

# TAC ATTACK

FEBRUARY 1986

February 1986



HARRISON



# ANGLE OF ATTACK

**W**e have just concluded a banner year. 1985 was our best ever. In all areas—ground, weapons, and flight, you name it—we did it better. Take a look:

- Ground—we had an overall decrease in total mishaps. A 6-percent decline in fatalities and a 46-percent reduction in two-wheel (motorcycle) fatalities.
- Weapons—total mishaps have decreased by 37 percent. Even while the consumption of munitions continually increased to support more realistic training, the number of mishaps caused by personnel error decreased more than 55 percent.
- Flight—although we lost 15 aircraft and 10 aircrews, that's a drop from 23 aircraft and 17 fatalities last year. That means we saved one-third of a squadron of aircraft. That equates to 2.1 (rate) mishaps per 100,000 hours—a whopping 34 percent reduction from last year's rate of 3.2.

What's more important is that we did all this—ground, weapons, and flight—while flying over 720,000 hours of the most realistic and productive combat training in the world. And not one Class A mishap was caused by TAC maintenance.

How did we do it? Simple. First, we wanted to. Second, we had strong command support all up and down the line. From the wing kings to flight commanders, they kept swinging those creative two-by-fours labeled awareness, discipline and smarts. Third, and most important—YOU. Each and every-



one of you wearing and supporting that TAC patch made it happen. Once again we are setting the pace for excellence—I think it's an exciting time to be on the TAC Team. Be proud of our record—YOU earned it.

*Edsel J. De Ville*

EDSEL J. DE VILLE, Colonel, USAF  
Chief of Safety



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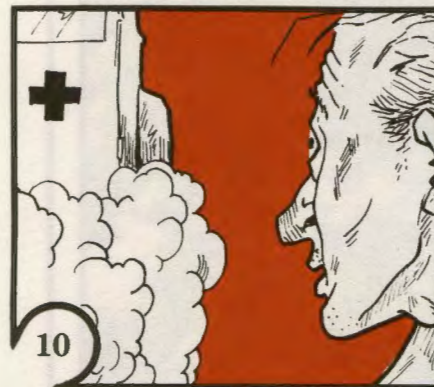
It's a term used frequently in day-to-day flying operations, but do we really understand what it means? MARSA plays a vital role in maximizing our peacetime training and safe fighter operations.

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We all have it from time to time. It may seem unimportant but "the big C" can ruin your whole day.

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### TACRP 127-1

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# ON THE HORIZON ON THE HORIZON

## ON THE HORIZON

### ON THE HORIZON

# GROUND COLLISION AVOIDANCE

**Maj Harley Davidson**  
 HQ TAC/SEP

**G**CAS—Ground Collision Avoidance System. Heard about it? As the saying goes, some have and some haven't. This article is directed particularly to those fighter pilots who continue to think that GCAS is just another fancy system to replace good judgment and keep the Whiskey Deltas of the fighter community from dying while flying. It's also aimed at those who think GCAS is OK for airliners, but can't possibly be adequate for tactical fighters. If you have either of these mistaken impressions, it's time to look at the hard facts and realign your thinking.

During the period 1980-85, the TAF experienced 47 controlled flight into terrain (CFIT) mishaps resulting in 52 fatalities. (A CFIT mishap occurs when the pilot [thinking the world is rosy and everything is under control]

flies into a position from which he cannot recover.) Everyone reading this article probably knows one of those 52 who died. Very few of our dead friends fell into the category of weak fighter pilots. The vast majority were above average to superb aviators who didn't deserve to die. The point is, we don't have to continue killing fighter pilots just to prove that flying close to the ground is dangerous. Technology in the area of ground collision avoidance systems has advanced dramatically in the last few years and, recently tested, shows excellent potential for saving lives.

The ground collision avoidance system uses a radar altimeter and computer which continually update information such as altitude, airspeed, dive angle and bank angle to provide the pilot with a *predictive* warning when the situation warrants. We've seen test aircraft in as much as 160 degrees of bank before the



ON

## NCE SYSTEM



radar altimeter broke lock. We've seen aircraft in as much as 60 degrees of dive before the capability of the radar antennas was exceeded. While the system can't keep a pilot from running into the face of a cliff or from rolling inverted and split-S-ing into the ground, it *will* save the pilot who gets distracted by a Master Caution light or a

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...we don't have to continue killing fighter pilots just to prove that flying close to the ground is dangerous.

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dropped pencil while his aircraft slowly descends into the ground. It *will* save the pilot who is padlocked on an aggressor at his six o'clock while his aircraft vectors

itself into the ocean or tree tops. It *will* save the pilot who rolls in on a target, day or night, without realizing that he's too steep or too low for a safe pass. It *will* also give pilots the opportunity to make unintentional fatal mistakes without paying the ultimate price. In most cases of spatial disorientation, the system will warn the pilot in time to recover or eject.

GCAS is designed to remain quiet until needed. Extensive research, development and modification efforts have drastically reduced the number of nuisance warnings. The average pilot will never know the system is on the aircraft. Very aggressive pilots, flying in the low altitude regime, may occasionally hear a warning. Knowing the pride of a fighter pilot, they'll probably call it a nuisance, but I'll bet that 90 percent of those same pilots won't volunteer to show that VTR film to the ops officer.

GCAS is not a training aid.

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It will also give pilots the opportunity to make unintentional fatal mistakes without paying the ultimate price.

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Any pilot who thinks he can press until he hears the GCAS warning and then make a comfortable recovery with room to spare is badly mistaken. Normally, when the warning goes off, the pilot is well into the danger area and needs to work on his judgment ASAP. The system is not designed as a substitute for good training and judgment.

GCAS is a reality. It's a good system that will save lives and aircraft, and it's on the horizon—look for it.



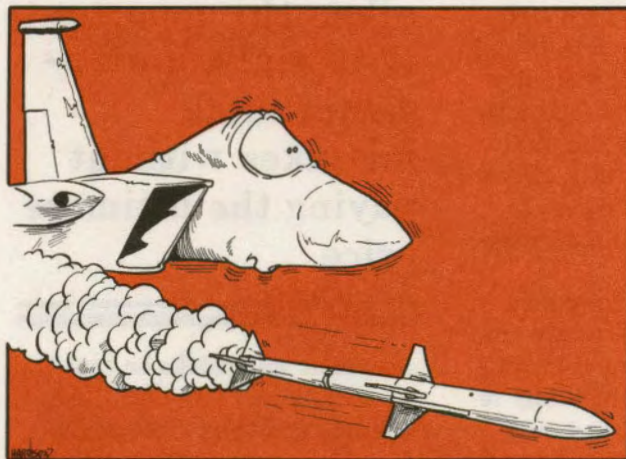
# TAG

tips

INTERESTING ITEM

## I didn't know

A couple of F-15s were loaded up for the day's mission, each with one captive AIM-9 and one captive AIM-7. During low altitude intercept practice, one of the pilots armed up his system for a simulated Sparrow delivery. When he pressed the weapons release button, the AIM-7 missile fell from the aircraft. There had been some confusion



with the aircraft's weapons load from the first sortie of the day. The pilot on that flight had questioned the status of the missiles, but the flight line dispatcher confirmed that they were inert captive-carry AIM-7s and -9s. Oh, they were inert alright (no warhead or rocket motor), but the AIM-7 had (although it didn't need to be) been carted. The pilot flew the mission without arming the weapon systems—thus, no problems. Unfortunately, the pilot on the second sortie didn't see that carts were installed during his preflight. So, when he

told the weapons release system to release, it did as advertised.

There are only three things that you want the stuff hanging on your airplane to do—either stay strapped on for the entire flight, jettison in an emergency or come off and hit a target. Use your preflight to make sure that all of your bombs, missiles, BRUs, TERs, TGMs and so forth are either going to stay where you last saw them or come off on target when requested. Anything else results in a wasted sortie when your expendable munitions don't expend or loss of valuable training tools when your captive carry ordnance does.

Now, a captive-carry AIM-7 isn't the normal daily training load for an Eagle driver. When you see something out of the ordinary on your jet, you can *assume* everything's OK or you can *make sure* everything is. Guess which is smarter?

## What's going on here?

Next time you fly, notice how well your throttle(s) work—both by feel and visual check. Do they seem too stiff or too loose; do they stop at the places they should like idle, full mil and AB?

Three F-16s were on a DACT sortie and number 2 was cleared in to become the engaged fighter. As he pressed the attack in full blower, the pilot saw he was going to overshoot, so he pulled the throttle to idle, popped the speedbrakes and began a



## IS, MISHAPS WITH MORALS, FOR THE TAC AIRCREWMAN

quarter-plane with a 7-G pull in the vertical. He went back into burner as he pulled the nose toward the target and heard a caution from the voice warning system. Rolling wings level, he noticed that the engine rpm was down to 38 percent. A knock-it-off was called, and the pilot returned to base after a successful UFC airstart.

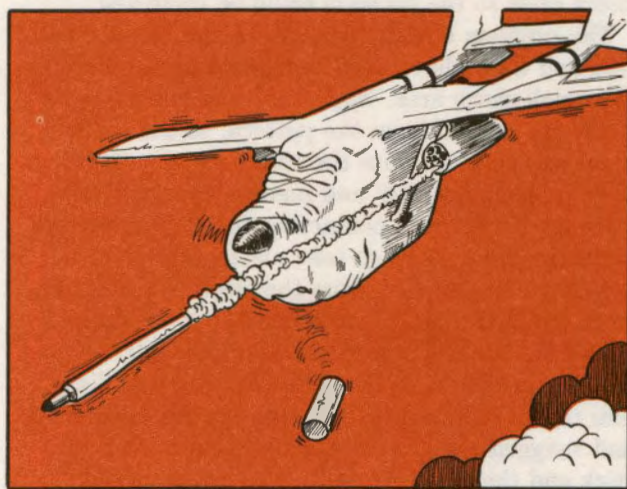
The engine problem was traced to the throttle cut-off release trigger. It was stuck in the depressed position. With the trigger malfunctioning, there was no mechanical stop to prevent the throttle from inadvertently rotating outboard and putting the engine into cut-off.

As long as mere mortals design airplanes, there will always be an opportunity for Murphy. Since you know about this one, make sure Murphy doesn't "trigger" an inadvertent shutdown.

### Too much slop

**T**wo O-2 pilots were out together practicing their rocket and flare deliveries on the range to hone their FAC skills. They had successfully fired three Willy Pete (white phosphorus) rockets from the left outboard station and then safed up both the left outboard fire/drop and master arm switches to prepare for a flare drop.

On the next pass, the pilot selected the proper switches to release a LUU-1 flare from the left inboard station. When he pulled the trigger, a flare



came off and another WP rocket fired off the left outboard station as well. The crew immediately confirmed that all left outboard station switches were still in the safe position and headed for home.

The weapons specialist found that the left outboard fire/drop switch was so loose that the switch could be moved to the fire position without rotating the switch out of safe. A check of other aircraft found similar switches that were also loose.

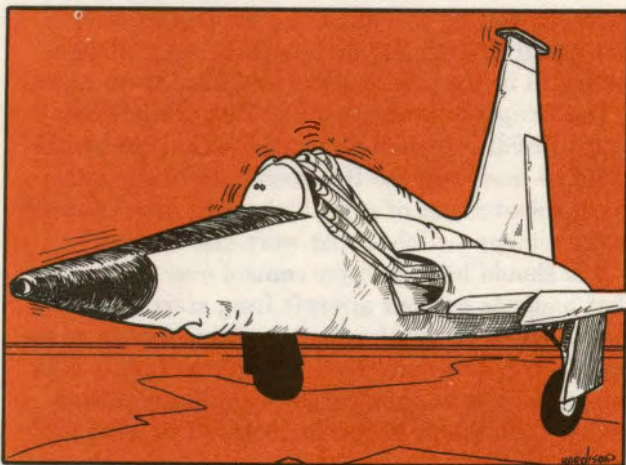
You should have positive control over everything that happens on your aircraft from start to shutdown. When you push a button, flip a switch or rotate a knob, you must have confidence that it is in the position you intended. When you can move a switch from one function to another (like safe to arm) with no resistance, then something's not right. When that happens, have the problem checked out by qualified people. If you don't, you may be driving around half-cocked and not even know it.



## Getting carried away

Three F-5s were preparing to take off for a 2 v 1 ride. Taxi to the arming area had been done as a flight with all canopies closed. After the flight moved onto the runway, an abnormal delay was experienced, so the IP in the back seat of one of the F-5s opened his canopy due to heat in the cockpit. Later, when he tried to close the canopy, he couldn't because the canopy seal was still inflated. The SOF was asked to contact the quick-check crew so the problem could be corrected.

The problem aircraft was in the number one position and didn't have sufficient room to taxi back to the quick-check area. Apparently, no one else was ready for takeoff or in the pattern, so the redball team was sent out onto the active runway to fix the problem. The SOF and maintenance control were unsuccessful in contacting the EOR crew; the IP in the F-5 decided to take matters in his own hands. He unstrapped from the ejection seat and stood up in the cockpit in order to get the ground crew's attention. He turned toward the left to motion for assistance and then felt a tug pulling him to the right side of the aircraft. Apparently, he had snagged the D-ring of his parachute on the stick and the deployed chute was being sucked down the right intake.



Once you're strapped into the ejection seat with the engines running, the best idea is to stay that way. Perhaps an even more important point is that

going to extraordinary means for mission accomplishment is unwise in the training environment. None of the things that we try to achieve during day-to-day training operations such as on-time take-offs, effective sorties and maximizing available training warrant actions that are unsafe. It's up to each of us to know the difference between a little extra effort to get the job done professionally and a misplaced sense of urgency which jeopardizes our ability to do the job in the future.

## One size doesn't fit all

The Falcon pilot had drawn a two-seater "B" model for the day's training sortie but there wouldn't be anybody to go along for the ride. No problem. Takeoff went as advertised. . .brake release. . .airspeed moving. . .100 knots. . .200 knots. As his airspeed passed through 330 knots, the pilot attempted to bring the engine out of afterburner but the throttle was stuck. He tried several times to free the throttle with varying degrees of force but still without success. Finally, he was able to break the throttle free by pushing it forward and then jerking it back with 50-75 pounds of force.

On preflight, the F-16 pilot had failed to remove the safety pins from the rear cockpit ejection seat. Since he hadn't checked the rear seat, he didn't know that someone had substituted an EPU pin for the normal ejection seat safing pin. During takeoff, the erroneous pin vibrated behind the rear cockpit throttle and prevented the pilot from deselecting afterburner.

Preflight checklists are designed to aid us in ensuring that nothing is left out in checking that our aircraft is airworthy. Everything from the obvious (two wings, required engines and fuel) to the not so apparent (FOD, loose fasteners and pins that haven't been pulled). Don't put yourself in a box by leaving checklist steps out that will come back and bite you later.



# AIRCREW OF DISTINCTION



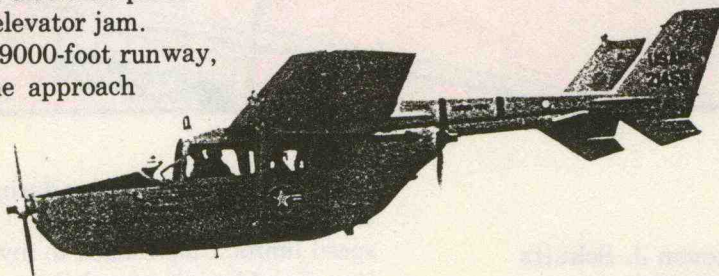
**C**aptain Gregory J. Dunn was flying an O-2 Operational check flight on 9 August 1985 following corrosion control work on the aircraft's flight controls. He returned to the overhead traffic pattern following a workout in the local area. As he rolled out on final, about 300 feet above the Atlantic waters bordering the airfield boundary, he attempted to raise the nose of the aircraft but found that the pitch controls were jammed. Realizing he had little time to resolve the problem as the aircraft rapidly descended toward the water, Captain Dunn pulled back on the flight controls with all his strength and was able to reposition the jammed elevator to a nose-high position.

The only way he could control the aircraft's pitch was by brute force to overcome the elevator jam. Since he was still lined up with the 9000-foot runway, Captain Dunn decided to continue the approach and land. Carefully manipulating the extremely limited elevator control available, he established a satisfactory landing attitude, controlled his descent with power adjustments and landed the aircraft undamaged.

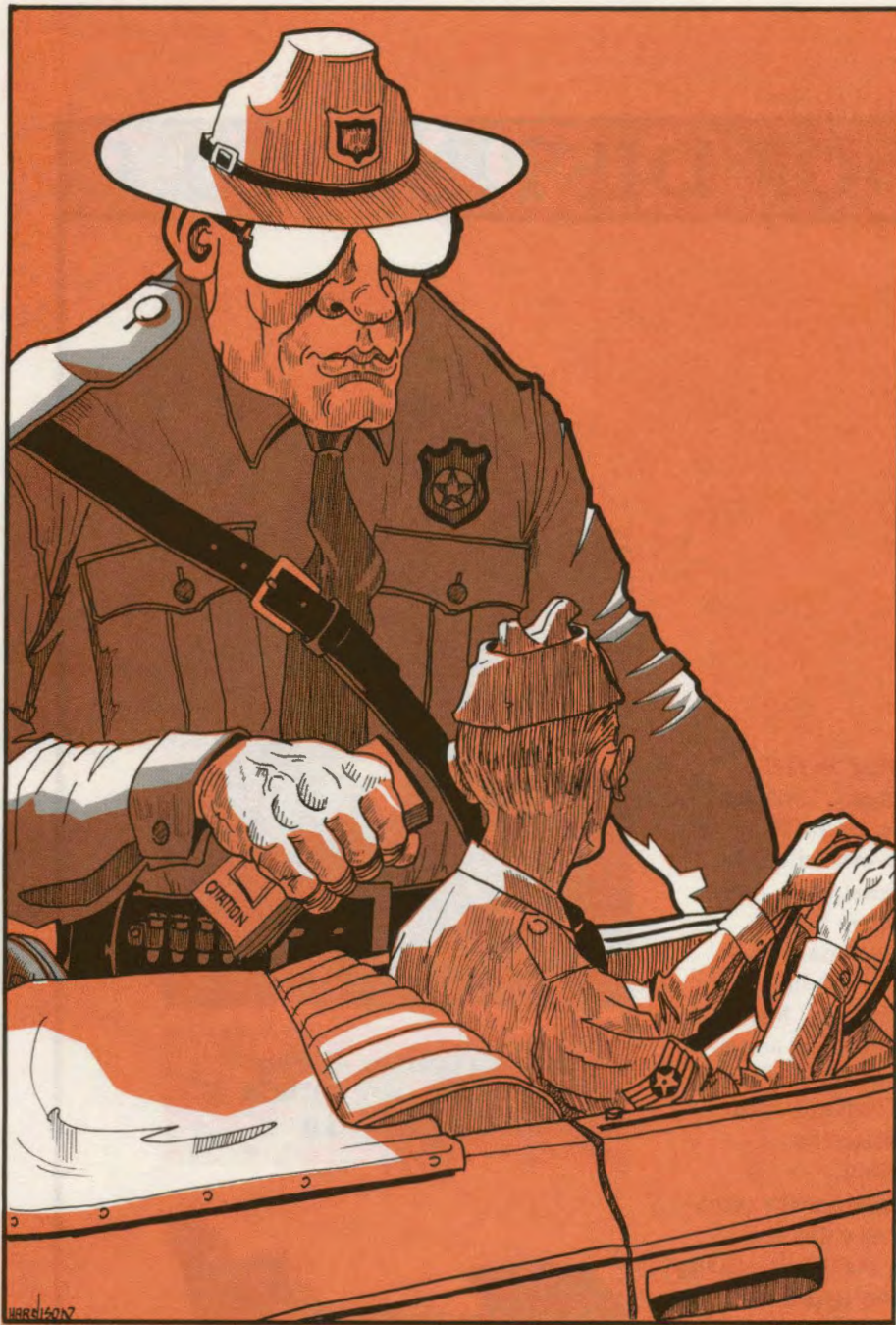
Captain Dunn's skillful flying and quick assessment of a critical aircraft malfunction prevented the loss of a valuable aircraft and potential injury.



**Captain Gregory J. Dunn**  
**549 TASTG, 507 TAIRCW**  
**Patrick AFB, Florida**







**SSgt Steven J. Schultz**  
**366 TFW/SEG**  
**Mountain Home AFB, Idaho**

**A** couple of weeks ago during an office discussion of speed limits, I mentioned to my boss that I hadn't exceeded the 55 mph speed limit for over two years. Why? Because I felt that I was "due" for a speeding ticket and I wasn't going to give Ol' Smokey a chance at me. The

# UNTIL

boss was quick to counter with: "There's no such thing as being due. You either cause something to happen or you take the effort to ensure that it is not allowed to happen." Actually, I believe we were both right.

You see, one of the basic premises of safety is that mishaps don't just happen—no one is "due" for a mishap—they are caused. A speeding ticket and a mishap are analogous. After just consideration, my comment should have been: "I don't drive above 55 mph because I've exceeded that speed occasionally for ten years now and, having never been caught, I've been lucky." As we all know, everyone's luck runs out eventually. The same concept applies to unsafe acts or easy ways of doing the job: eventually one's luck will expire and an injury or property damage will be allowed to occur—*will be caused*.

As a safety technician, I've been investigating mishaps on a daily basis for three years. During that time, I haven't investigated a single mishap that "just happened" or a mishap that was "just one of those things" (as I too frequently hear). I also haven't met anybody who was truly "due" for an unavoidable mishap. There's no one keeping a master log on each of us that says, "For every 1054 safe acts you perform, one mishap will come your way." Too often, we in the Air Force experience mishaps because someone presses

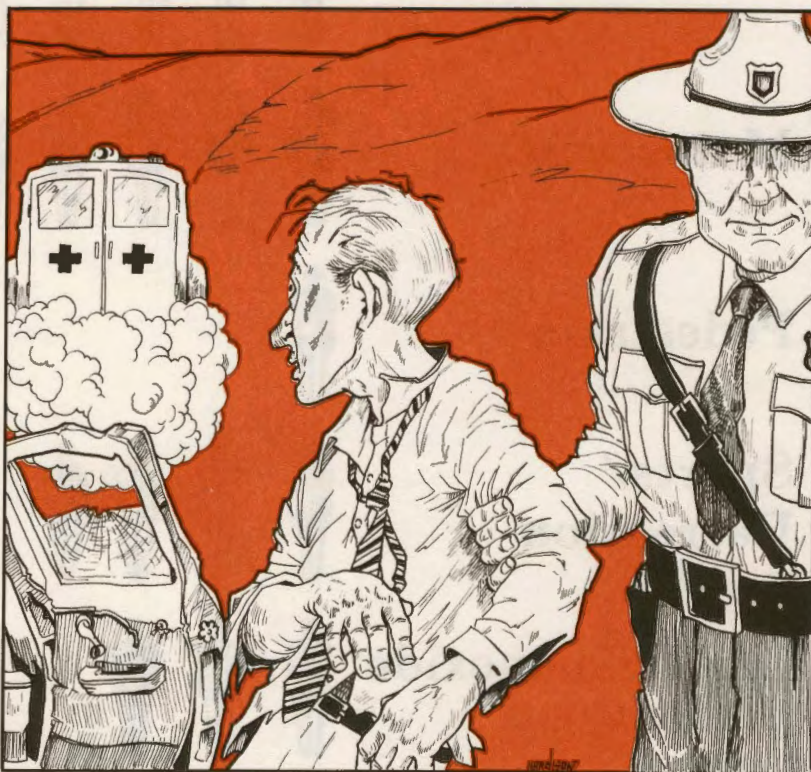


# I GET CAUGHT

their luck one time too often. How often is too often? No one knows for sure. Sometimes the hundredth is one time too many. Often, the first or second time is one time too many. The key, then, to mishap prevention is to deny that one chance the opportunity to occur.

Unfortunately, we don't. The human race is by nature a society of gamblers. We think of the internal joy we get when we outsmart the cops with our radar detectors or when we flip the checklist open only long enough for Safety or QA to pass by. And we say we'll do it "until I get caught."

Caught—to most of us that means when I get stopped for speeding or drinking and driving or when I get a DSV (detected safety violation) or when Safety writes me up for it. We think small, and never consider the Big Caught—when we kill ourselves, someone else or damage property. For each year Man occupies the planet, he becomes more convinced of his invincibility. Death and serious injury through mishaps are real and painful. It's not pretty and it doesn't always happen to someone else far away, as we like to think. Sometimes it strikes close to home. Consider the airmen who were servicing an aircraft with gaseous oxygen (GOX). Their failure to follow tech data allowed the aircraft to blow up and be destroyed. Or the high school chum of mine who got



drunk and drove a car. He killed a woman and her child. He was lucky to receive only minor cuts and abrasions (or was he, considering his two manslaughter convictions and the unending guilt that confronts him every day).

Until I get caught . . . That's like the person who says, "I wear my seatbelt only on long trips because I'm exposed to a greater accident potential." That person overlooks two critical facts: (1) the majority of automobile mishaps occur within 25 miles of home, and (2) you might need

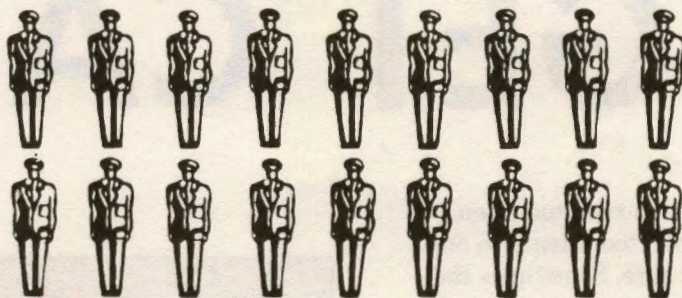
your seatbelt only once, but which once?

Which "once" will be the unsafe act that causes a mishap? When will your "luck" run out? Is there such a thing as luck or is it the alibi of losers and people who have been caught? And why wait "until I get caught"? It's much easier to do the job correctly now than to try later to explain why I did it wrong or to face the consequences. It all comes down to two words we've all heard since Day One: attitude and responsibility. ➤



## OFF-DUTY MISHAPS

Automobiles



Motorcycles



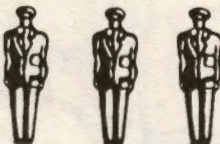
Pedestrian



Sports/  
Recreation



Carbon monoxide  
poisoning



Train

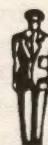


## ON-DUTY MISHAPS

Industrial



Automobile





**Lt Col James H. Montman**  
**25 TFS/DO**  
**Suwon AB, South Korea**

I didn't think it was going to be a very fun day to begin with. I got that impression when I did my normal early morning weather check (a look out my bedroom window). The ominous dark clouds, heavy rain and poor visibility were enough to make any operations officer shake his head in dismay. I resigned myself to rebuilding the flying schedule based on weather conditions and making the inevitable "launch or cancel flying" decision. Then, if we did fly, I would spend the rest of the morning in the RSU (runway supervisory unit) pulling SOF duty for our aircraft.

The RSU is owned, controlled and maintained by our host nation. Normally there are about five people in the RSU (four allies and a USAF-type). But since our allies had already cancelled flying, the enlisted man who maintains the RSU and I were the only occupants that day.

After launching two of my more capable A-10 pilots into the weather for a Hog's eye view of conditions better suited for ducks, I began taking their PIREPs. I was minding my own business monitoring our two airborne aircraft while the RSU maintainer tried to track down a minor water leak. He finally located the source as the flare gun port and removed both loaded flare guns in an attempt to dry them off while he fixed the leak. At this point I should have made his business mine as well. But with the weather rapidly deteriorating,

# THERE I WAS



rating, placing 10 other aircraft on weather hold plus talking to squadron ops, weather and the Command Post, not to mention the two Hogs still airborne, I really wasn't paying much attention to what was going on behind me. At least not until the loud explosion, flash of light and ricocheting red flare got my undivided attention. You guessed it. Another flare gun accidentally fired inside an RSU. I immediately performed the Boldface for Fire in the RSU: (1) Bailout of RSU, (2) Notify fire department, (3) Re-establish communications with the airborne fighters on the SOF truck back-up radio.

Luckily there was very little damage other than ringing ears, watering eyes and a bit of smoke inhalation plus some flooring that got torched off by the burning flare. Had there been the normal contingent of people on duty, the end result could have been much more serious.

The lessons I learned from this incident are familiar ones. Any firearms must be treated with utmost care and respect, not to mention unloading it prior to performing maintenance, or removing it from the flare gun port. Safety is everyone's responsibility, and you must be prepared to act if something doesn't look or sound right.

I suppose I've had my share of engine problems, hydraulic failures and other malfunctions that I was trained to handle as an Air Force pilot. But I never expected to be chased around the inside of an RSU by a ricocheting flare. And it's the unexpected that we can all avoid by being more aware of what's going on around us. ➤

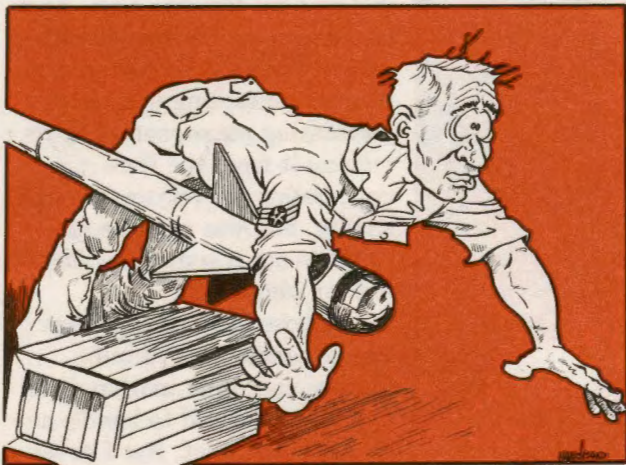


# WEAPONS WORDS

## Out of my way

**F**ollowing a mass missile download, a group of loaded trailers was awaiting post-load inspections at the missile shop. When the weekend shift of missile shop personnel arrived, they were instructed to expedite the downloading of trailers so that the empty ones could be returned to the flight line for further missile offloads. The three crew members were all qualified to handle missiles and were using proper tech data while they tried to transfer the missiles as rapidly as possible.

While carrying a missile to the storage rack, one of the crew members didn't notice a component box lying in his path. As he snagged his foot on the box and fell, the missile struck the pavement, damaging



both the glass dome and one of the canards. The crew member was injured as well.

While the workload was much greater than the weekend crew was used to, there was no reason for compromising their normal procedures and awareness of safe unloading techniques. Instead of

hastening completion of the work to be done, the mishap caused the damage of a valuable AIM-9 missile and the loss of a crew member to personal injury. When your work area gets abnormally junked up with supplies, parts, AGE and other work materials, take a few moments to get things sorted out and ensure that you've got clear walk paths to get the task done.

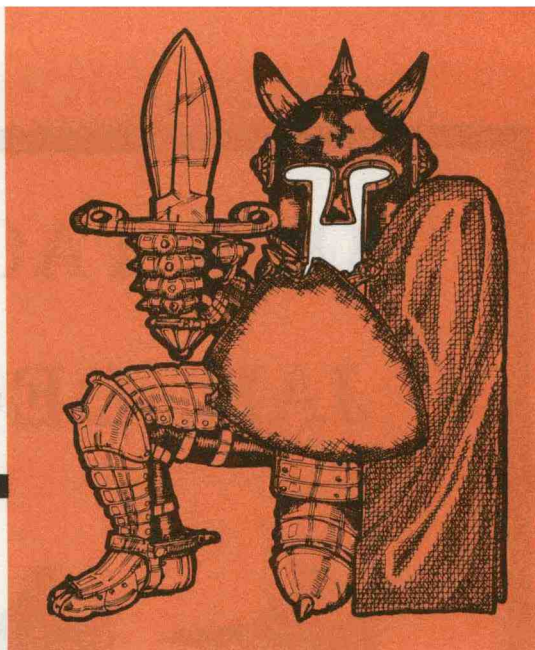
## Use precautions, not remedies

**P**recaution. Look at that word a little closer. Pre-caution—something you do in advance to protect against possible failure or danger. If we would use a little more precaution, then many safety investigations, accident reports and trips to the hospital could be avoided completely.

One weapons load crew was putting inert MK-82s on an A-10 during a steady rain. Using an MJ-1, the driver lifted the bomb about six inches above the bomb trailer while the load crew chief checked the bomb's position on the bomblift table. Determining that the bomb was situated properly, the crew chief cleared the driver to back up. Even though the members of the team tried to steady the bomb by hand, it slid off the bomblift when the driver stopped the vehicle. The nose fuse and tail fins were damaged in the fall.

The load crew was using the proper tech data, and everyone was fully qualified to do the job. The steady downpour of rain acted as a lubricant between the metal casing of the bombs and the





aluminum support rollers of the bomblift. Even though not required by the TO, use of the tie-down strap would have prevented any movement of the bomb during starts and stops of the lift and associated vibrations. In this instance, a little precaution could have prevented the need for corrective actions later.

## Bummed out battery

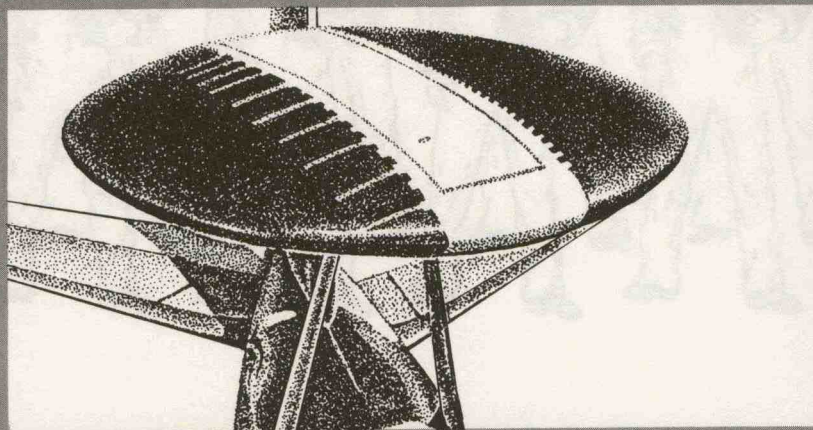
A load crew was sent to download some GBU-10s off an F-111. To begin the unloading procedures, the load crew chief put .020-gauge steel safety wire through the computer control group (CCG) battery pin and pulled it tight with about

three twists at a 90-degree angle from the pin. After the battery switch was safed, another crew member cut the arming cable in front of the aft sway brace. As he cut the arming wire, the battery pin was pulled out and the CCG was activated.

The reason for this incident was improper use of tech data and checklists. Instead of placing a safety wire at 90 degrees, it should have been 180 degrees away from the direction that the arming pin would be pulled. The TO contains a caution on the importance of using .032-gauge safety wire in this particular operation. As a result, there was little resistance against the pin being pulled out and a valuable laser guidance control unit was wasted.

Complete your maintenance work properly. Have the necessary tools and TOs available for the job at hand. Use them and follow the prescribed steps.

## HEADS UP



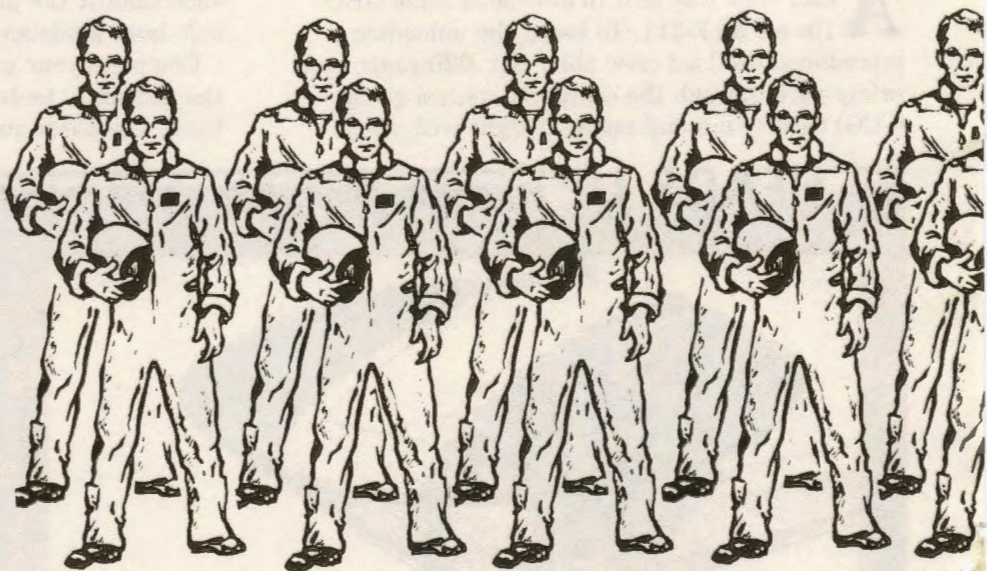
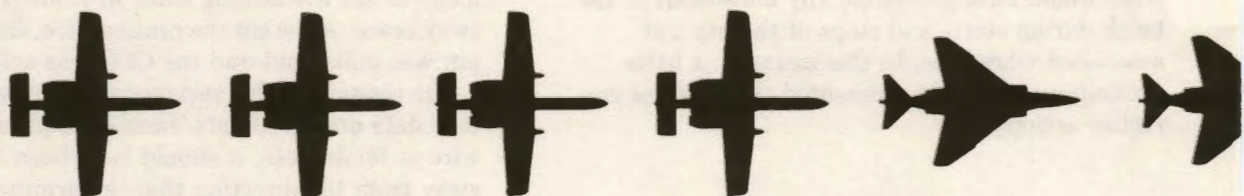
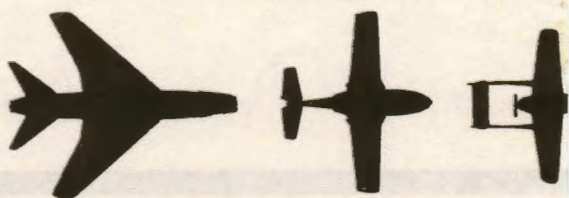
Next month, in the  
**MARCH**

issue of *TAC Attack*,  
you can look forward  
to seeing SrA Kelvin  
Taylor's stipple  
rendition of the  
E-3A Sentry  
**IN THE CENTER.**



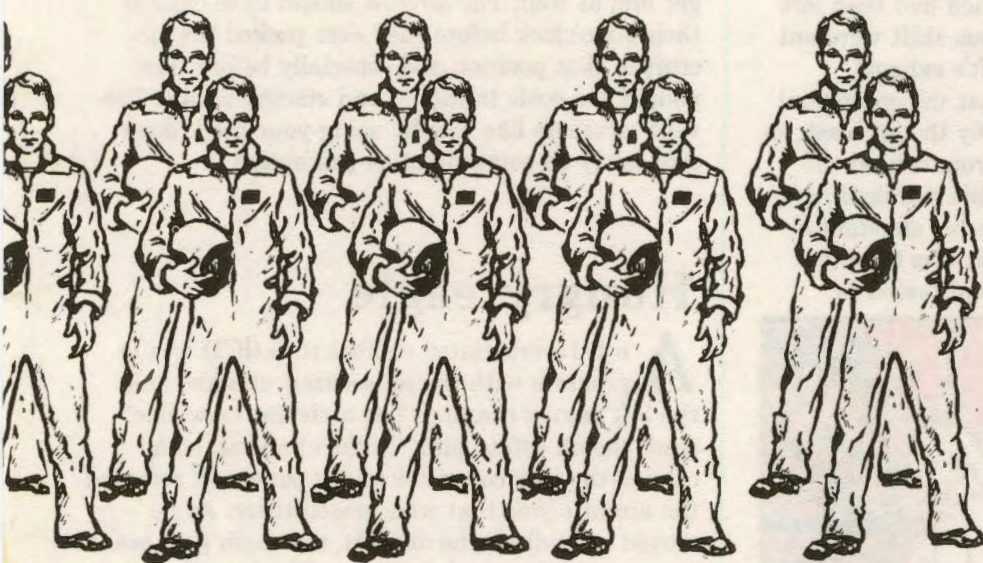
# OUR TAC AND TAC-GAINED

JAN - DEC 1985





# UNITS' LOSSES IN THE AIR





# CHOCK TALK

Chock talk

Incidents and

INCIDENTS AND

## In harms' way

**T**wo crew chiefs at one of our overseas tactical fighter bases were launching an F-4 for a low-level mission. The crew chief was using intercom to talk with the aircrew as they performed all the necessary tasks from engine start on through the flight control checks. Prior to scheduled taxi time, the pilot decided to taxi out of his shelter in order to improve his UHF radio reception. As he cleared the shelter, the pilot cocked his aircraft at a 45-degree angle. Unfortunately, several pieces of AGE (aerospace ground equipment) which had been left on the hardstand from the previous shift were not sitting directly behind the aircraft's exhaust.

The assistant crew chief saw that the equipment was in danger of being damaged by the jet blast, so he attempted to move the AGE from behind the aircraft. The crew chief also left his marshalling position in front of the jet to give his assistant a hand. When the pilot noted that it was time to taxi, he pushed up the throttles and taxied as

planned. The crew chief was able to escape the aircraft's exhaust blast but his assistant was blown into the equipment and injured.

This was a clear case of a breakdown in communication and discipline. Obviously neither the ground crew nor aircrew understood the other's intentions. The assistant crew chief's awareness of potential damage to the ground equipment was commendable, but he forgot to make sure that the jet exhaust he was concerned about wasn't going to get him as well. The aircrew should have cleared their six o'clock before they ever parked the aircraft in that position and especially before they poured the coals to the jet and started to taxi. Prevent incidents like this by using your head, don't rely solely on someone else's precaution.

## Hungry eagle

**A**n F-15 integrated combat turn (ICT) was in progress with the jet securely chocked and the left engine running. The assistant crew chief read "install safety pins" in the checklist, so he opened the jet's communications panel and removed the aircraft pins that were stored there. As he moved away from the aircraft, one main gear pin was sucked into the left engine. The jet was immediately shut down and the extent of the engine damage assessed.

The crew chief apparently didn't fully understand the established checklist procedures for ICTs. The



FEBRUARY 1986



## INCIDENTALS WITH A MAINTENANCE SLANT

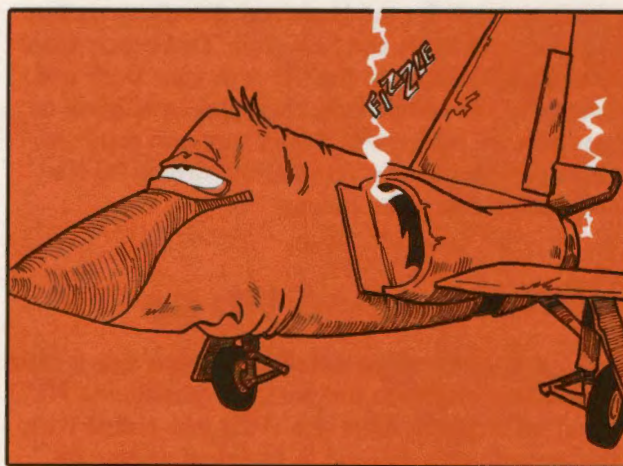
TO allows hot ICTs (with one engine running) and only requires that the weapons pins be installed. Either because of the press of the moment or simply because he didn't understand the proper steps to take, the crew chief attempted to install pins which were only required when both engines were shut down.

Integrated combat turns involve a beehive of activity as refueling, weapons loading and cocking procedures take place in quick succession. They don't allow a lot of extra time for questions and discussions that should have taken place during earlier training sessions. Everyone involved in the ICT must know his role and responsibilities. This includes crew chiefs, weapons loaders, refuelers and aircrews. If one link is weak, the whole turnaround process will suffer as a result. When the whistle blows, make sure you're ready to go.

### Barely enough

**A**n F-106 interceptor pilot had been cleared for takeoff and was performing his engine runup check when strange things began to happen. When he switched from the emergency to the normal fuel position at 85 percent, his fuel flow dropped from 4000 pounds per hour to less than 2000. Noticing this sudden drop, the pilot moved his throttle slightly, and the engine flamed out as the fuel flow dropped rapidly to zero.

Fortunately, this mishap occurred on the ground rather than somewhere later during flight. During



a flameout inspection of the engine, the maintenance folks found about a 1/2-inch break in the fuel line braiding and a 2- to 3-inch split in the fuel line itself.

Keep an eye open for any indications of abnormal wear or tear on wiring or fluid lines throughout your aircraft. Don't let problem areas go until something serious develops.

### Make sure it's right

**W**hile holding in position on the runway for their takeoff clearance, an F-4E crew noticed the right engine auto-accelerating followed shortly by utility hydraulic failure. Their wingman said he saw hydraulic fluid coming from the aux air doors along with smoke and fire. The aircraft was quickly shut down and the crew safely climbed over the side.

What caused all of that to happen? The jet had



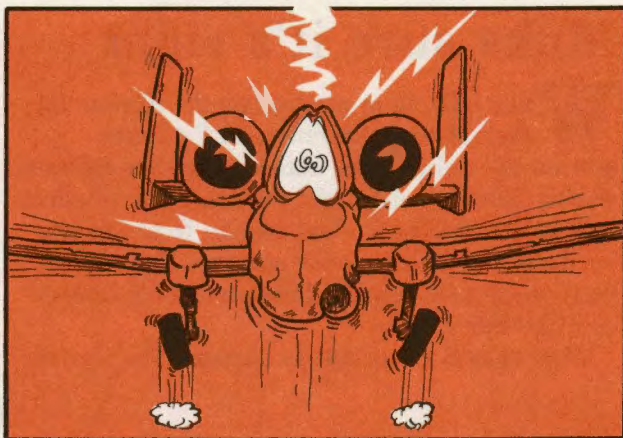
# CHOCK TALK

experienced right hydraulic pump failure earlier and both the right pump and filter were replaced. The repair work was done according to the TO, but the illustration in the tech data was mislabeled. As a result, the wrong filter was changed, leaving one in the jet still clogged, which caused the hydraulic failure, fire and other problems.

Mistakes in our tech data shouldn't be taken lightly. We rely on TOs, checklists, work cards and other materials for guidance and directions on how to do our jobs right the first time. Don't let a typo or mislabeled photo in the TO ruin your faith and reliance in the critical role they play in helping us maintain our equipment. Make sure you point out errors you find so the TOs can be correct for the next person that comes along.

## Watch those turns

**A**n A-10 Warthog found itself receiving a little extra attention due to a malfunctioning HUD (head up display). After the HUD was pulled from the aircraft and repaired in the shop, it was re-installed and the HUD circuit breakers were reset. The avionics specialist noticed that one of the GAU-8 circuit breakers was also popped, but resetting it didn't correct the HUD problem. Further inspection on the right main circuit breaker board turned up a master arm 35 amp AC "A" phase circuit breaker that was also popped. When the technician reset the master arm CB, smoke and sparks started coming out of panel F-14. Power to the jet



was immediately shut down in order to get to the bottom of the whole problem.

They traced the smoke and sparks to the armament control box where a wire bundle had been improperly routed which resulted in a sharp 90-degree bend at the cannon plug. Tension, insulation deterioration and improper routing caused a short in the wire bundle which burned halfway through the bundle before the ground was no longer present. That was fortunate because there is a vent purge line and main fuel line behind the bundle which could have greatly compounded the problem if they had become involved.

Part of troubleshooting electrical problems should include asking why circuit breakers are popped. Don't just push circuit breakers back in and hope that nothing happens. You might get more than you bargain for. When you're working around wire bundles, keep an eye out for sharp bends, 90-degree turns and bundles stretched over sharp metal edges. Wire doesn't take kindly to that kind of treatment and can give you plenty of trouble later on.

## A little fireworks

**I**t had been a good range sortie. Feeling good about the mission objectives he had completed, the O-2 pilot pushed his seat back a few inches to stretch his legs. As the seat moved, the pilot suddenly noticed a shower of sparks coming out from underneath his seat. He quickly moved the seat forward again; the sparks stopped and there didn't seem to be any other problems.

Back on the ground, they found that an improper sheet metal screw had been used to secure the fire extinguisher holder to the cockpit floor. When the seat was moved, it caused the sharp point of the screw to dig into the insulation of a nearby wire bundle and cause an electrical short.

Ensure that you use the proper part specified by the TO. The results this time were a few sparks and static on the radio, but those sparks could have led to an in-flight fire. It's happened before.



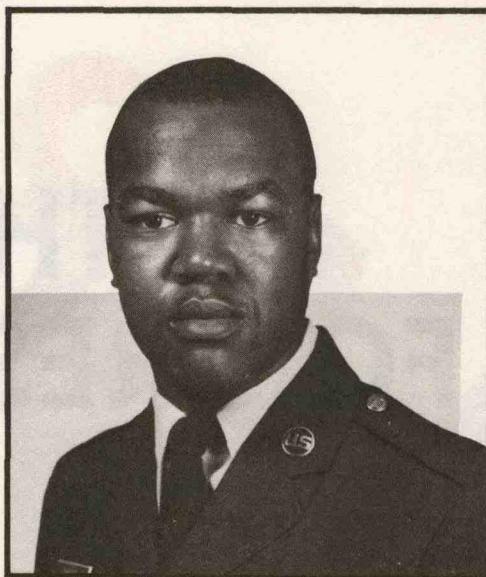
# TAC SAFETY AWARDS

## CREW CHIEF SAFETY AWARD

**A**1C Troy L. Harrison's sustained superior performance as a crew chief has enhanced the mission capability of the 474th Tactical Fighter Wing. His efforts and safety awareness have directly minimized or eliminated potentially hazardous incidents.

While Airman Harrison's aircraft was awaiting delivery of an electrical system wire bundle, over 30 items were cannibalized from it. Airman Harrison tracked the replacement of each part, ensured all maintenance actions were properly documented and thoroughly inspected all open compartments prior to paneling.

Airman Harrison is very conscientious and observant: He found a very small crack on the brake of his F-16A and removed and replaced the brake between flights. His awareness is not restricted to his assigned aircraft. Recently, he noticed a large nut in the path of another taxiing aircraft. He stopped the aircraft and removed the foreign object.



**A1C Troy L. Harrison**  
474 AGS, 474 TFW  
Nellis AFB, Nevada

## INDIVIDUAL SAFETY AWARD

**D**uring night flying operations, TSgt James M. Lee was the weapons supervisor for the end of runway inspection and arming for a flight of four F-16 aircraft. During the arming operation, Sergeant Lee observed what appeared to be intermittent sparks coming from the nosewheel area on one of the aircraft that had previously been inspected and released for flight by the aircraft maintenance crew.

Sergeant Lee recalled the maintenance crew and informed them of his observation. The aircraft was re-inspected; no discrepancy was found. Still not satisfied, Sergeant Lee continued to observe the suspected aircraft while other aircraft were being armed. During this time, he again observed sparks from the nosewheel area and again recalled the maintenance crew chief to inspect the aircraft. During this inspection, the crew chief discovered an intermittent electrical problem that turned out to be shorted wires on the angle of attack sensor. The aircraft was aborted.

Sergeant Lee's persistence safeguarded a valuable aircraft from a mishap.

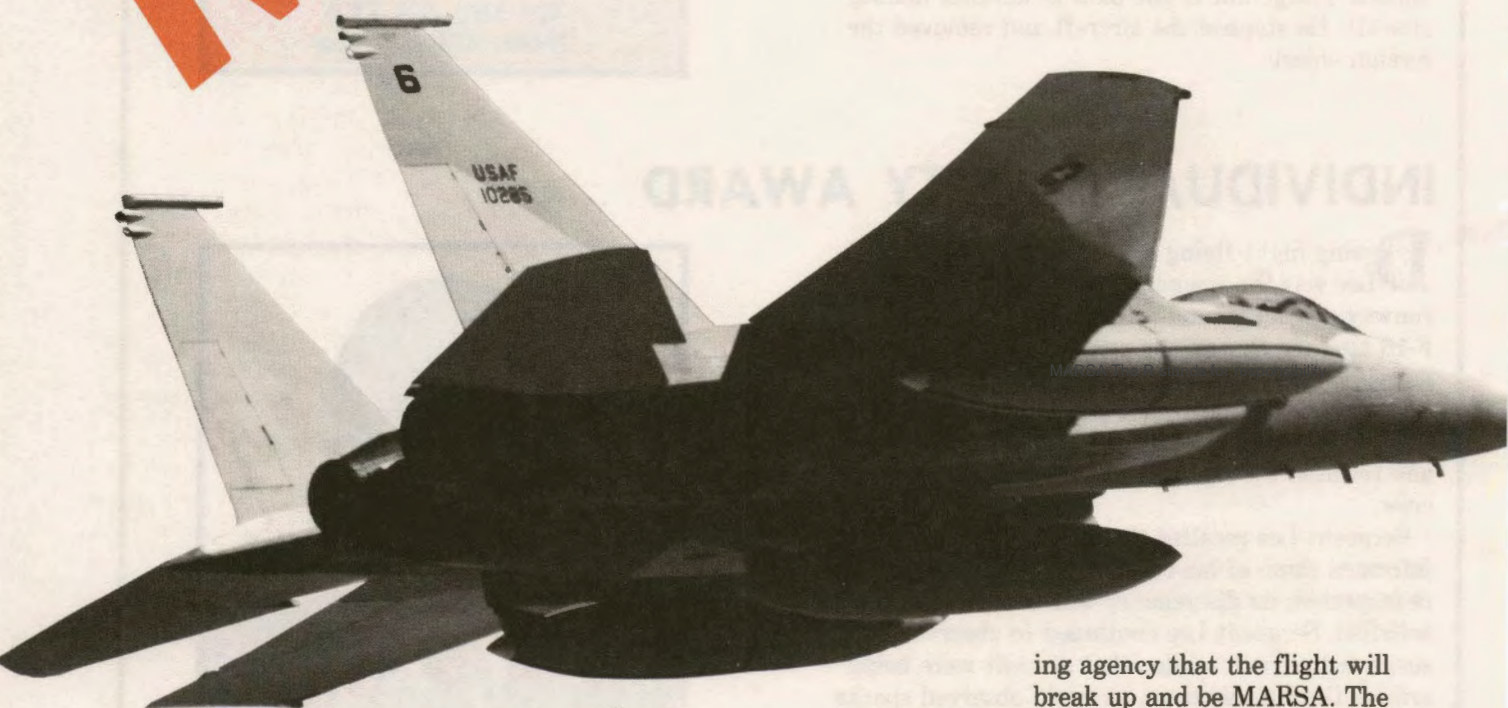


**TSgt James M. Lee**  
169 CAMS, 169 TFG  
McEntire ANGB, South Carolina



# MARSA

## THE R STANDS FOR RESPONSIBILITY



**Maj Frank Arnemann and  
Maj Marc Nathanson  
1 AF/SEF  
Langley AFB, Virginia**

**A** flight of four is briefed that it will break up into two separate two-ships when it arrives in the working area to perform intercepts or BFM (1 V 1), and the flights will be MARSA. The flight enters the area and lead tells the controll-

ing agency that the flight will break up and be MARSA. The controller advises that MARSA hasn't been approved and all will have to work as a flight. Naturally, this ruins the entire day because no alternate mission was briefed for such a situation and they end up practicing formation work, wondering why



the request for MARSA was denied. It has been approved at other times—why not now?

MARSA is expeditious and everybody understands exactly what it means. Or do we? This article is an attempt to penetrate the hazy cloud deck that sometimes obscures the very important and widely employed concept of MARSA (military accepts responsibility for separation of aircraft).

A recent, nonscientific survey among aviators, air traffic controllers and air weapons controllers about MARSA revealed widely differing interpretations of what was thought to have been the same concept. What does MARSA really mean and who can use it? Many hard-charging flyers and mission-minded controllers have employed or observed the use of MARSA. It worked, so it must have been right. Wrong.

Admittedly, MARSA has been known to save the day for flyers who were threatened by seemingly insurmountable limitations imposed by instrument flight rules and federal aviation regulations. In reality, MARSA is uncomplicated and vital to the accomplishment of your flying mission. While a straightforward concept, it does require thorough understanding and adherence to specific requirements in order to use it properly.

MARSA is an IFR concept. Basically, it is a condition where military services assume responsibility for separation between participating military aircraft in

the air traffic control system. Its use is designed to separate non-participating IFR aircraft from those who are involved in the MARSA operations; that is, if an aircraft is MARSA with another flight or aircraft, controllers will separate all other IFR traffic from the MARSA operations. Advisories concerning VFR traffic may be afforded, but these are subordinate to other services provided by the air traffic control (ATC) system. ATC facilities don't approve or deny MARSA. Their sole responsibility concerning the use of MARSA is to provide separation between military aircraft engaged in MARSA operations and other nonparticipating IFR aircraft.

Some aircrews believe MARSA can be declared for any type of operation. Although this is not true, the desired result has been attained by aircrews separating their aircraft or flights from each other in the same airspace by dividing it with a radial or DME. This is not MARSA unless the procedures are so designated by the appropriate authorities.

*OK, so what do I need to do in order to get MARSA approved and make sure I use it right the next time I need it?* Our own DOD FLIP (Flight Information Publication) points out that MARSA is decided upon by military command authorities, not by individual units or pilots. It's to be used for special IFR operations that require MARSA such as air refueling, air intercept training and military training

routes. Arrangements to establish the use of MARSA have to be coordinated with the proper air traffic control agencies and documented by letters of agreement or similar documents.

There are also several cases when MARSA is employed and specific letters of agreement are not required:

- 1) MARSA applies between all aircraft in an altitude reservation (ALTREV).
- 2) MARSA is in effect between aircraft in an ALTREV and other aircraft or groups of aircraft using the same "mission" name even though the flights originate from different air bases, headquarters and/or military commands. A prime example would be a strike force made up of aircraft from several different wings.
- 3) MARSA allows an ATC facility to clear a tanker to a common altitude with a receiver even though the altitude has not been processed as an ALTREV. This information and the identification of the other aircraft may be air-filed or included in the flight plan(s).
- 4) Air refueling—MARSA begins when the tanker and receivers enter the air refueling airspace and ends when vertical separation is established and ATC advises MARSA



# MARSA

is terminated. Under MARSA, receivers must stay within three miles of the tanker until MARSA is terminated. MARSA is applicable between a refueling operation and other aircraft specifically indi-

cated in the refueling schedule or approved by the scheduling unit to transit the published track; for example, the next set of fighters scheduled to refuel.

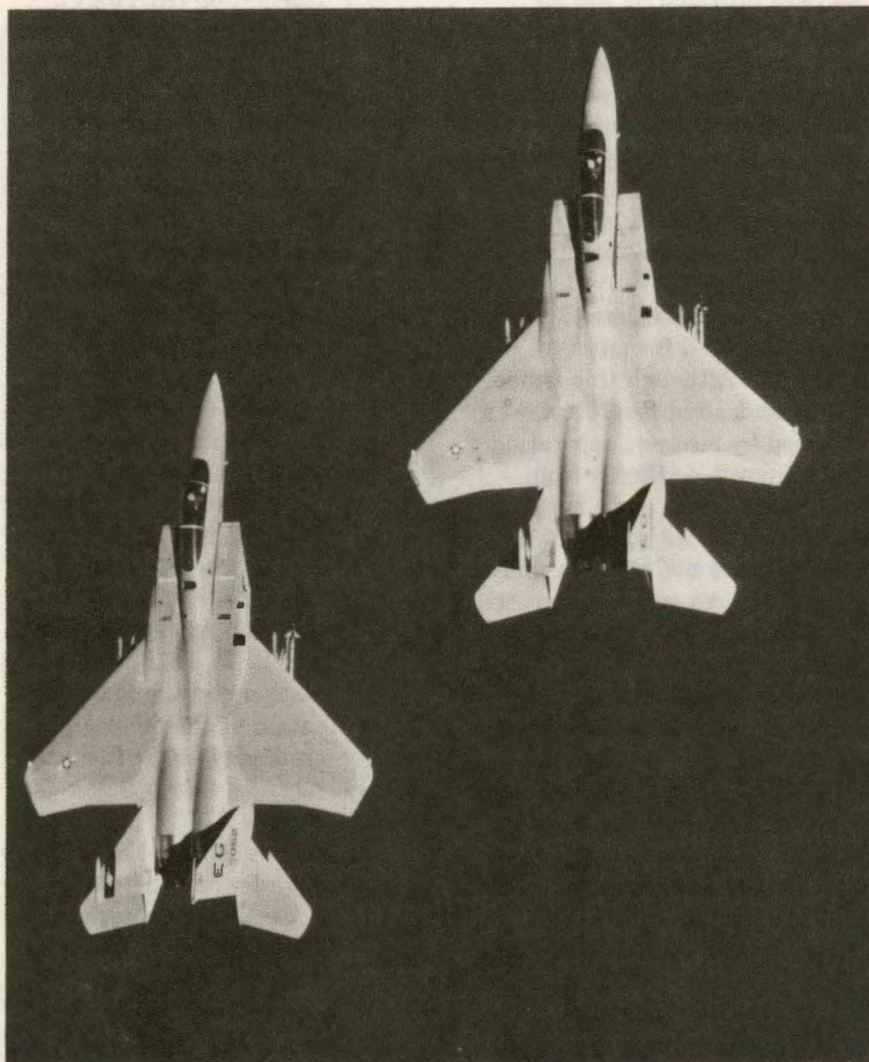
- 5) IR Low Level Routes—ATC is required to

provide separation between IR routes and MOA activity unless the aircraft using the two separate areas have agreed to MARSA. The MARSA procedures must be stated in the FLIP for the IR route and in a letter of agreement for the MOA.

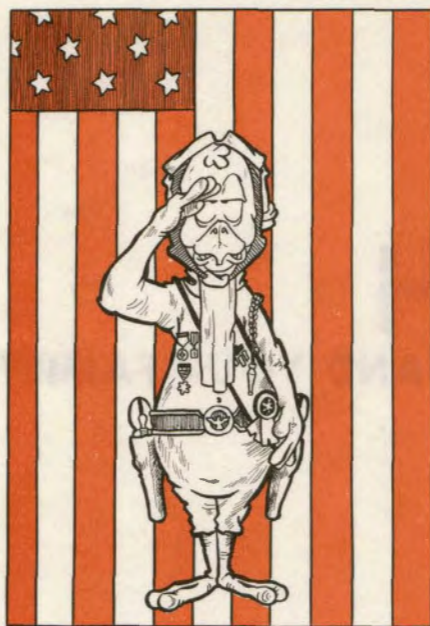
It all boils down to this: MARSA permits participating IFR military aircraft to operate together with less than the normal required IFR separation. But remember there must be an IFR clearance and the operating procedures have to be established in advance.

Where can you find the letters of agreement (LOAs) that affect your specific mission or operating area? They're on file at various locations such as the CATCO's office, airspace management offices, air traffic control facilities and wing DOTs. The procedures contained in the LOAs usually form the framework for your local flying directives.

There are numerous aviation concepts which enable us to carry out the unique aspects of military aviation operations. MARSA is one which is widely employed and vital to our effective use of the national airspace system. A full understanding and proper use of MARSA can help us to maintain maximum readiness within the safest possible training environment. ➤







## FLEAGLE SALUTES

**1st Lt Worthe S. Holt, Jr.,** 177 TFTS, 184 TFG (Kansas ANG), McConnell AFB, was performing remote supervisory unit (RSU) duties when he noticed an unusual flame pattern on the left engine afterburner of an F-4D. He immediately made a radio call on departure frequency informing the aircrew that a left engine fire was present. (There were no indications of fire, all engine instruments were normal and no engine fire or overheat lights illuminated.) By this time, the aircraft was airborne and the gear was being retracted; so the pilot deselected the afterburner and the fire extinguished. Lt Holt also relayed his observations to the aircrew and the supervisor of flying. Based on Lt Holt's input, the pilot placed the left engine at idle and flew an emergency landing pattern for recovery without further incident.

**SSgt Robert I. Backus, 4** AGS, 4 TFW, Seymour Johnson AFB, NC, is, according to his squadron commander, one of the most conscientious individuals in his unit when it comes to FOD prevention. On several occasions, he's prevented serious damage to aircraft. While replacing the panels on an F-4E that had just returned from the sound suppressor where it was troubleshot for an afterburner problem, Sgt Backus found that the screw bag had a hole in it. He retrieved screws from several doors and tail section then went to the sound suppressor for the rest of the screws. He also found a broken outboard mounting bolt and a loose inboard mounting bolt on an aircraft engine during a postflight inspection. If he had not found this problem, the throttle could possibly have jammed.

**A1C Kelly S. Bellamy, 474** EMS, 474 TFW, Nellis AFB, NV, has been invaluable in performing periodic inspections and major maintenance in a safe and expeditious manner. A1C Bellamy is assigned to the compressor section of the AGE branch. During a recent periodic inspection on an HB-1 heater, he found that the original burner nozzles were being replaced with substitute nozzles and the substitute nozzles were not equipped with a return orifice to allow unneeded fuel to return to the tank. Without the return orifice, excess fuel was being pumped into the combustion chamber causing a hotter combustion fire than necessary. This could have resulted in serious explosion. His alert actions identified a potentially serious safety hazard.

**MSgt Searcy Davis, 355** EMS, 355 TFW, Davis-Monthan AFB, AZ, prevented a minor incident from becoming a major disaster. Sgt Davis was walking through the phase section to observe maintenance procedures during a routine landing gear retraction check when he spotted a 440-volt electrical plug on a hydraulic test stand on fire. He alerted hangar personnel to be ready to evacuate aircraft; then determined that if he could disconnect the plug, the fire would probably go out. So Sgt Davis walked up the cord until the cord disconnected.

**Sgt Craig M. Gray, 31** CRS, 31 TFW, Homestead AFB, FL, has assisted in over 200 engine runs within the past ten months without incident or receiving any safety violations from quality control. He has also saved many manhours of work and on several occasions prevented possible personal injury and serious damage to aircraft and support equipment.

**SMSgt John R. Schey, 124** CAMS, 124 TRG, Idaho ANG, was on the flight line when an RF-4C aircraft experienced a residual fuel fire in the tailpipe. The fire department saw the fire and alerted the crew, who shut down and left the aircraft quickly. Sergeant Schey quickly determined that the best course of action was to blow air through the engine with an air cart. That's what he did; the fire department didn't have to spray it. Sergeant Schey's quick thinking eliminated the need to put cold fluid into a hot engine which prevented more serious damage to the engine.



# DOWN TO EARTH

ITEMS THAT CAN AFFECT YOU AND YOUR FAMILY

## Handle electricity with care

**W**hen you think of how many times a day you flip a switch or plug in an appliance, you realize how important electricity is in modern life. But you should also consider the potential this tool has for harm. Hundreds of people are electrocuted each year, and about 15 percent of all home fires are caused by electrical problems.

The Consumer Product Safety Commission has been active in promoting electrical safety, and has produced this home safety audit—a checklist for identifying and removing electrical hazards.

**Check the wattage of all bulbs in your light fixtures.** A bulb of too high wattage may lead to fire through overheating. Be especially sure to check bulbs in hooded lamps that can trap heat. If you don't know the correct wattage for a fixture, use a bulb no larger than 60 watts.

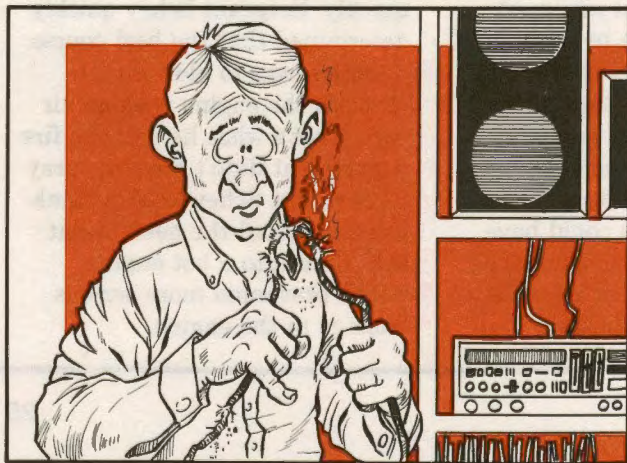
**Check all lamp and extension cords.** Make sure

they're not in traffic areas; aside from the obvious tripping hazard, a cord that is stepped on can become frayed, leading to a fire hazard. Also make sure furniture is not resting on cords. Replace any cords that are cracked or frayed. Cords should not be wrapped around themselves nor should they be attached to walls with nails or staples.

Extension cords that are not in use should be equipped with safety covers so children or pets won't be shocked. Don't overload extension cords; check the rating of both the cord and the appliance to make sure they're compatible. And remember, extension cords should only be a temporary measure.

**Check heating equipment.** All heating appliances should bear the label of a recognized testing agency, such as UL. Keep heaters on a stable surface so they won't tip over and make sure they're away from drapes and other combustibles. If the heater has a three-pronged plug, don't defeat the purpose of the ground by snipping it. Attach the adaptor's ground wire or tab to the outlet. (Make sure your house wiring system is grounded.)

**Check kitchen appliances.** Countertop appliances should be unplugged when not in use and placed so that cords will not come in contact with water or any source of heat. Large appliances should operate without excess vibration or movement; if they vibrate, have them checked. Keep combustibles away from your stove-top range.

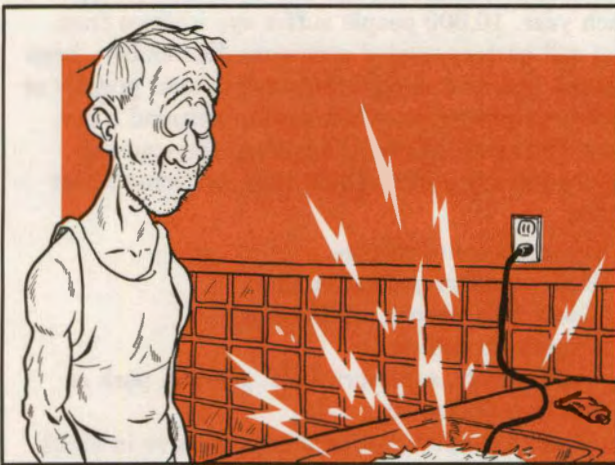




## HERE ON THE GROUND



**Check your bathroom.** All electrical appliances, including hair dryers, curling irons and razors,



should be unplugged when not in use. They should be used near water as little as possible—even a switched off appliance can cause electrocution if it falls into water while plugged in. Don't use portable heaters in a bathroom. The combination of water and many grounded surfaces makes a bathroom a risky place to use a heater.

**Check your bedrooms.** If you have an electric blanket, make sure it is free of cracks or breaks in wiring, plugs and connectors. Check for charred spots on both sides of the blanket—these indicate that there is a problem. Nothing should be covering an electric blanket that is in use, nor should it be folded back; this can cause overheating.

**Check your garage, basement and workshop.** All your power tools should be equipped with three-pronged plugs or be double-insulated to minimize the chances of electric shock. Consider replacing older tools that don't have these safety features.

**Check your wall outlets and switches.** All of them should be working properly, and any not in use should be equipped with safety covers. All outlets and switches should be cool to the touch and have a faceplate that doesn't allow any wiring to be exposed. All plugs should fit snugly; a loose plug can cause overheating.

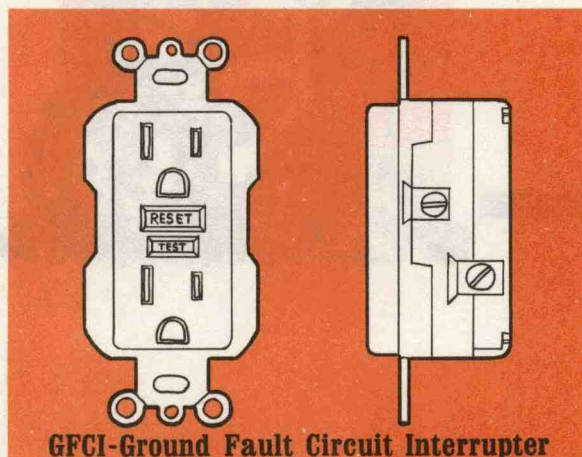
**Check television sets, radios and other entertainment equipment.** They should all be placed where the cords are away from traffic and where the air can circulate freely around equipment. Make sure the cords are in good condition and placed well away from sources of water.

**Check your fuse box or circuit breaker box.** Make sure fuses are the right size. If you have circuit breakers, "exercise" them periodically by turning them on and off about a dozen times. It's a good idea to have ground fault circuit interrupters to prevent electrocutions. If you have GFCIs, test them periodically following manufacturer's instructions.

**Check outdoor receptacles.** Each receptacle should have its own waterproof cover. Current building codes require GFCIs on outdoor circuits. If



# DOWN TO EARTH



your house was built before these codes took effect, consider having GFCIs installed as a safety measure.

**Check lawn and garden tools.** All cords should be in good condition. Have cracked or damaged cords replaced. Any equipment that operates erratically or abnormally should be repaired or replaced. When using extension cords outdoors, make sure they are rated for this use. Tools that are equipped with three-pronged plugs should be used only with extension cords made for three-pronged plugs.

*Courtesy National Safety News*

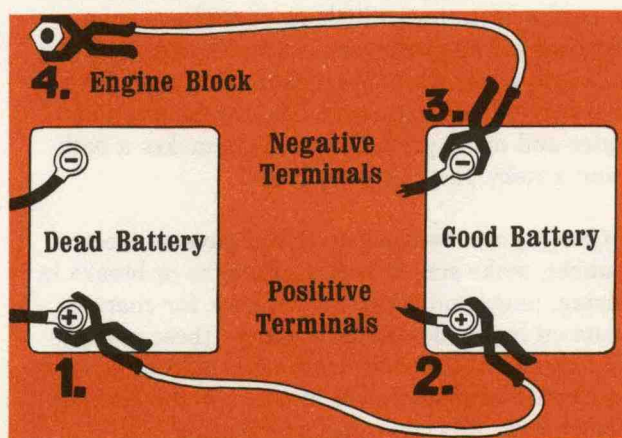


**What is a safe setting for your hot water heater?** 120 degrees or lower prevents scalding. Just five seconds of exposure to 140-degree water can cause a severe burn.

**Is it working?** The 55-mile-an-hour speed limit saves approximately 4,000 lives and prevents about 62,000 serious injuries each year. But, in the last 15 years, 400,000 people were killed and over 4 million were seriously injured because they didn't wear seat belts. Will mandatory seat belt laws work? New York's is: there was a 27-percent decrease in auto deaths in the first three months of the law's enactment.

**Careless jump-starts can hurt your eyes.** The Consumer Product Safety Commission says that each year, 10,000 people suffer eye injuries from wet cell battery-related accidents. Remember: keep flames, sparks and cigarettes away; wear goggles or other eye protection when working around a battery; and read the owner's manual for your car before you try a jump-start. Here are some smart rules:

- Batteries same voltage.
- Both negative posts grounded.
- Check fluid, check for freezing.
- Cars not touching.
- Ignitions off, accessories off, gears in park or neutral, brakes on.
- Attach clamps in order shown; remove in exact opposite order.





TSgt Charles A. Baggerly  
4450 Maintenance Squadron  
Nellis AFB, Nevada

**I**t's a bright sunny day at the air patch. You've got your tool box, TOs, an easy part to install and a minor discrepancy to fix. After a quick check of the forms, you climb into the cockpit of the sleek, ugly, neat, hog (pick one) fighting machine and start to work.

Things are going fine when, all of a sudden, you hear a sound that brings fear into the hearts of maintenance folks everywhere. Clunk, clunk, clunk, THUD!

Somewhere in your fighting machine rests a little piece of hardware about two inches long by about one-quarter inch, and it used to be yours. While you spend the next eight or so hours finding it, let's consider what happened.

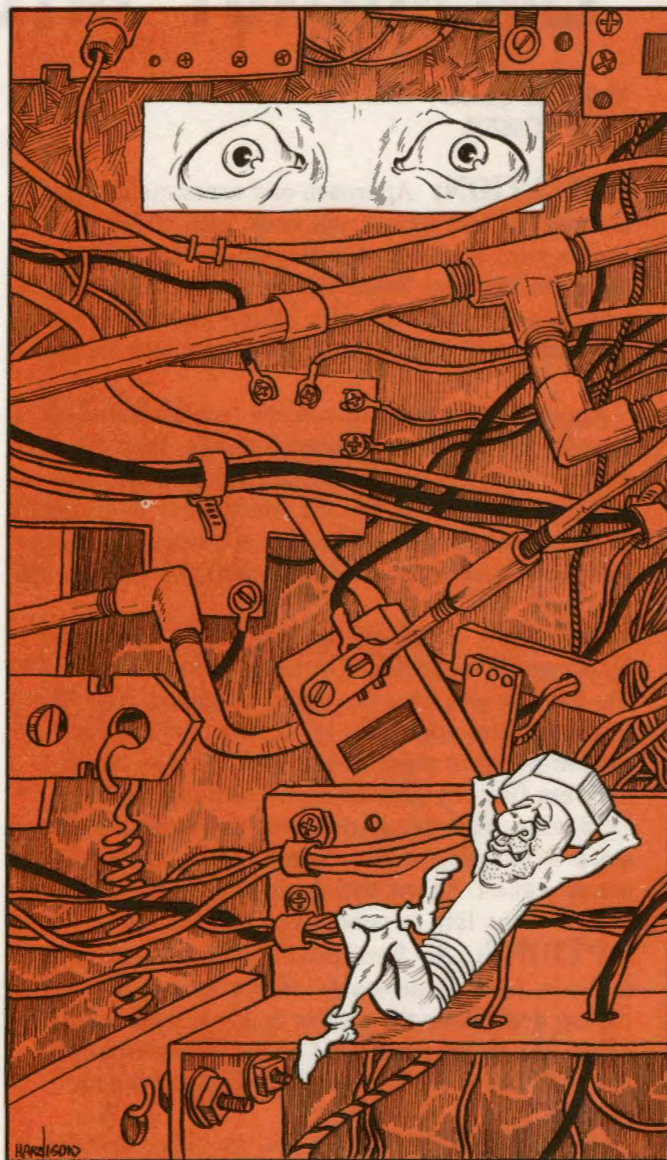
You had your TO, the job, the knowledge and everything else required to do a faultless job. Unknowingly, you had something else: **THE BIG C**. What is it? It's doing the same job, day after day, for X-number of years. It's **COMPLACENCY**. Everyone gets it. Usually, the results are harmless, resulting in a few minutes of sheer panic as you desperately search for the missing tool or piece of hardware at the end of the job. Sometimes, though, the results are hours of hard work that keep one of our fighting machines out of their natural environment—the air.

Complacency can happen on Monday just as easy as Friday. It can happen when you tow an aircraft a little too fast, drive your vehicle a tad too close to something and wrinkle the paint job or while you're making that little tweak on a circuit card. Supply guys, ops folks, admin personnel, as well as maintenance types, can suffer from **THE BIG C**.

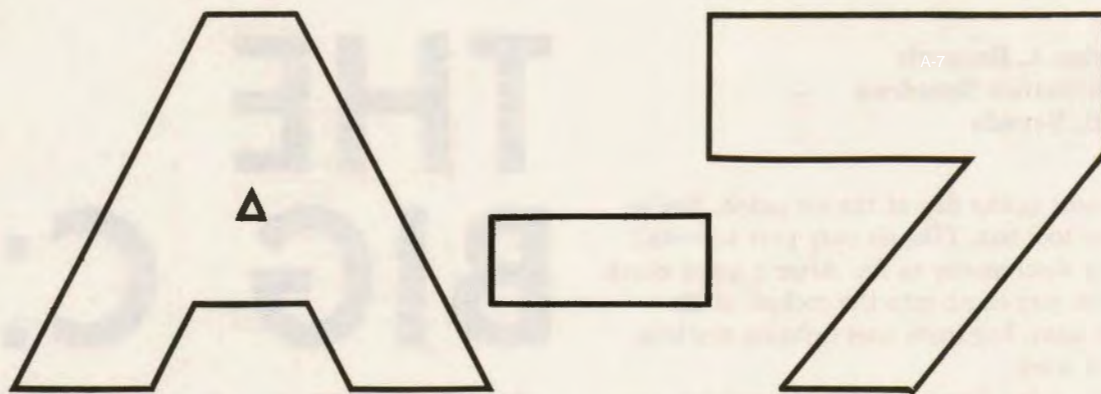
To avoid it, you need to be aware of its signs. A good warning is the feeling that everything is going your way. Some days, it does. Most days, it means impending disaster lurks in your future. Be aware of what you are doing, not just that you're doing it. Pay attention to the details. If you can't, for whatever reason, take a break. The short time you take to get your mind back on the task may save hours of work later.

Of course, the whole purpose of this is to keep our fighting machines in the air where they belong, not grazing on the asphalt of your local airplane patch.

# THE BIG C: COMPLACENCY







# EMERGENCY SITUATION TRAINING

**Maj Jim Quick**  
**HQ TAC/SER**

**SITUATION:** Approach-end arrestment. Most tactical fighters have a tail hook with which to snag a wire to either stop the jet on aborted takeoff or on landing. While this section of *TAC Attack* usually addresses a specific fighter emergency, this discussion will look at landing arrestments in general.

Approach-end arrestments are recommended or mandatory for many reasons. Usually, they are necessary when you anticipate directional control or stopping difficulties. So, for your utility hydraulic or generator failure, blown tire or flaps-up landing, wet runway or short field situation, you elect to use the hook.

Once down, hooks are designed to be held down by accumulator pressure so as to make contact with the runway and stay there until engaged. You fly the ideal final approach, plunk down at the prescribed distance short of the wire, see the donut markers flash by your ears and nothing happens. Hook skip. Your jet actually seems to speed up. Instead of stopping in less than 1,000 feet, you may not stop at all. As you tool down the runway, it might be too late to ponder the options.

**OPTIONS:** **A.** Been practicing touch-and-gos lately in your single seater? Know how to do one? No big deal. Pour the coal to it, go around and try again. **B.** Take a mid-field or departure-end barrier. **C.** Leave it on the runway and let the aircraft roll out to the end.

**DISCUSSION:** Murphy said it: "If something can go wrong, it will." If you don't plan to miss the cable, you very well might. Your Dash One describes how to execute a touch-and-go, so be pre-

pared to go to mil power, accelerate to takeoff speed (same as final approach speed for the bolted landing in an A-7), rotate to takeoff attitude and, when safely airborne, retract gear and flaps (if appropriate) and try again. The only difference will be several hundred pounds less JP-4 and a tail hook shoe that sits closer to the runway and is hot to the touch.

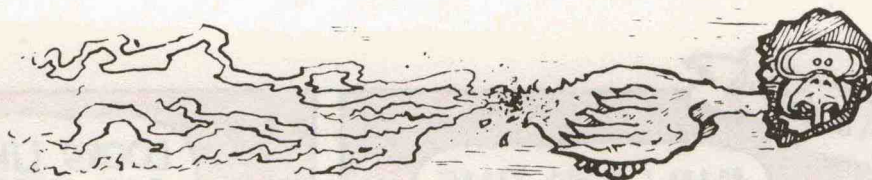
Option B says to try for the next barrier on down the runway. Swell, if you have one that's not too far down; but if it's at the other end, you may never make it. If you leave the hook down for 9000 feet or so and do manage to stay on the pavement, it may be ground down to a stub when you get there. As in Option C, if you miss the barrier and prefer to keep your emergency on the ground, be prepared to use whatever combination of flight controls, nose gear steering, differential/emergency braking you have available. For example, the A-7 Dash One recommends an approach-end engagement for generator failure due to no nosewheel steering or antiskid braking. But you still have unlimited differential braking, aileron/spoiler and rudder which should provide ample directional control with up to 10 or 15 knots of crosswind on a *dry* runway. Check the guidance in your own Dash One.

If you need a barrier, use it. But have a plan in mind for the miss. Consider the nature of the emergency, the weather and your fuel. Cross-country FLIP remarks should also be read closely for information that may be peculiar to your destination. Certain airports may require 10 to 15 minutes to rig a cable, while some installations may advise of problems with a particular barrier system.

Be prepared. Know why and when an approach-end arrestment is recommended as well as the actions you must follow when you don't get one. ➤



# TAC TALLY



CLASS A MISHAPS
AIRCREW FATALITIES
TOTAL EJECTIONS
SUCCESSFUL EJECTIONS

TAC		
DEC	THRU	DEC
	1985	1984
0	15	22
0	10	16
0	14	17
0	10	14

ANG		
DEC	THRU	DEC
	1985	1984
0	12	8
0	7	2
0	8	7
0	8	6

AFR		
DEC	THRU	DEC
	1985	1984
0	1	1
0	1	0
0	0	2
0	0	2

## TAC'S TOP 5 thru DEC 85



TAC FTR/RECCE	
class A mishap-free months	
41	405 TTW (F-15,F-5) Luke AFB, AZ
34	33 TFW (F-15) Eglin AFB, FL
32	366 TFW (EF/F-111) Mtn.Home AFB, ID
31	49 TFW (F-15) Holloman AFB, NM
30	67 TRW (RF-4) Bergstrom AFB, TX

TAC AIR DEFENSE	
class A mishap-free months	
155	57 FIS (F-4) Keflavik, Iceland
108	5 FIS (F-15) Minot AFB, ND
105	48 FIS (F-15) Langley AFB, VA
64	318 FIS (F-15) McChord AFB, WA
15	49 FIS (F-106) Griffiss AFB, NY

TAC-GAINED FTR/RECCE	
class A mishap-free months	
156	138 TFG ANG(A-7) Tulsa, OK
133	114 TFG ANG(A-7) Sioux Falls, SD
122	183 TFG ANG(F-4) Springfield, IL
119	180 TFG ANG(A-7) Toledo, OH
111	124 TRG ANG(RF-4) Boise, ID

TAC-GAINED AIR DEFENSE	
class A mishap-free months	
138	177 FIG ANG(F-106) Atlantic City, NJ
104	125 FIG ANG(F-106) Jacksonville, FL
87	119 FIG ANG(F-4) Fargo, ND
71	107 FIG ANG(F-4) Niagara Falls, NY
63	147 FIG ANG(F-4) Ellington AFB, TX

TAC-GAINED Other Units	
class A mishap-free months	
197	182 TASG ANG(OA-37) Peoria, IL
181	110 TASG ANG(OA-37) Battle Creek, MI
177	USAFTAWC (many fighters) Eglin AFB, FL
169	84 FITS (T-33) Castle AFB, CA
111	552 AWACW (E-3, EC-130) Tinker AFB, OK

## CLASS A MISHAP COMPARISON RATE

(CUM. RATE BASED ON ACCIDENTS PER 100,000 HOURS FLYING TIME)

TAC	1985	3.2	3.4	2.7	2.4	2.9	2.7	2.5	2.6	2.5	2.3	2.2	2.1
ANG	1985	4.8	4.8	3.0	4.3	4.2	4.9	5.4	5.2	5.1	5.0	4.6	4.3
AFR	1985	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.4	2.1	2.1
	1984	3.4	4.3	3.3	2.5	2.9	3.8	3.3	3.2	3.1	3.3	3.3	3.2
	1984	0.0	2.3	1.5	2.2	2.6	2.1	1.8	2.1	2.3	2.5	2.7	2.8
	1984	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	2.7	2.2	2.3	2.1

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC



FLEAGLE

MAN! THIS TIME  
O'YEAR IT GETS  
COLD IN A HURRY.



LOOKS LIKE WE HAD SUM  
BAD WEATHER WHILE I  
WUZ AWAY.



DON'T LOOK TOO BAD,  
SURE DO FEEL GOOD  
TO GET HOME.



ICE!



FLOP!

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FLEAGLE ??



HARRISON