Tac Attack

TAC ATTACK

Aug 1978

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DAVID GARCIA

CLEARED HOT!
...Pg 3

TACTICAL AIR COMMAND

TAC ATTACK

AUGUST 1978 VOL 18 NO 8

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Angle of ATTACK

ANTICIPATION

One of the first events following a major aircraft mishap is the convening of the investigation board. The members of the board conduct an exhaustive search to identify the causes and contributing factors involved in the mishap. Corrective actions are then devised and implemented in an effort to prevent furture mishaps of this type.

This system is only one answer to mishap prevention. In many cases the cause of a mishap is determined to be an element of operation which as well under our control--which we should have identified and corrected before it led to a mishap.

Early this year, TAC experienced two mishaps in which the aircrews were not completely familiar with their aircraft's performance capabilities. This lack of knowledge, combined with operation in unfamiliar terrain resulted in each aircrew placing their aircraft in an area where recovery was doubtful. More recently, a mid-air collision involved the use of unauthorized equipment in the cockpit.

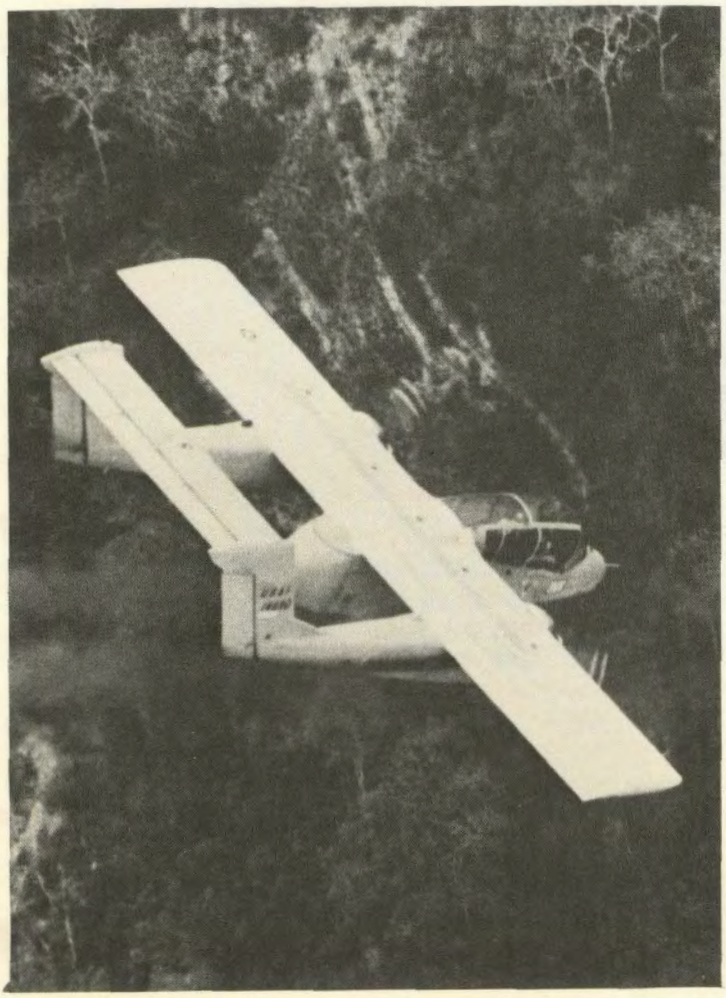
As our new aircraft are brought into the inventory and new capabilities are identified and explored, we must thoroughly examine the abilities of the aircrews and the aircraft to accomplish these new missions. Anticipation of potential problems, both in the man and the machine, is the key to mishap prevention.

All of us at TAC Safety are available to assist anyone, anytime, in any way we can. Our job is to help preserve our resources. As your new Chief of Safety, I intend to insure we do just that.

Richard K. Ely

RICHARD K. ELY, Colonel, USAF
Chief of Safety

CLEARED HOT!



By Capt Wayne F. Conroy
USAF TFWC/TAT-FC Tactics Branch
Nellis AFB, NV

I have, at times, sat at my desk mulling over the "Red Flag Mistakes" article in the March 78 issue of TAC ATTACK. Comments on poor FAC performance in the article raised feelings within me ranging from anger to self-evaluation. You see, I'm a FAC; but the reason I am a FAC is because foremost I'm a fighter pilot. Most of my peers are of the same makeup, so I can't understand all the furor that has arisen over an article about mistakes in Red Flag.

This next statement will probably blow the socks off of a lot of FACs, but the remarks in the article were somewhat accurate in a limited sense.

Where does the problem originate? For a fighter jock, when the assignment to be a FAC is received, there is a natural feeling of panic and loss of virility. I know, I've been there. All of a sudden, there's a mad scramble to call personnel, some colonel, or the chaplain. After all avenues of escape have been exhausted, such statements as, "What are they going to do -- send me to O-2s," or "I didn't join the Air Force to run around in the woods with the Army," begin to echo through the squadron.

We seem to lose sight of why the blue suiter is with the Army. We could go into all kinds of doctrinal and philosophical justifications; but

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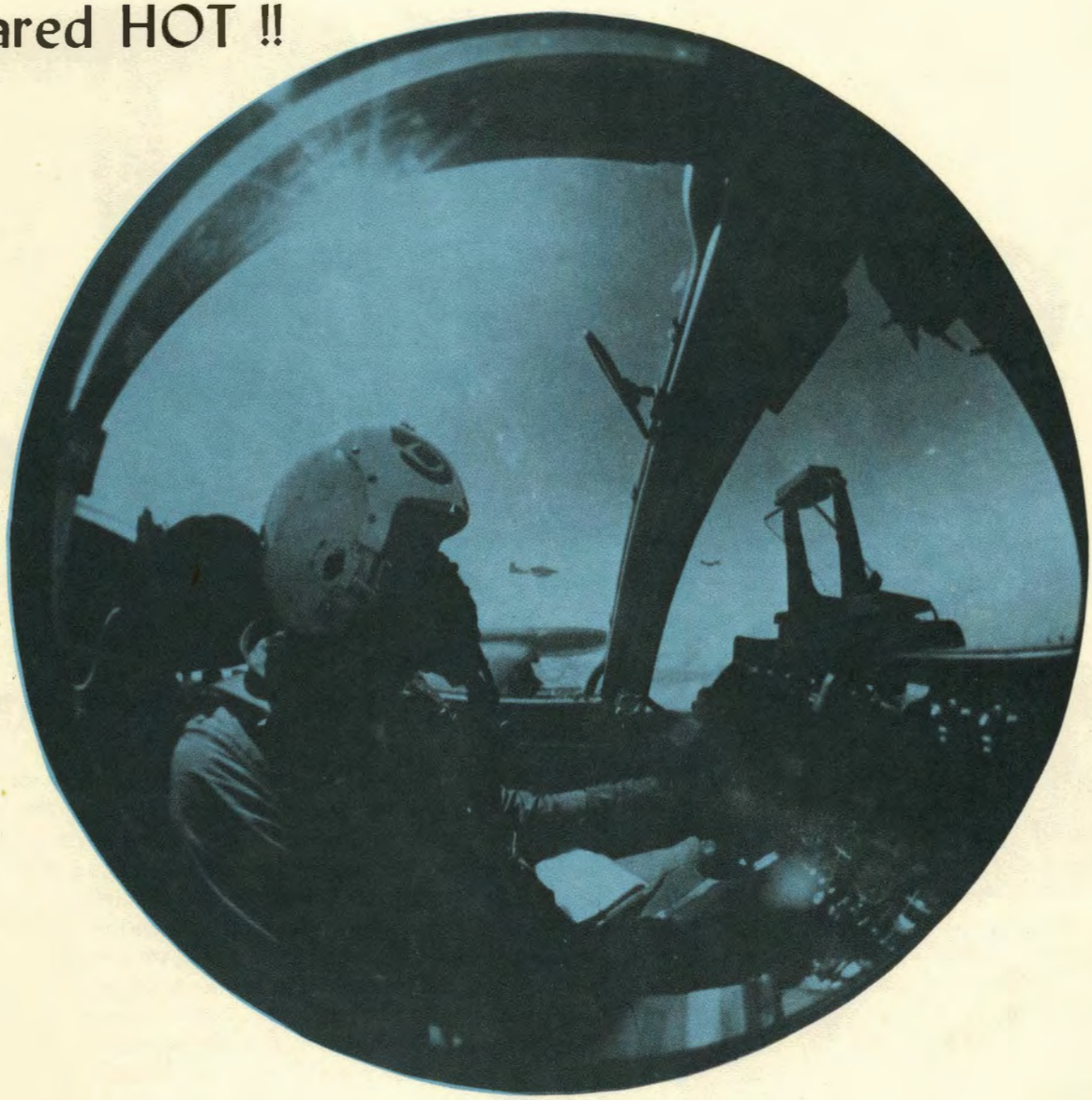


when you get right down to it, the FACs are there so their buddies in the fighters are employed in the most effective manner. To expand it further, the fighter pilot is helping the FAC out of a tight spot, and the FAC is working to get the fighter pilot on target and back home as quickly and safely as possible. What I'm getting at, guys, is: We should all be working together and the sooner we realize this, the more effective a team we will be. We, at the FAC Tactics Branch, have been involved in every close air support Red Flag since August of '76, and that's a lot of Red Flags. We have seen every variation of tactics and methods of application. Bear with me while I give you a few observations.

The high-threat environment we are faced with today has created many shortfalls in the FAC business. Everyone is well aware that new equipment is needed. We don't have the new equipment, and it is unlikely that you will find a brand spanking new FAC air machine sitting on your ramp next week or even next year. Let's face it, if a conflict erupts somewhere, we will have to use what we've got. So, when you FACs come to your next Red Flag, grab the problem with both hands and run with it. The biggest problem you will have on a mission is the lack of understanding of who is in control of the

Capt Wayne F. Conroy is this month's Fleagle T-shirt winner

mission, you or the fighters. When the Frag says, "FAC directed," that's exactly what it means, so don't walk in to brief the fighters saying, "What do you guys want to do today?" If you do that, you've lost all credibility; and the best thing to do is tell them, "Flight lead control," and go down to the casino. Your odds will be much higher. On the other hand, if you've done your planning and have applied lessons learned from the past, your quotient of success has just risen by a factor or two.

"Control" is defined: "to exercise authority or dominating influence over, direct, or regulate." I think the key word is direct; and in order for a FAC to direct, he should be an authority on the tactical situation and the resources available to him. It is very important that the FAC know the capabilities of the fighter aircraft he will be employing, the threat array, and the tactical situation. In the high-threat scenario, the FAC has got to be the eyes for the fighter pilot. He has to take into consideration all the above items and do his planning so the fighter guys have the best odds possible to ingress, hit the target, and egress successfully.

The first step in the right direction is to read and understand the scenario when it comes down from intelligence. As the FAC, you should pick out the IPs, not wait for the fighters or recces to do it for themselves. Select workable contact points, and get the word out to everyone. Until a better way is devised, set up the high-low FAC concept. When applied correctly, the concept has been highly successful; and when not correctly employed, it results in total disaster. To employ it correctly, you first have to believe in it and make it work. If you are the Forward FAC (FFAC (which is, by the way, the new term for the low FAC)*, you're the one who has to locate the target, appraise the threat and terrain, and get the word back to the Forward Attack Coordinator-Airborne (FAC-A)(the new term for the high FAC).* If you are having trouble communicating with the FAC-A, MOVE! Don't sit there and cuss out the equipment. Move to a better position, get your target information out and then go forward to put your mark in and to provide the fighters the assistance they need in order to hit the target.

*FFAC and FAC-A were terms proposed to HQ TAC by the Worldwide FAC Conference held in Mar 78. They are presently at HQ TAC for evaluation.

If you are the FAC-A for the mission, you're the "Big Kahuna" for the day. Know the capabilities of those A-10s, F-4s, A-7s, F-100s, A-37s, and A-4s you'll be working. You need to know their current tactics and preferences. Take the information the FFAC has passed and put it all together. Pick the appropriate IP; calculate the IP to the target geometry. Base the above on target, threat position, terrain, sun angle, and restrictions. Yeah, you're going to be very busy; that's why there should be two of you flying in that FAC-A bird. Not only do you have to do the above mentioned items, but you also have to brief and disperse the fighter flights and coordinate with the FFAC once the fighters are inbound. As a FAC, whether the FFAC or FAC-A, your work is cut out for you. If you're not prepared before you get in that cockpit, helicopter, or APC, it's too late. If you apply the definition of control to your job, you will find a lot more respect, credibility, and mission success coming your way.

All right, you fighter pilots, it's your turn. I hate to dissolve any of your preconceived notions about FACs. I'm not talking about those of you that have been FACs, as long as you remember how it was. FACs are not a conglomeration of misfits, weak sticks, or malcontents. We're a bunch of professionals just like you. In fact, we probably won a few bucks from some of you on range rides a few months ago. We want to be, and have to be, a part of your team. We are controllers. We'll do whatever possible to get you on target and out successfully. After all, we're fighter pilots.

There is a lot of coordination and planning that goes into that six-to-eight item high-threat briefing you get. When we're not talking to you, we may be talking to several other elements of the Tactical Air Control System or planning your ingress to the target areas. No, we aren't telling you what tactics to use, that's up to you. We just don't have the time or the freedom to read a book to you as was done in Southeast Asia. What we need from you is:

1. Call sign.
2. Number and type aircraft.
3. Ordnance.
4. Playtime -- from check-in to Bingo.

And that's all. We don't care why your number three man was late taking off, or why the tanker shortchanged you on fuel. That's ancient history. If we are ready to use you, we will brief you. If not, we will hold you at some point while we

Cleared HOT !!

coordinate or brief another flight.

When we're ready to use you, the following briefing format will be used:

1. IP.
2. Magnetic heading.
3. Distance or time from IP to target.
4. Target description and elevation.
5. Restrictions.,
6. Clearance/abort code.

If we have the information, and you want it, we will add:

7. Target coordinates/offsets -- for those aircraft with weapons computers.
8. Additional information -- when time and situation allow (or dictate).

As you can see, you won't be getting the information you get in the low-threat environment. You have to take this information and apply your tactics to the situation. Because of the environment, the fighter pilot is going to have to do more during the mission than in the past. He's going to have to believe what he is briefed and fly it to the best of his ability.

If things go wrong, you have to hit your secondary target or return to the contact point and try it from a different IP.

FACs now clear by exception. You may change to strike frequency and not hear a word. This tells you that everything is Sierra Hotel. If you do hear something, it will be an emergency call or an abort call. Or, if we're fortunate enough to be in a position to see your pop-up and the target, a verbal final correction -- but not normally a "Cleared Hot" call. That is pretty much gone except for certain special circumstances.

If at all possible, the FAC will allow for an unrestricted attack on a target. Certain circumstances may dictate a restricted run-in-and-attack direction. When this restricted situation arises, there isn't any time for a discussion or rebuttal of the direction given by the FAC. He has other problems to contend with. That's not to say that the fighters should not question an obvious error and rectify the situation at Point A, versus Point C when it's too late.

The high-threat close air support mission is one of the most demanding facing the tactical air forces today. It requires extensive coordination, radio discipline, and a thorough knowledge of the system and how it works. It's a team effort on the part of both the FAC and fighter communities. There is a lot more to it besides "Hit my smoke," and Cleared hot!" ➢

Captain Wayne F. Conroy graduated from Southeast Missouri State University, with a BS in Business Management. He entered the service through OTS in 1967. After pilot training, he flew F-4s in Thailand and at Homestead AFB, FL. He then flew A-7s at Myrtle Beach AFB, SC, and in Thailand during Linebacker II. He is presently flying O-2s and is a FAC Tactics Officer at the United States Air Force Tactical Fighter Weapons Center, Nellis AFB, NV.

DOWN TO EARTH

Holding your child can be lethal

Parents who "protect" their children in cars by holding them in their laps actually cause thousands of deaths and more severe injuries to children. The Insurance Institute for Highway Safety reports traveling with a child on one's lap or in one's arms is potentially lethal for the child, whether or not the adult and child are using a seat belt. The children are often crushed between the parent and part of the car such as dashboards or doors. A recent study shows that 44% of youngsters less than a year old are held in someone's lap while in cars. Here are some safety tips to be used when traveling with children:

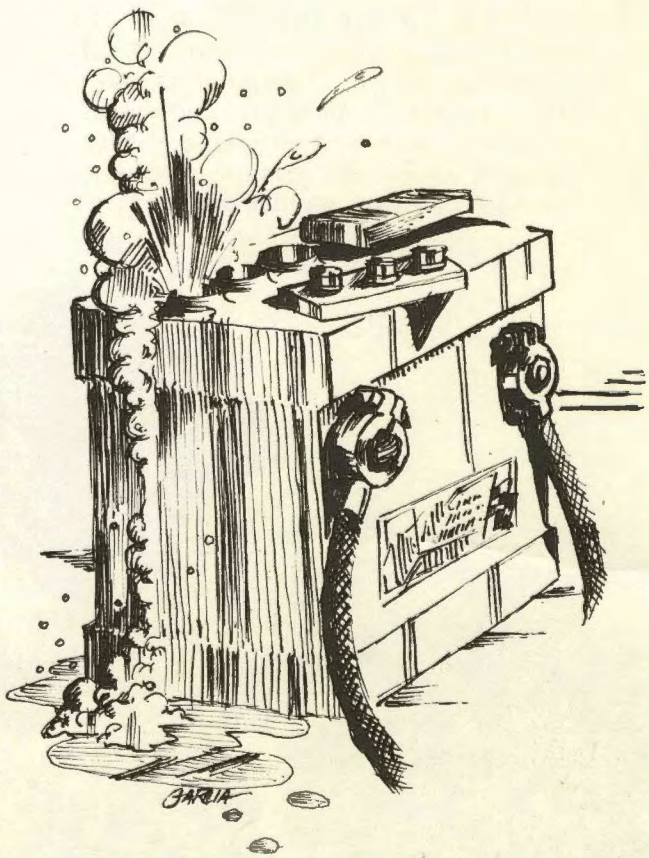
1. Keep youngsters in appropriate restraint devices such as infant carriers.
2. Keep children in the back seat where they're less likely to be hurt.
3. Make sure everyone in the car uses restraint devices to prevent in-crash contacts.

A practice of these simple points could prevent many deaths and injuries annually!

batteries can spray acid

All automobile batteries are potentially hazardous. Certain types are more hazardous than others ... especially side-terminal batteries. This battery has the positive and negative terminals located on the side of the battery. The battery incorporates a plastic filler cap that forms an encasement that traps battery solution overflow. The encasement filler cap has breather holes located in positions that are offset above the internal battery cells. The battery was not designed to be lifted by the terminals with a carrying strap, but someone tried it anyway. As a result, lifting the battery by its sides caused the battery to tilt and the acid solution in the encasement filler cap became pressurized. This caused the air and accumulated acid solution to be sprayed out the breather holes into an individual's eyes.

A recommended safe procedure for handling this type battery is to keep it level and cover the filler caps with a suitable rag to absorb the acid solution as it flows from the caps.



THE AIR FORCE FAC

By Lt Colonel David R. Hughes
HQ Tactical Training
Holloman AFB, NM

Recently I had the opportunity to study at the U.S. Army War College. While there, I became involved with other War College students in a project to evaluate the problems and issues of the employment of tactical air forces in support of the ground forces. We primarily focused on our air-to-mud mission—particularly the support of engaged ground combat forces. The purpose of this article is to convey impressions of combat-experienced Army commanders regarding FAC effectiveness in furnishing the Army with close air support. Emphasis will be placed on the Forward Air Controller (FAC) because, in the eyes of the Army, he is the "man with the air" and is the primary interface between a deployed battallion and the TACAIR assets.

In order to keep things in context, a couple of observations will be noted. First, few people in the U.S. Army, or any other U.S. military service, have been bombed or strafed by enemy aircraft.

We have enjoyed air superiority for many years. Second, due to the nature of the Vietnam War, a common tactic the Army used was to make contact with the enemy and then, instead of pressing the attack, pull back a sufficient distance and call in TACAIR to destroy the enemy. This tactic resulted in reducing friendly casualties. What becomes significant about both of these points is that in the next war, possibly neither case may be enjoyed because of the nature and intensity of that future war. Consequently, the ground force commander may find that his previous combat experience, and particularly his heavy reliance on TACAIR, cannot be transferred readily to a new situation. With these ideas in mind, let's look at the ways our Army counterparts view our FAC in his role of providing close air support to ground units.

Generally speaking, the combat-experienced Army commanders are well satisfied with the performance and capabilities of our FACs. Some typical comments are:

"...(FACs) were first-class people who were interested solely in providing the best support possible to the ground troops. Their contribution was indispensable—particularly in the Vietnam situation..."

and:

"In the main, I have found FACs to be well-trained, excellent advisors on air-delivered ordnance, and prepared to go the limit when necessary."

and:

"I worked closely with AF FACs, both in the air and on the ground. For the most part, they did an outstanding job—terrific pilots who would stick their necks out a mile for the guy on the ground."

These comments indicate general satisfaction with our FACs in their role of supporting the ground force combat commander. (Keep in mind that often our whole close air support (CAS) mission is evaluated through the FAC because he represents TACAIR to the ground force commander.)

Some of our Army colleagues did express concern about certain areas including survivability; ground FAC availability and training; integration and coordination; and equipment.

Survivability

There was a significant concern about the survivability of the FACs and their ability to conduct CAS in a medium-to-high intensity war such as we may experience in Europe or other locations. Can the FAC survive and be available to fulfill his responsibilities and be at the critical places when needed?

This worry was evident in such comments as:

"I would question the survivability of those aloft in a European scenario, but I wouldn't want to be without them whether up above or on the ground -- especially in an air threat environment such as Western Europe."

Or:

"...I have doubts that a FAC will be able to operate in the European environment the way he did in RVN. This is not to take away from their dedication or ability to control air strikes. The problem appears to be a strong anti-aircraft threat, limited number of close air support aircraft, and a very fluid, rapidly moving situation. The problems of trying to coordinate front lines, determining enemy/friendly positions, integrating close air support with artillery and Army aviation, and defeating front-line anti-aircraft missiles will probably be beyond the capability of a small team or airborne FAC."

It's apparent that we won't be able to translate all previous experiences with FACs (particularly

in a favorable air superiority environment) into a highly defended, high intensity scenario without changing a lot of ideas and tactics before the next war starts.

The Israelis learned this lesson in the early days of the Yom Kippur War in 1973. They lost many CAS aircraft in the Golan Heights and found the FAC wasn't too useful because of the high AAA and SAM threats. In fact, they lost a significant number of A-4s because they felt the aircraft couldn't fly fast enough. They also realized successive passes at a target were not advisable since most enemy ground units had very effective organic AAA. Using slower aircraft in that environment required an excessive amount of defensive suppression.

There are some alternatives to the problem. One is to use a combination of both airborne and ground FACs to direct CAS. The airborne FAC stays far enough behind the Foward Edge of the Battle Area (FEBA) to be safe from enemy air defenses (AAA and SAMs) and also, hopefully, out of the enemy comm jamming area. (See associated story, "Cleared Hot," on page 3.) From this position, he is able to receive data from the ground FAC located near the battle site and can brief and clear the inbound strike aircraft. Other potential solutions are also being explored.

Ground FAC Availability and Training

There is still a concern that the ground FAC will not be at the right place at the right time, plus a concern about the number of FACs assigned to a ground unit to provide 24-hour operations capability. One colleague expressed the thought that ground FACs might not be available in a Central European environment because pilots would be in a high demand to fill the flying mission. To help solve these problems, the joint Air Land Forces Application (ALFA) at Langley AFB is looking for alternatives to the ground FAC so the FAC function can be provided when and where required. One solution has been to train Army artillery Forward Observers (FO) in forward air control procedures and to utilize them in the absence of the FAC. This procedure presently is undergoing testing and looks feasible.

It has been a commonly held belief that it is most desirable to have a fighter pilot act as a FAC because he is familiar with both ends of the delivery process. However, previous wars and exercises have shown us that we can train other people, both pilots and nonpilots, to do the FAC function. Air Force combat controllers successfully performed both airborne and ground FAC functions in SEA and many Army Special Forces personnel were also trained and employed as ground FACs.

Integration and Coordination

Many problems voiced by Army commanders involved integration of the FAC into the ground unit and overall coordination. Commanders felt that the FAC who became part of the unit he supported was most effective, emphasizing they would work as a team and not just two services working together. First hand experience of what happens on the ground is an absolute requirement from the Army point of view. Another individual put it well when he stated:

"The FAC who lives with, talks with, practices with, and fights with the supported unit can learn exactly how to best support that unit, because he understands not only the mechanics, but also the spirit and philosophy of the commander's scheme of maneuver and his methods of using air support. He can recommend to, and educate, the commander and come to mutually agreed upon methods."

The thoughts above show the keen desire of the ground forces commander to integrate the FAC and TACAIR into his fire support plan. And that brings up another concern about coordinating TACAIR with other fire support. One officer stated, "We can no longer stop the war to bring in close air support. Procedures will have to be developed to integrate all supportive arms." Another stated, "The FAC's preoccupation with artillery fire and his demand that it be stopped before he will use fighters for CAS must be changed." Here we see the dilemma of the need

for heavy fire support by the ground forces commander (artillery and TACAIR simultaneously), and yet the necessity exists for prudent airspace management and control to insure effective and safe delivery of ordnance. During the past years, I have become extremely concerned about our ability to adequately manage the airspace over the battle area. Not only will artillery and CAS compete for this airspace, so will, missiles, interdiction sorties, airlift missions, reconnaissance sorties, search and rescue, electronic warfare, counter-air, command and control, air refueling, remotely piloted vehicles, bomber, Army aircraft, naval gunfire, and not to be forgotten, enemy artillery, missiles, and aircraft. Airspace management is a complex problem. The FAC is

on the spot where the problem occurs and he may have to sort it out -- this will be a very difficult task. At any rate, we must develop tactics that will permit TACAIR to deliver ordnance simultaneously with artillery fire, as well as the management techniques necessary for employing simultaneous deliveries.

Equipment

A final major concern was that of the FAC's equipment. In this regard, the perceived shortfall existed in two major areas: mobility and communications. For example, one colleague said: "Ground FACs are hindered by the enormity of the equipment -- both jeep-mounted and backpacked. The vehicle-mounted equipment is excessively heavy and the vehicle is stuck more often than not. Their portable equipment, except for the small radio, slows them considerably in a ground pounding environment."

Another said: "The vehicle that a FAC uses cannot always travel with a tank or armored personnel carrier; and as a result, a commander is at times separated from the FAC. Tradeoffs are possible but the net result is always a loss to the ground unit."

Similarly, another stated: "In an armored unit, the FAC must ride in a tank. The jeep is no good."

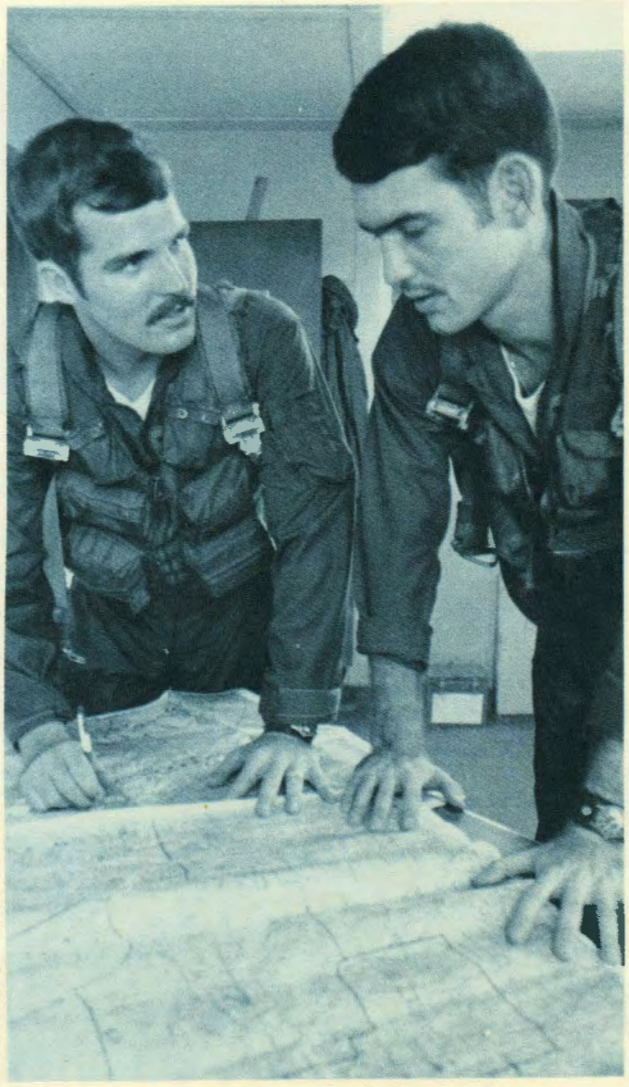
Regarding radios, one said: "Too often, FM communications with the Air Force FAC is not consistent or clear (Infantry Bn COs only have FM)."

And another said: "AF and FAC radios are not secure."

• • •

I found it interesting that my Army colleagues put a great emphasis on other services the FAC provided. Some of these were: (1) Providing up-to-date battle data -- where the enemy moved. (2) Providing orientation to, and the location of, friendly ground units. (3) Guidance and escort cover to med evac choppers. (4) Assistance to ground troops in locating where enemy fire was coming from. (5) Communication relay to other ground units. (6) Accurate strike information to Army gunships. In the combat situation, these extra functions performed by FACs were instrumental to the ground forces commanders in completing their missions.

Experience has been one of our greatest military assets -- particularly the experience from recent wars. However, total reliance on tactics and technologies that were successful in previous wars could prove to be disastrous in the next war. New tactics and capabilities are being explored and devised for the FAC. Also important in the next war will be the quick and precise analysis of the nature of the battle in order to employ the FAC prudently. To date, our FACs and close air support have more than proven their worth to the Army ground commander. Now it is up to us to keep this good reputation in new times and in different combat situations.



SPO CORNER

READY OR NOT, HERE I COME

By Maj G. H. Felix
HQ TAC/SEF

Several months ago, I wrote of an A-7 pilot who reacted correctly to a severe takeoff emergency. This month, I have a counter.

The nose of the aircraft did not rotate at rotation speed. The pilot initiated an abort, extended the tailhook, but didn't deploy the drag chute. The aircraft attitude associated with the heavy braking and a misrigged tailhook kept the hook from contacting the runway.

Now, instead of having that beautiful bird in the air where it belongs, or nestled in a BAK-12 if it misbehaves, it's making like an XM-1 tank plowing through the overrun. The ensuing trip over hill and dale just didn't work; the plane caught fire and burned. The crew egressed successfully.

Had all abort procedures been accomplished in a timely manner, the aircraft probably could have been stopped on the runway or in the overrun. In a situation such as this, when the cheese really gets binding, timely execution is not the easiest thing in the world. Boldface procedures and simulators help, but the greatest aid is a quick refresher before takeoff -- and I mean right before takeoff. While holding short or during quick check, think about what could happen and the proper reaction, then go for it.

The next time you're holding short listening to yourself sing "Boogie Shoes" in anticipation of Friday night at the O'Club, ask yourself if you're really ready. After all, you may be tap dancing in front of an accident board instead of boogieing at the O'Club.

TIRED?

By Maj G. H. Felix
HQ TAC/SEF

Appears to be increased huffing and puffing going on in the field. Examples:

AVIATION WEEK, reporting on a recent A-10 deployment: "The A-10s demonstrated their ability to fly a large number of sorties per day, with the limiting factor being crew fatigue."

ARMED FORCES JOURNAL, reporting on JAWS II: "The tough 'in the spinach' flying demanded innermost stamina and flying ability from the pilots. Scientists from Brooks AFB instrumented pilots and A-10 planes during the tests and were astounded at the results. During the flight, up to 7 positive Gs were pulled, and negative Gs were as high as 2. The jinking, turning, and rolling occurred in fractions of seconds, generating forces which exceeded those of astronauts at liftoff by a wide margin."

TD and E pilots reporting on themselves: "They became so winded they occasionally had to take a break."

Why the increase in physical demands? Technological advances, both ours and theirs. Our aircraft no longer run out of energy before the pilot does. Their air defenses necessitate aggressive aircraft maneuvering for survivability.

Our reaction to these increased physical demands must be increased physical activity. Running a mile and one-half every year doesn't get it. Running a mile and one-half a week doesn't get it; several times a week does. So does doing a few sit-ups and push-ups on the side.

My excuse is to launch out of this lousy chair and breathe some fresh air. Your excuse should be to better prepare yourself to fly that aircraft. If you seem to be draining your LOX bottle more than you should, maybe it's time for you to hit the track.

chock talk

Chock Talk

...incidents and incidentals with a maintenance slant.

SMASH!!!

While an F-4 was being prepared for launch, the aircraft crew chief experienced difficulty in removing the air hose from the Dash-60 starting unit. The nozzle C-clamp caught on some webbing. Instead of properly untangling the air hose, the crew chief braced himself and administered the old heave-ho.

The heave-ho worked -- too well. When the hose came free, the heavy nozzle end expended all its built-up inertia on the glass radome of a training missile which was on the aircraft. The missile required depot-level maintenance to the tune of $11,000+. Now, imagine your head in the path of that nozzle; and you can imagine how much worse it could have been ....

We all tend to pull things harder when maybe we ought to be pushing or finding out what's causing the hangup.

FERD IS ALIVE AND WELL!

The F-4 had flown three sorties since an engine removed for repairs to the oil tank and afterburner liner had been reinstalled. Following the third flight, FOD to the engine was discovered. Impressions on the compressor blades indicated that the damage was caused by a hexagonal nut of the type and size normally used in the engine bay on the starter assembly and BLC clamps. So much for the what -- how did it happen?

No one knows. All records indicate that the engine was properly installed. All hardware used during the repair and reinstallation was accounted for. QC inspections found an effective FOD prevention program and an exceptionally clean, organized engine shop. The cause remains undetermined.

Just one point: There's only one measure of an effective FOD prevention program -- your FOD rate. Do you know what yours is?

IF ...

An aircraft's external fuel tank was jettisoned on the parking ramp a short time ago. Luckily no one was injured, except for some folk's pride ... all because of a few shortcuts.

The tank was set up for installation on the right outboard station of the aircraft. A jettison check was performed by the installation crew instead of by weapons personnel as required. A screwdriver was used for the check (how does the PMEL calibrate a screwdriver?); and when the supervisor noted a spark, he signed off the jettison check.

A short time later, a weapons crew arrived and performed a stray voltage check, but they only checked the lower breech cavity firing pin. The tech order only requires one breech be checked -- this unit always checked the lower one. The carts were installed and signed off.

As the aircrew completed the preflight (with external power on), the crew chief pulled the tank safety pins. As the pin was pulled past the micro switch in the left pylon, the carts fired, jettisoning the tank.

A bent pin in the male connector was the culprit. It contacted the wrong female connector, and the current went the wrong way. The load crew did not accomplish the required check for bent connector pins. The bent pin would also have been discovered if the stray voltage check had been performed on the top breech.

A lot of "ifs" involved. It all boils down to shortcuts and failure to follow tech data. Mishaps don't result from shortcuts all the time -- but they occur often enough to show there's no future in taking the short way out.

POOF

Another AIM-9 gas grain generator was fired during flight because someone failed to insure that the captive adapter was installed. The missile was switched from one aircraft to another at a deployed location. During the switch, the captive adatper was left off.

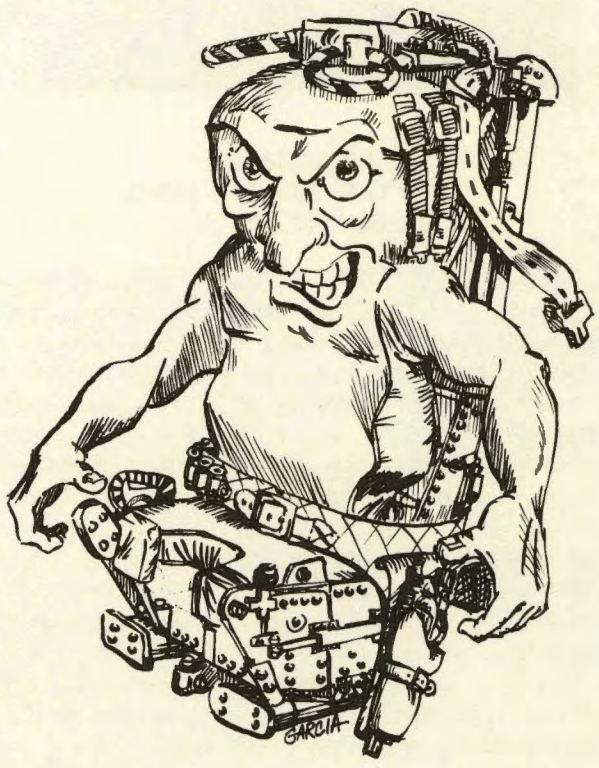
The cost? Just a hair under $300, a bunch of headaches, another load crew decertified, more messages, another incident report, and who knows what else. Just because the tech data was ignored. Is it worth it?

I DIDN'T KNOW THE SEAT WAS LOADED!

Two egress specialists were performing some in-shop checks on an ejection seat prior to installation in the aircraft. As a result of using the wrong tech order, several initiators were not removed and replaced with initiator simulators as required by the correct tech data. A locally manufactured seat restraint cable was also not being used.

During the grip force check, the lack of a restraint cable allowed the handgrips to be raised to the full up-and-locked position. When one of the specialists attempted to lower the left handgrip, he inadvertently squeezed the trigger, firing the initiators.

The mishap would not have occurred if the proper tech order had been used (ever hear that before?) or the seat restraint cable had been installed. Seat initiators are explosive devices and should be treated with care and respect. Only minor damage occurred to the seat -- next time we might not be so lucky. Better still, would be not to have a next time.



AIRCREW OF DISTINCTION

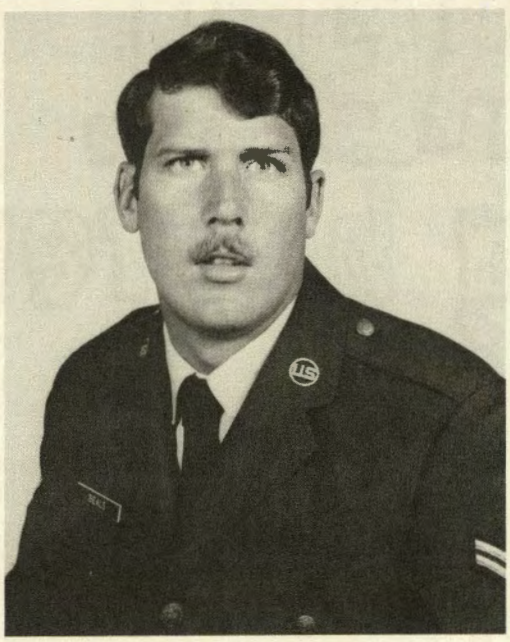
Capt Joe L. Rhoden
138 TFS/174 TFG (ANG)
Hancock Fld, NY

On May 1978, Capt Joe L. Rhoden was on a conventional air-to-ground training mission in an A-37B aircraft. On his first low angle - low drag bomb delivery, he encountered severe aircraft buffeting when he initiated his dive recovery. The aircraft did not respond in pitch as it should have and continued to descend in a shallow dive. Realizing he was out of the ejection envelope, he immediately unloaded the aircraft. He gradually reapplied back pressure to a point just short of heavy buffet. Control response was poor and only 2.5 Gs could be attained. Both hands were required on the controls due to the heavy stick force present. The aircraft cleared terrain obstacles by less than 100 feet. The planned minimum altitude had been 1,000 feet AGL.

With difficulty, Capt Rhoden kept the aircraft in a shallow climb. He began reducing airspeed and climbed to a safe altitude. The Range Officer advised him that pieces of the aircraft had departed during the dive recovery. The flight lead joined on him and performed a visual inspection that revealed the entire left elevator and trim tab were missing. The Supervisor of Flying was contacted and appraised of the situation. Capt Rhoden performed a controllability check over the range bailout area while the SOF contacted the Air Force Flight Safety Center and contractor personnel. There was no record of an A-37 aircraft being flown or landed in this configuration. Capt Rhoden elected to land and flew a flawless visual approach to a 5,000 foot runway. During the 20 minute duration of the airborne emergency, both hands were required on the stick to control the aircraft.

Post-flight inspection revealed the elevator controls were binding on the vertical stabilizer and the right elevator was damaged. Capt Rhoden's professional analysis of the situation, timely and decisive actions and outstanding airmanship resulted in recovery of a valuable aircraft and qualify him as Tactical Air Command Aircrew of Distinction.

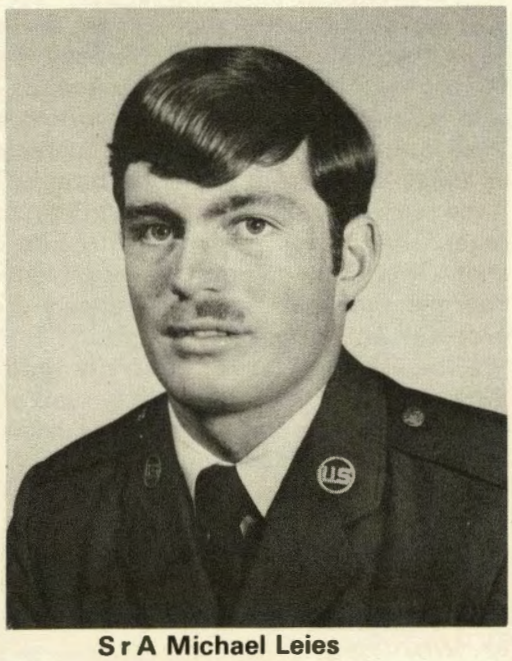
SAFETY AWARDS



A1C Kevin S. Beals
366 AGS/366 TFW
Mountain Home AFB, ID

individual safety award

Airman First Class Kevin S. Beals, 366th Aircraft Generation Squadron, 366th Tactical Fighter Wing, Mountain Home Air Force Base, Idaho, has been selected to receive the Tactical Air Command Individual Safety Award for August. Airman Beals will receive a desk set and a letter of appreciation from the Vice Commander, Tactical Air Command.



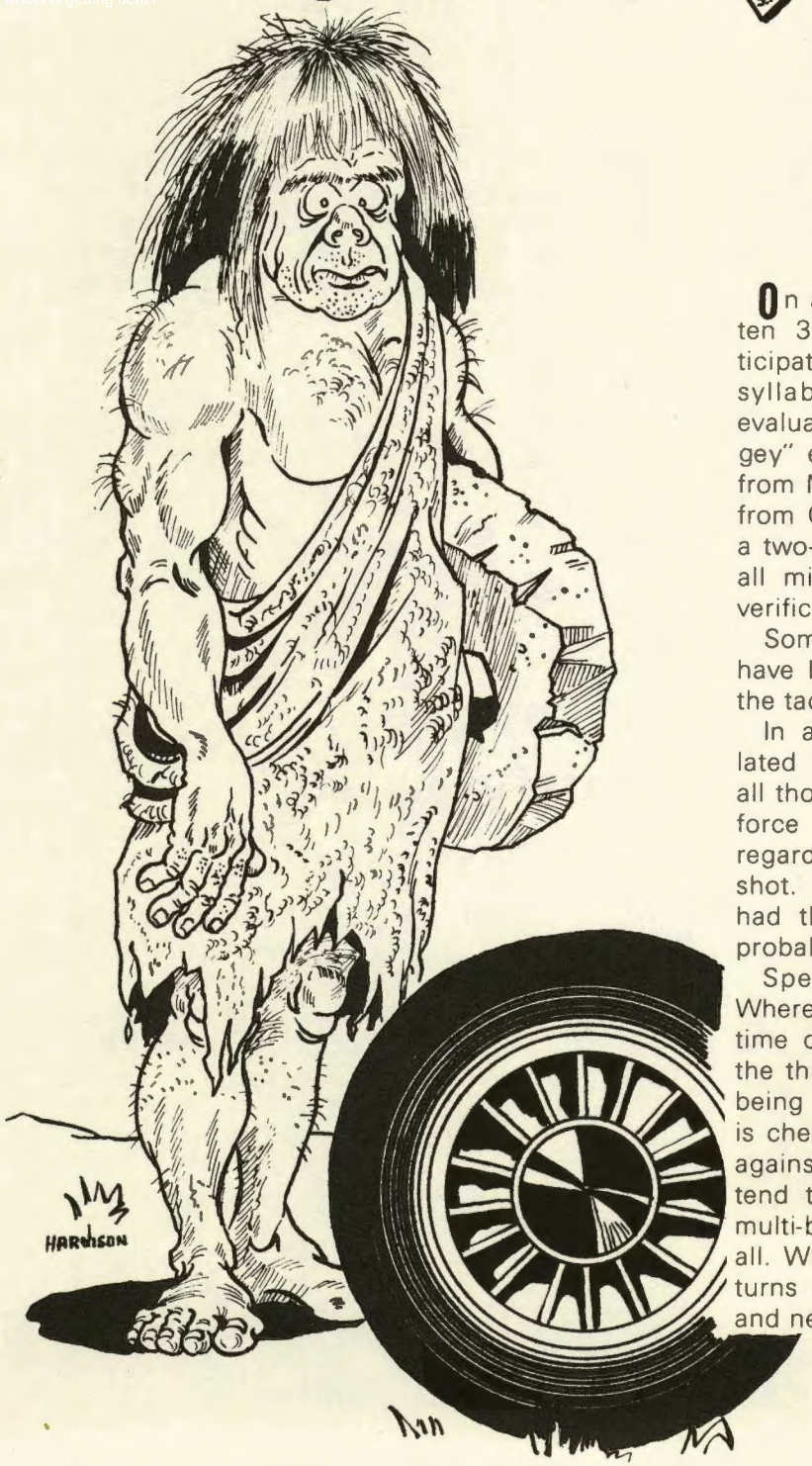
SrA Michael Leies
4 AGS/4 TFW
Seymour Johnson AFB, NC

crew chief safety award

Senior Airman Michael Leies, 4th Aircraft Generation Squadron, 4th Tactical Fighter Wing, Seymour Johnson Air Force Base, North Carolina, has been selected to receive the Tactical Air Command Crew Chief Safety Award for August. Airman Leies will receive a desk set and letter of appreciation from the Vice Commander, Tactical Air Command.

THE WHEEL is getting better

The wheel is getting better



Capt M. G. Brandt
21 TFTS/35 TFW
George AFB, CA

On a recent deployment to Nellis AFB, Nevada, ten 35 TFW IPs had the opportunity to participate in the 433d's F-15 Weapons School syllabus verification program. The scenario evaluated force survival in a realistic "multi-bogey" environment. Participants included F-106s from McChord, F-15s from the 433d, and F-4Cs from George. Each mission involved six aircraft; a two-ship of each type. The ACMI was used on all missions to assist with debriefs and "kill" verification.

Some of the items that will be covered here have been said before. My purpose is to relate the tactics that worked in this scenario.

In a multi-threat arena, any turn is a calculated risk and must involve an appreciation for all those factors that affect the balance between force survival and target destruction. In this regard, we proved again that any turn invited a shot. This shot is normally observed because had the individual seen the enemy. he would probably would not have turned.

Speed serves as a double-edged sword. Whereas it provides some security, it also limits time on station. Once again, the scenario and the threat will dictate your speed. I know what's being said now: "So what else is new?" Well, talk is cheap; but to live by the rules above is to go against the majority of our training. We (TAC) tend to tally, turn, talk BFM, kill. To live in a multi-bogey fight, it has to be a tally-kill or not at all. Why? First of all, outnumbered as we are, turns of any magnitude will have both positive and negative effects.

POSITIVE

(a) Reduces aspect or angle off
(b) Effects closure
(c) Possibly destroys an enemy's attack

NEGATIVE

(a) Starts predictability
(b) Reduces energy
(c) Aids acquisition of your A/C by the enemy
(d) Keeps us in the same area
(e) In formation, degrades mutual support

In actuality, the turn is neither good or bad. But theoretically speaking, there are more negative aspects than positive in a multi-bogey arena, so reduce their number to the minimum. Sound familiar? The bottom line is: With this turn, can I assure the target's destruction and still guarantee my survival? In most instances, guarantees are few and far between, so to fight in this arena requires the ability to avoid engaging bandits beyond your 10 to 2 o'clock positions. In addition to the two standard rules of thumb, "go fast and don't turn," let's add another standard, "have a plan." This plan can and should be the essence of simplicity. Assume a known engagement arena. Assume a basic fighter unit, a two-ship (more on the basic fighter unit later). Assume limited or no GCI, and limited to comm-out conditions. Assume a superior opposition force. Assume today's P, not 1.0 as is prevalent in our planning. Assume any air supremacy scenario: CAP, escort, sweep, etc. A one-to-one exchange ratio is totally unacceptable. Now, we have some information that will direct our tactics/plan: Kill as many of them as possible, and survive; but at all costs, survive.

An example: At Nellis, each two-ship drew for an altitude block and a radial from the center of the ACMR. Upon reaching the center, each two-ship proceeded to its assigned altitude and radial. With all players in position, the war was on. The Plan: My wingman and I initially headed opposite to the assigned position with our smoke trails as guides. Once headed in the wrong direction, we selected full A/B on one engine and idle on their other and headed to the

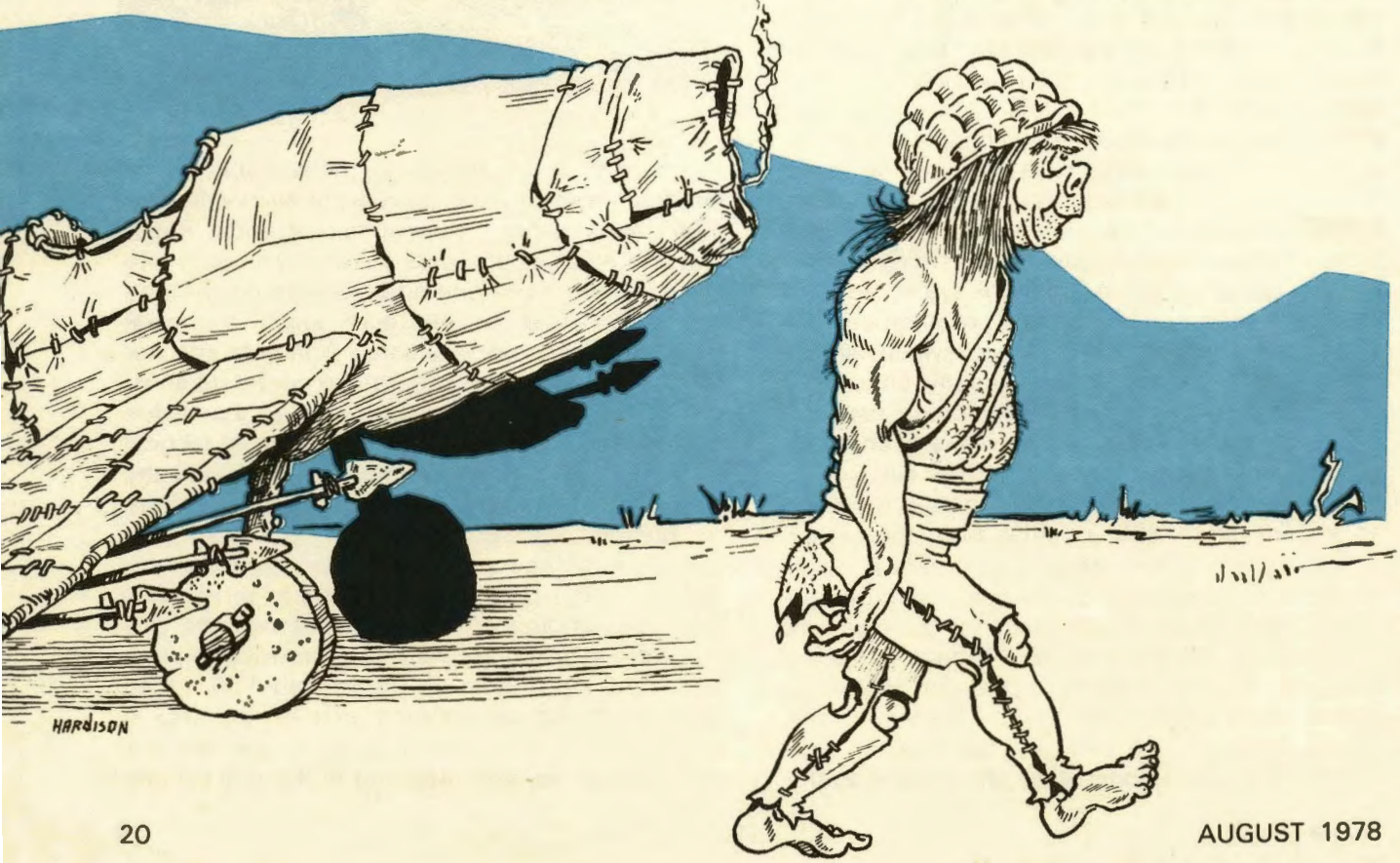
designated start point. When the war started, my wingman and I turned away from each other for 135°. We intended to maintain altitude, heading, full A/B for 90 seconds, and then turn into the area and make one high-speed pass through the center. That was the plan, and this is what happened: After approximately 1 minute into our turn, my wingman picked up two contracts at 30 starboard and 10 miles. He turned to a collision course and identified the two 106s in tactical formation. With a full system lock, he called the first shot of the war. At the call, I turned north as planned and pressed. I saw a burner puff followed by three aircraft. One was my wingman, and the other two were the 106s in turns away from one another. I auto-acquisitioned the one on the left and fired. At that time, I rolled right and fired a BST shot on the second 106. I then looked left and saw nothing; and left the area at approximately 1.5 mach. I rendezvoused with my wingman at the safe area and RTB'd. It is evident

the wheel is getting better

from our experience that "don't turn and stay fast" worked fairly well. We achieved a 4-0 shot ratio and confirmed two kills by my wingman. The 106s did not see my wingman until it was too late; and thus, he had an unobserved Fox II. The F-15s were never seen, nor did they see the F-4s. There should be one point here that doesn't fit into standard F-4 fighter operations. We went alone, and we survived. What about mutual support?

Due to the experience gained from previous flights of this type, feedback from others, articles in the FIGHTER WEAPONS REVIEW, limited comm capability, the attention and crew coordination necessary to effectively operate as a two-ship, and the advantage of a two-place aircraft, we decided to operate single-ship. Yet, we did have mutual support: That is, mutual support by "presence." Our plan allowed for relative positions and the intentions for the other fighter to be known. In addition, the plan called for flight paths to cross "X" minutes after the separation.

The fact that we were not together also led to some hesitation on the enemy's part since they had no idea where the "other guy" was. In this scenario, this type of mutual support is definitely more appropriate than the classical 6,000' line abreast or some variation of that theme. Finally, we felt that in a multi-bogey arena, a two-ship is unmanageable and quickly dissolved anyway; and that the two-place aircraft would not lose as much as the single-seat fighter by operating single-ship. This discussion naturally leads itself to a discussion of the "basic fighter unit" referred to earlier. I contend that under optimum conditions of numerical supermacy, formed crews, good communications, and low-threat scenarios, the two-ship has several advantages. But do we have any of those? Not one. So, is the basic fighter unit two or one? At our present state of readiness and proficiency, it is necessary to optimize the available resources and use guerilla warfare. We are not the all-powerful, invincible warriors of yesteryear. We are outnumbered, outgunned, and are in the process of outcoaching ourselves. It is our job to develop tactics to fit those scenarios while attempting to regain parity. The bottom line is that we have to be able to fight single-ship because that is the one indivisible fighting unit. >



TAC TIPS

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

Ignorance never settles a question.
Disraeli

LIFE SUPPORT CONTINUATION TRAINING

Following a recent ejection, the crewmember attempted to establish contact with his wingman. When initiating communications, the mishap pilot found the reception volume of the PRC-90 radio to be weak. He changed the battery in the radio to ensure power was not causing the poor volume situation. Installation of the spare battery did not improve the reception capability; therefore, the pilot concluded the radio might not be transmitting properly. Interviews with the wingman and rescue personnel indicated the radio was transmitting properly. The crewmember did not attempt to use the earphone.

The weak reception of the PRC-90 radio did not adversely affect the rescue effort. This problem, which concerns poor fidelity of the external speaker in certain blocks of PRC-90 radios, has been identified and is being corrected. However, further investigation reveals that not all aircrews and life support personnel were aware of this problem, and use of the earphone would have provided the desired eception. If you're ever unfortunate enough to be in this situation, try the earphone. You'll be surprised at the improvement in reception.

HIGH WIRE ACT

A recent mishap in another command resulted in fatal injuries to the pilot and his passenger. The flight was a combined training mission and orientation for the passenger. When an inoperative transponder prevented accomplishment of the primary mission, the pilot elected to fly a nav/visual recce alternate mission.

During this phase of flight, the pilot flew a sound aircraft into three high voltage lines strung across a valley. The wires were 188' AGL at the point of impact.

When flying with a passenger, or someone unfamiliar with the aircraft, both conscious and unconscious tendencies can cause a pilot to try too hard to impress his passenger. I'm not saying that's what happened here -- that might be the cause but it's officially undetermined.

Also, make sure you plan your alternate missions adequately. It's hard to change plans in midair; and given the short time available, errors in judgement are inevitable. If you haven't plan ned and prepared for it on the ground, don't try it in the air.

ARTCC WEATHER ASSISTANCE

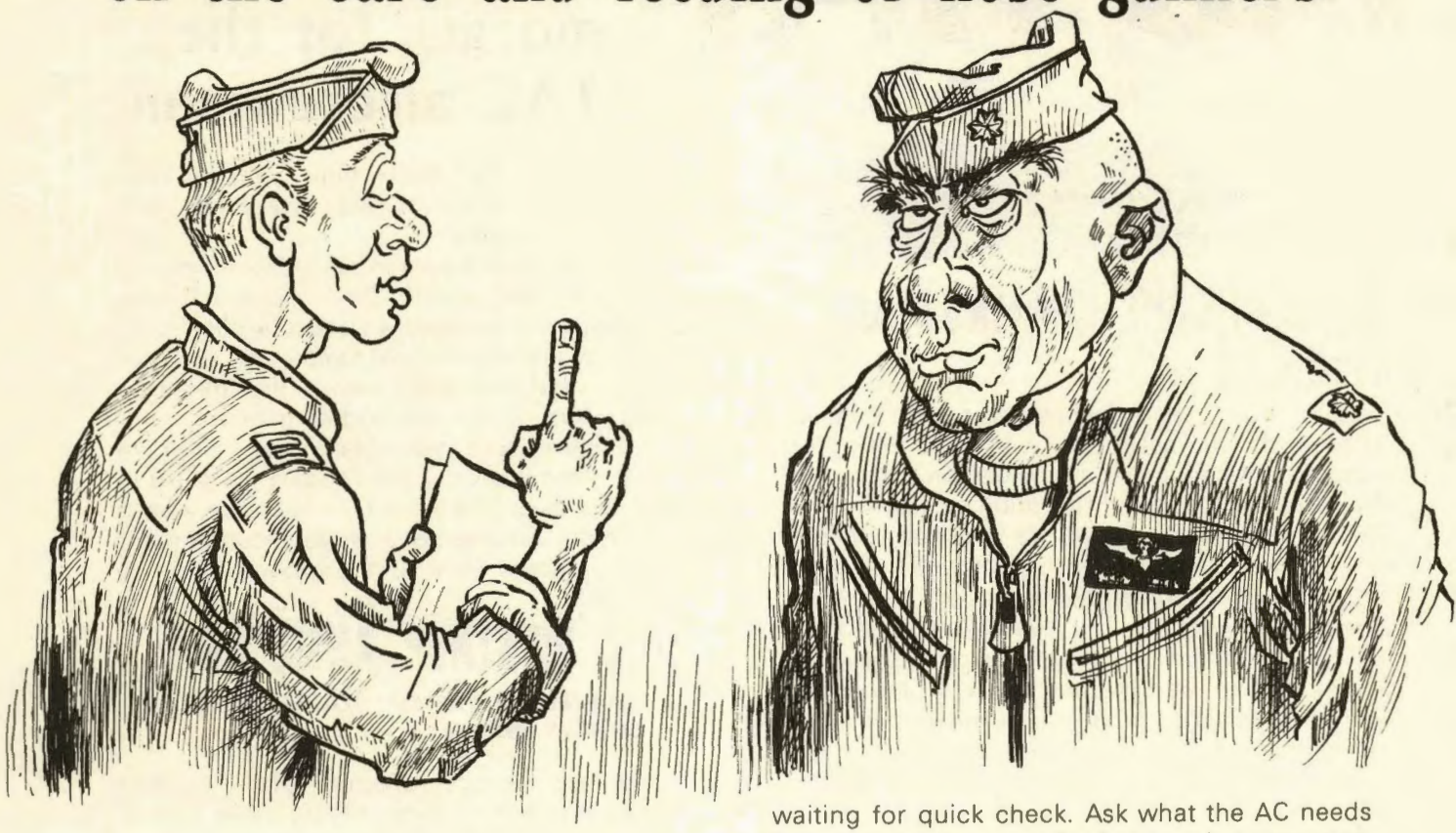
COURTESY OF THE 5th WEATHER WING LANGLEY AFB, VA

The Federal Aviation Administration (FAA) and National Weather Service (NWS) have placed meteorologists in 13 ARTCCs to provide tailored hazardous en route weather advisories within each ARTCC's area of responsibilities. This effort is a result of the concept tested by the FAA, NWS, and MAC at the Kansas City ARTCC. These advisories will be relayed to aircrews through center controllers. However, pilot-to-metro service (PMSV) is not available. Additional details of hazardous weather information can be obtained by requesting it through the controller. This is an advisory service for hazardous weather and is not intended for routine weather information. Don't expect the center controller to provide you with PMSV service. The above services are available 16 hours each day, approximately 0600-2200 LST, from the following ARTCCs:

Atlanta	Fort Worth	Kansas City
Boston	Houston	Memphis
Chicago	Indianapolis	Miami
Cleveland	Jacksonville	New York
		Washington

BASIC GIB SURVIVAL BRIEF

on the care and feeding of nose gunners



Peter T. McInerney, Capt, USAF
61 TFS/56 TFW
MacDill AFB FL 33608

The F-4 was designed for a two man-crew, but the only connection built between the two is a thin thread of intercom cord. Crew coordination is the art of getting two highly trained and intelligent minds together in an environment highly conducive to confusion, where a few seconds can decide the success of the mission.

BEFORE TAKEOFF: Know as much about the mission as the AC does. Don't tune out the briefer when he's just talking pilot talk. If you know details like which side of the formation to join on, how fast you should be going, and the mechanics of the various formations, you will be able to detect mistakes and potentially dangerous situations. Talk crew coordination in the PE room and the crew van, or when you are waiting for quick check. Ask what the AC needs from you, and be sure he knows what you want. He makes the decisions as Aircraft Commander, but you both will triumph, squeak by, bust the mission, or buy the farm in five foot close trail, so get your inputs in early.

ON TAKEOFF: Be securely strapped in; it could be a rough ride without warning. Everything you carried in should be stowed where you can get to it, but it can't get to you or your ejection seat linkage. Set up the radar and INS before you take the active, and forget them until you are safely airborne. Monitor the takeoff roll and be ready to back the AC up with abort or single-engine takeoff procedure. Cross check your instruments for continuous climb and acceleration until you get 1000 feet of air under you. Include the tachometers and gear and flap indicators. Listen to what air traffic control agencies are laying down; don't assume you got what you requested. Finish the climb check early.

EN ROUTE: Be aware of your altitude, airspeed,

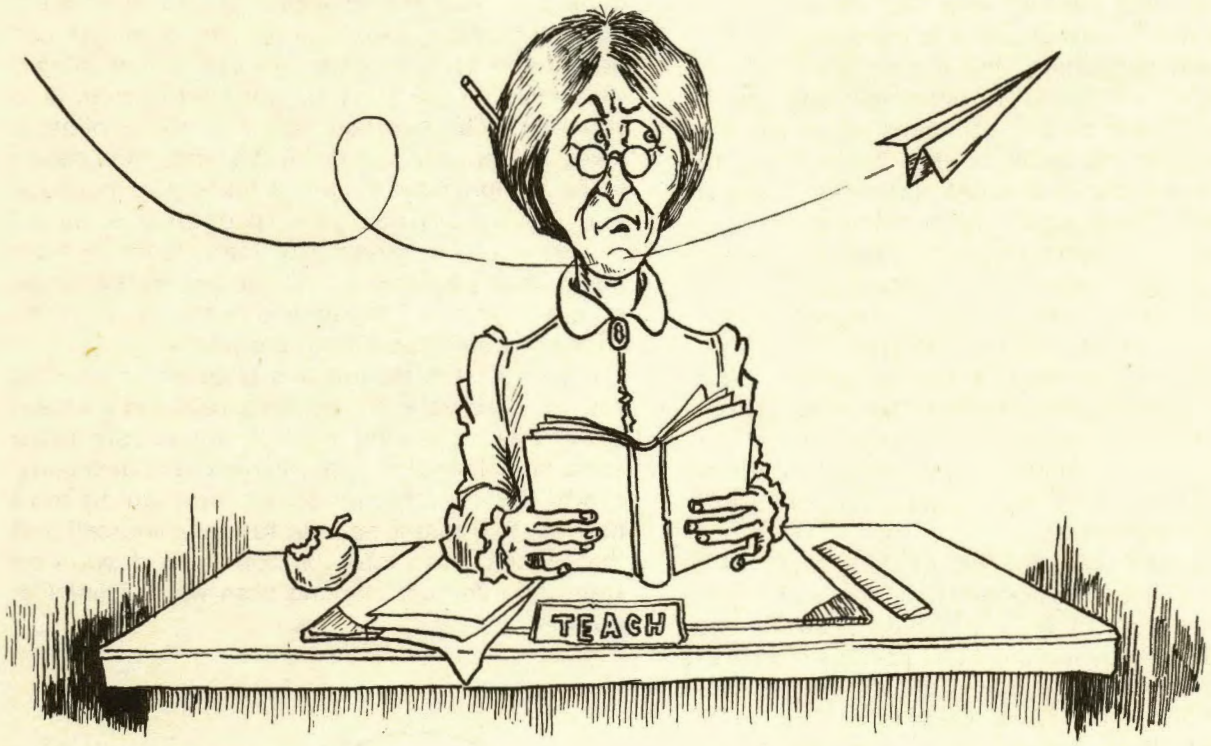
attitude, position and heading. Pilots, IPs included, are not perfect navigators or you would not be risking your skin to help them. If your nosegunner says he has everything wired, quietly assume that he's lying and continue to cross check what he does. Maintain a healthy cross feed of information. Long periods of silence should trigger your "AC head up and locked warning circuit," and you should check him out with a casual "How're we doing, ACE?" If you have something vital to say, don't hide it; if you don't, be careful to time what you say. If you hear "Stand by one" it means either you are drowning out the radio or that he is trying to think his way out of a rough spot. Don't take it personally. Close your mouth momentarily, but never your eyes, ears, or brain. Debrief him later on the proper respect for Fightergators. Don't neglect the checklist. "I got it already" is the pilots' second most common lie after "I love you, baby". Don't just read it like a sermon. You should say enough to trigger the right action, and then say the next one only after you get the right answer. The checklist is an aid; like the INS and RADAR, it is no substitute for good situational awareness.

RECOVERY: Monitor fuel quantity religiously. Be aware of the fuel you need to get back and compare that figure to what you have. You are the safety observer when the AC is practicing instruments. Some AC's do that in the VFR pattern; visual references are weak. Be wary of long turns with high bank angles, especially near entry points. You can't see traffic when you are belly up to it. Listen to ATC - it's just possible your AC is not. Get that landing pattern checklist every time. Note that the gear came down when he dropped the handle, look at it when he says "gear check", (he's lying again: he's really looking at the runway) and look at it over the threshold to be sure it didn't sneak back up again. Don't let him take a senseless mobile write-up for no landing light. Don't tolerate high pitched beeping from the aural AOA tone in the base turn or in the round out. Lateral control is weak and the sink rate can put you on a collision course with Mother Earth. Watch the VASI lights over his shoulder. White over white means he held his altitude in the turn (you should have seen about 1000' AGL halfway around and 300' AGL at roll out on final). Red over red plus 750 feet per minute descent means you are aimed at the overrun, which, everyone knows, is made of Jello and is a bad place to land. On the landing roll out be sure you don't drive off into the grass trying to beat the wing record time for finishing the checklist. Get an answer on these too; common hits are taxiing in with landing light on or flaps down.

Aircraft control is the most important thing in an emergency. If you have wings level climbing flight with stable airspeed, you have time to think and read the checklist. If you don't have aircraft control, you have to get it or get out before you get out of the safe ejection envelope. (See chart in the Dash I). Don't let anyone give you any heat because you are not a pilot; it takes as much aggressiveness and intelligence to be a Fightergator, and it takes guts because you have to trust your precious body to someone else's hands. Not many want to fight Mig's, face checkrides, put money on the range or crack weather minimums without the calm, knowledgeable voice from the pit.

If you get the feeling this program is passing you by, grab your IPs by the throat and let them know that you want part of the action: radio calls, stick time and a chance to make decisions. Stand by for the air-to-air and air-to-mud phases. You might be able to make yourself and that nosegunner into the top crew if you can keep the intercom working both ways. Think GIB power!

LESSONS LEARNED THE HARD WAY



By Capt Tom Lentz
602 TAIRCW
Bergstrom AFB, TX

Remember when reading, 'riting and 'rithmetic were the basics of education and stick-and-rudder were the basics of flying? Must be the good old days, right? Wrong! There is as much a need today as there was in the past for a strong foundation in the basics. The sophistication of high performance aircraft and their "smart" systems sometimes disguises the importance of "seat-of-the pants" pilotage! Our reeducation programs periodically emphasize aircraft systems, terminal procedures, threat and tactics; however, after UPT and RTU, seldom are the aerodynamic characteristics of flight discussed. The need to assimilate complex aircraft systems and tactics should not cloud the importance of good old-fashioned stick-and-rudder flying. Recent aircraft accidents indicate a need to reevaluate our training programs with an emphasis on "getting back to the basics."

Four of those recent aircraft accidents involved one common factor -- the hazards of operations in mountain/canyon terrain. As a result, we can assume that flying, to the uneducated, in these areas is potentially hazardous. To simplify the discussion of this often-misunderstood area, the term "mountain" will mean any part of a land mass which projects conspicuously above its surroundings. It will also be generalized into the singular term, "rough terrain," which will include mountains and canyons. Although terrain features vary considerably, the pilot should be aware of the hazards associated with rough terrain because the mission, tactic, or operating area may expose you to this potential hazard.

The purpose of this presentation is to share our experience with all pilots so the problems we encountered may, in the future, no longer be

problems, but valuable lessons--learned the hard way.

Our discussion of rough terrain flying begins, as do all flights, with mission planning. Proper preflight planning will not eliminate the inherent hazards, but will offer the pilot some alternatives when the mission or tactics dictate maneuvering in rough terrain. This preflight planning should include, as a minimum, the following:

1. Pilot and aircraft limitations.
2. Density altitude (high altitude/high temperature).
3. Route and area topography.
4. Meteorological conditions.

LIMITATIONS

PILOT

It has been said that what you don't know or can't see won't hurt you. However, statistically, the converse is true -- the proficient (knowledgeable and aware) pilot is less likely to get hurt.

Pilot proficiency, monitored by supervisors, stan/eval and especially by the pilot, is checked IAW 60-1 requirements and is improved continually through the assimilation of systems, tactics, ground and flying training. The pilot, to preclude stagnation, furthers this self-improvement process by being knowledgeable in all aspects of the flight. Ultimately then, it's the pilot's responsibility to maintain (and improve) proficiency and insure mission readiness prior to each flight. The situationally aware pilot, armed with a complete knowledge of his mission, will perform at a level to accomplish the task, and will only be deterred when he consciously or subconsciously omits an integral part of his planning. The pilot must then know not only his own limitations, but those characteristics peculiar to his particular aircraft and operating environment.

AIRCRAFT

There are as many aircraft limitations as there are different aircraft and pilots. High performance, low performance, fixed and rotary wing aircraft all have limitations unique to that particular aircraft; yet, basically, the principles of aerodynamics remain constant. The components of gravity, drag, lift and thrust (to name a few) work to varying degrees on all aircraft regardless of size, shape, or branch of the service. The pilot must be intimately aware of the performance characteristics of his aircraft. The aircraft Dash One provides definite information. However, the pilot must interpret this information to insure its compatibility with each given operation. Does your aircraft perform better at sea level or 20,000', in hot or cold weather, on Saturday or Thursday? Is your performance data computed just for takeoff and landing or should it include your operating area as well? If you take off at sea level and your area of operations is at 8,000' MSL, how much performance difference is there to maintain 100' AGL?

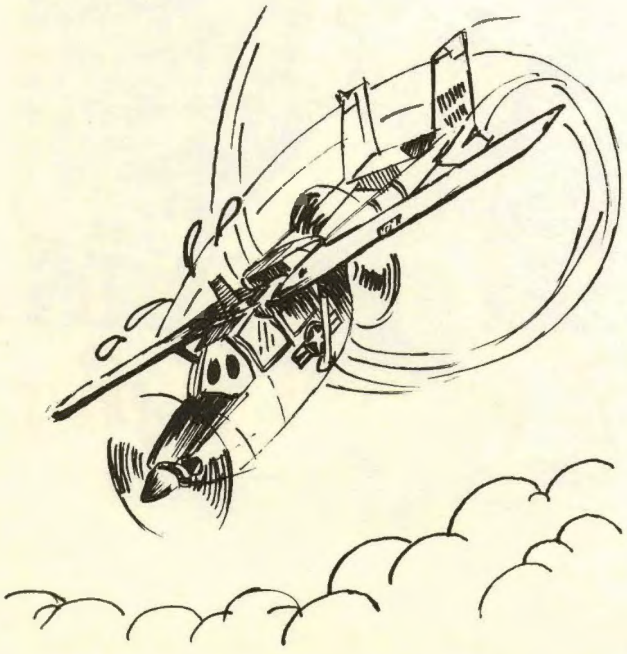
In some aircraft, altitude, combined with

LESSONS LEARNED THE HARD WAY

temperature, can reduce an aircraft's available runway capability from Cat II to Cat III and make the single-engine service ceiling fall below that of the field elevation at takeoff. Essentially, it boils down to a matter (affecting some aircraft more than others) of aircraft performance versus density altitude.

DENSITY ALTITUDE

Density altitude is a measure of air density. It is not to be confused with pressure altitude, true altitude or absolute altitude. Air density decreases with altitude; as air density decreases, density altitude increases. High temperature and high humidity, and their cumulative effects result in an increasingly high density altitude. High density altitude reduces aircraft performance. The pilot, therefore, must be aware that density altitude not only increases runway requirements for takoffs and landings but also results in a decreased rate of climb. Aircraft operations at altitudes significantly above sea level and at higher-than-standard temperatures are commonplace in the western United States. These operations quite often result in a drastic reduction in aircraft performance capabilities, due to the changing air density. Rough terrain, as an area of operation, can also limit tactics and maneuvers that can be effectively conducted.



ROUTE AND AREA TOPOGRAPHY

Rough terrain flying, to some, may appear as beautiful scenery passing well below the aircraft; to others, it appears as an impassable obstacle along their route of flight. In many ways, it affects all aircraft; however, for the purpose of discussion, comments will be confined to the worst representative conditions--a low performance aircraft, high density altitude, high temperature and a requirement for maneuvering the aircraft close to the ground.

Before launching your faster-than-the-speed-of-smell aircraft, the pilot should take a serious look ahead; and an integral part of this conscientious planning is mission area topography. Areas of consideration can be categorized into the following:

Planning hints.

Route of flight.

Do's and don't's of rough terrain flying.

The obvious solution, which is unrealistic, is to avoid rough terrain; however, when this is not possible, review the route of flight and:

1. Avoid terrain that will limit available power for maneuvering (keep it fast and have something left up your sleeve).

2. Plan the route as best you can to provide suitable emergency landing sites (with or without a parachute).

3. Don't exceed the pilot's design capabilities (prolonged flight at high altitudes could cause hypoxia or a bloody nose).

4. Don't exceed the aircraft's design capabilities (not all aircraft can plug in the burrito-(donkey) burner when they get low and slow ...).

Route familiarization could include a discussion with local pilots, flight safety officer or the FAA accident prevention counselor (available at each General Aviation District Office/Flight Safety District Office) about the potential hazards associated with that particular area. Basically, the route with the least exposure to the real threat will facilitate the degree of accessibility and survivability.

METEOROLOGICAL CONDITIONS

Weather wizards and their crystal balls can accurately predict blizzards in Antarctica, high temperatures in Death Valley and moisture in clouds; realistically, however, the weather-wise pilot looks upon a forecast as professional advice rather than an absolute. Worldwide, weather-

men are doing a commendable job considering the variety and the immensity of their task. Weather is continually changing, and consequently, the more current the forecast, the more accurate the weather picture. Rough terrain's magnifying influence on weather is apparent in the intensity and speed of weather masses, and in how it adversely affects the classical movements (fronts, squall lines, thunderstorms, etc.). Rapidly changing weather, which is difficult to forecast, combined with extremes in wind velocity (in a mountain pass, the wind may be triple the steady state -- Venturi tube effect), makes an extremely hostile environment to the few that foolishly dare to enter. Rough terrain weather will most probably be more severe than actually forecast; therefore, if the flatland weather is marginal, your rough terrain weather is probably for the birds -- only!

Hazards associated with rough terrain are not always visible. Granite clouds, updrafts, downdrafts, and dead air prey on the unwary pilot. A review of mountain winds, not always predictable on the AF Form 175-1, reveals that they follow the logical patterns of the terrain. The moving air mass surges up and over -- then being influenced by the lee side, rushes down with a potential velocity of over 1,000 feet per minute. (The velocity change of the wind is proportional to the angular difference between the air mass and the terrain.) Mountain wave action, influenced by terrain features, may be evident up to 100 miles downwind of the flow. The strongest seasonal winds are in the fall and winter, with summer winds strongest at higher elevations and the surface areas yielding more thermal activity than turbulence. Visual indicators for this invisible activity are lenticular cloud (lens-shaped cloud), roll cloud, and cap cloud.

The lenticular cloud is the lens-shaped cloud that is found at high altitudes normally 25,000 to 40,000 feet. Lenticulars may form in bands or as a single cloud, located above and slightly downwind from the ridge of the mountain. Sometimes, a mountain wave may exist without the formation of lenticular clouds. Although the air flow through the cloud is laminar and not turbulent, many times turbulence will be encountered flying beneath the cloud.

The roll (rotary) cloud is named for its horizontal rolling action and shape. Sometimes referred to as a "horizontal tornado," this cloud can produce updrafts and downdrafts in excess of 5,000 feet per minute. The roll cloud will be located downwind from the ridge, sometimes in several rows lying parallel to the ridge. The bases may be at or below ridge level, with the tops sometimes continuous with the base of the lenticular clouds above 20,000 feet.

The cap cloud, or foehnwall, looks like a white toupee sitting on top of the mountain ridge. The major part of the cloud extends upward, with fingerlike extensions running down the slope on the downwind side of the ridge. Under certain dry wind conditions, a mountain wave may be present with no visible cap cloud. Visual indicators like the roll cloud are not always reliable. The pilot should expect the worst possible conditions until verification to the contrary can be established.

The deceptiveness of mountain terrain is a major problem. Optical illusions are unique visual indicators that have grabbed more than one pilot by the short curlies (Ref AEROSPACE SAFETY Apr '78, "Common Human Behaviors and Aviation.") In rough terrain, both horizontal and vertical references are skewed. The perceived horizon may not be the actual horizon. Depending on the rise in terrain, the actual horizon is generally nearer the base of the mountain. If the summit of the peaks is used as the horizon, the aircraft would be in a constant climb attitude. The result of which, predicated by aircraft performance and terrain climb gradient, could be an inadvertent stall with insufficient altitude to recover. Visual acuity clues, needed to judge distances and heights that deceive even experienced pilots, can be improved through a study of area elevations, especially as they relate to aircraft performance capabilities already discussed. Pilots (high-timers, low-timers, or battle-weary) although forewarned of the hazards may not be familiar, let alone have a DOC requirement, in rough terrain flying. Therefore, to enlighten the privileged few, the following do's and don't's should enhance pilot proficiency and longevity (assuming the mission warrants flight in rough terrain).

DO'S AND DON'T'S FOR PILOTS

DO'S

1. Fly in a position from which a safe forced landing can be accomplished.

2. Maintain sufficient altitude/position to permit gliding to a reasonably safe landing area.

LESSONS LEARNED THE HARD WAY

3. Get a weather forecast and know the wind direction at all times. Plan for abrupt changes in wind direction and velocity over rough terrain. (To visualize the wind flow, picture water flowing over/around rocks in a fast-moving stream.)

4. Approach mountain passes and flight into/over canyons with the maximum excess altitude available in the event anticipated severe winds are encountered, aircraft performance is degraded, or pilot perception is mistaken. (Downdrafts on the leeward side may be as strong as 1,500 to 2,000 feet per minute.)

5. Approach passes and ridges at a 45-degree angle, so that a 90-degree turn will most expeditiously maneuver the aircraft to lower terrain.

6. Overfly, if possible, rough terrain by 50% of the land elevation or by 1,500 to 2,000 feet above the ground.

7. Expect the unexpected, and know your route of flight -- don't get caught up a box canyon. (Sectional maps have preplanned mountain routes displayed on the chart.)

8. Maintain aircraft control. Analyze the situation. Take appropriate action (a beeline to happy hour and swap tall tales with C. R. Terror.)

DON'T'S

1. Fly up the middle of a canyon at any time. The better flying position is along the side of the canyon, preferably the downwind side, to be in a position to execute a 180° turn. This will create more maneuvering airspace and allow for a turn downhill. (However, be aware that turn radius increases at higher density altitudes.)

2. Fly up a canyon. (It's preferable to fly from higher elevations to lower.)

3. Fly near or above abrupt terrain such as cliffs, or rugged areas. (Very dangerous turbulence may be expected, especially with high winds.)

4. Chase the aircraft when caught in a downdraft or turbulence; continue flying the stick-and-rudder (lower the nose, add power, and increase airspeed to either turn away from or maneuver with the down/updrafts).

5. Fly in doubtful weather; often flatland forecasts cannot effectively encompass local rough terrain. (Adverse weather will only compound the hazards prevalent in rough terrain.)

6. Forget the basics -- fly the aircraft.

In summary, expect the unexpected and attempt to remain in a position that will allow you to turn and fly downhill.

THE LESSON LEARNED...

Rough terrain flying knowledge was cited in recent aircraft crashes as a contributing factor. Additional investigation revealed a limited understanding among pilots as to the potential hazards of rough terrain flying. The intent of this discussion was to share our experience as lessons learned. We have not presented all the answers and do not intend this discussion to be the last word in terrain flying. However, this information, acquired through interviews with mountain flying experts and the FAA western region movie, "Tips on Mountain Flying," should alert pilots to the potential hazards and stimulate more in-depth study (suggested reference material is listed below).

The effects of high altitude, high temperature, and rough terrain can combine to trap the unfamiliar pilot. Hopefully, his prior knowledge will prevail, and the story's ending might sound like this, "And there I was -- out of airspeed and ideas, when I remembered ..." The pilot, the aircraft, and the wild blue yonder are all limited to varying degrees. By accepting and understanding these limitations, the pilot can work them advantageously to complete his mission.

Basically -- the bottom line rests squarely on the shoulders of the pilot. Good old-fashioned stick-and-rudder flying combined with an aware and proficient pilot will preclude future mistakes. If we learn from those who precede us -- and it prevents us from making the same mistake -- we have learned a valuable lesson -- and hopefully; not the hard way!

REFERENCES FOR SUGGESTED STUDY:

FAA Film FA-06-75
Mountain Flying (23)
FAA (Western Region) Tips on Mountain Flying
WE Form 8000-5.8 (4-72)
Weather for Aircrews
AFM 51-12

LETTERS

Editor

It's been 4 years since they clipped my wings, but I seem to recall a slightly different version of the hydroplaning speed formula printed on page 27 of the May 78 issue -- believe there's a $\sqrt{\ }$ missing there.

Keep up the fine work -- you folks have a 'class' magazine

Maj Peter S. Miner
Asst Chief, Mgt Div
DCS/P HQ USAF

Dear Maj Miner

You're correct, we left one out. The price of square roots being what it is these days, we were fresh out when the magazine went to press. A new supply has been ordered, so we shouldn't run out again.

To our potential authors out there -- please refrain from submitting articles with mathematic formulae requiring cube roots and above -- we simply can't afford any ....

ED

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Editor

A statement on page 9 of this May issue of TAC ATTACK caught my eye. "A 2-pound bird at 250 kts, equates to over 17 million foot pounds of energy." If my calculation is correct, a 2-pound bird at 250 kts, equates to about 5,600-foot pounds. At 250 kts, a 6,000-pound bird is required to obtain 17 million foot pounds of energy. Enclosed is a chart taken from AFFDL-TR-3-103 that gives kinetic energy in 1,000 ft-lbs for variation of velocity and bird weight

In any case, the energy level is still substantial and bird strikes to high speed aircraft have become a major flight safety problem.

Wilbur Bergen
System Safety Engineer
Fairchild Republic Co.

Dear Mr. Bergen

Ya' gotta admit, it made a pretty good story anyway! As you can probably tell, the editor wasn't a math major in college. I tried it, but found history much easier.

According to my Rockwell computer, the actual answer works out to 6,328.125 ft/lbs, but given my previous prowess with math, don't expect me to bet more than a beer on the answer.

Above all, watch out for the 6,000-pound bird!!

ED

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Editor

In your April 1978 issue, "The Holding Pattern," had a letter from Lt Col Joseph W. Moffett on recognition aids for attack/fighter pilots. Lt Col Moffett recommended a series of Army produced scale models of Soviet armor vehicles. Several members of the 27th Tactical Air Support Squadron (TASS) have seen these models, and while they are good for detailed analysis of structure, they do have a couple of disadvantages, i.e., size, cost, and variety. To give the pilot an idea of what the vehicle would look like at 6,000 feet slant range, he would have to get on the other end of a football field. If the squadron wants to show what a typical attack would look like, they practically have to sell one of their aircraft to buy the number of armor vehicles required. Obtaining the variety of different vehicles that you would see on the battlefield would also take an arm and a leg. Storage and display present other problems.

The 27 TASS has what we feel is a good solution to the disadvantages of these large scale models. Several companies (GHQ, Micro Scale, etc.) produce a series of 1/285th scale model armor vehicles which

LETTERS

can be purchased through local hobby shops. These vehicles are molded in lead, accurately detailed (you can count the gun ports on the BMP or the cooling louvers on the M60-1A), and are available in almost every piece of armor you would see on the battlefield. Realistic recognition is possible by backing off 21 feet to simulate what the vehicle would look like at 6,000 feet slant range. Due to the low price (five vehicles for $3.75), you can easily afford enough vehicles to teach recognition of various attack formations on a terrain board. In fact, you don't even have to create your own terrain board as the Army already has a 1/285th scale which they use in their Dun Kemph battlegame. In short, the 1/285th scale provides a solid model which can be used to provide realistic training in battlefield armor identification, is available in a large variety of vehicles (28 current NATO vehicles and 20 current Warsaw Pact vehicles), and is relatively inexpensive. The 27 TASS Weapons shop thinks the 1/285th scale is hard to beat.

Capt Jesse M. Moon III and Capt Brian H. Wilber
27 TASS/DOW
Davis-Monthan AFB, AZ

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ED NOTE: The following was taken from a letter inspired by Colonel Jones' article, "The Dangerous Art of Doing Nothing," which appeared in the May '78 TAC Attack. The words speak for themselves.

Editor

In regards to Col Jones' article in the May 78 TAC ATTACK, "The Dangerous Art of Doing Nothing," I must state that while I am in general agreement with the overall intent of the article, I must, however, take exception to several of the assumptions that Col Jones has made and the conclusions that he drew.

Certainly, the insidious syndrome of WSO/EWO complacency and "second class status" begins in Nav School, but in contrast to Col Jones' viewpoint, I believe the problem becomes firmly rooted and is perpetuated at the RTU level, long before the WSO/EWO reaches an operational unit.

Beginning with the separation of ACs and WSOs for upgrade training (F-4 RTU) and squadron's composed of (F-4 RTU) and squadrons composed of 90% IPs and 10% IWSOs, the student WSO/EWO is subjected to a training atmosphere that is highly unrealistic when compared with an operational unit.

At the same time, student ACs are exposed to a similar (unrealistic and segregated) environment and the "double standard" is further reinforced. In turn, the initial concept of crew coordination for the fledgling AC consists of the general notion that is the student AC is capable of handling all given emergency and situational problems, without the aid of a WSO/EWO (other than perfunctory checklist recitations), the AC is then cleared to fly with a WSO/EWO; now, other than specific WSO/EWO duties and functions, the AC can handle the "aircraft" and all flying duties on his own without WSO/EWO interference ....

In another vein, Col Jones' concept of stress testing is highly valid, but must be rooted in the total pattern of the WSO's/EWO's career progression, not just vague portions of his flying career.

The conclusion then that the WSO/EWO can shake the stick and make of himself what he will, is laudable, but highly unrealistic. Therefore, the ultimate responsibility for stress testing and developing capable WSOs/EWOs does not lie solely with the individual WSO/EWO anymore than the development of a fighter pilot lies solely in the hands of the pilot. It is an attitude that must be nurtured long before the first time a WSO/EWO steps on a fighter aircraft.

The development of an individual's capacity to handle responsibility comes from the advance knowledge that the opportunities exist to develop that ability in the first place.

A specific Air Force program must be developed which would allow WSO/EWOs to eventually perform the same duties as an aircraft commander (range, mobile, SOF) and assume the inherent responsibilities therein. This would do far more to build confidence and the ability to handle stress in a WSO/EWO than numerous self-generated, well-intentioned but unrelated personal attempts to develop those same skills.

The leadership, impetus for reform and overall responsibility for implementing the changes to allow this development to occur must come from the people who have the authority to allow meaningful responsibility to be inferred on the WSO/EWO so that the motivation (or lack thereof) for "doing nothing" will be removed at the source long before it ever has the opportunity to develop.

Capt Jan P. Devries
311 TFTS
Luke AFB, AZ

TAC TALLY

	TAC			ANG			AFR		
	JUN	thru JUN		JUN	thru JUN		JUN	thru JUN	
		1978	1977		1978	1977		1978	1977
CLASS A MISHAPS	4	16	13	1	8	6	0	1	1
AIRCREW FATALITIES	2	11	5	1	5	2	0	0	0
TOTAL EJECTIONS	7	20	10	0	5	6	0	1	1
SUCCESSFUL EJECTIONS	5	16	10	0	4	4	0	1	1

TAC'S TOP "5" thru JUNE

TAC FTR/RECCE	
class A mishap free months	
26	474 TFW
18	347 TFW
16	1 TFW
16	388 TFW
15	31 TFW

TAC GAINED FTR/RECCE		
class A mishap free months		
41	156 TFG	(ANG)
30	434 TFW	(AFR)
22	184 TFTG	(ANG)
21	123 TRW	(ANG)
14	132 TFW	(ANG)

TAC/GAINED Other Units		
class A mishap free months		
131	182 TASG	(ANG)
100	193 TEWG	(ANG)
92	110 TASG	(ANG)
87	USAFTAWC	(TAC)
83	919 SOG	(AFR)

CLASS A MISHAP COMPARISON RATE 77/78
(BASED ON ACCIDENTS PER 100,000 HOURS FLYING TIME)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TAC	77	0.0	5.3	5.8	5.4	5.1	5.0						
	78	16.0	12.4	8.3	7.5	5.8	6.4						
ANG	77	0.0	3.1	1.9	5.7	4.4	5.4						
	78	0.0	3.4	4.0	5.9	8.1	7.7						
AFR	77	0.0	0.0	10.1	7.4	5.8	4.7						
	78	0.0	0.0	10.9	7.8	6.0	4.9						

★ U.S. Government Printing Office: 1978 735-074/3


FLEAGLE
OK FLEAGLE, PROCEED TO POINT ZULU AND EXPEND RED FLIGHT ON TARGET 4833.
TEN FOUR.
HARDISON
YEP, JUS' WHERE THEY SAID IT WUZ.
THE ONE THING YA'DO AS A FAC, IS SAY ZACTLY WHAT YA'MEAN.
HIT MY SMOKE !!
SAKES ALIVE !!
I GUESS OLE' PATTERNS ARE HARD TO BREAK.
PITY.
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