Interceptor

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Interceptor

FOR THE MEN AND WOMEN RESPONSIBLE FOR AEROSPACE DEFENSE

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SPOTLIGHT

A person can feel that he has attained a modicum of maturity when the things he has to do and the things he wants to do start becoming the same things.

INTERCEPTOR Staff

DEPARTMENTS

SPECIAL FEATURES

OUR COVER

Sgt. Leon Basler captures the spirit of the Christmas season in an original painting. The INTERCEPTOR staff wishes you joyous accident free holidays. Fly safe, drive safe. Cheers!

"... where human failing caused an accident, one of the more dominant factors contributing to that cause was the lack of communications..."

While glancing through some old notes from the Safety Officers' course at USC, I found this statement double underlined: "Communication is the key to motivation; motivation is the key to accomplishment. When a conflict in communication occurs, the mind becomes biased and the goal becomes unpredictable." How does all this apply to safety? Well.

We've all heard the expression that accidents don't just happen — they are caused, and generally speaking people are the underlying cause factor in accidents. Statistics also show us that where human failing caused an accident, one of the more dominant factors contributing to that cause was the lack of communication, or more correctly, lack of understanding.

The art of effective communications is something I've always been interested in, and the formal and practical knowledge I've acquired over the years tells me this: wherever there is a breakdown in communication or understanding and a job isn't performed properly, the fault usually lies with the person who gave the directions. This is because that person is the one who originated the requirement for action.

Since communications is a "two-way street" — between the "sender" and the "receiver"—the "receiver" can't be expected to respond to (or comply with) instructions, if he didn't receive or understand the basic message. Nearly all of us have experienced the frustration of trying to decipher the typographical errors in a poorly transmitted TWX. But imagine the frustration at the operator level when the words seem clear, but the message is not.

A recent Navy accident highlights the vital necessity for accurate communications. The story goes like this. Two carrier aircraft launched in rapid succession. The second bird caught fire just as it left the catapult. The air boss shouted, "Off the bow, you're on fire, eject." You guessed it! The aircrews from both airplanes jumped out.

Our operators expect us to give them the word in clear text — ungarbled, straight, and pertinent. When we don't do this we cannot expect them to perform as we wish. The "how" of communication is not the real problem. Whether we communicate via the written word, spoken word, secret handshake, signal mirrors, smoke signals, or whatever, is not the issue. The point is to gain understanding by using the right words to express exactly what you mean. Example: "Do it now" versus "the interface between word and deed should be addressed without further procrastination." Perhaps an unidentified cynic said it best: "I know you believe you understand what you think I said, but I'm not sure you realize that what you heard is not what I meant."

COL JOHN M. VARGO
Chief of Safety

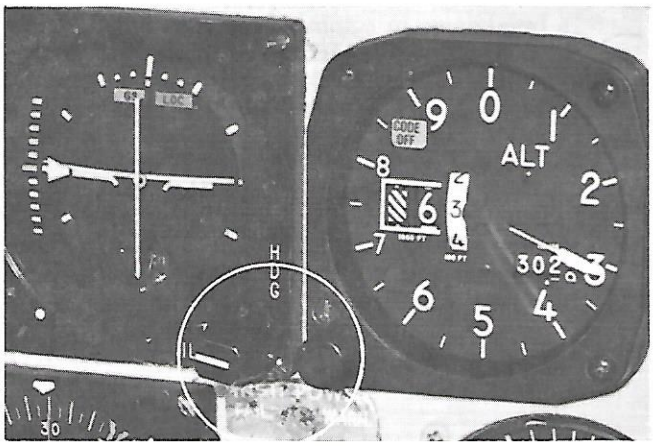
HOT LINE

APPLY HEAT TO REMOVE THAT STIFFNESS. This is not a commercial for some analgesic balm but a story of how, after three in-flight stiff stick write-ups checked out okay on the ground, the Voodoo Group Safety Officer started digging. The stiffness occurred at about 30,000 ft. at 270-300 KIAS but would clear up as the birds descended through 18,000 ft. The pilots had to force the sticks both out of neutral *and* back to neutral, so the "bind" was inboard of the control spring cartridges. They suspected frozen moisture because it had rained for several days prior to these incidents. But if freezing was the problem, it had to be where there was *some* heat because the controls would free at 18,000 ft., even though the freezing level was at about 6,000 ft. Some felt that the area of concern could be under the cockpit floor. The control torque tube bearings and feel spring cartridge are there. They flew a series of tests to determine the temperatures under the cockpit floor. They cruised at 280-290 KIAS, set the cockpit Temperature Control in the AUTO position, and waited five minutes at each altitude for the temperature to stablize. The results were:

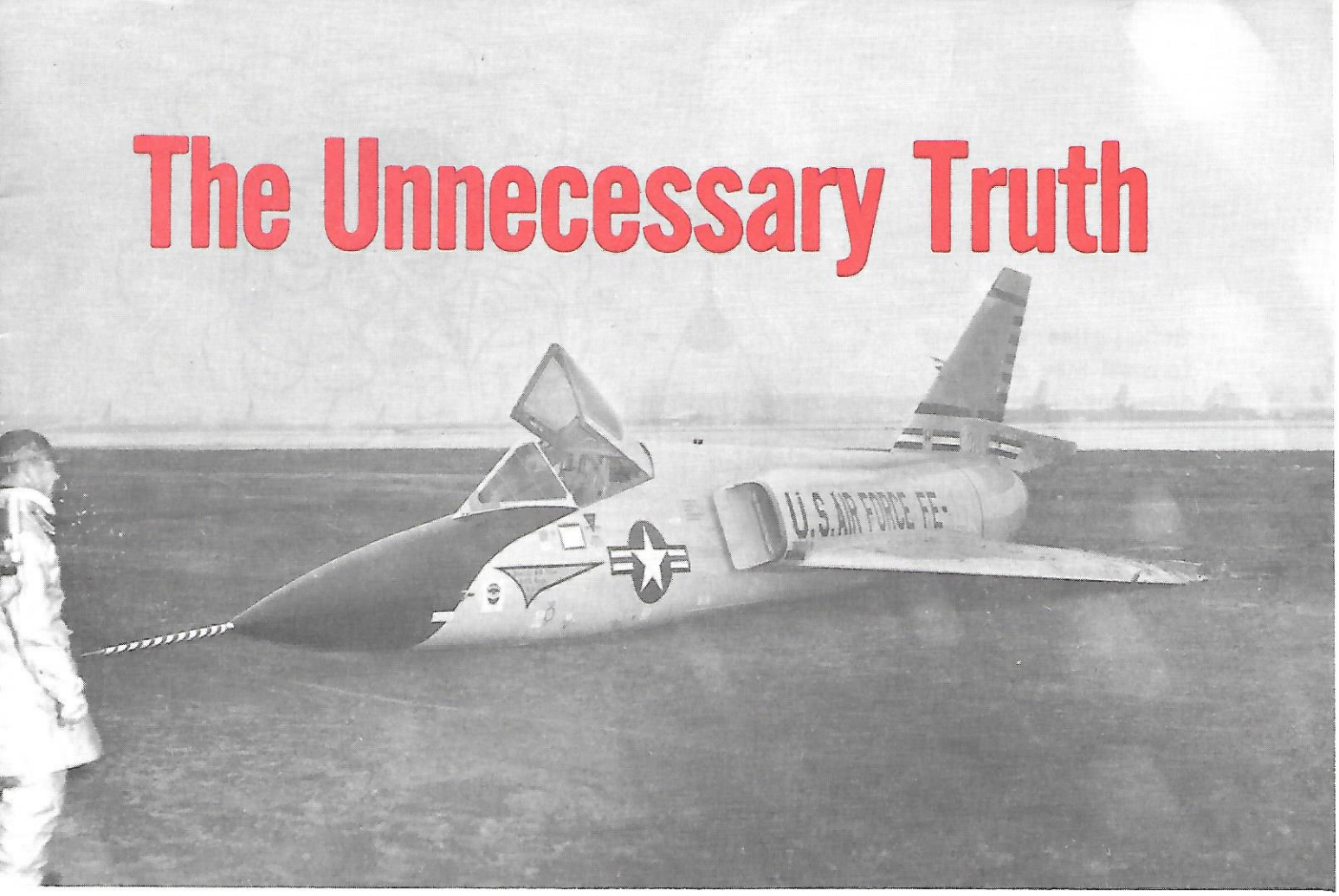
Altitude	OAT C°	Cockpit Temp C°
15,000	-11°	+25°
20,000	-19°	- 6°
25,000	-31°	- 5°
30,000	-44°	0°
35,000	-53°	+10°
40,000	-58°	+25°

Cockpit temperatures are affected by the Temperature Control setting, the efficiency of cockpit pressurization and the power setting. When crews are wearing heavy winter clothes, the temperature on the floor can drop to below freezing before crewmembers feel the cold. Thus ice could form within and under the cockpit and cause this stiffness without anyone realizing how cold it was. Since the pressurization system works to maintain a 5 psi differential, it will pump in more air and raise the temperature as you climb. A higher power setting (even momentarily) will also help raise the temperature under the cockpit floor. Under the same conditions and after the cockpit temperature had stabilized, the test pilots put the Cockpit Air Temperature Switch in MANUAL and held it in the hot position for one minute. This did raise the temperature and they briefed the crews on what they'd found. Since then there have been three more stiff aileron incidents. In each case the pilots used this procedure and in each case the controls shortly returned to normal. If it happens to you remember this simple procedure. You can maneuver more easily while you're waiting for the heat to thaw the ice under the floor if you select AFCS and use Command Stick Steering, Heading Select, or Heading Pre-select. Be sure to write-up the incident even if adding heat cured the stiffness.

LITTLE "NUDGE" — BIG ERROR. As the C-131 pilot turned onto the ILS final, he switched the MA-1 Flight Director from HEADING to ILS. The movement of his gloved hand turning the Flight Director knob caused his fingers to brush against the Kollsman window adjustment knob on the AIMS altimeter turning it enough to create a 200 foot altimeter error. (See cut.) The pilot was unaware that he'd changed the altimeter and, in this case, the weather was good enough so it didn't cause a hazard. But on that day when the "suds" are in the trees, that 200 foot error could ruin your whole day.



The Unnecessary Truth



QUESTIONABLE (hopefully) TRUTH DEPARTMENT There are two kinds of pilots; those who have landed gear up and those who *will* land gear up. Anyone want to argue about that? Probably quite a few of us.

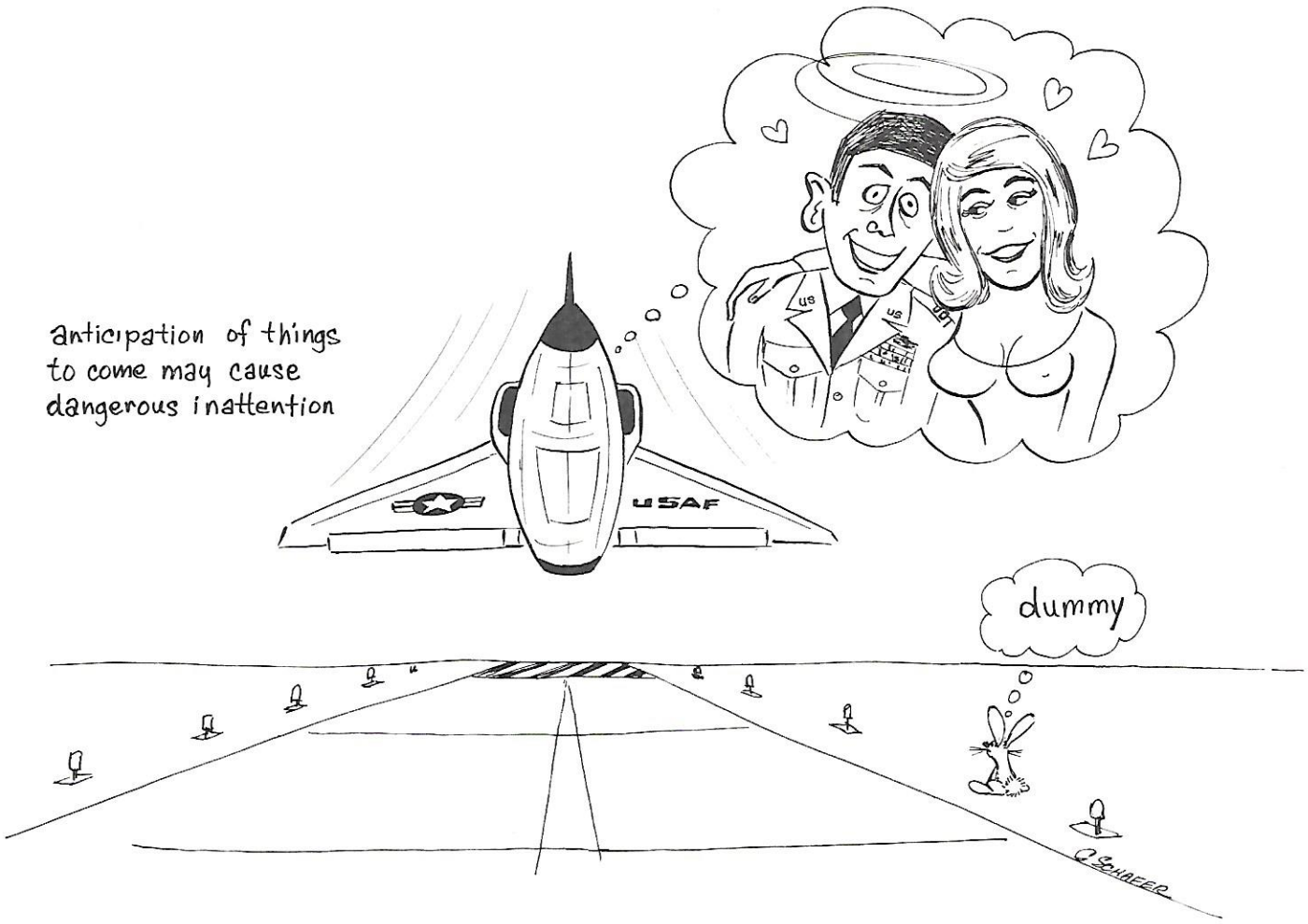
IRREFUTABLE TRUTH DEPARTMENT The *only* reason pilots unintentionally land gear up is — Are you ready for this? — because those pilots forgot to put the gear down. Anyone want to argue about *that?* Didn't think so.

Of all the gear up landings since the first guy "put 'em in the well," the cause has been a short circuit between the pilot and the gear handle. Either he pulled up the gear handle when he should have left it down or he never put it down in the first place. One can almost see the Flying Safety Officer at the base where they first demonstrated a retractable landing gear. He silently shakes his head as he wonders if the pilots, once they have the wheels up, will remember to put them back down. He slowly turns away from the sleek new bird and trudges back to his office where he cleans out part of a file drawer to make room for the paper work on a new type of accident — the gear up landing.

Ponder the fact that since the first guy forgot to lower his "rollers," everyone has known the cause. Most other kinds of accidents send teams of investigators scurrying to the scene to try to find the cause. Not the belly landing. Most people know what happened right away and those who don't know have a pretty good guess. You can usually tell by the look on the pilot's face.

Even though there is but one cause and we all know what that is, people continue to land with the wheels tucked securely in the fuselage/nacelles/wings. Those who *have* landed *sans* wheels vividly recall how "normal" things were as they flared. Normal until that last second when they got that horrible sinking feeling followed by the screech of the metal of the plane's belly as it ground across the ground. Those who "haven't yet" can imagine the sensation. People say that the "slide," though short when compared to a landing "roll," seems to last an eternity.

The cause is obvious — we all know what it is — but maybe we should look farther and try to determine "what causes the cause." Then we may be able to learn why a fix for this cause has been so



elusive.

Since we can almost entirely rule out aircraft mechanical malfunctions in these cases, we must blame either a weakness in the system that tells the pilot that his wheels aren't down and locked when he's ready to land or some malfunction between the earphones.

Let's discuss the latter first since that is really the fundamental cause — supported by what some refer to as a less than perfect warning system. Air Force experts on human psychological behavior tell us that there are about eight major factors which cause pilots to omit that one function which lowers the landing gear *before* landing. Let's briefly look at each one in an effort to identify what may be a trap into which some of us may be slowly falling. Air Force Communications Service claims they "saved" 21 gear up landings in 1971. Maybe we can save some by our discussion here.

INATTENTION Simply not concentrating on what you are doing. Obviously there are few times less appropriate for letting the mind wander than when you and your machine are nearing the ground. But it does happen to all of us. Maybe thoughts of the events of the past trip or anticipation (positive or negative) of what we are going to are so significant that they occupy our conscious mental activity. Thinking about putting the gear down is not stimulating enough so that we could voluntarily concentrate on it for extended periods of time. Thus it becomes somewhat of an habitual action — sort of like zipping one's fly. We don't consciously think of doing it, but somehow it gets done — most of the time. The trouble with an habitual action is that distractions often break the sequence of events in the habit pattern.

DISTRACTIONS The flight has been "normal" so far. Everything has happened in pretty much the regular sequence. We're on final now and our next "action" in the sequence is to put out the gear. Just before we reach for the gear handle a fuel low warning light comes on because we haven't transferred fuel properly; the hand light jiggles loose and falls in front of us; Approach Control warns us of nearby traffic; a large bird flashes by our windscreen — any unusual event that causes us to take some action in the "sequence space" normally reserved for putting down the gear handle. We feel comfortable ("nor-

mal") because we've satisfied our mental "sequence programmer" by performing an action when an action was called for. But where the action called for was lowering the gear, we did something else.

APPREHENSION We are so concerned about some other aspect of the flight that it occupies our total concentration. We've just about run ourselves out of fuel and we are so concerned about whether or not we're going to make it those last couple of miles on final that that's *all* we can think of. We'll probably make it — most birds glide (and flare) further with the gear UP.

PREOCCUPATION/CHANNELIZED ATTENTION A lot like Apprehension. We really get "Gunbarrel Vision" and concentrate so hard at staying on that GCA glide path or keeping those ILS localizer and glide slope deviation indicators centered that we tend to "forget" the other things we were supposed to do. It would seem senseless to hack an actual 100 and 1/4 GCA only to have the flight terminate by greasing it in — on the speed brakes, flaps and belly.

REPETITIOUS EVENTS We're on our "umteenth" low approach and we've put that gear handle down so many times that we've just about saturated our "sequence programmer" by pure repetition.

There are so many events in standardized approaches that are almost identical on each approach that they seem to run together. "Now let's see," we muse, "I put the gear down this time . . . or was it the last time?"

LACK OF CHECKLIST DISCIPLINE It is easy for supervisors, accident investigators, and inspectors to hang their hat on this one. And there's really no valid argument against it. Every Normal Procedures section in every Dash-One and every Abbreviated Checklist (for retractable gear aircraft) tells us to lower the landing gear. The actual physical use of the checklist (holding it, reading the challenges from it, and responding to them) lends itself more to the multi-crewmember situation than for a single seat aircraft. Rarely does a solo jock actually read off his Before Landing Checklist while he's in his overhead traffic pattern or on a night GCA. When could a wingman do it? It becomes incumbent upon the fighter pilot to maintain this Checklist Discipline *without* actually reading the checklist. If we *could* read the checklist while we pitched out, flew that last GCA, or were tacked on our leader's wing in the suds, then we might be able to mentally blast our way through those negative factors we've discussed that keep us from doing all the things we should. But since most of us can't, it's up to us to know our procedures so well that we can assure ourselves (and everyone else) that "not reading" the checklist in no way implies that we are not following the procedures listed in that checklist.

BOREDOM The flight has been completely uneventful — no deviations, plenty of fuel, weather good — a couple of those "hours and hours of boredom." We've been sitting in the same position hardly moving except for our hands, arms occasionally, head and eyes. Stagnate hypoxia is pulling at us and we are bored. "Gee, what a dull flight. I'll just pull this beauty around on final and put her down. Nobody else in the pattern. Maybe I'll (yawn) shorten up the pattern and turn final from here." In this case boredom causes inattention — not from thinking about something else but from simple complacency — nothing to get your attention.

FATIGUE Pure physical fatigue would be a factor here if you were just too tired to put down the gear handle. But physical fatigue affects mental activity and produces mental fatigue which can also prevent you from catching that step in the procedures. If you're too tired to put down the gear handle you ought to be home letting Momma take care of you, or safely tucked into the BOQ somewhere, or anywhere but at the controls of one of Uncle's airplanes.

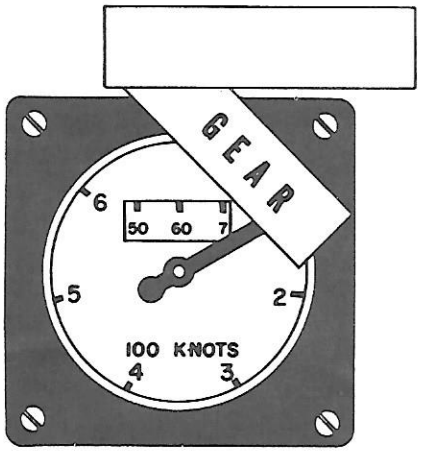
These are some of the more salient factors that could cause us to join those pilots who "have." Other than re-enforcing our knowledge of these factors in order to make us more aware of these dangers, there isn't a whole lot we can do to make these factors less formidable. Nobody *tries* to land gear up intentionally! So from this standpoint, we haven't progressed a whole lot since this phenomenon first appeared.

Some people in the flying units have suggested that the landing gear warning system itself is part of the cause and should be improved. As one Commander put it, "We couldn't stop the F-101 pilots from pulling back on the stick so hard that they pitched up, so we built a system to keep the pilots from pulling back on the stick so hard. We need a more reliable system to keep pilots from landing gear up for the same reason."

One of our allies incorporates a system on one of their fighters that lets the tower or the RSU know that the gear is down and locked. The system features an audio tone through a continuity system. As the fighter prepares to land, the tower advises the fighter to "check gear down and locked." Instead of the pilot verbally repeating "Gear down and locked," he depresses a button in the cockpit. If *all* gear are down and locked the

circuit is completed and the tone goes out over the radio. No tone—no land. They have *never* had an unintentional gear up landing using this system. Now, of course, here the tower operator becomes part of the system. There are many airports, especially where our ANG squadrons operate, where civilian tower people handle so much traffic and are so busy that we can't reasonably expect them to check *every* fighter and to send around every "no beep" bird. But the pilot would be no worse off then, even if the tower didn't query his tone, than he is now. He'd still have the same gear indicator/warning system he has now and wouldn't have to depend upon the tower.

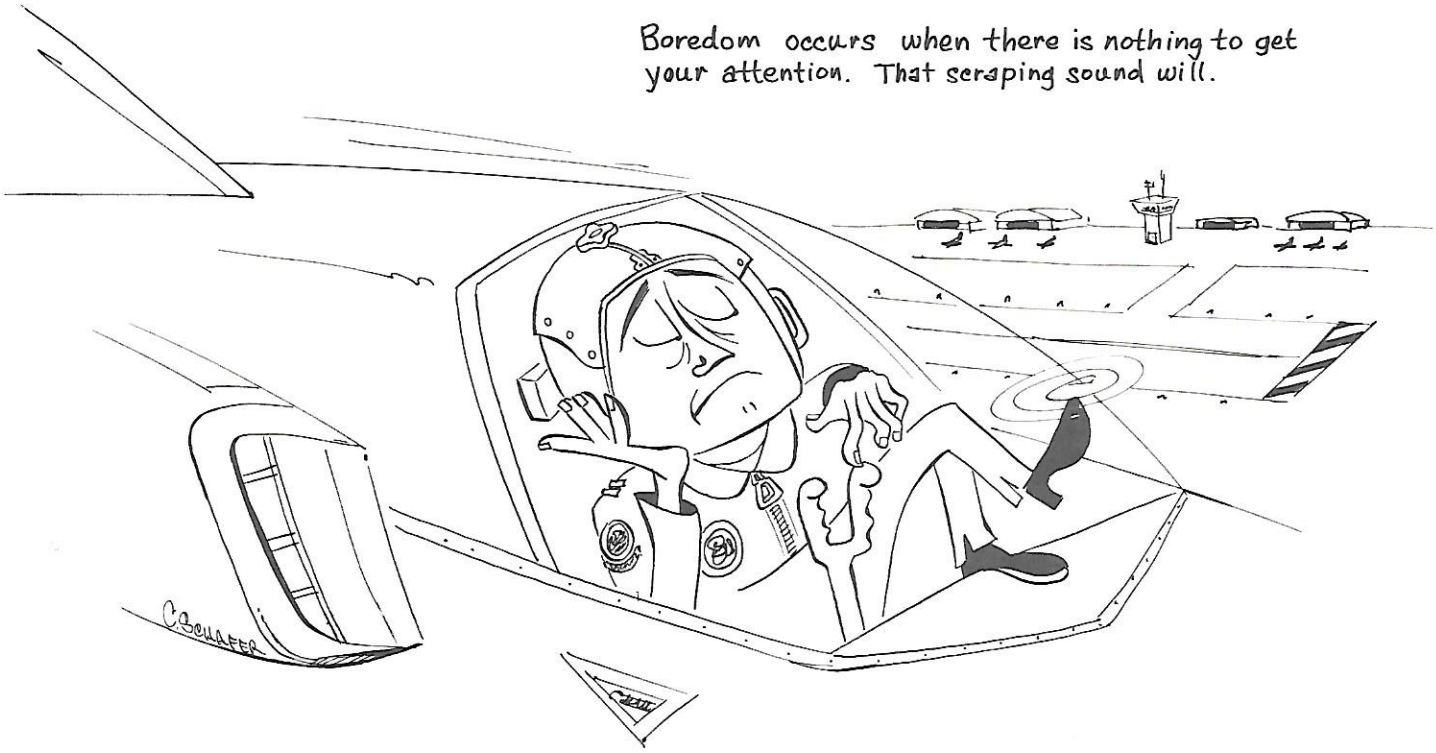
Another suggestion is that a flag warning system be mounted on the airspeed indicator. (See cut) If the



pilot doesn't look at another instrument during the landing pattern, he looks at the airspeed indicator. As his airspeed decreases into the final approach and landing range, a flag would drop over the airspeed indicator obscuring the landing speed portion if the gear was not down and locked. This flag would be made of lightweight, inexpensive plastic and would be mounted externally on the airspeed indicator. The flag could *not* be reset out of the way as we can silence the gear warning horn, but could be easily broken off if it should malfunction and fall over the instrument face at an inopportune time or when the gear was actually down and locked. Maintenance could simply replace the flag before the next flight.

Another suggestion is to project the gear warning light on the windscreen like a "Heads Up" display.

A simpler suggestion is merely to move the gear warning light right next to the airspeed indicator. It would seem difficult to ignore this bright, undimable light shining directly in your eyes when you're



trying to read your airspeed. ALSAFCOM 8/72 "suggests" that Operations people evaluate the present landing gear warning system. Maybe some of these or other suggested improvements will turn up in the form of a more "fool proof" system. But, other than welding the gear down on all our airplanes, can we take steps right now to prevent gear up landings?

The same ALSAFCOM urges flying supervisors to take another look at local conditions that might be conducive to creating one or more of those factors we've discussed. Whether it be a tendency for the tower or Approach Control to break guys out of the pattern or frequently to request pilots to deviate from standard patterns in order to facilitate traffic.

"Delay your break until midfield or departure end."

Most of us are accustomed to putting down the gear as soon as we roll out from the "pitch" on downwind. That's in our "sequence space" for that part of the pattern. Now we've delayed our break and, as we roll out on downwind, we are aware that we don't want to put down our gear now. As we reach the point in the pattern where we turn base, we've already passed the point where we were to put down the gear. However, we've already thought of putting down the gear in this pattern but we delayed it because we were down at the other end of the field when we were at that "sequence space" for gear lowering. Our habit pattern is satisfied and everything seems "normal" (we can even mouth back the gear check to tower) as we slide down final until we (1) hear the tower send us around, (2) see a red flare from the RSU or (3) hear the gear warning horn. Pilots have, on several occasions, ignored all three until that unusual scraping sound got their attention.

Another thing to consider is whether you cut off that gear warning horn with the button. Does your system reactivate when you advance the throttle then retard it? Does your system warn you if you put down your flaps with the gear still up? All these things are designed to keep us from landing gear up. Why should we deactivate the system? (Some guys even pull the Warning Horn circuit breakers.) If we weren't supposed to use these warning systems, why did the designers put them on our airplanes? Of course, then, why did they install the Horn Cutout buttons too? Maybe MAJCOMs should come out with a directive that these gear warning horn systems may be deactivated *only* when they are excessively distracting or are disrupting communications. Even if the MAJCOMs pass that "law," who is going to know that you punched off the horn? Whether you silenced the system before you landed gear up or it malfunctioned "just that once" should make for an interesting discussion among the members of the Collateral Board. But most gear up landings have been with the horn blowing.

The very fact that six pilots have unintentionally landed gear up this year shows that we haven't solved the problem. It's hard for us who have never landed gear up or haven't been in a squadron where someone has, to even imagine how a pilot can let it happen. It's virtually impossible for Flying Safety Officers to get the jocks in the "virgin" units too excited. You can bet that the guys in a squadron that just had a gear up landing won't forget what it's like for a while. Of course they probably have a living reminder walking around the ops building to keep them from forgetting. There must be an easier way to remind pilots.

Until someone comes up with that "never fail" system we'll just have to press on with "plan A" and hope that by reminding our people that, like "that second gotcha," the possibility of each of us forgetting to put down the wheels someday is always lurking in the shadows of that part of our brain that makes us forget.

There is a fine line between emphasizing a point just enough and boring people so that they tune us out and Safety Officers and flying supervisors have to watch that they don't overdo the reminders. Use IP/FE Stan Eval meetings to get these highly qualified jocks to really concentrate on this problem. Their BS (brain storming) sessions may just produce the answer we've been looking for. Mission briefings usually have enough details to fill everyone's mind but maybe that quick reminder to the "Mobileer" to give those gear a good check on final may just trigger the right response as the guys are coming back from the mission. Your Flying Safety Meetings could be a good place to discuss some of the actual incidents. Try to promote a cross-feed as to which factors might have caused that incident. Then lead into some local conditions and how you can avoid a similar trap.

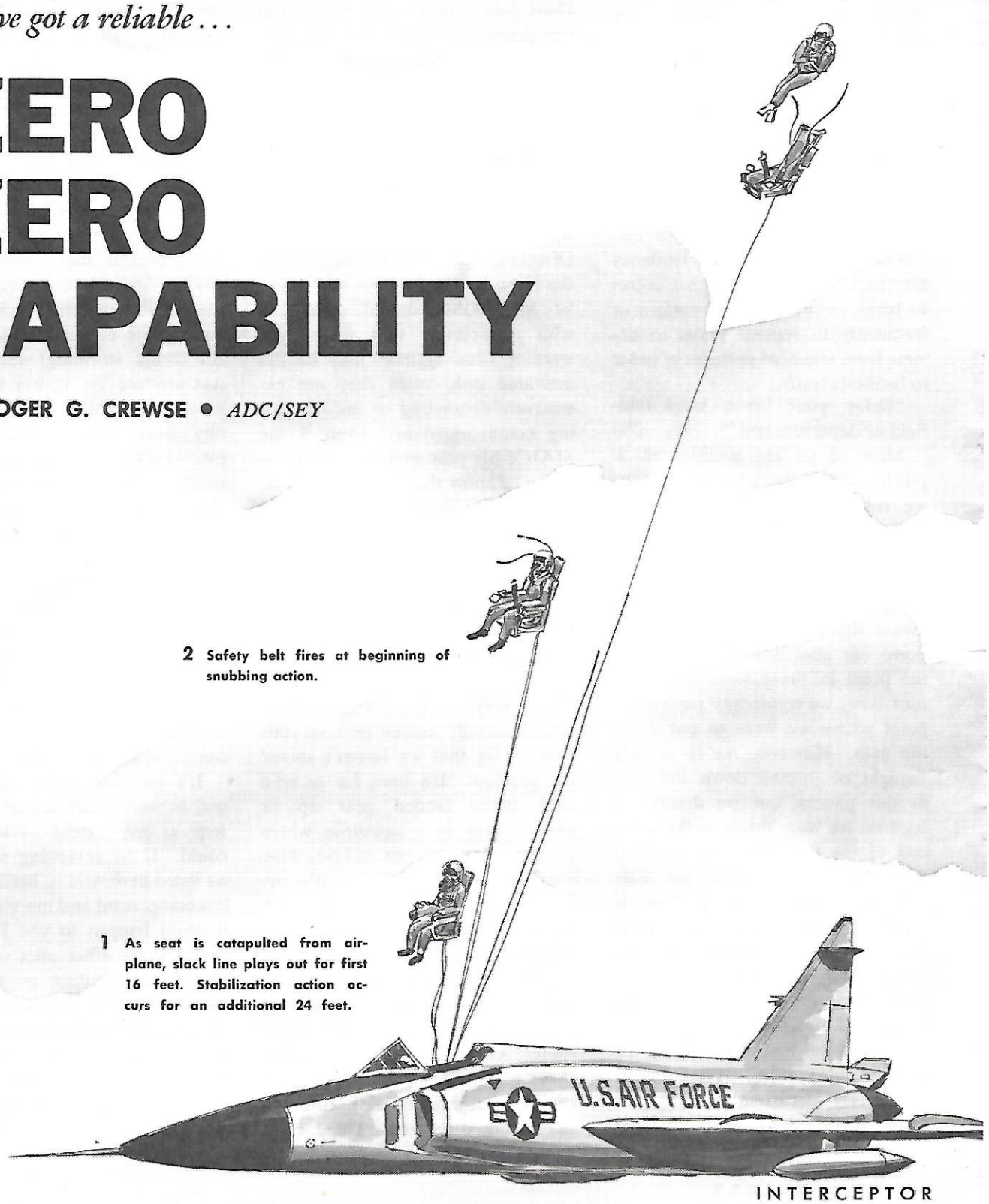
It's too bad we've said all this and haven't really solved the problem to any extent. We wish we could. If by reviewing the factors we listed here, you've become a little less complacent and more aware that it could happen to you just like it did to every other pilot who forgot only one procedure on the whole checklist, we've gained something. If each pilot remembers each time, we can re-write that "truth" to read,

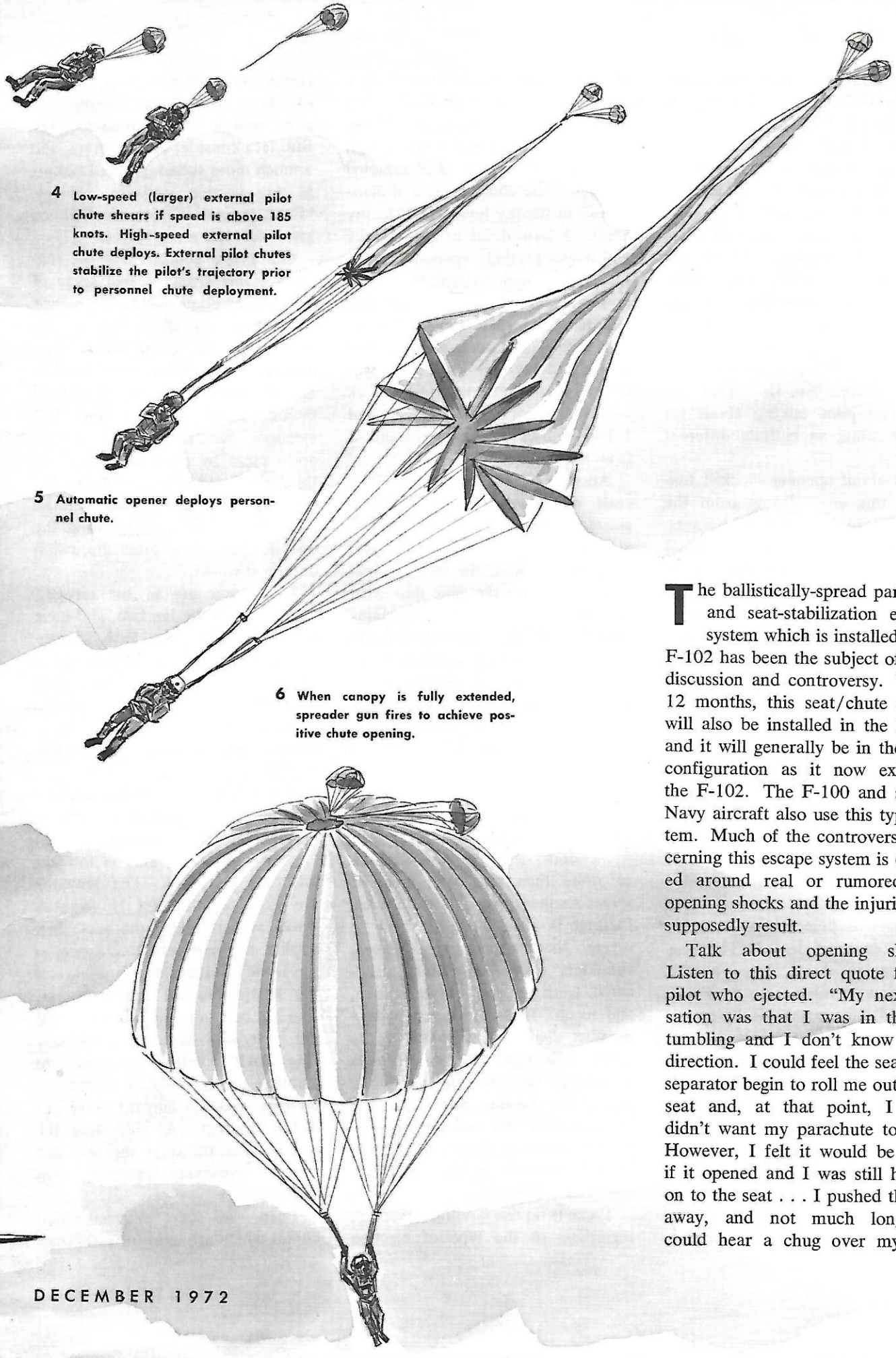
"There are those pilots who *could* land gear up but won't." ★

Whether you know it or not . . .
Whether you need it or not . . .
Whether you want it or not . . .
You've got a reliable . . .

ZERO ZERO CAPABILITY

by **ROGER G. CREWSE** • *ADC/SEY*





4 Low-speed (larger) external pilot chute shears if speed is above 185 knots. High-speed external pilot chute deploys. External pilot chutes stabilize the pilot's trajectory prior to personnel chute deployment.

5 Automatic opener deploys personnel chute.

6 When canopy is fully extended, spreader gun fires to achieve positive chute opening.

The ballistically-spread parachute and seat-stabilization ejection system which is installed in the F-102 has been the subject of much discussion and controversy. Within 12 months, this seat/chute system will also be installed in the F-101, and it will generally be in the same configuration as it now exists in the F-102. The F-100 and several Navy aircraft also use this type system. Much of the controversy concerning this escape system is centered around real or rumored high opening shocks and the injuries that supposedly result.

Talk about opening shock!!! Listen to this direct quote from a pilot who ejected. "My next sensation was that I was in the seat tumbling and I don't know which direction. I could feel the seat/man separator begin to roll me out of the seat and, at that point, I really didn't want my parachute to open. However, I felt it would be worse if it opened and I was still holding on to the seat . . . I pushed the seat away, and not much longer, I could hear a chug over my right

shoulder, then the parachute opened. The G forces from the opening shock knocked me out. The next sensation I had was that the parachute was already open and I was fouled in the lanyard that goes to the survival equipment. I checked my chute and could see that three panels had completely blown out and numerous more were torn. Several risers were loose in the air."

Now that's opening shock, but was that an F-102 pilot who was quoted above? No, sir. That was an F-106 pilot talking about his ejection using an entirely different system.

Talk about opening shock!!! Listen to this one. Quote from the medical report. "Groin harness, which may not have been of optimal tightness incised both groin areas. Bleeding was immediate and profuse. It is postulated that transmitted shock caused respiratory paralysis (and possibly death). Though the aircrew member may well have been unconscious prior to this time due to wind blast, during descent there was profuse hemorrhaging; and massive hemorrhaging occurred during and after ground contact. Since respiratory paralysis may have been irreversable, it is concluded, on the basis of known massive hemorrhage, and a relatively bloodless autopsy, that this massive hemorrhage was the primary cause of death." That was real opening shock, but was this an aircrew member from an F-102 equipped with a ballistically-spread parachute? Again, no sir, he was not. He was an F-89 aircrew member who ejected at high air speed. The chute was not damaged to the point that survival was not possible, but the crew member was fatally injured because of opening shock.

At one time or another, we have had tremendous opening shocks in all of our ejection seat aircraft. Here is a direct quote from a crew member who was in an F-102 with a non-ballistically-spread parachute. Listen to this! "I had a very rough ride but don't know if I tumbled or spun. The chute opened violently and drove my head down to my chest. I looked up at the canopy and it was partially opened with all the shroud lines twisted from harness to canopy. My ejection was initiated at approximately 150 knots at 7,000 feet. I took a rather bad beating on my legs. My groin was bruised from chute leg straps; neck very sore from chute opening, and I had bruises on my right elbow from aircraft ejection."

Another pilot from this same aircraft, which was a TF-102 said: "I ejected at approximately 170 knots at 7,000 feet. I experienced a good solid acceleration, the butt snapper threw me from the seat into what felt like a head down tumbling attitude. The chute opened immediately with a severe opening shock and I was hanging directly under the chute with no swinging motion. Since several of the chute panels were damaged, the 4-line cut was not made."

There are lots and lots of war stories associated with ejections. F-101 crew members have reported tremendous G forces on ejections. In more than one case, these G forces resulted in vertebra fractures. Flailing, in all aircraft, has been so severe that arms were broken, shoulders dislocated, knees dislocated, teeth chipped, tongues bitten, and so on. In one instance, a crew member died from exposure in the water. His right arm was broken sometime between the time he pulled the handles and when the chute opened. He could not deploy his life raft and, therefore, was unable to survive in the extremely cold water.

There is no use kidding ourselves, regardless of the type of ejection equipment used, it *is* going to be an extremely exciting ride, fraught with peril, and it may include injuries. But, let's consider another item, and a much more sobering one. Looking at our ejection statistics, we see: "Fatal ground impact, ejection too low," far too many times.

Our prime concern and the reason for this article is that some of the "deuce" pilots may have psyched themselves out about this escape system, to the point where they may delay their ejection decision or not make it at all. We don't intend, here, to take the 102 ejection seat/parachute system apart piece by piece or explain all the interrelated actions of the equipment. But, for the benefit of those of you who are not yet using the system, here is a brief discussion on how it works.

When you are in the aircraft, hooked up to the lap belt, and have the pins pulled, you have a zero-zero capability, whether you like it or not — or whether you need it or not. When you begin the ejection sequence, the canopy goes, as it always did, followed immediately by you.

The seat is "tied" to the airplane through a Directional Automatic Realignment of Trajectory (DART) lanyard assembly. This is for stabilization purposes. The lanyards are slack for the first 16 feet. A brake system under the seat then applies a slight retarding force to the DART lanyard at this point and the seat-stabilizing action begins. The lap belt initiator now fires and the seat/man separator activates. The DART system continues to stabilize the seat for an additional 34 feet, and the lanyard plays out a full 60 feet. At this time the snubber lanyard stops the seat and you are positively separated from it.

There are two external pilot chutes which are used for stabilizing

the pilot's trajectory. The low speed stabilizing chute, deploys prior to main chute deployment, and it shears if the deployment speed is above 185 knots. If it does shear, it deploys the high speed stabilizing chute. At low speeds, both of these chutes are out. However, only the low speed chute is deployed. In addition to pilot stabilization, the low or high speed chute, as the case may be, assists the internal pilot chute in pulling the main parachute canopy out of the bag soon as the automatic timer opens it.

When the parachute is stretched out to within a few feet of its entire length, a lanyard, which is shorter than the canopy and shroud lines, and which is tied to the gun firing mechanism, becomes taut and fires the spreader gun. If, for some reason, the gun malfunctions and doesn't fire, the slugs attached to the skirt which are, in turn, connected to the spreader gun, are mechanically released. The chute then deploys conventionally.

A great exercise . . . but, who needs it anyhow? Well, in the last five years there have been forty-eight ADC and ANG air crew members fatally injured in aircraft accidents. Of these forty-eight, nineteen would be alive today if all jet aircraft had had this system installed and the crew members had used it. Approximately 40 per cent, then, of all of our people fatally injured in the last five years would be alive if the ballistically-spread parachute/seat-stabilization ejection combination had been available to them. We are not saying here for one moment that there wouldn't have been injuries. Of course there would have been. But, as we pointed out earlier, there are injuries to one degree or another associated with almost every ejection.

What, then, does this system give you that the others don't. A faster opening parachute for one thing — speed is what we are after. Speed in deployment and something else. If we ejected at low speed and low altitude, the old seat/chute system would not have given us an open parachute immediately if the ejection air speed was below 90 knots in the F-102. In the F-101 and the T-33, 120 knots is still the minimum. The only way you could get the old chutes to open if you were below that critical speed was by free falling, which, of course, took altitude and time. In the new system, the spreader gun takes care of that problem.

The chute opens faster allowing you to neutralize a much greater sink rate at ejection. If you are still under the influence of acceleration provided by the rocket seat when the chute opens, it is obvious that you can get out under a higher sink rate condition at a lower altitude. Ninety-five per cent of the people who will use this chute can get out with a sink rate of more than 4,000 feet per minute, if the seat starts moving up before the aircraft strikes the ground. If you weigh less than average, this combination will overcome even higher sink rates.

Why do we need the seat-stabilizing snubbing system? The first reason is apparent. To stop tumbling throughout the entire ejection sequence. The aerodynamic forces which act on the seat/man mass change dramatically with ejection speeds, and the influences on the seat are difficult to predict. The second reason for snubbing is also logical. Positive seat/man separation has been a long-standing ejection problem, particularly in those aircraft where we use the zero lanyard. With the seat tied to the aircraft, seat/man/chute entanglement just won't happen.

The net results of the ballistically-deployed chute/seat-stabilization ejection system are that the chute canopy will open fully much quicker than any of the old systems, you have a wider ejection envelope, and there is less possibility of malfunctions and entanglements in the seat separation process.

OK. We need it. We agree to that. But, how about the opening shock? What are the disadvantages to this system? Are there any? Yes, of course there are. The first and most obvious is that for any given ejection speed and altitude, the opening shock will be higher than using a system with a non-spreader gun parachute. By use of the high and low speed deployment chutes, however, this opening shock is well within human tolerances. An intense testing program proved that.

However, one disadvantage is that, should you be holding onto the ejection handles at the time you come to the end of the 60 foot snubbing lanyard, some pretty interesting maneuvers may follow as you separate from the seat. These maneuvers are all unpredictable and they may well cause chute opening to occur while you are not lined up in the perfect chute opening position, e.g., facing into the wind, the parachute streaming behind you, and the pilot chute streaming behind the parachute. But, even though you are not exactly lined up, you have no real problems unless extremely high speeds are involved. Then you may have the chute open while you are sideways to the direction of travel, which may result in an uneven application of chute forces on the body harness. Also, your arms or legs can flail about with such severity that you may suffer fractures or dislocations. But this is true in *any* of the ejection systems now installed. In fact, the longer you free fall, the more susceptible you will be to these

flailing injuries. This system is faster, therefore flailing should be reduced. There is one other disadvantage to this system, in fact any ejection system. If your harness is loose — nice and comfortable — the opening shock will be amplified and the loose straps may cause injuries.

OK, let's look at our actual experience using the stabilized seat and the ballistically-deployed parachute system in the F-102. There have been five ejections using the complete system. The first was routine. The aircraft flamed out at 13,000 feet, and would not re-start. At approximately 2,500 feet above the ground, the pilot leveled the wings, raised the nose slightly and, at about 170 knots, ejected. The pilot stated he felt no opening shock. He had no injuries. In fact, there was nothing remarkable about the entire ejection sequence.

In the second ejection using this system, a malfunction did occur. The pilot experienced deteriorating engine performance, loss of oil and, finally, an inflight fire. He ejected between 220 and 240 knots at approximately 14,000 feet. He stated that he experienced considerable pain just after ejecting but did not associate it with opening shock. He landed successfully, was picked up by helicopter and was transported to the hospital. He suffered several fractured ribs, which had punctured both lungs. His right clavicle was broken. In spite of intensive care, the pilot died some 13 hours after the ejection.

Upon examination of the parachute and the harness, investigators found that the risers had somehow deployed under the channel guide in the back of the parachute. This, in turn, caused tremendous forces on the upper chest and shoulders when the chute opened. The malfunction, which resulted in this pilot's death, was not specifically caused by either the ejection system or opening shock. No panels blew out. No risers broke, nor were there other indications in the equipment that there was a severe opening shock. The pilot was literally squeezed to death when the risers broke the channel from the back of the chute and twisted it upward. The force applied would be similar to one resulting from having someone grab your shirt in the middle of your back and then start twisting the material. This, of course, would cause a tightening across the chest and over the shoulders until the material actually tore. In the case of the parachute harness, the material did not tear.

In the third ejection the pilot reported flight control difficulties on climb out. He announced that he was returning to his departure base. Sometime during the return, he ejected. We don't know exactly what the aircraft attitude and ejection altitude were because the pilot has no memory of the event. He lost his helmet during the ejection (which is certainly not unusual) and his head struck the ground when he landed. We know that the head injury occurred on landing because there was dirt in the wound and in the crusted blood.

In this accident the low speed pilot chute did not separate, which means that the chute opened at a reasonably low speed. As mentioned above, his helmet and mask came off during parachute deployment. Evidence on the helmet, which was recovered, and on the parachute-riser connecting links, indicated that the links struck the helmet as the chute deployed. This wasn't unusual either. There are riser connecting links on all parachutes and this is not the first time that the links have struck the helmet.

When rescuers found the pilot, he was fully conscious but was suffering from amnesia. He couldn't recall the mission, the ejection or the parachute landing. He complained of a tenderness in his chest. However, there were no bruises across the chest area. He had bruises on both shoulders and, undoubtedly, these were caused by strap slap. He also suffered bruises in the groin area, probably caused by the leg straps. No panels were blown in the parachute. No risers were broken. There was no evidence on any of the equipment that unusual forces had occurred at chute opening time. The Flight Surgeon on the investigation board noted that the parachute leg and shoulder straps did not fit the pilot as they should. They were loose, probably because he had been wearing all of his winter equipment during original strap adjustment; and, since he was on a cross country flight to the south, had removed this equipment and had not readjusted his chute harness.

The board medical member stated that had the pilot involved not been big boned and robust, he might have been more seriously injured. Other medical personnel disagreed. Those who studied the data resulting from the numerous equipment tests stated that while opening shock generated by this parachute was higher on the average than the non-ballistically-deployed chute, it was well within tolerances.

It was considered possible, by the reviewing medical authorities, that the chute opened while the crew member was sideways to the direction of deployment. This would subject him to unpredictable opening forces, particularly with a loose harness. Once again there were no indications on the equipment itself that any unusual forces beyond design limits had been experienced.

In the fourth ejection which in-

volved the ballistically-spread equipment, the engine failed. The pilot had turned towards home, and ejected at low speed approximately 5,000 feet over the water. The pilot also lost his helmet and mask, and was aware of a heavy blow around the head and shoulders just before chute opening. He stated that opening shock was mild and he wasn't injured. He lost his Life Support equipment while he was being rescued. This pilot was back on flying status a week after the accident.

The board suspected that the spreader gun had hit the pilot's head and shoulders as it deployed out of the parachute bag. During an extensive testing program and during all the time the Navy has been using this parachute, the spreader gun has never hit the crew member's head or shoulders regardless of how the chute deployed. The prime AMA says that what most likely happened was that the risers deployed across the pilot's neck and that the parachute-riser connecting link struck the blow which the pilot felt. As mentioned earlier, this is not unusual, and has happened with both conventional and spreader-gun deployed chutes. In any event, the injury was not of sufficient magnitude to prevent this pilot from being placed back on flying status almost immediately.

The fifth ejection using the ballistically-spread parachute was completely normal in all respects. The pilot experienced a flameout on final and ejected at an airspeed of approximately 170 knots. No damage occurred to the equipment and the pilot wasn't injured. The wing man stated, "I watched as he separated from the seat, and, almost instantaneously, the chute opened. When it opened, the chute and the pilot were in a horizontal position." (Just as desired)

However, we must recognize that a fatality did occur on one occasion with the use of this chute/seat combination. But, the fatality occurred because of a malfunction in the parachute which had nothing to do with the ballistically-deployed system. Since then the parachute has been modified and this malfunction cannot, repeat, cannot occur again. Regardless of rumors you may have heard of what could have happened, of what "they are trying to hide," and that "they" don't know what happened, those are the facts. The picture below is of the actual chute which failed. What happened is clearly evident.

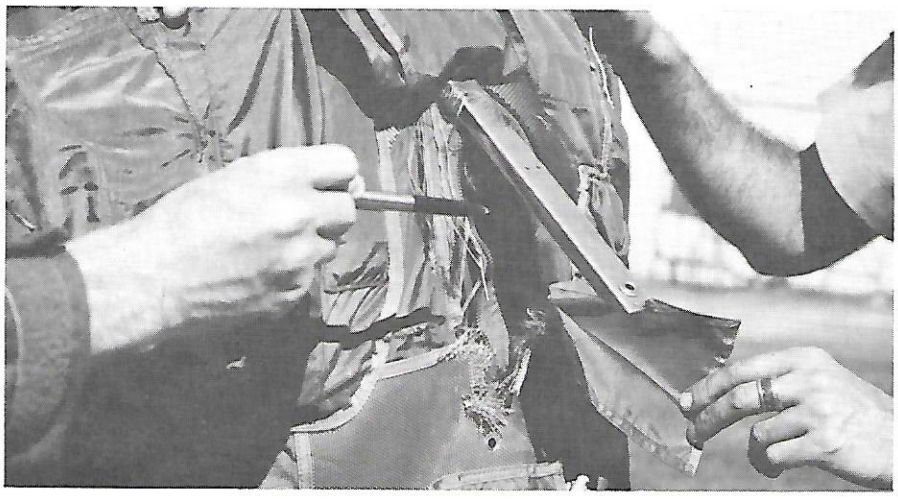
There is no evidence of *severe* opening shock associated with any of the five ejections. No chute panels were torn; no shroud lines broken, nor was there other parachute equipment damage. But, there is no question about it, this seat/chute/spreader-gun combination is fast, rough and effective. It has the best capability of anything we have in use. In just the past nine months, three Guardsmen died who would be alive today if this equipment had been available and used. With the systems they had, they didn't have a chance.

We know there are rumors of tremendous opening shocks which supposedly caused rather severe injuries, including the fatality which was experienced. They are just rumors. The above information, which we have presented, is not a rumor. It is fact!

If the rumors have so biased your judgment that you would rather land an aircraft on a road or field than attempt to use this equipment — fall back and regroup. We haven't had very good luck with that particular maneuver. The lack of success which we have had in landings on unprepared surfaces in jet aircraft is what caused ejection systems to be installed in the first place.

Once again, the facts are above. When you are in one of those tight places in flying which usually occur at low altitudes, low airspeeds, with no engine or flight control difficulties, don't hesitate. Don't bet your life on a rumor. The cold hard facts are what you want to use and what you must use. Don't expect not to be injured, regardless of the kind of equipment you may have in your aircraft. Chances are you *will* receive minor injuries of one sort or another.

Finally don't fall in that category of Air Force pilots who cannot stand the idea of being hurt, but don't seem to mind being killed. ★



Meet Miss INTERCEPTOR for 1973, Sgt Eileen McCusker. That's right, we said Sergeant but we won't call her that for another year. Since she won her new title and the opportunity to "Sugar-coat" the safety messages in our next 12 issues, we'll be more informal. Eileen has been doing nice things for WAF uniforms for just over two years and she presently graces the Airman Assignment Division at Headquarters ADC. To assure you AFM 35-10 buffs, she constrains her long hair under a short wig when she is in uniform. (There ought to be a Reg . . .). Our lovely miss is 5'4" and her green eyes perfectly compliment her golden hair. Born in Biloxi, Mississippi some 21 years ago (her blue-suiter Dad was stationed at Keesler), she grew up in Europe. She fell in love with "the Continent" and would especially like to go back to Germany. Eileen feels strongly that we should present our safety message positively and she is eager to devote her charms toward getting the word to you in the most pleasing way. She believes that her role as our safety messenger actually enhances the concept of female equality. We agree and are delighted that such a comely miss so well represents the distaff side of "The Men and Women Responsible for Aerospace Defense."

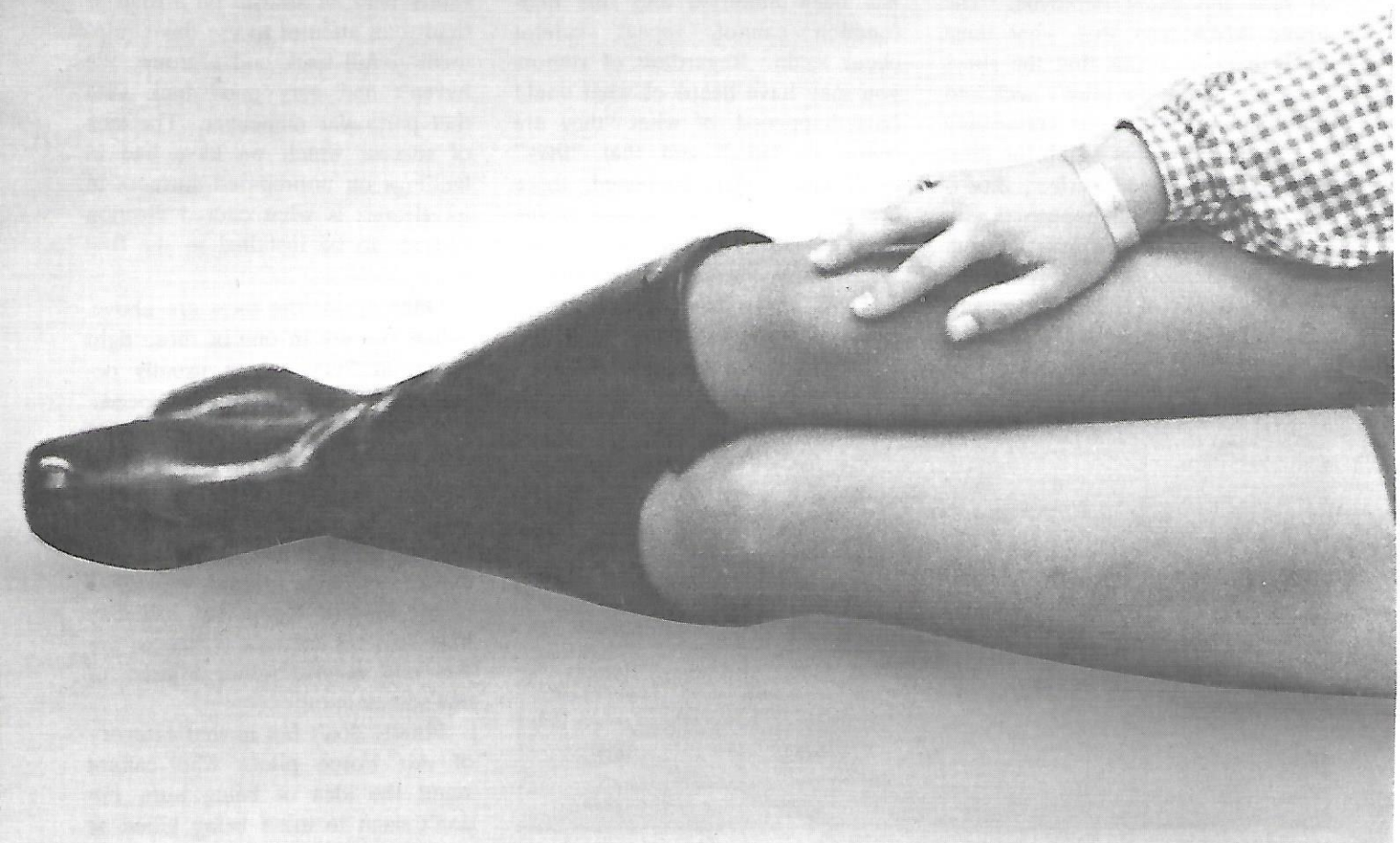
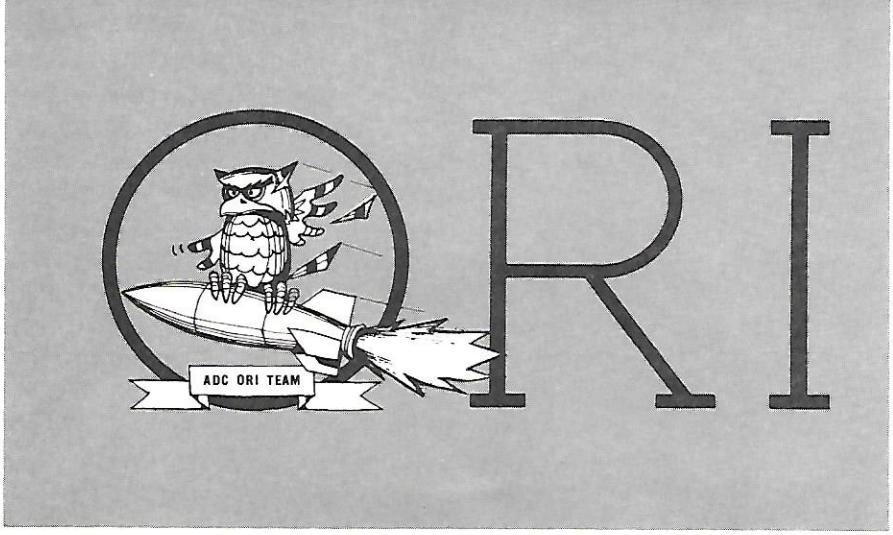


Photo by SSgt Richard Thomas



OPERATIONAL READINESS INSPECTION TEAM

HQ, ADC

SAGA 25-12-72

'Twas the night before Christmas when USAF IG directed the ORI Team to give a no-notice inspection at a selected air division. Needless to say, some small problems developed. Several of the permanent team could not be located on the Colorado ski slopes, and the Team Chief was out getting his white beard trimmed. NORAD assistance was minimal — they were at some undisclosed location caroling. Augmentation from the field looked doubtful as most of the direction center chiefs were out finishing their Christmas shopping. In addition, FISq scorekeep evaluators were not available because they were on "crew rest" for the Holiday Season.

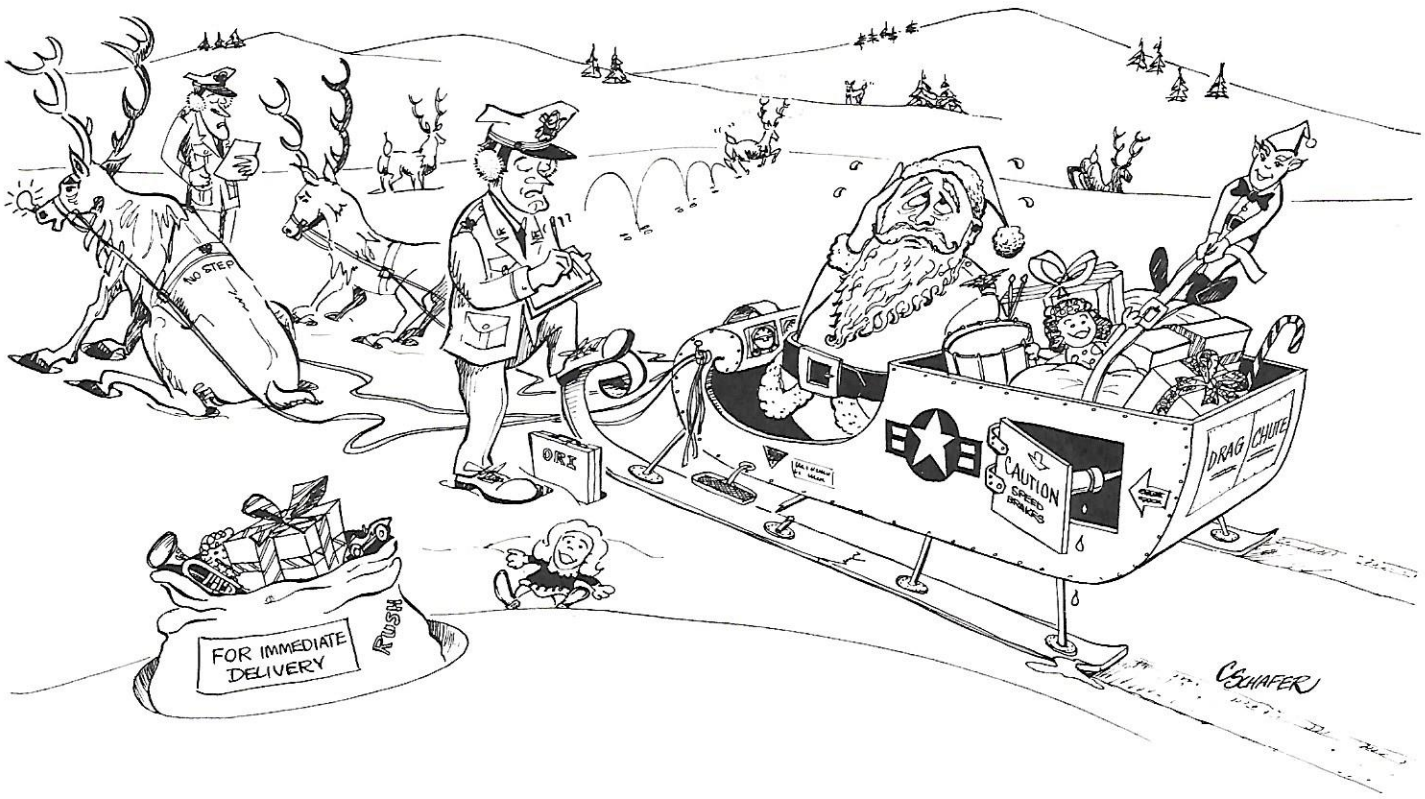
With the team composition problem unresolved, other challenges appeared. It was impossible to drag the secretaries from underneath the mistletoe long enough to type the inspection plan — but it really did not matter because the printing plant was booked up doing Christmas cards for the staff. The plans section advised that transportation for the inspection was to be C-119s because the Pete Field birds were scheduled to take Air Force Academy cadets home for the holidays.

At the inspection site, more challenges: The traditional wives party kept the bosses at home and a junior bachelor Captain was pressed into giving the "in briefing." However, it was soon discovered that the "dog and pony show" also had trouble; the dogs had been pressed into service by a guy in a red suit.

The air battle commenced with an "unknown" coming from the north. Surveillance had tracking problems compounded by external interference. It could be said they were snowed, but it was finally determined the unknown was "low and slow". After reliable tracking was established and weapons personnel were recalled from the crew party, interceptors were scrambled. The scramble was delayed until two Canadian birds were located. Most of the northern tier USAF fighters were down South at Tyndall firing. However, all interested (?) parties finally got together and an ID intercept was accomplished. The aircrews had problems getting a positive ID. They requested assistance from the IND to locate tail numbers on a two-runner sleigh. The WIZZO (guy in back for TAC types) finally confirmed that the object was piloted by a red-suited, white bearded rated supplement type.

The ORI Team as usual noted several discrepancies. If manual inputs had been inserting cards rather than making Christmas trees out of them, flight data might have been available. Identification was certainly remiss for not having a flight plan — particularly considering the time of year. And then there was a slight problem with the weapons status in the computer. Certainly the SD should have known where the alert birds were located, however, it was unfair planning on the part of the UNKNOWN to penetrate during the crew eggnog party.

The WD was nearly faultless. Although he was holding hands with his WAF tech throughout the mission, it did not detract from his performance. It only takes one hand to punch the buttons. The IND had nearly insurmountable problems because of the difficult tracking situation. Additionally, the only qualified IND Tech was TDY at IWS. The comm jamming,



" 'Ho Ho Ho' — 2 decibels below minimum acceptable standard."

with sleigh bells and "ho, ho, hos" loud and clear on the control frequency, did little to help the situation. The IND performed admirably considering that AFM 3-16 tactics were not designed for this type target. He was rated excellent on his reaction and flexibility in countering a non-squawking low level bogey. FAA support throughout the effort was outstanding — particularly considering the office party in progress.

In determining a rating based on mission results— NSR of 100 percent and PSR of 100 percent — what else could the overall rating be but OUTSTANDING.

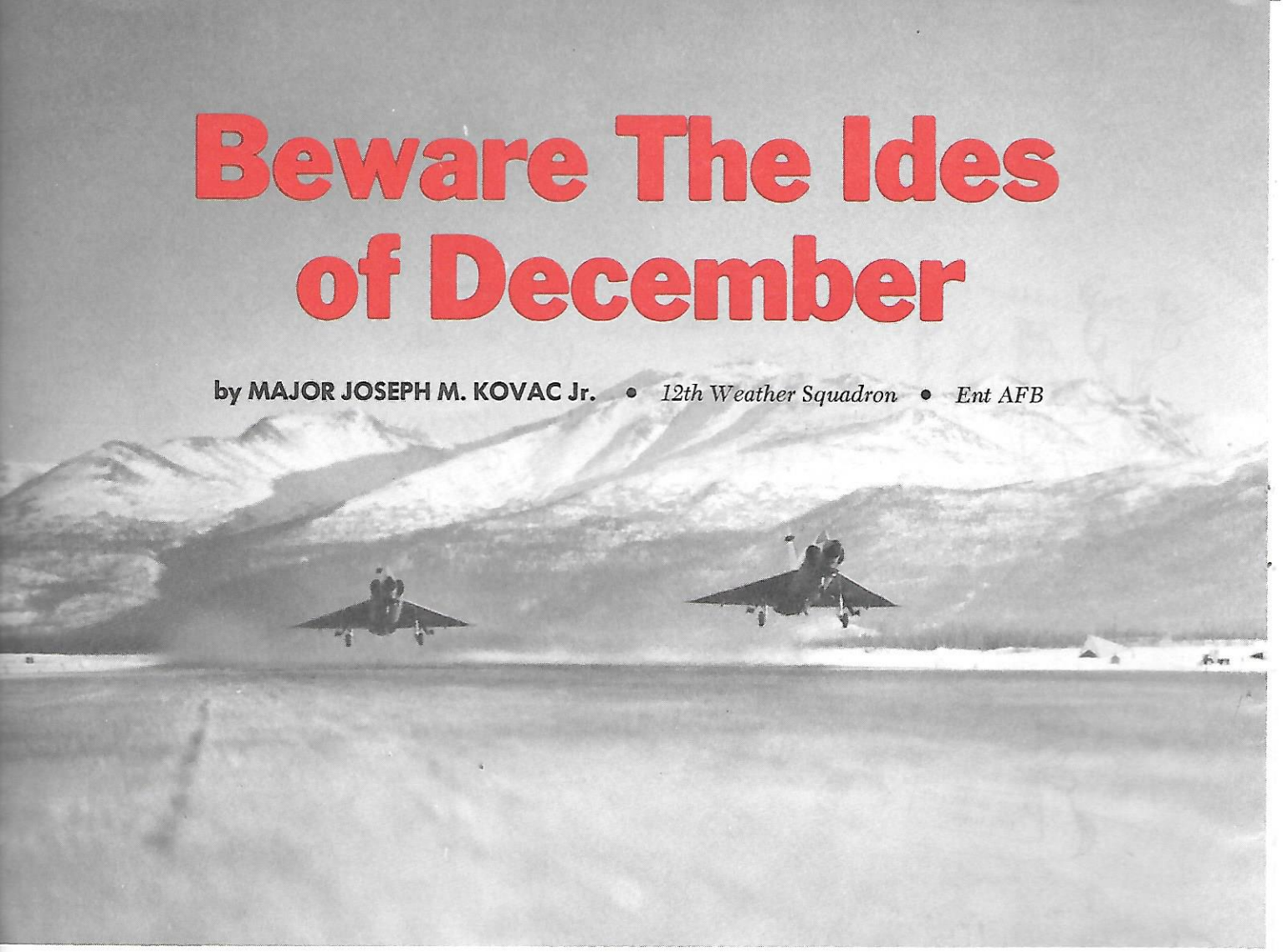
After the excitement (confusion) died down, the programmers once again cycled the Christmas music on the active computer and the crew returned to their previous engagements. The hard working ORI Team then began the tedious task of report writing.

It was decided that the traditional "Gold Book" would have red and green covers in keeping with the season. The standard exit briefing, minus the dog and pony show, was presented in cantata form. As the final sounds of "we're here to help you" faded out, the anxious-to-get-home ORI team was seen running for the C-119s. They too believed the long white bearded fellow would visit even *their* houses at this time of the year. Merry Christmas from all the members of the ORI Team.

EWELL D. WAINWRIGHT, Colonel, USAF
(Director, Operational Inspection)

Beware The Ides of December

by MAJOR JOSEPH M. KOVAC Jr. • *12th Weather Squadron* • *Ent AFB*



If there is one thing that turns-on a true meterologist more than a severe thunderstorm, it's a heavy blizzard. As you read this, the thundery bumpers have begun their migration to the southern resort areas like all true members of the jet (stream) set. It won't be long before "Thrill-a-Minute Time" is upon us. We'll soon see the beautiful colors on the hillsides as mother nature endows the world with her annual display of brillance before she, like the birds, heads south.

We weather forecasters are not really cold-hearted, vile "Snaveleys" who chuckle each time it rains on a picnic — we usually get rained on at *our* picnics too. Contrary to popular belief, we can't control the weather. But, we do make every attempt to give you the information you must have to reduce its adverse effects on your operation to a minimum. When you use the data we provide you, *beware of statistics.* Averages or means are just that. If you are in the mission-planning business, it would be much better not to use the median, but instead to use the mode, the most common occurrences for limiting conditions.

For example, let's say that climatology tells you that, on the average, it snows ten days a month at your base. However, the mean snowfall for the month is 36 inches. If you presume that the average snowfall per occurrence is three-plus inches, and that you should expect to be grounded for all or most of ten days, you could be making a big mistake. A little deeper dig into stormy's records might show you that the modal, or most common snowfall, is less than two inches per occurrence, with one or two "good" storms lasting less than 48 hours dumping the rest in a big pile on your driveway. Now you have a possible 26 days around which to build your flying schedule. You also may find that the most common time of day for snow showers is mid-afternoon. With this in mind you'll want to plan your heaviest flying load for the morning hours.

Temperature "facts" are also misleading. In any given winter, we usually find the average minimum

temperature reported twice a day—at a time the thermometer is on its way down to something lower, and while it is coming back up. Three days in the warm sector of a frontal system, with heavy cloud cover at night, can really modify that monthly "average." If you are responsible for people who must work outdoors at night, a better way to compute the effects of winter temperatures is to average the daily record minima as a reasonable lowest value to expect, and combine the average with the mean wind speed to determine equivalent chill factor. Winter wind doesn't always become calm just before sunrise, as it does in the summer, especially if you are in the northern third of the U.S. Just ask any Security Policeman who walks outside guard duty at, say, El Forko Grande.

You are probably well aware of winter weather patterns from what you've learned on visits to the weather station, instrument school lectures, and previous experience. But don't forget that local geographical influences play a major part in the intensity of the weather your airbase receives. For instance, a certain wind direction may be "bad." Beware of weather systems which appear to be out of the ordinary. Most weather changes are caused by perturbations in the upper atmosphere which are intensified as they extend downward and downstream toward the earth. Air is a fluid. Its density varies with altitude. The rotation of the earth normally causes a westward displacement of synoptic features as we go aloft. For instance, with a north-south cold front from a low pressure center moving across Indiana, we can expect the 20,000 foot level trough to be over Iowa and Missouri. (A hurricane is an example of a low which is constructed nearly perfectly vertical—bad.) *Cold* air along the normally warm Gulf Coast means low clouds, poor visibility; the few winter thunderstorms which occur over Wisconsin or Michigan are caused by an approaching *warm* front.

Now for the ordinary. Rather than trying to summarize individual changes, let's compare the same types of weather in different parts of the country. Sea temperatures along the west coast are fairly stable and change slowly. The 50°F line extends southwestward from the British Columbia coast near 55 degrees north in November and slowly drifts southward to near the Oregon-California border in January and February. Along the east coast of the U.S., however, the cold Labrador current forces the 50°F line from a position across Nova Scotia in October down to Cape Hatteras (35° north) in March. Sea temperatures in the northern Gulf of Mexico remain between 65° and 70°F throughout the winter.

The occurrence of low ceilings and visibilities varies significantly by location. Most frequent IFR is, naturally enough, along the western coast of the U.S. The Gulf of Mexico coastal zone from Corpus Christi to Panama City, and the east coast from Wilmington NC northward come in for their share of poor weather also. But the most persistent IFR from November to January is found over the state of Washington, and from December to March in an area bounded by Sault Ste Marie, Toronto, Quebec City, Charleston WV, and Chicago. (If you thought "pollution," you're about 70 per cent correct.) In both of these high-incidence areas, near or below minimum conditions can be expected to persist for days at a time. Having a few statistics in hand on preferred time of IFR can be useful. At Hamilton AFB, for instance, 40 per cent of all winter IFR occurs between 0730L and 0900L. On the other coast, Otis ANGB and Bangor IAP have no preferred time of low ceilings or reduced visibility. At Otis, the sea fog will roll in just as easily near sunset as sunrise (it seems to be IFR there usually) while at Bangor, below VFR conditions can be expected only in snow showers or with coastal storm systems. Duluth IAP and Griffiss AFB also have interesting IFR frequency curves by time of day, and both are caused by the same element — a wind blowing off one of the Great Lakes.

Speaking of wind, whether it blows on the ground or aloft it can be a hazard in winter. Gusty crosswinds are often found in combination with ice or snow-covered runways, low ceilings, and poor visibility. Winds aloft reach their strongest velocity in the winter. Two well-defined maximum wind zones can be found over the U.S. in winter. The more southerly zone extends from southern Arizona eastward across northern Louisiana then northeastward across Cape Hatteras. Average height is just under 40,000 feet, and wind speeds above 130 knots are common. The more northerly strong wind zone has a "Y" configuration with one arm from Utah eastward to southern Illinois then northeastward across Nova Scotia. The other arm begins over northern Minnesota and extends southeastward until it joins the mainstream over Pennsylvania. The core of this complex zone of winds slopes upward from 25,000 feet in the north to 35,000 feet along its southern boundary. Wind speeds in excess of 200 knots have been reported at and east of the juncture of the two arms.

Terrain combined with strong winds poses an additional hazard. If your flight path takes you parallel

When the temperature is close to 32° the snow is superslick compared to that at 10°. Plan every landing for the possibility of drag chute failure. Be prepared to jettison the drag chute if a strong crosswind causes directional control problems and watch out for dry patches on icy runways so you don't inadvertently skin off a tire.

to a range of hills, and you are downwind, you should expect turbulence. Winds in excess of 50 knots across a ridge line can produce severe turbulence. The standing wave produced as far as 50 miles downstream from a ridge line has been known to cause loss of control and destruction of aircraft. Here, wind and terrain join to produce one of nature's more disastrous combinations.

A snowflake is a fragile and beautiful product of nature. When seen from a cockpit, it is a gray blur of misery-making potential. On the ground it is best enjoyed as part of the essentials in a ski area. If we ignore the Rockies above 7,500 feet (and we can for takeoff and landing purposes), maximum snowfall in the continental U.S. occurs to the lee of the Great Lakes, especially on the west side of the Appalachians. The large size of a snowflake when compared with a raindrop, means that ceiling and visibility values will fluctuate much more rapidly in a snowstorm than they will in rain. Be alert to the fact that snow shower ceilings are often obscurations rather than the base of the cloud. In this case, you as a pilot should not expect to break out or be able to see forward when you reach the reported ceiling height as you make a landing approach. Snow and cold temperatures go together. An inch of snow on the runway with the temperature just below freezing is much more hazardous for landing and taking off than an inch of snow where the air temperature is near 10°F. This super-slippery condition is quite common at airfields along the east coast of the U.S. and south of 40 degrees north in the interior.

As you read this, the base engineer should already have a snow removal plan tested and proven. Now is almost too late to worry about eliminating possible problems which may surface, but you'd be wise to review critically the capabilities of your plan one more time. (Naturally all the equipment is in perfect repair and spares of known "probable-fail" parts are on hand!) All vehicle drivers are proficient (they can crunch cars efficiently, but won't bust blades and/or sidewalks) and the comm system they will use with the command post coordinator will work from all parts of the base. Right? One last check of the priorities. At the expense of ruffling some senior feathers, that Direction Center crew parking lot should have a more urgent requirement than the driveway or access road to the Vice Commander's quarters. Make a dry run of all areas as though there were a blizzard at the Main Gate. One base discovered that the vehicles they had available couldn't cover all Priority One areas at plowing speed on dry roads in the time alloted by the plan. What do you plan to do when you have an out of commission plow at the other end

Exercising your snow removal plan when the ground is clear will help prevent problem areas before the real thing comes.

of the base at 0345L?

One last word for you flying types. The little, non-hazardous elements can pile up quickly into one big baddie in the winter. With cloud tops at 8,000 feet and clear skies above, miscalculating your groundspeed against a jet stream can leave you in the wrong county for the amount of fuel you have remaining. Also this. We take pride in the teamwork between the weather troops and the INDs in the blockhouses. But, if a controller gives you a weather report that doesn't sound right compared with the briefing you got before challenging the elements, question him about it. A few seconds spent here, especially getting some alternate weather, could save hours spent on accident reports later. And finally, if home plate is up to its minimums in smog and murk and glob, the odds are strongly on the side of your favorite alternate being in the same sloppy situation. Take a little longer in flight planning, and be sure that you can get wherever you want to go from here. We'll be waiting with our pot of coffee and cheerfully prepared forecasts.

AS AN AFTERTHOUGHT:

Did you hear about the IG report that read "Security was lax. Five personnel were noted in a restricted area not displaying their badges. This was balanced, however, by the six personnel noted wearing their badges outside the restricted area"?

Closer to home is the recent comment in a similar vein by a pilot who had to "sweat" a bit while getting his bird back in marginal weather. "I called ALFA on PFSV for a forecast and got a lot of dead air. But that was just as good as BRAVO, I guess. He answered, but wouldn't give me a forecast for home plate anyway."

Well, sir. There are a number of changes in weather service caused by the recent drawdown. One of these is the decrease in the forecasting hours at a number of weather stations. This means that you can expect pilot-to-forecaster answering capability to be limited in some cases, to part-time. Most of these stations will continue to have a weather observer on duty in the weather station.

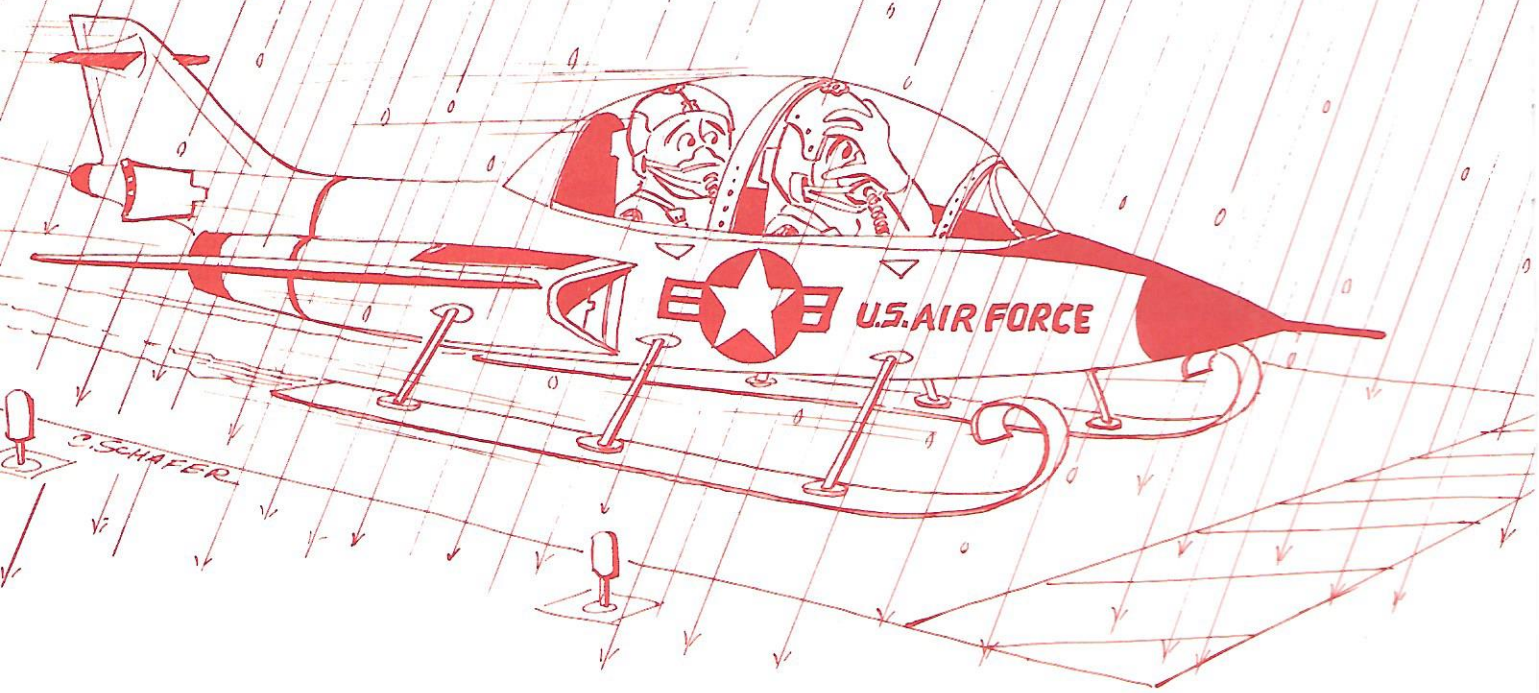
The duty observer will respond to PFSV calls, (we don't like dead air either) but is authorized to provide only weather observations and those forecasts for which he has a teletype copy. The weather observer has neither the training nor the authorization to interpret printed forecasts. In addition, if the observer is not a 5- or 7-level, he is not permitted to give you *any* forecasts. What you will get for your troubles if this is the case, is the reply "For the forecast service, please contact Buddy (a pseudonym) metro on XXX.X frequency." If all else fails, and you're close enough to a SAGE Direction Center, give them a call. We still provide immediate forecast service to our controllers 24 hours a day.

ABOUT THE AUTHOR

Major Joseph M. Kovac, Jr, is presently a Weather Staff Officer with the 12th Weather Squadron, at Ent AFB. Nearly all of his twenty years of military service has been spent in the weather business as an enlisted observer, forecaster, or Weather Staff Officer in such far-flung places as Turkey, Iran, and Saudi Arabia. He also served a stint as a Weather Staff Officer in SEA with the Air Commandos. When stateside he was a Weather Staff Officer/Detachment Commander at BOADS, 1st Air Force and 21st Air Division.

F-101 SLEIGH RIDE

by **MAJOR BRAD NEWELL** • *142 Ftr Gp. Oregon ANG*



In recent months there have been several cases of aircraft sliding off runways and breaking their legs or whatever. There have also been quite a few J.C. stories brought to the bar. The common factor has been apparent temporary or complete loss of directional control immediately after touchdown after landing on a slippery runway with a crosswind. The most notable offender has been the F-101. I believe the problem usually begins with the aircraft making a normal (even desirable) but unexpected motion which results in much stick stirring in the cockpit. The scenario usually goes something like this:

F-101 on final at 180 KIAS
Wind 90° cross at 20K
Weather — sloppy wet

Normal smooth touchdown wing low. Other main touches down and/or the drag-chute is deployed. Aircraft promptly turns something over 5° into the wind and the pilot looks down the runway out one of the side panels. Pilot says, "J.C." and the thrash is on. The aircraft makes one or more "S" turns while the pilot exercises rudder pedals and stick and the WSO breaks his beads. After parking the aircraft both bow to the east three times and adjourn to the bar.

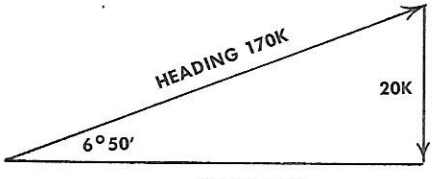
I would like to explain what the aircraft attempts to do and why it does it. It has an act which it will attempt to perform *every* time. At the risk of sounding like I'm talking down to everyone I would like to go back to a very basic discussion of what physically happens during a crosswind landing.

Let's take a typical winter day at PDX. Active runway 28R. Wind 190@20K. Rain in progress with water standing on the runway. F-101 on final at 180K. The aircraft makes its approach through a fluid (not water) which is moving with respect to the runway fixed to the earth. Assuming the pilot is Smilin' Jack, the aircraft tracks

along an extension of the runway centerline (final approach). The actual path of the aircraft through its medium, the air, is directed just over 6° left of runway heading. Whether you slip or crab the aircraft, and touch down with zero drift across the runway, the bird still travels upwind on the same course it was on during approach. (It is important to differentiate between the direction an aircraft is pointed and the direction of motion.) As it touches down with both mains and/or the chute is deployed, the aircraft will attempt to line up with the wind which it is living in. In this case it tries to turn just over 6° off the runway heading. But for now, let's leave our crew going sideways on the runway for a few moments and consider the other part of their problem.

The engineering and safety people tell us that a tire will reach full hydroplane at some speed equal to nine times the square root of the tire pressure. On the average 101 this works out to be approximately 145K. During a normal landing a 101 touches down somewhere around 165-180K depending on wind and weight. That is to say, *well* above the full hydroplane speed. Our crew in the above landing should expect zero lateral resistance on the tires for quite some time. So he's faced with the problem of keeping the damn thing on the runway. Here's what happens:

At the moment of touchdown the aircraft is tracking down the runway centerline. With respect to the runway, the motion balances out like this:



Now: as the aircraft slows up, the triangle no longer balances with the track down the runway. With no lateral resistance from the tires, the aircraft will start for the downwind side of the runway — even though it is pointed toward the other side. Somewhere the pilot must find an input that will move the bird upwind. The idle thrust of the engines help him some, but not enough. His only help comes from our old friend Relative Wind.

When he deploys the drag chute, the aircraft-chute combination will always try to point straight into the relative wind. By the time the ship has slowed to 160K the relative wind is just over 7° off runway heading. All he has to do to get an upwind input is to rudder the nose slightly to the left (in this case) of that 7° and the aircraft now senses *right* crosswind and is pushed (lifted) away from the downwind side of the runway.

This looks pretty scary out the window, but don't worry about strain on the gear. If there isn't enough friction to caster the bird straight, there isn't enough to hurt anything.

Now our smiling hero has everything under control, sliding down the runway with the crab angle. Somewhere around 140K something new enters the picture. The tires begin to burn through the water and spin up. Now, this provides a big input to windward. As the tires get a grip on the runway they will tend to drive the bird in the direction they are pointed (by now over 8° off runway heading).

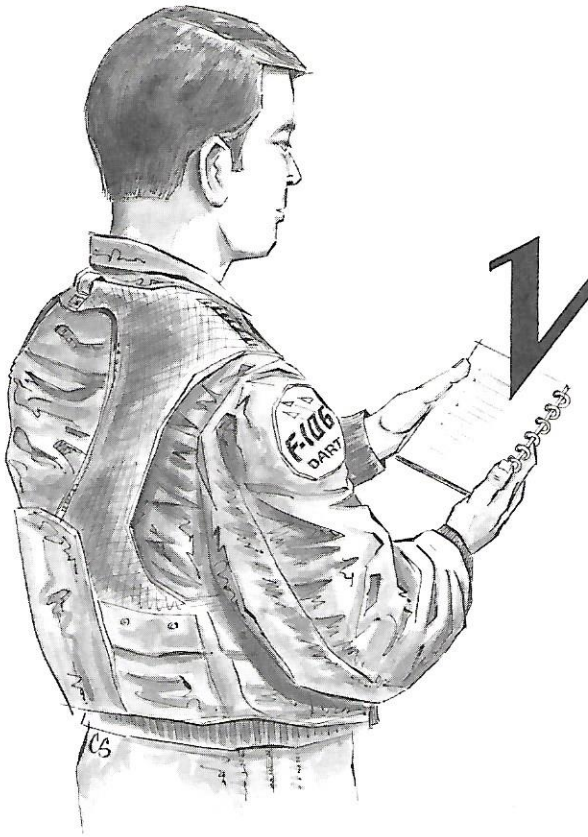
There is a never-never land between full hydroplane and good traction where lateral resistance goes from zero to its maximum value. When the aircraft enters that region it will start slowly upwind. The pilot must start to bring the nose around toward runway heading immediately as this occurs. The tires will start to develop some good traction very rapidly and the aircraft will dart to windward if you do not correct back. This is where the drag chute will become a problem. (Up to now it has helped.)

You should be able to get the nose straight with a combination of the inherent castering action of the gear and rudder. Be careful of aileron because somewhere in there you go from proverse (Yaw into the aileron versus yaw away from the aileron application.) to adverse yaw with a crosswind. Lower the nose at the Dash-One 120K. If you wait too long you may run out of rudder. If you dump it too soon you will lose a lot of aerodynamic braking. (Up to this point the best braking you have.) Get on the nosewheel steering as soon as you feel you can do so safely. If you're still having trouble with directional control — get rid of the chute. Use wheel brakes carefully. The anti-skid is nice but has so far demonstrated some unreliability. Get the maximum braking that you can without cycling the anti-skid except in an emergency.

Hopefully we will soon have new tires that will ease the problem at low speed. There is nothing we can do about the high speed area except be prepared and remember that being pointed off the runway isn't necessarily all bad. Between them we should be able to reduce both the scare stories at the bar and the WSO cardiac arrest rate. ★

ABOUT THE AUTHOR

Major Brad Newell is in the Oregon Air National Guard at Portland. He has over 3,600 hours in ADC interceptor aircraft, another couple of thousand in the right seat of a 707, and a B. S. in physics.



check points

Button, button, where's that button! A recent incident in an F-106 called our attention to a common problem in cockpit design in most aircraft. Because of the complexity, yet limited space in most aircraft cockpits, there are always switches or buttons that are hard to see and harder to reach. In this case, the pilot had difficulty finding the tail hook down button. Every F-106 pilot checks this button *visually* on preflight (no one goes around touching tail hook or jettison buttons). It is located on the extreme left of the instrument panel just below the drag chute handle. During normal flight operations it is safely out of the way, but in sight. However, when the drag chute handle is pulled, the button is obscured from view. When you need it you may not be able to find it RIGHT NOW! ADC Safety has recommended a modification that would relocate this button; but, in the meantime, the only solution is the simulator. If you practice pushing the emergency buttons (not just looking at them) while in the simulator, you will be able to find them blindfolded. Blindfolded? Didn't we play that game back in pilot training? (SED)

If you are planning to fly in a commercial airliner you can save yourself some embarrassment by "checking" your flight gear rather than hand carrying it. The new airline search procedures are turning up survival and hunting knives in "carry-on" baggage. Airline personnel have been confiscating these items and returning them at the final destination. We can't feature anyone threatening a "stew" with a "J" blade, but it's easier to "check" it than argue. (TIG Brief/SED)

A deuce pilot enjoyed a few exciting moments after hearing a loud noise during gear extension. He lowered the wheels at the maximum gear lowering speed, 240 kts, and the nose gear landing light bracket failed allowing the light to hang by the electrical wires. Since the F-102 has had a few gear door problems in the past, at least one fighter unit has imposed a local gear down airspeed limit of 220 kts. We think this idea has merit for all aircraft. Since all Dash-Ones give a speed range for lowering the gear, we think you should use the lower speed when you can and the higher speed only when you must. (SED)

The new AFR 121-6 provides some detailed guidance on the mandatory use of Instrument Flight Rule (IFR) flight operations. This regulation reemphasizes USAF's policy of maximum practical use of IFR, and then lists the following deficiencies that inspectors have noted at operating units:

- Failure to develop standard flight profiles so that functional check flights (FCFs) can be flown under IFR.
- Failure to operate local training sorties under IFR to the extent that mission requirements permit.
- Allowing aircraft commanders to depart VFR to nearby transition fixes and/or cancel IFR clearances prior to landing in an attempt to expedite departures and arrivals.
- Allowing aircraft commanders to operate VFR for an entire sortie when portions of the flight (to and from special airspace) should be under IFR.
- Allowing units to schedule daily sorties into narrow takeoff blocks that result in the saturation of airspace and the overloading of the air traffic control environment.
- Failure to identify air traffic control facilities that lack the capacity for maximum practical IFR operation.
- Failure to explore procedural revisions that would allow air traffic control facilities (RAPCON, TRACON, ARTCC) to increase the number of sorties and missions operating under IFR.

If any of these deficiencies are present in your flight operations, you can expect lots of help from the next inspection team. For USAF pilots, VFR flying is rapidly becoming a thing of the past. When it's gone, we'll miss it; but we'll be safer without it. (SED)

SAGAS SING THEIR SAD SATIRE

DAGGER WIZARD

The Air Guard One-O-Wonder and his Scope Wizard were standing at the bar at Tyndall during William Tell '72 when the pilot saw an old buddy of his, a Deuce jock who was also in the competition. After the usual boisterous greeting and backslapping, the '101 pilot said to his friend, "Hey, I want you to meet my W.S.O." The two shook hands. Then as the F-102 pilot still grasped the WSO's right hand, he extended his left hand to the Voodoo pilot. "I want you," he said, "to meet *my* W.S.O.!"

10 4789 AIR BASE GROUP

recipe for ten years of accident free flying

1. Basic Ingredients: 1 C-47, 1 T-29, 1 U-3A, 3 T-33s, and 1 T-39.

2. Add in a random selection of the following:

— A generous portion of senior headquarters personnel who have an average of 4,000 flying hours, very little of which is recent experience.

—A dash of AFIT students flying their four hours for pay.

— A sprinkling of ROTC instructors from the local universities.

— A pinch of fresh UPT graduates for seasoning.

3. Mix thoroughly and spread thinly so that there will be enough overlap for training.

4. Serve with multiple currency on a field of snow and ice.

5. Share this dish with the local civilian airlines in a highly congested flying area.

6. Suggested dessert: Bicarbonate of Soda.

The recipe described above could be for many things: a base commander's nightmare, a safety officer's baptism by fire, or a professional support group with over ten years of accident-free flying. The difference depends entirely on the management and dedication of the personnel involved.

This month the 4789 Air Base Group, marks their tenth year of accident-free flying. The mission of the unit is to support Headquarters 21 Air Division (ADC); a mission that requires a brand of flying many of us have forgotten. This involves transporting key personnel and equipment to and from bases in the U.S., Canada, Greenland, and Iceland. The remainder of their flying is either in support of target missions or strictly proficiency flying. At first glance, this operation seems rather tame, until we look at the other factors involved.

The aircrews that fly the 4789th aircraft are mainly headquarters personnel who have other demanding jobs — a fact that makes scheduling a nightmare. Although most of these crews have many hours of total flying time, their past experience isn't necessarily in the aircraft, or even type of aircraft, they now must fly. This adds the requirement for cross training and crews who must also perform instructor duties. Then we ask them to operate out of a field (which they share with a civilian airport) that is located in the highly congested northeast area of the U.S. The result is long hours of pushing old airplanes through heavy traffic in the low altitude structure. Would any of our red hot fighter pilots like to volunteer?

This unit's safety record seems more notable when we look at the weather factors involved. The winters at Hancock are characterized by ten feet of annual snowfall, icy ramps and taxiways, and many days of 100 - 1/8 weather. The aircrews must fly many of their approaches to a 6,480 foot runway without a precision approach, approach lights, or overruns. Their VORTAC is located six miles from the field and not aligned with any runway. Circling approaches soon becomes a way of life for these crew members.

What type of safety program must a unit maintain to fly for ten years without an accident? Colonel Donald E. Ewing, Base Commander at Hancock Field, feels that the basis of their program is a basic safety philosophy. Everyone involved must recognize his own personal limitations and make sure that he is not pressed into a situation beyond them. This requires a great deal of awareness and planning before you begin the flight. INTERCEPTOR agrees that this is good advice no matter what your mission or flying conditions, and we congratulate the 4789 Air Base Group, its aircrews and maintenance personnel, for ten years of safe flying. An excellent product from a tough recipe. Well done. ★

THE WAY THE BALL Bounces

ACCIDENT RATE

	ADC	ANG
1 Jan — 31 Oct 1972	5.0	7.6

MAJOR ALL AIRCRAFT

ON TOP OF THE HEAP

MO	ADC	MO	ADC	MO	ANG
61	49 FIS Griffiss	43	5 FIS Minot	59	158 Ftr Gp Burlington
55	57 FIS Keflavik	37	2 Fis Wurtsmith	54	163 Ftr Gp Ontario
49	552 AEW&C McClellan	33	95 FIS Dover	49	115 Ftr Gp Truax
44	4713 DSES Otis	28	460 FIS Grand Forks	36	141 Ftr Gp Spokane

ACCIDENT FREE

CUMULATIVE RATE

	ADC	ANG
JET	6.3	8.3
CONV	2.2	0.0

BOX SCORE

ACCIDENTS FOR OCT / CUM TOTAL

	RATE		20 AD	21 AD	23 AD	24 AD	25 AD	26 AD	ADWC	552	4600	ANG		
F-101	0	13.7										3		
F-102	0	2.5										1		
F-106	7.4	25.3	1		1 / 1				2 / 2			1 / 1		
T-33	2.7	12.6							1			1		
B-57	18.3					2								
EC-121	0													
OTHER	3.3	0									1			

RATE = MAJOR ACCIDENTS PER 100,000 FLYING HOURS ALL RATES ESTIMATED

MINOR ACCIDENTS THIS PERIOD — 0
MINOR ACCIDENTS CUMULATIVE — 6

we point with

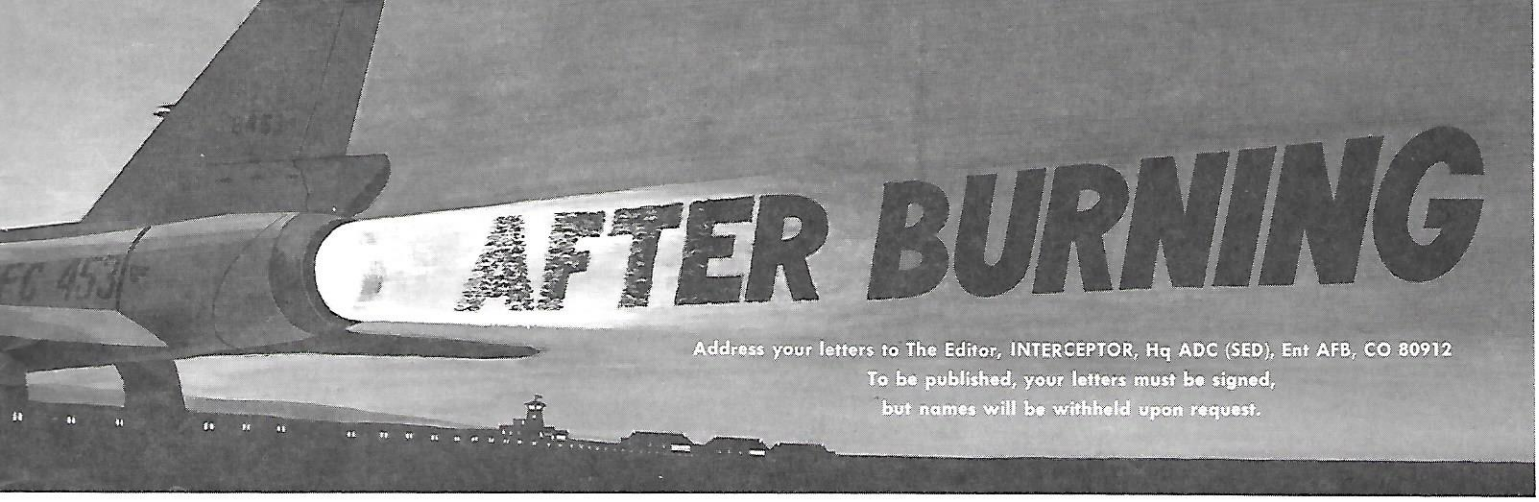
Captain Robert E. Wolf
4600 Air Base Wing
Peterson Field, Colorado

PRIDE

T-39 CONTROL PROBLEM

Captain Robert E. Wolf was the instructor pilot on a T-39 instrument training flight out of Peterson Field, Colorado. The aircraft had been airborne for over an hour, and the student was practicing approaches to a civilian field 30 miles away from the home base. As Captain Wolf took control of the aircraft to set up for a simulated flameout approach, the student remarked that the controls were out of trim. The aircraft began a slow descending roll to the left as Captain Wolf zeroed out the trim. He raised the nose, but found he could not move the yoke to the right beyond the neutral position. Using differential throttle positions and rudder, he was able to level the wings and start a climb toward home. He could move the controls slightly to the left and back to neutral, but no further.

Captain Wolf declared an emergency and requested a straight-in approach to Peterson Field. When the aircraft reached a safe altitude, he lowered the landing gear and performed a controllability check. He elected to leave the flaps up and use a higher final approach speed so that he would get the maximum effectiveness from the rudder. Since they were now aligned with the north runway, Captain Wolf decided to land with a slight right crosswind rather than chance a long circling maneuver to the active south runway. Again using the differential throttle technique and rudder, he flew the aircraft onto the runway at 140 knots, engaged the nose wheel steering, and stopped safely on the runway. Maintenance personnel found that FOD in the left aileron bellcrank area had jammed the flight controls. Captain Wolf's quick reactions in this emergency situation saved both of their lives and an irreplaceable ADC aircraft. For his cool judgment and demonstrated superior airmanship, we point to him with pride.



WEINERT PUT IT TOGETHER

Lt Col R. B. Weinert "put it all together" in his article, "EJECT!," in the September 1972 issue of INTERCEPTOR. It is an outstanding article! I am an ex-Naval Aviator and have been involved in the development of life support equipment for 24 years, and it is one of the very best treatments of this subject that I have read anywhere. It should be required reading, as much as the Emergency Procedures of the dash ones, for every jock who rides in an ejection seat.

Colonel Weinert has blended all of the infinite shadings of the physical and psychological factors that consciously and unconsciously affect a pilot's actions in an emergency situation. He had PRE-PROGRAMMED himself to EJECT when the right combination of inputs occurred. As a result, he is alive and flying today. But, the crunch point that is brought out in this is, how do you get somebody else, the young WGFPs to pre-program themselves? As Colonel Weinert relates when he finished talking to a questioning, bright-eyed pilot, " . . . the younger pilot nodded uncertainly . . . words weren't enough, they just weren't good enough." Probably, words are not good enough, but if there are enough Lt Col Weinerts spread around, some of the WGFrs will owe their lives to a maturing process that was initiated with the exposure to this philosophy.

Damm good show, Lt Col Weinert!

Charles K. Hodell
Chief, Crew Equipment Br.
Directorate of Crew & AGE
Engineering
Headquarters Aeronautical
Systems Division (AFSC)
Wright-Patterson AFB, OH

***We agree.**

FAA FAN

I request information how to subscribe to, or, if possible, to receive the INTERCEPTOR Magazine as an individual.

I am presently an Area Officer in the Minneapolis Air Traffic Control Center. I retired recently after 35 years of Military and Civil Service. After three years in the Air Force, First Pursuit Group, I entered on duty with the FAA in Air Traffic Control. I have held various operational and staff positions in Centers during my career, including six years as Air Defense Officer. As such I worked very closely with the military. My entire career has been in aviation.

We do receive the INTERCEPTOR in the center, and I always looked forward to receiving it. It is, in my opinion, the best aviation magazine published. Due to my work experiences, I find it easy to identify with all articles which appear in the magazine.

Now that I am retiring, I will no longer have the office copy to read. I will miss it.

There is nothing in your policy statement inside the cover indicating whether individuals can subscribe or not or what the cost would be; therefore, this letter requesting information.

Charles B. Paris
18851 Dodd Blvd. W.
Lakeville, NM 55044

***If we had our way, we'd mail to anyone who wants our magazine. However, we are prohibited from mailing to non-DOD affiliated individuals or agencies. Perhaps you can make a monthly visit to your local ANG or Reserve unit and pick up a copy there. They too might benefit from your vast experience in aviation.**

LADY KILLER THRILLED

Upon opening the October 72 issue of the INTERCEPTOR, I was delighted to see "For the Men and Women Responsibile for Aerospace Defense."

Thank you for including my letter in the September 72 issue of the INTERCEPTOR and for changing the wording beneath INTERCEPTOR. More importantly, though, thank you for your honest criticism, evaluation, and recognition of my ideas. Too often the military is characterized as impersonal and bureaucratic. It is encouraging to know that communication is not just a word, but is a practiced reality.

1/Lt Nancy J. Peters
WAF Squadron Commander
Hamilton AFB, CA

***Thank you for the opportunity to print another one of the "good" letters.**

FPDIB IN SAUDI ARABIA

We in Saudi Arabia are involved with training the Royal Saudi Air Force (RSAF) in the F-5B/E and the "Fighter Pilots Do It Better" slogan has caught on with the RSAF in a big way. Request fifty reprints of your "Fighter Pilots Do It Better" centerspread be sent to the following address:

Major William D. Ray
USMTMSA, Box 66
APO New York 09616

***Centerspreads are on their way. Keep up the good work.**

THEY'RE EVERYWHERE

Four reprints of your March '72 centerspread would assist our advisory effort and unit esprit here in Ethiopia. While our aircraft is the newest C-54 built, it requires Fighter Pilots to fly in the Ethiopian Mountains. We maintain the last reserve of VFR flying since we cannot make the MEA for IFR.

Major Gordon R. Flygare
Training Advisor
US Military Assistance
Advisory Group to Ethiopia

***Attitude is the important thing. Aircraft are incidental. Reprints are on the way.**

☆ U. S. GOVERNMENT PRINTING OFFICE: 1973 — 784-111/5

Photos by SSgt Richard Thomas

This holiday season is the most joyous time of the year. Our whole attitude seems to change as we decorate our homes and offices, make special efforts to be with friends and loved ones, and send gifts and greetings celebrating these happy days. Such feelings exemplify the true meaning of "Peace and Good Will." Sadly, though, there are those who won't be able to enjoy all this because, for one short moment, they simply forgot about their own safety and that of others. Maybe they tried to drive too far or too fast on their way to visit friends and relatives; or they celebrated too much and then drove when they should have ridden with someone or waited; or they were stricken with "gethomeitis" and tried to make it back in a plane with that "little" malfunction.

My Christmas wish is that you may enjoy the contentment and happiness of an accident-free holiday season and a safe, prosperous New Year.

Eileen