

TAC ATTACK

Tac Attack

April 1979

APRIL 1979



What's new in Life Support? Page 4

WHAT'S NEW
IN LIFE SUPPORT? ...Pg 4



READINESS IS OUR PROFESSION



TACTICAL AIR COMMAND

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TACRP 127-1

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Angle of Attack

WELL DONE

In this issue of TAC ATTACK we honor the winners of the Tactical Air Command Safety Awards in Flight, Ground, and Weapons Safety for 1978. These individuals have earned the awards through exceptional skill, dedication, and, most importantly, the support of individuals in their units.

Too often, we tend to focus our attention on the worst aspects of our operations while ignoring those areas which are running smoothly. While 1978 was one of the worst years in recent times for aircraft and ground mishaps, many more mishaps were avoided through the skill and prevention efforts of our dedicated personnel.

Every week, we receive incident reports which detail aircrew and support personnel response to an aircraft malfunction/emergency. In nearly every instance, the response of our personnel

has been correct, timely, and effective. These are the people who are making our mishap prevention efforts effective. The leveling off of the FOD rate is another indication of personnel involvement in this important prevention program.

We have been able to reduce maintenance and logistic involvement in many of our mishaps. Operational causes are still involved in too many of our mishaps. Although it is too early to be conclusive, our 1979 mishap experience indicates that we may not have learned the lessons from our 1978 mishaps. Operational causes are still involved in too many of our accidents---but those squadrons and wings which have remained mishap-free for extended periods of time are proof it can be done

Unfortunately, there are simply not enough awards to honor every deserving individual in the command. To the men and women of the command who continue to perform their duties in an exceptional manner in spite of bad weather, manpower shortages, and long hours---WELL DONE!

RICHARD K. ELY, Colonel, USAF
Chief of Safety

WHAT'S NEW IN LIFE SUPPORT



**By Lt Col Roland D. Guidry
USAFTAWC/THL
Eglin AFB, FL**

Got a stiff neck after pulling 7 Gs for a sustained period with your five pound HGU-26/P helmet with dual visor? Mask slips during ACM? G suit doesn't seem to help much during high G onset rates in the F-15? Well, there are a lot of hard-working people who are trying to do something about these and other things in the life support area. In this article I hope to describe to you how the Life Support Research, Development, Test and Evaluation (RDT&E) process works, what's currently being tested in life support, and what you can do to help the RDT&E process.

The whole process starts with you, the user. If you perceive the need for a new or improved item of life support gear, check out AFR 57-1

and write or initiate a Statement of Need (SON). The SON is the latest name for the official document used to identify and validate an operational need; it used to be called a ROC or GOR. The life support guys at HQ TAC--either in the requirements shop (DRPS, AV 432-5892) or the ops shop (DOXBL, AV 432-2442)--will be glad to help out. Once it is submitted, approved, and funded, it becomes a life support endeavor and is worked by a program manager at the Life Support SPO at Wright-Patterson AFB, Ohio (Aeronautical Systems Division, office symbol AEL). The program manager uses lots of DOD/DOE facilities throughout the development cycle of the item, such as the School of Aerospace Medicine at Brooks AFB, Texas, the Aeromedical Research Lab at Wright-Patterson AFB, Ohio, the Flight Test Center at Edwards AFB, California, Sandia Laboratories in Albuquerque, New Mexico, and civilian contractors. Once the item has completed its development cycle, it is tested to ensure that it meets the design specifications in a Development Test and Evaluation (DT&E). After it passes the DT&E, it is turned over to one

of the MAJCOM's for Initial Operational Test and Evaluation (IOT&E). The whole RDT&E process--from SON to satisfactory IOT&E report--can take from two to ten years depending on the nature of the need, the technology available to support the development effort, and many other factors. TAC has IOT&E OPR for life support items which fall into the fighter aircraft functional area: helmets, masks, G-suits, etc. IOT&Es of life support items are planned, managed, and reported on by TAC's Tactical Air Warfare Center, Combat Unit and Air Base Defense Support Directorate (USAFTAWC/THL, Eglin AFB FL). But IOT&Es on Life Support items are **conducted** by you, the TAC aircrew member and life support technician, in the operational unit designated by HQ TAC to participate in the test. Such is the nature of **operational** test and evaluation: TAWC cranks out the plans and reports, but you do the testing and provide the data. Now let's look at a few items this system has turned out as a result of ROCs or SONs submitted a few years ago. These items are currently being tested or have

recently been tested under TAWC's management and are in various states of being readied for production by the Life Support SPO.

- **Lightweight Helmet** (see Figure 1). After several test efforts, a lightweight helmet, suitable to the most discriminating aircrew members, is nearing production. It weighs approximately two pounds and uses a "snoopy" visor held on by elastic straps (no visor housing). The guys at Nellis (57 TTW) found that it was very stable under Gs, had a very low profile (allows you to move the seat up another inch or so), and had excellent sound attenuation characteristics. Once a few bugs are worked out with the snoopy visor and the edge roll, it will be ready for production. The snoopy visor won't go up and down with as little effort as our standard visor--but the weight reduction more than compensates for the extra care and effort needed for visor manipulation. The helmet is currently referred to as the lightweight version of the HGU-33/P helmet. The first batch of 600 for the F-15 and F-16 drivers could be available as early as the first part of 1980; the rest will follow in late 1980's.

- **MBU-12/P Mask** (see Figure 2). An inhouse development effort by the Life Support SPO has resulted in a super-comfortable new mask--the MBU-12/P. The hard shell and the soft silicone portions are molded together in this mask, as opposed to the two-layer MBU-5/P mask we currently have. The test subjects liked the stability and comfort of the new mask so much we had a hard time getting the test masks away from them at the end of the test. The MBU-12/P



FIGURE 1.
LIGHTWEIGHT VERSION OF HGU-33/P HELMET.



FIGURE 2.
MBU-12/P MASK.

WHAT'S NEW IN LIFE SUPPORT

also weighs a little less than the MBU-5/P and does not restrict downward vision as much. Once a few bugs are worked out of the microphone, the mask will go into production. Estimated availability is mid-1980 at the earliest.

- Improved G Valve. The G valve currently in the F-4 is also used in the F-15. It soon became evident after the F-15 became operational that the high G-onset rates of the F-15 were too much for the valve; several seconds elapsed before the valve could catch up with the Gs. The School of Aerospace Medicine came up with a new valve which has higher flow rates and has a selectable ready-pressure feature. When selected, the ready pressure inflates the G suit to 60% of its normal volume. The combination of this ready pressure and higher flow rate greatly reduces the lag between high G-onset and proper G suit pressure. Result is less pilot



FIGURE 3.
TEST PLD PACKED IN AN SRU-21/P.



Lt Col Roland D. Guidry
is this month's
Fleagle T-shirt winner

straining (M-1 maneuver) and, therefore, less fatigue at the end of a high G sortie. We're still writing the test report on this one; no estimate as to its availability.

- New G Suit. TAWC just initiated the active phase of a test of an improved G suit on 1 Feb 79. Four new fabrics are being tested which are supposed to be more durable. Also, the bladders are redesigned to reduce ballooning. The test hasn't been active long enough to tell us whether the suit is a definite improvement or not.

- Personnel Lowering Device (PLD)(see Figure 3). You guys may have some relief coming from PLD-induced backaches. A new PLD, totally contained (lanyard and braking device) in a survival vest pocket, is in the early stages of testing. The braking device has features which reduce the risk of injury characteristic of current PLDs. Kevlar is used as the lanyard materiel and the braking device enables you to lower yourself by depressing a lever. Again, too early for much feedback on whether it's any good or when it might be available if it proves out OK.

- Side-Actuated, Single-Lens Visor. A test is scheduled to go active in early summer 1979 on a new side-actuated single-lens visor. Plans are to test this item in PACAF, USAF, ADCOM, and ATC as well as TAC.

- New Flight Suit. SAC is cranking up a test on a new flight suit that has an improved fire-retardant fabric, looks better than our current suit, has a more durable knit fabric, and is supposed to be more comfortable. TAWC is supporting SAC's effort by providing a few of the TAC units with test suits and questionnaires.

- Automatic Life Preserver (see Figure 4). TAWC has conducted two tests on an automatic life preserver and is in the preliminary planning phase of another test. The preserver fits around the neck in a low-profile horse-collar fashion. If the dual sensing cells are immersed in water, the preserver inflates automatically in a manner that keeps an unconscious person's head out of water. Rain or liquid spills do not activate the inflation mechanism. Interference with head movement and with lap belt operation have been the main problems to date with the preserver, necessitating redesign and retesting. What we hope to be the final OT&E of the automatic life preserver is coming up later this year.



FIGURE 4.
AUTOMATIC LIFE PRESERVER BEFORE
AND AFTER INFLATION.

Your role in the requirements process. You, the TAC aircrew member and life support technician, can enhance the process of providing safe and effective life support gear by doing a few simple things. **Use** the deficiency reporting system to its fullest. Take the initiative and start the process by submitting or providing the necessary data for a SON when you perceive the need for a new or improved item. And please **cooperate** when your unit is tagged by HQ TAC to participate in OT&E. Carry out the test procedures and fill out the questionnaire to the best of your ability. Even if you **don't** like the item you're testing, careful completion of the test questionnaire with your **negative** comments provides the TAWC project managers with the kind of supportive data needed to eventually provide an item you **do** like.



Lt Col Roland D. Guidry is branch chief for Life Support OT&E at the Tactical Air Warfare Center at Eglin AFB FL. Following graduation from pilot training in 1962, he flew various models of the C-130: the ski model C-130D in TAC, AAC, and on the DEW Line and the DC-130 drone launch mother ship in SAC and Southeast Asia. He is a command pilot with over 4,000 flying hours. He received a master's degree in Astronautical Engineering from the AFIT School of Engineering in 1973 and an MBA from University of West Florida in 1976. He is a graduate of Air War College and the Industrial College of the Armed Forces by correspondence. Prior to his current Life Support OT&E duty, he was the primary TAWC project manager for Chemical Defense for over 3 years.

TAC TIPS

Few men have imagination enough
for the truth of reality.

GOETHE

FOR MY NEXT TRICK

The Eagle driver was slipping the surly bonds on an air combat tactics tactical qual check. During the second engagement at 500 knots, a red light illuminated in the gear handle. The pilot slowed the aircraft to 230 knots and cycled the gear. The red light went out and a chase aircraft indicated that all appeared normal.

During the next engagement, at about 500 knots, the red light illuminated in the gear



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

handle. (Some people have to be told twice) The pilot cycled the gear once more and headed for home.

While taxiing to parking, the normal brakes failed. Emergency brakes were used to stop the aircraft. Postflight investigation revealed damage to the right main gear door assembly and a punctured hydraulic brake line.

A long time ago, the principle of, "If you have a gear malfunction, put it down and leave it down" was first espoused. I guess it bears repeating now and then.

LET'S GO TROLLING....

The mission was scheduled as a dart sortie. The tow ship deployed the dart IAW directives; but when the first element of shooters rendezvoused with the tow ship, no dart was to be seen. The cable, however, was still attached to the tow ship. The dart bridle was also attached, but the chase aircraft didn't see it. Now, everybody knows the cable is a poor target even if you're Steve Canyon, so the mission was aborted. The dart tow ship also could not release the cable and was forced to RTB with the wire trailing the aircraft.

A steep, 17-unit approach was flown IAW directives; and the aircraft touched down 3500' down the runway. Unfortunately, the bridle caused the cable to fly lower than normal and the cable impacted some lights on short final. The score: 13 light bulbs, seven approach lights, two strobe lights, one middle marker antenna, and a partridge in a pear. . . .

Next time you're forced to bring the cable back, better have your wingee give you the full story on exactly what you're towing.

YGBSM TWICE

We're all familiar with something that's too good to be true -- how about things which appear too incredible to be true.

First, an F-4 was on a BFM mission. The crew completed six engagements and RTBd in tactical formation. The two aircraft completed a formation landing and entered the de-arm area. It was in the de-arm area where the ground crew noted the right external 370 fuel tank and pylon were missing. (The next day a woman called to inform the crew where they dropped the tank).

The pylon was found to be cracked so as to allow the shackle to move enough to release the pylon from the aircraft under alternating G buildup and release. That explains why the tank left. Now I have to figure out why the ground crew were the first folks to figure out it was missing...



The second incident involves the world's tallest tree. It started out as a three-ship ACM mission, but only one aircraft was available, so the crew flew an alternate BFM mission. After performing a loop, the aircraft was flown in level flight at an altitude estimated by the crew to be 500 AGL.

About five seconds after level off, the radome seemed to explode. At first the crew thought they had hit a bird. RTB and landing were normal in spite of the right engine being stuck at 70%.

Pieces of wood, some with bark intact were recovered from the radome. Guess it's time for a visit to the doc to check out the ole depth perception--or can trees do the high jump?



By Capt Stephen M. Horn
5 WW, Langley AFB, VA

"Lightning avoidance--that's easy," you say. "Just give those thunderstorms a wide berth, like 60-16 says, and everything will be OK." Right? WRONG!! If you don't believe us, consider the fate of a recent non-TAC mission. While flying through an area of rainshowers along the east coast, the 'lifter was struck by lightning and eventually crashed, with no survivors. Both aircraft and weather radar indicated that there were no thunderstorms in the area. Rainshowers topped out at 25,000 feet.

Freak occurrence? Nope. Consider this incident from our desert southwest: A flight of three fighters was recovering at home from an

ACM ride. While being GCA'd in at 7500 MSL, the birds entered rainshowers and two were struck by lightning. Both recovered safely, but not without extensive damage to their radomes. Again, radars painted no thunderstorms in the area, and tops of the rainshowers were only 20,000 feet.

These incidents are similar in several ways:

- They involved lightning strikes which occurred in an area apparently free of thunderstorm activity.
- They occurred while the aircraft were in rainshowers.

- Tops of showers in both cases extended above the -20°C temperature level (normally FL 200-250).

- All aircraft were flying 500-1000 feet above the freezing level when they took the hits.

By now, these factors should be welling up some recollections about lightning from your pilot training days, or maybe some long-forgotten refresher course. If those chords we're striking are faint, or if you missed that performance altogether, we'll repeat the most important points:

- The golden rule for avoiding lightning strikes is: "Don't fly in or near thunderstorms or any other clouds of high vertical development." This includes cumulus congestus clouds and rainshowers (Figure 1). The reason for such precautionary measures is that all of these cumulo-beasts have the potential to produce lightning strikes from the sides, bottom, and top. Unfortunately, like all golden rules, this one is often hard to follow. Situations arise where you can't dodge every rainshower in your path; however, you can minimize the threat of getting sizzled by recalling and respecting the following vital statistics and rules concerning lightning strikes.

- Avoid flying at or near the freezing level when operating in an area of rainshowers or thunderstorms. Eighty percent of the reported aircraft strikes have occurred within the temperature range of $\pm 10^{\circ}\text{C}$; 64 percent within the $\pm 5^{\circ}\text{C}$ range; and the real "hot spot" is just above the freezing level. Remember, in the incidents we cited at the start, the planes were just above the freezing level when they got zapped. With this in mind, ask the weather forecaster for the freezing level and the inclusive heights of the $\pm 10^{\circ}\text{C}$ envelope, whenever convective activity is briefed for your local flying area or along your proposed route. Plan ahead, so you can avoid these danger zones, should you have to penetrate a shower during your mission.

- Last, but not least, keep in mind that the difference between a rainshower and a thunderstorm is like the difference between a copperhead and a rattlesnake. The thunderstorm and the rattlesnake are noisy and give ample warning. The rainshower, like the copperhead, is silent--but still dangerous. Both these types of convective clouds have the potential to unleash huge electric currents (up to 200,000 amperes), once they build above the -20°C level. So, check with the local weather people to get a feel for the -20°C level when flying near convective

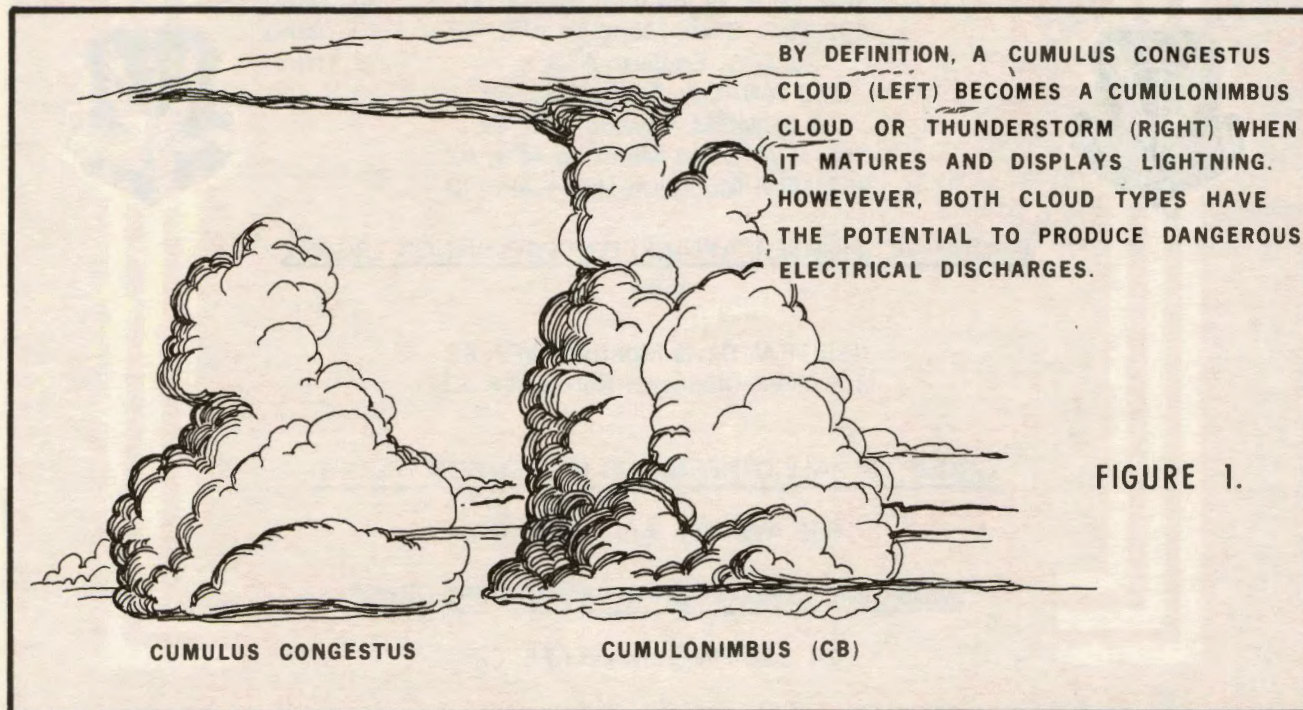


FIGURE 1.

LIGHTNING AVOIDANCE

clouds. As a rule-of-thumb, if the cloud top extends above that level and rain is falling from its base, watch out!! Even though its top may be only 20,000 feet, it can pack a tremendous wallop.

Now, let's try to put this all in perspective. The two earlier examples had one other similarity we purposely delayed discussing until now. This is incidental to the point we're trying to make, but must be considered in the overall flying safety equation. They both happened during the cold season. You've been up among them enough to know that cold-weather thunderstorms don't grow as big, nor do they conform to the classic anvil-topped heartthumpers that cause spring and summertime grief. And, you likely understand the dynamics that keep these smaller ones

just that way. The point we're making here is simple--many times the cold-weather cumulonimbus may appear, both visually and on radar, as our previously-identified cumulus congestus friend. On the other hand, during the warmer seasons, the congestus will normally mature into a full-blown anvil-shaped thunderstorm. Regardless of season or appearance of this vertically developed cloud, the critical measures of our monster's potential are whether it has penetrated the -20°C level and the location of the $\pm 10^{\circ}\text{C}$ envelope.

It's bottom-line time. Lightning avoidance isn't easy. Your mission may put you in a position where you must fly in or near convective weather. Understanding and applying these simple rules, though, will greatly increase your odds of returning to home plate without scorched tailfeathers. ➤

TAC COMMANDER'S TROPHY FOR FOD PREVENTION

12th Air Force, Bergstrom AFB, TX

TAC FOD PREVENTION TROPHY FOR FOD FREE YEAR

507 TAIRCW, Shaw AFB, SC	(3 Years)
602 TAIRCW, Bergstrom AFB, TX	(3 Years)
432 TDG, Davis Monthan AFB, AZ	(3 Years)
23 TFW, England AFB, LA	(2 Years)
552 AWACW, Tinker AFB, OK	(2 Years)
24 COMPW, Howard AFB, CZ	
355 TFW, Davis Monthan AFB, AZ	
366 TFW, Mountain Home AFB, ID	

GROUP "A" (FIGHTER/ATTACK) FOD PREVENTION TROPHY (TIE)

355 TFW, Davis Monthan AFB, AZ
366 TFW, Mountain Home AFB, ID

GROUP "B" (ALL OTHERS) FOD PREVENTION TROPHY

552 AWACW, Tinker AFB, OK

MOST IMPROVED FOD PREVENTION PROGRAM

24 COMPW, Howard AFB, CZ



FANTASTIC T-SHIRT GIVE AWAY !



**My friends at TAC ATTACK
are waiting to hear from you.**

Hi,

My name is Loni Anderson and I'm modeling the 1979 edition of the famous Fleagle T-Shirt. This designer fashion is a very exclusive item. If you don't believe me, check the finest stores in your town and I guarantee you won't find one. They couldn't even order one for you if they tried. Want to get one? Here's how to do it.

Write an article for TAC ATTACK on any aspect of aviation or support --maintenance, life support, training, survival, weapons delivery, or even your own personal, completely original "war story." If your article is chosen as the "best-of-the-month" when it's printed, you'll be a winner and join the elite club of T-Shirt wearers. Don't be fooled by imitations, or offers from second-rate publications which offer a T-Shirt to each author. Remember, this is a class item.

People in USAFE, PACAF, AAC, TAC and others throughout the Air Force, Army, Navy, and Marines need your ideas on how to do the job better---safer---more effectively. Don't wait! Sit down and write that article today. Send it to:

Editor, TAC ATTACK
HQ TAC/SEPP
Langley AFB, VA 23665
Attn 432-2937/3373

Photo courtesy Ms Loni Anderson. Ms Anderson is currently appearing in the television series, "WKRP in Cincinnati."

NOMEX

SPELLS "PROTECTION"

By: Jim Clark
Senior Technical Specialist
Northrop Corporation

Nomex is a trade name for the material developed by DuPont used in the manufacture of protective clothing for aircrews. The fabric is made from high-temperature-resistant aromatic polyamide fibers with the generic name of ARAMID. The correct designation is NOMEX ARAMID fiber. The fire-resistant qualities of the fabric are not derived from a treatment applied to the cloth, but rather are the result of the molecular structure of the material itself that prevents it from melting.

The early nomex fabrics were made from continuous filament fibers, unending fibers which were woven into fabric used for anti-G suits and other applications where strength, in addition to fire resistance, was an all-important factor. Such fabric, however, lacked the qualities needed for a soft and comfortable material to be used in garments worn every day.

The continuous filament was replaced by short fibers which were chopped up and made into yarn in a process much the same as that employed on an old-fashioned spinning wheel. The material made from the resultant Nomex threads is not only highly resistant to fire and heat, but is resilient, lightweight, and comfortable to wear. It also retains the required strength.

The standard items of apparel made from this

fabric are flight coveralls, jackets, shirts, trousers, and gloves. This flight gear should be reserved for actual flight operations, and never worn for general maintenance activities. Grease, oil, petroleum fuels, and other dirt and grime will degrade the fire-resistant properties in the contaminated area. Maximum protection requires that sleeves be worn down, cuffs fastened, bottoms of trouser legs fastened, and shirt tucked into trousers. Never wear synthetic underwear with Nomex. Synthetic underwear melts. Who wants a batch of melted underwear hung around his equator? Changing to clean underwear before each flight is strongly recommended. In the event of an accident involving burns, soiled clothes can produce infection.

CARE, of the "tender, loving" variety, is the magic ingredient that will ensure maximum protection from your Nomex garments. The number one preventive maintenance action for your Nomex clothing is to keep it clean. There is nothing magical about the cleaning process. Nomex can be dry-cleaned, hand-washed, or run through the home automatic or a commercial type unit. To obtain the best results follow these simple instructions:

- Turn all pockets inside out; brush away dirt, gunk, bits of paper, threads, and any other assorted trash. (Retrieve any paper money for future use.)
- Close all zippers and hook-and-pile (Velcro) fasteners.

- Use a water temperature of medium hot to hot.
- Add enough powder detergent to make plenty of suds.
- Wash clothes at least 5 minutes; rinse 4 to 5 minutes; spin dry 1 to 2 minutes. Tumble dry, or hang in shade to drip dry.
- Use a commercial fabric softener. Stop the machine and add it before the last rinse cycle starts.
- Launder your Nomex as soon as possible after a fuel spill.
- NEVER use starch - it will BURN! and there go the fire-resistant properties. If some NONPRO laundry type adds starch in the washing cycle, don't panic. Just run the Nomex through the rinse cycle a couple of times, dry it, and wear it with confidence.
- You can touch up Nomex with an iron, but never iron the hook and pile (Velcro) fasteners.

Some special tips apply to Nomex gloves. Wash and rinse them like you do Nomex shirts, trousers, and jackets. Drip dry or wrap them in a towel. Stretch them into shape. Never put gloves in the direct sun or use hot air to dry them.

Never wear Nomex gloves when working around your equipment where they can be soiled with grease and oil. They're supposed to be worn only when operating your aircraft. You may need a softening agent for the leather palms. Use neat's-foot oil or saddle soap. Don't be preturbed if the oil turns the leather darker.

Use of a fabric softener as recommended above is for a more subtle purpose than to make them soft and cuddly. The softener acts as a fabric lubricant and moisture retention agent. It won't destroy the fabric's fire resistance. You'll notice that the amount of static electricity is reduced, too. This is most important, and here's why:

Your body conducts electricity all the time - even when you're walking and working. In a dry atmosphere you can build up and hold a charge of several thousand volts. . . like when you walk across a synthetic rug. Most of this electricity is drained away harmlessly as fast as it is generated - through your shoes into the ground or floor. But, if you're working with fuel, it could be dangerous.

Natural fabrics like cotton and wool rubbing against man-made fabrics like polyester may



generate static electricity.

For instance, when you take off Nomex clothing that's fuel soaked, your movements could cause a static electricity discharge that could set the clothing on fire.

If you do spill fuel on your Nomex clothing, move slowly away from the area. Get at least 50 feet clear of any fueling operation. Hose down your clothing before taking them off. If you can't soak your clothes with water, grab hold of some grounded, bare metal with both hands. Hold on to it for a few seconds. This will equalize the electricity between you and the grounded object. Remove your clothes slowly and carefully.

A little skin irritation from the fuel won't kill you; the fire following a static discharge could!

FROM: January 1979 F-5 Technical Digest Reprinted with permission.

PRESSIN'

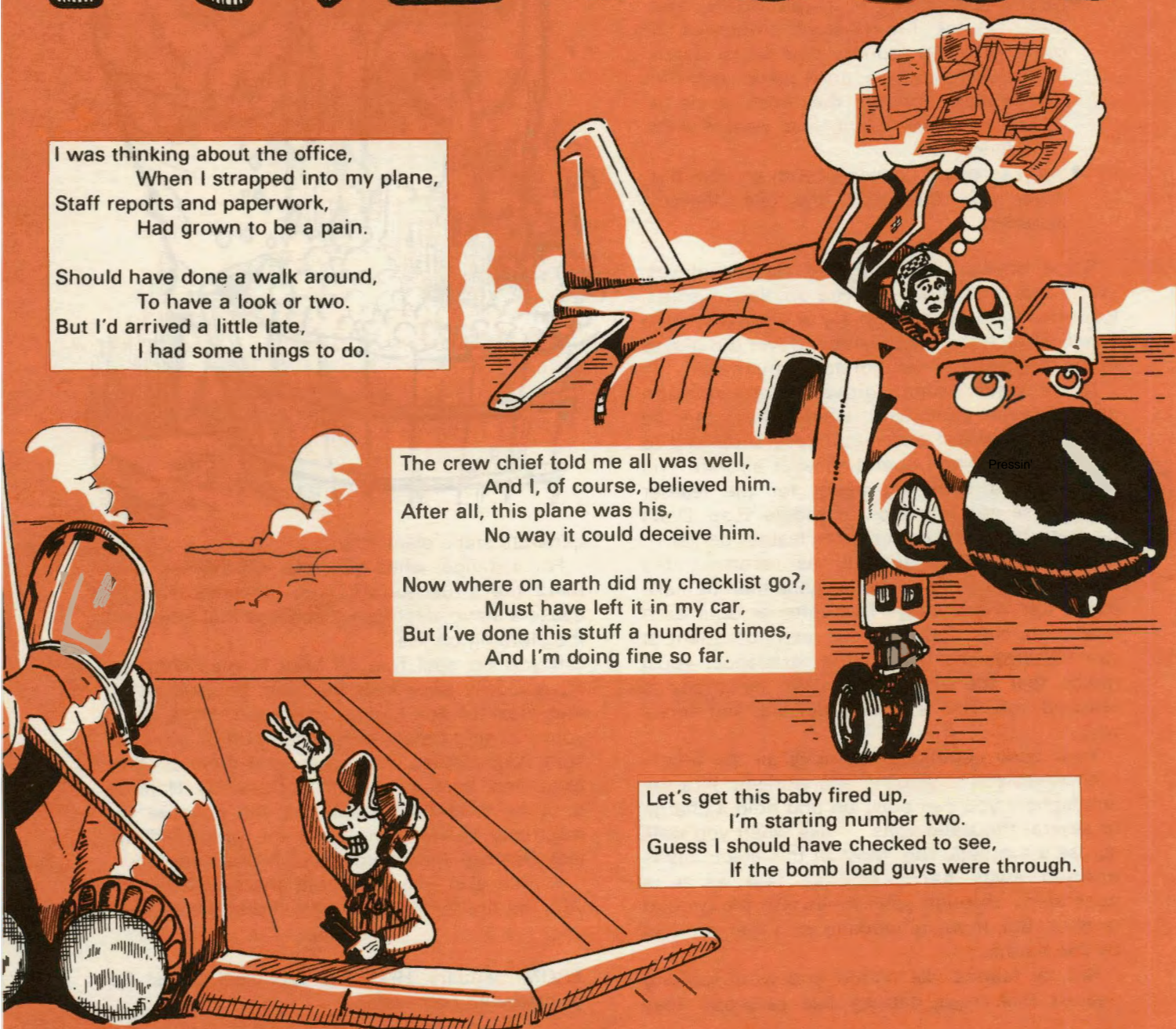
I was thinking about the office,
When I strapped into my plane,
Staff reports and paperwork,
Had grown to be a pain.

Should have done a walk around,
To have a look or two.
But I'd arrived a little late,
I had some things to do.

The crew chief told me all was well,
And I, of course, believed him.
After all, this plane was his,
No way it could deceive him.

Now where on earth did my checklist go?,
Must have left it in my car,
But I've done this stuff a hundred times,
And I'm doing fine so far.

Let's get this baby fired up,
I'm starting number two.
Guess I should have checked to see,
If the bomb load guys were through.



OOPS, that pressure's lookin' kinda low,
But I guess she'll be all right.
What was it that the T O said?,
Shoulda read that sup last night.

Maybe I should get on the horn,
And lay it on the SOF,
But the old man's screaming "Be On Time!",
Better get this beastie off.

You should have seen my currency,
Really let the small stuff slide.
Now the quarter's closing down,
And I gotta have this ride.

I was rolling from the arming ramp,
When I pushed in all the power.
I was passing through one hundred knots,
When things went really sour.

"Pull'em back and punch'em off,"
According to the book,
But just a sec, there's lots of time,
To give it one more look.

If the runway had twelve thousand feet,
I know I could have saved it.
Now that concrete's black with soot,
And I'm the one who paved it.

By
Capt Bill Sadler
Keesler AFB, MS

SPO CORNER



SURVIVAL KITS VS. FLIGHT CONTROLS

**By Maj Skip Weyrauch
HQ TAC/SEF**

There is an old wives' tale that we periodically see a repeat of the same accidents - reinvent the wheel.

First, let's review the earlier accident case file. A few years ago we nearly lost a crew when their flight controls jammed. They were flying basic flight maneuvers in the training area, working with a second aircraft. During an unloaded extension maneuver, the rear cockpit survival kit came partially out of the ejection seat bucket and lodged on the front lip of the ejection seat.

After the extension maneuver was terminated, the survival kit was repositioned in the seat bucket. However, the crew member was not snugly strapped-in to the aircraft.

During the next engagement, the pilot initiated another unloaded extension maneuver. While he was starting to float up in his harness, he felt a thump on the stick and realized the control stick was being pushed forward! YUP...you guessed it... The rear cockpit survival kit had come out of the seat bucket again and jammed the control stick in the forward position.

As a result of the jammed flight controls, both crew members ejected.

Now the second case... A pilot was completing checkout training in his new aircraft which included an unloaded extension maneuver from a split-S. With his aircraft nose pointed straight down, the pilot unloaded to slightly less than zero-G. Suddenly he was thrown forward, up and into the canopy.

The aircraft continued to pitch forward and began a slow right roll. The negative-G pinned the pilot against the canopy so that his head was forced down with his chin tucked against his chest. In that position he noted the edge of his survival kit had slipped out of the ejection seat bucket and was jammed up against his control stick. The pilot's initial attempts to move the survival kit into place were unsuccessful. He also knew that in his present position ejection was impossible because the survival kit completely covered the ejection handle. So he resumed his attempts to move the kit. Finally, by pushing down from the canopy with one hand and hitting the kit with the other, he succeeded in moving the kit aft. He then recovered the aircraft after almost two miles of nose-down flight, straight at the earth.

After landing, a thorough investigation revealed the survival kit retaining hooks had not been properly engaged in the retaining "rollers" during installation. Another aspect of this incident was the pilot had loosened his lap belt significantly to permit greater freedom of movement in the cockpit.

It's easy to conclude from these "very similar" mishaps that the old wives' tale has some truth. Right now everyone should have the word. If you happen to know someone who doesn't, let him in on the basic facts...

1. Preflight your survival kit for proper installation--when you need it, it's too late to correct any discrepancies.

2. Keep yourself hooked up and cinched down tight on top of the seat during flight.

An ounce of prevention isn't an old wives' tale.

DOWN AND OUT

By Maj Garry S. Mueller

TAC/SEF

A couple of months ago I wrote an article about a guy on a cross country in an Aero Club airplane. This individual did everything wrong. No flight plan, no weather brief, no instrument license, and no common sense-which all resulted in a landing in a plowed field because this guy got lost in IFR weather.

Well, some people never learn. Another guy, again in an Aero Club airplane, did his best to "improve" the bad show from the previous month. This pilot also did not have an instrument rating, which apparently did not faze him the smallest bit.

After a normal takeoff on his flight, he was forced to return to his point of departure after the intended point of landing went IFR. Flight time was 1.5 hours. The airplane (Cessna 150) was converted into a motel because that's where this individual took his crew rest. After waking up, obviously completely rested(?), he took to the sky which was still IFR. Some of the small details he omitted were refueling after the previous day's flight, filing a flight plan, checking the weather, and complying with other Aero Club regulations. Once airborne, he made no attempt to file a flight plan or check the weather.

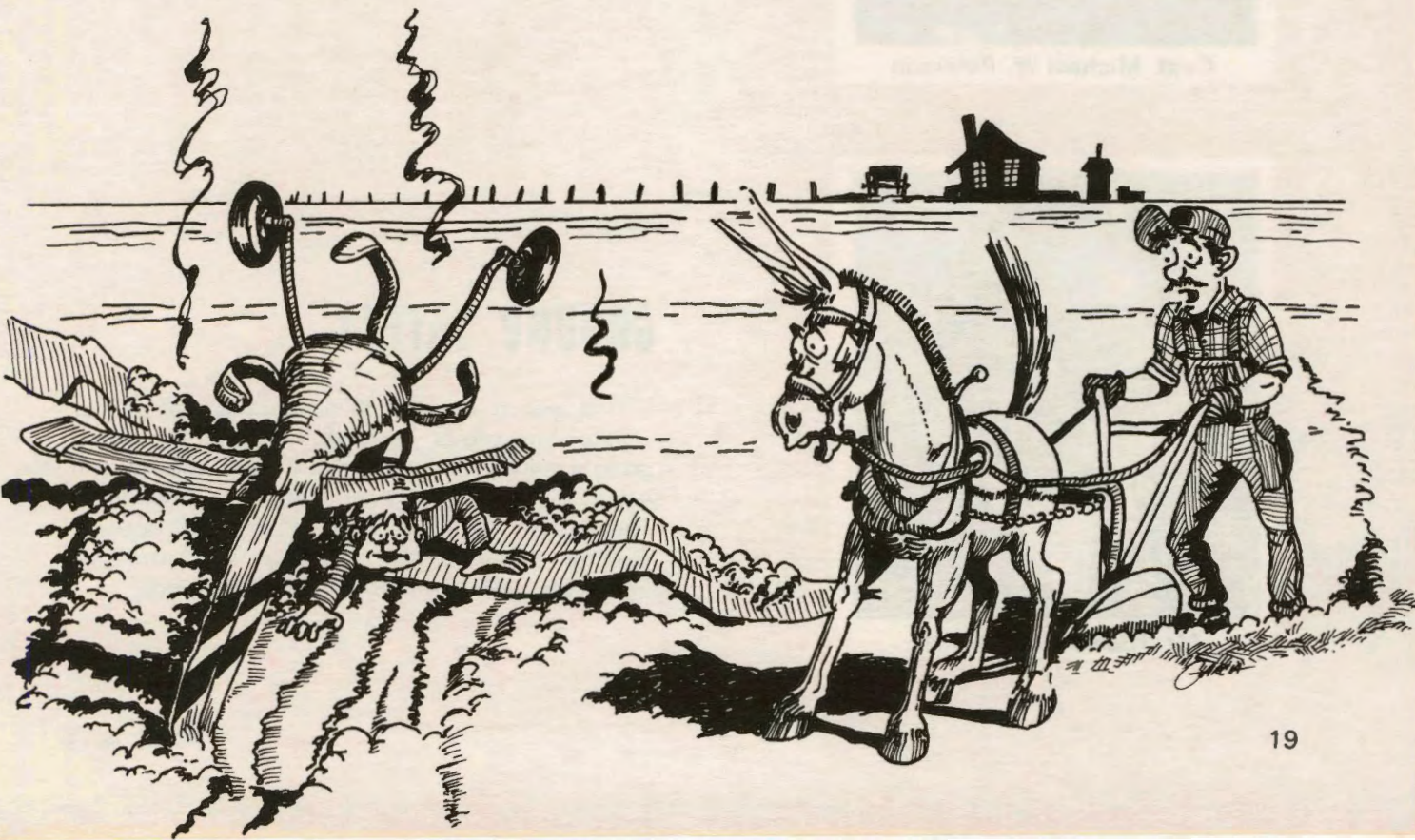
He got where he intended to go, but had to go elsewhere because the destination field was IFR. Again, no attempt to get any weather update. His divert destination was also IFR, so he started back to where he had been when he decided to go elsewhere. On his way back, he managed to get below the clouds, hoping to find a town with an airport.

However, he was lost and running out of gas. Here comes the "let's-land-in-a-plowed-field" trick again. The last, and probably only remaining regulation he failed to follow, was the one requiring a fly-by of the "field" of intended landing to see which way the furrows are plowed. He landed perpendicular to the furrows, and finally stopped. His "let's-land-in-a-field" trick also resulted in the "let's-land-in-a-field-and-flip-upside-down" trick.

We all got a good laugh from this ridiculous sequence of events.

We did not get a laugh from an Aero Club final mishap report we received the next day. Another pilot, with no IFR license and no weather update, had crashed, killing three people.

If you, the person reading this sad saga, are a pilot--experienced or not, young or old, jets or props--use some common sense the next time you fly, and everytime you fly.





TACTICAL AIR COMMAND

Individual Safety Awards

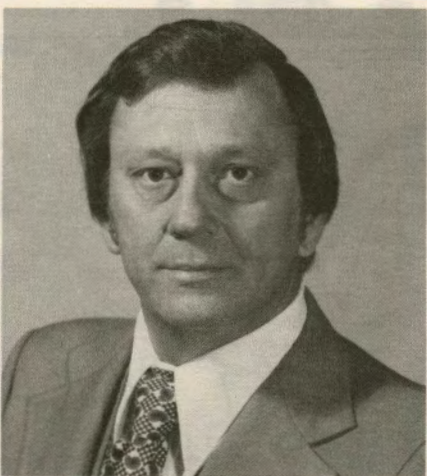
1978



Capt Michael W. Peterson

FLIGHT SAFETY OFFICER

This award is given to a Flight Safety Officer who has contributed to the Tactical Air Command accident prevention program through superior daily performance and outstanding individual actions in the area of flight safety. The winner for 1978 is Captain Michael W. Peterson, Flight Safety Officer, 363d Tactical Reconnaissance Wing, Shaw Air Force Base, South Carolina.



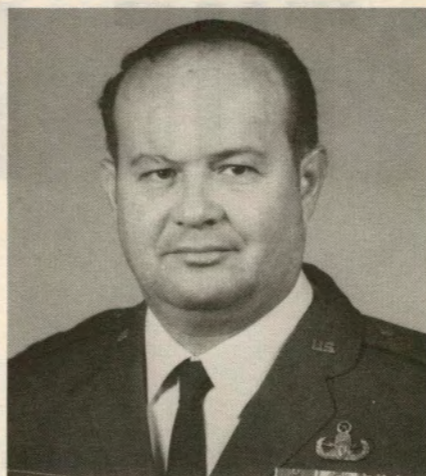
Mr. Richard C. Robeen

GROUND SAFETY

This award is given to active TAC enlisted or civilian personnel assigned primary duties in ground safety for outstanding performance and accomplishments in ground accident prevention. The winner for 1978 is Mr. Richard C. Robeen, Ground Safety Officer, 1st Special Operations Wing, Eglin AF Auxiliary Field No. 9, Florida.

WEAPONS SAFETY OFFICER

This award is given to an officer who has primary duty as weapons safety officer in active and gained reserve forces. The winner is chosen for weapons safety efforts and effectiveness based on standards in Air Force regulations. The winner for 1978 is Captain Manuel M. Costa, Jr., Weapons Safety Officer, 33d Tactical Fighter Wing, Eglin Air Force Base, Florida.



Capt Manuel M. Costa, Jr.

OUTSTANDING CONTRIBUTOR TO WEAPONS SAFETY

This award is given to an Officer/NCO in active or gained reserve forces who is not assigned primary duty in the weapons safety career field but who has made outstanding contributions to weapons safety. The winner for 1978 is Technical Sergeant Robert W. Hall, Standardization/Evaluation Aerial Gunner, 20th Special Operations Squadron, 1st Special Operations Wing, Eglin AF Auxiliary Field No. 9, Florida.



TSgt Robert W. Hall

WEAPONS SAFETY NONCOMMISSIONED OFFICER

This award is given to an NCO who has primary duty as weapons safety noncommissioned officer in active and gained reserve forces. The winner is chosen for weapons safety efforts and effectiveness based on standards in Air Force regulations. The winner for 1978 is Technical Sergeant Fred M. Fredline, Weapons Safety NCO, 366th Tactical Fighter Wing, Mountain Home Air Force Base, Idaho.



TSgt Fred M. Fredline

THE DECISION TO

By LT COL BILL YOUNG
12 AF/SEF

Life is filled with decisions. What school do I go to? What subjects do I take? What career do I pursue? These decisions are usually made after a good deal of time has been spent examining alternatives and weighing the pros and cons of each choice. Unfortunately, we as fighter crews usually don't have the luxury of extra time when it comes to many of our decisions. The most critical decision---the decision to eject---must often be made in seconds and the consequences of this decision are usually quite final.

During 1978, 30 active TAC and TAC-gained aircrew members were lost in 52 Class A mishaps. Many of these men might have survived if they had made the decision to eject--in time. While it's true that some fatalities result from seat malfunctions, the overwhelming majority are caused by a late decision to eject, or no decision at all.

Historically, the successful ejection rate goes down as the degree of operator involvement increases. It's not surprising then that our losses during 1978 support this historical trend.

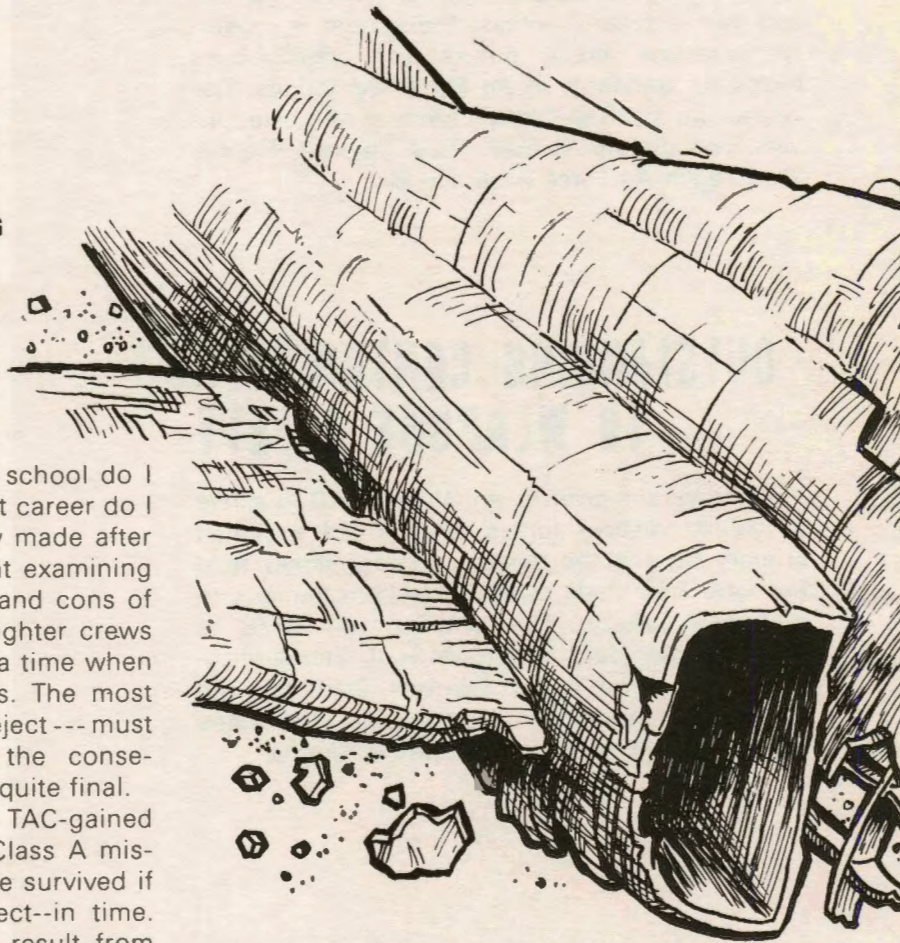
Why will an aircrew member eject in time more frequently when materiel failure occurs, then when personal error was involved? When the aircraft is on fire, the hydraulic systems have quit, and the plane becomes uncontrollable, the decision is evident. Eject or die. Not much of a choice there.

Now suppose you're on an ACT mission, the last engagement goes below the minimum

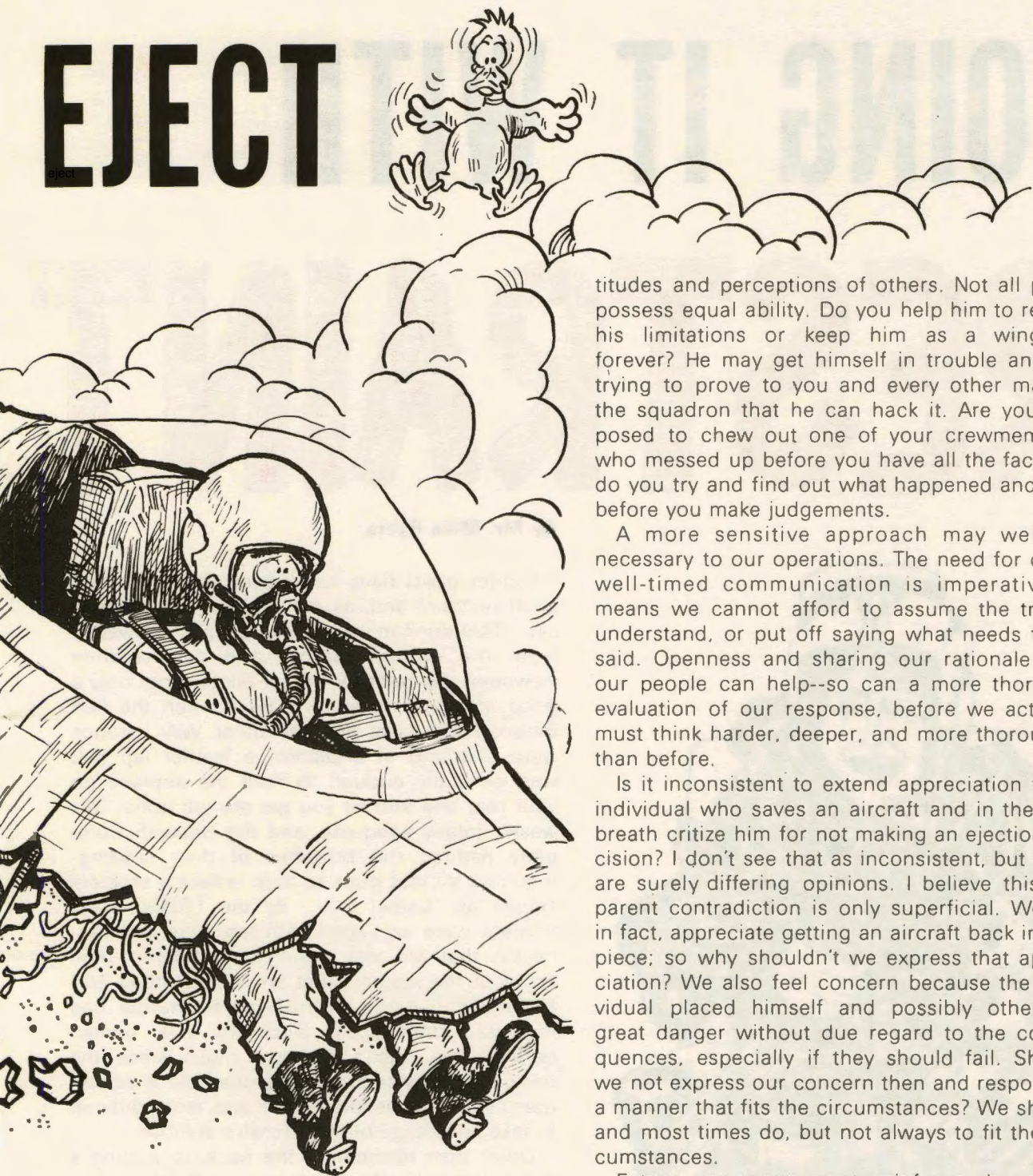
altitude, and during your last-ditch defensive maneuver, the aircraft departs. Depending on your aircraft and skill level, you're probably close to or below safe recovery altitude once you realize what's happened. What do you do? Try and recover? Eject immediately? Don't look at me for the answers--I don't have them.

Pride, disorientation, misperceptions, and fear are some considerations which may explain a person's choice. Certainly, there are numerous other factors affecting an individual's response. But regardless of how many factors influence the decision, one thing is certain. There is no stigma in saving one's self.

But is that tenet reflected in our everyday operations? People are influenced by their peers,



EJECT



supervisors, commanders--what we "glorify" and what we "punish"--even what we say and write. If we do not act to reflect the belief in getting out of the aircraft in time, we can easily create an influence opposite to that which we profess to hold.

Every person in a wing, squadron, or flight ought to be aware of his influence on the at-

titudes and perceptions of others. Not all pilots possess equal ability. Do you help him to realize his limitations or keep him as a wingman forever? He may get himself in trouble and die trying to prove to you and every other man in the squadron that he can hack it. Are you disposed to chew out one of your crewmembers who messed up before you have all the facts, or do you try and find out what happened and **why** before you make judgements.

A more sensitive approach may well be necessary to our operations. The need for clear, well-timed communication is imperative. It means we cannot afford to assume the troops understand, or put off saying what needs to be said. Openness and sharing our rationale with our people can help--so can a more thorough evaluation of our response, before we act. We must think harder, deeper, and more thoroughly than before.

Is it inconsistent to extend appreciation to an individual who saves an aircraft and in the next breath criticize him for not making an ejection decision? I don't see that as inconsistent, but there are surely differing opinions. I believe this apparent contradiction is only superficial. We do, in fact, appreciate getting an aircraft back in one piece; so why shouldn't we express that appreciation? We also feel concern because the individual placed himself and possibly others in great danger without due regard to the consequences, especially if they should fail. Should we not express our concern then and respond in a manner that fits the circumstances? We should and most times do, but not always to fit the circumstances.

Future responses must reinforce the policy that aircrew members mean more than hardware; that an early ejection decision in the envelope is a good one; that a late ejection decision is a bad decision; that we, in fact, mean what we say. **EJECT EARLY, SAVE YOUR LIFE!** Aircraft accidents are bad enough, but fatalities caused by late ejections are tragic and unjustifiable.

DOING IT WITH

RESTRAINT

By Mr. Mike Byers



Fighter pilots have never been noted for their great restraint and, as my old Grandma used to say, "That don't make 'em bad people." However, from the human factors and performance viewpoint, restraint for fighter pilots is not only a good idea, it's mandatory. Back when the Red Baron, Frank Luke and the other WW I troops were shooting at airplanes, a leather lap belt was generally enough to hold the airplane on your rear end and let you get the job done. This wasn't totally adequate, and the Sopwith Company padded the breeches of their cowl-mounted Vickers guns to help reduce a problem known as "Camel face." By the 1920s, many fighters were equipped with lap belts and harnesses that are not significantly different than some of the systems that are in use today. Unfortunately, while aircraft performance has increased dramatically since the 20s, human performance hasn't changed much since the basic Mark I model was designed. As a consequence, it has become more and more difficult to take advantage of the aircraft's abilities.

Other than eliminating the neck, or putting a boost pump on the heart to provide blood circulation under high G, one of the best ways to improve the man-machine interface in fighter aircraft is to improve the restraint system. Of course, it's relatively easy to strap a man in so he can't move and always maintains an optimum position for maneuvers, but this is not what I mean by improvements. A good restraint system should: 1) allow you to move when you need to

(or can), 2) prevent you from getting into a position that keeps you from flying the aircraft effectively, and 3) provide protection during ejections, impacts and turbulence. In short, it should help you when you need it, and not otherwise hinder your performance. During the last few years, considerable progress has been made in developing effective restraint systems. Some are available today, and some are still on the drawing boards. The following items of hardware and design concepts are either beginning to have an effect on restraint system design or are being developed as possible solutions for current problems.

WEBBING IMPROVEMENTS

The U.S. Army has done considerable research and testing on webbing and, as a result of this work, has developed some standards for webbing strengths, widths and elongation characteristics. While most of their research was aimed at developing restraints that were more crashworthy, the data certainly apply to some aspects of fighter systems. Basically, they found that lap belts should be 2¼ inches wide for best performance, shoulder harness should be 2 inches, and the webbing should have a minimum amount of stretch. The seat shown in photo 1 (UH-60A Blackhawk) uses a webbing developed to the Army's specification, and has been successfully tested to 30Gs "eyeballs out," using a five-point restraint. Now, I don't know of any fighters that will pull 30Gs; but when you consider the lap belt loads that develop when a seat drogue deploys at high speeds, the strength requirements are almost the same. An interesting (and useful) spin-off of this new webbing is that it is very easy to stitch, has good abrasion characteristics and works very smoothly through adjusters. It's 2¼-inches by .060 thick and has a tensile strength of over 8,000 pounds; this is a nice "pad" to compensate for wear, tear and degradation prior to scheduled replacement of the webbing.

SYSTEM CONFIGURATION

For some years, race drivers and professional acro pilots have used five-point restraints. For that matter, almost all airline crews fly with five-point systems. The reason is simple: this configuration really works for negative Gs and impact loads, and it's relatively inexpensive to install. What this configuration does, rather than physically restraining you with the fifth strap (That wouldn't be too smart, would it?), is to



UH-60A Blackhawk Crew Seat
Five-Point Restraint Photo
Courtesy of Norton Co.

Photo - 1

maintain the lap belt pull-off angle at near optimum and allow you to take the loads through the pelvic structure. This works better than taking the load in the guts during an impact and, because the lap belt stays at the same angle all the time, keeps an adjusted lap in the "adjusted" position during negative Gs. A snug, comfortable fit will stay that way, and you don't have to crush yourself into the seat with the lap belt for violent maneuvers. The fifth strap can easily be installed on ejection seats that use gas-operated lap belt buckles and with minor modifications, and could be installed on seats that use torso harnesses. U. S. Navy preliminary study indicates that the interface with D-ring equipped seats is not as difficult as it might appear --

DOING IT WITH RESTRAINT

(A good look at various seat buckets will probably convince you of this, as there is considerably more space for installation than you might imagine). Photo 2 shows a fifth strap installed on an F-5 seat.

Another configuration improvement is the seven-point or reflect strap system. (Photo 2 shows this with the shoulder harness and lap belt links disconnected from the single-point release). The cross straps in the shoulder harness are designed to provide improved lateral restraint; but since they are behind you, you really don't notice them. The "horse collar" arrangement on the harness makes the system very comfortable to wear, even under relatively high G conditions. Although the reflected strap system is presently being applied to fixed seats, it probably could be incorporated into an ejection seat, given a compatible inertia reel.

INERTIA REEL IMPROVEMENTS

Since the reel has to perform under a large variety of conditions, it's really the hardest working part of the restraint system. It's got a tough job, since it must lock under impact loads (but

not lock during ACM), haul your torso back against accelerations during ejections, smoothly wind up the webbing when you lean back in normal flight (but not apply a restrictive load), and allow enough slack for you to check six when necessary. Some of these conditions appear to be mutually exclusive; recent design work has shown that "there is a way." The following reel improvements are considered to be within reach of current engineering:

1. Independent straps: When you pull one strap out, the other one doesn't unreel. This allows you to twist around in the seat without having a lot of slack webbing behind you. Independent straps will also, according to some aeromedical type, improve ejection seat performance. When an independent strap reel is fired on ejection, the longest strap will "catch up" with the shorter strap before both haul back together. In other words, if you're twisted sideways in the seat when you eject, the reel will turn you around straight and haul you back. This would seem to reduce injury potential because the spine is not being torqued at the same time it is being loaded by the seat rocket.

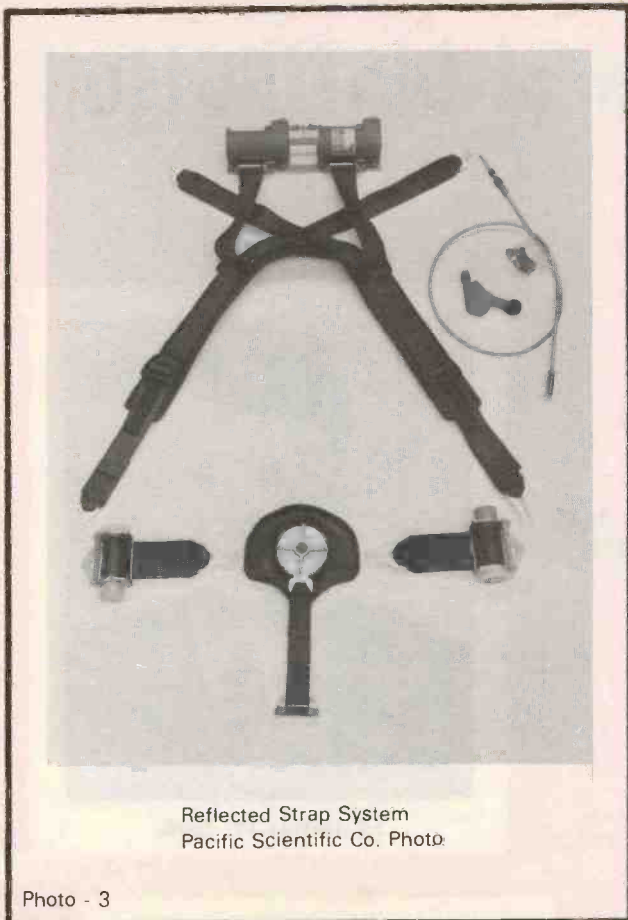
2. Variable strap preload: The strap force is adjustable, and can be tuned for the particular seat installation or mission. For example, a higher preload could be dialed in for flight through turbulence, or during high G maneuvers, depending upon the individual preference and flight conditions. Granted, you need to check six, but who can turn their head (much less their upper torso) at 6 or 8 Gs? For darn sure, there have been very few MiG kills where the good guy (we wear the round goggles, they wear square ones) had his nose down on the stick. Some extra support for the torso might be good sometimes, and you don't need a 30-pound preload dragging you back when you can and need to look around.

3. Command Haulback: Basically, a recyclable reel that will reposition you when you tell it to and otherwise leaves you alone. This is designed to compensate for forces that you are unable to overcome: departures and planned high-G maneuvers. The recycling portion of the reel is powered by nitrogen in a bottle or by an aircraft accumulator, and the ballistic section is not used until an ejection. As the forces start to overpower you, or if you find yourself out of position and unable to get back, you would be able to hit a switch on the stick, throttle or seat



Five-Point Restraint
Pacific Scientific Co. Photo

Photo - 2



and be reeled back up where you can fly the airplane. The reel could be proportional, in that the amount of switch movement would govern the amount of haulback. Naturally, haulback speeds would be slower than a ballistic reel, since a .300 second haulback under 8 or 9 Gs would leave your head on the HUD.

LAP BELT TIGHTENERS

Recent U.S. Navy developments in the MPES (Maximum Performance Ejection Seat) program have indicated that it is a good idea to tighten the lap belt enough to ensure the lower torso is against the seat back prior to ejection. The great thing about this system is that when you're sitting in the seat, you don't even know it's there. When the ballistic reel fires, the tighteners automatically cinch up the belt for best body position.

PASSIVE RESTRAINTS

Another Navy development, passive arm, leg and head/neck restraints are designed to provide protection during ejection without encumbering the pilot during flight. The restraints

are inflated during the ejection sequence by a gas generator similar to the type used in automotive airbags. Since the restraints are backed into the seat cushion and back, held in place by Velcro flaps, there is no extra gear on the pilot. The head/neck restraint, designed to keep your head from whipping forward when the seat fires, is also inflatable; like a flat cloth donut worn around the neck. Blowout patches on the arm and leg restraints, and a tubing cutter on the head/neck restraint release them for seat-man separation. At a recent demonstration, it felt like an octopus came out of the seat and grabbed me; there was no way to get a flailing injury. Since the MPES is a vertical-seeking seat that turns the corner and heads up in less than 50 feet when fired inverted, it's probably best to have a good grip on the man during this operation.

THE "SMART" SYSTEM

This one isn't even on the drawing boards yet: it's a concept that, given our current capabilities, should be possible to build. Here's how it might work: Inside the reel, we have the means (mechanical or solid-state electronic) to sense strap velocity and acceleration. In the aircraft, we have a three-axis G-sensor. Strap acceleration, strap velocity and the X, Y and Z axis G inputs are processed through a microcomputer. The inertia reel, lap belt tighteners and (possibly) the seat back angle are automatically adjusted according to these inputs, and according to system performance parameters have been designed or programmed into the microcomputer. The pilot also has a manual override so he can tell the system to "buzz off." Given the current state of microcomputer technology, and the fact that an inertia reel can be controlled by an electrical signal, it should be relatively easy to design a reliable, redundant system that would actively help the pilot fly the aircraft by automatically maintaining the best body position for ACM. The system would also automatically compensate for unplanned maneuvers. OK guys! Go out and get them Cylons!*

*The TV show seems somewhat inaccurate, since everyone knows, Cylons is golden.

Mike Byers is a former Air Force Captain who contributed several articles to TAC ATTACK while he was on active duty. He is currently working as district representative with Kin-Tech Division of Pacific Scientific.



AIRCREW of DISTINCTION



Capt Stephen C. Gillette

**307 TFS/31 TFW
Homestead AFB, FL**



Lt James W. Delk

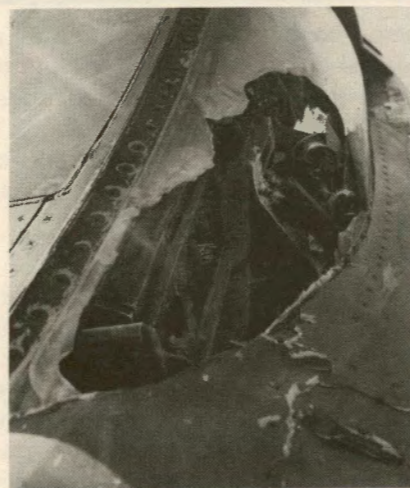
On 29 November 1978, Captain Stephen C. Gillette and Lt James W. Delk were leading a two ship ground attack mission. During target egress at 500', a turkey vulture impacted the aircraft, penetrating the left windscreen quarter panel. The impact forces on the canopy jettison handle moved it enough to jettison the front canopy.

Wind blast prevented cockpit and radio communication so the crew followed their prebriefed procedures. They climbed and decelerated to allow cockpit communication. After confirming they had positive control of the aircraft and that neither one was injured, an assessment of damage was made.

The left side of the instrument panel in the front cockpit was torn from its mounts. Numerous instruments were broken and dislodged. A join-up was completed with the number 2 aircraft and the crew decided to make an immediate recovery at Avon Park Auxiliary Airfield.

Shortly thereafter, the UHF control box in the rear cockpit began smoldering due to shorted electrical connections, forcing the crew to turn off the radio.

Due to restricted visibility, Capt Gillette was required to fly formation on the number 2 aircraft.

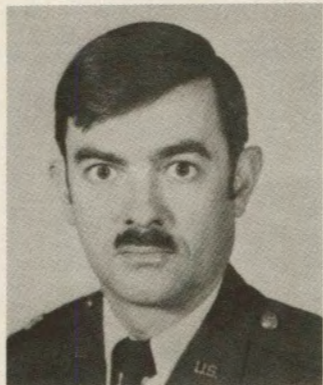


He was able to check runway alignment only through the hole in the windscreen. After successfully engaging the arresting cable, the crew egressed safely. The calm, professional reaction to this emergency qualifies Captain Gillette and Lt Delk for the award of the Aircrew of Distinction

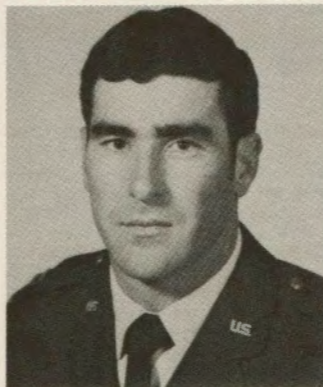


TACTICAL AIR COMMAND Annual Safety Trophies

TAC DISTINGUISHED AIRCREW ANNUAL FLIGHT SAFETY TROPHY



Major Raymond D. Fowler



Captain David J. McCloud

This trophy recognizes the individual or aircrewmembers who most successfully coped with an inflight emergency during the year. The recipients are selected from the monthly Aircrew of Distinction winners. Major Raymond D. Fowler and Captain David J. McCloud, 57 TTW, Nellis AFB, NV, are the winners for 1978. Major Fowler and Captain McCloud were the Aircrew of Distinction for June 1978.

TAC COMMANDER'S TROPHY FOR FLIGHT SAFETY

This trophy is presented to the numbered Air Force with the lowest command controlled Class A mishap rate. Active and gained Air National Guard and Air Force Reserve units are included in the computations. Ninth Air Force is the winner for 1978 with a mishap rate of 3.5, the lowest in Tactical Air Command for the second year in a row.





TAC

SAFETY AWARDS

Individual Safety Award

Captain William F. McDonald, F-16 Ready Team, 388th Tactical Fighter Wing, Hill Air Force Base, Utah, is the winner of the Individual Safety Award for April 1979. Captain McDonald was instrumental in developing and implementing flightline maintenance procedures for hydrazine servicing and handling of the F-16 Emergency Power Unit. He has also been deeply involved in all other facets of the wing's conversion to the F-16. The smooth transition achieved thus far is a testimony to his efforts.



Capt William F. McDonald

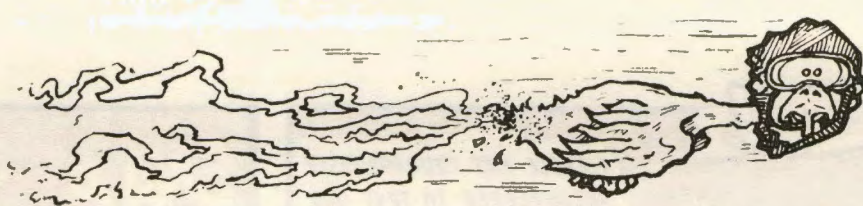
Crew Chief Safety Award

Staff Sergeant Dennis J. Wright, 35th Aircraft Generation Squadron, 35th Tactical Fighter Wing, George Air Force Base, California, is the winner of the Crew Chief Safety Award for April 1979. Sergeant Wright is one of the most highly qualified and skilled crew chiefs in the wing. His dedication and trouble shooting skills result in producing safe, airworthy aircraft well within scheduled time requirements.



SSgt Dennis J. Wright

TAC TALLY



TAC		
FEB	thru FEB	
	1979	1978
3	6	9
3	3	7
2	5	7
1	4	7

ANG		
FEB	thru FEB	
	1979	1978
3	3	1
3	3	0
2	2	1
2	2	1

AFR		
FEB	thru FEB	
	1979	1978
0	0	0
0	0	0
0	0	0
0	0	0

CLASS A MISHAPS	➡
AIRCREW FATALITIES	➡
TOTAL EJECTIONS	➡
SUCCESSFUL EJECTIONS	➡

TAC Flight Safety Trophy Winners



33 TFW
EGLIN AFB, FL
18 FEB 78 - 17 FEB 79

31 TFW
HOMESTEAD AFB, FL
2 MAR 78 - 1 MAR 79

193 TEWG (ANG)
HARRISBURG IAP, PA
26 FEB 78 - 25 FEB 79

602 TAIRCW
BERGSTROM AFB, TX
4 FEB 78 - 3 FEB 79
(INCLUDES 27 TASS, DAVIS MONTHAN AFB, AZ)

CLASS A MISHAP COMPARISON RATE 78/79 (BASED ON ACCIDENTS PER 100,000 HOURS FLYING TIME)

TAC	78	16.0	12.4										
	79	6.9	6.9										
ANG	78	0.0	3.4										
	79	0.0	10.4										
AFR	78	0.0	0.0										
	79	0.0	0.0										

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

FLEAGLE

FLEAGLE HAS COURAGEOUSLY
VOLUNTEERED TO TEST OUR
NEW 37 POINT RESTRAINT
SYSTEM.



SNAP CLIP FASTEN HOOK

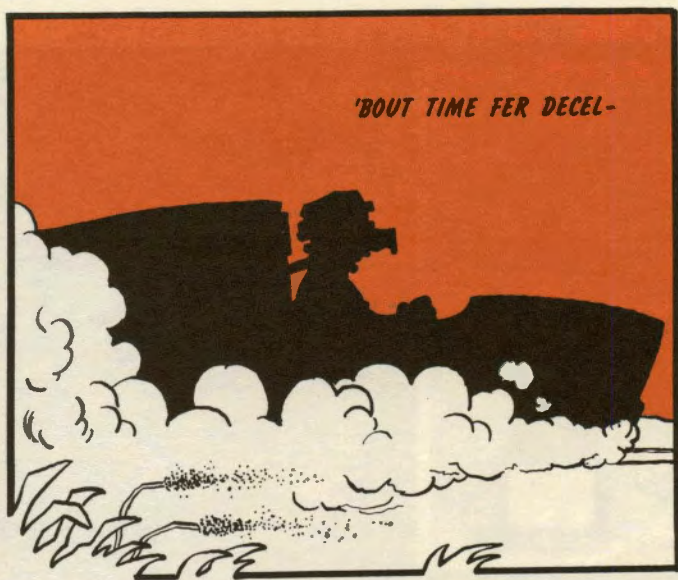
PEOPLE WAITING...GOTTA
HURRY, NO TIME T'USE
TH'CHECKLIST.



HARDISON



'BOUT TIME FER DECEL-



ERATION!!



IF'N HE'D ONLY
FOLLOWED TH'CHECKLIST.

YEAH, THEN MAYBE
HE'D GOTTEN ALL 37
FASTENED 'STEAD
OF JUS' 36.



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