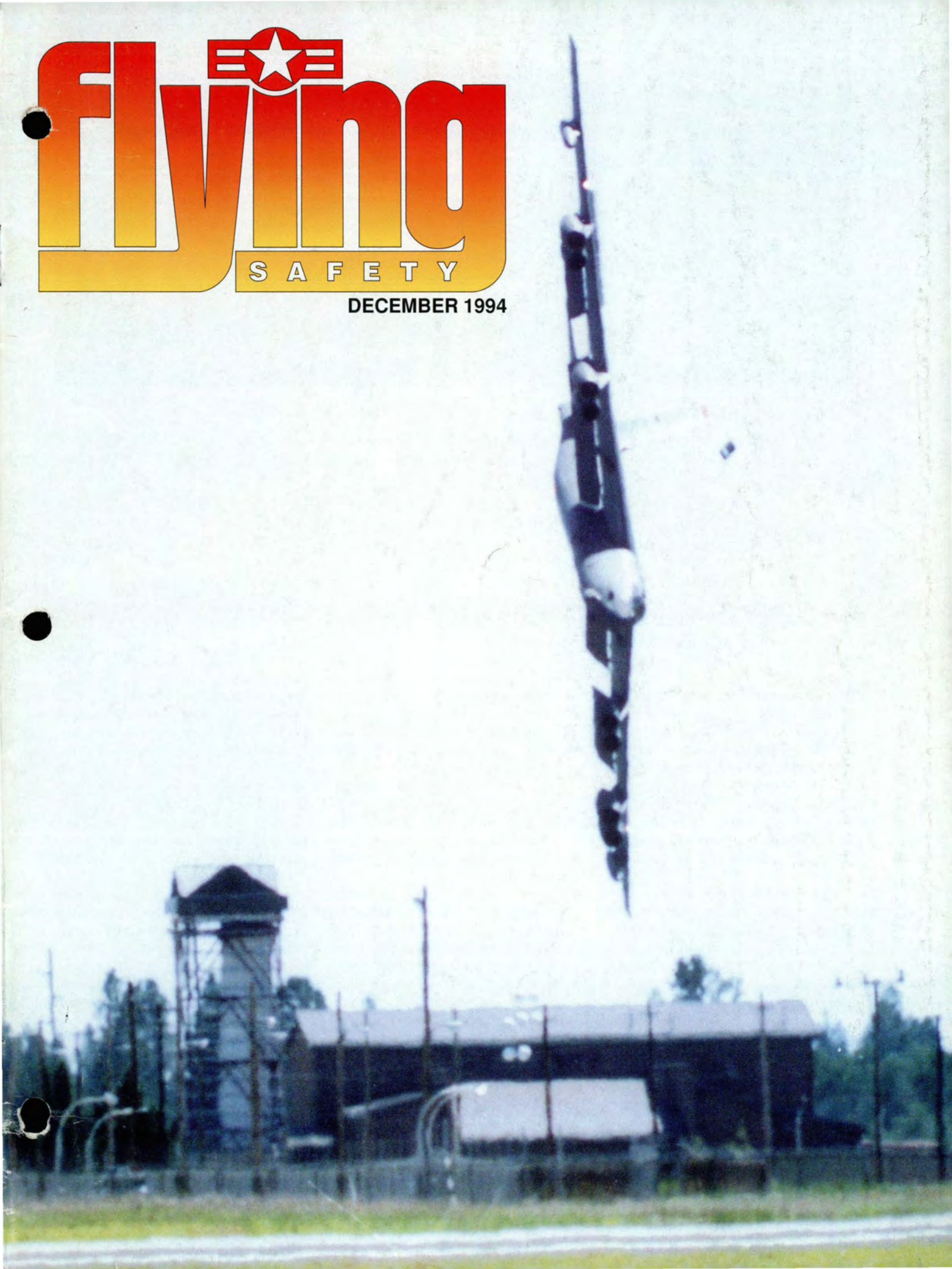
flying SAFETY

DECEMBER 1994



USAF Photo

THERE I WAS

■ One Friday afternoon last fall, while three other copilots and myself were sitting around the squadron just shooting the breeze, we realized all four of us were scheduled to fly companion trainer program (CTP) the next Monday. Since we are stationed at a midwest base field, it allows the freedom to see many parts of the country. We coordinated a noon rendezvous at Ellsworth AFB, South Dakota, on Monday, planning to get a bite to eat and see Mt. Rushmore from the air.

Unfortunately, my partner and I were scheduled for only two sorties, whereas our buddies had a three-hop to enjoy. They decided to show early on Monday morning and work it so they would land at Ellsworth at 1200 for lunch.

I can't really blame this story on being new in the flying business. I had over 2,000 hours of military flight time, 1,200 hours of which had been as a radar navigator/navigator in B-52s. Back in my navigator days, I had been envious of my copilots who could go cross-country in the ACE program when the schedule allowed. Now this was *my* chance to have some fun.

It could not have been a better day to fly. There was a slight chill in the air, and it was VFR from here to Ellsworth. It was even nice to have a 0900 show for a 1045 takeoff. I was thinking, "How does it get any better than this?"

My partner and I showed on time, but a paperwork problem at the CTP office put us a little behind. This meant a rushed mission planning and weather brief and then out the door to our T-38.

Since it was my turn to be the copilot on this leg, I was going to be riding in the back. We both quickly checked the forms. I offered to do the walk-around, and my partner gladly accepted. Just like the mission planning and weather brief, my preflight was also rushed and abbreviated.

Our airplane performed flawlessly as we cruised to Ellsworth at 0.9 Mach in the high 30s. Once we were talking to approach control at Ellsworth, we asked for vectors which would put us close to Mt. Rushmore. After a quick look at the monument, we received vectors for the approach and shot several touch-and-go's.

We landed at 1152, before our friends, and right on time to make lunch. My partner taxied us in, and transient alert met us to help in shutdown. Everything seemed to be perfect. But while I was unstrapping, transient maintenance asked me why masking tape was holding a small access panel on my airplane.

My first reaction was, "You've got to be kidding!" But there it was — masking tape. A tattered piece of masking tape was barely holding a small access door in place on the nose of my white rocket. In my rush to depart on time, I had simply overlooked it.

I shudder to think of what could have happened if this door had come off in flight since it is in front of the right INTAKE. Anyone who has flown the T-38 realizes they are not very FOD-resistant airplanes. There was no mention of anything in the forms about a panel being removed or tape being applied.

I learned a valuable lesson that day. Do not let schedules affect your attention to detail. ■

The Heavies Mishap Summary Issue for 1994

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SPECIAL FEATURES

REGULAR FEATURES

DEPARTMENT OF THE AIR FORCE • THE CHIEF OF SAFETY, USAF

PURPOSE — *Flying Safety* is published monthly to promote aircraft mishap prevention. Facts, testimony, and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. All names used in mishap stories are fictitious. The contents of this magazine are not directive and should not be construed as instructions, technical orders, or directives unless so stated. **SUBSCRIPTIONS** — For sale by the Superintendent of Documents, U.S. Government Printing Office (USGPO), Washington D.C. 20401; send changes in subscription mailings to the USGPO. Back issues of the magazine are not available. **REPRINTS** — Air Force organizations may reprint articles from *Flying Safety* without further authorization. Non-Air Force organizations must advise the Editor of the intended use of the material prior to reprinting. Such action will ensure complete accuracy of material amended in light of most recent developments. **DISTRIBUTION** — One copy for each three aircrew members and one copy for each six direct aircrew support and maintenance personnel. Air Force units must contact their base PDO to establish or change requirements.

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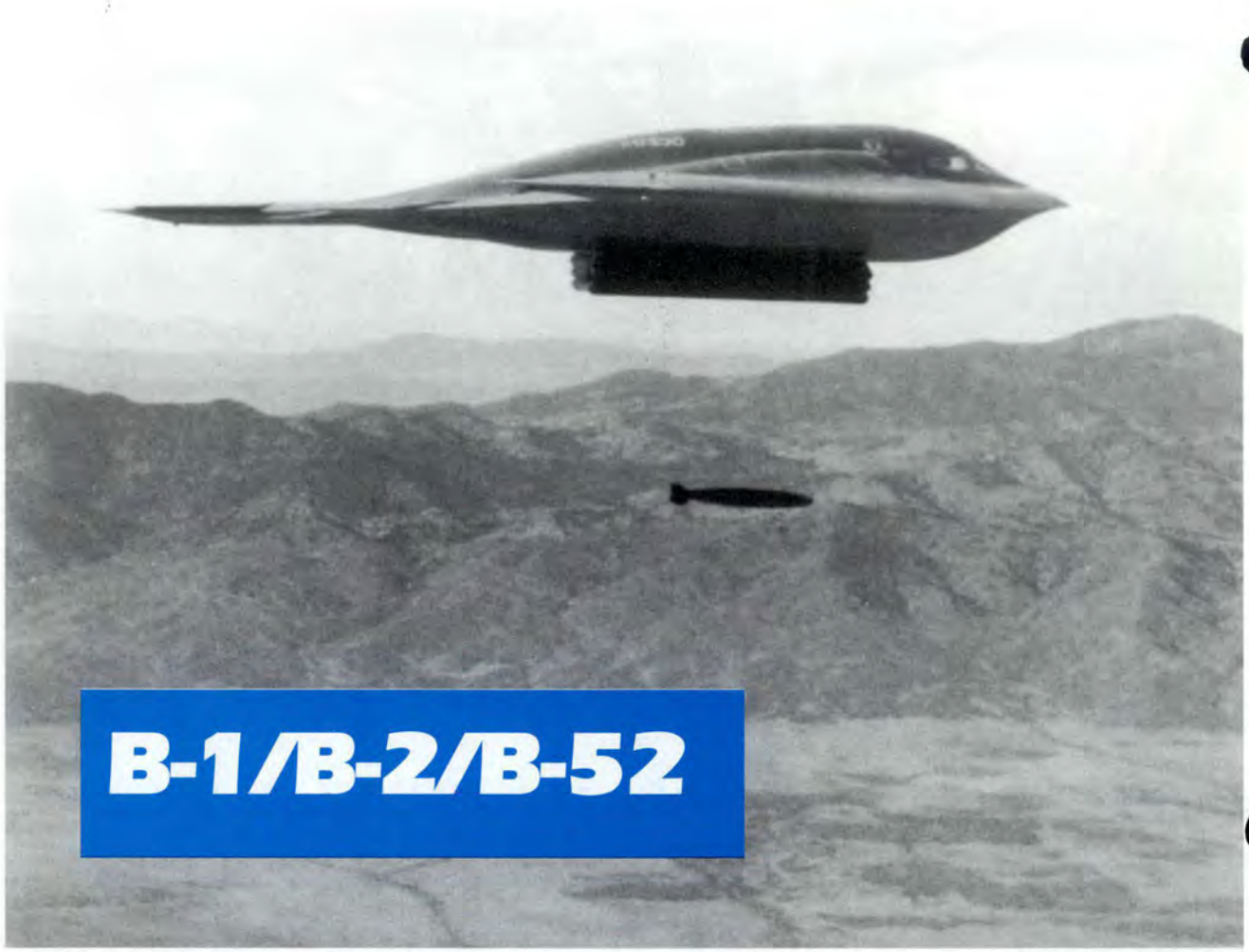

B-1/B-2/B-52

USAF Photo by Capt John P. Hunerwadel

LT COL FRANK SNAPP
HQ AFSA/SEFB

■ During FY94, the Air Force's bombers and crews continued the trend established over the last decade or so of about one mishap per year in which we lost an aircraft and its crew. Since 1984, the Air Force has lost five B-52s and four B-1s.

In FY94, the B-1s flew free of Class A mishaps. There was one Class B. During a training mission, an engine had to be shut down. The crew landed uneventfully. Dollar cost of repairs drove the mishap into the Class B range. This gives the B-1 a zero Class A rate for 1993 and a lifetime Class A rate of 5.09. The lifetime Class A destroyed rate is 2.03.

The first B-2s were delivered this year to the 509th Bomb Wing at Whiteman AFB, Missouri. As of this writing, there haven't been any reported mishaps. Rumor has it that a B-2 was attacked by a vicious redtailed hawk a while back. The damage to the B-2 was minor. The hawk wasn't so lucky.

The B-52 fleet experienced one Class A and one Class B during FY94. The Class B involved an engine fire, and the crew did a superb job of getting their stricken Stratofortress on the ground. The cost to fix the damage from the fire drove the mishap into the Class B range. More on the Class A later. Last year's B-52 Class A mishap rate was 3.04, giving the fleet a lifetime Class A rate of 1.29 and a Class A destroyed rate of 1.02 since the first Buff took to the air in 1955.

A while back, I had an opportunity to visit a bomb wing up in the Northern Tier. It was like going home — almost. The first thing I noticed different was nobody lived in the building at the end of the runway anymore. There weren't even any airplanes parked out there. Remembering what life was like when one-third of it was spent on alert, I casually remarked to my host that the life of a crew dog must be pretty cushy these days. He wasn't amused.

In the polite way that an O-3 explains to an O-5 that he's out of touch with what's going on, my host spent the next few hours explaining that the business of bombing is nothing like I remember. The only thing that had gone away, he told me, was alert. EWO certs, PRP, and all the pressures that went with those things that occupied two-thirds of my time when I wasn't on alert were still there. To all those things add an expanded conventional commitment, increased operations tempo, worldwide deployments, and a multitude of other complexities. To a crew dog who seldom landed anywhere but home station unless home was socked in, the old days of pulling alert looked easy. At least the airplanes were still familiar.

As we discussed the complexities of a bomber crewmember's life, the conversation evolved to one of risks

and how to handle them. Today's flying environment fits perfectly into a classic risk model. Change, resource constraints, new technology, mission complexity, stress, tempo of operations, and environmental circumstances are all sources of risk. I'm sure I'm stating the obvious when I say that virtually every crewmember, maintainer, commander, and supervisor confronts all of these on a daily basis.

Risk is inherent in what we do. And managing risk is an essential part of our job. To manage risk, just keep in mind a few simple principles. First, don't accept unnecessary risk. The second follows from the first — accept risk only when the benefits outweigh the costs. Finally, make risk decisions at the appropriate level.

On a practical level, you're managing risk when you and your crew thoroughly plan and brief each sortie and game plan for when things don't go as planned. You're managing risk when you study EPs and practice them in the simulator. And you're managing risk when you fly by the book.

As I read last year's Class C, B, and HAP mishap reports, I see clear evidence crews have prepared themselves well for emergency situations. And when I look at the demands of the current bomber mission, I see crews, maintainers, and commanders doing an outstanding job managing the risk. But when I look at this year's B-52 Class A mishap, I see a case where risk management was nonexistent.

By now, you've all heard about the B-52 that crashed this year. Most of you have seen the TV networks' analyses of the causes. Can't blame you if you're still wondering how a highly experienced crew with one of the Air Force's most highly skilled pilots could fly their airplane into a low altitude stalled condition, depart controlled flight, and impact the ground.

The proceedings of the Safety Investigation Board are privileged, and this magazine isn't, so I'm basing my comments on the report of the Accident Investigation Board conducted under AFR 110-14 (now known as AFI 51-503). That's a publicly releasable document.

There was nothing wrong with the airplane that could be causal in the accident. The structures, engines, flight controls, and all other systems needed to keep the jet flying were working as designed. They were flying outside the design limits of the airplane, in violation of the flight manual limits and in violation of a multitude of Air Force, MAJCOM, and FAA regulations. All those limits and regs were written to manage risk by defining the safe parameters for flying the airplane. They tell us what's an acceptable risk and what's not. This mishap is a clear example that if a crew flies outside the book limits once or twice they might get away with it. But sooner or later, the odds will catch up with them if they continue to accept unnecessary risk.

Wing supervisors planned an air show and didn't get MAJCOM approval. In essence, they didn't make decisions at the proper level. Maybe, if the planned airshow profile had been reviewed by individuals removed from the situation, they might have seen the undue risk of the plan and put a stop to it.

The aircraft commander had a history of breaking the rules — flying too low, banking too steep, and generally pushing this airplane beyond its limits. As an experienced pilot, IP, and flight examiner, he knew the rules. But, over a period of several years, he continued to fly in such a way as to jeopardize his aircraft and crew.

A final word for those of you who now and will one day command flying units. Always forgive an honest mistake. We learn from our mistakes. If you have a maverick in your unit who won't fly by the rules, do the Air Force a favor. Do his family a favor. Above all, do him a favor. Manage this risk. Ground him. ■

USAF Photos courtesy 509th CS/SCCV

FLYING THE HEAVIES

USAF Photo

LT COL DAN DOUGHERTY
HQ AFSA/SEFB

■ Overall, FY94 was another good year. We are all saddened by the loss of eight crewmembers earlier this year in the AC-130 mishap. We also lost two Starlifters to ground fires — one during fuel tank maintenance and the other fell prey to a fatally falling falcon. Bird strikes, from the mighty albatross to mallard ducks, cost us four Class Bs in the Galaxy world to the tune of $1,175,173!

This year I'm organizing my article to first talk of the big three (5s, 130s, and 141s). I've listed some stats, and I'll cover whatever issues I've been watching. I can't say much about the Globemaster III. It's had an okay year, but the numbers are still so small we can't find anything trendy. Then I'd like to present some overall issues which affect our trade and our safe pursuit of same. Let's get started.

C-5 Galaxy

When we tally the totals, Albert will have logged over 73,000 hours in FY94. That's about 5,000 less than FY93, but considerably less than FY91's whopping 166,676! Most impressive is that for the last 4 years, we've managed ZERO flight Class A's — great job! As I mentioned earlier, though, Class B bird strikes were definitely a problem last year. We're not alone, though. Air Force-wide bird strikes normally cost over $50 million yearly. Furthermore, we've lost crews and craft to this hazard. There are things we can do to prevent this. (See C-5 10-year mishap history, page 8.)

The Bird/Aircraft Strike Hazard (BASH) Team is now at AFSA. In fact, they sit about 17 feet away from me and answer DSN 246-0698. They are bird experts. They study migratory and feeding patterns and know a lot about managing this serious risk. We can greatly lessen our chances of bashing birds by adjusting operating hours, cutting grass (or even letting it grow longer), avoiding certain routes, and much more. The BASH Team assists with base visits, surveys, and will help develop bird avoidance plans.

On to another topic. When the Galaxy's engine was designed, a vapor barrier was placed between the compressor and combustion sections. The idea was to keep high temperature air out of the compressor section. To do so, the compressor side of the barrier maintains a slightly higher ambient pressure. Now this is great — that is, until a flammable fluid is misting on the compressor side. When this happens, the resulting explosion can blow the nacelle doors and fire detection system clean off the pylon, leaving only a fire as a reminder. Granted, this sure doesn't happen often, but San Antonio's depot and Lockheed are working hard to solve this problem.

Two other C-5 issues have captured and are holding my interest. The first is the environmental edict to replace Halon 1202 with a more environmentally acceptable agent. This, of course, affects the entire Air Force and its cargo fleet. We have 5 more years to find a replacement. Wright Labs are studying 12 possibilities. Stay tuned for further details. The other happened just before the end of the fiscal year. In fact, the report crossed my desk as I was writing this section. We clipped a tree with the wing during taxi. We haven't had one of these in a while, so let's consider this a gentle reminder.

C-130 Hercules

While the initial event in our lost AC-130 was *Spectre* specific, what happened during the next 9 *minutes*, until water impact applies to every crew airplane. Pause and try to imagine the systems knowledge, procedural knowledge, situation awareness, and crew coordination this crew displayed. According to the AFI 51-503 (formerly AFR 110-14) report, following the initial fire in the engine, the crew then faced a jammed condition lever, several cargo compartment fires, total loss of utility hydraulics, smoke and fumes, a massive fuel leak, a wing fire, another engine fire, and multiple electrical malfunctions. Further, they executed a bailout and ditching. Once again I remind you, all this occurred in only 9 minutes.

What can we gain? First of all, think through this scenario. If a timer were running, could you recall all of the procedures, facts, and parameters you would need to handle these emergency procedures? Probably not. The only way to prepare for this style calamity is to prepare for it. For example, do you feel comfortable with your grasp of ditching or bailout procedures? Can you recall and complete these and three more obscure, non-boldface EPs while the crew is telling you about more problems?

Second, have you ever chided your sim instructor for loading you with multiple EPs? Did you say, "That would never *really* happen?" I recommend we all begin to approach our emergency procedures with the belief they may come in multiples. That could mean some pretty creative daydreaming. For years now, most of us learned our procedures in exclusion. We assume when we pull the condition lever, it'll go to feather. Or when we need to dump fuel, fuel will dump. Do some deep study of your procedures, and use your imagination while you're reviewing the steps. For example, imagine you have no essential bus, no light, or no communication with your crew.

The final lesson we can learn is to start including the entire crew in your emergency discussions. Philosophically discuss issues like bailout versus ditching, who's supposed to do what, what kind of information

continued

Inventory by Command

MAJCOM	C-5	C-17	C-130	C-141
AMC	75	8	–	176
ANG	28	–	214	16
AFRES	16	–	139	36
AETC	7	–	10	15
ACC	–	–	187	–
AFSOC	–	–	65	–
PACAF	–	–	30	–
USAFE	–	–	19	–
AFMC	–	6	27	4

USAF Photo

Have you ever chided your sim instructor for loading you with multiple EPs? Did you ever say "That would never really happen?"

Inventory/Age/Hours

	C-5	C-17	C-130	C-141
First Delivery	1969	1992	1955	1963
Inventory	126	14	691	247
Destroyed	4	0	78	14
Average Age (Years)	A: 24 B: 9	4	*	29
Average Hours	A: 14,000 B: 6,000	500	*	35,000

***C-130's have been delivered off and on from 1955 forward. Substantial deliveries, still in service, fall between 1961 to 1964. These average between 15 to 20,000 hours each.**

FLYING THE HEAVIES

continued

do the guys in the front need, or the guys in the back? You have time to do this. Further, you may really have your eyes opened when you discover some pretty clever approaches we all haven't thought of before. This is empowerment, plain and simple. It's also classic risk management. And, most of all, it could save everyone's life when the crunch comes.

In other Hercules news items, we've had some problems with the auxiliary hydraulic pump relay. It's located behind the pilot's essential AC bus circuit breaker panel (in dreadfully close proximity to the oxygen supply line). For some as yet undetermined reason, two terminals are arcing and igniting fires. There have been a few reported, and Warner Robins ALC has issued a TCTO to inspect and replace as necessary. Each time it has occurred, the crews have handled it without difficulty. Heads up, anyway.

The items above are the exceptions to an otherwise near-perfect performance by a group of thorough professionals, from maintenance to the crews. Support agencies and port operators are in there making it happen too! There's not a trouble spot in the whole wide world where there's not a Hercules operating. Imagine the negative publicity if everyone involved wasn't doing it right — so keep it up!

C-141 Starlifter

The venerable Starlifter, backbone of deterrence and strategic airlift, may be suffering some growing pains, but don't write this workhorse off. The fat person ain't sung yet! When the last B-2 flies to the boneyard, its crew will ride home on a Starlifter. Well, having said this, let's look at the fleet. Finishing its thirty-first year since delivery, the C-141 came just short of breaking the 10-million-hour mark. Imagine all of those hours and certainly one of the lowest mishap rates in the Air Force. Impressive indeed!

Class A Flight Rates

	C-5	C-130	C-141
Lifetime	1.04	1.03	.33
FY 93	0.0	.34	.46
FY 94	0.0	.37	0.0
Destroyed	4	78	14

USAF Photo

I was fortunate enough to take a tour of the center wing box facility at Warner Robins last summer. This project is no easy chore. The precision required impressed the heck out of me, and WR-ALC is up to the task. Before lifting the old wing box out, they remove the wings. Once they're off the airplane, a team of experts climbs into the wing looking for cracks. But the center wing box replacement effort was never intended to be a wing crack repair project. In fact, it requires a separate contract to repair any discovered cracks. Unfortunately, we can expect cracks and restrictions to continue. Follow these restrictions. They keep you in a safe envelope and extend the plane's life.

We may finally have a handle on the rash of flameouts and rollbacks we were suffering through earlier this year. A TCTO corrected the dust particle problem, and WR-ALC instituted a complex procedure to prevent it from happening again. One of the noteworthy issues, discovered when a team tried to evaluate the nature of the flameout problem, was the total lack of compatibility — or interoperability if you will — between safety, maintenance, and operations reporting methods. We don't talk to each other, and it seems even if we did, we wouldn't answer each other.

For example, in a more than two-engine airplane, an engine shutdown is not reportable through safety channels. It may be in maintenance channels, but it may be reported as a specific part malfunction instead of a shutdown. Then there's Ops reporting criteria — not something I want to get into here. So, the problem happens when you want to study data for safety trend analysis. You could very well conclude an event has never happened, yet you know darn well

C-130: 10-Year Mishap History

FY:	85	86	87	88	89	90	91	92	93	94
Class A	4	2	1	3	1	0	0	2	1	1
Destroyed	3	2	1	1	1	0	0	3	1	1
Class B	2	0	3	0	0	0	0	0	0	1
Class C	160	92	38	46	59	55	63	86	46	41
HAP	62	60	97	76	72	46	18	17	11	20

Of the 64 reportable incidents, 15 were FOD (compared to FY93's 16) and 4 were bird strikes. For the second year running, the Herc suffered a deer strike.

2d CTCS photography by SrA Andrew Dunaway, II

	Definitions:
Aircraft Mishaps	Those involving USAF aircraft, and further categorized as either a Flight Mishap, a Flight-Related Mishap, or an Aircraft Involvement Mishap.
Class A:	Total destruction of an aircraft, damage of $1 million or more, or a fatality or permanent total disability.
Class B:	Total cost of $200,000 or more but less than $1 million, or a permanent partial disability, or inpatient hospitalization of three or more personnel.
Class C:	Total cost of $10,000 or more but less than $200,000 or an injury or occupational illness resulting in a loss of 8 hours or more.
HAP:	High Accident Potential. Events in the judgment of the reporting official where there is a significant hazard to the crew or aircraft. Base this judgment on whether a similar event could result in serious injury, illness, or damage.
Physiological Incident:	Any in-flight episode of a physical, physiological, medical, pathological, psychological, pharmacological, or toxicological nature which compromises performance, confuses, disorients, dulls, distracts, pains, endangers, or incapacitates.
	Source: AFI 91-204, Investigating and Reporting US Air Force Mishaps (formerly AFR 127-4)

it has! Well, a team is forming, under AFMC chairmanship, to study and *fix* this problem. You can help, and you'll see how. Just read on.

Issue: Reporting

Study the mishap histories in the tables. Do you notice anything about our Class C and HAP numbers over the last 10 years? If you said "Yes, they're going down," you would be absolutely correct. The *numbers* are going down, but are the *incidents?* This is beginning to concern me a lot. Remember, Class Cs and HAPs represent the kind of trend information we use to spark action and prevent Class As and Bs. As a matter of fact, the two hottest issues WR-ALC's C-130 office is working from the last C-130 system safety group came from Class C and HAP reports.

Some have told me reporting has become too difficult because of the new Aerospace Safety Automated Program (ASAP). This is a computer program we're all using now to report incidents. I have trouble blaming ASAP for reduced reporting. Were it that difficult, nothing would be reported. Besides, PACAF's safety office has mastered the program. Another reason may be some avoid reporting to "keep their numbers looking right." I wonder about this reason. Still others may have set a quality goal of reduced Class Cs — and they're getting their desired metric. A final reason may be the belief that what occurred is really an insignificant, one-of-a-kind type of event. I can assure you, human factors tend to remain constant throughout the human race.

continued

FLYING THE HEAVIES

continued

Or, maybe we just aren't having as many. Whatever the case, look inward and make sure you're contributing your share. Please understand how important trend analysis is to mishap prevention. We really need to know when parts are not living up to a warranty, when taxiways aren't being maintained, and so forth. Proactive safety is much less bloody than reactive safety.

USAF Photo

Finishing its thirty-first year since delivery, the C-141 came just short of breaking the 10-million-hour mark.

C-5: 10-Year Mishap History

FY:	85	86	87	88	89	90	91	92	93	94
Class A	0	1	0	0	1	1	0	0	0	0
Destroyed	0	0	0	0	0	1	0	0	0	0
Class B	0	1	1	0	0	0	2	1	2	4
Class C	32	14	14	14	14	21	17	17	24	19
HAP	16	8	14	10	8	5	0	3	4	4

Of the 27 reportable incidents, 3 were cargo leaks (tieing FY93), 1 was FOD, and 7 were bird strikes. In fact, the four Class Bs were all bird strikes.

Issue: Safety Privilege

Stop and think about the safety privilege. It's why, in this magazine, I can't tell you everything you'd like to know about mishaps. The undeniable benefit of the safety privilege is it helps us prevent mishaps with our major weapon systems. It's a granted immunity to crews, witnesses, contractors, and anyone else involved. What it says is "If you'll tell us everything you know about the mishap, we'll keep it within official safety channels." Furthermore, we can use your statement for *NO* other reason than mishap prevention.

That's the edge upon which we depend during the safety investigation to find causal factors and make appropriate recommendations to prevent the next mishap. Our claim to privileged information has been tested in courts several times, including the US Supreme Court, and is now written in law. Some erosion has occurred when the courts have pointed to sloppiness in handling the information. In these cases, the court ruled that if the military didn't protect the privileged information, it's only fair that plaintiffs get to use it too. The report from the followup accident board, otherwise known as the collateral investigation (previously referred to as the AFR 110-14 board and now the AFI 51-503 board) is fully open documentation. Before questioning by this board, witnesses are sworn in and have their rights read. They may also have their attorney present. Plaintiffs and defendants may use this information at will. I think you see the problem.

That's our dilemma in safety. We can prevent mishaps all right by using mishap recommendations to work T.O. changes, procedural improvements, and even hardware modifications. But we can't, through public mediums such as this, tell a highly motivated and interested professional audience everything you'd like to know. What's the solution? It has to get to you through your squadron or wing safety office or even word of mouth — but watch the rumors. Keep in mind, though, you share the responsibility to control mishap information.

Courts will exclude evidence wrongfully taken, meaning a mishap report that's stolen. But they might admit a mishap message found lying on a table in a break room or stapled to a "green bordered" bulletin board. So I'm asking for your help. Help us get the information to the front line, the folks who need it. At the same time, close-hold the information from those who would redress their grievance in a court.

Issue: Ops Tempo

I feel the overwhelming compulsion to include some comments about this subject. Everywhere I travel, if it's not the first "safety" issue brought up, it's probably because they're getting the p___ ants out of the way first. So what's the *safety* issue? Is it overtasking? Too much rotation? Insufficient time to train or stay proficient? No! These are ops

C-141: 10-Year Mishap History

FY:	85	86	87	88	89	90	91	92	93	94
Class A	0	0	2	0	1	1	0	0	1	0
Destroyed	0	0	0	0	1	0	0	0	2	0
Class B	0	0	0	0	0	0	0	0	0	0
Class C	70	39	21	18	25	39	42	27	23	16
HAP	45	38	59	47	25	11	14	12	3	6

Of the 22 reportable incidents, there was only 1 cargo leak and 4 bird strikes. Note however, that we lost two (destroyed) to ground fires; unfortunately, both were not "wing crack" restricted.

Combat Camera Image by SrA Andrew Dunaway, II

Cargo is off-loaded from a C-5 Galaxy from the 436th Airlift Wing, Dover AFB, Delaware, at San Vito Air Station, Italy, in support of Operation Deny Flight.

issues, controlled by our leaders in support of national objectives. We raised our right hands, swore (or affirmed) our acceptance of risk. The *safety* issue is *how much* risk you accept and how you manage it.

Is the problem overtasking, too much rotation, or insufficient time to train or stay proficient? It's really only a problem if your risks exceed your gain. If you spot unacceptable risks, stop the operation and take charge. Either control, eliminate, mitigate, or advise your boss. Weigh risks carefully against mission accomplishment.

Remember, interspersing your precious cargo with mangled wreckage, human remains, and dirt because you *thought* landing with thunderstorms in the vicinity was *worth the risk* just doesn't cut it! ■

USAF Photo

E-3

USAF Photo

MAJ ED JARRETT
HQ AFSA/SEFB

■ The E-3 community has experienced many years of safe flying with an unblemished Class A mishap rate. Looking back at the past 5 years, we have reported very few Class C and HAP mishaps (which means either we're very good or we're just not reporting). Of those reported, physiological mishaps lead with about half due to preexisting illnesses and the other half due to equipment malfunctions. Operationally, the E-3 crews have done an admirable job of flying safe and providing a valuable service to deployed forces in every major hot spot in the world. However, this year's most publicized mishap should lead all of us to some serious soul-searching.

The public scrutiny and judicial inquiry into our friendly fire mishap have resulted in an emphasis on legal liability with less concern and fanfare on the processes that led to the failure. This approach could have serious repercussions in our ability to properly manage our crews in the future. Some of these repercussions may include fear of making any mistake, fear of reporting problems, increased top-down management, and focus away from the people best able to solve the problems. We need to make sure we don't close the doors to the very people and processes that can improve the way we do business.

Like many units throughout the Department of Defense, you are being called upon to support increasing numbers of operations — often with little warning. This trend demands we look at how we manage our operations so we can optimize mission needs with safe implementation of the tasks required. To increase your mission effectiveness and safety record, we must abandon the traditional reactive management of hazards and move toward a proactive risk management approach. This approach involves three key principles of identifying the hazards, assessing the risks, and implementing a risk management plan.

We know subconsciously that the consolidation of many elements such as weather, crew coordination, training, et al., result in successful mission accomplishment. Identifying the hazards associated with these elements helps us acknowledge those areas that could adversely affect our success. These hazards include the quality of training, recency of experience, and total flying experience.

Interpersonal dynamics also play a significant role in crew aircraft by determining the extent and quality of communications. How well crews are able to rest, and the quality of that rest for the long haul, play a role in alertness and sound decision-making. Mission duration and complexity may demand the need for experienced members and possibly augmentees. Finally, theater procedures and guidance play a significant role in the crew's understanding of the mission's boundaries.

Once the hazards have been identified, each of them needs to be assessed as to its seriousness. After these risks have been combined to come up with a total risk value, then this value needs to be compared to the urgency or importance of the mission.

The last step is managing the final risk. The options available are to accept the risk, reduce the risk, avoid the major hazards, or spread the risk to some other player or organization. The higher the risk, the higher the required level of decision-making. Whatever the decision, leadership/management is the key to making this process work. If leaders send the implied message that the mission is always more important than the needs of the crews, then the key elements in being able to judge risk exposure are hidden. Leaders/managers will continue to see a rosy, but unrealistic, picture of their operations. Open communication between leadership and operators is critical to properly identifying and then appropriately deciding what level of risk each is willing to accept.

As we continue to meet increased operational taskings, we must approach how we do business smarter, better, and clearer so we can continue to provide the high level of service that all nations have come to expect from our dedicated professional crews. ■

Top Four Class C/H Categories

	1990	1991	1992	1993	1994
Physiological	1	3	4	1	2
Landings			2		
Hydraulic Lines		1	1		
FOD/Birdstrikes				1	1

KC-10

USAF Photo

MAJ ED JARRETT
AFSA/SEFB

■ You've done it again — the second year in a row of mishap-free Class A/B flying. Especially noteworthy: You achieved this record during the second highest KC-10 flying-hour year since Desert Storm while supporting the many worldwide operational requirements. Combine your heavy flying commitment with the aircraft moves from Seymour Johnson and Barksdale to Travis and McGuire, and you've done a remarkable job in maintaining that sharp mission focus while spending most of your days TDY.

A couple of ground mishap lessons this year remind us we need to be more forthright in asking probing questions. In the first mishap, we had a crew working with transient maintenance to ensure ice had been removed from all the surfaces and engine inlets. The aircraft had been parked the night before without the engine inlet cover installed. Assumed conditions resulted in damage to the engine after ice broke off during initial power application and subsequent abort. The moral of the story: ACs and FEs should demand all appropriate structures, inlets, etc., are visually inspected for ice and snow anytime an aircraft is deiced. A few extra minutes would have prevented the engine damage and saved the mission.

The second mishap of concern involves a ground taxi braking exercise to troubleshoot a recurring brake problem. The end result was damage to all main landing gear tires, failure of the center main landing gear drag link, and fuselage skin damage.

Anytime nonstandard maintenance is being done to the aircraft, it is the pilot's responsibility to ask some pointed questions based on *commonsense* rules.

- First, have all troubleshooting routines been applied?
- Second, if standard procedures have been thoroughly exhausted, has the ALC been brought into the loop on the problem and any possible solutions?
- Next, if a test is required, have all of the levels of approval from wing commander to ALC system program director been obtained before the test is authorized?
- Finally, does the expertise to conduct the test exist, or is it better suited for an ALC or test wing to accomplish the test?

Take a hard look at these *independent efforts* before accepting them as a way of doing business.

The move of our aircraft, people, and support equipment from Seymour Johnson and Barksdale to Travis and McGuire has resulted in just one more irritant in an already busy and demanding flying environment. It's critical we make every effort to take care of our people while we make the difficult transition to bases which are a few years from being able to fully support our operations.

New construction, housing, and other essentials will take some time to complete, but this still leaves us vulnerable to the *gotchas*. Careful planning at all levels, with involvement of the entire KC-10 community, will be critical to making this transition a safe and, hopefully, unremarkable event. Our community takes pride in how well we are able to adapt to adversity, and this is just another one of those challenges we can meet head-on with the same vigor we used in Desert Storm, Provide Comfort, and Provide Hope. ■

Top Categories for Flight Reportable Mishaps

	1990	1991	1992	1993	1994
Bird Ingestion					
Bird Strike, Structure	1			2	1
Cargo Leak/Loose Cargo		3			
FOD		1	1	1	2
In-flight Air Refueling	4	5	10	4	
In-flight Air Refueling System	5	1	1	3	1
Physiological	2				
Flight Class A Lifetime Mishap Rate	0.42				
Flight Class B Lifetime Mishap Rate	1.06				

HELICOPTER MISHAP SUMMARY

2d CTCS photography by SrA Andrew Dunaway, II

MAJ ALAN RESNICKE
HQ AFSA/SEFB

■ Once again the helicopter force has been restructured into a number of commands, several of which are relatively new to the fling-wing world.

Change has certainly been a part of "Aiming High" in the military. We've seen our rotary wing assets decentralized, reorganized, and forever scrutinized. And as the song says, "The beat goes on." Here, then, are the safety highlights for FY94. Hopefully, they will serve as food for thought for 1995.

The H-3 has finally retired to the boneyard, the museums, and the static displays. It spent its last several years mishap-free. "Atta boy" on the crews, maintainers, and supervisors!

I know more than one flier who is sad to see the Jolly Green Giant go away. The H-3's lifetime Class A mishap rate is about 4.25 (final flight hours are still coming in), and the Class B rate is about 2.75 per 100,000 flying hours. Overall, this is a noteworthy career for a real workhorse. Bye, Jolly!

The H-53 Pave Low and Super Jolly worlds were also quiet this year, continuing an excellent, mishap-free trend of 3 years. Kudos to the folks at AETC and AFSOC for keeping these warbirds in the air doing the mission.

Now for the rest of the story. We had three Class A mishaps — about average, but more than expected — and several close-call Class Cs this fiscal year. Rather than detail each one (check with your local helo safety person to see the sanitized messages if you need a refresher), let's review as overall issues needing immediate attention.

Back to Basics

Several close calls and actual mishaps have occurred this year because we have forgotten the basics of helicopter aerodynamics. The Dash Ones cannot tell us every detail of basic flying. That's why we go through Fort Rucker for the Rotary Wing Qualification Course.

It's time to review those old books and papers on aero or get your unit to purchase something like Prouty's *Helicopter Aerodynamics*. Get one of your IPs to conduct a refresher course at your next training day. Things like steep turns, G-loading, rotor vortices, and so forth need to be common knowledge throughout our flying careers, not just to impress the instructors at Fort Rucker.

Pilot types, especially, need to take a hard look in the mirror and examine themselves for any shred of overconfidence and complacency. The machines are flyable, but the humans need to be self-disciplined and focused.

Last year, in a paragraph entitled "Pet Peeves," I mentioned the fact many crews may have overflown perfectly good precautionary landing sites after having experienced some type of problem. Don't assume or elevate the level of risk needlessly. When No. 2 calls you and says something just flew off of your helicopter, PUT IT DOWN! If you hit some wires and there's an open field in the area, PUT IT DOWN! If you make contact with something on the ground (or even the ground), PUT IT DOWN! You're in a helicopter. You can make precautionary landings wherever space permits, and that's a

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USAF Photo

lot of places. Commanders, supervisors, and maintenance personnel should applaud all such decisions to land now and ask questions later.

Supervisors

A hard look at crew mixes and an individual's physical, mental, and emotional health is in order. Daily workloads are at, or near, max. Our people are being pushed hard with extended TDYs at home and overseas. Then they return to a fast-paced, catch-up training and currency program or more local operational missions and no time for training. Night vision goggles are being incorporated into more unit missions, adding the ability to see better at night but increasing individual workloads.

While AFSA is embarking on the development of a risk-management program, you can do an informal assessment of your people and mission before each flight, making sure the crew mix and their capabilities fit the sorties to be flown. Last-minute changes if things aren't just right might delay a takeoff but save a crew and helicopter from a possible mishap.

Crew Resource Management

With human factors now the predominant causal factor in most Class A and B mishaps, effective crew communication, both from the aircraft commander to the crew and from the crew to the aircraft commander, is absolutely essential. I like to remind folks "we don't crash in compartments." Yet, in too many cases, I read where effective communications would most likely have prevented the mishap sequence. This is not something which just "happens" among a crew — it must be learned and practiced. Use your simulator and "hangar flying" times to learn new techniques and open the doors of communication with fellow crewmembers.

H-60 Breeze Eastern Hoists

Obviously, this piece of machinery has had many problems over the last 18 months or so, and it is currently on its second "life or death only" grounding. The fix has been kit-proofed and is being distributed and installed even as I write this article. The logistics folks assure me this will bring the hoist up to the reliability standards we expect for a man-rated machine. And let's face it — hoists are part of our helicopter bread and butter. The scarcity of dollars in most of our commands makes a replacement hoist very unlikely. If you have a suggestion to improve the Breeze Eastern, please make sure it is forwarded on an AFTO 22 to WR-ALC for consideration.

Crosstell

Of all the safety areas I deal with, this one is the most critical and probably the least accomplished. A recent Class A mishap had its precursor (without the ground impact) in another unit only a month prior. However, word of a possible problem did not get out. We ALL have close calls, and while nobody likes to air "dirty laundry," other folks can learn from your experiences, be they crew, maintenance, or supervisory. Share the wealth and prevent someone else from having a mishap!

This can be done through formal reporting channels (i.e., a HAP message) or a narrative message entitled "Crosstell" sent via the helicopter AIG — I own it, and I say you can use it. A more anonymous method is to submit a "There I Was" article to the editor of *Flying Safety* for publishing in the magazine.

I'm convinced most of our mishaps need not occur. They are a combination of many factors, usually starting simple and getting into complex people issues. However, most can be prevented if only we see the mishap chain forming.

Consider this question (plagiarized from another safety officer here): **"HOW WILL IT** (my present or proposed action) **READ IN THE MISHAP REPORT?"** Your honest answer to this question, whether you are a maintainer, flier, or supervisor, will go a long way toward keeping all of us out of a tight fix and removing lots of the paperwork from my desk. (Anyone want to trade places?!?)

Get the mission done and FLY SAFE, please. Call me at DSN 246-0703; E-mail: resnicka%smtps@afsa1.saia.af.mil ■

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MAJ ED JARRETT
HQ AFSA/SEFB

■ Congratulations! We finished FY94 with a flawless Flight Class A and B mishap record. A lot of hard work and effort went into achieving this enviable record, from our maintainers doing the highest quality maintenance to our crews who have trained hard and continue to support the many ongoing worldwide contingencies. Even with this achievement, we experienced the tragic loss of six maintenance personnel and the fiery destruction of an aircraft in December 1993 due, according to the USAF's releasable report, to a faulty pump. It shows us we still have much room for improvement.

While we are experiencing a period of relative calm for -135 mishaps, this is a perfect time to reflect on how we've done during the past 5 years. During this period, we experienced six Class A and two Class B mishaps. Of the six Class As, five were ops-related with one logistics-related. The human factors included lack of proficiency, inadequate mission preparation/planning, poor crew communications, and inadequate supervision. *In most of these mishaps, mission fixation led to oversights in flight discipline.* If the winds/runway conditions aren't what you planned for, recalculate your landing data. If the formation you plan to fly appears dangerous and doesn't meet regulation guidance, then someone needs to stand up and raise the issue of safety and risk assessment. The bottom line is if it doesn't feel right, then you have the professional responsibility to prevent a potential mishap from developing. **BE SAFETY PROACTIVE!**

Most disturbing was a recent mishap involving a B-52 accompanying a KC-135 practicing for an airshow. We all know the outcome of this mishap — four lives and a destroyed aircraft. A similar incident occurred under nearly identical circumstances in 1987, resulting in the loss of six crewmembers and one tanker. Again, the common thread was two heavy aircraft attempting high performance maneuvers in support of an airshow. Two questions: Do we need to do this airshow as planned, and if so, have supervisors actively participated in the planning and approval for such a program? If the answer is "no" to either of these questions, then you need to call a time out and reconsider the safety risks involved. **DON'T LET HISTORY REPEAT ITSELF!**

A couple of Class C mishaps have caused us to reexplore the boom latch system. In each mishap, the boom landed in trail unbeknownst to the crew until landing rollout. Although human error can be a factor in that type of mishap, we also need to look at the system itself. Nowhere on the aircraft is there an indicator or light that provides feedback to crewmembers as to whether the boom is up and latched. Therefore, it's not inconceivable for a boom to appear to be latched, but actually not. We've got door indicators, gear indicators, and flap indicators for all those other components that we throw out into the slipstream, but nothing for the boom. To remedy this problem, a boom unlatch indicator is being installed both on the master boom

FUEL SYSTEMS

	1989	1990	1991	1992	1993	1994
Leak	5	5	1	1		2
Indicator	1	4				
Uncmd-xfer	1		2			
Trap			1			
Pump		4				
Valve				1		1

USAF Photo

operator panel and at the pilots' station. Your ideas generated from Class C and High Accident Potential (HAP) reports are vital to improving an already impressive tanker platform. Please continue to forward these good ideas through Class C and HAP reports. **TELL US ABOUT YOUR PROBLEMS!**

I would like to acknowledge the superb efforts of one of our -135 crews during a recent mishap earlier this year. Approximately halfway through a planned 16-hour redeployment, the crew experienced a generator problem resulting in shutdown of an engine. To complicate matters, the two remaining generators kicked off line, forcing the crew to DR their way across the ocean to their planned snow-covered divert base 2 hours away. The crew effort resulted in a spectacularly successful recovery in less than ideal weather conditions. Good mission planning and excellent crew ingenuity for an unpublished emergency procedure made the difference between success and a potential disaster. **NOTHING CAN SUBSTITUTE FOR GOOD TRAINING AND PREPARATION!**

The KC-135 Cockpit Avionics Upgrade is finally in motion. The first prototype for the AMC phase I modification, which moves nav station controls forward, is being evaluated at McConnell AFB from October-December 1994. Initial testing of the phase I modification utilizing the ASC crew station evaluation facility located at Wright-Patterson AFB

continued

C/KC-135 FLIGHT CLASS C/HAP MISHAPS BY FISCAL YEAR

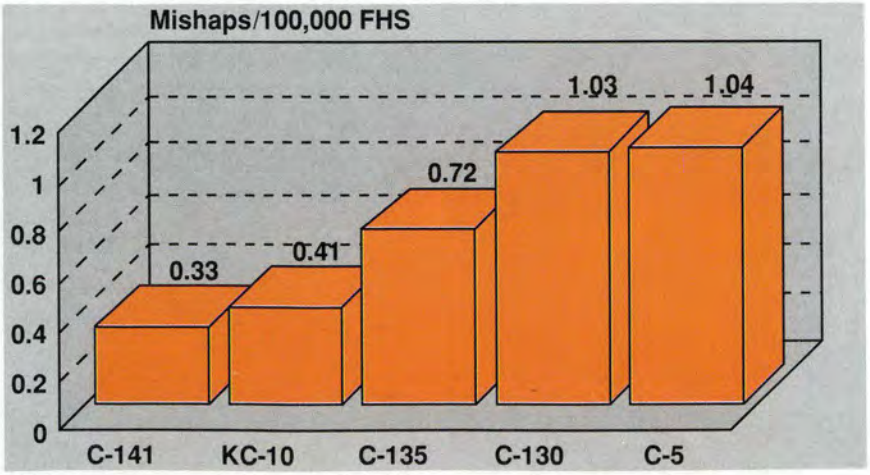
Category	1989	1990	1991	1992	1993	1994
Birdstrikes	13	11	6	7	7	6
Engines	22	28	13	11	10	9
Flight Controls	5	18	2	2	4	3
Fuel Systems	8	18	6	2	2	6
Hydraulics	7	2	1	1		
Physiological	7	8	5	10	6	3
Totals	62	85	33	33	29	27

BOOM/AIR REFUELING

	1989	1990	1991	1992	1993	1994
B.O. & or Rcvr	6	7	3	4		3
Material/Mx			2	3	1	1
Tech Data	1			1		
Undet				2		

Class A Rate Comparisons

Aircraft Historical Average



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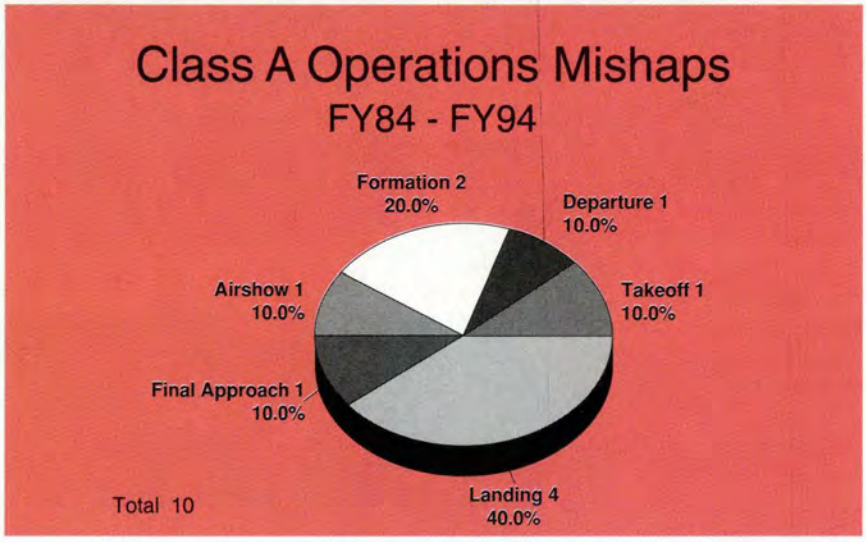
C/KC-135

continued

indicated significant problems with crew task loading if the navigator is eliminated from the crew. The challenge ahead during this 2-year transition period will be to determine how we can safely utilize the phase I configuration without significantly adding to our safety risks. From our leaders to our crew dogs, we need to methodically approach this program through thorough training, risk awareness and analysis, and sensitivity to mission needs to keep our operations safe. **USE RISK MANAGEMENT AT ALL LEVELS.** ■



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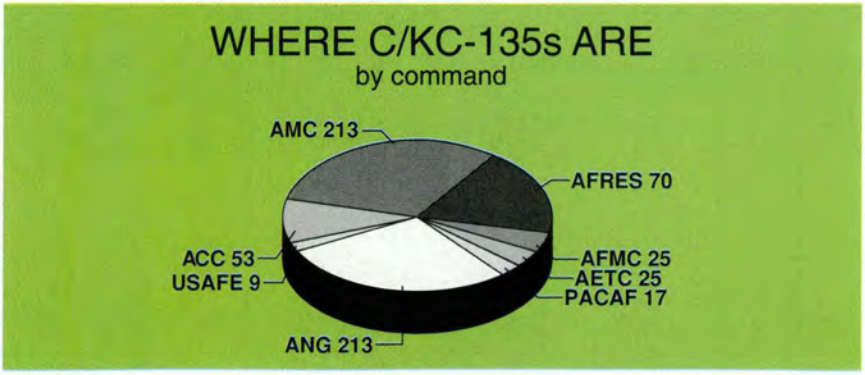
C/KC-135 Facts

The first C-135s are now 39 years old, and the total fleet as of 30 Jun 94 has flown 10.7 million hours. During these 39 years, the C-135 has been involved in 77 flight Class A mishaps which have claimed the lives of 625 individuals. Of the 808 original C-135 aircraft produced for the USAF, 625 aircraft are still in service. Aircraft #62-4139, an RC-135W, leads the fleet with approximately 40,200 hrs.



The Low Visibility Landing —

STACK THE ODDS IN YOUR FAVOR (PART 2)

MAJ R.D. WILLIAMS
USAF, Ret.*

■ Last month's article on low visibility landing parameters set the stage for this month's topic — crew coordination. A quick review of that article will refresh your minds on the challenges we face in such conditions. This month the topic shifts to meeting some of those challenges. Just because the topic is *crew* coordination, we haven't forgotten you single-seaters; your section is on page 19.

Crew Coordination — The Acid Test

If you fly single-seat aircraft only, you might want to skip to the section on single-seat aircraft.

Although I haven't checked the record book, I believe breakdowns in crew coordination have been cited as contributing factors in approach/landing mishaps more than any other factor. In the NTSB special study, mentioned last month, 16 of the 17 mishaps listed "a breakdown in crew coordination procedures" as a primary or contributory causal factor.

To prevent yourself and crew from falling victim to this killer, you must **be prepared**. Being prepared means developing crew procedures on who will fly the approach, who will land the aircraft, and what is expected of each crewmember. Emphasis must be placed on cockpit communication procedures and establishing who will be responsible for monitoring the instruments to touchdown.

Who Flies? Who Lands?

For those of us who fly two-seat aircraft, there are two widely accepted techniques deserving some discussion. The pilot flies the approach and landing, or the copilot flies the approach and the pilot makes the landing. The Advanced Instrument Flight Course (AIFC) teaches both methods and believes the decision on which method to use must be left up to the aircraft commander. The aircraft commander must know the pros and cons of both techniques.

continued

The Low Visibility Landing —

(PART 2)

continued

Pilot Flies, Pilot Lands

Advantages include:

- As pilot-in-command, the pilot has ultimate responsibility for all decisions. Accordingly, the aircraft is in the pilot's control throughout the approach.
- The pilot is more experienced and, in most cases, flies the aircraft better than the copilot. The importance of a stabilized approach is well known to all of us.
- A transfer of aircraft control is not required close to terra firma.

Disadvantages include:

- Limited time is available for the pilot to be "heads up" outside the cockpit to search for the "illusive" runway environment. Eighty to ninety percent of the pilot's time will be "heads down" in the cockpit.
- There is a tendency to "go visual" without sufficient visual information.
- If a missed approach must be initiated, especially below DH, the pilot will most likely have to transition back to the gauges. This can take several seconds to accomplish if the pilot has completely abandoned the instrument cross-check.

Copilot Flies, Pilot Lands

Advantages include:

- The pilot can be 80 to 90 percent "heads up." This provides "real time" information on which to base the continue/go-around decision throughout the most critical portion of the approach. The copilot continues to fly instruments until the pilot takes the aircraft. If the pilot does not take the aircraft until adequate visual references are available, a "duck under" will be highly unlikely.
- If a go-around decision is made, the copilot is already on instruments and executes the maneuver, eliminating the need for the pilot to transition back to the gauges.
- The copilot maintains "heads down" throughout the entire approach. Once the pilot takes the aircraft, the copilot remains "heads down" to detect any deviation from a normal glidepath. The need to transfer this responsibility in the vicinity of the DH/MDA then is eliminated.

Disadvantages include:

- The copilot must be able to fly the ILS approach with very tight tolerances. Deviations at or below DH in excess of ½ dot on the glidepath and/or ¼ dot on the localizer would most likely necessitate an immediate go-around.
- A transfer of aircraft control near the ground is required. This requires the aircraft to be stabilized (trimmed correctly).
- If this technique is used exclusively in low-visibility situations, the pilot can rapidly become a "fair weather" pilot. To maintain some degree of proficiency, the pilot needs to fly some approaches to a final landing in marginal weather.

Monitor the Gauges

This point cannot be overemphasized. Someone **must** monitor the instruments throughout the whole approach. If both pilots (or other crewmember) go visual, deviations from the proper glidepath will go undetected until too late. What about the crewmember in the jump seat, if applicable? A boom operator can monitor the glide slope and advise the pilot of any deviations. Pilots do not purposely land in the approach lights!

If the pilot flies the approach and landing, once the pilot goes visual, the copilot must monitor the flight instruments to touchdown. Many multiplace aircraft Dash Ones require the pilot not flying to call out deviations in sink rate and airspeed until touchdown. If the copilot flies the approach, he/she will stay on instruments throughout the approach.

Callouts!

What do you want to hear from your crewmembers? Only what is pertinent to the approach and landing. "I see the ground" is nothing but a distraction and has no place in a

With the possible exception of some critical action procedures, low-visibility approaches and landings demand the utmost in pilot skill. We hope the information below will help you with your next low visibility approach.

low-visibility approach. Besides required Dash One callouts, AIFC believes interphone conversation should be limited to the use of the words *cue, visual, go-around, I have the aircraft, sink rate,* and other callouts pertaining to visual cues associated with the runway environment.

"Cue" means a sighting of the runway, approach lights, or other markings associated with the approach end of the runway. It in **no way** means "go visual." "Visual" means adequate references are available to maintain a visual glidepath, and the runway threshold and part of the touchdown zone are in view. Other callouts might include statements such as "slightly left, correcting," etc. The meaning of "go-around," "I have the aircraft," and "sink rate" should be self-explanatory.

Successful completion of an IAP requires teamwork. This means all crewmembers with the capability to monitor the approach/landing must be involved in the total decision process. If a significant deviation is noted, an immediate missed approach should be initiated by the pilot flying the aircraft. The aircraft commander must ensure his crew is aware of their responsibility to *speak up* if a deviation is noted. If the copilot says "Go around," then go around and ask questions later. More than one mishap could have been prevented if another crewmember had brought a deviation to the attention of the pilot or had been a little more assertive.

Single-Seat Aircraft

Although it's fun to fly solo, a "no s—" instrument approach in marginal weather can literally make or break your whole day. You don't have the benefits of an extra set (or two) of eyes to break up the responsibilities of cross-checking the gauges and monitoring the runway environment. It's a one-person show. You have to divide your time between "heads up" and "heads down" for composite flight.

Dividing your attention between external cues and the flight instruments requires the utmost in concentration. Avoid the temptation to go visual too early. You **must** monitor the gauges throughout the whole approach. This point cannot be overemphasized!! It is imperative that composite flight be utilized until such time as the touchdown zone is in view.

If the instruments are dropped out of the cross-check with only marginal visual cues, deviations to the glidepath and excessive sink rate will, in all probability, go undetected until it's too late.

Let's Tie It All Together

Continuing an approach below MDA/DH is not a commitment to land. The decision to continue or go around must be evaluated all the way to touchdown. If cues are lost below MDA/DH and/or the approach becomes destabilized, your next course of action is clear-cut — GO AROUND!!

But what about the case when you are flying a perfect approach and the runway environment remains in view? At some point you must decide if references are sufficient to transition to visual flight or if a go-around would be the best course of action.

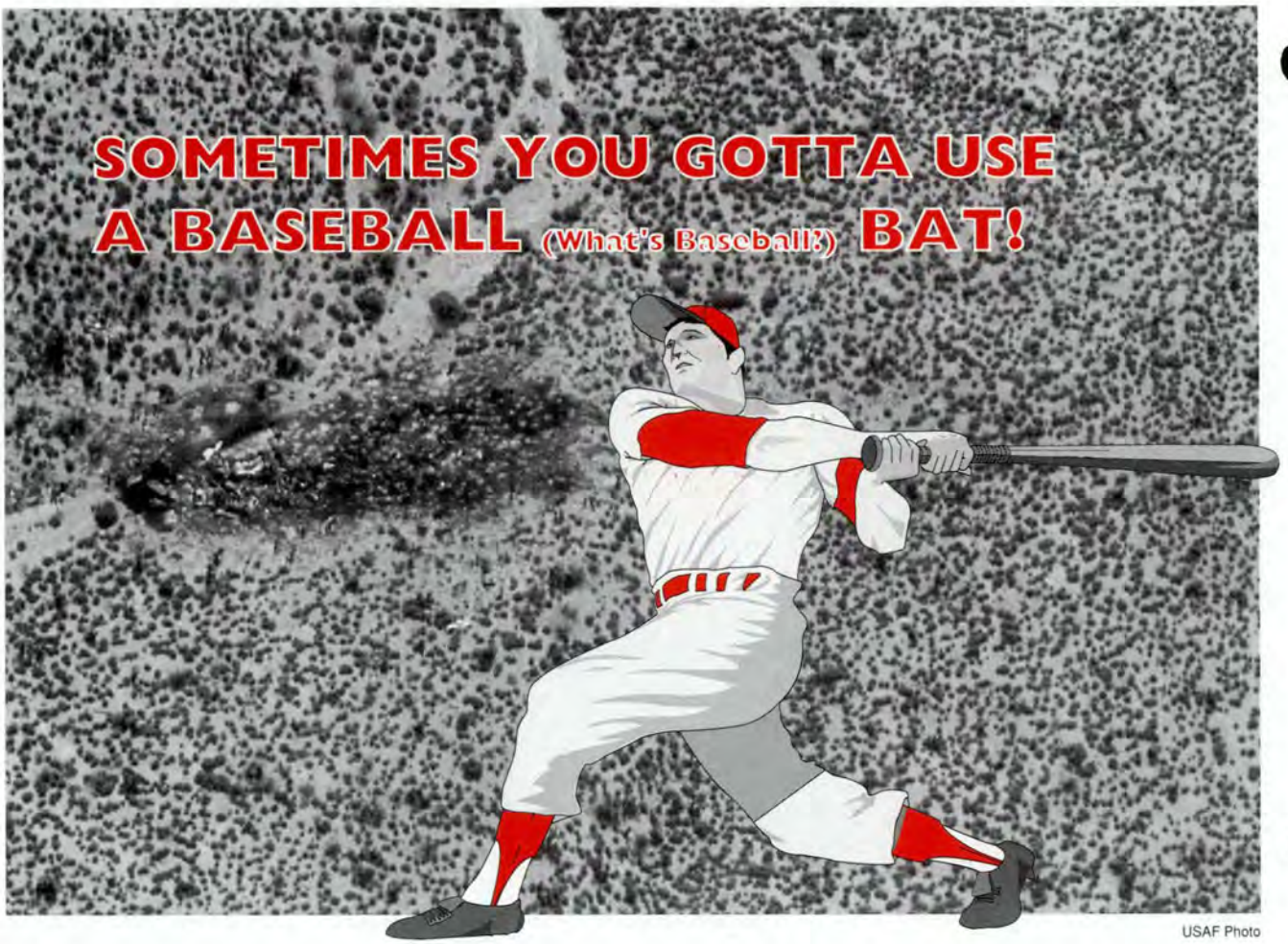
For nonprecision approaches, the answer is pretty objective. *Any descent below the MDA without adequate references to maintain a visual glidepath is, at best, risky and not recommended.* The AIFC "best bet" is to stay at the MDA until the touchdown zone is in sight. Otherwise, you have no means available to judge the proper descent angle. Depending on the type of aircraft, if the touchdown zone is not visible by the VDP, a missed approach might be the proper course of action.

In the case of the precision approach, the answer is not that simple. Unfortunately, it is difficult, if not impossible, to be completely objective in trying to establish a single rational answer on if, when, and how far one should/may continue an instrument approach below DH. What I have tried to do is provide you with some important facts, figures, and AIFC thoughts on the subject. The objective was to better prepare you to make the right decision the next time you are faced with less than ideal weather conditions while flying an ILS or PAR.

With the possible exception of some critical action procedures, low-visibility approaches and landings demand the utmost in pilot skill. We hope the above information will help you with your next low visibility approach.

Call AIFC at DSN 347-4571 if you have questions. ■

*Capt Bill Kelly and the Advanced Instrument Flight Course (AIFC) faculty made significant contributions to this article. The AIFC taught its last class in December and may start up again in late FY95 under AETC ownership at Randolph AFB. In the interim, if you have any questions regarding this article, contact the Air Force Flight Standards Agency at DSN 487-4400.



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MIKE HANNAH
Investigation Instructor
Southern California Safety Institute

Editor's Note: The following article is an editorial. The views expressed by Mr. Hannah are his own and do not necessarily reflect the views of the Air Force or the Air Force Safety Agency.

■ "Not a good year" is how a staff officer might characterize the FY94 flight mishap experience. We had several well-publicized disasters that resulted in media discussion of failures of crew and leadership in action, responsibility, and accountability. While FY94's Class A rate was the third best in our history, I (as a retired officer with considerable background in flying safety) see a potential in the increasing trend in Class A rates since FY91, a prelude to something worse.

Yes, we have had many past years with poorer results. But remember, we have had several recent years which were much better. You are in the trenches, and I am not, so it is up to you to further define the problem and reverse the negative trend with lasting action.

On the negative side of safety program management, we do safety investigations to identify *known* causes of mishaps (i.e., those which have already reared an ugly head). However, the corrective actions don't work if you don't look deep enough, or with enough breadth, during your investigation. Just because something "bad" (such as supervision) will surface, don't stop the investigative effort too soon. Keep digging, and flesh it out. Otherwise, your corrective action(s) won't fix the root cause(s).

But let's get ourselves on the front side of this curve and address how you can work to improve the positive side of prevention. I would use the word "proactive," but it has become a word like PARAMOUNT, AWESOME, CUTTING EDGE, and GLOBAL ECONOMY. We use it in a fashionable way with little communicative value left.

The opinions expressed are just that. Having spoken to over 250 students from around the world in our International Flight Safety Officer Course, our USAF Flight Safety Officer (FSO) and Aircraft Mishap Investigation (AMIC) Courses, and "other sources," I think I have a clue with regard to one facet of the prevention effort we can improve upon.

I am fearful we are slipping into an era and "modus operandi" where certain individuals subconsciously (or unconsciously) feel the measure of success is how much risk assumption we can get by with and how many times. This, in turn, can lead to a situation where negative actions (risk-taking) are reinforced rather than being swiftly investigated and punished (by investigations other than safety investigations).

You are living in a challenging work environment at this point in time in your Air Force career. There is much uncertainty with cutbacks in

dollars and personnel. While all this makes the "lean, mean fighting machine" concept become reality, it does something else not so desirable. It creates instability in the little nooks and crannies of your gray matter and could affect your judgment in the area of prioritization.

Commanders, operators, and maintainers may choose to take on higher levels of risk, showing superiors they can "hack it" to ensure self-preservation in their positions and careers. BUT, you argue, this risk assumption is not fostered by high-ranking officers. I agree. However, whether this choice to take on higher levels of risk is based on facts or mere perceptions of those individuals taking the risk, the end result becomes a real course of action which can result in tragedy.

USAF Photo

A major part of risk management is determining where the mission ends and risk assumption becomes excessive.

We have sustained a great loss of people and hardware in many recent Class A mishaps. The real shame of these events is most were easily preventable at the UNIT level. Yes, in these we couldn't find a broken part (which, by the way, is usually a people problem), bad technical orders (another people problem), or the MAJCOM training program. FOLLOWING ESTABLISHED GUIDANCE WAS ALL WE NEEDED TO DO!

We didn't. And that, my friends, is DEFICIENT SUPERVISION. I contend a commander cannot dodge accountability because he/she didn't know about something in their unit's operation a good leader should have known. Making it their business to know everything about what is going on in their unit is part of commandership.

Okay, Chiefs of Safety and FSOs (both wing and squadron), listen up! Here comes the BAT!

Once your unit has a mishap, you must follow the ROEs for privileged information and so forth. But in the daily operation, before that mishap occurs, you are more than just an FSO or Chief of Safety — you are an aviator, a manager, a leader, and a supervisor. So if people are not following the rules and there is no need to invoke privilege (i.e., no mishap, yet!), then grab the guilty parties by their oxygen masks (or headsets) and set them on the proper heading.

Beware of anyone in your unit who tries to get from Point A to Point B using the "where does it say I can't do it?" logic. Tell those folks to use that logic for the IRS Form 1040, *but not in your unit*. These people are a mishap downstream. (If you find them, pinch off their oxygen masks for about 10 minutes.)

You work for the commander and are his/her eyes and ears. IT'S YOUR JOB TO USE THE "BASEBALL BAT" TO ENFORCE THE RULES. The commander probably wants you to. You should want to. And if any of our recent victims could have spoken last words to you, I'll guarantee they would have wanted you to! So get invigorated, and keep some folks in your unit from hurting or killing themselves in the bogus name of "The Mission."

Some people never learn where the mission stops and STUPIDITY, in the form of unacceptably high risk, begins. That's where you come in as a Chief of Safety or FSO — an HONESTY BROKER based on objectivity and a complete evaluation of risks versus tangible benefits. It could even mean going through IG channels to head off a real catastrophe. This is a very bold step, to be used wisely and probably only when command channels fail.

Sure, it's not easy to buck the system. You can't stifle the unit's real mission because safety isn't paramount. HOWEVER, *SAFE MISSION* ACCOMPLISHMENT *IS* PARAMOUNT. Your challenging of the system will more likely involve discussions (sometimes they will be intense — if you're doing your job correctly) over what the "mission" is. Don't use emotional arguments. Present facts and convince the audience to reverse the course when they have crossed into the STUPID ZONE. You must use care not to get so close to the item in question that you lose objectivity and get judgmentally swept away with the rest of them.

The Chief of Safety and FSO positions are not for the shy and timid. You must work diligently to add impartiality to operations and keep everyone (including, at times, senior leaders) focused on risk assumption versus the reasonably expected tangible benefits. It truly is a tightrope act to maintain your integrity and still accomplish "the mission." As stated earlier, the problem is usually a distorted perception of where the mission ends and risk assumption becomes excessive.

Some of my comments may hit stingingly close to home — and that is my purpose. If the shoe fits . . . I am trying to make the Air Force a little safer place for us all. (P.S. One of the intangible benefits of being on inactive reserve status (retired) is the ability to render a somewhat untainted opinion.) Lead smart, fly smart! Good night, J.D., wherever you are! ■

Michael D. Hannah is the primary investigation instructor for the USAF Flight Safety Officer Course, Kirtland AFB, NM. Prior to his retirement from the USAF, he was Chief, Flight Safety Division, Strategic Air Command Headquarters. In this position he was responsible for establishing and overseeing the activities of many aircraft mishap investigation boards and the safety programs of flying units around the world.

He has a BS degree in Business Administration and an MS degree in Aeronautical Science. He is a Professional Member of the American Society of Safety Engineers, the Order of Daedalians, and the International Society of Air Safety Investigators.

THE FSO's CORNER

Is Anybody Sleepy?

MAJ DALE T. PIERCE
919th Special Operations Wing/SEF
Eglin AFB, Florida

■ Are you always as alert as you want to be when you fly? Does the thought of a night flight make you slump in your seat? Do early report times take their toll on your ability to stay ahead of the aircraft later in the day?

Does the Sandman creep into your cockpit and throw sand in your eyes at the worst possible moment? Does that megadose of caffeine let you down just when you need it most? Have you tried all the old methods without achieving that wide-eyed state you so genuinely desire?

If any of these apply to you, you're like most fliers. So what's the answer? A lot of answers can be found in the new Fatigue Countermeasures Education and Training (E&T) Module developed by the NASA Ames Research Center Z-Team. The Z-Team based the program on the latest research on aircrew fatigue.

In October, I went to the NASA Ames Research Center at NAS Moffett Field in California to attend their 2-day course on fatigue countermeasures. It was great. It's a train-the-trainer course providing necessary background information and materials for presenting a 1-hour class to aircrews. The 2-day course comes in two forms — aviation industry and military. The difference in the course material is minimal. The primary differences are the attendees and the nature of their discussions based on course material.

The course begins with a day and a half of background material. You learn how sleep works, about common sleep disorders, sleep medications, effects of fatigue on performance, circadian rhythms, and circadian rhythm disorders. Then they address the results of the latest fatigue countermeasures research. They support all areas covered with information and examples from both previous and ongoing NASA research and some examples from research conducted in other countries.

Once you understand the basics, they present the Fatigue Countermeasures E&T Module (the 1-hour class for aircrews). Then they go over the handouts and supporting materials and discuss typical questions asked by aircrew members. Finally, they discuss how various civilian and military organizations are using the E&T module.

In the words of the course administrator, after just 2 days, you leave the course knowing more about aircrew fatigue and fatigue countermeasures than 99 percent of the people in the flying business.

During 1995, the Z-Team plans to conduct this training on a frequent basis. To obtain the current course schedule and request a slot in the course, call Ms Elizabeth "Liz" Co at the NASA Ames Research Center, commercial (415) 604-0658. (Sorry, they have no DSN access on the NASA side of the base.)

I'm adapting the E&T module to our mission. Starting in January, I'll be presenting it quarterly as part of our annual block training for aircrews. Since our annual block training is mandatory, all wing-assigned aircrew members will receive fatigue countermeasures training.

So how much does it cost? The course is funded by the FAA, even for military attendees. All you must pay for is travel and per diem. For those of you on ever-tightening budgets, that amounts to airfare plus $200 (including a rental car). Note: NAS Moffett Field is 21 miles south of San Francisco Airport. The classroom is about a 1-mile walk from the BOQ, and on-base facilities are a little slim, so I highly recommend a rental car. To call the BOQ for reservations, dial DSN 359-6111 and ask for the BOQ at extension 4-9503. ■

What are you doing in your program that could help other FSOs if they knew about it? Call me during normal duty hours (Central Time) at DSN 872-5378 (USAFAWC), or drop me a line at 919 SOW/SEF, 506 Drone Street, Ste 2, Eglin AFB Fld 3, Florida 32542-6644.

USAF Photo

THERE I WAS

■ My crew and I were performing a functional check flight (FCF) on a KC-135Q. It was the second attempt to complete the FCF profile.

We performed a water-augmented takeoff with a normal takeoff roll and rotation. At 200 feet AGL and 180 KIAS, we started the flap retraction sequence. I noticed an increasing demand for left aileron and informed the crew something "interesting" was happening with the control yoke. I suspected a jammed right flap.

I pulled the power back to stay below the flap placard airspeed and then sent the boom operator back to scan the right flaps. He reported the flaps appeared to be up, but the right outboard aileron was full up. We cycled the flaps up and down several times to see if we could free whatever was binding. This had no effect on the outboard aileron. I was able to keep the aircraft straight by using about 50 percent of the available aileron and lots of rudder.

We climbed up to 11,000 feet and checked the Dash One for jammed flight control information. We found very little guidance other than keeping our airspeed up during the landing. We performed a controllability check to see what our options were. I checked with the crew to make sure we had not missed anything pertinent to our situation. We decided a 30-degree flap landing with a constant speed approach would be our best course of action.

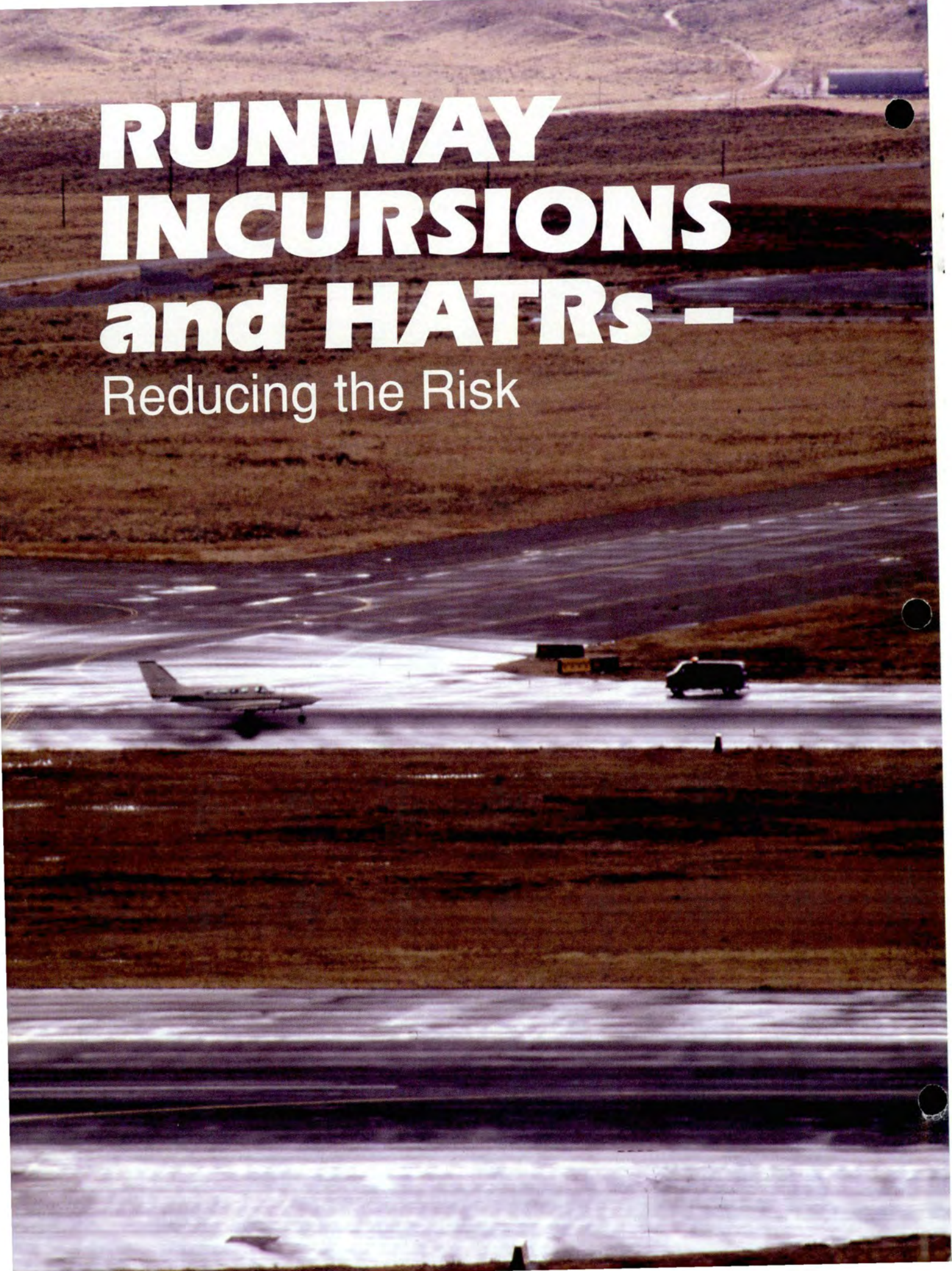
We contacted the SOF and advised him of our plan. Next, we declared an IFE with Approach Control and passed all of the required information. We requested and received extended vectors for an ILS straight in. We landed the aircraft in a 10-knot left crosswind. At times, almost full aileron control deflection was required.

Post-flight safety inspection revealed a castellated nut had not been torqued to specifications, and the cotter pin was not installed. This allowed the nut to drop off the bolt during the takeoff. The bolt worked its way up and jammed against the airframe as we retracted the flaps. The jammed bolt caused a control link to shear and the right aileron to jam full up.

This presented us with a threefold problem. We lost half of our available aileron with flaps up, we had appreciable drag from the full-up aileron, and we lost crosswind capability by reducing the aileron we had available.

Several important things were reinforced during this mishap. Sometimes you get problems which are not covered by the books and have to apply judgment to get the airplane back on the ground. Also, Approach Control misunderstood when we declared the IFE. On short final, they inquired what we would like the fire department to do for "jammed flight pumps" when we had actually called in jammed flight controls. Lastly, the fire chief takes over when you are on the ground and has to terminate the emergency so you can taxi to parking. Expect a fire truck to follow you to parking even if you have already been checked for hot brakes.

Fly smart, fly safe. ■



RUNWAY INCURSIONS and HATRs –

Reducing the Risk

MSGT TOM NORATO
HQ Air Force Flight Standards Agency
Andrews AFB, Maryland

■ What do the following individuals have in common?

- Mrs. Jane Cormier, age 35, housewife, mother of three,
- TSgt Bob Roberts, age 27, security policeman,
- John Abbott, age 78, retired Air Force,
- Mark Butler, age 45, civilian groundskeeper,
- And finally, (name unknown so we'll call him "Bruce") Bruce, age approximately 4 years, occupation — northern Maine moose.

So what is the link? Certainly not age, sex, or occupation — not even species! These individuals share an experience that is becoming all too common today. Each, at one time or another, has managed to find themselves on an active runway and directly in the path of an aircraft about to land.

Collectively, they have deprived various pilots of about 20 years of life expectancy — time lost as seconds became agonizing hours, while throttles were pushed to the firewall, flaps and gear were retracted, fingers were crossed and prayers said, all in response to an urgent transmission from the tower, "GO AROUND! VEHICLE ON THE RUNWAY!!" Or in the case of Bruce, "MOOSE ON THE RUNWAY!!"

Why Did It Happen?

In each of these instances, tragedy was averted by a matter of mere seconds. How long will it be before the seconds finally run out?

In the flying community, most people think of either pilots or air traffic controllers when flying operations and safety are addressed. Granted, each group receives extensive training in flight safety, but what about security police, base operations, civil engineers, even the civilian community? A review of their "flight safety training" reveals a curriculum varying from extensive airfield orientation and testing to "See that asphalt out there? That's a runway. Don't drive on it!"

Photos by TSgt Perry Heimer

Unfortunately, the trend in flight safety training for the rest of the base may be leaning toward the latter. The reasons for these near misses are numerous and varied, but they all have at least one thing in common — ignorance. With one possible exception, all of the individuals involved said they did not know they had done anything wrong. The one exception is Bruce, and we'll accept his panicked, wide-eyed full run into the woods as the aircraft passed over his antlers as an "I had no idea!!"

So what is the real reason for runway incursions, and how can we minimize the risk? Each of the individuals mentioned at the beginning of this article are real (names changed to protect the author), even Bruce, former 800-pound resident of the Loring AFB flightline area. They all experienced close encounters with aircraft trying to land. All these encounters were different, yet similar, in that they could have been avoided, with the possible exception of Bruce. Let's look at an actual incident and examine it.

A Car on the Runway

An aircraft was conducting an ILS approach to the runway and was in radio contact with the RAPCON. At 6 miles, after ensuring the runway was clear, the local controller in the tower relayed the landing clearance to the final controller. At approximately ½ mile, she scanned the runway again and noticed a privately owned blue vehicle on the south side of the runway, proceeding eastbound on the runway toward the approach end. She immediately transmitted go-around instructions to the final controller and heard no acknowledgement. She transmitted again and still did not receive any response.

Realizing this was an imminent situation, she keyed emergency frequency 243.0 and transmitted go-around instructions, adding, "VEHICLE ON THE RUNWAY!" The aircraft was over landing threshold and in the flare when it initiated the go-around. ide-eyed witnesses stated the aircraft had passed less than 200 feet over the top of the car. What happened here?

Retrospect

After the go-around, the vehicle drove off the runway and was apprehended by security police. The occupants were then escorted to base operations and questioned by law enforcement personnel and the wing flight safety officer. Interviews were conducted with the pilot, the adult occupants of the car (yes, there were also small children), the entry checkpoint security guard, and air traffic control personnel.

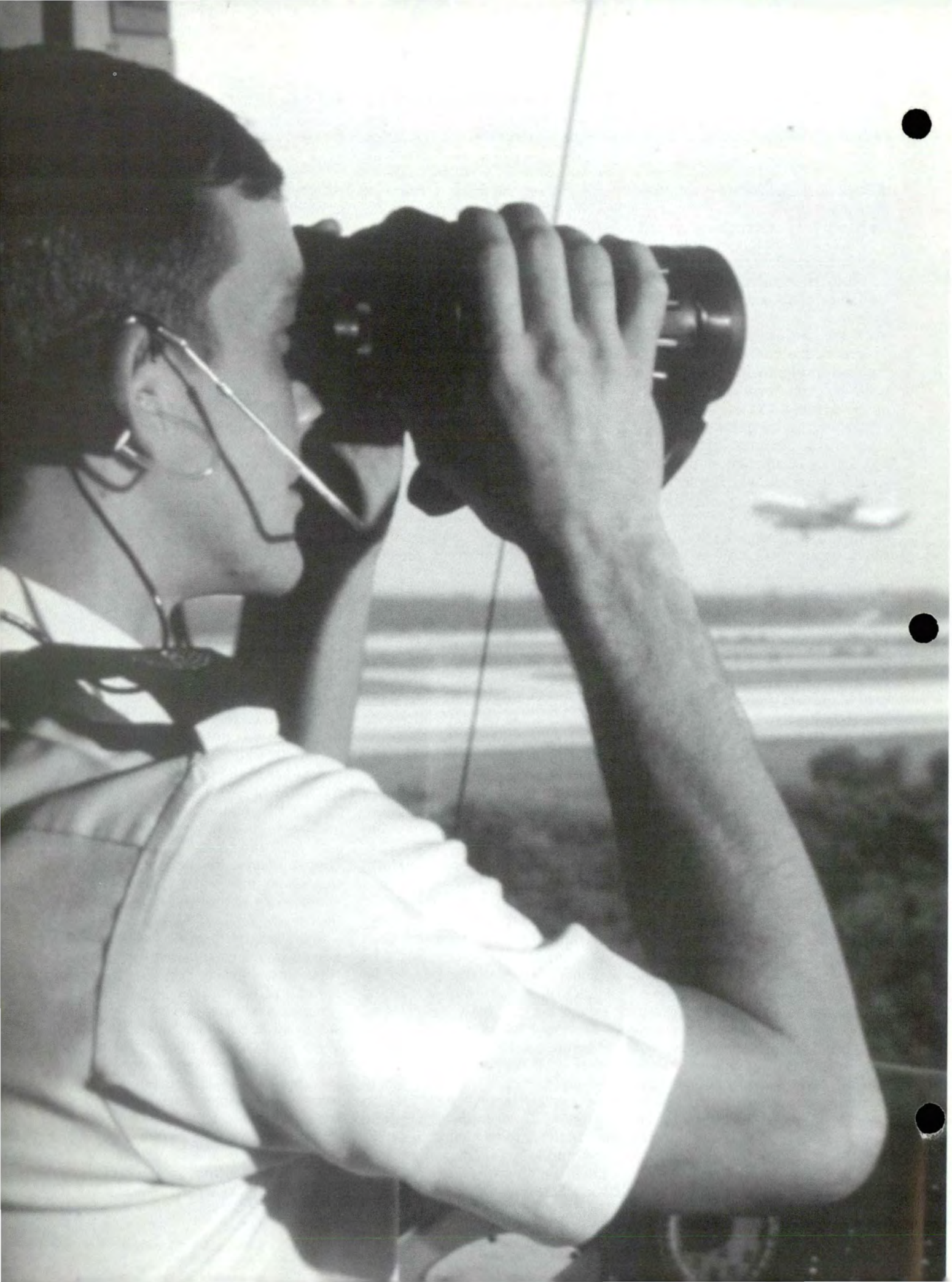
The investigation centered around answering these questions: **How did a car gain access to the runway**, and **Why did it take so long for the aircraft to initiate a go-around?**

The answer to the first question is simple: *Access to the runway environment at this particular installation, as with many others throughout the Air Force, was entirely too easy.* The driver of the vehicle, an Air Force dependent wife, was trying to find the Army mobilization area located on the southeast corner of the airfield. The husband of the other adult passenger, an Army dependent wife, was preparing to deploy to Saudi Arabia.

The women received verbal directions from a security police guard at an identification checkpoint and proceeded to the perimeter road on the north side of the runway. They turned left on the perimeter road and began looking for the next stop sign per the guard's directions. Unfortunately, the next stop sign they came to was at an active taxiway leading to the approach end of the runway.

Following the guard's well-intentioned directions, they made a right turn onto the taxiway and drove onto the active runway. None of the occupants recalled seeing a large sign which read "ACTIVE RUNWAY — DO NOT ENTER." They proceeded down the runway approximately 2,000 feet, driving over two arresting cables. They crossed to the south side of the runway and stopped between the arresting cable housings. It was at this point that the tower controller first saw the vehicle on the runway. The aircraft was now

continued



½ mile away and closing fast. The tower controller directed the radar controller to send the aircraft around.

Here things began to get exciting. The driver of the vehicle, now realizing she was on an active runway, started driving eastbound back toward the approach end. She saw the aircraft on final, and mindful of not driving on unpaved surfaces, headed toward the taxiway she had used to enter the runway. The vehicle was now crossing the runway diagonally, 1,000 feet from threshold! Meanwhile, the tower controller made two more calls to the RAPCON controller to direct a go-around and finally resorted to making the call over guard frequency.

Now we know how the car got there — ignorance: (1) well-meaning, but inaccurate, directions from the checkpoint guard, (2) driver and occupants totally unfamiliar with the base runway layout or what signs they should watch out for, and (3) airfield management not aware the runway was that susceptible to accidental incursion. The delay in the go-around was due to the aircrew reminding the RAPCON controller they had a VIP on board. More on pilot/controller communication in another issue.

At this particular base, all of these issues were later addressed — in retrospect. Security police reviewed and revised their gate entry procedures and training program. Airfield management took a long, hard look at access roads and taxiways. And public affairs began a campaign to educate the public on the hazards of driving in close proximity to the runway.

New signs are now up, restricted areas are more closely guarded, and flightline driving training and certification have been overhauled. In effect, this base now has an effective runway safety program, and the price of this program came relatively cheap — just a healthy scare for all involved.

But What About Other Bases?

Take a look at your base. All of the circumstances surrounding this incident could have occurred at almost any other Air Force base in the world. In fact, they do occur with alarming regularity. Eventually, one by one, bases with inadequate training programs and deficient operating procedures will begin to come around, and each will pay a price.

For some, the price will be paid in the form of a good scare. For others, it will be a tragedy. But for still others, the cost will be very inexpensive, an expenditure in time only — the time it takes to evaluate and correct inadequate procedures and/or training.

And what about Bruce? Keep an eye on the tree line as well as on the runway. If you look into the woods through your binoculars and find a pair of eyes looking back, odds are good you can expect a visitor soon.

AFFSA's Aircraft Save Program

The incident I used as an example came from the records of the Air Force Flight Standards Agency's Aircraft Save Program, a program whereby supervisors can recognize well-deserving individuals. And yes, it is an obligation!

However, there is another even more important program we also have an obligation to take part in— all of us, not just pilots and controllers. It is called the Hazardous Air Traffic Report (HATR) Program. I know — here it comes, another Headquarters Headhunter!! Nothing could be further from the truth.

The regulation itself, AFI 91-202 (formerly AFR 127-3), clearly states, right up front, that the information taken from these reports must be used solely for mishap prevention and not for disciplinary action. Individuals who submit HATRs on incidents are granted immunity from disciplinary action provided the violation was inadvertent, was not deliberate, no mishap occurred, no criminal offense was intended or committed, and the individual reported the incident as outlined in the AFI.

With every runway incursion "Save" nomination we receive, we should be receiving a corresponding HATR to track and analyze potential safety issues. We are not.

So why have these reports all but disappeared, even though the AFI requires them? I think they have somehow become associated with failure or disgrace. Ask someone if they are going to file a HATR on an incident and watch their reaction. "No, sir, not me! I don't need to get involved in that."

This program was intended for one purpose and one purpose only — to prevent mishaps and save lives. We can do this only if we take advantage of lessons learned from the past. Otherwise, we have only one recourse left — to learn from the mistakes we make ourselves.

This leads us directly to an often heard, yet very appropriate, phrase repeated for years throughout the flying community: *"Learn from other people's mistakes; you won't live long enough to make them all yourself."*

Let's eliminate the one thing I mentioned earlier — ignorance. To lose lives and aircraft in combat is expected. It is often the price of freedom and what we get paid to do. To risk those same lives in an incident that, in reality, can only be described as a traffic accident is unacceptable. ■

MAINTENANCE MATTERS

HF Radio Long Wire Fails

■ A KC-135E aircraft was on a post-programmed depot maintenance delivery sortie when the HF radio "long wire antenna" failed at the safety disconnect assembly. The flailing long wire repeatedly struck the empennage, the boom fairing, and the aft fuselage section before totally separating from the aircraft. The long wire still had the safety disconnect assembly attached which had contributed to the extensive damage.

A corroded mounting bolt was the suspected cause of the safety disconnect's initial failure. After tension was relieved, the safety disconnect didn't release the long wire — a secondary failure.

A TCTO modifying the remaining "long wires" with tail-mounted HF spike antennas will eventually eliminate this kind of mishap. But until then, you might make this mishap a "close watch" issue during periodic/phase / special inspections or wash-cycle opportunities — especially in high corrosion regions. Also, it wouldn't hurt to test safety disconnect assemblies to ensure they function properly when long wire tension is released. ■

Nutplate FODs Bomber

■ Minutes into the low-level segment of a routine training mission, a B-1 bomber crew had a No. 2 electrical bus trip off-line. The mission was aborted, and a return to base was necessary.

Maintenance discovered that in addition to the bus tripping off-line **there had also been a fire behind a power control assembly (PCA) in the wheel well!** Luckily, the fire apparently went out when the bus tripped off-line, stopping the electrical current.

The fire was attributed to an old nutplate that was left behind the PCA, and eventually it made contact with the No. 2 bus line contactor. The arcing caused the fire, and subsequently the bus tripped off-line.

Past maintenance records were reviewed, and it could not be determined when the nutplate was replaced and left behind as FOD (foreign object damage).

Here's another example of a simple maintenance action which had the potential for the loss of lives and/or an aircraft. This was a simple repair action which doesn't require mandatory supervisory involvement or a second pair of eyes to inspect the work.

So it's imperative all maintainers, regardless of grade or skill level, have the presence of mind to perform safe, quality work — start to finish — each and every time. ■

NEW FOD VIDEO

Photo courtesy Northrop Grumman Corp.

■ Has your wing LST/MAT received the new FOD prevention video? If not, your troops are missing out on a very up-to-date and hard-hitting program for ALL aircraft maintenance, AGE, and munitions personnel. This 10-minute program shows actual incident photos from several different aircraft reinforcing the importance of everybody doing their job in preventing FOD.

To order a copy, fax a letter to USAVIC/JVIA (at Tobyhanna PA), at DSN 795-6106, asking for PIN 612629, FOD Prevention.

For further ordering information, call DSN 795-6543/7927. This program was released in October by the AETC Training Support Squadron at Hill AFB UT, DSN 458-0160. ■

Our photo shows "Foddie," the mascot for the National Aerospace FOD Prevention Advisory Board.

*U.S. GOVERNMENT PRINTING OFFICE 1994-573-261-03005

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 Mishap Prevention Program.

CAPTAIN
Robert D. Harvey

FIRST LIEUTENANT
Daniel W. Tippett

52d Fighter Wing, Spangdahlem AB, Germany

■ The 480th Fighter Squadron, Spangdahlem Air Base, Germany, was deployed to Incirlik Air Base, Turkey, in support of a weapons training deployment and OPERATION PROVIDE COMFORT. Vegas, a flight of four F-16s, departed Incirlik for a weapons delivery sortie at Konya Range. Approximately 6 minutes after takeoff, at an altitude of 18,000 feet, Captain Robert D. Harvey, the Wing Weapons Officer, heard a loud rumble and a series of bangs from the engine. Sensing a problem, he terminated maneuvering and pointed the jet toward Incirlik, now about 25 nautical miles away.

The engine immediately auto-transferred to secondary control (SEC) and flamed out shortly thereafter. Capt Harvey expeditiously accomplished the appropriate critical action procedures by jettisoning the external wing tanks and attempting an airstart. Although initially successful, the restarted engine failed to provide enough thrust to maintain flight. Capt Harvey realized he would have to perform a flameout landing and told Incirlik on Guard to clear the runway.

First Lieutenant Daniel W. Tippett, the element flight lead, asked Capt Harvey to confirm he was in SEC and also reminded him to cycle the throttle and check the position of the fuel master switch. Capt Harvey determined that Incirlik was going to be out of gliding range. Lt Tippett suggested landing at Adana International, a civil airport 9 nautical miles closer, but the airport lacked suitable navigational aids and had no arresting cables. Capt Harvey called Incirlik Tower and told them to clear the runway at Adana Civil and that he was about to land opposite direction. Incirlik Tower coordinated with Adana Tower, cleared him to land, and alerted local fire and rescue crews.

Now only 5,000 feet above the ground, Capt Harvey was concerned he would be unable to locate the runway beneath the clouds and considered ejection. Lt Tippett located Adana and chased Capt Harvey throughout the approach. Once visual contact was made, Capt Harvey accomplished a flameout approach and landing. However, due to late runway acquisition, he landed long and with excessive speed. As he applied maximum brakes, Lt Tippett reminded him to aerobrake, which helped to slow the aircraft. Knowing there were no cables, Capt Harvey again thought about ejection as the runway end approached. He knew procedures dictated ejection rather than departing a prepared surface.

Capt Harvey continued to weigh his options in the remaining seconds. The aircraft finally came to rest in the departure end overrun with only 50 feet remaining before the end of the concrete and an open field. He then immediately performed an emergency ground egress. A mere 6 minutes after the trouble began, Capt Harvey was safely on the ground. Twenty-four hours later, a new engine was installed, and the aircraft was again flying operational sorties. Capt Harvey and Lt Tippett reacted quickly and effectively. Their team effort saved a valuable combat aircraft.

WELL DONE! ■