

for efficient tactical air power

## TAC ATTACK

#### MARCH 1970 VOL, 10 NO. 3

TACTICAL AIR COMMAND

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JAMIE SEZ:

Unfortunately, the most effective accident prevent motivation is someone else's wreckage. Keep the informed.

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#### TACRP 127-1

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#### pride and supervision

As TAC's new Chief of Safety, I look forward to this monthly editorial that allows an old fighter jock to express his ideas, and offer suggestions for improving the accident prevention program of the best organization in the Air Force.

With that as introduction, let me pass on to you working troops two thoughts in my initial attempt at offering "words of wisdom."

If we as commanders and supervisors can instill a deep sense of pride in each individual from commander to lowest-working-troop level throughout our units, then the majority of TAC's inherent safety problems will solve themselves. It has been proven to me many times in my flying career (and I am one who always feels that my soundron or wing is the best in the Air Force) that people pride in themselves and their organization seldom



make mistakes; and that statement covers everyone from the fighter jock out on a gunnery range to the loadcrewman checking for stray voltage.

And here's my second "blast." How many times after an accident/incident have you heard the comment, "Well, you can't fly the airplane for them," or, "You can't be looking over the shoulder of loadcrewmen and maintenance men all the time!" This type of statement I just can't buy. It usually comes from a supervisor feeling a bit guilty because his briefings or instructions failed to prepare his people, or he realizes that his flying program still has some "loose ends."

I'll venture a broad statement based on my personal observation during many years experience in the flying business: A contributing supervisory cause enters into the picture in practically all personnel-error accidents. People-problem accidents usually result when something out of the ordinary occurs and the individual involved makes a mistake in his attempted corrective action, I believe that not too much in the flying business is brand-new, and if the individual's supervisor covers that out-of-the-ordinary situation, or through adequate command and control provides a built-in margin of safety, the accident will not occur. The pilot will respond with the correct actions, or learn from his error without its reaching accident proportions. As a result, he'll gain valuable know-how that all new (and some old) heads require, without having to repeat painful mistakes.

In TAC's primary mission of training, the old, proven method of "walking before running" will add greatly to our chances of bettering 1969's fine safety record. Large measures of good, strong supervision coupled with individual pride in performing to the best of one's ability, will go a long way in cutting down TAC's costly personnel-error accidents.

Virgil K. MERONEY, Colopel, USAF

Chief of Safety

## CAN BANKRUPT YOUR FLYING BUSINESS

have you ever seen an actual downdraft doing its sneaky stuff off the approach end of a runway?

We haven't either. That's why the lead photograph caught our eye. And the accident investigator's use of a smoke grenade is a clever way to illustrate a "sinking situation" waiting to mousetrap unwary pilots driving down final at too-few-knots above stall into hilltop, absolute-minimum facility air patches. The picture's scattered assortment of airplane parts the bird shed after hanging its gear below the embankment lip also dramatizes a downdraft's dirty deed.

It can happen to you. And don't think that downdrafts are a phenomenon confined solely to mountain-top runways. A lesser amount of "downdraftitis" can lead to why-did-l-land-short embarrassment at some sophisticated

Grenade smoke follows downslope downdraft off approach end of runway.



FIGURE 1 - MOUNTAIN WAVE

side strips not necessarily

After examining the pictured end-product of low-airspeed approaches and disguised downdrafts we contacted Captain James F. Hines, 5th Weather Wing, about wind phenomena involved. He provided some reasons for, and diagrams of irregular wind movements over terrain features. They're worth review by flying types.

Captain Hines explained that downdraft landing accidents are avoidable if pilots will keep in mind how terrain irregularities change wind patterns. There are two significant wind phenomenon to consider: (1) mechanical turbulence; (2) mountain breeze and valley wind.

Mechanical turbulence results from wind flowing over uneven terrain. When air near the surface blows over any solid obstruction (hills, hangars, high-rise apartments, and other man-made mountains) it's disturbed and transformed into a complicated arrangement of irregular air movements.

Most pilots find mechanical turbulence readily recognizable in its visible extreme, the mountain wave cross-sectioned in Figure 1. They've encountered its familiar cloud forms while flying over mountainous country. Or, if not there, on a weather briefing slide during annual instrument refresher courses. As a result, the distinctive lenticular clouds and that mean roll cloud are respected and given a wide berth when seen or reported. If they don't and wander into one at the level of the pictured airplane, they'll be mechanical turbulence believers before the mountain wave turns them loose...hopefully, with a whole airplane.

The difficult downdraft recognition problem that a majority

of jocks face centers around mechanically-induced wind irregularities without visible "danger signals" in the form of lenticular and roll clouds. Sly downdrafts can occur in lower wind speeds and dry air masses that don't provide prominent "Caution – Downgrade" cloud signs.

The character of wind flow is also disturbed by uneven terrain at low wind speeds. Figure 2 demonstrates that lesser downdrafts can be generated by winds around the 20 MPH range. They're not great in vertical vector, but can be the few knots you can't spare if you're on the ragged edge of a stall. And the "disturbers of windpeace" aren't always in your airfield environs because Mother Nature put them there. Some sizeable structures that disrupt wind flow are self-inflicted ... think about the airfields you fly in and out of. Beside nature-provided dropoffs at either end

# DOWNDRAFTS



SURFACE OBSTRUCTIONS CAUSE EDDIES AND OTHER IRREGULAR WIND MOVEMENTS

of the runway, consider the close proximity of tall, slab-sided buildings. They're all contributors in their own little mechanical way to airflow disruption . . . and downdrafts.

Turbulence strength depends on wind speed, surface roughness, and air stability. The changes in wind structure can extend upward two to 20 times the height of the disrupting obstruction. After passing over the offending obstacle, wind change is mainly in the form of downdrafts. Farther downwind there are slight, induced updrafts.

Number two phenomenon, mountain breeze and valley wind are illustrated in Figures 3 and 4, respectively. A mountain breeze is a downslope wind component triggered



Impact points of main gear below lip of approach end embankment

by nighttime cooling. The maximum we d velocity in a valley caused by slope winds usually occurs g the period of greatest daily cooling, about 0300 to 0600 hours local. And here's a point for pilots to ponder, especially on night, low-level navigation runs in mountainous terrain. Mountain breezes can combine their after-dark downslope wind component with downdrafts caused by mechanical turbulence. When they join wind forces, their cumulative effort intensifies a mechanically-induced downdraft. So, night low-levels, arrivals, and departures can suffer a downdraft combination of mechanical turbulence and mountain breeze in hilly country.

Valley wind is the obverse side of the mountain breeze coin. It's an upslope component wind reaching its greatest strength at maximum heating time daily. Also in opposition to mountain breeze actions, valley wind tends to reduce downdraft velocities are mechanically-induced by

lar wind flow over hills and obstructions.

As a rule of thumb: valley wind reduces daytime mechanical downdrafts; mountain breeze intensifies nighttime mechanical downdrafts.

No pilot ever intends to close out his Form 781 with, "Undershoot, aircraft no longer airworthy." And ironically, most approach-end broken birds result from jocks trying to avoid a similar fate off the far end. With downdrafts present, minimum airspeeds on final don't permit the luxury of upward pitch corrections without applying power first... and fast!

Downdrafts on final are a little like bankdrafts. You need a favorable balance in your airspeed account before you make a quick pitch withdrawal. Otherwise, you might end up with a bankrupt bird . . . and out of the flying business.



FIGURE 3 - MOUNTAIN BREEZE.



FIGURE 4 - VALLEY WIND.



The windsock's lined up with the runway - the airplane's crosswind.

Tactical Air Command

mit Achievement Award

Our congratulations to the following units for completing 12 months of accident free flying :

136 Air Refueling Group, Hensley Field, Dallas, Texas 1 July 1967 through 30 June 1968

33 Tactical Reconnaissance Training Squadron, Shaw Air Force Base, South Carolina

15 March 1968 through 14 March 1969

29 Tactical Reconnaissance Squadron, Shaw Air Force Base, South Carolina

15 June 1968 through 14 June 1969

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- 481 Tactical Fighter Squadron, Cannon Air Force Base, New Mexico 1 January 1968 through 31 December 1968
- 43 Tactical Fighter Squadron, MacDill Air Force Base, Florida 20 January 1968 through 19 January 1969
- 39 Tactical Airlift Squadron, Lockbourne Air Force Base, Ohio 30 August 1968 through 29 August 1969
- 464 Tactical Airlift Wing, Pope Air Force Base, North Carolina 27 October 1968 through 26 October 1969

779 Tactical Airlift Squadron, Pope Air Force Base, North Carolina 27 October 1968 through 26 October 1969

#### ctical Air Command

#### Crew Chief of the Month

Staff Sergeant Richard J. Letter, 4531 Tactical Fighter Wing, Homestead Air Force Base, Florida, has been selected to receive the TAC Crew Chief Safety Award. Sergeant Letter will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.



SSgt Letter

#### Tactical Air Command

Maintenance Man of the Month

Technical Sergeant Vincent J. Ogrinc, 1st Special Operations Wing, Hurlburt Field, Florida, has been selected to receive the TAC Maintenance Man Safety Award. Sergeant Ogrinc will receive a letter of appreciation from the commander of Tactical Air Command and an engraved award.



**TSgt Ogrinc** 





#### Maintenance Man Challenge

by SMSgt Paul E. MacDonald

SMSgt Paul E. MacDonald began his career in the Air Force immediately after graduating from high school in Brewer, Maine.

He started his 20 years of aircraft maintenance experience as an assistant crew chief on a P-47 Thunderbolt. He was a crew chief on the first of the jets, the F-80, and worked on all types up to and including the F-111A.

His overseas assignments include the Korean action, Morocco, Germany, and Thailand.

SMSgt MacDonald has had experience in almost every phase of aircraft maintenance including electronics, quality control, all levels of supervision and category testing of new aircraft.

Before joining the Thunderbirds in March 1969, SMSgt MacDonald was assigned to the F-111A test force at Nellis AFB, Nevada. He has been selected for CMSgt in the 1970 promotion cycle.

he USAF Air Demonstration Squadron, the Thunderbirds, is a unique organization and team, and yet, just another squadron within the Tactical Air Command. From a maintenance point of view it is identical to a normal tactical squadron with a few variations because of mission requirements. We operate under TACM 66-31 and all other directives normally affecting tactical squadrons. This new concept of squadron maintenance is right down our alley as we have to be a self sustaining unit in every way possible to complete our highly specialized mission.

Our maintenance concept is actually divided into two

distinct operations during the year. We have a training season and a show season.

The training season starts on January 2nd and ends on our first deployment to a showsite, early in March. Someone once referred to this period as our "slack season." It is anything but that. During this time we try to get all the little extras done that we cannot get to during the show season. Whenever possible, major maintenance such as engine changes, extensive TCTOs, and major phase inspections are scheduled to come due during this time. Training of newly assigned pilots increases our fly? schedule to 45 sorties a week plus the usual add-ons and s that everyone experiences.

nnual training requirements for all maintenance personnel are a must during this time. This includes all GMT, proficiency training, annual evaluations, and of course, that trip to the firing range that comes around once a year.

We also evaluate our past year of show deployments and make changes or adjustments to make it a smoother operation for the coming year. The majority of maintenance personnel changes are accomplished during the training season and we strive to give them a good breaking-in period on our unique operation prior to their first show deployment.

The show season is our moment of truth. All of our hard work, long hours, and elaborate planning has got to pay off now. Here is the time that makes being a Thunderbird just a little bit different.

Did you ever get nervous doing a job because someone was looking over your shoulder at every move you made? Try a full day of maintenance and flying with 40,000 people watching from behind a restraining rope 100 feet away. Upon completion of the demonstration be prepared for questions you never dreamed of when the crowd is allowed to come forward for close hand inspection of the aircraft. Meeting the public and giving a lot of them their

\*\* opportunity to come in contact with the Air Force is nportant part of our job on the team. A few shows an enthusiastic crowds behind you, and a couple of public relations trips to hospitals to meet some children who want to know all about the Thunderbirds, will make you so proud of the patch you are wearing and the job you are doing, that you would not change it for a job anywhere.

As a maintenance man on the team you will not find the maintenance work different than any other organization. We are starting our second year with the F-4E aircraft and they are standard F-4s with very little modification. Specialists find this assignment a little more demanding than their past experiences. Due to the limited amount of personnel we can carry to a showsite, specialists are assigned to specific aircraft as assistant crew chiefs. This gives us a team effort on every aircraft.

This team is maintained throughout the year for both training and show season. The specialists complete proficiency training and testing on aircraft servicing, towing, drag chute installation, and general maintenance. This extra effort and training program makes our entire maintenance complex the finest trained unit in the Air Force. Sharing of the work load and the real team spirit generated gives everyone pride and a feeling of accomplishment with each achievement of the nderbirds. Early in the conversion program to the F-4 we learned a few things the hard way. The many panels and doors on the belly of the Phantom are in perfect position to cut your head if extreme care is not taken during work in that area. We had three head cuts in short order. To improve safety of all maintenance in our hangar, we designated it a "Bump Hat" area. We procured plastic bump hats and these are worn during all maintenance in the hangar. Not one injury has occurred since this was adopted. We now have some bump hats with gouges in the plastic that would otherwise have been in the man's head.



Bump hats are worn during all phases of maintenance in the Thunderbird hangar.

TAC ATTACK

#### a maintenance man challenge



"Booties" prevent damage to unique Thunderbird paint scheme and provide non-skid safety on smooth surfaces.

We keep our unique paint scheme highly polished and waxed. This makes our wings and fuselage areas v slippery. The white surfaces readily pick up black s marks from boots and require many hours of cleaning. To reduce this problem we needed a shoe or boot cover that would not mark the paint and would be non-skid to make the areas safe to work on. Surgical shoe covers proved to be the answer. These "booties" are worn anytime a man is required to work on these surfaces. The non-skid material does not mark the paint and they adhere to any smooth surface better than the standard boot.

Safety has to be one of our main concerns. Every man on the team has a job that is vital to completion of its mission and injuries hurt not only the individual but the whole team effort.

When one of our maintenance men travels in the back seat of our F-4s he makes sure he is up on all emergency, ejection, and ground evacuation procedures. His pilots may quiz him on these areas and he knows he had better know the answers if he wants to make that hop.

We are constantly checking each other for minor errors in everything we do. An unbuttoned pocket does not go unnoticed very long and you will be quickly checked if you start any aircraft maintenance with a watch or ring on. This habit of watching for minor details in everything we do soon makes every man aware that being a Thunderbird means being the best. There are no supermeon this team; just a group of men who are willing to maximum effort every day to make their organizat. true "Ambassadors in Blue."



The 1970 team.

**CTICAL AIR COMMAND** 



Capt Turczynski



Captain Raymond Turczynski, Jr., of the 16 Tactical Airlift Training Squadron, Sewart Air Force Base, Tennessee, has been selected as a Tactical Air Command Pilot of Distinction.

On a routine training mission Captain Turczynski was demonstrating maneuvers in a C-130 to two student pilots. A power-off stall had been completed; as power was reapplied an explosion occurred, and number two turbine overheat light illuminated. Fire was observed coming from number two engine. Captain Turczynski immediately initiated emergency engine shutdown procedures and discharged both fire extinguishers in order to put out the fire.

Captain Turczynski declared an emergency and

headed for the nearest airfield 25 miles away. He descended at higher than normal airspeed to prevent the fire from re-igniting. As flaps were lowered for landing the utility hydraulic system pressure dropped to zero, and it was necessary to hand-crank the gear to the down and locked position. A successful emergency landing was made by using reverse thrust and emergency brakes. Investigation revealed that the spacer between the first and second stage of the turbine had failed, causing the turbine to seize and sever the utility hydraulic system supply line.

Captain Turczynski's professional airmanship during a critical inflight emergency readily qualifies him as a Tactical Air Command Pilot of Distinction.

## Pilot's Printable Poetry Page

An aviator's windfall in the form of a POW's World War II diary crossed the editor's desk the other day. It contained some classic examples of the inspired, brown-shoe-days poetry that sustained the lagging spirits of downed aircrewmen spending involuntary TDY's in Germany's scattered Stalags. The authors are unknown and we're unable to give them much-deserved credit for boosting morale.

Perhaps some of TAC ATTACK's readers will recall the poet-pilot who authored these nostalgic notes. After you've wiped away that tear, send us his name. And in addition, if you have some not-too-boisterous ballads you've collected during your Air Corps/Air Force tours, send them along. We'll try illustrating them in future issues on our Pilot's Printable Poetry Page.

### With God in their P-51s

Back in the days of the second Great War Many of Uncle Sam's sons Began to write Air Force history anew. With God in their P-51s.

As big bombers flew on their everyday task The sergeants would fondle their guns. High up above them, churning contrails clear, Were their friends in P-51s.

Soon they arrived over the enemy's lair, And up came terrible flak. A hit! An explosion! Down went a Lib, With ten lads who'll never come back.

When enemy fighters swirl 'round the Libs, Mid the chatter of turret guns. We'll surely need help, why it's already here. Here come our P-51s!

Now homeward they drone, like great birds of prey, The shrill whine of in-lines they hear. The air battle is over, ere hardly begun, And their P-51s are still near.

The target's destroyed, they're back on their field, A sorrowful sun sinks in the West. Bomber crews trudge off, like weary old men, To seek their much needed rest.

As they sit by home fires and think of those days, And tell tales of valor to sons, They pray for saving young eagles who joined, With God in their P-51s.



# LOOK OUT !! HEADS UP !!



These two photos were taken 1.25 sec RF-84F flight. The flight of F-4s does or following frames. It's obvious that would have taken place less than 1.25

It isn't often that we have the chance to graphically portray an "almost" midair collision. The potential for catastrophe on these pages staggers the imagination. Any other actions by the six airplanes involved could have resulted in varying degrees of disaster, from losing one... to all six.

We're indebted to Major John Calhoun of the 187th Tactical Reconnaissance Group, Alabama National Guard, for the photos and narrative which follows.

Ed.

Some time ago while leading a flight of four RF-84Fs into Yuma MCAS, Yuma, Arizona we made a pass over the field at 12,500 feet for aerial photographs. The cameras were turned on and the extra picture button held down. This gave continuous operation of the cameras and allowed me to devote all my attention outside of the cockpit.

With the extra picture button depressed, a picture is taken every 1.25 seconds. While looking to my left, I saw two objects pass under the left side of my aircraft. I immediately turned to the right to see two Marine F-



not show up on either the preceding f a midair was destined to occur, it econds following the second photo.

> pulling up in very close formation. Then, undoubtedly realizing they had gone through our formation, they reacted by splitting up, the wingman in a fairly wild gyration. I then began to get reaction from my own flight. Number two on my left wing did not see them, number three felt a bump but did not see them, and number four went through the jet wash and broke off to the right. His reaction was also delayed, although he thought he had broken immediately to avoid collision. He had been flying in a slightly extended wing position which undoubtedly

d him. It appeared that the aircraft were in a slight

climb when they came through the formation and were not trailing smoke, indicating they were in AB at the time. From the photos, their closing rate is estimated at 500 to 600 kts, somewhat less than the closing rate of two fighters head on, which would normally be about 1200 kts.

The main point is: the brief time you have to react! This pictorial representation of time-and-distance emphasizes the need for the "see and be seen" concept. Had I seen them in the first picture I would have had less than 2.5 seconds to react and move my flight. Think about it! "One-thousand-one, one-thousand-two, one-thou... and that would have been it. Midair!"



#### ... interest items, mishaps

#### whap-whap-whap

This was the student's fifth air refueling mission in the F-105 and his first go at the probe-and-drogue bit. After being cleared from pre-contact to the contact position he established an excessive closure rate. The IP told him to slow down but he continued closing rapidly. The probe contacted the right side of the basket and the aircraft continued in beyond the normal contact position. The pilot then retarded power to back off for another attempt, but the basket and hose had wrapped around his probe. As he backed off, the hose separated at the boom and lashed back. The coupling on the hose shattered his canopy. He dropped away from the tanker with the hose and basket wedged between his probe and the forward fuselage. The IP then led him home for an uneventful recovery.

Because the pilot HAD HIS HELMET VISOR DOWN, HE ESCAPED INJURY TO HIS EYES from the plexiglas that flew into the cockpit at the time of hose impact.

#### ricochet

Following an uneventful air to ground mission, the ground crew found that a ricochet had struck their F-84 on the underside of its nose just forward of the nose gear door. The pilot was not aware of the strike. His firing dive angle was about ten degrees. It seems that the target area is quite sandy and a recent rain followed by a rapid freeze generated conditions conducive to ricochets. AMEN.



#### hypoxia

About ten minutes after takeoff, a T-33 pilot from another command noticed that his oxygen tasted, or smelled, foul or stale. He selected one-hundred percent, but noticed no improvement. The smell disappeared after a while so the flight was continued with a climb to FL 320, After about twenty-five minutes the pilot became hypoxic. One-hundred percent was again selected along with a pressure setting, and a descent to seventeen thousand was made. The pilot's hypoxia symptoms did not improve, he was now near unconsciousness. The bail-out bottle was activated and the hypoxia symptor disappeared. He headed back to his starting point seventeen thousand to stay above the weather and to clear a high mountain range. He became hypoxic a second time, and after clearing the mountain range, let down to traffic pattern altitude. The suspected cause of this incident is icing of the oxygen regulator due to high humidity. The oxygen checked out at 99.6 percent pure; this was double checked with another T-bird serviced from the same cart. The regulator and the pilot's mask were also checked and found okay.

Flight duration was 1.7 hours. From the narrative it would seem that the flight could have been terminated much earlier – as an "undetermined" accident. Or, failing that, a local to burn out fuel to landing weight followed by a comfortable investigation of the smelly oxygen.



#### with morals, for the TAC aircrewman

#### don't trust'em, old or new

On the new side, an F-4 being scrambled on an air defense exercise jettisoned both external wing tanks as the master switch was turned on. The aircraft had been preflighted with a complete engine run prior to cocking for the scramble, but the tank pins were in place. The cause was maintenance factor; the hydraulic transfer pumps electrical pin was connected to the external wing jettison circuit in the fuel panel cannon plug. Turning the master switches on energized the jettison circuit firing all four cartridges instead of de-energizing the transfer

s. Since the stray voltage check for the wing tanks nade with the master switches off, the miswiring was not detected. This was the first flight for this aircraft with wing tanks following re-potting.

And on the old side, the venerable T-33 tried to bite someone much the same way. Following the "quick check" and prior to taking the runway, the IP placed the auto-drop switch on and armed the bomb release master switch. Approximately fifteen seconds later both tip tanks jettisoned. The cause was a short in the left wing tip micro switch. The malfunction was duplicated ten times by two different teams. It is suspected that insulation within the switch broke down due to excessive wear or corrosion.

Drop tanks are not armament, but they can be just as deadly. If they are to be armed, as in the case of the T-33 – it must be done in the most isolated spot available. None of these four tanks burned, but they could have. In the case of the F-4 it's – "let's hope we're lucky" when they go.



#### F-4 ejection handle stays

An ASD study on redesigning the F-4 lower ejection handle has been completed and the decision is to leave it as is. The size, as well as shape and flexibility of the handle was under study – a different size and shape so that it could be grasped by the full grip of both hands (to prevent arm flailing at high speed bailouts), and flexible so that it would not be damaged by inadvertently stepping on it.

ASD says that no significant improvement can be gained by utilizing other handle designs, and recommends that the lower ejection handle now be grasped by a minimum of thumb and two fingers of each hand. "This will assure minimum possible risk of arm flailing up to aircraft speeds of 485 knots." They also recommend that personnel entering/exiting the aircraft "exercise extreme care to prevent ejection handle damage by inadvertently stepping on it."

#### cables and doors

This T-33 jock from another command leaped off on a test hop, rolling over a BAK-9 and BAK-12 in battery on the approach end. After cleaning it up he found the left main indicated unsafe; it remained so for two more retractions. He finally gave it up, checked all gear down, and landed. They found his left main gear door about fifty feet fron the BAK-9. It seems that the BAK-9 pendant cable was not pretensioned properly, allowing the nose gear to whip the cable. It caught the left gear door and tore it off.

19



he first runway to be grooved in Tactical Air Command was completed a little more than a year ago at Seymour Johnson AFB, N.C. At the time the grooving was being done, a wide range of opinion existed regarding runway grooving, including the need for grooving in the first place, cost-effective ratios for various grooving patterns and which one provides best coefficient of friction, and the possibility of creating a detrimental environment for aircraft, such as increased tire wear and excessive vibration.

Now that the Seymour Johnson runway has been used for more than a year a close look at its operational experience may shed new light on some of the pro and con arguments that were being offered before it all happened. But first, a description of the runway.

The SJ runway (08-26) is 11,758 feet long and 300 feet wide, the result of several revamping projects on the original 150 x 4400 foot strip built in 1942. Ten years ago, the center 75 feet of the 300 foot wide asphalt strip was replaced with portland-cement concrete. The center 70 feet of this concrete strip is the area now grooved, except for 1000 feet on each end which is not. Except for a couple of SEA asphalt strips, the groove pattern used at SJ is new, and untried at any stateside airdrome. The pattern consists of a series of 13 grooves, each one-quarter

inch wide and one-quarter inch deep, cut on two centers. Each series is separated from the next series by two feet of ungrooved concrete. (See Figure 1)

At the time the SJ groove pattern was selected, the NASA Langley Research Center was completing an extensive study on the subject. They determined by laboratory and actual testing programs that the most effective groove pattern (optimum coefficient of friction of tire to wet/dry runway) is continuous grooving of one-quarter inch deep and one-quarter inch wide grooves on one inch centers. But of course, grooving costs are directly related to the cubic volume of runway materials removed by cutting. Determining the groove pattern that provides an acceptable coefficient of friction (wet) for the least dollar cost is an important and practical goal. And this was one of the guiding factors that led to the SJ pattern. How the grooved SJ runway compares with other runways and various grooving patterns will soon be discussed, but first a look at what some of the people at SJ think about their grooved runway.

First of all, the runway has always had a good crown, forcing a fast rain runoff and preventing pool. formation. Because of this, F-4 aircrews queried about their experience on the runway before and after grooving were hard pressed to comment on noted differences in aircre

control, either wet or dry, especially when the generous

h of runway permits a normal no-brake, drag chute ng with room to spare.

On hydroplaning onset, aircrews also had little to offer, because none "recalled" experiencing the problem before or after it was grooved. However, most were quick to suggest that landing on the wet SJ runway was a lot different than landing on wet, ungrooved runways at other bases. At SJ, wet or dry, they always feel they "have a firm hold" on the runway, while at other bases when landing wet the "feel" is less decisive and sometimes "soft or floating."

A suspected fault of the grooved pattern voiced before the project was completed had to do with the alternating pattern of two feet grooved and two feet ungrooved. Some felt that this would affect antiskid systems, cause undue landing gear vibrations (similar to washboard alert strips sometimes used at critical highway intersections);



The Seymour Johnson AFB runway is grooved according to this pattern.



Wet/dry stopping ratio of groove patterns vary. Pattern at New York's Kennedy Airport (left) requires almost 50 percent more runway to stop when wet, while the pattern used at Beale AFB (right) requires only about 15 percent more.



#### GROOVY

and, especially when wet, set up an alternating high traction low traction surface which could be detrimental to tires and might lead to loss of control. However, aircrew experience on the grooved runway has not proved any of these suspected problems to be valid. The maintenance section has not noted any increase in antiskid failure; the tire section has noted some minor chevron cutting of the tire tread, and report only a few cases where chevron cuts on well-used casings may have influenced the decision to change a tire; and none of the aircrews reported anything that might be considered loss of control.

Other users of the SJ runway are a SAC B-52 unit and KC-135 unit. Except for minor chevron cutting (causing no tire changes), neither of the units reported unfavorable circumstances.

Another Air Force grooving project has recorded a different situation. At Beale AFB, the groove pattern used is one recommended by NASA as offering the best coefficient of friction. It's a continuous pattern of one-quarter inch square grooves on one-inch centers. However, the SAC equipment there is experiencing some severe chevron cutting and some tire shredding, on both retreads and new tires. To combat the problem, the depot



Chevron cutting at Seymour Johnson occurs on center treads of tire indicating a touchdown phenomena instead of braking. It occurs only occasionally and cannot be realistically predicted. This tire was cut when an F-4 came in with an engine bay fire, landing fast, with max braking. The surface cutting was not severe enough to damage tire integrity.



Rainwater landing on grooved runways drains immediately into grooves leaving runway surface texture almost free of skid-causing water buildup.



Rubber buildup at touchdown points does not appear to be more severe on grooved runways. To the contrary, draining water in grooves washes away most loose rubber laying in grooves.

is urging tire manufacturers to develop materials that can

Air Force to hold up new grooving projects until Air Force to hold up new grooving projects until autional research provides some possible answers to the tire problem at Beale.

A research project now underway to provide some of this information is called Combat Traction, a joint study by USAF and NASA. The program is utilizing a highly instrumented C-141, to measure and record those forces experienced during landing on various runway surfaces, grooved and ungrooved, and wet or dry. Though the project is incomplete, a preliminary report offers a good traction comparison of the SJ runway with several stateside and European landing strips.

To test traction capability of various surfaces, the aircraft landed at a standard weight and airspeed, stopping as soon as possible with maximum braking and no reverse thrust. For example, tests on ten ungrooved concrete runways provided the following information. The average stopping distance for the ten runways, dry, is 1009 feet. The average stopping distance for the same runways, wet, is 2199 feet. This gives a wet to dry landing distance, or traction, ratio of 2.18. Because the SJ runway was already grooved when the tests were started, it is not one of the ten tested for the ungrooved average, but it is safe to assume that before grooving it would have provided a similar wet/dry traction ratio.

owever, the SJ runway was one of several grooved tested under the same program. The wet/dry traction ratio of the SJ groove pattern surprised several critics as well as some of the personnel conducting the tests. The ratio is 1.37, with a dry stopping distance of 990 feet and 1355 feet when wet. This compares with other grooved runways as follows: This test shows that when landing on a wet runway at SJ, the pilot should figure on using about 37 percent more runway than if he were landing on the strip when dry, assuming he uses braking traction for his rollout.

In human life and dollar value, the grooved runway offers a new hedge against an old odds-maker, the out-of-control-off-the-runway accident. In other words, if the improved traction on a wet runway at SJ prevents one Phantom from running off, with little more damage than a collapsed nose gear, the whole grooving project is paid for. Dollar cost of the SJ project was about .089 per square foot of grooved runway for a total of \$60,751.50. The Kennedy International grooving projects cost from .153 to more than .20 per square foot.

Much is yet to be learned about the cost/effective factors for runway grooving. And more research and development is required to produce a tire that can withstand the forces created by new surface textures and higher coefficients of friction. But one thing is sure: eliminating some slippery runways is a valid way of reducing the number of dinged airplanes.



RUNWAY Seymour Johnson AFB	WET/DRY <u>RATIO</u> 1.37	STOP R. (In fe DRY 990	ANGE et) <u>WET</u> 1355	<u>GROOVE PATTERN</u> 1/4" sq grooves on 2" centers, with 2' grooved
				strips separated by 2' nongrooved strip.
Beale AFB	1.15	975	1122	1/4" sq grooves on 1" centers.
Midway (Chicago)	1.22	960	1174	1/4" sq grooves on 1 1/4" centers.
Kennedy (New York)	1.47	1090	1606	V-shaped groove, 3/8" wide at top, 1/8" deep, on 1 3/8" centers.
Average	1.31	1004	1314	

#### COMBAT TRACTION STUDY

**CATTACK** 



**BEFORE MODIFICATION** 



#### AFTER MODIFICATION

Here's a sample showing a wiring modification in the right hand engine bay. The improvement is obvious.

# STATUS REPORT

by CMSgt Ervin D. Vest NCOIC F/RF-4 Maint Br Hq TAC, Langley AFB, Va

**TAC ATTACK** printed an article in the September 1969 issue on the F/RF-4 engine and engine bay fire problems. Many things have transpired to correct the problem since the publication appeared and we believe that a few of the most pertinent aspects of the corrective actions should be brought to the attention of our reac

First, TAC convened a conference at Eglin AFB on Aug 1969 to define the problem and identify contributive factors. Air Force and industry representatives were invited to attend. As a result, some seventy-two items of hardware and technical order deficiencies that directly contributed to the chafing and fire problem were identified. These items were formalized and forwarded to the System Support Manager and ASD for action. A follow-on conference was convened at ASD on 9 September to decide on a course of action. Since the items identified fell into two different categories, technical orders and hardware deficiencies, separate efforts were initiated. McDonnell Douglas and General Electric were already working on the hardware problems so TAC and AFLC attacked the technical order deficiencies. It was necessary to identify the publication changes and the type and size of illustrations required. TAC and 00AMA developed the changes in conference with the contractor's technical data personnel and a timetable for the improvement program was established. The task was enormous due to the development of new data, the number of technical orders that required revision, and the timetable that had to be met.

In addition, TAC was tasked to kit proof the hardware changes and verify the new technical orders on e



Another example of what has been accomplished in a relatively short time. The top photo shows what was.... the other shows how future production models will look.

model of the aircraft and stay within the established time frame for release of the TCTOs and revised technical orders.

A new look in our engine and engine bay technical orders evolved from the effort. The engine bays were zone oriented to afford instant identification with a particular area. Detailed clamping and clearance criteria for hardware were included. A base line configuration for the engine bays of each model was established and an integrity guide was published to aid maintenance personnel in inspecting and maintaining the new configuration.

These technical orders were verified by TAC maintenance personnel at Nellis AFB in December 1969. hardware change kit proofing and trial installation were re-verified at the same time. The Nellis effort ended the Tactical Air Command participation in the development of the program. It is felt that the engine bay fire hazards will be greatly reduced, or eliminated, when the new hardware is installed and the engines and engine bays are standardized and inspected periodically by the new technical orders. An enormous task lies ahead of TAC F/RF-4 units in the expeditious accomplishment of the TCTOs.

The maintenance man has been given an excellent tool with these new technical orders; however, the final responsibility rests upon his shoulders to follow them religiously to assure operational safety of our F/RF-4 weapons system.

#### CHOCK TALK ... incidents and incidentals

#### fod-a new one

This F-4 was number two of a flight of four for a night ground attack mission. Takeoff was normal till the aircraft commander tried to get the throttles out of burner. The throttles would not move together and were extremely difficult to move individually. Afterburner was finally terminated on the left engine but the right throttle would not move below minimum afterburner range. The pilot moved the throttle to full AB and pulled it back - hard. It came out of AB and restored normal throttle response to both engines.

Two then joined up with lead who assumed a chase position and directed number two to dump fuel and recover. After landing investigators found an anti-skid-inop indicator lens cover in the throttle quadrant. The aircraft wasn't missing its own and it is impossible to determine how long it has been in the throttle quadrant. Hard to believe, isn't it??

#### armorer turns bombardier

An A-7D jock pulled off target after a successful low angle strafing pass. That was when the range officer advised him that he also dropped a 500 pounder, one of 12 carried on stations No. 2 and No. 7. The pilot declared hung ordnance and returned to base with 11 low drags still locked on the MERS.

Investigators found FOD impact marks (including a two and one-half inch cut) on one of the 10N MER racks, between the fairing panel and trigger mechanism, indicating that something had jammed the trigger assembly forward releasing the bomb. The inspectors also found that a fin access panel was missing from one of the bombs. And it didn't require much study to determine that the FOD marks on the damaged MER could have been caused by a maverick fin access panel.

Now, at this particular base, last chance inspectors have another item on their checklist: Bomb fin access panels secured - Check.

#### spontaneous initiators

Several F-4s were sitting on the line, ready for flight. At aircrew reporting time ground crews removed canopy safety struts and seat pins (except for face curtain and gun pins) according to preflight checklists. Then the launch was delayed when the mission was placed on a weather hold. Thirty minutes later the squadron maintenance officer directed that all canopies be recleaned to eliminate mist collected on the inside and outside of the glass.

One of the ground crew was working on the rear canopy of their bird. The flight chief on the ladder, and his assistant squatting on the left intake duct. That's when both men heard a popping noise, which turned out to be an initiator firing.

At no time did either man approach the initiator which is well down inside the cockpit, nor was there any object found within the cockpit which could have fallen from one of the men's pockets, tripping the mechanism. The crew chief had not violated existing checklists nor work cards.

The initiator was sent to the depot for teardown inspection, and to play it safe, ground crewmen are doing no work on their birds unless all pins are installed.

#### with a maintenance slant.

#### checklist checker leaves impressive mark

An F-100 returned from a combat mission with a three-foot long dent in the left drop tank. The dent, one-foot wide and ten inches deep, was marked with red paint. A red painted BLU-27/B had been dropped on target minutes before.

While looking for what caused the unstable bomb use, the TER gun was removed. A large piece of burnt material was found in the elbow section. The material seemed to be the remains of a paper-wound grease pencil, the kind used by munition loadcrews to mark-off their checklist.

Investigators believe the FOD was sufficient to partially block the gas ducts of the TER gun and cause a soft release on the BLU-27/B, allowing it to float beneath the aircraft.

#### short screws

After terminating afterburner, number two Phantom on a wing takeoff lost RPM on number one engine and noticed an EGT rise, these signs were followed by a vibration. Number three advised him that flames were coming out of his right engine so he pulled it to idle and made a half-flap recovery. On the ground, investigators found a screw missing from panel 6L which is located just ahead of the engine intake. They suspected that this screw was ingested by the engine, but won't know till the engine teardown is completed.

Aeanwhile, they got curious about the type screws

TAC ATTACK

holding this panel on and checked both 6L and 6R. They found thirty-three screws were the wrong length, too short. All other aircraft were checked and sure enough, more were found. All improper length screws were replaced with the correct item, PN-3MFR59-10R13.

#### eager beaver

After takeoff on a local cadet orientation ride, a T-bird pilot from another command couldn't move the gear handle to the up position. The manual override had no effect, and since the RCR was reported as 14, the pilot remained airborne and burned off fuel. A normal landing, taxi in, and shutdown were then accomplished. The crew chief discussed the problem with the pilot after shutdown and while the crew was still in the cockpit. Assuming the gear pins were in, he requested that the pilot attempt to move the gear handle up. The pilot refused and instructed the cadet in the rear cockpit to unstrap and leave the aircraft.

Undaunted, our eager crew chief slipped around to the rear cockpit and, disregarding the pilot's instructions, asked the cadet to try to move the rear cockpit gear handle. The cadet did so, but with no effect. The crew chief then reached in and depressed the rear cockpit override lever, the gear handle came up... and the nose gear folded. Both main gear downlocks also unlocked due to trapped hydraulic pressure, but neither gear collapsed. Damage was limited to the nose gear doors, the nose gear activating yoke... and, we hope, the eager beaver's ego. If he would have been more eager to complete his normal tasks, the gear pins would have been installed and he could have played games with the gear system for the rest of his shift.

# **EJECTION SEAT SHACKLE GUARD**

An ejection system is built with the hope that it will never be used. However, since it is there to save lives should the need arise, every effort must be made to provide the best system and then maintain it in perfect condition; mediocre or even "pretty good" care of the egress system can not be tolerated. Life is priceless. Nothing less than the best should, or can, be expended to save that life! Let's get down to cases and discuss an area where something less than the best invites disaster.

During the development of the H-7 rocket assist ejection seat, the need was seen for a device that would eliminate the possibility of the drogue parachute lines entangling with the scissors assembly during ejection. This was accomplished by attaching a guard (see photographs) to the lower right stationary member of the scissors assembly. However, as sometimes happens, the incorporation of a device to prevent a problem can complicate the area and give birth to new problems because not enough information has been presented about the new item to avoid maintenance and usage errors. So it is with the new "scissors guard."

If the drogue parachute bulges slightly because of being packed a bit too loosely, the scissors and shackle cannot be rotated far enough to keep them out of the way of the closing canopy. When this occurs, the local "cure" (unauthorized, unacceptable, but prevalent) consists of pounding the scissors with the palm of the hand so as to compress the drogue chute and its lines. While this might have been relatively harmless before, it now bends the guard and spells DANGER. Why?

Well, let's take a closer look at the action involved by studying the following "stop action" sequence photographs. Together, they show the instant during the ejection cycle that the scissors action is critical. Ejection has taken place and the drogue chute has deployed and blossomed, pulling the scissors assembly and drogue shackle to its upright position. The time release mechanism has just fired, releasing the plunger from its position against the movable scissors arm where it was keeping the scissors closed. However, the photograph was taken just an instant before the scissors started to open.





The scissors movable arm is pushing against the plunger and is in the process of opening. While this is going on, the time release mechanism also starts to release the shoulder harness, personnel parachute restraint straps, lap belt, and leg restraint cords to facilitate man-seat separation.

Now the plunger has been pushed out of the way, the scissors has opened completely, and the released shackle is moving quickly away from the seat. In addition, seat-man separation is well on its way.

But – what would happen to this sequence if the guard were bent? Unfortunately, the scissors would be stopped from opening! Even a small amount of friction between the scissors and arm would be enough to keep the device from operating because of the long-arm lever effect of the or assembly. However, the rest of the system would inue to operate normally. Within a short time an unfortunate combination of circumstances would present itself; the drogue chute would still be attached to the seat, the personnel parachute would likewise be attached to the seat, the personnel parachute would be attempting to open, and man-seat separation would be taking place. The situation obviously could deteriorate rapidly.

As a closing thought, let us remind you that the guard does not have to be bent to produce these complications. Overtorquing the shackle bolt, another reported malpractice, could accomplish the same thing by preventing the scissors from opening because of binding between the shackle and the scissors.

Courtesy PRODUCT SUPPORT DIGEST



Courtesy of Daily Press, Newport News, Va. © United Feature Syndicate, Inc. 1969



#### A BETTER MOUSETRAP ?

A TAC ATTACK reader submitted this as a "better mousetrap." He suggests that it be used in those inaccessible aircraft locations where security of fasteners is vital to airframe integrity.

We're having serious problems evaluating his suggestion . . . and eyestrain enters into it. Sometimes it looks for real. Most of the time we're puzzled. How does it strike you? Is he putting us on?



Ambihelical Hexnut

It will be noted that in attaching the bracket to the support, a special ambihelical hexnut is used. The application of this nut is rather unique in that any attempt to remove it in the usual manner only tightens it. Because of this design, the nut must be fully screwed on before it can be screwed off.

Thorough understanding will prevent confusion should you happen to encounter these devices in your daily labors. TAC TALLY

#### AIRCRAFT ACCIDENT RATES

\* Estimated

#### MAJOR ACCIDENT RATE COMPARISON

	T/	TAC		ANG		Res
	1969	1970	1969	1970	1969	1970
JAN	6.8	4.8	28.9	6.5*	0	0
FEB	6.2		12.8		0	
MAR	6.8		12.6		0	
APR	7.4		15.1		0	
MAY	7.5		12.9		0	
JUN	7.2		12.6		0	
JUL	7.4		11.3		0	
AUG	7.3		11.5		0	
SEP	6.9		10.5		0	
)	7.1		9.9		0	
NOV	6.6		9.4		0	
DEC	6.7		9.5		0	

UNITS							
THRU JAN	1969	1970	THRU JAN	1969	1970		
9 AF	3.5	4.3	12 AF	0.0	7.6		
4 TFW	0	0	23 TFW	0	0		
15 TFW	0	0	27 TFW	0	0		
33 TFW	0	0	49 TFW	0	62.1		
4531 TFW	0	45.5	479 TFW	0	0		
			474 TFW	0	0		
363 TRW	35.9	0	67 TRW	0	39.9		
			75 TRW	0	0		
64 TAW	0	0	313 TAW	0	0		
316 TAW	0	0	516 TAW	0	0		
317 TAW	0	0					
464 TAW	0	0					
4442 CCTW	0	0	4453 CCTW	0	0		
4554 CCTW	0	0	58 TFTW	0	0		
	٢	AC SPE	CIAL UNITS	0			
1 SOW		0	2 ADG	0	0		
4409 SUP SQ	0	0	4500 ABW	48.2	0		
4410 CCTW	55.1	0	57 FWW	0	0		
4416 TSQ	0	0					

Total TAC and ANG accidents for January were four, all fighters. TAC's were all F-4s, the ANG lost one F-84. Fatalities matched the number of accidents – three for TAC and one in the ANG. The cause of the three TAC fatalities was "no ejection." There were four ejections for this period – three successful, one unsuccessful with an undetermined cause.

An RF-4 was lost following instrument failure while IFR. An F-4 went in just after takeoff while trying to join up with his leader, the other F-4 crashed following fuel starvation after three unsuccessful approaches in dense fog. The F-84 suffered engine failure.

March and April accounted for seventeen of seventy-eight TAC and ANG accidents last year – that's just over twenty percent. There's no way to pin it on the "Ides of March," or just bad luck. An analysis of the seventeen accidents doesn't tell a trend story, they occurred in a random pattern with a mixture of all cause factors.

Weather will continue to be a problem during this period as well as proficiency for the "behind-the-liners." Especially the ones who haven't gotten started flying again following the big holiday – now's the time to get your night flying in troops, the days are getting longer.

There's another type accident we can do without that's really not related to the season...F-4 out-of-control bashes. We had one in January and hope that there's no more this year. Losing crews in this type of accident is tragic because you can't tell what went on ... and correct the problem. You will not recover from a max performance maneuver at low altitude if you go out-of-control. So for '70 – if you lose it at low altitude for any reason – get out! We need you to tell us what happened.

![](_page_31_Picture_0.jpeg)