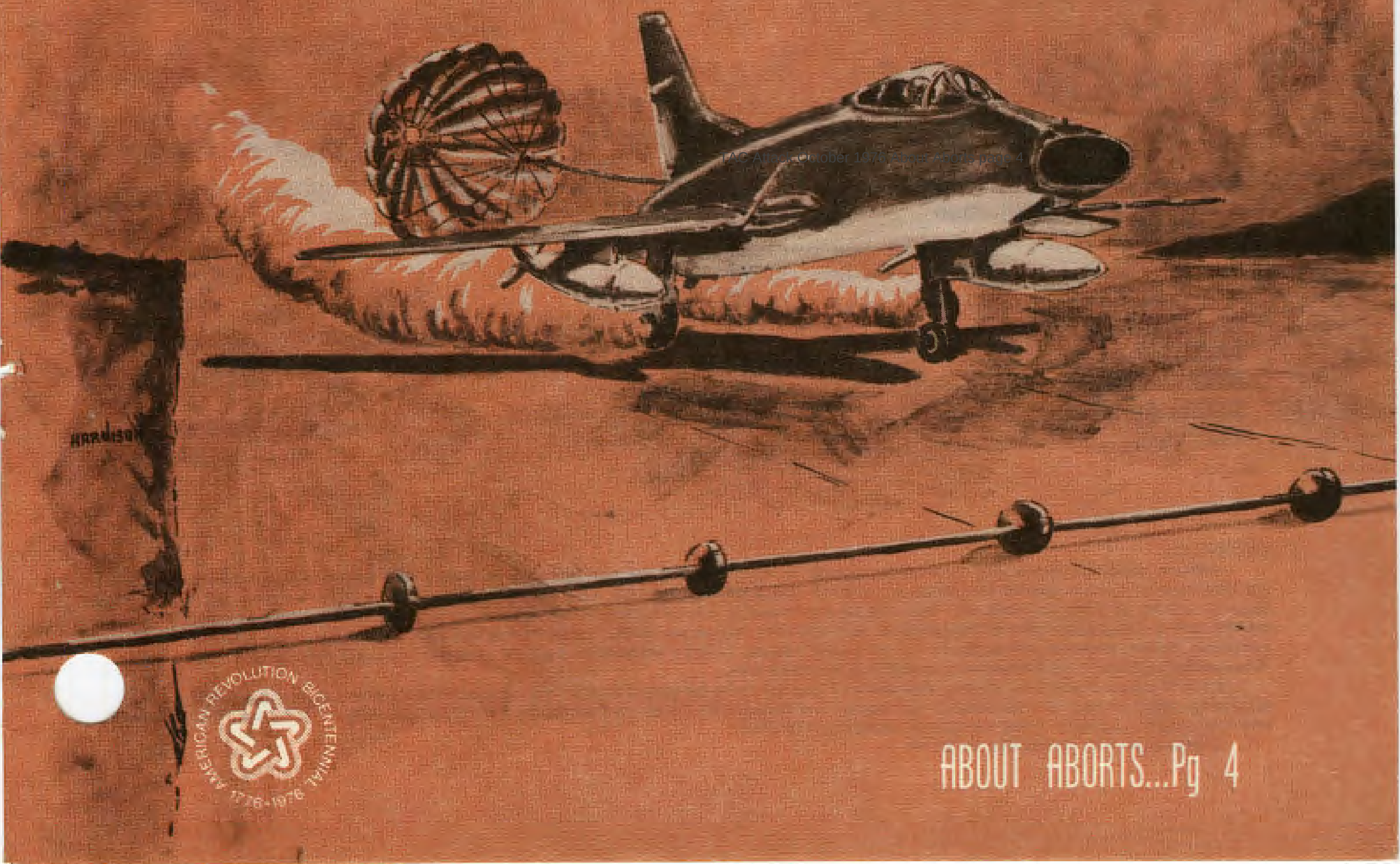
TAC ATTACK

OCTOBER 1976



ABOUT ABORTS...Pg 4

TAC ATTACK OCTOBER 1976 VOLUME 16 NUMBER 10

OCT

FOR EFFICIENT TACTICAL AIR POWER

FEATURES

DEPARTMENTS

TACRP 127-1

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Angle of ATTACK

GOOD JUDGMENT

Good judgment is difficult to define - but produces results that can be measured. One gauge of good aircrew judgment is a decrease in the number of accidents involving aircrew factors. Our statistics indicate that TAC is not doing well in this area in 1976. Through the first 8 months of 1976, TAC and TAC-gained Reserve Forces units have experienced 28 major aircraft accidents - 13 of these mishaps involved aircrew factors. Causes include incorrect execution of emergency procedures, failure to recognize aircrew or aircraft limitations, and failure to use all available assistance. The first two cause factors can be minimized by increased emphasis on professionalism during all phases of aircrew training - from basic instrument flying, weapons and tactics training, through individual efforts. The effectiveness of this training can be validated by a stringent standardization/evaluation program. The last problem - failure to utilize available assistance - requires a closer look. Here's where your judgment or lack of it, becomes most evident.

Most accidents result from a sequence of events that places you, the aircrew, in a position where safe recovery is impossible. It may start with poor planning, an aircraft system's malfunction, bad weather, or a combination of problems. It ends in disaster - unless you break this chain of events by making the right decision at the right time. This decision must be made using information from all available sources. The urgency of any situation limits the time you have to weigh your options, but several sources of assistance are normally only a radio call away.

A chase aircraft can provide a visual check for fire, gear problems, or structural damage. Chase can lead you home and handle radio calls if you experience electrical or instrument problems. Should an ejection be necessary, he can assist in rescue operations. If you need help, don't hesitate to ask for a chase aircraft.

Radar controllers and tower operators are your link to the whole ground system and can provide invaluable assistance. If the situation dictates, declare an emergency so they can give you priority for descent and landing. In addition, tower will alert the crash crews, command post, Runway Supervisory Officer (RSO), and Supervisor of Flying (SOF).

Use your RSO and SOF. They are experienced in your particular aircraft's systems and have Tech Orders - and other experts - available for technical assistance. They can also provide existing traffic, weather, and runway conditions. RSOs and SOFs have one additional advantage - being on the ground, they are not under the same pressure you face. Use them - they are there to help you. Don't let your situation get out of control.

You must be prepared to face tough decisions every time you fly. Tactical missions are especially demanding. Know your own limitations, your aircraft systems and procedures, and make sound decisions based on all available data. The bottom line of our accident prevention efforts is you, the guy in the cockpit. Your good judgment is the key.

George M. Sauls

GEORGE M. SAULS, Colonel, USAF
Chief of Safety

About Aborts

By Capt Dick Morrow
116th TFW/Flying Safety Officer (ANG)
Dobbins AFB, GA

Frequently, we in the flying safety business beat the obvious to death. For example, I remember sitting through thunderstorm briefings ad nauseum - all just to convince me not to fly into them. Really, now! Does anyone try to fly into thunderstorms? Having blundered into one in my "brown bar" days, I know better. And yet we harp on the obvious danger of thunderstorms.

Don't misunderstand, I am not trying to eliminate all thunderstorm briefings. Rather, I am using them as an illustration. My point is this. Rather than continually reviewing the obvious, maybe we should poke around under rocks and explore the dark, dusty, mysterious coffin corners. Occasionally we need to wrestle with some gray areas, and help rope off corners before pilots are boxed into them.

My purpose here is to discuss one of these gray areas, show how I've attempted to tackle it, and to promote discussion. Hopefully, from the collective wisdom of USAF pilots, we can distill some better guidance. The topic - ABORTS.

High speed aborts are always dangerous. Particularly in an aircraft like our venerable F-100 which gobbles up lots of runway getting airborne. On every takeoff, the ever-present choice looms: Is it now less dangerous to abort or continue takeoff? Always a knotty problem. Our F-100 Dash 1 provides sketchy help. It's replete with phrases similar to: "If blank happens and sufficient runway or overrun is availab abort the takeoff. If not feasible to abort

That's not much help - especially to new pilots without the gray hairs of Hun experience.

Of course, I realize emergency procedures must be flexible. Every situation is unique. Yet it should be possible to better define when to abort and when to continue.

Looking again to Dash 1, we can compute a refusal speed. This tells us the speed we can accelerate to and still stop in the remaining runway distance - with or without a drag chute. However, even this is relatively meaningless because we operate from runways with barriers, thereby allowing us to go faster and still stop. So, we are still pretty much in the dark.

My problem, then, was how to better define when to abort. To start, I had only my own personal opinions, but they needed challenging. Therefore, I began by devising a questionnaire for our pilots. I asked if they would abort in each of many situations. Additionally, I asked how these would change under IFR conditions and provided space for questions, comments, techniques, and opinions. Particular weight was given to answers by IPs and "old heads." Besides soliciting ideas, the questionnaire forced our jocks to think about their own personal abort parameters. Surprisingly, some admitted they had never considered each abort situation completely and had learned from just this detailed personal analysis.

Next, I reviewed data from the safety folks at Norton AFB. Armed with all this material, plus my own personal ideas, I waded into a flying safety meeting. And did we have a dandy. I refereed a rip-roaring good argument. (In fact, we continued over through a second meeting.) Amazingly enough, however, we ended by agreeing on many major areas.

Here is a simplified version of the questionnaire with our conclusions:

QUESTIONNAIRE

CONDITIONS: Dobbins AFB, F-100 with full 335 drop tanks, Wt 36,000 lbs, Temp 70°, P.A. 1,000 ft, Line Speed 122 knots at 2,500 ft, T.O. 172 knots at 5,600 ft, Formation takeoff, VFR day.

Would you abort under these conditions?

This light comes on:	LINE SPEED (122Knots)	ROTATION (157knots)	LIFT OFF (172knots)
Fire	yes	yes	divided (4)
Fire overheat	yes	yes	divided
Fuel valve fail	yes	no	no
Boost pump inop	yes	no	no
Anti-skid off	divided (1)	no	no
Heat & vent overheated	yes	no	no
Engine oil overheated	yes	divided(2)	no (5)
Flight system failure	yes	divided	no
Inst AC power off	yes	no	no
AC generator off	yes	no (3)	no
DC generator off	yes	no	no
This occurs:			
Loud thump or bang	yes	yes	no
AB failure	yes	yes	no

Notes:

(1) Many of us believe we should abort under any of these conditions at line speed to keep a simple, consistent decision technique. Many think anti-skid a legitimate exception as it is better to continue the mission and return to land and stop a lightweight aircraft.

(2) The questionnaire was worded, "This light comes on" purposefully to bring up the problem of false warnings. Also, the occurrence of transient conditions and the possibility of concurrent failure in backup systems were discussed frequently. These problems led partly to our divided opinions on "engine oil overheated" and "flight system failure."

(3) With low overcast skies, the "generator-off" light changes to an abort decision.

(4) At liftoff, we are divided for fire and overheat. It depends basically upon whether one has his faith in the ejection seat or barrier.

(5) The "no" answers in both liftoff and abort speed decisions are because we agreed the dangers encountered by continuing are less severe than those of a high-speed abort. It is not because we want to get airborne with a sick bird!

About Aborts

CAPT DICK MORROW is th[e] month's Fleagle T-shirt winner.

Nothing very revolutionary here ... but a good start. At least, we have now forced ourselves to define, and decide on, our own abort parameters. That's the real key anyway ... more important than any group decisions. Each of us must have a plan of action and carry through.

Our decisions here obviously apply only to one specific set of conditions. They don't apply at another base, or to another fighter. But we have tried coming to grips with one of our gray areas. In doing so, we have had some interesting fallout. First, our simulator program has been improved with much more knowledgeable and specific abort training. Second, we have identified an aircraft design and a Dash 1 weakness. They are:

1. We need better designed caution and warning systems. Advisory lights indicating abnormalities should trigger either a "Master Caution" (amber) or a separate "Master Warning" (red) light. This would aid pilots in making those split-second decisions and help eliminate our present confusion.

2. Our present refusal speed is almost worthless. We need a usable, realistic refusal speed which includes barrier systems and some probability of engagement success. This should give us a successful abort probability versus speed and runway remaining for a specific barrier configuration.

In conclusion, I'd like to challenge other pilots to analyze their abortion procedures and techniques. Through the Air Force pilot group, we can surely generate better information than we now have. Certainly, any crossfeed between units would be helpful. In particular, we would appreciate hearing any opinions on aborting from other Hun drivers.

Finally, I must restate these tried and true abort rules:

1. Practice, practice, practice in the simulator. That's the best way to become proficient at interpreting warnings, assessing airspeed and conditions, making the proper split-second decision, and executing the abort.

2. Have a plan for the day. Before taxiing onto the runway, decide what will cause you to abort that particular takeoff. Your decision will be based on runway length, barrier type, a[nd] weather conditions. It is no time for a mental [de]bate at 170 knots.

3. Review the abort procedure just before takeoff. Look at and physically touch all the necessary switches and handles. Crossing the BAK-9 looking for a tailhook button at night takes years off your flying career.

4. Don't delay. Abort early - avoid the rush! ➝

AIRCREWMEN of DISTINCTION

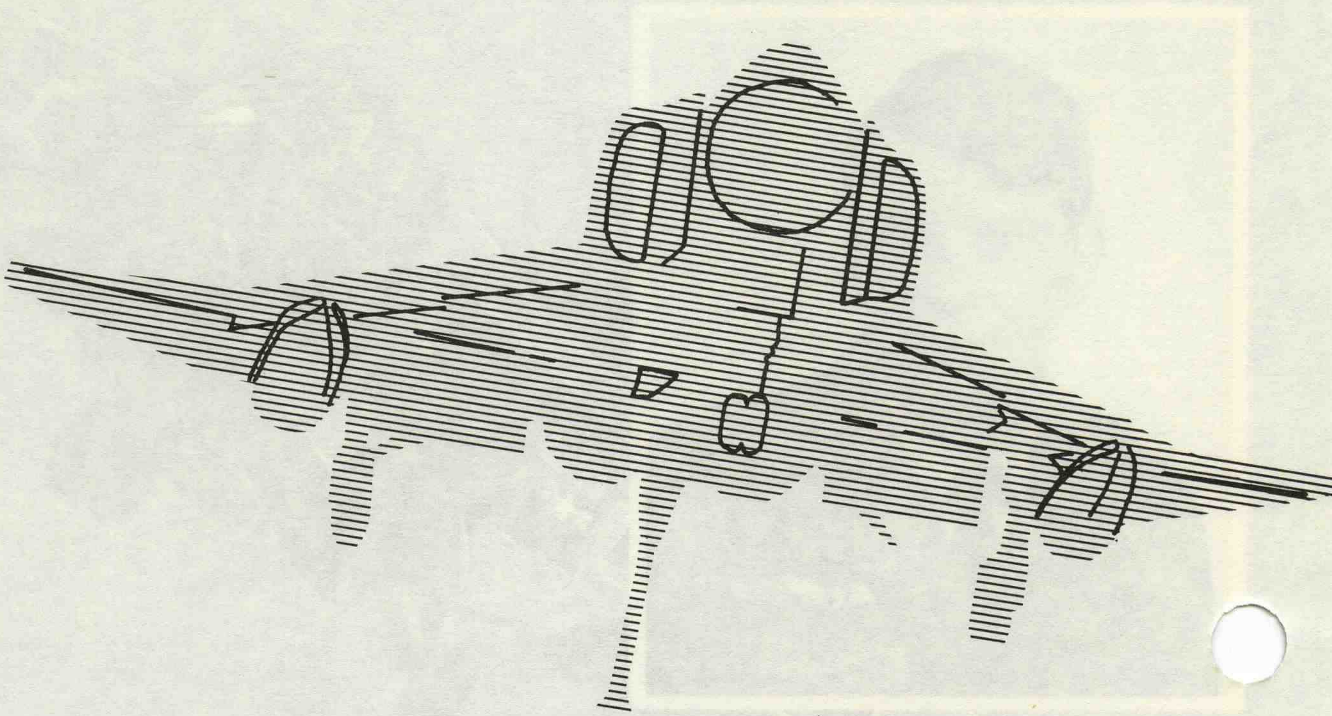
Capt Terry Q. McCammon
356th TFS/354th TFW
Myrtle Beach AFB, SC

While cruising at FL 310 on a simulated deployment mission, Captain McCammon's A-7D began experiencing severe engine vibrations. In an attempt to clear the vibrations, the throttle was retarded to idle and a descent initiated. Airspeed was increased during the descent to clear any compressor stalls. An emergency was declared, and the aircraft was turned towards the nearest suitable runway.

Captain McCammon selected normal fuel when the severity of the vibrations did not decrease after an airspeed increase of 40 knots. The vibrations continued, and the engine turbine outlet temperature (TOT) began to increase through 700°C. Approaching flight level 220, the TOT reached 730°C, and Captain McCammon elected to shut down the engine to prevent damage from excessive heat. The emergency power package was deployed to provide hydraulic power for the flight controls, and a power-off glide made to 11,000 feet where an immediate restart was successfully accomplished. After the restart, only minor vibrations were noted with the RPM stabilized at 76 percent. When the throttle was increased to 79.5 percent RPM, the vibrations ceased. He continued the descent and performed a flawless precautionary approach and landing without moving the throttle until touchdown.

Captain McCammon's timely reaction to a serious engine problem, and the professional airmanship demonstrated during a power-off glide and restricted power approach and landing qualify him as the Tactical Air Command Aircrewman of Distinction.

SIMULATOR EMERGENCY



The DASH-ONE is good testament to all that we have learned. However, until you have been there and back, you've never read enough....

By Capt Bernard R. Smith, Jr.
4th TFW
Seymour Johnson AFB, NC

To land or eject. Every time a pilot raises his gear, he is eventually faced with this decision. Strangely enough, the only place F-4 pilots are reminded of it in print is in the Dash-One (checklist), under the Emergency Procedure called "Utility Hydraulic and Engine Failure (with or without Single PC Failure)."

A lot has been said and written about this emergency, and the information in the Dash-One is a good testament to all that we have learned. However, until you have been there and back, you've never read enough. The saddest thing, though, is that all of us have been there more than once ... but most of us failed to le[arn] as much as possible from the experience. I'm ferring, of course, to the hours that all of us spend in the simulator practicing emergency procedures (EPs).

As a flight simulator instructor, I've seen hundreds of these emergencies. Over a period of time, I began to notice trends. Everyone "knows" that the simulator does not fly like a real plane and that it is only good for learning procedures, right? Well, a lot of crewmembers, when confronted with the above EP, use that as an excuse for systematically losing control 'way out on final and bailing out. I am no longer inclined to accept this excuse. I did when I first started operating the simulator console, but since then I have noticed several crews who would routinely "land" the simulator at the proper airspeed, even from the worst possible situation of no utility and a frozen engine. It didn't take me long before I started talking to ~~se guys to find out what was really happen- and how the sim, at least, could be brought ~~n."

Now, since I'm a WSO and the thought of telling a pilot how to fly his aircraft would never enter my mind, I devised a little drill that illustrates all the problems associated with this emergency, allowing the pilot to teach himself ... thereby sparing his fragile ego. It goes something like this.

Set up an emergency that requires one engine to be shut down, i.e., oil failure or overheat, etc, then fail the utility pump on the good engine. Even though the windmilling engine will provide utility pressure, the crew should analyze this as a utility failure with one engine and go to that portion of the checklist. The crew should also be aware that, if possible, airstarting the dead engine on final would improve the situation.

At this point, all the checklist procedures should be completed; then we will deviate from the routine sim profile of getting a GCA, making radio calls, etc, and concentrate on flying the beast. Standing by to freeze the altitude, if needed, the simulator instructor should now instruct the crew to maintain a heading and ~~tude while slowing to a speed slightly below ~~ minimum touchdown speed given in the checklist table. With the above configuration, there will be noticeable control problems, but the pilot should not run out of control per se, as indicated possible in the checklist.

If the pilot can hack this, tell him to accelerate back to 230+knots. As soon as he is stable, fail the other utility pump and repeat the above slowing procedure. This time control will still be possible to the minimum speed in level flight, but more aileron deflection will be needed. Again have the pilot accelerate. This time he may run out of aileron in the acceleration, illustrating the need to reduce power and lower the nose to retain control. The concept of reducing power to maintain control does not set well with most pilots who, in all other situations, always do well with the opposite reflex.

Once again, level and steady with 230+knots and the windmilling PC failed, the pilot should then slowly reduce speed in level flight until he reaches a point where the stick hits the stop. A gradual controlled arrival at this point is really what this exercise is all about. Now, have the pilot maintain an airspeed close to this regime, and point out that now he can actually control the roll of the aircraft by holding the stick against the stop and reducing power to roll towards the stick, or adding power to roll opposite the stick. Have him practice this a few minutes and soon the concept of minimum controllable airspeed being directly proportional to the power setting will become clear, to the extent that even the age old reflex of cobbing-in the power to regain control will be somewhat corrected as desired in this situation. Obviously, the last few moments of this drill go very quickly. Some prebriefing is advised along with the simulator instructor being alert at this point to freeze the altitude to prevent the inevitable.

Now, again have the pilot accelerate and unfreeze the altitude. Have the pilot set up a 1,500 FPM descent at 230 knots, initiating a flare (power back) at about 200' AGL and "land rather than eject." Next hour he'll be ready for no utility and a frozen engine. Who knows, maybe the next guy to land one of these for real will thank his flight simulator instructor.

PHYZ-BIZ

PHYSIOLOGICAL INCIDENTS

By Lt Col Harold Andersen
HQ TAC Physiological Training Coordinator

Recently some inflight incident reports stimulated discussion of physiological incidents and sent us scurrying to the reg file for a quick check of AFR 127-4. Physiological incidents are: "a physiological reaction, near accident or hazard in flight due to medical or physiological reasons." A number of the old, familiar problems are listed: hypoxia (proven or suspected), carbon monoxide poisoning (a form of hypoxia), decompression sickness, incapacitation due to expansion of trapped gas, hyperventilation, spatial disorientation, etc, and concludes with death by natural causes. All of these are familiar subjects to readers of this column, as we have covered most of them in the past couple of years.

One of the incidents which prompted our interest involved transporting a tank of inert gas (nitrogen) in liquid form. Liquid nitrogen, like liquid oxygen (LOX), continually goes from the liquid to the gaseous state. If the gas is not released from the container, the pressure buildup will rupture it. Any gas (including LOX) which is transported by aircraft should be in a container which is vented overboard from the aircraft and not permitted to escape into the interior of the cabin. The report classified th

"a physiological reaction, near accident or hazard in flight due to medical or physiological reasons."

physiological reactions of the crew as reactions to a "toxic substance." While it is true that nitrogen becomes increasingly toxic at pressure greater than one atmosphere ... at less than one atmosphere of pressure, its effect is *one* of suffocation. As the *percentage* of nitrogen in the cabin increases, less oxygen is available and the effect is that of hypoxic hypoxia. Two mistakes are apparent here: failure of the loadmaster to properly prepare the tank for transport by not venting waste gas overboard and, secondly, *the* classification of the *action* of the gaseous agent as "toxic."

The second incident involved hospitalization of two loadmasters with lung damage due to breathing fuel fumes. As in the first case, equipment was being transported, and the mission [illegible] pressed to its *completion* following a fuel [illegible] ... despite the fumes which filled the cabin area where the loadmasters were stationed. In this instance, the fuel really was a toxic substance, and once the cabin became contaminated, the mission should have been aborted. It was not, *however*, and the loadmasters *breathed* the fuel-laden cabin air for a considerable period. Several errors were committed in this incident:

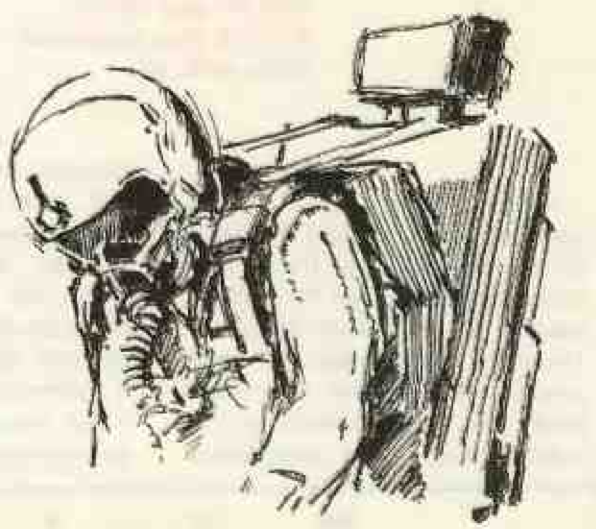
a. The fuel should have been drained prior to loading the cargo.

b. Once the cabin became *contaminated*, the aircraft *commander* should have aborted the mission.

c. The crew should have donned their oxygen masks and set their regulators to a 100% setting.

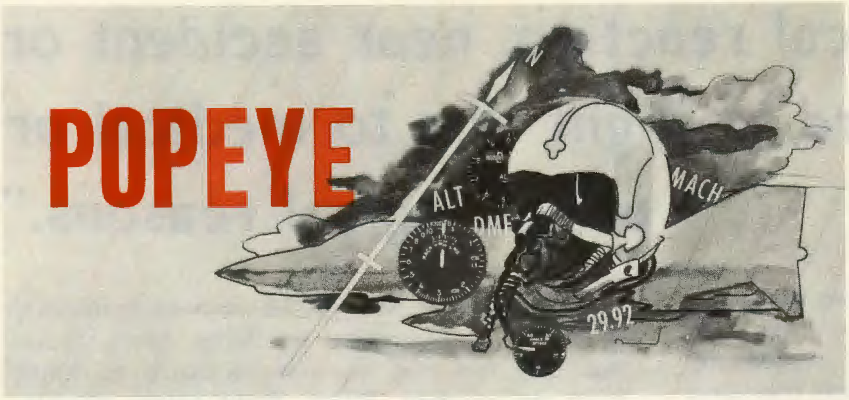
Neither of these incidents involved TAC aircrews. Although the *TAC* mission no longer *includes* airlift, there are some lessons here for us as well. Poor judgement, planning, and loading procedures could have been compensated for by proper use of available oxygen equipment by the crews. Had they followed the instructions given by their physiological *training* instructors, [illegible]one *would* have become unconscious or suf[illegible]ed lung damage.

In conclusion, let's review your responsibility to report physiological incidents. Many *crew*members feel that "*it's not* my place" to report *such* an incident. Pilots, flight safety officers, and flight surgeons are not the only responsible individuals. Each pilot, flying safety officer, or any other person with knowledge of a physiological incident must report it to the nearest USAF base commander, *flight* surgeon (or medical officer). From there on, it's their responsibility to send the required messages, fill out the required forms, etc. But remember ... you do have a responsibility to make the initial report. ➤



ED note:

The August 1976 *Phyz-Biz* article on hypertension contained a statement which some medical authorities interpret as "possibly misleading." The article stated that you are not necessarily placed in a DNIF status while undergoing treatment for hypertension. The current practice is to ground the patient for an initial 30-day period at the onset of treatment. If his hypertensive condition is satisfactorily controlled by the medication without side effects, he is then returned to flying duties.



POPEYE

DESCENT DECISIONS

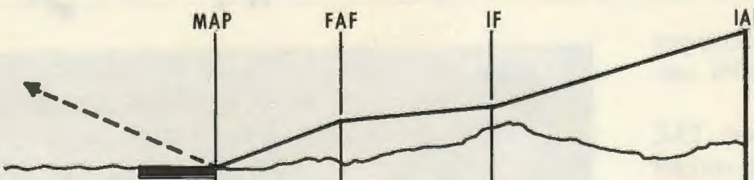
By Capt Mike C. Kostelnik
Test Project Officer
4485th Test Squadron
Eglin AFB, FL

When cleared for a TACAN approach, you should continue to the last point or fix in your clearance, and then fly a direct course to the Initial Approach Fix (IAF). Remember also that clearance for the approach does not include holding airspace unless you specifically request it. Upon reaching the IAF, turn in the shorter direction toward the penetration course, and initiate descent when the aircraft is established on a parallel or intercept heading and abeam or past the IAF. If maneuvering the aircraft to a more favorable position prior to starting the descent is considered necessary, obtai clearance from ATC. In the analysis, it is the pilot's ultimate responsibility to determine when maneuvering airspace is required to successfully complete the approach.

The Hi-TACAN Rwy 31L approach to Corpus Christi NAS is a typical example where maneuvering airspace may be essential. At Corpus NAS, in order to make good the 3,000 ft altitude restriction, it's imperative that descent be started no closer to the TACAN station than 22 DME. At first glance this requirement may not be obvious, but let's review some TERP's (AFM 55-9) criteria and some typical aircraft descent performance to see if we can predetermine descent requirements.

Referring to the TERP's criteria in Figure 1, we find that the maximum descent grad in the initial segment (Ir Approach Fix To Intermediate Fix) is 1,000 ft/NM for a Hi-TACAN approach. In the initial segment at Corpus NAS, 12,000 ft must be lost in the first 12 NM; this equates to a gradient of 1,000 ft/NM. However, in order for this 1,000 ft/NM figure to have any real significance for the reader, we'll have to relate it to something you can visualize in the cockpit. Let's review some basic aircraft descent characteristics and the relationship between relative pitch change and descent gradient.

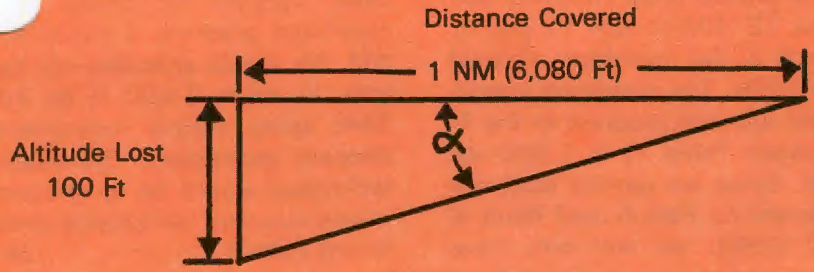
The basis for our approach to this problem will be the relationship that 1° relative pitch change will alter the aircraft's flight path in the vertical by approximately 100 ft/NM. This relationship can be verified by the following simple t onometry:



MISSED APPROACH	FINAL		INTERMEDIATE		INITIAL	
	OPT	MAX	OPT	MAX	OPT	MAX
Gradient/NM	300'	400'	150'	300'	(HI) 800'	1000'
					(LO) 250'	500

Figure 1: Design Gradients by Segment for a Typical Straight-in Instrument Approach.

Let α = Relative Pitch Change = Descent Angle (Degrees)



$$\text{Descent Angle} = \alpha = \tan^{-1} \frac{\text{Altitude Lost (Ft)}}{\text{Distance Covered (Ft)}}$$

If we assume that 100 Ft is lost in 1 NM;

$$\text{Descent Angle} = \alpha \quad \tan^{-1} \frac{100}{6080} = .94 = \underline{\text{approximately } 1^\circ}$$

We can use the above relationship to determine the actual descent gradient for any given pitch change using the following formula:

Descent Gradient (Ft/NM) = Relative Pitch Change (Degrees) X 100 ft/NM i.e. Given a 5° pitch change:

Descent Gradient = 5° x 100 ft/NM = 500 ft/NM

We can also compute the necessary pitch change given the altitude to lose and the distance covered. For example, if you lose 2,000 ft of altitude in 4 NM, your descent gradient is equal to 2,000 ft divided by 4 NM or 500 ft/NM, which we have already shown is equal to a pitch change of 5°.

Now that we have established a relationship between relative pitch change and descent gradient, we must determine the connection between aircraft descent parameters and relative pitch change. We will use the F-4 as a typical example, but the technique is applicable for your aircraft as well. The information in Table 1 depicts the descent options, relative pitch changes, and computed descent gradients for the F-4 aircraft in instrument conditions.

If you decide to penetrate at 300 kts, 80% RPM, and the speed brakes extended, you can expect a 10° pitch change and a descent performance of 1,000 ft/NM. You can use this gradient then, to determine if the descent parameters you have selected will meet the altitude restrictions for the TACAN approach you intend to fly.

In order to determine the descent characteristics for your particular aircraft, refer to the appropriate Dash 1 to determine applicable penetration airspeeds and drag configuration options, and perform the following inflight test: Set the miniature aircraft to indicate level flight on the artificial horizon at penetration airspeed; establish the desired descent parameters (RPM, Drag Devices, Airspeed); and note the actual pitch change required to maintain penetration airspeed. You will then be able to quickly analyze instrument descents and their altitude restrictions using your own aircraft's descent performance and the above relationships between relative pitch change and descent gradient.

Now that we have reviewed the relationships necessary for

PHANTOM II INSTRUMENT DESCENT PERFORMANCE CHART

AIRCRAFT PARAMETERS	PITCH CHANGE	DESCENT PERFORMANCE
300 Kts, 80% RPM, speed brakes retracted	5°	500 ft/NM
300 Kts, 80 RPM, speed brakes extended	10°	1,000 ft/NM

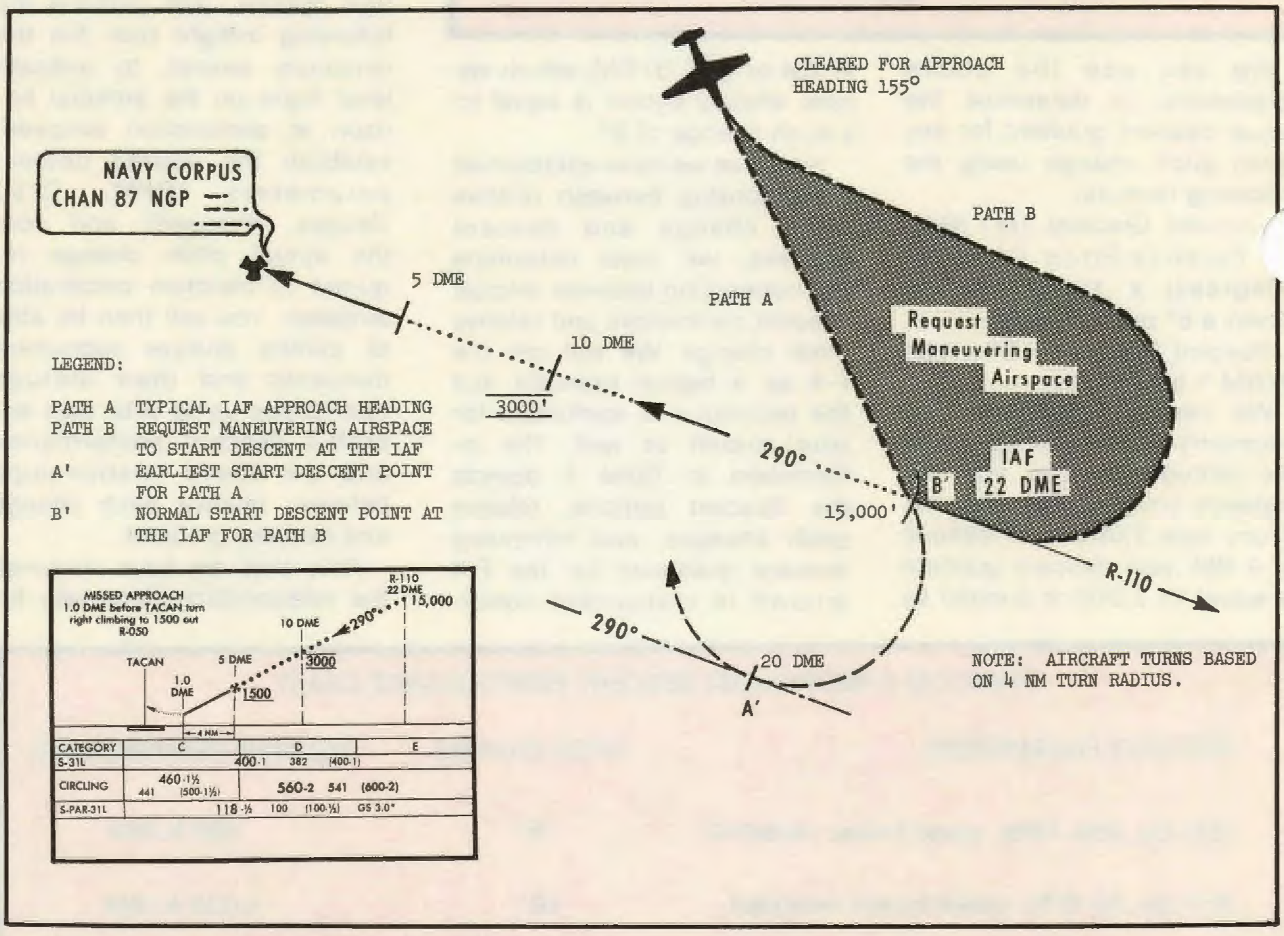
TABLE 1: F-4 Instrument Descent Performance Chart

POPEYE

analyzing an instrument descent, look closely at the Hi-TACAN approach to Corpus NAS, and see if you can determine why it would be better to request maneuvering airspace and follow Path B than to proceed direct on Path A. (Assume F-4 type aircraft)

SOLUTION: Since you must be at 3,000 ft by 10 DME, you have 12 NM to lose 12,000 ft, which is the maximum allowed by TERPs. The maximum instrument descent gradient in the F-4 (from Table 1) is 1,000 ft/NM. Since we cannot start our descent on Path A until Point A' (20 DME), we will only have approximately 10 DME (NM) to lose 12,000 ft. Since maximum gradient is 1,000 ft/NM, we would probably not be able to make 3,000 ft by 10 DME using 'normal' instrument descent techniques. The better technique would be to request maneuvering airspace and follow Path B .... →

COULD YOUR MACHINE HACK PATH A ?



HI-TACAN RWY 31L   CORPUS CHRISTI NAS

DOWN TO EARTH

COMMON SENSE & WATER SAFETY

By Capt Marty Steere

They had reported to work on the flightline in the predawn darkness. The wind was beginning to blow harder ... the rain lashed the concrete ramp. It would be a hectic morning ... all aircraft had to be evacuated to a safer inland location ... Hurricane Belle was rapidly approaching the Eastern U.S. coastline.

By 10 o'clock, all the aircraft had been evacuated, and flightline personnel were released. The rest of the day was their's - so the three airmen went home to decide what they would do. The rain had let up ... the wind wasn't as strong. Maybe they could spend the afternoon fishing.

One airman called the base weather station and asked about the hurricane ... was it a serious threat to the area? Not realizing the caller planned to go fishing, the weatherman advised the airman that Belle posed no serious threat to the local area. The die was cast.

The three airmen took their 9x4-foot, two-man raft to the beach. One airman remained on shore. The others climbed into the raft to launch the craft into the bay. During the launch, one paddle was lost ... but the airmen continued on. Approximately 50 yards from the shore, the other paddle broke. Both airmen tied themselves to the raft with 50-foot ropes and attempted to swim to shore. Unfortunately, the combination of an outgoing tide, a rough sea, and offshore winds prevented their return.

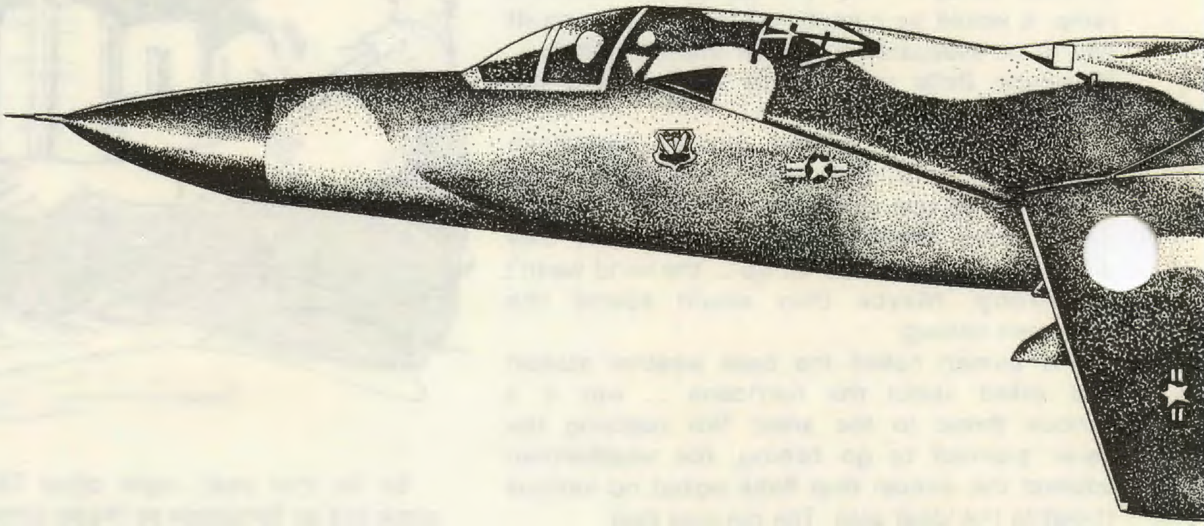
During their futile attempt to return to shore, a crowd had gathered. Seeing his companions in trouble, the airman who had remained on shore called the Coast Guard. Fortunately, a Coast Guard cutter arrived in time to save the TAC airmen.

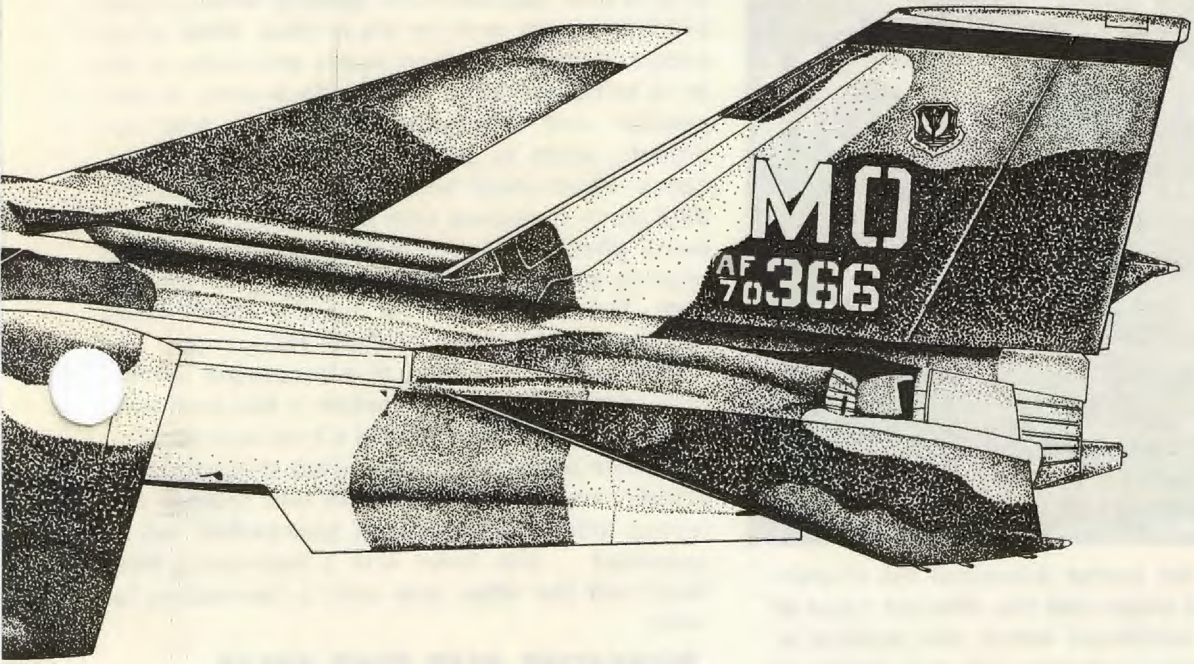
So far this year, eight other TAC individuals were not as fortunate as these airmen.

- It's hard to believe that someone who had been drinking beer all afternoon would try and swim 50 yards across a cove ... in 35° water. Well, an airman did try ... he drowned.
- It's hard to believe that someone who can't swim would wade out from shore during a violent thunderstorm. Someone in TAC did ... he was knocked down by a 4-foot wave and drowned.

We probably can't prevent every act of poor judgement and legislate common sense. Each base must maintain an effective education and training program ... but the responsibility really rests with the individual. Water sports can be fun. However, the water is unforgiving of the ignorant and foolhardy. Keep this in mind ... you may live through next summer. ➤

F-111





James H. Brown

WIND SHEAR ON FINAL APPROACH

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Last month, the author discussed the characteristics of wind shear and the different types of meteorological conditions which can produce it. This month, Major Carpenter will give details on how wind shear can affect an aircraft during approach and landing.

Many pilots have flown a perfect approach until just before touchdown when suddenly the plane slammed onto the runway. At other times, an aircraft will appear to float down the runway just a few feet off the surface and almost refuse to land. Such landings seldom make headlines in the newspaper unless an accident results. However, the only difference between these two situations and an accident is a matter of degree. Degree of what? "Pilot judgment," the records would probably read after an accident. But is this always correct? No - it could have been the amount of wind shear present in the landing area.

It is not surprising that most pilots do not understand how wind shear affects their aircraf It is a very complex topic and tends to b misunderstood. The often heard wind shear axiom is: "If a pilot suddenly loses a head wind, he will have a tendency to land short; but if he loses a tail wind, he will have a tendency to land long." However, it is not necessarily the direction of the winds which determines whether a pilot lands long or short. Instead, it is the location of the runway in relation to the wind shear point. Therefore, pilots cannot categorize certain reactions that will occur for a particular direction of shear ... it is more complicated.

Pilots are often lured into thinking that it will be a routine approach and landing when surface winds are calm and the sky is clear. Most pilots expect wind shear when winds are gusty or the air is turbulent; but a calm surface wind, in conjunction with a smooth descent on final approach, tends to produce a sense of complacency. Wind shear on final approach is usually difficult to recognize until the aircraft is actually being affected. Then it becomes difficult to determine exactly what is happening to the aircraft. Eastern Airlines 15 Jan '75 Flight Safety Bulletin stated that "Timely recognition and prompt action is the key to a successful landir or a required go-around when a low-level wir shear is encountered during a final approach."

To help pilots recognize a wind shear situation sooner, analyze it better, and take prompt corrective action, two different approaches will be examined ... one flown with a decreasing head wind and the other one with a decreasing tail wind.

DECREASING HEAD WIND SHEAR

If an aircraft stays on the glide path with a lower-than-normal rate of descent and the surface wind is reported *calm*, a pilot should suspect a strong head wind aloft and anticipate the possibility of encountering a low-level wind shear. In January 1975, Eastern Airlines reported an incident of a crew that did an excellent job of anticipating such a wind shear. The crew was flying an airplane equipped with an inertial navigation system (INS) and was executing a VOR/DME approach to runway 28 at night. Visibility was good and the approach lights were in sight with surface winds reported as 340 degrees at knots. At 1,500 feet, the crew noticed that the INS indicated winds o 315 degrees at 35 knots. This gave them a 3 knot head wind component with 10 to 11 degrees of left drift. The pilot later reported a drastic wind shear at 200 feet ... the head wind component and drift angle "just vanished." There was no noticeable turbulence at the low-level shear line, but one pilot described the feeling as though "the rug was pulled out from under them." The pilot flying the aircraft said it required full power to stop the excessive sink rate, but they were able to recover before touchdown.

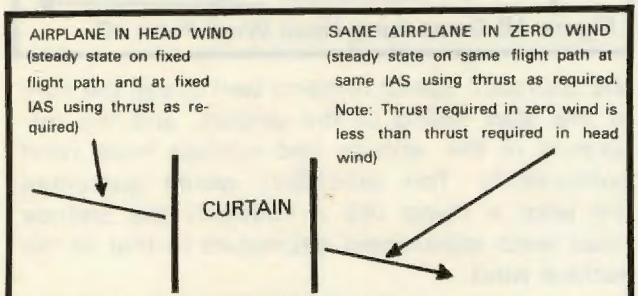


Figure 1 Decreasing Head Wind

Figure 1 depicts an aircraft in a strong steady head wind condition before it flies behind the imaginary curtain. When the aircraft emerges from the right side of the curtain, it is again in a steady state condition, but with zero wind. It is what goes on behind the curtain that must be understood. Assume the aircraft suddenly loses the entire head wind just as it disappears behind the curtain. This massive airplane, which is being propelled through the air with an enormous momentum, cannot react as abruptly as the wind did in changing velocity. Therefore, the Indicated Air Speed (IAS) will drop instantly by the amount of the wind shear. Due to a decrease in airspeed, the aircraft loses lift and sinks below the glide path. Now it is in a very critical situation - low and slow. At this point, it would be beneficial to determine how important airspeed is in recovering from this condition.

The importance of airspeed can be illustrated by examining the formula for the coefficient of lift ($C_L = 1/2 \rho V^2 S$). The coefficient of lift (C_L) is equal to one-half the air density ($1/2\rho$), multiplied by the velocity squared (V^2), times the wing area (S). The magnitude of C_L is representative of how hard the wind is working to produce lift at a fixed angle of attack. Since the formula is primarily used in aerodynamics for testing in wind tunnels, angle of attack is not a variable. But neither is it much of a variable on final approach in a landing configuration when the aircraft is operating very close to stall speed. Therefore, this increase-in-lift option, being somewhat limited, leaves the three variables in the coefficient of lift formula which influence the total lift of an aircraft. Since the density of the air is determined by Mother Nature, and the wing area is normally at its maximum during approach with flaps fully extended, an increase in velocity is the only significant means by which a pilot can increase lift. Since the velocity is squared (V^2) in the lift equation, it becomes a very powerful factor. For example, if the pre-shear velocity were 100 knots squared, it would be 10,000. If the post-shear velocity were decreased to 70 knots (squared, it would equal 4,900), the aircraft has lost 51 percent of its original lift.

Now a pilot can appreciate the seriousness of suddenly losing 20 to 30 knots of airspeed while in a landing configuration. How serious is the resulting increase in rate of descent? Well, assume a pilot is flying an approach with a 500 fpm rate of descent. Suddenly, he encounters a shear and the airspeed drops 30 knots, followed by an increased rate of descent totalling 1,000 fpm. What danger does this present? For this it is helpful to analyze the formula for kinetic energy ($KE = 1/2MV^2$).

Most pilots have probably seen this formula without even thinking about its potential effect on their flying careers. What it is really saying is that the vertical component of the kinetic energy of an airplane during final approach is equal to one-half the mass times the square of its vertical velocity. As in the coefficient of lift formula, the vertical velocity being squared becomes a very important factor. In the example above, the initial rate of (500 fpm) equals 250,000; the post-shear descent of (1,000 fpm) equals 1,000,000. Therefore, by simply doubling the vertical velocity, the kinetic energy has been quadrupled. Of course, the real danger is not having enough thrust or altitude available to recover. It was reported that EAL Flight 66, which crashed on 24 June 1975 at Kennedy International Airport, was on the glide path until 400 feet above the ground. At that point, the aircraft's airspeed sharply decreased by at least 20 knots and went into a 1,600 fpm rate of descent. As an airline captain with 20 years experience commented at the National Transportation Safety Board (NTSB) inquiry, "They were committed to crash at that point."

Now back to the shear problem behind the curtain. By first removing only the left half of the

wind shear on final approach

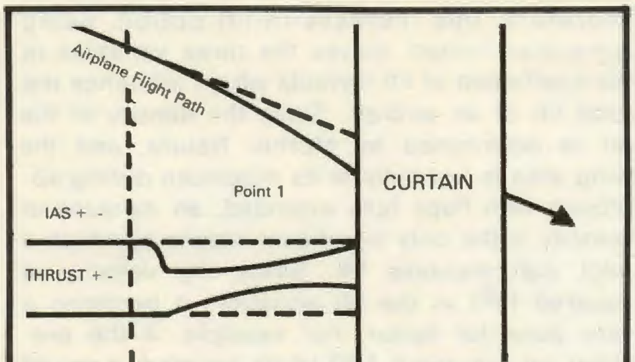


Figure 1A Decreasing Head Wind Point #1

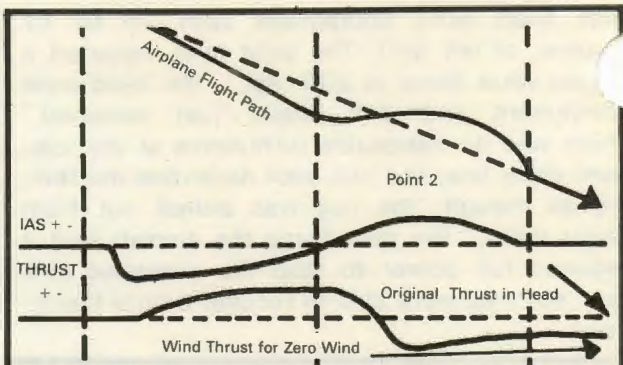


Figure 1B Decreasing Head Wind Point #2

curtain (Figure1A), the pilot's initial reaction can be analyzed. With a sudden drop in IAS, and a sinking feeling, the pilot will realize that he is going below the glide path and that his aircraft has suffered a loss in performance. He will undoubtedly increase thrust, pull back on the control column to get back up to the glide path, and perhaps even trim nose up. If the runway were located at point one, it is true that the aircraft might land slow, hard and some distance short of the intended touchdown point. However, if there is still sufficient altitude at point one, raising the second half of the curtain will reveal what can happen.

Assuming there is enough thrust available, the aircraft will begin to accelerate. As soon as the original airspeed is regained, suddenly, the thrust required to stay on the glide path is far less than for the earlier steady head wind descent. The pilot, having just recovered from a low airspeed situation, is not likely at this point to retard the throttles as rapidly as the situation dictates. Now with more thrust than required, the airspeed will go above the desired approach speed. This will increase lift and, with a nose-up trimmed condition, the aircraft is very likely to overshoot the glide path. Consequently, if the runway were located at point two, a pilot would have a tendency to be high, fast, and land far beyond the intended touchdown point. In this case, a go-around might be the only safe alternative.

Two conclusions can now be reached. The first is a characteristic of flying through any wind shear situation but is often neglected by pilots. That is, any correction made going into a wind shear will require counter corrections to stabilize the aircraft back on glide path once in the new wind condition. The second conclusion is that when a pilot is flying into a known decreasing head wind, he should make sure that the approach speed remains well above the sum of the stall speed of the aircraft, and the difference in the altitude and surface head wind components. This procedure would guarantee the pilot a flying IAS if suddenly the altitude head wind component decreased to that of the surface wind.

DECREASING TAIL WIND SHEAR

The second type of common wind sheer is a tail wind condition at altitude on final approach shearing into a head wind on the surface. It is not experienced by a pilot every day, but is a common occurrence.

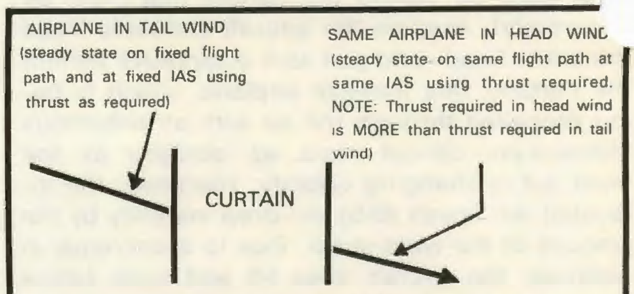


Figure 2 Decreasing Tail Wind

In the left of Figure 2, the aircraft is in a steady state with a constant tail wind. Of course its ground speed will be higher than normal. This will require a steeper descent than average, with less thrust, to maintain a constant approach speed. Therefore, with a high vertical velocity in the descent, throttles practically in idle, the pilot will still barely manage to stay on the glide path. The aircraft goes behind the curtain in this condition and when it emerges on the other side, it has made the necessary adjustments - it is now in a steady head wind and ready for landing. What went on behind the curtain? Immediately after going behind the curtain, the aircraft encountered a wind shear and suddenly lost all c

...e tail wind and picked up a moderate head ...nd. Again by lifting only one-half of the cur...ain, the pilot's reactions can be analyzed. When the tail wind stops, the IAS will naturally increase, but, in addition, the aircraft is entering a head wind which will cause a sharp surge in IAS. Because of the sudden lift produced, the aircraft will rise well above the glide path. Now the pilot must push forward on the control column and even trim nose down while reducing the thrust to idle. If the runway were at point one, the airplane would land fast, long, and well past the intended touchdown point.

However, raising the second half of the curtain reveals the critical action required. Chances are excellent at this point that the aircraft will go slightly below the glide path due to an over-correction on the part of the pilot. As the original approach speed is obtained and the glide path recaptured, considerably more thrust will be required instantly - even more than that required for the earlier steady tail wind condition. Due to the throttles being in idle and the aircraft being trimmed nose down, the pilot will not be able to match the thrust required and the aircraft will sink below the glide path. Now with a high angle ... attack and a deficiency in thrust, hopefully, he ...l be able to recover and recapture the glide path. However, if the runway were at point two, the aircraft would land slow, hard, and short of its intended touchdown point. Again a go-around at point one would be the best solution to the problem.

The DC-10 which crashed at Boston's Logan International Airport is a catastrophic example of the danger involved when a tail wind shears into a head wind. The shear was produced by a strong inversion below 600 feet. The aircraft encountered a shear estimated to be 31 to 34 knots in the last 1,000 feet. At 600 feet, there was a 16 to 19 knot tail wind which sheared into an 8-knot head wind at the surface. The surface winds were the only winds reported to the pilot. There was also a 23-knot crosswind component at altitude which sheared out to 3 knots on the surface. There was no turbulence associated with the shear. The pilot was flying an automatic ILS approach using auto-throttles.

This situation is very similar to that pictured in Figure 2B ... except the tail wind decreased over a considerable period of time allowing the auto-throttles to respond gradually by reducing thrust. Moreover, this gradual situation prevented an abrupt increase in IAS as in Figure 2A, thus masking the effect of the shear. However, the airplane began to sink below the glide path, as in Figure 2B. The pilot suddenly realized the need for overriding the auto-throttles and added considerable thrust. This all occurred as the pilot was breaking out of the overcast (surface visibility was 3/4 mile) and began a correction for the slight lateral offset caused by the change in crosswind component. The aircraft contacted the ground at point two, in Figure 2B, and was destroyed.

AUTOMATIC APPROACH IN WIND SHEAR

As indicated by the previous example, an automatic approach can be extremely dangerous - especially if auto-throttles are utilized. To make things worse, the auto-throttles may disguise the shear until it's too late to recover (as was noted in the example of the DC-10). Autopilots and flight directors dictate changes in pitch to maintain position on the glide path. Meanwhile, the auto-throttles strive to hold a preselected IAS. If the flight director calls for a "fly-up" in order to recapture the glide path, even though the airplane might be in a high sink rate, the autopilot only knows to increase pitch and fly up. Why?

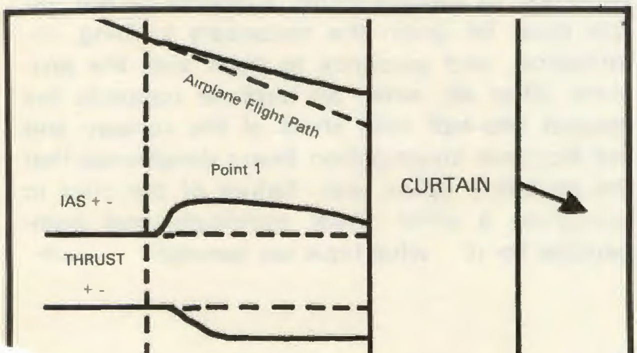


Figure 2A Decreasing Tail Wind Point #1

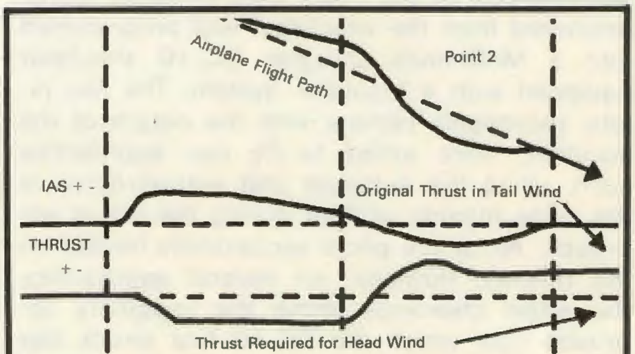


Figure 2B Decreasing Tail Wind Point #2

wind shear on final approach

Because neither the autopilot nor the flight director recognizes the need for thrust. The throttles could be very close to idle at this point if the aircraft were being flown under a tail wind condition. It is only when the IAS starts to rapidly drop off that the auto-throttles will surge in with partial power. This method of corrective action means that the secondary control requirement (pitch) is being attempted first, imposing a definite time lapse, before the primary control requirement (power) is even notified. Therefore, a wind shear that leaves an aircraft thrust deficient near the ground in a nose-high attitude can be particularly dangerous.

Automatic landing systems have to be certified by FAA to handle a maximum of eight knots per hundred feet of wind shear. However, statistics show that there is a 100 percent probability that this value will be exceeded, at least once, during the average lifetime of an aircraft. Therefore, perhaps a pilot should not fly an automatic approach into a known or suspected wind shear condition, and he should definitely not use the auto-throttles.

THE COMPLEXITY OF WIND SHEAR

The two examples of wind shear which have been analyzed (decreasing head wind and decreasing tail wind) were rather simple forms of shear problems. Even after discussing the two different situations thoroughly, if you were faced with an approach tomorrow under either set of circumstances, it would be a challenging experience. Five qualified pilots had their hands full when they were asked to participate in a simulator test and fly the approach that caused the DC-10 crash at Boston. The actual wind condition which existed during that approach (documented by the Flight Data Recorder (FDR) recovered from the wreckage) was programmed into a McDonnell Douglas DC-10 simulator equipped with a Visulator System. The five pilots, thoroughly familiar with the details of the accident, were asked to fly two approaches each, using the autopilot and auto-throttles in the same manner utilized during the actual approach. All of the pilots successfully landed on the runway. However, on several approaches, the wheel clearance above the imaginary approach light which the DC-10 first struck was less than 10 feet. Even when a pilot knows what the conditions are, it is not easy.

Captain W. W. Melvin of Delta Airlines ha[s] been writing articles for seven or eight years on the dangers involved when encountering wind shear. In one of his articles, published in the AIR LINE PILOT magazine in November 1971, Captain Melvin discusses different representative wind shear problems which have actually been recorded. In figure 3, the general characteristics are as follows:

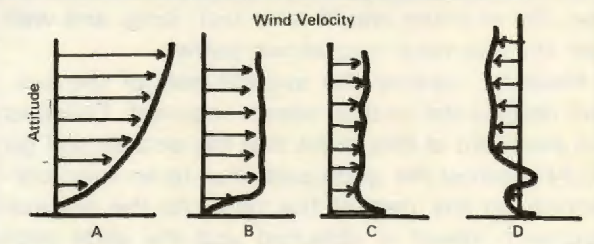


Figure 3 Wind Shear Categories

(a) Winds aloft up to 40 knots were measured at 200 feet and below. They sheared out at 12 knots/100 feet down to a surface wind of calm to 10 knots.

(b) Winds were stable in velocity until 100 feet above the ground - then dropped off 2[5] knots or more.

(c) Winds were found similar to "B" but with an increase in velocity near the ground. This is a very rare type of shear since surface friction normally decreases winds near the ground.

(d) Winds have been recorded similar to "B" but with a rapid reversal in direction of shear gradient close to the ground. Winds have been measured which sheared up to 21 knots/100 feet in both directions within 150 feet of the ground.

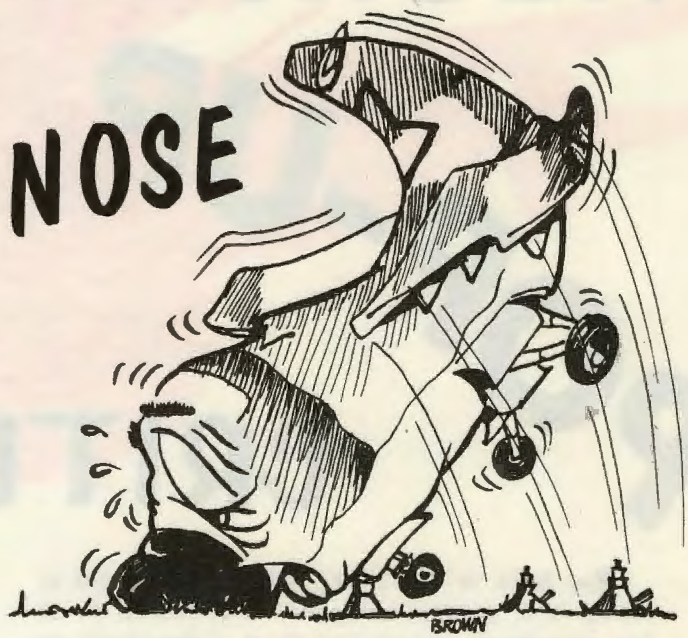
It is an understatement to say that wind shear is a complex phenomenon which appears in a multitude of various forms. Complex or not, pilots must be given the necessary training, information, and guidance to cope with the problem. After all, when an airplane contacts the ground one-half mile short of the runway and the Accident Investigation Board determines that the probable cause was "failure of the pilot to recognize a wind shear condition and compensate for it" - what have we learned? →

NEXT MONTH: Detecting and Coping with Win[d] Shear.

chock talk

...incidents and incidentals with a maintenance slant.

A-7D gets BROKEN NOSE



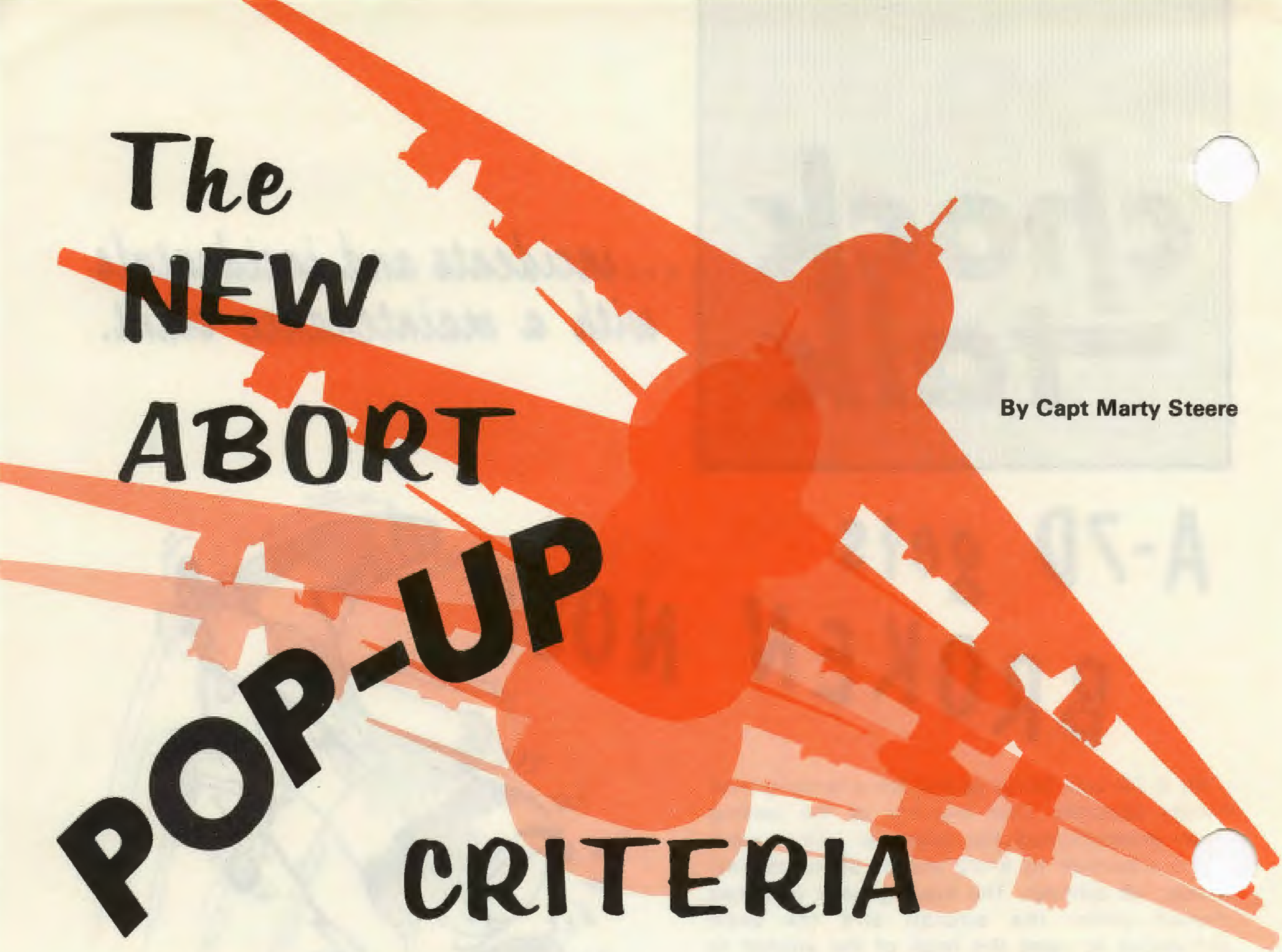
An A-7D was being jacked for a landing gear handle problem. One member of the jacking team prepositioned the fuselage jack's upper screw extension to 5-1/2 inches above the hydraulic lift cylinder. The fuselage jack was then moved under the aircraft and the team proceeded to raise the nose of the aircraft to ensure the wing jacks were seated properly. When the fuselage jack had been raised to approximately 6 inches, the jack screw extension separated from the hydraulic lift cylinder,causing the aircraft to fall forward striking the doppler radome.

How did this happen? First, the jacking team did not inspect the jacks prior to using them. Additionally, the jack screw had been set above the 4-inch height restriction contained in TO 35A2-2-76-1. The jack screw's internal stop pins had sheared off, which allowed this to occur.

The maintenance folks were not completely to blame. It was discovered that the tech data was insufficient. TO 1A-7D-2-1 and TO 1A-7D-2-1CL-1 do not contain the specific extension limits for jack screw extension for the fuselage jack. Both of these technical orders make reference to the 35A-2 series TOs ... but the 35A-2 series is primarily used by nonpowered AGE personnel for maintenance and inspection requirements and is not normally maintained by the flight line maintenance branch.

An AFTO Form 22 has been submitted to include fuselage and wing jack extension limits. The unit is also painting all the 17-ton jacks with the caution: "Do not screw the jack extension more than 4 inches above hydraulic cylinder." The 20-ton jacks presently have the limit reflected on a caution decal.

We were lucky this time. No one was injured, and the damage to the aircraft was minor. It could have been a lot worse. Jacking aircraft can be a very hazardous operation. If you are on a jacking team and you know of tech order discrepancies, let your supervisor know. Then follow it up. If a change to the TO was not submitted, give your wing safety office a call. They will help you get the change submitted through the proper channels. Your interest may prevent an accident ... even a loss of life.



The NEW ABORT POP-UP CRITERIA

By Capt Marty Steere

Way back in 1962 at "William Tell" held at Nellis AFB, competitors were required to fly at low altitude to a point just short of the target on all non-nuclear ground attack missions. A "pop-up" maneuver was then performed in order to intercept the appropriate dive angle for each event. According to available records, this was the first time this tactic was ever stipulated and flown in any USAF tactical fighter operation.

The "pop-up" was born of the requirement to destroy targets while minimizing exposure time to enemy defenses. At a preplanned point, a climb is initiated toward a desired apex in space. After gaining approximately one-half to three-quarters of the apex altitude (depending on ordnance and delivery conditions), a rolling, often near-inverted turn toward the target is entered so as to pass through the apex at the proper airspeed and altitude. The rolling turn is continued until the aircraft is aligned on the desired attack heading. Once this is achieved, the aircraft is then returned to an upright, wings-level attitude for the remainder of the pass. Because of the constantly changing aircraft heading, altitude, attitude, and airspeed, the pop-up maneuver eliminated the prolonged and vulnerable base leg common to box type air-to-ground patterns and fulfilled the requirement to minimize exposure time.

A successful attack on a ground target using the pop-up depends on the pilot's ability to maneuver his aircraft to a precise position in space relative to the target. This position is determined by the type of ordnance carried, precomputed delivery parameters for that ordnance, and maneuvering characteristics of the aircraft.

Although the pop-up is a viable tactic that has been around for some time, recent TAC accidents have pointed out the need for a review of pop-up training and caused restrictions to be placed on the aircrews performing the maneuver. This article will not explain how to plan a pop-up maneuver. The procedures utilized determining the Minimum Attack Parame

(MAP), and what the distance from the MAP to the pop-up point should be, are adequately covered in the various weapons instructional texts. The purpose of this article is to explain the new restrictions placed on TAC aircrews while performing the maneuver during peacetime operations and the rationale used in determining these restrictions.

A 5-year review of operations-related TAC accidents indicated that the majority of pop-up accidents were caused by steeper-than planned dive angles and low energy levels. In order to prevent low energy levels from recurring during the pop-up maneuver or the delivery, TAC has imposed a minimum airspeed of 350 knots during all low-angle deliveries (less than 30°) on all TAC fighters ... with the exception of the A-10 and A-37. (Minimum airspeed for the A-10 and A-37 during the pop-up maneuver and delivery is now 200 knots). These airspeeds were chosen because they are realistic minimum combat airspeeds for maneuvering aircraft executing low-angle pop-ups in a high threat area. (At this writing, the minimum airspeeds for high-angle deliveries are being determined). Steeper-than-planned dive angles result in short tracking times on final because of the necessity to pickle at a higher altitude and a greater-than-planned altitude loss during the pull-out. Delivery accuracy is also sacrificed ... again due to the short tracking time available. To ensure greater delivery accuracy, and to guard against excessive altitude loss during the pull-out, the delivery pass must now be aborted anytime the actual dive angle exceeds the preplanned dive angle by more than five degrees.

Restrictions were also placed on the type of pop-ups which could be performed, i.e., direct or angle-off pop-ups. TAC aircrews have been prohibited from performing direct pop-up deliveries because of the difficulty in target acquisition during the maneuver.

To provide inexperienced aircrews with a firm foundation in the basics of performing a pop-up, two steps were taken. The first was to limit aircrews undergoing Phase II training or operational and conversion courses to angle-off approaches between 15° and 90° of the attack heading. Second, these aircrews were prohibited from performing element pop-ups in any type of formation. These two restrictions will give the aircrews adequate visual reference with the target throughout the maneuver and allow them to spend their time maneuvering the aircraft to the desired delivery position ... not flying formation.

Investigations of the accidents involving pop-ups revealed that many of the aircrews began their pull-up at a point closer to the target than the preplanned pull-up point (PUP) and then apexed inside the preplanned minimum attack parameter. The result was often high angle-of-attack rolls and pull-downs, and steeper-than-planned dive angles. The usual reason for overflying PUP is poor premission planning: not enough time devoted to target area study which results in either a misidentified PUP or the PUP does not show because of poor selection. Because of this, aircrews in Phase II training or operational and conversion courses must abort the pop-up maneuver anytime it can be determined either that the actual PUP is closer to the target than the preplanned PUP, or if the actual flight apex is inside of the preplanned MAP. Aborting the pass at this point and setting up again with the proper parameters will be more beneficial to inexperienced aircrews than continuing a bad pass.

In a combat situation, the probability of attaining the desired approach or delivery position is less than 100 percent. However, aircrews must be trained in the various types of pop-up approaches and repositioning maneuvers. Because of this need, mission-capable and mission-ready aircrews, instructor pilots and FWIC/AWIC students are given the option of aborting the pop-up maneuver if the apex is inside the MAP, or taking positive repositioning action to place the aircraft at the MAP with the preplanned flight parameters. These experienced aircrews are also allowed to practice element pop-ups in formation ... a viable combat tactic.

The figure on page 26 depicts restrictions placed on TAC aircrews when performing the pop-up.

These restrictions will be formalized and incorporated into appropriate manuals. They may be modified in the future because of flight characteristics peculiar to each aircraft, but the intent will remain the same ... to provide a positive control against steep dive angles and low energy levels. The restrictions provide safer training for our inexperienced aircrews by allowing them to build a good foundation in pop-ups ... under controlled conditions. At the same time, the flexibility to conduct safe, realistic training of mission-capable and mission-ready aircrews is maintained.

POP-UP

	MR/MC	IP	STUDENT FWIC/ AWIC	PHASE II	STUDENT OPS CRS	STUDENT CONV. CRS
IF DIVE ANGLE GREATER THAN 5 DEGREES	ABORT	ABORT	ABORT	ABORT	ABORT	ABORT
IF AIRSPEED DURING LOW ANGLE POP-UP IS LESS THAN 350 KTS (200 KTS A-10 & A-37)	ABORT	ABORT	ABORT	ABORT	ABORT	ABORT
AIRCREW LIMITED TO ANGLE-OFF APPROACH (15 TO 90 DEG. OF ATTACK HEADING)	NO	NO	NO	YES	YES	YES
AIRCREW MAY PERFORM DIRECT POP-UP DELIVERIES	NO	NO	NO	NO	NO	NO
AIRCREW MUST ABORT WHEN PUP CLOSER TO MAP THAN PREPLANNED PUP	NO	NO	NO	YES	YES	YES
MAY PERFORM ELEMENT POP-UPS IN FORMATION	NO	NO	NO	YES	YES	YES
AIRCREW MUST ABORT IF APEX IS INSIDE OF MAP	YES	YES	YES	NO	NO	NO
MAY REPOSITION TO MAP WITH PREPLANNED PARAMETERS	YES	YES	YES	NO	NO	NO

TAC TIPS

... interest items,

mishaps with morals,

for the TAC aircrewman

... AND NOW FOR THE GOOD NEWS

If you took a survey at your unit and asked, "Do you enjoy attending wing or squadron safety meetings?" you would probably get more than a few strange glances. If you asked why, the answers would vary. However, they all would probably have one thing in common ... no one likes being told how everyone makes mistakes. Safety appears to be inherently negative. How many times have you heard, "The pilot failed to lower the gear ..." "The pilot flew the aircraft into a position from which recovery was impossible ..." "The maintenance technician failed to follow tech data." Ad nauseum.

Well friends and neighbors, hang on. This is not going to be one of those tales of doom and destruction caused by man's inability to be perfect. I'm going to tell you about some TAC troops who did things right. Yes ... you are reading a safety magazine. But, I thought I would try something different ... tell you some good things. Who knows, it could start a new trend.

The first incident occurred to an A-7 pilot. While flying a low-level at 400 feet AGL and 360 knots, the SLUF encountered a flock of birds. The pilot was able to avoid the main portion of the flock, but one bird struck the center windscreen. The impact fractured the glass, but the windscreen remained in position. However, glass fragments flew into the cockpit. The pilot was not injured because he had his visor down.

Another similar incident occurred to a Phantom jock. During the roll-in to a low angle strafe pass, a large egret struck the side panel of the windscreen. The bird shattered the panel, entered the cockpit, and struck the pilot on the shoulder and one side of the helmet. Fortunately, the pilot had his visor down and was unhurt. In both bird strike incidents, the pilots successfully recovered the damaged aircraft.

The final story is of a recent TAC accident. The aircrew had completed preflighting the F-4. Number two engine was started normally using cartridge start procedures. When the pilot actuated the start switch for a cartridge start on the number one engine, there was a small puff of smoke from the starter exhaust area accompanied by popping sounds. Flames shot out the starter exhaust door and shortly thereafter the underside of the aircraft was engulfed in flames. The pilot egressed using the emergency egress procedures and received only minor burns to the neck and right arm. The WSO egressed without injury.

What did this crew do right? They wore their nomex flight suits and gloves correctly. Sleeves were down and their gloves were on. If they had been attired like the crew in the photo, the story might have ended differently.

The common ingredient in all these mishaps is the proper utilization of life support equipment. These aircrews were professional ... and it paid off.

As you have seen, we really do notice when people do a good job. It's a lot easier to write about the good things that happen rather than the bad. Hopefully, it will get you to think about prevention ... because that's the key. Keep up the good work. ➢

SPO Corner

F-4 FUEL SYSTEM CAVITY DRAINS

Tell 'em where they are, what they're for, and how important it is to keep 'em open!

By Mr. Jim Cuidon
McDonnell Douglas Corp

A new maintenance man may look at a drain on the Phantom, see a clear fluid emitting from it, and figure that "it's draining water - just like it should." At this point, some of you older types should take 60 seconds to explain the purpose of F-4 fuel system cavity drains to Charlie-new-guy. Tell 'em where they are, what they're for, and how important it is to keep 'em open!

There are seven or eight fuel system cavity drains per aircraft - seven are standard on all models, the eighth is only on aircraft which have a No. 7 fuel cell. (Incidentally, some people call these "compartment" drains instead of "cavity" - they're talking about the same thing.)

There are two drains for the No. 1 cell cavity, and one drain for all the remaining fuselage cell cavities. Since the bottom of the No. 1 cell cavity is flat over a relatively large area, the attitude of the aircraft may have considerable effect on the amount of fluid which can be trapped in this cavity. These two drains are also on opposite sides of the cavity for the same reason. The remaining cavity drains are centered and at low points on each cavity. (Bear in mind that we are concerned with, and speaking of, open tube drains - not manual drains.)

You will very seldom see water dripping from these drains, except in certain climates and at times of the year which are conducive to excessive moisture production. It is therefore necessary that any fluid coming from one be examined, to assure it is water and not fuel - under normal circumstances, fuel will never be seen coming from these drains.

Now to the crux of this article. Where would the fuel first show up if a fuel cell were cut, punctured, ruptured, etc? Right! - at the cavity drain outlet. Take a moment and think about all the reasons a fuel cell might get a hole in it ....

Guess you now have enough reasons to closely examine these drains on each preflight/postflight. Now, every time you see any kind of fluid coming from any drain, let it remind you to check the fuel system cavity drains the next time you are at the airplane.

"WHERE OH WHERE IS THE JP-4 ?"

By Mr. Bob Moore
McDonnell Douglas Corp
Field Service Engineer, F/RF-4
HQ TAC, Langley AFB VA

The F-4 reverse fuel transfer problem still rears its ugly head. A TAC unit recently experienced an inflight reverse fuel transfer situation. The fuel flow level warning light and master caution lights came on just prior to landing. Fortunately, the aircraft was landed before the engines flamed out. The pilot first became aware of an abnormal fuel transfer situation when he observed a tape/counter mismatch after the normal tape/counter marriage. The miss-match progressively increased to the point of engine flame out. At that time, the counter still indicated fuel available while the tape indicated zero.

In order for an inflight reverse fuel transfer problem to occur, a double malfunction must exist or the aircraft must be set up for inflight refueling. Reverse transfer will occur when the [illegible]fuel valve is not completely closed and an [illegible]ernal wing tank or tanks are not pressurized. This allows part of the engine manifold fuel to be diverted through the open defuel valve into the refuel line to the internal wing tanks. Now, if one or both tanks have a malfunctioning pressure transfer system, that particular tank will fail to transfer the fuel back into the fuselage cells. The air refueling switch placed in the "extend" position also deactivates the pressure transfer system and results in the same situation. The tape will indicate a rapid decrease while the counter indication will remain stable.

The defuel shutoff valve open circuit was modified requiring a jumper plug to be installed in Door 23 in order to open the defuel valve when defueling is required. It is removed after defueling has been completed;and if the valve is inadvertently left in the open position, when an engine master switch is turned on, the valve will run closed. This is to assure that no power is applied to the defuel valve open circuit during flight.

What can be done by the pilot if he sees his tape going down more rapidly than his total internal counter reading? First, he must insure that the air refueling switch is in the "retract" position and check that the "INT WING-FUEL TRANS CONTROL" or "WING XFER CONT" circuit breakers on the No. 2 C/B panel are properly set. If these circuit breakers are popped, they would deactivate the internal wing pressure transfer system. He should also point the sharp end towards the nearest suitable landing field and land.

Prevention of the open defueling valve situation is a matter of valve reliability and a conscientious mechanic. Failure of the defuel valve has not been frequent; in fact, it has been extremely reliable.

Remember - if the tape starts down fast without a corresponding drop on the counter, be sure you are not in the refueling configuration and check your wing fuel transfer circuit breakers. If the circuit breakers are in and you're not in the refueling configuration ... bring it on home - now. The Phantom gets very quiet when it's out of JP-4. ➤

TAC SAFETY AWARDS

Crew Chief Safety Award

Airman First Class Donald R. Miller, 27th Organizational Maintenance Squadron, 27th Tactical Fighter Wing, Cannon Air Force Base, New Mexico, has been selected to receive the Tactical Air Command Crew Chief Safety Award for this month. Airman Miller will receive a certificate and letter of appreciation from the Vice Commander, Tactical Air Command.

A1C Donald R. Miller

Maintenance Safety Award

Technical Sergeant Richard L. Eckstein, 27th Organizational Maintenance Squadron, 27th Tactical Fighter Wing, Cannon Air Force Base, New Mexico, has been selected to receive the Tactical Air Command Maintenance Safety Award for this month. Sergeant Eckstein will receive a certificate and letter of appreciation from the Vice Commander, Tactical Air Command.

TSgt Richard L. Eckstein

TAC TALLY

	TAC AUG	TAC thru AUG 1976	TAC thru AUG 1975	ANG AUG	ANG thru AUG 1976	ANG thru AUG 1975	AFRES AUG	AFRES thru AUG 1976	AFRES thru AUG 1975
TOTAL ACFT. ACCIDENTS	2	21	21	1	7	11	1	3	0
MAJOR ACFT. ACCIDENTS	2	20	19	1	6	9	1	2	0
AIRCREW FATALITIES	0	9	16	0	2	6	0	1	0
TOTAL EJECTIONS	2	17	10	2	4	4	0	1	0
SUCCESSFUL EJECTIONS	2	13	7	2	4	3	0	0	0

FIGHTER/RECCE WINGS

ACCIDENT FREE MONTHS	Unit	
53	127 TFW	ANG
29	67 TRW	TAC
21	132 TFW	ANG
21	123 TRW	ANG
19	156 TFG	ANG

OTHER UNITS

ACCIDENT FREE MONTHS	Unit	
89	135 TASGP	ANG
85	182 TASGP	ANG
81	507 TAIRCG	TAC
78	193 TEWG	ANG
76	602 TAIRCG	TAC

MAJOR ACCIDENT COMPARISON RATE 75/76

(BASED ON ACCIDENTS PER 100,000 HOURS FLYING TIME)

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TAC	75	7.9	5.4	3.6	2.6	3.1	3.5	5.3	6.4	6.0	6.6	6.3	6.1
	76	2.9	8.6	9.0	7.3	8.0	8.1	6.9	6.8				
ANG	75	5.3	2.8	5.3	3.7	4.7	6.8	5.8	5.1	5.1	5.5	5.4	5.4
	76	10.5	5.0	6.5	4.8	3.8	3.9	3.3	3.5				
AFRES	75	0	0	0	0	0	0	0	0	0	0	0	4.9
	76	0	0	11.3	8.1	6.1	4.9	4.1	7.1				

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FLEAGLE
SURE WILL BE NICE TO GET HOME AND LOG SOME SACK TIME.
FLEAGLE, YOU HAVE A UFO EASTBOUND AT 10 O'CLOCK...FAST MOVING...ALTITUDE UNKNOWN.
UFO ? WHO ARE THEY KIDDING.
GREAT GOBS OF GNATGIZZARDS!!!
HARDISON
SPLAT!
SOME LUCK...I GET A CHANCE TO FLY ONE NIGHT OUT OF THE YEAR AND I RUN INTO A NUT LIKE THAT !!
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