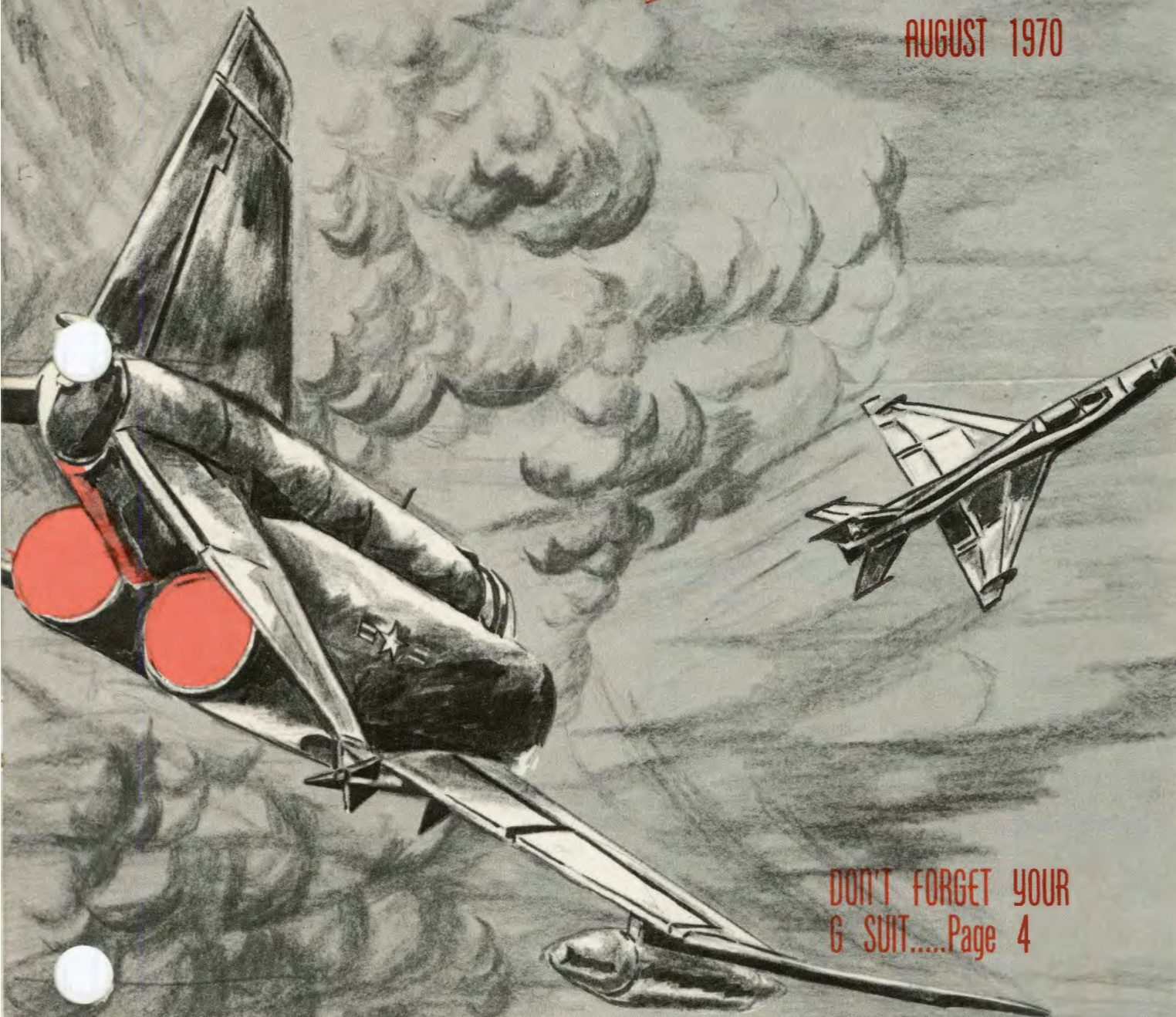


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TAC ATTACK

AUGUST 1970



DON'T FORGET YOUR
G SUIT.....Page 4

HARDISON

for efficient tactical air power

TAC ATTACK

AUGUST 1970

VOL. 10, NO. 8

TACTICAL AIR COMMAND

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VICE COMMANDER

LT GEN JAY T. ROBBINS

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current interest

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TACRP 127-1

Articles, accident briefs, and associated material in this magazine are non-directive in nature. All suggestions and recommendations are intended to remain within the scope of existing directives. Information used to brief accidents and incidents does not identify the persons, places, or units involved and may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. Names, dates, and places used in conjunction with accident stories are fictitious. Air Force units are encouraged to republish the material contained herein; however, contents are not for public release. Written permission must be obtained from HQ TAC before material may be republished by other than Department of Defense organizations.

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Angle of ATTACK



LOOKING AHEAD

In our present way of life we have people descending on us to perform surveys, inspections, staff visits and name it. The resulting, seemingly never ending, requirement to answer all those helpful visits appears, at times, to completely overshadow our mission of "flying and fighting and don't you ever forget it."

But why should it, were you caught short when they arrived? Were you living from day to day, unable to get out of the crush of routine tasks? If so, you have been "lucking out" in the accident prevention area. I submit that in our business of safety, if you really take a good look at it, you will not find any really new cause factors for accidents. Nor will the investigations turn up many surprises. The need to plan ahead and mould a flexible safety program to direct your work efforts is vital. At certain times of the year, weather will dictate adjustments or a surprise deployment may run you short in a vital area. A good safety program requires continual changes and revision to keep you ahead of the game. Don't fall into the trap of being so busy stomping on small fires that

you fail to detect the approach of a major requirement which presents problems.

We have all seen, or been associated with, units who have won awards for good safety records. But about the time for the presentation of the deserving award, ZAP, the shining past record is completely overshadowed by an accident. Bad luck? Sometimes, but not always. For we do have units that produce outstanding records year after year to help lower the overall command rates. Like all champions, a one hundred percent effort was required to achieve success. Those units which maintain their championship records continually work and train hard to remain there.

A unit with an outstanding program will also look forward to a visit by higher headquarters, to show off and receive recognition. A really sharp outfit with pride will find time to do a little crystal balling at future possible problems and not wait until they occur before taking action.

Virgil K. Meroney
VIRGIL K. MERONEY, Colonel, USAF
Chief of Safety

Don't forget your G Suit



by Lt Col James K. Fox

4 TFW

Seymour Johnson AFB, N.C.

The January issue of TAC ATTACK included an ACM article stressing the training environment. The opinions expressed in this article have some application to the training environment, but are primarily intended for combat. The flying is violent and highly demanding. If this type flying doesn't appeal to you, read no further and seek duty outside the fighter cockpit.

My primary subject is F-4 maneuvering performance

with some related thoughts on afterburner use. The very important areas of lookout, doctrine, tactics, crew coordination, etc., cannot be adequately covered in one article. Security classification also severely limits discussion in these areas.

Subsonic turning performance for fixed wing aircraft is controlled by two basic factors, indicated airspeed and angle of attack. Obviously, thrust or altitude must be available to attain the airspeed, and thrust available will be a limiting factor for a constant altitude turn. I will not discuss a constant altitude turn but only be concerned with turn radius and rate control without regard to the plane of maneuver. I haven't met the fighter pilot who was concerned about constant altitude turns while engaged with an enemy aircraft.

Minimum subsonic turn radius is achieved by pulling sufficient backstick to obtain maximum lift coefficient (CL_{MAX}) while maintaining just enough indicated airspeed to pull the G limit (normally 7 to 8). Once the aircraft is operating at CL_{MAX} , increasing the indicated airspeed above this point will further decrease the turn radius; however, the aircraft will be overstressed. If the tactical situation has deteriorated to the point where overstress is desirable, a safe assumption on ultimate strength is around 11 to 12 Gs. Loads beyond this will most probably cause structural failure. If unknown fatigue damage is present, loads below this figure may cause structural failure. Structural damage can be expected when operating past the 7 to 8 G elastic limit.

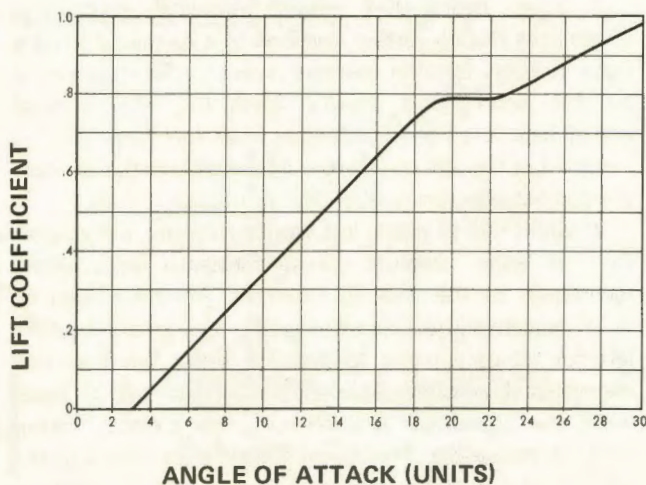
The F-4 subsonic lift curves indicate CL_{MAX} occurs between 27 and 30 units AOA. Unfortunately, this is an unusable lift coefficient due to stability problems.

phenomenon of the F-4 subsonic lift curves indicates more lift is available at 20 than at 22 units. This is apparent in the lift curve below.

FIGURE 1

TRIM LIFT COEFFICIENT VARIATION WITH AOA
BASIC CONFIGURATION — CG = 31%
10,000' ALTITUDE
0.8 MACH NUMBER

BASED ON WIND TUNNEL DATA AND ADJUSTED
TO AGREE WITH FLIGHT DATA



It is obvious that if any real gain in lift is to be obtained above 20 units, it is in the 24 unit range and above. Unfortunately, drag is extremely high in this area,

and in addition, static directional stability goes from positive to negative at around 24 units. These factors, coupled with possible heavy rock and rapidly decreasing static longitudinal stability, make operation in this area extremely hazardous to the health. This "No Mans Land" portion of the performance envelope should be reserved for badly needed energy dissipating maneuvers or intentional spin entries.

The "knee" or "step" in the subsonic lift curves, coupled with deteriorating stability in all axes, are the reasons maximum sustained turning performance occurs around 20 units. The AOA must be accomplished by sufficient indicated airspeed to pull good G, 350 to 400 knots does nicely. Do not exceed the mach number where aerodynamic center shift occurs (approximately .95) or insufficient stabilator lift will be available to produce desired AOA.

You will notice the lift curve slope is relatively shallow and that an increase of AOA in the 18 to 20 unit range only increases C_L from .74 to .80. This should tell the smart operators that good lift is available through a relatively broad area of AOA and that a small sacrifice in lift might be a worthwhile trade for a significant drag reduction. One outstanding error I have seen committed in ACM is trying to pull the aircraft too tight too much of the time, and then not nearly tight enough at the right time. This is one of the many areas in ACM where extensive practice is so necessary.

There is just no substitute in some circumstances for a sustained 7 to 8 G turn. The pilot who cannot withstand the G and operate efficiently is simply going to get beat if he competes with the right people. A sustained Lufbery below 15,000 feet requires G conditioning that is not

Don't Forget Your G Suit

available to the majority of tactical fighter pilots. The F-4 is a real "do it yourself hemorrhoid kit."

There is not much point in discussing supersonic turn control since stabilator lift is not sufficient to produce desired AOA. This is unfortunate because the lift curves are more favorable above mach 1. Use caution when operating above mach 1 with full back stick and high indicated airspeed. If deceleration occurs below mach 1, the forward shift of the aerodynamic center can cause severe overstress.

Extensive experimentation with minimum time 180° turn techniques has shown that a quick roll to around 135° bank angle, coupled with a 20 unit turn holding 350 to 400 KIAS, does the job nicely. Use afterburner as necessary to hold speed, but stay below aerodynamic center shift. A good rule of thumb is to hold 350 to 400 knots, or a .9 mach, whichever comes first. If you can't produce at least a 12° per second turn rate, sit down and have a long serious talk with yourself, and try again.

Low airspeed should be avoided if possible. Turn performance will suffer and in addition, if loss of control occurs, the AOA will be much more difficult to drive back to a desirable range. Your wingman may also have some fitting comments after he is picked up, or repatriated.

Try to avoid temporary loss of aircraft control. It is relatively simple for the most incompetent opponent to gain a position advantage while aircraft control is regained. Just think of the story the opposition will enjoy, like "I didn't fire a shot at the dumb (censored!), he just spun in." In addition the wingman sometimes has difficulty following the leader during his post-stall gyration phase.

If loss of control occurs, get full forward stick in early and the chute out if necessary. Reduce both throttles to idle. If a spin develops, all you have left to do is move the

stick into the forward corner with the spin. Idle thrust will not help the out of control of spin recovery, however it may prevent flameout. The position advantage gained by your opponent while you were floundering out of control will probably make this rather academic.

AFTERBURNER OPERATION

Afterburner thrust increases aircraft performance in all areas with the exception of energy dissipating maneuvers (such as high G rolls, vertical rolling scissor, and landing). Turn performance is increased because the downward thrust vector contributes to available G. Obviously afterburner thrust increases with speed due to increased mass airflow.

Correct afterburner use for ACM (except for energy dissipating maneuvers) can be stated in two parts:

When the fight starts, engage both afterburners.

When the fight is over, disengage both afterburners.

Other techniques may save fuel or temporarily tighten turn radius, however total energy will be degraded. If fuel is critical, try to use the afterburner at high speed.

I have heard F-4 pilots advocate disengaging afterburner during certain portions of a sustained turning fight. It is my opinion that any position advantage gained by this technique is usually worth the trade in total energy loss. It is a good technique when fuel is critical.

One last thought on afterburner use. It is better to leave the combat area low on fuel than not to leave at all.

I would like to add a last word of caution and advice. Do not apply absolute max-performance maneuvering techniques to the training situation. We don't want to work ourselves into a situation where only one aircraft is left for all us aviators to practice with. Avoid aircraft overstress if possible. Save the aircraft for high G loads when the opposition is lined up at Six o'clock, taking turns in the saddle. This is not the time for a wing to fail because of a training-produced fatigue crack. A lot can be learned about ACM while adhering to training restrictions. Seek advice from those who have a reputation for spending considerable time at Six.

Good hunting and ----- Check Six!

TACTICAL AIR COMMAND

PILOTS of DISTINCTION



Major Robert W. Pitt and Major Donald M. Thorne of the 9th Tactical Fighter Squadron, Holloman Air Force Base, New Mexico, have been selected as Tactical Air Command Pilots of Distinction.

Majors Pitt and Thorne were returning from an instrument navigation proficiency training flight when their F-4D experienced utility hydraulic system failure. Use of the emergency system did not lower the left main landing gear and efforts to lower this gear by applying negative Gs and porpoising the aircraft failed. Fuel was burned from the three external fuel tanks to reduce gross weight for an approach-end arrestment. Major Pitt reduced his rate of descent by flying a long, flat approach at seventeen units angle of attack, with flaps at one-half and the tail hook lowered. A successful approach-end engagement was made with the right main and nose gear down and the left gear up. The aircraft suffered minimal damage.

Majors Pitt and Thorne by their coordinated efforts prevented a possible loss of life and aircraft, and readily qualify as Tactical Air Command Pilots of Distinction.



Maj Pitt

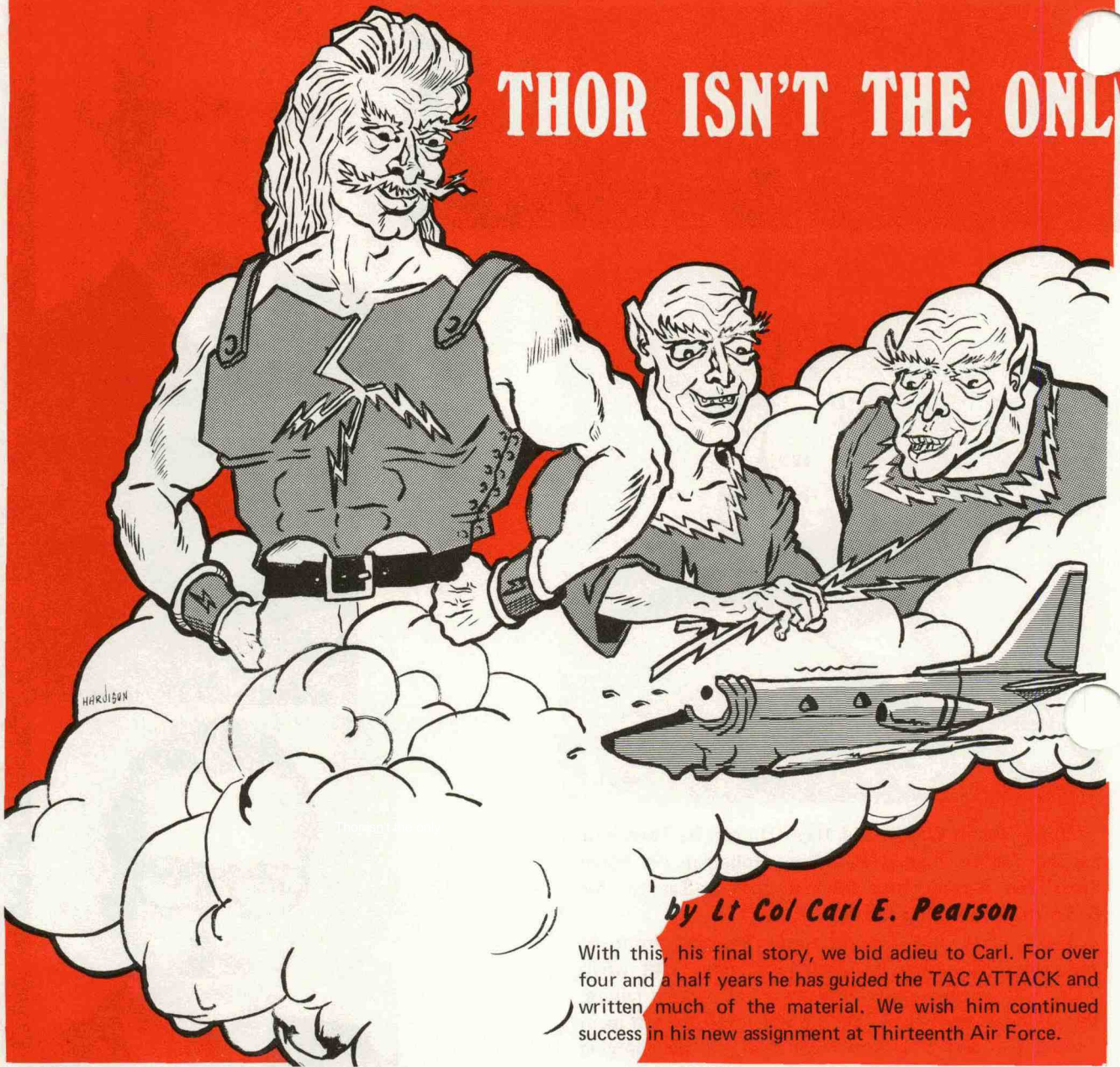
Maj Pitt



Maj Thorne

Maj Thorne

THOR ISN'T THE ONLY



by Lt Col Carl E. Pearson

With this, his final story, we bid adieu to Carl. For over four and a half years he has guided the TAC ATTACK and written much of the material. We wish him continued success in his new assignment at Thirteenth Air Force.

It appears that Thor, the most feared "junk" pitcher in the aerospace league, released the secret of his lightning-bolt ball to junior members of his cumulus clan some time ago. And they're tossing sizzling fireballs just as accurately as their team's leading pitcher. It's not that Thor plans to retire, or skip his regular rotation on the mound. What's hurting the good guys on the pilots' team is Thor's delegation of lightning strike authority to lesser

lights on his turbulent team; and a sneaky rules change that didn't receive too much publicity. It works this way: While you're at bat, keeping your baby blues glued on Thor, one of his renegade "ringers" somewhere on the diamond rears back and rips you with a strike. You're called out, and don't even know who skewered you! And the unkindest cut of all? Your team manager accuses you of standing too close to the plate.

THOR HEAD !

Thorhead!

If you've been driving airplanes for more than a few years, and you've invested some time boring holes thru assorted types of cumulus cloud formations, especially in the low-to-middle altitudes, then knowingly or unknowingly, lightning has been your close and unwelcome "wingman." And if you haven't been bounced by a bolt from the blue/black in your flying career, you're either very lucky, or you've enjoyed some very selective flying assignments. Of course, it could be that slight scorching you suffered wasn't spotted on postflight. Or you're the rare kind of jock who can launch thru swarms of scattering starlings and never ruffle a feather . . . either yours or a bird's.

However, if you're either an old, or still-bold pilot, and recorded a lightning strike or two in your travels, you'll recall looking around for the offending thunderstorm . . . or others of supervisory status doing it for you. Because the usual "strike" reaction is: There's got to be a cumulonimbus close by! Most pilots have grown up in the trade, trained and thinking that only T-storms throw electrified darts; and you were barbed rightfully because you wandered too close to a big one. Most lightning "strikees" will no doubt recall protesting their innocence or ignorance mightily, but the inevitable conclusion was: You failed to avoid a thunderstorm!

Then the Apollo 12 launch came along and cast doubt on some old pilot proverbs about the genesis of lightning strikes. If you were one of the many millions of television viewers watching at 1122 EST, on 14 November 1969, your concern, admiration, pride, and relief at launch time reverted to concern 36.5 seconds later as visible lightning flashed, and a launch vehicle/spacecraft strike was reported by news commentators. Again at 52 seconds after launch, concern deepened as another major electrical disturbance was attributed to lightning's intervention in man's space exploration. Fortunately, most effects of the strikes were temporary and the permanent damage involved only non-essential instrumentation sensors. These solid-state circuits and those components considered

most susceptible to lightning discharge damage.

Viewing pilots who had lightning strikes of their own to their credit (?) saw special significance in Apollo 12's lightning encounter. In their minds it raised questions beyond its being a world-wide display of rudeness on the part of a jealous Norse god, Thor, interfering in the internal affairs of a handsome god, Apollo, Greek mythology's bright sun diety. Also, he happens to be a patron of music, poetry, and art, founder of cities, maker of laws, god of healing, and father of Asclepius, a far-darting archer and god of war (the reason for Thor's jealousy is now obvious).

Pilots mumbled questions sounding something like: "What was the weather picture? Did they launch into, or too close to a thunderstorm? They've developed some pretty sophisticated instruments to detect and measure electric fields around the launch complex, did they use them?" Some thought wryly, "They can't blame this lightning strike on the astronauts, somebody else made the launch decision." And all flying types hoped and were thankful to learn that the eventual outcome would be no harm to the space explorers, but instead lightning research benefiting both "inner" and outer space travelers in the future.

An analysis of Apollo 12's lightning incident conducted by NASA did disclose interesting information for all flying types on "why lightning strikes" on aerospace vehicles. And of particular pilot interest: the new weather criteria established for future space launches.

WEATHER AT LAUNCH

The weather picture's a familiar one to pilot types experiencing lightning strikes. The day before launch an intense upper-air low pressure trough evolved over East Central U.S. A surface cold front extended from west of Bermuda across northern Florida and westward along the Gulf. A broad band of clouds with precip and thunderstorms covered the launch area during the

THORHEAD!

afternoon and evening. The severe stuff pushed southward overnight and the T-storms ended in early evening. During early morning, no precip or significant weather identified the front's location.

After daybreak a fairly solid line of precip echoes radar-identified the cold front activity. It passed thru the Space Center about launch time. Within thirty miles, cumulus congestus clouds topped out between 18 to 20,000 feet. Near the launch complex weather conditions were highly variable with scattered clouds at 800 to 1500 feet, and an overcast varying between two to 10,000 feet. Scattered showers fell at launch time and the precip ended less than an hour later; skies began clearing.

No natural lightning or thunder was seen or heard six hours before, or after, launch. The first strike at 6400 feet AGL was a cloud-to-ground type and visible to observers; apparently, the second strike was a within-the-cloud variety at 14,400 AGL and not seen from the ground. Freezing level at the time was about 12,400 feet. Potential gradient measurements recorded by lightning-detector instrumentation around the launch complex indicated rapidly, and highly fluctuating, electric fields in overhead clouds. Although not launched into an active thunderstorm, significant amounts of electric charge were present at the time. Figure 1 displays the frontal location four hours before launch.

WHY LIGHTNING STRIKES?

In general, the scientific study group concerned with atmospheric electricity research agreed that the lightning strikes were triggered by Apollo 12's presence in electrically charged clouds. They were not active thunderstorms, although vertical development extended above the 12,400-foot freezing level and precip was falling. The introduction of 364 feet of space vehicle, trailing five times that length of ionized-gas plume, into electrified clouds suddenly inserts about 1900 feet of electrical-conduction path where none existed moments ago. The distortion of the electric field equipotential lines by an upward accelerating Apollo 12 is illustrated in Figure 2. With enough potential gradient enlargement by the space vehicle, the enhanced electric fields at the vehicle's top and exhaust-plume bottom break down below the exhaust plume, propagating a discharge up, down, or both directions.

In previous studies, lightning researchers have established experimentally that the rapid injection of a "conductor" into highly charged fields can trigger

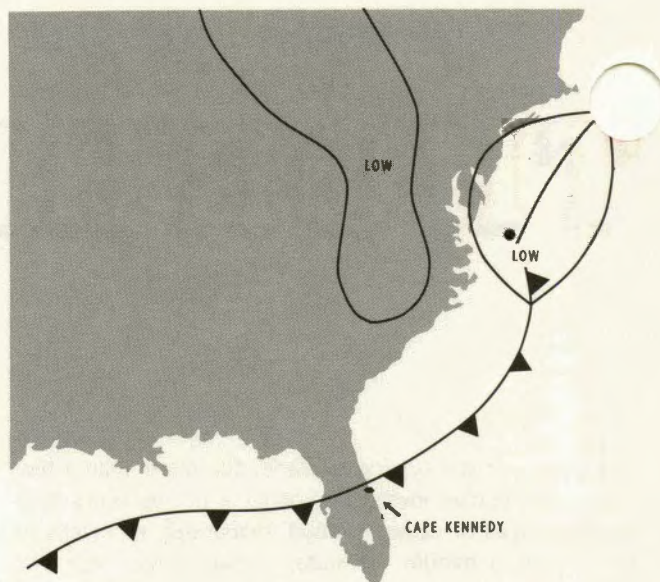


Figure 1

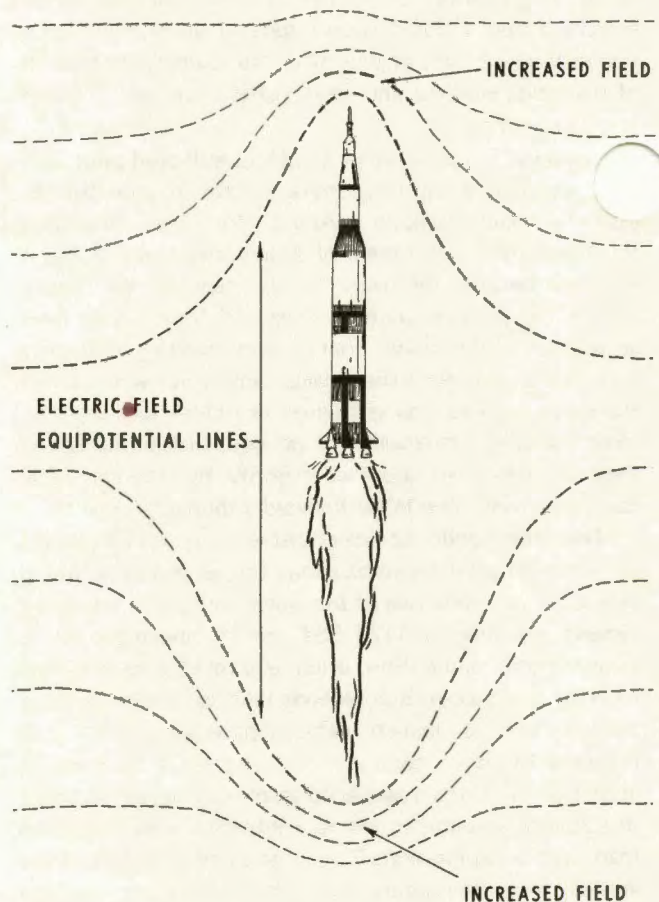


Figure 2

discharges. For example, rockets trailing a grounded wire and fired into bases of thunderstorms over water were "comebacked" by cloud-to-rocket lightning strikes. And on occasion, the water plume rising from an underwater explosion was warmly met by a lightning shaft from a T-storm loitering overhead. However, trailing-wire rocket firings haven't had much lightning-response success in over-land experimentation. This land-based lightning's reluctance to respond may have been Benjamin Franklin's saving grace when he tempted Thor with kites many years ago.

A comparable over-water flight incident involved an F-100 pilot. On an air-to-air gunnery mission he lost his Dart, but couldn't unload the extended 1500 feet of trailing cable. He dragged it back to base in, around, and under thunderstorms. He felt like he was piloting an airborne neon dart board most of the way. And the highly qualified players enroute were racking up sparkling, spectacular scores with their electrified darts.

ELECTRIFIED CLOUDS

The awesome lightning potential of thunderstorms is a respected, recognized phenomenon. Either fully developed, or decaying, cumulonimbus clouds are known and widely respected as an aircrew "no-no." Because, through the years, aircraft have suffered lightning strikes above, below, within, alongside, and somewhere in between T-storm tops and bottoms. As a result, flying into CBs is not considered a proper peace-time flying environment. And, no pilot tempts a thunderstorm knowingly if he has an alternative remaining. However, military (and civilian!) aircraft continue to rack up lightning strike damage and the reason for it can involve several cloud formation "ringers" previously unsuspected and unlabeled as Thorheads.

The Apollo 12 report identified other cloud conditions than CBs as potent producers of high electric fields. And they're types certainly not strangers to operational flying. In fact, they're fairly common clouds in the aerospace inventory. Their "unheralded" electrification might explain some of TAC's lightning strikes that occurred in less-than-thunderstorm cloud conditions. Even though natural lightning may not occur, electrical hazard does exist in:

Cold front or squall line clouds without thunderstorms, having vertical development extending above 10,000 feet and producing rain or shower activity.

Deep middle cloud layers of 6000 feet or more in thickness, with or without precip falling; bases of the clouds would be 8000 feet or above, normally. They're the type of cloud activity usually associated with large-scale, wide-area cyclonic circulations, and may or

may not produce thunderstorms. Potential gradients of the electric fields present may be high, but natural lightning is a rarity.

Cumulus clouds with vertical developments of ten to 25,000 feet. The kind that move inland from overwater locations and feature shower activity, plus high electric fields.

In general, any reported precipitation is a visible indicator of increased atmospheric electrical activity.

As a result of Apollo 12's lightning experience, atmospheric electrical hazards will be considered in greater depth on future flights. The following "cloud criteria" now apply:

No launch thru, or within five miles of a cumulonimbus cloud. A thunderstorm's anvil head near the flight path must be cleared by at least three miles.

No launch thru cold front or squall line clouds with a vertical development above 10,000 feet.

No launch thru middle cloud layers 6000 feet or more in height, having an imbedded freezing level.

No launch thru cumulus clouds topping out at 10,000 feet or higher.

The ability of Apollo 12 to trigger a lightning strike without an active thunderstorm nearby brought TAC's aircraft strikes to mind. Thor's practiced on our birds for a long time before getting interested in space vehicles. A review of incident reports might find some that parallel Apollo's experience on cloud formations. So we scanned every reported lightning strike on file, including those of PACAF and USAFE. Unfortunately, too little weather situation information was included in incident reports to identify cloud formations involved. Out of 29 reports reviewed only one strike occurred in the clear, between T-storms. All other crews were on the gauges in rain, snow, and ice crystals in varying intensities. One hit occurred while VFR in light rain below a cloud deck. At times, thunderstorms were identified and reported in the vicinity. In most cases, CBs weren't reported or observed on ground or airborne radar within the strike area. Most strikes occurred between 12 and 22,000 feet, however 3 to 4-thousand and above 35,000 feet were represented often enough to avoid complacency, or suggest immunity in those flight regions.

Three USAFE aircraft suffered lightning strikes in a two and one-half hour time span in April of this year. An RF-4 crew was hit while clear of clouds at low altitude near visible precip, pitched up into weather, lost flight instruments and elevator control, experienced fire in the rear cockpit, and ejected successfully. A short time later another RF-4 cruising at 6000 feet in weather under approach control was struck in the pitot boom area damaging the pitot tube and heat assembly, noise filters, static lines, electrical wiring, and leaving some minor

pitting and scorch marks on the right wing and stabilator. Following that, a T-29 at 4000 feet in snow and moderate turbulence was "hemstitched" by lightning along the lower half of the fuselage and lost its fiberglass vertical stabilizer and rotating beacon. A surface chart showing the offending occlusion located about midway between the three strike sites is shown in Figure 3. Its comparison with Apollo 12's frontal situation pictured in Figure 1 offers an interesting lightning strike weather parallel.

Other recorded instances of both commercial and military aircraft being hit by lightning during departures or arrivals have cited cloud formations such as: small snow showers, tops about 4500 feet with faint radar returns; rain showers and multiple layers to 15,000 feet with 1500-foot bottoms, temperature near freezing; in moderate rain shower at 8 degrees C with tops below 8000 feet, no buildups in area.

SUMMARY

The substance and behavior of lightning have yet to be defined. And little hope exists for man's positive control of this powerful natural threat to aerospace travel in the near future...especially in the area of lightning occurrence prediction. Aircrews do not have instrumentation aboard to detect its presence or potential.

"Eyeball" evidence in the form of St. Elmo's Fire and "P-static" aural signals tell crews that unusual electrical fields surround them, but how to dodge a strike and depart the charged area unscathed is unknown. The identification of additional cloud formations as lightning producers has added a new dimension to "all-weather flying." And the determination of the precise time of a cloud's arrival at electrical maturity is beyond an aircrew's judgment. If Apollo 12's flying through electrified clouds can trigger a strike where natural lightning wouldn't normally occur, it seems logical to assume that airplanes boring thru a similar environment should "enjoy" the same lightning strike privilege. And the number of aircraft strikes recorded through the years indicate that Thor hasn't shown any favoritism.

How do you avoid lightning strikes with ordinary cumulus clouds getting into the act? There's no sure-fire way. You accept the risk involved and build lightning strike protection into your aircraft. That way it doesn't make any difference how many Thorheads are around! ➤

References:

1. *Analysis of Apollo 12 Lightning Incident*, NASA, February 1970.
2. *Lightning Electrical Hazards to Flight Vehicles*, Air Force Avionics Laboratory, AFSC, December 1969.
3. *Lightning and Static Electricity Conference. Part II*, Air Force Avionics Laboratory, AFSC, May 1969.



Figure 3 Frontal location at time of USAF's three lightning strikes.

Tactical Air Command

Crew Chief of the Month

Staff Sergeant Leonard J. Roque, 414 Fighter Weapons Squadron, Nellis Air Force Base, Nevada, has been selected to receive the TAC Crew Chief Safety Award. Sergeant Roque will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.



SSgt Roque

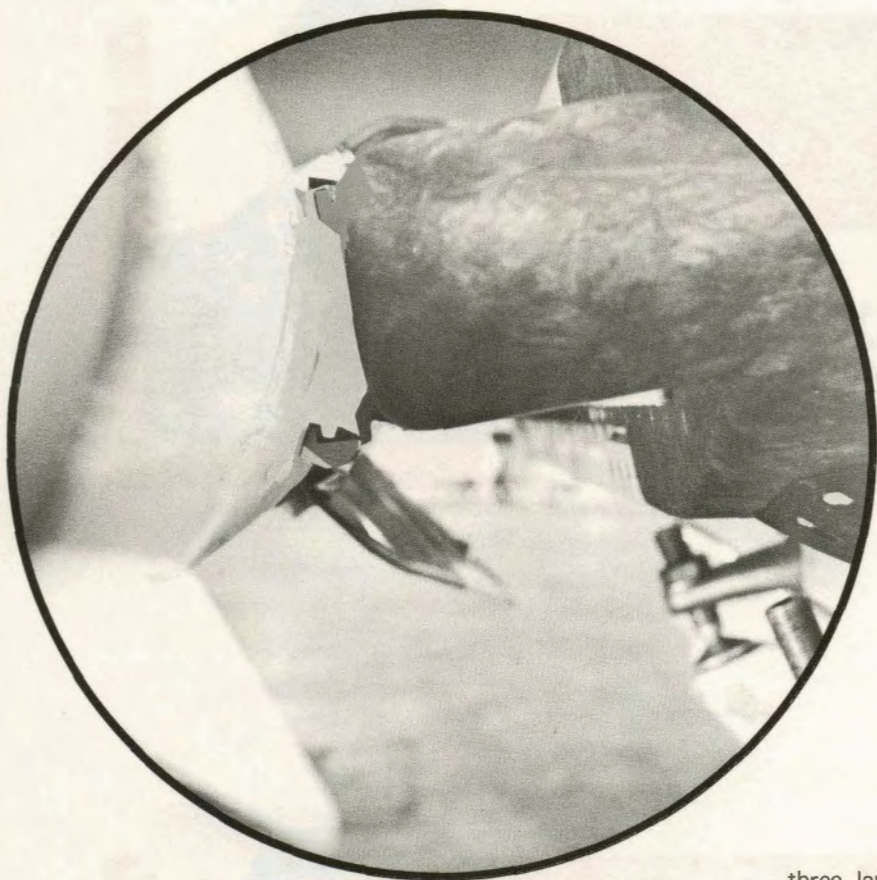
Tactical Air Command

Maintenance Man of the Month

Staff Sergeant James J. Bissette, 15 Tactical Fighter Wing, MacDill Air Force Base, Florida, has been selected to receive the TAC Maintenance Man Safety Award. Sergeant Bissette will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.



SSgt Bissette



AIM-4D

This Falcon was mounted, cocked, and believed ready for launch by loadcrews. And from only a couple feet away it looks ready to go. With lower lugs or hooks disengaged from the rail, umbilical contacts are not complete, and missile will probably fall from the mount during normal flight maneuvering.

No matter how good your aim, you can't score unless your musket fires . . . so keep your powder dry.!

There's more than a bit of validity in this directive of several conflicts past, and it can be directly related to modern day fighter flying. Several F-4 jocks have found themselves in similar predicaments when intending to score with an AIM-4D (Falcon). The missile was in position and cocked but failed to lock on target or fell unintentionally from the aircraft.

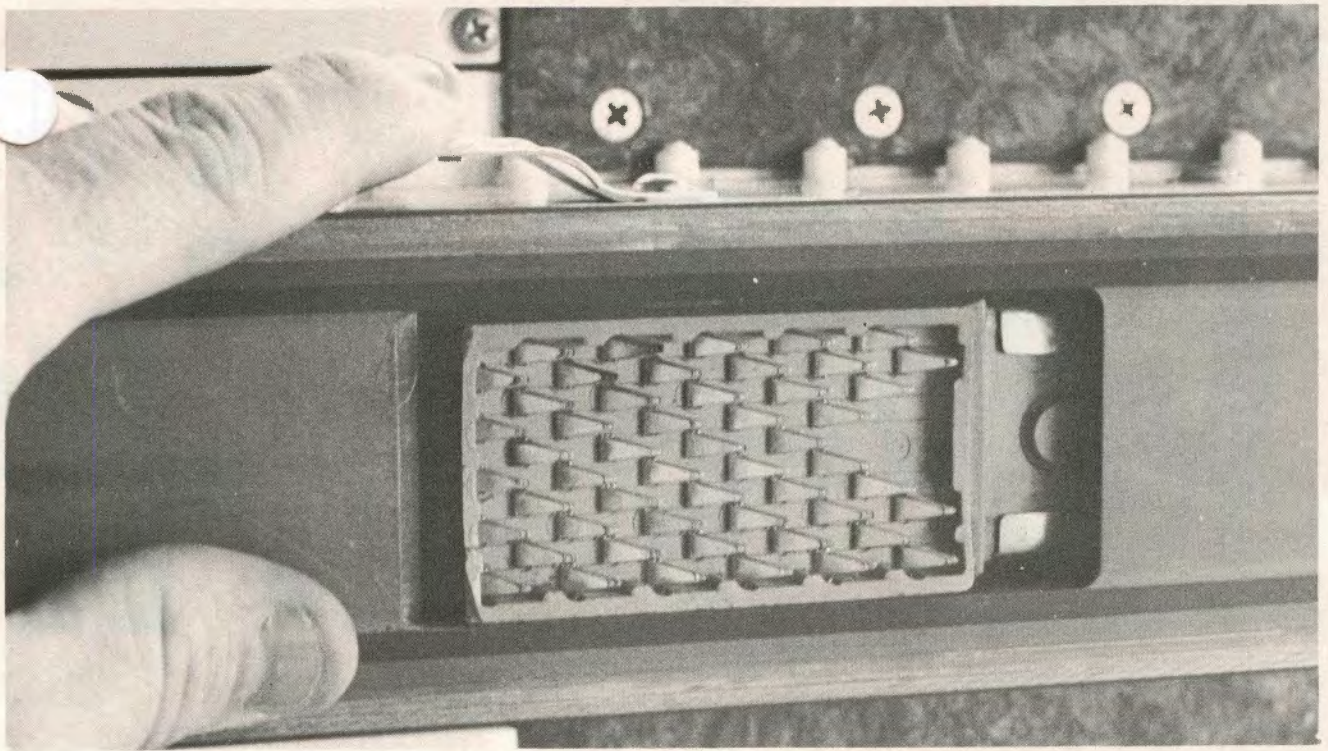
The Falcon can be mounted on F-4 pylons in one of

three launch positions, L-41, L-42, and L-43. The two are left and right inboard positions utilizing side mounting launch rails, and the third is the bottom launch rail on either station. The non-firing or falling Falcons have all been mounted on either of the side mount rails.

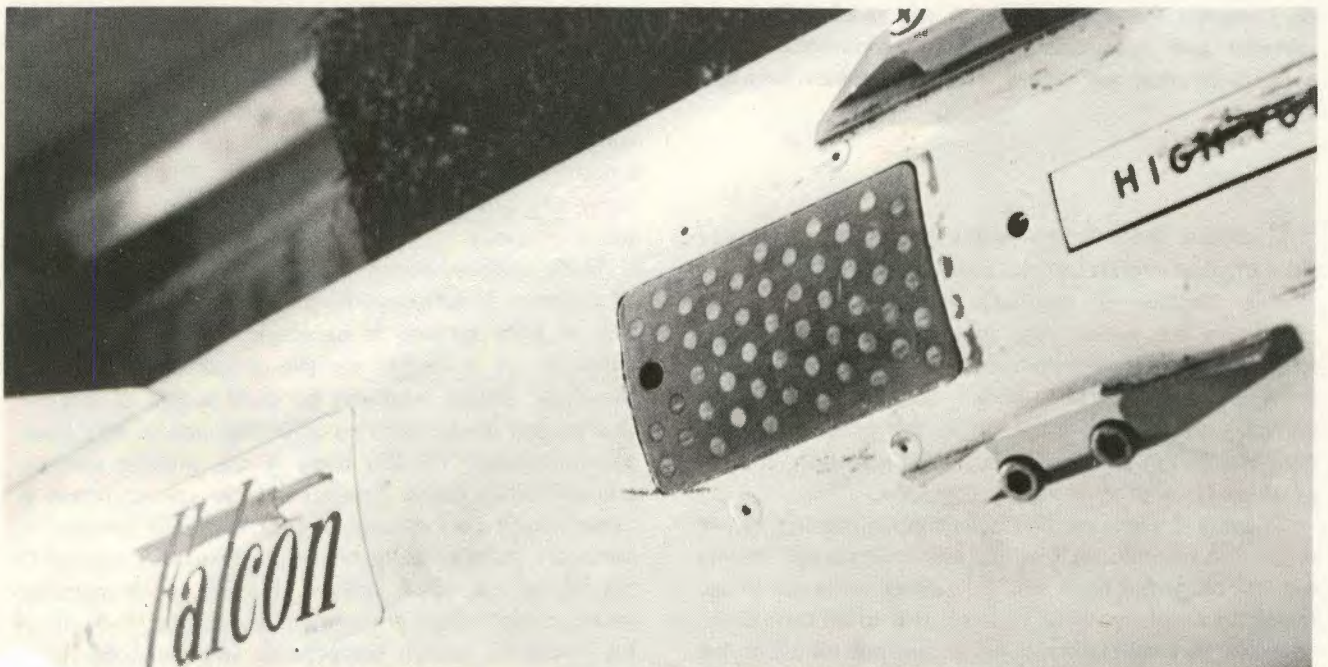
Mounting a Falcon is easy . . . simply cradle it in the arms of three men, engage each of three pairs of hooks or lugs as it is slid onto the launch rail, pushing it aft until the load follower snaps the holdback pin and umbilical contact block in position. Except for about a half hour of previous launcher circuit checks (MITS), that's all there is to it.

And that's the problem. Once the missile is mounted, no circuitry checks are permitted. And unless the lower lugs on the side mounting launchers are visually checked, the missile looks secure and the airplane will take off with only half of the lugs engaged and the umbilical contact block out of contact. It most likely will fall from the aircraft during normal maneuvering before an attempt to lock on is made.

There's only one way to detect an incorrectly mounted Falcon and prevent its loss. And that's spelled out in both the loading crew and aircrew checklists: "visually ensure that the lower missile lugs are properly mated with the lower launcher rail."



When the Falcon is correctly mounted on the launch rail contact points of the umbilical block touch the 'wafer' portion of the connection on the side of the missile. If incorrectly mounted only top row make contact and all circuits will not function for lock-on and launch.



Contaminating

We lifted this article from the March issue of the U. S. Navy CROSSFEED, a fine publication prepared by our counterparts at the Naval Safety Center on the other side of Hampton Roads. No attempt was made to edit the material and substitute Air Force terminology. The message is clear and urgent — in any service's language. Read it.

Ed.

Hydraulic fluid contamination has been in existence since the first aircraft utilized this type system.

The degree of emphasis toward contamination prevention has varied over the years somewhat like a thermometer. When contamination is established as the primary cause of an aircraft accident, there is a corresponding rise in attention to this problem. As the reports diminish so does the degree of attention, and the potential for another accident takes form.

Possibly the greatest hydraulic contamination problem is the lack of understanding (or some misconceptions) on the part of the mechanic who is involved in the day to day maintenance of hydraulic systems. It is often difficult to conceive that contaminants which are not visible to the

human eye can devastate a hydraulic system to the point of complete failure.

Contamination is the presence of foreign particles or substances in hydraulic fluid. If allowed to collect to a significant degree, contamination will adversely affect the equipment which it operates.

Hydraulic fluid used in modern naval aircraft is clear and bright red in color. Although a fluid sample may appear clean and clear to the human eye, it could contain a destructive quantity of contaminants. This is the reason many mechanics pay little attention to the problem. They just don't see it!

Many persons have little conception of the actual size of a micron. So let's consider this term a moment. Particle size in fluid systems is expressed in microns or one millionth of a meter. Particle shapes vary and are, therefore, always measured by their largest dimension. One micron is equivalent to 0.000039 inch. A 40 micron particle (about 0.00156 inch) is the smallest seen by average human vision. This size particle is unacceptable in modern high performance aircraft hydraulic systems. It can score cylinder walls, bind lapped surfaces, damage O ring seals, and block orifices. Further, these particles generate additional contaminants by eroding them from the hydraulic system components and plumbing itself.



particles continue to build up within the system, filling filters to capacity and rendering them ineffective. Unchecked, the contaminants finally produce system leakage, component malfunction or hydraulic pump destruction.

What, then, can be done about hydraulic system contamination? Starting at the bottom of the ladder, let's review the possible sources of contamination.

Prior to opening a can of hydraulic fluid, the outside of the can should be cleaned. Once opened (not with a greasy screwdriver) the fluid must be used immediately. Clean the area around the cap of the hydraulic test stand, test/fill stand or aircraft reservoir filler, whichever may be the case, prior to removing the cap. Hold the can as close to the filler neck as possible to reduce induction of airborne contaminants. Install the filler cap immediately. Throw away all left over fluid. Prior to hook up of the test/fill stand, or portable test stand, to the aircraft, clean both the GSE and aircraft connections. If dust caps are used, as required, half the battle is won. As soon as the service unit is disconnected from the aircraft replace the dust caps. Don't allow the hoses to fall to the deck. Hydraulic fluid picks up sand and "speedy dry" like a magnet! Always sight check the GSE reservoir prior to use. You'd be amazed at the objects dropped into

unattended equipment, everything from paper cups to "speedy dry"!!

When opening an aircraft hydraulic system, use dust caps on both the aircraft and components removed. Avoid breaking the system in conjunction with, or during, corrosion control efforts and the like. The abrasive matter will do the same job within the hydraulic system it does on the skin of the aircraft. Clean the area prior to breaking the first line. Use a vacuum cleaner to remove that accumulation of grit left over from the last corrosion control effort. Using hydraulic fluid, followed by a clean wipedown, remove the preservative you applied. If a component is removed and determined to be binding, scored, or contaminated, a filter cleaning and flush of the related system is necessary to prevent a second component failure. Filter removal required the same handling as any other component. Clean the filter bowl and reinstall it in the aircraft while awaiting ultrasonic cleaning of the filter element. The cleaned filter should be returned in a plastic bag or some other clean, air-tight container. Newly manufactured lines should be bench checked, flushed, and capped until installation. New components should be handled in a like manner. Removing the preservative fluid, flushing and testing, prevents the necessity of removing the component a second time because it was defective. It also assures that the newly installed fittings do not leak.

Filter inspection is good maintenance practice when troubleshooting hydraulic system failure. The main system pressure filter will reveal pump disintegration and the return system filter will reveal the amount of contaminants released into the system. A bypassing filter will pass the contaminants upstream to the next component or filter. Many times a second pump failure is experienced simply because the system was not flushed after the first pump failure. A pump which has been allowed to run dry should be tested and the filters inspected a second time prior to further flight. An aircraft that continuously reveals filter contamination, which cannot be isolated through troubleshooting, should be further investigated by a NARF evaluation of a fluid sample. This can be accomplished with an engineering investigation request through the proper NavAirSysComRep.

Finally, thoroughly document contamination problems through 3M and Safety UR's in order that unsatisfactory system performance may be properly investigated and improved through design. "Scored," "inoperative" and "dirty" are not satisfactory substitutes for the word contamination. Hydraulic contamination can be controlled if you take the time to understand the problems and make an earnest effort. And don't forget to report it.

CHOCK TALK

Chock Talk

...incidents and incidentals

Caps ON-Check

Caps ON-Check

A private citizen claimed that his house and garage had been "bombed" by a flight of Phantoms making a routine landing approach. He had pretty good proof too, considering the bomb remnants he turned in with the complaint turned out to be a starter breech cap common to all F-4 engines.

After establishing the exact time of the "attack" it wasn't difficult to figure out which flight made the "raid." And sure enough, one of the Phantoms flying at that time was missing a starter breech cap for the number two engine. The dropped cap was so well banged up that it was impossible to determine if the latching mechanism had been working OK. But one thing sure, it was either faulty, or installed incorrectly to jar loose, and lay in the engine bay waiting for the gear to lower for escape through the right auxiliary door. This can't happen on the number one engine cap because the cap is isolated from the left auxiliary air door.

Now this unit has put starter cap security on checklists for both maintenance preflight and aircrew preflight.

Flat Tire Explodes

Flat Tire Explodes

Hazards of tire explosion is a fact well known to most maintenance men, whether it be the motor pool shop or those on the flight line. But here's one that neither may have heard about.

A staff sergeant spotted some FOD stuck in a 12-ply vehicle tire. He tried prying it free, but it stayed snug. That's when he decided to drive it on through the casing with some firm persuasion from a steel hammer.

After two blows, the FOD exploded, severing a finger from one hand, breaking a finger on the other, and inflicting puncture wounds about his body. A person standing nearby was punctured in the thigh.

The FOD turned out to be a 20 MM projectile.

Recovered portions of the projectile showed no signs of barrel grooving (which would result from firing), but was corroded and pitted. Where the projectile came from or how long it was in the tire could not be determined.

But the boys in the tire shop are giving all FOD a second long look before laying on with the tools.

Avoiding a Hot Trail

Avoiding a Hot Trail

Near the end of a routine cross-country, an RF-101 jock chose to burn off a couple thousands pounds of fuel with about a three-minute afterburner run before landing. It was a completely uneventful flight, except on landing the drag chute failed to deploy, so he let it roll to the end of the runway.

While taxiing to the ramp, two crew chiefs spotted flames coming from the aft section. They flagged down the jock and extinguished the blaze.

Back at the ramp they found the "B" nut attaching the peanut drain to the low pressure vent mast was only finger tight. The book calls for 300 to 500 in/lbs of torque. The loose nut allowed fuel to leak into the aft section saturating the heat blanket around the drag chute compartment. Ignition of the collected fuel was probably caused by an extra warm aft section from the previous three-minute A/B burn.

Button 'em.... Tight

Button 'em.... Tight

At mach 1.95 during a routine FCF, the right auxiliary air door light came on so the pilot headed his Phantom toward home while reducing speed. Turning toward base, he felt a "thump" in the cockpit, and a couple minutes later, utility hydraulic pressure went to zero. He put gear and flaps down with emergency pressure and made an uneventful landing, if you can call missing the BAK-12 cable for an approach end engagement uneventful.

After parking, maintenance found door 82R

with a maintenance slant.

missing, and so were the locking bolts which someone had failed to install. Because the locks were not in place air pressures at high mach caused the door to give way with such force that it took the actuator, and hydraulic hoses, with it allowing fluid depletion and eventual utility failure.

Anyone care to debate the importance of securing those panels?

Loose Goose

After the second flight of the day, the pilot was missing a hydraulic system door panel on his favorite bird.

Crew preflight and end-of-runway checks had not detected anything amiss before launch.

However, the crew chief did recall opening the door to check fluid level before the second flight and remembers securing all five fasteners so that the panel was flush with the fuselage. However — and get this big HOWEVER — he also remembers that all the airlock fasteners were worn and seemed looser than normal.

The crew chief probably felt that he was doing the aircrew a favor by getting the bird launched, but it makes one wonder how his judgment would be when it comes to releasing the bird with other systems loose as a goose.

When is a Team a Team?

A crew chief and his assistant had to make a functional check of the barrier arresting hook on their F-105. The chief took the cockpit while his helper moved toward the hook with a PSM-6 tester in hand. Soon the chief called out for the first test, and continued with the switch-flipping checks done many times before, without further audible calls confirming checklist progress.

Then he heard the sharp report of the barrier hook explosive bolt, as it exploded in the hands of his friend; also proceeded with the check without verbal calls,

and was actually ahead of his chief in the cockpit. He was replacing the bolt — called for after the stray voltage test on the bolt circuit — at the exact time when his chief flipped the cockpit switch to make the stray voltage check.

The helper didn't lose his hand, but he collected five fragments which needed some picking out, and he learned a lesson the hard way about the importance of coordination in any team effort.

Wayward Wind

Lead Herky on a low-level formation dropped a panel from his left wing area. Number two saw it go by. Handling characteristics didn't change and the crew couldn't find any clues in flight. After landing, they discovered that the heat shield fairing aft of number two's tail pipe has torn away, scraping the left horizontal stabilizer after departing. It appears that several rivets were missing out of the 30 along the panel's leading edge. Airflow under the panel tore it away from the still-fastened attachment screws. The exhaust gas discoloration of the panel makes it hard to see missing rivets, but they're trying harder now.

Birds. Yes.... But Bees!

During takeoff, an F-4 pilot thought pitch feel was very light, and at both 200 and 300 KIAS he experienced mild PIO. At level off, the stick felt heavy though trim was in full nose-up condition. So he headed back home and made an uneventful straight-in landing.

Maintenance personnel found a bee lodged in the bellows ram air inlet port, restricting air flow through the port, which in turn allowed the control stick to free-fall forward because of the bobweight force.

Besides inspecting ram air inlet ports before each flight, ground crewmen in this unit are now quick to install covers after flight.

Pressing!

targets seldom deserve it



Pressing! Targets seldom deserve it

How many times have you heard or read about a fighter pilot pressing the target or trying to salvage a bad pass, either in training or combat?

In training, he has three alternatives: one, adhere to no-sweat recovery minimums and try again; two, recover at a very low altitude, which will probably get undivided attention for immediate on-the-spot corrective action; or third, end up unscorable at twelve o'clock in a smoking hole.

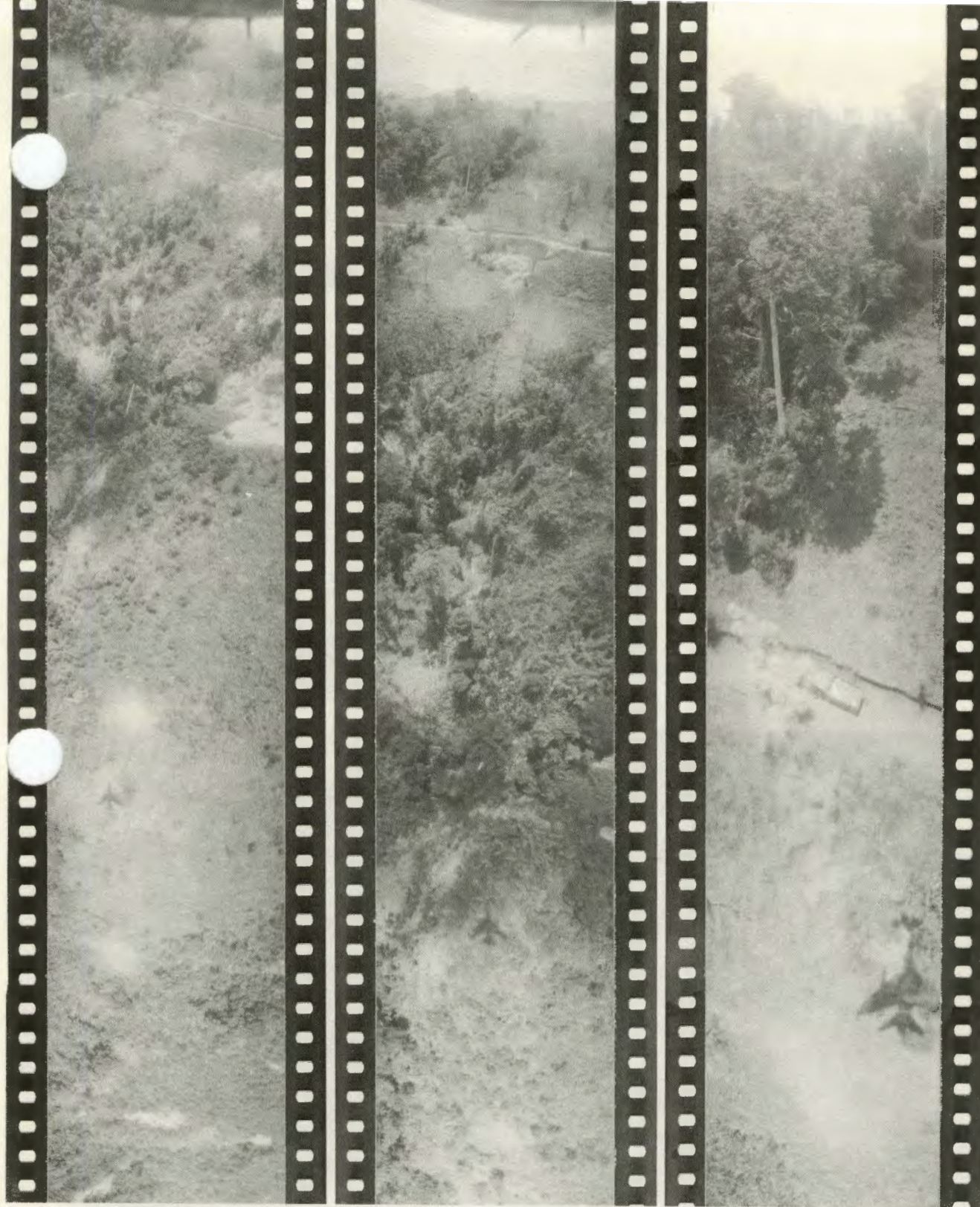
In combat, you have similar alternatives and an added hazard. Trees!!! Then add rising or sloping terrain to the setting and the situation is compounded.

These photographs tell the story of one strafe pass on a hillside target in SEA. The pictures are from the strike camera mounted in the belly of an attacking F-100. You

will note the first photo shows the 20 mike-mike cannon fire is short and to the right. To make a correction and get the bullets on target the pilot probably delayed recovery. Compounded by a flight path heading into the crest of a hill, the Super Sabre clipped tree tops during pull-out.

Fortunately, the pilot recovered his bent bird at the home drome. About 600 manhours repaired the plane. Analysis of the pass — airspeed, dive angle, open and cease fire, slant range, altitude above ground level, and terrain features — indicates the pilot put himself in a position which made contact with the trees inevitable.

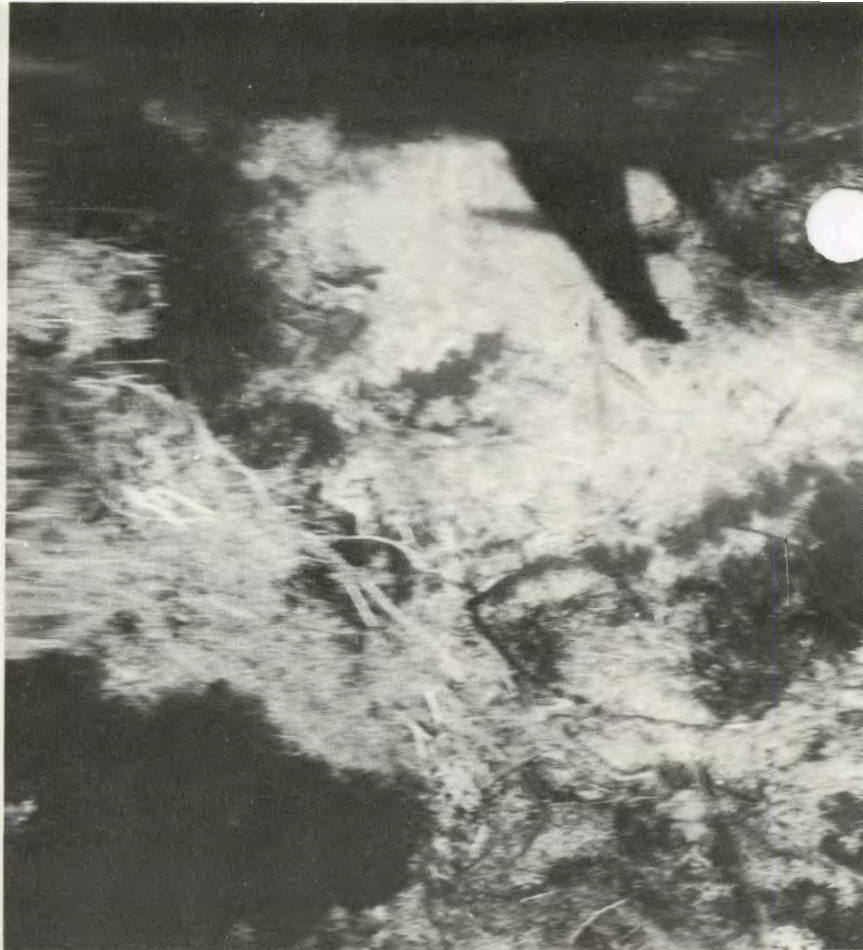
For those on their way to SEA, or those working the ranges, the message in these pictures can be summed up in one point: the target wasn't worth a bashed airplane much less jeopardizing the pilot's life.

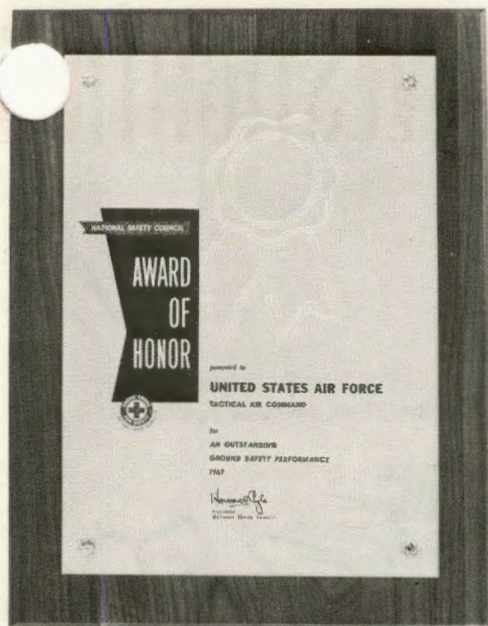


Increasing size of aircraft shadow (left center to right) shows loss of altitude as pilot tries to line up 20 MM fire on the target (left top), a truck on a hillside road. Starting recovery, though still descending (center), the pilot heads his bird toward a gap in the hillside tree line (right), pulled up his feet, then

PRESSING !

... passed over the hill at roof top
height (right) before slashing
through the tree tops!





1969 SAFETY AWARDS

Award of Merit

**9th Air Force,
Shaw AFB, S. Carolina**

**15th Tactical Fighter Wing,
MacDill AFB, Florida**

**313th Tactical Airlift Wing,
Forbes AFB, Kansas**

**464th Tactical Airlift Wing,
Pope AFB, N. Carolina**

**479th Tactical Fighter Wing,
George AFB, California**

**23th Tactical Fighter Wing,
McConnell AFB, Kansas**

**33rd Tactical Fighter Wing,
Eglin AFB, Florida**

**75th Tactical Reconnaissance Wing,
Bergstrom AFB, Texas**

**317th Tactical Airlift Wing,
Lockbourne AFB, Ohio**

**58th Tactical Fighter Training Wing,
Luke AFB, Arizona**

The following awards are presented for outstanding achievement in improvement of our Ground Safety records. Presentation of the Award of Honor to the Tactical Air Command for the third consecutive year is a "first." It would not have been possible without the help of everyone, at every level in this command.

Award of Honor

**Tactical Air Command,
Langley AFB, Virginia**

**12th Air Force,
Bergstrom AFB, Texas**

**1st Special Operations Wing,
Hulburt AFB, Florida**

Certificate of Commendation

Tactical Air Reconnaissance Center, Shaw AFB, S. Carolina



ACCIDENT INVESTIGATION

By Lt Col John S. Jensen
4th TFW, Seymour Johnson AFB, N. C.

Let's make everyone an aircraft accident investigator. "You mean you want to send us out to USC for three months of campus life with mini-skirted coeds, and bask in the hippie-haired student environment? What are you flying safety types trying to do, get rid of your jobs?" This comment would undoubtedly be made by pilots, maintenance officers and their supervisors if you were to suggest such a thing. Let's take a deeper look at this proposal, especially through the eyes of a concerned Unit Commander, who wrinkling up his brow, wonders just what else is there to do to prevent mishaps. Things have been moving smoothly despite heavy commitments and undermanning. All published directives are being followed. The OR rate is high, the maintenance shops are really putting out, aircrews are at their best, and morale is high. Safety is stressed at all unit meetings and Commanders' Calls. Can there be more?

A tactical fighter wing even in a peacetime situation is boxed in by heavy requirements. There are fire power demonstrations every other month or so. There are deployments in support of exercises. There are deployments to support actual emergencies. There are always training requirements to upgrade new pilots

HARRISON

TRAINING FOR EVERYONE *

phase three combat ready status. Some units will be front-seating back seaters from now on, until the single seat fighter becomes TAC's primary aircraft again.

The total effort of the wing is periodically practiced in supporting mobility requirements and combat crew training flights to the ranges preparing for the next ORI. Ground training barely fits into the already crowded schedules. People managers, flight commanders, maintenance officers, operations officers, on up through the DO, DM, and Wing Commander just can't afford to have their people take any more functions such as Accident Investigation Training, or can they?

No! At least not until the unit has an aircraft accident, then the people managers have to let go of a number of bodies to conduct and assist in the accident investigation.

may take a couple of weeks or more.

's take a look at a command post shortly after an accident has occurred. The reaction plan has been followed. The crash rescue and recovery phases are in operation. The on-scene commander has called in with news that the aircrew was picked up by the chopper and is headed for the hospital. The flying safety officer is at the scene getting statements from eyewitnesses. He needs to have the board come out and start their preliminary investigation. Although photos have been taken, the board may not want certain parts of the wreckage moved until they can see them. But, this is keeping a public highway blocked and the state police want to know when the wreckage will be removed. The Wing Safety Officer and the Wing Commander have just returned and are preparing the initial calls and reports to higher headquarters. The information office has already prepared the "official" press release that the aircraft was on a routine training flight and a board of qualified officers will conduct an investigation. The Information Officer asks for more details; three wire services want to know what caused the crash. Colonel Smacker, the Vice DO, (listed as a board president on the latest orders) is the only board member to make an appearance.

The Wing Commander says: "OK, let's get the investigation going," and looks to the Wing Safety Officer.

"Well, Sir," you answer, "Colonel Smacker is here and I've got the latest board orders. Since the 34th had the accident, we should use people listed from the other squadrons as board members. Division or Air Force will appoint a board president, Colonel Smacker will only be presiding temporarily. I'm waiting for a call now as to who it will be." So the Wing Safety Officer starts the calls, "Where is So-and-so?" After this frenzy of calls a board of available members not on TDY, leave, or flying is formed. Now let's stop here a moment. What is wrong? Why haven't board procedures and the forming been more organized? Surely, the Wing Flying Safety Officer has complied with AFR 127-4 and has conducted all required training. The many commitments mentioned makes training of a selected few for accident boards unrealistic. Well, anyway, board members somehow were organized, transported to the scene, and the investigation was started within a reasonable time. Causes were found and recommendations made. The formal reports were completed in a highly professional manner for lack of a better term. That means the accident must have been investigated by highly trained professional people then, doesn't it? But were they, in light of what I previously said? Answer — yes and no.

First, no they weren't highly trained. The majority of the board members that I'm familiar with had limited if any accident investigation training. Most, excluding the board president and flying safety advisor, had never been on a board. Quite a few were never even on the wing's accident board orders (due to obvious reasons explained previously) and so had not received the minimum training required by AFR 127-4.

Now for the "Yes" answer. They were highly professional people, qualified pilots in the types of aircraft involved in the mishap, or they were qualified

***Everyone meaning all aircrew members, direct support and flight line maintenance officers, etc.**

accident investigation training for everyone

maintenance members in that they already knew where to start looking for problems in maintenance malpractices. They were familiar with material deficiencies of the aircraft from experience with Time Compliance Technical Orders (TCTOs), Unsatisfactory Reports (URs), etc. They were qualified investigating officers because of the experience they gained in the flying game for the last 10 to 15 years. Also, one can assume some intelligence and maturity from the rank they held.

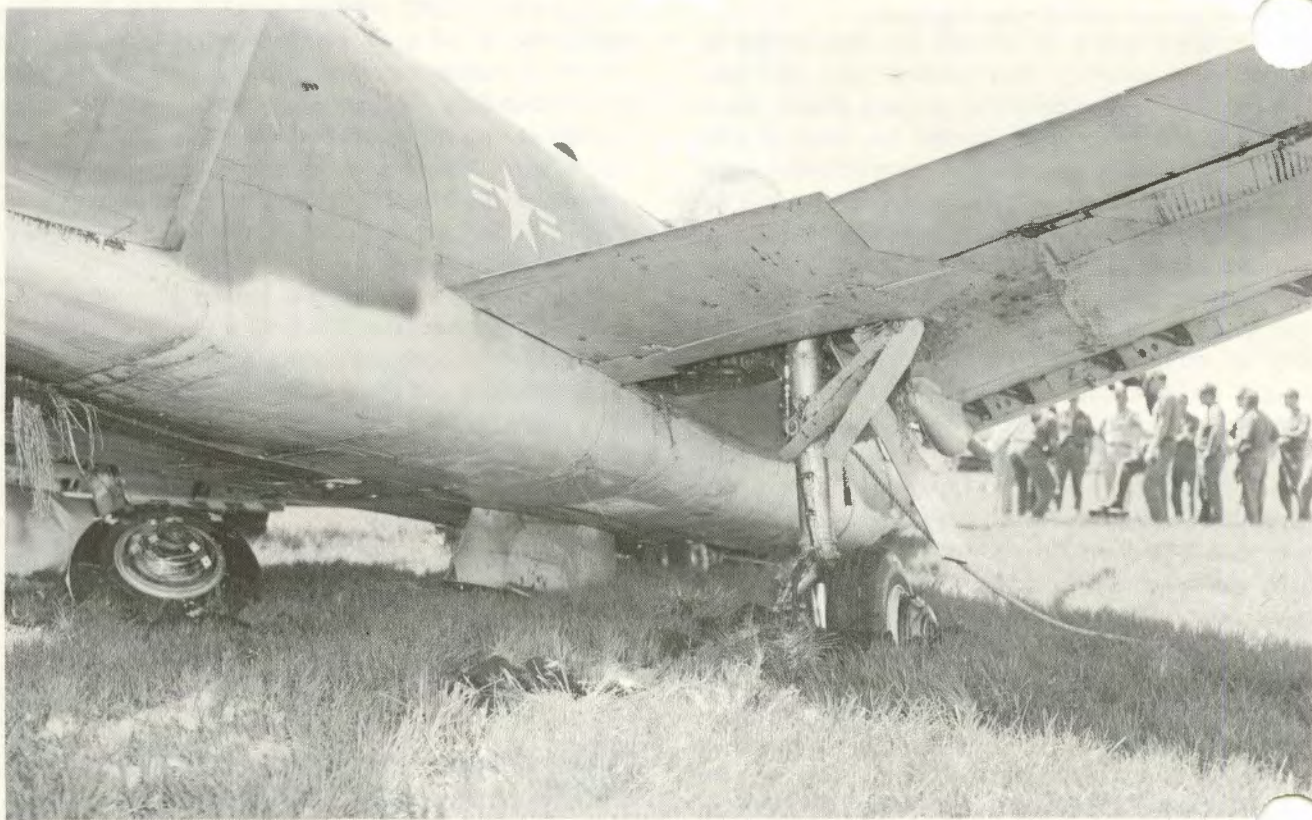
Other board members, because of experience in their AFSCs, like weather officers, and flight facility members, are experts in the same sense. The flight surgeon's training, or even the newest Doc who always seems to get a board, is more than adequate. Of course, the board president's experience and his final say so has been the primary factor in the quality of the reports. I believe that is why TAC, without exception, has required a Colonel for that most important position and should continue to do so.

Remember, this discussion is limited to TAC fighter

units with a varied non-static mission. There are rotational deployments, extended TDYs, overseas commitments, limited manning, and heavy training schedules with flying and ground training squares to fill. These act along with previously mentioned problems always tending to disrupt our present system of accident investigation. Let's see if there are other solutions.

One solution is: Let Norton, the Director of Aerospace Safety, investigate all accidents. They have the knowledge, skills and people who can do this job. However, a single visit to their shop will dispel that course of action. They are not manned to investigate all accidents.

The second solution might be to have accident investigation boards at Air Force level assigned to investigate all flight accidents; this means fighter boards, airlift boards, special warfare aircraft boards, etc. This has been a popular topic for command and staff papers including numerous thesis papers submitted by students in Advanced Safety Programs Management Course taught at USC. However, it doesn't appear to be feasible under our present and future manning policies. Headquarters TAC also has accident investigation officers/boards that may be directed to investigate selected mishaps of subordinate organizations at the direction of Commander TAC. It appears that we must continue to provide accident boards and the training required from our own resources. Let's reconsider the initial proposal of training everyone. It



helps solve the one problem noted in the command post scene of getting a qualified board formed. But more important, COULD IT PROVIDE THAT SOMETHING YOU COMMANDERS AND SUPERVISORS ARE SEARCHING FOR? I feel, as a Wing Safety Officer, it would be a NEW, VIABLE, and DYNAMIC approach to accident prevention.

Preparing such a program will not be an easy task. A training program even limited to a few hours of classroom work and a seminar simulating board procedures must be carefully planned and fit into a wing's scheduled activities.

How about tagging the training sessions on the annual instrument school after the initial program has been given? A one hour segment, such as the flight surgeon's role in investigations, can be given on a TGIF day. Developing maximum use of training aids, films, etc., is a must.

Directing training programs in accident investigation can be compared to conducting a symphony orchestra. You not only use the talents of each musician, but hope to harness the listener's interest and response to the theme. In other words, there is the factor of innate interest about accident investigation and that curiosity must be satisfied.

As you take the minds of your listeners through the detailed steps of the investigation processes using factual data from past reports of accidents, you are implanting preventative inputs that relate to their past experience. "Yeah, that could happen to me, I remember when I took off with one generator out." "Gee whiz, the board is sure thorough in checking switch positions." "I sure won't do that again."

Explaining how the board examines maintenance and material factors may enlighten some new flight line maintenance officer to ponder, "Humm, better take another look at that drag chute problem we've been having. Maybe I should submit another EMUR."

How about the younger pilots (who are usually the most curious)? The knowledge of the systematic look into the previous 48 hours of a pilots' activities may deter them just a little more (than any regulation of crew rest could) from extending their physical capabilities prior to a flight.

What about AFR 60-16 violations and the board's look-see into this area? "Yeah, man, I was lower than I should have been on that last low level, what if I had a birdstrike? Maybe I shouldn't have been there."

How about that visibility on the range, you flight leaders? What would a board say to your last Wednesday's flight when Three overtook Four in a dive bomb pattern (a near miss)? How would you write that up in an accident report if you were investigating officer?

Once everyone knows how and what an accident board

really looks for there will be a better understanding of why accident investigations are a necessary task for prevention, even if it is always after the fact.

New inroads to aerospace safety have developed with the space program and not entirely as a result of catastrophic mishaps. These programs, entitled Systems Safety, Engineering Safety, Human Factors Safety, use scientific engineering techniques but still rely on material developed from investigative processes. These newer techniques will eventually be used in all aspects of safety including the day to day operation of a tactical unit. The stigma of a wing safety program being a separate entity from the operational mission will disappear. Accident investigation training is a solid foundation for the application of the newer principles.

I believe that if everyone had some degree of accident investigation training they would subconsciously reduce the number of things they do wrong. Simple isn't it? In summary, I've said, "Let's train everyone to investigate accidents and let's use accidents to train everyone." Are you still frowning, Mr. Squadron Commander? ➤

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TAC TIPS

...interest items, mishaps

BUM STEER

The Provider touched down after its twelfth sortie of the day. On the following takeoff the bird swerved right when the airspeed climbed thru 60 knots. The pilot aborted with max reverse and braking. He couldn't get the nose wheel steering to turn to the left. When the right side of the runway looked too close he brought number two engine out of reverse. Unbalanced power and differential braking skidded the nose wheel, but the bird eased off the right side in spite of it. Fortunately, the area was clear of obstructions and no damage resulted.

Investigators found the arm on the steering valve broken. After disconnecting the nose wheel steering plumbing the bird departed for home. The broken arm had indications of a previous crack. This is a sneaky type of failure. The steering actuator valve will remain in its position at time of the arm failure. In out of neutral, hydraulic fluid is ported to one side of the steering actuator, driving it to full extension. The steering valve centering cartridge will not do its job and nose wheel steering is inop. Can't be called "fail-safe," can it?

SOCIETY OF WILD WEASELS
4th ANNUAL CONVENTION
16-18 October 1970
Las Vegas, Nevada

For information write or call Major
Robert F. Lewis, P.O. BOX 2202, NELLIS AFB,
NEVADA 89110 — Ext. 2920/4815

PLATFORM PROBLEM

The Herky slowed down and the loadmaster secured the left paratroop platform. After installation he checked it out with "foot pressure." The platform broke and departed the bird. Fortunately, the loadmaster managed to stay inside the bird. After a one-time inspection the unit found several platforms with cracks, mostly near hinge points. They're submitting an EUR and briefing C-130 crews on hazards of checking cracked platforms in flight.

BAD BRAKES, OR BAD BRAKING

The O-2 driver tried two takeoff runs and aborted both times. His acceleration didn't satisfy him and he suspected a dragging brake. Each time he returned the crew chief checked brake assemblies and power plant performance, but found no deficiencies. A test flight crew took over and an hour and a half later decided on a high-speed taxi test after finding no outward evidence of brake malfunction.

After several turns and brake applications they didn't see or hear any signs of brake drag at ramp speeds. And engine output appeared okay. So, they figured the next step was a higher speed check on the runway. They started at midfield on the 3000-foot strip and tested left and right brakes. No evidence of dragging on that run so they reversed heading and started down the full length of the runway at takeoff power. At about 60 knots, the pilot pulled throttles and stepped on the binders at 50 knots with 1500 feet remaining. Again, they discovered no power or braking problems. Then they decided on one more conclusive check of the O-2's power and braking.

Holding brakes at 2200 RPM on his pusher-pullers, he released and checked engine instruments and acceleration.

with morals, for the TAC aircrewman

up to about 45 knots. Then he retarded throttles and braked down to a high-speed taxi of 30 knots (winds unknown). Passing midfield, he elected to roll out to the end of the strip. With 800 feet to go he applied brakes to slow down and turn off the runway. By this time there was nothing remaining; he shutdown engines as he rolled off the runway, brake pedals horizontal. A mound of dirt sheared the nose gear; the nacelle and front prop burrowed in the dirt until the tired bird slid to a stop. The crew stepped out unharmed.

The unit wants Dash One amplification on procedures used after heavy braking. Meanwhile, they're requiring a 15-minute cooling off period after each excessive use of , or takeoff abort.

is will avoid future taxi-test-to-destruction efforts by enthusiastic aircrews . . . and provide interim braking guidance until engineers design that perfect aircraft braking system that never heat fades.

DOWN, BUT NOT OUT !

While descending in a 35-degree bank at 15 inches and 1500 rpm with flaps up and airspeed about 145 knots indicated, the Caribou pilot heard a loud noise and felt a violent downward pitch. With less than 2000 feet of altitude to play with, he attempted to pull out of the resulting 30-degree spiral, but received no response from elevator inputs. Leveling the wings, he applied power and dropped the gear for a possible crash landing short of the field. The added thrust and use of elevator trim slowed his rate of descent. Fortunately, he was lined up with the runway, but still in a nose-low attitude and aiming short. At 145 knots he dropped 15-degrees of flaps and ballooned onto the runway. He touched down nosewheel first and settled onto the main gear with power withdrawal. Reverse thrust and brakes stopped the bird okay.

Maintenance investigators found stripped threads on

the horizontal stabilizer drive actuator nut. The actuator dropped through, causing the horizontal stabilizer angle of incidence to change from a normal one degree to five degrees positive. They inspected all their horizontal stabilizer actuators for serviceability and plan a replacement cycle when new parts are available. Their EUMR suggests a time-change on actuators.

PART-UP, PART-DOWN FLAPS

The C-123 descended through 2000 AGL at 130 knots indicated, flaps in takeoff position. During his right turn to a base leg the pilot called for landing flaps. As the flaps passed through 40 degrees he heard a loud cracking sound; the left wing dropped and the bird veered sharply left. Full right rudder and aileron weren't enough to level the wings. Meto power on number one engine and flap retraction to takeoff position regained control. A quick wing scan revealed that the left outboard flap was ten degrees above full-up position. After regaining control with asymmetric power, the pilot completed his flaps part-up, part-down landing.

Maintenance troops found a broken left outboard flap hinge. They added another EUMR to the four they've submitted this year.

MISSED THE BOAT

The blue canoe IP practice-feathered number two prop during a student's proficiency check. When he attempted an engine restart the stubborn prop resisted all efforts to make it work again. To add to his power problem, number one's generator failed, leaving him a battery only for electrical power. It wouldn't crank the prop out of its streamline position. So his simulated emergency turned into an actual. After a successful single-engine landing the IP discovered that the prop unfeathering accumulator needed servicing. Apparently, a blue canoe phase inspector "missed the boat!"

LEFT ...OR... RIGHT ?

"Rog Junction Tower, Rye 22, understand landing runway 21R, have lights in sight, altimeter two niner . . . etc."

Nothing unusual about this pilot's response to tower landing instructions. It's a routine night time landing at one of the several military airdromes equipped with parallel runways. Or is it?

Not so, if you're the pilot all lined up on the "right" runway as shown here. You're about to land your favorite flying machine between a line of 100-foot runway lights and 1000-foot distance remaining markers!

This letter tells how it happened at one of TAC's bases:

Night Runway Illusions

TAC (OSF)

There have been several instances in the past where pilots landing at Nellis AFB on the inside runway (21R/03L) have reported the illusion of dual runways caused by the 100-foot runway lights and the 1000-foot distance remaining markers. At least two pilots have very nearly landed off the side of the runway because of this illusion.

This circumstance is usually reported by transient pilots making an approach when only one runway is lighted and the other runway is undergoing maintenance and is unlighted. Even though the pilots are briefed by the tower operator that one runway is closed, they still expect to see dual runways. It's at this time that the lack of other lights in the area for reference and depth perception cause the illusion to manifest itself.

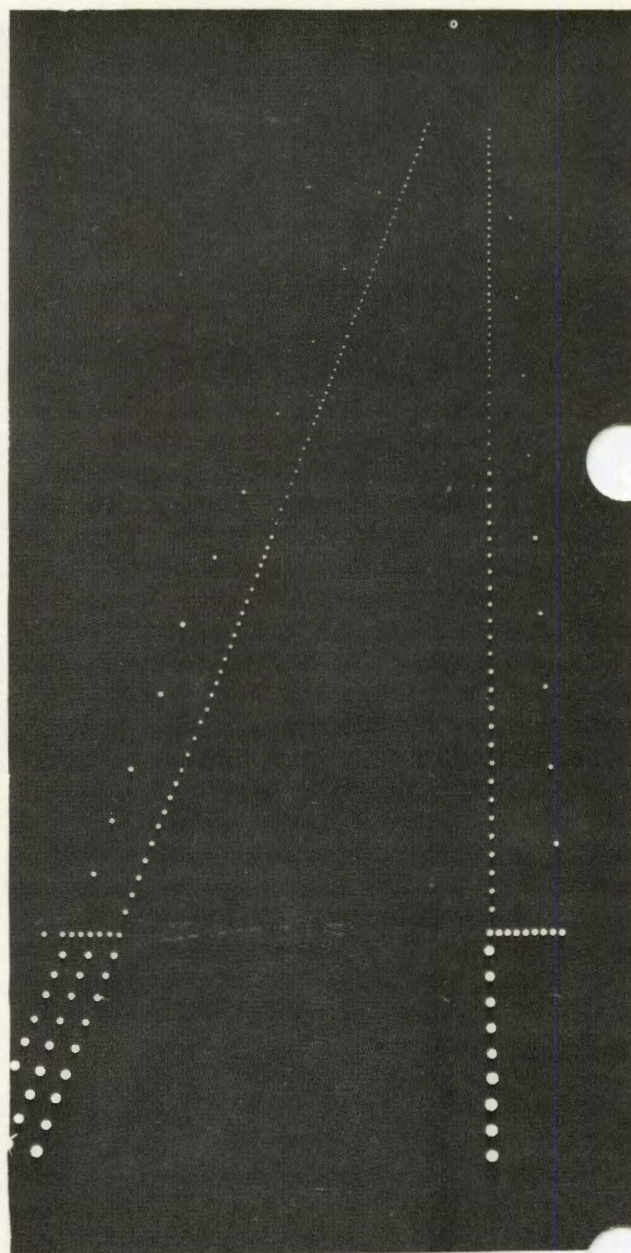
Most pilots never see the illusion of dual runways even when they try. We are attempting to educate the ones at Nellis who see it differently.

LLEWELLYN KENISON, Major, USAF
Flying Safety Officer

At Nellis, this problem isn't helped by the approach lighting system. Three different patterns are used for the four approaches. Perhaps this is not unusual either because the FLIP Charts illustrate ten FAA approved

approach lighting systems currently used at civil or military airfields.

Regardless of the cause, pilots have been taken in by night time runway illusions. And as far out as it may seem, chances are it may happen again. But maybe not, if jocks recognize that no man is immune from being deceived.



TAC TALLY

AIRCRAFT ACCIDENT RATES

* Estimated

UNITS

MAJOR ACCIDENT RATE COMPARISON

	TAC		ANG		AFRes	
	1969	1970	1969	1970	1969	1970
JAN	6.8	4.8	28.9	5.9	0	0
FEB	6.2	3.9	12.8	2.6	0	0
MAR	6.8	4.6	12.6	1.7	0	0
APR	7.4	4.9	15.1	2.4	0	0
MAY	7.5	6.2	12.9	3.6	0	0
JUN	7.2	5.5	12.6	3.9*	0	0
JUL	7.4		11.3		0	
AUG	7.3		11.5		0	
SEP	6.9		10.5		0	
OCT	7.1		9.9		0	
NOV	6.6		9.4		0	
DEC	6.8		9.5		0	

	THRU JUNE			THRU JUNE	
	1969	1970		1969	1970
9 AF	3.1	2.2	12 AF	9.3	8.3
4 TFW	7.4	0	23 TFW	11.1	7.9
15 TFW	0	4.7	27 TFW	0	6.9
33 TFW	20.3	0	49 TFW	0	10.3
4531 TFW	0	8.0	479 TFW	12.1	13.8
			474 TFW	27.2	0
363 TRW	11.4	5.6	67 TRW	0	14.7
			75 TRW	7.4	0
316 TAW	0	0	64 TAW	0	0
317 TAW	0	0	313 TAW	0	0
464 TAW	0	0	516 TAW	0	0
4554 CCTW	0	0	58 TFTW	12.4	20.6
			4442 CCTW	0	0
			4453 CCTW	6.9	0
TAC SPECIAL UNITS					
1 SOW	4.8	9.7	2 ADG	0	0
4409 SUP SQ	0	0	4500 ABW	7.6	0
4410 CCTW	12.0	0	57 FWW	17.3	0
4416 TSQ	0	0			

TAC SUMMARY

	JUNE 1970	THRU JUNE	
		1969	1970
TOTAL ACCIDENTS	2	38	25
MAJOR	1	32	23
MINOR	1	6	2
AIRCREW FATALITIES	2	19	20
AIRCRAFT DESTROYED	1	24	20
TOTAL EJECTIONS	1	20	14
SUCCESSFUL EJECTIONS	0	16	8
PERCENT SUCCESSFUL	0	80	57

