TAC ATTACK

MARCH 1983

Angle of Attack



'm more than ready for spring. Spring officially begins on March 21. It's the season when Nature rejuvenates herself and most of us as well. That's good, as long as we use common sense.

For aviators, this month we take a fresh look at the problem of G-stress in "G and Thee." The article supports some nagging suspicions we have about those mysterious tragedies in which a pilot collides with the ground in an apparently good aircraft. The long-term effect of repeated high-G maneuvers is a factor we need to consider in planning our missions. The article is worth a lot of thought.

Another article that's important to aircrews is "RESCAP Is Not Standard." Those of us who've taken part in long and unpredictable search and rescue missions in combat will agree that each situation is unique. But there are some principles and ideas we can think about ahead of time. And we strongly urge carrying a RESCAP checklist.

The Air Force's Project Warrior is emphasizing our heritage. You might enjoy the definitions in "Slanguage" from the Army Air Forces of four decades ago.

The cycle of renewal in nature is the new springing from the old. The same is true of us. We shouldn't forget where we came from—or how much it cost to get here.

Enjoy this spring.

Richard K. El

RICHARD K. ELY, Colonel, USAF Chief of Safety



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VOLUME 23 NUMBER 3

Contents

G and Thee 4
Aircrew of Distinction 8
TAC Tips
Weapons Words
Safety Awards 15
OV-10
Slanguage
Down to Earth
Quarterly Safety Awards
RESCAP
Help in Avoiding Bad Weather
Chock Talk
TAC Tally



By Maj Barry R. Barnhart and Capt Robert A. Munson

In 1918, the test pilot of a Sopwith triplane who pulled an estimated 41/2 G became the unfortunate subject of the first report of a G-induced loss of consciousness. In World War II G-suits were first used operationally by pilots, who regarded them as hot, uncomfortable, and ugly. But only fighter pilots had G-suits, and wearing them into the base ops grill was a good way to impress the young thing serving burgers. Forty years later, G-suits are still hot, uncomfortable, and ugly, while at the rare base ops grill today that young thing is still serving burgers, though wiser for the years.

Even more so today than in earlier years, the man-machine combination is limited by the physiological capabilities of the pilot. Since the last World War relatively little information has been added to the useful knowledge of Gs and G-suits. Most G research now is geared to making relatively small improvements in the equipment (such as a faster reacting G-valve), understanding the effects that other stresses (such as heat) have on a body's resistance to G, and investigating a G-screening program where all go-fast candidates would submit to one-time G-training on the centrifuge at Brooks AFB.

The efforts of these scientists and engineers

eventually filter to the operational side. Flying personnel get a heavy dose of G theory in their initial training and thereafter are refreshed occasionally by life support and safety. With time and experience, pilots get to be good at estimating the Gs they have pulled, to the point where reference to the G-meter is usually made just to confirm a nagging suspicion.

So why write about Gs and G-suits? The reason is that aviators generally regard G-suits as good only for preventing blackout and unconsciousness. Most fliers don't realize that G-forces exert their effects progressively with a gradual but insidious loss of senses and performance. Blackout and unconsciousness are merely the extreme end points of the process. In periods of G-maneuvering, fatigue and slight hypoxia also set in. This is tough after a seven-minute ACM engagement, and it's worse on the A-10 pilot going through repetitive combat turns on a sortie that may have 40 minutes of G-maneuvering. The net result is that flight surgeons still have a deal with occasional instances of unconsciousness, but many times the Gs pulled were way below the aviator's normal endurance limit.

It's difficult getting a grasp on the extent of the problem of G-stress. Even though scientists, particularly at the School of Aerospace Medicine, have given us a good understanding of G-stress measured in the lab, effects of G in the day-to-day flying operation are more complex. One recognized obstacle is that aviators are notoriously cagey when answering questions on how they are personally affected. Some fliers fear that to admit to an instance of unconsciousness is the best way to get an involuntary TDY to Texas for a medical evaluation. So



we have the iceberg effect: for every aviator a flight surgeon examines for a loss of consciousness, there may be seven others who have regained consciousness with their aircraft in a new and strange position and not reported it. To be fair, most of the fliers who lost consciousness during centrifuge tests didn't realize it until shown videotapes of the event. There is no memory of the episode. An aviator realizes he has been unconscious only if there are enough outside clues to prove it once he wakes up. Both the reticence of aircrew members and the

Both the reticence of aircrew members and the lack of memory for the event explains why many instances of loss of consciousness are reported by second parties—be it the IP wanting an explanation for that interesting but nonstandard jink-out or the range officer wondering about the over-the-top reattack. Sadly there are many instances where we can only conjecture about the perfectly good aircraft and crew that rolled in on the range and just kept on rolling.

By now you may have the suspicion, as we do, that in spite of G-suits and experience (or just experience for most OV-10 and T-37 pilots), loss of vision and unconsciousness do occur. From this point we want to give you a better idea of what factors may lead you to wake up inverted and what abilities and senses you lose before blacking out. No anti-G techniques will be given—they vary from plane-to-plane, mission-to-mission, and pilot-topilot. If you believe it is important to "know thy enemy," then it is at least as important to "know thyself" before taking on the enemy. On to specifics.

First a review. Positive Gs exert their effects by pulling blood away from the brain and eyes. The blood pools in the legs and abdomen and is prevented from returning to the heart. Without blood, the heart is a less effective pump. The G-suit and M-1 maneuver squeeze leg and abdominal blood back to the heart, which can then pump it vigorously headward. A less appreciated effect of the Gsuit is that when it squeezes the abdomen, the heart is prevented from sagging gutward. The less the heart sags, the more effective it is at getting blood to the head because the distance is shorter.

Rough guidelines are that a relaxed person will black out at 4 G and lose consciousness at 5 G. Add a G for a good M-1 maneuver and another G for an inflated G-suit and you arrive at the TAC average of 7 G. But the numbers are misleading and should not be relied on since there is such wide variation.

G AND THEE

These generalizations don't hold up because everything the safety officer has ever warned you about also affects your G-resistance: sunburn, circadian rhythms, fatigue, alcohol, dehydration, heat, emotional state, drugs, low-salt diet, etc. Some of the above factors are present on all sorties and cause G-tolerance to wane as expected. What is vexing for everyone is the occasional loss of consciousness that occurs out of the blue. G



testing on a centrifuge often won't turn up the cause because circumstances have changed and all the variables can't be reenacted.

Oddly enough, the pilot who can ride the centrifuge for 30 seconds at 9 G without losing vision is likely the one who is a candidate for a heart attack: older, short, overweight, high blood pressure, and maybe a bit high strung. The guy in the squadron you always thought epitomized the fighter pilot tall, lean, cool, young, runs 10 miles a day—probably passes out if he gets out of bed too fast. Throughout the Air Force the T-37 produces the most cases of unconsciousness reported to Norton Safety, with 56 reported in the 10 years prior to 1981. In the following year the School of Aerospace Medicine received reports of 30 more instances in that airplane. Most of the pilots were students, some were not. None wore G-suits. What is interesting is that about half occurred at 3.5 G or less. Our surveys and experiences in the OV-10 community have turned up similar anecdotal instances of loss of consciousness which usually have occurred at 5 G. Again, no G-suits were worn, but most of the pilots did have quite a bit of flying experience.

Numbers like that eventually get attention and so it is that the next generation trainer will have a Gsuit hookup, and the OV-10 FACs at Patrick are (not exactly) waiting in line at Equipment Issue for their G-suits. No one pretends that G-suits will eliminate the blackout problem, but the incidents will decrease, if only because an inflating G-suit is often the best reminder that you've forgotten to start an M-1.

Since G-suits can raise the blackout threshold to the point where it usually isn't a problem, we tend to get a bit complacent about the dangers of Gforces. G-stress is often perceived as nothing more than a nuisance. In one survey of flying personnel, G-stress was rated eighth as a problem affecting aircrews, ranking behind the likes of airsickness, hyperventilation, and decompression sickness. It seems that we don't regard G-forces as a factor until vision is lost.



In fact, aviators start to lose peripheral vision as soon as the stick comes back towards the lap. By the time they notice that their vision is tunneling at 5-6 G, 75 percent of the visual field is already gone. Something deserving of attention might be in that lost 75 percent of the visual field while the pilot is in a hard turn.

Another physiological process occurs when Gs are endured long and repeatedly: blood gets distributed unevenly in the lung and isn't oxygenated fully. The result is a functional hypoxia that may slow thinking or further decrease tolerance to G. This process is not prevented by wearing a G-suit and



may in fact be worsened by the M-1 maneuver. Though more oxygen should correct the problem, the use of 100 percent oxygen with a G-suit might lead to a condition called aerotelectasis in which areas of the lung collapse.

Probably the least appreciated benefit of G-suits is that their use cuts down on fatigue. Pilots rely on G-suits to keep them from blacking out in critical moments. In real life Joe Sixpack has an extraordinary ability to withstand high G-forces if he's got a missile at his 3 o'clock, a bad guy on his tail, or the chief of stan eval on his wing. G performance in these types of situations is widely accepted as being greater in real life than on the centrifuge. But this stress-enhanced ability comes at a cost, and the price is fatigue. Where the mission calls for long or repetitive sorties with extensive moderate-G maneuvering, preventing fatigue is more often required than protection from unconsciousness.

In that regard, the benefits of contemplated improvements to anti-G systems will probably be more in reducing fatigue than in increasing G resistance to visual loss. One mentioned improvement is a faster reacting G-valve since many pilots complain that the G-suits are slow to inflate. A small amount-of preinflation, possibly as a "combat setting," has also been shown to improve G tolerance. Another improvement available is a sequentially inflating G-suit which inflates from the leg up. This prevents blood from being trapped by the inflating abdominal bladder.

Forty years have passed since G-suits first appeared, but our G capability has not improved much, and high-G turns in an aircraft are still limited by human factors. It is unlikely that technology can ever eliminate the fatigue, sensory degradation, or incidents of unconsciousness as long as we love to bury the stick in our laps. So while the ever optimistic scientists are working on the problem, it's up to the aviator to appreciate how high Gs affect and fatigue him and to work to minimize those effects.

The authors: Capt Munson has left the ranks of OV-10 FACs to attend medical school at Loyola University in Chicago. After graduation in 1985, he plans on returning to the Air Force. Maj Barnhart is a flight surgeon at Patrick AFB and also works in support of launch missions from the Kennedy Space Center.

AIRCREW of DISTINCTION

On 25 October 1982, CAPT THOMAS L. DARNER was flying an F-106B on a cross-country mission with a passenger in the rear cockpit. Shortly after departure from runway 33 at Griffiss Air Force Base, New York, while level at 15,000 feet, both Captain Darner and his passenger felt a persistent airframe vibration. All other cockpit indications were normal. Captain Darner decided to return to the base because of the persistent vibrations. As he turned back to the base from about 18 miles out, he saw the Master Caution light and the Oil Pressure Low light come on. Captain Darner declared an emergency. Thirty seconds later, the engine flamed out because of the oil system failure and subsequent failure of the engine accessory unit.

Captain Darner concluded that a restart was not possible with this type of failure, so he concentrated on planning a flameout approach straight in to runway 15, opposite traffic. He briefed his passenger on the approach and the possibility of ejection. Controlling the airplane with hydraulic pressure supplied by the ram air turbine. Captain Darner extended the landing gear with the emergency system and flew the approach. A towed B-52 was on the runway he was approaching. As Captain Darner flew across the threshold, 500 feet in the air at 250 knots, the B-52 cleared the runway. He touched down with 7,000 feet of runway remaining, then deployed the drag chute, dropped the tailhook, and jettisoned the external tanks. The airplane engaged the BAK-12 cable, and both Captain Darner and his passenger climbed out with no injuries.



Capt Thomas L. Darner 49 FIS Griffiss AFB, NY

Captain Darner's prudent decision to return to base with an unknown problem made the flameout landing possible. Then he skillfully handled the emergency, which required analyzing the engine problem, deploying the ram air turbine, maintaining aircraft control, briefing the passenger, making necessary radio calls, and planning and executing an approach with no power, while he had to be concerned about the B-52 on the runway. His actions preserved an important air defense resource and prevented possible loss of life. He has earned the Tactical Air Command Aircrew of Distinction Award.

MARCH 1983



"Thou shalt not get found out" is not one of God's commandments; and no man can be saved by trying to keep it. —Leonard Bacon

IS IT REALLY FIXED?

When you find something wrong on your preflight and you ask your crew chief to get it fixed, do you insure that it's fixed before you start? Or do you go ahead and crank engines on time, assuming the problem is straightened out?

On an FCF after extended downtime for an F-4, the pilot noticed during preflight that both pitot-static drain caps in the nosewheel well were not safetychained. Recognizing the potential FOD, the pilot asked both the line supervisor and the crew chief to attach chains to the caps. Then he and his backseater completed their preflight, boarded the airplane, and started engines.

Their ground operations were normal until takeoff roll. Near their maximum abort speed, the airspeed indications stagnated. The pilot decided to continue the takeoff. Once airborne, he declared an emergency, joined up with another F-4, and followed it in



...interest items, mishaps with morals, for the TAC aircrewman

for a successful straight-in approach and landing.

The problem was that the pitot-static drain caps were missing. Both the crew chief and the line supervisor had misunderstood the pilot and thought that he wanted the drain caps removed because they weren't chained. So while the pilot was climbing into the cockpit, the line supervisor had told the crew chief to take off the drain caps. Removing the drain caps caused an air leak in the pitot-static system.

The results of this misunderstanding could have been avoided if the pilot had rechecked the drain lines and made sure they were correct before he climbed into the cockpit. The delay wouldn't have been more than a couple of minutes. Seems like something worth correcting on a preflight should also be worth rechecking before we accept the airplane.

WE LEARNED FROM THIS

(An Anonymous Fleaglegram)

It was the second sortie on the third scenario day during the ORI. Both sorties were fragged for low levels to the range, terminating with attacks on different targets. During the first sortie, we had an IG chase evaluate us. Both attacks were planned as double 90-degree attacks with 20-degree pop deliveries. On the first attack, lead misidentified the target and we dropped our bombs short of the fragged target. During the short time between sorties we confirmed we had actually missed our fragged target and discussed how we would ensure this would not happen again.

We flew the same low-level on the second sortie. Our target was an aircraft parked on a simulated runway at the range. Since our range photos showed the aircraft on the southern end of a 3000-foot northsouth runway, we planned to ingress from the east,

TAC TIPS

with the final attack axis for lead northeast to southwest and number two north to south.

We split at the proper spot. As I was clearing lead's aircraft, I could see that he hit the northern end of the runway. Remembering how he hit the wrong target on the first sortie, I still planned to hit



the southern end of the runway. It wasn't until I was halfway through the pop and pulling down toward my aim point that I realized there were no aircraft at the southern end of the runway. Knowing we were fragged to hit the aircraft. I began searching for the real target. I finally saw the aircraft out of the top of my canopy, (At this time we were approximately 150 degrees bank, pulling back towards the ground.) Without thinking and without any questioning from the rear cockpit, I pulled the nose of the aircraft to the target, knowing that it would be tight. Luckily, before we could even get wings level to track the target. I realized that we would never make it if I continued the attack. I recovered the aircraft at approximately 300 feet AGL. After a successful reattack, we made an uneventful egress from the target area. It wasn't until we were at altitude on our way home that we realized how close we had come to killing ourselves.

We had violated two of the basic safety rules for performing pop deliveries. We changed targets after roll-in, and we continued the attack when we knew we were well inside the MAP.

What caused us to be put in this position? We were a formed crew who had spent most of the past year flying together. We knew each other's strengths and weaknesses, and we were both highly motivated and determined to succeed. We had the attitude that we could get the job done no matter what. The fact that it was the third day of playing war and we had missed our first target made us determined not to let it happen again. We trusted each other's judgment.

We were lucky this time. I can now recognize some of the factors that might lead me to put myself in a situation from which I can't recover. We learned a valuable lesson from this—hopefully you can too!

OLD HABITS NEVER DIE

By Lt Col Jack Baker 116 TFW/SE Dobbins AFB, GA

Living with habit patterns is sometimes like the old adage about living with the opposite sex: you can't live without them, but you can't live with them. Certainly the designers have not intentionally tried to jumble our stick-throttle-linkage computers, but at times that's the way it seems.

A good example of this can be testified to by the troops that transitioned from the F-102 or F-106 into a ground attack aircraft. They found the bomb pickle button located in exactly the same place as the old UHF transmit button. No wonder there were so many "no spots" on the gunnery range.

There are other examples of how the switches can bite, like the placing of the F-105 emergency jettison button right next to the landing gear warning lights test button. That error embarassed a few troops too.

But folks, there is one trick that the affected aircrews must take note of and expend extra effort in order to undo old habit patterns ingrined by maybe years of training. It involves your last change—the ejection seat. Many of us have spent untold hours practicing on the seat side handles in such wonders as the F-100, F-105, or F-15. If we use our old habit patterns in the F-4 for an ejection sequence, we will have accomplished a successful deployment of the drag chute and a successful unstrap-



ping from the seat. A successful ejection is not likely to follow.

An old flight surgeon buddy named Bill Brath miraculously showed up at F-4 school to offer an idea to help overcome our old bad habits. Every time we climb into the Rhino, he suggests, we should touch the correct handle to mentally note how it's to be done if the time ever comes.

Retrain yourself, and don't let this habit pattern bite you.

HEARING WHAT'S EXPECTED

After flying multiple instrument approaches, the multi-engine crew switched to a VFR pattern. They were at 2,300 feet on VFR downwind for runway 35. A flight of two F-4s had broken out of the VFR over-head pattern and were now on a wider downwind at 2,800 feet to reenter initial. Because of a conflict with inbound IFR traffic, the tower told the multi-engine to "turn left 080, contact approach on 121.05." But the pilot responded, "turning right 080, climbing to 3,000." The tower didn't catch the difference.

The pilot did, in fact, turn left instead of right; but he also began to climb. Halfway through the turn, the pilot spotted the two F-4s at about 11 o'clock, 1,500 feet away and converging. So he quit climbing



and descended back to 2,300 feet. The pilot felt that the tower had directed him into a near collision.

What had actually happened was that the pilot's response was conditioned by his five instrument approaches earlier. The climbout instructions following each approach had been to turn right to 080 degrees and climb to 3,000 feet. When he heard the "080" from tower, his mind was triggered to the climbout instructions. A right turn would have been the long way around, so he turned in the shorter direction, left; but he still thought he should climb to 3,000 feet. Other crewmembers also thought they heard climb instructions, although the tapes show none were given.

The tower controller should have caught the error in the pilots read back, but he was swamped. The tower's Brite II radar monitor was out, and seven aircraft were in the pattern. The controller wasn't used to controlling that much traffic without the Brite II. So the tower controller wasn't really listening to the pilot's response. When the controller saw the multiengine in a left turn, he turned his attention to other traffic.

Both the tower controller and the aircrew heard what they expected to hear instead of what was actually said. None of them were really listening.

ONLY ONE TRY ALLOWED

he pilot was starting his A-10. The auxiliary power unit (APU) started normally. But when he started the left engine, it stagnated at 40 percent core rpm and 760 degrees ITT. After one minute of starting time had elapsed, the rpm still hadn't risen above 40 percent, so the pilot shut down the engine. The pilot and crew chief noticed some smoke coming from the rear of the engine when it was shut down. The pilot checked the ITT to make sure there was no postshutdown fire. The ITT seemed normal, so the pilot and crew chief attributed the smoke to residual fuel in the engine.

After letting the starter cool for a minute and ten seconds, the pilot tried again. The same thing happened: the rpm hung up at 40 percent. But this time, a lot of smoke came from the engine as the pilot shut down. Thinking he had a postshutdown fire, the pilot motored the engine. The smoke got worse. The pilot



finally stopped motoring, pulled the fire handle, shut down the APU, and climbed out of the airplane.

The air turbine starter was found burned out after the second attempt at starting.

The Dash One discussion on starter limitations allows for reattempting a start if the problem is no lightoff after 20 seconds. In that case you can retard the throttle to off, dry-motor the engine for 30 seconds, wait one minute, and try another start. But if on the start the engine does not reach idle speed within 60 seconds, the flight manual says to ''abort start and write up in Form 781.'' That means no second tries.



THE UNDERLYING PROBLEM

An F-15 returned from a mission on which it had fired an AIM-9 missile. Afterwards, the pilot wrote up the airplane for a cage problem with the AIM-9 missile system. A weapons load crew was sent out to check out the armament control system.

When they arrived at the airplane, the crew looked it over. The weapons crew chief checked the cartridges in stations 2 and 8 while the number 2 man removed the cartridges from station 5, which was loaded with a centerline fuel tank. After dearming station 5, the number 2 man climbed into the cockpit to set up the system checks. The weapons crew chief and number 3 man applied external power and cooling air.

As the number 2 man worked his way through the checklist, he came to a step that called for pressing and holding the jettison switch. When he pushed the switch, the station 8 inboard pylon jettisoned from the airplane. The crew shut down the power on the





aircraft and notified their supervisor, who was back in the shop. The damage came to just over \$25,000.

A closer look at station 8 showed that the impulse cartridges had not been removed and the pylon safety pin had not been installed before the check. The weapons crew chief thought he had seen the breeches safety-wired and sealed but didn't remember seeing the safety pin. Maybe he looked at the MAU-12 bomb rack breeches instead of the pylon breeches when he checked station 8.

Actually, we aren't surprised that the load crew missed a few things. Neither the crew chief nor the number 3 man were qualified to run the check they were sent out to do. They hadn't even been entered into training on the task.

The safety pin was missing because the aircraft crew chief was also using procedures new to him. Normally in this unit the F-15s fly with captive AIM-9s without the pylon jettison carts installed. The aircraft crew chief usually installs the pylon safety pin when the airplane returns to the chocks. But this time the crew chief didn't have the safety pin because it wasn't pulled until the airplane was at the end of the runway (EOR). The weapons crew at EOR had the pin. Because the missile had been expended, the pilot didn't stop at EOR to get safed after the mission. The aircraft crew chief had never before recovered an aircraft returning from a live missile firing. He wasn't experienced enough to be concerned about an unpinned but carted pylon. No supervisors came out to help the crew chief with the recovery.

The unit involved has since changed their procedures to require all aircraft returning from missions where munitions are involved to clear through dearm at the end of the runway. That's fine. But doesn't it seem as though the underlying problem was poor supervision? Sending unqualified people to run a weapons check and not overseeing the aircraft crew chief's first recovery of an aircraft that had carried live missiles—those seem to be symptoms of serious supervisory problems. To fix that, we need to change attitudes more than we need to change regulations.

LOOSE LATCH

he A-10 was making repeated strafing passes. The gun suddenly quit firing and the "gun unsafe"



light came on. The pilot declared an emergency, returned to his home base, and landed with no other problems. The pilot taxied the airplane to the gun butt area and shut down.

One of the latches on the access unit was found to be unlocked. The access unit door was partially open. When this happens, the elements with ammo can sag enough to catch on the lip of the access unit guide and buckle it, tearing out the rivets. The resulting sudden stoppage of the system causes extensive damage.

That's why the load crew's checklist has a separate step to check the ''access unit door closed, latched, locked.'' The checklist step is intended to prevent this kind of damage. But the checklist can't prevent anything if it isn't read and followed.

AN UNPLEASANT SURPRISE

An overeager sergeant caused a mishap by trying to do too much by himself. He decided to unload a pallet of TGM-65 missiles without any help. The pallet had four missiles in containers on it, stacked two high and two deep. The sergeant positioned the forks of an MHU-83 under the nearest missile container of the two on top. But he placed the forks too far forward: they were touching the outer edge of the second container. When he rolled the forks backward, they hit the lip of the second container and toppled it off the back of the pallet. Luckily the missile was protected by the container. The damage was limited to a bent fin.

The sergeant knew that he should not have begun the operation without spotters and a supervisor present. Maybe he thought he'd surprise everyone with what he'd done. If so, he was right. But in this case, the surprise wasn't pleasant.

CREATE GOOD HABIT PATTERNS

An individual was doing a periodic inspection and checkout of AIM-9 guidance and control units removed from storage. He was almost done with the next to the last unit for that work shift. As he removed the canards, the IR dome cover fell off the guidance and control unit. The individual bent over to pick it up, and a speed handle he was holding struck the IR dome and shattered the glass.



This shop had an unwritten policy that tools will be set down before protective equipment is installed, removed, or adjusted. Now the shop has it as a written policy. To make the policy work, the next step is to make sure that the policy is so well drilled into everyone that it becomes a habit pattern—even when a worker is tired and nearing the end of his shift.

WEAPONS WORDS

WEAPONS SAFETY INVOLVES ALL OF US

An 0-2A loaded with LUU-2 flares and white phosphorus rockets took off for what should have been a routine mission. Once he got to the range, the pilòt selected the right outboard pylon to drop a flare. When he flipped on the Master Arm switch, a rocket fired from the right *inboard* pylon. Concerned



that he might have selected the wrong station, the pilot rechecked the switches: the switch for the right inboard station was still safe. While he was looking, two more rockets fired.

The pilot disabled the system by pulling circuit breakers. But then he decided that he'd better get rid of the remaining ordnance before landing. He launched the rest of the rockets and the flares without incident. Then he safed the system and landed back at his home field.

Maintenance troubleshooters found the cause of the unintentional rocket firing. A wrong size screw had been used in the windscreen molding. It was too long, so it penetrated the wiring harness going to the external stores. The nose and tail arm wires shorted directly to the rocket fire control circuit for the right inboard pylon. Once the screw was replaced with one of the proper size and the wiring harness was repaired, the release system worked fine.

Cases like this one show that weapons safety isn't just the concern of the weapons troops. Anything we do around an airplane—even something as harm-less as fastening a windscreen molding on an 0-2—can affect weapons safety if it isn't done right. We are all involved in weapons safety.

WHY WE CALL FOULS

he F-105 was on a surface-attack mission to the controlled range. While strafing, he flew one pass steeper than normal and fired in too close. The range officer gave him a foul for firing past the line. Estimated cease fire was 1,900 feet from the target.

Except for the foul, the flight seemed normal. This was the pilot's first foul in any event in more than two years; so after he repented and paid his debts, no big thing was made of it.

But two days later, before the airplane flew again, a hole was found in the right intake during preflight. A closer look showed extensive foreign object damage to the engine, requiring an overhaul to repair. The foreign object seems to have been a 20-mm round.

If you think the only reason for fouls is to harass pilots, think again. The real reason is to save your life.

SHORT ROUND ON A RIDGE

wo A-10s were practicing strafe and rocket attacks on the tactical range. Leader planned a pass in which he'd fire his rockets first and then continue in to strafe the target area. The run in was over a ridgeline.

When the leader made his pass, he misjudged his slant range and fired too far out. The salvo of seven inert rockets hit the ridgeline in front of the aircraft. The pilot continued his pass and strafed the target. The flight completed their work on the range and returned to their base.

At the end of the runway after the planes had landed, the dearm crew found that the lead airplane had suffered damage. There were two holes in the leading edge of the left wing and one hole in the left inboard flap. Two fan blades in the right engine were nicked, and the TGM-65B missile dome was shattered.

The pilot had unknowingly flown through the frag pattern of the rockets when he crossed the ridgeline and struck some of the debris from the rockets. The initial cause was his error in estimating the range. His sight setting was based on a shorter slant range, so the rockets predictably hit short. That's not unusual. But on this run in, the difference was the ridgeline.

This time the ridgeline became a trap for the pilot. What if friendly ground troops had been on the ridgeline when the rockets hit short? Good tactics should allow a margin for error. Allowing that margin is safer for us and any ground troops in our path.

TAC SAFETY AWARDS

CREW CHIEF SAFETY AWARD

S_{GT} STEVEN R. STRONG and A1C JAMES E. KOOSER, JR., both from the 67th Equipment Maintenance Squadron, 67th Tactical Reconnaissance Wing, Bergstrom Air Force Base, Texas, are this month's winners of the Tactical Air Command Crew Chief Safety Award.

Sergeant Strong and Airman Kooser were launching an A-7D at Buckley ANGB, Colorado. The pilot started the plane but the Starter Caution light came on, so he aborted the start. By that time, Sergeant Strong and Airman Kooser heard unusual noises coming from the starter area. Suddenly fuel poured to the ground, and a fire broke out, engulfing the ramp area and spreading up the right side of the airplane. Sergeant Strong and Airman Kooser called to the pilot to leave the aircraft. Then they started fighting the fire.

CB agent blew into Airman Kooser's eyes and chest, but he continued to fight the fire. When he couldn't stand the burning from the CB agent any longer, Airman Kooser left to flush out his





Sgt Steven R. Strong

A1C James E. Kooser, Jr.

eyes while Sergeant Strong continued to fight the fire until it was extinguished.

Together, Sergeant Strong and Airman Kooser saved the burning aircraft and prevented six other aircraft from catching on fire. They have earned the Tactical Air Command Crew Chief Safety Award.

INDIVIDUAL SAFETY AWARD

SSGT WAYNE H. WALKER is this month's winner of the Tactical Air Command Individual Safety Award. He is an aircraft systems specialist with the 436th Aircraft Maintenance Unit, 479th Aircraft Generation Squadron, 479th Tactical Training Wing, Holloman Air Force Base, New Mexico.

Sergeant Walker was working on a landing gear warning horn malfunction. While testing the system, he noticed that the number 2 throttle moved when the number 1 throttle was pushed back and forth. There was also a very faint click. As an electrician, Sergeant Walker was not positive that a real malfunction existed, so he called the production superintendent for assistance. The superintendent verified that there was a problem and gave Sergeant Walker permission to investigate further.

When Sergeant Walker removed the front cockpit left console control heads, he found that a phenolic block which attaches to the anti-G valve had apparently not been secured properly on previous maintenance. This block was ob-



SSgt Wayne H. Walker

structing throttle movement.

Sergeant Walker's attention to detail and commitment in following through may have prevented the loss of an aircraft and its aircrew. He has earned the Tactical Air Command Individual Safety Award.





I hese definitions are from a pamphlet titled ''I've Got Wings,'' published by the U.S. Army Air Forces Office of Flying Safety circa 1945. We thought you'd enjoy comparing our jargon to the jargon of yesteryear. The language might spice up your ''woofing.''

Ace—a combat pilot with five or more victories. Blanket Drill—sleeping.

Blind Flying—a date with a girl you've never seen. **Bumps**—the effect of updrafts and downdrafts encountered in flight.

Bunk Flying-talking aviation in quarters.

Buzzing—flying dangerously low over people or property on the ground; (taboo).

Caterpiller Club—a jump for life in a parachute qualifies for membership.

Clinker-a poorly executed maneuver.

Conservatory—a power-operated, glass-enclosed machine gun turret.

Contact—a warning called out by the pilot to inform the mechanic the ignition switch is on.

Cracking Good Show—highest possible praise of a performance.

Dead Stick—gliding plane, after the engine had conked.

Dogfight—combat between two planes.

Drive It In The Hangar-stop talking aviation.

Dummer—a bonehead act.

Dust Bin—underside rear gun turret in an enemy aircraft.

Eggs-bombs.

Fat Friends-balloons.

Flak-antiaircraft fire.

Flying The Iron Beam Or Iron Compass—pilot flying along railroad.

Flying Pig-aerial torpedo.

Flying The Gauges—instrument flying.

Gain Some Altitude—come to a more erect standing or sitting position. Used to correct the "civilian slouch" in new cadets. Geese—enemy bomber formation. Get Eager—do your best; strive to the utmost. Give It The Gun—advance the throttle to accelerate engine speed.

Glasshouse—power operated turret. Go Into A Tailspin—get mad.

Going Upstairs—gaining altitude; climbing.

Good Show—a commendable action.

Grab A Brace—come to a position of super attention; usually directed at new cadets.

Hangar Pilot-mechanic who talks a great flight.

Hedge Hopping-low flying.

He's In A Flat Spin-a bit touched.

Hit The Deck-when an aviator lands.

Hitting The Silk-to make a parachute jump.

Hot Crate—a speedy plane.

H.P.-a hot pilot.

Jinking-dodging antiaircraft fire.

Lame Duck-damaged plane.

Laying The Eggs—dropping bombs.

Life Saver—a parachute.

Mustard—smart pilot.

Office-the pilot's cockpit, usually in a large airplane.

Onions-flaring antiaircraft shells.

Overshoot—to glide beyond the landing field before landing.

Pea Shooters—the high-powered planes of the Air Forces.

Pulpit-the cockpit.

Ready Room—the room where pilots on duty assemble, ready for instant call to action.

Reef Back—pull back the stick in flying a plane.

Roll Up Your Flaps-stop talking.

Shoot Landings—to acquire practice in landing a plane.

Short Snorter—a member of an unofficial flyers' club, each member of which carries a one dollar bill autographed by fellow short snorters. Any members being unable to show the bill upon request of a fellow member, must forfeit a comparable bill or note to each short snorter present.

Shot Down In Flames—jilted by a girl friend.

Show—action in the air.

Slap On The Coal—open the throttle to give a plane more gas.

Solo—flying alone; hence doing anything else without company.



Spin Off—take a nap; or go to bed. Spit Curl—a side slip in a plane. Sugar Report—a letter to or from a girl friend. Tear Off A Strip—to give someone a bawling out. Tin Fish—an aerial torpedo. Woofing—the telling of tall tales.

TAC ATTACK



A \$49.95 INVESTMENT IN LIFE

By SSgt Dee Veal 522 AWACW/PA

he motorcycle helmet cost \$49.95. It was obviously not one of your most expensive models. To SSgt Mark Joecks, the purchase of the motorcycle helmet was one that was made reluctantly.

But he soon found that the \$49.95 was an unexpected investment in life—his. He was to become another statistic on the Oklahoma Highway Patrol's records—a victim of a hit and run incident.

Assigned to the 552d Airborne Warning and Control Wing's Aircraft Generation Squadron Support Branch, the young staff sergeant preferred riding his Honda 350 with just safety goggles. The feeling of freedom, with the wind whipping through his hair and hitting his face, added to the thrill of the ride.

But for some reason, on this night, he decided to wear his helmet. It was routine for him to leave his home in Del City for work at Tinker AFB around 10:30 p.m. It was a short ride. Dressed in green fatigues, he was illuminated only by his silver helmet and the bike's headlight as he proceeded to work.

"I was heading eastbound near the I-40 overpass when I overtook a slow moving vehicle in the right lane. As I came to his left rear, about to pass, he turned into me. His unexpected lane change forced me into the left turn lane. I began moving over when I saw him closing in on me, but apparently not fast enough. I know he didn't see me—then," explained Sergeant Joecks.

"I didn't have many options open. I could hit him, hit the center cement pilings that support the overpass, or try to hit the grass median. It doesn't take long to realize that grass is softer than metal or concrete. In self-defense, I threw the bike back at the car to give me the leeway needed to get by the upcoming sign posts.

"Anyway, the front wheel on the bike impacted the curb and the tube blew out. Then the bike flipped. My face, or rather my visor on the helmet hit first. A witness said I landed face first. I don't remember. I was out momentarily. Most of the shock was absorbed by my right arm," the sergeant said.

A veteran motorcycle rider of 16 years, this was only the second accident Sergeant Joecks had ever had. "I couldn't believe he left me. He saw me hit. He had to—I practically did a somersault right in front of him. He made a left turn from the right lane



and turned on the interstate. The driver didn't even stop to see if I was alive or dead. Something like that really makes you stop and wonder about human nature!'' the sergeant said with disbelief. Sergeant Joecks' injuries consisted of cuts and abrasions to both knees and elbows. He may require surgery to his right forearm from the accident. "The only cut I had on my face was a razor cut. I think I got it when my visor hit the ground. If I had been wearing my goggles, my face and head would have been



ground into the dirt. It is not an experience I care to repeat. My \$49.95 investment is what I think saved my life," Sergeant Joecks admitted.

BUGS IN THE BROWN BAG

he last bout of diarrhea and fever you dismissed as "a bug going around at work" could have come from your bag lunch. If care is not taken while preparing food, bacteria can grow in it and cause food poisoning.

Because bacteria thrive at 60 to 120 degrees Fahrenheit, a good rule to follow is keep cold food cold and hot food hot. Don't set your lunch bag on a warm radiator, windowsill, or the dash of your car or truck. Either put your lunch, bag and all, in the refrigerator or protect the food by putting it in a thermos bottle.

Some foods are safer than others. Dried meats, such as pepperoni and beef jerky, keep longer. So do fully cooked meats, such as salami, franks, and bologna. Hot foods will stay safe if they're put into a vacuum bottle while still boiling hot.

The best way to keep bacteria from growing in the brown bag is to not use one. Metal lunch boxes, es-

LESSONS LEARNED

By Vonda Willingham TAC/SEW

I've learned a few things about wood stoves the hard way. Although embarrassed by these particular incidents, I feel compelled to write about them so that others might not make the same mistakes I did.

Using and taking care of a wood burning stove was a new experience for me when I moved up North from the deep South. I got off to a shaky start. The first time I tried to use my stove, my whole house immediately filled with smoke, setting off my new smoke detector. It's not much fun standing on a chair with the siren blaring in your ears trying to figure out how to turn off a smoke detector. I finally ended up pulling out the batteries. My eyes burned and watered all day and my house smelled like smoke for a whole week. A friend of mine, a veteran northerner, inspected my wood stove and immediately located the problem. The creosote buildup had



turned loose from the pipes and fallen into the bottom elbow, clogging my stove pipe. Once cleaned out, the stove worked beautifully. First lesson learned: Now I clean out the creosote buildup in the

DOWN TO EARTH

stove pipes before starting a new fire.

My second lesson learned came when I decided to empty the ashes out of my wood stove. Not even giving it a second thought, I cleaned out the ashes that had been sitting cold for 2 days in my stove and put them in a paper bag. Then transferred that to my plastic trash container outside. About 2 hours later, while in the kitchen talking on the phone, I noticed smoke going past the window. I didn't think anything



about it till I saw my neighbor rush into my backyard. My trash can was on fire! We quickly grabbed the water hose and thoroughly extinguished the fire. I have since learned that ashes and coals can still be hot days after a fire has been burned and they should always be put into a metal container, preferably a coal-type bucket, till they are sufficiently cold. This was a costly lesson to learn, \$45 for a new trash can and \$10 for a metal bucket.

My husband swears I'm trying to burn down the house, so he bought me a fire extinguisher. And I know how to use it.

I hope you will benefit from these lessons that I have learned. It's important to use your head and always practice home safety, especially when fire is involved.



Cleaning and Storing Electric Blankets. An electric blanket should only be washed by hand. Using the "hand wash" cycle on a washing machine, putting the blanket through a wringer, twisting it vigorously, machine drying, or dry cleaning will damage or expose the wiring. Store the blanket by wrapping it loosely around a cylinder-shaped object or put it back in the package it came in. And moth balls shouldn't be used. They can damage the fabric and expose the wiring.

Heat Detectors Versus Smoke Detectors. Heat detectors add protection when used with smoke detectors, but they're no substitute for a smoke detector. A heat detector will not sense a smoldering fire that is putting out lethal amounts of smoke, carbon monoxide, and other toxic gases. Heat detectors should be used where a smoke detector could be fooled, like the kitchen, or in areas that are too hot or too cold for smoke detectors to work properly: the attic, garage, or furnace room. Remember, smoke is usually the killer in a fire, not the heat.

Have You Tested Your Smoke Detector Lately? At least once a month give them some real smoke. Use a candle. If you're testing an ionization detector, hold the candle 6 inches under the detector and let the flame burn. If you're testing a photoelectric unit, blow out the flame and let the smoke drift into the detector. To stop the alarm, take the flame away or fan the smoke.

TAC QUARTERLY AWARDS



A1C Vernon C. Leugers, Jr.

GROUND SAFETY AWARD OF THE QUARTER

A1C VERNON C. LEUGERS, JR., is the recipient of the Tactical Air Command Ground Safety Award for the fourth quarter of 1982. He is a member of the 474th Equipment Maintenance Squadron, 474th Tactical Fighter Wing, Nellis Air Force Base, Nevada.

Airman Leugers has significantly contributed to safety both on and off the job. During the weight check acceptance inspections of nine 15ton axle jacks for the F-16, Airman Leugers discovered that four of the jacks were unserviceable. His strict adherence to technical data saved many dollars by preventing the axle jacks from being used and causing damage to aircraft on the flight line. On another occasion, while assigned to the gas turbine generator dock, Airman Leugers detected the improper installation of the chain hoist for removing - 60A generator covers. If the chain hoist had been used, several people could have been injured and extensive damage to the unit would have occurred.

On his way to work one day, Airman Leugers came upon an accident involving a motorcycle and an automobile. The motorcyclist had a deep laceration on his leg and possible shock. Airman Leugers treated the individual for shock and stopped the extensive flow of blood from the leg. He was instrumental in saving the airman's leg and possibly his life.

Airman Leugers is a very competent, safety conscious individual. He sets an outstanding example and has earned the Tactical Air Command Ground Safety Award of the Quarter.



SSgt Wayne B. King

WEAPONS SAFETY AWARD OF THE QUARTER

SSGT WAYNE B. KING is the recipient of the Tactical Air Command Weapons Safety Award for the fourth quarter of 1982. Sergeant King is a member of the 318th Fighter Interceptor Squadron, 25th Air Division, McChord Air Force Base, Washington.

Sergeant King displays an active involvement in all phases of the weapons safety program. He has increased the quality of the annual weapons safety training program by expanding the depth and applicability of the material taught in his classes and by revamping the weapons safety tests to insure that each student has retained a working knowledge of explosives. His approach to safety is highlighted by the zero explosives accident and incident record enjoyed by the squadron. What makes this outstanding record even more meaningful is that all missile training loads involve the use of live AIM-4 missiles. Sergeant King's daily involvement in flight line loading operations was highlighted during a recent ORI in which weapons support and maintenance were rated excellent. The quality, reliability, and safety of each load could be directly attributed to the load training and weapons safety program administered by Sergeant King.

Sergeant King's enthusiasm, initiative, and dedication to safety have significantly contributed to weapons safety and have earned him the Tactical Air Command Weapons Safety Award of the Quarter.



By Capt William A. Fletcher, Jr. 308 TFTS Homestead AFB, FL

A radio call rings out in the ACT area: "Mayday, Mayday, Mayday, Blue 1 is going in."

You're in Blue 2. What do you do now?

Maybe you've never discussed RESCAP procedures or ideas. The time to think about what to do is not on your first rescue mission. A good RESCAP plan and a knowledge of ICAO and DOD surface signals are important. They can help save a life, or at least get the downed crewmen rescued sooner.

I can hear you saying "Who is this guy?" and "Why is he wasting my time?" I've had the misfortune of flying in two peacetime RESCAP missions, with the recovery of three aircrew members. Both experiences were different. My experience on the first RESCAP, which others organized well, greatly aided the second RESCAP effort. The total experience will aid in a third, if required. To pass this experience on, I will discuss the RESCAPs and highlight the key lessons of both. I will also mention the new standard ICAO and DOD rescue code signals for survivors. (Note the three main points, SOS grads)

RESCAP #1 was over water in Turkey, and it involved an F-4 on an advanced handling ride with an IP in the pit. During a high-speed slice back, a dual sequenced ejection was initiated from the front seat. The IP had enough situational awareness to glance at the TACAN on his way out. The bearing and DME he remembered were super aids to locate singleman rafts.

A great flurry of activity followed. A three-ship ACT mission diverted to the area to initiate the SAR and set up a RESCAP. Once the rafts were located and radio comm was established with the lone survivor, the hard part started. There was no SAR capability at Incirlik—no rescue helicopters or PJs. A great job by squadron maintenance, visiting C-141s, and an intransit C-130, as well as superb coordination between the U.S. Air Force, the Turkish Navy, and especially a British helicopter unit from Cypress ensured a successful rescue. But only after the survivor had been in the water some 7 hours!

The specifics of the air aspect of the RESCAP included stacking of aircraft—three F-4s, a C-141, and



a C-130—to maintain sight of the survivor and to keep radio communication with him for morale purposes as well as to help keep him from going into serious shock. This required a constant refueling of F-4s at Incirlik and the generating of a C-141 loaded with 20-man rafts to help mark the survivor's position if he was too injured to get in them (he was). The control of this gaggle was the responsibility of the senior F-4 man present, who was the on-scene commander. It was his responsibility to direct altitudes and direction of all aircraft orbits and any other coordination required. He also maintained communication with Incirlik to keep them and the on-scene players informed.

Key Lessons of RESCAP #1

1. Get a TACAN bearing and DME as soon as pos-

sible and broadcast it. Get the survivor's location out.

2. Use your WRCS/INS to "freeze" over the rafts. Single-man rafts are hard to see and the wreckage sinks quickly. Mark the spot.

3. Get survivors to a rescue frequency, 282.8 (Aux 18), and off Guard ASAP. Discrete morale building can cheer up the survivors and not garbage up Guard.

4. If long-term RESCAP is necessary, stack your RESCAP aircraft in altitude blocks for fuel conservation, ease of radio communication and relay, and deconflict of aircraft.

5. Designate an on-scene commander. Someone has to be in charge. If you have a plan, designate yourself.

6. Pass on tally-ho of survivors to the next aircraft when the low jet bingos out.

7. Don't cheat on your bingo fuel! The survivors don't need four for bridge.

RESCAP #2 was over land with my jet joining on a burning F-4 during a Maple Flag exercise. We were flying defensive counterair and saw an F-4 apparently ingressing. We thought it was a recce and started to convert on it. We saw the flames from about two miles out and slowed our conversion. We flew to an extended route position slightly high and well off to the side and recognized it as our flight lead's jet. After we confirmed the fire, a dual sequence ejection occurred. We noted the location of both the ejection and the aircraft crash. We passed on the Maydays and the TACAN bearing and DMEs of the crash and the survivors to Cold Lake Tower. We also passed the map coordinates of the survivors. A Maple Flag "Knock it off" was called and the SAR started. We talked to the survivors until the A-7 Sandies showed up. We passed the tally-hos and RTBd. The survivors were back at Cold Lake in less than 2 hours.

Key Lessons of RESCAP #2

1. Stay away from the distressed aircraft's possible flight path and ejection path.

2. Confirm visual damage (if possible) and encourage ejection, if necessary.

3. Monitor the distressed aircraft's flying ability. Don't let it descend without mentioning it to the aircrew. They may be distracted by other events.

4. Check for chutes and seat separation.

5. Note TACAN bearing and DME, as well as plotting coordinates on your map and INS of the crash and survivor location. All this info will greatly aid the rescue helicopters. You can also get the survivors together.

RESCAP IS NOT STANDARD

6. If Sandies are available, pass on the information and responsibilities to them when they get on the scene—it's what they're trained to do.

7. Land from a straight-in. It's no fun watching your buddy burn. It will shake you up even if they get out OK.

8. Call a "Knock-it-off." Get the exercise stopped and rescue operation going. You don't want a practice war going on when you're trying to rescue aircrews.

⁹ 9. If you witness the ejection and events preceding, tape it or write everything down. The board will want anything you have; an accurate account of the going on is important.

It may pay to know the new (January 1982) surface-to-air rescue codes. They are used by ICAO and DOD and could be useful in rescue operations.





PROCEEDING IN THIS DIRECTION

Correct interpretation and use of these signals by aircrew members could mean the difference between an unsuccessful or successful rescue. If you go down, remember to stay close to your jet if you can. The search aircraft will be looking for it, and they tend to find the jet more easily than individuals.

RESCAP is not standard. Each rescue mission is different, but a basic plan of action will aid the effort. Broadcast the location. Have an on-scene commander. Establish radio communication with the survivors and Mother. Watch your gas.

Share your experiences with the rest of us. The things you've seen or done can help all of us should any of us either go down or perform in a RESCAP. RESCAPs tend to be very personal subjects for a lot of us, but their discussions are sure fire bar stories and an excellent way to pass out good info. That information could save a life—yours or mine!

Editor's Note: As Captain Fletcher's article points out, RESCAP is not standard: every situation is different. But each one of us can think about it ahead of time and develop a checklist for our own aircraft if we haven't already been provided one. For example, most of our A-10s don't have INS, so recording the UTMs or TACAN position is a must. How best to do that should be in the checklist. The checklist could also include the different control agencies that can be reached throughout the flying area and what rescue forces are available. Talk it over in the squadron and get each other's ideas on what should be included.

Your unit's in-flight guide is an excellent place for a RESCAP checklist. If you already have one, check and make sure it's up to date. Again, talk it over in the squadron and come up with a better one; then get it approved and printed.

Much of RESCAP is common sense; but when pressed, we may forget something that should be done. A checklist can't do our thinking for us, but it can help keep us from forgetting the good ideas we and others have already had.



By Maj David F. Green, Jr. TAC Weather Operations

A recent flight mishap illustrates what can happen when aircraft not equipped with weather avoidance radar neglect to contact the nearest pilot-tometro service (PMSV) facility and instead attempt to obtain weather avoidance information from the ARTCC. A T-38 was on descent in heavy cirrus clouds. On two occasions the crew asked ARTCC for weather information on the cleared routing. On both occasions the center advised that the route looked good all the way. While in a break in the cirrus the crew sighted a large isolated thunderstorm well northwest of their position, but the route of flight appeared void of thunderstorms. A third call to ARTCC was made to confirm no heavy weather on the proposed flight path, and center responded that the present heading looked good. The aircraft then encountered severe turbulence and heavy rain at approximately FL260. A bright flash, believed to be a lightning strike, was observed. The crew concentrated on maintaining a constant aircraft attitude in the turbulence and exited the cell one to two minutes later. The remainder of the descent and landing were uneventful.

The aircraft was inspected after landing; the only damage noted at that time was a two-inch hole in the fiberglass nose cone. The damage was repaired and the mission continued to final destination. On postflight inspection additional damage was discovered. There were 11 damaged avionics bay fastener hole doublers. The thin sheet-metal doublers had peeled back at the leading edge and the front portions were missing. The leading edge of the vertical stabilizer was dented and the top surface showed a burn area characteristic of a lightning strike. Fortunately there was no FOD due to the missing sheet-metal doublers and no compressor damage. The mishap could have been much worse.

The weather support to this mission was good. Preflight planning included a thorough weather briefing with special consideration of thunderstorm activity. The descent area was on the fringe of an area of isolated thunderstorms with tops less than 45,000 feet on the military weather advisory. The crew was well aware of the possibility for thunderstorms but did not contact a PMSV facility en route to update the weather briefing.

ARTCC radar failed to indicate an area of heavy precipitation in the mishap aircraft's flight path. A report on the mishap recommended research and development of ground-based weather detection equipment readily accessible by ARTCC controllers for aiding high-performance aircraft not equipped with weather avoidance radar.

The point is that ARTCCs now have only a very limited capability to detect weather; therefore, aircrews should not depend on ARTCC to provide accurate weather information. Maximum use should be made of Air Weather Service (AWS) weather radars located at most Air Force installations and many Army airfields. A U.S. map showing location of all pilot-to-metro service and weather radar facilities is contained in the DOD *Flight Information Handbook*.

In this case both PMSV and weather radar were available and would have been able to provide assistance to the mishap aircraft. The AWS forecasters are not permitted to vector aircraft, but they can provide the essential information to enable the crew to make critical real-time decisions for weather avoidance. Weather radars are designed for optimum detection of precipitation and thunderstorms, including intensity of cells, movement, and tops; plus, the forecasters are trained and instructed to provide this type of assistance to airborne aircraft on a first priority basis over all other peacetime station duties. The ARTCCs have a limited weather detection capability, but controlling aircraft is always their first priority.

Lesson learned: Whenever possible, time permitting and a PMSV/weather radar facility within UHF range, contact the AWS forecaster and use this valuable service. Don't wait until you're in the weather. If you're expecting thunderstorm activity on or near the route, update your weather briefing with the latest weather information available. You won't be sorry you did.



... incidents and incidentals with a maintenance slant.

BAD DIAGNOSIS

A T-38 was recovering from a slice-back maneuver when the aircrew heard a pop and saw the left



engine exhaust gas temperature rising. The pilot pulled the throttle back to idle, and the temperature returned within limits. Three minutes later, during straight and level flight, the left engine flamed out. The pilot restarted the engine. Five minutes after the airstart, the exhaust gas temperature again began to rise. As the temperature reached 840 degrees, the pilot shut down the engine. Return to base and single-engine landing were uneventful.

Four days earlier, oil samples from this engine showed a high level of iron and copper. The joint oil analysis program (JOAP) lab told the AMU to take a second set of oil samples to verify the abnormal readings. These samples also showed high iron and copper levels. The JOAP lab next had the AMU change the oil and run the engine for about ten minutes, then take another oil sample. This sample was normal. The aircraft was put on code F status, meaning it had to have oil samples taken after every flight. It was placed back on the flying schedule.

All this discussion on the engine oil samples took place between the JOAP lab and the AMU. The lab never told the jet engine intermediate maintenance shop what was going on. So no engine maintenance specialists were included in the loop.

The airplane didn't fly again until the day of the incident. The oil sample from the first flight that day showed an excessive increase in iron and copper levels. But the second sortie got airborne before anyone acted on the oil sample. On the second flight the engine's number 2 main bearing failed. The bearing failure allowed the entire compressor section to shift forward, damaging it extensively and causing the compressor stall and flameout.

The high levels of iron and copper were, of course, symptoms that the bearing was deteriorating. If the symptoms had been diagnosed properly, this incident could easily have been avoided. Consulting with the right specialists would have helped the diagnosis.

THE BIRDS ARE RETURNING

It may not feel like spring yet, but it won't be long before the birds return. We'd better start looking for bird nests in engine cowls, wheel wells, flight controls, air inlets, and exhaust ducts—all those nooks



and crannies around our airplane. When we can, we should plug all the inlets, especially if the aircraft is going to be down for extensive maintenance.

Birds aren't the only flying critters that build nests in airplanes. Some insects, especially the stinging kind, like to build nests in pitot tubes. Let's not let our airplanes become condominiums for bugs and birds.

A LITTLE FOD GOES A LONG WAY

(An Anonymous Fleaglegram)

Recently, an F-4 developed some stiffness in rudder movement during approach. Landing and rollout were uneventful; however, taxi off the runway and back to the chocks was hindered because full rudder (and subsequent full nose gear steering) could not be obtained. Several turns and bends in the taxiway were negotiated by the use of differential braking. The aircrew wrote up the stiffness in the



flight controls but did not recommend impounding the aircraft.

Troubleshooting showed no problems with cockpit controls or hydraulics associated with the nose gear. During the course of troubleshooting, a veteran from quality assurance chanced by and told the technicians to pull panel 21 (the backbone plate near the air refueling receptacle) because "they jes' might find sumpthin' interestin'." They did—a two-inch long section of a bolt, complete with nut plate, jammed in the rudder control cables that run the length of the aircraft spine. It was located so that it impeded rudder movement but did not lock it up completely. Had the itinerant bolt visited the neighboring cable, it could have affected (or stopped) stabilator movement.

The source of the FOD? Would you believe the left forward missile bay attachment bolt? Several months earlier, the bolt was found to be defective. The nutplate and bolt were replaced. Two months after replacement, a crew chief noted the head of the bolt missing. The launcher assembly was again removed, and the nutplate and bolt replaced a second time. It appears one of the "removed" nutplate/bolt fragments never left the airframe; instead it migrated the ten or so feet from forward of the pilot's feet to behind the WSO's headrest.

Lessons Learned

1. Don't feel obligated to bring one back to the chocks if it can't make the corners. That's why tugs and towbars were invented.

2. If standard feel and travel are not available from flight controls during any phase of operation, land as soon as possible or abort. In either case, the aircraft should be impounded.

3. Insure that technicians performing work on an aircraft are qualified to do that work and that the completed job is inspected by qualified supervisors.

4. FOD is not just something that destroys engine compressor blades and cuts tires. It may be little, but given enough time and the right circumstance (commonly called Murphy's Law), it could ruin your whole day.

MISSING ANY POCKET CHANGE ?

Just after takeoff, an F-4 aircrew noticed fuel flow fluctuations on the left engine and corresponding fluctuations in exhaust gas temperature. The pilot pulled the throttle back to idle, dumped fuel, and notified the supervisor of flying. Using single-engine procedures, the aircrew safely recovered the airplane.

Maintenance troubleshooters discovered foreign object damage to the first six stages of the compressor. The damage was blendable; it appeared to have been caused by a small flat object with high silver and copper content.

Hmmm. What small flat objects made of silver and copper do we often carry around? Lost any change lately?



CHOCK TALK

F-5 SWALLOWS PIN

An F-5 returned from a gunnery mission and taxied into the dearm area. While the aircraft was being dearmed, the instructor pilot in the back seat heard a strange noise and noticed the left engine rpm dropping through 40 percent. At the same time, the front seat pilot saw the left engine exhaust gas temperature increase through 750 degrees. They shut down the engine.

A member from the end-of-runway crew had chocked the nosewheel of the aircraft and moved around the intake and down the wing root to pin the centerline tank. Then he moved from under the aircraft, passing the left intake. An extra pylon pin being carried in a pencil pouch on his belt was then sucked into the intake.



This unit's operating instructions warn that special care should be taken while arming and dearming to avoid intakes and exhaust areas of engines. The instructions continue with "particular attention must be paid to control of safety pins and other FOD hazards." The EOR crewmember had not avoided the intake and was carrying more pins than he needed to dearm the F-5.

We all have similar operating instructions. The question is, do we really follow them? If not, our own FOD incident is just a matter of time.

FOD IN BATTLE



By MSgt Mike Hess 474 TFW

It's hard to strike fear In our enemies' hearts, When they're being sprayed With used engine parts.

Bent up blades Just sort of flutter around And don't do much damage When striking the ground.

If we do it enough, They just might consider; Calling a halt So we can pick up the litter.

But our planes are meant For counterattack For sending them out And getting them back.

They're a major part Of our national defense So keeping them safe Is just good common sense.

You can't complete Your first bombing run When you've got an engine That's coming undone.

So as a part Of keeping us free We must all stamp out F-O-D!

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