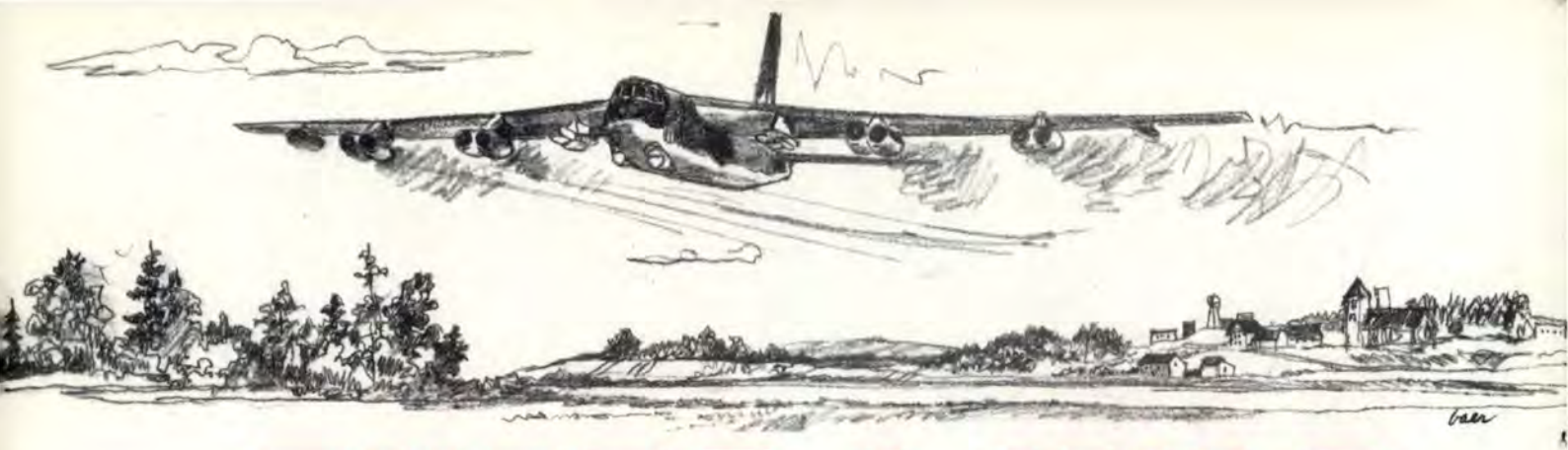
flying SAFETY

Mishap Summaries

FEBRUARY 1992



THERE I WAS

■ Bismarck once said, "God looks after drunks, fools, small children, and the United States of America." It's true. I know. I have been looked after.

Ever flown below 200 feet AGL? Below 100 feet AGL? For a long time? Not near a runway? I have — once — but won't again. This is how it happened.

We had planned a higher headquarters B-52 mission, and it was a Red Eye Special. We left the squadron at noon, to get 12 hours "crew rest," on a midnight show time for an 0300 takeoff time. (You can imagine how much sleep everybody got.)

The cell takeoff and night refueling went okay. Hours of high altitude droning along watching the autopilot got us farther up into Canada than anybody except Arctic explorers had ever gone.

We took spacing from the rest of our flight and dropped into a low-level route for the long trek back south to the target area. The pilot and radar nav managed to stay awake through the first half-hour or so of terrain avoidance flight. (The EW and gunner had promptly gone into the slumber mode since there were no threats along the route.)

I knew exactly when the left-seater began sawing logs because I noted his chin resting on his chest, eyes closed. The nav told me the radar had his head down on his table, so he was also asleep.

So there I was, young copilot, monitoring the engines and keeping a level 500 feet ASL as the nav steered us through a flat, featureless, lake-strewn low-level route across the tundra.

Finally, the nav couldn't stay awake any longer. He told me he just had to take a break for a while, and could I wake him up in 20 minutes or so? All I had to do was go straight, then turn 20 left at the far side of the next big shoreline, and we would be just fine.

There I *really* was, the only person awake on the jet. Now what? Well, it was *flat* outside. I figured airspeed control was easy, since I wouldn't be going up or down, and we wouldn't burn enough gas in 20 minutes to speed up any. I locked the throttles and put both hands on the yoke.

Next, I set the clearance plane at 200 feet AGL, as low as it worked, to get a computer-generated signal for low flight. I then set the radar altimeter at 100 feet AGL and started down. Why?

I had read "descend as low as possible and accelerate" for a long time but had never done it. (This was before the days of "hunker and extend.") I figured this might be my only chance to try really low flying, and I wondered what it would be like. Discoveries:

- Plus or minus 100 feet AGL permits you to do *nothing* but avoid the ground. I could barely see the blinking white "radar altitude low" stripe on the TV screen when I was looking outside. I couldn't get any depth perception when looking inside on the TV set.
- After a few minutes, 100 feet begins to look "normal." Over water, it looks "high."
- Once back up, 800 feet looks like 10,000 feet.
- All the video picture rushes by rapidly when low, and only the horizon stays steady.
- You have to climb to turn, or the low wingtip will drag through the marsh . . . but not for long.

The "not long" part finally made me think. What was I doing? This was a six-man team airplane, yet I was conducting a risky, unplanned, home-made experiment all by myself. That wasn't right. It also wasn't smart. I was in a "no error allowed" corner. One brief miscalculation about pushing or pulling on that yoke and it would have been over for all of us (not to mention birds, emergencies, or anything else).

I spoke the nav's first name on the interphone until he woke up. We each shook the right shoulder of our left-seat partners, got the defense team awake, climbed up to IFR for a while (2,000 AGL), and caught back up with the aircraft. The rest of the ride was pretty quiet. ■

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FY91 was a record-setting year for the Air Force. We had 41 Class A mishaps, and after several years of very gradual declines, the overall rate dropped dramatically from 1.49 to 1.11. Our heavy aircraft had a great year overall — the C-5, C-141, C-130, and E-3 all enjoyed a Class A mishap-free year, while the helicopters experienced a worse-than-normal year with two Class A mishaps.

In this issue, we take a look at how we did in FY91 in our heavy aircraft and helicopters. Next month, we will look at the fighter aircraft.

SPECIAL FEATURES

REGULAR FEATURES

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

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Photo by Maj Roy A. Poole

B-1B

MAJOR KELLY M. HAGGAR
Air Force Safety Agency

■ The B-1B experienced two Class A flight mishaps in FY91 for an 8.27 annual rate, with a lifetime rate of 5.53 since 1984. Both mishaps were internal engine failures; each crew successfully recovered their aircraft under difficult circumstances.

For these two B-1B mishaps to occur, both a blade and the retaining ring had to fail at the same time. This is a rare and unforeseen combination of unlikely events. The F101 engine has accumulated over 420,000 operating hours, with only 16 blade anomalies. Other engines designed at about the same time (F100, F110, TF39) had *more* blade and disk events by the same number of flight hours.

Unfortunately, these engine problems restricted the aircraft from normal training missions for much of the year, although the normal complement of alert sorties was maintained until bomber aircraft were removed from such duties on 28 September 1991. In the interim, TCTO — 556 equipped the aircraft with a

stronger blade retaining ring. This new ring has successfully retained blades in two instrumented ground tests and during an actual in-flight failure.

For the longer term, a series of small weights will be tested to dampen blade stresses by about one-third. The damper was selected after careful review of several other choices. For example, a part span shroud would increase fuel flow by about 300 pounds per hour per engine, reducing range. It would also increase the turbine temperature, reducing engine life.

As with other aircraft, the B-1B is constantly evolving. The "B-1B Game Plan," issued in June 1991, addressed the three main challenges ahead for the aircraft: Logistics, ECM, and conventional capabilities. The B-1B was originally fielded with the goal of being 75 percent mission capable by the time the fleet had attained 200,000 flight hours in early 1993. Backfilling the shortages in deferred logistics and funding the "CORE" ECM refit are required to reach these goals. These issues are still being worked at the Air Staff level.

Regarding conventional weapons, all B-1Bs are capable of carrying Mark 82s or Mark 36s. Planned improvements include a MIL-STD 1760A bus to internal stations and modular software to integrate more types of stores. Carriage of precision guided munitions are also under study. The Global Positioning System will be integrated into the B-1B's already superb navigation and bombing system. When coupled with the aircraft's high speed, small radar cross section, and unmatched terrain-following ability, the CORE, 1122 antenna, and radar warning receiver upgrades will render the B-1B exceptionally difficult to intercept.

The final area of B-1B news this year was the cracks in the shoulder longerons. The loads in one area of the aircraft, the forward intermediate fuselage, were higher in actual service than anticipated. This is by no means an unusual discovery in aeronautical engineering. Many aircraft have had this type of problem.

The B-1 is just another airplane. Actual squadron service regularly reveals major problems with all aircraft. Changes in usage also sometimes produce either entirely unforeseen deficiencies or more severe outcomes than were anticipated. As the B-52 squadrons phase out, the B-1B's roles will expand to cover additional missions. Whatever the shifts in unit size, composition, or parent MAJCOM may hold, the B-1B will be available as long as the Nation needs a low, fast, penetrating airframe. It fills a niche now no other aircraft can. ■

Photo by TSgt Mike Haggerty

The B-1B will continue to expand its conventional capabilities through the end of the century.

Last year, I recommended some after-hours reading, for extra credit, by the finance committee at the alert shack. This year, the alert shack was abolished. Next year's extra credit reading assignment will be carefully selected. Nominations will be accepted from the B-1 community. In the interim, I found the April 1991 F101 Independent Review Team Final Report to be enlightening reading and wish to acknowledge its major contribution to this article.

Modern ground support equipment has made B-1B maintenance easier and safer than previous bombers, despite the increasing complexity of the aircraft.

Photo by Maj Roy A. Poole

B-52

MAJOR KELLY M. HAGGAR
Air Force Safety Agency

■ Since last year, the B-52 has gone *"In Harm's Way."* All of the aircraft got back except one. This mishap yielded an annual rate of 1.09, with an overall lifetime rate of 1.30 since 1955. (Seventy-four B-52s have been destroyed in 94 Class A flight mishaps.)

The 1991 mishap occurred in support of Operation Desert Storm. The aircraft had returned to its base after a combat mission when it suffered loss of electrical power followed by multiple engine flameouts. Of the four confirmed ejection attempts, three were successful. This 75 percent success rate, while well below the USAF 82 percent overall average, is considerably better than the B-52's overall ejection or bailout history.

Living has to rate pretty high on the value scale, and when you've decided to jettison your jet, living is what's on your mind. Let's take some time to see who did and who didn't and why. Some ground rules along the way:

- An "attempt" has occurred when a trigger is squeezed on an ejection seat, regardless of reason or intent.
- A "bailout" has occurred when a crewmember, wearing a parachute, makes a known attempt to escape or when a tall tail gunner jettisons his turret.
- "Successful" means the crewmember lived, for whatever reason,
- "Unsuccessful" means the

B-52s will continue to support the Air Force mission as long as extreme long-range bombing is needed.

crewmember died, for whatever reason.

- The two known cases in which crewmembers accidently fell out of B-52s in flight were *not* counted in this analysis, as no *seat* trigger was squeezed, and neither intended to manually bail out. (The one wearing a parachute lived.)
- This review does not include combat ejections or bailouts. Readers desiring to mull over those cases should obtain a copy of the *Combat Damage Analysis* cited in last year's article.

There have been at least 183 confirmed attempts to eject from a B-52. At least 35 manual bailouts have been attempted by either a crewmember not in an ejection seat or by a crewmember whose ejection seat had malfunctioned. Of all these attempts, 105 ejections (57.4%) and 24 bailouts (68.6%) saved a life.

The obvious killer has been low-altitude, low-speed ejection attempts. Only 17 of the 44 low altitude out-of-the-envelope attempts were by nav teams with downward seats (nine radars; eight navs). Pilots made six tries; copilots, eight; EWOs, nine; and G/H-model gunners made four. Several of the traffic pattern and low-level mishaps had no escape attempts prior to impact. Those in which a crew flew into the ground, apparently unaware, would not be expected to produce ejections. However, in other cases, the crew *knew* for a few seconds, maybe for nearly a minute, they were in a tight jam.

If the pilot team has been driven to the wall trying to save the jet, they may not recognize the game is over. Even if they do, they may not be able to reach their rocker interphone switches to say anything, or take their hands off the yoke or throttles to reach back for the abandon light. Timely recognition of these situations could save at least a few lives in such mishaps.

The aircraft commander must instantly recognize the aircraft cannot be recovered. This must be immediately followed by the red light, either by switch activation or a trigger squeeze. If the aircraft commander is unable or fails to issue a bailout order, what will the rest of the crew do?

This decision takes an added urgency at low altitudes. There is at least one known case where the survivors' tales are about a brief "discussion" occurring in which crewmembers asked for permission to eject, and the pilot said "No."

Unfortunately, there is no "school solution" to this situation. At a minimum, the rest of the crew should huddle up with the aircraft commander and talk this out, before their flight, on the ground. "What are your personal minimums?" "Have you decided what you can't handle?" "How will you tell us to go?" "Do you want a prompt from the nav if the altimeter reverses?" "How about if the EVS or radar can't look over terrain?"

The bottom line on ejection: If you haven't thought this through, *rigorously,* before the situation arises, you're living on luck and borrowed time. ■

Desert Storm added another distinguished page to the B-52's long history of global air power.

C-5/C-141

MAJOR DON C. LARSON
Air Force Safety Agency

■ Military Airlift Command C-5 and C-141 aircraft from active duty, Guard, and Reserve forces enjoyed their best safety year ever in FY91. The number of reported mishaps versus hours flown decreased significantly over the previous record low. There were no Class A's, one Class B (a C-5 catastrophic engine failure), and a relatively small number of Class Cs and High Accident Potential (HAP) mishaps reported. This impressive safety record was achieved while participating in the most demanding, sustained airlift in the history of MAC.

Operation Desert Storm and, to a lesser degree, Operations Provide Comfort (Kurdish relief), Fiery Vigil (Philippine evacuation), and Sea Angel (Bangladesh relief) stretched our airlift capabilities up to, and sometimes over, operational limits, providing ample opportunities for mishaps to occur.

Long crew duty days, weeks away from home station, poor crew rest facilities, and minimum ground times resulted in tired aircrews and sick airplanes. Add to these operations into strange airfields with minimal facilities, poor communications between aircraft and ATC facilities, and over half of the flights conducted at night or in marginal weather conditions. Mix all of these elements with the overriding urgency everyone felt to accomplish the mission, and we have a classic environment for one or more major mishaps to occur.

Yet, *that major mishap never occurred.* **WHY?** Were we **LUCKY,** or were we **GOOD?** Did we cross the minefield of potential mishaps with arrogance and complacency, blindly avoiding a fatal misstep? Or did we attack it with preparation, knowledge, and professionalism, taking every opportunity to break the mishap sequence of events and complete the mission safely?

We Were Lucky

The only Class B mishap occurred when the no. 2 engine on a C-5A catastrophically failed in reverse idle on a routine landing. Pieces from the disintegrating engine caused almost immediate loss of the no. 1 and no. 4 hydraulic systems and did extensive damage to the left side of the aircraft, including a 4-inch X 18-inch hole through the leading edge of the wing and another hole 2 inches X 15 inches through the wiring just forward of the flaps.

Although the aircraft was already on the ground, the crew still had their hands full (and did a great job) bringing the aircraft to a stop and

Yes, there were foggy mornings in the desert, and C-5 crews kept the supplies coming.

Photo by SrA Chris Putnam

controlling the situation. Had the engine failed at a high rpm (i.e., on takeoff), it could have taken out the no. 1 engine also, or if one of the engine pieces had pierced the wing 4 inches closer to the center, it could have ignited a main fuel tank with disastrous results on the ground or in the air.

On a short leg into Frankfurt, a C-141 crew got a fuel filter bypass light. Fuel heat had no effect, so the engine was shut down. Soon, the other three engine fuel filter bypass lights illuminated. While on vectors for a three-engine approach and landing, the aircraft was struck by lightning. The crew initiated a missed approach, requested and received vectors for an opposite direction approach, and was promptly struck by lightning a second time.

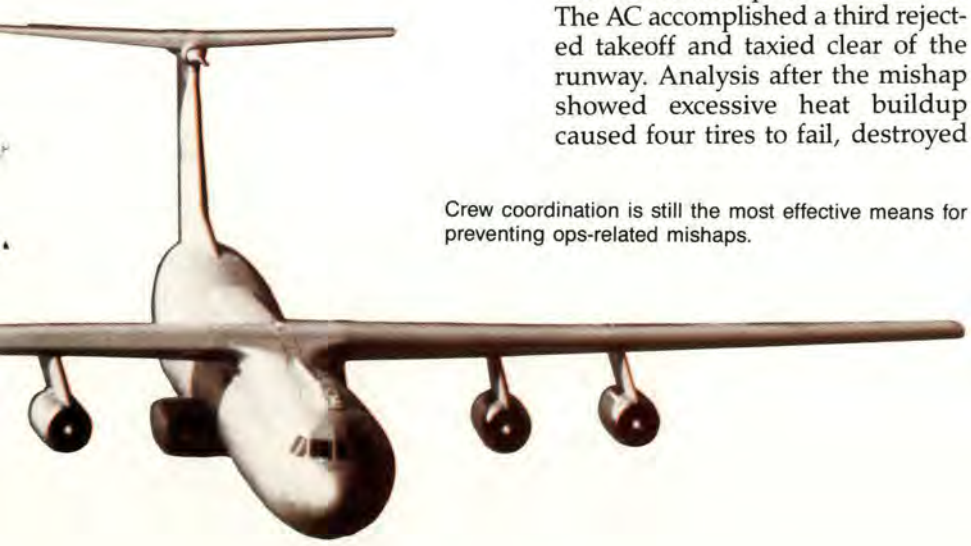
Investigation after landing discovered clogged fuel filters and minor burn holes in the radome and rudder. What if the bad gas had been pumped on an aircraft going east over the Atlantic? When was the last time you practiced a four-engine-out ditching drill?

A C-5 was taxiing out for takeoff from an in-theater location when both engines on the same side flamed out simultaneously just prior to taking the runway. Only an extended taxi route prevented that aircraft from being on takeoff roll or airborne when it happened.

A C-141 arrived at a European stage location and discovered the winds were gusting in and out of crosswind limits with a 32-knot crosswind recorded just 30 minutes prior to their arrival. The crew discussed diversion but elected to continue an approach when the winds were reported with a 10-knot crosswind 3 miles on final. At 1 mile, the reported winds produced a 19-knot crosswind, and the crew continued the landing. At touchdown, the winds recorded by the tower, but not reported to the crew, produced a 28-knot crosswind component. The aircraft weathervaned into the wind and departed the runway, causing extensive FOD damage to the no. 2 engine and other damage to the left main gear and gear doors.

A C-5 made a night landing at an in-theater location and began a progressive taxi to parking. Shortly after clearing the runway, the aircraft struck a Wilson loader with its right wingtip causing minor damage. The aircrew did not notice the downloader on the very poorly lit taxiway even though all exterior aircraft lighting was on. How many times did you taxi on a dark ramp, not really knowing where you were going or what was around you?

An inexperienced C-141 aircrew aborted two heavyweight (320,000 pounds) takeoffs with 30,000 of class A explosives on board when they got a "door open" indication from a previously written up left troop door. Without referencing the Dash-1 on abort procedures and brake limitations, the crew attempted a third takeoff after bypassing the left troop door. During the third takeoff, the crew heard a loud bang, and the aircraft pulled to the left. The AC accomplished a third rejected takeoff and taxied clear of the runway. Analysis after the mishap showed excessive heat buildup caused four tires to fail, destroyed five brakes, and damaged main gear doors and brackets. If those tires had blown airborne after retraction, all kinds of problems could have resulted as you will see if you read on.



Crew coordination is still the most effective means for preventing ops-related mishaps.

We Were Very Lucky

Within 2 months of each other, both a C-141 and a C-5 experienced a wing scrape while flying a visual approach to the same runway under almost identical conditions. Both aircraft overshot the runway while visually maneuvering themselves on final. Both aircraft continued aggressive maneuvering close to the ground to achieve runway alignment. The C-141 scraped the right wingtip while commencing a go-around. The C-5 scraped the left wingtip trying to salvage the landing. You can't get any closer to a major mishap occurrence than that.

We Were Good

Shortly after liftoff from an in-theater location, a C-141 crew heard a loud noise accompanied by a red light in the gear handle. Scanner reported they were losing no. 1 hydraulic system. Further inspection revealed they were losing no. 2 hydraulic system, no. 3 main tire had exploded, and there were visible cracks in the fuselage by the no. 1 hydraulic system.

The crew lowered the gear with residual no. 2 hydraulic pressure, declared an emergency, completed all required Dash-1 emergency procedures, and jettisoned fuel in preparation for landing. They correctly analyzed all factors involved in flying an approach and landing with only no. 3 hydraulic system operating and damaged landing gear. They brought the aircraft to a safe stop and egressed without further incident.

An alert C-5 crew was watching a C-141 taxi towards their position as they prepared to start engines at an in-theater location. While monitoring ground frequency and watching the C-141, they realized it was being told to taxi past the C-5 even though they knew there would not be enough room for him to get by.

continued

C-5/C-141 continued

As the C-141 moved closer to their position with marshalers and wingwalkers assisting, the C-5 crew attempted to stop the taxi, trying to contact ground control and the C-141 on ground frequency with no success. When it was obvious the wingwalkers were not going to stop the C-141, the pilot of the C-5 ran downstairs and positioned himself in front of the C-141 and signaled a stop, preventing the mishap. The C-5 ended up having to raise its nose to allow the C-141 to pass by.

Two C-141 crews experienced complete loss of Attitude Direction Indicators (pilot and copilot ADIs) shortly after takeoff in the weather. Both crews were able to recover the aircraft safely using needle, ball, and airspeed techniques. One crew elected to return and land while IMC and broke out at 500 feet AGL on final. The other crew elected to continue the climbout until they reached VMC conditions passing FL200 and continued on to their destination which was VFR. See "C-141 Top Issues" for more information on the dual ADI failures.

One C-141 crew was lucky and another C-141 crew was good when their aircraft almost hit each other at co-altitude, opposite direction, at night over the same coordinates crossing the Atlantic Ocean. The "lucky" pilot misprogrammed his INS by 1 degree, resulting in his being 60 miles off course on an opposite direction track. The "good" pilot was scanning outside when he saw the other aircraft at his 12 o'clock position, co-altitude, heading right at him. He took immediate evasive action (45 degrees of bank hard right turn) to avoid the aircraft and estimated they passed within 100 feet of each other.

Complacency accomplishing INS oceanic procedures almost cost two aircraft and aircrews. An alert pilot, scanning outside the cockpit in the middle of the night, over the middle of the ocean, was the only thing that saved them.

I know there were many other dramatic instances where human intervention or action prevented a serious mishap. Unfortunately, our reporting system tends to highlight the negative rather than the positive, so documentation was hard to come by. I know we made decisions day in and day out that weighed safety against mission accomplishment. And in almost every case, if we couldn't figure out a way to do it safely, we didn't do it.

Other Good Things

There were at least two other areas where we excelled, and that must continue in the post-Desert Storm era. Our communication between aircrews was outstanding, and our coordination among crew-

C-5 Top Issues

■ *Thrust Reverser:* A safety modification to the thrust reverser system is presently in test and evaluation. Fleetwide modification should begin within the next 4 months.

■ *MADAR II:* Replacement of the old MADAR I in C-5A aircraft continues at a slow, but steady, pace.

■ *Engine Pylon Safety Mod:* Some minor problems during the kitproofing have slowed full-scale implementation, but SA-ALC expects to begin very soon.

C-141 Top Issues

■ *Dual ADI Failure:* There have been four reported cases of simultaneous dual ADI failure with no backup in the last year. All four cases occurred shortly after takeoff and after the aircraft had been exposed to rain. Three aircraft had already entered the weather but managed to use needle, ball, and airspeed to recover safely. One stayed below the clouds on takeoff and landed. A fifth aircraft had the INS 1 ATT, INS 2 ATT, and AHRS ATT lights illuminated along with the TPLC light, but ADI indications appeared normal. In each case, the TPLC computer was replaced or a TPLC cannon plug was cleaned of corrosion to fix the problem, but no cause has been pinpointed as yet.

In each case, nothing the crew tried (circuit breakers, power sources,

Photo by SrA Chris Putnam

C-141s around the world will soon be painted in this new scheme.

etc.) recovered even one attitude source. They declared an emergency, minimized control inputs, and kept in constant communication with ATC. Two crews elected to continue a climb into VFR conditions and landed at another base. One crew returned for a modified PAR.

BOTTOM LINE: The ADIs might not be completely independent in all situations. Until the engineering folks can pinpoint the cause and develop a fix, crews need to be aware of the possibility of dual ADI failure, especially if the aircraft has been subjected to rain or water intrusion in the underdeck area.

■ *Wing Cracks:* The cracks developing at WS 405 continue to be the most serious problem affecting C-141 operations, and this issue has received the highest levels of attention. The fix is a TCTO which requires a detailed inspection and rework of all bolt holes in the WS 405 wing spar areas. WR-ALC has begun an ambitious program to complete a fleetwide rework by October 1993. MAC has implemented a series of recurring inspections designed to detect the larger, more serious cracks in aircraft that have not been modified. MAC has also imposed operational restrictions in addition to 1SS-57. While restricted flight does not slow down the rate of crack growth, it does provide a slightly higher margin of operating safety. Therefore, it is important aircrews take these restrictions seriously and not operate outside specified parameters.

members within a crew was superb.

Communication between aircrews was never better, both on the ground and in the air. Returning crews made a point of passing as much information as they could to departing crews. Crews asked as many questions as they could think of to gain as much knowledge of their mission and be as prepared as possible prior to takeoff. A lot of studying and "what iffing" was done prior to and during flight into the AOR. Let's continue that practice during our more routine peacetime missions. Find someone who has been there before, and pick their brain. Study anything you can get your hands on to familiarize yourself with every aspect of your mission and destinations.

I believe good crew coordination was the single biggest factor overall in allowing us to fly as safely as we did. I know there were some "Lone Rangers" out there who tried to do it all themselves, but for the most part, we practiced many of the principles taught in aircrew coordination training. We lived as a crew, flew as a crew, made decisions as a crew. We talked openly to each other. We have to continue to nurture those open lines of communication among crewmembers if we want to improve on our safety record.

Conclusion

So, were we lucky or were we good this last year? If you are like me, you can probably see some of both at different times, different places, different situations in the missions you flew. Reflect on the times you were good, and see how you could have been better. Remember the times you were lucky, and do what you can to prevent someone else from having to be as lucky as you were.

Remember, a successful flight safety program depends on you. Solutions can't be found until the problems are identified. We have had five known simultaneous failures of both ADIs in the C-141 in the past 2 years. Four have occurred in the last year. Only two were initially reported through normal safety channels. The others we found out about by word of mouth. In order to get action on any safety issue, we need your inputs. Review chapter 8 in the appropriate MAC Regulation 55-XX for reportable mishaps. If one of those happens to you, take the time to file a safety report. Above all . . . **FLY SAFE.** ■

Photo by SrA Chris Putnam

C-141s are an integral part of the new Air Force vision.

C-130

LT COL PETER H. MAGARGEE
Air Force Safety Agency

■ FY91 has been a historical year for the C-130. For the first time in the C-130's proud lifespan, we have now gone over 24 months without a Class A or B mishap. The importance of this milestone is doubled considering the fact we were fully involved in a war. We now have a lifetime rate of 1.06 with over 12,659,100 hours flown — very impressive!

From the days of Vietnam, when I first started flying the "Herk," we always had the attitude of "we can," but we always tempered this with much common sense and good judgment. Obviously, a lot of both was used during Operations Desert Shield and Desert Storm. We can proudly say "not only did we do it, we did it safely in a combat environment. But, we all knew we could, didn't we!"

Attitude and training were key players in our success. Only complete mission focus, attention to detail, and a highly effective training program made it happen right. The training just prior to Desert Storm did have an important impact, but also the years of corporate experience through lessons learned played a vital role in developing realistic training programs.

Quite frankly, we learned from our past mistakes, and only through the diligent efforts of many farsighted supervisors did this occur. Aircrew coordination training (ACT) has also helped to minimize the human factors side of this equation. From all this, it is quite evident proactive safety can play a vital role in mission accomplishment and mishap prevention.

Operation Provide Comfort gives us another excellent example where all these elements came together.

The C-130's role is unlimited . . . they even see use as fire bombers.

There is no doubt the weather and the mountains taxed our crews to the max. Only through years of developing flexible drop procedures was a mission of this magnitude and complexity accomplished so effectively and safely. My hat's off to all who were involved.

Operation Provide Comfort saw the C-130s at their best.

Safety Concerns

As we go into FY92, I have many safety concerns for the C-130 community. We have just come through a difficult period where we were pressed to the limits of, and many times beyond, our capabilities. With human factor mishaps on the increase, I foresee the most critical period of time for us will be after we are through the postwar letdown.

When we really start to feel comfortable, complacency can be very insidious. History tells us this — just look at post-Vietnam in the late '70s. In the past 20 years, this post-Vietnam era reflects our worst mishap period. In 1978, we had seven Class A mishaps alone.

Four-engine power loss continues to be a problem in the C-130 world, but it has now taken on new meaning. Just when we thought we had the problem licked with the new solid state synchrophaser and constant volt transmitters, we have had several instances of four-engine rollback in modified aircraft. Warner Robins ALC and the contractor are working hard to resolve this.

But it is not enough; we are attempting to clean up electricity to the synchrophaser. A recent HAP has highlighted a problem with shielding on the new ARC-190 HF radio. When transmitting in certain frequency ranges, strange cockpit indications are occurring (to include complete four-engine rollbacks). Folks, you have to be fast to solve that one! Originally, it was thought the range of frequencies causing this was limited, but as more testing is done on the ARC-190 HF radio, a much wider range is being found.

This brings up a big concern we all must be aware of. The C-130 does have an older electrical system. As we put on new mods, such as ARC-190 or the self-contained navigation system, to name two, we must all watch for unusual occurrences which are fleeting and transitory in nature. We can't just accept them as the norm or just another "manufacturer's fix." Let your safety office know of anything unusual. That's how we found out about the HF radio problem.

There are many ongoing initiatives to upgrade the C-130's electrical system. High on the list is the capability for immediate bus transfer. This is important for the systems such as self-contained or inertial navigation systems which cannot take any interruption in electricity. Also, two new additional avionics buses may be on the C-130s of the future to handle the additional loads. But for now, we must work with what we have. We need to be very watchful for insidious problems with the increasing complexity of the C-130 electrical system, as new, more technically advanced mods are placed on the aircraft.

Another important mod will be the upgrade of the bleed air duct system. Identified through numerous Class Cs or HAPs, the ducting system has several stress points where the old foil-encased ducting is failing. This is especially critical during takeoff when the crew's first indication of a problem is a loud bang. Fortunately, we have had several fast-acting crews who have saved the day. New epoxy-encased fiberglass ducting will replace the old ducting. All aircraft 10 years and older will be the first to be modified and then the new ducting will be changed every 10 years.

The self-contained navigation system upgrade is now well over halfway completed. I see this as a vast improvement to our navigation capabilities for the future. It is somewhat user friendly and makes the cockpit job a lot easier. However, I do see some drawbacks.

First, if you lose the system, you are down to one UHF and one or two ADFs (depending on your model aircraft). That may make your day. Remember what it was like in UPT with only one radio and TACAN? When is the last time you navigated solely using ADFs or shot

continued

HC-130s provide search and rescue support worldwide.

C-130 continued

a no-kidding, ADF approach to mins?

The new navigation system control head on the right side is placed such that right seaters need to use caution with the placement of their seats. There is very little leeway when moving the yoke to the right, between your right hand, leg, and the unit.

Also, if we slowly adapt this system into the IMC low-level drop mode, crew coordination will be of critical importance. The last place you will want to find out that you have incorrect coordinates is IP-inbound.

The Future

I think the future is bright, with many challenges for the entire C-130 community. I had the pleasure to fly in one of the 1991 H models and was very impressed with all the positive upgrades. Many of these changes have come out of lessons learned through the safety process. Such upgrades as Ground Proximity Warning System and betta lights provide a significant increase in the potential of technology to help prevent future mishaps. Put simply, the technology helps protect us from our machine and ourselves.

As this technology advances, logistical failures will be on the decrease. But it would not be realistic in this time of budgetary constraints to say this was going to happen overnight. So we must be prepared for anything to happen.

This is where realistic training programs are worth their weight in gold. ACT must provide dynamic situations so our crews will gain maximum value from them. Expanding efforts, like Joint Readiness Training Center at Little Rock AFB, Arkansas, and the Advanced Airlift Tactical Training Center at St. Joe, Missouri, play an important role in preparing our crews for the future. Along with all these programs, the caring for, and understanding of our aircrews, is paramount in preventing mishaps.

As I mentioned earlier, we must all take an active part in the safety process. We fly a complicated aircraft in which many things can, and do, go wrong — but just because they are transitory in nature (or it's a nice VMC day, and we made it anyway) is not a reason to overlook their importance. You can take a very active role in mishap prevention and allow the safety process to work aggressively by keeping the safety shops aware of what is going on in your aircraft. The last place we needed to learn about HF radio interference was during a heavyweight max effort takeoff. We didn't because people spoke up.

Again, congratulations to all who fly, maintain, and modify the C-130 on our best 24 months ever! Keep up the outstanding effort. ■

Where Have All the C-130s Gone?

Many have asked, "What's going on with the C-130 fleet?" Please note a majority are now in the AFRES/ANG.

USAF C-130 DISTRIBUTION

ANG	222
MAC	213
AFRES	163
AFSOC	62
TAC	24
AFSC	22
USAFE	3
AFLC	1
	710

As of October 1991

Controllers to pilots and back again

Adapted from *Air Traffic Control Digest*

■ In the *Airman's Information Manual*, paragraph 4-31, it correctly states the single most important thought in pilot-controller communications is "UNDERSTANDING." It is essential pilots acknowledge each controller instruction. In radio communications, brevity is important, but concise phraseology may not always be the most adequate medium to get your point across. In such cases, use whatever words are necessary. These procedures have been incorporated into *Federal Aviation Administration Handbook* (FAAH) 7110.65F, change 5.

The next most important element in communications is LISTENING. The Air Force, in AFP 50-34, Volume I, *The Enlisted Performance Fitness Manual*, defines "listening" as THE neglected communications skill. Most people are not formally instructed in the art of how to listen effectively. Research shows most of us spend 7 out of every 10 minutes in some form of communication, and of those 7 minutes, 45 percent is spent listening (or is it just hearing?).

Obstacles to listening are classified into five general categories, but you should be concerned with conceptual and attitudinal.

Conceptual: In Air Traffic Control, listening and understanding cannot be treated as passive and natural activities. EFFECTIVE LISTENING AND UNDERSTANDING TAKES BOTH WORK AND TOTAL INVOLVEMENT.

Attitudinal: Our attitude is a major obstacle to effective listening. We have a tendency to judge, evaluate, and approve or disapprove based upon what we hear, understand, accept, and/or reject. Because we are controllers, we sometimes adopt a "superiority attitude." That is, talkers are "superior" while listeners are "inferior." Remember this because it might apply to someone you know personally.

THE MORE AGGRESSIVE A PERSON IS (and as controllers, we all are), THE GREATER THE TENDENCY IS FOR THAT PERSON TO TALK, IN ORDER TO CONTROL THE SITUATION RATHER THAN LISTEN TO WHAT OTHERS HAVE TO SAY. There is little correlation between intelligence and listening. We do not become better listeners simply because we get older or are in the job longer. On the contrary, we tend to become less effective listeners as we get older. There is one thing which really distinguishes hearing from listening. Hearing involves simple receiving. Listening means being involved.

RADIO AND LANDLINE COMMUNICATIONS ARE THE CRITICAL LINK IN THE AIR TRAFFIC CONTROL SYSTEM. It is also the weakest link. FAAH 7110.65F, Chapter 2, Section 4, deals with communications. It assumes we know how to listen effectively. We all know what assume means. ■

KC/C-135

MAJOR C. TERRY ANDERSON
Air Force Safety Agency

■ When you read this article, the C-135 will be 36 years old, older than most of the crews who fly it. Aircrews, maintainers, and staff all combined to make this a banner year for the military derivative of the Boeing "Dash 80." Although we had one Class A mishap, there were no destroyed aircraft, and, more importantly, we lost no lives this year; nor did we have any Class B mishaps, giving us a 0.33 Class A and zero Class B mishap rate for FY91. This was our first year to do better than the "other" USAF tanker.

This year's rates were directly attributable to the maintainers and crews who put the aircraft into the air and operated them there. The job you did is summed up in a message from a senior USAF staff member who said, "You can't kick _____ without tanker gas." Regardless of what fighter pilots say of us around the bar, they appreciate us in the air. The comments are welcome, appreciated, and timely.

Here are the fixes in the works for the majority of the C-135 users:

Digital Autopilot

Bad gaskets in the accelerometer sensors have been fixed, **new gyros have been procured,** and the software has "detuned" a digital autopilot designed to work with totally hydraulic flight controls. The cable and pulley system in the C-135, while more reliable, is just not as responsive as the autopilot expected. Autopilot restrictions should have been lifted by now on nearly all of our aircraft.

Fuel Savings Advisory/Cockpit Advisory System

A contract to replace these systems was released for bids in July 1991 but is being contested by a contractor in court. You can expect a new system in place 3 to 5 years after contract award. In the interim, I highly recommend each unit construct and use the fuel panel guard described in TO 1C-135-2-11-6, Pages 5-40, Figure 5-25A. Some of our

most experienced aircraft maintainers and operators use them. Local manufacture is authorized. Using this panel will help prevent inadvertent drain valve and pump actuation. That may stop your unit from resting a tanker on its tail.

Some of the problems with the fuel indicating system may be the fuel sensing probes. Thank you for completing those fuel savings advisory/cockpit advisory working sheets. Now we will be able to pinpoint the problem areas for the manufacturer of the new unit.

Air Refueling Pumps

AFLC has been working hard on the automatic pump shutoff. The engineering division has gone back to basics in their approach to C-135 modifications. They are ensuring what they give us will work the first time it is fielded. In order to do this, they must design it, test it, fix it, test the fix, and fix it again as many times as necessary to be sure we get a product that does not have to be "modified" after issue.

Several OUTSTANDING NCOs in the 434 AREFW at Grissom AFB, Indiana, suggested the fix be pursued. These professionals are dedicated to getting us a good system and have been working with the C-135 longer than most of us have been in the USAF.

Presently, we have a system that works too well. The shutoff switches operate too quickly and too often. Less sensitive switches are installed on one aircraft. The switches are handmade. It takes up to 3 months to receive new ones which would be less or more sensitive. Then, it takes 30 flights to get a statistically significant number of operating hours to determine if they will work over the long haul. (So from the time we determine a change needs to be made until we find out if the fix works could be as long as 9 months.)

We hope to see kits issued for fleet installation by early summer. Not only will the pumps shut off automatically, an indicator light at the IP's station (that's the only place there was enough room) will tell whenever the hydraulic valve is energized open, to allow hydraulic fluid to operate the pump. The override switches will be on the same panel, adjacent to the lights.

Speaking of A/R pumps, ALC plans to rebuild all our existing pumps and then rebuild them again every second or third PDM cycle, so the bearings will never reach critical wear limits. In the future fight for limited funds, we need to make sure this happens.

Summary of Other Modifications

Re-engine. We are still getting three R-models per month. Estimated completion date (ECD): 2004.

Re-wire. Plans call for complete rewire, but presently only 20 percent of the wiring in each tanker is being replaced. ECD: 1994

New Aircraft Batteries — APU and INS/DNS batteries. We are dropping the existing NICAD batteries from use.

Corrosion Control. An engineer at OC-ALC is working hard to initiate application of corrosion preventive compound (CPC) to areas opened by rewire work. If CPC is not applied now, the C-135 fleet may not last an additional 20 years without major structural repair.

New Paint. In continuing the bat-

continued

The engineering division has gone back to basics in their approach to C-135 modifications.

C-135 continued

tle against corrosion, the C-135 will be repainted the same color as the nose of an F-16, duck-egg blue. Gloss paint would be much more effective against corrosion, but for tactical reasons, the paint will be flat.

Boom Interphone System. After years of frustration in both operations and maintenance, OC-ALC has found what promises to be the real fix. It should be fielded in February 1992.

Human Factors. It is tempting as operators to point at engineers and logisticians and agree they are doing a number on us. Unfortunately, this is neither fair nor accurate. Let's look in the mirror for a minute. Of the 23 Class A mishaps in the last 15 years, 16 have been caused by operations.

Aircrews, you have *some* control of your training and *complete* control of compliance with established procedures. If unsure of a system or specific procedure, go to training flight and get help. They get paid to train you. **Use them.** Plan and fly each mission as though the DO or Stan/Eval was on board.

Our TOs and directives are too often written in blood. If you really cannot abide by a directive or procedure because you perceive it is too restrictive, try to change it. If unsuccessful, ask yourself, "Am I willing to teach my crew/crew chiefs it is okay to obey only some of the rules?" Obviously, the answer to that question has to be "no."

Cockpit Resource Management (CRM)

CRM training is in full swing. The AFRES and ANG have funded their own version, so now more C-135 operators have the training available. Write me and let me know how CRM is working out (HQ AFSA/SEFB, Norton AFB CA 92409-7001, or call DSN 876-3416). We had no crew error mishaps in 1991, and we believe CRM had something to do with it.

Future Challenges

MAINTENANCE: I don't know if future challenges will be more or less, or just of a different sort, but things will be different. Elimination of alert may reduce time to work "delayed discrepancies." There may be more TDY to support other weapons systems. The burden of maintaining the oldest airframe in the Air Force, one which may also soon begin assuming greater roles, will almost certainly increase.

The KC-135 is 36 years old, and all operators and maintainers made it a banner year for this tanker!

There were no crew error mishaps in 1991!

If we treat the C-135 and its descendants with respect, it will perform faithfully for another 36 years.

Presently, 60 percent of maintenance man-hours expended on the C-135 are consumed by fuel leak repair and corrosion control. Maintainers are already taking a greater role in corrosion control. Fortunately, the C-135 lower wing has been reskinned, but other structures need to be constantly monitored. Areas that have never before been examined will need to be inspected for corrosion and metal fatigue.

With budget cutbacks and PDM contract changes, be vigilant of the PDM work that returns. Occasionally, aircraft return that have some discrepancies. They, too, are under down-sizing pressures.

Maintainers, YOU HAVE MORE RESPONSIBILITIES (TASKS TO PERFORM) AND FEWER PEOPLE TO DO THEM THAN EVER BEFORE. You have to know more, remember more, and perform better than ever. Rely on supervisors to help with situations that you have never before faced.

Operations

On 28 September 1991, for the first time in 34 years, the SAC alert force stood down. By mid-1992, SAC will no longer exist as a separate MAJCOM. Maintaining current systems knowledge, brushing up on EPs, cautions and warnings, and accomplishing additional duties — even spending time with families — will probably be done in different ways or at different times. Aircrews will operate under a different command structure which may or may not have a history of working with large aircraft. Before beginning operations in these new environments, consider:

- What stresses are being put on your old jet, and was it designed to fly these profiles?
- What needs to be done to accomplish this task the right way the first time?
- Can new profiles be tested on a small scale first?
- Can crews train incrementally, then maintain proficiency by staying current?

C-135 crews will have to be just as flexible to new ways of accomplishing new missions while relying on past proven methods for minimizing risk. The jet will fly the same. It does not care if it carries a cargo of pallets, fuel, or some of both. Nor does it matter what color or shape patches the operators wear.

If the USAF is still flying in another 30 years, the C-135 will still be flying. Boeing did their homework, and built the DC-3 of the jet age. If we treat the C-135 with respect, fly it the way it was designed to be flown, it will perform as faithfully as it has for another 36 years. ■

EQUIPMENT AVAILABLE

Safety improvements developed but not yet funded include:

- An advanced boom nozzle — will give the boom operator an independent disconnect capability even if the receiver's receptacle fails or is in override. It is further improved to insure no binding during disconnect. These two improvements could eliminate brute force disconnects. It also protects seal surfaces and reduces the possibility of fuel spray during contacts. Improved signal system — it also has quick removal and replacement features.
- Improved boom nozzle light which employs two independent and brighter lights. It provides redundancy and also reduces the pressure on the boom operator to refuel in less than adequate lighting conditions.
- A new air refueling pump with higher capacity that is also explosion proof.
- New ground support equipment has been developed that enables a ground check of the boom's electrical, mechanical, interphone, fuel flow transmitter, and pressure flow regulating systems. Other equipment has also been developed to check all the above functions on the drogue.

KC-10

MAJOR C. TERRY ANDERSON
Air Force Safety Agency

■ During Desert Storm operations, this big bird really came through and proved to the entire world what a great system it has become. Called upon to perform at extraordinary levels, the KC-10 did just that; in FY91, it flew 34 percent more than in any year of its history.

In spite of our best efforts this year, the KC-10 experienced two Class A and one Class B mishaps. Fortunately, no lives were lost.

Class A Mishap

Twenty minutes after takeoff, the MAC channel mission crew experienced severe vibrations from the no. 2 engine and two hydraulic system losses. The vibration was so severe the crew could not read their instruments. After securing the engine, the crew did a superb job recovering the aircraft.

Class B Mishap

The second day out on another MAC channel mission, the boom operator discovered a clear fluid in the air refueling operator's compartment. After an extensive search, he and other crewmembers located a pallet that was leaking fluid. The leaking "fluid" caused noxious fumes requiring emergency ventilation of the aircraft upon landing. Several batteries were not labeled correctly and were shipped on their sides. After 36 hours, the jellied acid ran out of the batteries into the aircraft. A superior job by the crew and tremendous effort by the crew chiefs limited the damage.

Class A Ground Mishap

Night deployed operations, nonstandard parking, ramp congestion, and human factors resulted in a Class A ground mishap. One KC-10 was parked well forward of normal, giving less clearance from the taxi line. Even the use of a marshaler did not prevent the wingtip of a passing KC-10 from striking the cockpit of the mispositioned KC-10. Class A damage resulted, but no one was injured.

Additionally, the KC-10 experienced 15 Class Cs and 4 HAPs last year. Of these mishaps, seven involved probe-and-drogue refueling, and five occurred in the last 4 months of the fiscal year. One of these resulted in Class A damage to

the receiver even though the pilot recovered the aircraft successfully. At the time of this writing, we have not yet determined the cause of these problems.

Also, requests for drogue refueling have increased dramatically, and the more frequently the drogue is used, the greater the chance for encountering problems. This fact at least partially explains the larger number of mishaps. Of the other mishaps, three were training or systems knowledge problems; two were cargo shifts in flight; two were tail cone access door problems, and the others were single, isolated incidents. In the one incident, the crew was unable to determine the reason for the high deck angle during approach and scraped the tail of the aircraft on landing. In another, the crew did not know how to properly operate the weather radar.

Ongoing and Proposed Modifications

The most visible change to the Extender is the addition of wing-mounted refueling drogue pods. Presently, 11 aircraft will be modified to accept the pods. Expect this number to be increased.

The *onboard loader* is replacing the LITE loader, courtesy of the 4950 AMD. It will handle 6,500 pounds, and assembly will be reduced to less than 4 hours by a team of three. It is less bulky and more capable. Testing of the prototype begins in February 1992.

The Aircrew Eye and Respiratory Protection System (AERP), an additional chemical/biological warfare defense system, began to be installed in August 1991. As aircraft return from their "C" check, they should be modified.

Several internal communications modifications are in progress:

- *ARC-190 Liaison Radio* and an automatic communications processor replaces the 618T2 HF radio. Estimated start date: May 1992.
- *KY-58 — Remote Control Head Keying* places a key head at the flight engineer's station. Installation begins in March 1992.
- *AEPDS — Automatic Emergency Action Message Processing and Dissemination System* — proposed only.
- *INS Software Changes* will reduce the number of nuisance faults displayed — presently in progress.
- *Global Positioning System* integration into navigation systems — currently in study stage only.

Changes

Changes are coming faster than ever before. One-third of the Extender fleet belongs to TAC; others may follow. New operational and career challenges are certain to present themselves. High, professional standards, an open mind, and good judgment are essential to meet these changes. (Take a look at the "future challenges" section of the C-135 article. The weapons system missions may become even more alike.) Distraction or inattention during flight preparation or execution can be fatal. Good crew coordination is essential to effectively complete every mission.

1991 Forecast

Although the KC-10 had its first flight Class A, first Class B since 1987, and third ground Class A, AFSA predicts no Class A mishaps for FY92. Despite the FY91 record (1.46), the KC-10 still has an excellent safety record, only a 0.29 lifetime Class A rate, the best of any USAF large transport. Let's make FY92 a Class A mishap-free year! ■

Photo by Mike Billig

HELICOPTERS

LT COL RONALD C. CUNNINGHAM
Air Force Safety Agency

■ "You can't help but have the feeling there will come a future generation of men who will look at old pictures of helicopters and say, 'You've got to be kidding!' Helicopters have the look that certain machines have in historical drawings — machines or devices which came just before a major breakthrough. Like the record player before the compact disk, for instance. Mark Twain once noted he lost belief in the conventional pictures of angels from his boyhood when a scientist calculated for a 150-pound man to fly like a bird, he would have to have a breastbone 15 feet wide and supporting wings in proportion. That's sort of the way a helicopter looks."

So wrote the late Harry Reasoner in the preface to his more well-known treatise, *Helicopter Pilots are Different*.

These rotary-wing wonders which seem strange to our fixed-wing brothers will be here for some time to come. The breakthrough, the CV-22 Osprey, is not yet part of the inventory. It is, therefore, critical for us to look at the past year's mishaps, learn from them, and apply our knowledge to further mishap prevention.

The efforts of commanders, supervisors, aircrews, maintenance, and support personnel performed superbly during Desert Shield and Desert Storm — no Class A or B mishaps. This is remarkable considering 75 percent of the combat missions flown by the H-3, H-60, and MH-53 aircrews were accomplished on NVGs. We were not as fortunate in daily training and exercise scenarios.

Class A Mishaps

In FY91, there were two Class A mishaps creating an annual rate of 3.09. There was also one flight-related Class A mishap not included in the annual rate.

The first mishap involved a UH-1N conducting a night instructor pilot upgrade sortie. One hour into the flight, the aircraft impacted the ground and was destroyed. The pilot and flight engineer (FE) were fatalities. The copilot and a second FE received major injuries. This was the fifth H-1 lost in the past 10 years.

An AFSOC MH-60 was no. 2 in a formation conducting an incentive flight to support personnel following an exercise. The aircraft crashed in shallow water. Three of the eight individuals on board were injured. This is the second loss of an H-60 since entering the inventory in 1982. There has been a dramatic increase in flying time on the roughly 40 H-60s in the active, Reserve, and National Guard squadrons, going from 8,000 hours in FY90 to almost 15,000 this year.

The final Class A was a flight-related mishap involving an MH-60G hoisting two exercise participants in a combat SAR scenario. The hoist cable broke when the forest penetrator was 10 feet below the aircraft, fatally injuring both the participants.

Class B Mishaps

An HH-1H was conducting rappel and extraction training in a 35-foot hover when it lost power. The pilot maintained collective position, allowing personnel on the ground time to clear. The aircraft landed hard, causing major structural damage. The crew egressed safely. The main drive shaft began to fail due to overheating, causing the power loss.

The second Class B mishap occurred when an MH-53J made an unexpected landing on a sand dune. The aircraft was conducting

its second hover coupled approach on NVGs. The Pave Low 53 sustained major damage as a result of the hard landing.

Class Cs and HAPs

There has been a significant reduction in the number of Class Cs and HAPs over the last 9 years, from a high of 105 down to 29 for FY91. Part of this can be attributed to a reduction in total helicopter hours flown — 92,000 to 65,000 in FY91. A more significant reason for this reduction may be a change in reporting criteria in these areas. There were no remarkable trends to mention.

Summary

There were tragic losses this last year. The loss of even one crewmember among our numbers is felt by all. We continue to fly an aging fleet in a demanding and increasingly complex environment. There were logistics factors that surfaced, and they will be pursued.

An area which has received renewed interest is cockpit resource management. Human error causes around 75 percent of our Class A mishaps. Pilot error is not a finding — it masks underlying reasons why the mishap occurred. Human factors training programs designed to improve decision making and crew coordination were started by MAC in 1986. MAC's Aircrew Coordination Training (ACT) helped reduce MAC's mishap rate by 51 percent compared to a 21 percent Air Force-wide improvement.

SAC started their CRM program in 1990. ATC began a similar program in 1991. The TAF in Europe started its program in late 1991. TAC began Aircrew Attention Awareness Management at basic fighter transition in the fall of 1991. AFSOC has surfaced an interest in annual crew coordination training.

With the recent activation of the newly modified MH-53J simulator at Kirtland AFB, New Mexico, and the advent of the MH-60G simulator this summer, the opportunity exists to renew an annual ACT program. For the H-1 and H-3 community, a simulator is not a prerequisite for a good ACT program. Your facilitators should be obtaining the latest information from Kirtland for an active, annual ACT. The MAC statistics prove ACT is one very good way to reduce mishap rates. This next year can be safer if maintenance, support, and aircrews focus their efforts. ■

Special missions require the best crew coordination from helicopter pilots.

Photo by Bob Simon

H-3 "JOLLY GREEN" UPDATE

Some of you have been asking yourself what's happening to all the H-3s being replaced by H-60s? Last count there were around 30 of the old birds still flying. The only reserve units still flying the HH-3 are at Homestead AFB, Florida, and Davis-Monthan AFB, Arizona. These veterans from Vietnam even saw some action during the Gulf War, equipped with some priority directed GPS and FLIR systems. Active duty Air Rescue squadrons still flying under the "Jolly" call sign include the 56th at Keflavik AB, Iceland, the 41st at Patrick AFB, Florida, and the 33d at Kadena AB, Japan.

To answer your question, I can say all the H-3s are not headed to the "boneyard." It seems the Army knows a good deal when it sees one. They have 9 and want 40 more. But all is not lost. The Smithsonian Air and Space Museum has asked for tail number 66-13290. It had an impressive record in Vietnam and won the Air Force Cross for Capt Leland Kennedy. That will be a fitting honor when the H-3 finally leaves the Air Force inventory.

The Berlin Airlift

LT COL JIMMIE D. MARTIN
Flying Safety, April 1, 1988

■ "Friday, Black Friday, Friday the thirteenth of August, 1948, is a date many of us who served on the Berlin Airlift wish we could forget." So begins General William H. Tunner's description of the Berlin Airlift in his book, *Over the Hump,* published by the Office of Air Force History.

Background

After World War II, Germany was divided into four zones of Allied occupation. The American, British, and French zones covered the western two-thirds of the country while the Soviet zone covered the eastern third. Although Berlin was deep inside the Soviet zone, it was also divided into four sectors because of its importance as the capital city and center of German culture. The Western allies were granted access to Berlin by one railway; one main highway for motor convoys; a canal for barge traffic; and three air corridors, each 20 miles wide. However, only the air corridors were guaranteed in writing.

Relations between the Western allies and the Soviets deteriorated in the years following the 1945 agreements. The final issue that led to the Berlin blockade was currency reform to control the runaway inflation. After the western allies agreed to make the Deutsche mark the only legal tender in Berlin, the Soviets suspended all surface traffic into Berlin from the west on 24 June 1948 due to "technical difficulties."

The only way left to supply the needs of the 2½ million people in

West Berlin was by air — a feat the Soviets and many other people thought was impossible. Except for the "Hump" airlift of World War II, no one had been successful in providing resupply solely by air. And the "Hump" airlift had not had the restrictions of Berlin. This was indeed a severe test for the U.S. Air Force, still in its first year as a separate service.

The Airlift Begins

General Lucius Clay, American Military Governor of Germany and Commander, United States Forces in Europe, began the airlift as a temporary measure. Knowing that coal would place the greatest burden on the airlift, General Clay telephoned Major General Curtis LeMay, commander of USAFE, to ask if he could transport coal by air. General LeMay's answer was, "Sir, the Air Force can deliver anything."

Prior to the blockage, West Berlin had imported 13,500 tons of supplies per day. The Air Force had 102 C-47s in Europe and 2 C-54s. The C-47s could carry 2½ tons, and the C-54s had a 10-ton capacity. The British had 60 C-47s, which they called the Dakota, and 50 Yorks which could carry a little over 8 tons. The French were heavily involved in Indo China and couldn't spare any aircraft.

The airlift began on 26 June, and in the first 48 hours, delivered 80 tons of flour, milk, and medicine to Berlin. The Americans dubbed the airlift "Operation Vittles," while the British named their airlift "Operation Plane Fare." The estimated basic subsistence level for Berlin was 4,000 tons per day, and General Clay estimated the maximum airlift capability at 700 tons per day. The shortfall was covered by a 30-day stockpile of supplies accumulated in Berlin before the blockade started.

By 7 July, the airlift had reached a level of 1,000 tons per day. By mid-July, the Americans were delivering 1,500 tons per day, and the British were adding 750 tons per day to the total. But still, there were problems.

Operation Vittles was enthusiastically reported by the press. Ironically, some of the things they praised actually indicated an inefficient operation. Newspapers told of pilots who continued flying despite exhaustion. Many were flying twice as many hours as they should. Desk officers went to the flight line whenever they could and found planes sitting there waiting for them. In spite of the excellent job being done by the officers running the airlift, General Tunner felt the job should be done by professional airlifters.

As he put it, "the last place you should find this type of activity is in a successful airlift. The actual operation of a successful airlift is about as glamorous as drops of water on stone. There's no frenzy, no flap, just the inexorable process of getting the job done."

General Tunner Takes Over

At the end of July, General Hoyt Vandenberg, Chief of Staff of the Air Force, put General Tunner in charge because of his experience in running the "Hump Airlift." With a hand-picked staff of 20 officers and a secretary, General Tunner left for Berlin, expecting to be back within 90 days.

When he arrived in Berlin, he described what he saw as ". . . a real cowboy operation. Few people knew what they would be doing the next day. Neither flight crews nor ground crews knew how long they'd be there or the schedules they were working. Everything was temporary."

It was obvious to General Tunner that although more aircraft were needed to meet the required tonnage, there was a limit on the number that could be used because of the limited airspace in the corridors and scarce ramp space. "We were going to have to shoot for a high

continued

After World War II, Germany was divided into four zones of occupation. Berlin was similarly divided, and the western allies were guaranteed access. However, the three air corridors were the only peaceful way to supply West Berlin during the Soviet blockade.

GERMANY (1948-49)

BERLIN (1949)

utilization rate for each plane, rather than a large number of planes themselves. This would be the headache of my maintenance men."

Maintenance The existing maintenance schedule was impossible. The maintenance operation was housed in crowded facilities and was responsible for both routine maintenance and for major periodic inspections. There was a serious shortage of tools and spare parts in the theater.

Eventually, these problems were solved by performing periodic inspections at depot and allowing German mechanics to work on the aircraft. However, it took the personal intervention of the Secretary of the Air Force, Stuart Symington, to complete the solutions.

Maintenance was one of the biggest problems of the Airlift. In the beginning, there was a shortage of qualified mechanics, spare parts, and tools. Some of the mechanics actually had to buy their own tools.

Airspace The American corridor was the longest of the three. A spur of the Harz Mountains required a climb to 5,000 feet. The Central Corridor was restricted to one-way traffic out of Berlin. The terrain was low and flat all the way, and the distance was shorter. The North corridor was also short and over flat country.

"Simple arithmetic showed that we would be able to get a higher rate of utilization out of our planes by using the two shorter corridors, in one and out the other. The tonnage that required a 1½-hour trip from Rhein-Main required only a 1-hour trip from the RAF bases at Fassberg and Celle; thus, two planes based at Fassberg could do the work of three based at Rhein-Main. As I have already noted, the two northern routes lay over low and level country. We could come in on the deck if we wanted to." After much negotiation, General Tunner succeeded in setting up a combined British-American airlift operation using the two northern corridors.

Airfields All planes were required to land at two airfields, Templehof in the American Sector and Gatow in the British. These fields were 4 minutes apart by air and in the midst of a checkerboard of Soviet fields. Both Templehof and Gatow were inadequate and were eventually improved through a combination of American ingenuity and German hard work. Improvements included the addition of runways and aprons. Also, a new airfield in the French sector, Tegel, was built from scratch.

Schedule The schedule was ragged with frequent delays. General Tunner eliminated the turnaround delays by requiring the pilots to stay with their aircraft in Berlin. While the aircraft was being unloaded, the crew was given ops briefings, weather briefings, etc., at the aircraft, and a mobile snackbar (operated by pretty German Red Cross girls) supplied coffee and doughnuts and other snacks. The turnaround time dropped to 30 minutes.

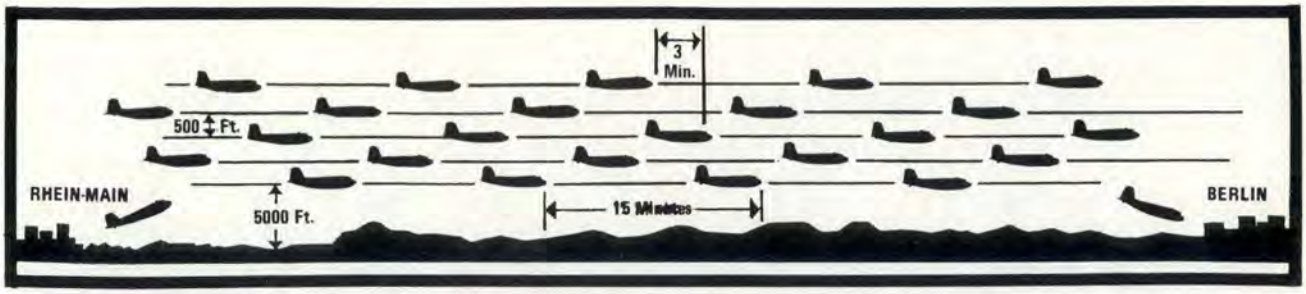
He also standardized flightpaths and times. "What we needed on this run was one standard and constant set of flight rules to govern all planes at all times . . . I thus decided all planes under my command would fly a never-changing flight pattern by instrument rules at all times, good weather or bad, night or day."

The timing was set up with takeoffs at 3-minute intervals because it was an ideal cadence of operations with the control equipment available at that time. This was based on the fact there are 1,440 minutes in a day. In a 24-hour period, there would be 480 landings at an airfield. That meant every 90 seconds there would be an aircraft either taking off or landing. "It is this beat, this precise rhythmical cadence, which determines the success of an airlift. This steady rhythm, constant as the jungle drums, became the trademark of the Berlin Airlift . . ."

Black Friday When the Berlin Airlift was 7 weeks old and General Tunner had been the commander for 15 days, he was flying to Berlin in a C-54 to attend a ceremony honoring this efficient, smooth-running operation. While they were en route, the weather closed in and both the tower operators and ground control approach operators lost control of the situation.

One C-54 crashed into a ditch off the departure end of the runway and caught fire. Another C-54 pilot blew both tires on landing to avoid running into the fire. A third pilot landed on an auxiliary runway that was still under construction, sliding in the rubber base until he finally

Just as it had on the Hump Airlift of World War II, the versatile C-47 provided the backbone of the Berlin Airlift. Over 100 Gooney Birds flew around the clock carrying supplies in and bringing out finished products manufactured in West Berlin.



For safety and efficiency, the aircraft were separated by time and altitude. They were spaced 3 minutes apart for takeoff and landing. The five flight levels were later reduced to two, but the spacing remained at 3 minutes.

ground looped the aircraft.

With all the confusion and planes still arriving at 3-minute intervals, air traffic control began stacking the aircraft up. By the time General Tunner's aircraft arrived, the stack reached from 3,000 to 8,000 feet and was still building. The air was filled with radio calls from worried pilots near panic who were trying to find out what was happening.

Things weren't much better on the ground. A traffic jam developed as aircraft left the unloading line at 3-minute intervals for takeoff and were told to hold. The controllers were afraid to clear them for takeoff because they might hit the aircraft milling around overhead.

General Tunner grabbed the mike and said, "This is 5549, Tunner talking, and you listen. Send every plane in the stack below and above me home. Then tell me when it's okay to come down."

There was a moment of silence, then an incredulous-sounding voice said, "Please repeat."

"I said: Send everybody in the stack below and above me home. Then tell me when it's okay to come down."

He got the message that time. "Roger, sir," he answered.

General Tunner felt the real success of the airlift stemmed from that Friday the 13th. Out of this incident came another one of his new, unconventional rules:

"If a pilot should happen to miss his landing for any reason whatsoever, he would continue straight out on course and return the 200 to 400 miles to his home base . . . If the ceiling was over 400 feet and visibility a mile or better, he would come in. If the ceiling was less than 400 feet, visibility less than a mile, he would simply shove forward his throttles, breathe a sigh of regret at missing the hot coffee and doughnuts and pretty girls in the Red Cross truck, and proceed for home base.

"I stated publicly that I would reduce to copilot status any pilot who failed to land with ceiling and visibility greater than 400 feet and a mile, and that I would court-martial any pilot or reduce anyone to copilot status on these counts — I never had any intention of doing so in the first place — but the message got across."

People and Pounds To improve morale while increasing tonnage, General Tunner appealed to the American spirit of competition and instituted daily quotas for the units. Each unit's accomplishments were printed in the Airlift's daily newspaper, the *Task Force Times*. It worked! Tonnage steadily increased far beyond predictions and morale also improved.

The last great push came on Easter Sunday, 1949. In that 24-hour period, they flew 1,398 flights and carried 12,941 tons of coal. That was averaging close to one flight for every one of the 1,440 minutes in the day. Throughout the entire operations, flying safety remained paramount. There was not one mishap or injury.

The End of the Blockade

General Tunner summed up the achievement. "It was that day, that Easter Sunday, I'm sure, that broke the back of the Berlin blockade. From then on we never fell below 9,000 tons a day; the land blockade was pointless. A month later, May 21, 1949, the Soviets grudgingly reached the same conclusion and ended it. Surface traffic began to move.

"We continued the airlift at more or less full capacity for 3 more months, building up a stockpile of reserves in the city just in case the Soviets might start the blockage again, and then gradually began to let down. By September 1, it was all over. In a total of 276,926 flights, the Airlift had hauled 2,323,067 tons into Berlin."

The official cost estimate for the American contribution was $300 million, although General Tunner felt it was much lower. However, he concluded, "Whatever the cost, the Airlift had done its job, and West Berlin was free. We had shown the world what the free nations could do."

Not only had they shown the free nations could complete an airlift operation considered impossible, but also that they could do it safely.

"Never, from the very beginning of my command until the end, had I subordinated flying safety to any other phase of operation. Despite our round-the-clock operation and the miserable weather conditions, our accident rate on the Berlin Airlift was less than the overall average for the United States Air Force.

"Of the total number of lives lost on the Airlift, 72 in all, of whom 35 were American, the great majority resulted from nonflying accidents. One of the many journalists who visited us, on looking at our accident figures, burst out: 'Why, I'm safer on the Berlin Airlift than I am flying between Washington and New York!' " ■

MAINTENANCE MATTERS

JP-8 Transition

■ The Air Force is switching from JP-4 to the less volatile JP-8 as its standard jet fuel. During the conversion, there will necessarily be quite a bit of commingling of the two jet fuels. While the mixing of these two fuels will not adversely affect engine performance, it can increase the possibility of fire and explosion.

Mixing the fuels causes two problems. For one thing, it lowers the flashpoint of the JP-8. In fact, an addition of only 2 percent of JP-4 can lower the flashpoint by 10 degrees. This means the flashpoint would be lowered from 110 to less than 100 degrees which is the minimum acceptable for safe use.

The second problem is mixing fuels can create an explosive atmosphere. By themselves, JP-4 and JP-8 do not create a particularly dangerous atmosphere. This is because JP-4 with its high vapor pressure generally creates an oxygen-poor atmosphere in an aircraft fuel tank (the word "generally" should be emphasized because fuel vapors should always be considered hazardous). On the other hand, JP-8 with negligible vapor pressure provides an atmosphere containing relatively little volatile fumes. But in various proportions, mixtures of JP-4 and JP-8 can create an atmosphere with just the right amount of fumes and oxygen to support a fire or explosion.

Fortunately, the hazards of commingling the two jet fuels can be reduced significantly by following some basic rules. To minimize the effect on the flashpoint of JP-8 and to lessen the possibility of creating an explosive atmosphere, add JP-8 to the least amount of JP-4. If possible, defuel the aircraft. The small amount of JP-4 drained from an aircraft can be returned to bulk storage tanks of JP-8 without significantly affecting the flashpoint.

Since the greatest cause of static buildup during refueling operations is the flow of fuel over and through fuel cell foam, the possibility of static discharge can be lessened by reducing the fuel pressure during single-point refueling and by avoiding refueling over the wing. It is also important to make frequent checks of fuel vent areas for smoke or soot that may indicate a fuel cell fire.

The Air Force's transition to JP-8 as its standard will not only significantly lessen the hazard of fire and explosion during maintenance operations, but it has also been estimated that with JP-8, the probability of postcrash fire is 12 percent less, and combat-induced fires will be reduced by as much as 31 percent.

Understanding the properties and hazards of jet fuels can also pay safety dividends. TO 42B-1-1, Quality Control of Aviation Fuels, contains some good information about the properties of jet fuels. Section VI contains important information on JP-4 to JP-8 conversion.

(For an interesting article on JP-8, see "The Big Switch," *Flying Safety*, January 1990. ■

Chafing

Although choosing the correct MIL SPEC is critical, even the correct type of wire can cause serious problems if it is not correctly installed. Improper routing of aircraft wiring almost always causes chafing, often with catastrophic results. In-flight fires and erroneous instrument indications caused by chafed wiring can challenge even the most experienced of aircrew. Many aircraft have been lost because of wire chafing.

Recently, the crew of a C-130 discovered a major fire in the cargo compartment. After a few tense minutes, the crew managed to isolate the defective circuits and extinguish the fire. Back in the chocks, a maintenance team found the fire was caused by a chafed wire bundle improperly routed through a lightening hole in a bulkhead.

The procedures for routing aircraft wiring are rather lengthy and beyond the scope of this article, but they are covered in detail in TO 1-1A-14.

Healthy electrical and electronic wiring is a must for flight safety. The next time you are required to install or replace an aircraft wire, take some time to review TO 1-1A-14. The time will be well spent and may prevent the loss of an aircraft. ■

OPS TOPICS

We Don't Make These Stories Up!

■ Sometimes, the pages of "Ops Topics" or "Maintenance Matters" must seem to be little more than the product of a writer's imagination here at *Flying Safety.* Not at all! Every story has an actual event as its source, although we do try to protect the "innocent" when we re-write the event for the magazine. Take, for example, the following tale.

Two T-38 Talons were working in the overhead pattern while a T-37 Tweet was following the taxi route out to its runway. The Tweet approached the active T-38 runway and waited for clearance to taxi across the approach end. One of the two Talons completed a touch-and-go, and the other announced base leg with gear for a no-flap pattern. The controller (sitting in the runway supervisory unit) cleared the Tweet to taxi across the active.

After a short delay, the Tweet started moving, and not until in the middle of the runway did the crew notice the T-38 on *short final.* The Talon crew had seen the Tweet holding short of the runway during their final turn, but the student stopped clearing the runway environment after lining up with the runway. From the back seat of the no-flap T-38, the IP could not see the Tweet until *very* close to it.

At that time, the IP shoved the throttles to Maximum and performed a go-around. The slight burble felt by the T-38 crew was not air turbulence — it was the main landing gear striking the Tweet's raised canopy frame. Since the T-37 crew had assumed the T-38 would be going around, they had stopped watching it. Not until they cleared the runway did they notice most of their canopy was missing.

There's a much-used illustration of aircraft mishaps being a series of links in a chain of events which ultimately leads to tragedy. The links of this incident are easy enough to identify. However, like most of the stories you read here, they are not the links to a single type of aircraft, but the links to any aircraft mishap.

Strike One!

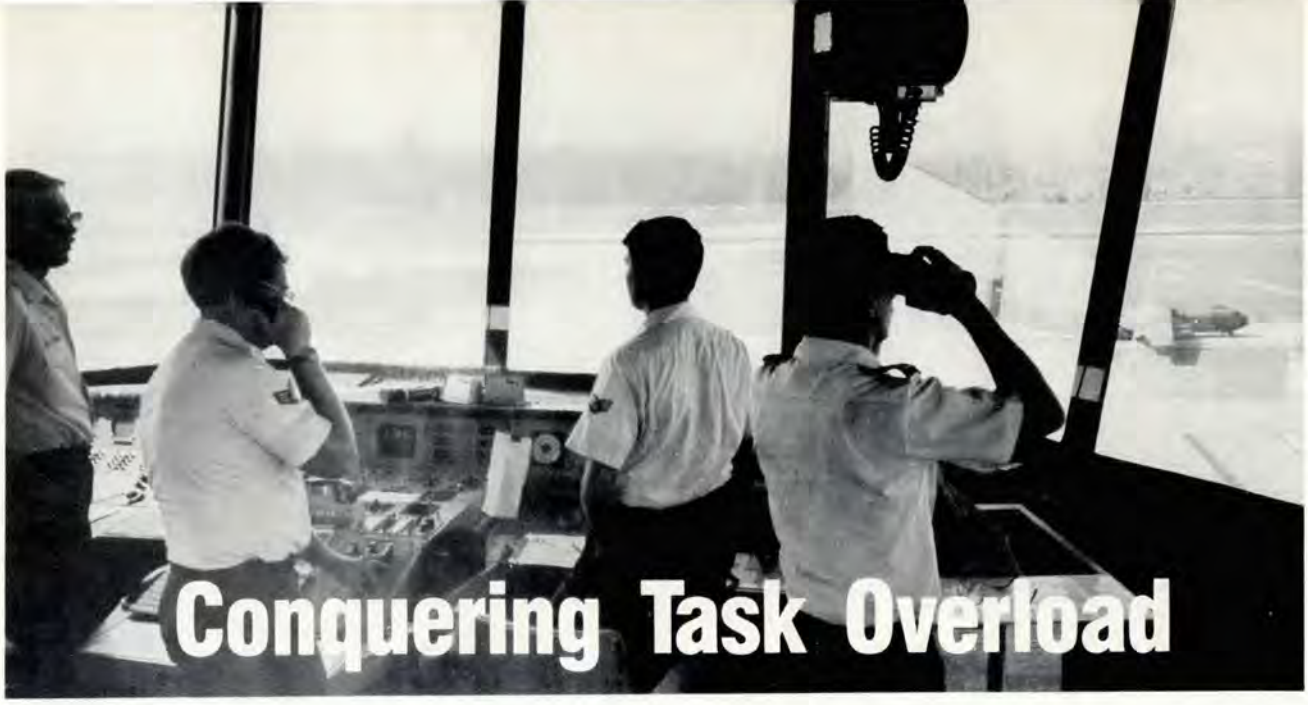
Stop me if you've heard this one: A low-flying, fast-moving, Air Force fighting machine takes out the top 2 feet of a transmission tower. I know, I know, you've heard it quite a few times in recent months. But why? Towers don't usually jump up a few feet and scrape the wings of Air Force jets.

The most recent story involved a formation (it usually does) of not-so-fast, but highly accurate, attack aircraft. The mishap pilot was flying wing in a two-ship formation at their local range. Lead was flying portions of the ground track at 100 feet AGL and expected the wing aircraft to be positioned slightly behind and above as they approached the update point.

The wing aircraft, however, was flying slightly below lead. And although the flight was only moderately demanding, wing spent too little time clearing the flightpath ahead. When the tower was spotted, wing began a pull-up to avoid it. After landing, a 10-inch piece of ½-inch-diameter lightning rod was found buried in the wing.

The rod came from the top 12 inches of a 114-foot-tall tower. No one is sure on which of the formation's six passes the strike occurred.

Throughout this story, and too many others, the same words are written: Familiarity, divided attention, misperceptions, and complacency. So far, nobody has yet attempted to blame a tower strike on logistics or maintenance. Like taxi mishaps, tower strikes are the sole responsibility of the pilot in command. ■



Conquering Task Overload

Adapted from *Air Traffic Control Digest*

■ Six to eight in the pattern, emergency aircraft inbound, inter/intra facility coordination, marginal weather, and a host of other factors which cause an air traffic controller to become "busy" can cause task overloading.

Human reaction under conditions of task overloading is a well-established phenomenon. Historically, task overload has been associated with aircrew duties, especially single-piloted aircraft requirements. But these phenomena can engulf an air traffic controller also.

First, the controller devotes less attention to each task in an attempt to complete them all. At some point, however, this process leads to neglecting one task (visual scan of all the airport traffic area/control zone, checking every aircraft's landing gear with binoculars, etc.), rendering the controller ineffective in that area. Depending upon their perceived importance, the controller then must either concentrate on the completion of some tasks to the exclusion of others, or drop one or more altogether in favor of more critical ones.

The longer this overload condition exists, the more tasks are discarded to allow time to concentrate on the perceived most crucial element, eventually resulting in "task fixation." Young controllers can easily relate this process with the tendency to fixate on one part of the scope or only scan out one of the control tower's windows. Add to this situation the stress of a "busy day," and the predictable result might be described in layman's terms as "going to Hades in a handbasket."

What can be done to reduce the impact of these recognized human limitations? The most obvious route is through constant training and practice. This solution works in the pilot and controller arena alike. Become proficient at each task of the job. This allows you the ability to accomplish each task with less attention and effort, thereby leaving more time for the others.

Standardized procedures and habit patterns can also play an important part by allowing the controller to perform certain tasks "automatically" while brainpower is devoted elsewhere. This is where the firm foundations in the basics of air traffic control are so vital. The controller simply does not have time to be thinking about optimum phraseology, or whether the situation calls for an approach-end or departure-end break, if they are to have enough brainpower remaining for the other elements of the job. The less concentration a juggler must spend on any one object, the more balls he can keep in the air for a longer period of time. Unlike swimming and bicycle riding, the skills required for safe, expeditious, and orderly air traffic control are lost quickly and must be constantly practiced if they are to be retained.

Overloading can also be curtailed by reducing the number of tasks a controller must perform to get the job done. Basically, this is helping your fellow controller out (checking landing gear, scanning the runway, watching for birds, etc.) when the "heat is on."

Other factors will help to lessen controller overload but are not as easy to change. Airport layout, airspace constraints, procedural areas, such as SIDs and STARs, and procedures designed to lessen the amount of controller coordination required are just some of these factors. Regardless of training or attempts to minimize the number and difficulty of the controller's tasks, you are still likely to reach a saturation point if you are exposed to "busy" for an extended length of time.

Just how long a controller can "keep all the balls in the air" depends on the factors discussed here. The length of time can change daily, depending upon your mental and physical condition. Training should emphasize the controller's ability to recognize the impending signs of task overload so some allowances can be made before disaster strikes. ■

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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.

FIRST LIEUTENANT

Timothy Conklin

Headquarters 401st Tactical Fighter Wing

■ On 18 October 1990, Lt Timothy J. Conklin, 613th Tactical Fighter Squadron, Torrejon AB, Spain, successfully recovered his F-16C at an unfamiliar field after sustaining substantial aircraft damage from a bird strike.

Lt Conklin was on an MQT upgrade syllabus ride. He was no. 2 of a four-ship on an air-to-ground gunnery sortie on Bardenas Reales Range, Spain. On his fifth pass in the pop pattern, turning base for a 10-degree, low-angle low-drag delivery, while at approximately 1,500 feet AGL and 400 KIAS, Lt Conklin's aircraft struck a 30-pound vulture. The vulture impacted the inboard section of the right leading edge flap, extensively damaging the aircraft. The entire right leading edge flap was rendered completely useless, and a 2-foot section was ripped off. The wing itself was also damaged due to the force of the impact. The aircraft immediately began an uncommanded right roll and began to shudder. Lt Conklin regained control of the aircraft, called a "Knock It Off," and informed his leader of the problem. He turned towards the nearest suitable field and began to climb, staying below a 4,000-foot overcast. Meanwhile, his flight lead rejoined to assess the damage.

While en route to Zaragoza AB, Spain, Lt Conklin found clear airspace, climbed, and did a controllability check. During the check, he determined that by locking the left leading edge flap in the ½-down position, minimal stick pressure was needed to fly the aircraft at landing speed. He proceeded to Zaragoza AB and flew a flawless approach and landing.

Lt Conklin's quick reactions and textbook handling of the emergency situation prevented this hazardous situation from becoming much more serious and possibly losing the aircraft. The superb airmanship demonstrated by Lt Conklin, an MQT student with low time in the F-16C, resulted in the safe recovery of a valuable aircraft.

WELL DONE! ■

WRITE A DUMB CAPTION CONTEST THING

Ahh! There's nothing like a case of vintage whine. Especially when it comes from Byron Q. Lackluster, President and Senior Sommelier of the United Organization of Dumb Caption Writers of America (U.O.D.C.W.A.).

Byron began whining sometime near the middle of the month because he had not been able to submit a single caption. "Pleeeease," he begged, "keep the contest open a few more days. Our computer went down and we've been unable to write any dumb captions."

A likely story, we thought sarcastically. Everyone else is able to write dumb captions without the aid of a computer. And besides, anyone who would trust the hard drive of their PC 428 without making a backup would have to be absolutdowheiadi*½!!qpwoeiriutytcmdkeiwsx.loedcrefv?]098awesqpwoeirutyghfjdksla;!!z.x,cmvnb 1.2,3m4n5b6ha;sldkfjghhgqpwoeirutyyzqaawsxedcrfvtgbyhnujmik,ol.p;¸¼¾/⅔¢*zpxocivubytme,wkqla;sldkfjd

Send your entries to ***"Dumb Caption Contest Thing"*** • *Flying Safety* Magazine • HQ AFSA/SEDP • Norton AFB CA 92409-7001