

THE COMBAT EDGE

FEBRUARY 1995



The Combat Edge February 1995



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LEADERSHIP, SAFETY & THEN SOME

*Brig Gen Silas R. Johnson, Jr.
Commander, 552d Air Control Wing
Tinker AFB OK*

28

QUANTITY DISTANCE

What it is and why should I care

There are basically two reasons for separation. One is to prevent an accidental explosion in one group of explosives from simultaneously detonating other explosives. The other reason is to protect our other resources from total destruction in case of an explosion.

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**THE
COMBAT
EDGE**
**Air Combat Command
Safety Magazine**

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ACCENT on Safety

First, congratulations on a noteworthy safety performance over the Thanksgiving, Christmas, and New Year's Holidays. Because of everyone's superb effort we only had 1 Class A ground mishap during the holidays. But the holidays are long past and we've all, more or less, settled back into our normal routines. We made a big push for safe holidays and added caution our first few days back on the job. Last month our emphasis was on preventing mishaps due to a lack of proficiency. We all get a bit rusty after a long layoff. Now the winter doldrums provide plenty of potential for complacency to set in. We're in the middle of the winter "dark ages" where depression, malaise, and give-a-care attitudes can take hold of us. Don't let them. Be aware of what's going on around you and stay focused on your job. We also need to be alert for the signs of attitude shifts in our friends, co-workers, and subordinates. "We Care" should be more than the title of one of our important people programs. It should be a cultural attitude that encompasses all of us and permeates everything we do. As Charles Swindoll said, "I am convinced that life is 10 percent what happens to me and 90 percent how I react to it. And so it is with you.... We are in charge of our attitudes." A caring, positive attitude will beat the winter blues.

We've hinted at it before. February is notorious for its bad weather. In fact, this month tends to bring some world-class bad weather with it. Now is the time to put into practice all of the appropriate bad weather techniques and procedures that you've just been thinking about up to this point. Don't let the gloomy, overcast days, dark skies, snow, rain and sleet get you down. The good news — spring will soon be here.

Speaking of inclement weather, this time of year provides an excellent time for daydreaming about warmer, sunnier places and times. That's great, but don't do it while you're working, driving, or engaged in any other activity requiring your concentration and undivided attention. Don't endanger yourself or others due to a lack of attention and concentration. As Brigadier General Johnson explains in his article (pg 4), "AND THEN SOME means one last look, one additional check, a little more preventive maintenance and a lot more involvement in the overall operation. It means people look ahead to what might happen — how a potentially harmful chain of events can be broken." Stay focused!

Just a reminder, May's Safety Day (the first of the year) isn't that far off. It's not too early to start your planning. Work hard, play hard — **BE SAFE!**

*Colonel Fack Acker
Chief of Safety*

Leadership, Safety And Then Some



*Brigadier General Silas R. Johnson, Jr.
Commander, 552d Air Control Wing
Tinker AFB OK*

Seventeen years ago the first E-3 Sentry came on active duty, and the race began.

The pace has grown faster as this weapon system has given farseeing eyes to the battle field. Airborne Warning and Control Systems gave other warfighters a vital edge and the nation an aerial flagship to show American presence. Our professionals took the reins of leadership and set a path for success despite the growing strain of meeting global commitments with only a handful of airframes.

There's no doubt that stress has impacted our crews. It's a difficult life — not only in meeting growing mission needs but in ensuring the highest degree of safety for ourselves and others. Yet, we're not alone in long deployments or difficult missions. Throughout Air Combat Command we see people and machines pushed to the limits. Nevertheless, overall safety records for the command are exemplary.

No doubt there's a wide range of techniques and plans that have helped us sustain a virtually unblemished safety record. However, there is one simple concept behind this that can apply to any system.

The bottom line to safety rests on the establishment of a leadership style which clearly highlights the importance of safety but also promotes positive action at every level.

I want to share with you my favorite anecdote which will provide the foundation for such a leadership style.

A very successful retired business executive was once asked his secret of success. He summed it up in three words, "AND THEN SOME."



"I discovered at an early age," he confided, "that most of the difference between good people and outstanding people can be explained in these three words. The outstanding people did what was expected of them AND THEN SOME."

The additional effort — the added edge — sets a person ahead of the pack. It's that quality which epitomizes the members of the 552d Air Control Wing and Air Combat Command. We've embraced the Air Force reorganization, transfer of missions and ACC quality with style — while keeping up with one of the most grueling deployment commitments! We've truly been the tip of the sword in combat while lead turning some of the most dramatic changes in Air Force history. Providing Global Reach and Power for America hasn't been just another phrase. It's a mind set we've successfully adopted and a mission we've heroically accomplished, but none of this would have happened without

us reaching out, making sure the job got done AND THEN SOME.

This team has done their job AND THEN SOME. But it's that philosophy of AND THEN SOME which establishes the very foundation of excellence and safety. You can see it in every good team member. Certainly, it's not a lackadaisical commitment to routine — that's the prescription for disaster. Yet, just as certainly, this philosophy goes beyond good checklist discipline.

AND THEN SOME means one last look, one additional check, a little more preventive maintenance and a lot more involvement in the overall operation. It means people look ahead to what might happen — how a potentially harmful chain of events can be broken.

It's important to know this dedication to excellence is contagious. This dedication to safety can be pervasive. Our people look to those above them for quality leadership.

When they see it, they emulate it. That's the very heart and soul of empowerment. It's also at the very center of safety consciousness. Only when people truly care and will move to make a difference will true excellence and the utmost in safety be seen. AND THEN SOME sums up success in these arenas.

All of us at all levels need to promote a positive vision, promote a positive understanding of mission and encourage a dedication to mission. That's what will spell success. AND THEN SOME will set us apart — as individuals, as units, as a command.

Start today. Whether you think your program needs help or not remember that our commitment should be continuous improvement. Look at what doing your job AND THEN SOME will do — then do it. You'll quickly see that this will mean success AND THEN SOME. ■

LANTIRN OPERATIONS

Lantern Operations

Mission Planning Keys to Living Low in the Dark

*Capt Merrick E. Krause
57 OG/OGV
Nellis AFB NV*

Twenty-one hundred local time, a quarter moon and no clouds, and the mission is going well. The B-1s are in a good trail position behind your F-15E flight, so you can provide them with mutual support. The terrain following radar (TFR) is working fine as you ingress at 500 feet and 550 knots. The visibility is great through the forward looking infrared (FLIR) image in the heads-up display (HUD), and it looks quiet in the target area. Suddenly, the weapons system officer (WSO) shouts, "Break right, missile launch right four o'clock...."

Flying low, in the dark, is an unnatural act for most fighter crews — or it was. The introduction of the low altitude navigation and targeting infrared for night (LANTIRN) system on the F-15E (and certain modified F-16s), first operationally employed during Desert Shield and Storm, allows night TFR flight to progress from the exclusive realm of the F-111 and B-1 into a mainstream fighter activity. As a result, many aircrews now regularly fly in the high speed, low-altitude night employment regime.

Mission Planning

Flying against surface-to-air missiles (SAMs), anti-aircraft artillery (AAA) and enemy fighters was challenging enough. Adding the element of darkness not only exacerbates some old problems, it creates many new concerns. There are several factors that can increase aircraft survivability during a low altitude, night TFR mission. Some critical mission planning factors include: route plan-

ning, weather, threats, formations, crew coordination, and training rules (TRs). This article will briefly look at each of these areas, and their significance to operating low and fast at night, to hopefully encourage some discussion which will enhance unit survivability. Non-TFR trained crews will hopefully note the concerns low, fast night flyers operating the LANTIRN system must consider, and discuss these planning factors when involved in any night composite force operations:

Route Planning

All published low-level routes have altitude and airspace restrictions, and most prevent full defensive reaction practice since they restrict 180 degree turns. Additionally, many fighter units practice at either 500 or 1,000 foot set clearance levels when operating TFR. In peacetime or combat, transition levels or other altitude restrictions and air tasking order-defined low level transit corridors affect desired routing. Terrain and the location and type of threat require the flight lead to find a path of least resistance and optimize terrain masking (direct or indirect). In all cases, calculation of minimum safe altitudes is a necessity for each leg, or segments of each leg. These altitudes provide safe airspace, typically 1,000 feet above the highest obstacle within 5 nautical miles of the course centerline (see local and MAJCOM regulations for spe-

cific). This obstacle-free airspace is then available for maneuvering when the LANTIRN fails, or when reacting aggressively to threats.

Weather

It is extremely important to incorporate ingress, target area, and egress weather into the mission planning process. Precision Guided Munitions (PGM) employment adds the necessity for more detail, but any LANTIRN sortie requires additional environmental information beyond ceiling, visibility, and winds. Moon illumination provides an indication of the enemy's ability to see the fighter and increases the crew's chance of seeing ground features. Thermal cross-over, and ground/target temperature may assist in LANTIRN navigation pod and targeting pod tuning and polarity selection. The absolute humidity also gives an indication of the range at which the FLIR can effectively identify ground or target features.

Threats

Threats en route, and in the target area, typically affect the tactics used to ingress and attack a target. If threats can be avoided by changing the route of flight, the route should be altered as much as practical. When threat reactions do occur, timeliness, training, and aggressiveness are keys to survival. To ensure the proper maneuver is accomplished at the appropriate time, the reactions attempted and how they are performed must be thoroughly discussed on the ground.

These maneuvers should also be practiced in

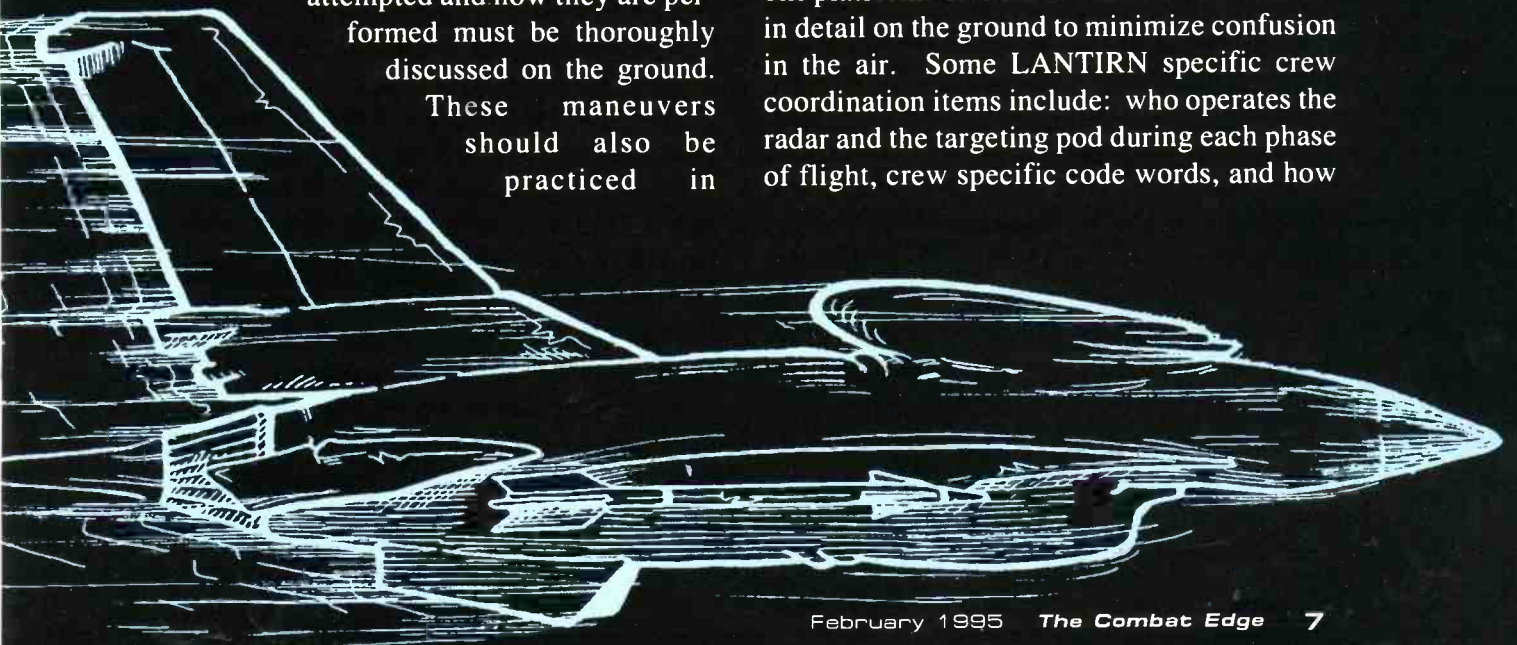
peacetime, before they can be confidently applied in battle. A threat reaction frequently involves flowing to the rear of a formation, a climbing break-turn, or "pushing-it-up-and-taking-it-down." LANTIRN operations require special attention to terrain, weather, and crew coordination to acquire an inbound missile or stream of cannon fire. All maneuvers exceeding TFR limits must occur above the MSA; and knowledge of the terrain and obstacles on the low level route is paramount.

Formations

Depending upon the size of an attack package, a mid-air collision is nearly as much of a threat to survival as a SAM or the ground. Trail formation, timing deconfliction, and parallel low level routes are techniques to separate LANTIRN fighters. Unfortunately, once threat reactions begin, the formation becomes more dynamic, and consequently more dangerous. FLIR, air-to-air TACAN, radar, IFF, and timing all contribute to situation awareness (SA). Timely radio calls for defensive maneuvers allow all flight members to redirect their attention to a changing formation, and possibly to changing roles between crew members within a jet.

Crew Coordination

In the F-15E, as in the F-111 or F-4, crew coordination is the force multiplier that makes an excellent fighter into an outstanding weapons platform. It is critical to brief crew duties in detail on the ground to minimize confusion in the air. Some LANTIRN specific crew coordination items include: who operates the radar and the targeting pod during each phase of flight, crew specific code words, and how



to effectively change crew duties. For example: frequently, on a LANTIRN non-PGM mission ingress, the WSO operates the radar and visually scans for bandits and surface threats. Simultaneously, the pilot flies and navigates in automatic terrain following mode (ATF) with control stick steering. As the WSO selects the targeting pod to attack the target, the pilot takes command of the radar to sanitize the target area, while monitoring the TFR to avoid obstacles. The WSO, when finished targeting, uses a crew specific code word, such as “designated,” to inform the pilot the target is acquired and stored in the navigation system. New steering is now available in the pilot’s HUD. The pilot selects a manual TFR mode for the attack run to allow a climb to a specific delivery altitude. The pilot then directs 100 percent of his or her attention to flying the planned attack parameters to accurately deliver the weapon and avoid the ground during the escape maneuver. The WSO operates the radar, monitors the radar warning receiver for threats, and checks 6 (looks out the back of the jet) for AAA tracers or missile plumes.

Single-Seat TFR

Single-seat fighters do not have the capability to share the work load in flight and are typically restricted to operating one piece of equipment at a time during TFR operations. ATF is a primary mode, so routes are planned requiring minimal pilot correction to maintain course. The radar enhances SA; but operating the radar, TFR, and targeting pod simultaneously is not practicable. Pre-mission planning of what duties to perform, and when in the mission to execute them, reduces the opportunity for task saturation. When dropping laser guided bombs from low altitude, single-seat fighters must restrict tactics due to safety considerations and overtaking, or use the point tracking capability of the targeting pod to track a specific target. In this case, the targeting pod computer tries to keep the laser on the selected target while the pilot concentrates on flying a recovery maneuver.

Training Rules (TR)

TRs are a contract “written in blood.” LANTIRN TRs are tools to enhance survivability. Crews must make sure their TFR and FLIR systems are operational and turn on the systems before descending. They must follow the flight director or couple the automatic system and monitor it. When maneuvering below the MSA, it is imperative that crews always fly within TFR limits. In the fog of war, or even during a night range ride, an emergency or break in a habit pattern may reduce SA and can lull a pilot into maneuvering outside of TFR limits below a safe altitude. Responding to a “Break right!” call while operating on LANTIRN might involve a climbing TFR turn to the MSA, followed by an aggressive break turn to defend against a threat while avoiding the ground.

Conclusion

Although flying low, in the dark, is neither comfortable nor particularly easy, there are hundreds of techniques available to increase survivability. With the introduction of the LANTIRN system, F-15Es and modified F-16s can now enjoy the luxury of flying TFR missions with a FLIR to provide some visual access to obstacles and targets previously unavailable to older generation aircraft. To fully realize the potential of the LANTIRN system, intensive mission planning must consider route planning, weather, threats, formations, crew coordination and TR reviews. The factors provided in this article are not the only considerations, but hopefully they provide some food for thought.

Suddenly, the WSO shouts, “Break right, missile launch right four o’clock.” As you begin a hard pull to the MSA, you call on the radio, “Bat 1, missile launch north.” While the WSO calls, “Chaff,” you see the flashes as the chaff bundles dispense. Reaching the briefed MSA, you begin a 6 G break to the right. The missile passes under your jet and you see the flash of a detonation behind and beneath you. Regaining TFR parameters, you descend while answering on the radio, “Bat 1, back to course.” Now, off to complete the mission — bombs on target! ■

AIRCREW SAFETY AWARD OF DISTINCTION



*Capt Thomas M. Williams
Capt Joseph A. Deboskey
1Lt Joseph M. Accardo
1Lt Timothy F. Giras*

*MSgt Michael J. Leftwich, MSgt Michael Hust, SSgt Nathaniel Thomas, SrA Robert E. Clare,
SrA Charles S. Turman, SrA Scott W. Griffin, 42 ACCS, 355 WG, Davis-Monthan AFB AZ*

The mission was to take off from Lajes Field, Azores, and fly to Dhahran, Saudi Arabia, in support of Operation Vigilant Warrior. Total flight time would be 14.5 hours.

Five hours into the flight the crew began experiencing problems with the number one and two essential transformer rectifiers (TRs) on their EC-130 aircraft. The circuit breakers to the bleeder resistors had popped and were reset. During the next 30 minutes both circuit breakers had popped again and would not reset. With only the two main TRs providing the total DC electrical load, the crew elected to reduce the electrical load as much as possible and make a turn towards NAS Sigonella while looking for additional options.

En route to NAS Sigonella, the number two main TR bleeder resistor circuit breaker had popped and was successfully reset. At this time the crew elected to declare an emergency as it appeared that total DC power may be lost before reaching NAS Sigonella. The crew requested direct Decimonannu for an emergency landing. The controller indicated that Decimonannu was closed but they could proceed to Elmas Air Base, a joint civilian-military Italian Air Base. Approximately 90 miles out, the number two main bleeder resistor circuit breaker popped and would not reset. The crew informed the

controller of their rapidly deteriorating situation and requested an immediate descent to penetrate the solid deck below them and set up for their night landing at Elmas. Thirty miles from the field, the crew began to configure the aircraft for landing in hope of completing this phase prior to losing DC power. Five seconds after the landing gear was lowered the final circuit breaker popped which rendered all nav-aids inoperative and only one UHF radio operating on battery power. The cockpit went dark and the pilot's ADI began to tumble and had to be selected to a backup mode. The master fire warning light illuminated with no associated T-Handle indication. The aircraft maintenance technicians visually checked all engines with no indication of a fire. Using flashlights to see with, the crew continued a descent at maximum configured airspeed to get below the weather before the 15 minutes of battery power ran out. Finally, about 10 miles from the field, they broke out of the weather, acquired the runway visually, and completed an uneventful landing. Outstanding crew coordination, systems knowledge, simulator emergency procedure training, and cool thinking under pressure prevented a very serious emergency from turning into a mishap, and resulted in a job well done!

PILOT SAFETY AWARD OF DISTINCTION

Major Fred R. Clifton, 74 FS, 23 WG, Pope AFB NC



Returning from a F-16 night strike mission in support of Operation Southern Watch/Vigilant Warrior, Major Clifton was 12 miles south of the established "No Fly Zone." Approximately 15 seconds after selecting afterburner, the Master Caution light illuminated, with an associated engine lube low MFL and PFL. Knowing that engine seizure was imminent, Major Clifton requested a snap to the nearest suitable landing surface. His wingman replied "snap 220, 30 miles show that Al Batin...steerpoint 24." While performing the checklist Major Clifton maneuvered the aircraft direct Al Batin. En route to the airfield, his wingman, flying one mile FLIR (Forward Looking Infra-Red) chase, was able to

reference the emergency divert pages of the inflight guide and provide his flight lead with valuable information as to the runway orientation and location of a nearby town. While attempting to contact Al Batin tower on all available frequencies, including guard, the flight was unable to visually locate the runway environment. Realizing the airfield was completely blacked-out and that it had no communications and limited navigational aids the flight arrived at High Key. Using only his LANTIRN FLIR, with his wingman backing him up, Major Clifton skillfully aligned himself with the runway. With no runway or approach lights to aid him, he executed a flawless approach and Simulated Flameout Landing (SFO) at an unfamiliar and completely blacked out airfield.

CREW CHIEF EXCELLENCE AWARD

Mr. Ronald Burns, Mr. Robert Weaver, 757 AS, 910 AW, Vienna OH



While working the afternoon shift, Ronald Burns and Robert Weaver were assigned to defuel a C-130 in hangar 302. Although it was not required by the defueling checklist, they decided to request the Fire Department to have a truck standing by at the location. Later, due to a malfunction in the fuel bowser, JP-4 started to flow out the top of the bowser funnel pipe sleeve. Ronald quickly crimped the plastic drain hose to keep additional fuel from going into the bowser while Robert unhooked the

air evacuation system and then the fuel line itself. Since the Fire Department was already on site, they were able to call for backup themselves as well as providing almost instant response. Together the firemen and the two crew chiefs decided it was a better idea to move the bowser itself rather than the airplane. The bowser was then moved without incident to an area a safe distance from the hangar. The Fire Department then completed the spill clean-up. Investigation of this incident led to having the Fire Department on station during defueling operations.

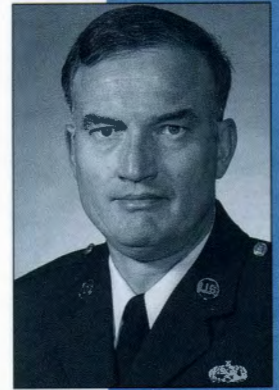


FLIGHTLINE SAFETY AWARD OF DISTINCTION

MSgt Steven R. Hyre, 524 FS, 27 FW, Cannon AFB NM

An F-111, aircraft 449, required a cabin pressure test due to the capsule bridle cable change one-time inspection. The Electro/Environmental personnel could not get the canopy seals to inflate using the cabin pressure tester, although the seals would inflate using "dash sixty" air. MSgt Hyre went out to the aircraft to help trouble shoot the cabin pressure tester problem. He removed the pilot's seat from the aircraft and disconnected the environmental control system line from the canopy seal test port. He then fed twelve inches of safety wire through the canopy seal test port. When no wire came through the opening, MSgt Hyre realized the ambient sensing line, which allows proper inflation of the attenuation bag, had been swapped with the canopy seal test port line. MSgt Hyre properly connected the lines and had the Egress shop

inspect the ambient sensing line and pressure regulator. The cabin pressure tester was then used to test the canopy seals and everything worked properly. If an aircrew had ejected, it would have resulted in an improperly inflated ejection capsule attenuation bag which would cause severe injury or death to an aircrew upon landing impact. Given the severity of this situation, MSgt Hyre performed a one-time inspection of all 524 FS aircraft, and advised the remaining squadrons of this occurrence. McClellan, along with the local Air Force Engineering Technical Systems representative, decided to send a QA flash for a fleet inspection with 781 forms documentation to correct this problem.



GROUND SAFETY INDIVIDUAL AWARD OF DISTINCTION

Ms. Sabrina Byrd, 4 SVS, 4 WG, Seymour Johnson AFB NC

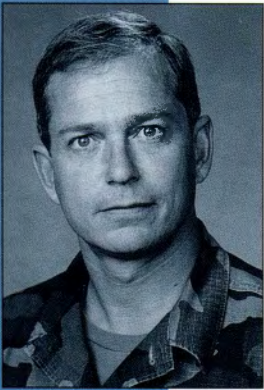
Sabrina Byrd, a housekeeper at the Southern Pines Inn, was on duty and making her way down the hall when she noticed the smell of grease coming from one of the rooms. She knocked at the door and heard a woman call "who is it?" As she passed the kitchen, the woman noticed a fire in a pan of grease on the stove. She grabbed the pan and moved towards the sink, spilling hot, burning grease on the stove. When she reached the sink, she accidentally hit the water faucet and turned on the water. When the water hit the grease in the pan, it caused a violent reaction. Sabrina Byrd, standing just outside the door, heard a loud whooshing sound and the woman inside screamed. Sabrina immediately used her pass key to enter the room and heard the woman

yelling "my baby," referring to the child in the back room. Sabrina ran past the burning kitchen to the bedroom and retrieved the child. After taking the child to safety, she returned to the kitchen. Noticing the woman was no longer in the room, she exited the room and began delegating duties to other individuals in the vicinity. She told one individual to get a fire extinguisher from the end of the hall, which he then used to put out the fire. She directed other housekeepers to notify others in the Southern Pines Inn of the fire, call 911, and sound a fire alarm. All personnel were safely evacuated from the building. Sabrina Byrd's ability to act quickly and decisively squelched what could have been a major disaster.



WEAPONS SAFETY AWARD OF DISTINCTION

MSgt Ricky K. Stong, 388 MS, 388 FW, Hill AFB UT



MSgt Ricky K. Stong exemplifies the “safety first” attitude of today’s Air Force. His sustained superior performance in the pursuit of a safe workplace sets the example for the flight. His daily visits to the workplace have earned Sergeant Stong the appreciation of his superiors and the respect of his subordinates. He pounds the pavement daily to provide his safety proactive approach to the young troops. His philosophy of out among the troops has paid enormous dividends—no explosive incidents. Sergeant Stong discovered a significant deficiency during a semi-annual munitions storage area fire drill. Other unrelated munitions agencies were not notified of emergencies within the 388th

clear zone. He developed a checklist to include notification of all affected agencies and coordinated the same; conducted orientation briefings for the affected agencies and exercised the new checklist successfully. He successfully directed 130 people supporting the breakout and buildup of 1,298,596 pounds of munitions during our recent ORI without an explosive incident. All munitions were transported, assembled, and delivered to aircraft during a three-day period; one-third of the assets used during the ORI were live configurations. The flight received an Excellent rating and the evaluators commented that safety was practiced and supervisors were involved.



UNIT SAFETY AWARD OF DISTINCTION

58th Fighter Squadron, 33d Fighter Wing, Eglin AFB FL

The 58th Fighter Squadron has distinguished itself by aggressively pursuing a proactive safety program resulting in a flying safety record free of Class A, B, or preventable Class C mishaps. There were nine deployments with 795 off-station sorties and only two IFEs. Aircraft swaps required the maintenance folks to work on over 40 individual tail numbers with two engine combinations and two radar systems. Additionally a PW100-220 core shortage resulted in over 100 unscheduled engine changes.

All of this would have been impossible without a “top to bottom” commitment to

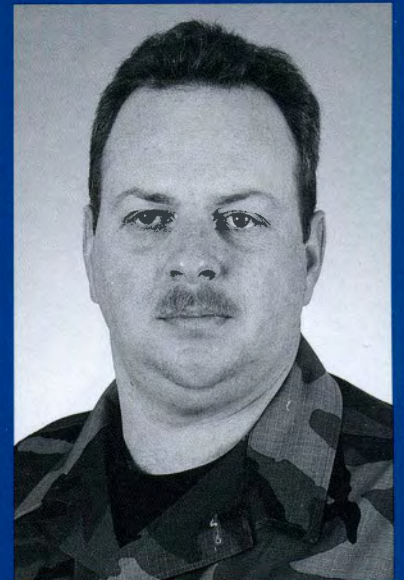
safety. The squadron made the ground safety slot a full-time position instead of part-time and tasked the flight safety officer as Chief of Safety. The Safety NCO focuses on training and spends the majority of his time on the ramp. The Safety Officer provides a safety summary for the pilots and a “how goes it letter” for the Commander on a monthly basis. During the 101 Critical Days of Summer, there was a “Safety Corner” in the squadron monthly newsletter highlighting high risk accident areas. Our “We Care” program was the model for the 33 FW and is now the benchmark for ACC. The 58 FS is setting the example for the rest of the Air Force.

Flight Safety Award of the Quarter



Whiteman AFB has been entrusted with a national resource and with an awesome responsibility: the B-2A Advanced Technology Bomber. Such a weapon system requires the most proactive flight safety program to safeguard it and the most dedicated and skillful people to make it work. MSgt Rick Anderson is such a person. Hand-picked for the B-2 initial cadre, he essentially created the flight, flightline, and ground safety programs within the 393d Bomb Squadron from scratch and had a major impact in developing the 509th Bomb Wing's flightline safety plan. He thoroughly revamped plans for the B-2 maintenance docks, making over 200 modifications to the original design. For instance, when he found the docks' toxic vapor detection system inoperative, he developed a fix then personally coordinated it through base agencies, the manufacturer, and higher command echelons, ensuring a working system was installed. When he found the underground aircraft servicing system contaminated with potentially damaging carbon particles, he coordinated a solution with the system manufacturer and the Army Corps of Engineers to prevent carbon dust damage to B-2 electrical components. He also developed cleaning specifications for acceptance of the docks, now implemented by the contractors, which resulted in a zero foreign object damage (FOD) rate for fiscal year 1994.

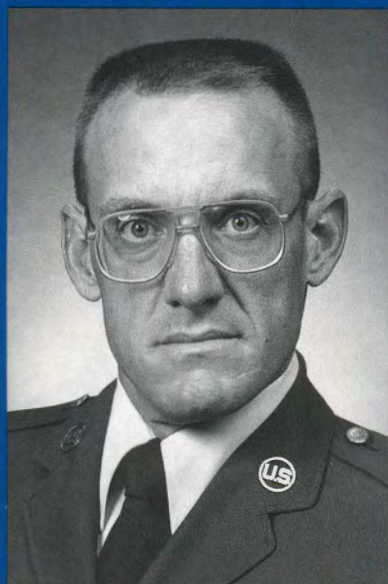
MSgt Anderson has been a champion of safety in many other arenas. He was the squadron coordinator in developing an aircraft system safety engineering analysis for B-2 concurrent servicing operations, an almost unheard of procedure which allows an aircraft to be simultaneously serviced and maintained within its own hangar, greatly increasing war-fighting capability. His efforts helped in getting immediate approval of these critical maintenance procedures. He coordinated the Defense Mapping Agency's airfield survey to determine the exact coordinates of many locations on base for future use with the Global Positioning System. Additionally, he designed a strikingly attractive and pertinent series of FOD control posters for use all over the base. He has worked extensively with agencies and pilots across the State of Missouri to promote the local Midair Collision Avoidance program and has designed a poster for its use. When conflicts developed between vehicular and aircraft traffic on the flightline, it was likely to be MSgt Anderson who discovered and resolved them. In his capacity as safety officer for the Aero Club, he has carried his keen safety awareness into the air on a regular basis. Flying an Aero Club aircraft, he recently helped survey proposed controlled bail-out areas for base flyers. MSgt Anderson's dedication to the cause of safety and his deep commitment to quality have earned the respect of all who have worked with him. Whiteman's B-2 program is a remarkable success story and MSgt Anderson is a major reason for our success.



*MSgt Richard D. Anderson, Jr.
393 BS, 509 BW
Whiteman AFB MO*



Ground Safety Award of the Quarter



MSgt Phillip R. Estrem has made significant contributions to ground safety within the 59th Fighter Squadron. He instituted a comprehensive and practical ground safety program from the ground up. He initiated two safety information programs—one for newcomers into the squadron and another for the commander and his staff. His proactive involvement in the squadron's Right Start program allows him to meet all newcomers face-to-face. He provides them with information concerning local safety hazards, both on and off duty, and how to identify and report hazards. He also includes information on proper mishap reporting procedures. In addition to the newcomers, Sergeant Estrem organized a new method for providing all safety related data to the commander, his staff, and flight chiefs. Each month he compiles all mishap data, all spot inspection findings, and all crosstell items he receives from wing safety into one package. He provides this information on a one-on-one basis so he can discuss corrective actions with the commander and supervisors. As a result of his intense efforts regarding safety issues and his crossflow of information, the 59th Fighter Squadron reduced ground mishaps by 40 percent when compared to fiscal year 1993. Sergeant Estrem's contributions to safety resulted in the squadron earning an "Excellent" rating during a recent annual Safety Inspection. During the recent wing safety day, Sergeant Estrem was instrumental in organizing activities at wing as well as squadron level. He sponsored three booths for the wing's exhibition and obtained films from the Family Advocacy Clinic and Security Police to enhance his squadron's safety day itinerary. His dedicated efforts enhanced safety not only within the 59th Fighter Squadron, but for the entire 33d Fighter Wing.

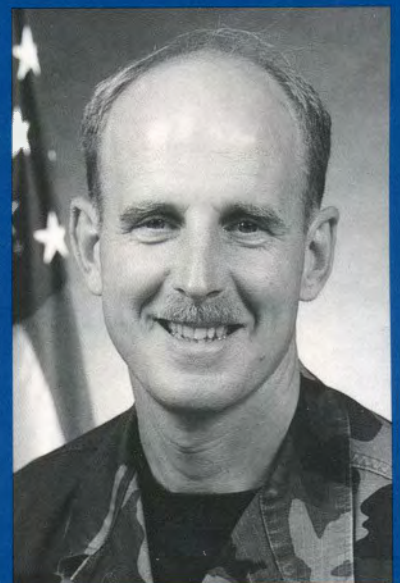
*MSgt Phillip R. Estrem
59 FS, 33 FW
Eglin AFB FL*

Weapons Safety Award of the Quarter

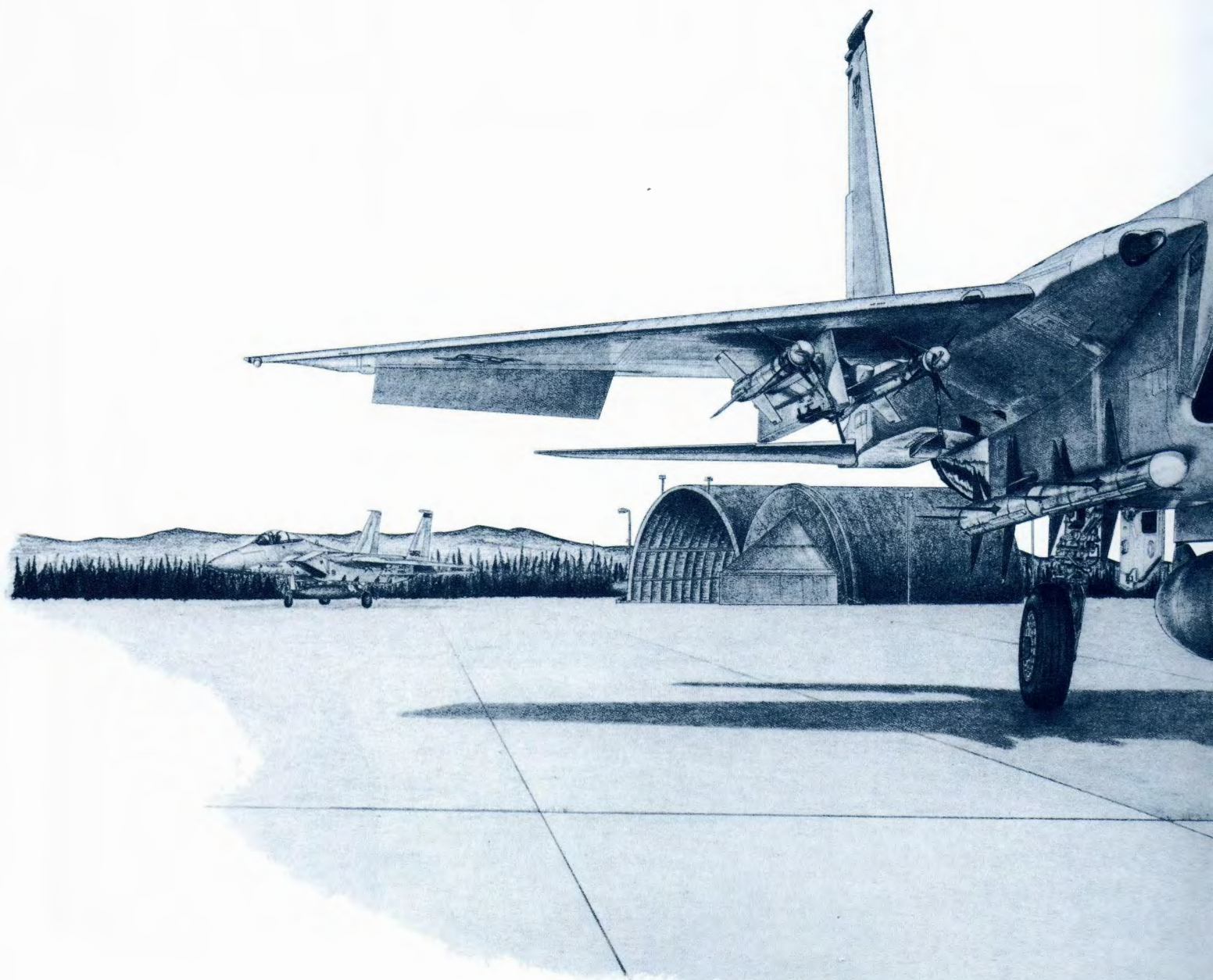


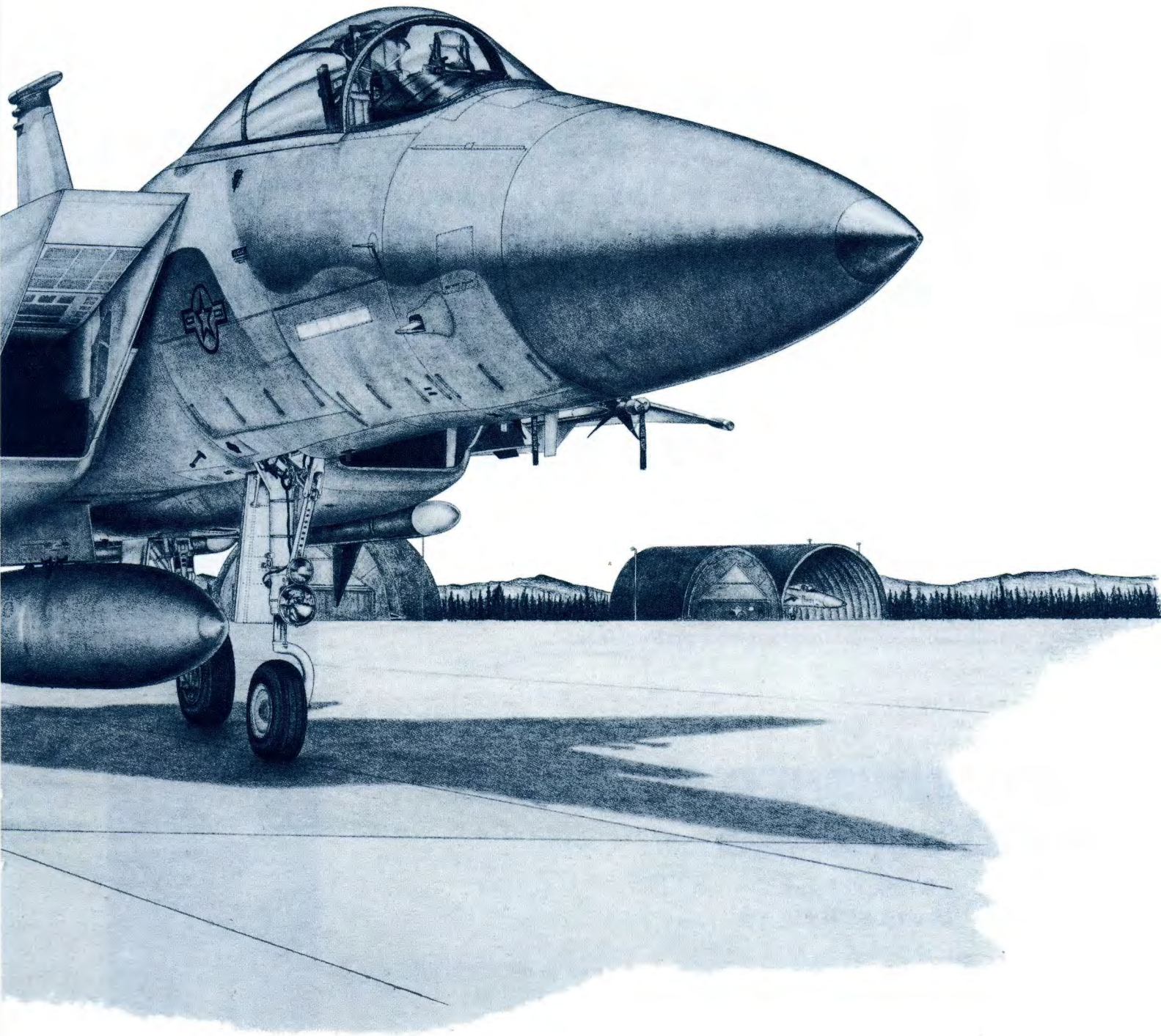
As our munitions section chief, TSgt Robert L. Cox spearheads an aggressive and comprehensive munitions build-up effort in support of HQ ACC's Air-to-Ground Weapon System Evaluation Program (A/G WSEP). The build-ups this year occurred at five separate operating locations: Cannon AFB NM, Elmendorf AFB AK, Hill AFB UT, Holloman AFB NM, and Mountain Home AFB ID. Munitions involved included AGM-65s, AGM-88s, AGM-130s, GBU-10s, GBU-12s, GBU-15s, GBU-24s, and GBU-27s. Sergeant Cox oversaw the scheduling, acquisition, assembly, functional checkout, and transportation of these munitions through supervision of a five-man munitions evaluation team. These actions included the very complicated and time-consuming task of installing telemetry and self-destruct devices in a number of these munitions, and ensuring these assets were in place and a functional check was properly done in a timely manner. Sergeant Cox monitored all operations for safety and compliance of correct technical procedures. As a direct result of his dedicated efforts, 277 sorties were flown with 143 precision-guided munitions expended from F-4G, F-15E, F-16CG, F-16CJ, F-111F, and F-117 aircraft during the period of 18-29 July 1994. Included in these operations were the first-ever A/G WSEP evaluation of F-16CJ/AGM-88, F-111F/AGM-130, and F-15E/GBU-15/24 integration with PACAF Global Reach Exercise Polar Thrust. These operations were accomplished without a single weapons mishap and every weapon procedure was completed correctly, professionally, and safely. His dedication to duty and attention to detail are exemplary and he is most deserving of this award.

TSgt Robert L. Cox
86 FWS, 79 TEG
Eglin AFB FL



Doug Kinsley is an Air Reserve Technician assigned to the 6 ARS, March AFB CA. He grew up in a military family and his association with aviation developed into a fascination. After serving in the Air Force, he earnestly began expressing his love for aircraft through a series of highly-detailed pencil drawings. Some of them required over 200 hours to complete, but as you can see by this F-15, the results are well worth the effort. A special thanks to Doug for sharing his talents with The Combat Edge and it's readers worldwide.





ACC FY94 ANNUAL AWARDS



SAFETY OFFICE OF THE YEAR AWARD - CATEGORY I

314 AW, Little Rock AFB AR

Recognizes a DRU/wing/group safety office for the most effective overall safety program

SAFETY SUSTAINED SUPERIOR PERFORMANCE AWARD

Capt Michael C. Staats
347 WG, Moody AFB GA

Honors an individual for sustained superior performance.



DISTINGUISHED CHIEF OF SAFETY AWARD

Lt Col James E. Moschgat
366 WG, Mt Home AFB ID

Recognizes a Chief of Safety for significant contributions to intermediate headquarters, unit, ACC, or USAF mishap prevention program (excludes NAFs and Sectors).



SAFETY OFFICE OF THE YEAR AWARD - CATEGORY II

33 FW, Eglin AFB FL

Recognizes a tenant unit with an exceptional ground safety mishap prevention program.



DISTINGUISHED PILOT SAFETY AWARD

**Lt Col Thomas J. McKinley
347 WG, Moody AFB GA**

Recognizes the outstanding pilot of the monthly award winners from the previous fiscal year.

DISTINGUISHED AIRCREW SAFETY AWARD

**Capt John Coffindaffer, Capt Steven W. Kelly,
Capt Gary L. Hurwitz, MSgt Wiley Mayfield,
TSgt Greg Lowdermilk, SSgt Greg Hehir,
SrA Dave Riddell, 41 RS, Patrick AFB FL**

Recognizes the outstanding aircrew of the monthly award winners from the previous fiscal year.



OUTSTANDING ACHIEVEMENT SAFETY AWARD

**314 AW, Little Rock AFB AR
347 WG, Moody AFB GA**

Recognizes units undergoing special activities other than operational mission accomplishment.





ANNUAL UNIT GROUND SAFETY AWARD – CATEGORY I

314 AW, Little Rock AFB AR

Recognizes a host unit with an exceptional ground safety mishap prevention program.

DISTINGUISHED FLIGHT SAFETY OFFICER AWARD

Capt Kurt G. Westfall
366 WG, Mt Home AFB ID

Recognizes a person for significant contributions to an established unit, intermediate headquarters, ACC, or USAF flight safety program.



DISTINGUISHED FLIGHT SAFETY NCO AWARD

MSgt Fred F. Pettit, III
4 WG, Seymour Johnson AFB NC

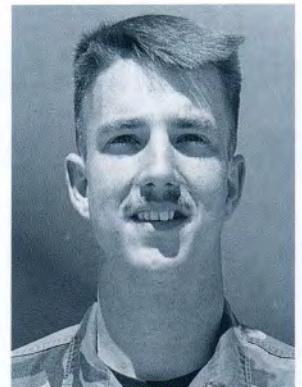
Recognizes a person for significant contributions to an established unit, intermediate headquarters, ACC, or USAF flight safety program.



DISTINGUISHED CREW CHIEF OF THE YEAR AWARD

SrA Brian M. Humphrey
366 WG, Mt Home AFB ID

Recognizes the outstanding crew chief of the monthly award winners from the previous fiscal year.



ANNUAL UNIT GROUND SAFETY AWARD – CATEGORY II

33 FW, Eglin AFB FL

Recognizes a tenant unit with an exceptional ground safety mishap prevention program.



DISTINGUISHED FLIGHTLINE SAFETY ACHIEVEMENT AWARD

Sgt Anthony L. King, II
20 FW, Shaw AFB SC

Recognizes the outstanding individual(s) of the monthly Flightline Safety Award of Distinction winners from the previous fiscal year.



DISTINGUISHED GROUND SAFETY ACHIEVEMENT AWARD

TSgt Gregory O. Mayweather, Sr
SrA Robert A. Gibbons, II
27 FW, Cannon AFB NM

Recognizes an individual(s) each year for exceptional safety contributions or achievements.



EXCEPTIONAL GROUND SAFETY LEADERSHIP AWARD

MSgt Mary M. Rowe
33 FW, Eglin AFB FL

Recognizes a ground safety professional who has demonstrated superior leadership capability at an established unit, intermediate headquarters, or MAJCOM.



ANNUAL TRAFFIC SAFETY AWARD – CATEGORY II

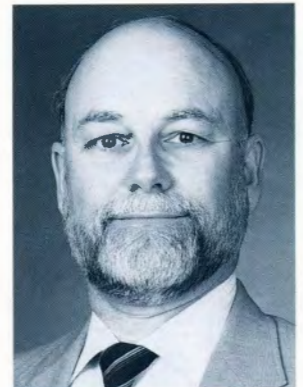
NEADS, Griffiss AFB NY

Recognizes a tenant unit with an effective traffic safety program.

SUPERIOR PERFORMER IN GROUND SAFETY

Mr. Frank L. Kelley
USAFWTC, Nellis AFB NV

Recognizes a ground safety member who has made meaningful contributions to his/her unit's mishap prevention program.



CMSGT PAUL A. PALOMBO AWARD FOR DISTINGUISHED GROUND SAFETY NEWCOMER

Sgt Michael M. Wolcott
33 FW, Eglin AFB FL

Recognizes a new member to the ground safety career field for exceptional performance.



EXCEPTIONAL WEAPONS SAFETY OFFICER AWARD

Capt Mark C. Murphy
366 WG, Mt Home AFB ID

Recognizes an ACC weapons safety officer who has made significant contributions to the weapons safety program of an established unit, intermediate headquarters, ACC, or USAF.



OUTSTANDING UNIT WEAPONS SAFETY AWARD – CATEGORY I

23 WG, Pope AFB NC

Recognizes a host unit with an effective program to prevent weapons mishaps.



EXCEPTIONAL WEAPONS SAFETY NCO AWARD

**MSgt John S. Logan
347 WG, Moody AFB GA**

Recognizes an ACC weapons safety NCO who has made significant contributions to the weapons safety program of an established unit, intermediate headquarters, ACC, or USAF.

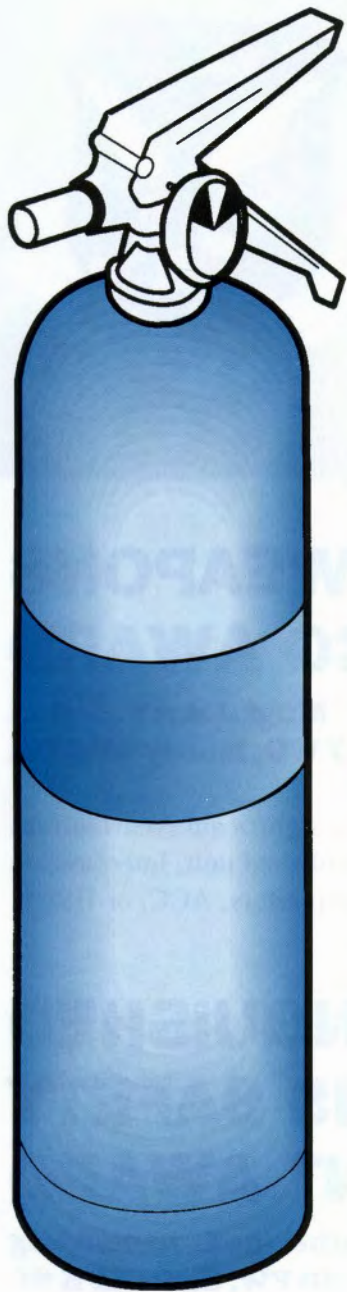


DISTINGUISHED WEAPONS SAFETY ACHIEVEMENT AWARD

**SSgt Katherine L. Armstrong
20 FW, Shaw AFB SC**

Recognizes an outstanding individual(s) of the monthly weapons award winners from the previous fiscal year.

CONGRATULATIONS TO ALL THE WINNERS!



HOME EXTINGUISHERS CAN SAVE LIVES IF USED PROPERLY

*MSgt Gary Reniker
442 FW/SEG
Whiteman AFB MO*

In comparison to smoke alarms, fire extinguishers are far less likely to be part of a home's safety equipment. But that could be a mistake if you're ever confronted with a small fire.

Portable home fire extinguishers aren't meant to be used to fight large or spreading fires, and fire-safety officials are concerned that homeowners with no training will use them improperly. But, in specific circumstances, these extinguishers can prove extremely useful. When used properly, a portable fire extinguisher can save lives and property by putting out a small fire or containing it until the fire department arrives. Fire extinguishers suitable for the home generally cost \$20 to \$50 and are widely available in hardware, discount stores, and building improvement stores as well as retail outlets.

Portable home fire extinguishers vary by the size of fire they can extinguish as well as the type of fires they are designed to put out. In general, extinguishers for home use can operate about 8 to 24 seconds. Fortunately, the information needed to buy a suitable fire extinguisher is available on the fire extinguisher itself. The most common recommendation for homeowners is that they purchase at least a 2-A:10-B:C fire extinguisher. The numbers and letters refer to the size and type of fire it is designed to fight.

A good fire extinguisher will also meet an Underwriters Laboratories standard which guarantees that it can put out the type and sizes of fires it claims. The UL seal should be on the label.

"A" type fires involve ordinary combustibles such as wood; "B" fires involve flammable liquids

such as grease; and "C" fires involve energized electrical equipment such as your television set. It's possible to buy a B:C extinguisher, but they are more suitable for commercial applications. Extinguishers that fight all three types of fire are available, and that's the kind most recommended for residential homes. The trade-off is that they aren't quite as effective in fighting grease fires. But, they also don't risk leaving the homeowner with an extinguisher that will not fight an "A" class fire. The main thing is that you don't want to waste time looking around for the right kind of fire extinguisher during an emergency situation.

The Underwriters Laboratories standard also rates how large a fire the extinguisher can battle by using a system of numbers. Basically, the bigger the number the more fire it can extinguish. The numbers don't apply to "C" type fires.

There are limits to how much fire an extinguisher for home use can fight because of its size. That's why the 2-A:10-B:C is typically recommended for home use. However, a magazine I recently read recommends that a 3-A:40-B:C might be a wiser choice if you can deal with its height and weight. Extinguishers should be located on each floor of the residence and within 40 feet of any location on the floor. It is also important that you familiarize yourself with "your" home extinguisher by reading the product's instructions and know how to operate the extinguisher.

Finally, know your limits. Home extinguishers are meant for small fires, and as a safety professional I'm clearly concerned that homeowners might try to exceed their capability and endanger themselves, possibly putting the homeowner in a dangerous active firefighter role.

Remember, a smoke alarm should always be purchased first. Fire extinguishers offer an important supplemental safety net in your home! ■

Fleagle

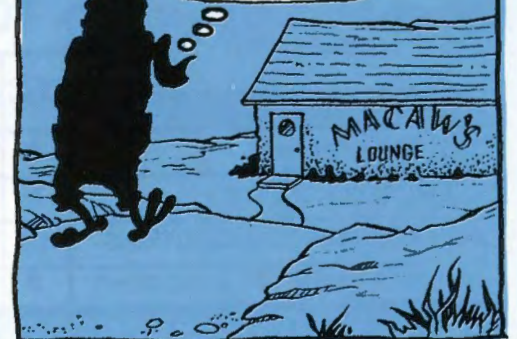
THIS TIME OF TH'YEAR REALLY GETS TO ME.



IT'S COLD, TH'TREES IS ALL BARE AND TH'WEATHER KEEPS FLYIN' TIME TO A MINIMUM.



BEING A SAFETY PERSON IS TOUGH ENOUGH ANYHOW. BUT WHEN YOU THROW IN A SEASON THIS BLEAK, IT'S NO WUNDER PEOPLE IS SNAPPIN' AT ONE ANOTHER.



HEY, I GOTTA SNAP OUT OF THIS. I'M TH' ONE WHAT'S EXPECTED T'SET AN EXAMPLE 'ROUND HERE.



FLEAGLE, MY MAN. WE WUZ JUS' TALKING 'BOUT YOU.



WE NOTICED LATELY YA' BEEN IN TH'DUMRSTER. SO WE CHIPPED IN AN' GOT YOU A LITTLE SUMPIN'. HAPPY VALENTINE.



WUZ HE CRYING? LET HIM GO. HE'LL BE OKAY.



ACCOLADES

QUESTIONS OR COMMENTS
CONCERNING DATA ON THIS
PAGE SHOULD BE
ADDRESSED TO HQ ACC/SEF,
DSN: 574-7031

	TOTAL			ACC			ANG			AFR		
	DEC	THRU DEC		DEC	THRU DEC		DEC	THRU DEC		DEC	THRU DEC	
		FY95	FY94		FY95	FY94		FY95	FY94		FY95	FY94
CLASS A MISHAPS	0	1	5	0	1	2	0	0	3	0	0	0
AIRCREW FATALITIES	0	0	3	0	0	2	0	0	1	0	0	0
* IN THE ENVELOPE EJECTIONS	1/0	1/0	3/0	1/0	0	1/0	0	0	2/0	0	0	0
* OUT OF ENVELOPE EJECTIONS	0	0	0/1	0	0	0/1	0	0	0	0	0	0

* (SUCCESSFUL/UNSUCCESSFUL)

CLASS A MISHAP COMPARISON RATE

(CUMULATIVE RATE BASED ON ACCIDENTS PER 100,000 HOURS FLYING)


	FY 94	MONTH											
		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
ACC	FY 94	0	1.1	1.5	1.8	2.4	2.4	2.0	1.7	1.7	1.8	1.8	1.9
	FY 95	2.1	1.1	0.7									
8 AF	FY 94	0	0	0	0	0	0	0	0	0	0	0	0
	FY 95	0	0	0									
9 AF	FY 94	0	0	0	2.1	3.3	4.0	3.2	2.8	2.2	2.1	1.9	1.6
	FY 95	0	0	0									
12 AF	FY 94	0	0	2.0	1.6	1.3	1.1	.9	.8	1.4	2.0	2.4	3.1
	FY 95	7.1	3.6	2.4									
DRU	FY 94	0	14.9	8.6	6.7	11.2	9.5	7.9	7.0	6.3	5.7	5.3	4.6
	FY 95	0	0	0									
ANG	FY 94	0	1.9	2.6	2.2	2.7	3.7	3.2	3.4	3.5	4.0	3.6	3.3
	FY 95	0	0	0									
AFR	FY 94	0	0	0	0	0	0	0	0	0	1.4	1.3	1.3
	FY 95	0	0	0									
TOTAL	FY 94	0	1.2	1.7	1.8	2.3	2.7	2.1	2.1	2.2	2.4	2.3	2.3
	FY 95	1.3	0.7	0.4									
MONTH		OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP

* (HOURS NOT AVAILABLE)

QUANTITY-DISTANCE

What it is and Why Should I Care

*MSgt Dave Green
23 WG/SEW
Pope AFB NC*



If you have been around the Air Force any length of time and have been lucky enough to hang out with munitions folks, you have probably heard the term Quantity-Distance or Q-D. In the weapons safety office we use this term everyday to explain to someone why they can't do something, and we usually get two responses. One response is when the individual acts like they know what we mean and they smile and nod. The other response is when people look bewildered and shrug their shoulders. In both cases they usually do what they want and disregard Q-D anyway! Well, I have to believe that if Q-D is properly explained to these people, maybe they will have just

enough understanding of it to stay out of trouble.

AFMAN 91-201, Explosive Safety Standards, defines Q-D as: "The quantity of explosive material and distance separation relationships which provide defined types of protection." Well, that clear-as-mud definition should answer all your questions about Q-D! But, on the off-chance that it didn't — keep reading. In English, Q-D simply means that everything should be a certain distance from explosives. This distance is determined by the amount of explosives and the degree of protection required.

Why should things be separated from explosives? History has taught us that if we put our explosives, aircraft, fuel, and people in one area and have a mishap, we have the potential to lose everything. Ever hear of the Bien Hoa disaster? All muni-

tions folks study this disaster in tech school; but to you unfortunate souls with other specialties, Bien Hoa was an air base in South Vietnam. Its flightline was very crowded with explosives loaded aircraft, fuel storage was a short distance away, and the bomb dump also was nearby. We had Q-D rules back then, but they were ignored because we were in combat and "the mission comes first." Well, we had an accident, a bomb loaded on an aircraft detonated and along with it we lost most of our fuel, our munitions, and our aircraft. After losing these assets, and suffering large casualties, you can imagine what happened to our ability to wage war from this base. As a result, the AF made a movie about the Q-D violations that existed on this base; and it was appropriately titled "How To Stage A Disaster."

Of course, the safest thing we can do is put all of our explosives in Alaska and all our other assets in Florida. The Eskimo's would love this! But since our mission is all about explosives, we must work with and around this nasty stuff everyday. We have to balance the need to perform the mission with the need to protect our resources. That is what Q-D is all about.

Q-D can best be understood by realizing that there are basically two reasons for separation. One is to prevent an accidental explosion in one group of explosives from si-

multaneously detonating other explosives, causing one huge bang! The other reason for separation is to protect our other resources from total destruction in case of an explosion. First of all let's discuss the explosive-to-explosive separation. The following examples should explain the theory.

EXAMPLE 1. You have two bundles of dynamite, the **quantity** of dynamite in each bundle equals 1 pound. You place both bundles on the ground with a **distance** of one foot between bundles. If you light the fuse attached to one bundle, can you guess what will happen? Will you get: (a) one small explosion, (b) two small explosions, or (c) one big explosion detonating both bundles simultaneously? If you guess c, you get the prize. You see, because the two bundles are so close together, the shock wave from one detonation will cause detonation of the other bundle. There will be such a short interval between the detonations they will appear as one large explosion. The shock waves from each detonation will grow together (coalesce) and produce pressures larger than either detonation could produce independently. Simply put, you get a bigger bang and more damage. This is known as "simultaneous detonation."

EXAMPLE 2. With the same **quantity** of explosives as above, you now separate the bundles a **distance** of 12

feet. Our calculations, which we will discuss later, determine that this distance is sufficient for this quantity. If you light the fuse, what will happen now? You should get only one small explosion. The bundle you detonated will not cause a simultaneous detonation of the other bundle because of the greater distance.

EXAMPLE 3. If you increase the **quantity** of dynamite in each stack to 2 pounds and place them at the same **distance** of 12 feet, then what will happen? Well, you will get one big bang that will detonate both bundles. In this case you increased the **quantity** of explosives but did not increase the **distance** between them. This caused the second bundle to detonate along with the first. Bad news, and a big hole!

EXAMPLE 4. Instead of two bundles of dynamite you now have five A-10's each loaded with a **quantity** of 100 pounds of explosives, which is known as the Net Explosive Weight (NEW). NEW is the amount of explosive filler in a bomb, not counting the casing, fins, etc. The same Q-D theory that applied to the bundles of dynamite also applies to the aircraft, since they are now bundles of explosives. These aircraft are parked in a line, with a **distance** of 10 feet between wing-tips. Our calculations determine that this is not enough separation to prevent simultaneous detonation.

QUANTITY

What is Why Should

One aircraft catches fire during engine-start, the fire envelops the munitions, causing them to detonate. By now you should know what happens. Since these aircraft are parked too close together, all loads will simultaneously detonate causing one great big bang, leaving a smoking hole where five A-10's used to be. Again, bad news and a big hole!

EXAMPLE 5. Along with a new squadron commander, you get five more A-10's to replace the ones you lost. You put the same **quantity** of explosives on them, but this time you listened to the safety people who keep preaching Q-D and you parked your aircraft with a **distance** of 60 feet between wing-tips. No fire this time, but a terrorist mortar round hits one of your aircraft, (you are really having some bad luck). Of course, the attack causes the load on this aircraft to detonate. However, in this case the aircraft are parked at the appropriate **distance** for the **quantity** of explosives on board and there is no detonation of the loads on the other aircraft. By complying with Q-D you possibly saved four aircraft, get a medal, and can keep your new commander!

Well, if you are still with me, you probably have a good understanding of Q-D as it applies to separating explosives from other explosives. But does Q-D tell us that we shouldn't build a child care center next to our flightline? There are no explosives in the child care center (we hope), so why do we care? Q-D rules also provide guidance on how much separation should exist between our other resources (buildings, people, fuel, etc.) and our explosives. This separation will not always protect us from damage in case of an explosion, but it will provide a "reasonable degree of protection." The degree of protection is dependent upon the type of resource and

its function. The following examples may help explain this.

EXAMPLE 6. Back on our flightline we have each aircraft loaded with 500 pounds NEW. The aircraft are separated by 100 feet which should prevent simultaneous detonation. So, the largest explosion we could have is limited to the detonation of one aircraft, consisting of 500 pounds NEW. We want to build a hangar but don't know how far we should place it from the flightline. We should build it as far as possible from the explosives, but we realize that because it supports the aircraft (a "related" facility) it may be closer to the flightline. Our Q-D calculations tell us that since this hangar is "related" to the explosive location, we should build it a minimum of 143 feet from the aircraft. Based on the **quantity** of explosives, this **distance** will provide a reasonable degree of protection. In case of an explosion, the hangar will suf-

Quantity Distance: What it is and why should I care?

DISTANCE

It is and Should I Care

for serious damage and so will the people inside it, but their purpose is to support the aircraft and its mission! The Air Force will accept that risk as part of accomplishing the mission.

EXAMPLE 7. Now we wish to build a child care center. The center does not in any way support the aircraft or explosive operations on the flightline. Can the center provide its services just as well if it is located far from the flightline? Sure it can and it is not "related" to the explosive operations, so we must build it at least 1,250 feet from the flightline. This distance will pretty much ensure that with the detonation of the **quantity** of explosives on the aircraft the child care center and its occupants will be spared. It will be reasonably protected not only from the blast, but the fragments as well.

You can see that the function of a facility determines the degree of protection that is required.

There are several different degrees of protection: they are referred to as "K factors." A protection factor of K1 provides almost no protection at all; K500 provides complete protection. Table 4-1, of AFMAN 91-201 tells us what K factor must be assigned to each different type of facility. Some examples are: a group of explosives must be protected by K11, a "related" facility by K18, and a public highway by K24. So big deal, what does it mean when I say your hangar must be at K18 from your explosive loaded aircraft? Well, get out your slide rule and calculate the equation $\text{Distance} = \text{the K factor} \times \text{the cube root of the NEW}$. In the case of our hangar, the $\text{Distance} = 18 (\text{the K factor for a related facility}) \times 7.93 (\text{the cube root of 500 pounds NEW})$, so the Distance from our hangar to the aircraft must be at least 18 times 7.93, or 143 feet. Did I lose you? Well, if you build your hangar closer than 143 feet from your aircraft, you place both it and the people inside it at a level of risk that the Air Force considers unacceptable.

Just glancing at the above formula, you should be able to see that increasing the **quantity** of explosives will also increase the required **distance**. Hey, that spells Q-D! Don't get bogged down trying to interpret the regulation and figure cube roots. You will most likely fry your calculator as well as your brain. That is what us weapons safety people are for. The AF provides us with calculators, regulations, and the training to figure out Q-D. Besides, our brains are already fried.

Hopefully, by now you have some understanding of what Q-D is all about. So, the next time weapons safety people begin talking about Q-D violations, you now have no excuse to shrug your shoulders and look bewildered. ■

