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Aerospace SAFETY

THE MAGAZINE DEVOTED TO YOUR INTERESTS IN FLIGHT

LANDING SHORT - PAGE 2

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SPECIAL FEATURES

REGULAR FEATURES

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As you probably know by now, this is the last issue of **Aerospace Safety** devoted exclusively to aircrews. Beginning next issue, this magazine will contain material oriented to both aircrew and maintenance personnel. The name will be the same, **Aerospace Safety,** for three or four months, then after suggestions have been evaluated and a selection made, there will probably be a new title.

In this issue we had strictly the pilot in mind. Here's what there is and where to find it.

• "Landing Short" is not conducive to longevity of either the crew or the aircraft. Beginning on page 2 you'll find a rundown on the problem based on a study of more than 100 such accidents over a four and one-half year period. During the last few months of 1969 there were several more that were not included. You might be surprised to know that the majority of these occur during daylight VFR.

• "Maintain Airspeed and Control" is an axiom for pilots. This article, page 6, tells about two major accidents in which this most important axiom was not heeded.

• "Crowd Pleaser." Most pilots never put on an airshow. But some do and unfortunately, a few overdo it with fatal results. But this article, page 10, is not about airshows. It is about knowing how to get the best performance out of your airplane through an understanding of thrust and drag forces.

• "Into The Hillside," page 20, dramatically relates what happened when a pilot failed to use lost communications procedures.

AIR FORCE RESERVE

1969 Aircraft Accident Rate:

ZERO

Airlift-passengers, materiel

Search & Rescue

Overwater Mission

SEA Support

**Tactical Airlift-
support of the Army**

**150,000 hours flying time,
8 different aircraft**

Congratulations

LANDING SHORT

While on a precision approach, the C-119 descended through the glide slope and dropped slightly low at about a mile and a quarter from GCA touch down. As the aircraft descended even lower the pilot was told to "wave off" straight ahead if the runway was not in sight.

Moments later the airplane touched down in an apparently normal manner. Then the "normal" part was all over. The right gear collapsed, the aircraft started to roll and turn right, which was corrected by the pilot, then settled on the right aft fuselage and finally skidded to a stop 2000 feet from the threshold, 50 feet off the runway.

The initial touchdown was 80 feet short of the overrun and 880 feet short of the runway, on a sandy slope three to four feet below the level of the overrun. Right on centerline, the aircraft struck a radar reflector which cut a 15-foot gash in the lower fuselage.

An isolated event? Hardly. This scene was repeated more than 100 times during the past four and one-half years. Practically every type of aircraft was involved at least once, and nearly every command got into the act. (The study from which these figures were taken covered only accidents, not incidents. What the significance is we don't know, but the F-100 came through scot-free).

While some of these accidents were the result of engine or other malfunctions that made a short landing inevitable, most of them were laid on the pilot—he misjudged, used poor technique, was distracted. The term "misjudged approach" or words to that effect appear frequently.

Overall we are not very consistent as the totals for the years included in the study illustrate. In 1965 there were 18 undershoot accidents. This jumped to 31 in '66 and you are probably saying, "ah, Vietnam!" Well, think again, because the number dropped to 11 in 1967, back up to 25 in '68, and 16 for the first nine months of 1969.

Fighters led the way in 1965 and 1966. Then the transports took over in '67 and '69 with a tie between the two in 1968. Figure 1 shows the totals for each type aircraft.

Obviously we don't have room here for an exhaustive analysis of these accidents. So to simplify matters, we are arbitrarily dividing them into two classifications: pilot factor and other. The latter should not be simply dismissed, but they are in the minority and consist of a number of random causes such as engine failure, electrical or fuel malfunction, etc. So we will address ourselves here to only those involving pilots.

Here are some very brief briefs selected from the aircraft types with the highest incidence:

F-102 ILS approach, right main gear hit strobe light. Pilot allowed aircraft to get too low.

F-102 Night ASR approach with VFR transition for landing. Aircraft hit 1130 feet short of the threshold and was destroyed. Pilot wore improper eye glasses (he'd broken his flying glasses and was wearing tinted bifocals); lack of night proficiency; airbase — earth overrun had settled and softened.

F-105 During go-around pilot was advised that he would be Nr 2 to land. Pilot stated minimum fuel and that he was going to bring it in. Base leg was close in and turn to final was tight with high sink, which continued to ground impact. Aircraft destroyed.

F-4 Aircraft was Nr 2 in a flight of two. Lead landed and Nr 2 started a straight-in TACAN approach after advising RAPCON of minimum fuel. Clearance to land issued at 4 NM. Aircraft flew into trees and crashed three NM short.

T-33 Turn to final approach on an SFO seemed normal and approach okay, then aircraft went low and hit a rock wall 1000 feet short and 30 feet below the runway. Both front seat pilot and IP apparently failed to recognize unsafe approach until too late. Misjudgment probably resulted from illusion caused by water and terrain features.

The factors in the cargo aircraft read similarly.

C-7 Routine approach until the aircraft hit short, right main gear struck runway lip and right wing separated. Pilot allowed aircraft to touchdown short and IP failed to correct. (Several of these read about the same.)

C-123 During flare pilot thought speed excessive and reduced power. Touchdown was 60 feet short and the right gear collapsed.

C-130 The flight was a pilot upgrading mission and the approach was to a 4300 foot strip over a 400 foot deep ravine. Turn to final was overshot and they went around. Again on final, the pilot tried to reduce descent with back stick and a high sink rate developed. Touchdown was short, right gear hit lip and separated. The aircraft left the runway and was severely damaged.

FIGURE 1

UNDERSHOOT ACCIDENTS

1965 - 1969 (8 months)

F-84	3	T-38	3	B-57	1
F-100	0	C-7	5	B-58	1
F-101	3	C-47	1	B-66	2
F-102	7	C-54	1	OV-10	1
F-104	2	C-97	1	O-1	7
F-105	8	C-118	1	O-2	0
F-106	1	C-121	2	U-2	1
F-4	10	C-123	7	U-6	1
F-111	1	C-124	1	UH-1	1
T-28	1	C-130	11	UH-3	2
T-33	10	C-135	1	UH-16	1
T-37	1	T-39	1	UH-21	1

While the predominant cause factor in these accidents was the pilot, this does not mean that we should point a finger at the jocks and holler "You goofed!" Many of the pilot factor accidents had contributing factors that must be examined if such accidents are to be prevented. For example:

- Facilities were involved in 20 accidents. Included were such deficiencies as no overrun, no approach lights, construction in progress, no runway lights, or only marginal or primitive lights, runway lips and soft dirt in the overrun, lack of or insufficient landing aids. These, of course, reflect the Southeast Asia environment and show up primarily in the figures for the C-7, C-123 and C-130 which were operating into many marginal airstrips.
- In 11 of these accidents training was in progress. Almost all of these were of the transition, check out, or in-country indoctrination type training, rather than student training. Several were clear cut cases of the AC or IP letting the pilot get in too deep before he took corrective action, which was then too late.
- Weather or weather associated phenomena appeared in 19 cases. This was in the form of low visibility during approaches, rain, wind, turbulence or downdrafts off the end of the runway due to terrain. Weather was not listed as the primary cause in any of these accidents, but was listed as contributing in that it aggravated the situation the pilot was coping with.

An accident is pure loss of manpower and equipment. But it may not be a total loss if the causes are determined and that knowledge applied to preventing others. From these landing-short accidents we should be able to profit.

One of the items that appeared with some frequency was that of the A/C or IP allowing the pilot to get into a situation from which recovery was impossible. This is a problem as old as aviation and involves the delicate instructor-student relationship. In a pure training situation the student is expected to make mistakes and the instructor is normally ready to take over early enough to prevent a disaster.

When both pilots are experienced and pure training, such as in an RTU, is not the case, the instructor or A/C may be more reluctant to take corrective action until the situation is really critical. Then it may be too late. Complacency may contribute, since the A/C may assume the pilot is capable of salvaging the situation.

At first glance it may seem obvious that the remedy, or at least a primary one, is alertness on the part of the pilot in command and aggressive action in taking over when necessary. But that is not the entire solution because we encounter situations in which both pilots were fooled, and that brings us to the next subject — airfiield environment and facilities.

There were several instances reported in which both the pilot in command and the trainee failed to perceive they were in trouble. Illusions created by the airfield environment probably were responsible for the pilots erring in several of these accidents. We could describe these as "they didn't see what they thought they saw." In other cases the problem was simply one of inadequate references that caused misjudgments, particularly at Class I and II (marginal for the type aircraft) airfields in SEA.

Incidentally, only about one-third of the landing-short accidents included in this study occurred in SEA.

The facility problem covers a multitude of things such as short, narrow runways, no overruns, soft, unstable overruns, lips on the end of runways, obstacles. Despite these conditions, several accidents probably could have been prevented by VFR landing aids such as VASI, approach lights, better runway lighting. These may be impractical in some locations in the combat zone, but there appears to be a need for a simple, reliable, relatively invulnerable landing aid. Ideally this would be electronic to provide at least a glide slope. However, some very simple devices have been developed. One of these, which the Navy uses, is shown in Figure 2.

Except where it would be impractical, VASI is useful. But as of 1 December it was reported that there were 24 USAF bases in the U.S. that did not have VASI installed.

Although weather appeared only as a contributing factor in accidents covered in the study, combined with other problems it made for some extremely sticky situations For example, a night landing with bare minimums in a driving rainstorm. Then add an airfield with marginal lighting. This is one heck of a good way to manufacture an accident.

Some situations made an accident inevitable. Others are such that, if uncorrected, accidents can be expected to happen. In the broad picture of landing-short accidents for the past few years certain things stand out:

Although there were a few maintenance or materiel failure induced accidents, and quite a few due to the SEA environment, well over half of these accidents occurred outside of SEA, in day VFR weather in normally functioning aircraft. ★

POMOLA. Poor Man's Optical Landing Aid. Still in use at some U. S. Navy airfields, device consists of three wooden panels to indicate position of aircraft relative to approach slope. This or similar device may be of value at austere airfields such as the one shown above.

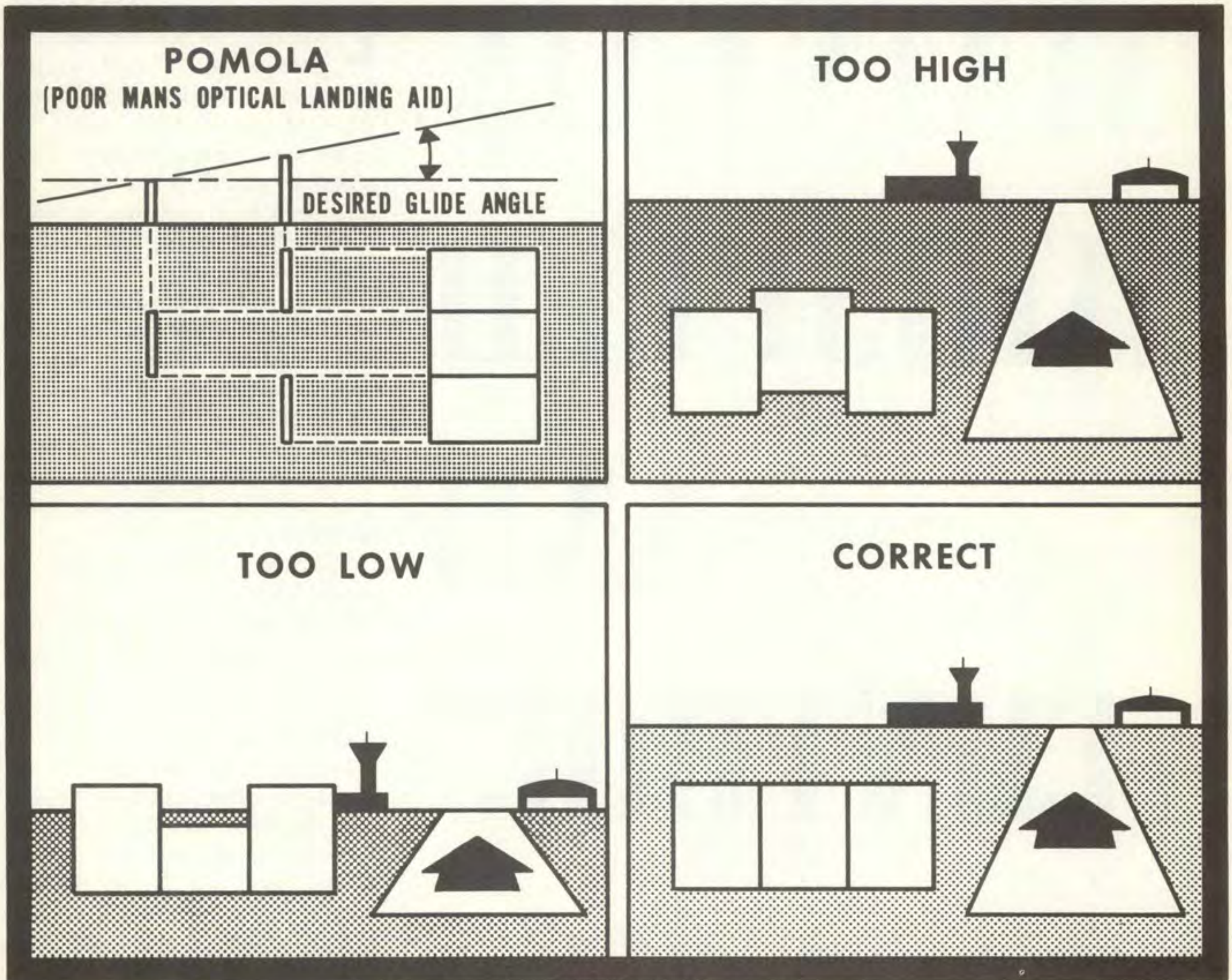


FIGURE 2

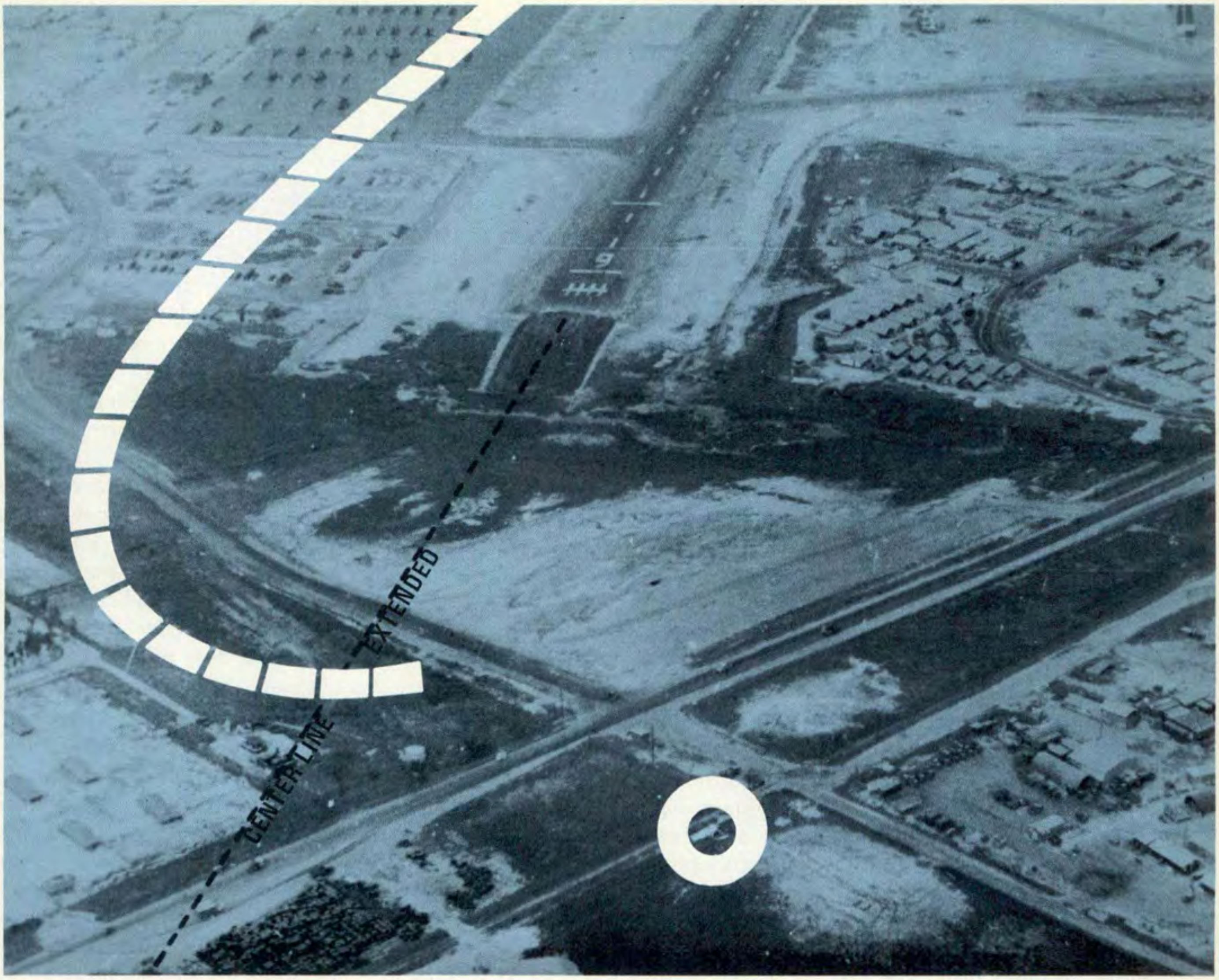
IF YOU WANT TO KEEP FLYING...

"MAINTAIN AIRSPEED AND CONTROL"

Last spring two pilots and an observer were killed and one pilot severely injured in a pair of almost identical accidents in very different parts of the world but in the same type of airplane. These accidents plus others of similar nature point to a void that somehow must be filled. Perhaps a brief summary and discussion will help.

The aircraft involved were O-2As, a relatively simple machine with two centerline-mounted engines, one in front and the other mounted on the aft end of the fuselage. Both aircraft had engine failure due to fuel starvation; both were very near runways when the emergency occurred.

The first of these accidents occurred in Southeast Asia and involved a pilot and observer. After takeoff the pilot climbed to a position near the field and went into orbit while awaiting a convoy he was to escort. Suddenly he noticed a loss of thrust, saw that the rear engine fuel flow had gone to zero, and the RPM was decreasing. He immediately shoved both throttles to full open and turned the rear engine fuel boost switch to high but the engine would not restart. His attempts to feather the rear



engine failed; however, the prop apparently quit turning and was stationary at impact.

Meanwhile, the pilot flew to a close downwind and prepared to land. He called the tower, lowered the gear, put down one-third flaps and began a tight 180-degree turn to final. Both he and a witness said that the rate of turn was much less than they would have expected from the angle of bank, and the aircraft seemed to be sinking quite rapidly. From this testimony the Board concluded that the pilot did not use enough rudder and the aircraft was slipping in the turn. The front engine surged, due possibly to the low fuel state of the tank and the aircraft attitude, or possibly because the propeller was not set for full power. However, post analysis showed that the engine was developing power at impact.

When the pilot saw that he could not reach the runway, he looked for a place to land and noted that his airspeed was down to 60 KIAS. Then the aircraft stalled, spun to the right and crashed.

Ten days later an IP and a student were killed under similar circumstances. From the evidence, which included witness statements, the board theorized that the in-

"MAINTAIN AIRSPEED AND CONTROL"

CONTINUED

structor was demonstrating a simulated forced landing at a dirt runway and that when he applied power for the go-around he discovered the rear engine inoperative. Apparently when he saw he could not maintain airspeed and altitude the IP attempted to land on the runway.

The aircraft meanwhile had got very low and overshot the runway in the turn. Then apparently the decision was made to attempt a landing in an open field. This required a steep turn. The aircraft stalled, rotated right and hit the ground in a right wing and nose low attitude.

In both of these accidents the failed engines were found to be operating on the auxiliary tank, which had gone dry. Also neither pilot jettisoned external stores. While the pilot of the first aircraft took off with the fuel selector on the aux tanks, this was not definitely proven in the second case. Possibly the IP had selected AUX during the simulated forced landing demonstration. At any rate, both selectors were found on aux tank with only a slight amount of fuel in the left tank, which feeds the front engine, and none in the right tank, which feeds the rear engine.

It is difficult to account for these accidents without going into other factors, the most obvious being the pilots themselves, their experience and the type of aircraft involved.

The pilot in the first case had approximately 60 hours O-2A time. Prior to transitioning into the O-2A his entire rated experience was in B-52s, about 1250 hours.

The instructor in the second accident was an old head with more than 6000 hours, practically all of which was in recips. He had about 300 hours O-2 time, most of it acquired in SEA. The student in this accident was a recent UPT graduate who was just starting training in the O-2A.

In examining the pilot factor one could easily conclude that the pilot in the first accident had only minimum experience in propeller-driven aircraft and that this may have contributed to his failure to safely manage the aircraft. There were several things that would point toward this conclusion. First, he failed to switch from AUX to main tanks prior to takeoff. It is standard practice in recips to check all tanks for feeding sometime prior to takeoff, then switch to the mains for takeoff. In trying to determine why he failed to switch to the mains, two things come into conflict. First, his experience in the B-52 and relatively short time in the O-2 may have resulted in his missing this important item—it had not become an automatic response. On the other hand, checklist discipline gained from his B-52 experience should have carried over to the O-2.

How to explain the pilot's possible omission to make this important check in the other accident is even more difficult because of his past experience. Perhaps both of these pilots were distracted, possibly by the occupant of the other seat.

One of the pilots failed to feather the prop on the failed engine and the other used the wrong procedure. Neither dropped stores, neither switched to a full tank and both of them had the landing gear down —one had the gear down the other placed it down.

According to the accident reports, the O-2A will not maintain altitude and airspeed in this configuration, which would make landing an immediate necessity from the altitudes they were at when the rear engines failed.

Even so, it would seem that both pilots had a very good chance to make a successful recovery for at least one of two reasons: (1) With plenty of fuel aboard, switching tanks should have produced an airstart; or (2) runways were available and with power from the front engine, making a landing should have been a relatively simple thing even for an inexperienced pilot.

In the Emergency Procedures Section of the Dash One, under ENGINE FAILURE DURING FLIGHT, the first line reads: "Maintain Airspeed and Control." In their concern with the immediate problems of analyzing the cause of the engine failure, feathering, and in one case getting the gear down, the pilots did not heed this all-important advice.

Why? Frankly, we don't know. But we do know that the O-2 and other light aircraft have demonstrated that they can kill you just as dead as can any supersonic jet. Therefore, they demand just as much respect from those who fly them and those who train the men who will fly them. ★

the GIB's BIPPY

—or, what've you got to lose?

It was to be a night re-check for the navigator in the back seat of an F-4. He'd flown in them before but it had been a couple of years ago. The briefings in the squadron brought it all back quickly and he was eager to get out to the bird. With the mission briefing completed and everyone ready to go, the crew headed for the airplane.

Before he mounted the ladder, the navigator watched the crew chief carry the nav bag full of maps and FLIP pubs up into the rear cockpit. It didn't register on him while he was strapping in that the bag was between the seat and the stick. While the nav was squaring away and getting reacquainted with the cockpit, he lowered the seat. This forced the nav bag against the stick, but he still failed to notice the potential for trouble.

While taxiing out, the pilot observed that aft stick movement was somewhat restricted, but he didn't think to challenge his back-seater about it. Passing 175 knots on takeoff roll, the pilot mentioned that he didn't think the bird was responding the way it should. But he continued the takeoff. The bird was still on the ground at 200-plus knots when the flaps blew up and finally became airborne with about 3000 feet of runway remaining!

Later in the flight, when the pilot asked his RIO for a frequency, the problem was identified. The GIB, reaching into his nav bag for the IFR Supplement, realized what had happened. And all this time the pilot, an old head in the airplane, had dismissed it all as no more than a bellows failure.

Still later in the evening, while the navigator was recounting the adventure for all who would listen, he was heard to mumble something about "... 200 knots and still on the deck, I should have ejected ... and left the evidence to blow out of the cockpit! But you can bet your Bippy this GIB won't store anything in front of the seat any more!!"

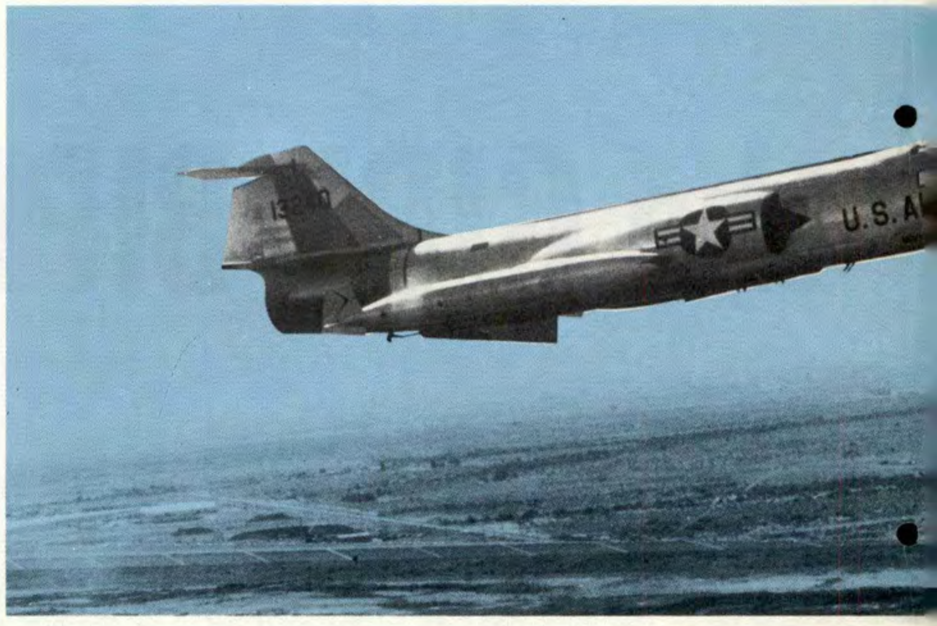
The lesson about stowing gear of any kind in front of the seat applies to all airplanes. And we should not really need to repeat it here. Like it's pretty basic—as is the lesson about taking off with restricted control movement!,

However, there's a problem—and a lesson — here for F-4 drivers which is a bit more subtle but equally hazardous. It concerns placing any kind of gear in a position where it can get under the rocket seat. This is considered an effective way of of contributing to inadvertent rocket motor ignition—which brings up a whole new set of problems.

If, while you were flying with the H-5 seat, you built yourself a habit of storing shoes, letdown books, your special cross-country kit or anything else in that little space under the seat—*break the habit* quick before you tangle with the machinery under the H-7 seat and ruin your whole day.

(Adapted from CROSSFEED) ★

crowd-pleaser



CLIMB OR

Standing on the ramp in front of Base Ops during a refueling stop, I watched an F-104 whistle up initial and into the break. There are so few of the beautiful things left, you always watch. When I'd followed him through the turn, wings level on downwind and gear extended, I glanced around me. Of the few people in sight on that quiet afternoon, only one didn't have his eyes on the sleek bird in the pattern. It's that kind of airplane.

I watched him around the turn, lined up on final and marveled at the speed of his touchdown, although I've seen it many times before. Smooth and precise, it was. Professional. But something about his rollout bothered me. Then I caught it . . . no drag chute!

Trouble?

No, there didn't seem to be a problem. He was going away now, and it was difficult to tell how hard his braking efforts were. But he turned off at the end with apparent ease.

It was a few minutes before he taxied past us to park on the transient line. The people around me made the normal comments about the airplane . . . "It's all engine, isn't it!" or, "He's just sitting there on thrust, isn't he?" None of them seemed to be wondering, as I was, why he had not used his drag

CRASH ?

chute. I had made up my mind: he's a transient in a hurry. And he's sure of himself.

Watch him!

And I did. The bird had hardly rocked to a stop, the engine had barely whined down, when I saw the pilot vault over the rail to the ground. He couldn't wait for a ladder. Impressive.

And telling.

This guy does bear watching.

After only a brief pause in front of the airplane while he talked to the Transient Alert crewman, he was striding across the pavement toward the Base Ops door.

Of course, I was watching for him when he burst out of the double doors and marched back out to his airplane. In short order he was fired up and taxiing. A pause at the end of the runway, and he was turning to line up with the runway. Then he was rolling, accelerating the way a '104 should. When he passed Base Ops he was beginning to rotate, and shortly he was airborne. The gear snapped into the wells as the nose continued to rise. Too much, I thought, he's trying too hard. Not enough speed for a truly impressive climb, but he's trying.

Well, the climb was impressive after all. To any layman, and even to most people with professional knowledge of airplanes, the extreme pitch attitude was impressive. And the rate of climb was enough more than most airplanes to attract admiring onlookers and complimentary comments.

But the rate of climb could have been a lot greater and a lot safer if the pilot had thought for a moment about the effects of airspeed on drag and thrust. Specifically, when he succumbed to the desire to do a bit of grandstanding (and it was a beautiful, clear, cold, invigorating day for it), he didn't plan his little demonstration to use the excess thrust of his airplane to the best advantage. Rotating early, he flew off at extreme angle of attack. By holding that angle of attack while trying to make an impressive climb, he was pulling an unnecessarily large amount of drag along with him. The drag kept him from accelerating, kept angle of attack high . . . and kept him from climbing at max rate of climb. Not only was his show less than best, he stayed perilously close to stall for a significant period of time while he was still very close to the ground.

He was soon out of sight, his con mixing with those of the airliners passing overhead. And then we were refueled, strapped in and on our own way. At home that night my thoughts returned to the mini-airshow and the F-104 pilot's false assumption that maximum nose up after takeoff equals max climb. I found myself going back to a similar, but far less successful, grandstanding attempt I had heard of a few years back. One where a C-130 pilot overseas tried a max performance, extreme pitch attitude, high angle of attack takeoff . . . and didn't succeed. He rotated early, was airborne after minimum run and disappeared into the low overcast in a startling, nose-high attitude. Seconds later, and only a few thousand feet down the runway, he reappeared from the low clouds in a 70-degree nose down attitude. He did not recover from the dive.

crowd-pleaser

CONTINUED

A C-130, even light weight, does not have the thrust to overcome exaggerated angle of attack that the F-104 has.

Both of these pilots were led astray because they did not understand induced drag and how it affects something called excess thrust. For simplicity's sake, we'll call excess thrust that amount of thrust your power plant is generating above the minimum required to overcome drag and maintain your aircraft, at a given weight and airspeed, in level flight. Therefore, the amount of excess thrust you can coax out of your machine will directly relate to your climb capability.

Total drag, and therefore excess thrust, are controlled by airspeed. At low airspeed, as in takeoff and climb, total drag is directly related to angle of attack (alpha). When you plot drag against airspeed this becomes more obvious. At minimum flight speed (just above stall) a large amount of drag is caused by the wing at high alpha. As airspeed increases, and angle of attack decreases, this induced drag drops off. The induced drag curve flattens out considerably, but as airspeed continues to increase, parasite drag increases. It eventually reaches values at high alpha which are much greater than induced drag.

The point where the two curves cross is the point of minimum total drag. It is also the point where you observe maximum excess thrust in many airplanes. When airspeed either increases or decreases from this point, more of the thrust available is used to offset drag and keep your bird in the air.

Now it makes sense, doesn't it? In an airplane with constant thrust, best sustained climb performance is going to be at that point where drag is minimum. Your best climb certainly is not ten or twenty knots above stall (or takeoff) speed where induced drag cuts significantly into the excess thrust your machine is capable of producing.

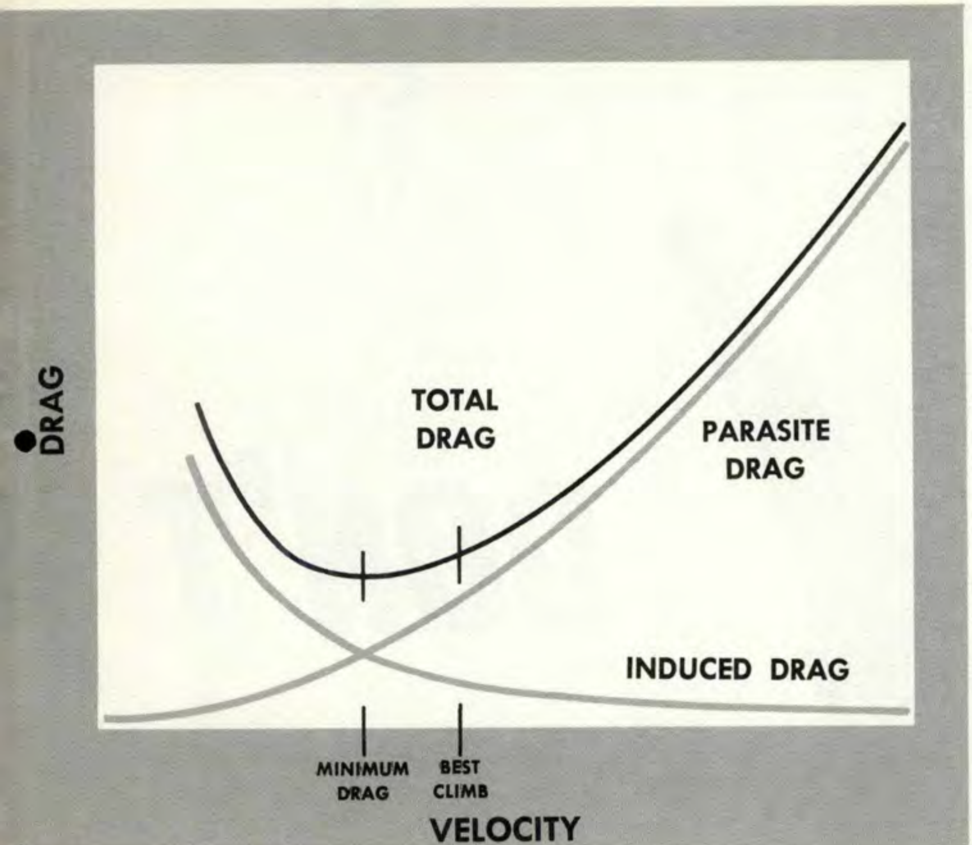
Okay, you say, that's fine. Best climb speed for an airplane producing constant thrust is the point where drag is minimum. All I have to do is monitor the Total Drag Indicator carefully during my crosscheck and I'll have it made. Since I haven't seen an airplane with a drag indicator on the panel, what does all this mean to me? Is this another gem of aeronautical information that I can't reach from the cockpit . . . that's nice to have handy when it comes to impressing friends and acquaintances at the bar?

No, it's a lot more than that. You *can* reach it from the cockpit. The airspeed that coincides with minimum drag is your best glide speed. And that's in every Dash One. You should know it.

Now, carry this a little further and you come to recommended climb speed. In non-turbojet aircraft you'll find the recommended climb speed is close to, but a little above best glide speed. It's above glide speed to account for the energy you dissipate while rotating to climb attitude.

The energy dissipated while you rotate from acceleration to climb attitude doesn't require a lot of explanation. It's easy to see that if you rotate right at best glide speed, you will probably have less than that speed when you arrive at your intended climb attitude. You will have less than max excess thrust at your command, and will be in real danger of falling farther behind the power curve. This is most important in birds with limited excess thrust — transports, bombers or fighters at heavy gross weights. Turbojet engine thrust generally increases with airspeed throughout the speed range of the aircraft. Therefore fighters in a clean configuration have plenty of excess thrust. They are capable of rotating at almost any speed and still retaining enough thrust advantage to continue to accelerate and climb. These birds encounter a different set of problems that are primarily concerned with pitch attitude. To the unthinking or uninformed, pitch attitude relates directly to rate of climb, but think about it for a minute.

At 30 degrees of pitch, the vertical component (vertical speed) of your climb vector equals 50 per cent of your true airspeed. At 50 degrees, vertical speed is approximately three-fourths of true air speed. And at 60 degrees pitch only ten per cent more of your air speed is converted to climb. Fifty degrees of pitch is not desirable because you are in the area where airspeed bleed off is becoming severe. Around 40 degrees and above, pitch attitude requires extremely close attention to maintain airspeed. Once you allow the speed to start decreasing without immediately reducing pitch, you will find that airspeed is disappearing faster than you can push the airplane over. Before you know it, you have backed yourself into a critical near-stall condition with the nose still high in the air. You not only have a very serious control problem on your hands, but your climb demonstration has completely ceased to be a climb demonstration. Few on-



and you are immediately faced with rapidly decreasing airspeed.

lookers are impressed by a recovery from unusual attitudes at low altitude.

To bring all this into focus, let's look at the F-4. The Dash One lists two climb schedules: 350 KIAS to cruise Mach, and 350 KIAS to .9 Mach. The 350 schedule assures you plenty of excess thrust, and it also keeps you at a pitch attitude you can comfortably control. At that speed and attitude, your forward speed gives you over 10,000 feet per minute up to start, and increases as true airspeed increases in the climb! That's impressive from the ground. You'll find you're holding about 25 degrees on the attitude indicator. And when you look outside you'll feel like it's a lot more.

So what's this all boil down to? You *can* make a demonstration climb in any bird if you know what you're doing. If you think in terms of thrust and drag. And when you're thinking this way, you'll rapidly come up with figures that closely resemble the climb schedule in the book. But you must temper your desire to make it look good to the folks on the ground with a sober evaluation of the machine you are flying.

• In a heavy, high-drag airplane, whether it is a many-motor model or a fighter with a lot of drag devices hanging under it, you must keep in mind the energy dissipated in rotation. Certainly you must stay above best glide speed.

• In a light fighter, you are concerned with over-rotation and rapid airspeed bleed-off. G-loading in the rotation and rate of G application are important here. Both can get you into trouble. Overshoot to a steeper attitude than you intended, and you are immediately faced with rapidly decreasing airspeed.

Let's face it, you can make a good crowd-pleaser out of a tech-order climb in a light-weight, high-performance fighter. Few of your admirers on the ground will be able to detect the difference between 10,000 feet per minute and 15,000 . . . when you will be out of sight in about a minute anyway.

In any other type or configuration, a tech-order climb may not be as spectacular, but you're better off giving them a show of good, professional airmanship than attempting something the bird was not designed for . . . and falling flat on your face!

Don Stuck, test pilot for McDonnell Aircraft Company wrote a few years ago in Tiger Talk II that ". . . for my money there is *no* method for tactical application which can provide any significant improvement over the properly executed handbook takeoff technique." He goes on to say, "After the aircraft breaks ground, it can only do one of three things to impress a crowd.

• Crash,

• Maneuver close to the ground to include acrobatics and low speed flight,

• Climb."

Don't laugh at Number 1. If your post-takeoff climb is not carefully planned and properly executed, you stand a good chance of providing a lot more "show" than you were counting on.

Leave Number 2 for the experts. There are rules about those things.

And when you get to Number 3, think about excess thrust. Quoting Don Stuck again, "It is obvious that you can't climb without pointing up. It is also obvious that you can't climb after you are pointed up if you have no forward speed. The best trade-off or cross-over point is what we're looking for."

And that's a tech-order climb. ★

DON'T W

1969 experience reinforces that oft-repeated advice on ejections . . .

AIT.. GO NOW

ROBERT H. SHANNON • Directorate of Aerospace Safety

Ejection attempts outside the envelope helped drive the USAF ejection success rate for 1969 to the lowest figure in 11 years.

If you fly an ejection system equipped aircraft, go back and reread the preceding paragraph.

Through December 10, there were 162 ejections in 1969, only 127 of which were successful—non-fatal—for a 78 per cent success rate. With the improvements in ejection systems in recent years the obvious question is why? There are some very good reasons and aircrews should understand what they are and what can be done to improve the situation.

The following is based on a critical, in-depth review of information submitted concerning the 35 crewmembers who did not make it.

The experience by aircraft type shows an 82 per cent success rate for fighters, 85 per cent for trainers, only 53 per cent for bombers, and 83 per cent for other type aircraft such as the A-1 and OV-10. With the possible exception of the trainer types, these are all considerably lower than we have observed over the years. The low percentage for bombers was entirely the result of one aircraft, the B-52. There was *not* a successful ejection from the B-52 in nine attempts last year.

The 35 fatalities were categorized as follows:

OUT OF THE ENVELOPE

Ejected out of the low level capabilities of the system involved, i.e., time available for completion of the ejection sequence was less than the time required, due to insufficient terrain clearance, bad attitude, high sink rate, and sometimes low airspeed. This accounted for 23 (65 per cent) of the total.

SYSTEM FAILURES

Three fatalities (9 per cent) were due to system failures. These were definitely identified system failures and do not include difficulties such as seat-man-chute interference, inadvertent lap belt opening, etc.

OTHER

The remaining nine (26 per cent) cases were categorized as "other" or, if you will, "misadventures." These are usually conditions that occur during within-the-envelope ejection.

Of the 23 out-of-the-envelope fatalities, 11 involved significant delays in initiating the escape sequence. Two of these were the result of attempts to avoid populated areas, six pilots delayed escape in an effort to overcome a problem, and one was attributed to possible confusion following a midair collision. In two cases, the cause of the delay could not be determined. In ten of the eleven, an earlier decision probably would have resulted in a successful rather than a fatal ejection.

Perhaps there isn't much that can be done to preclude delays due to attempts to spare the civilian populace or those that result from a traumatic experience such as a midair collision. However, staying with an obviously disabled aircraft while trying to overcome a hopeless situation, to the point where survival becomes marginal, is not only unrealistic but downright foolhardy.

Evidence indicated that in some of these cases the crewmember's decision was influenced by a misconception. He was told that his escape system had been modified to increase the escape envelope. This is true, but it is apparent that many crewmembers do not really understand the real intent of these egress system update programs. We can't emphasize enough the necessity for an early decision to eject. Aircrews must understand that improvements to escape systems are incorporated for the sole purpose of enhancing survival should it become necessary to eject in a marginal situation. System improvements should *never* be the basis for staying with the aircraft "just a little longer" to try to bring it in.

Our analysis also disclosed that at least five of the out-of-the-envelope fatalities might have been prevented had the systems involved incorporated available modifications developed to improve the success of ejection escape.

In the three cases involving system failures, one was due to delayed ignition of the rocket catapult which caused extensive damage to the back of the seat. The damage caused the survival kit to become jammed in the seat, preventing separation. The pilot deployed the chute manually while in the seat; however, it became entangled with the seat and did not inflate. The problem of delayed catapult ignition was immediately fixed by a crash program. Unfortunately this problem was not brought to light until a life was lost.

In another case, involving an F-4, the scissor shackle failed to open because of a bent guard that had been incorporated with the recent egress system update program. This prevented withdrawal of the parachute drogue line which allowed the seat, man and parachute to descend as a unit. The seat, which remained attached to the withdrawal line, swung like a pendulum striking the pilot a lethal blow to the head.

The third system failure involved the force-deployed parachute. The cartridge, which deploys the drogue slug, did not fire due to a defective primer. The ejection occurred at a very low altitude and there was not enough time to manually deploy the parachute. When two other defective primers were found, the force-deployed parachute was temporarily removed from service. An around-the-clock effort is under way to correct this problem.

The force-deployed parachute is considered to be a good system and we are very concerned over the fact that involved crewmembers have been temporarily denied the added capability provided by this system. However, removal of the parachute pending fix was the only course of action open at the time. We are lending all possible support to insure that the force-deployed parachute is reinstated as soon as possible.

The *nine* fatalities classified as "other" are the misadventures that cause a within-the-envelope ejection to terminate in a fatality. Two of these involved seat-man-chute interference in one of which the man was struck by the other crewmember's seat after separation. This was a tandem aircraft and both ejections were apparently normal in all respects up to this point. To the best of our knowledge, this is the first such occurrence.

Two crewmembers failed to survive parachute water landings: one was drowned and another is missing. In the former, there is rather strong evidence that an unidentified system failure may have contributed to the fatality. The pilot was struck and apparently incapacitated by an unknown object. The seat and parachute were not recovered.

Inadvertent opening of the manual lap belt release contributed to one fatality. Although the conditions of ejection were marginal, it was concluded that the pilot would probably have survived if the automatic function of the parachute had not been lost. A possibility exists that this pilot *did not* attach the gold key.

In another case, it was definitely established that the gold key *was not* attached in an ejection that was initiated at about 12,000 feet AGL. For unknown reasons, the pilot did not attempt to manually deploy his parachute. This pilot apparently just plain forgot to attach the gold key. He had been flying recently with the force-deployed parachute which, of course, does not utilize the parachute arming lanyard.

Failure to separate from the seat from unknown causes, resulted in one fatality. The crewman impacted in the seat approximately three and one-half seconds after the lap belt fired. There is a slight possibility that he was hung up in the seat; however, it appears more likely that he held onto the seat handles. The ejection seat in this case does not incorporate a seat-man separator.

One pilot died in a low-level ejection when he descended into the fire ball of the wreckage. It is not known at this time if death was due to burns or free-fall when the parachute was rendered inoperable.

The final case is almost unbelievable. It occurred just recently, and although all the factors involved are not known as of this writing, the best evidence available indicates the pilot did not have his parachute risers attached to his harness. On deployment, he and the canopy separated.

In summary, then, the box score as of December 10 was 35 fatalities, 17 of which could have been prevented through the application of known available resources. The rate could have been a relatively high 89 per cent instead of a tragic 78 per cent.

When we talk about preventable fatalities, we do not mean to write off the non-survivable, out-of-the-envelope fatalities. The non-survivables mean just that. There are no systems in existence today that could have prevented these deaths. The ejections were attempted at the last possible moment when it was obvious that there was absolutely no hope for survival. This does not mean that our technology cannot and will not ultimately design systems that will effectively deal with any and all conditions. The attainable goal should be as near to 100 per cent success as possible. As a realist, I do not think we will ever reach 100 per cent. Regardless of the capability designed into the system, there will always be individuals who will push it beyond its maximum limits.

Failure to use the zero lanyard, failure to attach the parachute arming lanyard, failure to connect the parachute risers to the harness, holding onto seat actuating controls, delaying the decision to eject, all point up the need for a re-evaluation of current training programs. Until such time as all egress systems incorporate the latest state-of-the-art features, which is not in the foreseeable future, we must make the most of what we have. We must provide the crewmember a thorough knowledge of his equipment. His training in the use of this equipment must be the very best and as frequent as necessary to insure that his response to an emergency is an automatic reflex action. And he must know how to cope with any unusual "misadventure" that may occur.

But perhaps even more important, present egress system update programs must be continued and renewed emphasis placed on quality control procedures and system maintenance. ★

REX RILEY'S

CROSS COUNTRY NOTES

IN THE ARTICLE starting on page 15 of this issue you'll find two cases of unsuccessful ejection which were attributed to failure of the pilot to hook up to an important part of his ejection equipment. In one case an instructor pilot in a dual airplane failed to attach the arming lanyard gold key to his lap belt. Without it he lost all automatic features of his system. And it appears that he did not pull his D-ring.

The second case is truly hard to believe. Here, the pilot in the back seat of an F-4 did not connect his parachute risers to his harness. The system worked as designed: the seat left the airplane, the parachute deployed. *But the pilot wasn't connected to the parachute.*

You can attribute both of these to over-familiarity, relegating the procedure of strapping into an airplane to automatic actions which one accomplishes with little or no conscious attention. Once you develop a habit pattern, each action follows the one before it without a hitch — until something interrupts the sequence.

Habit patterns of this nature are unavoidable, really, in actions you repeat very frequently. You reach in your pocket for your keys as you approach the car; as you slam the door with one hand, the other is inserting the key in the ignition. Or, climbing in your favorite fighter, you place your left hand in one specific position and your right hand in another each time. You swing your weight into the seat in the same manner each time. Then body, hand and arm movements flow smoothly and automatically until you are all strapped in.

There's nothing wrong with this habit pattern business. It speeds up the routine, mechanical things we must do every day. And it leaves us free to occupy our minds with more challenging and varying activities. But don't trip on this one . . . these other activities are not necessarily more important. As a matter of fact, we perform many important and critical activities with little conscious thought. Like strapping into the life-saving systems in an airplane.

The critically important thing is to recognize that we do things this way. Recognize the possibility of interrupted patterns, overlooked steps. And recognize that the overlooked steps in the sequence may be terribly easy to skip completely. It would be immediately obvious if you failed to place your left hand on the canopy bow before you swung yourself over the rail to get into the bird. But when would you notice, in the course of other habit-enshrouded actions, that you hadn't connected yourself to your parachute?

Best to build some checks into your routine. If you're riding a seat in which you hook the parachute to you after you sit down, as in the F-4 or A-1, lean forward against the inertia reel at a specific point in your pre-takeoff preparations (maybe just before brake release or before you take the runway). Consciously . . . and conscientiously . . . build this habit as a check on other automatic actions you take. In a bird with equipment that calls for a "pins-canopy-lanyard" check, *look* at the gold key when you feel for the lanyard.

Take some time to analyze the automatic actions you take in your cockpit. Look for the pitfalls, the items which, when overlooked, would not normally come to your attention in the course of later actions. Then establish a check on these critical items.

A final note on this subject. No habit pattern is going to be unbreakable or perfect. Don't let the checks you build into your routine also become automatic. Don't allow yourself to get to the point where you lean against the inertia reel to check the risers, feel no resistance, but press on to other matters because you have performed the check.

I guess it all boils down to one thing. There are several points in getting ready to fly (as well as flying itself) where you just have to think! ★

BIRD ATTACK. Although the incident to follow occurred early in December, when birds were migrating south, it won't be long til the fowl will be going the other way, so be alert. The crew of a C-130 saw what they at first thought was smoke from a multi-jet aircraft. When they got a bit closer they saw that the "smoke" was a huge flight of birds stretched from horizon to horizon. It was apparent that they couldn't get above them, so they tried to descend and go under. Then a flight of birds left the formation and headed down. At about 400 feet AGL the aluminum bird met the feathered flock and took out five of them, one of which caused some damage to the aircraft.

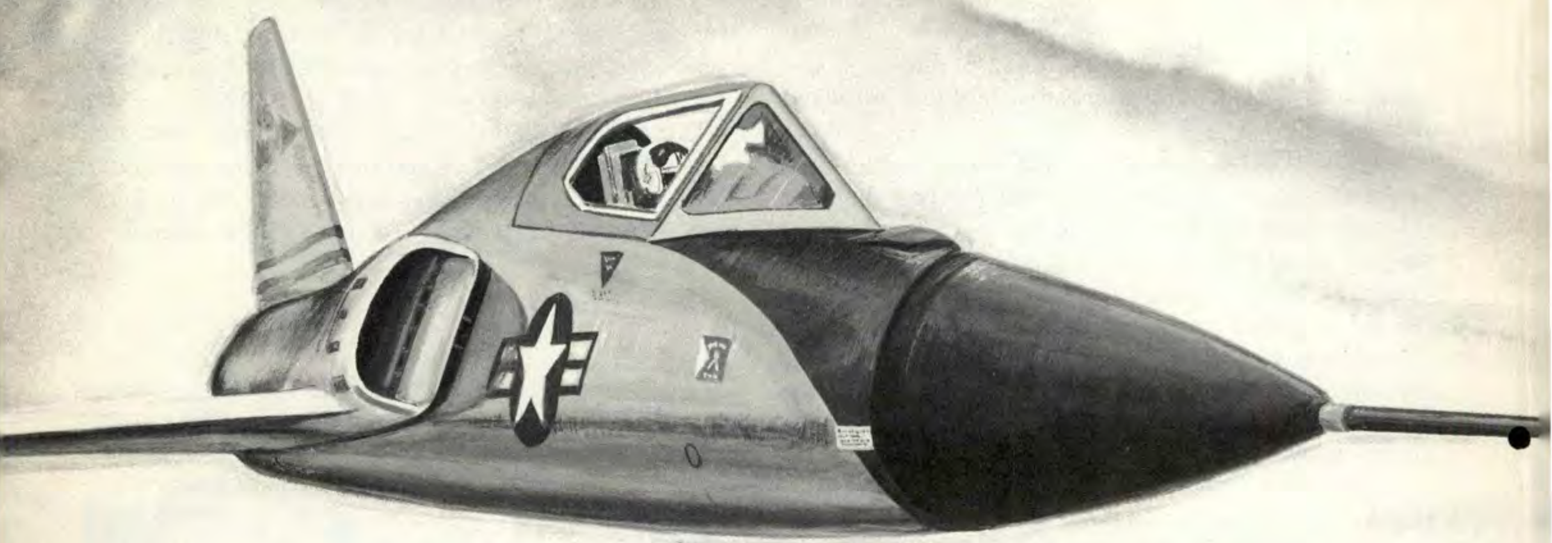
WINTER OPERATIONS. One of the winter flying problems that seldom gets advance attention is the increase in takeoff acceleration on cold days — and the increased possibility of exceeding gear-down speed on takeoff.

Most of us have developed a certain timing or rhythm for the many items that clamor for our attention during the first few seconds after liftoff — engine instruments, runway alignment, gear up, flaps if we use them, accelerate to climb speed and press on.

On many airplanes, we hesitate while the flaps are coming up — watching the slight sink or adjusting angle of attack to keep a climb going while the wing is being reconfigured. And after we once become accustomed to a particular airplane, there's no difficulty in performing these various chores in plenty of time. On all but the coldest days we have no difficulty getting the gear tucked in and the doors closed before we reach the magic airspeed the Dash One calls max.

But on the cold days, look out! That nice, comfortable rhythm you've developed may be just what catches you. You look at the airspeed meter and then the gear indicators and find that you've done it — exceeded the gear speed.

Don't grab for the gear handle — even though it is the first thing that comes into your mind. First, slow the bird below gear speed by raising the nose. Be careful about reducing power. *Then* cycle the gear. You're less likely to be embarrassed when the crew chief asks what happened to your gear doors. ★



into the hillside...

"IF NO TRANSMISSIONS ARE RECEIVED FOR TWO MINUTES ON THIS VECTOR OR FIVE SECONDS ON PAR FINAL PROCEED VFR; IF UNABLE, EXECUTE AN ILS APPROACH. IF THIS IS NOT POSSIBLE, THEN EXECUTE ANY OTHER PUBLISHED APPROACH AS APPROPRIATE."

There is something unusual in the lost communications instructions above. Did you catch it? " . . . *two* minutes on this vector . . ."

You probably did not catch the change from the normal one minute procedure until you read through it a second time. And this is the way most of us treat lost communications procedures when we hear them from a radar controller. We've heard them so often in the past that we hardly listen to them. They're always the same.

One stateside base took this approach and decided it was unnecessary to repeat the instructions every time a local pilot makes a radar vector approach. They printed the lost comm procedure as quoted above in their base 55-series manual and told local pilots they were expected to comply with it. On the surface it appeared to be a good idea, it saved a lot of time and chatter during periods of heavy recovery traffic.

But it didn't save an airplane and a pilot. One morning last year a fighter pilot from that base lost communications with the radar approach control shortly after he descended into a low cloud deck while being vectored to GCA final. He was level, about 2500 feet above field elevation, when he last received and acknowledged a transmission. Three minutes and forty-five seconds later, in level flight and on the last heading he had acknowledged, he flew into a hill.

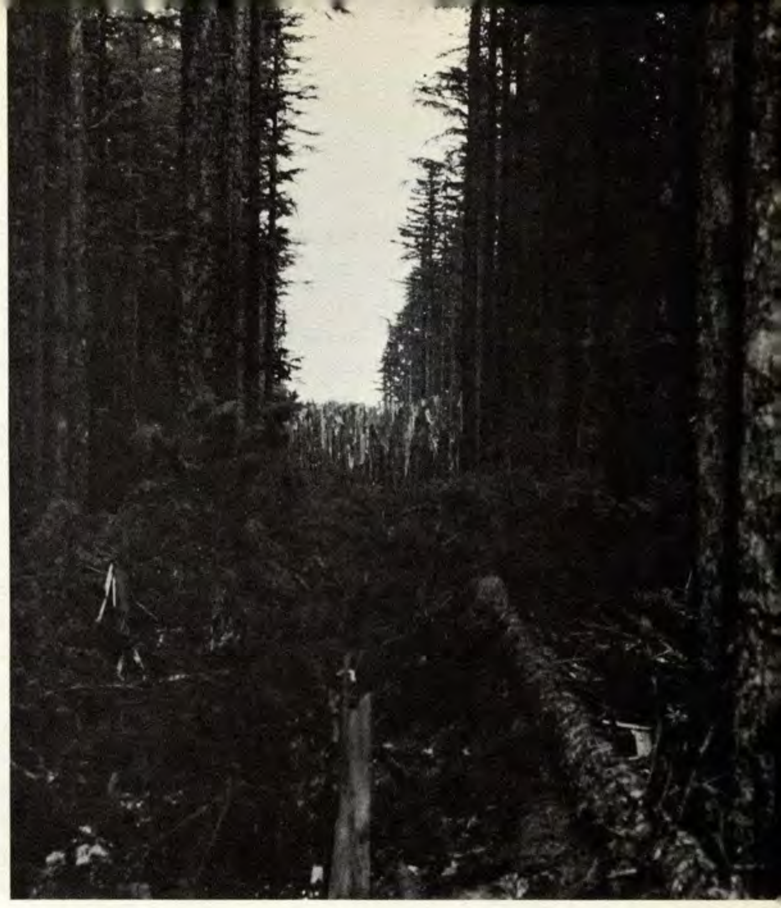
Trouble started when he was directed to change frequency after a flight break-up. He called several times, on several frequencies. The controller attempted to contact him many times. He received and acknowledged a heading change, but at that time he probably was not transmitting on the frequency the controller was monitoring. In the time between that heading change and impact, calls were made from Approach Control and Center on Guard, the TVOR frequency and several approach control frequencies, directing the pilot to make an emergency turn and climb.

This pilot failed to take several actions which he would be expected to take. Any of them would have saved his life. He failed to:

• Monitor Guard channel. The function selector on his UHF radio control panel was found in the Main, rather than Both position.

• Monitor the TVOR frequency or use his Data Link receiver as a backup UHF receiver. Squadron procedures directed the use of ILS receiver to monitor TVOR voice, and Data Link to backup the UHF control frequency.

• Check his position on TA-



STRAIGHT AND LEVEL NEARLY FOUR MINUTES AFTER THE LAST TRANSMISSION.

CAN relative to the airfield. His equipment was functioning, indicating the correct location at impact. Although the heading he was flying was normal for a radar approach to the field, he was several miles outside the normal pattern.

- Identify the frequency he was calling on. He made several calls on frequencies other than the one last assigned. Had he made it clear to the controller that he was on another channel, and which one it was, they would have had a better chance of getting together.

But most important, he failed to comply with the established lost communication instructions when he was unable to contact his controller for more than the prescribed two minutes.

It's the pilot's responsibility to take action when he loses radio contact during an approach. There's no other way. Although this pilot knew he had comm trouble, he continued on the same heading and altitude for nearly four minutes.

The manner in which the lost comm instructions were handled at this base may have helped to lull this pilot into overlooking them or not giving them the urgent attention they deserved. The procedure was not read to him as he started his approach. Certainly he was expected to know the procedure, but there was no active reminder which would be fresh in his mind when difficulties arose. Even if he didn't actually listen to the details of the procedure when it was read, recent exposure could be expected to trigger more reaction than he exhibited.

The lost comm period of two minutes instead of the one-minute standard may also have helped to set this one up. Few, if any, of us actually watch the clock after every transmission to see if a minute will elapse before the next one. But when you know in the back of your mind that you have two minutes instead of just one, the entire problem seems more remote. And when a controller knows that he need only transmit within two minutes instead of one, he may frequently exceed a minute or a minute and a half, particularly when he is busy. Pilots flying regularly in this environment become accustomed to longer periods of silence.

For years pilots have been flying into mountains minutes after they should have taken lost comm action. And unfortunately, we will continue to come up with accidents like this as long as we fly around in the clouds depending on instructions from the ground. There is only one way to prevent them.

Think lost comm! Be alarmed when you haven't heard that friendly voice for a while. If in doubt, call the guy and ask if he's still there. If the whole world's been quiet for a while and then you suddenly receive a transmission, it would be a good idea to double check with the controller to see if you've missed a transmission or two. And once you get into a scrambled-frequencies situation, watch the clock and be spring-loaded to the emergency procedure.

It's the only way. ★

The flight started as a fun thing. One doesn't often get the opportunity to pick up a brand new airplane at the factory and ferry it home. In this case, a single engine retractable — one of the latest models on the market — destined for the aero club.

Yes, the flight started as fun but it deteriorated into serious trouble brought on by an electrical malfunction, weather and inexperience, and finally ended in near-disaster. Fortunately the pilot sustained only minor injuries.

When the club had decided on the make and model of airplane to buy, one of the club officers who had been on the selection committee volunteered to go to the factory and ferry the new aircraft home. His offer was accepted and he duly set about the task. During the selection process he had flown the type one hour with an instructor and he received a ground checkout at the factory. Then he set off.

The first leg was just under five hours and uneventful. After refueling the pilot got a weather briefing in person at an FSS and filed VFR for home base, with an ETE of 3 + 45. The weather briefing indicated a cold front across his flight path with low ceilings that he would not be able to fly under.

In reviewing the history of this flight, it is apparent that the decisions made at this point ultimately culminated in the accident. Since he couldn't get through beneath the clouds, the pilot decided to file VFR on top with the intention of checking the weather enroute and making a decision later. Night was coming on and the pilot was relatively inexperienced (238 hours) and not instrument rated.

The flight departed at 1742 local which would put him into his destination at approximately 2127 local. Two hours after departure, as he approached Knobby Knoll VOR (all references to places are fictional), he called and asked for the weather. He was now at 10,500, VFR on top and, if the weather was not good, he intended to do a 180.

It was at this time that the pilot got his first nasty surprise. He noted that he was late passing the VOR and began to check his nav equipment. Finally he discovered

he landed on a picnic ground but

THIS WAS NO PICNIC

that the alternator was inoperative.

Meanwhile, the cloud tops were taking him higher, so he called the next radio on his route and asked for assistance in determining his position and selecting a suitable airport. By now he was at 12,500 and the FSS turned him over to Metropolitan Center. When he contacted the Center he reported that he was at 14,000 feet and the Center Controller located him 10 miles west of Knobby Knoll VOR. The Center established that the aircraft had 2 + 30 fuel remaining, that the pilot had been flying above 10,000 feet for about an hour and that he wanted vectors to the nearest airport he could get into.

The pilot, perhaps both over-anxious and over-confident, indicated to the Center that he was instrument qualified and that he could handle the weather and an instrument approach. The Center then vectored him toward Central City. To conserve the battery, the pilot turned off all unnecessary electrical equipment and lights. As the Center continued to direct him toward Central City and descended him to 7000 the battery gave out and the radio became inoperative.

Fortunately in a few minutes he broke into the clear, saw city lights below and descended to begin looking for an airport. It took a while with the charts but he finally identified the city. After flying around for about 45 minutes in a futile attempt to locate an airport, he spotted a flat area with flood lights on one side and went down to 800 feet to take a look at it (the place was a picnic ground parking area).

Deciding it was now or never, the pilot set up a tight pattern, slowed to near stall speed on final and prepared to land. Unfortunately the right wing tip hit a tree, which yawed the airplane slightly right. At about touchdown the right wing struck a light pole and sheared. The aircraft came to a stop and the pilot got out as quickly as possible. His only injury was a bump on the forehead.

The investigation of this accident produced a number of findings as to causes and recommendations to prevent recurrence. Most of these revolve around the pilot: He failed to maintain VFR, misled the center controller into believing that he was instrument rated, violated the club rule and AFM 215-4 on night flying, failed to heed the club president's instructions in regard to night flying and to maintain VFR at all times, was not qualified in the aircraft IAW club procedures.

Other contributing causes included materiel failure and supervisory factor: Aero club supervisory personnel did not determine that the pilot was qualified in the aircraft, failed to review his proposed flight plan and did not brief the pilot on specific procedures to be followed during the ferry flight.

Air Force aero clubs have come a long way from the loosely organized groups they were a few years ago. This accident indicates that the improved management and procedures that have been established must be maintained. Further it lends credence to the old saying that a pilot is most dangerous between about 200 hours and 1000 hours of flying time. He has learned enough to be a proficient flyer but hasn't had enough emergencies to keep him from being over-confident of his still limited abilities. ★

The Behind-The-Line Pilot...

Maj Larree D. Chetelat, AFSC

The relationship between the flight manager and the attached pilot is often strained by a conflict between the pilot's loyalties to his desk and the cockpit. The flight manager would like all his pilots to act like fulltime pilots; the office boss wants fulltime desk operators. And the behind-the-lines pilot finds himself caught in the middle. Immediate, daily office pressures occupy him most of the time. He finds he must spend extra hours (often "nonduty" hours) at his flying job to remain current, competent and safe.

It's easy to let the flying job be come a secondary job. Professional advancement, OERs — the rest of his Air Force career — depend on his performance in the office.

If you're in this position and haven't taken stock of yourself recently, spend a few minutes to evaluate your own situation. Ask yourself the questions on this page. No one need know the answers but you.

And if you answer YES too many times, no one can do anything about it but you!

1. Do I wait until the last minute to notify scheduling when I am unable to keep a flying commitment?

2. Do I continually turn down weekend and night flights because of other commitments?

3. Do I show up at Base Operations so late that there isn't time for adequate flight planning before takeoff?

4. Do I study aircraft systems and procedures only before a flight check?

5. Do I wait until the last part of the six month period to complete a proportionate share of flying hour requirements?

6. Do I expect a flight examiner to tell me during the flight check what I already should know?

7. Do I ignore letters or scheduling forms when a reply is requested?

8. Am I frequently "too busy" to return a phone call to flight operations?

9. Do I frequently cancel or reschedule training flights?

10. Do I feel that my responsibilities in the office are so pressing and important that I can't afford two or three days away on an extended flying mission?

11. Do I neglect to keep myself current on flying publications, regulations, technical orders, and changes thereto?

12. Do I spend so little time practicing emergency bold face items that my reactions are questionable when the situation develops?

13. Do I consider my office duties so pressing that I don't have time to attend flying safety or aircrew meetings?

14. Do I feel slightly apprehensive strapping into the pilot's seat because I haven't flown for 30 days or more?

15. Do I feel that I have not given the flying job my complete support because that is not where my OER is written?

16. Do I tend to rely heavily on the other pilot to handle unusual circumstances instead of being personally on top of all situations?
(Adapted from AFSC *Professional Approach*) ★

the I.P.I.S. approach

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

Q On a Radar approach (PAR-ASR), is the pilot informed of the landing runway?

A FAA Handbook 7110.8 states that Approach Information which includes runway in use will be given by Approach Control Facilities:

- Unless it is included in an ATIS broadcast for the airport of intended landing.
- When it has *not* been received by the pilot from ARTCC or another source. Therefore, the pilot should definitely receive the landing runway, probably more than once. If you don't get this information, you should request it since DH/MDA for the landing runway is necessary information for a safe approach and landing.

Q When does the radar controller give you weather information?

A Again referring to the FAA Handbook 7110.8, Approach Control Facilities are required to give you the ceiling and visibility if the ceiling at the airport of intended landing is reported below 1000 feet or below the highest circling minimum, whichever is greater, or the visibility is reported less than three miles. When such conditions exist, they will also transmit any known changes classified as special observations as soon as the volume of traffic, controller workload, and communications frequency congestion permit. This same requirement is listed under Radar approaches, so it is very possible that you will receive the weather information more than one time.

Q Who is responsible for designing and approving the instrument approach procedures for my home drome?

A AFR 60-27 states that each base commander is responsible for requesting publication of the minimum number of instrument approach procedures necessary. It is impossible to say who on your base actually designed the approach, but a good place to start your search is at your base operations. Approval authority for approach procedures rests with your Major Command or numbered Air Force. If the published approach procedures for your base do not conform to existing standards in JAFM 55-9 and/or charting specifications, it may be a good idea to inform the proper authorities through channels. Your Major Command or numbered Air Force is also responsible for annually reviewing all procedures to insure they conform to existing standards. On this same general subject, approach designers sometimes overlook the sentence in AFR 60-27 that is very important: "Simplicity of design and ease of use should be the keynote for all procedures."

AFM 51-37

By the time you read this, if everything goes as planned, a complete revision of AFM 51-37, *Instrument Flying*, should be well down the road toward publication. (The actual date the manual will reach the field is uncertain.) As you probaby know, there is quite a time lapse between final draft and publication/distribution. As fast as changes occur in this day and age, it is impossible to furnish you a perfectly current manual. We have tried to revise, rewrite, rearrange, add to, and update material so that the end product will provide adequate guidance for instrument flight under most circumstances. It will *not* be, and was never meant to be, a substitute for sound judgment. This philosophy was followed throughout the revision. We tried to avoid restricting the pilot whose knowledge and experience allow him to perform better by adding sound judgment to procedures and techniques.

Some of the major changes include a complete rewrite of Chapter 2, now called Illusions of Instrument Flying; a completely revised and updated Chapter 6, Angle of Attack; a new Chapter 13, Nonprecision Terminal Instrument Approaches, which includes a lot of information previously found in the VOR and TACAN chapters; elimination of the old Chapter 17, Integrated Flight Instrument Systems, as this information is now included in other chapters, mainly Chapter 10, Navigational Instruments; and a major overhaul of Chapters 16, 17 and 18, Radar Approaches, ILS, and Landing From an Instrument Approach.

Drafts of the manual were sent to every Major Command for their inputs and approval. We sincerely hope you will find the end product improved and, above all, useful.

If you have questions about anything related to instrument flying, just let us know.

USAF IPIS (FT-IPIS-PS)
Randolph AFB TX 78148 ★

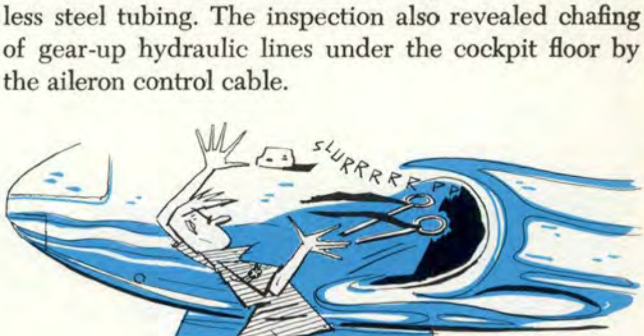
GEAR UP. Would you believe that a USAF senior pilot, with a commercial license, landed an aero club T-34 gear up at an Air Force base? We are not trying to ridicule this pilot. Who knows who will be next? We pass this on just to jog your gray matter with the realization that it can happen, no matter how many hours you have or how many aeronautical ratings you possess.

Over the years we have managed to stack up quite a number of items each designed to prevent just such a happening. We have warning horns, indicators, lights, checklists and the tower operator. And we have some procedures we are all familiar with but sometimes ignore. Like, when distracted, re-accomplish the before-landing-checklist before turning final. Like pulling the throttle all the way back to check the warning horn. Like making a last check for lights or indicators on final. Like not making an assumption and replying to the controller's query with an automatic "gear down" or similar phraseology.

Lt Col Thurman Lawrence, Jr.
Directorate of Aerospace Safety

CHAFED HYDRAULIC LINES. Loss of hydraulic fluid resulted in a gear-up landing in an O-2. The pilot put it down smoothly in foam and the aircraft received only very minor damage. When the maintenance types looked for the cause they found that the alternator blast tube was chafing a hydraulic line and eventually wore a hole in the line. Both the line and the blast tube were correctly installed but apparently when air was flowing through the tube it caused the tube to vibrate against the hydraulic line.

Following this incident all O-2s at the base were inspected and three nose gear down lines were replaced because of chafing. Additional clamps were installed where required and the unit has requested that aluminum hydraulic lines be replaced with stainless steel tubing. The inspection also revealed chafing of gear-up hydraulic lines under the cockpit floor by the aileron control cable.



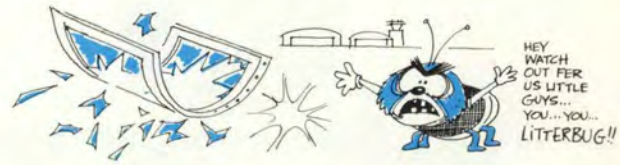
PINS AGAIN. This one is a bit ironic but it demonstrated again that constant vigilance is the password around aircraft. The crew of a T-33 was completing the before-taxi check with an airman stationed near the left wing tip. The pilot in the front cockpit was having difficulty closing the canopy and called for a check of the rear canopy. The guy in back was having trouble too so the airman moved in to assist him. In his right hand he had the pins and pitot cover and as he reached up with his left hand to help the pilot, the pins and cover were sucked out of his right hand and into the engine.

The ironic part is that this airman had previously been an instructor at Sheppard where one of his subjects was FOD. Aside from the fact that he had the items in his hand, he should never have approached so closely to the aircraft with the engines running.

TOO LATE . . . TOO LATE. During an air to ground range sortie, the number two F-4 in the flight was observed to nose over from 10,000 feet. Although the flight leader called repeatedly on the radio, there was no response from his wingman. The aircraft impacted in a 45-degree dive, traveling in excess of 500 knots. Although Flight Lead did not observe an ejection attempt, investigation revealed that the backseater did eject — but apparently out of the H-7 seat envelope. Apparently the pilot made no attempt to eject.

It would pay all of us to review the ejection envelope for various dive angles and airspeeds in the airplane we fly. If you're not familiar with it now, the information you come up with may surprise you. In the case above, with an H-7 seat and two-second crewmember reaction time, from a 45-degree dive at 500 knots you would need approximately 3000 feet for completion of the ejection sequence. And that doesn't account for altimeter lag! !

(Adapted from CROSSFEED)



AW, C'MON GUYS! DEPARTMENT. Explosive Accident — Type Aircraft, F-4. "After completion of mission, navigator inadvertently pulled canopy jettison handle while attempting to open the canopy. Canopy shattered upon impact with ramp."

HERE'S YOUR CHANCE....
NAME THE NEW
AIR FORCE SAFETY MAGAZINE

Beginning with the March 1970 issue, Aerospace Safety, Aerospace Maintenance Safety, and the USAF Nuclear Safety magazines will be consolidated in a single, comprehensive monthly accident-prevention publication. We want YOUR suggestions for a name for the new magazine.

I suggest the title of the new magazine combining Aerospace Safety, Aerospace Maintenance Safety and USAF Nuclear Safety be ....

MAIL TO EDITOR
AFIAS-E1
NORTON AFB
CA 92409

YOUR NAME ____________________

ADDRESS ____________________

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"ARE YOU READY?"

Reference "Are You Ready?" *Aerospace Safety* magazine, November 1969.

I wish to personally commend the author of the article "Are You Ready?" I was the Base Disaster Control Officer on the overseas base where the major aircraft accident used as the prime example in the article occurred.

I certainly learned some very valuable lessons and I, too, hope that "some deep, honest study by everyone reading it" will result.

1Lt Roger M. Ashley
2851 Air Base Group
Kelly AFB, Texas

ANGLE OF ATTACK ARTICLES

The *Aerospace Safety* magazine has had some fine articles on angle of attack systems recently ("Aural Alpha" and "What's Your Angle"). I would like to clarify one sentence in the latter article, however, to indicate that alpha is independent of landing gear position and is a function only of the wing configuration. As the author points out, icing (which changes the air foil) can invalidate the indication shown to the pilot.

Gary E. Krier
NASA, Flight Research Center
Edwards, Calif.

In the referenced article, we were talking to the pilot, and landing gear position will affect his presentation of alpha in the cockpit . . . in most airplanes. With fuselage-mounted alpha vanes, we often find that extended landing gear, gear doors and open gear wells change the local flow around the vane in flight, giving an erroneous indication of change when wing angle of attack has not changed.

UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

U. S. GOVERNMENT PRINTING OFFICE 1970 391-395/6

Colonel Gus Weiser
Pilot

Captain Wendell Adams
Aircraft Commander/IP

MSgt Zigmont W. Dawid
Flight Engineer

551st Airborne Early Warning & Control Wing Otis AFB, Massachusetts

On 5 March 1969 Col Weiser, Capt Adams and MSgt Dawid were departing Goose AB in an EC-121H. Aircraft weight at takeoff was 137,000 pounds. The weather was a 300-foot ceiling with two miles visibility in snow. As the aircraft became airborne, the fire warning circuits for Nr 1 engine activated. Sufficient runway did not remain to abort and a visual scan revealed flames coming from Nr 1 engine. Col Weiser ordered Nr 1 engine feathered; however, the fire continued until the engine fire extinguisher was discharged. Although a three-engine climb was continued, ground clearance remained less than 100 feet due to rising terrain and heavy gross weight. Therefore, Capt Adams directed the flight engineer to start dumping fuel. Captain Adams then notified Goose Tower that they had feathered Nr 1 engine, were declaring an emergency and attempting to climb to a safe altitude. A very slight rate of climb was maintained during the turn dictated by some hills rising into the clouds. Col Weiser and Capt Adams decided to remain VFR below the cloud base of 250 feet, until a weight was reached that would permit a better rate of climb and until radar contact could be established with Goose Approach Control. Takeoff power was maintained on the remaining three engines until the aircraft reached 140 knots, then the throttles were reduced to maximum continuous power.

Just as the Goose AB housing appeared directly ahead, the Nr 3 engine oversped to 3250 RPM. The flight engineer reported he had no governing control over the propeller and was retarding the throttle to try to get the RPM within limits. At idle, the RPM dropped to 2200.

Col Weiser began a shallow left turn toward the field, away from the dependent housing area. Because the aircraft still weighed over 120,000 pounds, level flight could not be maintained on two engines with the flaps in the takeoff position. Captain Adams set maximum power on engines 2 and 4 and directed the flight engineer to place the hydraulic crossover switch to emergency to give backup hydraulic pressure to the flight controls. Capt Adams then began to raise the flaps in small increments to reduce drag. Capt Adams eased the Nr 3 throttle forward to check the manifold pressure at 2900 RPM. At that RPM manifold pressure read 23 inches so it was decided not to feather the engine.

At less than 100 feet above the ground, with the flaps at 20 per cent, Col Weiser was able to maintain level flight at 135 knots, 15 knots below the minimum safe two-engine airspeed. Capt Adams notifed Goose Approach Control that they had lost another engine and requested a direct heading to the nearest runway at Goose. Although only two miles from the runway, neither pilot could see the field because the aircraft was in a depression below the field elevation.

Fuel dumping continued and as weight decreased a slight climb was possible. At one mile the runway was sighted directly ahead. Approximately one-fourth mile from the end of the runway Capt Adams directed the flight engineer to stop dumping fuel. He then placed the gear handle down. The flaps were left at 20 per cent so that gear extension would not be slowed by two systems operating on the hydraulic system at the same time. The gear locked down as the aircraft crossed the runway threshold and Capt Adams immediately placed the flap handle down. The flaps reached the down position at touchdown.

The aircraft was stopped on the runway so that a fire truck could assure the dump chutes had closed properly. The aircraft was still several thousand pounds heavier than the maximum normal landing weght. Investigation revealed material failure of a power recovery turbine hood on Nr 1 engine. This had allowed exhaust flames to start a fire inside the engine cowling, causing extensive damage to the engine area. The propeller governor on Nr 3 engine had failed, necessitating an engine change.

This crew exhibited outstanding teamwork, thorough knowledge of emergency procedures, and quick thinking which no doubt saved their lives, a valuable aircraft, and possibly the lives of some of the residents of the Goose dependent housing area. WELL DONE! ★

I'LL GO TO BAT FOR YOU

TOOTS is my name and I'm interested in your problems. I have been answering questions about Tech Orders and things for the maintenance fellas for years. Now I'll be answering questions for you aircrew guys as well. Write me c/o Editor (AFIAS-E1), Dep IG for Insp and Safety, USAF, Norton AFB, CA 92409.