

TAC ATTACK

APRIL 1972



FIN STALL...Pg 4

for efficient tactical air power

TAC ATTACK

APRIL 1972

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Tactical Air Command

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CURRENT INTEREST

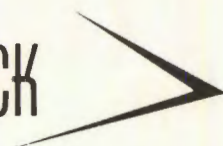
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Angle of ATTACK



A STOPGAP MEASURE

What's your job? Are you a line pilot, a maintenance technician, a wing commander, an ops clerk, a navigator, an instructor, or a civilian technician? Whatever your job happens to be, it's important not only to you and your supervisor but also to the safety types. Believe it or not, we endeavor to equip you with several means to handle your job safely. One of our primary vehicles in this education effort is TAC ATTACK.

TAC ATTACK is aimed primarily at the flying community but it also contains articles and briefs on ground and weapons safety. In other words, it contains something for each of you. It is a form of communication, and as such, relies on feedback to close the communications loop or gap! Without vital feedback there is no true communication.

Okay... what kind of feedback am I talking about? TAC ATTACK is published for your use, so it follows that if it is of no use to you, then we are not doing our job properly. But we don't know that if you don't tell us. We need your opinions.

Is there something about the magazine that you don't like... or that you do like? Is it helping you in your job?

Is there some way we can change it to benefit you? Let us know. Let us have your complaints, your suggestions, your ideas, and your feelings.

Sometimes we run features on a trial basis; if we get enough feedback we keep them in. If not, we drop them and go on to something that appears to have more merit. Fleagle is a good example. The first time he appeared on the back cover, the feedback was outstanding. As a result, Fleagle is now a regular feature. Another example is "Zark and Tink." We ran it for two issues, then dropped it because of no feedback. If it turned you on, you didn't mention it; consequently, we dropped it.

So, talk to us. How? Either by letter, Autovon, carrier pigeon, or pony express... write it in long hand, shorthand, typed, or just pick up the telephone.

We solicit your comments and ideas. Talk to us. Close the gap!

GERALD J. BEISNER, Colonel, USAF
Chief of Safety

THE C-130 FIN STALL PHENOMENON



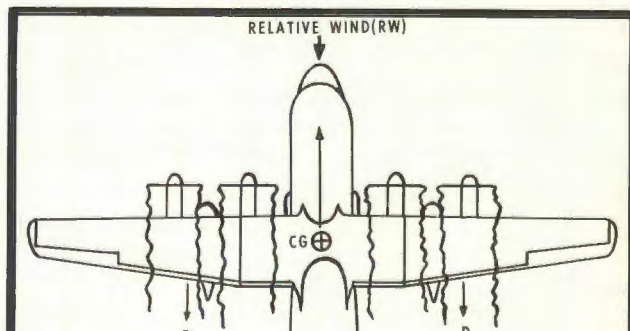
The Gooney Bird of the future . . . that's what many people call the durable C-130 Hercules. It has been around the Air Force for almost twenty years and will be around a lot longer. By any measure it is a classic airplane. It has been used as both an inter and intra theater airlifter, a bomber, a refueler, a ground attacker, a command post, a rescuer, an ambulance, and probably half a dozen other roles. About the only role it hasn't played is that of an air-to-air interceptor (and we're not too sure about that).

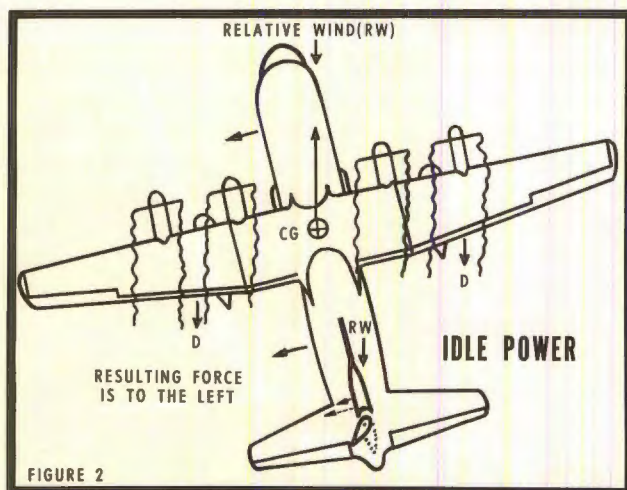
It's a good airplane, and like the Gooney Bird, a forgiving airplane. Neither, however, is without its idiosyncrasies and one common to both is the phenomenon known as FIN STALL.

WHAT IS IT?

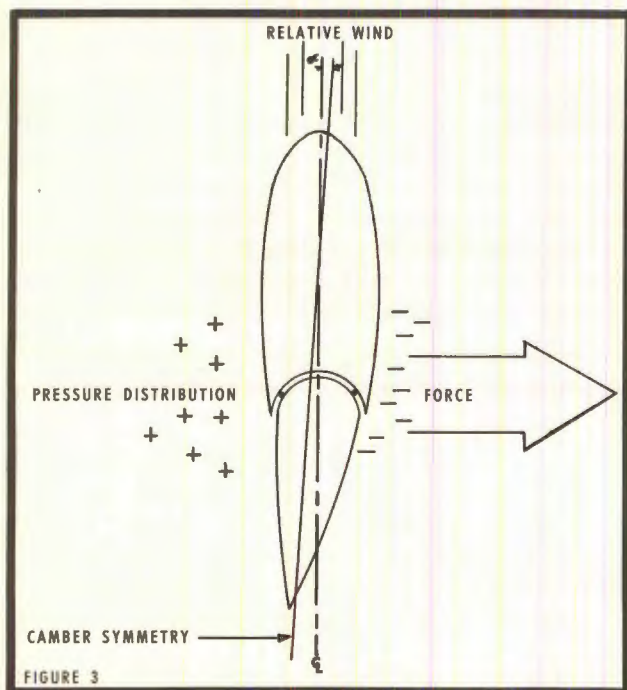
straight flight or prevent the sideslip angle from increasing.

As seen in Figure 1, an initial application of left rudder

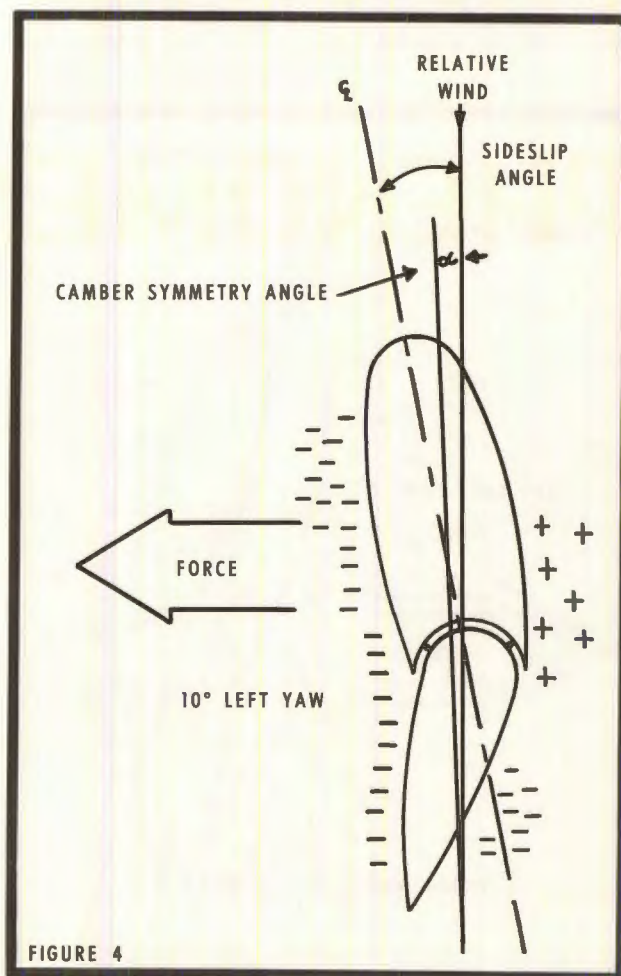




When the rudder is neutral, the airfoil formed by the vertical fin and rudder is symmetrical. If the relative wind is down the centerline of the airfoil, there will be no unbalanced lift. If, however, the rudder is deflected, it causes the airfoil to become unsymmetrical. A new line down which the relative wind must flow is formed and called the camber symmetry line. On initial application of rudder, the relative wind flowing over the newly formed airfoil produces negative pressure on the "long side" and positive pressure on the "short side" of the airfoil, resulting in a force vector: right force for left rudder and vice versa (Figure 3).



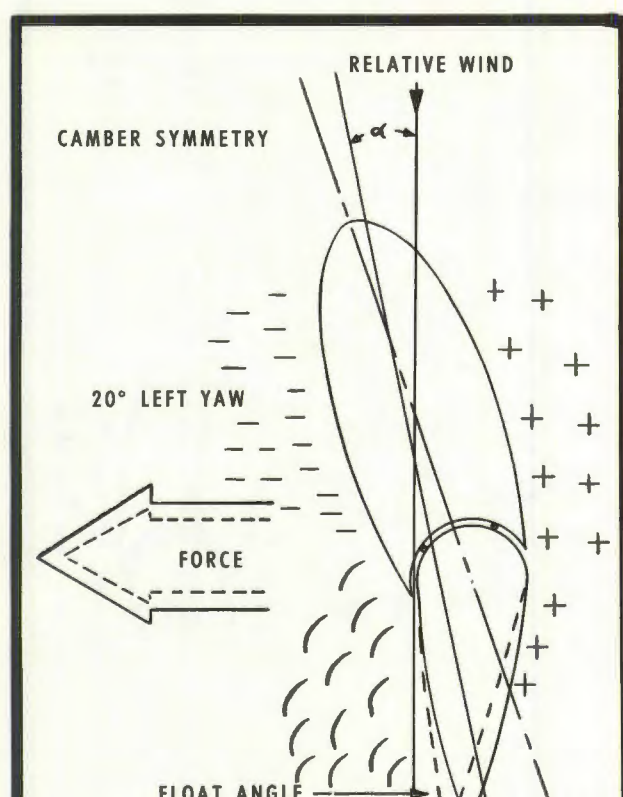
The airplane will continue to yaw to the left (left rudder applied) until the sideslip angle is greater than the camber symmetry angle. When this occurs, the resultant pressure distributions and force vectors will have swapped sides (Figure 4). If the rudder is released, the forces will cause it to float back toward neutral which will increase the restoring force causing the airplane to yaw toward zero sideslip. This is the desired stability feature.



In some airplanes (C-130, C-47) a sufficient sideslip angle can be induced which will cause airflow separation. When the rudder is deflected and a sideslip is produced, the relative wind is acting on an upside-down airfoil, which, basically, is not very efficient. At certain sideslip angles the interaction of fuselage interference, vortex from the wing to fuselage juncture, and engine slip stream, combined with the magnitude of the angle of attack, can cause a disturbed airflow, separation and fin stall. This air flow separation can produce forces that will cause the

THE C-130 FIN STALL PHENOMENON

rudder to float to a larger angle (Figure 5). When the rudder begins to float, a force reversal occurs; that is, a right pedal force is required to keep the rudder from



two ways to perform sideslips. The first is the wings level skidding turn used by some pilots to make small heading corrections during instrument approaches, as well as formation maneuvering, and very low level turns. These turns are accomplished by feeding in rudder while keeping the wings level. During the wings level heading change maneuver, it is impossible to produce fin stall with a slow deliberate application of full rudder at speeds of 1.2 times power off stall or greater.

Sideslips are also induced during crosswind approaches and landings where no heading change is desired. You're all familiar with the wing low method for crosswind landings in the C-130 (the only method that can be used). The wing is lowered into the wind and opposite rudder is applied to maintain a straight flight path. Greater sideslip angles can be produced by the wing down method; therefore, this is more likely to produce fin stall. But sideslip angles required for all normal operations are not of the magnitude that will produce fin stall.

After the fin has stalled on the C-130, and if the rudder is allowed to float, the airplane will yaw out to about a 40 to 45 degree sideslip angle. It stabilizes at this point due to the barn door effect of vertical fin. Under these conditions the rudder will maintain about a 24 degree deflection. If the rudder is forced back to neutral, which requires a maximum of 50 to 100 pounds of rudder pedal force, the airplane will return to zero sideslip.

Fin stall in the C-130 has never been experienced in the power off configuration or in a slow deliberate application of right rudder. This implies that the airplane is less stable with power on and that left rudder is more powerful than right rudder. Both are true and to explain a bit, we have to talk about torque effect.

The major contributor to torque effect in a multi-engine propeller driven airplane is the spanwise lift distribution on the wing. Figure 6 portrays the power on spanwise lift distribution on the wing of a C-130. The

and shifts the total lift on each wing to the left. To keep the airplane from rolling, aileron is applied and one would think that this would make the lift symmetrical again; however, because the ailerons are located far out on the wing they balance the rolling moments, but the peak lift areas remain to the left of each wing.

Lift on the wing also produces induced drag with spanwise distribution very similar to the lift distribution. Consequently, the total drag on the left wing is further outboard than on the right wing which causes the airplane to turn to the left. The pilot must apply right rudder to prevent this turn to the left. In straight flight, right rudder trim is required; therefore, more rudder is available for left yaw-right sideslip than there is for right yaw-left sideslip. For this reason it is possible to stall the fin because of left rudder application but it is not possible to do so by applying right rudder.

It's important to emphasize at this point that fin stall will not occur due to turbulence, crosswind corrections, or engine out control maneuvers.

REQUIRED CONDITIONS TO PRODUCE FIN STALL

- POWER ON (USUALLY POWER FOR LEVEL FLIGHT OR GREATER)
- LEFT RUDDER (LEFT YAW-RIGHT SIDESLIP)
- WING DOWN TO MAINTAIN STRAIGHT FLIGHT PATH (ZERO TURN RATE)
- SPEED FROM MINIMUM TO 170 KIAS
- FLAP AND GEAR EITHER UP OR DOWN

FLIGHT CHARACTERISTICS ASSOCIATED WITH FIN STALL

- ONSET OF UNMISTAKABLE FIN BUFFET BETWEEN 15 AND 24 DEGREES SIDESLIP
- REDUCTION IN RUDDER PEDAL FORCES AT 18 TO 30 DEGREES SIDESLIP
- NOSE UP PITCHING TENDENCY
- ZERO RUDDER PEDAL FORCE AT SOME POINT ABOVE 20 DEGREES SIDESLIP
- AN INCREASED TURNING RATE TO THE LEFT WHICH CANNOT BE CONTROLLED BY BANK ANGLE

TAC ATTACK

PILOT ACTIONS

- NORMAL MANEUVERING OF THE AIRPLANE, INCLUDING NORMAL SKIDDING TURNS AND SIDESLIPS, WILL NOT RESULT IN FIN STALL
- AVOID LARGE SUSTAINED, ABRUPT RUDDER INPUTS AT SLOW SPEED ESPECIALLY POWER ON UNLESS NEEDED FOR ENGINE OUT CONTROL
- IF FIN STALL OCCURS, RETURN THE RUDDER TO NEUTRAL BY APPLYING OPPOSITE RUDDER (50 TO 100 POUNDS RUDDER PEDAL FORCE) PLUS A COMBINATION OF THE FOLLOWING, IF FLIGHT CONDITIONS PERMIT:

LEVEL WINGS

NOSE DOWN

REDUCE POWER

USE ASYMMETRIC POWER

- IF AN UNDESIRE RUDDER CONTROL INPUT IS EXPERIENCED, SUCH AS A HARD OVER, WHICH RESULTS IN A FIN STALL, TURN THE RUDDER BOOST PRESSURE OFF AND CONTROL THE AIRPLANE WITH ASYMMETRIC POWER AND, IF FEASIBLE, USE THE OTHER RECOVERY TECHNIQUES MENTIONED PREVIOUSLY
- NEVER ATTEMPT TO FORCE THE AIRPLANE INTO A FIN STALL
- AS STATED IN THE DASH ONE, DO NOT PERFORM POWER ON STALLS; IF A POWER ON STALL IS ENTERED INADVERTENTLY, DO NOT ATTEMPT TO MAINTAIN LATERAL CONTROL BY LARGE RUDDER INPUTS.

SUMMARY

Fin stall is a phenomenon that all C-130 pilots should be aware of and know how to counteract, should it occur. It is a maneuver that the pilot has to almost force the airplane into but the possibility still remains that the pilot may inadvertently encounter the phenomenon. One point must be emphasized again. Never attempt to force the airplane into a fin stall for any reason. ➤

Adapted from a briefing given by Walter E. Hensleigh, Chief Engineering Test Pilot, Lockheed-Georgia Company.

TAC

TAC TIPS

. . . interest items,

A ROLLER

The C-130 pulled into the parking area and stopped. Number 1, 2, and 4 engines were shut down. Three was left running so the flight engineer could pull a bleed air check to confirm a malfunction.

During the check, the airplane began to roll forward. The IP selected emergency brakes and applied them while the engineer brought the ATM to normal; the student pilot reversed number 3 engine. Despite all this, the aircraft rolled forward and number 2 prop (which was not turning) hit the door of the power cart.

Cause? Ruptured brake lines.

Prevention? Chocks.

The next thing number 3 remembered was leveling at six thousand. He then returned to base and landed without further incident. Nothing was found wrong with the aircraft oxygen system (NATCH!) and the finger was pointed at hyperventilation combined with possible hyperthermia (body overheating).

No, don't stop wearing your longies as a result of reading this, but do remember the green apple! Pulling it will not only give you oxygen, but it will force you to slow your breathing. All that pressure is just plain hard to breathe against. In this case, the slowing of the breathing rate was the key. In either case, hypoxia or hyperventilation, the green apple can be your lifesaver. Don't hesitate to use it if you need it.

GREEN APPLES

The Hun pilot was number 3 in a 4-ship air

EWAS IS COMING

The pilot was number 3 in a 4-ship air

mishaps with morals, for the TAC aircrewman

hence, the system cannot be expected to provide services identical to those expected from the Air Weather Service (AWS) PFSV.

Full activation of all 90 sites will not be completed for 3 years, but four West Coast stations became operational in late March 1972 and additional stations in the East and Northeast are programmed for FY 73. Other sections of the country will follow in FY 74.

As the system expands, AWS will be studying it closely to determine the proper relation between it and their own services. Pilot experiences with the system are solicited and should be discussed with a local AWS forecaster after landing.

Identification of these EWAS sites will be included in the "SPECIAL NOTICES" Section of a forthcoming issue of the IFR-Supplement, U.S.

Lt Col R. R. Robinson
TAC/WEDO

DO SOMETHING !

In a great majority of accident investigations, the Dash One or some other tech order is found to be deficient. A safety supplement is quickly put together to correct the problem.

That's not true in all cases, of course, but it is true in enough of them to indicate that perhaps we have the wrong end pointed north.

Safety supplements and other items of "Hot Info" are generated to prevent accidents, but it doesn't follow that an accident must occur before one of these pieces of

paper can be distributed. Unfortunately, in too many cases that's exactly what happens even though the knowledge that could have prevented the accident was known all along by one, two, a dozen, or more people . . . possibly even someone in your outfit.

Get into a bull session with any other crew member in your outfit and chances are the two of you can come up with at least one tech order (Dash One or otherwise) deficiency.

No sweat, you say? Everybody knows about it? Here's hoping you're right . . . and here's hoping no one buys it if you're wrong. Here's hoping the guy that is 2000 hours up on you has told you everything he knows. Here's hoping you don't buy it because of something he didn't do.

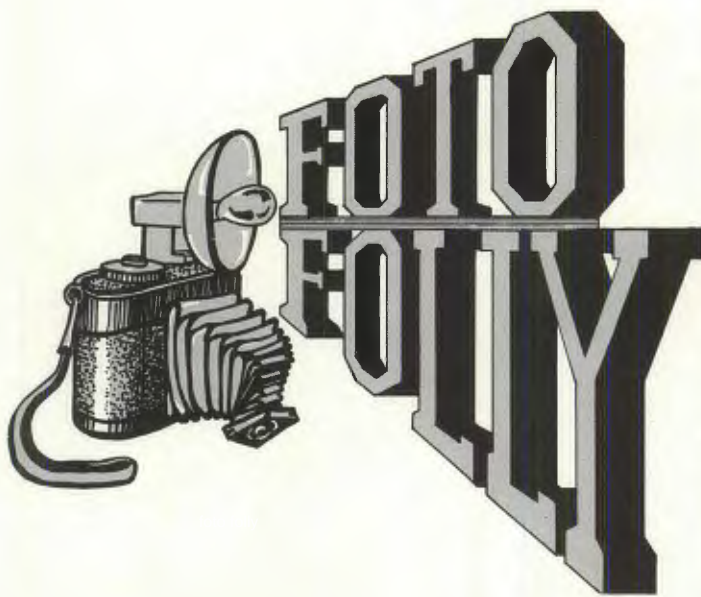
It gets uncomfortably close to home when put in those terms. It means that your responsibility doesn't stop when the mission report is turned in. There are too many people who will come behind you . . . too many people who need your expertise. If you've discovered a problem, a hazard, or a tech order deficiency, do something about it.

Get it in writing . . . check with stan/eval, QC, safety . . . get the word out. Make some changes . . . rattle some cages. Do it now.

AWFULLY CLOSE

The C-54 crew was taxiing in for a parts pickup. The IP was in the right seat checking the wing tip clearance from ramp lighting poles situated along the ramp off the right wing. He noticed a fire extinguisher located on the ramp and his attention was momentarily diverted from the poles to the extinguisher and the clearance between it and the number four prop. Then he noticed the poles again and said, "We are going to be awfully close" . . . Crunch.

He was right.



Ahhh, this cool water is better than Preparation-H





"Okay...Anybody know how to start this thing?"



"A little more to the left, I can still see his toe."



*"Hang on Herman,
we'll have you out of there in a minute."*



*Do F-84s have RELIEF
TUBES?*



One small step for man....



it was a dark

It was a dark



and . . .

Let's put together a formula for dinging an airplane.

"It was a dark and stormy night . . ." Make the time four o'clock in the morning, and the weather 700 broken, 1500 overcast, with two miles viz in rain and fog. Add to this a primary runway featuring a five knot tail wind and a runway surface that's slick as greased owl . . . er . . . feathers. Mix in an IP who had flown only ten hours in the last ninety days and who had been up all day before the flight began. Give him a technique of landing long and hot. Throw in a generous helping of non-cooperation from the tower operator. Shake well and pour out a T-39 ensnared in a MA-1A barrier off the departure end of the runway.

Let's run through that again, but this time let's look at it in more detail.

As the T-39 approached the airfield, the IP requested an ILS approach to runway 31. The winds were out of the north and favoring this runway. The tower, however, denied the request because the MA-1A barrier was raised and the landing aircraft would have to approach over the barrier. Instead, the pilot was cleared via an ASR approach to the tail wind runway (runway 13). He flew final approach at 112 knots IAS, which was the correct normal speed for his gross weight. Touchdown speed would normally have been 105 knots but the pilot was known to land long and hot. He landed 2000 feet down the 7000 foot runway, then hydroplaned severely for 3500 feet before braking became effective. The remaining 1500 feet was insufficient distance to stop the airplane as it went steaming into the barrier.

The T-39 Flight Manual states that total hydroplaning of the main gear tires can be expected at 116 knots. Partial hydroplaning occurs to varying degrees below that speed. The touchdown speed was about 110 indicated; add to that the five knot tail wind and the wet runway (it had been raining moderately for about three hours prior) and the scenario is complete.

The pilot did raise the flaps and leave the speed brake extended but took no further action. Perhaps he didn't realize the criticality of the situation until it was too late.

Admittedly, tower wasn't much help. They failed to switch runways when it became obvious that a tail wind was evident and that the best approach available on the current runway was an ASR with minimums of 600 and 1. Had they been on the stick and switched runways, approaching aircraft could have used an ILS approach with 200 and one-half minimums and a head wind factor.

by Major Bill Corrum
TAC/DOVX

Had this been done, the touchdown speed (ground speed) would have been reduced from 115 knots to 105 knots, a much more comfortable distance away from the 116 knot magic hydroplaning figure . . . and that's using normal approach speeds.

WHAT COULD THE PILOT DO?

He should have:

- Persisted in the request for an ILS approach.
- Flown a minimum run approach. This would have reduced his final approach speed to 107 knots IAS, his touchdown airspeed to 100 knots, and his ground speed at that point to 95 knots (assuming a landing on runway 31). It would also have helped him to effect a POSITIVE touchdown near the end of the runway. He would have had much more effective braking action and about 1500 feet more runway available.

Even had he proceeded with the approach to runway 13, he could have:

- Shut down one or both engines when it became apparent that stopping distance was marginal and a go-around was impossible. On a dry runway and using optimum braking, shutting down one engine reduces the ground roll by 4 percent. SMAMA indicates that the reduction is doubled by shutting down both engines and that the percentage increases proportionately as the RCR decreases. In other words, if the aircraft is sliding on the runway, shutting down both engines reduces the ground "roll" by much more than 8 percent. Actual values of this reduction have not been determined.

- After touching down long and finding his brakes ineffective, the pilot could have gone around and performed a missed approach. Had he done so, he could have contacted approach control and fairly demanded an ILS approach to runway 31. There is no reason to doubt that a minimum run landing from an ILS approach would have terminated uneventfully.

FINAL THOUGHT

In spite of the damage that occurred, this crew was extremely fortunate. The flight manual states that engaging the MA-1A barrier is unlikely at any speed. The aircraft could have stepped lightly over the barrier and continued on until striking an obstruction. (Think of the heavy vehicular traffic that passes the ends of many runways.) There was informal mention of the aircraft tipping onto a wingtip after barrier engagement. At a higher rate of speed . . . ➤



Tactical Air Command

UNIT ACHIEVEMENT AWARD

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

314 Tactical Airlift Wing, Little Rock Air Force Base, Arkansas
31 October 1970 through 30 October 1971

4424 Combat Crew Training Squadron, MacDill Air Force Base, Florida
1 December 1970 through 30 November 1971

131 Tactical Fighter Group, Lambert MAP, Missouri
3 December 1970 through 2 December 1971

309 Tactical Fighter Squadron, Homestead Air Force Base, Florida
5 December 1970 through 4 December 1971

4 Tactical Fighter Wing, Seymour Johnson Air Force Base, North Carolina
9 December 1970 through 8 December 1971

334 Tactical Fighter Squadron, Seymour Johnson Air Force Base, North Carolina
9 December 1970 through 8 December 1971

562 Tactical Fighter Squadron, McConnell Air Force Base, Kansas
16 December 1970 through 15 December 1971



**481 Tactical Fighter Squadron, Cannon Air Force Base, New Mexico
1 January through 31 December 1971**

**Detachment 2, 4500 Support Squadron, Seymour Johnson Air Force Base, North Carolina
1 January through 31 December 1971**

**Detachment 19, 2 Aircraft Delivery Group, Dobbins Air Force Base, Georgia
1 January through 31 December 1971**

**Detachment 21, 2 Aircraft Delivery Group, Hamilton Air Force Base, California
1 January through 31 December 1971**

**7 Special Operations Flight, Otis Air Force Base, Massachusetts
1 January through 31 December 1971**

**834 Combat Support Group, Hurlburt Field, Florida
1 January through 31 December 1971**

**927 Tactical Airlift Group, Selfridge Air Force Base, Michigan
1 January through 31 December 1971**

**914 Tactical Airlift Group, Niagara Falls Municipal Airport, New York
1 January through 31 December 1971**

**922 Tactical Airlift Group, Kelly Air Force Base, Texas
1 January through 31 December 1971**

**926 Tactical Airlift Group, USNAS, New Orleans, Louisiana
1 January through 31 December 1971**

**Detachment 20, 2 Aircraft Delivery Group, Randolph Air Force Base, Texas
1 January through 31 December 1971**

**313 Tactical Airlift Wing, Forbes Air Force Base, Kansas
1 January through 31 December 1971**



The last time you heard about an aircraft accident your first question was, "Did he get out?" It's everybody's first question. Not "Was it pilot factor?" or "Was it engine failure?" or "Were the bolts torqued

a successful ejection? Sure you have — we all have. We tend to dehumanize these mistakes with stilted language — out of envelope, delayed ejection decision, etc. It all boils down to the same thing that's been said

Hot out ?

Let's take a case and see how it's done. You're on the range and rolling in. At some point on your run-in, you're going to reach a point where for all practical purposes you're out of envelope because of dive angle, airspeed, vertical velocity, and seat capability. Where is the point? It depends on you, your mission, type airplane, and ejection system. The kicker is, YOU have to figure out where it is in advance. Once you reach that point, you have to take some kind of action to give yourself a break. You have to trade that airspeed for altitude, or at least for a decrease in vertical velocity, prior to ejecting. By figuring it out now, you've bought yourself additional time during the emergency.

Take another situation. What are the possibilities available to you in the event of a power loss on final approach? Once again, it depends on the airplane. The one thing you CAN'T do is sit there on final approach when it suddenly gets quiet and mull over the possibilities. In most TAC fighters you've got an ejection potential all the way to touchdown IF you do it right! About every

airplane has the capability to balloon while attempting to land. This is nothing more than an inadvertent swap of airspeed for altitude. That may be all the margin you need to accomplish a successful ejection. Once again — the old airspeed for altitude trick is the key. Ask any pilot what he would do if he were at 50 feet and 500 knots and suddenly flamed out and the first step in just about every case is . . . you guessed it! . . . trade airspeed for altitude. That's an easy one. Now, put the same pilot a mile on final at 500 feet, and the answers probably start to vary a little more.

Nobody can foresee all the possibilities. Flight manuals give recommended courses of action under certain conditions for selected situations. Ejection parameters are discussed constantly. There isn't a pilot around (hopefully!) who can't give the proper answers to minimum ejection altitude questions. However, the whole point is that there is more to it than that. Think about the mission you fly regularly. Chances are that somewhere, in that rather standard mission profile, is where you'll have to implement your decision. Will it be on takeoff or landing? On the range? While flying low level? On an instrument departure? During a mach run on an FCF?

Obviously, no pilot worth his salt flies around on every mission thinking he's going to punch out at any second. He wouldn't be very effective if he did. When his big moment comes it'll probably be somewhat of a surprise. He'll have several things he'll rely on. One, obviously, is experience. Another is good knowledge of his aircraft systems and emergency procedures. Yet another can be familiarity. Either he's been in the situation before (the trial and error type approach) or HE'S THOUGHT ABOUT IT BEFORE! You can't all go out and practice out of control recoveries, or flame engines out, or do any one of a hundred other things that can happen — but you can think about them, and if your simulator is good enough, practice some of them there.

Hangar flying has been around as long as aviation. It's an indispensable part of flying. Every pilot sits around (particularly after a 'tini' or two) and tells the classics he's heard about. "You know . . . there I was, at 30 thou," . . . or "I had these two guys trapped in my six o'clock," . . . or . . . "If that wasn't enough, my left main wouldn't come down." You can hear them at any O Club bar on any Friday afternoon of the year.

The Air Force has a ready-made stockpile of the above mentioned experiences. Each time you hear one, mentally place yourself in the situation. What would you have done? The one thing you can't do is sit back and wait for the real thing to happen. Think about it and make the decision before you strap on the airplane. Don't let pride get in your way . . . don't let it kill you.

WILL YOU GET OUT?



WEAPONS WORDS

Things That Go "BOOM"

by Lt Col Gordon F. Carmichael
Chief, Weapons Safety Division
Hq TAC

An interesting and important part of our work in the command accident prevention program requires us to review and evaluate accident and incident reports submitted by TAC organizations and to keep a running tabulation on the effectiveness of the weapons safety program. Our statistics tell us that the steady reduction in the number of accidents from year to year proves, beyond doubt, that you are becoming more professional in your work and that your equipment is safer and more reliable than it was just a few years ago.

If asked to identify one specific problem that contributes to the majority of our mishaps, the task would be easy — failure to use technical data or failure to use technical data correctly. A recent accident just about epitomizes all we have ever said and written about using checklists and what can happen when you try to beat the system.

The story starts with the takeoff of an F-4 on a cross-country training flight for a student pilot. Shortly

instructor pilot proceeded to perform the before exterior inspection (front cockpit), although transient maintenance personnel had not arrived nor had the maintenance preflight been accomplished. The IP did not use the Dash One checklist and failed to notice that the wing station jettison switch cover was in the up position. While the IP was performing the exterior preflight, transient maintenance personnel arrived and applied external power to the airplane. While getting strapped in the front cockpit to prepare for takeoff, the IP noticed the wing station jettison switch cover in the up position. When he reached down and closed the cover, the full wing tanks jettisoned to the ramp.

The investigation revealed some interesting facts concerning the accident:

- It could not be determined who raised the wing tank jettison switch cover that set the stage for the accident, but it was determined that the cover was not safety

- Following the accident the aircraft was impounded at the cross-country base. Numerous checks were conducted on the jettison system and associated equipment but the malfunction that caused the tanks to jettison when the guard cover was closed could not be duplicated.

This accident wasn't particularly spectacular as far as accidents go; it was just the most recent of a long list of accidents due to tech data violations that should not have happened. It also points out that no matter who you are or what your job, you can get bit . . . if you elect to play the game with your own rules.

As accident reports are received from other units and other commands, they are retransmitted to TAC units so that you may learn by the mistakes of others. The following more spectacular, TAC accident briefs are presented for this purpose; hopefully, they will prevent your next accident due to improper use of technical data.

- Two loadcrews had to violate tech data to cause this accident; either crew could have prevented it. The first crew downloaded a SUU-20 dispenser from an F-4 airplane without first unloading the two live rockets installed in the dispenser. The second crew uploaded the dispenser containing the rockets on another airplane and while performing the bomb and rocket functional checks, fired a rocket. The rocket went through an NF-2 lighting unit, turned 50 degrees, hit the ramp approximately 500 feet from the launching airplane, then passed beneath the wing of a combat loaded B-52 and impacted the blast fence to the rear.
- Approximately a year and a half after the above accident, the same unit did it again. This time, only one loadcrew was involved and the dispenser contained only one rocket. As you have probably guessed, the rocket fired during a functional check, only this time there was no equipment damage but there was an injury. The number three man received severe burns and had to have his left eye removed. A high price to pay to save a few minutes and a little work.
- At another base, an F-4 aircraft returned with hung ordnance in the SUU-20 dispenser. The download crew downloaded the remaining practice bomb but overlooked the three loaded rockets. The weapons release checkout crew failed to insure that the rockets had been removed and consequently fired a rocket while performing a functional check. Numerous discrepancies combined to set the stage for this accident, but the outdated checklist that didn't direct the weapons release crew to check for "rockets removed" was probably the catalyst that pulled it all together.
- Ten months after the above accident, the same base chalked up another rocket firing accident. The formal report is long and involved but, basically, a loadcrew removed a fully loaded dispenser from one F-4 and installed it on another airplane. The functional check crew failed to insure that the munitions had been removed from the dispenser and launched a rocket when they applied voltage to the rocket release system. Both rear tires of an MB-4 Coleman were impaled by the errant rocket.
- Gun systems came in for their share of attention also. During the preparation of a SUU-23 gun for a gun pod/aircraft functional check, the loadcrew failed to safe the gun in accordance with the checklist and when the trigger was pulled one round fired. Two loadcrew members were injured by shrapnel from the round striking the nose gear strut and the perforated strut had to be changed.
- Four accidental firings of 20 MM guns occurred in one eight month period.
- The three accidents associated with the M-39 gun concerned improperly performed functional checks. The crews did not follow tech data and did not insure the guns were clear. The last accident concerned a violation of TO 11A-1-33 in that maintenance was being performed on an aircraft containing ammunition and explosives material. The accident board cited personnel error as the primary cause of the accident and listed the following contributing causes:
 - The gun firing lead of the M-61 gun was not disconnected.
 - The clearing sector hold back tool was not installed.
 - The armament master switch was not checked in the safe position.
- A qualified maintenance technician or weapons mechanic was not present when maintenance was being performed on an armed or explosives loaded aircraft.

As we said before, these brief accident summaries are presented as a reminder that it can happen to you and the easiest way to make it happen is by not using your checklist. More than half of our accidents are caused by people, and the majority of these are caused by people who won't read or follow technical data.





Capt Nopsker



TACTICAL AIR COMMAND AIRCROWMAN of DISTINCTION

Captain Howard G. Nopsker of the 356th Tactical Fighter Squadron, Myrtle Beach Air Force Base, South Carolina, has been selected as the Tactical Air Command Aircrewman of Distinction for the month of February 1972.

Captain Nopsker was the wingman in a flight of two A-7Ds scheduled for day aerial refueling followed by air-to-ground gunnery. Formation takeoff was normal until the flight lead's air-speed indicator failed just after lift off. Captain Nopsker advised lead of his airspeed, and was directed to assume the lead. While passing lead at an altitude of 500 feet, Captain Nopsker reduced power to maintain maximum gear down speed of 200 knots. His engine began a series of violent compressor stalls and lead advised him that his tailpipe was torching. Captain Nopsker immediately throttled back. Power reduction eliminated the stalls and engine response was regained by

TACTICAL AIR COMMAND



Maintenance Man Safety Award

Staff Sergeant Robert R. Dale, 33rd Munitions Maintenance Squadron, Eglin Air Force Base, Florida, has been selected to receive the TAC Maintenance Man Safety Award for February 1972. Sergeant Dale will receive a letter of appreciation from the Commander of Tactical Air Command and a Certificate.



SSgt Dale

TACTICAL AIR COMMAND



Crew Chief Safety Award

Staff Sergeant Thomas L. Catlett, 425th Tactical Fighter Training Squadron, Luke Air Force Base, Arizona, has been selected to receive the TAC Crew Chief Safety Award for February 1972. Sergeant Catlett will receive a letter of appreciation from the Commander of Tactical Air Command and a Certificate.



SSgt Catlett

TACTICAL AIR COMMAND



Ground Safety Man of the Month

Second Lieutenant Harry V. Poynter, 317th Supply Squadron, Pope Air Force Base, North Carolina, has been selected to receive the TAC Ground Safety Man of the Month Award for February 1972. Lieutenant Poynter will receive a letter of appreciation from the Commander of Tactical Air Command and a Certificate.



2nd Lt Poynter

CHOCK TALK

...incidents and incidentals

PROPS STILL BITE

The scene is not some dusty airfield with Spads, Nieuports, and Sopwith Camels scattered about. No, it's the modern day, jet air force, where an occasional piston/prop type intrudes. Those who worked around Spads and the like had a healthy respect for that hand eating thing up front called a prop. Today, its maiming potential hasn't decreased one iota.

Recently, maintenance technicians were pulling the prop through on a U-3A to check for liquid lock. The engine suddenly fired and ran for a few seconds before it died. Luckily there were no injuries. Nobody was in the cockpit at the time, but somebody had been . . . the mag switches were left on.

The mechanics stated that they did not check the switches because "it isn't in the pre-flight checklist." Chances are it's in the checklist now. Another thing that isn't in the checklist is thinking.

"Always check the mag switches before doing any work on a recip engine." Orville probably said that to Wilbur at least once.

way he could have shut down his engine then would be through fuel starvation. If he did that, both engines would quit and due to the electrical failure, he would be unable to start either of them. A simple thing like a misrigged throttle could, combined with other failure, ruin a pilot's whole day. Don't let your area of responsibility on the airplane be less than correct. To do so may be inviting more than a 781 writeup!

IT HAPPENS ALL THE TIME

A problem cropped up in another command recently, that gives us a chance to check our own operations to make sure we don't follow suit.

A properly qualified crew chief was taxiing a T-39 when a hydraulic pump failure occurred. He recycled the switch to no avail, then pulled out the emergency brake handle, pumped up the brakes and clamped down on them . . . but not soon enough. The Sabreliner dropped off the edge of the ramp and mired in the mud up to the gear doors. Had the crew chief reached for the emergency brake handle sooner, you wouldn't be reading about it. Why didn't he?

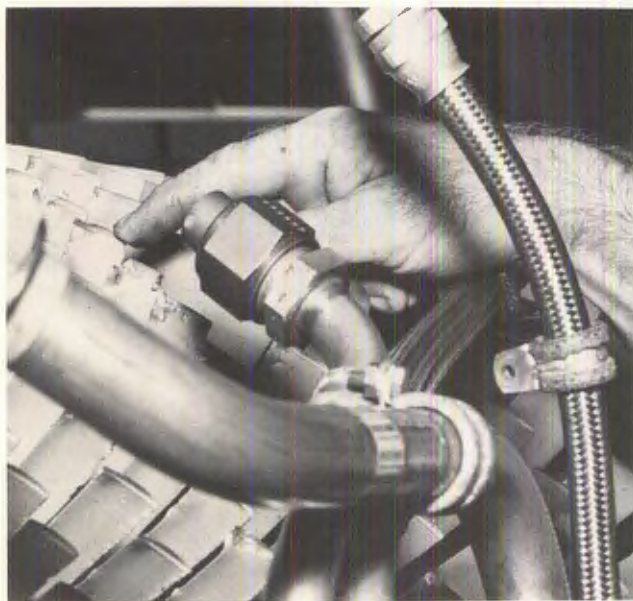
with a maintenance slant.

TRY IT-YOU'LL LIKE IT !!

You probably chuckle as I do at the current Madison Avenue offering on behalf of Alka Seltzer that goes "Try it, — you'll like it!! — Try it, — you'll like it!!"

Did you know that our jet engines get indigestion? It's odd to think that the inside of a jet engine reacts to the wrong food as violently as your stomach does to green apples. Feed it a nut, bolt, stone, or tool and you can count on it to burp or belch (in engine terms, compressor stall), lose energy (thrust), or develop a fever (high exhaust gas temperature) and require medical attention. The big difference is in the amount of the bill. For you or me, the treatment is normally very simple at the cost of a few dollars. The fix for a comparable engine ailment is neither easy nor inexpensive.

Failure to check the area surrounding a jet engine, improper clean-up following maintenance, dropped



An example of engine indigestion.

objects from vehicles on the ramp or taxiway, and many other careless actions are some of the acts that contribute to "Foreign Object Damage" (FOD), another term that we use to indicate engine indigestion. Specifically, FOD is that damage to the stators or rotating components of the compressor and turbine section of an operative aircraft gas turbine engine caused by the ingestion of foreign material so that the damaged components fail or their failure becomes imminent. Damage of this nature costs the Air Force thirty million dollars per year. The dollar figures are staggering and of great significance. FOD can and has caused the loss of human life. This wastefulness can be curbed since most instances of FOD are attributed to carelessness.

In the case of engine indigestion, prevention is the only acceptable cure. Each of us who works on or around the flight line, taxiways, runway, and hangars must become involved. The washer or stone you pick up is a possible \$50,000 deficit to you as a taxpayer. Ask Base Operations to dispatch a sweeper to clean up extensive FOD laden areas. Maintenance personnel must exercise strictest discipline in performing maintenance on aircraft. Without each individual's concern and participation, we will never be able to curtail engine belly ache. I solicit your participation — try it — we'll all like it!!

Lt Col W. F. Caldwell
Cmdr, 31 FMS
Homestead AFB, Florida



I can't believe it ate the whole thing.



INDIVIDUAL Safety Awards for 1971

We are proud to present the Tactical Air Command Individual Safety Award winners. The contribution to our mission made by these men will never be known . . . we have no way of counting accidents that have been prevented. Selection for the highest Tactical Air Command Award in their individual field is our way of recognizing outstanding efforts in behalf of accident prevention. I wish to add my congratulations to the many they have already received.

GERALD J. BEISNER, Colonel, USAF
Chief of Safety



Maj Marvin

Outstanding Flight Safety Officer (Second Half 1971)

Major John M. Marvin
162 Tactical Fighter Training Group (ANG)
Tucson, Arizona

Ground Safety Man of the Year

Senior Master Sergeant Robert A. Cresswell



UNIT SAFETY AWARDS

1971 TAC GROUND SAFETY AWARD

CATEGORY I - 4500th SUPPORT SQUADRON

CATEGORY II - 564th AIR FORCE BAND

1971 TAC TRAFFIC SAFETY AWARD

CATEGORY I - 4500th SUPPORT SQUADRON

CATEGORY II - 564th AIR FORCE BAND

SEMI-ANNUAL TAC DRIVE SAFE AWARD

CATEGORY I - 4500th SUPPORT SQUADRON

CATEGORY II - 564th AIR FORCE BAND

NOTE: Units with more than 1000 assigned military personnel compete for Category I awards. Those with 1000 or less compete in Category II.

SPOS CORNER

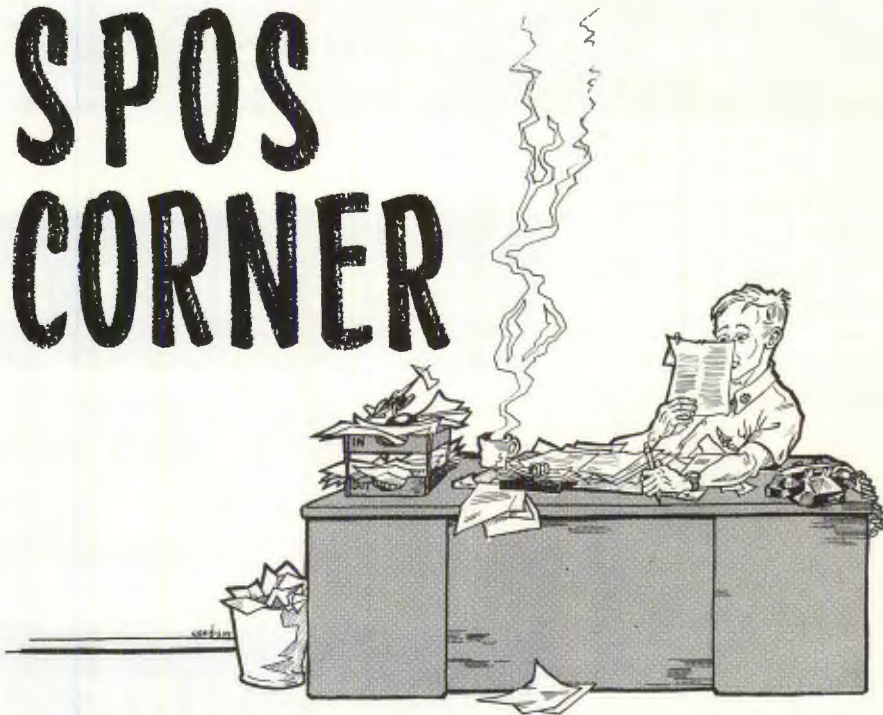
WARNINGS, CAUTIONS, AND NOTES

The warnings, cautions and notes found in the Dash One are usually fairly specific as to the procedure or technique which must be followed to prevent or minimize a particular hazard or undesired event. Sometimes, perhaps, these warnings are too specific... or at least we as operators interpret them as such. These entries are usually included as the result of a single identified problem or hazard and by purpose, must address that hazard and its prevention. As time passes and aircrews and maintenance personnel use a particular aerospace vehicle, additional hazards in the same general category are often discovered. Once

aircraft in a very abrupt manner. On closing the canopy, the shear pin failed and the canopy fell, striking the banana links. Fortunately, the interdictor pin prevented the seat from firing. The back-seater only knew he had a canopy that wouldn't close and attempted to reopen and close the canopy. In this case, ignorance (and a good interdictor pin) was bliss. The submitting unit properly recommended that a warning note be placed in the Dash One stating: "No attempt should be made to move the

submitted by one of our aggressive young aviator types who discovered that adjusting an F-4 seat with a loose kneeboard resting on the left aux armament panel can actuate the emergency oxygen bottle. I'm sure I didn't locate all references to loose items in the cockpit or exposed and critical linkages, but I found a bunch. Again, none specifically covered the O₂ bottle mixed with a loose clipboard, but I feel the intent is there.

Until ALL hazards associated with



GOLDEN B-Bs

With 1800 and 25,000 foot scattered decks, 10 miles viz, and calm winds, it seemed like a great morning for air-to-ground work — right up until Number Two started his recovery from the second strafe pass. Suddenly, the aircrew's tranquility was shattered by an explosion in the cockpit that stunned and temporarily blinded the pilot with a blow to the head, windblast, and flying debris. Regaining his vision moments later, the pilot found the canopy gone and his left arm pinned behind him by the tremendous windblast. The gauges looked good; while regaining level flight, the pilot pulled off some power with his right hand to slow the aircraft enough to get his left hand back on the throttle. It was then that he learned that his rear seat IP had ejected and was making his 4-line cut descending, scoreably, into the nuke circle. Following a routine controllability check, the aircraft was landed without further difficulty at the nearest airbase.

The trusty Hun had taken a ricochet just below the left forward windscreen side panel that took out the canopy on its way through the bird. Strike marks indicate that the "B-B" was a piece of old range debris that had been thrown into the air by Two's gunfire. Hard soil on the range, plus the fact that only a partial disking of the range had been accomplished a full week before the mishap, contributed to an increased ricochet potential on that otherwise great morning for strafing.

The ricochet potential we face on every air-to-ground mission is a real threat. You must respect it with the same regard as enemy fire and realize that the best protection you have is

sticking within the established delivery parameters. Of course, by continually keeping the ranges well policed, we can keep the potential "Golden B-Bs" to an absolute minimum. Had this strike been a tad higher and closer to the aircraft centerline, the jock would have literally shot himself down!

Of equal interest to Hun jocks was the plight of the backseat IP. He had his seat and visor full-up when the canopy blew and, consequently, lost his helmet immediately. Windblast and flying canopy glass/debris temporarily blinded him and inflicted multiple facial lacerations. Blinded and no comm, he quickly located the "go" levers and ejected without hesitation. Except for a minor compression fracture of the L-1

lumbar vertebra, the IP's ejection was successful.

Looking at the IP's actions, we can only reiterate the current Dash One guidance:

FLIGHT WITHOUT CANOPY

"The rear seat occupant will be extremely uncomfortable. Interphone communications cannot be relied upon. At speeds above approximately 225 knots IAS, the rear occupant may lose his helmet and suffer injury. Depending on the situation, it may be advantageous to have the rear occupant eject, rather than be subjected to continued flight at higher than recommended speeds."

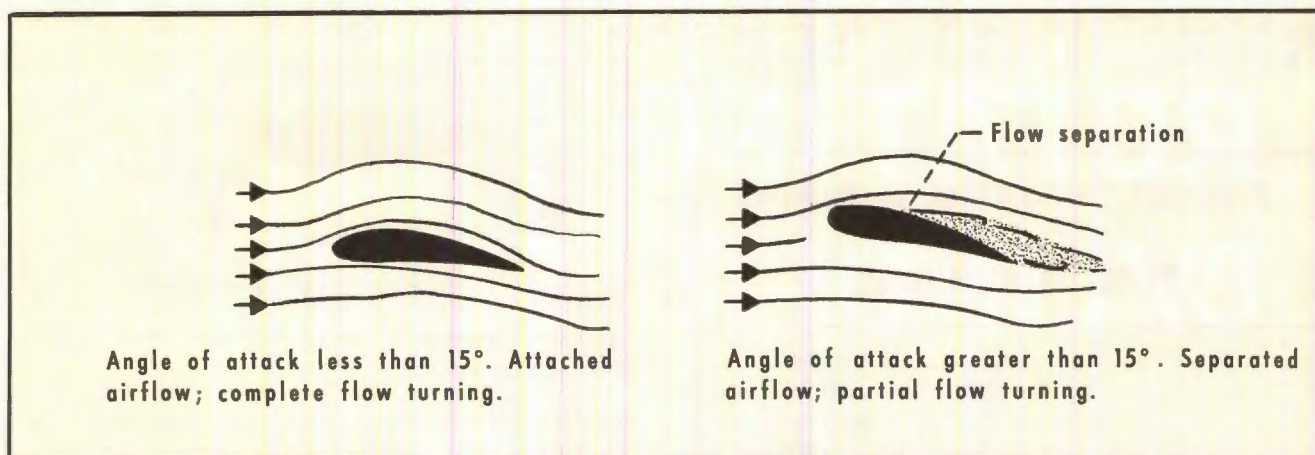


by
Maj Lefty Frizzell(Ret)



ROTATING CYLINDER FLAP





Effect of angle of attack on lift and airflow.

High-lift device	Coefficient of maximum lift, $C_{L, \max}$	Wing section	Relative landing speed
None	1.4		
Double slotted flap and leading-edge slat	3.5		

Effect of complex flap on lift and landing speed.

At a small angle of attack (the angle at which the wing meets the airflow), as occurs during cruise or shallow climbs and descents, the flow has little tendency to separate from the surface. When the angle of attack is increased, as in takeoffs and landings, the airflow has difficulty in adhering to the upper surface and separates from it before reaching the trailing edge, leaving dead air next to the wing. Separated flow contributes nothing to lift.

A trailing edge flap directs some of the air downward after it has passed over the main portion of the wing and also accelerates the airflow over the top of the wing. This acceleration reduces the pressure on the top of the wing and increases lift. A simple flap can increase lift by fifty percent. More complex flaps, such as a slotted flap, can more than double the lift.

But there is a limit to what a flap can do before the airflow over it separates. If additional energy could be added to the air near the trailing edge of the wing then, at any particular flap deflection, the airflow could cling to a

larger area of flap and thus increase lift.

One way to provide this energy is to install a rotating cylinder at the leading edge of the flap itself, and to spin the cylinder at high speed with the exposed surface rotated in the direction of the airflow. The rotating cylinder does two things: It delays the separation of the airflow from the wing and it adds energy to the downward flow of air. The resulting lift is theoretically about one and one-half times that available with the flap alone.

Results of NASA wind tunnel tests on models support the theory and have shown significant increases in wing lift over that of the flap without the rotating cylinder. To provide a more realistic test of this approach, a North American OV-10A aircraft, loaned to NASA by the Navy, has been modified to incorporate the rotating cylinder flap and to provide cross connection of the shafts of the two propellers. This cross-shaft connection insures control at very low speeds even with failure of one engine.

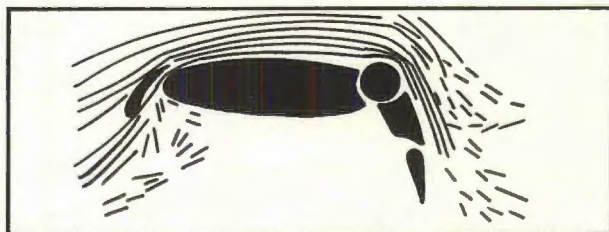
Estimates of the low speed performance expected from the modified aircraft, based on wind tunnel tests of a large

Rotating Cylinder Flap

Predicted Performance of Modified

OV-10A STOL Aircraft

	Basic OV-10A 30 ft Wing Span	OV-10A-RCF 30 ft Wing Span Cross Shafting
Takeoff Velocity	95 knots	65 knots
T.O. Distance Over 50 ft	1975 ft	950 ft
Approach Velocity	76 knots	50 knots
Landing Distance Over 50 ft	960 ft	530 ft
Single Engine Service Ceiling	10,500 ft	13,200 ft



Airflow over a rotating cylinder flap. Note that the flow remains attached to the upper surface of the flap and is directed downward.

scale OV-10A model, are shown in the table (left). Flight tests, which will include checking these estimates, are expected to extend into 1973. In the table, note the great anticipated reduction in takeoff distance and landing distance attained by the addition of the rotating cylinder flap.

Subsequent flight tests by the Ames Research Center, the lead NASA center for this research, will study the dynamic characteristics of an aircraft using the rotating cylinder flap in a realistic flight environment. These tests will also define any operational problems of the rotating cylinder flap before the concept is incorporated into production aircraft.

The rotating cylinder flap was patented by Alvarez Calderon of Perú, a NASA consultant. ➤



TAC TALLY

MAJOR ACCIDENT RATE COMPARISON

	TAC		ANG		AFRes	
	1972	1971	1972	1971	1972	1971
JAN	0	1.6	0	16.7	0	0
FEB	1.6	1.6	0	11.6	0	0
MAR		3.1		7.0		0
APR		2.7		4.9		0
MAY		2.5		5.7		0
JUN		2.6		6.9		0
JUL		2.9		7.1		0
AUG		2.7		7.8		2.7
SEP		3.2		7.4		2.4
OCT		3.2		6.9		2.1
NOV		3.3		6.9		2.0
DEC		3.2		6.4		1.8

AIRCRAFT ACCIDENTS

UNITS

*Estimated

	Thru Feb					Thru Feb			
	1972		1971			1972		1971	
	ACDTS	RATE	ACDTS	RATE		ACDTS	RATE	ACDTS	RATE
9AF	0	0	0	0	12AF	1	1.6	1	1.6
1 TFW	0	0	0	0	23 TFW	0	0	0	0
4 TFW	0	0	0	0	27 TFW	0	0	0	0
31 TFW	0	0	0	0	35 TFW	0	0	0	0
33 TFW	0	0	0	0	49 TFW	0	0	0	0
68 TASG	0	0	0	0	58 TFW	0	0	0	0
316 TAW	0	0	0	0	67 TRW	0	0	0	0
317 TAW	0	0	0	0	71 TASG	0	0	0	0
354 TFW	0	0	0	0	313 TAW	0	0	0	0
363 TRW	0	0	0	0	314 TAW	1	17.2	0	0
4403 TFW	0	0	0	0	355 TFW	0	0	0	0
					347 TFW	0	0	0	0
					425 TFTS	0	0	0	0
					474 TAW	0	0	0	0
					516 TAW	0	0	0	0
TAC SPECIAL UNITS									
1 SOW	0	0	0	0	4410 SOTG	1	21.8	0	0
2 ADG	0	0	0	0	4485 TTS	0	0	0	0
57 FWW	0	0	0	0	4500 ABW	0	0	0	0

SUMMARY

TAC		
FEB 72	THRU FEB	
	1972	1971
2	2	2
2	2	2
7	7	2
2	2	1
2	2	0
0	0	0
0%	0%	

TOTAL ACCIDENTS
MAJOR
AIRCREW FATALITIES
AIRCRAFT DESTROYED
TOTAL EJECTIONS
SUCCESSFUL EJECTIONS
PERCENT SUCCESSFUL

ANG		
FEB 72	THRU FEB	
	1972	1971
0	0	4
0	0	4
0	0	2
0	0	4
0	0	3
0	0	2
		67%

