Flying Safety

FY93 Mishap Summaries

Composite Aircraft Mishaps

McClellan's Nuclear Reactor

Crew "Recourse" Management

DECEMBER 1993

THE HEAVIES

THERE I WAS

■ Our C-130 crew was returning from a Friday night airdrop training mission to home base. During the high-level return trip, the IP was chatting with his students about the birthday party he was having for his soon-to-be 5-year-old son the next day. As we had to penetrate a frontal area, I suggested we call metro when we were 45 minutes out. The IP agreed and dialed in the frequency of an en route Air Force base we were passing.

Our Friday evening arrival weather was anything but encouraging, suddenly below minimums for any approach, with heavy fog. The nearest alternate was 30 minutes away on the other side of the front. Weather at that location was better, but with locally heavy thunderstorms.

I took this occasion to question my navigator student as to what he would do if it were his decision. His correct judgment was we had enough fuel to continue to our destination but needed to depart the local area with at least 9,000 pounds of fuel to be legal at our alternate. We informed the pilot of our decision that we could hold at destination, but only for 20 minutes.

After two trips in the holding pattern with no improvement in the weather, as the IN, I suggested a diversion. Three holding patterns later, and following a heated discussion over the pilot's shoulder, we headed toward our alternate.

Our fuel overhead the alternate now appeared to be over 1,000 pounds below the command-directed minimum of 6,000 pounds. Realizing the gravity of our situation, the pilot showed good judgment by asking for a direct clearance and declaring minimum fuel. Twenty miles out we asked for and received clearance for a visual straight-in from Approach Control. Shortly afterwards, we were shocked to learn from Tower the airport was closed because of an overhead thunderstorm and was not expected to reopen for another 15 minutes.

At this point, I informed the pilot the airborne radar was good and I felt we could get through a hole if we could get a special VFR landing clearance. Down to only one alternative, we accomplished it, landing after an "exciting" final approach with less than 3,800 pounds of fuel, and made it to the ramp without a flameout. ■

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SPECIAL FEATURES

REGULAR FEATURES

CONTRIBUTIONS

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B-1/B-52

MAJOR KELLY HAGGAR
2 BW/SEF
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■ The USAF bomber mishap experience for FY93 was a fairly straight-line extension of our history over the last decade. In recent years, we have averaged about one fatal, destroyed bomber per year, with close to one Class A mishap in each fleet.

Since 1984, the B-52 has logged six Class A mishaps, with four destroyed jets. The B-1B has reported 10 Class A mishaps, also with four aircraft lost, throughout this same time. The B-52's lifetime mishap rate is 1.28 overall, based upon 94 Class A events in nearly 7.3 million flying hours. The B-1B's lifetime rate of 5.93 is a reflection of a much smaller fleet size, far fewer hours, and the expected teething troubles of a higher technology aircraft. As the B-1B matures, its rate will come down. (We would all do well to remember the B-52's rates were as high as 26.92 in some of its early years.)

For the B-52, 1993 was a better-than-normal year. It was the eighth time a year of USAF service has passed without a Class A mishap in the 28-year career of the "aluminum overcast." The B-1B had a more subdued year, with the first loss of an aircraft in more than 4 years and only the second loss of life in an operational aircraft. Both of these bombers are doing much better now than was true in their early years. Overall, their safety records are excellent.

The B-1B's single Class A last fiscal year involved an aircraft on a night low-level training mission. The aircraft did not clear a long ridge line during the early portion of the low-level navigation leg, resulting in the immediate destruction of the aircraft and four deaths.

Both the B-52 and the B-1 each had a single Class B mishap in FY93. In the B-1B, a fuel tank carried in the forward weapons bay separated from the aircraft in flight, damaging the fuel lines in the bay, the lower surface of the aircraft, and two of the four engines. The flightcrew made a skillful divert to a nearby fighter/depot base, landing with only two engines running and an active fuel leak.

The B-52 Class B mishap occurred when a broken fan blade from the no. 3 engine penetrated the common firewall and then the case of the no. 4 engine, severely damaging it. The crew was quickly forced into flying the aircraft with all four engines on the left wing shut down. However, the situation eventually improved into a somewhat less adverse six-engine landing as engines 1 and 2 were returned to duty. No one was injured in either of these Class B mishaps.

However, 1993 was typical in more areas than just our mishap rate. As the USAF continued to restructure, reduce, and adapt, the bomber fleets did their part. Change is rapidly becoming the order of the day. The B-52G continues to leave the inventory, with the last water wagon slated to reach final parking not later than 31 December 1994. (NASA has dropped its request for a "G" to replace its B-52B, so there will be one last tall tail still flying, at least for a while.) Plans were announced for both the B-1 and the B-52 to soldier on, but not always on active duty. At this writing, Robins AFB, Georgia, and Barksdale AFB, Louisiana, will have the first Reserve bomber units in decades.

Virtually no one presently on active duty will have seen anything like it since the days when Douglas A-26s went to the Guard and Reserves after World War II. In the heyday of the heavies, anyone suggesting the B-47 or B-36 be put into the air reserve forces would have been laughed off or stared at. Pretty much the same reception would have greeted anyone who thought the days of iron bombs would return. The world has changed a great deal since the time when hundreds of bombers were on alert all over the globe.

Unfortunately, some things don't seem to change, no matter how much commanders, safety officers, those assigned to mishap boards, and families want them to. Even after reading several hundred mishap reports, it doesn't really get any easier. One day, all too soon, the letters from relatives filed on the left side of the final master USAF copy of a bomber mishap report will be requesting the reasons why a daughter crewmember died. Up until now, all those letters have been about sons, husbands, or fathers.

Perhaps it would be better if we could all do something to postpone the day that any such request letters needed to be written — about either sons or daughters? Perhaps we could stretch out the string of consecutive years without a Class A mishap? It's been done before — the B-52 once went 3 years without a Class A (1985-1987). Fine — a noble goal. How shall we attain it? Where should we focus our attention?

It's sad, but true: The aluminum is carrying its share of the mishap prevention load. The safety chain is breaking at the "carbon-based unit" links, not at those of the hardware. Doubt me? Ponder this: For the first time in its history, there are no open safety modifications on the B-52. Not one! Everything nominated has been installed. Every last safety-related TCTO is on the jet. In the B-1B, there have never been more than four such mods open on the jet at one time in its career. Even so, EMUX (electrical multiplex) "sparkling" and "Fire Protection" are complete. "Fire Prevention" will be finished by January 1996, before the "Aft DC Power" mod winds up. No, those hounds chasing hardware are barking up the wrong tree.

If we shift our focus to people, the "carbon-based units," what trends, warning signs, or pitfalls must we recognize to avoid loss of aircraft and crew? These things stand out clearly:

Pushing your people too hard. No one is well served when someone is upgraded before he or she is ready. It doesn't really matter if the unit is pushing Capt "X," the unit is being pushed by Capt "X's" sponsor, or if Capt "X" is the one doing the pushing to get ahead of the pack. There are many ways to bite off more than you can chew, and all of them have been tried at one time or another in the B-52 or the B-1.

Case in point: Young copilot gets made a left seater, even though he can't refuel very well and takes 23 rides to pass a check. On his third flight as an AC (on a dark and stormy night — no kidding), he gets a spectacular engine fire in the right outboard pod passing 4,000 feet on the initial takeoff climbout. Despite

continued

his junior status and below-average hands, he makes a good decision under extreme stress ... climb, get over the nearby water, assess the situation, and pick a game plan from there. But then, a much more senior stan/eval pilot flying behind him tells him to land if they are still burning.

At once, all other thoughts and plans are discarded as the crew attempts a night, weather, heavyweight, six-engine approach. The B-52 "S-turns" across final several times, ending up high, slow, left of course, and in a right bank, towards the silent engines. The go-around was attempted from this precarious position by firewalling the six good engines and pulling back on the yoke. Of course, the B-52 couldn't decide if it should depart first from yaw or simply stall right away. No one survived the near vertical impact, although at least four out-of-the-envelope ejections were attempted.

Pressing yourself. More than one crew has died, or lost a jet, by leaning upon themselves, even when no supervisor has asked or told them to "take that hill at all costs." Yes, getting engaged is a big day in a young person's life. Hosting a big squadron bash that night, where the big announcement will be made, can easily motivate anyone into "get-home-itis." But, if you can't see the runway, why continue the approach? Why tell the command post that it's so bad you'll make this your last approach? If it's that bad, get away from the trees first, then talk about it. But, this was the last approach for all of them, because no one noticed the unbroken descent rate, and an in-commission B-52 was simply flown into the trees short of the runway. Another "No Survivors" story for the record books.

There are other such stories, almost as sad. For example, if a fast food restaurant sign is going to be one of your NAVAIDS, shouldn't you speak up if it's never been in that portion of the windscreen on final before? If the weather is so bad that you cannot monitor the approach, why are you letting the left seater fly it? What can he possibly be using for a reference to fly by? So what if he's a stan/"evil" guy? You're betting your life, your crew's lives, and the airplane on "Superman" over there in the left seat with his X-ray vision in the fog.

Trying to win Bomb Comp, at any price, can be just as risky. Nothing in peacetime requires hatching a homemade game plan, which you neither fully understand yourself nor are willing to run by anyone else for a sanity check. In fact, it can be something as trivial as zeroing out your wing's flying time for the year. Anything can bite you *when you lose track of all relationship between the WORTH of what you're attempting to do and the RISKS you're willing to run to get it.*

Ignoring the "Wait a Minute" Light. Sorry, but that's the best category name available. Picture yourself on a special sortie for the wing, and you want to get all the points possible. (Just to turn up the heat a little, let's say stan/eval jumped on at Base Ops for a "no-notice.") To top it off, you lose half the flight control power for your rudder and elevator. But, you're a smart lad, and you've decided to come home and land. You get back just in time for a senior member of the wing staff to ask you to go off for some high bombing and electronic counter measures (ECM) so the wing can salvage some points out of this bad hand. Would you do it? In real life, the answer was "Yes." Everybody lived, by a minor miracle, but the jet was destroyed in a crash landing after the other half of the tail feathers died before they could get back home.

Many other cases can be cited, but the principle should be obvious: Pay attention to that little nagging whisper, the hairs on the back of your neck, that sinking feeling in the pit of your stomach. Does this idea, whatever it is, make sense? Will it get me where I want to go? Is the trip worthwhile? Have I considered all my options? Am I ready to try this?

Of course, you could always plan on being lucky, not good. Lots of yellow lights get run for every broadside smashup under a red light. Some folks have plunged ahead for years and never gotten hurt or scratched a jet. It might work out for you just fine. But then, there are the reports. Thick reports, green-covered reports, reports stacked floor to ceiling, reports filed in cool, green, steel, locked cabinets. It's quiet in that room. I've been there. It always reminded me of another room, another quiet room, another floor-to-ceiling stack of cool, steel lockers ... in the basement of a hospital. Nobody belongs there — not 'til they're old and gray, with lots of grandchildren left behind.

In the last analysis, it's all up to you, the maintainers and the crewdogs. No matter what anybody else has done, or failed to do, it finally comes down to the knucklebusters and the green bags. You guys have the last chance to make a difference. By the time you meet at the jet, 99 percent of what's going to happen has already been determined. Money, missions, hardware, parts, pay, manning, location — all of those calls are made, and in the past, when you meet at the jet.

But, the 1 percent remaining, that little sliver of the pie that you own, is more important than anything else that went on before you got to Sugar 22 or Zulu 3. You have the last chance to change the outcome, and that's why your 1 percent is the most crucial. You can salvage a bad plan or waste a good one. It's that simple. So is the outcome.

Wouldn't you rather read there were no Class A mishaps next year than be in one? ■

Major Kelly M. Haggar was the B-1/B-52 Action Officer at the Air Force Safety Agency for 4 years. Due to our move to Kirtland and the workload turbulence, we asked him to write one more bomber article. Thank you, Maj Haggar.

AMERICA'S GLOBAL REACH --
AIR FORCE AIRLIFTERS

MAJOR DAN DOUGHERTY
Directorate of Flight Safety/AFSA

■ After last year's lessons learning how *not* to fly low and slow, the *Herc* finished the year with one, six-fatality Class A due to another lesson we should have learned years ago. The venerable *Starlifter* has fallen on hard times. Besides the tragic midair last November which killed 13, the aging workhorse is suffering fatigue cracks and grounded fleets. This, of course, means the Galaxy and others could well be waiting to move future C-141 cargo requirements. The C-5 had a very good year.

Figures 1, 2, and 3 give you an idea of how we're doing. Right away you can see the downward trend in Class C and High Accident Potential incidents. (Please don't tell me we've stopped reporting some of them!) The numbers sure look good, though. Of the 23 C-141 Class C's, 6 were due to FOD. Of the C-5's 24 Class C's, FOD scores 3; and the C-130 with the props to block it (right!), 16 of the 46 were FOD. That's just short of a quarter of our Class C's and a bunch of ever-fewer dollars.

Speaking of props, our *Herc* brethren proved their voluntary exposure to the more dangerous envelopes by logging seven bird strikes. Victims included red-tailed hawks and one turkey buzzard — patience my &*%! Speaking of killing living things with your machine, one *Herc* also got a deer strike during takeoff. Operator-caused Class C's were low — one in the C-130, two in the C-5, and a big fat ZERO for the C-141.

Under the category of "That emergency never really happens," the C-141 had three thrust reverser problems in flight, one jammed aileron, an emergency generator which wouldn't power the bus when smoke was in the cabin, and a tumbling ADI. The C-130s had two fires in flight, a rudder malfunction, and a loss of AC bus. The C-5 had a real scary one over the ocean when both rudders started arguing with each other and tried to roll the plane! Easy to spot the point here — learn all of those emergency procedures.

Physiological mishaps continue to hurt people. Some are a function of metabolic reaction to slipping the surly bounds. Others are unfortunate, painful, and most of all, preventable. There really are no specific trends here. Usually causes have to do with being tossed about during turbulence; pushing, pulling, or lifting something too heavy; or *flying* when you should be *seeing* a flight surgeon.

Now take a look at Figure 4. All of you — ops, maintenance, support, log center, and development folks have all done an exceptional job!

Particularly noteworthy is the *Starlifter's* lifetime record. This airlift workhorse's first flight occurred on 13 December 1963. Thirty years later, of almost 270 built, we've destroyed only 14 in mishaps. The C-141 has a remarkably low mishap rate in all categories.

As the force shrinks, flying time diminishes, and experience grows old and retires, we've got to combine our thinking and work together.

Three issues have my attention for the upcoming year. The first one is melding our active, Guard, and Reserve safety programs. The second is preventing the creation of six different C-130 air forces. And finally, one of our long-time favorites, discipline.

Those of us who've traveled in and around the airlifter community for several years have always accepted the different philosophical approach taken by the active, Guard, and Reserve communities. Not that any was more right or wrong than the other. The point is, they were different. For myriad reasons, each entity expertly filled a particular aspect of airlift needs.

Times are changing. During the last several years, the Guard has gotten into strategic airlift, just in time to prove exceptionally capable during the Gulf War. It was a Reserve crew who gave their lives in our only Class A during that period. In fact, not one of these groups has cornered the stats in any area — we all share them equally — and that's my point.

We're all equally committed, talented, and *susceptible*. Every safety edict, TO change, or directive must start considering the fact we have three very different organizations with very similar needs. Those of us with an impact in these arenas have to become smarter when dealing with each group. It'll take commitment, understanding, and most of all, communication. As the force shrinks, flying time diminishes, and experience grows old and retires, we've got to combine our thinking and work together.

continued

Figure 1: C-5A/B Mishaps

Fiscal Yr:	84	85	86	87	88	89	90	91	92	93
Class A	1	0	1	0	0	1	1	0	0	0
Destroyed	0	0	0	0	0	0	1	0	0	0
Class B	3	0	1	1	0	0	0	1	1	2
Class C	25	32	14	14	14	14	21	17	17	24
HAP	15	16	8	14	10	8	5	0	3	4

Figure 2: All C-130 Mishaps

Fiscal Yr:	84	85	86	87	88	89	90	91	92	93
Class A	2	4	2	1	2	1	0	0	2	1
Destroyed	1	3	2	1	1	1	0	0	2	1
Class B	1	2	0	3	0	0	0	0	0	0
Class C	132	160	92	38	46	59	55	63	86	46
HAP	58	62	60	97	76	72	46	18	17	11

Figure 3: C-141A/B Mishaps

Fiscal Yr:	84	85	86	87	88	89	90	91	92	93
Class A	1	0	0	2	0	1	0	0	0	1
Destroyed	1	0	0	0	0	1	0	0	0	2
Class B	0	0	0	0	0	0	0	0	0	0
Class C	79	70	39	21	18	25	39	42	27	23
HAP	55	45	38	59	47	25	11	14	12	3

Figure 4: Class A Rates and Flying Hours

	Fiscal Year 1993		Lifetime	
	Rate	Hours	Rate	Hours
C-5	.00	78,319	1.07	1,389,303
C-130	.34	293,735	1.03	13,291,289
C-141	.46	216,615	.33	9,663,589

For many years, the *Starlifter* and the *Galaxy* have played critical roles in allowing America to respond to world events.

America's Global Reach – AIR FORCE AIRLIFTERS
continued

That brings me to my next concern. Who's watching the -130s? Don't get me wrong. The kind of watching I'm talking about was when they all belonged to one command and there was standardization — but most importantly, communication. We've now got six operational commands. By functionally aligning each command, we've made them more responsive.

There's certainly no problem with this. What I worry about is the way we all used to read the same safety messages and centralize our standardization. Remember how we TAC -130 drivers struggled with MAC Sups 1 and 2? I'd hate to think what will happen if we eventually have an exclusive way to operate in the Pacific, another way in the Guard, and yet another in AFSOC. I'm not talking mission directives — I'm talking the basics.

As of today, we all have been taught from the same sheet of music. Also as of today, we plan to continue this — hold that thought! Instructors, flight examiners, and all HQ staffers have to be the key-keepers. Keep the comm lines open, and fight the temptation to develop parochialism.

The final thought I want to leave you with is discipline. I know, you've heard almost all you want to about this, but if you're still reading, try this approach. Have you ever noticed, as an aircraft commander, you become the "answer man"?

"Pilot, what'da ya want to do about ...?" "Pilot, what time do you ...?" "Pilot, why don't we ...?" **That's your job.**

As an AC, you become the chief

As the King of Tactical Airlift, the C-130 is a shining example of the old saying "Works good — lasts a long time." World attention has focused on C-130 efforts to provide humanitarian relief this past year.

decision-maker, the leader! You never were the functional expert — that's what they gave you a crew for. They provide the inputs, you're the final authority. And as anyone who's done it knows, sometimes that's a cold and lonely position. Everyone knows those passages "written in blood" we call directives, TOs, and regulations. So why does it sometimes seem all the sought-after answers aren't to be found in all those books we carry? I don't know. That's life!

So, I want to give you two rules — a technique, if you will, for analyzing your options when you have to make a decision.

Rule #1: **Imagine how your decision will read in the mishap report.** I mean it. After you've decided you want to play, how would you like a safety board writing: "MP elected to conduct an unauthorized, aggressive, low-level flight profile"? Or try this line about the quality of your decision-making: "There were indications of a high degree of complacency, inattention, and situational euphoria." Oh, and another thing I should mention. These are actual quotes about real transporters who are now dead.

Here's another: "Having observed the mishap pilot execute unusually aggressive procedures, the wing DO and squadron commander took no action to change the pilot's behavior." Enough examples.

So here's the point. The preponderance of those decisions you have to make don't have to be snappers. Contemplate how it will read.

It only takes a few moments. For example: "MP elected to continue approach despite repeated reports of lightning ..." Or, "Crew failed to consider ..." Imagining how it will read is not hard to do, and it can be very revealing.

And what about the rest of the crew? You're not immune — the plane has never crashed by crew position. Not only can you do the same analysis, but you can start tailoring your proposed options using the same technique. In other words, don't offer something stupid! Speaking of *stupid*, that's another decision-making technique. Did you ever notice when you made some of the dumbest decisions in your life, it felt that way while you were doing it? Here's rule #2: **If it feels stupid, it probably is!**

Well, those are my three main points for FY93. Actives, Guardsmen, and Reservists, let's start combining our thinking and team up. Also, I'm counting on you instructors and stan/eval types to keep C-130 basics somewhat standard throughout our entire fleet. Finally, try giving my nifty rules for decision-making a try — they work most of the time.

Fly Missions! (Obviously, a completed mission was done safely! Right?) ■

KC-10

CAPT EDWARD H. JARRETT
Directorate of Flight Safety/AFSA

■ We're back on track. After experiencing one Class A and B mishap per year for the last couple of years, FY93 returned the KC-10 to its standard Class A mishap-free status. In addition to flying approximately 44,000 hours last year, the KC-10 experienced a dramatic 40 percent decline in Class C/HAP mishaps from FY92 with much of this decline attributable to a decrease in drogue-related mishaps. The only bad news was we experienced two in-flight FOD ingestions into the no. 2 engine in two separate incidents.

Our first FOD mishap involved a refueling with a KC-135R. Student training was being conducted on both aircraft. In the KC-10, an IP candidate was flying a limits demonstration while an Instructor Boom Operator (IBO) was flying the boom in the -135. During the limits demonstration, the IBO attempted to obtain a disconnect and was unable to do so, and, subsequently, called a breakaway. During the breakaway, the boom nozzle bound in the Universal Air Refueling Receptacle Slipway Installation (UARRSI) receptacle. Upon reaching the lower limit, the boom experienced a brute force disconnect breaking the nozzle which was ingested into the no. 2 engine causing significant FOD damage. The crew recovered the aircraft uneventfully, and damage was discovered on postflight inspection.

Our second FOD mishap involved the loss of a 6" x 8" panel aft of the UARRSI. During refueling with a KC-135E, the IBO observed a small panel come loose during the first contact and informed the -10 crew who terminated air refueling and returned home. Extensive damage was found to the no. 2 engine from the screw of the missing panel along with sheet metal damage from the panel hitting the left horizontal stabilizer. It was found that at some time after the UARRSI/panel check, the panel had been loosened but not secured before flight.

Lessons to be learned from these two FOD mishaps? In the first mishap, not much can be conclusively gained except an awareness that the UARSSI receptacle has an infrequent but known problem with nozzle binding. In the second mishap, we need to reemphasize maintenance discipline in removing and replacing panels for whatever reason. Panel removal/installation must always be documented and properly signed off.

Drogue Incidents

Since implementing the drogue operations procedure, we've experienced a significant decline in the number of drogue mishaps from eight mishaps in FY92 to three mishaps in FY93. Your efforts in strictly following the ops procedure has resulted in a significant savings in both capability and costs associated with damaged and/or lost drogues/hose assemblies. Of course, even the best operations procedures don't negate the need for specific system improvements to the centerline drogue system.

Drogue Improvements

During Oct/Nov '92, the Air Force, with McDonnell-Douglas, conducted two flights gathering data on the drogue system. The test results yielded a number of potential areas for improvement. Of these areas, the following are being pursued to aid in drogue refueling. First, Oklahoma City Air Logistics Center is attempting to procure and install new hose/reel accumulators which should decrease the number of delayed hose response incidents. Also, planned is the installation of a viewing mirror for the boom operator to monitor the hose response during air refueling. Additional items under consideration are modifying the hose chute access ramp and installing a butterfly valve in drogue assembly to maintain fuel in the hose at all times.

Concerns

One incident involving formation procedures revisits some of the same key problems in two previous Class A formation-refueling mishaps. During the recent scenario, a formation of two KC-10s was refueling with a KC-135E. After the first air refueling (AR), the lead aircraft dropped back to the post-AR position. As the no. 2 KC-10 moved into AR position, the lead aircraft moved out of position above and to the right. After the AR was completed, the lead aircraft waited to descend to the bottom of the block until no. 2 was established. Meanwhile, the -135 made a right climbing turn which took it into the path of the lead KC-10 which then had to make an abrupt evasive left turn to avoid a possible midair collision. A crewmember fell and was injured in the process. **We were very lucky!** Are you following the prescribed formation procedures? If you aren't, are you briefing and communicating your intentions? The bottom line is we can never afford a Class A mishap, but having one that repeats mistakes which should have been learned before is just unacceptable. Let's fly smart and safe! We can't afford to let this piece of history repeat itself.

Historic Information

The KC-10 flew an estimated 44,000 hours in FY93, up 2,000 hours from FY92. Presently, the KC-10 has a Class A mishap rate of .47 and a Class B mishap rate of 1.18. The FY93 Class C's and HAPs are broken down by category and shown in the table below: ■

Air Refueling	5
Physiological	1
FOD	2
Bird Strikes	2

KC/C-135

CAPT EDWARD H. JARRETT
Directorate of Flight Safety

■ FY93 marked an excellent safety record for the C-135 with no Class A mishaps and one Class B mishap involving multiple bird strikes. Although it wasn't a perfect year, the record is the best in over 5 years. This distinction wasn't just a random occurrence. It was the result of the hard work and effort of everyone from our logisticians and maintainers to you, the crews who fly this wonderful aircraft. Each of you deserve high praise for the safe flying environment you have maintained this last year. Let's work on making FY94 a mishap-free year.

An interesting trend is occurring in our Class C/HAP category. The numbers have dropped significantly. In just Class C's alone, the number has dropped from a high of 86 in FY90 (Desert Storm) to 23 in FY93. This represents a 47 percent decline in mishaps from the 43 recorded in FY92. Yes, we are better trained and equipped today than a few years ago, but does this equate to what the numbers are revealing? Are we reporting all the mishaps we should be reporting? Remember, we cannot fix problems found in the field unless they are reported appropriately.

Future Challenges

With the changing role of the military, the downsizing of our force, and younger crews, you are being increasingly challenged. Each of you is mission-oriented and willing to do whatever it takes to get the job done, but you must also be willing to call time out when you feel you've reached your limit and/or your crew's. The -135 is being heavily tasked to not only support its primary role in air refueling, but also to pick up the shortfall in cargo requirements caused by the wornout C-141 fleet. Until this shortfall is fixed, you can expect much of the same — numerous TDYs and long hours away from home. Ask the questions if you're unsure, tell supervision when you feel you and your crew need a break, but above all, make sure you and the rest of your crew are ready to fly, safely!

Air Refueling Pumps

The automatic pump shutoff system modification (TCTO 1C-135-1364) is in full production at this time. As of September 1993, 150 of a total of 628 operational -135 aircraft have been modified with the new shutoff system. Approximately 90 percent of the fleet will be completed by the spring of 1994. Those aircraft undergoing phase delayed maintenance (PDM) or major modifications may not be completed until September 1994.

Additionally, inspection criterion for the air refueling (AR) pumps have been established. Since 1990, San Antonio Air Logistics Center has been stamping the date of overhaul on the pump housing. Pumps will be removed and inspected once every PDM cycle (approximately 4 years). Pumps less than 8 years old have excessive wear, pumps are over 8 years old since last overhaul, or pumps with no date will all be sent to depot for overhaul. The combined program of both the shutoff system and the inspection program should prevent any future fatal mishaps involving AR pumps.

Ground Collision Avoidance System

The Ground Collision Avoidance System (GCAS) is almost here. The -135 has experienced 19 mishaps involving controlled-flight-into-terrain (CFIT) and 8 stall mishaps. Additionally, FAA studies have shown that non-GCAS equipped aircraft have approximately twice the CFIT rate than those with GCAS. Now that Congress has mandated the Air Force equip -135 aircraft with this system, significant progress is finally being made in this area. By summer of 1994, Oklahoma City Air Logistics Center expects to award a contract to install GCAS into approximately 600 aircraft. Shortly thereafter, we should expect to see installation of the new system in our aircraft.

KC-135R Reengining Program

Currently, 330 aircraft have been delivered with a final total of 400 kits procured. Approximately 25 aircraft will be modified each year for FY94 and FY95. Additionally, 10 KC-135E aircraft will be reengined in FY96.

USAF Photo by SSgt James Bryan

Fuel Savings Advisory System

A new Fuel Savings Advisory System (FSAS) is currently under development. The new system will include an improved fuel panel and data capability for all -135 models. Benefits include a significant increase in reliability from 600 hours between failures to approximately 4,000 hours. The computer architecture will be changed from an 8-bit chip to a 32-bit chip running at 25 MHz instead of the current 4 MHz. The new software will support the military standard computer language instead of using a nonstandard programming language. Currently, the program is on track and production should be fully funded.

Historic Information

The C-135 flew an estimated 270,000 hours in FY93, up 15,000 hours from FY92. It has a lifetime Class A mishap rate of .74 and a Class B mishap rate of 1.10. The FY93 Class C's and HAPs are broken down by category and shown in the table below: ■

Air Refueling	1
Bird Strikes	5
Engines	6
FOD	1
Physiological	5

COMPOSITE AIRCRAFT MISHAPS: HIGH-TECH HAZARDS? Part II

Environmental, Safety, and Health Concerns*

Wearing the appropriate protective clothing is key to minimizing the risk of exposure to composite fibers. The darkened area at right shows exposed composite fiber material.

LT JOHN M. OLSON
USAF Advanced Composites
Program Office

Mishap Response

■ Although burning composite aircraft represent the greatest danger because of the high concentrations of airborne material, firefighters are generally prepared for the most extreme cases with self-contained breathing apparatus (SCBA) and proximity suits. However, protection should be worn until the composite fires have been completely extinguished and cooled to an internal temperature below 300°F to eliminate slow, internal burns.

The potential exposure to composite mishap hazards may be more severe for secondary response efforts than for initial fire-fighting activities. The duration of exposure and reduced levels of protection are primary risks. In any case, the hazards are minimal if personal protective equipment (PPE) and proper procedures are used. Risk control employing realistic, conservative measures is the key for crash investigators, recovery and cleanup crews, and disposal personnel. This approach maximizes response effectiveness and mission accomplishment while minimizing hazard exposures until the hazards are better characterized.

Primary tasking should still be focused on accomplishing the response mission, but the environmental, safety, and health concerns cannot be overlooked. A rapid and effective response can be obtained through informed action. All affected personnel need to know both the hazards and the guidelines for mishap risk control.

*Part 1 of Lt Olson's article may be found on page 12 of the November issue of *Flying Safety*.

***High efficiency particulate air.*

MISHAP PERSONNEL PROTECTION GUIDE

Personal Protective Equipment (PPE):

1. Coated tyvek suit with hood and booties (recommended)—taped openings
2. Self-contained breathing apparatus
3. Full face respirator (dual cartridge HEPA** and organic)
4. Leather work gloves
5. Nitrile gloves
6. Hard-soled leather work boots (steel toe and shank recommended)

PPE RULES OF THUMB

Burning/Smoldering Composites

1. Self-contained breathing apparatus
2. Aluminized proximity suits
3. Aluminized/puncture resistant gloves
4. No rubber gloves

Broken or Splintered Composite Material

1. Full or half-face respirator with dual cartridge (HEPA and organic) filters
2. Coated and hooded tyvek suit with optional booties (taped seams)
3. Leather work gloves (external)
4. Nitrile gloves (internal)
5. Hard-soled, leather work boots

Minimal Composite Exposure

1. BDUs with sleeves worn down
2. Nondisposable HEPA respirator
3. Safety glasses with side shields
4. Leather work gloves (external)
5. Nitrile gloves (internal)
6. Hard-soled work boots

Many advanced aircraft, such as the F-22A, take advantage of composite materials in their construction.

Other Concerns

Most new military aircraft designs have a significant proportion of advanced aerospace composite materials. This increasing proliferation of composites in the fleet makes mishap response, maintenance and aircraft battle damage repair (ABDR) even more important.

Differences in the type of aircraft (fighter vs. transport), amount of composites, and mishap scenario can greatly affect the mishap response. For example, a mishap with a buried or "augered" aircraft requires a different approach than a widespread scattering of aircraft materials. Each situation demands a unique and flexible approach. However, newer aircraft are containing increasing amounts of composite structures which could be scattered across a wide area, thereby increasing the size of the hazardous site.

Extra precaution is required for burned, fractured, splintered, or exploded composite structures involved in post-mishap maintenance operations. Personnel should be protected in the same PPE as the mishap response crew in order to minimize long-term or cumulative exposure. Care must be taken to avoid dispersion of the fibers or particulates into the surrounding areas. Waste streams need to be properly controlled.

ABDR efforts should not be adversely affected unless fire is involved. Splinters and exploded parts may present puncture, abrasion, and mechanical hazards. Again, fire damage will necessitate added precaution to minimize the hazards.

Conclusions

The bottom line in dealing with fire, explosion, or impact damaged composites is common sense. If it is burning, don't breathe the smoke. If it is particulate dust, don't stir it up unnecessarily and wear a mask and protective clothing. The variability in weather, terrain, location, damage extent, type of aircraft, and risks associated with mishaps make universal risk control procedures impractical. The environmental, safety, and health hazards can be minimized by employing realistic, although conservative, PPE and procedural guidelines for personnel involved in all phases of a mishap response. Aerospace composites are a critical part of the force (and continue to extend the performance of our aircraft as they proliferate). It is absolutely essential to know the hazards and react appropriately — your health may depend on it!

continued

Approximately 14,000 pounds of composite material are included in the C-17's airframe.

Composite Aircraft Facts

The C-17 is not generally considered a composite aircraft because only 5 percent of the total structure is made of composites. However, those composites weigh 14,000 pounds!

Approximately 90 percent of the external structure and surface of the B-2 is comprised of advanced composite materials.

Why Use Composites?

The weight of an Airbus™ A320 can be reduced by 20 percent by replacing the 1.2-ton aluminum tail fins with composite ones. Over a 20-year lifetime, this results in a 70,000 gallon reduction in jet fuel consumption with an associated 800-ton reduction in atmospheric CO_2 emissions. Simultaneous speed, range, and payload gains are also realized, while reducing long-term environmental problems such as acid rain and the "greenhouse effect."

DO's AND DON'Ts

DO

■ Evacuate areas directly affected by dense smoke plume.

■ Restrict all unprotected personnel from assembling downwind of site.

■ Extinguish fire and cool composites to below 300°F.

■ Cordon off mishap site and establish a single entry/exit point.

■ Identify/note specific aircraft composite hazards by inspection, consulting with the crew chief, weapons system manager, reference documents, contractor, or aircraft specialists.

■ Remove contaminants from PPE with HEPA filtered vacuums when exiting site.

■ Shower in cool water prior to going off duty.

■ Wrap and seal disposable protective clothing in plastic bags — discard as routine waste.

■ Discard severely contaminated nondisposable clothing — otherwise launder separately.

■ Secure burned fibers/particulates with AFFF* foam or fine water mist until a "hold-down" fixant material can be applied to immobilize fibers.

■ Wrap damaged composite parts with plastic sheet/film and secure with tape.

■ Conduct disposal according to local, state, federal, and international guidelines.

■ Place any hazardous waste material in sealed drums and label the drums appropriately.

■ Clean any affected aircraft/equipment according to guidelines for composite particulates.

*Aqueous film forming foam

DON'T

■ Allow any unprotected personnel near mishap site.

■ Excessively disturb particulates by walking, working, or moving at the crash site.

■ Use helicopters or low flying aircraft to control/suppress the fire.

■ Fly/hover/taxi within 500 feet AGL of the site and 1,000 feet horizontally.

■ Eat/drink/smoke within 500 feet of mishap site.

■ Apply fixant** before consulting the specific aircraft authority and crash investigators, except when safety concerns necessitate it.

■ Apply fixant before composites are cooled to below 300°F.

■ Dispose of material without prior release from the investigators and other appropriate authorities.

FIXANT

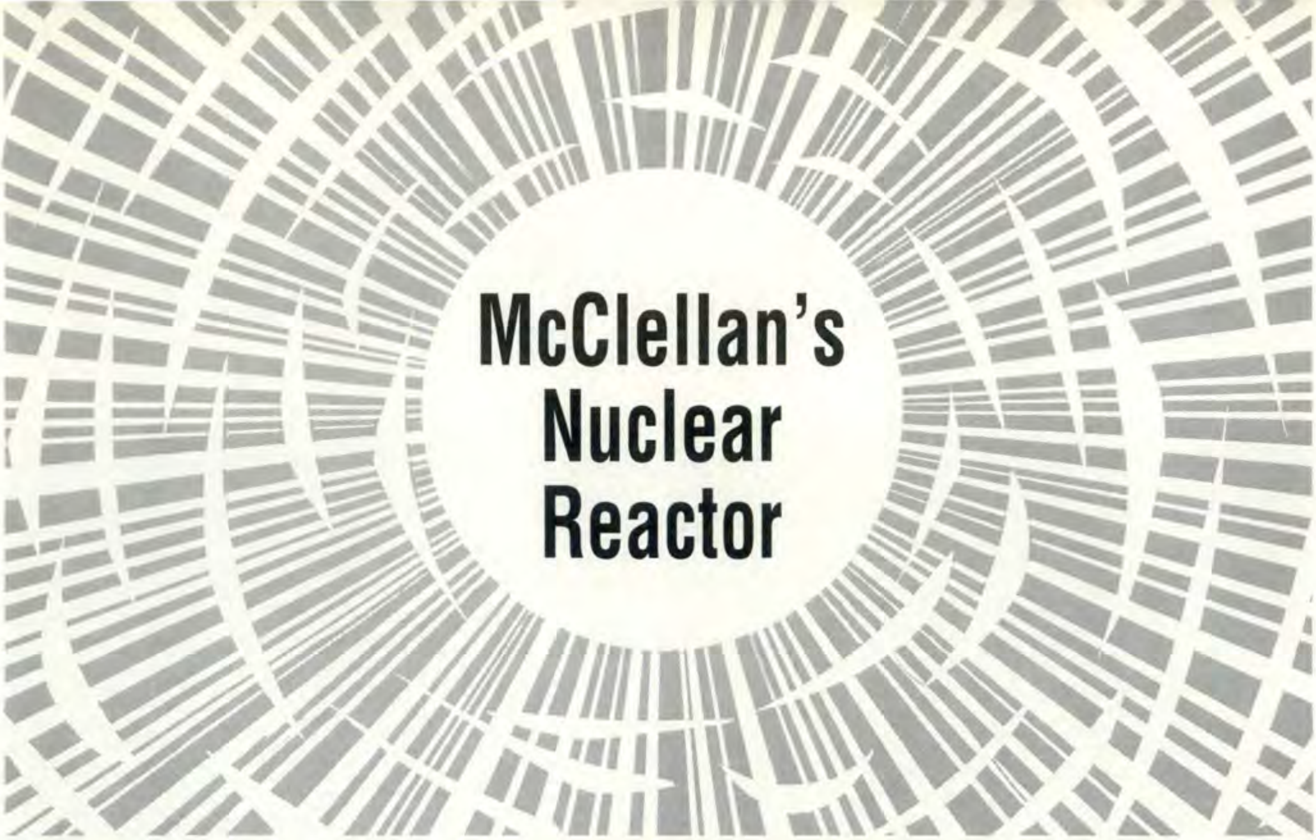
**What is fixant?

A solution or material applied to burned composites which prevents dispersal of the burned fibers or particulates. Two types of fixants are used, one for burned composites and debris, and the other for land surfaces. Fixant is usually not needed for open terrain and improved surfaces (concrete or asphalt) unless high concentrations exist. It is generally sprayed on via hand sprayers and allowed to dry or set up.

Application: Put a coating of the fixant or "hold-down" solution, such as polyacrylic acid (PAA) or acrylic floor wax (10:1 water to wax ratio), on all burned composite materials and on areas containing scattered/settled composite debris.

Note: PAA may be removed by a dilute solution of household ammonia (approximately 2 percent by volume of ammonium hydroxide in water) or trisodium phosphate (approximately one 8-ounce cup trisodium phosphate per 2 gallons of water). Strippability of fixant coatings is required where coatings are applied to debris which must later undergo microscopic analysis by crash investigators.

Soil tackifiers may be used to hold materials on sand or soil. Most solutions, including Polychem™, J-Tack™, or Terra Tack™ can be sprayed onto the ground at a rate of 0.5 gal/sq yd. Improved hard surfaces (i.e., concrete, asphalt, carrier deck) should be vacuumed or washed down with a detergent and water solution. The effluent should be collected via plastic or burlap-coated trenches or drainage ditches. Sweeping operations should be avoided as they redisseminate the particulate debris. Immediately flush/clean fixant-application equipment with a dilute solvent to avoid clogging.



McClellan's Nuclear Reactor

For almost 4 years, the Air Force's only nuclear reactor has been performing a unique function that is saving us lives and dollars from in-flight failures of honeycomb wings. It's proving to be one of our better investments.

CMSGT ROBERT T. HOLRITZ
Feature Writer

■ Since the mid sixties, many fighter aircraft wing and flight control surfaces have been constructed of an aluminum skin bonded to an aluminum honeycomb inner core. This construction was chosen because it is extremely strong and relatively light. However, as these aircraft aged, they began experiencing instances of in-flight failure caused by disbonding of the outer skin from the honeycomb core. The F-111, being the oldest aircraft to use aluminum honeycomb to aluminum skin bonding, also became the first to experience disbonding problems and in-flight failure of aluminum honeycomb components.

For the folks at the Sacramento Air Logistics Center, disbonding became a special problem. Disbonding is usually caused by corrosion resulting from moisture intrusion into the honeycomb. As the corrosion progresses, the honeycomb physically separates from the skin, weakening the components.

X-ray, a standard nondestructive inspection (NDI) procedure, can accurately spot cracks, structural damage, foreign objects, high levels of water, and advanced corrosion. However, X-ray doesn't have the ability to locate low levels of moisture or corrosion which may eventually cause a flight control surface to fail in flight. The answer to the problem was neutron radiography, or N-ray.

N-rays are beams of neutrons. Unlike X-rays, neutrons are extremely sensitive to the presence of hydrogen. Neutrons are scattered when they strike a hydrogen atom. Since corrosion, and the moisture which causes it, contains large amounts of hydrogen, N-ray inspection allows radiographers to detect their presence at even very low levels.

In the mid eighties, the Air Force saw the need for a neutron radiation source which could provide high resolution, real time, N-ray inspection of aircraft components. This requirement led to the construction of the Air Force's only nuclear reactor. The reactor was completed in 1989. In January 1990, it was licensed by authority of the Air Force Safety Agency under authority of the Atomic Energy Act of 1954.

TRIGA

TRIGA, as the reactor is called, stands for Training, Research, Isotope Production, General Atomics. General Atomics was the prime contractor for the reactor. By itself, the reactor is not especially unique. More than 80 are in use by hospitals and universities around the world.

McClellan's reactors' maximum steady state power is 1MW (one million watts). This is very small compared to the 1,000 to 3,000 MW of a typical power reactor.

What makes the TRIGA reactor unique is the facility which surrounds it. Dr Wade Richards leads the Air Force team which operates McClellan's TRIGA. As Dr Richards put it, "Basically, we told the contractors what we wanted, and they built it to our specifications. But they had to go to different facilities just to see if what we wanted was possible."

continued

Picture on the left shows an X-ray of an F-15 stabilator. In this photograph, there is no evidence of corrosion or moisture. The photo on the right is an N-ray inspection of the same stabilator. The gray areas of the honeycomb show both moisture and corrosion. N-ray inspection of F-15 stabs can detect the delamination of F-15 stabilators which has plagued the Air Force for the past 10 years.

The facility consists of the reactor, a reactor control room, four irradiation bays, and three staging areas. Each bay has a beam tube which carries the neutron beam from the reactor core to the irradiation bays. Aircraft parts to be inspected are placed in one of the bays and exposed to the neutron beam. The system provides both real time and film radiography. Not only does the inspection detect very low levels of moisture and corrosion, the real time images are recorded on VHS tape and the still shots on film to provide a permanent record of the inspection.

Keep It Cool

Unlike power reactors, those used to drive submarines or generate electricity by producing steam to turn a turbine, TRIGA reactors are kept at a low operating temperature, typically between 30 to 50 degrees C. TRIGA reactor has a cooling system much the same as the family car. The water which surrounds the core is constantly pumped through a cooling radiator, filtered, and returned to the reactor. The only source of hazardous waste generated by the reactor is the small amount of impurities trapped in the water filters. The water itself does not become radioactive.

The Fuel

The fuel used in TRIGA reactor is also quite different from that used in power reactors. It is a combination of Uranium 235 and Zirconium Hydride. Because the amount of U-235 in the fuel is less than 20 percent, the fuel is not considered separable (the U-235 cannot be recovered), and therefore, cannot be used for any other nuclear use. Therefore the fuel is not subject to high physical security requirements.

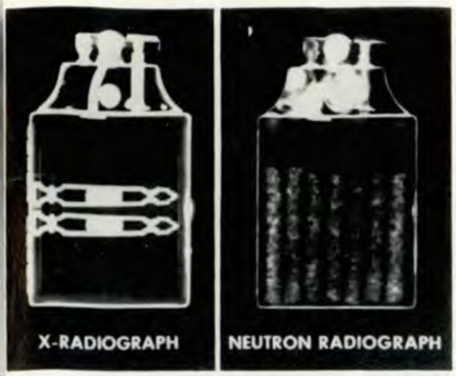
There is also another important difference in TRIGA fuel. It has a negative heat coefficient. This means the hotter the fuel gets, the less reactive it becomes. This is accomplished by doping the fuel with zirconium hydrides. As the zirconium hydrides heats up, their hydrogen molecules vibrate and cause the reactor power to decrease, thereby making it impossible to have a meltdown.

Research

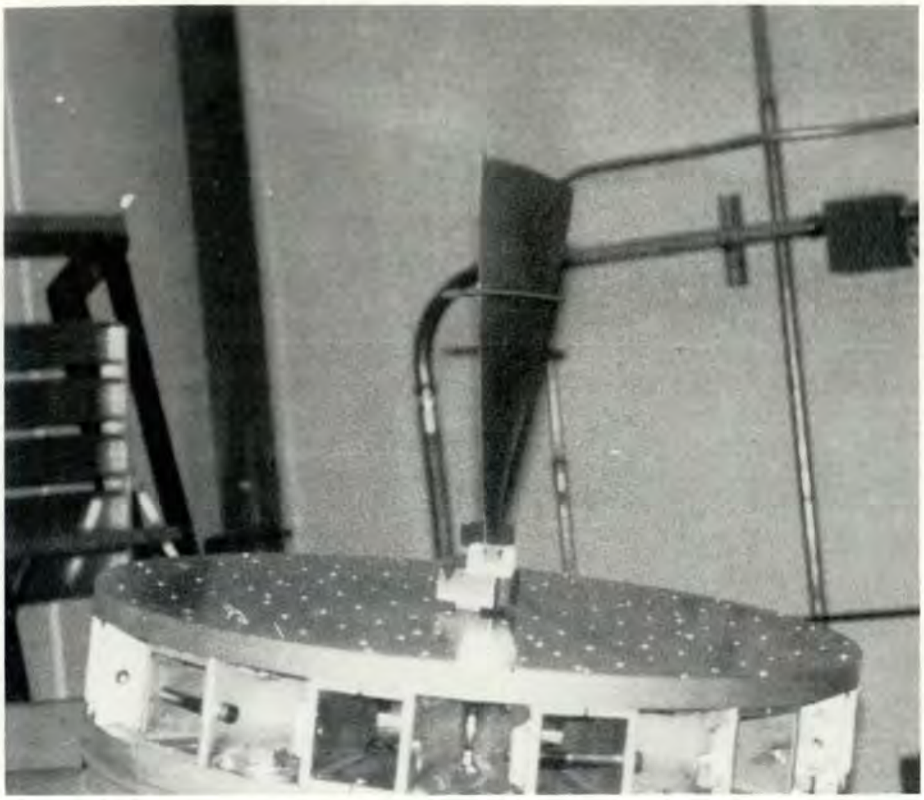
While the McClellan Nuclear Radiation Center's main purpose is nondestructive testing of aircraft parts, it is also a valuable research tool. For example, because of its ability to detect small amounts of hydrogen, engineers at Tinker AFB and Pratt and Whitney use the TRIGA to inspect jet engine fan blades for hydrogen embrittlement, which is essentially a fault in the molecular structure of the blade's metal. **Hydrogen embrittlement led to the engine failure that resulted in the tragic crash of the United Airline's DC-10 at Sioux City, Iowa, a few years ago.**

The TRIGA reactor is also being used to irradiate silicon ingots. After about 80 hours in the reactor core at full power (1,000,000 watts), the ingots can be used in the manufacture of "super" computer chips. The McClellan Nuclear Radiation Center has the only reactor facility licensed to distribute this material domestically.

There are also plans to use the reactor for brain tumor treatment. The patient is injected with a boron solution which has an affinity for cancer



A neutron radiograph of a cigarette case with an X-radiograph. Note the neutron radiograph detects the hydrogen in the lighter fuel and cigarette tobacco. The X-ray does not show the fluid or tobacco but does show the mechanical parts of the case. Neutron radiography and X-radiography complement each other.



This engine fan blade is about to undergo N-ray inspection for hydrogen embrittlement.

cells and interacts strongly with neutrons. The tumor is then exposed to a neutron beam. The neutrons interact with the boron in the brain tumor, releasing a highly ionized particle which kills tumor cells. Using this method, patients with certain types of inoperable tumors can now be treated. The therapy has been used by the Japanese with success, and doctors at David Grant Medical Center, Travis AFB, California, are also planning to conduct further research with the therapy.

Research is also being conducted on the effects of radiation on fiberoptics. During these tests, a fiberoptic cable carries a laser light down to the reactor core and back to a monitor that checks for continuous light transmission. During these tests, the reactor is "pulsed." That is, for a fraction of a second, the reactor is allowed to generate a pulse of energy with an output of 2,000 MW! The effect of this blast of high radiation on the segment of the fiberoptic cable exposed to the pulse is seen on the monitor. The pulsing is continued to find where light transmission through the fiberoptic cable is degraded.

Training

CMSgt Walter Brauer is about the only "blue suiter" to be found at the reactor facility. Although he is assigned to the Air Force Safety Agency at Kirtland AFB in New Mexico, he has spent much of his time during the past 2 years at McClellan. The agency sent Chief Brauer to the facility to set up a training program for the operating staff.

The initial training of the staff was provided under contract from the reactor manufacturer. At most nonpower reactor facilities, reactor operators work at two skill levels — reactor operators and senior reactor operators. The problem with the two-level system was it could take 2 years before an operator could be fully trained and used on the job. To solve the problem, Chief Brauer created a third level — the reactor console operator was created. Like the reactor operators, the console operators must have the skills and knowledge to operate the reactor during normal, abnormal, and emergency conditions. However, console operators are not certified to perform reactor-related maintenance. The new training program provides a certified reactor console operator in less than 6 months and gives the facility operations manager greater flexibility managing the operations staff.

Well Worth the Cost

At a cost of about $15 million, half the cost of a new fighter aircraft, the neutron radiography system has probably already paid for itself by finding defects in the F-111 not detectable by X-ray and which could have led to the damage or loss of an aircraft.

Other USAF fighters, such as the F-15, also suffer from in-flight failures of honeycomb constructed flight control surfaces. Again, hard-to-detect honeycomb corrosion, caused by moisture intrusion and subsequent disbonding, can lead to in-flight failures. Efforts are now underway to evaluate if the N-ray system can provide early detection of moisture and corrosion damage in failure-prone F-15 horizontal stabilators. ■

Crew "RECOURSE" Management

Photos by MSgt Patrick L. Kenaley, 185 Fighter Group, Iowa ANG, Sioux City, Iowa

ALAN DIEHL, PhD
Technical Advisor for
Human Performance/AFSA

■ I recently coined this term by mistyping a title slide for a Crew Resource Management (CRM) briefing. Well, maybe this was a Freudian slip. After all, when everything else goes wrong, using these concepts may be the crew's last *recourse* for averting a mishap. The purpose of this article is to describe how these training concepts came about and the direction you can expect future USAF CRM programs to take.

Such training began after the 1978 United Airlines accident in Portland, Oregon (see photo). Here, a highly experienced DC-8 crew was troubleshooting a landing gear-unsafe light. The captain, deeply involved with technical issues, ignored the unassertive "hints" from other crewmembers about fuel status. Deadsticking an airliner into a suburb in the dark with only 10 fatalities was no mean feat. But as the human performance investigator, I felt it was clearly time to embrace a new type of training — CRM.

By 1981, United Airlines had begun the first such program. Other airlines' programs followed suit. By 1985, the MAC Aircrew Coordination Training Program would become the first of the military transport and helicopter CRM programs. SAC launched its program in 1990, extending these concepts to tankers and bombers.

Incidents such as this DC-8 crash prompted United to begin aircrew CRM training in 1981.

Photo by Dr Alan Diehl, HQ AFSA

Today, most of these first-generation civil and military CRM programs are in the process of undergoing major overhauls. And none too soon, because in case you haven't heard, it's getting to be a tougher world out there.

Recent books, such as Ralph Nader's "Collision Course," have touted the potential dangers of today's airline flying environment: older equipment being flown by younger crews for longer hours with diminished job security on new routes. Many of the same type of stressors are also unpleasant realities in today's Air Force. Obviously, neither our commanders nor the crewmembers can do much to eliminate such problems. So, the next best thing is to develop new ways of recognizing and coping with the effect they can have on mission performance. That's where a comprehensive CRM program comes in.

Just as the airlines realized they had to continuously enhance and improve their own CRM programs, in spite of their financial straits, the Air Force has identified a need for a similar investment. CRM-related problems, such as inadequate brief-

CRM training paid off for United in the 1989 DC-10 crash at Sioux City airport. ANG personnel played a critical role in the recovery of crash victims.

ings, imprecise communications, and unchallenged breaches of judgment have been associated with many of our most recent mishaps. Furthermore, these tragic losses cut across MAJCOM and weapon system lines, making it clear that any proposed corrective action needs to involve the entire crew force. The groundwork for development of a systematic, Air Force-wide CRM program was laid at three important meetings this past year.

In February of 1993, AMC hosted the first USAF-wide CRM conference in recent years. Virtually every major command was represented, as were several airlines, aircrew training system contractors, and observers from other services.

The goals of this initial get-together were primarily to examine different CRM training methodologies and establish program baselines.

In September, AETC hosted the second USAF-wide CRM conference. Attendees outlined the plan of attack for systematically updating all USAF CRM-type training programs.

A proposal for a CRM "steering group" was developed, and program oversight requirements were broken down into several key areas. These include standardization, continuity (from the first day of flying training straight through regular continuation training), and research and development requirements. The major command representatives agreed to establish a regular meeting cycle to build the framework for CRM implementation across the board.

During the October Air Staff/MAJCOM DO conference, the attendees endorsed, in principle, the conclusions from the two MAJCOM CRM meetings. As a result of agreements made and direction given at that meeting, AETC began work on an Air Force Instruction aimed at development of a comprehensive state-of-the-art CRM training system.

The instruction will form the basis for command-run CRM programs, each of which will be tailored to the operators' unique missions and needs. The draft version of the instruction is making the rounds through the major commands.

It's expected to include guidelines for specific skills to be taught and will most likely establish several "levels" of training through which fliers will progress. These would include introductory, airframe-specific, and mission-specific training, as well as special courses for instructors, evaluators, and supervisors to learn the best ways of teaching CRM and identifying training deficiencies.

A number of other good ideas have been suggested to support the goals of our developing CRM program. These include anonymous incident reporting systems, "risk management" manuals aimed at the quirks and pitfalls of flying different kinds of aircraft, and a whole series of timely training videos. These and many other enhanced training tools and techniques will be explored in the months ahead.

Thanks to a lot of hard work by a lot of Air Force people, CRM is steadily moving forward, hopefully to become part of our "corporate culture" as it improves our mission effectiveness and safety.

Wondering about the payback we'll get from implementing CRM? Captain Al Haines, pilot of the crippled United Airlines DC-10 who made a near-miraculous controlled crash at Sioux City Airport in 1989, stated CRM training was one of the factors which helped him and his crew keep the aircraft flying after suffering a total flight control failure. Maybe this training is truly the crew's last "recourse" in many of these situations. ■

CRM teaches effective utilization of all resources — training which helps crews deal with emergencies that "aren't in the book."

FLYING EDGE

MAJOR BILL SNEEDER, MD
Flight Surgeon
32d Fighter Squadron
Soesterberg AB, The Netherlands

■ An experienced fighter pilot was returning to the F-15 cockpit after nearly 6 months of rehab for a major knee injury. He described climbing into the cockpit for his first flight after being granted return to flying status (RTFS) and "couldn't **remember how to start the engine**." Of course, he was exaggerating just a bit. But the point is that what had once been automatic now required some slow, methodical thought and concentration.

A fighter pilot's job is basically to shoot straight and put bombs on target (or variations thereof). Safety, training, and flying proficiency are an important part of that job every day. The best way to stay at peak performance is to fly regularly.

Besides medical grounding (DNIF), pilots may be out of the cockpit for other reasons such as PCS, vacation, nonflying assignment, or a new aircraft qualification. Pilots talk about losing their flying "EDGE" if they haven't flown in a while. But how long does it take to lose the "EDGE"? What are the best ways to diminish that loss? And what are the best ways to get the "EDGE" back? The best person to ask is the pilot.

What We Did

First, we made up a questionnaire. It asked about flying experience and reasons for absences from flying duty. It was also designed to collect pilot feedback on various methods of regaining, and reducing the extent of, lost flying proficiency (all qualified using a graded-scale rating). These methods included simulator missions, academics, exercise, and refresher sorties. Pilots were also asked to differentiate between the most and least helpful methods and to evaluate who is most qualified to determine when a pilot is ready to return to the cockpit (other than a flight surgeon assessing the medical status).

Additional information was collected on pilot impressions of current training regulation (USAFE Regulation 51-50) guidelines governing mission readiness for return to flying. Finally, pilots were asked if there was a perceived difference between medical versus administrative absences from flying duties.

What They Said

Questionnaires were given to pilots of the 32d Fighter Group at Soesterberg AB, the Netherlands, and the 36th Fighter Wing at Bitburg AB, Germany. The returned questionnaires (13 from Soesterberg and 14 from Bitburg)* showed pilot assessments for regaining the flying "EDGE" were remarkably similar between the two F-15 units.

The surveyed pilots said the flying "EDGE" is lost in a relatively short period of time — between 1 and 2 weeks. Also, the best nonflying methods to prepare for return to full flying duties are a Dash-One review and flying the simulator. A building-block approach, with initial limits on mission complexity and type, is the best way to regain your flying proficiency.

Most pilots considered the pilot himself as the best judge for giving the "thumbs up" on returning to the cockpit. Over 50 percent felt "time out is time out" when comparing the difference between a medical and administrative absence from flying.

Additionally, 14 pilots noted USAFE Regulation 51-50 was adequate, while 10 found it only somewhat helpful. Of these 10, a few commented the regulation was too restrictive and suggested more discretion be given to squadron-level supervisors. Two others believed the program should be tailored more to the individual.

One pilot felt additional training, such as simulator or actual flight sorties, should be required if necessary, regardless of rank or experience. Another pilot agreed simulator training was very important for regaining proficiency but felt simulator availability in USAFE needs to be increased.

What It Means

Some results obtained in this study may seem obvious. But this information is helpful in under-

continued

The complexity of today's flying mission demands a high degree of proficiency from *all* USAF pilots.

As Dr Sneeder's survey points out, regardless of the reason a pilot is away from flying, time out is time out.

Training sorties, which use a building block approach, can help pilots regain "THE EDGE."

standing pilot perception of the impact absence from the cockpit has on flying proficiency. Furthermore, it highlights what they believe, i.e., **flying experience** is the best way to regain the flying "EDGE."

This is valuable feedback for pilots when they or a squadron member face a prolonged absence from flying. As a flight surgeon, the loss of the flying "EDGE" is important to consider when placing someone on DNIF status and when discussing flying safety with pilots and their commanders. ■

*Although the sample base in Dr Sneeder's survey wasn't large enough to be statistically significant, he does highlight the need for instructors and commanders to exercise care in assessing the proficiency of their people after a break in flying.

Kudos to Dr. Sneeder for taking the initiative to look at this issue and for sharing his findings with us. If there are other flight surgeons out there who have a burning issue they would like to pass on to our aircrews and maintainers, we would like to hear from you. Call us on the safety hotline at DSN 246-0950.

FSO's CORNER

TAXI AWARENESS GUIDE

MAJOR DALE PIERCE
919 SOW/SEF
Duke Field, Florida

■ Despite diligent efforts by management personnel to prevent taxi mishaps, they still occur. I don't know about you, but the idea of having to explain why one of our aircraft got banged up in a taxi mishap is not high on my most-want-to-do list.

After any mishap, inevitably, the question comes up, "What could we have done better?" When this question echoes through the halls, it usually lands in the safety office. When it does, knowing what you've already done to prevent such mishaps is very useful.

Such actions might have included ensuring taxi lines are painted appropriately, aircrews and marshalers are trained, and the subject is discussed, ad nauseam, in your flight safety meetings.

But what else can **you** do?

The folks at the 314th Airlift Wing had an idea. They developed a **Taxi Awareness Guide for Aircrew and Marshalers**, A Common Sense Approach to Ramp Operations.

The guide discusses the commander's policy, preparation for arrival, marshaling basics, and communications. It also covers obstruction clearance, aircraft turning radii, and danger areas.

Near the back of the guide is a page of ALARM CUES. Does hearing this make you nervous? While clearing the runway, the pilot says, "Has anyone been here before?" It makes me sit up and take notice.

Perhaps the best part of the guide is on the back cover. It recommends predeparture and arrival techniques for preventing taxi mishaps.

If you don't have such a guide for every mission folder in your organization, you might want to consider developing one. I'm in the process of adapting the 314 AW guide for our use.

If you would like a copy of the 314 AW Taxi Awareness Guide, call/fax me at the number below, and I'll stuff one in the mail pouch with your address on it.

If you are doing something in your program that could enhance other safety programs if other safety personnel knew about it, call me (Major Dale Pierce) at DSN 872-5378/4557 or FAX 872-5212 (USAFAWC), or send a short note to 919 SOW/SEF, Duke Field, Florida 32542-6644.

FSOs: "The FSO's Corner" is a great place to exchange ideas on flying safety issues. If you have an idea that's working well for your unit, send it along to Maj Pierce or call our hotline at DSN 246-0950 and we'll include it in next month's FSO's Corner — Ed. ■

GOT SOMETHING TO SAY ?

GIVE US A CALL

We now have a 24-HOUR line you can call to tell us what is on your mind. Whether it concerns a safety issue, a question you would like answered, or you need information -- please give us a call. We will respond or route you to the experts.

DSN 246-0950 or (505) 846-0950

The Rest of the Story

LT COL EDWARD D. JOHNSEN
Chief, Aeronautical Information Division
USAF/IFC

■ While at base operations the other day, I overheard a conversation between an instructor pilot and his student. The weather briefer had given them some ugly news, and they were frantically trying to find a suitable alternate. Their search led to a puzzling discussion on the merits of using Midland International (see figure) as an alternate aerodrome. A review of the approach plate convinced them Midland had sufficient runway length to accommodate their aircraft and, if required to fly the approach, they had the necessary navigation equipment aboard.

The student proudly announced he knew a triangled "T" at the bottom of an approach plate stood for "trouble," because he had read an article in the September 1993 issue of *Combat Edge*. However, he didn't know what the triangled "A" represented and asked his instructor to explain.

The instructor smugly directed the student to look at the legend in the front of the DOD approach plate booklet. The student read the definition aloud: "Alternate minimums not standard. USA/USAF/USN pilots refer to appropriate regulations." By this time, I could see the wheels spinning in both their heads, searching for the answer to the question, "What the heck does THAT mean?"

The second sentence of this definition basically tells Air Force fliers to refer to AFR 60-16, paragraph 8-6, for guidance in determining if an airfield qualifies as an alternate. Since Midland has a published approach procedure we're capable of flying, the worst forecasted weather for the ETA (plus or minus 1 hour) must provide a ceiling of at least 1,000 feet or 500 feet above the lowest compatible published landing minimum, whichever is higher. The visibility must be at least 2 statute miles or 1 statute mile above the lowest compatible published landing minimum, whichever is higher.

When a nonmilitary flier has to determine if an airfield qualifies as an alternate, the FAA guidance requires a ceiling of at least 800 feet and 2 miles visibility when only a nonprecision approach is available. If a precision approach is available, it normally takes a minimum ceiling of 600 feet and 2 miles visibility to qualify as a suitable alternate. It doesn't take a genius to see AFR 60-16 guidance puts in a safety pad and is normally much more restrictive when dealing with alternate weather requirements.

Okay. So what does the first sentence of the definition, "Alternate minimums not standard," mean? If a nonmilitary flier wants to use this approach as an alternate, there are ***more restrictive*** weather minimums that have to be used: the standard 800/2 or 600/2 rule does not apply. In this example, a nonmilitary flier would look in the front of a National Oceanic and Atmospheric Association (NOAA) instrument approach booklet to find information about the triangled "A" at Midland. The pilot would read Category E aircraft require a ceiling of 800 feet and ***2½ miles*** visibility to use this as an alternate. But, if you look in the front of the DOD/DMA approach booklet most military fliers use, you won't find this information. Since military fliers are supposed to refer to their "appropriate regulations" for guidance in this instance, there's no need to place the alternate minima information in the DOD FLIP products.

I'm not sure whether the instructor pilot and his student ever truly figured out what the definition of the triangled "A" meant. The instructor's comment as they left the mission planning room was, "Don't worry. It doesn't apply to us." Although his comment may be true, he never did answer the student's original question. Hopefully, the two of them will someday read this article so they, too, will know ***the rest of the story.*** ■

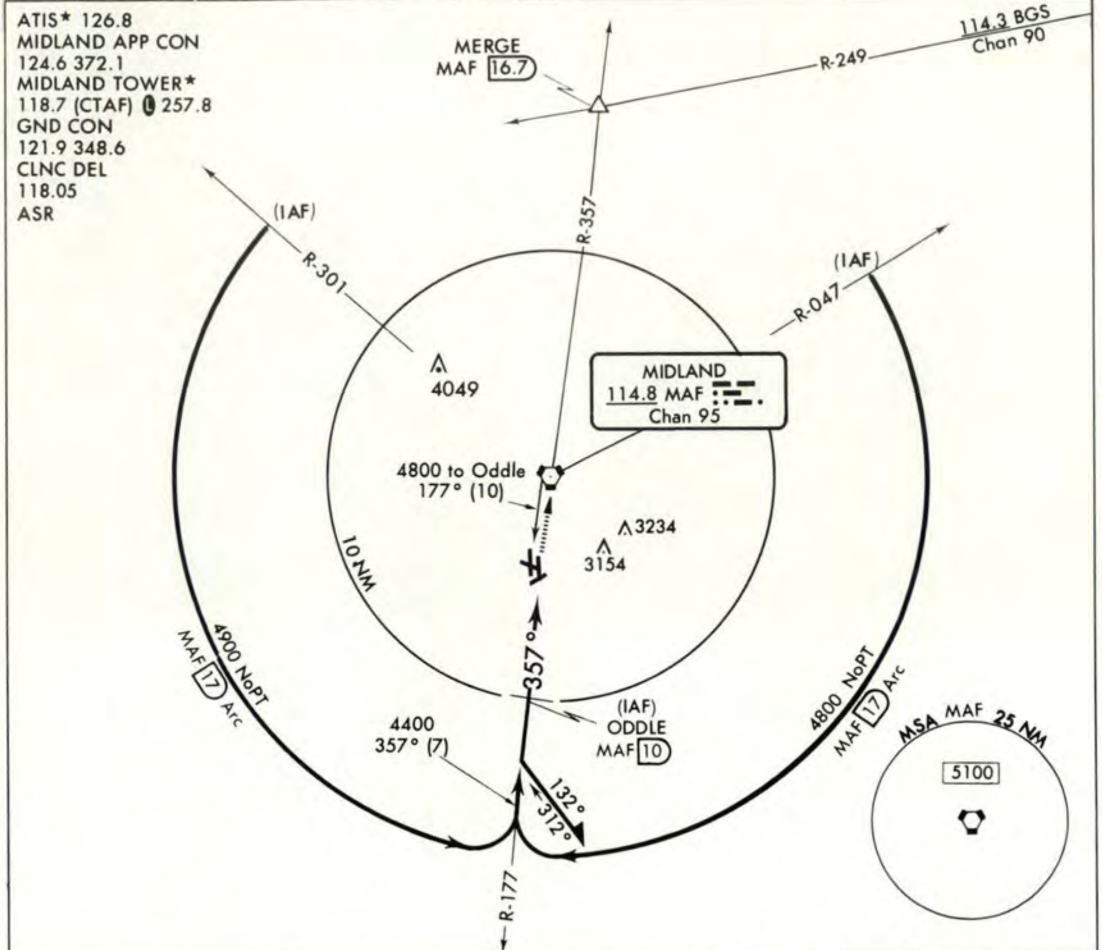
Not for in-flight use. Consult current FLIP IAPs.

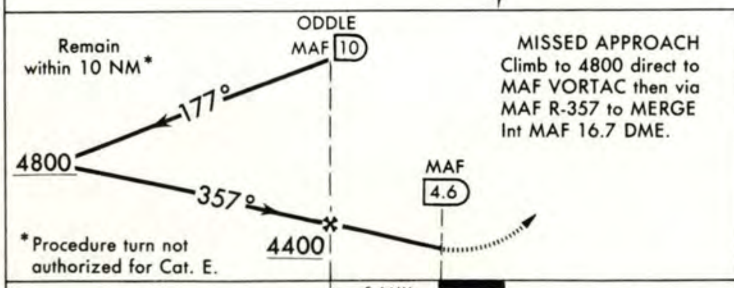
Amdt 9 93035 AL-258 (FAA)

VOR/DME or TACAN RWY 34L 290

MIDLAND INTL (MAF)
MIDLAND, TEXAS

ATIS* 126.8
MIDLAND APP CON
124.6 372.1
MIDLAND TOWER*
118.7 (CTAF) 257.8
GND CON
121.9 348.6
CLNC DEL
118.05
ASR

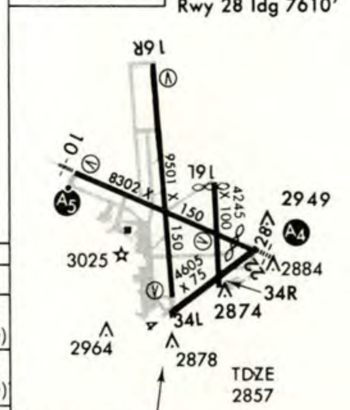




MISSED APPROACH
Climb to 4800 direct to MAF VORTAC then via MAF R-357 to MERGE Int MAF 16.7 DME.

CATEGORY	A	B	C	D	E
S-34L	3260-1 403 (400-1)		3260-1¼ 403 (400-1¼)		3260-1½ 403 (400-1½)
CIRCLING	3340-1 469 (500-1)		3340-1½ 469 (500-1½)	3440-2 569 (600-2)	3560-2½ 689 (700-2½)

ELEV 2871
Rwy 16L ldg 4151′
Rwy 28 ldg 7610′



MIRL Rwys 4-22 and 16L-34R
REIL Rwy 34L
HIRL Rwys 10-28 and 16R-34L

Knots	60	90	120	150	180
Min:Sec					

VOR/DME or TACAN RWY 34L

MIDLAND, TEXAS
MIDLAND INTL (MAF)

MAJOR
Lynn Oveson

MAJOR
David Mcauliffe

56th Fighter Wing
MacDill AFB, Florida

■ Major Oveson and Major Mcauliffe were on a cross-country training sortie from Pease IAP, New Hampshire, to Wright-Patterson AFB, Ohio. On takeoff, their RF-4C had a leading edge flap malfunction requiring return to Pease for an emergency landing. While being vectored for an approach, the aircraft had total utility hydraulic failure.

Major Oveson requested a vector to the nearest airfield with an approach-end arresting gear cable. En route to Brunswick NAS, approximately 60 nm from Pease, the UHF communication with approach control was lost and regained only after going to guard frequency. Major Oveson then lost his primary attitude indicator and noted his emergency telelight panel lights were inoperative. He then switched to his standby attitude indicator and noted that it also was inoperative.

Major Oveson suspected double generator failure and extended the ram air turbine (RAT) to power the emergency generator to regain electrical power and use of the standby attitude indicator. The aircrew heard two loud "bangs" which they felt could be indications of bleed air duct failure and requested a short turn on to a PAR final at Brunswick NAS where the weather was at minimums.

The turn to final approach was late and required the aircrew to go missed approach and accept another vector to a PAR approach. Major Oveson flew a flawless abbreviated PAR and picked up the runway environment at decision height approximately 1 mile from the only approach-end cable of the airfield. The aircraft landed just short of the cable and completed a successful engagement.

Majors Oveson and Mcauliffe exhibited superior flying skills and aircrew coordination in handling a complex emergency situation in extremely marginal flying conditions.

WELL DONE! ■

*U.S. GOVERNMENT PRINTING OFFICE 1994-573-261/84003

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.

From left to right: SSgt Jeff Dill, Captain Ken Scritchfield, and Captain Matthew S. Brown II.

CAPTAIN
Matthew S. Brown II

CAPTAIN
Ken Scritchfield

STAFF SERGEANT
Jeff Dill

HQ First Fighter Wing
Langley AFB, Virginia

■ Approximately 50 minutes into an emergency procedure training sortie, the crew began practice autorotations. Capt Brown performed the first straight-ahead autorotation, and all aircraft systems operated normally. Capt Scritchfield performed the next straight-ahead autorotation. He entered the maneuver from 500 feet by rolling both throttles to the flight idle position.

At approximately 250 feet above ground level, descending at 2,000 feet per minute, the no. 2 engine speed (Nf) and rotor RPM (Nr) began climbing rapidly. SSgt Dill alerted the crew of the rapidly rising engine and rotor RPM. This uncommanded increase in rotor RPM caused a violent 30-degree of yaw.

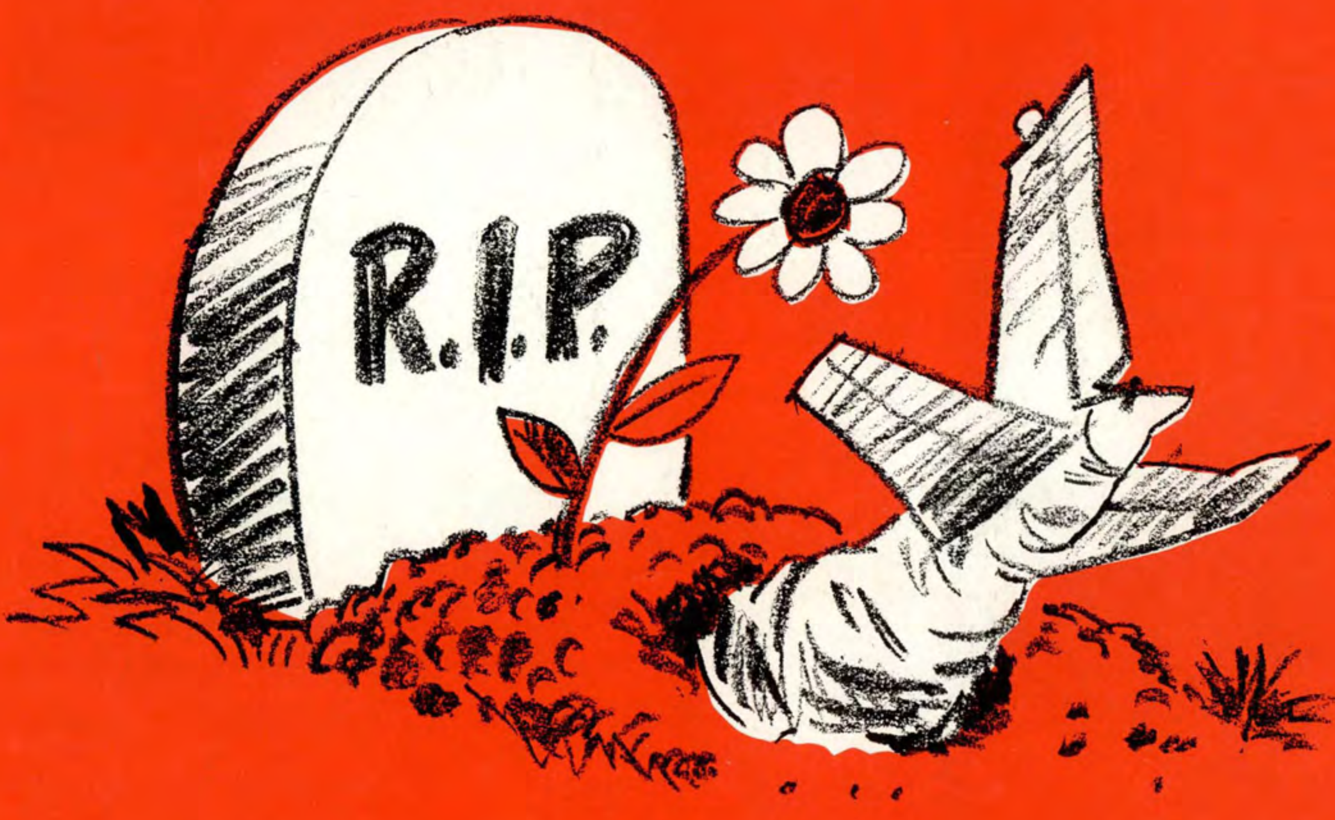
Capt Brown reacted quickly by taking the controls and increasing the collective to control the rotor speed. He then increased the no. 1 throttle to full open while directing the crew to shut down the no. 2 engine. Converting to single-engine operation allowed the crew to arrest the descent rate at approximately 30 feet above ground level.

At this point, the aircraft was in a favorable position for Capt Brown to perform a minimum power, single engine, slide landing. Prior to touchdown, SSgt Dill notified Air Traffic Control of the emergency situation and the crew's intentions. After landing, the crew performed a successful emergency shutdown.

Quick analysis and timely reaction allowed the crew to turn an otherwise critical emergency into a controlled landing with no injuries or damage to the aircraft.

WELL DONE! ■

Got A LITTLE Cold? Okay To Fly?...



NOT!!