flying SAFETY

Our 50th Year

GPS Instrument Approaches

A Workshop That Works

Coolstone Convenes the Board

Over Bosnian Skies

JULY 1994

THERE I WAS

■ The Tucson air was sultry as we were stepping for our 4 V X QUICK FORCE night sortie. Approaching the jets, the gravity of the mission gripped us, and the idea of schwaking untold numbers of subpar aerial machines had the flight in a veritable "feeding frenzy."

Takeoff and departure to the Sunny MOA for rendezvous with the package was uneventful. The package consisted of four F-15Es, four F-15Cs, and four F-16s, each with a KC-135. We were the middle cell with each group separated by 1,000 feet and 1NM distance. Everything was going as planned for the 600NM trek north. However, this was about to change.

As no. 4, I was last to take gas. After connecting, it was painfully obvious I had signal amplifier failure. At the moment I realized my jet could not take gas — WHAM! We entered the peanut butter. (I know what you're thinking — don't you mean "soup"? Well, you eat what you like, and I'll eat what I like!)

So we were in the peanut butter at night, and it was thick! A little unnerving, but we have all been there — no big deal. We started going in and out of clouds. Amidst some clear airspace, we all relaxed for a moment. Big mistake! That's when I noticed nos. 1 and 2 climbing away from the tanker in afterburner! Needless to say, they quickly disappeared into the peanut butter!

No. 3 queried them, but there was no answer. About 10 seconds elapsed before no. 1 called lost wingman. No. 2 wasn't far behind. So we have one flight member who couldn't take gas and two flight members who are lost wingman from the cell and each other! How are we doin'?

By now, we've entered the weather again, and I have just enough gas to get back to Tucson. A coordination nightmare ensues between the tanker, Salt Lake Center, and us. Eventually we get cleared off and start south with our element in 2NM trail.

We're still having difficulty talking to Center when no. 3 (five octaves higher than normal) reveals he just had a near midair collision and was climbing to FL200. Well, at the last syllable of "collision," yours truly was vertical in afterburner in trail with no. 3. We popped out of the weather, both boresighting the moon! The rest of the recovery was uneventful.

It took several days to figure out what actually happened. Nos. 1 and 2 had experienced spatial disorientation and climbed above the weather. The cell of F-15Es had also experienced spatial D, but they managed to combat the situation by switching off flying with their WSOs. Finally, the F-16s all went lost wingman and split to the four winds. In all probability, my lead (no. 3) went beak to beak with a Viper since all he saw were reflections off clouds from a flashing beacon.

So here's my lesson. Nothing is ever standard! Weather, fuels, diverts, systems problems, and composite force procedures require detailed planning. And more important, we should always expect and anticipate the worst — then we'll be ready.

Furthermore, when things just don't feel right, or the hair is standing up on your cranium, it's time to speak up and wave the flag. Our jets and our pink bodies are too valuable to simply "suck it up." ■

Our 50th Year

UNITED STATES AIR FORCE

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FRONT COVER:
Portrait of C-130 Aircraft Commander Maj Steve O'Brien while flying in Operation Provide Promise. Maj O'Brien is assigned to the 133d Airlift Wing of the Minnesota ANG at St. Paul, Minn.

(USAF Photo by SSgt Greg Suhay)

CONTRIBUTIONS

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SPECIAL FEATURES

REGULAR FEATURES

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

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GPS Instrument Approaches

MAJOR JOHN F. DAUGHTRY
AFFSA/IFC
Randolph AFB, Texas

Introduction

■ Last March, the 24th Block II/IIA Global Positioning System (GPS) satellite was successfully orbited, and the GPS constellation now has its full number of satellites.

Once initial operational test and evaluation (OT&E) is completed — sometime in 1995 — GPS will be declared fully operationally capable (FOC). When that day finally comes, military aircraft with approved GPS receivers properly installed will be able to legally fly en route and terminal area navigation, including nonprecision approaches using GPS as the sole reference *if* they have the okay from their MAJCOM.

"But wait a minute," you say. "We've been flying with GPS for a couple of years now."

Yes, that's probably true, but not as an approved means of instrument navigation, but as a way to augment the other ground-controlled radionavigation devices that you are *really* using (stomp feet three times). On the other hand, the FAA has already approved use of GPS as a means of supplemental navigation for the civil fleet, but only if the equipment is certified as meeting Technical Standard Order (TSO) C129, "Airborne Supplemental Navigation Using GPS" and is installed IAW a supplemental type certificate (STC) for that aircraft.

GPS History

GPS traces its roots to programs and experiments conducted both by the Air Force and Navy dating to the mid 1960s. In 1973, the DOD decided to combine all of these systems into one program — the Defense Navigation Satellite System (DNSS), with the Air Force as the executive service. GPS was initially developed to provide highly accurate 3-D position, velocity, and time information to U.S. military users anywhere in the world through an encrypted signal called Precise Positioning Service (PPS). A less accurate signal known as Standard Positioning Service (SPS) was also made available, free of charge, to civil users.

Together, these two signal types are replacing older, less-accurate systems such as VOR, DME, NDB, and TACAN as part of the Federal Radionavigation Plan (FRP) and the Joint Chiefs of Staff Master Navigation Plans.

AFFSA IFC Taskings

In 1989, as a limited constellation composed of test and production model satellites was formed, the Air Force Flight Standards Agency's (AFFSA) Instrument Flight Center (IFC) was given several GPS-related taskings by the DOD. First, evaluate GPS (PPS) as a primary external navigation aid (NAVAID). Make sure it can replace TACAN as advertised. Then:

a. Help determine the utility of GPS for en route, terminal area, and nonprecision approaches.

b. Develop pilot procedures on how to use GPS as a NAVAID.

c. Evaluate the feasibility of using GPS for vertical guidance.

Evaluation Procedures

Our first job was to design representative nonprecision (RNAV and TACAN) approaches using the standards found in AFM 55-9, United States Standard for Terminal Instrument Procedures (TERPS).

By using the criteria already published for different nonprecision approaches, we hoped to be able to *emulate* their procedures exactly. Subject pilots with a wide range of experience and flight time were then selected as "guinea pigs." We flew test flights at several locations while laser beams "shot" from ground stations provided a 3-D truth source. If lasers weren't available, aircraft present position data collected while airborne was merged with ground differentially corrected GPS data which allowed postflight "time and space" calculations.

With duplicate flight directors on board, one seat (the hooded subject pilot) used GPS signals for aircraft control while the other seat (the safety pilot) monitored another reference such as VOR, TACAN, ILS, or even MLS. As the world's only T-39 WSO, I sat in the back comparing the two signals and collecting the necessary data to produce that ever-important statistical "average."

Nonprecision Evaluation

After flying approximately 300 approaches, our initial test results showed the system, installed in accordance with the Air Force GPS Integration Guide, satisfies current requirements for En Route, Area Navigation (RNAV), Terminal Area Navigation, and emulation of TACAN/VOR/DME nonprecision approach procedures.

More importantly, using the existing procedures, our GPS-equipped NT-39 could fly nonprecision ap-

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proaches down to 250 feet above the runway. Horizontal guidance was good all the way down to the runway but vertical errors in the system prohibited the use of vertical guidance below 400 feet above touchdown.

Due to the way the satellites are arranged around the earth, unaided GPS vertical error will almost always be greater than the horizontal error. (For that reason, users should visualize a football on end-shaped accuracy plot as opposed to a perfect sphere.)

Precision Feasibility Testing

Since GPS by itself was limited to nonprecision work, a way had to be found to take out some of the system errors so we could get further "down the chute" and into the precision category. This gains additional importance since some of the various frequency protection agreements such as the one governing ILS expire and high-powered (read south-of-the-border) FM radio stations come up around the world.

One of the ways we studied to increase GPS vertical accuracy involved a ground-based receiver in the general location of the airport. This receiver sits on a spot with known, measured coordinates. This receiver now knows exactly where it is and can now calculate the distance error in the GPS signals that it picks up. Then, by using some type of data-link, it sends a correction (to compensate for the distance errors) to the approaching aircraft. The aircraft's GPS receiver then uses this correction factor to remove most of the error in the system (called differential correction) and permits the aircraft to get closer to a Category 1 decision height.

In our case, we again flew hundreds of approaches, this time to the FAA Flight Technical Center's runway 13 near Atlantic City, New Jersey (it's a tough job ...), for side-by-side evaluation comparing differential GPS to the existing ILS. To "tighten" the aircraft system, we used Local Area Differential GPS (LADGPS) which is a fancy way of saying the corrections were transmitted directly (line-of-sight) to the aircraft from the ground-based receiver. The numbers are still being "crunched," but so far our results look extremely promising — for both the military and civil receiver.

The Future

GPS instrument flight evaluation continues by the IFC. The data we have collected has been used by the FAA in developing national GPS equipment standards and is also being used to create GPS TERPS criteria (Terpsters — keep watching for chapter 13). Some of the items we intend to look at in the near future include the effects of terrain-masking and weather on signal reception.

Another potential problem is multi-path, which is where a signal is bounced around by buildings, wings, etc., before it is received by the aircraft's receiver. This causes the apparent distance to the satellite to be lengthened and, in turn, increases the system error. The list goes on and on.

Other non-IFC testing includes Wide Area Differential GPS (WADGPS). Here, the correction signals are beamed from the ground-based receiver to a satellite overhead which then sends the corrections to a whole bunch of aircraft (or ships, or trucks, etc.) over a wide area. With only 24 ground receiver/data-link stations, the FAA hopes to blanket the U.S. with WADGPS which they call Wide Area Augmentation Service (WAAS).

This will open up an incredible number of airports to precision approaches since there isn't any airport-based equipment involved (besides required runway markings and lighting). These types of differentially corrected systems could even be used to control aircraft movements on the ground in dense fog. And since GPS isn't slaved to the magnetic north pole like it's predecessors, there is even talk of converting to true headings (coincidental to the third pilot replacing navigators in some aircraft? — I think NAWT). ■

EQUIPPING IFC'S NT-39

To accomplish these tasks, the IFC's NT-39 was configured with the following equipment:

- Collins 3A GPS receiver (integrated to drive flight instruments)
- Duplicate flight directors (both left and right sides of cockpit)
- Center console mounted control display unit (CDU)
- Rubidium clock (locked to U.S. Naval Observatory standards)
- SNU-84 Ring Laser Gyro INS
- Sundstrom mission data loader
- Microwave landing system (MLS)
- Laser Retroreflectors
- Various test recording equipment (computers, video, and audio)

When Flying ... COMMUNICATE

MAJOR JOE STEPHANS
HQ AMC

■ We all tend to learn from our mistakes. The following incidents could have been prevented with proper crew coordination. The first incident involves an alleged violation of Federal Aviation Regulations (FAR). The second is feedback from an Air Traffic Service on an oceanic crossing. Both involve incomplete communications between individuals, crews, and air traffic controllers.

Incident One

Incident one was an alleged violation of FAR Section 91.123(a) which states that "When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless an amended clearance is obtained ..."

The crew in question was descending to their assigned altitude of 6,000 feet heading east and preparing for a visual approach to the active runway. Nearing the busy airport, the crew was given a radar vector to 020 degrees for a downwind leg and given a frequency change. The pilot flying the aircraft initiated the turn and began a descent to 5,000 feet in the turn while the pilot not flying was clearing and dialing in the new frequency.

The pilot not flying (PNF) queried the pilot flying (PF) about the assigned altitude as they were descending through 5,400 feet. The PNF contacted the controlling facility to confirm the altitude cleared to. The controller issued the crew a clearance to 4,000 feet. After landing, the crew was instructed to contact approach control while taxiing.

At some point in this incident, the aircraft commander gave the controller his name and social security number.

The first "lesson learned" is don't change altitudes without informing your crew of your actions. If you let the people around you know what you are doing, they can back you up and ensure you have gotten a complete message from the clearance issued. In this case, the PNF the aircraft may have been able to prevent this incident from occurring by confirming what the assigned altitude was before the descent to 5,000 feet.

The second lesson learned comes from FLIP General Planning, paragraphs 5-17a and b.

"Pilots of airborne aircraft should read back those parts of ATC clearances which contain altitude assignments/restrictions or radar vectors, as a means of mutual verification ... After receiving a revised altitude clearance, include the newly assigned altitude/flight level when reporting vacating the previously assigned altitude/flight level, e.g., 'PACER 82, leaving FL 240 for one six thousand.' In addition, if the clearance includes an altitude restriction at some fix/facility, include that altitude and the fix/facility at which it applies in the report." From the information indicated, this call was omitted eliminating any chance of "mutual verification" between the pilot and controller.

The third lesson learned in this incident is DO NOT give your name or numbers to a controller. Air Force Regulation 55-2, *Airspace Management*, paragraph 26a: "MILITARY PILOTS' NAMES ARE NOT TO BE RELEASED TO THE FAA WITHOUT APPROVAL OF HQ USAF/XOOSA." (It is now HQ AF Flight Standards Agency, DSN 858-4743.)

Incident Two

Question: Can you unilaterally decide not to use an Altitude Reservation (ALTRV)? The correct answer is NO. If you don't need the ALTRV, make sure you cancel the ALTRV with all the appropriate air traffic services involved. You may not be very popular with all of these organizations for a while, but you will not be as unpopular as you would be if you decided not to use your ALTRV at all and never canceled it.

For ALTRVs transiting oceanic areas, especially the North Atlantic (NAT) region, your mission receives extra attention to ensure the proper separation. The following quote is one NAT region controller's reaction to an ALTRV which wasn't canceled: "The waste of airspace utilization by failure to cancel the ASR (airspace reservation) and the filing of 7 Air Force aircraft down the busiest of the NAT Tracks at the busiest time of the day at the prime level indicates a total lack of appreciation of the oceanic operation."

Use Your CRM Training

Remember the old saying, "Aviate, navigate, and then communicate"? When communicating, make sure the message you receive is complete and understood and the messages you give are also complete and understood. In a crew aircraft, other crewmembers can help you with the communication part of flying. When changes occur in the mission, use this resource to keep other agencies in the loop. Use your CRM training, and involve the crew. ■

MAINTENANCE MATTERS

Missing: Inner Wheel Bearing ... and Maintenance Discipline

■ Here are just two of the many recent mishaps which could have been prevented by an inspector while clearing a red "X" condition and/or performing an in-process inspection.

During the preflight inspection of an airlifter transiting through an en route base, the crew found a main tire antiskid hub sensor missing. Further maintenance inspection uncovered both wheel and tire damage. The inner wheel bearing was also missing.

The mishap wheel and tire assembly had been replaced by unqualified Air Force maintainers at the last en route stop. Tech data **was not** followed, and the required in-progress inspection (which includes inspecting the bearing) **was not** performed.

It's not surprising maintenance discipline was cited as a mishap cause and training for the mishap maintainers was recommended. However, there are a few questions begging to be asked:

■ How could the mishap participants' supervisor or expeditor assign them — or allow them — to perform the task of changing the wheel and tire without knowing they weren't qualified?

■ Why didn't someone catch the faulty maintenance being performed?

■ On this critical task, why wasn't the missing in-progress inspection noticed at the time of the aircraft's "exceptional release"?

■ What kind of maintenance followup program was employed?

A same-type aircraft experienced a mishap with almost exact results except the circumstances were different. This time, lack of effective communication and coordination were causal factors.

Again, a supervisor cleared a red "X" condition *without* confirming the inner wheel bearing was, in fact, installed. Earlier, during the in-process inspection, the inspector noticed something was wrong, properly called attention to it, but had to leave the flight line for other official duties.

When the inspector returned, the wheel and tire were already installed. **Assuming** the earlier in-process inspection discrepancy was completed, the inspector went ahead and cleared the forms.

Remember, maintainers, inspectors, and flight line supervisors, an in-process inspection means exactly that. **Do not go past the point of the in-process inspection before an inspector has actually inspected and blessed the work!** Then, and only then, should the task resume. In this latter case, an inspector learned the hard way about the inflexibilities of these critical inspections.

These incidents should remind us aircraft airworthiness and mission effectiveness demand quality maintenance. Our corps of Air Force inspectors are, in most cases, the last line of defense to ensure quality maintenance is performed, i.e., critical safety of flight tasks! ■

CMSGT MICHAEL M. CAVEY
113th Fighter Wing
Washington, D.C.

A Work-shop That WORKS

■ Throughout my 29 years in the aircraft maintenance field, I have seen numerous accident prevention programs; some work, some don't. However, I believe a program called the "Accident Prevention Paradigm Workshop," created by Lt Colonel Richard A. Groben, truly works for the Air National Guard Bureau. I have participated in the program on both sides; once as a customer and twice as a team member administering the workshop.

Do we, as leaders, know when or where the next accident will be? Can we predict the cause of the next accident? Of course not. If we could, we would do what was necessary to prevent the accident. We could spend most of our time "what if'ing" every situation, and nothing would ever get accomplished. Or we can do something logical and take a look at our unit and see if we have created, and are we sustaining, a paradigm that encourages accident prevention. That inward look is the basic concept of the Accident Prevention Paradigm Workshop.

You might be asking yourself, "What is a paradigm?" For this workshop's purpose, a paradigm is "A set of rules that defines boundaries." More simply put, it's "a limit to the length we can/will go to do anything." "Because of an existing paradigm, we continue to do something a certain way because that is the way we have always done it."

After serving on four safety investigation boards, Lt Col Groben asked himself if we in the Air National Guard were actually doing everything possible on a foundation level to prevent accidents. Believing there was something missing, he created the Accident Prevention Paradigm Workshop. This workshop program looks at a unit through its members to assist in accident prevention.

The normal workshop process spans a 5-day cycle, including travel, and consists of a team of three people. In addition to Lt Col Groben as the team leader, there is a Chief Master Sergeant from aircraft maintenance and a pilot who is qualified in the type of aircraft which the unit is flying. Team members have infor

Photo by SrA Jerry Morrison

Lt Col Groben and his team do not grade the commander but provide an unbiased assessment of the unit's safety culture.

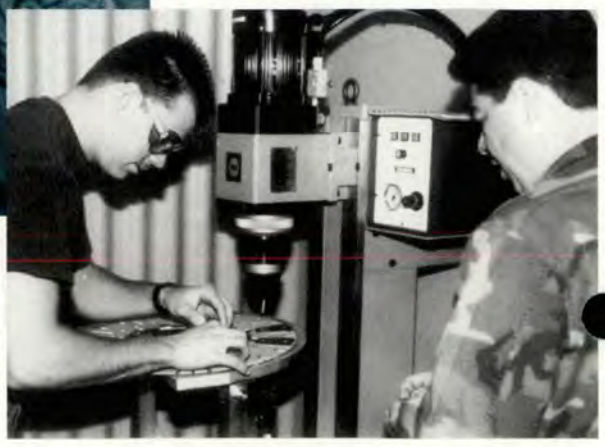


Photo by A1C Charlene Spade

mal conversations with unit members to become acquainted with the unit. Informal chats are followed by 1½-hour facilitated seminars.

Seminars are conducted with unit workers, supervisors, chiefs, officers, and finally the senior leadership. This format enables the team to define the paradigm accurately and to reveal any anomalies which can be addressed to prevent an accident. This process has revealed a strong connection between the unit's paradigm (as expressed by the way unit personnel act, speak, and listen) and the unit's accident record and/or accident potential.

The team's findings are not conjecture but rather an accumulation of input from the people in the unit. As this is not an inspection, and the findings are confidential to the unit, most people feel free to be candid, open, and honest while sharing both positive and negative discussions about their unit.

After completing interviews and seminars, an outbrief is given to the air commander. The outbrief communicates the team's findings and

continued

Photo courtesy Bolling AFB

"A COMMANDER'S PERSPECTIVE"

COL JOSEPH SIMEONE
157 ARG Commander

■ "Have you heard these statements on your base? 'It can't happen at our unit!' 'We are the Guard; we have the most experienced and professional personnel in today's Air Force!' Well, accidents can happen — even at the best units. As commanders, we are our unit's no. 1 safety officer. Our judgments and attitudes set the code of conduct within the unit. We establish the unit's safety culture. This culture is a strong force within the unit that develops over many years. Once established, this culture is difficult to alter. As the very fiber of the organization, this culture is an extraordinarily powerful force.

"About 4 years ago, our unit experienced its first 'Class A' ground accident. Fortunately, none of our people were injured, but a very valuable ANG/USAF asset was destroyed. As with any accident, any one break in the chain of events could have possibly prevented the circumstances that allowed this mishap to occur.

This is where the cultural aspects of an accident are very often overlooked. Does the unit have open lines of communication vertically and horizontally? Do we, as supervisors, listen and encourage feedback and open dialogue between subordinates, peers, and supervisors? Effective communication is one of the pillars of the foundation of the Accident Prevention Program.

"Because of the tremendous amount of changes in our unit, I decided to invite Lt Col Allan Groben and his team to conduct an Accident Prevention Paradigm Workshop. Prior to the start of the workshop, the Air Commander contracts (in a quality sense) with Lt Col Groben and his team. No one but the commander gets the results of the assessment. There is no visibility or accountability to State Headquarters, Major Commands, or the National Guard Bureau.

"The Accident Prevention Paradigm Workshop, in the course of 5 days, establishes a base line from which a commander can make changes if necessary. It's a quality tool to encourage continuous improvement in your safety culture. After going through the process, the commander sees himself and his relationship to the unit from a fresh perspective.

The workshop helps the commander by asking him to look into the mirror and to see himself and the organization from an unfiltered view. Lt Col Groben and his team are not grading the commander but are providing an unbiased assessment of the unit's safety culture. The Accident Prevention Paradigm Workshop (sponsored by ANGRC/SE) is certainly not an inspection or witch hunt. The workshop is an investment in your organization. I highly recommend this outstanding assessment program." ■

A Workshop That Works

continued

Does your unit have open lines of communication vertically and horizontally?

possible actions which could be taken. Units can expect some very specific results from the workshop. The results are sometimes both dramatic and subtle. Sometimes the results identify issues and problems the unit was previously aware of and, for some reason, had not addressed. Whatever the case, the unit will benefit because the people's participation in this workshop will produce accurate and credible results.

There is no written report on the findings or the results of the process, and the workshop exists solely for the benefit of the unit. The air commander will be the only recipient of the specific results generated during the workshop visit.

The workshop process accepts the fact there are two main causes of accidents — mechanical and human. Units can address, attack, and prevent mechanical problems but not the accidents caused by humans (the ones which the Accident Prevention Paradigm Workshop is most concerned with). These are the hardest to detect from within the unit because unit members are too close to the issues, and telltale signs escape detection.

The workshop team serves as the "third man in a chess game" and can, through contact with members of the unit, pinpoint a trend or an area of concern within the unit which the members cannot see because they *are* too close to the issue. The team uses the outcome of the visitations and seminars to produce an accurate and credible synopsis of information flow, discipline, morale, chain of command, leadership, and human factors which may contribute to the possibility of an accident.

As the results *are* confidential, I won't reveal any specific examples of past workshop findings. However, the Air Commander of the 157 ARG, Pease ANGB, who was a recent recipient of a workshop, has agreed to share his view of the program in the accompanying sidebar article.

The Accident Prevention Paradigm Workshop program *is* making a difference in accident prevention through an in-depth look at the unit's integrity, trust, and leadership. It is a project brought into existence as an idea from the field. It has been tested, developed, and is maturing in the field. It is available to any ANG unit upon the request of the Air Commander. Once again, **THE FINDINGS BELONG TO THE UNIT** — there is no written report generated. ■

Although this paradigm workshop is exclusive to the Air National Guard units, you can contact Lt Col Groben, DSN 924-6947, in case you are interested in the workshop process. After 35 workshops, he has it down to a science and is highly knowledgeable of its structure, procedures, and benefits. He stresses the workshop can be conducted for any mission/organization — it *does not* have to be a flying unit. And by the way, he happily reports there have been units whose paradigm was one of "noteworthy integrity, trust, and leadership created and sustained by effective communication," which he champions as a foundation for any unit.

—Technical Editor

Any one break in the chain of events could have possibly prevented the circumstances that allowed this mishap to occur. This is where the cultural aspects of an accident are often overlooked.

Photo by Walt Weible

THERE I WAS

THANKS

Thanks to all of you who have sent your "There I Was" experiences to us. You have shown such great response and interest that we will be printing two "There I Was" stories in this issue and in future issues of *Flying Safety*. The valuable lessons learned will surely help our readers to avoid some potentially serious pitfalls and could even prevent a mishap of their own. Your interest and support of this program have been great, and we encourage you to keep sending your stories to us — Ed.

■ I was certainly a proud person. My current assignment was as a Military Air Transport Service C-124 *Globemaster* pilot, instructor pilot, and tactical instructor pilot. Previous years as a helicopter pilot had caused me to have fewer logbook hours than my contemporaries. Now I could strut, building over 100 hours each month.

On the day of this incident, I was alerted to take an "Old Shakey" from Hickam AFB, Hawaii, to Norton AFB, California. The navigator and I met at Operations to pick up a World wide Navigation Kit, to get the weather briefing, and to file the flight plan. The navigator found the California Approach Plate book had coffee stains, and some pages were stuck together. He checked out another one, and we were soon at the aircraft doing the preflight.

At the midpoint of the flight, I called for the California charts and approach plates. With a red face, the navigator reported the approach plates were still on the counter at Hickam. Luckily, the weather was CAVU (ceiling and visibility unrestricted). I refused to ask for help from ATC.

The sun had set, and I could see the rotating beacon at Norton while still at cruise altitude over the Los Angeles coastline. Just a week earlier I had landed at Norton and remembered the frequency of Colton NDB, the LOM for the ILS to Runway 05. My clearance was to Colton with an ILS approach. No sweat!

In an attempt to get the ILS frequency without admitting I had no approach plate, I said, "Norton, I'm not receiving the ILS. Confirm the frequency." The controller advised me the ILS had just alarmed. I was to continue VFR, and I was no. 2 behind a T-39 on final. Super, no sweat!

Inside 1 mile of the runway, the tower advised the T-39 had missed his turnoff and was back-taxiing on Runway 23. "Execute the published ILS Runway 05 missed approach." I had no idea what this required — and there is one heck of a mountain nearby.

God looks after idiots and proud people! I called for "Props full increase" and full flaps and told tower I was sure I could land after the T-39 was clear. They bought it — I did it — and I never admitted what happened. ■

Some of our older aviators frequently ask about this story. Written by one of the Air Force's most talented authors, Roger Crewse reminds us that while it's important for aviators to utilize all the resources available to them, *pilots are ultimately responsible for the jets they fly.*

Although safety investigation boards deal with unpleasant circumstances, they play a critical role in the Air Force's mishap prevention program. First published in *Interceptor* magazine, this story takes a lighthearted look at the mishap investigation process and one pilot's attempt to "beat the system." Join Roger's would-be hero as ...

Coolstone Convenes the Board

MR. ROGER CREWSE
Former Editor
Interceptor Magazine

■ Coolstone had just taken off on a test flight in an F-101B. While climbing out, he had experienced some lateral control problems. He held at 35,000, and as the aircraft slowed down after the climb, he experienced an uncontrollable roll tendency to the left at around 270 knots. Even with full right aileron below 270 knots, he couldn't hold the aircraft level. He knew he was in serious trouble.

"Hello, McCoy Tower, McCoy Tower. This is Coolstone One, ove There was a certain amount of ur gency in Coolstone's tones.

"Roger, Coolstone. This is McCoy. Go ahead."

"This is Coolstone. I'm having some control difficulties with this aircraft. Please call our squadron ops and ask the CO to get on the radio. I'll pick him up on the tactical frequency."

As Coolstone waited, he began to weigh all of the factors in this situation. He was pretty sure he couldn't land the bird without an accident in its present condition, but he certainly didn't want to bail out. What do you suppose the accident board would say? If he bailed out, he probably wouldn't be open to much criticism, but it seemed such a shame to leave a bird in this kind of shape. If he tried to land the jet and goofed in the slightest, well, he'd seen the results before — GCI (ground control intercept).

Then on the radio he heard, "Hello, Coolstone One. This is Surefire Ops. Do you have a problem?"

Coolstone recognized the voice of his commander. "Surefire from Coolstone. You bet your boots I have trouble. I can't control this bird under 270 knots. Seems as if the aileron control craps out, or something. I let it go to 260 just a few minutes ago and got into a roll before I could get the speed up enough to stop it. What do you recommend?"

"How much fuel do you have, Coolstone?"

"Well, if I hold it here at 270 to 275, I'd say I have about 1 plus 45."

"Roger. Stand by."

At this point, a thought began to take form in Coolstone's mind — an insidious, sneaky, dirty thought that only could gain birth in a devious mind. I know what I'll do, he thought. I'll give the safety investigation board (SIB) my problem. I'll do exactly what they recommend, and no matter what happens, it won't be my accident. Let the experts investigate this one before it happens. For once they can do their famous second-guessing on the first go.

"Hello, Surefire. This is Coolstone One. Over."

"Roger, Coolstone. This is Surefire." It was the commander still.

"Roger, Skipper. I've got a problem here. I don't know whether to bail out or try to land this thing. In any case, I'm sure I am going to have an accident of some type. I can't control the bank under 270, and I can't stop it with full right aileron or rudder. I've turned off the autopilot, and I've pulled the circuit

continued

Coolstone Convenes the Board continued

breaker, so that should not be the trouble. What I was thinking — how about getting the accident board members together there in the squadron, and give me the expert advice before I have the accident? I'll abide by their judgment on whether to bail out or try to land this thing and have my accident then. I'm pretty sure I'm going to have one."

"Well, now, Coolstone," said the CO. "This is unusual, indeed. Actually, it is up to you — the pilot's discretion, and all that type of thing. It's really your deal."

"Yes, sir, I know it is my problem and at my discretion, but if my discretion isn't the SIB's discretion, I'll get tagged with a pilot error accident, and you know what that means. Unless you'd care to advise me what to do yourself?"

"No, no, er, ah, I wouldn't care to do that right now, and you do have a point. I tell you what I'll do. I'll get the board down here as quickly as possible."

The CO called the tower and activated the crash circuit, as there is nothing that will scare up an interim SIB quicker than the activation of the crash circuit. Therefore, 15 minutes later, an impressive-looking, puffing group was standing around the squadron radio. This group was composed of the board president, the accident investigator, the flight safety officer, the doc, the tech reps for the aircraft and engine, the weather man, the group maintenance officer, and, of course, the squadron operations officer, and the CO.

The board president took the microphone. "Hello, Coolstone One. This is the SIB president. I understand you are having a little problem. How much fuel do you have remaining?"

"Yes, I might say I have a little problem. I just can't control this bird under 270 knots. I have about 1 plus 30 remaining. I could use some advice. How about holding a board and right now, based on the information we both have available to us, advise me what to do? Shall I get out, or shall I try landing? I figure I have an accident cinched both ways. I might save part of the bird at least if I landed."

"Mmm, ah, yes. Let's see," said the board president. He looked inquiringly at the group surrounding him, and surprisingly enough, none were anxious to talk. At normal accident board meetings, the president couldn't keep them quiet. They all knew exactly what the pilot should have done and didn't, but now they were strangely silent.

"How about you?" The president looked at the aircraft tech rep. "What would you suggest under the circumstances?"

"Well, let's see," said the rep. "I really should have my Dash-Two to look at so I can check out the circuitry. I would hesitate to say without my books. I wouldn't be a bit surprised if this wasn't an engine problem anyhow." He looked slyly at the engine rep.

"Oh, come off of it," said the engine rep. "You airframe people stay up nights trying to hang us. Now you can't get out of this one."

"Well," said the board president, "I'm still waiting. What do you think? Should he come in and land, or should he bail out?"

"Well," said the aircraft rep, "offhand, I'd say he is probably exaggerating his problem somewhat and undoubtedly could make a safe landing. Our equipment has double-safe circuits with fail-safe devices provided to you only by my company." He broke off as the president handed him the mike.

"You tell the pilot all this information and whether you think he should land or not."

"Oh, no, no, no," said the tech rep, handling the mike like it was smallpox. "No, I didn't say for him to land. I just said —"

"Well, to sum it up," said the president, "what you said was that you don't know what he should do."

"Well, now, I didn't say that either," said the rep. "But look, I'm just an advisor. I'm really not a member of this board."

"Okay, okay," said the president. Looking around once again, he said, "Who's got something to say? How about you, Wag?"

"Yeah, yeah," said the irre-

pressible weather prophet. "I'd say about 5,000 broken and 15 miles, just as I forecasted."

"Sure you would, Wag. How about it, Doc? What do you think?"

The doc looked thoughtfully for a moment, then said, "Is he hypoxic? And ask him if he had breakfast. You might even ask him if he's having any personal problems."

"No, Doc. He's not hypoxic, and I doubt if personal problems or the lack of breakfast have anything to do with the aileron."

"Well," said the doc, "obviously I can't contribute."

At this point, the maintenance officer spoke up. "I've been thinking," he said. "Maybe if he came down to a lower altitude and tried it there, the temperature difference might improve the operation of the aileron control. Now, I don't mean that this particular problem right here is caused by temperature, but on the other hand, wide temperature changes can sometimes cause even the best-maintained equipment to operate strangely."

The SIB president recognized this pitch from the last accident board.

"Here's the mike," said the board president. "Go to it."

"Hello, Coolstone, this is the maintenance officer. I wonder if you have considered coming down to, say, 5,000 feet or so and seeing if the temperature change will solve your problem. It's just possible it might clear it up."

"Roger," said Coolstone. "I understand that you're *recommending* that I come down to 5,000 feet."

He was interrupted by the maintenance officer. "I didn't say I *recommended* that you do that. I just wondered if you had thought of it."

"Yes," said Coolstone. "I thought about that and lots of other things, too. Now just what is it that you recommend? Shall I come down and land, or shall I stay up and bail out, or is there something else you'd like me to try?"

"Well, now, let's see. Mmm — I recommend — no — stand by." The maintenance officer wordlessly handed the microphone back to the board president.

The board president addressed the flight safety officer. "What do you say? What should he do?"

"Well," said the flight safety type, "he obviously is experiencing a malfunction. I'll be sure to put it in my next safety officer's report. But as to what he should do right now, it looks like it's a decision he'll have to make for himself. But I sure would like to get the bird back so we can find out what's wrong."

"Wait a minute," said Coolstone. "I want to do the right thing as you people see it. Now it would appear you and the rest of the experts there, standing with both your feet firm on the ground, could do a little first-guessing for me, and give me some suggestions. What do you recommend I do? I'll follow through."

"You tell him that," said the safety board president, and the safety officer found himself holding the microphone.

"Hello, Coolstone, this is the flight safety officer. Do you read me?"

"Roger," said the Cold Rock. "What do you recommend? Do you have something?"

"Well," said the flight safety officer, "I recommend that you do whatever you think is right. It's up to you, the way I look at it."

"Wait a minute," said Coolstone. "I want to do the right thing as you people see it, not as I see it. Now it would appear you and the rest of the experts there, standing with both your feet firm on the ground, could do a little first-guessing for me, and give me some suggestions. What do you recommend I do? I'll follow through."

"Stand by," said the safety officer.

"Let's call the division," someone suggested.

"Excellent idea," said the board president.

A priority rush-rush call was placed. After a second or so, the division safety officer was on the line.

"This is the SIB president here at McCoy. We've got a problem." And he went on to explain the situation in full to the safety officer at the division. Then he said, "What do you recommend Coolstone should do here? He is insisting we give him some assistance in the form of recommended action. Would you suggest that he land, or should he bail out?"

"Stand by one," said the division safety officer. After a long delay, while the president could hear much loud discussion in the background, the safety officer came back on the line. Then he said, "Being that far away from the problem, we don't have any firm recommendations at this time. However, we think you'd better check with ADC."

"Roger," said the president. "That sounds real good."

The lines to ADC (Air Defense Command) were promptly cleared by the emergency call. Soon the director of flight safety at ADC was on the phone. "This is the director of flight safety. Can I help you?" he said.

"You certainly can," said the board president, and then proceeded to explain the whole situation, ending with the fact Coolstone had only about 30 minutes of fuel remaining and asking him for recommendations.

"Well, let's see," said the director of ADC flight safety. "Ah — mmm. I sure wish I had this on paper. I would definitely recommend that the pilot — oops, there goes the blue phone. The general is calling. I'll

continued

Coolstone Convenes the Board continued

have to hang up, but be sure to let me know how it comes out."

The board president had the problem back in his lap once again. At this time, Coolstone came back on the radio.

"Come off of it, you guys. I'm going to have to come in now, if you recommend that I land. Otherwise, I'll fly over the field and eject. I'm at the end of my fuel. I've tried flying the airplane with gear flaps and speed brakes down, but I still can't hold it below 270. What do you recommend? I have to have it right now."

Sweat broke out on each and every board member's forehead. The moment of truth had arrived. The president stared thoughtfully. The rest of the members shuffled their feet and cleared their throats but said nothing. Then the board president had an idea.

He called the squadron CO and the ops officer over. "Look," he said. "Let's tell him to come on in, and if he can't keep it in control all the way through to the final, have him eject. Is that okay?"

"It's a real good idea," said the maintenance officer. "The temperature might help too."

"Okay, Coolstone," said the board president with a sigh. "Here's what we recommend. Come on in. Keep your speed no higher than necessary, make a high pattern and a long, long final. If you have trouble anywhere in the pattern, eject before you get below 1,000 feet."

"Roger," said Coolstone. "I'll give it a go. Thanks a lot."

He brought the airplane down, entered a high downwind, put out his gear flaps and speed brakes, and kept his speed above 270 — right on 275, as a matter of fact. He turned a long, long base, and, trying to keep his altitude, allowed the speed to bleed off. The bird, already in a left bank, increased its angle of bank uncontrollably. Coolstone frantically brought in both afterburners, and he was ready to eject. It looked like he'd had it. Then the speed came up slowly, and he regained aileron control once again.

There were 10 separate sighs of relief — nine board members' and Coolstone's.

At this point, all the board members were yelling instructions at the president.

"Tell him to eject," one said.

"Tell him to turn without banking," another said.

"Tell him to hold it straight up," said another.

"Make a longer final."

"No, a shorter one."

Coolstone heard none of this. The president of the board remained silent.

On final now, Coolstone held a good, solid 275 with the stick full right. He even had some rudder in to hold the wings level. This caused a slight skid, but Coolstone was planning on releasing it as soon as he touched down. In fact, he had all of the steps firmly in mind. The runway was 9,200, including overrun. It had a barrier. He figured he'd pull the chute just as soon as he landed, use aerodynamic braking until 110 or so, and then lower the nose and really get on the binders. With luck, the barrier would catch him with little or no damage. If he missed the barrier, he'd be going off the end slowly enough so there would really be no serious damage to the aircraft.

Over the threshold now, he let the bird down, and then forced it and felt it catch, and then was horrified to feel it release again. He saw his airspeed was about 250. He held the nose up as far as he could without getting the main gear off. He felt the aerodynamic braking take over, then he saw the end of the runway coming up at a remarkable pace. At 115 or so, he placed the nose gear on the runway and really clamped on the binders. The antiskid went into action.

Coolstone could see he wasn't going to get stopped. At the last moment, he released the brakes and steered for the center of the barrier, then just held on. He glanced at his airspeed and saw he was doing 6 knots. The barrier did not catch him. He went off into the boondocks and, just before he stopped, hit a small ditch which collapsed the nose gear. That was all. The bird stopped.

Whoops, he thought. I made it, and a pretty good job, even if I do say so myself.

He got out of the airplane and surveyed the damage. Sure enough, all that was really dinged was the nose gear itself.

A week later, Coolstone attended the accident board for his accident. The president reassured him it was merely a formality, just to satisfy the records. After Coolstone was sworn in and had sat down, the president said, "Now we have a few questions, just for the record. For instance, what speed did you hold on final?"

"About 275," said Coolstone. "I couldn't hold the airplane level at any less. I tested it several times, and you saw what happened when I turned base."

"I'll say we did," said the president. "It took a good bit of flying to

recover from that. When did you deploy the chute?"

"Well, right at touchdown, of course," said Coolstone. "But it came right off because I was going too fast. For just a bit, I thought it would hold."

At this point, the maintenance officer spoke up. "Just for the record, here's what we found wrong with your control. It was maintenance error, and there was nothing you could have done to correct this problem in the air. And, just for the record, the chute did not malfunction. It was packed correctly and deployed correctly but, on account of the high speed, it sheared from the aircraft. That's just for the record," he repeated.

The board president took over once again. "I think that's all we'll need, Coolstone. Thank you very much. It looks like you did a real good job."

Coolstone left the room and decided to wait outside. He felt good. Everyone said he did a good job, and they had found the failure. But he wanted to hear the words — the actual board findings — from the horse's mouth. About an hour later, he was still waiting. He wasn't particularly concerned, because he knew of the many details and paperwork involved in an aircraft accident report.

Finally the door opened, and the board president led the group out.

Coolstone rose to greet them, all smiles. "Well," he said, jokingly, "what's the verdict?" never doubting for a moment what he would hear.

"Sit down, Coolstone," said the board president, placing a fatherly arm around Coolstone's shoulders. "Here's what we found — it was pilot error."

"Pilot error!" shouted Coolstone. "I did just what you said. You knew I was going to have some kind of an accident. I told you I would. You recommended that I land. I did just what you told me to do."

"Yes," said the board president, "but how could we know you would deploy the chute at 270. The maximum drag chute deployment speed, we find in looking at the Dash-One, is 215. Also, by our figures — we have just spent an hour with the charts — if you had waited until you did have 215, it would only have taken about 5,100 feet of runway to get stopped."

"BUT — but — but," said Coolstone.

"Don't worry," said the board president. "This is just a fact-finding committee. No disciplinary action will be taken."

Coolstone started to protest, but he knew better. He knew it would be no use. He walked dejectedly out of the room and said to himself, "Oh, well, maybe I'll like GCI." ■

Reprinted from *Interceptor* Magazine, April 1975.

ABOUT THE AUTHOR:

Mr. Roger G. Crewse was a pilot in WW II and saw combat in the Pacific. Following the war, he was retired for medical disability but was almost immediately reincarnated as a civilian specializing in flight safety. Airplanes were his first love, and he could not be kept away from them. He hung around the Air National Guard and the old Air Defense Command (ADC) and ultimately became editor of *Interceptor*, the ADC's flight safety magazine.

Roger was a prolific writer, and it was there he authored the "Coolstone" series. Coolstone, a corruption of "Hotrock," was the quintessence of all the fighter pilots he had ever known; a pilot who could be counted on to get himself into trouble at least monthly.

Roger's real contribution, though, was in safety analysis. At ADC, Roger became the first and only person in the Air Force engaged full-time in the attempt to turn all of the numbers and statistics into something useful — something that would prevent future mishaps.

In 1973, Roger came to the Air Force Inspection and Safety Center (as it was known then). The Center (today the Air Force Safety Agency) wanted someone who could analyze aircraft mishaps. Roger built the analysis program the Air Force has today. Now, the Air Force can predict its mishaps with uncanny accuracy and target its resources at problems which destroy planes and kill aircrews.

ELECTROMAGNETIC INTERFERENCE

Reprinted courtesy of *TWINJET*,
the McDonnell Douglas Flight Crew Newsletter, Volume 3, Issue 4

■ In the past 3 years, there has been a reevaluation of the industry attitude about potential causes and effects of Electromagnetic Interference (EMI) transmissions due to passenger "carry on" electronic devices. A Federal Advisory Committee, the Radio Technical Commission for Aeronautics (RTCA) has recently been commissioned to re-examine the cause and effect of EMI via Special Committee 177 (SC 177).

Their report of findings is due in July 1994. It may be some time before the RTCA committee recommends new procedures for addressing EMI, which makes it appropriate now to review reported events.

Although the number of events which have been reported to be EMI-related are extremely low compared to other reportable operational occurrences, the potential consequences of EMI are of concern. A search of our Safety Information System (SIS) reveals 97 such events since 1983.

A large number of erratic Omega indications believed to be due to EMI were experienced during 1984 and 1985, which resulted in the formation of committees to analyze EMI.

Studies indicated emissions from the early type of portable recording units, radios, and hearing aids were believed not to be a threat to the onboard navigational equipment. Software changes were made, nonetheless, and the number of reported EMI events decreased.

By 1990, however, the number of people boarding airplanes with electronic devices had grown significantly, and the low-voltage operation of modern aircraft digital electronics was potentially more susceptible to EMI.

A look at the data during the last 10 years indicates the most likely time to experience EMI emissions is during cruise flight. This may be misleading, however. During the last 3 years, 43 percent of the reported events occurred in cruise flight while an almost equal percentage of events occurred in the climb and approach phases.

When EMI is suspected or known, it is important to identify the specific type of equipment which is causing the interference. In the United States, cellular phones are licensed by the Federal Communications Commission for land-mobile operation only. If used in flight, a cellular phone can disrupt aircraft equipment and could disrupt ground users over a large area.

Of particular note: During the last 3 years, the number of events relating to computers, CD players, and phones has dramatically increased, and these devices have been found to more likely cause interference with systems which control the flight of the aircraft.

Recognizing an apparent instrument or autopilot malfunction to be EMI related may be difficult or impossible in many situations. In some reported events, the aircraft was off course but indications in the cockpit displayed on course. Air traffic controllers had to bring the course deviations to the attention of the crews. It is believed there are EMI events happening which are not recognized as related to EMI and, therefore, not reported.

Our review of the 97 events shows that:

- Events are on the rise.
- All phases of flight are exposed (not just cruise).
- Many devices may cause EMI (phones, computers, CD players, video cameras, stereos).
- Often there will be more than one device on a flight.
- Passengers will turn on a device even after told to turn it off!
- Passengers will conceal usage of some devices (phones, computers).
- Passengers will turn devices on just after takeoff and just prior to landing. Phones have become a critical problem.
- Specific device type and location should be recorded and reported by the crew.
- When the emitting EMI device is shut off, the aircraft systems return to normal operation. (In the case of positioning errors, a course change may be necessary.)
- Flight attendants should be briefed to recognize possible EMI devices. ■

The Air Force Perspective

■ After reading this article in *Twinjet*, I became curious as to the number of EMI incidents the Air Force had experienced over the last few years.

I'm sure most fliers are somewhat familiar with the prohibition in AFR 60-16 (soon to be AFI 11-206) on operating certain carry-on electric devices in Air Force aircraft. After talking with Air Force Command, Control, Communications, and Computer Agency, and the Air Force Flight Standards Agency, I found out some things you might consider.

First, let me refresh your memory on exactly what AFR 60-16 has to say on the subject (just in case your copy of 60-16 isn't right at your fingertips). According to paragraph 2-7a:

"No person may operate portable radio receivers and transceivers and other electric or electronic devices (except watches, handheld nonprinting calculators, hearing aids, medically prescribed physiological instrumentation, portable voice recorders, and laptop computers (when approved by MAJCOM)) unless a specific military requirement exists and the device has been tested, certified interference-free, and so labeled by Aeronautical Systems Center, Deputy for Engineering (ASD/ENACE).

(1) Individuals may use electric razors only in power receptacles similarly tested and labeled. They must not use cordless razors.

(2) MAJCOMs provide guidance on the use of other nonmission equipment aboard command-operated aircraft."

While the above regulation is supplemented by individual MAJCOM directives, I know many of you as crewmembers would be shocked to see a personal tape player or electronic game used aboard an Air Force aircraft on a long mission (yeah, right!).

Like most organizations in the Air Force, ASD/ENACE has undergone a name change and is now known as ASC/ENAI. As of this writing, ENAI reports no incidents of Air Force aircraft being affected by passenger carry-on electronic devices. A search of Air Force Safety Agency's data base also yielded the same results. However, AFI 11-206 (which was at the press as of this writing) will change the guidance now found in AFR 60-16 to read:

"2-8. Prohibitions. The following prohibitions apply to each passenger and crewmember aboard an Air Force aircraft:

2.8.1. Electronic Devices.

2.8.1.1. Nontransmitting portable electronic devices shall not be used during takeoff and landing (below 10,000 ft) or whenever directed by a crewmember. This equipment may be used at other times (above 10,000 ft), provided the pilot and crew are aware the equipment is being operated. If interference from a portable electronic device is suspected, the crew may prohibit operation of the device. Devices that may be used include but are not limited to:

- Audio and video recorders and playback devices.
- Computers, peripherals, and electronic devices.
- Radio Receivers.

2.8.1.2. Nontransmitting portable equipment that must be operated during all phases of flight due to mission requirements must meet the requirements of MIL-STD-461D, or methods RE102 and CE102, when tested in accordance with MIL-STD-462D. The

continued

The Air Force Perspective continued

pilot and crew are to be aware the equipment is being operated.

2.8.1.3. Paragraphs 2.8.1.1 and 2.8.1.2 do not apply to:

- Hearing aids.
- Heart pacemakers.
- Electronic watches, handheld nonprinting calculators, portable voice recorders.
- Properly certified operator equipment.

NOTE: Technical guidance and data evaluation are available from ASC/ENAI, 2450 D St., Ste. 2 WPAFB OH 45433-7630, DSN 785-5078."

You can see the new instruction is in some ways more liberal than the old AFR 60-16 verbiage. However, MAJCOMS may provide additional guidance to the above. As personal electronic devices become more miniaturized and the use of low voltage DC instruments in the cockpit grows, it's important for our aircrews to be aware this is an issue which is gaining attention in the civilian sector.

Aircrew personnel need to be on the lookout for the unauthorized use of carry-on electronic devices on their aircraft, and the potentially hazardous situations their use may create. Although we could not document an Air Force EMI aircraft incident from the unauthorized use of a carry-on personal electronic device, it could very well be that some of our flightcrews may have a personal experience with EMI effects which have not been previously reported. If you know of such an incident, we'd like to hear from you. Please call the Safety Hotline at DSN 246-0950. ■

— The ED.

EMI Event Summary

The following is a summary of EMI events experienced during the last 3 years. NOTE: Similar events have been combined in this list to provide clarity.

System	Suspect Device	Interference
Autopilot	Tape player/radio computer	While climbing through FL200 w/autopilot engaged. A/C abruptly banked right.
Autopilot	Phone	A/P disconnected during departure and approach.
Autopilot	Phone	On simulated autoland CAT III approach, A/C suddenly started to early flare and seconds later high flare.
Communication	Phone, computer	Lost all Comm 1 & 2. No transmit or receive.
Compass	Computer, VCR, electronic game	Both compasses stopped synchronizing and started turning off course.
Compass	Radio	Compass #2 fluctuating intermittently ± 15 degrees.
Compass	Computer, tape player/radio	NAV & CDI 5 to 10 degrees off, 8 NM off course.
FMS	Digital tape player	FMS displayed descent message during cruise. FMS also increased cruise speed.
FMS	Computer	FMS varying back and forth along track.
HSI	Video recorder	Captains' indications wandering left and right of center at rate of 1 cycle per minute.
HSI	Phone	Large discrepancy between captain HSI & F/O HSI.
ILS	Stereo	Unable to receive ILS on either box. When stereo off, ILS received on both boxes.
ILS	Phone	Localizer tracking erratic. At runway, deviation was almost 1 dot deflected.
Masterwarn	Phone	Pneumatic temp high and abnormal lite #3 at top of climb. Master warning indicated.
Omega	Tape player, phone, electronic game, computer	Omega vector off course, had to use radar vector.
VOR	Tape player/radio, phone, computer, FM radio, CD player	VOR indications erratic displaying off-course/ on-course signals.
VOR	Tape player/radio, Computer, TV	Aircraft received erroneous VOR signal and turned off course.

Reprinted courtesy of the McDonnell Douglas Flight Crew Newsletter, *TWINJET*

OOPS! WE GOOFED!

■ Stamp collectors are always on the lookout for any mistakes, errors, or goof-ups in government stamps.

They view these defects as rare and treasured finds which will enhance the value of their stamp collection.

In contrast, mistakes made while publishing magazines usually evoke quite a different response from readers. Our June issue of *Flying Safety* magazine was no exception.

Some noticed there was a problem with the picture on page 21. The picture accompanying Captain Chris Cicere's article, entitled "Crew Coordination Pave Low Style," is obviously not an MH-53J Pave Low, but an H-60 Pave Hawk.

In all fairness to Captain Cicere, the mistake was ours, not his.

To the men and women of AFSOC, and all those who fly and maintain both weapon systems, please accept our personal apology for this oversight.

We strive to produce a quality product for you every issue. We hope you will benefit from the topics we present in the interest of mishap prevention.

Our promise to you is continued vigilance to keep mistakes from affecting the quality product you've come to expect.

By calling attention to our mistakes and, hopefully, by telling us when we've given you something you find useful, you participate in the process of improving the quality of this magazine. (Please note the reader survey on page 25 of this issue.)

Your critiques and suggestions are very important to us. They help us to make course corrections and to repond to reader desires and current safety issues.

For example, based on the number of "There I Was" stories we've received in response to our May issue (keep them coming!), we'll be printing at least two "There I Was" stories every issue starting next month.

Getting back to the subject of pictures, I'd like to take this opportunity to make a plea for any current pictures of operational aircraft and scenes depicting USAF flying operations (i.e., aircrew briefings, POL operations, maintenance, weather and base operations scenes, tower operations, etc.).

We're looking for color photographs or slides, but negatives and black and white images are okay too. If you want your image back after we're through, we'll make sure you get it quickly.

In any case, if we use an image you send us, we'll make sure you or your unit gets credit for your work. Send your pictures to the address listed in the contibutions section on page 1.

Thanks for your time, and if you have any comments regarding *Flying Safety* magazine you don't want to put on the survey on page 25, please feel free to call me personally at DSN 246-0936. Fly safe, fly smart! ■

Jim Grigsby, Major, USAF
The Editor

FSO's Corner

Flight Safety Courses Information

■ Information about the flight safety short courses held at HQ AFSA, Kirtland AFB, New Mexico, is now available through the AFSA remote bulletin board system (RBBS) under Safety Education and Training (Directory 9). Four courses are listed:

- Aircraft Mishap Investigation Course (AMIC)
- Flight Safety Officer (FSO) Course
- ANG Aircraft Mishap Prevention (ANG/AMP) Course
- Chief of Safety (COS) Course

Specific information includes course number, length, location, description, quota allocations, prerequisites, class dates, uniform required, billeting, and transportation arrangements.

You may obtain this information from your local base safety office who has access to the RBBS. Units who do not have access may request this information from their MAJCOM safety office. ■

OVER BOSNIAN

CAPTAIN CHRISTOPHER J. KAUFMAN
37 ALS Flight Safety Officer
Rhein-Main AB, Germany

■ If a Flight Safety Officer (FSO) were to intentionally design a mishap sequence or chain of events for the 37th Airlift Squadron (ALS), it might look much like the Provide Promise mission we fly almost every night.

Ethnic warfare, and the ensuing chaos, has left thousands starving in the former Yugoslavia. Many noncombatants are without the essentials necessary to stay alive, including warm clothing, medicine, and food. The United Nations, in conjunction with the U.S. President, launched Operation Provide Promise to help these people. The instrument of this humanitarian assistance is the 37 ALS of the 435th Airlift Wing located at Rhein-Main AB, Germany.

The mission is to airdrop food, medicine, and clothing to areas unreachable by U.N. ground convoys and to air-land supplies to war-torn Sarajevo. The apparent threat is an array of AAA, SAMS, small arms fire, etc.

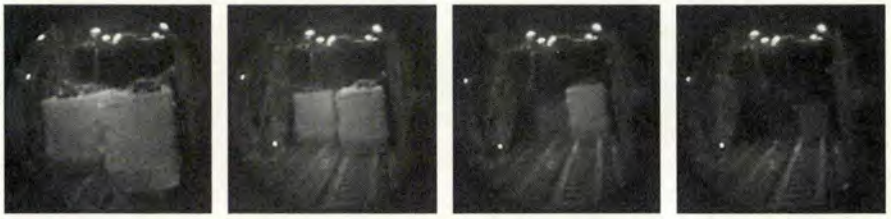
Although the warring factions have not stated their intention to fire upon our aircraft, we have taken rounds. A German aircraft was seriously damaged, and an Italian C-222 was shot down. In the fog of war, a formation of C-130s and C-160s can be an inviting target.

Our tactical planners developed an innovative solution to avoid the threat: high altitude formation night drops, preferably with some cloud cover. Enough to make any FSO cringe, but it enhances the survivability of the formation. Our navigators have proven, with the Adverse Weather Aerial Delivery System (AWADS), they can hit the drop zone with amazing accuracy from high altitude, in the weather, at night.

Since the mission is U.N. sponsored, our French and German allies

C-130s parked on the ramp at Aerodrom Split in Croatia.

(USAF photo by SSgt Greg Suhay)



A load of food, clothing, and medicine is dropped out of a C-130 over Bosnia-Herzegovina.

(USAF photo by SSgt Greg Suhay)

SKIES

*To date, U.S. and Allied forces participating in Provide Promise have delivered over 17,900 metric tons of food and supplies on 2,810 missions.

volunteered to fly with us on this challenging mission. The experienced pilot and safety officer can anticipate many possible mishap sequences.

A list of factors might include the threat environment, formation flying at night (often in the weather), dissimilar aircraft in the formation, language or communication difficulties, flying near stall speeds during the drop with wake turbulence from leading aircraft, deconfliction with other elements or formations, thunderstorms, mountainous terrain, etc., etc.

Despite this, the 37th ALS Blue Tail Flies have successfully airdropped over 8,500 tons of humanitarian aid on more than 1,200 missions.* This achievement would not have been possible without the indispensable help of the German, French, and other C-130 active duty and ARC units from the United States.

Safety issues have been hammered home by tactics briefers, intelligence technicians, mission commanders, serial leads, and aircraft commanders. Crewmembers are constantly reminded of their part in flying the mission SAFELY. Everyone from the wing commander to the loadmaster in the last airplane has made contributions to break the links in the mishap chain.

So, as a safety officer, why worry? The most insidious enemies have begun to weigh in against our unblemished safety record — fatigue and complacency. As the war has continued, people on the ground have come on desperate times. Many are near starvation in areas like Mostar. Therefore, the mission continues, often 7 days a week, with up to eight airplanes in a formation.

Many crewmembers have been into the AOR dozens of times, sometimes up to three times a week. The mission briefings begin in the early afternoon, and the debriefings conclude in the wee hours of the next morning. Similar briefings are heard again and again. The threat changes incrementally, and confidence is high. This is the perfect setup for complacency and/or fatigue to cause a mishap.

Our no. 1 safety officer, the squadron commander, has taken the lead in combating these twin evils. He not only exhorts his safety shop to fight complacent attitudes, but to watch over crew rest and create innovative briefings to keep crews on their toes. He also flies the mission himself, bringing up new ideas in briefings and guiding decision-making processes.

In addition, our wing commander has requested down days to rest the crews and support personnel. This has been a key factor in keeping squadron members fit and performance levels high. The mission goes on as does our constant assault on negative human factors. ■

Courtesy *Air Scoop*, Nov 93

"Watch Your Altitude"

An Altitude Awareness Program for All Operators

CAPTAIN ROBERT L. SUMWALT, III
Courtesy NASA's Aviation Safety Reporting System's (ASRS) *Callback*, Dec 93

NASA's Aviation Safety Reporting System's (ASRS) *Callback* Editor's Note: A 1992 FAA study of altitude deviations estimated a typical air carrier flight presents an extraordinary 100 "opportunities" for an altitude deviation. While the actual rate of altitude deviations is very low, even one altitude "bust" could result in one FAR violation at the very least, or at worst, a mishap.

In response to the hazards posed by altitude deviations, several domestic airlines have implemented safety programs which include altitude awareness procedures. The prototype for these programs was developed by USAir, in collaboration with the Air Line Pilots Association. Captain Robert L. Sumwalt, an ASRS research consultant, describes the origin and development of USAir's Altitude Awareness Program and ASRS's contributions to this program.

■ Four years ago, after a series of mergers with other carriers, USAir found it was flying more daily flights than any air carrier in the Western Hemisphere. More takeoffs and landings translate into more climbs and descents and, hence, more exposure to the risks of altitude deviations. USAir felt its exposure was also increased by route structures located predominantly in the northeastern U.S. where airspace is tight, traffic is congested, and ATC altitude clearances often are complex.

By mid-1990, the airline and the local USAir affiliate of the Air Line Pilots Association decided they could no longer accept the risks associated with this increased exposure. After all, altitude deviations can have a number of negative consequences. Passengers and crews may be injured due to rapid flight maneuvers while the aircraft is recovering from the altitude deviation. Costly FAA violations for crewmembers are not uncommon. In extreme circumstances, altitude deviations can lead to near midair collisions and mishaps. Something had to be done — quickly. The two organizations joined efforts to seek a solution. The Altitude Awareness Committee was formed.

In trying to learn more about the "anatomy" of an altitude bust, the committee obtained and studied NASA/ASRS Contractor Reports and Special Papers. A committee member also reviewed 150 ASRS incident reports involving altitude deviations. These ASRS resources revealed the majority of the reviewed altitude deviations could be placed into a half dozen or so major categories. By combining findings from analysis of ASRS sources with members' operational experience, the committee was able to focus its corrective efforts on a few areas.

Program Implementation and Effects

In September 1990, USAir officially implemented its Altitude Awareness Program. Within 6 months, the airline's altitude deviations had dropped by 65 percent. Over time, the program was refined to further improve its effectiveness. Overall, since program implementation, USAir's rate of altitude deviations has been reduced by approximately 75 percent.

Program Details

The USAir Altitude Awareness Program includes increased altitude vigilance through pilot education, specific altitude alerter setting proce-

dures, pilot-flying altitude callouts, and other recommended techniques — all designed to address specific problems which were identified by the Altitude Awareness Committee. Here are a few of the main points addressed by the program, with ASRS report excerpts to illustrate key concepts.

Improve Communications A majority of altitude deviations are the result of some type of communications breakdown — either with ATC or within the cockpit, and sometimes both. USAir reemphasized the importance of using proper radio phraseology, including the need to always read back ATC clearances completely with the full aircraft call sign. USAir pointed out to its pilots, however, clearance readback accuracy cannot be assured just because it goes unchallenged or uncorrected by a controller. An ASRS report excerpt describes this problem, known as "hearback error":

■ *Crew read back clearance to climb to 14,000 feet. Passing 10,700 feet, controller said, "Maintain 10,000" … Controller insisted we were cleared to 10,000 … Whether or not we were initially cleared to 14,000 feet is not the issue. We read back a [possibly erroneous] clearance, we were not corrected, and we proceeded on the assumption we were cleared. I have been corrected by controllers for inaccurate readbacks many times. This time we were not …*

Also emphasized was the need for cross-cockpit verification. If any cockpit crewmember does not agree on the assigned altitude, ATC must be consulted for confirmation. "Never resolve a clearance by cockpit consensus alone," reads a USAir memo outlining the Altitude Awareness Program.

Modify Altitude Alerter Procedures Virtually all transport aircraft have an altitude alerter installed to notify pilots (usually through an aural warning tone) they are approaching their assigned altitude. Each time a new altitude assignment is received, the new altitude is dialed into the alerter's window. Obviously, it's quite important the correct altitude be set. Once an altitude is set, regardless of whether or not it's correct, the altitude alerter tends to become the "sole authority for what the aircraft's altitude should be," according to a 1986 NASA Contractor Report by ASRS researcher, Captain William Monan. An ASRS report illustrates the "sole authority" idea:

■ *Center [cleared us to cross XYZ at] FL290. I wrote that down on my pad [but] the Captain set FL240 in the altitude alerter. I started down to cross at FL290, then noticed FL240 [set into the alerter's window] … Passing FL250, controller called asking our cleared altitude. We replied FL240 and he issued an immediate left turn with similar instructions to another aircraft.*

continued

"Watch Your Altitude"

continued

To encourage verification by both pilots, USAir adopted an altitude alerter procedure developed by Midwest Express Airlines after learning Midwest Express had dramatically reduced its number of altitude deviations since implementing this procedure 7 years earlier.

The procedure is as follows: When the "designated pilot" receives an altitude clearance, he or she sets the altitude into the altitude alerter and points to the setting until it is confirmed by the other pilot. Confirmation is not complete until both pilots look at the altitude alerter, verbally repeat the assigned altitude, and then point to the alerter. The "designated pilot" is instructed to continue pointing to the altitude alerter until confirmation is received from the other pilot. (At USAir, the "designated pilot" varies depending on aircraft type and on whether or not the autopilot is engaged. However, the "designated pilot" is generally the pilot who acknowledges the clearance to ATC.)

While this procedure may seem cumbersome at first, without cross-cockpit confirmation, it is possible for an unauthorized altitude to be set and go undetected.

Strengthen Altitude Callouts USAir also modified its cockpit altitude callouts to strengthen altitude vigilance. The pilot flying (PF) now makes this callout instead of the pilot not flying (PNF). Since the PF is the crewmember who must level the aircraft at the desired altitude, USAir felt, above all, this crewmember must remain keenly aware of altitude. Requiring the altitude callout to be made by the PF is also a way to strengthen this crewmember's altitude awareness.

Avoid Extraneous Tasks Stated one ASRS reporter, "... we were cleared from 5,000 feet to 6,000 feet. I read back the clearance and proceeded to do the paperwork (filling out the aircraft logbook). After the logbook was completed, I looked up and noticed we were at 8,500 feet ... We just weren't paying attention."

As part of USAir's Altitude Awareness Program, pilots are reminded to avoid tasks such as paperwork and searching for the next destination's approach charts while the aircraft is climbing and descending. They are also encouraged to focus their attention on two primary tasks during the last thousand feet of altitude change — on instrument scan and on visual monitoring for outside traffic.

Conclusions USAir's success in reducing altitude deviations has been impressive. Even so, the techniques developed by the USAir program may not be the only way to reduce altitude deviations. For example, recent research published by the *CRM Advocate* (Resource Options, Inc.) suggests different airlines may have different altitude deviation risk factors. For USAir, the altitude alerter setting procedure was an important risk factor. For another airline, a significant risk factor may be pilots' complacency surrounding the autopilot's level-off capability ("monitoring the capture").

Overall, though, the track record for altitude awareness programs has been positive. Techniques developed by USAir and other altitude awareness programs can be practiced by operators of all sizes — from single-pilot to large air transport operators — to reduce the risks associated with altitude deviations.

Altitude awareness techniques can have other safety spinoffs, too. Through greater emphasis on precise radio communications, cross-cockpit verification, and enhanced crew coordination, pilots may be involved in fewer runway transgressions, en route course deviations, and other aviation safety incidents. ■

Flying Safety Magazine
Reader Survey

Flying Safety is published for aircrew members as well as anyone in the various related fields whose job directly or even indirectly supports USAF flight operations. This includes such diverse jobs as maintenance, armament, weather, life support, flight simulators, base ops, fire fighters, GCA operators, controllers, survival training, and many more.

If you are in one of these fields or the other fields which support our flying missions, *Flying Safety* is for you, and your opinions are extremely important to us.We would like you to give us your honest opinion of how we're doing so we can publish a magazine that best meets your needs and desires.

Please take a few minutes to complete the attached pre-addressed, postage-paid survey and mail it today. It will be a big help.

Thanks!

The following information about this poll is provided in accordance with Chapter 3, AFI 37-132, 11 Mar '94; Air Force Privacy Act Program: **Authority:** 10 USC 8012, Secretary of the Air Force; Powers and duties; delegation by; **Principal Use:** To collect a sampling of opinions on *Flying Safety* magazine. **Routine Use:** To present resulting grouped data for decision makers to evaluate the effectiveness of the magazine. Your participation is voluntary.

Tell us about you:

A. What is your current job?

☐ Military ☐ Civilian ☐ Other

B. What is your AFSC / title?

_____

C. What is your MAJCOM?

_____

QUESTIONS

1. How often do you see *Flying Safety* magazine?

   ☐ Every issue ☐ Only occasionally
   ☐ Most issues ☐ First one I've seen

2. Why do you read *Flying Safety* magazine?

3. Do you receive new and useful information?

   ☐ Always ☐ Often ☐ Sometimes
   ☐ Seldom ☐ Never

4. Do you like how *Flying Safety* magazine looks?

   ☐ Unappealing ☐ OK ☐ Looks great

5. Do you enjoy reading *Flying Safety* magazine?

   ☐ Yes ☐ No

6. Please rate the length of stories.

   ☐ Too short ☐ Just right ☐ Too long

7. Please rate the level of writing in *Flying Safety* magazine.

   ☐ Too basic ☐ Just right
   ☐ Too technical

8. Are there enough photos and illustrations for each article?

   ☐ Yes ☐ No

9. What topics and features would you like to see in *Flying Safety* magazine?

   _____

   _____

10. What features would you eliminate?

    _____

    _____

11. What are your favorite regular features?

    _____

    _____

12. What types of article(s) do you find most interesting? (Please check one or more.)

    ☐ Technical ☐ Humorous
    ☐ General

13. How does *Flying Safety* magazine compare with other safety magazines? Please rank order.

    ☐ *Flying Safety* ☐ *AMC Forum*
    ☐ *Combat Edge* ☐ Navy *Approach*
    ☐ *Fighter Weapons Review*

See space for additional comments on reverse side

Thanks for your help... it's really appreciated.

SCN 94-40

ADDITIONAL COMMENTS _____

Fold

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OPS TOPICS

FAA HALTS DEVELOPMENT OF MICROWAVE LANDING SYSTEM, CANCELS CONTRACTS

■ In a move designed to focus on the adoption of satellite technology and to save money, the Federal Aviation Administration (FAA) has decided to halt further development of the category 2 and 3 microwave landing systems (MLS) and has canceled two contracts for such development.

FAA Administrator David R. Hinson said he believes satellite-based technology using the global positioning system (GPS) will have greater potential to do a better job. The FAA's decision to cancel the contracts with Raytheon Corp. and Wilcox Corp. is expected to save about $59 million.

Hinson said, "Continuing the MLS development program is not an economically sound strategy since all indications are that we will never need to deploy category 2 and 3 systems in any significant numbers." He added that if such systems are needed in the future, FAA can acquire them on the open market.

The MLS, which was designed to replace the old instrument landing system (ILS), provides precision guidance over a wider area and gives pilots guidance to the runway in all weather conditions.

FAA has already deployed the less advanced category 1 MLS at 7 airports and is in the process of installing systems at 22 other airports. Category 2 and 3 MLS systems are used in precision, low visibility landings. The GPS can already handle category 1 approaches. Given the speed with which satellite technology is improving, the FAA believes GPS has great potential to provide precision approach landings.

"We recognize this decision may impact on international organizations with whom we have longstanding relationships," Hinson said. "We are sensitive to their concerns and will continue to work closely with them. We expect the International Civil Aviation Organization's review of its ILS/MLS Transition Plan to continue unimpeded."

The airline industry, including most major US airlines, the Air Transport Association, and the Helicopter Association International, supported speeding the development of GPS and eliminating the MLS. The Radio Technical Commission for Aeronautics, another Industry group, also supports FAA use of satellite technology. ■

Reprinted courtesy of the US Department of Transportation's *News*.

MAJOR

Richard G. Williams, Jr.

169th Fighter Group, McEntire ANGB, South Carolina

■ Major Williams was lead of a two-ship F-16A formation flying on a low level route to a tactical range complex. Flying at 500 feet and 480 knots ground speed, the mission progressed normally until the fifth navigation point on the low level. As Maj Williams looked at his radar display to locate a flight flying the route ahead of him, he experienced an extremely loud explosion, followed immediately by severe cockpit vibrations.

He began a climb, retarded the throttle, and saw the head-up display combining glass and most of the canopy forward of his head was gone. Maj Williams leaned as far forward and down behind the instrument panel as possible. Even though his seat was full down, the wind blast and associated buffeting and vibration were severe. In the climb, he could only see the horizon either side of the 10 or 2 o'clock position around the instrument panel. Also, he could not read any numbers on the instruments — only relative pointer position and movement for airspeed and altitude indications.

Maj Williams leveled off at 2,500 feet, 140 to 150 KIAS and determined with throttle movements the engine was still responding. He tightened his helmet chinstrap and oxygen mask bayonets as his helmet was being lifted by the wind blast. He then called his wingman and told him he had a serious emergency. No. 2 was in the process of rejoining to route formation from a tactical line abreast position when he began his zoom. Maj Williams lowered the gear handle to get the flaps down to allow flight at a lower speed and higher angle of attack.

Due to extreme aircraft buffeting and poor visibility, he was unsure of the aircraft's controllability and prepared to eject. Two gave him a snap heading to Cherry Point MCAS and asked if he was hurt. Maj Williams responded negative, unaware of the extent of his injuries which were minor cuts to the face and neck and fir glass particles in his eyes causing slight irritation. Maj Williams found if he slowed below 135 KIAS, he would get the slow speed warning horn, and if the airspeed exceeded 150 KIAS, the vibration and buffeting was too severe to stay with the jet.

He informed the wingman he needed to stay around 140 KIAS. No. 2 responded that his indicated airspeed was 200 KIAS. Realizing the unreliable airspeed indication of the mishap aircraft, no. 2 informed Maj Williams of the airspeed difference, took the lead, and slowed below 170 KIAS with Maj Williams flying a wing formation. Even with the airspeed below 170 KIAS, he was still experiencing severe vibrations and buffeting. Maj Williams was able to fly route formation but his wingman's aircraft was just a blur due to the vibration.

He asked his wingman for the Cherry Point Tower frequency but was initially unable to dial it in by feel. Maj Williams had to hold his helmet down with one hand and concentrate on the remote channel indicator on the instrument panel to make out the channel numbers. His wingman coordinated with Cherry Point for an emergency straight-in approach to Runway 05 and advised Maj Williams he should fly a formation approach on the wing. Maj Williams flew a formation straight-in until about 50 feet in the air when he picked up the runway environment out the side of his aircraft and was able to land. Rollout was uneventful.

This single act of bravery and outstanding airman ship resulted in the preservation of a multimillion dollar aircraft.

WELL DONE! ■

*U.S. GOVERNMENT PRINTING OFFICE 1994-573-261/84012

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

Barry K. Johnson

HQ 1st Fighter Wing, Langley Air Force Base, Virginia

■ Captain Johnson was no. 8 of an eight-ship F-15 offensive counter air (OCA) Red Flag mission. The Squadron Intelligence Officer was in his back seat on an orientation flight. As Capt Johnson was rolling out of a full afterburner G-awareness turn at 26,000 feet, his element lead saw a large fireball forming behind Capt Johnson's jet. No. 7 called for him to check his engines and immediately turned to rejoin on him. Capt Johnson pulled both throttles to idle and looked at the aft end of his aircraft. He saw sparks and flames protruding from a hole in the right engine bay.

Capt Johnson immediately turned south towards Nellis AFB, Nevada, and began to descend. The right engine instruments were indicating normal but the element lead confirmed the right engine was on fire. Capt Johnson secured the right engine in accordance with the Dash-1 checklist. Suspecting he had an augmentor burn-through, Capt Johnson believed the fire would self-extinguish within approximately 30 seconds.

However, the fire became self-sustaining and continued to burn on the top and bottom of the jet. His element lead told Capt Johnson the fire was spreading forward. It had almost burned through the hook area and was burning through to the right engine. Pieces of the jet were beginning to depart the aft part of the aircraft.

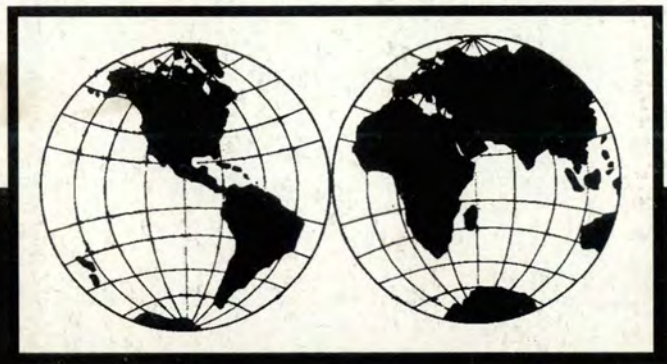
Aircraft control was becoming sluggish due to the weight of the aircraft (two full external tanks), single-engine operations, and the altitude of the aircraft. Capt Johnson briefed his backseater to prepare for a possible ejection situation and had the supervisor of flying scramble the search and rescue forces. He jettisoned his external ordnance and lowered the nose of the aircraft to gain airspeed.

These two quick and decisive actions instantaneously gained airspeed, allowing Capt Johnson to continue flying the aircraft. Shortly after cleaning off the jet, the fire began to extinguish. He continued to a single-engine emergency approach and landing at Nellis AFB.

At great risk to himself, Capt Johnson's aerial courage, professionalism, and timely decisions were directly responsible for the recovery of a valuable combat asset.

WELL DONE! ■

Thinking of Flying a GPS* Approach?



*Global Positioning System

THINK AGAIN!

USAF GPS equipment is not approved for instrument approaches