025" or greater, can short a pin to a case that is at missile skin or facility ground potential. The photograph above (Fig. 1) shows a pressure cartridge connector contaminated by a length of bare wire. This wire provided the fault current path which fired a pressure cartridge resulting in a hazardous situation as well as considerable out of readiness time. Emphasis on better inspection controls and practices would have prevented this problem.

Figure 2 schematically illustrates how a typical ordnance circuit is susceptible to connector contamination. A parallel DC return path is established by the contamination through the faulted ordnance item. This path is indicated in Figure 2 by the heavy arrows. If the resistance ratio between the normal return path and the parallel path produced by the fault is low, or if the DC current is large, the current through the faulted ordnance branch can be in excess of the five ampere sure fire rating. DC faults to ground, in-rush current during start of missile hydraulic motor pumps or the charging of large airborne capacitors (as shown) can provide surge currents of sufficient magnitude to fire a faulted ordnance item. Figure 2 also shows how contamination can shunt a bridge wire preventing its ignition.

A high percentage of ordnance devices short to case when fired. If a device does short to case when fired and another device exists within the system with a fault to ground, it will be prematurely ignited resulting in possible flight failure. Figure 3 schematically displays how this can occur.

In conclusion, there exists a definite need for complete and thorough inspections of all missile electrical connectors if the required safety and reliability are to be achieved.

In the Titan II Weapon System a modification will isolate the ordnance return circuits during readiness. This change also incorporates a sensor for the detection of electrical shorts within ordnance connectors. While this modification provides safety in readiness and assurance of the integrity of the ordnance circuits prior to flight, it in no way eliminates the need for thorough inspections of all electrical connectors prior to mating.

Similar problems of contaminated non-ordnance electrical connectors could result in serious flight problems and have actually caused aborted missions in missile test programs. Flight control and guidance circuits are especially susceptible to these modes of failure. ★

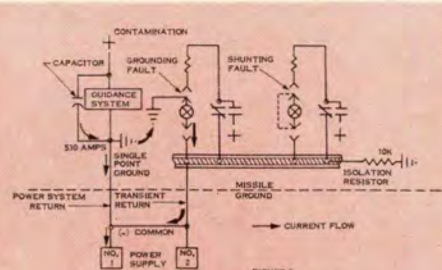


FIGURE 2

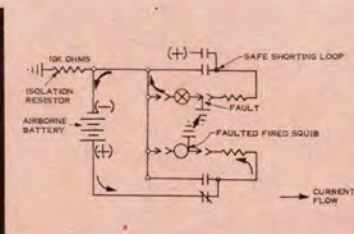


FIGURE 3

Missilanea

CIM-10—A missile periodic had just been completed at a CIM-10 (BOMARC) squadron with no abnormal indications. In a post inspection check, the right aileron was found damaged. The culprit responsible for the damage appeared to be a movable temperature control stand. Apparently, during preparation for the inspection, the stand had been inadvertently placed under the leading edge of the aileron. The unit is implementing a more thorough walk-around prior to each power application and is also recommending shortening of the movable stand to prevent aileron/stand contact.

INNOCENT BYSTANDER INJURED — "Dateline Blank AFB USA. — This morning an innocent bystander was struck by an Air Force water tanker that was backing up for a servicing operation. Witnesses stated apparently no one was directing or supervising the operation. Injuries consisted of . . ."

In this instance, the innocent bystander was a Hound Dog missile and the Air Force water tanker was a unit being backed in preparation for servicing a B-52. The lack of a directing supervisor or spotter has caused this incident to fall in the supervisory personnel error category which accounts for 60 per cent of the Hound Dog mishaps. It points up the requirement for the constant and continuing emphasis on supervision and control of ground handling and servicing equipment that must be a part of every unit's safety program.

Capt R. A. Boese
Directorate of Aerospace Safety

HOUND DOG ENGINE FIRE — After completing the Before Leaving Aircraft Check List, the pilot of a B-52 was notified by the ground crew that the left AGM-28 was still running. The missile switches were checked in the OFF position and the EGT and RPM on both missiles read zero. Leaning out the side window and observing that the Hound Dog was still running at a high RPM, the pilot actuated the emergency shutoff switch for the Nr. 1-AGM. Engine shutdown occurred and fire broke out in the missile engine. It was undetermined whether the engine caught fire just prior to, during or after the pilot actuated the emergency shut-off switch.

The aircraft recovery crew contained the fire until arrival of the fire department. Damage consisted of major fire damage to the missile engine and minor damage to paint.

After the AGM was removed from the aircraft, investigators started trying to find the cause of the fire.

The missile emergency fuel shut-off valve was found in the open position and the aircraft emergency shut-off switch was in the normal position. If the emergency shut-off switch had been actuated to CLOSE momentarily and then placed back in the normal position, the engine would have flamed out. Fuel would have pooled in the engine and engine fire would have resulted. However, since the pilot is certain that he left the emergency shut-off switch in the shut-off position and since it is also possible that a malfunctioning fuel control system could have caused an identical situation, no positive conclusion can be drawn from this as to the cause of fire.

Investigation revealed that the power lever actuator would not move below the 65-degree position. A defective feedback potentiometer in the actuator was the culprit. TCTO 21M-AGM28A-610, which requires replacement of the throttle control amplifier with an improved amplifier, had not been complied with.

It is recommended that, if AGM engines do not shut off normally in flight, the flight crew request maintenance assistance to manually shut down the missile after landing. ★

Maj Edward D. Jenkins
Directorate of Aerospace Safety

Aerobits

MISSING PANEL. The aircraft was Nr 3 of a four ship flight of F-100's on the bombing range. During turn to initial, the pilot thought he felt a birdstrike. Nr 4 looked him over and noted a missing panel (ground hydraulic quick disconnect). The pilot then terminated and returned to base for an uneventful landing.

On the ground it was determined that, during a very busy period just before launch, rain had fallen and several panels were temporarily secured. Unfortunately, the panel that left the aircraft had been secured with only two fasteners. During inspection of the aircraft six people, including the pilot, failed to notice the loose panel.

RUNWAY — WHAT RUNWAY? Of the F-105 accidents in 1965, one-third have occurred during landings and takeoffs. The only item in common with the three overrun/approach light landings we have had is the low visibility in light rain and fog. Specifically: Nr 1 happened in the afternoon with 2½ miles in light rain, Nr 2 at dusk with 4 miles in light rain, and Nr 3 at night with ¾ miles in fog and rain.

There is no new solution to this problem. The same old story still applies, take the GCA controller's instructions, cross check, and use the runway as another available instrument. The Dash One also still says:

(1) Touchdown at recommended speed.

(2) Throttle — IDLE.

Reversing steps (2) and (1) will eventually assure a "desert" landing and a "desert" landing in an aircraft this heavy generally does major damage.

Major P. R. O'Brien, Jr.
Directorate of Aerospace Safety

SLICK RUNWAY. Two miles from touchdown the B-52 pilot undoubtedly thought that this landing would be a piece of cake. Then everything turned sour.

What happened?

Weather reported a measured 1400 feet overcast with five miles vis, light freezing rain. At two miles out the pilot was given an RCR of 24. At about this time the weather observer noticed the beginning of ice formation but did not think that this would be serious before the landing could be completed. The aircraft touched down 2000 feet from the approach end, but the runway was by now so slick the pilot felt that his brakes had failed. His brakes hadn't, but his brake chute had and the aircraft went off the end of the runway.

When the chute was installed a piece of the main canopy was jammed under the door of the chute compartment, which prevented the door from opening. Winter is no time for malfunctioning drag chutes. The weather changes rapidly and what may look good one moment may be terrible the next. Then a malfunctioning chute might mean the difference between a successful landing and an accident.

Aerobits

A-SLIPPIN' AND A-SLIDIN' — Ol' Man Winter is back in business and this means snow and ice on the taxiways and runways.

The B-52 is difficult, if not impossible, to control when skidding on ice. Some of our troops stationed at northern bases will attest to this. Here is just one of the many incident/accidents that occurred last winter (and there's always that possibility of a recurrence).

The crew had just completed three taxi-back landings and was preparing for another takeoff. The aircraft was cleared and started the takeoff roll. In the process of turning onto the runway, the pilot overshot the centerline and was advised by the IP to tighten the turn and get in the center of the runway. The IP then got on the controls with the pilot and discovered that he had no steering authority. The IP attempted to regain control by using a combination of brakes and steering, but the aircraft continued to slide toward a snowbank on the other side of the runway. It was apparent to the IP that he could not stop the aircraft so he shut down all engines except Nr 3, and set the brakes. The B-52 continued "a-slippin' and a-sliding'," and finally came to a stop in the snowbank. Fortunately, damage was minor.

Some of our northern bases must live with the problems of thawing and refreezing, which result in patches of clear ice on taxiways, runways and ramps. So, be alert, cautious, and use extreme care, especially during nighttime operations. Don't go "a-slippin' and a-slidin'" in the B-52. It isn't healthy!

Lt Col Harold E. Brandon
Directorate of Aerospace Safety

NUTS & BOLTS. Here are a couple of **incident** reports that could very well have been **accident** reports. The story behind each of these is an old one: garbage in the controls.

RF-101 — During turn from base to final, the pilot noticed the control stick freeze momentarily in the lateral axis. When he applied more pressure, the stick yielded somewhat and he was able to line up with the runway and make an approach and landing. After the aircraft was on the ground the control stick could not be moved to the left. Throughout the event the hydraulic pressure remained normal. Inspection turned up a couple of screws, one lodged between the bell crank aileron torque tube and adjacent bulkhead, and the other in the bottom of the compartment. The aircraft had been released from periodic inspection the day before.

F-100F — The aircraft was flying right wing on a formation takeoff. After gear and flaps retracted at approximately 250KIAS, the aircraft seemed to want to roll to the right. Rudder kept it from rolling, but when the pilot attempted to turn right to move out from Lead, the control stick would not move to the right. Hydraulic pressure was normal. Meanwhile left rudder was required to keep from rolling to the right. Finally, the pilot used both hands and forced the stick from left to right. He heard and felt a thump as the stick broke loose. Normal control response then returned. Sure 'nuff, there was a bolt with nut and washer caught between the bottom of the arm assembly and the bottom inside of the control stick support assembly. Apparently the bolt was left in the aircraft during IRAN, since no maintenance had been performed on this area since IRAN.

NEW CHOPPER FOR VIET NAM. The Air Rescue Service has taken delivery on their first HH-3C—a twin engined, 5 bladed, cargo type chopper, modified especially for Viet Nam rescue operations.

Bulletproof panels will furnish increased protection for crewmembers and vital aircraft components. Because of the need for extended range rescue operations, auxiliary fuel tanks normally carried by the F-100 fighter were fitted outboard on sponsons of the HH-3C. An FM radio will permit the helicopter pilot to talk directly to ground tactical controllers rather than having to communicate through tower communications systems. Special direction-finding equipment gives the helicopter crew the ability to "home in" on a radio beacon carried by crewmen of fighters or bombers who have been shot down. The extra power provided by General Electric T58-5 engines maintains the performance of the -3C helicopter despite addition of the extra weight of the armor plating and other equipment.

The CH-3C is normally equipped with a combination cargo loading system and rescue hoist which extends from the cabin. This has been augmented by an external hoist with more than double the length of cable which is installed above the cabin door to give the helicopter crewman better control, thus expediting the rescue operation.

Modification of the helicopter improves the Air Force's ability to locate and pick up men who have been shot down in jungle or behind enemy lines. The HH-3C has been designed not only to increase chances of returning downed airmen but to give necessary protection to its own crew during operations over unfriendly territory.

Lt Col Robert E. Englebretson
Directorate of Aerospace Safety

SAME SONG — MAGNESIUM WHEELS. Takeoff roll was normal until, at approximately 100 knots, a slight thumping noise was heard in the cockpit. The takeoff was continued and after the C-130 became airborne, the loadmaster reported there had been a severe thumping or buffeting sound coming from one of the main landing gear areas. Gear retraction was normal and all indications were satisfactory. In an effort to pinpoint the problem, the aircraft was depressurized and inspection plates removed to check the gear. Inspection revealed the rear wheel of the left main gear had been damaged. Due to aircraft weight, parts availability, weather and mission dictates, a decision was made to continue to the destination.

Upon arrival, another airborne inspection was made, and it was determined the wheel would not rotate. The runway was foamed and an uneventful landing was accomplished. After the crew evacuated the aircraft, a maintenance tug was attached to tow the C-130 to the maintenance area. As the aircraft was being towed, metal chunks and particles began falling from the left gear area and a grinding noise was heard. Towing was terminated and a new wheel and brake assembly installed. A 39-inch long break, up to one and one-half inches wide, was found in the wheel assembly. This break had in turn created pressure on the brake assembly preventing free rotation of the wheel. The manner in which the aircrew handled this malfunction and the landing on a foamed runway prevented a more serious accident that could have been caused by heat generated from the jammed wheel and brake assembly.

NOTE: The above incident is attributed to materiel failure of the magnesium wheel. Concentrated efforts are now in motion to replace all C-130 magnesium wheels with aluminum wheels by February. Until that time, insure compliance with existing inspection directives until we are 100 per cent complete with the aluminum retrofit.

Maj William M. Bailey, Jr
Directorate of Aerospace Safety

Aerobits

KNOW YOUR AIRPLANE TODAY. (F-86F). The pilot, just completing a satisfactory flight, taxied to the line and parked the airplane. He moved the canopy switch to the OPEN position but the canopy opened only about six inches and stopped. The pilot planned to declutch the canopy and manually pull it aft. However, instead of pulling the declutch handle, he pulled the canopy alternate emergency jettison handle and blew off the canopy. (Fortunately, his forward position prevented his head being hit by the canopy bow as it moved aft.)

The pilot stated that he knew where the declutch handle was located in this airplane, but that he inadvertently pulled the wrong handle because his recent training had been in an airplane in which the declutch handle was located in the same relative position as the canopy jettison handle in the "F."

Cockpit controls are shaped and placed to minimize improper actuation. But cockpit controls can vary in their relative positions in different types, and even in the same types among different blocks of airplanes. No injuries resulted from this occurrence, but it does point up the need for knowing the location and function of every control (especially emergency controls) on the airplane you are flying today, not the one you flew yesterday.

No Am Avn Operation and Service News

Central NOTAM—The Air Force and FAA took the first step toward a single National NOTAM System when the USAF/USN Central NOTAM Facility (CNF) started moving from Tinker AFB to the FAA Hq in Washington, D. C. Both systems will function as separate units pending consolidation into a single National NOTAM System. When that will be will depend on availability of adequate telecommunications and computer services. ★

FALLOUT

continued from inside front cover

and reached the same conclusions as ours; (3) AFCS at Scott AFB has some research underway in this area; (4) Fighter pilots don't like VASI as a VFR approach aid, and (5) Something has to be done about all of this, soon.

Our views run like this: Present siting criteria are obsolete. Placement must be based on a comparison of runway available versus aircraft characteristics. VASI must be disassociated from IFR aids. Pilots can and do accept a high glide path IFR, knowing that they must correct at breakout. In a VFR approach, however, they know where they want to be, and it's always lower than present VASI approach slopes. It is nonsense to require a pilot to fly a precision glide path that is less than optimum when he is VFR.

We can promise more on this subject in the near future.

WE GOOFED

Have just received the November issue of AEROSPACE SAFETY. I think this is a very good method of keeping the troops informed, have nothing but praise for the staff and all the other people who make this magazine possible.

BUT! This time, somebody goofed. The goof in question is on page 3, and the picture should be titled "What's wrong with this picture?" Here are a couple of things I see wrong, if I am not wrong:

1. Oxygen servicing cart too close to aircraft being serviced with fuel.

2. Fire bottle access obstructed by tool box, and other safety hazard items. These are but a few of the things one sees at first glance.

This picture could very easily be misleading to a new troop. It could lead him to believe his supervisor is all wet when he tells him that oxygen safety is very important and must be handled with care; that all the rules about distances stated in Tech Orders and good housekeeping are paramount to good maintenance.

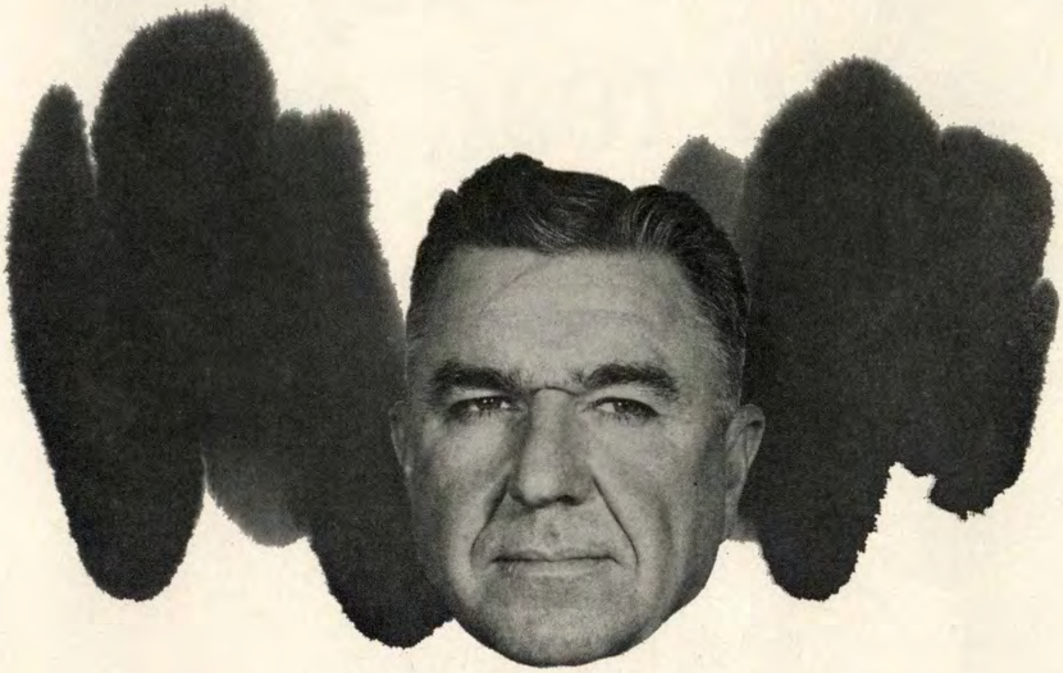
That's about it. Keep up the good work.

TSgt Sam G. D'Ortona
Aircraft Tech Advisor
Hq Sq M/MS 10 TRW
RAF Alconbury, England

You're so right. We did goof, but discovered the discrepancy too late to do anything about it. We've been waiting for letters; so far, yours is the first. Thanks for writing.

☆ U.S. GOVERNMENT PRINTING OFFICE 1966 201-213/4

✸ WELL DONE



MAJOR THOMAS E. NEWTON

50TH TROOP CARRIER SQUADRON, SEWART AFB, TENN

On 12 August, 1964, Major Thomas E. Newton was aircraft commander of a C-130E aircraft enroute from Sewart AFB to England AFB, Louisiana. During the inflight landing check, the main landing gear indicated down and locked, but the nose gear indicated "in transit." All published emergency procedures were followed in an attempt to get the nose gear down and all were without success. The pilot then decided to return the aircraft, main gear down and nose gear in transit, to Sewart AFB where technical assistance and maintenance could be more readily attained.

Upon return to Sewart AFB, Major Newton orbited the area and attempted several maneuvers to force the nose gear into a locked position. All were unsuccessful. A decision was then made to chop a hole through bulkhead station 165 and to loosen the bleed plug on the nose landing gear actuating cylinder one and one-half turns. This allowed hydraulic pressure applied to the cylinder to escape and the gear to move slowly to the down position.

After these actions were completed, the pilot applied positive "G" to the aircraft and the nose gear indicated down and locked. As an added safety measure, the nose gear was chained down and a normal landing was accomplished with no further damage to the aircraft.

This incident is the first of its kind to occur with the C-130E aircraft. Major Newton's knowledge of the aircraft hydraulic systems in general and of the landing gear in particular prevented possible injury to the crew and extensive damage to this valuable aircraft. WELL DONE! ☆

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